

R&S®ESR

EMI Test Receiver

Service Manual Instrument



1175.7051.02 – 07

The Service Manual Instrument describes the following R&S®ESR models and options:

- R&S ESR3 (1316.3003.03)
- R&S ESR7 (1316.3003.07)
- R&S ESR26 (1316.3003.26)

- R&S FSV-B9 (1310.9545.02)
- R&S FSV-B22 (1310.9600.02)
- R&S FSV-B29 (1310.9639.30)

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The following abbreviations are used throughout this manual:

R&S®ESR is abbreviated as R&S ESR.

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any purpose other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and, in some cases, a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

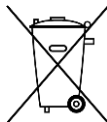
Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories. For product-specific information, see the data sheet and the product documentation.

Safety labels on products

The following safety labels are used on products to warn against risks and dangers.

Symbol	Meaning	Symbol	Meaning
	Notice, general danger location Observe product documentation	○	ON/OFF Power
	Caution when handling heavy equipment	⏻	Standby indication
	Danger of electric shock	≡	Direct current (DC)

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Symbol	Meaning	Symbol	Meaning
	Caution ! Hot surface		Alternating current (AC)
	Protective conductor terminal To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth		Direct/alternating current (DC/AC)
	Earth (Ground)		Class II Equipment to identify equipment meeting the safety requirements specified for Class II equipment (device protected by double or reinforced insulation)
	Frame or chassis Ground terminal		EU labeling for batteries and accumulators For additional information, see section "Waste disposal/Environmental protection", item 1.
	Be careful when handling electrostatic sensitive devices		EU labeling for separate collection of electrical and electronic devices For additional information, see section "Waste disposal/Environmental protection", item 2.
	Warning! Laser radiation For additional information, see section "Operation", item 7.		

Signal words and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates information considered important, but not hazard-related, e.g. messages relating to property damage.

In the product documentation, the word ATTENTION is used synonymously.

These signal words are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the signal words described here are always used only in connection with the related product documentation and the related product. The use of signal words in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Basic Safety Instructions

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of $\pm 10\%$ shall apply to the nominal voltage and $\pm 5\%$ to the nominal frequency, overvoltage category 2, pollution degree 2.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or even death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or even death.

Electrical safety

If the information on electrical safety is not observed either at all or to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the mains-supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with a protective conductor contact and protective conductor.
3. Intentionally breaking the protective conductor either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If there is no power switch for disconnecting the product from the mains, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the mains. In such cases, always ensure that the power plug is easily reachable and accessible at all times. For example, if the power plug is the disconnecting device, the length of the connecting cable must not exceed 3 m. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, the disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cables on a regular basis to ensure that they are in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

Basic Safety Instructions

6. The product may be operated only from TN/TT supply networks fuse-protected with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket provided for this purpose. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages $V_{rms} > 30$ V, suitable measures (e.g. appropriate measuring equipment, fuse protection, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC 60950-1 / EN 60950-1 or IEC 61010-1 / EN 61010-1 standards that apply in each case.
11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
12. If a product is to be permanently installed, the connection between the protective conductor terminal on site and the product's protective conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fuse-protected in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.
14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1). Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.

Basic Safety Instructions

2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal/Environmental protection", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. Laser products are given warning labels that are standardized according to their laser class. Lasers can cause biological harm due to the properties of their radiation and due to their extremely concentrated electromagnetic power. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).
8. EMC classes (in line with EN 55011/CISPR 11, and analogously with EN 55022/CISPR 22, EN 55032/CISPR 32)
 - Class A equipment:
Equipment suitable for use in all environments except residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings
Note: Class A equipment is intended for use in an industrial environment. This equipment may cause radio disturbances in residential environments, due to possible conducted as well as radiated disturbances. In this case, the operator may be required to take appropriate measures to eliminate these disturbances.
 - Class B equipment:
Equipment suitable for use in residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

Basic Safety Instructions

2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, protective conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
5. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
6. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
7. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.
2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.
3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Instrucciones de seguridad elementales

Waste disposal/Environmental protection

1. Specially marked equipment has a battery or accumulator that must not be disposed of with unsorted municipal waste, but must be collected separately. It may only be disposed of at a suitable collection point or via a Rohde & Schwarz customer service center.
2. Waste electrical and electronic equipment must not be disposed of with unsorted municipal waste, but must be collected separately.
Rohde & Schwarz GmbH & Co. KG has developed a disposal concept and takes full responsibility for take-back obligations and disposal obligations for manufacturers within the EU. Contact your Rohde & Schwarz customer service center for environmentally responsible disposal of the product.
3. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
4. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

For additional information about environmental protection, visit the Rohde & Schwarz website.

Instrucciones de seguridad elementales

¡Es imprescindible leer y cumplir las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

Instrucciones de seguridad elementales

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios. Los datos específicos del producto figuran en la hoja de datos y en la documentación del producto.

Señalización de seguridad de los productos

Las siguientes señales de seguridad se utilizan en los productos para advertir sobre riesgos y peligros.

Símbolo	Significado	Símbolo	Significado
	Aviso: punto de peligro general Observar la documentación del producto		Tensión de alimentación de PUESTA EN MARCHA / PARADA
	Atención en el manejo de dispositivos de peso elevado		Indicación de estado de espera (standby)
	Peligro de choque eléctrico		Corriente continua (DC)
	Advertencia: superficie caliente		Corriente alterna (AC)
	Conexión a conductor de protección		Corriente continua / Corriente alterna (DC/AC)
	Conexión a tierra		El aparato está protegido en su totalidad por un aislamiento doble (reforzado)
	Conexión a masa		Distintivo de la UE para baterías y acumuladores Más información en la sección "Eliminación/protección del medio ambiente", punto 1.

Instrucciones de seguridad elementales

Símbolo	Significado	Símbolo	Significado
	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)		Distintivo de la UE para la eliminación por separado de dispositivos eléctricos y electrónicos Más información en la sección "Eliminación/protección del medio ambiente", punto 2.
	Advertencia: rayo láser Más información en la sección "Funcionamiento", punto 7.		

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.



Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.



Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.



Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.



Indica información que se considera importante, pero no en relación con situaciones de peligro; p. ej., avisos sobre posibles daños materiales.

En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

Instrucciones de seguridad elementales

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal. Categoría de sobrecarga eléctrica 2, índice de suciedad 2.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, se pueden causar lesiones o, en determinadas circunstancias, incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, o bien si el interruptor existente no resulta apropiado para la desconexión de la red, el enchufe del cable de conexión se deberá considerar como un dispositivo de desconexión.
El dispositivo de desconexión se debe poder alcanzar fácilmente y debe estar siempre bien accesible. Si, p. ej., el enchufe de conexión a la red es el dispositivo de desconexión, la longitud del cable de conexión no debe superar 3 m).
Los interruptores selectores o electrónicos no son aptos para el corte de la red eléctrica. Si se integran productos sin interruptor en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.
5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.

Instrucciones de seguridad elementales

6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión $U_{\text{eff}} > 30 \text{ V}$ se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.
12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.
17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Instrucciones de seguridad elementales

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados —los llamados alérgenos (p. ej. el níquel)—. Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación/protección del medio ambiente", punto 1.
5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. Los productos con láser están provistos de indicaciones de advertencia normalizadas en función de la clase de láser del que se trate. Los rayos láser pueden provocar daños de tipo biológico a causa de las propiedades de su radiación y debido a su concentración extrema de potencia electromagnética. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).
8. Clases de compatibilidad electromagnética (conforme a EN 55011 / CISPR 11; y en analogía con EN 55022 / CISPR 22, EN 55032 / CISPR 32)
 - Aparato de clase A:
Aparato adecuado para su uso en todos los entornos excepto en los residenciales y en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.
Nota: Los aparatos de clase A están destinados al uso en entornos industriales. Estos aparatos pueden causar perturbaciones radioeléctricas en entornos residenciales debido a posibles perturbaciones guiadas o radiadas. En este caso, se le podrá solicitar al operador que tome las medidas adecuadas para eliminar estas perturbaciones.
 - Aparato de clase B:
Aparato adecuado para su uso en entornos residenciales, así como en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.

Instrucciones de seguridad elementales

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.
5. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
6. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
7. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.

Instrucciones de seguridad elementales

2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación/protección del medio ambiente

1. Los dispositivos marcados contienen una batería o un acumulador que no se debe desechar con los residuos domésticos sin clasificar, sino que debe ser recogido por separado. La eliminación se debe efectuar exclusivamente a través de un punto de recogida apropiado o del servicio de atención al cliente de Rohde & Schwarz.
2. Los dispositivos eléctricos usados no se deben desechar con los residuos domésticos sin clasificar, sino que deben ser recogidos por separado.
Rohde & Schwarz GmbH & Co.KG ha elaborado un concepto de eliminación de residuos y asume plenamente los deberes de recogida y eliminación para los fabricantes dentro de la UE. Para desechar el producto de manera respetuosa con el medio ambiente, diríjase a su servicio de atención al cliente de Rohde & Schwarz.
3. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
4. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

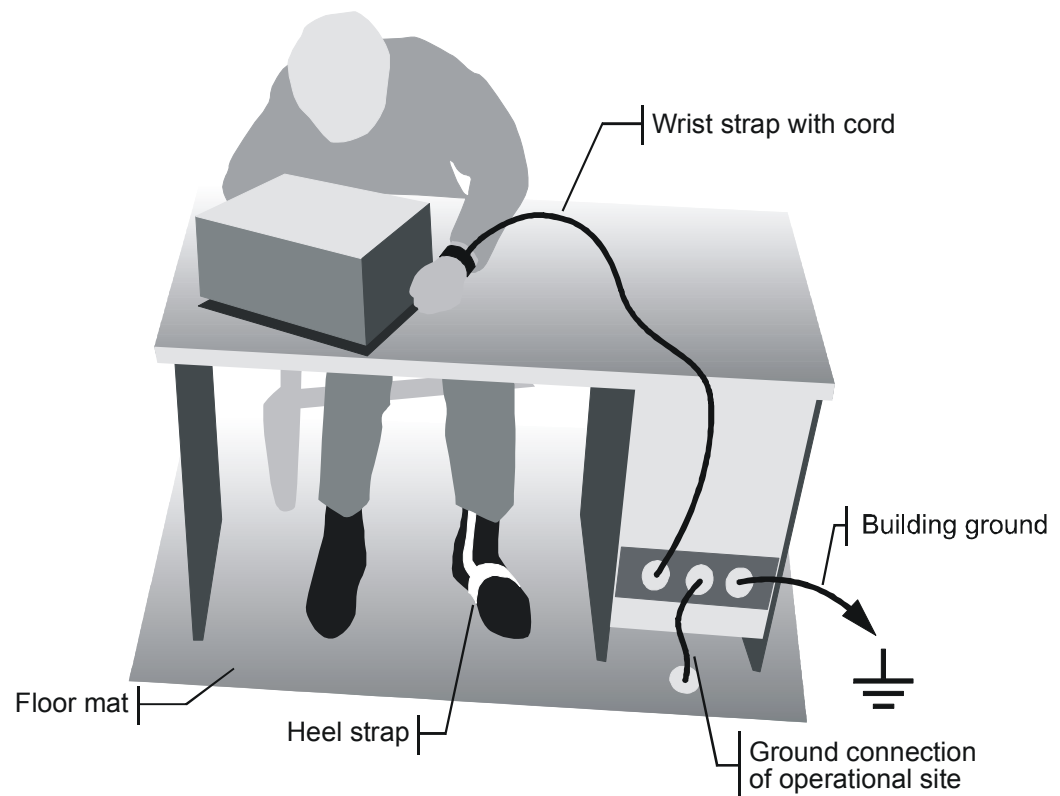
Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

Instructions for Electrostatic Discharge Protection

NOTICE

Risk of damaging electronic components

To avoid damage of electronic components, the operational site must be protected against electrostatic discharge (ESD).



The following two methods of ESD protection may be used together or separately:

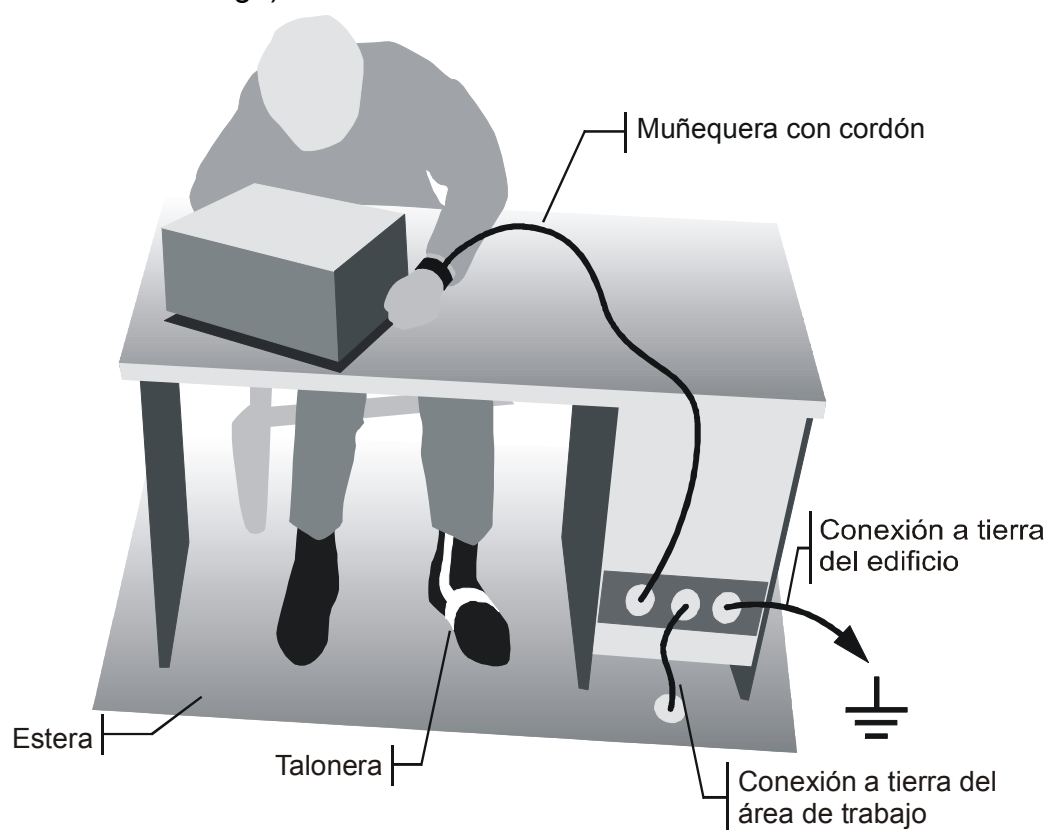
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

Instrucciones para la protección contra descargas electroestáticas

AVISO

Riesgo de avería de los componentes electrónicos

Para evitar averías en los componentes electrónicos, el área de trabajo tiene que estar protegido contra descargas electroestáticas ESD (electrostatic discharge).



Los siguientes dos métodos de protección ESD pueden ser usados juntos o separados:

- Muñequera con cordón para conexión a tierra
- Combinación de estera antiestática y talonera

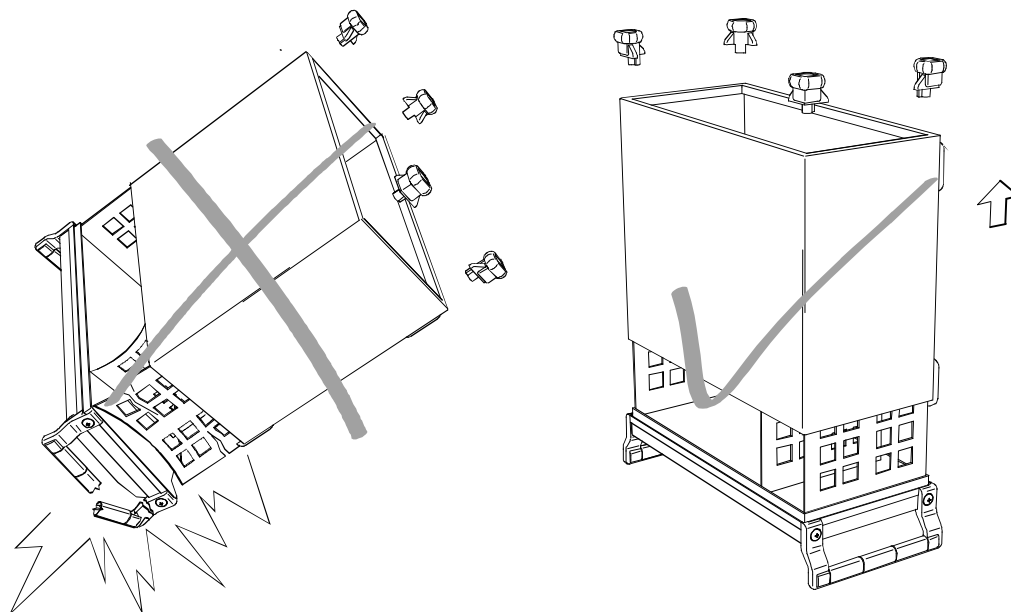
Safety Instructions for Units with Removable Cabinet

WARNING

Danger of injuries

When removing the rear feet, the unit can slip out of the cabinet.

Put the unit onto the front handles, before removing the rear feet and taking off the cabinet. Thus the risk of personal injuries and damages to the unit is avoided.



When mounting the cabinet take care not to pen in the fingers. Also pay attention not to damage or pull off cables. Screw the rear feet back on immediately after mounting the cabinet. Do not move the unit with the rear feet missing.

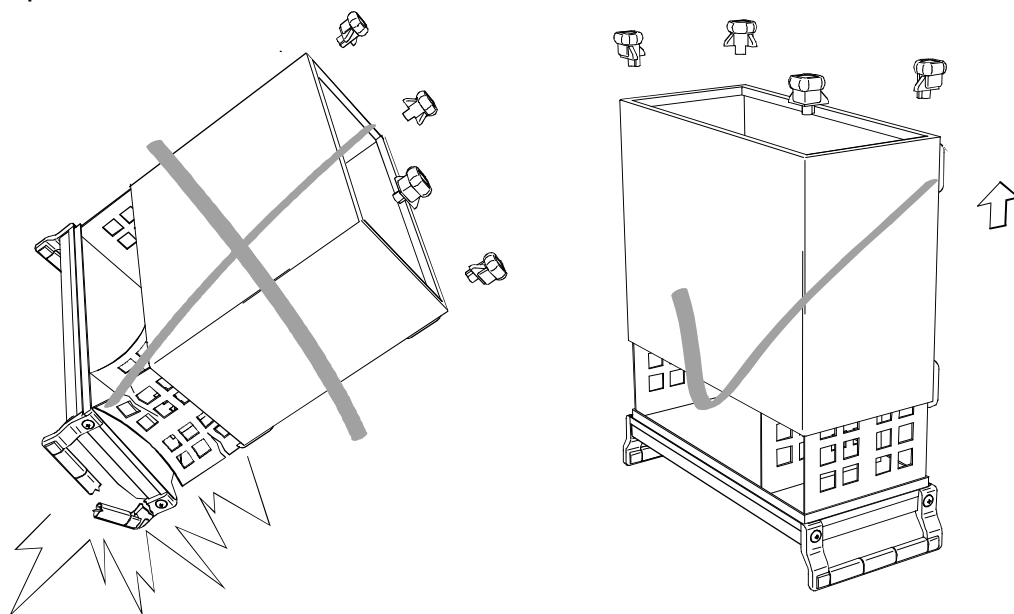
Informaciones de seguridad para aparatos con tubo de quita y pon

ADVERTENCIA

Peligro de heridas

Al sacar los pies de la pared posterior puede deslizarse el aparato fuera de la caja.

Posicionar el aparato de manera segura sobre las asas delanteras, antes de sacar los pies de la pared posterior y entonces sacar la caja. De esta manera evitarán el riesgo de daños en personas y daños en el aparato.



Existe el riesgo de heridas en el momento de poner otra vez la caja, como por ejemplo posiblemente engancharse los dedos. Por favor tengan además en cuenta de que no se enganchen o desconecten cables. Por favor atornillen los pies de la pared posterior directamente despues de poner la caja. No muevan el aparato nunca sin que los pies de la pared posterior estén atornillados.

Procedure in Case of Service and Ordering of Spare Parts

This section contains information on shipping an instrument to your service center and ordering spare parts.

Please contact your local Rohde & Schwarz service center if you need service or repair work of your equipment or to order spare parts. You can find the current address of your representative on our homepage www.rohde-schwarz.com.

Shipping the Instrument

We require the following information in order to answer your inquiry fast and correctly and to determine whether the warranty is still valid for your instrument:

- Instrument model
- Serial number
- Firmware version
- Must the instrument be returned with this firmware?
- Detailed error description in case of repair
- Indication of desired calibration
- Contact person for possible questions

In some countries, an RMA process is available for the return shipment of the instrument. For details, contact your local representative.

When shipping the instrument, be careful to provide for sufficient mechanical and antistatic protection.

- Use the original packaging for transporting or shipping the instrument. The protective caps for the front and rear prevent damage to the operating elements and the connectors.
- If you do not use the original packaging, provide for sufficient padding to prevent the instrument from slipping inside the box. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

Rohde & Schwarz offers repair and calibrations of the test systems it produces. The calibration documentation fulfills ISO 17025 requirements.

Shipping Defective Modules

Also when shipping a module, be careful to provide for sufficient mechanical and antistatic protection.

- Ship the module in a sturdy, padded box.
- Wrap the module in antistatic foil.

If the packaging is only antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the tightly fitting packaging is conductive.

Exception:

If the module contains a battery, the tightly fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

Ordering Spare Parts

To deliver spare parts promptly and correctly, we need the following information:

- Stock number (see list of spare parts in chapter "Documents")
- Designation
- Component number according to list of spare parts
- Number of pieces
- Instrument type for which the spare part is needed
- Instrument stock number
- Instrument serial number
- Contact person for possible questions

Refurbished Modules

Refurbished modules are an economical alternative to original modules. Bear in mind that refurbished modules are not new, but repaired and fully tested parts. They may have traces from use, but they are electrically and mechanically equivalent to new modules.

Your Rohde & Schwarz representative will be happy to inform you about which modules are available as refurbished modules.

Taking Back Defective Replaced Modules

Defective modules of the replacement program which cannot be repaired are taken back within three months following delivery. A repurchasing value is credited.

Excluded are parts which cannot be repaired, e.g. printed boards that are burnt, broken or damaged by attempts to repair them, incomplete modules, and parts with severe mechanical damage.

Please return the defective replacement modules, together with the accompanying document for returned merchandise, which you received with the spare module. We need the following information:

- Stock number, serial number and designation of the removed part
- Detailed error description
- Stock number, serial number and type of instrument from which the module was removed
- Date of removal
- Name of the engineer/technician who replaced the module
- R&S ordering number
- Service reference number (if available)

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Documentation Overview

The user documentation for the R&S ESR is divided as follows:

- Quick Start Guide
- Operating Manual
- Service Manual
- Online Help
- Release Notes

Quick Start Guide

This manual is delivered with the instrument in printed form and in PDF format on the CD. It provides the information needed to set up and start working with the instrument. Basic operations and basic measurements are described. Also a brief introduction to remote control is given. The manual includes general information (e.g. Safety Instructions) and the following chapters:

Chapter 1	Front and Rear Panel
Chapter 2	Putting into Operation
Chapter 3	Firmware Update and Installation of Firmware Options
Chapter 4	Basic Operations
Chapter 5	Basic Measurement Examples
Chapter 6	Brief Introduction to Remote Control
Appendix A	Printer Interface
Appendix B	LAN Interface

Operating Manuals

The operating manuals are a supplement to the Quick Start Guide. Operating manuals are provided for the base unit and each additional (software) option.

The operating manual for the base unit provides basic information on operating the R&S ESR in general, and the "Spectrum" mode in particular. Furthermore, the software options that enhance the basic functionality for various measurement modes are described here. The set of measurement examples in the Quick Start Guide is expanded by more advanced measurement examples. In addition to the brief introduction to remote control in the Quick Start Guide, a description of the basic analyzer commands and programming examples is given. Information on maintenance, instrument interfaces and error messages is also provided.

In the individual option manuals, the specific instrument functions of the option are described in detail. For additional information on default settings and parameters, refer to the data sheets. Basic information on operating the R&S ESR is not included in the option manuals.

For an overview of the available operating manuals, see the R&S ESR documentation CD. These manuals are available in PDF format on the CD delivered with the instrument. The printed manuals can be ordered from Rohde & Schwarz GmbH & Co. KG.

Service Manual

This manual is available in PDF format on the CD delivered with the instrument. It informs on how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the R&S ESR by the replacement of modules. The manual includes the following chapters:

Chapter 1 Performance Test

Provides all the information necessary to check for compliance with rated specifications. The required test equipment is included, too.

Chapter 2 Adjustment

Describes the manual adjustment of the calibration source and of the frequency uncertainty as well as the automatic adjustment of individual module data following module replacement.

Chapter 3 Repair

Describes the design as well as simple measures for repair and fault diagnosis, in particular, the replacement of modules.

Chapter 4 Software Update / Installing Options

Contains information on the extension and modification by installing instrument software and retrofitting options.

Chapter 5 Documents

Contains spare parts lists, exploded views and other diagrams and drawings.

Online Help

The Online Help is part of the firmware. It provides quick access to the description of the instrument functions and the remote control commands.

Release Notes

The release notes describe the installation of the firmware, new and modified functions, eliminated problems, and last minute changes to the documentation. The corresponding firmware version is indicated on the title page of the release notes. The current release notes are provided in the Internet.

1 Performance Test

This chapter provides information on executing performance tests. After an overview of the required equipment, the test procedure and the detailed test goals are described. At the end of this chapter, templates for test reports are supplied for your convenience. Fields in the report that the user must fill out before or during the test are indicated by a grey background.

1.1 Test Equipment

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1	Signal generator	9 kHz to 3.6 GHz	R&S SMA100A with options R&S SMA-B106, R&S SMA-B22, R&S SMA-K23	1400.0000.02 1405.0809.02 1405.1805.02 1405.2801.02	Reference frequency uncertainty IF filter Display linearity RF attenuator Phase noise CISPR detectors
2	Signal generator (2 units)	R&S ESR3/7: 10 Hz to 7 GHz R&S ESR26: 10 Hz to 26.5 GHz	R&S SMR20 or R&S SMR40 with options R&S SMR-B5, R&S SMR-B11	1104.0002.20 1104.0002.40 1104.3501.02 1104.4250.02	Frequency response Immunity to interference Nonlinearities Frequency response
3	Power splitter 2-resistor design	DC to 7 GHz equivalent output SWR 10 MHz to 3.6 GHz < 1.10 3.6 GHz to 7 GHz: ≤ 1.3 level imbalance 10 MHz to 3.6 GHz ≤ 0.1 dB 3.6 to 7 GHz ≤ 0.3 dB	Weinschel Model 1870A		Frequency response
4	Power splitter 2-resistor design	ESR3/7: 10 MHz to 7 GHz ESR26: 10 MHz to 26.5 GHz Level imbalance 8 GHz to 22 GHz ≤ 0.4 dB 22 GHz to 26.5 GHz ≤ 0.5 dB Equivalent output SWR 3.6 GHz to 7 GHz ≤ 1.3 8 GHz to 22 GHz ≤ 1.4 22 GHz to 26.5 GHz ≤ 1.5	Weinschel Model 1534		Frequency response Third order intercept
5	VSWR bridge	directivity > 30 dB 100 kHz to 30 MHz	R&S ZRC	1039.9492.55	VSWR
6	50-Ohm termination	10 MHz to 26.5 GHz	Anritsu 28S50		Noise display
7	Power meter	-30 dBm to +10 dBm Instrumentation uncertainty < 0.5 %	R&S NRP	1143.8500.02	Frequency response
8	Power sensor	9 kHz to 7 GHz -30 dBm to 0 dBm	R&S NRP-Z91	1168.8004.08	Frequency response
9	Power sensor	10 MHz to 40 GHz -30 dBm to 0 dBm VSWR cal unc. fact. % 50 to 128 MHz 1.15 1.6 3.6 to 8 GHz 1.15 2 8 to 22 GHz 1.25 2.5 22 to 40 GHz 1.35 3	R&S NRP-Z55	1138.2008.02	Frequency response
10	Step attenuator	Variable attenuation 0 dB to 100 dB, 1 - dB steps attenuation uncertainty < 0.1 dB (f = 128 MHz)	R&S RSG with special calibration	1009.4505.02 0859.4822.00	Display linearity RF attenuator
11	Fixed Attenuator (2 units)	fixed attenuation 10 dB	Anritsu 43KC-10		Nonlinearities
12	Network analyzer	20 MHz to 26.5 GHz	R&S ZVA	1145.1110.10	VSWR
13	Voltmeter	20 Hz to 9 kHz	R&S URE2	0350.5315.02	R&S FSV-B29, frequency response
14	50 Ω termination	BNC, 50 $\Omega \pm 0.1$ %	RAD 50	0844.9352.02	R&S FSV-B29, frequency response

15	N-cable	Attenuation < 0.5 dB up to 7 GHz			R&S FSV-B9, frequency response
16	CISPR pulse generator	CISPR bands A, B, C/D	Schwarzbeck IGUU 2918		CISPR detectors
17	Attenuator	Fixed attenuation 10 dB, 9 kHz to 1 GHz, Pulse loading capacity > 200 W/10µs, max. 150 V			

1.2 Performance Test R&S ESR

Test Instructions

To ensure that rated specifications are maintained, the following preparations must be made prior to checking the rated characteristics:

- Allow for a minimum warm-up time of 30 minutes at ambient temperature.
- Carry out all internal adjustments.
- The values are specified in the data sheet. Additional uncertainties introduced by the measurement equipment must be taken into account when checking the rated values.
- Unless specified otherwise, all measurements will be performed with external reference frequency.
- Restore the factory preset [**FILE** : STARTUP RECALL : FACTORY : **ENTER**].
- Select the Analyzer Preset [**SETUP** : NEXT : PRESET SPECTRUM].

1.2.1 Checking the DC-Offset at the RF-Input

Test equipment: Voltmeter

Test setup: ► Connect the DC current meter between cable conductor and ground of the RF-Input.

R&S ESR settings:- [PRESET]
- [**FREQ** : CENTER : **1 GHz**]
- [SPAN : 0 Hz]
- [**AMPT** : 10 dB MIN OFF]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**INPUT/OUTPUT** : INPUT DC]

Measurement: ► Read the voltage at the voltmeter.

R&S ESR settings:- [**FREQ** : CENTER : **9 GHz**]
► Read the voltage at the voltmeter.

1.2.2 Checking the Reference Frequency Uncertainty

Test equipment: Signal generator (chapter "Test Equipment", item. 1):

Frequency	e.g. 1000 MHz
Level	-20 dBm
Frequency uncertainty	$< 1 \times 10^{-9}$

If the frequency uncertainty of the test transmitter is insufficient, the transmitter can be set to the correct frequency with the aid of the frequency counter prior to the measurement.

Test setup:

- ▶ Connect RF output of the signal generator to RF input of the R&S ESR.
- ▶ Ambient temperature: 20°C to 30°C.

Signal generator settings:

- Frequency 1000 MHz
- Level -20 dBm

R&S ESR settings:

- [PRESET]
- [**FREQ** : CENTER : 1 GHz]
- [SPAN : 1 MHz]
- [**BW** : RES BW MANUAL : 300 kHz]
- [**AMPT** : REF Level : -8 dBm]
- [**SETUP** : REFERENCE INT / EXT]
- ▶ Switch to an internal reference source (INT)

Note: Before the following measurement, the R&S ESR must be on for at least ten minutes with an internal reference, so that the reference oscillator is warmed up.

Measurement:

- ▶ Switch marker frequency count:
- [**MKR** : SIGNAL COUNT]
- ▶ Set the appropriate resolution:
- [**MKR** : **NEXT** : CNT RESOL 1 Hz
 - Model without R&S FSV-B4 1 GHz $\pm$ 1 kHz (corresponds to 1E-6)
 - Model with R&S FSV-B4 1 GHz $\pm$ 100 Hz (corresponds 1E-7)

Note: The frequency of the reference oscillator can be adjusted by means of a service function (refer to chapter "Adjustment").

1.2.3 Checking Immunity to Interference

Test equipment: Signal generator (Section "Test Equipment", item 2):

Frequency range	R&S ESR3/7	10 MHz to 9 GHz
	R&S ESR26	10 MHz to 13.25 MHz
maximum level		0 dBm

Test setup: ► Connect RF output of the signal generator to RF input.

R&S ESR settings: - [PRESET]
 - [**AMPT** : 10 dB MIN OFF]
 - [**AMPT** : RF ATTEN MANUAL : **0 dB**]
 - [**AMPT** : REF LEVEL : **-30 dBm**]
 - [SPAN : 1 MHz]
 - [**BW** : RES BW MANUAL : **100 Hz**]

1.2.3.1 2nd IF Image Frequency Rejection

Additional signal generator settings: Frequency $f_{in} + 2 \times 729.9$ MHz
 $f_{in} - 2 \times 729.9$ MHz (see table of performance test report)
 Level adjust the output level of signal generator for an RF input level of -10 dBm

Additional - [**FREQ** : CENTER : $\{f_{in}\}$]

R&S ESR settings: See table of performance test report for values of f_{in} .

Measurement: ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]

Evaluation: The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):
 Image frequency rejection = -10dBm – L_{dis}

1.2.3.2 3rd IF Image Frequency Rejection

Additional signal generator settings: Frequency: $f_{in} + 2 \times 89.9$ MHz
 Level: adjust the output level of signal generator for an RF input level of -10 dBm

Additional - [**FREQ** : CENTER : $\{f_{in}\}$]

R&S ESR settings: See table of performance test report for values of f_{in} .

Measurement: ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]

Evaluation: The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):
 Image frequency rejection = -10dBm – L_{dis}

1.2.3.3 2nd IF Rejection

- Additional signal Frequency: 729.9 MHz
 generator settings: Level: adjust the output level of signal generator for an RF input level of -10 dBm
- Additional - [**FREQ** : CENTER : { f_{in} }]
 R&S ESR settings: See table of performance test report for values of f_{in} .
- Measurement: ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]
- Evaluation: The IF rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

$$\text{IF rejection} = -10\text{dBm} - L_{dis}$$

1.2.3.4 3rd IF Rejection

- Additional signal Frequency: 89.9 MHz
 generator settings: Level: adjust the output level of signal generator for an RF input level of -10 dBm
- Additional - [**FREQ** : CENTER : { f_{in} }]
 R&S ESR settings: See table of performance test report for values of f_{in} .
- Measurement: ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]
- Evaluation: The IF rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

$$\text{IF rejection} = -10\text{dBm} - L_{dis}$$

1.2.4 Checking Nonlinearities

1.2.4.1 Third-Order Intercept Point (IP3)

- Test equipment:
- 2 signal generators (Section "Test Equipment", item 2)
 - Frequency range: R&S ESR3/7 10 MHz to 7 GHz
 - R&S ESR26 10 MHz to 26.5 GHz
 - 2 attenuators (Section "Test Equipment", item 11)
 - Attenuation $a_{ATT} = 10$ dB
 - Frequency range: R&S ESR3/7 10 MHz to 7 GHz
 - R&S ESR26 10 MHz to 26.5 GHz
 - Power splitter/combiner (Section "Test Equipment", item 3/4)
 - Frequency range: R&S ESR3/7 10 MHz to 7 GHz
 - R&S ESR26 10 MHz to 26.5 GHz
- Test setup:
- ▶ Connect RF outputs of the signal generators via 10 dB attenuators to the inputs of the combiner
 - ▶ Connect output of the combiner to the RF input of the R&S ESR.
- Signal generator settings:
- Frequency: generator 1 $f_{g1} = f_{in} - 50$ kHz
 - generator 2 $f_{g2} = f_{in} + 50$ kHz
- (both generators):
- See table of performance test report for values of f_{in}
 - ▶ Adjust the output level of the signal generators for an input level at the R&S ESR of -15 dBm (-20 dBm with preselector) .
 - ▶ Switch off the ALC of the generators to reduce the interference between the generators.
- R&S ESR settings:-
- [PRESET]
 - [INPUT/OUTPUT : PRESELECTION {state}]
 - [AMPT : 10 dB MIN OFF]
 - [AMPT : RF ATTEN MANUAL : 0 dB] (25 dB with preamplifier)
 - [AMPT : -15 dBm]
 - [AMPT : PREAMP {state}]
 - [SPAN : 500 kHz]
 - [BW : RES BW MANUAL : 30 Hz]
 - [FREQ : CENTER : { f_{in} }]
- See table of performance test report for values of f_{in} and state of preselector and preamplifier.
- Measurement:
- [MKR FCTN : TOI]
- Evaluation:
- The third order intercept point (T.O.I) referred to the input signal is displayed in the marker field by the reading [TOI].
- Note:
- If the input signal is exactly known, the level of the spurious products can alternatively be measured in a span of 20 kHz, for example. The TOI is then calculated from the average of the two spurious signals and the average of the two useful signals.

1.2.5 Checking IF Filters

Test equipment: Signal generator (Section "Test Equipment", item 1):

Frequency 64 MHz

Level ≥ 0 dBm

Test setup: ► Connect RF output of the signal generator to the RF input of the R&S ESR.

1.2.5.1 Checking the Bandwidth Switching Level Uncertainty

Reference measurement (RBW 10 kHz)

Signal generator - Frequency: 64 MHz

settings: - Level: -20 dBm

R&S ESR settings: - [PRESET]

- [AMPT : -15 dBm]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [**FREQ** : CENTER : **64 MHz**]

- [**BW** : COUPLING RATIO : SPAN / RBW MANUAL : **1 : ENTER**]

- [SPAN : 10 kHz]

- [**SWEEP** : SWEETIME : **100 ms**]

- [**TRACE** : DETECTOR : RMS]

Reference measurement: ► Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

► Set reference to peak of signal

- [**MKR** : REFERENCE FIXED]

Checking the level uncertainty:

R&S ESR settings: - [**SPAN** : {1 x RBW}] for RBW $\leq$ 10 MHz or

- [**SPAN** : ZERO] for RBW > 10 MHz

- [**BW** : FILTER TYPE : {type}]

- [**BW** : RBW MANUAL : {RBW} : Hz]

See table of performance test report for values of RBW and filter type.

Measurement: ► Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The level difference is displayed in the marker field by the reading 'Delta [T1 FXD] {xxx} dB'.

Note: To check the FFT filter, the sweep mode has to be set manually to FFT mode.

- [**SWEEP** : SWEEP MODE : FFT]

1.2.5.2 Checking Bandwidth

- Signal generator settings: - Frequency: 64 MHz
- Level: 0 dBm
- R&S ESR settings: - [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [AMPT : 0 dBm]
- [**FREQ** : CENTER : **64 MHz**]
- [**BW** : COUPLING RATIO : SPAN/RBW MANUAL : **3** : **ENTER**]
▶ Determine Bandwidth
- [**BW** : FILTER TYPE : {type}]
- [**BW** : RBW MANUAL : {RBW} : **Hz**]
- [**MKR FCTN** : N DB DOWN : {bandwidth} **dB**]
- [**SPAN** : {3 x RBW}]
See table of performance test report for values of RBW, bandwidth and filter type.
- Measurement: - [**MKR** ⇒ : PEAK]
The bandwidth is displayed by the reading 'BW {bandwidth}'.

1.2.5.3 Checking the Shape Factor

- Signal generator settings: - Frequency: 64 MHz
- Level: 0 dBm
- R&S ESR settings: - [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [AMPT : 0 dBm]
- [**FREQ** : CENTER : **64 MHz**]
- [**BW** : COUPLING RATIO : SPAN/RBW MANUAL : **20** **ENTER**]
▶ Determine 60-dB-Bandwidth
- [**BW** : FILTER TYPE : {type}]
- [**BW** : RBW MANUAL : {RBW} : **Hz**]
- [**BW** : COUPLING RATIO : RBW/VBW NOISE [10]]
- [**MKR FCTN** : N DB DOWN : **60 dB**]
- [**SPAN** : {20 x RBW}]
See table of performance test report for values of filter type and RBW.
- Measurement: - [**MKR** ⇒ : PEAK]
The 60 dB bandwidth is displayed by the reading
'BW {bandwidth}'.
- Evaluation: The shape factor is calculated by $BW(60dB) / BW(3dB)$ or $BW(60dB) / BW(6dB)$.

1.2.5.4 Checking the Overall Selectivity

Signal generator - Frequency: 64 MHz

settings: - Level: 0 dBm

R&S ESR settings: - [PRESET]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [AMPT : 0 dBm]

- [**FREQ** : CENTER : **64 MHz**]

- [**BW** : FILTER TYPE : EMI]

- [**BW** : RBW MANUAL : {RBW} : **Hz**]

- [**BW** : COUPLING RATIO : RBW/VBW NOISE [10]]

- [**SPAN** : {span}]

See table of performance test report for values of RBW and span.

Measurement: - [**MKR** ⇒ : PEAK]

- [**MKR** : MARKER 2]

Evaluation: Check the filter response with the markers versus tolerance mask.

1.2.6 Checking Spurious Response

Test equipment: 50 Ω termination (Section "Test Equipment", item 5)

Frequency range: DC to 7 GHz

Test setup: ► Terminate the RF input of the ESR with 50 Ω

R&S ESR settings:- [PRESET]

- [**AMPT** : 10 dB MIN OFF]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [AMPT : -50 dBm]
- [SPAN : 10 kHz]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**FREQ** : CENTER : { f_{spur} }]

Measurement: - [**MKR** $\Rightarrow$: PEAK]

f_{spur}

32 MHz reference/4

64 MHz reference/2

128 MHz reference

256 MHz reference*2

384 MHz reference*3

1.2.7 Checking Noise Display (DANL)

Test equipment: 50 Ω termination (Section "Test Equipment", item 5)

Frequency range: R&S ESR3/7 DC to 7 GHz
R&S ESR26 DC to 26.5 GHz

Test setup: ► Terminate the RF input of the R&S ESR with 50 Ω

R&S ESR settings: - [PRESET]
- [INPUT/OUTPUT : PRESELECTOR {state}]
- [AMPT : 10 dB MIN OFF]
- [AMPT : RF ATTEN MANUAL : 0 dB]
- [INPUT/OUTPUT : INPUT DC]
- [AMPT : PREAMPLIFIER {state}]
- [SPAN : 0 Hz]
- [BW : RES BW MANUAL : 1 kHz]
- [BW : SWEEP TIME MANUAL : 50 ms]
- [TRACE 1 : AVERAGE]
- [TRACE 1 : SWEEP COUNT : 20 ENTER]
- [AMPT : {RefLev}]
- [FREQ : CENTER : {f_n}]
- [MEAS : TIME DOMAIN POWER : MEAN]

See table of performance test report for values of f_n and state of preselector and preamplifier.

Measurement: ► Read out the mean marker and correct the measurement value by -30 dB for the ratio of 1 Hz / 1 kHz.

Note: For example the DANL in 1 kHz bandwidth -126 dBm results in a corrected value of -156 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 1 kHz bandwidth to reduce measurement time.

Frequency	< 10 kHz	< 100 kHz	< 1 MHz	< 10 MHz	> 10 MHz
RefLev	-10 dBm	-20 dBm	-30 dBm	-60 dBm	-60 dBm

1.2.8 Checking the Level Accuracy and the Frequency Response

Test equipment: Signal Generator (Section "Test Equipment", item 2)

Frequency range:	R&S ESR3/7	9 kHz to 7 GHz
	R&S ESR26	9 kHz to 26.5 GHz

Maximum level: ≥ 0 dBm

Power meter (Section "Test Equipment", item 7)

Power range -30 to 0 dBm

Instrumentation uncertainty <0.5%

Uncertainty of power reference <1.2%

VSWR of power reference <1.10

Power Sensor (Section "Test Equipment", item 8)

Frequency range 9 kHz to 7 GHz

Power range -30 to 0 dBm

Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %

VSWR	1 MHz to 3.6 GHz	<1.15
	3.6 GHz to 7 GHz	<1.30
	50 MHz to 128 MHz	<1.10

Power Sensor (Section "Test Equipment", item 9) for **R&S ESR26**

Frequency range DC to 26.5 GHz

Power range -30 to 0 dBm

Cal factor uncertainty	50 MHz to 128 MHz	<1.6 %
	7 GHz to 8 GHz	<2 %
	8 GHz to 22 GHz	<2.5 %
	22 GHz to 26.5 GHz	<3 %

VSWR	50 MHz to 128 MHz	<1.15
	7 GHz to 8 GHz	<1.15
	8 GHz to 22 GHz	<1.25
	22 GHz to 26.5 GHz	<1.35

6 dB Power Splitter (Section "Test Equipment", item 3)

Frequency range DC to 7 GHz

Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
	3.6 GHz to 7 GHz	≤ 0.3 dB

Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1
	3.6 GHz to 7 GHz	≤ 1.3

6 dB Power Splitter (Section "Test Equipment", item 4) for **R&S ESR26**

Frequency range	DC to 26.5 GHz	
Level imbalance	3.6 GHz to 7 GHz	≤ 0.3 dB
	7 GHz to 22 GHz	≤ 0.4 dB
	22 GHz to 26.5 GHz	≤ 0.5 dB
Equivalent output VSWR	3.6 GHz to 7 GHz	≤ 1.3
	7 GHz to 22 GHz	≤ 1.4
	22 GHz to 26.5 GHz	≤ 1.5

1.2.8.1 Absolute Level Uncertainty at 64 MHz

- Test setup:
- ▶ Standardize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator settings:
- Frequency 64 MHz
 - Level -10 dBm
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to the corresponding RF input of the R&S ESR.
- R&S ESR settings:
- [PRESET]
 - [**INPUT/OUTPUT** : INPUT {state}]
 - [**INPUT/OUTPUT** : PRESELECTOR {state}]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**] (30 dB with preamplifier)
 - [**AMPT** : -10 dBm]
 - [**AMPT** : PREAMP ON {state}]
 - [**SWEEP** : SWEEP TIME : **10 ms**]
 - [**SPAN** : 30 kHz]
 - [**BW** : RES BW MANUAL : **10 kHz**]
 - [**TRACE** : DETECTOR : RMS]
 - [**FREQ** : CENTER : **64 MHz**]
 - ▶ Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]
- See table of performance test report for state of input, preselector and preamplifier.
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level uncertainty of the R&S ESR. It can be calculated as:

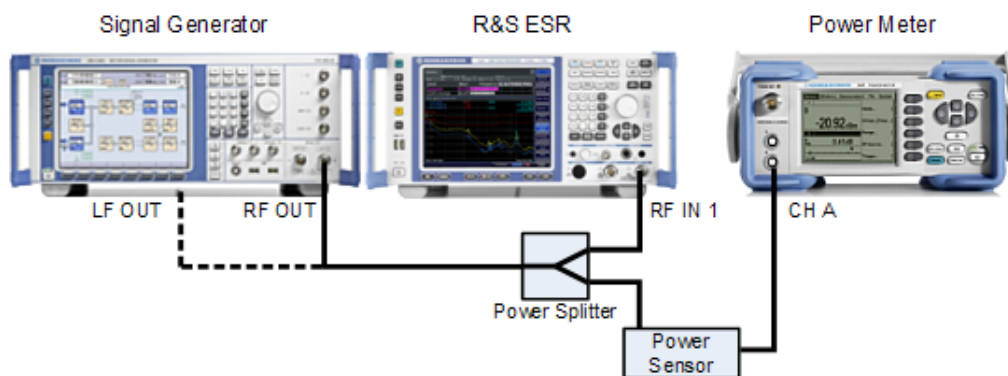
$$\text{Level uncertainty}_{64\text{MHz}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

1.2.8.2 Frequency Response (< 7 GHz)

Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

- Test setup:
- ▶ Standardize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Use Power Splitter/Combiner (item 3) and connect equipment as shown below.
 - ▶ Connect the power splitter directly to the corresponding RF input of the R&S ESR.
 - ▶ Use the LF output of the signal generator for frequencies <10 MHz.



Important Note

Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings: Level at DUT see table below
Frequency 64 MHz

- R&S ESR settings:
- [PRESET]
 - [INPUT/OUTPUT : INPUT {state}]
 - [INPUT/OUTPUT : PRESELECTOR {state}]
 - [AMPT : RF INPUT {coupling}]
 - [AMPT : 10 dB MIN OFF]
 - [AMPT : RF ATTEN MANUAL : {a_{ESR}}]
 - [AMPT : {ampt}]
 - [AMPT : PREAMP {state}]
 - [SPAN : 100 kHz]
 - [BW : RES BW MANUAL : 10 kHz]
 - [TRACE : DETECTOR : RMS]
 - [FREQ : CENTER : 64 MHz]
 - [MKR ⇒ : MORE : EXCLUDE LO]

See table of performance test report for values of coupling, a_{ESR} and state of input, preselector and preamplifier.

See table below for setting of reference level.

RF attenuation	5 dB	10 dB	20 dB	≥ 30 dB
Preselector off	-10 dBm	-5 dBm	-5 dBm	-5 dBm
Preselector on	-10 dBm	-5 dBm	-5 dBm	-5 dBm
Preamplifier on	-	-25 dBm	-15 dBm	-5 dBm

Reference measurement:

- ▶ Determine signal level $L_{\text{powermeter}}$.
- ▶ Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
- ▶ Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter: ▶ Read level indication from power meter : $L_{\text{powermeter}}$

Evaluation: ▶ Calculate

$$\Delta \text{Ref} / \text{dB} = L_{\text{ESR}} / \text{dBm} - L_{\text{powermeter}} / \text{dBm}$$

Record $\Delta \text{Ref} / \text{dB}$

Frequency Response Measurement:

Signal generator - Frequency: f_{fresp}
 settings: See table of performance test report for values of f_{fresp}

R&S ESR settings:- [**SPAN** : {span}]
 - [**FREQ** : CENTER : { f_{fresp} }]
 - [**BW** : RES BW MANUAL : {**RBW**}]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

- ▶ Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
- ▶ Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter: ▶ Read level indication from Power Meter : $L_{\text{powermeter}}$

Evaluation: ▶ The frequency response can be calculated as:

$$\text{Freq. response} / \text{dB} = L_{\text{ESR}} - L_{\text{powermeter}} - \Delta \text{Ref} / \text{dB}$$

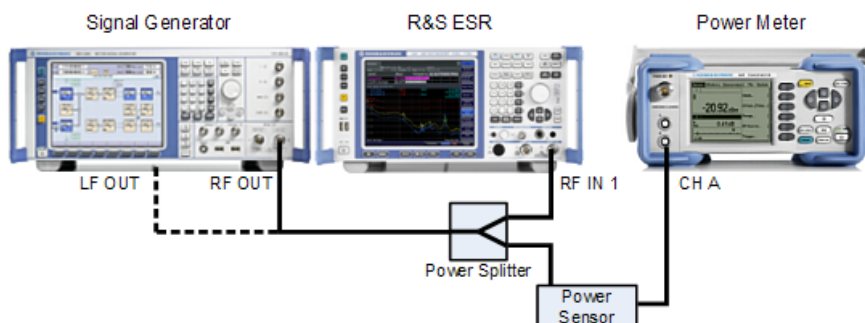
f_{center}	9 kHz	100.02 kHz	1.005 MHz	≥10 MHz
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.2.8.3 Frequency Response (> 7 GHz)

Checking the frequency response

Test setup:

- ▶ Standardize the Power Meter and Power Sensor (item 7, 9).
- ▶ Use Power Splitter/Combiner (item 4) and connect equipment as shown below.
- ▶ Connect the power splitter directly to the RF input 1 of the R&S ESR.
- ▶ Use the LF output of the signal generator for frequencies <10 MHz.



Important Note

Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

Signal generator settings:

Level at DUT	-10 dBm
Frequency	64 MHz

R&S ESR settings:

- [PRESET]
- [**AMPT** : RF INPUT {coupling}]
- [**AMPT** : 10 dB MIN OFF]
- [**AMPT** : RF ATTEN MANUAL : {a_{ESR}}]
- [**AMPT** : PREAMPLIFIER {state}]
- [**AMPT** : 0 dBm]
- [SPAN : 100 kHz]
- [**BW** : RES BW MANUAL : 10 kHz]
- [**TRACE** : DETECTOR : RMS]
- [**FREQ** : CENTER : 64 MHz]

See table of performance test report for values of coupling, a_{ESR} and state of input, preselector and preamplifier.

- ▶ Set marker to peak of signal
- [**MKR** ⇒ : PEAK]
- ▶ Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter:

- ▶ Read level indication from power meter : L_{powermeter}

Evaluation:

- ▶ Calculate
- $\Delta \text{Ref} / \text{dB} = L_{\text{ESR}} / \text{dBm} - L_{\text{powermeter}} / \text{dBm}$
- ▶ Record $\Delta \text{Ref} / \text{dB}$

Frequency Response Measurement (span = 100 kHz):

Signal generator - Frequency: f_{fresp}
 settings: See table of performance test report for values of f_{fresp}

R&S ESR settings:- [**FREQ** : CENTER : { f_{fresp} }]
 See table of performance test report for values of f_{fresp}
 ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]
 ► Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter: ► Read level indication from Power Meter : $L_{\text{powermeter}}$

Evaluation: ► The frequency response can be calculated as:

$$\text{Freq. response / dB} = L_{\text{ESR}} - L_{\text{powermeter}} - \Delta\text{Ref / dB}$$

 ► Take the value of ΔRef as ascertained before.

Frequency Response Measurement (full span):

R&S ESR settings:- [**PRESET**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**AMPT** : **0 dBm**]

Signal generator - Frequency: f_{fresp}
 settings: See table of performance test report for values of f_{fresp}

R&S ESR settings: See table of performance test report for values of f_{fresp}
 ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK]
 ► Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter: ► Read level indication from Power Meter : $L_{\text{powermeter}}$

Evaluation: ► The frequency response can be calculated as:

$$\text{Freq. response / dB} = L_{\text{ESR}} - L_{\text{powermeter}} - \Delta\text{Ref / dB}$$

 Take the value of ΔRef as ascertained before.

1.2.9 Checking the Display Nonlinearity

Test equipment: Signal generator (Section "Test Equipment", item 1)

Frequency 128 MHz

Maximum level ≥ 10 dBm

Step attenuator (Section "Test Equipment", item 10)

Frequency 128 MHz

Attenuation 0 to 100 dB in 1 dB steps

Attenuation uncertainty < 0.1 dB

Test setup:

- ▶ Connect RF output of the signal generator to RF input of the step attenuator
- ▶ Connect RF output of the step attenuator to RF input of the R&S ESR

Signal generator settings:

- Frequency 128.1 MHz
- Level +10 dBm

Step attenuator settings:

- Attenuation 20 dB

R&S ESR settings:

- [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [AMPT : 0 dBm]
- [**FREQ** : CENTER : **128.1 MHz**]
- [SPAN : 0 Hz]
- [**TRACE** : DETECTOR : AV]
- [**BW** : RES BW MANUAL : **10 kHz**]
- [**SWEEP** : SWEEP TIME MANUAL : {sweep time}]
- [**MEAS** : TIME DOMAIN POWER : MEAN]

See table below for values of sweep time.

Reference measurement:

- ▶ Read out the mean marker value ($= L_{\text{Ref}}$)

Measurement:

Step attenuator settings:

- Attenuation $\{a_{\text{ATT}}\}$

See table of performance test report for values of a_{ATT} .

Evaluation:

Read out the mean marker value. The difference between the level of the input signal of the R&S ESR and the reference L_{Ref} (about 10 dB below the reference level) can be calculated as :

$$\Delta L = L_{\text{ESR}} - L_{\text{Ref}}$$

Note:

A frequency between 5 MHz and 1 GHz may be used. It is recommended to use correction values for the uncertainty of the attenuator.

a_{ATT}	10 dB to 50 dB	50 dB to 80 dB
Sweep time	200 ms	600 ms

1.2.10 Checking the RF Attenuator Uncertainty

Test equipment: Signal generator (Section "Test Equipment", item 1)

Frequency 128 MHz

Maximum level ≥ 10 dBm

Step attenuator (Section "Test Equipment", item 10)

Frequency 128 MHz

Attenuation 0 to 80 dB in 5 dB steps

Attenuation uncertainty < 0.1 dB

Test setup:

- ▶ Connect RF output of the signal generator to RF input of the step attenuator
- ▶ Connect RF output of the step attenuator to RF input of the R&S ESR

Signal generator settings: - Frequency 128.1 MHz

- Level 10 dBm

R&S ESR settings:- [PRESET]

- [**AMPT** : 10 dB MIN OFF]

- [**FREQ** : CENTER : **128.1 MHz**]

- [SPAN : 500 Hz]

- [**BW** : RES BW MANUAL : **1 kHz**]

- [**TRACE** : DETECTOR : RMS]

- [**BW** : VIDEO BW MANUAL : **100 Hz**]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [AMPT : -35 dBm]

Reference measurement

▶ Set marker to peak of signal

- [**MKR** $\Rightarrow$: PEAK]

▶ Set reference to peak of signal

- [**MKR** : REFERENCE FIXED]

Measurement

Step attenuator settings: - Attenuation { 80dB - a_{ESR} }

R&S ESR settings:- [**AMPT** : RF ATTEN MANUAL : { a_{ESR} }]

- [**AMPT** : { -45dBm + a_{ESR} } **dBm**]

- [**MKR** $\Rightarrow$: PEAK]

See table below for values of a_{ESR} , a_{ATT} and reference level.

Evaluation: The difference between the level of the input signal of the R&S ESR and the reference (at 10 dB RF attenuation) is shown in the marker field by the reading delta [T1 FXD].

a_{ATT}	70 dB	80 dB	75 dB	65 dB	60 dB	55 dB	50 dB	40dB	30 dB	20 dB	10 dB
a_{ESR}	10 dB	0 dB	5 dB	15 dB	20 dB	25 dB	30 dB	40dB	50 dB	60 dB	70 dB
reference level	-35 dBm	-45 dBm	-40 dBm	-30 dBm	-25 dBm	-20 dBm	-15 dBm	-5 dBm	5 dBm	+15 dBm	+25 dBm

1.2.11 Checking the Phase Noise

Test equipment: Signal generator (refer to "Test Equipment", item 1)

Frequency	500 MHz
Level	≥ 0 dBm
Phase noise at 500 MHz:	< -94 dBc/Hz @ 100 Hz < -111 dBc/Hz @ 1 kHz < -116 dBc/Hz @ 10 kHz < -125 dBc/Hz @ 100 kHz < -144 dBc/Hz @ 1 MHz

Test setup: ► Connect RF output of the signal generator to RF input of the R&S ESR.

Signal generator settings:

- Frequency 500 MHz
- Level 3 dBm
- Adjust the output level of the signal generator for an input level at the R&S ESR of 3 dBm.

R&S ESR settings:

- [PRESET]
- [**SETUP** : REFERENCE INT]
- [**FREQ** : CENTER : **500 MHz**]
- [**AMPT** : ATTEN MANUAL: **10 dB**]
- [AMPT : 0 dBm]
- [SPAN : 1 MHz]
- [**TRACE 1** : DETECTOR RMS]
- [**SWEEP** : SINGLE]
- [**MKR FCTN** : SIGNAL COUNT]
- Set center frequency to counter frequency
- [**MKR FCTN** : PHASE NOISE]
- [**TRACE** : AVERAGE]
- [**SWEEP** : SWEEP COUNT : {sweep count} : **ENTER**]
- [**SWEEP** : SWEEP TIME MANUAL : {sweep time} : **ENTER**]
- [**SPAN** : {span}]
- [**MKR** : {Offset}]

See table below for values of reference level, sweep time, sweep count and span.

Refer to "Performance Test Report" table for values of offset.

Evaluation: The phase noise is displayed in the marker field by the reading
'PHNOISE 2'.

Note: Please make sure not to measure on a spurious signal.
In case of an IF overload the level of the signal generator has to be reduced.

Settings for phase noise measurement				
Offset	Span	RBW / Swepttime / Sweepcount	Reference level	a _{ESR}
100 Hz	200 Hz	10 Hz / 2000 ms / 5	0 dBm	10 dB
1 kHz	2 kHz	100 Hz / 800 ms / 5	0 dBm	10 dB
10 kHz	20 kHz	1 kHz / 500 ms / 5	0 dBm	10 dB
100 kHz	200 kHz	10 kHz / 200 ms / 5	0 dBm	10 dB
1 MHz	2 MHz	10 kHz / 100 ms / 5	0 dBm	10 dB

1.2.12 Checking the VSWR at the RF Input

Test equipment: Signal generator (Section "Test Equipment", item 1)

Frequency range: 100 kHz to 20 MHz

Level range: ≥ -10 dBm

Power meter (Section "Test Equipment", item 7)

Power sensor (Section "Test Equipment", item 8)

Frequency range 100 kHz to 20 MHz

SWR bridge (Section "Test Equipment", item 5)

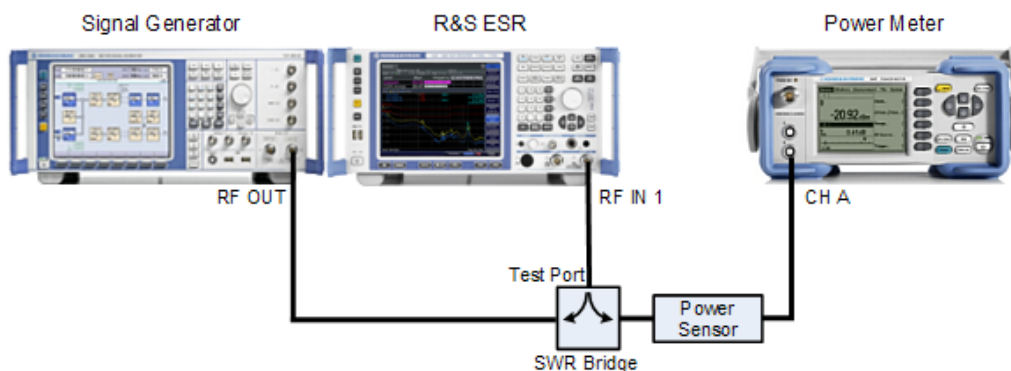
Frequency range 100 kHz to 20 MHz

Note:

As alternative to the VSWR bridge a suitable network analyzer can be used.

Network analyzer (Section "Test Equipment", item 12)

Test setup
($f_{in} < 20$ MHz):



Signal generator settings:

- Level -10 dBm
- Frequency $\{f_{in}\}$

See performance test report for values of f_{in} .

Calibration:

- Use total reflection (OPEN or SHORT) at the test port of the SWR bridge as a reference.
- Remove cable from RF input 1 of the R&S ESR and connect precision short or open to the cable. Determine reflected power with the power meter and store measured level L_{Ref} as reference. Repeat this procedure for every measurement over the whole frequency range.

R&S ESR settings:

- [PRESET]
- [INPUT/OUTPUT : INPUT {state}]
- [INPUT/OUTPUT : PRESELECTOR {state}]
- [AMPT : 10 dB MIN OFF]
- [AMPT : RF ATTEN MANUAL : $\{a_{ESR}\}$]

See table of performance test report for values of a_{ESR} , f_{in} and state of input and preselector.

- Measurement:
- ▶ Connect the corresponding RF input of the R&S ESR to the test port of the SWR bridge.
 - ▶ Measure reflected power L_r with the power meter. The return loss a_r of the RF input 1 of the R&S ESR can be calculated as:

$$a_r = L_{\text{Ref}} - L_r .$$

The VSWR can be calculated as:

$$s = \frac{10^{0.05a_r} + 1}{10^{0.05a_r} - 1}$$

- Test setup ($f_{\text{in}} > 20$ MHz):
- ▶ Connect the test port of the network analyzer to the corresponding RF input of the R&S ESR.

- R&S ESR settings: -
- [PRESET]
 - [**INPUT/OUTPUT** : INPUT {state}]
 - [**INPUT/OUTPUT** : PRESELECTOR {state}]
 - [**AMPT** : 10 dB MIN OFF]
 - [**AMPT** : RF ATTEN MANUAL : { a_{ESR} }]

See table of performance test report for values of a_{ESR} , f_{in} and state of input and preselector.

- Measurement:
- ▶ Determine the VSWR of the R&S ESR at the frequencies shown in the performance test report. See operating manual of the network analyzer for detailed information about VSWR measurement.

1.2.13 Checking the Detectors According CISPR16-1-1 (Receiver Mode)

1.2.13.1 Sine Wave Voltage Accuracy

Test equipment: Signal generator (Section "Test Equipment", item 1)

Frequency range 100 kHz to 1 GHz

Max. level ≥ 0 dBm

Power Meter (Section "Test Equipment", item 7)

Power Sensor (Section "Test Equipment", item 8)

6 dB Power Splitter (Section "Test Equipment", item 3)

CISPR Band A

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 101 kHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:

- Frequency 101 kHz
- Level -10 dBm (= 97 dBμV)

- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR

- R&S ESR settings:
- [PRESET]
 - [**MODE** : RECEIVER]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**MEAS** : DETECTOR : {Detector}
 - [**BW** : CISPR RBW UNCOUPLED]
 - [**BW** : RES BW : **200 Hz**]
 - [**MEAS** : MEAS TIME : **100 ms**]
 - [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPEAK, CISPR AVERAGE and RMS AVERAGE.

