

# Keysight 2-Port and 4-Port PNA-X Network Analyzer

N5249B - 10 MHz to 8.5 GHz

N5241B - 10 MHz to 13.5 GHz

N5242B - 10 MHz to 26.5 GHz

Data Sheet and  
Technical  
Specifications

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This is a complete list of the technical specifications for the N5241B, N5242B, and N5249B with the following options:

**Option 029**, adds hardware and firmware for high-accuracy noise figure measurements. It requires option 219, 222, 224, 419, 422, or 423. [See the block diagram.](#)

**Option 201**, 2-port standard test set (includes six front-panel access loops) and power range. [See the block diagram.](#)

**Option 217**, 2-port standard test set (includes six front-panel access loops), power range, and source and receiver attenuators (extended power range). [See the block diagram.](#)

**Option 219**, 2-port standard test set (includes six front-panel access loops), power range, source and receiver attenuators (extended power range), and bias-tees. [See the block diagram.](#)

**Option 222**, 2-port standard test set (includes six front-panel access loops), power range, source and receiver attenuators (extended power range), internal second source, a combiner, and mechanical switches to the 2-port analyzer. [See the block diagram.](#)

**Option 224**, 2-port standard test set (includes six front-panel access loops), power range, source and receiver attenuators (extended power range), internal second source, a combiner, mechanical switches to the 2-port analyzer, and bias tees. [See the block diagram.](#)

**Option 401**, 4-port standard test set (includes twelve front-panel access loops), power range, and an internal second source (Option 080 recommended). [See the block diagram.](#)

**Option 417**, 4-port standard test set (includes twelve front-panel access loops), power range, internal second source (Option 080 recommended), and source and receiver attenuators (extended power range). [See the block diagram.](#)

**Option 419**, 4-port standard test set (includes twelve front-panel access loops), power range, internal second source (Option 080 recommended), and source and receiver attenuators (extended power range), and bias-tees. [See the block diagram.](#)

**Option 422**, 4-port standard test set (includes six front-panel access loops), power range, source and receiver attenuators (extended power range), internal second source, a combiner, and mechanical switches to the 4-port analyzer. [See the block diagram.](#)

**Option 423**, 4-port standard test set (includes six front-panel access loops), power range, source and receiver attenuators (extended power range), internal second source, a combiner, mechanical switches to the 4-port analyzer, and bias tees. [See the block diagram.](#)

**Option 425**, (N5242B only) 4-port configurable test set, source and receiver attenuators, internal second source, combiner, mechanical switches, low frequency extension (LFE), and dedicated 26.5 GHz noise receiver. [See the block diagram.](#)

**NOTE**

Specifications for the N5241BS, N5242BS, and N5249BS Option H85, when configured in standard configuration, are the same as those of closest N5241B, N5242B, and N5249B option configuration.

[The Corrected System Performance with Cal Kits](#) and [Dynamic Accuracy Charts](#) apply ONLY to the N5241B, N5242B, and N5249B models with serial numbers starting with MY5241/42/49, SG5241/42/49, and US5241/42/49, and above. This document provides technical specifications only for the 85052B calibration kit, the N4433A 4-Port ECal module, and the N4691B 2-Port ECal module. Please download our free Uncertainty Calculator from [http://www.keysight.com/find/na\\_calculator](http://www.keysight.com/find/na_calculator) to generate the curves for your calibration kit and PNA setup.

For all tables in this data sheet, the specified performance at the exact frequency of a break is the degraded value of the two specifications at that frequency.

## Definitions

All specifications and characteristics apply over a  $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  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.

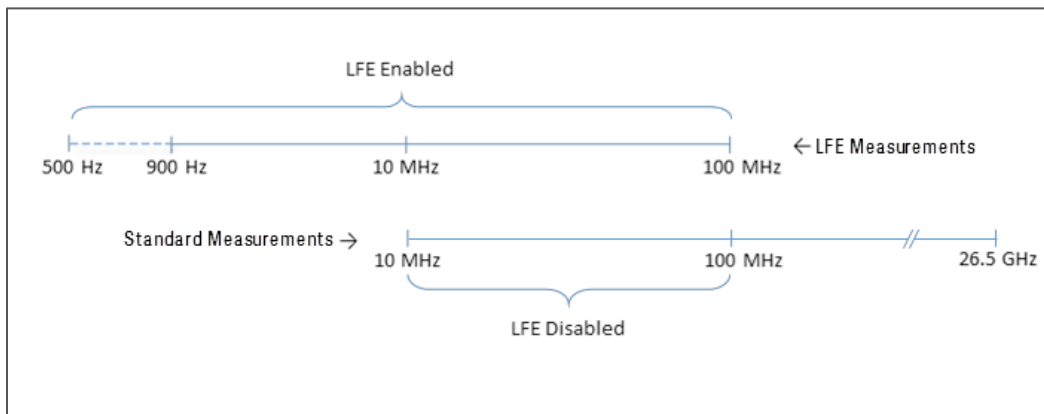
**Calibration:** The process of measuring known standards to characterize a network analyzer's systematic (repeatable) errors.

**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.

**Standard and LFE measurements:** With option 425, which adds low frequency extension (LFE) hardware, the LFE measurement range overlaps with the standard measurement range from 10 MHz to 100 MHz. With LFE Enabled, measurements from 500 Hz to 100 MHz use LFE hardware. With LFE Disabled, measurements from 10 MHz to 100 MHz use standard hardware. To measure below 10 MHz, LFE must be enabled. All measurements above 100 MHz use standard hardware, regardless of the LFE Enabled/Disabled setting.

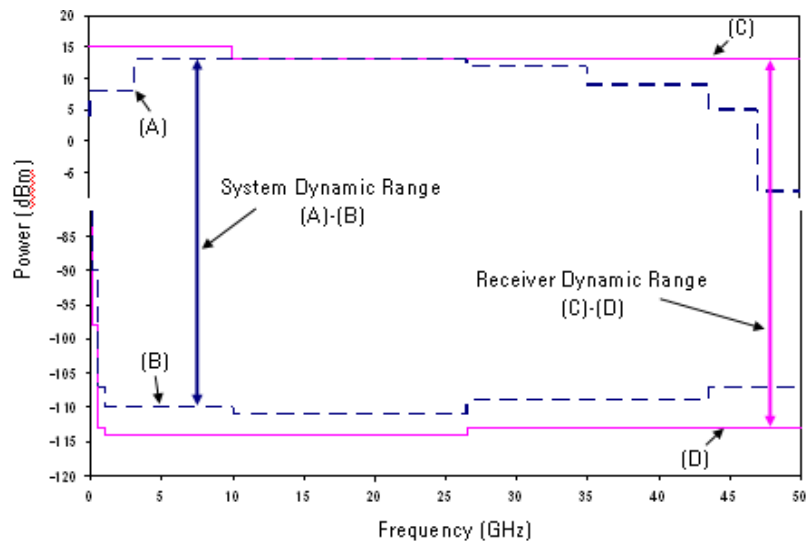




## Dynamic Range

The specifications in this section apply for measurements made with the N5241B, N5242B, and N5249B analyzer with the following conditions:

- 10 Hz IF bandwidth
  - No averaging applied to data
  - Isolation calibration with an averaging factor of 8
  - Source in filtered mode where applicable
- 
- **System Dynamic Range** is defined as the specified source maximum output power (A) minus the specified noise floor (B).
  - **Extended Dynamic Range at Direct Access Input** is defined as the specified source maximum output power (A) minus the specified direct receiver access input noise floor (not shown).
  - **Receiver Dynamic Range** is defined as the typical test port 0.1 dB compression (C) minus the typical noise floor (D).



## System Dynamic Range

Table 1. System Dynamic Range at Test Port (dB), Options 201 or 401

Description	Specification		Typical	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	93	93	106	104
50 MHz to 100 MHz	103	103	116	115
100 MHz to 500 MHz	117	117	131	130
500 MHz to 3.2 GHz	124	127	130	135
3.2 GHz to 8.5 GHz	127	127	137	136
8.5 GHz to 10 GHz	127	127	137	136
10 GHz to 13.5 GHz	127	127	134	133
13.5 GHz to 16 GHz	127	127	134	133
16 GHz to 20 GHz	127	124	133	129
20 GHz to 24 GHz	122	117	130	126
24 GHz to 26.5 GHz	112	109	124	120

<sup>1</sup> Either port can be used as the source port. Any other port can be used as the receiver port.

Table 2a. System Dynamic Range at Test Port (dB), Options 21x or 41x

Description	Specification		Typical	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	93	93	106	104
50 MHz to 100 MHz	103	103	115	114
100 MHz to 500 MHz	117	117	130	129
500 MHz to 3.2 GHz	124	127	130	135
3.2 GHz to 8.5 GHz	127	127	135	134
8.5 GHz to 10 GHz	127	127	135	134
10 GHz to 13.5 GHz	126	125	132	131
13.5 GHz to 16 GHz	126	125	132	131
16 GHz to 20 GHz	124	122	130	127
20 GHz to 24 GHz	118	117	127	124
24 GHz to 26.5 GHz	110	106	121	117

<sup>1</sup> Either port can be used as the source port. Any other port can be used as the receiver port.

Table 2b. System Dynamic Range at Test Port (dB), Option 22x

Description	Specification		Typical	
	Source 2 Out 1	Source 2 Out 2	Source 2 Out 1	Source 2 Out 2
10 MHz to 50 MHz	98	93	108	105
50 MHz to 100 MHz	108	107	117	116
100 MHz to 500 MHz	122	121	132	131
500 MHz to 3.2 GHz	128	128	134	136
3.2 GHz to 8.5 GHz	132	132	139	139
8.5 GHz to 10 GHz	132	132	139	139
10 GHz to 13.5 GHz	130	130	138	137
13.5 GHz to 16 GHz	130	130	138	137
16 GHz to 20 GHz	129	127	136	134
20 GHz to 24 GHz	123	122	133	132
24 GHz to 26.5 GHz	114	112	127	124

Table 2c. System Dynamic Range at Test Port (dB), Options 22x or 422, 423

Description	Specification		Typical			
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
10 MHz to 50 MHz	93	93	106	104	104	80
50 MHz to 100 MHz	103	103	115	115	112	90
100 MHz to 500 MHz	117	117	130	130	121	99
500 MHz to 3.2 GHz	124	127	130	134	127	112
3.2 GHz to 8.5 GHz	127	127	136	134	132	119
8.5 GHz to 10 GHz	127	127	136	134	132	119
10 GHz to 13.5 GHz	126	124	132	131	128	115
13.5 GHz to 16 GHz	126	124	132	131	128	115
16 GHz to 20 GHz	124	121	130	127	125	113
20 GHz to 24 GHz	117	115	127	124	121	109
24 GHz to 26.5 GHz	107	105	121	117	115	102

<sup>1</sup> Either port can be used as the source port. Any other port can be used as the receiver port.

Table 2d. System Dynamic Range at Test Port (dB), Option 423 with 029

Description	Specification		Typical			
	Port 1	Port 2	Port 1	Port 2	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
10 MHz to 50 MHz	92	93	105	104	103	89
50 MHz to 100 MHz	103	103	115	115	112	99
100 MHz to 500 MHz	117	117	130	130	127	114
500 MHz to 3.2 GHz	124	126	130	133	127	113
3.2 GHz to 8.5 GHz	127	127	136	134	132	119
8.5 GHz to 10 GHz	127	127	136	134	132	119
10 GHz to 13.5 GHz	126	124	132	131	128	115
13.5 GHz to 16 GHz	126	124	132	131	128	115
16 GHz to 20 GHz	124	120	130	126	125	113
20 GHz to 24 GHz	116	114	126	123	120	108
24 GHz to 26.5 GHz	107	105	121	117	113	102

Table 2e. System Dynamic Range at Test Port (dB), Option 425

Description	Specification		Typical			
	Ports 1, 3	Ports 2, 4	Ports 1, 3	Ports 2, 4	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
10 MHz to 50 MHz <sup>1</sup>	85	85	98	96	97	83
50 MHz to 100 MHz <sup>1</sup>	98	98	110	110	107	94
100 MHz to 500 MHz	112	112	125	125	122	109
500 MHz to 3.2 GHz	119	122	125	129	122	108
3.2 GHz to 8.5 GHz	125	125	134	132	130	117
8.5 GHz to 10 GHz	125	125	134	132	130	117
10 GHz to 13.5 GHz	124	122	130	129	126	113
13.5 GHz to 16 GHz	124	122	130	129	126	113
16 GHz to 20 GHz	122	119	128	125	123	111
20 GHz to 24 GHz	115	113	125	122	119	107
24 GHz to 26.5 GHz	105	103	119	115	113	100

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance  $\leq 100$  MHz, see Table 2f.

Table 2f N5242B System Dynamic Range at Test Port (dB), Option 425 (LFE Enabled)

Description	Specification	Typical	Effective Dynamic Range <sup>1</sup> (Typical)
500 Hz to 900 Hz	--	105	103
900 Hz to 1 kHz	93	109	105
1 kHz to 100 kHz	103	109	99
100 kHz to 1 MHz	119	124	124
1 MHz to 5 MHz	118	125	119
5 MHz to 10 MHz	111	117	117
10 MHz to 50 MHz	110	116	116
50 MHz to 100 MHz	110	116	116

<sup>1</sup> Effective dynamic range is when the crosstalk is greater than the noise floor, and thus crosstalk limits the dynamic range. Crosstalk only limits the dynamic range for IF bandwidths  $< 1$  kHz.

Table 2g. N5242B System Dynamic Range at Test Port (dB), Option 425 and Option 425 with 029 (LFE Enabled), Combine Mode - Typical

Description	Source 1 Port 1	Source 2 Port 1
500 Hz to 900 Hz	99	98
900 Hz to 1 kHz	103	102
1 kHz to 100 kHz	104	103
100 kHz to 1 MHz	118	118
1 MHz to 5 MHz	119	119
5 MHz to 10 MHz	111	110
10 MHz to 50 MHz	111	110
50 MHz to 100 MHz	111	110

Table 2h. System Dynamic Range at Test Port (dB), Option 425 with 029

Description	Specification		Typical			
	Port 1	Port 2	Port 1	Port 2	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
10 MHz to 50 MHz <sup>1</sup>	85	85	98	96	96	82
50 MHz to 100 MHz <sup>1</sup>	98	97	110	109	107	94
100 MHz to 500 MHz	112	111	125	124	122	109
500 MHz to 3.2 GHz	119	121	125	128	122	108
3.2 GHz to 8.5 GHz	125	125	134	132	130	117
8.5 GHz to 10 GHz	125	125	134	132	130	117
10 GHz to 13.5 GHz	124	122	130	129	126	113
13.5 GHz to 16 GHz	124	122	130	129	126	113
16 GHz to 20 GHz	122	118	128	124	123	111
20 GHz to 24 GHz	114	112	124	121	118	106
24 GHz to 26.5 GHz	105	103	119	115	111	100

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

## Extended Dynamic Range

Table 3a. Extended Dynamic Range at Direct Receiver Access Input (dB) - Typical

Description	Options 201, 401		Options 21x, 41x	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	128	128	128	128
50 MHz to 100 MHz	115	115	115	115
100 MHz to 500MHz	129	129	129	129
500 MHz to 3.2 GHz	136	139	136	139
3.2 GHz to 8.5 GHz	139	139	139	139
8.5 GHz to 10 GHz	139	139	139	139
10 GHz to 13.5 GHz	139	139	138	137
13.5 GHz to 16 GHz	139	139	138	137
16 GHz to 20 GHz	139	136	136	134
20 GHz to 24 GHz	134	129	130	129
24 GHz to 26.5 GHz	124	121	122	118

<sup>1</sup> Either port can be used as the source port. Any other port can be used as the receiver port.

Table 3b. Extended Dynamic Range at Direct Receiver Access Input (dB) - Typical

Description	Option 22x		Options 22x, 42x			
	Source 2 Out 1	Source 2 Out 2	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
10 MHz to 50 MHz	133	128	128	128	139	115
50 MHz to 100 MHz	120	119	115	115	124	102
100 MHz to 500MHz	134	133	129	129	133	111
500 MHz to 3.2 GHz	140	140	136	139	139	124
3.2 GHz to 8.5 GHz	144	144	139	139	144	131
8.5 GHz to 10 GHz	144	144	139	139	144	131
10 GHz to 13.5 GHz	142	142	138	136	140	127
13.5 GHz to 16 GHz	142	142	138	136	140	127
16 GHz to 20 GHz	141	139	136	133	137	125
20 GHz to 24 GHz	135	134	129	127	133	121
24 GHz to 26.5 GHz	126	124	119	121	127	114

<sup>1</sup> Either port can be used as the source port. Any other port can be used as the receiver port.

## Receiver Dynamic Range

Table 4a. Receiver Dynamic Range (dB), All Options

Description	Typical
10 MHz to 50 MHz <sup>1</sup>	--
50 MHz to 100 MHz <sup>1</sup>	--
100 MHz to 500 MHz	125
500 MHz to 3.2 GHz	130
3.2 GHz to 8.5 GHz	130
8.5 GHz to 13.5 GHz	130
13.5 GHz to 16 GHz	130
16 GHz to 20 GHz	129
20 GHz to 24 GHz	125.5
24 GHz to 26.5 GHz	123

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

Table 4b. N5242B Receiver Dynamic Range (dB), All Ports, Option 425 and Option 425 with 029 (LFE Enabled)

Description	Typical
500 Hz to 900 Hz	106
900 Hz to 1 kHz	109
1 kHz to 100 kHz	109
100 kHz to 1 MHz	123
1 MHz to 5 MHz	123
5 MHz to 10 MHz	119
10 MHz to 50 MHz	120
50 MHz to 100 MHz	120



## Corrected System Performance with 3.5mm Connectors, All Opts

For any  $S_{ii}$  reflection measurement:

- $S_{jj} = 0$ .

For any  $S_{ij}$  transmission measurement:

- $S_{ji} = S_{ij}$  when  $S_{ij} \leq 1$
- $S_{ji} = 1/S_{ij}$  when  $S_{ij} > 1$
- $S_{kk} = 0$  for all  $k$

Applies to the N5241B, N5242B, and N5249B Option 201 or 21x or 22x or 401 or 41x or 42x analyzers with serial numbers listed below, 85131F flexible test port cable set, and a full 2-port calibration.

N5241B and N5241BS: MY5241/SG5241/US5241 and above

N5242B and N5242BS: MY5242/SG5242/US5242 and above

Also applies to the following condition: Environmental temperature  $23^\circ \pm 3^\circ \text{C}$ , with  $< 1^\circ \text{C}$  deviation from calibration temperature. This document does not present specifications for the 85052C or 85052D Calibration Kit. The uncertainty charts were generated for Option 42x, although they are applicable for any option without Option 029. Please download our free Uncertainty Calculator from [http://www.keysight.com/find/na\\_calculator](http://www.keysight.com/find/na_calculator) to generate the curves for your calibration kit and PNA setup.

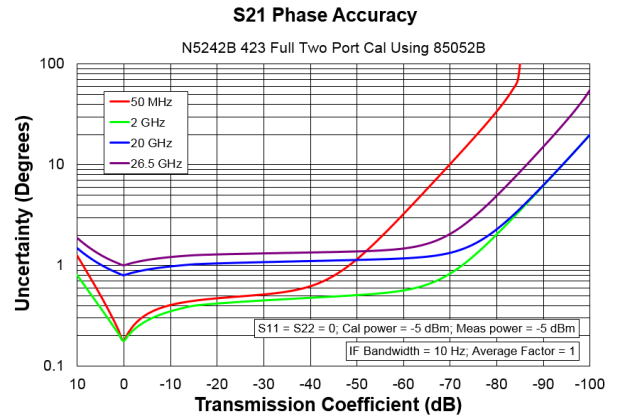
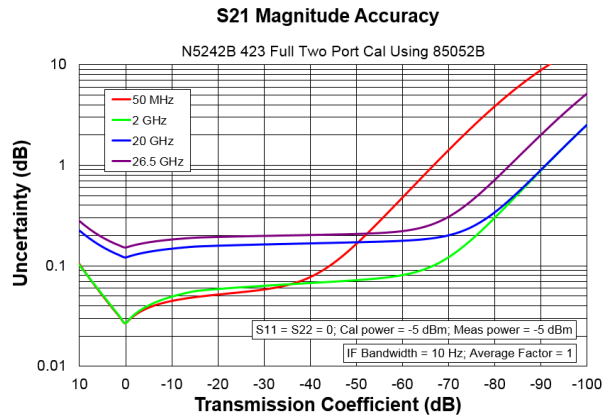
Table 5. 85052B Calibration Kit

Description	Specification (dB)						
	10 MHz to 50 MHz <sup>1</sup>	50 MHz to 500 MHz <sup>1</sup>	500 MHz to 2 GHz	2 GHz to 8.5 GHz	8.5 GHz to 13.5 GHz	13.5 GHz to 20 GHz	20 GHz to 26.5 GHz
Directivity	48	48	48	44	44	44	44
Source Match	40	40	40	31	31	31	31
Load Match	48	48	48	44	44	44	44
Reflection Tracking <sup>2</sup>							
Mag	$\pm 0.003$	$\pm 0.003$	$\pm 0.003$	$\pm 0.006$	$\pm 0.006$	$\pm 0.006$	$\pm 0.006$
Phase ( $^\circ$ )	$\pm 0.020$	$\pm 0.020$	$\pm 0.020$	$\pm 0.040$	$\pm 0.040$	$\pm 0.040$	$\pm 0.040$
Transmission Tracking without Option 029							
Mag	$\pm 0.034$	$\pm 0.034$	$\pm 0.017$	$\pm 0.091$	$\pm 0.091$	$\pm 0.104$	$\pm 0.119$
Phase ( $^\circ$ )	$\pm 0.225$	$\pm 0.225$	$\pm 0.110$	$\pm 0.602$	$\pm 0.602$	$\pm 0.688$	$\pm 0.788$
S <sub>21</sub> Transmission Tracking with Option 029 <sup>1</sup>							
Mag	$\pm 0.034$	$\pm 0.034$	$\pm 0.017$	$\pm 0.091$	$\pm 0.091$	$\pm 0.104$	$\pm 0.119$
Phase ( $^\circ$ )	$\pm 0.225$	$\pm 0.225$	$\pm 0.110$	$\pm 0.602$	$\pm 0.602$	$\pm 0.688$	$\pm 0.788$
S <sub>12</sub> Transmission Tracking with Option 029 <sup>1</sup>							
Mag	$\pm 0.017$	$\pm 0.017$	$\pm 0.017$	$\pm 0.091$	$\pm 0.091$	$\pm 0.104$	$\pm 0.119$
Phase ( $^\circ$ )	$\pm 0.110$	$\pm 0.110$	$\pm 0.110$	$\pm 0.602$	$\pm 0.602$	$\pm 0.688$	$\pm 0.788$

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

<sup>2</sup> The port 1 noise tuner switch set to the bypass position, and port 2 noise receiver switch set to the normal position.

