PXIe-5842 Specifications

2024-09-23

Contents

PXIe-5842 Specifications

Applicable Instruments

These specifications apply to PXIe-5842 instruments that are based around a PXIe-5842 module with assembly part number 138862***x***-***y***L, where the hardware revision ***x*** is a letter and ***y*** is one or more digits.

This assembly number series is used in shipping kits with the following part numbers:

- PXIe-5842 VST: 789600-***x***, where ***x*** is a series of digits
- PXIe-5842 with S-parameters: 788568-01

Related information:

- Locating the PXIe-5842 Assembly Part Number
- Front Panels and Pinouts

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty. Warranted specifications account for measurement uncertainties, temperature drift, and aging. Warranted specifications are ensured by design or verified during production and calibration.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- ***Typical*** specifications describe the performance met by a majority of models.
- ***Typical-95*** specifications describe the performance met by 95% (≈2σ) of models with a 95% confidence.
- ***Nominal*** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.
- ***Measured*** specifications describe the measured performance of a representative model.

Specifications are ***Warranted*** unless otherwise noted.

Conditions

All specifications are valid under the following conditions unless otherwise noted.

- 30 minutes warm-up time; warm-up time begins when the PXI Express chassis has been powered on and the operating system has completely loaded
- Self-calibration is performed after the warm-up time has completed
- Calibration cycle is maintained
- Environment temperature is within the ambient range, onboard temperature sensors within the PXIe-5842 instrument are within ±5 °C of the last self-calibration temperature, and temperature correction is enabled (default driver behavior)
- Installed in chassis with 82 W slot cooling capacity with fan mode set to Auto
- Empty chassis slots contain slot blockers and EMC filler panels to minimize temperature drift and reduce emissions
- Modules are connected with NI cables according to setup instructions, as documented in PXIe-5842 user documentation
- Indicated instrument driver is used with driver default settings unless otherwise noted:
  - PXIe-5842 VST: RFmx 2023 Q3 or later, NI-RFSA 2023 Q3 or later, or NI-RFSG 2023 Q3 or later
  - PXIe-5842 with S-parameters: RFmx 2023 Q4 or later, NI-RFSA 2023 Q4 or later, or NI-RFSG 2023 Q4 or later

Warranted specifications are valid under the following condition unless otherwise noted.

- Over an ambient temperature range of 0 °C to 40 °C

Typical and Typical-95 specifications are valid under the following condition unless otherwise noted.

- Over an ambient temperature range of 23 °C±5 °C

Typical specifications do not include measurement uncertainty.

Measured specifications do not include measurement uncertainty and are measured immediately after a device self-calibration is performed.

Interpreting the *PXIe-5842 Specifications*

The PXIe-5842 name applies to multiple instruments, each of which comprises a different set of individual modules. This document uses shorthand ***Configuration*** names to denote specifications that apply to a specific PXIe-5842 instrument; additionally, the ports at which specifications apply depend on the instrument.

Note PXIe-5842 instruments are integrated at the time of purchase and one instrument cannot be modified into another after purchase.

The following table describes which configuration name applies to which PXIe-5842 instrument and where the specifications apply within each PXIe-5842 instrument.

Table 1. PXIe-5842 Specifications Configurations and Applicable Ports

Instrument	Constituent Modules	Specification Configuration	Specifications Apply At			
			Module	RF Input	RF Output	VNA Input/ Output
PXIe-5842 VST	• PXIe-5842 • PXIe-5655	A	PXIe-5842	RF IN	RF OUT	N/A
PXIe-5842 with S-parameters	• PXIe-5842 • PXIe-5655 • PXIe-5633	B	PXIe-5633	PORT 1/PORT 2	PORT 1/PORT 2	PORT 1/PORT 2

The following figures illustrate these configurations and the modules within them:

Figure 1. PXIe-5842 Configuration A. PXIe-5842 VST

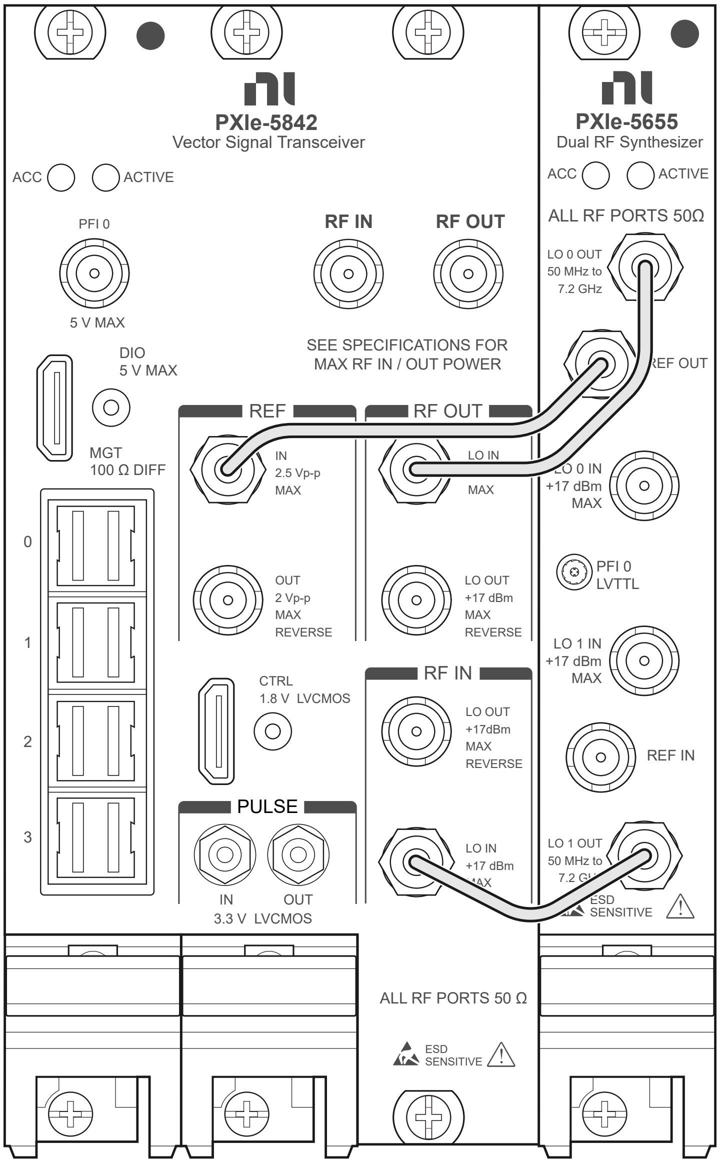
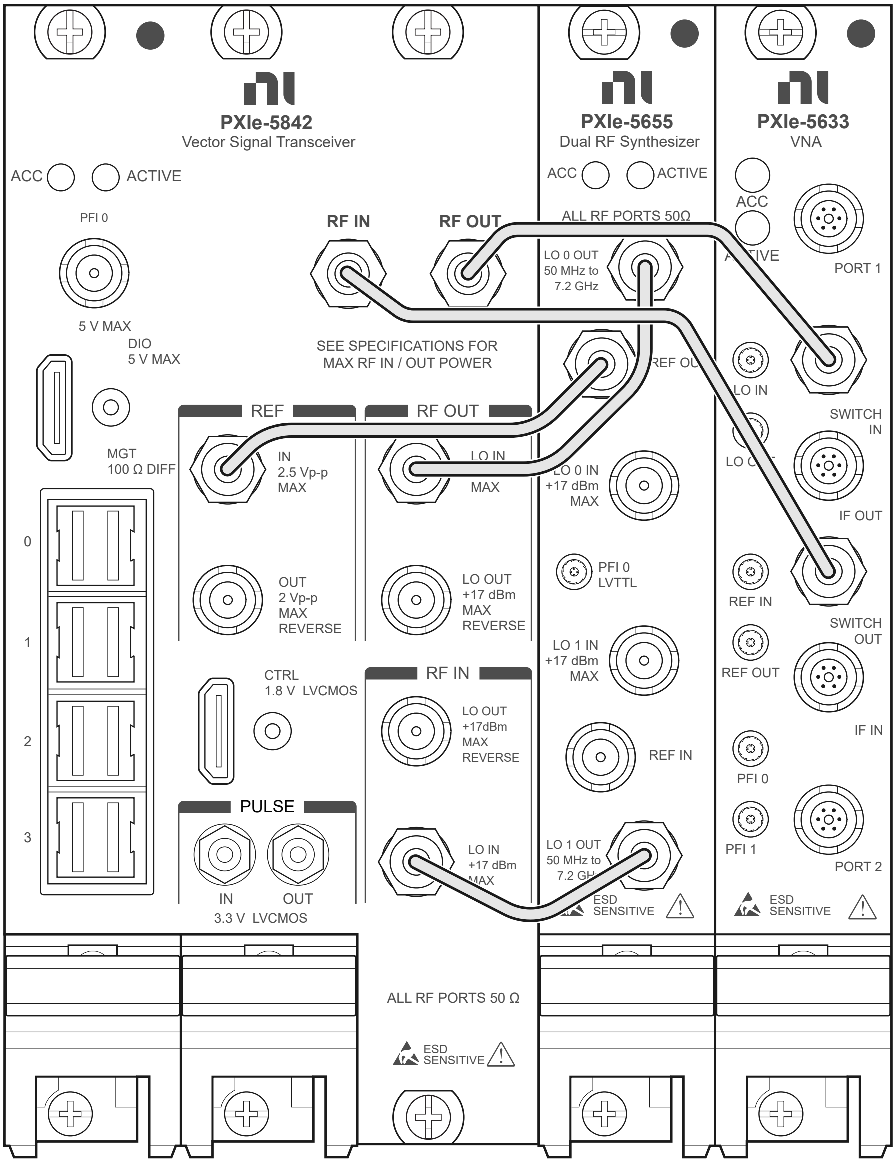


Figure 1. PXIe-5842 Configuration B. PXIe-5842 with S-parameters



PXIe-5842 Specifications and Licensed Capabilities

Various capabilities of the PXIe-5842 including but not limited to center frequency range, bandwidth, and capability for generation, analysis, or both are subject to licensing. Specifications for the PXIe-5842 cover the full possible performance, but your specific PXIe-5842 instrument must be appropriately licensed to realize the performance described in the specifications.

Common NI RF Terminology

Refer to the following list for definitions of common NI terms related to RF hardware and software-configured settings for the PXIe-5842 and used throughout documentation.

Table 2. Common Terminology Definitions

Term	Definition
Center Frequency	Refers to the IQ Carrier Frequency property in NI-RFSA, the Frequency property in NI-RFSG, and the Center Frequency property in RFmx.
Frequency Offset Mode is Automatic	Refers to the NI-RFSADownconverter Frequency Offset Mode property or NI-RFSGUpconverter Frequency Offset Mode property set to Automatic. Equivalent to the term ***Offset Mode is Automatic***. The PXIe-5842 uses a direct conversion architecture. Offset Mode allows the instrument to operate in low IF mode, which increases the separation between the signal of interest and the residual sideband image and residual LO leakage power. However, low IF mode limits the available instantaneous bandwidth. A setting of Automatic allows the driver to set Offset Mode to Enabled when the signal bandwidth is configured as small enough to allow it. You can read back the Offset Mode to determine if the driver selected Enabled or User-Defined. Automatic is the default value. NI recommends keeping Offset Mode set to the default value.
Frequency Offset Mode is Enabled	Refers to the NI-RFSA Downconverter Frequency Offset Mode property or NI-RFSGUpconverter Frequency Offset Mode property set to Enabled. Equivalent to the following terms or conditions:

Term	Definition
	• ***Offset Mode is Enabled*** • ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth*** The PXIe-5842 uses a direct conversion architecture. Offset Mode allows the instrument to operate in low IF mode, which increases the separation between the signal of interest and the residual sideband image and residual LO leakage power.
Frequency Offset Mode is User-Defined	Refers to the NI-RFSADownconverter Frequency Offset Mode property or NI-RFSGUpconverter Frequency Offset Mode property set to User-Defined. Equivalent to the following terms or conditions: • ***Offset Mode is User-Defined*** • ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** The PXIe-5842 uses a direct conversion architecture. Offset Mode set to User-Defined allows the instrument to operate with maximum instantaneous bandwidth.
Onboard	With respect to local oscillators, refers to the value of the LO Source property. A value of Onboard configures the hardware to use the integral local oscillator of the instrument, that of the associated PXIe-5655 module(s). With respect to reference clocks, refers to the value of the NI-RFSGReference Clock Source or NI-RFSARef Clock Source properties. A value of Onboard Clock configures the hardware to use the integral reference clock of the instrument, that of the associated PXIe-5655 module(s).
dBr	• **For input**—Power of an acquired signal with respect to the instrument's configured reference level. For example, if the reference level is set to -10 dBm and the acquired tone is -17 dBm, the signal is said to be at -7 dBr. • **For output**—Generated power of a CW with respect to the

Term	Definition
	instrument's peak power setting. For example, with a peak power level setting of +5 dBm and a -3 dBr setting, the power of the generated CW is +2 dBm.

VST Specifications

VST specifications apply to the PXIe-5842 VST (Configuration A) and PXIe-5842 with S-parameters (Configuration B). Specifications are differentiated between configurations where necessary.

RF Input and RF Output Frequency Specifications

Center Frequency Range

Center frequency range	
8 GHz frequency range option	30 MHz to 8 GHz
12 GHz frequency range option	30 MHz to 12 GHz
18 GHz frequency range option	30 MHz to 18 GHz
26.5 GHz frequency range option	30 MHz to 26.5 GHz

Equalized Bandwidth

Table 3. Maximum Bandwidth

Center Frequency	500 MHz Bandwidth Option	1 GHz Bandwidth Option	2 GHz Bandwidth Option
30 MHz to <1.75 GHz	Up to 500 MHz*	Up to 1 GHz†	Up to 1.97 GHz‡
1.75 GHz to 2 GHz	500 MHz	1 GHz	1 GHz
>2 GHz to 5.8 GHz	500 MHz	1 GHz	1.4 GHz
>5.8 GHz to 26.5 GHz	500 MHz	1 GHz	2 GHz

The PXIe-5842 uses the low frequency subsystem to directly acquire or generate RF signals when ***Center Frequency*** < 1.75 GHz. In this frequency range, the bandwidth varies as a function of the requested center frequency according to the following:

- *: ***Maximum Bandwidth*** = min[500 MHz, 2 × min(***Center Frequency*** - 30 MHz, 2 GHz - ***Center Frequency***)]

Center Frequency	500 MHz Bandwidth Option	1 GHz Bandwidth Option	2 GHz Bandwidth Option

For example:

- 500 MHz of bandwidth available for center frequencies between 280 MHz and 1.75 GHz

- †: ***Maximum Bandwidth*** = min[1 GHz, 2 × min(***Center Frequency*** - 30 MHz, 2 GHz - ***Center Frequency***)]

  For example:

  - ≥500 MHz of bandwidth available for center frequencies between 280 MHz and 1.75 GHz
  - 1 GHz of bandwidth available for center frequencies between 530 MHz and 1.5 GHz

- ‡: ***Maximum Bandwidth*** = 2 × min(***Center Frequency*** - 30 MHz, 2 GHz - ***Center Frequency***)

  For example:

  - ≥500 MHz of bandwidth available for center frequencies between 280 MHz and 1.75 GHz
  - ≥1 GHz of bandwidth available for center frequencies between 530 MHz and 1.5 GHz
  - 1.97 GHz of bandwidth available when ***Center Frequency*** = 1.015 GHz

Table 4. Maximum Offset Bandwidth

Center Frequency	500 MHz Bandwidth Option	1 GHz Bandwidth Option	2 GHz Bandwidth Option
30 MHz to 1.7 GHz	—	—	—
>1.7 GHz to 5.25 GHz	250 MHz	500 MHz	600 MHz
>5.25 GHz to 26.5 GHz	250 MHz	500 MHz	900 MHz

When Offset Mode is Automatic (the default) and ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***, the PXIe-5842 offsets the bandwidth and operates in a low IF mode. For ***Center Frequency*** ≤ 1.7 GHz, the PXIe-5842 uses the low frequency subsystem to directly acquire or generate the RF signal, and the ability to offset is not applicable.

Internal Frequency Reference Accuracy

Note Signals at the relevant RF IN and RF OUT connectors for your PXIe-5842 configuration make use of the same frequency reference. These specifications describe the performance of the PXIe-5655 LO for the PXIe-5842.

Initial calibration accuracy (temperature 15 °C to 35 °C)	$\pm 60 \times 10^{-9}$
Accuracy	***Initial Adjustment Accuracy*** ± ***Aging*** ± ***Temperature Stability***
Temperature stability	
15 °C to 35 °C	$\pm 30 \times 10^{-9}$
0 °C to 15 °C, 35 °C to 55 °C	$\pm 50 \times 10^{-9}$
Aging after 30 days of continuous operation	
Per day	$\pm 1.0 \times 10^{-9}$
Per year	$\pm 160 \times 10^{-9}$
Per 2 years	$\pm 200 \times 10^{-9}$

Note For more information about using an external frequency reference or sharing the internal frequency reference, refer to ***Front Panel I/O***.

Related reference:

- PXIe-5842 Front Panel I/O

Frequency Resolution

Tuning Resolution[1]	8.89 μHz
LO step size	≤1 Hz

Frequency Settling Time

Frequency Settling Time (μs), Typical	
To ≤1.0×10^{-6} of final frequency	≤230
To ≤0.1×10^{-6} of final frequency	≤250

> **Note** ***Frequency settling*** refers to the time it takes the frequency to settle once the hardware receives the frequency change. The additional time due to software-initiated frequency changes is not included and varies by computer. Frequency settling time includes only frequency settling and excludes any residual amplitude settling.

Phase Settling

If phase settling of one degree is required when changing frequencies, additional settling time must be added when transitioning between upconverter/downconverter center frequency bands.

Phase settling time, Configuration A	
From any band to band 1, 2, 3, or 5	350 ms

1. Tuning resolution combines LO step size capability and frequency shift digital signal processing (DSP) implemented on the FPGA.

Phase settling time, Configuration A	
From any band to band 4	1,500 ms

Band definitions for upconverter/downconverter center frequency:

- **Band 1**— 30 MHz to 1.75 GHz
- **Band 2**— >1.75 GHz to 7.2 GHz
- **Band 3**— >7.2 GHz to 14.4 GHz
- **Band 4**— >14.4 GHz to 18.4 GHz
- **Band 5**— >18.4 GHz to 26.5 GHz

RF Input Amplitude Specifications

RF Input Amplitude Range

Amplitude range	Average noise level to +25 dBm (CW RMS)[2]

Note ***Amplitude range*** refers to the settable range of the reference level. For input damage levels, see ***Front Panel I/O*** and ***Safety Voltages***.

Gain resolution	1 dB, nominal

Table 5. Analog Gain Range (dB), Nominal

Center Frequency	Analog Gain Range	
	Configuration A	Configuration B
30 MHz to 6 GHz	58	67
>6 GHz to 12 GHz	55	67
>12 GHz to 18 GHz	51	64
>18 GHz to 23 GHz	54	63

2. Reference levels up to +26 dBm are available when headroom is reduced to 0 dB.

Center Frequency	Analog Gain Range	
	Configuration A	Configuration B
>23 GHz to 26.5 GHz	52	58

Related reference:

- PXIe-5842 Front Panel I/O
- Safety Voltages

RF Input Amplitude Settling Time

RF input amplitude settling time[3]	
<0.5 dB of final value	15 μs, typical
<0.1 dB of final value	20 μs, typical

> **Note** ***Amplitude settling time*** refers to the time it takes to switch between two analog gain states with frequency unchanged once the hardware receives the amplitude change request from the driver software. The additional time due to software-initiated amplitude changes is not included and varies by computer. When changing frequencies, reconfiguration time is dominated by the frequency setting. Refer to ***Frequency Settling Time*** for more information.

Related reference:

- Frequency Settling Time

3. Constant RF input signal, varying input reference level.

RF Input Amplitude Accuracy

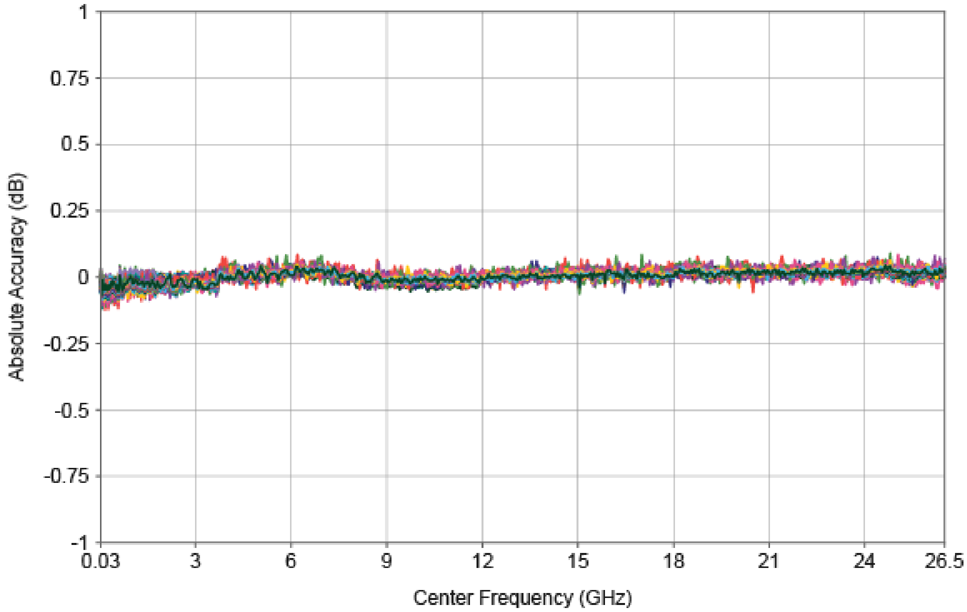
Table 18. RF Input Absolute Amplitude Accuracy (dB)

Center Frequency	Configuration A				Configuration B			
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical
30 MHz to <1.75 GHz	0.75	0.75	0.50	0.30	1.15	1.70	0.85	0.45
1.75 GHz to 6 GHz	0.70	0.75	0.40	0.20	1.45	1.85	1.15	0.45
>6 GHz to 12 GHz	0.85	0.95	0.50	0.25	1.10	1.5	0.85	0.45
>12 GHz to 18 GHz	1.05	1.10	0.50	0.30	1.85	1.9	1.65	0.85
>18 GHz to 22 GHz	1.15	1.30	0.50	0.30	1.50	1.75	1.30	0.75
>22 GHz to 26.5 GHz	1.40	1.50	0.55	0.35	2.25	2.70	2.00	1.10

Conditions: Reference level -30 dBm to 25 dBm. Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency. Verified with signal source at 0 dBr for ***Reference Level*** ≤ 10 dBm and at 10 dBm for ***Reference Level*** > 10 dBm.

Figure 1. RF Input Absolute Accuracy vs. Center Frequency, Measured.

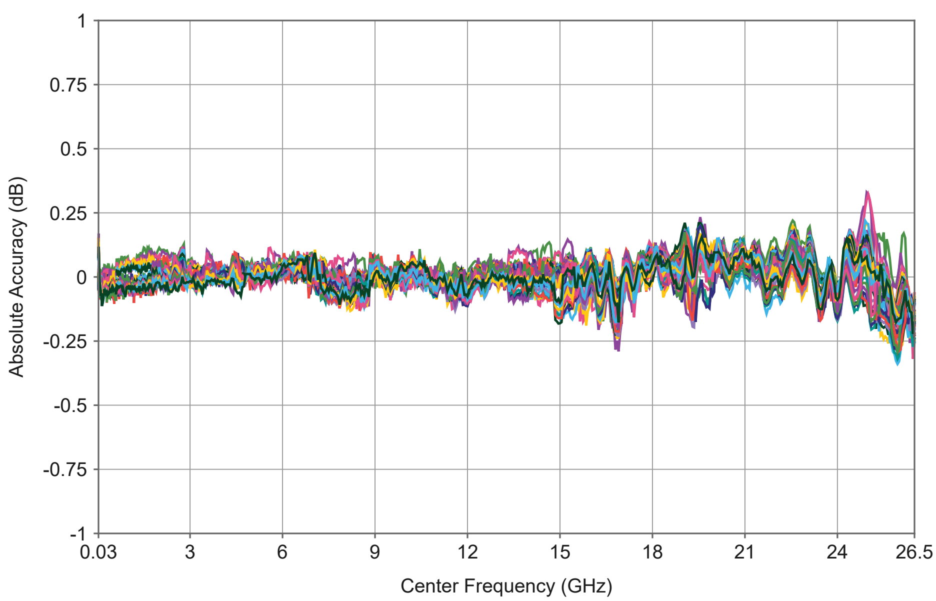
Configuration A



Conditions: Measured in 1 dB steps between -30 dBm and +25 dBm reference levels.

Figure 1. RF Input Absolute Accuracy vs. Center Frequency, Measured.

Configuration B



RF input ADC linearity (dB)	
Warranted	0.5
Typical-95	0.35
Typical	0.15

ADC linearity describes the residual error when comparing the amplitude of an input signal anywhere within the ADC dynamic range to the amplitude of the signal when the input signal power level is equal to the reference level (0 dBr).

Conditions: -40 dBr to 0 dBr; measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.

