

R&S®UPZ

Audio Switcher

Service Manual



1120.8610.82 – 03

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

- Model 1120.8004.02
- Model 1120.8004.03
- Model 1120.8004.12
- Model 1120.8004.13

© 2010 Rohde & Schwarz GmbH & Co. KG

Mueldorfstr. 15, 81671 Munich, Germany

Phone: +49 89 41 29 - 0

Fax: +49 89 41 29 12 164

E-mail: info@rohde-schwarz.com

Internet: <http://www.rohde-schwarz.com>

Printed in Germany – Subject to change – Data without tolerance limits is not binding.

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.

Trade names are trademarks of the owners.

The following abbreviations are used throughout this manual:

R&S®UPZ is abbreviated as R&S UPZ.

R&S®UPL is abbreviated as R&S UPL.

R&S®UPP is abbreviated as R&S UPP.

R&S®UPV is abbreviated as R&S UPV.

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 attached 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 intention 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 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.

Symbols and safety labels

							
Notice, general danger location Observe product documentation	Caution when handling heavy equipment	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Be careful when handling electrostatic sensitive devices

					
ON/OFF supply voltage	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double (reinforced) insulation

Tags 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 the possibility of incorrect operation which can result in damage to the product.

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

These tags 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 tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

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, pollution severity 2, overvoltage category 2, 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.
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 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 death.

Electrical safety

If the information on electrical safety is not observed either at all 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 AC 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 an earthing contact and protective earth connection.
3. Intentionally breaking the protective earth connection 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 the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 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, a disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.
6. The product may be operated only from TN/TT supply networks fused 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. 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 $V_{rms} > 30 \text{ V}$, suitable measures (e.g. appropriate measuring equipment, fusing, 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 IEC60950-1/EN60950-1 or IEC61010-1/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 PE terminal on site and the product's PE 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 fused 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.

Basic Safety Instructions

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.
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", 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. 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).

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.
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, PE 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. Keep cells and batteries out of the hands of children. If a cell or a battery has been swallowed, seek medical aid immediately.
5. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
6. 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.
7. 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.
8. 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.

Waste disposal

1. 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.
2. 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.

Informaciones elementales de seguridad

Es imprescindible leer y observar 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 adjunto 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.

Informaciones elementales de seguridad

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.

Símbolos y definiciones de seguridad

							
Aviso: punto de peligro general Observar la documentación del producto	Atención en el manejo de dispositivos de peso elevado	Peligro de choque eléctrico	Advertencia: superficie caliente	Conexión a conductor de protección	Conexión a tierra	Conexión a masa	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)

					
Tensión de alimentación de PUESTA EN MARCHA / PARADA	Indicación de estado de espera (Standby)	Corriente continua (DC)	Corriente alterna (AC)	Corriente continua / Corriente alterna (DC/AC)	El aparato está protegido en su totalidad por un aislamiento doble (reforzado)

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.



PELIGRO identifica un peligro inminente con riesgo elevado que provocará muerte o lesiones graves si no se evita.



ADVERTENCIA identifica un posible peligro con riesgo medio de provocar muerte o lesiones (graves) si no se evita.



ATENCIÓN identifica un peligro con riesgo reducido de provocar lesiones leves o moderadas si no se evita.



AVISO indica la posibilidad de utilizar mal el producto y, como consecuencia, dañarlo.

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.

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, grado de suciedad 2, categoría de sobrecarga eléctrica 2, 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.
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, pueden causarse lesiones o 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, se deberá considerar el enchufe del cable de conexión como interruptor. En estos casos se deberá asegurar que el enchufe siempre sea de fácil acceso (de acuerdo con la longitud del cable de conexión, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados 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.
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.

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", 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. 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).

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. Mantener baterías y celdas fuera del alcance de los niños. En caso de ingestión de una celda o batería, avisar inmediatamente a un médico.
5. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.

6. 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.
7. 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).
8. 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.
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

1. 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.
2. 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.

Kundeninformation zur Batterieverordnung (BattV)

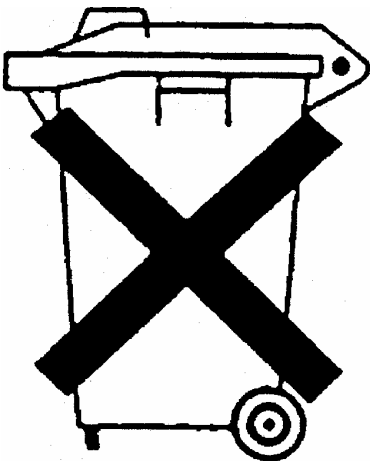
Dieses Gerät enthält eine schadstoffhaltige Batterie. Diese darf nicht mit dem Hausmüll entsorgt werden.

Nach Ende der Lebensdauer darf die Entsorgung nur über eine Rohde&Schwarz-Kundendienststelle oder eine geeignete Sammelstelle erfolgen.

Safety Regulations for Batteries (according to BattV)

This equipment houses a battery containing harmful substances that must not be disposed of as normal household waste.

After its useful life, the battery may only be disposed of at a Rohde & Schwarz service center or at a suitable depot.



Normas de Seguridad para Baterías (Según BattV)

Este equipo lleva una batería que contiene sustancias perjudiciales, que no se debe desechar en los contenedores de basura domésticos.

Después de la vida útil, la batería sólo se podrá eliminar en un centro de servicio de Rohde & Schwarz o en un depósito apropiado.

Consignes de sécurité pour batteries (selon BattV)

Cet appareil est équipé d'une pile comprenant des substances nocives. Ne jamais la jeter dans une poubelle pour ordures ménagères.

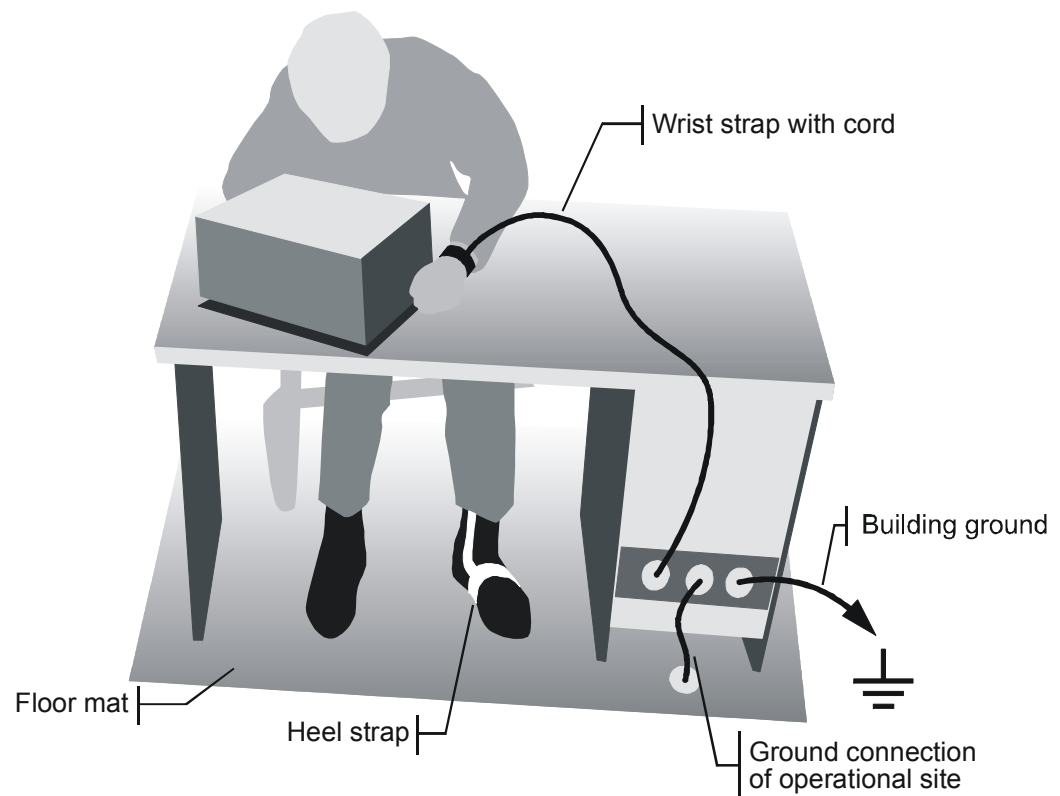
Une pile usagée doit uniquement être éliminée par un centre de service client de Rohde & Schwarz ou peut être collectée pour être traitée spécialement comme déchets dangereux.

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:

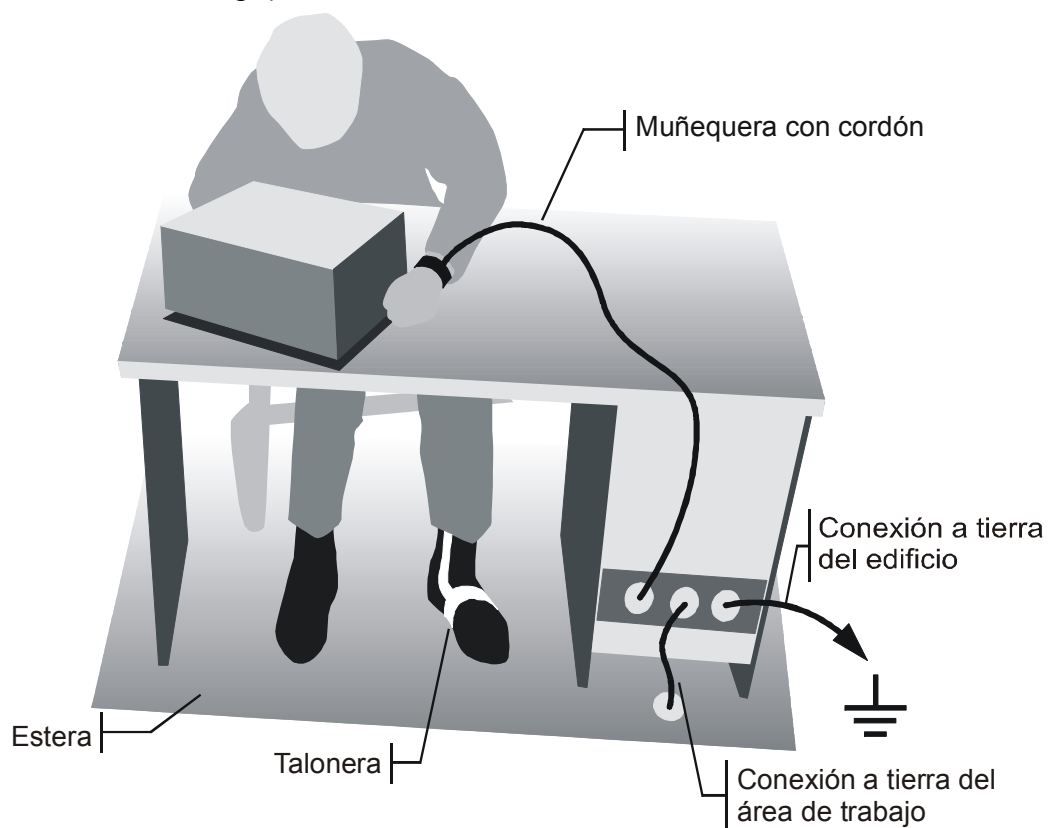
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

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

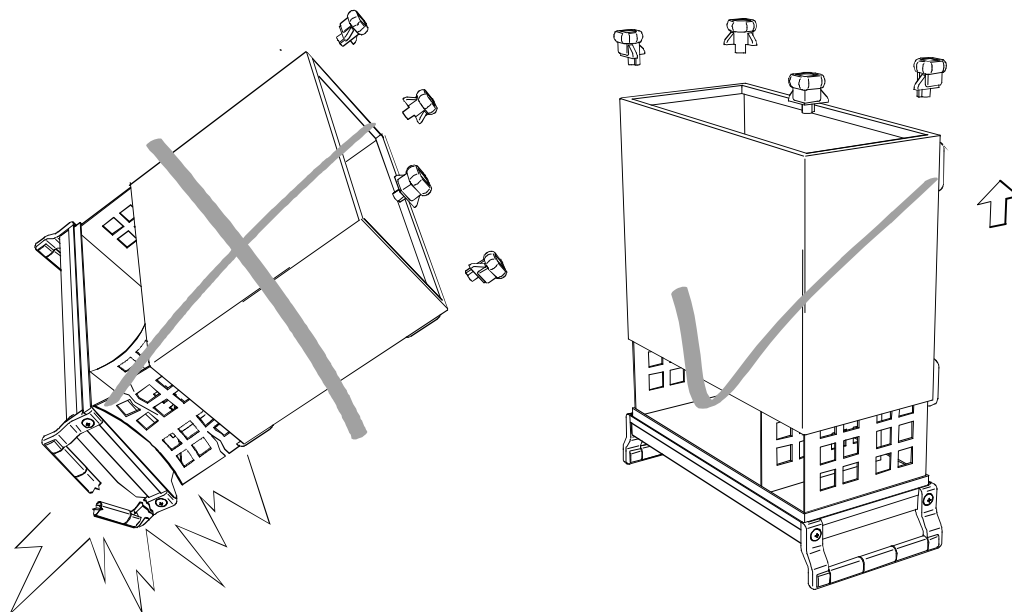
Safety Instructions for Units with Removable Cabinet

⚠ 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 pin 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.

