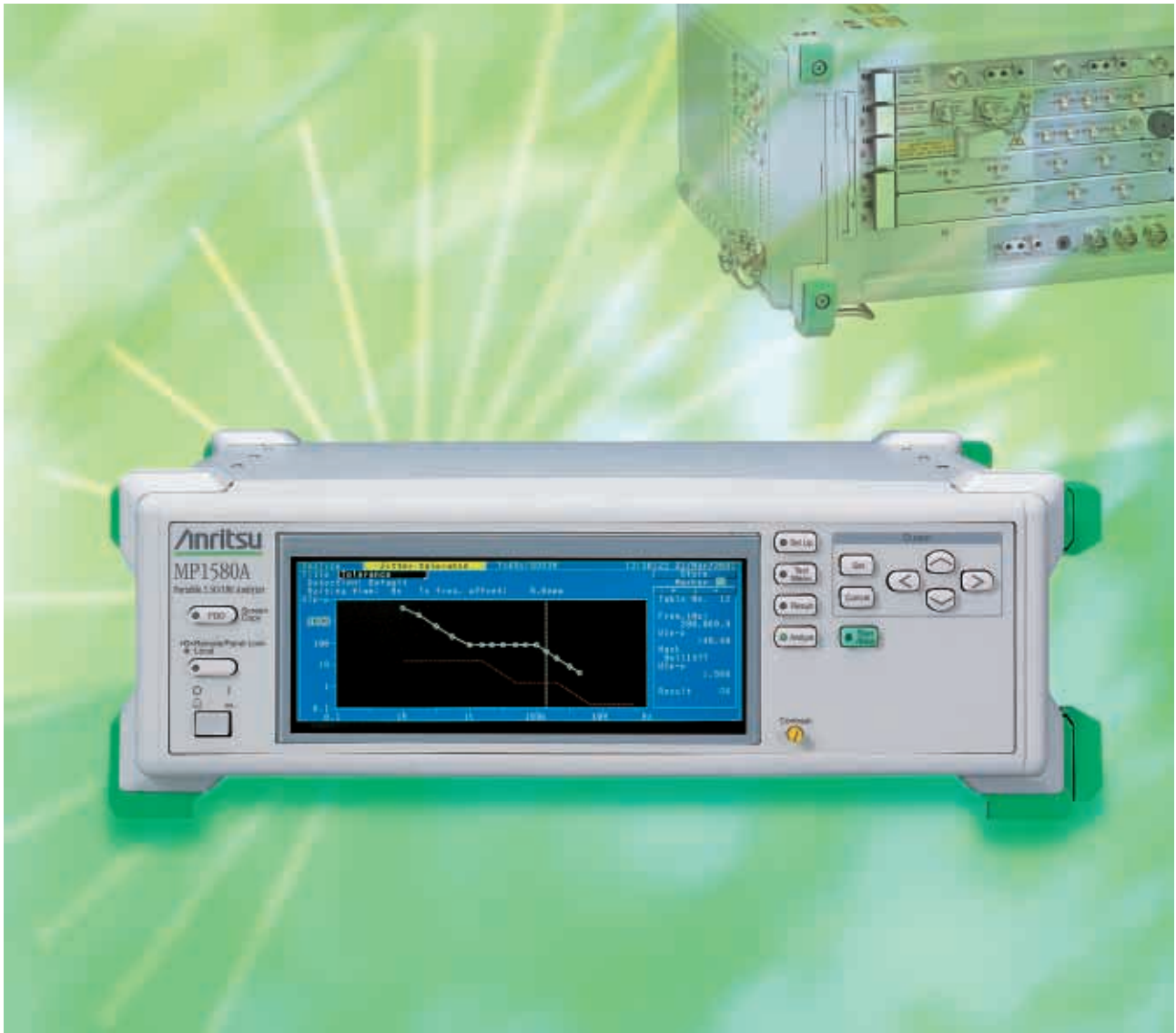# MP1580A

Portable 2.5G/10G Analyzer

For 2.5G/10G Jitter/Wander Measurements

The MP1580A is a unique and powerful solution for analyzing jitter at the standard OC-48/192 or STM-16/64 bit rates. It can measure jitter of 2.5G/10G electrical interfaces (clock signal) with a simple operation. In addition, when used in combination with the MP1570A SONET/SDH/PDH/ATM Analyzer, evaluation of jitter characteristics in digital transmission lines, systems and devices, such as —— jitter tolerance, jitter transfer, jitter generation, etc., can be performed easily.

Complies with the Latest ITU-T O.172 and Bellcore GR-1377 Standards

The MP1580A conforms to both the OC-192/STM-64 jitter measurement standards and supports required jitter modulation amplitude of 4000 UIp-p and 80 MHz jitter bandwidth.

Supports 10 GHz Wander Measurement According to the Latest ITU-T G.813 Standard (Option)

The MP1580A can generate and measure various types of wander. It can generate wander in the frequency range of 10 μHz to 10 Hz at 400,000 UIp-p max. In addition, MTIE/TDEV can be measured in real-time using an external PC and optional application software (MX150002A).

Single Cabinet Support for Both 2.5G and 10G Jitter/Wander Measurements

Just one MP1580A is required for 2.5G and 10G jitter generation and analysis. When combined with the MP1570A and MU150000A, jitter can be added to SONET/SDH signals and measured.

### Differences from Existing Instrument (MP1777A)

Anritsu launched the MP1777A 10 GHz Jitter Analyzer in February of 1998, as a jitter measurement solution for OC-192/STM-64 (9953M). The new MP1580A Portable 2.5G/10G Jitter Analyzer is providing more convenience in measurement without the need for ancillary equipment (network analyzer, external E/O-O/E converter). Anritsu has also developed a Wide Band O/E Converter (MU150017A/B) for the MP1570A to support jitter measurement of 80 MHz at 9953.28 Mbit/s as required by ITU-T standard in conjunction with the MP1580A. Although it uses two cabinets, the compact size makes the system ideal for R&D, manufacturing, installation and maintenance. In addition, the MP1570A can be controlled from the MP1580A for performing automatic measurements, such as Jitter Tolerance and Jitter Transfer.

