SONET/ATM ANALYZER

MP1555A

NEW

CE

GPIB OPTION

The MP1555A is a portable analyzer designed specifically for troubleshooting SONET, DSn, and ATM network construction and maintenance as well as for evaluating equipment for these networks. Various systems can be configured according to the application using plug-in units.

The MP1555A has two basic slots and three application slots. North American, CEPT, and Japanese systems can be analyzed by installing interface units into the basic slots. In addition, when two interface units are installed at the same time, the analyzer can perform international mapping. ATM and Jitter/Wander tests can be performed by installing application plug-in units in the three other slots.

The analyzer has a built-in printer and 3.5 inch floppy disk drive as standard. The measurement results can either be printed out or the data can be saved directly to the FDD for reading with an external personal computer. Furthermore, the FDD can be used to upgrade the analyzer firmware, making compliance with the latest Bellcore and ITU-T specifications easy.

Feature

- For SONET, DSn, and ATM network construction and maintenance

Performance and functions

• Simple operation

The pop-up menus permit item selection at a glance so even a novice can use the MP1555A immediately. In addition, the auto setup function enables automatic line mapping and easy line evaluation.

• DSn/SONET full analysis functions

An optical power meter is built-in, permitting optical power measurement while measuring alarms and errors with no need to switch optical fiber connections (Photo A).

Any TOH (1 byte) or K1/K2 byte can be captured in 64 frames for both error/alarm analysis and APS operation confirmation (Photo B). Measured errors/alarms can be displayed as a graph, and 1 second, 1 minute, 15 minutes, and 60 minutes can be set as the bar graph time units (Photo C).

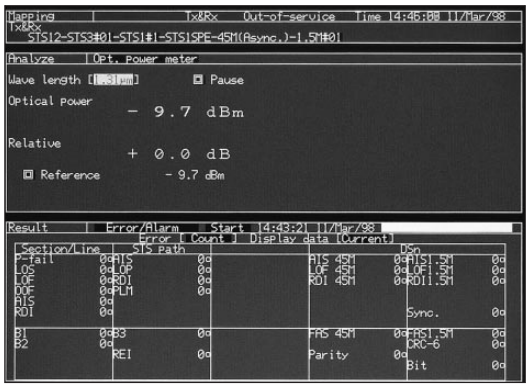


Photo A

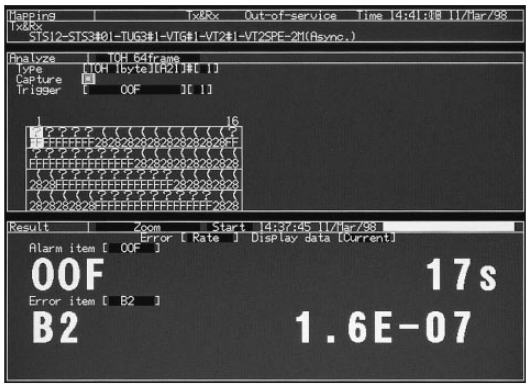


Photo B

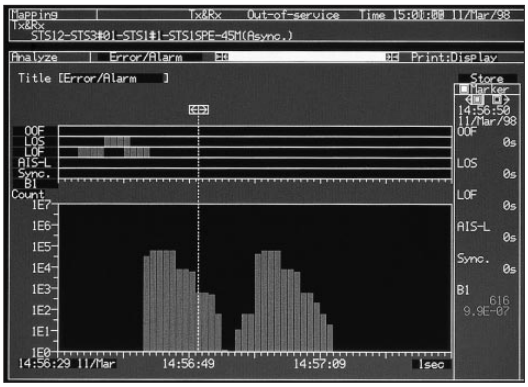
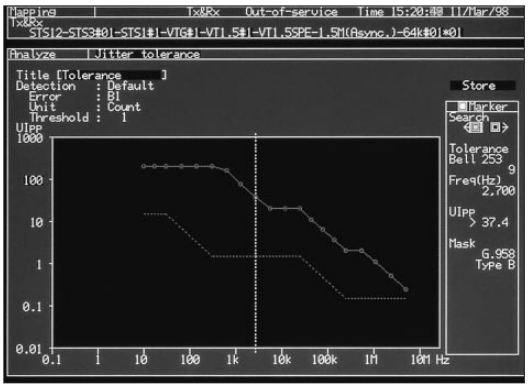


Photo C

- **Jitter and wander automatic measurement**

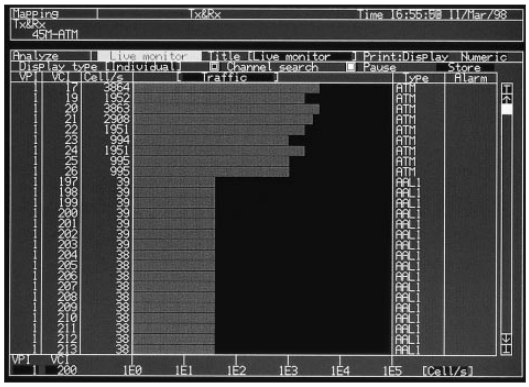
Jitter tolerance, jitter transfer, and jitter frequency can all be measured automatically. And since the data can be saved to floppy disk in the text format, data management is made simple by using a personal computer.

Masks conforming to Bellcore 499/253 and ITU-T Rec. G.823/G.824/G.825/G.958 standards are provided as preset data. Measurement is performed simply by pressing the start key. Furthermore, the operator can also set any other mask as necessary.



- **Simultaneous monitoring of 1023 channel cells and non-conforming cells**

The VPI/VCI for 1023 channels can be detected automatically, and the presence/absence of alarms, ATM cell count, and non-conforming cell count can be displayed graphically for easy comparison of line channel traffic.



