

**SDH/SONET ANALYZER  
ME3620A**

*For Evaluating Transmission Characteristics of Synchronous MUX/DEMUX Equipment Worldwide*



The ME3620A can access the Network Node Interface (NNI) of Synchronous Multiplexer/Demultiplexer systems in the world at 52, 156, 622, and 2488 Mb/s. The transmitter and receiver are housed in separate cabinets and can be operated independently.

The analyzer has a variety of modules so the required measurement can be easily performed just by changing the module. In particular, a wide variety of optical sender units is available at 1.31/ 1.55 wavelengths, along with a wide variety of optical receivers and jitter units at various bit rates.

**Features**

- Meets mapping requirements for both SDH and SONET
- Concatenation signal measurements for large capacity B-ISDN, ATM, etc. telecommunications
- Meets CID immunity measurement standards\*
- STM-16 (STS-48) 64-frame data generating/data logging
- SOH/POH, 64-frame memory
- Quick start and firmware up load

\*: ITU-T Rec. G. 958

SDH/SONET Analyzer RECEIVER (Receiver) 99-05-00 13:23:47

Measurement condition

Bit rate: 2488 M Type: SDH Unit: JVC4 #01

Info. pattern: JPR65 2'23-1

Test pattern / Delay measurement

OH byte: SDH 001 OH pattern: JPR65 2'15-1

Conc. 8/1 OFF

Delay measurement: OFF

Start: 99-05-18 11:23:08

Elapsed: 00-00-00:00

Warn. Sec: 00-00-14:24

Error/Rate: 0/0

Section	RU	LoSe	Scrambling	OH
LOS	0 as	0 as	0 as	0 as
LOF	0 as	0 as	0 as	0 as
LOP	0 as	0 as	0 as	0 as
RES	0 as	0 as	0 as	0 as
DCR	0 as	0 as	0 as	0 as
R1	2.0E-08	6.1E-06	0.14	1.5E-04
R2	7.0E-08	1.0E-07		

Measurement condition (receiver)

SDH/SONET Analyzer RECEIVER (Receiver) 99-05-00 13:23:47

Measurement condition

Bit rate: 2488 M Type: SDH Unit: JVC4 #01

Info. pattern: JPR65 2'23-1

Test pattern / Delay measurement

OH byte: SDH 001 OH pattern: JPR65 2'15-1

Conc. 8/1 OFF

Delay measurement: OFF

Start: 99-05-18 11:23:08

Elapsed: 00-00-00:00

Warn. Sec: 00-00-14:24

Error/Rate: 0/0

TYPE	SDH	POH
1	17 23 08 05 00 07 15 128	000
2	0C 00 00 00 00 00 00 00	00
3	00 00 00 00 00 00 00 00	00
4	00 00 00 00 00 00 00 00	00
5	00 00 00 00 00 00 00 00	00
6	00 00 00 00 00 00 00 00	00
7	00 00 00 00 00 00 00 00	00
8	00 00 00 00 00 00 00 00	00
9	00 00 00 00 00 00 00 00	00
0	00 00 00 00 00 00 00 00	00

SOH/POH data monitoring (receiver)

SDH/SONET Analyzer TRANSMITTER (Transmitter) 99-05-18 13:23:47

Measurement condition

Bit rate: 2488 M Type: SDH Unit: JVC4 #01

Info. pattern: JPR65 2'23-1

Test pattern / Delay measurement

OH byte: SDH 001 OH pattern: JPR65 2'15-1

Conc. 8/1 OFF

Delay measurement: OFF

Start: 99-05-18 11:23:08

Elapsed: 00-00-00:00

Warn. Sec: 00-00-14:24

Error/Rate: 0/0

Section	RU	LoSe	Scrambling	OH
LOS	0 as	0 as	0 as	0 as
LOF	0 as	0 as	0 as	0 as
LOP	0 as	0 as	0 as	0 as
RES	0 as	0 as	0 as	0 as
DCR	0 as	0 as	0 as	0 as
R1	2.0E-08	6.1E-06	0.14	1.5E-04
R2	7.0E-08	1.0E-07		

Measurement condition (transmitter)

