Anritsu

# MP1570A

## SONET/SDH/PDH/ATM Analyzer
## SDH Edition

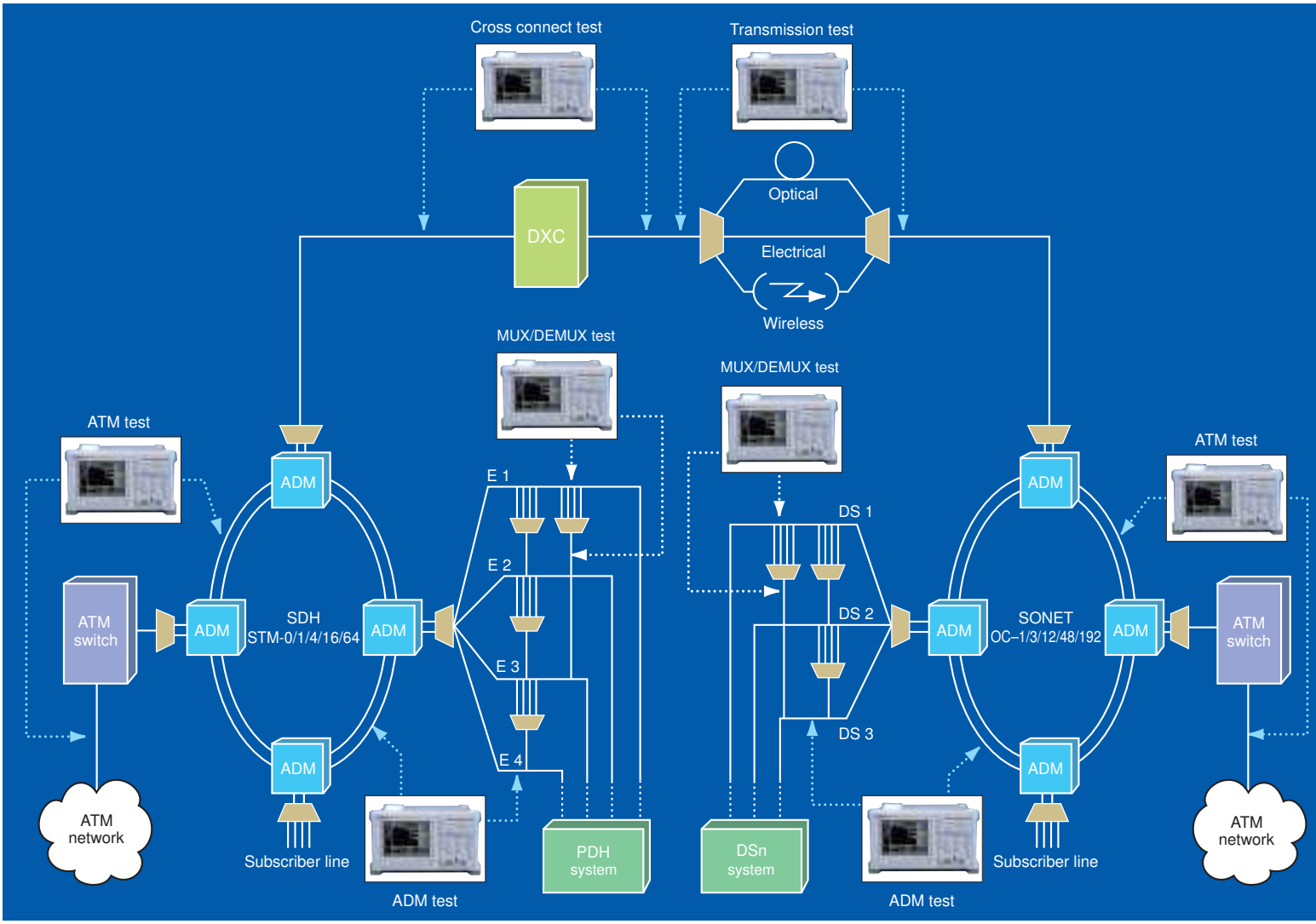

***High Performance and Portable for SONET, SDH, PDH, and ATM Networks***

# Analyzer Conforming to Bit Rates from 1.5 Mbps to 10 Gbps

The MP1570A is an analyzer designed for the manufacturing, construction, maintenance, and inspection of SONET, SDH, PDH, and ATM equipment and networks. Various plug-in units available for the MP1570A allow the user to construct various analysis systems for different applications.

The MP1570A has six slots to connect the plug-in units required for SDH and SONET tests at bit rates from 1.5 Mbps to 10 Gbps. Also ATM, jitter, and wander tests can be done by appropriate combinations of plug-in units. The MP1570A conforms to the ITU-T and Bellcore standards and supports concatenation mapping, tandem connection, APS measurement, and CID measurement. The user can measure 10 Gbps signals using a single MP1570A; conventionally, this required multiple pieces of measurement equipment.

The MP1570A has a printer and a 3.5-inch floppy disk drive as standard output devices. The user can print the measurement results, save and read data to and from a floppy disk, and read measurement data on an external personal computer. The user can also save screen data to a floppy disk. The MP1570A has a function to help the user understand the analyzer operations and functions and the connection methods.



## Conforming to bit rates from 1.5Mbps to 10 Gbps with a single unit

The MP1570A conforms to ITU-T Recommendations G.703 (2, 8, 34, 139, 1.5, and 45 Mbps) and G.703 and G.958 (52, 156, 622, 2,488, and 9,953 Mbps), allowing the user to select plug-in units for different applications, including SDH, ATM, and jitter tests.

## Concatenation mapping

The MP1570A can perform SDH and SONET tests through the mapping routes from STM-1C to STM-64C.

## Enhanced SDH and SONET test functions

The MP1570A supports the generation and detection of CID patterns (ITU-T Recommendation G.958), tandem connection patterns (ITU-T Recommendation G.707), and no-frame patterns and the setting and resetting of conditions for an APS switch time test (ITU-T Recommendations G.707, G.783, and G.842), overhead test, and alarm detection.

## Frame memory and capture (optional)

The MP1570A can be used to edit and analyze up to 64 frames of data (or up to 26 frames of data at 10 Gbps).

## Enhanced through-modes

The MP1570A allows the user to select one of four through modes: transparent through, overhead/over-write, payload/overwrite, and add/drop. The user can also insert various kinds of error and alarm signals into through signals.

## Error analysis (error performance)

The MP1570A enables the user to perform measurement conforming to ITU-T Recommendations G.821, M.2100, G.826, M.2101, M.2110, and M.2120.

## Frequency and optical power measurement

The MP1570A can measure received frequencies and display measurement results in a graph. If an optical interface plug-in unit is installed, the MP1570A can measure the absolute and relative values of optical power.

## Jitter generation and measurement

The MP1570A can measure jitter tolerance and jitter transfer characteristics in conformance with ITU-T Recommendations G.823, G.824, G.825, and G.958 and Bellcore 253 and 499. It displays measurement results as numeric values and in a graph, allowing the user to evaluate them easily.

## Wander generation

The MP1570A can generate wander signals in conformance with ITU-T Recommendations G.823, G.824, and G.825 and Bellcore 253 and 499. If a separately sold application program is installed on the external personal computer connected, evaluation of MTIE and TDEV is possible.

## ATM pattern generation and measurement

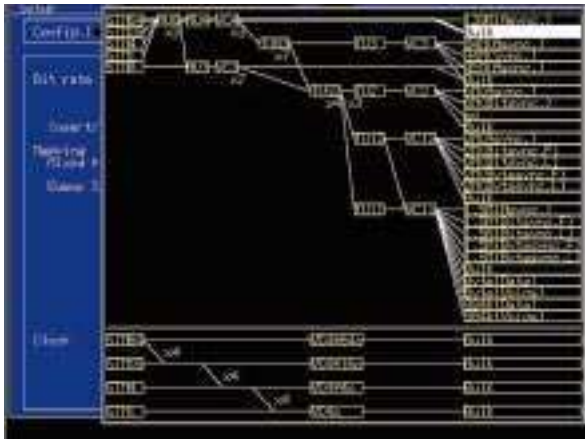
The MP1570A can not only test cell performance but also measure cell delay time, CDV, and cell traffic. For OAM testing, it can generate and detect the AIS, RDI, and continuity check cells for F4 and F5 flows. It can also generate the loopback and performance-monitoring cells which conform to ITU-T Recommendation I.610.

## Supporting SDH, SONET, and Japan modes with one cabinet (optional)

The MP1570A allows the user to set up the measurement of SDH, SONET, 384k, and Japan mapping with one cabinet. For Japanese mapping measurement, the user can set a signaling pattern (multi-frame pattern of 8 frames or 64 frames).

## Measurement at bit rates from 1.5 Mbps to 10 Gbps

The user can set a mapping route with a bit rate of up to 10 Gbps. The MP1570A mainly supports SDH, SONET, and Japanese mapping for digital communication. A route from STM-1C to up to STM-64C can be set for concatenation mapping. Furthermore, the MP1570A supports a combination of channels -- for example, one channel of VC4, 16 channels of STM4C, and four channels of STM16C. (See fig.1/P.10)

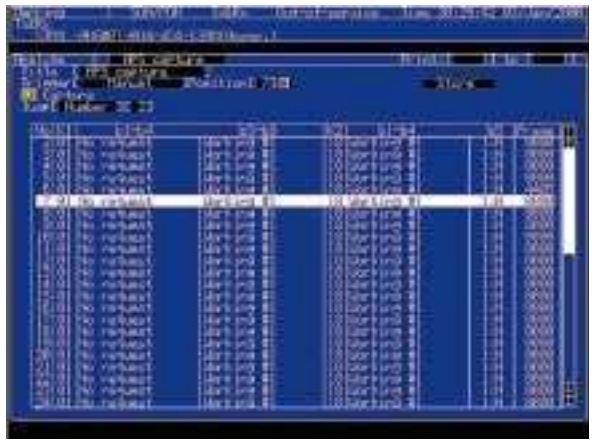


## Overhead setting and testing

The user can set overhead, modify the capture and overhead settings, and measure pointer 64 frames and overhead bit errors.

## APS function

The user can test the automatic protection switch (APS) by measuring the equipment switching time accurately in units of milliseconds. The MP1570A also conforms to ITU-T Recommendations G.783 and G.841.



## Tandem connection

The user can set and measure N1 and N2 bytes.

## Mixed payload

At measurement of mapping in TUG-3 and lower-level layers, the user can set two additional channels other than the measurement-target channels.

