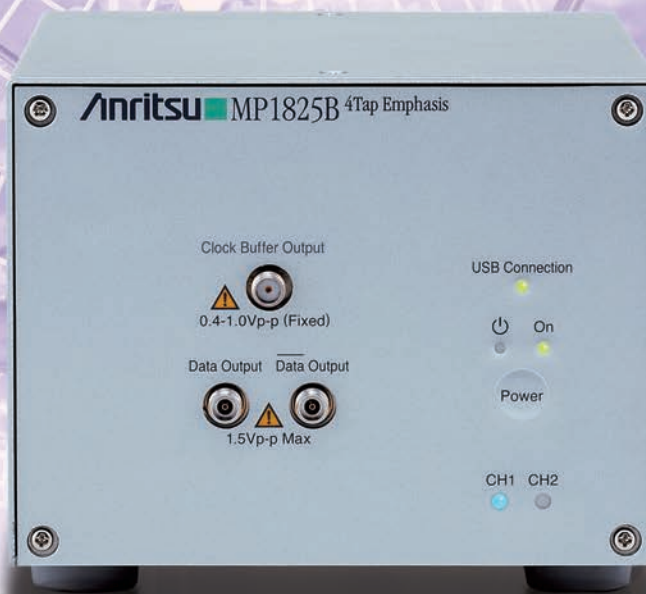


# MP1825B

4Tap Emphasis

14.1 Gbit/s

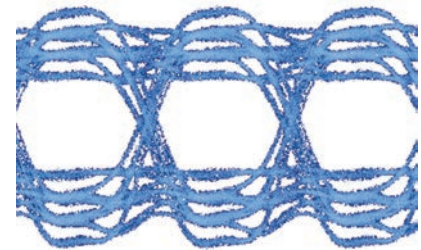
32.1 Gbit/s





# Characteristics Evaluation for Interconnect Serial Interface with 32.1 Gbit/s 4 taps Pre-emphasis Signals

The passage of signals through printed-circuit board (PCB) wiring causes signal level attenuation and quality degradation, resulting in a closed Eye diagram. Since it is impossible to transfer high-speed signals through PCBs without attenuation, many interconnect interfaces use pre-emphasis technology to maintain the Eye opening by correcting the level attenuation. The MP1825B 4Tap Emphasis is a 4 taps pre-emphasis converter for bit rates up to 32.1 Gbit/s; it supports easy changes to the pre-emphasis waveform amplitude, offset, amplitude of each tap, etc., for effective evaluation of the characteristics of high-speed interfaces below 10 Gbit/s, such as PCIe, USB, and Backplane Ethernet requiring pre-emphasis signals, as well as Infiniband 26G-IB-EDR, CEI-28G-VSR, 32G FC, etc., in the 30 Gbit/s band.



## Target Applications

CEI-28G-SR/VSR, Infiniband FDR (14G) /EDR (26G), PCI express, 100GbE (100GBASE-CR4, KR4)

### Pre-emphasis up to 4 taps

Generates 2 and 3 taps pre-emphasis signals required for various standards and supports up to 4 taps. Since each tap can be changed independently, the effect of adding pre-emphasis can be confirmed accurately.

### Jitter transparent

Supports accurate jitter tolerance tests due to transparent input data and clock jitter.

### Compact remote head

Shorter cable to DUT minimizes cable effects and assures high signal quality.

### Supports two ranges of bit rates

Choice of two configurations tailored to application, supporting 1 Gbit/s to 14.1 Gbit/s (MP1825B-001, 005) and 1 Gbit/s to 32.1 Gbit/s (MP1825B-002, 006).

### Use as front end for other makers' BERTs and customers' devices

Independent operation via USB control can generate pre-emphasis signals using other makers' devices as signal source to maximize efficiency of customers' investment in signal sources.