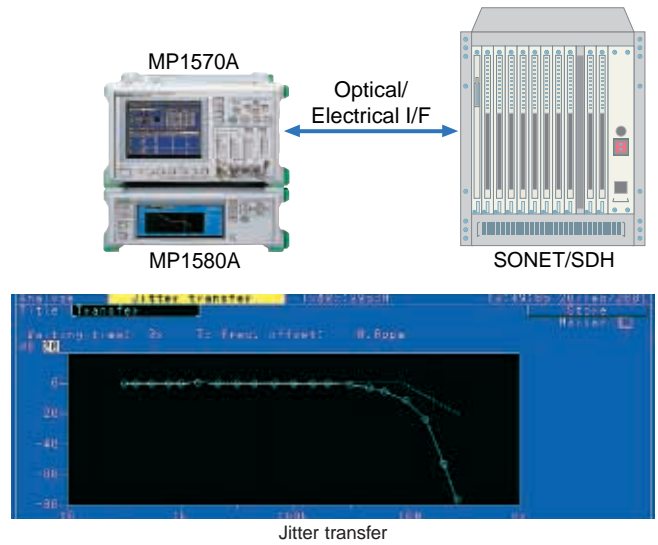# *Application*

Output Jitter Measurement

The MP1580A can easily measure the jitter clock signal (electrical interface only) by just inputting the output clock of DUT directly.

Output Jitter
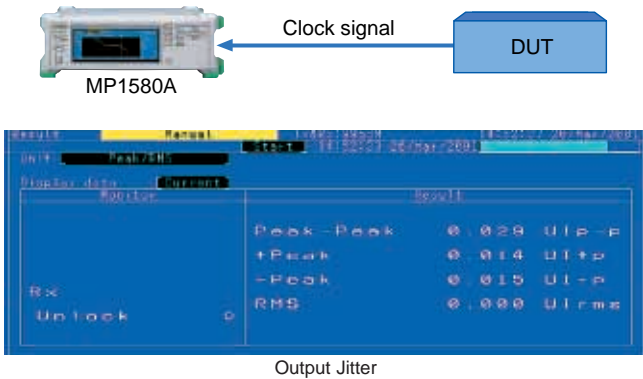
Optical signals can be measured easily by combining the MP1580A with the MP1570A, MU150000A, MU150001A and MU150017A/B.

Jitter Tolerance Measurement

When the MP1580A is used with the MP1570A (send/receive jittered clock), jitter tolerance tests can be performed on OC-192/STM-64 and OC-48/STM-16 signals of electrical and optical interfaces.
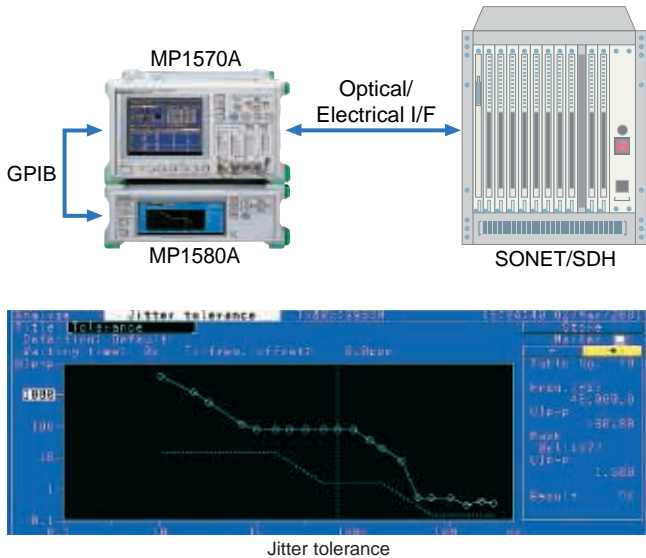

Jitter tolerance

Jitter Transfer Measurement

When the MP1580A is used with the MP1570A (send/receive jittered clock), jitter transfer tests can be performed on OC-192/STM-64 and OC-48/STM-16 signals of electrical and optical interfaces.

Jitter transfer

Wander Generation and Measurement

The MP1580A can generate and measure of wander conforming to ITU-T O.172 and also generation of TDEV conforming to ITU-T G.813. It also can measure TIE (Time Interval Error) by itself and measure MTIE and TDEV by connection of an external PC in which MX150002A is installed.
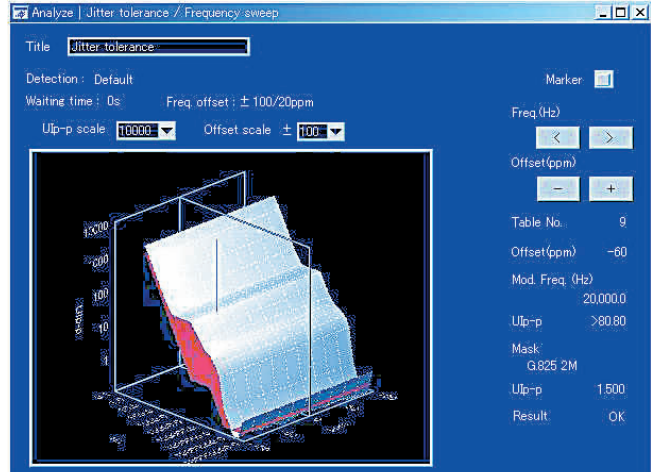