## Various analysis functions

The MP1570A has an internal optical power meter which allows the user to measure optical power during error and alarm measurement without changing the connections of the optical fiber cables. (Photo A)

The MP1570A can capture an arbitrary SOH or POH (1 byte), K1 or K2 byte, or H1 or H2 byte in 1,024 frames for analyzing errors and alarms and for checking APS operation. (Photo B)

Measured errors and alarms can be displayed in a graph. The user can select a unit time of 1 second, 1 minute, 15 minutes, or 60 minutes for a bar graph. (Photo C)

Photo A

Photo B

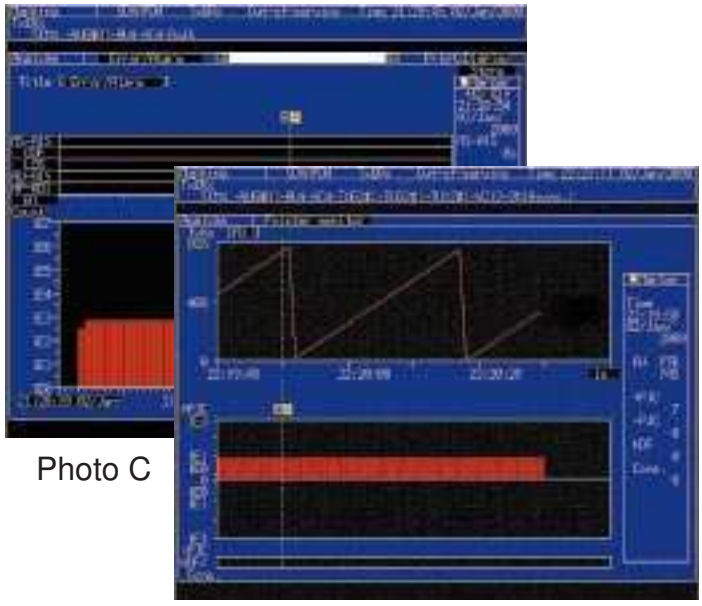


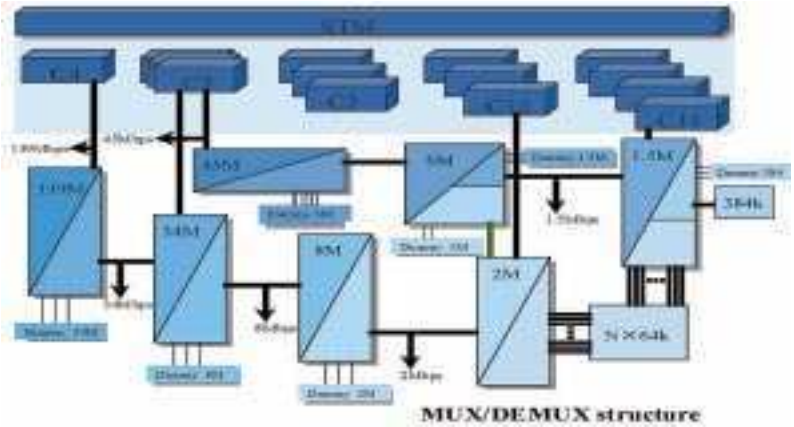
Photo C

## Pointer value monitoring

The MP1570A can display changes of pointer value in a graph. Monitored values are updated in real time.

## MUX/DEMUX function (optional)

The MP1570A allows the user to set frames on or off at every bit rate. If the MUX/DEMUX function is installed, the MP1570A can generate a multiplexing structure including frame alignment signals and perform multiplexer/demultiplexer measurement.



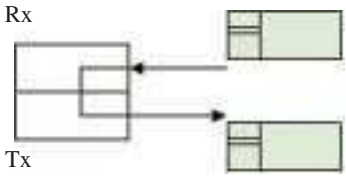
MUX/DEMUX structure

## Through-mode

The user can select one of four through-modes: transparent, overhead/over-write, payload/over-write, and add/drop.

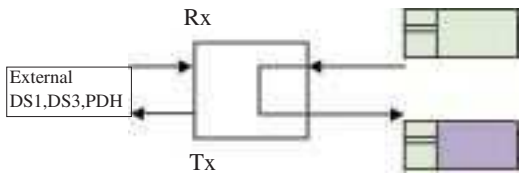
### Transparen t:

For in-service monitoring.



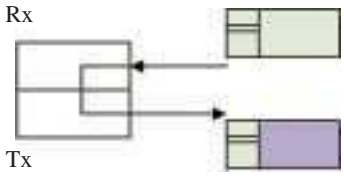

### Add/Drop :

Add/Drop of external DS1/DS3/PDH signals.



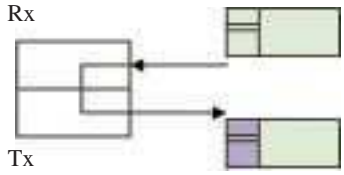

### Overhead/over-write :

Insertion of internal STS-3SPE/VC4, VT6/TU2, VT2/TU12, and VT1.5/TU11 signals.

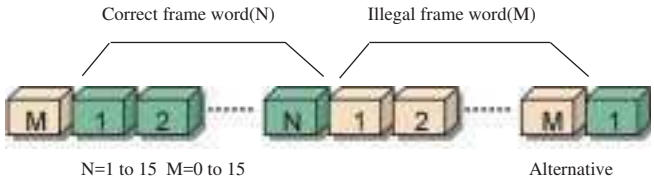



### Overhead/over-write :

Modification of SOH/POH byte.
Addition of various errors/alarms.



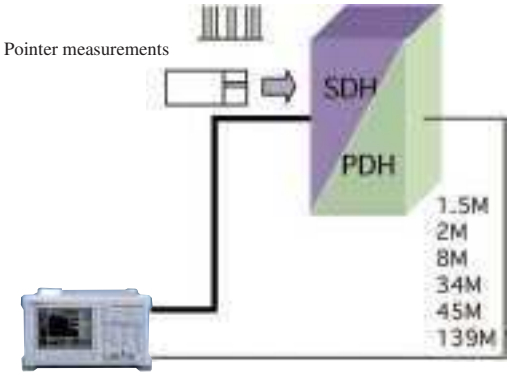





Frame alignment error simulation

## Enhanced error/alarm simulation

The MP1570A can generate normal and abnormal frames alternately to test the frame synchronization function of terminal equipment. (This function is an SDH FAS error addition function.)




Pointer sequence measurements

## Pointer sequence test by simple operation

The user can select one of four through-modes: transparent, overhead/over-write, payload/over-write, and add/drop.

# Specifications

**• MP0121A 2/8/34/139/156M*1 Unit**

| | |
|---|---|
| Bit rate | 2.048, 8.448, 34.368, 139.264 Mb/s |
| Level/waveform | Conforms to ITU-T G.703 (with 20 dB monitoring point) |
| Connectors | BNC (75 Ω, unbalanced), 3-pin Siemens (120 Ω, balanced)<br>2.048 Mb/s: HDB3 (balanced/unbalanced)<br>8.448, 34.368 Mb/s: HDB3 (unbalanced)<br>139.264 Mb/s: CMI (unbalanced) |
| Clock | Internal (accuracy: ±7 ppm, jitter unit not installed), external (ECL [AC] 50 Ω), received signal |
| Frame format | Unframed: 2, 8, 34, 139 Mb/s<br>Framed: 2 Mb/s (with/without CRC-4 at channels 30/31, G.704), 8 Mb/s (G.742), 34 Mb/s (G.751), 139 Mb/s (G.751), MUX/DEMUX (Option 06) |
| Test patterns | PRBS: $2^{11}-1$, $2^{15}-1$, $2^{20}-1$, $2^{23}-1$ (O.151)<br>Word: 16-bit programmable, all 0, all 1 |
| Error addition | Bit (all, test pattern), code, E-bit<br>Timing: Single, rate (1E–3, 1E–4, 1E–5, 1E–6, 1E–7)<br>FAS: n in 16 (n: 1 to 4), all |
| Alarm addition | LOS, LOF, AIS, RDI, RDI (MF)<br>Timing: All |
| Measurements | Mode: Single, repeat, manual<br>In-service<br>Errors: Frame, code, CRC-4, E-bit<br>Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF)<br>Error performance: G.821 (inc. Annex D), M.2100, G.826<br>Out-of-service<br>Errors: Frame, code, CRC-4, E-bit, bit<br>Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF), sync loss<br>Error performance: G.821 (inc. Annex D), M.2100, G.826 |
| LEDs | LOS, AIS, LOF, MF loss, RDI, RDI (MF), sync loss, errors |
| Monitor | Frame word |
| Trouble search | Auto search for errors/alarms in all measured channels |
| Delay measurement | 0 to 1 s |
| Auxiliary interface | Clock sync output, frame sync output, error output |

⋆1: Built-in 156M CMI (electrical) interface

**• MP0122A 1.5/45/52M*1 Unit, MP0122B 1.5/45/52/52M*2 (1.31)Unit**

| | |
|---|---|
| Bit rate | 1.544, 44.736 Mb/s |
| Level/waveform | 1.544 Mb/s: ANSI T1.102 (with 20 dB monitoring point), 0/655 ft<br>44.736 Mb/s: ANSI T1.102 (with 20 dB monitoring point), 0/450/900 ft |
| Connectors | BNC (75 Ω, unbalanced), Bantam (100 Ω, balanced)<br>1.544 Mb/s: AMI/B8ZS (balanced), 44.736 Mb/s: B3ZS (unbalanced) |
| Clock | Internal (accuracy: ±7 ppm, jitter unit not installed), external (ECL [AC] 50 Ω) received signal |
| Frame format | Unframed: 1.5, 45 Mb/s<br>Framed: 1.5 Mb/s (D4, ESF, Japan ESF*3), 45 Mb/s (M13, C-bit), MUX/DEMUX (Option 07) |
| Test patterns | PRBS: $2^{11}-1$, $2^{15}-1$, $2^{20}-1$ (zero suppress), $2^{20}-1$, $2^{23}-1$ (O.151)<br>Word: 16-bit program, all 0, all 1, 3 in 24 (1.5 Mb/s) |
| Error addition | Bit (all, test pattern), code, parity, CRC-6, C-bit, REI<br>Timing: Single, rate (1E–3, 1E–4, 1E–5, 1E–6, 1E–7)<br>FAS (45 Mb/s): n in 16 (n: 1 to 4), all |
| X-bit setting | 00, 01, 10, 11 |
| Alarm addition | LOS, LOF, AIS, RDI<br>Timing: All |
| Measurements | Mode: Single, repeat, manual<br>In-service<br>Errors: FAS, code, parity, CRC-6, C-bit, REI<br>Alarms: Power-fail, LOS, AIS, LOF, RDI<br>Error performance: G.821 (inc. Annex D), M.2100, G.826<br>Out-of-service<br>Errors: FAS, code, parity, CRC-6, C-bit, REI, bit<br>Alarms: Power-fail, LOS, AIS, LOF, RDI, sync loss<br>Error performance: G.821 (inc. Annex D), M.2100, G.826 |
| LEDs | LOS, LOF, AIS, RDI, sync loss, errors |
| Trouble search | Auto search for errors/alarms in all measured channels |
| Delay measurement | 0 to 1 s |
| Auxiliary interface | Clock sync output, frame sync output, error output |

