

N9321C Basic Spectrum Analyzer

9 kHz to 4 GHz



Definitions and Conditions

Specification

Describes the performance of parameters covered by the product warranty and apply to the full temperature range of 5 to 45 °C, unless otherwise noted.

Typical

Describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 20 to 30 °C. This data does not include measurement uncertainty.

Nominal

Indicates expected performance or describe product performance that is useful in the application of the product but are not covered by the product warranty.

The analyzer will meet its specifications when:

- It is within its calibration cycle
- It has been turned on at least 30 minutes
- It has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on; if it had previously been stored at a temperature range inside the allowed storage, but outside the allowed operating range

Frequency and Time Specifications

		Supplemental information
Frequency		
Range	9 kHz to 4 GHz	AC coupled
Resolution	1 Hz	
Frequency reference		
	Option PFR	Standard
Nominal frequency	10 MHz	10 MHz
Aging rate	$\pm 1 \times 10^{-7}/\text{Year}$	$\pm 1 \times 10^{-6}/\text{Year}$
Temperature stability		
20 °C to 30 °C	$\pm 1.5 \times 10^{-8}$	
5 °C to 45 °C	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-6}$
Achievable initial calibration accuracy	$\pm 4 \times 10^{-8}$	$\pm 1 \times 10^{-6}$
Frequency readout accuracy (start, stop, center, marker)		
Marker resolution	(frequency span)/(number of sweep point - 1)	
Uncertainty	$\pm (\text{freq indication} \times \text{freq reference uncertainty}^1 + 1\% \times \text{span} + 20\% \times \text{resolution bandwidth} + \text{marker resolution} + 1 \text{ Hz})$	
Sweep point	461, fixed	
Marker frequency counter		
Resolution	1 Hz	
Accuracy	$\pm [(\text{marker freq} \times \text{freq reference uncertainty}^1) + (\text{counter resolution})]$	RBW/Span ≥ 0.02 Marker level to displayed noise level > 25 dB, frequency offset = 0 Hz

1. Frequency reference uncertainty = Aging rate x period since adjustment + temperature stability.

		Supplemental information
Frequency span (FFT and swept mode)		
Range	0 Hz (zero span), 50 Hz to 4 GHz	
Resolution	1 Hz	
Accuracy	$\pm (0.22\% \times \text{span} + \text{span}/(\text{sweep point} - 1))$	Nominal
Sweep time and triggering		
Range	2 ms to 1000 s	Span \geq 100 Hz
	600 ns to 1000 s	Span = 0 Hz (minimum resolution = 600 ns, when RBW \geq 30 kHz)
Mode	Continuous, Single	
Sweep time rule	Accuracy or Speed	
Trigger	Free run, video, external, RF burst	
Trigger slope	Selectable positive or negative edge	
Trigger delay	\pm 12 ms to \pm 12 s, nominal	Span = 0 Hz
Time gated sweep (Option TMG)		
Gate sources	External	
	Periodic timer	Sync sources include free and external Period 0 to 20 s (It should be greater than gate delay plus gate length) Offset -5 to +5 s
Gate delay range	12 μ s to 10 s	Resolution = 200 ns
Gate length range	84 μ s to 10 s	Resolution = 200 ns
RBW range	\geq 1 kHz	VBW is fixed and equal to RBW for efficiency

		Supplemental information
Resolution bandwidth (RBW)		
Range (-3 dB bandwidth)	10 Hz to 3 MHz	In 1-3-10 sequence
Accuracy	± 5%, nominal	< 10% when RBW = 3 MHz
Resolution filter shape factor	< 5:1, nominal	60 dB/3 dB bandwidth ratio, digital, Gaussian-like
EMI bandwidth (CISPR compliant)	200 Hz, 9 kHz, 120 kHz, 1 MHz	Option EMC required
Accuracy	± 10%, nominal	
Resolution filter shape factor	< 5:1, nominal	-60 dB/-6 dB bandwidth ratio
Video bandwidth (VBW)		
Range	1 Hz to 3 MHz	In 1-3-10 sequence
Accuracy	± 10%, nominal	VBW = 1 Hz to 1 MHz

Amplitude Specifications

		Supplemental information
Measurement range		
100 kHz to 1 MHz	Displayed average noise level (DANL) to +10 dBm	Preamp off
1 MHz to 4 GHz	Displayed average noise level (DANL) to +20 dBm	
Input attenuator range	0 to 50 dB, in 1 dB steps	
Maximum damage level		
Average continuous power	+33 dBm, 3 minutes maximum	Input attn \geq 20 dB, 2 MHz to 4 GHz
DC voltage	\pm 50 VDC maximum	
Level display range		
Scale units	dBm, dBmV, dB μ V, W, V, dBmV EMF, dB μ V EMF, V EMF	
Marker level readout	0.01 dB	Log scale
Resolution	< 1% of signal level	Linear scale
Number of traces	4	
Detectors	Normal, positive peak, sample, negative peak, average (video, RMS, voltage), quasi-peak (option EMC required)	
Trace function	Clear/write, maximum hold, minimum hold, average	
Frequency response		
20 to 30°C, 30% to 70% relative humidity, attenuation 20 dB, reference frequency 50 MHz		
9 to 100 kHz	\pm 0.5 dB nominal	Preamp off
100 kHz to 3 GHz	\pm 0.7 dB	Preamp off
3 to 4 GHz	\pm 0.85 dB	Preamp off
100 kHz to 3 GHz	\pm 0.7 dB	Preamp on
3 to 4 GHz	\pm 0.9 dB	Preamp on

		Supplemental information
Input attenuation switching uncertainty at 50 MHz		
1 to 50 dB attenuation	± 0.2 dB, typical	Relative to 20 dB reference setting
Resolution bandwidth switching uncertainty		
10 Hz to 3 MHz RBW	+0.1 dB, nominal	
Total absolute amplitude accuracy		
20 to 30 °C, 30% to 70% RH, peak detector, RBW 1 kHz, VBW 300 Hz, sweep time Accuracy, input signal -50 to 0 dBm, preamp off, attenuation 20 dB. Add additional ± 0.3 dB when sweep time rule is set to Speed		
At 50 MHz	± 0.3 dB	
At all frequencies	± (0.3 dB + frequency response)	
100 kHz to 3 GHz	± 0.60 dB	95th percentile
3 to 4 GHz	± 0.65 dB	95th percentile
Preamp on		
At 50 MHz	± 0.4 dB	
At all frequencies	± (0.4 dB + frequency response)	
100 kHz to 3 GHz	± 0.60 dB	95th percentile
3 to 4 GHz	± 0.65 dB	95th percentile
Preamplifier (Option P04)		
Frequency range	9 kHz to 4 GHz	
Gain	25 dB, nominal	100 kHz to 4 GHz
	15 dB, nominal	9 to 100 kHz