Table 7. RF Input Amplitude Accuracy for ***Reference Level*** (dB) < -30 dBm

Center Frequency	Configuration A			Configuration B		
	Warranted	**Typical-95**	**Typical**	**Warranted**	**Typical-95**	**Typical**
30 MHz to <1.75 GHz	1.25	0.85	0.45	2.20	1.20	0.60
1.75 GHz to 6 GHz	1.25	0.75	0.35	2.35	1.40	0.60
>6 GHz to 12 GHz	1.35	0.85	0.40	2.00	1.20	0.60
>12 GHz to 18 GHz	1.40	0.85	0.45	2.40	2.00	1.00
>18 GHz to 22 GHz	1.60	0.85	0.45	2.25	1.65	0.90
>22 GHz to 26.5 GHz	1.70	0.90	0.50	3.20	2.35	1.25

This specification extends the reference level range by combining the RF Input Amplitude Accuracy specification and the RF Input ADC Linearity specification.

Conditions: Reference level -70 dBm to <-30 dBm; 0 dBr input signal level. Measured with a CW

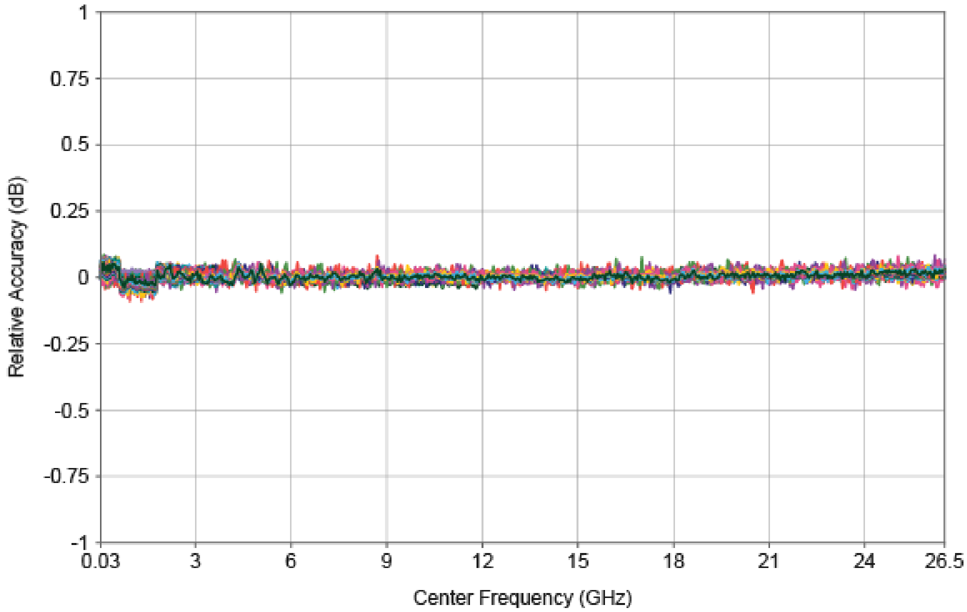
Center Frequency	Configuration A			Configuration B		
	Warranted	Typical-95	Typical	Warranted	Typical-95	Typical
signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.						

Table 19. RF Input Relative Amplitude Accuracy (dB), Typical

Center Frequency	Configuration A	Configuration B
30 MHz to <1.75 GHz	0.20	0.40
1.75 GHz to 6 GHz	0.15	0.45
>6 GHz to 12 GHz	0.20	0.40
>12 GHz to 18 GHz	0.20	0.55
>18 GHz to 22 GHz	0.20	0.45
>22 GHz to 26.5 GHz	0.25	0.55
Relative accuracy describes the residual absolute error when compared to the absolute accuracy error at the 0 dBm reference level. Conditions: Reference level -30 dBm to 25 dBm. Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.		

Figure 1. RF Input Relative Accuracy vs. Center Frequency, Measured.

Configuration A



Conditions: Measured in 1 dB steps between -30 dBm and +25 dBm reference levels. Normalized to absolute accuracy at 0 dBm reference level.

RF Input Frequency Response

Table 9. RF Input Magnitude Response (dB)

Center Frequency	Configuration A				Configuration B		
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted	Typical-95	Typical
30 MHz to 200 MHz	0.75	0.90	0.45	0.20	1.00	0.60	0.30
>200 MHz to <1.75 GHz	0.85	0.95	0.55	0.25	1.00	0.60	0.35
≥1.75 GHz to 6 GHz	0.85	0.90	0.55	0.25	0.90	0.55	0.25
>6 GHz to 12 GHz	0.95	1.00	0.60	0.25	1.25	0.90	0.60
>12 GHz to	1.00	1.10	0.60	0.25	1.35	1.00	0.55

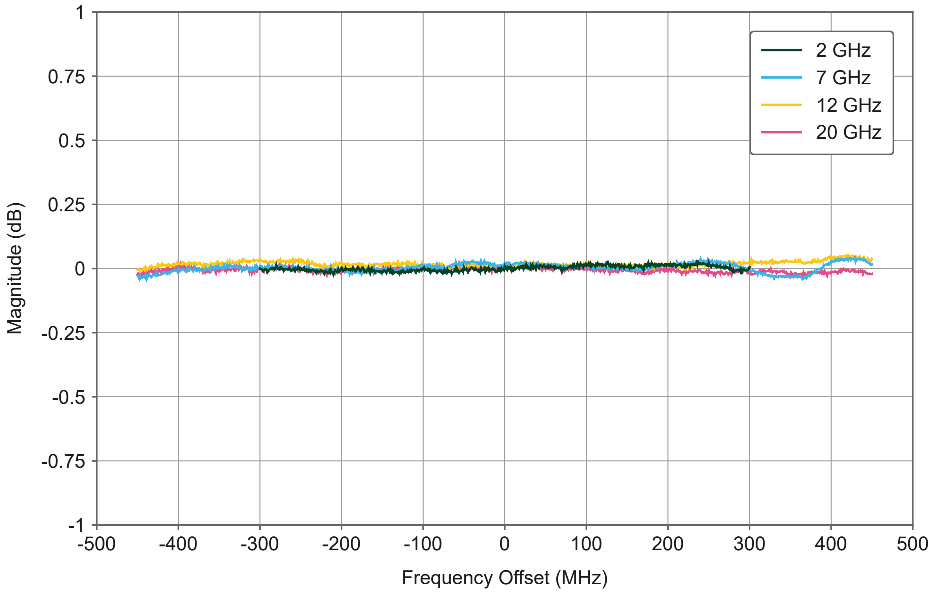
Center Frequency	Configuration A				Configuration B		
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted	Typical-95	Typical
18 GHz							
>18 GHz to 22 GHz	1.10	1.25	0.65	0.30	1.35	1.00	0.55
>22 GHz to 26.5 GHz	1.15	1.40	0.65	0.35	2.35	1.50	0.95

Conditions: Reference level -30 dBm to +25 dBm. This specification excludes the bandwidth between -20 MHz and +20 MHz when both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** > 1.75 GHz. See for more information on the offset mode. Verified with signal source at 0 dBr for ***Reference Level*** ≤ 10 dBm and at 10 dBm for ***Reference Level*** > 10 dBm.

Magnitude response is defined as the maximum relative amplitude deviation from the amplitude observed at the ***reference frequency***, the frequency where absolute amplitude accuracy is defined. For the absolute amplitude accuracy at the reference frequency, refer to the table in ***RF Input Amplitude Accuracy***. For the , the reference frequency is the center frequency, except when both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case the reference frequency is 20 MHz offset from the configured center frequency.

Figure 1. RF Input Magnitude Response (Maximum Offset Bandwidth), Measured.

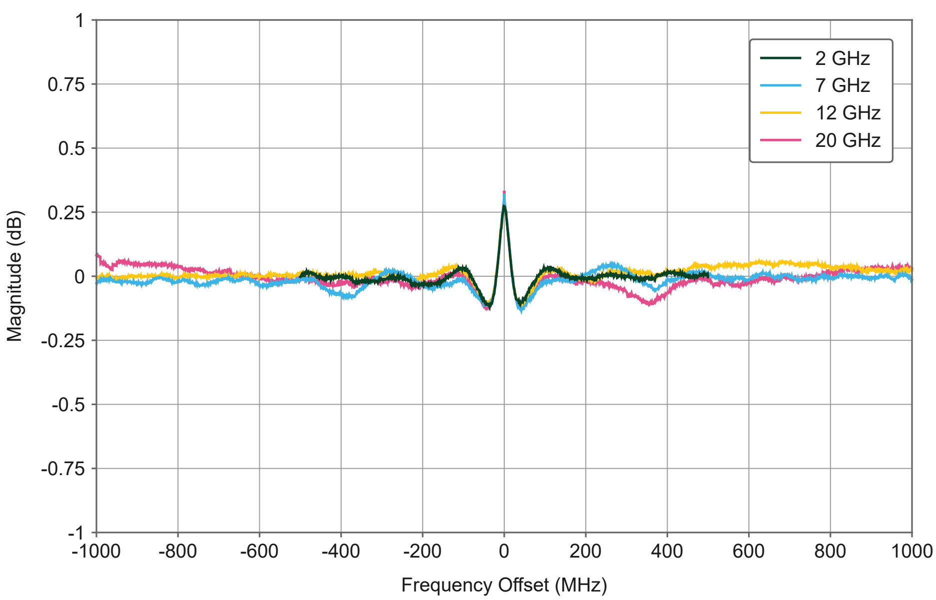
Configuration A



Conditions: 0 dBm Reference Level, normalized to 0 Hz

Figure 1. RF Input Magnitude Response (Maximum Bandwidth), Measured.

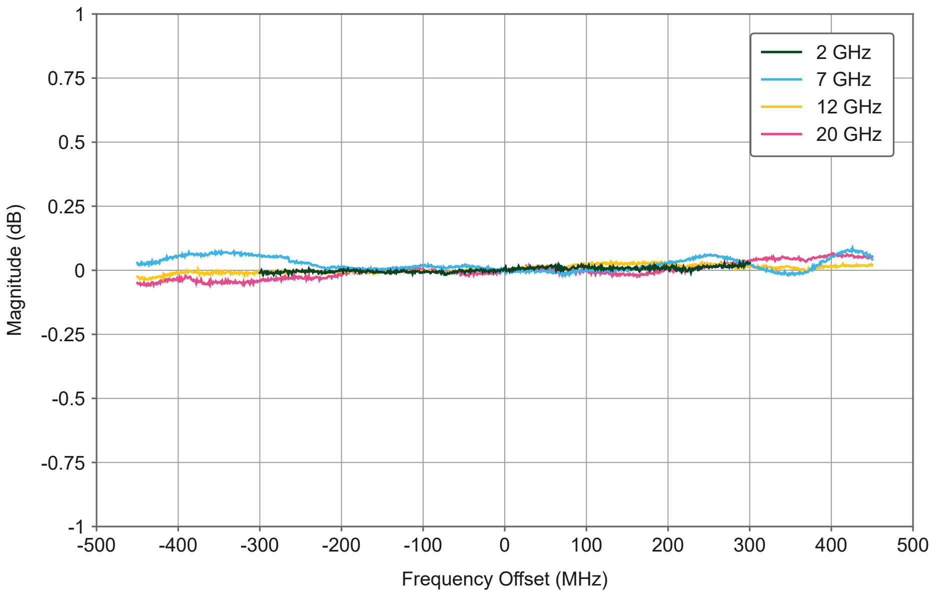
Configuration A



Conditions: 0 dBm Reference Level, normalized to 20 MHz

Figure 1. RF Input Magnitude Response (Maximum Offset Bandwidth), Measured.

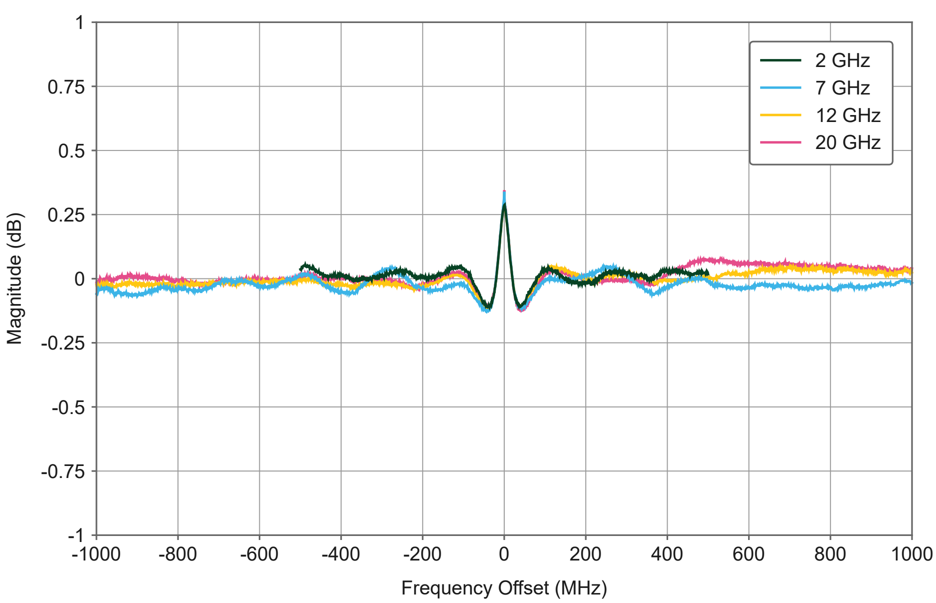
Configuration B



Conditions: 0 dBm Reference Level, normalized to 0 Hz

Figure 1. RF Input Magnitude Response (Maximum Bandwidth), Measured.

Configuration B



Conditions: 0 dBm Reference Level, normalized to 20 MHz

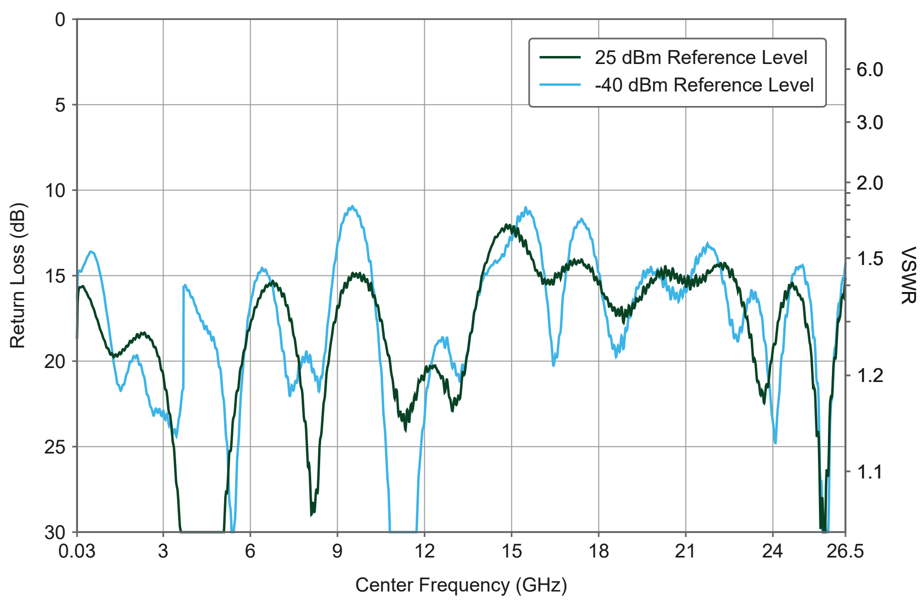
Related reference:

- Common NI RF Terminology

RF Input Return Loss

Figure 1. RF Input Return Loss, Measured.

Configuration A

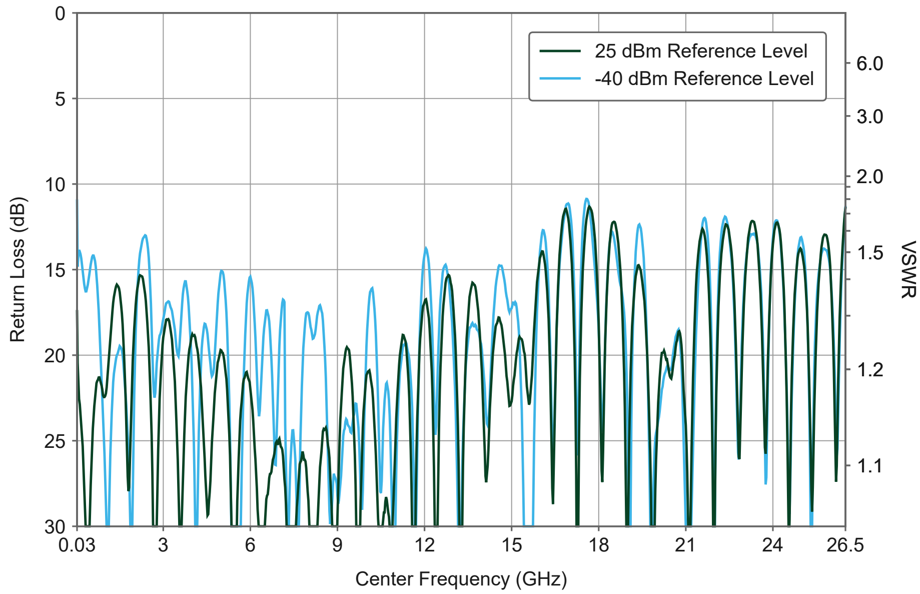


Condition: return loss measured at center frequency

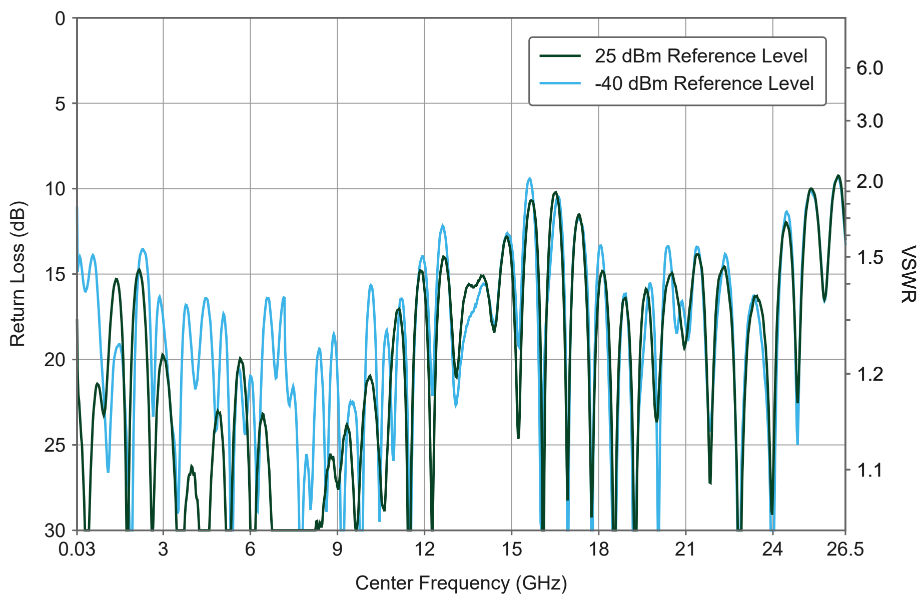
Figure 1. RF Input Return Loss, Measured.

Configuration B

PORT 1



PORT 2



Condition: return loss measured at center frequency

RF Input Dynamic Range Specifications

RF Input Average Noise Density

Table 10. RF Input Average Noise Density (dBm/Hz)

Center Frequency	Reference Level	Configuration A		Configuration B	
		Warranted	Typical	Warranted	Typical
30 MHz to 1.75 GHz	-30 dBm	-163	-167	-160	-163
>1.75 GHz to 3 GHz		-162	-165	-159	-162
>3 GHz to 12 GHz		-161	-164	-155	-159
>12 GHz to 18 GHz		-159	-162	-151	-155
>18 GHz to 22 GHz		-157	-161	-150	-153
>22 GHz to 25 GHz		-157	-160	-148	-152
>25 GHz to 26.5 GHz		-156	-159	-147	-151
30 MHz to 1.75 GHz	0 dBm	-141	-144	-134	-138
>1.75 GHz to 3 GHz		-140	-143	-133	-138
>3 GHz to 22 GHz		-140	-144	-133	-137
>22 GHz to 26.5 GHz		-140	-143	-131	-136

Noise density improves approximately 4 dB for the 0 dBm reference level when ***Center Frequency*** ≥ 3.75 GHz and ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth*** or when offset mode is enabled. Example: 5.25 GHz to 22 GHz frequency range at 0 dBm typical reference level improves from -144 dBm/Hz to -148 dBm/Hz when ***Signal Bandwidth*** ≤ 900 MHz.

Conditions: Result is the power spectral density expressed in dBm/Hz. Measured at 20 MHz offset

Center Frequency	Reference Level	Configuration A		Configuration B	
		Warranted	Typical	Warranted	Typical
from the center frequency; 10 averages computed from the root-mean-square average of the input signal across a 1 MHz span after spurs are removed and normalized to a 1 Hz noise bandwidth. Input terminated with a 50 Ω load.					

Note Signal analyzer specifications are often provided as ***displayed average noise level*** (DANL). To convert average noise density to DANL, subtract 2.51 dB. DANL is lower because it is computed using the average of the logarithm of measurement samples, not the logarithm of the average of measurement samples as provided.

RF Input Third-Order Intermodulation

Table 11. RF Input Third-Order Intercept Point (IIP_3, dBm)

Center Frequency	Reference Level	Configuration A			Configuration B		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
30 MHz to 1 GHz	-30 dBm	-9	-10	-3	-8	-8	-3
>1 GHz to 3 GHz		-10	-12	-6	-12	-13	-7
>3 GHz to 8 GHz		-11	-12	-8	-18	-18	-12
>8 GHz to 24 GHz		-8	-10	-4	-10	-11	-5
>24 GHz to 26.5 GHz		-8	-10	-4	-10	-11	-5
30 MHz to 1 GHz	0 dBm	16	15	22	21	20	26
>1 GHz to		19	17	23	18	18	22

Center Frequency	Reference Level	Configuration A			Configuration B		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
3 GHz							
>3 GHz to 8 GHz		18	17	21	13	12	18
>8 GHz to 24 GHz		19	18	23	13	12	18
>24 GHz to 26.5 GHz		19	18	23	13	12	18
30 MHz to 1 GHz	15 dBm	31	30	37	36	35	40
>1 GHz to 3 GHz		33	32	38	34	33	37
>3 GHz to 8 GHz		33	32	36	28	27	32
>8 GHz to 24 GHz		33	32	38	28	27	34
>24 GHz to 26.5 GHz		33	32	38	28	27	34

Conditions: Measured when receiving two -6 dBr tones at the following offsets from the center frequency:

- ***Center Frequency*** < 1 GHz: +10 MHz and +10.7 MHz
- ***Center Frequency*** ≥ 1 GHz: +95 MHz and +105 MHz

RF Input Phase Noise

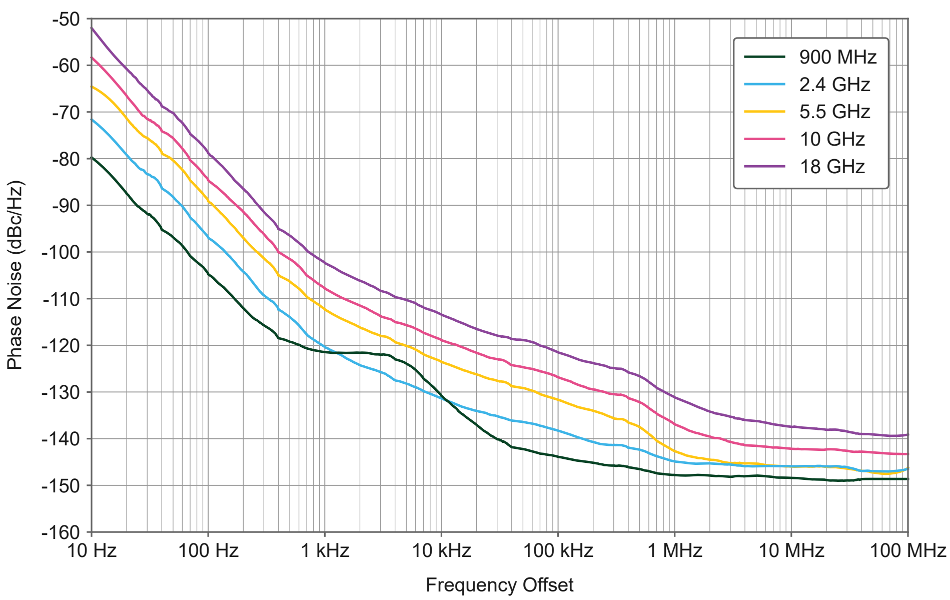
Table 12. RF Input Phase Noise (dBc/Hz), Typical

Center Frequency	Frequency Offset					
	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
900 MHz	-102	-118	-129	-140	-145	-146

Center Frequency	Frequency Offset					
	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
2.4 GHz	-93	-117	-127	-134	-143	-144
5.5 GHz	-86	-111	-121	-128	-140	-142
10 GHz	-81	-107	-117	-124	-136	-140
18 GHz	-75	-102	-112	-119	-131	-136
Condition: 0 dBm Reference Level.						

Figure 1. RF Input Phase Noise, Measured.

Configuration A



Measured data post-processed using Savitzky-Golay filter.

Conditions: 0 dBm Reference Level.

