

ADVANTEST®

R3267/3273
Spectrum Analyzers

For 3rd-Generation Mobile Communications
Present Digital Communication standards
(W-CDMA, PDC, PHS, IS-136, GSM, DECT, cdmaOne...)



R3267/3273



New communication technologies such as 3rd Generation Mobile (IMT 2000), microwave digital broadcast, high-speed multimedia mobile access (MMAC), and satellite-based services require the latest in spectrum and modulation measurement capabilities. Furthermore, these new services must be introduced in less time and for more users than ever before.

The R3267/3273 is a high-performance spectrum analyzer designed to meet these needs.

for evaluating/testing wide bands, high frequencies, and high-quality digital modulation signals required in these next-generation communication systems.

The 3267/3273 features a frequency span accuracy within $\pm 1\%$ and a dynamic range of -154 dBc/Hz (typ) in the 2 GHz band to allow accurate, repeatable measurements for high-quality digital signals. Further, its 10 Hz to 10 MHz resolution band with filter and ability to perform a 70 dB (typ, at 5 MHz offset) ACP measurement on W-CDMA makes it ideal for testing of wide band signals. Finally, with a frequency range from 100 Hz to 8 or 26.5 GHz, the R3267/3273 allow comprehensive measurements of even high frequency systems.

In addition, the optional digital modulation analysis option offers one-button testing of modulation parameters for communication systems including PHS, PDC, IS-136, DECT, GSM, and IS-95 as well as W-CDMA and CDMA-2000.

The R3267/3273 provides excellent value with its combination of spectrum and optional modulation analyzer, so that it can be used with applications ranging from research and development of communication devices, modules, to production line and deployment testing of communication infrastructure equipment. The R3267 and R3273: a new family of analyzers to test today's, and tomorrow's communication systems.

High Frequency and Wide Bandwidth Measurements

- Frequency range: R3267 100 Hz to 8 GHz
R3273 100 Hz to 26.5 GHz
- Resolution bandwidth: 10 Hz to 10 MHz
- Span accuracy: $\pm 1\%$ or better (for all spans)

High Dynamic Range Measurements

- Dynamic range: -154 dBc/Hz (2 GHz band, typ.)
70 dB or better (5 MHz offset, typ.)
for W-CDMA ACP measurement
- Outstanding Signal purity: -113 dBc/Hz (10 kHz offset)
- Input attenuator: 75 dB in 5 dB steps (R3267)
- 1 dB gain compression: 0 dBm
- 3rd order intermodulation distortion: -80 dBc or less

High Speed Measurements

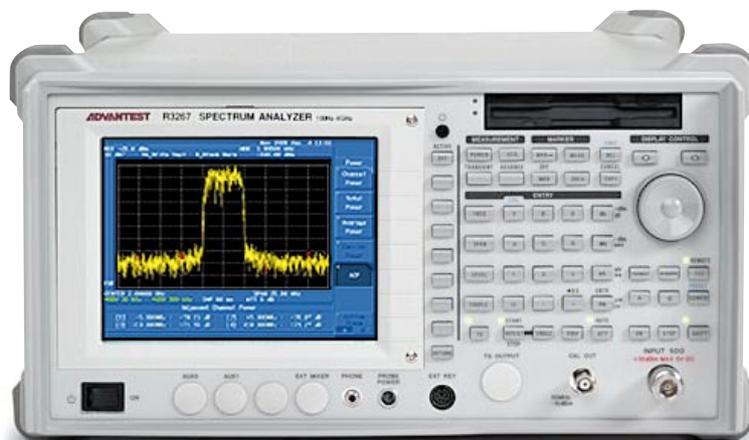
- Trace update rate: up to 20 times/sec.
- 1μ s fast zero-span sweep

Simplified, Automated Measurements for Mobile Communications

- ACP (adjacent channel leakage power) measurement
- OBW (occupied bandwidth) measurement
- Channel and total power measurement
- Harmonics measurement
- Spurious emission measurement
- 2-trace simultaneous measurement
- Delayed sweep/Gated sweep functions
- Peak list function
- Noise/Hz measurement
- XdB down measurement
- 3rd-order measurement
- %AM measurement
- 1 Hz resolution frequency counter

Simple Connectivity

- 6.5-inch TFT color LCD
- 3.5-inch MS-DOS compatible floppy disk drive
- Standard I/O interfaces for integration:
 GPIB, RS232, Parallel, and VGA