Evaluation: The difference between the signal levels measured with the power meter and the R&S ESR ('LEVEL {Detector}') reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine wave accuracy}_{\text{Band A}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band B

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 1.1 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator settings:
- Frequency 1.1 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]
 - [**BW** : RES BW : **9 kHz**]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPEAK, CISPR AVERAGE und RMS AVERAGE.
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR ('LEVEL {Detector}') reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine wave accuracy}_{\text{Band B}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band C

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 64 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
 - [**BW** : RES BW : **120 kHz**]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPEAK, CISPR AVERAGE und RMS AVERAGE.
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR ('LEVEL {Detector}') reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine wave accuracy}_{\text{Band C}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band D

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 650 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 650 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
 - [**BW** : RES BW : **120 kHz**]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPeAK, CISPR AVERAGE und RMS AVERAGE.
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR ('LEVEL {Detector}') reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine wave accuracy}_{\text{Band D}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band E

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 1001 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 1001 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **1001 MHz**]
 - [**BW** : RES BW : **1 MHz**]
 - ▶ Perform the measurement with the detectors MAX PEAK, CISPR AVERAGE und RMS AVERAGE.
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR ('LEVEL {Detector}')) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine wave accuracy}_{\text{Band E}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

1.2.13.2 Response to Pulses

Peak and Quasipeak Detector

- Test equipment
- CISPR pulse generator (Section "[Test Equipment](#)", item 16)
 - Attenuator, impulse resistant (Section "[Test Equipment](#)", item 17):
 - frequency range 9 kHz to 1 GHz
 - Signal generator with pulse modulation (Section "[Test Equipment](#)", item 1)
 - Frequency range 9 kHz to 2 GHz

Amplitude Relationship

CISPR Band A

- Test setup:
- Connect output of the main generator A/B via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- Additional CISPR generator settings:
- CISPR-band A
 - Level at DUT 60 dB μ V [CISPR 16 A]
 - Pulse frequency 25 Hz

- R&S ESR settings:
- [PRESET]
 - [**MODE** :RECEIVER]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**AMPT** : RF ATTEN MANUAL : **35 dB**]
 - [**MEAS** : DETECTOR : MAX PEAK]
 - [**MEAS** : DETECTOR : QUASIPEAK]
 - [**MEAS** : MEAS TIME : **100 ms**]
 - [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]

- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPEAK' (= reference value L_{Ref}).

CISPR Band B

- Additional CISPR - CISPR-band B
 generator settings: - Level at DUT 60 dB μ V [CISPR 16 B]
 - Pulse frequency 100 Hz
 Additional - [**AMPT** : RF ATTEN MANUAL : **40 dB**]
 R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **1,1 MHz**]
 Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPeAK' (= reference value L_{Ref}).

CISPR Band C

- Test setup: ► Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- Additional CISPR - CISPR band C/D
 generator settings: - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
 Additional - [**AMPT** : RF ATTEN MANUAL : **20 dB**]
 R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
 Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPeAK' (= reference value L_{Ref}).

CISPR Band D

- Test setup: ► Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- Additional CISPR - CISPR band C/D
 generator settings: - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
 Additional - [**AMPT** : RF ATTEN MANUAL : **20 dB**]
 R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
 Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPeAK' (= reference value L_{Ref}).

CISPR Band E

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings:

- Frequency 1002.5 MHz
- Level -33 dBm
- Modulation Pulse

Pulse generator settings:

- Period 20 μ s ($f_P = 50$ kHz)
- Pulse width 200 ns

Checking the pulse level: - Level 60 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**BW** : CISPR RBW UNCOUPLED]
- [**BW** : RES BW : **1 MHz**]
- [**BW** : DETECTOR : MAX PEAK]
- [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK'.

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the main generator A/B via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Level at DUT 60 dB μ V [CISPR 16 A]
- Pulse frequency 25 Hz

R&S ESR settings:

- [PRESET]
- [**MODE** :RECEIVER]
- [**INPUT/OUTPUT** : INPUT DC]
- [**AMPT** : RF ATTEN MANUAL : **35 dB**]
- [**MEAS** : DETECTOR : MAX PEAK]
- [**MEAS** : DETECTOR : QUASIPeAK]
- [**MEAS** : MEAS TIME : **4 s**]
- [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_p .

Measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

- CISPR generator settings:
- CISPR-band B
 - Level at DUT 60 dB μ V [CISPR 16 B]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**AMPT** : RF ATTEN MANUAL : **40 dB**] (**35 dB** for R&S ESR26)
 - [**FREQ** : RECEIVER FREQUENCY : **1,1 MHz**]
- Reference measurement:
- The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{Ref \text{ Band B}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_P .
- Measurement:
- The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:
- $$\Delta L = L_{MEAS} - L_{Ref \text{ Band B}}$$

CISPR Band C

- Test setup:
- Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings:
- CISPR band C/D
 - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**AMPT** : RF ATTEN MANUAL : **15 dB**]
 - [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
- Reference measurement:
- The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{Ref \text{ Band C/D}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_P .
- Measurement:
- The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:
- $$\Delta L = L_{MEAS} - L_{Ref \text{ Band C/D}}$$

CISPR Band D

Test setup: ► Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR band C/D
- Level at DUT 50 dB μ V [CISPR 16 C/D]
- Pulse frequency 100 Hz

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **15 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{\text{Ref Band C/D}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_p .

Measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

Measurement at 1 kHz Pulse Frequency

CISPR Band B

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band B
- Pulse frequency 100 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 B]

R&S ESR settings:

- [PRESET]
- [**MODE** :RECEIVER]
- [**AMPT** : RF ATTEN MANUAL : **40 dB**]
- [**MEAS** : DETECTOR : MAX PEAK]
- [**MEAS** : DETECTOR : QUASIPeAK]
- [**MEAS** : MEAS TIME : **100 ms**]
- [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{\text{Ref 1 kHz}}$)

CISPR generator settings:

- Pulse frequency 1 kHz

Measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref 1 kHz}}$ is to be determined as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref 1 kHz}}$$

CISPR Band C

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 100 Hz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{Ref\ 1\ kHz}$)

CISPR generator settings:

- Pulse frequency 1 kHz

Measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{Ref\ 1\ kHz}$ is to be determined as follows:

$$\Delta L = L_{MEAS} - L_{Ref\ 1\ kHz}$$

CISPR Band D

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 100 Hz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= reference value $L_{Ref\ 1\ kHz}$)

CISPR generator settings:

- Pulse frequency 1 kHz

Measurement: ► The measured level is indicated with the reading 'LEVEL QUASIPeAK' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{Ref\ 1\ kHz}$ is to be determined as follows:

$$\Delta L = L_{MEAS} - L_{Ref\ 1\ kHz}$$

CISPR Average Detector**Amplitude Relationship**

Test equipment: CISPR pulse generator (Section "[Test Equipment](#)", item 15):

Signal generator with pulse modulation (Section "[Test Equipment](#)", item 1)

Frequency range 9 kHz to 2 GHz

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [PRESET]
- [**MODE** : RECEIVER]
- [**AMPT** : RF ATTEN MANUAL : **35 dB**]
- [**INPUT/OUTPUT** : INPUT DC]
- [**MEAS** : DETECTOR : CISPR AVERAGE]
- [**MEAS** : MEAS TIME : **500 ms**]
- [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
- [**BW** : CISPR RBW UNCOUPLED]
- [**BW** : RES BW : **200 Hz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE'.

CISPR Band B

CISPR generator settings:

- CISPR-band B
- Pulse frequency 500 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 B]

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **40 dB**] (**35 dB** with R&S ESR26)
- [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]
- [**BW** : RES BW : **9 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE'.

CISPR Band C

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note: Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE'.

CISPR Band D

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note: Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE'.

CISPR Band E

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings:

- Frequency 1002.5 MHz
- Level -7 dBm
- Modulation Pulse

Pulse generator settings:

- Period 20 μ s (f_p = 50 kHz)
- Pulse width 200 ns

Checking the pulse level:

- Level 86 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]
- [**BW** : RES BW : **1 MHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE'.

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Pulse frequency 70 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [PRESET]
- [**MODE** : RECEIVER]
- [**AMPT** : RF ATTEN MANUAL : **35 dB**]
- [**INPUT/OUTPUT** : INPUT DC]
- [**MEAS** : DETECTOR : CISPR AVERAGE]
- [**MEAS** : MEAS TIME : **1 s**]
- [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
- [**BW** : CISPR RBW UNCOUPLED]
- [**BW** : RES BW : **200 Hz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_p

Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

CISPR generator settings:

- CISPR-band B
- Pulse frequency 3180 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **40 dB**] (**35 dB** with R&S ESR26)
- [**FREQ** : RECEIVER FREQUENCY : **1,1 MHz**]
- [**BW** : RES BW : **9 kHz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= reference value $L_{\text{Ref Band B}}$).

- CISPR generator settings: - Pulse frequency:
see table of performance test report for values of f_p
- Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE' (= L_{MEAS}).
- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{Ref\ Band\ A}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{MEAS} - L_{Ref\ Band\ B}$$

CISPR Band C

- Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings: - CISPR-band C/D
- Pulse frequency 42.4 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 A]

- Additional R&S ESR settings: - [**AMPT** : RF ATTEN MANUAL : **5 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
- [**BW** : RES BW : **120 kHz**]

- Reference measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE' (= reference value $L_{Ref\ Band\ C/D}$).

- CISPR generator settings: - Pulse frequency:
see table of performance test report for values of f_p

- Measurement: The measured level is indicated by the reading 'LEVEL CISPR AVERAGE' (= L_{MEAS}).

- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{Ref\ Band\ C/D}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{MEAS} - L_{Ref\ Band\ C/D}$$

CISPR Band D

- Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings: - CISPR-band C/D
- Pulse frequency 42.4 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 A]

- Additional R&S ESR settings: - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
- [**BW** : RES BW : **120 kHz**]

- Reference measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= reference value $L_{\text{Ref Band C/D}}$).
- CISPR generator settings: - Pulse frequency:
see table of performance test report for values of f_P
- Measurement: The measured level is indicated by the reading 'LEVEL CISPR AVERAGE ' (= L_{MEAS}).
- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band C/D}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band E

- Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR
- Signal generator settings: - Frequency 1002.5 MHz
- Level -7 dBm
- Modulation Pulse
- Pulse generator settings: - Period 2.83 μs ($f_P = 353.5 \text{ kHz}$)
- Pulse width 200 ns
- Checking the pulse level: - Level 86 dB $\mu\text{V/MHz} \pm 0.1 \text{ dB}$
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings: - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]
- [**BW** : RES BW : **1 MHz**]
- Reference measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= reference value $L_{\text{Ref Band E}}$).
- Pulse generator settings: Period T_P : see table of performance test report for values of T_P .

$$T_P = 1 / f_P$$
- Measurement: ► The measured level is indicated with the reading 'LEVEL CISPR AVERAGE ' (= L_{MEAS}).
- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band E}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band E}}$$

Response to Intermittent, Unsteady and Drifting Narrowband Disturbance

Test equipment: Signal generator with pulse modulation (Section "[Test Equipment](#)", item 1)

Frequency range 9 kHz to 2 GHz

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

CISPR Band A

Signal generator settings: - Frequency 101 kHz

- Level -7 dBm

- Modulation Pulse

Pulse generator settings: - Pulse width 160 ms

- Period 1.6 s

R&S ESR settings: - [PRESET]

- [**MODE** : RECEIVER]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [**INPUT/OUTPUT** : INPUT DC]

- [**MEAS** : DETECTOR : MAX PEAK]

- [**MEAS** : DETECTOR : CISPR AVERAGE]

- [**MEAS** : MEAS TIME : **2 s**]

- [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL CISPR AVERAGE' (L_{CAV}).

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band B

Signal generator settings: - Frequency 1.1 MHz

- Level -7 dBm

- Modulation Pulse

Pulse generator settings: - Pulse width 160 ms

- Period 1.6 s

R&S ESR settings: - [PRESET]

- [**MODE** : RECEIVER]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [**INPUT/OUTPUT** : INPUT DC]

- [**MEAS** : DETECTOR : MAX PEAK]

- [**MEAS** : DETECTOR : CISPR AVERAGE]

- [**MEAS** : MEAS TIME : **2 s**]

- [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL CISPR AVERAGE' (L_{CAV}).

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band C

Signal generator settings: - Frequency 64 MHz

- Level -7 dBm

- Modulation Pulse

Pulse generator settings: - Waveform Pulse Continue

- Pulse width 100 ms

- Period 1.6 s

Additional R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]

- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL CISPR AVERAGE' (L_{CAV}).

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band D

Signal generator settings: - Frequency 650 MHz

- Level -7 dBm

- Modulation Pulse

Pulse generator settings: - Waveform Pulse Continue

- Pulse width 100 ms

- Period 1.6 s

Additional R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]

- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL CISPR AVERAGE' (L_{CAV}).

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -7 dBm
 - Modulation Pulse
- Pulse generator settings:
- Waveform Pulse Continue
 - Pulse width 100 ms
 - Period 1.6 s
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]
 - [**BW** : RES BW : **120 kHz**]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK (L_{PK+}) and 'LEVEL CISPR AVERAGE ' (L_{CAV}).
- Evaluation:
- The difference between level L_{PK+} and L_{CAV} is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{CAV}$$

RMS Average Detector

Test equipment: CISPR pulse generator (Section "[Test Equipment](#)", item 15):
 Signal generator with pulse modulation (Section "[Test Equipment](#)", item 1)
 Frequency range 9 kHz to 2 GHz

Amplitude Relationship**CISPR Band A**

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings: - CISPR-band A
 - Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

CISPR generator settings: - [PRESET]
 - [**MODE** : RECEIVER]
 - [**AMPT** : RF ATTEN MANUAL : **35 dB**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**MEAS** : DETECTOR : RMS AVERAGE]
 - [**MEAS** : MEAS TIME : **1 s**]
 - [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
 - [**BW** : CISPR RBW UNCOUPLED]
 - [**BW** : RES BW : **200 Hz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE'.

CISPR Band B

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings:

- Frequency 1.1 MHz
- Level -21.1 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 20 μ s

Checking the pulse level:

- Level 119.9 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

R&S ESR settings:

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]
- [**BW** : RES BW : **9 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (L_{CRMS}).

CISPR Band C

Signal generator settings:

- Frequency 64 MHz
- Level -12.4 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 2 μ s

Checking the pulse level:

- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE'.

CISPR Band D

Signal generator settings:

- Frequency 650 MHz
- Level -12.4 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 2 μ s

Checking the pulse level:

- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
- [**BW** : RES BW : **120 kHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE'.

CISPR Band E

Signal generator settings: - Frequency 1002.5 MHz
- Level -1.6 dBm
- Modulation Pulse

Pulse generator settings: - Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 200 ns

Checking the pulse level: - Level $91.4 \text{ dB}\mu\text{V}/\text{MHz} \pm 0.1 \text{ dB}$

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings: - [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]
- [**BW** : RES BW : **1 MHz**]

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE'.

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [PRESET]
- [**MODE** : RECEIVER]
- [**AMPT** : RF ATTEN MANUAL : **35 dB**]
- [**INPUT/OUTPUT** : INPUT DC]
- [**MEAS** : DETECTOR : CISPR RMS]
- [**MEAS** : MEAS TIME : **1 s**]
- [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
- [**BW** : CISPR RBW UNCOUPLED]
- [**BW** : RES BW : **200 Hz**]

Reference measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_P .

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings:

- Frequency 1.1 MHz
- Level -21.1 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 20 μ s

- Checking the pulse level: - Level 119.9 dB μ V/MHz $\pm$ 0.1 dB
Note:
 For measurement of the pulse-modulated signal see annex.
- R&S ESR settings:- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**MEAS** : DETECTOR : CISPR RMS]
 - [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]
 - [**BW** : RES BW : **9 kHz**]
- Reference measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= reference value $L_{\text{Ref Band B}}$).
- Pulse generator settings: - Period $T_P = 1/f_P$:
 see table of performance test report for values of f_P .
- Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= L_{MEAS})
- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band B}}$$

CISPR Band C

- Signal generator settings: - Frequency 64 MHz
 - Level -12.4 dBm
 - Modulation Pulse
- Pulse generator settings: - Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 2 μ s
- Checking the pulse level: - Level 100.6 dB μ V/MHz $\pm$ 0.1 dB
Note:
 For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:- [**FREQ** : RECEIVER FREQUENCY : **64 MHz**]
 [**BW** : RES BW : **120 kHz**]
 - [**MEAS** : MEAS TIME : **100 ms**]
- Reference measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= reference value $L_{\text{Ref Band C/D}}$).
- Pulse generator settings: - Period $T_P = 1/f_P$:
 see table of performance test report for values of f_P .
- Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= L_{MEAS})
- Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band D

- Signal generator settings:
- Frequency 650 MHz
 - Level -12.4 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 2 μ s
- Checking the pulse level:
- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **650 MHz**]
 - [**BW** : RES BW : **120 kHz**]
 - [**MEAS** : MEAS TIME : **100 ms**]
- Reference measurement:
- The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= reference value $L_{\text{Ref Band C/D}}$).
- Pulse generator settings:
- Period $T_P = 1/f_P$:
see table of performance test report for values of f_P .
- Measurement:
- The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= L_{MEAS})
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -1.6 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 200 ns
- Checking the pulse level:
- Level 91.4 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:
- [**FREQ** : RECEIVER FREQUENCY : **1002.5 MHz**]
 - [**BW** : RES BW : **1 MHz**]
- Reference measurement:
- The measured level is indicated with the reading 'LEVEL RMS AVERAGE' (= reference value $L_{\text{Ref Band C/D}}$).
- Pulse generator settings:
- Period $T_P = 1/f_P$:
see table of performance test report for values of f_P .

Measurement: ► The measured level is indicated with the reading 'LEVEL RMS AVERAGE'
 (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference
 measurement $L_{Ref\ Band\ A}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{MEAS} - L_{Ref\ Band\ C/D}$$

Response to Intermittent, Unsteady and Drifting Narrowband Disturbance

CISPR Band A

- Signal generator settings:
- Frequency 101 kHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1.6 s
 - Pulse width 160 ms
- R&S ESR settings:-
- [PRESET]
 - [**MODE** : RECEIVER]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**MEAS** : DETECTOR : MAX PEAK]
 - [**MEAS** : DETECTOR : CISPR RMS]
 - [**MEAS** : MEAS TIME : **2 s**]
 - [**FREQ** : RECEIVER FREQUENCY : **101 kHz**]
- Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL RMS AVERAGE' ($L_{RMS\ AV}$).
- Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band B

- Signal generator settings:
- Frequency 1.1 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1.6 s
 - Pulse width 160 ms
- R&S ESR settings:-
- [PRESET]
 - [**MODE** : RECEIVER]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**MEAS** : DETECTOR : MAX PEAK]
 - [**MEAS** : DETECTOR : CISPR RMS]
 - [**MEAS** : MEAS TIME : **2 s**]
 - [**FREQ** : RECEIVER FREQUENCY : **1.1 MHz**]
- Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL RMS AVERAGE' ($L_{RMS\ AV}$).
- Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band C

- Signal generator settings:
- Frequency 64 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ : RECEIVER FREQUENCY : 64 MHz**]
 - [**BW : RES BW : 120 kHz**]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL RMS AVERAGE' ($L_{RMS\ AV}$).
- Evaluation:
- The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band D

- Signal generator settings:
- Frequency 650 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ : RECEIVER FREQUENCY : 650 MHz**]
 - [**BW : RES BW : 120 kHz**]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL RMS AVERAGE' ($L_{RMS\ AV}$).
- Evaluation:
- The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ : RECEIVER FREQUENCY : 1002.5 MHz**]
 - [**BW : RES BW : 120 kHz**]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' (L_{PK+}) and 'LEVEL RMS AVERAGE' ($L_{RMS\ AV}$).
- Evaluation:
- The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

1.2.14 Checking the Detectors According CISPR16-1-1 (Time Domain Scan, with R&S ESR-K53 option only)

Note: The measurements are performed with the Time Domain Scan using the following basic settings:

The screenshots show the 'Test Automation' software interface with the 'Scan Table' tab selected. The 'Time Domain Scan' option is turned ON. The following table summarizes the settings shown in the first screenshot (Range 1 selected):

Parameter	Value
Scan Start	100.5 kHz
Scan Stop	101.5 kHz
Step Mode	AUTO
Range 1 Start	9.0 kHz
Range 1 Stop	150.0 kHz
Range 1 Step Size	50.0 Hz
Range 1 Res BW	200.0 Hz
Range 1 Meas Time	100 ms
Range 1 Auto Ranging	OFF
Range 1 RF Attenuation	10 dB
Range 1 Preamplifier	OFF
Range 1 RF Input	1

The second screenshot shows Range 4 selected, with the following settings:

Parameter	Value
Scan Start	100.5 kHz
Scan Stop	101.5 kHz
Step Mode	AUTO
Range 4 Start	1.0 GHz
Range 4 Stop	2.0 GHz
Range 4 Step Size	30.0 kHz
Range 4 Res BW	120.0 kHz
Range 4 Meas Time	100 ms
Range 4 Auto Ranging	OFF
Range 4 RF Attenuation	10 dB
Range 4 Preamplifier	OFF
Range 4 RF Input	1

The settings for Scan Start and Scan Stop are adjusted during the measurements. The settings for measurement time, RF attenuation, resolution bandwidths must be changed in the scan table.

The detectors are selected in the trace menu.

1.2.14.1 Sine Wave Voltage Accuracy

Test equipment: Signal generator (Section "Test Equipment", item 1)

Frequency range 100 kHz to 1 GHz

Max. level ≥ 0 dBm

Power Meter (Section "Test Equipment", item 7)

Power Sensor (Section "Test Equipment", item 8)

6 dB Power Splitter (Section "Test Equipment", item 3)

CISPR Band A

Test setup:

- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
- ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 101 kHz.
- ▶ Connect Power Sensor through a cable to RF output of Signal Generator.

Signal generator settings:

- Frequency 101 kHz
- Level -10 dBm (= 97 dBμV)

Measurement:

- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
- ▶ Record the Power Meter indication.
- ▶ Disconnect Power Sensor from the cable.
- ▶ Connect the cable to RF input 1 of the R&S ESR

R&S ESR settings:

- [**MODE** : RECEIVER]
- [**INPUT/OUTPUT** : INPUT DC]
- [**MEAS** : DETECTOR : {Detector}
- [**SWEEP** : TD SCAN]
- [**FREQ** : START : **100.5 kHz**]
- [**FREQ** : STOP : **101.5 kHz**]
- [**TRACE** : DETECTOR : {DETECTOR}]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 1 : MEAS TIME: 1 s]
- [RUN SINGLE]
- ▶ Perform the measurement with the detectors MAX PEAK, QUASIPeAK, CISPR AVERAGE und RMS AVERAGE.

Measurement:

- ▶ Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine-wave accuracy}_{\text{Band A}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band B

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 1.1 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator settings:
- Frequency 1.1 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 1 s]
 - [RUN SINGLE]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPEAK, CISPR AVERAGE und RMS AVERAGE.
- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:
- $$\text{Sine-wave accuracy}_{\text{Band B}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band C

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 6, 7).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 64 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR

- Additional R&S ESR settings:
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 1 s]
 - [RUN SINGLE]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPeAK, CISPR AVERAGE und RMS AVERAGE.

- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine-wave accuracy}_{\text{Band C}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band D

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 650 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 650 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR
- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 1 s]
 - [RUN SINGLE]
 - ▶ Perform the measurement with the detectors MAX PEAK, QUASIPeAK, CISPR AVERAGE und RMS AVERAGE.
- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]

Evaluation: The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine-wave accuracy}_{\text{Band C}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

CISPR Band E

- Test setup:
- ▶ Normalize the Power Meter and Power Sensor (item 6, 7).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 1001 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator setting:
- Frequency 1002.5 MHz
 - Level -10 dBm (= 97 dBμV)
- Measurement:
- ▶ Adjust level to -10 dBm ± 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
 - ▶ Connect the cable to RF input 1 of the R&S ESR
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 4 : MEAS TIME: 1 s]
 - [RUN SINGLE]
 - ▶ Perform the measurement with the detectors MAX PEAK, CISPR AVERAGE und RMS AVERAGE.
- Evaluation: The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level accuracy of the R&S ESR. It can be calculated for each detector as:

$$\text{Sine-wave accuracy}_{\text{Band E}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

1.2.14.2 Response to Pulses

Peak and Quasipeak Detector

- Test equipment
- CISPR pulse generator (Section "Test Equipment", item 16):
 - Attenuator, impulse resistant (Section "Test Equipment", item 17):
 - frequency range 9 kHz to 1 GHz
 - Signal generator with pulse modulation (Section "Test Equipment", item 1)
 - Frequency range 9 kHz to 2 GHz

Amplitude Relationship

CISPR Band A

- Test setup:
- ▶ Connect output of the main generator A/B via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- Additional CISPR generator settings:
- CISPR-band A
 - Level at DUT 60 dB μ V [CISPR 16 A]
 - Pulse frequency 25 Hz

- R&S ESR settings:
- [**TRACE** : DETECTOR : MAX PEAK]
 - [**TRACE** : SELECT TRACE : 2]
 - [**TRACE** : CLEAR / WRITE]
 - [**TRACE** : DETECTOR : QUASIPEAK]
 - [**FREQ** : START : 100.5 kHz]
 - [**FREQ** : STOP : 101.5 kHz]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 1 : MEAS TIME: 2 s]
 - [RANGE 1 : RF ATT : 35 dB]
 - [RUN SINGLE]

- Measurement:
- ▶ The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPEAK' (= reference value L_{Ref}).
 - ▶ Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 - Trace 1: Level PK+
 - Trace 2: Level QPK (= reference value L_{Ref} Band A).

CISPR Band B

- Additional CISPR generator settings:
- CISPR-band B
 - Level at DUT 60 dB μ V [CISPR 16 B]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 2 s]
 - [RANGE 2 : RF ATT : 40 dB]
 - [RUN SINGLE]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPeAK' (= reference value L_{Ref}).
 - Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 - Trace 1: Level PK+
 - Trace 2: Level QPK (= reference value $L_{Ref \text{ Band B}}$).

CISPR Band C

- Test setup:
- Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- Additional CISPR generator settings:
- CISPR band C/D
 - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 20 dB]
 - [RUN SINGLE]
- Measurement:
- The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPeAK' (= reference value L_{Ref}).
 - Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 - Trace 1: Level PK+
 - Trace 2: Level QPK (= reference value $L_{Ref \text{ Band C/D}}$).

CISPR Band D

Test setup: ► Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

Additional CISPR generator settings: - CISPR band C/D
 - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz

Additional R&S ESR settings: - [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 20 dB]
 - [RUN SINGLE]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK' and 'LEVEL QUASIPEAK' (= reference value L_{Ref}).
 ► Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 Trace 1: Level PK+
 Trace 2: Level QPK (= reference value L_{Ref} Band C/D).

CISPR Band E

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings: - Frequency 1002.5 MHz
 - Level -33 dBm
 - Modulation Pulse
 Pulse generator settings: - Period 20 μ s (f_P = 50 kHz)
 - Pulse width 200 ns

Checking the pulse level: - Level 60 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings: - [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 4 : RF ATT : 10 dB]
 - [**SWEEP** : EDIT SCAN TABLE]

Measurement: ► The measured level is indicated with the reading 'LEVEL MAX PEAK'.
 ► Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the main generator A/B via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Level at DUT 60 dB μ V [CISPR 16 A]
- Pulse frequency 25 Hz

R&S ESR settings:

- [**TRACE** : DETECTOR : MAX PEAK]
- [**TRACE** : SELECT TRACE : 2]
- [**TRACE** : CLEAR / WRITE]
- [**TRACE** : DETECTOR : QUASIPEAK]
- [**FREQ** : START : 100.5 kHz]
- [**FREQ** : STOP : 101.5 kHz]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 1 : MEAS TIME: 2 s]
- [RANGE 1 : RF ATT : 35 dB]
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 2: Level QPK (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_p .

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 2: Level QPK (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

- CISPR generator settings:
- CISPR-band B
 - Level at DUT 60 dB μ V [CISPR 16 B]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 2 s]
 - [RANGE 2 : RF ATT : 40 dB] (35 dB for R&S ESR26)
 - [RUN SINGLE]
- Reference measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 2: Level QPK (= reference value $L_{\text{Ref Band B}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_p .
- Measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 2: Level QPK (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band B}}$$

CISPR Band C

- Test setup:
- Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings:
- CISPR band C/D
 - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 15 dB]
 - [RUN SINGLE]

- Reference measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 2: Level QPK (= reference value $L_{\text{Ref Band C/D}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_P .
- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 2: Level QPK (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band D

- Test setup:
- ▶ Connect output of the main generator C/D via the attenuator to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings:
- CISPR band C/D
 - Level at DUT 50 dB μ V [CISPR 16 C/D]
 - Pulse frequency 100 Hz
- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 15 dB]
 - [RUN SINGLE]
- Reference measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 2: Level QPK (= reference value $L_{\text{Ref Band C/D}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_P .
- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 2: Level QPK (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement L_{Ref} is to be determined for each pulse frequencies as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

Measurement at 1 kHz Pulse Frequency

CISPR Band B

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band B
- Pulse frequency 100 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 B]

R&S ESR settings:

- [**FREQ** : START : **1.0775 MHz**]
- [**FREQ** : STOP : **1.1225 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 2 : MEAS TIME: 100 ms]
- [RANGE 2 : RF ATT : 40 dB]
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 2: Level QPK (= reference value $L_{\text{Ref 1 kHz}}$)

Level PK+ is evaluated to control the input signal

CISPR generator settings:

- Pulse frequency 1 kHz

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 2: Level QPK (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref 1 kHz}}$ is to be determined as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref 1 kHz}}$$

CISPR Band C

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 100 Hz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

- Additional R&S ESR settings:
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 100 ms]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Reference measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 2: Level QPK (= reference value $L_{\text{Ref 1 kHz}}$)
- Level PK+ is evaluated to control the input signal

CISPR generator settings:

- Pulse frequency 1 kHz

- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 2: Level QPK (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref 1 kHz}}$ is to be determined as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref 1 kHz}}$$

CISPR Band D

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings:
- CISPR-band C/D
 - Pulse frequency 100 Hz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 100 ms]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Reference measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 2: Level QPK (= reference value $L_{\text{Ref 1 kHz}}$)
- Level PK+ is evaluated to control the input signal

CISPR generator - Pulse frequency 1 kHz
settings:

Measurement: ► Set marker to peak of signal
- [MKR ⇒ : PEAK]
Trace 2: Level QPK (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference
measurement L_{Ref 1 kHz} is to be determined as follows:

$$\Delta L = L_{MEAS} - L_{Ref\ 1\ kHz}$$

CISPR Average Detector**Amplitude Relationship**

Test equipment: CISPR pulse generator (Section "Test Equipment", item 15):

Signal generator with pulse modulation (Section "Test Equipment", item 3)

Frequency range 9 kHz to 2 GHz

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings: - CISPR-band A
- Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings: - [**TRACE** : DETECTOR : CISPR AVERAGE]
- [**FREQ** : START : **100.5 kHz**]
- [**FREQ** : STOP : **101.5 kHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 1 : MEAS TIME: 1 s]
- [RANGE 1 : RF ATT : 35 dB]
- [RUN SINGLE]

Measurement: ► Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]
Trace 1: Level CISPR AVERAGE

CISPR Band B

CISPR generator settings: - CISPR-band B
- Pulse frequency 500 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 B]

Additional R&S ESR settings: - [**FREQ** : START : **1.0775 MHz**]
- [**FREQ** : STOP : **1.1225 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 2 : MEAS TIME: 1 s]
- [RANGE 2 : RF ATT : 40 dB] (35 dB with R&S ESR26)
- [RUN SINGLE]

Measurement: ► Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]
Trace 1: Level CISPR AVERAGE

CISPR Band C

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**FREQ** : START : **63.7 MHz**]
- [**FREQ** : STOP : **64.3 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 3 : MEAS TIME: 1 s]
- [RANGE 3 : RF ATT : 10 dB]
- [RUN SINGLE]

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE

CISPR Band D

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 C/D]

Additional R&S ESR settings:

- [**FREQ** : START : **649.7 MHz**]
- [**FREQ** : STOP : **650.3 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 3 : MEAS TIME: 1 s]
- [RANGE 3 : RF ATT : 10 dB]
- [RUN SINGLE]

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE

CISPR Band E

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator - Frequency 1002.5 MHz

settings: - Level -7 dBm

- Modulation Pulse

Pulse generator - Period 20 μ s ($f_P = 50$ kHz)

settings: - Pulse width 200 ns

Checking the - Level 86 dB μ V/MHz $\pm$ 0.1 dB

pulse level:

Note:

For measurement of the pulse-modulated signal see annex.

Additional - [**FREQ** : START : **1000 MHz**]

R&S ESR settings: - [**FREQ** : STOP : **1005 MHz**]

- [**TRACE** : DETECTOR : {DETECTOR}]

- [**SWEEP** : EDIT SCAN TABLE]

- [RANGE 4 : MEAS TIME: 1 s]

- [RANGE 4 : RF ATT : 10 dB]

- [RUN SINGLE]

Measurement: ► Set marker to peak of signal

- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:-

- [**TRACE** : DETECTOR : CISPR AVERAGE]
- [**FREQ** : START : **100.5 kHz**]
- [**FREQ** : STOP : **101.5 kHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 1 : MEAS TIME: 1 s]
- [RANGE 1 : RF ATT : 35 dB]
- [RUN SINGLE]

Reference measurement: ► Set marker to peak of signal

- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_p

Measurement: ► Set marker to peak of signal

- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

CISPR generator settings:

- CISPR-band B
- Pulse frequency 500 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [**FREQ** : START : **1.0775 MHz**]
- [**FREQ** : STOP : **1.1225 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 2 : MEAS TIME: 1 s]
- [RANGE 2 : RF ATT : 40 dB] (35 dB with R&S ESR26)
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE (= reference value $L_{\text{Ref Band B}}$).

CISPR generator settings: Pulse frequency: see table of performance test report for values of f_P

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level CISPR AVERAGE (= L_{MEAS}).

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band B}}$$

CISPR Band C

Test setup: ► Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band C/D
- Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 A]

Additional R&S ESR settings:

- [**FREQ** : START : **63.7 MHz**]
- [**FREQ** : STOP : **64.3 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 3 : MEAS TIME: 1 s]
- [RANGE 3 : RF ATT : 5 dB]
- [RUN SINGLE]

- Reference measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 1: Level CISPR AVERAGE (= reference value $L_{\text{Ref Band C/D}}$).
- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_p
- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 1: Level CISPR AVERAGE (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band C/D}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band D

- Test setup:
- ▶ Connect output of the auxiliary generator C/D to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

- CISPR generator settings:
- CISPR-band C/D
 - Pulse frequency 5 kHz

Note:

Level is fixed to 40 dB μ V [CISPR 16 A]

- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 1 s]
 - [RANGE 3 : RF ATT : 5 dB]
 - [RUN SINGLE]

- Reference measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 1: Level CISPR AVERAGE (= reference value $L_{\text{Ref Band C/D}}$).

- CISPR generator settings:
- Pulse frequency: see table of performance test report for values of f_p

- Measurement:
- ▶ Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 1: Level CISPR AVERAGE (= L_{MEAS}).

- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band C/D}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band E

- Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR
- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -7 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 20 μ s ($f_P = 50$ kHz)
 - Pulse width 200 ns
- Checking the pulse level:
- Level 86 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 4 : MEAS TIME: 1 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Reference measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 1: Level CISPR AVERAGE (= reference value $L_{\text{Ref Band E}}$).
- Pulse generator settings:
- Period T_P : see table of performance test report for values of T_P .
- $T_P = 1 / f_P$
- Measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 1: Level CISPR AVERAGE (= L_{MEAS}).
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band E}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band E}}$$

Response to Intermittent, Unsteady and Drifting Narrowband Disturbance

Test equipment: Signal generator with pulse modulation (Section "Test Equipment", item 1)

Frequency range 9 kHz to 2 GHz

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

CISPR Band A

Signal generator - Frequency 101 kHz

settings: - Level -7 dBm

- Modulation Pulse

Pulse generator - Pulse width 160 ms

settings: - Period 1.6 s

R&S ESR settings: - [**TRACE** : DETECTOR : MAX PEAK]

- [**TRACE** : SELECT TRACE : **2**]

- [**TRACE** : CLEAR / WRITE]

- [**TRACE** : DETECTOR : CISPR AVERAGE]

- [**FREQ** : START : **100.5 kHz**]

- [**FREQ** : STOP : **101.5 kHz**]

- [**SWEEP** : EDIT SCAN TABLE]

- [RANGE 2 : MEAS TIME: 2 s]

- [RANGE 2 : RF ATT : 10 dB]

- [RUN SINGLE]

Measurement: ► Set marker to peak of signal

- [MKR ⇒ : PEAK]

Trace 1: Level PK+ (= L_{PK+})

Trace 2: Level CISPR AVERAGE (= L_{CAV})

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band B

Signal generator - Frequency 1.1 MHz

settings: - Level -7 dBm

- Modulation Pulse

Pulse generator - Pulse width 160 ms

settings: - Period 1.6 s

- R&S ESR settings:-
- [**TRACE** : DETECTOR : MAX PEAK]
 - [**TRACE** : SELECT TRACE : **2**]
 - [**TRACE** : CLEAR / WRITE]
 - [**TRACE** : DETECTOR : CISPR AVERAGE]
 - [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 2 s]
 - [RANGE 2 : RF ATT : 10 dB]
 - [RUN SINGLE]

- Measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 - Trace 1: Level PK+ (= L_{PK+})
 - Trace 2: Level CISPR AVERAGE (= L_{CAV})

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band C

- Signal generator settings:
- Frequency 64 MHz
 - Level -7 dBm
 - Modulation Pulse
- Pulse generator settings:
- Waveform Pulse Continue
 - Pulse width 100 ms
 - Period 1.6 s
- Additional R&S ESR settings:-
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]

- Measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 - Trace 1: Level PK+ (= L_{PK+})
 - Trace 2: Level CISPR AVERAGE (= L_{CAV})

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band D

- Signal generator settings:
- Frequency 650 MHz
 - Level -7 dBm
 - Modulation Pulse
- Pulse generator settings:
- Waveform Pulse Continue
 - Pulse width 100 ms
 - Period 1.6 s
- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level PK+ (= L_{PK+})
- Trace 2: Level CISPR AVERAGE (= L_{CAV})

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -7 dBm
 - Modulation Pulse
- Pulse generator settings:
- Waveform Pulse Continue
 - Pulse width 100 ms
 - Period 1.6 s
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level PK+ (= L_{PK+})
- Trace 2: Level CISPR AVERAGE (= L_{CAV})

Evaluation: The difference between level L_{PK+} and L_{CAV} is to be determined as follows:

$$\Delta L = L_{PK+} - L_{CAV}$$

RMS Average Detector

Test equipment: CISPR pulse generator (Section "Test Equipment", item 16):
 Signal generator with pulse modulation (Section "Test Equipment", item 1)
 Frequency range 9 kHz to 2 GHz

Amplitude Relationship**CISPR Band A**

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings: - CISPR-band A
 - Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

CISPR generator settings: - [**TRACE** : DETECTOR : RMS AVERAGE]
 - [**FREQ** : START : **100.5 kHz**]
 - [**FREQ** : STOP : **101.5 kHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 1 : MEAS TIME: 1 s]
 - [RANGE 1 : RF ATT : 35 dB]
 - [RUN SINGLE]

Measurement: ► Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
 Trace 1: Level RMS AVERAGE (L_{CRMS})

CISPR Band B

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings: - Frequency 1.1 MHz
 - Level -21.1 dBm
 - Modulation Pulse

Pulse generator settings: - Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 20 μ s

Checking the pulse level: - Level 119.9 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

- R&S ESR settings:-
- [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 1 s]
 - [RANGE 2 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level RMS AVERAGE (L_{CRMS})

CISPR Band C

- Signal generator settings:
- Frequency 64 MHz
 - Level -12.4 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 2 μ s
- Checking the pulse level:
- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:-
- [**FREQ** : START : **63.7 MHz**]
 - [**FREQ** : STOP : **64.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 1 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level RMS AVERAGE (L_{CRMS})

CISPR Band D

- Signal generator settings:
- Frequency 650 MHz
 - Level -12.4 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 2 μ s
- Checking the pulse level:
- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.

- Additional R&S ESR settings:
- [**FREQ** : START : **649.7 MHz**]
 - [**FREQ** : STOP : **650.3 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 1 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level RMS AVERAGE (L_{CRMS})

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -1.6 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 200 ns
- Checking the pulse level:
- Level 91.4 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 4 : MEAS TIME: 1 s]
 - [RANGE 4 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level RMS AVERAGE (L_{CRMS})

Variation with Repetition Frequency

CISPR Band A

Test setup: ► Connect output of the auxiliary generator A/B to RF input 1 of R&S ESR

Note:

Switch on pulse generator only after setting R&S ESR.

CISPR generator settings:

- CISPR-band A
- Pulse frequency 25 Hz

Note:

Level is fixed to 60 dB μ V [CISPR 16 A]

R&S ESR settings:

- [**TRACE** : DETECTOR : RMS AVERAGE]
- [**FREQ** : START : **100.5 kHz**]
- [**FREQ** : STOP : **101.5 kHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 1 : MEAS TIME: 1 s]
- [RANGE 1 : RF ATT : 35 dB]
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= reference value $L_{\text{Ref Band A}}$).

CISPR generator settings:

- Pulse frequency: see table of performance test report for values of f_P .

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band A}}$$

CISPR Band B

Test setup: ► Connect RF output of signal generator to RF input 1 of R&S ESR

Signal generator settings:

- Frequency 1.1 MHz
- Level -21.1 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 20 μ s

Checking the pulse level:

- Level 119.9 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

R&S ESR settings:

- [**FREQ** : START : **1.0775 MHz**]
- [**FREQ** : STOP : **1.1225 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 2 : MEAS TIME: 1 s]
- [RANGE 2 : RF ATT : 10 dB]
- [RUN SINGLE]

Reference measurement: ► Set marker to peak of signal

- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= reference value $L_{\text{Ref Band B}}$).

Pulse generator settings: Period $T_P = 1/f_P$: See table of performance test report for values of f_P .

Measurement: ► Set marker to peak of signal

- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band B}}$$

CISPR Band C

Signal generator settings:

- Frequency 64 MHz
- Level -12.4 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 2 μ s

Checking the pulse level:

- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**FREQ** : START : **63.7 MHz**]
- [**FREQ** : STOP : **64.3 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 3 : MEAS TIME: 1 s]
- [RANGE 3 : RF ATT : 10 dB]
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= reference value $L_{\text{Ref Band C/D}}$).

Pulse generator settings:

- Period $T_P = 1/f_P$:

see table of performance test report for values of f_P .

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band D

Signal generator settings:

- Frequency 650 MHz
- Level -12.4 dBm
- Modulation Pulse

Pulse generator settings:

- Period 1 ms ($f_P = 1000$ Hz)
- Pulse width 2 μ s

Checking the pulse level:

- Level 100.6 dB μ V/MHz $\pm$ 0.1 dB

Note:

For measurement of the pulse-modulated signal see annex.

Additional R&S ESR settings:

- [**FREQ** : START : **649.7 MHz**]
- [**FREQ** : STOP : **650.3 MHz**]
- [**SWEEP** : EDIT SCAN TABLE]
- [RANGE 3 : MEAS TIME: 1 s]
- [RANGE 3 : RF ATT : 10 dB]
- [RUN SINGLE]

Reference measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= reference value $L_{\text{Ref Band C/D}}$).

Pulse generator settings:

- Period $T_P = 1/f_P$:

see table of performance test report for values of f_P .

Measurement:

- Set marker to peak of signal
- [MKR $\Rightarrow$: PEAK]

Trace 1: Level RMS AVERAGE (= L_{MEAS})

Evaluation: The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:

$$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -1.6 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 ms ($f_P = 1000$ Hz)
 - Pulse width 200 ns
- Checking the pulse level:
- Level 91.4 dB μ V/MHz $\pm$ 0.1 dB
- Note:**
For measurement of the pulse-modulated signal see annex.
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**TRACE** : DETECTOR : {DETECTOR}]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 4 : MEAS TIME: 1 s]
 - [RANGE 4 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Reference measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 1: Level RMS AVERAGE (= reference value $L_{\text{Ref Band C/D}}$).
- Pulse generator settings:
- Period $T_P = 1/f_P$:
see table of performance test report for values of f_P .
- Measurement:
- Set marker to peak of signal
 - [MKR $\Rightarrow$: PEAK]
- Trace 1: Level RMS AVERAGE (= L_{MEAS})
- Evaluation:
- The difference between level L_{MEAS} and the value recorded in the reference measurement $L_{\text{Ref Band A}}$ is to be determined for each pulse frequency as follows:
- $$\Delta L = L_{\text{MEAS}} - L_{\text{Ref Band C/D}}$$

Response to Intermittent, Unsteady and Drifting Narrowband Disturbance

CISPR Band A

- Signal generator settings:
- Frequency 101 kHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1.6 s
 - Pulse width 160 ms
- R&S ESR settings:
- [**TRACE** : DETECTOR : MAX PEAK]
 - [**TRACE** : SELECT TRACE : **2**]
 - [**TRACE** : CLEAR / WRITE]
 - [**TRACE** : DETECTOR : RMS AVERAGE]
 - [**FREQ** : START : **100.5 kHz**]
 - [**FREQ** : STOP : **101.5 kHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 2 s]
 - [RANGE 2 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 - Trace 1: Level PK+ (= L_{PK+})
 - Trace 2: Level RMS AVERAGE (= $L_{RMS\ AV}$)
- Evaluation:
- The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band B

Signal generator settings: - Frequency 1.1 MHz
 - Level -10 dBm
 - Modulation Pulse

Pulse generator settings: - Period 1.6 s
 - Pulse width 160 ms

R&S ESR settings: - [**TRACE** : DETECTOR : MAX PEAK]
 - [**TRACE** : SELECT TRACE : **2**]
 - [**TRACE** : CLEAR / WRITE]
 - [**TRACE** : DETECTOR : RMS AVERAGE]
 - [**FREQ** : START : **1.0775 MHz**]
 - [**FREQ** : STOP : **1.1225 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 2 : MEAS TIME: 2 s]
 - [RANGE 2 : RF ATT : 10 dB]
 - [RUN SINGLE]

Measurement: ► Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 Trace 1: Level PK+ (= L_{PK+})
 Trace 2: Level RMS AVERAGE (= $L_{RMS\ AV}$)

Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:

$$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band C

- Signal generator settings:
- Frequency 64 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ : START : 63.7 MHz**]
 - [**FREQ : STOP : 64.3 MHz**]
 - [**SWEEP : EDIT SCAN TABLE**]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level PK+ (= L_{PK+})
- Trace 2: Level RMS AVERAGE (= $L_{RMS\ AV}$)

Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:

$$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band D

- Signal generator settings:
- Frequency 650 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ : START : 649.7 MHz**]
 - [**FREQ : STOP : 650.3 MHz**]
 - [**SWEEP : EDIT SCAN TABLE**]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level PK+ (= L_{PK+})
- Trace 2: Level RMS AVERAGE (= $L_{RMS\ AV}$)

Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:

$$\Delta L = L_{PK+} - L_{RMS\ AV}$$

CISPR Band E

- Signal generator settings:
- Frequency 1002.5 MHz
 - Level -10 dBm
 - Modulation Pulse
- Pulse generator settings:
- Period 1 s
 - Pulse width 100 ms
- Additional R&S ESR settings:
- [**FREQ** : START : **1000 MHz**]
 - [**FREQ** : STOP : **1005 MHz**]
 - [**SWEEP** : EDIT SCAN TABLE]
 - [RANGE 3 : MEAS TIME: 2 s]
 - [RANGE 3 : RF ATT : 10 dB]
 - [RUN SINGLE]
- Measurement:
- Set marker to peak of signal
 - [MKR ⇒ : PEAK]
- Trace 1: Level PK+ (= L_{PK+})
- Trace 2: Level RMS AVERAGE (= $L_{RMS\ AV}$)
- Evaluation: The difference between level L_{PK+} and $L_{RMS\ AV}$ is to be determined as follows:
- $$\Delta L = L_{PK+} - L_{RMS\ AV}$$

1.2.15 Annex

1.2.15.1 Measurement of Pulse-Modulated Signals (Pulse Spectral Density)

The pulse spectral density is determined by measuring the level of one spectral line (CISPR 16-1-1, annex E7, method 2).

Absolute Level Accuracy at the Carrier Frequency (f_c)

Test equipment: Signal Generator (Section "Test Equipment", item 3)

Frequency range 100 kHz to 3.6 GHz

Power Meter (Section "Test Equipment", item 7)

Power Sensor (Section "Test Equipment", item 8)

Test setup:

- ▶ Standardize the Power Meter and Power Sensor (item 7, 8).
- ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for f_c .
- ▶ Connect Power Sensor through a cable to RF output of Signal Generator.

Signal Generator settings:

- Frequency f_c
- Level L_{Gen}

Measurement:

- ▶ Adjust level to $L_{Gen} \pm 0.1$ dB as viewed on the Power Meter.
- ▶ Record the Power Meter indication.
- ▶ Disconnect Power Sensor from the cable.
- ▶ Connect the cable to the input of the spectrum analyzer.

Spectrum analyzer settings:

- Center frequency $\{f_c\}$
- Span $\{span\}$
- RBW $\{rbw\}$
- Reference level $\{ref. level\}$

Measurement: Set marker to peak of signal

Evaluation: The difference between the signal levels measured with the power meter and the spectrum analyzer (level reading of marker) reflects the absolute level accuracy of the spectrum analyzer at f_c . It can be calculated as:

$$\Delta Ref / dB = L_{SA} / dBm - L_{powermeter} / dBm$$

See table below for values of L_{GEN} , f_c , span, rbw and reference level.

Pulse Spectral Density

- Test equipment: Signal generator with pulse modulation (Section "Test Equipment", item 3)
 Frequency range 9 kHz to 2 GHz
 Function generator (Section "Test Equipment", item 26)
- Test setup:
- ▶ Connect output of function generator with pulse modulation input of the signal generator.
 - ▶ Adjust the output level of the function generator according to the input of the generator.
 - ▶ Connect RF output of signal generator to RF input of spectrum analyzer
- Signal generator settings:
- Frequency f_c
 - Level- L_{GEN}
- Function generator settings:
- Period $\{T_P\}$
 - Pulse width $\{pw\}$
- Note:**
 $f_p = 1 / T_P$
- Spectrum analyzer settings:
- Center frequency $\{f_c\}$
 - Span $\{span\}$
 - RBW $\{rbw\}$
 - Reference level $\{ref. level\}$
- Measurement:
- ▶ Set marker to peak of signal (= $L_{single\ spectral\ line}$)
- Evaluation: Pulse spectral density can be calculated as:
- $$D = L_{single\ spectral\ line} + \Delta Ref / dB + 20 \times \log (1\ MHz / f_p)$$
- ▶ Adjust the generator level if necessary to achieve the nominal level.

PEAK detector

	Band E
f_C	1002.5 MHz
Ref. level	77 dB μ V
RBW	5 kHz
Span	50 kHz
L_{GEN}	-33 dBm
T_P	20 μ s (f _P = 50 kHz)
Pw	200 ns
L_{single spectral line}	34 dB μ V $\pm$ 0.1 dB
D	60 dB μ V/MHz $\pm$ 0.1 dB

CISPR AV detector

	Band E
f_C	1002.5 MHz
Ref. level	107 dB μ V
RBW	5 kHz
Span	50 kHz
L_{GEN}	-7 dBm
T_P	20 μ s (f _P = 50 kHz)
pw	200 ns
L_{single spectral line}	60 dB μ V $\pm$ 0.1 dB
D	86 dB μ V/MHz $\pm$ 0.1 dB

RMS average detector

	Band B	Band C	Band D	Band E
f_C	1.1 MHz	64 MHz	650 MHz	1002.5 MHz
Ref. level	87 dB μ V	97 dB μ V	97 dB μ V	107 dB μ V
RBW	100 Hz	100 Hz	100 Hz	100 Hz
Span	1000 Hz	1000 Hz	1000 Hz	1000 Hz
L_{GEN}	-21.1 dBm	-12.4 dBm	-12.4 dBm	-1.6 dBm
T_P	1 ms (f _P = 1000 Hz)	1 ms (f _P = 1000 Hz)	1 ms (f _P = 1000 Hz)	1 ms (f _P = 1000 Hz)
pw	20 μ s	2 μ s	2 μ s	200 ns
L_{single spectral line}	51,9 dB μ V $\pm$ 0.1 dB	40,6 dB μ V $\pm$ 0.1 dB	40,6 dB μ V $\pm$ 0.1 dB	31,4 dB μ V $\pm$ 0.1 dB
D	111.9 dB μ V/MHz $\pm$ 0.1 dB	100.6 dB μ V/MHz $\pm$ 0.1 dB	100.6 dB μ V/MHz $\pm$ 0.1 dB	91.4 dB μ V/MHz $\pm$ 0.1 dB

1.3 Performance Test Option Tracking Generator R&S FSV-B9

1.3.1 Checking Absolute Level Uncertainty

Test equipment: N-cable (Section "[Test Equipment](#)", item 15)

Frequency range: 0...7 GHz

Attenuation: < 0.5 dB

Test setup: ► Connect RF Output and RF Input.

R&S ESR settings:- [PRESET]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [SPAN : 0 Hz]
- [**BW** : RES BW MANUAL : **5 Hz**]
- [**BW** : SWEEP TIME MANUAL : **500 ms**]
- [AMPT : -10 dBm]
- [**FREQ** : CENTER : **64 MHz**]
- [**MEAS** : Time Dom Power : **Mean**]
- [**OUTPUT** : STATE : On]
- [**SOURCE** : POWER : **-10dBm**]

Measurement: ► Read out the mean marker.

Evaluation: The difference between the signal level measured with the R&S ESR (level reading of marker 1) and the nominal value reflects the absolute level uncertainty of the tracking generator. It can be calculated as:

$$\text{Level uncertainty}_{64\text{MHz}} = L_{\text{ESR}} + 10 \text{ dBm} + a_{\text{Cable}(64 \text{ MHz})}$$

1.3.2 Checking the Frequency Response

Test equipment: N-cable (Section "[Test Equipment](#)", item 15)

Frequency range: 0...7 GHz

Attenuation: < 0.5 dB

Test setup: ► Connect RF Output and RF Input.

Reference measurement:

R&S ESR settings: - [PRESET]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [SPAN : 0 Hz]
 - [**BW** : RES BW MANUAL : **5 Hz**]
 - [**BW** : SWEEP TIME MANUAL : **500 ms**]
 - [AMPT : -10 dBm]
 - [**FREQ** : CENTER : **64 MHz**]
 - [**MEAS** : Time Dom Power : **Mean**]
 - [**OUTPUT** : STATE : On]
 - [**SOURCE** : POWER : **-10dBm**]

Measurement: ► Read out the mean marker.

Evaluation: ► Calculate:

$$L_{\text{ref}} = L_{\text{ESR}} + a_{\text{Cable}(64 \text{ MHz})}$$

Checking the frequency response (Range 1, with Tracking Generator, Var.03 only)

R&S ESR settings: - [PRESET]
 - [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**FREQ** : START : **9 kHz**]
 - [**FREQ** : STOP : **100 kHz**]
 - [**BW** : RES BW MANUAL : **1 kHz**]
 - [**BW** : SWEEP TIME MANUAL : **10 s**]
 - [AMPT : -10 dBm]
 - [**OUTPUT** : STATE : On]
 - [**SOURCE** : POWER : **-10dBm**]

Measurement: ► Set marker to peak of signal
 - [**MKR** ⇒ : PEAK] (=L_{max} at f₁)
 ► Set marker to minimum value
 - [**MKR** ⇒ : MORE : MIN] (=L_{min} at f₂)

Evaluation: The frequency response can be calculated as:

$$\text{Max. freq. response / dB} = L_{\text{max}} - L_{\text{ref}} + a_{\text{Cable}(f_1)}$$

$$\text{Min. freq. response / dB} = L_{\text{min}} - L_{\text{ref}} + a_{\text{Cable}(f_2)}$$

Take the value of L_{ref} as ascertained before.

Checking the frequency response (Range 2)

- R&S ESR settings: - [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
 - [**FREQ** : START : **100 kHz**]
 - [**BW** : RES BW MANUAL : **50 kHz**]
 - [**BW** : SWEEP TIME MANUAL : **10 s**]
 - [AMPT : -10 dBm]
 - [**OUTPUT** : STATE : On]
 - [**SOURCE** : POWER : **-10dBm**]

- Measurement:
- Set marker to peak of signal
 - [**MKR** ⇒ : PEAK] (= L_{max} at f_1)
 - Set marker to minimum value
 - [**MKR** ⇒ : MORE : MIN] (= L_{min} at f_2)

Evaluation: The frequency response can be calculated as:

$$\text{Max. freq. response / dB} = L_{\text{max}} - L_{\text{ref}} + a_{\text{Cable}(f_1)}$$

$$\text{Min. freq. response / dB} = L_{\text{min}} - L_{\text{ref}} + a_{\text{Cable}(f_2)}$$

Take the value of L_{ref} as ascertained before.

1.4 Performance Test Option RF Preamplifier R&S FSV-B22

1.4.1 Checking Noise Display (DANL)

Test equipment: 50 Ω termination (Section "Test Equipment", item 6)

Frequency range: DC to 7 GHz

- Terminate the RF input of the ESR with 50 Ω

R&S ESR settings:- [PRESET]

- [**AMPT** : 10 dB MIN OFF]
- [**AMPT** : RF ATTEN MANUAL : **0 dB**]
- [**INPUT/OUTPUT** : INPUT DC]
- [**AMPT** : PREAMP ON]
- [SPAN : 0 Hz]
- [**BW** : RES BW MANUAL : **1 kHz**]
- [**BW** : SWEEP TIME MANUAL : **50 ms**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
- [**AMPT** : {RefLev}]
- [**FREQ** : CENTER : { f_n }]
- [**MEAS** : Time Dom Power : **Mean**]

See table of performance test report for values of f_n .

Measurement: ► Read out the mean marker and correct the measurement value by –30 dB for the ratio of 1 Hz / 1 kHz .

Note: For example the DANL in 1 kHz bandwidth –126 dBm results in a corrected value of –156 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 1 kHz bandwidth to reduce measurement time.

Frequency	< 1MHz	< 10MHz	> 10kHz
RefLev	-30 dBm	-60 dBm	-60 dBm

1.4.2 Checking the Level Uncertainty and the Frequency Response

Test equipment: Signal Generator (Section "Test Equipment", item 2)

Frequency range: 10 MHz to 7 GHz

Maximum level: ≥ 0 dBm

Power meter (Section "Test Equipment", item 7)

Power range -30 to 0 dBm

Instrumentation uncertainty <0.5%

Uncertainty of power reference <1.2%

VSWR of power reference <1.10

Power Sensor (Section "Test Equipment", item 8)

Frequency range 9 kHz to 7 GHz

Power range -30 to 0 dBm

Cal factor uncertainty	1 MHz to 3.6 GHz	<1.6 %
	3.6 GHz to 7 GHz	<2 %
	3.6 GHz to 7 GHz	<1.15

VSWR	1 MHz to 3.6 GHz	<1.30
	50 MHz to 128 MHz	<1.10

6 dB Power Splitter (Section "Test Equipment", item 3)

Frequency range DC to 7 GHz

Level imbalance	10 MHz to 3.6 GHz	<0.1 dB
	3.6 to 7 GHz	≤ 0.3 dB

Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1
	3.6 to 7 GHz	≤ 1.3

1.4.2.1 Absolute Level Uncertainty at 64 MHz

- Test setup:
- ▶ Standardize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Set the Power Meter Cal Factor to the appropriate value for the Power Sensor for 64 MHz.
 - ▶ Connect Power Sensor through a cable to RF output of Signal Generator.
- Signal generator settings:
- Frequency 64 MHz
 - Level -10 dBm
- Measurement:
- ▶ Adjust level to -10 dBm $\pm$ 0.1 dB as viewed on the Power Meter.
 - ▶ Record the Power Meter indication.
 - ▶ Disconnect Power Sensor from the cable.
- R&S ESR settings:
- [PRESET]
 - [**AMPT** : RF ATTEN MANUAL : **30 dB**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**AMPT** : PREAMP ON]
 - [AMPT : -10 dBm]
 - [**SWEEP** : SWEEP TIME : **10 ms**]
 - [SPAN : 30 kHz]
 - [**BW** : RES BW MANUAL : **10 kHz**]
 - [**TRACE** : DETECTOR : RMS]
 - [**FREQ** : CENTER : **64 MHz**]
 - ▶ Set marker to peak of signal
 - [**MKR** $\Rightarrow$: PEAK]
- Evaluation:
- The difference between the signal levels measured with the power meter and the R&S ESR (level reading of marker 1) reflects the absolute level uncertainty of the R&S ESR. It can be calculated as:

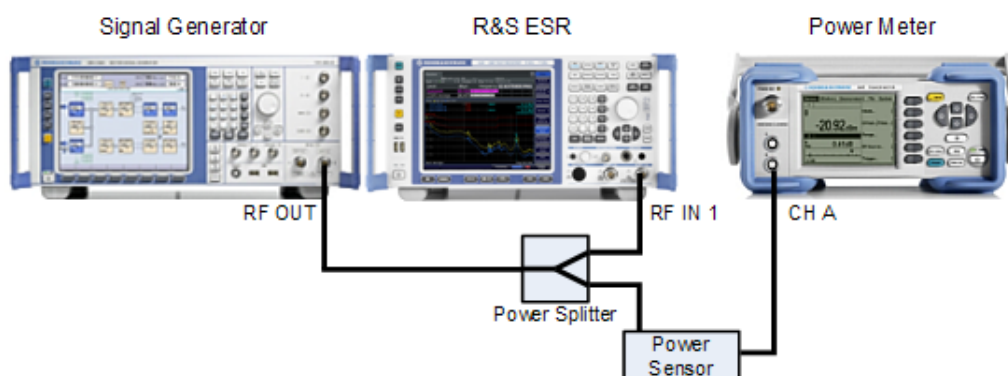
$$\text{Level uncertainty}_{64\text{MHz}} = L_{\text{ESR}} - L_{\text{powermeter}}$$

1.4.2.2 Frequency Response

Checking the frequency response

Note: If a power splitter with higher level imbalance is used, correction of the measured frequency response is recommended.

- Test setup:
- ▶ Standardize the Power Meter and Power Sensor (item 7, 8).
 - ▶ Use Power Splitter/Combiner (item 3) and connect equipment as shown below.
 - ▶ Connect the power splitter directly to the R&S ESR RF input 1.



Important Note

Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

- Signal generator settings:
- Level 0 dBm
 - Frequency 64 MHz
- R&S ESR settings:
- [PRESET]
 - [INPUT/OUTPUT : INPUT DC]
 - [AMPT : RF ATTEN MANUAL : 30 dB]
 - [AMPT : PREAMP ON]
 - [AMPT : 0 dBm]
 - [SPAN : 100 kHz]
 - [BW : RES BW MANUAL : 10 kHz]
 - [TRACE : DETECTOR : RMS]
 - [FREQ : CENTER : 64 MHz]
 - [MKR ⇒ : MORE : EXCLUDE LO]

Reference measurement:

- ▶ Determine signal level $L_{\text{powermeter}}$.
- ▶ Set marker to peak of signal
- [MKR ⇒ : PEAK]
- ▶ Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter:

- ▶ Read level indication from power meter : $L_{\text{PowerMeter}}$

Evaluation: ► Calculate

$$\Delta \text{Ref} / \text{dB} = L_{\text{ESR}} / \text{dBm} - L_{\text{PowerMeter}} / \text{dBm}$$

► Record

$$\Delta \text{Ref} / \text{dB}$$

Frequency Response Measurement:

Signal generator - Frequency f_{fresp}

settings: See table of performance test report for values of f_{fresp}

R&S ESR settings: - [**SPAN** : {span}]

- [**FREQ** : CENTER : { f_{fresp} }]

- [**BW** : RES BW MANUAL : {**RBW**}]

See table below for values of span and resolution bandwidth.

See table of performance test report for values of f_{fresp}

► Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

► Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Power Meter: ► Read level indication from Power Meter : $L_{\text{PowerMeter}}$

Evaluation: ► The frequency response can be calculated as:

$$\text{Freq. response} / \text{dB} = L_{\text{ESR}} - L_{\text{PowerMeter}} - \Delta \text{Ref} / \text{dB}$$

f_{center}	9 kHz	100.02 kHz	1,005 MHz	≥10 MHz
Span	0 Hz	0Hz	0 Hz	100 kHz
RBW	10 Hz	1 kHz	10 kHz	10 kHz

1.5 Performance Test Option Frequency Range Extension 10 Hz R&S ESR-B29

1.5.1 Checking Noise Display (DANL)

Test equipment: 50 Ω termination (Section "Test Equipment", item 5)

Frequency range: DC to 7 GHz

- Terminate the RF input of the ESR with 50 Ω

R&S ESR settings: - [PRESET]
 - [**INPUT/OUTPUT** : PRESELECTOR {state}]
 - [**AMPT** : 10 dB MIN OFF]
 - [**AMPT** : RF ATTEN MANUAL : **0 dB**]
 - [**INPUT/OUTPUT** : INPUT DC]
 - [**AMPT** : PREAMPLIFIER {state}]
 - [SPAN : 0 Hz]
 - [**BW** : RES BW MANUAL : **10 Hz**]
 - [**BW** : SWEEP TIME MANUAL : **500 ms**]
 - [**TRACE 1** : AVERAGE]
 - [**TRACE 1** : SWEEP COUNT : **20 ENTER**]
 - [AMPT : -10 dBm]
 - [**FREQ** : CENTER : { f_n }]
 - [**MEAS** : Time Dom Power : **Mean**]

See table of performance test report for values of f_n and state of preselector and preamplifier.

