Keysight N5264B
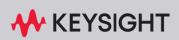# Measurement Receiver

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Table of Contents

Definitions

All specifications and characteristics apply over a 25 °C ±5 °C range (unless otherwise stated) and 90 minutes after the instrument has been turned on.

Specification (spec.): Warranted performance. Specifications include guardbands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions.

Characteristic (char.): A performance parameter that the product is expected to meet before it leaves the factory, but that is not verified in the field and is not covered by the product warranty. A characteristic includes the same guardbands as a specification.

Typical (typ.): Expected performance of an average unit which does not include guardbands. It is not covered by the product warranty.

Nominal (nom.): A general, descriptive term that does not imply a level of performance. It is not covered by the product warranty.

Calibration: The process of measuring known standards to characterize a network analyzer's systematic (repeatable) errors.

Corrected (residual): Indicates performance after error correction (calibration). It is determined by the quality of calibration standards and how well "known" they are, plus system repeatability, stability, and noise.

Uncorrected (raw): Indicates instrument performance without error correction. The uncorrected performance affects the stability of a calibration.

Standard: When referring to the analyzer, this includes no options unless noted otherwise.

Key Specifications

Table 1. Key Specifications

Description	Specification
Measurement Speed (max) points/sec @ 600 KHz IFBW, CW frequency	400,000 points/sec[1]
Receiver Inputs	5 (simultaneously)
Measurement Receivers	5 (simultaneously)
Data Buffer Size	4 billion bytes
Data Buffer size (max. points for single cut)	500 million points[2]
IF Bandwidth	1 Hz to 5 MHz
Frequency Source Control Interface	TLL hand shake
Trigger In / Out	Three pairs
Host Computer Interface	Ethernet, USB and GPIB
Security	Hard drive removable

[1] Fast CW mode - no point triggering.
[2] For single parameter; two parameters are 250 million points each.

Measurement Throughput Summary

Table 2. Typical Cycle Time[1, 2] (ms) for Measurement Completion

Description	Typical Performance (time/point in millisecond)			
Number of Points	CW 10 GHz (no band crossings), 801 points			
Trigger Mode	Hardware			
IF Bandwidth	600 kHz	100 kHz	10 kHz	1 kHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = MXG, N5183A opt. UNZ, Fast switching	0.070	0.075	0.185	1.00
RF = MXG, N5183A opt. UNZ, Fast switching LO = N5264B opt. 108[3]	0.070	0.075	0.185	1.00
RF = MXG, N5183A opt. UNZ, Fast switching LO = PSG	0.350	0.350	0.450	0.250
RF = MXG, N5183A opt. UNZ, Fast switching LO = 83623B	0.900	0.900	1.00	1.800
RF = UXG, N5193A opt. SS1, 1 µs switching speed LO = UXG, N5193A opt. SS1, 1 µs switching speed	.020	.027	.140	.940
	Standard			
Number of Points	801	1601		