Enhanced Options

OPT.01 Digital Modulation Analysis Option

OPT.61 cdmaOne Analysis Software

OPT.62 W-CDMA Analysis Software

OPT.63 GSM/DECT Analysis Software

OPT.64 PDC/PHS/IS-136 Analysis Software

OPT.73 FM Deviation Analysis Software

OPT.02 Memory Card Drive (instead of disk drive)

OPT.05 Audio Demodulation Output Option (AM, FM)

OPT.10 Level Tuning Option (for PDC-BS)

OPT.16 External Mixer Option (26.5 to 40 GHz, for R3273 only)

OPT.17 External Mixer Option (40 to 60 GHz, for R3273 only)

OPT.21 High-stability Frequency Reference Option ($\pm 5 \times 10^{-9}$ /day)

OPT.74 Tracking Generator Option (with attenuator)

OPT.79 Tracking Generator Option (without attenuator)

Note: Each of the above software options requires modulation analysis option OPT.01.

R3267 Specifications

Frequency

Frequency range: 100 Hz to 8 GHz

Frequency Bandwidth	Frequency Band	Harmonics Order N
100 Hz to 3.5 GHz	0	1
1.6 to 3.5 GHz	1	1
3.5 to 7 GHz	2	1
6.9 to 8 GHz	3	1

YIG-tuned Preselector built in for 1.6 to 8 GHz

Frequency read accuracy

\pm (Frequency reading x Frequency reference accuracy + Span x Span accuracy + 0.15 x Resolution bandwidth + 10 Hz)

Marker frequency counter (Span < 1 GHz)

Resolution Accuracy (S/N>25dB)	1Hz to 1kHz \pm (Marker frequency x Frequency reference accuracy + 5 Hz x N + 1LSD)
Delta counter	\pm (Delta frequency x Frequency reference accuracy + 10 Hz x N + 2LSD)

Frequency reference accuracy

Stability	$\pm 3 \times 10^{-8}$ /day	$\pm 5 \times 10^{-9}$ /day (OPT.21)
	$\pm 1 \times 10^{-7}$ /year	$\pm 8 \times 10^{-8}$ /year (OPT.21)

Frequency stability

Residual FM (zero span)	<3 Hz x Np-p/0.1sec.	N: Harmonics order
Frequency drift	Same as the reference value	

(After 60 min. warm-up)

Signal purity (dBc/Hz)

Frequency Band	Offset			
	1 kHz	10 kHz	100 kHz	1 MHz
100 Hz to 1 GHz	-100	-113	-118	-135
1 to 2.6 GHz	-100	-110	-118	-135
2.6 to 8 GHz	-98	-108	-112	-135

Frequency span

Range	200 Hz to 8 GHz, zero span
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Accuracy	$\pm 1\%$
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Resolution bandwidth (3 dB)

Range	10 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz
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Accuracy	$\pm 25\%$: Resolution bandwidth = 3 MHz, 5 MHz
	$\pm 15\%$: Resolution bandwidth = 100 Hz to 1 MHz
	$\pm 25\%$ (25°C \pm 10°C): Resolution bandwidth = 30 Hz

Selectivity	<15:1 (Resolution bandwidth = 100 Hz to 5 MHz)
	<20:1 (Resolution bandwidth = 30 Hz)

Video bandwidth

Range	1 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz
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Frequency sweep

Sweep time	Zero span: 1 μ s to 1000 s
	Span > 0 Hz: 20 ms to 1000 s

Accuracy	$\pm 3\%$
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Trigger	Free run, line, video, external, IF
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Gated sweep

Gate position/resolution	100 ns to 1 s/100 ns
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Gate value/resolution	1 μ s to 1 s/100 ns
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Trigger	IF (Mixer input -40 dBm or more), external trigger, external gate
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Delayed sweep

Delay time/resolution	100 ns to 1 s/100 ns
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Amplitude range

Measurement range

+30 dBm - Average noise level

Max. safety input

Average continuous power (input ATT >10 dB)	+30 dBm (1 W)
DC input	0 V

Display range: 10 x 10 div.

Log mode	10,5,2,1,0.5 dB/div
Linear mode	10% of the reference level/div.

