Agilent Technologies
Innovating the HP Way

812xx Performance Verification Test Procedure

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User Guide for Performance Verification Test
E4808A, E4805B, E4832A, E4861A, E4861B,
E4866A, E4867A

Revision 3.3

1 PVT Software Tool Scope and Technical Requirements

1.1 Introduction

This Performance Verification Test Procedure is to be used to verify specifications and functionality of the 812xx. The test has to be performed manually.
The specifications describe the warranted system performance after an **30 minute warm-up period**, with ambient temperature between 10°C and 40°C. The alignment between channels (residual skew) is valid only after completing the **deskew procedure** at the frontend connectors (zero delay) and performing the **Auto Delay Calibration**. The residual skew is further valid only for ambient temperature not exceeding +/- 5K from the ambient temperature at which system deskewing was performed.
At the end of this document you will find Agilent 812xx Performance Test Records to fill in the test results.

Detailed Tests:
Each test is consisting of four steps:

a. Prerequisites: this describes what parameters are to be set up, also if there are limitations due to individual front-end configurations.
b. Connections: this describes the physical interconnections between the test equipment and the Agilent 812xx.
c. Perform the measurement; further hints are given if appropriate.
d. Fill in the test result retrieved and compare them to the referring acceptance limits in the test tables. In cases of exceeding that limits please make sure the instrument accuracy of the test equipment has been used for evaluating the test results.

1.2 Devices-under-Test

The following system have to be measured:

81250 “ParBert” up to 10.8GB/s
81200 with High Speed capabilities up to 2.7Gb/s

Each system supports a choice of different front-ends and modules:
812xx – System

Modules

E4805B	Central Clock Modul
E4808A	Central Clock Module
E4832A	Module for Data Generator and Analyzer front-end (660MHz)
E4861A	Module for Data Generator and Analyzer front-end (2,6GB/s)
E4861B	Module for Data Generator and Analyzer front-end (3.35GB/s)
E4866A	One channel Data Generator Module (10.8Gb/s)
E4867A	One channel Data Analyzer Module (10.8Gb/s)

Generator front-ends:

E4838A	660MHz (Differential Output)
E4843A	660MHz
E4864A	1,6Gba/s
E4862A	2,6Gba/s
E4862B	3.35Gb/s

Analyzer front-ends:

E4835A	660MSa/s
E4865A	1,3Gba/s
E4863A	2,6Gba/s
E4863B	3.35Gb/s

1.3 Scope

The following tests for Modules and Generator and Analyzer front-ends need to be done:

Clock Modules:
1. System Clock

Generator front-ends/channel:
1. Generator Jitter
2. Generator Delay
3. Generator Width
4. Generator Level
5. Generator Transition time
6. Generator Overshoot

Analyzer front-ends/channel:
1. Receiver Threshold

1.4 Measurement Equipment

Recommended Accessories:
- Oscilloscope Agilent 54120 for speed class up to2.7Gb/s
- Oscilloscope Agilent 86100/86484A for speed class up to 10.8Gb/s
- Counter with range up to 1GHz (e.g. Agilent 53132A)
- Digital Volt Meter with a dc voltage range up to 10 V (e.g.: Agilent 3458A, Agilent 34401A)

Recommended Accessories:
- Attenuator 20db
  (Agilent 8493A, Opt.020)
- 4 SMA Cables á 50 Ohm **90cm length**
  (Agilent 8120-4948)
- Power Splitter 50Ohm
  (Agilent 11667B)
- 50 Ohm Feed-through Termination, 10 W, 0.1 %
- 50 Ohm Termination 11048C
- Torque Wrench
  (Agilent 8710-1582)
- BNC (f) to SMA (f) (Agilent 1250-1236)
- BNC (m) to SMA (m) (Agilent E9633A)

List of support scopes and 812xx products

86100A/86484A	**54120A**
E4808A	E4805A
E4805B	E4805B
E4861A	E4861A
E4862A	E4832A
E4863A	E4862A
E4864A	E4863A
E4865A	E4864A
E4861B	E4865A
E4862B	E4838A
E4863B	E4835A
E4866A	E4843A
E4867A	

1.5 System Calibration Hierachy:

Basically any front-end/data module **cannot** be tested as a standalone product.
E.g. a front-end E4862B need a data module E4861B, a data module need a clock module E4808A.
These three components are closely related together and defined as **ONE system**.

