

SPECIFICATIONS

PXI-5690

RF Amplifier

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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 *Typical* unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- 15-minute warm-up time at 25 °C ambient temperature.
- Calibration cycle maintained
- 100 kHz to 3.0 GHz

Frequency Range

| | |
|-----------------|--------------------|
| Frequency range | 100 kHz to 3.0 GHz |
|-----------------|--------------------|

Channels

| | |
|--------------------|---|
| Number of channels | 2 |
|--------------------|---|

Gain

| | |
|-----------|-------|
| Channel 0 | Fixed |
|-----------|-------|

| | |
|-----------|--------------|
| Channel 1 | Programmable |
|-----------|--------------|

Channel 0 (CH 0)

Channel 0 (CH 0) Main Path

| | |
|---------------------------|----------------------|
| Gain calibration accuracy | ±0.4 dB ¹ |
|---------------------------|----------------------|

| | |
|-------------------------------|-----------------------|
| Gain variation by temperature | Less than -0.03 dB/°C |
|-------------------------------|-----------------------|

| | |
|----------------------|---------|
| Maximum output power | +20 dBm |
|----------------------|---------|

| | |
|-------------------------|------------------|
| Output 1 dB compression | +18 dBm, typical |
|-------------------------|------------------|

| | |
|---------------------------|------------------|
| Second harmonic at +4 dBm | -40 dBc, typical |
|---------------------------|------------------|

¹ Under 500 kHz, ±1.5 dB. For all frequencies, degrades by ±0.03 dB/°C outside by 15 °C to 35 °C temperature range.

Survival input power -10 dBm, maximum

DC voltage at input ± 20 V, maximum²

Channel 0 Performance

Figure 1. Gain³

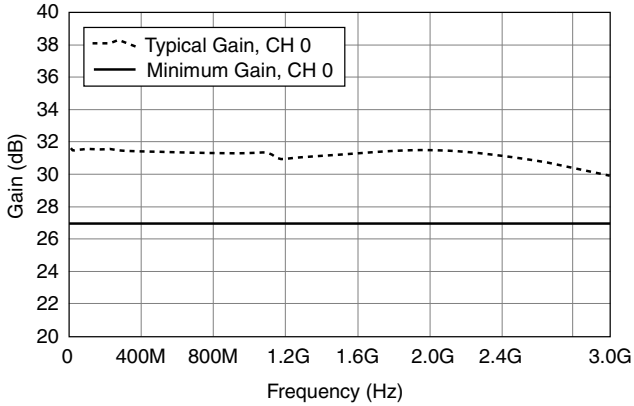
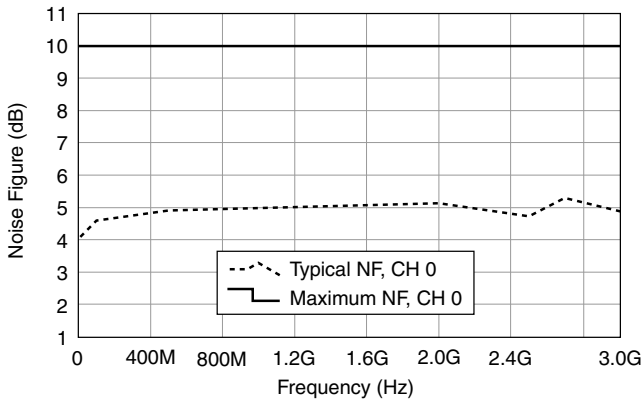


Figure 2. Noise Figure (NF)⁴



² Nondamaging for steady-state DC only. Direct path passes input DC level to output.

³ Typical flatness ± 0.5 dB.

⁴ For all frequencies, typical NF variation of ≤ 0.8 dB across entire operating temperature range.

Figure 3. Input and Output Voltage Standing Wave Ratio (VSWR)

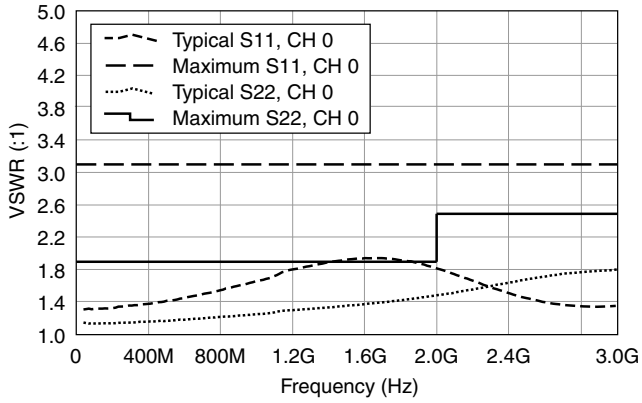
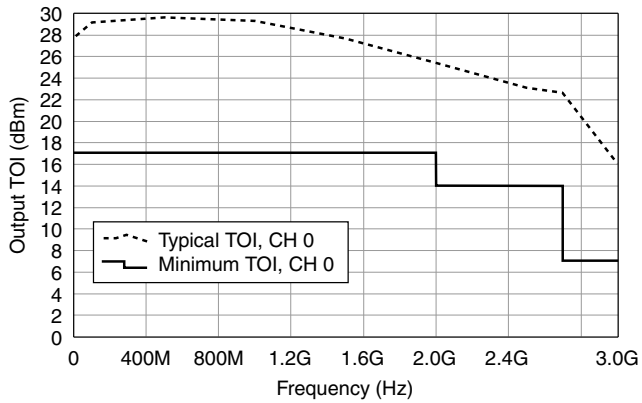
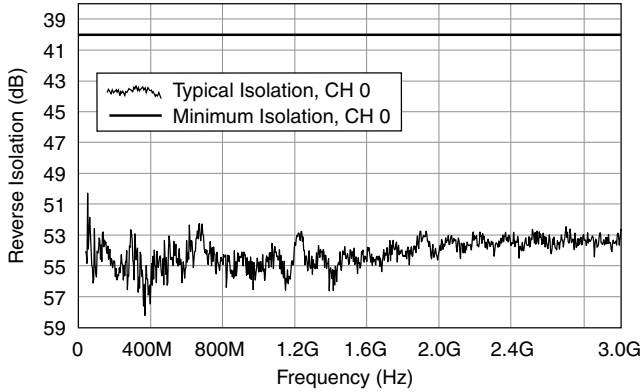


Figure 4. Output Third Order Intercept (TOI)⁵



⁵ For all frequencies, typical TOI variation of ≤ 2.5 dB across entire operating temperature range.