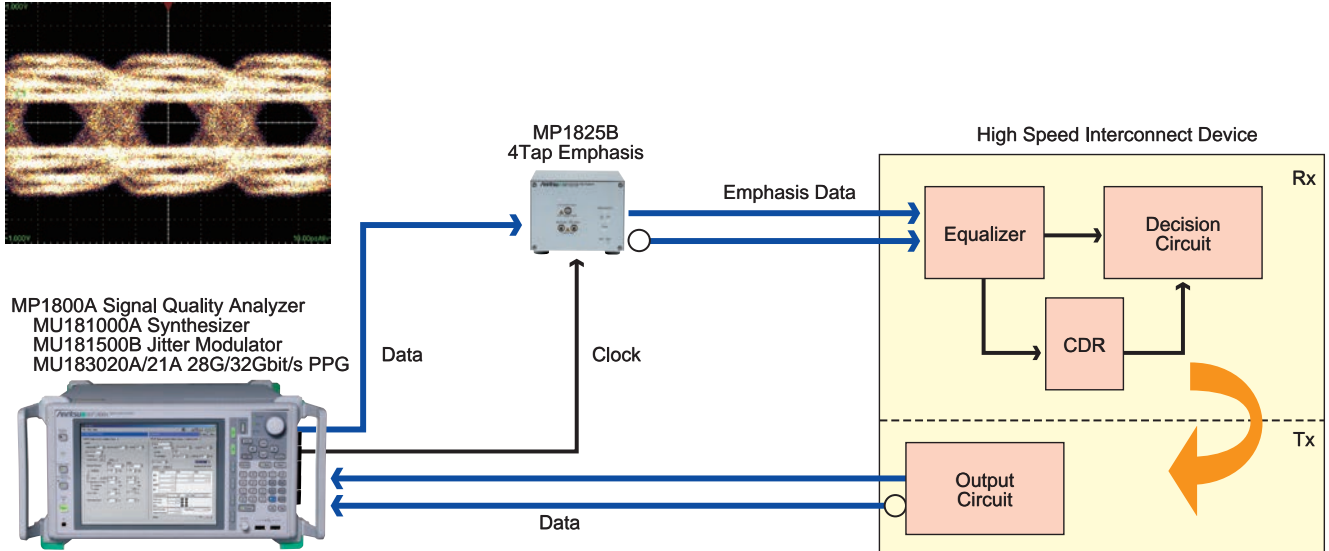
**MP1825B**  
 4Tap Emphasis  
 14.1 Gbit/s  
 32.1 Gbit/s



## Applications

### BER Measurements and Jitter Tolerance Tests of Receivers using Pre-emphasis Signals

The MP1825B supports up to 4 taps at pre-emphasis ratio required by the various standards. Using pre-emphasis signals creates an interconnect standards-compliant measurement system supporting reliable BER measurements and jitter tolerance tests.

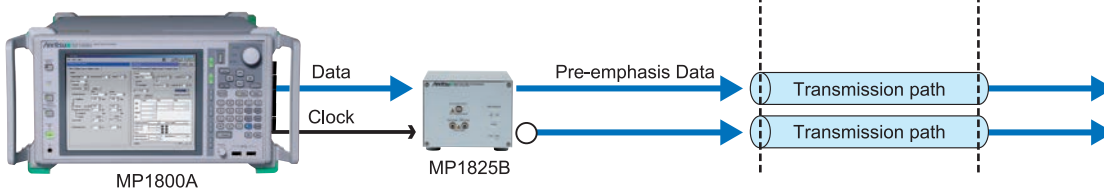
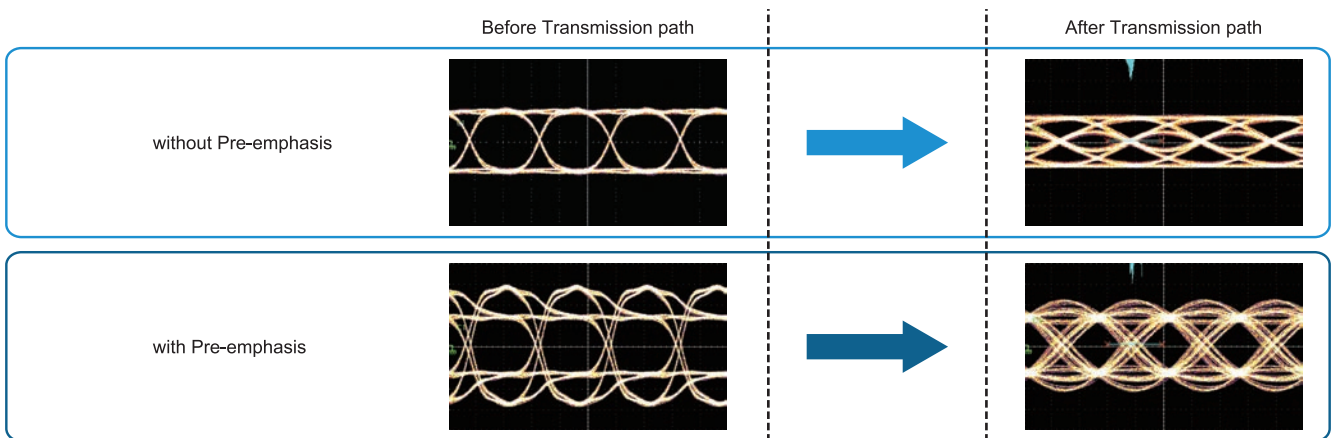


