MP1777A
10 GHz Jitter Analyzer
Operation Manual
Vol. 1

Seventh Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

APR.
2005

ANRITSU CORPORATION

Document No.: M-W1497AE-7.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment.
Some or all of the symbols may not be used on this equipment. In addition, when drawings are included in this manual, labels on the equipment may not be shown on them.

Safety Symbols Used in Manual

DANGER ⚠ This indicates a very dangerous procedure that could result in death or serious injury if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in death or serious injury if not performed properly.

CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and/or in Manual

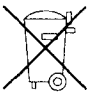
The following safety symbols are used inside or on the equipment near operation locations, and/or in manual to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

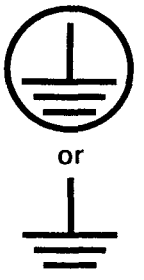
MP1777A
10 GHz Jitter Analyzer
Operation Manual Vol. 1

10 September 1998 (First Edition)
20 September 2002 (Seventh Edition)

For Safety

WARNING ⚠

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.



2. When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, before supplying power to the equipment, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Repair

WARNING ⚠

3. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.

Falling Over

4. This equipment should be used in the correct position. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.

For Safety

WARNING ⚠

Battery Fluid

5. DO NOT short the battery terminals and never attempt to disassemble it or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak.

   This fluid is poisonous.

   DO NOT touch it, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, irrigate them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

LCD

6. This instrument uses a Liquid Crystal Display (LCD); DO NOT subject the instrument to excessive force or drop it. If the LCD is subjected to strong mechanical shock, it may break and liquid may leak.

   This liquid is very caustic and poisonous.

   DO NOT touch it, ingest it, or get in your eyes. If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, irrigate them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

For Safety

CAUTION ⚠

Changing Fuse

1. Before changing the fuses, ALWAYS remove the power cord from the poweroutlet and replace the blown fuses. ALWAYS use new fuses of the type and rating specified on the fuse marking on the rear panel of the cabinet.

   T___A indicates a time-lag fuse.

   There is risk of receiving a fatal electric shock if the fuses are replaced with the power cord connected.

Cleaning

2. Keep the power supply and cooling fan free of dust.
   - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
   - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

3. Use two or more people to lift and move this equipment, or use a trolley. There is a risk of back injury, if this equipment is lifted by one person.

Changing memory back-up battery

4. This equipment uses a lithium battery to back-up the memory. This battery must be replaced by a service engineer when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.

   NOTE: The battery used in this equipment has a maximum useful life of 7 years. It should be changed before this period has elapsed.

5. The main unit of the MP1777A uses lithium batteries. When disposing of the batteries, make sure to conform with the local regulation.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the Electrotechnical Laboratory, the National Research Laboratory of Metrology and the Communications Research Laboratory, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Corporation or its representatives at the address in this manual.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.
Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.
When you dispose of export-controlled items, the products/manuals are needed to be broken/shredded so as not to be unlawfully used for military purpose.

Trademark and Registered Trademark

Quick Basic is a registered trademark of Microsoft Corporation.

CE Conformity marking

Anritsu affixes the CE Conformity Marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform with the EMC and LVD directive of the European Union (EU).

CE Marking

1. Product Model

Model: MP1777A 10 GHz Jitter Analyzer

and

Software: MP1777A Jitter Performance Test Software

2. Applied Directive

EMC: Council Directive 89/336/EEC

LVD: Council Directive 73/23/EEC

3. Applied Standards

EMC: Emission: EN61326: 1997/A1: 1998 (Class A)

Immunity: EN61326: 1997/A1: 1998 (Annex A)

	Performance Criteria*
IEC61000-4-2 (ESD)	B
IEC61000-4-3 (EMF)	A
IEC61000-4-4 (Burst)	B
IEC61000-4-5 (Surge)	B
IEC61000-4-6 (CRF)	A
IEC61000-4-8 (RPFMF)	A
IEC61000-4-11 (V dip/short)	B

*: Performance Criteria

A: During testing normal performance within the specification limits.

B: During testing, temporary degradation, or loss of function or which is self-recovering.

Harmonic current emissions:

EN61000-3-2: 1995/A2: 1998 (Class A equipment)

LVD: EN61010-1: 1993/A2: 1995 (Installation Category II, Pollution Degree 2)

C-tick Conformity marking

Anritsu affixes the C-tick marking on the following product(s) in accordance with the regulation to indicate that they conform with the EMC framework of Australia/New Zealand.

C-tick marking

1. Product Model

Model: MP1777A 10 GHz Jitter Analyzer

and

Software: MP1777A Jitter Performance Test Software

2. Applied Standards

EMC: Emission:

AS/NZS 2064.1/2 (ISM, Group 1, Class A equipment)

Power Line Fuse Protection

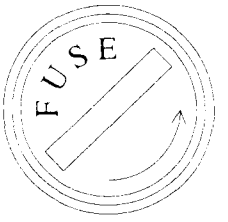
For safety, Anritsu products have either one or two fuses in the AC power lines as requested by the customer when ordering.

Single fuse: A fuse is inserted in one of the AC power lines.

Double fuse: A fuse is inserted in each of the AC power lines.

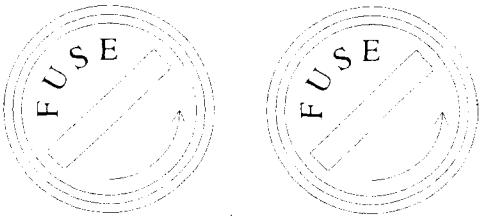
Example 1: An example of the single fuse is shown below:

Fuse Holder



Example 2: An example of the double fuse is shown below:

Fuse Holders



Composition of the MP1777A Operation Manual

The operation manual for the MP1777A 10 GHz Jitter Analyzer is composed of the two volumes shown below. Use the volume that suits the intended application of the product.

MP1777A Operation Manual	VOL. 1	Operation manual for the main unit
	VOL. 2	Operation manual for remote control

Operation manual for the main unit: This manual provides an outline of the MP1777A and its specifications, and describes its panel, performance and operation.

Operation manual for remote control: This manual describes remote control and provides program examples.

Table of Contents

IV.

Section 1 Outline

1.1 Product Description

The MP1777A 10 GHz Jitter Analyzer provides functions to generate jitter and perform measurement necessary to evaluate the quality of digital transmission circuit.

Moreover, the combination of the 10/12.5/15 G PPG, 10/12.5/15 G ED, and MS4630A/B Network Analyzer enables the basic jitter measurement listed below with an external PC (personal computer) to function as a controller.

Basic jitter measurement

(1) Jitter tolerance measurement
(2) Jitter transfer measurement
(3) Jitter generation measurement (rms measurement, With HP+LP)
(4) Output jitter measurement (peak to peak measurement, With HP1+LP, HP2+LP)

1.2 Specification

1.2.1 Standard

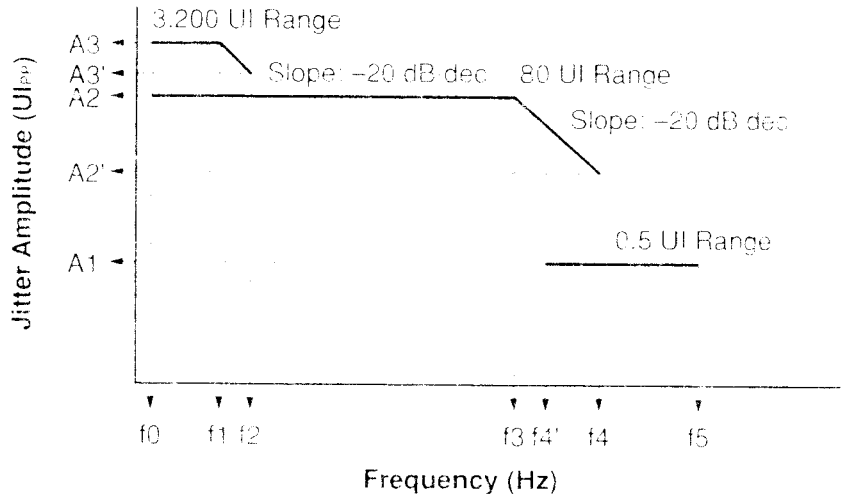
Section	Specification Item	Specification Value		
1	Jitter Clock Output			
1.1	Frequency	2,488.32 MHz, 4,976.64 MHz, 9,953.28 MHz		
1.2	Termination/Level	50 Ω/+5 dBm ± 3 dB		
1.3	Connector	APC 3.5 (Clock Output)		
2	Jitter Clock Input			
2.1	Frequency	2,488.32 MHz ±50 ppm, 4,976.64 MHz ±30 ppm, 9,953.28 MHz ±20 ppm		
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{p-p} 0.15 V to 1.3 V_{p-p} (with Option 19)		
2.3	Connector	APC 3.5 (Clock Input)		
3	Ext. Ref. Clock Input			
3.1	Frequency	155.52 MHz ±50 ppm		
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{p-p}		
3.3	Connector	SMA (Clock Input)		
4	DCS Input			
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)		
4.2	Level	Unbalance:	1.544 MHz,	
			2.048 MHz (CLOCK):	1.125 V_{p-p} ±3 dB G.703
			2.048 Mbit/s (HDB3):	2.37 V_{p-p} ±10 % G.703
		Balance:	1.544 Mbit/s, 2.048 Mbit/s:	
			3.0 V_{p-p} ±2 dB ANSI T1.102-1987	
4.3	Connector	Unbalance:	75 Ω/BNC	
		Balance:	100 Ω/Weco 310 Compatible	(1.544 Mbit/s)
			120 Ω/3-Pole CF	(2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/9,953.28 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/4,976.64 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,488.32 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.5 V_{PP}	(at 9,953.28 Mbit/s)	
		0.5 UI_{PP} ±15 %/1 V_{PP}	(at 4,976.64 Mbit/s)	
		0.5 UI_{PP} ±15 %/2 V_{PP}	(at 2,488.32 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(9,953.28 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(4,976.64 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,488.32 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(9,953.28 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(4,976.64 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,488.32 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Connector	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	[Clock mode]	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 2 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal	Reference signal synchronous with the internal reference signal
	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	155.52 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 Vp-p
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency, Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK): 1.125 Vp-p ±34 % G.703 2.048 Mbit/s (HDB3): 2.37 Vp-p ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s: 3.0 Vp-p ±24 % ANSI T1.102-1987
8.1.3.3	Connector	Unbalance: 75 Ω BNC Balance: 100 Ω Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CP (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	[Variable frequency]	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	2,488.32 Mbit/s, 4,976.64 Mbit/s, 9,953.28 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/9,953.28 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/4,976.64 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,488.32 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(9,953.28 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(4,976.64 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,488.32 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(9,953.28 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(4,976.64 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,488.32 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.5 V_{PP}	(at 9,953.28 Mbit/s)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1 V_{PP}	(at 4,976.64 Mbit/s)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/2 V_{PP}	(at 2,488.32 Mbit/s)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (9,953.28 Mbit/s only)		

Section	Specification Item	Specification Value	
8.5	Jitter modulation		
8.5.1	Range	3,200 UI Range:	Up to 3,200 UIpp (9,953.28 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UIpp (4,976.64 Mbit/s only)
		800 UI Range:	Up to 800 UIpp (2,488.32 Mbit/s only)
		80 UI Range:	Up to 80 UIpp (9,953.28 Mbit/s only)
		40 UI Range:	Up to 40 UIpp (4,976.64 Mbit/s only)
		20 UI Range:	Up to 20 UIpp (2,488.32 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UIpp
8.5.2	Amount of modulation	[Bit Rate: at 9,953.28 Mbit/s]	

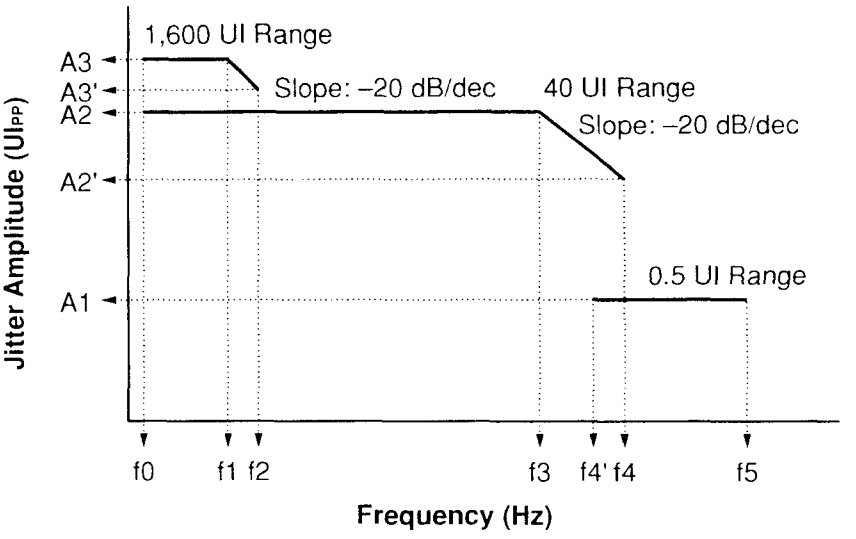


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
9,953.28 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UIpp	4 UIpp	80 UIpp	100 UIpp	3,200 UIpp

Section	Specification Item	Specification Value

[Bit Rate: at 4,976.64 Mbit/s]

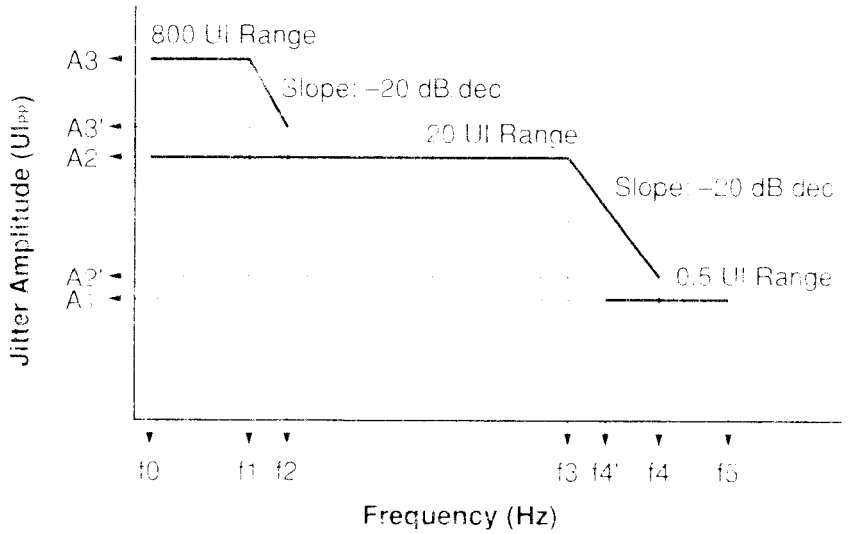


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
4,976.64 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UIPP	2 UIPP	40 UIPP	50 UIPP	1,600 UIPP

Section	Specification Item	Specification Value

[Bit Rate: at 2,488.32 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
2,488.32 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIpp	1 UIpp	20 UIpp	25 UIpp	800 UIpp

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIpp at 10 Hz	(at 9,953.28 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIpp at 10 Hz	(at 4,976.64 Mbit/s)
800 UI Range:	±5 % ± 5 UIpp at 10 Hz	(at 2,488.32 Mbit/s)
80 UI Range:	±5 % ±0.8 UIpp at 100 kHz	(at 9,953.28 Mbit/s)
40 UI Range:	±5 % ±0.6 UIpp at 100 kHz	(at 4,976.64 Mbit/s)
20 UI Range:	±5 % ±0.3 UIpp at 100 kHz	(at 2,488.32 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIpp at 100 kHz	(at 9,953.28 Mbit/s)
	±5 % ±0.08 UIpp at 100 kHz	(at 4,976.64 Mbit/s)
	±5 % ±0.05 UIpp at 100 kHz	(at 2,488.32 Mbit/s)

Frequency error (100 kHz set as the reference)

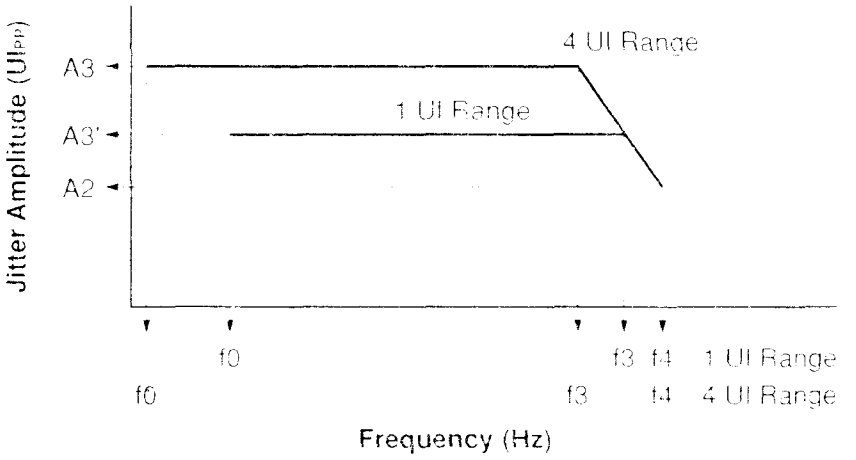
10 Hz to 20 Hz:	±5 %
20 Hz to 300 kHz:	±2 %
300 kHz to 1 MHz:	±3 %
1 MHz to 3 MHz:	±5 %
3 MHz to 10 MHz:	±10 %
10 MHz to 80 MHz:	±5 %

Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	2,488.32 MHz ±50 ppm, 4,976.64 MHz ±30 ppm, 9,953.28 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
2,488.32 M	5 k	–	1 M	–	12 k	20 M
4,976.64 M	8 k	–	2 M	–	12 k	40 M
9,953.28 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value
8.8.7	Measuring range	



Bit Rate (bit s)	Range	f0	f3	f4	A2	A3'	A3
2,488.32 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIpp	1 UIpp	
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIpp		4 UIpp
4,976.64 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIpp	1 UIpp	
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIpp		4 UIpp
9,953.28 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIpp	1 UIpp	
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIpp		4 UIpp

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIpp, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIpp/at 100 kHz 4 UI Range: ±5 % ±W UIpp/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W *1		Y *2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
2,488.32 M	0.05 UIpp	0.22 UIpp	0.008 UIrms	0.08 UIrms
4,976.64 M	0.07 UIpp	0.24 UIpp	0.009 UIrms	0.09 UIrms
9,953.28 M	0.09 UIpp	0.26 UIpp	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alarm	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Weight	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.2 Option 01

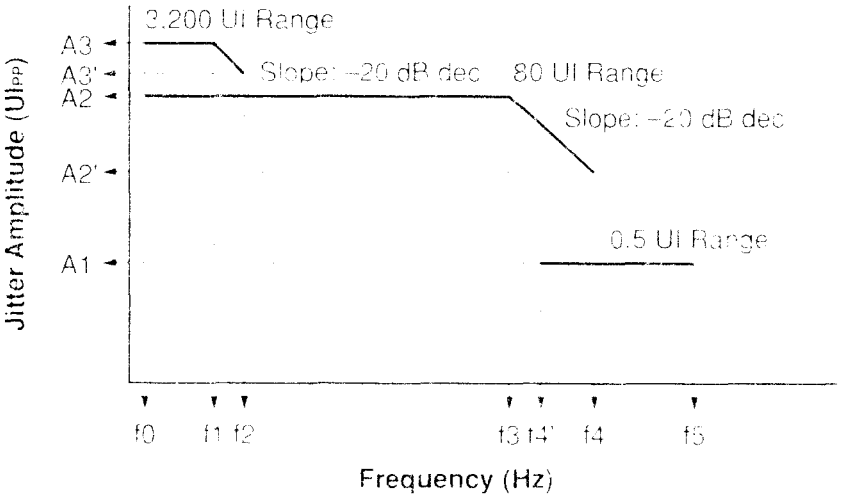
Section	Specification Item	Specification Value		
1	Jitter Clock Output			
1.1	Frequency	2,494.16 MHz, 4,988.32 MHz, 9,976.64 MHz		
1.2	Termination/Level	50 Ω +5 dBm ±3 dB		
1.3	Connector	APC 3.5 (Clock Output)		
2	Jitter Clock Input			
2.1	Frequency	2,494.16 MHz ±50 ppm, 4,988.32 MHz ±30 ppm, 9,976.64 MHz ±20 ppm		
2.2	Termination/Level	50 Ω/0.7 V to 1.3 Vp 0.15 V to 1.3 Vp (with Option 10)		
2.3	Connector	APC 3.5 (Clock Input)		
3	Ext. Ref. Clock Input			
3.1	Frequency	155.885 MHz		
3.2	Termination/Level	50 Ω/0.7 V to 1.3 Vp		
3.3	Connector	SMA (Clock Input)		
4	DCS Input			
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)		
4.2	Level	Unbalance:	1.544 MHz,	
			2.048 MHz (CLOCK):	1.125 Vp ±24 % G.703
			2.048 Mbit/s (HDB3):	2.37 Vp ±10 % G.703
		Balance:	1.544 Mbit/s, 2.048 Mbit/s:	
			3.0 Vp ±24 % ANSI T1.102-1987	
4.3	Connector	Unbalance:	75 Ω BNC	
		Balance:	100 Ω/Western 310 Compatible	(1.544 Mbit/s)
			120 Ω/3-Pole CF	(2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/9,976.64 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/4,988.32 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,494.16 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.5 V_{PP}	(at 9,976.64 Mbit/s)	
		0.5 UI_{PP} ±15 %/1 V_{PP}	(at 4,988.32 Mbit/s)	
		0.5 UI_{PP} ±15 %/2 V_{PP}	(at 2,499.16 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(9,976.64 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(4,988.32 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,494.16 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(9,976.64 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(4,988.32 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,499.16 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Connector	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 1.5 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	155.885 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 Vp-p
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK): 1.125 Vp-p ±34 % G.703 2.048 Mbit/s (HDB3): 2.37 Vp-p ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s: 3.0 Vp-p ±24 % ANSI T1.102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CI (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	2,494.16 Mbit/s, 4,988.32 Mbit/s, 9,976.64 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(0.5 UI Range/9,976.64 Mbit/s)	
		100 kHz to 40 MHz	(0.5 UI Range/4,988.32 Mbit/s)	
		100 kHz to 20 MHz	(0.5 UI Range/2,494.16 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(9,976.64 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(4,988.32 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,494.16 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(9,976.64 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(4,988.32 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,494.16 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.5 V_{PP}	(9,976.64 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1 V_{PP}	(4,988.32 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/2 V_{PP}	(2,494.16 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (9,976.64 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UIpp	(9,976.64 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UIpp	(4,988.32 Mbit/s only)
		800 UI Range:	Up to 800 UIpp	(2,494.16 Mbit/s only)
		80 UI Range:	Up to 80 UIpp	(9,976.64 Mbit/s only)
		40 UI Range:	Up to 40 UIpp	(4,988.32 Mbit/s only)
		20 UI Range:	Up to 20 UIpp	(2,494.16 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UIpp	
8.5.2	Amount of modulation	**[Bit Rate: at 9.976.64 Mbit/s]**		

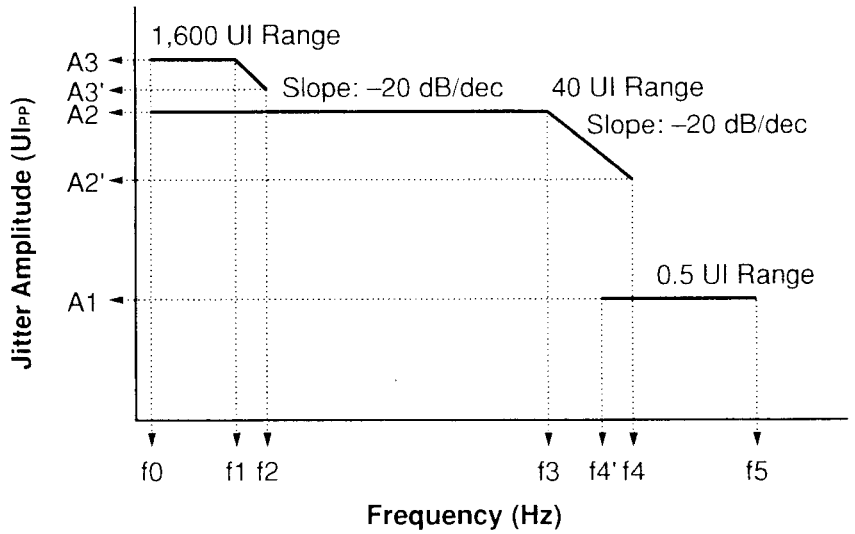


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
9,976,64 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UIpp	4 UIpp	80 UIpp	100 UIpp	3,200 UI

Section	Specification Item	Specification Value

[Bit Rate: at 4,988.32 Mbit/s]

