SPECIFICATIONS

PXIe-5663E

Vector Signal Analyzer

These specifications apply to the PXIe-5663E 6.6 GHz Vector Signal Analyzer.

The PXIe-5663E comprises the following modules:

- PXIe-5601 RF Signal Downconverter
- PXIe-5622 IF Digitizer
- PXIe-5652 RF Analog Signal Generator

There is no physical device named "PXIe-5663E".

Contents

NATIONAL INSTRUMENTS

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

The following characteristic specifications 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.
- *Nominal* specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are *Warranted* unless otherwise noted.

Conditions

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

- 30 minutes warm-up time
- Calibration cycle maintained
- Chassis fan speed set to High
- NI-RFSA version 2.3 or later
- NI-RFSA instrument driver self-calibration performed after instrument temperature is stable

- PXIe-5652 locked to the PXI backplane or to the front panel REF OUT2
- PXIe-5601 module revision G or later

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

- Over ambient temperature ranges of 23 °C ± 5 °C

Frequency

Frequency range[1]	10 MHz to 6.6 GHz
Tuning resolution	533 nHz

Bandwidth

Equalized Bandwidth

Table 1. PXIe-5663E Equalized Bandwidth

Tuned Frequency	Equalized Bandwidth
10 MHz to <120 MHz	10 MHz
120 MHz to <330 MHz	20 MHz
330 MHz to 6.6 GHz	50 MHz
Conditions: Using automatic calibration correction through NI-RFSA.	

Resolution Bandwidth

3 dB bandwidth	Fully adjustable (<1 Hz to 10 MHz)

Table 2. Selectivity

Window	60 dB : 3 dB Ratio
Flat Top	2.5, maximum
7-term Blackman-Harris	4.1, maximum

Note NI-RFSA also supports additional window types.

Frequency Reference

Refer to the *PXIe-5652 Specifications* for more information about frequency reference.

[1] The PXIe-5663E is operational to 1 MHz. The maximum tuned frequency = 6.6 GHz - ½ (frequency span).

Internal Frequency Reference

Frequency	10 MHz
Temperature stability	$\pm 1 \times 10^{-6}$, maximum (15 °C to 35 °C)
Aging per year	$\pm 5 \times 10^{-6}$, maximum
Initial achievable accuracy	$\pm 3 \times 10^{-6}$, maximum

External Frequency Reference Input

Frequency	10 MHz ($\pm 10 \times 10^{-6}$)
Peak-to-peak amplitude	0.2 V to 1.5 V into 50 Ω
Input impedance	50 Ω
Lock time to external reference	1 s, maximum

Spectral Purity

Phase Noise

Table 3. Single Sideband Phase Noise[2]

Tuned Frequency	Noise Density
100 MHz	<-125 dBc/Hz
500 MHz	<-112 dBc/Hz
1 GHz	<-105 dBc/Hz
2 GHz	<-98 dBc/Hz
3 GHz	<-95 dBc/Hz
4 GHz	<-93 dBc/Hz
5 GHz	<-90 dBc/Hz
6.6 GHz	<-90 dBc/Hz

[2] 10 kHz offset; measured using the PXIe-5652 with internal Reference Clock.

