

R3132 Specifications

Frequency

Frequency range:	9 kHz to 3 GHz		
Frequency reading accuracy: (Start, stop, center frequency, marker frequency)	\pm (Reading of frequency x Frequency reference accuracy + Span x 1% + RBW x 15% + 60 Hz)		
Counter			
Resolution:	1 Hz to 1 kHz		
Accuracy:	\pm (Marker frequency x Frequency reference accuracy + 1LSD) (S/N \geq 25 dB, span \leq 200 MHz)		
Frequency reference accuracy			
Stability:	$\pm 2 \times 10^{-6}$ /year, $\pm 1 \times 10^{-7}$ /year (Option 20) $\pm 1 \times 10^{-5}$ (0 to 50 °C), $\pm 2 \times 10^{-8}$ /day (Option 20)		
Frequency span			
Range:	1 kHz to 3 GHz, 0 Hz (zero span)		
Accuracy:	$\leq \pm 1\%$		
Residual FM:	≤ 60 Hzp-p/0.1s, ≤ 20 Hzp-p/0.1s (Option 20)		
Signal purity:	offset	f \leq 2.6 GHz	f > 2.6 GHz
	20 kHz	≤ -105 dBc/Hz	≤ -103 dBc/Hz
* RBW 300 Hz (Option 27)	10 kHz	≤ -100 dBc/Hz*	≤ -98 dBc/Hz*
Resolution bandwidth (3 dB)			
Range:	1 kHz to 3 MHz, 1-3-10 sequence 30 Hz, 100 Hz, 300 Hz (Option 27)		
Accuracy:	$< \pm 20\%$, 1 kHz to 1 MHz $< \pm 25\%$, 3 MHz $< \pm 20\%$ (added with Option 27)		
6 dB bandwidth:	1 MHz, 120 kHz, 9 kHz 200 Hz (Option 27)		
Video bandwidth:	10 Hz to 3 MHz, 1-3-10 sequence		

Amplitude range

Measuring range:	+30 dBm to average noise level		
Maximum input level (Input ATT \geq 10 dB)			
Preamplifier OFF:	+30 dBm, ± 50 VDC max.		
Preamplifier ON:	+13 dBm, ± 50 VDC max.		
Indication range:	10 x 10 div		
Log:	10, 5, 2, 1 dB/div		
Linear:	10% of the reference level/div.		
Reference level range			
Preamplifier OFF:	(Input ATT: 0 to 50 dB)		
Log:	-64 to +40 dBm (0.1 dB step)		
Linear:	141.1 μ V to 22.36 V		
Preamplifier ON:	(Input ATT: 0 to 30 dB)		
Log:	-82 to +10 dBm (0.1 dB step)		
Linear:	17.76 μ V to 707.1 mV		
Input ATT range:	0 to 50 dB (5 dB step)		

Dynamic range

Average noise level:	RBW 1 kHz, VBW 10 Hz, input ATT 0 dB, f \geq 10 MHz		
Preamplifier OFF:	-117 dBm + 2f (GHz) dB*		
Preamplifier ON:	-132 dBm + 3f (GHz) dB		
1 dB gain compression:	f \geq 200 MHz		
Preamplifier OFF:	> 0 dBm (mixer input level)		
Preamplifier ON:	> -25 dBm (RF input level)		
Spurious response:	Preamplifier OFF, Mixer input -30 dBm		
2nd-order harmonic distortion:	≤ -70 dBc (100 MHz \leq f < 800MHz) ≤ -80 dBc (f \leq 800MHz)		
2 signal 3rd-order intermodulation distortion:	≤ -80 dBc (f \geq 200 MHz, Offset > 50 kHz)		
Residual response:	When input ATT 0 dB, 50 Ω terminated, and 1 MHz to 3 GHz		
Preamplifier OFF:	≤ -100 dBm		
Preamplifier ON:	≤ -105 dBm		