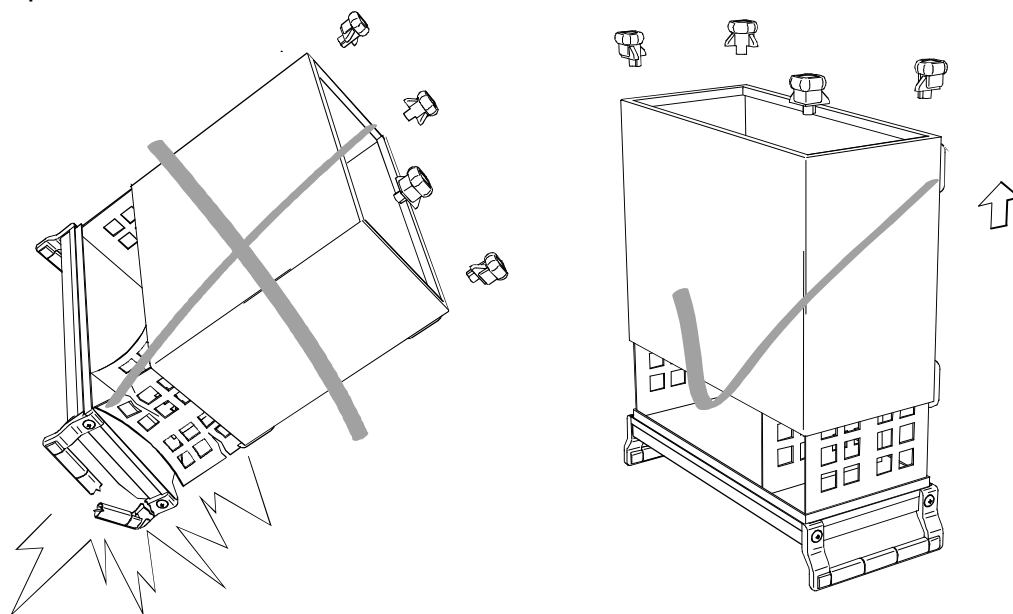
Informaciones de seguridad para aparatos con tubo de quita y pon

⚠ 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. The list of the Rohde & Schwarz representatives is provided at the beginning of this service manual. You can find the current address of your representative on our homepage www.rohde-schwarz.com. Navigate to Service & Support / Service Locations.

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)

Table of Contents

Figures	2
Tables	2
Documentation Overview	3
1 Performance Test	5
1.1 Recommended Measuring Equipment and Accessories	5
1.2 Test Procedure	6
1.2.1 Testing the USB Device Interface	6
1.2.2 Testing the USB Device Interface with R&S UPV	6
1.2.3 Testing the USB Device Interface with a PC	9
1.2.4 Crosstalk Measurement	10
1.2.5 Measurement of the Contact Resistance	13
1.2.6 Measurement of the Source Impedance with Channel Switched Off	14
1.2.7 Performance Test Report	16
2 Repair	17
2.1 Description of R&S UPZ	17
2.2 Error Messages	19
2.3 Function Test	19
2.4 Troubleshooting	20
2.4.1 Digital Section	20
2.4.2 Signal Section	21
2.4.3 Removal of PCB	22
3 Documentation	25

Figures

Fig. 1-1	Special cables for resistance measurement	5
Fig. 1-2	Opening the Switcher Panel	6
Fig. 1-3	Selecting the interface	7
Fig. 1-4	USB Serial Port.....	7
Fig. 1-5	OM Port Scan	7
Fig. 1-6	Switcher Panel.....	8
Fig. 1-7	Found New Hardware Dialog	9
Fig. 1-8	Crosstalk measurement.....	12
Fig. 1-9	Measurement of contact resistance.....	13
Fig. 1-10	Measurement of source impedance.....	14
Fig. 2-1	Block diagram of R&S UPZ	18
Fig. 2-2	Screw connection points on R&S UPZ	23
Fig. 2-3	Screw connection points of PCB	24

Tables

Table 1-1	Measuring equipment and accessories	5
Table 1-2	Performance test report	16
Table 2-1	Error messages.....	19

Documentation Overview

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

- Operating Manual
- Service Manual



The current user documentation is also available on the internet:

http://www2.rohde-schwarz.com/en/products/test_and_measurement/audio/UPZ.html

Operating Manual

The printed operating manual is also provided in PDF format on the CD-ROM. It provides a complete reference of the instrument functions and remote control. It includes information about maintenance of the instrument. It is subdivided into the following chapters:

- Putting into Operation
- Connection to the Test Setup
- Manual Operation
- Applications
- Remote Control and Remote Control Interfaces
- Maintenance

Service Manual

The service manual is provided in PDF format on the CD-ROM. It informs on how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for the maintenance of R&S UPZ. It is subdivided into the following chapters:

- Performance Test
- Repair
- Documents

1 Performance Test

This performance test allows all relevant data of the Audio Switcher R&S UPZ to be checked. The settings required for the R&S UPV or R&S UPL controlling the R&S UPZ are described for each test and the setup is shown.

Ambient temperature: 23°C ± 10°C

1.1 Recommended Measuring Equipment and Accessories

Table 1-1 Measuring equipment and accessories

Measuring equipment	Characteristics	Suggestion
Audio Analyzer	Generator level = 10 V, frequency = 20 kHz, balanced Crosstalk better than –150 dB	R&S UPV or R&S UPL
Ohmmeter	Four-line measurement method	R6552 from Advantest
XLR cable	Symmetric setup: male connector on the one side, female connector on the other side	
RS-232-C cable	9-contact 1:1 through-connected extension cable	Supplied with the R&S UPZ (Id. No. 1120.8891)
USB Device Cable	A to B	e.g. 3585.7167.00
Various test cables	For obtaining easy contacting for resistance measurements, it is recommended to use special cables.	See Fig. 1-1 Special cables for resistance measurement

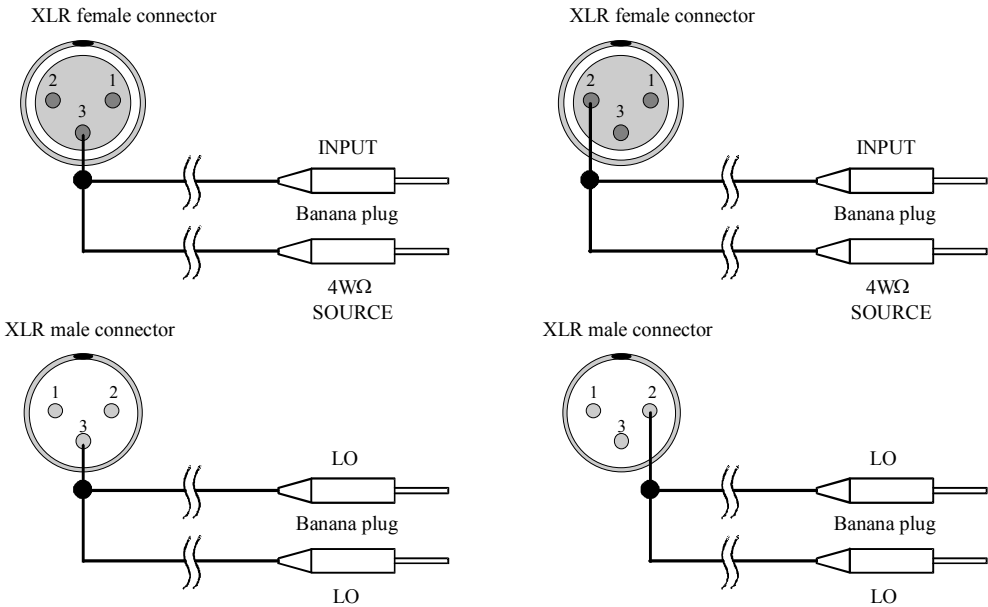


Fig. 1-1 Special cables for resistance measurement

1.2 Test Procedure

1.2.1 Testing the USB Device Interface



This test will be only performed with switchers starting with variant .12 (Input Switcher) or .13 (Output Switcher). Older models do not have an USB device interface.

This test can be performed in two different ways. If there is a R&S UPV available the functional check can be performed by using its firmware. If no R&S UPV is at hand, a normal PC with a Windows operating system can also be used.

1.2.2 Testing the USB Device Interface with R&S UPV

Measuring equipment:

- 1x R&S UPV (Firmware Version 3.2.x or higher)
- 1x R&S UPZ
- 1x USB Device Cable

Test setup:

1. Connect R&S UPV and R&S UPZ by using a USB Device cable.
2. Open the Switcher Panel:

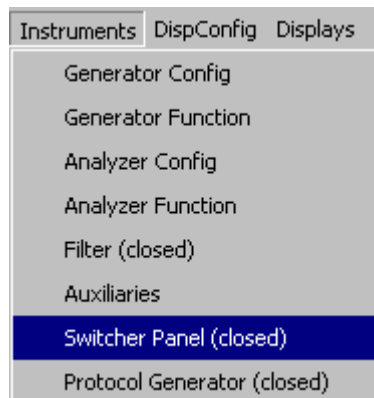


Fig. 1-2 *Opening the Switcher Panel*

Select „USB“ as switcher control interface:

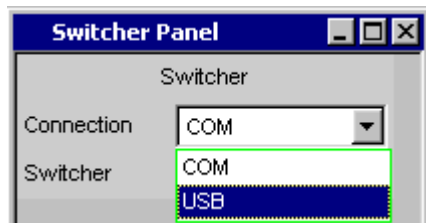


Fig. 1-3 **Selecting the interface**

The R&S UPV firmware automatically installs a driver for controlling the R&S UPZ via USB. This connection is listed as „USB Serial Port“ in the R&S UPV Device Manager and maps the USB Chip inside the R&S UPZ to a virtual serial COM Port.

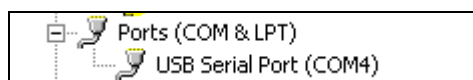


Fig. 1-4 **USB Serial Port**

If the USB interface was selected, the used COM Port must be selected next. Like shown in [Fig. 1-5 OM Port Scan](#), on page 7, the COM Port used by the driver can be figured out using the Device Manager.

The easiest way of establishing a connection however is using the „Auto“ setting. In this mode, the R&S UPV scans all available COM Ports for an R&S UPZ and waits for their response.

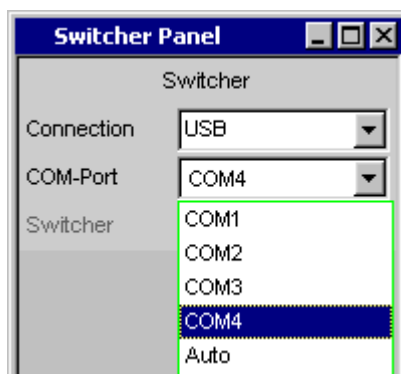


Fig. 1-5 **OM Port Scan**

A connection is established by selecting the Switcher checkbox.



Fig. 1-1 *Switcher Connection Establishment*

After a successful connection the following choices are offered:

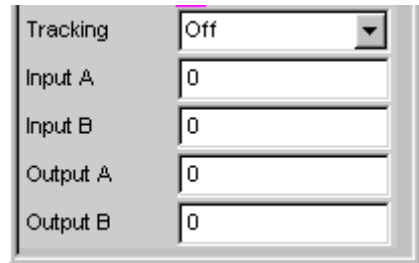


Fig. 1-6 *Switcher Panel*

The window shown here provides all control possibilities. Depending on whether an input or an output switcher is connected, only the lines relating to the connected switcher are displayed (the corresponding lines of an output switcher are not displayed if none is connected, for example).

Using the R&S UPV all channels for busbar A and B are tested by controlling whether the corresponding LED on the switcher front panel is switched on.

Example:

Input Switcher:

Input A = 1,2,3,4,5,6,7,8:

Visual Control (corresponding LED of busbar A is switched on)

Input A = 0

Input B = 1,2,3,4,5,6,7,8:

Visual Control (corresponding LED of busbar B is switched on)

Input B = 0



Disconnect the USB cable after this test!

1.2.3 Testing the USB Device Interface with a PC

Measuring equipment:

- 1x R&S UPZ
- 1x USB Device Cable
- 1x Windows PC

Test setup:

- Connect PC and R&S UPZ by using a USB Device cable.

The correct functionality is ensured by the „Found New Hardware“ dialog:



Fig. 1-7 Found New Hardware Dialog

- Close the dialog.



Disconnect the USB cable after this test!

1.2.4 Crosstalk Measurement

The R&S UPV or the R&S UPL can be used for measuring the crosstalk of the individual channels. The crosstalk specified in the data sheet is not relevant in this case since the two analyzer channels are not driven simultaneously with one signal, but only one is used. The decisive criterion for the measurement is the internal crosstalk between generator and analyzer, which meets the requirements for reasons of design.

The measurement is performed to determine how much the signal component of any channel in a busbar (e.g. **A**) interferes with any other channel of the busbar (e.g. **B**). The measurement is carried out at a frequency of 20 kHz in order to use the normal universal generator. If the indicated specifications are obtained at this frequency, it can be concluded that the R&S UPZ also complies with data sheet specifications at 100 kHz.