Figure 1. Typical Phase Noise at 1 GHz

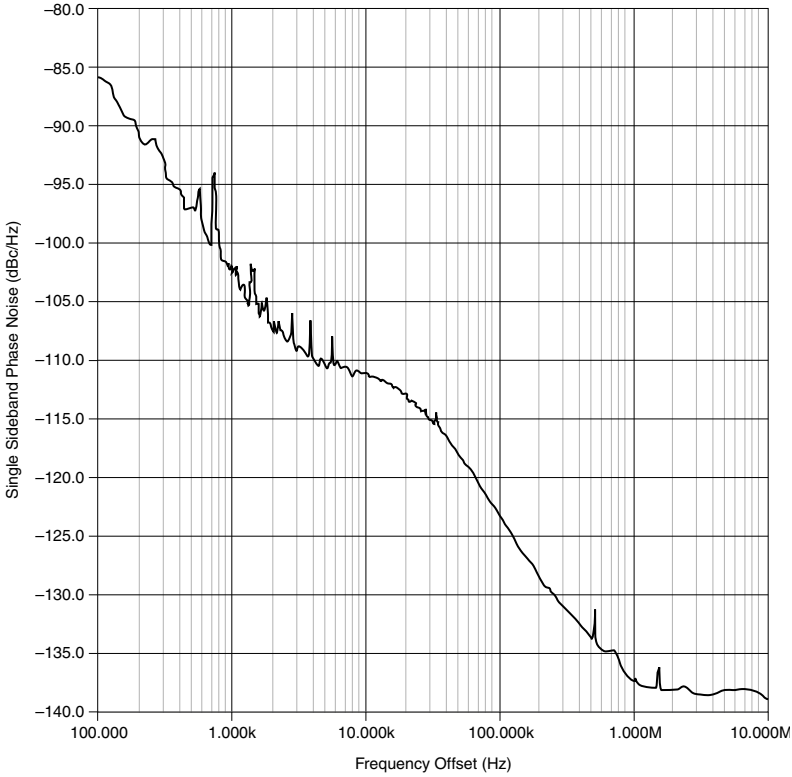


Figure 2. Typical Phase Noise at 2.4 GHz

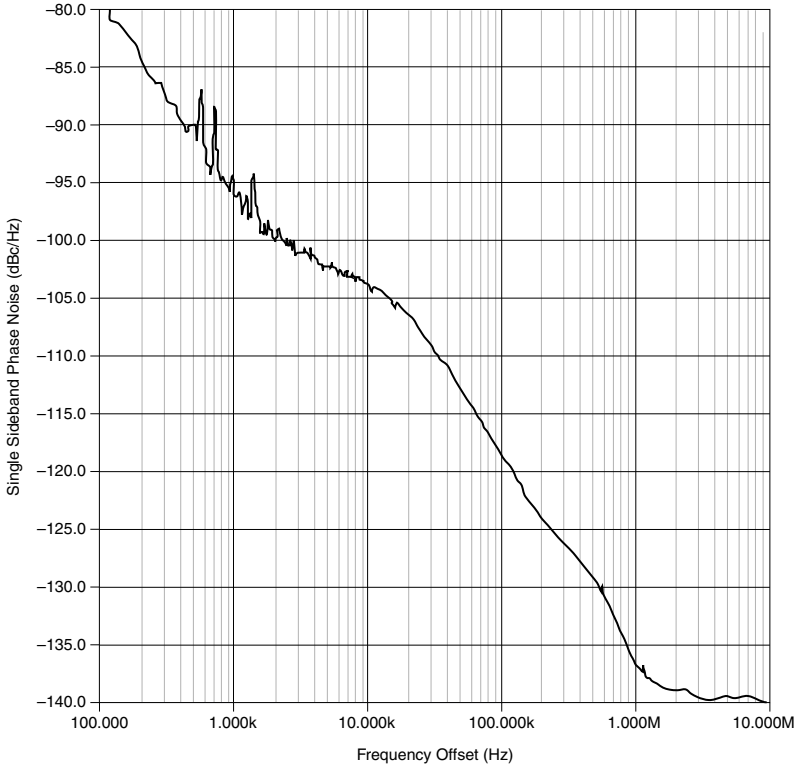
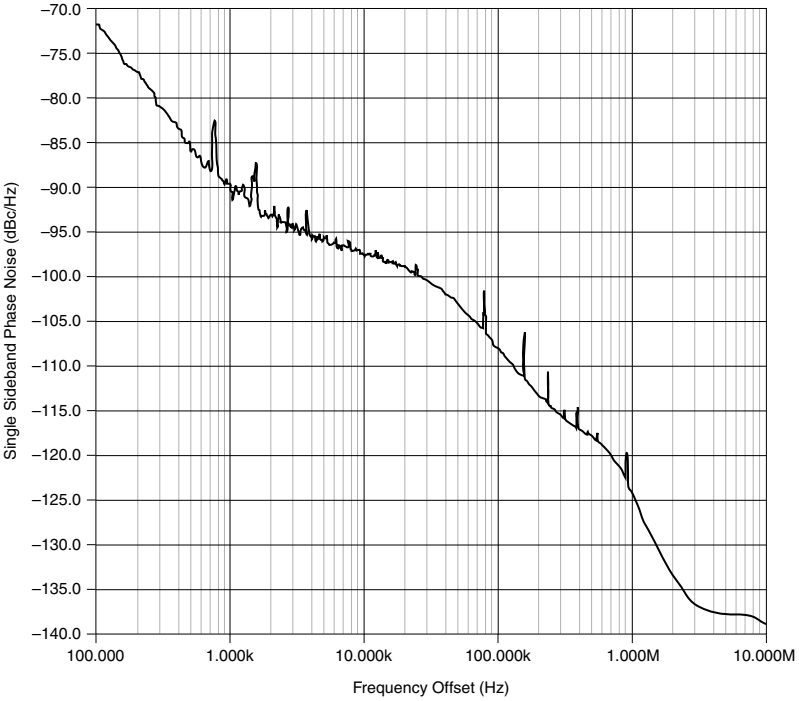