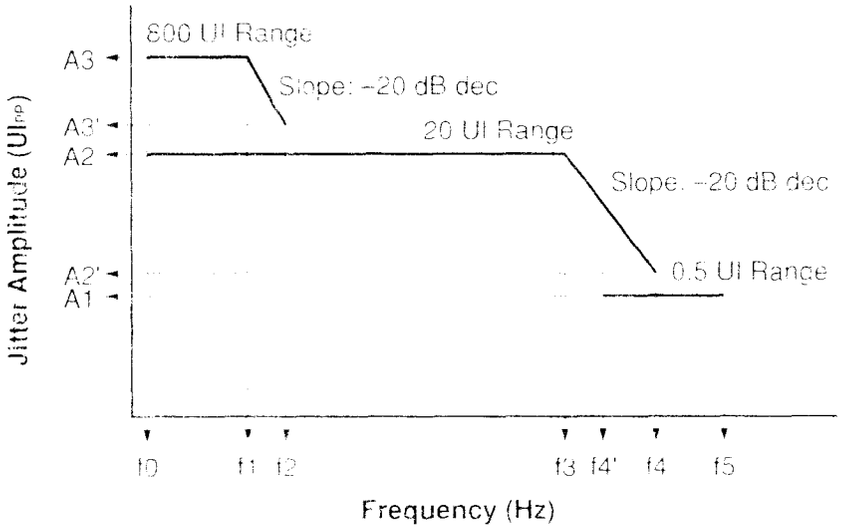


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
4,988.32 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UIPP	2 UIPP	40 UIPP	50 UIPP	1,600 UIPP

Section	Specification Item	Specification Value

[Bit Rate: at 2,494.16 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
2,494.16 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
2[illegible] MHz	0.5 UIpp	1 UIpp	20 UIpp	25 UIpp	800 UIpp

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIpp (at 10 Hz	(at 9,976.64 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIpp (at 10 Hz	(at 4,988.32 Mbit/s)
800 UI Range:	±5 % ± 5 UIpp (at 10 Hz	(at 2,494.16 Mbit/s)
80 UI Range:	±5 % ±0.8 UIpp at 100 kHz	(at 9,976.64 Mbit/s)
40 UI Range:	±5 % ±0.6 UIpp at 100 kHz	(at 4,988.32 Mbit/s)
20 UI Range:	±5 % ±0.3 UIpp (at 100 kHz	(at 2,494.16 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIpp (at 100 kHz	(at 9,976.64 Mbit/s)
	±5 % ±0.08 UIpp at 100 kHz	(at 4,988.32 Mbit/s)
	±5 % ±0.05 UIpp at 100 kHz	(at 2,494.16 Mbit/s)

Frequency error (100 kHz set as the reference)

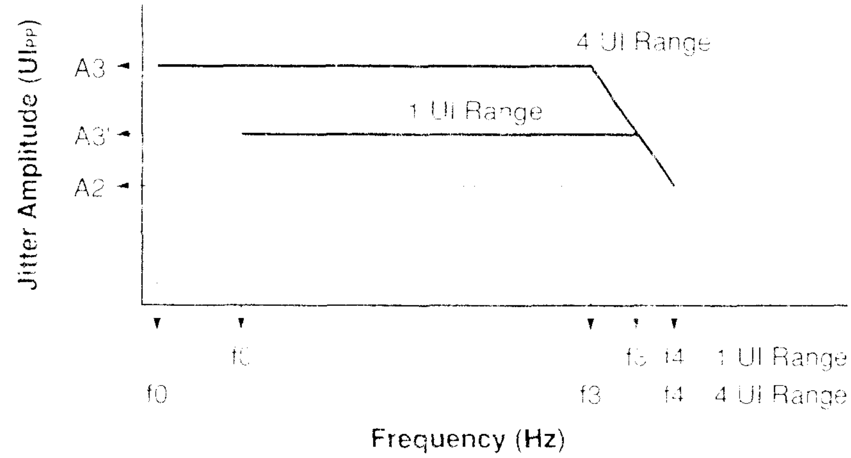
10 Hz to 20 Hz: ±5 %
20 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	2,494.16 MHz ±50 ppm, 4,988.32 MHz ±30 ppm, 9,976.64 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
2,494.16 M	5 k	–	1 M	–	12 k	20 M
4,988.32 M	8 k	–	2 M	–	12 k	40 M
9,976.64 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value
8.8.7	Measuring range	



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
2,494.16 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIpp	1 UIpp	
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIpp		4 UIpp
4,988.32 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIpp	1 UIpp	
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIpp		4 UIpp
9,976.64 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIpp	1 UIpp	
	4 UI	200 Hz	10 MHz	80 MHz	0.5 UIpp		4 UIpp

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIpp, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIpp/at 100 kHz 4 UI Range: ±5 % ±W UIpp/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
2,494.16 M	0.05 UIpp	0.22 UIpp	0.008 UIrms	0.08 UIrms
4,988.32 M	0.07 UIpp	0.24 UIpp	0.009 UIrms	0.09 UIrms
9,976.64 M	0.09 UIpp	0.26 UIpp	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alarm	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Weight	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.3 Option 02

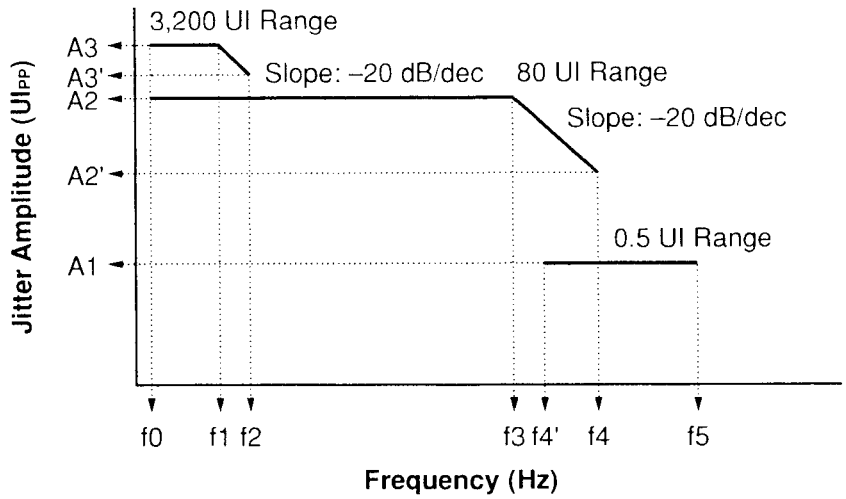
Section	Specification Item	Specification Value	
1	Jitter Clock Output		
1.1	Frequency	2,666.057 MHz, 5,332.114 MHz, 10,664.228 MHz	
1.2	Termination/Level	50 Ω/+5 dBm ±3 dB	
1.3	Connector	APC 3.5 (Clock Output)	
2	Jitter Clock Input		
2.1	Frequency	2,666.057 MHz ±50 ppm, 5,332.114 MHz ±30 ppm, 10,664.228 MHz ±20 ppm	
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{pp} 0.15 V to 1.3 V_{pp} (with Option 10)	
2.3	Connector	APC 3.5 (Clock Input)	
3	Ext. Ref. Clock Input		
3.1	Frequency	166.62857 MHz	
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{pp}	
3.3	Connector	SMA (Clock Input)	
4	DCS Input		
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI-B8ZS) or 1.544 MHz ±50 ppm (CLOCK)	
4.2	Level	Unbalance:	1.544 MHz, 2.048 MHz (CLOCK): 1.125 V_{pp} ±3 % G.703 2.048 Mbit/s (HDB3): 2.37 V_{pp} ±10 % G.703
		Balance:	1.544 Mbit/s, 2.048 Mbit/s: 3.0 V_{pp} ±2.4 % ANSI T1.102-1987
4.3	Connector	Unbalance:	75 Ω/BNC
		Balance:	100 Ω Wecо 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CP (2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,664.228 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,332.114 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,666.057 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.5 V_{PP}	(at 10,664.228 Mbit/s)	
		0.5 UI_{PP} ±15 %/1 V_{PP}	(at 5,332.114 Mbit/s)	
		0.5 UI_{PP} ±15 %/2 V_{PP}	(at 2,666.057 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,664.228 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,332.114 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,666.057 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,664.228 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,332.114 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,666.057 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Tangential line	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (BNC), Lock 2 MHz (UBNC), Lock 2 Mbit/s (BNC), Lock 2 Mbit/s (UBNC), Lock 1.5 MHz (UBNC), Lock 1.5 Mbit/s (BNC), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the EXT. REF. CLOCK Input
8.1.2.1	Frequency	166.62857 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{p-p}
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK): 1.125 V_{p-p} ±34 % G.703 2.048 Mbit/s (HDB3): 2.37 V_{p-p} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s: 3.0 V_{p-p} ±24 % ANSI T1.102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Western 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CPC (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.3 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	2,666.057 Mbit/s, 5,332.114 Mbit/s, 10,664.228 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,664.228 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,332.114 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,666.057 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,664.228 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,332.114 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,666.057 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,664.228 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,332.114 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,666.057 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.5 V_{PP}	(10,664.228 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1 V_{PP}	(5,332.114 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/2 V_{PP}	(2,666.057 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (10,664.228 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UI_{PP}	(10,664.228 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UI_{PP}	(5,332.114 Mbit/s only)
		800 UI Range:	Up to 800 UI_{PP}	(2,666.057 Mbit/s only)
		80 UI Range:	Up to 80 UI_{PP}	(10,664.228 Mbit/s only)
		40 UI Range:	Up to 40 UI_{PP}	(5,332.114 Mbit/s only)
		20 UI Range:	Up to 20 UI_{PP}	(2,666.057 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UI_{PP}	
8.5.2	Amount of modulation	**[Bit Rate: at 10,664.228 Mbit/s]**		

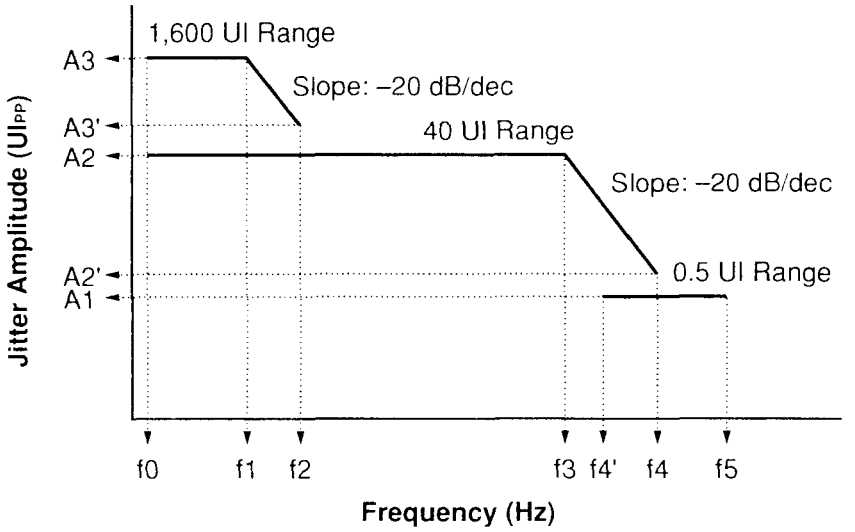


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
10,664.228 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UI_{PP}	4 UI_{PP}	80 UI_{PP}	100 UI_{PP}	3,200 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 5,332.114 Mbit/s]

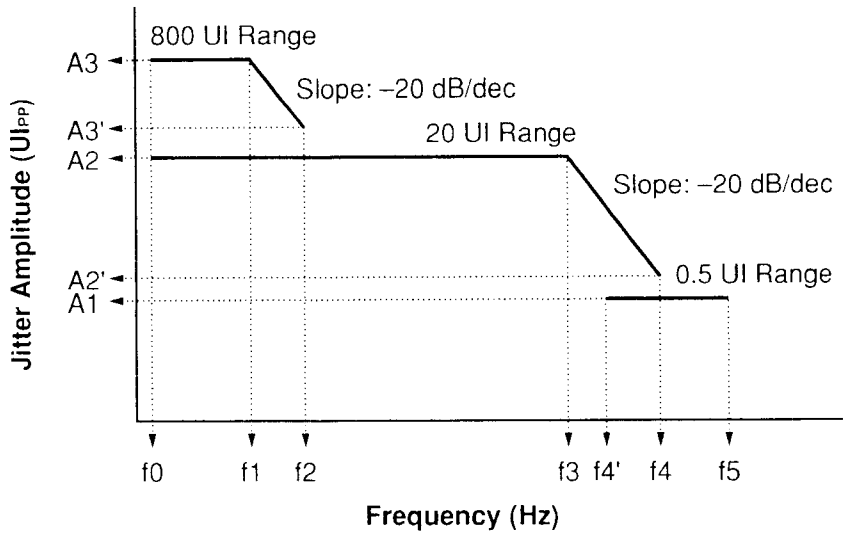


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
5,332.114 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UI_{PP}	2 UI_{PP}	40 UI_{PP}	50 UI_{PP}	1.600 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 2,666.057 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
2,666.057 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIPP	1 UIPP	20 UIPP	25 UIPP	800 UIPP

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIPP/at 10 Hz	(at 10,664.228 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIPP/at 10 Hz	(at 5,332.114 Mbit/s)
800 UI Range:	±5 % ± 5 UIPP/at 10 Hz	(at 2,666.057 Mbit/s)
80 UI Range:	±5 % ±0.8 UIPP/at 100 kHz	(at 10,664.228 Mbit/s)
40 UI Range:	±5 % ±0.6 UIPP/at 100 kHz	(at 5,332.114 Mbit/s)
20 UI Range:	±5 % ±0.3 UIPP/at 100 kHz	(at 2,666.057 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIPP/at 100 kHz	(at 10,664.228 Mbit/s)
	±5 % ±0.08 UIPP/at 100 kHz	(at 5,332.114 Mbit/s)
	±5 % ±0.05 UIPP/at 100 kHz	(at 2,666.057 Mbit/s)

Frequency error (100 kHz set as the reference)

10 Hz to 20 Hz:	±5 %
20 Hz to 300 kHz:	±2 %
300 kHz to 1 MHz:	±3 %
1 MHz to 3 MHz:	±5 %
3 MHz to 10 MHz:	±10 %
10 MHz to 80 MHz:	±15 %

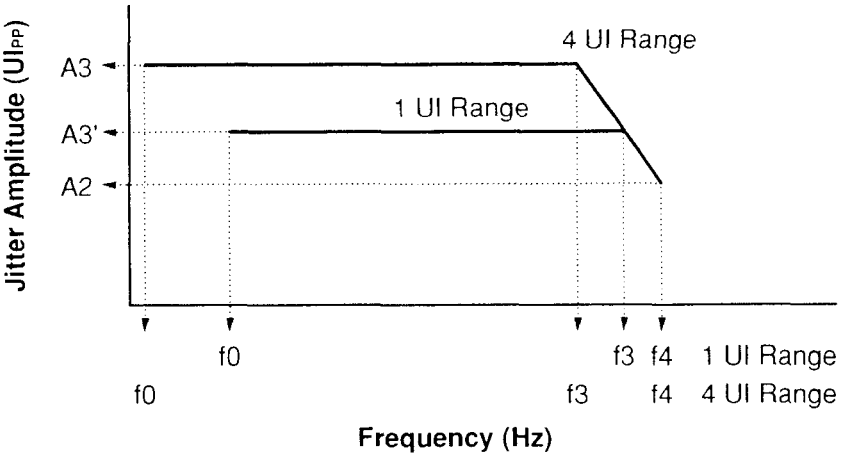
Section	Specification Item	Specification Value
8.6	**[Jitter measurement]**	
	Jitter signal input	
8.6.1	Frequency	2,666.057 MHz ±50 ppm, 5,332.114 MHz ±30 ppm, 10,664.228 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
2,666.057 M	5 k	–	1 M	–	12 k	20 M
5,332.114 M	8 k	–	2 M	–	12 k	40 M
10,664.228 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value

8.8.7 Measuring range



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
2,666.057 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIPP	–	4 UIPP
5,332.114 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIPP	–	4 UIPP
10,664.228 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIPP	–	4 UIPP

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIpp, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIpp/at 100 kHz 4 UI Range: ±5 % ±W UIpp/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
2,666.057 M	0.05 UIpp	0.22 UIpp	0.008 UIrms	0.08 UIrms
5,332.114 M	0.07 UIpp	0.24 UIpp	0.009 UIrms	0.09 UIrms
10,664.228 M	0.09 UIpp	0.26 UIpp	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alram	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Weight	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.4 Option 04

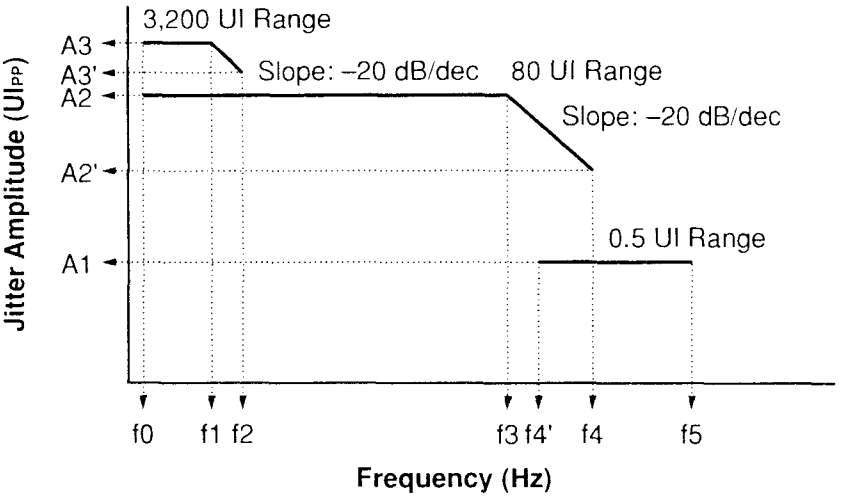
Section	Specification Item	Specification Value		
1	Jitter Clock Output			
1.1	Frequency	3,062.3629 MHz, 6,124.7259 MHz, 12,249.4517 MHz		
1.2	Termination/Level	50 Ω/+5 dBm ±3 dB		
1.3	Connector	APC 3.5 (Clock Output)		
2	Jitter Clock Input			
2.1	Frequency	3,062.3629 MHz ±50 ppm, 6,124.7259 MHz ±30 ppm, 12,249.4517 MHz ±20 ppm		
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP} 0.15 V to 1.3 V_{PP} (with Option 10)		
2.3	Connector	APC 3.5 (Clock Input)		
3	Ext. Ref. Clock Input			
3.1	Frequency	191.39768 MHz		
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}		
3.3	Connector	SMA (Clock Input)		
4	DCS Input			
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)		
4.2	Level	Unbalance:	1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{0P} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{0P} ±10 % G.703	
		Balance:	1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{0P} ±24 % ANSI T1 102-1987	
4.3	Connector	Unbalance:	75 Ω/BNC	
		Balance:	100 Ω/Weco 310 Compatible	(1.544 Mbit/s)
			120 Ω/3-Pole CF	(2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/12,249.4517 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/6,124.7259 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/3,062.3629 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.375 V_{PP}	(at 12,249.4517 Mbit/s)	
		0.5 UI_{PP} ±15 %/0.75 V_{PP}	(at 6,124.7259 Mbit/s)	
		0.5 UI_{PP} ±15 %/1.5 V_{PP}	(at 3,062.3629 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(12,249.4517 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(6,124.7259 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(3,062.3629 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(12,249.4517 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(6,124.7259 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(3,062.3629 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Tangential line	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 2 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	191.39768 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{OP} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{OP} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{OP} ±24 % ANSI T1 102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	3,062.3629 Mbit/s, 6,124.7259 Mbit/s, 12,249.4517 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/12,249.4517 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/6,124.7259 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/3,062.3629 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(12,249.4517 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(6,124.7259 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(3,062.3629 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(12,249.4517 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(6,124.7259 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(3,062.3629 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.375 V_{PP}	(12,249.4517 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.75 V_{PP}	(6,124.7259 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1.5 V_{PP}	(3,062.3629 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (12,249.4517 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UI_{PP}	(12,249.4517 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UI_{PP}	(6,124.7259 Mbit/s only)
		800 UI Range:	Up to 800 UI_{PP}	(3,062.3629 Mbit/s only)
		80 UI Range:	Up to 80 UI_{PP}	(12,249.4517 Mbit/s only)
		40 UI Range:	Up to 40 UI_{PP}	(6,124.7259 Mbit/s only)
		20 UI Range:	Up to 20 UI_{PP}	(3,062.3629 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UI_{PP}	
8.5.2	Amount of modulation	**[Bit Rate: at 12,249.4517 Mbit/s]**		

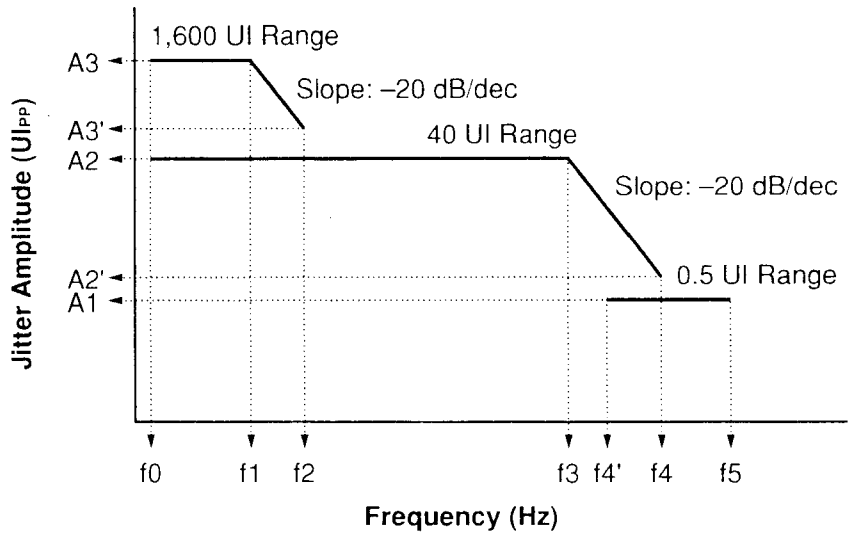


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
12,249.4517 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UI_{PP}	4 UI_{PP}	80 UI_{PP}	100 UI_{PP}	3,200 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 6,124.7259 Mbit/s]

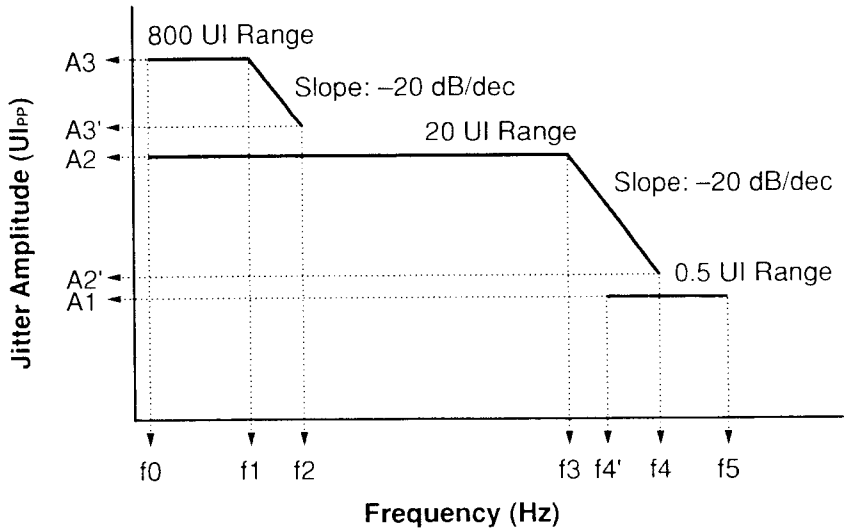


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
6,124.7259 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UI_{PP}	2 UI_{PP}	40 UI_{PP}	50 UI_{PP}	1,600 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 3,062.3629 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
3,062.3629 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIPP	1 UIPP	20 UIPP	25 UIPP	800 UIPP

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIPP/at 10 Hz	(at 12,249.4517 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIPP/at 10 Hz	(at 6,124.7259 Mbit/s)
800 UI Range:	±5 % ± 5 UIPP/at 10 Hz	(at 3,062.3629 Mbit/s)
80 UI Range:	±5 % ±0.8 UIPP/at 100 kHz	(at 12,249.4517 Mbit/s)
40 UI Range:	±5 % ±0.6 UIPP/at 100 kHz	(at 6,124.7259 Mbit/s)
20 UI Range:	±5 % ±0.3 UIPP/at 100 kHz	(at 3,062.3629 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIPP/at 100 kHz	(at 12,249.4517 Mbit/s)
	±5 % ±0.08 UIPP/at 100 kHz	(at 6,124.7259 Mbit/s)
	±5 % ±0.05 UIPP/at 100 kHz	(at 3,062.3629 Mbit/s)

Frequency error (100 kHz set as the reference)

10 Hz to 20 Hz:	±5 %
20 Hz to 300 kHz:	±2 %
300 kHz to 1 MHz:	±3 %
1 MHz to 3 MHz:	±5 %
3 MHz to 10 MHz:	±10 %
10 MHz to 80 MHz:	±15 %