Reference level range

Log mode	-140 to +60 dBm (0.1 dB steps)
Linear mode	22.4 nV to 223 V (steps of approx. 1% of the full scale)

Input attenuator range

0 to 75 dB (5 dB steps)

Dynamic range

Average noise level (Resolution bandwidth 100 Hz, input attenuator 0 dB, video bandwidth 1 Hz)

Frequency	Frequency Band	Average Noise Level
1 kHz	0	-90 dBm
10 kHz	0	-100 dBm
100 kHz	0	-101 dBm
1 MHz	0	-125 dBm
10 MHz to 3.5 GHz	0	-(130 - f(GHz)) dBm
1.6 to 3.5 GHz	1	-125 dBm
3.5 to 7 GHz	2	-125 dBm
6.9 to 8 GHz	3	-125 dBm

1 dB gain compression

10 to 100 MHz	-3 dBm
100 MHz to 8 GHz	0 dBm

Spurious response

Secondary harmonics distortion

	Frequency	Range Frequency Band	Mixer Level
<-70 dBc	10 MHz to 3.5 GHz	0	-30 dBm
<-90 dBc	> 1.6 GHz	1,2,3	-10 dBm

3rd order intermodulation distortion

	Frequency	Range Frequency Band	Mixer Level
<-70 dBc	10 to 100 MHz	0	-30 dBm
<-80 dBc	100 MHz to 1 GHz	0	-30 dBm
<-85 dBc	1 to 3.5 GHz	0	-30 dBm
<-90 dBc	1.6 to 8 GHz	1,2,3	-30 dBm

Image/Multiple/Out-of-band response

<-70 dBc (10 MHz to 8 GHz)

Residual response (no input, input ATT 0 dB, 50 ohm termination)

<-100 dBm	1 MHz to 3.5 GHz
<-90 dBm	300 kHz to 8 GHz



Amplitude accuracy

Frequency response

(input ATT 10 dB, after Preselector synchronization, for Band 1 to 3)

Frequency Range	Frequency Band	In-band Flatness (correlation value)
100 MHz to 3.5 GHz	0	±1.5 dB
50 MHz to 2.6 GHz	0	±1.0 dB
1.6 to 3.5 GHz	1	±1.5 dB
3.5 to 7.0 GHz	2	±1.5 dB
6.9 to 8.0 GHz	3	±1.5 dB

Additional error by band switching ±0.5 dB

Flatness with 30 MHz calibration signal as reference ±3.0 dB (100 Hz to 8.0 GHz)

Calibration signal accuracy (30 MHz)

-10 dBm ±0.3 dB

IF gain error (after auto calibration)

0 to -50 dBm ±0.5 dB
0 to -80 dBm ±0.7 dB

Scale display accuracy (after auto calibration)

Log mode	0 to -90 dB Max. ±0.85 dB ±0.2 / 1 dB
Linear mode	±5% of reference level

Input attenuator switching error (10 dB as reference, at 15 to 75 dB)

Frequency Range	Error
100 Hz to 8 GHz	±1.1 dB/5 dB steps, max. 2.0 dB

Resolution bandwidth switching error

(Resolution bandwidth: 300 kHz reference, after auto calibration)

<±0.3 dB (resolution bandwidth = 100 Hz to 5 MHz)
<±1.0 dB (resolution bandwidth = 30 Hz)

Input/Output

RF input

Connector	N-type female
Impedance	50 ohm (nominal)
VSWR (input ATT >10 dB, at set frequency)	<1.5:1 (<3.5 GHz) (nominal) <2.1:1 (>3.5 GHz) (nominal)

Calibration signal output

Connector	BNC female, front panel
Frequency	30 MHz x (1 ± Frequency reference determined)
Impedance	50 ohm (nominal)
Amplitude	-10 dBm ±0.3 dB

10 MHz frequency reference output

Connector	BNC female, front panel
Output impedance	50 ohm (nominal)
Output frequency accuracy	10 MHz x Frequency reference accuracy
Output amplitude range	0 ±5 dBm

10 MHz frequency reference input

Connector	BNC female, rear panel
Input impedance	50 ohm (nominal)
Input amplitude range	-5 to +5 dBm

Probe power source

±12.6 V (100 mA) (nominal)

21.4 MHz IF output

Connector	BNC female, rear panel
Impedance	50 ohm (nominal)

421.4 MHz IF output

Connector	BNC female, rear panel
Impedance	50 ohm (nominal)