## • Transmitter unit

Modular unit	Operation bit rate			
	52 Mb/s	156 Mb/s	622 Mb/s	2.5 Gb/s
ME0301A Main Frame				
ME0302B 2.5G Clock Generator	√	√	√	√
ME0303D 2.5G Jitter Generator	√	√	√	√
ME0304B 2.5G Pattern Generator	√	√	√	√
ME0305D 2.5G Optical Sender (1.31/1.55 μm)	√	√	√	√
ME0305D1 2.5G Optical Sender (1.31 μm)	√	√	√	√
ME0306A CMI/B3ZS Encoder	√	√		

## • Receiver unit

Modular unit	Operation bit rate			
	52 Mb/s	156 Mb/s	622 Mb/s	2.5 Gb/s
ME0301A Main Frame				
ME0312B 2.5G Data Memory	√	√	√	√
ME0313D 2.5G Jitter Detector	√	√	√	√
ME0314B 2.5G Error Detector	√	√	√	√
ME0315B 2.5G Optical Receiver			√	√
ME0315C 156M Optical Receiver	√	√		
ME0316A CMI/B3ZS Decoder	√	√		

## • Option

Option No.	Contents	Related modular units
01	RS-232C interface	ME0301A Main Frame
02	PTA (with JIS keyboard)	
03	PTA (without keyboard)	
24	PDH-1 module (45M/1.5M)	ME0304B Pattern Generator ME0314B Error Detector
25	PDH-2 module (139M/34M/2M/*1.5M/1.5M)	
26	PDH-3 module (139M/45M/34M/2M/*1.5M/1.5M)	
27	2048 kHz DCS	ME0302B Clock Generator ME0303D Jitter Generator
32	TX 64 frame memory module (52M/156M/622M/2.5G)	ME0304B Pattern Generator
ME0305D/D1-37	FC optical connector adapter	ME0305D/D1 Optical Sender (replaceable)
ME0305D/D1-38	ST optical connector adapter	
ME0305D/D1-39	DIN optical connector adapter	
ME0305D/D1-40	SC optical connector adapter	
ME0305D/D1-43	DIAMOND HMS-10/A connector adapter	
ME0315B/C-38	ST optical connector adapter	ME0315B/C Optical Receiver
ME0315B/C-39	DIN optical connector adapter	
ME0315B/C-40	SC optical connector adapter	
ME0315B/C-43	DIAMOND HMS-10/A connector adapter	

In the case of 1.5M, the mapping routes are as follows:

1.5M	SDH	C11 ↔ VC11 ↔ TU11 ↔ TUG2 ↔ VC3 ↔ AU3 ↔ STM [ ]
	SONET	DS1 ↔ VT1.5SPE ↔ VT1.5 ↔ STS1SPE ↔ STS [ ]
*1.5M	SDH	C11 ↔ VC11 ↔ TU12 ↔ TUG2 ↔ TUG3 ↔ VC4 ↔ AU4 ↔ STM [ ]

## Specifications

Mapping mode	SDH, SONET selectable
Mapping route	VC4: Bulk (Standard), 139M (Option 25/26) VC3: Bulk (Standard), 45M (Option 24/26), 34M (Option 25/26) VC12: 2M (Option 25/26) VC11: 1.5M (Option 24/25/26), *1.5M (Option 25/26) Add/Drop: 45M/1.5M (Option 24), 139M/34M/2M/*1.5M/1.5M (Option 25), 139M/45M/34M/2M/*1.5M/1.5M (Option 26) Insert/Extract: STM-0 (STS-1), STM-1 (STS-3) Through (line jitter and bit error addition to following signals) External through data: Retransmit external through data only SOH/RSOH: Overwrites SOH (SOH 1st to 3rd row) STS-1/STM-1: Overwrites selected one channel Concatenation: VC4-4c (STS-12c), VC4-16c (STS-48c)
Clock	Internal Frequency: 2488.32 MHz, 622.08 MHz, 155.52 MHz, 51.84 MHz Frequency accuracy: ±10 ppm Freq. variable range: ±50 ppm (1 ppm steps) External Frequency: 2488.32 MHz, 622.08 MHz, 155.52 MHz, 51.84 MHz Frequency range: ±1% Level: 0.8 to 1.2 Vp-p or ECL level External sync signal DCS: 2048 kb/s, 1544 kb/s, 64 kb/s Insert: 155.52 MHz, 51.84 MHz Through: 311.04 MHz, 77.76 MHz, 19.44 MHz, 6.48 MHz