## Transmission Uncertainty



## Reflection Uncertainty

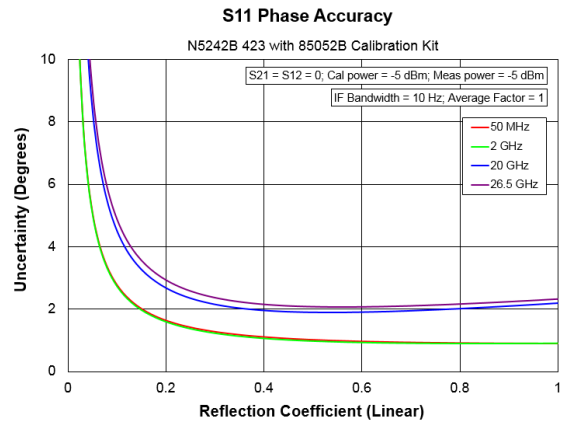
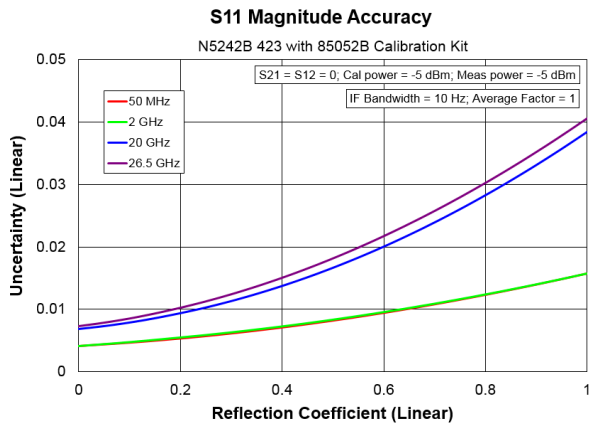


Table 6a. N4433A 4-Port Electronic Calibration Module

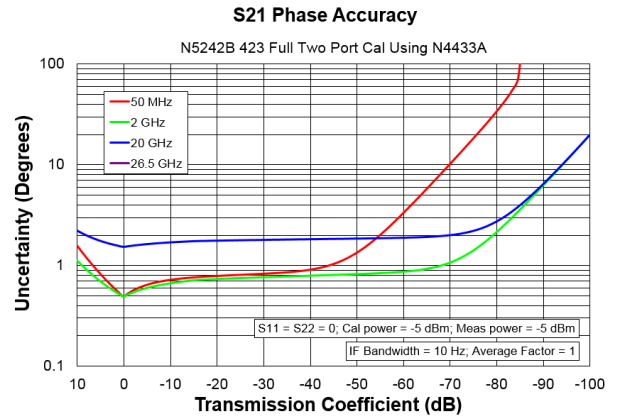
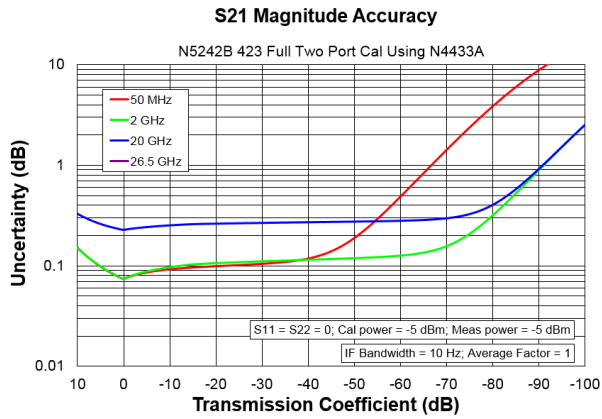
**NOTE** Uncertainty curves for the N4433A are created using a 2-port calibration. Multipoint uncertainties are not supported at this time.

Description	Specification (dB)					
	10 MHz to 50 MHz <sup>1</sup>	50 MHz to 500 MHz <sup>1</sup>	500 MHz to 2 GHz	2 GHz to 8.5 GHz	8.5 GHz to 13.5 GHz	13.5 GHz to 20 GHz
Directivity	50	50	50	45	45	40
Source Match	42	42	42	37	37	31
Load Match	40	41	41	35	35	29
Reflection Tracking <sup>2</sup>						
Mag	±0.060	±0.060	±0.060	±0.100	±0.100	±0.180
Phase (°)	±0.396	±0.396	±0.396	±0.660	±0.660	±1.188
Transmission Tracking without Option 029						
Mag	±0.068	±0.064	±0.064	±0.115	±0.115	±0.210
Phase (°)	±0.447	±0.421	±0.421	±0.761	±0.761	±1.387
S <sub>21</sub> Transmission Tracking with Option 029 <sup>1</sup>						
Mag	±0.070	±0.066	±0.070	±0.126	±0.126	±0.225
Phase (°)	±0.460	±0.436	±0.460	±0.829	±0.829	±1.485
S <sub>12</sub> Transmission Tracking with Option 029 <sup>1</sup>						
Mag	±0.082	±0.071	±0.072	±0.123	±0.123	±0.227
Phase (°)	±0.541	±0.469	±0.472	±0.812	±0.812	±1.496

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

<sup>2</sup> The port 1 noise tuner switch set to the bypass position, and port 2 noise receiver switch set to the normal position.

## Transmission Uncertainty



## Reflection Uncertainty

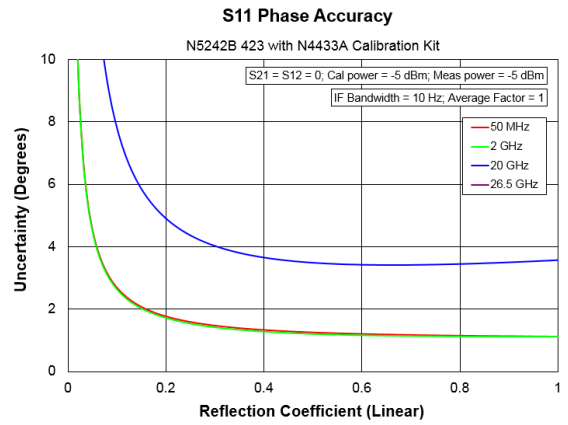
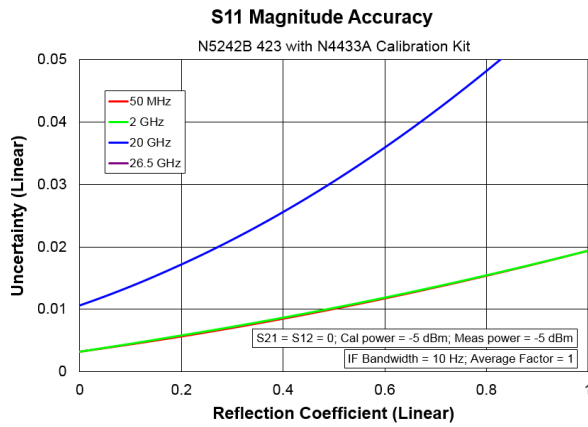


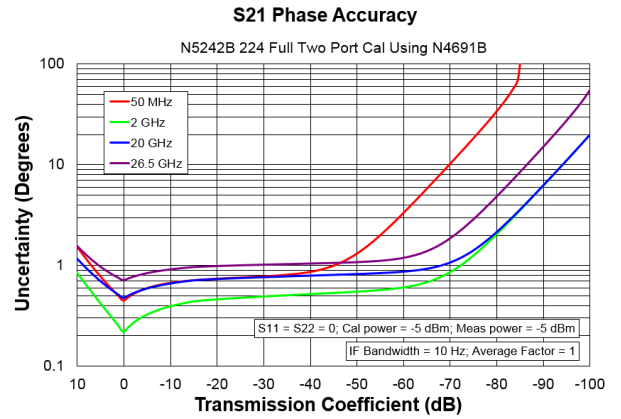
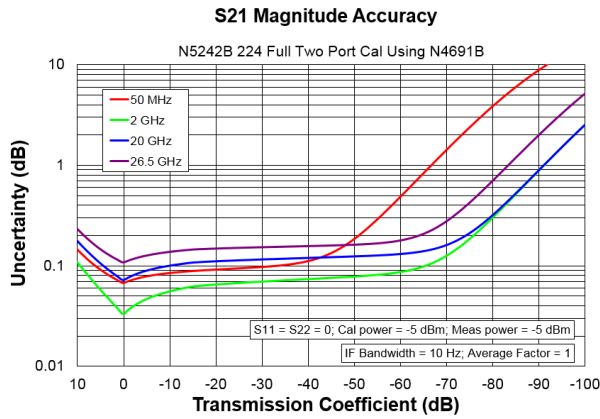
Table 6b. N4691B 2-Port Electronic Calibration Module

Description	Specification (dB)						
	10 MHz to 50 MHz <sup>1</sup>	50 MHz to 500 MHz <sup>1</sup>	500 MHz to 2 GHz	2 GHz to 8.5 GHz	8.5 GHz to 13.5 GHz	13.5 GHz to 20 GHz	20 GHz to 26.5 GHz
Directivity	46	46	52	46	46	46	44
Source Match	41	41	47	42	42	42	40
Load Match	40	40	46	41	41	40	38
Reflection Tracking <sup>2</sup>							
Mag	±0.050	±0.050	±0.020	±0.040	±0.040	±0.040	±0.050
Phase (°)	±0.330	±0.330	±0.132	±0.264	±0.264	±0.264	±0.330
Transmission Tracking without Option 029							
Mag	±0.062	±0.056	±0.023	±0.054	±0.054	±0.055	±0.072
Phase (°)	±0.410	±0.370	±0.152	±0.354	±0.354	±0.365	±0.473
S <sub>21</sub> Transmission Tracking with Option 029 <sup>1</sup>							
Mag	±0.065	±0.060	±0.028	±0.063	±0.063	±0.063	±0.079
Phase (°)	±0.431	±0.394	±0.183	±0.416	±0.416	±0.416	±0.521
S <sub>12</sub> Transmission Tracking with Option 029 <sup>1</sup>							
Mag	±0.085	±0.068	±0.029	±0.061	±0.061	±0.064	±0.078
Phase (°)	±0.559	±0.446	±0.193	±0.400	±0.400	±0.421	±0.517

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies ≤ 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

<sup>2</sup> The port 1 noise tuner switch set to the bypass position, and port 2 noise receiver switch set to the normal position.

## Transmission Uncertainty



## Reflection Uncertainty

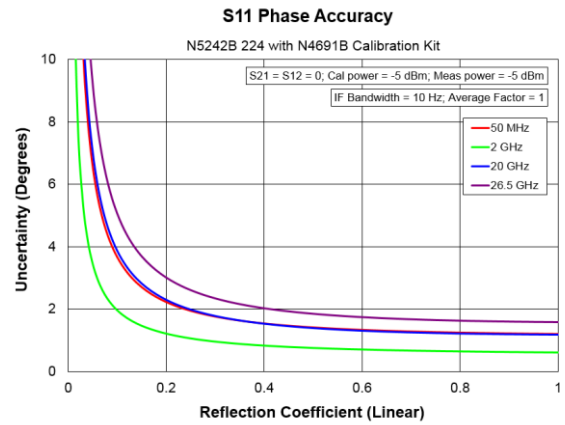
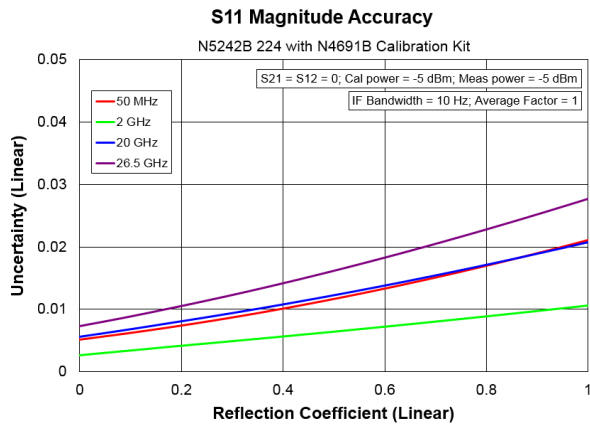
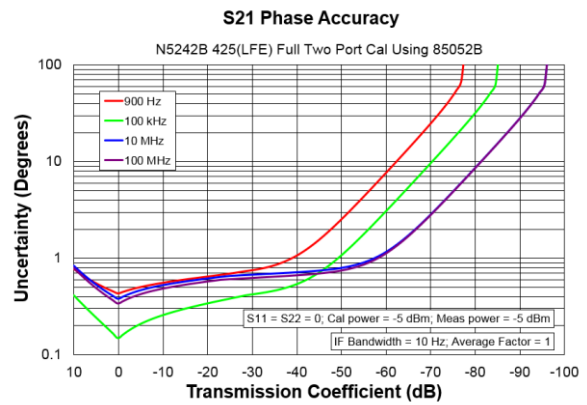
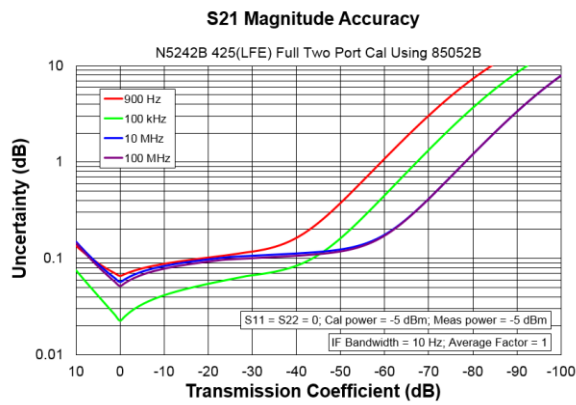


Table 7a. N5242B with 85052B Calibration Kit, Option 425

Description	Specification (dB)				
	1 kHz to 10 kHz	10 kHz to 1 MHz	1 MHz to 5 MHz	5 MHz to 50 MHz	50 MHz to 100 MHz
Directivity	48	48	48	48	48
Source Match	40	40	40	40	40
Load Match	48	48	48	48	48
Reflection Tracking					
Mag	±0.003	±0.003	±0.003	±0.003	±0.003
Phase (°)	±0.020	±0.020	±0.020	±0.020	±0.020
Transmission Tracking					
Mag	±0.055	±0.016	±0.050	±0.045	±0.045
Phase (°)	±0.361	±0.105	±0.333	±0.296	±0.296

**Transmission Uncertainty, Option 425**



**Reflection Uncertainty, Option 425**

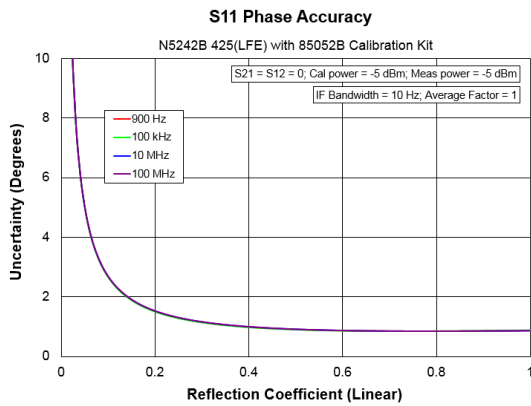
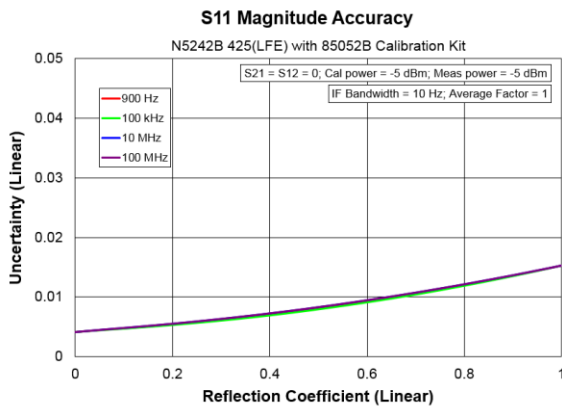
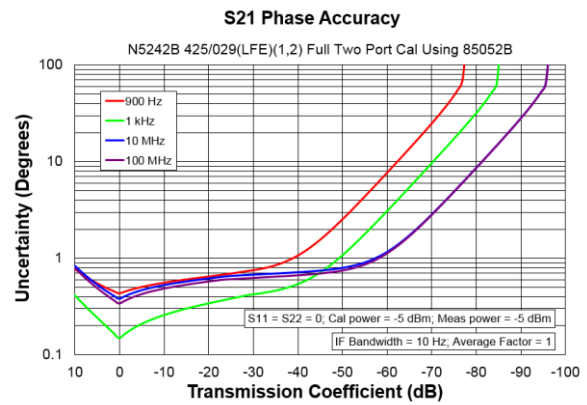
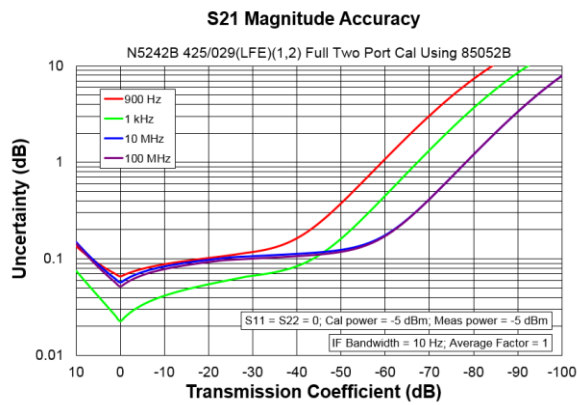


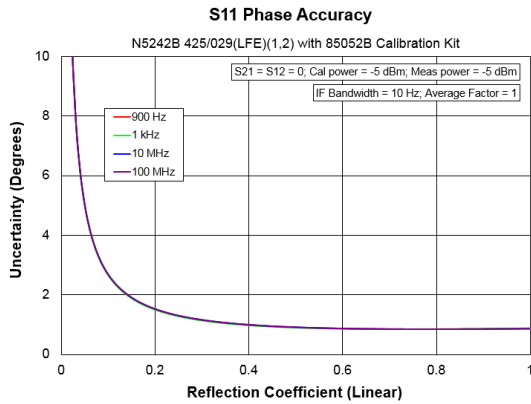
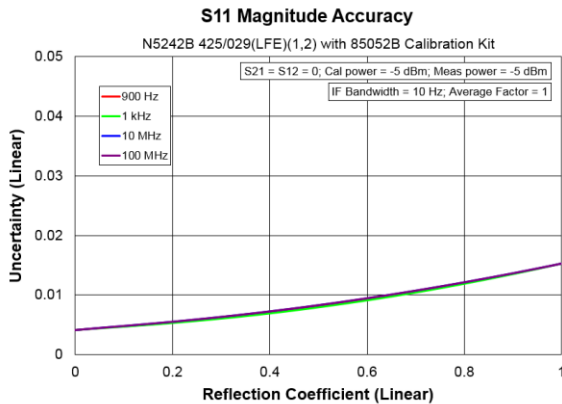
Table 7b. N5242B with 85052B Calibration Kit, Option 425 with Option 029

Description	Specification (dB)				
	1 kHz to 10 kHz	10 kHz to 1 MHz	1 MHz to 5 MHz	5 MHz to 50 MHz	50 MHz to 100 MHz
Directivity	48	48	48	48	48
Source Match	40	40	40	40	40
Load Match	48	48	48	48	48
Reflection Tracking					
Mag	±0.003	±0.003	±0.003	±0.003	±0.003
Phase (°)	±0.020	±0.020	±0.020	±0.020	±0.020
Transmission Tracking					
Mag	±0.055	±0.016	±0.050	±0.045	±0.045
Phase (°)	±0.361	±0.105	±0.333	±0.296	±0.296

**Transmission Uncertainty, Option 425 with Option 029**



**Reflection Uncertainty, Option 425 with Option 029**





## Uncorrected System Performance

Specifications apply to following conditions:

- Over environmental temperature of 25 °C ±5 °C, with less than 1°C variation from the calibration temperature.
- Cable loss not included in Transmission Tracking.
- Crosstalk measurement conditions: normalized to a thru, measured with shorts on all ports, 10 Hz IF bandwidth, averaging factor of 8, alternate mode, source power set to the specified maximum power.
- With option 029, port 1 impedance tuner switch is in external position and port 2 noise receiver switch is in noise receiver position unless specified. Refer to Options 201, 21x, 22x, 401, 41x, 42x for performance of Option 029 Port 1 with impedance tuner switch in internal position, Port 2 noise receiver switch in normal position, Ports 3 and 4.