Video output

Connector	VGA (15-pin, female), rear panel, equivalent to 640 x 480 dot VGA
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X-axis output

Connector	BNC female, rear panel
Impedance	1 kohm (nominal), DC-coupled
Amplitude	Approx. -5 to +5 V

Y-axis output

Connector	BNC female, rear panel
Impedance	220 ohm (nominal)
Amplitude	Approx. 2 V (at 10 dB/div.) full scale

External trigger input

Connector	BNC female, rear panel
Impedance	10 kohm (nominal), DC-coupled
Trigger level	TTL level

External gate input

Connector	BNC female, rear panel
Impedance	10 kohm (nominal), DC-coupled
Sweep stop	During LOW on TTL level
Sweep	During HIGH on TTL level

Trigger output

Connector	BNC female, rear panel
Amplitude	TTL level

Sound output (demodulation audio): OPT.05

Connector	Miniature monophonic jack, front panel
Power output	Max. 0.2 W, 32 ohm (nominal)

I/O

GPIB	IEEE-488 bus connector, rear panel
RS232	D-SUB 9-pin, rear panel
Printer	D-SUB 25-pin, rear panel
Peripheral unit I/O	D-SUB 25-pin, rear panel
3.5-inch floppy disk drive	

Direct print

Output by ESC/P, PCL, or ESC/P raster command

General Specifications

Temperature

Operating temperature	0 to 50°C
Storage temperature	-20 to 60°C
Humidity	RH 85% or less (no condensation)

Power supply: Auto switching between 100 VAC and 220 VAC systems

	100 VAC operation	220 VAC operation
Voltage	100 V - 120 V	220 V - 240 V
Power consumption	300 VA or less	300 VA or less
Frequency	50/60 Hz	50/60 Hz

Mass

18 kg or less (excluding options, front cover, and accessories)

Dimensions

Approx. 177 mm (H) x 350 mm (W) x 420 mm (D) (excluding handle, feet, and front cover)

Accessories

Product Name	Model Name
Power cable	A01412
Input cable	A01036-0150
N to BNC adapter	JUG-201A/U
Fuse	T6.3A/250V
Front cover	

R3273 Specifications

Frequency

Frequency range: 100 Hz to 26.5 GHz
26.5 to 60 GHz (external mixer used,
synchronization available up to 325 GHz)

Frequency Bandwidth	Frequency Band	Harmonics Order N
100 Hz to 3.5 GHz	0	1
3.5 to 7.5 GHz	1	1
7.4 to 15.4 GHz	2	2
15.2 to 26.5 GHz	3	4

YIG-tuned Preselector built in for 3.5 to 26.5 GHz

Frequency read accuracy

\pm (Frequency reading x Frequency reference accuracy + Span x Span accuracy + 0.15 x Resolution bandwidth + 10 Hz)

Marker frequency counter (Span <1 GHz)

Resolution	1 Hz to 1 kHz		
Accuracy (S/N >25 dB)	\pm (Marker frequency x Frequency reference accuracy + 5 Hz x N + 1LSD)		
Delta counter	\pm (Delta frequency x Frequency reference accuracy + 10 Hz x N + 2LSD)		

Frequency reference accuracy

Stability	$\pm 3 \times 10^{-9}$ /day	$\pm 5 \times 10^{-9}$ /day (OPT.21)
	$\pm 1 \times 10^{-7}$ /year	$\pm 8 \times 10^{-8}$ /year (OPT.21)

Frequency stability

Residual FM (zero span) <3 Hz x Np-p/0.1 sec. N: Harmonics order
Frequency drift Same as the reference source

(After 60 min. warm-up)

Signal purity (dBc/Hz)

Frequency Band	Offset			
	1 kHz	10 kHz	100 kHz	1 MHz
100 Hz to 1 GHz	-100	-113	-118	-135
1 to 2.6 GHz	-100	-110	-118	-135
2.6 to 7.5 GHz	-98	-108	-112	-135
7.4 to 15.4 GHz	-89	-102	-106	-129
15.2 to 26.5 GHz	-83	-96	-100	-123

Frequency span

Range	200 Hz to 26.5 GHz, zero span
Accuracy	$\pm 1\%$

Resolution bandwidth (3 dB)