⋆1: Built-in 52M B3ZS (electrical) interface
⋆2: Built-in 52M B3ZS (electrical) and optical interfaces
⋆3: Mounted Option 09 (Japan Mapping)

- **52/156/622/2488/9953M**

| | |
|---|---|
| Bit rate | 51.840, 155.520, 622.080, 2488.320, 9953.28 Mb/s |
| Level/waveform | 52M (electrical: B3ZS)*1: ANSI T1.102, 0/450 ft<br>52M (optical): As per MP0122B unit optical interface specifications<br>156M (electrical: CMI)*2: ITU-T G.703<br>156M (optical): As per optical 156M/622M unit specifications<br>622M (electrical/optical): As per optical 156M/622M unit and NRZ unit specifications<br>2488M (electrical/optical): As per 2.5G unit and 2.5G/10G unit specifications<br>9953M (electrical/optical): As per 2.5G/10G unit specifications |
| Clock | Internal (accuracy: ±3.5 ppm, jitter unit not installed), Lock (2 MHz, 1.5 MHz, 64 kHz + 8 kHz, 2 Mb/s, 1.5 Mb/s),<br>external (ECL [AC] 50 Ω, 9953M: 1.02 to 0.58 Vp-p, 50 Ω), received signal |
| Frame | SDH/SONET, CID pattern, non-frame |
| Mapping | See Fig. 1 |
| Through | Trance parent, over head overwrite, payload overwrite, Add/Drop |
| Test patterns | PRBS: $2^{11}-1$, $2^{15}-1$, $2^{20}-1$ (zero suppress, MP0122A/B installed), $2^{20}-1$, $2^{23}-1$, $2^{31}-1$ (only concatenation mapping 16C/64C)<br>(conform to O.151)<br>Word: 16-bit programmable, all 0, all 1 |
| Error addition | Bit all (all, test pattern), FAS, B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI<br>Timing: Single, single (burst) bit (1 to 64000), rate (1E–3, 1E–4, 1E–5, 1E–6, 1E–7, 1E–8, 1E–9)<br>User program AE-B (A: 1.0 to 9.9 step 0.1, B: 2 to 10)<br>Alternative: alarm frame (0 to 8000), normal frame (1 to 8000) |
| Alarm addition | LOS, LOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-SLM, HP-TIM, HP-RDI, HP-UNEQ, TU-AIS, TU-LOP, TU-LOM, LP-SLM,<br>LP-TIM, LP-RDI, LP-UNEQ, LP-RFI<br>Timing: Single, single (burst) frame<br>Alternative: alarm frame (0 to 8000), normal frame (1 to 8000), all |
| Measurements | Mode: Single, repeat, manual<br>In-service/Out-of-service<br>Errors: B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI<br>Alarms: Powerfail, LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-SLM, HP-TIM, HP-RDI, HP-UNEQ, TU-AIS,<br>TU-LOP, TU-LOM, LP-SLM, LP-TIM, LP-RDI, LP-UNEQ, LP-RFI<br>Error performance: G.826, M2101, M2110, M2120<br>Preset: Alarm measurement condition |
| LEDs | LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, HP-SLM, TU-AIS, TU-LOM, TU-LOP, LP-RDI, LP-RFI, LP-SLM,<br>Tandem, sync. loss, error |
| Tandem connection | N1 byte (Type 1, Type 2), N2 byte<br>Errors: N2 BIP-2, TC-REI, OEI, IEC<br>Alarms: VC-AIS, ISF, FAS, HP-Incoming-AIS, HP-TC-RDI, HP-ODI, LP-Incoming-AIS, LP-TC-RDI, LP-ODI |
| Justification | AU pointer, TU pointer, C, C1/C2<br>Measurement: NDF, +PJC, –PJC, Cons. C, C1/C2 |
| Monitor | SOH, POH, K1/K2, pointer, path trace (TIM alarms detectable), Tandem, payload |
| Pointer sequence | Signal of opposites polarity, regular with double, regular with missing, double of opposites polarity, 87-3/26-1 (normal, add,<br>cancel), continuous pattern (normal, add, cancel), single pointer adjustment, maximum rate pointer burst, phase transient pointer<br>burst, initialize period polarity, cooldown period |
| Over head capture | SOH/POH (any 1 byte), H1/H2, K1/K2 |
| Dummy channel setting | Payload: Dummy, copy, mixed payload<br>Setting: POH, pathtrace, SS bit, Tandem |
| Simultaneous measurement | VC2, VC12, VC11 |
| Trouble search | Auto search for errors/alarms in all measured channels |
| Delay | Measurement period: 0.5, 1, 2, 5, 10 s<br>Measurement range: 0 to 999 µs, 1.0 to 999.9 ms, 1.0 to 10.0 s, Time out<br>Display accuracy: ±5 µs (0.5, 1 s), ±50 µs (2, 5, 10 s) |
| APS (K1/K2) | Switch time measurement<br>Trigger<br>Internal: B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI, MS-AIS, AU-AIS, AU-LOP, HP-RDI, TU-AIS, TU-LOM, TU-LOP, LP-RDI,<br>LP-RFI, Bit<br>External: Measures trigger input signal (active high)<br>Threshold: Specify non-error alarm between 1 ms, 10 ms, 100 ms<br>Sequence generation: 2 to 64 word, repeat (8000 frame)<br>Sequence capture: 2 to 64 word, repeat(8000 frame) |
| Frequency measurement | Range: ±100 ppm, Accuracy: ±3.5 ppm (jitter unit not installed) |
| Over head test | OH change: SOH/POH 1 byte, K1/K2, RSOH, MSOH, SOH, POH (except B1, B2, B3, BIP-2)<br>PTR 64 frame: AU pointer, TU pointer<br>Timing: Single, Repeat (2 to 64)<br>Setting: PTR, NDF, +PJC, –PJC<br>OH BERT: SOH/POH 1 byte (exclude B1, B2, B3, BIP-2), D1-D3, D4-D12<br>Test pattern: $2^{11}-1$, $2^{15}-1$<br>OH add/drop: SOH/POH 1 byte, D1-D3, D4-D12 (exclude B1, B2, B3, BIP-2 additional type) |
| Japan mapping (option 09) | VC11 Signaling (8-multiframe, 64-multiframe setting) |

| | |
|---|---|
| Frame memory/capture (option 13) | Memory size: 64 frame (156M, 622M, 2.5G), 26 frame (10G) |
| Insert/extract | Bit rate: 10G (52M, 156M), 2.5G (52M, 156M) |
| Payload offset | ±100 ppm/0.1 ppm step |
| Auxiliary | Clock sync output, trigger input, trigger output, DCC interface (V.11), order wire, receive clock output |

∗1: Mounted MP0122A/B
∗2: Mounted MP0121A
MP0127A/0128A/0129A are usable (for specifications, refer to the MP1552B data sheet).

**• General**

| | |
|---|---|
| Printer | Internal, external |
| Internal memory | Measurement settings memory: 10, graphics memory: 15 |
| Others | FDD, RS-232C (Option 01)*1, GPIB (Option 02)*1, Ethernet (Option 03)*1, video output (Option 04)*1, buzzer, clock, help, screen copy |
| EMC | EN55011: 1991, Group 1, Class A<br>EN50082-1: 1992<br>Harmonic current emissions: EN61000-3-2 (1995) |
| Safety | EN61010-1: 1993 (Installation Category Ⅱ, Pollution Degree Ⅱ) |
| Dimensions and mass | 320 (W) x 177 (H) x 350 (D) mm, 10 kg approx. (excluding plug-in units and options) |
| Power | 100 to 240 Vac, 47.5 to 63 Hz, ≤500 VA |
| Temperature | 0˚ to +40˚C |

∗1: The video output, RS-232C, GPIB and Ethernet options cannot all be used simultaneously.
Only the video output + RS-232C, or video output + GPIB, or RS-232C + GPIB board, or Ethernet board combinations support simultaneous use, so change the board combinations according to the purpose.