Table 8a. Directivity (dB), Option 2xx, 4xx

Description	Specification		Typical	
	Without Option 029	With Option 029	Without Option 029	With Option 029
	All Ports	Ports 1, 2	All Ports	Ports 1, 2
10 MHz to 50 MHz <sup>1</sup>	16 (16)	16 (16)	23	22
50 MHz to 500 MHz <sup>1</sup>	24 (24)	24 (24)	28	28
500 MHz to 3.2 GHz	24 (24)	24 (24)	32	32
3.2 GHz to 8.5 GHz	23 (23)	23 (23)	25	25
8.5 GHz to 10 GHz	23 (22)	23 (22)	25	25
10 GHz to 13.5 GHz	16 (16)	16 (16)	22	20
13.5 GHz to 16 GHz	16 (16)	16 (16)	22	20
16 GHz to 20 GHz	16 (16)	15 (15)	22	20
20 GHz to 24 GHz	16 (16)	15 (15)	22	20
24 GHz to 26.5 GHz	16 (16)	15 (15)	22	20

( ) With Option 425 installed.

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 8e and 8f.

Table 8b. Source Match (dB), Option 2xx, 4xx

Description	Specification			Typical		
	Without Option 029	With Option 029		Without Option 029	With Option 029	
	All Ports	Port 1	Port 2	All Ports	Port 1	Port 2
10 MHz to 50 MHz <sup>1</sup>	11 (9)	9 (9)	9 (9)	14 (11)	13 (11)	12 (12)
50 MHz to 500 MHz <sup>1</sup>	18 (7)	18 (7)	13 (7)	28 (8)	28 (8)	15 (8)
500 MHz to 3.2 GHz	18 (7)	17 (7)	9 (7)	22 (8)	22 (8)	12 (8)
3.2 GHz to 8.5 GHz	14 (9)	12 (9)	6 (5)	18 (14)	18 (14)	7 (6)
8.5 GHz to 10 GHz	14 (9)	12 (9)	6 (5)	18 (14)	18 (14)	7 (6)
10 GHz to 13.5 GHz	12 (9)	11 (9)	6 (5)	16 (14)	16 (14)	8 (7)
13.5 GHz to 16 GHz	12 (10)	11 (10)	6 (6)	16 (16)	16 (16)	8 (8)
16 GHz to 20 GHz	10 (8)	9 (8)	7 (7)	15 (13)	13 (13)	9 (9)
20 GHz to 24 GHz	10 (6)	8 (6)	6 (6)	14 (11)	13 (11)	9 (9)
24 GHz to 26.5 GHz	8 (6)	7 (6)	6 (6)	12 (11)	12 (11)	9 (9)

( ) With Option 425 installed.

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 8e and 8f.

Table 8c. Load Match (dB), Option 2xx, 4xx

Description	Specification			Typical		
	Without Option 029	With Option 029		Without Option 029	With Option 029	
	All Ports	Port 1	Port 2	All Ports	Port 1	Port 2
10 MHz to 50 MHz <sup>1</sup>	11 (9)	11 (9)	9 (9)	18 (10)	18 (10)	12 (10)
50 MHz to 500 MHz <sup>1</sup>	17 (7)	17 (7)	13 (7)	25 (8)	24 (8)	15 (8)
500 MHz to 3.2 GHz	17 (7)	15 (7)	9 (7)	22 (8)	19 (8)	12 (8)
3.2 GHz to 8.5 GHz	13 (9)	10 (8)	5.5 (5.5)	17 (14)	15 (14)	7.5 (7.5)
8.5 GHz to 10 GHz	13 (9)	10 (8)	5.5 (5.5)	17 (12)	15 (12)	7.5 (7.5)
10 GHz to 13.5 GHz	10 (9)	9 (9)	5.5 (5.5)	15 (14)	15 (14)	7.5 (7.5)
13.5 GHz to 16 GHz	10 (9)	9 (9)	5.5 (5.5)	15 (14)	15 (14)	7.5 (7.5)
16 GHz to 20 GHz	9 (7)	8 (7)	5.5 (5.5)	14 (12)	13 (12)	7.5 (7.5)
20 GHz to 24 GHz	9 (6)	7 (6)	5.5 (5.5)	14 (11)	13 (11)	7.5 (7.5)
24 GHz to 26.5 GHz	8 (6)	7 (6)	5.5 (5.5)	13 (11)	11 (11)	7.5 (7.5)

( ) With Option 425 installed.

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 8e and 8f.

Table 8d. Transmission Tracking, Reflection Tracking, Crosstalk (dB), All Options, All Ports - Typical

	Transmission Tracking	Reflection Tracking	Crosstalk
10 MHz to 50 MHz <sup>1</sup>	+/-1.5	+/-1.5	-84
50 MHz to 100 MHz <sup>1</sup>	+/-1.5	+/-1.5	-90
100 MHz to 500 MHz	+/-1.5	+/-1.5	-110
500 MHz to 3.2 GHz	+/-1.5	+/-1.5	-120
3.2 GHz to 8.5 GHz	+/-1.5	+/-1.5	-122
8.5 GHz to 13.5 GHz	+/-1.5	+/-1.5	-122
13.5 GHz to 20 GHz	+/-1.5	+/-1.5	-122
20 GHz to 24 GHz	+/-1.5	+/-1.5	-117
24 GHz to 26.5 GHz	+/-1.5	+/-1.5	-114

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 8e and 8f.

Table 8e. N5242B Error Terms (dB), All Ports, Option 425 and Option 425 with 029 (LFE Enabled) - Specifications

Description	Directivity	Source Match	Load Match	Transmission Tracking	Reflection Tracking	Crosstalk
1 kHz to 10 kHz	1	7	7	--	--	--
10 kHz to 1 MHz	16	15	19	--	--	--
1 MHz to 5 MHz	16	9	11	--	--	--
5 MHz to 50 MHz	5	7	8	--	--	--
50 MHz to 100 MHz	5	8	9	--	--	--

Table 8f. N5242B Error Terms (dB), All Ports, Option 425 and Option 425 with 029 (LFE Enabled)- Typical

Description	Directivity	Source Match	Load Match	Transmission Tracking	Reflection Tracking	Crosstalk
500 Hz to 900 Hz	--	--	--	--	--	-103
900 Hz to 1 kHz	4	8	9	+/- 1.5	+/- 1.5	-105
1 kHz to 10 kHz	5	9	8	+/- 1.5	+/- 1.5	-99
10 kHz to 100 kHz	23	19	23	+/- 1.5	+/- 1.5	-105
100 kHz to 1 MHz	23	19	23	+/- 1.5	+/- 1.5	-125
1 MHz to 5 MHz	26	13	14	+/- 1.5	+/- 1.5	-119
5 MHz to 10 MHz	11	9	10	+/- 1.5	+/- 1.5	-120
10 MHz to 50 MHz	11	9	10	+/- 1.5	+/- 1.5	-117
50 MHz to 100 MHz	11	11	11	+/- 1.5	+/- 1.5	-118

## Test Port Output

See Block diagrams for all models and options beginning on page 60.

With option 029, port 1 noise tuner switch is in internal position and port 2 noise receiver switch is in normal position unless specified.

Table 9. Frequency Information, All Options

Description	Specification (dB)	Typical (dB)
N5249B Frequency Range	10 MHz to 8.5 GHz	--
N5241B Frequency Range	10 MHz to 13.5 GHz	--
N5242B Frequency Range	10 MHz to 26.5 GHz	--
N5242B Frequency Range (Option 425)	900 Hz to 26.5 GHz	500 Hz to 900 Hz
Frequency Resolution	1 Hz	--
Frequency Accuracy	+/- 1 ppm	--
Frequency Stability	--	+/-0.05 ppm, -10° to 70° C <sup>1</sup> +/-0.1 ppm/yr maximum <sup>2</sup>

<sup>1</sup> Assumes no variation in time.

<sup>2</sup> Assumes no variation in temperature.

Table 10a. Maximum Leveled Power (dBm), Options 201 or 401

Description	Specification			Typical		
	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>
	Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>		Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>	
10 MHz to 50 MHz	8	13	13	10	19	17
50 MHz to 500 MHz	10	13	13	11	21	20
500 MHz to 3.2 GHz	10	10	13	12	13	18
3.2 GHz to 8.5 GHz	13	13	13	20	20	19
8.5 GHz to 10 GHz	13	13	13	20	20	19
10 GHz to 13.5 GHz	13	13	13	17	17	16
13.5 GHz to 16 GHz	13	13	13	17	17	16
16 GHz to 20 GHz	13	13	10	16	16	12
20 GHz to 24 GHz	12	12	7	15	15	11
24 GHz to 26.5 GHz	5	5	2	11	11	7

<sup>1</sup> Either port can be used as the source port.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10b. Maximum Levelled Power (dBm), Options 21x or 41x

Description	Specification			Typical		
	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>
	Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>		Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>	
10 MHz to 50 MHz	8	13	13	10	19	17
50 MHz to 500 MHz	10	13	13	11	20	19
500 MHz to 3.2 GHz	10	10	13	11	13	18
3.2 GHz to 8.5 GHz	13	13	13	18	18	17
8.5 GHz to 10 GHz	13	13	13	18	18	17
10 GHz to 13.5 GHz	12	12	11	15	15	14
13.5 GHz to 16 GHz	12	12	11	15	15	14
16 GHz to 20 GHz	10	10	8	13	13	10
20 GHz to 24 GHz	8	8	7	12	12	9
24 GHz to 26.5 GHz	3	3	-1	8	8	4

<sup>1</sup> Either port can be used as the source port.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10c. Maximum Levelled Power (dBm), Option 21x or 41x with 029<sup>1</sup>

Description	Specification			Typical		
	Port 1		Port 2	Port 1		Port 2
	Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>		Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>	
10 MHz to 50 MHz	7	12	13	9	18	17
50 MHz to 500 MHz	9	12	13	10	19	19
500 MHz to 3.2 GHz	9	9	13	10	12	18
3.2 GHz to 8.5 GHz	12	12	13	17	17	17
8.5 GHz to 10 GHz	12	12	13	17	17	17
10 GHz to 13.5 GHz	12	12	9	15	15	12
13.5 GHz to 16 GHz	12	12	9	15	15	12
16 GHz to 20 GHz	10	10	5	13	13	7
20 GHz to 24 GHz	8	8	2	12	12	4
24 GHz to 26.5 GHz	3	3	-2	8	8	3

<sup>1</sup> Option 029 affects port 1 and port 2 maximum levelled power. Refer to Table 9b for other ports.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10d. Maximum Leveled Power (dBm), Options 22x, 422, or 423

Description	Specification			Typical		
	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>		Ports 2, 4 <sup>1</sup>
	Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>		Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>	
10 MHz to 50 MHz	7	13	13	9	19	17
50 MHz to 500 MHz	8	13	13	11	20	20
500 MHz to 3.2 GHz	8	10	13	11	13	17
3.2 GHz to 8.5 GHz	13	13	13	19	19	17
8.5 GHz to 10 GHz	13	13	13	19	19	17
10 GHz to 13.5 GHz	12	12	10	15	15	14
13.5 GHz to 16 GHz	12	12	10	15	15	14
16 GHz to 20 GHz	10	10	7	13	13	10
20 GHz to 24 GHz	7	7	5	12	12	9
24 GHz to 26.5 GHz	0	0	-2	8	8	4

<sup>1</sup> Either port can be used as the source port.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10e. Maximum Leveled Power (dBm), Options 22x, 422, or 423 Combine Mode - Typical

Description	Source 1 Port 1		Source 2 Port 1	
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>
10 MHz to 50 MHz	7	17	-7	3
50 MHz to 500 MHz	9	17	-5	4
500 MHz to 3.2 GHz	9	10	-5	-4
3.2 GHz to 8.5 GHz	15	15	2	2
8.5 GHz to 10 GHz	15	15	2	2
10 GHz to 13.5 GHz	11	11	-2	-2
13.5 GHz to 16 GHz	11	11	-2	-2
16 GHz to 20 GHz	8	8	-4	-4
20 GHz to 24 GHz	6	6	-6	-6
24 GHz to 26.5 GHz	2	2	-11	-11

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10f. Maximum Leveled Power (dBm), Option 22x

Description	Specification			Typical		
	Source 2 Out 1		Source 2 Out 2	Source 2 Out 1		Source 2 Out 2
	Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>		Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>	
10 MHz to 50 MHz	9	18	13	12	21	18
50 MHz to 500 MHz	11	18	17	13	22	21
500 MHz to 3.2 GHz	10	14	14	13	17	19
3.2 GHz to 8.5 GHz	18	18	18	22	22	22
8.5 GHz to 10 GHz	18	18	18	22	22	22
10 GHz to 13.5 GHz	16	16	16	21	21	20
13.5 GHz to 16 GHz	16	16	16	21	21	20
16 GHz to 20 GHz	15	15	13	19	19	17
20 GHz to 24 GHz	13	13	12	18	18	17
24 GHz to 26.5 GHz	7	7	5	14	14	11

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10g. Maximum Leveled Power (dBm), Options 22x, 422, or 423 with 029<sup>1</sup>

Description	Specification			Typical		
	Port 1		Port 2	Port 1		Port 2
	Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>		Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>	
10 MHz to 50 MHz	6	12	13	8	18	17
50 MHz to 500 MHz	8	13	13	11	20	20
500 MHz to 3.2 GHz	8	10	12	11	13	16
3.2 GHz to 8.5 GHz	13	13	13	19	19	17
8.5 GHz to 10 GHz	13	13	13	19	19	17
10 GHz to 13.5 GHz	12	12	10	15	15	14
13.5 GHz to 16 GHz	12	12	10	15	15	14
16 GHz to 20 GHz	10	10	6	13	13	9
20 GHz to 24 GHz	6	6	4	11	11	8
24 GHz to 26.5 GHz	0	0	-2	8	8	4

<sup>1</sup> Option 029 only affects port 1 and port 2 maximum leveled power. Refer to Table 10d for ports 3 and 4.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.



Table 10h. Maximum Leveled Power (dBm), Options 22x, 422, or 423 with 029<sup>1</sup>, Combine Mode – Typical

Description	Source 1 Port 1		Source 2 Port 1	
	Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>	Filtered Mode <sup>2</sup>	Hi Power Mode <sup>2</sup>
10 MHz to 50 MHz	6	16	-8	2
50 MHz to 500 MHz	9	17	-5	4
500 MHz to 3.2 GHz	9	10	-5	-4
3.2 GHz to 8.5 GHz	15	15	2	2
8.5 GHz to 10 GHz	15	15	2	2
10 GHz to 13.5 GHz	11	11	-2	-2
13.5 GHz to 16 GHz	11	11	-2	-2
16 GHz to 20 GHz	8	8	-4	-4
20 GHz to 24 GHz	5	5	-7	-7
24 GHz to 26.5 GHz	0	0	-11	-11

<sup>1</sup> Option 029 affects port 1 and port 2 maximum leveled power.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 10i. N5242B Maximum Leveled Power (dBm), Port 1 and 2, Option 425 with 029<sup>1</sup>

Description	Specification			Typical		
	Port 1		Port 2	Port 1		Port 2
	Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>		Filt. Mode <sup>2</sup>	Hi Pwr Mode <sup>2</sup>	
10 MHz to 50 MHz <sup>3</sup>	-2	5	5	0	11	9
50 MHz to 500 MHz <sup>3</sup>	3	8	7	6	15	14
500 MHz to 3.2 GHz	3	5	7	6	8	11
3.2 GHz to 10 GHz	11	11	11	17	17	15
10 GHz to 16 GHz	10	10	8	13	13	12
16 GHz to 20 GHz	8	8	4	11	11	7
20 GHz to 24 GHz	4	4	2	9	9	6
24 GHz to 26.5 GHz	-2	-2	-4	6	6	2

<sup>1</sup> Option 029 only affects port 1 and port 2 maximum leveled power. Refer to Table 10j for ports 3 and 4.

<sup>2</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

<sup>3</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 10n.

Table 10j. N5242B Maximum Leveled Power (dBm), Option 425

Description	Specification			Typical		
	Ports 1, 3		Ports 2, 4	Ports 1, 3		Ports 2, 4
	Filt. Mode <sup>1</sup>	Hi Pwr Mode <sup>1</sup>		Filt. Mode <sup>1</sup>	Hi Pwr Mode <sup>1</sup>	
10 MHz to 50 MHz <sup>2</sup>	-1	5	5	1	11	9
50 MHz to 500 MHz <sup>2</sup>	3	8	8	6	15	15
500 MHz to 3.2 GHz	3	5	8	6	8	12
3.2 GHz to 10 GHz	11	11	11	17	17	15
10 GHz to 16 GHz	10	10	8	13	13	12
16 GHz to 20 GHz	8	8	5	11	11	8
20 GHz to 24 GHz	5	5	3	10	10	7
24 GHz to 26.5 GHz	-2	-2	-4	6	6	2

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

<sup>2</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 10n.

Table 10k. N5242B Maximum Leveled Power (dBm), Options 425 with 029, Combine Mode - Typical

Description	Source 1 Port 1		Source 2 Port 1	
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>
10 MHz to 50 MHz <sup>2</sup>	-1	9	-15	-5
50 MHz to 500 MHz <sup>2</sup>	4	12	-10	-1
500 MHz to 3.2 GHz	4	5	-10	-9
3.2 GHz to 10 GHz	13	13	0	0
10 GHz to 16 GHz	9	9	-4	-4
16 GHz to 20 GHz	6	6	-6	-6
20 GHz to 24 GHz	3	3	-9	-9
24 GHz to 26.5 GHz	-2	-2	-13	-13

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

<sup>2</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 10m.

Table 10l. N5242B Maximum Leveled Power (dBm), Option 425, Combine Mode - Typical

Description	Source 1 Port 1		Source 2 Port 1	
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>
10 MHz to 50 MHz <sup>2</sup>	0	10	-14	-4
50 MHz to 500 MHz <sup>2</sup>	4	12	-10	-1
500 MHz to 3.2 GHz	4	5	-10	-9
3.2 GHz to 10 GHz	13	13	0	0
10 GHz to 16 GHz	9	9	-4	-4
16 GHz to 20 GHz	6	6	-6	-6
20 GHz to 24 GHz	4	4	-8	-8
24 GHz to 26.5 GHz	0	0	-13	-13

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

<sup>2</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 10m.

Table 10m. N5242B Maximum Power (dBm), All Ports, Option 425 (LFE Enabled), Combine Mode - Typical

Description	Source 1 Port 1	Source 2 Port 1
500 Hz to 900 Hz	6	5
900 Hz to 1 kHz	7	6
1 kHz to 100 kHz	7	6
100 kHz to 1 MHz	8	7
1 MHz to 5 MHz	7	6
5 MHz to 10 MHz	5	4
10 MHz to 50 MHz	5	4
50 MHz to 100 MHz	5	4

Table 10n. N5242B Maximum Power (dBm), All Ports – Option 425 and Option 425 with 029 (LFE Enabled)

Description	Specification	Typical
500 Hz to 900 Hz	--	12
900 Hz to 1 kHz	10	13
1 kHz to 100 kHz	12	13
100 kHz to 1 MHz	12	14
1 MHz to 5 MHz	10	13
5 MHz to 10 MHz	9	11
10 MHz to 50 MHz	8	10
50 MHz to 100 MHz	8	10

Table 11a. Power Level Accuracy (dB) at Nominal Power<sup>1</sup>, All Options

Description	Specification		Typical	
	Ports 1, 2, 3, 4 <sup>2</sup>	Source 2 Out 1 Source 2 Out 2	Ports 1, 2, 3, 4 <sup>2</sup>	Source 2 Out 1 Source 2 Out 2
10 MHz to 50 MHz <sup>3</sup>	+/-1.5	+/-2.5	+/-0.40	+/-0.55
50 MHz to 500 MHz <sup>3</sup>	+/-1.0	+/-2.0	+/-0.20	+/-0.25
500 MHz to 3.2 GHz	+/-1.0	+/-2.0	+/-0.25	+/-0.25
3.2 GHz to 8.5 GHz	+/-1.0	+/-2.0	+/-0.40	+/-0.25
8.5 GHz to 10 GHz	+/-1.0	+/-2.0	+/-0.40	+/-0.25
10 GHz to 13.5 GHz	+/-1.2	+/-2.0	+/-0.60	+/-0.25
13.5 GHz to 18 GHz	+/-2.0	+/-2.5	+/-0.60	+/-1.00
18 GHz to 26.5 GHz	+/-2.5	+/-2.5	+/-0.80	+/-0.90

<sup>1</sup> Level accuracy at power other than nominal power, Power Level Accuracy (dB) at Nominal Power + Power Level Linearity (dB)

<sup>2</sup> Any port can be used as the source port. Source in filtered mode where applicable.