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) 2.048 Mb/s: HDB3 (balanced/unbalanced) 8.448, 34.368 Mb/s: HDB3 (unbalanced) 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 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) Word: 16-bit programmable, all 0, all 1
Error addition	Bit (all, test pattern), code, E-bit Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) FAS: n in 16 (n: 1 to 4), all
Alarm addition	LOS, LOF, AIS, RDI, RDI (MF) Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: Frame, code, CRC-4, E-bit Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF) Error performance: G.821 (inc. Annex D), M.2100, G.826 Out-of-service Errors: Frame, code, CRC-4, E-bit, bit Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF), sync loss Error performance: G.821 (inc. Annex D), M.2100, G.826

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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*2 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 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) 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 Framed: 1.5 Mb/s (D4, ESF), 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) 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 Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) 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 Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: FAS, code, parity, CRC-6, C-bit, REI Alarms: Power-fail, LOS, AIS, LOF, RDI Error performance: G.821 (inc. Annex D), M.2100, G.826 Out-of-service Errors: FAS, code, parity, CRC-6, C-bit, REI, bit Alarms: Power-fail, LOS, AIS, LOF, RDI, sync loss 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

*2: Built-in 52M B3ZS (electrical) interface

• 52/156/622M

Bit rate	51.840, 155.520, 622.080 Mb/s
Level/waveform	52M (electrical: B3ZS)*1: ANSI T1.102, 0/450 ft 156M (electrical: CMI)*2: ITU-T G.703 156M (optical): As per interface unit specifications 622M (electrical/optical): As per interface unit specifications
Clock	Internal (accuracy: ±3.5 ppm, jitter unit not installed), lock (1.5/2M), external (ECL [AC] 50 Ω), received signal
Mapping	See Figs.1 to 3.
Through	Loop through (bit error insertion possible)
Test patterns	PRBS: $2^{11}-1$, $2^{15}-1$, $2^{20}-1$ (zero suppress, MP0122A installed), $2^{20}-1$, $2^{23}-1$ (O.151) Word: 16-bit programmable, all 0, all 1
Error addition	Bit (all, test pattern), FAS, B1, B2, B3, BIP-2, REI-L, REI-P, REI-V Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) FAS: Alternative (normal frame: 1 to 15, error frame: 0 to 15)
Alarm addition	LOS, LOF, AIS-L, RDI-L, AIS-P, LOP-P, RDI-P, AIS-V, LOP-V, LOM-V, RDI-V, RFI-V Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: B1, B2, B3, BIP-2, REI-L, REI-P, REI-V Alarms: Power-fail, LOS, LOF, OOF, AIS-L, RDI-L, AIS-P, LOP-P, RDI-P, AIS-V, LOP-V, LOM-V, RDI-V, RFI-V Error performance: G.826, M.2101 Out-of-service Errors: B1, B2, B3, BIP-2, REI-L, REI-P, REI-V, bit Alarms: Power-fail, LOS, LOF, OOF, AIS-L, RDI-L, AIS-P, LOP-P, RDI-P, AIS-V, LOP-V, LOM-V, RDI-V, RFI-V, sync loss Error performance: G.826, M.2101
LEDs	LOS, LOF, OOF, AIS-L, RDI-L, AIS-P, LOP-P, RDI-P, AIS-V, LOP-V, LOM-V, RDI-V, RFI-V, sync loss, errors
Justification	STS pointer, VT pointer, C, C1/C2 Measurement: NDF, +PJC, –PJC, 3 times consecutive
Monitor	TOH, POH, K1/K2, pointer, path trace (TIM alarms detectable)

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Pointer sequence	Signal of opposite polarity, regular with double, regular with missing, double of opposite polarity 87-3/26-1 (normal, add, cancel), continuous pattern (normal, add, cancel)
TOH 64-frame	K1/K2, any 1 byte
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, DCC interface (V.11)

*1: Mounted MP0122A
*2: Mounted MP0121A

● General

Printer	Internal, external
Internal memory	Measurement settings memory: 10, graphics memory: 15
Others	FDD, RS-232C (Option 01), GPIB (Option 02), buzzer, clock
EMC	EN55011: 1991, Group 1, Class A EN50082-1: 1992 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, ≤300 VA
Temperature	0˚ to +40˚C

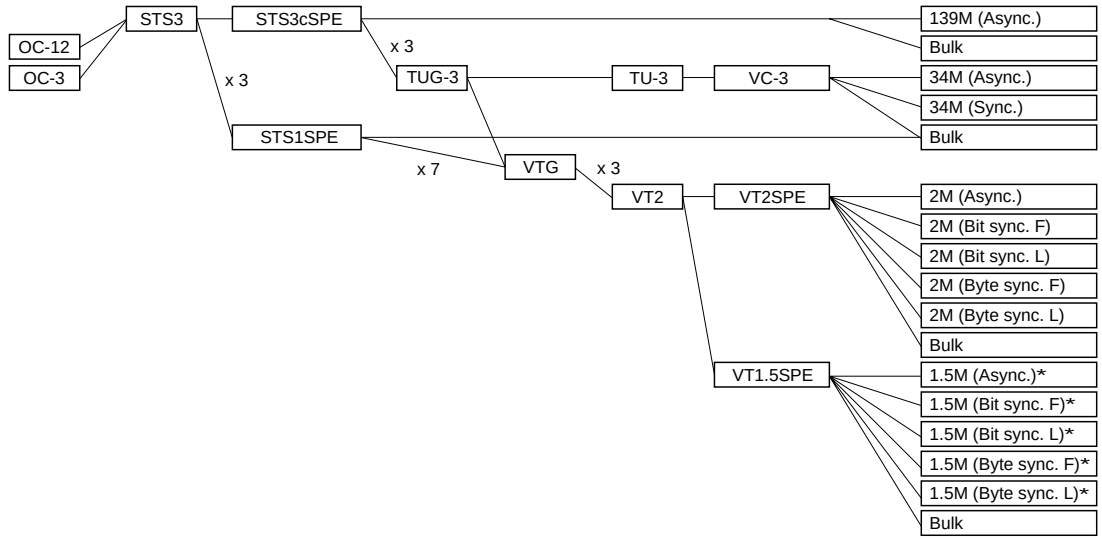


Fig. 1 Mapping when MP0121A installed

*: No frame pattern

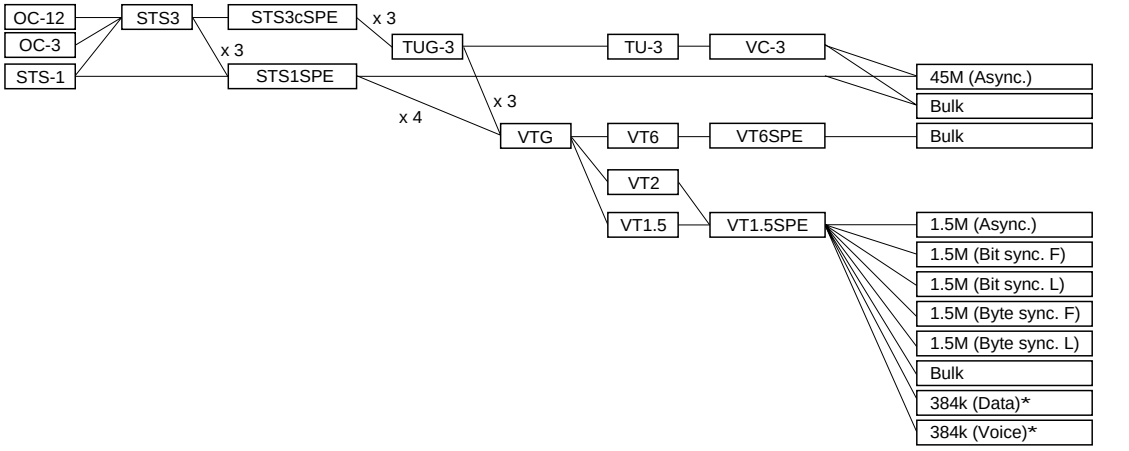


Fig. 2 Mapping when MP0122A installed

*: Option (Japan mapping)

