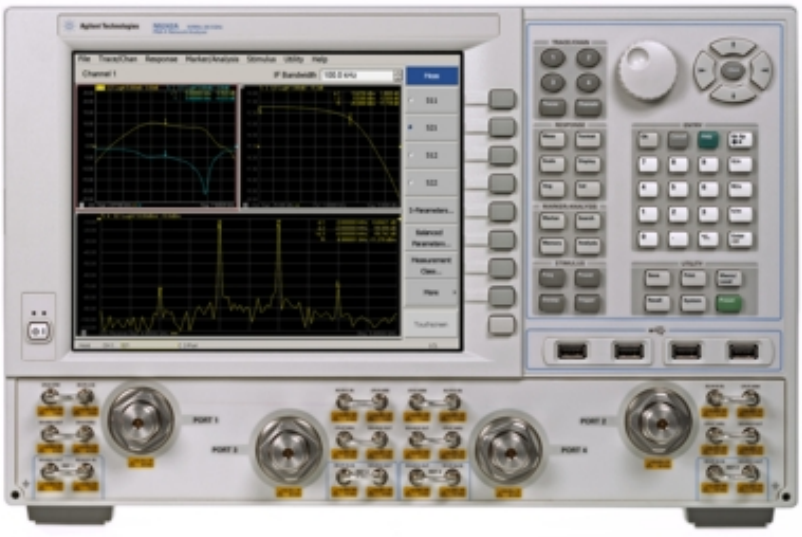
Agilent
2-Port and 4-Port PNA-X Network Analyzer

N5242A
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 N5242A PNA-X network analyzer with the following options:

Option 200, 2-port standard test set (includes six front-panel access loops) and power range. See the block diagram.

Option 219, adds 2-port extended power range, source and receiver attenuators, and bias-tees (requires Option 200). See the block diagram.

Option 224, adds an internal second source, a combiner, and mechanical switches to the 2-port analyzer (requires Option 200, 219, and 080). See the block diagram.

Option 400, 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 419, adds 4-port extended power range, source and receiver attenuators, and bias-tees (requires Option 400). See the block diagram.

Option 423, adds an internal combiner, and mechanical switches to the 4-port analyzer (requires Option 400, 419, and 080). See the block diagram.

Note

This document provides technical specifications 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.agilent.com/find/na_calculator to generate the curves for your calibration kit and PNA setup.

Definitions

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

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

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

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

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

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

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

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

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

Corrected System Performance

The specifications in this section apply for measurements made with the N5242A analyzer with the following conditions:

- 10 Hz IF bandwidth
- No averaging applied to data
- Isolation calibration with an averaging factor of 8

Table 1a. System Dynamic Range at Test Port [1]

Option 200 or 400

Description	Specification (dB) at Test Port		Typical (dB) at Test Port	
	Port 1 or 3[2]	Port 2 or 4[2]	Port 1 or 3[2]	Port 2 or 4[2]
10 MHz to 50 MHz[3]	93	93	106	104
50 MHz to 100 MHz[3]	103	103	116	115
100 MHz to 500 MHz[3]	117	117	131	130
500 MHz to 3.2 GHz	124	127	130	135
3.2 GHz to 10 GHz	127	127	137	136
10 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

1. The system dynamic range is calculated as the difference between the noise floor and the specified source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account.
2. Either port can be used as the source port. Any other port can be used as the receiver port.
3. May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 1b. System Dynamic Range at Test Port[1]

Option 219 or 419

Description	Specification (dB) at Test Port		Typical (dB) at Test Port	
	Port 1 or 3[2]	Port 2 or 4[2]	Port 1 or 3[2]	Port 2 or 4[2]
10 MHz to 50 MHz[3]	93	93	106	104
50 MHz to 100 MHz[3]	103	103	115	114
100 MHz to 500 MHz[3]	117	117	130	129
500 MHz to 3.2 GHz	124	127	130	135
3.2 GHz to 10 GHz	127	127	135	134
10 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

[1] The system dynamic range is calculated as the difference between the noise floor and the specified source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account.

[2] Either port can be used as the source port. Any other port can be used as the receiver port.

[3] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 1c. System Dynamic Range at Test Port [1]

Option 224

Description	Specification (dB) at Test Port		Typical (dB) at Test Port	
	Source 2, Out 1	Source 2, Out 2	Source 2, Out 1	Source 2, Out 2
10 MHz to 50 MHz[2]	98	93	108	105
50 MHz to 100 MHz[2]	108	107	117	116
100 MHz to 500 MHz[2]	122	121	132	131
500 MHz to 3.2 GHz	128	128	134	136
3.2 GHz to 10 GHz	132	132	139	139
10 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

[1] The system dynamic range is calculated as the difference between the noise floor and the specified source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account.

[2] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 1d. System Dynamic Range at Test Port [1]

Option 224 or 423

Description	Specification (dB) at Test Port		Typical (dB) at Test Port			
	Port 1 or 3[2]	Port 2 or 4[2]	Port 1 or 3[2]	Port 2 or 4[2]	Source 1, Port 1 Combine Mode	Source 2, Port 1 Combine Mode
10 MHz to 50 MHz[3]	93	93	106	104	104	80
50 MHz to 100 MHz[3]	103	103	115	115	112	90
100 MHz to 500 MHz[3]	117	117	130	130	121	99
500 MHz to 3.2 GHz	124	127	130	134	127	112
3.2 GHz to 10 GHz	127	127	136	134	132	119
10 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

[1] The system dynamic range is calculated as the difference between the noise floor and the specified source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account.

[2] Either port can be used as the source port. Any other port can be used as the receiver port.

[3] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 2a Extended Dynamic Range at Direct Receiver Access Input[1]

Option 200 or 400

Description	Typical (dB) at Direct Receiver Access Input	
	Port 1 or 3[2]	Port 2 or 4[2]
10 MHz to 50 MHz[3]	128	128
50 MHz to 100 MHz[3]	115	115
100 MHz to 500MHz[3]	129	129
500 MHz to 3.2 GHz	136	139
3.2 GHz to 10 GHz	139	139
10 GHz to 16 GHz	139	139
16 GHz to 20 GHz	139	136
20 GHz to 24 GHz	134	129
24 GHz to 26.5 GHz	124	121

[1] The direct receiver access input extended dynamic range is calculated as the difference between the direct receiver access input noise floor and the source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account. This set-up should only be used when the receiver input will never exceed its maximum receiver input. When the analyzer is in segment sweep mode, it can have predefined frequency segments which will output a higher power level when the extended dynamic range is required (i.e. devices with high insertion loss), and reduced power when the maximum receiver input level will occur (i.e. devices with low insertion loss). The extended range is only available in one-path transmission measurements.

[2]Either port can be used as the source port. Any other port can be used as the receiver port.

[3] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 2b. Extended Dynamic Range at Direct Receiver Access Input[1]

Option 219 or 419

Description	Typical (dB) at Direct Receiver Access Input	
	Port 1 or 3[2]	Port 2 or 4[2]
10 MHz to 50 MHz[3]	128	128
50 MHz to 100 MHz[3]	115	115
100 MHz to 500MHz[3]	129	129
500 MHz to 3.2 GHz	136	139
3.2 GHz to 10 GHz	139	139
10 GHz to 16 GHz	138	137
16 GHz to 20 GHz	136	134
20 GHz to 24 GHz	130	129
24 GHz to 26.5 GHz	122	118

[1] The direct receiver access input extended dynamic range is calculated as the difference between the direct receiver access input noise floor and the source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account. This set-up should only be used when the receiver input will never exceed its maximum receiver input. When the analyzer is in segment sweep mode, it can have predefined frequency segments which will output a higher power level when the extended dynamic range is required (i.e. devices with high insertion loss), and reduced power when the maximum receiver input level will occur (i.e. devices with low insertion loss). The extended range is only available in one-path transmission measurements.

[2]Either port can be used as the source port. Any other port can be used as the receiver port.

[3] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 2c. Extended Dynamic Range at Direct Receiver Access Input[1]

Option 224

Description	Typical (dB) at Direct Receiver Access Input	
	Source 2, Out 1	**Source 2, Out 2**
10 MHz to 50 MHz[2]	133	128
50 MHz to 100 MHz[2]	120	119
100 MHz to 500MHz[2]	134	133
500 MHz to 3.2 GHz	140	140
3.2 GHz to 10 GHz	144	144
10 GHz to 16 GHz	142	142
16 GHz to 20 GHz	141	139
20 GHz to 24 GHz	135	134
24 GHz to 26.5 GHz	126	124

[1] The direct receiver access input extended dynamic range is calculated as the difference between the direct receiver access input noise floor and the source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account. This set-up should only be used when the receiver input will never exceed its compression or damage level. When the analyzer is in segment sweep mode, it can have predefined frequency segments which will output a higher power level when the extended dynamic range is required (i.e. devices with high insertion loss), and reduced power when receiver compression or damage may occur (i.e. devices with low insertion loss). The extended range is only available in one-path transmission measurements.

[2] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Table 2d. Extended Dynamic Range at Direct Receiver Access Input[1]

Option 224 or 423

Description	Typical (dB) at Direct Receiver Access Input			
	Port 1 or 3[2]	Port 2 or 4[2]	Source 1, Port 1 Combine Mode	Source 2, Port 1 Combine Mode
10 MHz to 50 MHz[3]	128	128	139	115
50 MHz to 100 MHz[3]	115	115	124	102
100 MHz to 500MHz[3]	129	129	133	111
500 MHz to 3.2 GHz	136	139	139	124
3.2 GHz to 10 GHz	139	139	144	131
10 GHz to 16 GHz	138	136	140	127
16 GHz to 20 GHz	136	133	137	125
20 GHz to 24 GHz	129	127	133	121
24 GHz to 26.5 GHz	119	121	127	114

[1] The direct receiver access input extended dynamic range is calculated as the difference between the direct receiver access input noise floor and the source maximum output power. The effective dynamic range must take measurement uncertainties and interfering signals into account. This set-up should only be used when the receiver input will never exceed its compression or damage level. When the analyzer is in segment sweep mode, it can have predefined frequency segments which will output a higher power level when the extended dynamic range is required (i.e. devices with high insertion loss), and reduced power when receiver compression or damage may occur (i.e. devices with low insertion loss). The extended range is only available in one-path transmission measurements.

[2] Either port can be used as the source port. Any other port can be used as the receiver port.

[3] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

Receiver Dynamic Range technical specifications are not provided in this N5242A specs document.

N5242A Corrected System Performance with 3.5mm Connectors

All Options

Note: For any Sii reflection measurement:

- Sjj = 0.

For any Sij transmission measurement:

- Sji = Sij when Sij ≤ 1
- Sji = 1/Sij when Sij ≥ 1
- Skk = 0 for all k

Table 3. 85052B Calibration Kit N5242A

All Options

Applies to the N5242A Option 200 or 219 or 224 or 400 or 419 or 423 analyzers, 85052B (3.5mm) calibration kit, 85131F flexible test port cable set, and a full 2-port calibration. Also applies to the following condition:

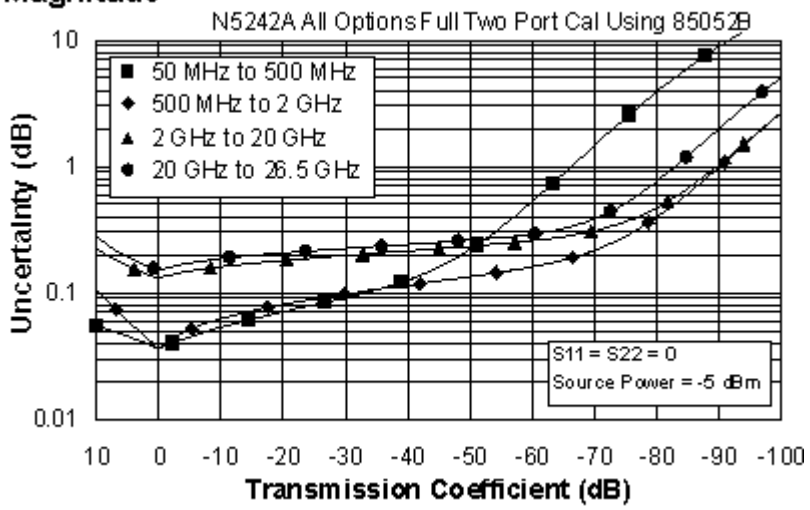
Environmental temperature 23° ±3 °C, with < 1 °C deviation from calibration temperature

Description	Specification (dB)			
	50 MHz to 500 MHz	500 MHz to 2 GHz	2 to 20 GHz	20 to 26.5 GHz
Directivity	48	48	44	44
Source Match	40	40	31	31
Load Match	48	48	44	44
Reflection Tracking [1]	±0.003 +0.010/°C	±0.003 +0.010/°C	±0.006 +0.020/°C	±0.006 +0.030/°C
Transmission Tracking [1]	±0.017 +0.010/°C	±0.017 +0.010/°C	±0.104 +0.020/°C	±0.119 +0.030/°C

[1]Temperature deviation is a characteristic value.

Transmission Uncertainty (Specifications)

Magnitude



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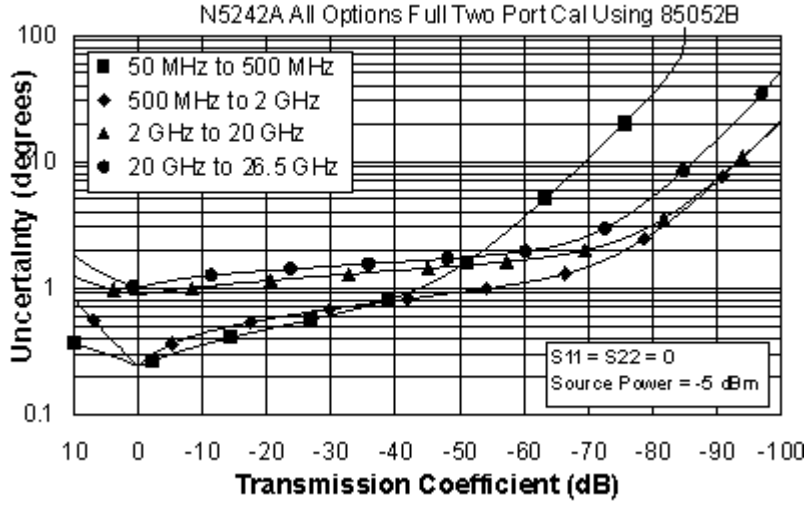
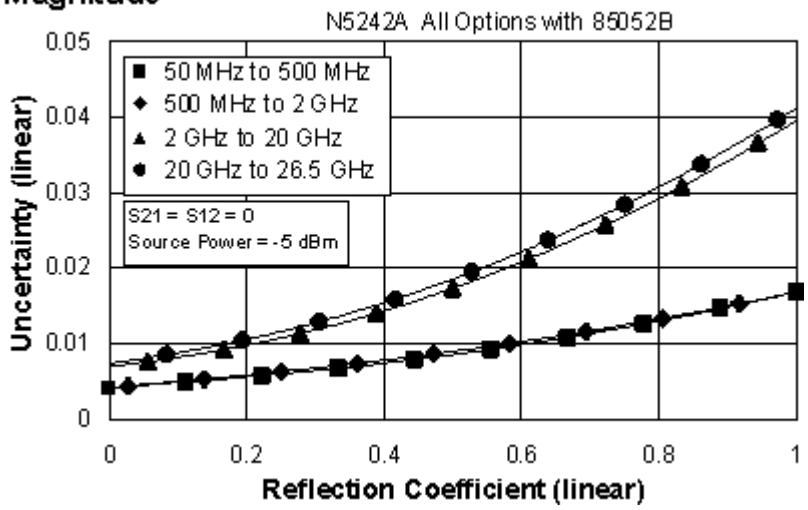


Reflection Uncertainty (Specifications)

Magnitude



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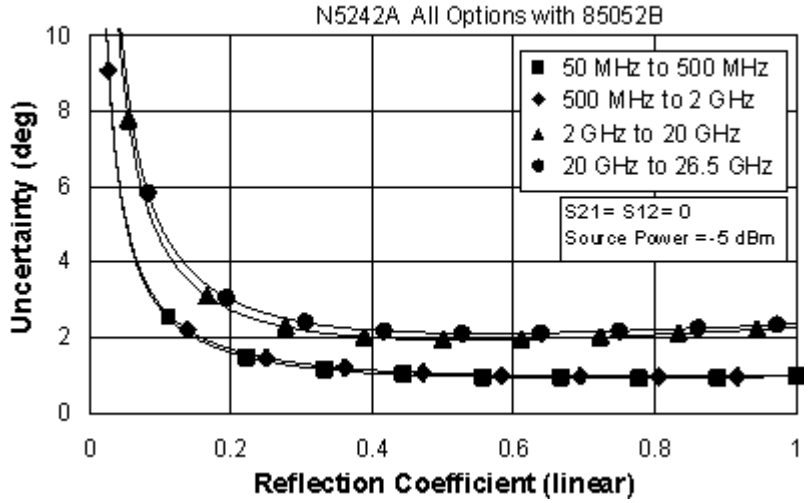


Table 4. N4433A 4-Port Electronic Calibration Module N5242A

All Options

Note: Uncertainty curves for the N4433A are created using a 2-port calibration. Multiport uncertainties are not supported at this time.