<sup>3</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 11b.

Table 11b. N5242B Power Level Accuracy (dB), All Ports, Option 425 (LFE Enabled)

Description	Specification	Typical
500 Hz to 900 Hz	--	+/- 0.1
900 Hz to 1 kHz	+/- 1.0	+/- 0.1
1 kHz to 100 kHz	+/- 1.0	+/- 0.1
100 kHz to 1 MHz	+/- 1.0	+/- 0.15
1 MHz to 5 MHz	+/- 1.0	+/- 0.15
5 MHz to 10 MHz	+/- 1.0	+/- 0.2
10 MHz to 50 MHz	+/- 1.0	+/- 0.2
50 MHz to 100 MHz	+/- 1.0	+/- 0.2

Table 12a. Power Level Linearity<sup>1</sup> (dB), All Options - Specification

Description	Ports 1, 3 <sup>2</sup> -25 dBm ≤ P < -20 dBm	Ports 1, 3 <sup>2</sup> -20 dBm ≤ P < -15 dBm	Ports 1, 3 <sup>2</sup> P ≥ -15 dBm
10 MHz to 50 MHz <sup>3</sup>	+/-2.0	+/-1.5	+/-1.0
50 MHz to 500 MHz <sup>3</sup>	+/-1.5	+/-1.0	+/-1.0
500 MHz to 8.5 GHz	+/-1.0	+/-1.0	+/-1.0
8.5 GHz to 13.5 GHz	+/-1.0	+/-1.0	+/-1.0
13.5 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

<sup>1</sup> Referenced to nominal power.

<sup>2</sup> Either port can be used as the source port. Source in filtered mode.

<sup>3</sup> With Option 425 installed and LFE disabled, applied to frequencies ≤ 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance ≤ 100 MHz, see Table 12d.

Table 12b. Power Level Linearity<sup>1</sup> (dB), All Options - Specification

Description	Ports 2, 4 <sup>2</sup> -25 dBm ≤ P < -20 dBm	Ports 2, 4 <sup>2</sup> -20 dBm ≤ P < -15 dBm	Ports 2, 4 <sup>2</sup> P ≥ -15 dBm
10 MHz to 50 MHz <sup>3</sup>	+/-5.0	+/-2.0	+/-1.5
50 MHz to 500 MHz <sup>3</sup>	+/-4.0	+/-2.0	+/-1.5
500 MHz to 3.2 GHz	+/-2.5	+/-1.0	+/-1.0
3.2 GHz to 8.5 GHz	+/-2.0	+/-1.0	+/-1.0
8.5 GHz to 10 GHz	+/-2.0	+/-1.0	+/-1.0
10 GHz to 13.5 GHz	+/-1.5	+/-1.5	+/-1.5
13.5 GHz to 16 GHz	+/-1.5	+/-1.5	+/-1.5
16 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

<sup>1</sup> Referenced to nominal power.

<sup>2</sup> Either port can be used as the source port.

<sup>3</sup> With Option 425 installed and LFE disabled, applied to frequencies ≤ 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance ≤ 100 MHz, see Table 12d.

Table 12c. Power Level Linearity<sup>1</sup> (dB), Option 22x - Specification

Description	Source 2 Out 1 <sup>2</sup> P ≥ -15 dBm	Source 2 Out 2 -15 dBm ≤ P < -10 dBm	Source 2 Out 2 P ≥ -10 dBm
10 MHz to 500 MHz <sup>3</sup>	+/-1.0	+/-1.5	+/-1.0
500 MHz to 8.5 GHz	+/-1.0	+/-1.0	+/-1.0
8.5 GHz to 13.5 GHz	+/-1.0	+/-1.0	+/-1.0
13.5 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

<sup>1</sup> Referenced to nominal power.

<sup>2</sup> Source in filtered mode.

<sup>3</sup> With Option 425 installed and LFE disabled, applied to frequencies ≤ 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance ≤ 100 MHz, see Table 12d.

Table 12d. N5242B Power Level Linearity<sup>1</sup> (dB), All Ports, Option 425 (LFE Enabled)

Description	Specification
500 Hz to 900 Hz	--
900 Hz to 100 MHz	+/-1.0

<sup>1</sup> Referenced to nominal power, from -25 dBm to max power.

Table 13a. Power Sweep Range (dB), Options 201 or 401

Description	Specification		Typical	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	33	38	46	44
50 MHz to 500 MHz	35	38	48	47
500 MHz to 3.2 GHz	35	38	40	45
3.2 GHz to 8.5 GHz	38	38	47	46
8.5 GHz to 10 GHz	38	38	47	46
10 GHz to 13.5 GHz	38	38	44	43
13.5 GHz to 16 GHz	38	38	44	43
16 GHz to 20 GHz	38	35	43	39
20 GHz to 24 GHz	37	32	42	38
24 GHz to 26.5 GHz	30	27	38	34

<sup>1</sup> Either port can be used as the source port. Source in filtered mode where applicable.

Table 13b. Power Sweep Range (dB), Options 21x or 41x

Description	Specification		Typical	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	33	38	46	44
50 MHz to 500 MHz	35	38	47	46
500 MHz to 3.2 GHz	35	38	40	45
3.2 GHz to 8.5 GHz	38	38	45	44
8.5 GHz to 10 GHz	38	38	45	44
10 GHz to 13.5 GHz	37	36	42	41
13.5 GHz to 16 GHz	37	36	42	41
16 GHz to 20 GHz	35	33	40	37
20 GHz to 24 GHz	33	32	39	36
24 GHz to 26.5 GHz	28	24	35	31

<sup>1</sup> Either port can be used as the source port. Source in filtered mode where applicable.

Table 13c. Power Sweep Range (dB), Options 21x or 41x with 029<sup>1</sup>

Description	Specification		Typical	
	Port 1 <sup>2</sup>	Port 2 <sup>2</sup>	Port 1 <sup>2</sup>	Port 2 <sup>2</sup>
10 MHz to 50 MHz	32	38	45	44
50 MHz to 500 MHz	34	38	46	46
500 MHz to 3.2 GHz	34	38	39	45
3.2 GHz to 8.5 GHz	37	38	44	44
8.5 GHz to 10 GHz	37	38	44	44
10 GHz to 13.5 GHz	37	34	42	39
13.5 GHz to 16 GHz	37	34	42	39
16 GHz to 20 GHz	35	30	40	34
20 GHz to 24 GHz	33	27	39	31
24 GHz to 26.5 GHz	28	23	35	30

<sup>1</sup> Option 029 only affects port 1 and port 2 power sweep ranges. Refer to Table 13b for ports 3 and 4.

<sup>2</sup> Source in filtered mode where applicable.

Table 13d. Power Sweep Range (dB), Options 22x or 422, 423

Description	Specification		Typical	
	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>	Ports 1, 3 <sup>1</sup>	Ports 2, 4 <sup>1</sup>
10 MHz to 50 MHz	32	38	46	44
50 MHz to 500 MHz	33	38	47	47
500 MHz to 3.2 GHz	33	38	40	44
3.2 GHz to 8.5 GHz	38	38	46	44
8.5 GHz to 10 GHz	38	38	46	44
10 GHz to 13.5 GHz	37	35	42	41
13.5 GHz to 16 GHz	37	35	42	41
16 GHz to 20 GHz	35	32	40	37
20 GHz to 24 GHz	32	30	39	36
24 GHz to 26.5 GHz	25	23	35	31

<sup>1</sup> Either port can be used as the source port. Source in filtered mode where applicable.



Table 13e. Power Sweep Range (dB), Option 22x

Description	Specification		Typical	
	Source 2 Out 1 <sup>1</sup>	Source 2 Out 2	Source 2 Out 1 <sup>1</sup>	Source 2 Out 2
10 MHz to 50 MHz	24	28	38	35
50 MHz to 500 MHz	26	32	39	38
500 MHz to 3.2 GHz	25	29	34	36
3.2 GHz to 8.5 GHz	33	33	39	39
8.5 GHz to 10 GHz	33	33	39	39
10 GHz to 13.5 GHz	31	31	38	37
13.5 GHz to 16 GHz	31	31	38	37
16 GHz to 20 GHz	30	28	36	34
20 GHz to 24 GHz	28	27	35	34
24 GHz to 26.5 GHz	22	20	31	28

<sup>1</sup> Source in filtered mode where applicable.

Table 13f. Power Sweep Range (dB), N5242B, Option 425

Description	Specification		Typical	
	Port 1, 3	Port 2, 4	Port 1, 3	Port 2, 4
10 MHz to 50 MHz <sup>1</sup>	30	30	38	36
50 MHz to 500 MHz <sup>1</sup>	33	33	42	42
500 MHz to 3.2 GHz	30	33	35	39
3.2 GHz to 10 GHz	36	36	44	42
10 GHz to 16 GHz	35	33	40	39
16 GHz to 20 GHz	33	30	38	35
20 GHz to 24 GHz	30	28	37	34
24 GHz to 26.5 GHz	23	21	33	29

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

Table 13g. Power Sweep Range (dB), Options 22x or 422, 423 with 029<sup>1</sup>

Description	Specification		Typical	
	Port 1 <sup>2</sup>	Port 2 <sup>2</sup>	Port 1 <sup>2</sup>	Port 2 <sup>2</sup>
10 MHz to 50 MHz	31	38	45	44
50 MHz to 500 MHz	33	38	47	47
500 MHz to 3.2 GHz	33	37	40	43
3.2 GHz to 8.5 GHz	38	38	46	44
8.5 GHz to 10 GHz	38	38	46	44
10 GHz to 13.5 GHz	37	35	42	41
13.5 GHz to 16 GHz	37	35	42	41
16 GHz to 20 GHz	35	31	39	36
20 GHz to 24 GHz	31	29	37	35
24 GHz to 26.5 GHz	25	23	35	31

<sup>1</sup>Option 029 affects port 1 and port 2 power sweep ranges. Refer to Table 12d for other ports.

<sup>2</sup>Source in filtered mode where applicable.

Table 13h. Power Sweep Range (dB), N5242B, Option 425 with 029

Description	Specification		Typical	
	Port 1	Port 2	Port 1	Port 2
10 MHz to 50 MHz <sup>1</sup>	30	30	38	36
50 MHz to 500 MHz <sup>1</sup>	33	32	42	41
500 MHz to 3.2 GHz	30	32	35	38
3.2 GHz to 10 GHz	36	36	44	42
10 GHz to 16 GHz	35	33	40	39
16 GHz to 20 GHz	33	29	38	34
20 GHz to 24 GHz	29	27	36	33
24 GHz to 26.5 GHz	23	21	33	29

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 13i.

Table 13i. Power Sweep Range (dB), N5242B – Option 425 and Option 425 with 029 (LFE Enabled)

Description	Specification	Typical
500 Hz to 900 Hz	--	39
900 Hz to 1 kHz	35	40
1 kHz to 100 kHz	37	40
100 kHz to 1 MHz	37	41
1 MHz to 5 MHz	35	40
5 MHz to 10 MHz	34	38
10 MHz to 50 MHz	33	37
50 MHz to 100 MHz	33	37

Table 14. Nominal Power (Preset Power, dBm)

Description	Options 201, 401	Options 21x, 22x, 41x, 42x	Option 22x		Options 22x, 42x	
	All Ports <sup>1</sup>	Ports 1, 2, 3, 4 <sup>1</sup>	Source 2 Out 1	Source 2 Out 2	Source 1 Port 1 Combine Mode	Source 2 Port 1 Combine Mode
N5241B	0	-5	-5	-5	-5	-5
N5242B	0	-5	-5	-5	-5	-5
N5249B	0	-5	-5	-5	-5	-5

<sup>1</sup> Any port can be used as the source port.

Table 15. Power Resolution and Maximum/Minimum Settable Power, All Ports<sup>1</sup>

Description	Specification (dB)	Typical (dBm)		
	All Options	All Options	Options 201, 401	Options 21x, 41x, 22x, 42x
Power Resolution	0.01	--	--	--
Maximum Settable Power	--	30	--	--
Minimum Settable Power	--	--	-30	-95

<sup>1</sup> Any port can be used as the source port.

Table 16a. Harmonics at Max Specified Power (dBc), All Options - Typical

Description <sup>1</sup>	2 <sup>nd</sup> and 3 <sup>rd</sup> Harmonics		1/2 and 1/4 Sub-Harmonics	
	Ports 1, 3 <sup>2</sup> Source 2 Out 1 <sup>3</sup>	Ports 2, 4 <sup>2</sup> Source 2 Out 2	Ports 1 3 <sup>2</sup> Source 2 Out 1 <sup>3</sup>	Ports 2, 4 <sup>2</sup> Source 2 Out 2
10 MHz to 2 GHz <sup>4</sup>	-51	-13	-73	-73
2 GHz to 3.2 GHz	-60	-21	-73	-73
3.2 GHz to 8.5 GHz	-60	-21	-66	-63
8.5 GHz to 13.5 GHz	-60	-21	-66	-63
13.5 GHz to 20 GHz	-60	-21	-66	-63
20 GHz to 26.5 GHz	-60	-21	-61	-52

<sup>1</sup> Listed frequency is fundamental frequency; test at max specified power

<sup>2</sup> Any port can be used as the source port. Source in Filtered mode where applicable.

<sup>3</sup> At port 1 max specified power.

<sup>4</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 16b.

Table 16b. N5242B 2<sup>nd</sup> and 3<sup>rd</sup> Harmonics at Max Specified Power (dBc), All Ports, Option 425 (LFE Enabled) - Typical

Listed frequency is fundamental frequency; test at max specified power

Description	2 <sup>nd</sup> Harmonic	3 <sup>rd</sup> Harmonic
500 Hz to 900 Hz	-32	-31
900 Hz to 1 kHz	-22	-23
1 kHz to 100 kHz	-22	-23
100 kHz to 1 MHz	-25	-22
1 MHz to 5 MHz	-28	-24
5 MHz to 10 MHz	-27	-22
10 MHz to 33 MHz	-28	-21
33 MHz to 50 MHz	-28	--

Table 17. Non-Harmonic Spurs (dBc) at Nominal Power, All Options, All Ports - Typical

Description	Based on 100kHz offset Frac-N
10 MHz to 500 MHz <sup>1</sup>	-50
500 MHz to 2 GHz	-42
2 GHz to 4 GHz	-45
4 GHz to 8 GHz	-39
8 GHz to 16 GHz	-33
16 GHz to 26.5 GHz	-27

<sup>1</sup> Non-harmonic spurs are negligible with Option 425 installed and LFE enabled.

Table 18a. Phase Noise (dBc/Hz), All Options, All Ports - Typical

Description	1 kHz Offset	10 kHz Offset	100 kHz Offset	1 MHz Offset
10 MHz to 500 MHz <sup>1</sup>	-100	-95	-95	-120
500 MHz to 1 GHz	-107	-117	-112	-127
1 GHz to 2 GHz	-101	-111	-106	-121
2 GHz to 4 GHz	-95	-105	-100	-115
4 GHz to 8 GHz	-89	-99	-94	-109
8 GHz to 8.5 GHz	-83	-93	-88	-103
8.5 GHz to 13.5 GHz	-83	-93	-88	-103
13.5 GHz to 16 GHz	-83	-93	-88	-103
16 GHz to 26.5 GHz	-77	-87	-82	-97

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 18b.

Table 18b. N5242B Phase Noise (dBc/Hz), All Ports, Option 425 and Option 425 with 029 (LFE Enabled) - Typical

Description	1 kHz Offset	10 kHz Offset	100 kHz Offset	1 MHz Offset
500 Hz to 100 MHz	-120	-130	-125	-135

## Test Port Input

Table 19a. Noise Floor<sup>1</sup> (dBm) at 10 Hz IFBW, All Options, All Ports

Description	Specification		Typical	
	Test Port	Direct Receiver Access Input	Test Port	Direct Receiver Access Input
10 MHz to 50 MHz <sup>2</sup>	-80	--	-87	-130
50 MHz to 100 MHz <sup>2</sup>	-90	--	-95	-128
100 MHz to 500 MHz <sup>2</sup>	-104	--	-110	-132
500 MHz to 2 GHz	-114	--	-117	-133
2 GHz to 8.5 GHz	-114	--	-117	-129
8.5 GHz to 13.5 GHz	-114	--	-117	-129
13.5 GHz to 20 GHz	-114	--	-117	-129
20 GHz to 24 GHz	-110	--	-115	-122
24 GHz to 26.5 GHz	-107	--	-113	-119

<sup>1</sup> Total average (rms) noise power calculated as the mean value of a linear magnitude trace expressed in dBm.

<sup>2</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance  $\leq 100$  MHz, see Table 19b.

Table 19b. N5242B Test Port Noise Floor (dBm) @ 10 Hz IFBW, Option 425 and Option 425 with 029 (LFE Enabled)

Description	Specification	Typical
500 Hz to 900 Hz	--	-93
900 Hz to 1 kHz	-83	-96
1 kHz to 100 kHz	-91	-96
100 kHz to 1 MHz	-107	-110
1 MHz to 5 MHz	-108	-112
5 MHz to 10 MHz	-102	-106
10 MHz to 50 MHz	-102	-106
50 MHz to 100 MHz	-102	-106

Table 20a. 0.1 dB Compression, All Options, All Ports - Typical

Description	Test Port Power (dBm)
10 MHz to 500 MHz <sup>1</sup>	--
500 MHz to 8.5 GHz	13
8.5 GHz to 13.5 GHz	13
13.5 GHz to 16 GHz	13
16 GHz to 20 GHz	12
20 GHz to 24 GHz	10.5
24 GHz to 26.5 GHz	10

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance  $\leq 100$  MHz, see Table 20b.

Table 20b. N5242B 0.1 dB Compression, All Ports, Option 425 and Option 425 with 029 (LFE Enabled) - Typical

Description	Test Port Power (dBm)
500 Hz to 900 Hz	13
900 Hz to 1 kHz	13
1 kHz to 100 kHz	13
100 kHz to 1 MHz	13
1 MHz to 5 MHz	11
5 MHz to 10 MHz	13
10 MHz to 50 MHz	14
50 MHz to 100 MHz	14

Table 21a. Test Port Compression (dB) at 8 dBm Test Port Power, All Options, All Ports

Description	Specification
10 MHz to 500 MHz <sup>1</sup>	--
500 MHz to 8.5 GHz	<0.17
8.5 GHz to 13.5 GHz	<0.17
13.5 GHz to 16 GHz	<0.17
16 GHz to 24 GHz	<0.23
24 GHz to 26.5 GHz	<0.29

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies  $\leq 100$  MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled.

Table 21b. N5242B Compression, All Ports, Option 425 and Option 425 with 029 (LFE Enabled) - Specification

Description	Test Port Power (dBm)	Receiver Compression
	All Options	Magnitude (dB)
500 Hz to 900 Hz	--	--
900 Hz to 1 kHz	10	0.2
1 kHz to 100 kHz	12	0.2
100 kHz to 1 MHz	12	0.2
1 MHz to 5 MHz	10	0.2
5 MHz to 10 MHz	9	0.2
10 MHz to 50 MHz	8	0.2
50 MHz to 100 MHz	8	0.2

Table 22a. Trace Noise Magnitude (dB rms), All Options, All Ports

Ratioed measurement, nominal power at test port.

Description	Specification	Typical		
		1 kHz IFBW	100 kHz IFBW	600 kHz IFBW
10 MHz to 100 MHz <sup>1</sup>	0.007	0.0039	0.040	0.140
100 MHz to 8.5 GHz <sup>1</sup>	0.002	0.0005	0.005	0.011
8.5 GHz to 13.5 GHz	0.002	0.0005	0.005	0.011
13.5 GHz to 16 GHz	0.002	0.0005	0.005	0.011
16 GHz to 22.5 GHz	0.002	0.0006	0.005	0.012
22.5 GHz to 24 GHz	0.003	0.0014	0.008	0.020
24 GHz to 26.5 GHz	0.005	0.0020	0.008	0.020

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 22b.



Table 22b. N5242B Trace Noise Magnitude (dB rms), All Ports, Option 425 and Option 425 with 029 (LFE Enabled)

Ratioed measurement, nominal power at test port.

Description	Specification		Typical			
	100 Hz IFBW	1 kHz IFBW	100 Hz IFBW	1 kHz IFBW	100 kHz IFBW	600 kHz IFBW
500 Hz to 900 Hz	--	--	0.002	--	--	--
900 Hz to 4 kHz	0.004	--	0.001	--	--	--
4 kHz to 300 kHz	--	0.004	--	0.002	--	--
300 kHz to 2 MHz	--	0.004	--	0.001	0.01	--
2 MHz to 100 MHz	--	0.004	--	0.001	0.01	0.025

Table 22c. Trace Noise<sup>1</sup> Phase (deg rms), All Options, All Ports

Ratioed measurement, nominal power at test port.

Description	Specification	Typical		
	1 kHz IFBW	1 kHz IFBW	100 kHz IFBW	600 kHz IFBW
10 MHz to 100 MHz <sup>1</sup>	0.051	0.0261	0.266	1.053
100 MHz to 8.5 GHz <sup>1</sup>	0.015	0.0041	0.030	0.075
8.5 GHz to 13.5 GHz	0.015	0.0041	0.030	0.075
13.5 GHz to 16 GHz	0.042	0.0124	0.030	0.075
16 GHz to 22.5 GHz	0.042	0.0135	0.033	0.082
22.5 GHz to 26.5 GHz	0.054	0.0225	0.057	0.139

<sup>1</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 22d.