The measurement test report does define which products are related to ONE SYSTEM:
1) The measurement equipment which was used with including serial number
2) The position where the clock module/data module and front-end is located with serial number.

In the second part, the measurement results are documented.
Each tested front-end shows the exact position within the entire system with labeling.
E.g.0102001 => equal to the description in the header, where the entire system configuration is explained.

IMPORTANT:
Calibration Hierachy:
-If you exchange the clock module, the entire clock system including all data modules related to this clock module must be verified
-If you exchange only the data module and use the same frontends again, the entire data module including the frontends must be verified
-If you exchange only the frontend, the frontend only must be verified.

Is the system calibration lost due to a failed data module?
Each data module and front-end does carry its own measurement data with measurement results.
The verified specification is only true, as long as the same data module and clock module within the same system is used.

2 Performance Verification for 812xx

2.1 Specifications

2.1.1 Clock Modules

Clock period accuracy:
+/- 50ppm (Agilent E4805B,E4808A)

2.1.2 Generator front-ends:

Jitter:
< 10ps rms (E4832A)
< 5ps rms (E4861A)
< 2ps rms (E4866A)
<30ps p-p (E4862B)

Generator Delay accuracy:
+/-50ps +/-50ppm (Agilent E4832A, E4861A)
+/-20ps+/-50ppm (E4866A)
+/-25ps+/-50ppm (E4862B)

Generator Width Accuracy:
+/- 200ps +/- 0.1%
(for Agilent E4843A and Agilent E4838A)
+/- 50ps +/- 50ppm
(for Agilent E4862B)

Generator Level accuracy:
+/-3% +/-25mV after 5ns settling time (Agilent E4838A)
+/-1% +/-25mV after 5ns settling time @ECL (Agilent E4838A)
+/-5% +/- 100mV (Agilent E4843A)
+/-2% +/-10mV (Agilent E4862A and Agilent E4864A)
+/-2%+/-10mV (E4866A,E4862B)

Transition Times @LVDS/ECL (20% - 80%)
350ps typ. (Agilent E4838A)
<350ps (Agilent E4843A)
<150ps (Agilent E4862A and Agilent E4864A)
<60ps (E4866A)
<75ps (E4862B)

Transition Times @ 1,5V (20% - 80%)
+/-5% +/-100ps. (Agilent E4838A)
500ps typ (Agilent E4843A)
<150ps (Agilent E4862 and E4864A)
<75ps (E4862B)

Overshoot @ECL:
<7% (Agilent E4838A)
<5% (Agilent E4843A)
<10% +/-20mV (Agilent E4862A and Agilent E4864A)
<10%+/-20mV (E4866A)
<5%+/-10mV(E4862B)

2.1.3 Analyzer front-ends:

Receiver Threshold Accuracy:
+/-20mV +/-1% (E4838A,E4843A, E4862A, E4864A,E4863B)
+/-20mV +/-2% (E4866A)

2.2 Performance Verification Test Settings for 812xx

2.2.1 System Clock Performance

Settings for Generator front-ends for 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	RZ	RZ	NRZ	NRZ	NRZ	RZ
Rise/Fall Time	Minimum	minimum	Minimum	Minimum	Minimum	minimum
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
a) CLK Freq.min	1KHz	1KHz	336MHz	336MHz	9.5Gb/s	21MHz
b) CLK Freq.max	660MHz	660MHz	2,66Gbit/s	1,33Gbit/s	10.8Gb/s	3.35Gb/s
Segment setting	Segment with length = 80, all Vectors = 1, infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable		No data setup. Clock output is used.	Segment with length = 1024, all Vectors = 1, infinite Loop; Trigger enable
Connection Editor	Setup Pulse Port		Setup Pulse Port		No port	Pulse Port

Connections:
Measurement has to be performed with a counter.