Figure 3. Typical Phase Noise at 5.8 GHz



Amplitude

Range

Amplitude range	*Average Noise Level* to +30 dBm
RF input attenuation	0 dB to 50 dB in 1 dB steps, nominal

Average Noise Level

Table 4. PXIe-5663E Average Noise Level

Frequency	23 °C ± 5 °C	0 °C to 55 °C
10 MHz to <30 MHz	<-155 dBm/Hz; <-157 dBm/Hz, typical	<-154 dBm/Hz; <-156 dBm/Hz, typical
30 MHz to <120 MHz	<-159 dBm/Hz; <-163 dBm/Hz, typical	<-158 dBm/Hz; <-162 dBm/Hz, typical

Table 4. PXIe-5663E Average Noise Level (Continued)

Frequency	23 °C ± 5 °C	0 °C to 55 °C
120 MHz to <3 GHz	<-155 dBm/Hz; <-158 dBm/Hz, typical	<-154 dBm/Hz; <-157 dBm/Hz, typical
3.0 GHz to <5.0 GHz	<-153 dBm/Hz; <-156 dBm/Hz, typical	<-152 dBm/Hz; <-155 dBm/Hz, typical
5.0 GHz to 6.6 GHz	<-151 dBm/Hz; <-154 dBm/Hz, typical	<-150 dBm/Hz; <-153 dBm/Hz, typical
Conditions: Input terminated; no input signal; 0 dB RF attenuation; -10 dBm reference level at frequencies < 100 MHz, -50 dBm reference level elsewhere.		

Absolute Accuracy

Table 5. PXIe-5663E Absolute Accuracy

Frequency	Accuracy	
	23 °C ± 5 °C	0 °C to 55 °C[3]
10 MHz to <120 MHz	±2.2 dB; ±1.4 dB, typical	±2.3 dB; ±1.5 dB, typical
120 MHz to <400 MHz	±1.7 dB; ±0.65 dB, typical	±1.8 dB; ±0.75 dB, typical
400 MHz to <3.0 GHz	±1.6 dB; ±0.65 dB, typical	±1.8 dB; ±0.75 dB, typical
3.0 GHz to <5.5 GHz	±1.7 dB; ±0.65 dB, typical	±1.8 dB; ±0.75 dB, typical
5.5 GHz to 6.6 GHz	±1.6 dB; ±0.65 dB, typical	±2.0 dB; ±1.0 dB, typical
Conditions: RF attenuation ≥ 8 dB; signal-to-noise ratio ≥ 20 dB.		

Spurious Responses

The single downconversion stage architecture does not provide RF image rejection.

[3] Using automatic calibration correction of the NI-RFSA instrument driver, within ±5 °C of a self calibration by Self Cal.

IF Rejection

Table 6. PXIe-5601 IF Rejection[4], Typical

Tuned Frequency	Interference Frequency	Level
10 MHz to <120 MHz	187.5 MHz	<-75 dBc
120 MHz to <330 MHz	53 MHz	<-52 dBc
330 MHz to 6.6 GHz	187.5 MHz	<-52 dBc
Conditions: -30 dBm input signal; -30 dBm reference level; 0 dB attenuation.		

Non-Input-Related Spurs (Residual Spurs)[5]

10 MHz to 6.6 GHz[6] <-100 dBm, typical

Sideband Spurs[7]

Table 7. Typical Sideband Spurs, >1 kHz to ≤100 kHz Offset

Tuned Frequency	Level
10 MHz to <3.3 GHz	<-65 dBc
3.3 GHz to 6.6 GHz	<-50 dBc
Conditions: 0 dBm input level; 0 dBm reference level; automatic attenuation settings.	