Table 22d. N5242B Trace Noise Phase (deg rms), All Ports, Option 425 and Option 425 with 029 (LFE Enabled)

Ratioed measurement, nominal power at test port.

Description	Specification		Typical			
	100 Hz IFBW	1 kHz IFBW	100 Hz IFBW	1 kHz IFBW	100 kHz IFBW	600 kHz IFBW
500 Hz to 900 Hz	--	--	0.012	--	--	--
900 Hz to 4 kHz	0.03	--	0.008	--	--	--
4 kHz to 300 kHz	--	0.03	--	0.014	--	--
300 kHz to 2 MHz	--	0.03	--	0.007	0.064	--
2 MHz to 100 MHz	--	0.03	--	0.007	0.068	0.166

Table 23. Reference Level - Specification

Description	Magnitude (dB)	Phase (°)
Range	+/-500	+/-500
Resolution	0.001	0.01

Table 24a. Stability<sup>1</sup>, All Options - Typical

Description	Magnitude (dB/°C)	Phase (°/°C)
10 MHz to 50 MHz <sup>2</sup>	0.01	0.29
50 MHz to 500 MHz <sup>2</sup>	0.01	0.06
500 MHz to 3.2 GHz	0.01	0.07
3.2 GHz to 8.5 GHz	0.02	0.13
8.5 GHz to 10 GHz	0.02	0.13
10 GHz to 13.5 GHz	0.02	0.13
13.5 GHz to 16 GHz	0.02	0.13
16 GHz to 20 GHz	0.03	0.40
20 GHz to 24 GHz	0.03	0.54
24 GHz to 26.5 GHz	0.04	0.56

<sup>1</sup> Stability is defined as a ratio measurement made at the test port.

<sup>2</sup> With Option 425 installed and LFE disabled, applied to frequencies <= 100 MHz. Above 100 MHz, performance is the same for both LFE enabled or disabled. For LFE enabled performance <= 100 MHz, see Table 24b.

Table 24b. Stability<sup>1</sup>, N5242B, Option 425 (LFE Enabled) - Typical

Description	Magnitude (dB/°C)	Phase (°/°C)
500 Hz to 900 Hz	0.010	0.2
900 Hz to 1 kHz	0.010	0.2
1 kHz to 100 kHz	0.010	0.2
100 kHz to 1 MHz	0.010	0.1
1 MHz to 5 MHz	0.010	0.1
5 MHz to 10 MHz	0.010	0.1
10 MHz to 50 MHz	0.010	0.1
50 MHz to 100 MHz	0.020	0.1

<sup>1</sup> Stability is defined as a ratio measurement made at the test port.

Table 25. Damage Input Level, All Options - Specification

Description	RF (dBm)	DC (V)
Test Ports (All Options except those noted below)	> +30	>40
Source 2 Out 1, Source 2 Out 2 (Option 224)	> +30	>0
Test Port 2, Noise Mode <sup>1</sup> (Option 029 without Option 425)	> +27	>40
Test Ports (Option 425)	> +20	>50

<sup>1</sup> Noise mode sets port 2 noise receiver switch to noise receiver position.

## Noise Receiver Input (Option 029 only)

**NOTE** Option 029 operation does not apply with LFE enabled.

Table 26. Noise Receiver Bandwidth

Description	Bandwidth
10 MHz to 25 MHz	800 kHz, 2 MHz
25 MHz to 60 MHz	800 kHz, 2/4 MHz
60 MHz to 150 MHz	800 kHz, 2/4/8 MHz <sup>1</sup>
150 MHz to 26.5 GHz	800 kHz, 2/4/8/24 MHz <sup>1</sup>

<sup>1</sup> 8 and 24 MHz bandwidths are available only with calibration using noise source.

Table 27a. Receiver Noise Figure (dB), Port 2, at All BW, High Gain Setting

Description	Specification	Typical
10 MHz to 200 MHz	11.0	--
200 MHz to 1.3 GHz	12.0	--
1.3 GHz to 2.0 GHz	14.0	--
2.0 GHz to 8.5 GHz	14.5	--
8.5 GHz to 13.5 GHz	14.5	--
13.5 GHz to 20 GHz	14.5	--
20 GHz to 26.5 GHz	17.0 <sup>1</sup>	--

<sup>1</sup> Degraded by 1.5 dB with 24 MHz BW.

Table 27b. N5242B Receiver Noise Figure (dB), Port 2, at All BW, High Gain Setting, Option 425

Description	Specification	Typical
10 MHz to 200 MHz	18.5	15
200 MHz to 1.3 GHz	17.5	14
1.3 GHz to 2.0 GHz	16	14
2.0 GHz to 8.5 GHz	17	14
8.5 GHz to 13.5 GHz	17	13
13.5 GHz to 20 GHz	17.5	14
20 GHz to 26.5 GHz	19.5 <sup>1</sup>	16

<sup>1</sup> Degraded by 1.5 dB with 24 MHz BW.

Table 28. Noise Figure Trace Noise<sup>1</sup> (dB rms) at 4 MHz BW

Frequency	Specification			Typical		
	Low Gain Setting	Medium Gain Setting	High Gain Setting	Low Gain Setting	Medium Gain Setting	High Gain Setting
10 MHz to 15 MHz	0.30	0.30	0.10	0.15	0.15	0.07
15 MHz to 3 GHz	0.10	0.10	0.10	0.07	0.07	0.07
3 GHz to 8.5 GHz	0.11	0.10	0.10	0.07	0.07	0.07
8.5 GHz to 13.5 GHz	0.11	0.10	0.10	0.07	0.07	0.07
13.5 GHz to 26.5 GHz	0.11	0.10	0.10	0.07	0.07	0.07

<sup>1</sup> Trace noise magnitude performance on noise figure trace or sometime called noise jitter, 201 points, 1 noise average, port 2 terminated. May typically be degraded at frequencies below 500 MHz due to spurious noise receiver residuals.

Table 29. Noise Receiver Linearity (dB) at 4 MHz BW - Specification

Power Range (dBm)			Specification
Low Gain Setting Reference to -60 dBm	Medium Gain Setting Reference to -70 dBm	High Gain Setting Reference to -80 dBm	
-36 to -64	-48 to -76	-58 to -84	+/-0.05
-64 to -70	-76 to -86	-84 to -92	+/-0.10

Table 30. Noise Receiver Input Range - Specification

Description	Max DUT NF + Gain (dB) <sup>1</sup>			Max Input Power (dBm) for <0.1 dB Compression <sup>2</sup>		
	High Gain Setting	Medium Gain Setting	Low Gain Setting	High Gain Setting	Medium Gain Setting	Low Gain Setting
500 MHz to 3 GHz	32	44	55	<=-57	<=-45	<=-34
3 GHz to 8.5 GHz	46	57	68	<=-43	<=-32	<=-21
8.5 GHz to 13.5 GHz	46	57	68	<=-43	<=-32	<=-21
13.5 GHz to 26.5 GHz	46	57	68	<=-43	<=-32	<=-21

<sup>1</sup> Limited by 0.1 dB receiver compression. Applies to devices with bandwidth < 400 MHz. For devices with higher bandwidths, calculate the DUT output noise power as -174 dBm + 10\*log<sub>10</sub>(B) + Gain (dB) + NF (dB), where B is the bandwidth of the DUT in Hz, and use the Max Input Power specification.

<sup>2</sup> Derived from ensuring < 0.25 dB compression with a CW signal 5 dB higher than the stated max input power value for 0.1 dB compression. Referenced to test port 2.

# Dynamic Accuracy

Table 31. Dynamic Accuracy - Specification

Standard receiver accuracy of the test port input power reading relative to the reference input power level. It is verified with the following measurements:

- Compression over frequency
- IF linearity at a single frequency of 1.998765 GHz using a reference level of -20 dBm for an input power range of 0 to -60 dBm. For value below -60 dBm, refer to “VNA Receiver Dynamic Accuracy Specifications and Uncertainties”.

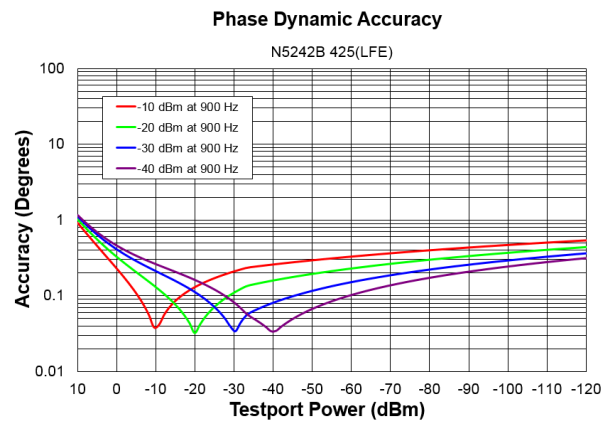
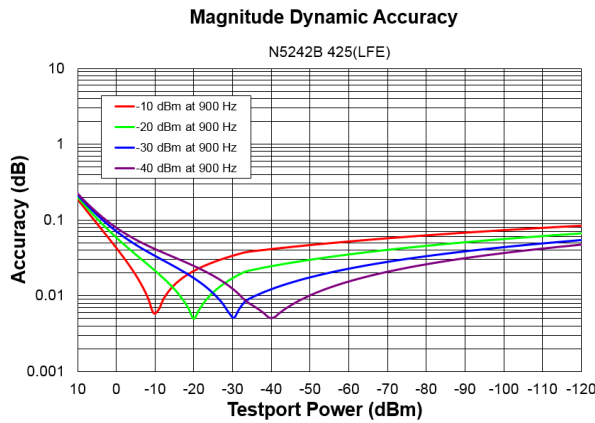
Applies to N5249B (all serial numbers) and N5241B, N5242B with following serial numbers:

N5241B and N5241BS: MY5241/SG5241/US5241 and above

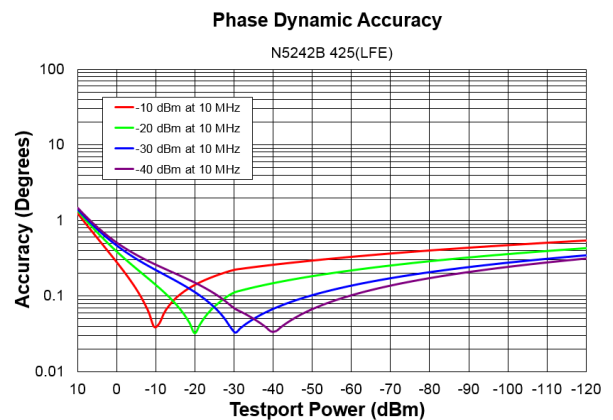
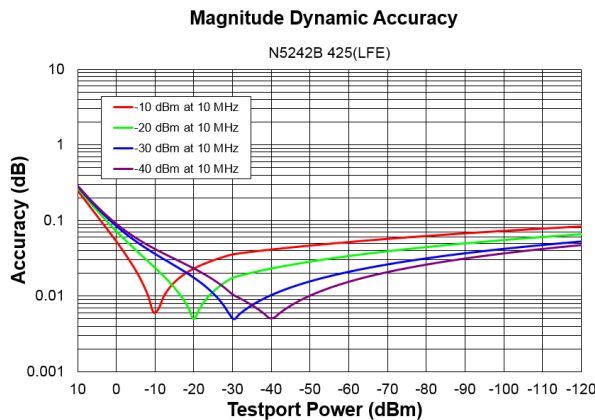
N5242B and N5242BS: MY5242/SG5242/US5242 and above

Please download our free Uncertainty Calculator from [http://www.keysight.com/find/na\\_calculator](http://www.keysight.com/find/na_calculator) to generate the curves for your PNA.

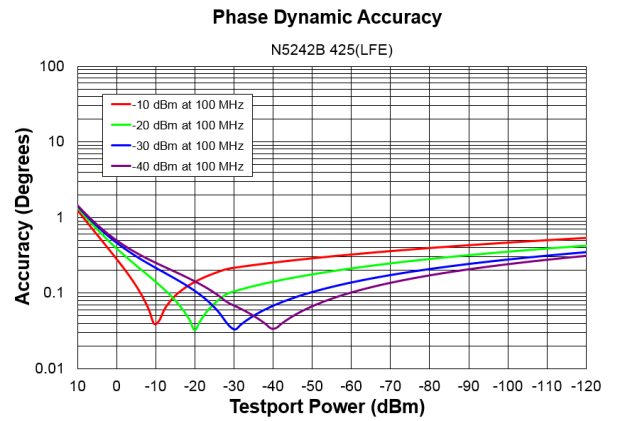
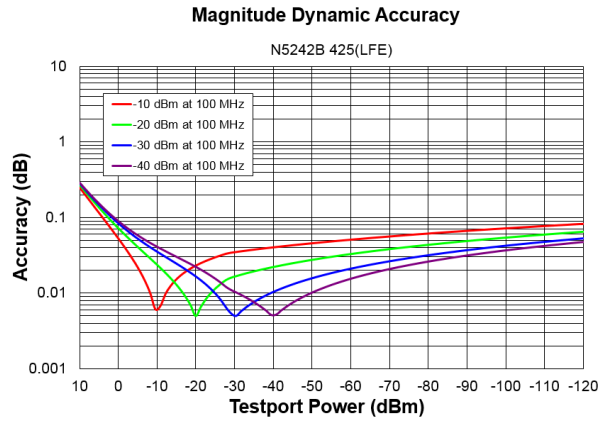
## N5242B Dynamic Accuracy, 900 Hz (LFE Enabled) - Specification



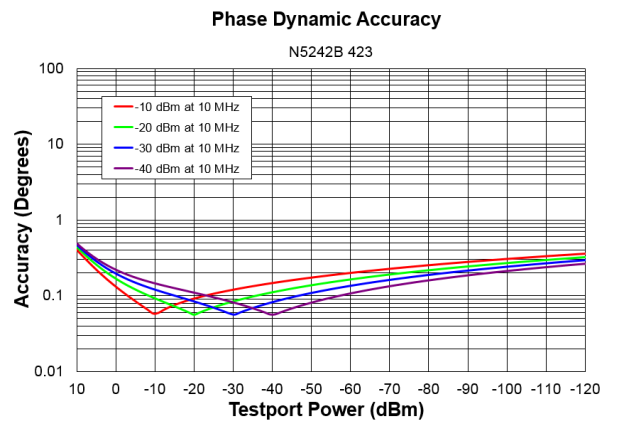
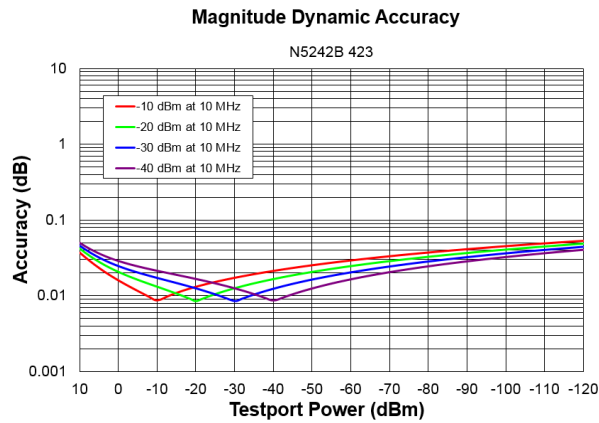
## N5242B Dynamic Accuracy, 10 MHz (LFE Enabled) - Specification



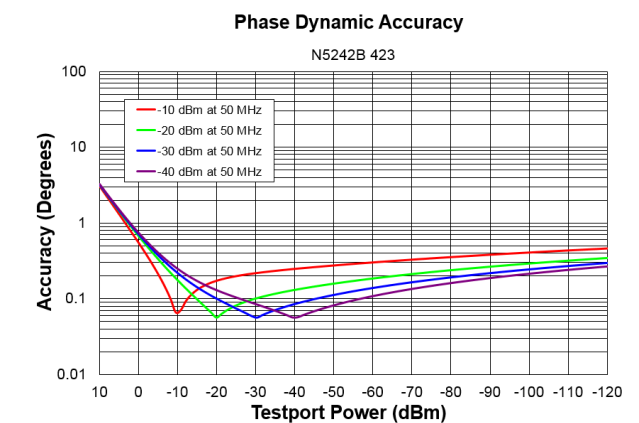
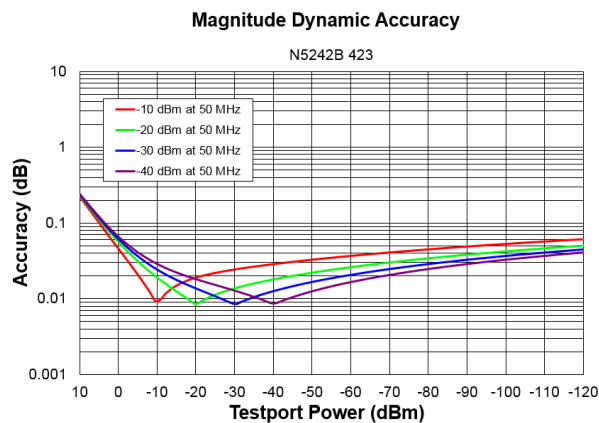
## N5242B Dynamic Accuracy, 100 MHz (LFE Enabled) - Specification



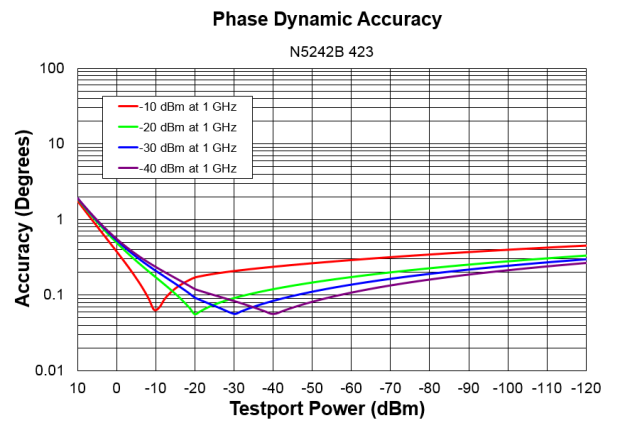
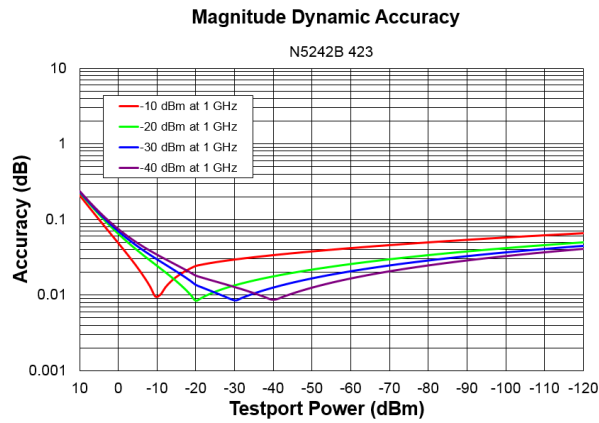
## Dynamic Accuracy, 10 MHz



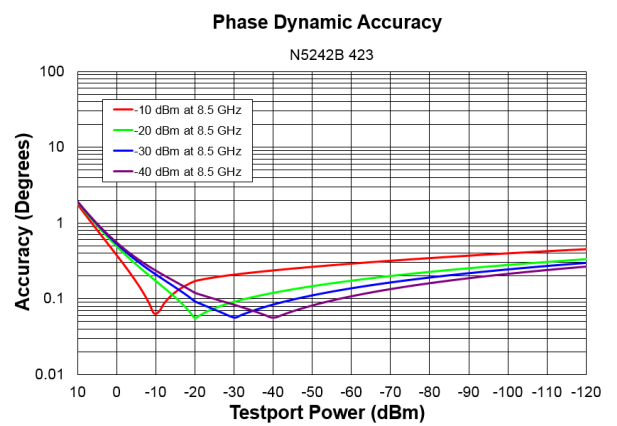
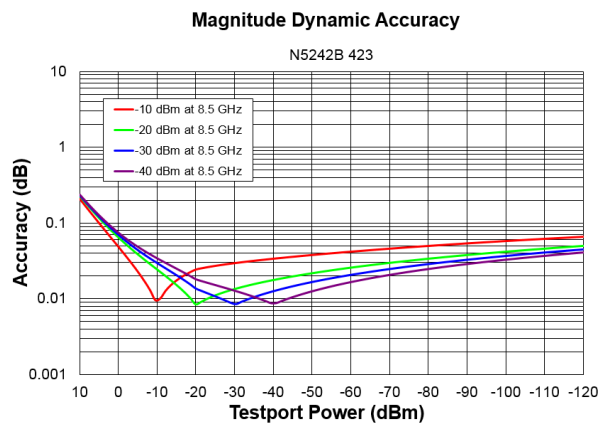
## Dynamic Accuracy, 50 MHz