Description	Typical Performance (time/point in millisecond)		
Trigger Mode	Hardware		Sensitivity(dBm)[4]
Start 2 GHz, Stop 18 GHz, 1 MHz IF bandwidth (with band crossings)			
RF = MXG, N5183A opt. UNZ, Fast switching LO = MXG, N5183A opt. UNZ, Fast switching	0.580	0.580	-90.5 dBm, 2 – 3 GHz - 94.5 dBm, 3 – 12.5 GHz - 83 dBm, 12.5 – 18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = N5264B opt. 108[3]	0.580	0.580	-85.5 dBm, 2 – 3 GHz - 90.5 dBm, 3 – 12.5 GHz - 81 dBm, 12.5 – 18 GHz
RF = UXG, N5193A opt. SS1, 1 µs switching speed LO = UXG, N5193A opt. SS1, 1 µs switching speed	0.039	0.034	-90.5 dBm, 2 – 3 GHz - 94.5 dBm, 3 – 12.5 GHz - 83 dBm, 12.5 – 18 GHz
Start 2 GHz, Stop 18 GHz, 600 kHz IF bandwidth (with band crossings)			
RF = MXG, N5183A opt. UNZ, Fast switching LO = MXG, N5183A opt. UNZ, Fast switching	0.580	0.580	-92.5 dBm, 2 – 3 GHz - 96.5 dBm, 3 – 12.5 GHz - 85 dBm, 12.5 – 18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = N5264B opt. 108[3]	0.580	0.580	-85.5 dBm, 2 – 3 GHz - 92.5 dBm, 3 – 12.5 GHz - 83 dBm, 12.5 – 18 GHz
RF = UXG, N5193A opt. SS1, 1 µs switching speed LO = UXG, N5193A opt. SS1, 1 µs switching speed	0.045	0.039	-92.5 dBm, 2 – 3 GHz - 96.5 dBm, 3 – 12.5 GHz - 85 dBm, 12.5 – 18 GHz
Start 2 GHz, Stop 18 GHz, 10 kHz IF bandwidth (with band crossings)			
RF = MXG, N5183A opt. UNZ, Fast switching LO = MXG, N5183A opt. UNZ, Fast switching	0.730	0.730	-110.5 dBm, 2 – 3 GHz - 114.5 dBm, 3 –12.5 GHz - 103 dBm, 12.5 – 18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = N5264B opt. 108[3]	0.730	0.730	-103.5 dBm, 2 – 3 GHz - 110.5 dBm, 3 –12.5 GHz - 101 dBm, 12.5 –18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = PSG E8267D opt. 520, UNX	9.50	9.50	-110.25 dBm, 2 – 3 GHz - 112.50 dBm, 3 –12.5 GHz - 96.50 dBm, 12.5 – 18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = 83623B	7.80	--	-108.5 dBm, 2 – 3 GHz - 113.0 dBm, 3 –12.5 GHz - 96.0 dBm, 12.5 –18 GHz
RF = UXG, N5193A opt. SS1, 1 µs switching speed LO = UXG, N5193A opt. SS1, 1 µs switching speed	0.170	0.167	-110.5 dBm, 2 – 3 GHz - 114.5 dBm, 3 –12.5 GHz - 103 dBm, 12.5 – 18 GHz
Start 2 GHz, Stop 18 GHz, 1 kHz IF bandwidth (with band crossings)			
RF = MXG, N5183A opt. UNZ, Fast switching LO = MXG, N5183A opt. UNZ, Fast switching	1.5	1.5	-120.5 dBm, 2 – 3 GHz - 124.5 dBm, 3 –12.5 GHz - 113 dBm, 12.5 – 18 GHz
RF = MXG, N5183A opt. UNZ, Fast switching LO = N5264B opt. 108[3]	1.5	1.5	-113.5 dBm, 2 – 3 GHz - 120.5 dBm, 3 –12.5 GHz - 111 dBm, 12.5 – 18 GHz
RF = UXG, N5193A opt. SS1, 1 µs switching speed LO = UXG, N5193A opt. SS1, 1 µs switching speed	0.970	0.970	-120.5 dBm, 2 – 3 GHz - 124.5 dBm, 3 –12.5 GHz - 113 dBm, 12.5 – 18 GHz

Description	Typical Performance (time/point in millisecond)		
Start 2 GHz, Stop 18 GHz, 500 Hz IF bandwidth (with band crossings)			
RF = UXG, N5193A opt. SS1, 1 μs switching speed LO = UXG, N5193A opt. SS1, 1 μs switching speed	1.85	1.85	-120.5 dBm, 2 – 3 GHz - 124.5 dBm, 3 –12.5 GHz - 113 dBm, 12.5 – 18 GHz
Option 118 Fast-CW mode (CW frequency)			
	Number of Points per Second (#pt/Sec)		**External Trigger**
C.W, 7.0 GHz, ≥1 MHz IF bandwidth	--		400,000
C.W, 7.0 GHz, 600 KHz IF bandwidth	Up to 400,000		240,000
C.W, 7.0 GHz, 10 KHz IF bandwidth	Up to 8,200		7,000
C.W, 7.0 GHz, 1 KHz IF bandwidth	Up to 1,000		1,000

[1] Includes sweep time, retrace time and band-crossing time. Analyzer display turned on. Minus 21 ms from total time for display off with DISPLAY:ENABLE OFF. Data for two traces (A & B receiver) per measurement.
[2] After first complete sweep.
[3] When configuring the N5264B Option 108 as the LO source, you may improve system measurement sensitivity by using a method of AM noise suppression.
[4] Performance Characteristics when connected with 85309A and 85320A/B mixers - system noise floor + conversion gain.