Table 8. Typical Sideband Spurs, >100 kHz Offset

Tuned Frequency	Level
10 MHz to <50 MHz	<-75 dBc
50 MHz to < 3.3 GHz	<-70 dBc
3.3 GHz to 6.6 GHz	<-65 dBc
Conditions: 0 dBm input level; 0 dBm reference level; automatic attenuation settings.	

[4] IF rejection is the suppression of an input signal at the IF frequency when the vector signal analyzer is tuned elsewhere.
[5] Residual responses are the responses observed when no input signal is present.
[6] Input terminated; no input signal; 0 dB attenuation; ≤ -60 dBm reference level; does not include LO leakage.
[7] Sideband spurs are due to system operation and appear on signals being observed.

Input-Related Spurs

Table 9. PXIe-5663E Typical Input-Related Spurs

RF Frequency	Level
10 MHz to <120 MHz	-70 dBc
120 MHz to <330 MHz	-50 dBc
330 MHz to <410 MHz	-35 dBc
410 MHz to <3.3 GHz	-65 dBc
3.3 GHz to 6.6 GHz	-50 dBc
Conditions: 0 dB input level; 0 dBm reference level; automatic attenuation settings.	

LO Leakage[8]

Table 10. Typical LO Leakage at RF Input Port (RF IN)

RF Frequency	Level
10 MHz to <3.0 GHz	<-60 dBm
3.0 GHz to 6.6 GHz	<-55 dBm
Conditions: 0 dB attenuation; -30 dBm reference level.	

Linearity

Third-Order Intermodulation Distortion (Input IP_3 (IIP_3))

Table 11. -20 dBm Reference Level, Typical

Frequency Range	Input IP_3
10 MHz to < 30 MHz	≥5 dBm
30 MHz to <330 MHz	≥7 dBm
330 MHz to <3.0 GHz	≥12 dBm

[8] LO leakage is the local oscillator signal that appears at the RF input port.

Table 11. -20 dBm Reference Level, Typical (Continued)

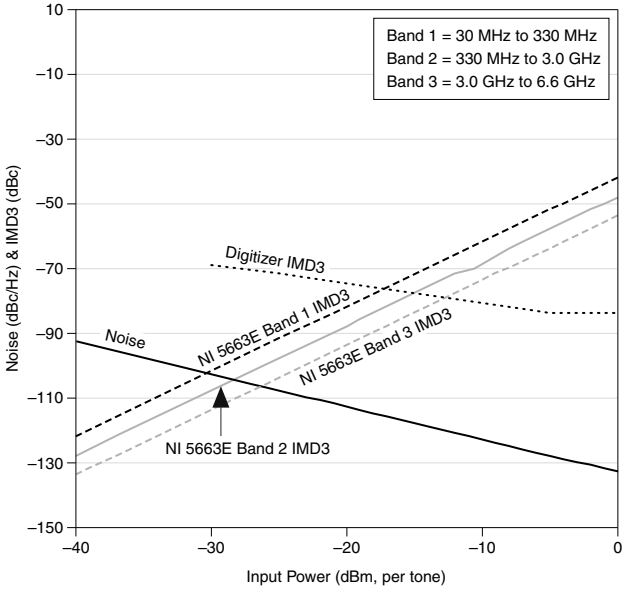
Frequency Range	Input IP_3
3.0 GHz to 6.6 GHz	≥9 dBm
Conditions: Two -24 dBm input tones = 200 kHz apart.	

Table 12. 0 dBm Reference Level, Typical

Frequency Range	Input IP_3
10 MHz to <30 MHz	≥21 dBm
30 MHz to <330 MHz	≥18 dBm
330 MHz to <3.0 GHz	≥21 dBm
3.0 GHz to 6.6 GHz	≥21 dBm
Conditions: Two -4 dBm input tones = 200 kHz apart.	