For all front-end combinations of E4832A/41A/61A/61B connect the generator outputs to the counter inputs channel 1 and 3 by using a power splitter.
For the E4862B connect a 50 Ohm feedthrough directly to the generator output !!!
For the E4866A connect the generator CLK OUT to the counter input channel 3

Measurements:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
CLK Freq. min.	1kHz +/- 0,050Hz (E4805B)		336MHz +/-16800Hz (E4805B/08A)		9,5Gb/s +/-475MHz (E4808A)	21Mb /s +/-1,05MHz (E4808A)
CLK Freq. max	660,000 MHz +/-33kHz (E4805B)	660,000 MHz +/-33kHz (E4805B)	2,66Gbit/s +/- 66,5 kHz (E4805B/08A)	1,33Gbit/s +/- 33,3 kHz (E4805B/08A)	10.8Gb/s +/-540MHz (E4808A)	3.35Gb/s +/-167,5MHz (E4808A)

2.2.2 Jitter

Settings for Generators of 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	RZ	RZ	NRZ	NRZ	NRZ	RZ
Rise/Fall Time	minimum	minimum	Minimum	Minimum	Minimum	minimum
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
CLK Freq.	100MHz	100MHz	336MHz	336MHz	10GHz	3Gb/s
Segment setting	Segment with length = 80, all Vectors = 1, infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable		No data setup, only Clock output is used	Segment with length = 1024, all Vectors = 1, infinite Loop; Trigger enable
Connection Editor	Setup Pulse Port		Setup Pulse Port		Clock output	Setup Pulse Port

Connections:

When using an Agilent 54120A Oscilloscope:
Connect the generator outputs (E4838A/42A/43A/46A) to the input of the scope, and connect the clock trigger output to the trigger input of the scope via an attenuator of 20 dB, respectively.

When using an Agilent 86100A Oscilloscope:
For the E4862A in combination with E4861A: Connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER). Connect the generator output to the scope input via a 20dB attenuator.
For the E4862B in combination with E4861B : Connect the clock trigger output to the cope trigger input (FRONT PANEL TRIGGER). Connect the generator output to scope input via a 20dB attenuator.
For the test of the E4866A: Connect the generator CLK OUT of the data module to the scope input via a 20dB attenuator and to the scope trigger input (FRONT PANEL TRIGGER) via a power splitter.

Measurement with oscilloscope 54120:

Connect trigger output to Scope trigger input and connect generator output to the Scope input.

1.) Trigger on the first positive edge
2.) Set positive transition with ~50mV/Div and ~50ps/Div and Offset to -1,250V
3.) Set Scope voltage window marker to –1,254V and –1,246V
4.) Acquire 1000 samples in the histogram mode.
5.) Start acquiring

The Scope result will be sigma = rms jitter, which is not the true rms jitter value. It includes the effect of the +/-8mV marker window and Oscilloscope's trigger/time base jitter.
The true rms value needs to be calculated from the measured sigma value by using the following formular:

a. eliminate the transition time error:
x = (6x sigma – window_transition_time) / 6

Measurement with oscilloscope 86100/48646:

Connect complementary data channel output to scope trigger option 001 and connect normal data channel output to scope channel input 1.

The Scope result will be sigma = rms jitter, which is not the true rms jitter value. It includes the effect of the +/-8mV marker window and Oscilloscope's trigger/time base jitter.
The true rms value needs to be calculated from the measured sigma value by using the following formular:

b. eliminate the transition time error:
x = (6x sigma – window_transition_time) / 6

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Jitter [ps]	<10ps rms		<5ps rms		<2ps rms	<30ps peak-peak

2.2.3 Generator Delay

Settings for Generators of 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	RZ	RZ	NRZ	NRZ	NRZ	RZ
Rise/Fall Time	minimum	minimum	Minimum	Minimum	Minimum	minimum
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
CLK Freq.	10MHz	10MHz	336MHz	336MHz	10GHz	3Gb/s
Segment setting	Segment with length = 80, all Vectors = 1; infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable		Segment with length = 1024, all Vectors = 1010, infinite Loop; Trigger enable	Segment with length = 1024, all Vectors = 1, infinite Loop; Trigger enable
Connection Editor	Setup Data Port					

