Specifications

Frequency

Frequency Range

Spectrum analysis mode: 20 Hz to 32 GHz

Frequency range	Frequency Band	Harmonic mixing mode (N)
20 Hz to 3.5 GHz	0	1 –
3.4 to 7.5 GHz	1	1 –
7.4 to 15.4 GHz	2	2 –
15.2 to 32 GHz	3	4 –

Bands 1 to 3 use a built-in YIG tuning preselector

Modulation analysis mode: (Enabled when the modulation analysis option is specified)
20 MHz to 6 GHz

Frequency range	Frequency Band	Harmonic mixing mode (N)
20 MHz to 3.5 GHz	0	1 –
3.5 to 6 GHz	1M	1 –

Band 1M bypasses the built-in YIG tuning preselector

Built-in preamplifier (Band 0 only): 100 kHz to 3.5 GHz, 20 dB gain (typical)

Input coupling: DC

Internal frequency reference stability
- Aging rate: ±5 x 10^{-8}/day, ±5 x 10^{-7}/year
- Temperature stability: ±1 x 10^{-7} (at 5 to 40°C, with frequency at 25°C as reference)
- Warm-up (nominal): ±5 x 10^{-7}/minute
- Reference frequency error: ±(Time elapsed from the latest factory calibration x Aging rate + Temperature stability)

Marker frequency counter (S/N >50 dB)
- Accuracy: ±(Marker frequency x Reference frequency error + Residual FM)
- Resolution: 0.01 Hz

Frequency reading accuracy: (Resolution bandwidth 1 Hz to 3 MHz)
±(Frequency reading x Reference frequency error + Span x Span accuracy + Resolution bandwidth x 0.1 + Residual FM)

Frequency stability (with internal reference frequency source)
- Residual FM: ≤(3 Hz x Np-p)/100 ms

Frequency span
- Range: 20 Hz to 32 GHz, 0 Hz (zero span)
- Accuracy: ±1% (200 Hz ≤Span)
  ±1 x N% (20 Hz ≤Span <200 Hz)

Signal purity: (with internal reference frequency source, Frequency 800 MHz, and temperature range: 20 to 30°C)
- 100 Hz offset: <–87 dBc/Hz
- 1 kHz offset: <–110 dBc/Hz
- 10 kHz offset: <–120 dBc/Hz
- 100 kHz offset: <–120 dBc/Hz
- 1 MHz offset: <–140 dBc/Hz
- 10 MHz offset: <–155 dBc/Hz (nominal)

Resolution bandwidth (RBW)
- Range: 1 Hz to 10 MHz (sequences 1, 2, 3, and 5)
- Accuracy: ±3%: Resolution bandwidth 1 Hz to 500 kHz
  ±7%: Resolution bandwidth 1 to 3 MHz
  ±12%: Resolution bandwidth 5 MHz
  ±20%: Resolution bandwidth 10 MHz
- Selectivity (60 dB/3 dB): <6: 1 (5: 1, typ.)

Video bandwidth (VBW)
- Range: 1 Hz to 10 MHz (sequences 1, 2, 3, and 5)

Sweep

Sweep time setting range
- Zero span: 1 µs to 6000 s
- Span > 0 Hz: 10 ms to 2000 s

Sweep time accuracy: ±2%

Sweep mode: Continuous and single

Trigger function
- Trigger source: Free-run, Video, IF, Line, Ext 1 (TTL level), and Ext 2 (0 to 5 V, Resolution: 20 mV)
- Trigger delay setting range: 10 ns to 1 s
- Resolution: 10 ns

Amplitude

Amplitude measurement range
- Preamplifier off: +30 dBm to Average display noise level
- Preamplifier on (Band 0 only): +20 dBm to Average display noise level

Maximum safety input level
- Average continuous power
  - Preamplifier off: +30 dBm (at input ATT. ≥10 dB)
  - Preamplifier on: +13 dBm (at input ATT. ≥10 dB)
- DC voltage: 0 V (No DC applied to signals)

Input ATT. range: 0 to 75 dB by 5 dB steps

Scale display range: 10 div., fixed
- Log scale: 0.1 to 1 dB/div. by 0.1 dB steps
  1 to 20 dB/div. by 1 dB steps
- Linear scale: 10%/div. of reference level

Scale unit : dBm, dBmV, dBµV, dBµVemf, dBpW, W, V

Reference level setting range
- Preamplifier off
  - Log scale: –170 to +60 dBm by 0.01 dB steps
  - Linear scale: 707.1 pV to 223.6 V by Approx. 1% steps
- Preamplifier on
  - Log scale: –170 to +30 dBm, 0.01 dB steps
  - Linear scale: 707.1 pV to 7.071 V by Approx. 1% steps

Trace: 4 maximum

Detector modes: Normal, positive peak, negative peak, sample, RMS, video average, and voltage average

Amplitude accuracy

Calibration signal (50 MHz)
- Amplitude: –10 dBm
- Accuracy: ±0.2 dB (temperature range: 20 to 30°C)

