

Spectrum Analyzers

100 Hz to 26.5 GHz (60 GHz)

R3271

Mit freundlichen Grüßen / With compliments **Rainer Förtig Elektronik**
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Specifications

Frequency

Frequency range: 100 Hz to 26.5 GHz

18 GHz to 60 GHz (325 GHz tunable with external mixers)

Frequency Band	Harmonic Mode (N)
100 Hz to 3.6 GHz	1
3.5 GHz to 7.5 GHz	1
7.4 GHz to 15.4 GHz	2
15.2 GHz to 23.3 GHz	3
23 GHz to 26.5 GHz	4

Preselector: 3.5 GHz to 8 GHz using VIG tuned preselector

Frequency readout accuracy (Start, Stop, CF, Marker): \pm (freq readout \times freq reference accuracy + span \times span accuracy + $0.15 \times$ res BW + 10 Hz)

Span accuracy $\pm 3\%$ (span > 2 MHz), $\pm 5\%$ (span \leq 2 MHz)

Count frequency marker:

Resolution 1 Hz to 1 kHz

Count accuracy (S/N \geq 25 dB) \pm (marker freq \times freq reference accuracy + 5 Hz \times N + 1 LSD)

Delta marker count accuracy (S/N \geq 25 dB) \pm (delta marker freq \times freq reference accuracy + 10 Hz \times N + 2 LSD)

Frequency reference accuracy: $\pm 2 \times 10^{-9}$ /day, $\pm 1 \times 10^{-7}$ /year, $\pm 5 \times 10^{-9}$ /day (Opt. 21)

Frequency stability:

Residual FM (zero span) < 3 Hz \times $N_{p-p}/0.1s$

Drift (after warm up 1 H) < 2.5 kHz \times sweep time (minute) \times N
50 kHz $<$ span \leq 2 MHz
 < 60 Hz \times sweep time (minute) \times N
span \leq 50 kHz

Spectral purity: Noise sidebands

offset	f \leq 2.6 GHz	f $>$ 2.6 GHz
1 kHz	< -100 dBc / Hz	$< (-95+20 \log N)$ dBc / Hz
10 kHz	< -110 dBc / Hz	$< (-108+20 \log N)$ dBc / Hz
20 kHz	< -110 dBc / Hz	$< (-108+20 \log N)$ dBc / Hz
100 kHz	< -114 dBc / Hz	$< (-110+20 \log N)$ dBc / Hz

Frequency span:

Lin span Range 200 Hz to 8 GHz, zero span

Accuracy $\pm 3\%$ (span > 2 MHz), $\pm 5\%$ (span \leq 2 MHz)

Log span Range 1 kHz to 1 GHz, 1, 2, 3 decades selected

Accuracy $\pm(10\% + \text{stop freq} \times 0.1\%)$

Resolution bandwidth (-3 dB):

Range 10 Hz to 3 MHz 1, 3, 10 sequence

Accuracy $\pm 15\%$ 100 Hz to 1 MHz, $\pm 25\%$ 30 Hz (25°C \pm 10°C), 3 MHz, $\pm 50\%$ 10 Hz to 100 Hz (digital IF)

Selectivity (-60 dB/-3 dB) $< 15:1$ 100 Hz to 3 MHz
 $< 20:1$ 30 Hz

5:1 (nominal) 10 Hz to 100 Hz (digital IF)

Bandwidth (-6 dB) 200 Hz, 9 kHz, 120 kHz

Conformed to CISPR standard

Video bandwidth range: 1 Hz to 3 MHz 1, 3, 10 sequence

Amplitude Range

Amplitude range: +30 dBm to noise level

Maximum input:

Average continuous power +30 dBm (1 W) (Input atten \geq 10 dB)
DC 0 V

Display range:

Scale calibration 10 \times 10 division graticule

Log 10, 5, 2, 1, 0.5, 0.2, 0.1 dB/div

Linear 10% of reference level/div

QP log 40 dB (5 dB/div)

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

Dynamic Range

Maximum dynamic range:

1 dB gain compression to noise level

130 dB-1.55f (GHz) dB, 10 MHz to 3.6 GHz

Signal distortion harmonic 85 dB 10 MHz to 3.6 GHz

110 dB $>$ 3.5 GHz

Third order Intermodulation 90 dB $>$ 10 MHz

Displayed average noise level: 10 Hz res BW, 0 dB input atten, 20 times ave.

-100 dBm 1 kHz

-110 dBm 10 kHz

-111 dBm 100 kHz

-{135-1.55f (GHz)} dBm 1 MHz to 3.6 GHz

-130 dBm 3.5 GHz to 7.5 GHz

-123 dBm 7.4 GHz to 15.4 GHz

-116 dBm 15.2 GHz to 23.3 GHz

-110 dBm 23 GHz to 26.5 GHz

Gain compression (1 dB): -5 dBm mixer input level $>$ 10 MHz

Spurious response:

		Freq range	Mixer level
Second harmonic distortion	< -70 dBc	10 MHz to 3.6 GHz	-30 dBm
	< -100 dBc	$>$ 3.5 GHz	-10 dBm
Third order intermodulation distortion	< -70 dBc	10 MHz to 3.6 GHz	-30 dBm
	< -75 dBc	$>$ 3.6 GHz	-30 dBm
Residual responses (no signal at input, 0 dB RF attention)	< -100 dBm	1 MHz to 3.6 GHz	
	< -90 dBm	300 kHz to 26.5 GHz	

Amplitude Accuracy

Frequency response:

In band flatness (10 dB input atten)