**Jitter Tolerance Test Configuration using Pre-emphasis Signals**

Frequency doubler I/O is used when the MP1825B-002 28 Gbit/s option is installed. Half-rate clock operation is supported at bit rates of 8 Gbit/s to 28.1 Gbit/s. The doubler circuit operation frequency is up to 28.1 GHz even when the MP1825B-006 32 Gbit/s Extension is installed. Bit rates of 28.1 Gbit/s to 32.1 Gbit/s require full-rate clock input.

### Optimized Pre-emphasis

The pre-emphasis signal minimizes signal attenuation in the transmission path. Because the MP1825B can change the emphasis ratio for each tap individually, the optimum pre-emphasis for the transmission path is confirmed easily.



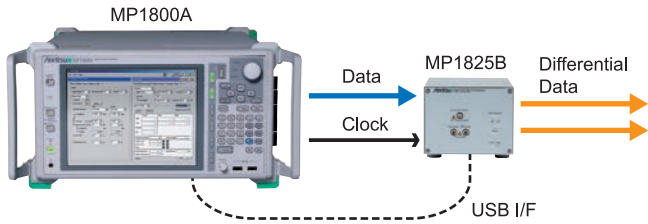
**Optimized Pre-emphasis Effect**



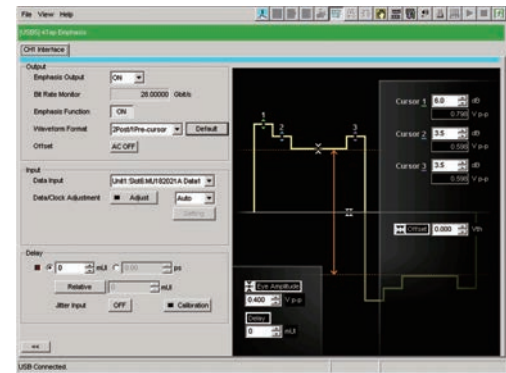
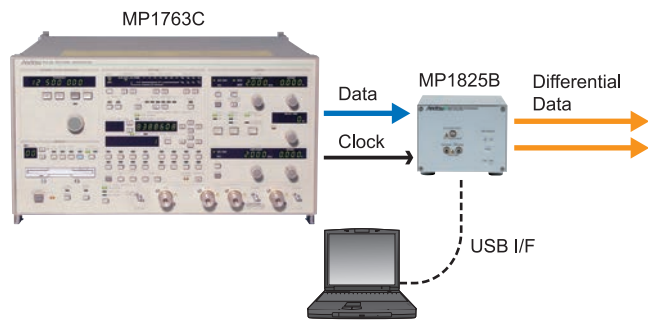
## Setup

Using the MP1800A Signal Quality Analyzer as a signal source enables the MX180000A Signal Quality Analyzer Control Software installed in the MP1800A to control both MP1825B and MP1800A. When using signal sources other than the MP1800A, the MP1825B can be controlled independently via the USB interface from a PC with MX180000A installed.