Continued on next page

<p>Test pattern</p>	<p>SDH main signal                  PRBS: 2<sup>n</sup> - 1 (n: 9, 11, 15, 20, 23)                  PRGM: 8 bit programmable                  SDH SOH/POH                  PRBS: 2<sup>n</sup> - 1 (n: 11, 15)                  PRGM: 8 bit programmable                  CID (ITU-T Rec. G.958) 0/1 consecutive bytes: 1 to 100 bytes (1 byte steps)                  Zero signal: All 0 pattern except 1 and 2 row of SOH                  Consecutive 0/1 signal (signal inserted into SDH or Zero signal)                  0/1 consecutive bytes: 1 to 100 bytes (1 byte steps), 1 to 87 bytes (1 byte steps, 52M)                  PDH (Option 24/25/26)                  139M: PRBS 2<sup>n</sup> - 1 (n: 15, 23), all 0, all 1                  45M: PRBS 2<sup>n</sup> - 1 (n: 15, 20, 23), all 0, all 1                  34M: PRBS 2<sup>n</sup> - 1 (n: 15, 20, 23), all 0, all 1                  2M: PRBS 2<sup>n</sup> - 1 (n: 15, 20, 23), all 0, all 1                  1.5M: PRBS 2<sup>n</sup> - 1 (n: 15, 20, 20 zero suppression, 23), all 0, all 1                  No frame signal                  PRBS: 2<sup>n</sup> - 1 (n: 7, 9, 11, 15, 20, 23)                  PRGM: 8 bit programmable                  FIX: 1/8, 7/8, all 0, all 1</p>
<p>Error addition</p>	<p>Bit error                  Internal: 5 x 10<sup>-3</sup> or 1 x 10<sup>-n</sup> (n: 3 to 10), single                  External: Depends on external error signal                  Parity error (B1, B2, B3, BIP2, FEBE)                  Internal: Single, all, alternate, rate (10<sup>-3</sup> to 10<sup>-10</sup>)                  External: Depends on external error signal</p>
<p>Alarm addition</p>	<p>LOS, OOF, LOF, AIS, FERF, LOP</p>
<p>Pointer test</p>	<p>ITU-T Rec. G.783 or ANSI T1X1.6 (only available with Option 24/25/26)                  Sequence: Burst, addition, cancellation, mixed                  Type: Positive justification, negative justification                  Pointer 64-frame memory (H1, H2)                  NDF: 0000 to 1111, SS: 00 to 11, Pointer values: 0 to 1023                  Pointer setting, monitor                  TX: Manual setting NDF, SS, PTR value                  RX: Monitoring</p>
<p>SOH/POH data setting/monitor</p>	<p>64-frame memory: All SOH (TOH)/POH bytes except parity, H1 and H2 bytes, 64-frame capacity                  Setting/monitor: TX manual setting, RX monitoring</p>
<p>Frame data memory</p>	<p>Data memory capacity (TX)                  Option 32: 2.5G 64 frames                  Logging memory capacity (RX)                  Standard: SOH (TOH)/POH one byte 64 frames, K1/K2 64 frames                  Unit option: All 64 frames data (ME0312B: 2.5G 64 frames)</p>
<p>Measurement</p>	<p>Error detection: Bit, B1, B2, B3, BIP2, FEBE                  Alarm detection: LOS, OOF, LOF, AIS, FERF, LOP                  Error measurement range                  Error count: 0 to 9.9 x 10<sup>18</sup>, Error rate: 1.0 to 1.0 x 10<sup>-18</sup>, Error seconds: 0 to 9 x 10<sup>9</sup>                  % Error seconds: 0 to 100, Error performance analysis (ITU-T Rec.G.784, G.826)                  Alarm measurement range                  Seconds: 0 to 9 x 10<sup>9</sup>, frame: 0 to 9.9 x 10<sup>18</sup>                  Delay measurement: 1 μs to 10 s                  APS function (K1, K2 bytes): Response time, recovery time, changing time</p>
<p>Line jitter</p>	<p>TX jitter addition (ME0303D Jitter Generator Unit: option)                  ME0303D: 2488.32 MHz, 622.08 MHz, 155.52 MHz, 51.84 MHz (ITU-T Rec. G.958/825, SONET Category II)                  RX jitter measurement (ME0313D Jitter Detector Unit: option)                  ME0313D: 2488.32 MHz, 622.08 MHz, 155.52 MHz, 51.84 MHz (ITU-T Rec. G.958/825, SONET Category II)</p>
<p>Electrical interface</p>	<p>STM-N, STS-N                  Bit rate: 2488.32/622.08/155.52/51.84 Mb/s                  Scramble/Descramble: ON/OFF                  Input/Output: 1 (NRZ data, Clock)                  Level: Variable 0.5 to 2.0 Vp-p, ECL, 50 Ω                  Logic/polarity: DATA/DATA, CLOCK/CLOCK                  PDH (Option 24/25/26)                  Bit rate: 139.264 Mb/s (CMI), 44.736 Mb/s (B3ZS), 34.368 Mb/s (HDB3), 2.048 Mb/s (HDB3), 1.544 Mb/s (B8ZS)                  Level: 1 Vp-p/75 Ω (139.264 Mb/s), 0.9 Vp-p or DSX/75 Ω (44.736 Mb/s), 1 Vo-p/75 Ω (34.368 Mb/s),                  2.37 Vo-p/75 Ω (2.048 Mb/s), 2.37 Vo-p or DSX/75 Ω (1.544 Mb/s)                  CMI/B3ZS (ME0306A Encoder/ME0316A Decoder Unit: option)                  Bit rate (format): 155.52 Mb/s (CMI), 51.84 Mb/s (B3ZS)                  Level: Compatible with ITU-T G.703/TA-NWT-000253, 75 Ω                  Insert/Extract bit rate (format)                  Unipolar interface: 155.52/51.84 Mb/s, clock and data ECL, 75 Ω, Insert/Extract (TX or RX)                  Coded data interface: 155.52 Mb/s (CMI), 51.84 Mb/s (B3ZS), compatible with ITU-T/ANSI, 75 Ω, Insert (TX only)                  Add/Drop bit rate (format)                  Option 24: 44.736 Mb/s (B3ZS), 1.544 Mb/s (B8ZS)                  Option 25: 139.264 Mb/s (CMI), 34.368 Mb/s (HDB3), 2.048 Mb/s (HDB3), 1.544 Mb/s (B8ZS)                  Option 26: 139.264 Mb/s (CMI), 44.736 Mb/s (B3ZS), 34.368 Mb/s (HDB3), 2.048 Mb/s (HDB3), 1.544 Mb/s (B8ZS)                  SOH/POH Add/Drop                  Bit rate (unipolar): 576 kb/s (D4 to D12), 192 kb/s (D1 to D3), 128 kb/s (K1/K2), 64 kb/s (selected 1-byte in SOH or POH)                  Level: TTL/75 Ω (TX clock output, RX clock output, RX data output), TTL/75 Ω or High (TX data input)                  Through                  Frequency: 311.04 MHz, 77.76 MHz, 19.44 MHz, 6.48 MHz                  Input/output number: 8 (1/8 data), 1 (1/8 clock), 1 (frame, 8 kHz)                  Level: ECL/50 Ω</p>