± 1.5 dB 100 Hz to 3.6 GHz, ± 1.0 dB 50 MHz to 2.6 GHz,

± 1.5 dB 3.5 GHz to 7.5 GHz, ± 3.5 dB 7.4 GHz to 15.4 GHz,

± 4.0 dB 15.4 GHz to 23.3 GHz, ± 4.0 dB 23 GHz to 26.5 GHz

Additional uncertainty due to band switching ± 0.5 dB

Frequency response referenced to CAL signal (10 dB input atten)

± 5 dB 100 Hz to 26.5 GHz

Calibrator accuracy: -10 dBm ± 0.3 dB

IF gain uncertainty: After automatic calibration

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

Scale fidelity:

Log ± 0.2 dB/1 dB, ± 1 dB/10 dB, ± 1.5 dB/90 dB

Linear $\pm 5\%$ of reference level

QP mode log ± 1.0 dB/30 dB, ± 2 dB/40 dB, ± 1.0 dB/40 dB
(25°C \pm 10°C)

Input attenuator switching accuracy: 20 to 70 dB settings referenced to 10 dB

± 1.1 dB/10 dB step, 2.0 dB max, 0 to 12.4 GHz

± 1.3 dB/10 dB step, 2.5 dB max, 12.4 GHz to 18 GHz

± 1.8 dB/10 dB step, 3.5 dB max, 18 GHz to 26.5 GHz

Resolution bandwidth switching uncertainty:

At reference BW 300 kHz, after automatic calibration

$\leq \pm 0.3$ dB 100 Hz to 3 MHz

$\leq \pm 1$ dB 30 Hz

$\leq \pm 1.5$ dB 10 Hz to 100 Hz (digital IF)

Pulse digitization uncertainty: (pulse response mode PRF $>$ 700/sweep time) Peak to Peak

Log 1.2 dB (RBW \leq 1 MHz), 3 dB (RBW : 3 MHz)

Linear 4% of ref level (RBW \leq 1 MHz), 12% of ref level (RBW : 3 MHz)

SWEEP

Sweep time:

SPAN = 0 50 μ s to 1000 s and manual sweep

SPAN \geq 200 Hz 20 ms to 1000 s and manual sweep

Accuracy \pm 3%

Sweep trigger: Free run, line, single, video, TV-H, TV-V, external

Demodulation

Spectrum demod:

Modulation type AM and FM

Audio output Speaker and phone jack with volume control

Marker pause time 100 ms to 1000 s

Inputs/Outputs

RF Input:

Connector type N type (adaptable to SMA type : R3271)

Impedance 50 Ω (nominal)

VSWR (input atten \geq 10 dB, at turned frequency)

< 1.5 : 1 for \leq 3.6 GHz (nominal)

< 2.5 : 1 for > 3.6 GHz (nominal) R3271

LO emission level (average)

< -80 dBm (nominal) 10 dB input atten, 0 to 26.5 GHz

Video output:

Connector BNC female, rear panel

Impedance (AC coupled) 75 Ω (nominal)

Amplitude Approx. 1 V_{P-P} (Composite video signal)

Probe power: 4 pin connector front panel

Voltage +15 V, -15 V

Current 150 mA max, each

Phone output: (Demodulated audio)

Connector Subminiature Monophonic jack, rear panel

Power output 0.2 watt 8 Ω (nominal)

GPIB interface: A standardly provided GPIB function enables remote operation and data input/output.

Connector IEEE-488 bus Connector

Direct plotter output Supports R9833, HP7470A, HP7475A, HP7440A, HP7550A

General Specifications

Environment temperature:

Operating temperature 0°C to 50°C

Non-operating temperature -20°C to +60°C

Humidity RH 85%

Power supply: Automatically selections between 100 VAC and 220 VAC

	100 VAC	200 VAC
Voltage	90 V to 132 V	198 V to 250 V
Power Consumption	Max. 400 VA	Max. 400VA
Frequency	48 Hz to 440 Hz	48 Hz to 66 Hz

Dimensions: 353 (W) \times 177 (H) \times 450 (D) mm
(without handle, feet, and front cover)

Weight: 22 kg (nominal)

Accessories

Product	Model	Remarks
Power cable	A01412	
Input cable	MC-61	Connector UG-88/U
Input cable	MI-09	Connector 3DW-P2
Connector adaptor	JUG-201A/U	N-BNC Adaptor
Memory card		one card (32 K bytes)
Front cover		

Options

Option 15 Controller Function

Option 16 External mixer (26.5 GHz to 40 GHz)

Option 17 External mixer (40 GHz to 60 GHz)

Option 21 5×10^{-9} /day X 'tal

Option 71 Delayed Sweep

The delayed sweep can be used to analyze the frequency of only the portion specified in the zero-span mode (time domain) and to expand the portion specified in the zero-span mode. Any gate signal is internally produced from a trigger signal source. This gate signal enables the portion you wish to analyze to be gated, the frequency to be analyzed partially, and the time domain waveform to be expanded.

Delayed Sweep Specifications

Trigger signal source: External trigger signal (input from the external trigger input connector). VIDEO and TV-V

Delay time: 200 ns to 1.5 s with a resolution of 100 ns

Delayed sweep time: 50 μ s to 1000 s (the resolution is the same as that set in the sweep time.)

Gated Sweep Specifications

Trigger signal source: Produce a gate signal. Input from the external trigger input connector or gate input connector.

Frequency domain analysis External trigger input and gate input

Time domain analysis External trigger input, gate input, VIDEO and TV-V

Gate position: 300 ns to 100 ns with resolution of 100 ns

Gate width: 1 μ s to 1.5 s with a resolution of 100 ns