Wander
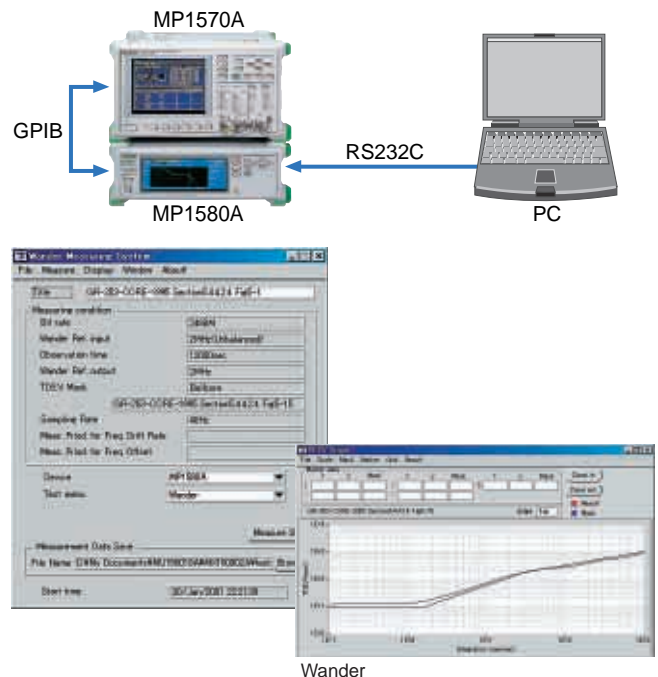
Software

MX158070A Jitter Measurement Application Software

The MX158070A software is used to perform remote control of the MP1580A Portable 2.5G/10G Analyzer and the MP1570A SONET/SDH/PDH/ATM Analyzer from an external PC to measure various types of jitter at 2.5G/10G.
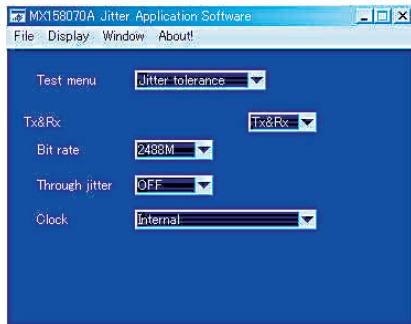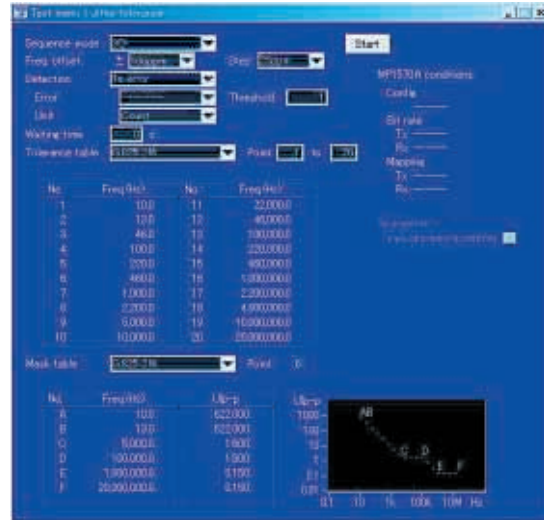
- **3D Display of jitter tolerance measurement results**
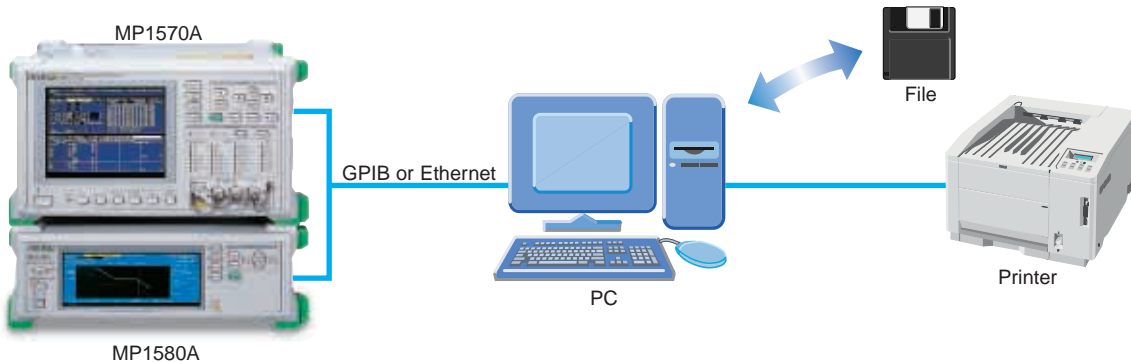- **Printing of measured data and screen**
- **Remote control via GPIB or Ethernet**

Configuration

MX158071A Jitter Measurement Sequence Driver

The MX158071A software helps in writing measurement application software without the need for understanding complex control of measuring instruments.

- **Interface control (DLL) using functions and files**
- **Remote control via GPIB or Ethernet**

User application	Jitter Measurement Sequence Driver (MX158071A)	NI-VISA™	GPIB
			Ethernet

Configuration

Display, file operation, printout

Setting change
Set condition readout
Measurement start/stop
Measurement result readout

Control interface by functions and files

Jitter measurement

Remote control

Remote control

GPIB or Ethernet

MP1570A
(Error measurement)