Optical interface	Optical Sender Unit (option) ME0305D: 51.84 to 2488.32 Mb/s, Source type DFB-LD (SLM), Extinction ratio $\geq 10$ dB, +2 dBm $\pm 3$ dB (1.31 $\mu$ m), +2 dBm $\pm 3$ dB (1.55 $\mu$ m) ME0305D1: 51.84 to 2488.32 Mb/s, Source type DFB-LD (SLM), Extinction ratio $\geq 10$ dB, +2 dBm $\pm 3$ dB (1.31 $\mu$ m) Optical safety standard FDA 21 CFR 1040.10: CLASS IIIb IEC 825-1: CLASS 3A Optical Receiver Unit (option) ME0315B: 622/2488 Mb/s, -13 to -3 dBm (narrow band, 1.31/1.55 $\mu$ m), -8 to -3 dBm (wide band, 1.31/1.55 $\mu$ m) ME0315C: 52/156 Mb/s, -20 to -3 dBm (narrow band, 1.31/1.55 $\mu$ m), -15 to -5 dBm (wide band, 1.31/1.55 $\mu$ m)
Auxiliary input and output	TX: Error control input, alarm control input, trigger output, frame sync output RX: Trigger input, trigger output, frame sync output, clock output
Remote control	GPIB: 1 + (1), RS-232C (Option 01): (1)
Power supply	85 to 135/170 to 250 Vac, 47 to 63 Hz
Operating temperature range	0° to +50°C (+5° to +45°C for FD, 0° to +40°C for ME0315B/C)
Dimensions and mass	426 (W) x 221.5 (H) x 451 (D) mm (transmitter and receiver), $\leq 25$ kg (each transmitter and receiver)
EMC*1	EN55011: 1991, Group 1, Class A EN50082-1: 1992
Safety	EN61010-1: 1993 (Installation Category II, Pollution Degree II)