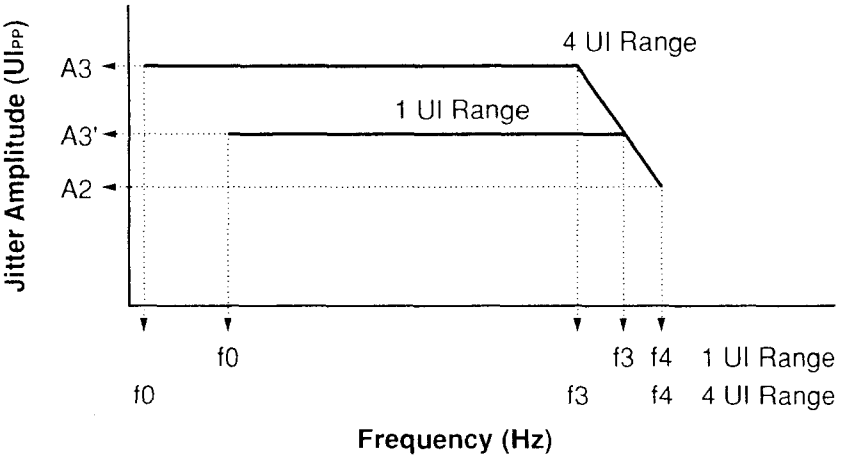
Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	3,062.3629 MHz ±50 ppm, 6,124.7259 MHz ±30 ppm, 12,249.4517 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
3,062.3629 M	5 k	–	1 M	–	12 k	20 M
6,124.7259 M	8 k	–	2 M	–	12 k	40 M
12,249.4517 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value

8.8.7 Measuring range



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
3,062.3629 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIPP	–	4 UIPP
6,124.7259 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIPP	–	4 UIPP
12,249.4517 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIPP	–	4 UIPP

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIPP, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIPP/at 100 kHz 4 UI Range: ±5 % ±W UIPP/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
3,062.3629 M	0.05 UIPP	0.22 UIPP	0.008 UIrms	0.08 UIrms
6,124.7259 M	0.07 UIPP	0.24 UIPP	0.009 UIrms	0.09 UIrms
12,249.4517 M	0.09 UIPP	0.26 UIPP	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alram	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Weight	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.5 Option 05

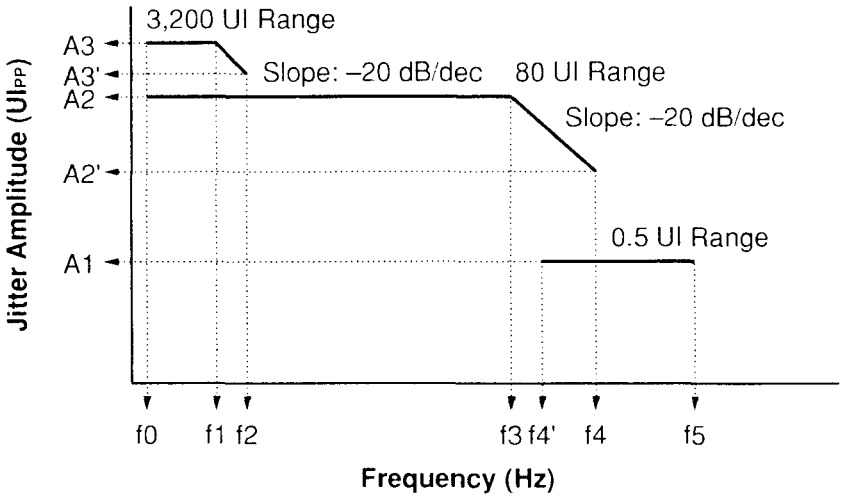
Section	Specification Item	Specification Value	
1	Jitter Clock Output		
1.1	Frequency	3,069 MHz, 6,138 MHz, 12,276 MHz	
1.2	Termination/Level	50 Ω/+5 dBm ±3 dB	
1.3	Connector	APC 3.5 (Clock Output)	
2	Jitter Clock Input		
2.1	Frequency	3,069 MHz ±50 ppm, 6,138 MHz ±30 ppm, 12,276 MHz ±20 ppm	
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP} 0.15 V to 1.3 V_{PP} (with Option 10)	
2.3	Connector	APC 3.5 (Clock Input)	
3	Ext. Ref. Clock Input		
3.1	Frequency	191.8125 MHz	
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}	
3.3	Connector	SMA (Clock Input)	
4	DCS Input		
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)	
4.2	Level	Unbalance:	1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{OP} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{OP} ±10 % G.703
		Balance:	1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{OP} ±24 % ANSI T1 102-1987
4.3	Connector	Unbalance:	75 Ω/BNC
		Balance:	100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/12,276 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/6,138 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/3,069 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.375 V_{PP}	(at 12,276 Mbit/s)	
		0.5 UI_{PP} ±15 %/0.75 V_{PP}	(at 6,138 Mbit/s)	
		0.5 UI_{PP} ±15 %/1.5 V_{PP}	(at 3,069 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(12,276 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(6,138 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(3,069 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(12,276 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(6,138 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(3,069 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Tangential line	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 2 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	191.8125 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{0P} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{0P} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{0P} ±24 % ANSI T1 102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	3,069 Mbit/s, 6,138 Mbit/s, 12,276 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/12,276 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/6,138 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/3,069 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(12,276 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(6,138 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(3,069 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(12,276 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(6,138 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(3,069 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.375 V_{PP}	(12,276 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.75 V_{PP}	(6,138 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1.5 V_{PP}	(3,069 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (12,276 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UI_{PP}	(12,276 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UI_{PP}	(6,138 Mbit/s only)
		800 UI Range:	Up to 800 UI_{PP}	(3,069 Mbit/s only)
		80 UI Range:	Up to 80 UI_{PP}	(12,276 Mbit/s only)
		40 UI Range:	Up to 40 UI_{PP}	(6,138 Mbit/s only)
		20 UI Range:	Up to 20 UI_{PP}	(3,069 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UI_{PP}	
8.5.2	Amount of modulation	**[Bit Rate: at 12,276 Mbit/s]**		

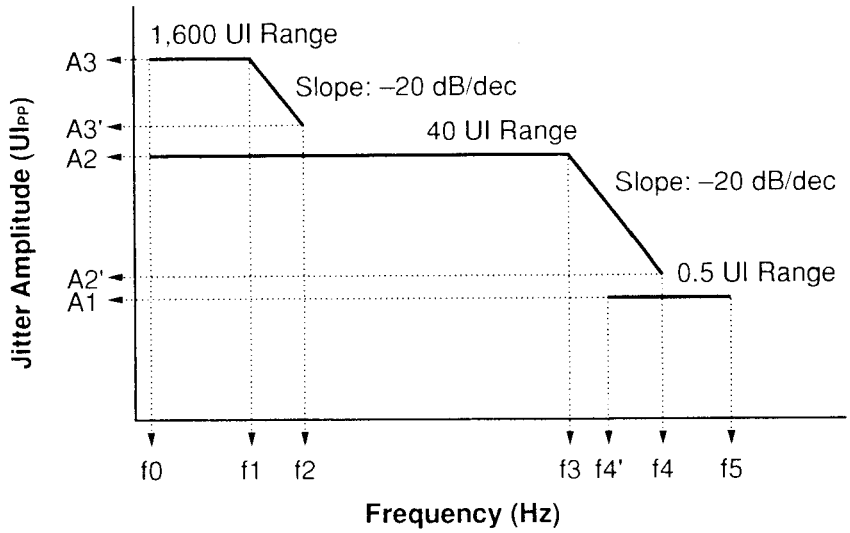


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
12.276 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UI_{PP}	4 UI_{PP}	80 UI_{PP}	100 UI_{PP}	3,200 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 6,138 Mbit/s]

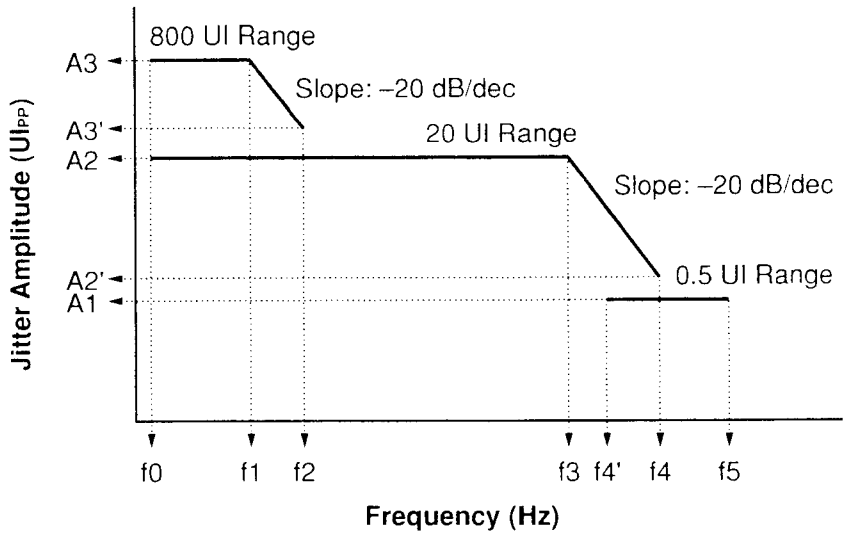


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
6,138 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UIPP	2 UIPP	40 UIPP	50 UIPP	1.600 UIPP

Section	Specification Item	Specification Value

[Bit Rate: at 3,069 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
3,069 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIPP	1 UIPP	20 UIPP	25 UIPP	800 UIPP

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIPP/at 10 Hz	(at 12,276 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIPP/at 10 Hz	(at 6,138 Mbit/s)
800 UI Range:	±5 % ± 5 UIPP/at 10 Hz	(at 3,069 Mbit/s)
80 UI Range:	±5 % ±0.8 UIPP/at 100 kHz	(at 12,276 Mbit/s)
40 UI Range:	±5 % ±0.6 UIPP/at 100 kHz	(at 6,138 Mbit/s)
20 UI Range:	±5 % ±0.3 UIPP/at 100 kHz	(at 3,069 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIPP/at 100 kHz	(at 12,276 Mbit/s)
	±5 % ±0.08 UIPP/at 100 kHz	(at 6,138 Mbit/s)
	±5 % ±0.05 UIPP/at 100 kHz	(at 3,069 Mbit/s)

Frequency error (100 kHz set as the reference)

10 Hz to 20 Hz: ±5 %
20 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

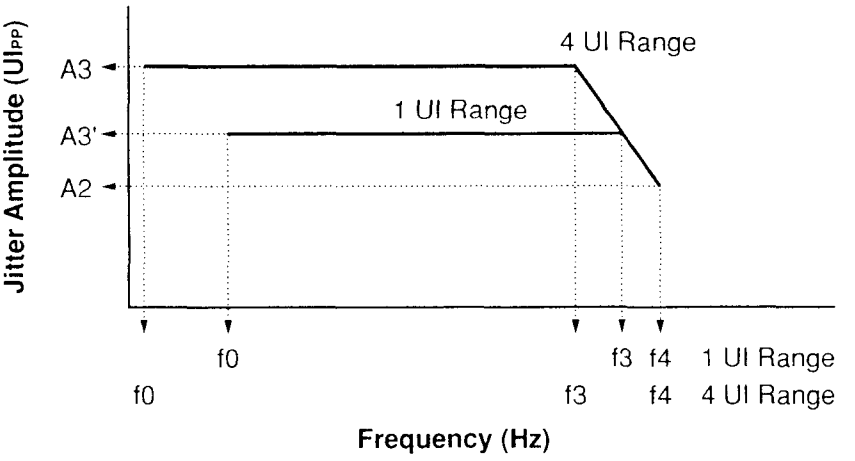
Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	3,069 MHz ±50 ppm, 6,138 MHz ±30 ppm, 12,276 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
3,069 M	5 k	–	1 M	–	12 k	20 M
6,138 M	8 k	–	2 M	–	12 k	40 M
12,276 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value

8.8.7 Measuring range



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
3,069 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIPP	–	4 UIPP
6,138 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIPP	–	4 UIPP
12,276 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIPP	–	4 UIPP

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIPP, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIPP/at 100 kHz 4 UI Range: ±5 % ±W UIPP/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
3,069 M	0.05 UIPP	0.22 UIPP	0.008 UIrms	0.08 UIrms
6,138 M	0.07 UIPP	0.24 UIPP	0.009 UIrms	0.09 UIrms
12,276 M	0.09 UIPP	0.26 UIPP	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alram	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Weight	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.6 Option 06

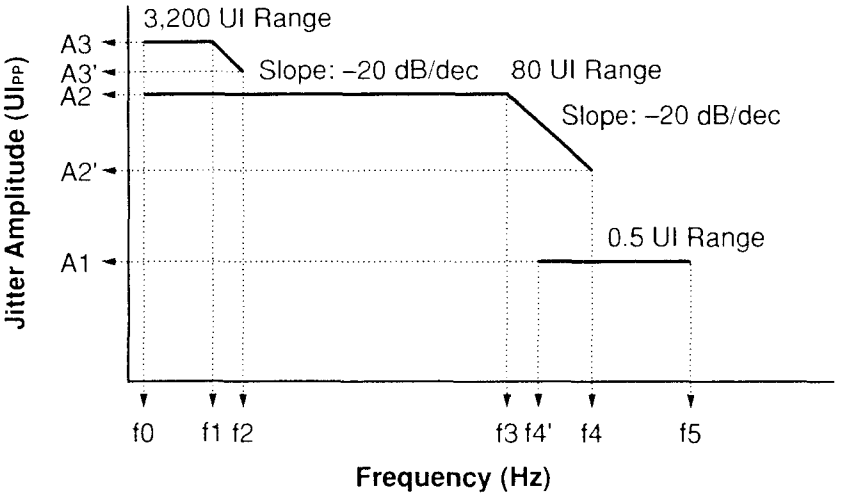
Section	Specification Item	Specification Value
1	Jitter Clock Output	
1.1	Frequency	2,677.3063 MHz, 5,354.6127 MHz, 10,709.2253 MHz
1.2	Termination/Level	50 Ω/+5 dBm ±3 dB
1.3	Connector	APC 3.5 (Clock Output)
2	Jitter Clock Input	
2.1	Frequency	2,677.3063 MHz ±50 ppm, 5,354.6127 MHz ±30 ppm, 10,709.2253 MHz ±20 ppm
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP} 0.15 V to 1.3 V_{PP} (with Option 10)
2.3	Connector	APC 3.5 (Clock Input)
3	Ext. Ref. Clock Input	
3.1	Frequency	167.3316 MHz
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
3.3	Connector	SMA (Clock Input)
4	DCS Input	
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
4.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{0P} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{0P} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{0P} ±24 % ANSI T1 102-1987
4.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,709.2253 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,354.6127 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,677.3063 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.375 V_{PP}	(at 10,709.2253 Mbit/s)	
		0.5 UI_{PP} ±15 %/0.75 V_{PP}	(at 5,354.6127 Mbit/s)	
		0.5 UI_{PP} ±15 %/1.5 V_{PP}	(at 2,677.3063 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,709.2253 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,354.6127 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,677.3063 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,709.2253 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,355.6127 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,677.3063 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Tangential line	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 2 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	167.3316 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{OP} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{OP} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{OP} ±24 % ANSI T1 102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	2,677.3063 Mbit/s, 5,354.6127 Mbit/s, 10,709.2253 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,709.2253 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,354.6127 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,677.3063 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,709.2253 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,354.6127 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,677.3063 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,709.2253 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,354.6127 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,677.3063 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.375 V_{PP}	(10,709.2253 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.75 V_{PP}	(5,354.6127 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1.5 V_{PP}	(2,677.3063 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (10,709.2253 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UI_{PP}	(10,709.2253 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UI_{PP}	(5,354.6127 Mbit/s only)
		800 UI Range:	Up to 800 UI_{PP}	(2,677.3063 Mbit/s only)
		80 UI Range:	Up to 80 UI_{PP}	(10,709.2253 Mbit/s only)
		40 UI Range:	Up to 40 UI_{PP}	(5,354.6127 Mbit/s only)
		20 UI Range:	Up to 20 UI_{PP}	(2,677.3063 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UI_{PP}	
8.5.2	Amount of modulation	**[Bit Rate: at 10,709.2253 Mbit/s]**		

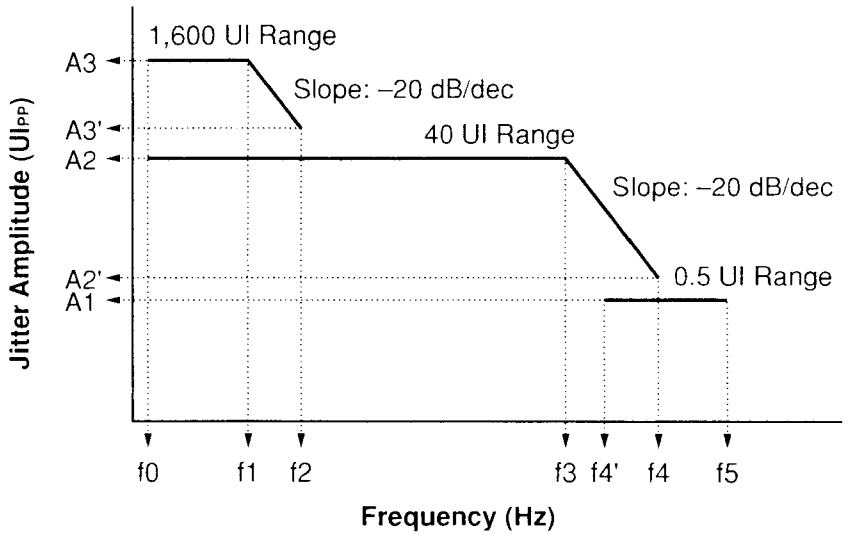


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
10,709.2253 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UI_{PP}	4 UI_{PP}	80 UI_{PP}	100 UI_{PP}	3,200 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 5,354.6127 Mbit/s]

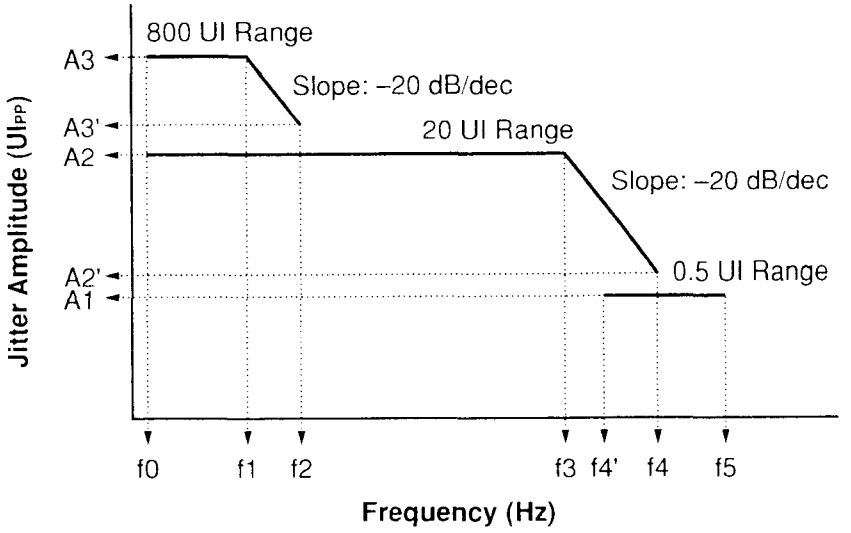


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
5,354.6127 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UIPP	2 UIPP	40 UIPP	50 UIPP	1,600 UIPP

Section	Specification Item	Specification Value

[Bit Rate: at 2,677.3063 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
2,677.3063 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIPP	1 UIPP	20 UIPP	25 UIPP	800 UIPP

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIPP/at 10 Hz	(at 10,709.2253 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIPP/at 10 Hz	(at 5,354.6127 Mbit/s)
800 UI Range:	±5 % ± 5 UIPP/at 10 Hz	(at 2,677.3063 Mbit/s)
80 UI Range:	±5 % ±0.8 UIPP/at 100 kHz	(at 10,709.2253 Mbit/s)
40 UI Range:	±5 % ±0.6 UIPP/at 100 kHz	(at 5,354.6127 Mbit/s)
20 UI Range:	±5 % ±0.3 UIPP/at 100 kHz	(at 2,677.3063 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIPP/at 100 kHz	(at 10,709.2253 Mbit/s)
	±5 % ±0.08 UIPP/at 100 kHz	(at 5,354.6127 Mbit/s)
	±5 % ±0.05 UIPP/at 100 kHz	(at 2,677.3063 Mbit/s)

Frequency error (100 kHz set as the reference)

10 Hz to 20 Hz:	±5 %
20 Hz to 300 kHz:	±2 %
300 kHz to 1 MHz:	±3 %
1 MHz to 3 MHz:	±5 %
3 MHz to 10 MHz:	±10 %
10 MHz to 80 MHz:	±15 %

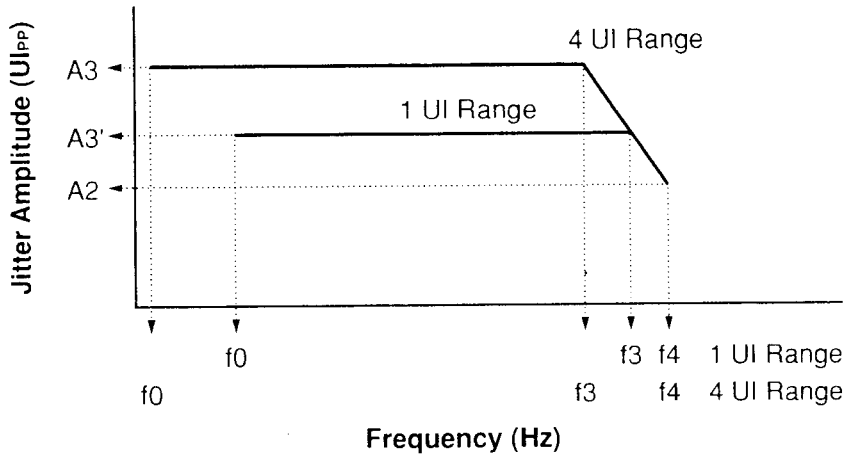
Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	2,677.3063 MHz ±50 ppm, 5,354.6127 MHz ±30 ppm, 10,709.2253 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP

Bit Rate (bit/s)	HP1 (Hz)	HP1'* (Hz)	HP2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
2,677.3063 M	5 k	–	1 M	–	12 k	20 M
5,354.6127 M	8 k	–	2 M	–	12 k	40 M
10,709.2253 M	10 k	20 k	4 M	50 k	12 k	80 M

* The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value

8.8.7 Measuring range



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
2,677.3063 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIPP	–	4 UIPP
5,354.6127 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIPP	–	4 UIPP
10,709.2253 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIPP	1 UIPP	–
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIPP	–	4 UIPP

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIpp, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIpp/at 100 kHz 4 UI Range: ±5 % ±W UIpp/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
2,677.3063 M	0.05 UIpp	0.22 UIpp	0.008 UIrms	0.08 UIrms
5,354.6127 M	0.07 UIpp	0.24 UIpp	0.009 UIrms	0.09 UIrms
10,709.2253 M	0.09 UIpp	0.26 UIpp	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alram	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Mass	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

1.2.7 Option 07

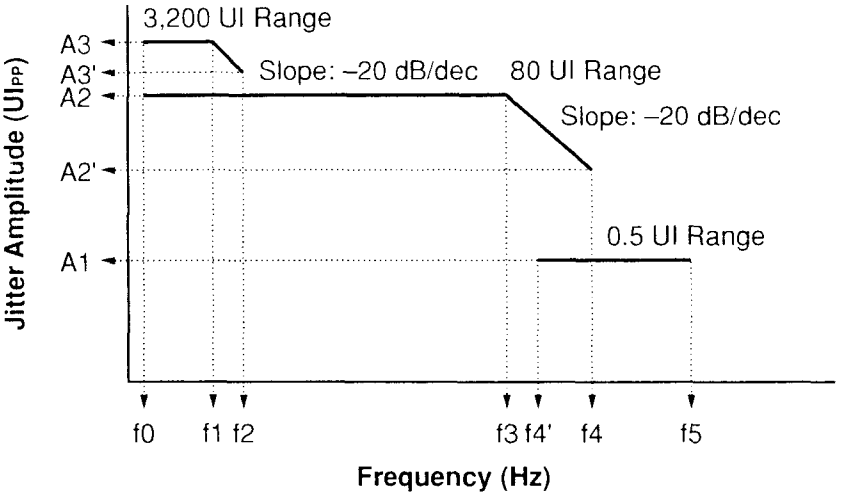
Section	Specification Item	Specification Value
1	Jitter Clock Output	
1.1	Frequency	2,578.125 MHz, 5,156.25 MHz, 10,312.5 MHz
1.2	Termination/Level	50 Ω/+5 dBm ±3 dB
1.3	Connector	APC 3.5 (Clock Output)
2	Jitter Clock Input	
2.1	Frequency	2,578.125 MHz ±50 ppm, 5,156.25 MHz ±30 ppm, 10,312.5 MHz ±20 ppm
2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP} 0.15 V to 1.3 V_{PP} (with Option 10)
2.3	Connector	APC 3.5 (Clock Input)
3	Ext. Ref. Clock Input	
3.1	Frequency	161.13281 MHz
3.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
3.3	Connector	SMA (Clock Input)
4	DCS Input	
4.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
4.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{OP} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{OP} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{OP} ±24 % ANSI T1 102-1987
4.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)