The settings for R&S UPV and R&S UPL are the following:

Settings on GEN:	INSTRUMENT	ANALOG
	Channel(s)	2
	Output	BAL
	Impedance	10 Ω
	FUNCTION	SINE
	FREQUENCY	20.000 kHz
	VOLTAGE	10.000 V
Settings on ANAL:	INSTRUMENT	ANLG 22kHz
	Channel(s)	2
	Ch2 Input	BAL
	Ch2 Imped	600 Ω
	FUNCTION	FFT
	Unit Ch2	dBr
	Reference	Value
		10.000 V
	Avg Count	2

Settings on DISP:	OPERATION	SPECTRUM
	Mode	DEL BEF WR
	TRACE A	FUNC CH2
	Unit	dBr
	Scale	MANUAL
	Spacing	LIN
	Top	-100 dBr
	Bottom	-180 dBr
	X AXIS	FREQUENCY
	Scale	MANUAL
	Spacing	LIN
	Left	19.500 kHz
	Right	20.500 kHz

Measuring equipment:

- 1x R&S UPV or
- 1x R&S UPL
- 1x R&S UPZ

Test setup:

The test setup is the same for the input and output switcher. The R&S UPZ is to be set to address 0. To control the R&S UPZ establish the connection between R&S UPV or R&S UPL (COM1) and R&S UPZ (FROM PREVIOUS) via the RS-232-C extension cable.

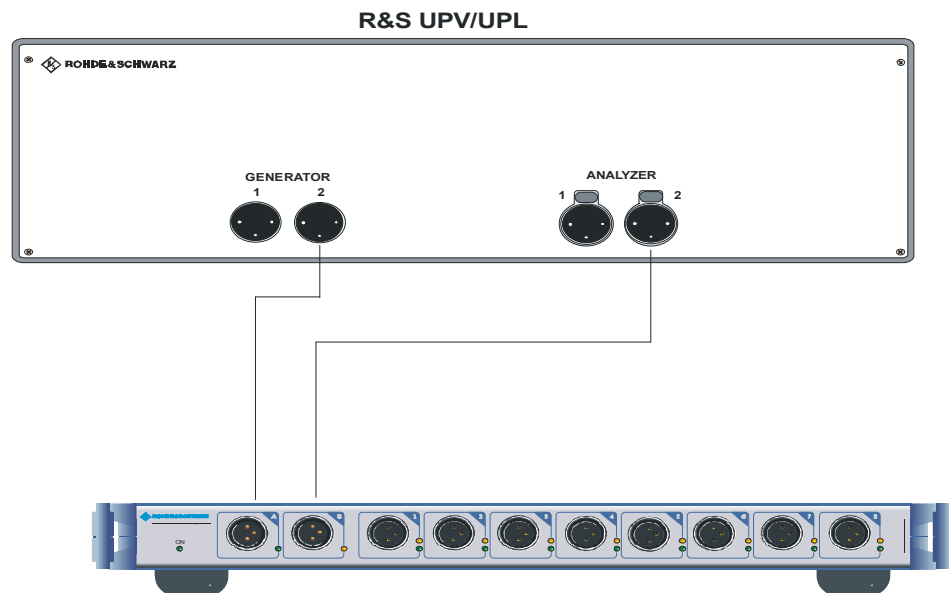


Fig. 1-8 *Crosstalk measurement*

Measurement:

1. Feed channel 2 generator signal from R&S UPL into busbar A of R&S UPZ.
2. Select channel 8 in A.
3. Connect channel 2 analyzer input of R&S UPL to busbar B of R&S UPZ.
4. Through-connect channels 1B to 7B under OPTIONS and measure the signal at 20 kHz using the cursor function on the display.
5. Select channel 1 in A and channel 8 in B.
6. Measure the signal with the cursor function on the display at 20 kHz in channel 8B.



Since the R&S UPZ rear panel has an XLR female connector and an XLR male connector at each busbar (equivalent to the connectors at the front panel), commercial XLR extension cables fitted with plug and socket can be used for the measurement.

1.2.5 Measurement of the Contact Resistance

The resistance to be measured is less than $1\ \Omega$ so that a four-line measurement method has to be used.

Settings on R&S UPL:

1. Through-connect channels 1A to 8A and 1B to 8B under OPTIONS
2. Control in the appropriate line (input A or B, output A or B)

Measuring equipment:

- 1x R6552
- 1x R&S UPZ

Test setup:

The test setup is the same for the input and output switcher. The R&S UPZ is to be set to address 0. To control the R&S UPZ establish the connection between R&S UPL (COM1) and R&S UPZ (FROM PREVIOUS) via the RS-232-C extension cable.

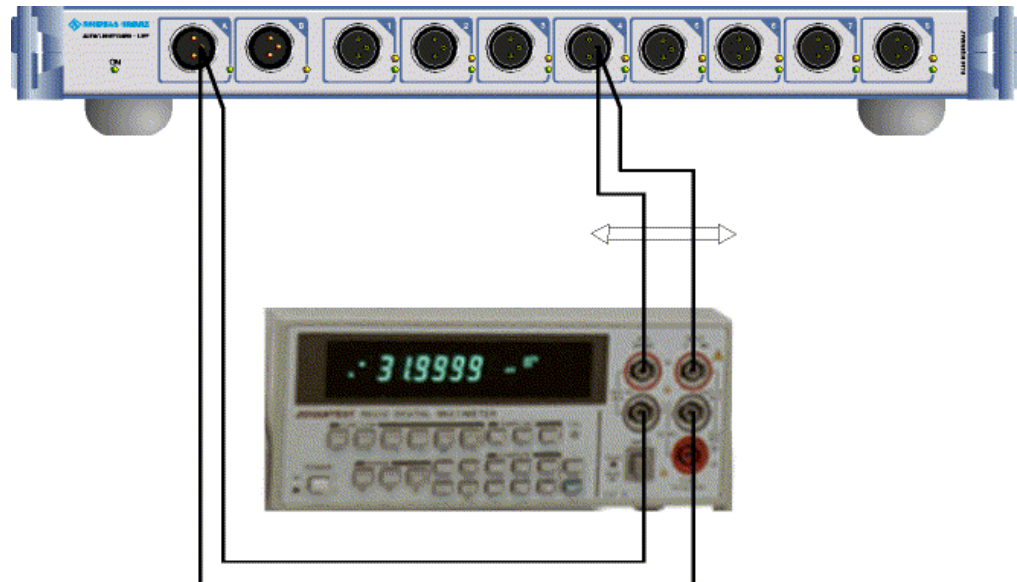


Fig. 1-9 Measurement of contact resistance

Measurement:

1. Zeroing the ohmmeter with test cables connected.
2. Measuring
 - a. Measurement between pin 2 of busbar A and pin 2 of active channel.
 - b. Measurement between pin 3 of busbar A and pin 3 of active channel.
3. Repeat steps 2a) and 2b) for busbar B.
4. Through-connect channels 1 to 8 and read measured value.

Contacting at the XLR connectors can be performed with normal prods. Use the measurement cables shown in [Fig. 1-1 Special cables for resistance measurement](#), on page 5 to obtain much more accurate and reproducible results.

1.2.6 Measurement of the Source Impedance with Channel Switched Off

This measurement shows whether the switched-off channel of the **output switcher** forms a source with nearly $600\ \Omega$ for a DUT connected (see Fig. 1-1: "Basic circuit diagram" in the Operating Manual). If the corresponding channel is selected (i.e. switched on), the source impedance is switched off.

Settings on R&S UPL:

- Through-connect channels 1 to 8 under OPTIONS (whether the channel to be measured is switched to busbar A or B is not important)

Measuring equipment:

- 1x R6552
- 1x R&S UPZ

Test setup:

The R&S UPZ is to be set to address 0. To control the R&S UPZ establish the connection between R&S UPL (COM1) and R&S UPZ (FROM PREVIOUS) via the RS-232-C extension cable.

The ohmmeter has to be contacted to signal pins 2 and 3 of the XLR connectors of channels 1 to 8. A four-line measurement is not absolutely necessary since the impedance is relatively high.

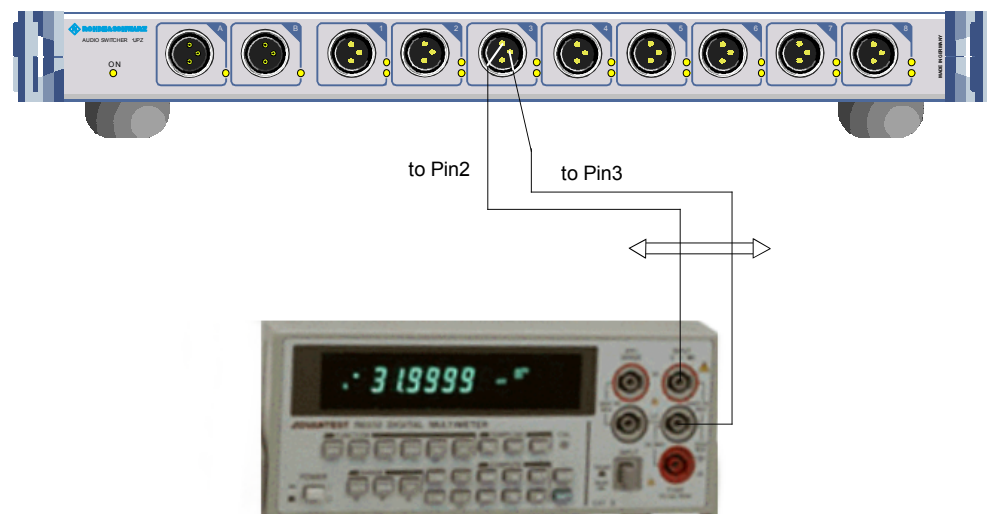


Fig. 1-10 *Measurement of source impedance*

Measurement:

1. Measurement with channel on → very high impedance.
2. Measurement with channel off → nominal value acc. to performance test report.
3. Measure all channels from 1 to 8.

NOTICE

Signals must not be fed via the busbars when the source impedance is measured.

Contacting at the XLR connectors can be performed with normal prods.

1.2.7 Performance Test Report

Audio Switcher R&S UPZ Rohde & Schwarz

Order No. 1120.8004.0..... Date:

Serial No.: Name:

Table 1-2 Performance test report

Measurement	Min.	Actual value		Max.	Unit
Crosstalk					
Channel 1	- ∞			- 135	dB
Channel 2	- ∞			- 135	dB
Channel 3	- ∞			- 135	dB
Channel 4	- ∞			- 135	dB
Channel 5	- ∞			- 135	dB
Channel 6	- ∞			- 135	dB
Channel 7	- ∞			- 135	dB
Channel 8	- ∞			- 135	dB
Contact resistance					
		Pin 2	Pin 3		
Channel 1A	0			0.6	ohm
Channel 2A	0			0.6	ohm
Channel 3A	0			0.6	ohm
Channel 4A	0			0.6	ohm
Channel 5A	0			0.6	ohm
Channel 6A	0			0.6	ohm
Channel 7A	0			0.6	ohm
Channel 8A	0			0.6	ohm
Channel 1B	0			0.6	ohm
Channel 2B	0			0.6	ohm
Channel 3B	0			0.6	ohm
Channel 4B	0			0.6	ohm
Channel 5B	0			0.6	ohm
Channel 6B	0			0.6	ohm
Channel 7B	0			0.6	ohm
Channel 8B	0			0.6	ohm
Output switcher: source impedance					
Channel 1	588			650	ohm
Channel 2	588			650	ohm
Channel 3	588			650	ohm
Channel 4	588			650	ohm
Channel 5	588			650	ohm
Channel 6	588			650	ohm
Channel 7	588			650	ohm
Channel 8	588			650	Ohm

2 Repair

2.1 Description of R&S UPZ

Basically, a switcher of the R&S UPZ family is a relay switching matrix, which permits two audio signals delivered by a generator to be distributed to eight selectable outputs (output switcher) or allows up to eight incoming audio signals to be applied to two analyzer inputs (input switcher).

Up to 16 switchers of the same type can be cascaded to increase the number of channels, so that a maximum of 128 channels is available.

Each channel is switched on or off by a relay combination in T configuration to ensure a high crosstalk attenuation between the channels. In addition, the signal lines to the busbars are disconnected within a R&S UPZ when no channel is selected in order to reduce the capacitive load of the signal line when several switchers are used.

The relays are controlled via drivers, which are directly connected to the processor ports. The control lines of the relays also supply the associated channel LED so that the status of the LEDs reflects the switching state of the channel concerned.

The microprocessor used controls the relay drivers, reads the device address set at the coding switch as well as the firmware and board version and sends this information to the controlling instrument (Audio Analyzer or PC) on request.

The R&S UPZ firmware is stored in an EEPROM. This memory IC cannot be accessed from the outside. To change the contents of the EEPROM, contact a Rohde & Schwarz agency. A usual software update procedure is not necessary since the R&S UPZ firmware is simple.

The internal wiring of the 9-contact RS-232-C links ensures that setting commands arrive at each R&S UPZ and that requested identifications are transferred from one R&S UPZ to another until the querying control unit is reached (when several switchers are cascaded).