RF Input Non-Harmonic Spurs

Table 13. RF Input Non-Harmonic Spurs (dBc), Typical

Configuration A

Center Frequency	Maximum Offset Bandwidth			Maximum Bandwidth		
	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz
30 MHz to <1.75 GHz	—	—	—	-88	-89	-64
≥1.75 GHz to 3 GHz	-82	-86	-72	-82	-85	-68
>3 GHz to 6 GHz	-76	-82	-70	-76	-81	-66
>6 GHz to 8 GHz	-74	-77	-69	-73	-78	-65
>8 GHz to 12 GHz	-69	-76	-65	-71	-71	-65
>12 GHz to 18 GHz	-66	-70	-61	-67	-70	-60
>18 GHz to 22 GHz	-65	-70	-62	-64	-69	-62
>22 GHz to 25 GHz	-63	-69	-63	-63	-68	-60
>25 GHz to 26.5 GHz	-62	-68	-61	-62	-67	-58

Non-harmonic spurs exclude RF harmonic spurs, residual LO, and residual sideband image.

Conditions: Reference level 0 dBm; input tone level -6 dBm.

Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.

Center Frequency	Maximum Offset Bandwidth			Maximum Bandwidth		
	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz
For ***Offset*** ≥ 1 MHz, the maximum offset is limited to within the equalized bandwidth of the referenced center frequency. ***Offset*** refers to ± desired signal offset (Hz) around the tone frequency. ***Maximum Offset Bandwidth*** refers to setting ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***; ***Maximum Bandwidth*** refers to setting ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***; the signal bandwidth corresponding to ***Maximum Bandwidth*** and ***Maximum Offset Bandwidth*** varies by center frequency and is defined by the values in ***Equalized Bandwidth***. See for definitions of offset mode settings.						

Related reference:

- Equalized Bandwidth
- Common NI RF Terminology

RF Input LO Residual Power

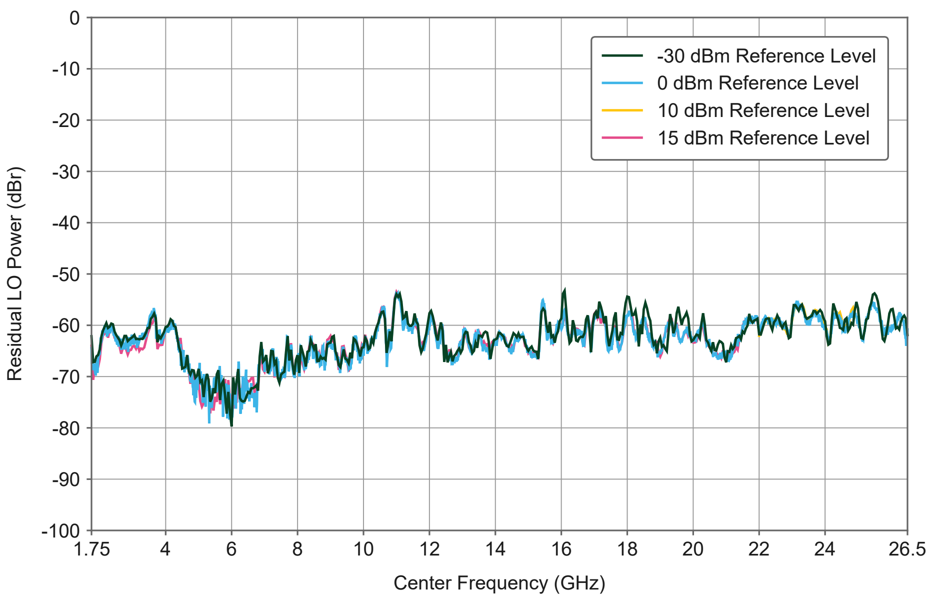
Table 18. RF Input LO Residual Power (dBr), Typical

Center Frequency	Configuration A	Configuration B
1.75 GHz to 3 GHz	-56	-54
>3 GHz to 6 GHz	-51	-47
>6 GHz to 8 GHz	-55	-51
>8 GHz to 12 GHz	-47	-44
>12 GHz to 18 GHz	-44	-43
>18 GHz to 23 GHz	-42	-40
>23 GHz to 25 GHz	-43	-40
>25 GHz to 26.5 GHz	-39	-33

Center Frequency	Configuration A	Configuration B
Conditions: Reference level is -30 dBm to +25 dBm; maximum LO residual power when receiving a CW signal anywhere within the full instrument bandwidth. The PXIe-5842 uses the low frequency subsystem to directly acquire the RF input signal for center frequencies <1.75 GHz.		

Figure 1. RF Input LO Residual Power, Measured.

Configuration A



Conditions: Measured by sweeping a 0 dBr CW signal across the bandwidth and calculating the maximum residual LO power.

Note Measurements below 1.75 GHz are not applicable because the PXIe-5842 uses the low frequency subsystem to directly digitize the RF input signal for center frequencies <1.75 GHz.

RF Input Residual Sideband Image

Table 15. RF Input Residual Sideband Image (dBc), Typical

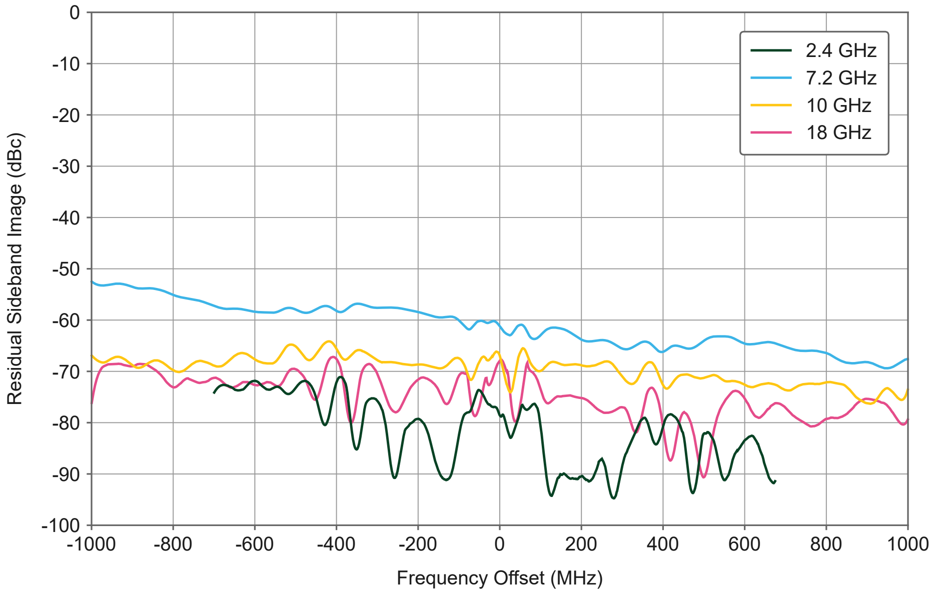
Center Frequency	Configuration A	Configuration B
1.75 GHz to 3 GHz	-60	-59
>3 GHz to 6 GHz	-47	-48
>6 GHz to 8 GHz	-45	-42
>8 GHz to 12 GHz	-47	-44
>12 GHz to 18 GHz	-51	-50
>18 GHz to 23 GHz	-51	-48
>23 GHz to 25 GHz	-52	-49
>25 GHz to 26.5 GHz	-42	-30

Conditions: Reference level is -30 dBm to +25 dBm; maximum residual sideband image when receiving a CW signal anywhere within the full instrument bandwidth.

The uses the low frequency subsystem to directly acquire the RF input signal for center frequencies <1.75 GHz.

Figure 1. RF Input Residual Sideband Image, Measured.

Configuration A



Conditions: 0 dBm Reference Level

Measured data post-processed using Savitzky-Golay filter.

RF Output Amplitude Specifications

RF Output Amplitude Range

Table 16. RF Output Maximum Power (dBm), Maximum Bandwidth

Center Frequency	Configuration A		Configuration B	
	Specification Maximum Level	Maximum Attainable Power, Nominal	Specification Maximum Level	Maximum Attainable Power, Nominal
30 MHz to 200 MHz	15	23	9	15
>200 MHz to 600 MHz	19	23	9	15
>600 MHz to <1.75 GHz	19	23	9 (18)*	15 (23)*
1.75 GHz to 4 GHz	19	25	17	25

Center Frequency	Configuration A		Configuration B	
	Specification Maximum Level	Maximum Attainable Power, Nominal	Specification Maximum Level	Maximum Attainable Power, Nominal
>4 GHz to 6 GHz	20	25	17	24
>6 GHz to 8 GHz	20	23	16	23
>8 GHz to 12 GHz	18	23	15	22
>12 GHz to 18 GHz	18	22	14	20
>18 GHz to 20 GHz	18	22	13	20
>20 GHz to 22 GHz	15	20	13	19
>22 GHz to 24 GHz	10	18	11	17
>24 GHz to 25 GHz	8	15	3	11
>25 GHz to 26.5 GHz	0	6	-9	0

Specification Maximum Level defines the maximum requested power level where compression is minimal and the ***RF Output Amplitude Accuracy*** specification is valid.

Maximum Attainable Power defines the maximum realizable output power of the PXIe-5842 when the requested output power is maximized. Maximum Attainable Power is typically compressed from the requested power and its level accuracy is not specified by the ***RF Output Amplitude Accuracy*** specification.

Conditions: ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***. Measured with a CW signal at the center frequency when ***Center Frequency*** < 1.75 GHz, and measured with a CW at 20 MHz offset from the center frequency when ***Center Frequency*** ≥ 1.75 GHz.

This table describes PXIe-5842 performance under default conditions. If ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth*** when offset mode is Automatic, the PXIe-5842 offset mode setting automatically changes to Enabled, which provides less output power. Use the User-Defined offset mode if you want to maintain the output power shown in this table when also setting ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. See ***Common NI RF Terminology*** for definitions of offset mode settings; see ***Maximum Bandwidth*** in ***Equalized Bandwidth*** for more information about bandwidth.

Center Frequency	Configuration A		Configuration B	
	Specification Maximum Level	Maximum Attainable Power, Nominal	Specification Maximum Level	Maximum Attainable Power, Nominal
* : ***Signal Bandwidth*** = 500 MHz				

Table 17. RF Output Maximum Power (dBm), Maximum Offset Bandwidth

Center Frequency	Configuration A		Configuration B	
	Specification Maximum Level	Maximum Attainable Power, Nominal	Specification Maximum Level	Maximum Attainable Power, Nominal
30 MHz to <1.7 GHz	—	—	—	—
1.7 GHz to 4 GHz	19	25	18	25
>4 GHz to 6 GHz	20	25	17	24
>6 GHz to 8 GHz	20	23	16	23
>8 GHz to 12 GHz	17	21	15	22
>12 GHz to 18 GHz	16	21	15	20
>18 GHz to 20 GHz	16	21	13	20
>20 GHz to 22 GHz	13	18	13	19
>22 GHz to 24 GHz	6	14	8	15
>24 GHz to 25 GHz	4	12	3	10
>25 GHz to 26.5 GHz	0	6	-8	0

Specification Maximum Level defines the maximum requested power level where compression is minimal and the ***RF Output Amplitude Accuracy*** specification is valid.

Maximum Attainable Power defines the maximum realizable output power of the PXIe-5842 when the requested output power is maximized. Maximum Attainable Power is typically

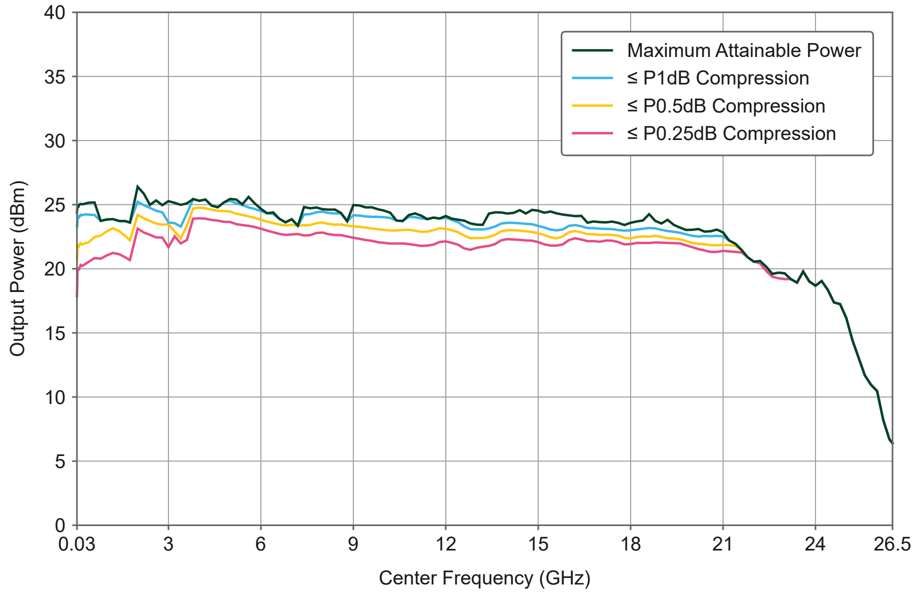
Center Frequency	Configuration A		Configuration B	
	Specification Maximum Level	Maximum Attainable Power, Nominal	Specification Maximum Level	Maximum Attainable Power, Nominal
compressed from the requested power and its level accuracy is not specified by the ***RF Output Amplitude Accuracy*** specification. Conditions: ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. Measured with a CW signal at the configured center frequency.				

Minimum output power	Noise floor, nominal
Analog gain range	85 dB, nominal
Analog attenuation resolution	1 dB, nominal
Digital attenuation resolution[4]	<0.1 dB

Figure 1. RF Output Maximum Power (Maximum Bandwidth), Measured.

4. Average output power ≥ -100 dBm

Configuration A



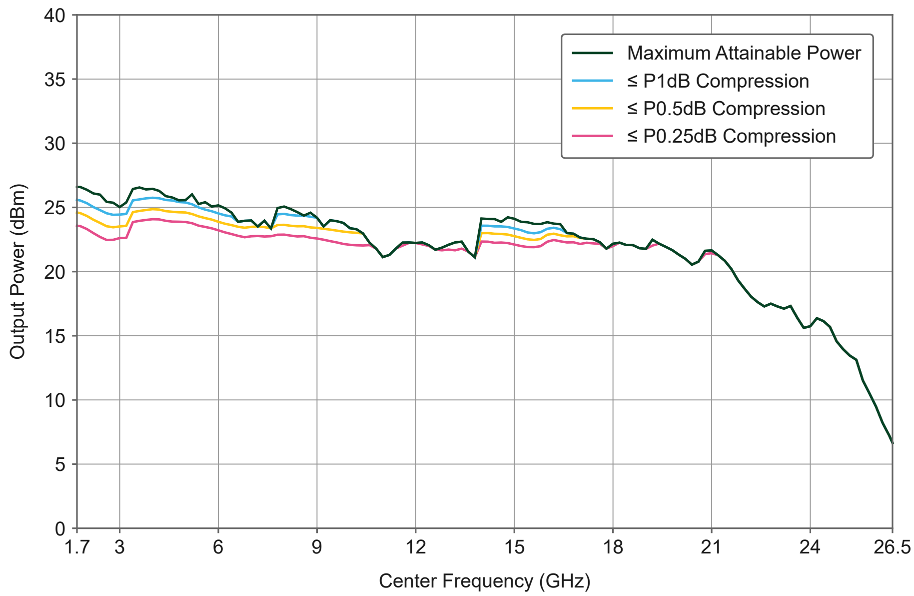
Conditions: ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***. Measured with a CW signal at the center frequency when ***Center Frequency*** < 1.75 GHz, and measured with a CW at 20 MHz offset from the center frequency when ***Center Frequency*** ≥ 1.75 GHz.

Note This figure describes PXIe-5842 performance under default conditions. If ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth*** when offset mode is Automatic, the PXIe-5842 offset mode setting automatically changes to Enabled, which provides less output power. Use the User-Defined offset mode if you want to maintain the output power shown in this table. See ***Common NI RF Terminology*** for definitions of offset mode settings; see ***Maximum Bandwidth*** in ***Equalized Bandwidth*** for more information about bandwidth.

Note Compression is calculated for each power level by comparing the expected full scale linear power from a 20 dB digital backoff against the actual full scale power without any digital backoff. Each compression metric trace in the figure represents the lowest output power where the stated compression is achieved. If the compression metric trace is equal to the maximum attainable power, then the compression metric was not achieved and the compression is less than the stated value.

Figure 1. RF Output Maximum Power (Maximum Offset Bandwidth), Measured.

Configuration A



Conditions: ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. Measured with a CW signal at the configured center frequency.

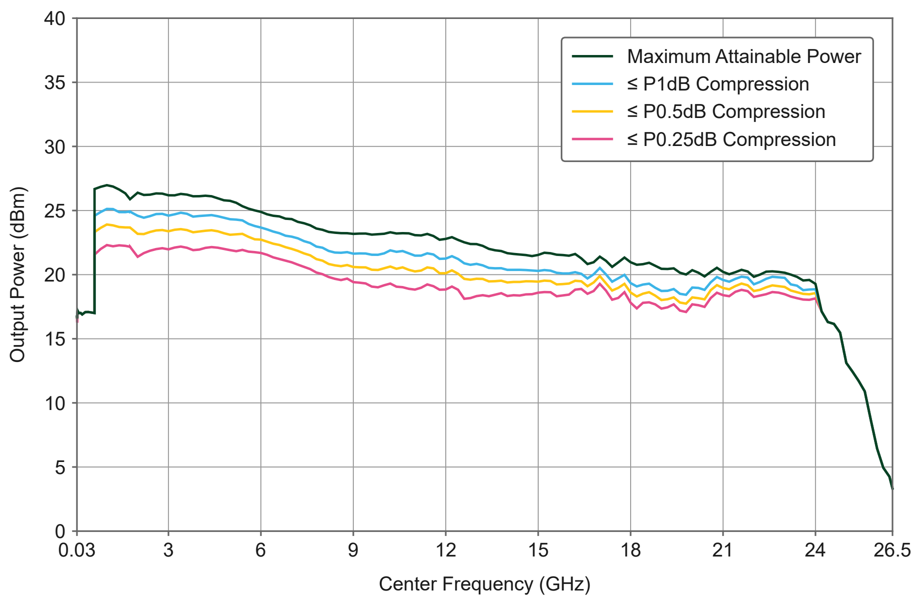
Note Measurements below 1.7 GHz are not applicable because the PXIe-5842 uses the low frequency subsystem to directly generate the RF output signal for center frequencies <1.7 GHz.

Note The default offset mode for the PXIe-5842 is Automatic. When ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***, the PXIe-5842 automatically offsets the bandwidth. See ***Common NI RF Terminology*** for more information.

Note Compression is calculated for each power level by comparing the expected full scale linear power from a 20 dB digital backoff against the actual full scale power without any digital backoff. Each compression metric trace in the figure represents the lowest output power where the stated compression is achieved. If the compression metric trace is equal to the maximum attainable power, then the compression metric was not achieved and the compression is less than the stated value.

Figure 1. RF Output Maximum Power (Maximum Bandwidth), Measured.

Configuration B



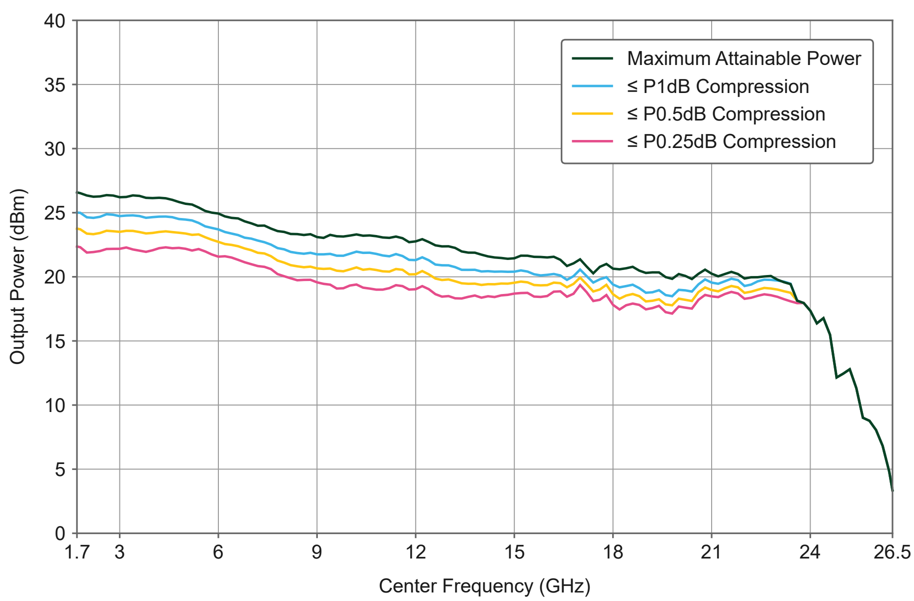
Conditions: ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***. Measured with a CW signal at the center frequency when ***Center Frequency*** < 1.75 GHz, and measured with a CW at 20 MHz offset from the center frequency when ***Center Frequency*** ≥ 1.75 GHz.

Note This figure describes PXIe-5842 performance under default conditions. If ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth*** when offset mode is Automatic, the PXIe-5842 offset mode setting automatically changes to Enabled, which provides less output power. Use the User-Defined offset mode if you want to maintain the output power shown in this table. See ***Common NI RF Terminology*** for definitions of offset mode settings; see ***Maximum Bandwidth*** in ***Equalized Bandwidth*** for more information about bandwidth.

Note Compression is calculated for each power level by comparing the expected full scale linear power from a 20 dB digital backoff against the actual full scale power without any digital backoff. Each compression metric trace in the figure represents the lowest output power where the stated compression is achieved. If the compression metric trace is equal to the maximum attainable power, then the compression metric was not achieved and the compression is less than the stated value.

Figure 1. RF Output Maximum Power (Maximum Offset Bandwidth), Measured.

Configuration B



Conditions: ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. Measured with a CW signal at the configured center frequency.

Note Measurements below 1.7 GHz are not applicable because the PXIe-5842 uses the low frequency subsystem to directly generate the RF output signal for center frequencies <1.7 GHz.

Note The default offset mode for the PXIe-5842 is Automatic. When ***Signal***

Bandwidth ≤ ***Maximum Offset Bandwidth***, the PXIe-5842 automatically offsets the bandwidth. See ***Common NI RF Terminology*** for more information.

Note Compression is calculated for each power level by comparing the expected full scale linear power from a 20 dB digital backoff against the actual full scale power without any digital backoff. Each compression metric trace in the figure represents the lowest output power where the stated compression is achieved. If the compression metric trace is equal to the maximum attainable power, then the compression metric was not achieved and the compression is less than the stated value.

RF Output Amplitude Settling Time

RF output amplitude settling time	
<0.5 dB of final value	20 µs, typical
<0.1 dB of final value	40 µs, typical

Note ***Amplitude settling time*** refers to the time it takes to switch between two analog gain states with frequency unchanged once the hardware receives the amplitude change. The additional time due to software-initiated amplitude changes is not included and varies by computer. When changing frequencies, reconfiguration time is dominated by the frequency settling. Refer to ***Frequency Settling Time*** for more information.

RF Output Amplitude Accuracy

Table 18. RF Output Absolute Amplitude Accuracy (dB)

Center Frequency	Configuration A				Configuration B			
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical
30 MHz to 200 MHz	0.95	1.10	0.60	0.50	—	—	—	2.70
>200 MHz to <1.75 GHz	0.70	0.85	0.45	0.35	1.05	1.40	0.85	0.45
1.75 GHz to 6 GHz	0.70	0.85	0.35	0.25	1.05	1.35	0.85	0.45
>6 GHz to 8 GHz	0.85	1.10	0.50	0.30	1.35 (1.15)*	1.60 (1.55)*	1.15	0.70
>8 GHz to 12 GHz	0.85	1.10	0.50	0.30	1.40 (1.05)*	2.05 (1.25)*	1.20	0.70
>12 GHz to 22 GHz	0.95	1.20	0.50	0.30	1.35 (1.20)*	1.65 (1.55)*	1.15	0.75
>22 GHz to 25 GHz	0.95	1.20	0.50	0.30	1.60	1.90	1.40	0.75
>25 GHz to 26.5 GHz	1.10	1.35	0.85	0.50	1.95	2.15	1.75	0.95

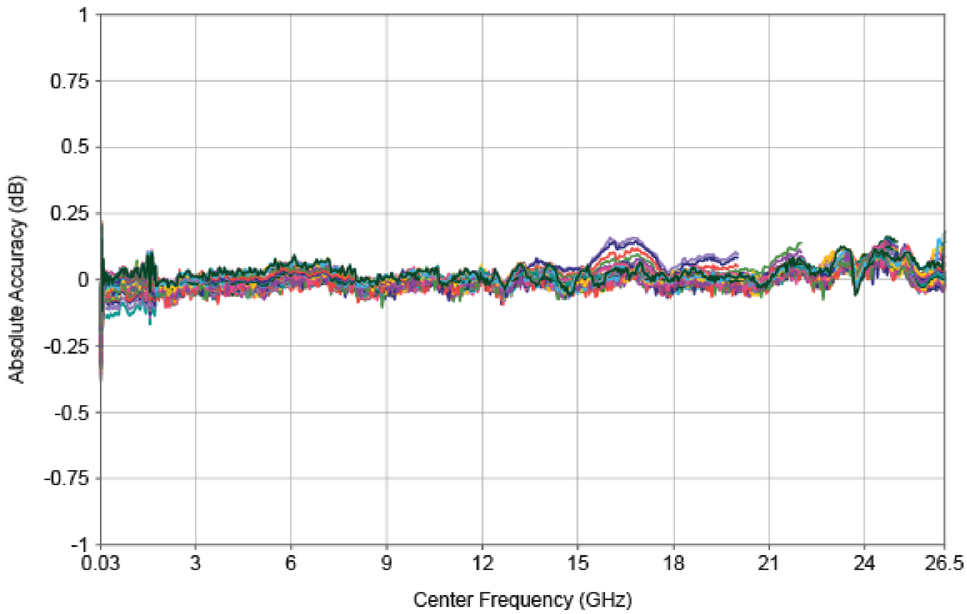
Conditions: Peak power level -30 dBm to leveled Specification Maximum Level in ***RF Output Amplitude Range***.

Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** > 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.

* : Improved accuracy is achieved when the output power remains between -20 dBm and the Specification Maximum Level at that frequency.

Figure 1. RF Output Absolute Accuracy vs. Center Frequency, Measured.

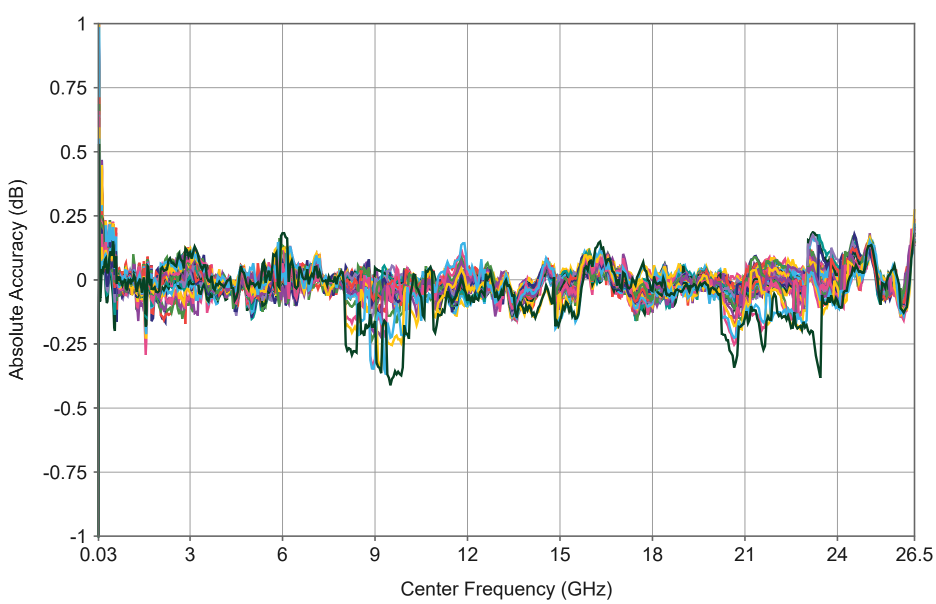
Configuration A



Conditions: Measured in 1 dB steps between -30 dBm and Specification Maximum Level.

Figure 1. RF Output Absolute Accuracy vs. Center Frequency, Measured.

Configuration B



Conditions: Measured in 1 dB steps between -30 dBm and Specification Maximum Level.

Table 19. RF Output Relative Amplitude Accuracy (dB), Typical

Center Frequency	Configuration A	Configuration B
30 MHz to 200 MHz	0.20	1.45
>200 MHz to 1.75 GHz	0.20	0.40
>1.75 GHz to 6 GHz	0.20	0.45
>6 GHz to 8 GHz	0.25	0.55 (0.50)*
>8 GHz to 12 GHz	0.25	0.70 (0.25)*
>12 GHz to 22 GHz	0.25	0.70 (0.30)*
>22 GHz to 25 GHz	0.30	0.65 (0.40)*
>25 GHz to 26.5 GHz	0.40	0.45

Relative accuracy describes the residual absolute error when compared to the absolute accuracy error at the 0 dBm peak power level settling while all other settings and conditions remain identical.

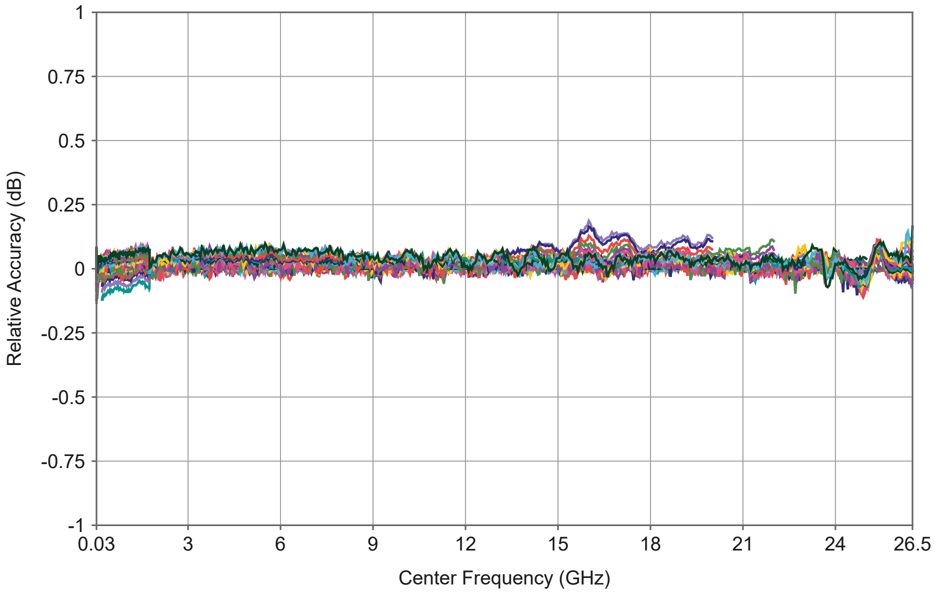
Conditions: Peak power level -30 dBm to Specification Maximum Level in ***RF Output Amplitude Range***. Normalized to absolute accuracy at the 0 dBm power level setting.

Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** > 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.

* : Improved accuracy is achieved when the output power remains between -20 dBm and Specification Maximum Level at that frequency.

Figure 1. RF Output Relative Accuracy vs. Center Frequency, Measured.

Configuration A



Conditions: Measured in 1 dB steps between -30 dBm and Specification Maximum Level. Normalized to absolute accuracy at the 0 dBm Power Level Setting.

RF Output Frequency Response

Table 20. RF Output Magnitude Response (dB)

Center Frequency	Configuration A				Configuration B			
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical
30 MHz to 200 MHz	1.10	1.20	0.85	0.70	—	—	—	3.85
>200 MHz to 1.1 GHz	0.75*	0.90*	0.45*	0.30*	1.35*	1.70*	1.15*	0.75*
>1.1 GHz to 1.75 GHz	0.75	0.90	0.45	0.30	1.10	1.20	0.90	0.70
>1.75 GHz to 8 GHz	0.65	0.75	0.40	0.20	1.00	1.35	0.75	0.40
>8 GHz to	0.65	0.70	0.40	0.20	1.00	1.45	0.70	0.40

Center Frequency	Configuration A				Configuration B			
	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical-95	Typical
12 GHz								
>12 GHz to 18 GHz	0.75	0.90	0.45	0.20	0.90	1.25	0.60	0.35
>18 GHz to 22 GHz	0.80	0.90	0.50	0.25	1.20	1.45	0.90	0.60
>22 GHz to 25 GHz	0.90	1.00	0.60	0.35	1.25	1.75	0.90	0.50
>25 GHz to 26.5 GHz	1.25	1.35	0.95	0.60	2.35	2.80	2.05	1.20

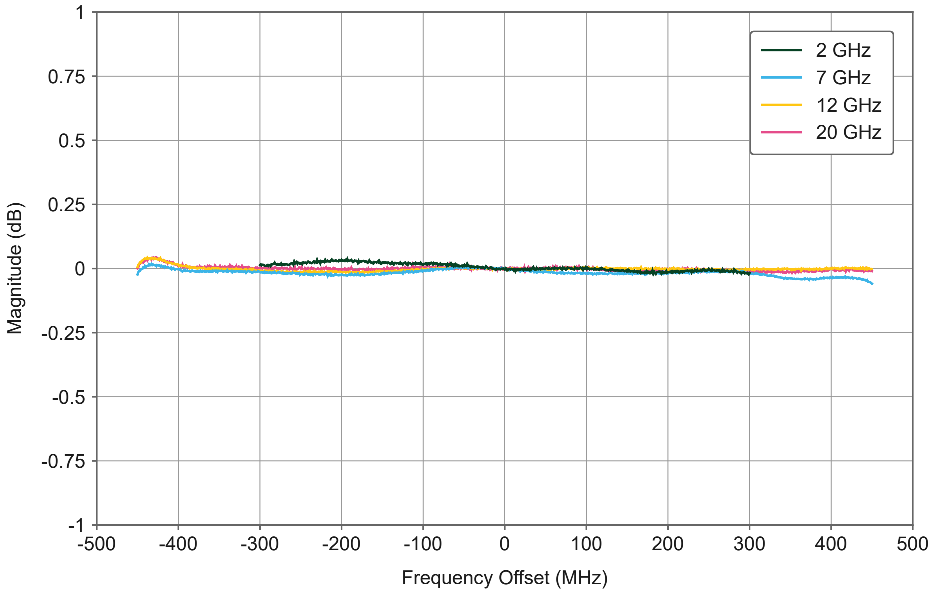
Conditions: Peak power level -30 dBm to Specification Maximum Level in ***RF Output Amplitude Range***.

Magnitude response is defined as the maximum relative amplitude deviation from the amplitude observed at the ***reference frequency***, the frequency where absolute amplitude accuracy is defined. For the absolute amplitude accuracy at the reference frequency, refer to the table in ***RF Output Amplitude Accuracy***. For the , the reference frequency is the center frequency, except when both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** > 1.75 GHz, in which case the reference frequency is 20 MHz offset from the configured center frequency.

*: Frequency offsets within the equalized bandwidth that occur below an absolute frequency of 200 MHz are excluded from the specification.

Figure 1. RF Output Magnitude Response (Maximum Offset Bandwidth), Measured.

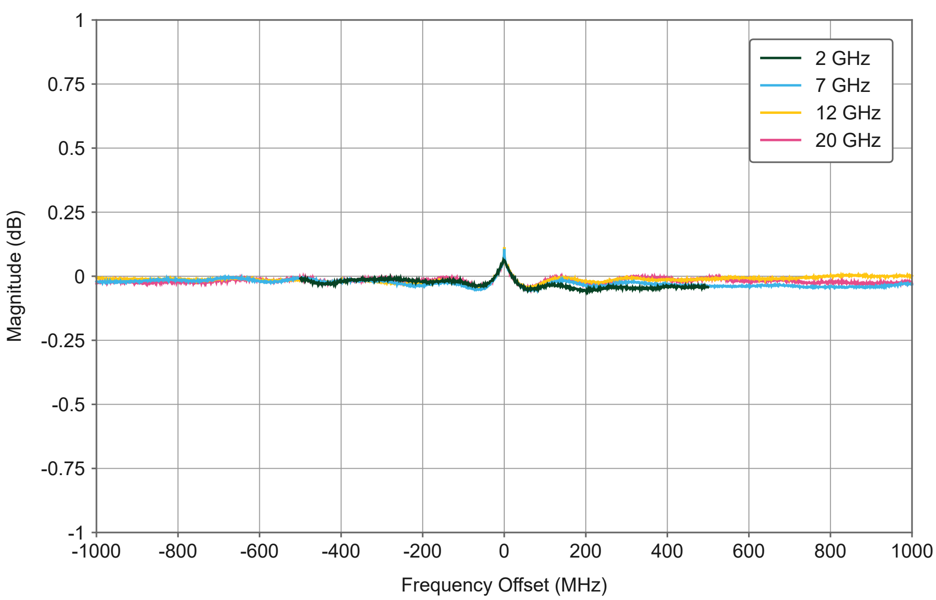
Configuration A



Conditions: 0 dBm Power Level, Normalized to 0 Hz

Figure 1. RF Output Magnitude Response (Maximum Bandwidth), Measured.

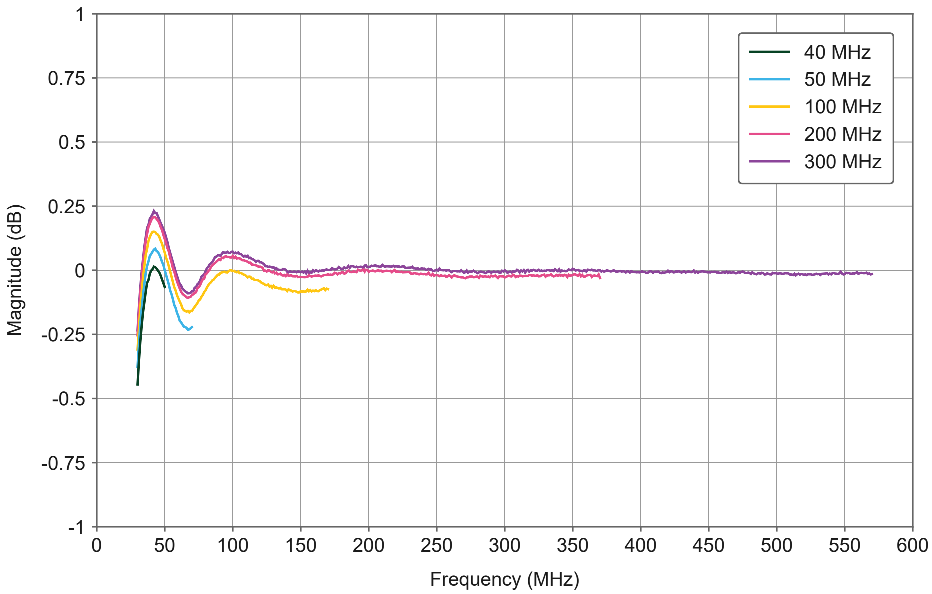
Configuration A



Conditions: 0 dBm Power Level, normalized to 20 MHz

Figure 1. RF Output Magnitude Response (Low Frequency), Measured.

Configuration A

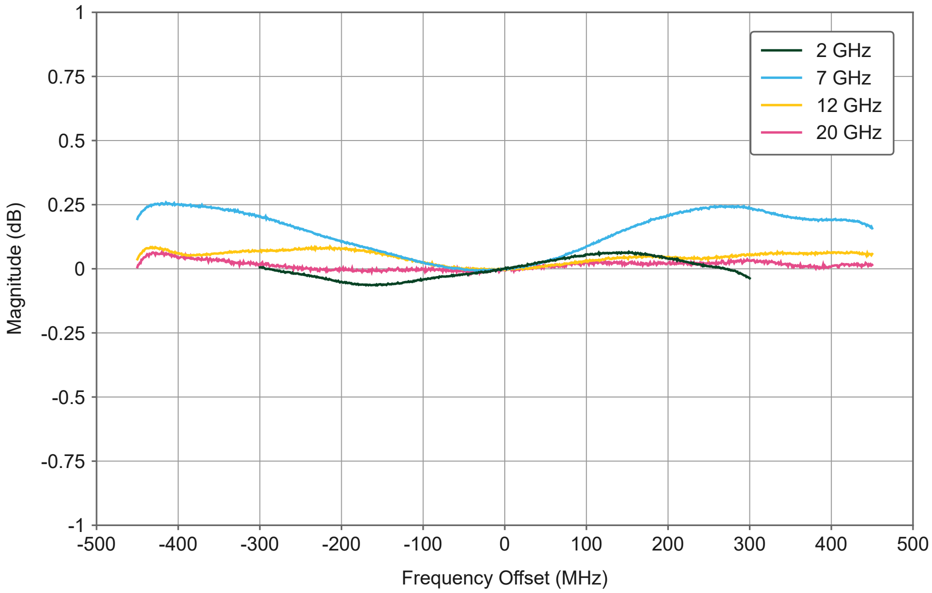


Conditions: 0 dBm Power Level, normalized to the Center Frequency.

> **Note** Frequency span corresponds to the maximum supported bandwidth for each center frequency. Refer to ***Equalized Bandwidth*** for more information on the maximum supported bandwidth.

Figure 1. RF Output Magnitude Response (Maximum Offset Bandwidth), Measured.

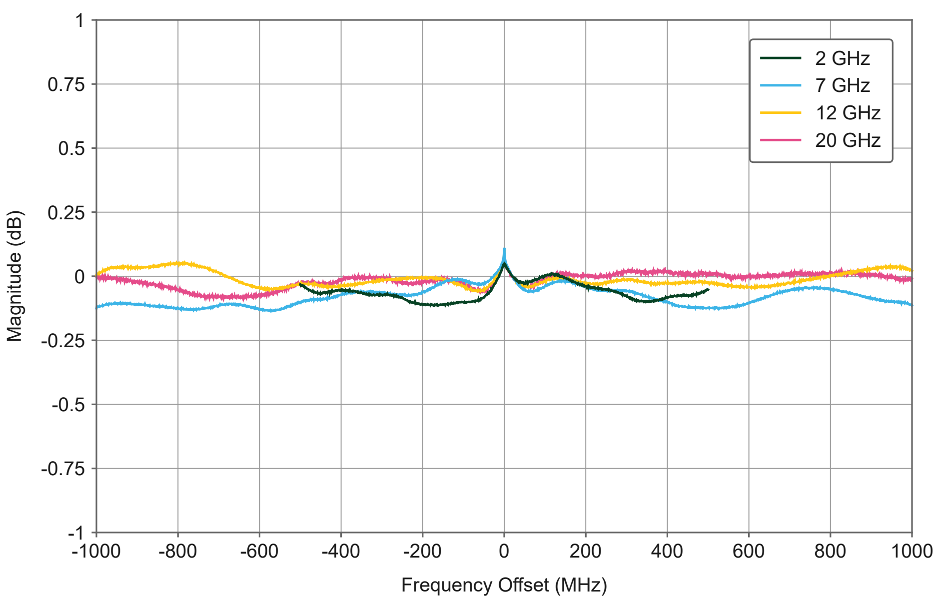
Configuration B



Conditions: 0 dBm Power Level, Normalized to 0 Hz

Figure 1. RF Output Magnitude Response (Maximum Bandwidth), Measured.

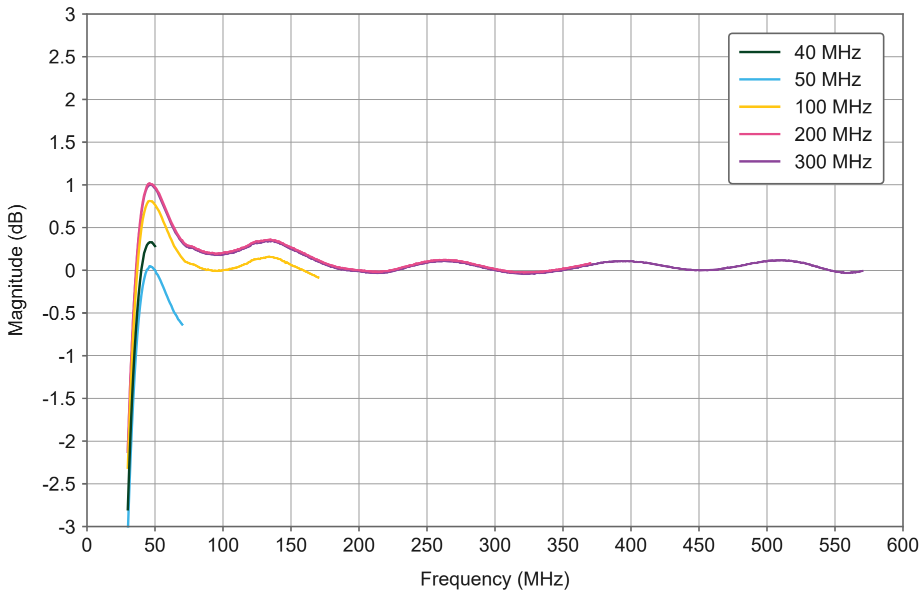
Configuration B



Conditions: 0 dBm Power Level, normalized to 20 MHz

Figure 1. RF Output Magnitude Response (Low Frequency), Measured.

Configuration B



Conditions: 0 dBm Power Level, normalized to the Center Frequency.

> **Note** Frequency span corresponds to the maximum supported bandwidth for each center frequency. Refer to ***Equalized Bandwidth*** for more information on the maximum supported bandwidth.

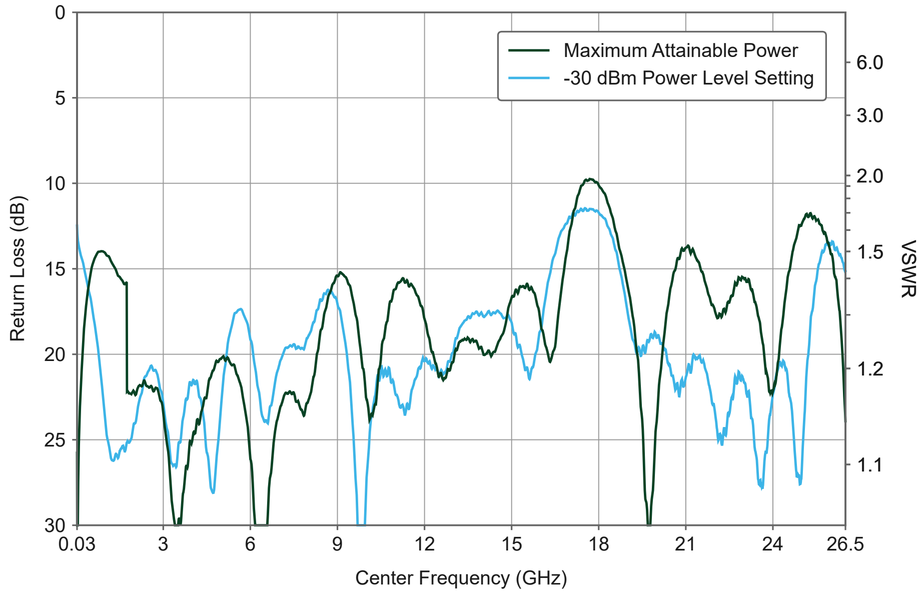
Related reference:

- Equalized Bandwidth

RF Output Return Loss

Figure 1. RF Output Return Loss, Measured.

Configuration A

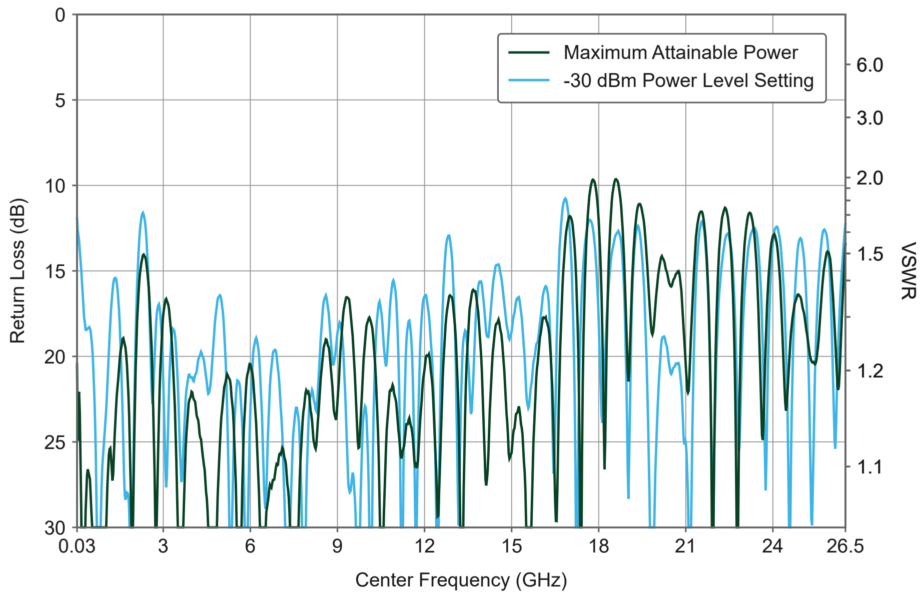


Conditions: Return loss measured at RF output center frequency.

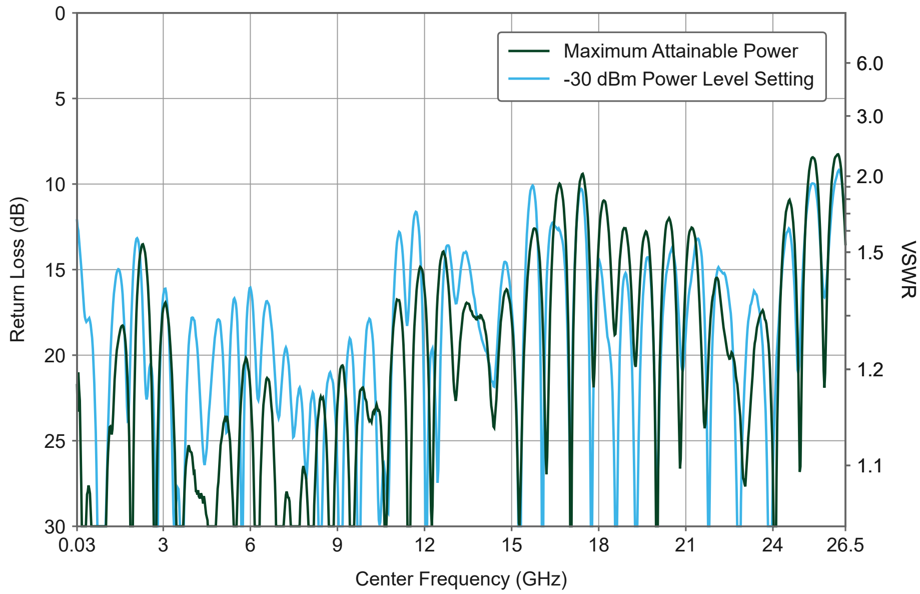
Figure 1. RF Output Return Loss, Measured.

Configuration B

PORT 1



PORT 2



Conditions: Return loss measured at RF output center frequency.