### Using MP1800A as signal source

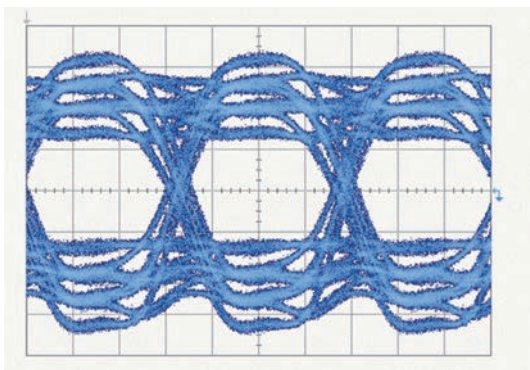


### Using other product as signal source

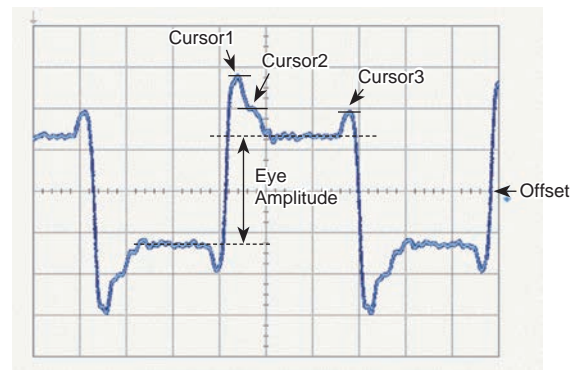


MP1825B 4Tap Emphasis Setting Screen

## Waveform



Test Pattern: PRBS31

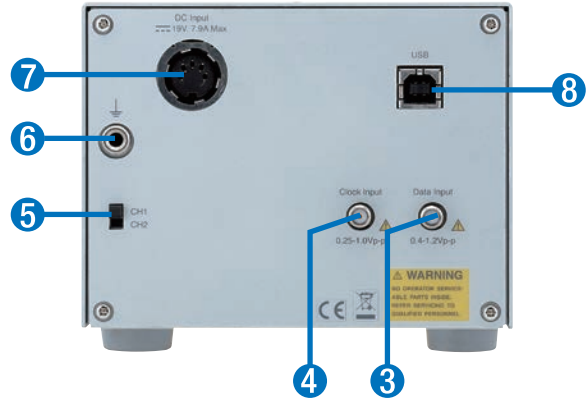


Test Pattern: FF00

Setting: 28.1 Gbit/s, Eye Amplitude: 0.5 Vp-p, Offset: 0 Vth, Cursor1: 6 dB, Cursor2: 3.5 dB, Cursor3: 3.5 dB

# Panel Layout

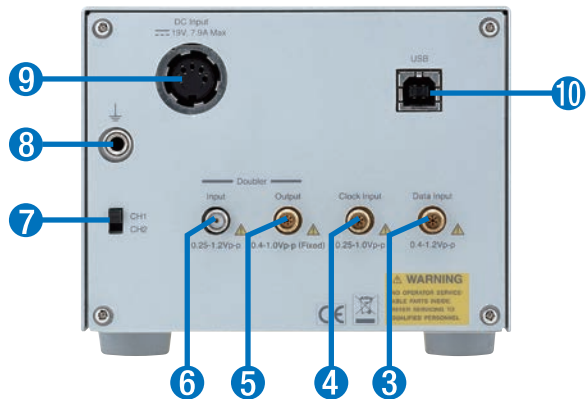
## MP1825B (MP1825B-001 14 Gbit/s Operation)



- 1 Data/  $\overline{\text{Data}}$  Output**  
Outputs pre-emphasized differential data signal
- 2 Clock Buffer Output**  
Outputs clock for input to Clock Input
- 3 Data Input**  
Input for data for conversion to pre-emphasis signal
- 4 Clock Input**  
Input for clock synchronized with data signal

- 5 Channel Switch**  
Set CH1 or CH2
- 6 Ground**  
This terminal is used to discharge static electricity
- 7 DC Input**  
For AC adapter
- 8 USB**  
Connected to MP1800A or control PC