Measurement: ► Read out the mean marker and correct the measurement value by -10 dB for the ratio of 1 Hz / 10 Hz.

Note: For example the DANL in 10 Hz bandwidth -120 dBm results in a corrected value of -130 dBm in 1 Hz bandwidth.

As both filter designs are digitally and using the same hardware setting, the DANL can be measured also with 10 Hz bandwidth to reduce measurement time.

1.5.2 Checking the Frequency Response

Test equipment: Signal Generator (Section "Test Equipment", item 1)

Frequency range 10 Hz to 128 MHz

Maximum level ≥ 0 dBm

Voltmeter (Section "Test Equipment", item 11)

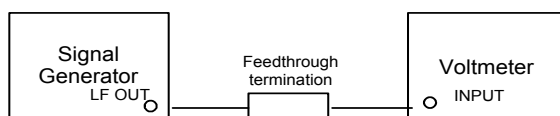
Frequency range 10 Hz to 100 kHz

50 Ω feedthrough termination (Section "Test Equipment", item 14)

Reference measurement: See chapter "Frequency Response (< 7 GHz)"

Signal generator calibration:

Test setup: ► Connect the LF output of the signal generator via the feedthrough termination with the input of the voltmeter.



Ambient temperature: 20°C to 30°C

Signal generator settings: - $V_{\text{Gen I}}$ 70,7 mV (-10 dBm)
13 mV (-25 dBm) with Preamplifier = On

Measurement: ► Set the Signal Generator frequency to the first value listed in the table below.
► Read the voltage at the voltmeter. Calculate the level / dBm as follows:

$$L_{\text{Gen}} / \text{dBm} = 10 \times \log((V_{\text{Gen}}^2 / 50 \text{ Ohm}) / 1 \text{ mW})$$

► Record the measured values in the table below.

Repeat the steps for the remaining frequencies listed in the table below.

Applied frequency (f_{fresp}) $L_{\text{Gen}} / \text{dBm}$

10 Hz	_____
110 Hz	_____
1010 Hz	_____
2010 Hz	_____
3010 Hz	_____
5010 Hz	_____
7010 Hz	_____
8990 Hz	_____

Checking the frequency response

Test setup: ► Connect the LF output of the signal generator with the input of the R&S ESR.

Signal Generator - Frequency f_{fresp}

settings: See table of performance test report for values of f_{fresp}

R&S ESR settings: - [PRESET]
 - [INPUT/OUTPUT : INPUT DC]
 - [AMPT : RF ATTEN MANUAL : 10 dB]
 - [INPUT/OUTPUT : PRESELECTOR {state}]
 - [AMPT : -5 dBm]
 - [AMPT : PREAMP {state}]
 - [SPAN : 10 Hz]
 - [BW : RES BW MANUAL : 10 Hz]
 - [TRACE : DETECTOR : RMS]

Measurement: - [FREQ : CENTER : { f_{fresp} }]
 ► See table in performance test report for values of f_{fresp} and state of preselector
 ► Set marker to peak of signal
 - [MKR ⇒ : PEAK]
 ► Read level indication from R&S ESR (reading of marker 1): L_{ESR}

Evaluation: The frequency response can be calculated as:

$$\text{Freq. response / dB} = L_{\text{ESR}} - L_{\text{Gen}} - \Delta\text{Ref / dB}$$

Take the value of ΔRef as ascertained before.

1.5.3 Checking IF Filters

Test equipment: Signal generator (Section "Test Equipment", item 1):

Frequency 64 MHz

Level ≥ 0 dBm

Test setup: ► Connect RF output of the signal generator to the RF input of the R&S ESR.

1.5.3.1 Checking the Bandwidth Switching Level Uncertainty

Reference measurement (RBW 10 kHz)

Signal generator - Frequency: 64 MHz

settings: - Level: -20 dBm

R&S ESR settings: - [PRESET]

- [AMPT : -15 dBm]

- [**AMPT** : RF ATTEN MANUAL : **10 dB**]

- [**FREQ** : CENTER : **64 MHz**]

- [**BW** : COUPLING RATIO : SPAN / RBW MANUAL : **1 : ENTER**]

- [SPAN : 10 kHz]

- [**SWEEP** : SWEETIME : **100 ms**]

- [**TRACE** : DETECTOR : RMS]

Reference measurement: ► Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

► Set reference to peak of signal

- [**MKR** : REFERENCE FIXED]

Checking the level uncertainty:

R&S ESR settings: - [**SPAN** : {1 x RBW}]

- [**BW** : FILTER TYPE : EMI]

- [**BW** : RBW MANUAL : {RBW} : Hz]

See table of performance test report for values of RBW.

Measurement: ► Set marker to peak of signal

- [**MKR** ⇒ : PEAK]

Evaluation: The level difference is displayed in the marker field by the reading

'Delta [T1 FXD] {xxx} dB'.

Note: To check the FFT filter, the sweep mode has to be set manually to FFT mode.

- [**SWEEP** : SWEEP MODE : FFT]

1.5.3.2 Checking Bandwidth

- Signal generator settings: - Frequency: 64 MHz
- Level: -0 dBm
- R&S ESR settings:- [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**AMPT** : **0 dBm**]
- [**FREQ** : CENTER : **64 MHz**]
- [**BW** : COUPLING RATIO : SPAN/RBW MANUAL : **3** : **ENTER**]
▶ Determine Bandwidth
- [**BW** : FILTER TYPE : EMI]
- [**BW** : RBW MANUAL : {RBW} : **Hz**]
- [**MKR FCTN** : N DB DOWN : **6 dB**]
- [**SPAN** : {3 x RBW}]
See table of performance test report for values of RBW.
- Measurement: - [**MKR** ⇒ : PEAK]
The bandwidth is displayed by the reading 'BW {bandwidth}'.

1.5.3.3 Checking the Shape Factor

- Signal generator settings: - Frequency: 64 MHz
- Level: 0 dBm
- R&S ESR settings:- [PRESET]
- [**AMPT** : RF ATTEN MANUAL : **10 dB**]
- [**AMPT** : 0 dBm]
- [**FREQ** : CENTER : **64 MHz**]
- [**BW** : COUPLING RATIO : SPAN/RBW MANUAL : **20 ENTER**]
▶ Determine 60-dB-Bandwidth
- [**BW** : FILTER TYPE : EMI]
- [**BW** : RBW MANUAL : {RBW} : **Hz**]
- [**BW** : COUPLING RATIO : RBW/VBW NOISE [10]]
- [**MKR FCTN** : N DB DOWN : **60 dB**]
- [**SPAN** : {20 x RBW}]
See table of performance test report for values RBW.
- Measurement: - [**MKR** ⇒ : PEAK]
The 60 dB bandwidth is displayed by the reading 'BW {bandwidth}'.
- Evaluation: The shape factor is calculated by BW (60dB) / BW (6dB).

1.6 Performance Test Report R&S ESR

ROHDE&SCHWARZ	EMI Test Receiver	1316.3003.03/07
Serial number:		
Date:		
Person responsible:		
Signature:		



Nominal data and limits

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
	General Tests				
Page 14	DC-Offset at the RF-Input f_{in}				
	ESR 26:				
	1 GHz	-0.5	_____	0.5	V
	9 GHz	-0.5	_____	0.5	V
Page 15	Reference Frequency Uncertainty				
	Basic unit	999.999	_____	1000.001	MHz
	with option R&S FSV-B4	999.9999	_____	1000.0001	MHz
Page 16	2 nd IF Image Frequency Rejection f_{in}				
	ESR 3/7/26:				
	101 MHz	80	_____	-	dB
	1799 MHz	80	_____	-	dB
	3599 MHz	80	_____	-	dB
	ESR 7/26:				
	5299 MHz	80	_____	-	dB
	6999 MHz	80	_____	-	dB
	ESR 26:				
	9999 MHz	80	_____	-	dB
	17999 MHz	80	_____	-	dB
	25999 MHz *)	80	_____	-	dB
	*) $f_{in} - 2 \times 729.9 \text{ MHz}$				

Page 16	3rd IF Image Frequency Rejection f_{in}				
	ESR 3/7/26:				
	101 MHz	80	_____	-	dB
	3599 MHz	80	_____	-	dB
	ESR 7/26:				
	6999 MHz	80	_____	-	dB
	ESR26:				
	9999 MHz	80	_____	-	dB
	21999 MHz	80	_____	-	dB
Page 17	2nd IF Rejection f_{in}				
	ESR 3/7/26:				
	101 MHz	80	_____	-	dB
	3599 MHz	80	_____	-	
	ESR 7/26:				
	5299 MHz	80	_____	-	
	6999 MHz	80	_____	-	
	ESR 26:				
	9999 MHz	80	_____	-	dB
	21999 MHz	80	_____	-	dB
Page 17	3rd IF Rejection f_{in}				
	1001 MHz	80	_____	-	dB
Page 18	Third-Order Intercept Point Preselector off, preamplifier off f_{in}				
	ESR 3/7/26:				
	10.2 MHz	12	_____	-	dBm
	50.2 MHz	12	_____	-	dBm
	100.2 MHz	13	_____	-	dBm
	600.2 MHz	13	_____	-	dBm
	1100.2 MHz	13	_____	-	dBm
	1600.2 MHz	13	_____	-	dBm
	2100.2 MHz	13	_____	-	dBm
	2600.2 MHz	13	_____	-	dBm
	3100.2 MHz	13	_____	-	dBm
	3599.2 MHz	13	_____	-	dBm
	ESR 7/26:				
	3601.2 MHz	15	_____	-	dBm
	4101.2 MHz	15	_____	-	dBm
	4601.2 MHz	15	_____	-	dBm

	5101.2 MHz	15	_____	-	dBm
	5601.2 MHz	15	_____	-	dBm
	6101.2 MHz	15	_____	-	dBm
	6601.2 MHz	15	_____	-	dBm
	6999.2 MHz	15	_____	-	dBm
	ESR 26:				
	7999 MHz	15	_____		dBm
	8999 MHz	15	_____		dBm
	9999 MHz	15	_____		dBm
	10999 MHz	15	_____		dBm
	11999 MHz	15	_____		dBm
	12999 MHz	15	_____		dBm
	13999 MHz	15	_____		dBm
	15999 MHz	15	_____		dBm
	17999 MHz	15	_____		dBm
	19999 MHz	15	_____		dBm
	21999 MHz	15	_____		dBm
	23999 MHz	15	_____		dBm
	25999 MHz	15	_____		dBm
	26499 MHz	15	_____		dBm
Page 18	Third-Order Intercept Point Preselector on, preamplifier off f_{in}				
	ESR 3/7/26:				
	10.2 MHz	5	_____	-	dBm
	50.2 MHz	5	_____	-	dBm
	100.2 MHz	8	_____	-	dBm
	600.2 MHz	8	_____	-	dBm
	1100.2 MHz	8	_____	-	dBm
	1600.2 MHz	8	_____	-	dBm
	2100.2 MHz	8	_____	-	dBm
	2600.2 MHz	8	_____	-	dBm
	3100.2 MHz	8	_____	-	dBm
	3599.2 MHz	8	_____	-	dBm
	ESR 7/26:				
	3601.2 MHz	8	_____	-	dBm
	4101.2 MHz	8	_____	-	dBm
	4601.2 MHz	5	_____	-	dBm
	5101.2 MHz	5	_____	-	dBm
	5601.2 MHz	5	_____	-	dBm
	6101.2 MHz	5	_____	-	dBm

	6601.2 MHz	5	_____	-	dBm
	6999.2 MHz	5	_____	-	dBm
Page 18	Third-Order Intercept Point Preselector on, preamplifier on f_{in}				
	ESR 3/7/26:				
	10.2 MHz	- 16	_____	-	dBm
	50.2 MHz	- 16	_____	-	dBm
	100.2 MHz	- 14	_____	-	dBm
	600.2 MHz	- 14	_____	-	dBm
	1100.2 MHz	- 14	_____	-	dBm
	1600.2 MHz	- 14	_____	-	dBm
	2100.2 MHz	- 14	_____	-	dBm
	2600.2 MHz	- 14	_____	-	dBm
	3100.2 MHz	- 14	_____	-	dBm
	3599.2 MHz	- 14	_____	-	dBm
	ESR 7/26:				
	3601.2 MHz	- 10	_____	-	dBm
	4101.2 MHz	- 10	_____	-	dBm
	4601.2 MHz	- 10	_____	-	dBm
	5101.2 MHz	- 10	_____	-	dBm
	5601.2 MHz	- 10	_____	-	dBm
	6101.2 MHz	- 10	_____	-	dBm
	6601.2 MHz	- 10	_____	-	dBm
	6999.2 MHz	- 10	_____	-	dBm
Page 19	Bandwidth switching level uncertainty sweep mode, Normal (3dB) RBW				
	40 MHz	-0.1	_____	0.1	dB
	28 MHz	-0.1	_____	0.1	dB
	20 MHz	-0.1	_____	0.1	dB
	10 MHz	-0.1	_____	0.1	dB
	5 MHz	-0.1	_____	0.1	dB
	3 MHz	-0.1	_____	0.1	dB
	2 MHz	-0.1	_____	0.1	dB
	1 MHz	-0.1	_____	0.1	dB
	500 kHz	-0.1	_____	0.1	dB
	300 kHz	-0.1	_____	0.1	dB
	200 kHz	-0.1	_____	0.1	dB
	100 kHz	-0.1	_____	0.1	dB
	10 kHz		Reference		
	1 kHz	-0.1	_____	0.1	dB

	100 Hz	-0.1	_____	0.1	dB
Page 19	Bandwidth switching level uncertainty FFT mode, Normal (3dB) RBW				
	300 kHz	-0.2	_____	0.2	dB
	200 kHz	-0.2	_____	0.2	dB
	100 kHz	-0.2	_____	0.2	dB
	10 kHz	-0.2	_____	0.2	dB
	1 kHz	-0.2	_____	0.2	dB
	100 Hz	-0.2	_____	0.2	dB
Page 19	Bandwidth switching level uncertainty Sweep mode, EMI (6dB) RBW				
	1MHz	-0.1	_____	0.1	dB
	120 kHz	-0.1	_____	0.1	dB
	9 kHz	-0.1	_____	0.1	dB
	200 Hz	-0.1	_____	0.1	dB
Page 19	Bandwidth switching level uncertainty FFT mode, EMI (6dB) RBW				
	1MHz	-0.2	_____	0.2	dB
	120 kHz	-0.2	_____	0.2	dB
	9 kHz	-0.2	_____	0.2	dB
	200 Hz	-0.2	_____	0.2	dB
Page 20	Bandwidth Normal (3dB) RBW				
	10 MHz	-3	_____	+3	%
	5 MHz	-3	_____	+3	%
	3 MHz	-3	_____	+3	%
	2 MHz	-3	_____	+3	%
	1 MHz	-3	_____	+3	%
	500 kHz	-3	_____	+3	%
	300 kHz	-3	_____	+3	%
	200 kHz	-3	_____	+3	%
	100 kHz	-3	_____	+3	%
	10 kHz	-3	_____	+3	%
	1 kHz	-3	_____	+3	%
	100 Hz	-3	_____	+3	%
Page 20	Bandwidth EMI (6dB) RBW				
	1 MHz	-3	_____	+3	%
	120 kHz	-3	_____	+3	%

	9 kHz	-3	_____	+3	%
	200 Hz	-3	_____	+3	%
Page 20	Shape Factor Normal (3dB) RBW				
	10 MHz	-	_____	5	
	5 MHz	-	_____	5	
	3 MHz	-	_____	5	
	2 MHz	-	_____	5	
	1 MHz	-	_____	5	
	500 kHz	-	_____	5	
	300 kHz	-	_____	5	
	200 kHz	-	_____	5	
	100 kHz	-	_____	5	
	10 kHz	-	_____	5	
	1 kHz	-	_____	5	
	100 Hz	-	_____	5	
Page 20	Shape Factor EMI (6dB) RBW				
	1 MHz	-	_____	4	
	120 kHz	-	_____	4	
	9 kHz	-	_____	4	
	200 Hz	-	_____	4	
	Overall selectivity RBW				
	200 Hz				
	B1.5 dB	90	_____	220	Hz
	B6 dB	180	_____	220	Hz
	B20 dB	180	_____	440	Hz
	9 kHz				
	B _{1.5} dB	4	_____	10	kHz
	B ₆ dB	8	_____	10	kHz
	B ₂₀ dB	8	_____	20	kHz
	120 kHz				
	B _{1.5} dB	40	_____	140	kHz
	B ₆ dB	100	_____	140	kHz
	B ₂₀ dB	100	_____	280	kHz
	1 MHz				

	B ₃ dB	0.5	_____	1.1	MHz
	B ₆ dB	0.75	_____	1.1	MHz
	B ₉ dB	0.9	_____	2	MHz
	B ₂₀ dB	0.9	_____	2.7	MHz
Page 21	Spurious Response f _{spur}				
	16 MHz	-	_____	-103	dBm
	32 MHz	-	_____	-103	dBm
	64 MHz	-	_____	-103	dBm
	128 MHz	-	_____	-103	dBm
	256 MHz	-	_____	-103	dBm
	384 MHz	-	_____	-103	dBm
Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 23	Noise Display normalized to 1 Hz Preselector off, preamplifier off f _n				
	ESR 3/7:				
	9 kHz	-	_____	-130	dBm
	99 kHz	-	_____	-130	dBm
	999 kHz	-	_____	-145	dBm
	10.1 MHz	-	_____	-152	dBm
	19.99 MHz	-	_____	-152	dBm
	49.99 MHz	-	_____	-152	dBm
	99.99 MHz	-	_____	-152	dBm
	199.9 MHz	-	_____	-152	dBm
	499.9 MHz	-	_____	-152	dBm
	599.9 MHz	-	_____	-152	dBm
	699.9 MHz	-	_____	-152	dBm
	799.9 MHz	-	_____	-152	dBm
	899.9 MHz	-	_____	-152	dBm
	999.9 MHz	-	_____	-152	dBm
	1199.9 MHz	-	_____	-150	dBm
	1399.9 MHz	-	_____	-150	dBm
	1599.9 MHz	-	_____	-150	dBm
	1799.9 MHz	-	_____	-150	dBm
	1999.9 MHz	-	_____	-150	dBm
	2199.9 MHz	-	_____	-150	dBm
	2399.9 MHz	-	_____	-150	dBm
	2599.9 MHz	-	_____	-150	dBm
	2799.9 MHz	-	_____	-150	dBm

	2999.9 MHz	-	_____	-150	dBm
	3199.9 MHz	-	_____	-150	dBm
	3399.9 MHz	-	_____	-150	dBm
	3599.9 MHz	-	_____	-150	dBm
	ESR 7:				
	3601.0 MHz	-	_____	-148	dBm
	3799.9 MHz	-	_____	-148	dBm
	3999.9 MHz	-	_____	-148	dBm
	4199.9 MHz	-	_____	-148	dBm
	4399.9 MHz	-	_____	-148	dBm
	4599.9 MHz	-	_____	-148	dBm
	4799.9 MHz	-	_____	-148	dBm
	4999.9 MHz	-	_____	-148	dBm
	5199.9 MHz	-	_____	-148	dBm
	5399.9 MHz	-	_____	-148	dBm
	5599.9 MHz	-	_____	-148	dBm
	5799.9 MHz	-	_____	-148	dBm
	5999.9 MHz	-	_____	-148	dBm
	6199.9 MHz	-	_____	-146	dBm
	6399.9 MHz	-	_____	-146	dBm
	6599.9 MHz	-	_____	-146	dBm
	6799.9 MHz	-	_____	-146	dBm
	6999.9 MHz	-	_____	-146	dBm
Page 23	Noise Display normalized to 1 Hz Preselector off, preamplifier off fn				
	ESR 26:				
	9 kHz	-	_____	-130	dBm
	99 kHz	-	_____	-130	dBm
	999 kHz	-	_____	-145	dBm
	10.1 MHz	-	_____	-150	dBm
	19.99 MHz	-	_____	-150	dBm
	49.99 MHz	-	_____	-150	dBm
	99.99 MHz	-	_____	-150	dBm
	199.9 MHz	-	_____	-150	dBm
	499.9 MHz	-	_____	-150	dBm
	599.9 MHz	-	_____	-150	dBm
	699.9 MHz	-	_____	-150	dBm
	799.9 MHz	-	_____	-150	dBm
	899.9 MHz	-	_____	-150	dBm
	999.9 MHz	-	_____	-150	dBm

	1000.1 MHz	-	_____	-147	dBm
	1199.9 MHz	-	_____	-147	dBm
	1399.9 MHz	-	_____	-147	dBm
	1599.9 MHz	-	_____	-147	dBm
	1799.9 MHz	-	_____	-147	dBm
	1999.9 MHz	-	_____	-147	dBm
	2199.9 MHz	-	_____	-147	dBm
	2399.9 MHz	-	_____	-147	dBm
	2599.9 MHz	-	_____	-147	dBm
	2799.9 MHz	-	_____	-147	dBm
	2999.9 MHz	-	_____	-147	dBm
	3199.9 MHz	-	_____	-147	dBm
	3399.9 MHz	-	_____	-147	dBm
	3599.9 MHz	-	_____	-147	dBm
	3600.1 MHz	-	_____	-144	dBm
	3999.9 MHz	-	_____	-144	dBm
	4199.9 MHz	-	_____	-144	dBm
	4399.9 MHz	-	_____	-144	dBm
	4599.9 MHz	-	_____	-144	dBm
	4799.9 MHz	-	_____	-144	dBm
	4999.9 MHz	-	_____	-144	dBm
	5199.9 MHz	-	_____	-144	dBm
	5399.9 MHz	-	_____	-144	dBm
	5599.9 MHz	-	_____	-144	dBm
	5799.9 MHz	-	_____	-144	dBm
	5999.9 MHz	-	_____	-144	dBm
	6000.1 MHz	-	_____	-141	dBm
	6199.9 MHz	-	_____	-141	dBm
	6399.9 MHz	-	_____	-141	dBm
	6599.9 MHz	-	_____	-141	dBm
	6799.9 MHz	-	_____	-141	dBm
	6999.9 MHz	-	_____	-141	dBm
	7399.9 MHz	-	_____	-141	dBm
	7400.1 MHz	-	_____	-145	dBm
	7999.9 MHz	-	_____	-145	dBm
	8499.9 MHz	-	_____	-145	dBm
	8999.9 MHz	-	_____	-145	dBm
	9499.9 MHz	-	_____	-145	dBm
	9999.9 MHz	-	_____	-145	dBm
	10499.9 MHz	-	_____	-145	dBm

	10999.9 MHz	-	_____	-145	dBm
	11499.9 MHz	-	_____	-145	dBm
	11999.9 MHz	-	_____	-145	dBm
	12499.9 MHz	-	_____	-145	dBm
	12999.9 MHz	-	_____	-145	dBm
	13599.9 MHz	-	_____	-145	dBm
	13600.1 MHz	-	_____	-143	dBm
	14999.9 MHz	-	_____	-143	dBm
	15000.1 MHz	-	_____	-141	dBm
	16999.9 MHz	-	_____	-141	dBm
	17999.9 MHz	-	_____	-141	dBm
	18999.9 MHz	-	_____	-141	dBm
	19999.9 MHz	-	_____	-141	dBm
	20999.9 MHz	-	_____	-141	dBm
	21999.9 MHz	-	_____	-141	dBm
	22999.9 MHz	-	_____	-141	dBm
	23999.9 MHz	-	_____	-141	dBm
	24999.9 MHz	-	_____	-141	dBm
	25999.9 MHz	-	_____	-141	dBm
	26499.9 MHz	-	_____	-141	dBm
Page 23	Noise Display normalized to 1 Hz Preselector on, preamplifier off fn				
	ESR 3/7:				
	9 kHz	-	_____	-130	dBm
	99 kHz	-	_____	-130	dBm
	999 kHz	-	_____	-145	dBm
	10.1 MHz	-	_____	-152	dBm
	19.99 MHz	-	_____	-152	dBm
	49.99 MHz	-	_____	-152	dBm
	99.99 MHz	-	_____	-152	dBm
	199.9 MHz	-	_____	-152	dBm
	499.9 MHz	-	_____	-152	dBm
	599.9 MHz	-	_____	-152	dBm
	699.9 MHz	-	_____	-152	dBm
	799.9 MHz	-	_____	-152	dBm
	899.9 MHz	-	_____	-152	dBm
	999.9 MHz	-	_____	-152	dBm
	1199.9 MHz	-	_____	-150	dBm
	1399.9 MHz	-	_____	-150	dBm
	1599.9 MHz	-	_____	-150	dBm

	1799.9 MHz	-	_____	-150	dBm
	1999.9 MHz	-	_____	-150	dBm
	2199.9 MHz	-	_____	-150	dBm
	2399.9 MHz	-	_____	-150	dBm
	2599.9 MHz	-	_____	-150	dBm
	2799.9 MHz	-	_____	-150	dBm
	2999.9 MHz	-	_____	-150	dBm
	3199.9 MHz	-	_____	-150	dBm
	3399.9 MHz	-	_____	-150	dBm
	3599.9 MHz	-	_____	-150	dBm
	ESR 7:				
	3601.0 MHz	-	_____	-148	dBm
	3799.9 MHz	-	_____	-148	dBm
	3999.9 MHz	-	_____	-148	dBm
	4199.9 MHz	-	_____	-148	dBm
	4399.9 MHz	-	_____	-148	dBm
	4599.9 MHz	-	_____	-148	dBm
	4799.9 MHz	-	_____	-148	dBm
	4999.9 MHz	-	_____	-148	dBm
	5199.9 MHz	-	_____	-148	dBm
	5399.9 MHz	-	_____	-148	dBm
	5599.9 MHz	-	_____	-148	dBm
	5799.9 MHz	-	_____	-148	dBm
	5999.9 MHz	-	_____	-148	dBm
	6199.9 MHz	-	_____	-146	dBm
	6399.9 MHz	-	_____	-146	dBm
	6599.9 MHz	-	_____	-146	dBm
	6799.9 MHz	-	_____	-146	dBm
	6999.9 MHz	-	_____	-146	dBm
Page 23	Noise Display normalized to 1 Hz Preselector on, preamplifier off fn				
	ESR 26:				
	9 kHz	-	_____	-130	dBm
	99 kHz	-	_____	-130	dBm
	999 kHz	-	_____	-145	dBm
	10.1 MHz	-	_____	-150	dBm
	19.99 MHz	-	_____	-150	dBm
	49.99 MHz	-	_____	-150	dBm
	99.99 MHz	-	_____	-150	dBm
	199.9 MHz	-	_____	-150	dBm

	499.9 MHz	-	_____	-150	dBm
	599.9 MHz	-	_____	-150	dBm
	699.9 MHz	-	_____	-150	dBm
	799.9 MHz	-	_____	-150	dBm
	899.9 MHz	-	_____	-150	dBm
	999.9 MHz	-	_____	-150	dBm
	1000.1 MHz	-	_____	-147	dBm
	1199.9 MHz	-	_____	-147	dBm
	1399.9 MHz	-	_____	-147	dBm
	1599.9 MHz	-	_____	-147	dBm
	1799.9 MHz	-	_____	-147	dBm
	1999.9 MHz	-	_____	-147	dBm
	2199.9 MHz	-	_____	-147	dBm
	2399.9 MHz	-	_____	-147	dBm
	2599.9 MHz	-	_____	-147	dBm
	2799.9 MHz	-	_____	-147	dBm
	2999.9 MHz	-	_____	-147	dBm
	3199.9 MHz	-	_____	-147	dBm
	3399.9 MHz	-	_____	-147	dBm
	3599.9 MHz	-	_____	-147	dBm
	3600.1 MHz	-	_____	-144	dBm
	3999.9 MHz	-	_____	-144	dBm
	4199.9 MHz	-	_____	-144	dBm
	4399.9 MHz	-	_____	-144	dBm
	4599.9 MHz	-	_____	-144	dBm
	4799.9 MHz	-	_____	-144	dBm
	4999.9 MHz	-	_____	-144	dBm
	5199.9 MHz	-	_____	-144	dBm
	5399.9 MHz	-	_____	-144	dBm
	5599.9 MHz	-	_____	-144	dBm
	5799.9 MHz	-	_____	-144	dBm
	5999.9 MHz	-	_____	-144	dBm
	6000.1 MHz	-	_____	-141	dBm
	6199.9 MHz	-	_____	-141	dBm
	6399.9 MHz	-	_____	-141	dBm
	6599.9 MHz	-	_____	-141	dBm
	6799.9 MHz	-	_____	-141	dBm
	6999.9 MHz	-	_____	-141	dBm
	7399.9 MHz	-	_____	-141	dBm
	7400.1 MHz	-	_____	-145	dBm

	7999.9 MHz	-	_____	-145	dBm
	8499.9 MHz	-	_____	-145	dBm
	8999.9 MHz	-	_____	-145	dBm
	9499.9 MHz	-	_____	-145	dBm
	9999.9 MHz	-	_____	-145	dBm
	10499.9 MHz	-	_____	-145	dBm
	10999.9 MHz	-	_____	-145	dBm
	11499.9 MHz	-	_____	-145	dBm
	11999.9 MHz	-	_____	-145	dBm
	12499.9 MHz	-	_____	-145	dBm
	12999.9 MHz	-	_____	-145	dBm
	13599.9 MHz	-	_____	-145	dBm
	13600.1 MHz	-	_____	-143	dBm
	14999.9 MHz	-	_____	-143	dBm
	15000.1 MHz	-	_____	-141	dBm
	16999.9 MHz	-	_____	-141	dBm
	17999.9 MHz	-	_____	-141	dBm
	18999.9 MHz	-	_____	-141	dBm
	19999.9 MHz	-	_____	-141	dBm
	20999.9 MHz	-	_____	-141	dBm
	21999.9 MHz	-	_____	-141	dBm
	22999.9 MHz	-	_____	-141	dBm
	23999.9 MHz	-	_____	-141	dBm
	24999.9 MHz	-	_____	-141	dBm
	25999.9 MHz	-	_____	-141	dBm
	26499.9 MHz	-	_____	-141	dBm
Page 23	Noise Display normalized to 1 Hz preselector on, preamplifier on fn				
	ESR 3/7:				
	9 kHz	-	_____	-150	dBm
	99 kHz	-	_____	-150	dBm
	999 kHz	-	_____	-155	dBm
	10.1 MHz	-	_____	-165	dBm
	19.99 MHz	-	_____	-165	dBm
	49.99 MHz	-	_____	-165	dBm
	99.99 MHz	-	_____	-165	dBm
	199.9 MHz	-	_____	-165	dBm
	499.9 MHz	-	_____	-165	dBm
	599.9 MHz	-	_____	-165	dBm
	699.9 MHz	-	_____	-165	dBm

	799.9 MHz	-	_____	-165	dBm
	899.9 MHz	-	_____	-165	dBm
	999.9 MHz	-	_____	-165	dBm
	1199.9 MHz	-	_____	-162	dBm
	1399.9 MHz	-	_____	-162	dBm
	1599.9 MHz	-	_____	-162	dBm
	1799.9 MHz	-	_____	-162	dBm
	1999.9 MHz	-	_____	-162	dBm
	2199.9 MHz	-	_____	-162	dBm
	2399.9 MHz	-	_____	-162	dBm
	2599.9 MHz	-	_____	-162	dBm
	2799.9 MHz	-	_____	-162	dBm
	2999.9 MHz	-	_____	-162	dBm
	3199.9 MHz	-	_____	-162	dBm
	3399.9 MHz	-	_____	-162	dBm
	3599.9 MHz	-	_____	-162	dBm
	ESR 7:				
	3601.0 MHz	-	_____	-160	dBm
	3799.9 MHz	-	_____	-160	dBm
	3999.9 MHz	-	_____	-160	dBm
	4199.9 MHz	-	_____	-160	dBm
	4399.9 MHz	-	_____	-160	dBm
	4599.9 MHz	-	_____	-160	dBm
	4799.9 MHz	-	_____	-160	dBm
	4999.9 MHz	-	_____	-160	dBm
	5199.9 MHz	-	_____	-160	dBm
	5399.9 MHz	-	_____	-160	dBm
	5599.9 MHz	-	_____	-160	dBm
	5799.9 MHz	-	_____	-160	dBm
	5999.9 MHz	-	_____	-160	dBm
	6199.9 MHz	-	_____	-158	dBm
	6399.9 MHz	-	_____	-158	dBm
	6599.9 MHz	-	_____	-158	dBm
	6799.9 MHz	-	_____	-158	dBm
	6999.9 MHz	-	_____	-158	dBm
Page 23	Noise Display normalized to 1 Hz preselector on, preamplifier on f _n				
	ESR 26:				
	9 kHz	-	_____	-150	dBm
	99 kHz	-	_____	-150	dBm

	999 kHz	-	_____	-155	dBm
	5.01 MHz	-	_____	-161	dBm
	10.1 MHz	-	_____	-161	dBm
	19.99 MHz	-	_____	-161	dBm
	49.99 MHz	-	_____	-161	dBm
	99.99 MHz	-	_____	-161	dBm
	199.9 MHz	-	_____	-161	dBm
	499.9 MHz	-	_____	-161	dBm
	599.9 MHz	-	_____	-161	dBm
	699.9 MHz	-	_____	-161	dBm
	799.9 MHz	-	_____	-161	dBm
	899.9 MHz	-	_____	-161	dBm
	999.9 MHz	-	_____	-161	dBm
	1000.1 MHz	-	_____	-158	dBm
	1199.9 MHz	-	_____	-158	dBm
	1399.9 MHz	-	_____	-158	dBm
	1599.9 MHz	-	_____	-158	dBm
	1799.9 MHz	-	_____	-158	dBm
	1999.9 MHz	-	_____	-158	dBm
	2199.9 MHz	-	_____	-158	dBm
	2399.9 MHz	-	_____	-158	dBm
	2599.9 MHz	-	_____	-158	dBm
	2799.9 MHz	-	_____	-158	dBm
	2999.9 MHz	-	_____	-158	dBm
	3199.9 MHz	-	_____	-158	dBm
	3399.9 MHz	-	_____	-158	dBm
	3599.9 MHz	-	_____	-158	dBm
	3600.1 MHz	-	_____	-156	dBm
	3999.9 MHz	-	_____	-156	dBm
	4199.9 MHz	-	_____	-156	dBm
	4399.9 MHz	-	_____	-156	dBm
	4599.9 MHz	-	_____	-156	dBm
	4799.9 MHz	-	_____	-156	dBm
	4999.9 MHz	-	_____	-156	dBm
	5199.9 MHz	-	_____	-156	dBm
	5399.9 MHz	-	_____	-156	dBm
	5599.9 MHz	-	_____	-156	dBm
	5799.9 MHz	-	_____	-156	dBm
	5999.9 MHz	-	_____	-156	dBm
	6000.1 MHz	-	_____	-154	dBm

	6199.9 MHz	-	_____	-154	dBm
	6399.9 MHz	-	_____	-154	dBm
	6599.9 MHz	-	_____	-154	dBm
	6799.9 MHz	-	_____	-154	dBm
	6999.9 MHz	-	_____	-154	dBm
	7399.9 MHz	-	_____	-154	dBm
	7400.1 MHz	-	_____	-164	dBm
	7999.9 MHz	-	_____	-164	dBm
	8499.9 MHz	-	_____	-164	dBm
	8999.9 MHz	-	_____	-164	dBm
	9499.9 MHz	-	_____	-164	dBm
	9999.9 MHz	-	_____	-164	dBm
	10499.9 MHz	-	_____	-164	dBm
	10999.9 MHz	-	_____	-164	dBm
	11499.9 MHz	-	_____	-164	dBm
	11999.9 MHz	-	_____	-164	dBm
	12499.9 MHz	-	_____	-164	dBm
	12999.9 MHz	-	_____	-164	dBm
	13599.9 MHz	-	_____	-164	dBm
	13600.1 MHz	-	_____	-157	dBm
	14999.9 MHz	-	_____	-157	dBm
	15000.1 MHz	-	_____	-157	dBm
	16999.9 MHz	-	_____	-157	dBm
	17999.9 MHz	-	_____	-157	dBm
	18999.9 MHz	-	_____	-157	dBm
	19999.9 MHz	-	_____	-157	dBm
	20999.9 MHz	-	_____	-157	dBm
	21999.9 MHz	-	_____	-157	dBm
	22999.9 MHz	-	_____	-157	dBm
	23999.9 MHz	-	_____	-157	dBm
	24999.9 MHz	-	_____	-157	dBm
	25999.9 MHz	-	_____	-157	dBm
	26499.9 MHz	-	_____	-157	dBm
Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 25	Absolute level uncertainty at 64 MHz				
	Input 1, preselector off, preamplifier off	-0.2	_____	0.2	dB
	Input 1, preselector on, preamplifier off	-0.3	_____	0.3	dB
	Input 1, preselector on, preamplifier on	-0.3	_____	0.3	dB
	Input 2, preselector off, preamplifier off	-0.3	_____	0.3	dB

	Input 2, preselector on, preamplifier off	-0.3	_____	0.3	dB
	Input 2, preselector on, preamplifier on	-0.3	_____	0.3	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 5 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-1	_____	1	dB
	100.02 kHz	-1	_____	1	dB
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB
	501 MHz	-1	_____	1	dB
	601 MHz	-1	_____	1	dB
	701 MHz	-1	_____	1	dB
	801 MHz	-1	_____	1	dB
	901 MHz	-1	_____	1	dB
	1001 MHz	-1	_____	1	dB
	1501 MHz	-1	_____	1	dB
	2001 MHz	-1	_____	1	dB
	2501 MHz	-1	_____	1	dB
	3001 MHz	-1	_____	1	dB
	3599 MHz	-1	_____	1	dB
	ESR 7/26:				
	3601 MHz	-1.5	_____	1.5	dB
	4001 MHz	-1.5	_____	1.5	dB
	4501 MHz	-1.5	_____	1.5	dB
	5001 MHz	-1.5	_____	1.5	dB
	5501 MHz	-1.5	_____	1.5	dB
	6001 MHz	-1.5	_____	1.5	dB
	6501 MHz	-1.5	_____	1.5	dB
	6999 MHz	-1.5	_____	1.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 10 dB, DC coupled ffresp				
	ESR 3/7/26:				

	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	1001 MHz	-0.3	_____	0.3	dB
	1501 MHz	-0.3	_____	0.3	dB
	2001 MHz	-0.3	_____	0.3	dB
	2501 MHz	-0.3	_____	0.3	dB
	3001 MHz	-0.3	_____	0.3	dB
	3599 MHz	-0.3	_____	0.3	dB
	ESR7/26:				
	3601 MHz	-0.5	_____	0.5	dB
	4001 MHz	-0.5	_____	0.5	dB
	4501 MHz	-0.5	_____	0.5	dB
	5001 MHz	-0.5	_____	0.5	dB
	5501 MHz	-0.5	_____	0.5	dB
	6001 MHz	-0.5	_____	0.5	dB
	6501 MHz	-0.5	_____	0.5	dB
	6999 MHz	-0.5	_____	0.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		

	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	1001 MHz	-0.3	_____	0.3	dB
	1501 MHz	-0.3	_____	0.3	dB
	2001 MHz	-0.3	_____	0.3	dB
	2501 MHz	-0.3	_____	0.3	dB
	3001 MHz	-0.3	_____	0.3	dB
	3599 MHz	-0.3	_____	0.3	dB
	ESR7/26:				
	3601 MHz	-0.5	_____	0.5	dB
	4001 MHz	-0.5	_____	0.5	dB
	4501 MHz	-0.5	_____	0.5	dB
	5001 MHz	-0.5	_____	0.5	dB
	5501 MHz	-0.5	_____	0.5	dB
	6001 MHz	-0.5	_____	0.5	dB
	6501 MHz	-0.5	_____	0.5	dB
	6999 MHz	-0.5	_____	0.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB

	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	1001 MHz	-0.3	_____	0.3	dB
	1501 MHz	-0.3	_____	0.3	dB
	2001 MHz	-0.3	_____	0.3	dB
	2501 MHz	-0.3	_____	0.3	dB
	3001 MHz	-0.3	_____	0.3	dB
	3599 MHz	-0.3	_____	0.3	dB
	ESR 7/26:				dB
	3601 MHz	-0.5	_____	0.5	dB
	4001 MHz	-0.5	_____	0.5	dB
	4501 MHz	-0.5	_____	0.5	dB
	5001 MHz	-0.5	_____	0.5	dB
	5501 MHz	-0.5	_____	0.5	dB
	6001 MHz	-0.5	_____	0.5	dB
	6501 MHz	-0.5	_____	0.5	dB
	6999 MHz	-0.5	_____	0.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	1001 MHz	-0.3	_____	0.3	dB
	1501 MHz	-0.3	_____	0.3	dB
	2001 MHz	-0.3	_____	0.3	dB

	2501 MHz	-0.3	_____	0.3	dB
	3001 MHz	-0.3	_____	0.3	dB
	3599 MHz	-0.3	_____	0.3	dB
	ESR 7/26:				
	3601 MHz	-0.5	_____	0.5	dB
	4001 MHz	-0.5	_____	0.5	dB
	4501 MHz	-0.5	_____	0.5	dB
	5001 MHz	-0.5	_____	0.5	dB
	5501 MHz	-0.5	_____	0.5	dB
	6001 MHz	-0.5	_____	0.5	dB
	6501 MHz	-0.5	_____	0.5	dB
	6999 MHz	-0.5	_____	0.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector off, preamplifier off, RF attenuation 10 dB, AC coupled ffresp				
	ESR 3/7/26:				
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB
	501 MHz	-1	_____	1	dB
	601 MHz	-1	_____	1	dB
	701 MHz	-1	_____	1	dB
	801 MHz	-1	_____	1	dB
	901 MHz	-1	_____	1	dB
	1001 MHz	-1	_____	1	dB
	1501 MHz	-1	_____	1	dB
	2001 MHz	-1	_____	1	dB
	2501 MHz	-1	_____	1	dB
	3001 MHz	-1	_____	1	dB
	3599 MHz	-1	_____	1	dB
	ESR 7/26:				
	3601 MHz	-1.5	_____	1.5	dB
	4001 MHz	-1.5	_____	1.5	dB
	4501 MHz	-1.5	_____	1.5	dB
	5001 MHz	-1.5	_____	1.5	dB

	5501 MHz	-1.5	_____	1.5	dB
	6001 MHz	-1.5	_____	1.5	dB
	6501 MHz	-1.5	_____	1.5	dB
	6999 MHz	-1.5	_____	1.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 5 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-1	_____	1	dB
	100.02 kHz	-1	_____	1	dB
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB
	501 MHz	-1	_____	1	dB
	601 MHz	-1	_____	1	dB
	701 MHz	-1	_____	1	dB
	801 MHz	-1	_____	1	dB
	901 MHz	-1	_____	1	dB
	1001 MHz	-1	_____	1	dB
	1501 MHz	-1	_____	1	dB
	2001 MHz	-1	_____	1	dB
	2501 MHz	-1	_____	1	dB
	3001 MHz	-1	_____	1	dB
	3599 MHz	-1	_____	1	dB
	ESR 7/26:				
	3601 MHz	-1.5	_____	1.5	dB
	4001 MHz	-1.5	_____	1.5	dB
	4501 MHz	-1.5	_____	1.5	dB
	5001 MHz	-1.5	_____	1.5	dB
	5501 MHz	-1.5	_____	1.5	dB
	6001 MHz	-1.5	_____	1.5	dB
	6501 MHz	-1.5	_____	1.5	dB
	6999 MHz	-1.5	_____	1.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 10 dB, DC coupled				

	ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB

	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB

	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR 7/26:				dB
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB

	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR 7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier off, RF attenuation 10 dB, AC coupled ffresp				
	ESR 3/7/26:				
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB
	501 MHz	-1	_____	1	dB
	601 MHz	-1	_____	1	dB
	701 MHz	-1	_____	1	dB
	801 MHz	-1	_____	1	dB
	901 MHz	-1	_____	1	dB
	1001 MHz	-1	_____	1	dB
	1501 MHz	-1	_____	1	dB
	2001 MHz	-1	_____	1	dB
	2501 MHz	-1	_____	1	dB
	3001 MHz	-1	_____	1	dB
	3599 MHz	-1	_____	1	dB
	ESR 7/26:				
	3601 MHz	-1.5	_____	1.5	dB
	4001 MHz	-1.5	_____	1.5	dB

	4501 MHz	-1.5	_____	1.5	dB
	5001 MHz	-1.5	_____	1.5	dB
	5501 MHz	-1.5	_____	1.5	dB
	6001 MHz	-1.5	_____	1.5	dB
	6501 MHz	-1.5	_____	1.5	dB
	6999 MHz	-1.5	_____	1.5	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier on, RF attenuation 10 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB

Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier on, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier on, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB

	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR 7/26:				dB
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier on, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB

	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	1001 MHz	-0.6	_____	0.6	dB
	1501 MHz	-0.6	_____	0.6	dB
	2001 MHz	-0.6	_____	0.6	dB
	2501 MHz	-0.6	_____	0.6	dB
	3001 MHz	-0.6	_____	0.6	dB
	3599 MHz	-0.6	_____	0.6	dB
	ESR 7/26:				
	3601 MHz	-0.8	_____	0.8	dB
	4001 MHz	-0.8	_____	0.8	dB
	4501 MHz	-0.8	_____	0.8	dB
	5001 MHz	-0.8	_____	0.8	dB
	5501 MHz	-0.8	_____	0.8	dB
	6001 MHz	-0.8	_____	0.8	dB
	6501 MHz	-0.8	_____	0.8	dB
	6999 MHz	-0.8	_____	0.8	dB
Page 26	Frequency response < 7 GHz, input 1, preselector on, preamplifier on, RF attenuation 10 dB, AC coupled ffresp				
	ESR 3/7/26:				
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB
	501 MHz	-1	_____	1	dB
	601 MHz	-1	_____	1	dB
	701 MHz	-1	_____	1	dB
	801 MHz	-1	_____	1	dB
	901 MHz	-1	_____	1	dB
	1001 MHz	-1	_____	1	dB

	1501 MHz	-1	_____	1	dB
	2001 MHz	-1	_____	1	dB
	2501 MHz	-1	_____	1	dB
	3001 MHz	-1	_____	1	dB
	3599 MHz	-1	_____	1	dB
	ESR 7/26:				
	3601 MHz	-1.5	_____	1.5	dB
	4001 MHz	-1.5	_____	1.5	dB
	4501 MHz	-1.5	_____	1.5	dB
	5001 MHz	-1.5	_____	1.5	dB
	5501 MHz	-1.5	_____	1.5	dB
	6001 MHz	-1.5	_____	1.5	dB
	6501 MHz	-1.5	_____	1.5	dB
	6999 MHz	-1.5	_____	1.5	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector off, preamplifier off, RF attenuation 10 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	999 MHz	-0.3	_____	0.3	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector off, preamplifier off, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB

	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	999 MHz	-0.3	_____	0.3	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector off, preamplifier off, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB
	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	999 MHz	-0.3	_____	0.3	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector off, preamplifier off, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.5	_____	0.5	dB

	1.005 MHz	-0.5	_____	0.5	dB
	10.15 MHz	-0.3	_____	0.3	dB
	51 MHz	-0.3	_____	0.3	dB
	64 MHz		Reference		
	101 MHz	-0.3	_____	0.3	dB
	201 MHz	-0.3	_____	0.3	dB
	301 MHz	-0.3	_____	0.3	dB
	401 MHz	-0.3	_____	0.3	dB
	501 MHz	-0.3	_____	0.3	dB
	601 MHz	-0.3	_____	0.3	dB
	701 MHz	-0.3	_____	0.3	dB
	801 MHz	-0.3	_____	0.3	dB
	901 MHz	-0.3	_____	0.3	dB
	999 MHz	-0.3	_____	0.3	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier off, RF attenuation 10 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier off, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB

	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier off, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.5	_____	0.5	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz	-0.6	_____	0.6	
	101 MHz		Reference		dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier off, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB

	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier on, RF attenuation 10 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier on, RF attenuation 20 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB

	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier on, RF attenuation 30 dB, DC coupled ffresp				
	ESR 3/7/26				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB
	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 26	Frequency response < 7 GHz,, input 2, preselector on, preamplifier on, RF attenuation 40 dB, DC coupled ffresp				
	ESR 3/7/26:				
	9 kHz	-0.6	_____	0.6	dB
	100.02 kHz	-0.6	_____	0.6	dB

	1.005 MHz	-0.6	_____	0.6	dB
	10.15 MHz	-0.6	_____	0.6	dB
	51 MHz	-0.6	_____	0.6	dB
	64 MHz		Reference		
	101 MHz	-0.6	_____	0.6	dB
	201 MHz	-0.6	_____	0.6	dB
	301 MHz	-0.6	_____	0.6	dB
	401 MHz	-0.6	_____	0.6	dB
	501 MHz	-0.6	_____	0.6	dB
	601 MHz	-0.6	_____	0.6	dB
	701 MHz	-0.6	_____	0.6	dB
	801 MHz	-0.6	_____	0.6	dB
	901 MHz	-0.6	_____	0.6	dB
	999 MHz	-0.6	_____	0.6	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 5 dB, DC coupled ffresp				
	ESR26:				
	7001 MHz	-2.5	_____	2.5	dB
	7501 MHz	-2.5	_____	2.5	dB
	8001 MHz	-2.5	_____	2.5	dB
	8501 MHz	-2.5	_____	2.5	dB
	9001 MHz	-2.5	_____	2.5	dB
	9501 MHz	-2.5	_____	2.5	dB
	10001 MHz	-2.5	_____	2.5	dB
	10501 MHz	-2.5	_____	2.5	dB
	11001 MHz	-2.5	_____	2.5	dB
	11501 MHz	-2.5	_____	2.5	dB
	12001 MHz	-2.5	_____	2.5	dB
	12501 MHz	-2.5	_____	2.5	dB
	13001 MHz	-2.5	_____	2.5	dB
	13501 MHz	-2.5	_____	2.5	dB
	13599 MHz	-2.5	_____	2.5	dB
	13601 MHz	-3	_____	3	dB
	14001 MHz	-3	_____	3	dB
	15001 MHz	-3	_____	3	dB
	16001 MHz	-3	_____	3	dB
	17001 MHz	-3	_____	3	dB
	18001 MHz	-3	_____	3	dB
	19001 MHz	-3	_____	3	dB

	20001 MHz	-3	_____	3	dB
	21001 MHz	-3	_____	3	dB
	22001 MHz	-3	_____	3	dB
	23001 MHz	-3	_____	3	dB
	24001 MHz	-3	_____	3	dB
	25001 MHz	-3	_____	3	dB
	26001 MHz	-3	_____	3	dB
	26499 MHz	-3	_____	3	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 10 dB, DC coupled ffresp				
	ESR 26:				
	7001 MHz	-1.5	_____	1.5	dB
	7501 MHz	-1.5	_____	1.5	dB
	8001 MHz	-1.5	_____	1.5	dB
	8501 MHz	-1.5	_____	1.5	dB
	9001 MHz	-1.5	_____	1.5	dB
	9501 MHz	-1.5	_____	1.5	dB
	10001 MHz	-1.5	_____	1.5	dB
	10501 MHz	-1.5	_____	1.5	dB
	11001 MHz	-1.5	_____	1.5	dB
	11501 MHz	-1.5	_____	1.5	dB
	12001 MHz	-1.5	_____	1.5	dB
	12501 MHz	-1.5	_____	1.5	dB
	13001 MHz	-1.5	_____	1.5	dB
	13501 MHz	-1.5	_____	1.5	dB
	13599 MHz	-1.5	_____	1.5	dB
	13601 MHz	-2	_____	2	dB
	14001 MHz	-2	_____	2	dB
	15001 MHz	-2	_____	2	dB
	16001 MHz	-2	_____	2	dB
	17001 MHz	-2	_____	2	dB
	18001 MHz	-2	_____	2	dB
	19001 MHz	-2	_____	2	dB
	20001 MHz	-2	_____	2	dB
	21001 MHz	-2	_____	2	dB
	22001 MHz	-2	_____	2	dB
	23001 MHz	-2	_____	2	dB
	24001 MHz	-2	_____	2	dB
	25001 MHz	-2	_____	2	dB

	26001 MHz	-2	_____	2	dB
	26499 MHz	-2	_____	2	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 20 dB, DC coupled ffresp				
	ESR 26:				
	7001 MHz	-1.5	_____	1.5	dB
	7501 MHz	-1.5	_____	1.5	dB
	8001 MHz	-1.5	_____	1.5	dB
	8501 MHz	-1.5	_____	1.5	dB
	9001 MHz	-1.5	_____	1.5	dB
	9501 MHz	-1.5	_____	1.5	dB
	10001 MHz	-1.5	_____	1.5	dB
	10501 MHz	-1.5	_____	1.5	dB
	11001 MHz	-1.5	_____	1.5	dB
	11501 MHz	-1.5	_____	1.5	dB
	12001 MHz	-1.5	_____	1.5	dB
	12501 MHz	-1.5	_____	1.5	dB
	13001 MHz	-1.5	_____	1.5	dB
	13501 MHz	-1.5	_____	1.5	dB
	13599 MHz	-1.5	_____	1.5	dB
	13601 MHz	-2	_____	2	dB
	14001 MHz	-2	_____	2	dB
	15001 MHz	-2	_____	2	dB
	16001 MHz	-2	_____	2	dB
	17001 MHz	-2	_____	2	dB
	18001 MHz	-2	_____	2	dB
	19001 MHz	-2	_____	2	dB
	20001 MHz	-2	_____	2	dB
	21001 MHz	-2	_____	2	dB
	22001 MHz	-2	_____	2	dB
	23001 MHz	-2	_____	2	dB
	24001 MHz	-2	_____	2	dB
	25001 MHz	-2	_____	2	dB
	26001 MHz	-2	_____	2	dB
	26499 MHz	-2	_____	2	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 30 dB, DC coupled ffresp				
	ESR 26:				

	7001 MHz	-1.5	_____	1.5	dB
	7501 MHz	-1.5	_____	1.5	dB
	8001 MHz	-1.5	_____	1.5	dB
	8501 MHz	-1.5	_____	1.5	dB
	9001 MHz	-1.5	_____	1.5	dB
	9501 MHz	-1.5	_____	1.5	dB
	10001 MHz	-1.5	_____	1.5	dB
	10501 MHz	-1.5	_____	1.5	dB
	11001 MHz	-1.5	_____	1.5	dB
	11501 MHz	-1.5	_____	1.5	dB
	12001 MHz	-1.5	_____	1.5	dB
	12501 MHz	-1.5	_____	1.5	dB
	13001 MHz	-1.5	_____	1.5	dB
	13501 MHz	-1.5	_____	1.5	dB
	13599 MHz	-1.5	_____	1.5	dB
	13601 MHz	-2	_____	2	dB
	14001 MHz	-2	_____	2	dB
	15001 MHz	-2	_____	2	dB
	16001 MHz	-2	_____	2	dB
	17001 MHz	-2	_____	2	dB
	18001 MHz	-2	_____	2	dB
	19001 MHz	-2	_____	2	dB
	20001 MHz	-2	_____	2	dB
	21001 MHz	-2	_____	2	dB
	22001 MHz	-2	_____	2	dB
	23001 MHz	-2	_____	2	dB
	24001 MHz	-2	_____	2	dB
	25001 MHz	-2	_____	2	dB
	26001 MHz	-2	_____	2	dB
	26499 MHz	-2	_____	2	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 40 dB, DC coupled ffresp				
	ESR 26:				
	7001 MHz	-1.5	_____	1.5	dB
	7501 MHz	-1.5	_____	1.5	dB
	8001 MHz	-1.5	_____	1.5	dB
	8501 MHz	-1.5	_____	1.5	dB
	9001 MHz	-1.5	_____	1.5	dB
	9501 MHz	-1.5	_____	1.5	dB

	10001 MHz	-1.5	_____	1.5	dB
	10501 MHz	-1.5	_____	1.5	dB
	11001 MHz	-1.5	_____	1.5	dB
	11501 MHz	-1.5	_____	1.5	dB
	12001 MHz	-1.5	_____	1.5	dB
	12501 MHz	-1.5	_____	1.5	dB
	13001 MHz	-1.5	_____	1.5	dB
	13501 MHz	-1.5	_____	1.5	dB
	13599 MHz	-1.5	_____	1.5	dB
	13601 MHz	-2	_____	2	dB
	14001 MHz	-2	_____	2	dB
	15001 MHz	-2	_____	2	dB
	16001 MHz	-2	_____	2	dB
	17001 MHz	-2	_____	2	dB
	18001 MHz	-2	_____	2	dB
	19001 MHz	-2	_____	2	dB
	20001 MHz	-2	_____	2	dB
	21001 MHz	-2	_____	2	dB
	22001 MHz	-2	_____	2	dB
	23001 MHz	-2	_____	2	dB
	24001 MHz	-2	_____	2	dB
	25001 MHz	-2	_____	2	dB
	26001 MHz	-2	_____	2	dB
	26499 MHz	-2	_____	2	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 10 dB, AC coupled ffresp				
	ESR 26:				
	7001 MHz	-2.5	_____	2.5	dB
	7501 MHz	-2.5	_____	2.5	dB
	8001 MHz	-2.5	_____	2.5	dB
	8501 MHz	-2.5	_____	2.5	dB
	9001 MHz	-2.5	_____	2.5	dB
	9501 MHz	-2.5	_____	2.5	dB
	10001 MHz	-2.5	_____	2.5	dB
	10501 MHz	-2.5	_____	2.5	dB
	11001 MHz	-2.5	_____	2.5	dB
	11501 MHz	-2.5	_____	2.5	dB
	12001 MHz	-2.5	_____	2.5	dB
	12501 MHz	-2.5	_____	2.5	dB

	13001 MHz	-2.5	_____	2.5	dB
	13501 MHz	-2.5	_____	2.5	dB
	13599 MHz	-2.5	_____	2.5	dB
	13601 MHz	-3	_____	3	dB
	14001 MHz	-3	_____	3	dB
	15001 MHz	-3	_____	3	dB
	16001 MHz	-3	_____	3	dB
	17001 MHz	-3	_____	3	dB
	18001 MHz	-3	_____	3	dB
	19001 MHz	-3	_____	3	dB
	20001 MHz	-3	_____	3	dB
	21001 MHz	-3	_____	3	dB
	22001 MHz	-3	_____	3	dB
	23001 MHz	-3	_____	3	dB
	24001 MHz	-3	_____	3	dB
	25001 MHz	-3	_____	3	dB
	26001 MHz	-3	_____	3	dB
	26499 MHz	-3	_____	3	dB
Page 27	Frequency response > 7 GHz, input 1, preselector off, preamplifier off, RF attenuation = 10 dB, DC coupled, full span ffresp				
	ESR 26:				
	7001 MHz	-2.5	_____	2.5	dB
	7501 MHz	-2.5	_____	2.5	dB
	8001 MHz	-2.5	_____	2.5	dB
	8501 MHz	-2.5	_____	2.5	dB
	9001 MHz	-2.5	_____	2.5	dB
	9501 MHz	-2.5	_____	2.5	dB
	10001 MHz	-2.5	_____	2.5	dB
	10501 MHz	-2.5	_____	2.5	dB
	11001 MHz	-2.5	_____	2.5	dB
	11501 MHz	-2.5	_____	2.5	dB
	12001 MHz	-2.5	_____	2.5	dB
	12501 MHz	-2.5	_____	2.5	dB
	13001 MHz	-2.5	_____	2.5	dB
	13501 MHz	-2.5	_____	2.5	dB
	13599 MHz	-2.5	_____	2.5	dB
	13601 MHz	-3	_____	3	dB
	14001 MHz	-3	_____	3	dB
	15001 MHz	-3	_____	3	dB

	16001 MHz	-3	_____	3	dB
	17001 MHz	-3	_____	3	dB
	18001 MHz	-3	_____	3	dB
	19001 MHz	-3	_____	3	dB
	20001 MHz	-3	_____	3	dB
	21001 MHz	-3	_____	3	dB
	22001 MHz	-3	_____	3	dB
	23001 MHz	-3	_____	3	dB
	24001 MHz	-3	_____	3	dB
	25001 MHz	-3	_____	3	dB
	26001 MHz	-3	_____	3	dB
	26499 MHz	-3	_____	3	dB
Page 28	Frequency response > 7 GHz, input 1, preselector off, preamplifier on, RF attenuation = 40 dB, DC coupled ffresp				
	ESR 26:				
	7001 MHz	-1.5	_____	1.5	dB
	7501 MHz	-1.5	_____	1.5	dB
	8001 MHz	-1.5	_____	1.5	dB
	8501 MHz	-1.5	_____	1.5	dB
	9001 MHz	-1.5	_____	1.5	dB
	9501 MHz	-1.5	_____	1.5	dB
	10001 MHz	-1.5	_____	1.5	dB
	10501 MHz	-1.5	_____	1.5	dB
	11001 MHz	-1.5	_____	1.5	dB
	11501 MHz	-1.5	_____	1.5	dB
	12001 MHz	-1.5	_____	1.5	dB
	12501 MHz	-1.5	_____	1.5	dB
	13001 MHz	-1.5	_____	1.5	dB
	13501 MHz	-1.5	_____	1.5	dB
	13599 MHz	-1.5	_____	1.5	dB
	13601 MHz	-2	_____	2	dB
	14001 MHz	-2	_____	2	dB
	15001 MHz	-2	_____	2	dB
	16001 MHz	-2	_____	2	dB
	17001 MHz	-2	_____	2	dB
	18001 MHz	-2	_____	2	dB
	19001 MHz	-2	_____	2	dB
	20001 MHz	-2	_____	2	dB
	21001 MHz	-2	_____	2	dB

	22001 MHz	-2	_____	2	dB
	23001 MHz	-2	_____	2	dB
	24001 MHz	-2	_____	2	dB
	25001 MHz	-2	_____	2	dB
	26001 MHz	-2	_____	2	dB
	26499 MHz	-2	_____	2	dB
Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 30	Display Nonlinearity aatt				
	10 dB	9.9	_____	10.1	dB
	12 dB	7.9	_____	8.1	dB
	14 dB	5.9	_____	6.1	dB
	16 dB	3.9	_____	4.1	dB
	18 dB	1.9	_____	2.1	dB
	20 dB	-	Reference	-	
	22 dB	-2.1	_____	-1.9	dB
	24 dB	-4.1	_____	-3.9	dB
	26 dB	-6.1	_____	-5.9	dB
	28 dB	-8.1	_____	-7.9	dB
	30 dB	-10.1	_____	-9.9	dB
	32 dB	-12.1	_____	-11.9	dB
	34 dB	-14.1	_____	-13.9	dB
	36 dB	-16.1	_____	-15.9	dB
	38 dB	-18.1	_____	-17.9	dB
	40 dB	-20.1	_____	-19.9	dB
	42 dB	-22.1	_____	-21.9	dB
	44 dB	-24.1	_____	-23.9	dB
	46 dB	-26.1	_____	-25.9	dB
	48 dB	-28.1	_____	-27.9	dB
	50 dB	-30.1	_____	-29.9	dB
	52 dB	-32.1	_____	-31.9	dB
	54 dB	-34.1	_____	-33.9	dB
	56 dB	-36.1	_____	-35.9	dB
	58 dB	-38.1	_____	-37.9	dB
	60 dB	-40.1	_____	-39.9	dB
	65 dB	-45.15	_____	-44.85	dB
	70 dB	-50.15	_____	-49.85	dB
	75 dB	-55.2	_____	-54.8	dB
	80 dB	-60.2	_____	-59.8	dB
Page 30	RF Attenuator uncertainty				

	aESR				
	0 dB	9.8	_____	10.2	dB
	5 dB	4.8	_____	5.2	dB
	10 dB		Reference		
	15 dB	-5.2	_____	-4.8	dB
	20 dB	-10.2	_____	-9.8	dB
	25 dB	-15.2	_____	-14.8	dB
	30 dB	-20.2	_____	-19.8	dB
	40 dB	-30.2	_____	-29.8	dB
	50 dB	-40.2	_____	-39.8	dB
	60 dB	-50.2	_____	-49.8	dB
	70 dB	-60.2	_____	-59.8	dB
Page 33	Phase Noise Offset				
	100 Hz	-	_____	-84	dBc (1Hz)
	1 kHz	-	_____	-101	dBc (1Hz)
	10 kHz	-	_____	-106	dBc (1Hz)
	96 kHz	-	_____	-115	dBc (1Hz)
	1 MHz	-	_____	-134	dBc (1Hz)
Page 35	VSWR				
	0 dB, Input 1, DC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	2	
	1 MHz	-	_____	2	
	10 MHz	-	_____	2	
	250 MHz	-	_____	2	
	500 MHz	-	_____	2	
	750 MHz	-	_____	2	
	1000 MHz	-	_____	2	
	1001 MHz	-	_____	3	
	1250 MHz	-	_____	3	
	1500 MHz	-	_____	3	
	1750 MHz	-	_____	3	
	2000 MHz	-	_____	3	
	2250 MHz	-	_____	3	
	2500 MHz	-	_____	3	
	2750 MHz	-	_____	3	
	3000 MHz	-	_____	3	
	3250 MHz	-	_____	3	