Frequency response (After automatic calibration, where reference frequency: 50 MHz; input ATT.: 10 dB; pre-selector: peak-adjusted; and temperature range: 20 to 30°C)

Spectrum analysis mode

Preamplifier off:	50 MHz to 2.5 GHz: <±0.4 dB
	20 Hz to 3.5 GHz: <±1.0 dB
	3.5 to 7.5 GHz: <±1.5 dB
	7.5 to 15.4 GHz: <±2.0 dB
	15.4 to 32 GHz: <±2.5 dB
Preamplifier on:	50 MHz to 2.5 GHz: <±1.0 dB
	100 kHz to 3.5 GHz: <±2.0 dB

Input ATT. switching error: (At input ATT. 5 to 50 dB, with ATT. 10 dB as reference)
- 20 Hz to 8 GHz: <±1.0 dB
- 8 to 12 GHz: <±1.3 dB
- 12 to 20 GHz: <±1.4 dB
- 20 to 26.5 GHz: <±1.8 dB
- 26.5 to 32 GHz: <±2.1 dB

Scale display error: (Mixer level: –20 dBm as reference, mixer level range: –10 to –50 dBm, and temperature range: 20 to 30°C) <±0.13 dB

Resolution bandwidth switching uncertainty: (RBW 100 kHz as reference, after automatic calibration with and 10 dB/div. or less)
- <±0.05 dB: Resolution bandwidth 1 Hz to 3 MHz
- <±0.3 dB: Resolution bandwidth 5 MHz, 10 MHz

Total level accuracy: (After automatic calibration, mixer level: –10 to –50 dBm, preamplifier: off; input ATT.: 10 dB; RBW: 100 kHz; and temperature range: 20 to 30°C) <±(0.2 dB + Frequency response + Scale display error)

Dynamic range

Average display noise level

Spectrum analysis mode (Input terminated, input ATT.: 0 dB; RBW: 1 Hz; VBW: 1Hz, detector: sample; average: 20 times or more; AVG mode: Video; and temperature range: 20 to 30°C. For a temperature range of 5 to 40°C, 2 dB is added.)

Preamplifier off:	100 Hz: <–96 dBm
	1 kHz: <–119 dBm
	10 kHz: <–129 dBm
	100 kHz: <–130 dBm
	1 MHz: <–140 dBm
	10 MHz to 1 GHz: <–156 dBm (typical: –158 dBm)
	1 to 2 GHz: <–154 dBm (typical: –156 dBm)
	2 to 2.5 GHz: <–152 dBm (typical: –154 dBm)
	2.5 to 3 GHz: <–150 dBm (typical: –152 dBm)
	3 to 3.5 GHz: <–148 dBm (typical: –150 dBm)
	3.5 to 7.5 GHz: <–146 dBm (typical: –149 dBm)
	7.5 to 15.4 GHz: <–146 dBm (typical: –149 dBm)
	15.4 to 26.5 GHz: <–141 dBm (typical: –144 dBm)
	26.5 to 32 GHz: <–140 dBm (typical: –143 dBm)
Preamplifier on:	100 kHz: <–136 dBm
	1 MHz: <–146 dBm
	10 MHz to 1 GHz: <–162 dBm (typical: –168 dBm)
	1 to 2.5 GHz: <–160 dBm (typical: –166 dBm)
	2.5 to 3 GHz: <–158 dBm (typical: –164 dBm)
	3 to 3.5 GHz: <–156 dBm (typical: –162 dBm)

1 dB gain compression: (Separation: Resolution bandwidth x 15, 50 kHz min.)
- 10 to 200 MHz: >+2 dBm (typical: +5 dBm)
- 200 MHz to 3.5 GHz: >+7 dBm (typical: +10 dBm)
- 3.5 to 7.5 GHz: >–5 dBm (typical: –2 dBm)
- 7.5 to 32 GHz: >–3 dBm (typical: 0 dBm)

2nd order harmonic distortion:
- 10 MHz to 1.75 GHz: <–60 dBc (mixer level: –20 dBm)
- >1.75 GHz: <–90 dBc (mixer level: –10 dBm)

3rd order intercept point (TOI): (Mixer level: –20 dBm, separation: 25 kHz)
- 10 to 200 MHz: >+12 dBm (typical: +16 dBm)
- 200 to 500 MHz: >+16 dBm (typical: +20 dBm)
- 500 MHz to 1 GHz: >+20 dBm (typical: +24 dBm)
- 1 to 2 GHz: >+21 dBm (typical: +25 dBm)
- 2 to 3.5 GHz: >+22 dBm (typical: +26 dBm)
- 3.5 to 7.5 GHz: >+5 dBm (typical: +10 dBm)
- 7.5 to 32 GHz: >+8 dBm (typical: +12 dBm)

Image/multiple/out-band spurious

Spectrum analysis mode:
- 10 MHz to 15.4 GHz: <–70 dBc
- 15.4 to 26.5 GHz: <–65 dBc
- 26.5 to 32.0 GHz: <–60 dBc

