

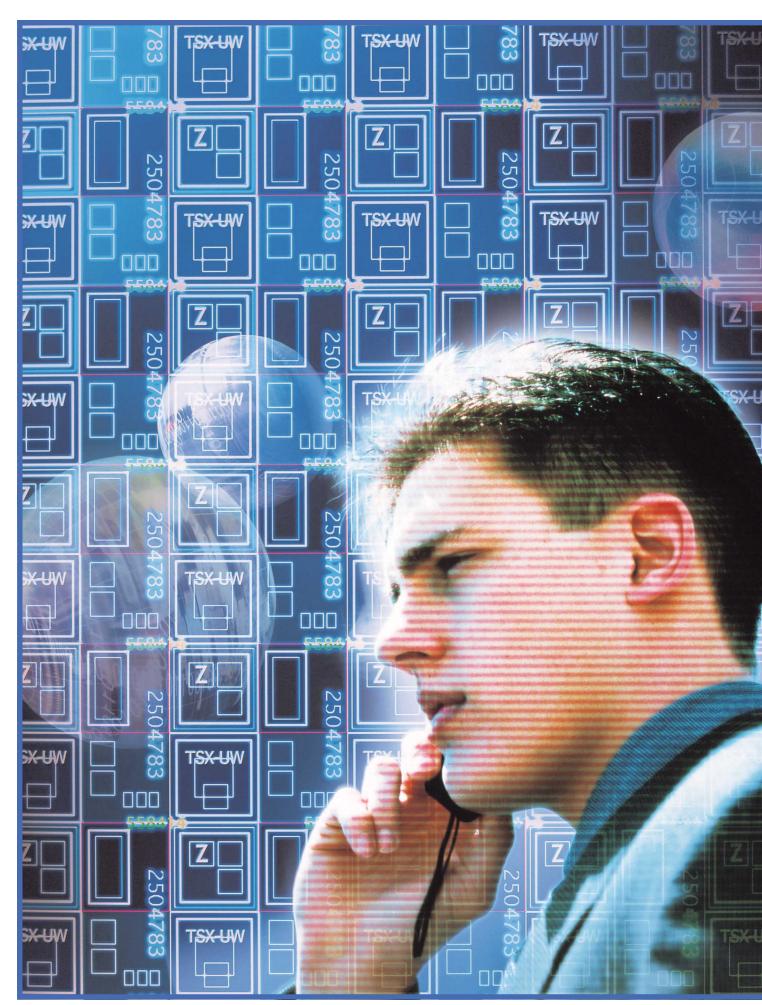
# MS2687B

## **Spectrum Analyzer**

9 kHz to 30 GHz



For evaluation of Wireless LAN equipment and devices



## High-performance microwave spectrum analyzer covering 30 GHz

High-speed Internet services using Wireless LANs are spreading rapidly. High-speed hot-spot wireless services are appearing in hotels, offices, restaurants. 5-GHz Wireless LAN equipment and devices are being actively developed and there is urgent need for OFDM signal analysis.

The MS2687B Microwave Spectrum Analyzer covers a frequency range up to 30 GHz and can measure up to 5th-order harmonics on 5-GHz Wireless LANs. Moreover, the MS2687B has a maximum RBW of 20 MHz and is ideal for measuring the burst power of wideband signals used by Wireless LANs. When the MX268730A Measurement Software is installed, the modulation accuracy, of each sub-carrier of the OFDM signal can be measured at high speed and high accuracy.



### **Features**

- Optional measurement software (sold separately) for high-speed modulation analysis (0.5 sec. with IEEE802.11a)
- Optional wide resolution bandwidth up to 20 MHz and narrow resolution bandwidth from 1 Hz
- Optional power meter that measures up to 32 GHz
- Data transmission speed approximately 10 times faster\*
   (GPIB transmission speed: 120 kbytes/s) \* Comparison with our conventional models
- Optional rubidium reference oscillator for warm-up time of just 7 minutes



### **Basic Specifications**

### ■ For R&D and manufacturing of wireless LAN equipment and devices

Frequency range: 9 kHz to 30 GHz

Reference oscillator start-up characteristics:

5 x 10<sup>-8</sup> or lower (standard)

1 x 10<sup>-9</sup>/7 min. or lower (option 05)

Span accuracy: ±1% Resolution bandwidth:

300 Hz to 3 MHz, 5 MHz, 10 MHz, 20 MHz

1 Hz to 1 kHz (option 02, FFT)

10 Hz to 1 MHz (option 04)

Average noise level: ≤-146 dBm/Hz (1 MHz to 2.5 GHz)

Input attenuator: 0 to 70 dB (10 dB step)

### ■ For installation and maintenance of radio stations

Save/recall of set parameters: up to 12 into/from internal memory Output of measurement results: BMP, CSV format or printer (ESC/P compatible model)

PC card interface: PC compatible Memory card

(Memory card equipped as standard for 32 Mbytes or over)

Display: 6.5 inch (17 cm) color TFT-LCD

Dimensions, weight: 320 (W) x 177 (H) x 411 (D) (mm), 16 kg

#### ■ For maintenance of microwave entrance lines

Frequency range: 9 kHz to 30 GHz

(When using external mixer: to 110 GHz)

Measure: One-touch measurement of occupied

bandwidth, channel power, and adjacent

channel leakage power

Power meter function: 100 kHz to 32 GHz

(Power sensor optionally available)

A backpack and soft carrying case convenient for field use is also available.



#### ■ For development and production line of various radio frequency parts

Reference oscillator stability: ±2 x 10<sup>-8</sup>/day (standard)

 $\pm 5 \times 10^{-9}$ /day (option 01)

Sweep time: 10 ms to 1000 s (frequency span)

1 µs to 1000 s (time span)

Sweep refresh rate: 20 trace/s

I/O interface:

GPIB, RS-232C, and Centronics equipped as standard Ethernet (option 09) allows network control by 10BASE-T.

GPIB transfer rate: 120 kbytes/s

#### Options

Option 01: Precision frequency reference

(aging rate:  $5 \times 10^{-10}$ /day)

Option 02: Narrow resolution bandwidth (FFT)

Option 04: Digital resolution bandwidth (RMS detection)

Option 05: Rubidium reference oscillator

Option 09: Ethernet interface Option 18: I/Q unbalanced input

Option 21: Power meter function

Option 23: Range expansion power meter function

Option 34: 4 GHz LO output

Option 41: Power meter function retrofit

Option 43: Range expansion power meter function retrofit Option 44: Range expansion power meter function upgrade

Option 46: Auto power recovery

Option 47: Rack mount (IEC) without handles Option 48: Rack mount (JIS) without handles

#### Warranty

Option 90: Extended three year warranty service Option 91: Extended five year warranty service

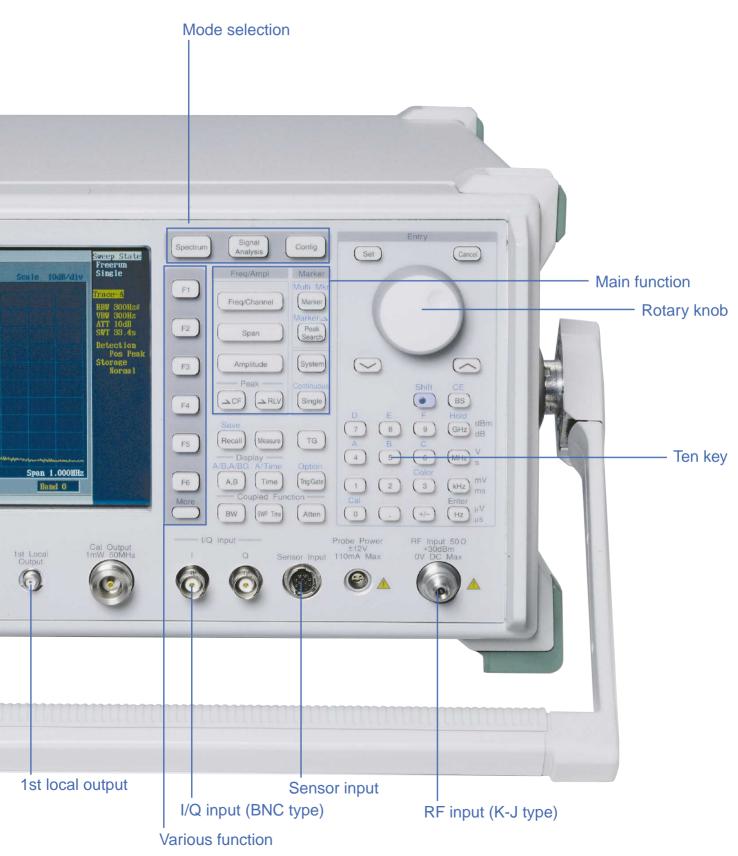
### **Easy-to-Use Panel Design**



- 2 Reference input/output (BNC type)
- 3 Power
- 4 AC input
- **5** Ethernet interface (10BASE-T, optional)
- 6 RS-232C interface
- VGA output
- 8 GPIB interface
- Parallel interface (D-sub25)
- Trigger input (BNC type)
- 1 Video signal output (BNC type)



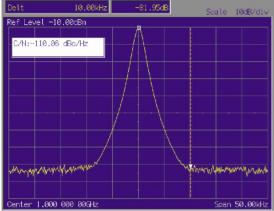




### **Excellent Basic Performance**

#### High C/N ratio to securely capture adiacent signals

The MS2687B has excellent noise sideband characteristics of -108 dBc/Hz or lower (1 GHz, 10 kHz offset), which is ideal for analyzing weak signals adjacent to strong signals or a narrow bandwidth carrier.



Example of C/N characteristics waveform

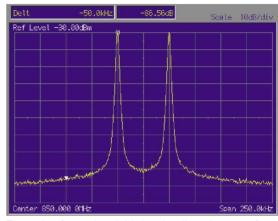
#### Broad dynamic range that accurately captures weak signals

With the development of digital radio technology, analyzed signals are becoming weaker and broader than ever. With the MS2687B, a dynamic range display of up to 156 dB (typical value) has been achieved, thus allowing accurate analysis of even weak signals.

The resolution bandwidth of up to 20 MHz permits the analysis of broadband signals and can handle the broader bandwidths of the future.

#### **Extremely low distortion rate suitable** for power amplification or harmonic measurement

The MS2687B has extremely low harmonic distortion levels, including second harmonic distortion of -90 dBc and two-signal third-order distortion of -85 dBc, making it suitable for evaluating the non-linearity of high-power amplifiers and for measuring harmonics.

