

Printer	Printer type	Thermal printer (28 characters/line)
	Print contents	Measurement conditions, measured result data, error occurrence (EC or ER for one second), alarm occurrence, intermediate data (each period or accumulation, period: 1 to 99 seconds, 1 to 99 minutes, 1 to 99 hours, 1 to 99 days), screen information
	Functions	Print on/off, item selection, threshold setting (EC: >1, >10, >100, >1000; ER: >10 <sup>-3</sup> , >10 <sup>-4</sup> , >10 <sup>-5</sup> , >10 <sup>-6</sup> ) and paper saving for error occurrence (printing is stopped after 10 seconds continuous printing/ resumes printing when an error below the threshold limit value occurs continuously for more than 10 seconds.) Intermediate data can be selected for continuous printing or printing only if an error or an alarm occurs in the previous cycle.
Other functions	Display	Current or last display, zoom display
	Graph display	Bar graph display of the measured value (EC or ER) and alarms Measurement interval: 1 s (second), 10 s, 1 m (minute), 10 m, 1 h (hour), 6 h, 1 d (day), 4 d Bar graph display of the measured value distribution (EC or ER)
	Memory for measured data	Stores about 10000 lines of measured results, error and alarm occurrences
	Memory for setting conditions	Up to 20 settings can be stored (battery back-up).
	Buzzer	Error, alarm
	Self-test	Available
	Display	LCD display, 40 x 15 characters, 320 x 240 dots
	Built-in timer	Setting of year, month, day, hour, minute, and second (battery back-up)
Panel lock	Available	
External control interface	GPIB (Option 04) or RS-232C (Option 05)	
Temperature	0° to 50°C (operating), -20° to 70°C (storage)	
Power	85 to 139 Vac/170 to 250 Vac, 47 to 63 Hz, ≤160 VA (without option), ≤180 VA (with option)	
Dimensions and mass	284 (W) x 177 (H) x 350 (D) mm, ≤10 kg (without option), ≤11 kg (with option)	
EMC*2	EN55011: 1991, Group 1, Class A EN50082-1: 1992	
Safety	EN61010-1: 1993 (Installation Category II, Pollution Degree II)	

\*1: Bipolar and CMI input/output data share a common connector.

\*2: Electromagnetic compatibility

## Options

### • Option 01: Frequency offset

Bit rate	2.048, 8.448, 34.368, and 139.264 Mb/s
Variable range	±100 ppm in 1 ppm steps
Accuracy	±10 ppm

### • Option 04: GPIB interface

Functions	SH1, AH1, T5, L3, SR1, RL1, PP0, DC1, DT1, C0 An external printer can be connected.
Control	All settings except power switch and LCD contrast. Measurement data output

### • Option 02: Mux/Demux

Frame structure	The following or a subset of the following. Channels can be set freely. 139 Mb/s ↔ 34 Mb/s ↔ 8 Mb/s ↔ 2 Mb/s ↔ N x 64 kb/s (N: 1 to 31)
Error or alarm addition	Errors or alarms can be added to any one layer.
Measurement	Errors and alarms in all layers are measured simultaneously. Only one channel for each layer

### • Option 05: RS-232C interface

Functions	An external printer can be connected.
Speed	300, 600, 1200, 2400, 4800, 9600, and 19200 bps
Data bits	7 and 8 bits
Parity bits	None, odd, and even
Control	All settings except power switch and LCD contrast. Measurement data output

### • Option 03: 3 ch bipolar outputs

Bit rate	2.048, 8.448, and 34.368 Mb/s
Code	HDB3
Level/impedance	2.048/8.448 Mb/s: 2.37 ±0.237 Vo-p/75 Ω 34.368 Mb/s: 1 ±0.1 Vo-p/75 Ω
Waveform	Meets ITU-T G.703
Number of outputs	3
Phase difference	Each 4 bits
Connector	BNC type