Applies to the N5242A Option 200 or 219 or 224 or 400 or 419 or 423 analyzers, N4433A (3.5mm) electronic calibration module, 85131F flexible test port cable set, and a full 2-port calibration. Also applies to the following condition:

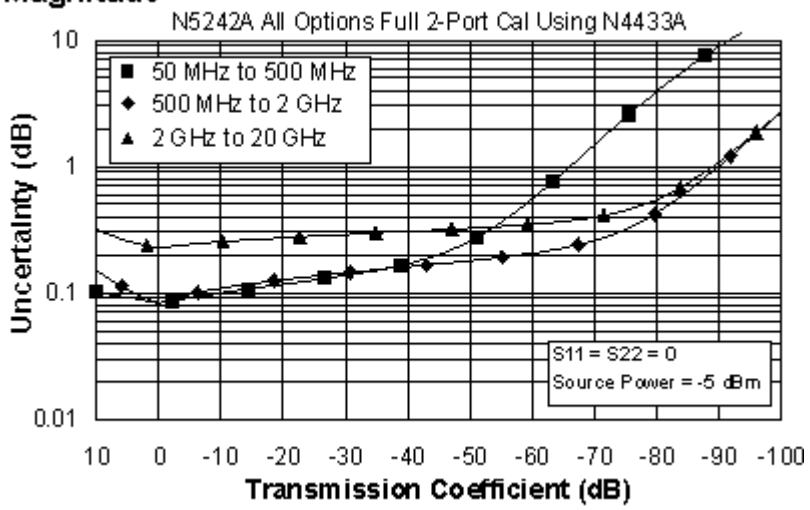
Environmental temperature 23° ±3 °C, with < 1 °C deviation from calibration temperature

Description	Specification (dB)		
	50 MHz to 500 MHz	500 MHz to 2 GHz	2 to 20 GHz
Directivity	52	52	45
Source Match	42	42	31
Load Match	41	41	29
Reflection Tracking [1]	±0.060 +0.010/°C	±0.060 +0.010/°C	±0.180 +0.020/°C
Transmission Tracking [1]	±0.063 +0.010/°C	±0.063 +0.010/°C	±0.197 +0.020/°C

[1] Temperature deviation is a characteristic value.

Transmission Uncertainty (Specifications)

Magnitude



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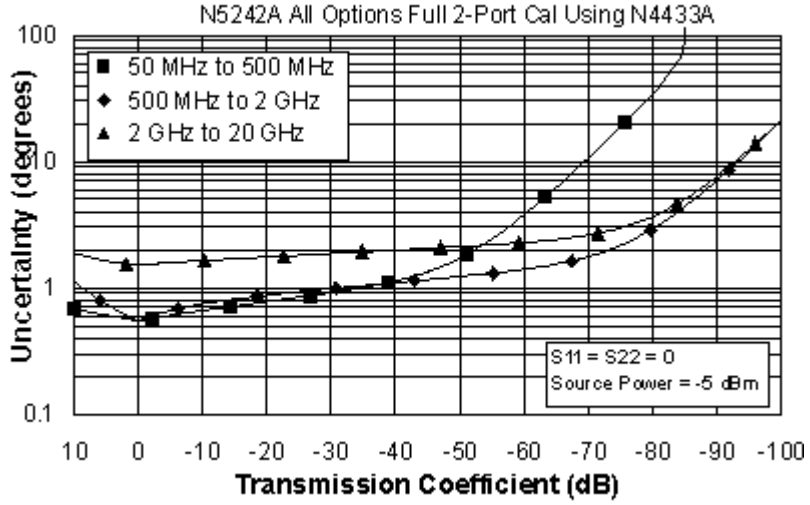
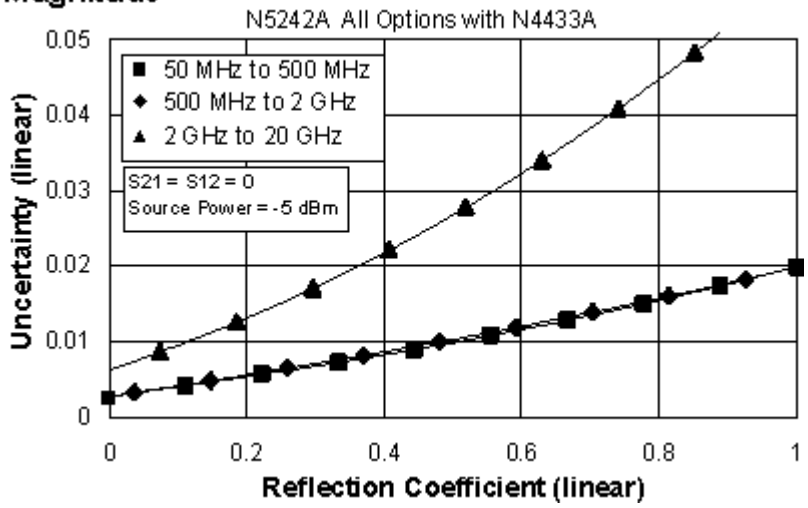


Reflection Uncertainty (Specifications)

Magnitude



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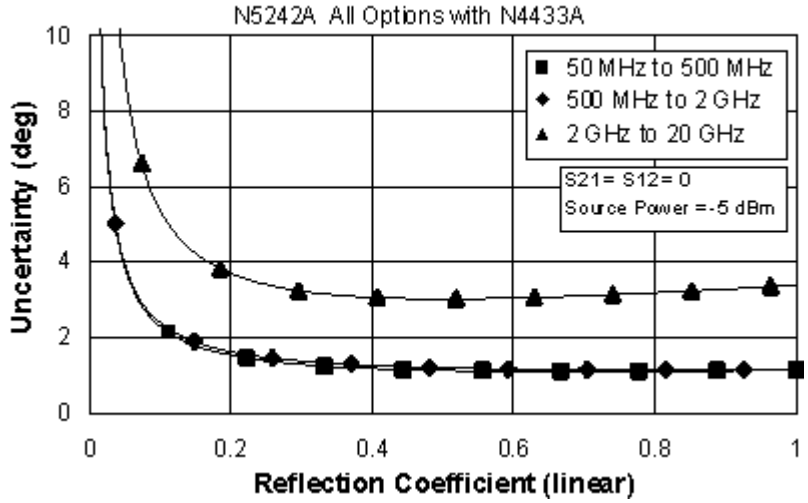


Table 5. N4691B 2- Port Electronic Calibration Module

N5242A All Options

Applies to the N5242A Option 200 or 219 or 224 or 400 or 419 or 423 analyzers, N4691B (3.5mm) electronic calibration module, 85131F flexible test port cable set, and a full 2-port calibration. Also applies to the following condition:

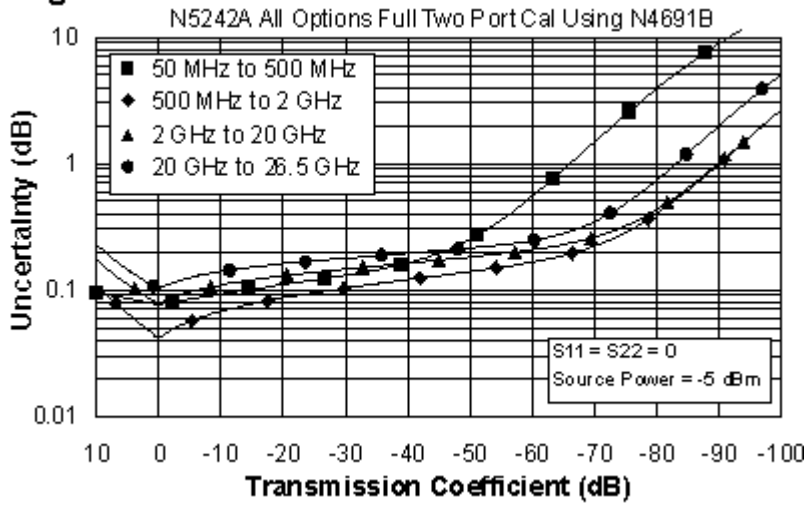
Environmental temperature 23° ±3 °C, with < 1 °C deviation from calibration temperature

Description	Specification (dB)			
	50 MHz to 500 MHz	**500 MHz to 2 GHz**	**2 to 20 GHz**	**20 to 26.5 GHz**
Directivity	46	56	48	44
Source Match	41	47	44	40
Load Match	40	46	42	38
Reflection Tracking [1]	±0.050 +0.010/°C	±0.020 +0.010/°C	±0.040 +0.020/°C	±0.050 +0.030/°C
Transmission Tracking [1]	±0.056 +0.010/°C	±0.022 +0.010/°C	±0.052 +0.020/°C	±0.072 +0.030/°C

[1] Temperature deviation is a characteristic value.

Transmission Uncertainty (Specifications)

Magnitude



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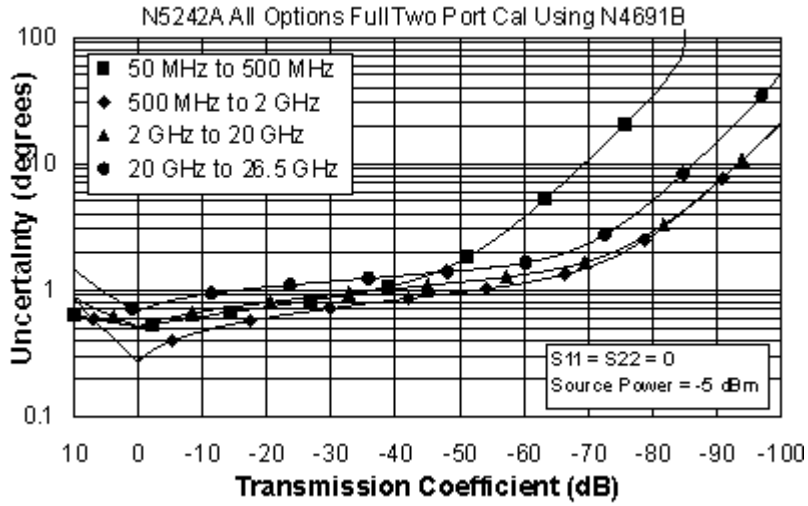
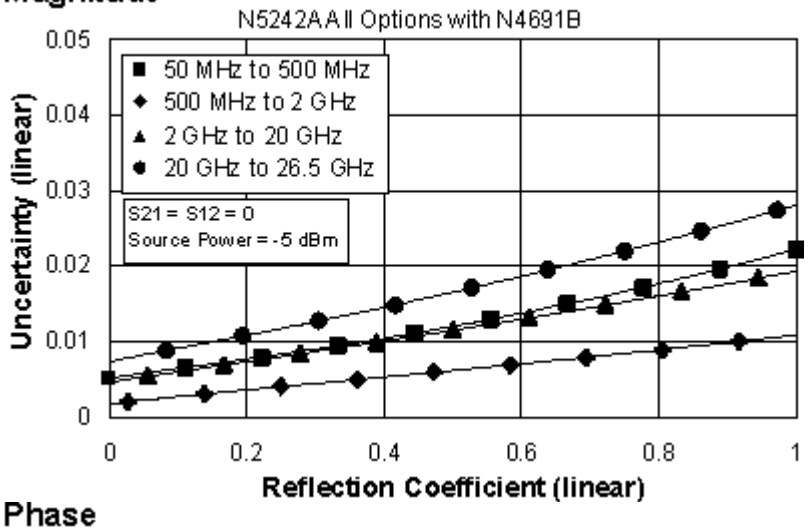


Reflection Uncertainty (Specifications)

Magnitude



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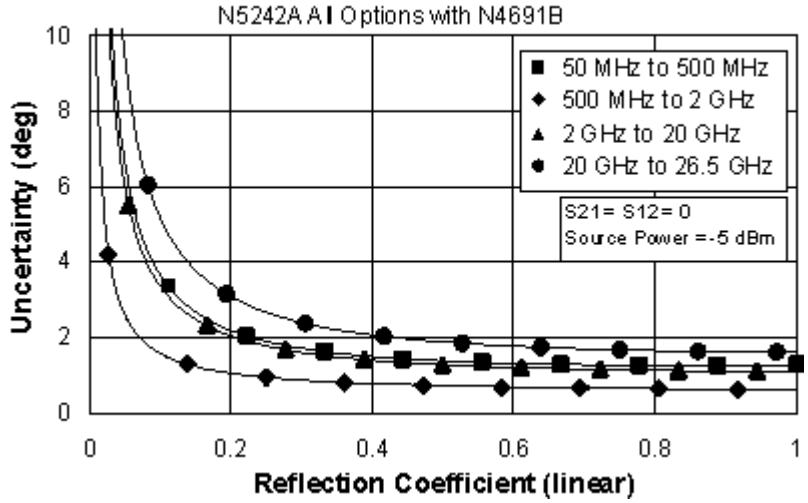


This N5242A document does not present specifications for the 85052C or 85052D Calibration Kit. Please download our free Uncertainty Calculator from http://www.agilent.com/find/na_calculator to generate the data and curves for the 85052C or the 85052D Calibration Kit.

Uncorrected System Performance

Table 6. Error Terms[1]

All Options - Ports 1, 2, 3, 4

Description	Specification	Typical
Directivity (dB)		
10 MHz to 50 MHz	16	23
50 MHz to 500 MHz	24	28
500 MHz to 3.2 GHz	24	32
3.2 GHz to 10 GHz	23	25
10 GHz to 16 GHz	16	22
16 GHz to 20 GHz	16	22
20 GHz to 24 GHz	16	22
24 GHz to 26.5 GHz	16	22
Source Match (dB)		
10 MHz to 50 MHz	11	14
50 MHz to 500 MHz	18	28
500 MHz to 3.2 GHz	18	22
3.2 GHz to 10 GHz	14	18
10 GHz to 16 GHz	12	16
16 GHz to 20 GHz	10	15
20 GHz to 24 GHz	10	14
24 GHz to 26.5 GHz	8	12
Load Match (dB)		
10 MHz to 50 MHz	11	18
50 MHz to 500 MHz	17	25
500 MHz to 3.2 GHz	17	22
3.2 GHz to 10 GHz	13	17
10 GHz to 16 GHz	10	15
16 GHz to 20 GHz	9	14
20 GHz to 24 GHz	9	14

Description	Specification	Typical
24 GHz to 26.5 GHz	8	13
Transmission Tracking[3] (dB)		
10 MHz to 50 MHz	--	+/-1.5
50 MHz to 500 MHz		
500 MHz to 3.2 GHz		
3.2 GHz to 10 GHz		
10 GHz to 16 GHz		
16 GHz to 20 GHz		
20 GHz to 24 GHz		
24 GHz to 26.5 GHz		
Reflection Tracking (dB)		
10 MHz to 50 MHz	--	+/-1.5
50 MHz to 500 MHz		
500 MHz to 3.2 GHz		
3.2 GHz to 10 GHz		
10 GHz to 16 GHz		
16 GHz to 20 GHz		
20 GHz to 24 GHz		
24 GHz to 26.5 GHz		

Crosstalk[4] (dB)		
10 MHz to 50 MHz	--	-84
50 MHz to 100 MHz		-90
100 MHz to 500 MHz		-110
500 MHz to 3.2 GHz		-120
3.2 GHz to 20 GHz		-122
20 GHz to 24 GHz		-117
24 GHz to 26.5 GHz		-114

[1] Specifications apply over environmental temperature of 25 °C ±5 °C, with less than 1°C variation from the calibration temperature.

[3] Cable loss not included.

[4] Measurement conditions: normalized to a thru, measured with two shorts, 10 Hz IF bandwidth, averaging factor of 8, alternate mode, source power set to the lesser of the maximum power-out or the maximum receiver power.

Test Port Output

Table 7. Frequency Information

All Options

Description	Specification (dB)	Typical (dB)
Frequency Range	10 MHz to 26.5 GHz	--
Frequency Resolution	1 Hz	--
Frequency Accuracy	+/- 1 ppm	--
Frequency Stability	--	+/-0.05 ppm, -10° to 70° C +/-0.1 ppm/yr maximum

Table 8a. Maximum Leveled Power, Option 200 or 400

Description	Specification (dBm)			Typical (dBm)		
	Port 1 or 3[1] Filtered Mode[2] See Figure 2 (Opt 200) or Figure 5 (Opt 400)	Port 1 or 3[1] Hi Pwr Mode[2] See Figure 3 (Opt 200) or Figure 6 (Opt 400)	Port 2 or 4[1]	Port 1 or 3[1] Filtered Mode[2] See Figure 2 (Opt 200) or Figure 5 (Opt 400)	Port 1 or 3[1] Hi Pwr Mode[2] See Figure 3 (Opt 200) or Figure 6 (Opt 400)	Port 2 or 4[1]
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 10 GHz	13	13	13	20	20	19
10 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

[1] Either port can be used as the source port.