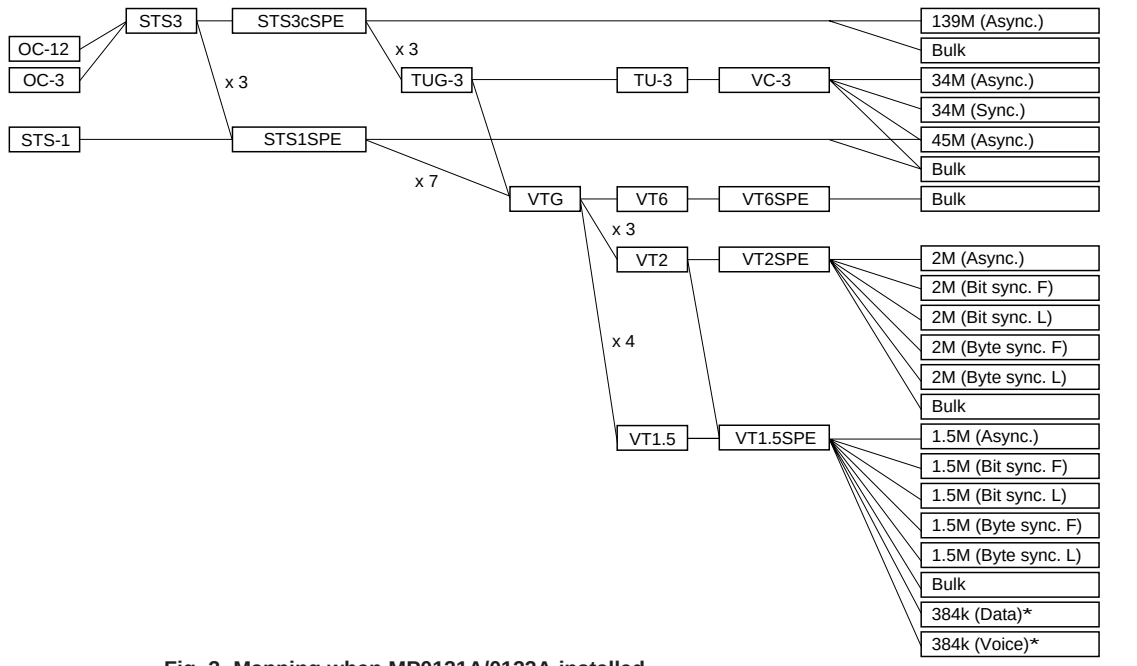
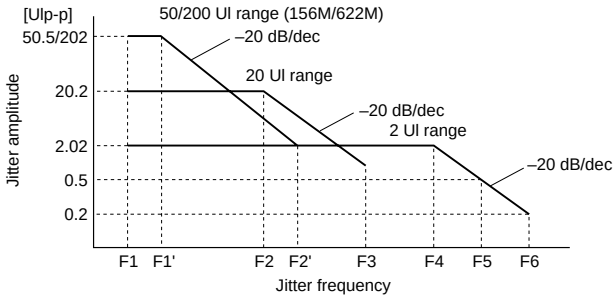


Fig. 3 Mapping when MP0121A/0122A installed

*: Option (Japan mapping)

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

Jitter tolerance measurement	Conforms to Bellcore 253/499, 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

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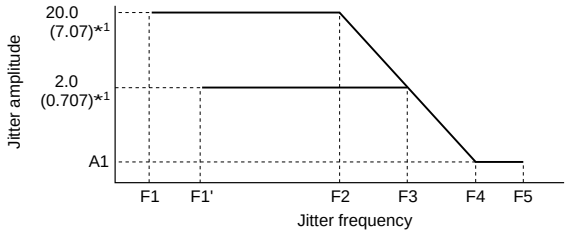
Jitter measurement

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

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	0.040	0.22	0.006	0.04
2.048	0.040	0.22	0.006	0.04
8.448	0.040	0.22	0.006	0.04
34.368	0.040	0.22	0.017	0.04
44.736	0.040	0.22	0.006	0.04
139.264	0.040	0.30	0.022	0.06
51.84	0.040	0.22	0.017	0.05
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)	HP (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 Bellcore 253/499 and ITU-T G.823/G.824/G.958 [selective bandwidth: ≤200 Hz (modulation frequency: <100 Hz), ≤10 Hz (modulation frequency: ≥100 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

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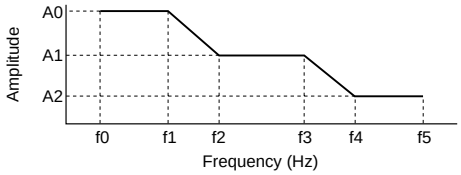
Wander generation

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



Bit rate (Mb/s)	Amplitude			Frequency					
	A0 (UIp-p)	A1 (UIp-p)	A2 (UIp-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)

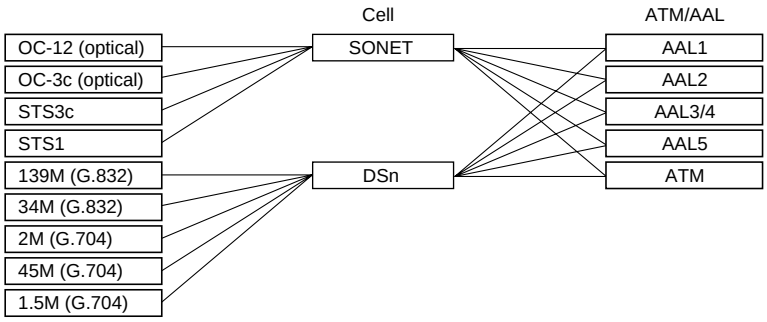
Reference input: 1.544M (AMI/B8ZS, clock), 2.048M (HDB3, clock)
Measurement range
p-p: 0.0 to 3.2E5 ns, +p/–p: 0.0 to 1.6E5 ns, TIE: ±0.0 to 1.6E5 ns, MTIE*: 0.0 to 1E6 ns, TDEV*: 0.0 to 1E6 ns
*: MTIE, TDEV measurement require external PC and MX150001A Wander (MTIE, TDEV) Application Software
Resolution: 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