Amplitude accuracy

Frequency response:	After auto calibration at ATT = 10 dB	
Preamplifier OFF:	$\leq \pm 0.5$ dB (100 kHz to 3 GHz)* ² $\leq \pm 2$ dB (9 kHz to 3 GHz)	
Preamplifier ON:	$\leq \pm 1$ dB (100 kHz to 2.7 GHz) $\leq \pm 2$ dB (9 kHz to 3 GHz)	
Calibration signal level accuracy:	-20 dBm ± 0.3 dB	
IF gain error:	After auto calibration $< \pm 0.5$ dB	
Scale indication accuracy:	After auto calibration	
Log:	$\leq \pm 1.5$ dB/80 dB $\leq \pm 1$ dB/10 dB $\leq \pm 0.2$ dB/1 dB	
Linear:	$\pm 5\%$ of reference level	
Input ATT switching error:	$\leq \pm 0.3$ dB (for 0 to 50 dB, with reference to 30 MHz/10 dB)	
Resolution bandwidth switching level error:	After auto calibration $< \pm 0.5$ dB	
Total level accuracy:	± 1.5 dB (REF = -50 to 0 dBm, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, f > 100 kHz, after auto calibration)	

Sweep

Sweep time:	20 ms to 1000 s, 50 μ s to 1s (Option 29, zero span)	
Accuracy:	$\pm 2\%$	
Trigger mode:	FREE RUN, LINE, VIDEO, EXT, TV,	
Sweep mode:	REPEAT, SINGLE	

I/O

RF input		
Connector:	N type female	
Impedance:	50 Ω (nominal)	
VSWR		
Preamplifier OFF:	<1.5:1 (100 kHz to 2 GHz) Input ATT = 10 to 50 dB <2:1 (9 kHz to 3 GHz) Input ATT = 5 to 50 dB	
Preamplifier ON:	<2.5:1 (9 kHz to 3 GHz)	
Probe power:	± 12 V, 4-pin connector	
Calibration output signal:	BNC female, 50 Ω (nominal) 30 MHz, -20 dBm	
10 MHz reference input:	BNC female, 500 Ω (nominal) -10 to +10 dBm	
External trigger input:	BNC female	
Sound output (demodulated audio):	Small monophonic jack	
GPIB interface:	IEEE-488 BUS connector	
RS232 interface:	D-sub 9-pin	
Printer interface:	D-sub 25-pin, ESC/P, ESC/P-R, PCL	
Video output:	VGA (15-pin, female)	
Floppy disk:	3.5-inch, MS-DOS format	

General specifications

Operating temperature:	0 to +50 °C, Relative humidity 85% or less (no dew condensation)	
Storage temperature:	-20 to +60 °C, relative humidity 85% or less	
Power supply:	100/200 VAC auto-switchable 100 VAC: 100 to 120 VAC, 50 to 60 Hz 200 VAC: 200 to 240 VAC, 50 to 60 Hz	
Power consumption:	200 VA or less	
Dimensions:	Approx. 424 (W) x 177 (H) x 300 (D) mm (excluding feet and connectors)	
Mass:	14 kg or less (excluding options, cover, and accessories)	