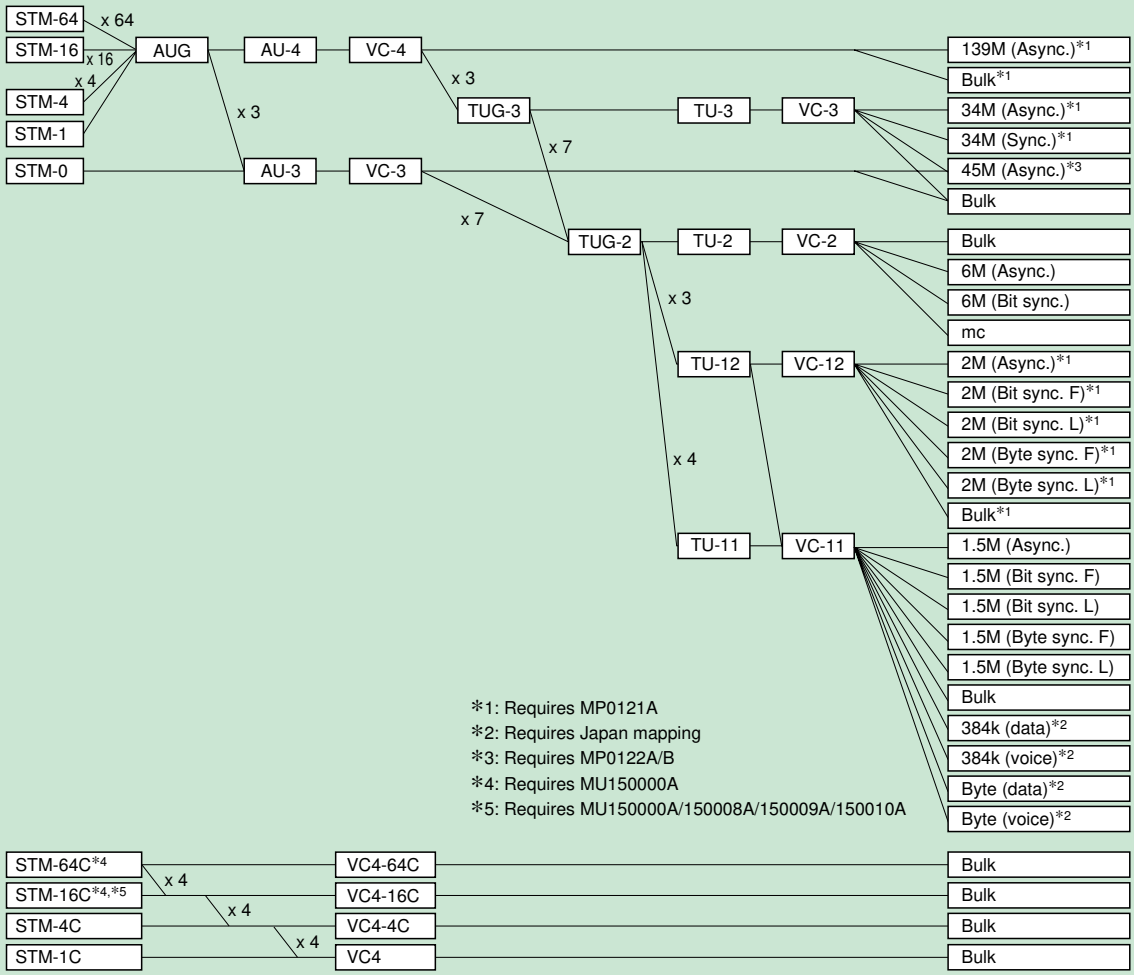



**Fig. 1 Mapping structure**

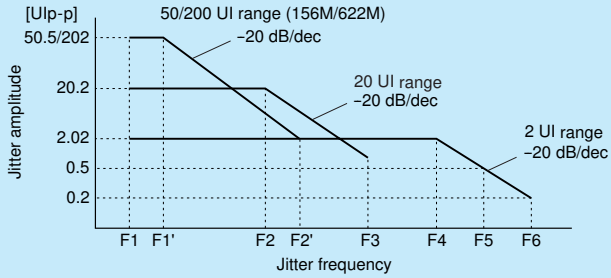
## • MP0124A/0125A/0126A Jitter Unit

### Bit rate

MP0124A: 2.048, 8.448, 34.368, 139.264, 155.520, 622.080 Mb/s
MP0125A: 1.544, 44.736, 51.840, 155.520, 622.080 Mb/s
MP0126A: 1.544, 2.048, 8.448, 34.368, 44.736, 139.264, 51.840, 155.520, 622.080 Mb/s

### Jitter generation

Modulation frequency: 0.1 Hz to 6 MHz
Amplitude: 0 to 202.0 Ulp-p
Resolution: 0.001 Ulp-p (2 UI range), 0.01 Ulp-p (20 UI range), 0.1 Ulp-p (50/200 UI range)




| Bit rate (Mb/s) | F1 (Hz) | F1' (Hz) | F2* (kHz) | F2'* (kHz) | F3* (kHz) | F4* (kHz) | F5* (kHz) | F6* (kHz) |
|---|---|---|---|---|---|---|---|---|
| 1.544 | 0.1 | – | 0.5 | – | 10 | 12.5 | 50 | – |
| 2.048 | 0.1 | – | 1 | – | 20 | 27.5 | 110 | – |
| 8.448 | 0.1 | – | 2 | – | 20 | 105 | 420 | – |
| 34.368 | 0.1 | – | 5 | – | 100 | 250 | 1000 | – |
| 44.736 | 0.1 | – | 5 | – | 100 | 250 | 1000 | – |
| 139.264 | 0.1 | – | 5 | – | 100 | 1000 | 4000 | – |
| 51.840 | 0.1 | – | 2 | – | 80 | 50 | – | 500 |
| 155.520 | 0.1 | 1000 | 6.5 | 25 | 500 | 150 | – | 1500 |
| 622.080 | 0.1 | 500 | 25 | 50 | 500 | 600 | – | 6000 |

*: typical value

Accuracy (at Fr): ±5% ±0.05 Ulp-p (2 UI range), ±5% ±0.3 Ulp-p (20 UI range), ±5% ±0.8 Ulp-p (50 UI range),
±5% ±3.2 Ulp-p (200 UI range) *Fr: 100 kHz (156M/622M, 2UI range), 500 Hz (1.5M, 20UI range), 1 kHz (others)

### Jitter tolerance measurement

Conforms to ITU-T G.823/G.824/G.825/G.958
Display: Numeric, graphic

### Frequency offset

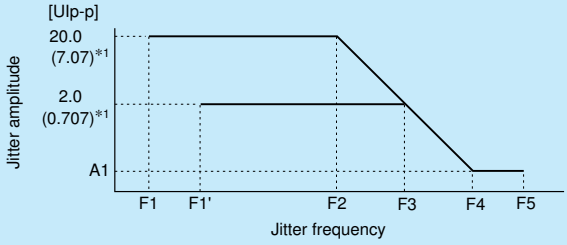
Range: ±999.9 ppm/step (0.1 ppm, Jitter: off), ±70 ppm/step (0.1 ppm, Jitter: on/off)
Accuracy: ±0.1 ppm (after power-on, calibrates after 60 min. warm-up, 23˚ ±5˚C)

### Auxiliary interface

External modulation input, external 10 MHz reference input, reference clock output

### Jitter measurement

Conforms to ITU-T O.172 [TABLE 8 ($f_1$-$f_4$), TABLE 9, pseudo-random signal ($f_1$-$f_4$) only]
Modulation frequency: 2 Hz to 5 MHz
Amplitude: 0 to 20.00 Ulp-p, 0 to 7.07 Ulrms (Option 01)
Resolution: 0.001 Ulp-p/0.001 Ulrms (2 UI range), 0.01 Ulp-p/0.01 Ulrms (20 UI range)




| Bit rate (Mb/s) | A1 (Ulp-p) | F1 (Hz) | F1' (Hz) | F2 (kHz) | F3 (kHz) | F4 (kHz) | F5 (kHz) |
|---|---|---|---|---|---|---|---|
| 1.544 | 0.5 | 2 | 20 | 0.2 | 2.5 | 10 | 40/(15)*2 |
| 2.048 | 0.5 | 2 | 20 | 0.45 | 6 | 25 | 100/(18)*2 |
| 8.448 | 0.5 | 2 | 20 | 0.2 | 10 | 100 | 400/(70)*2 |
| 34.368 | 0.5 | 2 | 20 | 0.5 | 40 | 500 | 800/(300)*2 |
| 44.736 | 0.5 | 2 | 20 | 3 | 40 | 200 | 400 |
| 139.264 | 0.5 | 2 | 20 | 0.25 | 50 | 1000 | 3500/(1200)*2 |
| 51.840 | 0.2 | 2 | 20 | 0.2 | 5 | 100 | 400 |
| 155.520 | 0.2 | 2 | 20 | 0.7 | 20 | 500 | 1300 |
| 622.080 | 0.2 | 2 | 20 | 20 | 200 | 2000 | 5000 |

*1: rms; F1, F1' = 100 Hz *2: 20 UI range in parentheses

**Jitter measurement**

Accuracy
[Ulp-p]: ±5% ±W Ulp-p (Fr Hz)
156 Mb/s (optical): When input level –25 dBm max. add 0.01 Ulp-p/dB to above specifications.
622 Mb/s (optical): When input level –20 dBm max. add 0.01 Ulp-p/dB to above specifications.
[Ulrms]: ±5% ±Y Ulp-p (Fr Hz)
156 Mb/s (optical): When input level –25 dBm max. add 0.002 Ulrms/dB to above specifications.
622 Mb/s (optical): When input level –20 dBm max. add 0.002 Ulrms/dB to above specifications.
Frequency response (Fr Hz):
±5% (2 to 20 Hz), ±2% (20 Hz to 300 kHz), ±3% (300 kHz to 1 MHz), ±5% (1 to 3 MHz), ±10% (3 to 5 MHz)
⋆fr: 100 kHz (156M/622M, 2 UI range), 1 kHz (others)

| Bit rate (Mb/s) | W (Ulp-p)*1 | | Y (Ulrms)*2 | |
|---|---|---|---|---|
| | 2 UI | 20 UI | 2 UI | 20 UI |
| 1.544 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 1.544 (AMI/B8ZS) | 0.040 | 0.22 | 0.006 | 0.04 |
| 2.048 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 2.048 (HDB3) | 0.040 | 0.22 | 0.006 | 0.04 |
| 8.448 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 8.448 (HDB3) | 0.040 | 0.22 | 0.006 | 0.04 |
| 34.368 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 34.368 (HDB3) | 0.040 | 0.22 | 0.017 | 0.04 |
| 44.736 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 44.736 (B3ZS) | 0.040 | 0.22 | 0.006 | 0.04 |

| Bit rate (Mb/s) | W (Ulp-p)*1 | | Y (Ulrms)*2 | |
|---|---|---|---|---|
| | 2 UI | 20 UI | 2 UI | 20 UI |
| 139.264 (CLK) | 0.030 | 0.20 | 0.005 | 0.03 |
| 139.264 (CMI) | 0.040 | 0.30 | 0.022 | 0.06 |
| 51.840 (CLK) | 0.015 | 0.20 | 0.005 | 0.03 |
| 51.840 (B3ZS) | 0.040 | 0.22 | 0.017 | 0.05 |
| 51.840 (optical)*3 | 0.070 | 0.30 | 0.022 | 0.06 |
| 155.52 (CLK) | 0.035 | 0.20 | 0.017 | 0.05 |
| 155.52 (CMI) | 0.070 | 0.30 | 0.022 | 0.06 |
| 155.52 (optical)*3 | 0.070 | 0.30 | 0.022 | 0.06 |
| 622.08 (CLK) | 0.050 | 0.20 | 0.027 | 0.07 |
| 622.08 (optical)*3 | 0.100 | 0.30 | 0.032 | 0.08 |

⋆1: With HP1 + LP, ⋆2: With HP + LP, ⋆3: +10˚ to +40˚C

Filter

| Bit rate (Mb/s) | HP0 (Hz) | HP1 (Hz) | HP2 (kHz) | HP2' (kHz) | HP (kHz) | LP (kHz) |
|---|---|---|---|---|---|---|
| 1.544 | 10 | 10 | 8 | – | 12 | 40 |
| 2.048 | 10 | 20 | 18 | 0.7 | 12 | 100 |
| 8.448 | 10 | 20 | 3 | 80 | 12 | 400 |
| 34.368 | 10 | 100 | 10 | – | 12 | 800 |
| 44.736 | 10 | 10 | 30 | – | 12 | 400 |
| 139.264 | 10 | 200 | 10 | – | 12 | 3500 |
| 51.840 | 10 | 100 | 20 | – | 12 | 400 |
| 155.520 | 10 | 500 | 65 | – | 12 | 1300 |
| 622.080 | 10 | 1000 | 250 | – | 12 | 5000 |