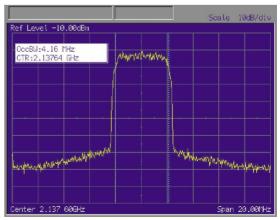


Example of two-signal third-order distortion waveform

#### Instantaneous evaluation of various radio devices Standard measure functions

The MS2687B has a wealth of measuring functions to perform various high-speed evaluations of radio devices such as power measurement, frequency measurement, adjacent channel leakage power measurement, and mask measurement.

Optional measurement software is also available for instantaneously analyzing various digital communication systems by just installing the software.

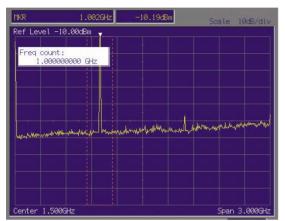


Example of occupied bandwidth

### **Convenient and Easy-to-Use Functions**

## 1 Hz resolution Built-in frequency counter

The built-in frequency counter is convenient for measuring the frequency of a signals arbitrarily selected from multiple signals. High resolution of 1 Hz even at full span is assured.

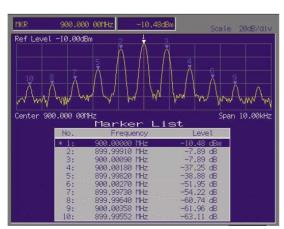


Example of frequency counter

### Multiple waveform display and multimarkers

The MS2687B is equipped with multiple waveform display function that allows superimposition of two waveforms or simultaneous display of analysis of frequency domain and time domain.

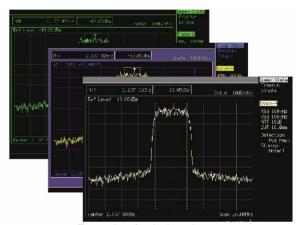
It also has substantial marker functions that allow up to 10-point multimarkers to be displayed for comparison of waveforms and measurement of harmonics.



Example of harmonics measurement

### Bright and easy-to-see 6.5 inch (17 cm) color TFT display

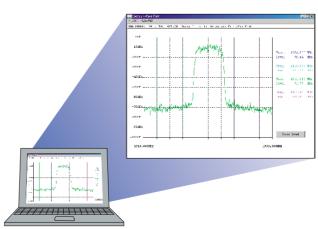
The MS2687B has a 6.5 inch (17 cm) color TFT-LCD. Intensity and color can be adjusted freely according to the operating conditions.



Example of coloring change

### Easy measurement data control allowed by various interfaces

The results of measurement with the MS2687B can be saved at the touch of a button (in BMP or CSV format; data can also be output to a printer). The large-capacity memory card instead of a floppy disk which is susceptible to mechanical failure allows accurate and high-speed storage of important data. Various interfaces such as RS-232C, Centronics, GPIB, and Ethernet (optional) permit easy connection to a PC for data collection.



Example of capture soft



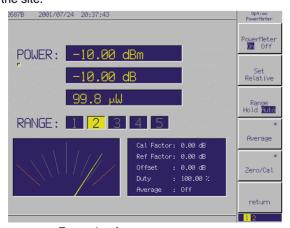
## Ideal for installation and maintenance of radio stations Short warm-up time of just 7 minutes

The MS2687B is a portable spectrum analyzer ideal for installing and maintaining various radio stations. A frequency range of 9 kHz to 30 GHz has been achieved, and by using an external mixer, this can be extended up to 110 GHz. This range covers the frequencies of various mobile communication systems and applications such as microwave entrance lines. The warm-up time of the optional rubidium reference oscillator (option 05) is just 7 minutes, making it ideal if you have to move from one site to another.

### Optional power meter function for highly accurate power measurement

The MS2687B has an optional power meter function that permits measurement of up to 32 GHz. Just by mounting a power sensor to the full-face connector, highly accurate power measurement can be performed.

Use of the MS2687B eliminates the need to carry a power meter to the site, and enables more efficient measurement at the site.

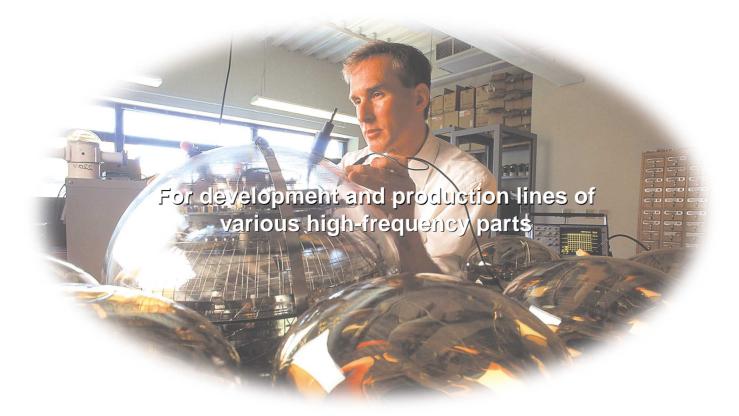


Example of power measurement

### Various accessories ideal for field use

A backpack and soft carrying case are available for installation and maintenance of radio stations in the field. Various accessories such as a rubber protective pad for the back of the analyzer are useful precautions for field use.

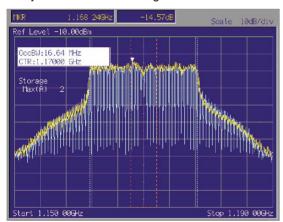




### Suitable for analysis of broadband signals Wide resolution bandwidth of up to 20 MHz

The MS2687B comes with a high-performance DSP as standard. Various modulation analysis functions can be added simply by installing measurement software. In signal analysis mode, analysis by I/Q input (option 18 required) can be performed.

The resolution bandwidth is up to 20 MHz, which allows the analysis of Wireless LAN signal.



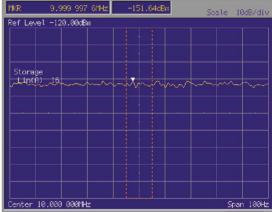
Example of wide bandwidth signal measurement

### High-speed measurement for construction of automatic manufacturing lines

The MS2687B has a high sweep rate of more than 20 times/s. A slight change of the signal can thus be accurately captured and measured at high speed. The GPIB transfer speed of the measured data is as fast as 120 kbytes/s, making it approximately 10 times faster than our conventional model. Use of the optional Ethernet interface allows connection to a LAN for centralized management and high-speed measurement, and thus efficient construction of production lines.

### High-speed sweep by FFT Narrow resolution bandwidth (optional)

Optional narrow resolution bandwidth with FFT (fast Fourier transform) is available (option 02, 1 Hz to 1 kHz). This option permits state-of-the-art high-speed measurement in a narrow band that used to be impossible with the conventional sweep method.



Example of narrow resolution bandwidth measurement

### Versatile Options for Improving Performance and Functions

[option 01]

#### ■ Precision frequency reference

Highly-stable reference crystal oscillator option with frequency of 10 MHz, and aging rate of 5 x  $10^{-10}$ /day.

[option 02]

#### Narrow resolution bandwidth

Realizes narrow RBW of 1 Hz to 1 kHz with FFT adopted.

[option 04]

#### Digital resolution bandwidth

Adds RMS director and expands resolution bandwidth (10 Hz to 1 MHz).

[option 05]

#### Rubidium reference oscillator

Offers excellent start-up characteristics of 10 MHz oscillation frequency and start-up characteristics of 1 x  $10^{-9}$ /7 min.

[option 09]

#### **■** Ethernet interface

Allows external control via 10BASE-T.

[option 18]

### **I/Q** unbalanced input

Mounts 2 connectors for I/Q sync inputs and operating inputs (BNC type) to the front panel. Measurement software corresponding to I/Q input is required for actual measurement.

[option 21, 41]

#### Power meter function

The main unit can be used as a power meter with the upper limit of 32 GHz by mounting an external power sensor (see ordering information for details) to the connector on the front panel.

Power measurement range expands from -20 to +20 dBm.

[option 23, 43, 44]

### Range expansion power meter function

The main unit can be used as a power meter with the upper limit of 32 GHz by mounting an external power sensor (see ordering information for details) to the connector on the front panel.

Power measurement range expands from –30 to +20 dBm

[option 34]

#### ■ 4 GHz LO output

Outputs internal 2nd local signal through rear connector.

[option 46]

### **■** Auto power recovery

Disables the power switch on the front panel. Power is automatically reset after the line is restored.

[option 47]

### ■ Rack mount (IEC) without handles

Mounts an IEC standard rack mount. When mounted, the tilt handle (standard) is eliminated.

[option 48]

### ■ Rack mount (JIS) without handles

Mounts a JIS standard rack mount. When mounted, the tilt handle (standard) is eliminated.

### **Application Software**

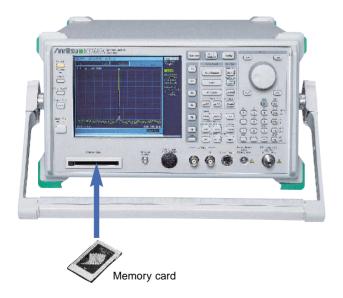
The MS2687B Spectrum Analyzer has been designed to provide the optimum performance required for evaluation of the advanced radio communication devices. They have a wide dynamic range, wide resolution bandwidth (20 MHz), and high-speed sweep (refresh rate: 20 times/s).

When measurement software is stalled in the mainframe, the analysis function of spectrum analyzer to each communication system will be extended. In this case, more advanced analysis can be performed.

#### ■ Selection guide

Communication system	Measurement software	
W-CDMA	MX268701B W-CDMA Measurement software	
W-CDIVIA	MX268751A W-CDMA Release5 uplink Measurement Software	
GSM	MX268702A GSM Measurement software	
EDGE	W/250762/1 COM Mododromont Software	
cdmaOne	MX268703A cdma Measurement software	
cdma2000 1x		
cdma2000 1xEV-DO	MX268704A 1xEV-DO Measurement software	
π/4DQPSK		
PDC		
PHS	MX268705A π/4DQPSK Measurement software	
NADC (IS-136)	WAZOOFOOT WEDGE OF MOGOGIONION CONTRACT	
STD-39/T79		
STD-T61		
WLAN		
IEEE802.11a/b/g	MX268730A Wireless LAN Measurement software	
HiSWANa		
HiperLAN2		
WLAN		
IEEE802.11a/b/g	MX268732A Wireless LAN Measurement software Limited Version	
HISWANa		
HiperLAN2	ANYGOOTOOA TD CODMA M	
TD-SCDMA	MX268760A TD-SCDMA Measurement Software	

<sup>\*:</sup> For details, please see the data sheet of MX268X series measurement software.



- Measurement software is installed in main frame using a memory card.
- The signal of various kinds is analyzable with the function of the measurement software installed in main frame. The notebook PC for analyzing a signal is unnecessary.
- Measurement software is installable in one set of a spectrum analyzer to three.