[2] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Figure 1. Block Diagram, N5242A Option 200

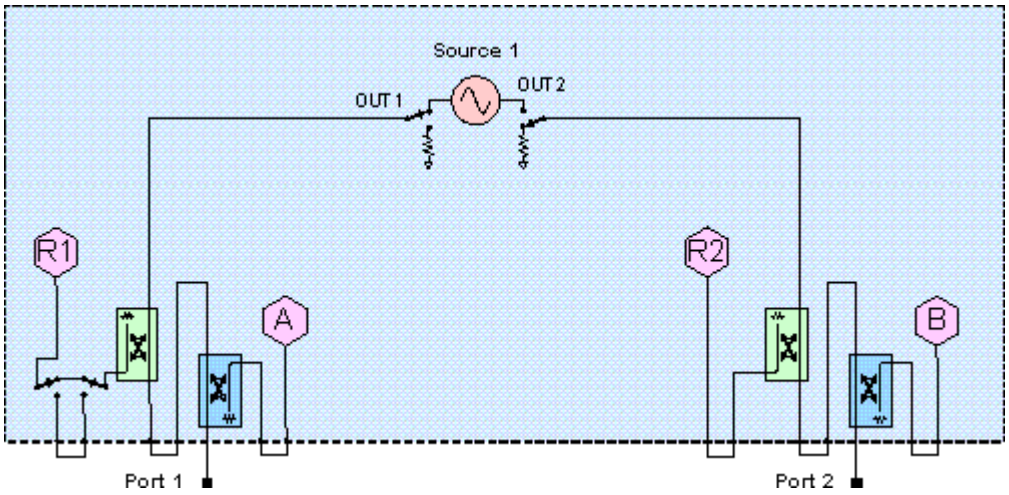


Figure 2. Path Configuration Diagram, N5242A Option 200, Port 1 Filtered Mode

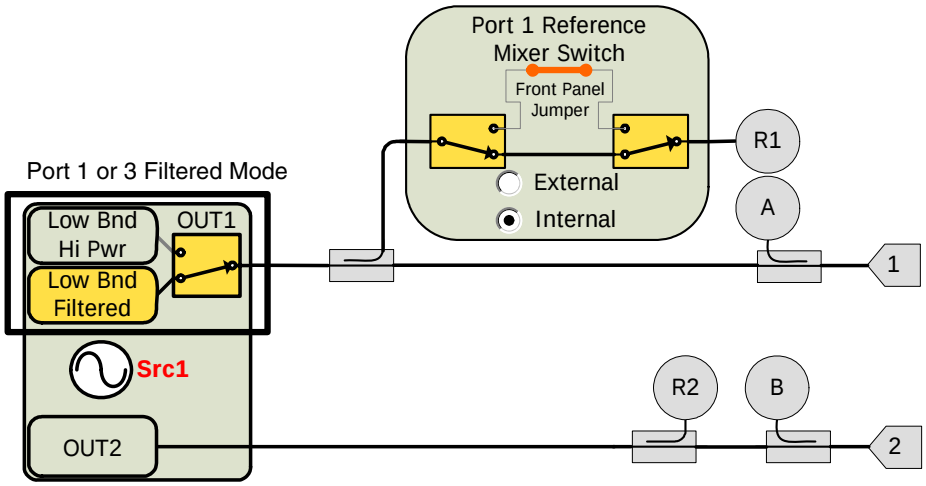


Figure 3. Path Configuration Diagram, N5242A Option 200, Port 1 Hi Pwr Mode

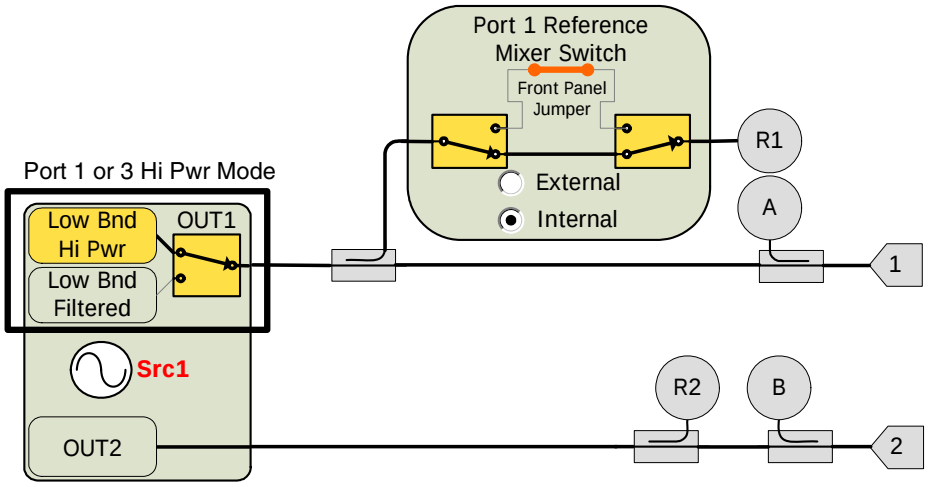


Figure 4. Block Diagram, N5242A Option 400

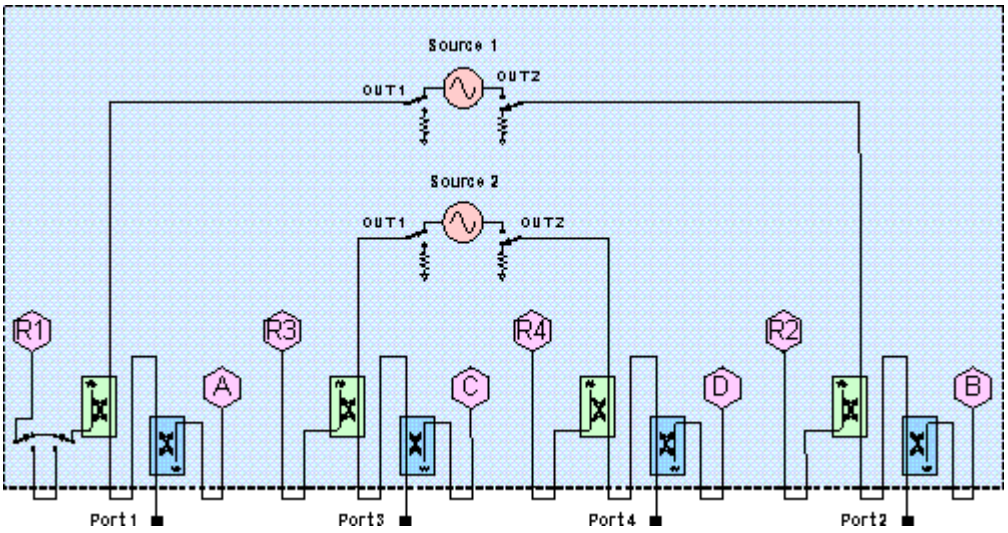


Figure 5. Path Configuration Diagram, N5242A Option 400, Port 1 or 3 Filtered Mode

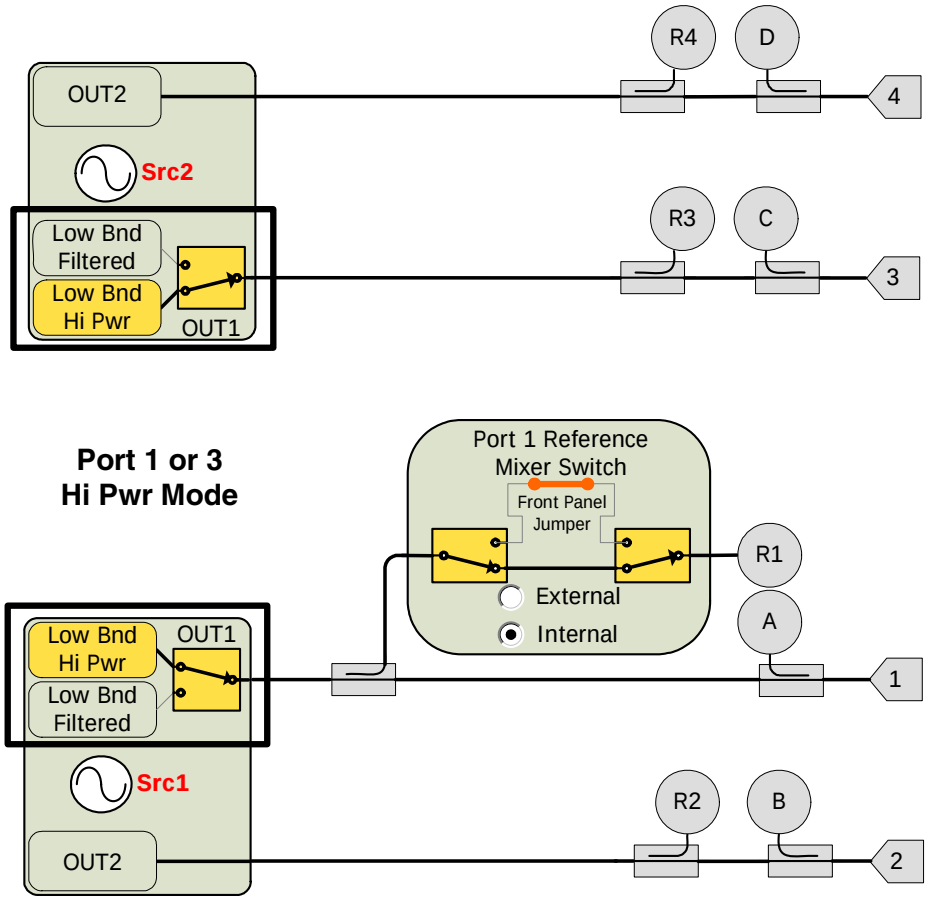


Figure 6. Path Configuration Diagram, N5242A Option 400, Port 1 or 3 Hi Pwr Mode

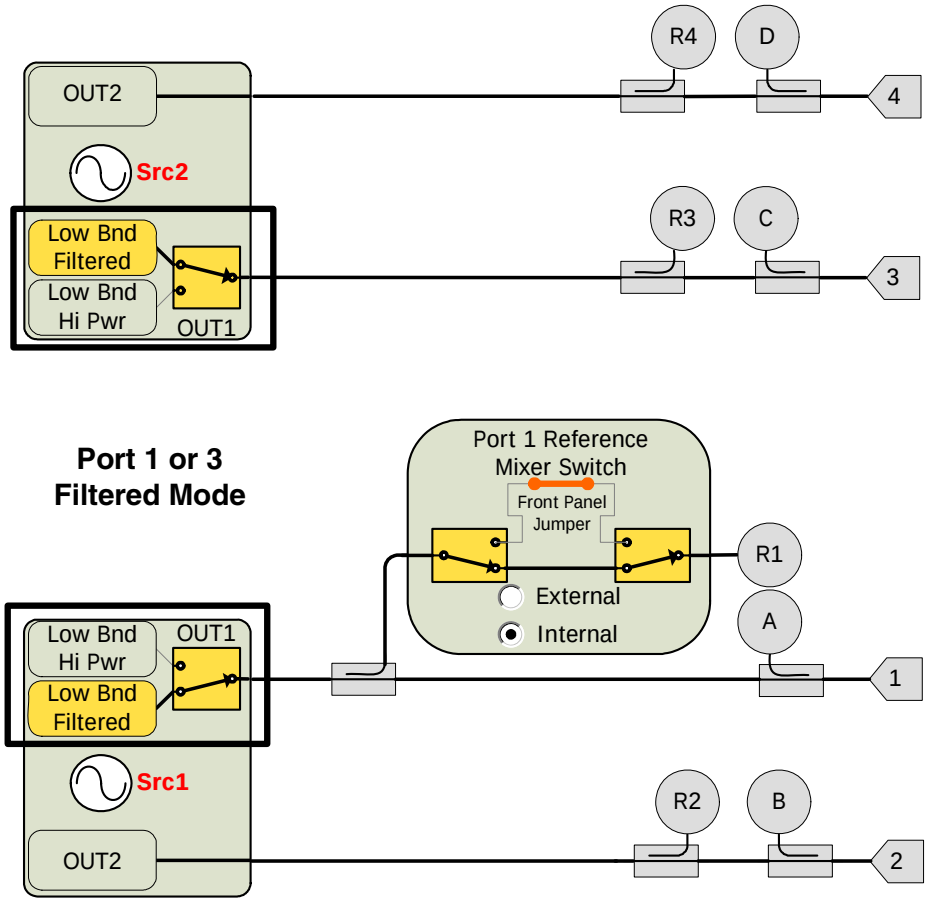


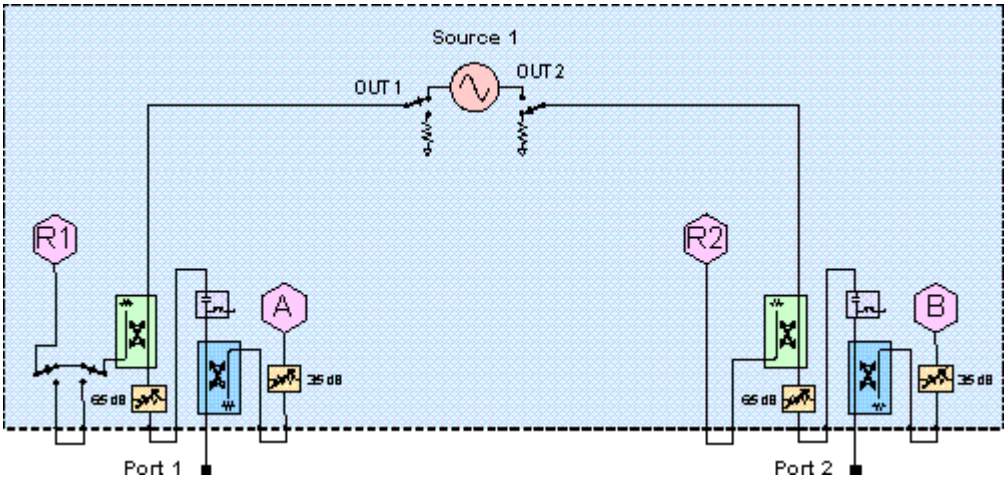
Table 8b. Maximum Leveled Power, Option 219 or 419

Description	Specification (dBm)			Typical (dBm)		
	Port 1 or 3[1] Filtered Mode[2]	Port 1 or 3[1] Hi Pwr Mode[2]	Port 2 or 4[1]	Port 1 or 3[1] Filtered Mode[2]	Port 1 or 3[1] Hi Pwr Mode[2]	Port 2 or 4[1]
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 10 GHz	13	13	13	18	18	17
10 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

[1] Either port can be used as the source port.

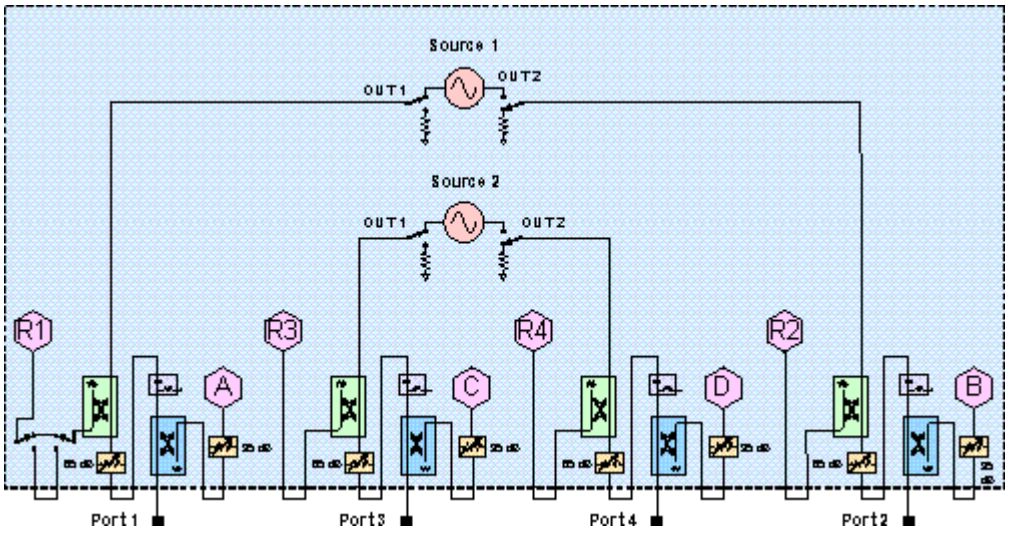
[2] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Figure 7. Block Diagram, N5242A Option 219



Note: The path configuration drawing for Option 219 is identical to the path configuration drawings for Option 200, which are shown in Figure 2 and Figure 3.

Figure 8. Block Diagram, N5242A Option 419



Note: The path configuration drawing for Option 419 is identical to the path configuration drawings for Option 400, which are shown in Figure 5 and Figure 6.

Table 8c. Maximum Leveled Power, Option 224

Description	Specification (dBm)			Typical (dBm)		
	Port 1 Filtered Mode[1]	Port 1 Hi Pwr Mode[1]	Port 2	Port 1 Filtered Mode[1]	Port 1 Hi Pwr Mode[1]	Port 2
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 10 GHz	13	13	13	19	19	17
10 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

[1] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Table 8d. Maximum Leveled Power, Option 224

Description	Specification (dBm)			Typical (dBm)		
	Source 2, Out 1 Filtered Mode[1]	Source 2, Out 1 Hi Pwr Mode[1]	Source 2, Out 2	Source 2, Out 1 Filtered Mode[1]	Source 2, Out 1 Hi Pwr Mode[1]	Source 2, Out 2
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 10 GHz	18	18	18	22	22	22
10 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

[1] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Figure 9. Block Diagram: N5242A Option 224