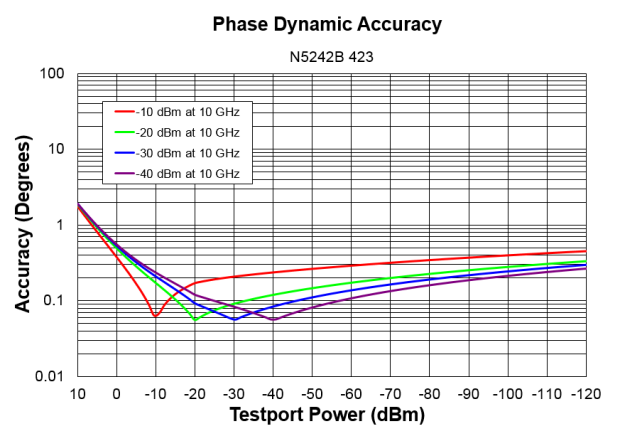
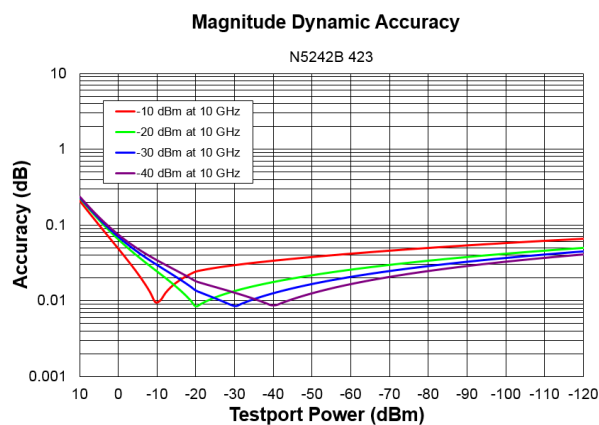
## Dynamic Accuracy, 1 GHz



## Dynamic Accuracy, 8.5 GHz

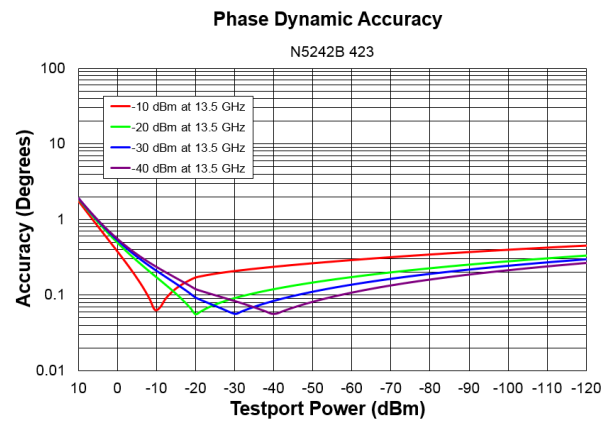
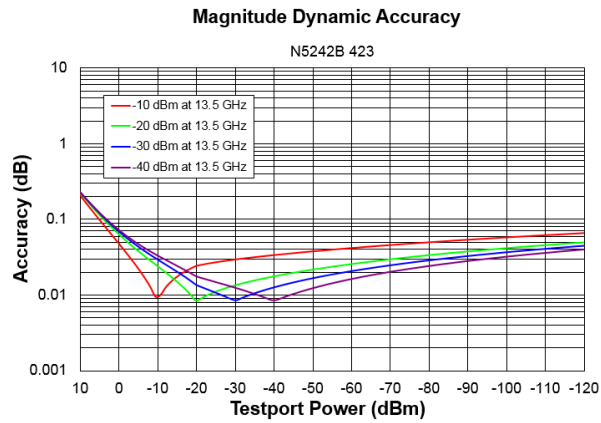


## Dynamic Accuracy, 10 GHz

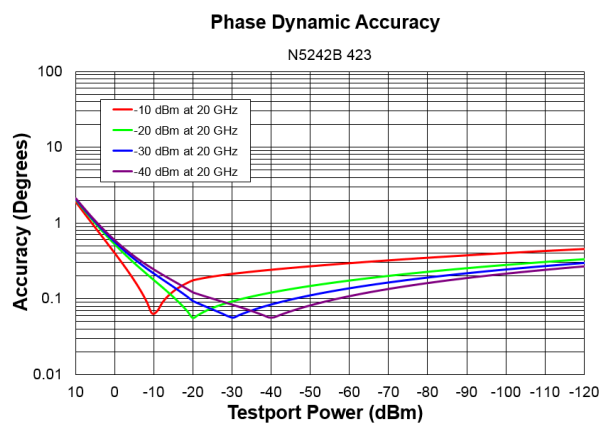
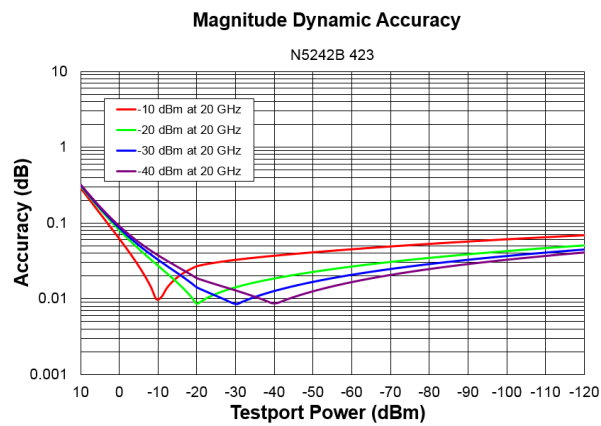




## Dynamic Accuracy, 13.5 GHz



## Dynamic Accuracy, 20 GHz



## Dynamic Accuracy, 26.5 GHz

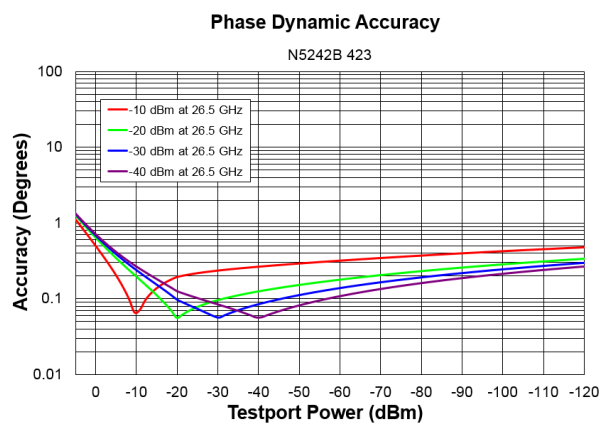
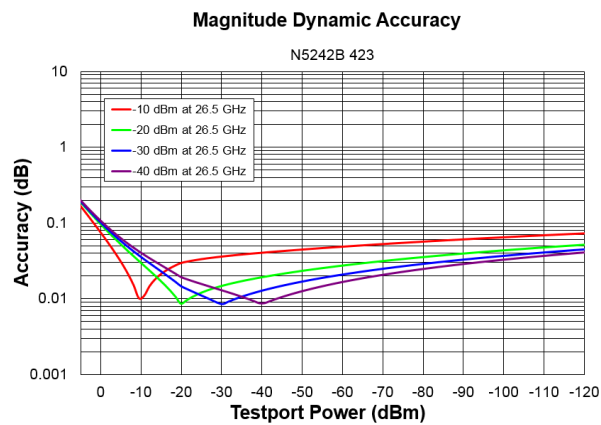


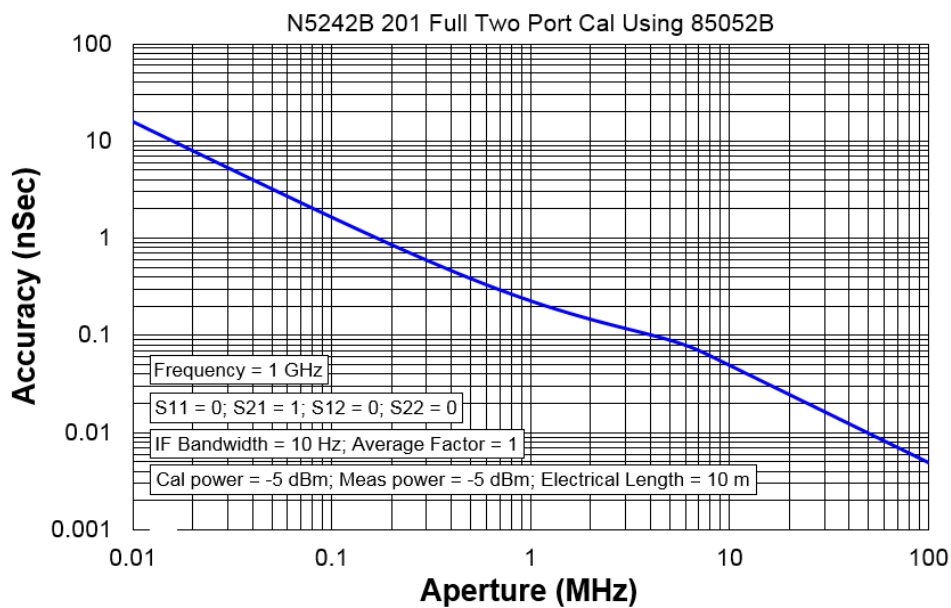
Table 32. Test Port Input (Group Delay)<sup>1</sup>

Description	Typical Performance
Aperture (selectable)	(frequency span)/(number of points -1)
Maximum Aperture	20% of frequency span
Range	0.5 x (1/minimum aperture)
Maximum Delay	Limited to measuring no more than 180° of phase change within the minimum aperture.)
Accuracy	See graph below. Char.

The following graph shows characteristic group delay accuracy with full 2-port calibration and a 10 Hz IF bandwidth. Insertion loss is assumed to be < 2 dB and electrical length to be ten meters.

For any  $S_{ij}$  Group Delay measurement,  $S_{ii} = 0$ ,  $S_{ji} = 1$ ,  $S_{ji} = 0$ ,  $S_{kl} = 0$  for all  $kl \neq ij$

### Group Delay Accuracy (Typical)



In general, the following formula can be used to determine the accuracy, in seconds, of specific group delay measurement:

$$\pm \text{Phase Accuracy (deg)} / [360 \times \text{Aperture (Hz)}]$$

Depending on the aperture and device length, the phase accuracy used is either incremental phase accuracy or worst-case phase accuracy.

<sup>1</sup> Group delay is computed by measuring the phase change within a specified frequency step (determined by the frequency span and the number of points per sweep).

## General Information

- Miscellaneous Information
- Front Panel
- Rear Panel
- Environment and Dimensions

Table 33. Miscellaneous Information

Description	Supplemental Information
System IF Bandwidth Range	1 Hz to 15 MHz, nominal (7 MHz, 10 MHz, and 15 MHz IFBW are available ONLY with FW A.09.42 and later, and with DSP version 5)
CPU	For the latest information on CPUs and associated hard drives, visit: <a href="http://na.support.keysight.com/pna/hdnumbers.html">http://na.support.keysight.com/pna/hdnumbers.html</a>
LXI	Class C (only applies to N5241B, N5242B, and N5249B models that are shipped with firmware revision A.08.20 and higher)

Table 34. Front Panel Information, All Options

Description	Typical Performance
<b>RF Connectors</b>	
Test Ports	3.5 mm (male), 50 ohm (nominal), 0.002 in. Center Pin Recession (characteristic)
Jumpers	3.5 mm (female) connectors with SMA (male) jumper cables
<b>USB 2.0 Ports - Master (4 ports)</b>	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
<b>Display</b>	
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	<p>Any of the following would cause a display to be considered faulty:</p> <ul style="list-style-type: none"> <li>• A complete row or column consists of “stuck” or “dark” pixels.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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).</li> <li>• “Stuck on” pixels or more than two “dark” pixels less than 6.5 mm apart (excluding consecutive pixels).</li> </ul>

Table 34. (Continued) Front Panel Information, All Options

Description	Typical Performance
<b>Display Range</b>	
Magnitude	+/-2500 dB (at 500 dB/div), max
Phase	+/-2500° (at 500 degrees/div), max
Polar	10 pUnits, min 10,000 Units, max
<b>Display Resolution</b>	
Magnitude	0.001 dB/div, min
Phase	0.01°/div, min
<b>Marker Resolution</b>	
Magnitude	0.001 dB, min
Phase	0.01°, min
Polar	10 pUnit, min

Table 35. Rear Panel Information, All Options

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

Table 35. (Continued) Rear Panel Information, All Options

Description	Typical Performance			
<b>External IF Inputs</b>				
Function	Allows use of external IF signals from remote mixers, bypassing the PNA's first converters			
Connectors	SMA (female); A, B, C, D, R (4-port); A, B, R1, R2 (2-port)			
Frequency				
<b>Path</b>	<b>DSP Version</b>	<b>IF Bandwidth</b>	<b>RF Frequency</b>	<b>IF Frequency</b>
Normal IF path:	4	All	< 53 MHz	2.535211 MHz
		All	>= 53 MHz	7.605634 MHz
	5	<= 600 kHz	< 53 MHz	2.479339 MHz
			>= 53 MHz	7.438017 MHz
		1 MHz	All	7.692 MHz
		1.5 MHz	All	7.368 MHz
		2 MHz	All	8.450 MHz
		3 MHz	All	8.163 MHz
		5 MHz	All	6.897 MHz
		7 MHz	All	10.53 MHz
10 MHz	All	15.38 MHz		
		15 MHz	All	22.22 MHz
Narrowband IF path:	4 or 5	All	All	10.70 MHz
Input Impedance	50 $\Omega$			
RF Damage Level	+23 dBm			
DC Damage Level	5.5 VDC			
0.1 dB Compression Point				
Normal IF path	-9.0 dBm at 7.438 MHz			
Narrowband IF path	-17 dBm at 10.70 MHz			
<b>Pulse Inputs (IF Gates)</b>				
Function	Internal receiver gates used for point-in-pulse and pulse-profile measurements			
Connectors	15-pin mini D-sub			
Input Impedance	1 K Ohm			
Source Modulators	20 ns minimum pulse width			
Receiver Gates	20 ns minimum pulse width			
DC Damage Level	5.5 VDC			
Drive Voltage	0 V (off), +3.3 V (on), nominal			

Table 35. (Continued) Rear Panel Information, All Options

Description	Typical Performance	
<b>RF Pulse Modulator Input (Source Modulator)</b>		
<b>On/Off Ratio</b>		
10 MHz to 3.2 GHz	-64 dB	
3.2 GHz to 8.5 GHz	-80 dB	
8.5 GHz to 13.5 GHz	-80 dB	
13.5 GHz to 26.5 GHz	-80 dB	
<b>Pulse Period</b>		
Minimum	20 ns	
Maximum	70 s	
<b>Pulse Outputs</b>		
Voltage (TTL)	High: 3.3 V to 3.5 V Low: <1 V	
Impedance	50 Ohm	
<b>External Test Set Driver</b>		
Function	Used for driving remote mixers	
Connections	SMA (female)	
RF, LO Output Frequency Range <sup>1</sup>	1.7 to 13.5 GHz (N5241B) 1.7 to 26.5 GHz (N5242B)	
<b>Rear Panel LO Power</b>	<b>Upper Limit (dBm)</b>	<b>Lower Limit (dBm)</b>
1.7 GHz to 8.5 GHz	0	-10
8.5 GHz to 13.5 GHz	0	-10
13.5 GHz to 18 GHz	0	-10
18 GHz to 22.5 GHz	2	-8
22.5 GHz to 26.5 GHz	6	-5
<b>Rear Panel RF Power</b>	<b>Upper Limit (dBm)</b>	<b>Lower Limit (dBm)</b>
3.2 GHz to 13.5 GHz	-3	-8
13.5 GHz to 20 GHz	-3	-8
20 GHz to 26.5 GHz	-8	-14

<sup>1</sup> Full LO frequency range is: 12.535 MHz to 13.5 GHz. (N5241B), 12.535 MHz to 26.5 GHz. (N5242B)

Table 35. (Continued) Rear Panel Information, All Options

Description	Typical Performance
<b>Devices Supported:</b>	<b>Resolutions:</b>
Flat Panel (TFT)	1024 X 768, 800 X 600, 640 X 480
Flat Panel (DSTN)	800 X 600, 640 X 480
CRT Monitor	1280 X 1024, 1024 X 768, 800 X 600, 640 X 480
Simultaneous operation of the internal and external displays is allowed, but with 640 X 480 resolution only. If you change resolution, you can only view the external display (internal display will "white out").	
<b>Bias Tee Inputs</b>	
Connectors	BNC(f) for ports 1, 2, 3 and 4
Fuse	500 mA, bi-pin style
Maximum Bias Current	+/-200 mA with no degradation of RF specifications
Maximum Bias Voltage	+/-40 VDC
Trigger Inputs/Outputs	BNC(f), TTL/CMOS compatible
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
Pulse I/O	15-pin D connector provides access to Pulse Modulators and Generators
GPIB	Two ports - dedicated controller and dedicated talker/listener. 24-pin D-sub (Type D-24), female; compatible with IEEE-488
PCIe	Cabled PCIe x4 connector is a 4-lane slot (not currently used)
USB Port	Two SuperSpeed USB ports (900 mA each), one USB port below LAN connector, and one USB device port. There are also four USB ports (500 mA each) on the front panel. The total current limit for all rear panel USB ports is 2.3 amps. The total current limit for all front panel USB ports is 2 amps.
LAN	10/100/1000 BaseT Ethernet, 8-pin configuration; auto selects between the data rates
VGA Video Output	15-pin mini D-Sub; Drives VGA compatible monitors
Mini DisplayPort	Miniature DisplayPort connector for connection to external displays
<b>Line Power</b>	
Frequency, Voltage	50/60/400 Hz for 100 to 120 VAC 50/60 Hz for 220 to 240 VAC
	Power supply is auto switching
Max	450 watts

**Table 36. Analyzer Dimensions and Weight**

All N5241B, N5242B, and N5249B models are shipped with bottom feet, handles, and front and rear hardware.

See detailed PNA dimension drawings at: <http://na.support.keysight.com/pna/PNADimensions.pdf>

<b>Cabinet Dimensions</b>	<b>Metric (mm)</b>	<b>Imperial (inches)</b>
<b>Height</b>		
Without bottom feet: EIA RU <sup>1</sup> = 6	266.1	10.5
With bottom feet	279.1	11.0
<b>Width</b>		
Without handles or rack-mount flanges	425.6	16.8
With handles, without rack-mount flanges	458.7	18.1
With handles and rack-mount flanges	482.9	19.0
<b>Depth</b>		
Without front and rear panel hardware	533.0	21.0
With front and rear panel hardware, handles	578.0	22.7
<b>Weight (nominal)</b>	<b>Net</b>	<b>Shipping</b>
2-port models	27 kg (60 lb)	43 kg (95 lb)
4-port models	37 kg (82 lb)	53 kg (117 lb)

<sup>1</sup>Electronics Industry Association rack units. 1 RU = 1.75 in.

### 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>.



## Measurement Throughput Summary

- Typical Cycle Time for Measurement Completion
- Cycle Time vs. IF Bandwidth
- Cycle Time vs. Number of Points
- Data Transfer Time

Cycle time Includes sweep time, retrace time and band-crossing time. Analyzer display turned off with DISPLAY:ENABLE OFF. Add 21 ms for display on. Data for one trace (S<sub>11</sub>) measurement.

Table 37a. Cycle Time (ms) for Measurement Completion, All Options - Typical

Sweep Range	IF Bandwidth		Number of Points			
			201	401	1601	16001
50 kHz to 100 MHz	10kHz	Uncorrected	75	141	515	4726
		2-Port cal	155	285	1050	9505
	1kHz	Uncorrected	306	599	2339	23000
		2-Port cal	611	1200	4715	46185
	100Hz	Uncorrected	2543	5085	20293	202691
		2-Port cal	5120	10200	40640	405200
7 GHz to 8 GHz	600 kHz	Uncorrected	6	6.3	9.6	56
		2-Port cal	20	21	28	134
	10 kHz	Uncorrected	36	53	200	1945
		2-Port cal	80	115	405	3900
	1 kHz	Uncorrected	227	444	1740	17000
		2-Port cal	460	900	3484	34000
9 GHz to 10 GHz	600 kHz	Uncorrected	6	6.3	9.6	56
		2-Port cal	20	21	28	134
	10 kHz	Uncorrected	36	53	200	1945
		2-Port cal	80	115	405	3900
	1 kHz	Uncorrected	227	444	1740	17000
		2-Port cal	460	900	3484	34000
10 GHz to 13.5 GHz	600 kHz	Uncorrected	26	33	54	85
		2-Port cal	62	77	121	190
	10 kHz	Uncorrected	70	118	273	1958
		2-Port cal	149	245	553	3922
	1 kHz	Uncorrected	236	459	1780	17300
		2-Port cal	400	926	3565	34600

<b>13.5 GHz to 20 GHz</b>	600 kHz	Uncorrected	26	33	54	85
		2-Port cal	62	77	121	190
	10 kHz	Uncorrected	70	118	273	1958
		2-Port cal	149	245	553	3922
	1 kHz	Uncorrected	236	459	1780	17300
		2-Port cal	400	926	3565	34600

Table 37b. Cycle Time (ms) for Full-Span Measurement Completion - Typical

<b>10 MHz to 26.5 GHz</b>		<b>Number of Points</b>			
<b>IF Bandwidth</b>		<b>201</b>	<b>401</b>	<b>1601</b>	<b>16001</b>
600 kHz	Uncorrected	59	69	118	350
	2-Port cal	125	147	244	707
10 kHz	Uncorrected	94	156	480	2333
	2-Port cal	196	320	968	4674
1 kHz	Uncorrected	277	504	1873	17950
	2-Port cal	561	1015	3756	35900

Table 38. Cycle Time vs. IF Bandwidth - Typical

Applies to the Preset condition (201 points, correction off) except for the following changes:

- CF = 10 GHz
- Span = 100 MHz
- Display off (add 21 ms for display on)

Cycle time includes sweep and retrace time.