Range	10 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz
Accuracy	$\pm 25\%$: Resolution bandwidth = 3 MHz, 5 MHz $\pm 15\%$: Resolution bandwidth = 100 Hz to 1 MHz $\pm 25\%$ (25 °C ± 10 °C): Resolution bandwidth = 30 Hz
Selectivity	<15:1 (Resolution bandwidth = 100 Hz to 5 MHz) <20:1 (Resolution bandwidth = 30 Hz)

Video bandwidth

Range	1 Hz to 10 MHz (1, 3, or 10 sequences), 5 MHz
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Frequency sweep

Sweep time	Zero span: 1 μ s to 1000 s Span >0 Hz: 20 ms to 1000 s
Accuracy	$\pm 3\%$
Trigger	Free run, line, video, external, IF

Gated sweep

Gate position/resolution	100 ns to 1 s/100 ns
Gate width/resolution	1 μ s to 1 s/100 ns
Trigger	IF (Mixer input -40 dBm or more), external trigger, external gate

Delayed sweep

Delay time/resolution	100 ns to 1 s/100 ns
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Amplitude range

Measurement range

+30 dBm - Average noise level

Max. safety input

Average continuous power (input ATT>10 dB)	+30 dBm (1 W)
DC input	0 V

Display range: 10 x 10 div.

Log mode	10, 5, 2, 1, 0.5 dB/div.
Linear mode	10% of the reference level/div.

Reference level range

Log mode	-140 to +60 dBm (0.1 dB steps)
Linear mode	22.4 nV to 223 V (steps of approx. 1% of the full scale)

Input attenuator range

0 to 70 dB (10 dB steps)

Dynamic range

Average noise level
(Resolution bandwidth 100 Hz, input attenuator 0 dB, video bandwidth 1 Hz)

Frequency	Frequency Band	Average Noise Level
1 kHz	0	-90 dBm
10 kHz	0	-100 dBm
100 kHz	0	-101 dBm
1 MHz	0	-125 dBm
10 MHz to 3.5 GHz	0	-(130 - f(GHz)) dBm
3.5 to 7.5 GHz	1	-125 dBm
7.4 to 15.4 GHz	2	-122 dBm
15.2 to 22.0 GHz	3	-120 dBm
22.0 to 26.5 GHz	3	-117 dBm

1 dB gain compression

10 to 100 MHz	-3 dBm
100 MHz to 3.5 GHz	0 dBm
3.5 to 7.5 GHz	-10 dBm
7.5 to 26.5 GHz	-3 dBm

Spurious response

Secondary harmonics distortion

	Frequency Range	Frequency Band	Mixer Level
<-70 dBc	10 MHz to 3.5 GHz	0	-30 dBm
<-100 dBc	>3.5 GHz	1,2,3	-10 dBm

3rd order intermodulation distortion

	Frequency Range	Frequency Band	Mixer Level
<-70 dBc	10 to 100 MHz	0	-30 dBm
<-80 dBc	100 MHz to 1 GHz	0	-30 dBm
<-85 dBc	1 to 3.5 GHz	0	-30 dBm
<-70 dBc	3.5 to 7.5 GHz	1	-30 dBm
<-75 dBc	7.5 to 26.5 GHz	2,3	-30 dBm

Image/Multiple/Out-of-band response

<-70 dBc (10 MHz to 18 GHz)
<-60 dBc (10 MHz to 23 GHz)
<-50 dBc (10 MHz to 26.5 GHz)

Residual response (no input, input ATT 0 dB, 50 ohm termination)

<-100 dBm	1 MHz to 3.5 GHz
<-90 dBm	300 kHz to 26.5 GHz

Please be sure to read the product manual thoroughly before using the products.
Specifications may change without notification.

Amplitude accuracy

Frequency response

(input ATT 10 dB, after Preselector synchronization, for Band 1 to 3)

Frequency Range	Frequency Band	In-band Flatness (correlation value)
100 Hz to 3.5 GHz	0	±1.5 dB
50 MHz to 2.6 GHz	0	±1.0 dB
3.5 to 7.5 GHz	1	±1.5 dB
7.4 to 15.4 GHz	2	±3.5 dB
15.4 to 26.5 GHz	3	±4.0 dB

Additional error by band switching	±0.5 dB
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Flatness with 30 MHz calibration signal as reference	±5.0 dB (100 Hz to 26.5 GHz)
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Calibration signal accuracy (30 MHz)