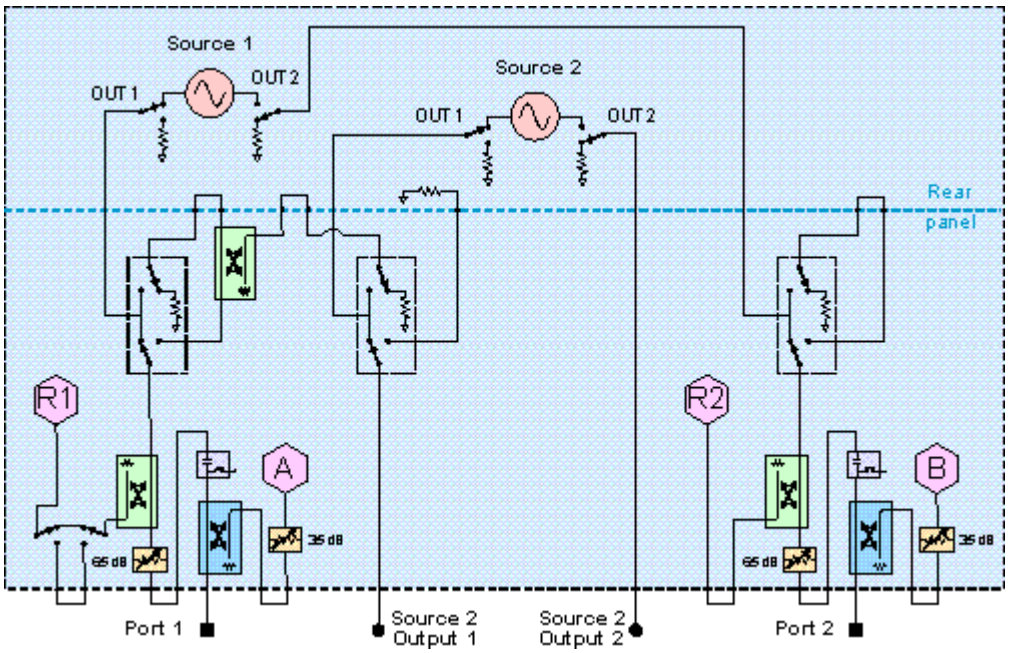


Figure 10. Path Configuration Diagram, N5242A Option 224

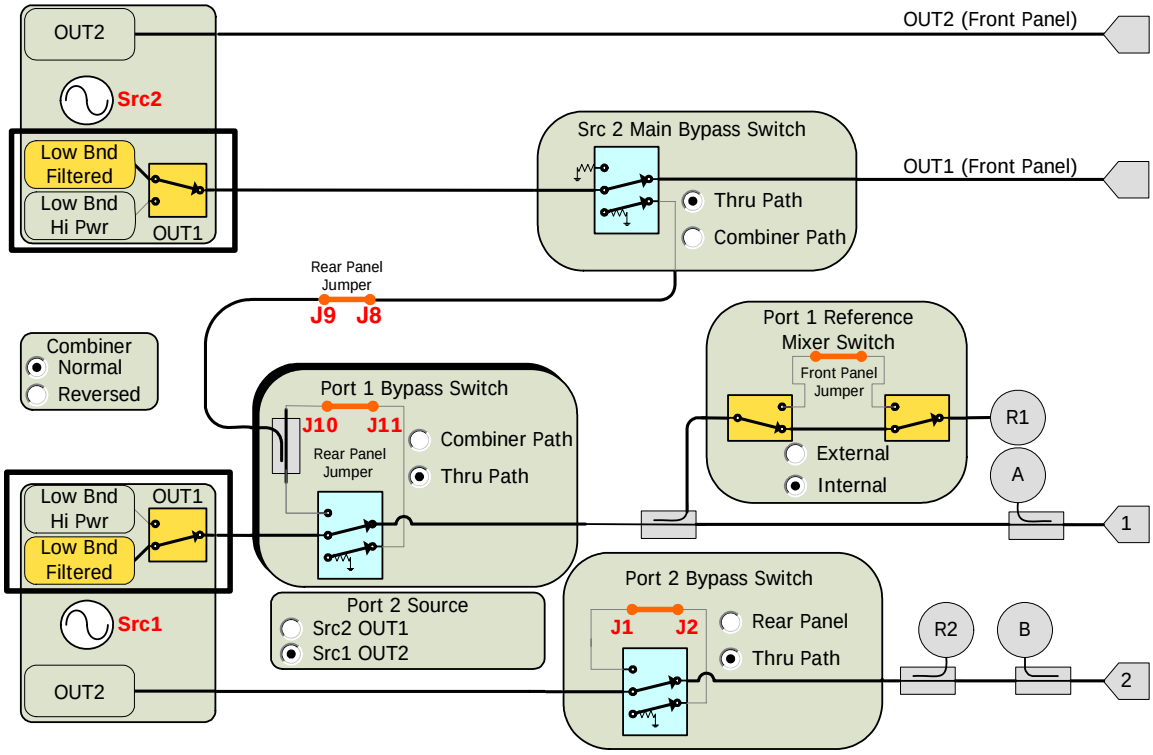


Table 8e. Maximum Leveled Power, Option 423

Description	Specification (dBm)			Typical (dBm)		
	Port 1 or 3 Filtered Mode[1]	Port 1 or 3 Hi Pwr Mode[1]	Port 2 or 4	Port 1 or 3 Filtered Mode[1]	Port 1 or 3 Hi Pwr Mode[1]	Port 2 or 4
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 10 GHz	13	13	13	19	19	17
10 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

[1] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Table 8f. Maximum Leveled Power, Option 224 or 423

Description	Typical (dBm)			
	Source 1, Port 1 Combine Mode Filtered Mode[1]	Source 1, Port 1 Combine Mode Hi Pwr Mode[1]	Source 2, Port 1 Combine Mode Filtered Mode[1]	Source 2, Port 1 Combine Mode Hi Pwr Mode[1]
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 10 GHz	15	15	2	2
10 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

[1] In Filtered Mode, the signal path goes through filters to minimize harmonics below 3.2 GHz. In Hi Pwr Mode, the signal bypasses the filters to maximize output power.

Figure 11. Block Diagram: N5242A Option 423

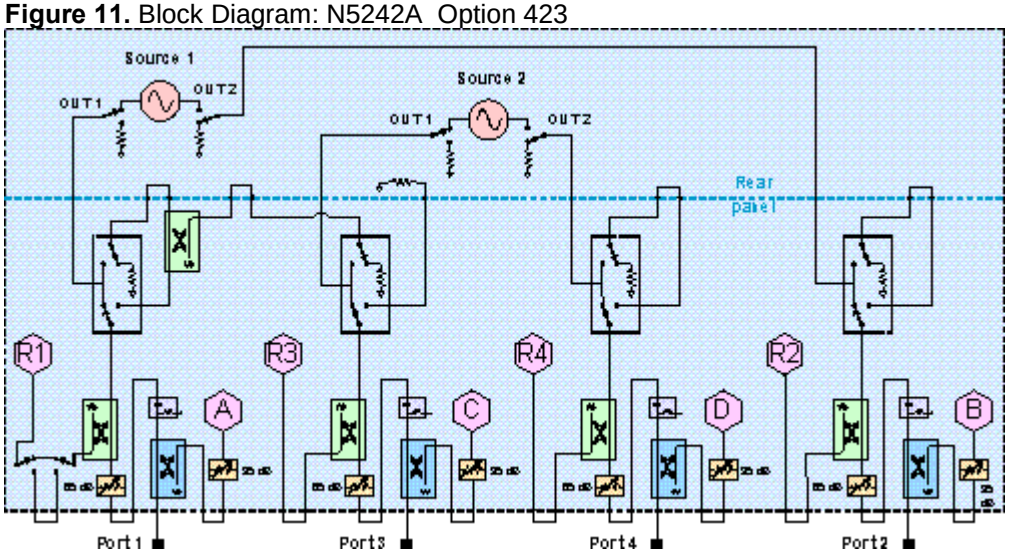


Figure 12. Path Configuration Diagram, N5242A Option 423

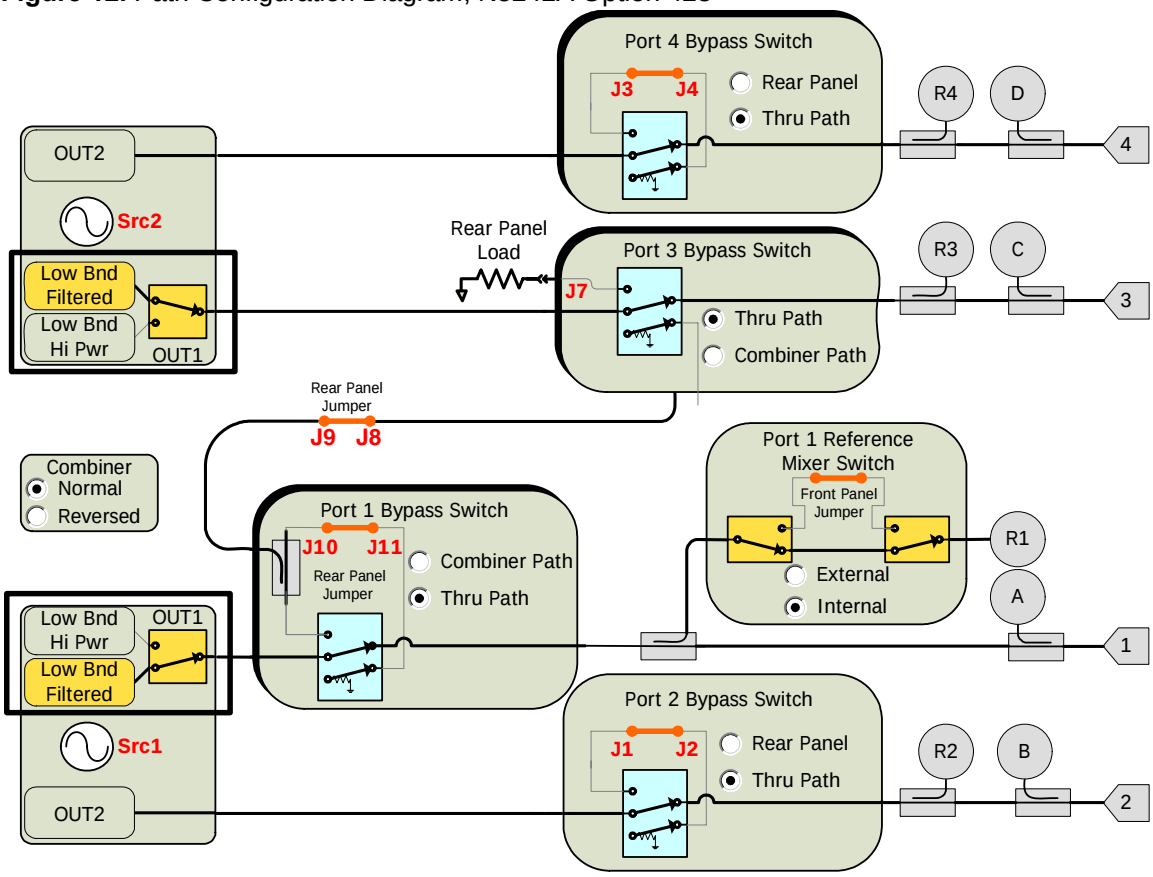


Table 9a. Power Level Accuracy

All Options

Description	Specification (dB)		Typical (dB)	
	Ports 1, 2, 3, 4[1]	Source 2, Out 1 Source 2, Out 2	Ports 1, 2, 3, 4[1]	Source 2, Out 1 Source 2, Out 2
10 MHz to 50 MHz	+/-1.0	+/-2.0	+/-0.40	+/-0.55
50 MHz to 500 MHz	+/-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 10 GHz	+/-1.0	+/-2.0	+/-0.40	+/-0.25
10 GHz to 13 GHz	+/-1.2	+/-2.0	+/-0.60	+/-0.25
13 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

[1]Any port can be used as the source port. Source in filtered mode where applicable.

Table 9b. Power Level Linearity

All Options

Description	Specification (dB)		
	Port 1 or 3[1] -25dBm ≤ P<-20dBm	Port 1 or 3[1] -20dBm ≤ P<-15dBm	Port 1 or 3[1] P ≥-15dBm
10 MHz to 50 MHz	+/-2.0	+/-1.5	+/-1.0
50 MHz to 500 MHz	+/-1.5	+/-1.0	+/-1.0
500 MHz to 3.2 GHz	+/-1.0	+/-1.0	+/-1.0
3.2 GHz to 10 GHz	+/-1.0	+/-1.0	+/-1.0
10 GHz to 16 GHz	+/-1.0	+/-1.0	+/-1.0
16 GHz to 20 GHz	+/-1.0	+/-1.0	+/-1.0
20 GHz to 24 GHz	+/-1.0	+/-1.0	+/-1.0
24 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

[1] Either port can be used as the source port. Source in filtered mode.

Table 9c. (Continued) Power Level Linearity

All Options

Description	Specification (dB)		
	Port 2 or 4[1] -25dBm ≤P<-20dBm	Port 2 or 4[1] -20dBm ≤P<-15dBm	Port 2 or 4[1] P ≥-15dBm
10 MHz to 50 MHz	+/-5.0	+/-2.0	+/-1.5
50 MHz to 500 MHz	+/-4.0	+/-2.0	+/-1.5
500 MHz to 3.2 GHz	+/-2.5	+/-1.0	+/-1.0
3.2 GHz to 10 GHz	+/-2.0	+/-1.0	+/-1.0
10 GHz to 16 GHz	+/-1.5	+/-1.5	+/-1.5
16 GHz to 20 GHz	+/-1.0	+/-1.0	+/-1.0
20 GHz to 24 GHz	+/-1.0	+/-1.0	+/-1.0
24 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

[1] Either port can be used as the source port.

Table 9d. Power Level Linearity

Option 224

Description	Specification (dB)		
	Source 2, Out 1[1] P ≥-15dBm	Source 2, Out 2 -15dBm ≤P<-10dBm	Source 2, Out 2 P ≥-10dBm
10 MHz to 50 MHz	+/-1.0	+/-1.5	+/-1.0
50 MHz to 500 MHz	+/-1.0	+/-1.5	+/-1.0
500 MHz to 3.2 GHz	+/-1.0	+/-1.0	+/-1.0
3.2 GHz to 10 GHz	+/-1.0	+/-1.0	+/-1.0
10 GHz to 16 GHz	+/-1.0	+/-1.0	+/-1.0
16 GHz to 20 GHz	+/-1.0	+/-1.0	+/-1.0
20 GHz to 24 GHz	+/-1.0	+/-1.0	+/-1.0
24 GHz to 26.5 GHz	+/-1.0	+/-1.0	+/-1.0

[1]Source in filtered mode.

Table 10a. Power Sweep Range

Option 200 or 400

Description	Specification (dB)		Typical (dB)	
	Port 1 or 3[1]	Port 2 or 4[1]	Port 1 or 3[1]	Port 2 or 4[1]
10 MHz to 50 MHz	38	38	46	44
50 MHz to 500 MHz	38	38	48	47
500 MHz to 3.2 GHz	35	38	40	45
3.2 GHz to 10 GHz	38	38	47	46
10 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

[1] Either port can be used as the source port. Source in filtered mode where applicable.

Table 10b. Power Sweep Range

Option 219 or 419

Description	Specification (dB)		Typical (dB)	
	Port 1 or 3[1]	Port 2 or 4[1]	Port 1 or 3[1]	Port 2 or 4[1]
10 MHz to 50 MHz	38	38	46	44
50 MHz to 500 MHz	38	38	47	46
500 MHz to 3.2 GHz	35	38	40	45
3.2 GHz to 10 GHz	38	38	45	44
10 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

[1] Either port can be used as the source port. Source in filtered mode where applicable.

Table 10c. Power Sweep Range

Option 224 or 423

Description	Specification (dB)		Typical (dB)	
	Port 1 or 3[1]	Port 2 or 4[1]	Port 1 or 3[1]	Port 2 or 4[1]
10 MHz to 50 MHz	38	38	46	44
50 MHz to 500 MHz	38	38	47	47
500 MHz to 3.2 GHz	35	38	40	44
3.2 GHz to 10 GHz	38	38	46	44
10 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

[1] Either port can be used as the source port. Source in filtered mode where applicable.

Table 10d. Power Sweep Range

Option 224

Description	Specification (dB)		Typical (dB)	
	Source 2[1] Out 1	Source 2 Out 2	Source 2[1] Out 1	Source 2 Out 2
10 MHz to 50 MHz	33	28	38	35
50 MHz to 500 MHz	33	32	39	38
500 MHz to 3.2 GHz	29	29	34	36
3.2 GHz to 10 GHz	33	33	39	39
10 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

[1]Source in filtered mode where applicable.

Table 11. Nominal Power (Preset Power)

Description	Specification (dBm)				Typical (dBm)	
	Option 200 or 400	Option 219 or 224 or 419 or 423	Option 224		Option 224 or 423	
	Ports 1, 2, 3, 4[1]		Source 2, Out 1	Source 2, Out 2	Source 1, Port 1 Combine Mode	Source 2, Port 1 Combine Mode
10 MHz to 26.5 GHz	0	-5	5	5	-10	-15

[1] Any port can be used as the source port. Any other port can be used as the receiver port.

Table 12. Power Resolution and Maximum/Minimum Settable Power

Description	Specification at Test Port	Typical at Test Port		
	All Options	All Options	Option 200 or 400	Option 219 or 419
		Ports 1, 2, 3, 4[1]		
Power Resolution	0.01 dB	--	--	--
Maximum Settable Power	--	30 dBm	--	--
Minimum Settable Power	--	--	-30 dBm	-95 dBm

[1] Any port can be used as the source port.

Table 13. Harmonics at Max Specified Power

All Options

(See Tables 8a - 8f Maximum Leveled Power)

Description	Typical (dBc)	
	Port 1 or 3[1,2] Source 2 Out 1	Port 2 or 4[1] Source 2 Out 2
2nd Harmonics[3]		
10 MHz to 50 MHz	-51	-13
50 MHz to 2 GHz	-51	-13
2 GHz to 3.2 GHz	-60	-21
3.2 GHz to 10 GHz	-60	-21
10 GHz to 16 GHz	-60	-21
16 GHz to 20 GHz	-60	-21
20 GHz to 24 GHz	-60	-21
24 GHz to 26.5 GHz	-60	-21
3rd Harmonics[3]		
10 MHz to 50 MHz	-51	-13
50 MHz to 2 GHz	-51	-13
2 GHz to 3.2 GHz	-60	-21
3.2 GHz to 10 GHz	-60	-21
10 GHz to 16 GHz	-60	-21
16 GHz to 20 GHz	-60	-21
20 GHz to 24 GHz	-60	-21
24 GHz to 26.5 GHz	-60	-21

1/2 and 1/4 Sub-Harmonics[3]		
10 MHz to 50 MHz	-73	-73
50 MHz to 2 GHz	-73	-73
2 GHz to 3.2 GHz	-73	-73
3.2 GHz to 10 GHz	-66	-63
10 GHz to 16 GHz	-66	-63
16 GHz to 20 GHz	-66	-63
20 GHz to 24 GHz	-61	-52
24 GHz to 26.5 GHz	-61	-52

[1] Any port can be used as the source port.