\*1: Electromagnetic compatibility

### Laser product safety protection

The ME0305D/D1 are laser products and safety protection conforming to optical safety standards 21 CFR 1040.10 (USA) is incorporated; the following warning labels are affixed to the product.



Warning label example for ME0305D



Warning label example for ME0305D1

### Ordering information

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

Model/Order No.	Name	
ME0301A	<b>Main frame</b> Main frame	
	<b>Standard accessories (for main frame)</b>	
J0491	Power cord, 2.5 m:	1 pc
F0079	Fuse, 10 A (for 100 V mains):	2 pcs
F0071	Fuse, 8 A (for 200 V mains):	2 pcs
W0670AE	SDH operation manual:	1 copy
W0671AE	SONET operation manual:	1 copy
W0672AE	GPIB operation manual:	1 copy
	<b>Option (factory assembly required)</b>	
Option 01	RS-232C interface	
	<b>Standard accessories (for Option 01)</b>	
W0673AE	RS-232C interface operation manual:	1 copy
Option 02	PTA (with keyboard)	
	<b>Standard accessories (for Option 02)</b>	
MC3305A	JIS Type PTA Keyboard:	1 pc
W0674AE	PTA operation manual:	1 copy
Option 03	PTA (without keyboard)	
	<b>Standard accessories (for Option 03)</b>	
W0674AE	PTA operation manual:	1 copy
Option 24	PDH-1 module (45M, 1.5M)	
Option 25	PDH-2 module (139M, 34M, 2M, 1.5M)	
Option 26	PDH-3 module (139M, 45M, 34M, 2M, 1.5M)	
Option 27	2048 kHz DCS	
Option 28	V.11 interface	
ME0302B	2.5G Clock Generator Unit	
	<b>Standard accessories</b>	
J0609C	Semirigid cable (50 $\Omega$ , U link):	1 pc
J0610	Coaxial cord (75 $\Omega$ , U link):	1 pc
ME0303D	2.5 G Jitter Generator Unit	
	<b>Standard accessories</b>	
J609C	Semirigid cable (50 $\Omega$ , U link):	1 pc
J0610	Coaxial cord (75 $\Omega$ , U link):	1 pc
J0775B	Coaxial cord (BNC-P • 3C-2WS • BNC-P), 2 m:	1 pc
ME0304B	2.5G Pattern Generator Unit	
	<b>Standard accessory</b>	
	Coaxial cord (BNC-P • 3C-2WS • BNC-P), 2 m:	2 pcs
	<b>Option (factory assembly required)</b>	
Option 32	TX 64 frame memory module	