## MP1825B (MP1825B-002 28 Gbit/s Operation)



- 1 Data/  $\overline{\text{Data}}$  Output**  
Outputs pre-emphasized differential data signal
- 2 Clock Buffer Output**  
Outputs clock for input to Doubler Clock Input
- 3 Data Input**  
Input for data for conversion to pre-emphasis signal
- 4 Clock Input**  
Input for clock synchronized with data signal
- 5 Doubler Clock Output**  
Outputs clock with doubled frequency for input to Doubler Clock Input

- 6 Doubler Clock Input**  
Input for half-rate clock synchronized with data signal
- 7 Channel Switch**  
Set CH1 or CH2
- 8 Ground**  
This terminal is used to discharge static electricity
- 9 DC Input**  
For AC adapter
- 10 USB**  
Connected to MP1800A or control PC

## Selection Guide

No.	Main Frame	Bit Rate	Data Delay
1	MP1825B 4Tap Emphasis	MP1825B-001 14 Gbit/s Operation	MP1825B-003 14 Gbit/s Variable Data Delay
2			
3		MP1825B-005 14.1 Gbit/s Extension	MP1825B-003 14 Gbit/s Variable Data Delay
4			
5		MP1825B-002 28 Gbit/s Operation	MP1825B-004 28 Gbit/s Variable Data Delay
6			
7			

### MP1825B 4Tap Emphasis

Converts input signals to pre-emphasis signals and outputs signals

### MP1825B-001 14 Gbit/s Operation

Covers bit rate from 1 Gbit/s to 14.05 Gbit/s. Select either MP1825B-001 or MP1825B-002.

### MP1825B-002 28 Gbit/s Operation

Covers bit rate from 1 Gbit/s to 28.1 Gbit/s. Select either MP1825B-001 or MP1825B-002.

### MP1825B-003 14 Gbit/s Variable Data Delay

Phase shifts input data and input clock. Select this option to input ideal phase when data and clock phase shift function not available at signal source. Requires MP1825B-001.

### MP1825B-004 28 Gbit/s Variable Data Delay

Phase shift input data and input clock. Select this option to input ideal phase when data and clock phase shift function not available at signal source. Requires MP1825B-002.