Connection:

When using an Agilent 54120A Oscilloscope:
Connect the generator outputs (E4838A/42A/43A/46A) to the input of the scope, and connect the clock trigger output to the scope trigger input via a 20 dB attenuator respectively.
When using an Agilent 86100A Oscilloscope:
For the E4862A in combination with E4861A : Connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER). Connect the generator output to the scope input via a 20dB attenuator.
For the E4862B in combination with E4861B and E4866A: Connect the clock trigger output to the scope trigger input (FRONT PANEL TRIGGER). Connect the generator output to the oscilloscope input via a 20dB attenuator**.**

a) Measurement:
1.) With delay=0 (GUI) adjust Scope to get the first positive transition in the middle of the display. Use settings of Oscilloscope (Delay, Time, Voltage)
2.) Keep in mind the delay time (x) of Oscilloscope.
3.) Set voltage marker to 50% of transition
4.) Set start-time-marker to 50% positive transition edge.
5.) Save this window trace.
6.) Set delay of 812xx GUI to 5ns.
7.) Set delay of Oscilloscope to (5ns + x) ns
8.) Set stop-time-marker to 50% of new shifted transition edge.
9.) Read Δt delay time

Deviation of:	E4838A	E4842A	E4862A	E4864A	E4866A	E4862B
Generator Delay	+/-50ps +/-50ppm				+/-20ps +/-50ppm	+/-25ps +/-50ppm

2.2.4 Generator Width

Settings for Generators of 812xx:

	E4838A	E4843A	E4862B	E4862A, E4864A, E4866A
Delay [ns]	0	0	0	This measurement is not practical, as the Agilent E4862/64A does not support the data formats RZ and R1.
a) Duty Cycle [%]	50	50	50	
b) Duty Cycle [%]	10	10	10	
Hold Width	-	-	-	
Hold Duty Cycle	X	X	X	
Format	RZ	RZ	RZ	
Rise/Fall Time	minimum	minimum	minimum	
High level [V]	-0,9	-0,9	-0,9	
Low Level [V]	-1,7	-1,7	-1,7	
Ext. Impedance [Ω]	50	50	50	
Termination Voltage[V]	0	0	0	
CLK Freq.	10MHz	10MHz	500MHz	
Segment setting	Segment with length = 80, all Vectors = 1; infinite Loop; Trigger enable		Segment with length = 1024, all Vectors = 1; infinite Loop; Trigger enable	
Connection Editor	Setup Data Port			

Connection:

Measurement has to be performed with the Oscilloscope.
Connect Agilent 81200 clock trigger output to Scope trigger input and connect one after the other Generator output to the Scope input.

When using an Agilent 54120A Oscilloscope:
Connect the generator outputs (E4838A/42A/43A/46A) to the scope input and connect the clock trigger output to the scope trigger input, via a 20 dB attenuator respectively.
When using an Agilent 86100A Oscilloscope:
For the module E4862B in combination with E4861B: Connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER). Connect the generator output to the scope input via a 20dB attenuator.

Measurement

Adjust the Scope to get one cycle into the display. Assign timing markers to 50% of first positive and negative transition. Let the Scope perform the time measurement, the reading should be

	E4838A	E4843A	E4862B
Duty Cycle 50%	50ns +/-200ps+/-0,1%	50ns +/-200ps+/-0,1%	0,5ns +/-50.1ps
Duty Cycle 10%	10ns +/-200ps +/-0,1%	10ns +/-200ps +/-0,1%	0,1ns+/-50.1ps

2.2.5 Generator Level

Settings for Generators of 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	NRZ	NRZ	NRZ	NRZ	NRZ	NRZ
Rise/Fall Time	minimum	minimum	minimum	minimum	minimum	minimum
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
CLK Freq.	10MHz	10MHz	336MHz	336MHz	10GHz	3GHz
Segment setting	Segment with length = 80, all Vectors = 1; infinite Loop; Trigger enable				Segment with length = 1024, all Vectors = 1; infinite Loop; Trigger enable	
Connection Editor	Setup Data Port					

Connection:

Connect the generator outputs (E4838A/42A/43A/46A/62A/62B/66A) to the DMM input, using a 50 Ohm feedthrough, SMA-BNC adapter and BNC jack plug adapter.