Dynamic Range Specifications

1 dB gain compression			
20 to 30°C, frequency ≥ 50 MHz, Ref level > -20 dBm, nominal			
Mixer power level (dBm) = input power (dBm) – input attenuation (dB) when preamp off			
Total power at the preamp = total power at the input (dBm) – input attenuation (dB) when preamp on			
Preamp off	50 to 200 MHz	+2 dBm	
	200 to 500 MHz	+4 dBm	
	500 MHz to 4 GHz	+7 dBm	
Preamp on	> -32 dBm, total power at the preamp		
Displayed average noise level	Normalized to 1 Hz	Minimum RBW	
20 to 30 °C, input terminated 50 Ω, 0 dB input attenuation, RBW = 1 kHz, RMS detector, average ≥ 40			
Preamp off	9 to 100 kHz	-100 dBm, nominal	-90 dBm, nominal
	100 kHz to 1 MHz	-108 dBm, typical -127 dBm	-98 dBm, typical -117 dBm
	1 to 10 MHz	-128 dBm, typical -146 dBm	-118 dBm, typical -136 dBm
	10 to 500 MHz	-142 dBm, typical -146 dBm	-132 dBm, typical -136 dBm
	500 MHz to 2.5 GHz	-141 dBm, typical -145 dBm	-131 dBm, typical -135 dBm
	2.5 to 4 GHz	-140 dBm, typical -144 dBm	-130 dBm, typical -134 dBm
Preamp on	9 to 100 kHz	-110 dBm, nominal	-100 dBm, nominal
	100 kHz to 1 MHz	-131 dBm, typical -150 dBm	-121 dBm, typical -140 dBm
	1 to 10 MHz	-148 dBm, typical -163 dBm	-138 dBm, typical -153 dBm
	10 to 500 MHz	-161 dBm, typical -164 dBm	-151 dBm, typical -154 dBm
	500 MHz to 2.5 GHz	-159 dBm, typical -162 dBm	-149 dBm, typical -152 dBm
	2.5 to 4 GHz	-158 dBm, typical -161 dBm	-148 dBm, typical -151 dBm

Spurious response		
Input terminated and 0 dB input attenuation, preamp off 20 to 30 °C		
Residual response	< -90 dBm, typical -98 dBm	
-30 dBm signal at input mixer 20 to 30 °C		
Input related spurious	< -75 dBc	
	Exceptions:	
	-65 dBc (F1 - 21.4 MHz, with F1 input frequency)	
	-65 dBc (F1 - 5.35 MHz, with F1 input frequency)	
Mixer signal level at -30 dBm, input attenuation 0 dB, preamp off, 20 to 30 °C		
Second harmonic distortion	50 MHz to 3 GHz	< -65 dBc
	3 to 4 GHz	< -70 dBc
Two -20 dBm tones at input mixer, spaced by 100 kHz, input attenuation 0 dB, preamp off, reference level > -20 dBm, 20 to 30 °C		
Third order intermodulation distortion (third order intercept)	50 to 300 MHz	+9 dBm, typical +12 dBm
	300 MHz to 4 GHz	+11 dBm, typical +15 dBm
Phase noise		
20 to 30 °C, center frequency = 1 GHz		
Offset from CF signal	10 kHz	Typical -90 dBc/Hz
	100 kHz	-98 dBc/Hz, typical -100 dBc/Hz
	1 MHz	-119 dBc/Hz, typical -121 dBc/Hz
Residual FM		
20 to 30 °C, RBW 100 Hz	≤ 10 Hz p-p in 20 ms, nominal	

Option Specifications

		Supplemental information
Tracking generator (Option TG4)		
Frequency range	5 MHz to 4 GHz	
Output level	0 to -20 dBm	1 dB steps
Resolution bandwidth	3 kHz to 3 MHz	
Output flatness	1 dB	Nominal
VSWR	< 2.0:1	Nominal
Connector and impedance	Type-N female, 50 Ω	
Maximum safe reverse level	30 dBm (1W)	Average total power
	± 50 VDC	DC voltage
Reflection measurement (Option RM4, requires Option TG4)		
Frequency range	5 MHz to 4 GHz	
Frequency resolution	100 kHz	
Output power	-4 to +2 dBm, nominal	
Measurement speed	2 s (full span 5 MHz to 4 GHz)	
Number of data points	461	
Directivity of calibrator	> 40 dB	Mechanical OSL calibrator
Return loss		
Range	0 to 60 dB	
Accuracy	$20 \times \log_{10} (1.1 + 10^{-(D-RL)/20}) + 0.016 \times 10^{-(RL/20)} + 10^{(-3+RL/20)}$	Nominal, after average D: Directivity of calibrator RL: Return loss of the DUT
Resolution	0.01 dB	

		Supplemental information
Voltage standing wave ratio		
Range	1 to 65	
Resolution	0.01	
Accuracy	Refer to return loss accuracy	
Insertion loss		
Range	0 to 30 dB	
Resolution	0.01 dB	
Distance-to-fault (DTF)		
Vertical range	0 to 60 dB	Return loss
	1 to 65	VSWR
Range	(Number of data points – 1) × resolution	Number of data points = 461
Resolution (meter)	$(1.5 \times 10^8) \times (V_P)/(F_2 - F_1)$ Hz	VP is the cable's relative propagation velocity F ₂ is the stop frequency F ₁ is the start frequency
Immunity to interface		
On-channel	+17 dBm	Nominal
On-frequency	-5 dBm	Nominal
AM/FM modulation analysis (Option AMA)		
Frequency range	10 MHz to 4 GHz	
Carrier power accuracy	± 1.8 dB	Nominal
Carrier power range	-30 to +10 dBm	100 kHz to 2 MHz
	-30 to +20 dBm	2 MHz to 4 GHz

		Supplemental information
AM measurement (included in Option AMA)		
Modulation rate	20 Hz to 100 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Depth	5 to 95%	
Accuracy	± 4%	Nominal
FM measurement (included in Option AMA)		
Modulation rate	20 Hz to 200 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Deviation	20 Hz to 400 kHz	
Accuracy	± 4%	Nominal
ASK/FSK modulation analysis (Option DMA)		
Frequency range	2.5 MHz to 4 GHz	
Carrier power accuracy	± 2 dB	Nominal
Carrier power range	-30 to +20 dBm	Nominal
Carrier power displayed resolution	0.01 dBm	
ASK measurement (included in Option DMA)		
Symbol rate range	100 Hz to 100 kHz	
Modulation depth/index	5 to 95%	
Accuracy	± 4%	Nominal
Displayed resolution	0.1%	