**Hit measurement**

Count, seconds, % free seconds

**Jitter transfer measurement**

Conforms to ITU-T G.823/G.824/G.958 [selective bandwidth: ≤10 Hz (modulation frequency: ≥20 Hz)]
Display: Numeric, graphic

**Frequency measurement**

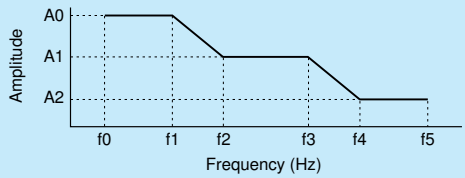
Resolution: 0.1 ppm, Display: Hz or ppm (after power-on, calibrates after 60 min. warm-up, 23˚ ±5˚C)

**Auxiliary interface**

Demodulation output, reference clock input

**Wander generation**

Modulation frequency: 10 µHz to 0.2 Hz (sine wave)




| Bit rate (Mb/s) | Amplitude | | | Frequency | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A0 (Ulp-p) | A1 (Ulp-p) | A2 (Ulp-p) | f0 (µHz) | f1 (µHz) | f2 (mHz) | f3 (mHz) | f4 (mHz) | f5 (mHz) |
| 1.544 | 40 | – | 20 | 10 | – | – | 65 | 130 | 200 |
| 2.048 | 40 | – | 20 | 10 | – | – | 65 | 130 | 200 |
| 8.448 | 200 | – | 20 | 10 | – | – | 13 | 130 | 200 |
| 34.368 | 1000 | 113 | 20 | 10 | 180 | 1.6 | 23 | 130 | 200 |
| 44.736 | 1200 | 135 | 20 | 10 | 180 | 1.6 | 19 | 130 | 200 |
| 139.264 | 3000 | 338 | 50 | 10 | 180 | 1.6 | 19 | 130 | 200 |
| 51.840 | 1200 | 135 | 20 | 10 | 180 | 1.6 | 19 | 130 | 200 |
| 155.520 | 3600 | 406 | 50 | 10 | 180 | 1.6 | 16 | 130 | 200 |
| 622.080 | 14400 | 1620 | 200 | 10 | 180 | 1.6 | 16 | 130 | 200 |

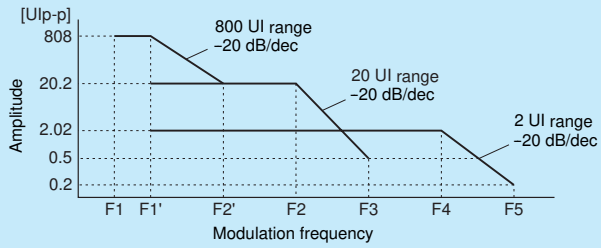
**Wander measurement (Option 02)**

Reference input: 1.544M (AMI/B8ZS, clock), 2.048M (HDB3, clock)
Measurement range
p-p: 0.0 to 3.2E5 ns, +p/–p: 0.0 to 1.6E5 ns, TIE: ±0.0 to 1.6E5 ns, MTIE*: 0.0 to 1E6 ns, TDEV*: 0.0 to 1E6 ns
⋆: MTIE, TDEV measurement require external PC and MX150001A Wander (MTIE, TDEV) Application Software
Resolution: 0.1 ns
Sampling interval: 25 ms
Filter: DC to 0.01 Hz, DC to 10 Hz, 0.01 Hz to 10 Hz
Display: Numeric, graphic

## • MP0130A 2.5G Jitter Unit

### Jitter generation

Frequency: 2488.32 MHz
Modulation frequency: 0.1 Hz to 20 MHz
Amplitude: 0 to 808.0 UIp-p




| Bit rate | F1 (Hz) | F1' (Hz) | F2 (Hz) | F2' (kHz) | F3 (kHz) | F4 (kHz) | F5 (kHz) |
|---|---|---|---|---|---|---|---|
| 2488.32 Mb/s | 0.1 | 15 | 600 | 25 | 500 | 2,000 | 20,000 |

### Jitter tolerance measurement

Conforms to ITU-T G.825, G.958A, G.958B, user, Bellcore 253

### Frequency offset

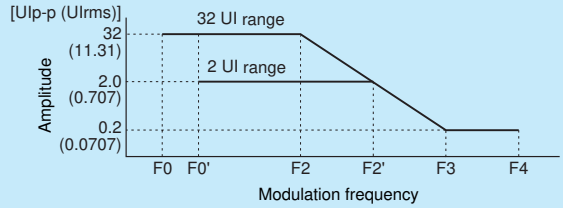
±70 ppm/step (0.1 ppm, jitter: on/off)

### Auxiliary interface

External clock input, reference clock output

### Jitter measurement

Frequency: 2488.32 MHz ±50 ppm, conforms to ITU-T O.172 [TABLE 8 ($f_1$-$f_4$) only]




| Bit rate | | F0 (Hz) | F0' (Hz) | F2 (kHz) | F2' (kHz) | F3 (kHz) | F4 (Hz) |
|---|---|---|---|---|---|---|---|
| 2488.32 Mb/s | 2 UI | – | 100 | – | 100 | 1,000 | 20,000 |
| | 32 UI | 10 | – | 6.25 | – | 1,000 | 20,000 |

Accuracy (Mounted MU150008A, MU150009A, MU150001A)
[UIp-p]: ±5% ±W UIp-p (Fr Hz)
2488 Mb/s (optical): When input level –12 to –10 dBm max. add 0.01 UIp-p/dB to above specifications.
[UIrms]: ±5% ±Y UIp-p (Fr Hz)
2488 Mb/s (optical): When input level –12 to –10 dBm max. add 0.002 UIrms/dB to above specifications.

| Bit rate (Mb/s) | W (UIp-p)*1 | | Y (UIrms)*2 | |
|---|---|---|---|---|
| | 2 UI | 20 UI | 2 UI | 20 UI |
| 2488 (CLK) | 0.030 | 0.60 | 0.007 | 0.35 |
| 2488 (optical) | 0.100 | 2.20 | 0.027 | 0.55 |

### Jitter transfer measurement

ITU-T G.958A, G.958B, user, Bellcore 253 [selectable bandwidth: ≤10 Hz (modulation frequency: ≥20 Hz)]

### Frequency measurement

2488.32 MHz ±100 ppm (resolution: 0.1 ppm)

### Hit measurement

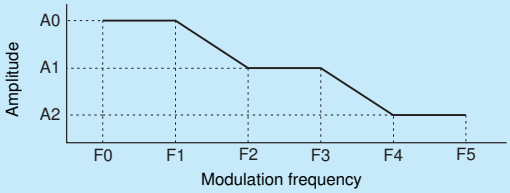
Count, seconds, % free seconds

### Auxiliary interface

Reference, clock input

### Wander generator

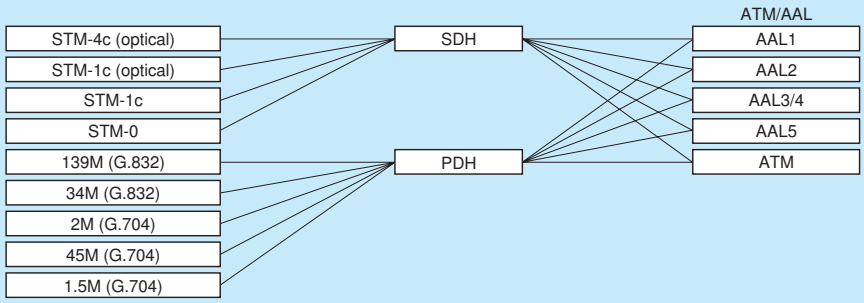
Frequency: 2488.32 MHz
Modulation frequency: 10 µHz to 200 mHz (sine wave)




| Bit rate | Amplitude (UIp-p) | | | Frequency (mHz) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A0 | A1 | A2 | f0 | f1 | f2 | f3 | f4 | f5 |
| 2488M | 57,600 | 6,480 | 800 | 0.01 | 0.18 | 1.6 | 16 | 130 | 200 |

| | |
|---|---|
| Wander measurement | Frequency:<br>2488.32 MHz ±50 ppm (Wander measurement becomes effective when MP0124A/0125A/0126A plus Option 02 is mounted.)<br>Measurement frequency: Up to 10 Hz<br>Measurement range<br>P-P: 0.0 to 3.2E5 ns, +P/–P: 0.0 to 1.6E5 ns, TIE: 0.0 to ±1.6E5 ns, MTIE/TDEV: 0.0 to 1.0E6 ns<br>Auto-measurement: TIE, MTIE, TDEV (MTIE, TDEV: necessary for MX150001A application software) |

