MP1570A
SONET/SDH/PDH/ATM Analyzer
Operation Manual
Vol.4
2.5G/10G Measurement

Eighth Edition

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

ANRITSU CORPORATION

Document No.: M-W1723AE-8.0

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 following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

Symbols used in manual

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

WARNING This indicates a hazardous procedure that could result in serious injury or death 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 in Manual

The following safety symbols are used inside or on the equipment near operation locations 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.

MP1570A
SONET/SDH/PDH/ATM Analyzer
Operation Manual Vol.4 2.5G/10G Measurement

7 February 2000 (First Edition)
10 December 2003 (Eighth 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. Measurement Categories
   This instrument is designed for Measurement category I (CAT I). Don't use this instrument at the locations of measurement categories from CAT II to CAT IV.
   In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV.
   The category outline is as follows:
   Measurement category I (CAT I):
   Secondary circuits of a device connected to an outlet via a power transformer etc.
   Measurement category II (CAT II):
   Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.
   Measurement category IV (CAT IV):
   All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).

For Safety

WARNING ⚠

3. Laser radiation warning
   - NEVER look directly into the cable connector on the equipment nor into the end of a cable connected to the equipment. If laser radiation enters the eye, there is a risk of injury.
   - Laser Radiation Markings on a following page show the Laser Safety label attached to the equipment near the cable connector.

4. When supplying power to this equipment, connect the accessory 3-pin power cord to a grounded outlet. If a grounded 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 ⚠

5. 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

6. 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.
   And also DO NOT use this equipment in the position where the power switch operation is difficult.

For Safety

WARNING ⚠

7. 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.

Battery Fluid

   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.

8. 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.

LCD

   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 ⚠

Replacing Fuse

CAUTION ⚠

1. Before Replacing 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.
   ___A or F___ A indicate a normal fusing type 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. The maximum input levels of the optical signal are 0 dBm for MU150002A 10G input, –8 dBm for MU150002A Option 01 2.5G input, and +3 dBm for MU150017A/B input. Excessive input level can damage the internal devices and circuit.

   Before performing a self loop-back test, always install 15 dB (when MP0127A/MP0128A/MP0129A or MU150008A/MU150009A/ MU150010A installed), 10 dB (when MU150002A installed), or 5 dB (when MU150017A/B installed) attenuator between the output connector and the input connector.

For Safety

WARNING ⚠

Laser Safety

The laser safety is assured by correct operation of the warning means of the laser output. Before using the optical output, if it is not possible to check the optical emission using the warning means of the laser output at power-on or when the optical output switch is set to on, the laser output may be faulty. Do not use the equipment and call our service department or representative to request repair.

Optical units for the MP1570A SONET/SDH/PDH/ATM Analyzer have Class 1 laser emitting parts as specified in IEC 60825-1, or Class I and IIIb parts as specified in 21CFR 1040.10 (refer to Table 1). Classes are indicated on the label at the top panel of this equipment and the front panel of each unit (refer to Table 2 and Figs 1 to 5).

Do not look directly into the end of any cable connected to the optical output connector of the unit. Laser light can seriously damage the eyes. Operating this unit in a procedure other than that as described above might result in injury or damage from laser emission. Please follow the handling instructions carefully.

Table 1 Class of each unit

Model number	Standard name	
	IEC 60825-1	21CFR 1040.10
MP0111A	Class 1	Class I
MP0112A	Class 1	Class I
MP0113A	Class 1	Class I
MP0122B	Class 1	Class I
MP0127A	Class 1	Class IIIb
MP0128A	Class 1	Class IIIb
MP0129A	Class 1	Class IIIb
MU150001A/B	Class 1	Class IIIb
MU150008A	Class 1	Class IIIb
MU150009A	Class 1	Class IIIb
MU150010A	Class 1	Class IIIb
MU150031A/C	Class 1	Class IIIb
MU150061A/B	Class 1	Class IIIb

For Safety

Class 1 indicates the danger degree of the laser radiation specified below according to IEC 60825-1.

Class 1: Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

And, Class I, IIa, II, IIIa and IIIb indicates the degree of danger of the laser radiation outlined below as defined by 21CFR 1040.10.

Class I: Class I labels of laser radiation are not considered to be hazardous.

Class IIa: Class IIa labels of laser radiation are not considered to be hazardous if viewed for any period of time less than or equal to 1×10^3 seconds but are considered to be a chronic viewing hazard for any period of time greater than 1×10^3 seconds. The wavelength range of laser radiating is in 400 to 710 nm.

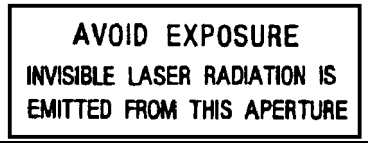
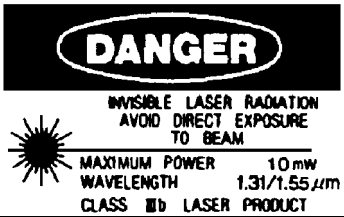
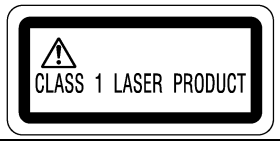
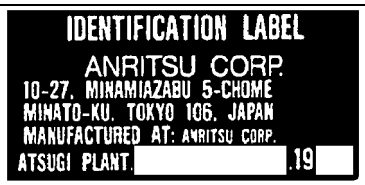
Class II: Class II labels of laser radiation are considered to be a chronic viewing hazard. The wavelength range of laser radiating is in 400 to 710 nm.

Class IIIa: Class IIIa labels of laser radiation are considered to be, depending upon the irradiance, either an acute intrabeam viewing hazard or chronic viewing hazard, and an acute viewing hazard if viewed directly with optical instruments. The wavelength range of laser radiating is in 400 to 710 nm.

Class IIIb: Class IIIb labels of laser radiation are considered to be an acute hazard to skin and eyes from direct radiation.

For Safety

Table 2

No.	Label	Description
[1]		Aperture label (FDA 21CFR 1040.10)
[2]		Explanatory label (FDA 21CFR 1040.10)
[3]		Explanatory label (IEC 60825-1)
[4]		Warning label (IEC 60825-1)
[5]		Certification label (FDA 21CFR 1040.10)
[6]		Identification label (FDA 21CFR 1040.10)

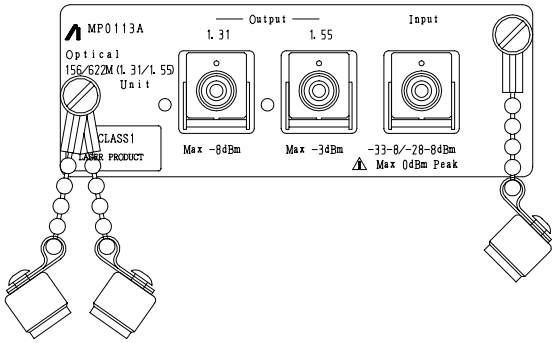


Fig. 1 MP0111A, MP0112A, MP0113A Front Panel of Unit

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.

Please, attach it to the place, shown above.

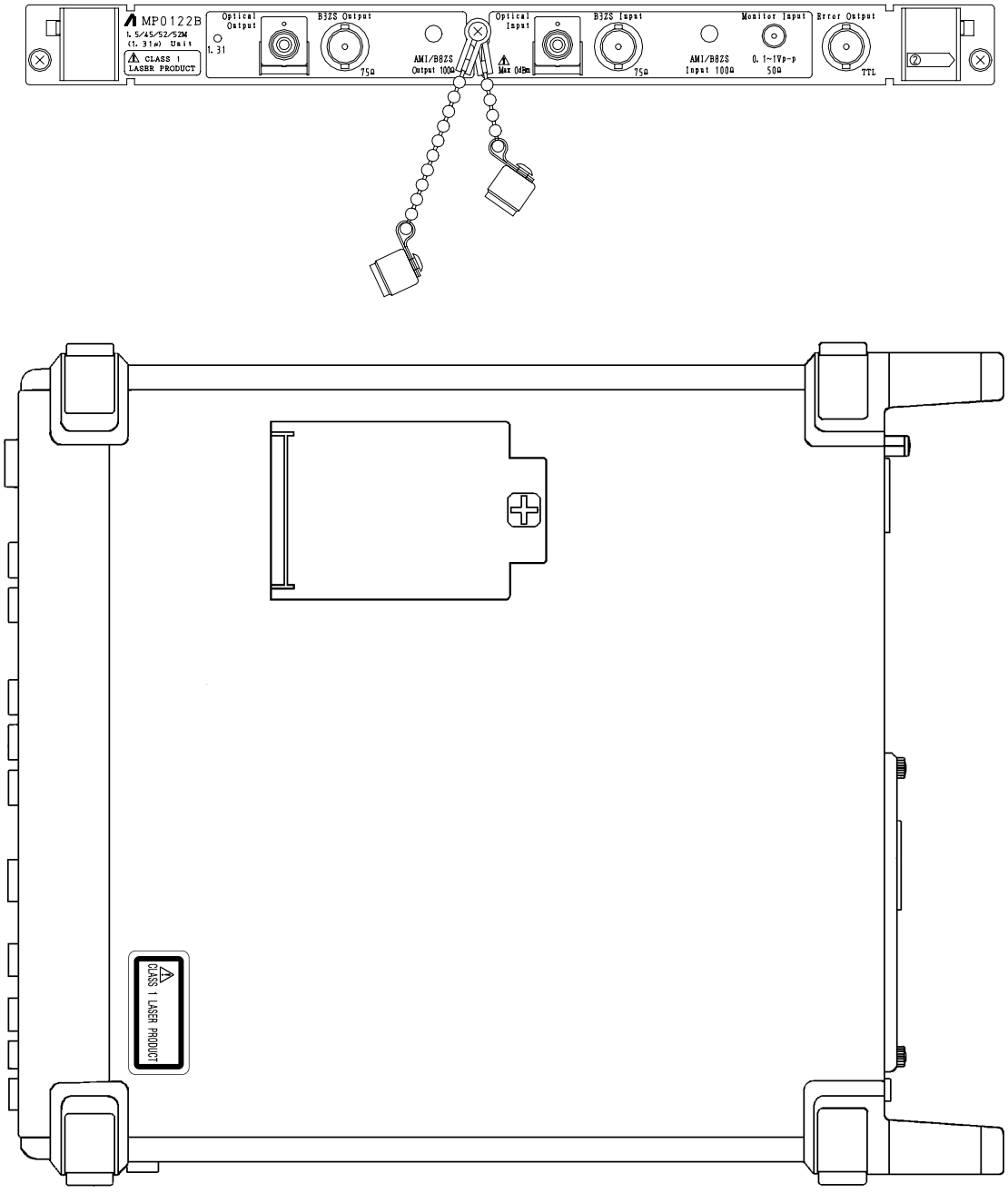


Fig. 2 MP0122B Front Panel of Unit and Top Panel of MP1570A
(Products shipping besides U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

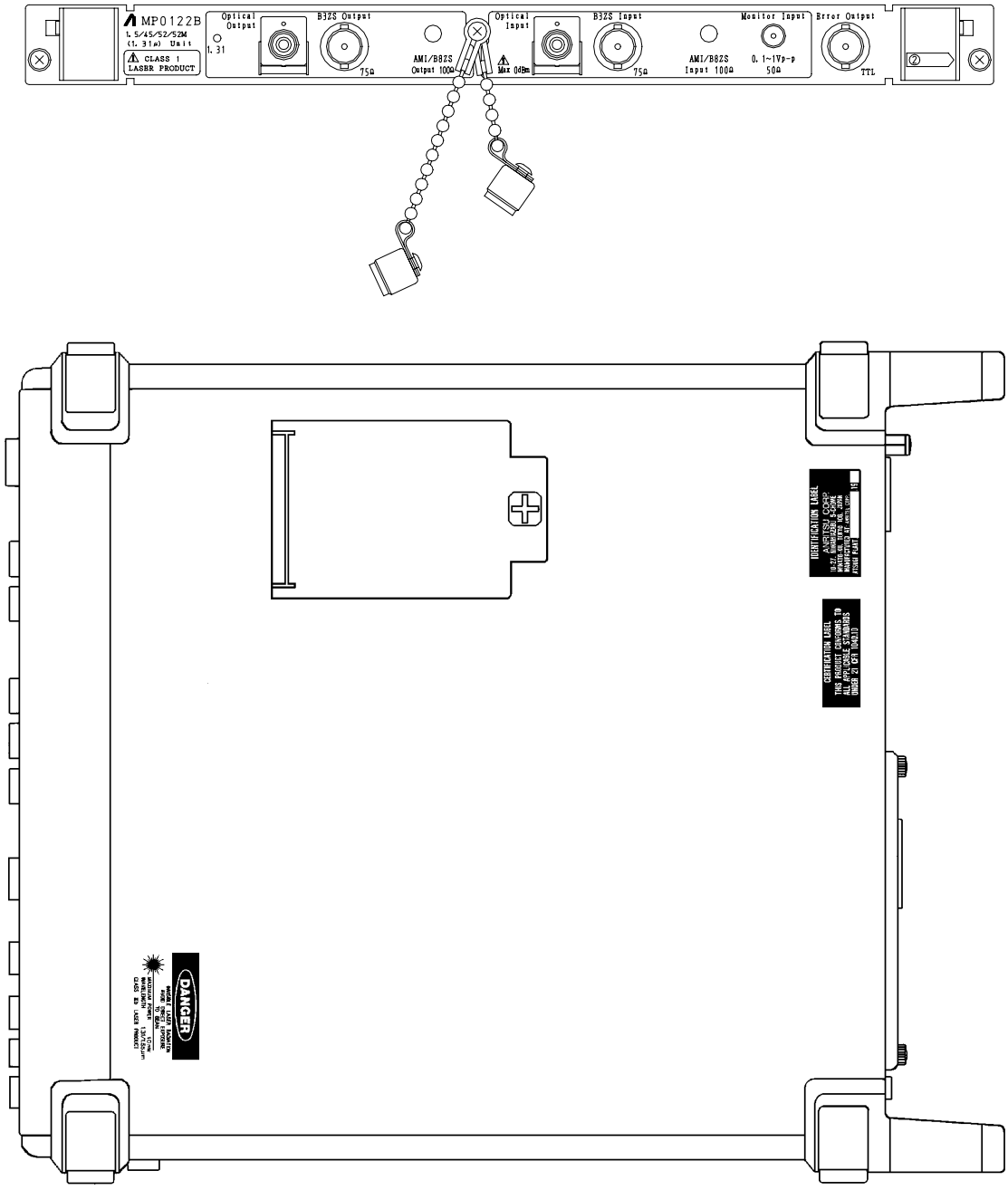


Fig. 3 MP0122B Front Panel of Unit and Top Panel of MP1570A
(Products shipping to U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

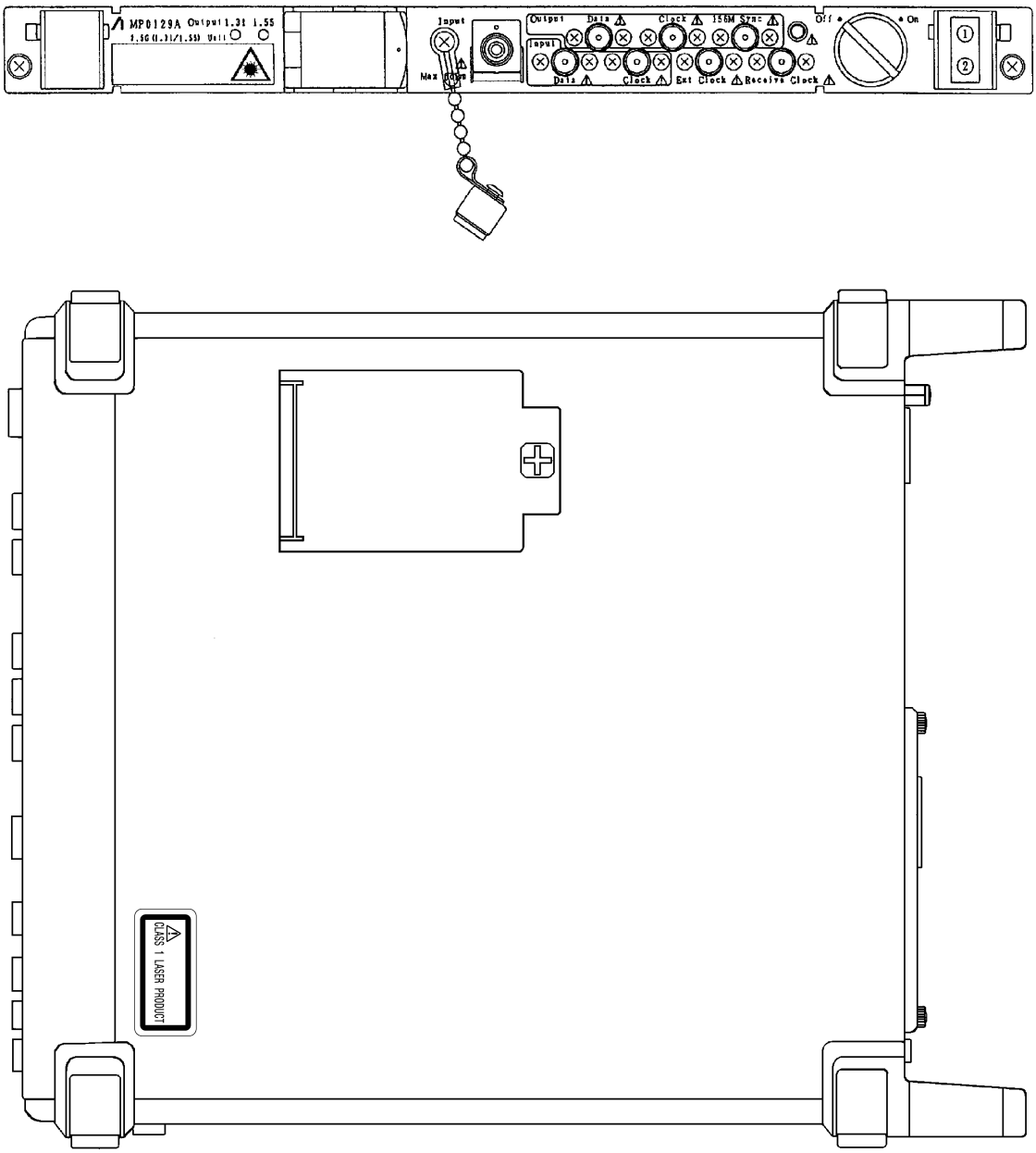


Fig. 4 MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A
Front Panel of Unit and Top Panel of MP1570A
(Products shipping besides U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

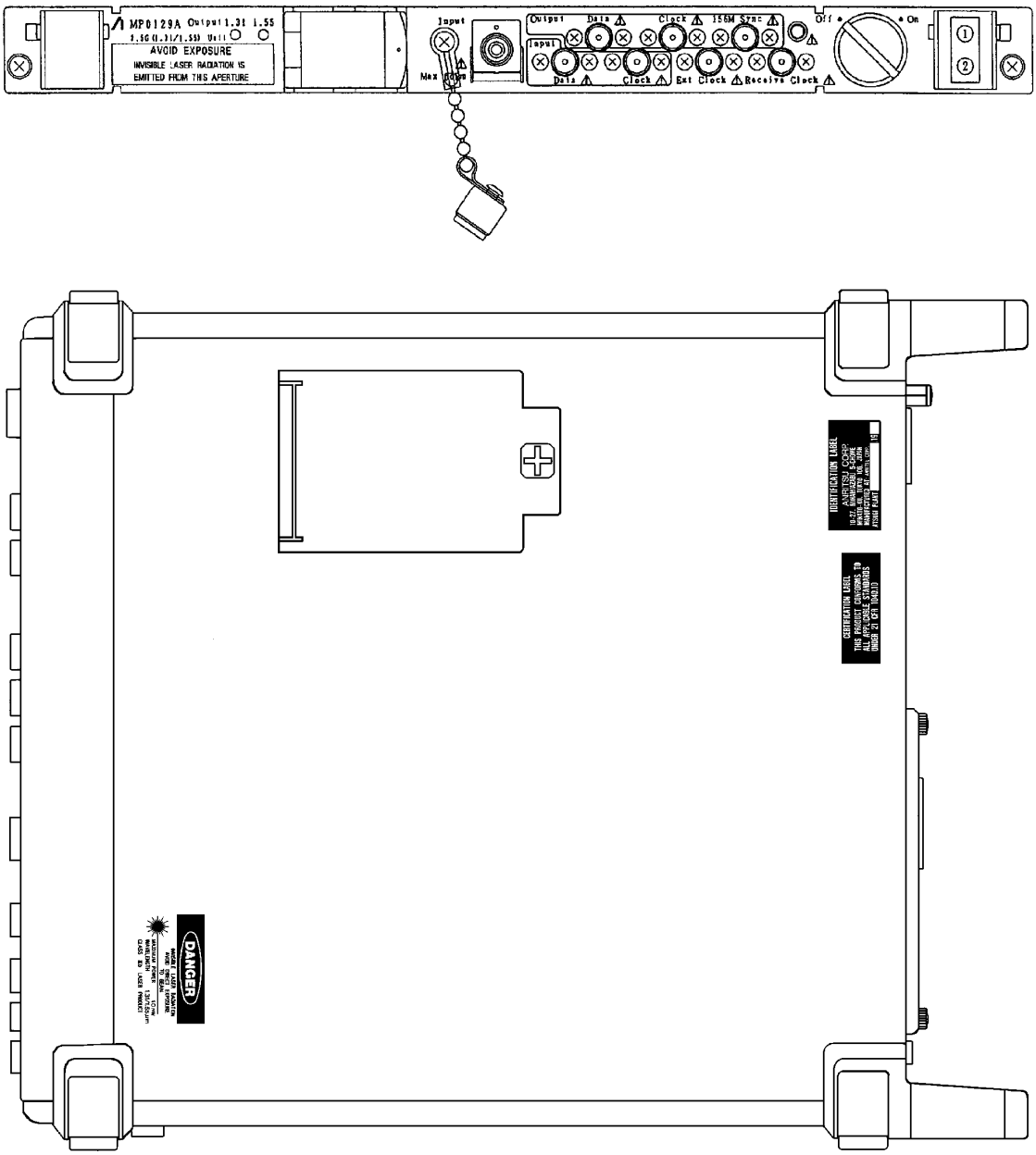


Fig. 5 MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A
Front Panel of Unit and Top Panel of MP1570A
(Products shipping to U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

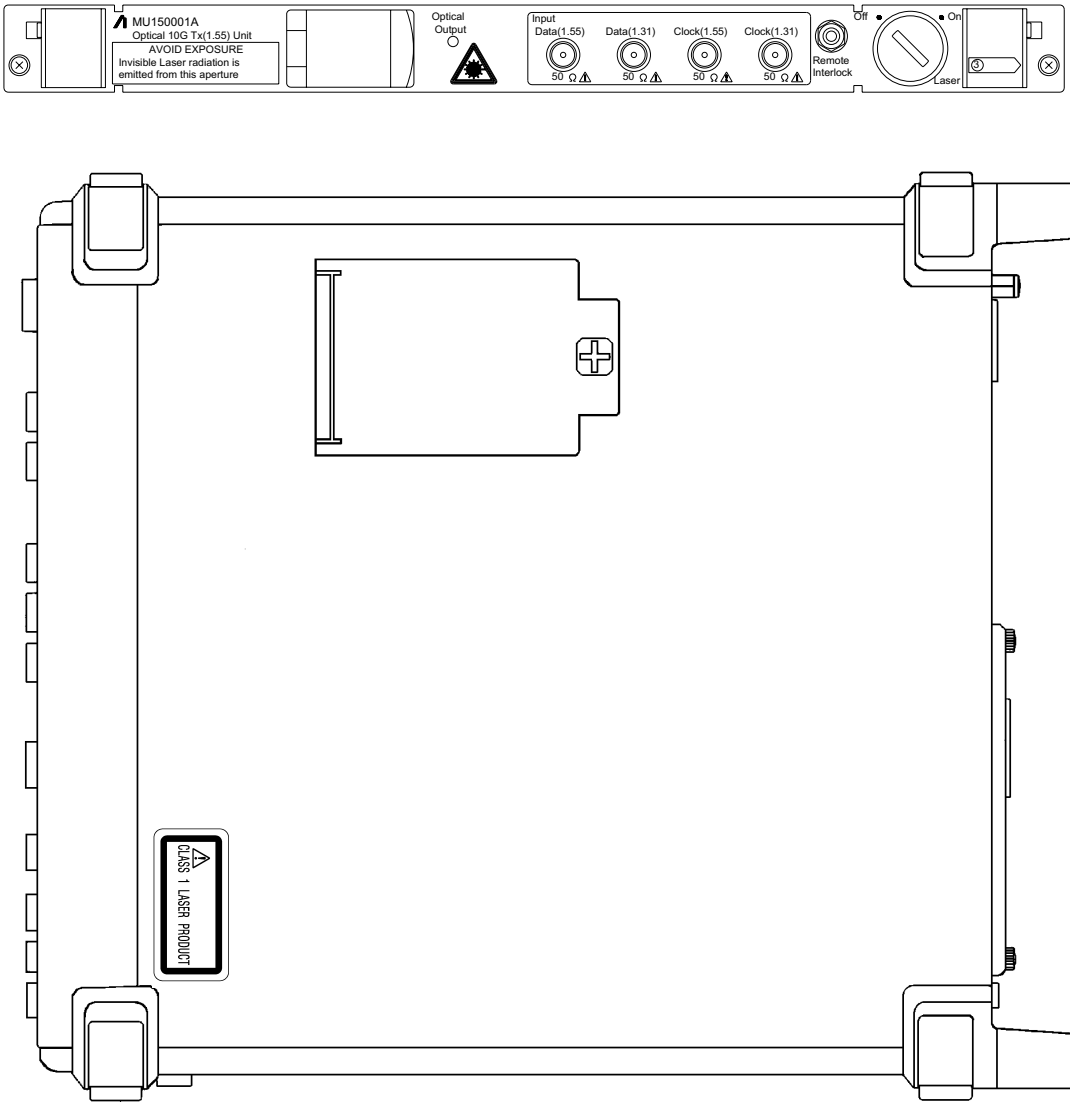


Fig. 6 MU150001A/B, MU150031A/C, MU150061A/B
Front Panel of Unit and Top Panel of MP1570A
(Products shipping besides U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

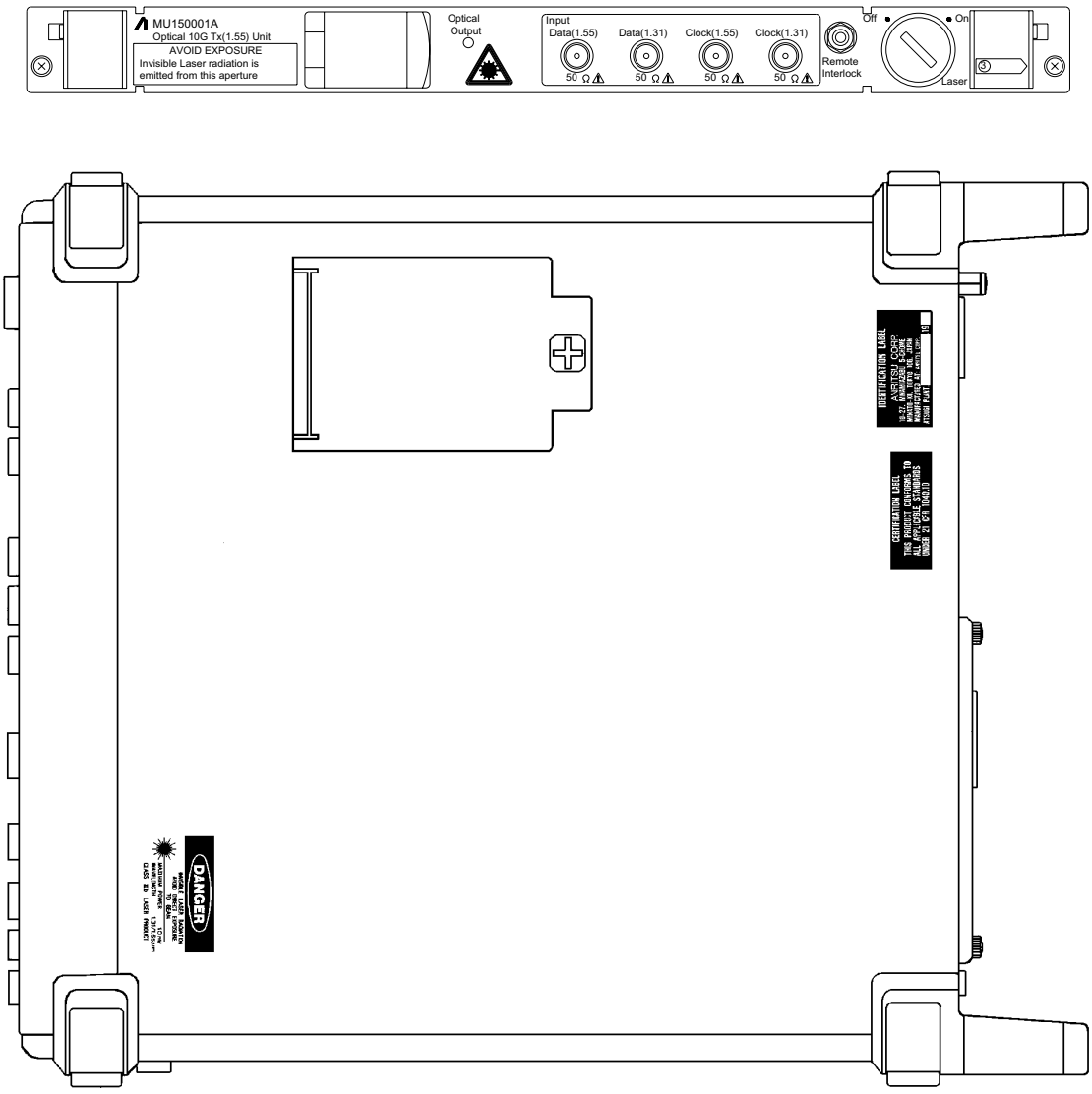


Fig. 7 MU150001A/B, MU150031A/C, MU150061A/B
Front Panel of Unit and Top Panel of MP1570A
(Products shipping to U.S.A.)

CAUTION ⚠

When only a Unit is purchased, an adhesive label is supplied with the Unit.
Please, attach it to the place, shown above.

For Safety

Security Measure Functions

The MP0127A, MP0128A, MP0129A, MU150001A/B, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061A/B are provided with the following security measure functions to prevent the possibility of infliction bodily injury on operators.

- Laser cut-off

  When the cable is disconnected from the optical output section, the protective cover closes and the laser emission stops.
- Laser output key lock

  The laser output is mainly controlled by the key switch of the laser On/Off. When the switch is set to the OFF position, the key can be removed. In this state, the laser is locked off.
- Remote control using the remote interlock connectors

  To ensure safe control of the laser output from a remote location, the laser output can be controlled using the remote interlock connectors of the Laser Output Remote Interlock section. When both the ends of these two connectors (white and black) are connected electrically, the laser can be emitted. When both the ends are disconnected, it is not possible to emit the laser. For the voltage of the open end, the potential is +5 V at the white connector for the black connector. The laser output can be controlled by any equipment with a 0/+5 V interface.
- Laser emission indicators

  These indicators on the optical output light while laser is being emitted.
- Laser output warning

  When the laser is set to ON, the laser emission indicator lights as a warning or 3 to 4 seconds before laser is actually emitted. The laser is not emitted during this period.

Handling

The following safety precautions should be observed when handling the MP0127A, MP0128A, MP0129A, MU150001A/B, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061A/B.

- Before installing/removing this unit in/from the main frame, always make sure the main frame power switch is set to OFF.
- Before connecting/disconnecting a cable to/from the optical output section of this unit, always be sure to set the Laser On/Off key switch to OFF.

For Safety

CAUTION ⚠

Replacing Memory Back-up Battery

This equipment uses a Poly-carbomonofluoride 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 replaced before this period has elapsed.

Make sure that the output level from the MP0111A, MP0112A, MP0113A, MP0122B, MP0127A, MP0128A, MP0129A, MU150001A, MU150001B, MU150008A, MU150009A, MU150010A, MU150031A/C or MU150061A does not exceed the maximum rated input level when connecting.

The laser output is mainly controlled by the key switch of the laser On/Off. Before turning the equipment on, be sure to set the Laser On/Off key switch to OFF.

Before making the connections, make sure that the input level does not exceed the absolute maximum rating level of the equipment.
The input device may be damaged when the input level exceeds the maximum rating of MP0127A, MP0128A, MP0129A, MU150002A, MU150008A, MU150009A and MU150017A/B in particular. Before performing a self loop-back test, always insert the attached 15-dB optical attenuator between the input and output connectors for the MP0127A, MP0128A, MP0129A, MU150008A, MU150009A and MU150010A. For the MU150002A or MU150017A/B, use the 10-dB or 5-dB attenuator, respectively. The input device will be damaged if the direct output is connected by using the optical cable only.

Floppy Disk

Don't place in a dusty area.
Clean the magnetic head periodically for normal operation.
Use a cleaning kit sold at market for cleaning.
Anritsu does not recommend any specific cleaning kit. Contact with Anritsu or our sales representative if you inquire about the cleaning kit.
If the floppy disk drive malfunctions even after the cleaning, it is considered to be a fault. Ask for repair to Anritsu or our sales representative.

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 National Institute of Advanced Industrial Science and Technology, 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 Service and Sales offices at the address at the end of paper-edition manual or the separate file of CD-edition manual.

Notes On Export Management

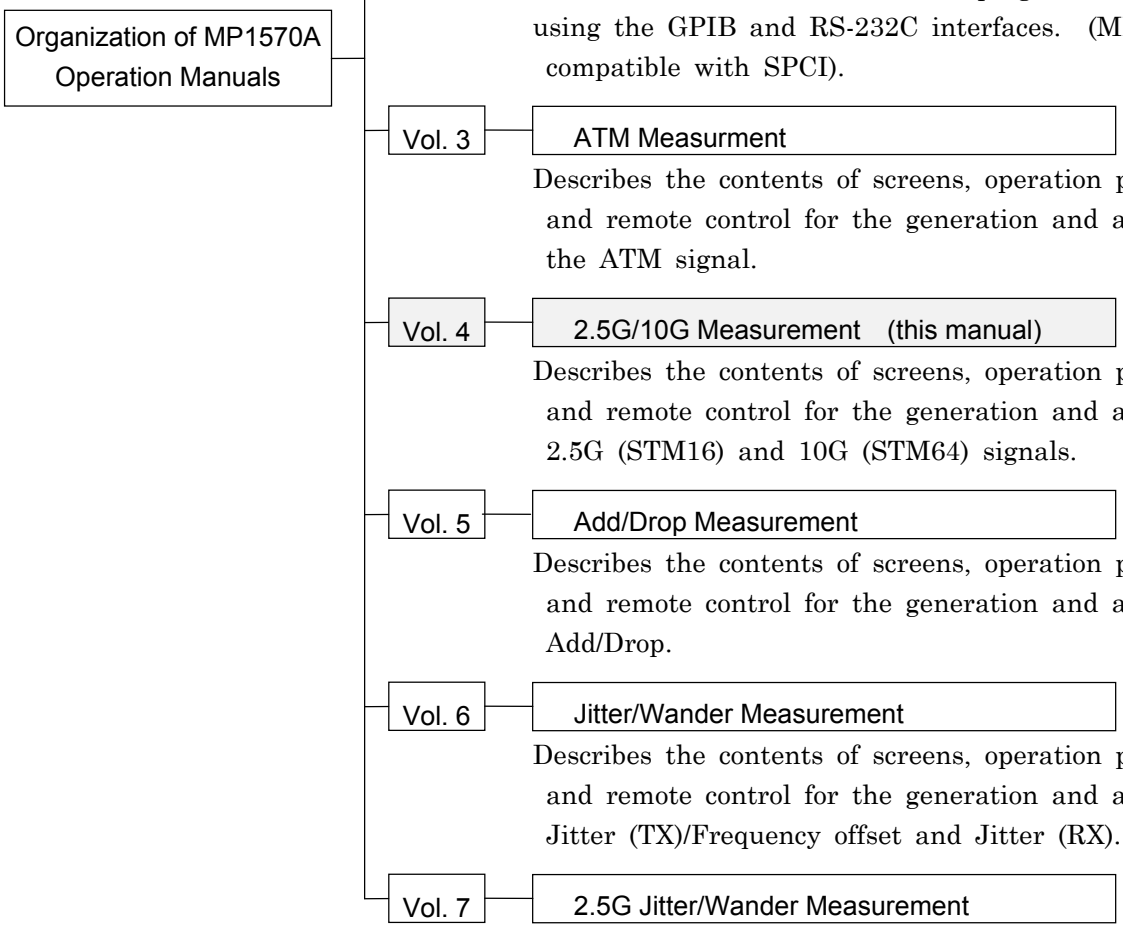
This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.
Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.
When you dispose of export-controlled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

Disposing of Product

The MP1570A employs a Lithium Battery. Also, the MP0111A, MP0112A, MP0113A, MP0122B, MP0127A, MP0128A, MP0129A, MU150001A/B, MU150002A, MU150008A, MU150009A, MU150010A, MU150017A/B, MU150031A/C, MU150061A/B use PD/LD modules including arsenic. The MP0130A use IC including arsenic. At the end of its life, the equipment should be recycled or disposed properly according to the local disposal regulations.

About MP1570A Operation Manuals

MP1570A SDH/PDH/ATM Analyzer Operation Manuals comprise of the following eight documents. Use them properly according to the usage purpose.



Using This Operation Manual

Screen Names

MP1570A has 4 major screens, namely, 'Setup', 'Test menu', 'Result', and 'Analyze', and each major screen has its own subscreens. (For details, see MP1570A Operation Manual Vol.1 ‘Section 4 Screens and Parameter Setting’).

If 'Setup' is selected as the main screen and 'Mapping' as the subscreen, see 'Setup: Mapping’ screen in the manual for the explanation.

CONTENTS

CONTENTS

Section 1 General

This section describes the 2.5G and 10G measurements and the outline of the 2.5G, 2.5G/10G, and 10G units to install to the MP1570A SONET/SDH/PDH/ATM analyzer.

1.1 Product Outline

The MP1570A SONET/SDH/PDH/ATM analyzer can evaluate the 2.5G and 10G signals after being equipped with the 2.5G, 10G optical, and 2.5G/10G units.

1.2 Product Features

Measuring the 2.5G signal

The 2.5G signal can be measured by installing MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, or MU150010A to MP1570A.

Measuring the 10G signal (electric)

The 10G signal (electric) can be measured by installing MU150000A to MP1570A.

Measuring the 10G signal (optical)

The 10G signal (optical) can be transmitted by installing MU150000A, MU150031A/C, MU150061A/B and MU150001A/B to MP1570A. The MP1570A can also receive and measure the 10 G optical by mounting it to the MU150000A, MU150002A or MU150017A/B.

Mapping

Mappings can be selected by combining the MP0121A 2/8/34/139/156M (CMI) or MP0122A/B 1.5/45/52/52M units and the above mentioned 2.5G, 10G, and 2.5G/10G units.

Functions of Insert/Extract

MU150000A, MU150008A, MU150009A, and MU150010A have the function of Insert/Extract.

Measuring the 10G Jitter/Wander

Optical 10G interface Jitter/Wander can be measured to install the MU150017A/B and combining with the MP1580A and MU150018A setup.

1.3 Configuration of 2.5G, 10G Optical, and 2.5G/10G Units

Configurations of 2.5G, 10G Optical, and 2.5G/10G units are shown in the following tables:

2.5G Unit

Model/Code	Product	remarks
MP0127A	2.5G(1.31) Unit	optical 1.31 μm
MU150008A	2.5G(1.31) Unit	optical 1.31 μm Insert/Extract
MP0128A	2.5G(1.55) Unit	optical 1.55 μm
MU150009A	2.5G(1.55) Unit	optical 1.55 μm Insert/Extract
MP0129A	2.5G(1.31/1.55) Unit	optical 1.31/1.55 μm
MU150010A	2.5G(1.31/1.55) Unit	optical 1.31/1.55 μm Insert/Extract

2.5G/10G Unit

Model/Code	Product	remarks
MU150000A	2.5G/10G Unit	electric Insert/Extract

- MU150000A transmits and receives electric signals of 2.5G and 10G.

10G Optical Unit

Model/Code	Product	remarks
MU150001A/B	Optical 10G Tx (1.55) Unit	Install it with the optical 1.55 μm (10G) MU150000A at the same time.
MU150002A	Optical 10G Rx (Narrow) Unit	Install it with the optical interface MU150000A at the same time.
MU150017A	Optical 10G Rx (Wide) Unit	Install it with the optical interface MU150000A at the same time.
MU150017B	Optical 2.5G/10G Rx (Wide) Unit	Install it with the optical interface MU150000A at the same time.
MU150031A	Optical 10G (1.55) High Power Tx Unit	Optical 1.55 μm (10G). Mount together with the MU150000A
MU150031C	Optical 2.5G (1.55)/10G (1.55) High Power Tx Unit	Optical 1.55 μm (2.5G)/1.55 μm (10G). Mount together with the MU150000A
MU150061A	Optical 10G (1.31) Tx Unit	Optical 1.31 μm (10G). Mount together with the MU150000A.

MU150061B	Optical 2.5G (1.31)/10G (1.31) Tx Unit	Ootical 1.31 μ m (2.5G)/1.31 μ m (10G). Mount together with the MU150000A.

- Optical 10G signal can be transmitted when installing MU150000A and MU150001A/B, MU150031A/C, MU150061A/B (MU150001A/B, MU150031A/C, MU150061A/B E/O-converts the 10G electric signal generated by MU150000A and outputs it as the optical signal).
- Optical 10G signal can be received when installing MU150000A, MU150002A and MU150017A/B.

Plug-in unit accessories

Model	Name	Qty	remarks
W1723AE	MP1570A operation manual Vol.4 2.5G/10G measurement	1	MP0127A, MP0128A, MP0129A, MU150000A, MU150001A/B, MU150002A, MU150031A/C, MU150061A/B MU150008A, MU150009A, MU150010A, MU150017A/B
J0002C	U link cable	3set	MU150000A
J0907Q	Remote inter lock code	1	MP0127A, MP0128A, MP0129A, MU150001A/B, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061A/B
J0908	Remote inter lock terminator	1	MP0127A, MP0128A, MP0129A, MU150001A/B, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061A/B
J1002A	U link	2set	MU150001A/B, MU150031A/C, MU150061A/B
J1003K	U link	1set	MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A
E0008A	Optical output control key	2	MP0127A, MP0128A, MP0129A, MU150001A/B, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061A/B
J1002B	U link	2set	MU150002A, MU150017A/B
J0747A	Optical attenuator(5dB)	1	MU150017A/B
J0747B	Optical attenuator(10dB)	1	MU150002A
J0747C	Optical attenuator(15dB)	1	MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A

Model	Name	Qty	remarks
J0635A	FC･PC-FC･PC-1m-SM	1	MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A, MU150002A, MU150017A/B
J0796E	Exchangeable FC optical connector	2 1	MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A MU150002A, MU150017A/B

1.4 Plug-in Units Insertion Slots

Slots to insert each plug-in unit are shown in the table below.

2.5G, 2.5G/10G, and 10G units are shaded.

Plug-in units insertion slots

Unit	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5
MP0121A 2/8/34/139/156M Unit	○ *1	—	—	—	—
MP0122A 1.5/45/52M Unit	○ *1,4	○ *1,4	—	—	—
MP0122B 1.5/45/52/52M(1.31) Unit	○ *1,4	○ *1,4	—	—	—
MP0123A ATM Unit	—	—	○	—	—
MP0124A 2/8/34/139M 156/622M Jitter Unit	—	—	—	○ *2	
MP0125A 1.5/45/52M 156/622M Jitter Unit	—	—	—	○ *2	
MP0126A 2/8/34/139M 1.5/45/52M 156/622M Jitter Unit	—	—	—	○ *2	
MP0127A 2.5G(1.31) Unit *3	○	○	—	—	—
MP0128A 2.5G(1.55) Unit *3	○	○	—	—	—
MP0129A 2.5G(1.31/1.55) Unit *3	○	○	—	—	—
MP0130A 2.5G Jitter Unit	—	—	○	—	—
MP0131A Add/Drop Unit	○	○	—	—	—
MU150000A 2.5G/10G Unit *3	—	—	—	○ *2	
MU150001A Optical 10G Tx(1.55) Unit	—	—	○	—	—
MU150002A Optical 10G Rx(Narrow) Unit	—	○	—	—	—
MU150008A 2.5G(1.31) Unit *3	—	○	—	—	—
MU150009A 2.5G(1.55) Unit *3	—	○	—	—	—
MU150010A 2.5G(1.31/1.55) Unit *3	—	○	—	—	—
MU150017A Optical 10G Rx(Wide) Unit	—	○	—	—	—
MU150017B Optical 2.5G/10G Rx(Wide) Unit	—	○	—	—	—
MU150031A Optical 10G(1.55) High Power Tx Unit	—	—	○	—	—
MU150031C Optical 2.5G(1.55)/10G(1.55) High Power Tx Unit	—	—	○	—	—
MU150061A Optical 10G(1.31) Tx Unit	—	—	○	—	—
MU150061B Optical 2.5(1.31)/10G(1.31) Tx Unit	—	—	○	—	—

○ ..... Indicates slots to which the unit can be inserted.

— ..... Indicates slots to which no unit can be inserted.

*1 ... Insert MP0121A and MP0122A/B at Slot 1 and Slot2, respectively to insert MP0121A and MP0122A/B at the same time.

*2 ... Use two slots, Slot 4 and Slot 5.

*3 ... MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, or MU150010A cannot be installed with MU150000A.

*4 ... When the MP0123A is inserted in Slot 3, Slot 1 cannot be used for insertion.

Note

The MP1570A may not start up normally for some unit combination.

- Blank panel can be inserted at all the slots.

2.5G unit

- Insert the 2.5G unit of MP0127A, MP0128A, and MP0129A at Slot 1 or Slot2. Insert MP0121A and the 2.5G unit at Slot 1 and Slot 2, respectively when using the combination of MP0121A and the 2.5G unit. MP1570A operates by inserting MP0122A/B and the 2.5G unit at either Slot 1 or Slot 2 when using the combination of MP0122A/B and the 2.5G unit.
- Insert the 2.5G units of MU150008A, MU150009A, and MU150010A at Slot2. Insert MP0121A or MP0122A/B at Slot 1 and insert the 2.5G unit at Slot 2 when using the combination of MP0121A or MP0122A/B and the 2.5G unit.

2.5G/10G and 10G Optical units

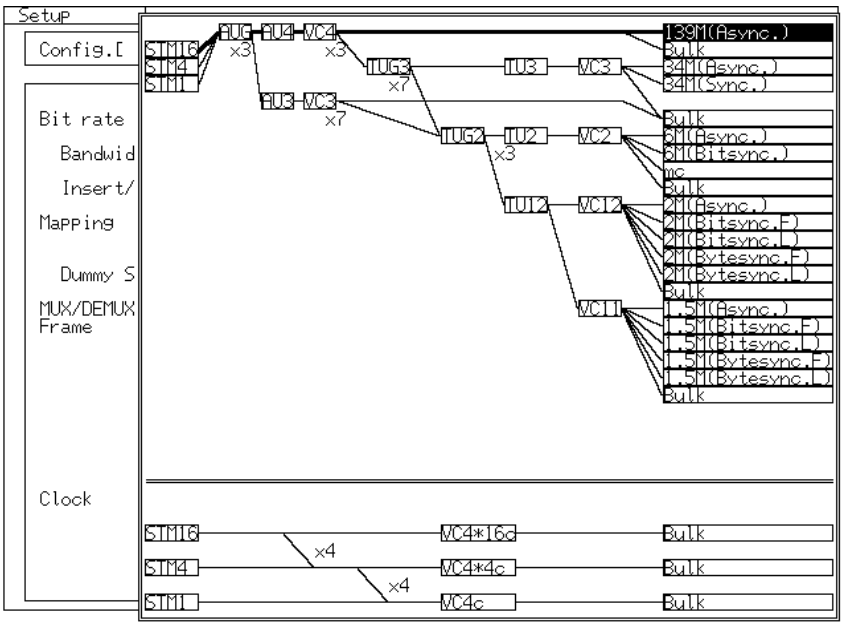
- Insert MU150000A at two slots, Slot 4 and Slot 5.
- Insert MU150001A, MU150031A/C, MU150061A/B at Slot 3. Use this unit by combining MU150000A.
- Insert MU150002A at Slot 2. Use this unit by combining MU150000A.
- Insert MU150017A/B at Slot 2. Use this unit by combining MU150000A.

1.5 Mapping Route Measurable When Installing the 2.5G Unit

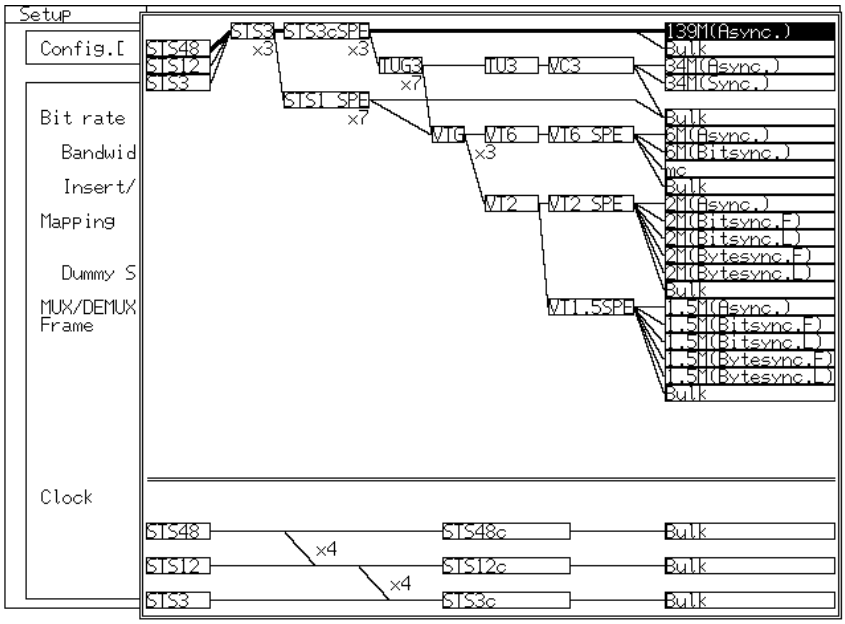
The table below shows the combination of units, measurable bit rates and mapping routes when installing the 2.5G unit.