### **MS2687B Specifications**

Specified values are obtained after warming up the equipment for 30 minutes at a constant ambient temperature and then performing calibration. The typical values are given for reference, and are not guaranteed.

	Fraguenay ranga 0 kHz to 20 CHz	
	Frequency range	9 kHz to 30 GHz
		Band Frequency range Mixer harmonics order [N]
		0 9 kHz to 3.2 GHz 1
	Frequency band	1- 3.15 to 6.3 GHz 1
	, ,	1+ 6.2 to 7.9 GHz 1
		2+ 7.8 to 15.3 GHz 2
	Due colonton nonco	4+ 15.2 to 30 GHz 4
	Pre-selector range	Pre-selector range: 3.15 to 30 GHz (band 1–, 1+, 2+, 4+)
	Diaglassfaransarass	± (Display frequency x reference frequency accuracy + span x span accuracy + resolution bandwidth x
	Display frequency	0.15 + 10 Hz x N Hz)
	accuracy	Normal marker: same as frequency display accuracy, Delta marker: same as span accuracy, N : Mixer harmonics order
	Fraguency counter recolution	
Frequency	Frequency counter resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz (counts the received frequency at the peak point inside the zone)  ± (Display frequency x reference frequency accuracy +2 x N Hz + 1 LSD)
Ine	Frequency counter	
reo	accuracy	(at S/N 20 dB or more and RBW 3 MHz or less), N : Mixer harmonics order
[	Frequency span	Setting range: 0 Hz, and 5 kHz to 30 GHz, accuracy: ±1.0% (band 0, 1), ±2.5% (band 2, 4)
		* At single band sweep, data point 1001
	Decalistics bandwidth	Setting range: 300 Hz to 3 MHz (1, 3 sequence), 5 MHz, 10 MHz, 20 MHz (0 band)
	Resolution bandwidth	* Manually settable, or automatically settable according to frequency span
	(RBW) [3 dB bandwidth]	Accuracy: ±20% (300 Hz to 10 MHz), ±40% (20 MHz)
	Video bandwidth (VBW)	Selectivity (60 dB: 3 dB): ≤15 : 1
	video bandwidth (VBVV)	1 Hz to 3 MHz (1, 3 sequence), Off * Manually settable, or automatically settable according to RBW  Noise singleband: ≤–108 dBc/Hz (1 GHz, 10 kHz offset), ≤–120 dBc/Hz (1 GHz, 100 kHz offset)
	Signal purity	Spurious resulting from local cause: $\leq$ -65 dBc (at harmonic mixing order 1)
		Frequency: 10 MHz
		Start-up characteristics: ≤5 x 10 <sup>-8</sup> (after 10 minutes warm-up, with frequency after 24 hours warm-up referenced)
	Reference oscillator	Aging rate: $\leq 2 \times 10^{-8}$ /day, $\leq 1 \times 10^{-7}$ /year (with frequency after 24 hours of warm-up referenced)
		Temperature characteristics: ±5 x 10 <sup>-8</sup> (0 to 50°C, with frequency at 25°C referenced)
		Measurement range: Average noise level to +30 dBm
		Maximum input level
		Continuous average power: +30 dBm (RF ATT: ≥10 dB)
		Peak pulse input: +47 dBm (pulse width ≤1 µs, duty ratio ≤1%, RF ATT: ≥30 dB)
		DC voltage: 0 Vdc
		Average noise level display
		RBW: 300 Hz, VBW: 1 Hz, RF ATT 0 dB, in SAMPLE detection mode
		≤–124 dBm + f [GHz] dB (1 MHz to 2.5 GHz, band 0)
	Level measurement	$\leq -120 \text{ dBm} + f [GHz] \text{ dB}  (1 \text{ mHz} \text{ to 2.3 GHz}, \text{ band 0})$
		≤-120 dBin + 1 [Gi12] dB (2.3 to 3.2 Gi12, band 0) ≤-115 dBm (3.15 to 7.9 GHz, band 1)
		≤-113 dBm (3.13 to 1.9 GHz, band 1) ≤-113 dBm (7.8 to 15.3 GHz, band 2)
		≤-113 dBm (15.2 to 30.0 GHz, band 2) ≤-103 dBm (15.2 to 30.0 GHz, band 4)
		Residual response: RF ATT 0 dB, input terminated at 50 Ω
		≤-100 dBm (1 MHz to 3.2 GHz, band 0),
nde		≤-100 dBm (1 MHz to 3.2 GHz, band 0), ≤-90 dBm (3.15 to 7.8 GHz, band 1)
Amplitud		· · · · ·
Ę		Setting range
1		Log scale: –100 to +40 dBm or equivalent level, Linear scale: 2.24 μV to 22.4 V
		Unit
		Log scale: dBm, dBμV, dBmV, dBμV (emf), W, V, dBμV/m
		Linear scale: V
		Reference level accuracy:
	Defense de la col	±0.5 dB (-49.9 to 0 dBm), ±0.75 dB (+0.1 to +30 dBm, -69.9 to -50 dBm), ±1.5 dB (-80 to -70 dBm)
	Reference level	* After calibration, at 50 MHz, span: 1 MHz (when RF ATT, RBW, VBW, and sweep time set to AUTO)
		RBW switching uncertainty:
		±0.3 dB (300 Hz to 5 MHz), ±0.5 dB (10, 20 MHz)
		* After calibration, with RBW 3 kHz referenced
		Input attenuator (RF ATT):
		Setting range: 0 to 70 dB (10 dB step), manually settable, or automatically settable according to reference level
		Switching uncertainty: ±0.3 dB (10 to 50 dB), ±0.5 dB (50 to 70 dB)
	i e	* With 50 MHz, RF ATT 10 dB referenced

		Relative flatness: at RF ATT 10 dB with the center point of frequency response in the band referenced	
		±1.0 dB (9 kHz to 3.2 GHz, band 0), ±1.5 dB (3.15 to 7.9 GHz, band 1)	
	_	±3.0 dB (7.8 to 15.3 GHz, band 2), ±4.0 dB (15.2 to 30 GHz, band 4)	
	Frequency response	* After pre-selector tuning for band 1, 2, and 4	
		Absolute flatness: at RF ATT 10 dB with 50 MHz referenced	
		±5.0 dB (9 kHz to 30 GHz),	
		* After pre-selector tuning for band 1, 2, and 4	
		Scale: 10 div (single scale)	
		Log scale: 10, 5, 2, 1 dB/div, Linear scale: 10, 5, 2, 1%/div	
		Linearity (after calibration)	
		Log scale: ±0.4 dB (0 to −20 dB, RBW ≤1 kHz), ±1.0 dB (0 to −70 dB, ≤1 kHz),	
	Waveform display	±1.2 dB (0 to −90 dB, ≤1 kHz)	
		Linear scale: 4% of reference level	
ω		Marker level resolution	
pn		Log scale: 0.01 dB, linear scale: 0.02%	
₽		2nd harmonic distortion:	
Amplitude			
		≤-60 dBc (input frequency 10 to 200 MHz, Mixer input: -30 dBm)	
		≤-70 dBc (0.2 to 1.6 GHz, band 0, Mixer input: -30 dBm)	
		≤-90 dBc or lower than average noise level (1.6 to 15 GHz, band 1, 2, and 4, Mixer input: -10 dBm)	
		Two-signal third-order intermodulation distortion (Frequency difference of two signals: ≥50 kHz, Mixer	
		input: –30 dBm)	
	Spurious response	≤–70 dBc (10 to 100 MHz),	
	Spanisas response	≤–85 dBc (0.1 to 3.2 GHz, band 0)	
		≤–80 dBc (3.15 to 7.9 GHz, band 1)	
		≤-75 dBc or lower than average noise level (7.8 to 15.3 GHz, band 2)	
		≤-75 dBc or lower than average noise level (15.2 to 30 GHz, band 4, Typical)	
		Image response: ≤–65 dBc (≤18 GHz), ≤–60 dBc (≤22 GHz), ≤–55 dBc (≤30 GHz)	
		Multiple response/spurious outside the band:	
		≤–60 dBc (≤22 GHz), ≤–55 dBc (≤30 GHz)	
	1 dB gain compression	≥0 dBm (≥100 MHz), ≥+3 dBm (≥500 MHz, band 0), ≥-5 dBm (≥3150 MHz, band 1, 2, and 4)	
	Sweep mode	Continuous, single	
	Sweep mode	Continuous, single	
	Sweep mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW	
	Sweep time	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW	
		Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s)	
dee	Sweep time	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%	
sweep	Sweep time Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered	
	Sweep time	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3% Free run, triggered Wide IF video, external (TTL), external (±10 V), line	
	Sweep time Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3% Free run, triggered Wide IF video, external (TTL), external (±10 V), line Off, random sweep mode	
	Sweep time Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range	
Frequency sweep	Sweep time Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3% Free run, triggered Wide IF video, external (TTL), external (±10 V), line Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)	
	Sweep time Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)	
	Sweep time  Trigger switch  Trigger source  Gate sweep mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 μs)  Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs)  Gate end: Internal/external	
	Sweep time  Trigger switch  Trigger source  Gate sweep mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 μs)  Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.	
	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 μs)  Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).	
	Sweep time  Trigger switch  Trigger source  Gate sweep mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 μs)  Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single	
	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 μs)  Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 μs (1, 2, 5 sequence), 100 μs to 4.9 ms (100 μs resolution)	
	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)	
Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%	
Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point)	
Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s)  Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode  Setting range  Gate delay range: 0 to 65.5 ms (Resolution: 1 µs)  Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs)  Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution)  5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point)  Setting range: –time span to 0 s	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: –time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: —time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: −time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger  Setting range: 0 µs to 65.5 ms	
sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: —time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger	
Time sweep Frequency	Sweep time  Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point)  Setting range: −time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger  Setting range: 0 µs to 65.5 ms	
Time sweep Frequency	Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source  Trigger delay	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 μs) Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 μs (1, 2, 5 sequence), 100 μs to 4.9 ms (100 μs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: - time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger Setting range: 0 μs to 65.5 ms Resolution: 100 ns (sweep time: ≤4.9 ms), 1 μs (sweep time: ≥5 ms)	
Time sweep Frequency	Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source  Trigger delay  Number of data points Detection mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3%  Free run, triggered  Wide IF video, external (TTL), external (±10 V), line  Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external  Sweeps the indicated range in the zone only.  Sweeps following the peak point inside the zone marker (zone sweep also available).  Continuous, single  Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits)  Accuracy: ±1%  Free run, triggered  Wide IF video, video, external (TTL), external (±10 V), line  Pre-trigger (displays waveform before trigger occurrence point) Setting range: -time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger  Post-trigger Setting range: 0 µs to 65.5 ms Resolution: 100 ns (sweep time: ≤4.9 ms), 1 µs (sweep time: ≥5 ms)  Selectable between 501 and 1001	
Time sweep Frequency	Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source  Trigger delay  Number of data points	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3% Free run, triggered Wide IF video, external (TTL), external (±10 V), line Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 µs) Gate length range: 2 µs to 65.5 ms (Resolution: 1 µs) Gate end: Internal/external Sweeps the indicated range in the zone only. Sweeps following the peak point inside the zone marker (zone sweep also available). Continuous, single Setting range/resolution: 1 to 50 µs (1, 2, 5 sequence), 100 µs to 4.9 ms (100 µs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits) Accuracy: ±1% Free run, triggered Wide IF video, video, external (TTL), external (±10 V), line Pre-trigger (displays waveform before trigger occurrence point) Setting range: –time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger Post-trigger Setting range: 0 µs to 65.5 ms Resolution: 100 ns (sweep time: ≤4.9 ms), 1 µs (sweep time: ≥5 ms) Selectable between 501 and 1001 NORMAL, POSITIVE PEAK, NEGATIVE PEAK, SAMPLE, AVERAGE TRACE A, TRACE B, TRACE A/BG, TRACE A/TIME	
sweep Frequency	Trigger switch Trigger source  Gate sweep mode  Zone sweep Tracking sweep Sweep mode  Sweep time  Trigger switch Trigger source  Trigger delay  Number of data points Detection mode	Setting range: 10 ms to 1000 s * Manual setting and span automatically settable according to RBW and VBW Set resolution: 5 ms (5 ms to 1 s), Top three digits (≥1 s) Accuracy: ±3% Free run, triggered Wide IF video, external (TTL), external (±10 V), line Off, random sweep mode Setting range Gate delay range: 0 to 65.5 ms (Resolution: 1 μs) Gate length range: 2 μs to 65.5 ms (Resolution: 1 μs) Gate end: Internal/external Sweeps the indicated range in the zone only. Sweeps following the peak point inside the zone marker (zone sweep also available). Continuous, single Setting range/resolution: 1 to 50 μs (1, 2, 5 sequence), 100 μs to 4.9 ms (100 μs resolution) 5.0 ms to 1 s (5 ms resolution), 1 to 1000 s (setting of top three digits) Accuracy: ±1% Free run, triggered Wide IF video, video, external (TTL), external (±10 V), line Pre-trigger (displays waveform before trigger occurrence point) Setting range: −time span to 0 s Resolution: time span/500 or 100 ns, whichever is larger Post-trigger Setting range: 0 μs to 65.5 ms Resolution: 100 ns (sweep time: ≤4.9 ms), 1 μs (sweep time: ≥5 ms) Selectable between 501 and 1001 NORMAL, POSITIVE PEAK, NEGATIVE PEAK, SAMPLE, AVERAGE	