• 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 CDV, Poisson

Test patterns

Cell: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern, time stamp
O.191: Edit pattern
AAL1: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern, time stamp
AAL2 (CPS-PDU): Time stamp
AAL2 (CPS-PACKET): Single cell PRBS 7, 8-bit word pattern, edit pattern
AAL3/4 (SAR-PDU): Time stamp
AAL3/4 (CPCS-PDU): Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern
AAL5: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern

Error addition

Cell: HEC, programmable pattern
O.191: Lost cell, misinserted cell, errored cell, SECB
AAL1: Lost cell, SNP, PRBS, word
AAL2 (CPS-PDU): P, SN, OSF
AAL2 (CPS-PACKET): HEC, PRBS, word
AAL3/4 (SAR-PDU): SN, CRC10, segment type, LI, abort
AAL3/4 (CPCS-PDU): CPI, B/E tag mismatch, BA size, AL, length, PRBS, word
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

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Measurement	Mode: Single, repeat, manual Error Cell: Cell count, correctable HEC, uncorrectable HEC, non-conforming cell O.191: Errored cell, lost cell, misinserted cell, SECB AAL1: SAR-PDU count, lost cell, SNP, uncorrectable SNP, PRBS, word AAL2: CPS-PDU count, P, OSF, SN, CPS packet count, HEC, PRBS, word 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 *CRC10 is calculated for all SAR-PDU. The others are calculated for SAR-PDU with specified MID. AAL5: CPCS-PDU count, frame size, length, CRC32, abort, discarded PDU (one of frame size error, length error, CRC32 error, or abort), PRBS, word FM: Lost cell, misinserted cell, BIPV, SECB BR: Lost cell, misinserted cell, BIPV, SECB 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

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

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

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

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

• 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 Level: 1 ±0.1 V (0 to 12 dB, with $\sqrt{f}$ auto correction and monitor function) Connector: BNC (75 Ω)

• MP0108A NRZ Unit

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

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MP1555A	SONET/ATM Analyzer	
	Standard accessories	
J0670A	AC power cord:	1 pc
Z0169	Printer paper (5 rolls/pack):	1 pack
F0014	Fuse, 6.3 A:	2 pcs
B0329G	Protective cover:	1 pc
W1356AE	MP1555A operation manual (Vol. 1, Panel operation):	1 copy
W1357AE	MP1555A operation manual (Vol. 2, Remote control, supplied with MP1555A-01 or MP1555A-02):	1 copy
W1358AE	MP1555A operation manual (Vol. 3, Jitter/wander, supplied with MP0124A, MP0125A or MP0126A):	1 copy
W1359AE	MP1555A operation manual (Vol. 4, ATM, supplied with MP0123A):	1 copy
W1323AE	MX150001A wander (MTIE, TDEV) application software operation manual (supplied with MX150001A):	1 copy
	Plug-in units	
MP0121A*1	2/8/34/139/156M Unit	
MP0122A*1	1.5/45/52M 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)	
MP0126A	2/8/34/139M, 1.5/45/52M, 156/622M Jitter Unit (only jitter generation/measurement, requires MP0121A or MP0122A)	
MP0111A*2,*3	Optical 156M/622M (1.31) Unit (with optical power meter)	
MP0112A*2,*3	Optical 156M/622M (1.55) Unit (with optical power meter)	
MP0113A*2,*3	Optical 156M/622M (1.33/1.55) Unit (with optical power meter, 1.31/1.55 switchable)	
MP0105A	CMI Unit (used in common with MP1550A/B)	
MP0108A	NRZ Unit (used in common with MP1550A/B)	
	Options	
MP1555A-01	RS-232C	
MP1555A-02	GPIB	
MP1555A-06	MUX/DEMUX (2/8/34/139 Mb/s, for MP0121A)	
MP1555A-07	MUX/DEMUX (1.5/45 Mb/s, for MP0122A)	
MP1555A-08	45M-2M MUX/DEMUX (requires MP0121A and MP0122A)	
MP1555A-09	VC11-384k mapping (for MP0122A)	

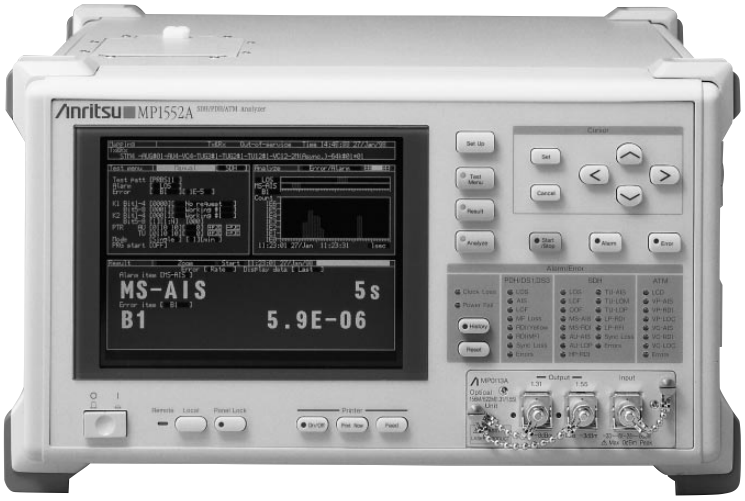
*1: Either the MP0121A or the MP0122A is required to operate the MP1555A.
*2: MP0111A/0112A/0113A can not be used with MP1550A/B.
*3: Specify the connector to be supplied as the standard connector when ordering the above options. If the connector is not specified, the FC connector (MP0111A/0112A/ 0113A-37) is supplied as standard.