-10 dBm ±0.3 dB

IF gain error (after auto calibration)

0 to -50 dBm	±0.5 dB
0 to -80 dBm	±0.7 dB

Scale display accuracy (after auto calibration)

Log mode	0 to -90 dB Max. ±0.85 dB ±0.2/1 dB
Linear mode	±5% of reference level

Input attenuator switching error (10 dB as reference, at 20 to 70 dB)

Frequency Range	Error
100 Hz to 12.4 GHz	±1.1/10 dB steps, max. 2.0 dB
12.4 to 18 GHz	±1.3/10 dB steps, max. 2.5 dB
18 to 26.5 GHz	±1.8/10 dB steps, max. 3.5 dB

Resolution bandwidth switching error

(Resolution bandwidth: 300 kHz reference, after auto calibration)

<±0.3 dB (resolution bandwidth = 100 Hz to 5 MHz)

<±1.0 dB (resolution bandwidth = 30 Hz)

Input/Output

RF input

Connector	N-type female (changeable to SMA)
Impedance	50 ohm (nominal)
VSWR (input ATT>10 dB, at set frequency)	<1.5:1 (<3.5 GHz) (nominal) <2.1:1 (>3.5 GHz) (nominal)

Calibration signal output

Connector	BNC female, front panel
Frequency	30 MHz x (1 ± Frequency reference determined)
Impedance	50 ohm (nominal)
Amplitude	-10 dBm ±0.3 dB

10 MHz frequency reference output

Connector	BNC female, rear panel
Output impedance	50 ohm (nominal)
Output frequency accuracy	100 MHz x Frequency reference accuracy
Output amplitude range	0 dBm ±5 dB

10 MHz frequency reference input

Connector	BNC female, rear panel
Input impedance	50 ohm (nominal)
Input amplitude range	-5 to +5 dBm

Probe power source

±12.6 V (100 mA) (nominal)

21.4 MHz IF output

Connector	BNC female, rear panel
Impedance	50 ohm (nominal)

421.4 MHz IF output

Connector	BNC female, rear panel
Impedance	50 ohm (nominal)

1st LO output

Connector	SMA female, front panel
Impedance	50 ohm (nominal)
Frequency range	3.921 to 7.921 GHz
Amplitude	>+10 dBm

Video output

Connector	VGA (15-pin, female), rear panel, equivalent to 640 x 480 dot VGA
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X-axis output

Connector	BNC female, rear panel
Impedance	1 kohm (nominal), DC-coupled
Amplitude	Approx. -5 to +5 V

Y-axis output

Connector	BNC female, rear panel
Impedance	220 ohm (nominal)
Amplitude	Approx. 2 V (at 10 dB/div.) full scale

External trigger input

Connector	BNC female, rear panel
Impedance	10 kohm (nominal), DC-coupled
Trigger level	TTL level

External gate input

Connector	BNC female, rear panel
Impedance	10 kohm (nominal), DC-coupled
Sweep stop	During LOW on TTL level
Sweep	During HIGH on TTL level

Trigger output

Connector	BNC female, rear panel
Amplitude	TTL level

Sound output (demodulation audio): OPT.05

Connector	Miniature monophonic jack, front panel
Power output	Max. 0.2 W, 32 ohm (nominal)

I/O

GPIB	IEEE-488 bus connector, rear panel
RS232	D-SUB 9-pin, rear panel
Printer	D-SUB 25-pin, rear panel
Peripheral unit I/O	D-SUB 25-pin, rear panel
3.5-inch floppy disk drive	

Direct print

Output by ESC/P, PCL, or ESC/P raster command

General Specifications

Temperature

Operating temperature	0 to 50°C
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Humidity	RH 85% or less (no condensation)

Power supply: Auto switching between 100 VAC and 220 VAC systems

	100 VAC operation	220 VAC operation
Voltage	100 V - 120 V	220 V - 240 V
Power consumption	300 VA or less	300 VA or less
Frequency	50/60 Hz	50/60 Hz

Mass

18 kg or less (excluding options, front cover, and accessories)

Dimensions

Approx. 177 mm (H) x 350 mm (W) x 420 mm (D) (excluding handle, feet, and front cover)

Accessories

Product Name	Model Name
Power cable	A01412
Input cable	A01036-0150
N to BNC adapter	JUG-201A/U
Fuse	T6.3A/250V
Front cover	