Table 3. Time/Point (ms)

Description	Typical Performance					
Start 2 GHz, Stop 18 GHz, 801 points (with band crossings), hardware trigger						
IF Bandwidth	1 MHz	600 kHz	100 kHz	10 kHz	1 kHz	500 Hz
RF = UXG, N5193A opt. SS1, 1 μs switching speed LO = UXG, N5193A opt. SS1, 1 μs switching speed	.032	.035	.047	.165	.965	1.85

Table 4. Data Transfer Time (ms)

Description	Typical Performance			
	Number of Points			
	201	**401**	**1601**	**16,001**
SCPI over GPIB				
Program executed on external PC[1]				
32-bit floating point	5.6	10.5	39.9	400
64-bit floating point	10.5	20.3	79.2	788
ASCII	46	92.5	370	3702
SCPI over SICL/LAN or TCP/IP Socket				
Program executed in the analyzer				
32-bit floating point	0.18	0.21	0.5	3.6
64-bit floating point	0.22	0.28	0.62	5.3
ASCII	6.3	12.3	47.3	470
COM[2]				
Program executed in the analyzer				
32-bit floating point	<0.15	0.15	0.2	0.7
Variant type	0.75	1.2	4.5	50
DCOM over LAN[2]				
Program executed on external PC				
32-bit floating point	<1.0	1.2	2.1	13
Variant type	2.7	4.5	15	150

[1] Measured when using the SCPI command DISPlay: VISible OFF.
[2] Values are for real and imaginary pairs, with the analyzer display off.

Rear Panel Information

Table 5. External IF Inputs

External IF Inputs	
Description	**Typical Performance**
Function	Allows use of external IF signals from remote mixers or frequency converters
Connectors	SMA (female); A, B, C, D, R
Input Frequency	7.438017 MHz (See IF Input Frequencies below.)
Input Level	10 MHz: -15 dBm to +20 dBm 100 MHz: -10 dBm to +20 dBm
Input Impedance	50 Ω, nom.
RF Damage Level	+23 dBm
DC Damage Level	1 VDC
0.1 dB Compression Point	-9.0 dBm
Compression @ -10 dBm	
Magnitude	0.03 dB
Phase	0.23°
Noise Floor	
10 Hz IF BW	-143 dBm
10KHz IF BW	-113 dBm
Crosstalk	-134 dB[1]
Dynamic Range @ 10 Hz	134 dB @ 0.1dB compression to noise floor
Dynamic Accuracy	
-40 dBm reference, over range set by compression and noise floor @ IF Frequencies	
-10 dBm	0.037 dB
-20 dBm	0.024 dB
-30 dBm	0.016 dB
-40 dBm	0.010 dB
-50 dBm	0.013 dB
-60 dBm	0.021 dB
-70 dBm	0.032 dB

[1] Measurement conditions: normalized to -10 dBm, 10 Hz IFBW, averaging factor of 8.

IF Input Frequencies

The IF Input frequencies are different depending on the DSP Version.

With DSP Version 4:

- RF or Transmitting frequency < 53 MHz: IF = 2.535211 MHz [3 x (60e6 / 71)]
- RF or Transmitting frequency >= 53 MHz: IF = 7.605634 MHz [9 x (60e6 / 71)]

With DSP Version 5, the IF frequency is dependent on the RF or Transmitting frequency AND the current IFBW setting:

- All RF or Transmitting frequency; IF Bandwidth **>=** 1MHz

IFBW Setting	IF Frequency
1 MHz	7.692 MHz
1.5 MHz	7.368 MHz
2 MHz	8.450 MHz
3 MHz	8.163 MHz
5 MHz	6.897 MHz
7 MHz	10.53 MHz
10 MHz	15.38 MHz
15 MHz	22.22 MHZ

- IF Bandwidth <= 600 kHz:
  - RF or Transmitting frequency **<** 53 MHz; IF = 2.479339 MHz [(3 x (100e6 / 121)]
  - RF or Transmitting frequency **>=** 53 MHz; IF = 7.438017 MHz [(9 x (100e6 / 121)]

Manually change the IF frequency

The IF frequency can be changed to any value between +14.9999 MHz and -14.9999 MHz using SENS:IF:FREQ (SCPI) or **IFFrequency** (COM) commands.