	3500 MHz	-	_____	3	
	ESR 7/26:				
	3750 MHz	-	_____	3	
	4000 MHz	-	_____	3	
	4250 MHz	-	_____	3	
	4500 MHz	-	_____	3	
	4750 MHz	-	_____	3	
	5000 MHz	-	_____	3	
	5250 MHz	-	_____	3	
	5500 MHz	-	_____	3	
	5750 MHz	-	_____	3	
	6000 MHz	-	_____	3	
	6250 MHz	-	_____	3	
	6500 MHz	-	_____	3	
	6750 MHz	-	_____	3	
	7000 MHz	-	_____	3	
	ESR 26:				
	8000 MHz	-	_____	3	
	9000 MHz	-	_____	3	
	10000 MHz	-	_____	3	
	11000 MHz	-	_____	3	
	12000 MHz	-	_____	3	
	13000 MHz	-	_____	3	
	14000 MHz	-	_____	3	
	16000 MHz	-	_____	3	
	18000 MHz	-	_____	3	
	20000 MHz	-	_____	3	
	22000 MHz	-	_____	3	
	24000 MHz	-	_____	3	
	26000 MHz	-	_____	3	
	26500 MHz	-	_____	3	
	0 dB, Input 1, DC coupled, preselector on, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	2	
	1 MHz	-	_____	2	
	10 MHz	-	_____	2	
	250 MHz	-	_____	2	
	500 MHz	-	_____	2	
	750 MHz	-	_____	2	

	1000 MHz	-	_____	2	
	1001 MHz	-	_____	3	
	1250 MHz	-	_____	3	
	1500 MHz	-	_____	3	
	1750 MHz	-	_____	3	
	2000 MHz	-	_____	3	
	2250 MHz	-	_____	3	
	2500 MHz	-	_____	3	
	2750 MHz	-	_____	3	
	3000 MHz	-	_____	3	
	3250 MHz	-	_____	3	
	3500 MHz	-	_____	3	
	ESR 7/26:				
	3750 MHz	-	_____	3	
	4000 MHz	-	_____	3	
	4250 MHz	-	_____	3	
	4500 MHz	-	_____	3	
	4750 MHz	-	_____	3	
	5000 MHz	-	_____	3	
	5250 MHz	-	_____	3	
	5500 MHz	-	_____	3	
	5750 MHz	-	_____	3	
	6000 MHz	-	_____	3	
	6250 MHz	-	_____	3	
	6500 MHz	-	_____	3	
	6750 MHz	-	_____	3	
	7000 MHz	-	_____	3	
	ESR 26:				
	8000 MHz	-	_____	3	
	9000 MHz	-	_____	3	
	10000 MHz	-	_____	3	
	11000 MHz	-	_____	3	
	12000 MHz	-	_____	3	
	13000 MHz	-	_____	3	
	14000 MHz	-	_____	3	
	16000 MHz	-	_____	3	
	18000 MHz	-	_____	3	
	20000 MHz	-	_____	3	
	22000 MHz	-	_____	3	
	24000 MHz	-	_____	3	

	26000 MHz	-	_____	3	
	26500 MHz	-	_____	3	
	10 dB, Input 1, DC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	
	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	
	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	
	4500 MHz	-	_____	2	
	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				
	8000 MHz	-	_____	2	

	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
Page 35	VSWR				
	20 dB, input 1, DC coupled preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	
	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	
	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	

	4500 MHz	-	_____	2	
	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				
	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
Page 35	VSWR				
	40 dB, input 1, DC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	

	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	
	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	
	4500 MHz	-	_____	2	
	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				
	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	

Page 35	VSWR				
	0 dB, Input 1, AC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	10 MHz	-	_____	2	
	250 MHz	-	_____	2	
	500 MHz	-	_____	2	
	750 MHz	-	_____	2	
	1000 MHz	-	_____	2	
	1001 MHz	-	_____	3	
	1250 MHz	-	_____	3	
	1500 MHz	-	_____	3	
	1750 MHz	-	_____	3	
	2000 MHz	-	_____	3	
	2250 MHz	-	_____	3	
	2500 MHz	-	_____	3	
	2750 MHz	-	_____	3	
	3000 MHz	-	_____	3	
	3250 MHz	-	_____	3	
	3500 MHz	-	_____	3	
	ESR 7/26:				
	3750 MHz	-	_____	3	
	4000 MHz	-	_____	3	
	4250 MHz	-	_____	3	
	4500 MHz	-	_____	3	
	4750 MHz	-	_____	3	
	5000 MHz	-	_____	3	
	5250 MHz	-	_____	3	
	5500 MHz	-	_____	3	
	5750 MHz	-	_____	3	
	6000 MHz	-	_____	3	
	6250 MHz	-	_____	3	
	6500 MHz	-	_____	3	
	6750 MHz	-	_____	3	
	7000 MHz	-	_____	3	
	ESR 26:				
	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	

	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
	0 dB, Input 1, AC coupled, preselector on, preamplifier off fin				
	ESR 3/7/26:				
	10 MHz	-	_____	2	
	250 MHz	-	_____	2	
	500 MHz	-	_____	2	
	750 MHz	-	_____	2	
	1000 MHz	-	_____	2	
	1001 MHz	-	_____	3	
	1250 MHz	-	_____	3	
	1500 MHz	-	_____	3	
	1750 MHz	-	_____	3	
	2000 MHz	-	_____	3	
	2250 MHz	-	_____	3	
	2500 MHz	-	_____	3	
	2750 MHz	-	_____	3	
	3000 MHz	-	_____	3	
	3250 MHz	-	_____	3	
	3500 MHz	-	_____	3	
	ESR 7/26:				
	3750 MHz	-	_____	3	
	4000 MHz	-	_____	3	
	4250 MHz	-	_____	3	
	4500 MHz	-	_____	3	
	4750 MHz	-	_____	3	
	5000 MHz	-	_____	3	
	5250 MHz	-	_____	3	
	5500 MHz	-	_____	3	
	5750 MHz	-	_____	3	

	6000 MHz	-	_____	3	
	6250 MHz	-	_____	3	
	6500 MHz	-	_____	3	
	6750 MHz	-	_____	3	
	7000 MHz	-	_____	3	
	10 dB, input 1, AC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	
	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	
	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	
	4500 MHz	-	_____	2	
	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				

	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
Page 35	VSWR				
	20 dB, input 1, AC coupled preselector off, preamplifier off fin				
	ESR 3/7/26:				
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	
	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	
	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	
	4500 MHz	-	_____	2	

	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				
	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
Page 35	VSWR				
	40 dB, input 1, AC coupled, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
	1001 MHz	-	_____	2	
	1250 MHz	-	_____	2	
	1500 MHz	-	_____	2	
	1750 MHz	-	_____	2	
	2000 MHz	-	_____	2	

	2250 MHz	-	_____	2	
	2500 MHz	-	_____	2	
	2750 MHz	-	_____	2	
	3000 MHz	-	_____	2	
	3250 MHz	-	_____	2	
	3500 MHz	-	_____	2	
	ESR 7/26:				
	3750 MHz	-	_____	2	
	4000 MHz	-	_____	2	
	4250 MHz	-	_____	2	
	4500 MHz	-	_____	2	
	4750 MHz	-	_____	2	
	5000 MHz	-	_____	2	
	5250 MHz	-	_____	2	
	5500 MHz	-	_____	2	
	5750 MHz	-	_____	2	
	6000 MHz	-	_____	2	
	6250 MHz	-	_____	2	
	6500 MHz	-	_____	2	
	6750 MHz	-	_____	2	
	7000 MHz	-	_____	2	
	ESR 26:				
	8000 MHz	-	_____	2	
	9000 MHz	-	_____	2	
	10000 MHz	-	_____	2	
	11000 MHz	-	_____	2	
	12000 MHz	-	_____	2	
	13000 MHz	-	_____	2	
	14000 MHz	-	_____	2	
	16000 MHz	-	_____	2	
	18000 MHz	-	_____	2	
	19999 MHz	-	_____	2	
	20000 MHz	-	_____	2.2	
	22000 MHz	-	_____	2.2	
	24000 MHz	-	_____	2.2	
	26000 MHz	-	_____	2.2	
	26500 MHz	-	_____	2.2	
	10 dB, Input 2, preselector off, preamplifier off fin				
	ESR 3/7/26:				

	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
Page 35	VSWR				
	20 dB, input 2 preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
Page 35	VSWR				
	40 dB, input 2, preselector off, preamplifier off fin				
	ESR 3/7/26:				
	100 kHz	-	_____	1.2	
	1 MHz	-	_____	1.2	
	10 MHz	-	_____	1.2	
	250 MHz	-	_____	1.2	
	500 MHz	-	_____	1.2	
	750 MHz	-	_____	1.2	
	1000 MHz	-	_____	1.2	
Page 37	Detectors according CISPR 16-1-1 Receiver Mode:				
Page 37	Sine-wave voltage accuracy				
	Band A				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band B				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V

	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band C				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band D				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band E				
	Max Peak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
Page 40	Response to pulses				
Page 40	Peak and Quasipeak detector Amplitude relationship				
	Band A				
	Max peak	64.6	_____	67.6	dB μ V
	Quasipeak	58.5	_____	61.5	dB μ V
	Band B				
	Max peak	65.1	_____	68.1	dB μ V
	Quasipeak	58.5	_____	61.5	dB μ V
	Band C				
	Max peak	60.5	_____	63.5	dB μ V
	Quasipeak	48.5	_____	51.5	dB μ V
	Band D				
	Max peak	60.5	_____	63.5	dB μ V
	Quasipeak	48.5	_____	51.5	dB μ V
	Band E				
	Max peak	58.5	_____	61.5	dB μ V
Page 43	Quasipeak, variation with repetition frequency				
	Band A fP				
	25 Hz (Reference)	-	_____	-	dB μ V
	100 Hz	+3	_____	+5	dB
	60 Hz	+2	_____	+4	dB

	10 Hz	-5	_____	-3	dB
	5 Hz	-9	_____	-6	dB
	2 Hz	-15	_____	-11	
	1 Hz	-19	_____	-15	dB
	Single	-21	_____	-17	dB
	Band B fP				
	100 Hz (Reference)	-	_____	-	dB μ V
	20 Hz	-7.5	_____	-5.5	dB
	10 Hz	-11.5	_____	-8.5	dB
	2 Hz	-22.5	_____	-18.5	dB
	1 Hz	-24.5	_____	-20.5	dB
	Single	-25.5	_____	-21.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+3.5	_____	+5.5	dB
	Band C fP				
	100 Hz (Reference)	-	_____	-	dB μ V
	20 Hz	-10	_____	-8	dB
	10 Hz	-15.5	_____	-12.5	dB
	2 Hz	-28	_____	-24	dB
	1 Hz	-30.5	_____	-26.5	dB
	Single	-33.5	_____	-29.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+7	_____	+9	dB
	Band D fP				
	100 Hz (Reference)	-	_____	-	dB μ V
	20 Hz	-10	_____	-8	dB
	10 Hz	-15.5	_____	-12.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+7	_____	+9	dB
Page 48	CISPR Average Amplitude relationship				
	Band A	47.1	_____	50.1	dB μ V
	Band B	40.5	_____	43.5	dB μ V
	Band C	23.5	_____	26.5	dB μ V
	Band D	23.5	_____	26.5	dB μ V
	Band E	59.5	_____	62.5	dB μ V
Page 50	CISPR Average, variation with repetition frequency:				
	Band A				

	fP				
	70 Hz (Reference)	-	_____	-	dB μ V
	35 Hz	-7	_____	-3	dB
	17.5 Hz	-13	_____	-9	dB
	Band B fP				
	3180 Hz (Reference)	-	_____	-	dB μ V
	1590 Hz	-7	_____	-3	dB
	795 Hz	-13	_____	-9	dB
	398 Hz	-19	_____	-15	dB
	Band C fP				
	42400 Hz (Reference)	-	_____	-	dB μ V
	21200 Hz	-7	_____	-3	dB
	10600 Hz	-13	_____	-9	dB
	5300 Hz	-19	_____	-15	dB
	2650	-25		-21	
	Band D fP				
	42400 Hz (Reference)	-	_____	-	dB μ V
	21200 Hz	-7	_____	-3	dB
	10600 Hz	-13	_____	-9	dB
	5300 Hz	-19	_____	-15	dB
	2650	-25		-21	
	Band E fP				
	353500 Hz (Reference)	-	_____	-	dB μ V
	176750 Hz	-7	_____	-3	dB
	17675 Hz	-27	_____	-23	dB
Page 53	CISPR Average Response to intermittent disturbance				
	Band A	-10	_____	-8	dB
	Band B	-10	_____	-8	dB
	Band C	-10	_____	-8	dB
	Band D	-10	_____	-8	dB
	Band E	-10	_____	-8	dB
Page 56	RMS Average Amplitude relationship				
	Band A	54.3	_____	57.3	dB μ V
	Band B	58.5	_____	61.5	dB μ V
	Band C	58.5	_____	61.5	dB μ V

	Band D	58.5	_____	61.5	dB μ V
	Band E	58.5	_____	61.5	dB μ V
Page 59	RMS-average, variation with repetition frequency:				
	Band A fP				
	25 Hz (Reference)	-	_____	-	dB μ V
	100 Hz	+5.4	_____	+6.6	dB
	10 Hz	-4.4	_____	-3.6	dB
	5 Hz	-9.7	_____	-8.3	dB
	Band B fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-16.5	_____	-13.5	dB
	25 Hz	-17.6	_____	-14.4	dB
	10 Hz	-22	_____	-18	dB
	5 Hz	-27.3	_____	-22.7	dB
	Band C fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	10000 Hz	+9	_____	+11	dB
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-22	_____	-18	dB
	Band D fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	10000 Hz	+9	_____	+11	dB
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-22	_____	-18	dB
	Band E fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	100000 Hz	+18	_____	+22	dB
	10000 Hz	+9	_____	+11	dB
	316 Hz	-11	_____	-9	dB
Page 63	RMS Average Response to intermittent disturbance				
	Band A	-8.9	_____	-6.9	dB
	Band B	-8.9	_____	-6.9	dB

	Band C	-10	_____	-8	dB
	Band D	-10	_____	-8	dB
	Band E	-10	_____	-8	dB
Page 65	Detectors according CISPR 16-1-1 Time Domain Scan (ESR-K53 option)				
Page 66	Sine-wave voltage accuracy				
	Band A				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band B				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band C				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band D				
	Max Peak	95	_____	99	dB μ V
	Quasipeak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
	Band E				
	Max Peak	95	_____	99	dB μ V
	CISPR Average	95	_____	99	dB μ V
	RMS Average	95	_____	99	dB μ V
Page 70	Response to pulses				
Page 70	Peak and Quasipeak detector Amplitude relationship				
	Band A				
	Max peak	64.6	_____	67.6	dB μ V
	Quasipeak	58.5	_____	61.5	dB μ V
	Band B				
	Max peak	65.1	_____	68.1	dB μ V
	Quasipeak	58.5	_____	61.5	dB μ V
	Band C				

	Max peak	60.5	_____	63.5	dB μ V
	Quasipeak	48.5	_____	51.5	dB μ V
	Band D				
	Max peak	60.5	_____	63.5	dB μ V
	Quasipeak	48.5	_____	51.5	dB μ V
	Band E				
	Max peak	58.5	_____	61.5	dB μ V
Page 73	Quasipeak, variation with repetition frequency				
	Band A fP				
	25 Hz (Reference)	-	_____	-	dB μ V
	100 Hz	+3	_____	+5	dB
	60 Hz	+2	_____	+4	dB
	10 Hz	-5	_____	-3	dB
	5 Hz	-9	_____	-6	dB
	2 Hz	-15	_____	-11	
	1 Hz	-19	_____	-15	dB
	Single	-21	_____	-17	dB
	Band B fP				
	100 Hz (Reference)	-	_____	-	dB μ V
	20 Hz	-7.5	_____	-5.5	dB
	10 Hz	-11.5	_____	-8.5	dB
	2 Hz	-22.5	_____	-18.5	dB
	1 Hz	-24.5	_____	-20.5	dB
	Single	-25.5	_____	-21.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+3.5	_____	+5.5	dB
	Band C fP				
	100 Hz (Reference)	-	_____	-	dB μ V
	20 Hz	-10	_____	-8	dB
	10 Hz	-15.5	_____	-12.5	dB
	2 Hz	-28	_____	-24	dB
	1 Hz	-30.5	_____	-26.5	dB
	Single	-33.5	_____	-29.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+7	_____	+9	dB
	Band D fP				
	100 Hz (Reference)	-	_____	-	dB μ V

	20 Hz	-10	_____	-8	dB
	10 Hz	-15.5	_____	-12.5	dB
	100 Hz (Ref1kHz)	-	_____	-	dB μ V
	1 kHz	+7	_____	+9	dB
Page 79	CISPR Average Amplitude relationship				
	Band A	47.1	_____	50.1	dB μ V
	Band B	40.5	_____	43.5	dB μ V
	Band C	23.5	_____	26.5	dB μ V
	Band D	23.5	_____	26.5	dB μ V
	Band E	59.5	_____	62.5	dB μ V
Page 82	CISPR Average, variation with repetition frequency:				
	Band A fP				
	70 Hz (Reference)	-	_____	-	dB μ V
	35 Hz	-7	_____	-3	dB
	17.50 Hz	-13	_____	-9	dB
	Band B fP				
	3180 Hz (Reference)	-	_____	-	dB μ V
	1590 Hz	-7	_____	-3	dB
	795 Hz	-13	_____	-9	dB
	398 Hz	-19	_____	-15	dB
	Band C fP				
	42400 Hz (Reference)	-	_____	-	dB μ V
	21200 Hz	-7	_____	-3	dB
	10600 Hz	-13	_____	-9	dB
	5300 Hz	-19	_____	-15	dB
	2600 Hz	-25	_____	-21	
	Band D fP				
	42400 Hz (Reference)	-	_____	-	dB μ V
	21200 Hz	-7	_____	-3	dB
	10600 Hz	-13	_____	-9	dB
	5300 Hz	-19	_____	-15	dB
	2600 Hz	-25	_____	-21	
	Band E fP				
	353500 Hz (Reference)	-	_____	-	dB μ V

	176750 Hz	-7	_____	-3	dB
	17675 Hz	-27	_____	-23	dB
Page 86	CISPR Average Response to intermittent disturbance				
	Band A	-10	_____	-8	dB
	Band B	-10	_____	-8	dB
	Band C	-10	_____	-8	dB
	Band D	-10	_____	-8	dB
	Band E	-10	_____	-8	dB
Page 89	RMS Average Amplitude relationship				
	Band A	54.3	_____	57.3	dB μ V
	Band B	58.5	_____	61.5	dB μ V
	Band C	58.5	_____	61.5	dB μ V
	Band D	58.5	_____	61.5	dB μ V
	Band E	58.5	_____	61.5	dB μ V
Page 92	RMS-average, variation with repetition frequency:				
	Band A fP				
	25 Hz (Reference)	-	_____	-	dB μ V
	100 Hz	+5.4	_____	+6.6	dB
	10 Hz	-4.4	_____	-3.6	dB
	5 Hz	-9.7	_____	-8.3	dB
	Band B fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-16.5	_____	-13.5	dB
	25 Hz	-17.6	_____	-14.4	dB
	10 Hz	-22	_____	-18	dB
	5 Hz	-27.3	_____	-22.7	dB
	Band C fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	10000 Hz	+9	_____	+11	dB
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-22	_____	-18	dB
	Band D fP				

	1000 Hz (Reference)	-	_____	-	dB μ V
	10000 Hz	+9	_____	+11	dB
	316 Hz	-5.5	_____	-4.5	dB
	100 Hz	-11	_____	-9	dB
	32 Hz	-22	_____	-18	dB
	Band E fP				
	1000 Hz (Reference)	-	_____	-	dB μ V
	100000 Hz	+18	_____	+22	dB
	10000 Hz	+9	_____	+11	dB
	316 Hz	-11	_____	-9	dB
Page 97	RMS Average Response to intermittent disturbance				
	Band A	-8.9	_____	-6.9	dB
	Band B	-8.9	_____	-6.9	dB
	Band C	-10	_____	-8	dB
	Band D	-10	_____	-8	dB
	Band E	-10	_____	-8	dB

1.6.1 Performance Test Report Option R&S FSV-B9

ROHDE&SCHWARZ	Option Tracking Generator R&S FSV-B9	1310.9639.02
Serial number:		
Date:		
Person responsible:		
Signature:		



Nominal data and limits

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 104	Absolute level uncertainty at 64 MHz, output level -10 dBm	-1	_____	+1	dB
Page 105	Frequency response				
	ESR 3:				
	9 kHz to 100 kHz, min. value	-4	_____	+4	dB
	9 kHz to 100 kHz, max. value	-4	_____	+4	dB
	100 kHz to 3.6 GHz, min. value	-3	_____	+3	dB
	100 kHz to 3.6 GHz, max. value	-3	_____	+3	dB
	ESR 7:				
	9 kHz to 100 kHz, min. value	-4	_____	+4	dB
	9 kHz to 100 kHz, max. value	-4	_____	+4	dB
	100 kHz to 7 GHz, min. value	-3	_____	+3	dB
	100 kHz to 7 GHz, max. value	-3	_____	+3	dB

1.6.2 Performance Test Report Option R&S FSV-B22

ROHDE&SCHWARZ	Option RF Preamplifier R&S FSV-B22	1310.9600.02
Serial number:		
Date:		
Person responsible:		
Signature:		

**Nominal data and limits**

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 107	Noise Display normalized to 1 Hz LN Preamplifier = ON f_n				
	ESR 3/7:				
	101 kHz	-	_____	-150	dBm
	999 kHz	-	_____	-150	dBm
	10.1 MHz	-	_____	-162	dBm
	19.99 MHz	-	_____	-162	dBm
	49.99 MHz	-	_____	-162	dBm
	99.99 MHz	-	_____	-162	dBm
	199.9 MHz	-	_____	-162	dBm
	499.9 MHz	-	_____	-162	dBm
	599.9 MHz	-	_____	-162	dBm
	699.9 MHz	-	_____	-162	dBm
	799.9 MHz	-	_____	-162	dBm
	899.9 MHz	-	_____	-162	dBm
	999.9 MHz	-	_____	-162	dBm
	1199.9 MHz	-	_____	-160	dBm
	1399.9 MHz	-	_____	-160	dBm
	1599.9 MHz	-	_____	-160	dBm
	1799.9 MHz	-	_____	-160	dBm
	1999.9 MHz	-	_____	-160	dBm
	2199.9 MHz	-	_____	-160	dBm
	2399.9 MHz	-	_____	-160	dBm
	2599.9 MHz	-	_____	-160	dBm

2799.9 MHz	-	_____	-160	dBm
2999.9 MHz	-	_____	-160	dBm
3199.9 MHz	-	_____	-160	dBm
3399.9 MHz	-	_____	-160	dBm
3599.9 MHz	-	_____	-160	dBm
3601.0 MHz	-	_____	-158	dBm
3799.9 MHz	-	_____	-158	dBm
3999.9 MHz	-	_____	-158	dBm
4199.9 MHz	-	_____	-158	dBm
4399.9 MHz	-	_____	-158	dBm
4599.9 MHz	-	_____	-158	dBm
4799.9 MHz	-	_____	-158	dBm
4999.9 MHz	-	_____	-158	dBm
5199.9 MHz	-	_____	-158	dBm
5399.9 MHz	-	_____	-158	dBm
5599.9 MHz	-	_____	-158	dBm
5799.9 MHz	-	_____	-158	dBm
5999.9 MHz	-	_____	-158	dBm
ESR 7:				
6199.9 MHz	-	_____	-156	dBm
6399.9 MHz	-	_____	-156	dBm
6599.9 MHz	-	_____	-156	dBm
6799.9 MHz	-	_____	-156	dBm
6999.9 MHz	-	_____	-156	dBm
ESR 26:				
101 kHz	-		-145	dBm
999 kHz	-		-145	dBm
10.1 MHz	-		-155	dBm
19.99 MHz	-		-155	dBm
20.01MHz	-		-160	dBm
49.99 MHz	-		-160	dBm
99.99 MHz	-		-160	dBm
199.9 MHz	-		-160	dBm
499.9 MHz	-		-160	dBm
599.9 MHz	-		-160	dBm
699.9 MHz	-		-160	dBm
799.9 MHz	-		-160	dBm
899.9 MHz	-		-160	dBm
999.9 MHz	-		-160	dBm
1000.1 MHz	-		-157	dBm
1199.9 MHz	-		-157	dBm
1399.9 MHz	-		-157	dBm
1599.9 MHz	-		-157	dBm

	1799.9 MHz	-		-157	dBm
	1999.9 MHz	-		-157	dBm
	2199.9 MHz	-		-157	dBm
	2399.9 MHz	-		-157	dBm
	2599.9 MHz	-		-157	dBm
	2799.9 MHz	-		-157	dBm
	2999.9 MHz	-		-157	dBm
	3199.9 MHz	-		-157	dBm
	3399.9 MHz	-		-157	dBm
	3599.9 MHz	-		-157	dBm
	3600.1 MHz	-		-153	dBm
	3799.9 MHz	-		-153	dBm
	3999.9 MHz	-		-153	dBm
	4199.9 MHz	-		-153	dBm
	4399.9 MHz	-		-153	dBm
	4599.9 MHz	-		-153	dBm
	4799.9 MHz	-		-153	dBm
	4999.9 MHz	-		-153	dBm
	5199.9 MHz	-		-153	dBm
	5399.9 MHz	-		-153	dBm
	5599.9 MHz	-		-153	dBm
	5799.9 MHz	-		-153	dBm
	5999.9 MHz	-		-153	dBm
	6000.1 MHz	-		-150	dBm
	6199.9 MHz	-		-150	dBm
	6399.9 MHz	-		-150	dBm
	6599.9 MHz	-		-150	dBm
	6799.9 MHz	-		-150	dBm
	6999.9 MHz	-		-150	dBm
Page 109	Absolute level uncertainty at 64 MHz	-0.2		0.2	dB
Page 110	Frequency response < 3.6 GHz, RF attenuation 30 dB, DC coupled LN Preamplifier = ON f_{fresp} ESR 3/7/26:				
	100.02 kHz	-1	_____	1	dB
	1.005 MHz	-1	_____	1	dB
	10.15 MHz	-1	_____	1	dB
	51 MHz	-1	_____	1	dB
	64 MHz		Reference		
	101 MHz	-1	_____	1	dB
	201 MHz	-1	_____	1	dB
	301 MHz	-1	_____	1	dB
	401 MHz	-1	_____	1	dB

501 MHz	-1	_____	1	dB
601 MHz	-1	_____	1	dB
701 MHz	-1	_____	1	dB
801 MHz	-1	_____	1	dB
901 MHz	-1	_____	1	dB
1001 MHz	-1	_____	1	dB
1501 MHz	-1	_____	1	dB
2001 MHz	-1	_____	1	dB
2501 MHz	-1	_____	1	dB
3001 MHz	-1	_____	1	dB
3599 MHz	-1	_____	1	dB
ESR 7/26:				
3601 MHz	-1.5	_____	1.5	dB
4001 MHz	-1.5	_____	1.5	dB
4501 MHz	-1.5	_____	1.5	dB
5001 MHz	-1.5	_____	1.5	dB
5501 MHz	-1.5	_____	1.5	dB
6001 MHz	-1.5	_____	1.5	dB
6501 MHz	-1.5	_____	1.5	dB
6999 MHz	-1.5	_____	1.5	dB

1.6.3 Performance Test Report Option R&S ESR-B29

ROHDE&SCHWARZ	Option Freq. Range Extension 10 Hz R&S ESR-B29
Serial number: Date: Person responsible: Signature:	



Nominal data and limits

For nominal data and limit values refer to the data sheet supplied with the instrument.

Ref.	Measurand	Specified min. value	Measured value	Specified max. value	Unit
Page 112	Noise Display normalized to 1 Hz preselector and preamplifier off f_n				
	10 Hz	-	_____	-90	dBm
	20 Hz	-	_____	-100	dBm
	110 Hz	-	_____	-110	dBm
	1010 Hz	-	_____	-120	dBm
Page 112	Noise Display normalized to 1 Hz preselector on, preamplifier off f_n				
	10 Hz	-	_____	-90	dBm
	20 Hz	-	_____	-100	dBm
	110 Hz	-	_____	-110	dBm
	1010 Hz	-	_____	-120	dBm
Page 112	Noise Display normalized to 1 Hz preselector on, preamplifier on f_n				
	ESR 3/7:				
	1010 Hz	-	_____	-140	dBm
	ESR 26:				
	1010 Hz	-	_____	-130	dBm
Page 113	Frequency response < 9 kHz, RF attenuation 10 dB DC coupled, preselector off f_{fresp}				
	10 Hz	-1	_____	+1	dB

	110 Hz	-1	_____	+1	dB
	1010 Hz	-1	_____	+1	dB
	2010 Hz	-1	_____	+1	dB
	3010 Hz	-1	_____	+1	dB
	5010 Hz	-1	_____	+1	dB
	7010 Hz	-1	_____	+1	dB
	8990 Hz	-1	_____	+1	dB
Page 113	Frequency response < 9 kHz, RF attenuation 10 dB DC coupled, preselector on, preamplifier off f_{resp}				
	10 Hz	-1	_____	+1	dB
	110 Hz	-1	_____	+1	dB
	1010 Hz	-1	_____	+1	dB
	2010 Hz	-1	_____	+1	dB
	3010 Hz	-1	_____	+1	dB
	5010 Hz	-1	_____	+1	dB
	7010 Hz	-1	_____	+1	dB
	8990 Hz	-1	_____	+1	dB
Page 113	Frequency response < 9 kHz, RF attenuation 10 dB DC coupled, preselector on, preamplifier on f_{resp}				
	1010 Hz	-1	_____	+1	dB
	2010 Hz	-1	_____	+1	dB
	3010 Hz	-1	_____	+1	dB
	5010 Hz	-1	_____	+1	dB
	7010 Hz	-1	_____	+1	dB
	8990 Hz	-1	_____	+1	dB
Page 115	Bandwidth switching level uncertainty Sweep mode, EMI (6dB) RBW				
	100 kHz	-0.1	_____	0.1	dB
	10 kHz	-0.1	_____	0.1	dB
	1 kHz	-0.1	_____	0.1	dB
	100 Hz	-0.1	_____	0.1	dB
	10 Hz	-0.1	_____	0.1	dB
Page 115	Bandwidth switching level uncertainty FFT mode, EMI (6dB) RBW				
	100 kHz	-0.2	_____	0.2	dB
	10 kHz	-0.2	_____	0.2	dB
	1 kHz	-0.2	_____	0.2	dB

	100 Hz	-0.2	_____	0.2	dB
	10 Hz	-0.2	_____	0.2	dB
Page 116	Bandwidth EMI (6dB) RBW				
	100 kHz	-3	_____	+3	%
	10 kHz	-3	_____	+3	%
	1 kHz	-3	_____	+3	%
	100 Hz	-3	_____	+3	%
	10 Hz	-3	_____	+3	%
Page 116	Shape Factor EMI (6dB) RBW				
	100 kHz	-	_____	5	
	10 kHz	-	_____	5	
	1 kHz	-	_____	5	
	100 Hz	-	_____	5	
	10 Hz	-	_____	5	

2 Adjustment

NOTICE

Risk of erroneous measurement results

Adjustment must be carried out exclusively by qualified personnel since any change can considerably affect the instrument's measurement uncertainty.

2.1 Measuring Equipment

Table 2-1: Measuring Equipment and Accessories for Manual Adjustment of the R&S ESR Reference Oscillator

Item	Type of equipment	Recommended Specifications	Recommended Equipment	R&S Order No.	Use
1	Signal generator	Frequency: 1 GHz Output level: > -20 dBm Uncertainty of frequency: 1×10^{-9}	R&S SMA100A		Frequency Uncertainty of Reference Oscillator
2	Spectrum-analyzer	Frequency range: 100 kHz to 7 GHz	R&S FSV 7 R&S FSU 8		Check Preselector paths and Input2

2.2 Measuring the Frequency Uncertainty

**Automatic adjustment of the reference oscillator without adjustment software:
(Instruments with and without option R&S FSV-B4) .**

Test equipment: Signal generator (chapter "[Measuring Equipment](#)", item. 1):

- Frequency: e.g. 1000 MHz
- Level: - 15 dBm
- Frequency uncertainty: $< 1 \times 10^{-9}$

If the frequency uncertainty of the test transmitter is insufficient, the transmitter can be set to the correct frequency with the aid of the frequency counter prior to the measurement.

Test setup: ► Connect RF output of the signal generator to RF input of the R&S ESR.

R&S ESR settings: - [**SETUP**: MORE: SERVICE: PASSWORD: **894129**]



Warming up the reference oscillator

Before the following measurement, the R&S ESR must be on for at least ten minutes with an internal reference, so that the reference oscillator is warmed up.

Measurement: ► Start automatic adjustment by entering the service function:

- [**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.3.12**]

The instrument performs the automatic adjustment. The new tuning values are stored in the EEPROM automatically.

2.3 Troubleshooting

Checking the input signal:

The automatic adjustment routine checks the power level of the input signal. The adjustment is aborted if the input level is not within the range from - 10 dBm to - 20 dBm.

The automatic adjustment is also aborted if the input signal is not within the nominal frequency range:

- Model without OCXO (option R&S FSV-B4): 1.0 GHz $\pm$ 1 kHz
- Model with OCXO (option R&S FSV-B4): 1.0 GHz $\pm$ 100 Hz

For verification proceed as follows:

R&S ESR
settings:

- [**SETUP** : REFERENCE : INT]
- ▶ Toggle to internal reference.

Signal generator
settings:

Frequency: as above (e.g. 1000 MHz)

R&S ESR
settings:

- [PRESET]
- [FREQ : 1 GHz]
- [SPAN : 100 kHz]
- [**BW** : RES BW MANUAL: **10 kHz**]
- [**MKR FUNC** : SIGNAL COUNT]

Measurement:

- ▶ Read out the power level of the marker and check whether the input level is within the range from - 10 dBm to - 20 dBm.
- ▶ Read out the frequency value (Count:) of the marker and check whether the input signal frequency is in the nominal frequency range as shown above.

Checking appropriate warm-up of the instrument:

The automatic adjustment routine checks the drift of the internal reference oscillator. If there is too much drift (warming up is not completed) the adjustment is aborted.

Checking the R&S FSV-B4 option

Disconnect the instrument from all power supplies, remove option R&S FSV-B4, connect the power again and perform the automatic adjustment as described above. If this works correctly, most likely the R&S FSV-B4 option is defective.

2.4 Frequency Response Correction

With some boards (see chapter 3, section "[Repair](#)"), a frequency response correction is necessary. This correction can be performed by R&S service representations.

2.5 Tracking Generator

Adjustment of the tracking generator (R&S FSV-B9) output level.

1. Press the "Windows" button at the instrument. Open "My Computer".
2. Open the file:
"C:\R_S\Instr\EEPROM\trackinggenerator\SglValues.dat" with a text editor while the firmware is running.
3. Edit the values in the [ATT_ERROR] section of the file:

ABSOLUTE_ERROR_ALC_ON=0.0

ABSOLUTE_ERROR_ALC_OFF=0.0
4. Overwrite the existing file by saving the edited file.
5. Change to analyzer firmware and enter the service password:
[SETUP : MORE : SERVICE : PASSWORD : 30473035]
6. Load the edited file:
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.25.0.track]
7. Measure the level accuracy according to the performance test at 64 MHz as described in chapter "Checking Absolute Level Accuracy".
8. Calculate values to write in the "SglValues.dat" file: measured value + 10 dBm. (the correction value is < 0 if the output power is below – 10 dBm).
9. Edit the values in the [ATT_ERROR] section of the "SglValues.dat" file:

ABSOLUTE_ERROR_ALC_ON=[calculated Value]

ABSOLUTE_ERROR_ALC_OFF=0.0
10. Keep the "SglValues.dat" file opened and continue as follows:
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.8.0.1.2]
11. Repeat steps 7 and 8.
12. Edit the values in the [ATT_ERROR] section of the file "SglValues.dat":

ABSOLUTE_ERROR_ALC_ON=[do not edit!]

ABSOLUTE_ERROR_ALC_OFF=[calculated Value]
13. Save the file by overwriting the old one.

14. Load the edited file:
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.25.0.track]
15. Repeat step 7. Deviation to nominal output level (- 10 dBm) must be < 1,5dB.
16. Continue as follows:
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.8.0.0]
17. Repeat step 7. Deviation to nominal output level (- 10 dBm) must be < 1dB.
18. Save the file in the EEPROM:
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 3.8.6.1]
19. Check the frequency response by doing the performance test as described in "Checking the Frequency Response".

3 Repair

The following chapter describes how to replace modules in the R&S ESR. The general procedures to open and complete the instrument are described in the introduction. For all descriptions, the numbers in parenthesis refer to the elements indicated in the inserted graphics.

⚠ WARNING

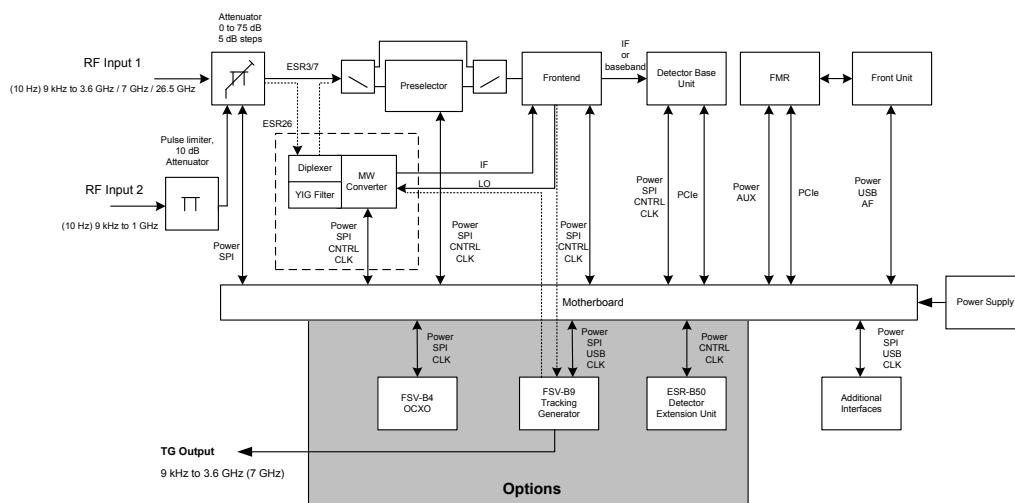
Shock hazard

Before opening the casing, make sure that the instrument is switched off and disconnected from all power supplies.

Read all safety instructions at the beginning of this manual carefully!

3.1 Functional Description

The following figure shows a block diagram of the R&S ESR.



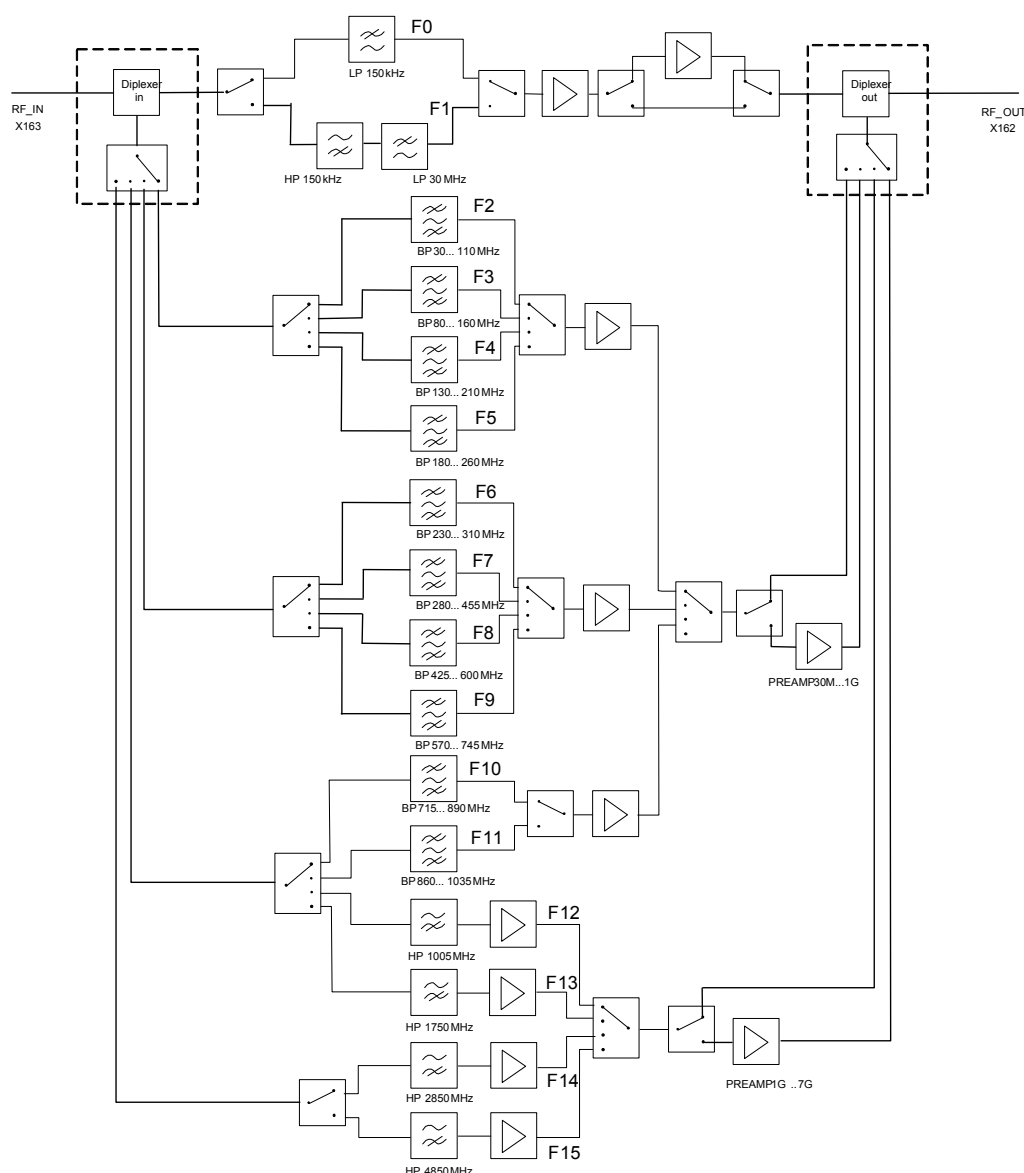
The R&S ESR is a triple-conversion (double conversion for frequencies > 7 GHz) heterodyne receiver for the frequency range from 10 Hz to 3.6 GHz, 7 GHz or 26.5 GHz depending on the instrument model. The input RF spectrum is converted to an IF of 90 MHz which is fed to the detector base unit where digital filtering is provided. The filtered data is transferred to the host processor via a PCI express (PCIe) interface. The hardware settings are controlled via a serial interface on the motherboard that is set from the host via the PCIe interface.

3.1.1 Attenuator

The attenuator switches in 5 dB steps and has a maximum total attenuation of 75 dB. It contains an AC coupling that can be bypassed.

3.1.2 Preselector

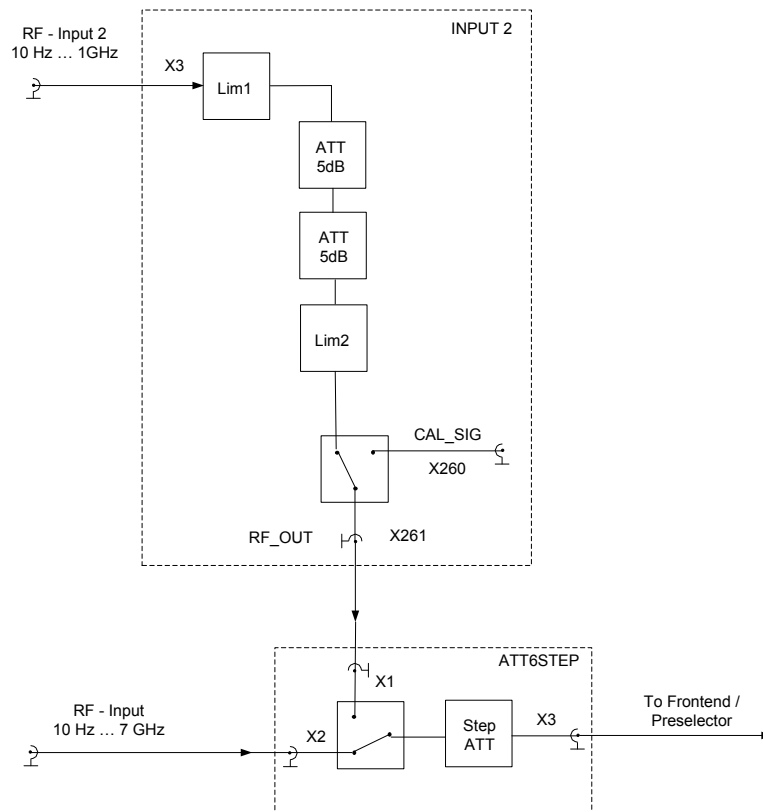
The Preselector can be switched on or off (bypassed). The Preselector has 15 different lowpass, bandpass and highpass filters to narrow the input spectrum. The Preselector improves the ability of the ESR to handle high level RF signals. For best sensitivity the Preselector has a switchable Preamplifier with a gain of 20 dB.



3.1.3 Input 2

The Input2 board is a second input for the frequency range 10 Hz to 1 GHz with a fixed 10 dB attenuator and additional limiter circuits.

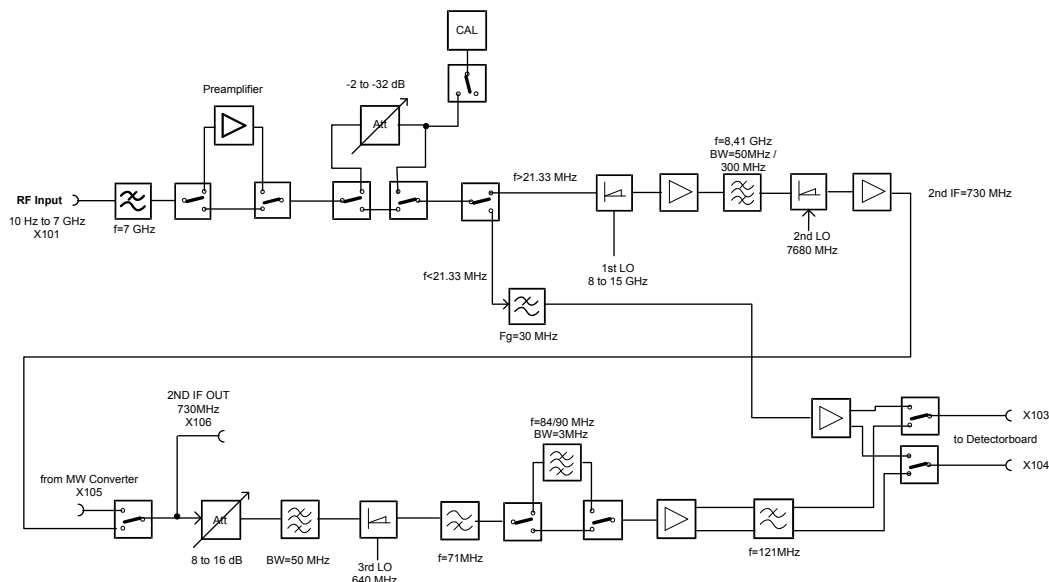
With a switch in the step attenuator either the normal input or Input2 can be selected .



3.1.4 Frontend

The frontend converts the RF frequency in the range from 10 Hz to 7 GHz to an IF of approx. 90 MHz. The module also includes the required local oscillators and associated frequency processing circuits.

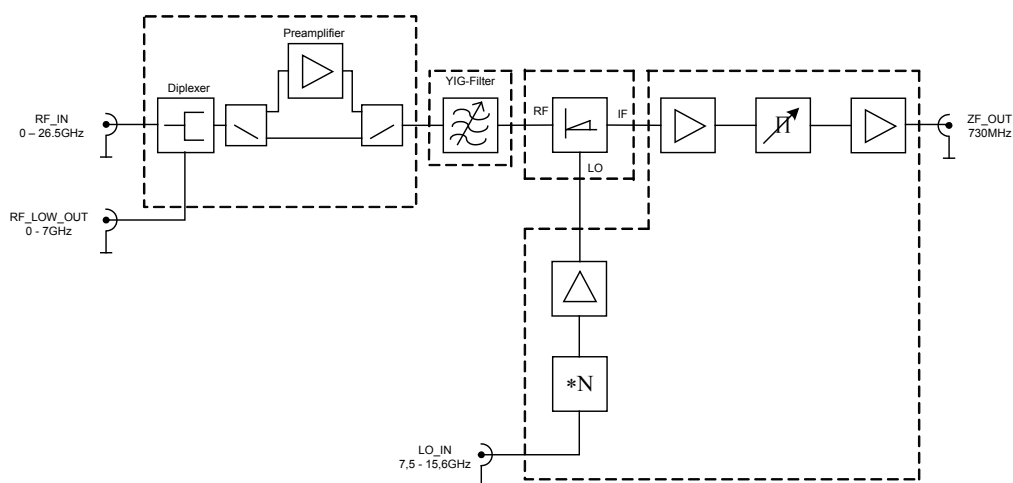
The following figure shows a block diagram of the R&S ESR frontend:



3.1.5 Microwave Converter Unit

The R&S ESR26 (frequency range > 7 GHz) also comprise a microwave converter board. This module converts the input signals in the range above 7 GHz to the second IF of approx. 730 MHz. After the attenuator, the input signals are split within the diplexer into the two signal paths < 7 GHz and > 7 GHz. Signals above 7 GHz are forwarded to the mixer via the YIG filter.

The following figure shows a block diagram of the microwave converter unit for R&S ESR26:



3.1.6 Detector Base Unit

The detector base unit digitizes the IF or baseband signal of the frontend. The module contains the digital signal processing and the sequence control for the spectrum mode. The detector base unit is connected to the front module controller via PCIe bus.

3.1.7 Motherboard

The motherboard provides the slots for the modules. It contains signal connections and the power and reference signal distribution. A FPGA that contains the board EEPROM controls the two main fans.

3.1.8 Front Module Controller

The front module controller (FMR) contains all the necessary components on a board, including the processor, memory chips (SIMM modules), I/O devices (PCIe bus), lithium battery, IEC/IEEE bus controller, LCD graphics controller, external VGA monitor graphics interface (monitor), controller for SATA hard drive and an USB interfaces.

3.1.9 Front Unit

The front unit consists of an aluminium case panel and a mounting plate which accommodates the LCD with touch screen, the touch screen controller, the backlight inverter, the keyboard mat with the membrane, the rotary knob, the front connector board, the headphone jack and the volume regulator.

3.1.10 Additional Interfaces

The board contains the interfaces IF/Video output, trigger output, aux port and two USB ports.

3.1.11 Power Supply

The power supply unit provides all currents necessary for the operation of the R&S ESR. It can be switched off by means of the power switch on the rear panel.

The power supply unit is a primary clocked switching power supply. On the secondary side, it generates the following DC voltages: + 5.5 V, + 12.2 V, - 12.2 V and + 13.5 V standby.

A control signal controlled by the front module controller (depending on the STANDBY/ON key on the front of the instrument frame) activates the power supply. In standby operation, it only supplies the 13.5 V - standby voltage for heating the OCXO (R&S FSV-B4), the LED STANDBY on the front panel and the power up control logic on the front module controller.

3.1.12 Options

3.1.12.1 OCXO R&S FSV-B4

The R&S FSV-B4 option contains an oven-controlled crystal oscillator (OCXO). This OCXO generates a 10 MHz signal, which is routed to the frontend and used as a reference signal.

3.1.12.2 Tracking Generator R&S FSV-B9

In normal operation (no frequency offset), the tracking generator generates a signal exactly at the input frequency of the R&S ESR in the frequency range up to 7 GHz.

To support frequency-converting measurements, a constant frequency offset of ± 1 GHz between the input frequency of the R&S ESR and the output signal of the tracking generator can be set. In addition, I/Q modulation or AM or FM of the output signal can be performed using two analog input signals.

The output level is controlled and can be adjusted between - 60 dBm and 0 dBm in 0.1 dB steps.

3.1.12.3 DC Power Supply R&S FSV-B30

With the optional DC Power Supply adapter (R&S FSV-B30) installed the instrument can operate from a 12 V DC source.

3.1.12.4 Battery Pack R&S FSV-B32

The optional battery pack (R&S FSV-B32) provides a 12 V DC power source to feed the DC Power Supply adapter (R&S FSV-B30). With the battery pack the instrument can operate independently from any stationary power source.

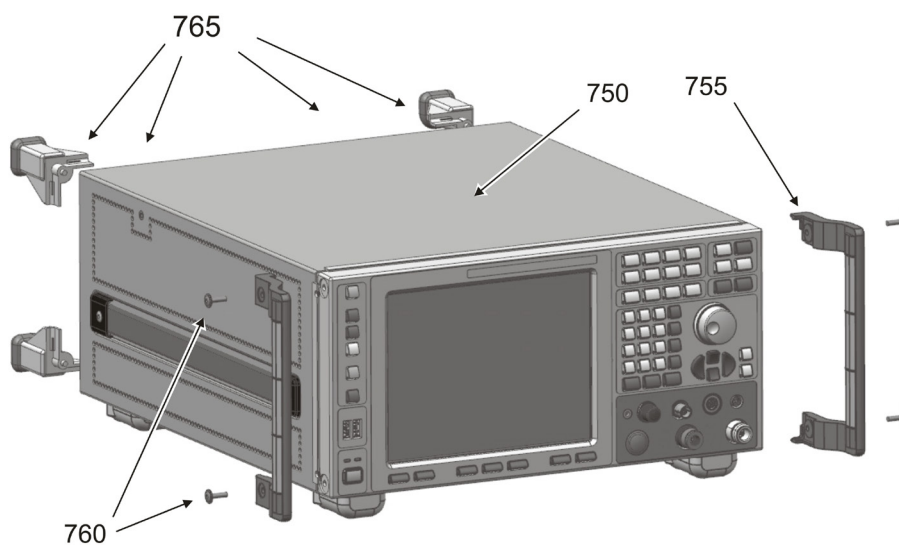
3.1.12.5 Battery Charger R&S FSV-B34

The optional battery charger R&S FSV-B34 is used to charge the four batteries of the battery pack FSV-B32.

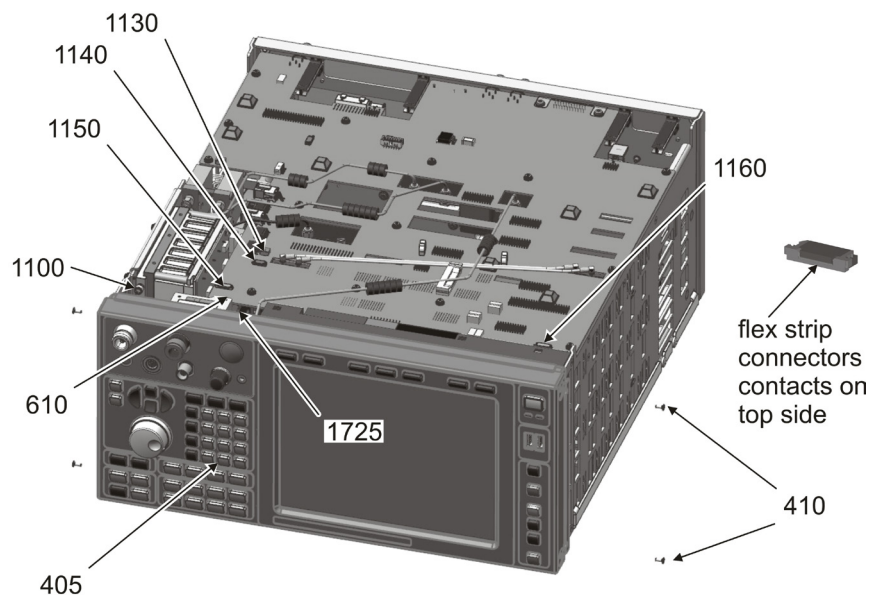
3.1.12.6 Detector Extension Unit R&S ESR-B50

The detector extension unit contains the signal processing for the real time and time domain modes. The data, digitized by the detector base unit, is sent to the detector extension unit via a proprietary highspeed LVDS link. This data is processed on the detector extension unit and sent back to the detector base unit also by a highspeed LVDS link. The detector base unit sends the processed data to the front module controller via the PCIe bus.

3.2 Opening the Instrument



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew the four screws (760) of the front handles (755) on both sides and remove them.



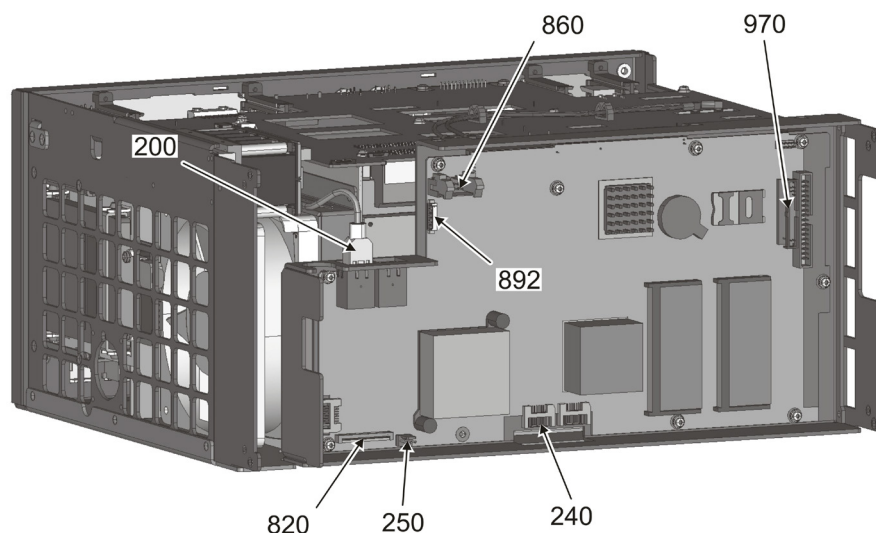
5. Disconnect the flex strip cables W71 (1140), W20 (1150) and W61 (1160).
6. Disconnect the cable W42 (1130).
7. Disconnect the cable W50 (610) from the Input 2 Board.

For instruments with Option R&S FSV-B9: Disconnect RF cable W13-2 (1725) from the front unit side (405).

8. Unscrew four screws (410) in the front unit (405).

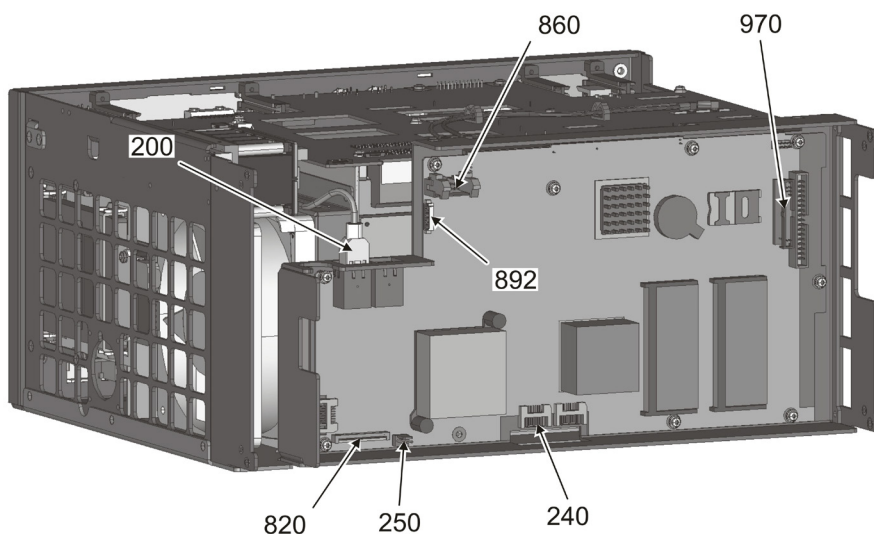
NOTICE! Risk of damage to the instrument. Cables are still connected to the controller.

9. Disconnect RF cable W1 (1100/1107).
10. Move the front unit (405) carefully a few millimeters to the front side to disconnect the controller cables.



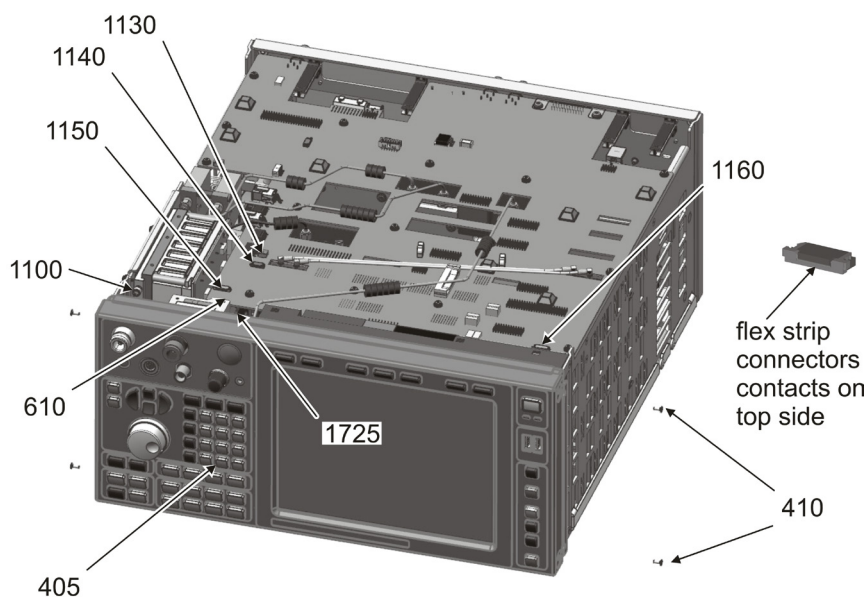
11. Disconnect cable flex switch board ESR (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (892), patchcable (200), SATA datacable (240) and SATA powercable (250) from the controller.
12. Remove the front unit (405) completely.

3.3 Completing the Instrument



13. Connect cable flex switch board R&S ESR (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (892), patchcable (200), SATA datacable (240) and SATA powercable (250).

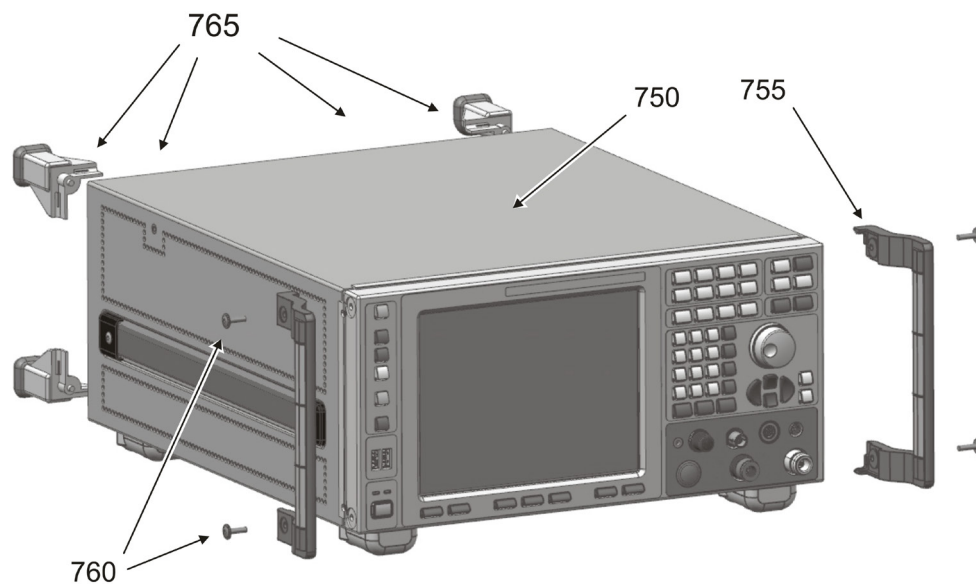
NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.



14. Assemble the front unit (405) carefully and connect RF cable W1 (1100/1107).
 15. Connect the flex strip cables W71(1140), W20(1150) and W61(1160).
 16. Connect the cable W42 (1130).
 17. Connect the cable W50 (610) to the Input 2 Board.

Note: The flex strip connector contacts are on the top of the device. For instruments with Option R&S FSV-B9: Connect RF cable W13-2 (1725).

18. Fasten the four screws (410) to screw the front unit (405) together with the unit frame.
19. Mount the front handles (755) on both sides by using the four screws (760).



20. Mount the housing (750) and adjust it properly to the front unit (405).
21. Mount the rear wall feet (765).

3.4 Putting into Operation

After completely assembling the instrument the following steps need to be carried out depending on the replaced module. The additional tasks are described with the replacement procedure of the corresponding board. In addition to these tests it is recommended to perform a performance test according to chapter “[1.2 Performance Test R&S ESR](#)” to verify the functionality of the instrument.