[2] < 3.2 GHz Filtered Mode

[3] Listed frequency is fundamental frequency; test at max specified power

Table 14. Non-Harmonic Spurs at nominal power

Description	Typical (dBc) at Test Port
	Ports 1, 2, 3, 4 Source 2 Out 1, Source 2 Out 2
Offset frequency = 30 kHz to 5 MHz	
10 MHz to 500 MHz	-50
500 MHz to 1 GHz	-60
1 GHz to 2 GHz	-60
2 GHz to 4 GHz	-57
4 GHz to 8 GHz	-51
8 GHz to 16 GHz	-45
16 GHz to 24 GHz	-39
24 GHz to 26.5 GHz	-33

Table 15. Phase Noise

All Options

Description	Typical (dBc/Hz)			
	Ports 1, 2, 3, 4, Source 2 Out 1, Source 2 Out 2			
	1 kHz Offset	10 kHz Offset	100 kHz Offset	1 MHz Offset
10 MHz to 500 MHz	-85	-85	-85	-120
500 MHz to 1 GHz	-105	-115	-110	-127
1 GHz to 2 GHz	-100	-110	-105	-121
2 GHz to 4 GHz	-95	-105	-100	-115
4 GHz to 8 GHz	-89	-100	-94	-110
8 GHz to 16 GHz	-83	-94	-88	-105
16 GHz to 26.5 GHz	-78	-89	-82	-100

Test Port Input

Table 16. Test Port Input

All Options

Description	Specification	Typical
	Ports 1, 2, 3, 4	
Test Port Noise Floor[1] (dBm)		
10 Hz IFBW		
10 MHz to 50 MHz[2]	-80	-87
50 MHz to 100 MHz[2]	-90	-95
100 MHz to 500 MHz[2]	-104	-110
500 MHz to 2 GHz	-114	-117
2 GHz to 20 GHz	-114	-117
20 GHz to 24 GHz	-110	-115
24 GHz to 26.5 GHz	-107	-113
Direct Receiver Access Input Noise Floor[1] (dBm)		
10 Hz IFBW		
10 MHz to 50 MHz[2]	--	-130
50 MHz to 100 MHz[2]	--	-128
100 MHz to 500 MHz[2]	--	-132
500 MHz to 2 GHz	--	-133
2 GHz to 20 GHz	--	-129
20 GHz to 24 GHz	--	-122
24 GHz to 26.5 GHz	--	-119

Test Port Compression at 0.1 dB (dBm)		
10 MHz to 50 MHz	--	--
50 MHz to 500 MHz	--	--
500 MHz to 3.2 GHz	--	13
3.2 GHz to 10 GHz	--	13
10 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
Receiver Compression @ 8 dBm Test Port Power (dB)		
10 MHz to 50 MHz[3]	--	--
50 MHz to 500 MHz[3]	--	--
500 MHz to 3.2 GHz	<0.17	--
3.2 GHz to 10 GHz	<0.17	--
10 GHz to 16 GHz	<0.17	--
16 GHz to 20 GHz	<0.23	--
20 GHz to 24 GHz	<0.23	--
24 GHz to 26.5 GHz	<0.29	--

Table 16.(Continued) Test Port Input

All Options - Ports 1, 2, 3, 4

Description	Specification	Typical
Trace Noise Magnitude (dB rms)		
Ratioed measurement, nominal power at test port.		
1 kHz IFBW		
10 MHz to 100 MHz	0.007	0.0039
100 MHz to 13.5 GHz	0.002	0.0005
13.5 GHz to 16 GHz	0.002	0.0005
16 GHz to 22.5 GHz	0.002	0.0006
22.5 GHz to 24 GHz	0.003	0.0014
24 GHz to 26.5 GHz	0.005	0.0020
100 kHz IFBW		
10 MHz to 100 MHz	--	0.040
100 MHz to 13.5 GHz	--	0.005
13.5 GHz to 16 GHz	--	0.005
16 GHz to 22.5 GHz	--	0.005
22.5 GHz to 24 GHz	--	0.008
24 GHz to 26.5 GHz	--	0.008
600 kHz IFBW		
10 MHz to 100 MHz	--	0.140
100 MHz to 13.5 GHz	--	0.011
13.5 GHz to 16 GHz	--	0.011
16 GHz to 22.5 GHz	--	0.012
22.5 GHz to 24 GHz	--	0.020
24 GHz to 26.5 GHz	--	0.020

Trace Noise Phase (deg rms)		
Ratioed measurement, nominal power at test port.		
1 kHz IFBW		
10 MHz to 100 MHz	0.051	0.0261
100 MHz to 13.5 GHz	0.015	0.0041
13.5 GHz to 16 GHz	0.042	0.0124
16 GHz to 22.5 GHz	0.042	0.0135
22.5 GHz to 26.5 GHz	0.054	0.0225
100 kHz IFBW		
10 MHz to 100 MHz	--	0.266
100 MHz to 13.5 GHz	--	0.030
13.5 GHz to 16 GHz	--	0.030
16 GHz to 22.5 GHz	--	0.033
22.5 GHz to 26.5 GHz	--	0.057
600 kHz IFBW		
10 MHz to 100 MHz	--	1.053
100 MHz to 13.5 GHz	--	0.075
13.5 GHz to 16 GHz	--	0.075
16 GHz to 22.5 GHz	--	0.082
22.5 GHz to 26.5 GHz	--	0.139
Reference Level Magnitude		
Range	+/-500 dB	--
Resolution	0.001 dB	--
Reference Level Phase		
Range	+/-500°	--
Resolution	0.01°	--

Stability Magnitude (dB/°C)		
Stability is defined as a ratio measurement made at the test port.		
10 MHz to 50 MHz	--	0.01
50 MHz to 500 MHz	--	0.01
500 MHz to 3.2 GHz	--	0.01
3.2 GHz to 10 GHz	--	0.02
10 GHz to 16 GHz	--	0.02
16 GHz to 20 GHz	--	0.03
20 GHz to 24 GHz	--	0.03
24 GHz to 26.5 GHz	--	0.04

Table 16. (Continued)Test Port Input

All Options - Ports 1, 2, 3, 4

Description	**Specification**	**Typical**
Stability Phase (dB/°C)		
Stability is defined as a ratio measurement made at the test port.		
10 MHz to 50 MHz	--	0.29
50 MHz to 500 MHz	--	0.06
500 MHz to 3.2 GHz	--	0.07
3.2 GHz to 10 GHz	--	0.13
10 GHz to 16 GHz	--	0.13
16 GHz to 20 GHz	--	0.40
20 GHz to 24 GHz	--	0.54
24 GHz to 26.5 GHz	--	0.56

Table 16. (Continued)Test Port Input

Description	Typical
Damage Input Level	
Test Port 1 or 2 or 3 or 4	> +30 dBm RF, 40 VDC
(Option 224 only) Source 2 Out 1 or Source 2 Out 2	> +30 dBm RF, 0 VDC

[1]Total average (rms) noise power calculated as the mean value of a linear magnitude trace expressed in dBm.

[2] May typically be degraded at particular frequencies below 500 MHz due to spurious receiver residuals.

[3]Test port receiver compression at specified input levels below 500 MHz is negligible due to coupler roll off in this frequency range.

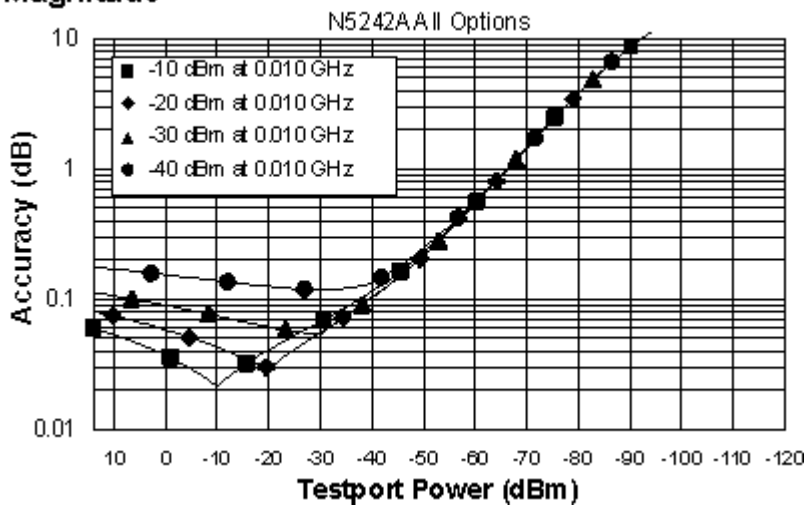
Dynamic Accuracy

Table 17 Dynamic Accuracy (Specification)

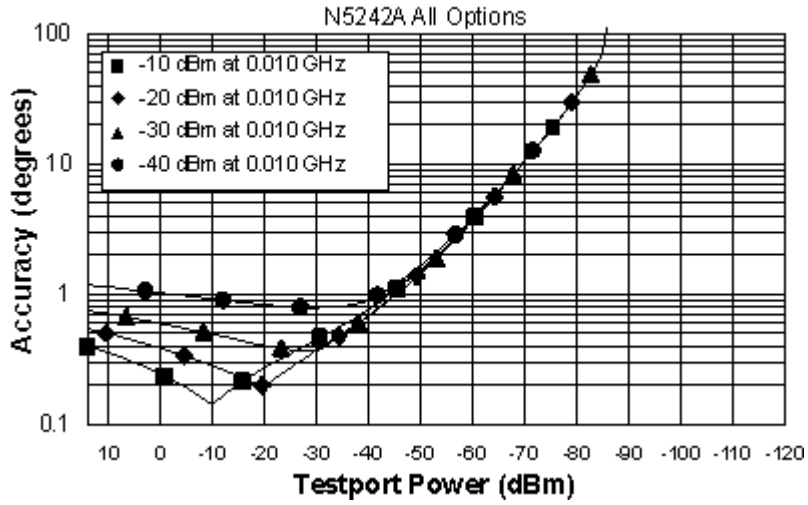
Accuracy of the test port input power reading relative to the reference input power level.