		Supplemental information
FSK measurement (included in Option DMA)		
FSK deviation	100 Hz to 400 kHz	
Symbol rate range	100 Hz to 20 kHz	$1 \leq \beta^1 \leq 20$
	20 to 50 kHz	$1 \leq \beta \leq 8$
	50 to 100 kHz	$1 \leq \beta \leq 4$
Accuracy	$\pm 4\%$	Nominal
Displayed resolution	0.01 Hz	
Channel scanner (Option SCN)		
Scan modes	Top N, bottom N, and list	
Channels displayed	1 to 20	
Displayed orientation	Vertical	Number of channels ≤ 5
	Horizontal	Number of channels > 5
Chart	Bar chart, and time chart	
Log file	*.csv	
Spectrum monitor (Option MNT)		
Display modes	Spectrogram	
	Spectrum trace	
	Combination of spectrogram and spectrum trace in one screen	
Port control	Disable or enable LAN or USB connectors	

1. β is the ratio of frequency deviation to symbol rate (deviation/rate).

		Supplemental information
Security features (Option SEC)		
Security erase method	Erase the entire user flash memory by writing single character “1” over all memory locations	Non-recoverable
Port control	Disable or enable LAN or USB connectors	
Task planner (Option TPN)		
Task plan execution mode	Auto, manual, and manual if fail	
Task plan file	*.TPN	Complementary task plan editor is available with Keysight HSA and BSA PC software
Number of tasks	Maximum 20 in a single .TPN file	
Measurements supported	Spectrum analysis and power suite (channel power, ACPR and OBW)	
	For more information, visit www.keysight.com/find/taskplanner	
USB average power sensor support (Option PWM)		
Power sensor supported	Keysight U2000 Series USB power sensor	
Frequency range	9 kHz to 24 GHz	Sensor dependent
Dynamic range	-60 to +44 dBm	Sensor dependent
USB peak and average power sensor support (Option PWP)		
Power sensor supported	Keysight U2020 and U2042/44 X-Series USB peak and average power sensor	
Frequency range	50 MHz to 40 GHz	Sensor dependent
Dynamic range	-30 to +20 dBm	Sensor dependent

		Supplemental information
Base band input (Option BB1)		
Frequency range	9 kHz to 10 MHz	
Frequency span	100 kHz to 9.997 MHz	
Frequency resolution	1 Hz	
Measurement ranged	DANL to +10 dBm (9 kHz to 2 MHz)	
	DANL to +20 dBm (2 MHz to 10 MHz)	
Overall amplitude accuracy		
20 to 30°C, 30 to 70% RH, peak detector, input signal -50 to 0 dBm, 95 th percentile		
9 to 100 kHz	± 2.5 dB	
100 kHz to 10 MHz	± 1.5 dB	
Displayed average noise level		
20 to 30 °C, 30 to 70% RH, 10 Hz RBW, 1 Hz VBW, 50 Ω termination on input, 0 dB attenuation, RMS detector, Trace average > 40, reference level < -35 dBm		
9 to 100 kHz	-135 dBm	Nominal
100 kHz to 10 MHz	-145 dBm	
Phase noise		
Fc = 5 MHz, RBW = 1 kHz, VBW = 30 Hz. Ref level -30 dBm, input attenuation 0 dB, input signal -20 dBm, average > 40		
Offset 30 kHz	-120 dBc/Hz	Nominal
Offset 100 kHz	-127 dBc/Hz	Nominal
Offset > 200 kHz	-130 dBc/Hz	Nominal

		Supplemental information
Base band input (Option BB1, continued)		
Residual response		
	< -120 dBm, nominal	20 to 30°C, Ref level < -35 dBm 50 Ω termination on input 0 dB attenuation
Second harmonic distortion		
	< -55 dBc nominal	F > 100 kHz Signal level -30 dBm Ref level -30 dBm Attenuation 0 dB
Third order intermodulation distortion		
	< -55 dBc, nominal	F > 100 kHz -20 dBm tones at 100 kHz apart Ref level -20 dBm Attenuation 0 dB

Inputs and Outputs

Front panel		
RF input connector	N-type female, 50 Ω , nominal	
VSWR	10 MHz to 3 GHz	< 1.5:1, nominal, \geq 10 dB attenuation
	3 to 4 GHz	< 2.0:1, nominal, \geq 10 dB attenuation
Calibration output	Amplitude	-25 ± 0.25 dBm
	Frequency	40 MHz
	Connector and impedance	BNC-type female, 50 Ω , nominal
Probe power	Voltage/Current	+15 V, 150 mA maximum
		-12.6 V, 150 mA maximum
RF output connector	N-type female, 50 Ω , nominal	Option TG4 installed
USB interface (host)	A plug, version 1.1	
Rear panel		
10 MHz reference output	Output amplitude	> 0 dBm
	Frequency	10 MHz \pm (10 MHz \times frequency reference accuracy)
	Connector and impedance	BNC-type female, 50 Ω , nominal
10 MHz reference input	Input amplitude	-5 to +10 dBm, nominal
	Frequency	10 MHz
	Connector and impedance	BNC-type female, 50 Ω , nominal
External trigger input	Input amplitude	5 V TTL level, -12.6 V, 150 mA max (nominal)
	Connector and impedance	BNC-type female, 10 k Ω
LAN TCP/IP interface	100Base-T, RJ-45 connector	
USB interface (device)	B plug, version 1.1	
Mini USB (device)	Mini-AB female, version 1.1	
GPIB interface	IEEE-488 bus connector	Optional G01 installed

General

Temperature and relative humidity	
Operating temperature range	+5 to +45 °C
Storage temperature range	-20 to +70 °C
Relative humidity	< 95%
EMC	
Complies with European EMC Directive 2014/30/EU	
IEC/EN 61326-1	
CISPR Pub 11 group 1, class A	
AS/NZS-AS CISPR 11:2017	
ICES/NMB-001	
This ISM device complies with Canadian ICES-001	
Cet appareil ISM est conforme à la norme NMB-001 du Canada	
Safety	
Complies with European Low Voltage Directive 2014/35/EU	
· IEC/EN 61010-1 3.1 Edition	
· Canada: CAN/CSA-C22.2 No 61010-1-12	
· USA: UL 61010-1 3.1 Edition	
Audio noise	
Normal position. Per ISO 7779.	
Acoustic noise emission	LpA < 70 dB