Section	Specification Item	Specification Value		
5	Ext. Mod. Input			
5.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,312.5 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,156.25 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,578.125 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
5.2	Sensitivity	(0.5 UI Range)		
		0.5 UI_{PP} ±15 %/0.375 V_{PP}	(at 10,312.5 Mbit/s)	
		0.5 UI_{PP} ±15 %/0.75 V_{PP}	(at 5,156.25 Mbit/s)	
		0.5 UI_{PP} ±15 %/1.5 V_{PP}	(at 2,578.125 Mbit/s)	
		(3,200 UI, 1,600 UI, 800 UI, 80 UI, 40 UI, 20 UI Range)		
		3,200 Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,312.5 Mbit/s only)
		1,600 Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,156.25 Mbit/s only)
		800 Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,578.125 Mbit/s only)
		80 Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,312.5 Mbit/s only)
		40 Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,156.25 Mbit/s only)
		20 Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,578.125 Mbit/s only)
5.3	Termination	50 Ω		
5.4	Connector	BNC (Ext. Mod. Input)		
6	Demod. Output			
6.1	Frequency range	100 Hz to 80 MHz		
6.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range), 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)		
6.3	Termination	50 Ω		
6.4	Tangential line	BNC (Demod. Output)		
7	10M STD Input			
7.1	Frequency range	10 MHz ±50 ppm		
7.2	Level	0 to +10 dBm		
7.3	Termination	50 Ω		
7.4	Connector	BNC		

Section	Specification Item	Specification Value
8		
8.1	**[Clock mode]**	
	CLOCK	Internal, External, Lock 2 MHz (B), Lock 2 MHz (UB), Lock 2 Mbit/s (B), Lock 2 Mbit/s (UB), Lock 1.5 MHz (UB), Lock 1.5 Mbit/s (B), Lock 10 M
8.1.1	Internal Accuracy	Reference signal synchronous with the internal reference signal ±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)
8.1.2	External	Reference signal synchronous with the incoming signal from the Ext. Ref. Clock Input
8.1.2.1	Frequency	161.13281 MHz ±50 ppm
8.1.2.2	Termination/Level	50 Ω/0.7 V to 1.3 V_{PP}
8.1.2.3	Connector	SMA
8.1.3	DCS Input	Reference signal synchronous with the incoming signal from the DCS Input
8.1.3.1	Frequency/Interface	2.048 Mbit/s ±50 ppm (HDB3) or 2.048 MHz ±50 ppm (CLOCK) 1.544 Mbit/s ±50 ppm (AMI/B8ZS) or 1.544 MHz ±50 ppm (CLOCK)
8.1.3.2	Level	Unbalance: 1.544 MHz, 2.048 MHz (CLOCK); 1.125 V_{OP} ±34 % G.703 2.048 Mbit/s (HDB3); 2.37 V_{OP} ±10 % G.703 Balance: 1.544 Mbit/s, 2.048 Mbit/s; 3.0 V_{OP} ±24 % ANSI T1 102-1987
8.1.3.3	Connector	Unbalance: 75 Ω/BNC Balance: 100 Ω/Weco 310 Compatible (1.544 Mbit/s) 120 Ω/3-Pole CF (2.048 Mbit/s)
8.1.4	10M STD Input	Reference signal synchronous with the incoming signal from the 10M STD Input
8.1.4.1	Frequency range	10 MHz ±50 ppm
8.1.4.2	Level	0 to +10 dBm
8.1.4.3	Termination	50 Ω
8.1.4.4	Connector	BNC
8.2	**[Variable frequency]**	
8.2.1	Frequency range	±50 ppm
8.2.2	Step	0.1 ppm
8.2.3	Accuracy	±0.1 ppm (at 23 ±5 °C following calibration performed 60 minutes after the power is turned ON)

Section	Specification Item	Specification Value		
8.3	**[Jitter generation]**			
8.3.1	Bit Rate	2,578.125 Mbit/s, 5,156.25 Mbit/s, 10,312.5 Mbit/s		
8.4	Jitter modulating signal			
8.4.1	Ext. Mod. Input	Connector for external modulating signal input		
8.4.1.1	Frequency range	100 kHz to 80 MHz	(at 0.5 UI Range/10,312.5 Mbit/s)	
		100 kHz to 40 MHz	(at 0.5 UI Range/5,156.25 Mbit/s)	
		100 kHz to 20 MHz	(at 0.5 UI Range/2,578.125 Mbit/s)	
		10 Hz to 2 MHz	(80 UI, 40 UI, 20 UI Range)	
		10 Hz to 480 Hz	(3,200 UI, 1,600 UI, 800 UI Range)	
8.4.1.2	Waveform	Sine wave		
8.4.1.3	Sensitivity	3,200 UI Range:	3,200 UI_{PP} ±15 %/1 V_{PP}	(10,312.5 Mbit/s only)
		1,600 UI Range:	1,600 UI_{PP} ±15 %/1 V_{PP}	(5,156.25 Mbit/s only)
		800 UI Range:	800 UI_{PP} ±15 %/1 V_{PP}	(2,578.125 Mbit/s only)
		80 UI Range:	80 UI_{PP} ±15 %/1 V_{PP}	(10,312.5 Mbit/s only)
		40 UI Range:	40 UI_{PP} ±15 %/1 V_{PP}	(5,156.25 Mbit/s only)
		20 UI Range:	20 UI_{PP} ±15 %/1 V_{PP}	(2,578.125 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.375 V_{PP}	(10,312.5 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/0.75 V_{PP}	(5,156.25 Mbit/s only)
		0.5 UI Range:	0.5 UI_{PP} ±15 %/1.5 V_{PP}	(2,578.125 Mbit/s only)
8.4.1.4	Termination	50 Ω		
8.4.1.5	Connector	BNC (Ext. Mod. Input)		
8.4.1.6	Equalizer Amp	Selection of Equalizer Amp. to suit the jitter tolerance mask enabled (10,312.5 Mbit/s only)		

Section	Specification Item	Specification Value		
8.5	Jitter modulation			
8.5.1	Range	3,200 UI Range:	Up to 3,200 UI_{PP}	(10,312.5 Mbit/s only)
		1,600 UI Range:	Up to 1,600 UI_{PP}	(5,156.25 Mbit/s only)
		800 UI Range:	Up to 800 UI_{PP}	(2,578.125 Mbit/s only)
		80 UI Range:	Up to 80 UI_{PP}	(10,312.5 Mbit/s only)
		40 UI Range:	Up to 40 UI_{PP}	(5,156.25 Mbit/s only)
		20 UI Range:	Up to 20 UI_{PP}	(2,578.125 Mbit/s only)
		0.5 UI Range:	Up to 0.5 UI_{PP}	
8.5.2	Amount of modulation	**[Bit Rate: at 10,312.5 Mbit/s]**		

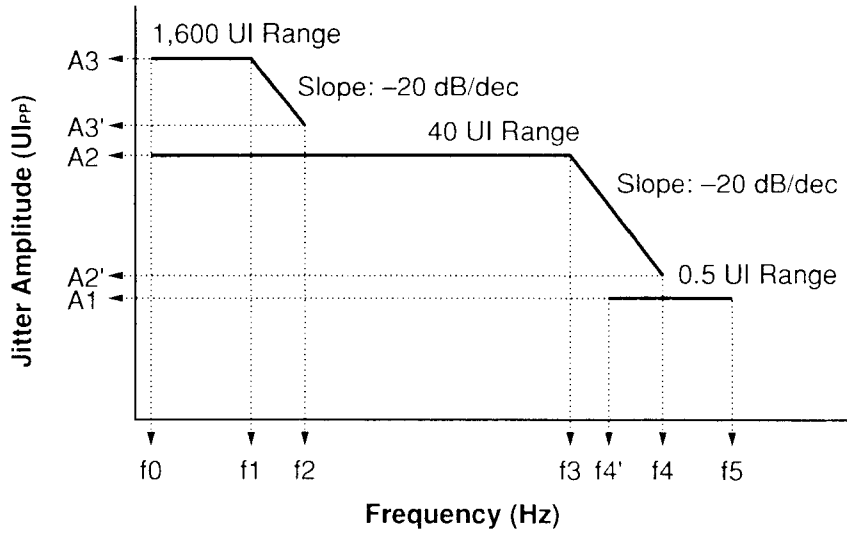


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
10,312.5 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
80 MHz	0.5 UI_{PP}	4 UI_{PP}	80 UI_{PP}	100 UI_{PP}	3,200 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 5,156.25 Mbit/s]

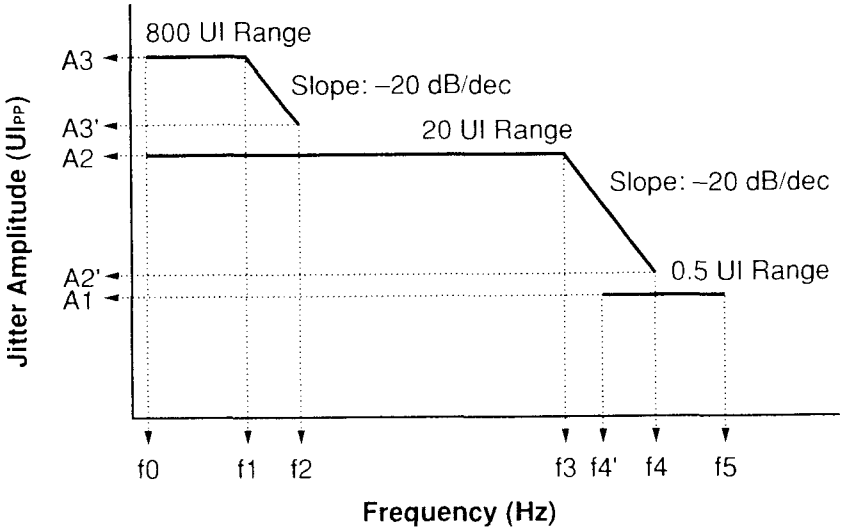


Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
5,156.25 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
40 MHz	0.5 UI_{PP}	2 UI_{PP}	40 UI_{PP}	50 UI_{PP}	1,600 UI_{PP}

Section	Specification Item	Specification Value

[Bit Rate: at 2,578.125 Mbit/s]



Bit Rate (bit/s)	f0	f1	f2	f3	f4	f4'
2,578.125 M	10 Hz	15 Hz	480 Hz	100 kHz	2 MHz	100 kHz

f5	A1	A2'	A2	A3'	A3
20 MHz	0.5 UIPP	1 UIPP	20 UIPP	25 UIPP	800 UIPP

8.5.3 Accuracy

3,200 UI Range:	±5 % ±10 UIPP/at 10 Hz	(at 10,312.5 Mbit/s)
1,600 UI Range:	±5 % ± 8 UIPP/at 10 Hz	(at 5,156.25 Mbit/s)
800 UI Range:	±5 % ± 5 UIPP/at 10 Hz	(at 2,578.125 Mbit/s)
80 UI Range:	±5 % ±0.8 UIPP/at 100 kHz	(at 10,312.5 Mbit/s)
40 UI Range:	±5 % ±0.6 UIPP/at 100 kHz	(at 5,156.25 Mbit/s)
20 UI Range:	±5 % ±0.3 UIPP/at 100 kHz	(at 2,578.125 Mbit/s)
0.5 UI Range:	±5 % ±0.1 UIPP/at 100 kHz	(at 10,312.5 Mbit/s)
	±5 % ±0.08 UIPP/at 100 kHz	(at 5,156.25 Mbit/s)
	±5 % ±0.05 UIPP/at 100 kHz	(at 2,578.125 Mbit/s)

Frequency error (100 kHz set as the reference)

10 Hz to 20 Hz:	±5 %
20 Hz to 300 kHz:	±2 %
300 kHz to 1 MHz:	±3 %
1 MHz to 3 MHz:	±5 %
3 MHz to 10 MHz:	±10 %
10 MHz to 80 MHz:	±15 %

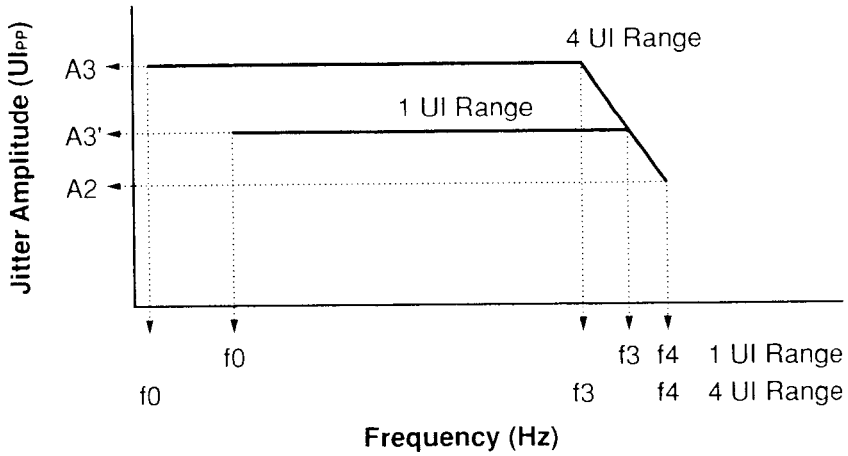
Section	Specification Item	Specification Value
8.6	**[Jitter measurement]** Jitter signal input	
8.6.1	Frequency	2,578.125 MHz ±50 ppm, 5,156.25 MHz ±30 ppm, 10,312.5 MHz ±20 ppm
8.7	Jitter demodulating signal	
8.7.1	Demod. Output	Output of signal demodulated from the incoming signal
8.7.1.1	Frequency range	100 Hz to 80 MHz
8.7.1.2	Sensitivity	1 V_{PP} ±15 %/1 UI_{PP} (1 UI Range) 1 V_{PP} ±15 %/4 UI_{PP} (4 UI Range)
8.7.1.3	Termination	50 Ω
8.7.1.4	Connector	BNC
8.8	Jitter measurement	
8.8.1	Unit	UI_{PP}, UI+p, UI–p, UIrms
8.8.2	Measurement range	1 UI Range (0.000 to 1.010 UI_{PP}/Step 0.001 UI_{PP}) (0.000 to 0.357 UIrms/Step 0.001 UIrms) 4 UI Range (0.00 to 4.04 UI_{PP}/Step 0.01 UI_{PP}) (0.00 to 1.43 UIrms/Step 0.01 UIrms)
8.8.3	Measurement mode	Single, Repeat, Manual
8.8.4	Measurement interval	1 to 99 (second) (1-second step) 1 to 99 (minute) (1-minute step) 1 to 99 (hour) (1-hour step)
8.8.5	Measurement display	Current, Last
8.8.6	Filter	LP, HP1+LP, HP1'+LP, HP2+LP, HP+LP, HP'+LP, HP3+LP*2 (*2 Only for Option 07)

Bit Rate (bit/s)	HP1 (Hz)	HP1'*1 (Hz)	HP2 (Hz)	HP3*2 (Hz)	HP' (Hz)	HP (Hz)	LP (Hz)
2,578.125 M	5 k	—	1 M	6.186 M	—	12 k	20 M
5,156.25 M	8 k	—	2 M	6.186 M	—	12 k	40 M
10,312.5 M	10 k	20 k	4 M	6.186 M	50 k	12 k	80 M

*1 The HP1'+LP filter can be used at Revision 3 of main body farm-ware or the later.

Section	Specification Item	Specification Value

8.8.7 Measuring range



Bit Rate (bit/s)	Range	f0	f3	f4	A2	A3'	A3
2,578.125 M	1 UI	100 Hz	10 MHz	20 MHz	0.5 UIPP	1 UIPP	—
	4 UI	100 Hz	2.5 MHz	20 MHz	0.5 UIPP	—	4 UIPP
5,156.25 M	1 UI	100 Hz	20 MHz	40 MHz	0.5 UIPP	1 UIPP	—
	4 UI	100 Hz	5 MHz	40 MHz	0.5 UIPP	—	4 UIPP
10,312.5 M	1 UI	100 Hz	40 MHz	80 MHz	0.5 UIPP	1 UIPP	—
	4 UI	100 Hz	10 MHz	80 MHz	0.5 UIPP	—	4 UIPP

Section	Specification Item	Specification Value
8.8.8	Accuracy	**[UIPP, UI+p, UI–p]** 1 UI Range: ±5 % ±W UIPP/at 100 kHz 4 UI Range: ±5 % ±W UIPP/at 100 kHz **[UIrms]** 1 UI Range: ±5 % ±Y UIrms/at 100 kHz 4 UI Range: ±5 % ±Y UIrms/at 100 kHz

Bit Rate (bit/s)	W*1		Y*2	
	1 UI Range	4 UI Range	1 UI Range	4 UI Range
2,578.125 M	0.05 UIPP	0.22 UIPP	0.008 UIrms	0.08 UIrms
5,156.25 M	0.07 UIPP	0.24 UIPP	0.009 UIrms	0.09 UIrms
10.312.5 M	0.09 UIPP	0.26 UIPP	0.010 UIrms	0.10 UIrms

NOTE *1:

With HP1+LP

NOTE *2:

With HP+LP

Frequency error (100 kHz set as the reference)

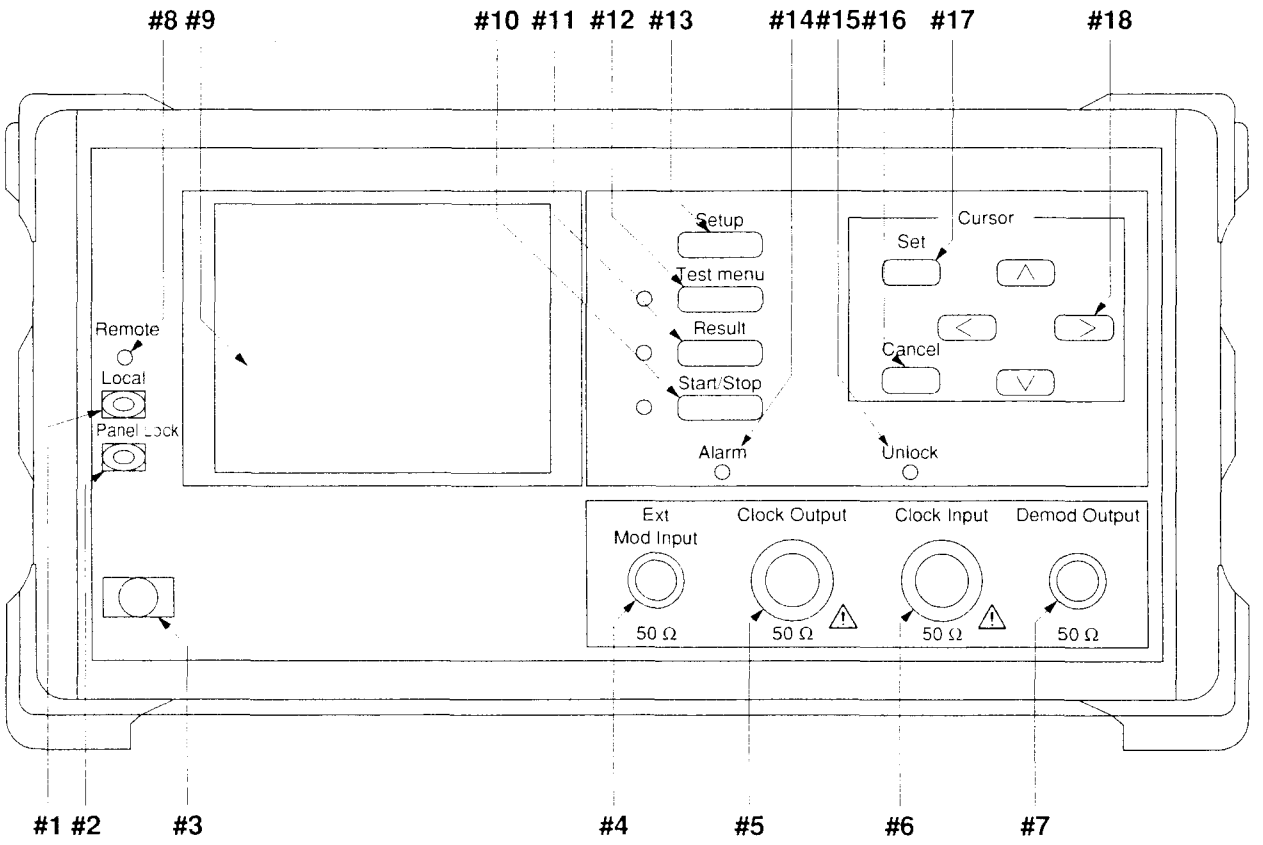
100 Hz to 300 kHz: ±2 %
300 kHz to 1 MHz: ±3 %
1 MHz to 3 MHz: ±5 %
3 MHz to 10 MHz: ±10 %
10 MHz to 80 MHz: ±15 %

8.9	LED display	Unlock, Alarm, Remote
8.9.1	Unlock	Lights up when the Rx section switches into the unlock status.
8.9.2	Alram	Lights up when the Tx section switches into the abnormal status (such as unlock).
8.9.3	Remote	Lights up when the mode switches into the remote status by the external controller.
8.10	External interface	
8.10.1	GPIB	All the control except for cancellation of remote status enabled from the external controller
8.11	Other	
8.11.1	Dimensions	221.5 High, 426 Wide, 451 Deep (mm)
8.11.2	Mass	23 kg (Max.)
8.11.3	Power source	85 to 132 Vac or 170 to 250 Vac 47.5 to 63 Hz
8.11.4	Temperature	10 to 40 °C, –20 to 60 °C (When stored)

Section 2 Description of Panel

2.1 Description of Main Unit Panel

2.1.1 Front Panel

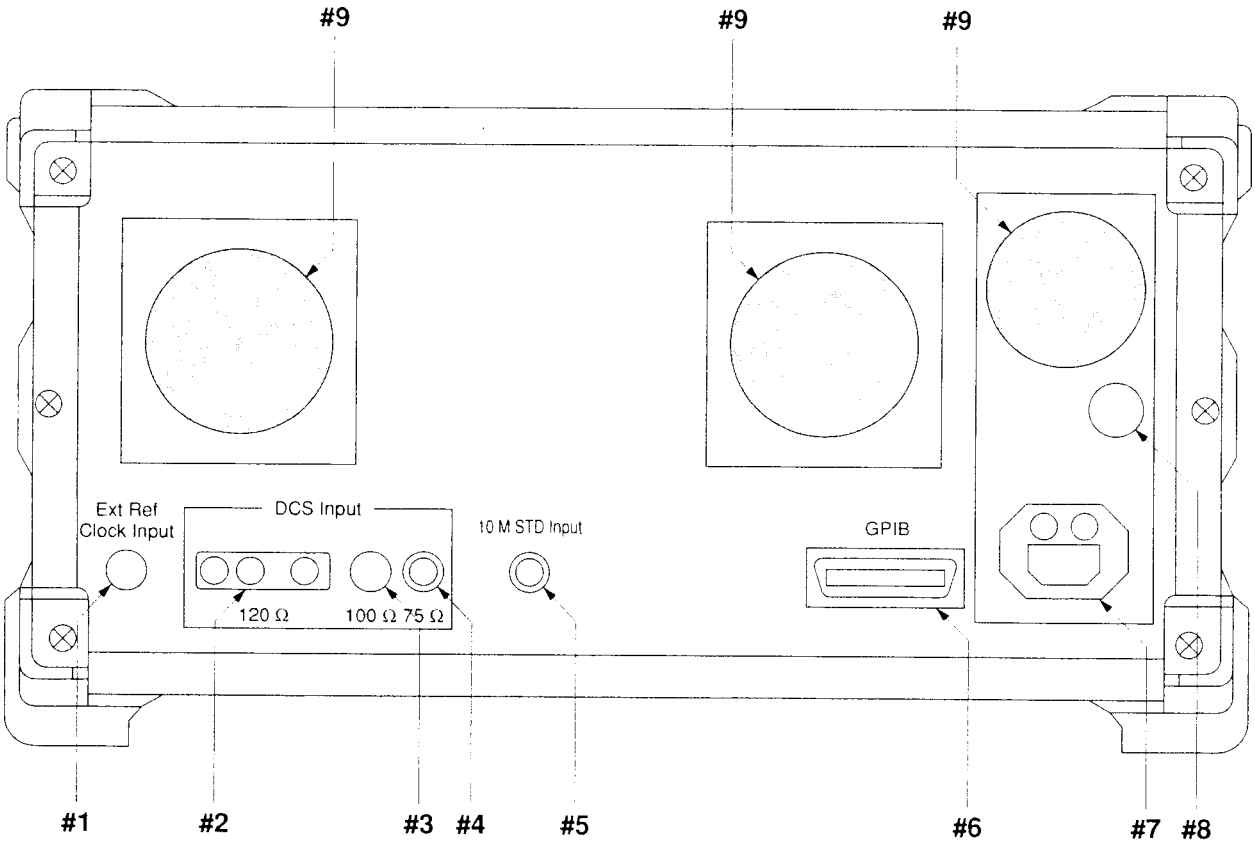


Description of the Front Panel

No.	Label	Description
#1	Local	Switches this device into the local control status (state where the panel key is effective) by an effective key when the remote lamp is lit. This does not operate when the remote lamp is unlit.
#2	Panel Lock	Switches keys other than the panel lock and local keys between the status of input enabled and the status of input disabled. When the LED is ON, input of keys other than panel lock and local keys is disabled.
#3	Power switch	A switch to turn the AC power source ON and OFF.
#4	Ext. Mod. Input	Inputs external modulating signal to the BNC connector.
#5	Clock Out	Connector for clock output. Level: +4 dBm ±3 dB Connector: APC 3.5/50 Ω

No.	Label	Description
#6	Clock Input	Connector for clock input Level: 0.7 to 1.3 V_{PP} 0.15 V to 1.3 V_{PP} (with Option 10) Connector: APC 3.5/50 Ω
#7	Demod. Out	Connector to output the demodulation signal.
#8	Remote	Lights up when this device is in the remote status (status controlled by GPIB)
#9	(Display screen)	A screen to display the measurement items, setup items and measured results.
#10	Start/Stop	Starts and stops measurement.
#11	Result	Displays the Result screen. Closes the Result screen when it is already displayed. Does not operate when the window is open. Does not operate either when the Result window alone is displayed. Indicates "Result Screen Currently being Displayed" when the LED is ON.
#12	Test Menu	Displays the Test Menu screen. Closes the Test Menu screen when it is already displayed. Does not operate when the window is open. Does not operate either when the Test Menu window alone is displayed. Indicates "Test Menu Screen Currently being Displayed" when the LED is ON.
#13	Setup	Displays the Setup screen. Closes the Setup screen when it is already displayed. Does not operate when the window is open. Does not operate either when the Setup window alone is displayed. Indicates "Setup Screen Currently Displayed" when the LED is ON.
#14	Alarm	The lamp lights up when the jitter transmission module is in the state of Unlock.
#15	Unlock	The Unlock lamp lights up when the jitter reception module is in the state of Unlock.
#16	Cancel	Selected at the time of data setting to close the window. The data being set in the window become invalid (setting before opening of the window will be maintained). Does not operate when the window is closed.
#17	Set	Selected at the time of data setting to open the window. Sets the item on the black and white reversed cursor when the window is already open.
#18	<∧∨>	Moves the cursor and window cursor on the screen. Increases or decreases the numerical value by using the ∧ and ∨ in the window of numerical value input. These keys operate continuously by holding them down.