Model/Order No.	Name
MP0124A-01	RMS measurement
MP0125A-01	RMS measurement
MP0126A-01	RMS measurement
MP0124A-02	Wander measurement
MP0125A-02	Wander measurement
MP0126A-02	Wander measurement
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)
	Application equipment
MP1656A	Portable STM-16 Analyzer
	Optional accessories
MX150001A	Wander (MTIE, TDEV) Measurement Application Software (for MP0124A/0125A/0126A-02)
MZ8012A	Connector Cleaning Set (for MP0111A/0112A/0113A)
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
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, SM, FC-SPC connector both ends)
J0747C	Fixed optical attenuator (15 dB, SM, FC-SPC connector both ends)
J0747D	Fixed optical attenuator (20 dB, SM, FC-SPC connector both ends)
J0322B	Coaxial cable (11SMA • SUCOFLEX104 • 11SMA), 1 m
J0008	GPIB cable, 2 m
B0322	Soft case
B0336C	Carrying case

SDH/PDH/ATM ANALYZER

MP1552A

NEW



CE

GPIB
OPTION

The MP1552A is a portable analyzer designed specifically for troubleshooting SDH, PDH, and ATM network construction and maintenance as well as for evaluating equipment for these networks. Various systems can be configured according to the application using plug-in units.

The MP1552A has two basic slots and three application slots. CEPT, North American, and Japanese systems can be analyzed by installing interface units into the basic slots. In addition, when two interface units are installed at the same time, the analyzer can perform international mapping. ATM and Jitter/Wander tests can be performed by installing application plug-in units in the three other slots.

The analyzer has a built-in printer and 3.5 inch floppy disk drive as standard. The measurement results can be printed out or the data can be saved directly to the FDD for reading with an external personal computer. Furthermore, the FDD can be used to upgrade the analyzer firmware, making compliance with the latest ITU-T specifications easy.

Feature

- For SDH, PDH, and ATM network construction and maintenance

Performance and functions

• Simple operation

The pop-up menus permit item selection at a glance, so even a novice can use the MP1552A immediately. In addition, the auto set-up function enables automatic line mapping and easy line evaluation.

• PDH/SDH full analysis functions

An optical power meter is built-in, permitting optical power measurement while measuring alarms and errors with no need to switch optical fiber connections (Photo A).

Any SOH (1 byte) or K1/K2 byte can be captured in 64 frames for both error/alarm analysis and APS operation confirmation (Photo B). Measured errors/alarms can be displayed as a graph, and 1 second, 1 minute, 15 minutes, and 60 minutes can be set as the bar graph time units (Photo C).

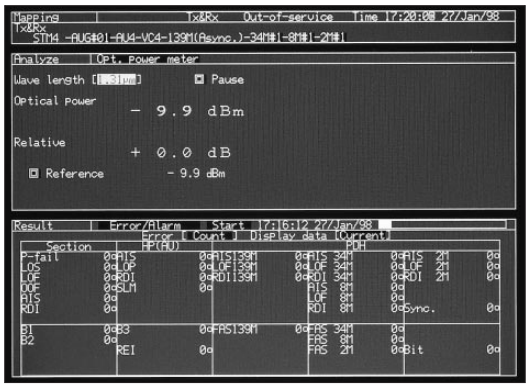


Photo A

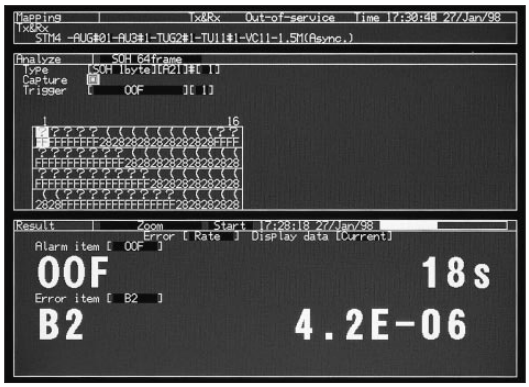


Photo B

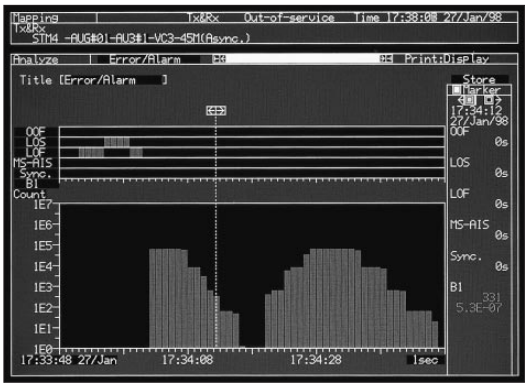
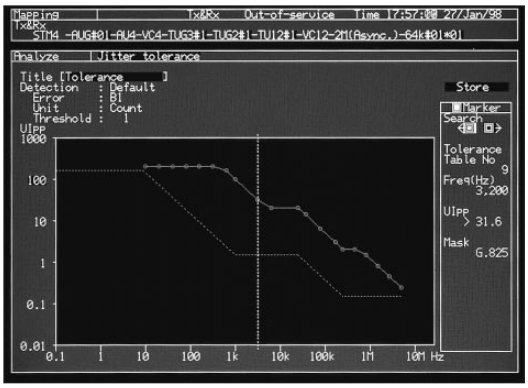


Photo C

- **Jitter and wander automatic measurement**

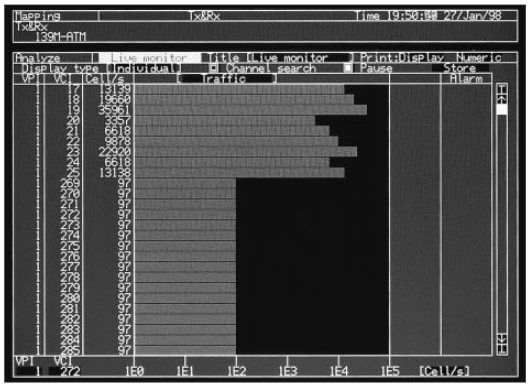
Jitter tolerance, jitter transfer, and jitter frequency can all be measured automatically. And since the data can be saved to floppy disk in the text format, data management is made simple by using a personal computer.

Masks conforming to ITU-T Rec. G.823/G.824/G.825/G.958 standards are provided as preset data. Measurement is performed simply by pressing the start key. Furthermore, the operator can also set any other mask as necessary.



- **Simultaneous monitoring of 1023 channel cells and non-conforming cells**

The VPI/VCI for 1023 channels can be detected automatically, and the presence/absence of alarms, ATM cell count, and non-conforming cell count can be displayed graphically for easy comparison of line channel traffic.