Replaced Module	Basic Instrument Checks (refer to 3.4.1)	Frequency response correction (refer to 3.4.1.4)	Additional Tests/Tasks (refer to corresponding chapter)
Controller A90	X	X	X
Sata HDD ADAPTOR A92	X	-	-
Lithium battery	X	X	-
Speaker B1	X	-	-
Display with Touch Screen	X	X	-
Front Connector Board A20	X	X	-
Touch Controller USB Board A60	X	X	-
Rotary Pulse Generator A70	X	X	-
Push-Button Board Set A80	X	X	X
Flex Switch Board A81	X	X	X
RF Cable W1	X	X	-
AF Output A71	X	X	-
Power Supply Unit	X	-	X
Fans	X	-	-
Frontend A100	X	X	-
Microwave Converter Unit A150	X	X	-
YIG Unit	X	X	-
Mixer A153	X	X	-
Preamplifier Unit	X	X	-
Preselect Board A160	X	X	-
Detector Base Unit A120	X	-	-
Detector Extension Unit A130	X	-	-
Additional Interface A220	X	-	-
Attenuator Unit A40	X	X	-
Motherboard A10	X	X	-
OCXO A250 (FSV-B4 option)	X	Reference frequency adjustment only	-
Tracking Generator A140 /FSV-B9 option)	X	Output level adjustment only	-

3.4.1 Basic Instrument Checks

3.4.1.1 Checking the Hardware List

When a board has been changed check the hardware list by executing

[**SETUP** : System Info : Hardware Info]

and verify if the corresponding board has been correctly detected and the serial number is updated.

3.4.1.2 Checking the System Messages

Next check the system messages by executing

[**SETUP** : System Info : System Messages]

to find errors in the hardware configuration.

Performing an instrument selftest

Next run the instrument selftest by executing

[**SETUP** : More : Service : Selftest]

and check the results.

If the selftest fails enter the service password by entering

[**SETUP** : More: Service : Password : 894129 : Enter]

and repeat the selftest in service mode to get more information and the check results again.

3.4.1.3 Performing an Instrument Self-alignment

Run the instrument self-alignment by executing

[**SETUP** : Alignment : Self Alignment]

and check the results.

3.4.1.4 Performing a Frequency Response Correction

The frequency response correction is required only in the cases listed in the table above or when you have opened any connector in the RF signal path. Without the frequency response correction the instrument may not achieve the required performance. For details see "[Adjustment](#)" on page 192.

3.5 Module Replacement

⚠ WARNING

Danger of injury during module replacement

Any adjustments, replacement of parts, maintenance or repair must be carried out exclusively by technical personnel authorized by Rohde & Schwarz.

Observe the safety instructions for units with a removable casing.

Follow the step-by-step instructions for module replacement carefully to avoid injury and to help ensure safe operation.

NOTICE

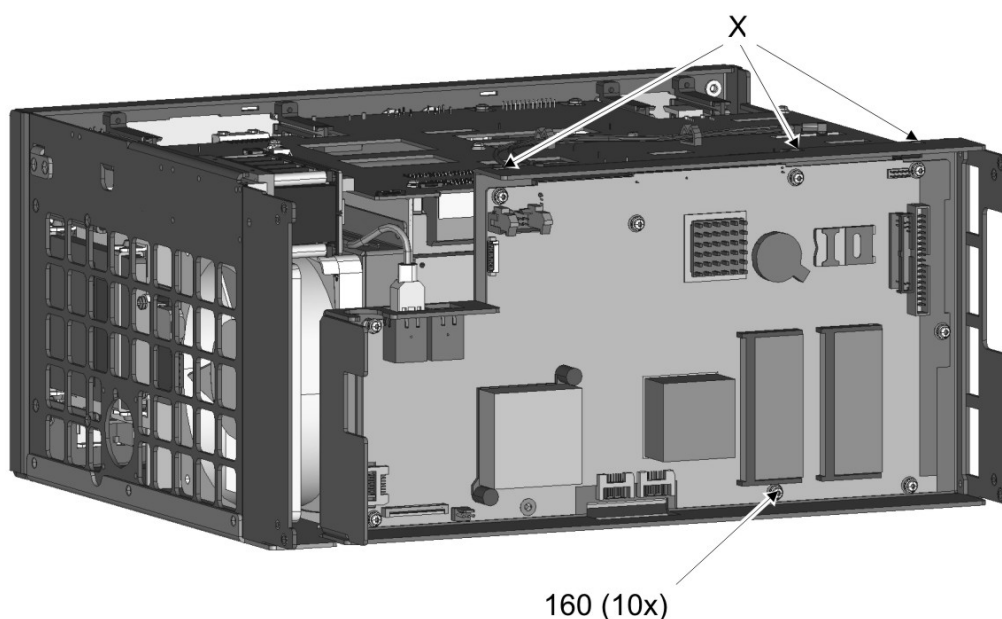
Risk of electrostatic discharge

Protect the work area against electrostatic discharge to avoid damage to electronic components in the modules. For details, refer to the safety instructions at the beginning of this manual.

3.5.1 Controller A90

See chapter 5.1 Spare Parts, item 150, and explosion drawings 1316.3003.01 sheet 1.

3.5.1.1 Removing the Controller



1. Open the instrument as described in "[3.2 Opening the Instrument](#)".
2. Unscrew ten screws (160).
3. Remove the controller using a screwdriver, if necessary. Put the screwdriver into each of the three holes (indicated by an X in the graphic), to press the controller out.

3.5.1.2 Installing the New Controller

1. Carefully insert the new controller (150) and fasten it using ten screws (160).
2. Complete the instrument as described in "[3.3 Completing the Instrument](#)".

3.5.1.3 Putting into Operation

In case a trial key was installed or should be installed in the future, also the time control key must be entered. Request the code via the service support database.

- Connect the instrument to the mains and switch on the instrument power switch. The instrument is now in standby mode.

BIOS Update:

1. You can download the BIOS image from Gloris, section "Firmware/Software".
2. Select "FW by type" and choose "ESR".
3. Follow the instructions in the PDF file on how to create the boot CD-ROM.

Creating a BIOS Update CD-ROM:

Download the latest ISO file from Gloris, section "Firmware/Software" and burn it on a CD. This CD contains the bios update file.

Executing the Update:

NOTICE

Risk of causing instrument unusability

During the BIOS update, do not switch off the instrument.

If you terminate the update procedure before it is completed, the instrument will likely not boot again. In this case, contact your Rohde & Schwarz service center.

1. To perform the BIOS update you need a USB CD-ROM drive (or DVD ROM drive) and a USB keyboard.
2. Switch the device off at the rear panel.
3. Insert BIOS Update CD-ROM in USB CD drive.
4. Connect USB CD drive to the device front panel USB connector.
5. Connect USB keyboard to the device front panel USB connector.

6. Switch on the power switch at the rear panel of the device.
7. Press 'DEL' key on the keyboard to enter the BIOS SETUP.
8. Choose with page up / down keys the 'Advanced Bios Features'. Press 'ENTER'.
9. Select "Boot Configuration" and press 'ENTER'.
10. Choose "First Boot Device" and change from "Hard Drive" to "USB-CDROM".
11. Press key 'F10' and confirm with key 'Y'.
12. The unit reboots from the CD-ROM automatically (if the CD is not recognized either the CD-ROM is not working or the CD is not burned as an ISO CD image. Change CD-ROM or burn the ISO image again).
13. Bios update starts automatically.
NOTICE! Do not switch off the unit before the program tells you to. Otherwise the CPU board has to be replaced!
14. Unplug the USB cable of the CD-ROM.
15. Reboot the instrument.
16. Start self test and check results:
[**SETUP** : SERVICE : SELFTEST] then [SELFTEST RESULTS]
17. Start a total calibration and check the result:
[**SETUP** : ALIGNMENT] then [SHOW ALIGN RESULTS].
18. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
19. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.2 Lithium Battery on the Controller

See chapter 5.1 Spare Parts, item 159, and explosion drawings 1316.3003.01 sheet 1.
The lithium battery is located on the controller.

WARNING

Risk of intoxication and explosion

Observe the safety regulations for batteries in the Grouped Safety Messages at the beginning of the manual.

3.5.2.1 Removing the Lithium Battery

1. Open the instrument as described in "[3.2 Opening the Instrument](#)".
2. Carefully push the contact springs of the battery holder up and remove the battery (159).

3.5.2.2 Installing the New Battery

1. Carefully push the contact springs of the battery holder up and insert battery into the holder beneath the springs.

Note: The plus pole (+) of the battery points upwards.

NOTICE! Risk of damage to the instrument. Do not short-circuit the battery!

2. Complete the instrument as described in "[3.3 Completing the Instrument](#)".

3.5.2.3 Putting into Operation

1. Connect the instrument to the mains and switch on its power switch. The instrument is now in standby mode.
2. After starting the instrument, check hardware info:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
3. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.3 SATA Hard Drive A91

See chapter [5.1 Spare Parts](#), item 275, and explosion drawings 1316.3003.01 sheet 1.

The spare part is already formatted for the R&S ESR and contains the complete software.

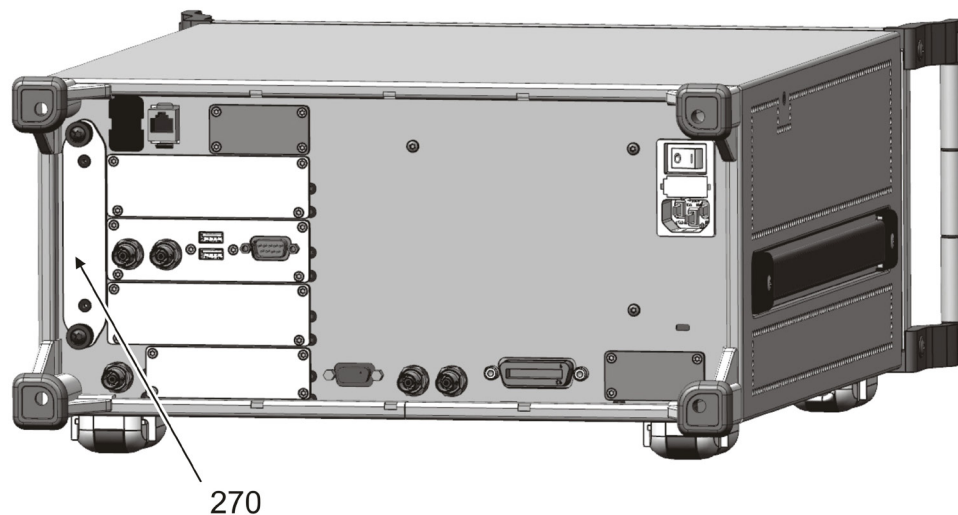
NOTICE

Risk of losing important information

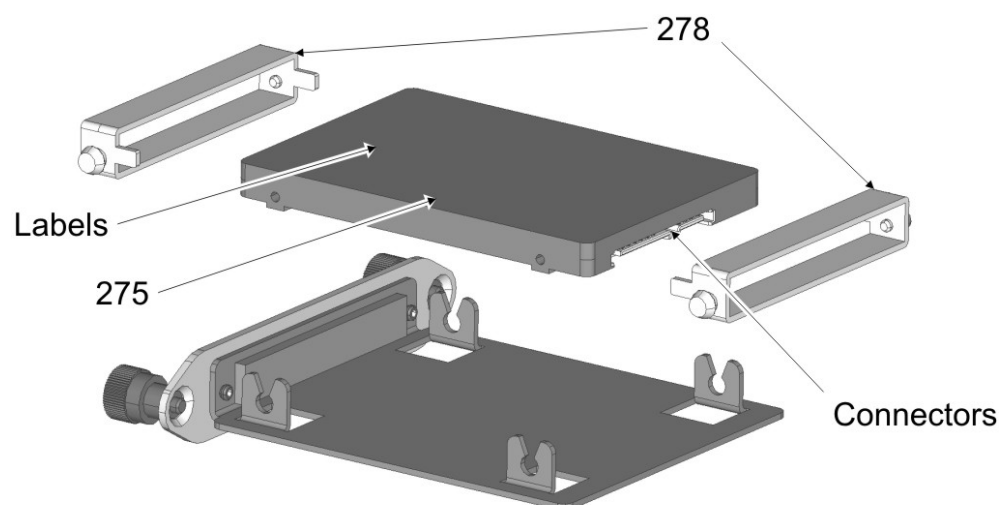
Important information about the type of instrument, installed hardware, options, etc., is stored both on the motherboard and on the hard drive. This information is required in order to restore the instrument in case of errors. Thus, do not replace the motherboard and the hard drive at the same time, as doing so will cause this information to be lost. If the instrument does not function after the hard drive has been replaced, do not replace the motherboard. Instead, re-install the old hard drive and then replace the motherboard.

3.5.3.1 Removing the SATA Hard Drive

1. Switch off the instrument and disconnect the power plug.
2. Unscrew the two knurled screws and remove the Hard Drive (270) to the rear.



3. Carefully remove the hard drive (275) together with the two holders (278) from the sheet-metal part.
4. Remove the two holders (278) from the hard drive (275).



3.5.3.2 Installing the New Hard Drive

1. Attach the two holders (278) to the new hard drive (275).
2. Push the new hard drive (275) together with the two holders (278) into the holes of the sheet-metal part.
Note: Make sure that all parts are orientated as shown in the picture above and that they lock in place. The connectors have to be on the rear of the hard drive (270) and the labels above.
3. Insert the Hard Drive (270) and fasten the two knurled screws.
4. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

NOTICE

Blue screen after replacing a hard drive

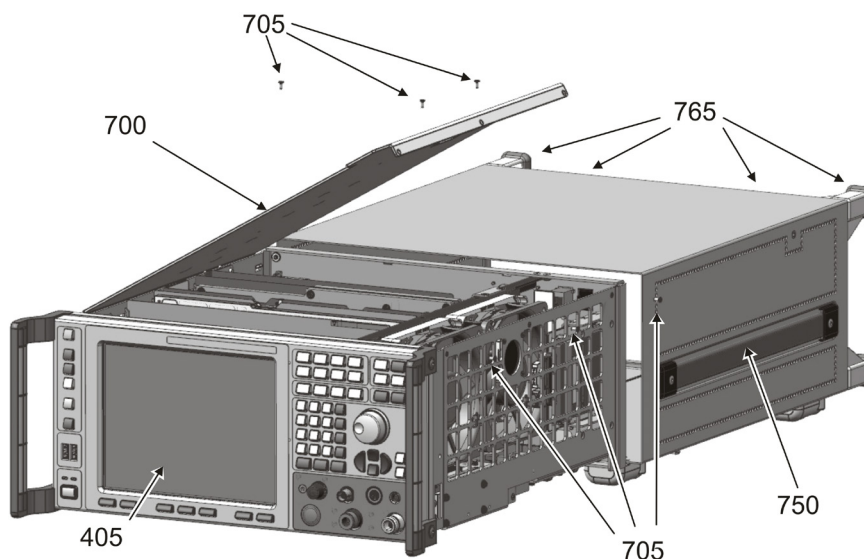
If a blue screen appears after starting the instrument, make sure that the knurled screws are fixed properly and the hard drive has a contact to the SATA adaptor.

3.5.4 SATA Adaptor A92

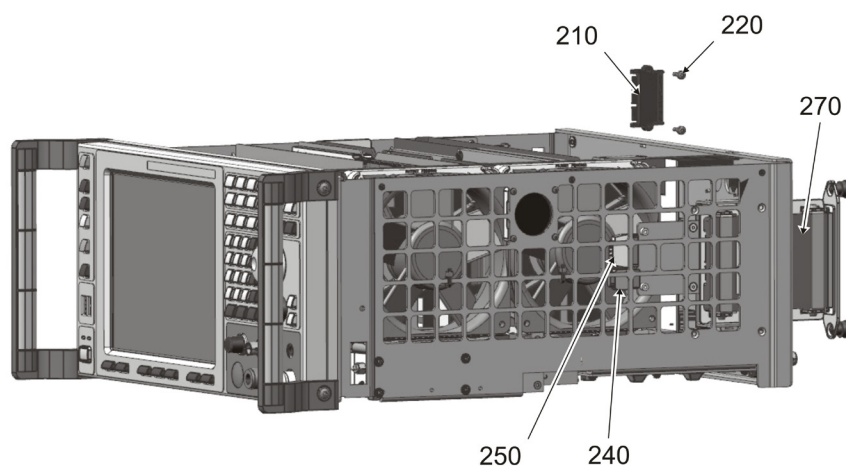
See chapter "5.1 Spare Parts", item 210, and explosion drawing 1316.3003.01 sheet 1.

The SATA Adaptor is fitted at the right side of the instrument frame of the R&S ESR.

3.5.4.1 Removing the SATA Adaptor



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove the cover.



5. Unscrew the two knurled screws and remove the hard drive (270) to the rear.
6. Disconnect the SATA data cable (240) and the SATA power cable (250).
7. Unscrew two screws (220) and remove them together with the SATA adaptor (210).

3.5.4.2 Installing the New SATA Adaptor

1. Mount the new SATA adaptor (210) with two screws (220).
2. Reconnect the SATA data cable (240) and the SATA power cable (250).
3. Insert the hard drive (270) at the rear and fix it with the two knurled screws.
4. Mount the top cover (700) on the instrument with six screws (705).
5. Mount the housing (750) and adjust it properly to the front unit (405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
8. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
9. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

NOTICE

Blue screen after replacing a hard drive

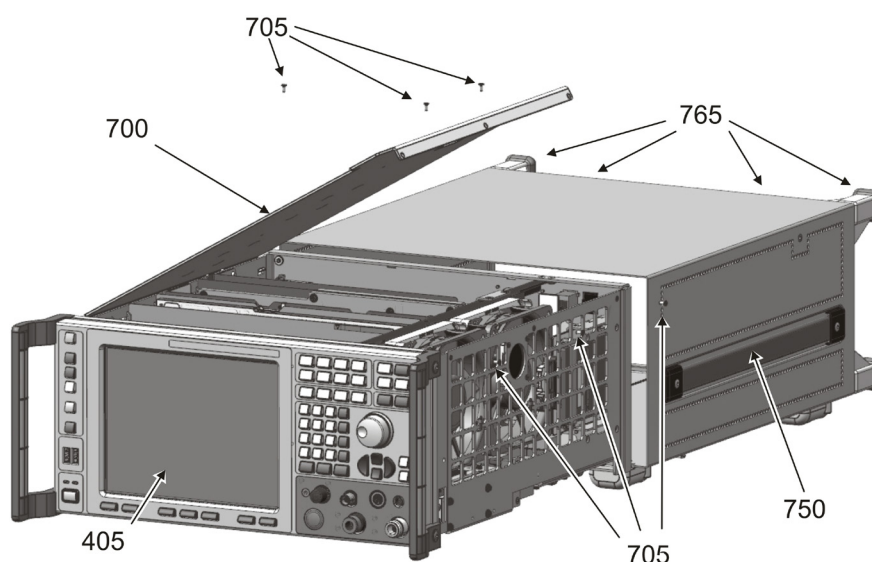
If a blue screen appears after starting the instrument, make sure that the knurled screws are fixed properly and the hard drive has a contact to the SATA adaptor.

3.5.5 Speaker B1

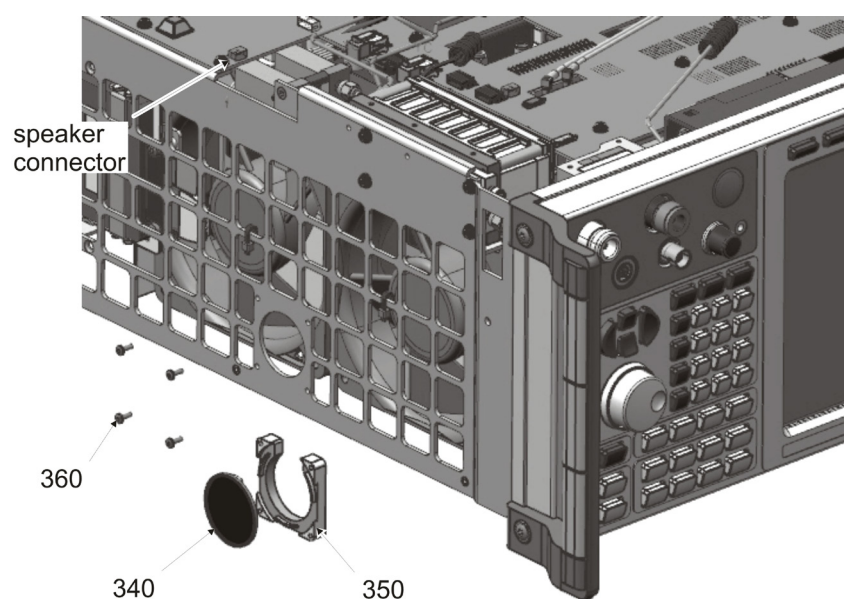
See chapter "5.1 Spare Parts", item 390 and explosion drawing 1316.3003.00 sheet 1.

The speaker is installed on the right side of the instrument.

3.5.5.1 Removing the Speaker



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Unplug the speaker connector X70 from motherboard.



6. Unscrew the four screws (360).
7. Remove the holder (350) together with the speaker (340).
8. Pull the speaker (340) out of the holder (350)

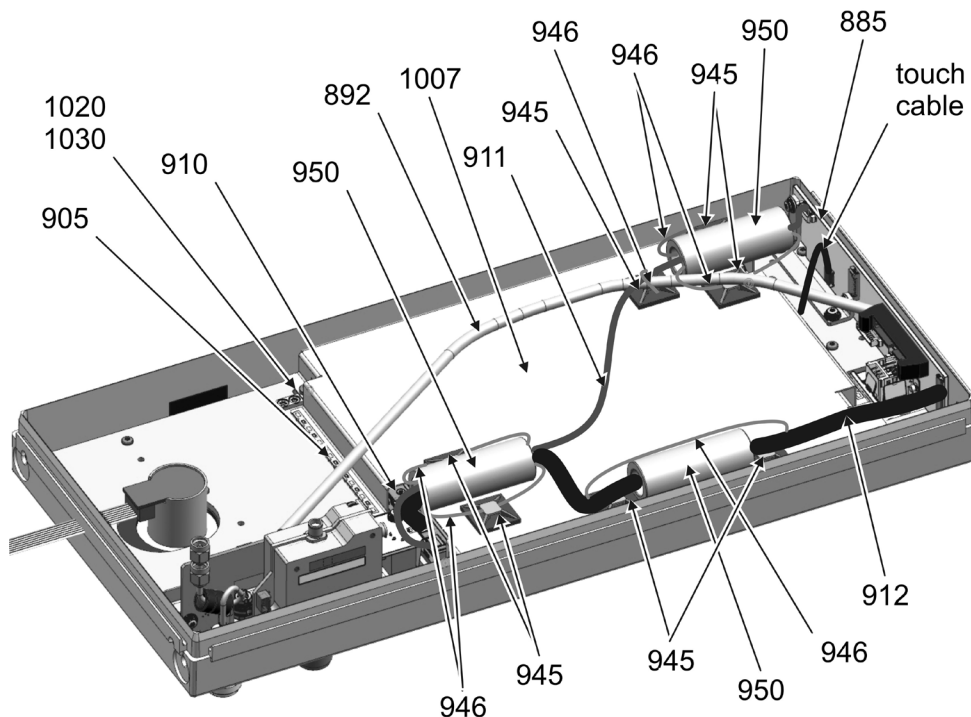
3.5.5.2 Installing the New Speaker

9. Pull the new speaker (340) carefully into the holder (350).
10. Mount the holder (350) with four screws (360) on the frame.
11. Connect the speaker with the connector X70 on the motherboard.
12. Mount the top cover (700) on the instrument with six screws (705).
13. Mount the housing (750) and adjust it properly to the front unit (405).
14. Mount the rear wall feet (765).
15. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
 - Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
 - Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.6 Display with Touch Screen

See chapter "5.1 Spare Parts", item 910, and explosion drawing 1316.3226.01 sheet 1.

3.5.6.1 Removing the Touch Screen



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the six cable ties (946) from the holders (945).
3. Put the cable (892) to the right, without plugging off.
4. Unplug the display cable (912) on the display side.
5. Unplug the LED backlight cable (911) from the display (910) and put it to the right.
6. Remove the touch cable from the touch controller board (885).
7. Unscrew four screws (1020) and four washers (1030) in the display shielding (1007).
8. Remove the display shielding (1007) carefully.
9. Remove the display with touch screen (910).
10. Make sure that the rubber seal 2,0 mm black (905) remains in the groove of the front unit.

3.5.6.2 Installing the New Touch Screen

1. Make sure that the rubber seal 2,0mm black (905) is properly located in the groove of the front unit.
2. Carefully put in the new touch screen (910).
3. Mount the display shielding (1007) with four screws (1020) and four washers (1030).
4. Connect the touch cable to the touch controller board (885).
5. Connect the LED backlight cable (911) to the display (910).
6. Connect the display cable (912) to the display (910).
7. Tie the LED backlight cable (911) and the cable (892) together with a cable tie (946) on the holder (945).
8. Tie the three axial ferrite beads with six cable ties (946) on the holders (945).
9. Complete the instrument as described in "[3.3 Completing the Instrument](#)".

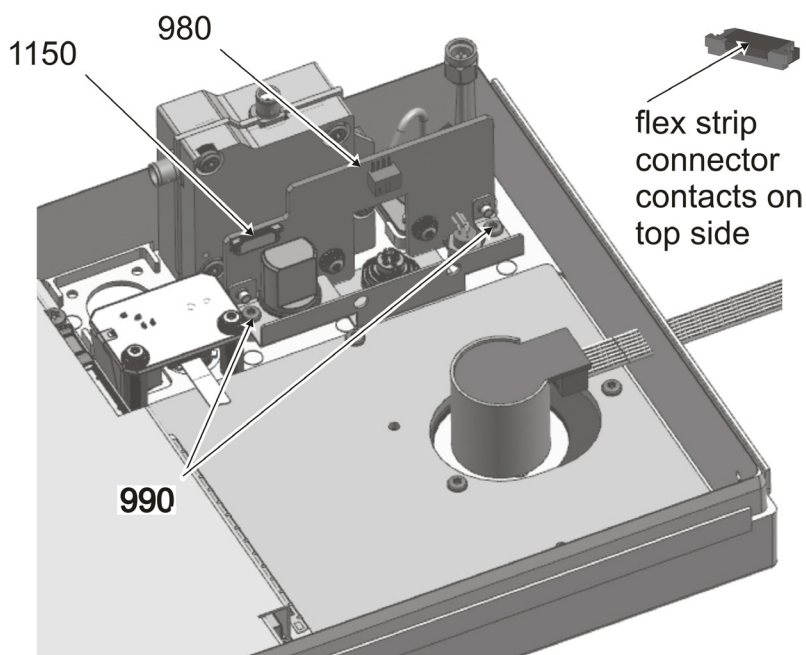
3.5.6.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Calibrating the touch screen: to calibrate the touch screen you need a USB mouse or a USB keyboard with a touch ball.
[SETUP : ALIGNMENT : TOUCH SCREEN ALIGNMENT], follow the instructions on the screen.
3. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
robert
5. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
6. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.7 Front Connector Board A20

See chapter "5.1 Spare Parts", item 980, and explosion drawing 1316.3226.01 sheet 1.

3.5.7.1 Removing the Front Connector Board



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Unplug the flex strip cable (1150) from the Frontconnector Board (980).
3. Unscrew two screws (990) from the Frontconnector Board (980).
4. Remove the Front Connector Board (980) carefully.

3.5.7.2 Installing the New Front Connector Board

1. Mount the new front connector board (980) carefully with two screws (990).
2. Connect the flex strip cable (1150) to the front connector board (980).
Note: The flex strip connector contacts are on the top of the device.
3. Complete the instrument as described in "3.3 Completing the Instrument".

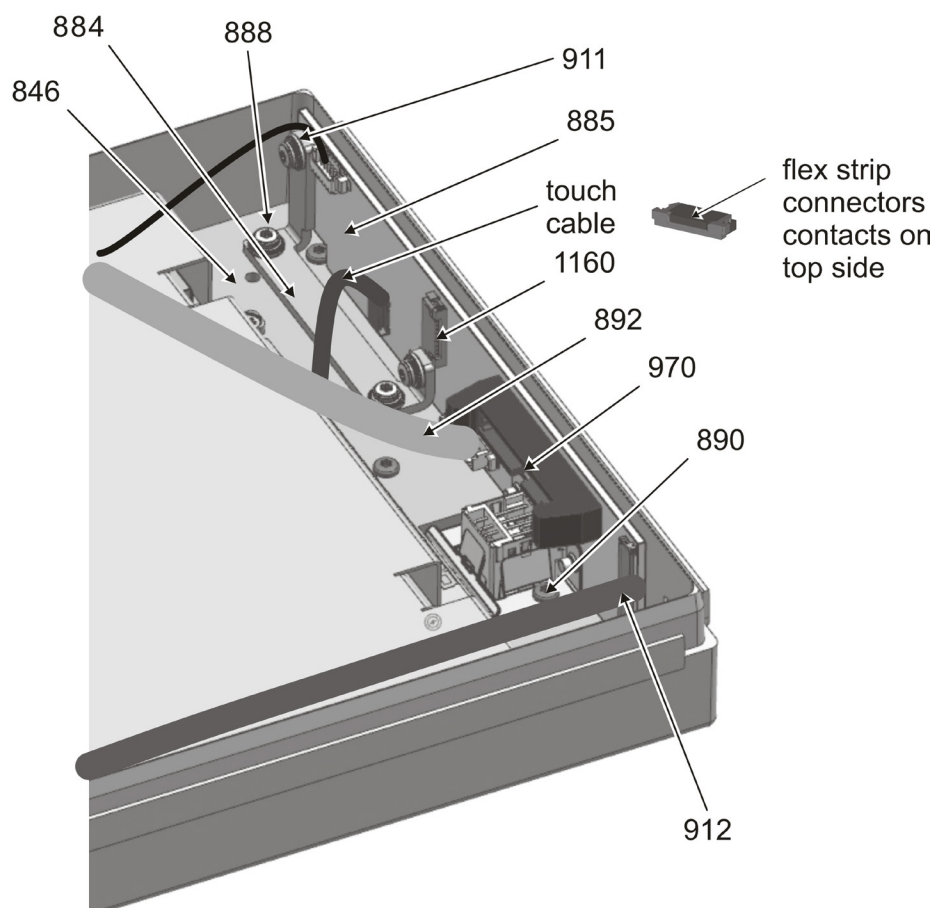
3.5.7.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
3. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
4. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.8 Touch Controller USB Board A60

See chapter "5.1 Spare Parts", item 885, and explosion drawing 1316.3226.01 sheet 1.

3.5.8.1 Removing the Touch Controller USB Board



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Unplug the cable (892), the touch cable, the LED backlight cable (911) and the display cable (912) from the touch-controller-USB-board (885).
3. Unscrew two screws (888) and two screws (890) from the keyboard holder (846).
4. Carefully remove the USB-touch-controller-board (885).
5. Unscrew two screws (888) from the touch-controller-USB-board (885) and remove the holder touch controller (884), the cable W31 LST board FMR (970) and the flex strip cable (1160) completely.

3.5.8.2 Installing the New Touch Controller USB Board

1. Mount the holder touch controller (884) with two screws (888) to the new touch-controller-USB-board (885).
2. Mount the new touch-controller-USB-board (885) carefully with two screws (890) and two screws (888) to the front unit.
3. Connect the cable (892), the touch cable, the LED backlight cable (911) and the display cable (912) with the touch-controller-USB-board (885).
4. Connect the cable W31 LST board FMR (970) and the flex strip cable (1160) to the touch-controller-USB-board (885).
5. Complete the instrument as described in "[3.3 Completing the Instrument](#)".

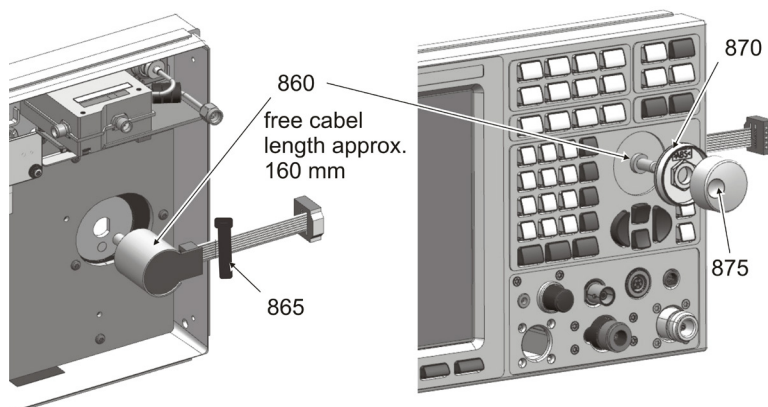
3.5.8.3 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Calibrating the touch screen: to calibrate the touch screen you need a USB mouse or a USB keyboard with a touch ball.
[SETUP : ALIGNMENT : TOUCH SCREEN ALIGNMENT], follow the instructions on the screen
3. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
5. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
6. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.9 Rotary Pulse Generator A70

See chapter "5.1 Spare Parts", item 860, and explosion drawing 1316.3226.01 sheet 1.

3.5.9.1 Removing the Rotary Pulse Generator



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the knob (875) carefully from the rotary pulse generator (860).
3. Unscrew the collar with nut (870).
4. Remove the rotary pulse generator (860) from the frame unit.

3.5.9.2 Installing the New Rotary Pulse Generator

1. Mount the new rotary pulse-generator (860) carefully with the collar with nut (870) to the front unit.
2. Assemble the knob (875).
3. Shorten the free length of the cable (860) carefully to approx. 160mm by using a cable tie (865).
4. Complete the instrument as described in "3.3 Completing the Instrument".

3.5.9.3 Putting into Operation

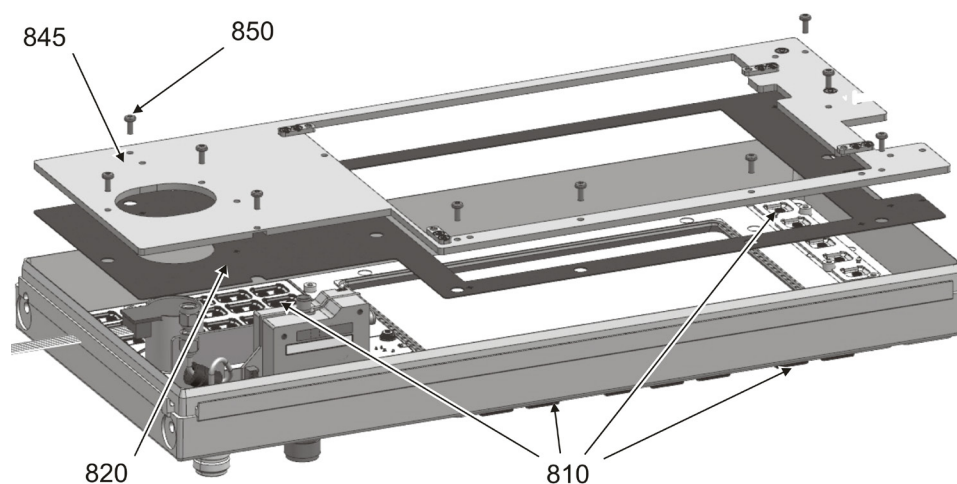
1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
3. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
4. Perform a frequency response correction using the correction software. Further information can be found in chapter "2 Adjustment".
5. Adjust the instrument as described in chapter "2 Adjustment".

3.5.10 Push-Button Board Set A80

See chapter "5.1 Spare Parts", item 810, and explosion drawing 1316.3226.01 sheet 1.

NOTE: For quality reasons, it is strictly recommended that you change the Push-Button Board Set (810) together with the flex switch board (820)!

3.5.10.1 Removing the Push-Button Board Set



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the touch screen (910) as described in "3.4.6.1 Removing the Touch Screen".
3. Remove the USB-touch-controller-board (885) as described in "3.4.8.1 Removing the Touch Controller USB Board".
4. Unscrew ten screws (850) from the keyboard holder (846) and remove the holder.
5. Remove the flex switch board (820).
6. Remove the four pieces of the push-button board set (810).

3.5.10.2 Installing the New Push-Button Board Set

1. Insert four pieces of the new push-button board set (810) into the front cover.
2. Place in the flex switch board (820). Make sure that all nipples of the push-button board set (810) pass through the holes of the flex switch board (820).
3. Assemble the keyboard holder (846) with ten screws (850).
4. Assemble the touch-controller-USB-board (885) as described in "3.4.8.2 Installing the New Touch-Controller-USB-Board".
5. Assemble the touch screen (910) as described in "3.4.6.2 Installing the New Touch Screen".
6. Complete the instrument as described in "3.3 Completing the Instrument".

3.5.10.3 Checking the Push-Button Board Set and Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

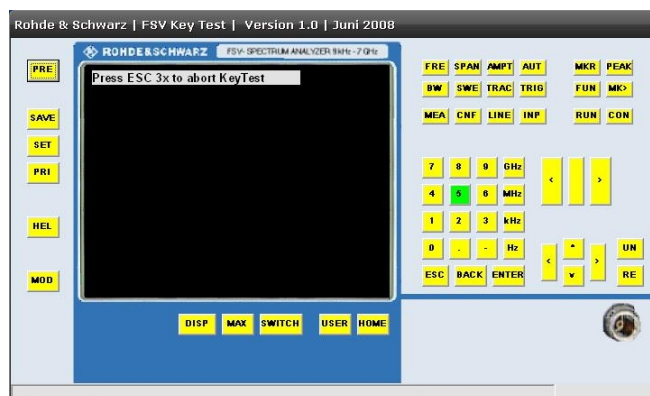
2. Starting the key test tool:

[SETUP : MORE : SERVICE : ENTER PASSWORD : 894129 ENTER]

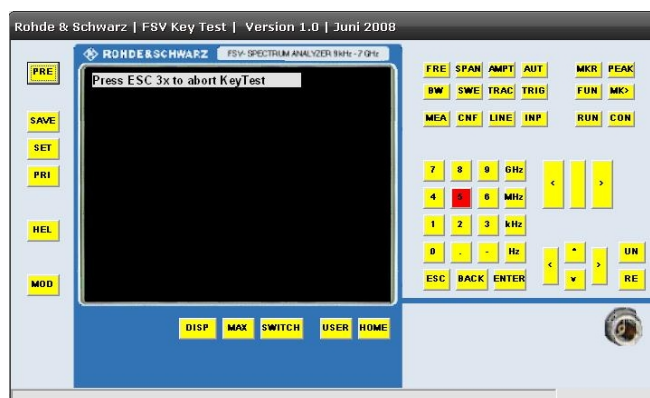
[SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.14.0]



3. After the first pressing of a key the corresponding button changes its color from yellow to green:



4. If the key is pressed a second time, the corresponding button changes its color from green to red.
5. If a key does not match the given key code, the corresponding button does not change its color and the unknown key code is displayed in the dialog status line.



6. To verify that all keys work properly, all keys should be pressed twice and finally all displayed buttons should have a red color. Otherwise the keyboard does not work properly.
7. Press the ESC key three times to abort the key test tool during the test.
8. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
10. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.11 Flex Switch Board A81

See chapter "[5.1 Spare Parts](#)", item 820, and explosion drawing 1316.3226.01 sheet 1.

NOTE: For quality reasons, it is strictly recommended that you change the Push-Button Board Set (810) together with the flex switch board (820)!

The procedure is the same as the one described in section "[Push-Button Board Set A80](#)".

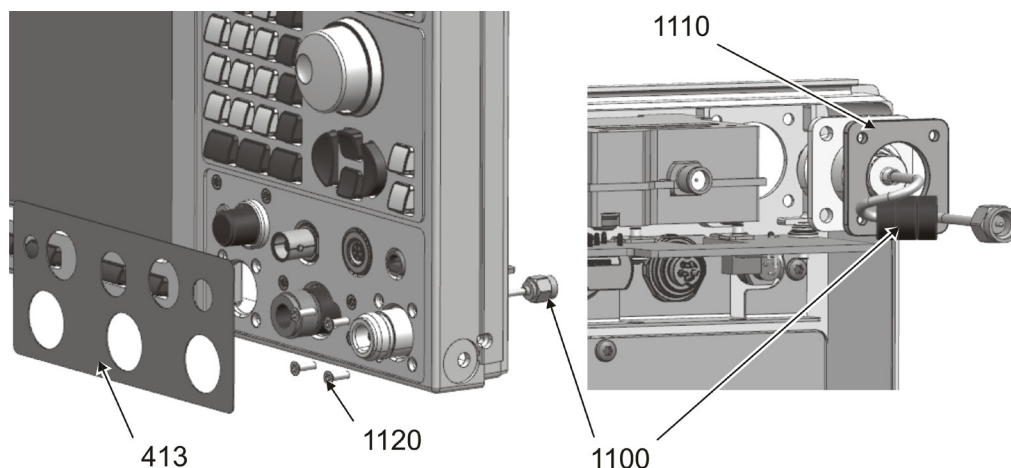
The flex switch board (820) is placed above the push-button board set (810).

Finally the key test described in section "[Checking the Push-Button Board Set and Putting into Operation](#)" must also be performed using the tool.

3.5.12 RF Cable W1 (R&S ESR3/7)

See chapter "5.1 Spare Parts", item 1100 and explosion drawing 1316.3226.01 sheet 1.

3.5.12.1 Removing the RF Cable



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the label R&S ESR connector (413).
3. Unscrew four screws (1120).
4. Remove the RF cable W1 (1100) carefully.
5. Disassemble the mounting plate (1110) from the RF cable W1 (1100).

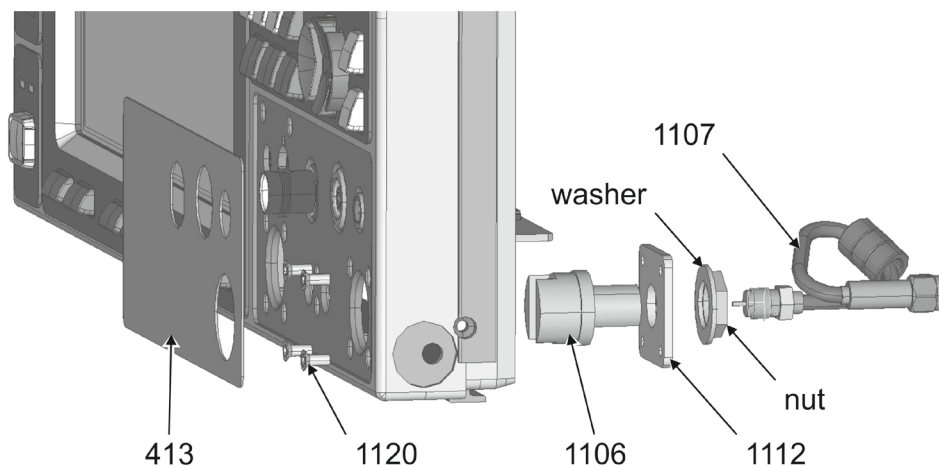
3.5.12.2 Installing the New RF Cable W1 and Putting into Operation

1. Mount the new RF cable W1 (1100) and the mounting plate (1110) with four screws (1120) to the front unit.
2. Place the label R&S ESR connector (413) on the front unit.
3. Complete the instrument as described in "3.3 Completing the Instrument".
4. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
5. Start selftest and check results:
6. [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
7. Start alignment and check the result:
8. [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter "2 Adjustment".
10. Adjust the instrument as described in chapter "2 Adjustment".

3.5.13 Adaptor (R&S ESR26)

See chapter "5.1 Spare Parts", item 1106/1107/1112 and explosion drawing 1316.3226.01 sheet 1.

3.5.13.1 Removing the Adaptor



Open the instrument as described in chapter 3.2.

11. Unmount the front unit as described in chapter 3.2.
12. Remove the label R&S ESR connector (413).
13. Unscrew four screws (1120).
14. Remove the adaptor (1106) together with the mounting plate (1112) and the RF cable W1 (1107).
15. Disassemble the RF cable W1 (1107) from the adaptor (1106).
16. Unscrew the nut and disassemble the washer and the mounting plate (1112) from the adaptor (1106).

3.5.13.2 Installing the New Adaptor and Putting into Operation

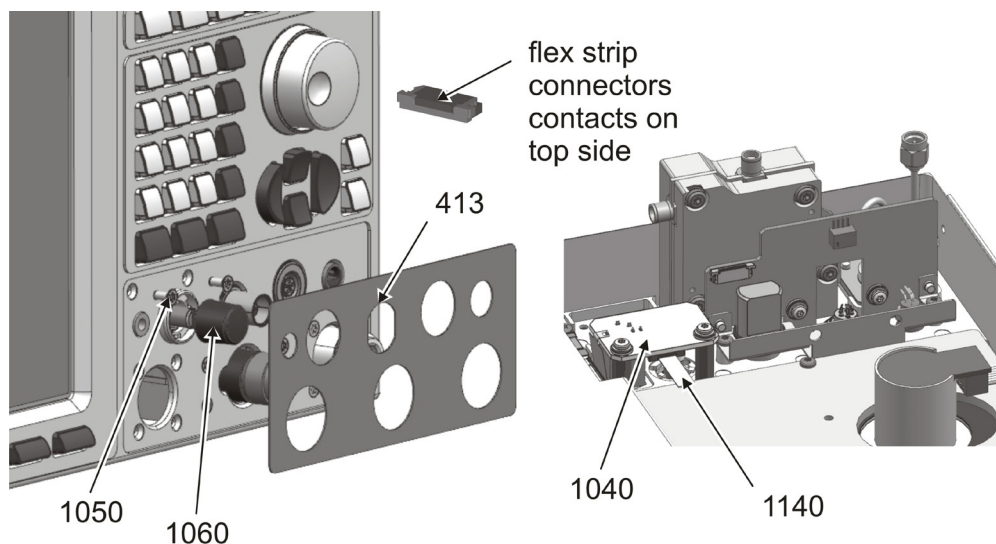
17. Assemble the new adaptor (1106) together with the mounting plate (1112), the washer, nut and the RF cable W1 (1107).
18. Mount the adaptor (1106) with four screws (1120) to the front unit.
19. Place the label R&S ESR connector (414) on the front unit.
20. Mount the front unit as described in chapter 3.3.
21. Complete the instrument as described in chapter 3.3.
22. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

23. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
24. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
25. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2.4 Frequency Response Correction](#)".
26. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.14 AF Output A71

See chapter "5.1 Spare Parts", item 1040, and explosion drawing 1316.3226 sheet 1.

3.5.14.1 Removing the AF Output



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the label R&S ESR connector (413).
3. Remove the knob (1060).
4. Unscrew two screws (1050).
5. Remove the AF output (1040) carefully.
6. Disconnect flex-strip (1140) from the AF output (1040).

3.5.14.2 Installing the New AF Output

1. Connect the flex-strip (1140) to the new AF output (1040).
Note: The flex strip connector contacts are on the top of the device.
2. Mount the new AF output (1040) with two screws (1050) to the front unit.
3. Place the label ESR connector (413) on the front unit.
4. Assemble the knob (1060).
5. Complete the instrument as described in "3.3 Completing the Instrument".

3.5.14.3 Putting into Operation

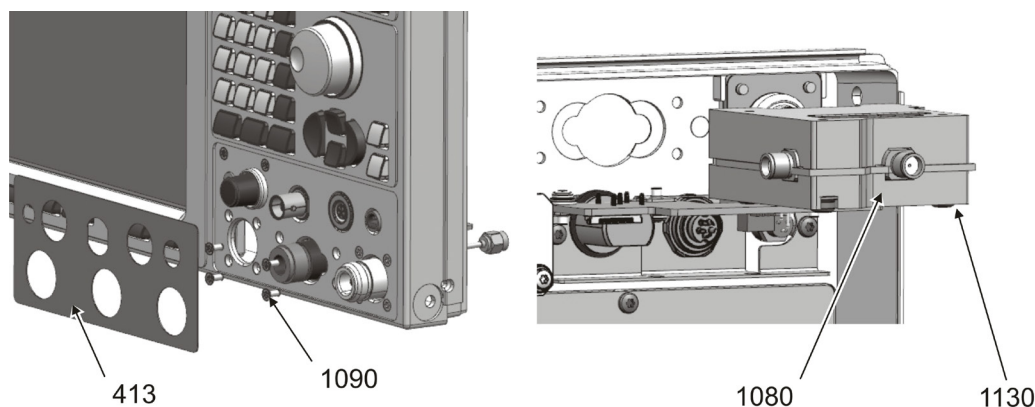
1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Start selftest and check results:
3. [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
4. Start alignment and check the result:
5. [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
6. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
7. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.15 Input 2 Board A260

See chapter "5.1 Spare Parts", item 1080 and explosion drawing 1316.3226.01 sheet 1.

The input 2 board is installed in the front panel.

3.5.15.1 Removing the Input 2 Board



1. Open the instrument as described in "3.2 Opening the Instrument".
2. Remove the label ESR connector (413).
3. Unscrew four screws (1090).
4. Remove the input 2 board (1080) carefully.
5. Disconnect the cable W42 (1130) from the Input 2 Board (1080).

3.5.15.2 Installing the New Input 2 Board

1. Connect the cable W42 (1130) to the Input 2 Board (1080).
2. Mount the new input 2 board (1080) with four screws (1090) to the front unit.
3. Place the label ESR connector (413) on the front unit.
4. Complete the instrument as described in "3.3 Completing the Instrument".
 - After starting the instrument check:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
 - Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
 - Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
 - Perform a frequency response correction using the correction software. Further information can be found in chapter "2 Adjustment".

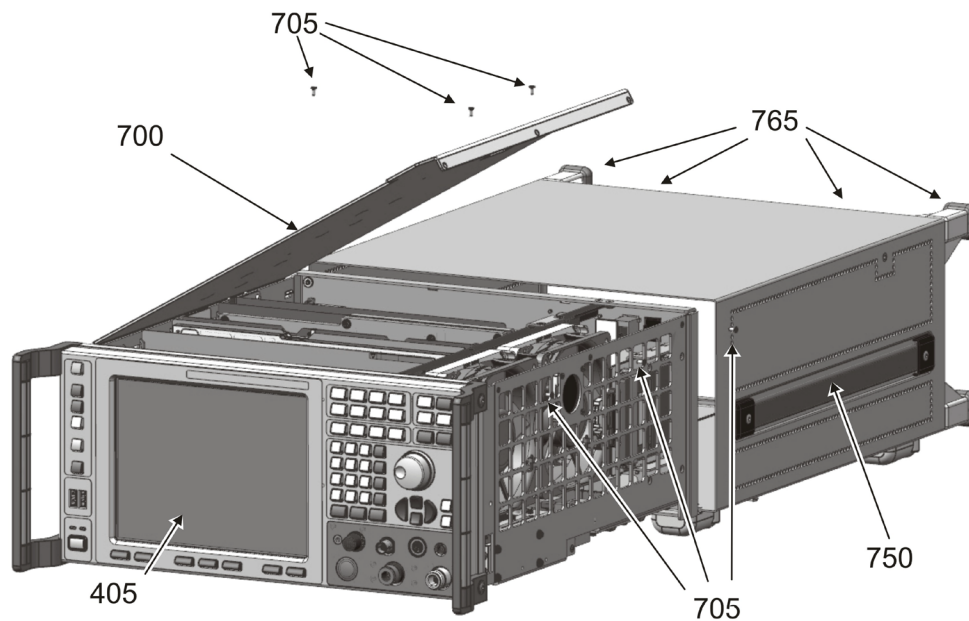
Adjust the instrument as described in chapter "2 Adjustment".

3.5.16 Power Supply Unit

See chapter "[5.1 Spare Parts](#)", item 30 and explosion drawing 1316.3003.01 sheet 2.

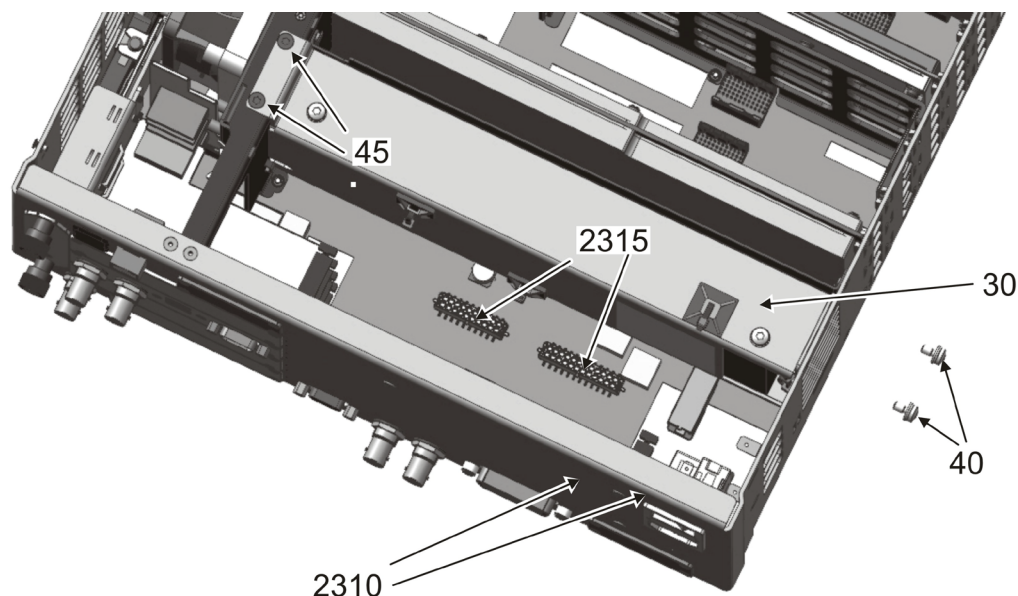
The power supply is fitted at the rear of the instrument frame of the R&S ESR.

3.5.16.1 Removing the Top Cover



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.

3.5.16.2 Removing the Power Supply Unit



1. Remove the power input cable (2310) from the connectors.
2. Disconnect the cable power supply-motherboard (2315) from the motherboard.
3. Unscrew two screws (40) and two screws (45).
4. Take out the power supply unit (30) completely.

3.5.16.3 Installing the New Power Supply Unit

1. Connect cable power supply-motherboard (2315) and the power input cable (2310) to the connectors.
2. Place the power supply outside of the instrument. Take care not to shortcircuit the mains input or the current output of the power supply.
3. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.

NOTICE! Mains voltage is applied to the power supply.

4. Adjust the + 5 V voltage to + 5.2 V $\pm$ 50 mV, measured at the motherboard (see picture below).

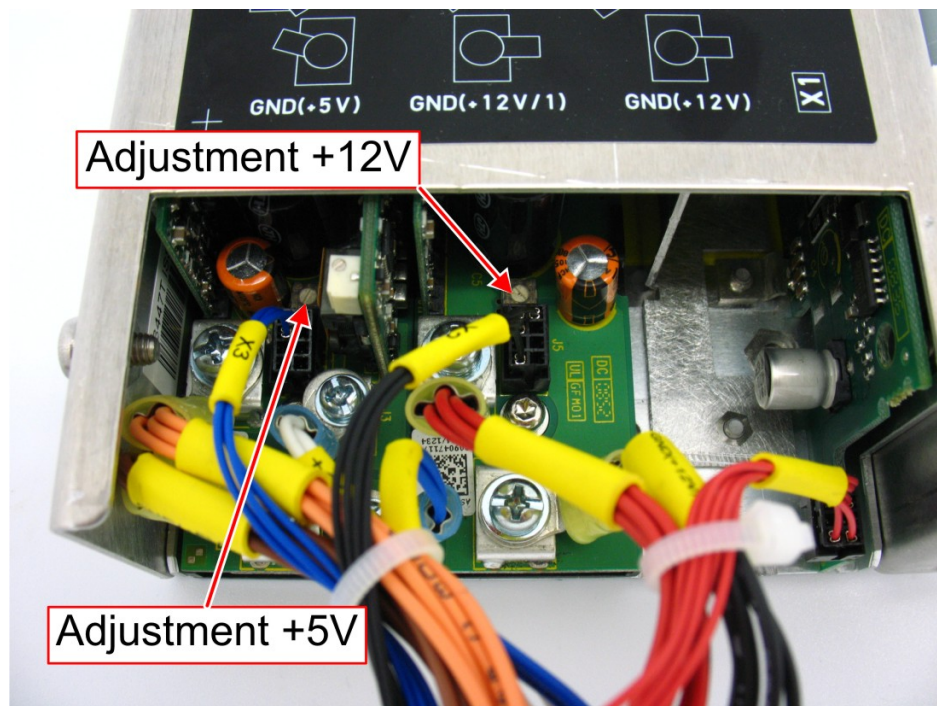


Figure 3-1: Location of the potentiometers

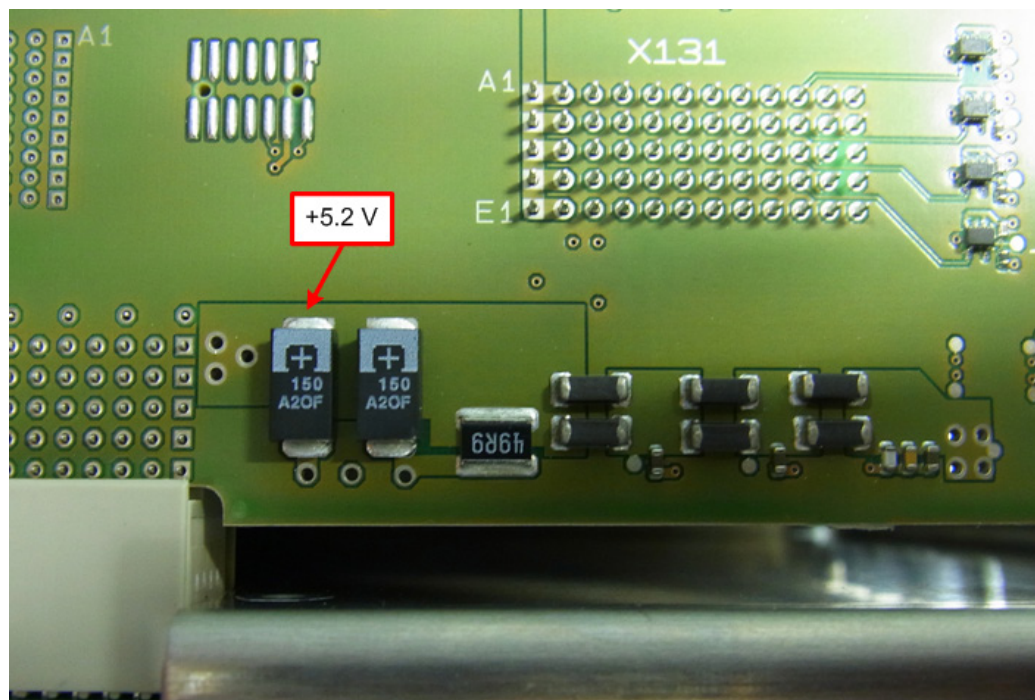


Figure 3-2: Location of the test point on the mainboard

5. Adjust the + 12 V voltage to + 12,2 V $\pm$ 25 mV, measured at the motherboard (fuse F10, see picture below).

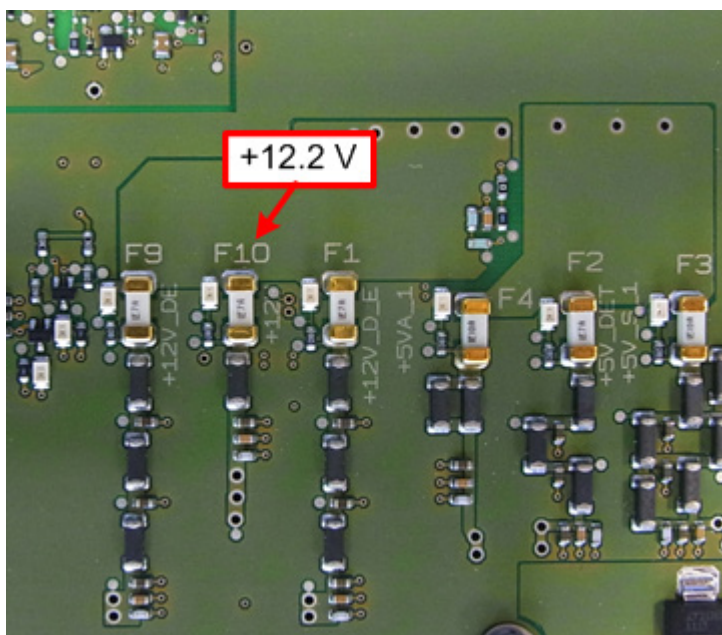


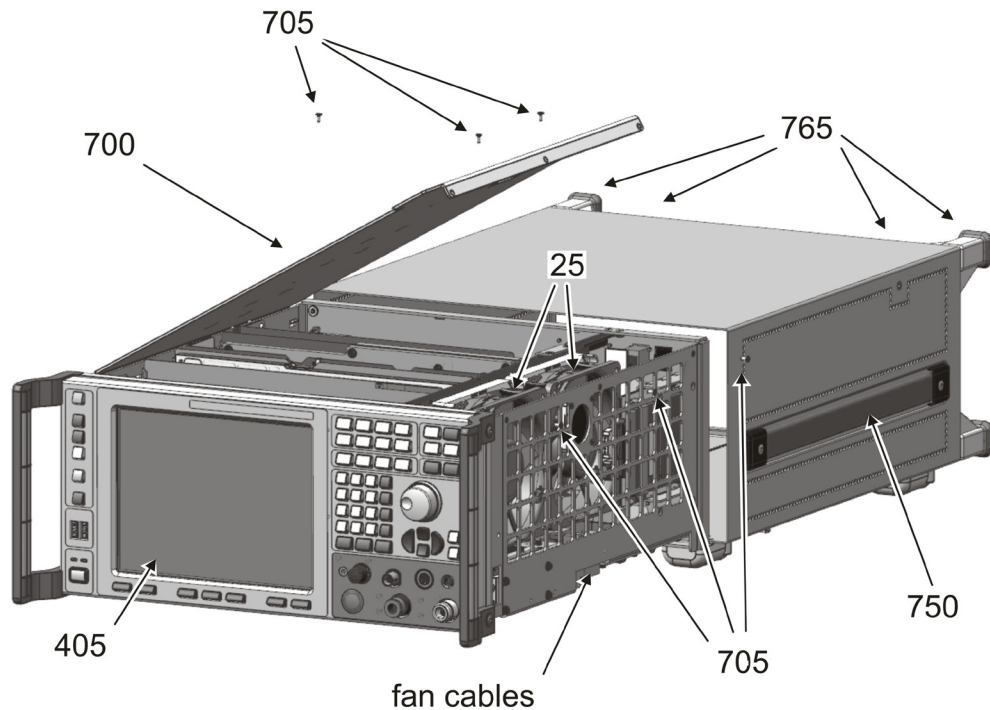
Figure 3-3: Location of the test point on the mainboard

6. Switch the instrument off.
7. Tie the cable power input (2315) and both cable ties (2360) to holders (2355).
8. Carefully insert the power supply (2300) into the instrument.
NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.
9. Assemble the power supply unit with four screws (40/45) to the instrument.
10. Connect two protective earth conductors to their connectors.
11. Tie the cable power input to the holder on the power supply unit near the power inlet by use of a cable tie.
12. Fix the top cover (700) with six screws (705).
13. Mount the housing (750) and adjust it properly to the front unit (405).
14. Mount the rear wall feet (765).
15. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
16. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
17. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.17 Fan

See chapter "5.1 Spare Parts", item 25 and explosion drawings 1316.3003.01 sheet 1.

3.5.17.1 Removing the Fan



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Unplug the two fan cables from the motherboard X83, X84 (FAN).
6. Remove the fan (25) from the rubber sleeve.

3.5.17.2 Installing the New Fan

1. Insert the new fan (25) and mount it to the frame with the rubber sleeve.
2. Connect the fan cables to the motherboard connector X83, X84 (FAN).

Note: Twist every fan cable by himselfe five rotations before plugging in and lay cable as far as possible from RF cables away.

Note: Note the direction of the airflow printed on the fan. The fan must blow the air into the instrument.

Make sure you route all cables with enough distance to the fan.

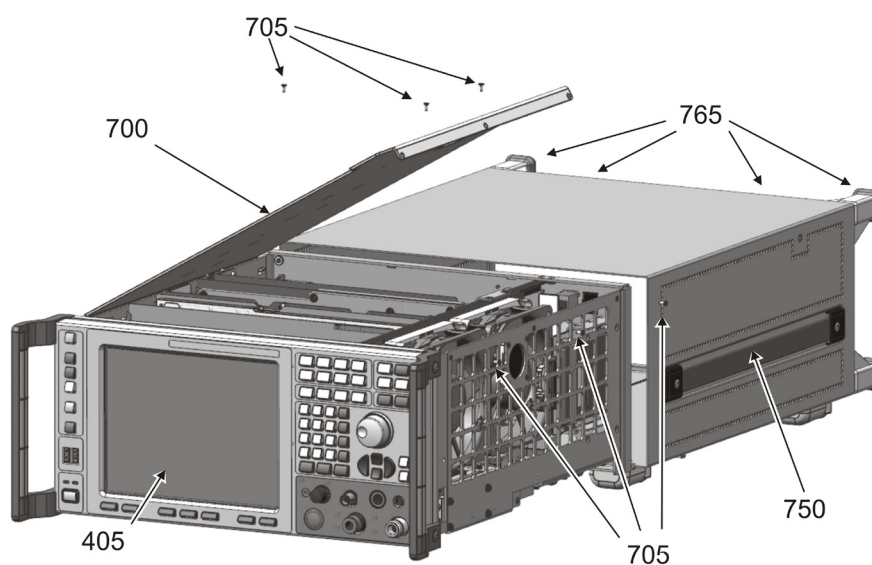
3. Mount the top cover (700) on the instrument with six screws (705).
4. Mount the housing (750) and adjust it properly to the front unit (405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. Watch the fans: they have to spin up at power on of the instrument and slow down after a short time.