MP1580A
(Jitter addition)
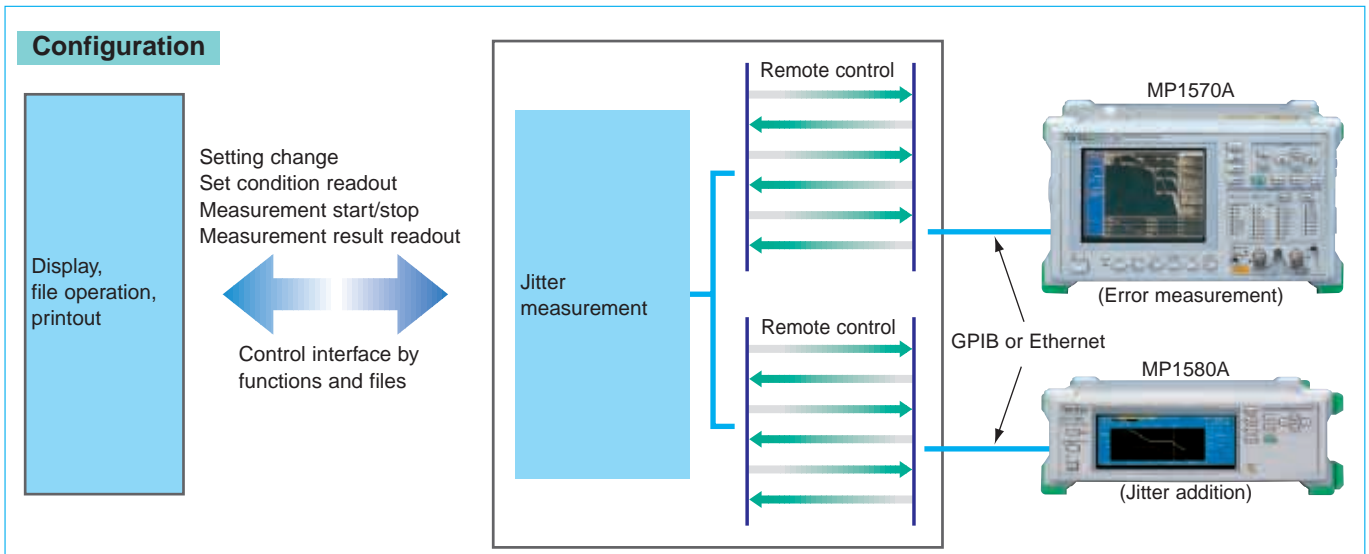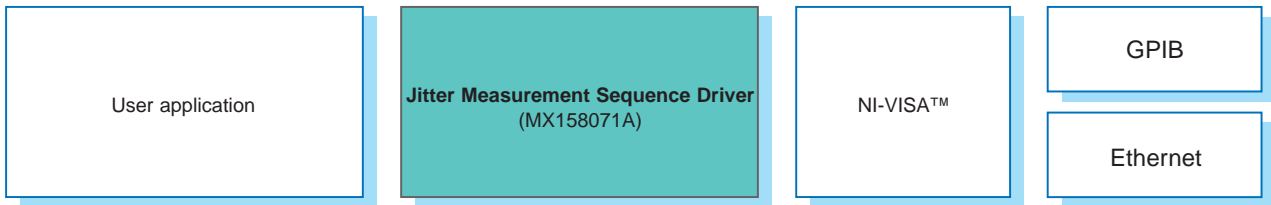
MP1580A Portable 2.5G/10G Analyzer
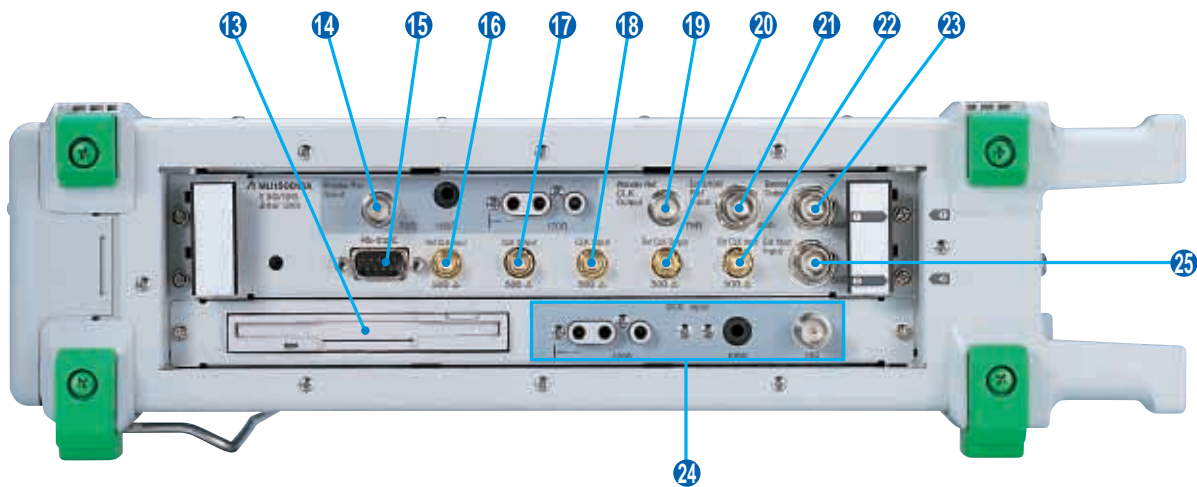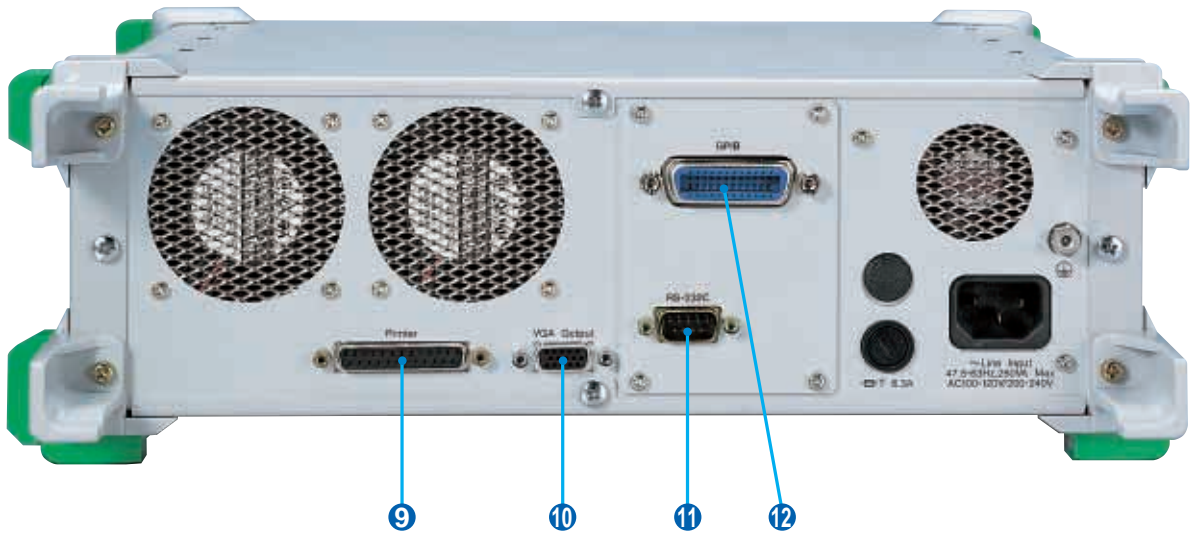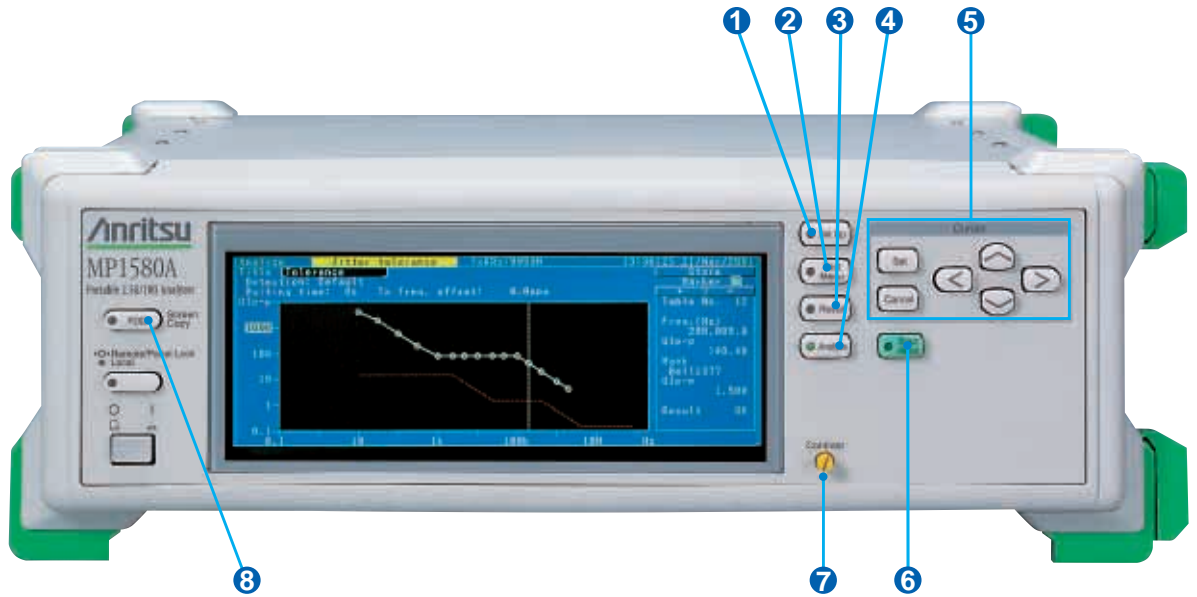
❶ **Setup:** Displays setup screen
❷ **Test Menu:** Displays main test menu screen
❸ **Result:** Displays main measurement results screen
❹ **Analyze:** Displays main analysis screen
❺ **Cursor**
   Set: Set data and opens windows for numeric and character
   input
   Cancel: Cancels data setting and closes windows for
   numeric and character input
   ∧ ∨ < >: Move cursor or windows cursor on screen. At the
   numeric input windows, the ∧ and ∨ keys increase and
   decrease the numeric value, respectively
❻ **Start/Stop:** Starts and stops measurement
❼ **Contrast:** Controls LCD contrast
❽ **FDD:** Outputs screen in bitmap format to floppy disk