Dynamic Accuracy, 0.010 GHz

Magnitude

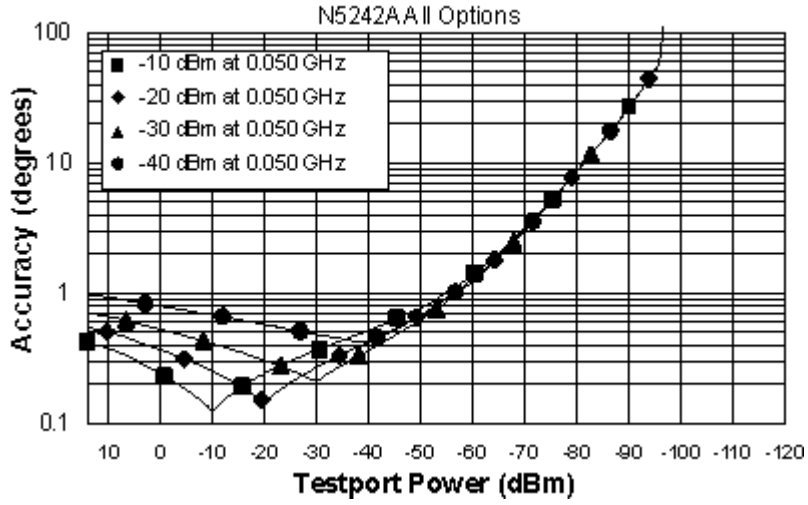


Phase

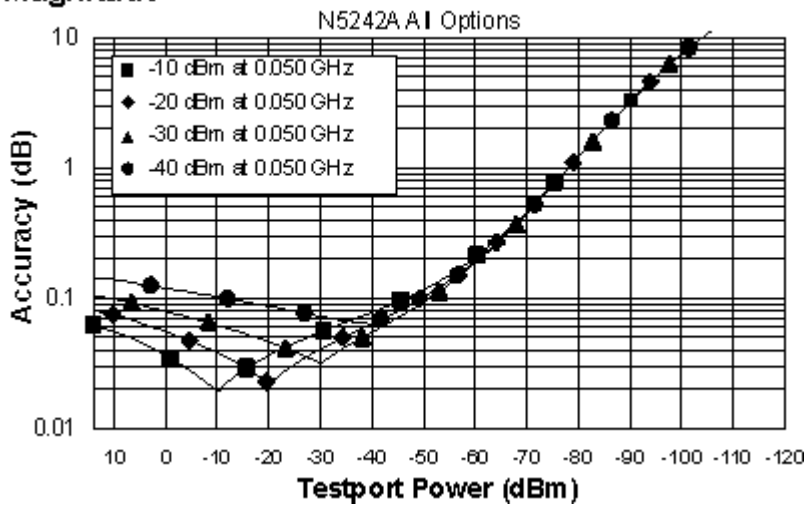


Dynamic Accuracy, 0.050 GHz

Phase

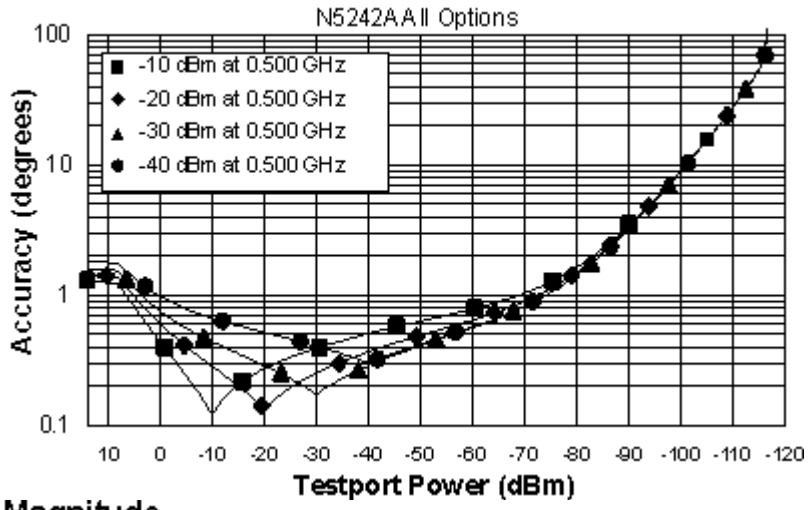


Magnitude

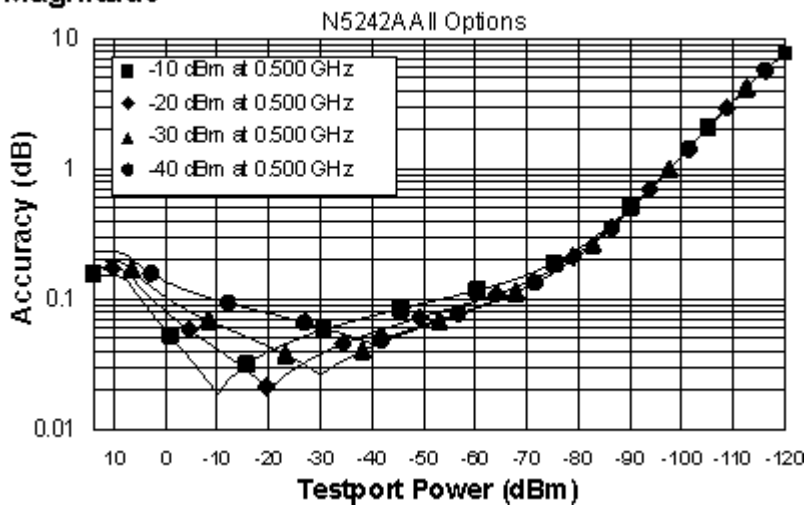


Dynamic Accuracy, 0.500 GHz

Phase

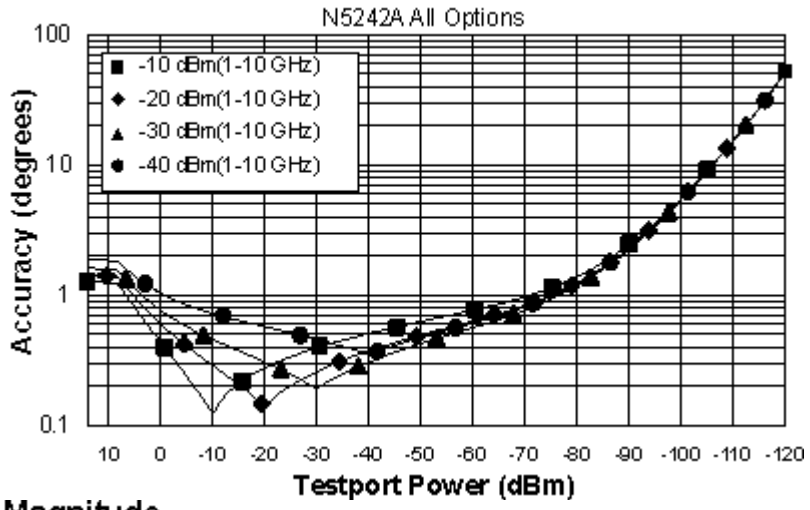


Magnitude

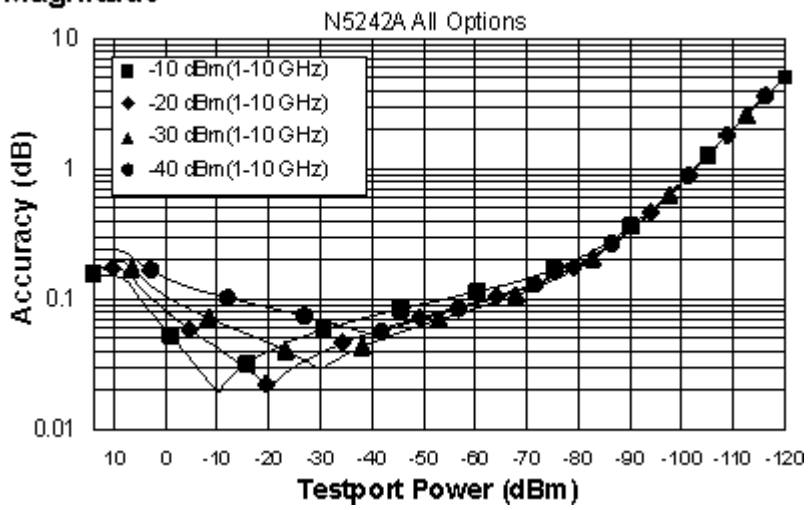


Dynamic Accuracy, 1- 10 GHz

Phase

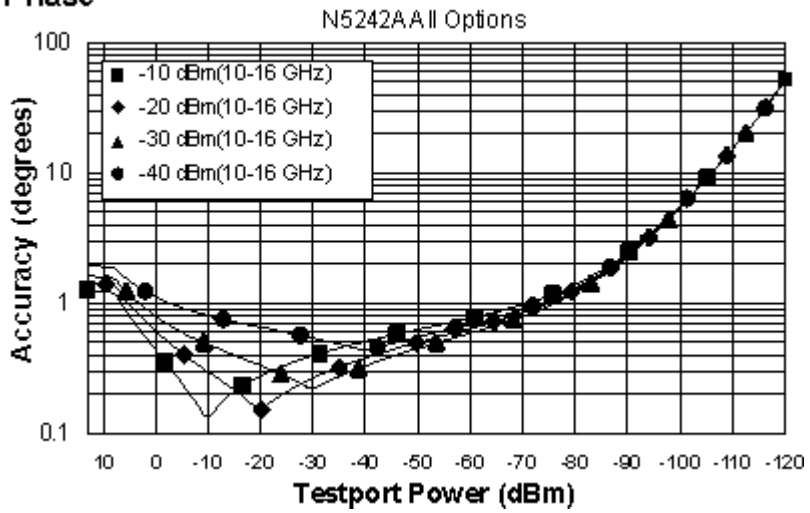


Magnitude

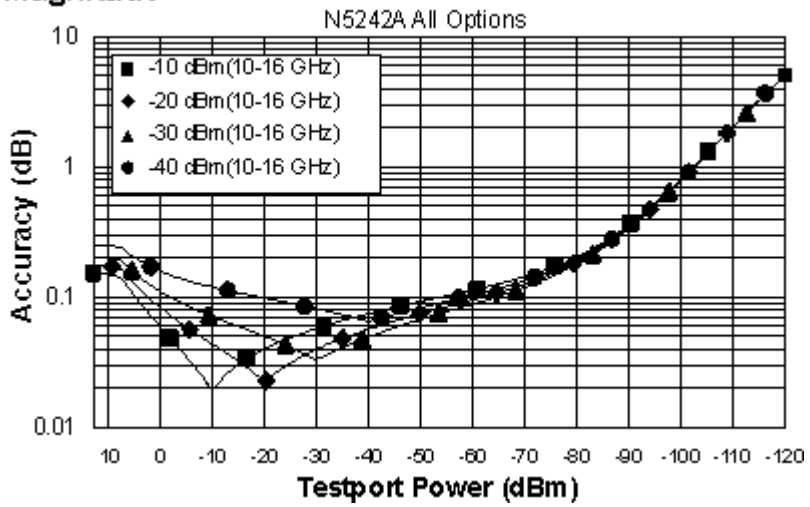


Dynamic Accuracy, 10 - 16 GHz

Phase

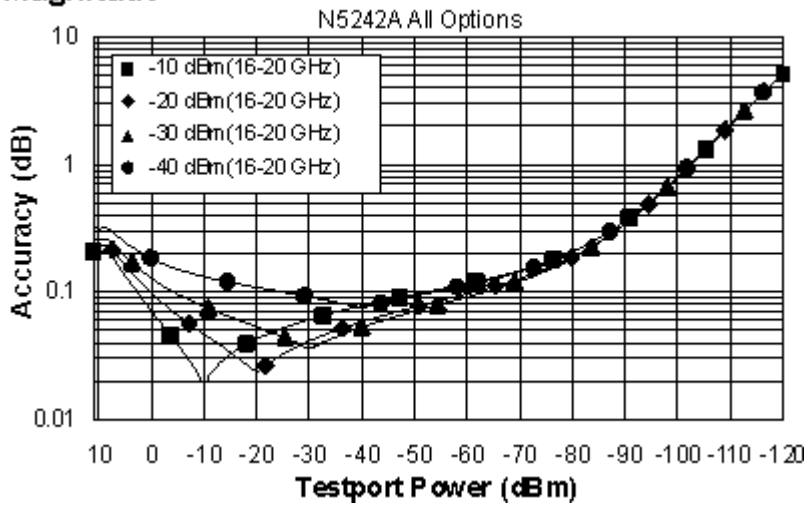


Magnitude

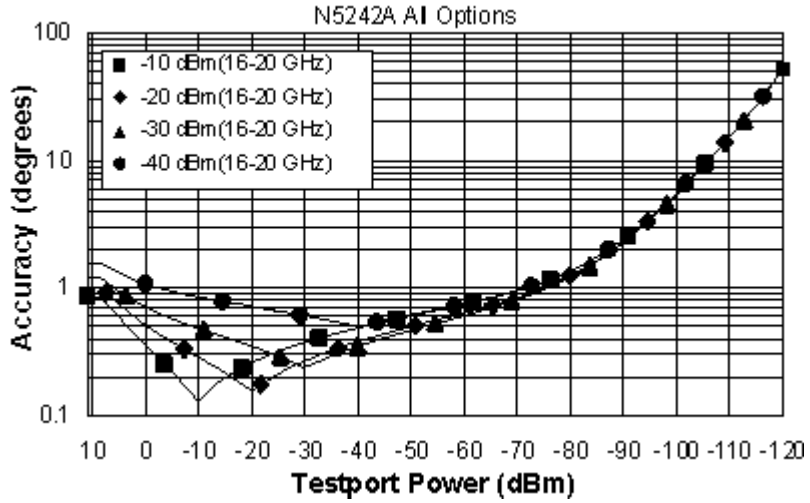


Dynamic Accuracy, 16 - 20 GHz

Magnitude

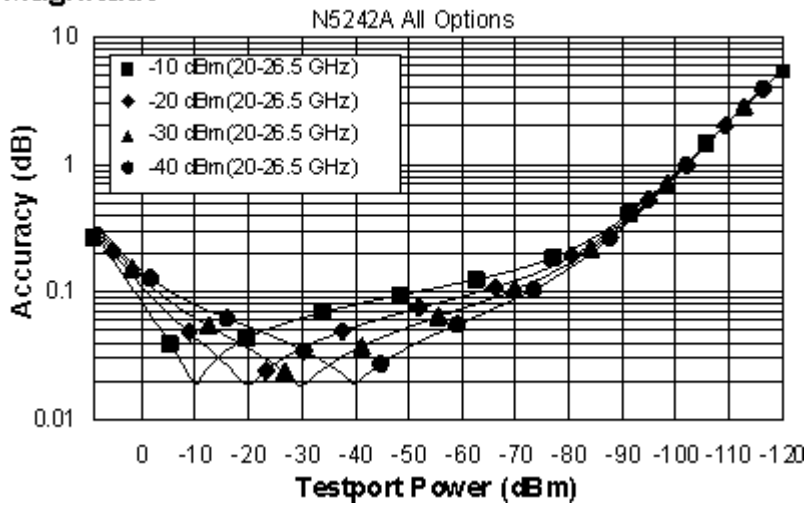


Phase

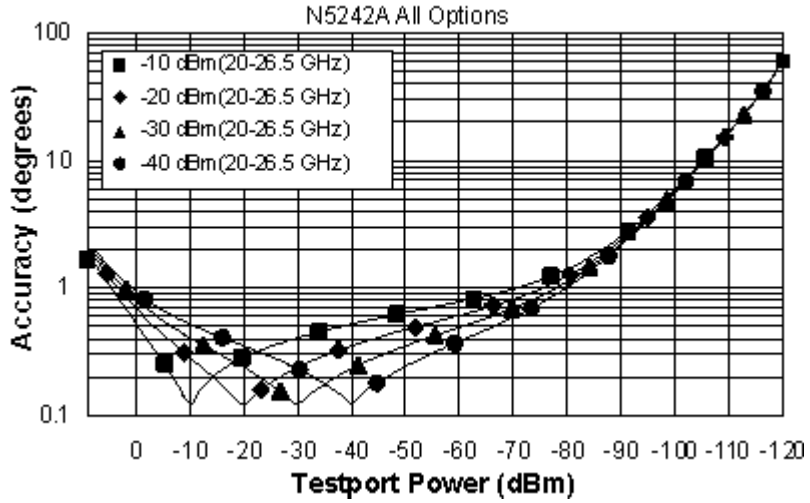


Dynamic Accuracy, 20 - 26.5 GHz

Magnitude



Phase



[2] Dynamic accuracy is verified with the following measurements:

Compression over frequency

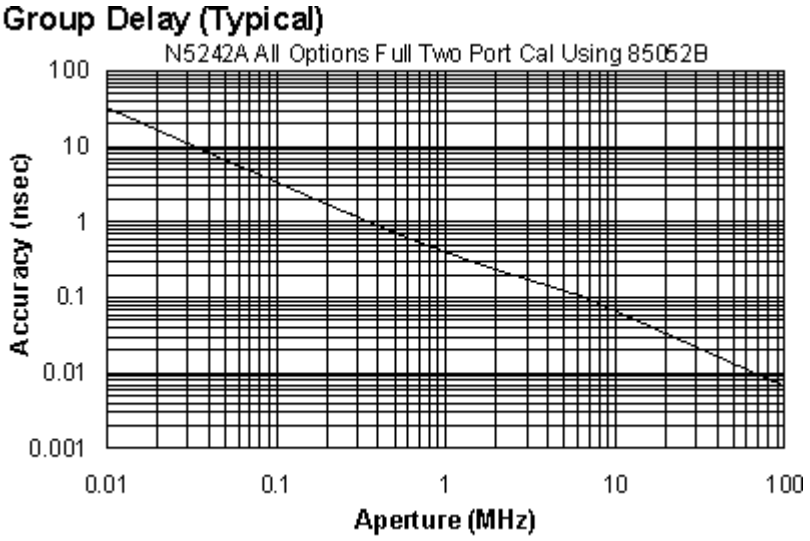
IF linearity at a single frequency of 1.195 GHz using a reference level of -20 dBm for an input power range of 0 to -120 dBm.

Table 18. Test Port Input (Group Delay)[a]

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, $S_{ii} = 0$, $S_{ij} = 1$, $S_{ji} = 0$, $S_{kl} = 0$ for all $kl \neq ij$



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

±Phase Accuracy (deg)/[360 × Aperture (Hz)]

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

[a] 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 19. Miscellaneous Information

Description	Supplemental Information
System IF Bandwidth Range	1 Hz to 5 MHz, nominal
CPU	Intel® 1.6 GHz Pentium® M with 1 GByte RAM

Table 20. Front Panel Information

All Options

Description	Typical Performance
RF Connectors	
Type	Option 200 or 219 or 224 or 400 or 419 or 423: 3.5 mm (male), 50 ohm, (nominal)
Center Pin Recession	0.002 in. (characteristic)
USB 2.0 Ports	
Master (4 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Display	
Size	26.3 cm (10.4 in) diagonal color active matrix LCD; 1024 (horizontal) X 768 (vertical) resolution
Refresh Rate	Vertical 60 Hz; Horizontal 46.08 kHz
Pixels	A display is considered faulty if: More than 0.002% of the total pixels have a constant blue, green, red, or black appearance that will not change. Three or more consecutive pixels have a constant blue, green, red, or black appearance that will not change.

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

Table 21 Rear Panel Information

All Options

Description	Typical Performance
10 MHz Reference In	
Connector	BNC, female
Input Frequency	10 MHz ± 10 ppm, typical
Input Level	-15 dBm to +20 dBm, typical
Input Impedance	200 Ω, nom.
10 MHz Reference Out	
Connector	BNC, female
Output Frequency	10 MHz ± 1 ppm, typical
Signal Type	Sine Wave, typical
Output Level	+10 dBm ± 4 dB into 50 Ω
Output Impedance	50 Ω, nominal
Harmonics	<-40 dBc, typical
External IF Inputs	
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)
Input Frequency	VNA IF (2.54 MHz, 7.61 MHz, or 10.73 MHz)
Input Impedance	50 Ω
RF Damage Level	
DC Damage Level	5.5 VDC
0.1 dB Compression Point	

Pulse Inputs (IF Gates)	
Function	Internal receiver gates used for point-in-pulse and pulse-profile measurements
Connectors	15-pin mini D-sub
Input Impedance	1 K Ohm
Minimum Pulse Width, Source Modulators	33 ns
Minimum Pulse Width, Receiver Gates	20 ns
DC Damage Level	5.5 VDC
Drive Voltage	0 V (off), +3.3 V (on), nominal
RF Pulse Modulator Input (Source Modulator)	
On/Off Ratio	
10 MHz to 3.2 GHz	-64
3.2 GHz to 26.5 GHz	-80
Pulse Period	
Minimum	33 ns
Maximum	70 s
External Test Set Driver	
Function	Used for driving remote mixers
Connections	SMA (female)
RF, LO Output Frequency Range	1.7 to 26.5 GHz

Table 21. (Continued) Rear Panel Information

Description	Typical (dBm)	
	Upper Limit (dBm)	Lower Limit (dBm)
Test Set Drivers (Continued)		
Rear Panel LO Power		
1.7 GHz to 18 GHz	0	-10
18 GHz to 22.5 GHz	2	-8
22.5 GHz to 26.5 GHz	6	-5
Rear Panel RF Power		
3.2 GHz to 20 GHz	-3	-8
20 GHz to 26.5 GHz	-8	-14

Table 21. (Continued) Rear Panel Information

Description	Typical Performance
VGA Video Output	
Connector	15-pin mini D-Sub; Drives VGA compatible monitors
Devices Supported:	
	Resolutions:
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").
Bias Tee Inputs	
Connectors	BNC(f) for ports 1, 2, 3 and 4
Fuse	500 mA
Maximum Bias Current	+/-200 mA
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.

GPIB (two ports - dedicated controller and dedicated talker/listener)	24-pin D-sub (Type D-24), female; compatible with IEEE-488.
Parallel Port (LPT1)	25-pin D-Sub miniature connector, female; provides connection to printers or any other parallel port peripherals
Serial Port (COM 1)	9-pin D-Sub, male; compatible with RS-232
USB Port	Four ports on front panel (all Host) and five ports (four Host and one Device) on rear panel. Type A configuration (eight Host) and Type B configuration (one Device), USB 2.0 compatible.
LAN	10/100BaseT Ethernet, 8-pin configuration; auto selects between the two data rates
Line Power	
Frequency, Voltage	50/60 Hz for 100 240 VAC
	Power supply is auto switching
Max	450 watts

Note: Option H11 is not available with the N5242A network analyzer.

Table 22. Analyzer Dimensions and Weight

Cabinet Dimensions	Height	Width	Depth
Excluding front and rear panel hardware and feet	266 mm 10.5 in	436 mm 17.4 in	514 mm 20.6 in
Excluding front and rear panel hardware and feet. Including rack-mount flanges.	266 mm 10.5 in EIA RU[1] = 6	482 mm 19.3 in	561 mm 22.4 in
Excluding front and rear panel hardware and feet. Including rack-mount flanges and handles.	266 mm 10.5 in EIA RU[1] = 6	482 mm 19.3 in	581 mm 23.2 in
As shipped - including front panel connectors, rear panel bumpers, and feet.	277 mm 10.9 in	436 mm 17.4 in	561 mm 22.4 in
As shipped including rack-mount flanges	277 mm 10.9 in	482 mm 19.3 in	561 mm 22.4 in
As shipped including handles	277 mm 10.9 in	458 mm 18.3 in	581 mm 23.2 in
As shipped including rack-mount flanges and handles	277 mm 10.9 in	482 mm 19.3 in	581 mm 23.2 in
Weight			
	Option 200 or 219 or 224	Option 400 or 419 or 423	--
Net	27 kg (60 lb), nominal	37 kg (82 lb), nominal	--
Shipping	43 kg (95 lb), nominal	53 kg (117 lb), nominal	--

[1]Network analyzer feet removed.

Note: For Regulatory and Environmental information, refer to the PNA Series Installation and Quick Start Guide, located online at http://cp.literature.agilent.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

Table 23. Typical Cycle Time[a] (ms) for Measurement Completion

All Options

Description	Typical Performance			
	Number of Points			
	201	401	1601	16001
Start 9 GHz, Stop 10 GHz, 600 kHz IF bandwidth				
Uncorrected	6	6.3	9.6	56
2-Port cal	20	21	28	134
Start 9 GHz, Stop 10 GHz, 10 kHz IF bandwidth				
Uncorrected	36	53	200	1945
2-Port cal	80	115	405	3900
Start 9 GHz, Stop 10 GHz, 1 kHz IF bandwidth				
Uncorrected	227	444	1740	17000
2-Port cal	460	900	3484	34000
Start 10 GHz, Stop 20 GHz, 600 kHz IF bandwidth				
Uncorrected	26	33	54	85
2-Port cal	62	77	121	190
Start 10 GHz, Stop 20 GHz, 10 kHz IF bandwidth				
Uncorrected	70	118	273	1958
2-Port cal	149	245	553	3922
Start 10 GHz, Stop 20 GHz, 1 kHz IF bandwidth				
Uncorrected	236	459	1780	17300
2-Port Cal	400	926	3565	34600

Start 10 MHz, Stop 26.5 GHz, 600 kHz IF bandwidth				
Uncorrected	59	69	118	350
2-Port cal	125	147	244	707
Start 10 MHz, Stop 26.5 GHz, 10 kHz IF bandwidth				
Uncorrected	94	156	480	2333
2-Port cal	196	320	968	4674
Start 10 MHz, Stop 26.5 GHz, 1 kHz IF bandwidth				
Uncorrected	277	504	1873	17950
2-Port cal	561	1015	3756	35900

[a] 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_{11}) measurement.

Note: Option H08 and Option H11 are not available with the N5242A network analyzer.

Table 24. Cycle Time vs. IF Bandwidth

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)

Description	**Typical Performance**	
IF Bandwidth (Hz)	Cycle Time (ms)[1]	Trace Noise
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
10	17830	<0.0002
3	60000	<0.0002

a Cycle time includes sweep and retrace time.

Table 25. 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)

Description	Typical Performance	
IF Bandwidth (Hz)	Number of Points	Cycle Time (ms)[1]
1,000	3	7.7
	11	16.6
	51	60
	101	115
	201	222
	401	436
	801	860
	1,601	1,700
	6,401	6,700
	16,001	16,000
10,000	3	5.44
	11	7.90
	51	10.7
	101	16.8
	201	29.0
	401	53.0
	801	102
	1,601	199
	6,401	780
	16,001	1950

Description	Typical Performance	
IF Bandwidth (Hz)	Number of Points	Cycle Time (ms)[1]
30,000	3	5.7
	11	5.9
	51	6.5
	101	8.2
	201	11.8
	401	18.8
	801	32.8
	1,601	60.5
	6,401	228
	16,001	566
600,000	3	5.4
	11	5.4
	51	5.5
	101	5.6
	201	5.9
	401	6.3
	801	7.2
	1,601	9.6
	6,401	25
	16,001	56

a Cycle time includes sweep and retrace time.