Slot 1	Slot 2	Slot 3	Slot 4-5	Interface Unit
MP0121A	MP0127A MP0128A MP0129A MU150008A MU150009A MU150010A	*1	*2	*3 *4

Mapping route display in SDH mode



Mapping route display in SONET mode



Note

The concatenation mapping is enabled only for the MU150008A/ MU150009A/ MU150010A.

Combine the units in accordance with the measurement item as follow:

*1 ... The MP0123A ATM unit and the 2.5G jitter unit can be inserted at Slot 3. The format of measurable bit rate and mapping route does not depend on these units insertion.

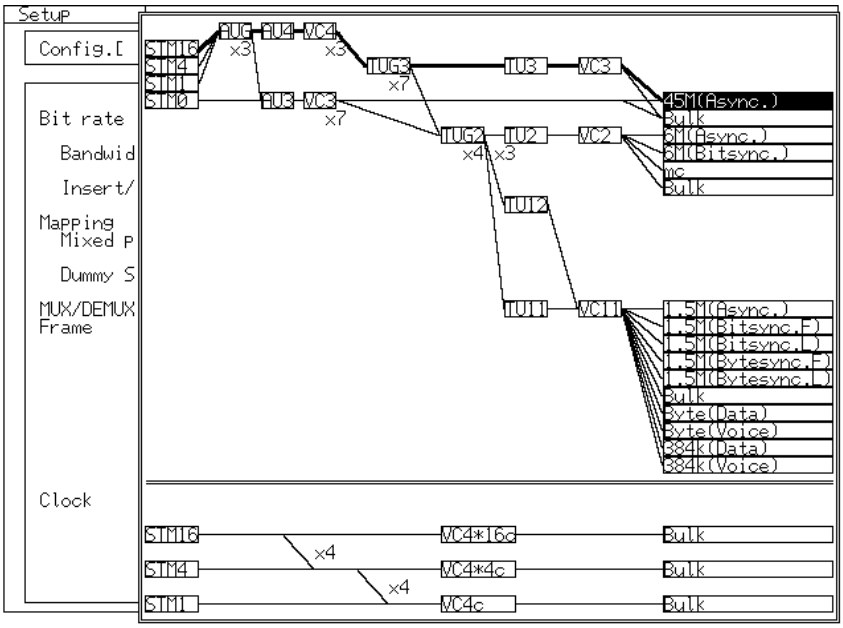
*2 ... The Jitter units can be inserted at Slot 4 - 5. The format of measurable bit rate and mapping route does not depend on these units insertion.

*3 ... The format of bit rate and mapping route does not depend on the 156M-type I/F unit.

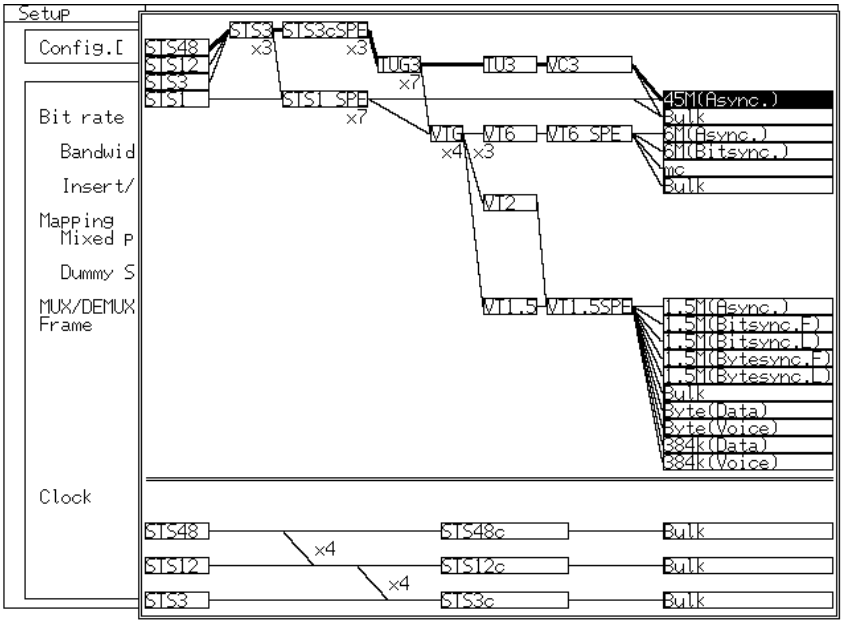
*4 ... The STM4 and STS12 mappings are displayed only when the interface unit involves the 622M interface type.

Slot 1	Slot 2	Slot 3	Slot 4-5	Interface Unit
MP0122A/B	MP0127A MP0128A MP0129A MU150008A MU150009A MU150010A	*1	*2	*3

Mapping route display in SDH mode



Mapping route display in SONET mode



Combine the units in accordance with the measurement item as follow:

*1 ... The MP0123A ATM unit and the 2.5G jitter unit can be inserted at Slot 3. The format of measurable bit rate and mapping route does not depend on these units insertion.

*2 ... The Jitter units can be inserted at Slot 4 - 5. The format of measurable bit rate and mapping route does not depend on these units insertion.

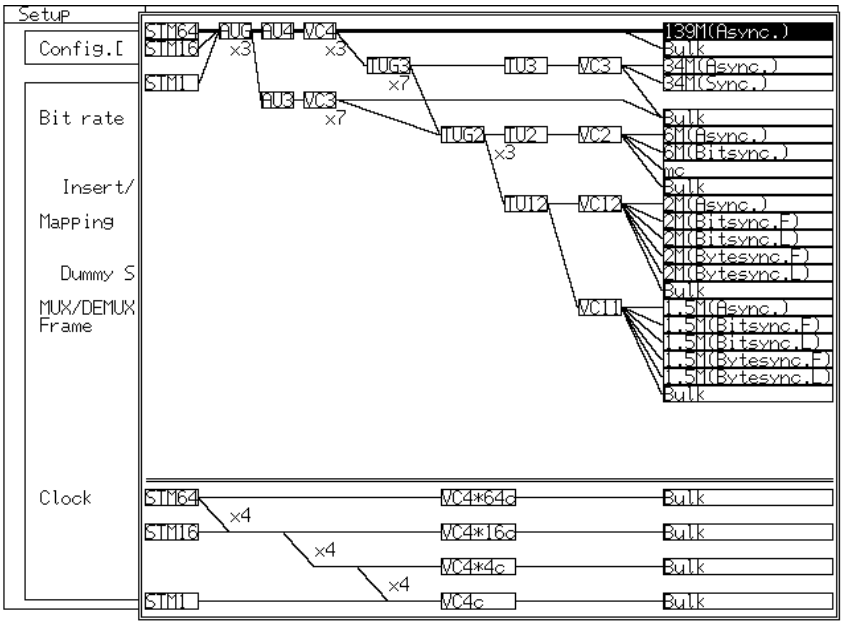
*3 ... The STM1/4 and STS3/12 mappings are displayed only when the interface unit involves the 156M or 622M interface type.

1.6 Mapping Route Measurable When Installing the 2.5G/10G Unit

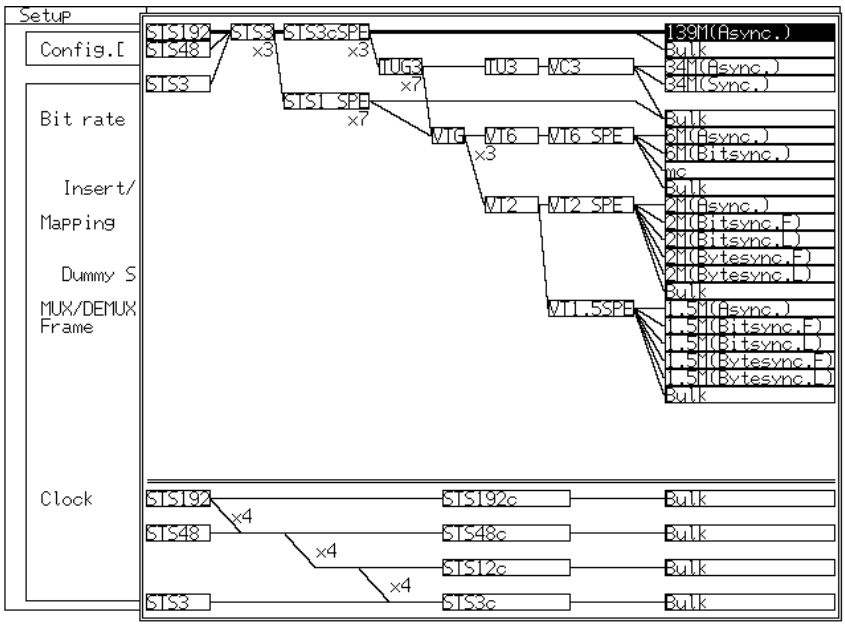
The table below shows the combination of units, measurable bit rates and mapping routes when installing the 2.5G/10G and 10G units.

Slot 1	Slot 2	Slot 3	Slot 4-5
MP0121A	MU150002A *1 MU150017A/B *2	MU150001A/B *2 MU150031A/C *2 MU150061A/B *2	MU150000A

Mapping route display in SDH mode



Mapping route display in SONET mode



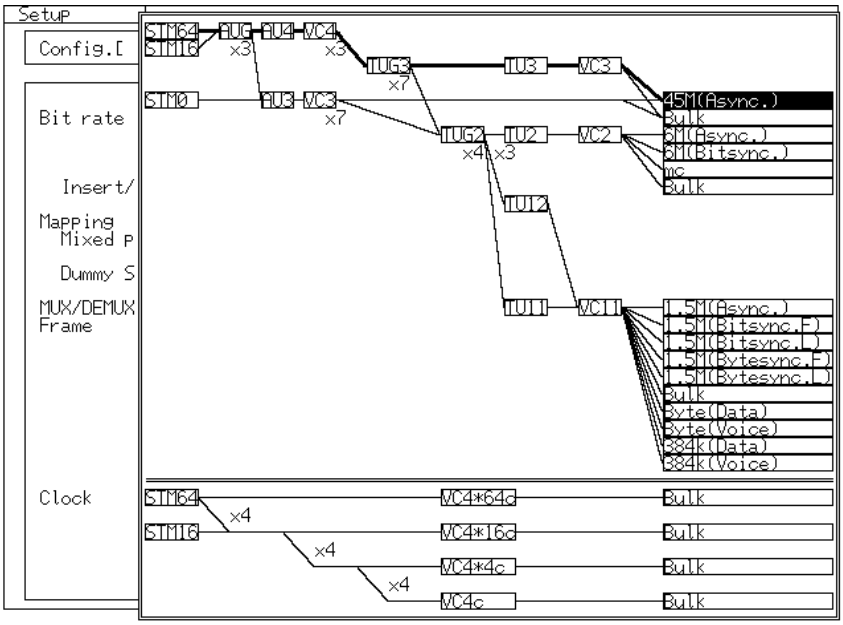
Combine the units in accordance with the measurement item as follow:

*1 ... Install it to receive the optical 10G signal.

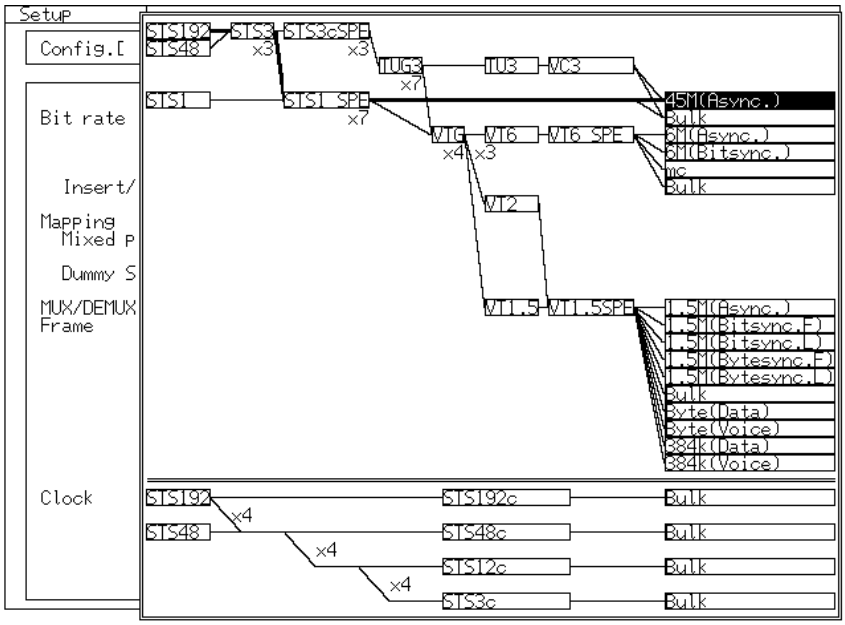
*2 ... Install it to transmit the optical 10G signal.

Slot 1	Slot 2	Slot 3	Slot 4-5
MP0122A/B	MU150002A *1 MU150017A *1 MU150017B *1	MU150001A *2 MU150031A/C *2 MU150061A/B *2	MU150000A

Mapping route display in SDH mode



Mapping route display in SONET mode



Combine the units in accordance with the measurement item as follow:

*1 ... Install it to receive the optical 10G signal.

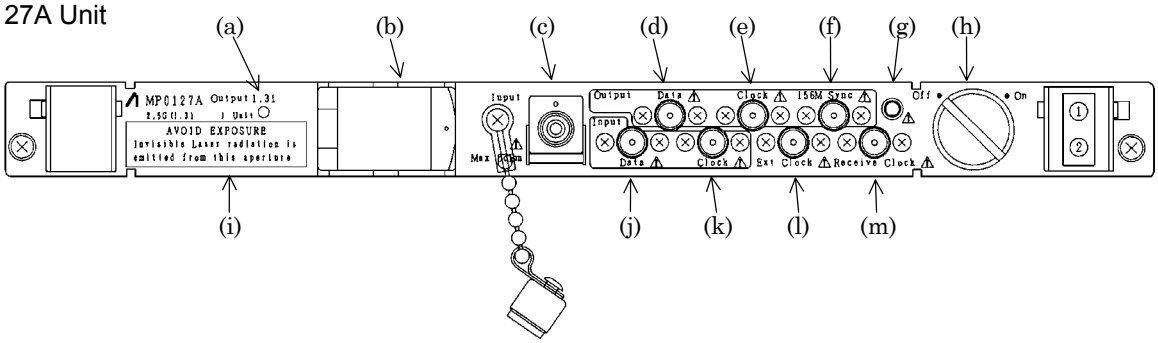
*2 ... Install it to transmit the optical 10G signal.

Section 2 Panel Description

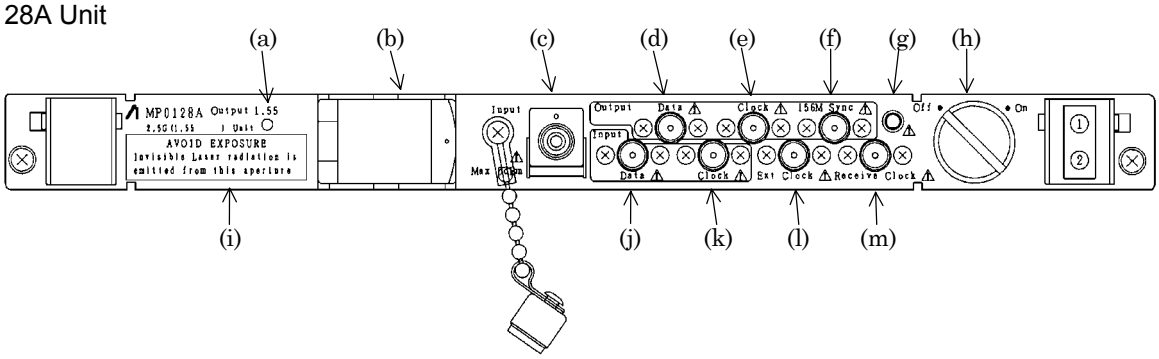
This section describes each section name and function of the 2.5G, 10G Optical, and 2.5G/10G units.

2.1 Description of the 2.5G Unit (MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, and MU150010A) Panel

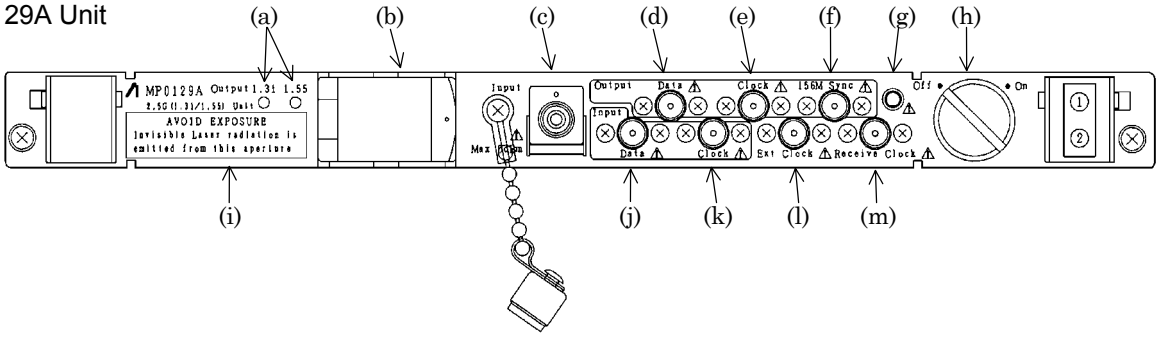
MP0127A Unit



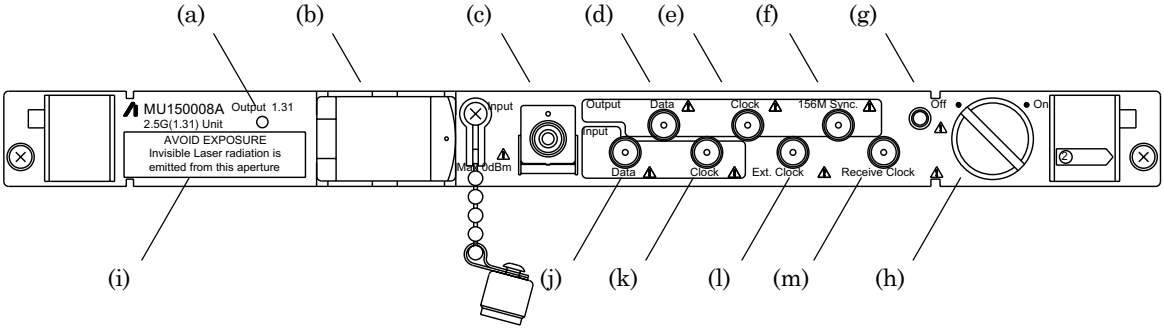
MP0128A Unit



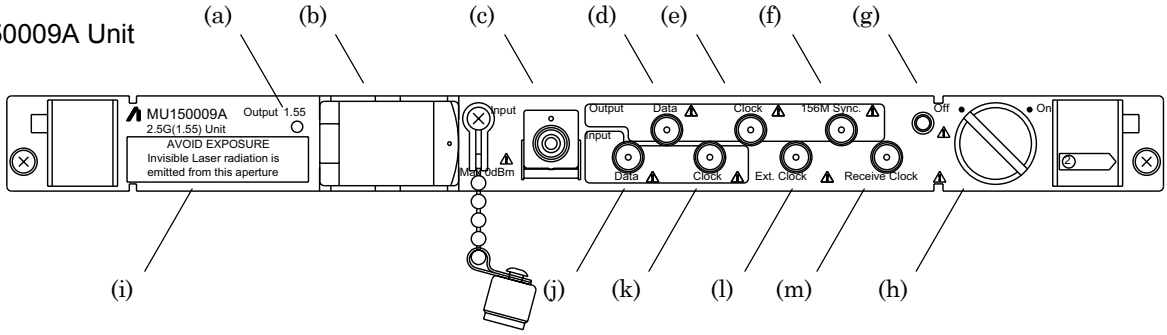
MP0129A Unit



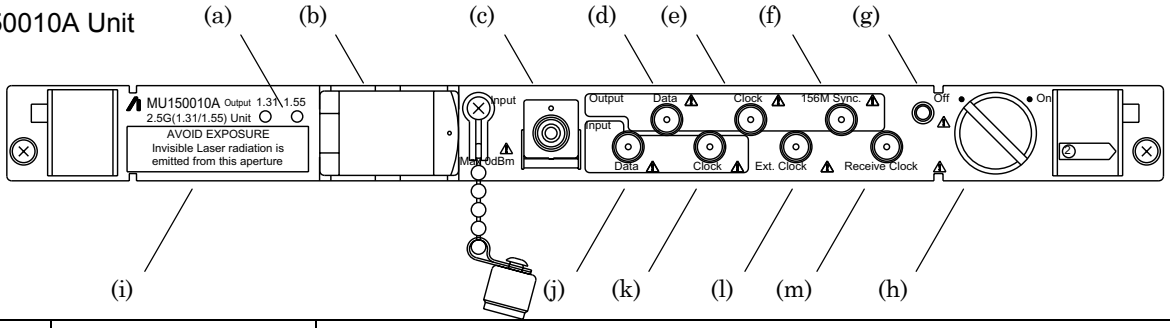
MU150008A Unit



MU150009A Unit

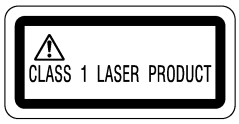


MU150010A Unit



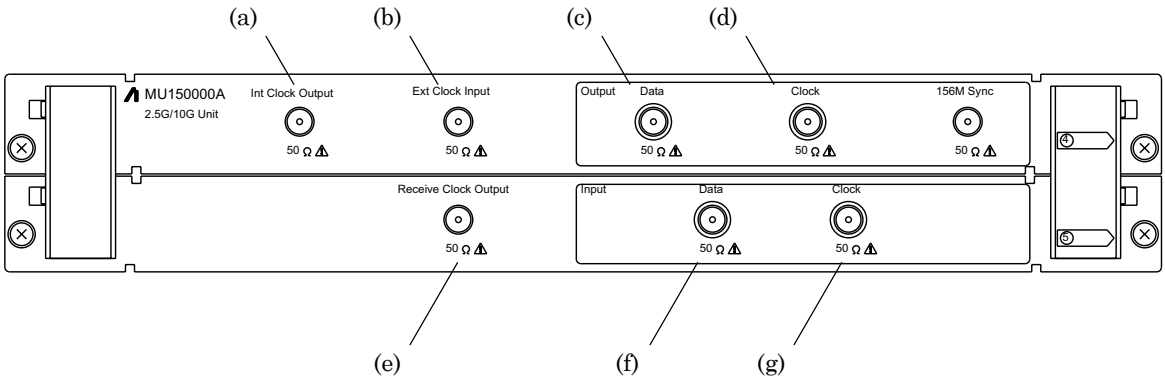
(a)	[Lamp]	Illuminated when an optical signal is output.
(b)	Optical output	Optical signal output connector When the (a) lamp is illuminated, an optical signal is being output. Bit rate..... 2488.32Mbit/s Code ..... NRZ Wavelength band ... 1.31 μ m (MP0127A, MU150008A) 1.55 μ m (MP0128A, MU150009A) 1.31 μ m/1.55 μ m (MP0129A, MU150010A) Side Compression ratio .....≥ 30dB Optical power ..... -4dBm±3dB (PN average power) Isolation ..... ≥ 10dB Connector ..... FC-PC (Single mode fiber)

(c)	Input ⚠ Max 0dBm	Optical signal input connector Both 1.31 and 1.55 can be received. Bit rate ..... 2488.32Mbit/s Code ..... NRZ Receive light wavelength band ...1.31 μ m/1.55 μ m Level ... Narrow: - 28 to - 9 dBm (BER1 × 10^{-10} or less) Wide: - 20 to - 9 dBm (BER1 × 10^{-10} or less) Connector ..... FC-PC (Single mode fiber) Absolute maximum rating ... 0 dBm (peak power) - "⚠ Max 0 dBm" indicates the absolute maximum rating of the input power level. If a signal exceeding the displayed power level is input, the MP1570A may be damaged.
(d)	Output Data	2.5G signal (data) output connector Bit rate ..... 2488.32Mbit/s Code ..... NRZ Level ..... ECL（50Ω/-2V termination） Connector ..... SMA 50Ω
(e)	Output Clock	2.5G signal (clock) output connector Frequency ..... 2488.32MHz Level ..... ECL (50Ω/-2V termination) Connector ..... SMA 50Ω
(f)	Output 156M Sync	Output connector of 156M Sync. transmission clock Frequency..... 155.520MHz Level ..... ECL (AC) Connector ..... SMA 50Ω
(g)	[Laser remote interlock]	Laser remote interlock connector - The optical signal can be outputted only when this connector is connected.

(h)	[Key switch]	Controls the output of optical signal. On ... Enables the optical signal output. * Off ... Disables the optical signal output. *: When the (g) laser remote interlock connector is not connected to ground, even if the key switch is turned on, no optical signal can be output.
(i)		The laser light aperture label indicates the following classification under the corresponding standards of optical signals output from the (b) Output connector. - IEC 60825-1 CLASS 1 - 21CFR1040.10 CLASSⅢb
(j)	Input Data	2.5G signal (data and monitored signal) input connector Bit rate .....2488.32Mbit/s Code .....NRZ Level (data) .....ECL (50Ω/-2Vtermination) (monitored signal) 0.1 to 1.0V_{pp} (50Ω/AC) Connector .....SMA 50Ω
(k)	Input Clock	2.5G signal (clock) input connector Frequency .....2488.32MHz Level .....ECL (50Ω/-2V termination) Connector .....SMA 50Ω
(l)	Ext. Clock	Input connector used to receive an external transmission clock This input is enabled when "External" is selected for Clock on the 'Setup: Mapping' screen. Frequency .....2488.32MHz Level .....0.8±0.3V_{pp} Connector .....SMA 50Ω
(m)	Receive Clock	Connector used to output a clock signal generated in the optical receiving section Frequency .....2488.32MHz Level .....ECL (AC) Connector .....SMA 50Ω Amplitude .....45% to 55%

- The serial number is indicated on the label at the upper panel of the unit.
- For the removing and cleaning the optical connector and attaching protective cap at optical connector, refer to the 'MP1570A SONET/SDH/PDH/ATM Analyzer Operation Manual Vol. 1 Basic Operation'.

2.2 Description of the 2.5G/10G (MU150000A) Unit Panel

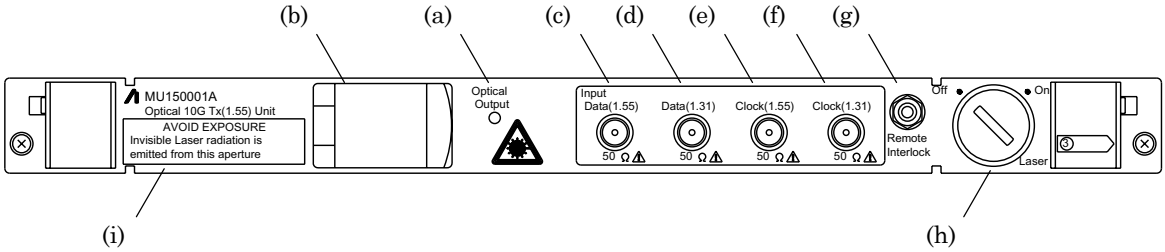


(a)	Int. Clock Output	Internal 10G signal (clock) output connector Frequency .....9953.28MHz Level .....0.6 to 1.0V(pp) Connector .....SMA 50Ω
(b)	Ext. Clock Input	Clock input connector used when operating this equipment with external clock. When using the internal clock, connect (a) Int. Clock Output and this connector with the attached semi-rigid cable. Frequency .....2488.32, 9953.28MHz Level .....0.6 to 1.0V(pp) Connector .....SMA 50Ω
(c)	Output Data	Data output connector Bit rate .....2488.32, 9953.28Mbit/s Code .....NRZ Level .....0.65 to 1.4V(pp), H: 0 to –0.2V, L: 0.85 to –1.4V (50Ω, GND termination) Connector .....SMA 50Ω
(d)	Output Clock	Clock output connector Bit rate .....2488.32, 9953.28Mbit/s Level .....0.65 to 1.3V(pp), H: 0 to –0.2V, L: 0.85 to –1.3V (50Ω, GND termination) Connector .....SMA 50Ω
(e)	Receive Clock Output	Connector used to output a clock signal received by (g) Input Clock connector. Frequency .....depends on (g) Input Clock connector. Level .....≥0.6V(pp) (50Ω, GND termination) Connector .....SMA 50Ω

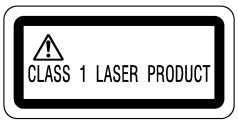
(f)	Input Data	Data input connector Bit rate ..... 2488.32, 9953.28Mbit/s Level ..... 0.65 to 1.4Vpp (50Ω, GND termination) Connector ..... SMA 50Ω
(g)	Input Clock	Clock input connector Frequency ..... 2488.32, 9953MHz Level ..... 0.65 to 1.3Vpp (50Ω, GND termination) Connector ..... SMA 50Ω

2.3 Description of the 2.5G/10G Unit (MU150001A/B, MU150031A/C, MU150061A/B, MU150002A, and MU150017A/B) Panel

2.3.1 MU150001A/B

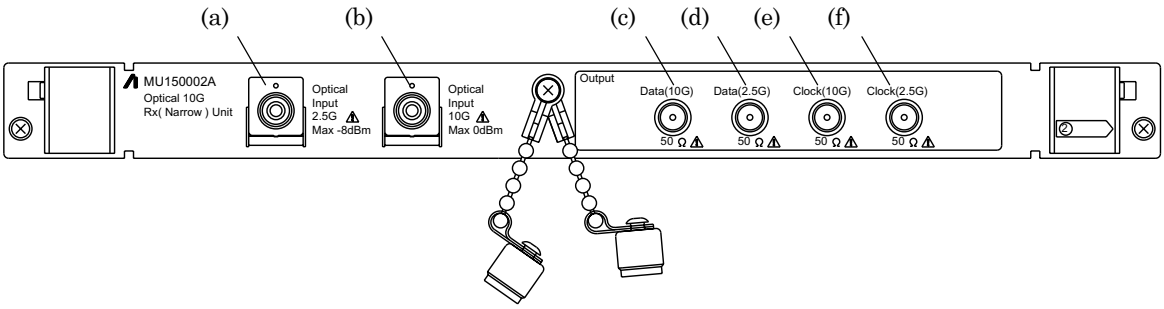


(a)	[Lamp]	Illuminated when an optical signal is output.
(b)	Optical output	Optical signal output connector Lamp (a) lights during optical signal output. Bit rate..... 9953.28Mbit/s, 2488.32Mbit/s (when option01, 02, or 03 is installed.) Code ..... NRZ Optical power ..... –4dBm±3dB (PN average power) Peak wavelength ...1545±20nm, 1315nm±50nm (when option01 or 03 is installed.) Spectrum width ..≤ 1nm Side mode suppression ratio .....≥ 30dB Extinction ratio ..≥ 8.2dB
(c)	Input Data (1.55)	10G and 2.5G (1550nm band) data signal input connector Input the signal to this connector when a signal (optical : 1550nm band, bit rate : 10G or 2.5G (only when option 02 or 03 is installed)) is outputted. Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (when option 02 or 03 is installed.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.4V Connector ..... SMA 50Ω
(d)	Input Data (1.31)	2.5G (1310nm band) data signal input connector Input the signal to this connector when a signal (optical : 1550nm band, bit rate : 10G or 2.5G (only when option 01 or 03, is installed)) is outputted. Bit rate ..... 2488.32Mbit/s (when option 01 or 03 is installed.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.4V Connector ..... SMA 50Ω - This connector is installed only when option 01 or 03 is installed.

(e)	Input Clock (1.55)	10G and 2.5G (1550nm band) clock signal input connector Input the signal to this connector when a signal (optical : 1550nm band, bit rate : 10G or 2.5G (only when option 02 or 03 is installed)) is outputted. Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (when option 02 or 03 is installed.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.3V Connector ..... SMA 50Ω
(f)	Input Clock (1.31)	2.5G (1310nm band) clock signal input connector Input the signal to this connector when a signal (optical : 1310nm band, bit rate : 2.5G (only when option 01 or 03 is installed)) is outputted. Bit rate ..... 2488.32Mbit/s (when option 01 or 03 is installed.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.3V Connector ..... SMA 50Ω - This connector is installed only when option 01 or 03 is installed.
(g)	[Laser remote interlock]	Laser remote interlock connector - The optical signal can be outputted only when this connector is connected.
(h)	[Key switch]	Controls the output of optical signal. On ... Enables the optical signal output. * Off ... Disables the optical signal output. *: When the (g) laser remote interlock connector is not connected to ground, even if the key switch is turned on, no optical signal can be output.
(i)		The laser light aperture label indicates the following classification under the corresponding standards of optical signals output from the (b) Output connector. - IEC 60825-1 CLASS 1 - 21CFR1040.10 CLASSⅢb

- The serial number is indicated on the label at the upper panel of the unit.
- For the removing and cleaning the optical connector and attaching protective cap at optical connector, refer to the 'MP1570A SONET/SDH/PDH/ATM Analyzer Operation Manual Vol. 1 Basic Operation'.

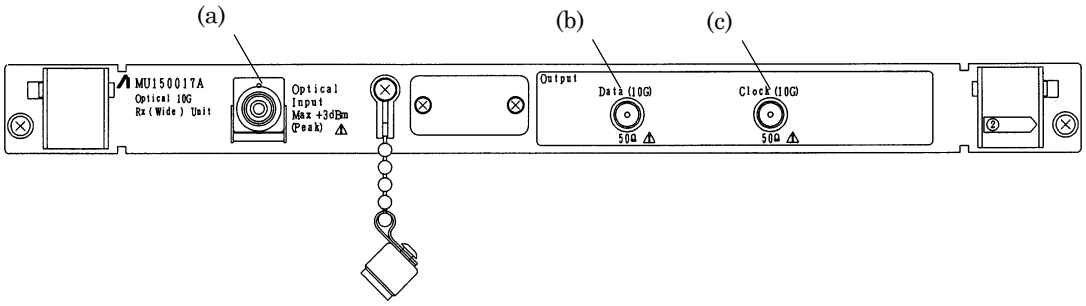
2.3.2 MU150002A



(a)	Optical Input 2.5G ⚠ Max -8dBm	Optical signal (2.5G) input connector Bit rate..... 2488.32Mbit/s Code ..... NRZ Receive light wavelength band ...1310nm and 1550nm bands Input Level ...- 29 to -10 dBm (BER1 × 10^{-11}) Connector ..... FC-PC (Single mode fiber) Absolute maximum rating ...-8dBm (average power) - "⚠ Max -8 dBm" indicates the absolute maximum rating of the input power level. If a signal exceeding the displayed power level is input, the MP1570A may be damaged. - This connector is installed only when option 01 is installed.
(b)	Optical Input 10G ⚠ Max 0dBm	Optical signal (10G) input connector Bit rate..... 9953.28Mbit/s Code ..... NRZ Receive light wavelength band ...1550nm bands,1310nm band (option.04) Input Level ...- 13 to -3 dBm (BER1 × 10^{-12}) Connector ..... FC-PC (Single mode fiber) Absolute maximum rating ...0dBm (average power) - "⚠ Max -0 dBm" indicates the absolute maximum rating of the input power level. If a signal exceeding the displayed power level is input, the MP1570A may be damaged.

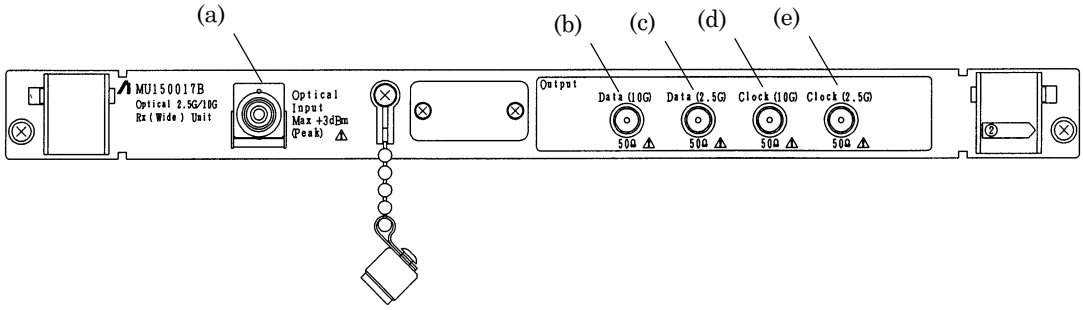
(c)	Output Data (10G)	10G signal (data) output connector Bit rate ..... 9953.28Mbit/s Code ..... NRZ Level ..... 0.65 to 1.4V(pp) Connector ..... SMA 50Ω
(d)	Output Data (2.5G)	2.5G signal (data) output connector Bit rate ..... 2488.32Mbit/s Code ..... NRZ Level ..... 0.65 to 1.4V(pp) Connector ..... SMA 50Ω - This connector is installed only when option 01 is installed.
(e)	Output Clock (10G)	10G signal (clock) output connector Frequency ..... 9953.28MHz Level ..... 0.65 to 1.3V(pp) Connector ..... SMA 50Ω
(f)	Output Clock (2.5G)	2.5G signal (clock) output connector Frequency ..... 2488.32MHz Level ..... 0.65 to 1.3V(pp) Connector ..... SMA 50Ω - This connector is installed only when option 01 is installed.

2.3.3 MU150017A



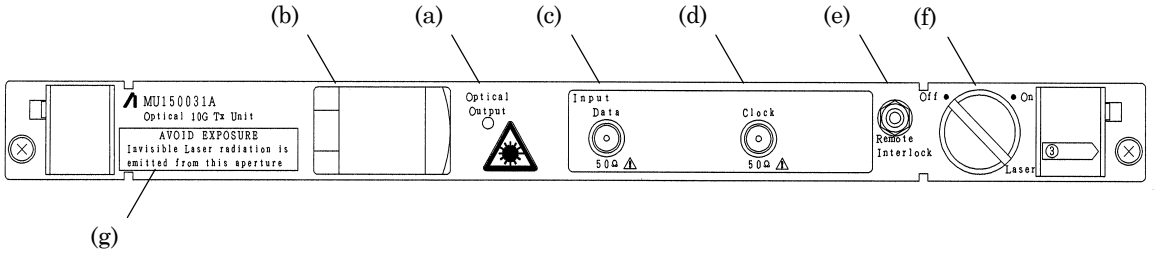
(a)	Optical Input	Optical signal output connector When the (a) lamp is illuminated, an optical signal is being output. Bit rate..... 9953.28Mbit/s Code ..... NRZ Receiving optical wavelength ..... 1.55 μm band Optical input level –11 to –3 dBm±3dB (BER1×10^{-12}) Connector..... FC-SPC Absolute maximum rating ..... +3 dBm (peak power) - "⚠ Max +3dBm" indicates the absolute maximum rating for input level. This unit may be damaged if the input signal level exceeds the indicated value.
(b)	Output Data(10G)	10G signal (data) output connector Bit rate..... 9953.28Mbit/s Code ..... NRZ Level..... 1.0±0.3V(pp) Connector..... SMA 50Ω
(c)	Output Clock(10G)	10G signal (clock) output connector. Frequency ..... 9953.28Mbit/s Level..... 0.65 to 1.3V(pp) Connector..... SMA 50Ω

2.3.4 MU150017B



(a)	Optical Input	Optical signal input connector Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s Code ..... NRZ Receiving optical wavelength …1.31 μm band (2.5G)/1.55 μm band (2.5G/10G) Optical input level …–11 to –3 dBm (BER1×10^{-12}): 10G –15 to –3 dBm (BER1×10^{-10}): 2.5G Connector ..... FC-SPC Absolute maximum rating ..... +3 dBm (peak power) –"⚠ Max +3dBm" indicates the absolute maximum rating for input level. This unit may be damaged if the input signal level exceeds the indicated value.
(b)	Output Data(10G)	10G signal (data) output connector Bit rate ..... 9953.28Mbit/s Code ..... NRZ Level ..... 1.0±0.3V(pp) Connector ..... SMA 50Ω
(c)	Output Data(2.5G)	2.5G signal (data) output connector Bit rate ..... 2488.32Mbit/s Code ..... NRZ Level ..... 1.0±0.3V(pp) Connector ..... SMA 50Ω
(d)	Output Clock(10G)	10G signal (clock) output connector Frequency..... 9953.28Mbit/s Level ..... 0.65 to 1.3V(pp) Connector ..... SMA 50Ω
(e)	Output Clock(2.5G)	2.5G signal (clock) output connector Frequency..... 2488.32Mbit/s Level ..... 0.65 to 1.3V(pp) Connector ..... SMA 50Ω

2.3.5 MU150031A/C

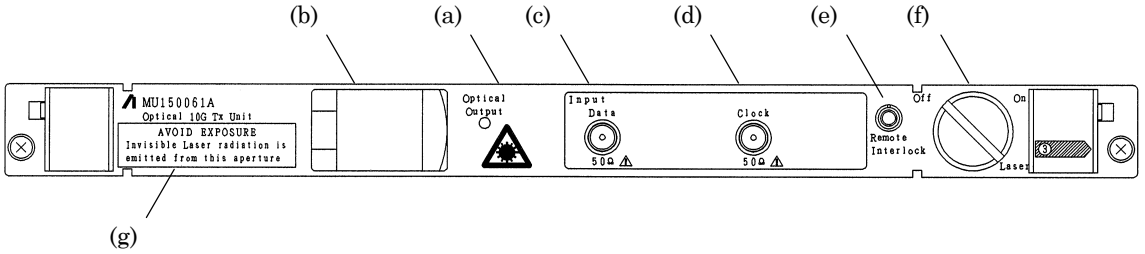


(a)	[Lamp]	Illuminated when an optical signal is output.
(b)	Optical output	Optical signal output connector Lamp (a) lights during optical signal output. Bit rate..... 9953.28Mbit/s, 2488.32Mbit/s (for type C only) Code ..... NRZ Optical power ..... –2dBm±2dB (PN average power) Peak wavelength ...1545±20nm, Spectrum width ..≤ 1nm Side mode suppression ratio .....≥ 30dB Extinction ratio ..≥ 8.2dB
(c)	Input Data	10/2.5G data signal input connector Input the data signal to this connector when 1.55 µm –band optical signal is outputted with a bit rate of 10 G or 2.5 (for type C only.) Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (for type C only) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.4V Connector ..... SMA 50Ω
(d)	Input Clock	10G/2.5G clock signal input connector Input clock signal to this connector when 1.55 µm –band optical signal is outputted with abit rate of 10G or 2.5G (for type C only.) Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (for type C only.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.3V Connector ..... SMA 50Ω
(e)	[Laser remote interlock]	Laser remote interlock connector - The optical signal can be outputted only when this connector is connected.

(f)	[Key switch]	Controls the output of optical signal. On ... Enables the optical signal output. * Off ... Disables the optical signal output. *: When the (g) laser remote interlock connector is not connected to ground, even if the key switch is turned on, no optical signal can be output.
(g)		The laser light aperture label indicates the following classification under the corresponding standards of optical signals output from the (b) Output connector. - IEC 60825-1 CLASS 1 - 21CFR1040.10 CLASSⅢb

- The serial number is indicated on the label at the upper panel of the unit.
- For the removing and cleaning the optical connector and attaching protective cap at optical connector, refer to the 'MP1570A SONET/SDH/PDH/ATM Analyzer Operation Manual Vol. 1 Basic Operation'.

2.3.6 MU150061A/B



(a)	[Lamp]	Illuminated when an optical signal is output.
(b)	Optical output	Optical signal output connector Lamp (g) lights during optical signal output. Bit rate..... 9953.28Mbit/s, 2488.32Mbit/s (for type B only) Code ..... NRZ Optical power ..... +3dBm±2dB (PN average power) Peak wavelength ...1310±20nm, Spectrum width ..≤ 1nm Side mode suppression ratio .....≥ 30dB Extinction ratio ..≥ 6dB
(c)	Input Data	10G/2.5G data signal input connector Input data signal to this connector when 1.31 µm-band optical signal is outputted with a bit rate of 10G or 2.5G (for type B only.) Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (for type B only) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.4V Connector ..... SMA 50Ω
(d)	Input Clock	10G/2.5G clock signal input connector Input clock signal to this connector when 1.31 µm-band optical signal is outputted with a bit rate of 10G or 2.5G (for type B only.) Bit rate ..... 9953.28Mbit/s, 2488.32Mbit/s (for type C only.) Code ..... NRZ Level ..... H : 0 to –0.2, L : 0.85 to –1.3V Connector ..... SMA 50Ω
(e)	[Laser remote interlock]	Laser remote interlock connector - The optical signal can be outputted only when this connector is connected.

(f)	[Key switch]	Controls the output of optical signal. On ... Enables the optical signal output. * Off ... Disables the optical signal output. *: When the (g) laser remote interlock connector is not connected to ground, even if the key switch is turned on, no optical signal can be output.
(g)		The laser light aperture label indicates the following classification under the corresponding standards of optical signals output from the (b) Output connector. - IEC 60825-1 CLASS 1 - 21CFR1040.10 CLASSⅢb

- The serial number is indicated on the label at the upper panel of the unit.
- For the removing and cleaning the optical connector and attaching protective cap at optical connector, refer to the 'MP1570A SONET/SDH/PDH/ATM Analyzer Operation Manual Vol. 1 Basic Operation'.

Section 3 Screen Description

This section describes screens displayed when the 2.5G, 2.5G/10G, or 10G unit is installed to MP1570A.

3.1 Screen Configurations

Composition of main screens and subscreens when the 2.5G, 2.5G/10G, or 10G unit is installed to MP1570A are as listed in the following table.

3.1.1 Subscreens of 'Setup' Main Screen

Display	Description
Mapping	Selects the type of signal, the interface, and measurement conditions, according to the measured item,.
Memory	Saves and retrieves the measurement condition data and graphic data on the Analyze screen.
Print	Sets the printing conditions.
OH preset data	Presets the overhead conditions of send signal.
Tandem	Sets the tandem connection measurement.
Dummy preset	Sets the dummy channel.
APS program data	Sets the APS (Automatic Protection Switch) measurement of transmission line.
System	Sets the buzzer, clock, screen color, GPIB and RS-232C.
Floppy disk	Saves the measurement conditions data and graphic data of Analyze main screen in the floppy disk, retrieves them from the disk.
Custom function	Sets specific functions that cannot be set on other screens.
Measurement condition	Sets the error and alarm detection release conditions, tandem connection conditions and performance measurement conditions.
PTR64 frame	Sets the pointer value to generate 64 frames of SDH pointer.
OH change data	Presets the OH change data pattern of the SDH OH test function.
Frame memory	Sets the frame memory to be sent.
Signaling preset	Sets the signaling data.
Selftest	Performs the self test.
Auto setup	Automatically sets the bit rate according to the input signal.

3.1.2 Subscreens of 'Test menu' Main Screen

Display	Description
Trouble search	Sets the measurement conditions of trouble search.
Manual	Sets the conditions of manual measurement.
Pointer sequence	Sets the type and time interval of pointer sequence measurement.
Delay	Sets the conditions of delay measurement.
OH test	Sets the conditions of overhead test.
APS test	Sets the APS test conditions.
Performance check	Sets the performance check conditions.
Frame memory	Sets the frame transmission conditions.

3.1.3 Subscreens of 'Result' Main Screen

Display	Description
Trouble search	Displays the trouble search measurement results.
Error / Alarm	Displays the error and alarm measurement results.
Justification	Displays the justification measurement results.
Zoom	Zooms up the error and alarm measurement results.
Performance	Displays the performance measurement results.
B2 error	Displays the B2 measurement results.
Simultaneous	Displays the simultaneous errors and alarms measurement results of VC2(7ch), VC12(21ch) and VC11(28ch) of TUG3 or VC-3.
Delay	Displays the delay measurement results.
APS test	Displays the APS test measurement results.
Recall	Displays the automatic measurement results.

3.1.4 Subscreens of 'Analyze' Main Screen

Display	Description
Trouble search	Analyzes the trouble search measurement result.
Error / Alarm	Displays the error and alarm measurement result on graphs.
OH monitor	Displays the overhead monitor result together with the path trace, payload, pointer value, and K1/K2 byte monitor result.
Opt. power meter	Displays the power monitor, wavelength setting and optical power of the optical signal.
Pointer monitor	Monitors the SDH pointer value.
Sequence test	Analyzes the automatic measurement result.
APS capture	Set the capturing of K1/K2 byte used in the APS test, and analyzes it.
OH capture	Set the capturing of 1,023 bytes of SDH overhead, and analyzes it.
Frame capture	Set the capturing of SDH framed, and displays the result.
Recall	Displays the graph data stored in the memory or floppy disk.

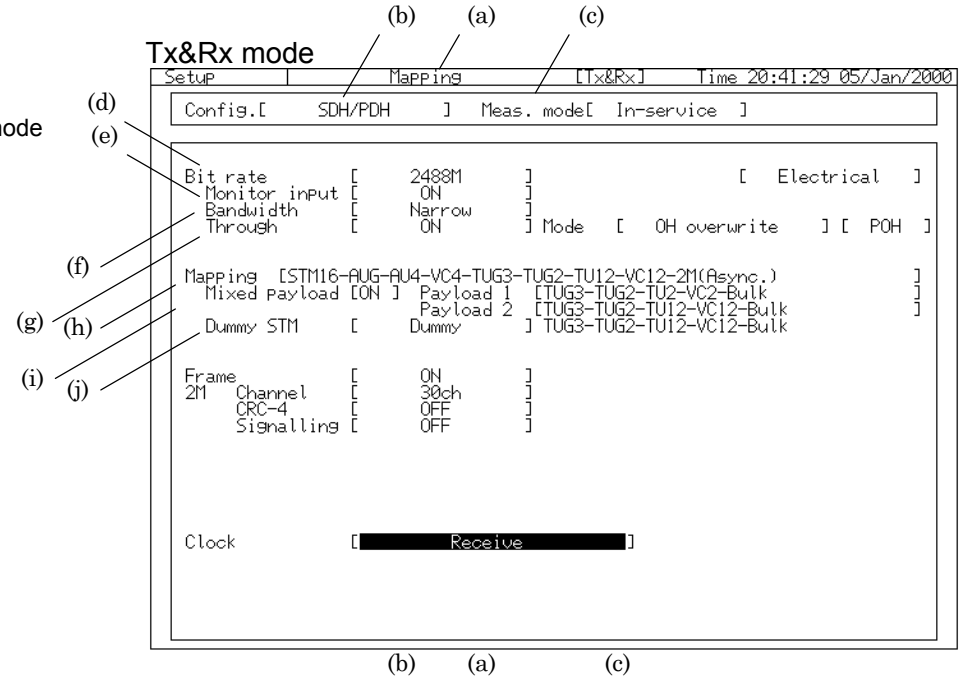
3.2 'Setup : Mapping' subscreen

The basic setting of measurement condition is performed on this screen.