R3132N Specifications

Frequency

Frequency range:	9 kHz to 3 GHz		
Frequency reading accuracy: (Start, stop, center frequency, marker frequency)	\pm (Reading of frequency x Frequency reference accuracy + Span x 1% + RBW x 15% + 60 Hz)		
Counter	Resolution: 1 Hz to 1 kHz Accuracy: \pm (Marker frequency x Frequency reference accuracy + 1LSD) (S/N \geq 25 dB, span \leq 200 MHz)		
Frequency reference accuracy	Stability: $\pm 2 \times 10^{-6}$ /year, $\pm 1 \times 10^{-7}$ /year (Option 20) $\pm 1 \times 10^{-5}$ (0 to 50°C), $\pm 2 \times 10^{-9}$ /day (Option 20)		
Frequency span	Range: 1 kHz to 3 GHz, 0 Hz (zero span) Accuracy: $\leq \pm 1\%$		
Residual FM:	≤ 60 Hzp-p/0.1s, ≤ 20 Hzp-p/0.1s (Option 20)		
Signal purity:	offset	f ≤ 2.6 GHz	f > 2.6 GHz
	20 kHz	≤ -105 dBc/Hz	≤ -103 dBc/Hz
RBW 300 Hz (Option 27)	10 kHz	≤ -100 dBc/Hz	≤ -98 dBc/Hz*
Resolution bandwidth (3 dB)	Range: 1 kHz to 3 MHz, 1-3-10 sequence 30 Hz, 100 Hz, 300 Hz (Option 27) Accuracy: $< \pm 20\%$, 1 kHz to 1 MHz $< \pm 25\%$, 3 MHz $< \pm 20\%$ (added with Option 27) 6 dB bandwidth: 1 MHz, 120 kHz, 9 kHz 200 Hz (Option 27)		
Video bandwidth:	10 Hz to 3MHz, 1-3-10 sequence		

Amplitude range

Measuring range:	+134 dB μ V to average noise level
Maximum input level (Input ATT ≥ 10 dB)	Preamplifier OFF: +134 dB μ V, ± 50 VDC max. Preamplifier ON: +120 dB μ V, ± 50 VDC max.
Indication range:	10 x 10 div Log: 10, 5, 2, 1 dB/div Linear: 10% of the reference level/div.
Reference level range	Preamplifier OFF: (Input ATT: 0 to 50 dB) +44.8 dB μ V to +148.8 dB μ V (0.1 dB step) Linear: 172.8 μ V to 27.39 V Preamplifier ON: (Input ATT: 0 to 30 dB) +26.8 dB μ V to +118.8 dB μ V (0.1 dB step) Linear: 21.75 μ V to 866 mV
Input ATT range:	0 to 50 dB (5 dB step)

Dynamic range

Average noise level:	RBW 1 kHz, VBW 10 Hz, input ATT 0 dB, f ≥ 10 MHz Preamplifier OFF: -6 dB μ V + 2f (GHz) dB* ¹ Preamplifier ON: -21 dB μ V + 3f (GHz) dB
1 dB gain compression:	f ≥ 200 MHz Preamplifier OFF: $> +107$ dB μ V (mixer input level) Preamplifier ON: $> +82$ dB μ V (RF input level)
Spurious response:	Preamplifier OFF, Mixer input +77 dB μ V
2nd-order harmonic distortion:	≤ -70 dBc (100 MHz \leq f < 800MHz) ≤ -80 dBc (f \leq 800MHz)
2 signal 3rd-order intermodulation distortion:	≤ -80 dBc (f ≥ 200 MHz, Offset > 50 kHz)
Residual response:	When input ATT 0 dB, 75 Ω terminated, and 1 MHz to 3 GHz Preamplifier OFF: $\leq +7$ dB μ V Preamplifier ON: $\leq +2$ dB μ V

Amplitude accuracy

Frequency response:	After auto calibration at ATT = 10 dB $\leq \pm 0.5$ dB (100 kHz to 2.2 GHz) ^{*2}
Preamplifier OFF:	$\leq \pm 2$ dB (9 kHz to 2.2 GHz)
Preamplifier ON:	$\leq \pm 1$ dB (100 kHz to 2.2 GHz) $\leq \pm 2$ dB (9 kHz to 2.2 GHz)
Calibration signal level accuracy:	-20 dBm ± 0.3 dB
IF gain error:	After auto calibration $< \pm 0.5$ dB
Scale indication accuracy:	After auto calibration Log: $\leq \pm 1.5$ dB/80 dB $\leq \pm 1$ dB/10 dB $\leq \pm 0.2$ dB/1 dB Linear: $\pm 5\%$ of reference level
Input ATT switching error:	$\leq \pm 0.3$ dB (for 0 to 50 dB, with reference to 30 MHz/10 dB)
Resolution bandwidth switching level error:	After auto calibration $< \pm 0.5$ dB
Total level accuracy:	± 1.5 dB (REF = +57 to +107 dB μ V, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, 100 kHz < f ≤ 2.2 GHz after auto calibration)

