

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as Spectrum Analyzers, Signal Generators, Oscilloscopes, Power Meters, Network Analyzers etc from all the major suppliers such as Keysight, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. We fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 1 year warranty. Our staff have extensive backgrounds in T&M which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, presenting flexible technical + commercial solutions and supplying a loan unit during warranty repair, if available.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based in at Oakley, Bedfordshire in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our 40GHz in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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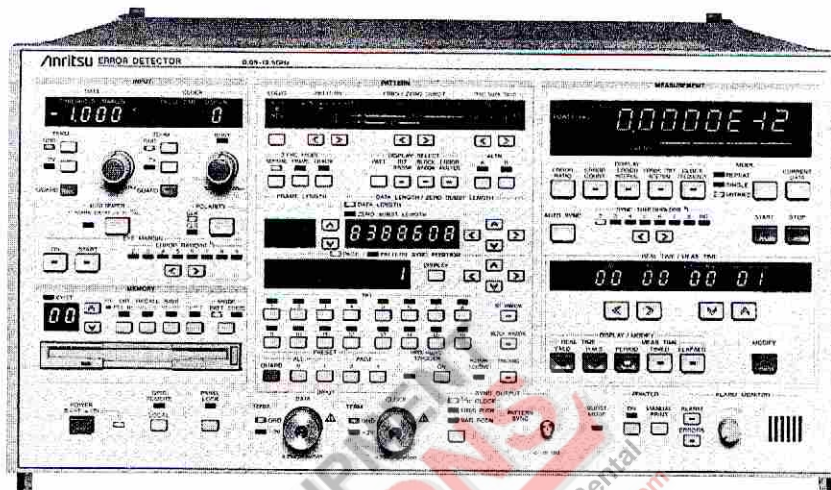
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ERROR DETECTOR MP1764A

12.5 GHz

For R&D of High-Speed Logic, ICS, Optical Modules and Devices



CE GPIB

The MP1764A is used in combination with the MP1763B Pulse Pattern Generator to detect errors used to evaluate conformity with ITU-T standards. In addition, complicated searching for input thresholds or phase adjustments is simplified with the touch of a single key. These functions are ideally suited for the research and development of ultrahigh-speed logic ICs and digital communication systems.

MX176400A Q and Eye Analysis Software controls MP1764A and MP1763B from the PC to measure Q factor, eye margin, and eye diagram. MX176401A SDH/SONET Pattern Editor controls the MP1764A and MP1763B to generate frame pattern conforming to SDH/SONET standards.

Features

- Auto-search function for setting optimum values of input threshold and phase setting by a "one-touch" operation
- Synchronization of 8 Mbits pattern is easily made within a short period of time (when in frame mode)
- Errors are detected in intervals as short as 0.1 sec.
- Zero wait time counter gate

Specifications

Operation frequency		0.05 to 12.5 GHz
Data input	Input waveform	NRZ
	Input voltage	0.25 to 2.0 Vp-p
	Threshold voltage variable range	-3.000 to +1.875 Vp-p (1 mV steps)
	Phase margin	≥70 ps (typical value at 10 Gb/s, PRBS 2 ²³ - 1, and an input amplitude of 1 Vp-p)
	Input sensitivity	50 mVp-p (typical value at 10 Gb/s and PRBS 2 ²³ - 1)
	Termination	50 Ω connected to GND (other than ECL) or to -2 V (ECL)
	Connector	APC-3.5
Clock input	Input waveform	Rectangular wave (<0.5 GHz), rectangular or sine wave (≥0.5 GHz), duty factor: 50%
	Input voltage	0.25 to 2.0 Vp-p
	Input delay variable range	-500 to +500 ps (1 ps steps)
	Polarity inversion	CLOCK/CLOCK inversion possible
	Termination	50 Ω connected to GND (other than ECL) or -2 V (ECL)
Automatic input data threshold/delay search function	Provided, voltage/delay (vertical/horizontal axis)	
Receive pattern	Pseudorandom binary sequence pattern (PRBS)	Pattern: 2 ⁿ - 1 (n: 7, 9, 11, 15, 20, 23, 31) Mark ratio: 1/2, 1/4, 1/8, 0/8 (1/2, 3/4, 7/8, 8/8 are possible with logic inversion.) Number of AND bit shift when setting mark ratio: 1, 3 bits (selectable by using DIP switch on rear panel)
	Data pattern*1	Data length: 2 to 8388608 bits, Pattern reset/preset: ALL/PAGE selectable
	Logic inversion	Positive or negative
	Tracking	Information of pattern set by the error detector is sent to the pulse pattern generator via GPIB.
	Alternate pattern	A/B pattern word length: 128 to 4194304 bits (128 bits steps), Number of loops: Controlled using external signal
	Zero substitution pattern	Zero bit length: 1 to (pattern length - 1) bits, Pattern length: 2 ⁿ (n: 7, 9, 11, 15)