❾ **Printer:** Connector for external printer
❿ **VGA Output:** Connector for external monitor (Option)
⓫ **RS-232C:** For external control (Option)
⓬ **GPIB:** For MP1570A and external control (Option)

⓭ Floppy disk drive
⓮ **Wander Ref. Input:** Reference signal input for wander measurement (Option)
⓯ **RS-232C:** Wander measurement data output (Option)
⓰ **Ref. CLK Input:** External reference signal input for jitter measurement (155.52 MHz)
⓱ **CLK Output:** Clock signal output (2488.32/9953.28 MHz)
⓲ **CLK Input:** Clock signal input (2488.32/9953.28 MHz)
⓳ **Wander Ref. CLK Output:** Reference signal output for wander measurement
⓴ **Ref. CLK Output:** Reference signal output
㉑ **Ext 5/10M Ref. Input:** Reference signal input (5/10 MHz)
㉒ **Ext CLK Input:** External reference signal input for jitter generation (155.52 MHz)
㉓ **Demod Output:** Jitter demodulation signal output
㉔ **DCS Input:** Input for synchronization transmission signal with external signal
㉕ **Ext Mod Input:** External modulation signal input

Specifications

● **MP1580A**

|	

Jitter generation	Frequency
	    Range: 9953.28, 2488.32 MHz
	    Offset range: ±100 ppm
	    Resolution: 0.1 ppm
	    Accuracy: ±0.1 ppm (calibrate after 60 min warm-up, 23 ±5°C)
	Generation function: Clock signal output, data signal output (with MP1570A), jitter on, wander on/off
	Modulation source: Internal (sine wave), external (for jitter generation function only)
	Modulation frequency accuracy: fm ±100 ppm (0.1 Hz to 80 MHz)
	Jitter generation: Conform to ITU-T O.172
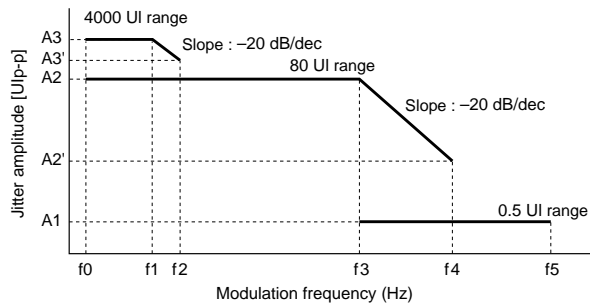
Bit rate (Mbit/s)	f0 (Hz)	f1 (Hz)	f2 (Hz)	f3 (kHz)	f4 (MHz)	f5 (MHz)	A1 (UIp-p)	A2' (UIp-p)	A2 (UIp-p)	A3' (UIp-p)	A3 (UIp-p)
9953.28	0.1	15	600	100	2	80	0.5	4	80	100	4000