**• MP0123A ATM Unit**

| | |
|---|---|
| Bit rate | 1.544, 2.048, 34.368, 44.736, 139.364, 51.840, 155.520, 622.080 Mb/s |
| Mapping |  |
| Traffic pattern | CBR, burst, sawtooth, PCR with CBR, Poisson |
| Test patterns | Cell: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern, time stamp<br>O.191: Edit pattern<br>AAL1: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern, time stamp<br>AAL2 (CPS-PDU): Time stamp<br>AAL2 (CPS-PACKET): Single cell PRBS 7, 8-bit word pattern, edit pattern<br>AAL3/4 (SAR-PDU): Time stamp<br>AAL3/4 (CPCS-PDU): Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern<br>AAL5: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern |
| Error addition | Cell: HEC, programmable pattern<br>O.191: Lost cell, misinserted cell, errored cell, SECB<br>AAL1: Lost cell, SNP, PRBS, word<br>AAL2 (CPS-PDU): P, SN, OSF<br>AAL2 (CPS-PACKET): HEC, PRBS, word<br>AAL3/4 (SAR-PDU): SN, CRC10, segment type, LI, abort<br>AAL3/4 (CPCS-PDU): CPI, B/E tag mismatch, BA size, AL, length, PRBS, word<br>AAL5: Frame size, length, CRC32, abort, PRBS, word |
| Alarm addition | LCD, VP/VC AIS, VP/VC RDI, VP/VC CC, VP/VC loopback cell |
| PM cell | Error insertion: Lost cell, misinserted cell, BIPV, SECB |
| Cell editing | O.191, AAL1, AAL2, AAL3/4, AAL5, AIS, RDI, CC, loopback, FM, BR, background (10 ch) |
| Memorized cell | Possible to send after editing receiver's capture data |
| Measurement | Mode: Single, repeat, manual<br>Error<br>Cell: Cell count, correctable HEC, uncorrectable HEC, non-conforming cell<br>O.191: Errored cell, lost cell, misinserted cell, SECB<br>AAL1: SAR-PDU count, lost cell, SNP, uncorrectable SNP, PRBS, word<br>AAL2: CPS-PDU count, P, OSF, SN, CPS packet count, HEC, PRBS, word<br>AAL3/4*: SAR-PDU count, CRC10, MID count (SAR-PDU with selected MID value), SN, ST (segment type), LI, abort, discarded PDU (one of SN error, LI error, abort, COM with ST error, or EOM with ST error), CPCS-PDU count, CPI, B/E tag mismatch, BA size, AL, length, undeliverded PDU (one of CPI error, B/E tag mismatch, BA size error, AL error, or length error), PRBS, word<br>*CRC10 is calculated for all SAR-PDU. The others are calculated for SAR-PDU with specified MID.<br>AAL5: CPCS-PDU count, frame size, length, CRC32, abort, discarded PDU (one of frame size error, length error, CRC32 error, or abort), PRBS, word<br>FM: Lost cell, misinserted cell, BIPV, SECB<br>BR: Lost cell, misinserted cell, BIPV, SECB<br>Alarm: LCD, VP/VC segment AIS, VP/VC end-to-end AIS, VP/VC segment RDI, VP/VC end-to-end RDI, VP/VC segment LOC, VP/VC end-to-end LOC |
| LED | LCD, VP-AIS, VP-RDI, VP-LOC, VC-AIS, VC-RDI, VC-LOC, error |
| Monitor | Live monitor (1023 channel monitor), traffic monitor, cell monitor |
| Delay measurement | 1-point CDV, 2-point CDV |
| Capture | 1 to 2016 cells |

### • MP0131A Add/Drop Unit

| | |
|---|---|
| Bit rate | 1.544, 2.048, 34.368, 44.736, 139.264 Mb/s |
| Level/waveform | 1.544 Mb/s: ANSI T1.102, 0/655 ft<br>44.736 Mb/s: ANSI T1.102, 0/450/900 ft (0 ft: Drop only)<br>2.048/34.368/139 Mb/s: ITU-T G.703 |
| Connector | BANTAM (100 Ω, balanced): 1.544 Mb/s (AMI/B8ZS)<br>3-pin Siemens (120 Ω, balanced): 2.048 Mb/s (HDB3)<br>BNC (75 Ω, unbalanced): 2.048 Mb/s, 34.368 Mb/s (HDB3), 139.264 Mb/s (CMI) |
| Mapping | See Fig. 2 |

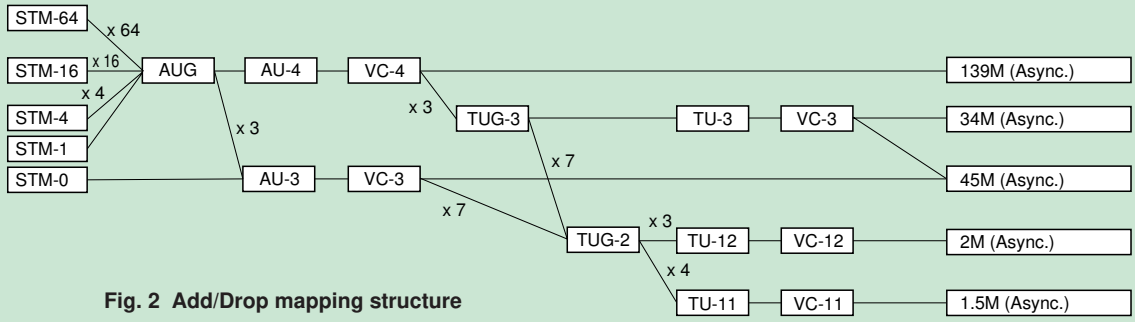



**Fig. 2 Add/Drop mapping structure**

### • MP0111A Optical 156M/622M (1.31) Unit

| | |
|---|---|
| Transmit | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Wavelength: 1310 nm<br>Output level: –11.5 dBm ±3.5 dB<br>Optical safety: IEC 825-1 Class 1, 21CFR1040.10 Class I<br>Connector: FC-PC (SM-F) |
| Receive | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Sensitivity<br>156M: –33 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>622M: –28 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>Connector: FC-PC (SM-F)<br>Power measurement<br>Measurement range: –30 to 0 dBm (peak power)<br>Accuracy: ≤±1 dB (–20 dBm)<br>Linearity: ≤±1 dB (–30 to 0 dBm) |

### • MP0112A Optical 156M/622M (1.55) Unit

| | |
|---|---|
| Transmit | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Wavelength: 1550 nm<br>Output level: –5 dBm ±2 dB<br>Optical safety: IEC825-1 Class 1, 21CFR1040.10 Class I<br>Connector: FC-PC (SM-F) |
| Receive | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Sensitivity<br>156M: –33 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>622M: –28 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>Connector: FC-PC (SM-F)<br>Power measurement<br>Measurement range: –30 to 0 dBm (peak power)<br>Accuracy: ≤±1 dB (–20 dBm)<br>Linearity: ≤±1 dB (–30 to 0 dBm) |

### • MP0113A Optical 156M/622M (1.31/1.55) Unit

| | |
|---|---|
| Transmit | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Wavelength: 1310/1550 nm<br>Output level<br>1.31 µm: –11.5 dBm ±3.5 dB, 1.55 µm: –5 dBm ±2 dB<br>Optical safety: IEC825-1 Class 1, 21CFR1040.10 Class I<br>Connector: FC-PC (SM-F) |
| Receive | Bit rate: 155.520, 622.080 Mb/s (NRZ)<br>Sensitivity<br>156M: –33 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>622M: –28 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>Connector: FC-PC (SM-F)<br>Power measurement<br>Measurement range: –30 to 0 dBm (peak power)<br>Accuracy: ≤±1 dB (–20 dBm)<br>Linearity: ≤±1 dB (–30 to 0 dBm) |

### • MP0122B 1.5/45/52/52 (1.31) Unit
### Optical interface

| | |
|---|---|
| Transmit | Bit rate: 51.84 Mb/s (NRZ)<br>Wavelength: 1310 nm<br>Output level: –11.5 dBm ±3.5 dB<br>Optical safety: IEC 825-1 Class 1, 21CFR1040.10 Class I<br>Connector: FC-PC (SM-F) |
| Receive | Bit rate: 51.84 Mb/s (NRZ)<br>Sensitivity<br>52M: –33 to –8 dBm (test pattern: PRBS $2^{23}-1$, BER $10^{-10}$, +10˚ to +40˚C)<br>Connector:FC-PC (SM-F)<br>Power measurement<br>Measurement range: –30 to 0 dBm (peak power)<br>Accuracy: ≤±1 dB (–20 dBm)<br>Linearity: ≤±1 dB (–30 to 0 dBm)<br>Monitor input<br>Level: 0.1 to 1.0 Vp-p (AC), Connector: SMA (50 Ω) |

### • MU150008A/150009A/150010A 2.5G unit

| | |
|---|---|
| Bit rate | 2488.32 Mb/s (NRZ) |
| Optical output | Wavelength: 1310 nm (MU150008A), 1550 nm (MU150009A), 1310/1550 nm (MU150010A)<br>Output level: –4 dBm ±3 dB<br>Optical safety: IEC825-1 Class 3A, 21CFR1040.10 Class IIIb<br>Connector: FC-PC (SM-F) |
| Optical input | Sensitivity<br>Narrow: –28 to –9 dBm (BER $10^{-10}$, +10˚ to +30˚C), –27 to –9 dBm (BER $10^{-10}$, 0˚ to +30˚C)<br>Wide: –20 to –9 dBm (BER $10^{-10}$, +10˚ to +40˚C)<br>Connector: FC-PC (SM-F)<br>Power measurement<br>Range: –30 to –9 dBm (peak power)<br>Accuracy: ≤±2 dB (–20 dBm)<br>Linearity: ≤±2 dB (–30 to –9 dBm) |
| Electrical I/O | Transmit (NRZ)<br>Level: ECL (–2 V), Connector (data, clock): SMA (50 Ω)<br>Receive (NRZ)<br>Level: ECL (–2 V), Connector (data, clock): SMA (50 Ω)<br>Monitor input<br>Level: 0.1 to 1.0 Vp-p (AC), Connector (data): SMA (50 Ω) |
| Auxiliary interface | External clock input, receive clock output, sync. output |

### • MU150000A 2.5G/10G unit

| | |
|---|---|
| Bit rate | 2488.320, 9953.28 Mb/s (NRZ) |
| Electrical I/O | Transmit (NRZ)<br>Level: 0/–1 V ±0.3 V<br>Connector (data, clock): SMA (50 Ω)<br>Receive (NRZ)<br>Level: 1 V(p-p) ±0.3 V<br>Connector (data, clock): SMA (50 Ω) |
| Auxiliary interface | External clock input, Internal clock output, receive clock output, 156M sync output, Error output |

### • MP0105A CMI Unit

| | |
|---|---|
| Transmit | Bit rate: 155.520 Mb/s, Level: 1 ±0.1 V, Connector: BNC (75 Ω) |
| Receive | Bit rate: 155.520 Mb/s<br>Level: 1 ±0.1 V (0 to 12 dB, with $\sqrt{f}$ auto correction and monitor function)<br>Connector: BNC (75 Ω) |

### • MU150001A/B Optical 10G Tx (1.55)

| | |
|---|---|
| Bit rate | 9953.28 Mbit/s, 2488.320 Mb/s (Option 01, 02, 03) |
| Optical output | Wavelength: 1550 nm band, 1310 nm band (Option 01, 03)<br>Output level: –4 dBm ±3 dB<br>Optical safety: IEC825-1 Class 3A, 21CFR1040.10 Class IIIb<br>Connector: FC-PC (SMF) |
| Electrical input | Data input: 0/–1 ±0.3 V<br>Clock input: 0/–1 ±0.3 V<br>Connector: SMA 50 Ω |