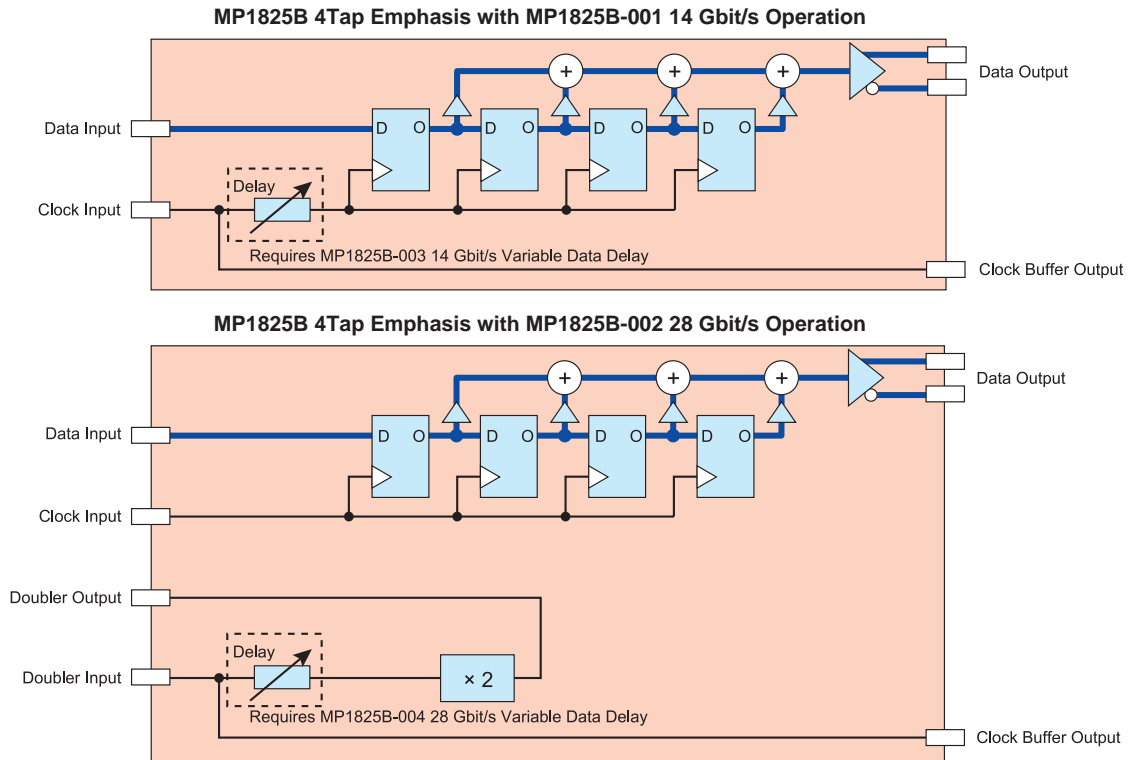
### MP1825B-005 14.1 Gbit/s Extension

Extends bit rate from 1 Gbit/s to 14.1 Gbit/s. Requires MP1825B-001.

### MP1825B-006 32 Gbit/s Extension

Extends bit rate from 1 Gbit/s to 32.1 Gbit/s. Requires MP1825B-002.

## Block Diagrams



Even when the MP1825B-006 32 Gbit/s Extension option is installed, the upper limit of the MP1825B-004 28 Gbit/s Variable Data Delay operation range is 28.1 Gbit/s. The Data/Clock phase between the MU183020A/21A PPG and MP1825B is auto-adjusted by the MU183020A/21A-030/031 Data Delay function.

# Specifications

Bit Rate	<p>1 Gbit/s to 14.05 Gbit/s [MP1825B-001]            1 Gbit/s to 14.1 Gbit/s [MP1825B-001, 005]            1 Gbit/s to 28.1 Gbit/s [MP1825B-002, when not using Doubler Input/Output]            1 Gbit/s to 32.1 Gbit/s [MP1825B-002, 006, when not using Doubler Input/Output]            8 Gbit/s to 28.1 Gbit/s [MP1825B-002, when using Doubler Input/Output]</p>
Data Output*1	<p>Number of Output: 2 (Data/xData)            Emphasis Setting:            a) 2post-cursor, 1pre-cursor            b) 3post-cursor            c) 1post-cursor, 1pre-cursor            d) 2post-cursor            e) 1post-cursor            f) Rev. 3post-cursor            Peak Voltage: 100 mVp-p to 1.5 Vp-p (Single-ended)            Eye Amplitude: 100 mVp-p to 1.0 Vp-p (Single-ended), Steps: 2 mVp-p            Offset: -1.0 Vth to +1.0 Vth, Steps: 1 mV            Total Jitter*2: 8 ps p-p (typ.)            Tr/Tf*3: 20 ps (typ.), ≤25 ps (20 to 80%) [MP1825B-001]                      12 ps (typ.), ≤16 ps (20 to 80%) [MP1825B-002]            Cursor1 Emphasis: -20 to +20 dB, 20log (Eye Amplitude/Cursor1), Steps: 0.1 dB            Cursor2 Emphasis: -20 to +20 dB, 20log (Eye Amplitude/Cursor2), Steps: 0.1 dB            Cursor3 Emphasis: -20 to +20 dB, 20log (Eye Amplitude/Cursor3), Steps: 0.1 dB            On/Off Function: Supported            Connector: K (f.), Termination: 50 Ω/AC Coupling</p>
Data Input	<p>Amplitude: 0.4 Vp-p to 1.2 Vp-p            Connector: SMA (f.) [MP1825B-001], K (f.) [MP1825B-002], Termination: 50 Ω/GND</p>
Clock Input	<p>Frequency Range: 1 GHz to 14.05 GHz [MP1825B-001]                              1 GHz to 14.1 GHz [MP1825B-001, 005]                              1 GHz to 28.1 GHz [MP1825B-002]                              1 GHz to 32.1 GHz [MP1825B-002, 006]            Amplitude: 0.25 Vp-p to 1.0 Vp-p            Connector: SMA (f.) [MP1825B-001], K (f.) [MP1825B-002], Termination: 50 Ω/AC Coupling</p>
Clock Buffer Output	<p>Frequency Range: 1 GHz to 14.05 GHz [MP1825B-001]                              1 GHz to 14.1 GHz [MP1825B-001, 005]                              4 GHz to 14.05 GHz [MP1825B-002]            Amplitude: 0.4 Vp-p (Min.), 1.0 Vp-p (Max.) (Fixed)            Connector: SMA (f.), Termination: 50 Ω/AC Coupling</p>
Doubler Input [MP1825B-002]	<p>Frequency Range: 4 GHz to 14.05 GHz            Amplitude: 0.25 Vp-p to 1.2 Vp-p            Connector: SMA (f.), Termination: 50 Ω/AC Coupling</p>
Doubler Output [MP1825B-002]	<p>Amplitude: 0.4 Vp-p (Min.), 1.0 Vp-p (Max.) (Fixed)            Connector: K (f.), Termination: 50 Ω/AC Coupling</p>
Variable Data Delay [MP1825B-003 or MP1825B-004]	<p>Phase Variable Range: -1000 mUI to +1000 mUI            Accuracy: 50 mUIp-p (typ.)</p>
General Specification	<p>Channel Switch: CH1/CH2 (Rear panel switch)            Operation Interface: USB 2.0 or 1.1 Type B            Power Supply: 100 V(ac) to 240 V(ac), 50 Hz/60 Hz            Power Consumption: &lt;100 W            Dimensions: 120 (W) × 90.9 (H) × 140 (D) mm            Mass: &lt;5 kg            Operating Temperature: 15° to 35°C            EMC: EN61326-1, EN61000-3-2            LVD: EN61010-1</p>