<b>Description</b>	<b>Typical Performance</b>	
<b>IF Bandwidth (Hz)</b>	<b>Cycle Time (ms)</b>	<b>Trace Noise</b>
600,000	5.00	0.009
100,000	6.84	0.003
30,000	11.6	0.002
10,000	29.0	0.001
3,000	71.8	0.0007
1,000	222	0.0004
300	640	0.0003
100	1826	0.0002
30	5982	<0.0002

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10	17830	<0.0002
3	60000	<0.0002

---

**Table 39. Cycle Time vs. Number of Points**

Applies to the Preset condition (correction off) except for the following changes:

- CF = 10 GHz
- Span = 100 MHz
- Display off (add 21 ms for display on)

Cycle time includes sweep and retrace time.

Description	IF Bandwidth (Hz)			
	1,000	10,000	30,000	600,000
3	7.7	5.44	5.7	5.4
11	16.6	7.90	5.9	5.4
51	60	10.7	6.5	5.5
101	115	16.8	8.2	5.6
201	222	29.0	11.8	5.9
401	436	53.0	18.8	6.3
801	860	102	32.8	7.2
1,601	1,700	199	60.5	9.6
6,401	6,700	780	228	25
16,001	16,000	1950	566	56

Table 40. Data Transfer Time<sup>1</sup> (ms) - Typical

Description	Number of Points			
	201	401	1601	16,001
SCPI over GPIB (Program executed on external PC <sup>2</sup> )				
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 <sup>3</sup> (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 <sup>3</sup> (Program executed on external PC)				
32-bit floating point	<1.0	1.2	2.1	13
Variant type	2.7	4.5	15	150

<sup>1</sup> Measured with the analyzer display off. Values will increase slightly if the analyzer display is on.

<sup>2</sup> Measured when using the SCPI command DISPlay: VISible OFF.

<sup>3</sup> Values are for real and imaginary pairs, with the analyzer display off.

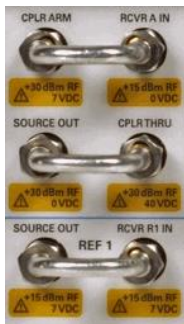
**NOTE**

Specifications for Recall & Sweep Speed are not provided for the N5241B, N5242B, and N5249B analyzers.

## Specifications: Front-Panel Jumpers

**NOTE**

All PNA-X options have the following front-panel jumpers for each port.



- Measurement Receiver Inputs
- Reference Receiver Inputs and Reference Source Outputs
- Source Outputs
- Coupler Inputs
- Damage Level

Table 41. Measurement Receiver Inputs (dBm) - Typical

(RCVR A, B, C, D IN) @ 0.1 dB Typical Compression

Description	All Options
10 MHz to 50 MHz	-4
50 MHz to 500 MHz	-3
500 MHz to 8.5 GHz	-2
8.5 GHz to 13.5 GHz	-2
13.5 GHz to 16 GHz	-2
16 GHz to 20 GHz	-2.5
20 GHz to 26.5 GHz	-4

Table 42a. Reference Receiver Inputs and Reference Source Outputs (dBm) - Typical

(RCVR R1 IN, REF 1 SOURCE OUT) @ Max Specified Output Power

Description	Options 201, 401		Options 21x, 41x		Options 22x, 42x	
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>
10 MHz to 50 MHz	-8	-3	-8	-3	-9	-6
50 MHz to 500 MHz	-6	-3	-6	-3	-7	-5
500 MHz to 3.2 GHz	-6	-6	-5	-5	-7	-5
3.2 GHz to 8.5 GHz	-3	-3	-2	-2	-2	-2
8.5 GHz to 10 GHz	-3	-3	-2	-2	-2	-2
10 GHz to 13.5 GHz	-4	-4	-3	-3	-3	-3
13.5 GHz to 16 GHz	-4	-4	-3	-3	-3	-3
16 GHz to 20 GHz	-5	-5	-6	-6	-6	-6
20 GHz to 24 GHz	-7	-7	-8	-8	-9	-9
24 GHz to 26.5 GHz	-16	-16	-15	-15	-18	-18

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 42b. Reference Receiver Inputs and Reference Source Outputs (dBm) - Typical

(RCVR R2, R3, R4 IN, REF 2, 3, 4 SOURCE OUT) @ Max Specified Output Power

Description	Option 401		Options 201, 401	Option 41x		Options 21x, 41x
	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R2, R4 IN, REF 2, 4 SOURCE OUT	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R2, R4 IN, REF 2, 4 SOURCE OUT
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>		Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	
10 MHz to 50 MHz	-6	-1	-1	-6	-1	-1
50 MHz to 500 MHz	-4	-1	-1	-4	-1	-1
500 MHz to 3.2 GHz	-4	-4	0	-3	-3	-1
3.2 GHz to 8.5 GHz	0	0	0	1	1	0
8.5 GHz to 10 GHz	0	0	0	1	1	0
10 GHz to 13.5 GHz	1	1	0	1	1	1
13.5 GHz to 16 GHz	1	1	0	1	1	1
16 GHz to 20 GHz	1	1	-3	0	0	-3
20 GHz to 24 GHz	0	0	-6	-1	-1	-4
24 GHz to 26.5 GHz	-8	-8	-12	-7	-7	-13

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.



Table 42c. Reference Receiver Inputs and Reference Source Outputs (dBm) – Typical  
(RCVR R2, R3, R4 IN, REF 2, 3, 4 SOURCE OUT) @ Max Specified Output Power

Description	Option 42x		Options 22x, 42x
	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R3 IN, REF 3 SOURCE OUT	RCVR R2, R4 IN, REF 2, 4 SOURCE OUT
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	
10 MHz to 50 MHz	-7	-4	-1
50 MHz to 500 MHz	-6	-4	-1
500 MHz to 3.2 GHz	-5	-3	-1
3.2 GHz to 8.5 GHz	1	1	0
8.5 GHz to 10 GHz	1	1	0
10 GHz to 13.5 GHz	1	1	-2
13.5 GHz to 16 GHz	1	1	-2
16 GHz to 20 GHz	0	0	-4
20 GHz to 24 GHz	-2	-2	-6
24 GHz to 26.5 GHz	-10	-10	-10

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

Table 43a. Source Outputs (dBm) – Typical

(PORT 1, 2, 3, 4 SOURCE OUT) @ Max Specified Output Power

Description	Options 201, 401		Options 21x, 41x			
	PORT 1, 3 SOURCE OUT		PORT 2, 4 SOURCE OUT	PORT 1, 3 SOURCE OUT		PORT 2, 4 SOURCE OUT
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>		Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	
10 MHz to 50 MHz	8	13	13	8	13	13
50 MHz to 500 MHz	10	13	13	10	13	13
500 MHz to 3.2 GHz	11	11	13	11	11	14
3.2 GHz to 8.5 GHz	14	14	14	14	14	14
8.5 GHz to 10 GHz	14	14	14	14	14	14
10 GHz to 13.5 GHz	14	14	14	14	14	13
13.5 GHz to 16 GHz	14	14	14	14	14	13
16 GHz to 20 GHz	14	14	11	12	12	10
20 GHz to 24 GHz	13	13	9	10	10	9
24 GHz to 26.5 GHz	7	7	4	5	5	2

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

**Table 43b. Source Outputs (dBm) - Typical**

(PORT 1, 2, 3, 4 SOURCE OUT) @ Max Specified Output Power

Description	Options 22x, 42x		
	PORT 1, 3 SOURCE OUT		PORT 2, 4 SOURCE OUT
	Filtered Mode <sup>1</sup>	Hi Power Mode <sup>1</sup>	
10 MHz to 50 MHz	7	10	13
50 MHz to 500 MHz	8	10	13
500 MHz to 3.2 GHz	9	11	14
3.2 GHz to 8.5 GHz	14	14	14
8.5 GHz to 10 GHz	14	14	14
10 GHz to 13.5 GHz	14	14	12
13.5 GHz to 16 GHz	14	14	12
16 GHz to 20 GHz	12	12	9
20 GHz to 24 GHz	9	9	7
24 GHz to 26.5 GHz	2	2	4

<sup>1</sup> In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Power Mode, the signal bypasses the filters to maximize output power.

**Table 44. Coupler Inputs (dB) - Typical**

(PORT 1, 2, 3, 4 CPLR THRU) Insertion Loss of Coupler Thru

Description	Options 201, 401	Options 21x, 41x, 22x, 42x
10 MHz to 50 MHz	0	-0.5
50 MHz to 500 MHz	-0.25	-0.75
500 MHz to 3.2 GHz	-0.5	-1.0
3.2 GHz to 8.5 GHz	-0.75	-1.25
8.5 GHz to 10 GHz	-0.75	-1.25
10 GHz to 13.5 GHz	-1.0	-1.75
13.5 GHz to 16 GHz	-1.0	-1.75
16 GHz to 20 GHz	-1.5	-2.25
20 GHz to 24 GHz	-1.5	-2.5
24 GHz to 26.5 GHz	-1.75	-2.5

Table 45. Damage Level - Typical

Description	RF (dBm)	DC (V)
RCVR A, B, C, D IN	15	0
RCVR R1 IN	15	7
RCVR R2, R3, R4 IN	15	15
REF 1 SOURCE OUT	15	7
REF 2, 3, 4 SOURCE OUT	30	0
PORT 1, 2, 3, 4 SOURCE OUT	15	0
PORT 1, 2, 3, 4 CPLR THRU	30	40
PORT 1, 2, 3, 4 CPLR ARM	30	7