Residual spurious (Spectrum analysis mode, no input, input terminated, input ATT.: 0 dB)
- Preamplifier on: 1 MHz to 3.5 GHz: <–95 dBm
- Preamplifier off: 1 MHz to 32 GHz: <–90 dBm

Input/Output

RF input	
Connector:	K type (male), front panel
Impedance:	50 Ω (nominal)
VSWR:	(Input ATT.: ≥10 dB, at the specified frequency) <1.5: 1 (<3.5 GHz) (nominal) <2.0: 1 (>3.5 GHz) (nominal)
Calibration signal output	
Connector:	BNC (female), front panel
Impedance:	50 Ω (nominal)
Frequency:	50 MHz
Probe power source	
Connector:	4-pin connector, front panel
Output voltage and current:	±15 V, 150 mA (nominal)
I/Q input	
Connector:	BNC (female), front panel
Impedance:	50 Ω (nominal), AC/DC coupling
Maximum input amplitude:	1.0 Vp-p (DC ±0.5 V or less)
External trigger input 1	
Connector:	BNC (female), rear panel
Impedance:	10 kΩ (nominal), DC coupling
Trigger level:	TTL level
External trigger input 2	
Connector:	BNC (female), rear panel
Impedance:	10 kΩ (nominal), DC coupling
Trigger level:	0 to 5 V
Trigger output	
Connector:	BNC (female), rear panel
Amplitude:	TTL level
Frequency reference input	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	5 to 20 MHz
Amplitude:	0 dBm ±5 dB
10 MHz frequency reference output	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	10 MHz
Amplitude:	0 dBm ±5 dB
21.4 MHz IF output	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	21.4 MHz
Amplitude:	Mixer level: +2 dB (typical at 50 MHz)
I/O	
Keyboard:	PS/2 101/106 keyboard, front panel
Mouse:	PS/2 mouse, front panel
USB:	Front panel
GPIB:	Conforming to IEEE-488.2, rear panel
LAN port:	10 Base-T, supporting TCP/IP, rear panel
Printer port:	Conforming to IEEE-1284-1994, rear panel
Signal for external indicator:	15-pin D-subconnector (VGA), rear panel

Notice: RS232 and EXT IN 1 to 4 connectors are not available.

General specifications

Operating environment range:	Ambient temperature: +5 to +40°C Relative humidity: 80% or less (No condensation)
Storage environment range:	Ambient temperature: –20 to +60°C Relative humidity: 80% or less (No condensation)
AC power input:	100 to 120 VAC, 50 Hz/60 Hz 220 to 240 VAC, 50 Hz/60 Hz (automatic switching between 100 VAC and 220 VAC)
Power consumption:	500 VA or less Approx. 220 VA (excluding options)
Dimensions:	Approx. 424 (W) x 266 (H) x 530 (D) mm
Mass:	32 kg or less (excluding options)

Options

OPT.22 High-stability frequency reference source

Reference frequency stability	
Aging rate:	±3 x 10^{-10}/ day, ±2 x 10^{-8}/ year
Temperature stability:	±5 x 10^{-9} (5 to 40°C, with frequency at 25°C as reference)
Warm-up (nominal):	(At 25°C, the frequency at 24 hours after power is turned on is used as a reference) ±1 x 10^{-8}/30 minutes ±5 x 10^{-9}/60 minutes
Reference frequency error:	±(Time elapsed from the latest factory calibration x Aging rate + Temperature stability)

OPT.68 OFDM modulation analysis function

Temperature range:	Ambient temperature: +20 to +30°C
EVM	(100-symbol RMS value when S/N >40 dB IEEE802.11a, HiperLAN/2, HiSWANa signals are measured with the equalizer on)
Residual EVM:	–40 dB or less
Center frequency error	(S/N >40 dB, 2. 1000-symbol average)
Measuring range	
Standard signal	
IEEE802. 11a:	±312.5 kHz
HiperLAN/2, HiSWANa:	±312.5 kHz (at broadcast burst and uplink burst) ±125 kHz (at downlink burst)
User table	±Subcarrier frequency interval x 0.25
Measurement accuracy:	±(100 Hz + Center frequency x Reference frequency error)
Amplitude measurement:	(After automatic calibration, S/N >40 dB, preamplifier off, input ATT.: 10 dB, 100-symbol average)
Frequency response (Band 1M):	<±1.0 dB (3.5 to 6 GHz)
Power measurement accuracy:	<±(0.2 dB + Frequency response)
Residual center frequency leakage power:	–40 dB (at the subcarrier average power)

Ordering information

Accessories

Power cable:	A01402	1
Input cable (50 Ω):	A01261-30	1
K (f)–K (f) adapter:	5A-SFF40 (A)	1
SMA (f) – SMA (f) adapter:	HRM-501	1
SMA (m) – BNC (m) adapter:	HRM-517 (09)	1
Stylus pen:	ST-PEN	1

Options

High-stability frequency reference source:	OPT.22
OFDM modulation analysis function:	OPT.68

Accessories (optional)

Rack-mount set B:	A02724	EIA standard
	A02725	JIS standard
Panel extension cable (3 m):	A112003	

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