RF Output Dynamic Range Specifications

RF Output Average Noise Density

Table 21. RF Output Average Noise Power Spectral Density (dBm/Hz)

Center Frequency	Output Power	Configuration A		Configuration B	
		Warranted	Typical	Warranted	Typical
30 MHz to 600 MHz	-30 dBm	-167	-170	-152	-158
>600 MHz to 1.75 GHz		-167	-170	-165	-168
>1.75 GHz to 3.75 GHz		-166	-169	-164	-168
>3.75 GHz to 8 GHz		-166	-169	-165	-168
>8 GHz to 12 GHz		-165	-168	-164	-168
>12 GHz to 18 GHz		-162	-166	-161	-165

Center Frequency	Output Power	Configuration A		Configuration B	
		Warranted	Typical	Warranted	Typical
>18 GHz to 22 GHz		-160	-164	-160	-164
>22 GHz to 25 GHz		-158	-161	-157	-160
>25 GHz to 26.5 GHz		-156	-159	-153	-158
30 MHz to 600 MHz	0 dBm	-142	-147	-117	-126
>600 MHz to 1.75 GHz		-142	-147	-142	-147
>1.75 GHz to 3.75 GHz		-142	-146	-142	-146
>3.75 GHz to 6 GHz		-146	-149	-144	-148
>6 GHz to 8 GHz		-145	-147	-144	-148
>8 GHz to 12 GHz		-143	-146	-140	-145
>12 GHz to 18 GHz		-140	-143	-138	-142
>18 GHz to 22 GHz		-139	-142	-138	-142
>22 GHz to 25 GHz		-138	-141	-133	-138
>25 GHz to 26.5 GHz		-132	-136	—	—
30 MHz to 600 MHz	Minimum of 15 dBm and Specification Maximum Level	-128	-130	-112	-118
>600 MHz to 1.75 GHz		-128	-130	-123	-129
>1.75 GHz to 3.75 GHz		-131	-134	-125	-130

Center Frequency	Output Power	Configuration A		Configuration B	
		Warranted	Typical	Warranted	Typical
>3.75 GHz to 6 GHz		-134	-137	-128	-134
>6 GHz to 8 GHz		-130	-134	-128	-133
>8 GHz to 12 GHz		-130	-134	-127	-132
>12 GHz to 18 GHz		-129	-133	-122	-128
>18 GHz to 22 GHz		-128	-132	-124	-130
>22 GHz to 24 GHz		-130	-135	-127	-133
>24 GHz to 25 GHz		-130	-135	-130	-135

Conditions:

- Measurement configuration: power measured 20 MHz offset from the center frequency; 10 averages; normalized to a 1 Hz equivalent noise bandwidth
- Generation configuration: -40 dBr CW signal 20 MHz offset from the measurement frequency

Noise for power level setting of -30 dBm is limited by the measurement instrument.

Noise relative to output power, in dBc/Hz, is the difference between noise power density, in dBm/Hz, and the output power level in dBm. Example: the typical specification for 3.75 GHz to 6 GHz relative to 15 dBm output power is -137 dBm/Hz - 15 dBm = -152 dBc/Hz.

RF Output Third-Order Intermodulation

Table 22. RF Output Third-Order Intermodulation (IMD_3, dBc)

Center Frequency	Power Level Setting	Configuration A					
		Maximum Offset Bandwidth			Maximum Bandwidth		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
30 MHz to 3 GHz	-30 dBm	-51	-48	-55	-51	-48	-55
>3 GHz to 6 GHz		-52	-50	-56	-49	-47	-53
>6 GHz to 12 GHz		-56	-53	-61	-53	-51	-57
>12 GHz to 26.5 GHz		-49	-47	-56	-46	-44	-51
30 MHz to 3 GHz	0 dBm	-51	-49	-55	-47	-45	-56
>3 GHz to 6 GHz		-50	-47	-55	-48	-46	-53
>6 GHz to 12 GHz		-55	-53	-61	-53	-51	-57
>12 GHz to 26.5 GHz		-50	-48	-57	-47	-45	-50
30 MHz to 200 MHz	15 dBm	-45	-41	-52	-45	-41	-51
>200 MHz to 3 GHz		-48	-45	-52	-48	-44	-51
>3 GHz to 6 GHz		-50	-48	-53	-49	-45	-53
>6 GHz to 12 GHz		-46	-45	-50	-46	-45	-49
>12 GHz to 18 GHz		-40	-40	-44	-40	-38	-44

Center Frequency	Power Level Setting	Configuration A					
		Maximum Offset Bandwidth			Maximum Bandwidth		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
>18 GHz to 20 GHz		-38	-37	-42	-38	-37	-42
>20 GHz to 22 GHz	Specification Maximum Level	-39	-39	-44	-36	-36	-40
>22 GHz to 25 GHz		-49	-48	-52	-40	-39	-45

Conditions: Measured by generating two -7 dBr tones at the following offsets from the center frequency:

- ***Center Frequency*** < 1 GHz: +10 MHz and +10.7 MHz
- ***Center Frequency*** ≥ 1 GHz: +95 MHz and +105 MHz

The nominal peak envelope power is 1 dB below the output power level setting.

Maximum offset bandwidth refers to setting ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. ***Maximum bandwidth*** refers to setting ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***. The signal bandwidth corresponding to maximum bandwidth and maximum offset bandwidth varies by center frequency and is defined in ***Equalized Bandwidth***. See ***Common NI RF Terminology*** for definitions of offset mode settings.

Table 23. RF Output Third-Order Intermodulation (IMD_3, dBc)

Center Frequency	Power Level Setting	Configuration B					
		Maximum Offset Bandwidth			Maximum Bandwidth		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
30 MHz to 600 MHz	-30 dBm	—	—	—	-54	-52	-56
>600 MHz		-54	-53	-58	-44	-43	-48

Center Frequency	Power Level Setting	Configuration B					
		Maximum Offset Bandwidth			Maximum Bandwidth		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
to 3 GHz							
>3 GHz to 6 GHz		-47	-44	-52	-47	-44	-52
>6 GHz to 12 GHz		-51	-48	-56	-46	-43	-54
>12 GHz to 18 GHz		-48	-44	-56	-44	-40	-52
>18 GHz to 26.5 GHz		-46	-42	-52	-41	-37	-48
30 MHz to 600 MHz	0 dBm	—	—	—	-46	-36	-57
>600 MHz to 3 GHz		-53	-52	-57	-46	-44	-52
>3 GHz to 6 GHz		-49	-47	-53	-49	-47	-52
>6 GHz to 12 GHz		-50	-47	-54	-49	-48	-52
>12 GHz to 18 GHz		-48	-42	-53	-46	-41	-52
>18 GHz to 25 GHz		-46	-42	-51	-44	-39	-48
30 MHz to 3 GHz	15 dBm	-48	-48	-52	-42	-40	-47
>3 GHz to 6 GHz		-45	-43	-47	-45	-44	-49
>6 GHz to 12 GHz		-42	-41	-47	-41	-40	-46
>12 GHz to 18 GHz	Specification Maximum	-34	-33	-39	-37	-36	-41

Center Frequency	Power Level Setting	Configuration B					
		Maximum Offset Bandwidth			Maximum Bandwidth		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
>18 GHz to 20 GHz	Level	-36	-35	-41	-36	-35	-41
>20 GHz to 22 GHz		-35	-34	-39	-35	-34	-39
>22 GHz to 24 GHz		-42	-38	-47	-35	-34	-41
>24 GHz to 26.5 GHz		-42	-38	-47	-38	-34	-41

Conditions: Measured by generating two -7 dBr tones at the following offsets from the center frequency:

- ***Center Frequency*** < 1 GHz: +10 MHz and +10.7 MHz
- ***Center Frequency*** ≥ 1 GHz: +95 MHz and +105 MHz

The nominal peak envelope power is 1 dB below the output power level setting.

Maximum offset bandwidth refers to setting ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***. ***Maximum bandwidth*** refers to setting ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***. The signal bandwidth corresponding to maximum bandwidth and maximum offset bandwidth varies by center frequency and is defined in ***Equalized Bandwidth***. See ***Common NI RF Terminology*** for definitions of offset mode settings.

Related reference:

- Equalized Bandwidth
- Common NI RF Terminology

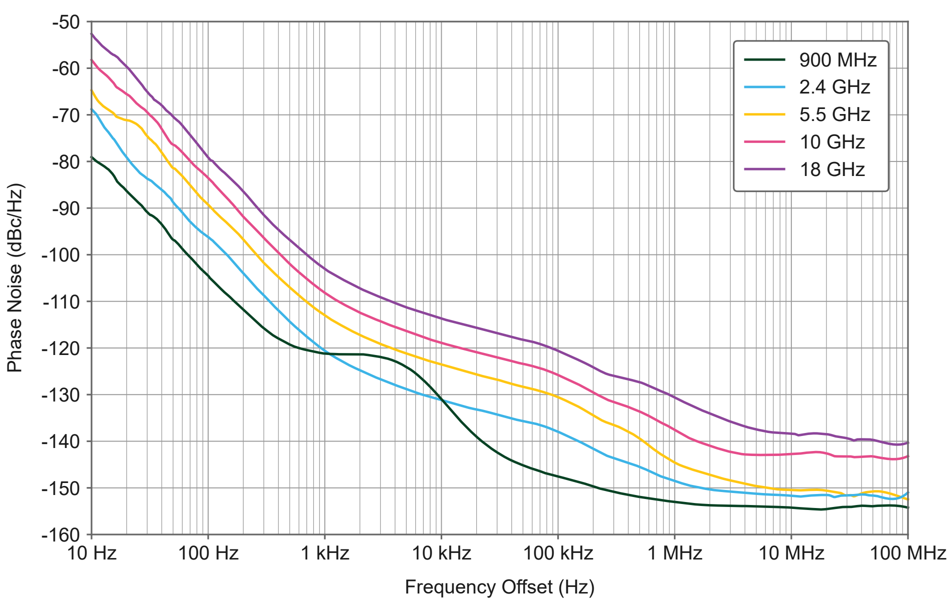
RF Output Phase Noise

Table 24. RF Output Phase Noise (dBc/Hz), Typical

Center Frequency	Frequency Offset					
	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
900 MHz	-102	-118	-129	-140	-145	-146
2.4 GHz	-93	-117	-127	-134	-143	-144
5.5 GHz	-86	-111	-121	-128	-140	-142
10 GHz	-81	-107	-117	-124	-136	-140
18 GHz	-75	-102	-112	-119	-131	-136
Condition: 0 dBm Power Level setting						

Figure 1. RF Output Phase Noise, Measured.

Configuration A



Measured data post-processed using Savitzky-Golay filter.

Conditions: 0 dBm Power Level Setting.

RF Output Non-Harmonic Spurs

Table 25. RF Output Non-Harmonic Spurs (dBc), Typical

Configuration A

Center Frequency	Maximum Offset Bandwidth			Maximum Bandwidth		
	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz
30 MHz to <1.75 GHz	—	—	—	-81	-81	-60
≥1.75 GHz to 3 GHz	-82	-78	-76	-82	-80	-64
>3 GHz to 6 GHz	-79	-78	-72	-81	-78	-51
>6 GHz to 8 GHz	-78	-76	-70	-78	-77	-53
>8 GHz to 12 GHz	-75	-75	-67	-76	-72	-52
>12 GHz to 18 GHz	-73	-69	-62	-73	-69	-49
>18 GHz to 22 GHz	-71	-67	-59	-71	-70	-58
>22 GHz to 25 GHz	-69	-69	-62	-69	-69	-57
>25 GHz to 26.5 GHz	-68	-68	-61	-68	-68	-59

Non-harmonic spurs exclude RF harmonic spurs, residual LO, and residual sideband image.

Conditions: Generation CW signal level 0 dBm; measured relative to the CW output signal.

Measured with a CW signal at the center frequency unless both ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** and ***Center Frequency*** ≥ 1.75 GHz, in which case measured at 20 MHz offset from the center frequency.

Center Frequency	Maximum Offset Bandwidth			Maximum Bandwidth		
	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz	10 kHz ≤ ***Offset*** < 100 kHz	100 kHz ≤ ***Offset*** < 1 MHz	***Offset*** ≥ 1 MHz

For ***Offset*** ≥ 1 MHz, the maximum offset is limited to within the equalized bandwidth of the referenced center frequency.

Offset refers to ± desired signal offset (Hz) around the tone frequency.

Maximum Offset Bandwidth refers to setting ***Signal Bandwidth*** ≤ ***Maximum Offset Bandwidth***; ***Maximum Bandwidth*** refers to setting ***Signal Bandwidth*** > ***Maximum Offset Bandwidth***; the signal bandwidth corresponding to ***Maximum Bandwidth*** and ***Maximum Offset Bandwidth*** varies by center frequency and is defined by the values in ***Equalized Bandwidth***. See for definitions of offset mode settings.

Related reference:

- Equalized Bandwidth
- Common NI RF Terminology

RF Output Harmonic Spurs

Table 26. RF Output Harmonic Spurs (dBc)

Center Frequency	Digital Gain Backoff	Configuration A			Configuration B		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
30 MHz to 1.75 GHz	0 dB	-35	-30	-43	-33	-29	-38
>1.75 GHz to 2.3 GHz		-40	-31	-48	-31	-30	-37
>2.3 GHz to 3 GHz		-33 (-40)*	-30 (-36)*	-38 (-45)*	-28 (-36)*	-27 (-35)*	-35 (-42)*
>3 GHz to 6 GHz		-39	-36	-44	-27	-23	-33

Center Frequency	Digital Gain Backoff	Configuration A			Configuration B		
		Warranted 23 °C ± 5 °C	Warranted	Typical	Warranted 23 °C ± 5 °C	Warranted	Typical
>6 GHz to 8 GHz		-37	-35	-42	-31	-28	-36
>8 GHz to 13.25 GHz		-34	-32	-38	-30	-29	-35
30 MHz to 1.75 GHz	12 dB	-45	-40	-52	-40	-39	-47
>1.75 GHz to 2.3 GHz		-52	-43	-60	-43	-42	-49
>2.3 GHz to 3 GHz		-45 (-53)*	-42 (-48)*	-51 (-57)*	-40 (-47)*	-40 (-46)*	-47 (-53)*
>3 GHz to 6 GHz		-52	-48	-57	-40	-37	-46
>6 GHz to 8 GHz		-49	-47	-54	-44	-41	-48
>8 GHz to 13.25 GHz		-46	-44	-50	-43	-41	-47

Conditions: Power level setting 0 dBm; measured with CW signal at 20 MHz offset from the center frequency. Includes CW and LO harmonic content up to 26.5 GHz.

*: Improved harmonic suppression is achieved when ***Signal Bandwidth*** > ***Maximum Offset Bandwidth*** as defined in ***Equalized Bandwidth***.

Related reference:

- Equalized Bandwidth

RF Output LO Residual Power

Table 27. RF Output LO Residual Power (dBr), Typical

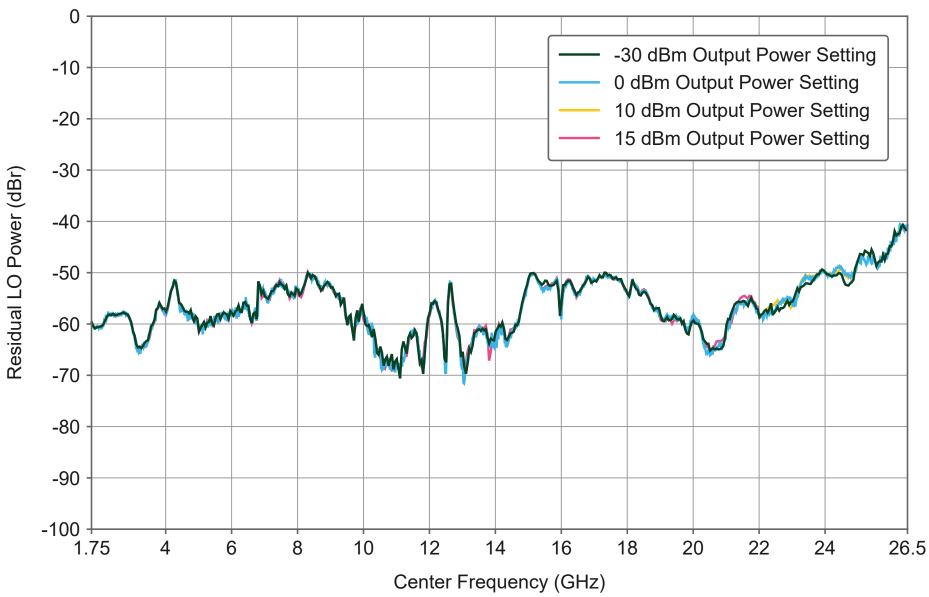
Center Frequency	Digital Gain Backoff	Configuration A	Configuration B
>1.75 GHz to 3 GHz	0 dB	-55	-54
>3 GHz to 6 GHz		-49	-48
>6 GHz to 8 GHz		-46	-45
>8 GHz to 10 GHz		-46	-46
>10 GHz to 12 GHz		-45	-43
>12 GHz to 14 GHz		-39	-37
>14 GHz to 18 GHz		-39	-37
>18 GHz to 23 GHz		-37	-38
>23 GHz to 25 GHz		-40	-35
>25 GHz to 26.5 GHz		-32	-28
>1.75 GHz to 3 GHz	12 dB	-59	-58
>3 GHz to 6 GHz		-57	-57
>6 GHz to 8 GHz		-52	-52
>8 GHz to 10 GHz		-53	-53
>10 GHz to 12 GHz		-49	-45
>12 GHz to 14 GHz		-38	-36
>14 GHz to 18 GHz		-38	-37
>18 GHz to 23 GHz		-39	-39
>23 GHz to 25 GHz		-39	-35
>25 GHz to 26.5 GHz		-32	-28

Conditions: Peak power level -30 dBm to Specification Maximum Level in ***RF Output Amplitude Range***; maximum LO residual power when generating a CW signal anywhere within the full instrument bandwidth. A digital backoff of 12 dB is representative of the residual LO power performance for many wideband communications signals with a PAPR of approximately 12 dB.

Center Frequency	Digital Gain Backoff	Configuration A	Configuration B
The PXIe-5842 uses the low frequency subsystem to directly generate the RF output signal for center frequencies ≤1.75 GHz.			

Figure 31. RF Output LO Residual Power (0 dB Digital Gain Backoff), Measured.

Configuration A

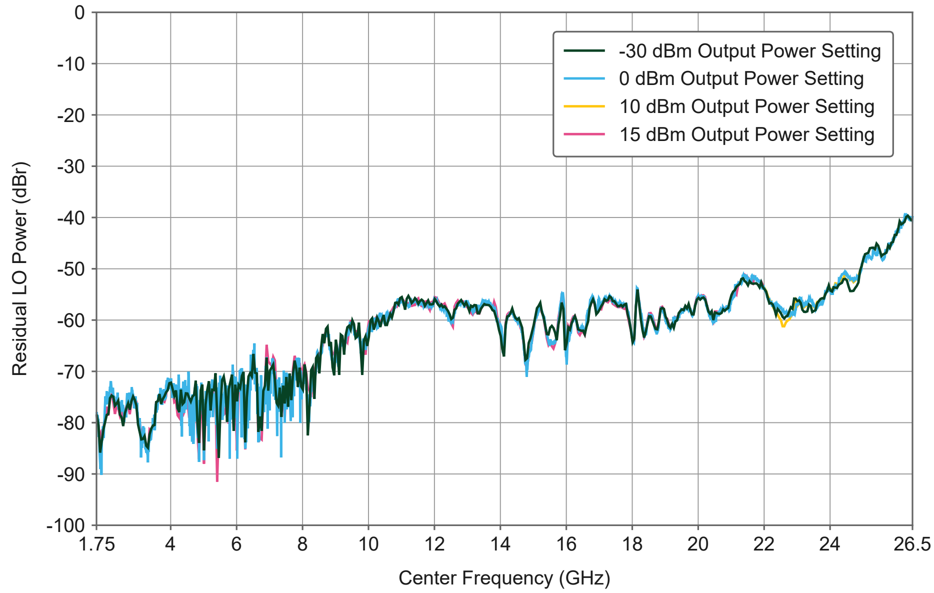


Conditions: Measured by sweeping a 0 dBr CW signal across the bandwidth and calculating the maximum residual LO power.

> **Note** Measurements below 1.75 GHz are not applicable because the PXIe-5842 uses the low frequency subsystem to directly generate the RF output signal for center frequencies <1.75 GHz.

Figure 32. RF Output LO Residual Power (12 dB Digital Gain Backoff), Measured.

Configuration A



Conditions: Measured by sweeping a -12 dBr CW signal across the bandwidth and calculating the maximum residual LO bandwidth. A digital backoff of 12 dB is representative of the residual LO power performance for many wideband communications signals with a PAPR around 12 dB.

Note Measurements below 1.75 GHz are not applicable because the PXIe-5842 uses the low frequency subsystem to directly generate the RF output signal for center frequencies <1.75 GHz.

Related information:

- Output Amplitude Range (5842)

RF Output Residual Sideband Image

Table 28. RF Output Residual Sideband Image (dBc), Typical

Center Frequency	Digital Gain Backoff	Configuration A	Configuration B
>1.75 GHz to 3 GHz	0 dB	-57	-55
>3 GHz to 6 GHz		-45	-44
>6 GHz to 8 GHz		-43	-41

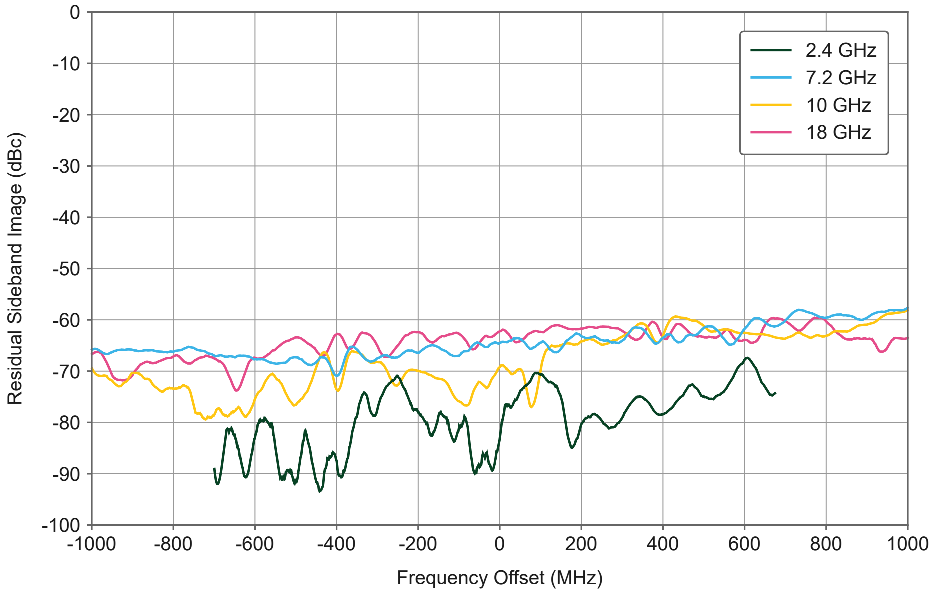
Center Frequency	Digital Gain Backoff	Configuration A	Configuration B
>8 GHz to 10 GHz		-41	-40
>10 GHz to 12 GHz		-48	-47
>12 GHz to 14 GHz		-36	-34
>14 GHz to 18 GHz		-51	-49
>18 GHz to 23 GHz		-50	-50
>23 GHz to 25 GHz		-48	-44
>25 GHz to 26.5 GHz		-38	-33
>1.75 GHz to 3 GHz	12 dB	-59	-57
>3 GHz to 6 GHz		-54	-50
>6 GHz to 8 GHz		-44	-43
>8 GHz to 10 GHz		-43	-42
>10 GHz to 12 GHz		-49	-49
>12 GHz to 14 GHz		-48	-46
>14 GHz to 18 GHz		-48	-49
>18 GHz to 23 GHz		-50	-49
>23 GHz to 25 GHz		-51	-46
>25 GHz to 26.5 GHz		-43	-38

Conditions: Peak power level -30 dBm to Specification Maximum Level in ***RF Output Amplitude Range***; maximum residual sideband image when generating a CW signal anywhere within the full instrument bandwidth. A digital backoff of 12 dB is representative of the sideband image performance for many wideband communications signals with a PAPR of approximately 12 dB.

The uses the low frequency subsystem to directly generate the RF output signal for center frequencies <1.75 GHz.

Figure 1. RF Output Residual Sideband Image, (0 dB Digital Gain Backoff), Measured.

Configuration A

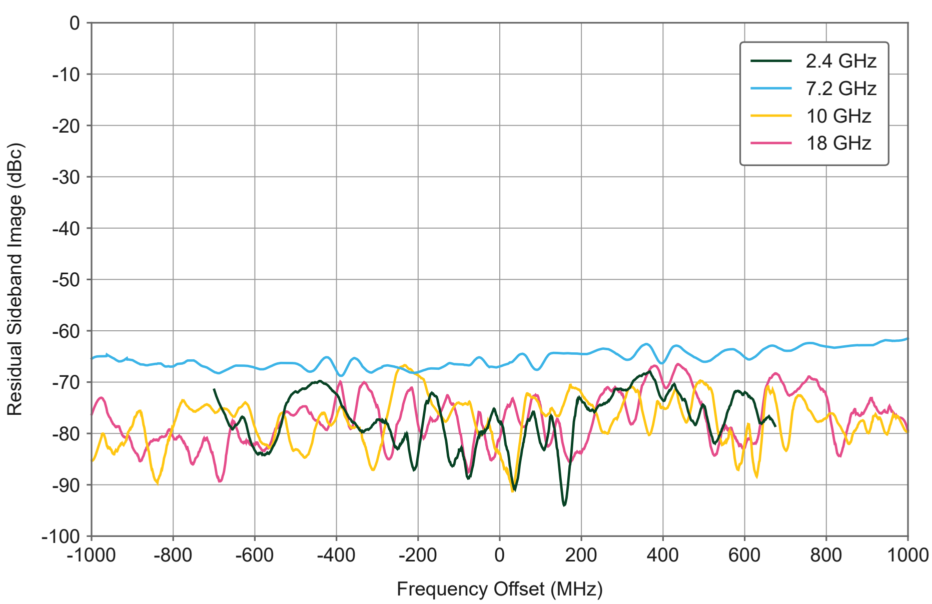


Conditions: 0 dBm Reference Level

Measured data post-processed using Savizky-Golay filter.