0.5 UI range: 0.000 to 0.505 UIp-p (0.001 UIp-p steps)
80 UI range: 0.00 to 80.80 UIp-p (0.05 UIp-p steps)
4000 UI range: 0 to 4040 UIp-p (2 UIp-p steps)
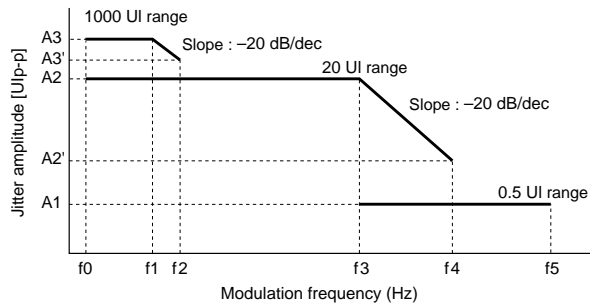
Bit rate (Mbit/s)	f0 (Hz)	f1 (Hz)	f2 (Hz)	f3 (kHz)	f4 (MHz)	f5 (MHz)	A1 (UIp-p)	A2' (UIp-p)	A2 (UIp-p)	A3' (UIp-p)	A3 (UIp-p)
2488.32	0.1	15	600	100	2	20	0.5	1	20	25	1000

0.5 UI range: 0.000 to 0.505 UIp-p (0.001 UIp-p steps)
20 UI range: 0.00 to 20.20 UIp-p (0.01 UIp-p steps)
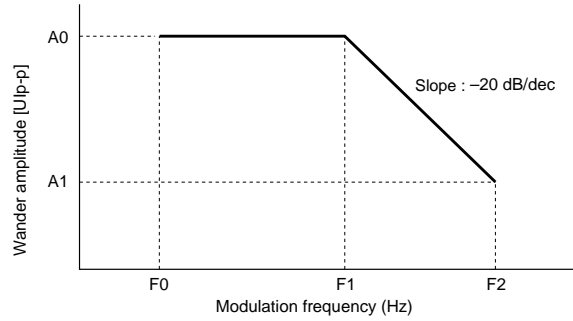1000 UI range: 0 to 1010 UIp-p (1 UIp-p steps)

| Wander generation	Wander generation: 10 µHz to 10 Hz, 0 to 400,000 UIp-p (1 UIp-p steps), conform to ITU-T O.172

Bit rate (Mbit/s)	F0 (µHz)	F1 (mHz)	F2 (Hz)	A0 (UIp-p)	A1 (UIp-p)	Steps (UIp-p)
2488.32	10	400	10	400,000	16,000	1
9953.28	10	400	10	400,000	16,000	1

Jitter measurement

Measurement functions: UIp-p, UI + peak, UI − peak, UIrms, hit count, hit second, %F second, peak jitter
Measurement mode: Repeat, single, manual
Display: Current, last
Measurement interval: 1 to 99 s, 1 to 99 min, 1 to 99 h, 1 to 99 day
Jitter measurement: Conform to ITU-T O.172
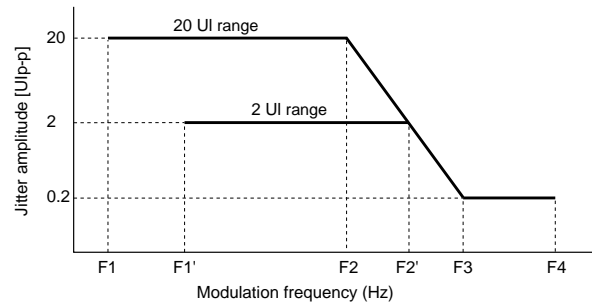
Bit rate (Mbit/s)	Range (UI)	F1 (Hz)	F1' (Hz)	F2 (kHz)	F2' (kHz)	F3 (MHz)	F4 (MHz)
2488.32	2	—	100	—	100	1	20
	20	10	—	10	—	1	20
9953.28	2	—	100	—	400	4	80
	20	10	—	40	—	4	80
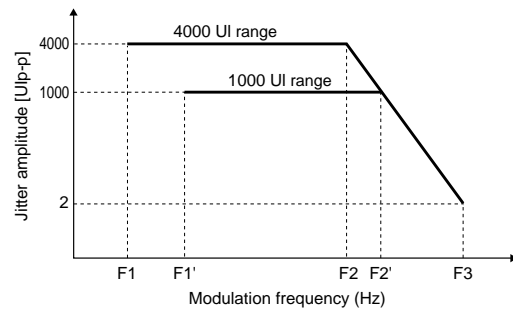
Bit rate (Mbit/s)	Range (UI)	F1 (Hz)	F1' (Hz)	F2 (Hz)	F2' (Hz)	F3 (kHz)
2488.32	1000	—	1	—	12.1	5
9953.28	4000	1	—	12.1	—	20

	UIp-p measurement

UIp-p measurement
  2 UI range: 0.000 to 2.020 UIp-p (0.001 UIp-p steps)
  20 UI range: 0.00 to 20.20 UIp-p (0.01 UIp-p steps)
  1000 UI range: 0 to 1010 UIp-p (1 UIp-p steps, 2488.32 Mbit/s only)
  4000 UI range: 0 to 4040 UIp-p (2 UIp-p steps, 9953.28 Mbit/s only)
UI rms measurement
  2 UI range: 0.000 to 0.714 UIrms (0.001 UIrms steps)
  20 UI range: 0.00 to 7.17 UIrms (0.01 UIrms steps)
Filters:
  Confirming to ITU-T O.172 and Bellcore GR1377
  LP, HP0 + LP, HP1 + LP, HP1' + LP, HP2 + LP, HP + LP, HP' + LP, LP' (1000/4000 UI range only),
  HP0 + LP' (1000/4000 UI range only)

Bit rate (Mbit/s)	HP0 (Hz)	HP1 (kHz)	HP1' (kHz)	HP2 (MHz)	HP' (kHz)	HP (kHz)	LP (MHz)	LP' (kHz)
2488.32	10	5	—	1	—	12	20	5
9953.28	10	10	20	4	50	12	80	20

Accuracy (UIp-p, UI+p, UI-p)
  2UI Range: ±R% ± W UIp-p
  20UI Range: ±R% ± W UIp-p
  1000UI Range: ±R% ± W UIp-p
  4000UI Range: ±R% ± W UIp-p

Fixed error [W]