Continued on next page

Model/Order No.	Name
ME0305D ME0305D1	2.5G Optical Sender Unit (1.31/1.55 μm, DFB-LD) 2.5G Optical Sender Unit (1.31 μm, DFB-LD)
J0609D E0007	<b>Standard accessories</b> Semi-rigid cable (50 Ω, U link): 1 pc Optical output control key: 2 pcs
ME0305D/D1-37 ME0305D/D1-38 ME0305D/D1-39 ME0305D/D1-40 ME0305D/D1-43	<b>Options</b> FC connector adapter ST connector adapter DIN connector adapter SC connector adapter HMS-10/A connector adapter
ME0306A	CMI/B3ZS Encoder
J0609A	<b>Standard accessory</b> Semi-rigid cable (50 Ω, U link): 2 pcs
ME0312B	2.5G Data Memory Unit
J0785C	<b>Standard accessory</b> Multi-contact coaxial cable, 0.2 m: 1 pc
ME0313D	2.5G Jitter Detector
J0668A J0776D	<b>Standard accessory</b> Semirigid cable (50 Ω, U link): 1 pc Coaxial cord (BNC-P-3W • 3D-2W • BNC-P-3W), 2 m
ME0314B	2.5G Error Detector Unit
J0775D J0611A J0785A	<b>Standard accessories</b> Coaxial cord (BNC-P • 3C-2WS • BNC-P), 2 m: 2 pcs Multi-contact coaxial cable, 0.7 m: 1 pc Shielded multi-contact coaxial cable, 0.7 m: 1 pc
ME0315B ME0315C	2.5G Optical Receiver Unit 156M Optical Receiver Unit
J0634E J0634F	<b>Standard accessories</b> Semirigid cable [50 Ω, U link (1) for clock]: 1 pc Semirigid cable [50 Ω, U link (2) for data]: 1 pc
ME0315B/C-01 ME0315B/C-38 ME0315B/C-39 ME0315B/C-40 ME0315B/C-43	<b>Options</b> Wide band equalizing amplifier ST connector adapter DIN connector adapter SC connector adapter HMS-10/A connector adapter
ME0316A	CMI/B3ZS Decoder
J0609A	<b>Standard accessory</b> Semirigid cable (50 Ω, U link): 2 pcs

Model/Order No.	Name
	<b>Application equipments</b>
MN9605C	Optical Attenuator
MN9610B	Programmable Optical Attenuator
MP9653A	Waveform Monitor
MP9654A	Waveform Monitor
MP9655A	Waveform Monitor
MA1418A	4 th-order Bessel-Thomson LPF (52 Mb/s)
MA1514A	4 th-order Bessel-Thomson LPF (156 Mb/s)
MA1515A	4 th-order Bessel-Thomson LPF (622 Mb/s)
MA1619A	4 th-order Bessel-Thomson LPF (2.5 Mb/s)
ML9001A	Optical Power Meter
MA9711A	Optical Sensor
MB24C	Portable Test Rack (rating current of power cord and plug: 15 A)
MC3305A	JIS Type PTA Keyboard
MC3306A	ASCII Type PTA Keyboard
J0617B	Replaceable optical connector (FC, for ME0305D/D1)
J0618D	Replaceable optical connector (ST, for ME0305D/D1)
J0618E	Replaceable optical connector (DIN, for ME0305D/D1)
J0618F	Replaceable optical connector (HMS10-A, for ME0305D/D1)
J0619B	Replaceable optical connector (SC, for ME0305D/D1)
J0056[*]	Optical fiber cable, 1 m (for FC connector, SM fiber)
J0635[*]	Optical fiber cable, 1 m (for super FC-PC connector, SM fiber)
J0519[*]	FC-ST conversion cable, 1 m (for SM fiber)
FC-AP	Adapter (FC-type)
J0517[*]	FC-DIN conversion cable, 1 m (for SM fiber)
J0521[*]	FC-SC conversion cable, 1 m (for SM fiber)
J0206[*]	FC-DIAMOND conversion cable, 1 m (for SM fiber)
J0210[*]	FC-D4 conversion cable, 1 m (for SM fiber)
J0208[*]	FC-RUNGE conversion cable, 1 m (for SM fiber)
J0692[*]	FCPC-SCPC conversion cable, 1 m (for SM fiber)
J0637[*]	FCPC-D4PC conversion cable, 1 m (for SM fiber)
J0008	GPIB cable, 2 m
B0329D	Front cover
B0333D	Rack mount kit
B0332	Joint plate
B0348	Soft case (for one main frame, one front cover is necessary.)
B0349	Unit housing case (for containing 6 units)
J0503B	Coaxial cord (BNC plug • WECO 440A plug), 2 m
J0616	Coaxial cord (BNC plug • Siemens plug), 2 m
J0164	Balanced cord (M-3912 • - • M-214S-SP), 2 m

[\*]: These lengths are expressed by symbols A, B and C in the order number, for example; J0056A, B or C, where A = 1 m, B = 2 m, C = 3 m.