2.1.2 Back Panel



Description of the Back Panel

No.	Label	Description
#1	Ext Ref Clock Input	Connector for external reference signal input.
#2	DCS Input 120 Ω	Connector for synchronization with the external signal. Input clock that conforms to ITU-T.G.703-10 or HDB3 data.
#3	DCS Input 100 Ω	Connector for synchronization with the external clock. Input HDB3, AMI, or B8ZS data that conforms to ANSI T1.
#4	DCS Input 75 Ω	Connector for synchronization with the external clock. Input clock that conforms to ITU-T.G.703-10 or HDB3 data.
#5	10M STD Input	Connector to input 10 MHz signal from the external equipment at the time of Clock = Lock 10 M.
#6	GPIB	A GPIB interface connector.
#7	[Tangential line for AC power source]	A tangential line for AC power source. Make sure to use the power source cord that comes with the device.
#8	[Frame grounding terminal]	A frame grounding terminal. Make sure to connect it to the ground potential before the power is supplied to use a bipolar power receptacle.
#9	Cooling fan	A fan for cooling purpose. Do not block this face.

Section 3 Basic Operations

3.1 Screen Structure

The MP1777A screen is configured as follows.

Main screen name	Secondary screen name	Detail of screen contents
Setup	Interface	Performs setting for the interface, clock source, equalizer and other.
	Memory	Performs setting for the memory and other.
	System	Performs setting for the buzzer, clock, GPIB and other.
Test menu	Manual Jitter	Performs setting for Tx, Rx, frequency offset and other.
Result	Jitter	Performs setting for the style of display data, mode of measured result display and other.

3.2 Segmented Display of Screen

The MP1777A enables the Main screen shown below to be displayed at the same time.

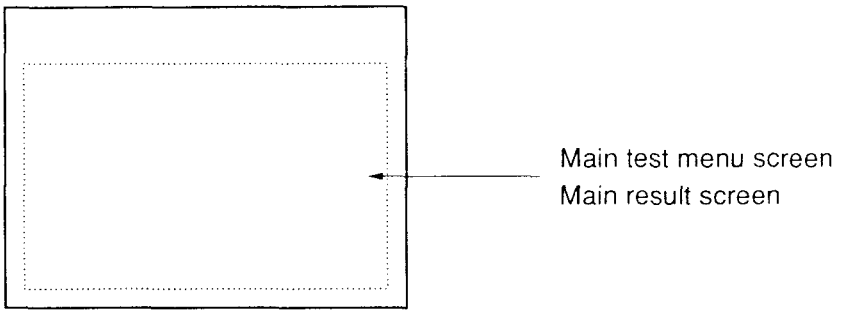
(1) Main test menu screen

(2) Main result screen

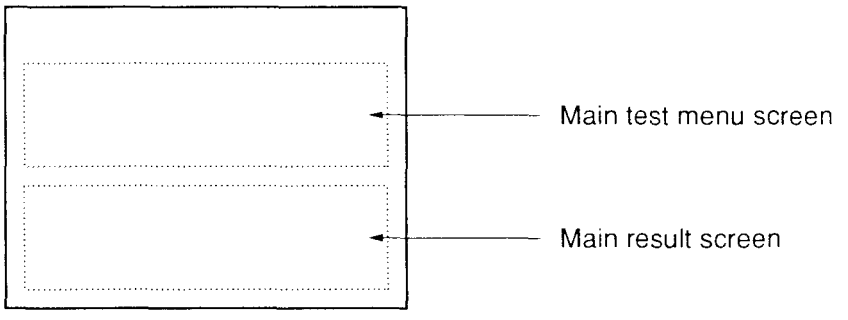
The combination of these screens is shown on segmented display. The Main setup screen cannot be displayed together with other screens.

Switch the screen layout from (1) to (2).

(1) Single segment display



(2) Display segmented into two



3.3 Selection of Screen

This section provides explanations of the method of selection of the MP1777A screen.

(1) Selection of the Main screen

The Main screen can be selected by using the setup, test menu or result key.

Key name	Description
Setup	Pressing this key once causes the screen to move to the Main setup screen. Pressing this key again causes the screen to return to the screen shown before the move.
Test menu	Pressing this key once causes the LED located to the left of the key to light up. Pressing the key again causes the same LED to light off. • When LED is lit: Shows that the Main test menu screen is displayed. • When LED is unlit: Shows that the Main test menu screen is no displayed.
Result	Pressing this key once causes the LED located to the left of the key to light up. Pressing the key again causes the same LED to light off. • When LED is lit: Shows that the Main result screen is displayed. • When LED is unlit: Shows that the Main result screen is no displayed.

NOTE:

When the LED located to the left of the test menu key and the result key are lit at the same time, it signifies that the Main screens for these are displayed at the same time. (Segmented display)

(2) Selection of the secondary screen

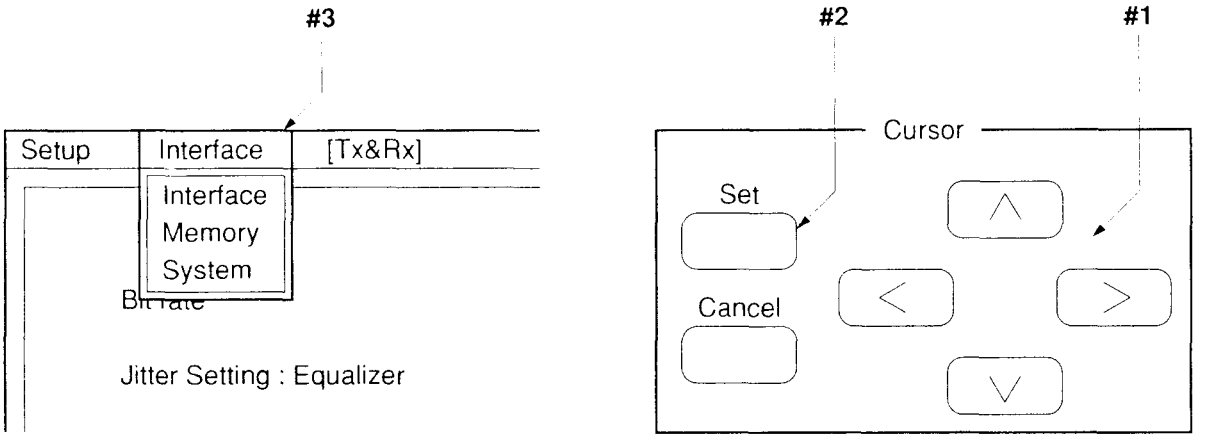
Move the cursor to the area for switching to the secondary screen (located to the right of the main screen name) on each screen and press the Set key. As the window for item selection is displayed, select a secondary screen of your choice from the window. Pressing the Set key again causes the window for item selection to close and the specified secondary screen to be displayed.

3.4 Setting of Measurement Conditions

3.4.1 Basic Operation of Setting

Basically follow procedures set out below in order to modify items for the MP1777A.

(1) Press the cursor key (#1) and move the cursor onto the item you wish to modify.
(2) Press the Set (#2) key.
(3) As the window for item modification opens, set the target item in accordance with the explanations given in 3.4.2. (#3)
(4) When the window for item modification closes, the modified details are set.



NOTE:

Pressing the Cancel key causes the setting to return to the original setting if you wish to cancel setting operations. Windows for some of the items you wish to modify may not open.

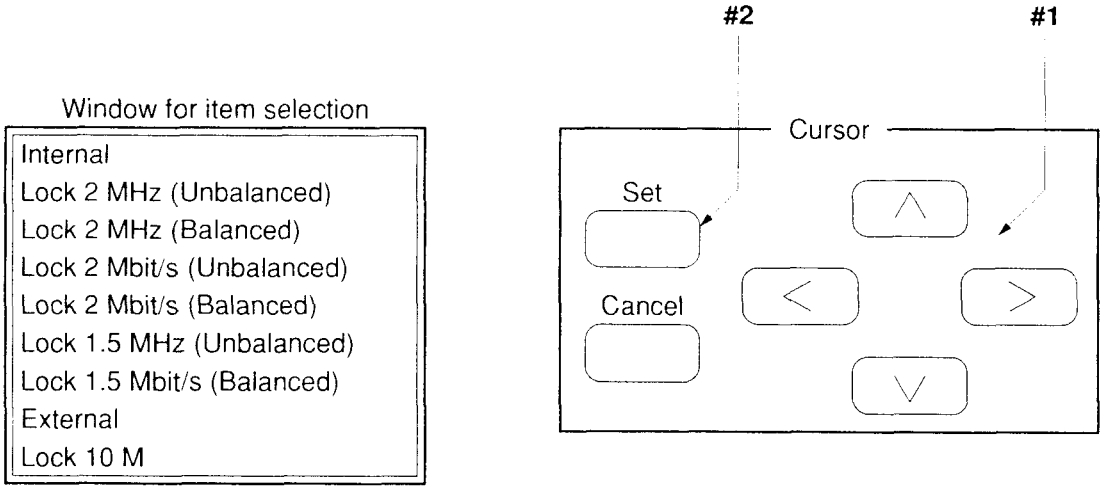
3.4.2 Setting by Item

To perform setting by item selection, the window for item selection opens.
This section provides operation procedures in the window for item selection.

(1) Press the cursor key (#1) and move the cursor onto the item of your choice.
(2) Press the Set (#2) key.
(3) The window for item selection automatically closes.

NOTE:

A window for Yes or No selection for confirmation purposes may open for certain items selected. In this case, check the item selected and press the Set key pointed to Yes to set the item or the same key pointed to No to cancel the item. The cancel key can also be used to cancel the item setting.

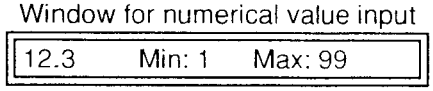


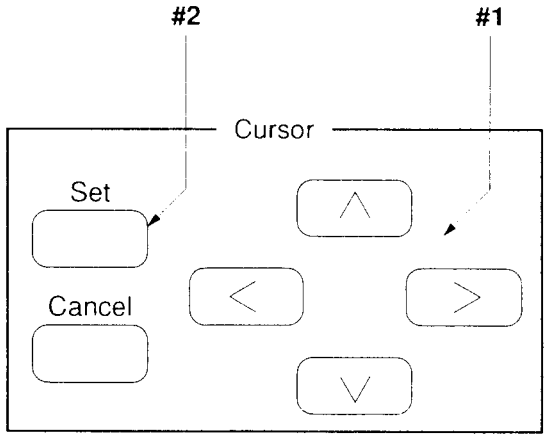
3.4.3 Setting by Numerical Value

To perform setting by numerical value input, the window for numerical value input opens.
This section provides operation procedures in the window for numerical value input.

(1) Press the cursor key (← or → of #1) and move the cursor onto the digit of your choice.
(2) Press the cursor key (↑ or ↓ of #1) and modify the value.
(3) Repeat operations, (1) and (2), until the value in the window reaches the numerical value intended.
(4) Press the Set (#2) key.
(5) The window for numerical value input automatically closes.

Window for numerical value input

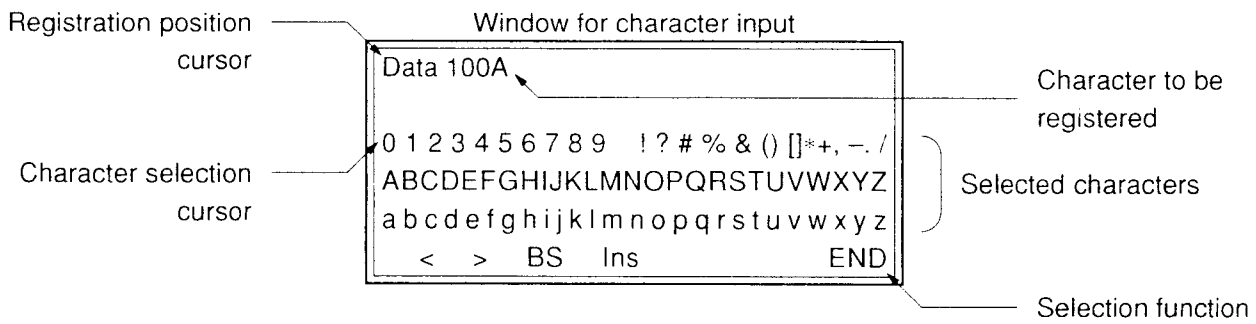


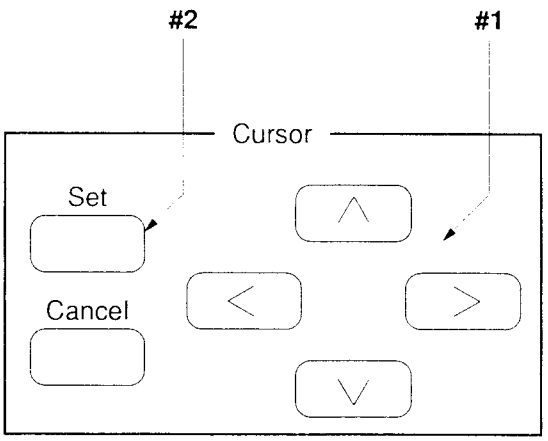


3.4.4 Setting by Character

To perform setting by character input, the window for character input opens. This section provides operation procedures in the window for character input.

(1) Press the cursor key (#1) and move the character selection cursor onto < or >.
(2) Press the Set (#2) key and move the registration position cursor.
(3) Press the cursor key (#1) and move the character selection cursor onto the character of your choice
(4) Press the Set (#2) key and input characters.
(5) Repeat operations, (3) and (4), until the character string to be registered becomes the character string intended.
(6) When the input of the character string is completed, press the cursor key (#1) and move the character selection cursor onto END.
(7) Press the Set key.
(8) The window for character input automatically closes.

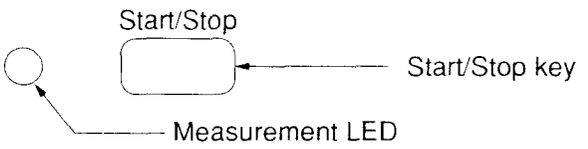




Function character for selection	Operations
<	Moves the registration position cursor to the top left. Moves the same cursor to the left edge when it is located at the left edge of the registration character area.
>	Moves the registration position cursor to the right. Moves the same cursor to the left edge when it is located at the right edge of the registration character area.
BS	Deletes a character located to the left of the registration position cursor and moves the character string that comes from after the registration position cursor by one character worth to the left. Does not operate when the registration position cursor is located at the left edge of the registration character area.
Ins	Moves the character string located from after the registration position cursor to the right by one character worth and insert a blank space equivalent to a character at the position of the registration position cursor. The registration character string comprises up to fifteen characters and any excess character will be deleted.
END	Sets the character string to be registered and closes the character string window.

3.5 Starting/Stopping Measurement

Basically, use the Start/Stop key to start/stop the measurement on the MP1777A. The Start/Stop LED indicates the measurement status: When the LED is ON, it indicates that the MP1777A is measuring. When the LED is OFF, you can click the Start/Stop key to start the measurement. When the LED is ON, you can click the Start/Stop key to stop the measurement.



Notes:

1. Measurement starts in the following cases in addition to the case when clicking the Start/Stop key at LED-OFF.
   - With repeat measurement set, a new round of measurement has started.
   - Setting conditions related to measurement are modified during measurement.
2. Measurement stops in the following cases in addition to the case when clicking the Start/Stop key at LED-ON.
   - With a measurement cycle set, the measurement cycle set comes to an end after the measurement starts. (In the case of repeat measurement, the next round of measurement starts immediately after the previous round of measurement ends.)
   - Setting conditions related to measurement are modified during measurement. (The next round of measurement starts immediately after the previous round of measurement ends.)

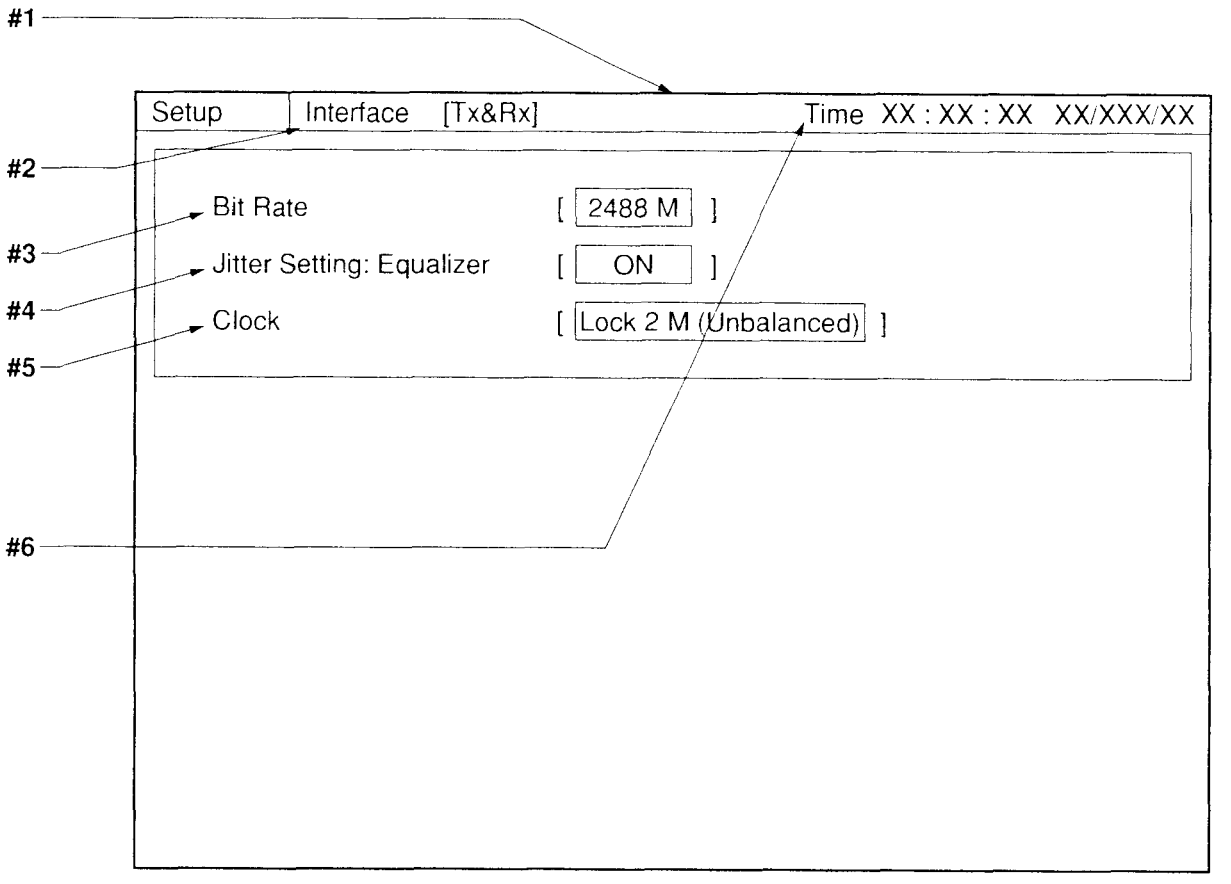
Section 4 Description of Each Screen

4.1 Main Setup Screen

4.1.1 Secondary Interface Screen

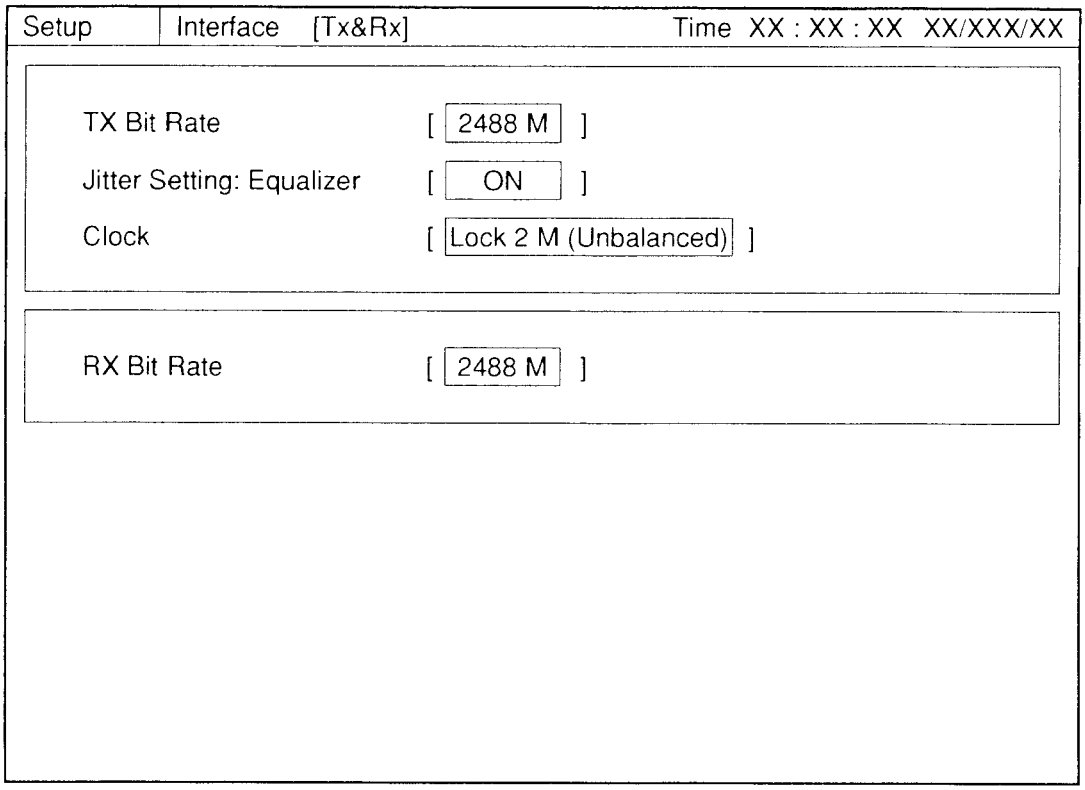
(1) Interface (Tx&Rx)

A screen to establish default setting of measurement. When modifications are added to the screen in the process of measurement, the measurement starts again. A method is available to establish setting separately for transmission and reception as Tx/Rx.