Bit rate (Mbit/s)	W Structured signal (With MU150017B)					
	HP1 + LP		HP1' + LP		HP2 + LP	
	2 UI	20 UI	2 UI	20 UI	2 UI	20 UI
2488.32	0.1	2.0	—	—	0.05	1.0
9953.28	—	—	0.15	3.0	0.05	1.0

Bit rate (Mbit/s)	HP0 + LP' 1000/4000 UI	Container
2488.32	30	VC4-16c
9953.28	120	VC4-64c

Info: $2^{23} - 1$

Bit rate (Mbit/s)	W Clock signal					
	HP1 + LP		HP1' + LP		HP2 + LP	
	2 UI	20 UI	2 UI	20 UI	2 UI	20 UI
2488.32	0.05	0.5	—	—	0.03	0.3
9953.28	—	—	0.05	0.5	0.03	0.3

Bit rate (Mbit/s)	HP0 + LP' 1000/4000 UI
2488.32	20
9953.28	80

∗: +10°C to +40°C with input level 2488 M: −12 to −9 dBm
                                                    9953 M: −10 to −8 dBm
∗∗: Additional 0.01 UIp-p/dB at 2488 Mbit/s with input level <−12 dBm
     Additional 0.01 UIp-p/dB at 9953 Mbit/s with input level <−10 dBm
Accuracy (UIrms)
  2 UI Range: ±R% ± Y UIrms
  20 UI Range: ±R% ± Y UIrms

Fixed error [Y]

Bit rate (Mbit/s)	Y Structured signal (With MU150017B)			Y Clock signal	
	HP + LP		Container	HP + LP	
	2 UI	20 UI		2 UI	20 UI
2488.32	0.012	0.06	VC4-16c	0.008	0.04
9953.28	0.015	0.08	VC4-64c	0.01	0.05

Info: $2^{23} - 1$

The leftmost label spanning this section: **Jitter measurement**

Jitter measurement	∗: +10˚C to +40˚C with input level 2488.32 M: −12 to −9 dBm 9953.28 M: −10 to −8 dBm ∗∗: Additional 0.002 UIrms/dB at 2488.32 Mbit/s with input level <−12 dBm Additional 0.002 UIrms/dB at 9953.28 Mbit/s with input level <−10 dBm Frequency error [R] | Additional Error	Frequency Range
±15%	<5 kHz (at 2488.32 M) <20 kHz (at 9953.28 M)
±7%	5 kHz −300 kHz (at 2488.32 M) 20 kHz −300 kHz (at 9953.28 M)
±8%	300 kHz −1 MHz
±10%	1 MHz −3 MHz
±15%	3 MHz −10 MHz	

Reference wander generation (MU150018A Option 03)	Off: Able to set non-modulated status∗1
	TDEV mask:
	  The 37 types of TDEV masks that are regulated by ITU-T, ETSI, ANSI, and Bellcore standards are available as default.
	  It is possible to add the wander modulation on the user specified TDEV mask.
	Transient: It is possible to change the A $(1 - e^{-63.7t})$ phase by the timing of the start.
	Signal off: It is possible to disconnect the standard signal.
	Wander tolerance (TDEV) measurement: Evaluation by the various TDEV mask generations

Wander measurement (MU150018A Option 02)	Conform to ITU-T O.172
	Reference input: 2.048M (HDB3, clock), 1.544M (AMI/B8ZS, clock), 64k + 8 kHz, 5 MHz, 10 MHz
	Sampling frequency: 40 Hz, 1 Hz, 0.1 Hz (select by MX150002A)
	Measurement range
	  P-P: 0.0 to 2E10 ns, +P/−P: 0.0 to 1E10 ns, TIE: 0.0 to ±1E10 ns
	Measurement time: 10 to 1×10^8 s (max. 120,000 s; MP1570A only)
	Wander application (requires MX150002A Wander Application Software)
	  TIE: Max. 1×10^8 s, MTIE: Max. 1×10^8 s, TDEV: Max. 1×10^6 s
	  Frequency offset: Measurement conforms to ANSI TI.105.09
	  Frequency drift rate: Measurement conforms to ANSI TI.105.09
	  Wander tolerance (TDEV) measurement: Evaluation by the various TDEV mask generations

Other measurement	Jitter transfer, frequency measurement Jitter tolerance, jitter sweep, frequency sweep, wander sweep (with MP1570A)
Power	AC 100-120V/200-240V, 47.5-63 Hz, ≤250 VA
Dimensions and mass	320 (W) x 100 (H) x 350 (D) mm, ≤10 kg (with MU150018A)
Temperature range	0˚ to +40˚C (operating), −20˚ to +60˚C (storage)
EMC	EN61326: 1997/A1: 1998 (Class A), EN61000-3-2: 1995/A2: 1998 (Class A) EN61326: 1997/A1: 1998 (Annex A)
LVD	EN610101-1: 1993/A2: 1995 (Installation Category Ⅱ, Pollution degree 2)

∗1: Only non-modulated status can be set without this option.

• MX158070A Jitter Measurement Application Software

Operating condition	Personal computer: IBM-PC/AT compatible
	CPU: Pentium® (200MHz or faster)
	Memory size: 64 MB min.
	OS: Windows® 95, 98, Me, 2000, Windows NT®
	HDD free space: 50 MB or more for full install
	Display
	  Resolutions: 800 x 600, Colors: Set to 256 or more
	Others
	  CD-ROM drive
	  GPIB: National Instruments™ PCI-GPIB, PCMCIA-GPIB, or AT-GPIB/TNT
	  LAN: LAN board is able to mount for IBM-PC/AT compatible
	  NI-VISA™: Ver 2.5 or more (Free software. download from NI™ Web)

Applicable Instruments	Jitter analyzer: MP1580A (Ver 1.2 or later) Error analyzer: MP1570A (Ver 3.0 or later)
Remote interface	GPIB, Ethernet
Measurement	Manual, jitter tolerance, jitter sweep, frequency sweep, jitter transfer, wander sweep
File operation	Save/read measurement condition, measurement result
Printer	Display dump, measurement result data

Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries.
IBM and AT are registered trademarks of IBM Corporation.
Pentium is registered trademark of Intel Corporation.
NI-VISA is registered trademark of National Instruments Corporation.