Measurement:

Measuring high level:

Settings:	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
High level [V]	4,4	3,0	3,0	3,0	2,5	2,5
Low Level [V]	1,0	0,8	2,2	2,2	1,0	1,0
Spec. HL	4,4V +/- 157mV	3,0V+/- 250mV	3,0V +/- 70mV	3,0V +/- 70mV	2,5V+/- 60mV	2,5V+/- 60mV
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Spec. HL	-0,9 V+/- 34mV	-0,9V+/- 145mV	-0,9 +/- 28mV	-0,9 +/- 28mV	-0,9 +/- 28mV	-0,9 +/- 28mV

2.2.6 Generator Transition Time

Settings for Generators of 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4866A
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	RZ	RZ	NRZ	NRZ	NRZ	NRZ
a) Rise/Fall Time	0,5ns	minimum	minimum	minimum	minimum	minimum
b) Rise/Fall Time	5ns	-	-	-	-	-
High level [V]	a)-0,9 // b)1,5	a)-0,9 // b)1,5	a)-0,9 // b)1,5	a)-0,9 // b)1,5	a)-0,9 // b)1,5	a)-0,9 // b)1,5
Low Level [V]	a)-1,7 // b)0	a)-1,7 // b)0	a)-1,7 // b)0	a)-1,7 // b)0	a)-1,7 // b)0	a)-1,7 // b)0
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
CLK Freq.	10MHz	10MHz	336MHz	336MHz	10Gb/s	3Gb/s
Segment setting	Segment with length = 80, all Vectors = 1; infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable		Segment with length = 1024, all Vectors = 1010, infinite Loop; Trigger enable	
Connection Editor	Setup Data Port					

Connection:

When using an Agilent 54120A Oscilloscope:
Connect the generator outputs (E4838A/42A/43A/46A) to the scope input and connect the clock trigger output to the scope trigger input via a 20 dB attenuator respectively.
When using an Agilent 86100A Oscilloscope:
For the E4862A in combination with E4861A: Connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER). Connect the generator output to the scope input via a 20dB attenuator.
For the E4862B in combination with E4861B or E4866A: Connect the clock trigger output to the scope trigger input (FRONT PANEL TRIGGER). Connect the generator output to scope input via a 20dB attenuator.

Measurement:

Set your Oscilloscope to get one cycle into your window. You have to measure with your voltage markers 20/80%at ECL. Get the positive transition with best resolution into your scope window. Take reading of time markers at 20/80% voltage level.

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
1,5V (Rt=min.)	0,5ns +/-125ps	500ps typ.(fixed)	<132ps	<132ps	<60ps	<75ps
1,5V (Rt=max.)	5,0ns +/-350ps	500ps typ. (fixed)	-	-	-	-
ECL to GND.	350ps typ.	<350ps	<108ps	<108ps	<60ps	<75ps

2.2.7 Generator Overshoot

Settings for Generators of 812xx:

	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
Delay [ns]	0	0	0	0	0	0
Duty Cycle [%]	50	50	50	50	50	50
Hold Width	-	-	-	-	-	-
Hold Duty Cycle	X	X	X	X	X	X
Format	RZ	RZ	NRZ	NRZ	NRZ	NRZ
Rise/Fall Time	minimum	Minimum	minimum	minimum	minimum	minimum
High level [V]	-0,9	-0,9	-0,9	-0,9	-0,9	-0,9
Low Level [V]	-1,7	-1,7	-1,7	-1,7	-1,7	-1,7
Ext. Impedance [Ω]	50	50	50	50	50	50
Termination Voltage[V]	0	0	0	0	0	0
CLK Freq.	10MHz	10MHz	336MHz	336MHz	10GHz	3GHz
Segment setting	Segment with length = 80, all Vectors = 1; infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable		Segment with length = 80, all Vectors = 11001100, infinite Loop; Trigger enable	Segment with length = 80, all Vectors = 1010, infinite Loop; Trigger enable
Connection Editor	Setup Data Port					