3.5.18 Frontend A100

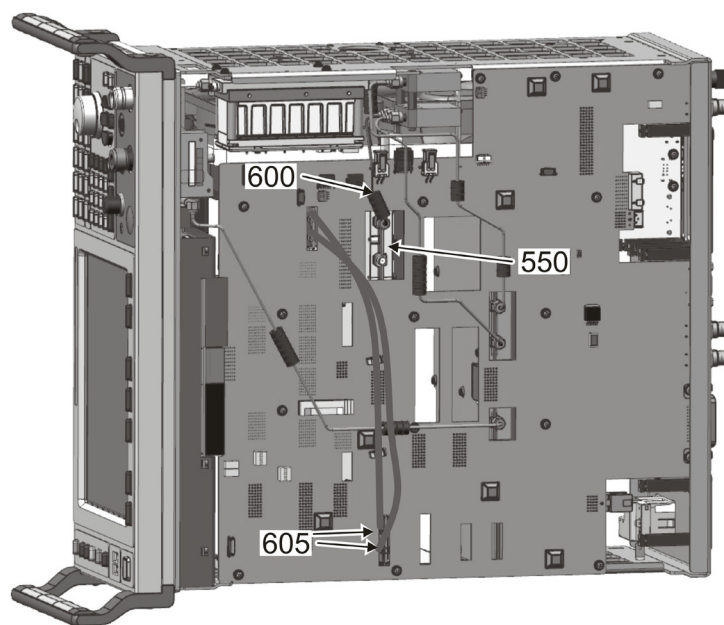
See chapter "[5.1 Spare Parts](#)", item 550 and explosion drawing 1316.3003.01 sheet 1.

The frontend is installed in the middle of the instrument.

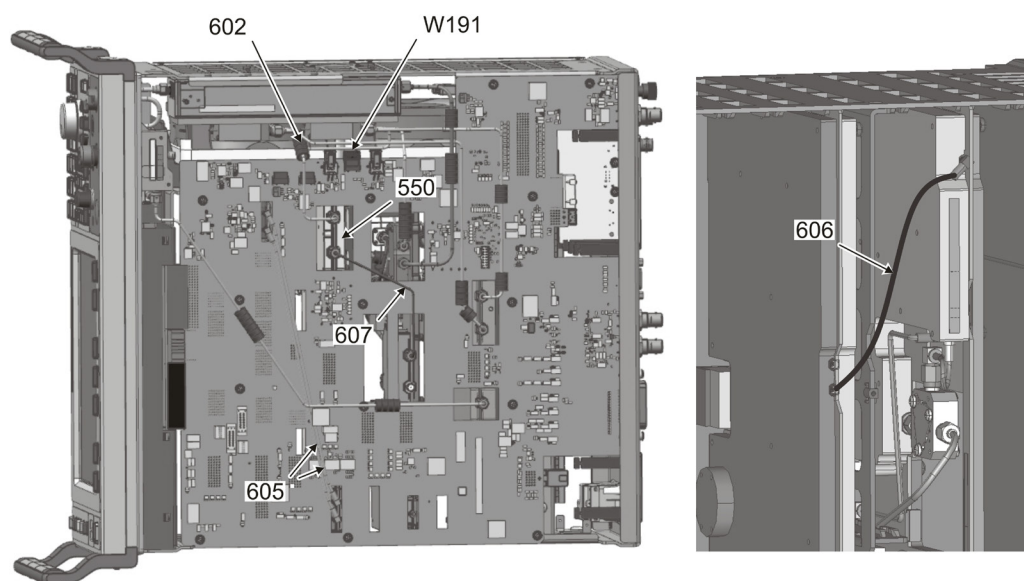
3.5.18.1 Removing the Frontend



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Place the instrument on the left side frame.



6. R&S ESR3/7: Disconnect RF cable W2 (600) and both RF cables W3/W4 (605) from the frontend (550).



R&S ESR26: Disconnect RF cable W2 (602), both RF cables W3/W4 (605), RF cable W7 (607) and RF cable W6 (606) (if available) from frontend.

7. For instruments with Option R&S FSV-B9: Remove RF cable W15 (1735).
 8. Push out the frontend (550) to the top side of the instrument.

Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

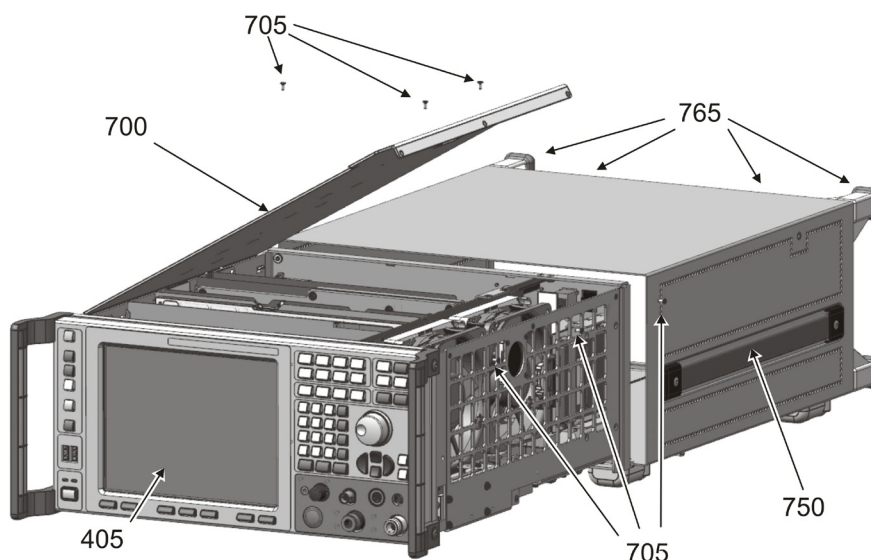
3.5.18.2 Installing the New Frontend

1. Plug the new frontend into the instrument.
2. R&S ESR3/7: Connect RF cable W2 (600) and both RF cables W3/W4 (605) to the board (550).
3. R&S ESR26; Connect RF cable W2 (602), both RF cables W3/W4 (605), RF cable W6 (606) and RF cable W7 (607) to the frontend.
4. For instruments with Option R&S FSV-B9: Connect RF cable W15 (1735).
5. Mount the top cover (700) on the instrument with six screws (705).
6. Mount the housing (750) and adjust it properly to the front unit (405).
7. Mount the rear wall feet (765).
8. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
9. After starting the instrument check:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
10. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
11. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
12. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
13. Adjust the instrument as described in chapter "[2 Adjustment](#)".

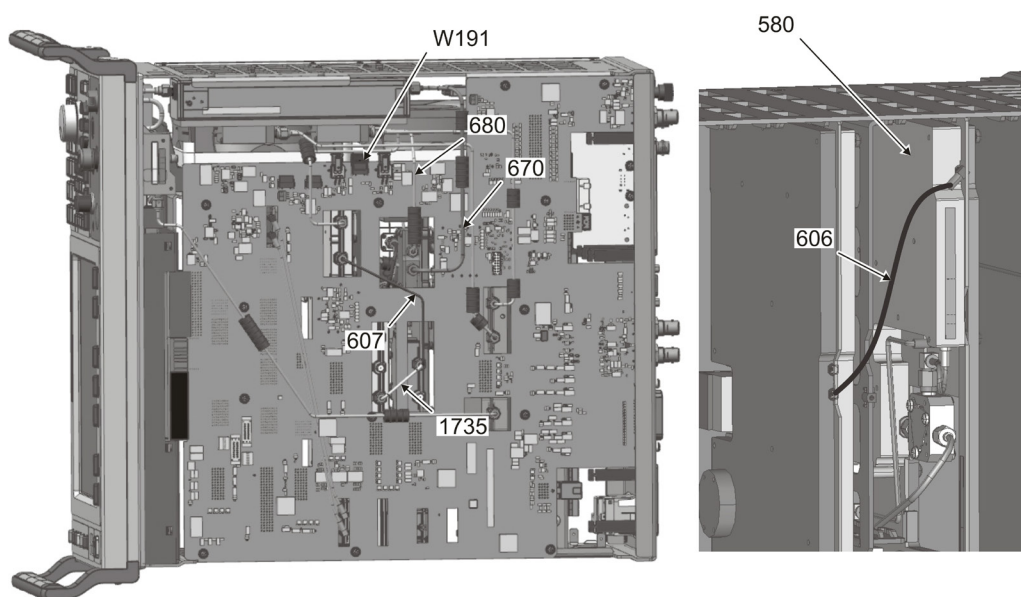
3.5.19 MWC Unit A150 (R&S ESR26)

See chapter "5.1 Spare Parts", item 580 and explosion drawing 1316.3003.01 sheet 8.

3.5.19.1 Removing the Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew five screws (705) in the top cover (700) and remove it.
5. Place the instrument on the right side frame.



6. Disconnect RF cable W6 (606) from the MW converter unit (580).
7. Disconnect RF cable W54 (670), RF cable W55 (680) and RF cable W7 (607) (if available) completely.
8. For instruments with Option R&S FSV-B9: Remove RF cable W15 (1735).
9. Disconnect the preamplifier cable W191.
10. Push out the MW converter unit (580) to the top side of the instrument.

Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.5.19.2 Installing the New MW Converter Unit

Plug the new MW converter unit (580) into the instrument and reconnect RF cable W54 (670), RF cable W55 (680), RF cable W7 (607) (if available) and RF cable W6 (606).

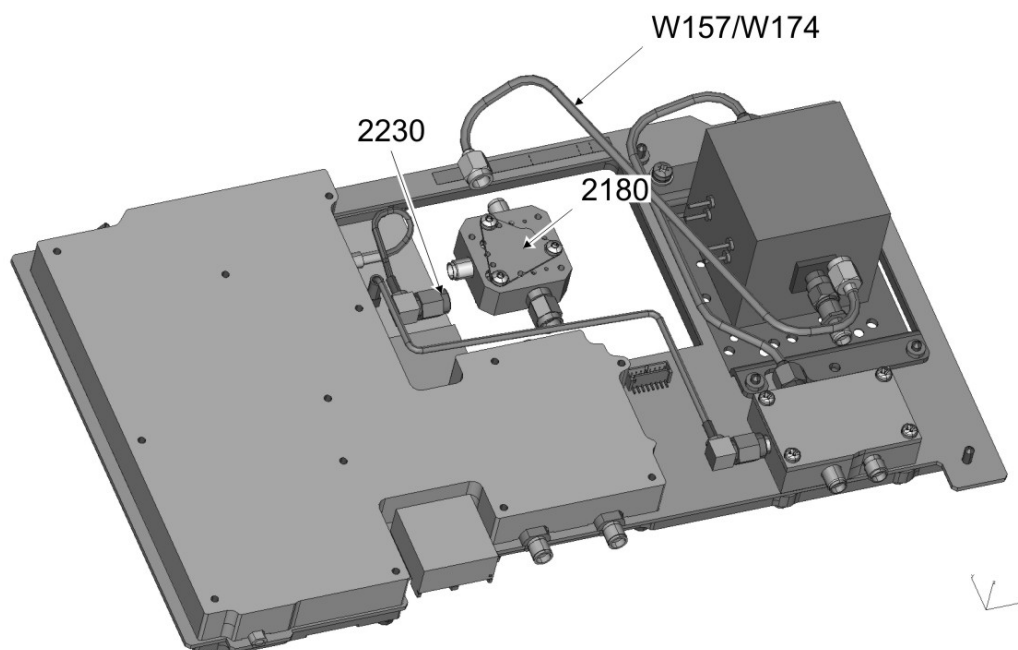
Note: Refer to the cable wiring drawing on the motherboard.

11. For instruments with Option R&S FSV-B9: Connect RF cable W15 (1735).
12. Connect the preamplifier cable W191 to the motherboard.
13. Mount the top cover (700) on the instrument with five screws (705).
14. Mount the housing (750) and adjust it properly to the front unit(405).
15. Mount the rear wall feet (765).
16. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
17. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
18. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then[SHOW ALIGN RESULTS]
19. Perform a frequency response correction using the correction software. Further information can be found in chapter “[2.4 Frequency Response Correction](#)”.
20. Adjust the instrument as described in chapter “[2. Adjustment](#)”.

3.5.20 Mixer A153 (R&S ESR26)

See chapter "5.1 Spare Parts", item 2180 and explosion drawing 1307.9748.01, sheet 2.

3.5.20.1 Opening the Instrument, Removing the Board and Removing the Mixer



21. Remove the MW converter unit as described in "3.5.19.1 Removing the Board".
22. Disconnect RF cable W174/W157 completely and RF cable W167 (2230) from the mixer (2180).
23. Unscrew and remove the mixer (2180) from the unit.

3.5.20.2 Installing the New Mixer

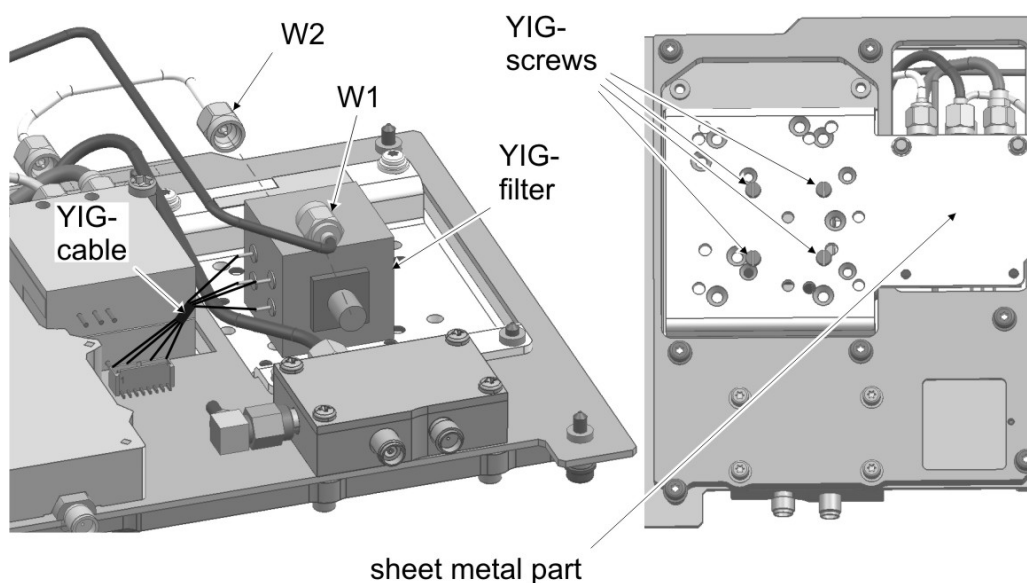
24. Mount the new mixer (2180).
25. Reconnect RF cable W174/W157 and RF cable W167 (2230) with the mixer (2180).
26. Continue with the procedure described in "3.5.19.2 Installing the New MW Converter Unit".

3.5.21 YIG-Unit

See chapter "5.1 Spare Parts", item 2115 and explosion drawing 1307.9748.01, sheet 2.

The YIG Unit includes a sheet metal part on which the YIG filter is mounted. It is not necessary to replace it. How to position and mount the new filter can be seen from the provided unit.

3.5.21.1 Opening the Instrument, Removing the Board and Removing the YIG-Unit



27. Remove the MW converter unit as described in "3.5.19.1 Removing the Board".
28. Remove both RF cables (W1/W2) from the filter completely.
29. Unplug the cable W1 from the connector.
30. Unscrew four YIG screws and remove the filter.

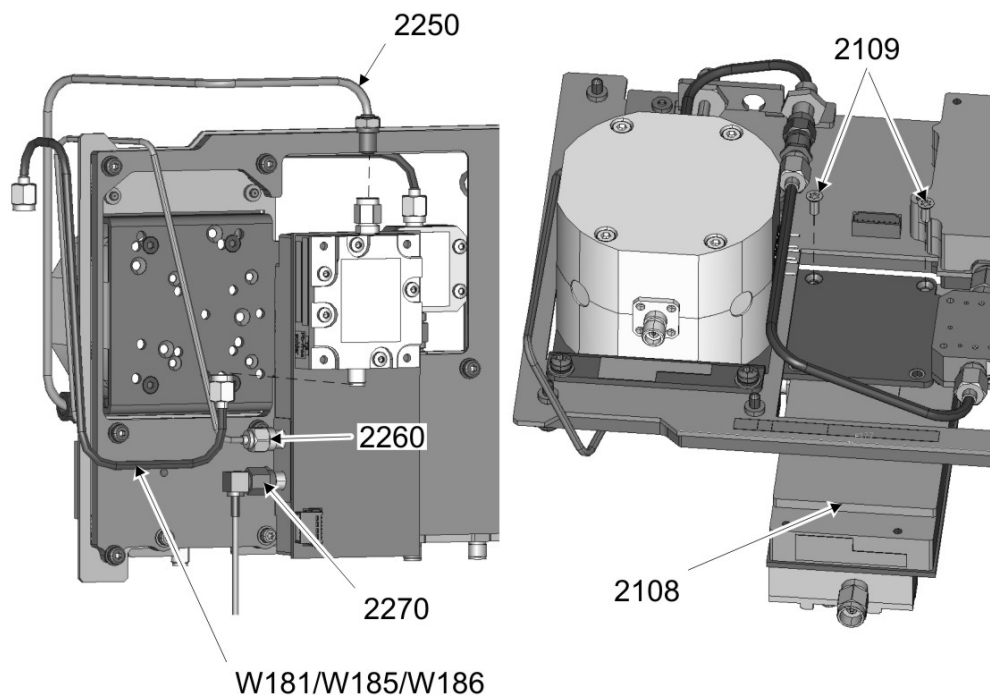
3.5.21.2 Installing the New YIG-Unit

31. Mount the new filter to the sheet metal part. Depending on which filter is provided with your unit use the appropriate screw holes to mount it.
32. Connect the RF cables (W1/W2) to the unit.
33. Connect the YIG cable to the connector.
34. Continue with the procedure described in "3.5.19.2 Installing the New MW Converter Unit".

3.5.22 Preamplifier Unit (R&S ESR26)

See chapter "5.1 Spare Parts", item 2108 and explosion drawing 1307.9748.01 sheet 2.

3.5.22.1 Removing the Board and the Preamplifier Unit



35. Remove the MW converter unit as described in "3.5.19.1 Removing the Board".
36. Remove RF cable W181/W185/W186 and RF cable W180 (2250) completely from the board.
37. Disconnect RF cable W190 (2270) and RF cable W184 (2260) from the preamplifier unit (2108).
38. Unscrew and remove two screws (2109).
39. Remove the preamplifier unit (2108) from the board.

3.5.22.2 Installing the New Preamplifier Unit

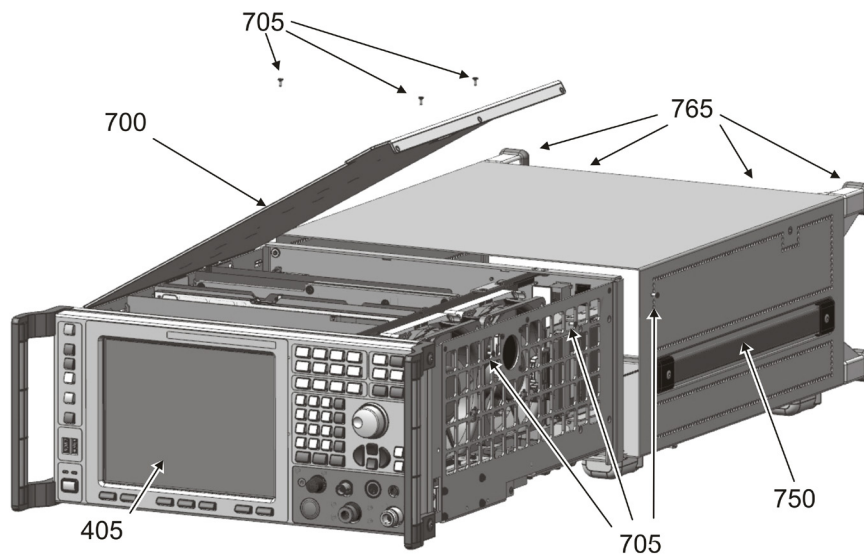
40. Mount the new preamplifier unit (2108) with two screws (2109).
41. Assemble RF cable W181/W185/W186 and RF cable W180 (2250).
42. Connect RF cable W190 (2270) and RF cable W184 (2260).
43. Continue with the procedure described in "3.5.19.2 Installing the New MW Converter Unit".

3.5.23 Preselect Board A160

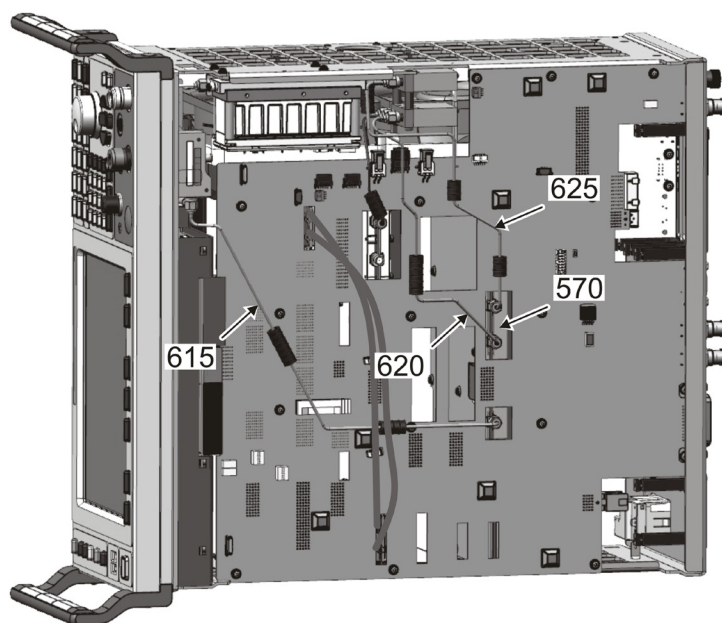
See chapter "[5.1 Spare Parts](#)", item 570 and explosion drawing 1316.3003.01 sheet 1.

The preselect board is installed in the middle of the instrument.

3.5.23.1 Removing the Preselect Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Place the instrument on the left side frame.



6. Disconnect RF cables W51 (615), W52 (620) and W53 (625) from the preselect board (570).
7. Push out the Preselect Board (570) to the top side of the instrument.

Tip: The board can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

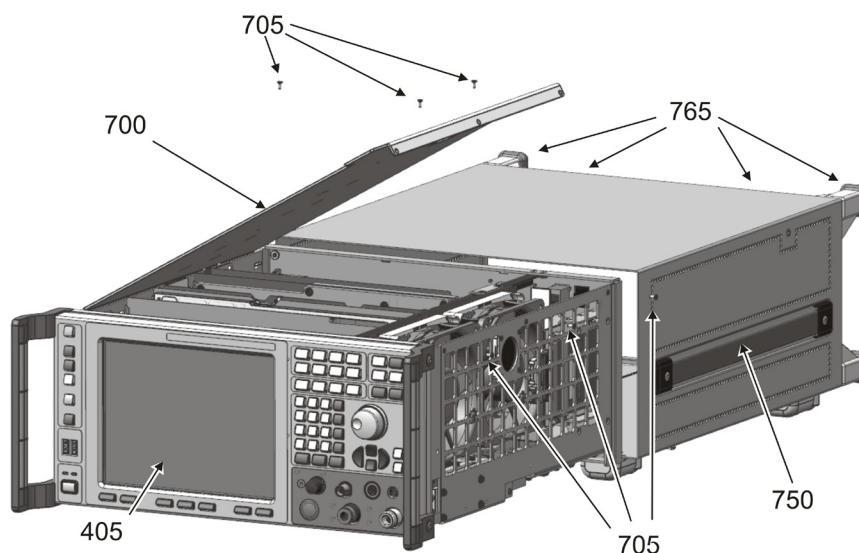
3.5.23.2 Installing the New Preselect Board

1. Plug the new preselect board into the instrument.
2. Connect RF cables W51 (615), W52 (620) and W53 (625) to the board (570).
3. Mount the top cover (700) on the instrument with six screws (705).
4. Mount the housing (750) and adjust it properly to the front unit (405).
5. Mount the rear wall feet (765).
6. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
7. After starting the instrument check:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
8. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
9. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
10. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
11. Adjust the instrument as described in chapter "[2 Adjustment](#)".

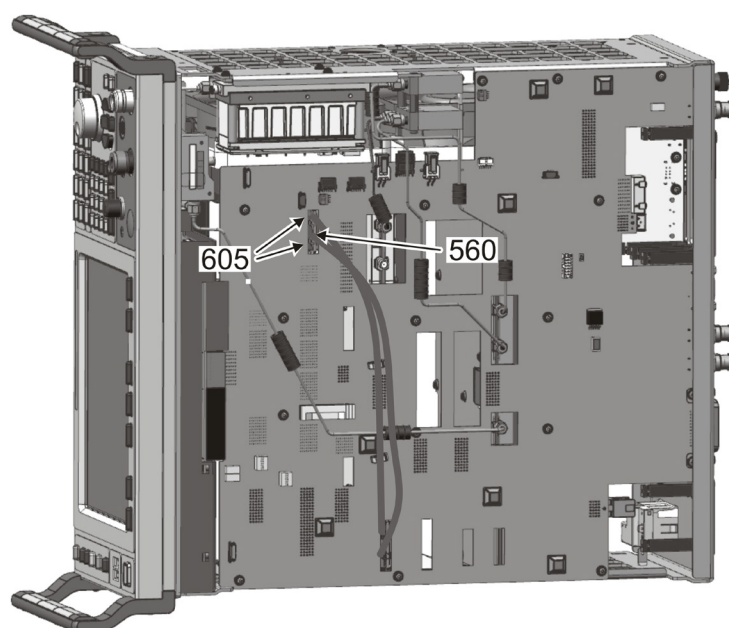
3.5.24 Detector Base Unit A120

See chapter "5.1 Spare Parts", item 560 and explosion drawing 1311.0006.01 sheet 1.

3.5.24.1 Removing the Detector Base Unit



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Place the instrument on the left side frame.



6. Disconnect the RF cables W3/W4 (605) from the detector base unit (560).
7. Push out the detector base unit (560) to the top side of the instrument.

Tip: The unit can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

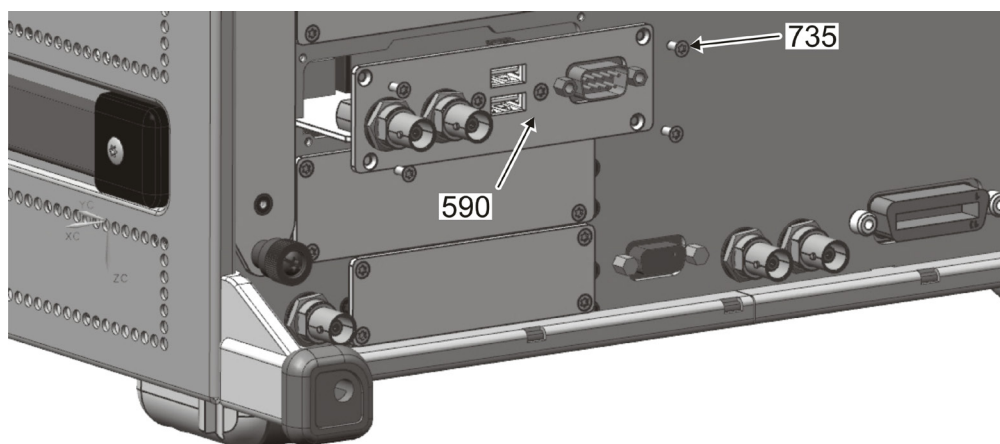
3.5.24.2 Installing the New Detector Base Unit

1. Plug the new detector base unit into the instrument and reconnect RF cables W3/W4 (605) to the board.
2. Mount the top cover (700) on the instrument with six screws (705).
3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Perform an instrument check:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
10. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.25 Additional Interface A220

See chapter "5.1 Spare Parts", item 590, and explosion drawing 1316.3003.01 sheet 2.

3.5.25.1 Removing the Additional Interface



1. Unscrew four screws (735).
2. Carefully remove the additional interface (590).

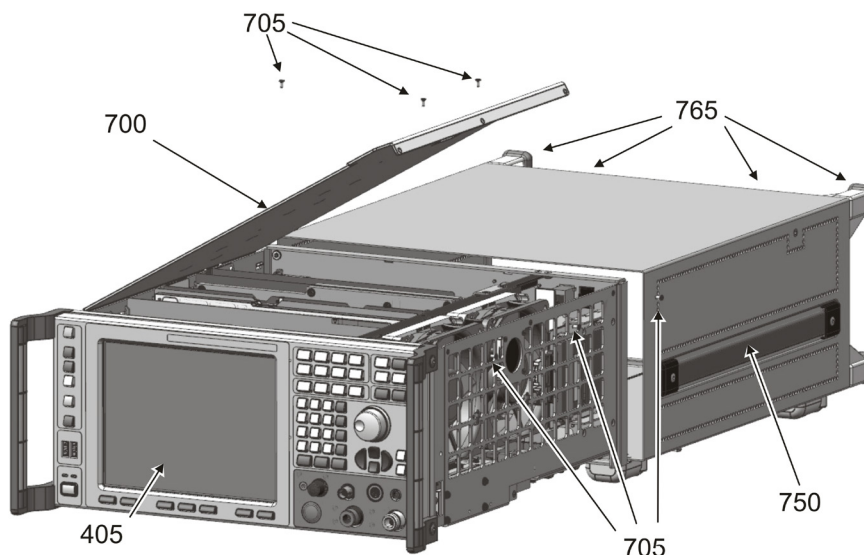
3.5.25.2 Installing the New Additional Interface and Putting into Operation

1. Insert the new additional interface (590) carefully and mount it with four screws (735).
2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
 - Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
 - Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.26 Detector Extension Unit A130

See chapter "5.1 Spare Parts", item 1500 and explosion drawing 1316.3649.00 sheet 1.

3.5.26.1 Removing the Detector Extension Unit



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.
5. Push out the detector extension unit (1500) to the top side of the instrument. It is the first board behind the front unit (405).

3.5.26.2 Installing the New Detector Extension Unit

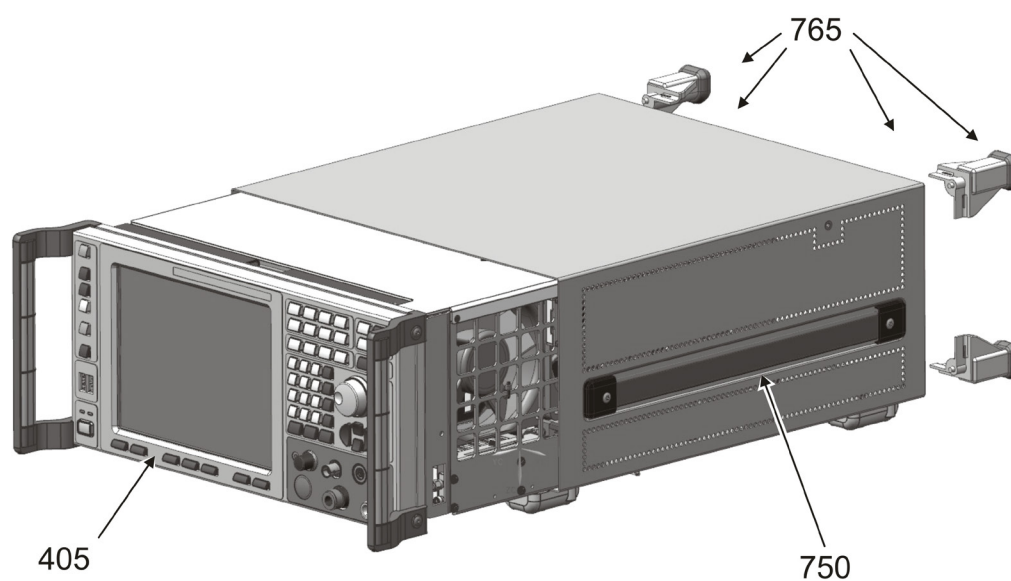
1. Plug the new detector extension unit (1500) into the instrument.
2. Mount the top cover (700) on the instrument with six screws (705).
3. Mount the housing (750) and adjust it properly to the front unit (405).
4. Mount the rear wall feet (765).
5. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
6. Perform an instrument check:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.27 Attenuator Unit A40

See chapter "5.1 Spare Parts", item 500 and explosion drawing 1316.3003.01 sheet 1.

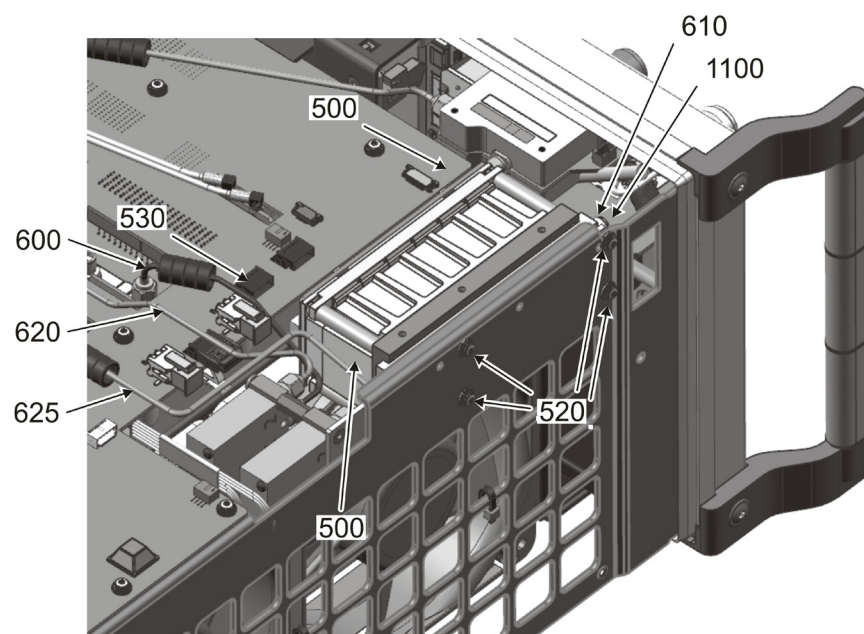
3.5.27.1 Removing the Attenuator Unit

1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).

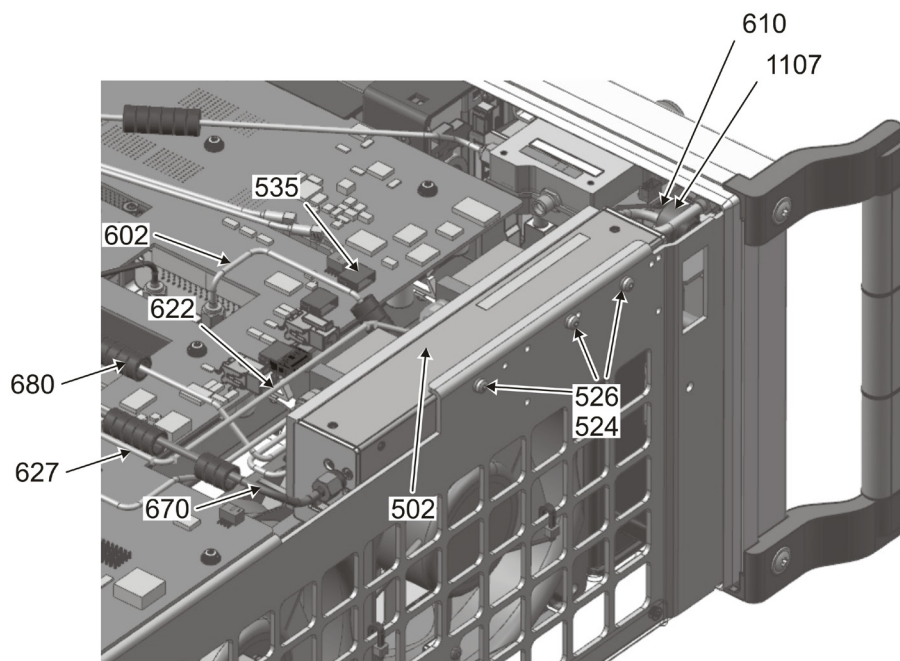


4. Place the instrument on the back side.

R&S ESR3/7:



5. Remove RF cables W2 (600), W52 (620) and W53 (625) completely from the instrument.
6. Disconnect the RF cables W1 (1100) and W50 (610) from the attenuator unit (500) and attenuator cable (530) from the motherboard.
7. Unscrew four screws (520) and remove the attenuator unit (500).
8. Disconnect attenuator cable (530) from the attenuator unit (500).

**R&S ESR26:**

9. Remove RF cables W54 (670), W52 (622), W53 (627) and W2 (602) completely from the instrument.
10. Disconnect the RF cables W1 (1107) and W50 (610) from the attenuator unit (502) and attenuator cable (530) from the motherboard.
11. Unscrew three screws (526) with sleeves (524) and remove the attenuator unit (502).
12. Disconnect attenuator cable (530) from the attenuator unit (502).

3.5.27.2 Installing the New Attenuator Unit

R&S ESR3/7:

13. Connect the attenuator cable (530) to the new attenuator unit (500).
14. Mount the new attenuator unit (500) with four screws (520).
15. Connect the RF cable W1 (1100) to attenuator RF input.
16. Connect the RF cable W50 (610) to attenuator Cal input.
17. Connect the attenuator cable (530) to the Motherboard X81.
18. Connect the RF cable W2 (600) to the attenuator unit (500) and the fronted (550).
19. Connect the RF cables W52 (620) and W53 (625) to the attenuator unit (500) and the preselect board (570).

R&S ESR26:

20. Connect the attenuator cable (530) to the new attenuator unit (502).
21. Mount the new attenuator unit (502) with three screws (526) with sleeves (524).
22. Connect the RF cable W1 (1107) to attenuator RF input.
23. Connect the RF cable W50 (610) to attenuator Cal input.
24. Connect the attenuator cable (530) to the Motherboard X81.
25. Connect the RF cable W2 (602) to the attenuator unit (502) and the fronted (550).
26. Connect the RF cables W52 (622) and W53 (627) to the attenuator unit (502) and the preselect board (570).
27. Connect the RF cables W54 (670) to the attenuator unit (502) and the microwave converter unit (550).

All models:

28. Mount the housing (750) and adjust it properly to the front unit (405).
29. Mount the rear wall feet (765).
30. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
31. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
32. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
33. Perform a frequency response correction using the correction software. Further information can be found in chapter "2 Adjustment".
34. Adjust the instrument as described in chapter "2 Adjustment".

3.5.28 Motherboard A10

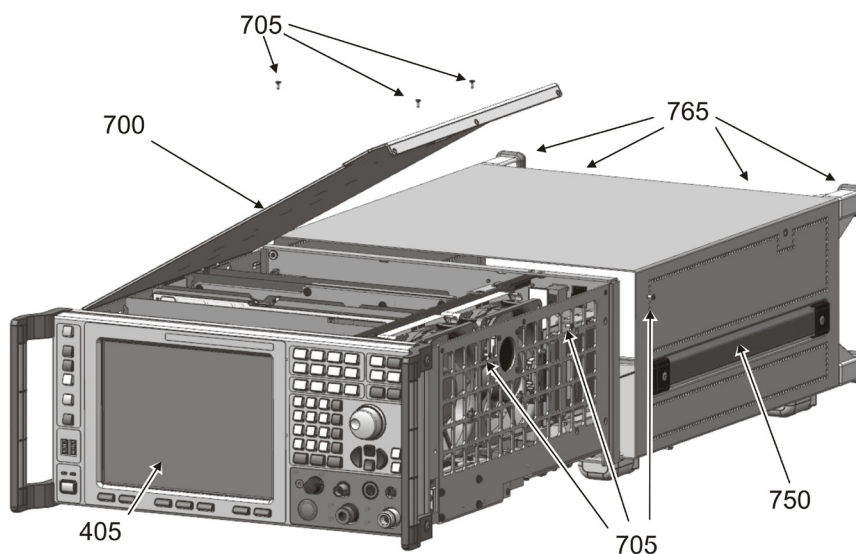
See chapter "5.1 Spare Parts", item 120, and explosion drawings 1316.3003.01 sheet 3. In case of a blown fuse it is possible to change only the fuse instead of the whole Motherboard. Please see chapter Replacing a Blown Fuse on the Motherboard A10 for further informations.

NOTICE

Risk of losing important information

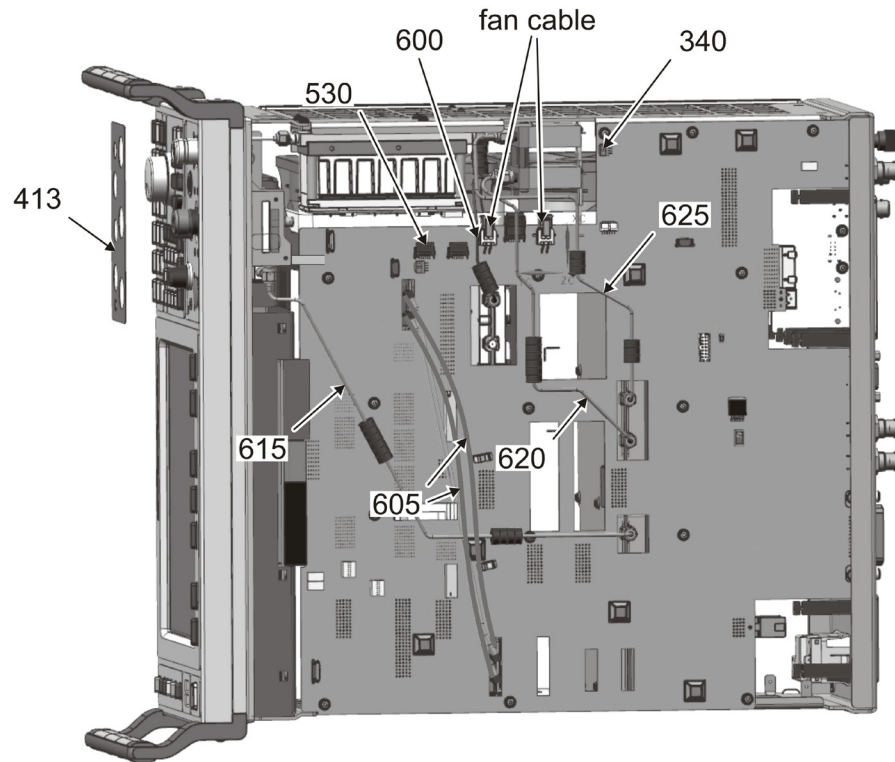
Important information about the type of instrument, installed hardware, options, etc., is stored both on the motherboard and on the hard drive. This information is required in order to restore the instrument in case of errors. Thus, do not replace the motherboard and the hard drive at the same time, as doing so will cause this information to be lost. If the instrument does not function after the hard drive has been replaced, do not replace the motherboard. Instead, re-install the old hard drive and then replace the motherboard.

3.5.28.1 Opening the Instrument

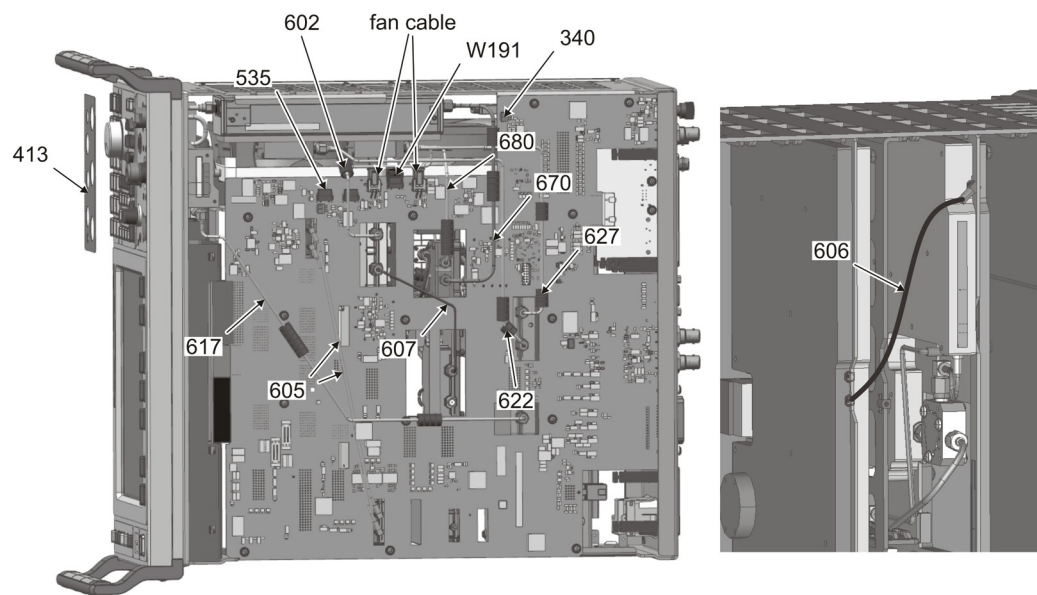


1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.

3.5.28.2 Removing the Frontend, the Detector Base Unit, the Detector Extension Unit, the Preselector Board, Microwave Converter Unit (R&S ESR26) and the Tracking Generator (FSV-B9)



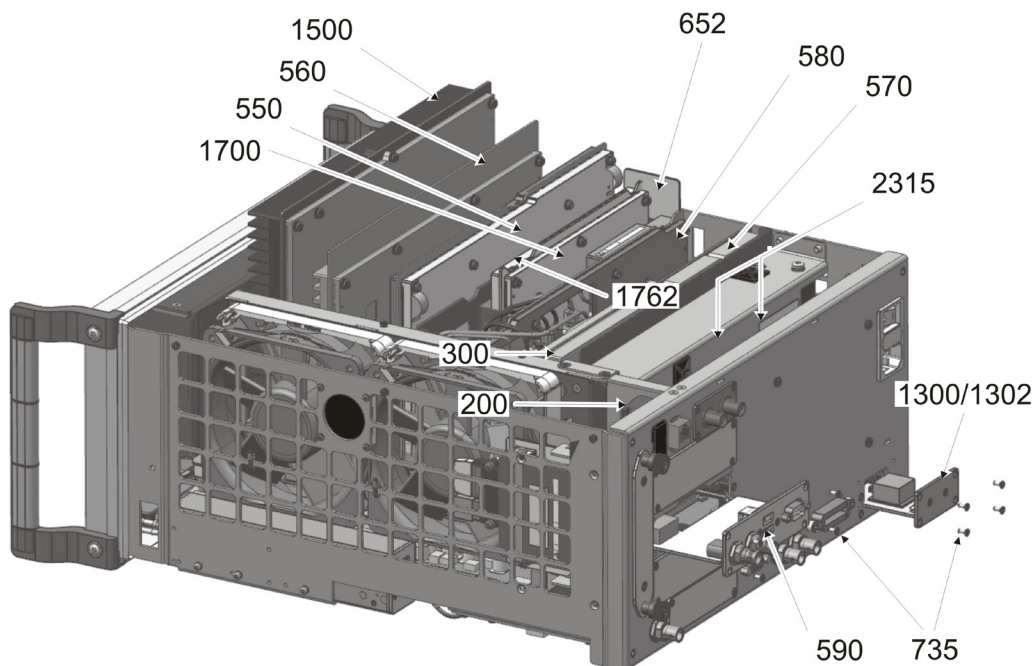
1. R&S ESR3/7: Remove RF cables W2 (600), W51 (615), W52 (620), W53 (625), W3/W4 (605), completely from the instrument.



R&S ESR26: Remove RF cables W2 (602), W51 (617), W52 (622), W53 (627), W3/W4 (605), RF cables W54 (670), W55 (680), W6 (606) and W7 (607) (if available) completely from the instrument. Disconnect cable W191 from motherboard.

2. Disconnect both fan cables X83, X84, the speaker cable (340) and the attenuator cable (530).
3. For instruments with option R&S FSV-B9: Remove RF cable W13-2 (1725), RF cable W14 (1730), RF cable W15 (1735) completely.

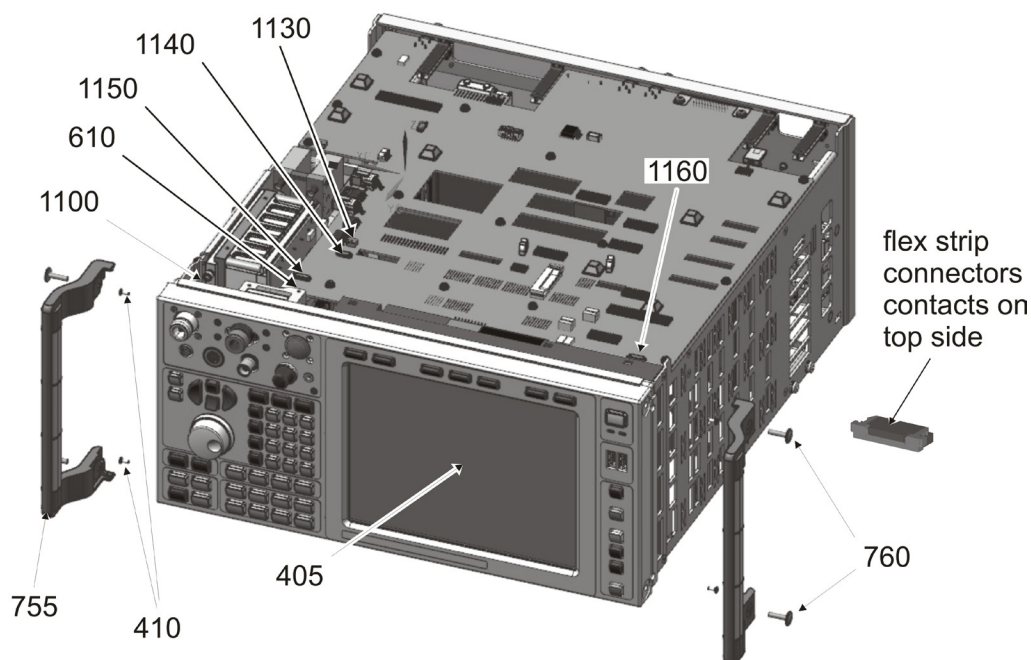
3.5.28.3 Removing the Boards



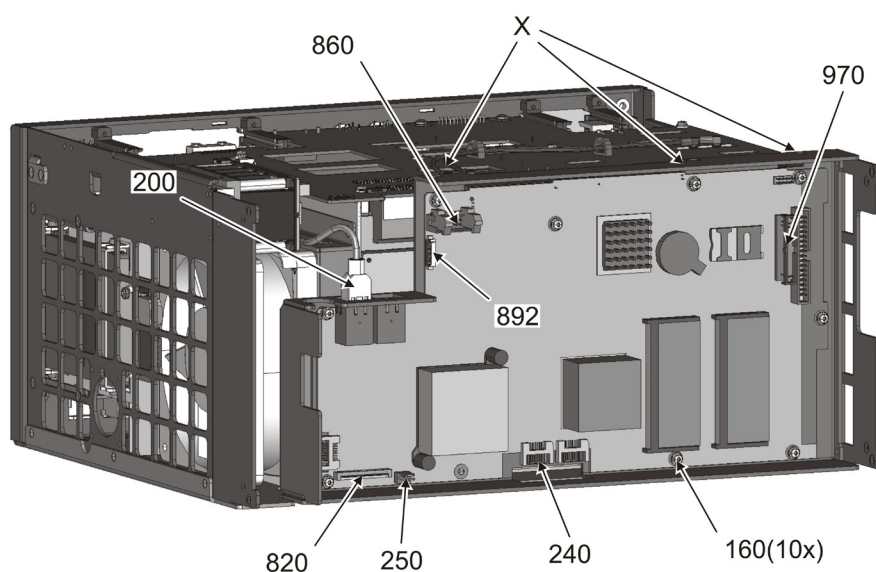
1. For instruments with R&S FSV-B4: Unscrew four screws (735) at option OCXO (1300/1302) and remove it.
2. Unscrew four screws (735) at additional interfaces (590) and remove it.
3. For instruments with Option R&S FSV-B9: Disconnect RF cables W16/17 (1762) and push out the tracking generator (1700) to the top side of the instrument.
4. For instruments without Option R&S FSV-B9: Remove the baffle plate (652).
5. Disconnect the patch cable (200) and both connectors of the cable power supply-motherboard (2315).
6. Carefully remove the adapterboard (300).
7. Push out the preselect board (570), detector base unit (560), microwave converter unit (580) and frontend (550) to the top side of the instrument.
8. For instruments with R&S ESR-B50: Push out the detector extension unit (1500) to the top side of the instrument.

Tip: The boards can be moved up by pressing carefully from the bottom through the connector holes in the motherboard against the board.

3.5.28.4 Removing the Controller

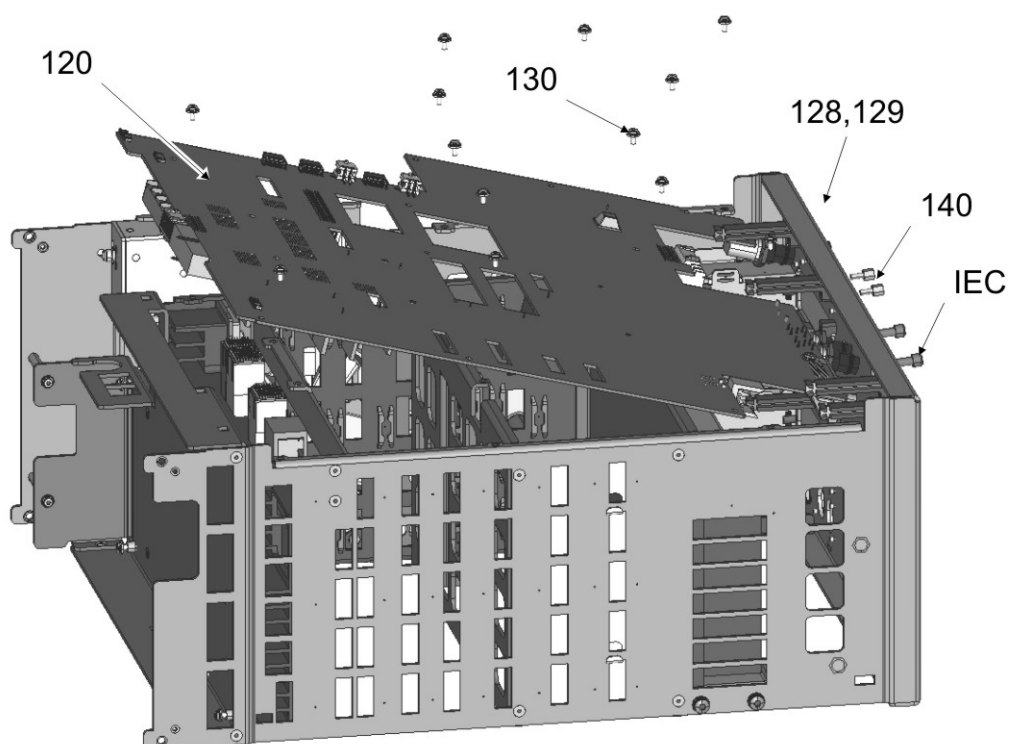


1. Unscrew the four screws (760) of the front handles (755) on both sides and remove them.
2. Disconnect flex strip cables W71 (1140), W20 (1150) and W61 (1160).
3. Disconnect cables W42 (1130) from the motherboard and W50 (610) from the input 2 board.
4. Unscrew four screws (410) in the front unit (405).
NOTICE! Risk of damage to the instrument. Cables are still connected to the controller.
5. Disconnect RF cable W1 (1100/1107).
6. Move the front unit (405) carefully a few millimeters to the front side to disconnect the controller cables.



7. Disconnect cable flex switch board ESR (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (892), patchcable (200), SATA datacable (240) and SATA powercable (250) from the controller.
8. Remove the front unit (405) completely.
9. Unscrew ten screws (160).
10. Remove the controller. If necessary, use a screwdriver to take it off. Push the screwdriver alternately into one of the three holes (singned with a X on the picture above) to press the controller out.

3.5.28.5 Removing the Motherboard



1. Remove two screws (140), three nuts (129), three washers (128) and two bolts (IEC) with washers at the rear.
2. Unscrew and remove fifteen screws (130).
3. Carefully take the motherboard (120) out of the frame as shown in the picture above.

3.5.28.6 Installing the New Motherboard

1. Insert the new motherboard into the instrument in reverse order.
Note: Move the motherboard carefully to the rear panel without causing damage to the parts on the board.
2. Fix two screws (140), three washers (128) with nuts (129) and two bolts (IEC) with washers at the rear.
3. Mount the motherboard with fifteen screws (130).
4. Connect the fan cables to the motherboard connector X83 and X84 (FAN), the speaker cable (340) to connector X70 and the attenuator cable (530) to connector X81.
5. Carefully place down the controller (150) and fasten it with ten screws (160).
6. Connect cable flex switch board ESR (820), cable rotary puls-generator (860), cable W31 LST board FMR (970), cable touch-controller-usb-board (892), patchcable (200), SATA datacable (240) and SATA powercable (250).
NOTICE! Risk of damage to the instrument. Make sure you route the cables properly.
7. Assemble the front unit (405) carefully and connect RF cable W1 (1100/1107).
8. Connect flex strip cables W71 (1140), W20 (1150) and W61 (1160).
Note: The flex strip connector contacts are on the top of the device.
9. Connect cable W42 (1130) to connector X86.
10. Connect cable W50 (610) to attenuator unit (500/502) and the input 2 board (1080).
11. Fasten the four screws (410) to screw the front unit (405) together with the unit frame.
12. Mount front handles (755) on both sides by using four screws (760).
13. Plug the detector base unit (560), the preselect board (570), the microwave converter unit (R&S ESR26, (580)) and the frontend (550) into the instrument.
14. For instruments with R&S ESR-B50: Plug in the detector extension unit (1500).
15. Connect RF cable W3/W4 (605).
16. Connect RF cable W2 (600/602) to the attenuator unit (500/502) and the frontend (550).
17. Connect the RF cable W51 (615/617) to the input 2 board (1080) and the preselect board (570).
18. R&S ESR26: Connect the RF cables W55 (680) and W54 (670) to the attenuator unit (502) and the microwave converter unit (580). Connect the cable W191 to motherboard X80. Connect RF cable W6 (606) and RF cable W7 (607) (if available) to microwave converter unit (580) and frontend (550).

19. Connect the RF cables W52 (620/622) and W53 (625/627) to the attenuator unit (500/502) and the preselect board (570).
20. Plug in the adapterboard (300) and connect the patch cable (200).
21. Connect both connectors of the cable power supply-motherboard (2315).
22. For instruments with Option R&S FSVR-B9: Plug the tracking generator (1700) into the instrument and connect RF cable W13-2 (1725), RF cable W14 (1730), RF cables W16/17 (1762) and RF cable W15 (1735).
23. For instruments without option R&S FSV-B9: Insert the baffle plate (652).
24. For instruments with option R&S FSV-B4: Mount the option OCXO (1300/1302) with four screws (735).
25. Mount the additional interfaces (590) with four screws (735).
26. Mount the top cover (700) on the instrument with six screws (705).
27. Mount the housing (750) and adjust it properly to the front unit (405).
28. Mount the rear wall feet (765).

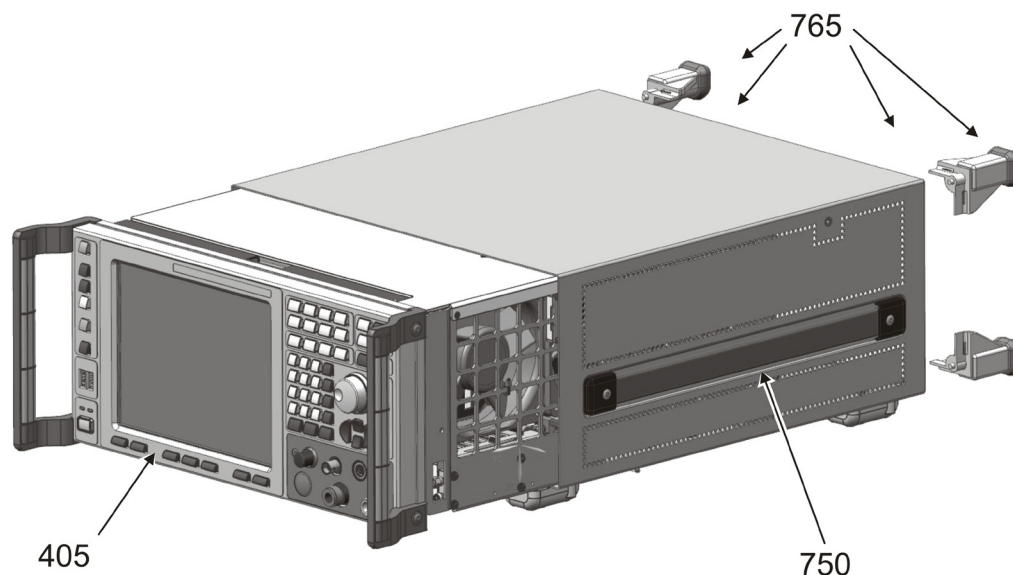
3.5.28.7 Putting into Operation

1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. Watch the fans: The fans must speed up at power on of the instrument and slow down after a short time.
3. A backup of the EEPROM files must be made with the aid of a service function.
4. [SETUP : MORE : SERVICE : ENTER PASSWORD : 20122004 ENTER]
5. [SETUP : MORE : SERVICE : SERVICE FUNCTION : 10.0.3 ENTER]
6. After starting the instrument, check hardware info:
[SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
7. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
8. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
9. Perform a frequency response correction using the correction software. Further information can be found in chapter "[2 Adjustment](#)".
10. Adjust the instrument as described in chapter "[2 Adjustment](#)".

3.5.29 Replacing a Blown Fuse on the Motherboard A10

In case of a blown Fuse on the Motherboard it is possible to replace the corresponding fuse only. A blown fuse is indicated by the red light near the fuse lighting up.

3.5.29.1 Removing the Defective Fuse



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. The fuses are on the bottom of the Motherboard. Carefully desolder the defective fuse. Be careful not to damage the board! A good practice is to use two solder irons, one on the left side of the fuse and the other one on the right side of the fuse, to desolder the fuse.
5. Clean the pads on the board carefully by use of a desolder wick.

3.5.29.2 Installing the New Fuse

1. Replace the defective fuse only by an original spare part! Otherwise you will lose the safety approval of the instrument! The fuses and its spare parts are listed in the following table:

F1	2079.5994.00	7A FF	Power supply rail for detector base unit
F2	6104.9199.00	10A FF	Power supply rail for detector base unit
F3	6104.9199.00	10A FF	Power supply rail for front module controller
F4	6104.9199.00	10A FF	Power supply rail for analog modules
F5	6100.7862.00	3A FF	Standby supply rail
F6	2079.5994.00	7A FF	Negative voltage supply rail
F7	2079.5994.00	7A FF	Power supply rail for fans
F9	2079.5994.00	7A FF	Power supply rail for detector extension unit
F10	2079.5994.00	7A FF	Supply rail for analog modules



2. Solder carefully the fuse to the corresponding pads on the motherboard by use of a Pb free solder tin. Be careful not to overheat the fuse. This may result in a defective fuse!
3. Be sure there is no shortcircuit on the board!

3.5.29.3 Putting into Operation

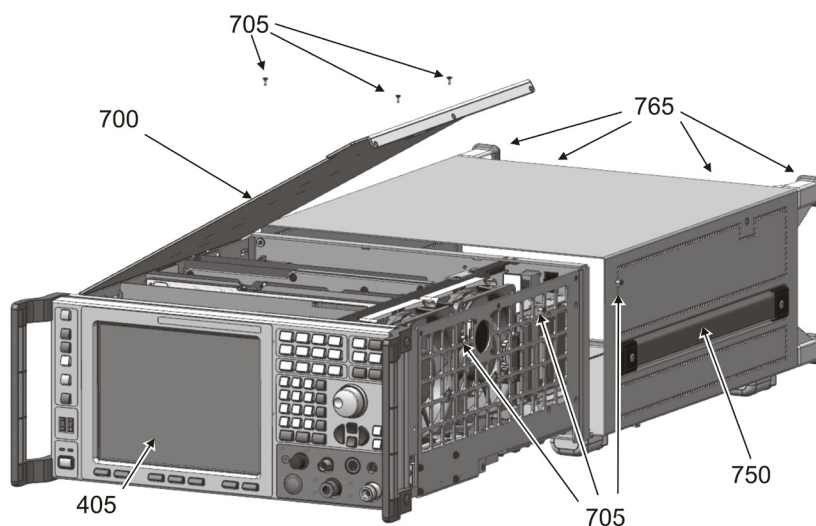
1. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
2. **NOTICE!** Mains voltage is applied to the power supply.
3. Control the power rail with the replaced Fuse by measuring the corresponding voltage. If the fuse is blown again check the boards supplied by this powerrail. Please see the chapter 3.6 for further details.