Table 26. Data Transfer Time (ms)

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

[1] Measured with the analyzer display off. Values will increase slightly if the analyzer display is on.

[2] Measured when using the SCPI command DISPlay: VISible OFF.

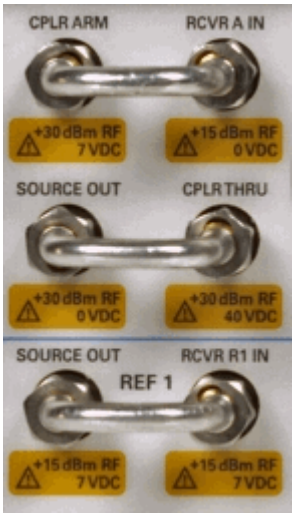
[3] Values are for real and imaginary pairs, with the analyzer display off.

Note: Specifications for Recall & Sweep Speed are not provided for the N5242A analyzers.

Specifications: Front-Panel Jumpers

Model N5242A (PNA-X)

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



- Measurement Receiver Inputs
- Reference Receiver Inputs
- Reference Outputs (Source Out)
- Source Outputs
- Coupler Inputs

Table 27 Measurement Receiver Inputs

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

Description	Typical
	All Options
Maximum Input Level	
10 MHz to 50 MHz[1]	--
50 MHz to 500 MHz[1]	--
500 MHz to 3.2 GHz	-2 dBm
3.2 GHz to 10 GHz	-2 dBm
10 GHZ to 16 GHz	-2 dBm
16 GHZ to 20 GHz	-2.5 dBm
20 GHZ to 24 GHz	-4 dBm
24 GHZ to 26.5 GHz	-4 dBm
Damage Level	
N5242A	+15 dBm
Maximum DC Level	
N5242A	0 V

[1]Test port receiver compression at specified input levels below 500 MHz is negligible due to coupler roll off in this frequency range.

Table 28. Reference Receiver Input

(RCVR R1 IN) @ Max Specified Output Power

Description	Typical					
	Option 200 or 400 Filtered Mode	Option 200 or 400 Hi Pwr Mode	Option 224 or 423 Filtered Mode	Option 219 or 419 Filtered Mode	Option 219 or 419 Hi Pwr Mode	Option 224 or 423 Hi Pwr Mode
Maximum Input Level						
10 MHz to 50 MHz	-8 dBm	-3 dBm	-9 dBm	-8 dBm	-3 dBm	-6 dBm
50 MHz to 500 MHz	-6 dBm	-3 dBm	-7 dBm	-6 dBm	-3 dBm	-5 dBm
500 MHz to 3.2 GHz	-6 dBm	-6 dBm	-7 dBm	-5 dBm	-5 dBm	-5 dBm
3.2 GHz to 10 GHz	-3 dBm	-3 dBm	-2 dBm	-2 dBm	-2 dBm	-2 dBm
10 GHZ to 16 GHz	-4 dBm	-4 dBm	-3 dBm	-3 dBm	-3 dBm	-3 dBm
16 GHZ to 20 GHz	-5 dBm	-5 dBm	-6 dBm	-6 dBm	-6 dBm	-6 dBm
20 GHZ to 24 GHz	-7 dBm	-7 dBm	-9 dBm	-8 dBm	-8 dBm	-9 dBm
24 GHZ to 26.5 GHz	-16 dBm	-16 dBm	-18 dBm	-15 dBm	-15 dBm	-18 dBm
Damage Level						
	+15 dBm					
Maximum DC Level						
	+/-7 V					

Table 29. Reference Receiver Input

(RCVR R2 IN, RCVR R3 IN, RCVR R4 IN) @ Max Specified Output Power

Description	Typical					
	Option 400 RCVR R3 IN Filtered Mode	Option 400 RCVR R3 IN Hi Pwr Mode	Option 200 or 400 RCVR R2 IN RCVR R4 IN	Option 419 RCVR R3 IN Filtered Mode	Option 419 RCVR R3 IN Hi Pwr Mode	Option 219 or 419 RCVR R2 IN RCVR R4 IN
Maximum Input Level						
10 MHz to 50 MHz	-6 dBm	-1 dBm	-1 dBm	-6 dBm	-1 dBm	-1 dBm
50 MHz to 500 MHz	-4 dBm	-1 dBm	-1 dBm	-4 dBm	-1 dBm	-1 dBm
500 MHz to 3.2 GHz	-4 dBm	-4 dBm	0 dBm	-3 dBm	-3 dBm	-1 dBm
3.2 GHz to 10 GHz	0 dBm	0 dBm	0 dBm	1 dBm	1 dBm	0 dBm
10 GHZ to 16 GHz	1 dBm	1 dBm	0 dBm	1 dBm	1 dBm	1 dBm
16 GHZ to 20 GHz	1 dBm	1 dBm	-3 dBm	0 dBm	0 dBm	-3 dBm
20 GHZ to 24 GHz	0 dBm	0 dBm	-6 dBm	-1 dBm	-1 dBm	-4 dBm
24 GHZ to 26.5 GHz	-8 dBm	-8 dBm	-12 dBm	-7 dBm	-7 dBm	-13 dBm
Damage Level						
	+15 dBm					
Maximum DC Level						
	+/-15 V					

Table 29. (Continued) Reference Receiver Input

(RCVR R2 IN, RCVR R3 IN, RCVR R4 IN) @ Max Specified Output Power

Description	Typical		
	Option 423 RCVR R3 IN Filtered Mode	Option 423 RCVR R3 IN Hi Pwr Mode	Option 224 or 423 RCVR R2 IN RCVR R4 IN Filtered Mode Note: No filtered mode for ports 2 & 4
Maximum Input Level			
10 MHz to 50 MHz	-7 dBm	-4 dBm	-1 dBm
50 MHz to 500 MHz	-6 dBm	-4 dBm	-1 dBm
500 MHz to 3.2 GHz	-5 dBm	-3 dBm	-1 dBm
3.2 GHz to 10 GHz	1 dBm	1 dBm	0 dBm
10 GHZ to 16 GHz	1 dBm	1 dBm	-2 dBm
16 GHZ to 20 GHz	0 dBm	0 dBm	-4 dBm
20 GHZ to 24 GHz	-2 dBm	-2 dBm	-6 dBm
24 GHZ to 26.5 GHz	-10 dBm	-10 dBm	-10 dBm
Damage Level			
	+15 dBm		
Maximum DC Level			
	+/-15 V		

Table 30. Reference Output

(REF 1 SOURCE OUT) @ Max Specified Output Power

Description	Typical					
	Option 200 or 400 Filtered Mode	Option 200 or 400 Hi Pwr Mode	Option 219 or 419 Filtered Mode	Option 219 or 419 Hi Pwr Mode	Option 224 or 423 Filtered Mode	Option 224 or 423 Hi Pwr Mode
Maximum Input Level						
10 MHz to 50 MHz	-8 dBm	-3 dBm	-8 dBm	-3 dBm	-9 dBm	-6 dBm
50 MHz to 500 MHz	-6 dBm	-3 dBm	-6 dBm	-3 dBm	-7 dBm	-5 dBm
500 MHz to 3.2 GHz	-6 dBm	-6 dBm	-5 dBm	-5 dBm	-7 dBm	-5 dBm
3.2 GHz to 10 GHz	-3 dBm	-3 dBm	-2 dBm	-2 dBm	-2 dBm	-2 dBm
10 GHZ to 16 GHz	-4 dBm	-4 dBm	-3 dBm	-3 dBm	-3 dBm	-3 dBm
16 GHZ to 20 GHz	-5 dBm	-5 dBm	-6 dBm	-6 dBm	-6 dBm	-6 dBm
20 GHZ to 24 GHz	-7 dBm	-7 dBm	-8 dBm	-8 dBm	-9 dBm	-9 dBm
24 GHZ to 26.5 GHz	-16 dBm	-16 dBm	-15 dBm	-15 dBm	-18 dBm	-18 dBm
Damage Level						
	+15 dBm					
Maximum DC Level						
	+/-7 V					

Table 31. Reference Output

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

Description	Typical					
	Option 400 REF 3 Source Out Filtered Mode	Option 400 REF 3 Source Out Hi Pwr Mode	Option 200 or 400 REF 2 Source Out REF 4 Source Out Filtered Mode	Option 419 REF 3 Source Out Filtered Mode	Option 419 REF 3 Source Out Hi Pwr Mode	Option 219 or 419 REF 2 Source Out REF 4 Source Out Filtered Mode
Maximum Input Level						
10 MHz to 50 MHz	-6 dBm	-1 dBm	-1 dBm	-6 dBm	-1 dBm	-1 dBm
50 MHz to 500 MHz	-4 dBm	-1 dBm	-1 dBm	-4 dBm	-1 dBm	-1 dBm
500 MHz to 3.2 GHz	-4 dBm	-4 dBm	0 dBm	-3 dBm	-3 dBm	-1 dBm
3.2 GHz to 10 GHz	0 dBm	0 dBm	0 dBm	1 dBm	1 dBm	0 dBm
10 GHZ to 16 GHz	1 dBm	1 dBm	0 dBm	1 dBm	1 dBm	1 dBm
16 GHZ to 20 GHz	1 dBm	1 dBm	-3 dBm	0 dBm	0 dBm	-3 dBm
20 GHZ to 24 GHz	0 dBm	0 dBm	-6 dBm	-1 dBm	-1 dBm	-4 dBm
24 GHZ to 26.5 GHz	-8 dBm	-8 dBm	-12 dBm	-7 dBm	-7 dBm	-13 dBm
Damage Level						
	+15 dBm					
Maximum DC Level						
	0 V					

Table 31. (Continued) Reference Output

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

Description	Typical		
	Option423 REF 3 Source Out Filtered Mode	Options 423 REF 3 Source Out Hi Pwr Mode	Option 224 or 423 REF 2 Source Out REF 4 Source Out
Maximum Input Level			
10 MHz to 50 MHz	-7 dBm	-4 dBm	-1 dBm
50 MHz to 500 MHz	-6 dBm	-4 dBm	-1 dBm
500 MHz to 3.2 GHz	-5 dBm	-3 dBm	-1 dBm
3.2 GHz to 10 GHz	1 dBm	1 dBm	0 dBm
10 GHZ to 16 GHz	1 dBm	1 dBm	-2 dBm
16 GHZ to 20 GHz	0 dBm	0 dBm	-4 dBm
20 GHZ to 24 GHz	-2 dBm	-2 dBm	-6 dBm
24 GHZ to 26.5 GHz	-10 dBm	-10 dBm	-10 dBm
Damage Level			
	+15 dBm		
Maximum DC Level			
	0 V		

Table 32. Source Outputs

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

Description	Typical					
	Option 200 or 400 Port 1 Source Out Port 3 Source Out Filtered Mode	Option 200 or 400 Port 1 Source Out Port 3 Source Out Hi Pwr Mode	Option 200 or 400 Port 2 Source Out Port 4 Source Out	Option 219 or 419 Port 1 Source Out Port 3 Source Out Filtered Mode	Option 219 or 419 Port 1 Source Out Port 3 Source Out Hi Pwr Mode	Option 219 or 419 Port 2 Source Out Port 4 Source Out
Maximum Input Level						
10 MHz to 50 MHz	8 dBm	13 dBm	13 dBm	8 dBm	13 dBm	13 dBm
50 MHz to 500 MHz	10 dBm	13 dBm	13 dBm	10 dBm	13 dBm	13 dBm
500 MHz to 3.2 GHz	11 dBm	11 dBm	13 dBm	11 dBm	11 dBm	14 dBm
3.2 GHz to 10 GHz	14 dBm	14 dBm	14 dBm	14 dBm	14 dBm	14 dBm
10 GHZ to 16 GHz	14 dBm	14 dBm	14 dBm	14 dBm	14 dBm	13 dBm
16 GHZ to 20 GHz	14 dBm	14 dBm	11 dBm	12 dBm	12 dBm	10 dBm
20 GHZ to 24 GHz	13 dBm	13 dBm	9 dBm	10 dBm	10 dBm	9 dBm
24 GHZ to 26.5 GHz	7 dBm	7 dBm	4 dBm	5 dBm	5 dBm	2 dBm
Damage Level						
	+30 dBm					
Maximum DC Level						
	0 V					

Table 32. (Continued) Source Outputs

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

Description	Typical		
	Option 224 or 423 Port 1 Source Out Port 3 Source Out	Option 224 or 423 Port 1 Source Out Port 3 Source Out	Option 224 or 423 Port 2 Source Out Port 4 Source Out
	Filtered Mode	Hi Pwr Mode	
Maximum Input Level			
10 MHz to 50 MHz	7 dBm	10 dBm	13 dBm
50 MHz to 500 MHz	8 dBm	10 dBm	13 dBm
500 MHz to 3.2 GHz	9 dBm	11 dBm	14 dBm
3.2 GHz to 10 GHz	14 dBm	14 dBm	14 dBm
10 GHZ to 16 GHz	14 dBm	14 dBm	12 dBm
16 GHZ to 20 GHz	12 dBm	12 dBm	9 dBm
20 GHZ to 24 GHz	9 dBm	9 dBm	7 dBm
24 GHZ to 26.5 GHz	2 dBm	2 dBm	4 dBm
Damage Level			
	+30 dBm		
Maximum DC Level			
	0 V		

Table 33. Coupler Inputs

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

Description	Typical	
	Option 200 or 400	**Option 219 or 419 or 224, or 423**
Maximum Input Level		
10 MHz to 50 MHz	0 dB	-0.5 dB
50 MHz to 500 MHz	-0.25 dB	-0.75 dB
500 MHz to 3.2 GHz	-0.5 dB	-1.0 dB
3.2 GHz to 10 GHz	-0.75 dB	-1.25 dB
10 GHZ to 16 GHz	-1.0 dB	-1.75 dB
16 GHZ to 20 GHz	-1.5 dB	-2.25 dB
20 GHZ to 24 GHz	-1.5 dB	-2.5 dB
24 GHZ to 26.5 GHz	-1.75 dB	-2.5 dB
Damage Level		
N5242A	+30 dBm	
Maximum DC Level		
N5242A	+/-40 V	

Test Set Block Diagrams

Figure 13. 2-Port N5242A Base Unit (Option 200)

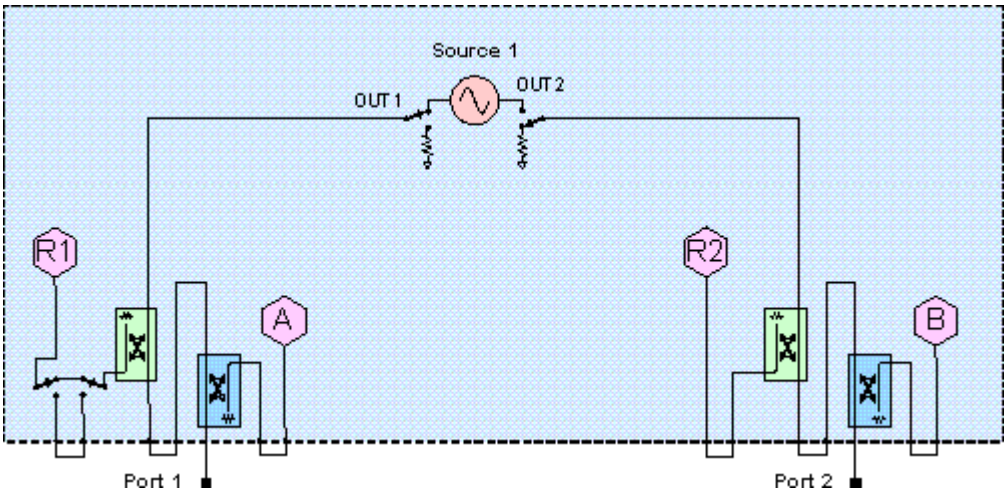


Figure 14. 2-Port N5242A (Option 219)

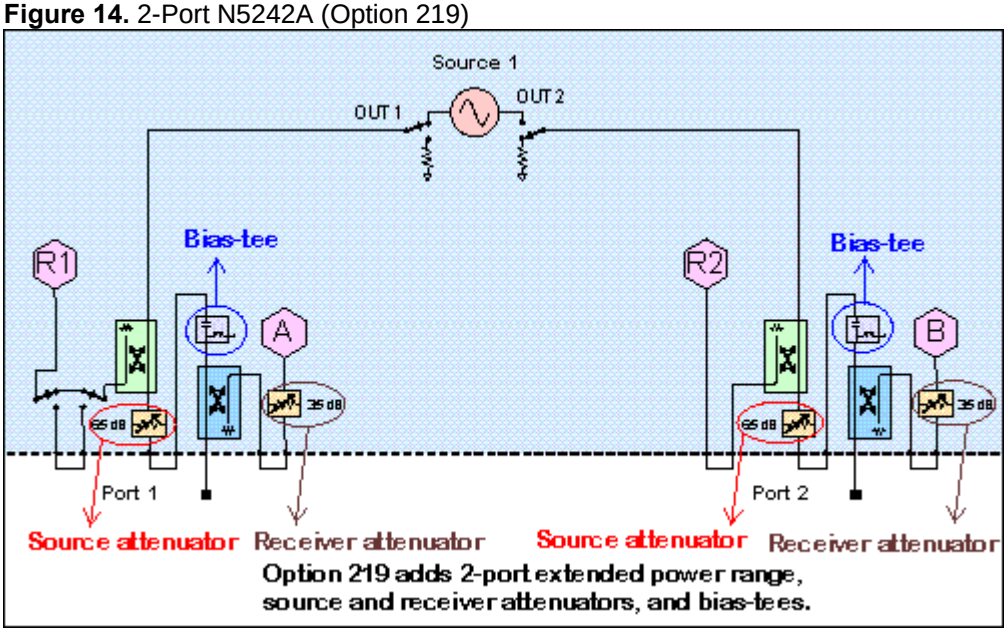


Figure 15. 2-Port N5242A (Option 224)