## **MS2687B Specifications**

Single search: AUTO TUNE, PEAK → CF, PEAK → REF, SCROLL Zone marker: NORTMAL, DELTA Marker functions: MARKER → CF, MARKER → REF, MARKER → CF STEP SIZE, Δ Marker functions: MARKER → CF, MARKER → SPAN, ZONE → SPAN Peak search: PEAK, NEXT PEAK, MIN DIR, NEXT DIP Multi marker: 10 mark, (righest 10, harmomics, manually set) Noise power: dBm/Hz, dBm/CH, dBpl/V/FIZ CN: dBoHz, dBc/CH, dBpl/V/FIZ CN: dBoHz, dBc/CH, dBs/JV/FIZ CN: dBc/Hz, dBc/CH, dBc			
Marker functions: MARKER → CF, MARKER → CF STEP SiZE, AMARKER → CF STEP SIZE			Single search: AUTO TUNE, PEAK $\rightarrow$ CF, PEAK $\rightarrow$ REF, SCROLL
Marker   Peak search: PEAK, NEXT PEAK MIN (DIR NEXT DIP Multit marker: 10 max, (highest 10, harmonics, manually set)			Zone marker: NORMAL, DELTA
Peak search: ERAK, NEXT PEAK, MIN DIP, NEXT DIP Multi marker: 10 max. (highest 10, harmonics, manually set) Noise power: dibrity, dism'CH, dight/VH, dip/VH2 CN: dBoHz, dBoCH Noise power: dibrity, dibrity, dibrity, dip/VH2 CN: dBoHz, dBoCH Neasure  Measure  Measure  REF: total power/defence levelevin-band level method Display, channel designate display: (3 channel s x2), graphic display Average power within burst signia: evarage power in the designated range of time domain waveform Template comparison (at time sweep): upper limit x2, lower limit x2  Correction  Frequency response can be corrected arbitrarily up to 150 points Display Color TFH-LCD, V6A 17 cm (6.5 type) Color Number of colors: 4096, RGB, each 16-scale setable Intensity Setable in 5 steps (display off included) Contents Save/recall Save sea not recalls setting conditions and waveform data to internal memory (max. 12) or memory card Display ddata can be hard-toppied with the printer via parallel interface (PCL level 3 or lover, or ESCP)-438, 184 compatible models only) Meats IEEE488.2. Controllable with atternal controller (except for power switch) Interface function: SNI, 4AH, T. G. L. 487, R. R. H. P.P.O. (D. T), TI, Co. E2  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Baud rate: 120, 240, 480, 980, 175, R. R. R. H. P.P.O. (D. T), TI, Co. E2  Controllable with external controller (except for power switch) Interface function: SNR ≥ 23 Typical (R. R.T. ≥ 10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) II output: ENIX connector: (SQ n. ominal value, II produce) and the produce of the display scale upper edge. 50 Ω terminated) Broadband IF output: RNC connector, 50 Ω nominal value, 66/1106 MHz Level - 10 dB Typical (frequency 50 MHz, display scale upper edge. 50 Ω terminated) Video output: Output analog RGB, D-sub 15-pin connector (jack) II produce output: CNC connector, 50 Ω nominal value, 66/1106 MHz Level - 10 dB Typical (frequency 50 MHz, display scale upper edge. 50 Ω terminated) Sev		NA - alora	Marker functions: MARKER $\rightarrow$ CF, MARKER $\rightarrow$ REF, MARKER $\rightarrow$ CF STEP SIZE,
Peak search: PEAK, NEXT PEAK, MIN DIP, NEXT DIP Multi marker: 10 max, (highest 10, harmonics, manually set) Noise power: dBm/Hz, dBm/CH, dByW/Hz C/N; dBo/Hz, dBo/CH Cocupied bandwidth: power N/s method, X-dB down method Adjacent channel leakage power REF: total power/reference level/in-band level method Displays: channel designate designate designate display; (3 channels x 2), graphic display Average power within burst signal: average power in the designated drange of time domain waveform Template companison (at time sweep): upper limit x 2, lower limit x 2 MASK (at frequency sweep): upper limit x 2, lower limit x 2 MASK (at frequency sweep): upper limit x 2, lower limit x 2 Mask (at frequency sweep): upper limit x		Marker	$\Delta$ MARKER $\rightarrow$ SPAN. ZONE $\rightarrow$ SPAN
Multi marker: 10 max. highest 10, harmonics, manually set)			·
Noise power: dBm/Hz, dBm/CH, dByW/HZ   C/N-t Bc/Hz, dBc/CH   Corupied bandwidth: power N/s method, X-dB down method   Adjacent channel leakage power   REF-total power/reference level/in-band level method   Display: channel designate display (3 channels x 2), graphic display   Average power within burst signat: average power in the designated grape   Display: channels x 2), graphic display   Average power within burst signat: average power in the designated grape of time domain waveform   Template companison (at time severe): upper limit x 2, lower limit x 2   MASK (at frequency severe): upper limit x 2, lower limit x 2   MASK (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency severe): upper limit x 2, lower limit x 2   Mask (at frequency 5   Mask (at frequ			
Controllable with the service of the controllable setting conditions and waveform data to internal memory (max. 12) or memory card Display controllable setting conditions and waveform data to internal memory (max. 12) or memory card Display controllable setting conditions and waveform data to internal memory (max. 12) or me	1,0		
Measure  REF: total power/reference level(in-band level method Display, channel designated display; (2 channels x 2), graphic display Average power within burst signal: average power in the designated range of time domain waveform Tomplate comparison (at time sweep); upper limit x 2, lower limit x 2  MASK (at frequency sweep); upper limit x 2, lower limit x 2  Correction  Frequency response can be corrected arbitrarily up to 150 points Color TFILOD, VGA 17 cm (5 type)  Color TFILOD, VGA 17 cm (5 type)  Color Intensity Setable in 5 steps (display of included) Contents Save/recall  Save/recall Saves and recalls setting condition, menu, title Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Piccl. Level 3 or lower, or ESCP/183, 384 compatible models only)  Meets IEEE488 2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T5, L4, SR1, R41, PP,D, DC1, DT1, C0, E2 Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DT58, ERROR, PE)  PC card interface  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4900, 9900, 192.k, 38.4 k, 56 k, 115 kbps Input connector: K-J, 50 Ω nominal value, Impedance: VSWR -2.3 Typical ((FM ATT ≥10 dB) Video output; outputs analog R6B, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60/10.69 MHz, Level: 1-0 to 50 y -0.01 Y pola (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 10 to 9.01 V = 10/10 V = 10	l ä l		
Measure  REF: total power/reference level(in-band level method Display, channel designated display; (2 channels x 2), graphic display Average power within burst signal: average power in the designated range of time domain waveform Tomplate comparison (at time sweep); upper limit x 2, lower limit x 2  MASK (at frequency sweep); upper limit x 2, lower limit x 2  Correction  Frequency response can be corrected arbitrarily up to 150 points Color TFILOD, VGA 17 cm (5 type)  Color TFILOD, VGA 17 cm (5 type)  Color Intensity Setable in 5 steps (display of included) Contents Save/recall  Save/recall Saves and recalls setting condition, menu, title Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Piccl. Level 3 or lower, or ESCP/183, 384 compatible models only)  Meets IEEE488 2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T5, L4, SR1, R41, PP,D, DC1, DT1, C0, E2 Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DT58, ERROR, PE)  PC card interface  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4900, 9900, 192.k, 38.4 k, 56 k, 115 kbps Input connector: K-J, 50 Ω nominal value, Impedance: VSWR -2.3 Typical ((FM ATT ≥10 dB) Video output; outputs analog R6B, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60/10.69 MHz, Level: 1-0 to 50 y -0.01 Y pola (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 10 to 9.01 V = 10/10 V = 10	ţ <u>i</u>		
Measure  REF: total power/reference level(in-band level method Display, channel designated display; (2 channels x 2), graphic display Average power within burst signal: average power in the designated range of time domain waveform Tomplate comparison (at time sweep); upper limit x 2, lower limit x 2  MASK (at frequency sweep); upper limit x 2, lower limit x 2  Correction  Frequency response can be corrected arbitrarily up to 150 points Color TFILOD, VGA 17 cm (5 type)  Color TFILOD, VGA 17 cm (5 type)  Color Intensity Setable in 5 steps (display of included) Contents Save/recall  Save/recall Saves and recalls setting condition, menu, title Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Displayed data can be hard-copied with the printer via parallel interface Piccl. Level 3 or lower, or ESCP/183, 384 compatible models only)  Meets IEEE488 2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T5, L4, SR1, R41, PP,D, DC1, DT1, C0, E2 Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DT58, ERROR, PE)  PC card interface  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4900, 9900, 192.k, 38.4 k, 56 k, 115 kbps Input connector: K-J, 50 Ω nominal value, Impedance: VSWR -2.3 Typical ((FM ATT ≥10 dB) Video output; outputs analog R6B, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60/10.69 MHz, Level: 1-0 to 50 y -0.01 Y pola (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 10 to 9.01 V = 10/10 V = 10	<u>:</u>		
Average power within burst signal; average power in the designated range of time domain waveform Template comparison (at time sweep): upper limit x 2, lower limit x 2.  Average power within burst signal; average power in the designated range of time domain waveform Template comparison (at time sweep): upper limit x 2, lower limit x 2.  Correction Firequency response can be corrected arbitrarily up to 150 points  Color Number of colors; 4098, RGB, seach 16-scale settable  Intensity Settable in 5 steps (display) off included)  Contents Scale, waveform data, setting conditions, men, title  Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card bisplayed data can be hard-coled with the printer via parallel interface  (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)  Hard copy Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card bisplayed data can be hard-coled with the printer via parallel interface  (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)  Interface Unclion: SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, CO, E2  GPIB Metis IEEE AB2. Controllable with external controller (except for power switch)  Interface Unclion: SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, CO, E2  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack)  Data line exclusive for output 8, Control line: 4 (BUSY, DTSB, ERROR, PE)  RS-232C Controllable with external controller (except for power switch)  Baud rate; 1200, 2400, 4800, 9800, 192 k, 33 4 k, 56 k, 115 kbps  Input connector: K-J, 50 μ nominal value, 6/10 c8 MHz,  Impedance: VSWR -2.3 Typical (RF ATT ±0 dB)  Video output: outputs analog RGB, D-sub 15-pin connector (jack)  If output: BNC Connector, 50 μ nominal value, 6/10 c80 MHz,  Impedance: VSWR -2.3 Typical (RF ATT ±0 dB)  Video output (Y): BNC connector, 50 μ nominal value, 6/10 c80 MHz,  Gain: 0 dB mypical (50 MHz, RF ATT ±0 dB, for RF input level)  Video outpu	"	Measure	
Average power within burst signal: average power in the designated range of time domain waveform Template companismo (at time sweep): upper limit x 2, lower limit x 2.  MASK (af frequency sweep): upper limit x 2, lower limit x 2.  Prequency response can be corrected arbitrarily up to 150 points  Color TFFLCD, VGA 17 cm (6.5 lype)  Color Number of colors: 4096, RGB, each 16-scale settable  Intensity Settable in 5 steps (display of included)  Contents Scale, waveform data, setting condition, menu, title  Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface  PCC level 3 or lower, or ESC/P-188, 384 compatible models only)  Meets IEEE488.2. Controllable with external controller (except for power switch) Interface functions: SH1, AH, 17, E4, SR1, RL1, PPD, DC1, DT1, CG, E2  Parallel interface  PC card interface  PC card interface  RS-232C  Controllable with external controller (except for power switch)  Baud rate: 1200, 2400, 4800, 9800, 19.2 k, 38.4 va, 58.4 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, impedance: VSWR -2.3 Typical (RFATT ≥10 dB)  Video output: outputs analog RGB, b-sub 15-pin connector (jack)  Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Riybical (50 MHz, RT T1: 0 dB)  Video output: Output sand part (spellency 50 MHz, 16 RF Fat produce)  Input/output connector  Input/output connector  Input/output connector  Frequency: 10 MHz = 10 Hz, 13 MHz = 13 Hz, level: 10 dB (spellency)  Video output (Y): BNC connector, Level: 10 to V ± 0.1 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 to V ± 0.1 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 to V ± 0.1 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 to V ± 0.0 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 DF ± 0.0 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 DF ± 0.0 V (20 DB (Frequency) on MHz, 16 RF Fat produce), 10 DF ± 0.0 V (20 DB (Frequency), 10			