- With DSP Version 4 - 34 and above, min and max IF frequencies up to +/- 20.1 MHz are available.
- With DSP Version 5, min and max IF frequencies up to +/- 38 MHz are available.
- Performance is degraded drastically above +/- 14.9999 MHz.

Table 6. External IF Inputs (Cont.)

External IF Inputs (Cont.)	
Description	**Typical Performance**
Dynamic Accuracy (Cont.)	
-40 dBm reference, over range set by compression and noise floor @ IF Frequencies	
-80 dBm	0.041 dB
-90 dBm	0.049 dB
-100 dBm	0.057 dB
-110 dBm	0.072 dB
-120 dBm	0.188 dB

Table 7. LO Output 2 (Option 108)

LO output 2 (Option 108)	
Description	**Typical Performance**
Frequency Stability	+/- 0.05 ppm, -10 to 70C, +/- 0.1ppm/yr max
Frequency Accuracy	+/- 1 ppm
Frequency Range	10 MHz to 26.5 GHz
Frequency Switching Speed[2]	< 100 microsecond/point
Frequency Resolution	1 Hz
Power Flatness	+/- 1.0 dB
Power Output	+10 dBm
2nd Harmonics[3]	
20 MHz to 2.0 GHz	-23 dBc
2.0 GHz to 5.0 GHz	-28 dBc
5.0 GHz to 23.0 GHz	-35 dBc
23.0 GHz to 26.5 GHz	-27 dBc
3rd Harmonics[2]	
30 MHz to 8.0 GHz	-32 dBc
8.0 GHz to 15.0 GHz	-38 dBc
15.0 GHz to 26.5.0 GHz	-48 dBc

LO output 2 (Option 108)				
Description	**Typical Performance**			
Phase Noise				
	1 KHz Offset	**10 KHz Offset**	**100 KHz Offset**	**1 MHz Offset**
10 MHz to 500 MHz	-80 dBc/Hz	-85 dBc/Hz	-76 dBc/Hz	-113 dBc/Hz
500 MHz to 1 GHz	-90 dBc/Hz	-110 dBc/Hz	-106 dBc/Hz	-115 dBc/Hz
1 GHz to 2 GHz	-85 dBc/Hz	-105 dBc/Hz	-101 dBc/Hz	-110 dBc/Hz
2 GHz to 4 GHz	-80 dBc/Hz	-100 dBc/Hz	-96 dBc/Hz	-105 dBc/Hz
4 GHz to 8 GHz	-74 dBc/Hz	-94 dBc/Hz	-90 dBc/Hz	-99 dBc/Hz
8 GHz to 16 GHz	-68 dBc/Hz	-88 dBc/Hz	-84 dBc/Hz	-93 dBc/Hz
16 GHz to 26.5 GHz	-62 dBc/Hz	-82 dBc/Hz	-78 dBc/Hz	-87 dBc/Hz

[1] Absolute LO frequency is Front Panel set frequency plus 1 IF.
[2] No band crossings; IFBW ≥ 100 kHz with 801 measurement points.
[3] Listed frequency is the harmonic frequency setting entered with front panel (frequency setting entered with front panel plus {IF frequency} * {harmonic number}) at typical power.

Table 8. 10 MHz Reference

10 MHz Reference	
10 MHz Reference In	
Connector	BNC, female
Input Frequency	10 MHz ± 10 ppm, typical
Input Level	-15 dBm to +20 dBm, typical
Input Impedance	200 Ω, nom.
10 MHz Reference Out	
Connector	BNC, female
Output Frequency	10 MHz ± 1 ppm
Signal Type	Sine Wave, typical
Output Level	+10 dBm ± 4 dB into 50 Ω
Output Impedance	50 Ω, nominal
Harmonics	<-40 dBc, typical