F1	nominal value: +12,2V	Power supply rail for detector base unit
F2	nominal value: +5,25V	Power supply rail for detector base unit
F3	nominal value: +5,25V	Power supply rail for front module controller
F4	nominal value: +5,25V	Power supply rail for analog modules
F5	nominal value: +13,5 V	Standby supply rail
F6	nominal value: -12,2 V	Negative voltage supply rail
F7	nominal value: +12,2V	Power supply rail for fans
F9	nominal value: +12,2V	Power supply rail for detector extension unit
F10	nominal value: +12,2V	Supply rail for analog modules
4. Switch off the instrument and disconnect the power plug.
5. Mount the housing (750) and adjust it properly to the front unit (405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
8. Start selftest and check results: [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
9. Start alignment and check the result: [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

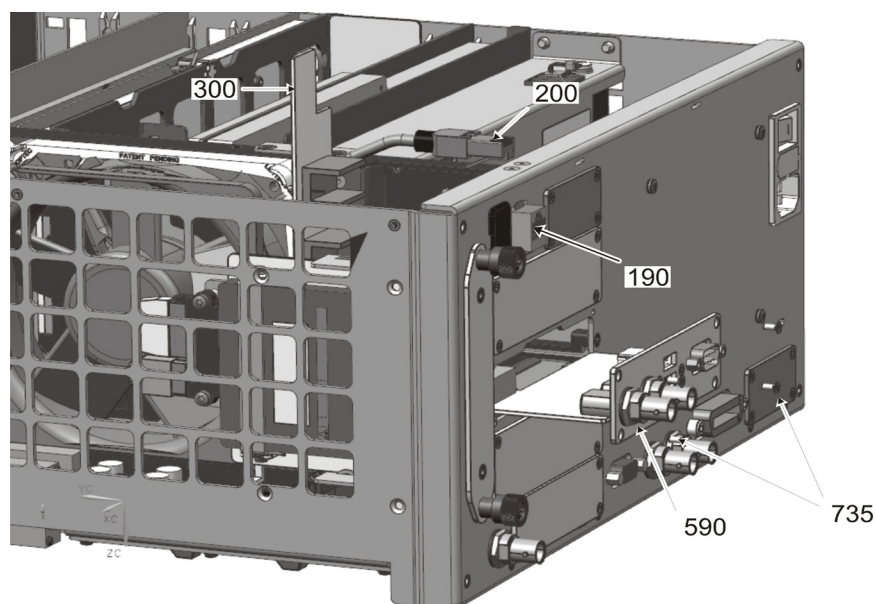
3.5.30 Adapter Board A11

See chapter "5.1 Spare Parts", item 300 and explosion drawing 1316.3003.01 sheet 2.

3.5.30.1 Removing the Adapter Board



1. Switch off the instrument and disconnect the power plug.
2. Unscrew four screws in the rear wall feet (765) and remove them.
3. Remove the housing (750).
4. Unscrew six screws (705) in the top cover (700) and remove it.



5. Unplug the patch cable (200) from the coupler (190).
6. Unscrew four screws (735) and remove the additional interfaces (590).
7. Carefully remove the adapter board (300) from the motherboard.

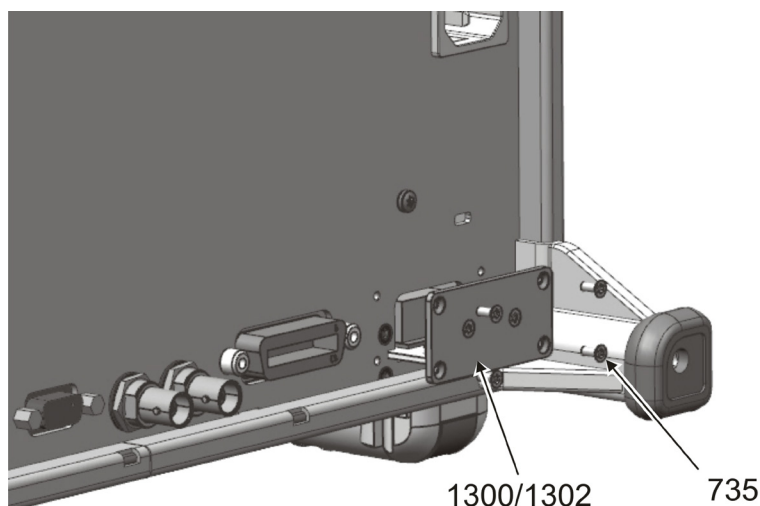
3.5.30.2 Installing the New Adapter Board

1. Pull the new adapter board (300) carefully into the motherboard.
2. Connect the patch cable (200) to the coupler (190).
3. Mount the additional interfaces (590) with four screws (735).
4. Mount the top cover (700) on the instrument with six screws (705).
5. Mount the housing (750) and adjust it properly to the front unit (405).
6. Mount the rear wall feet (765).
7. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
 - Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
 - Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.31 OCXO A250 (R&S FSV-B4)

See chapter "5.1 Spare Parts", item 1300/1302, and explosion drawing 1316.3649.00.

3.5.31.1 Removing the OCXO



1. Unscrew four screws (735).
2. Carefully remove the OCXO (1300/1302).

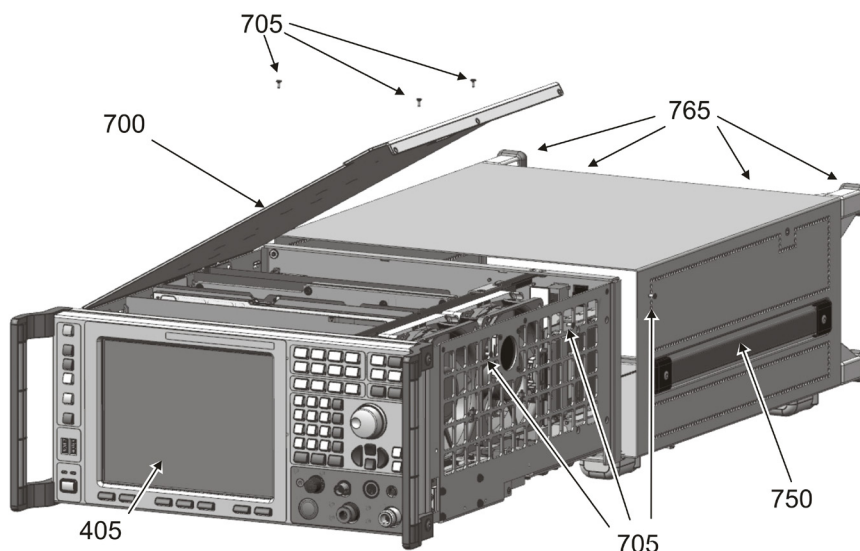
3.5.31.2 Installing the New OCXO and Putting into Operation

1. Insert the new OCXO (1300/1302) carefully and mount it with four screws (735).
2. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
 - Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
 - Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.5.32 IEC-Bus Control A210 (R&S ESR-B10)

See chapter "5.1 Spare Parts", item 1510, and explosion drawing 1316.3649.00.

3.5.32.1 Removing the IEC-Bus Control



3. Switch off the instrument and disconnect the power plug.
4. Unscrew four screws in the rear wall feet (765) and remove them.
5. Remove the housing (750).
6. Unscrew six screws (705) in the top cover (700) and remove it.
7. Remove the IEC-bus control (1515) from the instrument.

3.5.32.2 Installing the New IEC-Bus Control and Putting into Operation

8. Insert the new IEC-bus control (1515) carefully.
9. Mount the top cover (700) on the instrument with six screws (705).
10. Mount the housing (750) and adjust it properly to the front unit (405).
11. Mount the rear wall feet (765).
12. Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/OFF key.
13. Start selftest and check results:
[SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
14. Start alignment and check the result:
[SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

3.6 Troubleshooting

Malfunctions may have simple causes but also may be caused by faulty components.

These troubleshooting instructions enable you to locate error causes down to board level and make the instrument ready for use again by means of board replacement.

We recommend that the instrument be shipped to our experts in the service centers (see address list) for module replacement and further error elimination.

WARNING

Shock hazard

Before opening the casing, make sure that the instrument is switched off and disconnected from all power supplies.

Read all safety instructions at the beginning of this manual carefully!

NOTICE

Risk of damage to the boards

Be careful not to cause short circuits when measuring voltages at pins placed close together!

Utilities provided in the R&S ESR for diagnostic purposes:

- Permanent monitoring of levels and frequencies in the instrument
 - Self test
 - System error correction
-



Frequent cause of problems: connections

When problems occur, first check whether any cables, plug-in connections of boards, etc are damaged and whether they are connected properly.

3.6.1 Measuring Equipment and Accessories

Item	Type of equipment	Specifications recommended	Equipment recommended	R&S-Order No.	Use
1	DC meter		R&S URE	0350.5315.02	Troubleshooting Start Up
2	Spectrum Analyzer		R&S FSV	1307.9002.30	Troubleshooting Frontend
3	Signal Generator		R&S SMR20	1104.0002.30	Troubleshooting Frontend

3.6.2 Troubleshooting Start-up Problems

3.6.2.1 Error: R&S ESR cannot be switched on

- Check power-on switch at the rear.
- If the power switch is OFF: Switch on power supply.
- Check the cabling of the power supply unit. All connectors must fit to its sockets.
- If the power supply starts, but the screen remains dark, check the fuses at the bottom of the Motherboard. A blown fuse is indicated by a red light near the fuse. If a fuse is blown refer to chapter 3.5.29 for replacing it.
- If there is no defective fuse measure the voltages of the power rails on the motherboard:



F1	nominal value: +12,2V	Power supply rail for detector base unit
F2	nominal value: +5,25V	Power supply rail for detector base unit
F3	nominal value: +5,25V	Power supply rail for front module controller
F4	nominal value: +5,25V	Power supply rail for analog modules
F5	nominal value: 13,5 V	Standby supply rail
F6	nominal value: -12,2 V	Negative voltage supply rail
F7	nominal value: +12,2V	Power supply rail for fans
F9	nominal value: +12,2V	Power supply rail for detector extension unit
F10	nominal value: +12,2V	Supply rail for analog modules

3.6.2.2 Error: Fan does not work

- Check voltage at connector: X83 or X84 pins 1+ 2 : rated value +12,2 V
- voltage o.k.: check green LED on Motherboard near the fuses. If there is no green light check voltages at fuse F4 according to 3.6.2.1.
 - fuse and voltage o.k.: The FPGA on the motherboard cannot load its configuration; the motherboard might be defective.
- green light o.k.: fan is blocked or fan is defective

3.6.2.3 Error: Fan speeds up and did not slow down after a while at room temperature or below

- check green LED on Motherboard near the fuses. If there is no green light, the motherboard might be defective.
- check if the instrument is working properly:
 - if the measurement application is not starting up check the frontend
 - If the instrument is working properly replace the fan

3.6.3 Troubleshooting Problems with the Boot Process

3.6.3.1 Error: R&S ESR does not start the measurement application

Following switch-on, the R&S ESR first boots the computer BIOS. After successful initialization of the computer, the Windows XP operating system starts up. Subsequently, the measurement application is loaded as start-up program. Simultaneously, self tests are performed at various locations and error messages, if any, are output. For troubleshooting, it is advisable to connect a keyboard to one of the USB sockets.

Starting the device

► Start R&S ESR

Subsequent to switching on the R&S ESR, the following BIOS message is displayed:

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2007, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V7.0-4-62-1
Main Processor : Intel (R) Core(TM)2 Duo 2.28GHz (200x11.0)
Memory Testing :
```

Hardware test

The computer starts the hardware test. The test results are displayed on the screen. If errors occur during the boot procedure, these messages may indicate defects.

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2007, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V7.0-4-62-1
Main Processor : Intel (R) Core(TM)2 Duo 2.28GHz (200x11.0)
Memory Testing : 4185024K OK + 8M shared memory
```

Note:

If no result of the memory test is indicated, the memory is defective.

Memory test

The memory test issues the memory capacity of the controller.

Hardware check

Subsequently, BIOS starts the hardware check and displays all PC boards found.

This procedure can be interrupted using the ESC key on the connected external keyboard; any other key continues the boot process.

```
Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2007, Phoenix Technologies, LTD.
R&S ANALYZER BIOS V7.0-4-62-1
Main Processor : Intel (R) Core (TM)2 Duo 2.28GHz (200x11.0)
Memory Testing : 4185024K OK + 8M shared memory
CPU Brand Name : Intel (C) Core™2 Duo CPU T7500 @ 2.28GHz
C1E Bios Supported
EM64T
```

Memory Frequency For DDR2 667 (Dual Channel Mode)
IDE Channel 0 Master : None
IDE Channel 0 Slave : None
IDE Channel 1 master : Fujitsu MHZ22080BH (depending on the installed hard drive)

Note:

If this hard drive entry is missing, the hard drive may be faulty.

Operating system start

After this test, the BIOS has been loaded and the operating system is started.

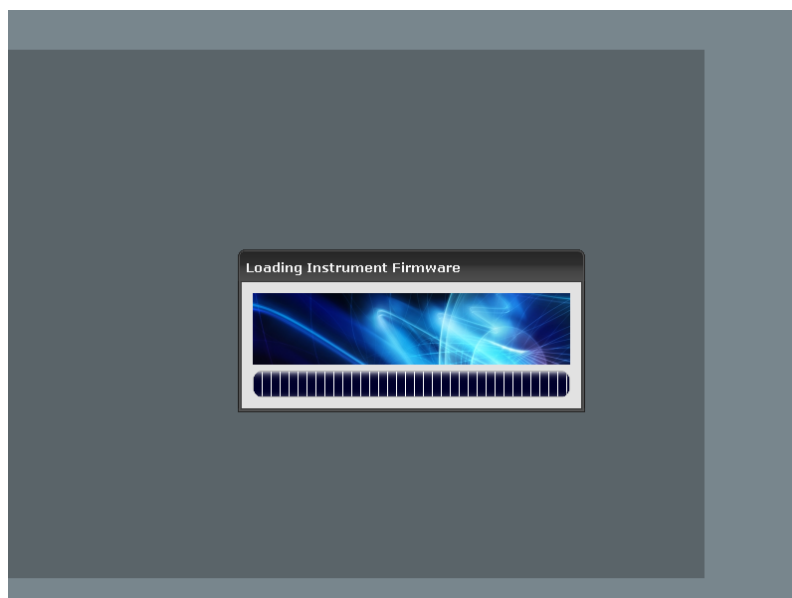


If the message "No System Disk or Disk error ..." is displayed at this point, the contents of the hard drive are not correct. Replace the hard drive.

If the operating system on the hard drive has been destroyed or cannot be loaded correctly, Windows XP reacts by displaying a "blue screen". This blue screen contains all essential information on the internal states of the computer. Be shure to have properly installed the harddrive to the instrument. (see chapter: 3.5.3) If harddrive is installed properly Windows XP and the instrument firmware must be updated. Contact the service to perform the update.

Application start

Subsequent to starting the operation system, the application for the R&S ESR is loaded in a start-up program. The program start is initiated automatically and generates a window that displays information on the start-up procedure.



While starting the application reads the hardware information and sets up the measurement hardware. If the hardware information of the motherboard, the frontend, the step attenuator, the detector extension unit or the detector base unit can not be read the application denies starting by displaying an error message. In this case the module mentioned in the error message must be checked if the hardware information in the EEPROM on the module is correct and can be read properly. If there is no fault check the serial bus on the motherboard.

3.6.4 Troubleshooting Problems with the Frontend

3.6.4.1 Error: No level is displayed or the level is too small.

- Test equipment: Signal Generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1):
- Frequency : { f_{Frontend} }
 - Level : - 20 dBm +/- 1 dB
- Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):
- Frequency : 90 MHz
- Test setup:
- ▶ Connect the signal generator to the input of the Frontend at X101.
 - ▶ Connect the Spectrum Analyzer to the IF output of the Frontend at X103
 - ▶ Repeat this measurement at the IF output of the Frontend at X104.
- R&S ESR settings:
- [PRESET]
 - [**SPAN** : ZERO]
 - [**FREQ** : CENTER : { f_{Frontend} }]
- Measurement:
- [**MKR** ⇒ : PEAK]
 - Read Marker and check Level to { L_{IFout} }

f_{Frontend}	10 MHz	100 MHz	1000 MHz	3000 MHz	7000 MHz
L_{IFout}	> - 16 dBm	> - 18 dBm	> - 18 dBm	> - 20 dBm	> - 24 dBm

If these levels are ok, check the attenuator and the input cable.

3.6.5 Troubleshooting Problems with the Preselector

3.6.5.1 Error: No level is displayed or the level is too small, when using the Preselector.

Measuring each Preselector Filter Path (F0 to F15, see preselector block diagram)

Test equipment: Signal Generator (chapter "3.6.1 Measuring Equipment and Accessories", item. 1):
Spectrum Analyzer (chapter "3.6.1 Measuring Equipment and Accessories", item. 2):

- Frequency : { f_{Presel} }
- Level : - 30 dBm +/- 1 dB

Test setup:

- ▶ Connect the signal generator to the input of the Preselector at X163.
- ▶ Connect the Spectrum Analyzer to the output of the Preselector at X162.

R&S ESR settings:

- [PRESET]
- [INPUT/OUTPUT : PRESELECTOR : On]
- [AMPT : PREAMP : Off]
- [SPAN : ZERO]
- [FREQ : CENTER : { f_{Presel} }]

Measurement:

- [MKR ⇒ : PEAK]
- ▶ Read Marker and check Level to { $L_{\text{Preamp off}}$ }

R&S ESR settings:

- [AMPT : PREAMP : ON]
- [FREQ : CENTER : { f_{Presel} }]

Measurement:

- [MKR ⇒ : PEAK]
- ▶ Read Marker and check Level to { $L_{\text{Preamp on}}$ }

f_{Presel}	$L_{\text{Preamp off}}$	$L_{\text{Preamp on}}$	Preselector-Filter-Path
100 kHz	> - 24 dBm	> - 5 dBm	F0
10 MHz	> - 29 dBm	> - 10 dBm	F1
60 MHz	> - 27 dBm	> - 6 dBm	F2
120 MHz	> - 27 dBm	> - 6 dBm	F3
170 MHz	> - 28 dBm	> - 6 dBm	F4
220 MHz	> - 28 dBm	> - 6 dBm	F5
270 MHz	> - 27 dBm	> - 6 dBm	F6
350 MHz	> - 27 dBm	> - 6 dBm	F7
500 MHz	> - 28 dBm	> - 7 dBm	F8
650 MHz	> - 28 dBm	> - 7 dBm	F9
800 MHz	> - 27 dBm	> - 7 dBm	F10
950 MHz	> - 28 dBm	> - 7 dBm	F11
1200 MHz	> - 27 dBm	> - 7 dBm	F12
2000 MHz	> - 27 dBm	> - 8 dBm	F13
3000 MHz	> - 28 dBm	> - 14 dBm	F14
5000 MHz	> - 28 dBm	> - 18 dBm	F15

3.6.6 Troubleshooting Problems with the Input2 unit

3.6.6.1 Error: No level is displayed or the level is too small, when using Input2.

Measuring the Input2 Path

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)

Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

- Frequency : { f_{Input2} }
- Level : 0 dBm +/- 1 dB

Test setup:

- ▶ Connect the signal generator to the input of the Input2 unit at X3 of the R&S ESR.
- ▶ Connect the output of the Input2 unit at X261 to the spectrum analyzer.

R&S ESR settings:

- [PRESET]
- [**INPUT/OUTPUT** : INPUT : INPUT2]

Measurement:

- [**MKR** ⇒ : PEAK]
- ▶ Read Marker and check level to { L_{Input2} } +/- 2 dB

f_{Input2}	L_{Input2}	Filter-Path
100 kHz	- 10 dBm	F0
120 MHz	- 10 dBm	F3
950 MHz	- 11 dBm	F11

3.6.7 Troubleshooting Problems with the Microwave Converter Unit (R&S ESR26)

3.6.7.1 Error: No level is displayed or the level is too small ($f > 7$ GHz).

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)
Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

Test setup:

- ▶ Connect the signal generator to X45 of the preamp unit.
- ▶ Connect X159 of the microwave converter to the spectrum analyzer.

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { f_{input} }]

Spectrum analyzer setting:

- Center 729.9 MHz
- Span 10 MHz
- Ref.-Level 0 dBm

Signal Generator setting:

- Frequency : { f_{input} }
- Level : -20 dBm +/- 1 dB

Measurement: ▶ Check level at X159 >-15 dBm

f_{input}	10 GHz	13.5 GHz	22 GHz	26 GHz
Output level	> -15 dBm	>-15 dBm	>-15 dBm	>-15 dBm

If the level is ok, check the attenuator ,input cable or frontend.

3.6.7.2 Level conditions at the preamp unit ($f > 7$ GHz)

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)
Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

Test setup:

- ▶ Connect the signal generator X45 of the preamp unit.
- ▶ Connect X46 of the preamp unit to the spectrum analyzer.

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { f_{Input} }]

Spectrum analyzer setting:

- Center { f_{Input} }
- Span 10 MHz
- Ref.-Level -10 dBm

Signal Generator setting:

- Frequency : { f_{Input} }
- Level : -20 dBm +/- 1 dB

Measurement: ▶ Check level at X46 >-25 dBm

f_{Input}	10 GHz	13.5 GHz	22 GHz	26 GHz)
Output level	> -25 dBm	>-25 dBm	>-25 dBm	>-25 dBm

3.6.7.3 Level conditions at the preamp unit (f < 7 GHz)

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)
Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

Test setup:

- ▶ Connect the signal generator X45 of the preamp unit.
- ▶ Connect X4 of the preamp unit to the spectrum analyzer.

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : 6999 : **MHz**]

Spectrum analyzer setting:

- Center 6999 MHz
- Span 10 MHz
- Ref.-Level -10 dBm

Signal Generator setting:

- Frequency : 6999 MHz
- Level : -20 dBm +/- 1 dB

Measurement: ▶ Check level at X4 >-25 dBm

3.6.7.4 Level conditions at the YIG filter unit

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)
Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

Test setup:

- ▶ Connect the signal generator X1 (IN) YIG filter input.
- ▶ Connect X2 (OUT) of the YIG filter to the spectrum analyzer..

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { f_{Input} }]

Spectrum analyzer setting:

- Center { f_{Input} }
- Span 10 MHz
- Ref.-Level -10 dBm

Signal Generator setting:

- Frequency : { f_{Input} }
- Level : -20 dBm +/- 1 dB

Measurement: ▶ Check level at X2 >-30 dBm

f_{Input}	10 GHz	13.5 GHz	22 GHz	26 GHz
Output level	> -30 dBm	>-30 dBm	>-30 dBm	>-30 dBm

3.6.7.5 Level conditions at the mixer

Test equipment: Signal generator (chapter "3.6.1 Measuring Equipment and Accessories", item. 1)
Spectrum Analyzer (chapter "3.6.1 Measuring Equipment and Accessories", item. 2):

Test setup:

- ▶ Connect the signal generator to RF (mixer).
- ▶ Connect IF of the mixer to the spectrum analyzer.

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { f_{Input} }]

Spectrum analyzer setting:

- Center 729.9 MHz
- Span 10 MHz
- Ref.-Level -10 dBm

Signal Generator setting:

- Frequency : { f_{Input} }
- Level : -20 dBm +/- 1 dB

Measurement: ▶ Check level at IF >-30 dBm

Frequency	10 GHz	13.5 GHz	22 GHz	26 GHz
Output level	>-30 dBm	>-30 dBm	>-30 dBm	>-30 dBm

Additional test setup:

- ▶ Connect X1501 of the microwave converter to the spectrum analyzer.

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { frequency }]

Measurement ▶ Check level at X1501 >-30 dBm

Frequency	10 GHz	13.4 GHz	22 GHz	26 GHz
LO frequency	10.7299 GHz	14.1299 GHz	22.7299 GHz	28.2701 GHz
LO level	> 11 dBm	>11 dBm	>6 dBm	>8 dBm

3.6.7.6 Level conditions at the IF signal path

Test equipment: Signal generator (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 1)
Spectrum Analyzer (chapter "3.6.1 [Measuring Equipment and Accessories](#)", item. 2):

Test setup:

- ▶ Connect the signal generator to X1508.
- ▶ Connect X159 of the microwave converter to the spectrum analyzer.

R&S ESR26 setting:

- [PRESET]
- [**SPAN** : ZERO]
- [**FREQ** : CENTER : { frequency }]

Spectrum analyzer setting:

- Center 729.9 MHz
- Span 10 MHz
- Ref.-Level -10 dBm

Signal Generator setting:

- Frequency : { f_{input} }
- Level : -30 dBm +/- 1 dB

Measurement: ▶ Check level at X159 >-15 dBm

Frequency	10 GHz	13.5 GHz	22 GHz	26 GHz
Output level	> -15 dBm	>-15 dBm	>-15 dBm	>-15 dBm

4 Software Update / Installing Options

This chapter contains information on updating software, restoring the operating-system installation and installing options to the R&S ESR. Additional manuals obtained together with a software/firmware update or with subsequently acquired options can be filed here.

4.1 Installation of New R&S ESR Software

For information on updating software refer to the release notes. The most recent version is provided on our Internet site at www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

4.2 Installing Options

A list of all available hardware and software options is provided on our Internet site at www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

For retrofitting, note the mounting instructions enclosed with the options.

WARNING

Shock hazard

Before opening the housing, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC and DC power connector.

Read all safety instructions at the beginning of this manual carefully!

NOTICE

Risk of electrostatic discharge

Protect the operational site against electrostatic discharge to avoid damage to electronic components of the modules. For details refer to the safety instructions at the beginning of this manual.

When installing hardware options, note the following:

- ▶ Switch off the instrument and disconnect the power supply cables.
 - Unscrew that part of the rear-panel where the option has to be inserted.
 - Plug in the option and fix it using the screws you previously removed.
 - Switch on the R&S ESR.
 - Install additional software, if supplied, according to the instructions enclosed with the option.
 - If an adjustment is required for this option, the appropriate notes can be found in the installation instructions for the option.

5 Documents

This chapter provides information on the ordering of spare parts and contains the spare part list and the documents for the complete R&S ESR unit.

5.1 Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the spare part list further down.

NOTICE

Risk of damaging a module

When shipping a module, observe the instructions provided in the section titled "Procedure in Case of Service and Ordering of Spare Parts" at the beginning of this document.

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
Drawing 1316.3003.01 (R&S ESR EMI TEST RECEIVER)					
20	UNIT FRAME ESR (ESR3/7)	1316.3161.00	1		X
22	UNIT FRAME ESR26 (ESR26)	1316.4174.00	1		X
25	FAN 119X119X38	1304.7021.00	1		
30	POWER SUPPLY UNIT (ESR3/7)	1311.0506.02	1		X
30	POWER SUPPLY UNIT (ESR26)	1311.0506.06	1		X
40	SCREW	0794.7130.00	2		
45	SCREW	1148.2817.00	2		
50	HOLDER	0794.5214.00	1		
60	CABLE TIE	0015.9038.00	1		
70	POWER ENTRY MODUL	1160.2988.00	1	A51	X
80	FUSE DRAWER EXTRA SAVE	1160.2994.00	1		X
90	TIME LAG FUSE T6.3H	0020.7630.00	2		X
100	GROUND WIRE	1300.2731.00	1	W12	X
120	MOTHERBOARD ESR (ESR3/7)	1316.3110.02	1	A10	X
122	MAINBOARD ESR (ESR26)	1316.4151.02	1	A10	X
128	SERRATED LOCK WASHER	3583.1578.00	3		
129	NUT	3583.1561.00	3		
130	SCREW (ESR3/7)	1148.3059.00	15		
132	SCREW (ESR26)	1148.3059.00	14		
140	LOCKING SCREW	1093.9180.00	2		
145	FLAT ERRITE CORE (ESR3/7)	3588.3279.00	2		
150	FRONTMODUL CONTR. 9/6	1206.0198.00	1	A90	X
159	3.0 V 230MAH LI-MNO2 CR2032	0858.2049.00	1		X

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
160	SCREW	1148.3059.00	10		
175	BIOS FOR FMR9	1308.2324.00	1		
190	2XRJ45 COUPLER JACK STRAIGHT	1093.9122.00	1	X90	X
192	SILICONE CORD RD4X8MM	1130.0164.00	1		
200	PATCHCABLE CAT.6. 0.5M	0041.9283.00	1	W90	
210	SATA ADAPTOR	1308.0280.00	1	A92	X
220	SCREW	1304.9199.00	2		X
240	SATA DATACABLE 500	3585.8234.00	1	W91	
250	SATA POWERCABLE 440	1091.3433.00	1	W92	
255	CABLETIE	0015.9038.00	2		
260	GROMMET 14X24X7	0099.1440.00	1		
270	REMOVEABLE HARD DRIVE ESR	1316.3190.02	1		
275	SATA HARD DRIVE WITH SOFTWARE ESR	1316.3203.02	1	A91	X
278	HOLDER	1201.8161.00	2		X
280	OPERATING SYSTEM	1099.8570.00	1		
290	IMAGE SOFTWARE	0048.7540.00	1		
300	ADAPTERBOARD	1307.9919.02	1	A11	X
305	MOTHERBOARD BRIDGE LVDS	1308.0250.01	1	A245	X
340	SPEAKER FSV	1308.0809.00	1	B1	X
350	SPEAKER BRACKET	1308.0580.00	1		
360	DIE CAST SCREW	1300.4457.00	4		
405	FRONT UNIT ESR (ESR3/7)	1316.3226.02	1		
407	FRONT UNIT ESR26 (ESR26)	1316.3226.05	1		
410	SCREW	1148.3288.00	4		
411	LABEL ESR3	1316.3255.00	1		
412	LABEL ESR7	1316.3261.00	1		
413	LABEL ESR CONNECTOR	1316.3278.00	1		X
414	LABEL ESR26	1316.4222.00	1		
415	COVER RD 15.9	0009.9200.00	1		
500	ATTENUATOR UNIT ESR	1316.3055.02	1	A40	X
502	ATTENUATOR UNIT ESR26	1316.4239.02	1	A40	X
520	SCREW (ESR3/7)	1148.3059.00	4		
522	INSULATING FOIL (ESR26)	1316.4422.00			
524	SLEEVE (ESR26)	0332.3495.00	3		
526	SCREW ESR26)	1148.3059.00	3		
530	ATTENUATOR CABLE (ESR3/7)	1308.0815.00	1	W40	X
535	ATTENUATOR CABLE (ESR26)	1316.4439.00	1	W40	X
550	FRONTEND	1311.0512.02	1	A100	X
560	DETECTOR BASE UNIT	1311.0012.03	1	A120	X
570	PRESELECT BOARD (ESR3/7)	1316.3010.02	1	A160	X
575	PRESELECT BOARD (ESR26)	1316.3010.03	1	A160	X
580	MWC UNIT 30GHZ WITH PREAMPLIFIER	1307.9748.35	1	A150	X
590	ADDITIONAL INTERFACE	1307.9831.02	1	A220	X
600	RF CABLE W2 (ESR3/7)	1316.3426.00	1	W2	X
602	RF CABLE W2 (ESR26)	1316.4245.00	1	W2	X
605	RF CABLE W3/4	1164.6271.00	2	W3	X

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
606	RF CABLE W6 (ESR26)	1308.0867.00	1	W6	X
607	RF CABLE W7 (ESR26)	1308.0873.00	1	W7	X
610	RF CABLE W50	1316.3403.00	1	W50	X
615	RF CABLE W51 (ESR3/7)	1316.3432.00	1	W51	X
617	RF CABLE W51 (ESR26)	1316.4251.00	1	W51	X
620	RF CABLE W52 (ESR3/7)	1316.3455.00	1	W52	X
622	RF CABLE W52 (ESR26)	1316.4268.00	1	W52	X
625	RF CABLE W53 (ESR3/7)	1316.3449.00	1	W53	X
625	RF CABLE W53 (ESR26)	1316.4274.00	1	W53	X
630	TOROIDAL WOUND CORE (ESR3/7)	5353.1935.00	5		
	TOROIDAL WOUND CORE (ESR26)	5353.1935.00	1		
635	CABLETIE	0015.9038.00	2		
640	SPRING 19	1316.0356.00	1		
645	SPRING 52.25 (ESR3/7)	1316.3884.00	1		
646	SPRING 33.25 (ESR26)	1316.4368.00	1		
650	SPRING 223.25 (ESR3/7)	1316.3890.00	1		
651	SPRING 242.25 (ESR26)	1316.4374.00	1		
652	BAFFLE PLATE	1308.1363.00	1		
670	RF CABLE W54 (ESR26)	1316.4297.00	1	W54	X
680	RF CABLE W55 (ESR26)	1316.4300.00	1	W55	X
700	TOP COVER (ESR3/7)	1311.0258.00	1		
700	TOP COVER (ESR26)	1316.4280.00	1		
705	SCREW	1148.3288.00	6		
707	SPRING 313.5	1316.3903.00	1		
710	COVER	0852.0467.00	1		
720	REAR PLATE OPTION	1307.9519.00	2		
725	REAR PLATE LVDS	1307.9525.00	1		
730	REAR PLATE OCXO	1307.9531.00	2		
735	SCREW	1148.3288.00	24		
740	SCREW	1148.2630.00	3		
745	WASHER	0082.4570.00	3		
750	CASE 4HU 7/8 D450 ESR	1316.3503.00	1		X
755	FRONT HANDLE	1096.1480.00	2		X
760	SCREW	1096.4896.00	4		
765	REAR WALL FOOT	1096.2493.00	4		X
770	LABEL F. REAR PANEL FOOT	1096.2435.00	1		
780	ACCESSORIES (ESR3/7)	1316.3490.00	1		
780	ACCESSORIES (ESR26)	1316.4097.00	1		
Drawing 1316.3226.01 (Front Unit R&S ESR3/7 MOD02, ESR26 MOD05)					
802	FRONT COVER ESR	1316.3232.00	1		
805	SEALING	0396.1035.00	1.1 M		
810	PUSH-BUTTON BOARD SET	1307.9083.00	1	A80	X
820	FLEX. SWITCH BOARD	1307.9090.00	1	A81	X
830	SHROUD	0852.1234.00	1		X
846	KEYBOARD HOLDER DISPLAY AUO	1311.1525.00	1		
850	SCREW	1300.4457.00	10		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
860	ROTARY PULS-GENERATOR	0852.2799.00	1	A70	X
865	CABLE TIE	0015.9038.00	1		
870	COLLER WITH NUT	0852.2699.00	1		
875	KNOB	0852.1128.00	1		X
884	HOLDER TOUCH CONTROLLER	1308.1628.00			
885	TOUCH-CONTROLLER-USB-BOARD-3	1313.2364.02	1	A60	X
888	SCREW	1148.3059.00	4		
890	SCREW	1300.4457.00	2		
892	CABLE	2085.4350.00	1	W60	
905	RUBBER SEAL 2.0MM. BLACK	1308.1011.00	0,7 M		
910	DISPLAY AUO WITH TOUCH 8.4 INCH	1311.1519.00	1	A30	X
911	LED BACKLIGHT CABLE AUO DISPLAY	1311.1560.00	1		
912	DISPLAYCABLE L270	1311.1554.00	1		
945	HOLDER	0794.5214.00	7		
946	CABLE TIE	0015.9038.00	6		
950	AXIAL FERRITE BEAD	3586.7590.00	3		
970	CABLE W31 LST BOARD - FMR	1307.9425.00	1	W31	
980	FRONTCONNECTOR BOARD ESR	1316.3332.02	1	A20	X
990	DIE CAST SCREW 2.5X6	1300.4457.00	2		
1007	DISPLAY SHIELDING AUO	1316.3761.00	1		
1020	SCREW	3565.7203.00	4		
1030	WASHER	0082.4570.00	4		
1040	AF OUTPUT	1308.0144.03	1	A71	
1050	SCREW	1148.3288.00	2		
1060	KNOB	4066.1169.00	1		
1070	SHROUD	0852.1228.00	1		
1080	INPUT 2 BOARD	1316.3032.02	1	A260	
1090	SCREW	1148.3288.00	4		
1100	CALE W1 (ESR3/7)	1316.3284.00	1	W1	
1106	ADAPTOR (ESR26)	1021.0493.00	1		
1107	CALE W1 (ESR26)	1316.4339.00	1	W1	
1110	MOUNTING PLATE (ESR3/7)	1093.4750.00	1		
1112	MOUNTING PLATE (ESR26)	1093.4772.00	1		
1120	SCREW	1148.3294.00	4		
1130	CABLE W42	1316.3484.00	1	W42	
1140	FLEX STRIP 10P. R=0.5 L=150	3584.6696.00	1	W71	
1150	FLEX STRIP 16P. R=0.5 L=75	1308.1034.00	1	W20	
1160	FLEX STRIP 16P. R=0.5 L=150	1308.1040.00	1	W61	
Drawing 1316.3649.00 (Option FSV-B4 1310.9522.02/03)					
1300	OCXO (VAR02)	1300.3180.05	1	A250	X
1302	OCXO HIGH PERFORMANCE (VAR03)	1300.3180.07	1	A250	X
Drawing 1307.9748.01 (MWC Unit) (R&S ESR26)					
2102	MW CONVERTER2	1308.0721.05	1	A150	
2108	PREAMPLIFIER UNIT	1164.5481.02	1		X
2109	SCREW	1148.2769.00	2		
2115	YIG UNIT 30GHZ + PREAMP (R&S)	1308.1292.33	1		X

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
2125	YIG UNIT 30GHZ + PREAMP (MICRO LAMBDA)	1308.1292.34	1		X
2130	ATTENUATOR 3dB	1127.9441.00	1		
2170	SCREW	1148.3059.00	3		
2180	MIXER M1	1307.1501.02	1	A153	X
2192	HOLDING PLATE	1308.2299.00	1		
2207	SCREW	1096.5205.00	2		
2210	A SIDE COVER MWC	1313.0084.00	1		
2220	B SIDE COVER MWC	1308.1186.00	1		
2230	RF CABLE W167	1308.1328.00	1		
2250	RF CABLE W180	1308.2218.00	1		
2250	RF CABLE W180	1308.2218.00	1		
2260	RF CABLE W184	1308.2253.00	1		
2270	RF CABLE W190	1308.2424.00	1		
Drawing 1316.3649.00 (Option ESR-B50 1316.3584.02)					
1500	DETECTOR EXTENSION UNIT	1311.0035.02	1		X
Drawing 1316.3649.00 (Option ESR-B19 1316.3561.02)					
1600	SATA HARD DRIVE WITH SOFTWARE	1316.3203.02	1		X
1620	HOLDER	1201.8161.00	2		X
1630	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1310.9774.00 (Option FSV-B9 1310.9545.02)					
1700	TRACKING GENERATOR	1308.0196.02	1	A140	X
1705	RF CABLE W13	1308.1892.00	1	W13	X
1710	MOUNTING PLATE	1093.4750.00	1		
1715	SCREW	1148.3294.00	4		
1725	RF CABLE W13-2	1308.1928.00	1	W13-2	
1730	RF CABLE W14	1308.1740.00	1	W14	
1735	RF CABLE W15	1308.1757.00	1	W15	
1740	TERMINATION 50 OHM	0249.7823.00	1		
1745	REAR PLATE TRACKING GENERATOR	1308.1934.00	1		
1750	SCREW	1148.3288.00	4		
1755	RF CABLE W16/17	1311.0635.00	1	W16	
1760	RF CABLE W16/17	1311.0635.00	1	W17	
1765	CABLE HOLDER	1093.9045.00	2		
1770	LABEL FSV CONNECTOR	1308.0309.00	1		X
1775	COVER	0009.9181.00	1		
1780	COVER	3585.4545.00	1		
Drawing 1316.3649.00 (Option ESR-B18 1316.3555.02)					
2500	SSD WITH SOFTWARE	1316.3203.04	1		X
2530	HOLDER	1201.8161.00	2		X
2540	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1310.9897.01 (Option FSV-B30 1316.3584.02)					
2610	INVERTER 12V/300W	1311.1683.00	1		X
2620	ADAPTER PLATE	1311.1654.00	1		
2660	CABLE W2	1311.0993.00	1		
2670	VELCRO-STRIP ONE-WRAP	5500.8537.00	0.1m		
2690	POWER CABLE EURO-F 2M	0099.1456.00	1	A130	

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
Drawing 1321.3750.01, sheet 2 (Option R&S FSV-B32 1321.3750.02)					
30	THERMAL GAP PAD 15X15X1	1412.5560.00			X
40	BATTERY PACK	1316.3810.02			X
80	ROCKER SWITCH 1POL. 6A BK	3586.0250.00			
120	CABLE ON-OFF	1321.3850.00			
130	POWER SUPPLY INTERN	1321.3866.00			
170	BATTERY PACK 14.4V 6.2AH LI-ION	1321.3772.00			X
180	POWER SUPPLY EXTERN	1321.3872.00			
Option R&S FSV-B34 1321.3950.02)					
20	MULTI-BAY BATTERY CHARGER	1321.3966.00			X

Stock No.	Earthed-contact connector	Preferably used in
DS 0006.7013.00	BS1363: 1967" 10 A, 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12, 10 A, 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13, 10 A, 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099, GB1002, 10 A, 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303, 7A, 125 V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3, 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00 DS 0099.1456.00	DIN 49 441, 10 A, 250 V, angular DIN 49 441, 10 A, 250 V, straight approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	Europe (except Switzerland)

5.2 Mechanical Drawings

5 Documents

This chapter provides information on the ordering of spare parts and contains the spare part list and the documents for the complete R&S ESR unit.

5.1 Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the spare part list further down.

NOTICE

Risk of damaging a module

When shipping a module, observe the instructions provided in the section titled "Procedure in Case of Service and Ordering of Spare Parts" at the beginning of this document.

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
Drawing 1316.3003.01 (R&S ESR EMI TEST RECEIVER)					
20	UNIT FRAME ESR (ESR3/7)	1316.3161.00	1		X
22	UNIT FRAME ESR26 (ESR26)	1316.4174.00	1		X
25	FAN 119X119X38	1304.7021.00	1		
30	POWER SUPPLY UNIT (ESR3/7)	1311.0506.02	1		X
30	POWER SUPPLY UNIT (ESR26)	1311.0506.06	1		X
40	SCREW	0794.7130.00	2		
45	SCREW	1148.2817.00	2		
50	HOLDER	0794.5214.00	1		
60	CABLE TIE	0015.9038.00	1		
70	POWER ENTRY MODUL	1160.2988.00	1	A51	X
80	FUSE DRAWER EXTRA SAVE	1160.2994.00	1		X
90	TIME LAG FUSE T6.3H	0020.7630.00	2		X
100	GROUND WIRE	1300.2731.00	1	W12	X
120	MOTHERBOARD ESR (ESR3/7)	1316.3110.02	1	A10	X
122	MAINBOARD ESR (ESR26)	1316.4151.02	1	A10	X
128	SERRATED LOCK WASHER	3583.1578.00	3		
129	NUT	3583.1561.00	3		
130	SCREW (ESR3/7)	1148.3059.00	15		
132	SCREW (ESR26)	1148.3059.00	14		
140	LOCKING SCREW	1093.9180.00	2		
145	FLAT ERRITE CORE (ESR3/7)	3588.3279.00	2		
150	FRONTMODUL CONTR. 9/6	1206.0198.00	1	A90	X
159	3.0 V 230MAH LI-MNO2 CR2032	0858.2049.00	1		X

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
160	SCREW	1148.3059.00	10		
175	BIOS FOR FMR9	1308.2324.00	1		
190	2XRJ45 COUPLER JACK STRAIGHT	1093.9122.00	1	X90	X
192	SILICONE CORD RD4X8MM	1130.0164.00	1		
200	PATCHCABLE CAT.6. 0.5M	0041.9283.00	1	W90	
210	SATA ADAPTOR	1308.0280.00	1	A92	X
220	SCREW	1304.9199.00	2		X
240	SATA DATACABLE 500	3585.8234.00	1	W91	
250	SATA POWERCABLE 440	1091.3433.00	1	W92	
255	CABLETIE	0015.9038.00	2		
260	GROMMET 14X24X7	0099.1440.00	1		
270	REMOVEABLE HARD DRIVE ESR	1316.3190.02	1		
275	SATA HARD DRIVE WITH SOFTWARE ESR	1316.3203.02	1	A91	X
278	HOLDER	1201.8161.00	2		X
280	OPERATING SYSTEM	1099.8570.00	1		
290	IMAGE SOFTWARE	0048.7540.00	1		
300	ADAPTERBOARD	1307.9919.02	1	A11	X
305	MOTHERBOARD BRIDGE LVDS	1308.0250.01	1	A245	X
340	SPEAKER FSV	1308.0809.00	1	B1	X
350	SPEAKER BRACKET	1308.0580.00	1		
360	DIE CAST SCREW	1300.4457.00	4		
405	FRONT UNIT ESR (ESR3/7)	1316.3226.02	1		
407	FRONT UNIT ESR26 (ESR26)	1316.3226.05	1		
410	SCREW	1148.3288.00	4		
411	LABEL ESR3	1316.3255.00	1		
412	LABEL ESR7	1316.3261.00	1		
413	LABEL ESR CONNECTOR	1316.3278.00	1		X
414	LABEL ESR26	1316.4222.00	1		
415	COVER RD 15.9	0009.9200.00	1		
500	ATTENUATOR UNIT ESR	1316.3055.02	1	A40	X
502	ATTENUATOR UNIT ESR26	1316.4239.02	1	A40	X
520	SCREW (ESR3/7)	1148.3059.00	4		
522	INSULATING FOIL (ESR26)	1316.4422.00			
524	SLEEVE (ESR26)	0332.3495.00	3		
526	SCREW ESR26)	1148.3059.00	3		
530	ATTENUATOR CABLE (ESR3/7)	1308.0815.00	1	W40	X
535	ATTENUATOR CABLE (ESR26)	1316.4439.00	1	W40	X
550	FRONTEND	1311.0512.02	1	A100	X
560	DETECTOR BASE UNIT	1311.0012.03	1	A120	X
570	PRESELECT BOARD (ESR3/7)	1316.3010.02	1	A160	X
575	PRESELECT BOARD (ESR26)	1316.3010.03	1	A160	X
580	MWC UNIT 30GHZ WITH PREAMPLIFIER	1307.9748.35	1	A150	X
590	ADDITIONAL INTERFACE	1307.9831.02	1	A220	X
600	RF CABLE W2 (ESR3/7)	1316.3426.00	1	W2	X
602	RF CABLE W2 (ESR26)	1316.4245.00	1	W2	X
605	RF CABLE W3/4	1164.6271.00	2	W3	X

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
606	RF CABLE W6 (ESR26)	1308.0867.00	1	W6	X
607	RF CABLE W7 (ESR26)	1308.0873.00	1	W7	X
610	RF CABLE W50	1316.3403.00	1	W50	X
615	RF CABLE W51 (ESR3/7)	1316.3432.00	1	W51	X
617	RF CABLE W51 (ESR26)	1316.4251.00	1	W51	X
620	RF CABLE W52 (ESR3/7)	1316.3455.00	1	W52	X
622	RF CABLE W52 (ESR26)	1316.4268.00	1	W52	X
625	RF CABLE W53 (ESR3/7)	1316.3449.00	1	W53	X
625	RF CABLE W53 (ESR26)	1316.4274.00	1	W53	X
630	TOROIDAL WOUND CORE (ESR3/7)	5353.1935.00	5		
	TOROIDAL WOUND CORE (ESR26)	5353.1935.00	1		
635	CABLETIE	0015.9038.00	2		
640	SPRING 19	1316.0356.00	1		
645	SPRING 52.25 (ESR3/7)	1316.3884.00	1		
646	SPRING 33.25 (ESR26)	1316.4368.00	1		
650	SPRING 223.25 (ESR3/7)	1316.3890.00	1		
651	SPRING 242.25 (ESR26)	1316.4374.00	1		
652	BAFFLE PLATE	1308.1363.00	1		
670	RF CABLE W54 (ESR26)	1316.4297.00	1	W54	X
680	RF CABLE W55 (ESR26)	1316.4300.00	1	W55	X
700	TOP COVER (ESR3/7)	1311.0258.00	1		
700	TOP COVER (ESR26)	1316.4280.00	1		
705	SCREW	1148.3288.00	6		
707	SPRING 313.5	1316.3903.00	1		
710	COVER	0852.0467.00	1		
720	REAR PLATE OPTION	1307.9519.00	2		
725	REAR PLATE LVDS	1307.9525.00	1		
730	REAR PLATE OCOXO	1307.9531.00	2		
735	SCREW	1148.3288.00	24		
740	SCREW	1148.2630.00	3		
745	WASHER	0082.4570.00	3		
750	CASE 4HU 7/8 D450 ESR	1316.3503.00	1		X
755	FRONT HANDLE	1096.1480.00	2		X
760	SCREW	1096.4896.00	4		
765	REAR WALL FOOT	1096.2493.00	4		X
770	LABEL F. REAR PANEL FOOT	1096.2435.00	1		
780	ACCESSORIES (ESR3/7)	1316.3490.00	1		
780	ACCESSORIES (ESR26)	1316.4097.00	1		
Drawing 1316.3226.01 (Front Unit R&S ESR3/7 MOD02, ESR26 MOD05)					
802	FRONT COVER ESR	1316.3232.00	1		
805	SEALING	0396.1035.00	1.1 M		
810	PUSH-BUTTON BOARD SET	1307.9083.00	1	A80	X
820	FLEX. SWITCH BOARD	1307.9090.00	1	A81	X
830	SHROUD	0852.1234.00	1		X
846	KEYBOARD HOLDER DISPLAY AUO	1311.1525.00	1		
850	SCREW	1300.4457.00	10		

Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
860	ROTARY PULS-GENERATOR	0852.2799.00	1	A70	X
865	CABLE TIE	0015.9038.00	1		
870	COLLER WITH NUT	0852.2699.00	1		
875	KNOB	0852.1128.00	1		X
884	HOLDER TOUCH CONTROLLER	1308.1628.00			
885	TOUCH-CONTROLLER-USB-BOARD-3	1313.2364.02	1	A60	X
888	SCREW	1148.3059.00	4		
890	SCREW	1300.4457.00	2		
892	CABLE	2085.4350.00	1	W60	
905	RUBBER SEAL 2.0MM. BLACK	1308.1011.00	0,7 M		
910	DISPLAY AUO WITH TOUCH 8.4 INCH	1311.1519.00	1	A30	X
911	LED BACKLIGHT CABLE AUO DISPLAY	1311.1560.00	1		
912	DISPLAYCABLE L270	1311.1554.00	1		
945	HOLDER	0794.5214.00	7		
946	CABLE TIE	0015.9038.00	6		
950	AXIAL FERRITE BEAD	3586.7590.00	3		
970	CABLE W31 LST BOARD - FMR	1307.9425.00	1	W31	
980	FRONTCONNECTOR BOARD ESR	1316.3332.02	1	A20	X
990	DIE CAST SCREW 2.5X6	1300.4457.00	2		
1007	DISPLAY SHIELDING AUO	1316.3761.00	1		
1020	SCREW	3565.7203.00	4		
1030	WASHER	0082.4570.00	4		
1040	AF OUTPUT	1308.0144.03	1	A71	
1050	SCREW	1148.3288.00	2		
1060	KNOB	4066.1169.00	1		
1070	SHROUD	0852.1228.00	1		
1080	INPUT 2 BOARD	1316.3032.02	1	A260	
1090	SCREW	1148.3288.00	4		
1100	CALE W1 (ESR3/7)	1316.3284.00	1	W1	
1106	ADAPTOR (ESR26)	1021.0493.00	1		
1107	CALE W1 (ESR26)	1316.4339.00	1	W1	
1110	MOUNTING PLATE (ESR3/7)	1093.4750.00	1		
1112	MOUNTING PLATE (ESR26)	1093.4772.00	1		
1120	SCREW	1148.3294.00	4		
1130	CABLE W42	1316.3484.00	1	W42	
1140	FLEX STRIP 10P. R=0.5 L=150	3584.6696.00	1	W71	
1150	FLEX STRIP 16P. R=0.5 L=75	1308.1034.00	1	W20	
1160	FLEX STRIP 16P. R=0.5 L=150	1308.1040.00	1	W61	
Drawing 1316.3649.00 (Option FSV-B4 1310.9522.02/03)					
1300	OCXO (VAR02)	1300.3180.05	1	A250	X
1302	OCXO HIGH PERFORMANCE (VAR03)	1300.3180.07	1	A250	X
Drawing 1307.9748.01 (MWC Unit) (R&S ESR26)					
2102	MW CONVERTER2	1308.0721.05	1	A150	
2108	PREAMPLIFIER UNIT	1164.5481.02	1		X
2109	SCREW	1148.2769.00	2		
2115	YIG UNIT 30GHZ + PREAMP (R&S)	1308.1292.33	1		X

Pos.	Designation	Stock No.	No.	Electr. design.	Rec. spare parts
2125	YIG UNIT 30GHZ + PREAMP (MICRO LAMBDA)	1308.1292.34	1		X
2130	ATTENUATOR 3dB	1127.9441.00	1		
2170	SCREW	1148.3059.00	3		
2180	MIXER M1	1307.1501.02	1	A153	X
2192	HOLDING PLATE	1308.2299.00	1		
2207	SCREW	1096.5205.00	2		
2210	A SIDE COVER MWC	1313.0084.00	1		
2220	B SIDE COVER MWC	1308.1186.00	1		
2230	RF CABLE W167	1308.1328.00	1		
2250	RF CABLE W180	1308.2218.00	1		
2250	RF CABLE W180	1308.2218.00	1		
2260	RF CABLE W184	1308.2253.00	1		
2270	RF CABLE W190	1308.2424.00	1		
Drawing 1316.3649.00 (Option ESR-B50 1316.3584.02)					
1500	DETECTOR EXTENSION UNIT	1311.0035.02	1		X
Drawing 1316.3649.00 (Option ESR-B19 1316.3561.02)					
1600	SATA HARD DRIVE WITH SOFTWARE	1316.3203.02	1		X
1620	HOLDER	1201.8161.00	2		X
1630	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1310.9774.00 (Option FSV-B9 1310.9545.02)					
1700	TRACKING GENERATOR	1308.0196.02	1	A140	X
1705	RF CABLE W13	1308.1892.00	1	W13	X
1710	MOUNTING PLATE	1093.4750.00	1		
1715	SCREW	1148.3294.00	4		
1725	RF CABLE W13-2	1308.1928.00	1	W13-2	
1730	RF CABLE W14	1308.1740.00	1	W14	
1735	RF CABLE W15	1308.1757.00	1	W15	
1740	TERMINATION 50 OHM	0249.7823.00	1		
1745	REAR PLATE TRACKING GENERATOR	1308.1934.00	1		
1750	SCREW	1148.3288.00	4		
1755	RF CABLE W16/17	1311.0635.00	1	W16	
1760	RF CABLE W16/17	1311.0635.00	1	W17	
1765	CABLE HOLDER	1093.9045.00	2		
1770	LABEL FSV CONNECTOR	1308.0309.00	1		X
1775	COVER	0009.9181.00	1		
1780	COVER	3585.4545.00	1		
Drawing 1316.3649.00 (Option ESR-B18 1316.3555.02)					
2500	SSD WITH SOFTWARE	1316.3203.04	1		X
2530	HOLDER	1201.8161.00	2		X
2540	HOLDER HARD DRIVE	1307.9460.00	1		
Drawing 1310.9897.01 (Option FSV-B30 1316.3584.02)					
2610	INVERTER 12V/300W	1311.1683.00	1		X
2620	ADAPTER PLATE	1311.1654.00	1		
2660	CABLE W2	1311.0993.00	1		
2670	VELCRO-STRIP ONE-WRAP	5500.8537.00	0.1m		
2690	POWER CABLE EURO-F 2M	0099.1456.00	1	A130	

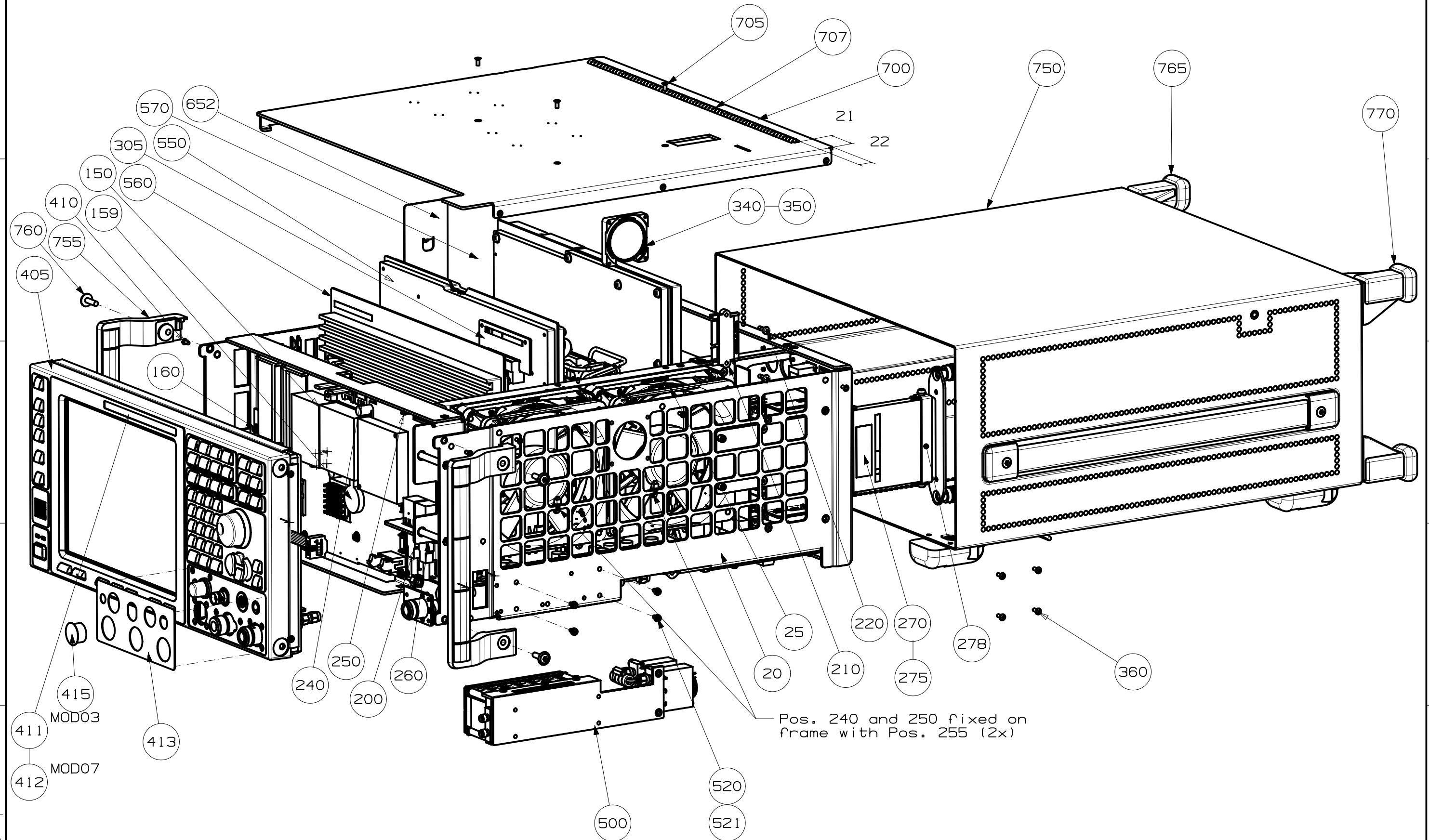
Pos.	Designation	Stock No.	No.	Electr. desig.	Rec. spare parts
Drawing 1321.3750.01, sheet 2 (Option R&S FSV-B32 1321.3750.02)					
30	THERMAL GAP PAD 15X15X1	1412.5560.00			X
40	BATTERY PACK	1316.3810.02			X
80	ROCKER SWITCH 1POL. 6A BK	3586.0250.00			
120	CABLE ON-OFF	1321.3850.00			
130	POWER SUPPLY INTERN	1321.3866.00			
170	BATTERY PACK 14.4V 6.2AH LI-ION	1321.3772.00			X
180	POWER SUPPLY EXTERN	1321.3872.00			
Option R&S FSV-B34 1321.3950.02)					
20	MULTI-BAY BATTERY CHARGER	1321.3966.00			X

Stock No.	Earthed-contact connector	Preferably used in
DS 0006.7013.00	BS1363: 1967" 10 A, 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12, 10 A, 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13, 10 A, 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099, GB1002, 10 A, 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303, 7A, 125 V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3, 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00 DS 0099.1456.00	DIN 49 441, 10 A, 250 V, angular DIN 49 441, 10 A, 250 V, straight approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	Europe (except Switzerland)

5.2 Mechanical Drawings

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Projektions-
methode
Projection
Method

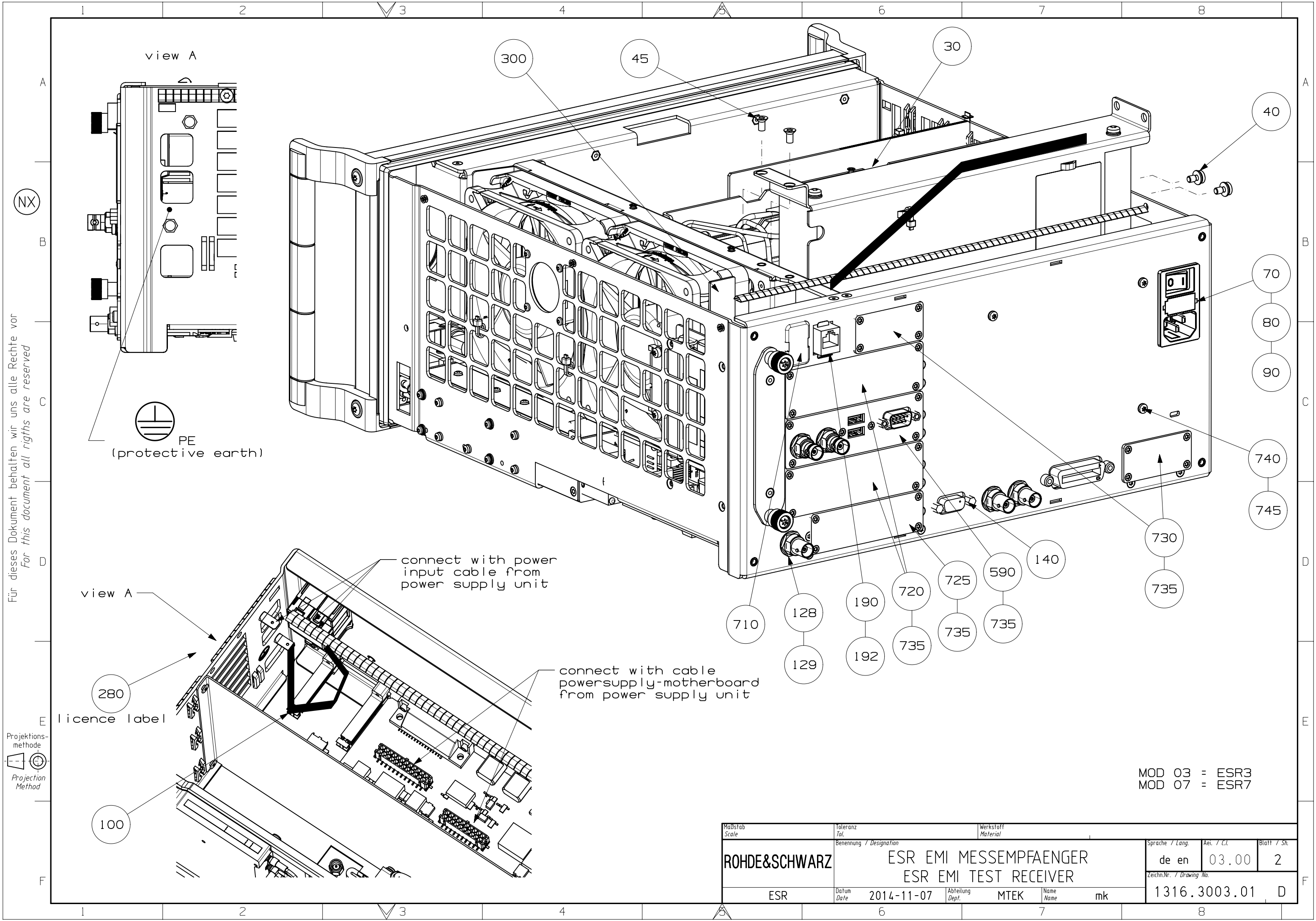


MOD 03 = ESR3
MOD 07 = ESR7

Maßstab Scale	Toleranz Tol.	ISO2768-m	Werkstoff Material			
Benennung / Designation			Sprache / Lang.	Ael. / C.I.	Blatt / Sh.	
ROHDE&SCHWARZ			de en	04.00	1	
			Zeichn.Nr. / Drawing No.			
ESR			Datum Date	2015-11-12	Abteilung Dept.	3MTEK
			Name Name	mk	1316.3003.01	
			D			