Template comparison (at time sweep): upper limit x 2 (lower limit x 2 MASK (at requency sweep): upper limit x 2, lower limit x 2 (more limit x 2 decoration)  Correction Frequency response can be corrected arbitrarily up to 150 points  Color Number of colors: 4096, RSB, each 16-scale settable  Intensity Settable in 5 steps (display off included)  Contents Scale, waveform data, setting condition, menu, title  Saverecall Saves and recalls setting condition, menu, title  Saverecall Saves and recalls setting condition sand waveform data to internal memory (max. 12) or memory card bisplayed data can be hard-copied with the printer via parallel interface (PCL level 3 or lower, or ESCP-J83, J84 compatible models only)  Mets IEEE488.2 Controllable with external controller (except for power switch)  Interface function: SH1, AH1, T6, L4, SR1, RL1, PPD, DC1, DT1, C0, E2  Centronics-compatible, outputs print data to printer. D-sub 25 pin connector (jack)  Data line exclusive for output: 8. Control line: 4 (BUSY, DTSB, ERROR, PE)  Parallel interface  PC card interface  Controllable with external controller (except for power switch)  Baud rate: 1200, 2400, 4800, 9800, 192. k., 36. kt, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value,  Impedance: VSMP x-2.3 Typical (FR ATT 10 dB)  Video output: Outputs analog RGB, D-sub 15-pin connector (jack)  IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz,  Level: -10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated)  Broadband IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz,  Cain: 0 dB Typical (S0 MHz, RF ATT: 0 dB), for RF input level)  Video output (V): BNC connector,  Level: 10 to 0.5 v ± 0.1 V Typical (linear scale),  (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,  Level: 10 to 0.5 v ± 0.1 V Typical (linear scale),  (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,  Level: 10 to 0.5 v ± 0.1 V Typical			
MASK (at frequency sweep): upper limit x 2, lower limit x 2   Correction   Frequency response can be corrected arbitrarily up to 150 points			
Correction   Frequency response can be corrected arbitrarily up to 150 points			
Color TFT-LCD, VGA 17 cm (6.5 type)			MASK (at frequency sweep): upper limit x 2, lower limit x 2
Color Number of colors: 4096, RGB, each 16-scale settable Intensity Settable in 5 steps (display off included)  Contents Scale, waveform data, setting condition, menu, title Save/recall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)  Meats IEEE488.2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T6, L4, SR1, R11, PP0, DC1, DT1, C0, E2  Parallel interface  PC card interface  PC card interface  Controllable with external controller (except for power switch) Data line exclusive for output: 8, Control line: 4 (BUSY, DTSB, ERROR, PE)  Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type 1 or Open or Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector (3.3/5 V), C		Correction	Frequency response can be corrected arbitrarily up to 150 points
Intensity   Settable in 5 steps (display off included)		Display	Color TFT-LCD, VGA 17 cm (6.5 type)
Scale, waveform data, setting condition, menu, title Saverrecall Saves and recalls setting conditions and waveform data to internal memory (max. 12) or memory card Displayed data can be hard-copied with the printer via parallel interface (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only) Meets IEEE488.2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T6, L4, SR1, R1., PPO, DC1, DT1, C0, E2 Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DTSB, ERROR, PE)  PC card interface  PC card interface  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 192, 45, 38, 4 k, 56 k, 115 kbps  Input connector: Type I of Type II of PC card  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 192, 45, 38, 4 k, 56 k, 115 kbps  Input connector: V, J 50 Ω nominal value, Impedance: VSWR ≤ 2.3 Typical (RF ATT ≥10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60:09/66 MHz, Gain: 0 dB Typical (S0 MHz, gR ATT) ≥10 dB) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 MHz, gR ATT) ≥10 dB) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 MHz, gR ATT) ≥10 dB) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 MHz, gR ATT) ≥10 dB) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 DMz, gr ATT) ≥10 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 DQ DMz, gr ATT) ≥10 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 DQ DMz, gr ATT) ≥10 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60:09/66 MHz Gain: 0 dB Typical (S0 DQ DMz,		Color	Number of colors: 4096, RGB, each 16-scale settable
Save/secall  Save/s and recalls setting conditions and waveform data to internal memory (max. 12) or memory card  Hard copy  Displayed data can be hard-copied with the printer via parallel interface  (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)  Meets IEEE488.2. Controllable with external controller (except for power switch) Interface hunction: SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, C0, E2  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (gack) Data line exclusive for outputs: 8, Control line: 4 (BUSY, DT5B, ERROR, PE)  Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type II of PC card  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 to nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB)  Video output: outputs analog R6B, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60 60/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output: ONE Connector (10 such a connector) Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, 50 Ω nominal value, 60 60/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, Level: 2 to 5 V (p-1) (200 Ω terminated)  Suffered Output: BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  Sweep Output (X): BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  Sweep Output (X): BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  100 to 120/200 to 240 Vac (-15%/+10%, 250 V max., wide range inp		Intensity	Settable in 5 steps (display off included)
Save/secall  Save/s and recalls setting conditions and waveform data to internal memory (max. 12) or memory card  Hard copy  Displayed data can be hard-copied with the printer via parallel interface  (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)  Meets IEEE488.2. Controllable with external controller (except for power switch) Interface hunction: SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, C0, E2  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (gack) Data line exclusive for outputs: 8, Control line: 4 (BUSY, DT5B, ERROR, PE)  Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type 1 or Type II of PC card  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 to nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB)  Video output: outputs analog R6B, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60 60/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output: ONE Connector (10 such a connector) Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, 50 Ω nominal value, 60 60/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, Level: 2 to 5 V (p-1) (200 Ω terminated)  Suffered Output: BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  Sweep Output (X): BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  Sweep Output (X): BNC connector, Level: 1 to 10 V ± 0.1 V (2100 kΩ terminated)  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  100 to 120/200 to 240 Vac (-15%/+10%, 250 V max., wide range inp		Contents	Scale, waveform data, setting condition, menu, title
Hard copy    Displayed data can be hard-copied with the printer via parallel interface (PCL level 3 or lower, or ESC/P-J83, J84 compatible models only)   GPIB   Meets EEE488.2. Controllable with external controller (except for power switch) Interface function: SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, C0, E2     Centrolisc-compatible, outputps print data to printer, Desub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DTSB, ERROR, PE)   Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type I or Type I of PC card   RS-232C   Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9800, 19 ≥ k, 38.4 k, 56 k, 115 kbps     Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB) Video output couptus analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: -10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector		Save/recall	
Hard copy   PCL [evel 3 or lower, or ESCIP_J83, J84 compatible models only)			
Parallel interface function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2	\ <sub>\(\rho\)</sub>	Hard copy	, , ,
Parallel interface  Parallel interface  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DTSB, ERROR, PE)  Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type I or Type II of PC card  RS-232C  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 192 k, 384 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB) Video output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (Irequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz Gain: 0 dB Typical (50 MHz, RF ATT : 0 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT : 0 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT : 0 dB, for RF input level) Video output (Y): BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (100 Mz, RF ATT : 0 dB, for RF input level) Video output (Y): BNC connector, 1 devel of 0 0 0 4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 0 to 0 √ ± 0.1 V (≥100 Ω terminated) Sweep Output (X): BNC connector, Level: 10 to 10 V ± 0.1 V (≥100 Ω termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated)  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  47.5 to 63 Hz, ≤400 V ac (−15%/+10%, ≥50 V max., wide range input) 47.5 to 63 Hz, ≤4	Jer		· · · · · · · · · · · · · · · · · · ·
Parallel interface  Centronics-compatible, outputs print data to printer, D-sub 25 pin connector (jack) Data line exclusive for output: 8, Control line: 4 (BUSY, DTSB, ERROR, PE)  Saves and recalls setting condition and waveform data, Memory card accessible (3:3/5 V), Connector: Type I or Type II of PC card  RS-23CC  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB) Video output: eviptus analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector  Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,  Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector,  Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector,  Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector,  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  47.5 to 63 Hz, ≤400 V for the details; refer to the last page.  Dimensions, weight  70 to +50°C, RH ≤85%  (no condensation allowed)  Storage temperature range  EMC  EMC  EMC  EMC  EMC  EMC  EMC  EM	늄	GPIB	
Data line exclusive for output: 8. Control line: 4 (BUSY, DTSB, ERROR, PE)  PC card interface  RS-232C  Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V).  Connector: Type I of Type II of PC card  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: V-J, 5 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector, Level: 10 to 10 V ± 0.1 V ⟨100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (2): BNC connector, Level: 1TL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, ±10 mA max, each. Trig/Gate input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  47.5 to 53 Hz, ≤400 VA  Ambient temperature and O' to +50°C, RH ≤85% (no condensation allowed)  Storage temperature range  EMC  EMC  EMC  EMC  EMC  EMC  Bat Internal set in the details, refer to the last page.  EMC  EMC  EMC  EMC  EMC  EMC  EMC  EM	-		
Saves and recalls setting condition and waveform data, Memory card accessible (3.3/5 V), Connector: Type I or Type II of PC card Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External mixer Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 17 MHz ± 13 Hz, le		Parallel interface	
Connector: Type I or Type II of PC card  Controllable with external controller (except for power switch)  Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB)  Video output: outputs analog R68, D-sub 15-pin connector (jack)  IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated)  Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector, 10 close output level; 0 to 0.5 v ± 0.1 v Typical (log scale), 0 to 0.4 v ± 0.1 v Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector, Level: 2 to 5 v (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector, Level: 2 to 5 v (p-p) (200 Ω terminated)  Sweep Status Output (Z): BNC connector, Level: T1 (low level at sweep)  Sweep Status Output (Z): BNC connector, Level: T1 (low level at sweep)  Probe source: 4-pole connector, +12 v, −12 v, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, level: ±10 v (0.1 v resolution), or TTL level  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 to 120/200 to 240 Vac (−15%/+10%, 250 v max., wide range input)  47.5 to 63 Hz, ≤400 vA  Ambient temperature and humidity  Cno condensation allowed)  Cno condensation allowed)  FN61020-3-2: 2000 (Class A)  EN61326: 1997/A2: 2001 (Class A)  EN61326: 1997/A2: 2001 (Class A)			
RS-232C  Controllable with external controller (except for power switch) Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps  Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≤2.3 Typical (RR ATT ≥10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (2): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, revel: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 15 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, For the details, refer to the last page.  Oimensions, weight  7 to 450 C, RH 385%  (no condensation allowed)  10 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and  Ambient temperature range  1		PC card interface	
RS-232C   Baud rate: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 56 k, 115 kbps			
Input connector: K-J, 50 Ω nominal value, Impedance: VSWR ≥.3 Typical (RF ATT ≥10 dB) Video output: outputs analog RGB, D-sub 15-pin connector (jack) IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz, ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz, ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 15 MHz, ±		RS-232C	