Connection:

When using an Agilent 54120A Oscilloscope:
Connect the generator outputs (E4838A/42A/43A/46A) to the scope input, and connect the clock trigger output to the scope trigger input, via a 20 dB attenuator respectively.
When using an Agilent 86100A Oscilloscope:
For the E4862A in combination with E4861A : Connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER). Connect the generator output to the oscilloscope input via a 20dB attenuator. For the E4862B in combination with E4861B or E4866A:
Connect the clock trigger output to scope trigger input (FRONT PANEL TRIGGER). Connect the generator output to the scope input via a 20dB attenuator.</

Measurement:

Let the Scope measure overshoot. Go to menu voltage markers and set markers to 0%100%. Read overshoot in voltage.

Deviation of:	E4838A	E4843A	E4862A	E4864A	E4866A	E4862B
ECL to Gnd. level	<56mV	<40mV	<100mV	<100mV	<100mV	<55mV

2.2.8 Receiver Threshold Range

Settings for Analyzer of 812xx:

	E4835A	E4863A	E4864A	E4863B	E4867A
Threshold [V]	-1,7V // 0V				0V
Int. Impedance [Ω]	50				
Segment setting	Segment with length = 24, all Vectors = 1010; infinite Loop; Trigger enable			Segment with length = 1024, all Vectors = 1010; infinite Loop; Trigger enable	Expected 1
Connection Editor	Setup Data Port				

Setting for any Generator/Analyzer of 812xx

	Generator E4843A, -38A,-62A,-62B	Generator E4866A
Delay [ns]	5 (cable delay)	5 (cable delay)
Duty Cycle [%]	50	50
Hold Width	-	-
Hold Duty Cycle	X	X
Format	NRZ	Pause 1
Rise/Fall Time	Minimum	Minimum
High level [V]	a)-1,5 //b)0,7	a)0,7
Low Level [V]	a)-2,0 //b)-0,7	b)-0,7
Ext. Impedance [Ω]	50	50
Termination Voltage[V]	0	0
CLK Freq.	336MHZ	10GHz

Set in measurement Configuration >Error Rate Measurement – All Failures<
Open Bit Error Rate measurement. The current BER should have no Bit Errors.

Connection:

When using an Agilent 54120A Oscilloscope:
Connect the generator output to analyzer input. Connect the generator compl. output to the scope input (Channel 1), and connect the clock trigger output to the scope trigger input, via 20 dB attenuators respectively.
Use a generator like the E4838A or E4843A for the test of analyzers with f < 660MHZ,
Use a generator like the E4862A or E4864A for the test of analyzers with f > 660MHZ.
When using an Agilent 54120A Oscilloscope:
For the E4863A (with E4862A) / E4863B (with E4862B) in combination with E4861A(2.6Gb/s) / 61B(3Gb/s), connect the clock trigger output to the scope trigger input (MODULE CHANNEL TRIGGER).
Connect the generator output to the analyzer input and connect the generator compl. output to the scope input via a 20 dB attenuator. For the analyzer E4867A (10GHz) connect the generator output to the analyzer input.

Measurement:

Set a:

1.) Adjust the Generator output levels of –1,5V and –2,0 V in 0.01 steps with voltage markers and Auto level set.
2.) Adjust the high level with 0.01 steps to nearly –1,7V threshold of Analyzer. Note the voltage value of voltage markers with auto level set if the BER is changing.
3.) Set high level back to –1,5 V
4.) Adjust the low level with 0.01 steps to nearly –1,7V threshold of Analyzer. Note the voltage value of voltage markers with auto level set if the BER is changing.
5.) Set low level back to –2,0 V
6.) Subtract both voltage values from each other and divide them by two.

Set b:

1.) Adjust the Generator output levels of 0,7V and –0,7V in 0.01 steps with voltage markers and Auto level set .
2.) Adjust the high level with 0.01 steps to nearly 0V threshold of Analyzer. Note the voltage value of voltage markers with auto level set if the BER is changing.
3.) Set high level back to 0,7V
4.) Adjust the low level with 0.01 steps to nearly 0V threshold of Analyzer. Note the voltage value of voltage markers with auto level set if the BER is changing.
5.) Set low level back to –0,7V
6.) Subtract both voltage values from each other and divide them by two.