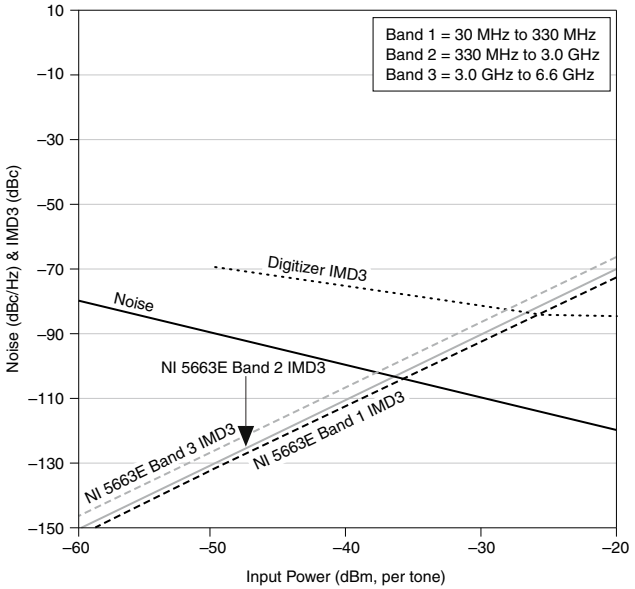
Dynamic Range (Noise and IMD3)[9]

Figure 4. PXIe-5663E Nominal Dynamic Range, 0 dBm Reference Level



[9] Reference level allows 10 dB headroom for single-tone input signals before digitizer clipping occurs.

Figure 5. PXIe-5663E Nominal Dynamic Range, -20 dBm Reference Level



Note The dynamic range plots in the two preceding figures show nominal performance with NI-RFSA automatic coupled settings that are optimized for noise performance. If you use the RF attenuation manual settings, third-order intermodulation distortion (IMD3) performance can improve with minimal degradation in noise floor, thus increasing the effective spurious free dynamic range (sFDR) in the power per tone signal range of -10 dB to 0 dB below reference level.

Modulation

IF Flatness

Table 13. Typical[10] IF Amplitude Flatness, 23 °C ± 5 °C

Tuned Frequency	Bandwidth	Amplitude Flatness
10 MHz to <75 MHz	5 MHz	±0.25 dB
	10 MHz	±0.3 dB

[10] *Typical* represents the worst ripple expected for any reference level setting across the specified frequency range.

Table 13. Typical[10] IF Amplitude Flatness, 23 °C ± 5 °C (Continued)

Tuned Frequency	Bandwidth	Amplitude Flatness
75 MHz to <120 MHz	5 MHz	±0.4 dB
	10 MHz	±0.6 dB
120 MHz to <140 MHz	5 MHz	±0.45 dB
	10 MHz	±0.65 dB
	20 MHz	±0.9 dB
140 MHz to <330 MHz	5 MHz	±0.2 dB
	10 MHz	±0.4 dB
	20 MHz	±0.5 dB
330 MHz to <6.6 GHz	10 MHz	±0.2 dB
	20 MHz	±0.35 dB
	50 MHz	±0.60 dB
Conditions: RF attenuation ≥8 dB, 18 °C to 28 °C, with calibration correction; bandwidth centered about tuned frequency.		

Table 14. Typical[10] IF Amplitude Flatness, 0 °C to 55 °C

Tuned Frequency	Bandwidth	Amplitude Flatness
10 MHz to <75 MHz	5 MHz	±0.3 dB
	10 MHz	±0.45 dB
75 MHz to <120 MHz	5 MHz	±0.35 dB
	10 MHz	±0.6 dB
120 MHz to <140 MHz	5 MHz	±0.55 dB
	10 MHz	±0.85 dB
	20 MHz	±1.1 dB

[10] *Typical* represents the worst ripple expected for any reference level setting across the specified frequency range.

Table 14. Typical[10] IF Amplitude Flatness, 0 °C to 55 °C (Continued)

Tuned Frequency	Bandwidth	Amplitude Flatness
140 MHz to <330 MHz	5 MHz	±0.35 dB
	10 MHz	±0.8 dB
	20 MHz	±0.8 dB
330 MHz to <6.6 GHz	10 MHz	±0.25 dB
	20 MHz	±0.4 dB
	50 MHz	±0.7 dB
Conditions: RF attenuation ≥8 dB, 0 °C to 55 °C, with calibration correction; bandwidth about tuned frequency.		