No.	Display	Description
#1	[Secondary screen selection]	Selects a secondary screen of the Main setup screen. A secondary screen must be selected at this position also with other screens.
#2		Enables selection of the setting method. Tx&Rx: Enables the same setting for transmission and reception. The value set for Rx will be set as the bit rate when the mode is switched from Tx/Rx to Tx&Rx. Tx/Rx: Enables setting separately for transmission and reception.
#3	Bit Rate	Clock Sets the Tx and Rx bit rate. When Option is not mounted, the following bit rate can be set. 2,488 Mbit/s, 4,977 Mbit/s, 9,953 Mbit/s When Option 01 is mounted, the following bit rate can be set. 2,494 Mbit/s, 4,988 Mbit/s, 9,977 Mbit/s When Option 02 is mounted, the following bit rate can be set. 2,666 Mbit/s, 5,332 Mbit/s, 10,664 Mbit/s When Option 04 is mounted, the following bit rate can be set. 3,062 Mbit/s, 6,125 Mbit/s, 12,249 Mbit/s When Option 05 is mounted, the following bit rate can be set. 3,069 Mbit/s, 6,138 Mbit/s, 12,276 Mbit/s When Option 06 is mounted, the following bit rate can be set. 2,677 Mbit/s, 5,355 Mbit/s, 10,709 Mbit/s When Option 07 is mounted, the following bit rate can be set. 2,578 Mbit/s, 5,156 Mbit/s, 10,313 Mbit/s
#4	Jitter Setting: Equalizer	Sets the equalizer ON and OFF. (Enabled only when 9,953 Mbit/s, 9,977 Mbit/s, 10,664 Mbit/s, 12,249 Mbit/s, 12,276, 10,709 Mbit/s and 10,313 Mbit/s are selected.) ON: The Ext. Mod. Input sensitivity changes linked to the tolerance mask. OFF: The Ext. Mod. Input sensitivity becomes fixed.
#5	Clock	Sets the clock source. Internal: Internal self-oscillation. Lock 2 MHz (Balanced): Clock synchronous with the 2 MHz signal input from the external DCS Input (120 Ω) Lock 2 MHz (Unbalanced): Clock synchronous with the 2 MHz signal input from the external DCS Input (75 Ω) Lock 2 Mbit/s (Balanced): Clock synchronous with the 2 Mbit/s signal input from the external DCS Input (120 Ω) Lock 2 Mbit/s (Unbalanced): Clock synchronous with the 2 Mbit/s signal input from the external DCS Input (75 Ω) Lock 1.5 Mbit/s (Balanced): Clock synchronous with the 1.5 Mbit/s signal input from the external DCS Input (100 Ω) Lock 1.5 MHz (Unbalanced): Clock synchronous with the 1.5 MHz signal input from the external DCS Input (75 Ω) External: Clock synchronous with the signal input from the Ext. Ref. Clock Input. Lock 10 M: Clock synchronous with the 10 MHz signal input from the 10'M STD Input
#6	Time	Displays the current date and time.

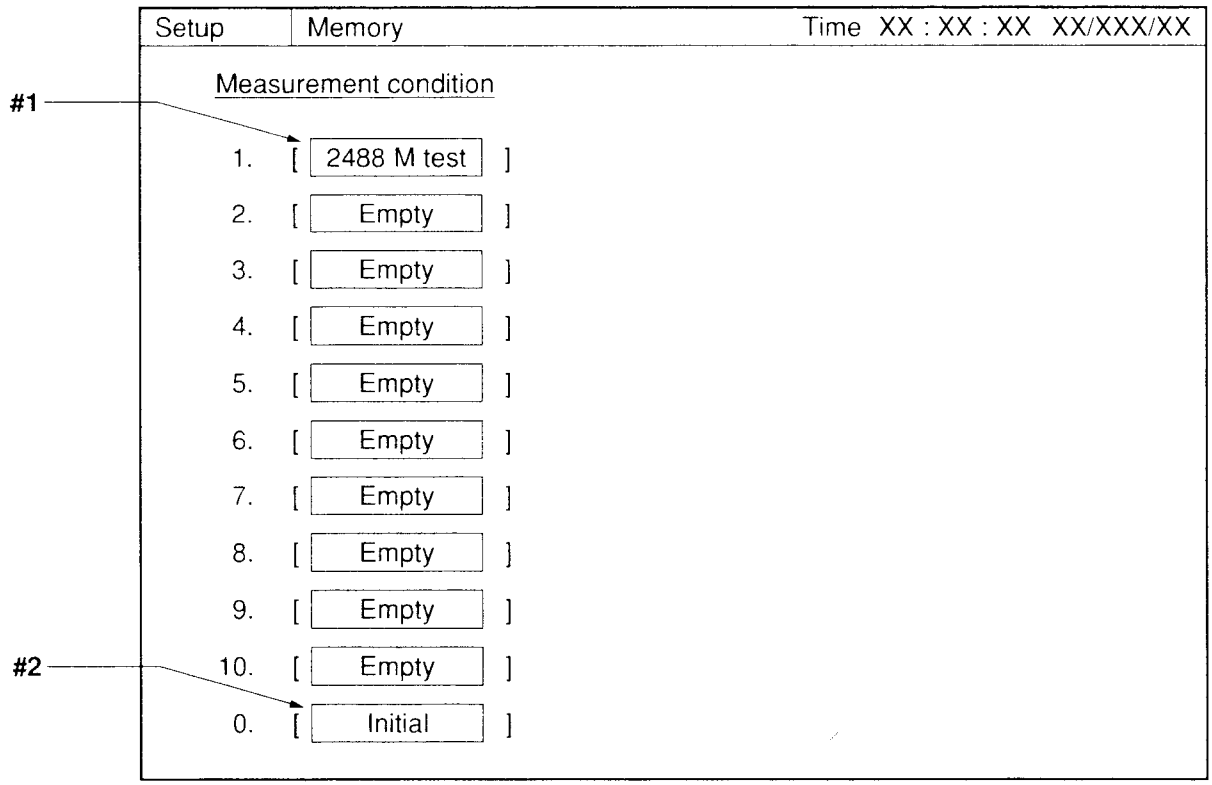
(2) Interface (Tx/Rx)



Setting for transmission is performed in the upper half of the screen, while setting for reception is performed in the bottom half of the screen. The details of the display are the same as those for Tx&Rx.

4.1.2 Secondary Memory Screen

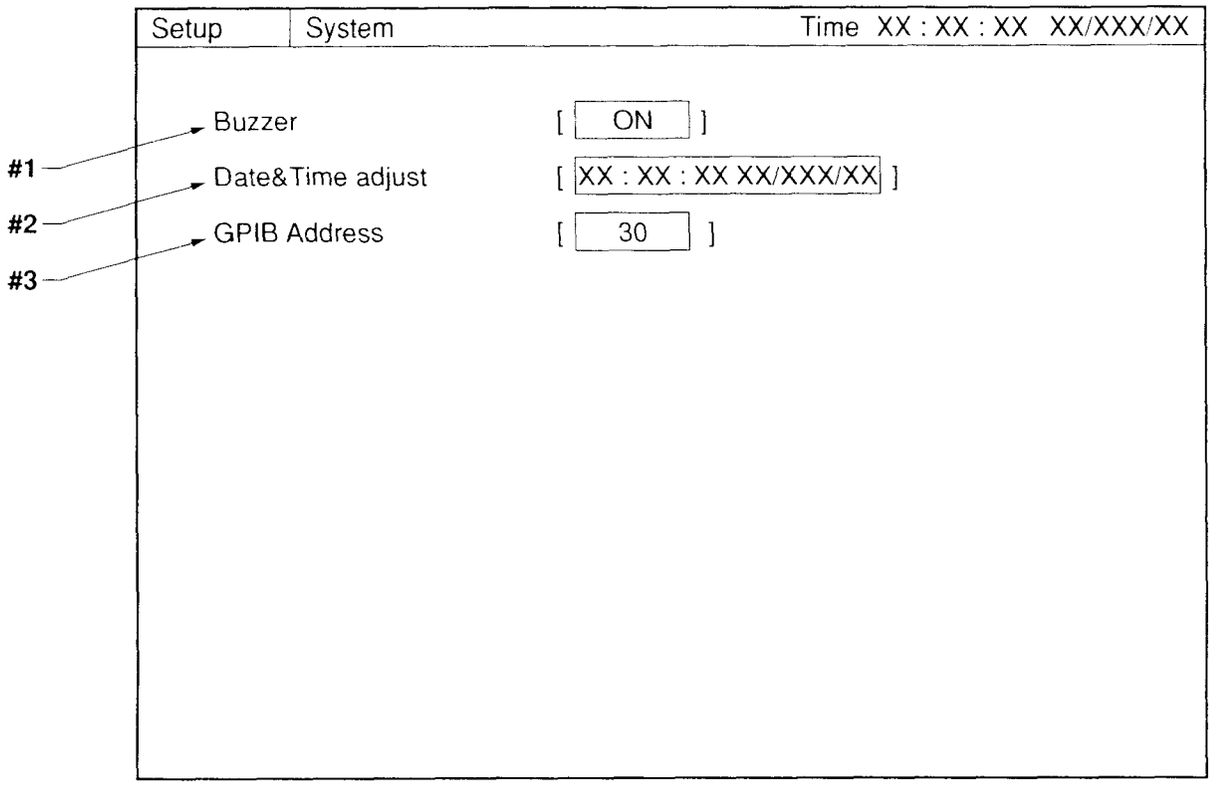
The MP1777A can internally store setting conditions. This screen is used to store and read setting conditions. Memory can be maintained even when the power is turned OFF.



No.	Display	Description
#1	Measurement Condition 1-10	Memory to store measurement conditions. Registration of up to ten measurement conditions enabled. Pressing the Set key causes the window for item selection to open. Here, saving, overwriting, reading and deleting data, and changing names are enabled. To save data or change names, the window for character input further opens to enable input of names. When memory is empty, the name "Empty" is displayed.
#2	Measurement Condition 0	A special memory storing default values. Used to return measurement conditions to initial values. This memory cannot be used for operations other than reading.

4.1.3 Secondary System Screen

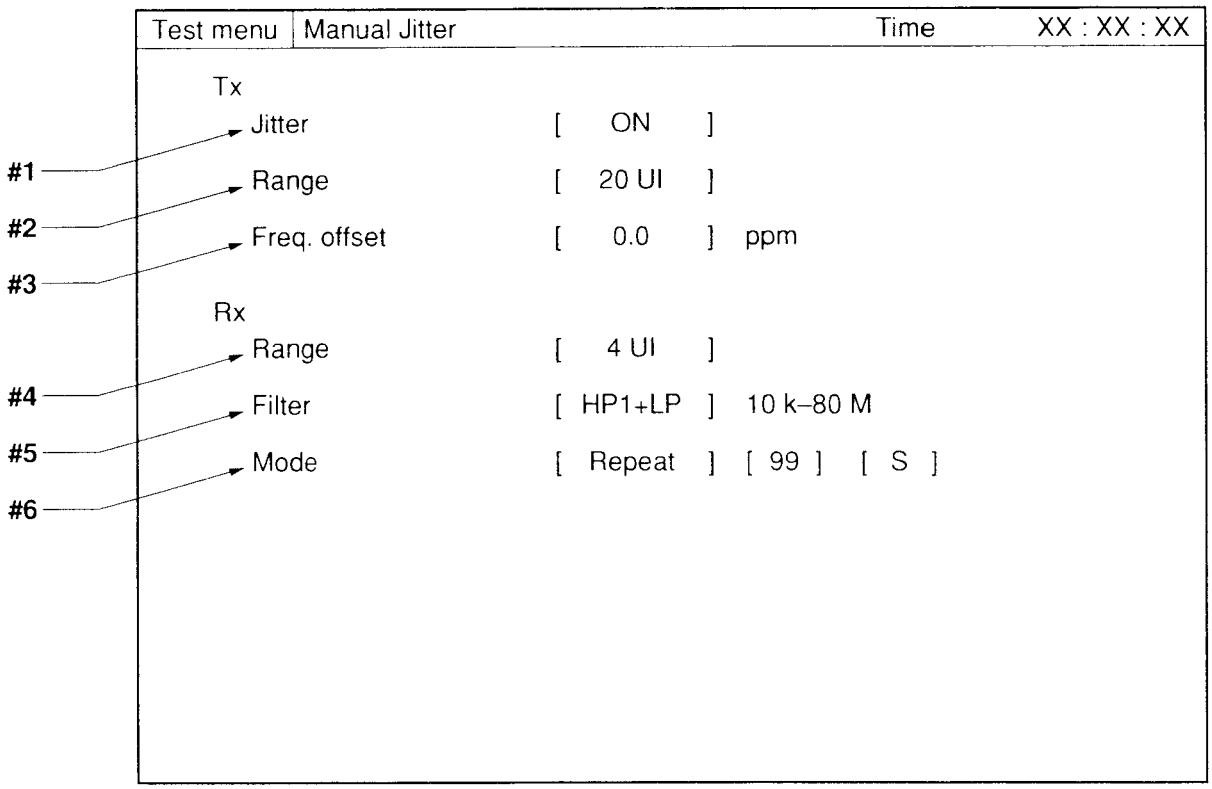
A screen used to perform basic MP1777A setting. This screen is also used to establish setting for GPIB.



No.	Display	Description
#1	Buzzer	Enables selection of whether or not to blow buzzer when alarm or unlock is generated or the setting is wrong.
#2	Date&Time adjust	Sets the clock built in the MP1777A. Pressing the Set key causes the window for numerical value input to open to enable setting of the time.
#3	GPIB Address	Enables setting of the primary address of GPIB within the range between 0 and 30.

4.2 Main Test Menu Screen

4.2.1 Secondary Manual Screen



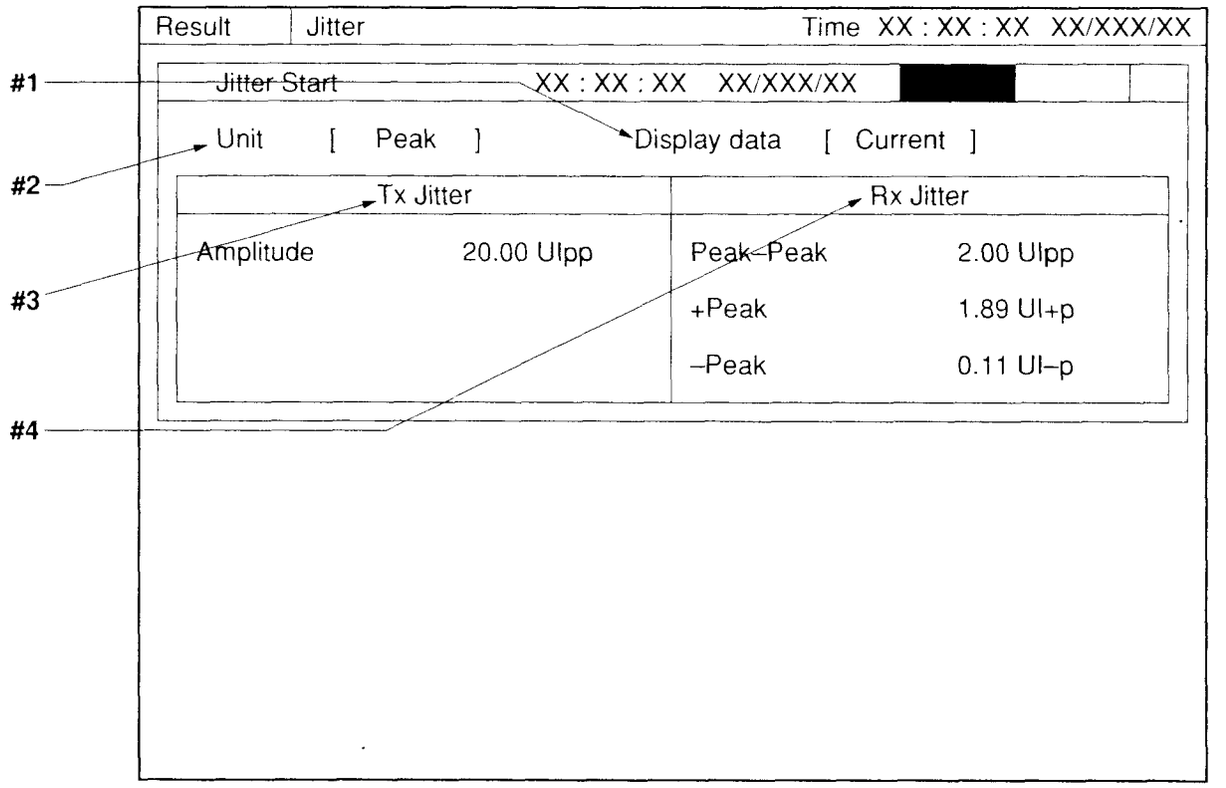
No.	Display	Description
#1	Tx Jitter	Sets jitter generation ON and OFF. ON: Enables addition of the jitter. OFF: Disables addition of the jitter.
#2	Tx Range	Switches the jitter generation range.
#3	Freq.offset	Sets the frequency offset.
#4	Rx Range	Switches the range for reception jitter measurement.
#5	Filter	Enables selection of filter for reception jitter measurement.
#6	Mode	Enables selection of measurement mode. Single: Performs single measurement. Repeat: Automatically starts the next round of measurement after completion of a round of measurement. Manual: Continues measurement until the Start/Stop key is pressed once measurement starts. Sets the measuring time for measurement performed in the single or repeat mode.

4.3 Main Result Screen

4.3.1 Secondary Jitter Screen

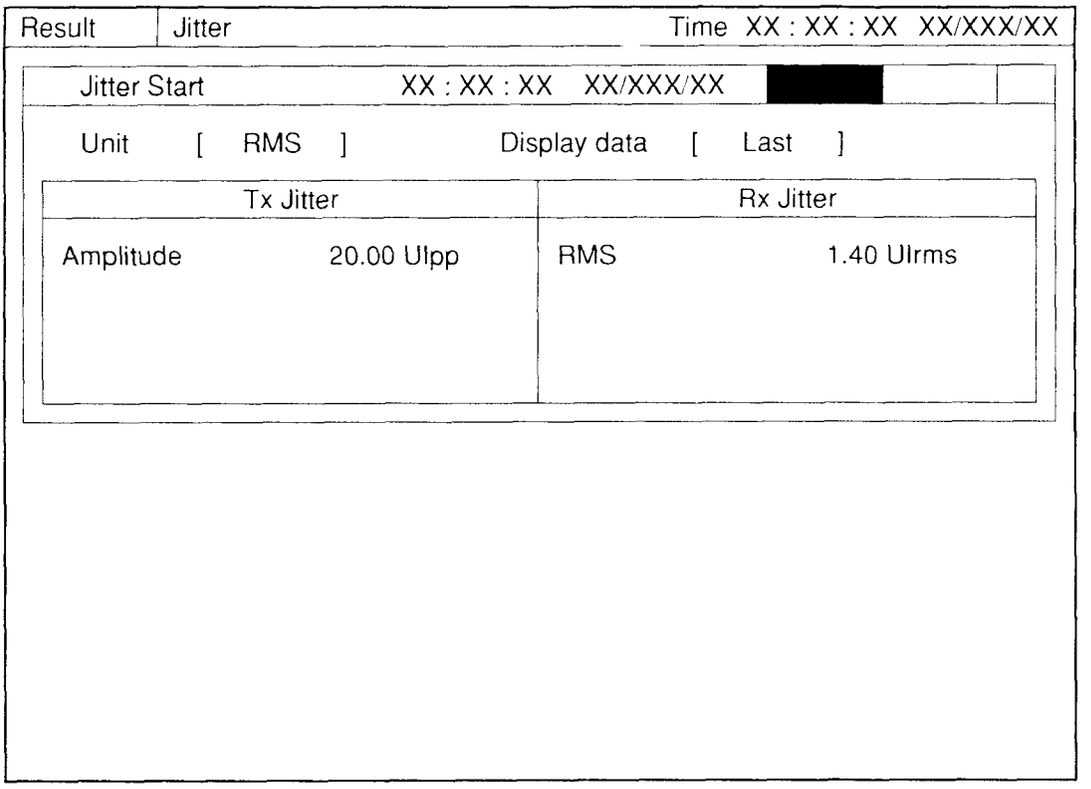
A screen to display the measured results of jitter.

(1) At peak



No.	Display	Description
#1	Display data	Enables selection of the method for measured result display. Current: Displays the results from the measurement start to the present. Last: Displays the results at the completion of measurement.
#2	Unit	Enables selection of the style of data to be displayed. Peak: Displays the peak to peak measured results of the jitter. RMS: Displays the measured results of effective jitter value.
#3	Tx Jitter	Displays the monitor value of transmission jitter amplitude.
#4	Rx Jitter	Peak–Peak displays the peak value of the measured values of the reception jitter in UI_{PP}. +Peak: Displays the +peak value of measured values of the reception jitter in UI+p. –Peak: Displays the –peak value of measured values of the reception jitter in UI–p. RMS displays the effective value of measured values of the reception jitter in UIrms.

(2) RMS


Result
Jitter
Time XX : XX : XX XX/XXX/XX
Jitter Start
XX : XX : XX XX/XXX/XX
Unit [RMS]
Display data [Last]
Tx Jitter
Amplitude 20.00 UIpp
Rx Jitter
RMS 1.40 UIrms

Section 5 Example of Operations

5.1 Block Diagram of Jitter Generation Module

The MP1777A can and add jitter that conform to ITU-T 0.172 Draft to the signal (clock) of the bit rate (clock) coverd by each option 01, 02, 04, 05, 06 or 07.

Figure 5-1 shows a block diagram of the jitter modulation module of the MP1777A. As the MP1777A does not incorporate a modulating signal generator, the modulating signal must be input from an external signal generator.

NOTE:

All the jitter measurement can be automatically performed from an external Personal Computer by combining the MS4630B Network Analyzer and the MX177701A Jitter Performance Test Software.

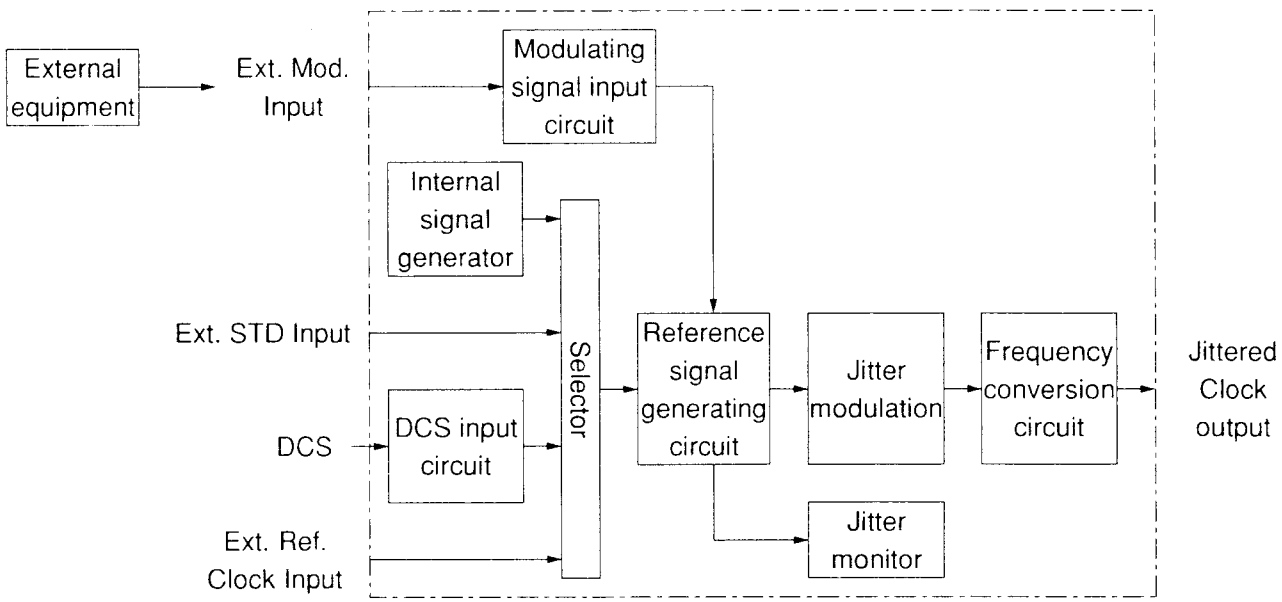


Fig. 5-1 Block Diagram for MP1777A Jitter Generation Module

5.2 Generation of Jitter

5.2.1 Operation procedures

Procedures for jitter generation using external modulating signal source
Example: Bit Rate = 9,953 MHz, Modulation frequency = 100 kHz, Jitter amplitude = 1 UI_{PP}

(1) Connect an external modulating signal generator to Ext. Mod. Input of the MP1777A (See Fig. 5-2).
(Do not input signal exceeding 2 V_{PP}.)

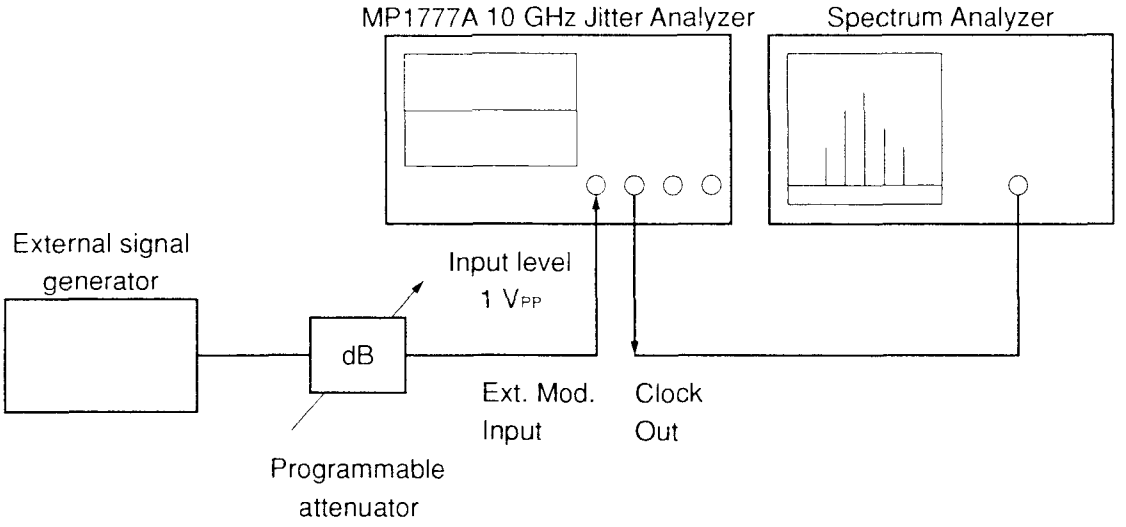


Fig. 5-2 Jitter Generation Configuration

(2) Select Bit Rate = 9,953 M on the secondary screen of the setup menu interface of the MP1777A.
Also, set Jitter Setting/Equalizer = OFF.
(The equalizer is used for automatic measurement of jitter transfer. Normally, select the equalizer setting of OFF.)