Figure 34. RF Output Residual Sideband Image, (12 dB Digital Gain Backoff).

Configuration A



Conditions: 0 dBm Reference Level

Measured data post-processed using Savitzky-Golay filter.

Related information:

- Output Amplitude Range (5842)

Pulse Modulation Specifications

Pulse Modulation Specifications

On/Off Ratio

Table 29. RF Output Pulse Modulation On/Off Ratio (dB) by Pulse Modulation Mode, Typical

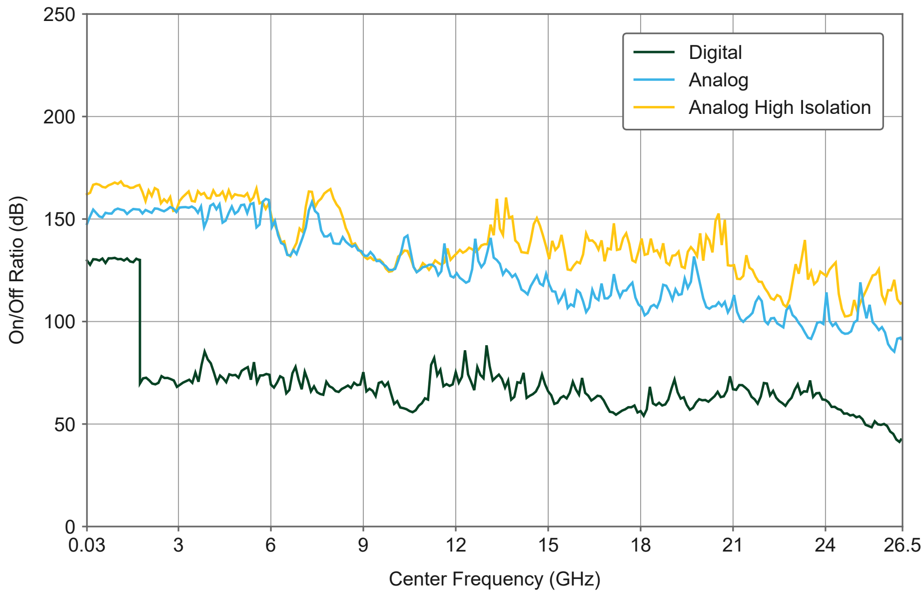
Center Frequency	Configuration A			Configuration B		
	Digital*	Analog	Analog High Isolation	Digital*	Analog	Analog High Isolation
30 MHz to <1.75 GHz	126	146	159	107	115	116
≥1.75 GHz to 8 GHz	—	117	121	—	116	119
>8 GHz to 12 GHz	—	113	116	—	92	94
>12 GHz to 18 GHz	—	101	112	—	88	106
>18 GHz to 22 GHz	—	89	108	—	88	106
>22 GHz to 26.5 GHz	—	81	97	—	73	67

Conditions: Power level for the on condition is the maximum specified power level.

* : For unspecified entries, see the table in ***RF Output LO Residual Power***.

Figure 1. On/Off Ratio from 30 MHz to 26.5 GHz, Measured.

Configuration A



Conditions: On/off ratio from 30 MHz to 26.5 GHz. Power level for each frequency point set to the maximum specified output power.

Related reference:

- RF Output LO Residual Power

PULSE: IN to RF OUT Latency

Table 58. PULSE: IN to RF OUT Latency, Measured

Configuration A

Pulse Modulation Mode	Latency
Digital	122 ns
Analog	122 ns
Analog High Isolation	2.72 µs
Conditions: Measured with a CW signal running at 200 MHz; Pulse Modulation Source: PulseIn; Pulse	

Pulse Modulation Mode	Latency
in width: 5 µs; Pulse in duty cycle: 10%.	

Rise/Fall Time

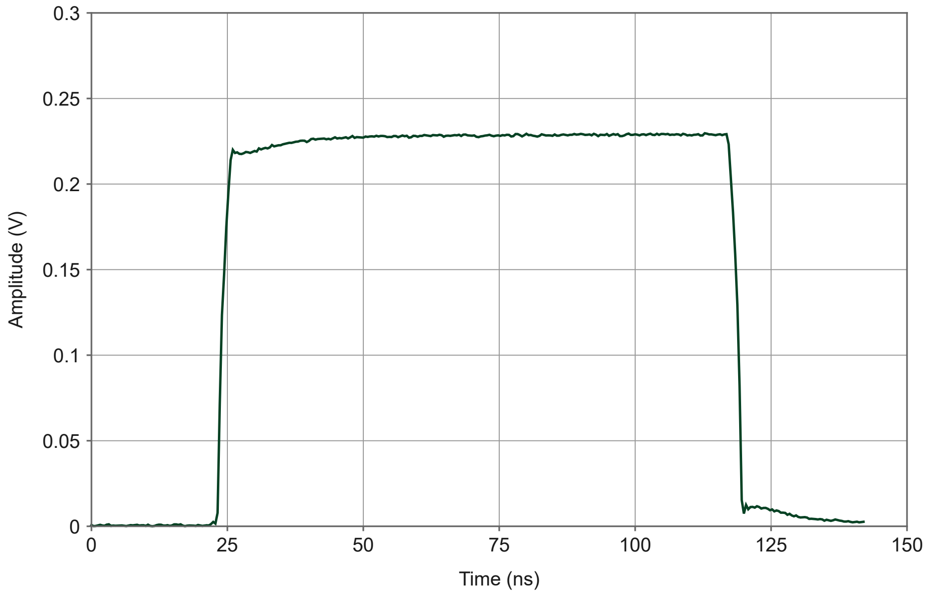
Table 31. RF Output Pulse Modulation Rise/Fall Time (ns), Measured

Configuration A

Center Frequency	Pulse Modulation Mode					
	Digital		Analog		Analog High Isolation	
	Rise	Fall	Rise	Fall	Rise	Fall
1 GHz	2.07	1.99	1.83	2.29	2.11	2.56
10 GHz	2.17	2.03	2.26	1.42	2.21	2.41
20 GHz	2.25	2.04	2.27	1.44	2.31	1.45
Conditions: Measured with a CW signal at the configured center frequency at 5 dBm; measured from 10% to 90% of RF amplitude.						

Figure 1. RF Output Pulse Modulation Pulse Shape, Digital, Measured

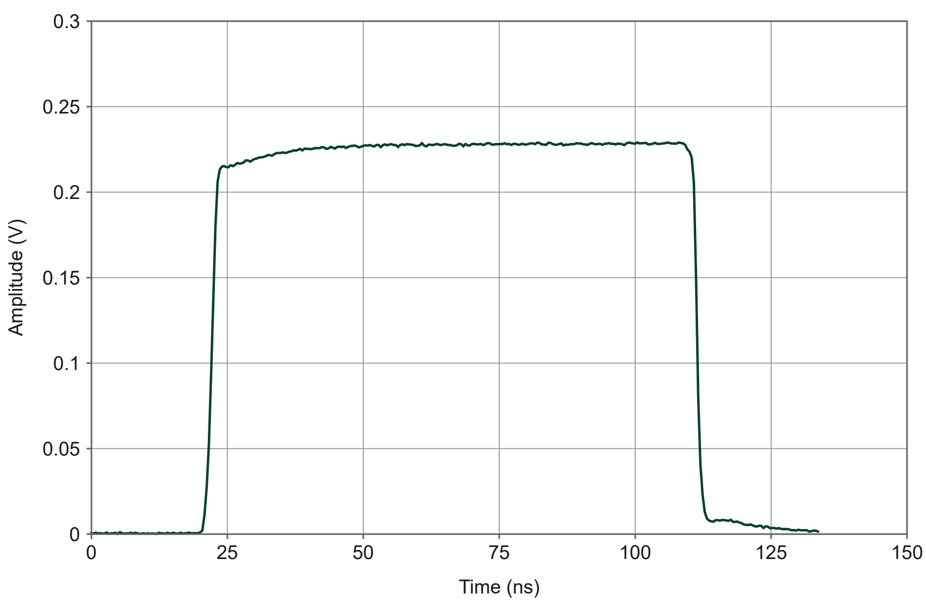
Configuration A



Conditions: Measured with a CW signal at 10 GHz. Pulse width 100 ns; 10% duty cycle; Pulse Modulation Source: PulseIn; Pulse Modulation Mode: Digital.

Figure 1. RF Output Pulse Modulation Pulse Shape, Analog, Measured

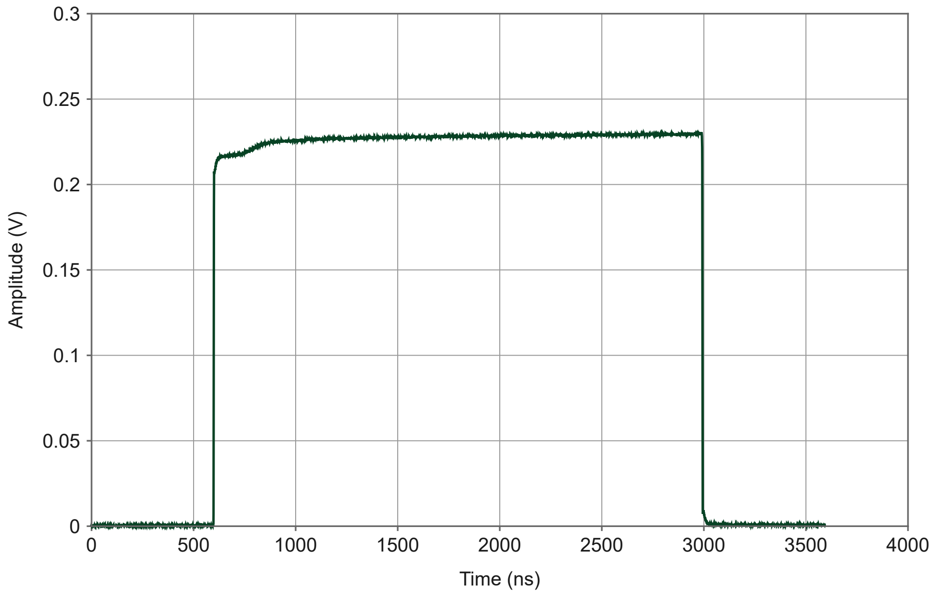
Configuration A



Conditions: Measured with a CW signal at 10 GHz. Pulse width 100 ns; 10% duty cycle; Pulse Modulation Source: PulseIn; Pulse Modulation Mode: Analog.

Figure 1. RF Output Pulse Modulation Pulse Shape, Analog High Isolation, Measured

Configuration A



Conditions: Measured with a CW signal at 10 GHz. Pulse width 5 µs; 10% duty cycle; Pulse Modulation Source: PulseIn; Pulse Modulation Mode: Analog High Isolation.

Minimum Pulse Width

Table 32. RF Output Pulse Modulation Minimum Pulse Width, Nominal

Configuration A

Pulse Modulation Mode	Minimum Pulse Width
Digital	18 ns
Analog	18 ns
Analog High Isolation	2.65 µs
Conditions: For ***Frequency*** > 200 MHz; measured with a 10% duty cycle.	

Minimum Pulse Intervals

Table 33. RF Output Pulse Modulation Minimum Pulse Interval, Nominal

Configuration A

Pulse Modulation Mode	Minimum Pulse Interval
Digital	140 ns
Analog	140 ns
Analog High Isolation	2.8 µs
Conditions: Measured at the minimum pulse width specified in ***Minimum Pulse Width***.	

Overshoot

Table 34. RF Output Pulse Modulation Overshoot (%), Typical

Center Frequency	Configuration A			Configuration B		
	Digital	Analog	Analog High Isolation	Digital	Analog	Analog High Isolation
400 MHz to <650 MHz	5.05	3.95	1.05	—	—	—
≥650 MHz to <1.75 GHz	5.05	3.95	1.05	5.74	5.58	2.67
≥1.75 GHz to 8 GHz	1.85	1.95	1.55	2.46	2.61	2.21
>8 GHz to 12 GHz	1.60	1.70	1.20	2.26	2.36	2.18
>12 GHz to 20 GHz	1.90	1.85	1.50	3.37	2.84	2.97
>20 GHz to 22 GHz	1.75	1.80	1.35	3.14	3.11	2.71
>22 GHz to 26.5 GHz	2.35	2.20	2.10	—	—	—

Center Frequency	Configuration A			Configuration B		
	Digital	Analog	Analog High Isolation	Digital	Analog	Analog High Isolation
Conditions: Measured with a CW signal at the configured center frequency at RF Output Maximum Power specification in ***RF Output Amplitude Range***.						

Related information:

- Output Amplitude Range (5842)

Modulation Quality Specifications

WLAN Modulation Quality

Table 35. WLAN EVM (dB), Measured

Center Frequency	Configuration A			Configuration B		
	80 MHz 802.11ax*	160 MHz 802.11be†	320 MHz 802.11be‡	80 MHz 802.11ax*	160 MHz 802.11be†	320 MHz 802.11be‡
5.180 GHz	-56.6	-54.6	-52.5	-53.2	-51.7	-49.2
5.925 GHz	-56.9	-55.4	-52.7	-53.7	-52.5	-49.5
7.125 GHz	-56.1	-54.6	-51.6	-53.4	-51.9	-49.5
Conditions: RF OUT loopback to RF IN (Configuration A), PORT 2 loopback to PORT 1 (Configuration B); 16 OFDM data symbols; 20 packet averages; channel destination type: Ch Estimation Ref (Preamble and Pilots); Average Power Level = -10 dBm; ***Reference Level*** = ***Average Power Level*** + ***Waveform PAPR***; RF OUT Digital Gain Servo technique (increase RF OUT Digital Gain until DSP overflow reported) applied; ModAcc Auto Level: Enabled; Noise Compensation: Enabled (Configuration A), Noise Compensation: Disabled (Configuration B); Reference Level headroom: 1 dB (default)						
* Waveform PAPR: 9.95 dB; MCS index: 11 † Waveform PAPR: 11.41 dB; MCS index: 13						

Center Frequency	Configuration A			Configuration B		
	80 MHz 802.11ax*	160 MHz 802.11be†	320 MHz 802.11be‡	80 MHz 802.11ax*	160 MHz 802.11be†	320 MHz 802.11be‡
‡ Waveform PAPR: 12.01 dB; MCS index: 13						

Cellular Modulation Quality: 5G NR FR1

Table 36. 5G NR FR1 (dB), Measured

Center Frequency	Configuration A			Configuration B		
	1 CC × 100 MHz*	2 CC × 100 MHz†	4 CC × 100 MHz‡	1 CC × 100 MHz*	2 CC × 100 MHz†	4 CC × 100 MHz‡
4 GHz	-57.9	-56.1	-53.9	-54.5	-52.2	-50.1
5 GHz	-58.3	-56.4	-54.6	-55.1	-53.1	-50.8

Conditions: NR downlink, FDD, FR1, 256-QAM, fully filled resource blocks; RF OUT loopback to RF IN; Average Power Level = -10 dBm; ***Reference Level*** = ***Average Power Level*** + ***Waveform PAPR***; ModAcc Auto Level: Enabled; RF OUT digital gain servo technique (increase RF OUT digital gain until DSP overflow reported) applied; 2 slots analyzed; 1 packet averages; Noise Compensation: Enabled (Configuration A), Noise Compensation: Disabled (Configuration B); Reference Level headroom: 1 dB (default)

* 1 × 100 MHz carrier: 30 kHz subcarrier spacing, 11.62 dB PAPR

† 2 × 100 MHz carrier: 30 kHz subcarrier spacing, 11.87 dB PAPR, CC 0 and 1 averaged

‡ 4 × 100 MHz carrier: 30 kHz subcarrier spacing; 12.29 dB PAPR; CC 0, 1, 2, and 3 averaged

Cellular Modulation Quality: 5G NR FR2 at IF Frequencies

Table 37. 5G NR FR2 at IF Frequencies (dB), Measured

Configuration A

Center Frequency	1 CC × 100 MHz*	2 CC × 100 MHz†	1 CC × 400 MHz‡	2 CC × 400 MHz**	4 CC × 400 MHz††
5.801 GHz	-58.8	-57.4	-55.2	-53.0	-48.8
10 GHz	-57.3	-55.9	-53.3	-51.8	-48.3
18 GHz	-52.4	-50.5	-48.6	-46.9	-46.2
Conditions: NR downlink, FDD, FR2, 256-QAM, fully filled resource blocks; RF OUT loopback to RF IN; Average Power Level = -10 dBm; ***Reference Level*** = ***Average Power Level*** + ***Waveform PAPR***; 2 slots analyzed; 1 packet averages; ModAcc Auto Level: Enabled; RF OUT digital gain servo technique (increase RF OUT digital gain until DSP overflow reported) applied; Noise Compensation: Enabled; Reference Level headroom: 1 dB (default)					
* 1 × 100 MHz carrier: 120 kHz subcarrier spacing, 11.04 dB PAPR † 2 × 100 MHz carrier: 120 kHz subcarrier spacing, 11.56 dB PAPR; CC 0 and 1 averaged ‡ 1 × 400 MHz carrier: 120 kHz subcarrier spacing, 11.87 dB PAPR ** 2 × 400 MHz carriers: 120 kHz subcarrier spacing, 11.80 dB PAPR; CC 0 and 1 averaged †† 4 × 400 MHz carriers: 120 kHz subcarrier spacing, 12.76 dB PAPR; CC 0, 1, 2, and 3 averaged					

Table 38. 5G NR FR2 at IF Frequencies (dB), Measured

Configuration B

Center Frequency	1 CC × 100 MHz*	2 CC × 100 MHz†	1 CC × 400 MHz‡	2 CC × 400 MHz**	4 CC × 400 MHz††
5.801 GHz	-56.5	-54.2	-52.0	-49.5	-45.1
10 GHz	-53.9	-51.8	-49.7	-47.9	-44.2

Center Frequency	1 CC × 100 MHz*	2 CC × 100 MHz†	1 CC × 400 MHz‡	2 CC × 400 MHz**	4 CC × 400 MHz††
18 GHz	-50.4	-48.3	-46.5	-44.5	-42.3

Conditions: NR downlink, FDD, FR2, 256-QAM, fully filled resource blocks; RF OUT loopback to RF IN; Average Power Level = -10 dBm; ***Reference Level*** = ***Average Power Level*** + ***Waveform PAPR***; 2 slots analyzed; 1 packet averages; ModAcc Auto Level: Enabled; RF OUT digital gain servo technique (increase RF OUT digital gain until DSP overflow reported) applied; Reference Level headroom: 1 dB (default)

* 1 × 100 MHz carrier: 120 kHz subcarrier spacing, 11.04 dB PAPR

† 2 × 100 MHz carrier: 120 kHz subcarrier spacing, 11.56 dB PAPR; CC 0 and 1 averaged

‡ 1 × 400 MHz carrier: 120 kHz subcarrier spacing, 11.87 dB PAPR

** 2 × 400 MHz carriers: 120 kHz subcarrier spacing, 11.80 dB PAPR; CC 0 and 1 averaged

†† 4 × 400 MHz carriers: 120 kHz subcarrier spacing, 12.76 dB PAPR; CC 0, 1, 2, and 3 averaged

Error Vector Magnitude

Table 39. 64-QAM EVM (dB) by Average Power Level, Typical

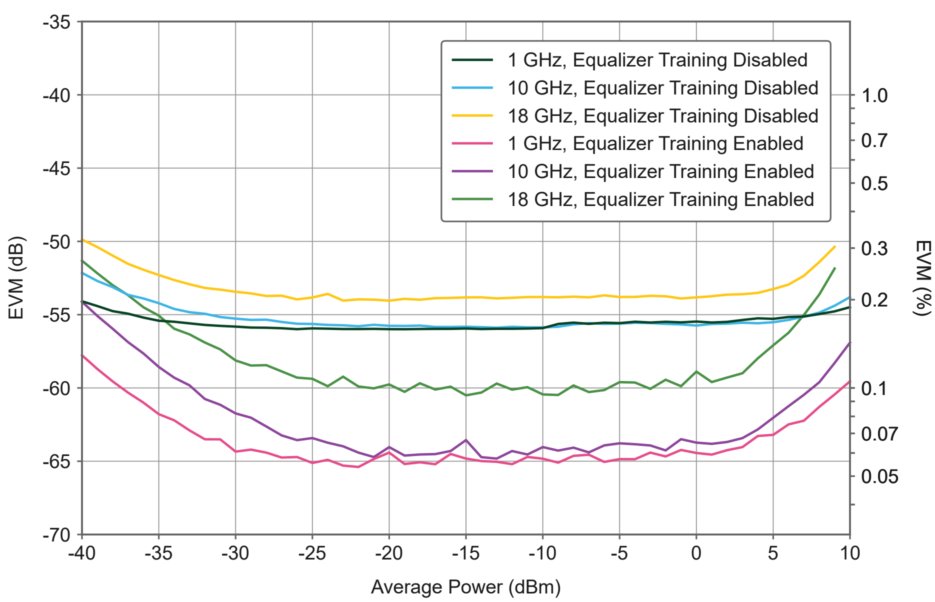
Center Frequency	Configuration A		Configuration B	
	0 dBm	-30 dBm	0 dBm	-30 dBm
100 MHz to 600 MHz	-54	-54	-51	-51
>600 MHz to 2 GHz	-54	-54	-55	-54
>2 GHz to 3 GHz	-54	-54	-53	-51
>3 GHz to 8 GHz	-55	-54	-53	-53
>8 GHz to 12 GHz	-54	-53	-53	-53
>12 GHz to 16 GHz	-53	-53	-52	-51
>16 GHz to 18 GHz	-51	-51	-50	-49
>18 GHz to 22 GHz	-52	-52	-50	-50

Center Frequency	Configuration A		Configuration B	
	0 dBm	-30 dBm	0 dBm	-30 dBm
>22 GHz to 24 GHz	-51	-52	-49	-48
>24 GHz to 26.5 GHz	-51	-52	—	-48

Conditions: RF OUT loopback to RF IN with 3 dB attenuator in the loopback; 12.5 MHz bandwidth 64-QAM modulated signal; pulse-shape filtering: root-raised cosine, alpha = 0.25; PXIe-5842 RF input reference level and RF output power level set to value specified; Offset Mode is Automatic; acquisition length: 300 µs.

Figure 1. 64-QAM EVM vs. Average Power, Measured.

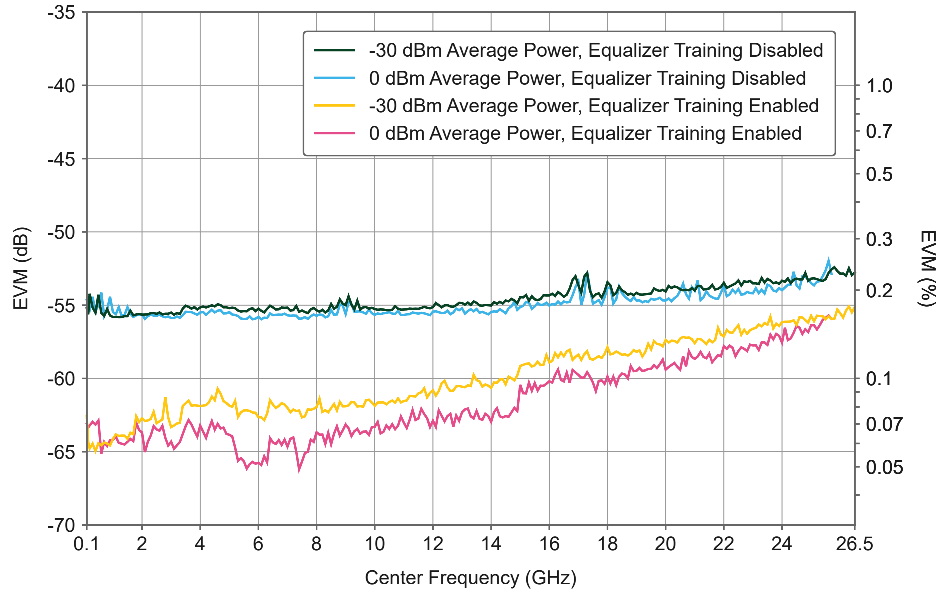
Configuration A



Conditions: RF OUT loopback to RF IN with 3 dB attenuator in the loopback; 12.5 MHz bandwidth 64-QAM modulated signal; pulse-shape filtering: root-raised cosine, alpha = 0.25; Offset Mode is Automatic; acquisition length: 300 µs

Figure 1. 64-QAM RMS EVM vs. Center Frequency, Measured.

