



PXle-5698

Specifications



Provided by:

Test & Measurement Automation

Embedded Control & Monitoring

Cyth Systems
9939 Via Pasar
San Diego, CA 92126

phone (858) 537-1960
support@cyth.com



Authorized
Distributor



Integration
Partner

Contents

PXIe-5698 Specifications 3

PXIe-5698 Specifications

Definitions

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

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% ($\approx 2\sigma$) of models with a 95% confidence.
- **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.

- Over ambient temperature ranges of 0 °C to 55 °C.
- 30 minutes warm-up time.
- Calibration cycle maintained.
- Chassis fan speed set to High. NI recommends using slot blockers and EMC filler panels in empty module slots to minimize temperature drift and reduce emissions.
- NI-RFSA instrument driver is used.

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

- Over ambient temperature ranges of 23 °C $\pm$ 5 °C.

Amplitude

Minimal Gain

Table 1. PXIe-5698 Minimal Gain (Specification)

Frequency Range	23 °C ± 5 °C		0 °C to 55 °C	
	Preamplifier Enabled (dB)	Preamplifier Disabled (dB)	Preamplifier Enabled (dB)	Preamplifier Disabled (dB)
10 MHz to 200 MHz	≥23	≥-0.8	≥22	≥-0.8
>200 MHz to 1 GHz	≥32	≥-1.0	≥31	≥-1.0
>1 GHz to 2 GHz	≥32	≥-1.0	≥31	≥-1.0
>2 GHz to 3 GHz	≥29	≥-1.0	≥28	≥-1.0
>3 GHz to 3.6 GHz	≥26	≥-1.0	≥25	≥-1.3
>3.6 GHz to 6 GHz	≥23	≥-1.3	≥22	≥-1.4
>6 MHz to 9 GHz	≥20	≥-1.4	≥19	≥-1.5
>9 GHz to 14 GHz	≥16	≥-2.0	≥15	≥-2.4
>14 GHz to 20 GHz	≥13	≥-2.3	≥13	≥-2.8
>20 GHz to 24 GHz	≥11	≥-2.3	≥10	≥-2.8
>24 GHz to 26 GHz	≥10	≥-2.6	≥8	≥-3.4

Values with preamplifier enabled are based on the stand-alone PXIe-5698 module.

Values with preamplifier disabled reflect insertion loss, as setting preamplifier to disabled bypasses

Frequency Range	23 °C ± 5 °C		0 °C to 55 °C	
	Preamplifier Enabled (dB)	Preamplifier Disabled (dB)	Preamplifier Enabled (dB)	Preamplifier Disabled (dB)
the amplifier stages.				

Noise Figure

Table 2. PXIe-5698 Noise Figure (Nominal)

Frequency Range	23 °C ± 5 °C (dB)
10 MHz to 200 MHz	≤3.1
>200 MHz to 1 GHz	≤3.6
>1 GHz to 1.7 GHz	≤3.9
>1.7 GHz to 2.6 GHz	≤4.5
>2.6 GHz to 3.6 GHz	≤5.2
>3.6 GHz to 6 GHz	≤5.0
>6 GHz to 10 GHz	≤5.8
>10 GHz to 14 GHz	≤6.6
>14 GHz to 20 GHz	≤8.8
>20 GHz to 24 GHz	≤11.2
>24 GHz to 26.5 GHz	≤12.6
Values are based on the Noise Figure Y factor method.	

Table 3. PXIe-5668 with PXIe-5698 Noise Figure, Preamplifier Enabled, Preselector Enabled (Nominal)

Frequency Range	23 °C ± 5 °C (dB)
10 MHz to 200 MHz	≤6.2
>200 MHz to 1 GHz	≤5.2
>1 GHz to 1.7 GHz	≤5.2

Frequency Range	23 °C ± 5 °C (dB)
>1.7 GHz to 2.6 GHz	≤6.2
>2.6 GHz to 3.6 GHz	≤7.7
>3.6 GHz to 6 GHz	≤6.7
>6 GHz to 10 GHz	≤6.7
>10 GHz to 14 GHz	≤9.2
>14 GHz to 20 GHz	≤10.7
>20 GHz to 24 GHz	≤14.2
>24 GHz to 26.5 GHz	≤17.7
Values are based on the Average Noise Level -174.2 dBm/Hz with offset for log averaging and window scale [dB].	