• MX158071A Jitter Measurement Sequence Driver

Operating condition	Personal computer: IBM-PC/AT compatible
	CPU: Pentium® (200 MHz or faster)
	Memory size: 64 MB min.
	OS: Windows® 95, 98, Me, 2000, Windows NT®
	HDD free space: 50 MB or more for full install
	Display
	  Resolutions: 800 x 600, Colors: 256 or more
	Others
	  CD-ROM drive
	  GPIB: National Instruments™ PCI-GPIB, PCMCIA-GPIB, AT-GPIB/TNT
	  LAN: LAN board is able to mount for IBM-PC/AT compatible
	  Measurement Studio (LabWindows™/CVI) Ver 1.0.1 or more
	  NI-VISA™ Ver 2.5 or more (Free software. Downloaded from NI™ Web)

Applicable Instruments	Jitter analyzer: MP1580A (Ver 1.2 or later) Error analyzer: MP1570A (Ver 3.0 or later)
Remote interface	GPIB, Ethernet
Measurement	Manual, jitter tolerance, jitter sweep, frequency sweep, jitter transfer, wander sweep

Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation in the United States and other countries.
IBM and AT are registered trademarks of IBM Corporation.
Pentium is registered trademark of Intel Corporation.
Measurement Studio, LabWindows/CVI and NI-VISA are registered trademarks of National Instruments Corporation.

Ordering Information

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

Model/Order No.	Name	Remarks
	Main frame	
MP1580A	Portable 2.5G/10G Analyzer	
	Standard accessories	
	AC power cord: 1 pc	
F0014	Fuse, 6.3 A: 1 pc	
B0489	Front cover: 1 pc	
B0495	Side cover: 1 pc	
W1889AE	MP1580A operation manual (Vol 1 Jitter/wander): 1 copy	
W1890AE	MP1580A operation manual (Vol 2 Remote control): 1 copy	
MX158072A	Labwindows CVI driver for MP1580A: 1 copy	
MX150002A	Wander Measurement Application Software (MTIE/TDEV): 1 pc	Supplied with MU150018A-02
W1892AE	MX150002A operation manual (wander application): 1 copy	Supplied with MX150002A
J1074	Semirigid cable Tx 1 pc	For connection to MP1570A
J1075	Semirigid cable Rx 1 pc	For connection to MP1570A
B0490	Joint plate: 4 pcs	
	Plug-in unit	
MU150018A	2.5G/10G Jitter Unit	
	Options	
MP1580A-01	RS-232C	
MP1580A-02	GPIB	
MP1580A-03	Ethernet	
MP1580A-04	VGA output	
MU150018A-02	Wander measurement	
MU150018A-03	Wander reference output phase modulation	
	Maintenance service	
MP1580A-90	Extened three year warranty service	
MU150017A/B-90	Extened three year warranty service	
MU150018A-90	Extened three year warranty service	
	Main frame	
MX158070A	Jitter Measurement Application Software	
	Standard accessory	
W1956AE	MX158070A operation manual (CD-ROM): 1 pc	
	Optional accessory	
W1935AE	MX158070A operation manual	
	Main frame	
MX158071A	Jitter Measurement Sequence Driver	
	Standard accessory	
W1957AE	MX158071A operation manual (CD-ROM): 1 pc	
	Optional accessory	
W1936AE	MX158071A operation manual	
	Application equipments	
MP1570A	SONET/SDH/PDH/ATM Analyzer	
MP1570A-02	GPIB	Requires to combine with MP1580A
MP1570A-10*	SDH	
MP1570A-11*	SONET	
MU150000A	2.5G/10G Unit	Electrical for MP1570A
MU150001A	Optical 10G Tx (1.55) Unit	2 km, for MP1570A
MU150001B	Optical 10G Tx (1.55) Unit	40 km, for MP1570A
MU150001A/B-01	2.5G (1.31)	Option for MP1570A
MU150001A/B-02	2.5G (1.55)	Option for MP1570A
MU150001A/B-03	2.5G (1.31/1.55)	Option for MP1570A
MU150031A	Optical 10G (1.55) High Power Tx Unit	For MP1570A (custom made)
MU150031C	Optical 2.5G (1.55)/10G (1.55) High Power Tx Unit	For MP1570A (custom made)
MU150017A	Optical 10G Rx (Wide) Unit	For MP1570A
MU150017B	Optical 2.5G/10G Rx (Wide) Unit	For MP1570A
MP9677B	E/O, O/E Converter	
MU967701A	Clock Recovery Unit (9953.28 MHz)	For MP9677B
MP35A	Matching Transformer (BNC-J/Siemence, C42334-A282)	75/120 Ω

Model/Order No.	Name	Remarks
	Optional accessories	Cross cable with D-sub 9 pin connector at both ends
J0661A	RS232C cable, 2 m	
J0006	GPIB cable, 0.5 m	
J0007	GPIB cable, 1 m	
J0008	GPIB cable, 2 m	
J0696A	Coaxial cord (AA-165-500), 0.5 m	
J0696C	Coaxial cord (AA-165-1000), 1 m	
J0900E	Coaxial cord (AA-165-1500), 1.5 m	
J0162A	Balanced cord (Siemence 3P・Siemence 3P) 1 m	
J0162C	Balanced cord (Siemence 3P・Siemence 3P), 2 m	
J0845A	Balanced cord, (Bantam 3P・Bantam 3P), 6 ft	
J0775D	Coaxial cord (BNC-P620・3C-2WS・BNC-P620, 75 Ω), 2 m	
J0776D	Coaxial cord (BNC-P-3W・3D-2W・BNC-P-3W, 50 Ω), 2 m	
B0491	Soft case	
B0492	Hard carrying case	

∗: Must specify SDH (Option 10) or SONET (Option 11) when ordering depends on your systems. The option price is included in the MP1570A.
  These two options can be installed simultaneously. But in this case, one option is charged.

Anritsu

Specifications are subject to change without notice.