Sweep

Sweep time:	20 ms to 1000 s, 50 μ s to 1s (Option 29, zero span)
Accuracy:	$< \pm 2\%$
Trigger mode:	FREE RUN, LINE, VIDEO, EXT, TV,
Sweep mode:	REPEAT, SINGLE

I/O

RF input	Connector: N type female Impedance: 75 Ω (nominal)
VSWR	Preamplifier OFF: $< 1.5:1$ (100 kHz to 2.2 GHz) Input ATT = 10 to 50 dB $< 2:1$ (9 kHz to 2.2 GHz) Input ATT = 5 to 50 dB $< 2.5:1$ (9 kHz to 2.2 GHz)
Preamplifier ON:	
Probe power:	± 12 V, 4-pin connector
Calibration output signal:	BNC female, 75 Ω (nominal) 30 MHz, -20 dBm
10 MHz reference input:	BNC female, 500 Ω (nominal) -10 to +10 dBm
External trigger input:	BNC female
Sound output (demodulated audio):	Small monophonic jack
GPIO interface:	IEEE-488 BUS connector
RS232 interface:	D-sub 9-pin
Printer interface:	D-sub 25-pin, ESC/P, ESC/P-R, PCL
Video output:	VGA (15-pin, female)
Floppy disk:	3.5-inch, MS-DOS format

General specifications

Operating temperature:	0 to +50 °C, Relative humidity 85% or less (no dew condensation)
Storage temperature:	-20 to +60°C, relative humidity 85% or less
Power supply:	100/200 VAC auto-switchable 100 VAC: 100 to 120 VAC, 50 to 60 Hz 200 VAC: 200 to 240 VAC, 50 to 60 Hz 200 VA or less
Power consumption:	
Dimensions:	Approx. 424 (W) x 177 (H) x 300 (D) mm (excluding feet and connectors)
Mass:	14 kg or less (excluding options, cover, and accessories)

R3162 Specifications

Frequency

Frequency range:	9 kHz to 8 GHz	
Frequency band:	Frequency band	Band
	9 kHz to 3.3 GHz	0
	3.2 GHz to 6.6 GHz	1-
	6.5 GHz to 8 GHz	1+

Frequency reading accuracy: \pm (Reading of frequency x Frequency reference (Start, stop, center frequency, accuracy + Span x 1% + RBW x 15% + 60 Hz) marker frequency)

Counter	
Resolution:	1 Hz to 1 kHz
Accuracy:	\pm (Marker frequency x Frequency reference accuracy + 1LSD) (S/N \geq 25 dB, span \leq 200 MHz)

Frequency reference accuracy	
Stability:	$\pm 2 \times 10^{-6}$ /year, $\pm 1 \times 10^{-7}$ /year (Option 20) $\pm 1 \times 10^{-5}$ (0 to 50°C), $\pm 2 \times 10^{-8}$ /day (Option 20)

Frequency span	
Range:	1 kHz to 8 GHz, 0 Hz (zero span)
Accuracy:	$\leq \pm 1\%$

Residual FM: ≤ 60 Hzp-p/0.1s, ≤ 20 Hzp-p/0.1s (Option 20)

Signal purity:	offset	f ≤ 2.6 GHz	f > 2.6 GHz
	20 kHz	≤ -105 dBc/Hz	≤ -103 dBc/Hz

* RBW 300 Hz (Option 27)