### • MU150002A Optical 10G Rx (Narrow)

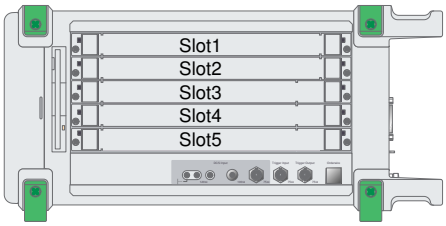
| | |
|---|---|
| Bit rate | 9953.28 Mbit/s, 2488.320 Mb/s (Option 01) |
| Optical input | Sensitivity<br>10G: –13 to –3 dBm (BER $10^{-12}$, NRZ, mark ratio 1/2, PRBS: $2^{31}-1$)<br>2.5G: –29 to –10 dBm (BER $10^{-11}$, NRZ, mark ratio 1/2, PRBS: $2^{23}-1$) (Option 01)<br>Connector: FC-PC (SMF)<br>Power measurement<br>Range: –16 to 0 dBm (10G, average power), –30 to –10 dBm (2.5G, average power)<br>Accuracy: ≤±2 dB (10G, –10 dBm), ≤±2 dB (2.5G, –20 dBm)<br>Linearity: ≤±2 dB (10G, –16 to 0 dBm), ≤±2 dB (2.5G, –30 to –10 dBm) |
| Electrical output | Data output: 1 ±0.3 V(p-p)<br>Clock output: 0.8±0.2 V(p-p) (10G),1 ±0.3 V(p-p) (2.5G)<br>Connector: SMA 50 Ω |

### • MP0108A NRZ Unit

| | |
|---|---|
| Transmit | Bit rate: 155.520, 622.080 Mb/s<br>Level: ECL<br>Connector (clock, data): SMA (50 Ω) |
| Receive | Bit rate: 155.520, 622.080 Mb/s<br>Level: ECL (–2 V)<br>Connector (clock, data): SMA (50 Ω) |

# *Typical Configuration*

## 10G b/s Configuration




### • 10 G (North America)

MP1570A Main frame

Slot1:MP0122A 1.5/45/52M Unit

Slot2:MU150002A Optical 10G Rx(Narrow) Unit

Slot3:MU150001A Optical 10G Tx(1.55) Unit

Slot4/5:MU150000A 2.5G/10G Unit

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit

### • 10G (Europe)

MP1570A Main frame

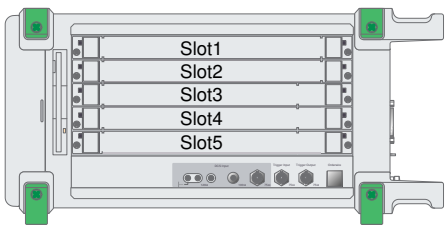
Slot1:MP0121A 2/8/34/139/156M Unit

Slot2:MU150002A Optical 10G Rx(Narrow) Unit

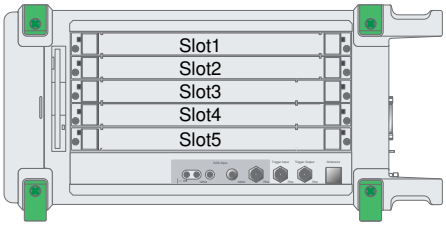
Slot3:MU150001A Optical 10G Tx(1.55) Unit

Slot4/5:MU150000A 2.5G/10G Unit

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit



## 2.5G b/s Configuration




- **2.5G (Europe)**

MP1570A Main frame

Slot1:MP0121A 2/8/34/139/156M Unit

Slot2:MU150009A 2.5G(1.55) Unit

Slot3:

Slot4/5:

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit

- **2.5G (North America)**

MP1570A Main frame

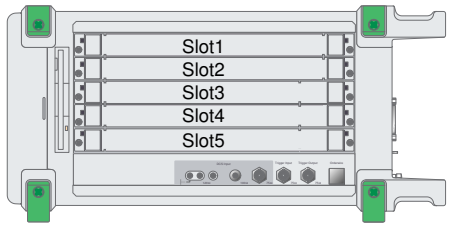
Slot1:MP0122A 1.5/45/52M Unit

Slot2: MU150009A 2.5G(1.55) Unit

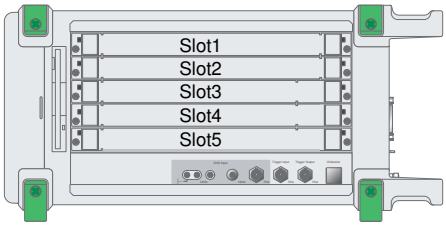
Slot3:

Slot4/5:

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit




## 2.5G b/s Configuration Jitter measurement




- **2.5G (Europe)**

MP1570A Main frame

Slot1:MP0121A 2/8/34/139/156M Unit

Slot2: MU150010A 2.5G(1.31/1.55) Unit

Slot3: MP0130A 2.5G Jitter Unit

Slot4/5:MP0124A 2/8/34/139M 156 /622M Unit

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit

- **2.5G (North America)**

MP1570A Main frame

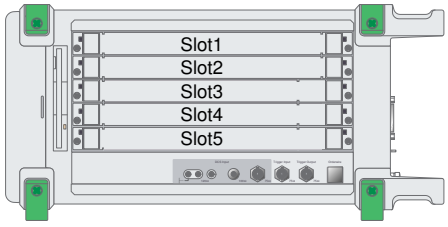
Slot1:MP0122A 1.5/45/52M Unit

Slot2: MU150010A 2.5G(1.31/1.55) Unit

Slot3: MP0130A 2.5G Jitter Unit

Slot4/5:MP0125A 1.5/45/52M 156/622M Jitter Unit

Front:MP0113A Optical 156M/622M(1.31/1.55) Unit




| Unit | Slot 1 | Slot 2 | Slot 3 | Slot 4/5 |
|---|---|---|---|---|
| MP0121A 2/8/34/139/156M Unit | √ | | | |
| MP0122A 1.5/45/52M Unit | √ | √ | | |
| MP0122B 1.5/45/52/52M (1.31) Unit | √ | √ | | |
| MP0123A ATM Unit | | | √ | |
| MP0124A 2/8/34/139M, 156/622M Jitter Unit | | | | √ |
| MP0125A 1.5/45/52M, 156/622M Jitter Unit | | | | √ |
| MP0126A 2/8/34/139M, 1.5/45/52M, 156M/622M Jitter Unit | | | | √ |
| MU150008A 2.5G (1.31) Unit | | √ | | |
| MU150009A 2.5G (1.55) Unit | | √ | | |
| MU150010A 2.5G (1.31/1.55) Unit | | √ | | |
| MP0130A 2.5G Jitter Unit | | | √ | |
| MP0131A Add/Drop Unit | √ | √ | | |
| MU150000A 2.5G/10G Unit | | | | √ |
| MU150001A/B Optical 10G Tx (1.55) Unit | | | √ | |
| MU150002A Optical 10G Rx (Narrow) Unit | | √ | | |

# Ordering Information

Please specify the model/order number and quantity when ordering.

| Model/Order No. | Name | | Remarks |
|---|---|---|---|
| | **Main frame** | | |
| MP1570A | SONET/SDH/PDH/ATM Analyzer | | |
| | **Standard accessories** | | |
| | AC power cord: | 1 pc | |
| Z0169 | Printer paper (5 rolls/pack): | 1 pack | |
| F0079 | Fuse, 10 A: | 2 pcs | |
| B0329G | Protective cover: | 1 pc | |
| J0907Q | Remote interlock cord: | 1 pc | For MU150001A/B, MU150008A, MU150009A, MU150010A |
| J0908 | Remote interlock terminator: | 1 pc | For MU150001A/B, MU150008A, MU150009A, MU150010A |
| E0008A | Optical output control key: | 1 pc | For MU150001A/B, MU150008A, MU150009A, MU150010A |
| J0747B | Fixed optical attenuator (10 dB): | 1 pc | For MU150001A/B |
| J0747C | Fixed optical attenuator (15 dB): | 1 pc | For MU150008A/MU150009A/MU150010A |
| J0900A | Coaxial cable (AA-165-200), 20 cm: | 2 pcs | For MP0130A |
| W1719AE | MP1570A operation manual (Vol. 1 Basic operation for SDH): | 1 copy | |
| W1720AE | MP1570A operation manual (Vol. 1 Basic operation for SONET): | 1 copy | |
| W1721AE | MP1570A operation manual (Vol. 2 Remote control): | 1 copy | |
| W1722AE | MP1570A operation manual (Vol. 3 ATM measurement): | 1 copy | |
| W1723AE | MP1570A operation manual (Vol. 4 2.5G/10G measurement): | 1 copy | |
| W1724AE | MP1570A operation manual (Vol. 5 Add/Drop function): | 1 copy | |
| W1725AE | MP1570A operation manual (Vol. 6 Jitter/wander measurement): | 1 copy | |
| W1726AE | MP1570A operation manual (Vol. 7 2.5G jitter/wander measurement): | 1 copy | |
| W1323AE | MX150001A wander (MTIE, TDEV) application software operation manual: | 1 copy | Supplied with MX150001A |
| J1002A | Semi-rigid cable: | 2 pcs | For MU150001A/B |
| J1002B | Semi-rigid cable: | 2 pcs | For MU150002A |
| J1002C | Semi-rigid cable: | 3 pcs | For MU150000A |
| | **Plug-in units** | | |
| MP0121A | 2/8/34/139/156M Unit | | |
| MP0122A | 1.5/45/52M Unit | | |
| MP0122B*2 | 1.5/45/52/52M (1.31) Unit | | |
| MP0123A | ATM Unit | | |
| MP0124A | 2/8/34/139M, 156/622M Jitter Unit | | Only jitter generation/measurement, requires MP0121A |
| MP0125A | 1.5/45/52M, 156/622M Jitter Unit | | Only jitter generation/measurement, requires MP0122A/B |
| MP0126A | 2/8/34/139M, 1.5/45/52M, 156/622M Jitter Unit | | Only jitter generation/measurement, requires MP0121A or MP0122A/B |
| MU150008A*2 | 2.5G (1.31) Unit | | With optical power meter |
| MU150009A*2 | 2.5G (1.55) Unit | | With optical power meter |
| MU150010A*2 | 2.5G (1.31/1.55) Unit | | With optical power meter |
| MP0130A | 2.5G Jitter Unit | | Only jitter generation/measurement, requires MU150008A, MU150009A, or MU150010A |
| MP0131A | Add/Drop Unit | | |
| MU150000A | 2.5G/10G Unit | | |
| MU150001A*2 | Optical 10G Tx (1.55) Unit | | |
| MU150001B*2 | Optical 10G Tx (1.55) Unit | | |
| MU150002A*2 | Optical 10G Rx (Narrow) Unit | | With optical power meter |
| MP0111A*2 | Optical 156M/622M (1.31) Unit | | With optical power meter |
| MP0112A*2 | Optical 156M/622M (1.55) Unit | | With optical power meter |
| MP0113A*2 | Optical 156M/622M (1.33/1.55) Unit | | With optical power meter, 1.31/1.55 switchable |
| MP0105A | CMI Unit | | |
| MP0108A | NRZ Unit | | |
| | **Options** | | |
| MP1570A-01 | RS-232C | | |
| MP1570A-02 | GPIB | | |
| MP1570A-03 | Ethernet | | |
| MP1570A-04*3 | VGA output | | |
| MP1570A-06 | MUX/DEMUX (2/8/34/139 Mb/s) | | For MP0121A |
| MP1570A-07 | MUX/DEMUX (1.5/45 Mb/s) | | For MP0122A/B |
| MP1570A-08 | 45M-2M MUX/DEMUX | | Requires MP0121A and MP0122A/B |
| MP1570A-09 | Japan mapping | | Requires MP0122A or MP0122B |
| MP1570A-10*1 | SDH | | |
| MP1570A-11*1 | SONET | | |
| MP1570A-13 | Frame memory capture (156M/622M) | | |
| MP0124A-01 | RMS measurement | | |
| MP0125A-01 | RMS measurement | | |
| MP0126A-01 | RMS measurement | | |
| MP0130A-01 | RMS measurement | | |
| MP0124A-02 | Wander measurement | | |
| MP0125A-02 | Wander measurement | | |
| MP0126A-02 | Wander measurement | | |
| MU150008A-01 | Frame memory capture (2.5G) | | |
| MU150009A-01 | Frame memory capture (2.5G) | | |
| MU150010A-01 | Frame memory capture (2.5G) | | |
| MU150000A-01 | Frame memory capture (2.5G/10G) | | |
| MU150001A/B-01 | 2.5G (1.31) | | |
| MU150001A/B-02 | 2.5G (1.55) | | |
| MU150001A/B-03 | 2.5G (1.31/1.55) | | |
| MU150002A-01 | 2.5G | | |