Impedance: VSWR ≤2.3 Typical (RF ATT ≥10 dB)  Video output: outputs analog RGB, D-sub 15-pin connector (jack)  IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz,  Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated)  Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector  Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale),  (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,  Level: 2 to 5 V (ρ-p) (200 Ω terminated)  Sweep Output (X): BNC connector,  Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector,  Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level  External reference input: BNC connector,  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  On to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and  O' to +50°C, RH ≤85%  humidity  Storage temperature range  EMC  EN61326: 1997/A2: 2001 (Class A)			·
Video output: outputs analog RGB, D-sub 15-pin connector (jack)  IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz,  Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated)  Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz  Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)  Video output (Y): BNC connector  Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale),  (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,  Level: 2 to 5 V (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector,  Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector,  Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector,  External reference input: BNC connector,  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and  o' to +50°C, RH ≤85%  (no condensation allowed)  Storage temperature range  EMC  EN61326: 1997/A2: 2001 (Class A)  EN61326: 1997/A2: 2001 (Class A)  EN61326: 1997/A2: 2001 (Class A)			
IF output: BNC connector, 50 Ω nominal value, 66/10.69 MHz, Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 ∨ ± 0.1 ∨ Typical (log scale), 0 to 0.4 ∨ ± 0.1 ∨ Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 ∨ (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 ∨ ± 0.1 ∨ (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, 1+2 ∨ −12 ∨, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1evel: ±10 ∨ (0.1 ∨ resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Dimensions, weight 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value) Power  Ambient temperature and humidity (no condensation allowed) Storage temperature range -20' to +60'C, RH ≤85% (no condensation allowed) EMC EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Class A)			
Level: −10 dBm Typical, (frequency 50 MHz, display scale upper edge, 50 Ω terminated) Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, 1-2 V, ±10% each, 110			
Broadband IF output: BNC connector, 50 Ω nominal value, 60.69/66 MHz Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level) Video output (Y): BNC connector Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated) Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated) Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep) Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency: 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range  -20' to +60'C EN61326: 1997/A2: 2001 (Class A) EMC EMC EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Class A)			
Gain: 0 dB Typical (50 MHz, RF ATT: 0 dB, for RF input level)   Video output (Y): BNC connector   Level: 0 to $0.5 \text{ V} \pm 0.1 \text{ V}$ Typical (log scale), 0 to $0.4 \text{ V} \pm 0.1 \text{ V}$ Typical (linear scale),   (50 MHz, from upper edge to lower edge at 10 dB/div or $10\%$ /div, $75 \Omega$ terminated)   Buffered Output: BNC connector,   Level: 2 to $5 \text{ V}$ (p-p) ( $200 \Omega$ terminated)   Sweep Output (X): BNC connector,   Level: 0 to $10 \text{ V} \pm 0.1 \text{ V}$ ( $\geq 100 \text{ k}\Omega$ termination, from the left edge to the right edge of the display scale single band sweep)   Sweep Status Output (Z): BNC connector,   Level: TTL (low level at sweep)   Probe source: 4-pole connector, $\pm 12 \text{ V}$ , $\pm 10\%$ each, $\pm 10 \text{ M}$ max. each.   Trig/Gate input: BNC connector, level: $\pm 10 \text{ V}$ (0.1 V resolution), or TTL level   External reference input: BNC connector,   Frequency: $\pm 10 \text{ MHz} \pm 10 \text{ Hz}$ , $\pm 10 \text{ Mz}$ ,			
Video output (Y): BNC connector         Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)         Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated)         Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)         Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep)         Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm         External mixer       Frequency range: 18 to 110 GHz, For the details, refer to the last page.         Dimensions, weight       320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)         Power       47.5 to 63 Hz, ≤400 VA         Ambient temperature and humidity       (no +50°C, RH ≤85% (no condensation allowed)         Storage temperature range       -20° to +60°C         EMC       EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Annex A)			
Level: 0 to 0.5 V ± 0.1 V Typical (log scale), 0 to 0.4 V ± 0.1 V Typical (linear scale), (50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector, Level: 2 to 5 V (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Dimensions, weight  Power  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range  EMC  EMC  EMC  EMC  EN61326: 1997/A2: 2001 (Class A) EN6100-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)			
(50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)  Buffered Output: BNC connector,     Level: 2 to 5 V (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector,     Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector,     Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each.     Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level     External reference input: BNC connector,     Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  External mixer  Dimensions, weight  Power  100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity  (no condensation allowed)  Storage temperature range  EMC  EMC  EMC  EN61326: 1997/A2: 2001 (Class A)  EN61326: 1997/A2: 2001 (Class A)  EN61326: 1997/A2: 2001 (Annex A)			Video output (Y): BNC connector
Buffered Output: BNC connector,   Level: 2 to 5 V (p-p) (200 Ω terminated)			Level: 0 to 0.5 V $\pm$ 0.1 V Typical (log scale), 0 to 0.4 V $\pm$ 0.1 V Typical (linear scale),
Buffered Output: BNC connector,   Level: 2 to 5 V (p-p) (200 Ω terminated)			(50 MHz, from upper edge to lower edge at 10 dB/div or 10%/div, 75 Ω terminated)
Level: 2 to 5 V (p-p) (200 Ω terminated)  Sweep Output (X): BNC connector,  Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector,  Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each.  Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level  External reference input: BNC connector,  Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and  0° to +50°C, RH ≤85%  (no condensation allowed)  Storage temperature range  -20° to +60°C  EN61326: 1997/A2: 2001 (Class A)  EMC  EN61326: 1997/A2: 2001 (Class A)  EN61000-3-2: 2000 (Class A)	Ing	out/output connector	
Sweep Output (X): BNC connector, Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity  Storage temperature range  -20" to +60"C  EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Class A) EN61326: 1997/A2: 2001 (Annex A)	'	•	Level: 2 to 5 V (p-p) (200 $\Omega$ terminated)
Level: 0 to 10 V ± 0.1 V (≥100 kΩ termination, from the left edge to the right edge of the display scale single band sweep)  Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  47.5 to 63 Hz, ≤400 VA  Ambient temperature and 0° to +50°C, RH ≤85% (no condensation allowed)  Storage temperature range  -20° to +60°C  EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)			
single band sweep)  Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep)  Probe source: 4-pole connector, +12 V, -12 V, $\pm$ 10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: $\pm$ 10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz $\pm$ 10 Hz, 13 MHz $\pm$ 13 Hz, level: $\geq$ 0 dBm  External mixer  Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight  320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), $\leq$ 16 kg (nominal value)  Power  47.5 to 63 Hz, $\leq$ 400 VA  Ambient temperature and humidity  (no condensation allowed)  Storage temperature range  -20° to +60°C  EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)			
Sweep Status Output (Z): BNC connector, Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range -20° to +60°C  EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)			,
Level: TTL (low level at sweep) Probe source: 4-pole connector, +12 V, −12 V, ±10% each, 110 mA max. each. Trig/Gate input: BNC connector, level: ±10 V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power  100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input) 47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range −20° to +60°C  EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)	1		
Probe source: 4-pole connector, $+12$ V, $-12$ V, $\pm 10\%$ each, $\pm 10$ mA max. each. Trig/Gate input: BNC connector, level: $\pm 10$ V (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: $\pm 10$ Hz,			
Trig/Gate input: BNC connector, level: $\pm 10 \text{ V}$ (0.1 V resolution), or TTL level External reference input: BNC connector, Frequency: $10 \text{ MHz} \pm 10 \text{ Hz}$ , $13 \text{ MHz} \pm 13 \text{ Hz}$ , level: $\geq 0 \text{ dBm}$ External mixer Frequency range: $18 \text{ to } 110 \text{ GHz}$ , For the details, refer to the last page.  Dimensions, weight $320 \text{ (W)} \times 177 \text{ (H)} \times 411 \text{ (D)} \text{ mm}$ (handle, leg, front cover, fan cover excluded), $\leq 16 \text{ kg}$ (nominal value)  Power $47.5 \text{ to } 63 \text{ Hz}$ , $\leq 400 \text{ VA}$ Ambient temperature and humidity $(no \text{ condensation allowed})$ Storage temperature range $-20^{\circ} \text{ to } +60^{\circ} \text{ C}$ EN61326: $1997/\text{A2}$ : $2001 \text{ (Class A)}$ EMC $EN61000-3-2: 2000 \text{ (Class A)}$ EN61326: $1997/\text{A2}$ : $2001 \text{ (Annex A)}$			
External reference input: BNC connector, Frequency: 10 MHz $\pm$ 10 Hz, 13 MHz $\pm$ 13 Hz, level: ≥0 dBm  External mixer Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power 100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range −20° to +60°C  EN61326: 1997/A2: 2001 (Class A)  EN61000-3-2: 2000 (Class A)  EN61326: 1997/A2: 2001 (Annex A)			
Frequency: 10 MHz ± 10 Hz, 13 MHz ± 13 Hz, level: ≥0 dBm  External mixer Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight 320 (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), ≤16 kg (nominal value)  Power 100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input)  47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity (no condensation allowed)  Storage temperature range −20° to +60°C  EN61326: 1997/A2: 2001 (Class A)  EN61000-3-2: 2000 (Class A)  EN61326: 1997/A2: 2001 (Annex A)			
External mixer Frequency range: 18 to 110 GHz, For the details, refer to the last page.  Dimensions, weight $320 \text{ (W)} \times 177 \text{ (H)} \times 411 \text{ (D)} \text{ mm (handle, leg, front cover, fan cover excluded), } \le 16 \text{ kg (nominal value)}$ Power $100 \text{ to } 120/200 \text{ to } 240 \text{ Vac } (-15\%/+10\%, 250 \text{ V max., wide range input)}$ 47.5 to 63 Hz, $\le 400 \text{ VA}$ Ambient temperature and humidity $(0) \text{ to } +50^{\circ}\text{C} \text{ RH} \le 85\%$ $(0) \text{ to } -50^{\circ}\text{C} \text{ RH} \le 85\%$ $(0) \text{ to } +60^{\circ}\text{C} \text{ EN61326: } 1997/A2: 2001 \text{ (Class A)}$ EMC $(0) \text{ EN61000-3-2: } 2000 \text{ (Class A)}$ $(0) \text{ EN61326: } 1997/A2: 2001 \text{ (Annex A)}$			,
Dimensions, weight $320 \text{ (W) x 177 (H) x 411 (D) mm (handle, leg, front cover, fan cover excluded), } \le 16 \text{ kg (nominal value)}$ Power $100 \text{ to } 120/200 \text{ to } 240 \text{ Vac } (-15\%/+10\%, 250 \text{ V max., wide range input)}$ $47.5 \text{ to } 63 \text{ Hz, } \le 400 \text{ VA}$ Ambient temperature and humidity $(\text{no condensation allowed})$ Storage temperature range $-20^{\circ} \text{ to } +60^{\circ} \text{C}$ EN61326: 1997/A2: 2001 (Class A)  EN61000-3-2: 2000 (Class A)  EN61326: 1997/A2: 2001 (Annex A)	<u> </u>	tana at as Si	
Power 100 to 120/200 to 240 Vac (−15%/+10%, 250 V max., wide range input) 47.5 to 63 Hz, ≤400 VA  Ambient temperature and humidity 0° to +50°C, RH ≤85% (no condensation allowed)  Storage temperature range −20° to +60°C  EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)			, , ,
Power       47.5 to 63 Hz, ≤400 VA         Ambient temperature and humidity       0° to +50°C, RH ≤85% (no condensation allowed)         Storage temperature range       -20° to +60°C         EN61326: 1997/A2: 2001 (Class A)         EMC       EN61000-3-2: 2000 (Class A)         EN61326: 1997/A2: 2001 (Annex A)			, , , , , ,
Ambient temperature and humidity       0° to +50°C, RH ≤85% (no condensation allowed)         Storage temperature range       -20° to +60°C         EN61326: 1997/A2: 2001 (Class A)         EMC       EN61000-3-2: 2000 (Class A)         EN61326: 1997/A2: 2001 (Annex A)			,
humidity         (no condensation allowed)           Storage temperature range         -20° to +60°C           EN61326: 1997/A2: 2001 (Class A)           EMC         EN61000-3-2: 2000 (Class A)           EN61326: 1997/A2: 2001 (Annex A)			·
Storage temperature range		•	
EN61326: 1997/A2: 2001 (Class A) EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)	_		
EMC EN61000-3-2: 2000 (Class A) EN61326: 1997/A2: 2001 (Annex A)	Sto	orage temperature range	
EN61326: 1997/A2: 2001 (Annex A)	1		,
	EN	/IC	
LVD EN61010-1: 2001 (Pollution Degree 2)			
	LVD		EN61010-1: 2001 (Pollution Degree 2)