Environmental stress

Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions. Test methods are aligned with IEC 60068-2 and levels are similar to MILPRF-28800F Class 3

Power requirements

Voltage and frequency (nominal)	100 to 240 VAC, 50 to 60 Hz, Auto ranging
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Power consumption	≤ 25 W, < 20 W, typical
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Display

Resolution	640 x 480
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Size	165.1 mm (6.5 inch) diagonal (nominal)
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Data storage

Internal	64 MB nominal
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External	Supports USB 3.0 compatible memory devices
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Weight (without options)

Net	7.9 kg (17.4 lbs), nominal
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Shipping	14.5 kg (30.9 lbs), nominal
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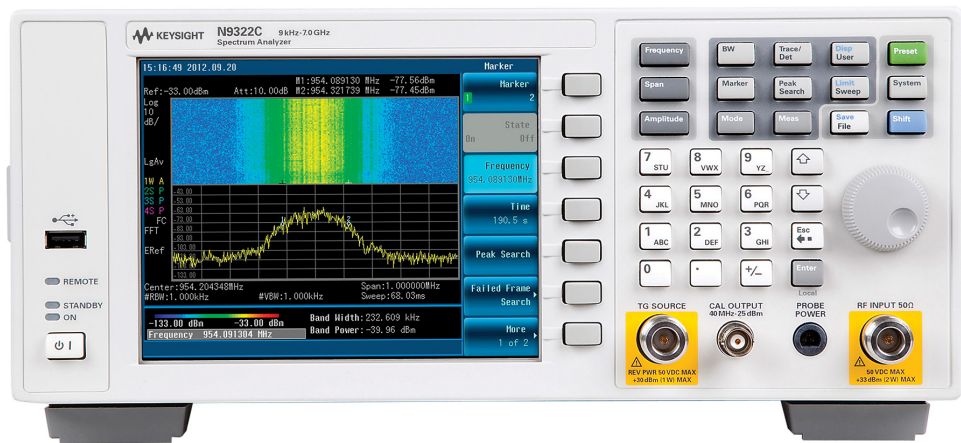
Dimensions	
Height	132.5 mm (5.2 inch)
Width	320 mm (12.6 inch)
Length	400 mm (15.7 inch)
Warranty	
The N9321C spectrum analyzer is supplied with a five-year warranty	
Calibration cycle	
The recommended calibration cycle is one year. Calibration services are available through Keysight service centers	

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus



Keysight Technologies N9322C Basic Spectrum Analyzer



Easy on your budget. Tough to beat performance, efficiency, and simplicity.

Easy on Your Budget Value

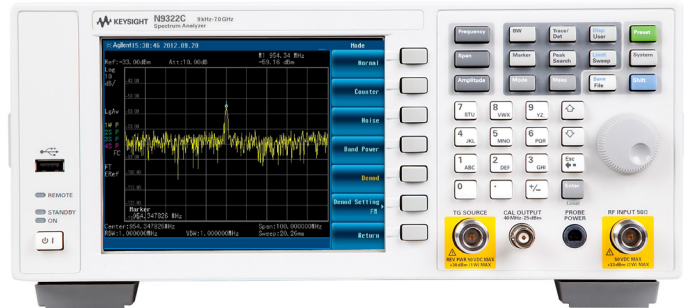
Achieve higher productivity on a smaller budget. That's the challenge you face whether you are fine-tuning a new design, balancing throughput and accuracy on the manufacturing floor, providing maintenance service, or verifying field equipment.

It also necessitates that your choice of equipment provides just the right balance between price and performance. The modestly-priced, general purpose Keysight Technologies, Inc. N9322C basic spectrum analyzer (BSA) delivers.



Tough to Best Performance, Efficiency, and Simplicity

When it comes to spectrum analyzers, the Keysight N9322C BSA defines a new generation of value-priced, general purpose instruments for the 9 kHz to 7 GHz frequency range. Features like proven testing efficiency, best-in-class usability, and the flexibility to adapt to new requirements are just a few of the reasons using the N9322C means you can rely on results.



Key specifications and features

- 9 kHz to 7 GHz frequency range
- ± 0.3 dB absolute amplitude accuracy
- 10 Hz to 3 MHz resolution bandwidth
- -152 dBm displayed average noise level (Freq at 1 GHz, 10 Hz minimum RBW)
- -90 dBc/Hz phase noise
- 50 dB input attenuator, with 1 dB steps
- $+11$ dBm TOI
- 2 ms to 1000 s sweep time (span ≥ 100 Hz)
- Optional 7 GHz tracking generator, and reflection measurement

General specifications

- 5 to 45 °C operating temperature
- 25 W nominal power consumption
- Dimension (H x W x D): 132.5 x 320 x 400 mm, (5.2 x 12.6 x 15.7 inch)
- Weight: 7.6 kg
- 1 year calibration cycle

Count on Performance

As market forces necessitate “cost down” programs, compromising quality is not an option and reliability is paramount. Whether your application is consumer electronics R&D, manufacturing bench repair, RF-related education, or spectrum management projects, you need an affordable spectrum analyzer that is equipped with the essential functionality and the required performance.

Best-in-class RF performance translates to precision for every measurement task with the Keysight N9322C spectrum analyzer. With an annual aging rate up to ± 0.1 ppm, frequency drift is minimal so measurement accuracy is finely tuned. The typical displayed average noise level of up to -152 dBm makes identifying low-level signals quick and easy. Total absolute amplitude accuracy up to ± 0.6 dB ensures you can trust power measurement results.

Work with ease

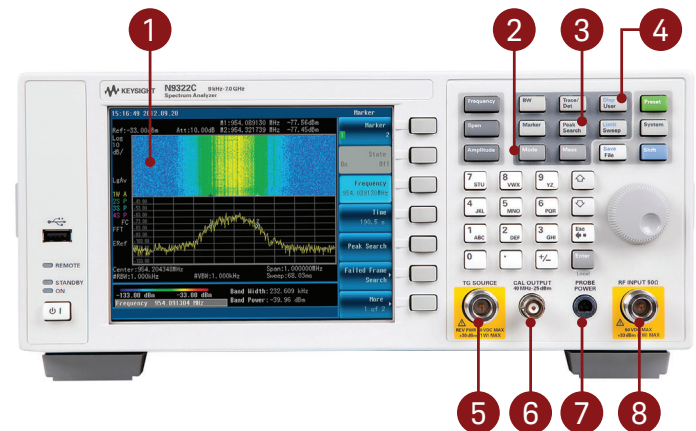
The N9322C has redefined the meaning of “ease-of-use” for a basic spectrum analyzer. User-definable softkeys mean up to seven of the engineer’s most frequently used measurements setups are readily accessible. That makes switching between tasks more efficient and that helps improve higher throughput rates.