The block diagram illustrates the interconnections within a R&S UPZ.

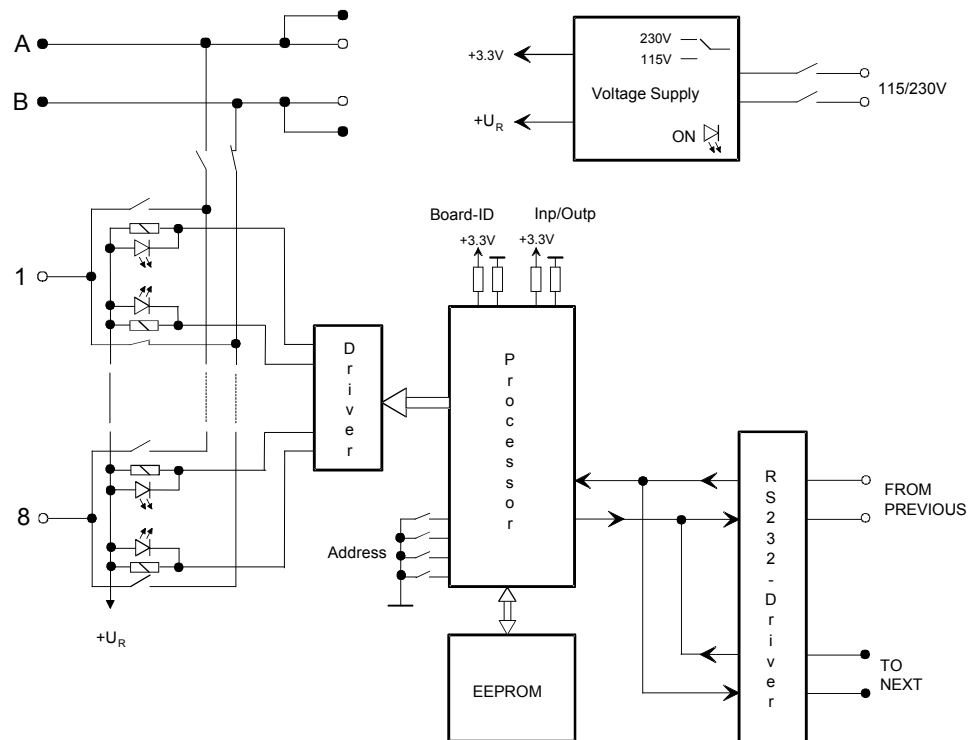


Fig. 2-1 Block diagram of R&S UPZ

2.2 Error Messages

This chapter shows how to detect minor errors in the instrument and contains a list of all error messages generated by the R&S UPZ and displayed on the R&S UPL.

Table 2-1 contains all error messages generated either by the R&S UPV/R&S UPL or R&S UPZ. It facilitates the detection or elimination of an error, which may be due to a software incompatibility, a real hardware error or an erroneous test setup or an incorrect command.

Table 2-1 *Error messages*

Error message	Cause(s)
No switcher connected!	No R&S UPZ connected R&S UPZ connected not switched on
<type> switcher with address <x> is not connected!	A channel was to be set, for which no R&S UPZ was recognized at the required address.
RS-232-C output to switcher failed!	The output from the R&S UPL to the R&S UPZ has failed, e.g. because the calculated length of the output string was incorrect.
RS-232-C Input from switcher failed (overrun, parity or frame error)!	The RS-232-C interface parameters of the controlling instrument and the R&S UPZ do not correspond (e.g. bit length, baud rate, parity, etc). This message is output only because of an identification since the R&S UPZ signals back to the controlling instrument only after this identification.
Cannot write to R&S UPZ configuration file C:\R&S UPL\USER\R&S UPZCONF.TXT	The creation of the configuration file is not possible, e.g. because the hard disk has not enough storage capacity.

2.3 Function Test

Since the switcher function can be read at the channel LEDs, the function test is simple to carry out. Switching of the signal path between the different channels is tested.

To check proper functioning select the individual channels consecutively and perform a visual check of the associated LEDs. The correct switching (on/off) of the channels can be checked by feeding a generator signal from the R&S UPL, which is routed via the R&S UPZ, and by measuring this signal with the R&S UPL analyzer.

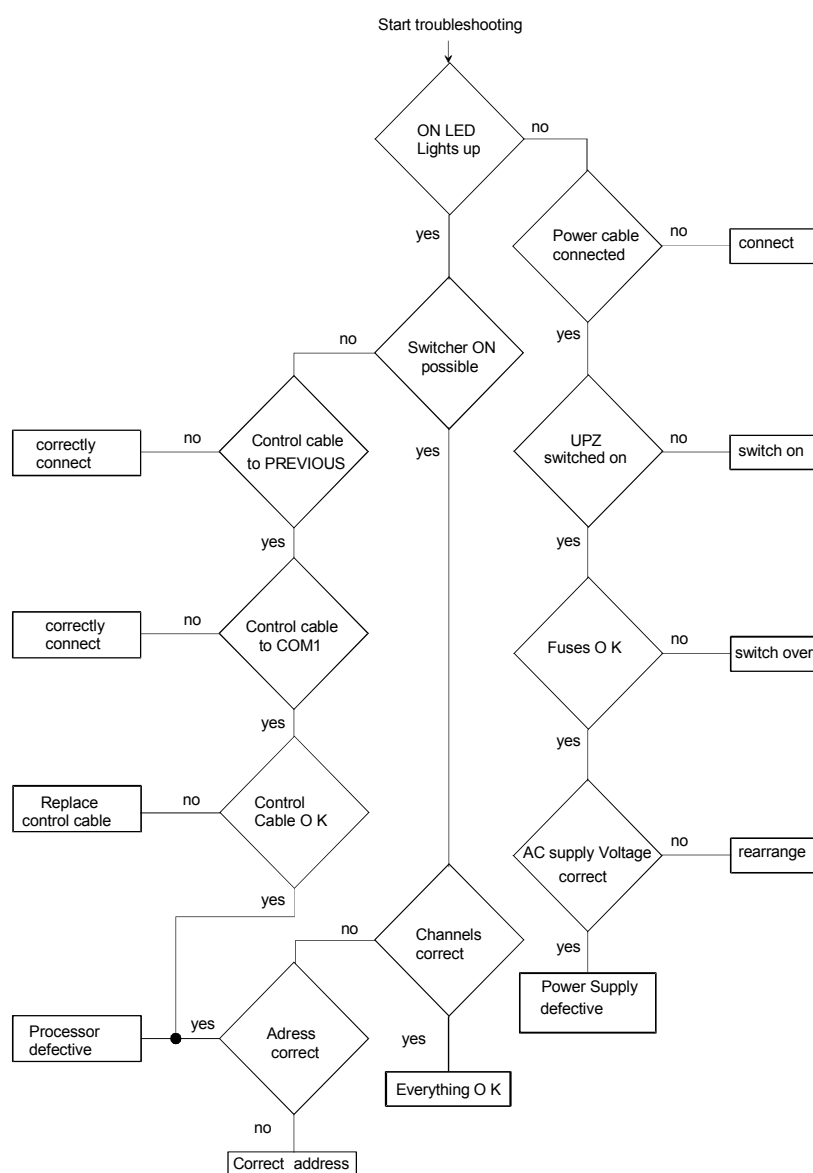
2.4 Troubleshooting

Troubleshooting can be performed in the control section, which comprises the connection to the R&S UPV/R&S UPL (digital section), and in the signal section itself.

2.4.1 Digital Section

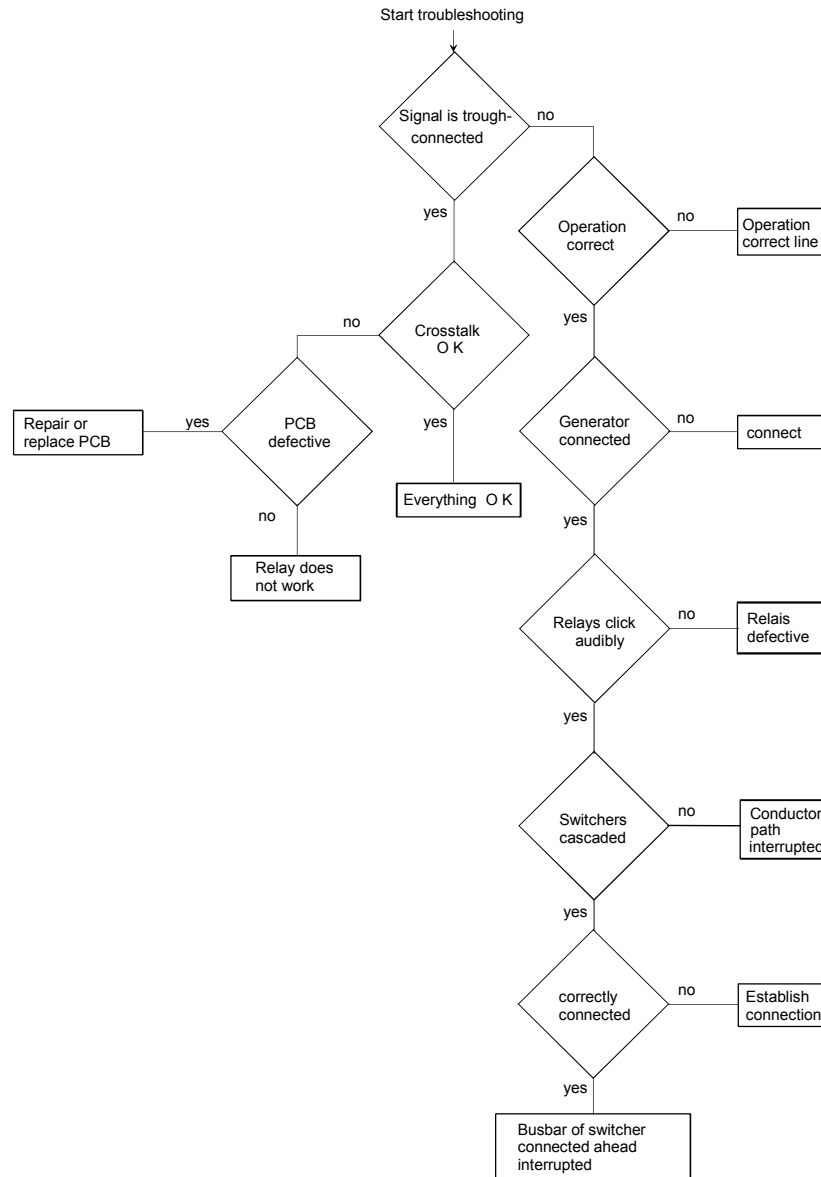
The microcontroller used is a CY7C64613. The external EEPROM has a capacity of 32 Kbyte. The processor directly controls the relay drivers via its port outputs, reads in the board ID and set address (via a coding switch) and stores this information in the internal RAM. Two port lines are used as a serial interface.

An error in the digital section may have different effects, which are given in a flow chart together with the possible causes.



2.4.2 Signal Section

The signal section only comprises the relays and the associated conductor paths. Fault detection and location is therefore very easy in this case.



2.4.3 Removal of PCB

The R&S UPZ comprises only one PCB. Except the AC supply input, it accommodates all components including LEDs, male and female connectors.

For the following initial steps, refer to [Fig. 2-2](#).

- Switch off R&S UPZ and unplug power cable
- Remove rear-panel feet (screwdriver size 2)
- Withdraw enclosure towards the rear
- Remove lateral front handles by undoing two screws at each side (screwdriver size 2)
- Remove labelled front cover
- Undo 2 screws per XLR connector (screwdriver size 1) at front mounting trough
- Remove front mounting through from front frame by undoing 4 screws (2 at top and 2 at bottom) (screwdriver size 1)
- Withdraw mounting trough from front frame towards the front.
- Unscrew rear XLR connectors from rear panel (screwdriver size 1)
- Unscrew two 9-contact D-sub connectors (fork or socket wrench size 5)

Then, remove PCB from frame (see [Fig. 2-3](#)).

- Remove two regulators in the TO220 casing from the right-hand side panel
- Remove PCB from frame (10 screws)
- Remove connection cable from AC supply input to PCB (transformer primary connector)
- Pull PCB towards the front so that it can be swivelled towards the top at the rear
- Pull PCB out off frame toward the rear

Installing the new PCB in the R&S UPZ casing:

- Mount new PCB on frame and plug connection cable (do not forget to fasten regulators; the use of heat-conductive paste is recommended)
- Screw on mounting trough to XLR connectors and fasten to front frame
- Push labelled front cover onto frame and screw it together with the lateral front handles to the front frame
- Push enclosure from rear onto unit and fasten rear-panel feet



The enclosure must have good contact to the front frame to ensure RF shielding of the R&S UPZ. To do this, it is recommended to ensure that the enclosure fits well into the frame groove when mounting the rear-panel feet.

Note concerning power-up

On power-up of the R&S UPZ, the ON LED must light up and all other channel LEDs are dark. When the instrument is controlled via a R&S UPL, any channel can be switched to busbar A or B. The associated LED must light up.