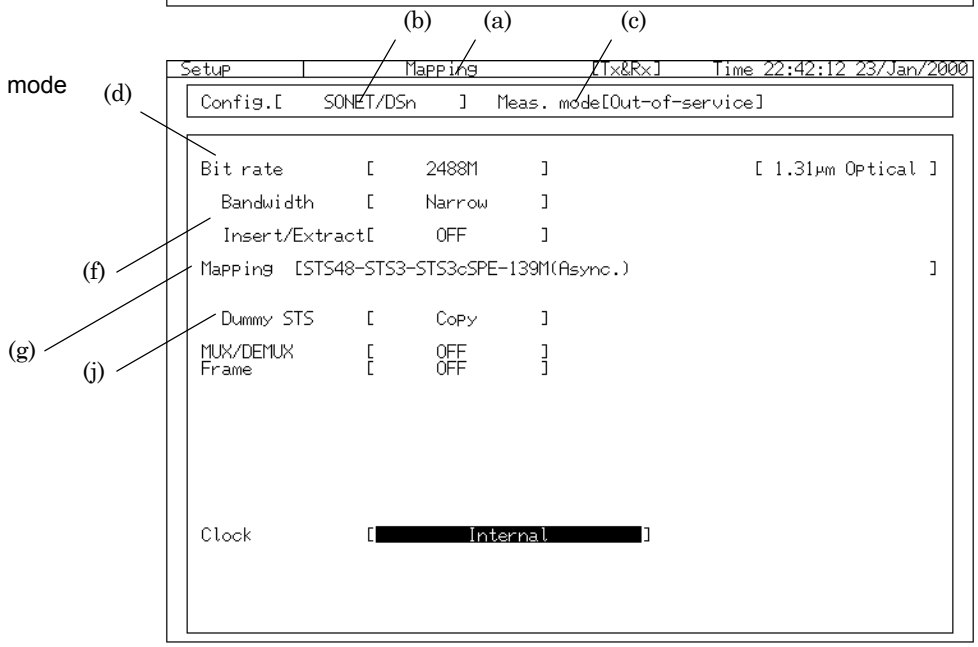
- If settings on this screen are changed during measurement, the measurement restarts.
- If the Tx&Rx operation mode is specified, items related to both TX and RX can be set together. If Tx/Rx is specified, items related to Tx and Rx can be set individually.

Tx&Rx mode

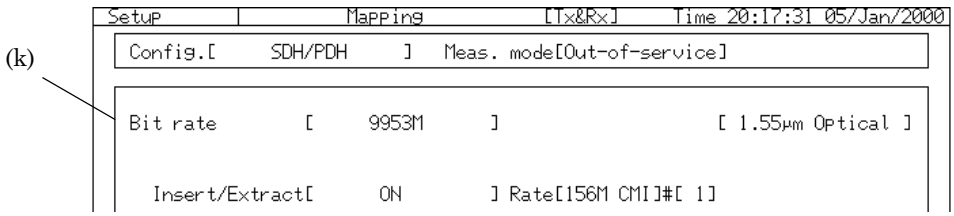
Display in SDH mode



Display in SONET mode



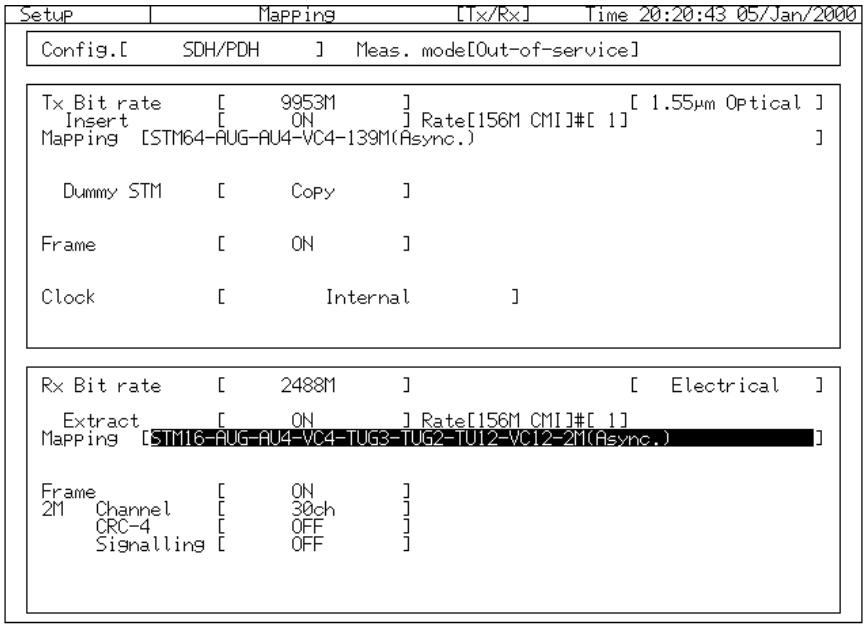
	Display	Description
(a)	[Subscreen selection]	Select a subscreen of the Setup main screen. Also select subscreens of other main screens at this position.
(b)	Config.	Set the configuration to "SDH/PDH"
(c)	Meas. mode	Select the measurement mode from "In-service" and "Out-of-service".
(d)	Bit rate	Select the bit rate for TX and RX. For 2488 M bit rate, set the 2.5G signal input/output type as below: 1.31 μm Optical ... 1.31 μm band light-source input/output 1.55 μm Optical ... 1.55 μm band light-source input/output Electrical ... Electrical input/output
(e)	Monitor input	Set the Monitor input to On/Off of the 2.5G unit. When On, the measurement is enabled if the electrical input is data only.
(f)	Bandwidth	Set the bandwidth of 2.5G unit, as below: Narrow ... - 29 to - 9 dBm Wide ... - 20 to - 9 dBm - Used when the receive 2.5G interface is "Optical" or the Monitor input is On.
(g)	Through	Set the Through mode. Select the mode from "Transparent through", "OH overhead", and "Payload overhead" to turn On the through mode.
(h)	Mapping	Select a mapping. - Selectable mappings depend on the installed unit. For the details, see "1.5 Mapping Route Measurable When Installing the 2.5G Unit" and "1.6 Mapping Route Measurable When Installing the 2.5G/10G and 10G Units".
(i)	Mixed payload	Select "ON" and press the Set key to specify a different mapping (PDH signal) from the main channel mapping to be measured when their channels are the same and the mapping route set by (i) passes through TUG3 or TUG2. Then set Payload1 and Payload2 when the mixed payload edit screen is displayed.
(j)	Dummy STM	Set "Dummy" to send the dummy channel signal with the content set on the Setup: Dummy preset screen. (Set "Copy" to copy the measurement channel payload to the dummy channel so that the signal is sent. For the details, see "6.6 Editing Dummy Channel" in Vol. 1 or Vol. 2 of the Operation Manual.)



	Display	Description
(k)	Insert/Extract	Set On/Off of Insert/Extract. - This item can be set when MU150008A, MU150009A, or MU150010A is installed.

Tx/Rx mode

Display in SDH mode



Display in SONET mode

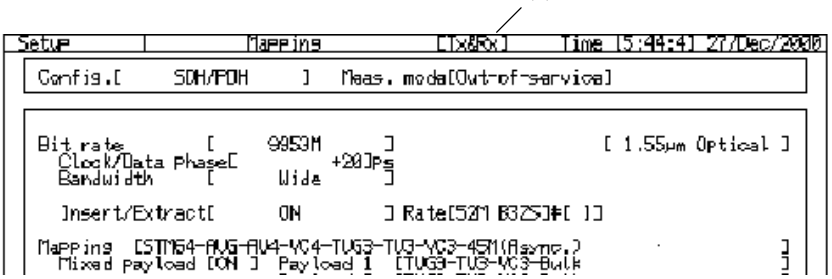
- Set items related to TX at the top of the screen. Set items related to RX at the bottom of the screen. The displayed contents are the same as those displayed when Tx&Rx is specified.

Section 4 Application Examples

This section provides the basic parameters set in the “Setup : Mapping” screen and sample measurement connections to explain the procedures to connect this unit and LTE.

4.1 Setting Basic Parameters in "Setup : Mapping" Screen

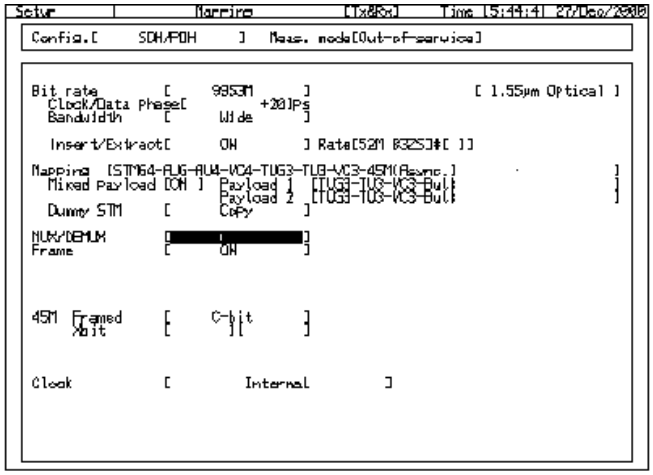
Set the signal type, interface and frame configuration for the test connection between this unit and LTE in the Setup : Mapping screen. Each parameter is described below.



(a) [Operation Mode] Sets the operation mode for Tx/Rx for this unit.

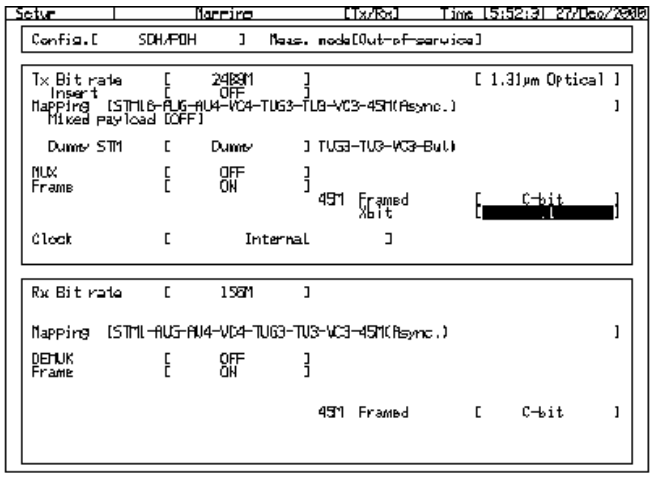
Tx&Rx.....Sets simultaneous Tx/Rx.

Sample display for the Tx&Rx mode

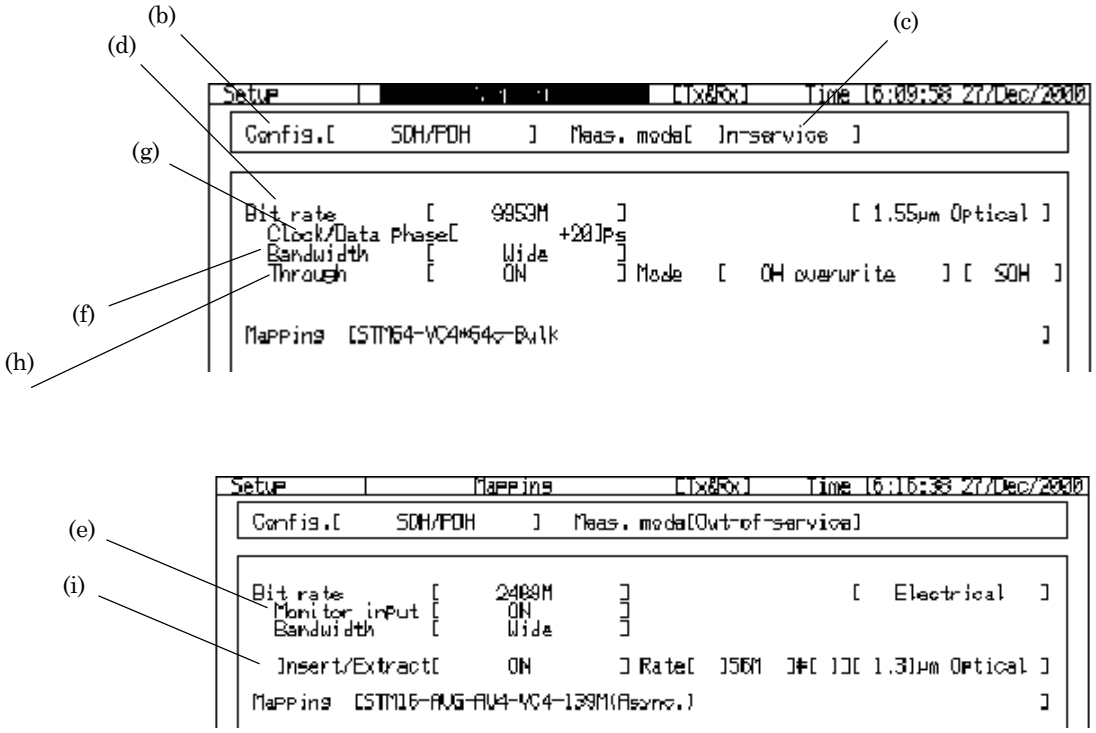


Tx/Rx..... Sets Tx and Rx independently.

Sample display for the Tx/Rx mode -- Tx and Rx parameters are displayed separately.



When switching from the Tx/Rx mode to the Tx&Rx mode, Tx is set to same as Rx.



(b) Config. ..... Sets the measurement signal type, frame type or payload type (switching among SDH/SONET, CID and Nonframe pattern).

- When the configuration is changed, the display parameters return to the initial setting.

(c) Meas. Mode..... Sets the measurement mode

In-service.....Measures the LTE in service status. Payload measurement is masked.

Out-of-service.....Mode for measuring an LTE that is not in-service.

(d) Bitrate ..... Sets the bit rate and interface for connection to the LTE.

(e) Monitor input ..... Set to ON when the reception interface is electric NRZ data only. MP1570A internally regenerates the clock using the received data and performs measurement. (Valid for MP127A, MP0128A, MP0129A, MU150008A, MU150009A and MU150010A)

(f) Bandwidth ..... Selects the clock regeneration bandwidth for the received data when the optical interface or Monitor input is set to ON.

(g) Clock/Data Phase ... Moves the phase for the 10G clock to be output. (Valid only for "Bit rate 10G" for MU150017A/B.)

(h) Through ..... Set to ON when throughing the SDH/SONET received data during In-service measurement. The following three types are available.

Transparent ..... Outputs the received data as it is.

OH overwrite ..... Throughs the received data by replacing the selected OH with a preset one.

Payload overwrite .... Throughs the received data by replacing the payload part.

- When "Through mode" is set to ON, the transmission clock is set automatically to the clock (Receive) regenerated from the received data.

(i) Insert/Extract ..... Outputs 2.5G/10G payload by inserting the external 52M/156M/622M data. (Insert function)

Extracts 52M/156M/622M data from the received 2.5G/10G signal and outputs it. (Extract function)

For both of these functions, a plug-in unit for 52M/156M/622M data input/output or an interface unit should be mounted.

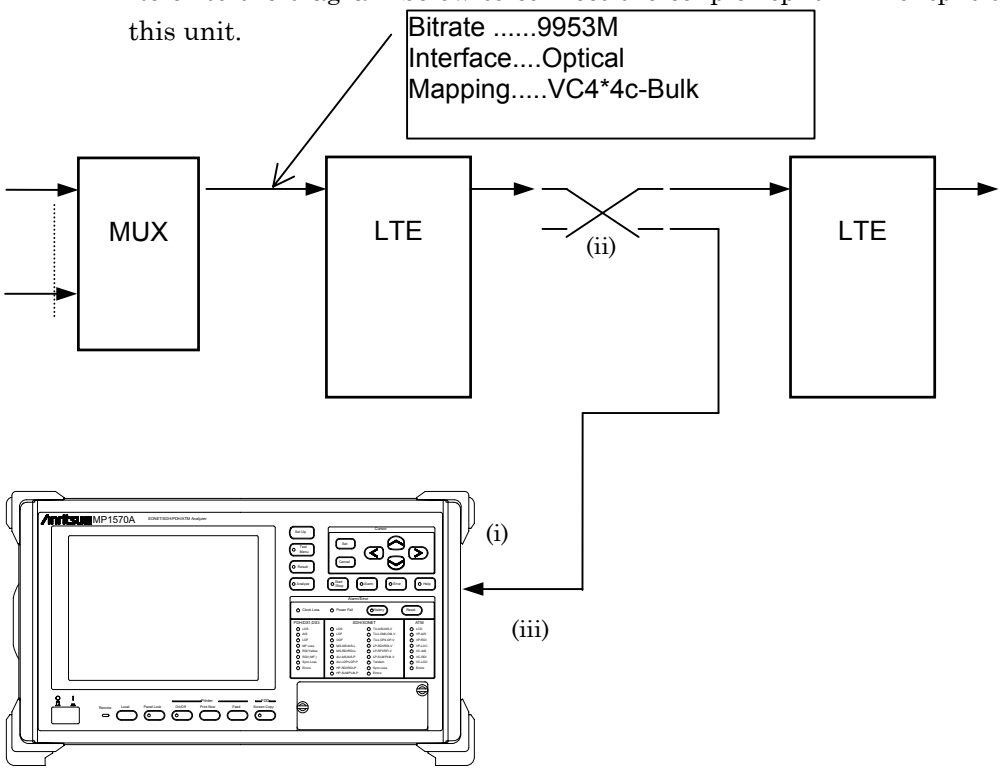
Refer to Section 5 in Vol. 1 for details on SDH/SONET, PDH/DSn settings.

4.2 SDH/SONET Monitoring (Measuring the output signal split by coupler)

Monitoring procedure for the 9953M signal, a multiplexed 622M signal, that is output from LTE using a coupler is shown below.

4.2.1 Measurement system connection

Refer to the diagram below to connect the coupler-split LTE output to this unit.



(i) Turn the power switch for this unit Off and then mount MU150000A or MU150002A. (The unit mounted varies depending on the LTE.)

(ii) Insert an optical fiber coupler into the LTE output to split the output signal.

(iii) Check that the signal split using the coupler does not exceed the absolute maximum rating for MU150002A.

(iv) Connect the split signal to Optical input 10G on MU150002A using a single mode (SM) optical fiber cable.

(v) Connect the 10G Clock output on MU150002A to the Clock input on MU150000A using the U-link attached to MU150002A.

(vi) Connect the 10G Data output on MU150002A and Data input on MU150000A using the U-link attached to MU150002A.

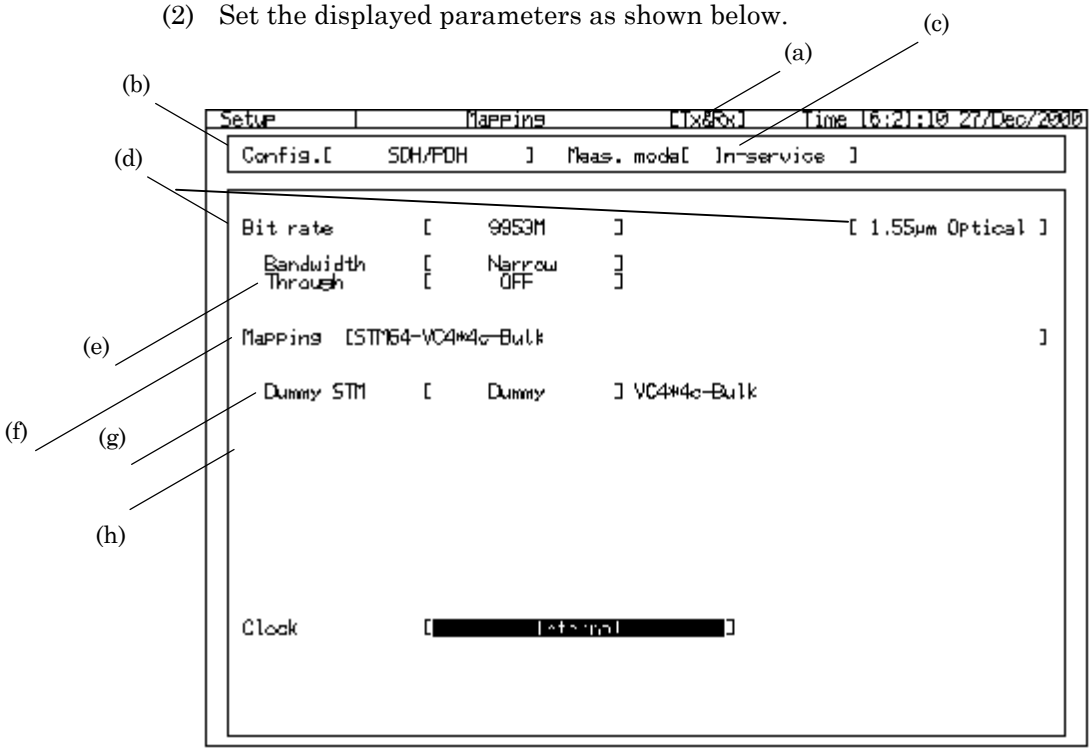
(vii) When the above connections are completed, turn the power switch for this unit On.

4.2.2 Basic Setting *"Setup : Mapping" screen*

The basic settings for measurement described in the preceding page are shown below.

(1) Display the Setup : Mapping screen.

(2) Set the displayed parameters as shown below.



(a) [Operation mode] ..... Set to "Tx&Rx"

(b) Config.....Set to "SDH/PDH" "SONET/DSn"

(c) Meas. mode.....Set to "In-service"

(d) Bit rate .....Set to "9953M" "Optical"

(e) Through .....Set to "OFF"

(f) Mapping.....Set to "AUG-VC4*4c-Bulk"

(g) Dummy STM .....Setting is not required because this is a transmission item.

(h) Clock .....Setting is not required because this is a transmission item.

This completes the connection and basic settings for SDH/SONET signal monitoring.

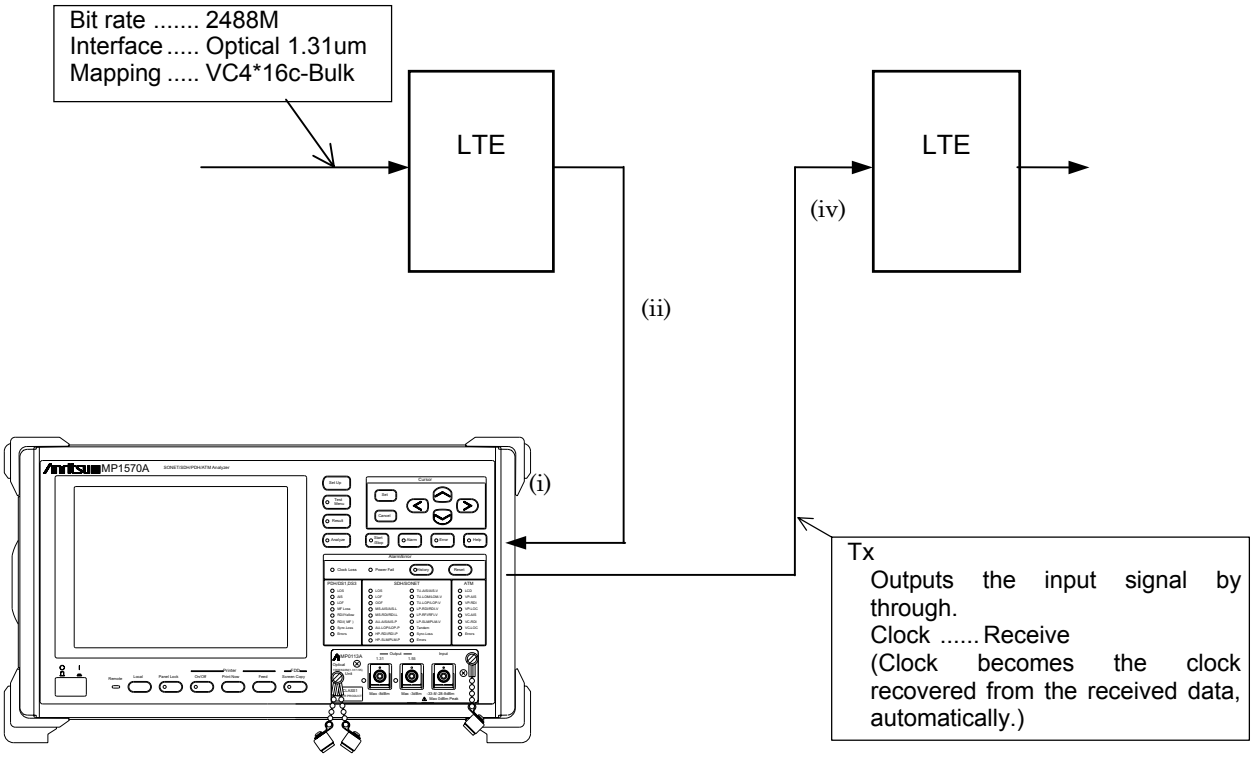
Refer to Sections 6 and 7 in Vol. 1 for details on error/alarm measurement for the received signal and signal monitoring procedures.

4.3 Signal Monitoring using the Through Mode

Monitoring procedure for 2488M signal shown below using the through mode is as follows.

4.3.1 Measurement system connection

Refer to the following diagram to connect the LTE input/output to this unit.



(i) Turn the power switch of this unit Off and then mount MU150008A. (The unit mounted varies depending on the LTE.)

(ii) Check that the LTE signal level does not exceed the absolute maximum rating (0 dBm at peak power).

(iii) Connect a signal with a verified level to Optical Input on MU150008A using a single mode (SM) optical fiber cable.

(iv) Connect Optical Output on MU150008A and LTE input using the SM optical fiber cable. (Check that output signal level for this unit does not exceed the absolute maximum rating of the LTE.)

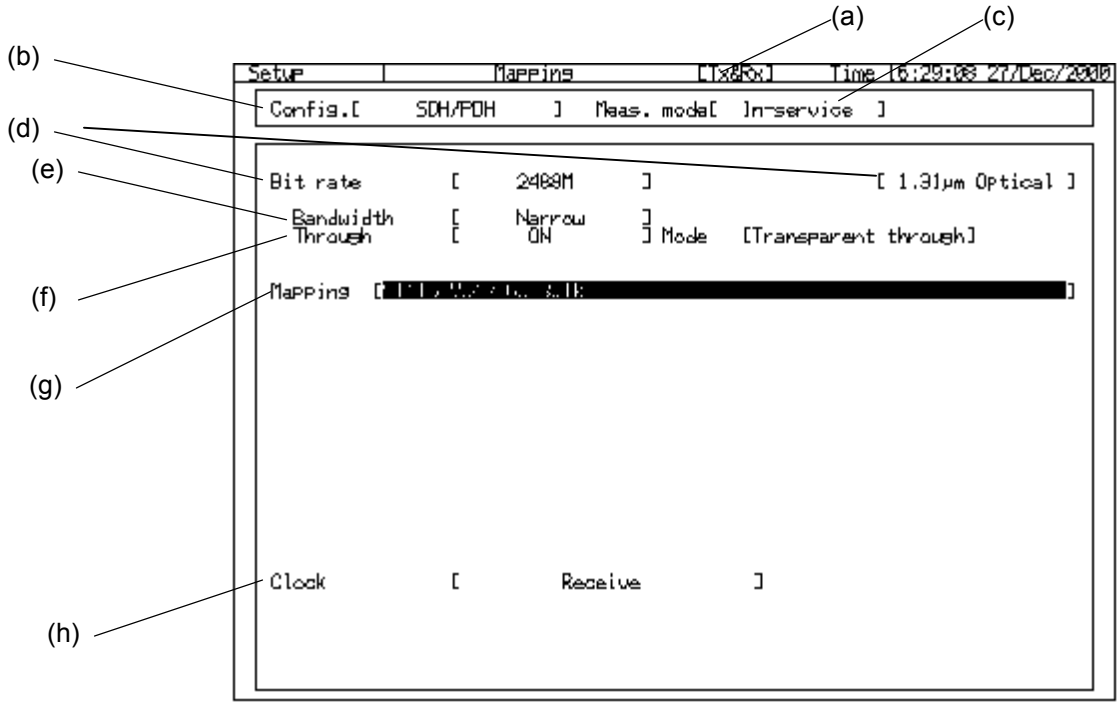
(v) When the connections described in (iii) and (iv) are complete, turn the power switch for this unit On.

4.3.2 Basic Setting *"Setup : Mapping" screen*

The basic settings for measurement described in the preceding page are shown below.

(1) Display the Setup : Mapping screen.

(2) Set the displayed parameters as shown below.



(a) [Operation mode] ..... Set to "Tx&Rx"

(b) Config.....Set to "SDH/PDH" "SONET/DSn"

(c) Meas. mode.....Set to "In-service"

(d) Bit rate .....Set to "2488M" "1.31um Optical"

(e) Bandwidth.....Set to "Narrow" when not performing Jitter measurement

(f) Through .....Set to "On" and select one of the following modes

Transparent..... Transmits the received signal as it is.

OH overwrite..... Transmits the received data by replacing its overhead with preset data. Select the overhead from "RSOH", "MSOH", "SOH", "POH", "K1/K2" or "S1" ("K1/K2" and "S1" are available only when Option 22 K1/K2 Overwrite Through is mounted.).

Payload overwrite .... Transmits the received data by replacing its payload with the test pattern set in the Test menu : Manual screen.

(g) Mapping.....Set to "VC4*16c-Bulk"

(h) Clock..... Clock (Receive) regenerated from the received signal is selected during the Through mode.

This completes the connection and basic settings for SDH/SONET signal monitoring.

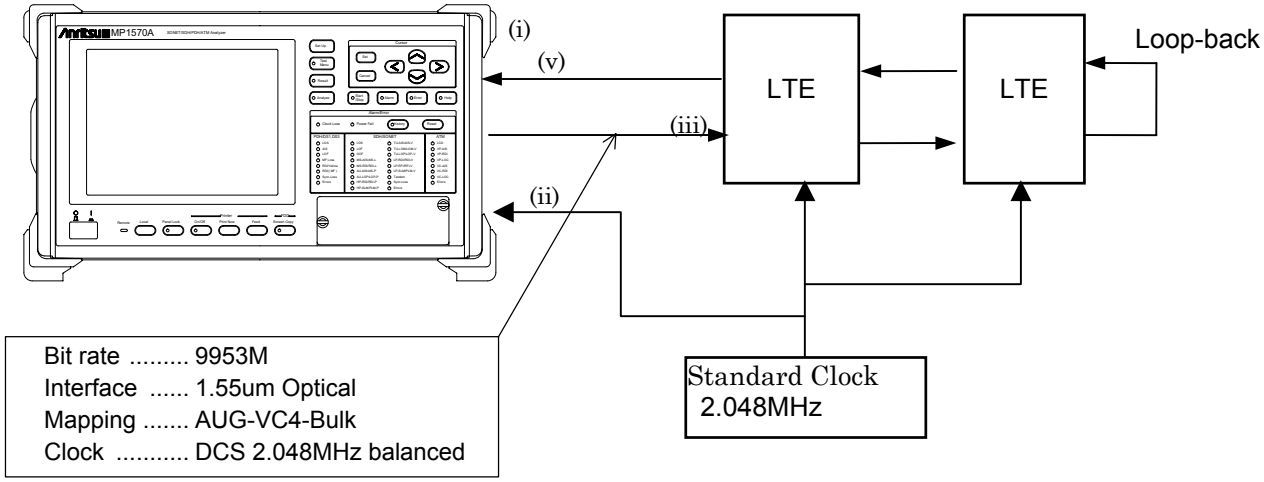
Refer to Sections 6 and 7 in Vol. 1 for details on received signal monitoring and edit procedures for through data and overhead.

4.4 Loop-Back Test

The loop-back test procedures for LTE line (9953M optical interface) under the external standard clock shown are descried below.

4.4.1 Measurement system connection

Connect the LTE input/output to this unit as shown below.



(i) Turn the power switch of this unit Off and then mount MP0121A, MU150000A, MU150001B, MU150031A/C, MU150061A/B MU150031A/C, MU150051A/B or MU150002A. (The unit mounted varies depending on the LTE.)

(ii) Connect the standard clock to DCS input (120Ω balanced) on this unit.

(iii) Check that the output signal level of this unit does not exceed the absolute maximum rating for the LTE.

(iv) Connect the Optical output 10G on MU150001B to the LTE input using a single mode (SM) optical fiber cable.

(v) Perform loop-back within the LTE to check that the optical output level connected to this unit does not exceed the absolute maximum rating for MU150002A. Then connect LTE output to the 10G Optical input on MU150002A using an SM optical fiber cable.

(vi) Connect Clock input(1.55) on MU150001B to the Clock output on MU150000A using the U-link attached to MU150001B.

(vii) Connect Data input(1.55) on MU150001B to the Data output on MU150000A using the U-link attached to MU150001B.

(viii) Connect Int.Clock Output on MU150000A to the Ext.Clock input

using the U-link attached to MU150000A.

(ix) Connect 10G Clock output on MU150002A to the Clock input on MU150000A using the U-link attached to MU150002A.

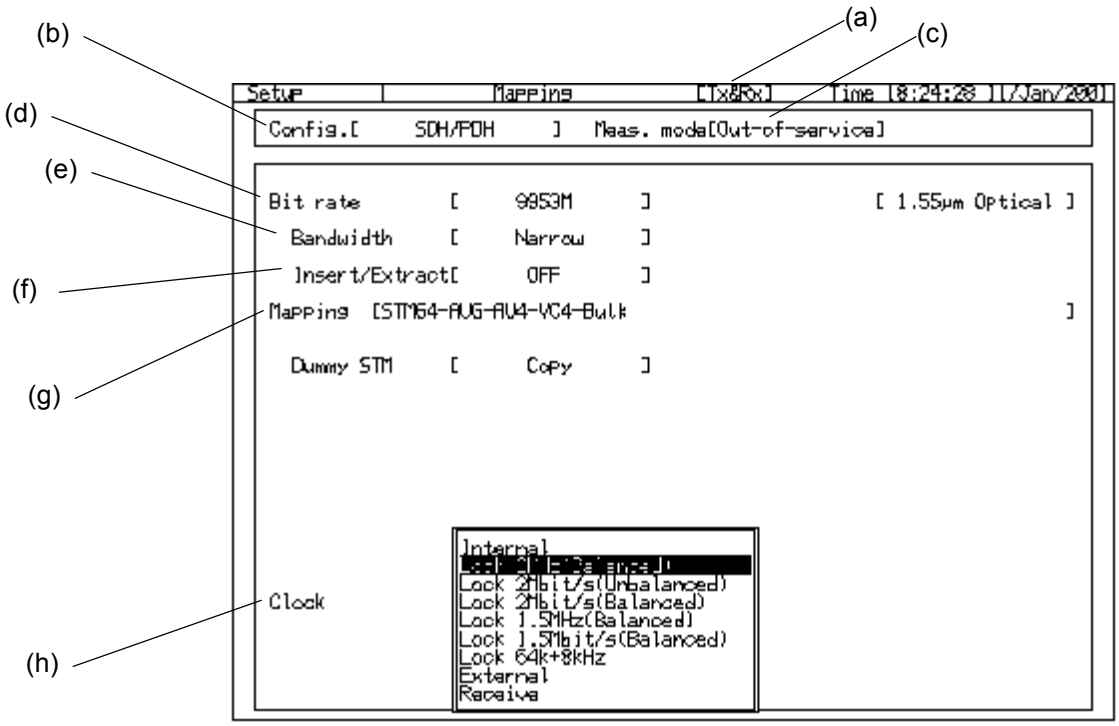
(x) Connect 10G Data output on MU150002A to the Data input on MU150000A using the U-link attached to MU150002A.

(xi) When the above connections are completed, turn the power switch for this unit On.

4.4.2 Basic Setting *"Setup : Mapping" screen*

(1) Display the Setup : Mapping screen.

(2) Set the displayed parameters as shown below.



(a) [Operation mode] ..... Set to "Tx&Rx"

(b) Config.....Set to "SDH/PDH" "SONET/DSn"

(c) Meas. mode.....Set to "Out-of-service"

(d) Bit rate .....Set the Bit rate value to "9953M" and "1.55um Optical" ("1.31 µm Optical" for MU150061A/B.)

(e) Bandwidth.....Set to "Narrow" when not performing Jitter measurement

(f) Insert/Extract....See Section 4.6 for details.

(g) Mapping.....Set to "AUG-AU4-VC4-Bulk"

(h) Clock .....Set the clock source for transmission signal to "Lock 2MHz Balanced"

This completes the connection and basic settings for the loop-back test.

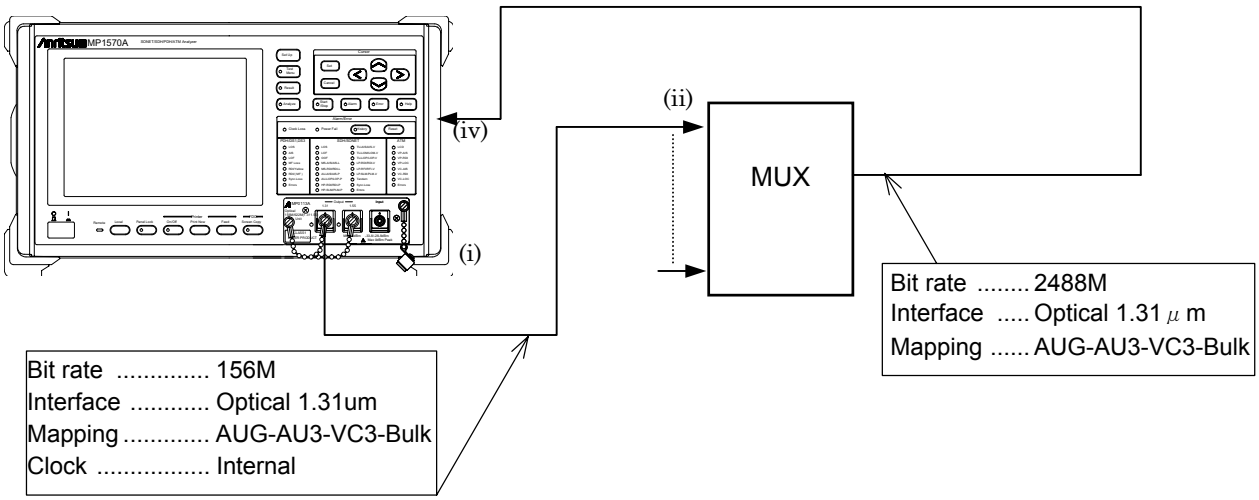
Refer to Sections 6 and 7 in Vol. 1 for details on test pattern generation and error addition procedures.

4.5 Evaluation Test for Multiplexer

The evaluation test procedures for a multiplexer outputting a 2488M signal, a multiplexed 156M signal, are explained as shown below.

4.5.1 Measurement system connection

Connect the LTE (MUX unit) to this unit as shown below.



(i) Turn the power switch for this unit Off and then mount MP0122A, MP0113A or MU150008A. (The unit mounted varies depending on the MUX unit.)

(ii) Check that the output signal level of this unit does not exceed the absolute maximum rating for the MUX unit.

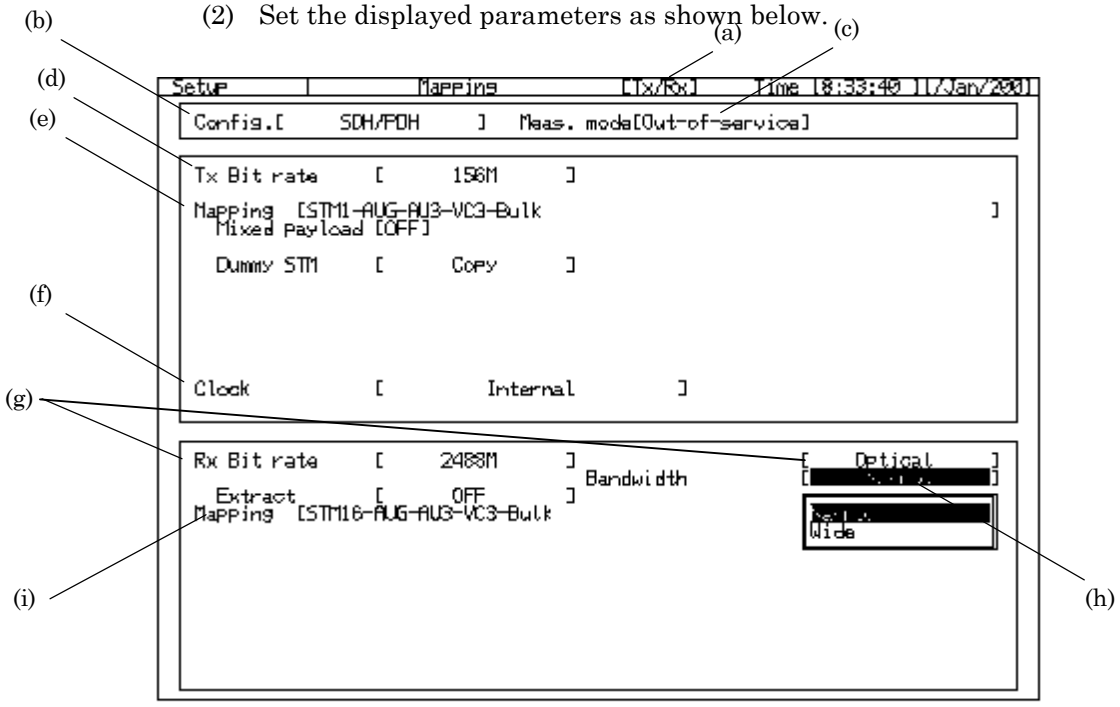
(iii) After checking the level, connect Optical output(1.31) on MP0113A to the input on the MUX unit using an optical fiber cable.

(iv) Check that the output signal level for the MUX to be connected to this unit does not exceed the absolute maximum rating for MU150008A. Then connect MUX output to the Optical input on MU150008A using a single mode (SM) optical fiber cable.

(v) When the above connections are completed, turn the power switch for this unit On.

4.5.2 Basic Setting *"Setup : Mapping" screen*

(1) Display the Setup : Mapping screen.
(2) Set the displayed parameters as shown below.



(a) [Operation mode] .....Set to "Tx/Rx"
(b) Config.....Set to "SDH/PDH" "SONET/DSn"
(c) Meas. mode.....Set to "Out-of-service"

Tx (transmission side) settings
(d) Bit rate .....Set to "156M"
(e) Mapping.....Set to "AUG-AU3-VC3-Bulk"
(f) Clock .....Set to "Internal" (internal clock of this unit).

Rx (reception side) settings
(g) Bit rate .....Set to "2488M"
(h) Bandwidth.....Set to "Narrow" because Jitter measurement is not performed
(i) Mapping.....Set to "AUG-AU3-VC3-Bulk"

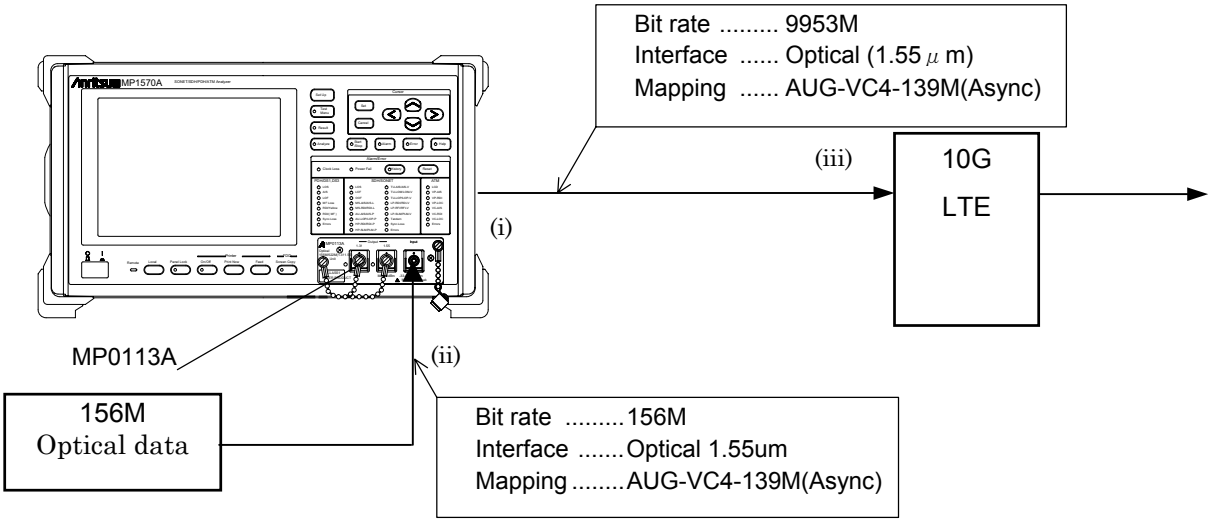
This completes the connection and basic settings for the evaluation test of the multiplexer.
Refer to Sections 6 and 7 in Vol. 1 for details on test pattern generation and error addition procedures.

4.6 Insert/Extract

This unit maps the payload for 52M/156M signal input to the interface unit or plug-in unit to the payload for 2.5G or 10G channel to be transmitted (Insert). It also extracts payload for received 2.5G or 10G channel and transmit it as 52M or 156M signal by adding overhead (Extract).
A connection sample and basic settings for using Insert/Extract functions are shown below.

4.6.1 Measurement system connection

Insert : Example for inputting an external 156M signal to this unit and outputting its payload data after mapping to 10G signal.



(i) Turn the power switch for this unit Off and then mount MP0121A, MU150000A, MU150001A, MU150002A or MP0113A. (The unit mounted varies depending on the LTE.)

(ii) Check that the output level of the 156M signal source to be connected to this unit does not exceed the absolute maximum rating for MP0113A. Then connect the signal source output to the Optical input on MP0133A using a single mode (SM) optical fiber cable.

(iii) Check that the level of the 10G optical signal output from this unit does not exceed the absolute maximum rating for the LTE.

(iv) After checking the level, connect Optical output on MU150001A to the LTE input using an SM optical fiber cable.

(v) Connect Clock input(1.55) on MU150001A to the Clock output on MU150000A using the U-link attached to MU150001A.

(vi) Connect Data input(1.55) on MU150001A to the Data output on MU150000A using the U-link attached to MU150001A.

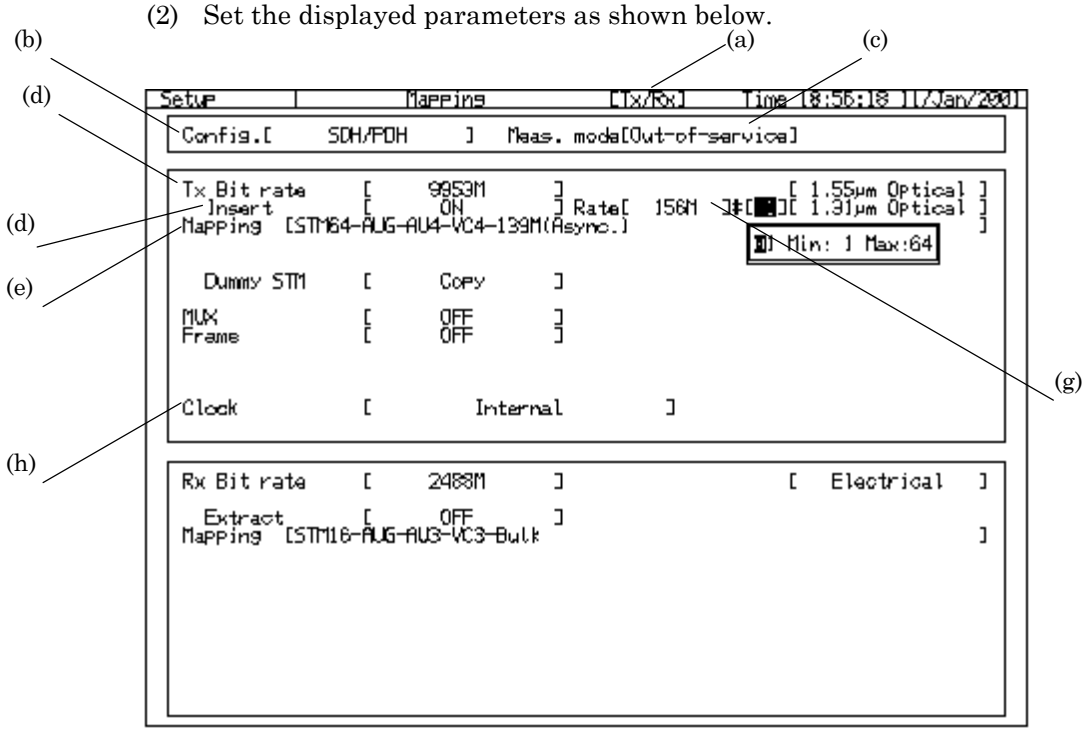
(vii) Connect Int.Clock Output on MU150001A to the Ext.Clock input using the U-link attached to MU150000A.

When the above connections are completed, turn the power switch for this unit On.

4.6.2 Basic Setting *"Setup : Mapping" screen*

(1) Display the Setup : Mapping screen.

(2) Set the displayed parameters as shown below.



(a) [Operation mode].....Set to "Tx/Rx"

(b) Config. ..... Set to "SDH/PDH" "SONET/DSn"

(c) Meas. mode ..... Set to "Out-of-service"

Tx (transmission side) settings

(d) Tx Bit rate ..... Set to "9953M" "1.55µm Optical"

(e) Mapping ..... Set to "AU4-VC4-139M(Async.)"