| Model/Order No. | Name | Remarks |
|---|---|---|
| MP0111A/0112A-37 | FC connector | Exchangeable 2 sets |
| MP0111A/0112A-38 | ST connector | Exchangeable 2 sets |
| MP0111A/0112A-39 | DIN connector | Exchangeable 2 sets |
| MP0111A/0112A-40 | SC connector | Exchangeable 2 sets |
| MP0111A/0112A-43 | HMS-10/A connector | Exchangeable 2 sets |
| MP0113A-37 | FC connector | Exchangeable 3 sets |
| MP0113A-38 | ST connector | Exchangeable 3 sets |
| MP0113A-39 | DIN connector | Exchangeable 3 sets |
| MP0113A-40 | SC connector | Exchangeable 3 sets |
| MP0113A-43 | HMS-10/A connector | Exchangeable 3 sets |
| MP0122B-37 | FC connector | Replaceable, 2 sets |
| MP0122B-38 | ST connector | Replaceable, 2 sets |
| MP0122B-39 | DIN connector | Replaceable, 2 sets |
| MP0122B-40 | SC connector | Replaceable, 2 sets |
| MP0122B-43 | HMS-10/A connector | Replaceable, 2 sets |
| MU150008A-37 | FC connector | Replaceable, 2 sets |
| MU150008A-38 | ST connector | Replaceable, 2 sets |
| MU150008A-39 | DIN connector | Replaceable, 2 sets |
| MU150008A-40 | SC connector | Replaceable, 2 sets |
| MU150008A-43 | HMS-10/A connector | Replaceable, 2 sets |
| MU150009A-37 | FC connector | Replaceable, 2 sets |
| MU150009A-38 | ST connector | Replaceable, 2 sets |
| MU150009A-39 | DIN connector | Replaceable, 2 sets |
| MU150009A-40 | SC connector | Replaceable, 2 sets |
| MU150010A-43 | HMS-10/A connector | Replaceable, 2 sets |
| MU150010A-37 | FC connector | Replaceable, 2 sets |
| MU150010A-38 | ST connector | Replaceable, 2 sets |
| MU150010A-39 | DIN connector | Replaceable, 2 sets |
| MU150010A-40 | SC connector | Replaceable, 2 sets |
| MU150010A-43 | HMS-10/A connector | Replaceable, 2 sets |
| MU150001A/B-37 | FC connector | Replaceable, 2 sets |
| MU150001A/B-38 | ST connector | Replaceable, 2 sets |
| MU150001A/B-39 | DIN connector | Replaceable, 2 sets |
| MU150001A/B-40 | SC connector | Replaceable, 2 sets |
| MU150001A/B-43 | HMS-10/A connector | Replaceable, 2 sets |
| MU150002A-37 | FC connector | Replaceable, 2 sets |
| MU150002A-38 | ST connector | Replaceable, 2 sets |
| MU150002A-39 | DIN connector | Replaceable, 2 sets |
| MU150002A-40 | SC connector | Replaceable, 2 sets |
| MU150002A-43 | HMS-10/A connector | Replaceable, 2 sets |
| | **Application equipment** | |
| MP1777A | 10 GHz Jitter Analyzer | |
| MP9766A | E/O, O/E Converter | |
| | **Optional accessories** | |
| MX150001A | Wander (MTIE, TDEV) Measurement Application Software | For MP0124A/0125A/0126A-02 |
| J0796A | ST connector | Exchangeable, with protective caps, 1 set |
| J0796B | DIN connector | Exchangeable, with protective caps, 1 set |
| J0796C | SC connector | Exchangeable, with protective caps, 1 set |
| J0796D | HMS-10/A connector | Exchangeable, with protective caps, 1 set |
| J0796E | FC connector | Exchangeable, with protective caps, 1 set |
| J0162A | Balanced cable, 1 m | Siemens 3p-Siemens 3p |
| J0162B | Balanced cable, 2 m | Siemens 3p-Siemens 3p |
| J0845A | Balanced cable, 6 ft | BANTAM 3P/BANTAM 3P |
| J0775D | Coaxial cable (BNC-P620 • 3C-2WS • BNC-P620, 75 Ω), 2 m | |
| J0776D | Coaxial cable (BNC-P-3W • 3D-2W • BNC-P-3W, 50 Ω), 2 m | |
| J0398A | Conversion cable (M-1PS • BANTAM 3P), 1 m | |
| J0398B | Conversion cable (M-1PS • BANTAM 3P), 2 m | |
| J0635A | Optical fiber cable, 1 m | SM, FC-SPC connector both ends |
| J0635B | Optical fiber cable, 2 m | SM, FC-SPC connector both ends |
| J0635C | Optical fiber cable, 3 m | SM, FC-SPC connector both ends |
| J0747B | Fixed optical attenuator (10 dB) | |
| J0747C | Fixed optical attenuator (15 dB) | |
| J0747D | Fixed optical attenuator (20 dB) | |
| J0322B | Coaxial cable (11SMA • SUCOFLEX104 • 11SMA), 1 m | |
| J0008 | GPIB cable, 2 m | |
| B0448 | Soft case | |
| B0336C | Carrying case | |

⋆1: Must specify SDH (option 10) or SONET (option 11) when ordering depends on your system. The option price is included in the MP1570A.
These two options can be installed simultaneously. But in this case, one option price is charged.
⋆2: Specify the connector to be supplied as the standard connector when ordering the above options.
If the connector is not specified the FC connector is supplied as standard.
⋆3: The video output, RS-232C, GPIB and Ethernet options cannot all be used simultaneously.
Only the video output + RS-232C, or video output + GPIB, or RS-232C + GPIB board, or Ethernet board combinations support simultaneous use, so change the board combinations according to the purpose.

Anritsu

Specifications are subject to change without notice.


**ANRITSU CORPORATION**
5-10-27, Minamiazabu, Minato-ku, Tokyo 106-8570, Japan
Phone: +81-3-3446-1111
Telex: J34372
Fax: +81-3-3442-0235

Overseas Subsidiaries

● **U.S.A.**
**ANRITSU COMPANY**
**North American Region Headquarters**
1155 East Collins Blvd., Richardson, Tx 75081, U.S.A.
Phone: +1-972-644-1777
Fax: +1-972-644-3416

● **Canada**
**ANRITSU ELECTRONICS LTD.**
Unit 102, 215 Stafford Road West
Nepean, Ontario K2H 9C1, Canada
Phone: +1-613-828-4090
Fax: +1-613-828-5400

● **Brasil**
**ANRITSU ELETRÔNICA LTDA.**
Praia de Botafogo 440, Sala 2401 CEP 22250-040,
Rio de Janeiro, RJ, Brasil
Phone: +55-21-5276922
Fax: +55-21-537-1456

● **U.K.**
**ANRITSU LTD.**
200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

● **Germany**
**ANRITSU GmbH**
Grafenberger Allee 54-56, 40237 Düsseldorf 1,
Germany
Phone: +49-211-96855-0
Fax: +49-211-96855-55

● **France**
**ANRITSU S.A.**
9, Avenue du Québec Z.A. de Courtabœuf 91951 Les
Ulis Cedex, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

● **Italy**
**ANRITSU S.p.A.**
Via Elio Vittorini, 129, 00144 Roma EUR, Italy
Phone: +39-06-502-26-66
Fax: +39-06-502-24-25

● **Sweden**
**ANRITSU AB**
Botvid Center, Fittja Backe 1-3 145 84 Stockholm,
Sweden
Phone: +46-853470700
Fax: +46-853470730

● **Singapore**
**ANRITSU PTE LTD.**
6, New Industrial Rd., #06-01/02, Hoe Huat Industrial
Building, Singapore 536199
Phone: +65-282-2400
Fax: +65-282-2533

● **Hong Kong**
**ANRITSU COMPANY LTD.**
Suite 719, 7/F., Chinachem Golden Plaza, 77 Mody
Road, Tsimshatsui East, Kowloon, Hong Kong, China
Phone: +852-2301-4980
Fax: +852-2301-3545

● **Korea**
**ANRITSU CORPORATION**
14F Hyun Juk Bldg. 832-41, Yeoksam-dong,
Kangnam-ku, Seoul, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604～5

● **Australia**
**ANRITSU PTY LTD.**
Unit 3/170 Forster Road Mt. Waverley, Victoria, 3149,
Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

● **Taiwan**
**ANRITSU COMPANY INC.**
6F, 96, Sec. 3, Chien Kou North Rd. Taipei, Taiwan,
R.O.C.
Phone: +886-2-2515-6050
Fax: +886-2-2509-5519



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