Average Noise Level

Table 4. PXIe-5668 with PXIe-5698 Average Noise Level, Preamplifier Enabled, Preselector Disabled (Typical)

Frequency Range	23 °C ± 5 °C (dBm/Hz)	0 °C to 55 °C (dBm/Hz)
10 MHz to 200 MHz	≤-169	≤-169
>200 MHz to 1.7 GHz	≤-170	≤-169
>1.7 GHz to 3 GHz	≤-170	≤-168
>3 GHz to 3.6 GHz	≤-167	≤-166
>3.6 GHz to 5 GHz	≤-167	≤-166
>5 GHz to 8 GHz	≤-166	≤-165
>8 GHz to 14 GHz	≤-163	≤-162
>14 GHz to 17 GHz	≤-162	≤-161
>17 GHz to 24 GHz	≤-158	≤-157
>24 GHz to 26.5 GHz	≤-157	≤-155

Frequency Range	23 °C ± 5 °C (dBm/Hz)	0 °C to 55 °C (dBm/Hz)
Values are based on input-terminated, 5 dB RF attenuation, with the preamplifier enabled and preselector disabled, ≤-90 dBm reference level, and >10 averages. Log averaging noise level is normalized to a 1 Hz noise bandwidth.		

Table 5. PXIe-5668 with PXIe-5698 Average Noise Level, Preamplifier Enabled, Preselector Enabled (Typical)

Frequency Range	23 °C ± 5 °C (dB)	0 °C to 55 °C (dB)
	Preamplifier Enabled (dBm/Hz)	Preamplifier Enabled (dBm/Hz)
>3.6 GHz to 5 GHz	≤-169	≤-168
>5 GHz to 8 GHz	≤-169	≤-168
>8 GHz to 14 GHz	≤-165	≤-164
>14 GHz to 17 GHz	≤-164	≤-163
>17 GHz to 24 GHz	≤-160	≤-159
>24 GHz to 26.5 GHz	≤-158	≤-156
Values are based on input-terminated, 5 dB RF attenuation, with the preamplifier enabled and preselector enabled, ≤-90 dBm reference level, and >10 averages. Log averaging noise level is normalized to a 1 Hz noise bandwidth.		

Table 6. PXIe-5668 with PXIe-5698 Average Noise Level, Preamplifier Disabled, Preselector Disabled (Typical)

Frequency Range	23 °C ± 5 °C (dBm/Hz)	0 °C to 55 °C (dBm/Hz)
10 MHz to 200 MHz	≤-153	≤-153
>200 MHz to 1.7 GHz	≤-155	≤-152
>1.7 GHz to 3 GHz	≤-153	≤-150
>3 GHz to 3.6 GHz	≤-150	≤-147
>3.6 GHz to 5 GHz	≤-158	≤-156
>5 GHz to 8 GHz	≤-157	≤-155

Frequency Range	23 °C ± 5 °C (dBm/Hz)	0 °C to 55 °C (dBm/Hz)
>8 GHz to 14 GHz	≤-155	≤-153
>14 GHz to 17 GHz	≤-150	≤-148
>17 GHz to 24 GHz	≤-152	≤-150
>24 GHz to 26.5 GHz	≤-149	≤-147

Values are based on input-terminated, 5 dB RF attenuation, with the preamplifier disabled and preselector disabled, ≤-90 dBm reference level, and >10 averages. Log averaging noise level is normalized to a 1 Hz noise bandwidth.