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) 2.048 Mb/s: HDB3 (balanced/unbalanced) 8.448, 34.368 Mb/s: HDB3 (unbalanced) 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 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) Word: 16-bit programmable, all 0, all 1
Error addition	Bit (all, test pattern), code, E-bit Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) FAS: n in 16 (n: 1 to 4), all
Alarm addition	LOS, LOF, AIS, RDI, RDI (MF) Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: Frame, code, CRC-4, E-bit Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF) Error performance: G.821 (inc. Annex D), M.2100, G.826 Out-of-service Errors: Frame, code, CRC-4, E-bit, bit Alarms: Power-fail, LOS, AIS, LOF, MF loss, RDI, RDI (MF), sync loss Error performance: G.821 (inc. Annex D), M.2100, G.826

Continued on next page

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*2 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 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) 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 Framed: 1.5 Mb/s (D4, ESF), 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) 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 Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) 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 Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: FAS, code, parity, CRC-6, C-bit, REI Alarms: Power-fail, LOS, AIS, LOF, RDI Error performance: G.821 (inc. Annex D), M.2100, G.826 Out-of-service Errors: FAS, code, parity, CRC-6, C-bit, REI, bit Alarms: Power-fail, LOS, AIS, LOF, RDI, sync loss 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

*2: Built-in 52M B3ZS (electrical) interface

● **52/156/622M**

Bit rate	51.840, 155.520, 622.080 Mb/s
Level/waveform	52M (electrical: B3ZS)*1: ANSI T1.102, 0/450 ft 156M (electrical: CMI)*2: ITU-T G.703 156M (optical): As per interface unit specifications 622M (electrical/optical): As per interface unit specifications
Clock	Internal (accuracy: ±3.5 ppm, jitter unit not installed), lock (2/1.5M), external (ECL [AC] 50 Ω), received signal
Mapping	See Figs.1 to 3.
Through	Loop through (bit error insertion possible)
Test patterns	PRBS: $2^{11}-1$, $2^{15}-1$, $2^{20}-1$ (zero suppress, MP0122A installed), $2^{20}-1$, $2^{23}-1$ (O.151) Word: 16-bit programmable, all 0, all 1
Error addition	Bit (all, test pattern), FAS, B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI Timing: Single, rate (1E-3, 1E-4, 1E-5, 1E-6, 1E-7) FAS: Alternative (normal frame: 1 to 15, error frame: 0 to 15)
Alarm addition	LOS, LOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, TU-AIS, TU-LOP, TU-LOM, LP-RDI, LP-RFI Timing: All
Measurements	Mode: Single, repeat, manual In-service Errors: B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI Alarms: Power-fail, LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, TU-AIS, TU-LOP, TU-LOM, LP-RDI, LP-RFI Error performance: G.826, M.2101 Out-of-service Errors: B1, B2, B3, BIP-2, MS-REI, HP-REI, LP-REI, bit Alarms: Power-fail, LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, TU-AIS, TU-LOP, TU-LOM, LP-RDI, LP-RFI, sync loss Error performance: G.826, M.2101
LEDs	LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, TU-AIS, TU-LOP, TU-LOM, LP-RDI, LP-RFI, sync loss, error
Justification	AU pointer, TU pointer, C, C1/C2 Measurement: NDF, +PJC, –PJC, 3 times consecutive

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Monitor	SOH, POH, K1/K2, pointer, path trace (TIM alarms detectable)
Pointer sequence	Signal of opposite polarity, regular with double, regular with missing, double of opposite polarity 87-3/26-1 (normal, add, cancel), continuous pattern (normal, add, cancel)
SOH 64-frame	K1/K2, any 1 byte
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, DCC interface (V.11)

*1: Mounted MP0122A
*2: Mounted MP0121A

• General

Printer	Internal, external
Internal memory	Measurement settings memory: 10, graphics memory: 15
Others	FDD, RS-232C (Option 01), GPIB (Option 02), buzzer, clock
EMC	EN55011: 1991, Group 1, Class A EN50082-1: 1992 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, ≤300 VA
Temperature	0˚ to +40˚C