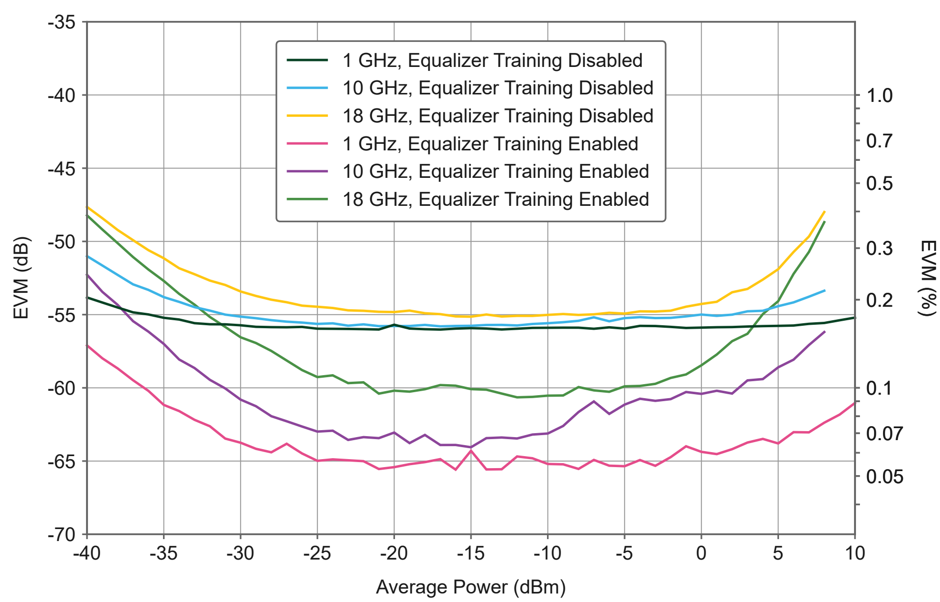
Configuration A



Conditions: RF OUT loopback to RF IN with 3 dB attenuator in the loopback; 12.5 MHz bandwidth 64-QAM modulated signal; pulse-shape filtering: root-raised cosine, alpha = 0.25; PXIe-5842 RF input reference level and RF output power level set to value specified in legend; Offset Mode is Automatic; acquisition length: 300 µs

Figure 1. 64-QAM EVM vs. Average Power, Measured.

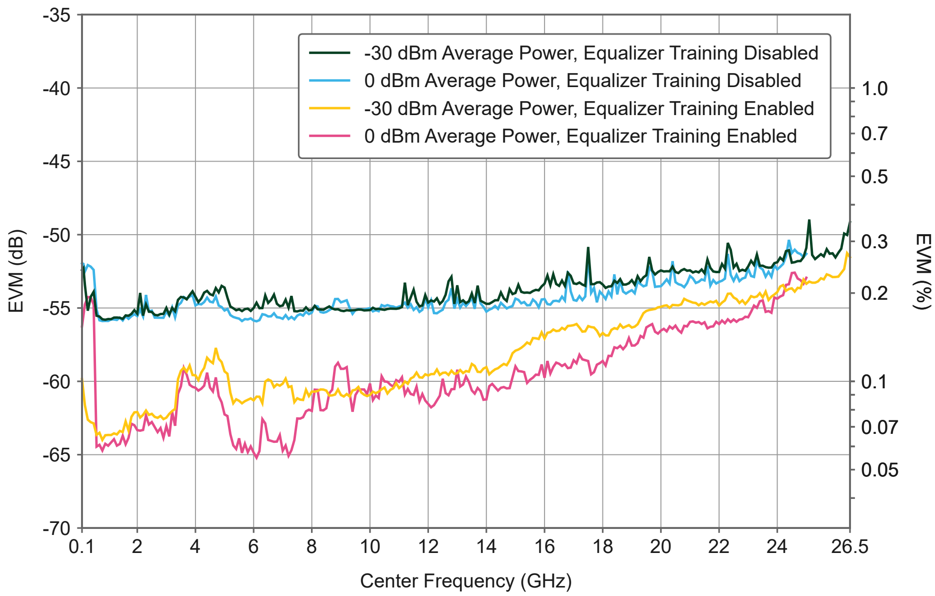
Configuration B



Conditions: RF OUT loopback to RF IN with 3 dB attenuator in the loopback; 12.5 MHz bandwidth 64-QAM modulated signal; pulse-shape filtering: root-raised cosine, alpha = 0.25; Offset Mode is Automatic; acquisition length: 300 µs

Figure 1. 64-QAM EVM vs. Center Frequency, Measured.

Configuration B



Conditions: RF OUT loopback to RF IN with 3 dB attenuator in the loopback; 12.5 MHz bandwidth 64-QAM modulated signal; pulse-shape filtering: root-raised cosine, alpha = 0.25; PXIe-5842 RF input reference level and RF output power level set to value specified in legend; Offset Mode is Automatic; acquisition length: 300 µs

VNA Specifications

VNA specifications apply to the PXIe-5842 with S-parameters (Configuration B) only.

Related information:

- PXIe-5633 Product Certifications

VNA Frequency Specifications

VNA Frequency Range

VNA Frequency Range, Configuration B	
8 GHz frequency range option	50 MHz to 8 GHz
12 GHz frequency range option	50 MHz to 12 GHz
18 GHz frequency range option	50 MHz to 18 GHz
26.5 GHz frequency range option	50 MHz to 26.5 GHz

VNA Internal Frequency Reference Accuracy

Note The internal clock uses the PXIe_CLK100 signal as a reference, typically 25 ppm. Refer to your chassis specifications to determine the reference clock frequency accuracy. When using a PXIe-1095 chassis with the Timing and Synchronization OCXO upgrade option as the external reference, the frequency accuracy is $\pm 80 \times 10^{-9}$.

VNA Frequency Resolution

Resolution	1 Hz

VNA IF Bandwidth

Minimum VNA IF bandwidth	1 Hz
Maximum VNA IF bandwidth	15 MHz

Note Available IF bandwidth values include 10 MHz, 15 MHz, and [1, 2, 3, 5, or 7] × 10^{n} Hz for integers n between 0 and 6.

VNA System Specifications

VNA Dynamic Range

Table 40. VNA Dynamic Range

Frequency	Typical (dB)
100 MHz to 300 MHz	134
>300 MHz to 6 GHz	146
>6 GHz to 18 GHz	137
>18 GHz to 22 GHz	134
>22 GHz to 26.5 GHz	125
Conditions: 10 HzIF Bandwidth. ***Dynamic range*** specifies the difference between the maximum power and the noise floor, excluding crosstalk. It is calculated from the ***VNA Generation Maximum Output Power*** specification and the ***VNA Receiver Noise Floor*** specification, normalized to a 10 HzIF Bandwidth.	

VNA Effective Residual Error Terms

Table 41. VNA Effective Residual Error Terms

Frequency	Directivity (dB)	Source Match (dB)	Load Match (dB)	Reflection Tracking (dB)	Transmission Tracking (dB)
100 MHz to 300 MHz	42	39	38	0.08	0.08
>300 MHz to 6 GHz	42	39	38	0.06	0.06
>6 GHz to 8 GHz	42	38	38	0.07	0.07
>8 GHz to 12 GHz	41	37	36	0.08	0.08
>12 GHz to 18 GHz	40	35	35	0.11	0.11
>18 GHz to 20 GHz	40	33	32	0.18	0.18
>20 GHz to 26.5 GHz	39	30	29	0.22	0.22
Conditions: PXIe-5633 calibrated using CAL-5501 vector calibration module and instrument temperature is within 1 °C of calibration temperature. Frequency List, Power Level, and IF Bandwidth are set identically across calibration and measurement. Calibration performed with 10 HzIF Bandwidth and -10 dBmPower Level at 23 ± 5 °C ambient temperature.					

VNA Corrected Measurement Performance

Table 42. VNA Reflection Measurement Uncertainty, Warranted

Frequency	Logarithmic			Linear	
	Reflection Level (dB)	Magnitude (dB)	Phase (degrees)	Reflection Range (dB)	Magnitude (linear)
100 MHz to 12 GHz	0	0.20	1.6	0 to -3	0.023
	-3	0.20	1.6	-3 to -6	0.016
	-6	0.21	1.6	-6 to -15	0.012

Frequency	Logarithmic			Linear	
	Reflection Level (dB)	Magnitude (dB)	Phase (degrees)	Reflection Range (dB)	Magnitude (linear)
	-15	0.41	3.0	-15 to -25	0.009
	-25	1.21	8.3	-25	0.008
>12 GHz to 20 GHz	0	0.31	2.5	0 to -3	0.035
	-3	0.31	2.5	-3 to -6	0.023
	-6	0.31	2.5	-6 to -15	0.017
	-15	0.52	3.9	-15 to -25	0.011
	-25	1.45	10.1	-25	0.010
>20 GHz to 26.5 GHz	0	0.38	2.9	0 to -3	0.043
	-3	0.38	2.9	-3 to -6	0.029
	-6	0.38	2.9	-6 to -15	0.021
	-15	0.61	4.4	-15 to -25	0.013
	-25	1.69	11.3	-25	0.011

Conditions: This specification is derived using VNA receiver specifications and residual error terms when PXIe-5633 is calibrated using CAL-5501 vector calibration module. Analysis is performed with DUT S11 = S22, S21 = S12 = 0 (lin), 10 HzIF Bandwidth, 0 dBTest Attenuation, -10 dBmSource Power Level during calibration and measurement. Frequency List is identical between calibration and measurement. Ambient temperature is 23 ± 5 °C and board temperature is +/-1 °C from calibration.

Figure 1. Reflection Uncertainty Linear Magnitude, Typical

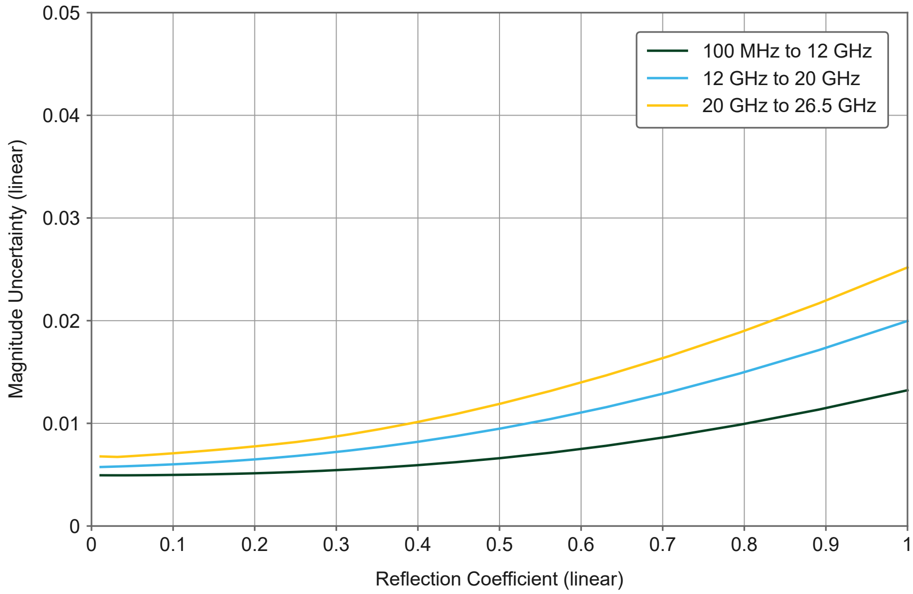


Figure 1. Reflection Uncertainty Log Magnitude, Typical

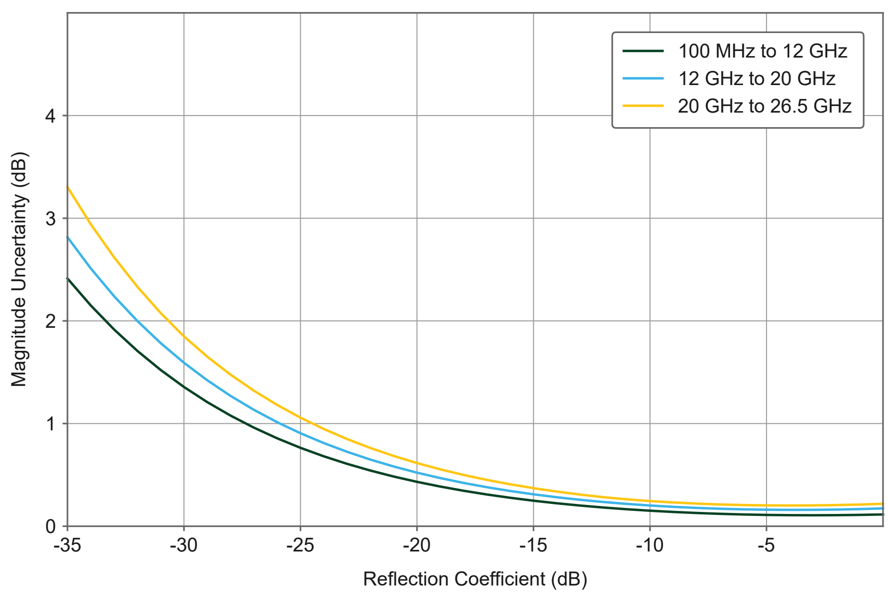


Figure 1. Reflection Uncertainty Phase, Typical

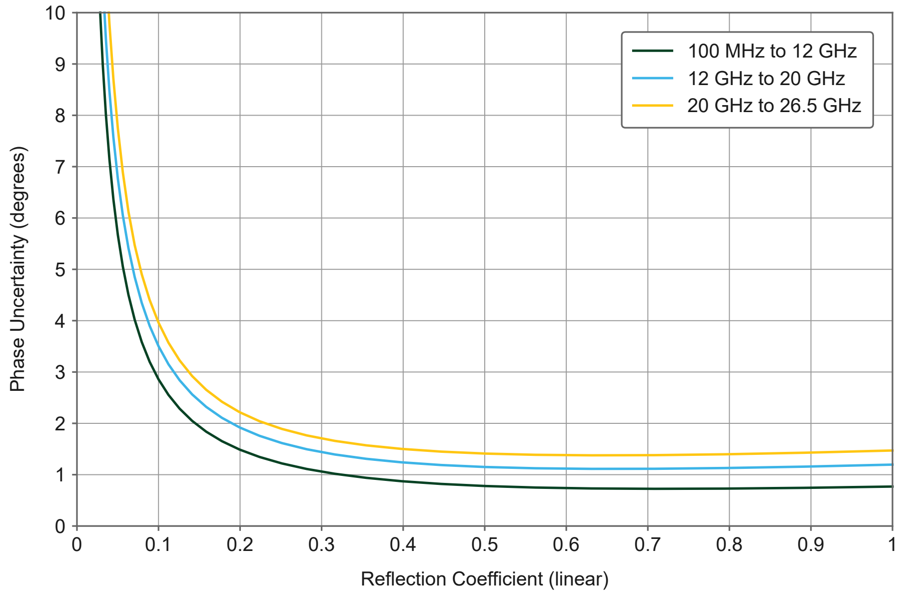


Figure 46. Reflection Uncertainty Log Magnitude Phase, Typical

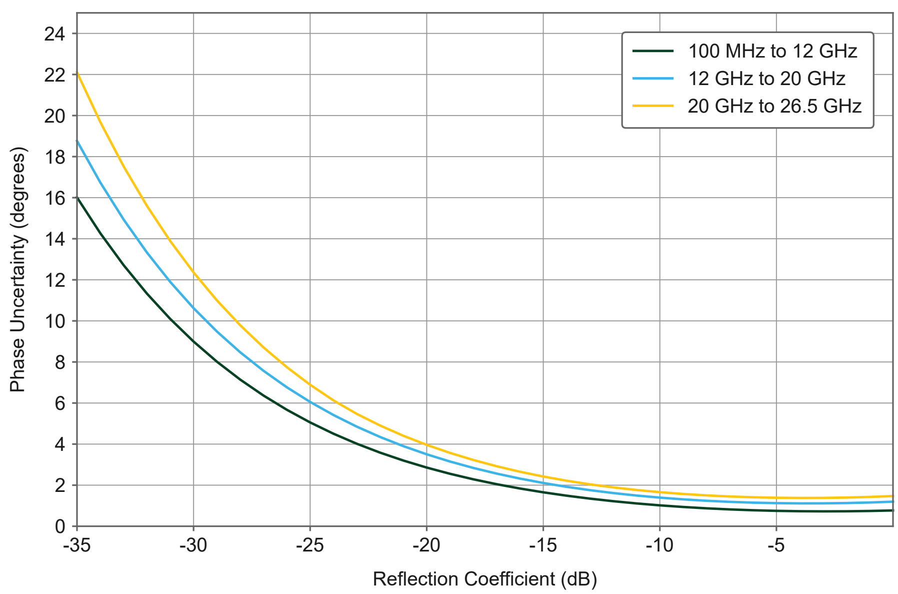


Table 43. VNA Transmission Measurement Uncertainty, Warranted

Frequency	Transmission Coefficient (dB)	Magnitude (dB)	Phase (degrees)
100 MHz to 12 GHz	5 to 0	0.12	1.1
	0 to -10	0.12	1.1
	-10 to -20	0.14	1.2
	-20 to -30	0.27	2.1

Frequency	Transmission Coefficient (dB)	Magnitude (dB)	Phase (degrees)
	-30 to -40	0.72	4.9
>12 GHz to 20 GHz	5 to 0	0.16	1.6
	0 to -10	0.16	1.6
	-10 to -20	0.16	1.6
	-20 to -30	0.29	2.3
	-30 to -40	0.73	5.1
>20 GHz to 23 GHz	0 to -10	0.21	1.8
	-10 to -20	0.22	1.9
	-20 to -30	0.35	2.6
	-30 to -40	0.84	5.7
>23 GHz to 26.5 GHz	0 to -10	0.21	1.8
	-10 to -20	0.28	2.1
	-20 to -30	0.66	4.5

Conditions: This specification is derived using VNA receiver specifications and residual error terms when a PXIe-5633 is calibrated using CAL-5501 vector calibration module. Analysis is performed with DUT S12 = S21 (for Transmission Coefficient ≤ 0 dB), S12 = 1/S21 (for Transmission Coefficient > 0 dB, S11 = S22 = 0 (lin), 10 HzIF Bandwidth, 0 dBTest Attenuation, -10 dBmSource Power Level during calibration and measurement. Frequency List is identical between calibration and measurement. Ambient temperature is 23 ± 5 °C and board temperature is +/-1 °C from calibration.

Figure 1. Transmission Uncertainty Magnitude, Typical

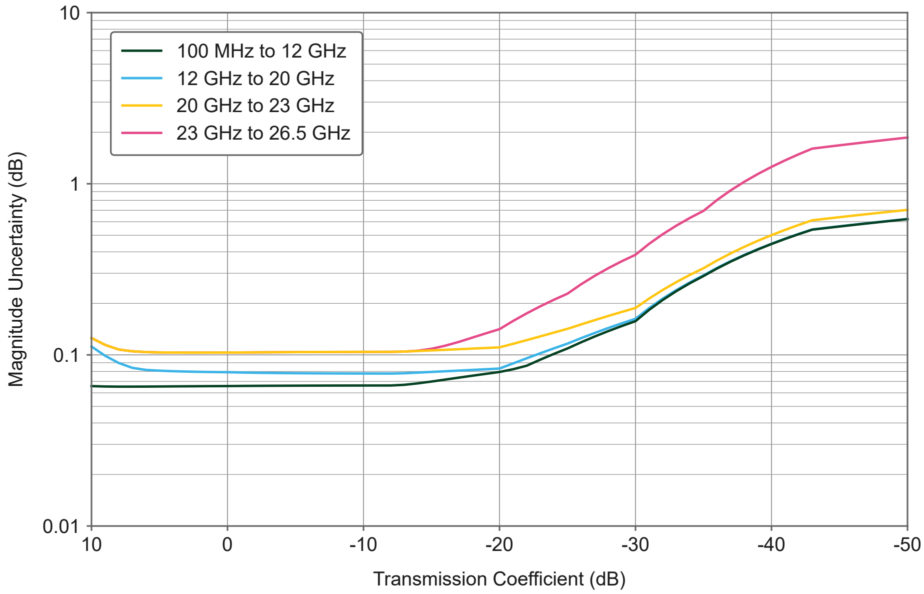
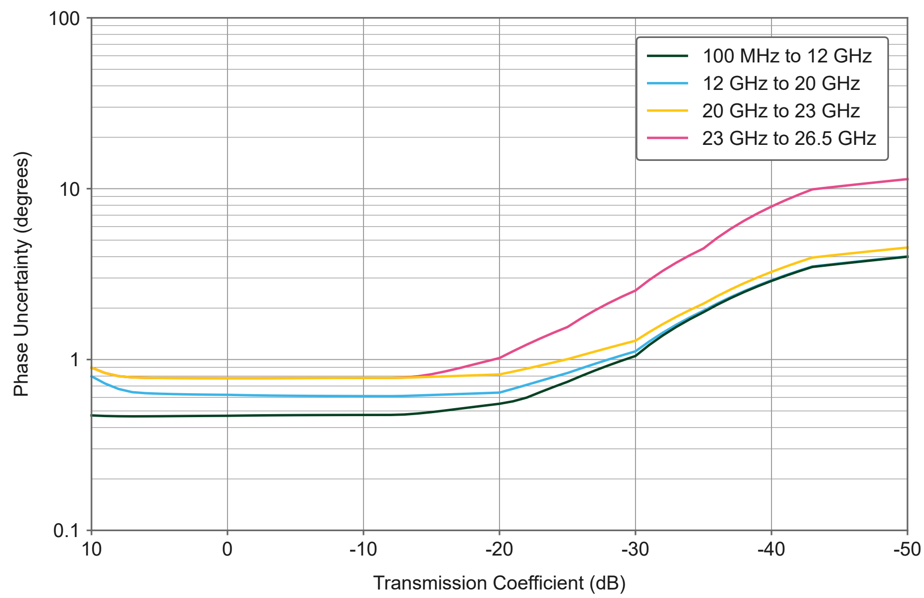


Figure 1. Transmission Uncertainty Phase, Typical



VNA Measurement Speed

Table 44. VNA Measurement Speed (ms), Measured

Frequency Sweep Range	IF Bandwidth	Number of Points							
		Corrected Two-Port Measurement				Uncorrected One-Port Measurement			
		51	201	401	1601	51	201	401	1601
50 MHz to 26.5 GHz	10 kHz	21.1	78.6	155	605	10.9	39.5	77.5	306
	100 kHz	9.9	34.2	66.5	252	5.2	17.2	33.1	129
	1 MHz	7.7	25.4	48.9	182	4.0	12.7	24.3	93.9
	15 MHz	6.5	20.4	38.4	138	3.5	10.1	19.0	71.9

Frequency Sweep Range	IF Bandwidth	Number of Points							
		Corrected Two-Port Measurement				Uncorrected One-Port Measurement			
		51	201	401	1601	51	201	401	1601

Conditions: Measured using a PXIe-1095 chassis and a PXIe-8881 embedded controller with Windows 10 64-bit, Xeon 8-core processor, and 16 GB DDR4 RAM configuration. ***Measurement speed*** is defined as the time between when RFmx VNAInitiate is called and when the specified measurements have been returned with corrections applied by an RFmx VNA fetch function. Each sweep is run ***n*** times and the times for ***n*** - 1 iterations are averaged (the first iteration is dropped). For two-port corrected measurements, S_{21} is enabled and fetched. One-port uncorrected measurements are for one sweep direction. Auto IF Bandwidth Scaling Enabled is set to False. InstrumentStudio debug mode is disabled.

VNA Receiver Specifications

VNA Noise Floor

Table 45. VNA Noise Floor (dBm/Hz)

Frequency	Warranted	Typical
100 MHz to 300 MHz	-107	-126
>300 MHz to 6 GHz	-131	-138
>6 GHz to 12 GHz	-125	-132
>12 GHz to 22 GHz	-127	-134
>22 GHz to 26.5 GHz	-125	-130

Conditions: Test receiver power measured with VNA source turned off, high-reflection terminations at the port, 30 kHzIF Bandwidth, 0 dBTest Receiver Attenuation, 100 averages, excluding spurs, normalized to 1 Hz bandwidth, ambient temperature 23 ±5 °C.

VNA Trace Noise

Table 46. VNA Trace Noise Magnitude (dB RMS)

Frequency	Warranted	Typical
50 MHz to <6 GHz	0.003	0.0015

Frequency	Warranted	Typical
6 GHz to 26.5 GHz	0.006	0.0020

Conditions: 0 dBmPower Level, 10 kHzIF Bandwidth, 0 dBTest Receiver Attenuation, ambient temperature 23 °C ± 5 °C.

Measured using a high-reflection termination at the port and then calculating the uncorrected S_{11} magnitude stability across 201 iterations in 100 MHz increments.

Table 47. VNA Trace Noise Phase (Degrees RMS)

Frequency	Warranted	Typical
50 MHz to 300 MHz	0.03	0.007
>300 MHz to 1 GHz	0.03	0.006
>1 GHz to 3 GHz	0.03	0.005
>3 GHz to <6 GHz	0.03	0.004
6 GHz to 26.5 GHz	0.06	0.008

Conditions: 0 dBmPower Level, 10 kHzIF Bandwidth, 0 dBTest Receiver Attenuation, ambient temperature 23 °C ± 5 °C.

Measured using a high-reflection termination at the port and then calculating the uncorrected S_{11} phase stability across 201 iterations in 100 MHz increments.