\*1: Measured at PRBS 2<sup>31</sup> - 1, Mark Ratio 1/2 with 50 GHz sampling oscilloscope

\*2: Measured at 14.05 Gbit/s or 28.1 Gbit/s (with MP1825B-002) with the sampling oscilloscope, intrinsic jitter should be less than 200 fs (rms)

\*3: Emphasis Function: Off



# Ordering Information

Please specify the model/order number, name and quantity when ordering.  
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No	Name
MP1825B	<b>- Main frame -</b> 4Tap Emphasis
<b>- Standard accessories -</b>	
J1137	Terminator: 3 pcs
J1341A	Open: 2 pcs
J1359A*	Coaxial Adaptor (K-P, K-J, SMA compatible): 2 pcs/3 pcs
J1507A**	Semirigid Cable: 1 pc
J1615A	Coaxial Cable set (Jitter-PPG-Emphasis): 1 pc
J1475A	USB Cable: 1 pc
Z1312A	AC Adaptor: 1 pc
	Power Cord: 1 pc
Z0897A	MP1800A Manual CD: 1 pc
Z0918A	MX180000A Software CD: 1 pc

\*: MP1825B-001: 2 pcs, MP1825B-002: 3 pcs  
\*\*: Select MP1825B-002

Model/Order No	Name
<b>- Options -</b>	
MP1825B-001	14 Gbit/s Operation
MP1825B-002	28 Gbit/s Operation
MP1825B-003	14 Gbit/s Variable Data Delay
MP1825B-004	28 Gbit/s Variable Data Delay
MP1825B-005	14.1 Gbit/s Extension
MP1825B-006	32.1 Gbit/s Extension
MP1825B-103	14 Gbit/s Variable Data Delay Retrofit
MP1825B-104	28 Gbit/s Variable Data Delay Retrofit
MP1825B-105	14.1 Gbit/s Extension Retrofit
MP1825B-106	32.1 Gbit/s Extension Retrofit
<b>- Optional accessories -</b>	
J1342A	Coaxial Cable 0.8 m (APC-3.5, DC to 27.5 GHz)
J1439A	Coaxial Cable (0.8 m, K Connector) (DC to 40 GHz)
W3482AE	MP1825B Operation Manual
<b>- Maintenance service -</b>	
MP1825B-ES310	Extended Three Year Warranty Service
MP1825B-ES510	Extended Five Year Warranty Service



Specifications are subject to change without notice.

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