Resolution bandwidth (3 dB)	
Range:	1 kHz to 3 MHz, 1-3-10 sequence 30 Hz, 100 Hz, 300 Hz (Option 27)
Accuracy:	$< \pm 20\%$, 1 kHz to 1 MHz $< \pm 25\%$, 3 MHz $< \pm 20\%$ (added with Option 27)
6 dB bandwidth:	1 MHz, 120 kHz, 9 kHz 200 Hz (Option 27)

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

Amplitude range

Measuring range: +30 dBm to average noise level

Maximum input level (Input ATT ≥ 10 dB)	
Preamplifier OFF:	+30 dBm, 0 VDC max.
Preamplifier ON:	+13 dBm, 0 VDC max.

Indication range:	
Log:	10 x 10 div 10, 5, 2, 1 dB/div
Linear:	10% of the reference level/div.

Reference level range	
Preamplifier OFF:	(Input ATT: 0 to 75 dB)
Log:	-64 to +65 dBm (0.1 dB step)
Linear:	141.1 μ V to 397.63 V
Preamplifier ON:	(Input ATT: 0 to 30 dB)
Log:	-82 to +10 dBm (0.1 dB step)
Linear:	17.76 μ V to 707.1 mV

Input ATT range: 0 to 75 dB (5 dB step)

Dynamic range

Average noise level:	
	RBW 1 kHz, VBW 10 Hz, input ATT 0 dB, f ≥ 10 MHz
Preamplifier OFF*1:	Band 0: -117 dBm + 2f (GHz) dB Band 1-: -115 dBm + 0.5f (GHz) dB Band 1+: -115 dBm + 0.5f (GHz) dB
Preamplifier ON:	-132 dBm + 3f (GHz) dBm (at 1 MHz to 3.3 GHz)

1 dB gain compression:	
	f ≥ 200 MHz
Preamplifier OFF:	> 0 dBm (mixer input level)
Preamplifier ON:	> -25 dBm (RF input level)

Spurious response: Preamplifier OFF			
2nd-order harmonic distortion:			
	Frequency range	Mixer input	Distortion level
	100 MHz \leq f < 800 MHz	-30 dBm	≤ -70 dBc
	f ≥ 800 MHz (Band 0)	-30 dBm	≤ -80 dBc
	f ≥ 3.3 GHz	-10 dBm	≤ -100 dBc

2 signal 3rd-order intermodulation distortion: ≤ -80 dBc (Mixer input -30 dBm, f ≥ 200 MHz, Offset > 50 kHz)

Image/multiple/outband response: ≤ 70 dBc

Residual response:	When input ATT 0 dB, 50 Ω terminated
Preamplifier OFF:	≤ -100 dBm (1 MHz to 3.3 GHz) ≤ -90 dBm (> 3.3 GHz)
Preamplifier ON:	≤ -105 dBm (1 MHz to 3.3 GHz)

Amplitude accuracy

Frequency response:	
	After auto calibration Preselector peak After adjustment at ATT = 10 dB
Preamplifier OFF:	$\leq \pm 0.5$ dB (100 kHz to 3 GHz)*2 $\leq \pm 2$ dB (9 kHz to 3.3 GHz) $\leq \pm 2$ dB (3.2 to 8 GHz)
Preamplifier ON:	$\leq \pm 1$ dB (100 kHz to 2.7 GHz) $\leq \pm 2$ dB (9 kHz to 3.3 GHz)

Calibration signal level accuracy:	
	-20 dBm ± 0.3 dB

IF gain error:	
	After auto calibration $< \pm 0.5$ dB

Scale indication accuracy:	
Log:	After auto calibration $\leq \pm 1.5$ dB/80 dB $\leq \pm 1$ dB/10 dB $\leq \pm 0.2$ dB/1 dB
Linear:	$\pm 5\%$ of reference level

Input ATT switching error:	
	$\leq \pm 0.3$ dB (for 0 to 50 dB, with reference to 30 MHz/10 dB)