Absolute Amplitude Accuracy

Table 7. PXIe-5668 with PXIe-5698 Absolute Amplitude Accuracy (Typical)

Frequency Range	23 °C ± 5 °C		0 °C to 55 °C	
	Preamplifier Enabled (dBm)	Preamplifier Disabled (dBm)	Preamplifier Enabled (dBm)	Preamplifier Disabled (dBm)
10 MHz to 700 MHz	±0.8	±0.8	±1.2	±1.4
>700 MHz to 1.7 GHz	±0.8	±0.8	±1.2	±1.4
>1.7 GHz to 3.6 GHz	±0.8	±1.0	±1.5	±2.0
>3.6 GHz to 5 GHz	±1.2	±1.2	±1.5	±2.0
>5 GHz to 14 GHz	±1.4	±1.4	±2.0	±2.5
>14 GHz to 20 GHz	±1.6	±1.4	±3.0	±2.5
>20 GHz to 26.5 GHz	±2.0	±1.8	±3.5	±3.2

Values are based on -35 dBm to -55 dBm reference level, 5 dB RF attenuation, 300 kHz IF filter for

Frequency Range	23 °C ± 5 °C		0 °C to 55 °C	
	Preamplifier Enabled (dBm)	Preamplifier Disabled (dBm)	Preamplifier Enabled (dBm)	Preamplifier Disabled (dBm)
center frequency <100 MHz, 100 MHz IF filter for center frequency ≥100 MHz, with preamplifier disabled and preselector disabled, and using automatic calibration correction of the NI-RFSA instrument driver within ±5 °C of the temperature at the last calibration. The absolute amplitude accuracy is measured at the center frequency, after the hardware has settled. The high band to low band signal path transitions can take up to 200 ms for hardware to settle to within 0.1 dB of the final amplitude.				

Spurious Responses

Non-Input Related (Residual) Spurs^[1]

Table 8. PXle-5668 with PXle-5698 Non-Input Related Spurs (Nominal) (23 °C ± 5 °C)

Frequency Range	Preamplifier Enabled (dBm)	Preamplifier Disabled (dBm)
100 MHz to 3.6 GHz	≤-131	≤-115
>3.6 GHz to 11 GHz	≤-120	≤-115
>11 GHz to 26.5 GHz	≤-115	≤-105
Values use 300 kHz and 5 MHz IF bandwidth, RF input terminated, -60 dBm reference level, 5 dB RF attenuation with preamplifier enabled and 0 dB RF attenuation with preamplifier disabled. The PXle-5668 preselector is disabled.		

Image Rejection

Table 9. PXle-5668 with PXle-5698 RF Image Rejection (Nominal) (23 °C ± 5 °C)

Frequency Range	Preamplifier Enabled (dBc)	Preamplifier Disabled (dBc)
100 MHz to 350 MHz	-78	-97
>350 MHz to 1 GHz	-97	-97

Frequency Range	Preamplifier Enabled (dBc)	Preamplifier Disabled (dBc)
>1 GHz to 3.6 GHz	-97	-97
>3.6 GHz to 14 GHz	-88	-88
>14 GHz to 26.5 GHz	-82	-85
Values are based on -35 dBm input signal and reference level, 5 dB RF attenuation with preamplifier enabled, and -15 dBm input signal and reference level, 10 dB RF attenuation with preamplifier disabled. For frequencies <3.6 GHz, the IF filter is either 100 MHz or 320 MHz. For frequencies >3.6 GHz, the preselector is enabled and the IF filter is 100 MHz.		

Linearity

Third-Order Intermodulation Distortion

Table 10. PXle-5668 with PXle-5698 Third-Order Intermodulation Distortion, Preamplifier Enabled (Typical)

Frequency Range	23 °C ± 5 °C (dBm)
10 MHz to 500 MHz	-9
>500 MHz to 3.6 GHz	-13
>3.6 GHz to 5 GHz	-7.5
>5 GHz to 7.5 GHz	-7
>7.5 GHz to 14 GHz	-7.5
>14 GHz to 17 GHz	-11
>17 GHz to 26.5 GHz	-14
Values are based on two -35 dBm tones spaced at 700 kHz apart, 5 dB RF attenuation, -35 dBm reference level, and the 300 kHz filter. Mixer level is equivalent to input signal level minus RF attenuation plus nominal preamplifier gain. For center frequencies greater than 3.6 GHz, the preselector is enabled.	