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Sync mode	Normal	Valid for PRBS and programmable pattern
	Frame	Valid for programmable pattern (≥ 128 bits)
	Frame bit length	4 to 32 bits (4-bit step)
	Quick	Valid for DATA, zero subset pattern
Error detection mode		Omission insertion, total (selectable with DIP switch on rear panel)
Synchronous threshold		Preset value or 10^{-n} (n: 2, 3, 4, 5, 6, 7, 8)
Measurement item	Error rate	0.0000×10^{-16} to 1.0000×10^{-9}
	Number of errors	0 to 9.9999×10^{16}
	Error interval (asynchronous)	0 to 9999999 (interval: 1 ms, 10 ms, 100 ms, 1 s)
	Error free interval (EFI)	0.0000% to 100.0000% (interval: 1 ms, 10 ms, 100 ms, 1 s)
	Clock frequency	0.05 to 12.5 GHz, Resolution: 1 kHz, Error: $\pm (10 \text{ ppm} + 1 \text{ kHz})$
Eye margin measurement function		Provided
Error performance data calculation function		Provided [results are output to external printer or external instruments via GPIB.]
Measurement CH mask		1 to 32 ch (settable independently)
Block windowError for any block of 32-bit segments can be measured.		
Error analysis (option 01)		Pattern (256 bits in total) before and after bit in which error occurred is stored.
Current data	Display cycle	0.1, 0.2 s (selectable with rear panel DIP switch)
	Display mode	INTERVAL/CYCLE (selectable with rear panel DIP switch)
Measurement mode		Repeat, single, untimed
Measurement time		1 s to 99 days 23 hours 59 minutes 59 seconds (1 second steps)
Timer		Year, month, day, hour, minute, second
Auxiliary output	Sync signal output	Number of outputs CLOCK: 1 (1/32 clock, fixed position pattern or variable position pattern selectable) Level: 0/-1 V; Connector: SMA
	ORED ERROR output (DIRECT)	Number of outputs: 1(1/32 ored error); Level: 0/-1 V; Connector: SMA
	ORED ERROR output (STRETCHED)	Output level: TTL; Pulse width: 350 ns (typical); Connector: BNC
	Alarm output	Output condition: Power recovery, clock loss, asynchronous Output level: TTL Connector: BNC
	Frame sync output	Level: 0/-1 V; Connector: SMA
	Sync gain output	Output level: 0/-1 V; Connector: SMA
Auxiliary input	External mask input	Input level: 0/-1 V; Connector: SMA
	Resync input	Input level: 0/-1 V; Connector: SMA
	Alternate A/B switching input	Input level: ECL; Connector: SMA
Display	Measurement results	7 segments, 7 digits
	Gate time	12-segment bar graph
	Alarm	Error occurrence: Red lamp comes on; Clock loss: Orange lamp comes on; Sync loss: Orange lamp comes on
Audible alarm		Provided (error sound)
External control		GPIB (IEEE 488.2)
Operating temperature range		0° to +50°C (however, 5° to 45°C for parameter memory floppy disk)
Parameter memory		Media: 3.5 inch floppy disk (2HD, 2DD) Format: MS-DOS (Rev. 3.1)*2 Content: Programmable pattern and other parameters
Power		*3Vac $\pm 10\%$, 50/60 Hz (100/200 V selectable), $\leq 800 \text{ VA}$
Dimensions and mass		426 (W) x 221.5 (H) x 451 (D) mm, $\leq 35 \text{ kg}$
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)

*1: Relationship between number of pages and items of word length, number of words, and data length

Numerical relation between data length and step width

Data length	Step width
2 to 65536	1 step
65536 to 131072	2 step
131072 to 262144	4 step
262144 to 524288	8 step
524288 to 1048576	16 step
1048576 to 2097152	32 step
2097152 to 4194304	64 step
4194304 to 8388608	128 step

Relationship between pages of WORD mode and DATA mode

Output pattern/mode	Variable page range
DATA	1 to $\lfloor \text{data length} / 16 \rfloor$, 1 step width (up to quotient value when the remainder is 0, up to quotient value +1, 1 step width)
	Data length Number of pages
	2 to 16 1
	17 to 32 2
	33 to 48 3
	≥ 49 ≥ 4

*2: MS-DOS is a registered trade mark of Microsoft Corporation.

Floppy disk format

Media type	Memory capacity	Sector length	Sector number	Track number	Recording surface
2HD	1440 KB	512 bytes	18	80	Double-sided
2DD	720 KB	512 bytes	9	80	Double-sided
2HD	1232 KB	1024 bytes	8	77	Double-sided
2DD	640 KB	512 bytes	8	80	Double-sided

*3: Specify one nominal line voltage between 100 and 240 V when ordering.
Maximum operating voltage is 250 V.

Ordering information

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

Model/Order No.	Name
MP1764A	Main frame Error Detector
J0500A	Standard accessories Semi-rigid cable (SMA-P • SX-36 • SMA-P), 0.5 m: 2 pcs
J0693A	SMA cable (HRM202B-3D2W-HRM202B), 1 m: 3 pcs
J0496	APC-3.5 J-J connector: 2 pcs
J0008	GPIO cable, 2 m: 2 pc
	Power cord: 1 pc
Z0168	3.5 inch floppy disk (MF2HD-3.5MF): 2 pcs
F0079	Fuse, 10 A (for 100 V/200 V mains): 2 pcs
W0887AE	MP1764A operation manual: 1 copy
W0888AE	MP1764A GPIO operation manual: 1 copy
MP1764A-01	Option Error analysis
MX176400A	Application software Q/Eye Analysis Software
MX176401A	SDH/SONET Pattern Editor
J0500B	Optional accessories Semi-rigid cable (SMA-P • SX-36 • SMA-P), 1 m
J0322A	Coaxial cable (11SMA • SUCOFLEX104 • 11SMA), 0.5 m
J0322B	Coaxial cable (11SMA • SUCOFLEX104 • 11SMA), 1 m
J0498	Coaxial cable (APC3.5-P • • APC3.5-P), 0.5 m (double shielded)
J0499	Coaxial cable (APC3.5-P • • APC3.5-P), 1 m (double shielded)
J0007	GPIO cable, 1 m
Z0054	3.5 inch floppy disk (MF2DD-3.5MF)
MB24B	Portable Test Rack (rating current of power cord and plug: 20A)
B0413A	Carrying case
B0163	Soft carrying case
B0044	Rack mount (for 1MW • 5U panel)
Z0416	3.5 inch head cleaning disk