## Option 06: Jitter generation/measurement

Jitter generation	Bit rate	2.048, 8.448, 34.368, 139.264 Mb/s $\pm$ 100 ppm																																			
	Internal modulation signal	Frequency: 2 to 99 Hz in 1 Hz steps, 100 to 990 Hz in 10 Hz steps, 1 to 9.9 kHz in 0.1 kHz steps, 10 to 99 kHz in 1 kHz steps, 100 to 990 kHz in 10 kHz steps, 1 to 4 MHz in 0.1 MHz steps Accuracy: $\pm$ 100 ppm																																			
	External modulation signal	Frequency: 2 Hz to 4 MHz Sensitivity: 2 Ulp-p/1 V (2 UI range), 20 Ulp-p/1 V (20 UI range) Termination/connector: 75 $\Omega$ /BNC																																			
Jitter amplitude	<p>Range: 2 UI (0.000 to 2.020 Ulp-p in 0.001 Ulp-p steps), 20 UI (0.00 to 20.20 Ulp-p in 0.01 Ulp-p steps) Generated jitter amplitude vs. jitter frequency: Meets ITU-T O.171</p> <table border="1"> <thead> <tr> <th>Bit rate</th> <th>F1</th> <th>F2*</th> <th>F3*</th> <th>F4*</th> <th>F5*</th> </tr> </thead> <tbody> <tr> <td>2 Mb/s</td> <td>2 Hz</td> <td>1 kHz</td> <td>20 kHz</td> <td>27.5 kHz</td> <td>110 kHz</td> </tr> <tr> <td>8 Mb/s</td> <td>2 Hz</td> <td>1 kHz</td> <td>20 kHz</td> <td>105 kHz</td> <td>420 kHz</td> </tr> <tr> <td>34 Mb/s</td> <td>2 Hz</td> <td>5 kHz</td> <td>100 kHz</td> <td>250 kHz</td> <td>1 MHz</td> </tr> <tr> <td>139 Mb/s</td> <td>2 Hz</td> <td>5 kHz</td> <td>100 kHz</td> <td>1 MHz</td> <td>4 MHz</td> </tr> </tbody> </table> <p>* : Typical value</p> <p>Accuracy: <math>\pm</math>5% <math>\pm</math>0.05 Ulp-p at 1 kHz (2 UI range), <math>\pm</math>5% <math>\pm</math>0.3 Ulp-p at 1 kHz (20 UI range) Frequency response error referring to error at 1 kHz 2 UI range: <math>\pm</math>2% (F1 to F4), <math>\pm</math>5% (F4 to F5) 20 UI range: <math>\pm</math>2% (F1 to F2), <math>\pm</math>5% (F2 to F3)</p>	Bit rate	F1	F2*	F3*	F4*	F5*	2 Mb/s	2 Hz	1 kHz	20 kHz	27.5 kHz	110 kHz	8 Mb/s	2 Hz	1 kHz	20 kHz	105 kHz	420 kHz	34 Mb/s	2 Hz	5 kHz	100 kHz	250 kHz	1 MHz	139 Mb/s	2 Hz	5 kHz	100 kHz	1 MHz	4 MHz						
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	Jitter amplitude	<p>Measurements: Peak-to-peak, zero-to-+peak, zero-to-peak Range: 2 UI (0.000 to 2.020 Ulp-p, 0.000 to <math>\pm</math>1.010 Ulp-p), 20 UI (0.00 to 20.20 Ulp-p, 0.00 to <math>\pm</math>10.10 Ulp-p), Auto Measured jitter amplitude vs. jitter frequency: Meets ITU-T O.171</p> <table border="1"> <thead> <tr> <th>Bit rate</th> <th>F1a</th> <th>F1b</th> <th>F2*</th> <th>F3*</th> <th>F4*<sup>1</sup></th> <th>F5*</th> </tr> </thead> <tbody> <tr> <td>2 Mb/s</td> <td>10 Hz</td> <td>20 kHz</td> <td>1 kHz</td> <td>20 kHz</td> <td>25 kHz</td> <td>100 kHz</td> </tr> <tr> <td>8 Mb/s</td> <td>10 Hz</td> <td>20 kHz</td> <td>1 kHz</td> <td>20 kHz</td> <td>100 kHz</td> <td>400 kHz</td> </tr> <tr> <td>34 Mb/s</td> <td>50 Hz</td> <td>100 kHz</td> <td>5 kHz</td> <td>100 kHz</td> <td>200 kHz</td> <td>800 kHz</td> </tr> <tr> <td>139 Mb/s</td> <td>100 Hz</td> <td>200 kHz</td> <td>5 kHz</td> <td>100 kHz</td> <td>875 kHz</td> <td>3.5 MHz</td> </tr> </tbody> </table> <p>* : Typical value</p> <p>Accuracy: <math>\pm</math>5% <math>\pm</math>0.01 Ulp-p <math>\pm</math>X Ulp-p at 1 kHz (2 UI range), <math>\pm</math>5% <math>\pm</math>0.1 Ulp-p <math>\pm</math>X Ulp-p at 1 kHz (20 UI range) X: 0.025 Ulp-p/2 and 8 Mb/s, 0.05 Ulp-p/34 Mb/s, 0.085 Ulp-p/139 Mb/s (2 UI range) 0.12 Ulp-p/2, 8 and 34 Mb/s, 0.2 Ulp-p/139 Mb/s (20 UI range) Frequency response error referring to error at 1 kHz: <math>\pm</math>5% (10 to 20 Hz), <math>\pm</math>2% (20 Hz to 300 kHz), <math>\pm</math>3% (300 kHz to 1 MHz), <math>\pm</math>5% (1 to 3 MHz), 10% (3 to 3.5 MHz)</p>	Bit rate	F1a	F1b	F2*	F3*	F4* <sup>1</sup>	F5*	2 Mb/s	10 Hz	20 kHz	1 kHz	20 kHz	25 kHz	100 kHz	8 Mb/s	10 Hz	20 kHz	1 kHz	20 kHz	100 kHz	400 kHz	34 Mb/s	50 Hz	100 kHz	5 kHz	100 kHz	200 kHz	800 kHz	139 Mb/s	100 Hz	200 kHz	5 kHz	100 kHz	875 kHz	3.5 MHz
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Measurement mode	Interval: 0.2 s, 1 s, 10 s, coupled (same as error measurement interval)																																				
Display	Current, last																																				
Demodulation signal output	Amplitude: 1 V/2 Ulp-p (2 UI range), 1 V/20 Ulp-p (20 UI range) Termination/connector: 75 $\Omega$ /BNC																																				

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