IF Phase Linearity

Table 15. Typical PXIe-5663E IF Phase Linearity

Tuned Frequency	Bandwidth	Maximum Phase Deviation[11]
10 MHz to <120 MHz	10 MHz	±3.0 degrees
120 MHz to <330 MHz	10 MHz	±1.5 degrees
	20 MHz	±5.0 degrees
330 MHz to 6.6 GHz	10 MHz	±1.0 degree
	20 MHz	±2.0 degrees
	40 MHz	±3.0 degrees
	50 MHz	±4.5 degrees

[11] Measured at 23 °C ambient temperature.

Error Vector Magnitude (EVM) and Modulation Error Ratio (MER)

Table 16. Nominal EVM and MER[12], 825 MHz Carrier Frequency

QAM Order	Symbol Rate (kS/s)	α_{RRC}	EVM (% RMS)	MER (dB)
M = 4	160	0.25	0.3	52
	800	0.25	0.4	49
	4,090	0.22	0.5	46
M = 16	17,600	0.25	0.7	41
	32,000	0.25	1.0	37
M = 64	5,360	0.15	0.4	44
	6,952	0.15	0.5	43
	40,990	0.22	1.1	35
M = 256	6,952	0.15	0.4	43

Table 17. Nominal EVM and MER[12], 3.4 GHz Carrier Frequency

QAM Order	Symbol Rate (kS/s)	α_{RRC}	EVM (% RMS)	MER (dB)
M = 4	160	0.25	0.65	44
	800	0.25	0.65	44
	4,090	0.22	0.74	43
M = 16	17,600	0.25	1.13	36
	32,000	0.25	1.94	32
M = 64	5,360	0.15	0.59	41
	6,952	0.15	0.66	40
	40,990	0.22	2.15	30
M = 256	6,952	0.15	0.64	40

[12] Data length is 1,250 symbols pseudorandom bit sequence (PRBS) at -30 dBm power level. These results were obtained using the PXIe-5663E onboard clock (the PXIe-5652 LO source onboard clock) and do not include software equalization using the NI Modulation Toolkit. Results are the composite effect of both the PXIe-5663E and the PXIe-5673 Vector Signal Generator.

Table 18. Nominal EVM and MER[12], 5.8 GHz Carrier Frequency

QAM Order	Symbol Rate (kS/s)	α_{RRC}	EVM (% RMS)	MER (dB)
M = 4	160	0.25	0.89	41
	800	0.25	0.85	41
	4,090	0.22	1.04	40
M = 16	17,600	0.25	1.49	34
	32,000	0.25	2.00	31
M = 64	5,360	0.15	0.83	38
	6,952	0.15	0.90	37
	40,990	0.22	2.06	30
M = 256	6,952	0.15	1.00	36

Measurement Speed

Tuning Time[13]

Table 19. Nominal Tuning Time

Accuracy	Tuning Time[14]	
	Narrow Loop Bandwidth	Wide Loop Bandwidth
0.1×10^{-6} of final frequency, 0.1 dB of final amplitude	6.0 ms	3.7 ms
0.01×10^{-6} of final frequency, 0.1 dB of final amplitude	13.1 ms	10.3 ms

[13] Measurement time is made up of tuning time plus analysis time. Tuning time includes programming time, frequency settling time, and amplitude settling time. Programming time partially overlaps frequency settling time and amplitude settling time. Measurement time is dependent on the specific measurement settings used.

[14] Typical for tuning between any two frequencies excluding transitions that cross the 120 MHz and 330 MHz frequency boundaries.

RF Configuration List Mode Tuning Time

Table 20. Nominal RF Configuration List Mode Tuning Time

Accuracy	Tuning Time[15]
0.1×10^{-6} of final frequency, 0.1 dB of final amplitude	450 µs
0.01×10^{-6} of final frequency, 0.1 dB of final amplitude	600 µs

Frequency Settling Time[16]

Table 21. Nominal Frequency Settling Time

Accuracy	Frequency Settling Time[17]
0.1×10^{-6} of final frequency	1.5 ms
0.01×10^{-6} of final frequency	6.5 ms