The optional task planner capability automates testing using pre-defined setup routines.



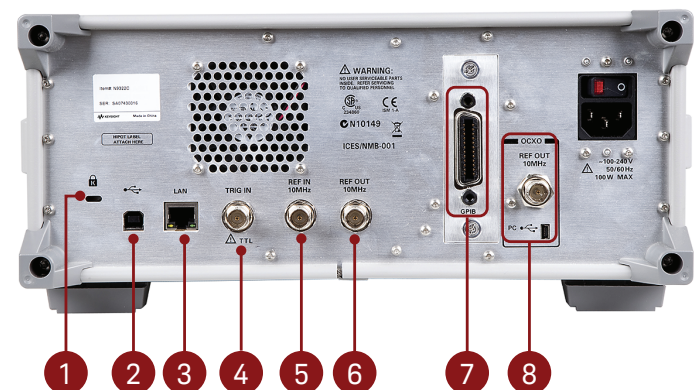
N9322C front panel

1. 6.5" TFT color display with multiple language user interface
2. Multiple measurement modes
3. One-button PowerSuite
4. User key for quick access to 7 frequently-used measurement configurations
5. 7 GHz tracking generator (including a built-in bridge)
6. 40 MHz calibration output
7. Probe power
8. RF input, 50 Ω



N9322C rear panel

1. Security Kensington lock
2. USB port (device)
3. LAN port 100Base-T
4. Trigger input, TTL level
5. Reference input, 10 MHz
6. Reference output, 10 MHz
7. GPIB interface (Option G01)
8. Precision frequency reference, 10 MHz, $\pm 1 \times 10^{-7}$ /year aging rate (Option PFR)



Work with Ease

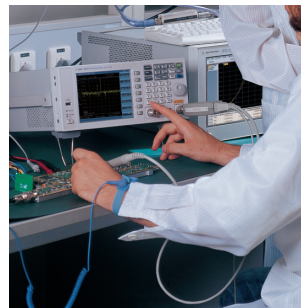
Rich features for budget-driven applications

Whether your application is consumer electronics R&D, manufacturing, bench repair, or RF-related education or spectrum management projects, you need a spectrum analyzer that provides essential functionality and required performance at an affordable price. The N9322C BSA is designed to be the right answer for you.



General purpose R&D

If the pressure to deliver new products on a tight schedule rests with you, you recognize the importance of achieving faster verification without compromising the reliability of test results. The N9322C has the essential capability you need to look into your design so you can quickly overcome development obstacles. Add to that measurement repeatability you can trust and you have an affordable resource to help you reach those time-to-market and on-schedule-delivery goals—and that peace of mind can be invaluable.



You can also get more tests done with Keysight N9322C BSA:

- One-button power suite: CHP, OBW, ACPR, SEM, and spectrogram make signal measurements simple and intuitive
- 7 GHz tracking generator with built-in VSWR bridge, support transmission and reflection measurements
- Demodulation mode allows you to easily and cost-effectively gain more insight into AM/FM, and ASK/FSK signal analysis
- Supports Keysight U2000 Series and U2020 X-Series USB power sensors for precision amplitude accuracy

RF education

Every year a new crop of students rely on you to teach them the basic principles of spectrum analysis and you realize the most effective way for them to learn is with hands-on lab work. The constraint is often the number of available analyzers. Your solution is the N9322C. It has the basic functions students need to learn, at a price that allows you to get more spectrum analyzers than you thought possible.



Work with Ease (continued)

Spectrum monitoring

The rapid release of new mobile devices is placing unprecedented demand on spectrum availability. Glitches in the system mean lost revenue and unhappy customers. You need the ability to detect low-level RF signals while simultaneously resolving closely spaced frequencies. You can depend on the N9322C. Included in its capability is its spectrum monitoring feature that allows you to record and playback captured traces, so you can quickly identify interfering signals arising from unwanted or unexpected transmissions.



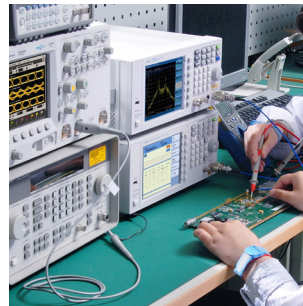
Consumer electronics manufacturing

Maintaining the production line and ensuring dependable operation is part of your domain, and the demands are numerous. Topping the list are typically goals aimed at lowering product costs and shortening the production process. One method to reach these expectations is to shorten test times, without compromising product quality. The N9322C is your solution. With “just right” functionality it gives you the performance, reliability, and efficiency you need—at an attractively frugal price.



Bench repair

Repairing handsets (such as mobile phones) demands fast, cost effective test solutions. The N9322C is a functional and indispensable in low-cost bench repair applications—and for general purpose RF development and verification test. Detecting low-level signals while simultaneously resolving closely spaced frequencies is a fundamental requirement for RF testing. Employing one of the best combinations of sensitivity and narrow resolution bandwidths (RBW) ensures that the N9322C BSA readily handles these tasks.



Outperform Basic Expectations

Power measurements made easy

One of the most fundamental measurements performed by spectrum analyzers is the frequency domain measurement of RF power. However, detailed analysis of a signal often requires standards-defined spectral masks or more complex power, bandwidth, and detector measurement combinations.

With its one-button PowerSuite the N9322C makes it easy to measure channel power, occupied bandwidth (OBW), adjacent channel power ratio (ACPR), spectrum emission mask (SEM).

The channel scanner (Option SCN) enables the N9322C BSA to simultaneously scan a maximum of 20 different channels, calculate each channel's power, and display the results in a bar or time chart.

Option SCN supports three scan modes:

- Top N
- Bottom N
- List

Depending on the number of channels, the N9322C display toggles between horizontal and vertical views, making it easier to read results. A one-button logging function saves results in a .csv file.