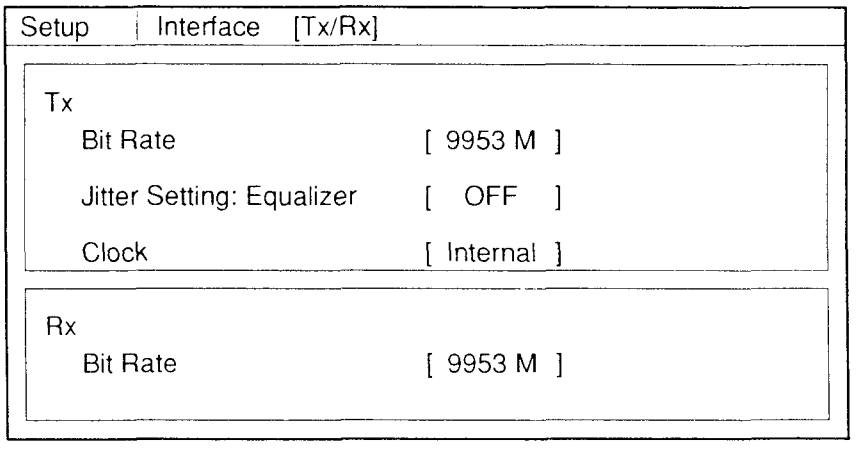


Fig. 5-3 Setup Screen

(3) Set Tx Jitter = ON on the Test menu/manual jitter screen.
Also set Tx Range = 80 UI.

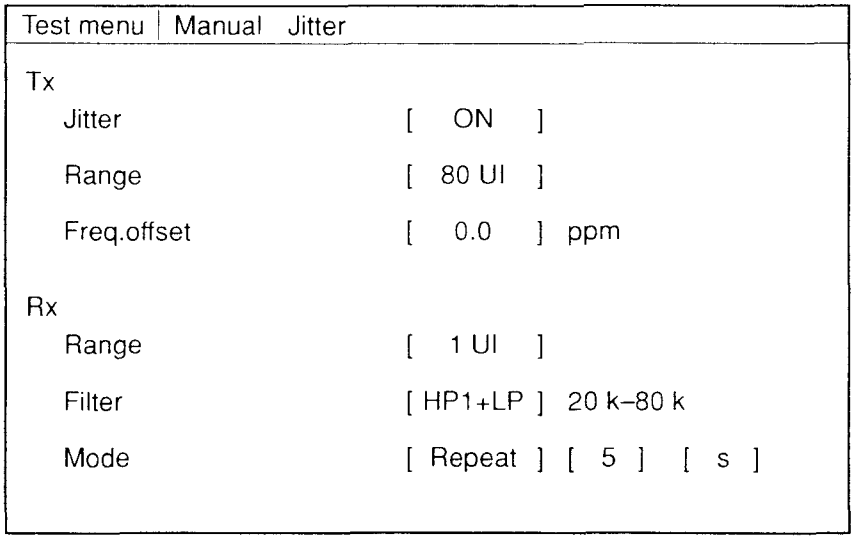


Fig. 5-4 Test Menu Screen (Manual)

(4) A clock with 1 UI jitter can be generated by setting the output level of the external modulating signal so that the TX monitor value on the Result screen becomes 1 UI.

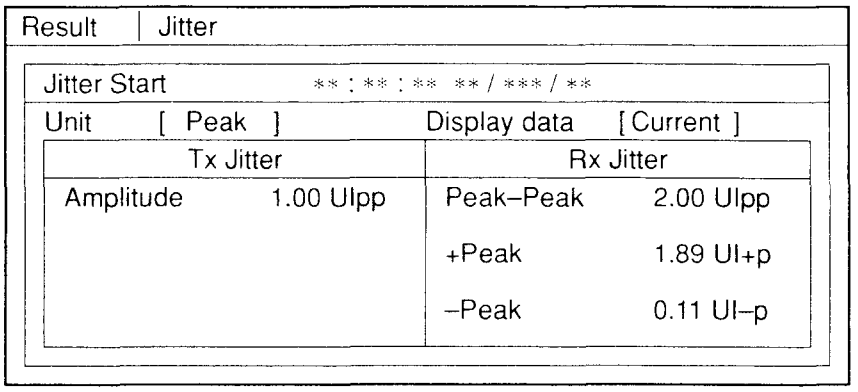


Fig. 5-5 Result Screen (Manual)

NOTE:

Refer to the Section 8 "Supplementary Data" for the amount of jitter enabled to be generated on each bit range and range.

5.3 Jitter Measurement

The MP1777A 10 GHz Jitter Analyzer enables measurement of jitter of up to 80 MHz bandwidth, which conforms to ITU-T 0.172 Draft.

5.3.1 Operation procedures

Example:

Measurement of output jitter of bit rate = 9.953 M

(1) Connect the signal (clock) to be measured to the MP1777A 10 GHz Jitter Analyzer.

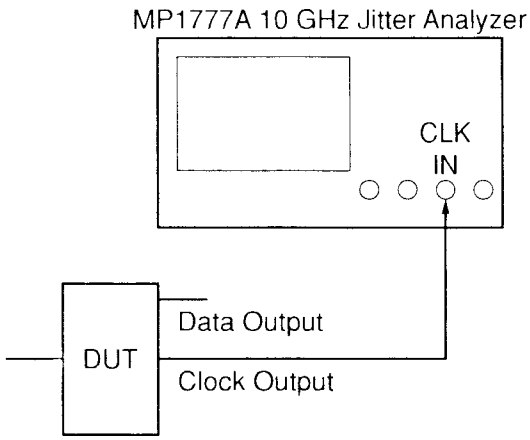


Fig. 5-6 Connection Diagram for Jitter Measurement

(2) Set Rx Bit Rate = 9.953 M on the Setup screen.

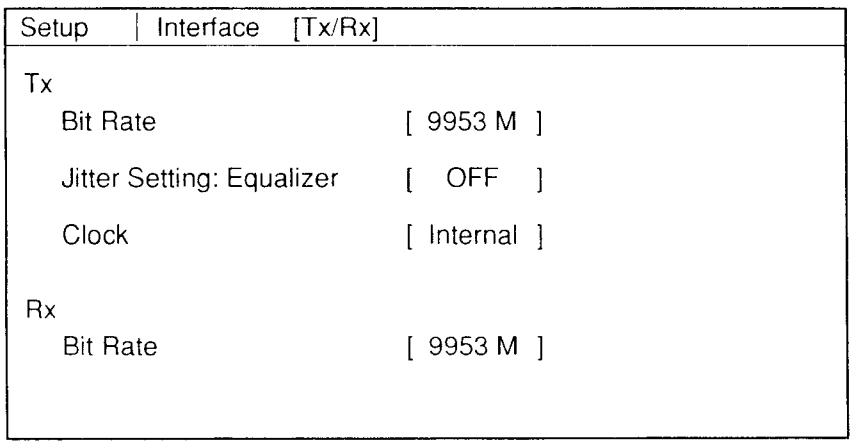


Fig. 5-7 Setup Screen

(3) Set Rx Range = 4 UI and Filter = HP1+LP on the Test menu screen.
Also set Mode = Single and 60 second

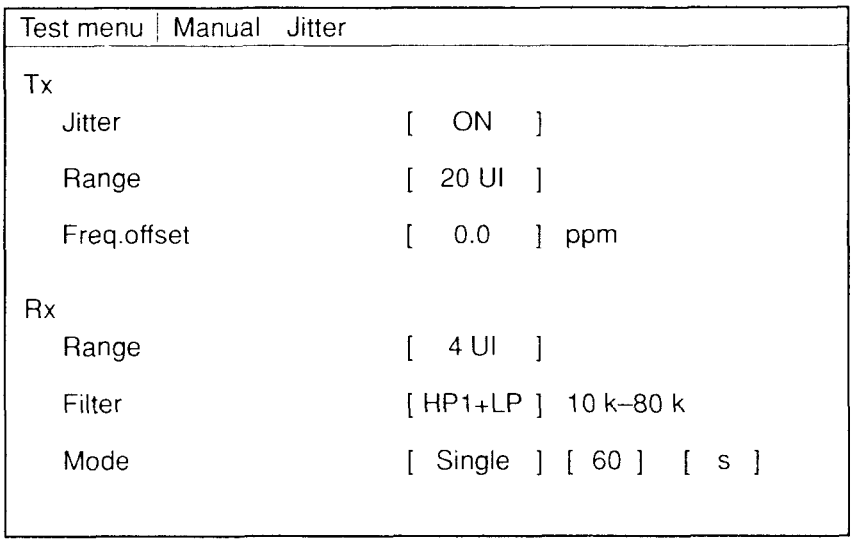


Fig. 5-8 Test Menu Screen (Manual)

(4) Pressing the Start/Stop button to start measurement causes the results to be displayed on the Result screen.

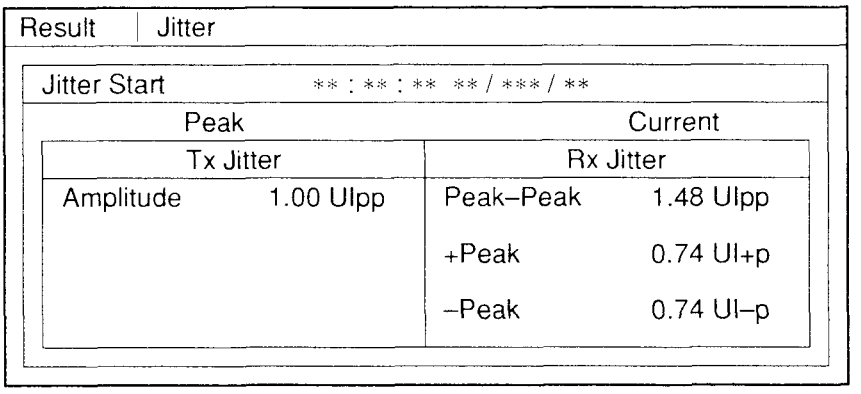
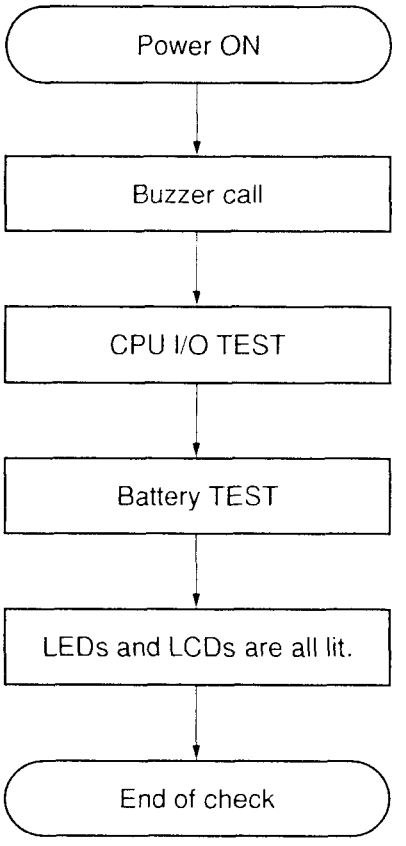


Fig. 5-9 Result Screen (Manual)

Section 6 Performance Tests

6.1 Checking CPU and Peripheral Devices

The MP1777A checks the CPU and the peripheral devices in the following sequence when the power is turned on.



6.2 Checking Clock Output Level

Check the output level in the following sequence.

(1) Connect the MP1777A 10 GHz Jitter Analyzer and the Spectrum Analyzer as shown in Fig. 6-1.
(2) Set the Bit Rate to 9953M on the "Setup: Interface" screen.
(3) Set the Tx Jitter = OFF on the "Test menu: Manual" screen.
(4) Adjust the Spectrum Analyzer sensor frequency to 9953.28 MHz.
(5) Check that the output level satisfies +5 dBm ±3 dB.
(6) Change the Bit Rate on the "Setup: Interface" screen, and repeat 1 to 5.

NOTE:

Refer to Table 6-1 to set the Bit Rate and the Spectrum Analyzer sensor frequency on the Setup menu.

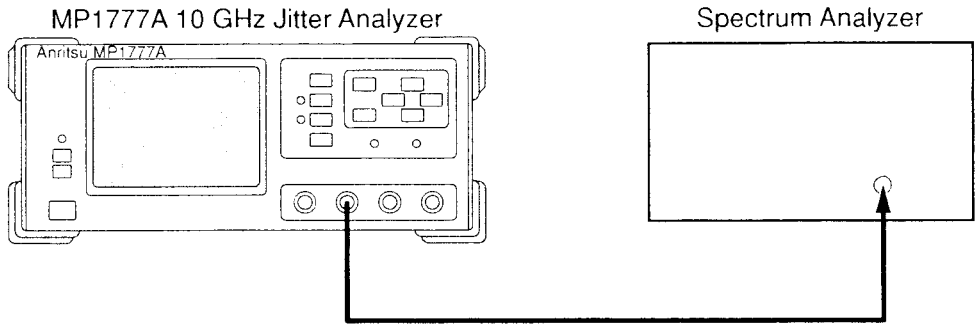


Fig. 6-1 Clock Output Level Performance Test

Table 6-1 Nominal Frequency for Each Bit Rate

	Bit Rate	Nominal frequency
Standard	2488 M	2488.32 MHz
	4977 M	4976.64 MHz
	9953 M	9953.28 MHz
Option 01	2494 M	2494.16 MHz
	4988 M	4988.32 MHz
	9976 M	9976.64 MHz
Option 02	2666 M	2666.0571 MHz
	5332 M	5332.1142 MHz
	10664 M	10664.2284 MHz
Option 04	3062 M	3062.3629 MHz
	6125 M	6124.7259 MHz
	12249 M	12249.4517 MHz
Option 05	3069 M	3069.0 MHz
	6138 M	6138.0 MHz
	12276 M	12276.0 MHz
Option 06	2677 M	2677.3063 MHz
	5355 M	5354.6127 MHz
	10709 M	10709.2253 MHz
Option 07	2578 M	2578.125 MHz
	5156 M	5156.25 MHz
	10313 M	10312.5 MHz

6.3 Checking External Modulation Input Sensitivity

Check the external modulation input sensitivity in the following sequence.

(1) Connect the MP1777A 10 GHz Jitter Analyzer and the Signal Generator as shown in Fig. 6-2.
(2) Set the Bit Rate to 9953M on the "Setup: Interface" screen.
(3) Set the Tx Jitter = ON and the Range = 0.5 UI on the "Test menu: Manual Jitter" screen.
(4) From the Signal Generator, enter the sine wave signals with frequency 100 kHz and level 0.5 V_{PP} to Ext. Mod. Input of the MP1777A.
(5) Check that the Tx monitor on the "Result/Jitter" screen satisfies the standard in Table 6-2.
(6) Check the other Bit Rates and Ranges by referring to Table 6-2 , as in the same manner.

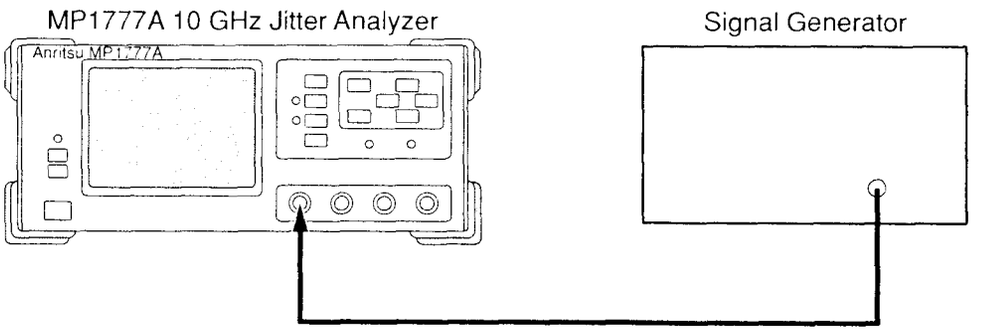


Fig. 6-2 External Modulation Input Sensitivity Performance Test

Table 6-2 External Modulation Input Sensitivity Threshold Values

Bit Rate	Range	Minimum value (UI_{PP})	Maximum value (UI_{PP})	Standard
2488 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/2 V_{PP}, 100 kHz
2494 M	20 UI	17	23	20 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
2666 M	800 UI	680	920	800 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz
4977 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
4988 M	40 UI	34	46	40 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
5332 M	1600 UI	1360	1840	1600 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz
9953 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/0.5 V_{PP}, 100 kHz
9976 M	80 UI	68	92	80 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
10664 M	3200 UI	2720	3680	3200 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz
3062 M 3069 M 2677 M 2578 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/1.5 V_{PP}, 100 kHz
	20 UI	17	23	20 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
	800 UI	680	920	800 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz
6125 M 6138 M 5355 M 5156 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/0.75 V_{PP}, 100 kHz
	40 UI	34	46	40 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
	1600 UI	1360	1840	1600 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz
12249 M 12276 M 10709 M 10313 M	0.5 UI	0.425	0.575	0.5 UI_{PP} ± 15 %/0.375V_{PP}, 100 kHz
	80 UI	68	92	80 UI_{PP} ± 15 %/1 V_{PP}, 100 kHz
	3200 UI	2720	3680	3200 UI_{PP} ± 15 %/1 V_{PP}, 10 Hz

6.4 Checking Jitter Measurement Accuracy

Check the Jitter measurement accuracy in the following sequence.

(1) Connect the MP1777A 10 GHz Jitter Analyzer and the Signal Generator as shown in Fig. 6-3.
(2) Set the Bit Rate to 9953M on the "Setup: Interface" screen.
(3) Set the TX Jitter = ON and the Freq. Offset = 0.0 ppm on the "Test menu: Manual Jitter" screen.
(4) Set the Range = 0.5 UI on the "Test menu: Manual Jitter" screen.
(5) Enter the sign wave signals of 100 kHz frequency from the external signal generator. Adjust the amplitude of the Signal Generator so that the Tx monitor on the "Result/Jitter" screen is set to 0.5 UI_{PP}.
(6) Set the Rx Range = 1 UI and the Filter = HP1 + LP on the "Test menu: Manual Jitter" screen.
(7) Check that the value of the Rx Jitter Peak–Peak on the "Result: Jitter" screen satisfies the standard in Table 6-3-1.
(8) Set the Rx Range = 1 UI and the Filter = HP + LP on the "Test menu: Manual Jitter" screen.
(9) Check that the value of the Rx Jitter rms on the "Result: Jitter" screen satisfies the standard in Table 6-3-2.
(10) Change the Bit Rate on the "Setup: Interface" screen, and repeat 1 to 9 to check the accuracy.

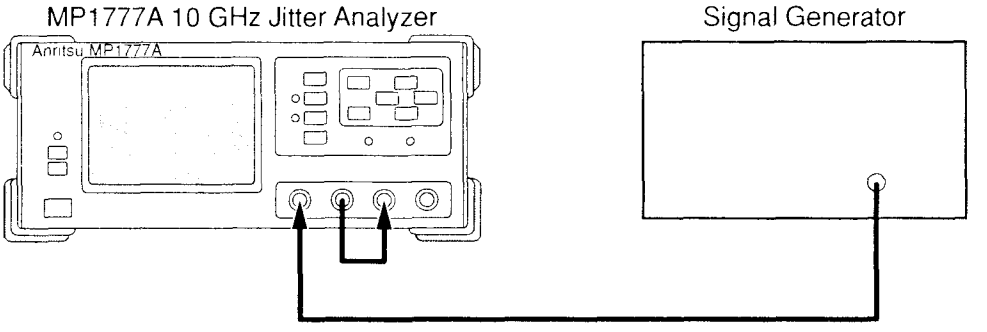


Fig. 6-3 Jitter Measurement Accuracy Performance Test

Table 6-3-1 Jitter Measurement Accuracy Threshold Values (UI_{PP})

Bit Rate	Range	Minimum value (UI_{PP})	Maximum value (UI_{PP})	Standard (UI_{PP})
2488 M 2494 M 2666 M 3062 M	1 UI	0.425	0.575	−5 % ± 0.05 UI_{PP} (with HP1 + LP)
3069 M 2677 M 2578 M	4 UI	0.26	0.74	−5 % ± 0.22 UI_{PP} (with HP1 + LP)
4977 M 4988 M 5332 M 6125 M	1 UI	0.423	0.577	−5 % ± 0.07 UI_{PP} (with HP1 + LP)
6138 M 5355 M 5156 M	4 UI	0.24	0.76	−5 % ± 0.24 UI_{PP} (with HP1 + LP)
9953 M 9976 M 10664 M 12249 M	1 UI	0.421	0.579	−5 % ± 0.09 UI_{PP} (with HP1 + LP)
12276 M 10709 M 10313 M	4 UI	0.22	0.78	−5 % ± 0.26 UI_{PP} (with HP1 + LP)

Table 6-3-2 Jitter Measurement Accuracy Threshold Values (UIrms)

Bit Rate	Range	Minimum value (UIrms)	Maximum value (UIrms)	Standard (UIrms)
2488 M 2494 M 2666 M 3062 M	1 UI	0.163	0.191	−5 % ± 0.008 UIrms (with HP + LP)
3069 M 2677 M 2578 M	4 UI	0.10	0.26	−5 % ± 0.08 UIrms (with HP + LP)
4977 M 4988 M 5332 M 6125 M	1 UI	0.162	0.192	−5 % ± 0.009 UIrms (with HP + LP)
6138 M 5355 M 5156 M	4 UI	0.09	0.27	−5 % ± 0.09 UIrms (with HP + LP)
9953 M 9976 M 10664 M 12249 M	1 UI	0.161	0.193	−5 % ± 0.01 UIrms (with HP + LP)
12276 M 10709 M 10313 M	4 UI	0.08	0.28	−5 % ± 0.1 UIrms (with HP + LP)

6.5 Checking Demod. Output Sensitivity

Check the Demod. Output sensitivity in the following sequence.

(1) Connect the MP1777A 10 GHz Jitter Analyzer, the Signal Generator and the Oscilloscope as shown in Fig. 6-4.
(2) Set the Bit Rate to 9953M on the "Setup: Interface" screen.
(3) Set the Tx Jitter = ON and the Range = 80 UI on the "Test menu: Manual Jitter" screen.
(4) Set the Rx Range = 1 UI and the Filter = HP1 + LP on the "Test menu: Manual Jitter" screen.
(5) Enter the sine wave signals of 100 kHz frequency from the external signal generator. Adjust the amplitude of the Signal Generator so that the Rx monitor on the "Result/Jitter " screen is set to 1.000 UI_{PP}.
(6) Check the Demod. Output using the Oscilloscope. Check that the value satisfies the standard in Table 6-4.
(7) Change the Bit Rate on the "Setup: Interface" screen, and repeat 1 to 6 to check the sensitivity.

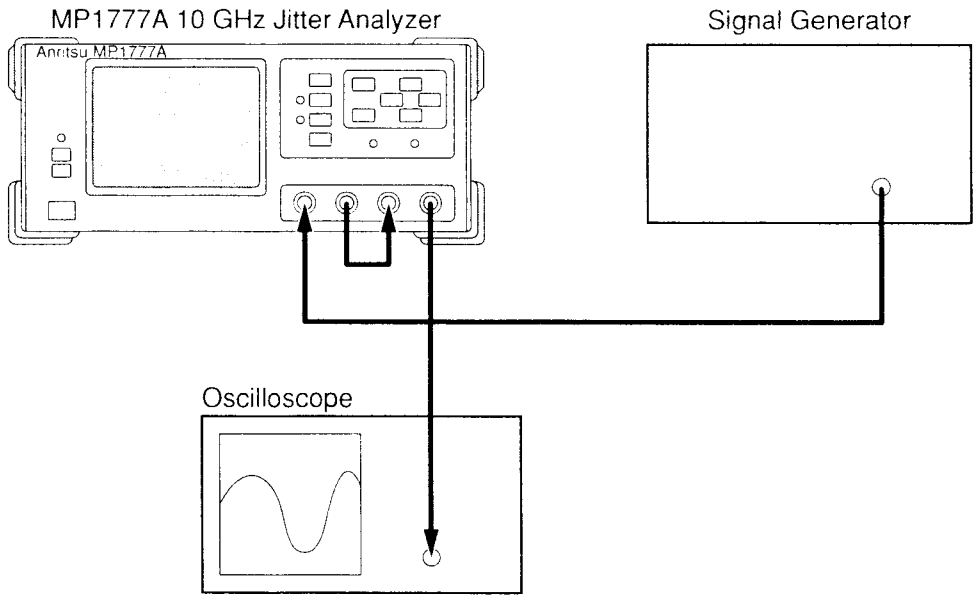


Fig. 6-4 "Demod. Output" Output Sensitivity Performance Test

Table 6-4 "Demod. Output" Output Sensitivity Performance Test Threshold Values

Bit Rate	Range	Minimum value (V_{PP})	Maximum value (V_{PP})	Standard
2488 M 2494 M 2666 M 3062 M 3069 M 2677 M 2578 M	1 UI	0.85	1.15	1 V_{PP} ± 15%/1 UI_{PP}
	4 UI	0.85	1.15	1 V_{PP} ± 15%/4 UI_{PP}
4977 M 4988 M 5332 M 6125 M 6138 M 5355 M 5156 M	1 UI	0.85	1.15	1 V_{PP} ± 15%/1 UI_{PP}
	4 UI	0.85	1.15	1 V_{PP} ± 15%/4 UI_{PP}
9953 M 9976 M 10664 M 12249 M 12276 M 10709 M 10313 M	1 UI	0.85	1.15	1 V_{PP} ± 15%/1 UI_{PP}
	4 UI	0.85	1.15	1 V_{PP} ± 15%/4 UI_{PP}

Section 7 Storage and Transportation

7.1 Daily Maintenance

Table 7-1 shows the procedure and time for daily maintenance.