# Test Set Block Diagrams

**NOTE** For best readability, use a color printer for printing the following graphics.

## Legend

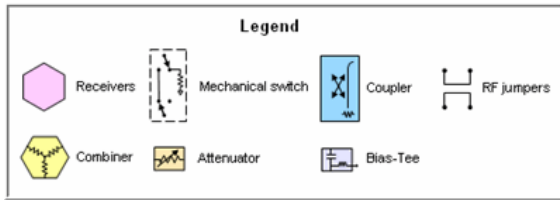


Figure 1. 2-Port N5241B, N5242B, and N5249B Base Unit Option 201

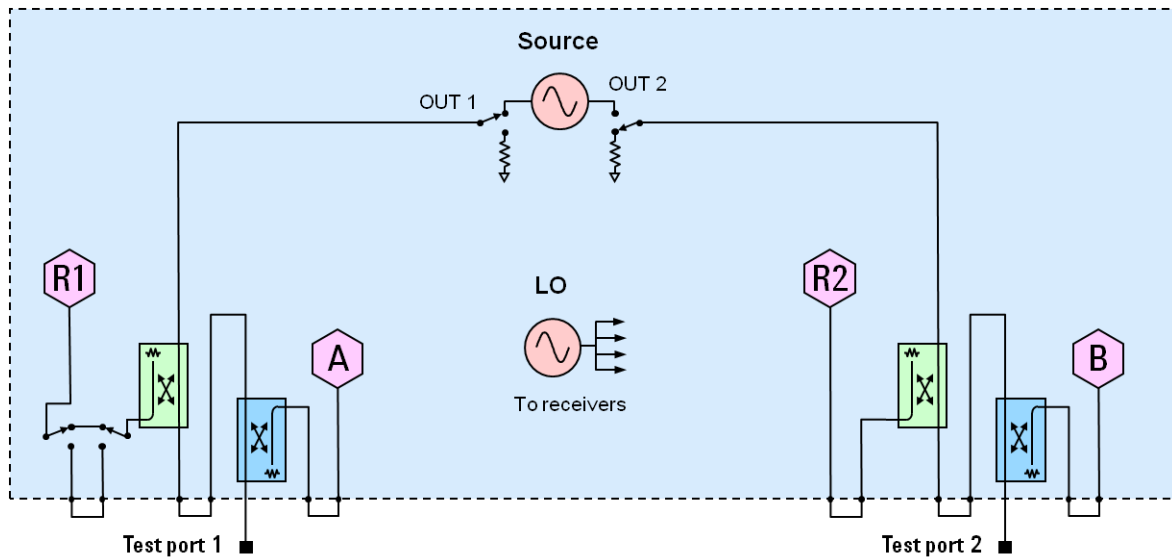


Figure 2. 2-Port N5241B, N5242B, and N5249B Option 217

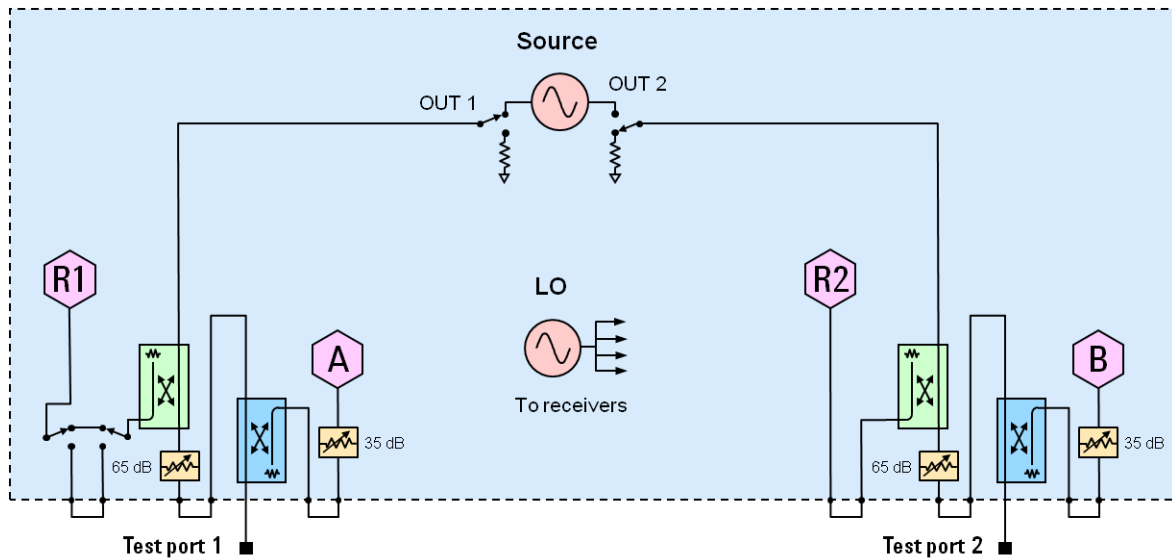


Figure 3. 2-Port N5241B, N5242B, and N5249B Option 219

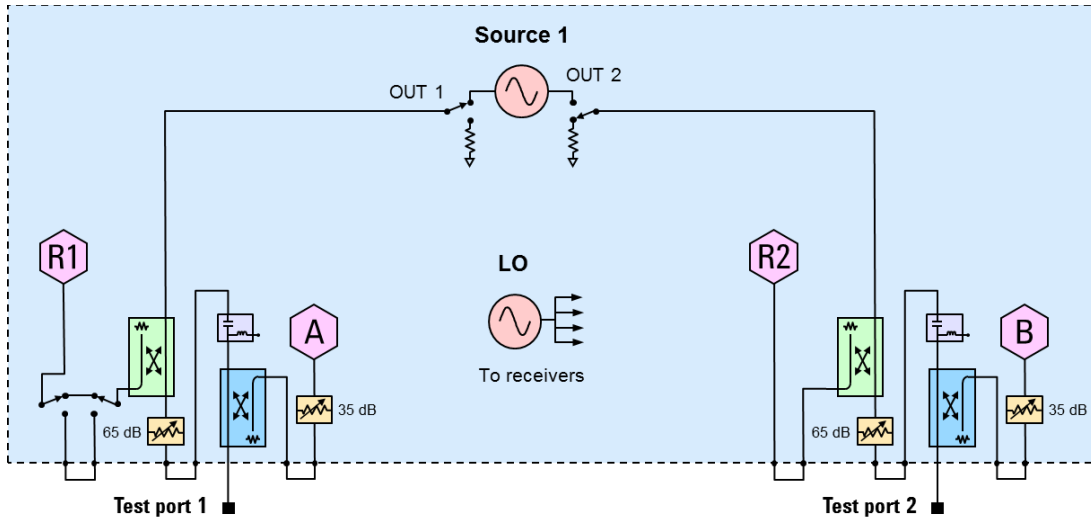


Figure 4. 2-Port N5241B, N5242B, and N5249B Option 222

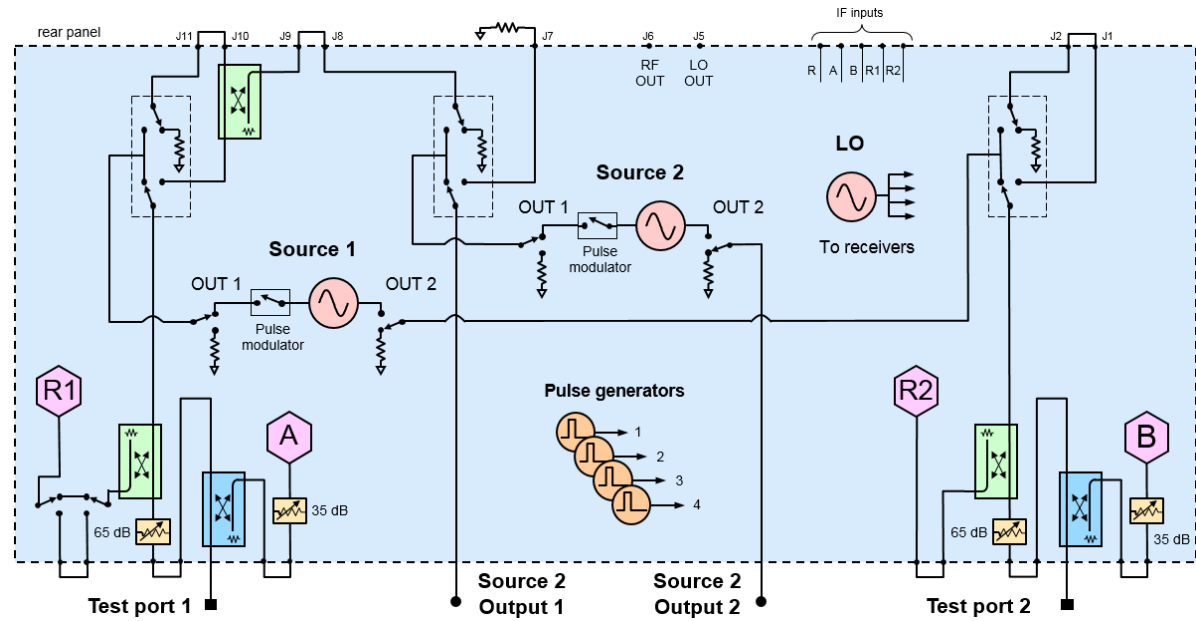


Figure 5. 2-Port N5241B, N5242B, and N5249B Option 224

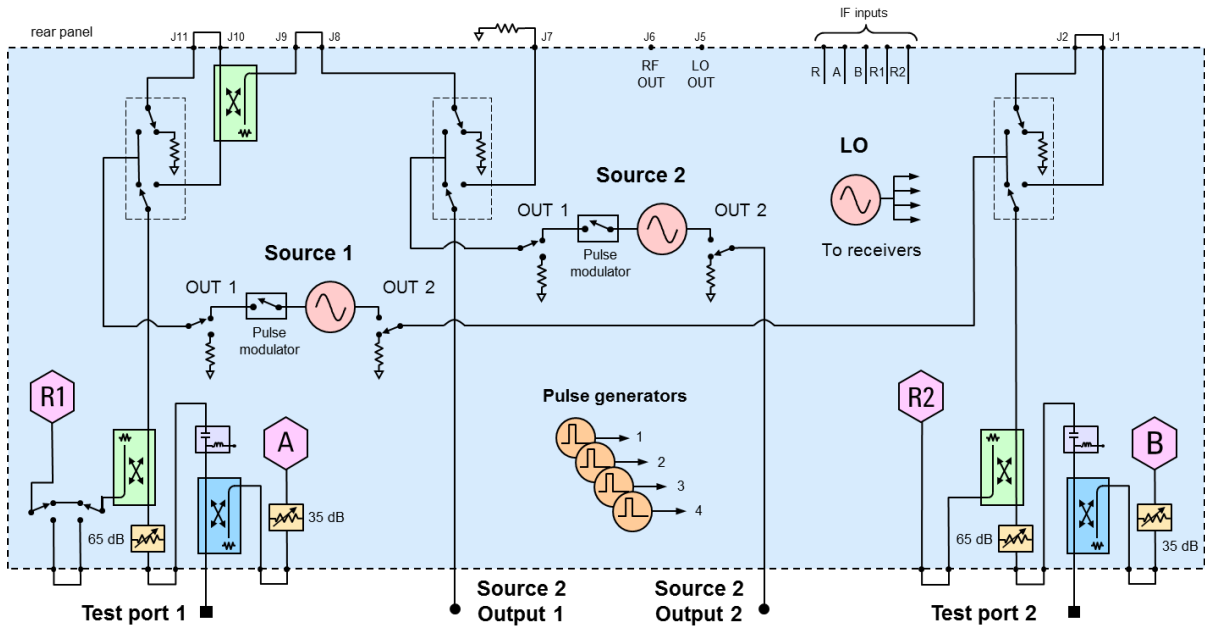


Figure 6. 2-Port N5241B, N5242B, and N5249B Option 224 with 029

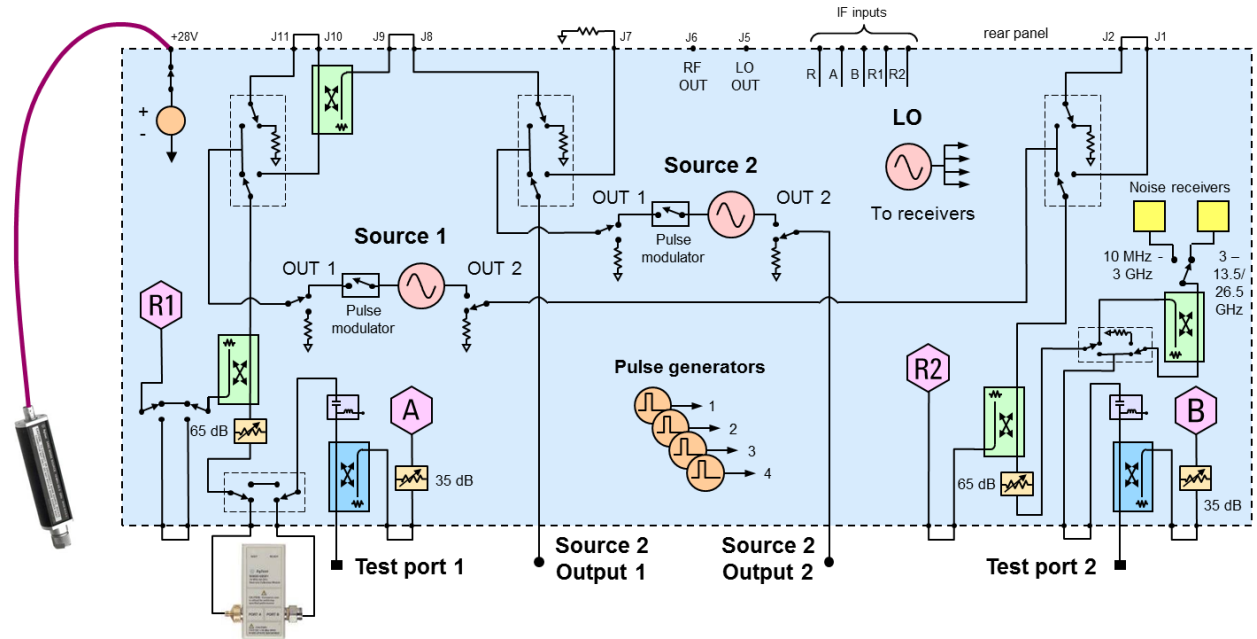


Figure 7. 4-Port N5241B, N5242B, and N5249B Base Unit Option 401

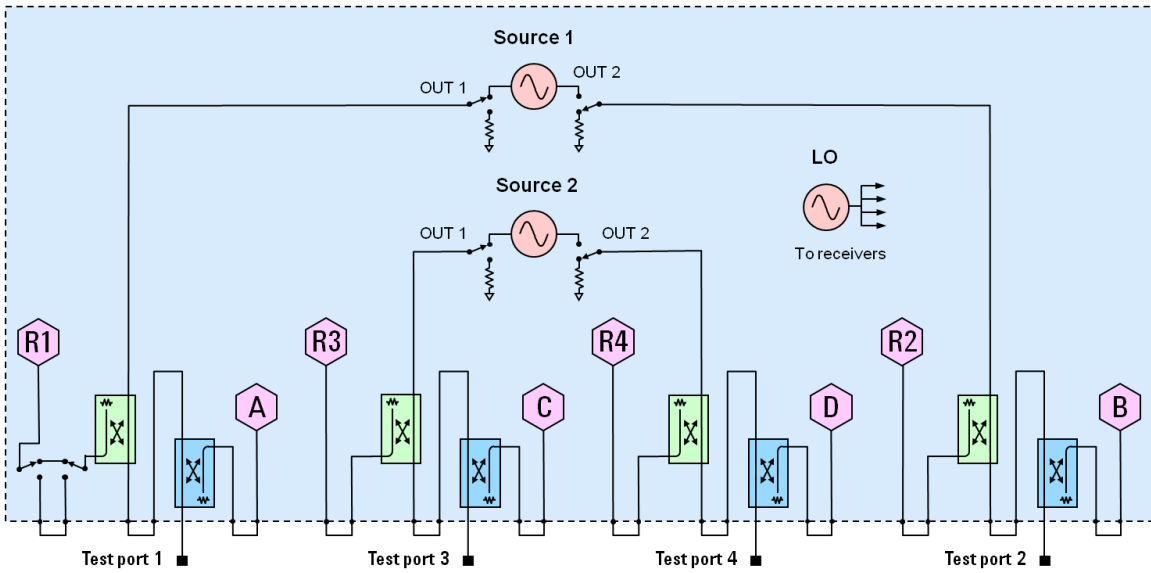


Figure 8. 4-Port N5241B, N5242B, and N5249B Option 417

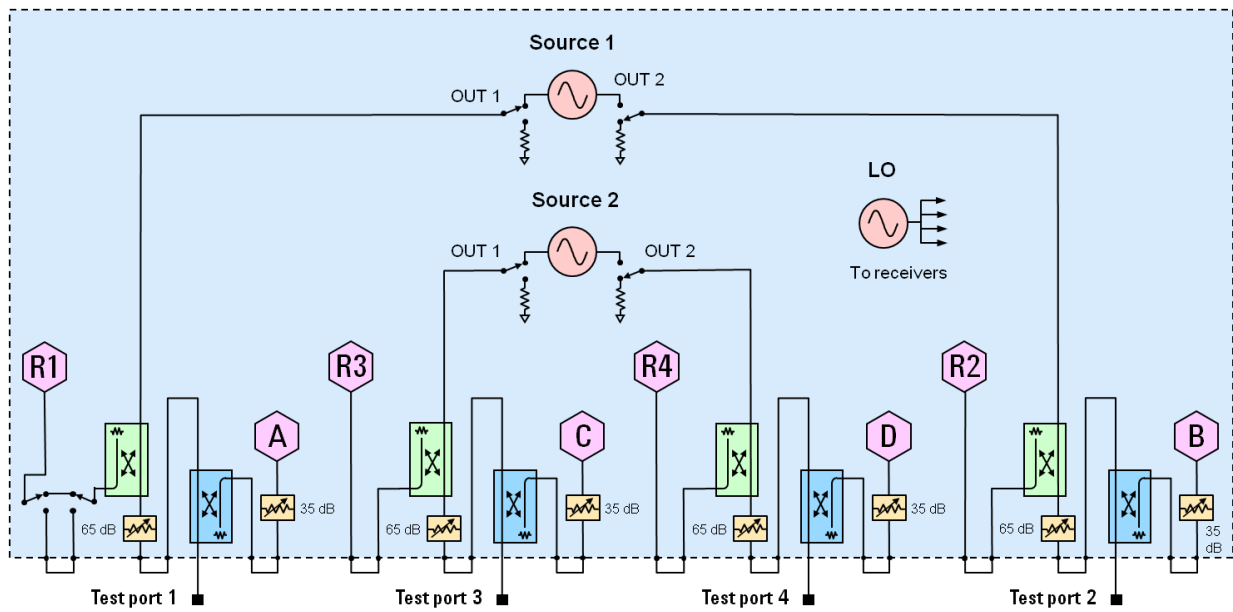




Figure 9. 4-Port N5241B, N5242B, and N5249B Option 419

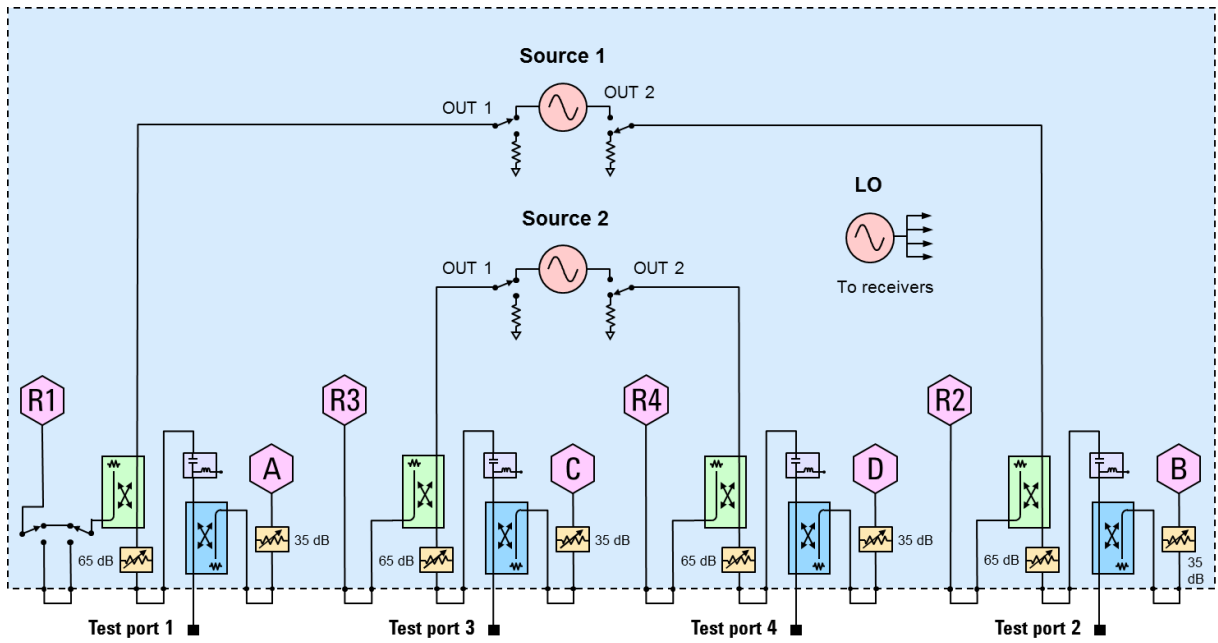


Figure 10. 4-Port N5241B, N5242B, and N5249B Option 422

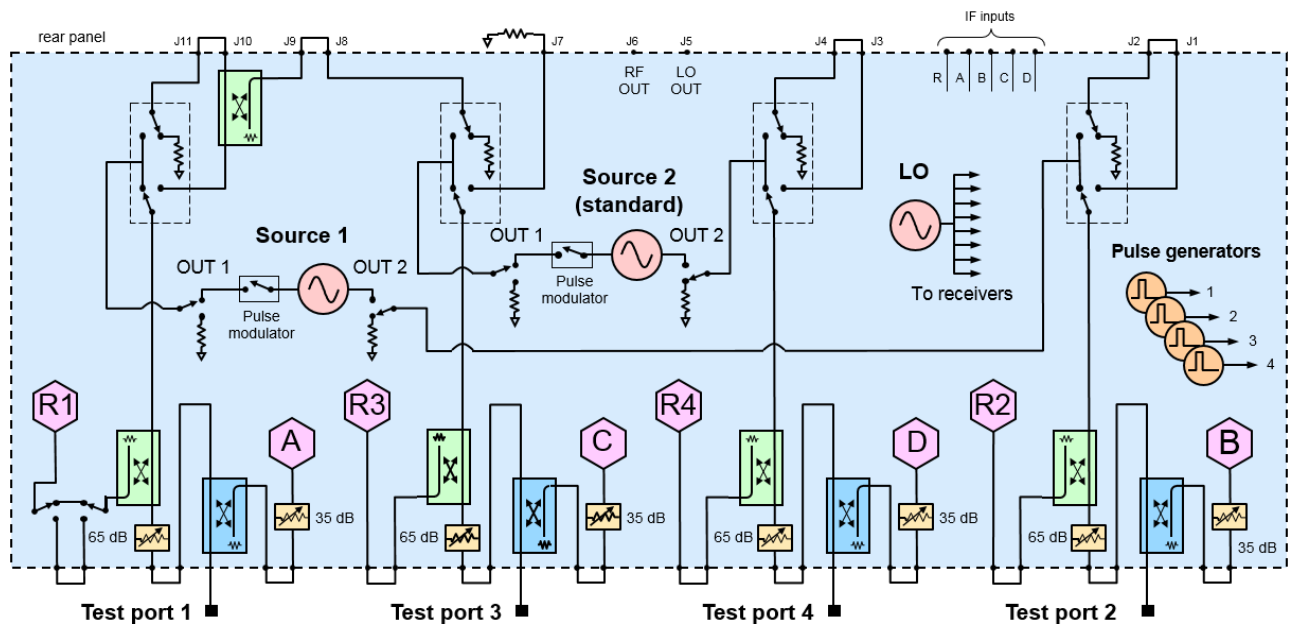


Figure 11. 4-Port N5241B, N5242B, and N5249B Option 423

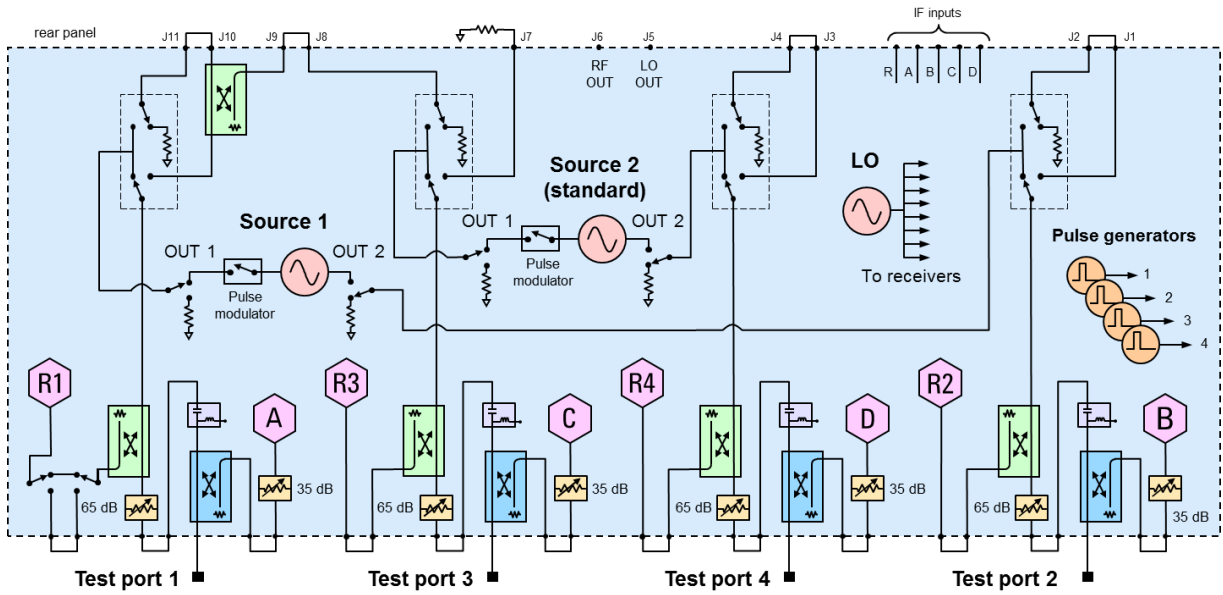


Figure 12. 4-Port N5241B, N5242B, and N5249B Option 423 with 029

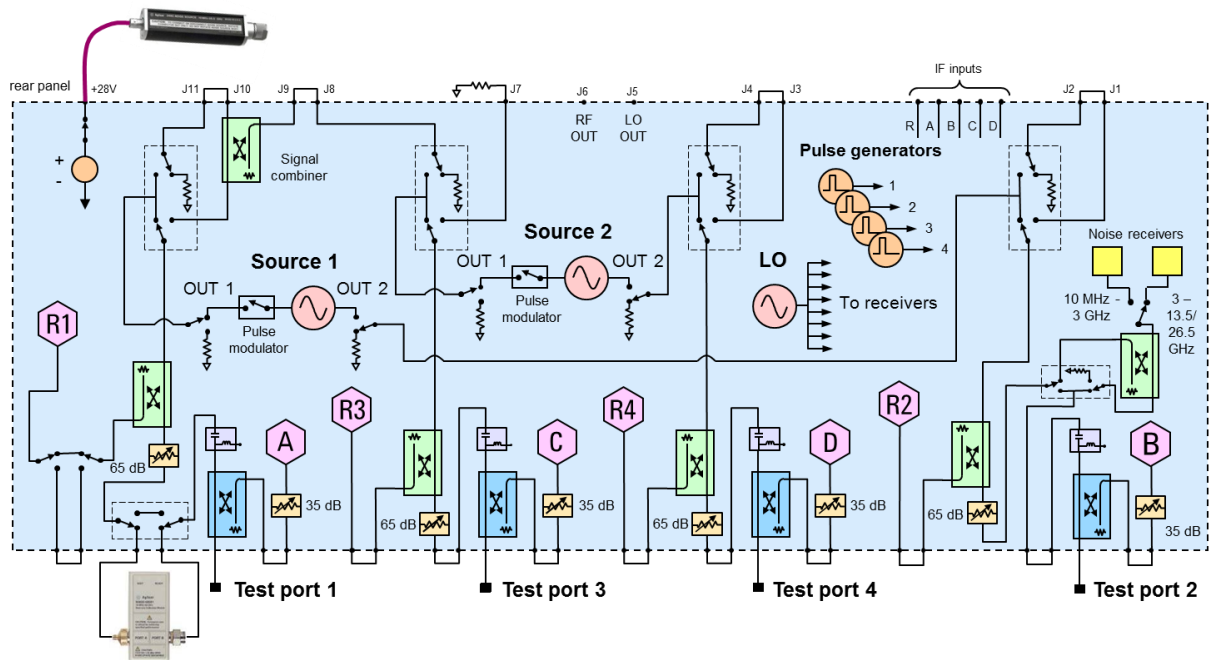


Figure 13. Option 425 Low Frequency Extension

The following LFE block diagram shows how the low-frequency hardware is configured for a single test port. The other ports are configured similarly.

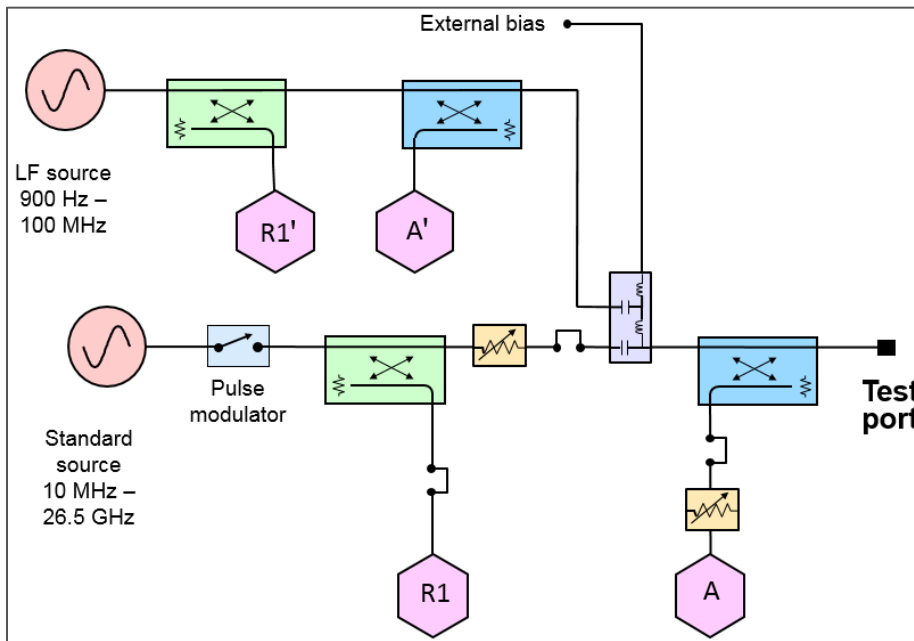
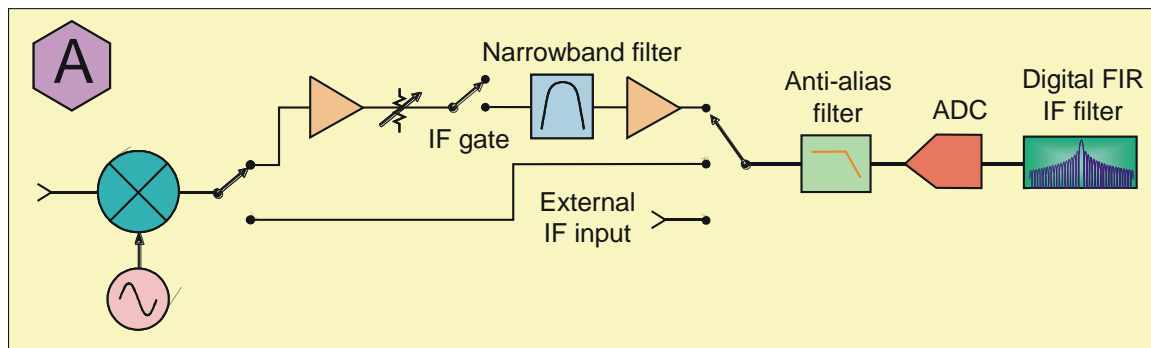


Figure 14. Receiver Block Diagram





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