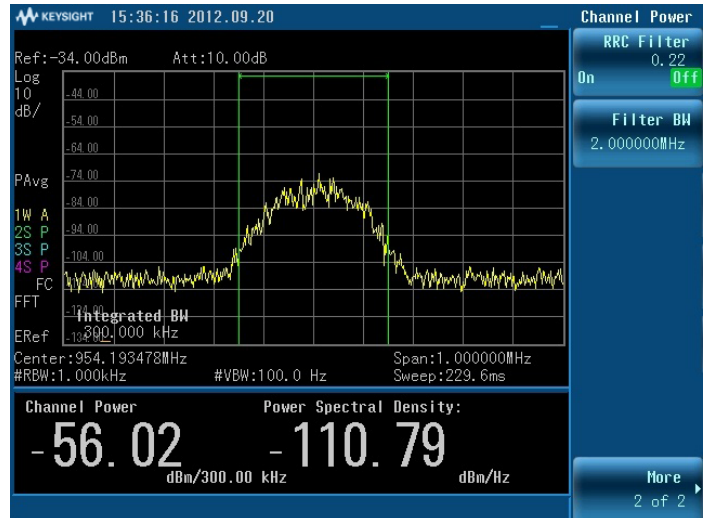


Figure 1. Channel power measurement

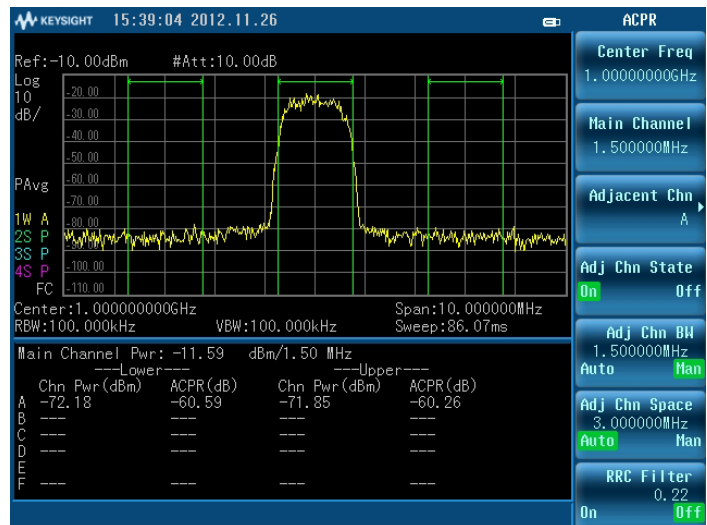


Figure 2. ACPR measurement

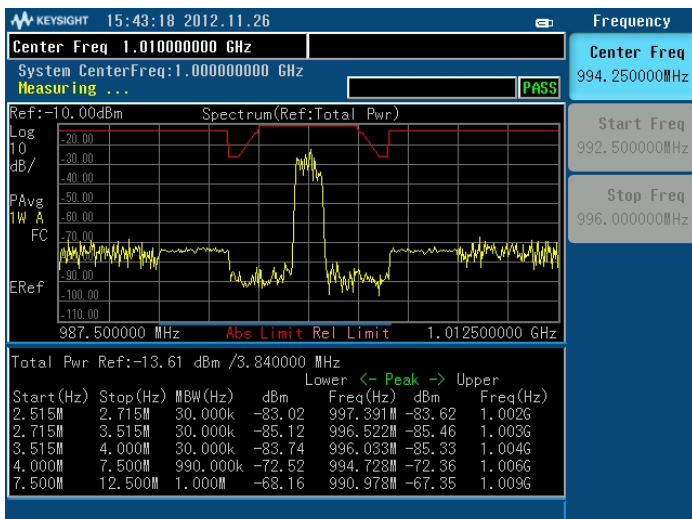


Figure 3. SEM measurement

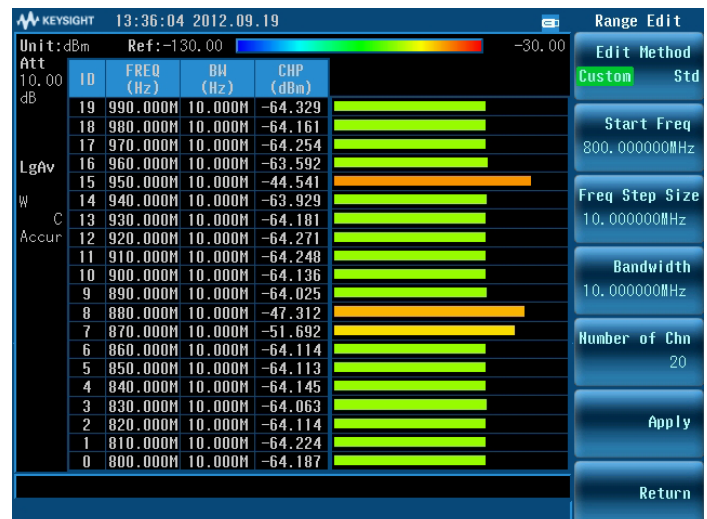


Figure 4. Option SCN (Channel scanner) for simultaneous channel power measurement

Outperform Basic Expectations (continued)

ASK/FSK demodulation analysis

The ASK/FSK modulation has been widely adopted in low power, low data rate RF communications, because it ties low cost, high performance wireless connectivity with long battery life. Today, ASK/FSK modulation technology is embedded in a variety of products and systems, ranging from personal consumer electronics, automotive electronics, RFID and automatic meter reading, to giant industrial devices.

The N9322C with Option DMA offers a cost-effective ASK/FSK demodulation analysis solution for you.

- It supports four display modes: symbol, waveform, ASK/FSK error, and eye diagram.
- The demodulation metrics include carrier power, ASK modulation depth, ASK modulation depth, FSK frequency deviation, ASK/FSK error, ASK index, and more.

Did you know FSK enables...

- Wireless medical telemetry (patient monitoring)
- Railway temperature monitoring
- Wireless peripherals: speakers, headphones, mice, and keyboards
- Auto vehicle access
- Tire pressure monitoring systems
- Garage door openers
- Crane control
- More...