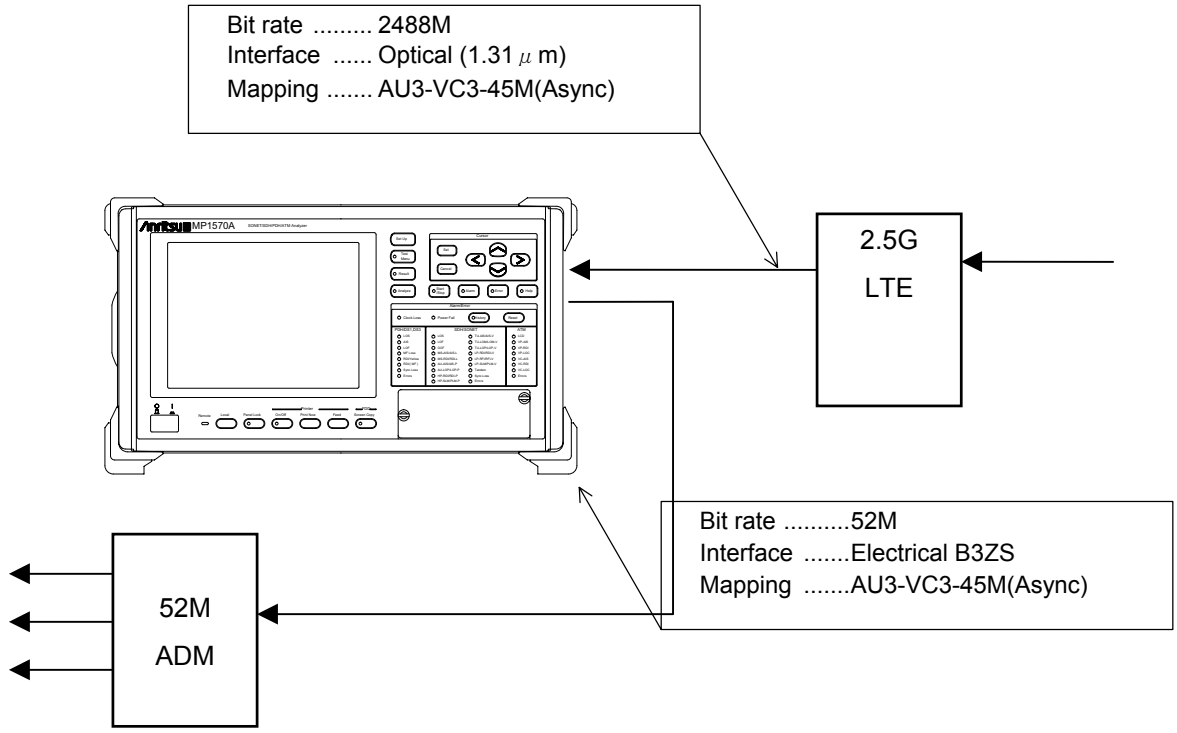
(f) Insert..... Set to ON when using the Insert function

(g) Rate ..... Select the bit rate, interface and channel for insertion

(h) Clock..... Automatically follows the clock extracted from the inserted data when Insert is set to ON.

This completes the connection and basic settings for the insert function. Refer to Sections 6 and 7 in Vol. 1 for details on settings other than the channel to be inserted.

Extract : Example of outputting a 52M signal for one channel from the inputted 2.5G signal.



(i) Turn the power switch for this unit Off and then mount MP0122A or MP150008A. (The unit mounted varies depending on the LTE)

(ii) Connect B3ZS output on MP0122A to the LTE input using a BNC(75 Ω) coaxial cable.

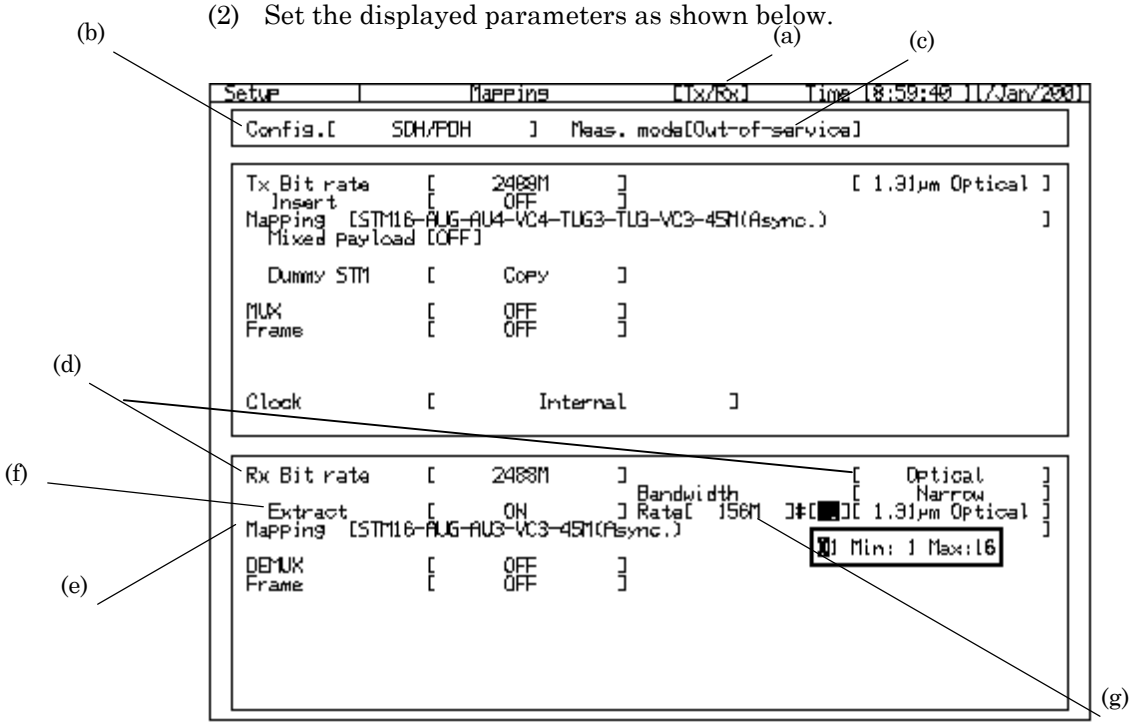
(iii) Check that the output level of the LTE to be connected to this unit does not exceed the absolute maximum rating for MU150008A. Then connect the LTE output to the Optical input on MU150008A using a single mode (SM) optical fiber cable.

(iv) When the above connections are completed, turn the power switch for this unit On.

4.6.2 Basic Setting *"Setup : Mapping" screen*

(1) Display the Setup : Mapping screen.

(2) Set the displayed parameters as shown below.



(a) [Operation mode].....Set to "Tx/Rx"

(b) Config. ..... Set to "SDH/PDH" "SONET/DSn"

(c) Meas. mode ..... Set to "Out-of-service"

Rx (reception side) settings

(d) Rx Bit rate ..... Set to "2488M" "Optical"

(e) Mapping ..... Set to "AU3-VC3-45M(Async.)"

(f) Extract ..... Set to ON when using the Extract function

(g) Rate ..... Select the bit rate, interface and channel for extraction

This completes the connection and basic settings for the extract function.

Refer to Sections 6 and 7 in Vol. 1 for details on error measurement procedures other than extraction.

4.7 Frame Memory and Frame Capture

The MP1570A equipped with the Frame Memory/Capture option (Option 01) of the MU150008A, MU150009A, or MU150010A, or equipped with the Frame Memory/Capture option (Option 01) of the MU150000A can perform the frame memory and frame capture.

Frame Memory .....When the bit rate is 2488M, 64 frames of patterns including payloads are preset, and when the bit rate is 9953M, 26 frames of patterns including payloads are preset. Then, the patterns are generated in accordance with the set sequence.

Frame Capture .....Received data including payloads (64 frames when the bit rate is 2488M, and 26 frames when the bit rate is 9953M) are stored in the memory and displayed.

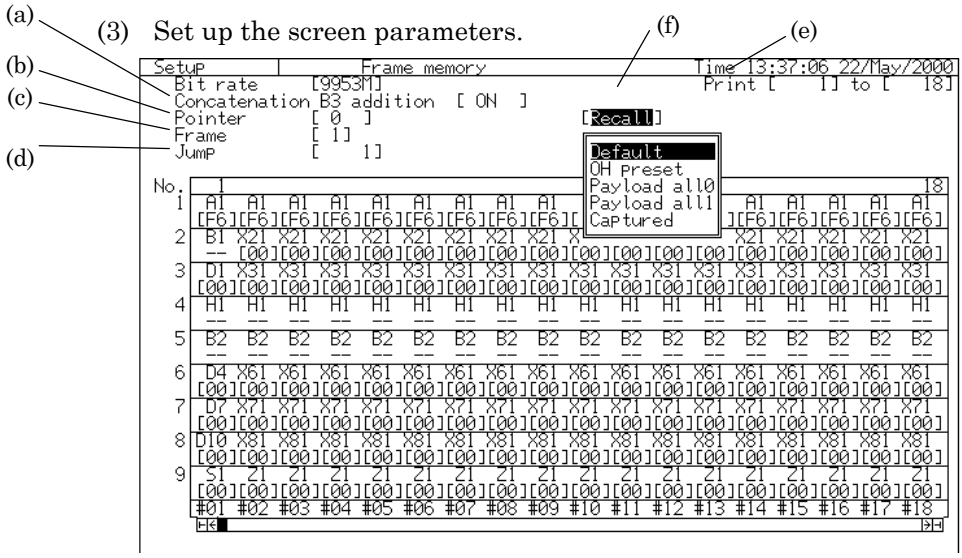
4.7.1 Frame Memory *Setup : Frame memory screen*

(1) Set the bit rate on the Setup : Mapping screen.

- Frame pattern can be set only for the bit rate of the transmission side.

(2) Open the Setup : Frame memory screen to edit the frame pattern to be generated.

(3) Set up the screen parameters.



(a) Concatenation B3 addition.....sets whether to perform the B3 calculation and add it.

(b) Pointer .....sets the pointer value to "0" or "522".

(c) Frame .....specifies the frame number.

(d) Jump ..... specifies the start position of the displayed column.

(e) Print ..... Specify the column number to print the displayed frame. See "8.5 Printing" for the details.

(4) Preset data as follows.

Move the cursor to the desired byte and press Set. A numerical input window is displayed. Set the byte in hexadecimal numbers.

(f) Recall..... sets the pattern.

Default ..... initializes the pattern.

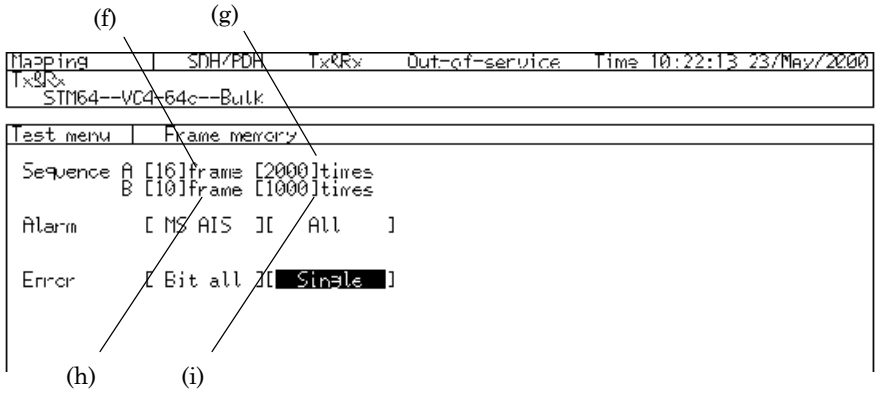
OH preset..... overwrites the overhead data set on the Setup : OH preset screen.

Payload all 0 ... sets all the payload patterns to "0".

Payload all 1 ... sets all the payload patterns to "1".

Captured ..... overwrites 64 frames of the data captured in the frame capture.

(5) After the settings shown in (3) and (4), open the Test menu : Frame memory screen to generate the frame data set on the Test menu : Frame memory screen.



(f) Indicates the number of A frame.

(g) Indicates A frame repeating times.

(h) Indicates the number of B frame.

(i) Indicates B frame repeating times.

About Sequence Generation

64 frames of the data (when the bit rate is 2488M) and 26 frames of the data, that are set on the Setup : Frame memory screen, are divided into A frame and B frame respectively.

When Bit rate is 2488M

A frame ..... The frames from No.1 to No.n (n=1 to 64) can be set.

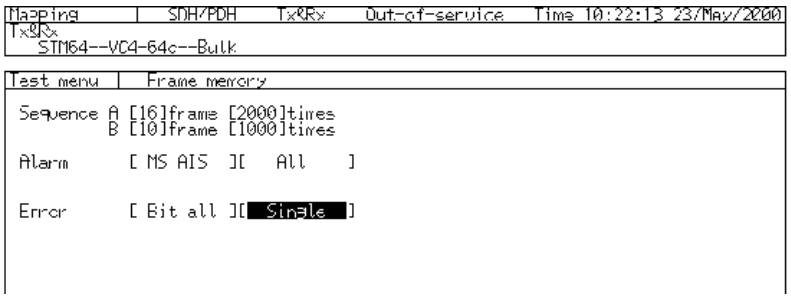
B frame ..... The frames from No.n+1 to No.m (m=n+1 to 64) can be set.

When Bit rate is 9953M

A frame ..... The frames from No.1 to No.n (n=1 to 26) can be set.

B frame ..... The frames from No.n+1 to No.m (m=n+1 to 26) can be set.

In the example shown below, the test sequences are generated as follows.



(1) A frame .....No.1 - No.16, 2000 times

(2) B frame .....No.17 - No.26, 1000 times

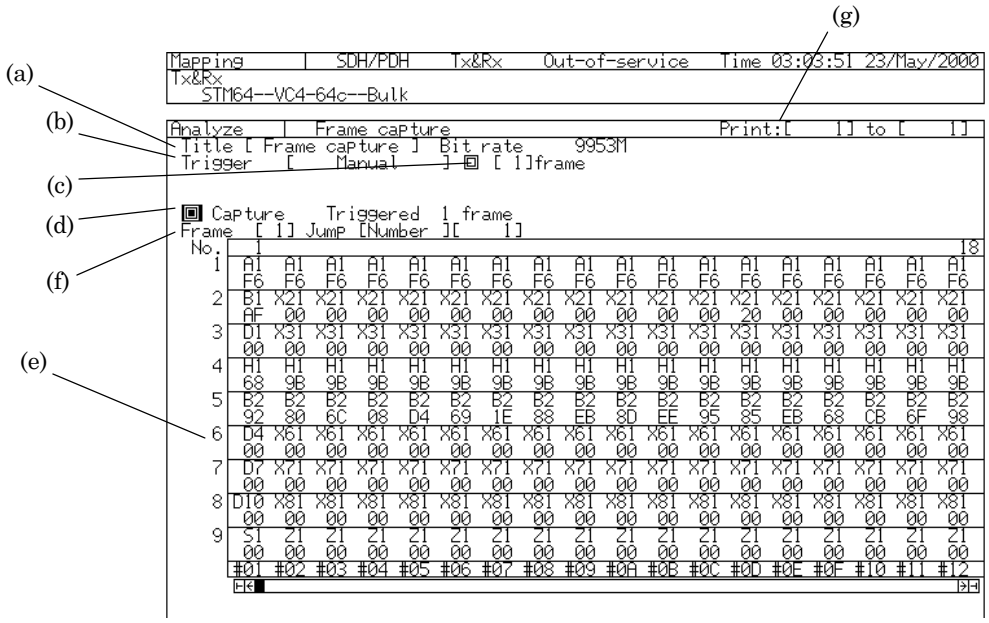
(3) The sequences shown in (1) and (2) are repeated.

Note:

- The generation of the frame memory pattern starts when the Test menu : Frame memory screen is displayed.
- When the setting of (f), (g), (h), or (i) is changed, it is reflected by pressing Set .

4.7.2 Frame Capture *Analyze : Frame capture screen*

The received data can be displayed on the Analyze : Frame capture screen. Here is the procedure for capturing.



Capture Procedure

(a) Title ..... assigns a title to the screen currently displayed. This function is only available on a single display screen.

- The title is needed when the analyze data is recalled on the Setup : Memory screen.

(b) Trigger ..... selects the type of the trigger for capturing the data.

- When "Manual" is selected as the trigger type, ▣ is displayed. It is triggered off by moving the cursor here and pressing Set .
- When "External" is selected as the trigger type, it is triggered off by the rise edge of the signal which is inputted from the "Trigger input" connector on the right side panel, See "3.1.3 Right Side Panel" for the trigger input.

(c) Trigger frame ... .specifies a trigger position to trigger. When "5 frame" is inputted as the "Trigger frame", 4 frames before and 59 frames after it are captured.

(d) Capture.....The capture starts by moving the cursor here and pressing [Set].

■ ..... indicates that the capture has started and a trigger is being waited for.

□ ..... indicates that the capture has finished.

- In the example shown above, No.1 frame is captured using a manual trigger.

Analyzing the Captured Data

The captured data is displayed in 9 row * (270*n) column.

(e) [Data scroll] .....scrolls the data upwards and downwards.

⊢ ..... Moves to the top page.

← ..... Moves half page before.

→ ..... Moves half page forward.

⊣ ..... Moves to the last page.

(f) Frame .....displays the specified capture frame.

Printing the Captured Data

(g) Print ..... Specify column number to print the desired contents (Press [Print Now] to print it). See "8.5 Printing" for the details.

Storing the Captured Data

The captured data can be stored into floppy disks after the capture. See "8. Floppy Disk" for the details.

Note:

When all captured frames are stored, two or more floppy disks might be needed.

Section 5 Performance Test

This section describes the procedures to check the waveforms output by the 2.5G, 2.5G/10G, and optical 10G units. Contact Anritsu or our sales representatives when any standard not satisfied in the performance test explained here may imply a failure.

5.1 2.5G Output Waveform (Optical)

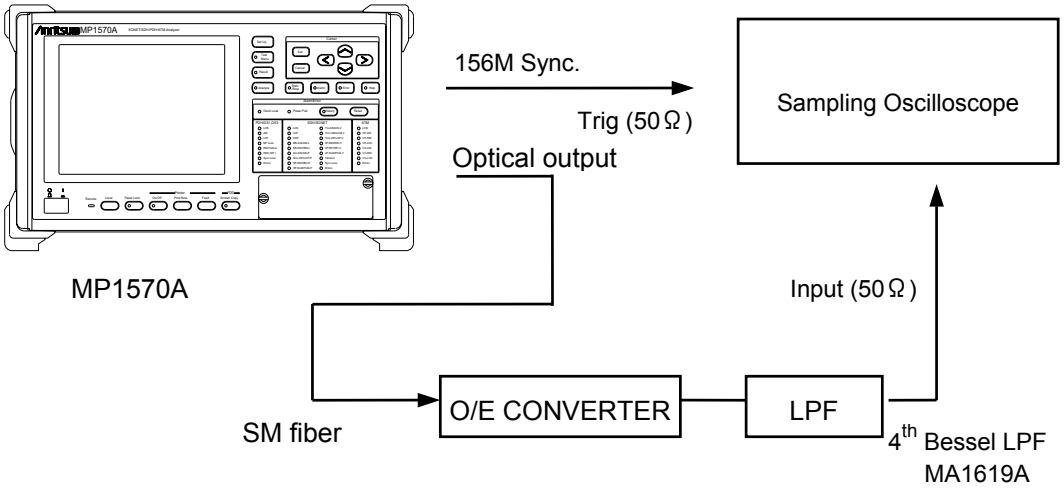
This section describes the procedures to check the optical output waveform of 2.5G for MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A, MU150031A/C, MU150061B and MU150001B.

5.1.1 Connection

(1) Turn off the power switch of MP1570A.

(2) Connect the above 2.5G or 10G unit to MP1570A.

(3) Connect the O/E converter and the Sampling Oscilloscope as shown in the following figure:



(4) Turn on the power switch of MP1570A after the connection.

5.1.2 Test procedures

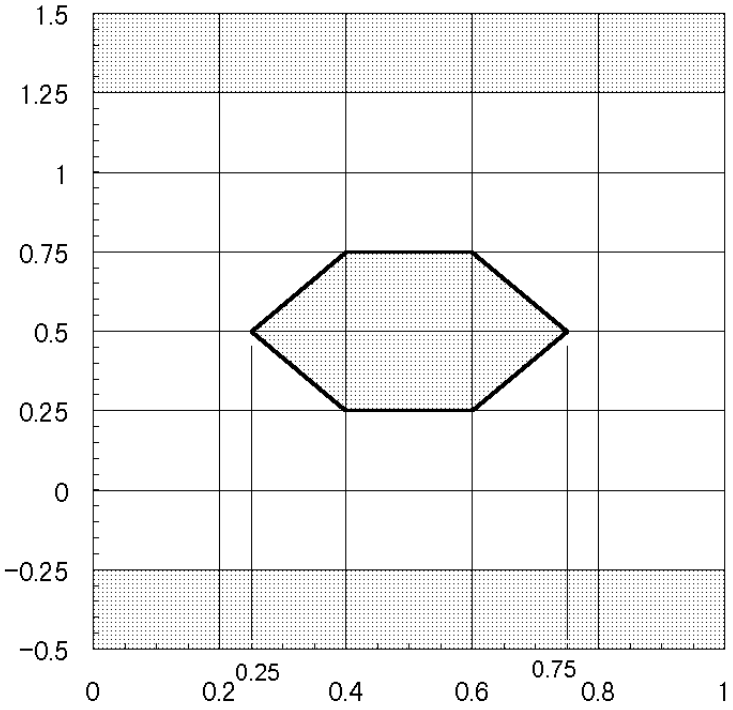
Test the output waveform in the following procedures:

(1) Display the Setup: Mapping screen.

(2) Set the Bit rate to "2488M".

(3) Check whether the waveform displayed on the Sampling Oscilloscope is within the pulse mask shown in the next page.

5.1.3 Pulse mask (2.5G)



5.2 2.5G Output Waveform (Electric)

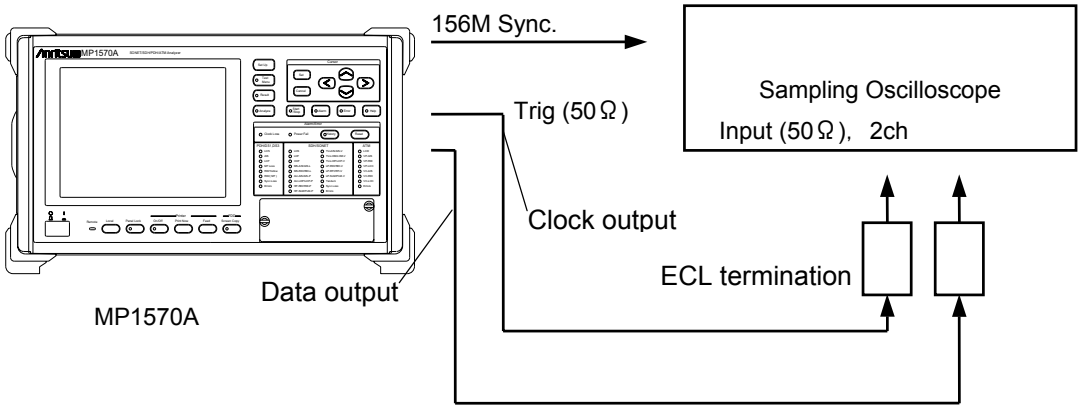
This section describes the procedures to check the 2.5G output waveform of MP0127A, MP0128A, MP0129A, MU150008A, MU150009A, MU150010A, MU150000A, MU150002A-01 and MU150017B.

5.2.1 Connection

(1) Turn off the power switch of MP1570A.

(2) Connect the above 2.5G unit to MP1570A.

(3) Connect the ECL termination and the Sampling Oscilloscope as shown in the following figure:



- When the MU150000A, MU150002A-01, MU150017B are tested, the ECL termination is not necessary.

(4) Turn on the power switch of MP1570A after the connection indicated in (3).

5.2.2 Test procedures

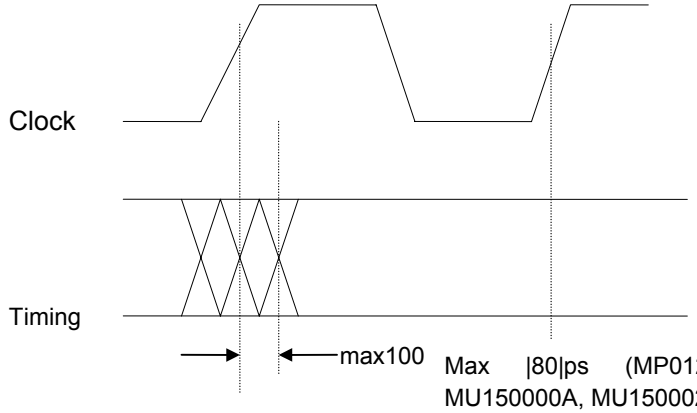
Test the output waveform in the following procedures:

(1) Display the Setup: Mapping screen.

(2) Set the Bit rate to "2488M".

(3) Check whether the waveform displayed on the Sampling Oscilloscope satisfies the following timing:

5.2.3 Timing



Max |80|ps (MP0127A, MP0128A, MP0129A, MU150000A, MU150002A-01, MU150017B)
Max |40|ps (MU150008A, MU150009A, MU150010A)

5.3 10G Output Waveform (Optical)

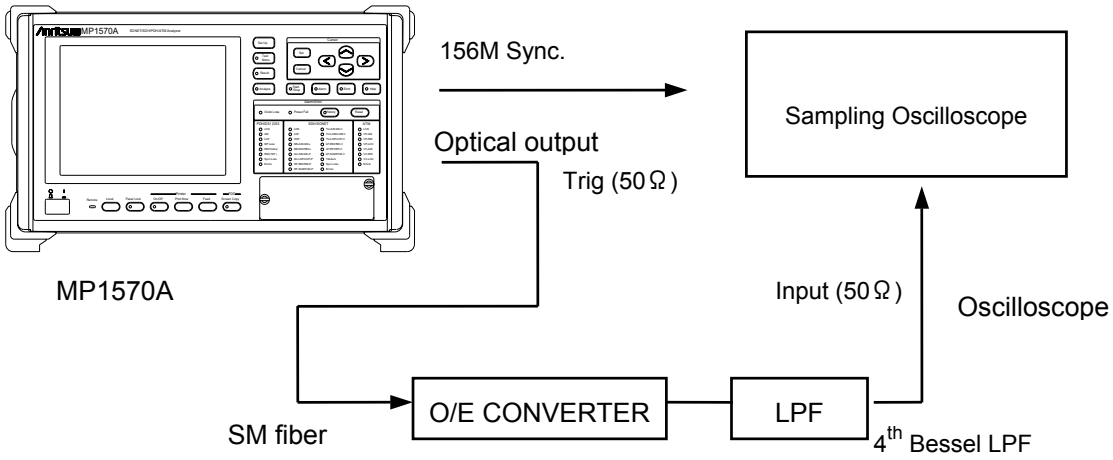
This section describes the procedures to check the 10G optical output waveform of MU150001A/B, MU150031A/C, MU150061A/B.

5.3.1 Connection

(1) Turn off the power switch of MP1570A.

(2) Connect MU150000A and MU150001A/B to MP1570A.

(3) Connect the O/E converter and the Sampling Oscilloscope as shown in the following figure:



(4) Turn on the power switch of MP1570A after the connection.

5.3.2 Test procedures

Test the output waveform in the following procedures:

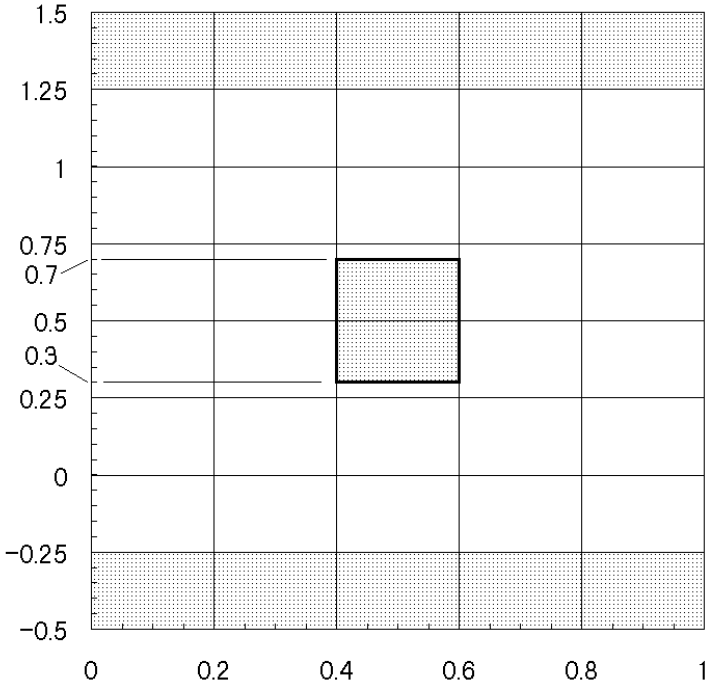
(1) Display the Setup: Mapping screen.

(2) Set the Bit rate to "9953M".

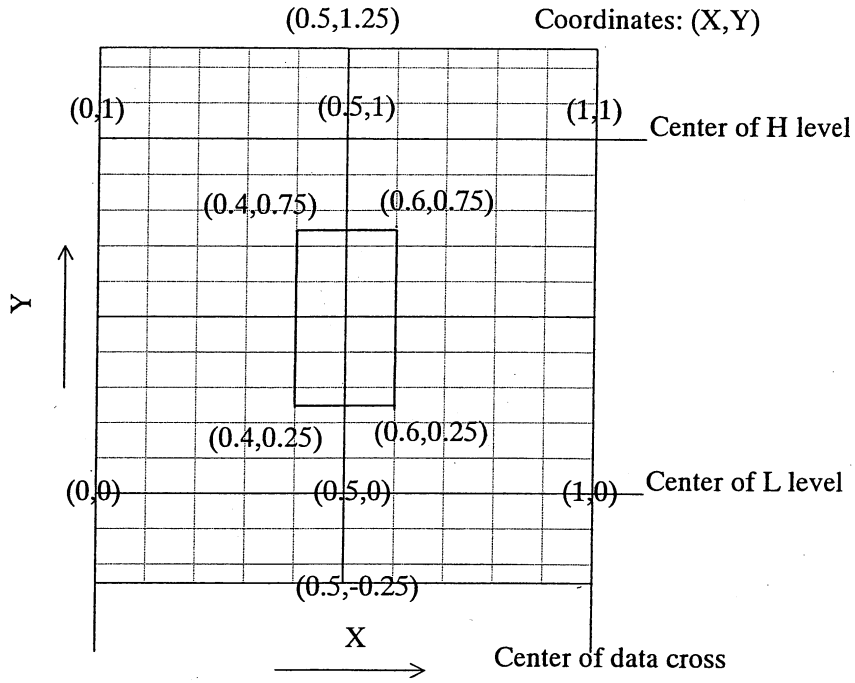
(3) Check whether the waveform displayed on the Sampling Oscilloscope is within the pulse mask shown in the next page.

5.3.3 Pulse mask (10G)

MU150001A/B



MU150031A/C, MU150061A/B



5.4 10G Output Waveform (Electric)

This section describes the procedures to check the 10G output waveform of MU150000A, MU150002A and MU150017A/B.

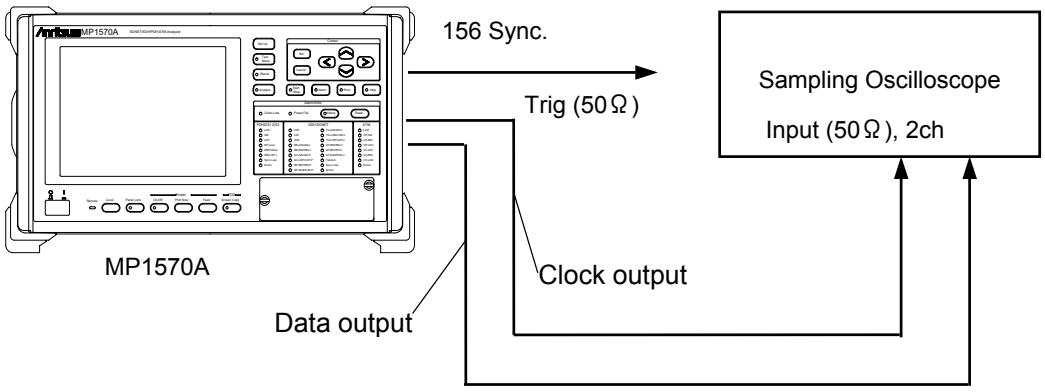
5.4.1 Connection

(1) Turn off the power switch of MP1570A.

(2) Connect the above unit to MP1570A.

(3) When measuring the waveform for MU150002A or MU150017A/B, make a loop-back connection for transmission/reception using optical cables.

(4) Connect the Sampling Oscilloscope as shown in the following figure:



(5) Turn on the power switch of MP1570A after the connection indicated in (3).

5.4.2 Test procedures

Test the output waveform in the following procedures:

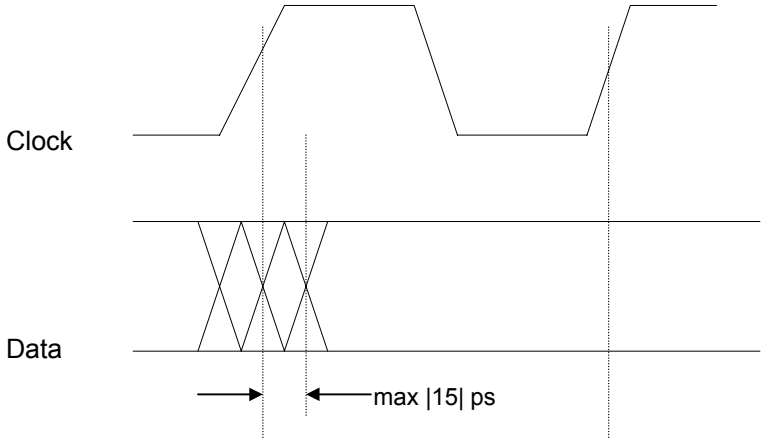
(1) Display the Setup: Mapping screen.

(2) Set the Bit rate to "9953M".

(3) Check whether the waveform displayed on the Sampling Oscilloscope satisfies the following timing:

(4) Set any value for Clock/Data phase to check that the phase of the waveform displayed on the sampling oscilloscope moves at the set value (for MU150017A/B only.)

5.4.3 Timing



Section 6 Remote Control

This section explains the remote control related to the 2.5G measurement and the 10G measurement.

6.1 Remote Control

The MP1570A SONET/SDH/PDH/ATM Analyzer can be controlled by an external controller to automate measurement. Use the GPIB, RS-232C, or Ethernet interface for connection. This device supports IEEE488.2 common commands that can be used commonly for the GPIB or RS-232C interface.

To enable remote control, the standard commands for a programmable instrument (SCPI) are adopted. For details, refer to the MP1570A SONET/SDH/PDH/ATM Analyzer operation manual Vol.2 Remote Control.

6.2 Equipment Unique Command

This section gives details on the equipment unique commands.

- This section describes the commands, which relate to 2.5G and 10G measurement. These commands should be added to the MP1570A Operation Manual Vol.2 Remote Control.

6.2.1 SOURce subsystem

The SOURce subsystem sets the sender conditions.

Function	Command	Parameter
Page 6-9		
Sets the code speed of the TX signal.	:SOURce:TELecom:BRATe	brate
Queries the code speed of the TX signal.	:SOURce:TELecom:BRATe?	
Page 6-9		
Sets the mapping route of the TX signal.	:SOURce:TELecom:MAPPing:TYPE	mtype
Queries the mapping route of the TX signal.	:SOURce:TELecom:MAPPing:TYPE ?	
Page 6-10		
Sets whether to add CRC for 2M.	:SOURce:TELecom:M2:CRC	boolean
Queries whether to add CRC for 2M.	:SOURce:TELecom:M2:CRC?	
Sets the maximum number of channels for the 2M signal.	:SOURce:TELecom:M2:MCHannel	numeric
Queries the maximum number of channels for the 2M signal.	:SOURce:TELecom:M2:MCHannel ?	
Page 6-12		
Sets the 1.5M signal frame.	:SOURce:TELecom:M1_5:FRAMed	frame
Queries the 1.5M signal frame.	:SOURce:TELecom:M1_5:FRAMed ?	
Page 6-13		
Sets the 45M signal frame.	:SOURce:TELecom:M45:FRAMed	frame
Queries the 45M signal frame.	:SOURce:TELecom:M45:FRAMed ?	
Sets the X bit of the 45M signal.	:SOURce:TELecom:M45:XBIT	string
Queries the X bit of the 45M signal.	:SOURce:TELecom:M45:XBIT ?	
Page 6-14		
Sets the cable length of DSX for the TX signal.	:SOURce:TELecom:DSX	numeric
Page 6-14		
Sets the number of error insertion bits.	:SOURce:TELecom:ERRor:PATTern	numeric
Queries the number of error insertion bits.	:SOURce:TELecom:ERRor:PATTern ?	
Sets the position of the SOH 1 byte for OH Change.	:SOURce:TELecom:ERRor:OHTYpe	otype
Queries setting of the SOH 1 byte for OH change.	:SOURce:TELecom:ERRor:OHTYpe ?	
Page 6-16		

Sets the SOH preset data of TX signal.	:SOURce:TELecom:OHPReset:SOHPattern	brate, numeric, sohpoint, string
Queries setting of the SOH preset data for TX signal.	:SOURce:TELecom:OHPReset:SOHPattern?	
Sets the S1 data of the SOH preset data for TX signal (plain-language format).	:SOURce:TELecom:OHPReset:SSMessage	brate, string
Queries the S1 data of plain-language format of the SOH preset data for TX signal.	:SOURce:TELecom:OHPReset:SSMessage?	brate

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Sets a frame format of the frame memory.	:SOURce:TELecom:FMEMory:BRATe	brate
Queries the frame format set by the frame memory.	:SOURce:TELecom:FMEMory:BRATe?	
Sets whether to add B3 automatically.	:SOURce:TELecom:FMEMory:B3ADdition	mode
Query the state of the automatic B3 addition.	:SOURce:TELecom:FMEMory:B3ADdition?	
Sets the pointer value of a frame.	:SOURce:TELecom:FMEMory:POINter	pointer
Queries the set value of the frame pointer.	:SOURce:TELecom:FMEMory:POINter?	
Sets frame No. to edit.	:SOURce:TELecom:FMEMory:FRAMe	frame
Queries the set value of a frame to be edited.	:SOURce:TELecom:FMEMory:FRAMe?	
Sets a frame data.	:SOURce:TELecom:FMEMory:PATTern	Row column string
Queries the frame data.	:SOURce:TELecom:FMEMory:PATTern?	
Initializes the setting of the frame memory.	:SOURce:TELecom:FMEMory:RECall	mode
Queries the initialization type of the frame memory.	:SOURce:TELecom:FMEMory:RECall?	
Set a printing range.	:SOURce:TELecom:FMEMory:PRINt	From to
Queries the printing range.	:SOURce:TELecom:FMEMory:PRINt?	

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Sets the transmission frame number of the frame memory A pattern.	:SOURce:FMEMory:SEQuence:A:FRAMe	frame

Queries the transmission frames number of the frame memory A pattern.	:SOURce:FMEMory:SEQuence:A:FRAMe?	
Sets the transmission times of the frame memory A pattern.	:SOURce:FMEMory:SEQuence:A:TIME	times
Queries the transmission times of the frame memory A pattern.	:SOURce:FMEMory:SEQuence:A:TIME?	
Sets the transmission frame number of the frame memory B pattern.	:SOURce:FMEMory:SEQuence:B:FRAMe	frame
Queries the transmission frames number of the frame memory B pattern.	:SOURce:FMEMory:SEQuence:B:FRAMe?	
Sets the transmission times of the frame memory B pattern.	:SOURce:FMEMory:SEQuence:B:TIME	times
Queries the transmission times of the frame memory B pattern.	:SOURce:FMEMory:SEQuence:B:TIME?	

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Sets the alarm type inserted into a transmission signal.	:SOURce:FMEMory:ALARm:TYPE	atype
Queries the alarm type inserted into the transmission signal.	:SOURce:FMEMory:ALARm:TYPE?	
Sets the alarm addition timing.	:SOURce:FMEMory:ALARm:TIMing:TYPE	type
Queries the alarm addition timing.	:SOURce:FMEMory:ALARm:TIMing:TYPE?	
Set the number of alarm addition frames when Alternate is set.	:SOURce:FMEMory:ALARm:TIMing:ALARm	error
Queries the number of alarm addition frames when Alternate is set.	:SOURce:FMEMory:ALARm:TIMing:ALARm?	
Set the number of normal frames when Alternate is set.	:SOURce:FMEMory:ALARm:TIMing:NORMal	normal
Queries the number of normal frames when Alternate is set.	:SOURce:FMEMory:ALARm:TIMing:NORMal?	
Sets the alarm insertion timing and the unit.	:SOURce:FMEMory:ALARm:TIMing:BURSt	timing unit
Queries the alarm insertion timing and the unit.	:SOURce:FMEMory:ALARm:TIMing:BURSt?	

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Set an error inserted into a transmission signal.	:SOURce:FMEMory:ERRor:TYPE	etype
Queries the error inserted into the transmission signal.	:SOURce:FMEMory:ERRor:TYPE?	
Sets the error addition timing.	:SOURce:FMEMory:ERRor:TIMing:TYPE	timing
Queries the error addition timing.	:SOURce:FMEMory:ERRor:TIMing:TYPE?	

Set the number of error addition frames when Alternate is set.	:SOURce:FMEMory:ERRor:TIMing:ERRor	error
Queries the number of error addition frames when Alternate is set.	:SOURce:FMEMory:ERRor:TIMing:ERRor?	
Sets the addition value for the Programmable rate error.	:SOURce:FMEMory:ERRor:TIMing:PROGrate	error
Queries the addition value for the Prog.rate error addition.	:SOURce:FMEMory:ERRor:TIMing:PROGrate?	
Sets the number of normal frames at Alternate.	:SOURce:FMEMory:ERRor:TIMing:NORMal	normal
Queries the number of normal frames at Alternate.	:SOURce:FMEMory:ERRor:TIMing:NORMal?	
Sets the number of error insertion bits.	:SOURce:FMEMory:ERRor:TIMing:BURSt:BIT	bit
Queries the number of error insertion bits.	:SOURce:FMEMory:ERRor:TIMing:BURSt:BIT?	

:SOURce:TELecom:BRATe <brate>

Parameter <brate> = <CHARACTER PROGRAM DATA>

M9953	9953Mbit/s	
M2488	2488Mbit/s	
M622	622Mbit/s	
M156	156Mbit/s	
M156CMI	156Mbit/s	CMI
M52	52Mbit/s	
M52B3ZS	52Mbit/s	B3ZS
M139	139Mbit/s	
M45	45Mbit/s	
M34	34Mbit/s	
M8	8Mbit/s	
M2	2Mbit/s	
M1_5	1.5Mbit/s	

Function Sets the code speed of the TX signal.

Restriction Invalid when;

・9953M is selected: and

The 2.5G/10G unit is not installed.

・2488M is selected: and

The 2.5G unit is not installed.

The 2.5G option is not installed.

Example use To set the code speed of the TX signal to 2,488 Mbit/s:

> :SOURce:TELecom:BRATe M2488

:SOURce:TELecom:BRATe?

Response <brate> = <CHARACTER RESPONSE DATA>

Function Queries the code speed of the TX signal.

Example use > :SOURce:TELecom:BRATe?

< M2488

:SOURce:TELecom:MAPPing:TYPE <mtype>

Parameter <mtype> = <CHARACTER PROGRAM DATA>

VC4_ASY	139M(Async.)
VC4_BLK	VC4(Bulk)
VC3_ASY	34M(Async.)

VC3_SYN	34M(Sync.)
VC3_45MASY	45M(Async.)
VC3_BLK	VC3(Bulk)
VC2_6MASY	6M(Async.)
VC2_6MBIT	6M(Bitsync.)
VC2_BLK	VC2(Bulk)
VC12_ASY	2M(Async.)
VC12_BIF	2M(Bitsync.F)
VC12_BIL	2M(Bitsync.L)
VC12_BYF	2M(Bytesync.F)
VC12_BYL	2M(Bytesync.L)
VC12_BLK	VC12(Bulk)
VC11_ASY	1.5M(Async.)
VC11_BIF	1.5M(Bitsync.F)
VC11_BIL	1.5M(Bitsync.L)
VC11_BYF	1.5M(Bytesync.F)
VC11_BYL	1.5M(Bytesync.L)
VC11_BLK	VC11(Bulk)
VC11_384D*	384k(Data)
VC11_384V*	384k(Voice)

*: Valid when the options are installed.

Function Sets the mapping route of the TX signal.

Restriction Some mapping is invalid depending on the type of an installed unit. See Paragraphs 1.5 "Mapping Route Measurable When Installing the 2.5G Unit" and 1.6 "Mapping Route Measurable When Installing the 2.5G/10G Unit" in this manual.

Example use To set the mapping route of the TX signal to 139M (Async.):

> :SOURce:TELecom:MAPPing:TYPE VC4_ASY

:SOURce:TELecom:MAPPing:TYPE ?

Response <mtype> = <CHARACTER RESPONSE DATA>

Function Queries the mapping route of the TX signal.

Example use > :SOURce:TELecom:MAPPing:TYPE ?

< VC4_ASY

:SOURce:TELecom:M2:CRC <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>

OFF or 0	CRC is not added.
ON or 1	CRC is added.

Function Sets whether to add CRC for 2M.

Restriction Invalid when;

- The 2/8/34/139/156M (CMI) unit is not installed.
- :SOURce:TELecom:BRATe is <M2488>, and :SOURce:TELecom:MAPPing:TYPE is VC4_BLK>, <VC3_45MASY>, <VC3_BLK>, <VC2_BLK>, <VC12_BLK>, <VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>, <VC11_BYL>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.
- :SOURce:TELecom:BRATe is <M2488>, :SOURce:TELecom:MAPPing:TYPE is VC4_ASY>, <VC3_ASY>, or <VC3_SYN>, and :SOURce:TELecom:MUX:MRATe is <OFF>, <M34>, or <M8>.
- :SOURce:TELecom:FRAMing is <OFF>, <ON> is set.

Example use To set CRC addition to ON:

> :SOURce:TELecom:M2:CRC ON

:SOURce:TELecom:M2:CRC?

Response <boolean> = <NR1 NUMERIC RESPONSE DATA>

Function Queries whether to add CRC for 2M.

Example use > :SOURce:TELecom:M2:CRC?

< 1

:SOURce:TELecom:M2:MCHannel <numeric>

Parameter <numeric> = <CHARACTER PROGRAM DATA>

30	30 channel
31	31 channel

Function Sets the maximum number of channels for the 2M signal.

Restriction Invalid when;

- The 2/8/34/139/156M (CMI) unit is not installed.
- :SOURce:TELecom:BRATe is <M2488>, and :SOURce:TELecom:MAPPing:TYPE is <VC4_BLK>, <VC3_45MASY>, <VC3_BLK>, <VC2_BLK>, <VC12_BLK>, <VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>,

<VC11_BYL>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.

・:SOURce:TELecom:BRATe is
<M2488>, :SOURce:TELecom:MAPPing:TYPE is <VC3_45MASY>, and the 45M-2M option is not installed.

・:SOURce:TELecom:BRATe is
<M2488>, :SOURce:TELecom:MAPPing:TYPE is <VC4_ASY>, <VC3_ASY>, <VC3_SYN>, and :SOURce:TELecom:MUX:MRATe is <OFF>, <M34>, or <M8>.

Example use To set the maximum number of channels to 30:
> :SOURce:TELecom:M2:MCHannel 30

:SOURce:TELecom:M2:MCHannel?

Response <numeric> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the maximum number of channels for the 2M signal.

Example use > :SOURce:TELecom:M2:MCHannel?
< 30

:SOURce:TELecom:M1_5:FRAMed <frame>

Parameter <frame> = <CHARACTER PROGRAM DATA>
D4
ESF

Function Sets the 1.5M signal frame.

Restriction Invalid when;

・The 1.5/45/52M unit is not installed.

・:SOURce:TELecom:BRATe is <M2488>,
and :SOURce:TELecom:MAPPing: TYPE is <VC4_ASY>, <VC4_BLK>, <VC3_ASY>, <VC3_SYN>, <VC3_BLK>, <VC2_BLK>, <VC12_ASY>, <VC12_BIF>, <VC12_BIL>, <VC12_BYF>, <VC12_BYL>, <VC12_BLK>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.

・:SOURce:TELecom:BRATe is
<M2488>, :SOURce:TELecom:MAPPingTYPE is <VC3_45MASY>, and :SOURce:TELecom: MUX:MRATe is <OFF>.

・:SOURce:TELecom:BRATe is
<M2488>, :SOURce:TELecom:MAPPing:TYPE is <VC3_45MASY>, :SOURce:TELecom:MUX:MRATe is <M2>,

<K64_M2>, and the 45M-2M option is not installed.

Example use To set the 1.5M frame to D4:

> :SOURce:TELecom:M1_5:FRAMed D4

:SOURce:TELecom:M1_5:FRAMed?

Response <frame> = <CHARACTER RESPONSE DATA>

Function Queries the 1.5M signal frame.

Example use > :SOURce:TELecom:M1_5:FRAMed?

< D4

:SOURce:TELecom:M45:FRAMed <frame>

Parameter <frame> = <CHARACTER PROGRAM DATA>

M13

CBIT

Function Sets the 45M signal frame.

Restriction Invalid when;

・The 1.5/45/52M unit is not installed.

・:SOURce:TELecom:BRATe is <M2488>,

and :SOURce:TELecom:MAPPing: TYPE is other than <VC3_45MASY>.

Example use To set the 45M fame to M13:

>:SOURce:TELecom:M45:FRAMed M13

:SOURce:TELecom:M45:FRAMed?

Response <frame> = <CHARACTER RESPONSE DATA>

Function Queries the 45M signal frame.

Example use > :SOURce:TELecom:M45:FRAMed?

< M13

:SOURce:TELecom:M45:XBIT <string>

Parameter <string> = <STRING PROGRAM DATA>

"00"

"01"

"10"

"11"

Function Sets the X bit of the 45M signal.

Restriction Invalid when;
・The 1.5/45/52M unit is not installed.
・:SOURce:TELecom:BRATe is <M2488>,
and :SOURce:TELecom:MAPPing: TYPE is other than <VC3_45MASY>.

Example use To the X bit of 45M signal to "01".
> :SOURce:TELecom:M45:XBIT "01"

:SOURce:TELecom:M45:XBIT?

Response <string> = <STRING RESPONSE DATA>

Function Queries the X bit of the 45M signal.

Example use > :SOURce:TELecom:M45:XBIT?
< "01"

:SOURce:TELecom:DSX <numeric>

Parameter <numeric> = <CHARACTER PROGRAM DATA>

0	0ft
450	450ft
655	655ft
900	900ft

Function Sets the cable length of DSX for the TX signal.