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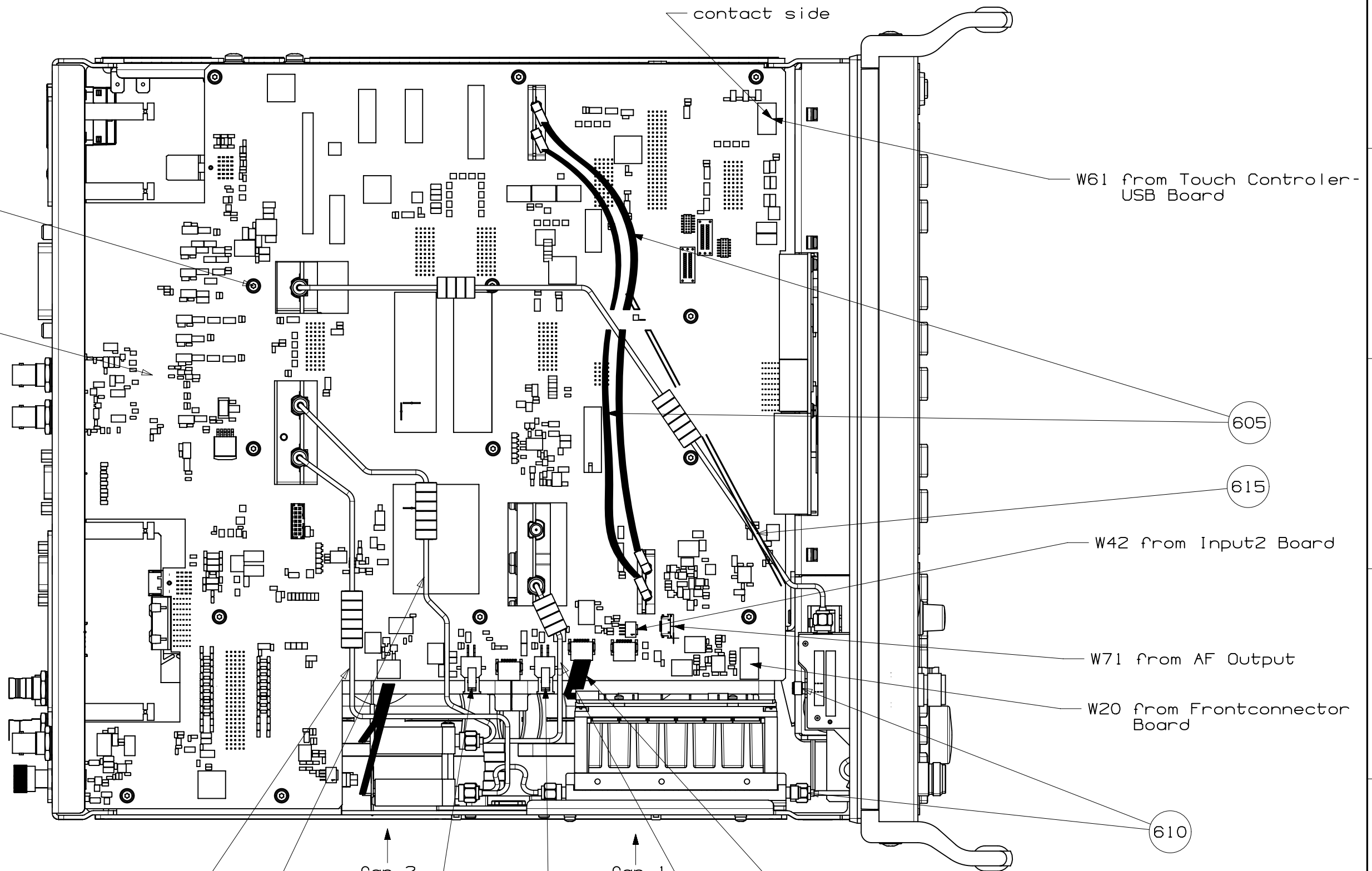
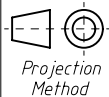
Projektions-
methode
Projection
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material			
Benennung / Designation			Sprache / Lang.	Ärl. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ			de en	03.00	2
ESR			Zeichn.Nr. / Drawing No.		
Datum Date			Abteilung Dept.	Name Name	
2014-11-07			MTEK	mk	
			1316.3003.01		
			D		

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Projektions-
methode
Projection
Method



twist fan cable from fan 2 five rotations before plugging in X84 and lay cable as far as possible from RF cables away

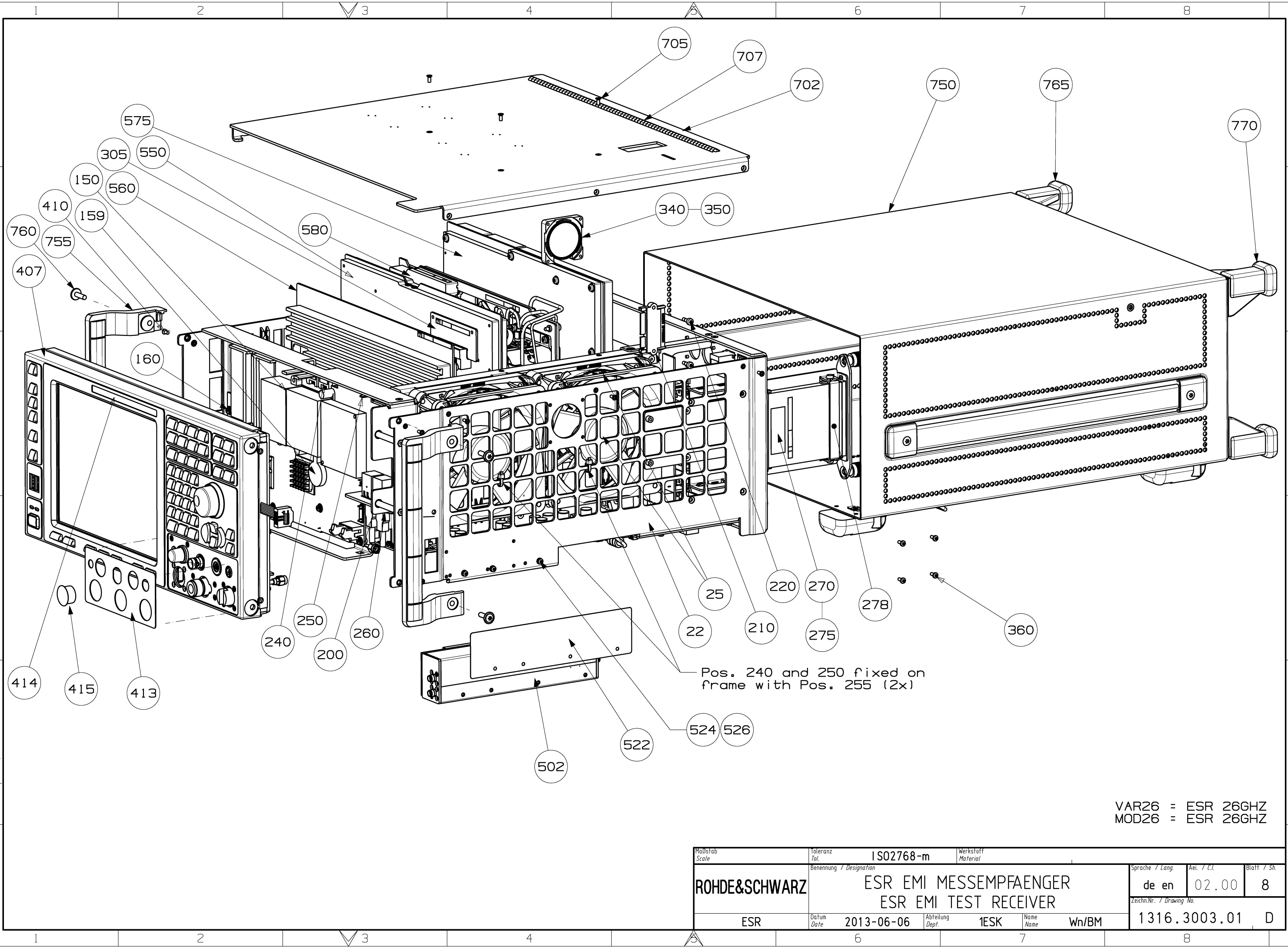
twist fan cable from fan 1 five rotations before plugging in X83 and lay cable as far as possible from RF cables away

MOD 03 = ESR3
MOD 07 = ESR7

Maßstab Scale	Toleranz Tol.	ISO2768-m	Werkstoff Material			
Benennung / Designation			Sprache / Lang.		Ael. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ			de en		04.00	3
ESR			Datum Date		2013-12-20	Abteilung Dept.
			1ESK		Name Name	mk
			Zeichn.Nr. / Drawing No.		1316.3003.01	
					D	

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Projektions-
methode
Projection
Method

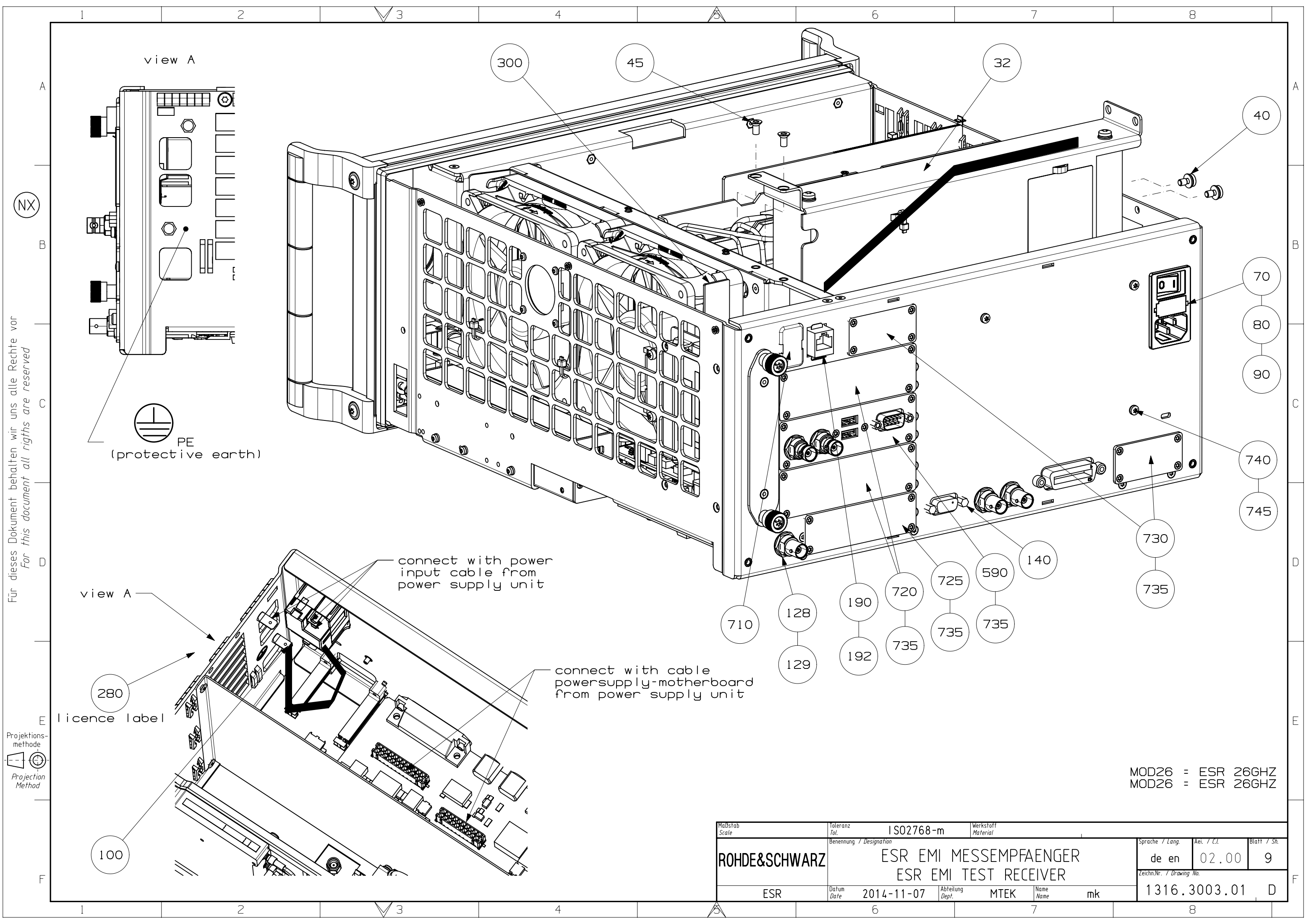


VAR26 = ESR 26GHZ
MOD26 = ESR 26GHZ

Maßstab Scale	Toleranz Tol.	ISO2768-m	Werkstoff Material			
Benennung / Designation			Sprache / Lang.		Ael. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ			de en		02.00	8
Datum Date			Abteilung Dept.		Name Name	Zeichn.Nr. / Drawing No.
ESR			2013-06-06		1ESK Wn/BM	1316.3003.01 D

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Projektions-
methode
Projection
Method



MOD26 = ESR 26GHZ
MOD26 = ESR 26GHZ

Maßstab Scale	Toleranz Tol.	ISO2768-m	Werkstoff Material			
Benennung / Designation			Sprache / Lang.	Ael. / C.I.	Blatt / Sh.	
ROHDE&SCHWARZ			de en	02.00	9	
Datum Date			Abteilung Dept.	Name Name	Zeichn.Nr. / Drawing No.	
ESR			2014-11-07	MTEK	mk	
					1316.3003.01	
					D	

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Projektions-
methode
Projection
Method

132

122

607

627

680

622

670

fan 2

602

fan 1

535

from ATT-Unit

contact side

W61 from Touch Controller-
USB Board

605

617

W42 from Input2 Board

W71 from AF Output

W20 from Frontconnector
Board

610

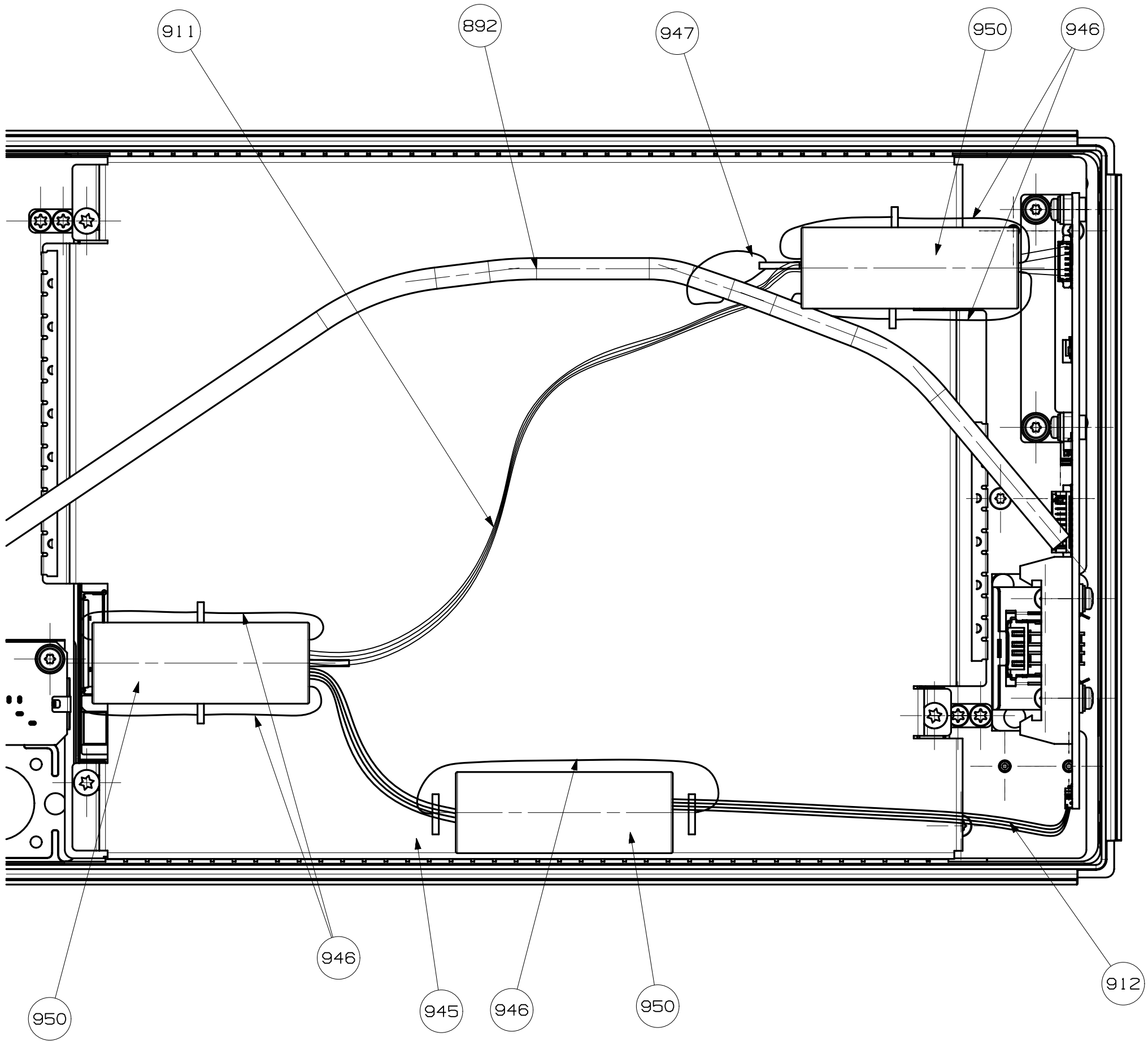
twist fan cable from fan 2 five
rotations before plugging in X84
and lay cable as far as possible
from RF cables away

W191 from MW-Converter Unit

twist fan cable from fan 1 five
rotations before plugging in X83
and lay cable as far as possible
from RF cables away

VAR26 = ESR 26GHZ
MOD26 = ESR 26GHZ

Maßstab Scale	Toleranz Tol.	ISO2768-m		Werkstoff Material			
Benennung / Designation		ESR EMI MESSEMPFÄNGER ESR EMI TEST RECEIVER			Sprache / Lang.	Ael. / C.I.	Blatt / Sh.
ESR		Datum Date	2013-07-09	Abteilung Dept.	1ESK	Name Name	Wn
					1316.3003.01		
					D		

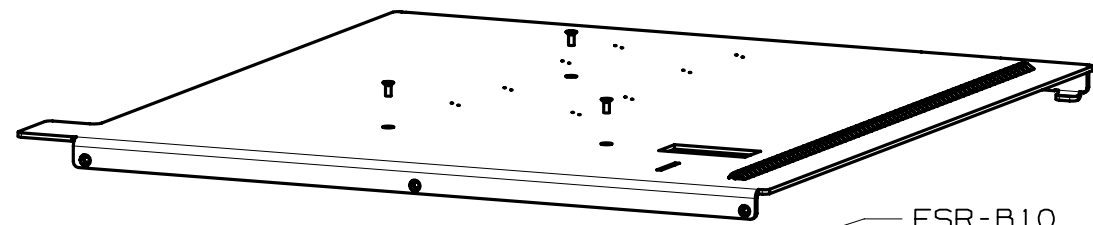
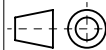


NX

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Projektions-
methode
Projection
Method

Maßstab Scale	1:1	Toleranz Tol.	ISO2768-m	Werkstoff Material	
ROHDE&SCHWARZ		Benennung / Designation			
ESR		Datum Date	2015-08-07	Abteilung Dept.	3MTEK
		Name Name	mk	Sprache / Lang.	
				de en	04.00
				Blatt / Sh.	
				2	
				Zeichn.Nr. / Drawing No.	
				1316.3226.01	
				D	



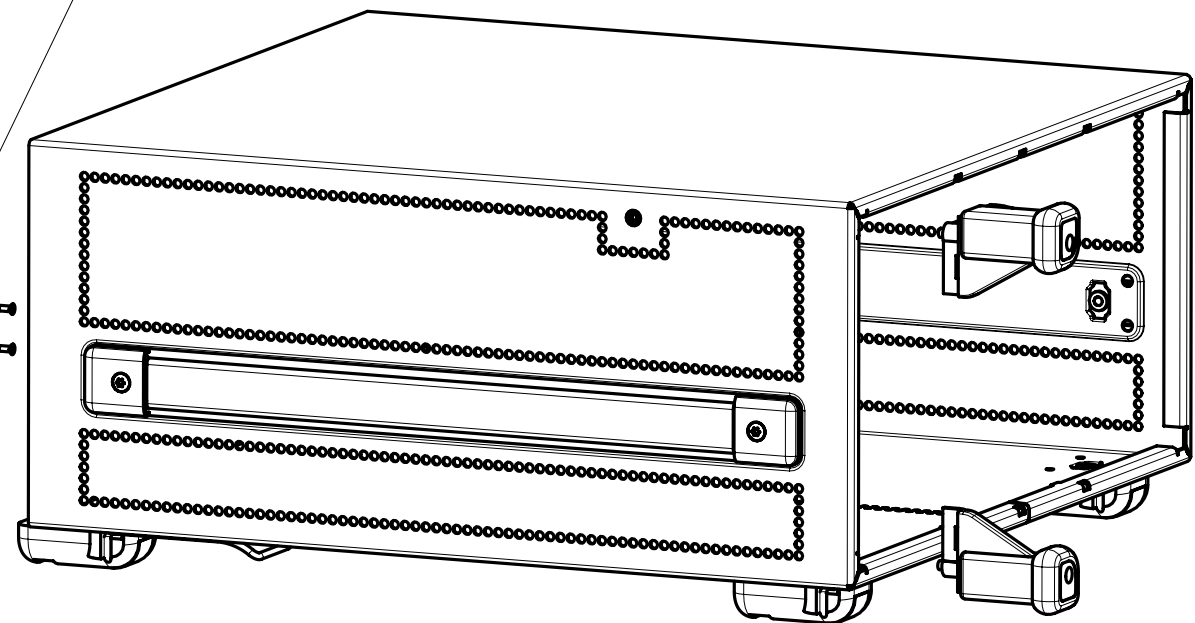
ESR-B50 —
1316.3584.02

- ESR-B10
1316.4745.02

FSV-B4
1310.9522.02

FSV-B4
1310.9522.03

remove



- remove

ESR-B18 —
1316.3555.02/12

ESRP-B18
1316.3555.03/13

ESR-B19
1316.3561.02/12

ESRP-B19
1316.3561.03/13

ESR-B10
1307.9854.02

Assembly instruction for
FSV-B4
ESR-B10
ESR-B18
ESRP-B18
ESR-B19
ESRP-B19
ESR-B50

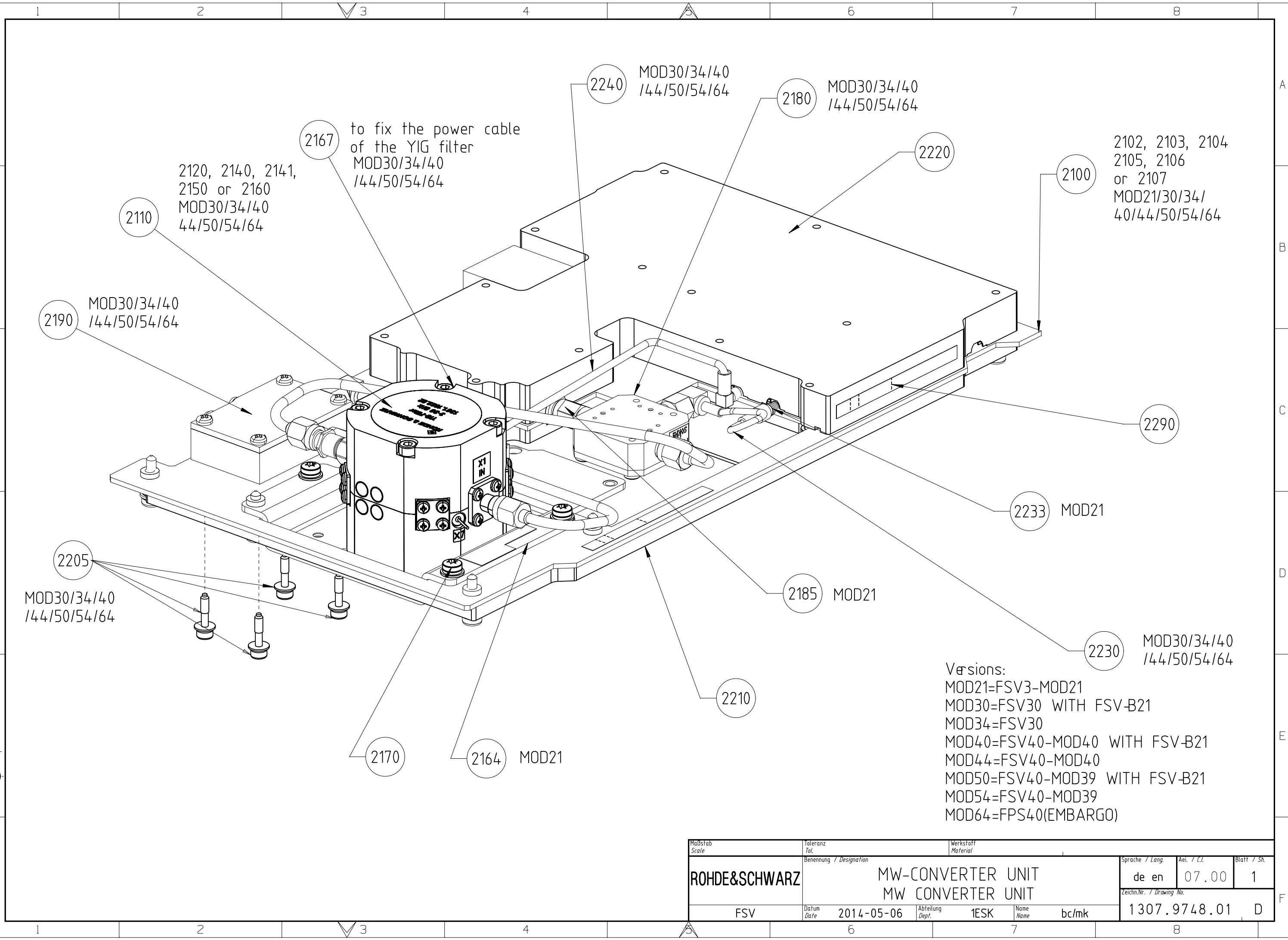
Maßstab Scale	Toleranz Tol.	Werkstoff Material						
ROHDE&SCHWARZ	Benennung / Designation					Sprache / Lang.	Aei. / C.I.	Blatt / Sh.
	EINBAUANWEISUNG ESR ASSEMBLY INSTRUCTION ESR					de en	03.00	1
						Zeichn.Nr. / Drawing No.		
ESR	Datum Date	2015-05-14	Abteilung Dept.	1ESK	Name Name	Wn	1316.3649.00	D

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Maßeinheit
Measuring
Unit
[mm]

Projektions-
methode
Projection
Method

A3



Versions:
MOD21=FSV3-MOD21
MOD30=FSV30 WITH FSV-B21
MOD34=FSV30
MOD40=FSV40-MOD40 WITH FSV-B21
MOD44=FSV40-MOD40
MOD50=FSV40-MOD39 WITH FSV-B21
MOD54=FSV40-MOD39
MOD64=FPS40(EMBARGO)

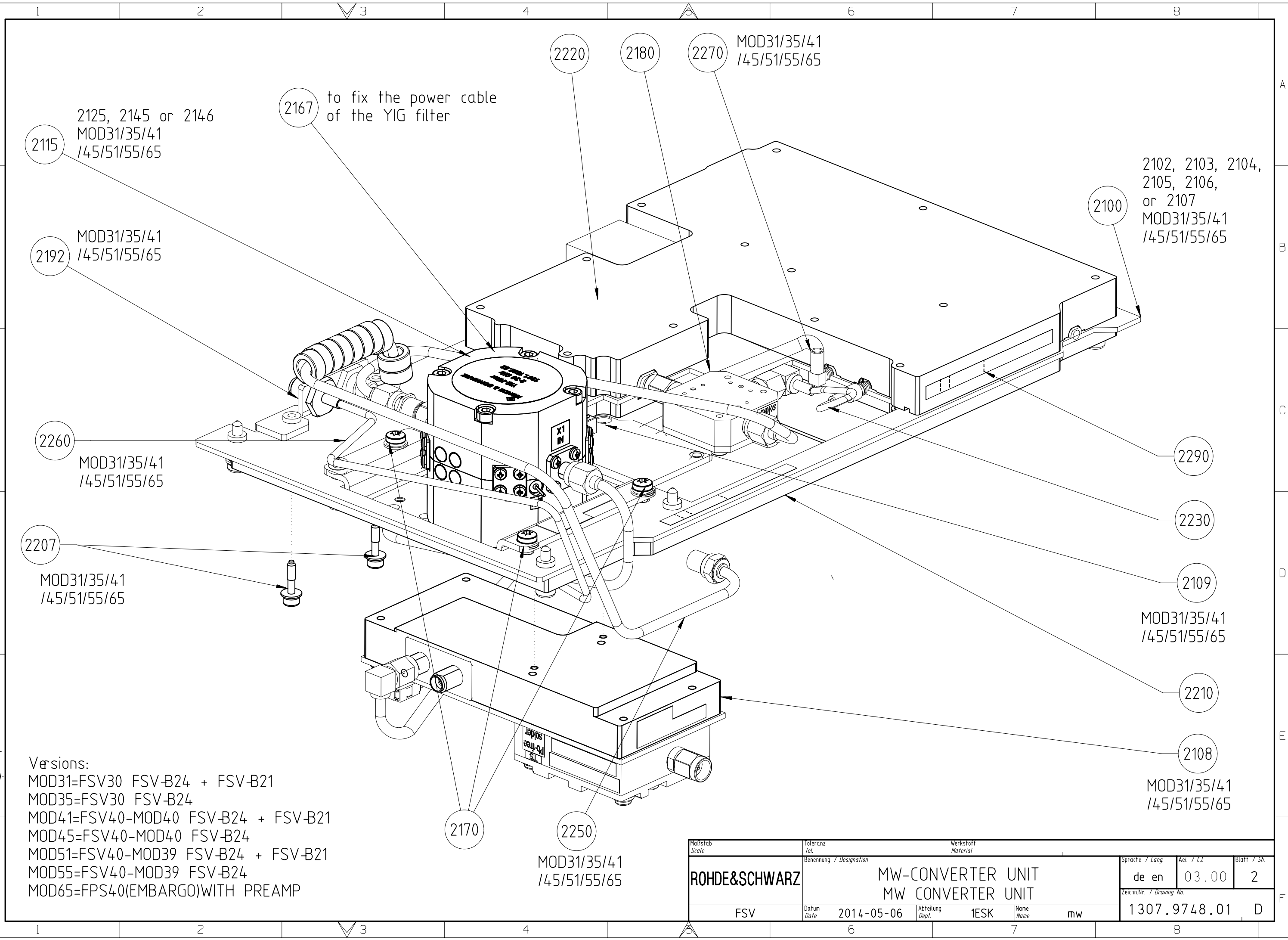
Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang.	Ael. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	MW-CONVERTER UNIT MW CONVERTER UNIT	de en	07.00	1
FSV	Datum Date	2014-05-06	Abteilung Dept.	1ESK	Name Name
				bc/mk	1307.9748.01
					D

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Maßeinheit
Measuring Unit
[mm]

Projektions-
methode
Projection
Method

A3



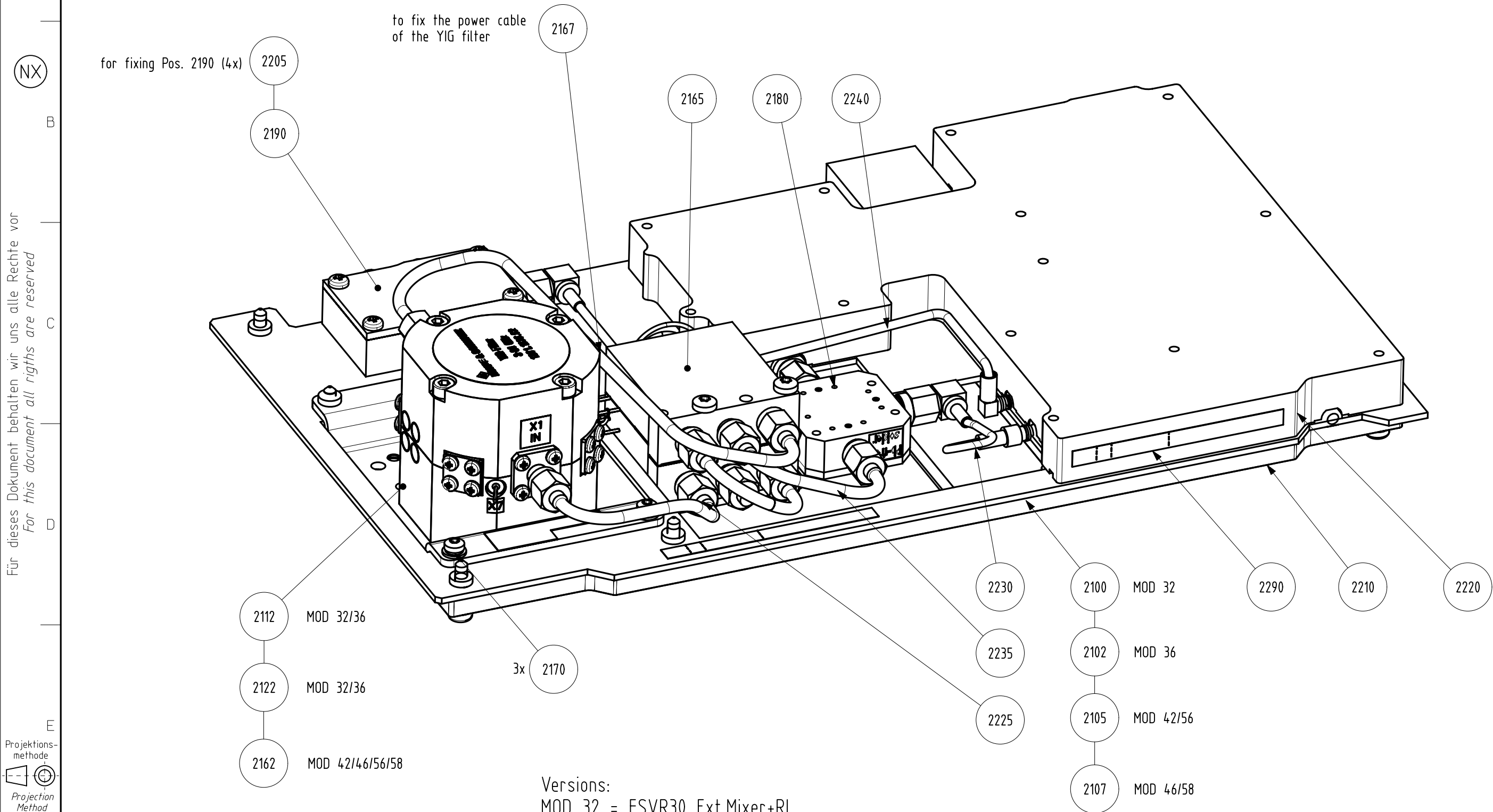
Versions:

MOD31=FSV30 FSV-B24 + FSV-B21
MOD35=FSV30 FSV-B24
MOD41=FSV40-MOD40 FSV-B24 + FSV-B21
MOD45=FSV40-MOD40 FSV-B24
MOD51=FSV40-MOD39 FSV-B24 + FSV-B21
MOD55=FSV40-MOD39 FSV-B24
MOD65=FPS40(EMBARGO)WITH PREAMP

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang.	Ael. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	MW-CONVERTER UNIT MW CONVERTER UNIT	de en	03.00	2
FSV	Datum Date	2014-05-06	Abteilung Dept.	1ESK	Name Name
				mw	
					1307.9748.01
					D

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Projektions-
methode
Projection
Method



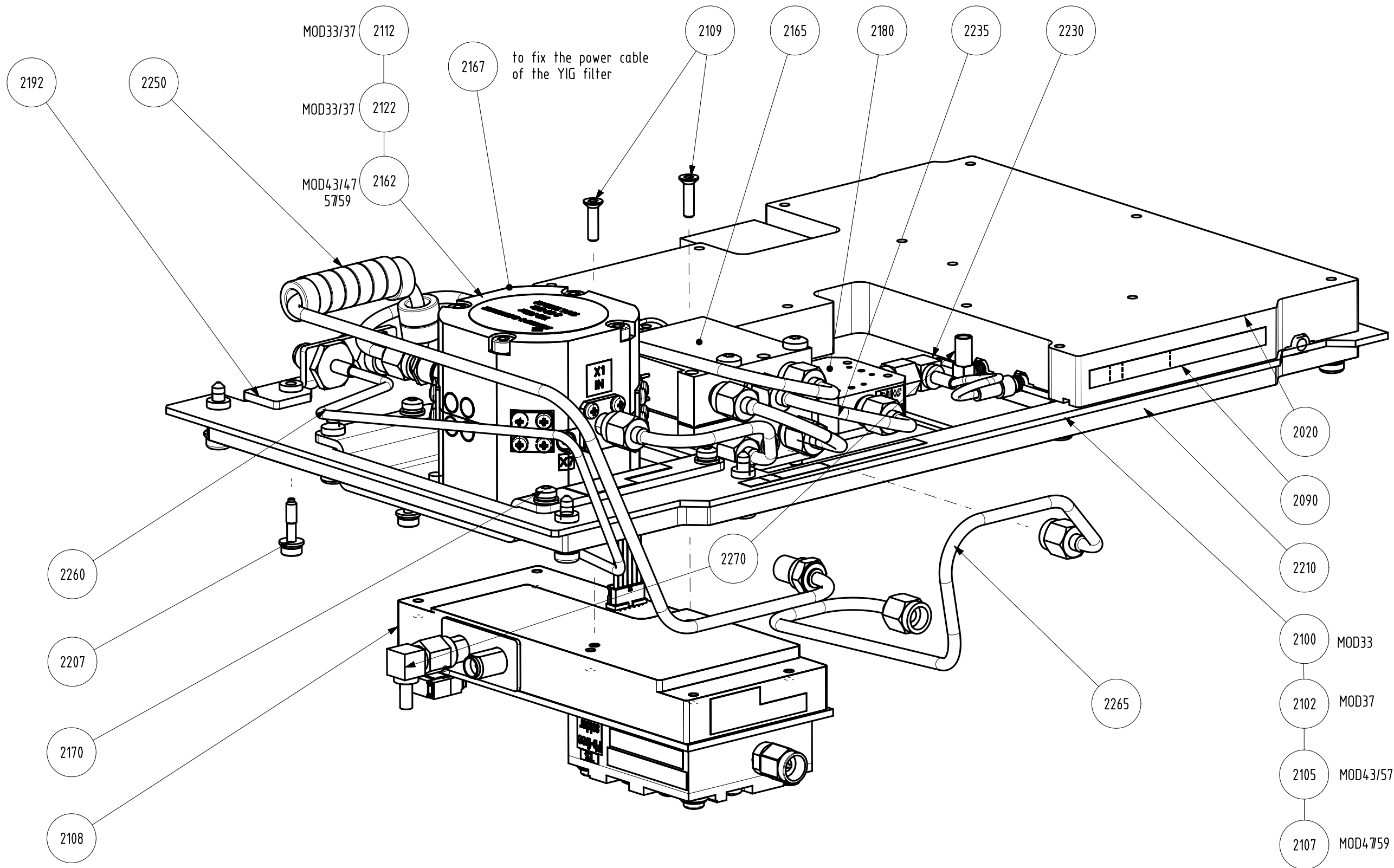
Versions:
MOD 32 = FSVR30 Ext.Mixer+RL
MOD 36 = FSVR30 RL
MOD 42 = FSVR40 Ext.Mixer+RL
MOD 46 = FSVR40 RL
MOD 56 = FSVA40 EMBARGO Ext.Mixer+RL
MOD 58 = FSVA40 EMBARGO RL

Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material			
ROHDE&SCHWARZ		Benennung / Designation		MW-CONVERTER UNIT MW CONVERTER UNIT		
FSV	Datum Date	2015-07-22	Abteilung Dept.	3MTEK	Name Name	mk
				Sprache / Lang.	Ael. / C.I.	Blatt / Sh.
				de en	03.00	3
				Zeichn.Nr. / Drawing No.		
				1307.9748.01 D		

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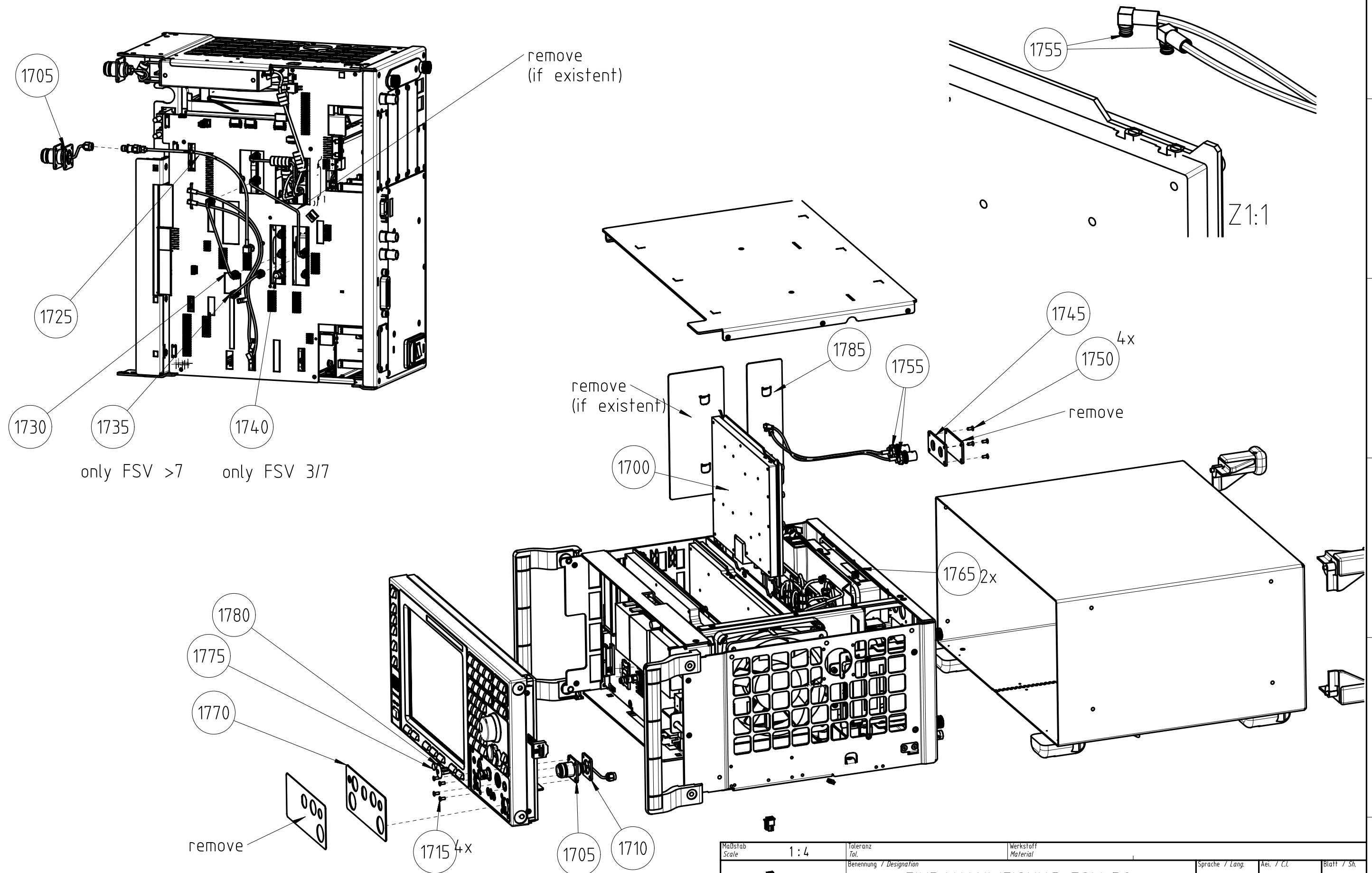
Projektions-
methode
Projection
Method

NX



MOD 33 = FSVR30 PREAMP+Ext.Mixer
MOD 37 = FSVR30 PREAMP
MOD 43 = FSVR40 PREAMP+Ext.Mixer
MOD 47 = FSVR40 PREAMP
MOD 57 = FSVA40 EMBARGO PREAMP+Ext.Mixer+RL
MOD 59 = FSVA40 EMBARGO PREAMP+ RL

Maßstab Scale	1:1	Toleranz Tol.	Werkstoff Material			
Benennung / Designation		MW-CONVERTER UNIT MW CONVERTER UNIT			Sprache / Lang.	Ael. / C.I.
FSV		Datum Date	2010-07-22	Abteilung Dept.	3MTEK	Name Name
				mk		1307.9748.01
						D



Maßstab Scale		1 : 4		Toleranz Tol.		Werkstoff Material											
ROHDE&SCHWARZ				EinBAUANWEISUNG FSV-B9 ASSEMBLY INSTRUCTION FSV-B9				Sprache / Lang.		Aei. / C.I.		Blatt / Sh.					
								de en		06.00		1					
								Zeich.Nr. / Drawing No.									
FSV-B9		Datum Date		2014-08-29		Abteilung Dept.		MTEK		Name Name		MK		1310.9774.00		D	

NX

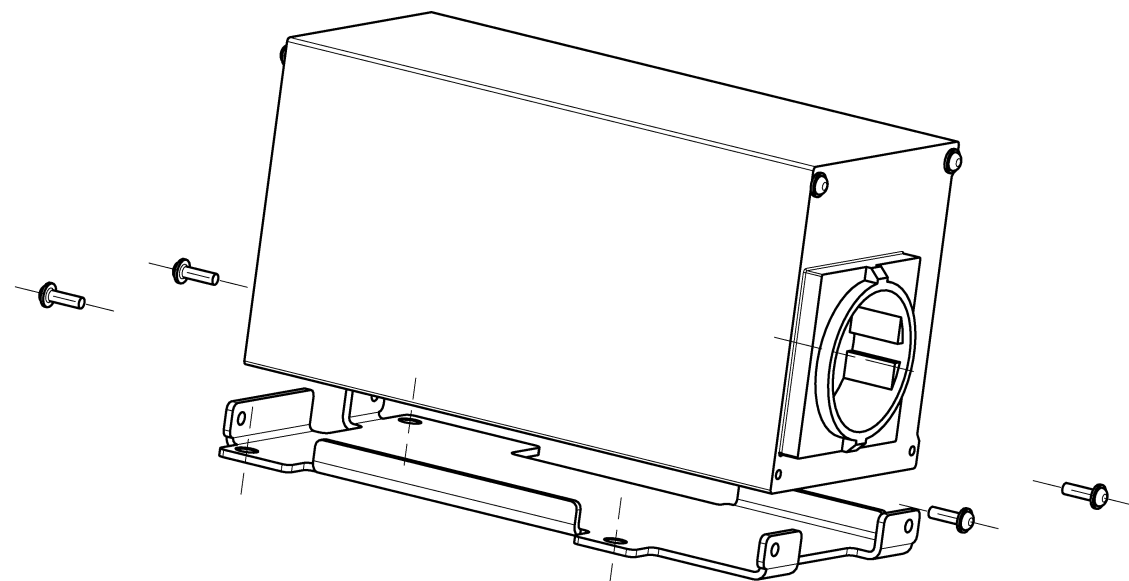
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Projektions-
methode
Projection
Method

A
B
C
D
E
F
G
H

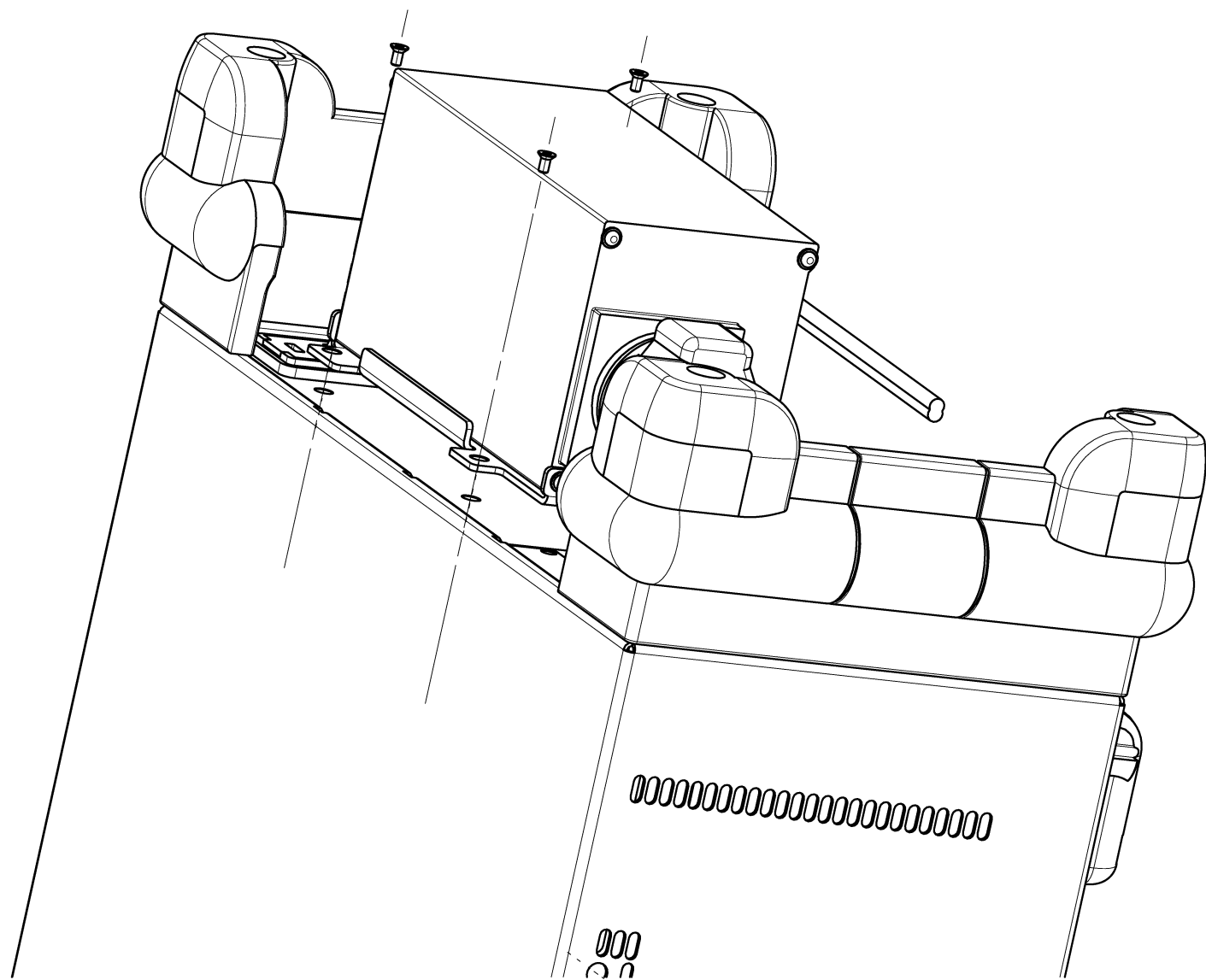
First mount adapter plate (Pos. 2620)
on power converter (Pos. 2610).
Therefore remove the screws on the
left hand side on front and back and fit
the adapter plate. Keep the converter closed.

Step 1



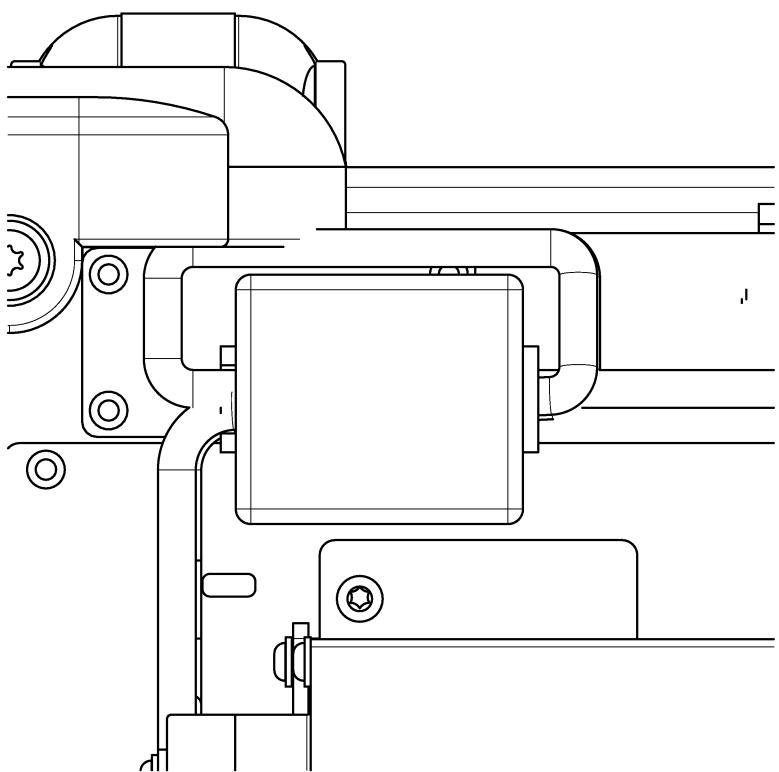
Now place the instrument on the front side
and remove the three marked screws
from the instrument mains adapter rear panel.
Assemble the converter unit on the instrument.

Step 2



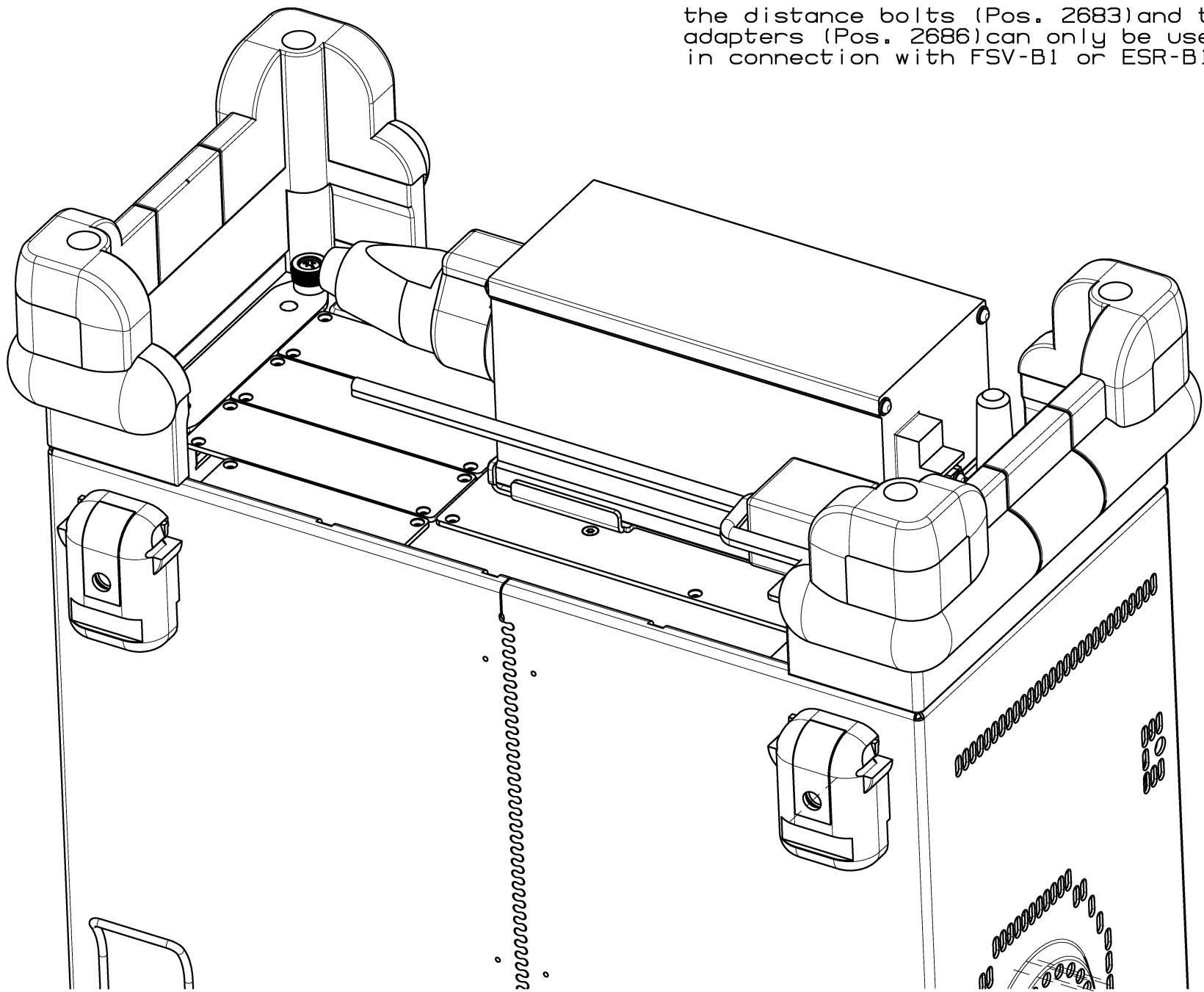
Bend the inverter cable
to one loop around the ferrit butterfly core
(Pos. 2680) and close the core

Step 3



If necessary fix with tape (Pos. 2670)
the rest of the cable to a bundle.

the distance bolts (Pos. 2683) and the
adapters (Pos. 2686) can only be used
in connection with FSV-B1 or ESR-B1



the converter's remaining accessories
(connector cable with battery clamps,
fuses and the manufacturer's instruction manual)
are not delivered with the option FSV-B30.

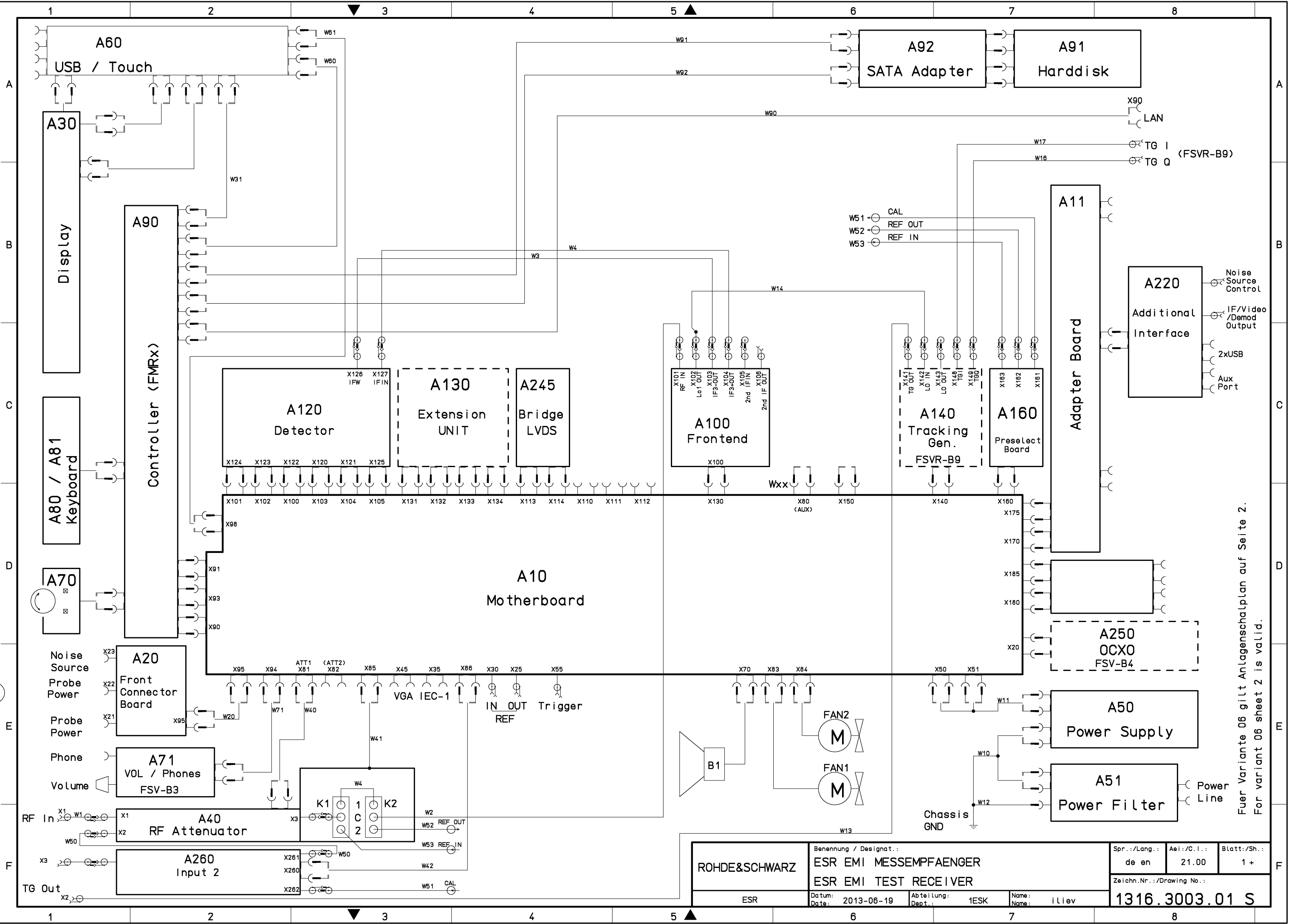
Modell Scale	ISO2768-m	Werkstoff Material	Sprache / Lang.	Rev. / Ed.	Blatt / Sh.
ROHDE&SCHWARZ	FSV-B30 DC POWER SUPPLY FSV-B30 DC POWER SUPPLY		de en	04.00	1
FSV-B30	Datum Date	2013-04-09	Abteilung Dept.	1ESK	Name Name
				Wn	1310.9897.01 D

1 2 3 4 5 6 7 8 9 10 11 12

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E

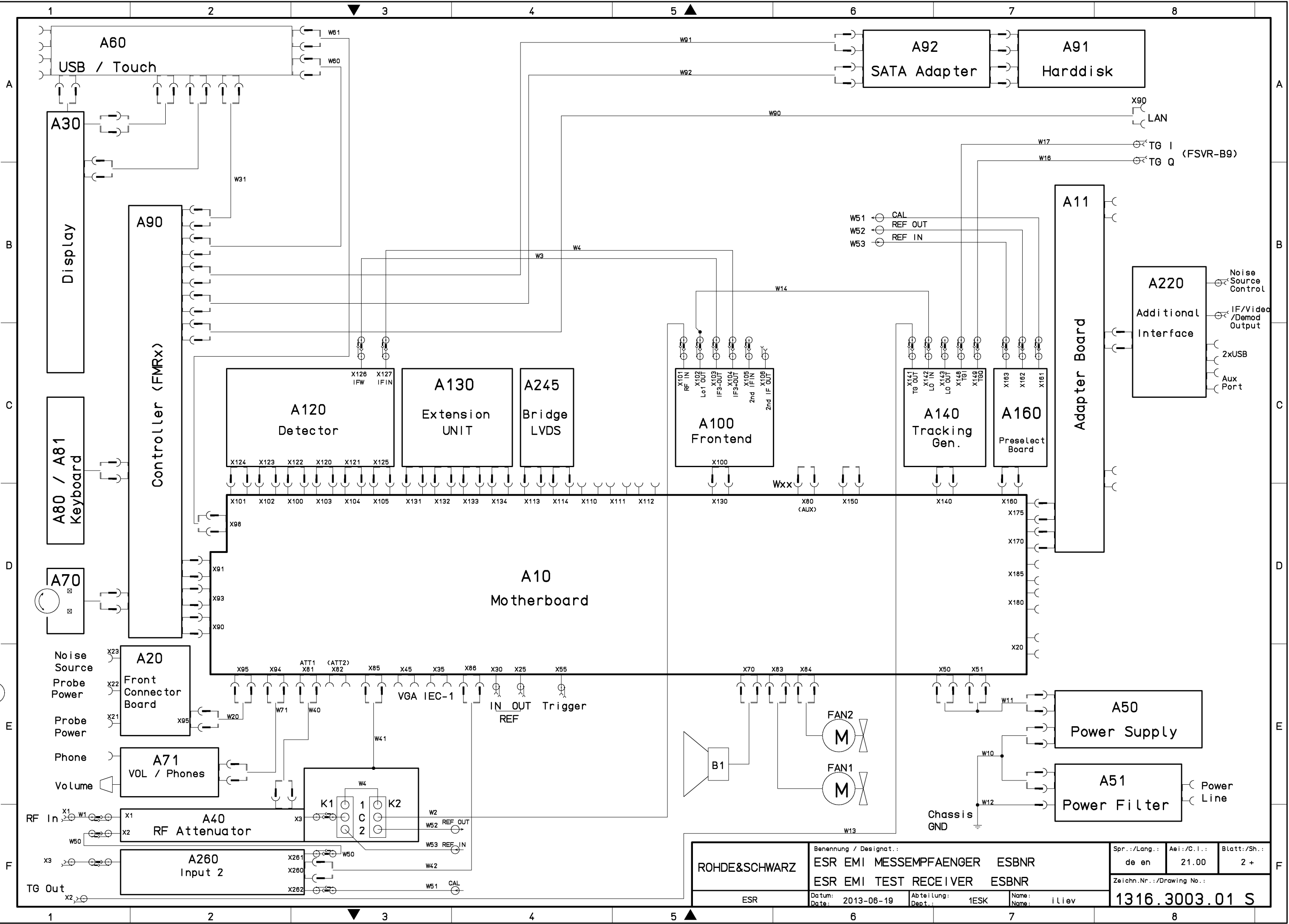
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E

F



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