### **Options**

#### ■ Option 01: Precision frequency reference oscillator

Frequency	10 MHz
Start-up characteristics	≤5 x 10 <sup>-8</sup> (≤7 min. 25°C, Typical)
Aging rate	≤±5 x 10 <sup>-10</sup> /day (With the frequency at 24 hours after the power is turned on referenced)
Temperature characteristics	≤±5 x 10⁻¹0 (With the frequency at 0 to 50°C and 25°C referenced)

#### ■ Option 02: Narrow resolution bandwidths (FFT)

	Setting range: 1 Hz to 1 kHz (1, 3 sequence)	
	Bandwidth accuracy: ±10% (RBW = 30, 300 Hz)	
Resolution bandwidth	±10% Typical (RBW = 1, 3, 10, 100, 1 kHz)	
	RBW selectivity (60 dB: 3 dB): ≤5:1	
	RBW switching uncertainty: ±0.5 dB	
Span setting	Minimum setting span: 100 Hz	
	When RBW is 1 Hz, RF ATT is 0 dB	
	≤-146.5 dBm + 1.5f [GHz] dB Typical (1 MHz to 2.5 GHz, band 0)	
Average noise level display	≤-142.5 dBm + 1.5f [GHz] dB Typical (2.5 to 3.2 GHz, band 0)	
Average noise level display	≤–137.5 dBm Typical (3.15 to 7.9 GHz, band 1)	
	≤–135.5 dBm Typical (7.8 to 15.3 GHz, band 2)	
	≤–125.5 dBm Typical (15.2 to 30 GHz, band 4)	

#### ■ Option 04: Digital resolution bandwidth

	Setting range: 10 Hz to 1 MHz (1, 3 sequ	uence)	
	Bandwidth accuracy: ±10% (RBW ≥100	Hz)	
	±10% Typical (RB)	<i>N</i> ≤30 Hz)	
Resolution bandwidth	Bandwidth selectivity (60 dB: 3 dB):		
	≤5:1 (RBW ≥100 H	≤5:1 (RBW ≥100 Hz)	
	≤5:1 Typical (RBW	≤5:1 Typical (RBW ≤30 Hz)	
	RBW switching uncertainty: ±0.5 dB		
Detection mode	NORMAL, POSITIVE PEAK, NEGATIVE	PEAK, SAMPLE, RMS	
Detection mode	RMS: displays root-mean-square value of	of average power between sample points	
	When RBW is 10 Hz, RF ATT is 0 dB		
	≤–136.5 dBm + f [GHz] dB Typical	(1 MHz to 2.5 GHz, band 0)	
Average noise level	≤–132.5 dBm + f [GHz] dB Typical	(2.5 to 3.2 GHz, band 0)	
Average hoise level	≤–127.5 dBm Typical	(3.15 to 7.9 GHz, band 1)	
	≤–125.5 dBm Typical	(7.8 to 15.3 GHz, band 2)	
	≤–115.5 dBm Typical	(15.2 to 30 GHz, band 4)	

#### ■ Option 05: Rubidium reference oscillator

Frequency	10 MHz
Start-up characteristics	±1 x 10 <sup>-9</sup> /7 min. (with frequency one hour after the power is turned on referenced)
Aging rate	±1 x 10 <sup>-10</sup> /month (with frequency one hour after the power is turned on referenced)
Temperature characteristics	±1 x 10 <sup>-9</sup> (with frequency at 0 to 45°C and 25°C referenced)
Accessories	J1066 coaxial code 0.15 m (BNC211-LP4)

#### ■ Option 09: Ethernet interface

Function	Control with external controller (except for power switch)	
Connector	10BASE-T	

#### ■ Option 18: I/Q unbalanced input

Connector	BNC	
Impedance Selectable between 1 M $\Omega$ (parallel capacity <100 pF) and 50 $\Omega$		
Input lovel reage	Differential voltage range: 0.1 to 1 Vp-p (at input terminal)	
Input level range	Changeable between DC connection and AC connection	

### **Options**

#### ■ Option 21, 41: Power meter function

Frequency range	100 kHz to 32 GHz, Depends on the power sensor used.	
Applicable power sensor	MA4601A (100 kHz to 5.5 GHz), MA4701A (10 MHz to 18 GHz),	
Applicable power serisor	MA4703A (50 MHz to 26.5 GHz), MA4705A (50 MHz to 32 GHz)	
Power measurement range		
Display	Selectable from W, dBm, and dB (RELATIVE), Digital 4 digit display, 20% over range,	
Display	Power range: 4 range/10 dB step (Measurement level range is listed on the power sensor specifications.)	
Range switching	Auto, manual (settable to arbitrary range irrespective of range hold or input level)	
Accuracy	±0.7% (W mode), ±0.03 dB (dBm mode, dB (RELATIVE) mode)	
Accuracy	* Pressing ZERO ADJ key allows automatic adjustment to zero point.	
Zero setting	±0.5% of full scale Typical value (100 μW range of maximum sensitivity)	
Zero move between ranges	±0.2% (after zero setting at 100μW range of maximum sensitivity)	
Calibration oscillator frequency	50 MHz	
Calibration oscillator level	1 mW ± 1.2% (for one year)	
Averaging	An average count can be set from 2 to 10.	