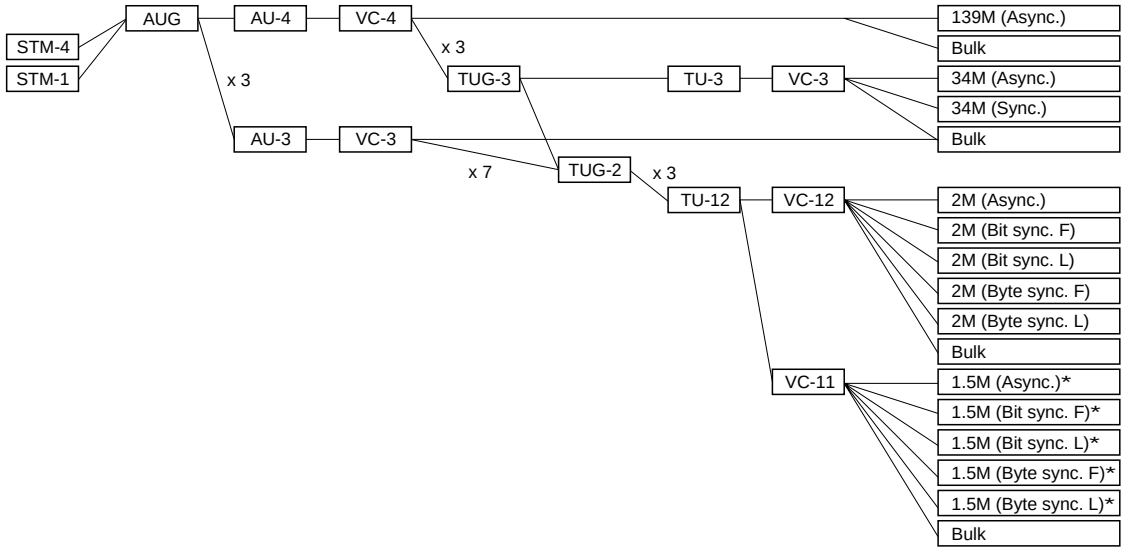


Fig. 1 Mapping when MP0121A installed

*: No frame pattern

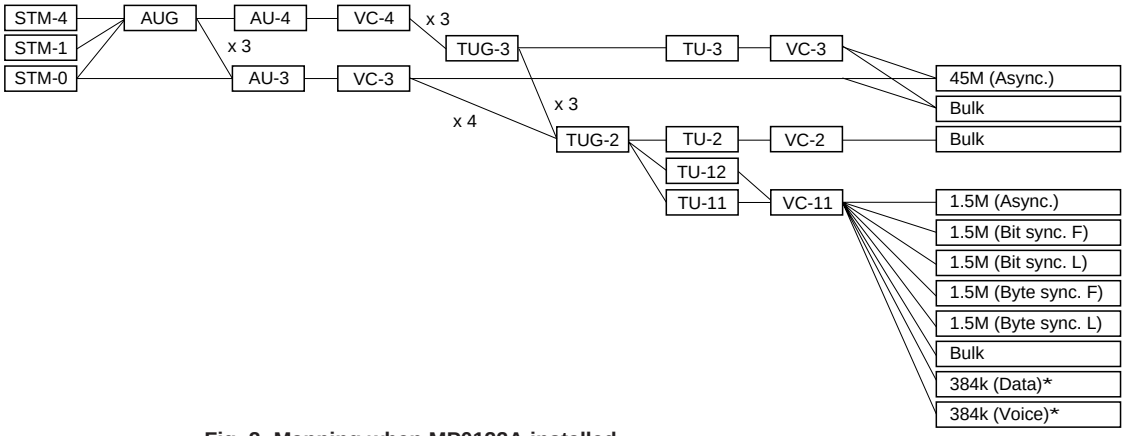


Fig. 2 Mapping when MP0122A installed

*: Option (Japan mapping)

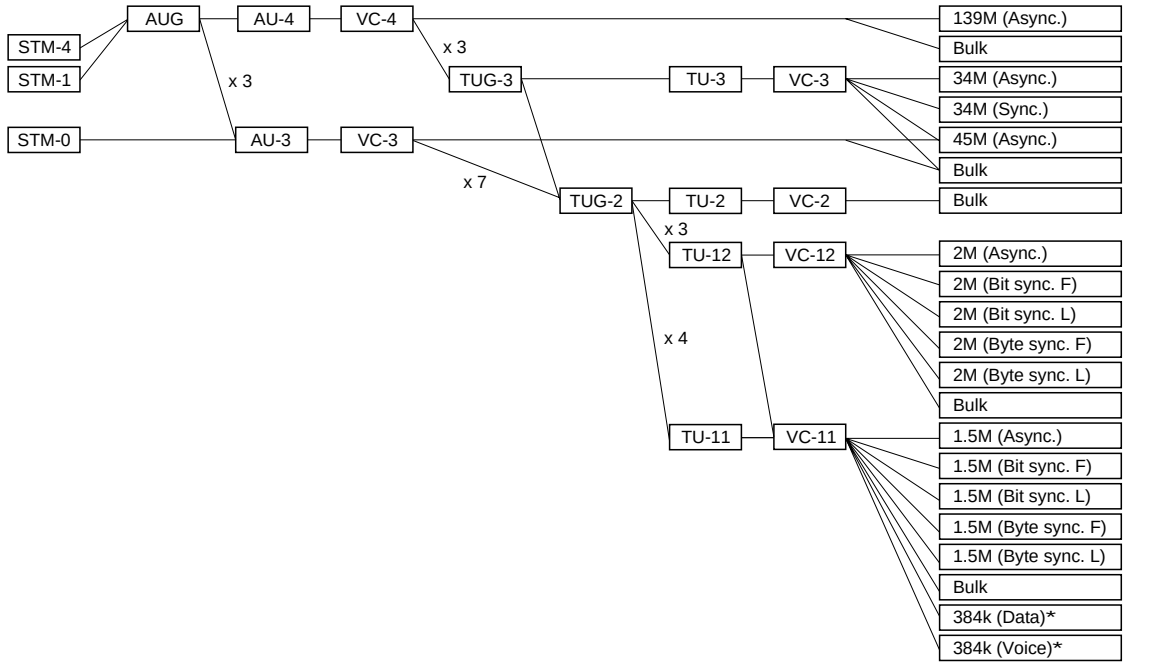
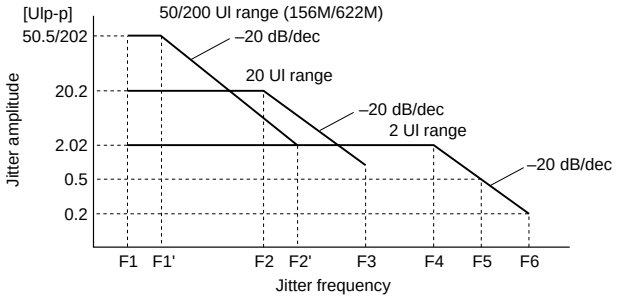


Fig. 3 Mapping when MP0121A/0122A installed

*: Option (Japan mapping)

• 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 200 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

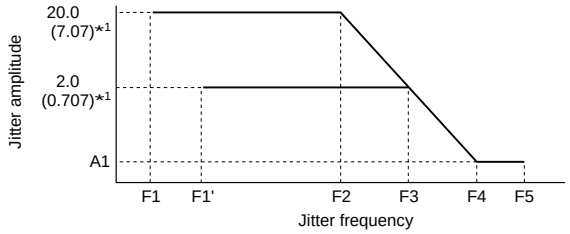
Accuracy: ±5% ±0.05 Ulp-p/Fr (2 UI range), ±5% ±0.3 Ulp-p/Fr (20 UI range), ±5% ±0.8 Ulp-p/Fr (50 UI range), ±5% ±3.2 Ulp-p/Fr (200 UI range)
*Fr: 100 kHz (156M/622M, 2UI range), 500 Hz (1.5M, 20UI range), 1 kHz (others)

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

Continued on next page

Jitter measurement

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 (UIp-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

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 (UIp-p)*1		Y (UIrms)*2	
	2 UI	20 UI	2 UI	20 UI
1.544	0.040	0.22	0.006	0.04
2.048	0.040	0.22	0.006	0.04
8.448	0.040	0.22	0.006	0.04
34.368	0.040	0.22	0.017	0.04
44.736	0.040	0.22	0.006	0.04
139.264	0.040	0.30	0.022	0.06
51.84	0.040	0.22	0.017	0.05
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)	HP (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: ≤200 Hz (modulation frequency: <100 Hz), ≤10 Hz (modulation frequency: ≥100 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

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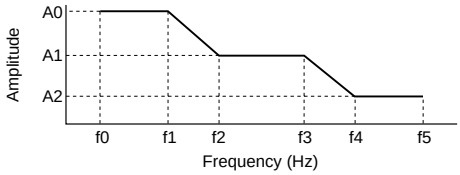
Wander generation

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



Bit rate (Mb/s)	Amplitude			Frequency					
	A0 (UIp-p)	A1 (UIp-p)	A2 (UIp-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)