Deviation of:	E4835A	E4863A	E4865A	E4863B	E4866A
Set a:Threshold accuracy[V]	+/-1% +/-20mV (< 37mV)				-
Set b:Threshold accuracy[V]	+/-1% +/-20mV (< 20mV)				+/-2% +/-20mV (< 20mV)

3 Documentation

Type of Front-end Module: ☐ **Agilent E4862B**

Location of host Agilent E4862B Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4861A Module: ☐ 1 ☐ 2

Slot No. of host Agilent E4862B Module: _____

Serial No. of host Agilent E4862B Module: _____

1. System Clock Performance:

Frequency at 21MHz:	19,95Gb/s	_____	22,05Gb/s	P/F
Frequency at 3,35Gb/s:	3,1825Gb/s	_____	3,5175Gb/s	P/F

2. Jitter:

at 3Gb/s:		_____	<30ps p-p	P/F

3. Generator Delay:

Delay value 5ns:	4,725ns	_____	5,275ns	P/F

4. Generator Level:

Hi: 2,5V	2,440V	_____	2,560V	P/F
Hi: -0,9V	-0,872V	_____	-0,928V	P/F

5. Generator Transition Time:

Amplitude: 0,8V		_____	< 75ps	P/F
Amplitude: 1,5V		_____	< 75ps	P/F

1. Generator Width:

at 500MHZ				
with 50% duty cycle:	0.9499ns	_____	1.0501ns	P/F
with 10% duty cycle:	0.1499ns	_____	0,2501ns	P/F

6. Generator Overshoot:

Amplitude: 0,8V		_____	< 55mV	P/F

Type of Front-end Module: ☐ **Agilent E4866A**

Location of host Agilent E4866A Module: ☐ Mainframe

☐ Extender Frame 1

☐ Extender Frame 2

Slot No. of host Agilent E4866A Module: _____

Serial No. of host Agilent E4866A Module: _____

7. System Clock Performance:

Frequency at 9,5Gb/s:	9,025Gb/s	_____	9,975Gb/s	P/F
Frequency at 10,8Gb/s:	10,26Gb/s	_____	11,34Gb/s	P/F

8. Clock Jitter:

at 10Gb/s:		_____	<2ps rms	P/F

9. Generator Delay:

Delay value 5ns:	4,94975ns	_____	5,05025ns	P/F

10. Generator Level:

Hi: 2,5V	2,440V	_____	2,560V	P/F
Hi: -0,9V	-0,872V	_____	-0,928V	P/F

11. Generator Transition Time:

Amplitude: 0,8V		_____	< 60ps	P/F
Amplitude: 1,5V		_____	< 60ps	P/F

12. Generator Overshoot:

Amplitude: 0,8V		_____	< 100mV	P/F

Type of Front-end Module: ☐ **Agilent E4862A** ☐ **Agilent E4864A**

Location of host Agilent E4861A Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4861A Module: ☐ 1 ☐ 2

Slot No. of host Agilent E4861A Module: _____

Serial No. of host Agilent E4861A Module: _____

13. System Clock Performance:

Frequency at 336MHZ:	335,983MHZ	_____	336,017kHz	P/F
Frequency at 2,66Gbit:	2,65987Gbit	_____	2,66013Gbit	P/F

14. Clock Jitter:

at 336MHZ:		_____	<5ps rms	P/F

15. Generator Delay:

Delay value 5ns:	4,94975ns	_____	5,05025ns	P/F

16. Generator Level:

Hi: 3,0V Lo: 2,2V	2,93V	_____	3,07V	P/F
Hi: -0,9V Lo: –1,7V	-0,872V	_____	-0,928V	P/F

17. Generator Overshoot:

Amplitude: 0,8V		_____	< 100mV.	P/F

Generator Transition Time

Amplitude: 0,8V		_____	< 108ps	P/F
Amplitude: 1,5V		_____	< 132ps	P/F

Type of Front-end Module: ☐ **Agilent E4863B** ☐ **Agilent E4863A** ☐ **Agilent E4865A**