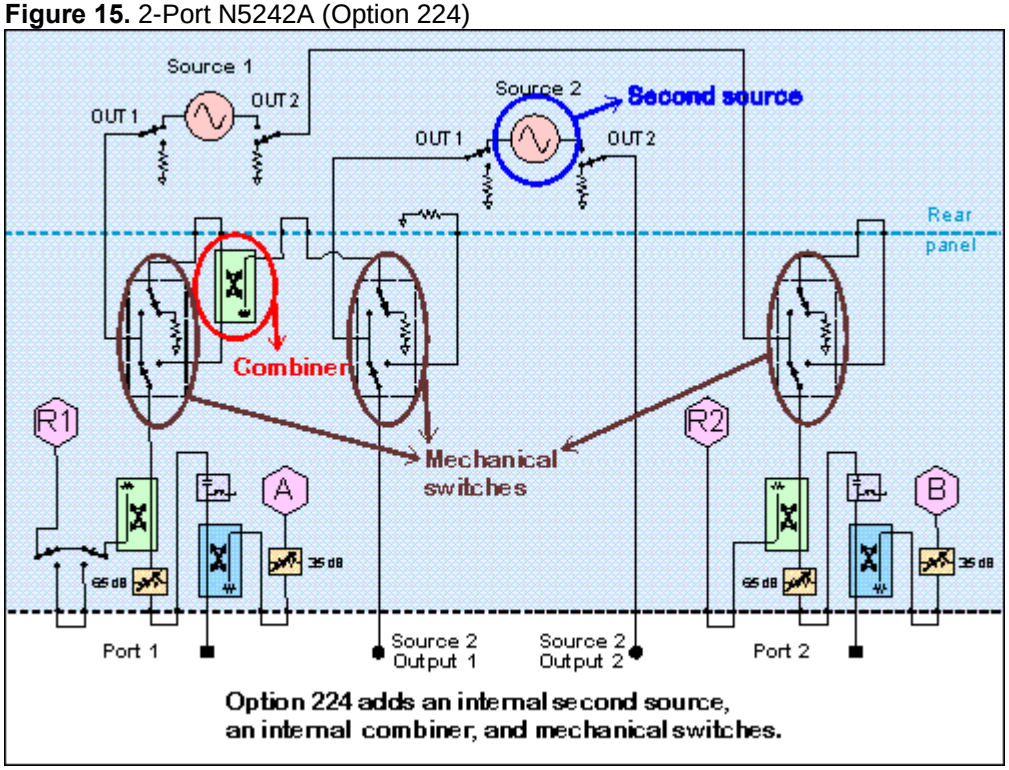


Figure 16. 4-Port N5242A Base Unit (Option 400)

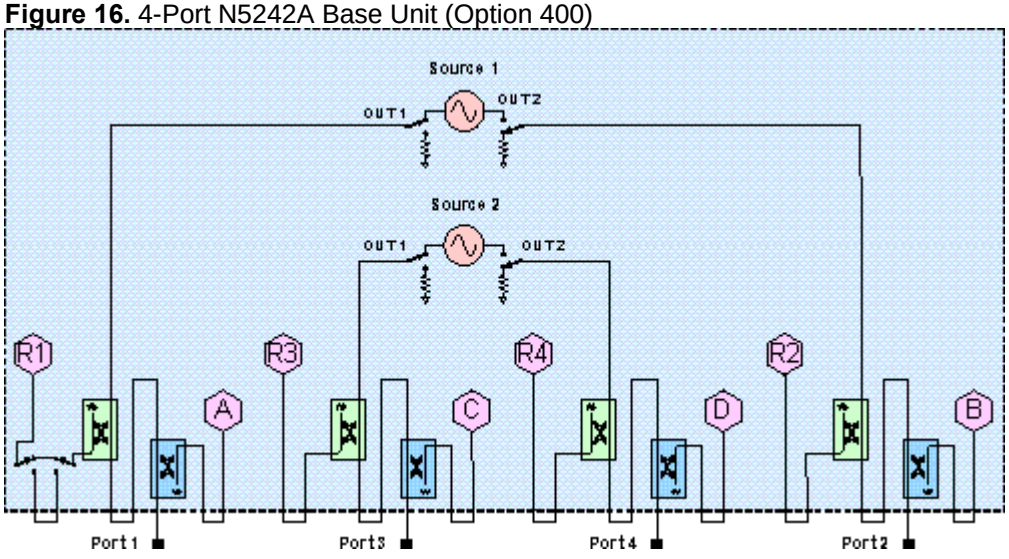


Figure 17. 4-Port N5242A (Option 419)

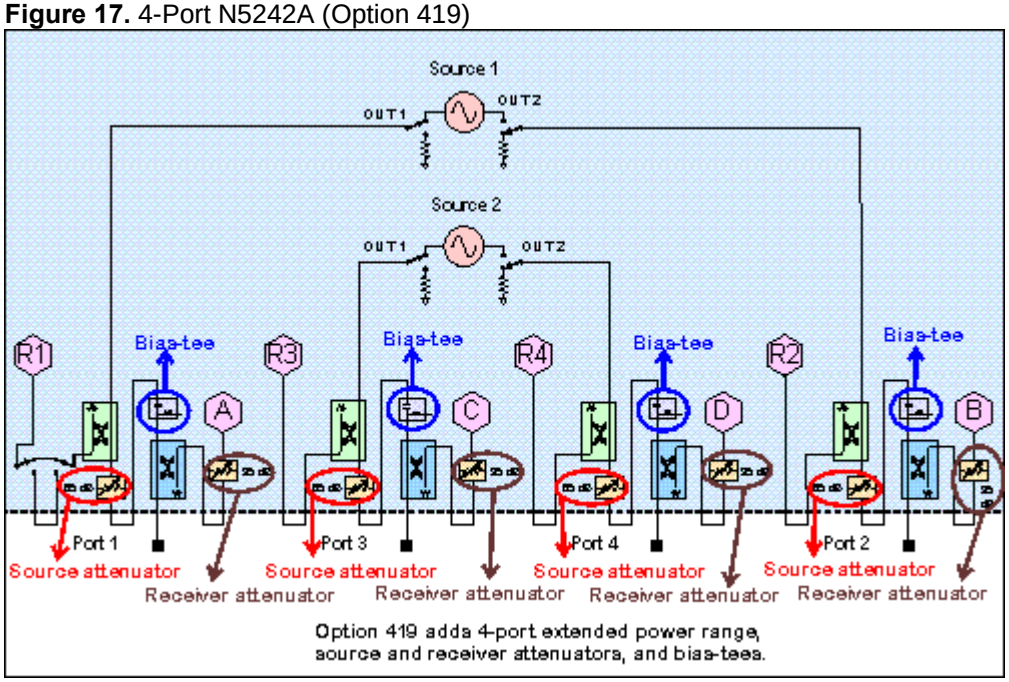


Figure 18. 4-Port N5242A (Option 423)

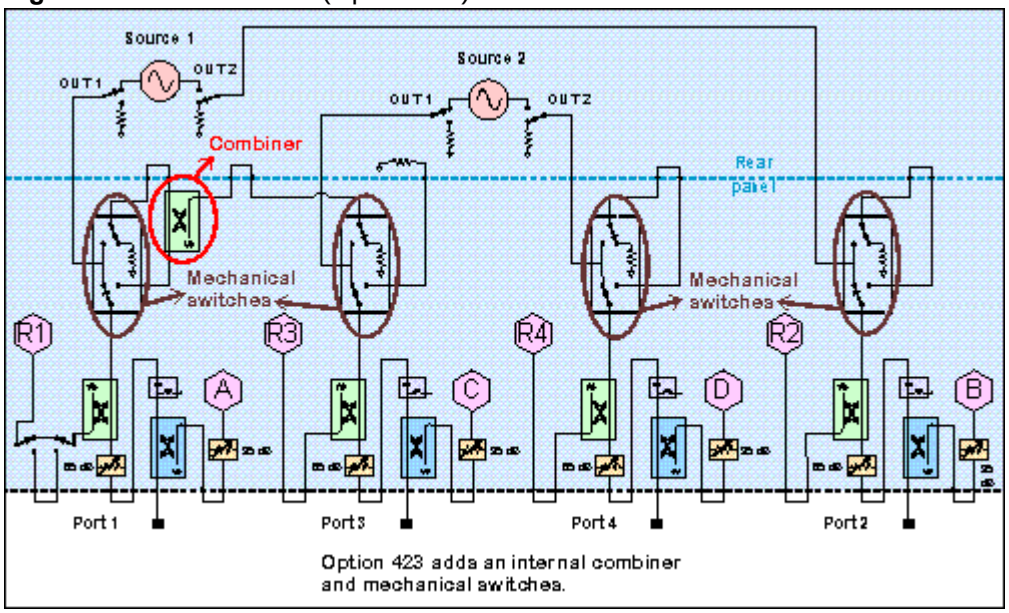


Figure 19. 2-Port N5242A (Option 219, 224), Showing J-Designators for Rear Panel Connectors

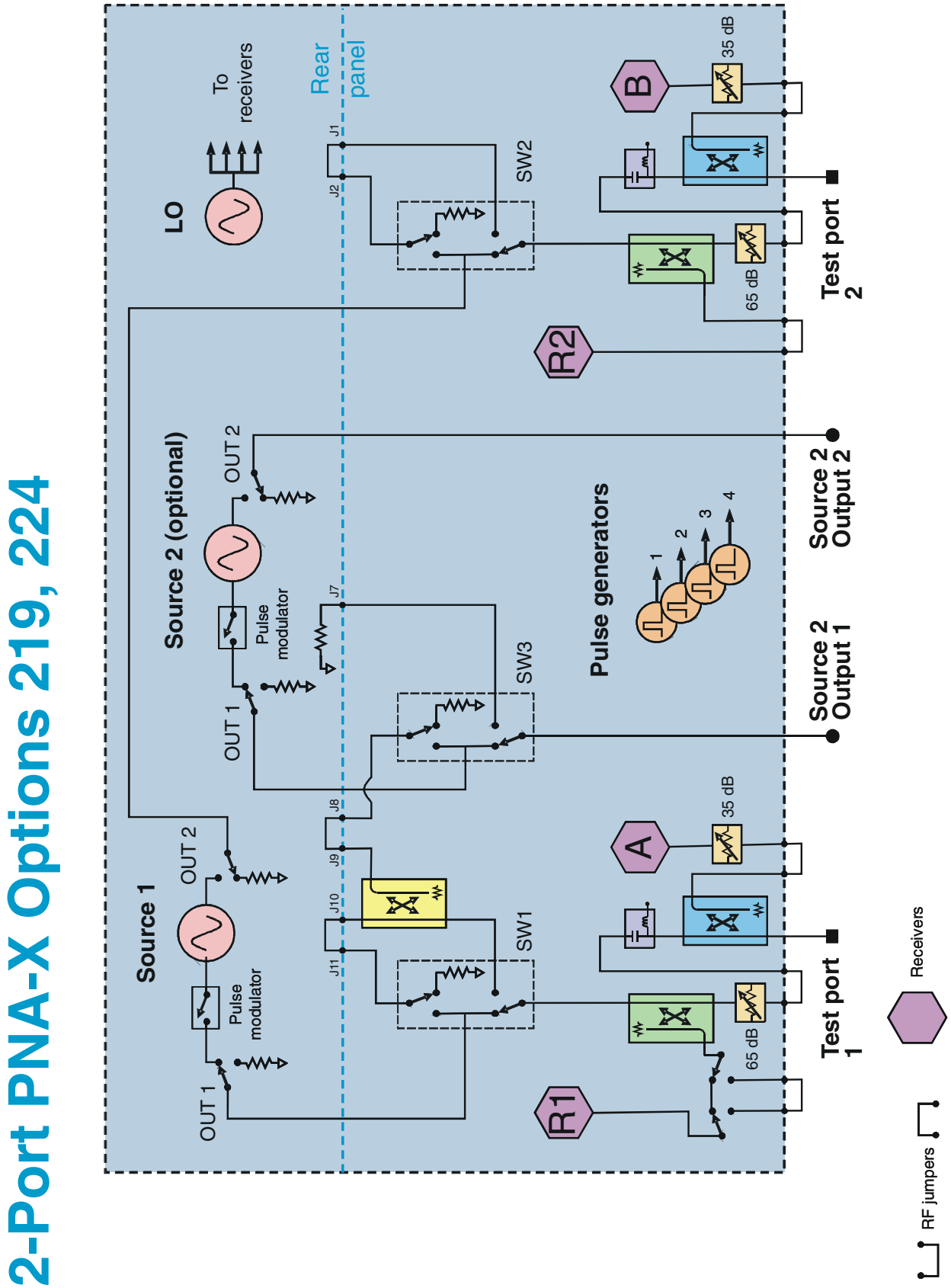


Figure 20. 4-Port N5242A (Option 419, 423), Showing J-Designators for Rear Panel Connectors

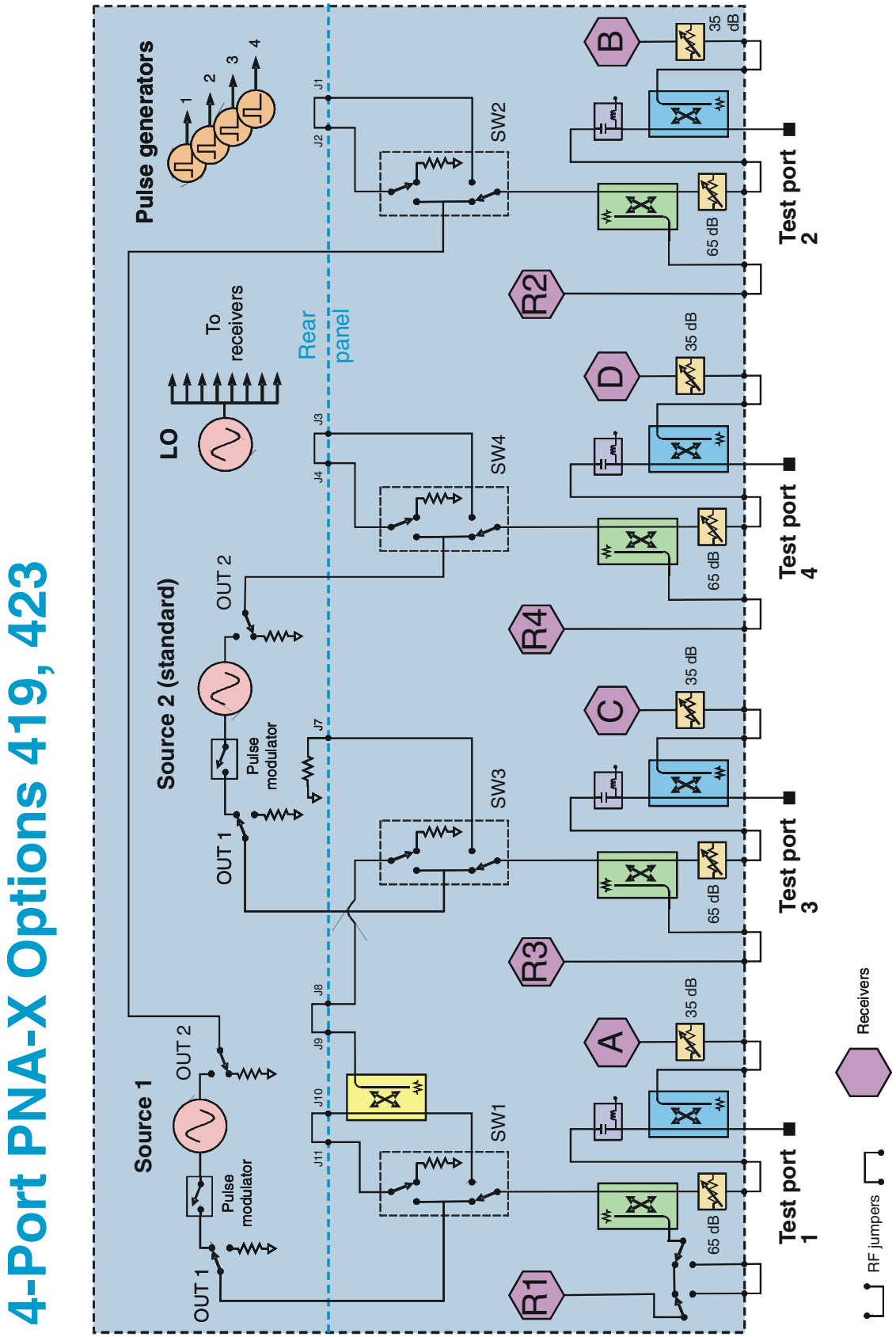
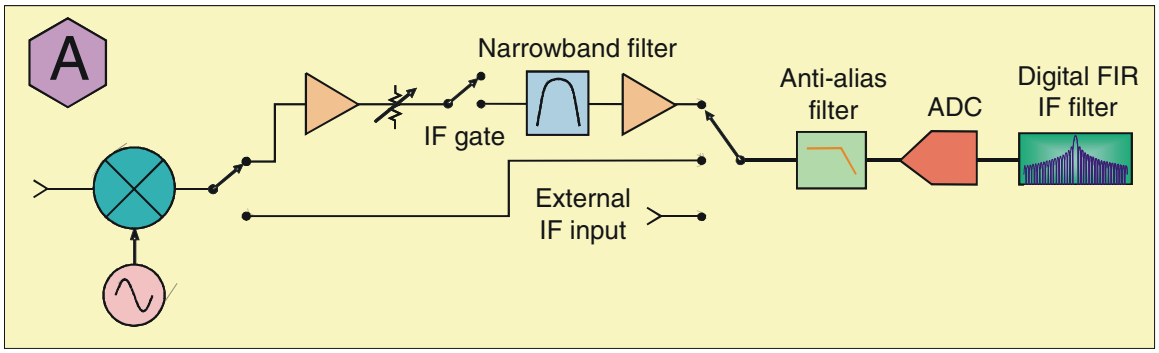


Figure 21. Receiver Block Diagram



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