Restriction Invalid when;
・The 1.5/45/52M unit is not installed.
・:SOURce:TELecom:BRATe is <M2488>.

Example use To set the cable length of DSX to 450 feet:
> :SOURce:TELecom:DSX 450

:SOURce:TELecom:ERRor:PATTern<numeric>

Parameter <numeric> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 8	(B1)
1 to 384	(B2)
1 to 8	(HP-B3)
1 to 8	(LP-B3)
1 to 2	(BIP-2)
1 to 8	(MS-REI)
1 to 8	(HP-REI)

1 to 8 (LP-REI)

*1: The range of B2 depends on the bit rate.

For 2488M, 1 to 384

*2: The range of LP-REI changes in the following cases:

(a) :SOURce:TELecom:MAPPing:TYPE is <OFF>:

VC4_ASY, VC4_BLK, VC3_ASY, VC3_SYN, VC3_45MASY, VC3_BLK

1 to 8

(b) In other cases:

1 to 2

*3 If parameter is set outside the range, it becomes invalid because of error.

Function Sets the number of error insertion bits.

Restriction Invalid when;

・:SOURce:TELecom:ERRor:ERATe is other than <BURST>.

Example use To set the number of repeated error frames of a B1 error to 5:

> :SOURce:TELecom:ERRor:PATTern 5

:SOURce:TELecom:ERRor:PATTern?

Response <numeric> <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of error insertion bits.

Example use > :SOURce:TELecom:ERRor:PATTern ?

< 5

:SOURce:TELecom:ERRor:OHTYpe <otype>

Parameter <type> =<CHARACTER PROGRAM DATA>

A11,	A12,	A13,	A21,	A22,	A23,	J0,	X18,	X19,
X21,	X22,	X23,	E1, X24,	X25,	X26,	F1, X27,	X28,	X29,
D1, X31,	X32,	X33,	D2, X34,	X35,	X36,	D3, X37,	X38,	X39,
			X54,	X55,	X56,	X57	X58,	X59,
D4, X61,	X62,	X63,	D5, X64,	X65,	X66,	D6, X67,	X68,	X69,
D7, X71,	X72,	X73,	D8, X74,	X75,	X76,	D9, X77,	X78,	X79,
D10, X81,	X82,	X83,	D11, X84,	X85,	X86,	D12, X87,	X88,	X89,
S1, Z11,	Z12,	Z13,	Z21,	Z22,	M1, Z23,	E2, X97,	X98,	X99,

Function Sets the position of the SOH 1 byte for OH Change.

Restriction Invalid when;

・DISPlay:TMENu[:NAME] is other than <"MANual[:JOFF]">,

<"MANual:TCLayer">, <"MANual:TCEL1">, <"MANual:RCEL1">, and <"PSEQuence[:JOFF]">.

- :SOURce:TELecom:ERRor:TYPE is other than <OHCHG>.
- SOURce:TELecom:ERRor:OHCH <numeric> is 1, and <X21>, <X24>, <X27>, <X31>, <X34>, <X37>, <X54>, <X57>, <X61>, <X64>, <X67>, <X71>, <X74>, <X77>, <X81>, <X84>, <X87>, <Z11>, or <X97 is set.
- SOURce:TELecom:ERRor:OHCH <numeric> is 2 to 16, <E1>, <F1>, <D1>, <D2>, <D3>, <D4>, <D5>, <D6>, <D7>, <D8>, <D9>, <D10>, <D11>, <D12>, <S1>, or <E2> is set.
- <brate> is M2488, <numeric> is other than 3,<M1> is set.
- <brate> is M2488, <numeric> is 3, and <Z23> is set.

Example use To set A11 in the SOH 1 byte of OH change:
>:SOURce:TELecom:ERRor:OHTYpe A11

:SOURce:TELecom:ERRor:OHTYpe ?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries setting of the SOH 1 byte for OH change.

Example use >:SOURce:TELecom:ERRor:OHTYpe ?
<A11

:SOURce:TELecom:OHPReset:SOHPattern <brate>, <numeric>, <sohpoint>, <string>

Parameter <brate> = <CHARACTER PROGRAM DATA>

M9953	9953Mbit/s
M2488	2488Mbit/s
M622	622Mbit/s
M156	156Mbit/s
M52	52Mbit/s

<numeric> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 16 Step value : 1

<sohpoint> = <CHARACTER PROGRAM DATA>

A11,	A12,	A13,	A21,	A22,	A23,	J0,	X18,	X19,
X21,	X22,	X23,	E1, X24,	X25,	X26,	F1, X27,	X28,	X29,
D1, X31,	X32,	X33,	D2, X34,	X35,	X36,	D3, X37,	X38,	X39,
			k1, X54,	X55,	X56,	K2, X57	X58,	X59,
D4, X61,	X62,	X63,	D5, X64,	X65,	X66,	D6, X67,	X68,	X69,

D7, X71,	X72,	X73,	D8, X74,	X75,	X76,	D9, X77,	X78,	X79,
D10, X81,	X82,	X83,	D11, X84,	X85,	X86,	D12, X87,	X88,	X89,
S1, Z11,	Z12,	Z13,	Z21,	Z22,	M1, Z23,	E2, X97,	X98,	X99,

<string> = <STRING PROGRAM DATA>

"00000000" to "11111111" (Binary format)

Function: Sets the SOH preset data of TX signal.

<string> is represented by a binary number.

Restriction: Invalid when;

- The 2.5G/10G unit is not installed, and <M9953> is set.
- The 2.5G unit is not installed, and <M2488> is set.
- <numeric> is 1, and <X21>, <X24>, <X27>, <X31>, <X34>, <X37>, <X54>, <X57>, <X61>, <X64>, <X67>, <X71>, <X74>, <X77>, <X81>, <X84>, <X87>, <Z11>, or <X97> is set.
- <numeric> is 2 to 16, and <E1>, <F1>, <D1>, <D2>, <D3>, <D4>, <D5>, <D6>, <D7>, <D8>, <D9>, <D10>, <D11>, <D12>, <S1>, or <E2> is set.
- <brate> is M2488, and <numeric> is other than 3; <M1> is set.
- <brate> is M2488, and <numeric> is 3; <Z23> is set.
- :INSTrument:ATM is <ON>, and <X54>; <X57> is set.

Example use: To set the preset data of 2488M, CH#4, and SOH data as follows:

A11="AB"

> :SOURce:TELecom:OHPReset:SOHPattern M2488, 4, A11, "10101011"

:SOURce:TELecom:OHPReset:SOHPattern? <brate>, <numeric>, <sohpoint>

Parameter: <brate> = <CHARACTER PROGRAM DATA>

<numeric> = <DECIMAL NUMERIC PROGRAM DATA>

<sohpoint> = <CHARACTER PROGRAM DATA>

Response: <string> = <STRING RESPONSE DATA>

Function: Queries setting of the SOH preset data for TX signal.

<string> is represented by a binary number.

Example use: Example use: To query the preset data of 2488M, CH#4, and SOH A11:

> :SOURce:TELecom:OHPReset:SOHPattern? M2488, 4, A11

< "10101011"

:SOURce:TELecom:OHPReset:SSMessage <brate>, <string>

Parameter: <brate> = <CHARACTER PROGRAM DATA>

M9953	9953Mbit/s
M2488	2488Mbit/s

M622 622Mbit/s
M156 156Mbit/s
M52 52Mbit/s

<string> = <STRING PROGRAM DATA>

S1 (b5 to b8) can be set in plain-language format.

"Synchronized Traceability Unkown" (0000)
"Stratum 1 Traceble" (0001)
"Startum 2 Traceble" (0100)
"Startum 3 Traceble" (1010)
"SONET Minimun Clock Traceble" (1101)
"Don't USE for Synchroization" (1111)

*: Abbreviated formats are not provided for the above character strings.

Function Sets the S1 data of the SOH preset data for TX signal (plain-language format).

Restriction Invalid when;

・The 2.5G/10G unit is not installed, and <M9953> is set.

・The 2.5G unit is not installed, and <M2488> is set.

Example use To set the S1 preset data of 2488M to "Don't USE for Synchronization" in plain-language format:

> :SOURce:TELecom:OHPReset:SSMessage M2488, " Don't USE for Synchroization "

:SOURce:TELecom:OHPReset:SSMessage? <brate>

Parameter <brate> = <CHARACTER PROGRAM DATA>

Response <string> = <STRING RESPONSE DATA>

Function Queries the S1 data of plain-language format of the SOH preset data for TX signal.

Example use To query the S1 preset data of 2488M:

> :SOURce:TELecom:OHPReset:SSMessage? M2488

< "Don't USE for Synchroization"

:SOURce:TELecom:FMEMory:BRATe <brate>

Parameter <brate> = <CHARACTER PROGRAM DATA>

M9953 9953M
M2488 2488M

Function Sets a frame format of the frame memory.

Restriction Invalid when;
- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.
- The bit rate that corresponds to the setting is not set.

Example use To set the frame format to 9953M.
> :SOURce:TELecom:FMEMory:BRATe M9953

:SOURce:TELecom:FMEMory:BRATe?

Response <brate> = <CHARACTER RESPONSE DATA>

Function Queries the frame format set by the frame memory.

Example use To query the frame format set by the frame memory.
> :SOURce:TELecom:FMEMory:BRATe?
< M9953

:SOURce:TELecom:FMEMory:B3ADdition <mode>

Parameter <mode> = <BOOLEAN PROGRAM DATA>

OFF or 0	Automatic B3 addition: OFF
ON or 1	Automatic B3 addition: ON

Function Sets whether to add B3 automatically.

Restriction Invalid when;
- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.

* When <trace> of :SOURce:TELecom:OHPReset:PTCondition is set to ON, this command can not be set to OFF.

Example use To add B3 automatically.
> :SOURce:TELecom:FMEMory:B3ADdition ON

:SOURce:TELecom:FMEMory:B3ADdition?

Response <mode> = <NR1 NUMERIC RESPONSE DATA>

0	Automatic B3 addition: OFF
1	Automatic B3 addition: ON

Function Query the state of the automatic B3 addition.

Example use To query the state of the automatic B3 addition.
> :SOURce:TELecom:FMEMory:B3ADdition?
< 1

:SOURce:TELecom:FMEMory:POINter <pointer>

Parameter <pointer> = <CHARACTER PROGRAM DATA>

0

522

Function Sets the pointer value of a frame.

Restriction Invalid when;

- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.

Example use To set the point value of the frame to “0”.

> :SOURce:TELecom:FMEMory:POINter 0

:SOURce:TELecom:FMEMory:POINter?

Response <pointer> = <CHARACTER RESPONSE DATA>

Function Queries the set value of the frame pointer.

Example use To query the set value of the frame pointer.

> :SOURce:TELecom:FMEMory:POINter?

< 0

:SOURce:TELecom:FMEMory:FRAMe <frame>

Parameter <frame> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 26 (When the 2.5G/10G unit is installed.)

1 to 64 (When the 2.5G unit is installed.) Step value: 1

Function Sets frame No. to edit.

Restriction Invalid when;

- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.

Example use To edit frame No.7.

> :SOURce:TELecom:FMEMory:FRAMe 7

:SOURce:TELecom:FMEMory:FRAMe?

Response <frame> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the set value of a frame to be edited.

Example use To query the set value of a frame to be edited.

> :SOURce:TELecom:FMEMory:FRAMe?

< 7

:SOURce:TELecom:FMEMory:PATTern <row>, <column>, <string>

Parameter <row> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 9 Line number Step value: 1

<column> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 4303 When the bit rate is 2448M

1 to 17263 When the bit rate is 9953M Row number Step value: 1

<string> = <STRING PROGRAM DATA>

"00" to "FF" (HEX format) * Up to 18 bytes can be set.

Function Sets a frame data.

Restriction Invalid when;

- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.

Example use To set the frame data from the third line of seven column to the third line of eleven column to "AB, BC, CD, DE, EF".

> :SOURce:TELecom:FMEMory:PATTern 3, 7,"AB, BC, CD, DE, EF"

:SOURce:TELecom:FMEMory:PATTern? <row1>,<column1>, <row2>, <column2>

Parameter <row1>, <row2> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 9 line number Step value: 1

<column1>, <column2> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 4303 When the bit rate is 2448M

1 to 17263 When the bit rate is 9953M Row number Step value: 1

Response <string> = <STRING RESPONSE DATA>

Function Queries the frame data.

Example use To query the frame data from the third line of seven column to the third line of eleven column.

> :SOURce:TELecom:FMEMory:PATTern 3, 7, 3, 11

< "AB, BC, CD, DE, EF"

:SOURce:TELecom:FMEMory:RECall <mode>

Parameter <mode> = <CHARACTER PROGRAM DATA>

DEFault	Default
OHPRESET	OH preset
ALL1	Payload all1
ALL0	Payload all0
CAPTURED	Captured

Function Initializes the setting of the frame memory.

Default	Sets the default values.
OH preset	Copies the overheads set on the Setup : OH preset screen.
Payload all0/1	Set all payloads to “0” or “1”.

Restriction Invalid when;

- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.
- No data exists; and <CAPTURED> is selected.

Example use To set all payloads to “0”.

> :SOURce:TELecom:FMEMory:RECall ALL0

:SOURce:TELecom:FMEMory:RECall?

Response <mode> = <CHARACTER RESPONSE DATA>

Function Queries the initialization type of the frame memory.

Example use To query the initialization type of the frame memory.

> :SOURce:TELecom:FMEMory:RECall?

< ALL0

:SOURce:TELecom:FMEMory:PRINt <from>,<to>

Parameter <from> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 17280 Step value: 1

<to> = <DECIMAL NUMERIC PROGRAM DATA>

“Value set by <from>” to 17280 Step value: 1

Function Set a printing range.

Restriction Invalid when;

- Both the option 13 of MP1570A and the option 01 Frame memory/capture of the unit are not installed.
- The value of <from> is higher than that of <to>.

* Upper limit depends on the bit rate.

9953M: 270 * 64

2488M: 270 * 16

Example use To print line 7.

> :SOURce:TELecom:FMEMory:PRINt 7,7

:SOURce:TELecom:FMEMory:PRINt?

Response <from> = <NR1 NUMERIC RESPONSE DATA>

<to> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the printing range.

Example use > :SOURce:TELecom:FMEMory:PRINt?

< 7,7

:SOURce:FMEMory:SEQuence:A:FRAMe <frame>

Parameter <frame> = <DECIMAL NUMERIC PROGRAM DATA>

Transmission frame number: 1 to 26 Step value: 1

Function Sets the transmission frame number of the frame memory A pattern.

Restriction Invalid when;

・:DISPlay:TMENu[:NAME] is set to other than <"FMEMory”>.

Example use To set the transmission frame number of the frame memory A pattern to “2”.

> :SOURce:FMEMory:SEQuence:A:FRAMe 2

:SOURce:FMEMory:SEQuence:A:FRAMe?

Response <frame> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the transmission frames number of the frame memory A pattern.

Example use To query the transmission frame number of the frame memory A pattern.

> :SOURce:FMEMory:SEQuence:A:FRAMe?

< 2

:SOURce:FMEMory:SEQuence:A:TIME <times>

Parameter <times> = <DECIMAL NUMERIC PROGRAM DATA>

Transmission number: 1 to 8000 Step value: 1

Function Sets the transmission times of the frame memory A pattern.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory”>.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.

Example use To set the transmission times of the frame memory A pattern to “50”.

> :SOURce:FMEMory:SEQuence:A:TIME 50

:SOURce:FMEMory:SEQuence:A:TIME?

Response <times> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the transmission times of the frame memory A pattern.

Example use To query the transmission times of the frame memory A pattern.

> :SOURce:FMEMory:SEQuence:A:TIME?

< 50

:SOURce:FMEMory:SEQuence:B:FRAMe <frame>

Parameter <frame> = <DECIMAL NUMERIC PROGRAM DATA>

Transmission frame number: 0 to 25 Step value: 1

Function Sets the transmission frame number of the frame memory B pattern.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.

* The maximum number is below.

26 – A A: the transmission frame number of A pattern.

Example use Sets the transmission frame number of the frame memory B pattern to "2".

> :SOURce:FMEMory:SEQuence:B:FRAMe 2

:SOURce:FMEMory:SEQuence:B:FRAMe?

Response <frame> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the transmission frames number of the frame memory B pattern.

Example use To query the transmission frame number of the frame memory B pattern.

> :SOURce:FMEMory:SEQuence:B:FRAMe?

< 2

:SOURce:FMEMory:SEQuence:B:TIME <times>

Parameter <times> = <DECIMAL NUMERIC PROGRAM DATA>

Transmission number: 1 to 8000 Step value: 1

Function Sets the transmission times of the frame memory B pattern.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.

- <0> is set by :SOURce:FMEMory:SEQuence:B:FRAMe.

Example use To set the transmission times of the frame memory B pattern to “50”.

> :SOURce:FMEMory:SEQuence:B:TIME 50

:SOURce:FMEMory:SEQuence:B:TIME?

Response <times> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the transmission times of the frame memory B pattern.

Example use To query the transmission times of the frame memory B pattern.

> :SOURce:FMEMory:SEQuence:B:TIME?

< 50

:SOURce:FMEMory:ALARm:TYPE <atype>

Parameter <atype> = <CHARACTER PROGRAM DATA>

(SDH)

OFF	OFF
LOS	LOS
LOF	LOF
MAIS	MS-AIS
MRDI	MS-RDI

(SONET)

OFF	OFF
LOS	LOS
LOF	LOF
AISL	AIS-L
RDIL	RDI-L

Function Sets the alarm type inserted into a transmission signal.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory”>.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- A concatenation mapping route is not selecte.

Example use To insert MS-AIS into the transmission signal.

> :SOURce:FMEMory:ALARm:TYPE MAIS

:SOURce:FMEMory:ALARm:TYPE?

Response <atype> = <CHARACTER RESPONSE DATA>

Function Queries the alarm type inserted into the transmission signal.

Example use To query the alarm type inserted into the transmission signal.

> :SOURce:FMEMory:ALARm:TYPE?

< MAIS

:SOURce:FMEMory:ALARm:TIMing:TYPE <type>

Parameter <type> = <CHARACTER PROGRAM DATA>

BURST
ALTERNATE
ALL

Function Sets the alarm addition timing.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ALARm:TYPE is set to <OFF>.
- SOURce:FMEMory:ALARm:TYPE is set to <LOS>; and "BURST" or "ALTERNATE" is set.

Example use To set the alarm addition timing to "BURST".

> :SOURce:FMEMory:ALARm:TIMing:TYPE BURST

:SOURce:FMEMory:ALARm:TIMing:TYPE?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries the alarm addition timing.

Example use To query the alarm addition timing.

> :SOURce:FMEMory:ALARm:TIMing:TYPE?

< BURST

:SOURce:FMEMory:ALARm:TIMing:ALARm <error>

Parameter <error> = <DECIMAL NUMERIC PROGRAM DATA>

0 to 8000 Step value: 1

Function Set the number of alarm addition frames when Alternate is set.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ALARm:TYPE is set to <OFF>.
- :SOURce:FMEMory:ALARm:TIMing:TYPE is set to other than <ALTERNATE>.

Example use To set the number of alarm addition frames to "3000".

> :SOURce:FMEMory:ALARm:TIMing:ALARm 3000

:SOURce:FMEMory:ALARm:TIMing:ALARm?

Response <error> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of alarm addition frames when Alternate is set.

Example use To query the number of alarm addition frames when Alternate is set.

> :SOURce:FMEMory:ALARm:TIMing:ALARm?

< 3000

:SOURce:FMEMory:ALARm:TIMing:NORMal <normal>

Parameter <normal> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 8000 Step value: 1

Function Set the number of normal frames when Alternate is set.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ALARm:TYPE is set to <OFF>.
- :SOURce:FMEMory:ALARm:TIMing:TYPE is set to other than <ALTERNATE>.

Example use To set the number of normal frames to “1700”.

> :SOURce:FMEMory:ALARm:TIMing:NORMal 1700

:SOURce:FMEMory:ALARm:TIMing:NORMal?

Response <normal> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of normal frames when Alternate is set.

Example use To query the number of normal frames when Alternate is set.

> :SOURce:FMEMory:ALARm:TIMing:NORMal?

< 1700

:SOURce:FMEMory:ALARm:TIMing:BURSt <timing>, <unit>

Parameter <timing> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 8000 when the unit is frame Step value: 1

1 to 1000000 when the unit is us Step value: 125

<unit> = <CHARACTER PROGRAM DATA>

FRAME frame

US μs

Function Sets the alarm insertion timing and the unit.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ALARm:TYPE is set to <OFF>.
- :SOURce:FMEMory:ALARm:TIMing:TYPE is set to other than <BURST>.

Example use To the alarm insertion timing to “5000 frame”.

> :SOURce:FMEMory:ALARm:TIMing:BURSt 5000, FRAME

:SOURce:FMEMory:ALARm:TIMing:BURSt?

Response <timing> = <NR1 NUMERIC RESPONSE DATA>

<unit> = <CHARACTER RESPONSE DATA>

Function Queries the alarm insertion timing and the unit.

Example use To query the alarm insertion timing and the unit.

> :SOURce:FMEMory:ALARm:TIMing:BURSt?

< 5000, FRAME

:SOURce:FMEMory:ERRor:TYPE <etype>

Parameter <etype> = <CHARACTER PROGRAM DATA>

(SDH)

OFF	OFF
B1	B1
B2	B2
HB3	HP-B3
MREI	MS-REI
HREI	HP-REI
FAS	FAS
BALL	Bit all

(SONET)

OFF	OFF
B1	B1
B2	B2
HB3	HP-B3
REIL	REI-L
REIP	REI-P
FAS	FAS

	BALL	Bit all

Function Set an error inserted into a transmission signal.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.

Example use To insert B1 into the transmission signal

> :SOURce:FMEMory:ERRor:TYPE B1

:SOURce:FMEMory:ERRor:TYPE?

Response <etype> = <CHARACTER RESPONSE DATA>

Function Queries the error inserted into the transmission signal.

Example use To query the error inserted into the transmission signal.

> :SOURce:FMEMory:ERRor:TYPE?

< B1

:SOURce:FMEMory:ERRor:TIMing:TYPE <timing>

Parameter <timing> = <CHARACTER PROGRAM DATA>

ONCE	Single error
R1E_3	1E-3
R1E_4	1E-4
R1E_5	1E-5
R1E_6	1E-6
R1E_7	1E-7
R1E_8	1E-8
R1E_9	1E-9
ALL	All
BURST	Burs
R5E_3	5E-3
R5E_4	5E-4
R5E_5	5E-5
R5E_6	5E-6
R5E_7	5E-7
R5E_8	5E-8
R5E_9	5E-9
ALTERNATE	Alternate
PROGRATE	Programable rate

Function Sets the error addition timing.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.

- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ERRor:TYPE is set to <OFF>.
- The timing that does not correspond to the error to be inserted is selected.

Example use To set the error addition timing to “All”.

> :SOURce:FMEMory:ERRor:TIMing:TYPE ALL

:SOURce:FMEMory:ERRor:TIMing:TYPE?

Response <timing> = <CHARACTER RESPONSE DATA>

Function Queries the error addition timing.

Example use To query the error addition timing.

> :SOURce:FMEMory:ERRor:TIMing:TYPE?

< ALL

:SOURce:FMEMory:ERRor:TIMing:ERRor <error>

Parameter <error> = <DECIMAL NUMERIC PROGRAM DATA>

0 to 8000 Step value: 1

Function Set the number of error addition frames when Alternate is set.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory”>.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>.
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ERRor:TIMing:TYPE is set to other than <ALTERNATE>.

Example use To set the number of error addition frames to “3000” when Alternate is set.

> :SOURce:FMEMory:ERRor:TIMing:ERRor 3000

:SOURce:FMEMory:ERRor:TIMing:ERRor?

Response <error> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of error addition frames when Alternate is set.

Example use To query the number of error addition frames when Alternate is set.

> :SOURce:FMEMory:ERRor:TIMing:ERRor?

< 3000

:SOURce:FMEMory:ERRor:TIMing:PROGrate <error>

Parameter <error> = <STRING PROGRAM DATA>

"1.0E-2" to "9.9E-10"

Mantissa portion 1.0 to 9.9 Step value: 0.1

Exponent portion 1 to 10 Step value: 1

"1.0E-2" can also be "1E-2".

Function Sets the addition value for the Programmable rate error.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ERRor:TIMing:TYPE is set to other than <PROGRATE>.

Example use To set the addition value for the Prog.rate error addition to 1.0E-5.

> :SOURce:FMEMory:ERRor:TIMing:PROGrate "1.0E-5"

:SOURce:FMEMory:ERRor:TIMing:PROGrate?

Response <error> = <STRING RESPONSE DATA>

Function Queries the addition value for the Prog.rate error addition

Example use To query the addition value for the Prog.rate error addition .

> :SOURce:FMEMory:ERRor:TIMing:PROGrate?

< "1.0E-5"

:SOURce:FMEMory:ERRor:TIMing:NORMal <normal>

Parameter <normal> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 8000 Step value: 1

Function Sets the number of normal frames at Alternate.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.。
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ERRor:TIMing:TYPE is set to other than <ALTERNATE>.

Example use To set the number of normal frames to "1700".

> :SOURce:FMEMory:ERRor:TIMing:NORMal 1700

:SOURce:FMEMory:ERRor:TIMing:NORMal?

Response <normal> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of normal frames at Alternate.

Example use To query the number of normal frames at Alternate.

> :SOURce:FMEMory:ERRor:TIMing:NORMal?

< 1700

:SOURce:FMEMory:ERRor:TIMing:BURSt:BIT <bit>

Parameter <bit> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 64000 Step value: 1

Function Sets the number of error insertion bits.

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"FMEMory">.
- :SOURce:TELecom:MAPPing:TYPE is set to <mtype>
- Concatenation mapping route is not selected.
- :SOURce:FMEMory:ERRor:TIMing:TYPE is set to other than <BURST>.

Example use To set the number of error insertion bits to 1000.

> :SOURce:FMEMory:ERRor:TIMing:BURSt:BIT 1000

:SOURce:FMEMory:ERRor:TIMing:BURSt:BIT?

Response <bit> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the number of error insertion bits.

Example use To query the number of error insertion bits.

> :SOURce:FMEMory:ERRor:TIMing:BURSt:BIT?

< 1000

6.2.2 SENSe subsystem

The SENSe subsystem sets the receiver and measurement conditions.

Function	Command	Parameter
Page 6-35		
Sets the bit rate for receive signals.	:SENSe:TELecom:BRATe	brate
Queries the code speed of RX signal.	:SENSe:TELecom:BRATe?	
Page 6-35		
Sets the mapping route for RX signal.	:SENSe:TELecom:MAPPing:TYPE	mtype
Queries the mapping route of RX signal.	:SENSe:TELecom:MAPPing:TYPE ?	
Page 6-36		
Sets whether to check CRC for 2M.	:SENSe:TELecom:M2:CRC	boolean
Queries whether to check CRC for 2M.	:SENSe:TELecom:M2:CRC?	
Sets the signaling multi-frame.	:SENSe:TELecom:M2:SIGNaling	boolean
Queries the signaling multi-frame setting.	:SENSe:TELecom:M2:SIGNaling?	
Sets the maximum number of channels for the 2M signal.	:SENSe:TELecom:M2:MCHannel	numeric
Queries the maximum number of channels for the 2M signal.	:SENSe:TELecom:M2:MCHannel?	
Page 6-39		
Sets the 1.5M signal frame.	:SENSe:TELecom:M1_5:FRAMed	frame
Queries the 1.5M signal frame.	:SENSe:TELecom:M1_5:FRAMed?	
Page 6-40		
Sets the 45M signal frame.	:SENSe:TELecom:M45:FRAMed	frame
Queries the 45M signal frame.	:SENSe:TELecom:M45:FRAMed?	
Page 6-40		
Sets the Monitor input operation of the 2.5G unit.	:SENSe:TELecom:M2488:MPOInt	boolean
Queries the Monitor input operation of the 2.5G unit.	:SENSe:TELecom:M2488:MPOInt?	
Sets the bandwidth of the 2.5G unit.	:SENSe:TELecom:M2488:BWIDth	type
Queries the bandwidth of the 2.5G unit.	:SENSe:TELecom:M2488:BWIDth?	
Page 6-41		
Setting of CLOCK/DATA phase adjustment	:SENSe:TELecom:PHASe	time
Querying of phase adjustment value (ps)	:SENSe:TELecom:PHASe?	
Setting of 2.5G/10G unit bandwidth	:SENSe:TELecom:M9953:BWIDth	type
Querying of 2.5G/10G unit bandwidth	:SENSe:TELecom:M9953:BWIDth?	

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Sets the input signal level.	:SENSe:TELecom:IMODe	imode
Queries the input signal level.	:SENSe:TELecom:IMODe?	

Page 6-43

Sets the cable length of DSX for RX signal.	:SENSe:TELecom:DSX	dsx
Queries the cable length of DSX for RX signal.	:SENSe:TELecom:DSX?	

Page 6-43

Starts frame capture.	:SENSe:FRAMecapture:STARt	

Page 6-44

Stops frame capture.	:SENSe:FRAMecapture:STOP	

Page 6-44

Queries the status of Frame capture.	:SENSe:FRAMecapture:STATe?	

Page 6-44

Sets the trigger item for frame capture.	:SENSe:FRAMecapture:TRIGger:TYPE	type position
Queries the setting of Trigger item for Frame capture.	:SENSe:FRAMecapture:TRIGger:TYPE?	
Sets the trigger pattern of Frame capture.	:SENSe:FRAMecapture:TRIGger:PATTern	pattern
Queries the trigger pattern of Frame capture.	:SENSe:FRAMecapture:TRIGger:PATTern?	
Sets the trigger pattern to mask of Frame capture.	:SENSe:FRAMecapture:TRIGger:MASK	mask
Queries the trigger pattern to mask of Frame capture.	:SENSe:FRAMecapture:TRIGger:MASK?	

:SENSe:TELecom:BRATe <brate>

Parameter <brate> = <CHARACTER PROGRAM DATA>

M9953	9953Mbit/s	
M2488	2488Mbit/s	
M622	622Mbit/s	
M156	156Mbit/s	
M156CMI	156Mbit/s	CMI
52M	52Mbit/s	
M52B3ZS	52Mbit/s	B3ZS
M139	139Mbit/s	
M45	45Mbit/s	
M34	34Mbit/s	
M8	8Mbit/s	
M2	2Mbit/s	
M1_5	1.5Mbit/s	

Function Sets the bit rate for receive signals.

Restriction Invalid when;

- 9953M is selected: and the 2.5G/10G unit is not installed.
- 2488M is selected: and the 2.5G unit is not installed or the 2.5G option is not installed.

Example use To set the code speed of RX signal to 2488 Mbit/s:

> :SENSe:TELecom:BRATe M2488

:SENSe:TELecom:BRATe?

Response <brate> = <CHARACTER RESPONSE DATA>

Function Queries the code speed of RX signal.

Example use > :SENSe:TELecom:BRATe?

< M2488

:SENSe:TELecom:MAPPing:TYPE <mtype>

Parameter <mtype> = <CHARACTER PROGRAM DATA>

VC4_ASY	139M(Async.)
VC4_BLK	VC4(Bulk)
VC3_ASY	34M(Async.)
VC3_SYN	34M(Sync.)
VC3_45MASY	45M(Async.)

VC3_BLK VC3(Bulk)
VC2_6MASY 6M(Async.)
VC2_6MBIT 6M(Bitsync.)
VC2_BLK VC2(Bulk)
VC12_ASY 2M(Async.)
VC12_BIF 2M(Bitsync.F)
VC12_BIL 2M(Bitsync.L)
VC12_BYF 2M(Bytesync.F)
VC12_BYL 2M(Bytesync.L)
VC12_BLK VC12(Bulk)
VC11_ASY 1.5M(Async.)
VC11_BIF 1.5M(Bitsync.F)
VC11_BIL 1.5M(Bitsync.L)
VC11_BYF 1.5M(Bytesync.F)
VC11_BYL 1.5M(Bytesync.L)
VC11_BLK VC11(Bulk)
VC11_384D* 384k(Data)
VC11_384V* 384k(Voice)

*: Becomes valid when the options are installed.

Function Sets the mapping route for RX signal.

Restriction Some mapping is invalid depending on the type of inserted unit.
See Paragraph 1.5 "Mapping Route Measurable When Installing the 2.5G Unit" and 1.6 "Mapping Route Measurable When Installing the 2.5G/10G Unit" in this manual.

Example use To set the mapping route of RX signal to 139M (Async.):
> :SENSe:TELecom:MAPPing:TYPE VC4_ASY

:SENSe:TELecom:MAPPing:TYPE ?

Response <mtype> = <CHARACTER RESPONSE DATA>

Function Queries the mapping route of RX signal.

Example use > :SENSe:TELecom:MAPPing:TYPE ?
< VC4_ASY

:SENSe:TELecom:M2:CRC <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>
OFF or 0 CRC is not checked.

ON or 1 CRC is checked.

Function Sets whether to check CRC for 2M.

Restriction Invalid when;

・The 2/8/34/139/156M (CMI) unit is not installed.

・SENSe:TELecom:BRATe is <M2488>,
and :SENSe:TELecom:MAPPing:TYPE is <VC4_BLK>, <VC3_45MASY>, <VC3_BLK>, <VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>, <VC11_BYL>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.

・:SENSe:TELecom:BRATe is
<M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC3_45MASY>, and the 45M-2M option is not installed.

・:SENSe:TELecom:BRATe is
<M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC4_ASY>, <VC3_ASY>, <VC3_SYN>, and :SOURce:TELecom:DEMUX:MRATe is <OFF>, <M34>, or <M8>.

・:SENSe:TELecom:BRATe is
<M2488>, :SENSe:TELecom:MAPPing:TYPE<VC3_45MASY>, and the 45M-2M option is not installed.

・:SENSe:TELecom:FRAMing is <OFF>, and <ON> is set.

Example use To turn on the CRC check:

> :SENSe:TELecom:M2:CRC ON

:SENSe:TELecom:M2:CRC?

Response <boolean> = <NR1 NUMERIC RESPONSE DATA>

Function Queries whether to check CRC for 2M.

Example use > :SENSe:TELecom:M2:CRC?

< 1

:SENSe:TELecom:M2:SIGNaling <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>

OFF or 0 The signaling multiframe is turned off.

ON or 1 The signaling multiframe is turned on.

Function Sets the signaling multiframe.

Restriction Invalid when;

・The 2/8/34/139/156M (CMI) unit is not installed.

・:SENSe:TELecom:BRATe is <M2488>,
and :SENSe:TELecom:MAPPing:TYPE is <VC4_BLK>,
<VC3_45MASY>, <VC3_BLK>, <VC2_BLK>, <VC12_BLK>,
<VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>,
<VC11_BYL>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.
・:SENSe:TELecom:BRATe is
<M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC3_45MASY>,
and the 45M-2M option is not installed.
・:SENSe:TELecom:BRATe is
<M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC4_ASY>,
<VC3_ASY>, <VC3_SYN>, and :SENSe:TELecom:DEMUX:MRATe
is <OFF>, <M34>, or <M8>.
・:SENSe:TELecom:M2:MCHannel is <31>, and <ON> is set.
・:SENSe:TELecom:FRAMing is <OFF>, and <ON> is set.

Example use To turn on the signaling multiframe setting:
> :SENSe:TELecom:M2:SIGNaling ON

:SENSe:TELecom:M2:SIGNaling?

Response <boolean> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the signaling multiframe setting.

Example use > :SENSe:TELecom:M2:SIGNaling?
< 1

:SENSe:TELecom:M2:MCHannel <numeric>

Parameter <numeric> = <CHARACTER PROGRAM DATA>

30	30 channel
31	31 channel

Function Sets the maximum number of channels for the 2M signal.

Restriction Invalid when;
・The 2/8/34/139/156M (CMI) unit is not installed.
・:SENSe:TELecom:BRATe is <M2488>,
and :SENSe:TELecom:MAPPing:TYPE is <VC4_BLK>,
<VC3_45MASY>, <VC3_BLK>, <VC2_BLK>, <VC12_BLK>,
<VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>,
<VC11_BYL>, <VC11_BLK>, <VC11_384D>, or <VC11_384V>.
・:SENSe:TELecom:BRATe is

<M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC3_45MASY>, and the 45M-2M option is not installed.

・:SENSe:TELecom:BRATe is <M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC4_ASY>, <VC3_ASY>, <VC3_SYN>, and :SENSe:TELecom:DEMUX:MRATe is <OFF>, <M34>, or <M8>.

Example use To set the maximum number of channels to 30:

> :SENSe:TELecom:M2:MCHannel 30

:SENSe:TELecom:M2:MCHannel?

Response <numeric> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the maximum number of channels for the 2M signal.

Example use > :SENSe:TELecom:M2:MCHannel?

< 30

:SENSe:TELecom:M1_5:FRAMed <frame>

Parameter <frame> = <CHARACTER PROGRAM DATA>

D4

ESF

Function Sets the 1.5M signal frame.

Restriction Invalid when;

・The 1.5/45/52M unit is not installed.

・:SENSe:TELecom:BRATe is <M2488>, and :SENSe:TELecom:MAPPing:TYPE is <VC4_ASY>, <VC4_BLK>, <VC3_ASY>, <VC3_SYN>, <VC3_BLK>, <VC2_BLK>, <VC12_ASY>, <VC12_BIF>, <VC12_BIL>, <VC12_BYF>, <VC12_BYL>, <VC12_BLK>, <VC11_384D>, or <VC11_384V>.

・:SENSe:TELecom:BRATe is <M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC3_45MASY>, and :SENSe:TELecom:DEMUX:MRATe is <OFF>.

・:SENSe:TELecom:BRATe is <M2488>, :SENSe:TELecom:MAPPing:TYPE is <VC3_45MASY>, :SENSe:TELecom:DEMUX:MRATe is <M2>, and the 45M-2M option is not installed.

Example use To set the 1.5M frame to D4:

> :SENSe:TELecom:M1_5:FRAMed D4

:SENSe:TELecom:M1_5:FRAMed?

Response <frame> = <CHARACTER RESPONSE DATA>

Function Queries the 1.5M signal frame.

Example use > :SENSe:TELecom:M1_5:FRAMed?

< D4

:SENSe:TELecom:M45:FRAMed <frame>

Parameter <frame> = <CHARACTER PROGRAM DATA>

M13

CBIT

Function Sets the 45M signal frame.

Restriction Invalid when;

・The 1.5/45/52M unit is not installed.

・:SENSe:TELecom:BRATe is <M2488>, and :SENSe:TELecom:MAPPing:TYPE is other than <VC3_45MASY>.

Example use To set the 45M signal frame to M13:

> :SENSe:TELecom:M45:FRAMed M13

:SENSe:TELecom:M45:FRAMed?

Response <frame> = <CHARACTER RESPONSE DATA>

Function Queries the 45M signal frame.

Example use > :SENSe:TELecom:M45:FRAMed?

< M13

:SENSe:TELecom:M2488:MPOInt <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>

OFF or 0

ON or 1

Function Sets the Monitor input operation of the 2.5G unit.

Restriction Invalid when;

・:ROUTe:STM16:INPut is <OPTical>.

・:SENSe:TELecom:BRATe is other than <M2488>.

Example use To set the Monitor input operation of the 2.5G unit.

> :SENSe:TELecom:M2488:MPOInt ON

:SENSe:TELecom:M2488:MPOInt?

Response <boolean> = <NRI NUMERIC RESPONSE DATA>
0
1

Function Queries the Monitor input operation of the 2.5G unit.

Example use > :SENSe:TELecom:M2488:MPOInt?
< 1

:SENSe:TELecom:M2488:BWIDth <type>

Parameter <type> = <CHARACTER PROGRAM DATA>
NARRow
WIDE

Function Sets the bandwidth of the 2.5G unit.

Restriction Invalid when;
・:ROUTe:STM16:INPut is <ELECtrical>,
and :SENSe:TELecom:M2488:MPOInt is <OFF>.
・:SENSe:TELecom:BRATe is other than <M2488>.

Example use To set the bandwidth of the 2.5G unit to Wide.
> :SENSe:TELecom:M2488:BWIDth WIDE

:SENSe:TELecom:M2488:BWIDth?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries the bandwidth of the 2.5G unit.

Example use > :SENSe:TELecom:M2488:BWIDth?
< WIDE

:SENSe:TELecom:PHASe <time>

Parameter <time> = <NON DECIMAL NUMERIC PROGRAM DATA >
–30 to +30 step2

Function Sets CLOCK/DATA phase adjustment in O/E for signal input.

Restriction Invalid when,
・ MU150017A,MU1500017B unit is not installed, and invalid.
・ <ATM> or <JITTER> is set for :INSTrument:CONFig.
・ :SOURce:TELecom:BRATe is other than <M9553>
・ :ROUTe:STM64:INPut or :ROUTe:STS192:INPut are <ELECtrical>.

Example of use To set phase adjustment to 0ps

> :SENSe:TELecom:PAHSe 0

:SENSe:TELecom:PHASe?

Response <time> = <NON DECIMAL RESPONSE DATA>
–30 to +30 step2

Function Queries phase adjustment value (ps).

Example of use To query phase adjustment value
> :SENSe:TELecom:PHASe?
< +30

:SENSe:TELecom:M9953:BWIDth <type>

Parameter <type> = <CHARACTER PROGRAM DATA>
NARRow
WIDE

Function Sets 2.5G/10G unit (optical Rx unit when MU150000A is installed (MU150002A, MU1500017A,B, MU150022A and B) bandwidth.

Restriction Invalid when,
- :SENSE:TELecom:BRATe is other than <M9953> and <M2488>.
- <NARRow> is set when MU150017A and B are installed and :SENSe:TELecom:BRATe is <M9953> or <M2488>.
- <WIDE> is set when MU150022A and B are installed and :SENSe:TELecom:BRATe is <M9953> or <M2488>.
- When :SENSe:TELecom:BRATe is <M2488> then :SENSe:TELecom:M2488:BWIDth is the same.

Example of use To set bandwidth to WIDE
> :SENSe:TELecom:M9953:BWIDth WIDE

:SENSe:TELecom:M9953:BWIDth?

Response <type> = <CHARACTER RESPONSE DATA>
NARR
WIDE

Function Queries 2.5G/10G unit bandwidth.

Example of use > :SENSe:TELecom:M9953:BWIDth?
< WIDE

:SENSe:TELecom:IMODe <imode>

Parameter	<imode> = <CHARACTER PROGRAM DATA>	
	TERMinal	Monitor mode OFF
	MONitoring	Monitor mode ON
Function	Sets the input signal level.	
Restriction	Invalid when;	
	・:SENSe:TELecom:BRATe is <M2488>.	
Example use	To set the input signal level Monitor mode to OFF:	
	> :SENSe:TELecom:IMODe TERMinal	

:SENSe:TELecom:IMODe?

Response	<imode> = <CHARACTER RESPONSE DATA>
Function	Queries the input signal level.
Example use	> :SENSe:TELecom:IMODe?
	< TERM

:SENSe:TELecom:DSX <dsx>

Parameter	<dsx> = <CHARACTER PROGRAM DATA>	
	0	0ft
	450	450ft
	655	655ft
	900	900ft
Function	Sets the cable length of DSX for RX signal.	
Restriction	Invalid when;	
	・The 1.5/45/52M unit is not installed.	
	・:SENSe:TELecom:BRATe is <M2488>.	
Example use	To set the cable length of DSX to 450 feet:	
	> :SENSe:TELecom:DSX 450	

:SENSe:TELecom:DSX?

Response	<dsx> = <CHARACTER RESPONCE DATA>
Function	Queries the cable length of DSX for RX signal.
Example use	> :SENSe:TELecom:DSX?
	< 450

:SENSe:FRAMecapture:STARt

Parameter	None

Function Starts frame capture.

Example use To start the frame capture.

> :SENSe:FRAMecapture:STARt

:SENSe:FRAMecapture:STOP

Parameter None

Function Stops frame capture.

Example use To stop frame capture.

> :SENSe:FRAMecapture:STOP

:SENSe:FRAMecapture:STATe?

Response <numeric> = <NR1 NUMERIC RESPONSE DATA>

0 indicates that the Manual Trigger is not inserted.

1 indicates that the Manual Trigger is being inserted.

Function Queries the status of Frame capture.

Example use > :SENSe:FRAMecapture:STATe?

< 0

:SENSe:FRAMecapture:TRIGger:TYPE <type>,<position>

Parameter <type> = <STRING PROGRAM DATA>

(SDH)

"B1"	B1
"B2"	B2
"HB3"	HP-B3
"LB3"	LP-B3
"MREI"	MS-REI
"HREI"	HP-REI
"LOS"	LOS
"LOF"	LOF
"OOF"	OOF
"MAIS"	MS-AIS
"MRDI"	MS-RDI
"AAIS"	AU-AIS
"ALOP"	AU-LOP
"HRDI"	HP-RDI
"HSLM"	HP-SLM
"HTIM"	HP-TIM
"HUNEQ"	HP-UNEQ
"K12MAtch"	K1/K2 match
"K12MIsmatch"	K1/K2 mismatch

"ANDF”	AU-NDF
"APPJC”	AU+PJC
"AMPJC”	AU-PJC
"A3CONS”	AU 3 cons
"EXTernal"	External
"MANual"	MANual

(SONET)

"B1"	B1
"B2"	B2
"HB3"	HP-B3
"LB3"	LP-B3
"REIL"	REI-L
"REIP"	REI-P
"LOS"	LOS
"LOF"	LOF
"OOF"	OOF
"AISL"	AIS-L
"RDIL"	RDI-L
RDI-L	AIS-P
"LOPP"	LOP-P
"RDIP"	RDI-P
"SLMP"	SLM-P
"TIMP"	TIM-P
"UNEQP"	UNEQ-P
"K12MAtch"	K1/K2 match
"K12MIsmatch"	K1/K2 mismatch
"ANDF”	STS-NDF
"APPJC”	STS+PJC
"AMPJC”	STS 3 cons
"EXTernal”	EXTernal
"MANual"	MANual

<position> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 64 Step value: 1

Function Sets the trigger item for frame capture.

Example use To set Trigger to LOF20:

> :SENSe:FRAMecapture:TRIGger:TYPE "LOF",20

:SENSe:FRAMecapture:TRIGger:TYPE?

Response <type> = <CHARACTER RESPONSE DATA>

<position> = <NR1 NUMERIC RESPONSE DATE>

Function Queries the setting of Trigger item for Frame capture.

Example use To query the setting of Trigger item for Frame capture.

> :SENSe:FRAMecapture:TRIGger:TYPE?

< "LOF",20

:SENSe:FRAMecapture:TRIGger:PATTern <pattern>

Parameter <pattern> = <STRING PROGRAM DATA>
"00000000 00000000" to "11111111 11111111"

Function Sets the trigger pattern of Frame capture.

Restriction Invalid when;
- :SENSe:FRAMecapture:TRIGger:TYPE is set to other than <"K12MAtch"> or <"K12MIsmatch">.

Example use To set the Trigger pattern to "BC":
> :SENSe:FRAMecapture:TRIGger:PATTern 10111100

:SENSe:FRAMecapture:TRIGger:PATTern?

Response <pattern> = <STRING RESPONSE DATA>

Function Queries the trigger pattern of Frame capture.

Example use > :SENSe:FRAMecapture:TRIGger:PATTern?
< 10111100

:SENSe:FRAMecapture:TRIGger:MASK <mask>

Parameter <mask> = <STRING PROGRAM DATA>
"00000000 00000000" to "11111111 11111111"

Function Sets the trigger pattern to mask of Frame capture.

Restriction Invalid when;
- :SENSe:FRAMecapture:TRIGger:TYPE is set to other than <"K12MAtch"> or <"K12MIsmatch">.

Example use To set the Trigger pattern mask.
> :SENSe:FRAMecapture::TRIGger:MASK 1001001

:SENSe:FRAMecapture:TRIGger:MASK?

Response <mask> = <STRING RESPONSE DATA>

Function Queries the trigger pattern to mask of Frame capture.

Example use > :SENSe:FRAMecapture:TRIGger:MASK?
< 1001001

6.2.3 DISPlay subsystem

The DISPlay subsystem sets the Result and Analyze screens.

Function	Command	Parameter
Page 6-49		
Selects the items to be displayed on the Test menu screen.	:DISPlay:TMENu[:NAME]	tdisplay
Queries the items displayed on the Test menu screen.	:DISPlay:TMENu[:NAME] ?	
Page 6-49		
Selects the items displayed on the Result screen.	:DISPlay:RESult[:NAME]	rdisplay
Queries items displayed on the Result screen.	:DISPlay:RESult[:NAME] ?	
Page 6-50		
Selects the contents of an error in a measurement result (performance G.826).	:DISPlay:RESult:PERFormance:ERRor[:G826]	error
Queries the contents of an error in a measurement result (performance G.826).	:DISPlay:RESult:PERFormance:ERRor[:G826] ?	
Page 6-51		
Selects a monitor item for the Analyze main screen (OH monitor subscreen).	:DISPlay:ANALysis:OHMonitor:TYPE	ohmonitor
Queries the monitor item for the Analyze main screen (OH monitor subscreen).	:DISPlay:ANALysis:OHMonitor:TYPE?	
Queries the SOH/TOH monitor channel on the Analyze main screen (OH monitor subscreen).	:DISPlay:ANALysis:OHMonitor:SOHCh	numeric
	:DISPlay:ANALysis:OHMonitor:TOHCh	numeric
Queries the SOH/TOH monitor channel for the Analyze main screen (OH monitor subscreen).	:DISPlay:ANALysis:OHMonitor:SOHCh?	
	:DISPlay:ANALysis:OHMonitor:TOHCh?	
Queries the SOH monitor data in OH monitoring.	:DISPlay:ANALysis:OHMonitor:SOHData?	
Page 6-54		
Sets the title for the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:TITLe	title
Queries the title for the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:TITLe?	