Table 9. External IO Information

External IO Information		
Description	**Typical Performance**	
CPU Version	**CPU version 7.0, 8.0**	**CPU version 9.0**
USB Port	Four ports on front panel (all Host) and five ports (four hosts and one Device) on rear panel. Type A configuration (eight hosts) and Type B configuration (one Device), USB 2.0 compatible.	Four host ports on front panel (USB2.0, Type A). Four host ports on rear panel (USB3.1, Type A). One device port on rear panel (USB 3.0, Type B).
LAN	1G port; 10/100/1000 BaseT Ethernet, 8-pin configuration; auto selects between the data rates.	1G and 10G ports; 10GBASE-T, Ethernet, 8-pin configuration; auto selects between the data rates. Works with Cat6/Cat7 cable.
Video Output	15-pin mini D-Sub; Drives VGA compatible monitors	Display Port and USB-C (port TB1 only)
GPIB (two ports - dedicated controller and dedicated talker/listener)	24-pin D-sub (Type D-24), female; compatible with IEEE-488.	
Test Set IO	25-pin D-Sub connector, available for external test set control.	
Power IO	9-pin D-Sub, female; analog and digital IO	
Handler IO	36-pin parallel I/O port; all input/output signals are default set to negative logic; can be reset to positive logic via GPIB command.	

Table 10. Trigger Information

Trigger Information	
Description	**Typical Performance**
Trigger In/Meas Trigger	
Nominal Input Impedance	5K Ohms
Minimum Pulse Width	1 us
DC Damage Level	5.5 volts
Drive Voltage	TTL (0, +5.0) Volts
Trigger out/Meas Trigger Ready	
Nominal Input Impedance	5K Ohm
Pulse Width	= Data acquisition
Polarity	Selectable with sweep or point mode
Drive Voltage	TTL (0, +5.0) Volts
Trigger Inputs/Outputs (Aux. 1 & 2)	BNC(f), TTL/CMOS compatible

Table 11. Line Power

Line Power	
Description	**Typical Performance**
Power supply is auto switching	
Frequency, Voltage	50/60/400 Hz for 100/120 VAC 50/60 Hz for 220/240 VAC
Max	575 watts

Front Panel Information

Table 12. Front Panel Information, All Options

Description	Typical Performance
USB 2.0 Ports	
Number of Ports	4
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Display	
Size	31 cm (12.1 in) diagonal color active matrix LCD; 1280 (horizontal) X 800 (vertical) resolution
Refresh Rate	Vertical 60 Hz; Horizontal 49.31 kHz
Pixels	Any of the following would cause a display to be considered faulty: • A complete row or column consists of "stuck" or "dark" pixels. • More than six "stuck on" pixels (but not more than three green) or more than 0.002% of the total pixels are within the LCD specifications. • More than twelve "dark" pixels (but no more than seven of the same color) or more than 0.004% of the total pixels are within the LCD specifications. • Two or more consecutive "stuck on" pixels or three or more consecutive "dark" pixel (but no more than one set of two consecutive dark pixels). • "Stuck on" pixels or more than two "dark" pixels less than 6.5 mm apart (excluding consecutive pixels).
Display Range	
Magnitude	±2500 dB (at 500 dB/div), max
Phase	±2500° (at 500 degrees/div), max
Polar	10 pUnits, min 10,000 Units, max
Display Resolution	
Magnitude	0.001 dB/div, min
Phase	0.01°/div, min
Marker Resolution	
Magnitude	0.001 dB, min
Phase	0.01°, min
Polar	10 pUnit, min

Analyzer Dimensions and Weight

Table 13. Analyzer Dimensions and Weight

Cabinet Dimensions	Height	Width	Depth
Excluding front and rear panel hardware and feet	267 mm 10.5 in	426 mm 16.75 in	533 mm 20.97 in
Excluding front and rear panel hardware and feet. Including rack-mount flanges.	266 mm 10.5 in EIA RU[1] = 6	426 mm 16.75 in	558 mm 21.95 in
As shipped - including front panel connectors, rear panel bumpers, and feet.	280 mm 11.0 in	435 mm 17.1 in	558 mm 21.95 in
As shipped including rack-mount flanges	280 mm 11.0 in	483 mm 19.00 in	558 mm 21.95 in
Weight			
	Standard	Option 108	--
Net	21 kg (45 lb), nominal	22 kg (48 lb), nominal	--
Shipping	37 kg (82 lb), nominal	38 kg (85 lb), nominal	--

[1] Feet removed from the N5264B.

Regulatory and Environmental Information

For Regulatory and Environmental information, refer to the PNA Series Installation and Quick Start Guide, located online at http://literature.cdn.keysight.com/litweb/pdf/E8356-90001.pdf.