Resolution bandwidth switching level error:	
	After auto calibration $< \pm 0.5$ dB

Total level accuracy:	
	± 1.5 dB (REF = -50 to 0 dBm, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, f = 100 kHz to 3 GHz, after auto calibration)

Sweep

Sweep time:	
	20 ms to 1000 s, 50 μ s to 1s (Option 29, zero span) $< \pm 2\%$

Accuracy: $< \pm 2\%$

Trigger mode: FREE RUN, LINE, VIDEO, EXT, TV,

Sweep mode: REPEAT, SINGLE

I/O

RF input	
Connector:	N type female
Impedance:	50 Ω (nominal)

VSWR	
Preamplifier OFF:	$< 2:1$ (9 kHz to 3.3 GHz) $< 2:1$ (3.2 to 8 GHz) Input ATT = 10 to 75 dB
Preamplifier ON:	$< 2.5:1$ (9 kHz to 3.3 GHz)

Probe power: ± 12 V, 4-pin connector

Calibration output signal:	
	BNC female, 50 Ω (nominal) 30 MHz, -20 dBm

10 MHz reference input:	
	BNC female, 500 Ω (nominal) -10 to +10 dBm

External trigger input: BNC female

Sound output (demodulated audio):	
	Small monophonic jack

GPIO interface: IEEE-488 BUS connector

RS232 interface: D-sub 9-pin

Printer interface: D-sub 25-pin, ESC/P, ESC/P-R, PCL

Video output: VGA (15-pin, female)

Floppy disk: 3.5-inch, MS-DOS format

General specifications

Operating temperature:	
	0 to +50 °C, Relative humidity 85% or less (no dew condensation)

Storage temperature:	
	-20 to +60 °C, relative humidity 85% or less

Power supply:	
	100/200 VAC auto-switchable 100 VAC: 100 to 120 VAC, 50 to 60 Hz 200 VAC: 200 to 240 VAC, 50 to 60 Hz

Power consumption: 200 VA or less

Dimensions:	
	Approx. 424 (W) x 177 (H) x 300 (D) mm (excluding feet and connectors)

Mass: 15 kg or less (excluding options, cover, and accessories)

*1 Temperature range at 20 to 30°C 2 dB is added in the range of 0 to 50°C

*2 Temperature range at 20 to 30°C 0.5 dB is added in the range of 0 to 50°C

Options

OPT.73 Wide-range FM demodulation

Measuring amplitude range: > -50 dBm + input attenuation value
(at center frequency 1 GHz, RBW Wide,
-20 dB or more than reference level)

FM Deviation

Measuring range 2.5 MHz, 1 MHz, 500 kHz, 250 kHz, 100 kHz,
50 kHz, 25 kHz, 10 kHz
Linearity error*: \leq (2 % of measuring range)
Offset error*: \leq (4 % of measuring range + K + Readout of
frequency x Frequency reference accuracy)
K: 8 kHz (measuring range 2.5 MHz to 250 kHz)
2 kHz (measuring range 100 kHz to 10 kHz)

Demodulation frequency
bandwidth (3 dB): \leq 300 kHz (nominal)

** These errors are values obtained by executing "FM Demod ALL CAL" software,
after warming up the R3132/3132N/3162 for 30 minutes or more.*

OPT.74 Tracking generator

Frequency range: 100 kHz to 3.0 GHz
Output level range: 0 to -59.9 dBm
Output level accuracy: \pm 0.5 dB (30 MHz, -10 dBm, 20 to 30°C)
Output level flatness: \pm 1.0 dB (100 kHz to 1 GHz)
 \pm 1.5 dB (100 kHz to 3 GHz)
(-10 dBm, 30 MHz reference)

Spurious

Harmonics: \leq -20 dBc (output level = -10 dBm)
Non-harmonics: \leq -30 dBc (output level = -10 dBm)