Sets the frame number to display for the Analyze screen (Frame capture sunscreen).	:DISPlay:ANALysis:FRAMecapture:DFRame	frame
Queries the frame number to display for the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture: DFRame?	
Sets the display position (type) on the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:JUMP:TYPE	
Queries the display position (type) on the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:JUMP:TYPE?	
Sets the display position (Number) on the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:JUMP:LINE	numeric
Queries the display position (Number) on the Analyze screen (Frame capture subscreen).	:DISPlay:ANALysis:FRAMecapture:JUMP:LINE?	
Sets the start and end positions to print the Frame capture data.	:DISPlay:ANALysis:FRAMecapture:PRINt	from to
Queries the start and end positions to print the Frame capture data.	:DISPlay:ANALysis:FRAMecapture:PRINt?	
Instructs scroll on the Frame capture data table for the Analyze screen.	:DISPlay:ANALysis:FRAMecapture:SCRoll	type
Set wave length for the Analyze : Opt. power meter screen.	:DISPlay:ANALysis:OPMeter:WLENgth	type
Queries wave length for the Analyze : Opt. power meter screen.	:DISPlay:ANALysis:OPMeter:WLENgth?	

:DISPlay:TMENu[:NAME] <tdisplay>

Parameter <tdisplay> = <STRING PROGRAM DATA>

"TSEarch"	Trouble search screen
"MANual"	Manual(STM) screen
"MANual:JOFF"	Manual(STM) screen
"PSEQuence"	Pointer sequence screen
"PSEQuence:JOFF"	Pointer sequence screen
"DELay"	Delay screen
"ASETup"	Auto setup screen

Function Selects the items to be displayed on the Test menu screen.

Restriction Invalid when;

・:SENSe:TELecom:MMODe is <ISERvice>, and <"DELay"> is set.

Example use To set the items displayed on the Test menu screen to the MANual:jitter screen:

> :DISPlay:TMENu:NAME "MANual:JON"

or

> :DISPlay:TMENu "MANual:JON"

:DISPlay:TMENu[:NAME]?

Response <tdisplay> = <STRING RESPONSE DATA>

"TSE"	Trouble search screen
"MAN"	Manual screen
"MAN:JOFF"	Manual screen
"PSEQ"	Pointer sequence screen
"PSEQ:JOFF"	Pointer sequence screen
"DEL"	Delay screen
"ASETup"	Auto setup screen

Function Queries the items displayed on the Test menu screen.

Example use > :DISPlay:TMENu:NAME?

or

> :DISPlay:TMENu?

< "MAN:JOFF"

:DISPlay:RESult[:NAME] <rdisplay>

Parameter <rdisplay> = <STRING PROGRAM DATA>

"TSEarch"	Trouble search screen

	"EALarm"	Error/Alarm screen
	"JUSTificat"	Justification screen
	"ZOOM"	Zoom screen
	"PERFormance"	Performance screen
	"DELay"	Delay screen
	"B2"	B2 Error screen

Function Selects the items displayed on the Result screen.

Restriction Invalid when;

・:DISPlay:TMENu[:NAME] is other than <"TSEarch">, and <"TSEarch"> is set.

Example use To set items displayed on the Result screen to "TSEarch":

> :DISPlay:RESult:NAME "TSEarch"

or

> :DISPlay:RESult "TSEarch"

:DISPlay:RESult[:NAME]?

Response <rdisplay> = <STRING RESPONSE DATA>

	"TSE"	Trouble search screen
	"EAL"	Error/Alarm screen
	"JUST"	Justification screen
	"ZOOM"	Zoom screen
	"PERF"	Performance screen
	"DEL"	Delay screen
	"B2"	B2 Error screen

Function Queries items displayed on the Result screen.

Example use > :DISPlay:RESult:NAME?

or

> :DISPlay:RESult?

< "TSE"

:DISPlay:RESult:PERFormance:ERRor[:G826] <error>

Parameter <error> = <STRING PROGRAM DATA>

	"BIP"	BIP
	"REI"	REI
	"FCRC"	FAS/CRC
	"PARITY"	Parity

"BIT" Bit

Function Selects the contents of an error in a measurement result (performance G.826).

Restriction Invalid when;

- The 1.5/45/52M unit is installed; and <"PARITY"> is set.
- :DISPlay:TMENu[:NAME] is other than <"MANual[:JOFF]"> and <"PSEQuence[:JOFF]">.
- :CALCulate:TELecom:PERFormance:TYPE is <OFF>, <G821>, <M2100>, or <M2101>.
- :SENSe:TELecom:MAPPing:TYPE is <VC4_BLK>, <VC3_BLK>, <VC2_BLK>, <VC12_BLK>, <VC11_BLK>, <VC11_384V>, or <VC11_384D>, and <"FCRC"> or <"BIT"> is set.
- :SENSe:TELecom:MMODe is <OSERvice>, and <"FCRC"> is set.
- :SENSe:TELecom:MMODe is <ISERvice>, and <"BIT"> is set.
- :SENSe:TELecom:MMODe is <ISERvice>, :SENSce:TELecom:DEMUX:MRATe is <OFF>, and <"FCRC"> is set when :SENSe:TELecom:FRAMing is <OFF>.

Example use To set an error in a measurement result (performance G.826) to BIP:

> :DISPlay:RESult:PERFormance:ERRor "BIP"

or,

> :DISPlay:RESult:PERFormance:ERRor:G826 "BIP"

:DISPlay:RESult:PERFormance:ERRor[:G826]?

Response <error> = <STRING RESPONSE DATA>

Function Queries the contents of an error in a measurement result (performance G.826).

Example use > :DISPlay:RESult:PERFormance:ERRor?

or,

> :DISPlay:RESult:PERFormance:ERRor:G826?

< "BIP"

:DISPlay:ANALysis:OHMonitor:TYPE <ohmonitor>

Parameter <ohmonitor> = <CHRACTER PROGRAM DATA>

OHead	OH
PMSP	PTR,K1/K2
PTRace	Path trace
PFRame	DSn frame
TTRace	Trail trace

IBYTe	Info. Byte
PAYLoad	Payload
TANDem	Tandem
SIGNal	Signalling

Function Selects a monitor item for the Analyze main screen (OH monitor subscreen).

Restriction Invalid when;

- :DISPlay:TMENu[:NAME] is set to other than <"MANual[:JOFF]">, <PSEQuenc [:"JOFF"]>.
- :SENSe:TELecom:BRATe is set to other than <M139>, <M45>, <M34>, <M8>, <M2>, and <M1_5>; and <OHead>, <PMSP>, or <PTRace> is set.
- :SENSe:TELecom:MAPPing:TYPE is set to <VC4_BLK>, <VC3_45MASY>, <VC3_BLK>, <VC2_BLK>, <VC2_MC>, <VC12_BLK>, <VC11_ASY>, <VC11_BIF>, <VC11_BIL>, <VC11_BYF>, <VC11_BYL>, or <VC11_BLK>; and <PFRame> is set.
- :SENSe:TELecom:BRATe is set to <M45> or <M1_5>; and <PFRame> is set.
- :SENSe:TELecom:DEMUX:MRATe is set to <OFF>; and :SENSe:TELecom:FRAMing is set to <OFF>; and <PFRame> is set.
- :SENSe:TELecom:BRATe is other than <M139> and <M34>; and <TTRace> is set.
- <SIGNal> is set; and the option 09 is not installed.

Example use To select Path trace.

> :DISPlay:ANALysis:OHMonitor:TYPE PTRace

:DISPlay:ANALysis:OHMonitor:TYPE?

Response <ohmonitor> = <CHRACTER RESPONSE DATA>

OH	OH
PMSP	PTR,K1/K2
PTR	Path trace
PFR	DSn frame
TTR	Trail trace
IBYT	Info. byte
PAYL	Payload
TANDem	Tandem
SIGNal	Signalling

Function Queries the monitor item for the Analyze main screen (OH monitor subscreen).

Example use > :DISPlay:ANALysis:OHMonitor:TYPE?
< PTR

:DISPlay:ANALysis:OHMonitor:SOHCh<numeric>
:DISPlay:ANALysis:OHMonitor:TOHCh <numeric>

Parameter <numeric> = <DECIMAL NUMERIC PROGRAM DATA>
1 to 64 Step value: 1

Function Sets the SOH/TOH monitor channel on the Analyze main screen (OH monitor subscreen).

Restriction Invalid when;
・:DISPlay:TMENu[:NAME] is other than <"MANual[:JOFF]"> and <PSEQuence [:"JOFF"]>.
・:DISPlay:ANALysis:OHMonitor:TYPE is other than <OH>.
・ :SENSe:TELecom:BRATe is set to <M156>, <M156CMI>, <M52B3ZS>, <M139>, <M45>, <M34>, <M8>, <M2>, or <M1_5>.

Example use > :DISPlay:ANALysis:OHMonitor:SOHCh 4

:DISPlay:ANALysis:OHMonitor:SOHCh?
:DISPlay:ANALysis:OHMonitor:TOHCh?

Response <numeric> = <NR1 NUMERIC RESPONSE DATA>
1 to 64 Step value: 1

Function Queries the SOH/TOH monitor channel for the Analyze main screen (OH monitor subscreen).

Example use > :DISPlay:ANALysis:OHMonitor:SOHCh?
< 4

:DISPlay:ANALysis:OHMonitor:SOHData?

Response <string> = <STRING RESPONSE DATA>
SOH monitor data (hexadecimal display)
*: If there is no data, the following contents are output.
・When the bit rate is set to 2488M or 9953M:
"--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,

--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --,
--, --, --, --, --, --, --, --, --"

Function Queries the SOH monitor data in OH monitoring.

Example use > :DISPlay:ANALysis:OHMonitor:SOHData?

< "01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09,
01, 02, 03, 04, 05, 06, 07, 08, 09"

:DISPlay:ANALysis:FRAMecapture:TITLe <title>

Parameter <title> = <STRING PROGRAM DATA>

"Title string": Title string (maximum 15 characters)

The title string length is 0 to 15 character(s) and double-quotation marks are usable.

Pad the string with spaces when its length is less than 15 characters.

Function Sets the title for the Analyze screen (Frame capture subscreen).

Example use To display "TITLE-DISP" as the title of measurement:

> :DISPlay:ANALysis:FRAMecapture:TITLe "TITLE-DISP"

:DISPlay:ANALysis:FRAMecapture:TITLe?

Response <title> = <STRING RESPONSE DATA>

Function Queries the title for the Analyze screen (Frame capture subscreen).

Example use > :DISPlay:ANALysis:FRAMecapture:TITLe?

< "TITLE-DISP "

:DISPlay:ANALysis:FRAMecapture:DFRame <frame>

Parameter <frame> = <DECIMAL NUMERIC PROGRAM DATA>
1 to 26 Step value: 1

Function Sets the frame number to display for the Analyze screen (Frame capture subscreen).

Example use To set the frame start position at 1:
> :DISPlay:ANALysis:FRAMecapture:DFRame 1

:DISPlay:ANALysis:FRAMecapture: DFRame?

Response <frame> = <DECIMAL NUMERIC RESPONSE DATA>

Function Queries the frame number to display for the Analyze screen (Frame capture subscreen).

Example use > :DISPlay:ANALysis:FRAMecapture:DFRame?
< 1

:DISPlay:ANALysis:FRAMecapture:JUMP:TYPE

Parameter <type> = <CHARACTER PROGRAM DATA>
TRIGger Displays the trigger position.
NUMBer Displays the Number position.

Function Sets the display position (type) on the Analyze screen (Frame capture subscreen).

Restriction Invalid when;
No capture data exists.

Example use To shift to the trigger display position:
> :DISPlay:ANALysis:FRAMecapture:JUMP:TYPE TRIGger

:DISPlay:ANALysis:FRAMecapture:JUMP:TYPE?

Response <type> = <CHARACTER RESPONSE DATA>
TRIG Displays the trigger position.
NUMB Displays the Number position.

Function Queries the display position (type) on the Analyze screen (Frame capture subscreen).

Example use > :DISPlay:ANALysis:FRAMecapture:JUMP:TYPE?
< TRIG

:DISPlay:ANALysis:FRAMecapture:JUMP:LINE <numeric>

Parameter <numeric> = <DECIMAL NUMERIC RESPONSE DATA>
1 to 17272 Step value: 1

Function Sets the display position (Number) on the Analyze screen (Frame capture subscreen).

Restriction Invalid when;
No capture data exists.

Example use To set the display position at 10:
> :DISPlay:ANALysis:FRAMecapture:JUMP:LINE 10

:DISPlay:ANALysis:FRAMecapture:JUMP:LINE?

Response <numeric> = <DECIMAL NUMERIC RESPONSE DATA>

Function Queries the display position (Number) on the Analyze screen (Frame capture subscreen).

Example use > :DISPlay:ANALysis:FRAMecapture:JUMP:LINE?
< 10

:DISPlay:ANALysis:FRAMecapture:PRINt <from>,<to>

Parameter <from> = <DECIMAL NUMERIC PROGRAM DATA>
1 to 17280 Step value: 1
<to> = <DECIMAL NUMERIC PROGRAM DATA>
<from> to 17280 Step value: 1

Function Sets the start and end positions to print the Frame capture data.

Restriction Invalid when;
- The range is selected other than Bit Rate: 9953M: 1 to 17280, 2448M: 1 to 4320.
- The set value is greater than the total number of Capture data.

Example use To print the Frame capture data from 10 to 20:
> :DISPlay:ANALysis:FRAMecapture:PRINt 10,20

:DISPlay:ANALysis:FRAMecapture:PRINt?

Response <from> = <NR1 NUMERIC RESPONSE DATA>
<to> = <NR1 NUMERIC RESPONSE DATA>

Function Queries the start and end positions to print the Frame capture data.

Example use To query the start and end positions to print the Frame capture data:
> :DISPlay:ANALysis:FRAMecapture:PRINt?
< 10,20

:DISPlay:ANALysis:FRAMecapture:SCRoll <type>

Parameter <type> = <CHARACTER PROGRAM DATA>

TOP	Jumps to the top position of horizontal axis of data.
END	Jumps to the end position of horizontal axis of data.
BEFOR	Scrolls to the left by 18 bytes on the horizontal axis of data.
NEXT	Scrolls to the right by 18 bytes on the horizontal axis of data.

Function Instructs scroll on the Frame capture data table for the Analyze screen.

Example use To scroll to the end position of table:

> :DISPlay:ANALysis:FRAMecapture:SCRoll END

:DISPlay:ANALysis:OPMeter:WLENgth <length>

Parameters <boolean> = <CHARACTER PROGRAM DATA>

"1.31"	1.31µm
"1.55"	1.55µm

Function Sets Wave length for Opt. Power meter.

Restrictions This command is disabled in the following cases:

- <"OPMeter">cannot be selected for :DISPlay:ANALysis[:NAME].
- :SENSe:TELecom:BRATe is set to 156M and CMI/52M B3ZS/139M/34M/8M/2M/45M/1.5M.
- :SENSe:TELecom:BRATe is set to 622M/156M with MP0111A mounted (fixed to 1.31µm)
- :SENSe:TELecom:BRATe is set to 622M/156M with MP0112A mounted (fixed to 1.55µm)
- :SENSe:TELecom:BRATe is set to 52M with MP0122B mounted (fixed to 1.31µm)
- :SENSe:TELecom:BRATe is set to 52M with MP0122C mounted (fixed to 1.55µm)

Example use To set Wave length for Opt. power meter to 1.31:

> :DISPlay:ANALysis:OPMeter:WLENgth 1.31

:DISPlay:ANALysis:OPMeter:WLENgth?

Response	<boolean> = <CHARACTER PROGRAM DATA>
	"1.31" 1.31μm
	"1.55" 1.55μm
Function	Queries Wave length for Opt. Power meter.
Example use	> :DISPlay:ANALysis:OPMeter:WLENgth?
	< "1.31"

6.2.4 ROUTe subsystem

The ROUTe subsystem provides the control (setting and display) related to the signal route in measurement units.

Function	Command	Parameter
Page 6-60		
Sets the input of the 2.5G signal.	:ROUTe:STM16:INPut	type
Queries the input setting of the 2.5G signal.	:ROUTe:STM16:INPut?	
Page 6-60		
Sets the output of the 2.5G signal.	:ROUTe:STM16:OUTPut	type
Queries the output setting of the 2.5G signal.	:ROUTe:STM16:OUTPut?	
Page 6-60		
Setting of 10G signal input on SDH	:ROUTe:STM64:INPut	type
Setting of 10G signal input on SONET	:ROUTe:STS192:INPut	type
Querying of 10G signal input on SDH	:ROUTe:STM64:INPut?	
Querying of 10G signal input on SONET	:ROUTe:STS192:INPut?	
Setting of 10G signal output on SDH	:ROUTe:STM64:OUTPut	type
Setting of 10G signal output on SONET	:ROUTe:STS192:OUTPut	type
Querying of 10G signal output on SDH	:ROUTe:STM64:OUTPut?	
Querying of 10G signal output on SONET	:ROUTe:STS192:OUTPut?	

:ROUTe:STM16:INPut <type>

Parameter <type> = <CHARACTER PROGRAM DATA>
OPTical
ELECtrical

Function Sets the input of the 2.5G signal.

Restriction Invalid when;
・:SOURce:TELecom:BRATe is other than <M2488>.

Example use To set the input of the 2.5G signal to Optical.
> :ROUTe:STM16:INPut OPTical

:ROUTe:STM16:INPut?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries the input setting of the 2.5G signal.

Example use > :ROUTe:STM16:INPut?
< OPT

:ROUTe:STM16:OUTPut <type>

Parameter <TYPE> = <CHARACTER PROGRAM DATA>
OPTical1 (1.31 μm)
OPTical2 (1.55 μm)
ELECtrical

Function Sets the output of the 2.5G signal.

Restriction Invalid when;
・2.5G (1.31 μm) unit is not installed; and <OPTical1> is set.
・2.5G (1.55 μm) unit is not installed; and <OPTical2> is set.
・:SENSe:TELecom:BRATe is other than <M2488>.

Example use > :ROUTe:STM16:OUTPut OPTical1

:ROUTe:STM16:OUTPut?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries the output setting of the 2.5G signal.

Example use >:ROUTe:STM16:OUTPut?
< OPT1

(SDH) :ROUTe:STM64:INPut <type>
(SONET) :ROUTe:STS192:INPut <type>

Parameter <type> = <CHARACTER PROGRAM DATA>
OPTical
ELECtrical
Function Sets 10G signal input
Restriction Invalid when,
・:SENSE:TELecom:BRATe is other than <M9953>.
Example of use To set 10G signal input to Optical
> :ROUTe:STM64:INPut OPTical

(SDH) :ROUTe:STM64:INPut?
(SONET) :ROUTe:STS192:INPut?

Response <type> = <CHARACTER RESPONSE DATA>
OPT
ELEC
Function Queries 10G signal input.
Example of use > :ROUTe:STM64:INPut?
< OPT

(SDH) :ROUTe:STM64:OUTPut <type>
(SONET) :ROUTe:STS192:OUTPut <type>

Parameter <type> = <CHARACTER PROGRAM DATA>
OPTical1 (1.31 μm)
OPTical2 (1.55 μm)
ELECtrical
Function Sets 10G signal output.
Restriction Invalid when,
・ <Optical1> is set when 10G (1.31 μm) unit is not installed.
・ <Optical2> is set when 10G (1.55 μm) unit is not installed.
・ :SENSe:TELecom:BRATe is other than <M9953>.
Example of use To set 10G signal output to Optical (1.31 μm)
> :ROUTe:STM64:OUTPut OPTical1

(SDH) :ROUTe:STM64:OUTPut?
(SONET) :ROUTe:STS192:OUTPut?

Response <type> = <CHARACTER RESPONSE DATA>
OPT1

OPT2

ELEC

Function Queries 10G signal output.

Example of use > :ROUTe:STM64:OUTPut?

< OPT1

6.2.5 CALCulate subsystem

The CALCulate subsystem sets the performance measurement and displays the measured result.

Function	Command	Parameter
Page 6-64		
Sets the type of performance measurement.	:CALCulate:TELecom:PERFormance:TYPE	perform
Queries the type of performance measurement.	:CALCulate:TELecom:PERFormance:TYPE?	
Page 6-64		
Queries the Frame Capture data.	:CALCulate:FRAMecapture：DATA?	start1 start2 stop1 stop2

:CALCulate:TELecom:PERFormance:TYPE <perform>

Parameter <perform> = <CHARACTER PROGRAM DATA>

OFF	OFF	
G821	G.821	performance measurement
G826	G.826	performance measurement
M2100	M.2100	performance measurement
M2101	M.2101	performance measurement

Function Sets the type of performance measurement.

Restriction Invalid when;

・All the following conditions are satisfied; and <G821> or <M2100> is set.

(a):SENSe:TELecom:BRATe is <M2488>.

(b):SENSe:TELecom:MMODe is <ISERvice>.

(c):SENSe:TELecom:DEMUX:MRATe is <OFF>.

(d):SENSe:TELecom:FRAMing is <OFF>.

Example use To set the performance measurement of the M.2100:

> :CALCulate:TELecom:PERFormance:TYPE M2100

:CALCulate:TELecom:PERFormance:TYPE?

Response <perform> = <CHARACTER RESPONSE DATA>

Function Queries the type of performance measurement.

Example use > :CALCulate:TELecom:PERFormance:TYPE?

< M2100

:CALCulate:FRAMecapture : DATA? <start1>,<start2>,<stop1>,<stop2>

Parameter <start1>, <stop1> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 9	Step value: 1	Line No.

<start2>, <stop2> = <DECIMAL NUMERIC PROGRAM DATA>

1 to 4320	2448M	Step value: 1	Column No.
1 to 17280	9953M	Step value: 1	Column No.

Response <string> = <STRING RESPONSE DATA>

Receives data of the designated numbers in hexadecimal digits.

Function Queries the Frame Capture data.

Example use To queries the Frame Capture data from the third line of seven column to the third line of eleven column.

> :CALCulate:FRAMecapture : DATA? 3,7,3,11

< ”00,01,02,03,04”

6.2.6 TEST subsystem

The TEST subsystem displays the self-test result, etc.

Function	Command	Parameter
Page 6-68		
Sets the STM16 to the test item of the main-frame function test.	:TEST:CONTent:STM16	boolean
Queries the setting state of the STM16 in the main-frame function test.	:TEST:CONTent:STM16 ?	
Page 6-68		
Sets the wavelength of the STM16 test.	:TEST:CONTent:SWAVelength	type
Queries the test wavelength at the STM16 test.	:TEST:CONTent:SWAVelength ?	
Sets “Optical STM-64” as a test item for the main unit function test.	:TEST:SCONtent:OPT64	type
Queries the “Optical STM-64” setting status for the main unit function test	:TEST:SCONtent:OPT64 ?	
Sets the wavelength to be tested with the Optical STM-64 test.	:TEST:SCONtent:WAVelength64	type
Queries the wavelength to be tested with the STM-64 test.	:TEST:SCONtent:WAVelength64 ?	

:TEST:CONTent:STM16 <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>

OFF or 0	Does not make the STM16 test.
ON or 1	Make the STM16 test.

Function Sets the STM16 to the test item of the main-frame function test.

Restriction Invalid when;

- :TEST:TYPE is other than <MFT>.
- :TEST:CONTent:TYPE is other than <ISEL>.
- The 2.5G unit is not installed.

Example use To set the STM16 to the test item.

> :TEST:CONTent:STM16 ON

:TEST:CONTent:STM16 ?

Response <boolean> = <NR1 RESPONSE DATA>

Function Queries the setting state of the STM16 in the main-frame function test.

Example use > :TEST:CONTent:STM16

< 1

:TEST:CONTent:SWAVelength <type>

Parameter <type> = <CHARACTER PROGRAM DATA>

ALL	Wavelength 1.31 μm and 1.55 μm
1_31	Wavelength 1.31 μm
1_55	Wavelength 1.55 μm

Function Sets the wavelength of the STM16 test.

Restriction Invalid when;

- :TEST:TYPE is other than <MFT>.
- :TEST:CONTent:TYPE is other than <ISEL>.
- The 2.5G unit is not installed.
- MP0127A is usable; and <1_55> is set.
- MP0128A is usable; and <1_31> is set.

Example use To set the test wavelength to 1.31 μm.

> :TEST:CONTent:SWAVelength 1_31

:TEST:CONTent:SWAVelength ?

Response <type> = <CHARACTER RESPONSE DATA>

Function Queries the test wavelength at the STM16 test.

Example use > :TEST:CONTent:SWAVelength?
< 1_31

:TEST:SCONtent:OPT64 <boolean>

Parameter <boolean> = <BOOLEAN PROGRAM DATA>

OFF or 0	Does not preform the Optical STM-64 test.
ON or 1	Performs the Optical STM-64 test.

Function Sets “Optical STM-64” as a test item for the main unit function test.

Restrictions This command is disabled in the following cases:

・:DISPlay:SETup[:NAME] is set to other than <”STESt”>.

・:TEST: TYPE is set to other than <”MFTest”>.

・:TEST:SCONtent:TYPE is set to other than <”ISELect”>.

Example use To set “Optical STM-64” as a test item.
> :TEST:SCONtent:OPT64 ON

:TEST:SCONtent:OPT64

Parameter <boolean> = <NR1 NUMERIC RESPONSE DATA>

0	Does not preform the Optical STM-64 test.
1	Performs the Optical STM-64 test.

Function Queries the “Optical STM-64” setting status for the main unit function test

Example use > :TEST:SCONtent:OPT64?
<1

:TEST:SCONtent:WAVelength64 <type>

Parameter <type> = <CHARACTER PROGRAM DATA>

"STM64_1.55" 10 G, wavelength of 1.55 µm

"STM64_1.31" 10 G, wavelength of 1.31 µm

"STM16_1.31" 2.5 G, wavelength of 1.31 µm

"STM16_1.55" 2.5 G, wavelength of 1.55 µm

Function Sets the wavelength to be tested with the Optical STM-64 test.

Restrictions This command is disabled in the following cases:

・:DISPlay:SETup[:NAME] is set to other than <"STESt">.

・:TEST: TYPE is set to other than <"MFTest">.

・:TEST:SCONtent:TYPE is set to other than <"ISELect">.

Example use To set the wavelength to be tested to 2.5 G and a wavelength of 1.31µm

> :TEST:SCONtent:WAVelength64 "STM16_1.31"

:TEST:SCONtent:WAVelength64?

Response <type> = <CHARACTER RESPONSE DATA>

Same as for :TEST:SCONtent:WAVelength64

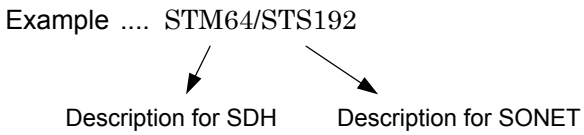
Function Queries the wavelength to be tested with the STM-64 test.

Example use > :TEST:SCONtent:WAVelength64?

< "STM16_1.31"

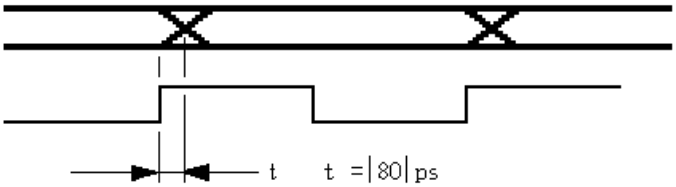
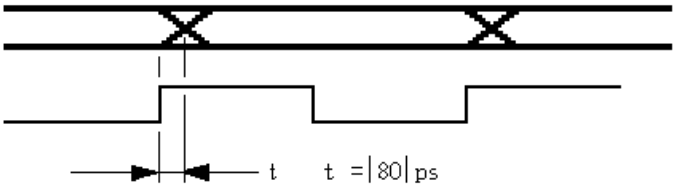
Appendix A Specifications

Specifications of 2.5G, 2.5G/10G, and 10G units are explained. Explanations here for SDH and SONET are described side-by-side.



A.1 Specifications of the MP0127A 2.5G (1.31) Unit

Item No.	Item	Specification
1	Optical Output	
1.1	Bit rate	2488.32Mbit/s ±100ppm
1.2	Code	NRZ
1.3	Optical source type	DFB-LD
1.4	Peak wavelength	1310nm±20nm
1.5	Wavelength width	1nm（Maximum width: - 20 dB)
1.6	Suppression ratio	30 dB or more
1.7	Optical power output	-4dBm±3dB（PN average power）
1.8	Optical output waveform	In accordance with Eye Mask specification using 4th Bessel filter (See "12 Eye Mask".)
1.9	Extinction ratio	10 dB or more
1.10	Connector	FC-PC（Single mode fiber）
2	Optical Input	
2.1	Bit rate	2488.32Mbit ±100ppm
2.2	Code	NRZ
2.3	Receive light wavelength	1310nm band
2.4	Level （PN average power）	Narrow : -28 to -9dBm(BER 1×10^{-10} or less, +10°C to +30°C) -27 to -9dBm(BER 1×10^{-10} or less, 0°C to +40°C)
2.5	Absolute maximum Rating	Wide : -20 to -9dBm(BER 1×10^{-10} or less, +10°C to +40°C) 0dBm（Peak power）
2.6	Optical input return Loss	≥ 27dBm (1310nm) or more
2.7	Connector	FC-PC（Single mode fiber）

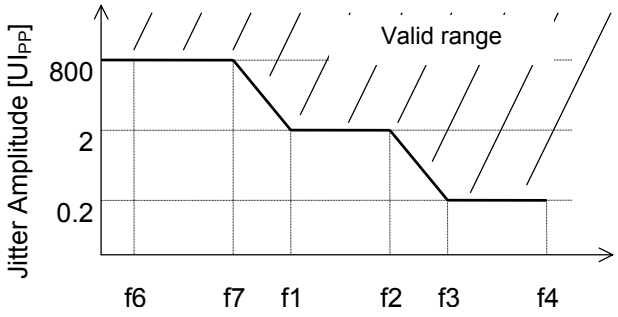
Item No.	Item	Specification
3	Electric Output	
3.1	Data	
3.1.1	Bit rate	2488.32Mbit/s ±100ppm
3.1.2	Code	NRZ
3.1.3	Level	ECL 0.8V±0.3V_{pp}
3.1.4	Connector	SMA 50Ω -2V
3.2	Clock	
3.2.1	Frequency	2488.32MHz±100ppm
3.2.2	Level	ECL 0.8V±0.3V_{pp}
3.2.3	Connector	SMA 50Ω -2V
3.3	Clock/Data phase	Timing 
4	Electric input	
4.1	Data	
4.1.1	Bit rate	2488.32Mbit/s ±100ppm
4.1.2	Code	NRZ
4.1.3	Level	ECL
4.1.4	Connector	SMA 50Ω -2V
4.2	Clock	
4.2.1	Frequency	2488.320MHz±100ppm
4.2.2	Level	ECL
4.2.3	Connector	SMA 50Ω -2V
4.3	Clock/Data phase	Timing 
5	Monitor Input	
5.1	Bit rate	2488.32Mbit/s ±100ppm
5.2	Interface	NRZ
5.3	Level	0.1 to 1V_{pp}
5.4	Connector	SMA 50Ω

Item No.	Item	Specification
6	External Clock Input	
6.1	Bit rate	2488.32Mbit/s ±100ppm
6.2	Level	$0.8 \pm 0.3 V_{pp}$
6.3	Connector	SMA 50Ω
7	Clock Sync Output	
7.1	Frequency	155.52MHz ±100ppm
7.2	Level	ECL（AC)
7.3	Connector	SMA 50Ω
8	Receive Clock Output	
8.1	Frequency	2488.32MHz ±100ppm
8.2	Level	ECL（AC）
8.3	Connector	SMA 50Ω

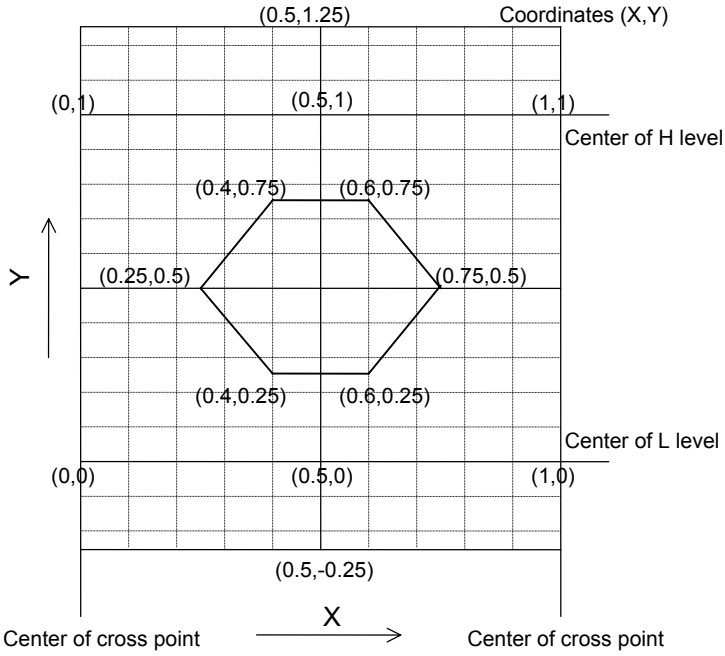
Item No.	Item	Specification
9	Optical functions	
9.1	Transmission	Selection of Wide or Narrow
9.2	bandwidth selection Optical input power measurement	
9.2.1	Measurement rage	- 30 to - 9 dBm (1310 nm, peak power)
9.2.2	Absolute accuracy	±2 dB or less (at - 20 dBm, 1310 nm)
9.2.3	Linearity	±2 dB or less (at - 30 to - 9 dBm, 1310 nm)
9.3	Optical output control	The key switch is used to control the emission of an optical output.
9.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
9.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
9.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 9.3 and 9.4 is performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
9.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
9.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

Item No.	Item	Specification
10	Electrical functions	
10.1	Mapping	See "1.5 Mapping Route Measurable When Installing the 2.5G Unit".
10.2	Through	Passes the received 2.5G signal to the transmitter section, as it is.
10.3	Error Insertion	Refer to MP1570A Operation Manual Vol.1.
10.4	Alarm Addition	Refer to MP1570A Operation Manual Vol.1.
10.5	OH Preset	SOH/TOH : #1 SDH/SONET: Uses the value set in the #1 main frame. #2 to #16: Presets all bytes except for B1, H1, H2, H3, and C1. Sets common values for #2 to #16. A value that identifies a channel can be set in C1.
10.6	Error Measurement	Refer to MP1570A Operation Manual Vol.1.
10.7	Alarm Measurement Measurement range	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
10.8	Performance	Satisfies ITU-T G.826. B1 : EB, ES, SES, BBE, ESR, SESR, BBER, US B2 : EB, ES, SES, BBE, ESR, SESR, BBER, US Measurement range : EB, ES, SES, BBE, US 0 to 999999, 1.0E06 to 9.9E15, >9.9E15 (Over flow) ESR, SESR, BBER 1.0E-15 to 9.9E-01, 1.0E-00, <1.0E-15 (Under flow) Values 0 (EB, ES, SES, BBE, or US) and 1.0E-00 (ESR, SESR, or BBER) are set during one second after the start of measurement.
10.9	Alarm detection/release conditions	LOS Detection : Optical input loss Release : 2 frames OOF Detection : 4 frames Release : 2 frames MS-AIS/AIS-L Detection : 5 frames of b678 = 111 of K2 Release : 5 frames of bits other than b678 = 111 of K2 Sync. Detection : 10000-bit error in 99968 bits (non-fame) Release : No error in 64-bit succession
10.10	Monitor	K1, K2 bytes, AU/STS pointer, SOH/TOH 9x9 bytes, Pathtrace
10.11	Clock	Refer to MP1570A Operation Manual Vol.1.
10.12	Clock Loss detection	Detects clock loss for External Clock..
10.13	Framed/Unframed	PRBS 2^{23}-1 (Option 02 installed)

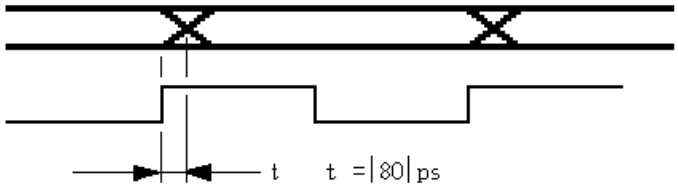
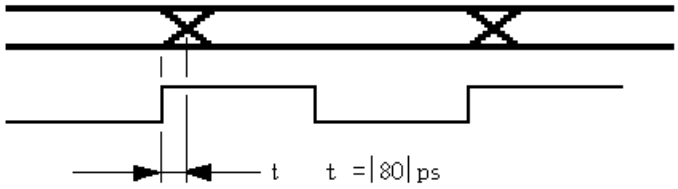
<table>
<tr><th>Item No.</th><th>Item</th><th>Specification</th></tr>
<tr><td>11
11.1</td><td>Jitter
Output jitter</td><td>
<table>
<tr><td></td><td></td><td>Additional error (UIPP)
* SDH/SONET internal signal</td></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.110
2.2</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping,
Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to –10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm
<table>
<tr><td></td><td></td><td>Additional error (UIrms)
* SDH/SONET internal signal</td></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.027
0.55</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping,
Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to –10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm
</td></tr>
<tr><td>11.2</td><td>Jitter tolerance</td><td>


<table>
<tr><td rowspan="2">Bit rate</td><td colspan="6">Jitter frequency [Hz]</td></tr>
<tr><td>f6</td><td>f7</td><td>f1</td><td>f2</td><td>f3</td><td>f4</td></tr>
<tr><td>2.5Gbit/s</td><td>10</td><td>12.1</td><td>5K</td><td>100K</td><td>1M</td><td>20M</td></tr>
</table>
Measurement condition
・+10 to +40°C
・Input level : -12 to -10dBm
</td></tr>
</table>

Item No.	Item	Specification
12	Eye Mask	Uses the 4th Bessel Thomson filter to evaluate the waveform in accordance with the following Eye Mask specification: <Eye Mask specification> 
13	General	
13.1	Dimensions, mass	21(H)×255(W)×167.6(D)mm（Excluding projections），less than 2 kg
13.2	Operation temperature	0 to +40℃
13.3	Storage temperature	-20 to +60℃

A.2 Specifications of the MP0128A 2.5G (1.55) Unit

Item No.	Item	Specification
1	Optical Output	
1.1	Bit rate	2488.32Mbit/s ±100ppm
1.2	Code	NRZ
1.3	Optical source type	DFB-LD DFB-LD (built-in EA modulation, option 01)
1.4	Peak wavelength	1550nm±20nm
1.5	Wavelength width	1nm（Maximum width: - 20 dB)
1.6	Suppression ratio	30 dB or more
1.7	Optical power output	-4dBm±3dB（PN average power）
1.8	Optical output waveform	In accordance with Eye Mask specification using 4th Bessel filter (See "12 Eye Mask".)
1.9		
1.10	Extinction ratio	10 dB or more
	Connector	FC-PC（Single mode fiber）
2	Optical Input	
2.1	Bit rate	2488.32Mbit/s ±100ppm
2.2	Code	NRZ
2.3	Receive light wavelength	1550nm band
2.4	Level （PN average power）	Narrow : -28 to -9dBm(BER 1×10^{-10} or less, +10°C to +30°C) -27 to -9dBm(BER 1×10^{-10} or less, 0°C to +40°C) Wide : -20 to -9dBm(BER 1×10^{-10} or less, +10°C to +40°C)
2.5	Absolute maximum rating	0dBm（Peak power）
2.6	Connector	FC-PC（Single mode fiber）
2.7	Return loss	27dB（1550nm） or more

Item No.	Item	Specification
3	Electric Output	
3.1	Data	
3.1.1	Bit rate	2488.32Mbit/s ±100ppm
3.1.2	Code	NRZ
3.1.3	Level	ECL 0.8V±0.3V_{pp}
3.1.4	Connector	SMA 50Ω -2V
3.2	Clock	
3.2.1	Frequency	2488.320MHz±100ppm
3.2.2	Level	ECL 0.8V±0.3V_{pp}
3.2.3	Connector	SMA 50Ω -2V
3.3	Clock/Data phase	Timing 
4	Electric input	
4.1	Data	
4.1.1	Bit rate	2488.32Mbit/s ±100ppm
4.1.2	Code	NRZ
4.1.3	Level	ECL
4.1.4	Connector	SMA 50Ω -2V
4.2	Clock	
4.2.1	Frequency	2488.32MHz±100ppm
4.2.2	Level	ECL
4.2.3	Connector	SMA 50Ω -2V
4.3	Clock/Data phase	Timing 
5	Monitor Input	
5.1	Bit rate	2488.32Mbit/s ±100ppm
5.2	Interface	NRZ
5.3	Level	0.1 to 1V_{pp}
5.4	Connector	SMA 50Ω

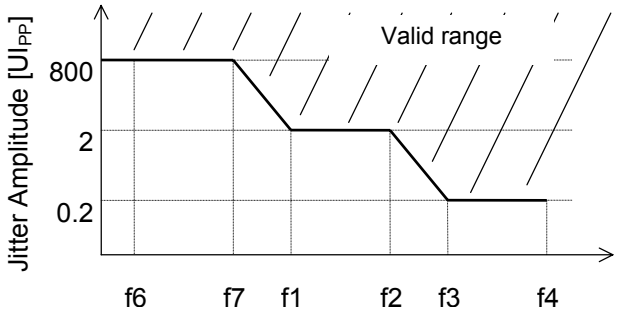
Item No.	Item	Specification
6	External Clock Input	
6.1	Bit rate	2488.32Mbit/s ±100ppm
6.2	Level	$0.8 \pm 0.3 V_{pp}$
6.3	Connector	SMA 50Ω
7	Clock Sync Output	
7.1	Frequency	155.52MHz ±100ppm
7.2	Level	ECL（AC)
7.3	Connector	SMA 50Ω
8	Receive Clock Output	
8.1	Frequency	2488.32MHz ±100ppm
8.2	Level	ECL（AC）
8.3	Connector	SMA 50Ω

Item No.	Item	Specification
9	Optical functions	
9.1	Transmission bandwidth selection	Selection of Wide or Narrow
9.2	Optical input power measurement	-
9.2.1	Measurement rage	- 30 to - 9 dBm (1550 nm, peak power)
9.2.2	Absolute accuracy	±2 dB or less (at - 20 dBm, 1550 nm)
9.2.3	Linearity	±2 dB or less (at - 30 to - 9 dBm, 1550 nm)
9.3	Optical output control	The key switch is used to control the emission of an optical output.
9.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
9.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
9.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 9.3 and 9.4 is performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
9.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
9.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

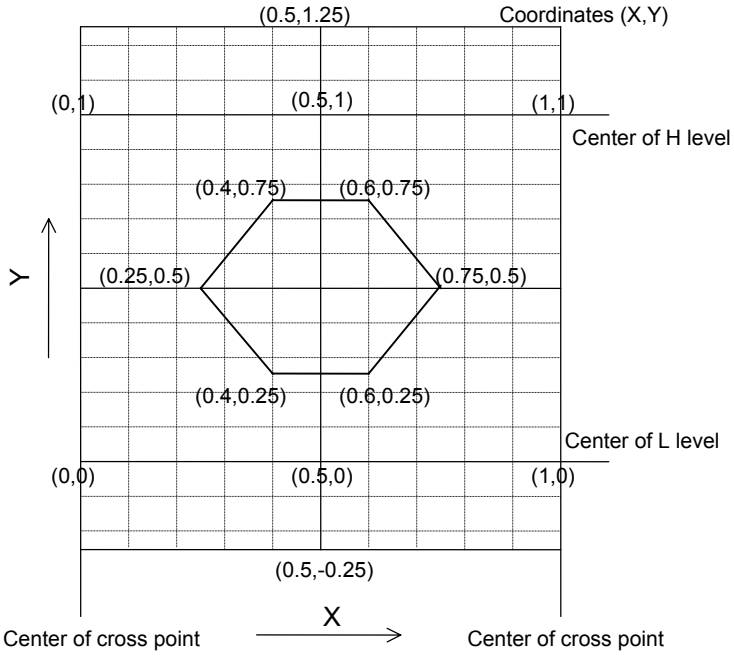
Item No.	Item	Specification
10	Electrical functions	
10.1	Mapping	See "1.5 Mapping Route Measurable When Installing the 2.5G Unit".
10.2	Through	Passes the received 2.5G signal to the transmitter section, as it is.
10.3	Error Insertion	Refer to MP1570A Operation Manual Vol.1.
10.4	Alarm Addition	Refer to MP1570A Operation Manual Vol.1.
10.5	OH Preset	SOH/TOH: #1 SDH/SONET: Uses the value set in the #1 main frame. #2 to #16: Presets all bytes except for B1, H1, H2, H3, and C1. Sets common values for #2 to #16. A value that identifies a channel can be set in C1.
10.6	Error Measurement	Refer to MP1570A Operation Manual Vol.1.
10.7	Alarm Measurement Measurement range	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
10.8	Performance	Satisfies ITU-T G.826. B1 : EB, ES, SES, BBE, ESR, SESR, BBER, US B2 : EB, ES, SES, BBE, ESR, SESR, BBER, US Measurement range : EB, ES, SES, BBE, US 0 to 999999, 1.0E06 to 9.9E15, >9.9E15 (Over flow) ESR, SESR, BBER 1.0E-15 to 9.9E-01, 1.0E-00, <1.0E-15 (Under flow) Values 0 (EB, ES, SES, BBE, or US) and 1.0E-00 (ESR, SESR, or BBER) are ser during one second after the start of measurement.
10.9	Alarm detection/release conditions	LOS Detection : Optical input loss Release : 2 frames OOF Detection : 4 frames Release : 2 frames MS-AIS/AIS-L Detection : 5 frames of b678 = 111 of K2 Release : 5 frames of bits other than b678 = 111 of K2 Sync. Detection : 10000-bit error in 99968 bits (non-frame) Release : No error in 64-bit succession
10.10	Monitor	K1, K2 bytes, AU/STS pointer, SOH/TOH 9x9 bytes, Pathtrace
10.11	Clock	Refer to MP1570A Operation Manual Vol.1.
10.12	Clock Loss detection	Detects clock loss for External Clock.
10.13	Framed/Unframed	PRBS 2^{23}-1 (Option 02 installed)

<table>
<tr><th>Item No.</th><th>Item</th><th>Specification</th></tr>
<tr><td>11
11.1</td><td>Jitter
Output jitter</td><td>
<table>
<tr><th rowspan="2">Bit rate</th><th rowspan="2">Range</th><th>Additional error (UIPP)</th></tr>
<tr><th>* SDH/SONET internal signal</th></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.110
2.2</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping,
Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to –10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm

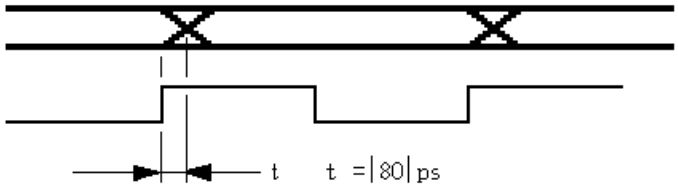
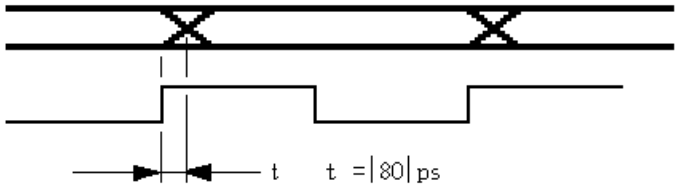
<table>
<tr><th rowspan="2">Bit rate</th><th rowspan="2">Range</th><th>Additional error (UIrms)</th></tr>
<tr><th>* SDH/SONET internal signal</th></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.027
0.55</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping,
Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to –10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm
</td></tr>
<tr><td>11.2</td><td>Jitter tolerance</td><td>


<table>
<tr><th rowspan="2">Bit rate</th><th colspan="6">Jitter frequency [Hz]</th></tr>
<tr><th>f6</th><th>f7</th><th>f1</th><th>f2</th><th>f3</th><th>f4</th></tr>
<tr><td>2.5Gbit/s</td><td>10</td><td>12.1</td><td>5K</td><td>100K</td><td>1M</td><td>20M</td></tr>
</table>
Measurement condition
・+10 to +40°C
・Input level : -12 to -10dBm
</td></tr>
</table>

Item No.	Item	Specification
12	Eye Mask	Uses the 4th Bessel Thomson filter to evaluate the waveform in accordance with the following Eye Mask specification: <Eye Mask specification> 
13	General	
13.1	Dimensions, mass	21(H)×255(W)×167.6(D)mm（Excluding projections），less than 2 kg
13.2	Operation temperature	0 to +40℃
13.3	Storage temperature	-20 to +60℃

A.3 Specifications of the MP0129A 2.5G (1.31/1.55) Unit

Item No.	Item	Specification
1	Optical Output	
1.1	Bit rate	2488.32Mbit/s ±100ppm
1.2	Code	NRZ
1.3	Optical source type	1310nm band : DFB-LD 1550nm band : DFB-LD 1550nm band : DFB-LD (built-in EA modulation, option 01)
1.4	Peak wavelength	1310nm±20nm 1550nm±20nm
1.5	Wavelength width	1nm（Maximum width: - 20 dB)
1.6	Suppression ratio	30 dB or more
1.7	Optical power output	-4dBm±3dB（PN average power）
1.8	Optical output waveform	In accordance with Eye Mask specification using 4th Bessel filter (See "12 Eye Mask".)
1.9	Extinction ratio	10 dB or more
1.10	Connector	FC-PC（Single mode fiber）
2	Optical Input	
2.1	Bit rate	2488.32Mbit/s
2.2	Code	NRZ
2.3	Receive light wavelength	1310nm band and 1550nm band
2.4	Level （PN average power）	Narrow : -28 to -9dBm(BER 1×10^{-10} or less, +10°C to +30°C) -27 to -9dBm(BER 1×10^{-10} or less, 0°C to +40°C) Wide : -20 to -9dBm(BER 1×10^{-10} or less, +10°C to +40°C)
2.5	Absolute maximum Rating	0dBm（Peak power）
2.6	Optical input return loss	27dBm or more
2.7	Connector	FC-PC（Single mode fiber）