NOTICE

*It is not possible to switch the same channel to busbars A **and** B at the same time.*

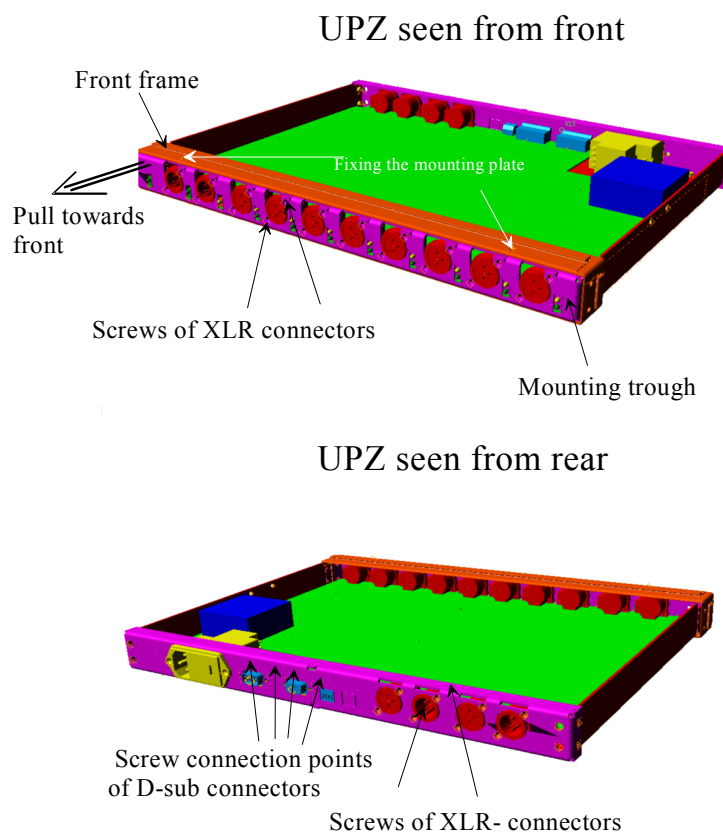


Fig. 2-2 Screw connection points on R&S UPZ

UPZ from above

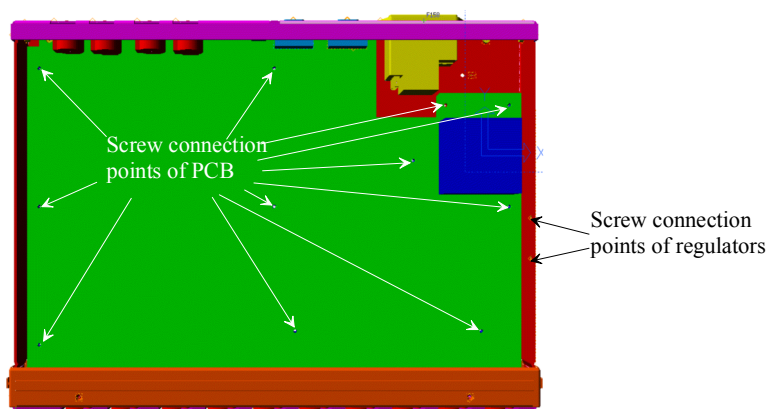
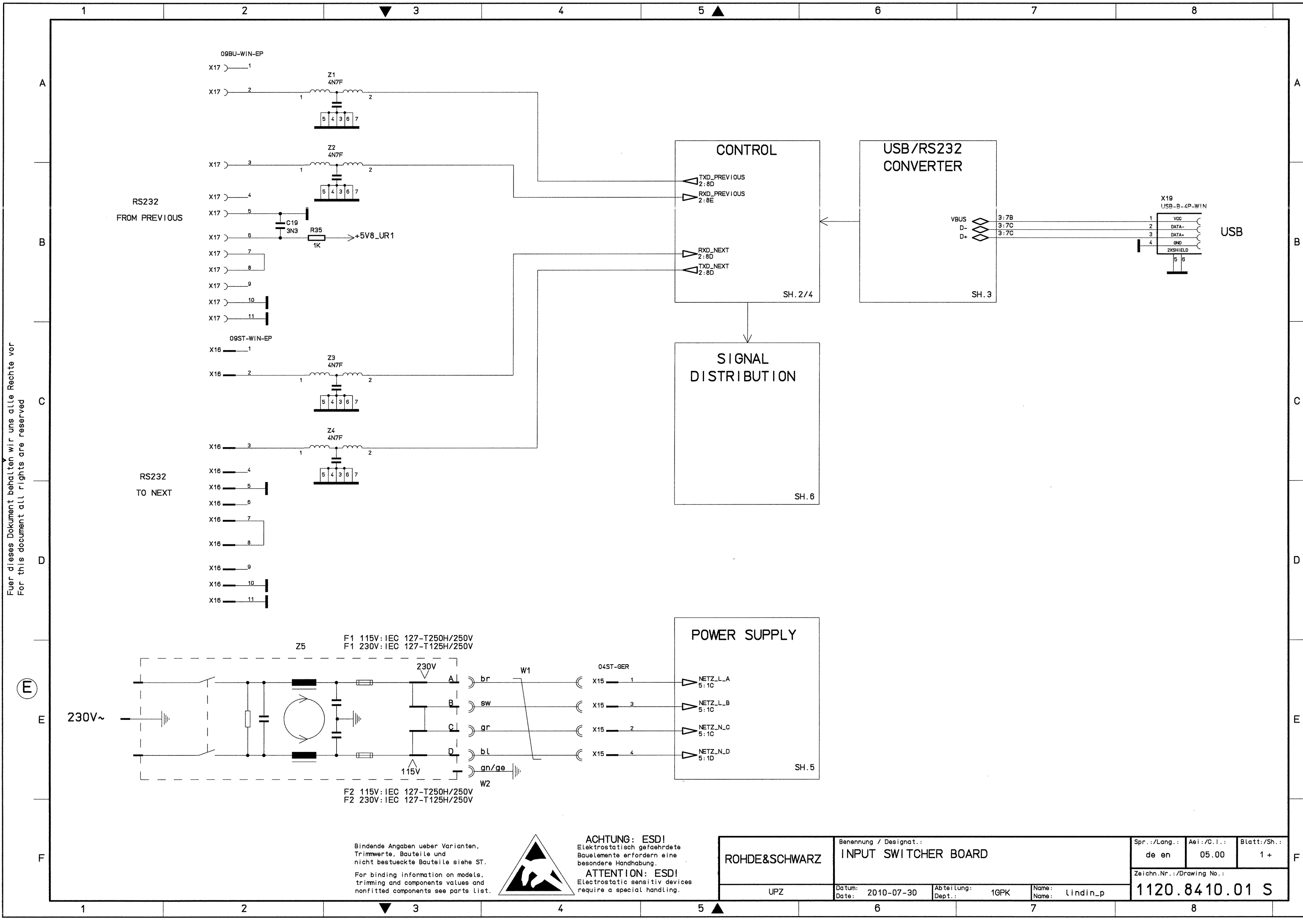


Fig. 2-3 **Screw connection points of PCB**

3 Documentation

- Circuit diagrams
- Components location plans

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: INPUT SWITCHER BOARD			Spr.:/Lang.: de en	Art./C.I.: 05.00	Blatt./Sh.: 1 +
	UPZ	Datum: Date: 2010-07-30	Abteilung: Dept.: 10PK	Name: Name: lindin_p	Zeichn.Nr.:/Drawing No.: 1120.8410.01 S	

⑤



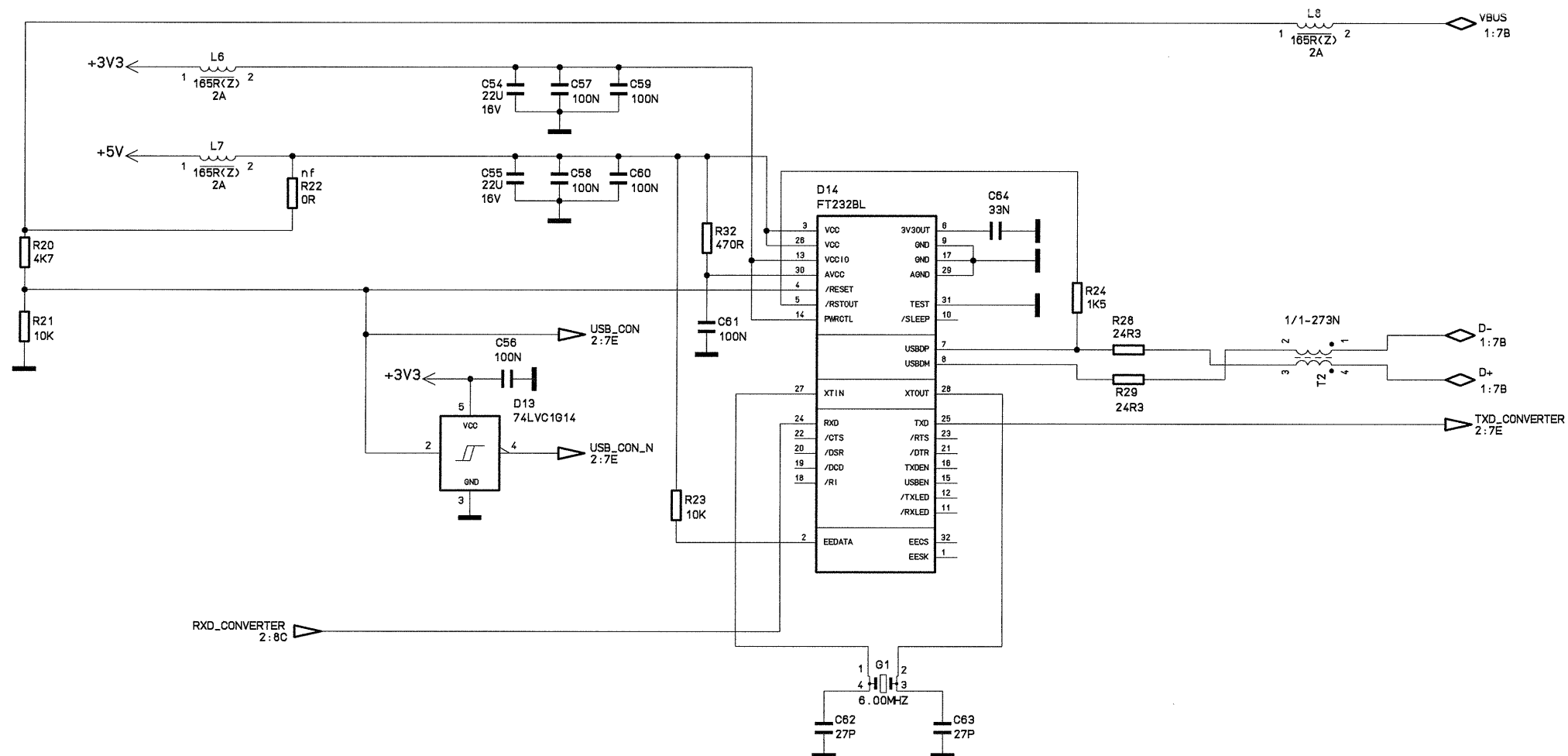
ACHTUNG: ESD!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.

ATTENTION: ESD!
Electrostatic sensitive devices require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: INPUT SWITCHER BOARD				Spr.:/Lang.: de en		Aei:/C.L.: 05.00		Blatt:/Sh.: 2 +	
	UPZ				Datum: Date: 2010-07-30		Abteilung: Dept.: 1GPK		Name: Name: Lindin_p	
					Zeichn.Nr.:/Drawing No.: 1120.8410.01 S					

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

USB/RS232 CONVERTER



nf=NOT FITTED

Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
INPUT SWITCHER BOARD

Datum:
Date:

2010-07-30

Abteilung:
Dept.:

10PK

Name:
Name:

Lindin_p

Spr.:/Lang.: Aei:/C.I.: Blatt:/Sh.:

de en

05.00

3 +

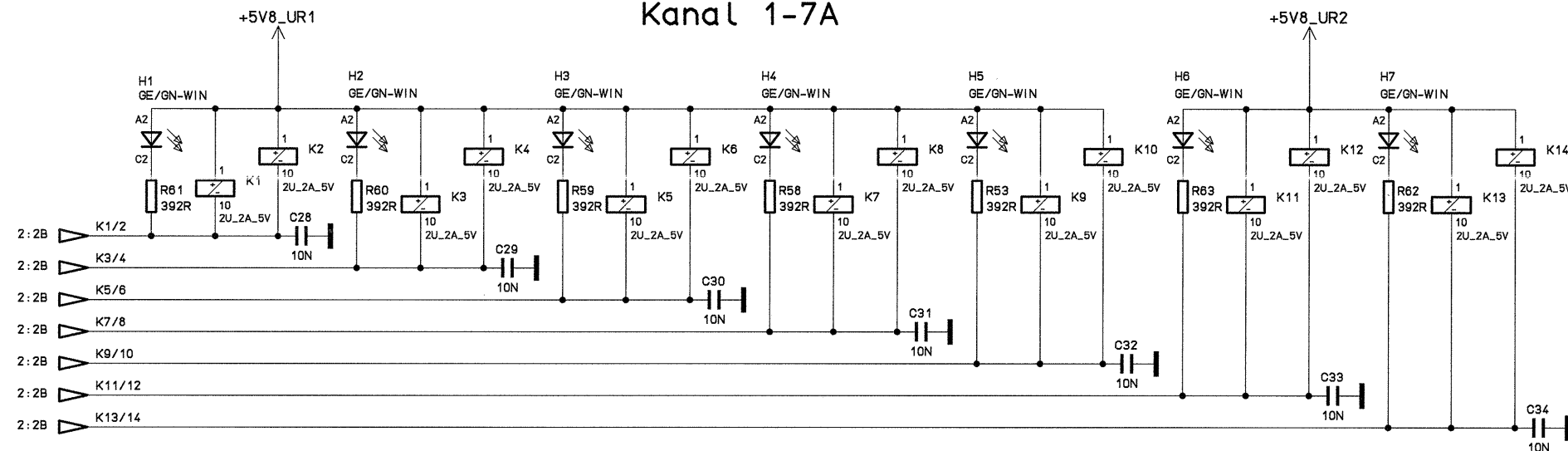
Zeichn.Nr.:/Drawing No.:

1120.8410.01 S

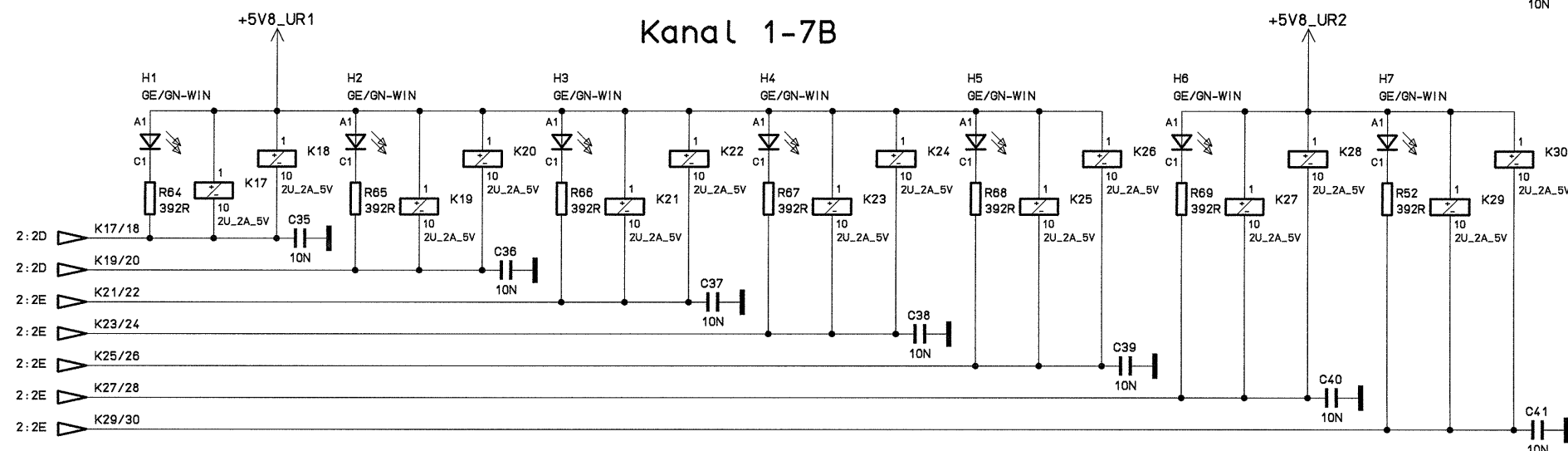
Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

CONTROL

Kanal 1-7A

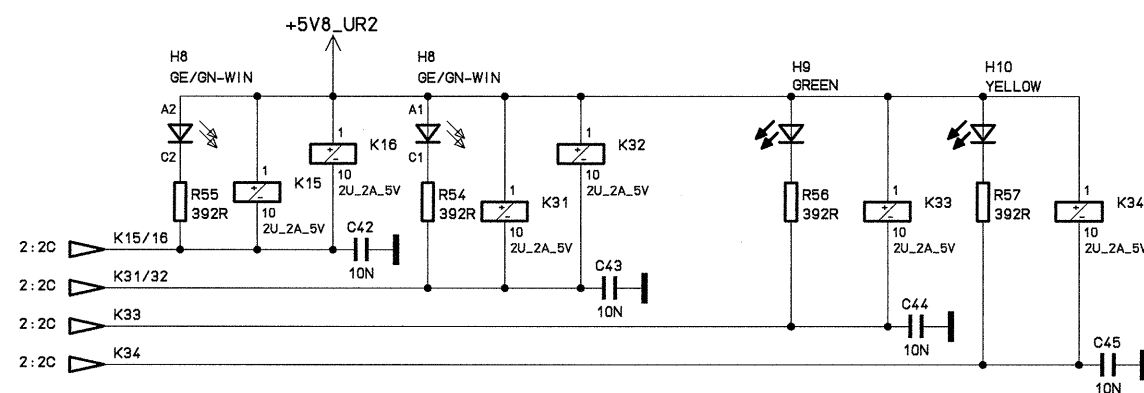


Kanal 1-7B



Kanal 8A + 8B

Sammelschiene A + B



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitive devices
require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
INPUT SWITCHER BOARD

UPZ

Datum:
Date: 2010-07-30

Abteilung:
Dept.: 10PK

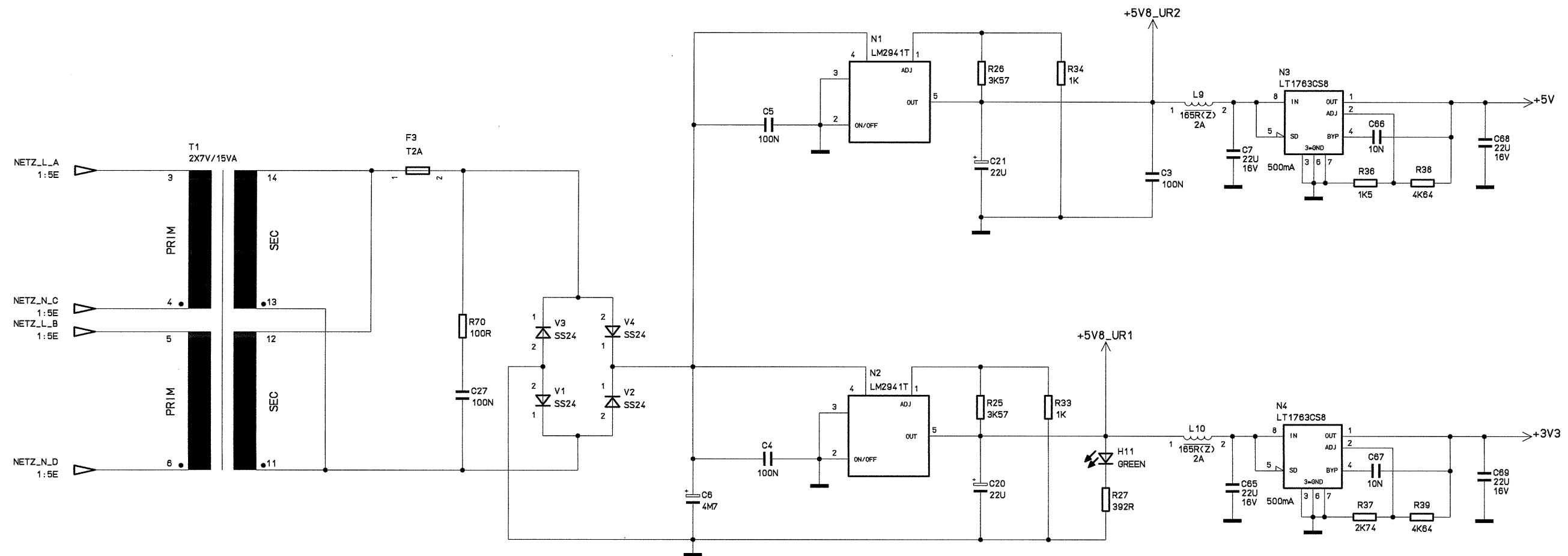
Name:
Name: lindin_p

Spr.:/Lang.: de en
Aei:/C.I.: 05.00
Blatt:/Sh.: 4 +

Zeichn.Nr.:/Drawing No.:
1120.8410.01 S

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

POWER SUPPLY



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
INPUT SWITCHER BOARD

Spr.:/Lang.: de en
Aei:/G.I.: 05.00
Blatt:/Sh.: 5 +

Zeichn.Nr.:/Drawing No.:

1120.8410.01 S

UPZ

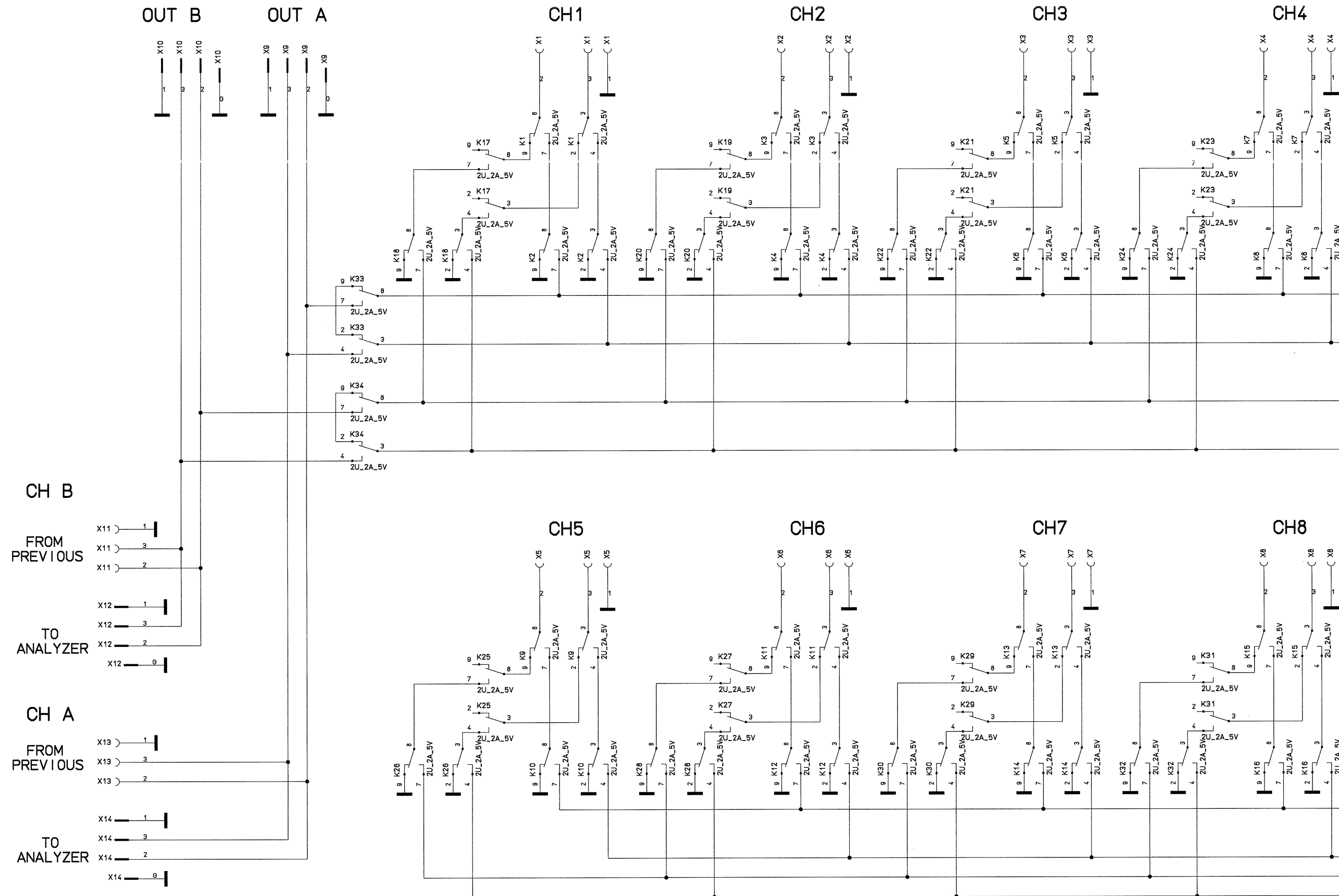
Datum: 2010-07-30
Date:

Abteilung: 10PK
Dept.:

Name: Lindin_p
Name:

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

SIGNAL DISTRIBUTION



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitive devices
require a special handling.