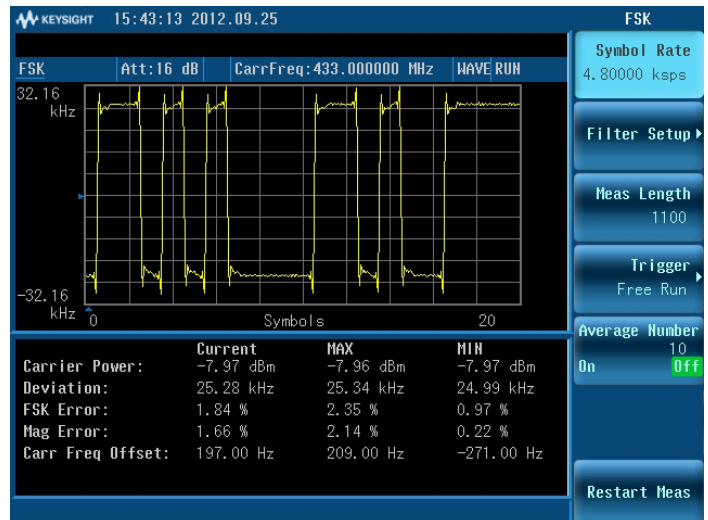


Figure 5. FSK demodulation with waveform view

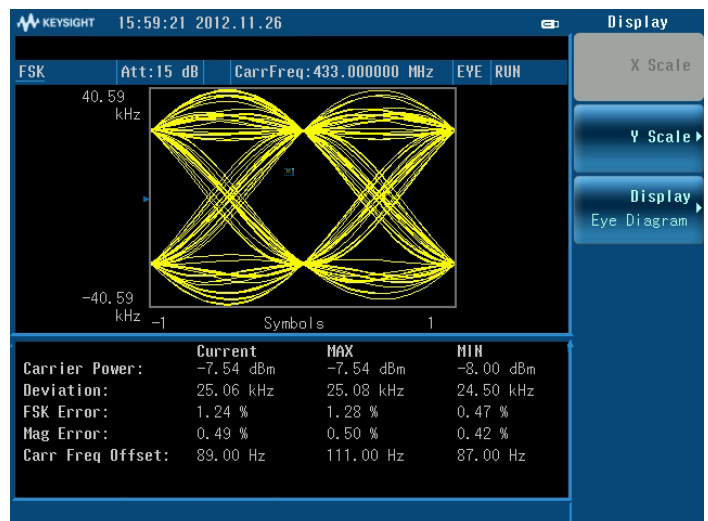


Figure 6. FSK demodulation with eye diagram view

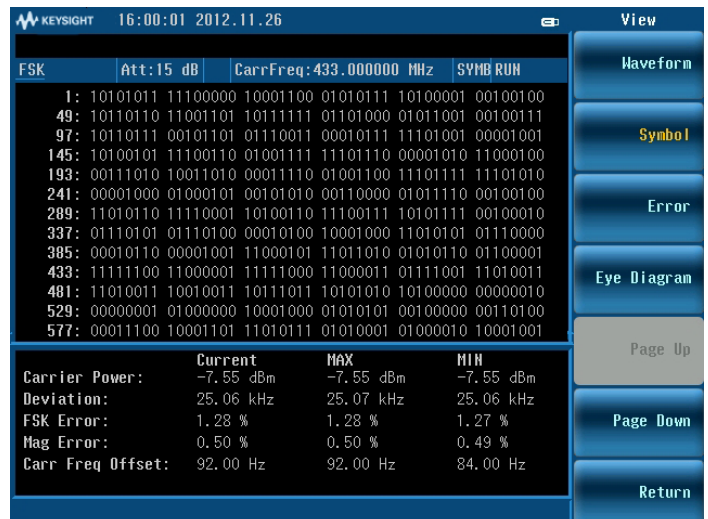


Figure 7. FSK demodulation with symbol view

Outperform Basic Expectations (continued)

More stimulus/response measurements covered

Varieties of RF components are used as building blocks for larger systems. A designer counts on certain specifications being met, such as filter cutoff frequency, amplifier power output, and antenna match. These specifications must be verified by the component manufacturer and often by the R&D designer as well.

The N9322C with Option TG7 offers a 7 GHz tracking generator to help you cost-effectively implement scalar network analysis (magnitude versus frequency).

Often it is also important to measure the reflection of a component to ensure efficient transfer of RF energy. Measuring antenna match is a good example. The N9322C's Option RM7 and Option RM7 combined with the tracking generator, built-in VSWR bridge, and reflection measurement capability, easily covers one-port return loss, VSWR, insertion loss, and distance-to-fault measurement capabilities for frequencies up to 7 GHz.

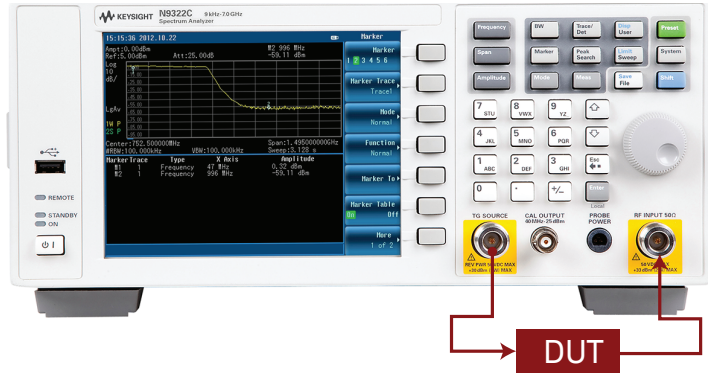


Figure 8. Option TG7 (tracking generator) provides scalar network analysis capability up to 7 GHz