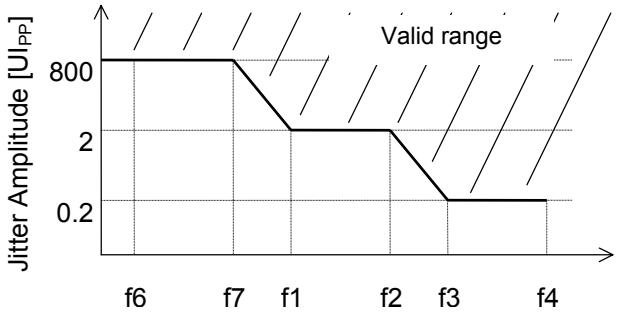
Item No.	Item	Specification
3	Electric Output	
3.1	Data	
3.1.1	Bit rate	2488.32Mbit/s ±100ppm
3.1.2	Code	NRZ
3.1.3	Level	ECL 0.8V±0.3V_{pp}
3.1.4	Connector	SMA 50Ω -2V
3.2	Clock	
3.2.1	Frequency	2488.32MHz ±100ppm
3.2.2	Level	ECL 0.8V±0.3V_{pp}
3.2.3	Connector	SMA 50Ω -2V
3.3	Clock/Data phase	Timing 
4	Electric input	
4.1	Data	
4.1.1	Bit rate	2488.32Mbit/s ±100ppm
4.1.2	Code	NRZ
4.1.3	Level	ECL
4.1.4	Connector	SMA 50Ω -2V
4.2	Clock	
4.2.1	Frequency	2488.32MHz±100ppm
4.2.2	Level	ECL
4.2.3	Connector	SMA 50Ω -2V
4.3	Clock/Data phase	Timing 
5	Monitor Input	
5.1	Bit rate	2488.32Mbit/s ±100ppm
5.2	Interface	NRZ
5.3	Level	0.1 to 1V_{pp}
5.4	Connector	SMA 50Ω

Item No.	Item	Specification
6	External Clock Input	
6.1	Bit rate	2488.32Mbit/s ±100ppm
6.2	Level	$0.8 \pm 0.3 V_{pp}$
6.3	Connector	SMA 50Ω
7	Clock Sync Output	
7.1	Frequency	155.52MHz ±100ppm
7.2	Level	ECL（AC)
7.3	Connector	SMA 50Ω
8	Receive Clock Output	
8.1	Frequency	2488.32MHz ±100ppm
8.2	Level	ECL（AC）
8.3	Connector	SMA 50Ω

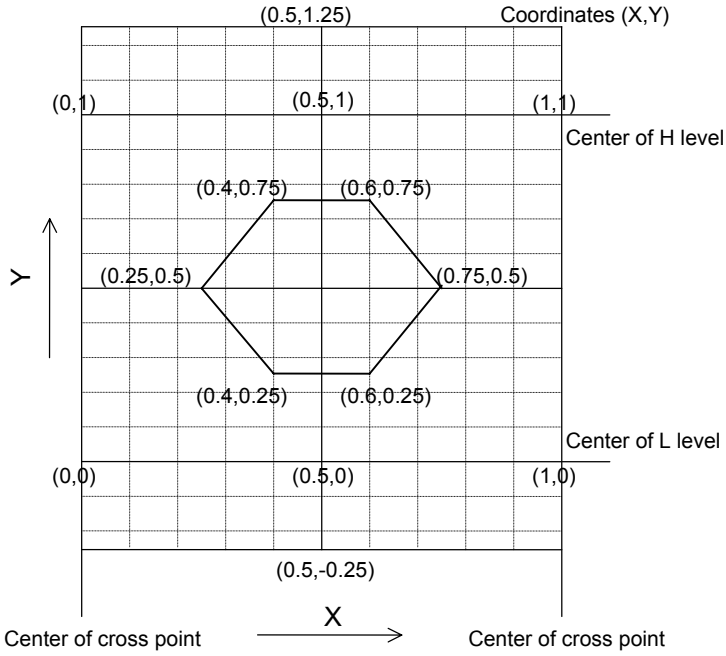
Item No.	Item	Specification
9	Optical functions	
9.1	Transmission bandwidth selection	Selection of Wide or Narrow
9.2	Optical input power measurement	-
9.2.1	Measurement rage	- 30 to - 9 dBm (1310/1550 nm, peak power)
9.2.2	Absolute accuracy	± 2 dB or less (at - 20 dBm, 1310/1550 nm)
9.2.3	Linearity	± 2 dB or less (at - 30 to - 9 dBm, 1330/1550 nm)
9.3	Optical output control	The key switch is used to control the emission of an optical output.
9.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
9.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
9.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 9.3.1, 9.3.2, or 9.3.3 is performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
9.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
9.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

Item No.	Item	Specification
10	Electrical functions	
10.1	Mapping	See "1.5 Mapping Route Measurable When Installing the 2.5G Unit".
10.2	Through	Passes the received 2.5G signal to the transmitter section, as it is.
10.3	Error Insertion	Refer to MP1570A Operation Manual Vol.1.
10.4	Alarm Addition	Refer to MP1570A Operation Manual Vol.1.
10.5	OH Preset	SOH/TOH : #1 SDH/SONET: Uses the value set in the #1 main frame. #2 to #16: Presets all bytes except for B1, H1, H2, H3, and C1. Sets common values for #2 to #16. A value that identifies a channel can be set in C1.
10.6	Error Measurement	Refer to MP1570A Operation Manual Vol.1
10.7	Alarm Measurement Measurement range	Refer to MP1570A Operation Manual Vol.1

Item No.	Item	Specification
10.8	Performance	Satisfies ITU-T G.826. B1 : EB, ES, SES, BBE, ESR, SESR, BBER, US B2 : EB, ES, SES, BBE, ESR, SESR, BBER, US Measurement range : EB, ES, SES, BBE, US 0 to 999999, 1.0E06 to 9.9E15, >9.9E15 (Over flow) ESR, SESR, BBER 1.0E-15 to 9.9E-01, 1.0E-00, <1.0E-15 (Under flow) Values 0 (EB, ES, SES, BBE, or US) and 1.0E-00 (ESR, SESR, or BBER) are ser during one second after the start of measurement.
10.9	Alarm detection/release conditions	LOS Detection : Optical input loss Release : 2 frames OOF Detection : 4 frames Release : 2 frames MS-AIS/AIS-L Detection : 5 frames of b678 = 111 of K2 Release : 5 frames of bits other than b678 = 111 of K2 Sync. Detection : 10000-bit error in 99968 bits (non-frame) Release : No error in 64-bit succession
10.10	Monitor	K1, K2 bytes, AU/STS pointer, SOH/TOH 9 × 9 bytes, Path trace
10.11	Clock	Refer to MP1570A Operation Manual Vol.1.
10.12	Clock Loss detection	Detects clock loss for External Clock.
10.13	Framed/Unframed	PRBS 2^{23}-1 (Option 02 installed)

<table>
<tr><th>Item No.</th><th>Item</th><th>Specification</th></tr>
<tr><td>11
11.1</td><td>Jitter
Output jitter</td><td>
<table>
<tr><th rowspan="2">Bit rate</th><th rowspan="2">Range</th><th>Additional error (UIPP)</th></tr>
<tr><th>* SDH/SONET internal signal</th></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.110
2.2</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping, Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to – 10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm
<table>
<tr><th rowspan="2">Bit rate</th><th rowspan="2">Range</th><th>Additional error (UIrms)</th></tr>
<tr><th>* SDH/SONET internal signal</th></tr>
<tr><td>2488.32M</td><td>2UI
32UI</td><td>0.027
0.55</td></tr>
</table>
Filter : HP1+LP
* SDH/SONET internal signal: VC4/STS3cSPE mapping, Info : PRBS 2^{23}-1,
Scramble "ON", + 10°C to + 40°C at input level -12 to – 10 dBm. Additional 0.01 UIpp/dB with input level < -12 dBm</td></tr>
<tr><td>11.2</td><td>Jitter tolerance</td><td>


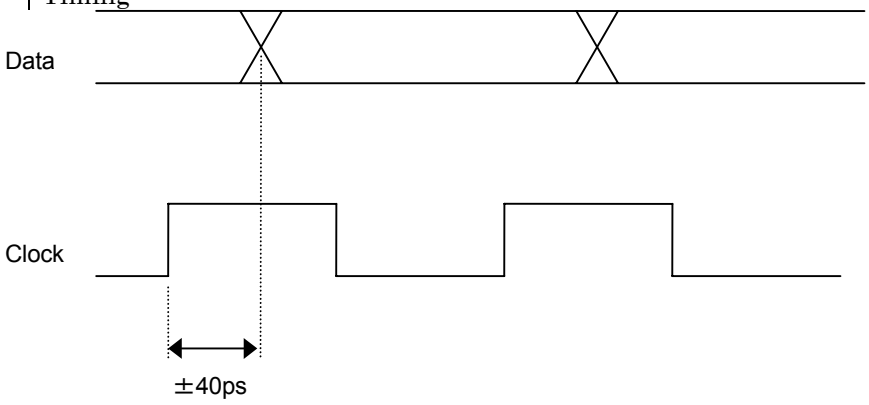
<table>
<tr><th rowspan="2">Bit rate</th><th colspan="6">Jitter frequency [Hz]</th></tr>
<tr><th>f6</th><th>f7</th><th>f1</th><th>f2</th><th>f3</th><th>f4</th></tr>
<tr><td>2.5Gbit/s</td><td>10</td><td>12.1</td><td>5K</td><td>100K</td><td>1M</td><td>20M</td></tr>
</table>
Measurement condition
・+10 to +40°C
・Input level : -12 to -10dBm</td></tr>
</table>

Item No.	Item	Specification
12	Eye Mask	Uses the 4th Bessel Thomson filter to evaluate the waveform in accordance with the following Eye Mask specification: <Eye Mask specification> 
13	General	
13.1	Dimensions, mass	21(H)×255(W)×167.6(D)mm（Excluding projections），less than 2 kg
13.2	Operation temperature	0 to +40℃
13.3	Storage temperature	-20 to +60℃

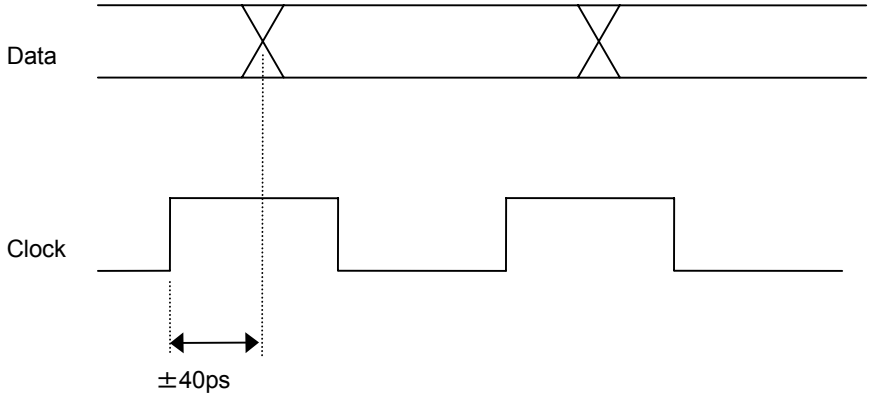
A.4 Specifications of the MU150008A 2.5G (1.31) Unit

Item No.	Item	Specification
1	Optical input signal	
1.1	Bit rate	2488.320Mbit/s±100ppm
1.2	Input signal code	NRZ
1.3	Receive optical wavelength band	1310nm band
1.4	Optical input level (PN average power)	Narrow:-27 to -9dBm(BER 1×10^{-10} or less, at 0 - 30°C) Wide :-20 to -9dBm(BER 1×10^{-10} or less,10 - 40°C)
1.5	Absolute Maximum input power	0 dBm(peak power)
1.6	Optical Input return loss	27dB or more
1.7	Connector	FC-PC(SMF)
2	Optical output signal	
2.1	Bit rate	2488.32Mbit/s±100ppm
2.2	Optical source type	1310nm band optical source : DFB-LD
2.3	Peak wavelength	1310nm band optical source : 1310nm±20nm
2.4	Wavelength width	1.0nm max. (Full width at -20dB)
2.5	Side mode suppression ratio	30dB or more
2.6	Optical output power	-4dBm±3dB (PN average power)
2.7	Output signal code	NRZ
2.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(See Item No .11)
2.9	Extinction ratio	10dB or more
2.10	Connector	FC-PC(SMF)

Item No.	Item	Specification
3	Electric input signal	
	Data input	
3.1	Bit rate	2488.320Mbit/s±100ppm
3.2	Input signal level	
	Data input mode	ECL
	Monitor input mode	0.1 to 1V(p-p)
3.3	Input signal code	NRZ
3.4	Impedance	
	Data input mode	50Ω / -2V termination
	Monitor input mode	50Ω AC
3.5	Connector	SMA
	Clock input	
3.6	Frequency	2488.320MHz±100ppm
3.7	Input signal level	ECL(50Ω / -2V termination)
3.8	Clock/Data phase	Timing
3.9	Connector	SMA



Item No.	Item	Specification
4	External clock input	
4.1	Frequency	2488.320MHz±100ppm
4.2	Impedance	50Ω AC
4.3	Connector	SMA
5	Electric output signal	
	Data output	
5.1	Bit rate	2488.320Mbit/s±100ppm
5.2	Output signal level	ECL
5.3	Output signal code	NRZ
5.4	Impedance	50Ω / -2V termination
5.5	Connector	SMA
	Clock output	
5.6	Frequency	2488.320MHz±100ppm
5.7	Output signal level	ECL
5.8	Clock/Data phase	Timing
5.9	Impedance	50Ω / -2V termination
5.10	Connector	SMA
6	Clock sync. output	
6.1	Frequency	155.520MHz±100ppm
6.2	Output signal level	ECL（50Ω AC）
6.3	Connector	SMA



Item No.	Item	Specification
7	Receive clock output	
7.1	Frequency	2488.320MHz±100ppm
7.2	Output signal level	ECL(50Ω AC)
7.3	Connector	SMA
8	Optical functions	
8.1	Transmission bandwidth selection	Selection of Wide or Narrow
8.2	Optical input power measurement	-
8.2.1	Measurement rage	- 30 to - 9 dBm (1310 nm, peak power)
8.2.2	Absolute accuracy	± 2 dB or less (at - 20 dBm, 1310 nm)
8.2.3	Linearity	± 2 dB or less (at - 30 to - 9 dBm, 1310 nm)
8.3	Optical output control	The key switch is used to control the emission of an optical output.
8.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
8.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
8.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 8.3 and 8.4 are performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
8.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
8.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

Item No.	Item	Specification
9	Electric functions)	
9.1	Mapping	See "1.5 Mapping Route Measurable When Installing the
9.2	Concatenation mapping	2.5G Unit".
9.3	Through mode	Only when Tx&Rx mode
	Bit rate	2488.320Mbit/s
	Mode	Transparent through, OH overwrite, Payload overwrite, add/drop
9.4	Insert/Extract mode	Inserts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals (inputted from an external equipment) into the STM-N (N = 16)/ STS-N (N = 48) signals. Extracts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals from the STM-N (N = 16)/ STS-N (N = 48) signals, and then outputs them. At that time, B1 and B2 are re-calculated.
	Bit rate	STM-1/STS-3
	Interface	STM-1/STS-3
9.5	CID mode	
	all"0"/all"1"	0 to 100Bytes, all"0"/all"1" alternate
	PN pattern	PN7 In the CID mode, the scrambler of STM-16/STS48 stops.
	Measurement	LOS, LOF, Syncloss, Bit
9.6	Test Pattern (Non-Frame, Concatenation)	Refer to MP1570A Operation Manual Vol.1.
9.7	Error addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	

Item No.	Item	Specification
9.8	Alarm addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	
9.9	OH preset data	SOH/TOH : All bytes other than B1,B2, H1, H2, and H3 VC3/STS1 POH, VC4/STS3 POH : All bytes other than B3 VC1/VT POH : All bytes other than BIP-2 - They can be set in plain languages or bit.
9.10	Pointer setting (Dummy Channel)	AU/STS pointer : 522 (fixed) SS : 00 to 11 TU/VT pointer : 0 (fixed) SS : 00 to 11
9.11	Path Trace (Dummy Channel)	J1,J2 (with or without CRC7) inserted in the TX side ASCII code (64bytes)
9.12	Pay Load (Dummy channel)	
	Mode	Copy / Dummy
	Dummy Pattern	all"0", all"1", PN11, PN15
		1)Dummy channel of STM1/STS3 with a measurement channel has the mapping up to the same level as the measurement channel. 2)Dummy channel of STM1/STS3 without measurement channel has the mapping up to bulk of the same level as the measurement channel
	☆In-service	
9.13	Error measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.
9.14	Alarm measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.15	Performance (In-service)	G826(SDH/SONET) : B1, B2, B3, BIP-2, MS-REI/REI-L, HP-REI/REI-P, LP-REI/REI-V measurement range ES, SES, ESR, SESR, BBER, US, BBE, SDP : 0 to 999999, 1.0E06 to 9.9E15, 9.9E15
	☆Out-of-service	
9.16	Error measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.17	Alarm measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.18	Performance (Out-of-service)	G826 : B1, B2, B3, MS-REI/REI-L measurement range : ES, SES, ESR, SESR, BBER, US, BBE, SDP - 0 to 999999, 1.0E06 to 9.9E15, > 9.9E15

Item No.	Item	Specification
9.19	Detection・Release conditions	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.20	OH test	Refer to MP1570A Operation Manual Vol.1.
9.20.1	OH monitor	SOH/TOH of the specified channel or payload 9×9 bytes
9.20.2	OH capture Depth Setting Trigger Out Trigger In Trigger point	SOH/TOH and POH 1byte is inputted by a trigger shown below (Trigger In). 1023byte SOH/TOH or POH : 1byte Measurable error/alarm - including error/alarm of SDH/SONET - 1 to 1023 are settable.
9.20.3	OH change Timing	SOH/TOH or POH1byte,RSOH,MSOH,SOH/TOH,POH (except for B1, B2, B3, and BIP-2) A-pattern : 1 to 64frames, B-pattern : 1 to 64frames Alternative : A=1 to 8000, B=1 to 8000
9.20.4	OH BERT Test pattern	SOH/TOH or POH1byte (except for B1, B2, B3, and BIP-2) Pattern : OFF, 2^{11}-1,2^{15}-1(INV)
9.20.5	OH add/drop	SOH/TOH or POH1byte (except for the add of B1, B2, B3, and BIP-2) Setting : ON/OFF
9.21	Delay measurement	
9.21.1	Measurement period	0.5, 1, 2, 5, 10s (for concatenation) 0.5, 1.0s (Except for Concatenation)
9.21.2	measurement range	0 to 999 μs, 1.0 to 999.9ms, 1.0 to 10.0s, >Timeout
9.21.3	Accuracy	±5 μs at period = 0.5/1 s, ±50 μs at 2/5/10 s

Item No.	Item	Specification
9.22	Frame memory (TX)	
	Memory size	STM-16/STS48×64frame (2.5Mbytes)
	Configuration	A frame : length(1 to 64 frames)×repeat(1 to 8000 frames) B frame : length(63 to 0 frames)×repeat(1 to 8000 frames)
	OH pattern	Copies OH preset data to all frames, user program
	Payload pattern	all"0" , all"1", Playback（outputs the captured data）
	Parity	B1 and B2 are automatically calculated. Adding concatenation B3: on/off
	Error addition	FAS, Bit all, B1, B2, B3, MS-REI/REI-L
	Alarm addition	LOS, LOF, MS-AIS/AIS-L, MS-RDI/RDI-L
	K1,K2setting	Same as (SDH/SONET)
	Pointer setting	Same as (SDH/SONET)
	Path trace setting	Same as (SDH/SONET)
9.23	Frame capture (RX)	
	Memory size	STM-16/STS48×64frames (2.5Mbytes)
	Trigger	Measurable error/alarm alarm K1／K2 : same/not same trigger (16bit mask, possible) NDF, +PJC, -PJC, 3cons, manual, External
	Trigger point	1 to 64 (32)

Item No.	Item	Specification

9.24 Jitter

9.24.1 Output jitter

Bit rate(bit/s)	range	Additional error (UIp-p) *SDH Internal	
		HP1+LP	HP2+LP
		Spec.	Spec.
2488.320M	2UI	0.10	0.05
	32UI	2.2	1.1

*SDH/SONET Internal : VC4-16c/STS48c , Info : PRBS 2^{23}-1, HP1 + LP, HP2+LP,Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.01UIp-p/dB with input level < -12dBm

Bit rate(bit/s)	range	Additional error (UIrms) *SDH Internal
		Spec.
2488.320M	2UI	0.027
	32UI	0.55

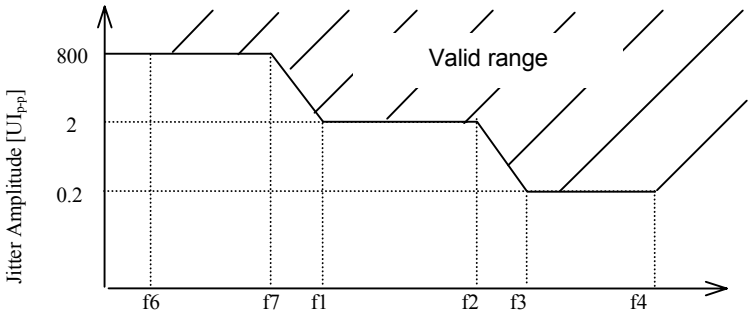
*SDH/SONET Internal : VC4-16c/STS48c , Info : PRBS 2^{23}-1, HP + LP, Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.002UIrms/dB with input level < -12dBm

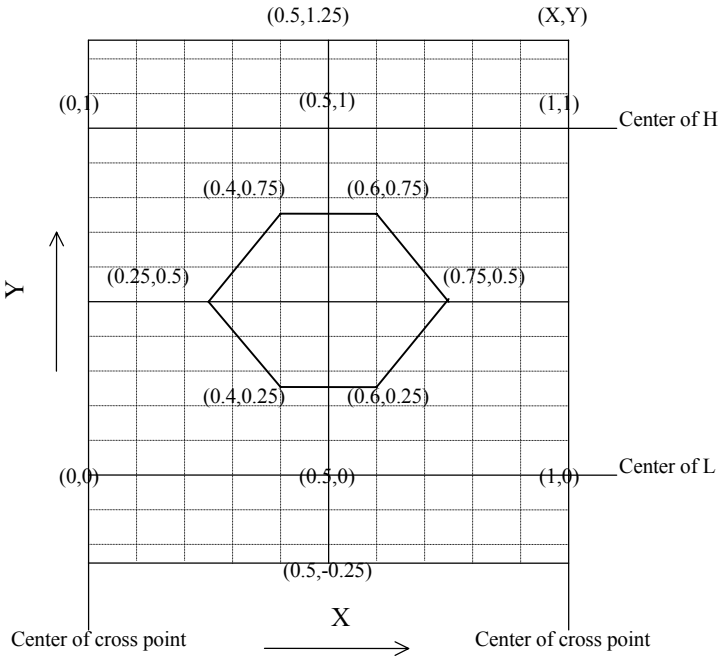
9.24.2 Jitter tolerance



measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Narrow

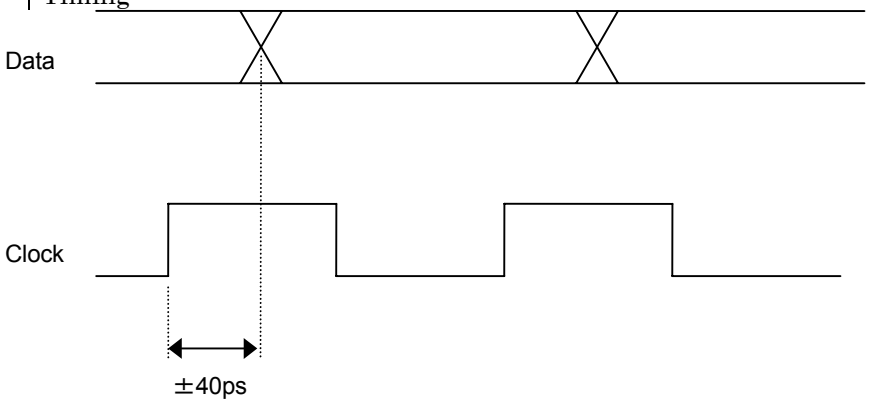
Bit Rate	Jitter Frequency [Hz]					
	f6	f7	f1	f2	f3	f4
2.5Gbit/s	10	12.1	5K	100K	1M	20M

Item No.	Item	Specification
10	General	
10.1	Dimensions, mass	21mm(H)× 255mm(W)× 167.6mm(D) (Excluding projections) Less than 2.0kg
10.2	Operation temperature	0 to +40℃
10.3	Storage temperature	-20 to +60℃
11	Eye mask (in using 4th Bessel LPF)	

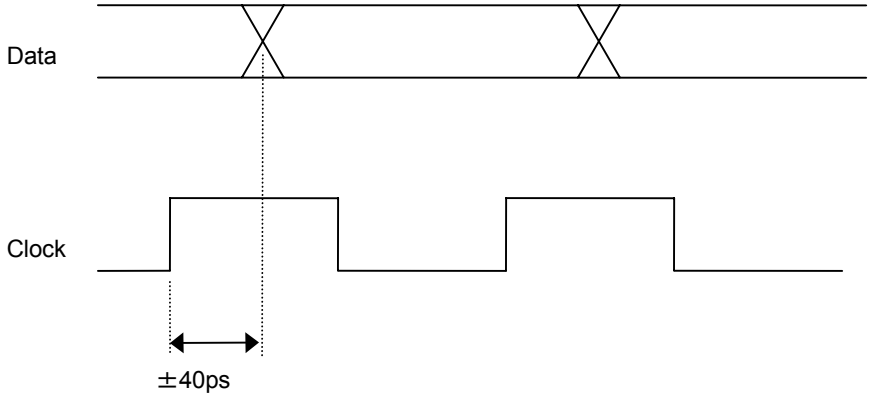
A.5 Specifications of the MU150009A 2.5G (1.55) Unit

Item No.	Item	Specification
1	Optical input signal	
1.1	Bit rate	2488.320Mbit/s±100ppm
1.2	Input signal code	NRZ
1.3	Receive optical wavelength band	1550nm band
1.4	Optical input level (PN average power)	Narrow:-27 to -9dBm(BER 1×10^{-10} or less, at 0 - 30°C) Wide :-20 to -9dBm(BER 1×10^{-10} or less,10 - 40°C)
1.5	Absolute Maximum input power	0 dBm(peak power)
1.6	Optical Input return loss	27dB or more
1.7	Connector	FC-PC(SMF)
2	Optical output signal	
2.1	Bit rate	2488.32Mbit/s±100ppm
2.2	Optical source type	1550nm band optical source : DFB-LD
2.3	Peak wavelength	1550nm band optical source : 1550nm±20nm
2.4	Wavelength width	1.0nm max. (Full width at -20dB)
2.5	Side mode suppression ratio	30dB or more
2.6	Optical output power	-4dBm±3dB (PN average power)
2.7	Output signal code	NRZ
2.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(see Item No .11)
2.9	Extinction ratio	10dB or more
2.10	Connector	FC-PC(SMF)

Item No.	Item	Specification
3	Electric input signal Data input	
3.1	Bit rate	2488.320Mbit/s±100ppm
3.2	Input signal level	
	Data input mode	ECL
	Monitor input mode	0.1 to 1V(p-p)
3.3	Input signal code	NRZ
3.4	Impedance	
	Data input mode	50Ω / -2V termination
	Monitor input mode	50Ω AC
3.5	Connector	SMA
	Clock input	
3.6	Frequency	2488.320MHz±100ppm
3.7	Input signal level	ECL(50Ω / -2V termination)
3.8	Clock/Data phase	Timing
3.9	Connector	SMA



Item No.	Item	Specification
4	External clock input	
4.1	Frequency	2488.320MHz±100ppm
4.2	Impedance	50Ω AC
4.3	Connector	SMA
5	Electric output signal Data output	
5.1	Bit rate	2488.320Mbit/s±100ppm
5.2	Output signal level	ECL
5.3	Output signal code	NRZ
5.4	Impedance	50Ω / -2V termination
5.5	Connector	SMA
5.6	Clock output	2488.320MHz±100ppm
5.7	Frequency Output signal level	ECL
5.8	Clock/Data phase	Timing
5.9	Impedance	50Ω / -2V termination
5.10	Connector	SMA
6	Clock sync. output	
6.1	Frequency	155.520MHz±100ppm
6.2	Output signal level	ECL（50Ω AC）
6.3	Connector	SMA



Item No.	Item	Specification
7	Receive clock output	
7.1	Frequency	2488.320MHz±100ppm
7.2	Output signal level	ECL(50Ω AC)
7.3	Connector	SMA
8	Optical functions	
8.1	Transmission bandwidth selection	Selection of Wide or Narrow
8.2	Optical input power measurement	-
8.2.1	Measurement rage	- 30 to - 9 dBm (1550 nm, peak power)
8.2.2	Absolute accuracy	± 2 dB or less (at - 20 dBm, 1550 nm)
8.2.3	Linearity	± 2 dB or less (at - 30 to - 9 dBm, 1550 nm)
8.3	Optical output control	The key switch is used to control the emission of an optical output.
8.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
8.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
8.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 8.3 and 8.4 are performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
8.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
8.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

Item No.	Item	Specification
9	Electric functions)	
9.1	Mapping	See "1.5 Mapping Route Measurable When Installing the 2.5G Unit".
9.2	Concatenation mapping	
9.3	Through mode	Only when Tx&Rx mode
	Bit rate	2488.320Mbit/s
	Mode	Transparent through, OH overwrite, Payload overwrite, add/drop
9.4	Insert/Extract mode	Inserts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals (inputted from an external equipment) into the STM-N (N = 16)/ STS-N (N = 48) signals. Extracts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals from the STM-N (N = 16)/ STS-N (N = 48) signals, and then outputs them. At that time, B1 and B2 are re-calculated.
	Bit rate	STM-1/STS-3
	Interface	STM-1/STS-3
9.5	CID mode	
	all"0"/all"1"	0 to 100Bytes, all"0"/all"1" alternate
	PN pattern	PN7 In the CID mode, the scrambler of STM-16/STS-48 stops.
	Measurement	LOS, LOF, Syncloss, Bit
9.6	Test Pattern (Non-Frame, Concatenation)	Refer to MP1570A Operation Manual Vol.1.
9.7	Error addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	

Item No.	Item	Specification
9.8	Alarm addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	
9.9	OH preset data	SOH/TOH : All bytes other than B1,B2, H1, H2, and H3 VC3/STS1 POH, VC4/STS3 POH : All bytes other than B3 VC1/VT POH : All bytes other than BIP-2 - They can be set in plain languages or bit.
9.10	Pointer setting (Dummy Channel)	AU/STS pointer : 522 (fixed) SS : 00 to 11 TU/VT pointer : 0 (fixed) SS : 00 to 11
9.11	Path Trace (Dummy Channel)	J1,J2 (with or without CRC7) inserted in the TX side ASCII code (64byte)
9.12	Pay Load (Dummy channel)	
	Mode	Copy / Dummy
	Dummy Pattern	all"0", all"1", PN11, PN15
		1)Dummy channel of STM1/STS3 with a measurement channel has the mapping up to the same level as the measurement channel. 2)Dummy channel of STM1/STS3 without measurement channel has the mapping up to bulk of the same level as the measurement channel
	☆In-service	
9.13	Error measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.
9.14	Alarm measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.15	Performance (In-service)	G826(SDH/SONET) : B1, B2, B3, BIP-2, MS-REI/REI-L, HP-REI/REI-P, LP-REI/REI-V measurement range ES SES ESR SESR BBER US BBE SDP } 0 to 999999, 1.0E06 to 9.9E15, 9.9E15
	☆Out-of-service	
9.16	Error measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.17	Alarm measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.18	Performance (Out-of-service)	G826 : B1, B2, B3, MS-REI/REI-L measurement range : ES, SES, ESR, SESR, BBER, US, BBE, SDP - 0 to 999999, 1.0E06 to 9.9E15, > 9.9E15

Item No.	Item	Specification
9.19	Detection・Release conditions	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.20	OH test	Refer to MP1570A Operation Manual Vol.1.
9.20.1	OH monitor	SOH/TOH of the specified channel or payload 9×9 bytes
9.20.2	OH capture Depth Setting Trigger Out Trigger In Trigger point	SOH/TOH or POH 1byte is inputted by a trigger shown below (Trigger In). 1023bytes SOH/TOH or POH :1byte Measurable error/alarm - including error/alarm of SDH/SONET - 1 to 1023 are settable.
9.20.3	OH change Timing	SOH/TOH or POH1byte,RSOH,MSOH,SOH/TOH,POH (except for B1, B2, B3, and BIP-2) A-pattern : 1 to 64frames, B-pattern : 1 to 64frames Alternative : A=1 to 8000, B=1 to 8000
9.20.4	OH BERT Test pattern	SOH/TOH or POH1byte (except for B1, B2, B3, and BIP-2) Pattern : OFF, 2^{11}-1,2^{15}-1(INV)
9.20.5	OH add/drop	SOH/TOH or POH1byte (except for the add of B1, B2, B3, and BIP-2) Setting : ON/OFF
9.21	Delay measurement	
9.21.1	Measurement period	0.5, 1, 2, 5, 10s (for concatenation) 0.5, 1.0s (Except for Concatenation)
9.21.2	measurement range	0 to 999 μs, 1.0 to 999.9ms, 1.0 to 10.0s,＞Timeout
9.21.3	Accuracy	±5 μs at period = 0.5/1 s, ±50 μs at 2/5/10 s

Item No.	Item	Specification
9.22	Frame memory (TX)	
	Memory size	STM-16/STS48×64frames (2.5Mbytes)
	Configuration	A frame : length(1 to 64 frames)×repeat(1 to 8000 frames) B frame : length(63 to 0 frames)×repeat(1 to 8000 frames)
	OH pattern	Copies OH preset data to all frames, user program
	Payload pattern	all"0" , all"1", Playback（outputs the captured data）
	Parity	B1 and B2 are automatically calculated. Adding concatenation B3: on/off
	Error addition	FAS, Bit all, B1, B2, B3, MS-REI/REI-L
	Alarm addition	LOS, LOF, MS-AIS/AIS-L, MS-RDI/RDI-L
	K1,K2setting	Same as (SDH/SONET)
	Pointer setting	Same as (SDH/SONET)
	Path trace setting	Sane as (SDH/SONET)
9.23	Frame capture (RX)	
	Memory size	STM-16/STS48×64frames (2.5Mbytes)
	Trigger	Measurable error/alarm alarm K1／K2 : same/not same trigger (16bit mask, possible) NDF, +PJC, -PJC, 3cons, manual, External
	Trigger point	1 to 64 (32)

Item No.	Item	Specification
9.24 9.24.1	Jitter Output jitter	

Bit rate(bit/s)	range	Additional error (UIp-p) *SDH Internal	
		HP1+LP Spec.	HP2+LP Spec.
2488.320M	2UI	0.10	0.05
	32UI	2.2	1.1

*SDH/SONET Internal : VC4-16c/STS48c , Info : PRBS 2^{23}-1, HP1 + LP, HP2+LP,Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.01UIp-p/dB with input level < -12dBm

Bit rate(bit/s)	range	Additional error (UIrms) *SDH Internal
		spec.
2488.320M	2UI	0.027
	32UI	0.55

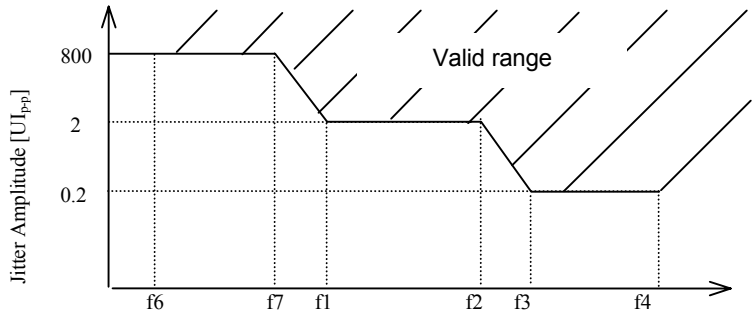
*SDH/SONET Internal : VC4-16c/STS48c , Info : PRBS 2^{23}-1, HP + LP, Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.002UIrms/dB with input level < -12dBm

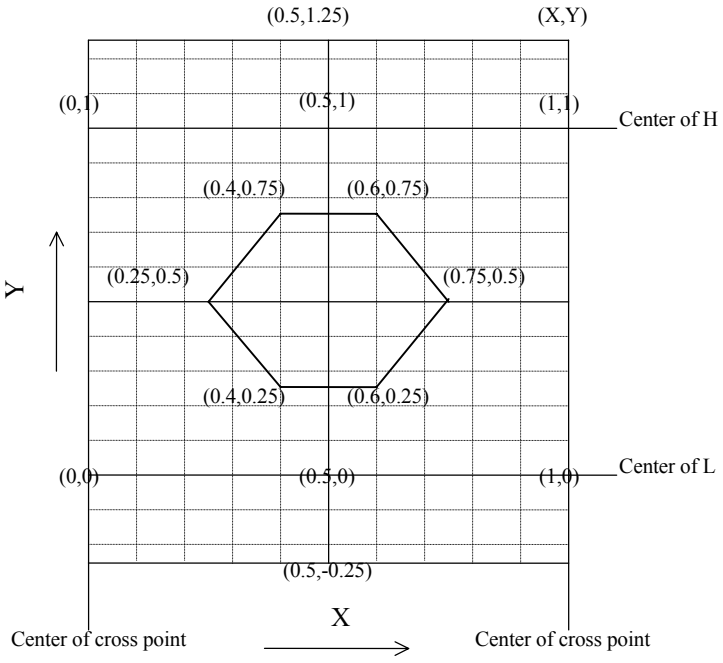
9.24.2 Jitter tolerance



measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Narrow

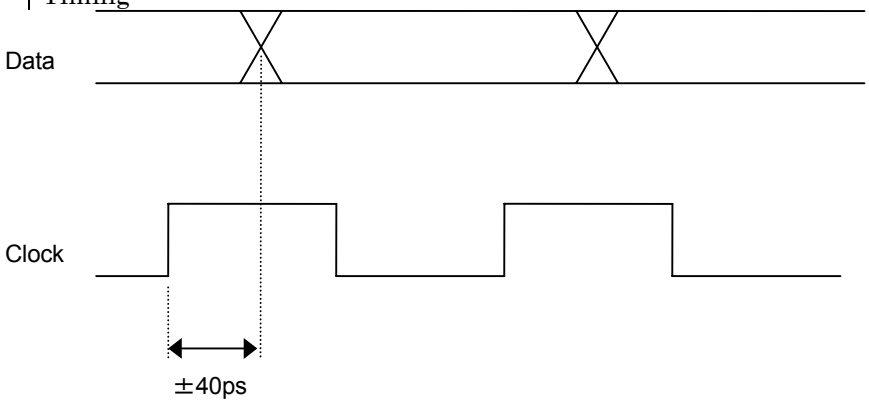
Bit Rate	Jitter Frequency [Hz]					
	f6	f7	f1	f2	f3	f4
2.5Gbit/s	10	12.1	5K	100K	1M	20M

Item No.	Item	Specification
10	General	
10.1	Dimensions, mass	21mm(H)× 255mm(W)× 167.6mm(D) (Excluding projections) Less than 2.0kg
10.2	Operation temperature	0 to +40°C
10.3	Storage temperature	-20 to +60°C
11	Eye mask (in using 4th Bessel LPF)	

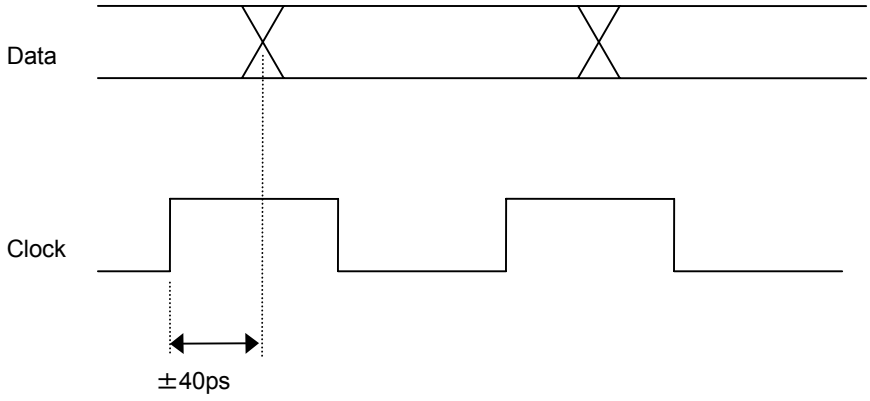
A.6 Specifications of the MU150010A 2.5G (1.31/1.55) Unit

Item No.	Item	Specification
1	Optical input signal	
1.1	Bit rate	2488.320Mbit/s±100ppm
1.2	Input signal code	NRZ
1.3	Receive optical wavelength band	1310/1550nm band
1.4	Optical input level (PN average power)	Narrow:-27 to -9dBm(BER 1×10^{-10}or less, at 0 - 30°C) Wide :-20 to -9dBm(BER 1×10^{-10}or less,10 - 40°C)
1.5	Absolute Maximum input power	0 dBm(peak power)
1.6	Optical Input return loss	27dB or more
1.7	Connector	FC-PC(SMF)
2	Optical output signal	
2.1	Bit rate	2488.32Mbit/s±100ppm
2.2	Optical source type	1310nm band optical source : DFB-LD 1550nm band optical source : DFB-LD
2.3	Peak wavelength	1310nm band optical source : 1310nm±20nm 1550nm band optical source : 1550nm±20nm
2.4	Wavelength width	1.0nm max. (Full width at -20dB)
2.5	Side mode suppression ratio	30dB or more
2.6	Optical output power	-4dBm±3dB (PN average power)
2.7	Output signal code	NRZ
2.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(See Item No .11.)
2.9	Extinction ratio	10dB or more
2.10	Connector	FC-PC(SMF)

Item No.	Item	Specification
3	Electric input signal Data input	
3.1	Bit rate	2488.320Mbit/s±100ppm
3.2	Input signal level	
	Data input mode	ECL
	Monitor input mode	0.1 to 1V(p-p)
3.3	Input signal code	NRZ
3.4	Impedance	
	Data input mode	50Ω / -2V termination
	Monitor input mode	50Ω AC
3.5	Connector	SMA
3.6	Clock input	
	Frequency	2488.320MHz±100ppm
3.7	Input signal level	ECL(50Ω / -2V termination)
3.8	Clock/Data phase	Timing
3.9	Connector	SMA



Item No.	Item	Specification
4	External clock input	
4.1	Frequency	2488.320MHz±100ppm
4.2	Impedance	50Ω AC
4.3	Connector	SMA
5	Electric output signal Data output	
5.1	Bit rate	2488.320Mbit/s±100ppm
5.2	Output signal level	ECL
5.3	Output signal code	NRZ
5.4	Impedance	50Ω / -2V termination
5.5	Connector	SMA
5.6	Clock output Frequency	2488.320MHz±100ppm
5.7	Output signal level	ECL
5.8	Clock/Data phase	Timing
5.9	Impedance	50Ω / -2V termination
5.10	Connector	SMA
6	Clock sync. output	
6.1	Frequency	155.520MHz±100ppm
6.2	Output signal level	ECL（50Ω AC）
6.3	Connector	SMA



Item No.	Item	Specification
7	Receive clock output	
7.1	Frequency	2488.320MHz±100ppm
7.2	Output signal level	ECL(50Ω AC)
7.3	Connector	SMA
8	Optical functions	
8.1	Transmission bandwidth selection	Selection of Wide or Narrow
8.2	Optical input power measurement	-
8.2.1	Measurement rage	- 30 to - 9 dBm (1310/1550 nm, peak power)
8.2.2	Absolute accuracy	± 2 dB or less (at - 20 dBm, 1310/1550 nm)
8.2.3	Linearity	± 2 dB or less (at - 30 to - 9 dBm, 1330/1550 nm)
8.3	Optical output control	The key switch is used to control the emission of an optical output.
8.4	Laser remote interlock	When the laser remote interlock terminal is opened, the optical output is forcibly turned off.
8.5	Optical output power detection	Power detection threshold value: - 6 to - 8 dB range of ordinary operation power When the optical output power exceeds the threshold value, the lamp comes on. When the optical output power falls below the threshold value, the lamp goes off.
8.6	Optical output delayed transmission	When the on-operation of optical output power of the function described in Item 9.3.1, 9.3.2, or 9.3.3 is performed, the display comes on. When the optical output light is emitted several seconds after the optical output power is turned on, the display comes on.
8.7	Laser safety standard	21 CFR1040.10 : CLASSⅢb IEC 60825-1 : CLASS 1
8.8	INPUT LOS detection	Detects an input loss (at - 40 to - 35 dBm or without data signal input).

Item No.	Item	Specification
9	Electric functions)	
9.1	Mapping	See "1.5 Mapping Route Measurable When Installing the
9.2	Concatenation mapping	2.5G Unit".
9.3	Through mode	Only when Tx&Rx mode
	Bit rate	2488.320Mbit/s
	Mode	Transparent through, OH overwrite, Payload overwrite, add/drop
9.4	Insert/Extract mode	Inserts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals (inputted from an external equipment) into the STM-N (N = 16)/ STS-N (N = 48) signals. Extracts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals from the STM-N (N = 16)/ STS-N (N = 48) signals, and then outputs them. At that time, B1 and B2 are re-calculated.
	Bit rate	STM-1/STS-3
	Interface	STM-1/STS-3
9.5	CID mode	
	all"0"/all"1"	0 to 100Byte , all"0"/all"1" alternate
	PN pattern	PN7 In the CID mode, the scrambler of STM-16/STS48 stops.
	Measurement	LOS, LOF, Syncloss, Bit
9.6	Test Pattern (Non-Frame, Concatenation)	Refer to MP1570A Operation Manual Vol.1.
9.7	Error addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	

Item No.	Item	Specification
9.8	Alarm addition	Refer to MP1570A Operation Manual Vol.1.
	Timing	
9.9	OH preset data	SOH : All bytes other than B1,B2, H1, H2, and H3 VC3/STS1 POH, VC4/STS3 POH : All bytes other than B3 VC1/VT POH : All bytes other than BIP-2 - They can be set in plain languages or bit.
9.10	Pointer setting (Dummy Channel)	AU/STS pointer : 522 (fixed) SS : 00 to 11 TU/VT pointer : 0 (fixed) SS : 00 to 11
9.11	Path Trace (Dummy Channel)	J1,J2 (with or without CRC7) inserted in the TX side ASCII code (64byte)
9.12	Pay Load (Dummy channel)	
	Mode	Copy / Dummy
	Dummy Pattern	all"0", all"1", PN11, PN15
		1)Dummy channel of STM1/STS3 with a measurement channel has the mapping up to the same level as the measurement channel. 2)Dummy channel of STM1/STS3 without measurement channel has the mapping up to bulk of the same level as the measurement channel
	☆In-service	
9.13	Error measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.
9.14	Alarm measurement (In-service)	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.15	Performance (In-service)	G826(SDH/SONET) : B1, B2, B3, BIP-2, MS-REI/REI-L, HP-REI/REI-P, LP-REI/REI-V measurement range ES, SES, ESR, SESR, BBER, US, BBE, SDP : 0 to 999999, 1.0E06 to 9.9E15, 9.9E15
	☆Out-of-service	
9.16	Error measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.17	Alarm measurement (Out-of-service)	Refer to MP1570A Operation Manual Vol.1.
9.18	Performance (Out-of-service)	G826 : B1, B2, B3, MS-REI/REI-L measurement range : ES, SES, ESR, SESR, BBER, US, BBE, SDP - 0 to 999999, 1.0E06 to 9.9E15, > 9.9E15

Item No.	Item	Specification
9.19	Detection・Release conditions	Refer to MP1570A Operation Manual Vol.1.