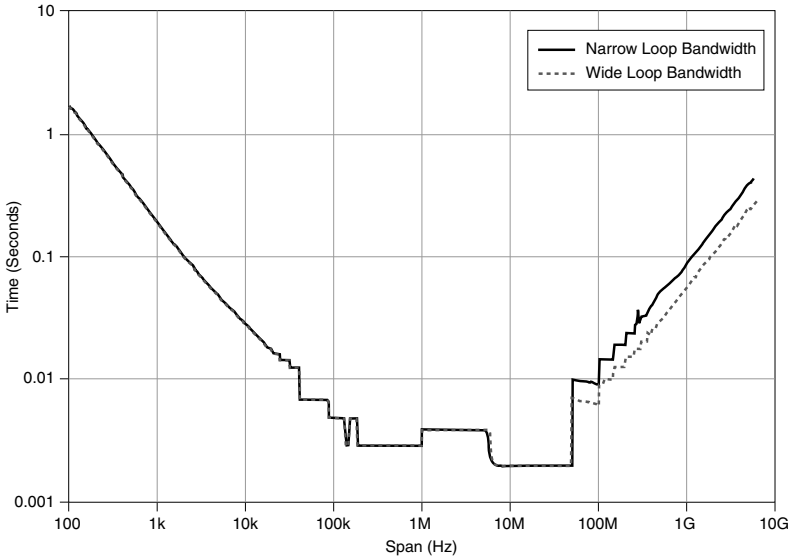
Amplitude Settling Time[18]

Nominal amplitude settling time	
Reference level step size[19]	All
Accuracy	0.1 dB of final amplitude
Amplitude settling time[20]	50 µs, 5 ms

15 Typical for tuning between any two frequencies, excluding transitions that cross the 120 MHz, 330 MHz, and 3 GHz frequency boundaries using Wide Loop bandwidth.
16 Frequency and amplitude settling times partially overlap.
17 Typical for tuning between any two frequencies. You can reduce settling time using a wide downconverter loop bandwidth.
18 Frequency and amplitude settling times partially overlap.
19 Settled within 0.15 dB in 1 ms for frequency transitions across 3 GHz or 0.4 dB in 10 ms for frequency transitions across 120 MHz or 330 MHz.
20 Mechanical attenuator not used.

Analysis Time versus Span

Figure 6. PXIe-5663E Nominal Measurement Time[21]



Data Streaming[22]

Maximum continuous transfer rate	300 MB/s, nominal

Input and Output Characteristics

IF/Baseband (PXIe-5622)

Resolution	16 bits
System IF frequency range	187.5 MHz ± 25 MHz[23] or 53 MHz ± 10 MHz[24]
Sample rate	150 MS/s

[21] Measured with a tuned frequency ≥330 MHz. 190 frequency points measured below 1 MHz span; 1,000 frequency points measured above 1 MHz span. Analysis time includes acquisition, FFT analysis, and data transfer time. For spans > 50 MHz, analysis time also includes tuning time.

[22] Data streaming specification measured using the PXIe-1065 chassis and the PXIe-8130 controller. Performance is system dependent.

[23] When input RF frequency is ≥10 MHz to <120 MHz, and ≥330 MHz to 6.6 GHz.

[24] When input RF frequency is ≥120 MHz to <330 MHz.

Digital downconverter (OSP) bandwidth	Adjustable between 60 MHz and 0.9 kHz using 150 MS Sample clock timebase.[25]
Onboard memory	64 MB, 256 MB

Note Refer to the *PXIe-5622 Specifications* for additional IF/baseband and onboard signal processing (OSP) specifications.

PXIe-5601

RF IN (PXIe-5601)

Connector	SMA female
Impedance	50 Ω, nominal
Coupling	AC
Maximum safe DC input voltage	±5 V, nominal

Maximum Safe Continuous RF Power Level (PXIe-5601)

RF attenuation enabled (≥ 8 dB)	+30 dBm
RF attenuation disabled (0 dB)	+20 dBm

Voltage Standing Wave Ratio (VSWR)

Table 22. PXIe-5601 VSWR, Nominal

Attenuation	Frequency	VSWR
Enabled (≥8 dB)[26]	10 MHz to <1.3 GHz	1.4:1
	1.3 GHz to <5.0 GHz	2.0:1
	5.0 GHz to 6.6 GHz	3.0:1
Disabled (0 dB)	10 MHz to <5.0 GHz	2.0:1
	5.0 GHz to 6.6 GHz	3.0:1

IF OUT (PXIe-5601)

Connector	SMA female
Impedance	50 Ω, nominal
Coupling	AC

[25] The OSP bandwidth is 0.4 times the sample rate in real acquisition mode, where sample rate varies between 150 MS/s to 2.289 kS/s.