#### ■ Option 23, 43, 44: Range expansion power meter function

• • •	
Frequency range 100 kHz to 32 GHz ( Depends on the power sensor used )	
Applicable power concer	MA4601A (100 kHz to 5.5 GHz), MA4701A (10 MHz to 18 GHz),
Applicable power sensor	MA4703A (50 MHz to 26.5 GHz), MA4705A (50 MHz to 32 GHz)
Power measurement range	-30 to +20 dBm
Display	Selectable from W, dBm, and dB (RELATIVE), Digital 4 digit display, 20% over range
Dower range	5 range / 10 dB step (Measurement level range is listed on the power sensor specifications.)
Power range	full scale value: -20, -10, 0, +10, +20 (10 μW to 100 mW)
Range switching	Auto, manual (settable to arbitrary range irrespective of range hold or input level)
Acquirect	±0.6% (W mode), ±0.026 dB (dBm mode, dB (RELATIVE) mode)
Accuracy	When including the zero drift in range1 (10 μW range) is as follows.
	±1.2% (W mode), ±0.052 dB (dBm mode, dB (RELATIVE) mode)
	Pressing ZERO ADJ key allows automatic adjustment to zero point.
Zero setting	±0.6% of full scale Typical value (10 μW range of maximum sensitivity)
Zero move between ranges	±0.2% of full scale (after zero setting at 10 μW range of maximum sensitivity)
Calibration oscillator frequency 50 MHz	
Calibration oscillator level	1 mW ± 1.2% (for one year)
Averaging	An average count can be set from 2 to 10.

#### ■ Option 34: 4 GHz LO output

Frequency	Frequency: 4 GHz
	Frequency accuracy: ± (4 GHz x reference frequency accuracy) ±1 Hz
Output level	-10 dBm Typical
Spurious	≤–40 dBc Typical

#### ■ Option 46: Auto power recovery

	Function	Disables the power switch on the front panel and automatically restores power after power failure.
		ON/OFF operation can be performed using the standby switch on the rear panel.
		* Power switch on the front panel of this unit does not have a latching function. Therefore, if power is
		interrupted in the ON status, the standby status is kept even after power is restored.

#### ■ Option 47: Rack mount (IEC)

Function	Mounts the rack mount for IEC standard-compatible rack. When mounted, the tilt handle (standard) is eliminated.
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#### ■ Option 48: Rack mount (JIS)

Function	Mounts the rack mount for JIS standard-compatible rack, When mounted, the tilt handle (standard) is eliminated.

### **Ordering Information**

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

Model/order No.	Name		
	- Main frame -		
MS2687B	Spectrum Analyzer		
	- Standard accessories -		
	Power cord, 2.6m :1 pc		
J0996B	RS-232C cable :1 pc		
Z0744	Memory card (32MB) :1 pc		
F0014	Fuse, 6.3 A :1 pc		
MX268001A	File Transfer Utility :1 pc		
W1754AE	MS2681A/83A/87B operation manual :1 copy		
	- Options -		
MS2687B-01	Precision frequency reference		
	(Aging rate: 5 x 10 <sup>-10</sup> /day)		
MS2687B-02	Narrow resolution bandwidths (FFT)		
MS2687B-04	Digital resolution bandwidth		
MS2687B-05	Rubidium reference oscillator		
MS2687B-09	Ethernet interface		
MS2687B-18	I/Q unbalanced input		
MS2687B-21	Power meter function		
MS2687B-23	Range expansion power meter function		
MS2687B-34	4 GHz LO output		
MS2687B-41	Power meter function retrofit		
MS2687B-43	Range expansion power meter function retrofit		
MS2687B-44	Range expansion power meter function		
	upgrade		
MS2687B-46	Auto power recovery		
MS2687B-47	Rack mount (IEC) without handles		
MS2687B-48	Rack mount (JIS) without handles		
	- Warranty -		
MS2687B-90	Extended three year warranty service		
MS2687B-91	Extended five year warranty service		
	- Measurement software -		
MX268701B	W-CDMA Measurement Software		
W1746AE	W-CDMA Measurement Software operation		
MX268702A	manual GSM Measurement Software		
W1854AE	GSM Measurement Software operation manual		
MX268703A	cdma Measurement Software		
W1865AE	cdma Measurement Software operation manual		
MX268704A	1xEV-DO Measurement Software		
W2090AE	1xEV-DO Measurement Software operation		
	manual		
MX268705A	π/4DQPSK Measurement Software		
W1866AE	π/4DQPSK Measurement Software operation manual		
MX268730A	WIRELESS LAN Measurement Software		
W2080AE	WIRELESS LAN Measurement Software		
VVZUOUAE	operation manual		
MX268760A	TD-SCDMA Measurement Software		
W2593AE	TD-SCDMA Measurement Software operation		
MAY000754 *	manual		
MX268751A	W-CDMA Release5 uplink Measurement		
	Software		
\A/OC47AF			
W2617AE	W-CDMA Release5 uplink Measurement Software operation manual		

ucing.				
Model/order No.	Name			
105700	- Application parts -			
J0576D	Coaxial cord (N-P, 5D-2W, N-P), 2 m			
J0561	Coaxial cord (N-P, 5D-2W, N-P), 2 m			
J0104A	Coaxial cord (BNC-P, RG-55/U, BNC-P), 1 m			
J0127C	Coaxial cord (BNC-P, RG-58A/U, BNC-P), 0.5 m			
J0127A	Coaxial cord (BNC-P, RG-58A/U, BNC-P), 1 m			
DGM010-02000EE	Coaxial cord (general use, N-P · N-P, DC to 18 GHz), 2 m			
DGM024-02000EE	Coaxial cord (low-loss type, N-P $\cdot$ N-P, DC to 18 GHz), 2 m			
J0911	Coaxial cord (K-P · K-P, DC to 40 GHz), 1 m			
J0912	Coaxial cord (K-P · K-P, DC to 40 GHz), 0.5 m			
J0007	GPIB cable, 1 m			
J0008	GPIB cable, 2 m			
J1047	Ethernet cross cable, 5 m			
MA1612A	Four-port Junction Pad (5 to 3000 MHz)			
MA1621A	50 $\Omega \to$ 75 $\Omega$ Impedance Transformer (75 $\Omega$ , 9 kHz to 3 GHz, ±100 V, NC-type)			
MP614B	$50 \leftrightarrow 70~\Omega$ Impedance Converter (50 to 1200			
	MHz, 1.5 dB or lower)			
J0395	Fixed attenuator for high-power (30 dB, 30 W, DC to 9 GHz)			
J0078	High power attenuator			
	(N type, 20 dB, 10 W, DC to 18 GHz)			
B0472	Fixed attenuator for high-power			
	(N type, 30 dB, 100 W, DC to 18 GHz)			
34AKNF50	Ruggedized K-to-Type N Adapter			
MA2507A	DC Block Adaptor			
	(50 Ω, 9 kHz to 3 GHz, ±50 V)			
J0805	DC block, N type			
	(10 kHz to 18 GHz, made by wineshell)			
B0452A	Hard carrying case (with casters)			
B0452B	Hard carrying case (without casters)			
B0488	Rear panel protective pad			
W1888AW	Assembling guide drawing for rear protective pad			
B0481B	Soft carrying case supporter			
B0479	Soft carrying case (rucksack type)			
MA4601A	Power Sensor			
	(100 kHz to 5.5 GHz, -30 to +20 dBm, N connector)			
MA4701A	Power Sensor			
	(10 MHz to 18 GHz, -30 to +20 dBm, N connector)			
MA4703A	Power Sensor			
	(50 MHz to 26.5 GHz, -30 to +20 dBm, APC3.5(P)			
	connector)			
MA4705A	Power Sensor			
	(50 MHz to 32 GHz, -30 to +20 dBm, APC3.5(P)			
	connector)			
J0370A	Sensor connecting cord, 1.5 m (for power			
	meter option)			
J0370C	Sensor cord, 2.5 m (for power meter option)			
J0370E	Sensor cord, 5 m (for power meter option)			
J0370G	Sensor cord, 10 m (for power meter option)			
MA2741A	External Mixer (26.5 to 40 GHz)			
MA2742A	External Mixer (33 to 50 GHz)			
MA2743A	External Mixer (40 to 60 GHz)			
MA2744A	External Mixer (50 to 75 GHz)			
MA2745A	External Mixer (60 to 90 GHz)			
MA2746A	External Mixer (75 to 110 GHz)			
J0364	APC-3.5 to N conversion connector			
	(for MA4703A and MA4605A)			
	,			

Mainframe specifications when external mixer is used.

		Frequency	range: 18 to 110 GHz		
		Frequency band:			
		Band	Frequency range	Mixer harmonics order [N]	
ē		K	18 to 26.5 GHz	4	
∣≘		Ka	26.5 to 40 GHz	6	
<u>a</u>	Frequency	Q	33 to 55 GHz	8	
External Mixer		υ	40 to 60 GHz	9 or 10	
\ <u>\</u>		V	50 to 75 GHz	11 or 12	
		E	60 to 90 GHz	13 or 14	
		W	75 to 110 GHz	16	
	Span setting range	0 Hz, (100 x N) Hz to each bandwidth			
	Mixer transform loss				
ge	setting range	15 to 85 dB			
Amplitude	Maximum input level	Depend of external mixer			
Į į	Average noise level	Depend of external mixer			
~	Frequency response	Depend of external mixer			
Ħ	Adaptive mixer	Only 2 port mixer			
Input/Output	Local frequency	4 to 7 GHz			
15	IF frequency	460.69 or 466 MHz			
르	Display gain	0 ±2 dB (External mixer input level –10 dBm, Mixer transform loss 15 dB)			



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