Item No.	Item	Specification
9.20	OH test	Refer to MP1570A Operation Manual Vol.1.
9.20.1	OH monitor	SOH/TOH of the specified channel or payload 9×9 bytes
9.20.2	OH capture Depth Setting Trigger Out Trigger In Trigger point	SOH/TOH or POH 1byte is inputted by a trigger shown below (Trigger In). 1023byte SOH/TOH or POH 1byte Measurable error/alarm - including error/alarm of SDH/SONET - 1 to 1023 are settable.
9.20.3	OH change Timing	SOH/TOH or POH1byte,RSOH,MSOH,SOH,POH (except for B1, B2, B3, and BIP-2) A-pattern : 1 to 64frame , B-pattern : 1 to 64frame Alternative : A=1 to 8000 , B=1 to 8000
9.20.4	OH BERT Test pattern	SOH/TOH or POH1byte (except for B1, B2, B3, and BIP-2) Pattern : OFF, 2^{11}-1,2^{15}-1(INV)
9.20.5	OH add/drop	SOH/TOH or POH1byte (except for the add of B1, B2, B3, and BIP-2) Setting : ON/OFF
9.21	Delay measurement	
9.21.1	Measurement period	0.5, 1, 2, 5, 10s (for concatenation) 0.5, 1.0s (Except for Concatenation)
9.21.2	Measurement range	0 to 999 μs, 1.0 to 999.9ms, 1.0 to 10.0s,＞Timeout
9.21.3	Accuracy	±5 μs at period = 0.5/1 s, ±50 μs at 2/5/10 s

Item No.	Item	Specification
9.22	Frame memory (TX)	
	Memory size	STM-16/STS48×64frames (2.5Mbytes)
	Configuration	A frame : length(1 to 64 frames)×repeat(1 to 8000 frames) B frame : length(63 to 0 frames)×repeat(1 to 8000 frames)
	OH pattern	Copies OH preset data to all frames, user program
	Payload pattern	all"0" , all"1", Playback（outputs the captured data）
	Parity	B1 and B2 are automatically calculated. Adding concatenation B3: on/off
	Error addition	FAS, Bit all, B1, B2, B3, MS-REI/REI-L
	Alarm addition	LOS, LOF, MS-AIS/AIS-L, MS-RDI/RDI-L
	K1,K2setting	Same as (SDH/SONET)
	Pointer setting	Same as (SDH/SONET)
	Path trace setting	Sane as (SDH/SONET)
9.23	Frame capture (RX)	
	Memory size	STM-16/STS48×64frames (2.5Mbytes)
	Trigger	Measurable error/alarm alarm K1／K2 : same/not same trigger (16bit mask, possible) NDF, +PJC, -PJC, 3cons, manual, External
	Trigger point	1 to 64 (32)

Item No.	Item	Specification

9.24 Jitter

9.24.1 Output jitter

Bit rate(bit/s)	range	Additional error (UIp-p) *SDH Internal	
		HP1+LP	HP2+LP
		Spec.	Spec.
2488.320M	2UI	0.10	0.05
	32UI	2.2	1.1

*SDH/SONET Internal : VC4-16c/STS48c, Info : PRBS 2^{23}-1, HP1 + LP, HP2+LP,Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.01UIp-p/dB with input level < -12dBm

Bit rate(bit/s)	range	Additional error (UIrms) *SDH Internal
		Spec.
2488.320M	2UI	0.027
	32UI	0.55

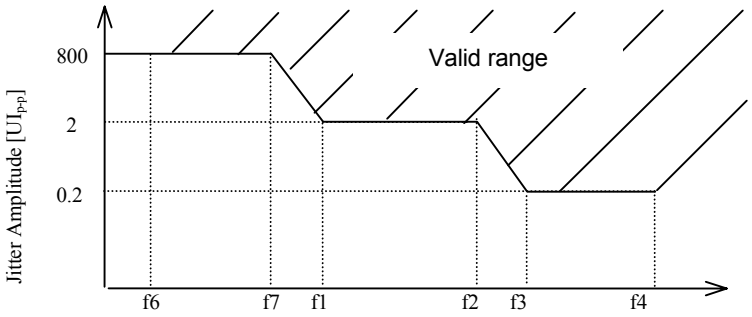
*SDH/SONET Internal : VC4-16c/STS48c , Info : PRBS 2^{23}-1, HP + LP, Scramble:ON

measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Wide

additional 0.002UIrms/dB with input level < -12dBm

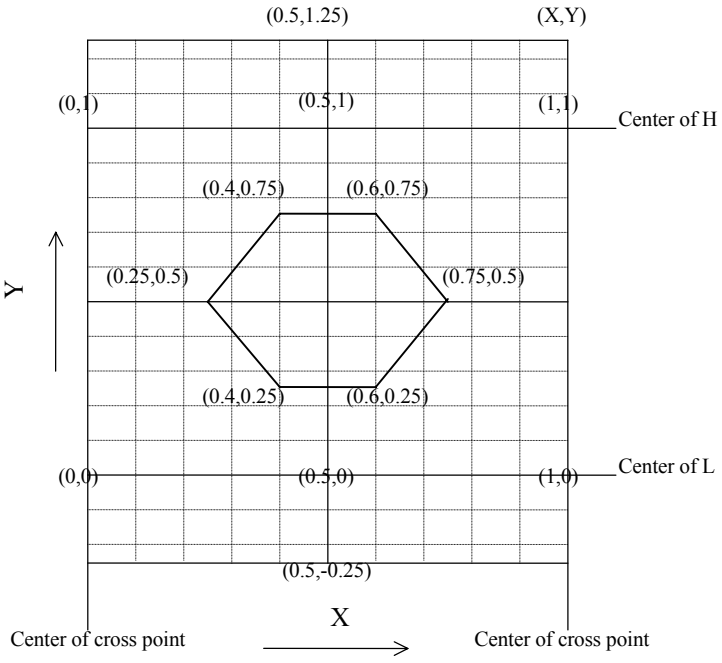
9.24.2 Jitter tolerance



measurement conditions

Input level:-12 to -10dBm, +10°C to +40°C, Narrow

Bit Rate	Jitter Frequency [Hz]					
	f6	f7	f1	f2	f3	f4
2.5Gbit/s	10	12.1	5K	100K	1M	20M

Item No.	Item	Specification
10	General	
10.1	Dimensions, mass	21mm(H)× 255mm(W)× 167.6mm(D) (Excluding projections) Less than 2.0kg
10.2	Operation temperature	0 to +40℃
10.3	Storage temperature	-20 to +60℃
11	Eye mask (in using 4th Bessel LPF)	

A.7 Specifications of MU150000A 2.5G/10G unit

	Item	Specification
1.	Electrical performance	
1.1	External interface at transmission side	
1.1.1	Clock Output	Function : 2.5GHz・10GHz clock output Frequency : 9953.28MHz 2488.32MHz (However, the accuracy varies by the clock used in Item 2.1.1.) Level : 0.65 to 1.3Vpp at H: 0 to-0.2V, L: -0.85 to -1.3V Connector : SMA Impedance : 50Ω
1.1.2	Data Output	Function : 2.5Gbit/s・10Gbit/s data output Bit rate : 9953.28Mbit/s 2488.32Mbit/s Level : 0.65 to 1.4Vpp at H: 0 to-0.2V, L: -0.85 to -1.4V Code : NRZ Connector : SMA Impedance : 50Ω Timing : 
1.1.3	Clock Sync. Output	Function : 156M synchronization output Frequency : 155.52MHz (The accuracy varies by the clock used in Item 2.1.1.) Level : ECL(AC) Connector : SMA Impedance : 50Ω
1.1.4	Internal Clock Output	Function : 10GHz Internal clock output Frequency : 9953.28MHz (However, the accuracy depends on the main unit.) Level : 0.6 to 1.0Vpp Connector : SMA Impedance : 50Ω

	Item	Specification
1.1.5	External Clock Input	Function : 2.5GHz・10GHz external clock input Frequency : 9953.28MHz±100ppm 2488.32MHz±100ppm Level : 1.0 - 0.6Vpp Connector : SMA Impedance : 50Ω
1.2	External interface at receive side	
1.2.1	Clock input	Function : 2.5GHz・10GHz clock input Frequency : 9953.28MHz±100ppm 2488.32MHz±100ppm Level : 0.65 - 1.3Vpp Connector : SMA Impedance : 50Ω
1.2.2	Data input	Function : 2.5Gbit/s・10Gbit/s data input Bit rate : 9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm Level : 0.65 - 1.4Vpp Code : NRZ Connector : SMA Impedance : 50Ω Timing : 
1.2.3	Receive clock output	Function : receive clock output (for Jitter) Frequency : Depends on the frequency from the Clock input. Level : ≥0.6Vpp Connector : SMA Impedance : 50Ω

	Item	Specification
2	Function	
2.1	Transmission function	
2.1.1	Clock	Internal, External, Receive, Lock(64k/1.5M/2M) Frequency and accuracy vary by each item: Internal : Depends on MP1570A Specifications External : Depends on the input of Item 1.1.5. Receive : Depends on the input of Item 1.2.1.
2.1.2	Frame format	Without frame, with frame, and CID pattern
2.1.2.1	Without frame	Generates the test pattern shown in Item 2.1.4.
2.1.2.2	With frame	Generates the 2.5G and 10G signals in accordance with the mapping shown in Item 2.1.3. Signals including the test channel of STM1/STM3 are received from the main unit when using STM64/STS192 and STM16/STS48. In this case, this unit generates the dummy signal of STM1/STS3.
2.1.2.3	CID pattern	Continuous 0/1 signal : 0 to 100Bytes PRB/S : 2^7-1
2.1.3	Mapping	See "1.5 Mapping Route Measurable When Installing the 2.5G Unit" and "1.6 Mapping Route Measurable When Installing the 2.5G/10G Unit".

	Item	Specification
2.1.4	Test pattern	Refer to MP1570A Operation Manual Vol.1.
2.1.5	OH preset	SOH/TOH: All bytes except for B1, B2, H1, H2, and H3 VC4/STS3 POH *1: All bytes except for B3 *1 : Corresponds to the Through function when using STM64c/STS192c and STM16c/STS48c. Set them in plain language and in the Bit unit.
2.1.6	Dummy channel	1) Dummy channel of STM1/STS3 with a measurement channel has the mapping up to the same level as the measurement channel. 2) Dummy channel of STM1/STS3 without measurement channel has the mapping up to bulk of the same level as the measurement channel.
2.1.6.1	Mode	Copy, Dummy
2.1.6.2	Dummy pattern	PRBS : 2^{11}-1, 2^{15}-1 Word : All0, All1
2.1.6.3	Dummy channel POH	VC3/STS1 POH : All bytes except for B3 VC4/STS3 POH : All bytes except for B3 VC1/VT POH : All bytes except for BIP-2
2.1.6.4	Dummy channel pointer	AU/STS pointer 522 fixed SS: 00 to 11 TU/VT pointer 0 fixed SS: 00 to 11
2.1.6.5	Dummy channel path trace	J1, J2 (with or without CRC-7) ASCII data

	Item	Specification
2.1.7	Error addition	Refer to MP1570A Operation Manual Vol.1.
2.1.7.1	Type	
2.1.7.2	Timing	
2.1.8	Alarm addition	Refer to MP1570A Operation Manual Vol.1.
2.1.8.1	Type	
2.1.8.2	Timing	
2.1.9	Insert	Inserts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals (inputted from an external equipment) into the STM-N (N = 16 or 64)/ STS-N (N = 48 or 192) signals.
2.1.9.1	Insert signal	STM1/STS3
2.1.9.2	Error/Alarm addition	For the error addition, see Item 2.1.7. For the alarm addition, see Item 2.1.8.

	Item	Specification
2.1.10	OH change	Refer to MP1570A Operation Manual Vol.1.
2.1.10.1	Selection position	Refer to MP1570A Operation Manual Vol.1.
2.1.10.2	Timing	
2.1.11	OH BERT	
2.1.11.1	Selection position	Refer to MP1570A Operation Manual Vol.1.
2.1.11.2	Pattern	
2.1.12	OH add	
2.1.12.1	Selection position	Refer to MP1570A Operation Manual Vol.1.
2.1.12.2	Setting	

	Item	Specification
2.2	Receive function	
2.2.1	Frame format	Without frame, with frame, and CID pattern
2.2.1.1	Without frame	Performs the measurement for the test pattern shown in Item 2.2.3.
2.2.1.2	With frame	Refer to MP1570A Operation Manual Vol.1.
2.2.1.3	CID pattern	Continuous 0/1 signal : 0 to 100Bytes PRB/S : 2^7-1
2.2.2	Mapping	See "1.6 Mapping Route Measurable When Installing the 2.5G/10G Unit". SDH/SONET * : SDH and SONET have the same mapping despite the name difference.

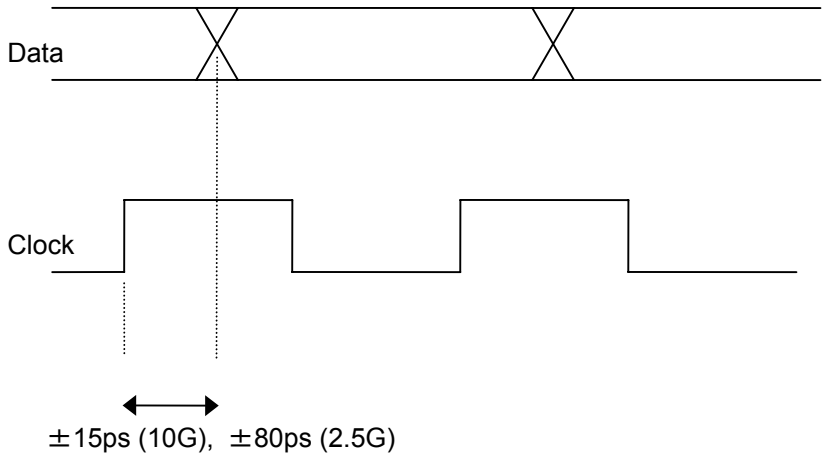
	Item	Specification
2.2.3	Test pattern	Refer to MP1570A Operation Manual Vol.1.
2.2.4	Error/Alarm measurement	
2.2.4.1	Error measurement	Refer to MP1570A Operation Manual Vol.1.
2.2.4.2	Performance	Refer to MP1570A Operation Manual Vol.1.
2.2.4.3	Alarm measurement	Refer to MP1570A Operation Manual Vol.1.

	Item	Specification
2.2.4.4	Detection/release conditions	Refer to MP1570A Operation Manual Vol.1.
2.2.5	Extract	Extracts the STM-n (n = 0 or 1)/ STS-n (n = 1 or 3) signals from the STM-N (N = 16 or 64)/ STS-N (N = 48 or 192) signals, and then outputs them.
2.2.6	OH monitor	Refer to MP1570A Operation Manual Vol.1.
2.2.7	OH Capture	Refer to MP1570A Operation Manual Vol.1.
2.2.8	OH BERT	Refer to MP1570A Operation Manual Vol.1.
2.2.9	OH Drop	Refer to MP1570A Operation Manual Vol.1.
2.3	Through	Outputs the received 2.5G and 10G signals as the transmission data.
2.3.1	Mode	Transparent Through Outputs the received data as they are as the transmission data. OH Overwrite SOH : Rewrites the received SOH to the OH Preset. POH : Rewrites the received POH to the OH Preset. All : Rewrites the received SOH/TOH or POH to the OH Preset. K1/K2 : Rewrites the received K1/K2 bytes to the Manual setting or APS programmable data. S1 : Rewrites the received S1 byte to the OH preset or S1 programmable data. OH Overwrite Through of S1/K2 bytes and S1 byte requires the Option 22 of the MP1570A. Payload Overwrite Rewrites the received Payload to the transmission Payload.

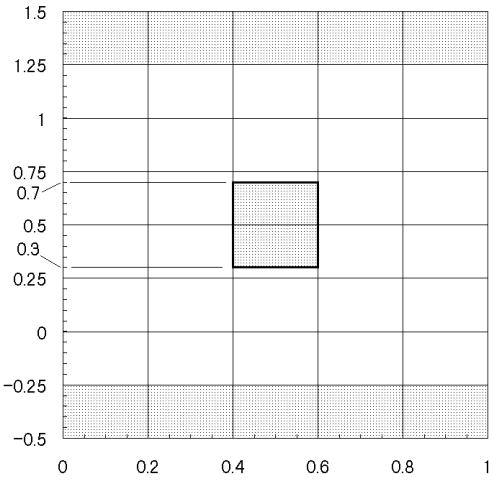
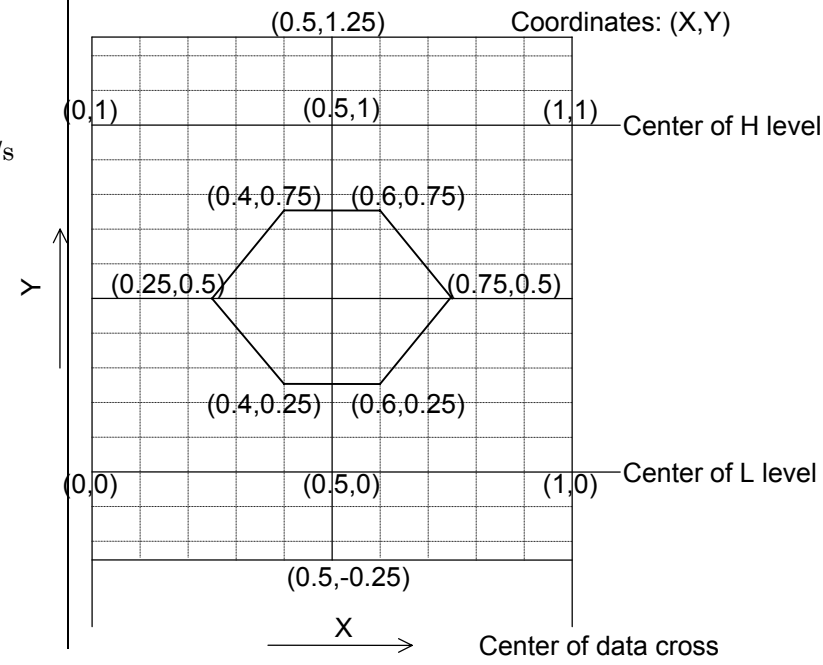
	Item	Specification
2.5	Delay measurement	Function: Measures the time period from time the pattern data is transmitted for the delay measurement to time the pattern data is received. Measurement interval: 0.5, 1, 2, 5, and 10 s Measurement range: 0 to 999 μs, 1.0 to 999.9 ms, 1.0 to 10.0 s > Timeout Display accuracy: ± 5 μs at the 0.5 or 1 s interval or ± 50 μs at the 2, 5, or 10 s interval
3.	Environmental performance	
3.1	Operation temperature	0 to 40℃（except for the time of FDD operation）
3.2	Storage temperature	-20 to 60℃
4.	Mechanical performance	
4.1	Dimensions	255mm(W)×42mm(H)×167.6mm(D) （Excluding projections）
4.2	Mass	3 kg or less

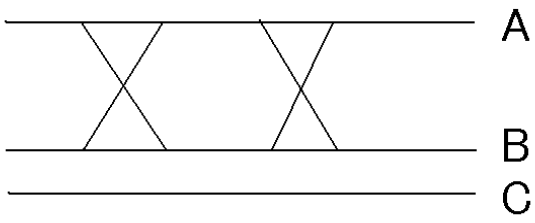
A.8 Specifications of the MU150001A/B Optical 10G Tx (1.55) Unit

	Item	Specification
1	Optical/Electrical performance Optical output signal	
1.1	Bit rate	9953.28Mbit/s, 2488.32Mbit/s <Option 01, 02, 03>
1.2	Optical source type	1550nm band optical source : DFB-LD（EA modulator built in） 1310nm band optical source : DFB-LD （for Option 01 and 03）
1.3	Peak wavelength	1545nm±20nm 1315nm±50nm <Option 01, 03>
1.4	Spectral width	1.0nm or less (Full width at -20dB)
1.5	Side mode suppression ratio	30dB or more
1.6	Optical output power	-4dBm±3dB(PN average power)
1.7	Optical output signal form	NRZ
1.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(see Item 5)
1.9	Extinction ratio	8.2dB or more (see Item.6)
1.10	Connector	FC-PC（SM fiber）

	Item	Specification
	Electric input signal	
	Data input	
1.11	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm (option 01, 02, and 03)
1.12	Input level	H: 0 to -0.2 / L: -0.85 to -1.4V at 0.65 to 1.4Vpp
1.13	Wave form	NRZ
1.14	Impedance	50Ω
1.15	Connector	SMA
	Clock input	
1.16	Frequency	9953.28MHz±100ppm 2488.32MHz±100ppm (option 01, 02, and 03)
1.17	Input Level	H: 0 to -0.2 / L: -0.85 to -1.3V at 0.65 to 1.3Vpp
1.18	Duty	Timing
1.19	Clock/Data phase	
1.20	Impedance	50Ω
1.21	Connector	SMA

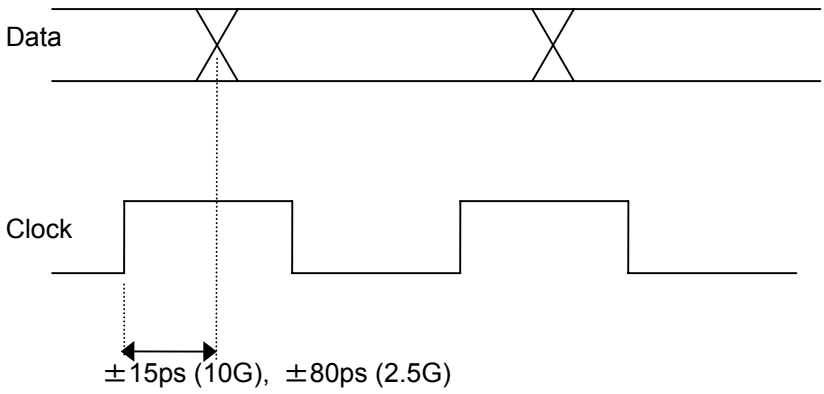
	Item	Specification
1.22	Optical output detection	LED lights when LD is turned on.
1.23	Output control	The key switch is used to control the emission of an optical output.
1.24	Remote interlock	When the remote interlock terminal is opened, the optical output is forcibly turned off.
1.25	Optical output delayed transmission	When the on-operation of optical output power is performed, the display blinks. When the optical output light is emitted a few seconds after the optical output power is turned on, the display comes on.
1.26	Laser safety standard	JIS, IEC 60825-1 : CLASS 1 21 CFR1040.10 : CLASS Ⅲb
	Electric section	
1.27	Alarm addition variable function	LOS

	Item	Specification
2	Mechanical performance	
2.1	Dimensions/mass	22(H)×126(W)×254(D), 2 kg or less
3	Environmental performance	
3.1	Operation temperature	0 to +40°C
3.2	Storage temperature	-20 to +60°C
4	Eye Mask Bit rate : 9.95328Gbit/s	
	Bit rate : 2.48832Gbit/s	

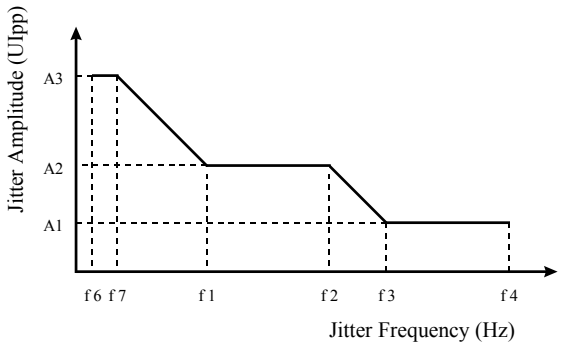
	Item	Specification
5	Extinction ratio measurement	EX (Extinction Ratio) is calculated by the following method based on the waveform when the bit rate is set at 9.95328 Gbit/s: EX=10・log{(A-C)/(B-C)} A : Average value of "H" level B : Average value of "L" level C : Average level value at the waveform monitor power turned on and the optical input turned off 

A.9 Specifications of the MU150002A Optical 10G Rx (NARROW) Unit

	Item	Specification
1.	Optical/electrical performance Optical input signal	
1.1	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm (Option 01)
1.2	Receive optical wavelength band	1550nm band (10G), 1310nm band (10G) (Option 04) 1310nm band and 1550nm band (2.5G) (Option 01)
1.3	Optical input level (PN average power, BER 10^{-12})	10G Optical input : -13 to -3dBm 2.5G Optical input : -29 to -10dBm (Option 01)
1.4	Absolute maximum input power	0dBm(10G) -8dBm(2.5G) (Option 01)
1.5	Optical input signal code	NRZ
1.6	Optical input return loss	27dB or more
1.7	Connector	FC-PC（SM fiber）

	Item	Specification
	Electric output signal	
	Data output	
1.8	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm (Option 01)
1.9	Output level	0.65 to 1.4 Vpp
1.10	Wave form	NRZ
1.11	Impedance	50Ω
1.12	Connector	SMA
	Clock output	
1.13	Frequency	9953.28MHz±100ppm 2488.32MHz±100ppm (Option 01)
1.14	Output Level	0.65 to 1.3 Vpp
1.15	Duty	
1.16	Clock/Data phase	Timing 
1.20	Impedance	50Ω
1.21	Connector	SMA
1.22	Input loss detection	Detects an input loss. 10G: -18dBm or less 2.5G:-32dBm or less (Option 01)

	Item	Specification
	Electric section	
1.23	Alarm measurement	LOS
1.24	Alarm detection condition	LOS Detection: Optical input loss
1.25	Same sign tolerance	9 bytes or more
	Input Optical Power measurement	
1.27	Measurement range	10G : -16 to -2dBm 2.5G : -30 to -10dBm
1.28	Measurement accuracy	±2dB

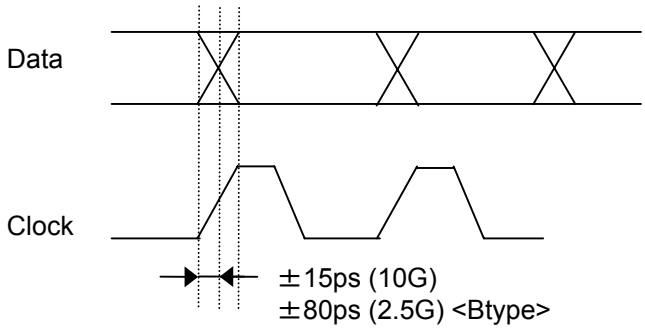
<table>
<tr><th></th><th>Item</th><th>Specification</th></tr>
<tr><td>2.
2.1</td><td>Jitter
Output Jitter</td><td>
<table>
<tr><td rowspan="2">Bit rate(bit/s)</td><td colspan="3">Additional error</td></tr>
<tr><td colspan="2">UIpp</td><td>UIrms</td></tr>
<tr><td></td><td>HP1+LP</td><td>HP'+LP</td><td>HP+LP</td></tr>
<tr><td>9953.28M</td><td>—</td><td>0.17</td><td>—</td></tr>
<tr><td>2488.32M</td><td>0.1</td><td>—</td><td>0.010</td></tr>
</table>
Measurement Condition
Mapping: STM64, PRBS 2^{31}-1, Scramble"ON"
VC4-16c, PRBS 2^{23}-1, Scramble"ON" (2.5G)
Input Level: -8 to -10dBm(10G),-15 to -20dBm(2.5G)
</td></tr>
<tr><td>2.2</td><td>Jitter tolerance</td><td>


<table>
<tr><td colspan="2">Bit rate Mbit/s</td><td>A1
UIpp</td><td>A2
UIpp</td><td>A3
UIpp</td><td>f6
Hz</td><td>f7
Hz</td><td>f1
Hz</td><td>f2
Hz</td><td>f3
Hz</td><td>f4
Hz</td></tr>
<tr><td rowspan="2">9953.2</td><td>*1</td><td>0.2</td><td>2</td><td>2000</td><td rowspan="2">10</td><td rowspan="2">12.</td><td rowspan="2">20k</td><td rowspan="2">400k</td><td rowspan="2">4M</td><td rowspan="2">80M</td></tr>
<tr><td>*2</td><td>0.15</td><td>1.5</td><td>2000</td></tr>
<tr><td colspan="2">2488.3</td><td>0.2</td><td>2</td><td>800</td><td>10</td><td>12.1</td><td>5k</td><td>100k</td><td>1M</td><td>20M</td></tr>
</table>
Measurement Condition
Mapping: STM64, PRBS 2^{23}-1, Scramble"ON"
Input Level: -10dBm
*1 25°C (room temperature)
*2 0 to 40°C
</td></tr>
</table>

	Item	Specification
3.	Mechanical performance	
3.1	Dimensions/mass	22(H)×126(W)×254(D), 2.0 kg or less
4.	Environmental performance	
4.1	Operation temperature	0 to +40°C
4.2	Storage temperature	-20 to +70°C

A.10 Specifications of the MU150017A/B Optical 2.5G/10G Rx (Wide) Unit

	Item	Specification
1.	Optical/electrical performance	
	Optical input signal	
1.1	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm <Btype>
1.2	Receive optical wavelength band	1550nm Band (10G) 1310nm Band and 1550nm Band (2.5G) <Btype>
1.3	Optical input level (PN average power)	9953.28M (Wide) : -11 to –3dBm (BER 10^{-12} or less) 2488.32M (Wide) : -15 to –3dBm (BER 10^{-10} or less) <Btype>
1.4	Absolute maximum input power	+3dBm (Peak Power)
1.5	Optical input signal code	NRZ
1.6	Optical input return loss	28dB or more
1.7	Connector	FC-SPC（SM fiber）
	Electric output signal	
	Data output	
1.8	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm <Btype>
1.9	Output level	1±0.3 Vpp
1.10	Signal code	NRZ
1.11	Impedance	50Ω
1.12	Connector	SMA

	Item	Specification
	Clock output	
1.13	Frequency	9953.28MHz 2488.32MHz <Btype>
1.14	Output Level	0.65 to 1.3 Vpp
1.15	Clock/Data Phase	Timing
		
	10G Phase shifter	
	Phase Range	±30ps
	Accuracy	±2ps/1step (Typical)
1.16	Duty	50%±5%
1.17	Impedance	50Ω
1.18	Connector	SMA
	Electric section	
1.19	Input LOS detection	Detects an input loss (LOS) 10G: -27dBm or less 2.5G:-37dBm or less <Btype>
1.20	Same sign tolerance	10G : 5 bytes or more 2.5G : 9 bytes or more
	Input optical power measurement	
1.21	Range	10G : -2 to -16dBm (1550nm Band) 2.5G : -2 to -36dBm (1310nm/1550nm Band) <Btype>
	Accuracy	±2dB

	Item	Specification
2.	Jitter	
2.1	Intrinsic Jitter	

Bit Rate (bit/s)	Jitter Amplitude			
	Bandwidth	UIpp		UIrms
		HP1+LP	HP2+LP	HP+LP
9953.28M	Wide	0.15	0.05 (Typical)	0.03

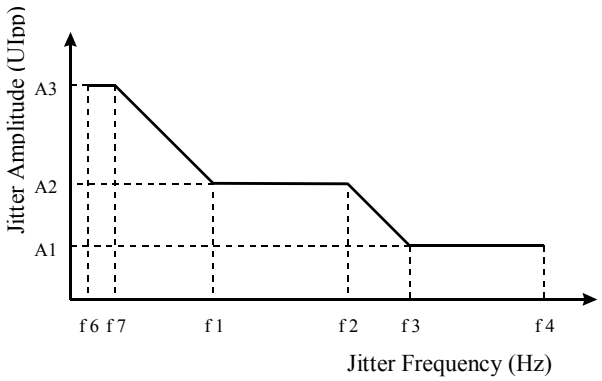
Temperature condition : 10 to 40°C
SDH Internal : VC4-64c, Info : PRBS 2^{23}-1, Mark ratio 1/2
Scramble : ON
Input Level 9953.28MHz : -8 to -10dBm
additional 0.01UIpp, 0.002Uirms/dB

Transmitter: MP9677B

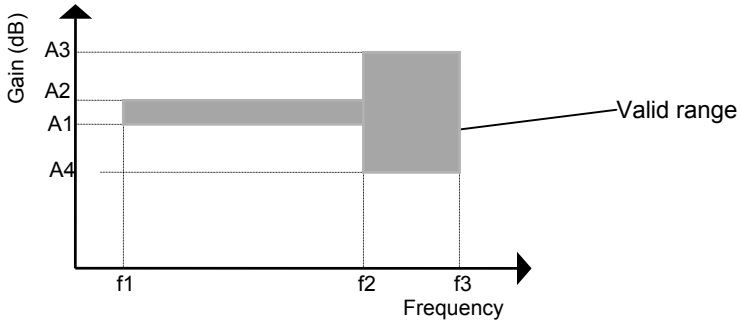
Bit Rate (bit/s)	Jitter Amplitude		
	UIpp		UIrms
	HP1+LP	HP2+LP	HP+LP
2488.32M	0.1	0.05	0.027

<Btype>
Temperature condition : 10 to 40°C
Scramble : ON
Input Level 2488.32MHz : –8 to –10dBm
additional 0.01UIpp, 0.002Uirms/dB
Transmitter: MU150001A(Option 02)

2.2	Jitter Tolerance	



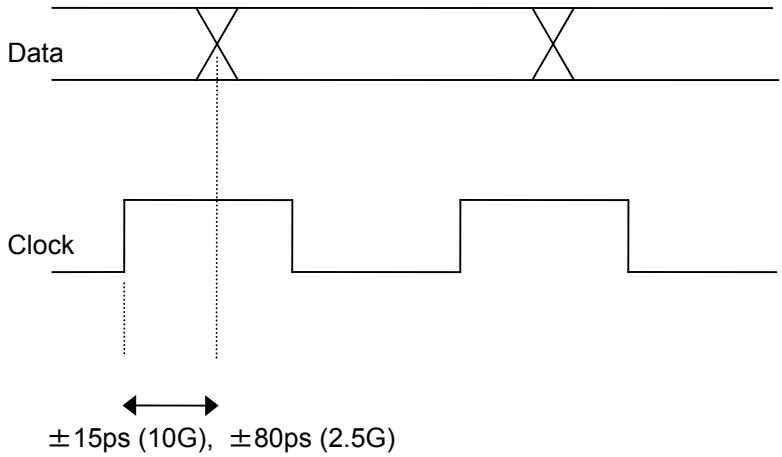
Bit Rate Mbit/s	A1 UIpp	A2 UIpp	A3 UIpp	f6 Hz	f7 Hz	f1 Hz	f2 Hz	f3 Hz	f4 Hz
9953.28	0.2	2	3200	10	12.1	20k	400k	4M	80M
2488.32	0.2	2	800	10	12.1	5k	100k	1M	20M

<table>
<tr><th></th><th>Item</th><th>Specification</th></tr>
<tr><td></td><td></td><td>SDH Internal : VC4-16c (2.5G)<Btype>, VC4-64c (10G), Info : PRBS 2^{23}-1, Scramble : ON Mark ratio 1/2
Input Level 9953.28MHz : -8 to -10dBm
2488.32MHz : -8 to -12dBm</td></tr>
<tr><td>2.3</td><td>Jitter Transfer</td><td>Jitter Transfer Bandwidth
 

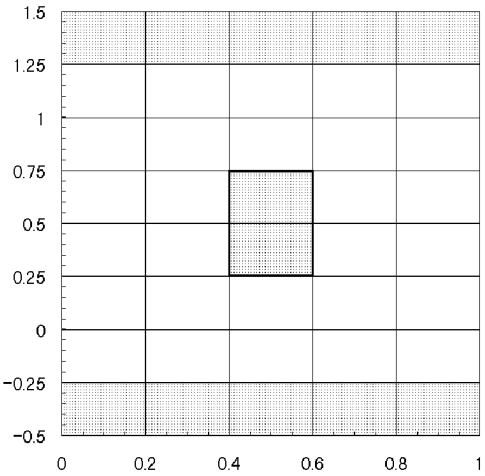
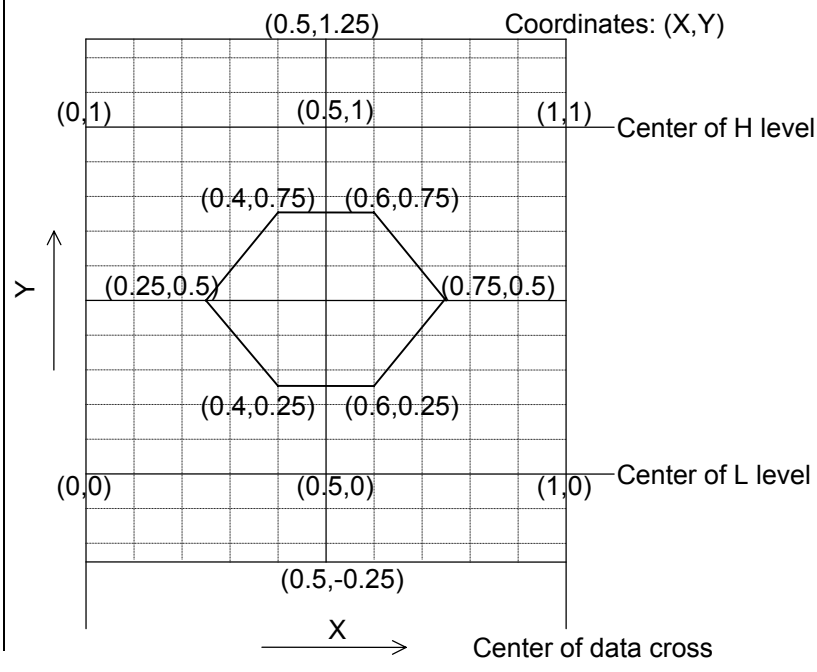
<table>
<tr><th></th><th>A1</th><th>A2</th><th>A3</th><th>A4</th><th>f1</th><th>f2</th><th>f3</th></tr>
<tr><th></th><th>(dB)</th><th>(dB)</th><th>(dB)</th><th>(dB)</th><th>(Hz)</th><th>(MHz)</th><th>(MHz)</th></tr>
<tr><td>9953.28M</td><td>1.5</td><td>−1.5</td><td>3.5</td><td>−3.5</td><td>100</td><td>10</td><td>80</td></tr>
</table></td></tr>
<tr><td>3.</td><td>Mechanical performance</td><td></td></tr>
<tr><td>3.1</td><td>Dimensions/mass</td><td>21mm(H)×255mm(W)×167.6mm(D), 2.5kg or less</td></tr>
<tr><td>4.</td><td>Environmental performance</td><td></td></tr>
<tr><td>4.1</td><td>Operation temperature</td><td>0 to +40°C (Except Jitter measurement)</td></tr>
<tr><td>4.2</td><td>Storage temperature</td><td>-20 to +60°C</td></tr>
</table>

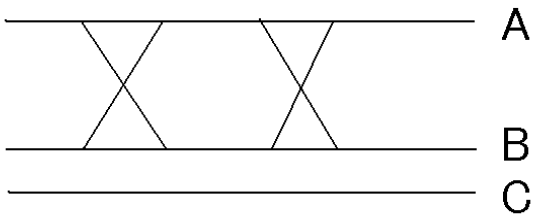
A.11 Specifications of the MU150031A/C Optical 10G (1.55) High Power Tx Unit

	Item	Specification
1	Optical/Electrical performance Optical output signal	
1.1	Bit rate	9953.28Mbit/s, 2488.32Mbit/s (C type only)
1.2	Optical source type	1550nm band optical source : DFB-LD（EA modulator built in）
1.3	Peak wavelength	1545nm±20nm
1.4	Spectral width	1.0nm or less (Full width at -20dB)
1.5	Side mode suppression ratio	30dB or more
1.6	Optical output power	+2dBm±2dB(PN average power)
1.7	Optical output signal form	NRZ
1.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(see Item 5)
1.9	Extinction ratio	8.2dB or more (see Item.6)
1.10	Connector	FC-PC（SM fiber）

	Item	Specification
	Electric input signal	
	Data input	
1.11	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm (C type only)
1.12	Input level	H: 0 to -0.2 / L: -0.85 to -1.4V at 0.65 to 1.4Vpp
1.13	Wave form	NRZ
1.14	Impedance	50Ω
1.15	Connector	SMA
	Clock input	
1.16	Frequency	9953.28MHz±100ppm 2488.32MHz±100ppm (C type only)
1.17	Input Level	H: 0 to -0.2 / L: -0.85 to -1.3V at 0.65 to 1.3Vpp
1.18	Duty	Timing
1.19	Clock/Data phase	
1.20	Impedance	50Ω
1.21	Connector	SMA

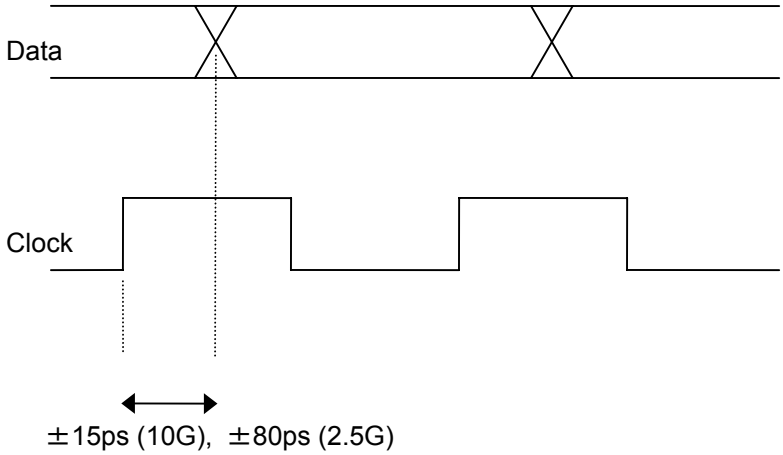
	Item	Specification
1.22	Optical output detection	LED lights when LD is turned on.
1.23	Output control	The key switch is used to control the emission of an optical output.
1.24	Remote interlock	When the remote interlock terminal is opened, the optical output is forcibly turned off.
1.25	Optical output delayed transmission	When the on-operation of optical output power is performed, the display blinks. When the optical output light is emitted a few seconds after the optical output power is turned on, the display comes on.
1.26	Laser safety standard	JIS, IEC 60825-1 : CLASS 1 21 CFR1040.10 : CLASS Ⅲb
	Electric section	
1.27	Alarm addition variable function	LOS

	Item	Specification
2	Mechanical performance	
2.1	Dimensions/mass	22(H)×126(W)×254(D), 2 kg or less
3	Environmental performance	
3.1	Operation temperature	0 to +40°C
3.2	Storage temperature	-20 to +60°C
4	Eye Mask Bit rate : 9.95328Gbit/s	
	Bit rate : 2.48832Gbit/s	

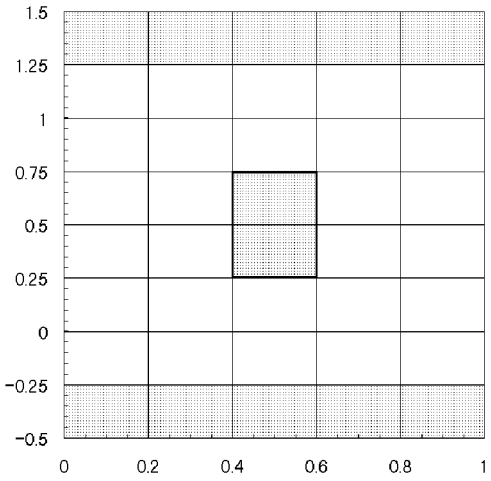
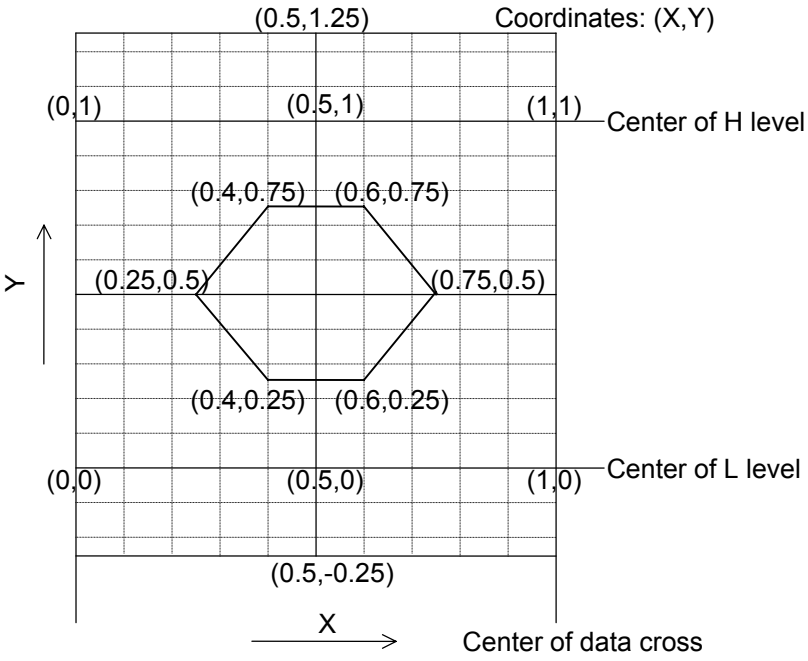
	Item	Specification
5	Extinction ratio measurement	EX (Extinction Ratio) is calculated by the following method based on the waveform when the bit rate is set at 9.95328 Gbit/s: EX=10・log{(A-C)/(B-C)} A : Average value of "H" level B : Average value of "L" level C : Average level value at the waveform monitor power turned on and the optical input turned off 

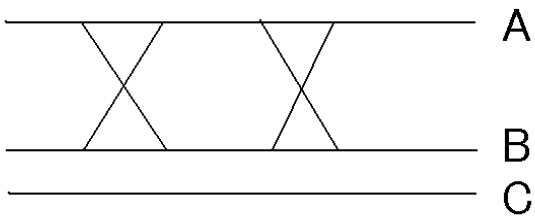
A.12 Specifications of the MU150061A/B Optical 10G (1.31) Tx Unit

	Item	Specification
1	Optical/Electrical performance Optical output signal	
1.1	Bit rate	9953.28Mbit/s, 2488.32Mbit/s (B type only)
1.2	Optical source type	1310nm band optical source : DFB-LD
1.3	Peak wavelength	1310nm±20nm
1.4	Spectral width	1.0nm or less (Full width at -20dB)
1.5	Side mode suppression ratio	30dB or more
1.6	Optical output power	+3dBm±2dB(PN average power)
1.7	Optical output signal form	NRZ
1.8	Optical output wave form	In accordance with Eye mask specification using 4th Bessel LPF(see Item 5)
1.9	Extinction ratio	6dB or more (see Item.6)
1.10	Connector	FC-PC（SM fiber）

	Item	Specification
	Electric input signal	
	Data input	
1.11	Bit rate	9953.28Mbit/s±100ppm 2488.32Mbit/s±100ppm (B type only)
1.12	Input level	H: 0 to -0.2 / L: -0.85 to -1.4V at 0.65 to 1.4Vpp
1.13	Wave form	NRZ
1.14	Impedance	50Ω
1.15	Connector	SMA
	Clock input	
1.16	Frequency	9953.28MHz±100ppm 2488.32MHz±100ppm (B type only)
1.17	Input Level	H: 0 to -0.2 / L: -0.85 to -1.3V at 0.65 to 1.3Vpp
1.18	Duty	Timing
1.19	Clock/Data phase	
1.20	Impedance	50Ω
1.21	Connector	SMA

	Item	Specification
1.22	Optical output detection	LED lights when LD is turned on.
1.23	Output control	The key switch is used to control the emission of an optical output.
1.24	Remote interlock	When the remote interlock terminal is opened, the optical output is forcibly turned off.
1.25	Optical output delayed transmission	When the on-operation of optical output power is performed, the display blinks. When the optical output light is emitted a few seconds after the optical output power is turned on, the display comes on.
1.26	Laser safety standard	JIS, IEC 60825-1 : CLASS 1 21 CFR1040.10 : CLASS Ⅲb
	Electric section	
1.27	Alarm addition variable function	LOS

	Item	Specification
2	Mechanical performance	
2.1	Dimensions/mass	22(H)×126(W)×254(D), 2 kg or less
3	Environmental performance	
3.1	Operation temperature	0 to +40°C
3.2	Storage temperature	-20 to +60°C
4	Eye Mask Bit rate : 9.95328Gbit/s	
	Bit rate : 2.48832Gbit/s	

	Item	Specification
5	Extinction ratio measurement	EX (Extinction Ratio) is calculated by the following method based on the waveform when the bit rate is set at 9.95328 Gbit/s: EX=10・log{(A-C)/(B-C)} A : Average value of "H" level B : Average value of "L" level C : Average level value at the waveform monitor power turned on and the optical input turned off 

Appendix B Option

The table below shows the optional items that are available for 2.5G unit, 2.5G/10G unit, and 10G optical unit. These items other than optical connectors must be installed at our plant.

Model or Order No.	Item	Remarks
MP0128A-01	1550 nm band LD module with built-in EA modulator	Option 01
MP0129A-01	1550 nm band LD module with built-in EA modulator	Option 01
MP0130A-01	RMS meas	Option 01 2448M RMS measurement

Model or Order No.	Item	Remarks
MP0127A-38	Replaceable ST optical connector	Option 38 2 pairs for MP0127A
MP0127A-39	Replaceable DIN optical connector	Option 39 2 pairs for MP0127A
MP0127A-40	Replaceable SC optical connector	Option 40 2 pairs for MP0127A
MP0127A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MP0127A
MU150008A-38	Replaceable ST optical connector	Option 38 2 pairs for MU150008A
MU150008A-39	Replaceable DIN optical connector	Option 39 2 pairs for MU150008A
MU150008A-40	Replaceable SC optical connector	Option 40 2 pairs for MU150008A
MU150008A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MU150008A
MP0128A-38	Replaceable ST optical connector	Option 38 2 pairs for MP0128A
MP0128A-39	Replaceable DIN optical connector	Option 39 2 pairs for MP0128A
MP0128A-40	Replaceable SC optical connector	Option 40 2 pairs for MP0128A
MP0128A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MP0128A
MU150009A-38	Replaceable ST optical connector	Option 38 2 pairs for MU150009A
MU150009A-39	Replaceable DIN optical connector	Option 39 2 pairs for MU150009A
MU150009A-40	Replaceable SC optical connector	Option 40 2 pairs for MU150009A
MU150009A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MU150009A

Model or Order No.	Item	Remarks
MP0129A-38	Replaceable ST optical connector	Option 38 2 pairs for MP0129A
MP0129A-39	Replaceable DIN optical connector	Option 39 2 pairs for MP0129A
MP0129A-40	Replaceable SC optical connector	Option 40 2 pairs for MP0129A
MP0129A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MP0129A
MU150010A-38	Replaceable ST optical connector	Option 38 2 pairs for MU150010A
MU150010A-39	Replaceable DIN optical connector	Option 39 2 pairs for MU150010A
MU150010A-40	Replaceable SC optical connector	Option 40 2 pairs for MU150010A
MU150010A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MU150010A
MU150001A-38	Replaceable ST optical connector	Option 38 2 pairs for MU150001A
MU150001A-39	Replaceable DIN optical connector	Option 39 2 pairs for MU150001A
MU150001A-40	Replaceable SC optical connector	Option 40 2 pairs for MU150001A
MU150001A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MU150001A
MU150002A-38	Replaceable ST optical connector	Option 38 2 pairs for MU150002A
MU150002A-39	Replaceable DIN optical connector	Option 39 2 pairs for MU150002A
MU150002A-40	Replaceable SC optical connector	Option 40 2 pairs for MU150002A
MU150002A-43	Replaceable HMS-10/A optical connector	Option 43 2 pairs for MU150002A

Model or Order No.	Item	Remarks
MU150017A-38	Replaceable ST optical connector	Option 38 1 pcs for MU150017A
MU150017A-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150017A
MU150017A-40	Replaceable SC optical connector	Option 40 1 pcs for MU150017A
MU150017A-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150017A
MU150017B-38	Replaceable ST optical connector	Option 38 1 pcs for MU150017B
MU150017B-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150017B
MU150017B-40	Replaceable SC optical connector	Option 40 1 pcs for MU150017B
MU150017B-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150017B
MU150031A-38	Replaceable ST optical Connector	Option 38 1 pcs for MU150031A
MU150031A-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150031A
MU150031A-40	Replaceable SC optical connector	Option 40 1 pcs for MU150031A
MU150031A-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150031A
MU150031C-38	Replaceable ST optical Connector	Option 38 1 pcs for MU150031C
MU150031C-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150031C
MU150031C-40	Replaceable SC optical connector	Option 40 1 pcs for MU150031C
MU150031C-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150031C
MU150061A-38	Replaceable ST optical Connector	Option 38 1 pcs for MU150061A
MU150061A-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150061A
MU150061A-40	Replaceable SC optical connector	Option 40 1 pcs for MU150061A
MU150061A-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150061A

Model or Order No.	Item	Remarks
MU150061B-38	Replaceable ST optical Connector	Option 38 1 pcs for MU150061B
MU150061B-39	Replaceable DIN optical connector	Option 39 1 pcs for MU150061B
MU150061B-40	Replaceable SC optical connector	Option 40 1 pcs for MU150061B
MU150061B-43	Replaceable HMS-10/A optical connector	Option 43 1 pcs for MU150061B

Appendix C Self Test Error Codes

See 'Appendix G Self Test Error Codes' of 'MP1570A Operation manual Vol.1 Basic Operation' for the details.

Appendix D 2.5G and 10G Alarm Detection/Release Conditions

See 'Appendix E Alarm Detection and Removal Conditions' of 'MP1570A Operation manual Vol.1 Basic Operation' for the details.