Location of host Agilent E4861A/B Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4861A/B Module: ☐ 1 ☐ 2

Slot No. of host Agilent E4861A/B Module: _____

Serial No. of host Agilent E4861A/B Module: _____

1. Receiver Threshold Range

Threshold –1,7V	_____	< 0,037V	P/F
Threshold 0,0V	_____	< 0,020V	P/F

Type of Front-end Module: ☐ **Agilent E4843A**

Location of host Agilent E4832A Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4832A Module: ☐ 1 ☐ 2

Slot No. of host Agilent E4832A Module: _____

Serial No. of host Agilent E4832A Module: _____

2. System Clock Performance:

Frequency at 1000HZ:	999,95HZ	_____	1000,05HZ	P/F
Frequency at 660MHZ:	659,967MHZ	_____	660,033MHZ	P/F

3. Clock Jitter:

at 100MHZ:		_____	<10psrms	P/F

4. Generator Delay:

Delay value 5ns:	4,94975ns	_____	5,05025ns	P/F

5. Generator Level:

Hi: 3,0V Lo: 0,8V	2,75V	_____	3,25V	P/F
Hi: -0,9V Lo: –1,7V	-0,755V	_____	-1,045V	P/F

6. Generator Width:

at 10MHZ				
with 50% duty cycle:	49,75ns	_____	50,25ns	P/F
with 0,7% duty cycle:	9,79ns	_____	10,21ns	P/F

7. Generator Overshoot:

Amplitude: 0,8V		_____	< 40mV	P/F

8. Generator Transition Time:

Amplitude: 0,8V		_____	<500ps typ.	P/F
Amplitude: 1,5V		_____	< 350ps	P/F

Type of Front-end Module: ☐ **Agilent E4838A**

Location of host Agilent E4832A Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4832A Module: ☐ 1 ☐ 2

Slot No. of host Agilent E4832A Module: _____

Serial No. of host Agilent E4832A Module: _____

9. System Clock Performance:

Frequency at 1000HZ:	999,95HZ	_____	1000,05HZ	P/F
Frequency at 660MHZ:	659,967MHZ	_____	660,033MHZ	P/F

10. Clock Jitter:

at 100MHZ:		_____	<10ps rms	P/F

11. Generator Delay:

Delay value 5ns:	4,94975ns	_____	5,05025ns	P/F

12. Generator Level:

Hi: 4,4V Lo: 1,0V	4,243V	_____	4,3943V	P/F
Hi: -0,9V Lo: –1,7V	-0,866V	_____	-0,934V	P/F

13. Generator Width:

at 10MHZ				
with 50% duty cycle:	49,75ns	_____	50,25ns	P/F
with 0,7% duty cycle:	9,79ns	_____	10,21ns	P/F

14. Generator Overshoot:

Amplitude: 0,8V		_____	< 56mV	P/F

15. Generator Transition Time:

Amplitude: 0,8V with fixed rise/fall time		_____	<350ps typ.	P/F
Amplitude: 1,5V with 0,5ns rise/fall time	4,65ns	_____	5,35ns	P/F
Amplitude: 1,5V with 50ns rise/fall time	3,75ns	_____	6,25ns	P/F

Type of Front-end Module: ☐ **Agilent E4835A**

Location of host Agilent E4832A Module: ☐ Mainframe ☐ Extender Frame 1 ☐ Extender Frame 2

Position within E4832A Module: ☐ 1 ☐ 2 ☐ 3 ☐ 4

Slot No. of host Agilent E4832A Module: _____

Serial No. of host Agilent E4832A Module: _____

2. Receiver Threshold Range

Threshold –1,7V	_____	< 0,037V	P/F
Threshold 0,0V	_____	< 0,020V	P/F

Type of Front-end Module: ☐ **Agilent E4867A**

Location of host Agilent E4867A Module: ☐ Mainframe

☐ Extender Frame 1

☐ Extender Frame 2

Slot No. of host Agilent E4832A Module: _____

Serial No. of host Agilent E4832A Module: _____

3. Receiver Threshold Range

Threshold 0,0V	_____	< 0,020V	P/F