[26] Available in 1 dB steps.

Amplitude	4 dBm, digitizer full-scale, -6 dBm, nominal, with reference level input
Maximum IF output level	+23 dBm
Maximum reverse power level	+20 dBm
Maximum safe DC voltage	±5 V
IF center frequency	53 MHz, 187.5 MHz[27], or Bypass[28], nominal
VSWR	
53 MHz	2.1:1
187.5 MHz	1.65:1
Bypass	1.4:1[28]

LO IN and LO OUT (PXIe-5601)

Connector	SMA female
Impedance	50 Ω, nominal
Coupling	AC
Frequency	173 MHz to 6.4125 GHz, nominal
Amplitude	0 dBm, nominal, input and output
Maximum safe RF input level	+20 dBm
Maximum reverse power level	+20 dBm
Maximum safe DC voltage	±5 V
LO input to output noise figure	15 dB, nominal

PXIe-5622 Front Panel Connectors

IF IN (PXIe-5622)

Connector	SMA female
Impedance	50 Ω

PF1 (PXIe-5622)

Connector	SMB
Impedance	150 kΩ

[27] Dependent on frequency range of RF input signal.
[28] 10 MHz to 300 MHz.

CLK IN (PXIe-5622)

Connector	SMA female
Impedance	50 Ω
Peak-to-peak input amplitude, sine wave	0.63 V to 2.8 V (0 dBm to +13 dBm)
Peak-to-peak input amplitude, square wave	0.25 V to 2.8 V
Peak-to-peak maximum input overload	6.3 V (+20 dBm)

CLK OUT (PXIe-5622)

Connector	SMA
Output impedance	50 Ω
Output amplitude, 50 Ω load	> +10 dBm
Peak-to-peak output amplitude, 1 kΩ load	>2 V

PXIe-5652 Front Panel Connectors

RF OUT (PXIe-5652)

Connector	SMA female
Impedance	50 Ω

REF IN/OUT (PXIe-5652)

Connector	SMA female
Impedance	50 Ω
Peak-to-peak input amplitude	0.2 V to 1.5 V (50 Ω)
Peak-to-peak maximum safe input level	5 V
Input frequency range	10 MHz ± 100 Hz
Peak-to-peak output amplitude	1.0 V (50 Ω)
Output frequency	10 MHz

REF OUT2 (PXIe-5652)

Connector	SMA female
Impedance	50 Ω
Peak-to-peak input amplitude	0.2 V to 1.5 V (50 Ω)
Peak-to-peak maximum safe input level	5 V
Input frequency range	10 MHz ± 100 Hz

Peak-to-peak output amplitude	1.0 V (50 Ω)
Output frequency	10 MHz

Power Requirements

Table 23. Nominal Power Requirements

Module	+3.3 VDC	+5 VDC	+12 VDC	-12 VDC
PXIe-5601	640 mA	—	740 mA	—
PXIe-5622	1.75 A	—	2.25 A	—
PXIe-5652	1.00 A	—	1.00 A	—

Note Voltages ±5%.

Calibration

Interval	1 year[29]

Physical Characteristics

Dimensions	
PXIe-5601	3U, One Slot, PXI Express module, 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)
PXIe-5622	3U, One Slot, PXI Express module, 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)
PXIe-5652	3U, One Slot, PXI Express module, 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)
Weight	
PXIe-5601	454 g (16.0 oz)
PXIe-5622	376 g (13.3 oz)

[29] Calibration interval applies to the PXIe-5601, PXIe-5622, and PXIe-5652.

PXIe-5652	415 g (14.6 oz)
Combined unit	1,245 g (43.9 oz)

Environment

Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution Degree	2

Indoor use only.

Operating Environment

Ambient temperature range	0 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Storage Environment

Ambient temperature range	-40 °C to 71 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)
Relative humidity range	5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Shock and Vibration

Operating shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g_{rms} (Tested in accordance with IEC 60068-2-64.)
Nonoperating	5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Compliance and Certifications

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations, certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit *ni.com/certification*, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at *ni.com/environment*. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

电子信息产品污染控制管理办法（中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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