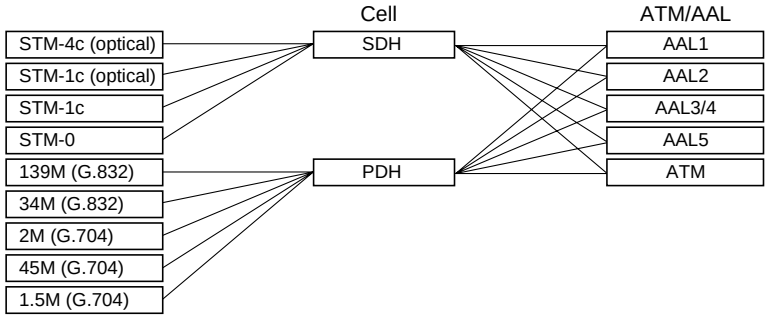
Reference input: 1.544M (AMI/B8ZS, clock), 2.048M (HDB3, clock)
Measurement range
p-p: 0.0 to 3.2E5 ns, +p/–p: 0.0 to 1.6E5 ns, TIE: ±0.0 to 1.6E5 ns, MTIE*: 0.0 to 1E6 ns, TDEV*: 0.0 to 1E6 ns
*: MTIE, TDEV measurement require external PC and MX150001A Wander (MTIE, TDEV) Application Software
Resolution: 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

● 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
O.191: Edit pattern
AAL1: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern, time stamp
AAL2 (CPS-PDU): Time stamp
AAL2 (CPS-PACKET): Single cell PRBS 7, 8-bit word pattern, edit pattern
AAL3/4 (SAR-PDU): Time stamp
AAL3/4 (CPCS-PDU): Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern
AAL5: Single cell PRBS 9, cross cell PRBS 9/15/23, 16-bit word pattern, edit pattern

Error addition

Cell: HEC, programmable pattern
O.191: Lost cell, misinserted cell, errored cell, SECB
AAL1: Lost cell, SNP, PRBS, word
AAL2 (CPS-PDU): P, SN, OSF
AAL2 (CPS-PACKET): HEC, PRBS, word
AAL3/4 (SAR-PDU): SN, CRC10, segment type, LI, abort
AAL3/4 (CPCS-PDU): CPI, B/E tag mismatch, BA size, AL, length, PRBS, word
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

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Measurement	Mode: Single, repeat, manual Error Cell: Cell count, correctable HEC, uncorrectable HEC, non-conforming cell O.191: Errored cell, lost cell, misinserted cell, SECB AAL1: SAR-PDU count, lost cell, SNP, uncorrectable SNP, PRBS, word AAL2: CPS-PDU count, P, OSF, SN, CPS packet count, HEC, PRBS, word 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 *CRC10 is calculated for all SAR-PDU. The others are calculated for SAR-PDU with specified MID. AAL5: CPCS-PDU count, frame size, length, CRC32, abort, discarded PDU (one of frame size error, length error, CRC32 error, or abort), PRBS, word FM: Lost cell, misinserted cell, BIPV, SECB BR: Lost cell, misinserted cell, BIPV, SECB 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

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

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

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

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

• 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 Level: 1 ±0.1 V (0 to 12 dB, with $\sqrt{f}$ auto correction and monitor function) Connector: BNC (75 Ω)

• MP0108A NRZ Unit

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

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MP1552A	SDH/PDH/ATM Analyzer	
	Standard accessories	
J0670A	AC power cord:	1 pc
Z0169	Printer paper (5 rolls/pack):	1 pack
F0014	Fuse, 6.3 A:	2 pcs
B0329G	Protective cover:	1 pc
W1276AE	MP1552A operation manual (Vol. 1, Panel operation):	1 copy
W1277AE	MP1552A operation manual (Vol. 2, Remote control, supplied with MP1552A-01 or MP1552A-02):	1 copy
W1278AE	MP1552A operation manual (Vol. 3, Jitter/wander, supplied with MP0124A, MP0125A or MP0126A):	1 copy
W1279AE	MP1552A operation manual (Vol. 4, ATM, supplied with MP0123A):	1 copy
W1323AE	MX150001A wander (MTIE, TDEV) application software operation manual (supplied with MX150001A):	1 copy
	Plug-in units	
MP0121A*1	2/8/34/139/156M Unit	
MP0122A*1	1.5/45/52M 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)	
MP0126A	2/8/34/139M, 1.5/45/52M, 156/622M Jitter Unit (only jitter generation/measurement, requires MP0121A or MP0122A)	
MP0111A*2,*3	Optical 156M/622M (1.31) Unit (with optical power meter)	
MP0112A*2,*3	Optical 156M/622M (1.55) Unit (with optical power meter)	
MP0113A*2,*3	Optical 156M/622M (1.33/1.55) Unit (with optical power meter, 1.31/1.55 switchable)	
MP0105A	CMI Unit (used in common with MP1550A/B)	
MP0108A	NRZ Unit (used in common with MP1550A/B)	
	Options	
MP1552A-01	RS-232C	
MP1552A-02	GPIB	
MP1552A-06	MUX/DEMUX (2/8/34/139 Mb/s, for MP0121A)	
MP1552A-07	MUX/DEMUX (1.5/45 Mb/s, for MP0122A)	
MP1552A-08	45M-2M MUX/DEMUX (requires MP0121A and MP0122A)	
MP1552A-09	VC11-384k mapping (for MP0122A)	

*1: Either the MP0121A or the MP0122A is required to operate the MP1552A.
*2: MP0111A/0112A/0113A can not be used with MP1550A/B.
*3: Specify the connector to be supplied as the standard connector when ordering the above options. If the connector is not specified, the FC connector (MP0111A/0112A/ 0113A-37) is supplied as standard.

Model/Order No.	Name
MP0124A-01	RMS measurement
MP0125A-01	RMS measurement
MP0126A-01	RMS measurement
MP0124A-02	Wander measurement
MP0125A-02	Wander measurement
MP0126A-02	Wander measurement
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)
	Application equipment
MP1656A	Portable STM-16 Analyzer
	Optional accessories
MX150001A	Wander (MTIE, TDEV) Measurement Application Software (for MP0124A/0125A/0126A-02)
MZ8012A	Connector Cleaning Set (for MP0111A/0112A/0113A)
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
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, SM, FC-SPC connector both ends)
J0747C	Fixed optical attenuator (15 dB, SM, FC-SPC connector both ends)
J0747D	Fixed optical attenuator (20 dB, SM, FC-SPC connector both ends)
J0322B	Coaxial cable (11SMA • SUCOFLEX104 • 11SMA), 1 m
J0008	GPIB cable, 2 m
B0322	Soft case
B0336C	Carrying case