ROHDE&SCHWARZ

UPZ

Benennung / Designat.:
INPUT SWITCHER BOARD

Datum: 2010-07-30
Date:

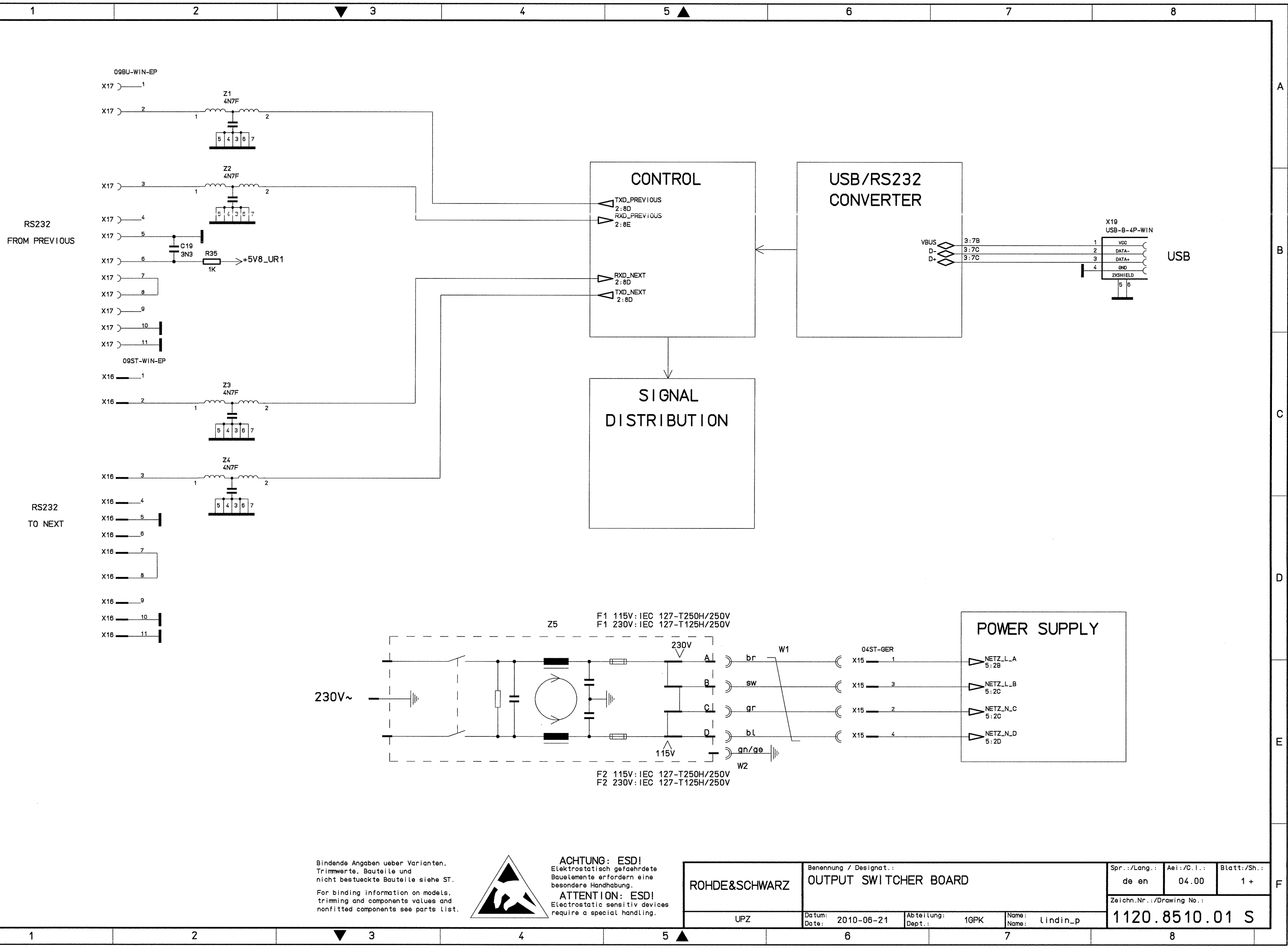
Abteilung: 1GPK
Dept.:

Name: lindin_p
Name:

Spr.:/Lang.: de en
Aei:/C.I.: 05.00
Blatt:/Sh.: 6 -

Zeichn.Nr.:/Drawing No.:
1120.8410.01 S

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved



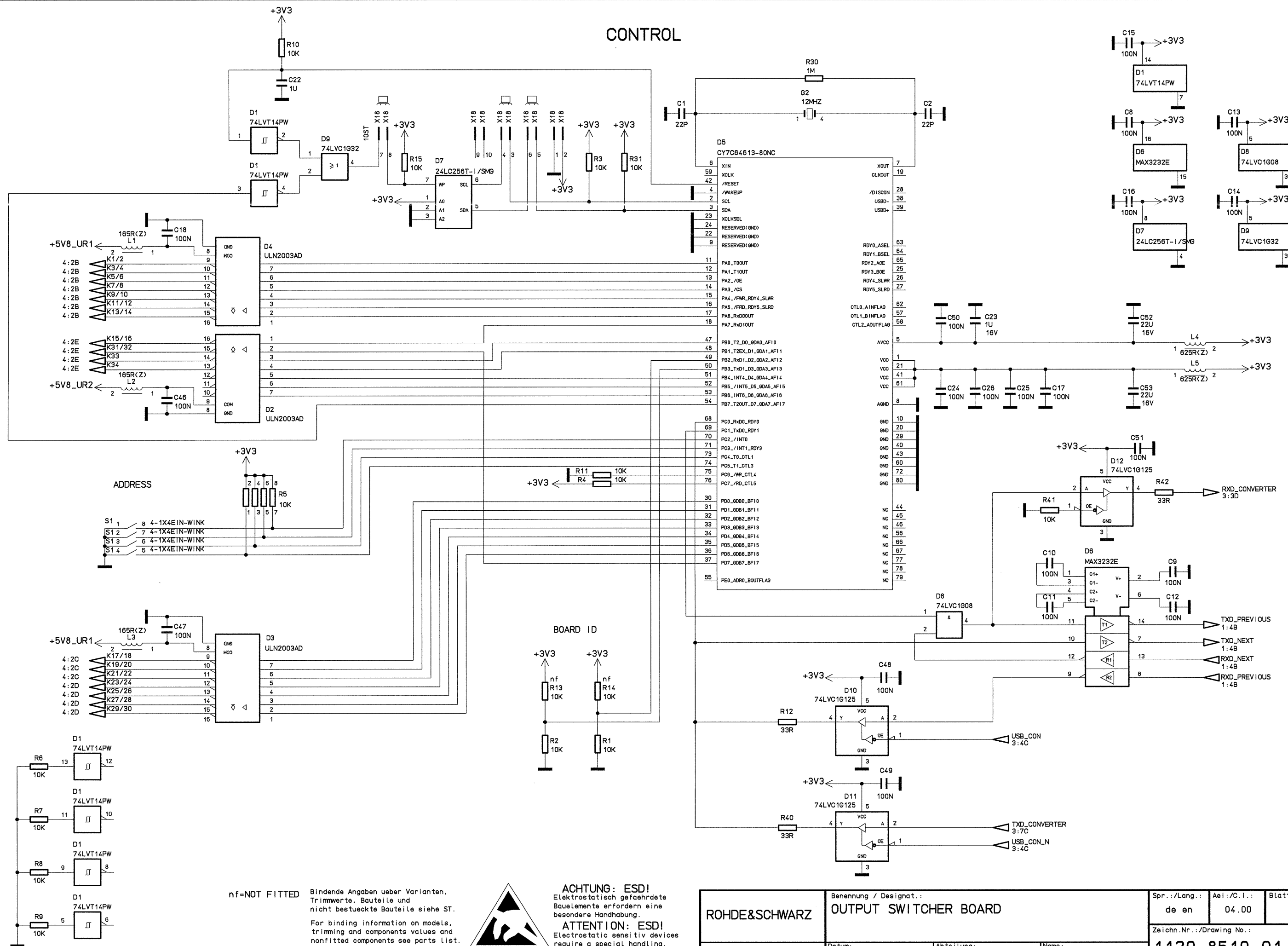
Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdate
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: OUTPUT SWITCHER BOARD			Spr.:/Lang.: de en	Aei:/G.l.: 04.00	Blatt:/Sh.: 1 +
	UPZ	Datum: Date: 2010-06-21	Abteilung: Dept.: 1GPK	Name: Name: lindin_p	Zeichn.Nr.:/Drawing No.: 1120.8510.01 S	

CONTROL



nf=NOT FITTED

Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitive devices
require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
OUTPUT SWITCHER BOARD

Spr.:/Lang.: Aei:/C.I.: Blatt:/Sh.:

de en 04.00 2 +

Zeichn.Nr.:/Drawing No.:

1120.8510.01 S

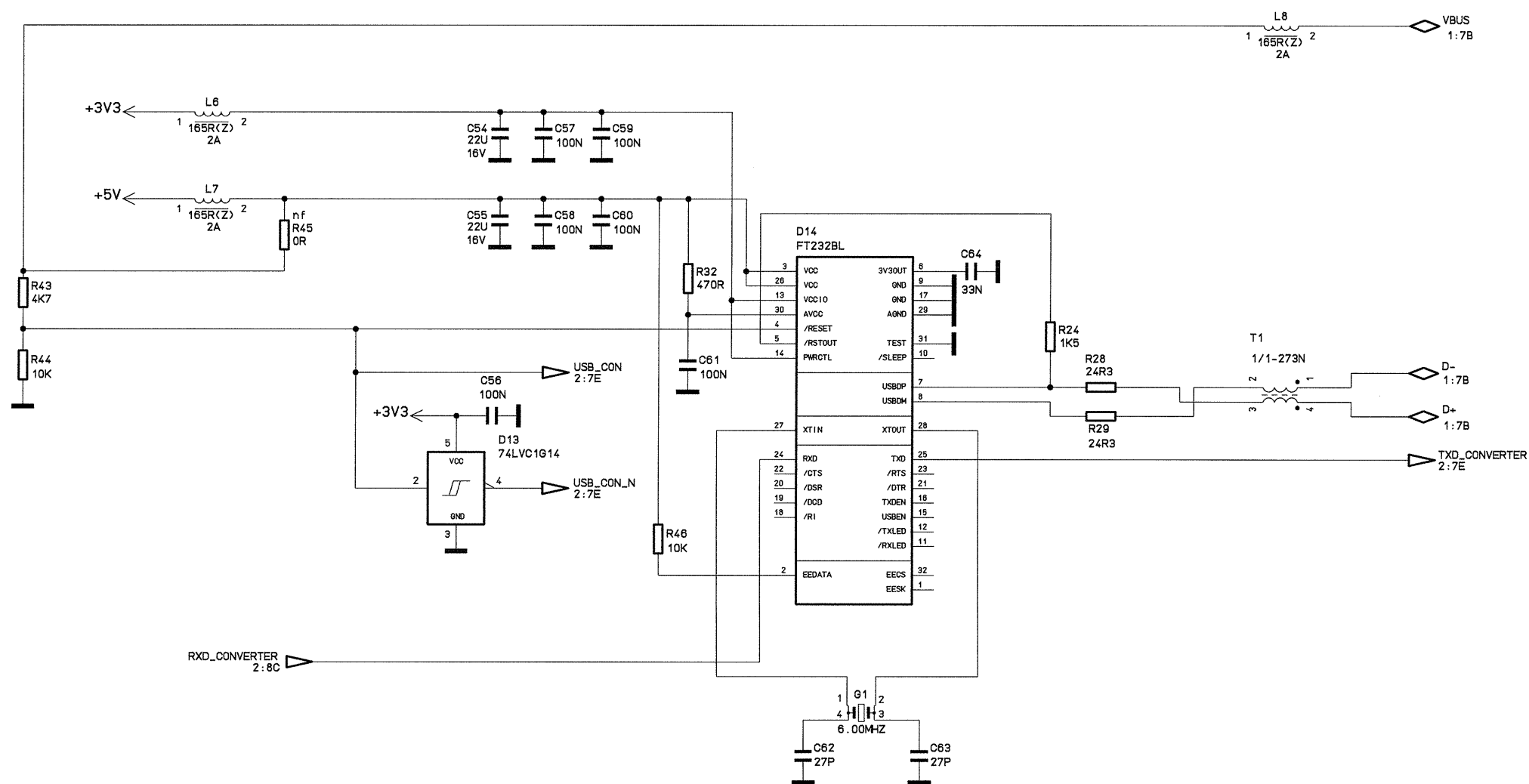
UPZ

Datum: 2010-06-21

Abteilung: 19PK

Name: lindin_p

USB/RS232 CONVERTER



nf=NOT FITTED

Bindende Angaben ueber Varianten, Trimmwerte, Bauteile und nicht bestueckte Bauteile siehe ST.