Table 7-1 Daily Maintenance

Item	Time	Procedure
Stained outer surfaces	• Before long-time storage • After using in a dusty place	Wipe using cloth moistened with diluted neutral detergent.
Adhered dust and dirt	• When a foreign matter is involved • When dust is involved	Clean using an electric cleaner. When cleaning a fan, do not vacuum the air too hard.
Loosened screws	• Whenever a loosenedscrew is found	Tighten it using a suitable tool.

7.2 Storage

7.2.1 Precaution on storage

Be sure to observe the following points when storing for a long time.

(1) Wipe off dust and dirt adhered on the analyzer before storage.
(2) Avoid storing the analyzer in a place where the temperature may rise higher than +60 or lower below –20 degrees centigrade or a place where humidity may rise higher than 75 % or lower below 20 %.
(3) Avoid storing the analyzer for a long period of time in a place subject to direct sunlight or a dusty place.
(4) Avoid storing the analyzer in a place possibly exposed to dew condensation, active gas or acid.

7.2.2 Recommended Storage Conditions

When storing the analyzer for a long time, the storage place must meet the conditions in 7.2.1. In addition, the following storage conditions are also recommended:

- Temperature: 5 to 30 °C
- Humidity: 40 % to 75 %
- Daily fluctuation of temperature and humidity is small.

7.3 Transportation

Observe the following points when transporting the analyzer.

(1) Attach a protective cover to the front of the MP1777A.
(2) To protect the analyzer from moisture, shocks and vibration, put it in a vinyl bag, and then put it in a corrugated cardboard box filled with cushioning material.
(3) During the transportation, place the analyzer in an environment which meets the conditions in 7.2.1.

Section 8 Supplementary Data

8.1 Jitter Amplitude Limit

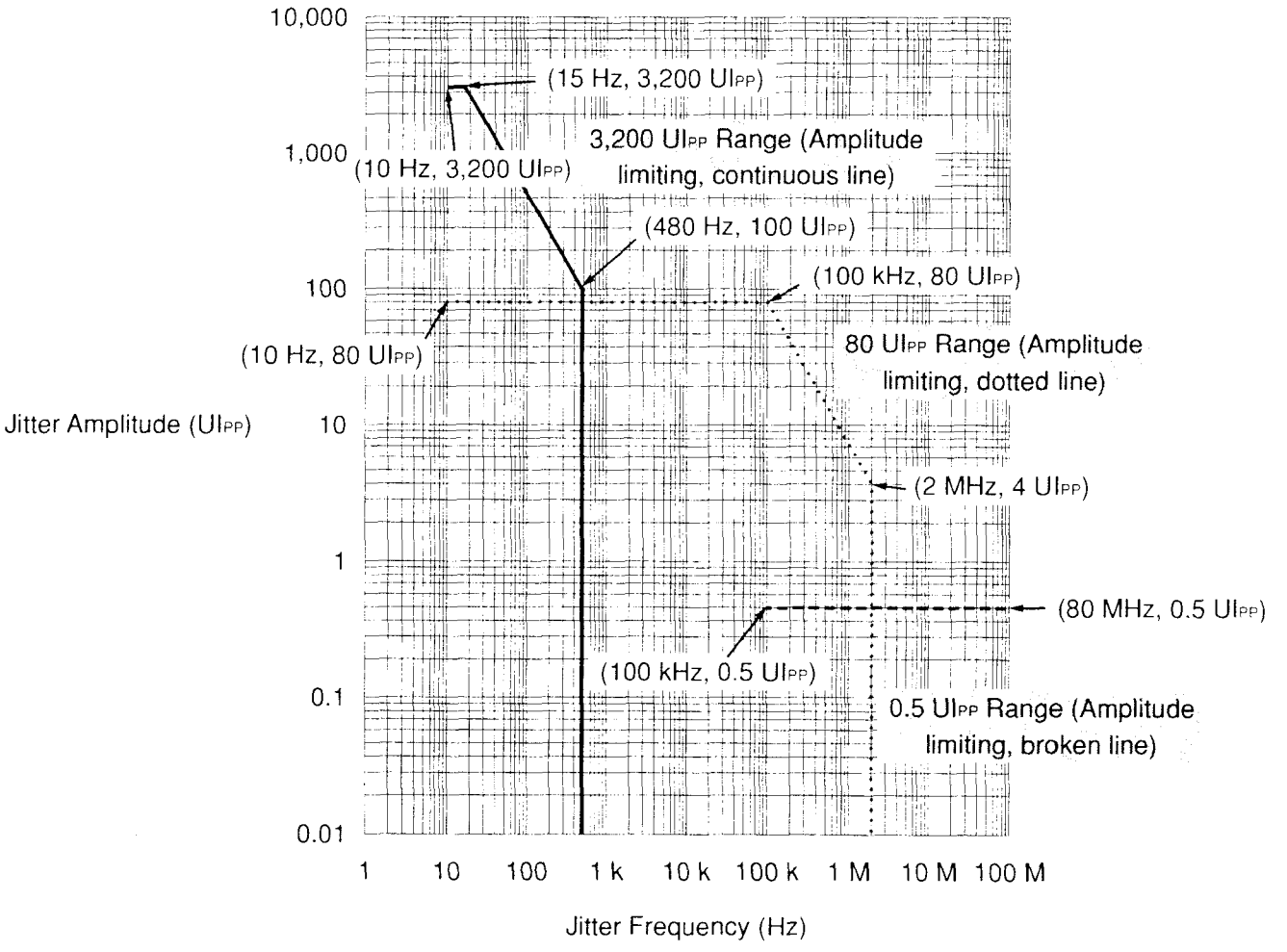


Fig. 8-1 MP1777A 10 Gbit/s Jitter Amplitude Limiting

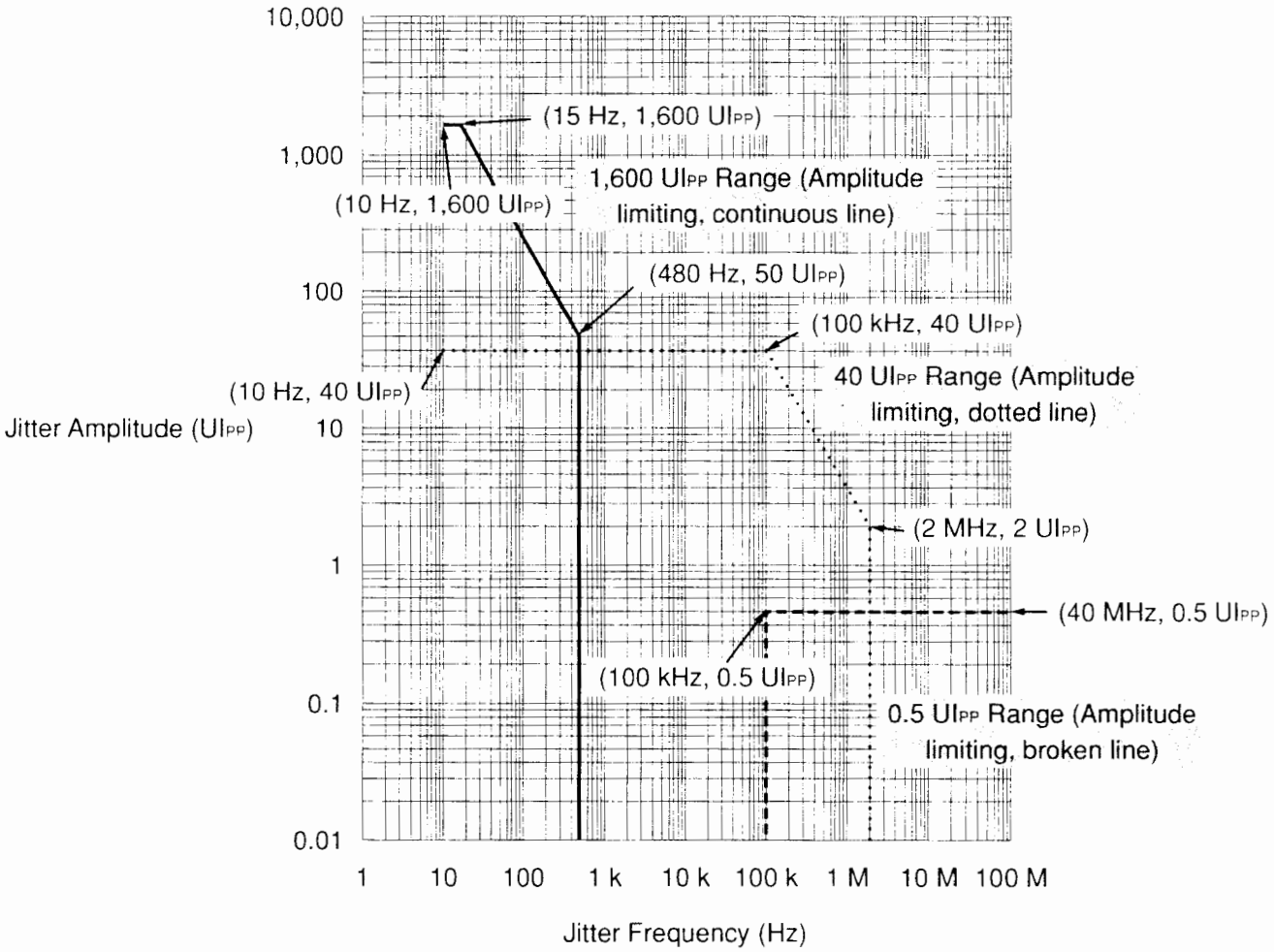


Fig. 8-2 MP1777A 5 Gbit/s Jitter Amplitude Limiting

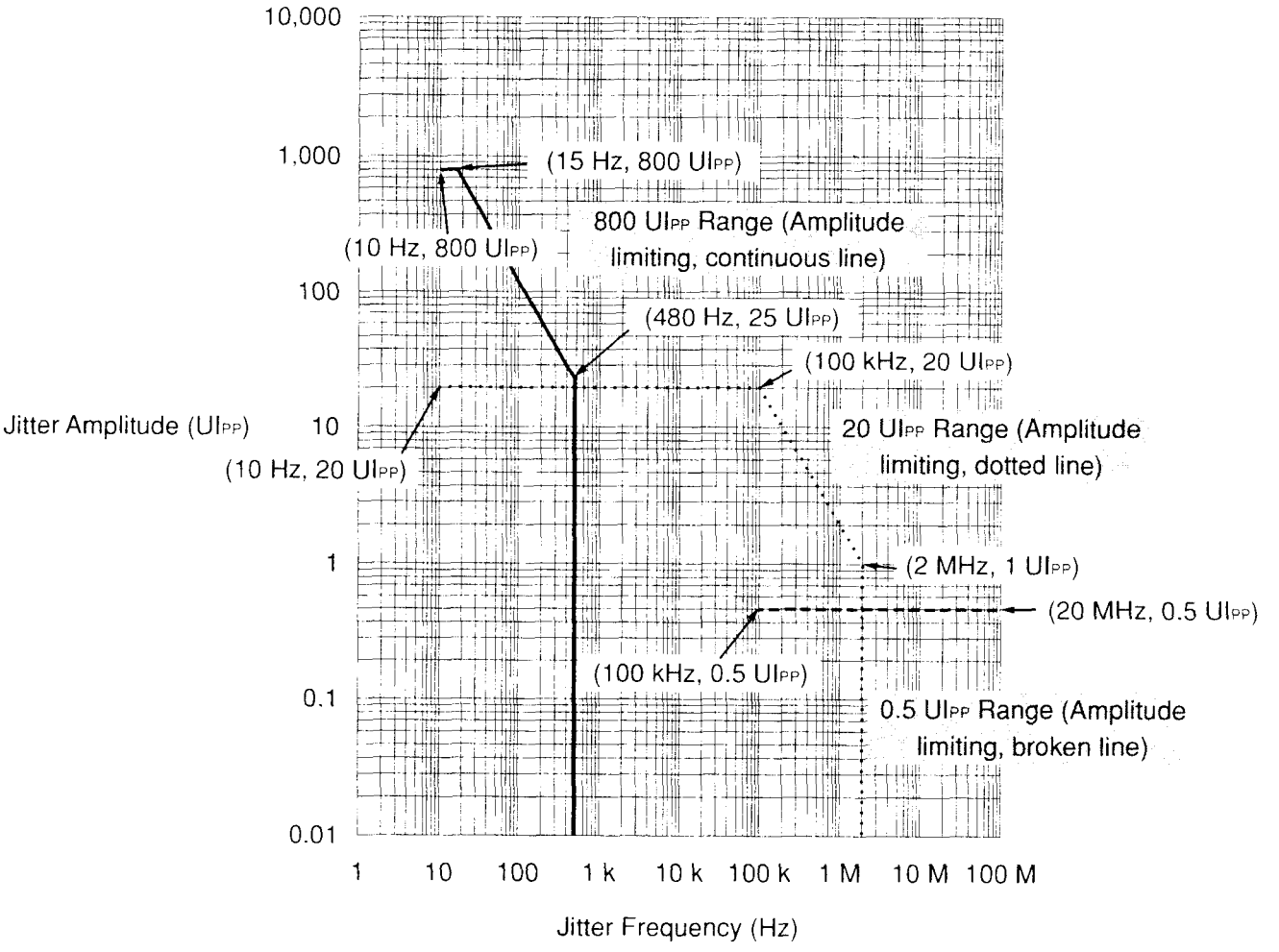


Fig. 8-3 MP1777A 2.5 Gbit/s Jitter Amplitude Limiting

Appendix A
Performance Test Results Entry Table

Test site _____ Report No. _____

_____ Date _____

_____ Person in charge of the test _____

Analyzer name: MP1777A 10 GHz Jitter Analyzer

Manufacturing No. _____ Ambient temperature _____ ßC

Power supply frequency _____ Hz Relative temperature _____ %

Remarks:

_____

_____

_____

_____

_____

MP1777A 10 GHz Jitter Analyzer No. _____ Date _____

Test name [Clock output level]	Minimum specification value	Result	Maximum specification value	Measurement uncertainty
2488 M	+2 dBm		+8 dBm	
2494 M	+2 dBm		+8 dBm	
2666 M	+2 dBm		+8 dBm	
3062 M	+2 dBm		+8 dBm	
3069 M	+2 dBm		+8 dBm	
2677 M	+2 dBm		+8 dBm	
2578 M	+2 dBm		+8 dBm	
4977 M	+2 dBm		+8 dBm	
4988 M	+2 dBm		+8 dBm	
5332 M	+2 dBm		+8 dBm	−0.4 dB
6125 M	+2 dBm		+8 dBm	
6138 M	+2 dBm		+8 dBm	
5355 M	+2 dBm		+8 dBm	
5156 M	+2 dBm		+8 dBm	
9953 M	+2 dBm		+8 dBm	
9976 M	+2 dBm		+8 dBm	
10664 M	+2 dBm		+8 dBm	
12249 M	+2 dBm		+8 dBm	
12276 M	+2 dBm		+8 dBm	
10709 M	+2 dBm		+8 dBm	
10313 M	+2 dBm		+8 dBm	

Appendix A Performance Test Results Entry Table

Test mane [External modulation input sensitivity]	Minimum specification value	Result	Maximum specification value	Measurement uncertainy
2488 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
2488 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
2488 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
2494 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
2494 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
2494 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
2666 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
2666 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
2666 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
3062 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
3062 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
3062 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
3069 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
3069 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
3069 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
2677 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
2677 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
2677 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
2578 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
2578 M / 20 UI	17 UI_{PP}		23 UI_{PP}	
2578 M / 800 UI	680 UI_{PP}		920 UI_{PP}	
4977 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
4977 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
4977 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
4988 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
4988 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
4988 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
5332 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
5332 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
5332 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
6125 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
6125 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
6125 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
6138 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
6138 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
6138 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
5355 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
5355 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
5355 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
5156 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
5156 M / 40 UI	34 UI_{PP}		46 UI_{PP}	
5156 M / 1600 UI	1360 UI_{PP}		1840 UI_{PP}	
9953 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
9953 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
9953 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	

Test mane [External modulation input sensitivity]	Minimum specification value	Result	Maximum specification value	Measurement uncertainy
9976 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
9976 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
9976 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	
10644 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
10664 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
10664 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	
12249 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
12249 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
12249 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	
12276 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
12276 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
12276 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	
10709 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
10709 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
10709 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	
10313 M / 0.5 UI	0.425 UI_{PP}		0.575 UI_{PP}	
10313 M / 80 UI	68 UI_{PP}		92 UI_{PP}	
10313 M / 3200 UI	2720 UI_{PP}		3680 UI_{PP}	

Appendix A Performance Test Results Entry Table

Test mane [Jitter measurement accuracy](UIpp)	Minimum specification value	Result	Maximum specification value	Measurement uncertainy
2488 M / 1 UI	0.425 UIpp		0.575 UIpp	
2488 M / 4 UI	0.26 UIpp		0.74 UIpp	
2494 M / 1 UI	0.425 UIpp		0.575 UIpp	
2494 M / 4 UI	0.26 UIpp		0.74 UIpp	
2666 M / 1 UI	0.425 UIpp		0.575 UIpp	
2666 M / 4 UI	0.26 UIpp		0.74 UIpp	
3062 M / 1 UI	0.425 UIpp		0.575 UIpp	
3062 M / 4 UI	0.26 UIpp		0.74 UIpp	
3069 M / 1 UI	0.425 UIpp		0.575 UIpp	
3069 M / 4 UI	0.26 UIpp		0.74 UIpp	
2677 M / 1 UI	0.425 UIpp		0.575 UIpp	
2677 M / 4 UI	0.26 UIpp		0.74 UIpp	
2578 M / 1 UI	0.425 UIpp		0.575 UIpp	
2578 M / 4 UI	0.26 UIpp		0.74 UIpp	
4977 M / 1 UI	0.423 UIpp		0.577 UIpp	
4977 M / 4 UI	0.24 UIpp		0.76 UIpp	
4988 M / 1 UI	0.423 UIpp		0.577 UIpp	
4988 M / 4 UI	0.24 UIpp		0.76 UIpp	
5332 M / 1 UI	0.423 UIpp		0.577 UIpp	
5332 M / 4 UI	0.24 UIpp		0.76 UIpp	
6125 M / 1 UI	0.423 UIpp		0.577 UIpp	
6125 M / 4 UI	0.24 UIpp		0.76 UIpp	
6138 M / 1 UI	0.423 UIpp		0.577 UIpp	
6138 M / 4 UI	0.24 UIpp		0.76 UIpp	
5355 M / 1 UI	0.423 UIpp		0.577 UIpp	
5355 M / 4 UI	0.24 UIpp		0.76 UIpp	
5156 M / 1 UI	0.423 UIpp		0.577 UIpp	
5156 M / 4 UI	0.24 UIpp		0.76 UIpp	
9953 M / 1 UI	0.421 UIpp		0.579 UIpp	
9953 M / 4 UI	0.22 UIpp		0.78 UIpp	
9976 M / 1 UI	0.421 UIpp		0.579 UIpp	
9976 M / 4 UI	0.22 UIpp		0.78 UIpp	
10664 M / 1 UI	0.421 UIpp		0.579 UIpp	
10664 M / 4 UI	0.22 UIpp		0.78 UIpp	
12249 M / 1 UI	0.421 UIpp		0.579 UIpp	
12249 M / 4 UI	0.22 UIpp		0.78 UIpp	
12276 M / 1 UI	0.421 UIpp		0.579 UIpp	
12276 M / 4 UI	0.22 UIpp		0.78 UIpp	
10709 M / 1 UI	0.421 UIpp		0.579 UIpp	
10709 M / 4 UI	0.22 UIpp		0.78 UIpp	
10313 M / 1 UI	0.421 UIpp		0.579 UIpp	
10313 M / 4 UI	0.22 UIpp		0.78 UIpp	

Test mane [Jitter measurement accuracy](UIrms)	Minimum specification value	Result	Maximum specification value	Measurement uncertainy
2488 M / 1 UI	0.163 UIrms		0.191 UIrms	
2488 M / 4 UI	0.10 UIrms		0.26 UIrms	
2494 M / 1 UI	0.163 UIrms		0.191 UIrms	
2494 M / 4 UI	0.10 UIrms		0.26 UIrms	
2666 M / 1 UI	0.163 UIrms		0.191 UIrms	
2666 M / 4 UI	0.10 UIrms		0.26 UIrms	
3062 M / 1 UI	0.163 UIrms		0.191 UIrms	
3062 M / 4 UI	0.10 UIrms		0.26 UIrms	
3069 M / 1 UI	0.163 UIrms		0.191 UIrms	
3069 M / 4 UI	0.10 UIrms		0.26 UIrms	
2677 M / 1 UI	0.163 UIrms		0.191 UIrms	
2677 M / 4 UI	0.10 UIrms		0.26 UIrms	
2578 M / 1 UI	0.163 UIrms		0.191 UIrms	
2578 M / 4 UI	0.10 UIrms		0.26 UIrms	
4977 M / 1 UI	0.162 UIrms		0.192 UIrms	
4977 M / 4 UI	0.09 UIrms		0.27 UIrms	
4988 M / 1 UI	0.162 UIrms		0.192 UIrms	
4988 M / 4 UI	0.09 UIrms		0.27 UIrms	
5332 M / 1 UI	0.162 UIrms		0.192 UIrms	
5332 M / 4 UI	0.09 UIrms		0.27 UIrms	
6125 M / 1 UI	0.162 UIrms		0.192 UIrms	
6125 M / 4 UI	0.09 UIrms		0.27 UIrms	
6138 M / 1 UI	0.162 UIrms		0.192 UIrms	
6138 M / 4 UI	0.09 UIrms		0.27 UIrms	
5355 M / 1 UI	0.162 UIrms		0.192 UIrms	
5355 M / 4 UI	0.09 UIrms		0.27 UIrms	
5156 M / 1 UI	0.162 UIrms		0.192 UIrms	
5156 M / 4 UI	0.09 UIrms		0.27 UIrms	
9953 M / 1 UI	0.161 UIrms		0.193 UIrms	
9953 M / 4 UI	0.08 UIrms		0.28 UIrms	
9976 M /1 UI	0.161 UIrms		0.193 UIrms	
9976 M / 4 UI	0.08 UIrms		0.28 UIrms	
10664 M / 1 UI	0.161 UIrms		0.193 UIrms	
10664 M / 4 UI	0.08 UIrms		0.28 UIrms	
12249 M / 1 UI	0.161 UIrms		0.193 UIrms	
12249 M / 4 UI	0.08 UIrms		0.28 UIrms	
12276 M / 1 UI	0.161 UIrms		0.193 UIrms	
12276 M / 4 UI	0.08 UIrms		0.28 UIrms	
10709 M / 1 UI	0.161 UIrms		0.193 UIrms	
10709 M / 4 UI	0.08 UIrms		0.28 UIrms	
10313 M / 1 UI	0.161 UIrms		0.193 UIrms	
10313 M / 4 UI	0.08 UIrms		0.28 UIrms	

Appendix A Performance Test Results Entry Table

Test mane [Demod. Out] Output sensitivity	Minimum specification value	Result	Maximum specification value	Measurement uncertainy
2488 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
2488 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
2494 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
2494 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
2666 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
2666 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
3062 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
3062 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
3069 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
3069 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
2677 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
2677 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
2578 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
2578 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
4977 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
4977 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
4988 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
4988 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
5332 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
5332 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
6125 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
6125 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
6138 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	±1.1%
6138 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
5355 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
5355 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
5156 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
5156 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
9953 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
9953 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
9977 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
9977 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
10664 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
10664 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
12249 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
12249 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
12276 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
12276 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
10709 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
10709 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	
10313 M / 1 UI	0.85 V_{PP}		1.15 V_{PP}	
10313 M / 4 UI	0.85 V_{PP}		1.15 V_{PP}	

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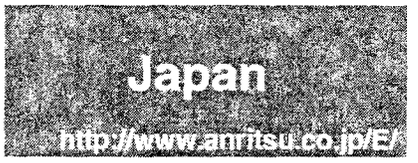

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