Table 48. VNA Measurement Stability, Typical

Frequency (Hz)	Magnitude (dB/°C)	Phase (deg/°C)
100 MHz to 6 GHz	0.015	0.10
>6 GHz to 8 GHz	0.025	0.40
>8 GHz to 15 GHz	0.015	0.35
>15 GHz to 22 GHz	0.030	0.55
>22 GHz to 26.5 GHz	0.050	0.50

Frequency (Hz)	Magnitude (dB/°C)	Phase (deg/°C)
Conditions: 0 dBmPower Level, 100 HzIF Bandwidth, 0 dBTest Receiver Attenuation, ambient temperature 23 °C ± 5 °C. Ratioed measurement stability when measuring a low loss through or a high reflect termination. Firmware version: 1.0.2f4		

VNA Non-Linearity

Table 49. VNA Receiver Compression Level for 0.1 dB Compression, Measured

Frequency	Compression Level (dBm)
>100 MHz to 1 GHz	9
>1 GHz to 3 GHz	8
>3 GHz to 6 GHz	10
>6 GHz to 22 GHz	10
>22 GHz to 26.5 GHz	10
Conditions: 0 dBTest Receiver Attenuation. Measured P0.1 dB or ADC saturation.	

Table 50. VNA Linearity

Frequency	Power Level (dBm)	Magnitude (dB)		Phase (degrees)	
		Warranted	Typical	Warranted	Typical
100 MHz to 1 GHz	-5 to -22.5	0.12	0.04	0.80	0.27
	-30	0.16	0.08	1.06	0.53
	-35	0.20	0.10	1.32	0.66
	-40	0.34	0.16	2.25	1.06
>1 GHz to 20 GHz	-5 to -22.5	0.11	0.03	0.73	0.20
	-30	0.13	0.06	0.86	0.40
	-35	0.23	0.11	1.52	0.73
	-40	0.35	0.16	2.31	1.06
>20 GHz to	-10 to -22.5	0.11	0.06	0.73	0.40

Frequency	Power Level (dBm)	Magnitude (dB)		Phase (degrees)	
		Warranted	Typical	Warranted	Typical
23 GHz	-30	0.14	0.07	0.93	0.47
	-35	0.25	0.13	1.65	0.86
	-40	0.38	0.20	2.51	1.32
>23 GHz to 26.5 GHz	-10 to -22.5	0.12	0.06	0.80	0.40
	-30	0.28	0.17	1.85	1.13
	-35	0.50	0.27	3.30	1.79
	-40	0.87	0.55	5.75	3.63
Conditions: Accuracy of test port receiver measured relative to -10 dBm input port power with 0 dBTest Receiver Attenuation, 10 HzIF Bandwidth at 23 ± 5 °C ambient temperature.					

VNA Uncorrected Error Terms

Table 51. VNA Uncorrected Error Terms, Typical

Frequency	Directivity (dB)	Source Match (dB)	Load Match (dB)
50 MHz to 300 MHz	24	23	16
>300 MHz to 1 GHz	20	18	18
>1 GHz to 3 GHz	22	16	14
>3 GHz to 6 GHz	21	17	15
>6 GHz to 8 GHz	17	19	18
>8 GHz to 12 GHz	13	14	12
>12 GHz to 18 GHz	12	10	9
>18 GHz to 22 GHz	12	11	9
>22 GHz to 26.5 GHz	10	9	8
Conditions: Measured at VNA ports, -10 dBmPower Level, 10 kHzIF Bandwidth, 0 dBTest Receiver Attenuation, ambient temperature 23 ± 5 °C.			

VNA Source Specifications

VNA Output Amplitude Range

Table 52. VNA Maximum and Minimum Output Power (dBm), Typical

Frequency	Maximum	Minimum
50 MHz to 6 GHz	18	-36
>6 GHz to 8 GHz	16	-38
>8 GHz to 12 GHz	15	-39
>12 GHz to 18 GHz	13	-39
>18 GHz to 22 GHz	10	-43
>22 GHz to 26.5 GHz	5	-44
Conditions: Measured at the VNA ports, 23 ± 5 °C ambient temperature.		

Amplitude resolution	≤0.05 dB, nominal

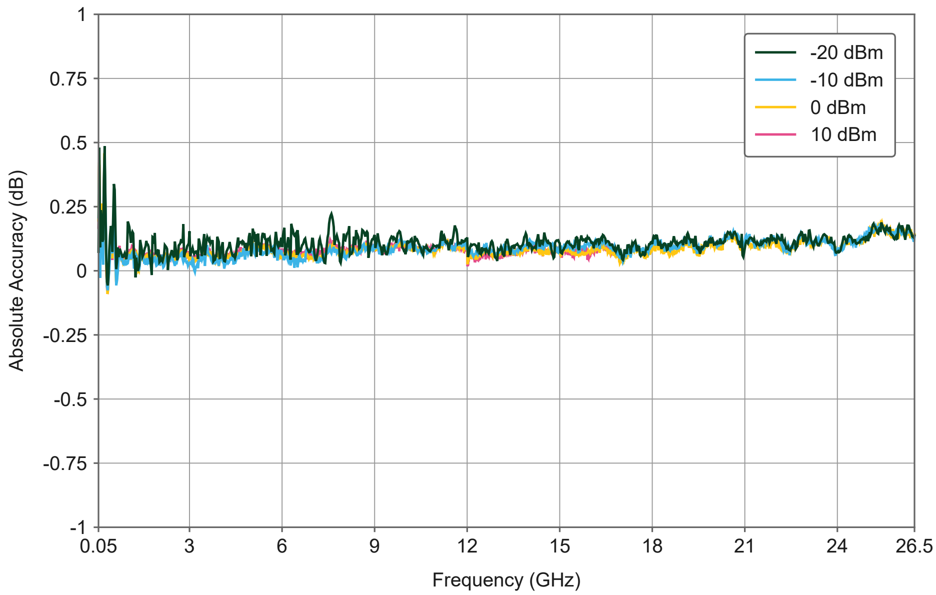
VNA Output Amplitude Accuracy

Table 53. VNA Output Amplitude Accuracy (dB), Typical

Frequency	Amplitude Accuracy
50 MHz to 1 GHz	1.10
>1 GHz to 12 GHz	0.90
>12 GHz to 22 GHz	0.90
>22 GHz to 26.5 GHz	1.10
Conditions: Measured at VNA ports from -30 dBm to ***Maximum Output Power*** defined in ***VNA Output Amplitude Range*** specification. Ambient temperature 23 ± 5 °C.	

Figure 1. VNA Output Amplitude Accuracy.

Configuration B



Conditions: Factory calibration; ambient temperature 23 ± 5 °C.

VNA Output Harmonics

Table 54. VNA Output Harmonics (dBc), Measured

Frequency	Harmonic Level
>300 MHz to 1 GHz	-34
>1 GHz to 3 GHz	-37
>3 GHz to 6 GHz	-26
>6 GHz to 8 GHz	-26
>8 GHz to 12 GHz	-26
Conditions: 0 dBm power level. Includes second and third harmonic content up to 26.5 GHz. Excludes sub-harmonic and non-harmonic spurs.	

Other Specifications

Baseband Characteristics

I/Q sample rate range	38 kS/s to 2.5 GS/s

Onboard DRAM

RF input memory size	4 GB
RF output memory size	4 GB

Triggering

Script Trigger

Table 58. Script Trigger Latency (µs), Measured

IQ Rate (Sa/S)	Latency, PFI 0[5]	Latency, PULSE: IN
2.5 G	2.276	2.291
1 G	2.294	2.310
100 M	2.572	2.588
10 M	5.354	5.369
1 M	33.130	33.146

Jitter, PFI 0	6.4 ns pk-pk, measured
Jitter, PULSE: IN	6.4 ns pk-pk, measured

5. Measured from trigger present at PFI 0 connector to RF signal observed at RF OUT connector.

Reference Trigger

Resolution, PFI 0	0.2 ns, measured
Resolution, PULSE: IN	0.4 ns, measured
Resolution, PXI trigger	6.4 ns, measured

Table 58. Reference Trigger Rearm Time (µs), Measured

IQ Rate (Sa/s)	Rearm Time
2.5 G	<2.111
1 G	<2.130
100 M	<2.723
10 M	<6.406
1 M	<32.006

List Mode

> **Note**
> These specifications are only valid with the following instrument drivers:
>
> - NI-RFSA 2024 Q3 or later.
> - NI-RFSG 2024 Q3 or later.

RF Output

Table 58. RF Output List Mode Reconfiguration Speed, Measured

List Mode Settling Latency	Time
Power Reconfiguration	<220 µs

List Mode Settling Latency	Time
Frequency Reconfiguration	<250 µs
List Mode Settling Latency is the time from the Configuration List Step Trigger to RF Output settled to the default frequency settling of 0.1 ppm and power of 0.5 dB	

RF Input

Table 58. RF Input List Mode Reconfiguration Speed, Measured

List Mode Settling Latency	Time
Power Reconfiguration	<220 µs
Frequency Reconfiguration	<250 µs
List Mode Settling Latency is the time from the Configuration List Step Trigger to RF Input settled to the default frequency settling of 0.1 ppm and power of 0.1 dB. By default, the Configuration List Step Trigger is equivalent to the End of Record Event and the configuration settled event gates the acquisition Ready for Advance signal.	

PXIe-5842 Front Panel I/O

These specifications relate to front panel I/O of the PXIe-5842 module. Refer to the specifications for the other individual modules within PXIe-5842 instruments for information on front panel I/O of those modules.

Understanding PXIe-5842 Connector Nomenclature

Individual connectors not within a larger grouping of connectors are named according to their label on the front panel; individual connectors within a grouping of connectors are named according to the convention ***Grouping Label: Connector Label***. For example:

- **RF IN** —The individual connector on the PXIe-5842 front panel labeled ***RF IN***
- **RF IN: LO OUT**—The individual connector on the PXIe-5842 front panel labeled ***LO OUT*** within the group of connectors on the PXIe-5842 labeled ***RF IN***

RF IN

Connector	3.5 mm (female)
Input impedance	50 Ω, nominal
Coupling	AC
Maximum DC input voltage	±10 V
Absolute maximum input power	
Reference Level ≤ 20 dBm	***Reference Level*** + 6 dB
Reference Level > 20 dBm	+27 dBm (CW RMS) with source match ≤-6 dB

Note Derate to +24 dBm (CW RMS) when source match is worse than -6 dB.

RF OUT

Connector	3.5 mm (female)
Impedance	50 Ω, nominal
Coupling	AC
Absolute maximum reverse power (RF output power setting	Not to exceed +20 dBm

≥+20 dBm)	
Absolute maximum reverse power (RF output power setting <20 dBm or disabled[6])	+15 dBm
Minimum load return loss	≥10 dB when RF output power setting ≥+20 dBm

RF OUT: LO IN, RF IN: LO IN

RF OUT: LO IN and RF IN: LO IN are used as internal connections only.

RF OUT: LO OUT, RF IN: LO OUT

Connector	SMA (female)
Frequency range	1.5 GHz to 7.2 GHz
Output power range	-5 dBm to +7 dBm, nominal
Output power resolution	0.25 dB, nominal
Output power accuracy	±2 dB, nominal
Impedance	50 Ω, nominal

6. Maximum reverse power derates linearly from +20 dBm to +10 dBm CW from 400 MHz to 10 MHz. Reverse power source return loss ≥ 10 dB.

Coupling	AC
Output return loss	>10 dB, nominal

REF: IN

REF: IN is used as an internal connection only.

REF: OUT

Connector	SMA (female)
Frequency	10 MHz and 100 MHz (software-selectable)
Amplitude	1.3 V pk-pk into 50 Ω, nominal
Output impedance	50 Ω, nominal
Coupling	AC

PFI 0

Connector	SMA (female)

Impedance

Input impedance	100 kΩ, nominal
Output impedance	50 Ω, nominal

Maximum DC drive strength	24 mA
Absolute maximum input range	-0.5 V to 50 V

Voltage levels	
V_{IL}, maximum	0.8 V
V_{IH}, minimum	2.0 V
V_{OL}, maximum	0.2 V with 100 µA load
V_{OH}, minimum	2.9 V with 100 µA load

DIO

Connector	Mini HDMI

Notice The DIO port is not an HDMI interface. Do not connect the DIO port on the PXIe-5842 to the HDMI interface of another device. NI is not liable for

> any damage resulting from such signal connections.

Number of channels	8
Signal type	Single-ended
Voltage families	3.3 V 2.5 V 1.8 V 1.5 V 1.2 V

Impedance	
Input impedance	100 kΩ, nominal
Output impedance	50 Ω, nominal

Signal direction	
Direction control	Per channel
Minimum latency required for direction change	200 ns

Maximum output toggle rate	60 MHz with 100 µA load, nominal
3.3 V power supply	250 mA

CTRL

CTRL is used as an internal connection only.

> **Notice** The CTRL port is not an HDMI interface. Do not connect the CTRL port on the PXIe-5842 to the HDMI interface of another device. NI is not liable for any damage resulting from such signal connections.

MGT

Connector	iPass+ zHD
Number of connectors	4

Number of channels	
TX channels	4 per connector
RX channels	4 per connector

Data rate	500 Mbps to 16.25 Gbps, nominal

Supported cable type	Electrical
I/O AC coupling capacitor	100 nF
Minimum differential output voltage	360 mV pk-pk into 100 Ω, nominal

Differential input voltage range	
≤6.6 Gbps	150 mV pk-pk to 2 V pk-pk, nominal
>6.6 Gbps	150 mV pk-pk to 1.25 V pk-pk, nominal

Differential input resistance	100 Ω, nominal

PULSE: IN

Connector	SMB (m)
Input impedance	100 kΩ, nominal
Maximum DC drive strength	24 mA
Absolute maximum input range	-0.5 V to 5 V

Voltage levels

V_{IL}, maximum	0.8 V
V_{IH}, minimum	2.0 V
V_{OL}, maximum	0.2 V with 100 µA load
V_{OH}, minimum	2.9 V with 100 µA load

PULSE: OUT

Connector	SMB (m)
Output impedance	50 Ω, nominal
Maximum DC drive strength	24 mA

PXIe-5655 Front Panel I/O

Note Only the PXIe-5655 with SMA connectors is used within PXIe-5842 instruments.

LO 0 OUT and LO 1 OUT

LO 0 OUT and LO 1 OUT are used as internal connections only with PXIe-5842 instruments.

Connector, PXIe-5655 with MMPX	MMPX (female)
Connector, PXIe-5655 with SMA	SMA (female)
Output impedance	50 Ω, nominal, AC coupled
Maximum DC input voltage without damage	±10 V DC
Absolute maximum output power	+18 dBm
LO output return loss (standing wave ratio), nominal (dB)	
50 MHz to 100 MHz	13.0 (1.58:1)
>100 MHz to 1.0 GHz	16.0 (1.38:1)
>1.0 GHz to 2.2 GHz	13.0 (1.58:1)
>2.2 GHz to 3.6 GHz	12.5 (1.62:1)
3.6 GHz to 7.2 GHz	11.5 (1.73:1)

LO 0 IN and LO 1 IN

Connector, PXIe-5655 with MMPX	MMPX (female)

Connector, PXIe-5655 with SMA	SMA (female)
Input impedance	50 Ω, nominal, AC coupled
Input range	-6 dBm to 6 dBm
Input return loss	>12 dB
Maximum DC input voltage without damage	±10 V DC
Absolute maximum input power	17 dBm

REF IN

Connector, PXIe-5655 with MMPX	MMPX (female)
Connector, PXIe-5655 with SMA	SMA (female)
Frequency	10 MHz, nominal 100 MHz, nominal 270 MHz, nominal 3.84 MHz × ***y***, nominal, where ***y*** is 4, 8, 16, 24, 25, or 32
Lock range[7]	$\pm 10 \times 10^{-6}$

7. ***Initial Adjustment Accuracy*** ± ***Aging*** ± ***Temperature Stability***

Amplitude[8]	0.7 V pk-pk to 3.3 V pk-pk into 50 Ω, typical
Input impedance	50 Ω, nominal
Coupling	AC

REF OUT

REF OUT is used as an internal connection only with PXIe-5842 instruments.

Connector type, PXIe-5655 with MMPX	MMPX (female)
Connector type, PXIe-5655 with SMA	SMA (female)
Frequency	10 MHz
Amplitude	1.65 V pk-pk into 50 Ω, typical
Output impedance	50 Ω, nominal
Coupling	AC

PFI 0 (Programmable Function Input)

Connector	MMPX (female)

8. Jitter performance improves with increased slew rate of input signal.

Input impedance	10 kΩ, nominal
Output impedance	50 Ω, nominal
Maximum DC drive strength	24 mA
Voltage Levels	
Absolute maximum input voltage range	-0.5 V to 5.5 V
VIL	0.8 V
VIH	2 V
VOL with 100 µA load	0.2 V
VOH with 100 µA load	2.9 V

PXIe-5633 Front Panel I/O

Note Refer to ***PXIe-5633 Safety Voltages*** in this document for connector damage levels.

PORT 1, PORT 2

Connector	3.5 mm (f)

Frequency range	
VST passthrough operation	30 MHz to 26.5 MHz
VNA operation	50 MHz to 26.5 MHz

IF IN, IF OUT

The IF IN and IF OUT connectors are reserved.

SWITCH IN, SWITCH OUT

SWITCH IN and SWITCH OUT are used as internal connections only.

LO IN, LO OUT

The LO IN and LO OUT connectors are reserved.

REF IN, REF OUT

Connector	MMPX (f)

PFI 0, PFI 1

Connector	MMPX (f)

Safety Voltages

> **Note** Consult the safety voltages for each module within your PXIe-5842 instrument to understand the aggregate safety voltage information for the

instrument.

Notice The use of some ports is reserved. Make connections to the ports of your PXIe-5842 instrument only as indicated in the ***PXIe-5842 User Manual***.

Related information:

- PXIe-5842 User Manual

PXIe-5842 Safety Voltages

Note This section applies to the PXIe-5842 module.

Connect only voltages that are below these limits.

RF IN absolute maximum input power	+27 dBm with reference level >20 dBm
RF OUT <0,1> absolute maximum reverse power	+20 dBm
RF OUT: LO IN absolute maximum input power	+15 dBm
RF OUT: LO OUT absolute maximum reverse power	+10 dBm
RF IN: LO IN absolute maximum input power	+15 dBm
RF IN: LO OUT absolute maximum reverse power	+10 dBm

REF: IN maximum input voltage

Frequency ≥10 MHz	5 V pk-pk
Frequency <10 MHz	2 V pk-pk

REF: OUT absolute maximum reverse voltage	2 V pk-pk
PFI 0 absolute maximum input range	-0.5 V to 5 V
DIO absolute maximum input range	-0.5 V to 5 V

Notice The DIO port is not an HDMI interface. Do not connect the DIO port on the to the HDMI interface of another device. NI is not liable for any damage resulting from such signal connections.

MGT absolute maximum input range	
≤6.6 Gbps	150 mV pk-pk to 2 V pk-pk
>6.6 Gbps	150 mV pk-pk to 1.25 V pk-pk

CTRL absolute maximum input	1.8 V

Notice The CTRL port is not an HDMI interface. Do not connect the CTRL port on the to the HDMI interface of another device. NI is not liable for any damage resulting from such signal connections.

PULSE: IN, PULSE: OUT absolute maximum input	5 V
Measurement Category	CAT I/O

Measurement Category

Caution Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.

Attention Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Warning Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINs circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

Mise en garde Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut

> tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as ***MAINS*** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

> **Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

PXIe-5655 Safety Voltages

Connect only voltages that are below these limits.

Absolute maximum input power (LO 0/1 IN)	+17 dBm
Absolute maximum reverse power (LO 0/1 OUT)	+18 dBm
Maximum input voltage (REF IN)	3.3 V pk-pk
Measurement Category	CAT I/O

Measurement Category

Warning Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINs circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

Mise en garde Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as ***MAINS*** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

PXIe-5633 Safety Voltages

Connect only voltages that are below these limits.

PORT 1, PORT 2

Absolute maximum input power for VST passthrough[9] when operating as vector signal analyzer	
Reference Level ≤ 20 dBm	***Reference Level*** + 5 dB
Reference Level **> 20 dBm**	
0.3 GHz to 2 GHz	+25 dBm (CW RMS)
>2 GHz to 8 GHz	+26 dBm (CW RMS)
>8 GHz to 26.5 GHz	+27 dBm (CW RMS)

Note Derate by 2 dB when source match is worse than -6 dB.

Absolute maximum reverse power for VST passthrough[10] when operating as vector signal generator	
Output Power ≤ +16 dBm	+25 dBm

9. When used within PXIe-5842 with S-parameters.
10. When used within PXIe-5842 with S-parameters.

Output Power ≤ +20 dBm	+20 dBm

Absolute maximum input power for VNA load port	
Test Receiver Attenuation < 8 dB	+20 dBm
Test Receiver Attenuation ≥ 8 dB	+27 dBm

Absolute maximum reverse power for VNA reflection port	
RF Output Power ≤ +10 dBm, ***Test Receiver Attenuation*** < 8 dB	+15 dBm
RF Output Power ≤ +20 dBm, ***Test Receiver Attenuation*** ≥ 8 dB	+20 dBm

Notice In certain conditions, such as generating into a short, reflections of signals that otherwise comply with these limits may exceed these values and damage the instrument.

IF Ports

IF IN absolute maximum input power	+18 dBm
IF OUT absolute maximum reverse power	+18 dBm

Other Ports

SWITCH IN absolute maximum input power	+14 dBm
SWITCH OUT absolute maximum reverse power	+10 dBm
LO IN absolute maximum input power	+12 dBm
LO OUT absolute maximum reverse power	+10 dBm
REF IN maximum input voltage	5 Vpk-pk
REF OUT absolute maximum reverse voltage	2 Vpk-pk
PFI 0, PFI 1 absolute maximum input range	-0.5 V to 5 V
Measurement Category	CAT I/O

Measurement Category

Caution Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.

Attention Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as ***MAINS*** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

> **Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Environmental Guidelines

> **Notice** Failure to follow the mounting instructions in the product documentation can cause temperature derating.

> **Notice** This product is intended for use in indoor applications only.

Environmental Characteristics

> **Note** Consult the environmental characteristics for each module within your PXIe-5842 instrument to understand the aggregate environmental characteristics of the instrument.

PXIe-5842 Environmental Characteristics

> **Note** This information in this section applies to the PXIe-5842 module.

Temperature	
Operating	0 °C to 40 °C [11]
Storage	-41 °C to 71 °C

11. The PXIe-5842 requires a chassis with 82 W slot cooling capacity. Refer to chassis specifications to

Humidity	
Operating	10% to 90%, noncondensing
Storage	5% to 95%, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)

Shock and Vibration	
Operating vibration	5 Hz to 500 Hz, 0.3 g RMS
Non-operating vibration	5 Hz to 500 Hz, 2.4 g RMS
Operating shock	30 g, half-sine, 11 ms pulse

PXIe-5655 Environmental Characteristics

Temperature	
Operating	
Chassis with slot cooling capacity ≥58 W[12]	0 °C to 55 °C
Chassis with slot cooling capacity ≥38 W[13]	0 °C to 40 °C

determine the ambient temperature ranges your chassis can achieve.

12. Tested with chassis fan mode set to Auto and cooling profile set to 58 W/82 W in NI Measurement & Automation Explorer (MAX). Not all chassis with slot cooling capacity ≥58 W can achieve this ambient temperature range. Refer to PXI chassis specifications to determine the ambient temperature ranges

Humidity	
Operating	10% to 90%, noncondensing
Storage	5% to 95%, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Shock and vibration	
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g RMS
Non-operating	5 Hz to 500 Hz, 2.4 g RMS
Operating shock	30 g, half-sine, 11 ms pulse

PXIe-5633 Environmental Characteristics

Temperature	
Operating	0 °C to 40 °C
Storage	-40 °C to 71 °C

your chassis can achieve.

13. For chassis with slot cooling capacity = 38 W, the fan speed must be set to HIGH for use in this ambient temperature range.

Humidity	
Operating	10% RH to 90% RH, noncondensing
Storage	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Shock and Vibration	
Operating vibration	5 Hz to 500 Hz, 0.3 g RMS
Non-operating vibration	5 Hz to 500 Hz, 2.4 g RMS
Operating shock	30 g, half-sine, 11 ms pulse

Power Requirements

PXIe-5842 Power Requirements

These characteristics relate to the individual PXIe-5842 module.

Power requirements, nominal	
+3.3 V DC	7.5 A (24.75 W)
+12 V DC	14.5 A (174.0 W)

Total power	198.75 W

PXIe-5655 Power Requirements

Power requirements, nominal	
+3.3 V DC	1.1 A (11.78 W)
+12 V DC	2.4 A (28.8 W)
Total power	32.43 W

PXIe-5633 Power Requirements

Power requirements, nominal	
+3.3 V DC	0.66 A (2.19 W)
+12 V DC	4.99 A (59.88 W)
Total power	62.07 W

Physical Characteristics

PXIe-5842 Physical Characteristics

These characteristics relate to the individual PXIe-5842 module.

Dimensions	3U, 3 slots For more information, visit ***ni.com/dimensions*** and search by model number.
Weight	1,418 g (50.0 oz)

PXIe-5655 Physical Characteristics

Dimensions	3U, 1 slot For more information, visit ***ni.com/dimensions*** and search by module number.
Weight	570 g (20.1 oz)

PXIe-5633 Physical Characteristics

Dimensions	3U, 1 slot 21.1 cm × 12.9 cm × 2.03 cm (8.3 in. × 5.1 in. × 0.8 in.) For more information, visit ***ni.com/dimensions*** and search by module number.
Weight	555 g (19.6 oz)

Related information:

- Dimensional Drawings: ni.com/dimensions

Calibration

Interval	1 year