For binding information on models, trimming and components values and nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitive devices require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
OUTPUT SWITCHER BOARD

Spr.:/Lang.:
de en

Ael.:/C.I.:
04.00

Blatt:/Sh.:
3 +

Zeichn.Nr.:/Drawing No.:

1120.8510.01 S

UPZ

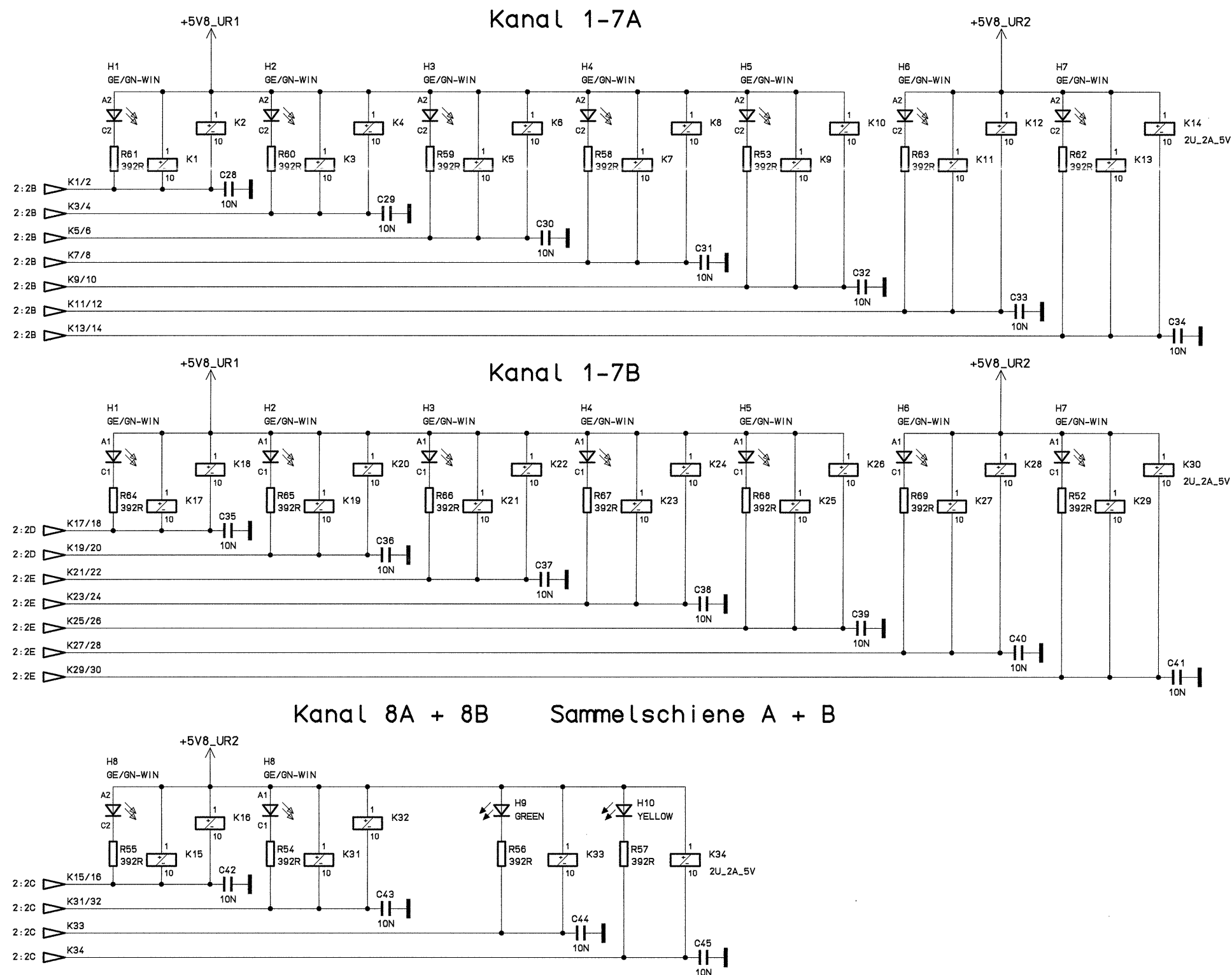
Datum: 2010-06-21

Abteilung: 10PK

Name: lindin_p

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

CONTROL



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ

Benennung / Designat.:
OUTPUT SWITCHER BOARD

UPZ

Datum:
Date: 2010-06-21

Abteilung:
Dept.: 1GPK

Name:
Name: Lindin_p

Spr.:/Lang.: de en
Aei:/C.I.: 04.00
Blatt:/Sh.: 4 +

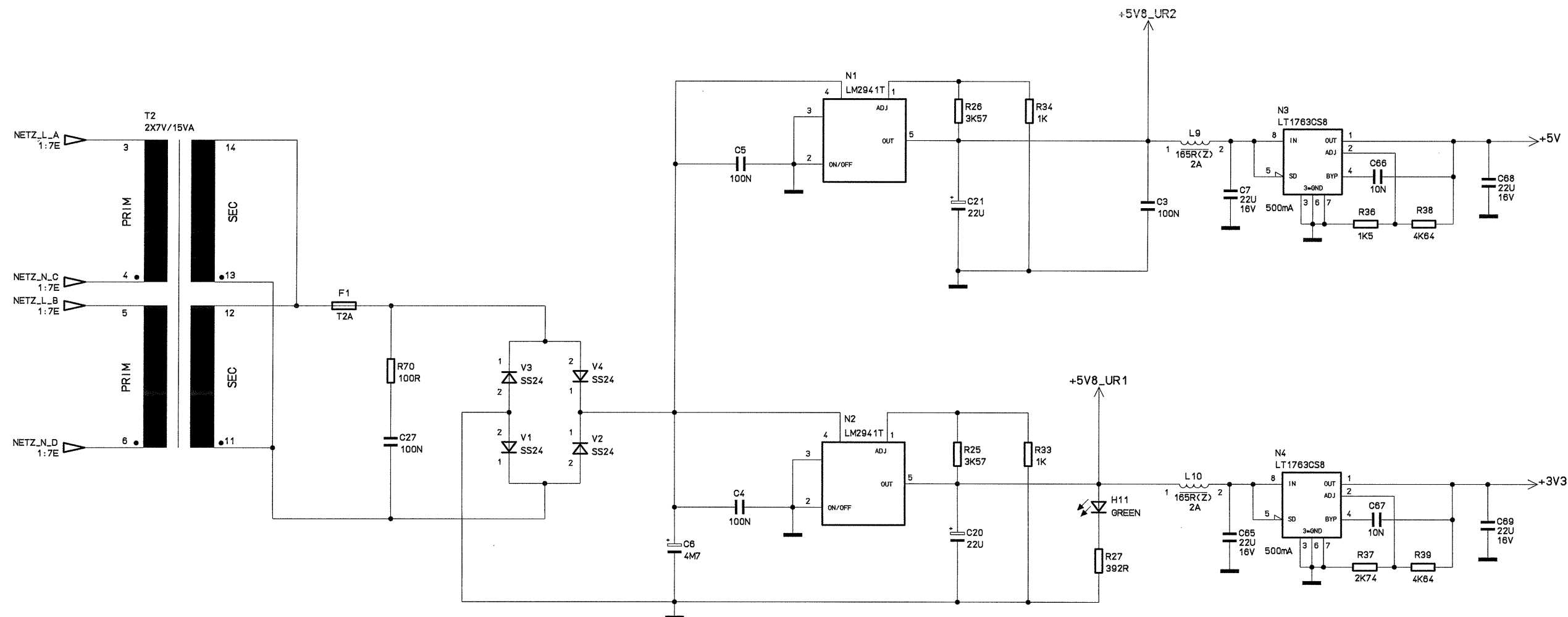
Zeichn.Nr.:/Drawing No.:
1120.8510.01 S

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

E

E

F



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ

UPZ

Benennung / Designat.:
OUTPUT SWITCHER BOARD

Datum: 2010-06-21
Date:

Abteilung: 10PK
Dept.:

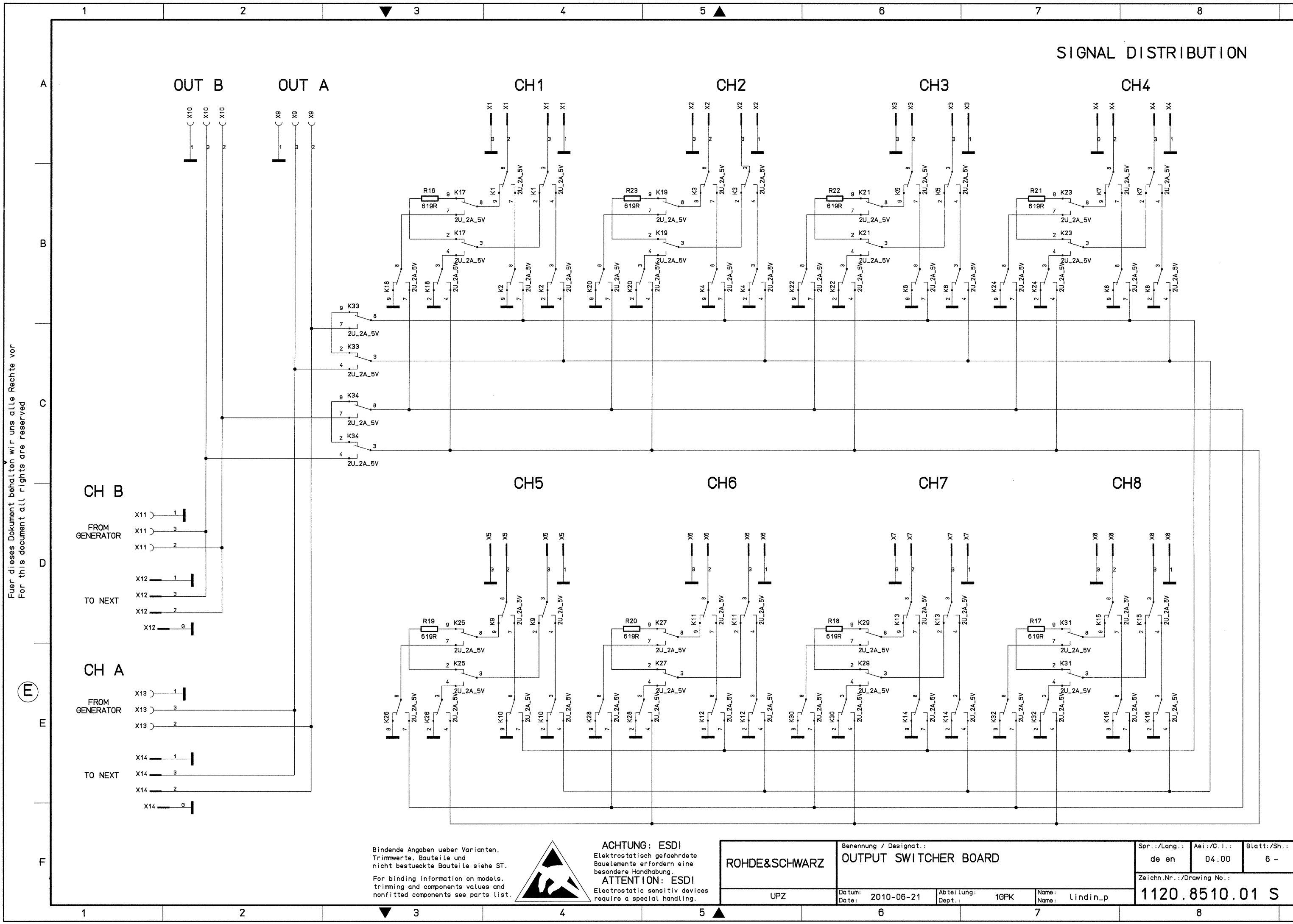
Name: lindin_p
Name:

Spr.:/Lang.: de en
Ael.:/C.I.: 04.00
Blatt:/Sh.: 5 +

Zeichn.Nr.:/Drawing No.:

1120.8510.01 S

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved



Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.
For binding information on models,
trimming and components values and
nonfitted components see parts list.



ACHTUNG: ESD!
Elektrostatisch gefaehrdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitiv devices
require a special handling.

ROHDE&SCHWARZ	Benennung / Designat.: OUTPUT SWITCHER BOARD		Spr.:/Lang.: de en	Ael./C.I.: 04.00	Blatt:/Sh.: 6 -
	UPZ	Datum: 2010-06-21 Date:	Abteilung: 10PK Dept.:	Name: lindin_p	1120.8510.01 S

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

Darstellung Seite B (Top)
View on Side B (Top)



ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDOTE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES
REQUIRE A SPECIAL HANDLING

BINDENDE ANGABEN UEBER VARIANTEN,
TRIMMWERTE, BAUTEILWERTE UND NICHT
BESTUECKTE BAUTEILE SIEHE SA.
FOR BINDING INFORMATION ON MODELS,
TRIMMING AND COMPONENT VALUES AND
NON-FITTED COMPONENTS SEE PARTS LIST.

ROHDE&SCHWARZ	Benennung / Designation				Spra. / Lang.	Aei / C.I.	Blatt / Sh.
	INPUT SWITCHER BOARD				de en	05.00	1-
	Dokument Nr. / Document No.						
UPZ	Datum Date	2010-07-30	Abteilung Dept.	1GPK	Name Name	lindin_p	
1120.8410.01 D							

Fuer dieses Dokument behalten wir uns alle Rechte vor
For this document all rights are reserved

Darstellung Seite B (Top)
View on Side B (Top)



ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES
REQUIRE A SPECIAL HANDLING

BINDENDE ANGABEN UEBER VARIANTEN,
TRIMMWERTE, BAUTEILWERTE UND NICHT
BESTUECKTE BAUTEILE SIEHE SA.
FOR BINDING INFORMATION ON MODELS,
TRIMMING AND COMPONENT VALUES AND
NON-FITTED COMPONENTS SEE PARTS LIST.

ROHDE&SCHWARZ	Benennung / Designation					Spra. / Lang.	Ass. / C.I.	Blatt / Sh.
	OUTPUT SWITCHER BOARD					de en	04.00	1-
						Dokument Nr. / Document No.		
UPZ	Datum Date	2010-06-21	Abteilung Dept.	1GPK	Name Name	lindin_p		
					1120.8510.01 D			