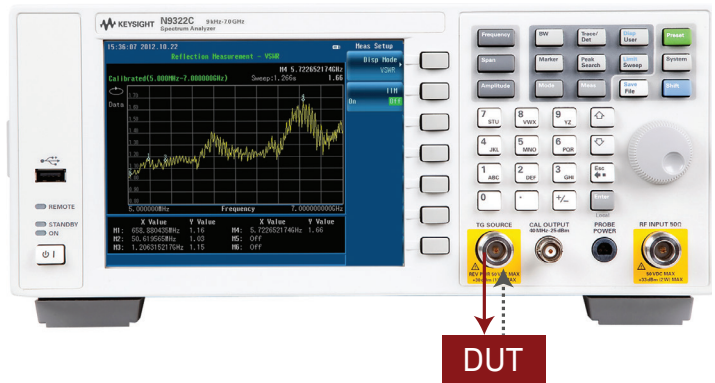


Figure 9. Option RM7 provides reflection measurement capability up to 7 GHz

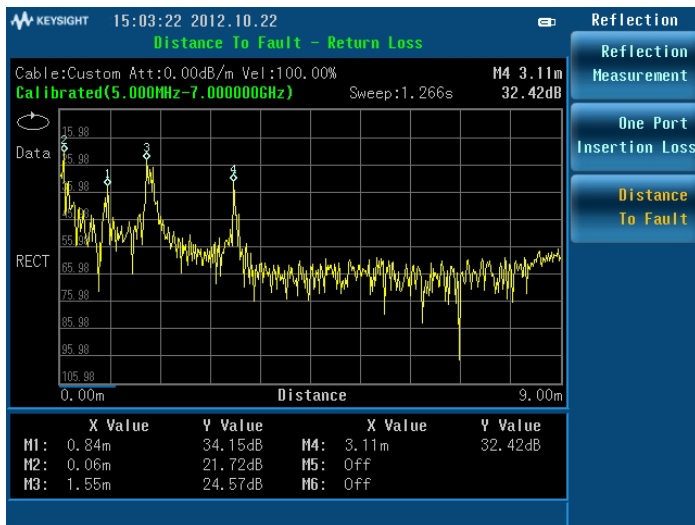


Figure 10. Measuring distance-to-fault with N9322C

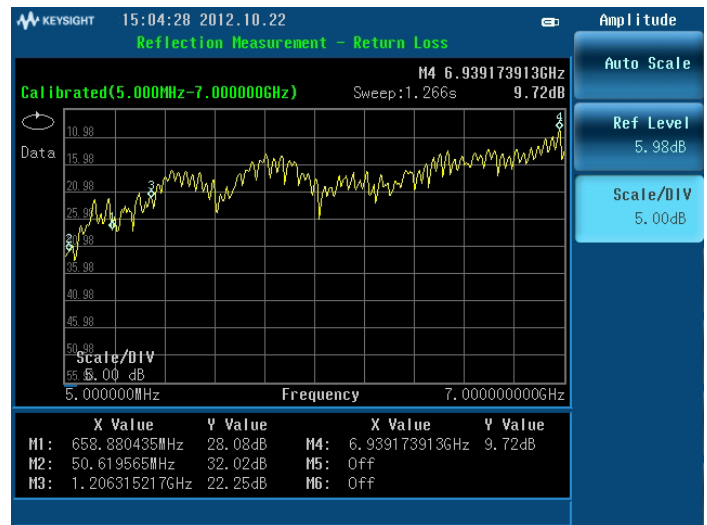


Figure 11. Measuring return loss with N9322C

N9322C Measurement Capabilities Overview

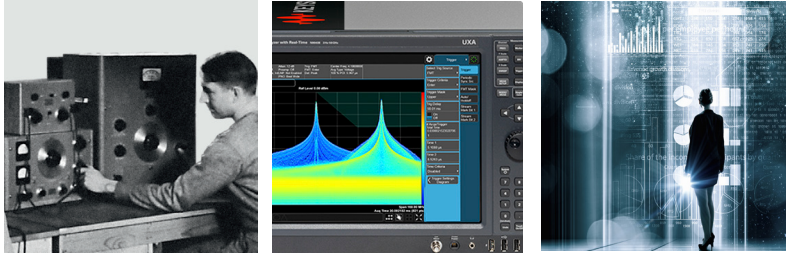
Description	Option	Additional information
Swept-tuned and FFT	Standard	Allows selection of swept-tuned or FFT to be made manually or defer to the mode determined by the N9322C BSA. Note: the FFT mode can be turned on when RBW is set to 30 kHz or lower
Auto tune	Standard	Finds, tunes, and zoom-in on the signal automatically (level > -50 dBm)
Trace math	Standard	Provides true power calculations with results displayed in dBm
Simultaneous detectors	Standard	Features a total of four traces and support simultaneous detectors. Four different detectors can be used on four different traces in a single sweep
Marker zoom-in/out	Standard	Moves the marker to the signal of interest, zooms in to see more details with one button push, and zooms out to see the whole frequency band
Noise marker	Standard	Measures noise level in dBm/Hz or dBuV/Hz
Marker logging	Standard	Records the marker readout over time to a .csv file
Band power	Standard	Measures both power and power spectral density in a specified channel bandwidth
Peak table	Standard	Displays a list of up to 10 signal peaks from the selected trace. Exporting the peak table to .csv file is supported
User key	Standard	Customer-definable softkeys for express access to 7 of the most frequently used measurement setups
AM/FM tune and listen	Standard	Supplies AM/FM demodulated audio that can be heard with the internal speaker. The speaker volume and demodulation delay time are adjustable
Channel power	Standard	Computes and displays the power between the reference marker and the associated delta marker. Results can be displayed in a bar chart, or a meter graphical user interface (GUI)
Adjacent channel power ratio (ACPR)	Standard	Finds the transmitter's potential for interfering with a receiver on an adjacent channel (upper or lower). Up to six pairs of adjacent channels can be set up
Occupied bandwidth (OBW)	Standard	Determines the band of frequencies that contain a specified percentage of the total power within the measurement span
Channel table	Standard	Includes the major wireless communication standards and can be customized
AM/FM demodulation metrics	Option AMA	Shows the demodulation metrics: carrier power, modulation rate, AM depth/FM deviation, SINAD, and carrier frequency offset
ASK/FSK demodulation metrics	Option DMA	Shows the modulation metrics: carrier power, carrier frequency offset, ASK modulation depth/index, and FSK deviation. Displays the demodulated signal in any of four formats: waveform, symbol, error, and eye diagram
Channel scanner	Option SCN	Measures channel power for up to 20 channels simultaneously
Tracking generator	Option TG7	Measures two-port transmission of filters, amplifiers, and other devices
Reflection measurement	Option RM7	Measures one-port reflection of antenna, cable and other components or devices. Requires Option TG7 be installed on the instrument
Time-gated spectrum analysis	Option TMG	Obtains spectral information about signals in the frequency domain, that are separated in the time domain using an internal timer or external trigger signal to separate these time-varying signals
Task planner	Option TPN	Implements up to 20 pre-defined measurements automatically. Reduces test setup time by 95%, delivers test automation and consistency, and makes it easy to capture test results, generate reports and share task plans from one instrument to another
User data sanitation	Option SEC	Performs user data sanitation process, and overwrites instrument memory with "1"s
Spectrum monitoring	Option MNT	Monitors the spectrum and identifies interfering signals arising from unwanted or unexpected transmissions. Allows recording and playback of captured traces
High accuracy average power measurement	Option PWM	Makes true average power measurements with Keysight U2000 Series USB power sensors
High accuracy peak power measurement	Option PWP	Makes the true peak power measurement with Keysight U2020 X-Series USB power sensors

For more information on N9322C options, refer to:

- *N9322C Configuration Guide*, literature number 5991-1168EN
- *N9322C Data Sheet*, literature number 5991-1167EN
- Visit N9322C Web site at www.keysight.com/find/n9322c

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