Second Harmonic Intercept

Table 11. PXIe-5668 with PXIe-5698 Second Harmonic Intercept, Preamplifier Enabled (Typical)

Frequency Range	23 °C ± 5 °C
10 MHz to 300 MHz	+8
>300 MHz to 1 GHz	+9
>1 GHz to 1.8 GHz	+2
>1.8 GHz to 2 GHz	+2
>2 GHz to 9 GHz	+4
>9 GHz to 13.25 GHz	-4

Values are based on a -35 dBm mixer level, 5 dB RF attenuation, and 300 kHz IF filter.

Mixer level is equivalent to input signal level minus RF attenuation plus nominal preamplifier gain. For center frequencies greater than 3.6 GHz, the preselector is enabled.

Gain Compression

Table 12. PXIe-5668 with PXIe-5698 Gain Compression, Preamplifier Enabled (Typical)

Frequency Range	23 °C ± 5 °C (dBm)
10 MHz to 3 GHz	-26
>3 GHz to 3.6 GHz	-25
>3.6 GHz to 17 GHz	-18
>17 GHz to 26.5 GHz	-24

Values with preamplifier enabled are based on a two-tone technique, tone separation is greater than one and a half times the instantaneous bandwidth, 5 dB RF attenuation, -35 dBm reference level, and 300 kHz IF filter. For center frequencies greater than 3.6 GHz, the preselector is enabled.

Input and Output Characteristics

RF IN and RF OUT Front Panel Connectors

Connectors	2.92 mm female
Impedance	50 Ω (nominal)
Coupling	AC and DC
Maximum DC Input	± 10 V
Maximum DC Output	0 V

NOISE SOURCE Front Panel Connector

Connector	HD BNC
Noise source On	+28 VDC
Noise source Off	0 VDC

Voltage Standing Wave Ratio (VSWR)

Table 13. PXIe-5698 VSWR (Nominal)

Frequency Range	Preamplifier Disabled		Preamplifier Enabled	
	Input VSWR	Output VSWR ^[2]	Input VSWR	Output VSWR ^[2]
10 MHz to 1 GHz	1.3	1.3	1.5	1.5
>1 GHz to 2 GHz	1.3	1.3	1.8	1.5
>2 GHz to 3.6 GHz	1.3	1.3	2.3	1.5
>3.6 GHz to 14 GHz	1.3	1.3	2.7	2.2
>14 GHz to 20 GHz	1.5	1.5	3.0	2.3
>20 GHz to 26.5 GHz	1.6	1.6	3.5	2.9

Power

Power Requirements

Table 14. PXIe-5698 Power Requirements

From +3.3 VDC (W)	From +12 VDC (W)	Total (W)
6.93	26.4	33.33

Power Limits

Table 15. PXIe-5698 Power Limits (Nominal)

Signal Path	Maximum Continuous Safe RF Power (dBm)
Preamplifier Enabled	10
Preamplifier Disabled	30

Calibration

Interval	2 years
----------	---------



Note For module revision D and above, use NI-RFSG 20.7 or later to perform an external calibration as described in the ***Adjusting RF OUT Power*** section of the ***PXle-5654 Calibration Procedure***.

Physical Characteristics

Dimensions and Weight

Dimensions	3U, single-slot, PXI Express module, 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)
Weight	500 g, (17.6 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
Relative humidity range	10% to 90%, noncondensing

Storage Environment

Ambient temperature range	-40 °C to 71 °C
Relative humidity range	5% to 95%, noncondensing

Shock and Vibration

Operating shock	30 g peak, half-sine, 11 ms pulse
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g _{rms}
Nonoperating	5 Hz to 500 Hz, 2.4 g _{rms}

Compliance and Certifications

Safety Compliance Standards

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 safety certifications, refer to the product label or the [Product Certifications and Declarations](#) 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 [Product Certifications and Declarations](#) section.

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

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 ***Engineering a Healthy Planet*** 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.

EU and UK Customers

-  **Waste Electrical and Electronic Equipment (WEEE)**—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RoHS**—NI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NI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.)