Figure 5. Reverse Isolation



Channel 1

Channel 1 (CH 1) Main Path

| | |
|-------------------------------|-------------------------------------|
| Gain calibration accuracy | ± 0.4 dB ⁶ |
| Gain variation by temperature | Less than -0.03 dB/ $^{\circ}$ C |
| Maximum output power | +20 dBm |
| Output 1 dB compression | +16 dBm, typical |
| Second harmonic at +4 dBm | -40 dBc, typical |
| Survival input power | +20 dBm, maximum (with attenuation) |
| DC voltage at input | ± 20 V, maximum ⁷ |

⁶ Under 500 kHz, ± 1.5 dB. For all frequencies, degrades by ± 0.03 dB/ $^{\circ}$ C outside by 15 $^{\circ}$ C to 35 $^{\circ}$ C temperature range.

⁷ Nondamaging for steady-state DC only. Direct path passes input DC level to output.

Channel 1 Performance, Main Path

Figure 6. Programmable Gain Range⁸

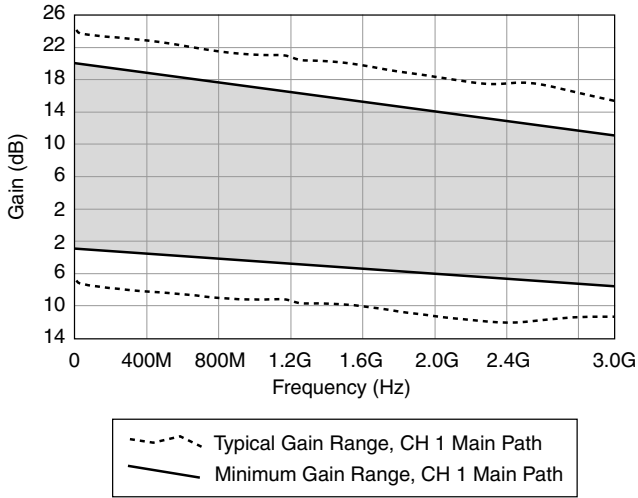
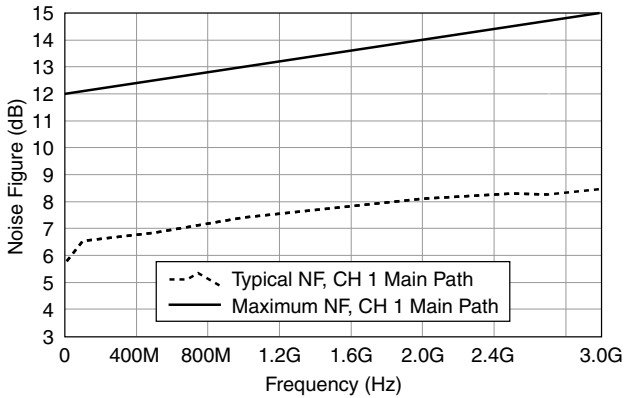


Figure 7. Noise Figure (NF)⁹



⁸ Available in nominal 1 dB steps.

⁹ For all frequencies, typical NF variation of ≤ 0.8 dB across entire operating temperature range.

Figure 8. Input and Output VSWR

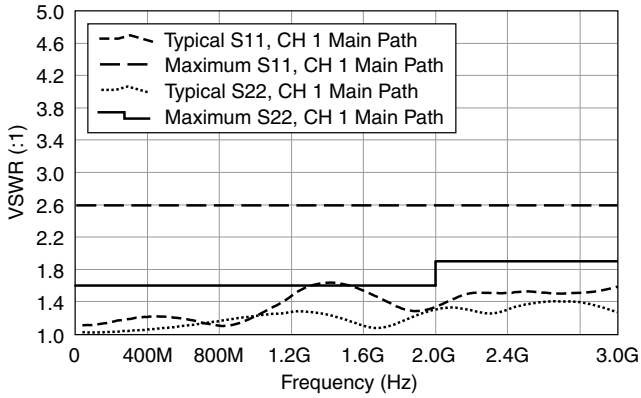
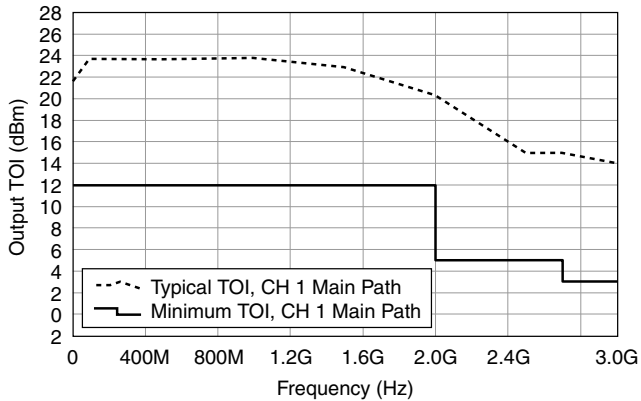
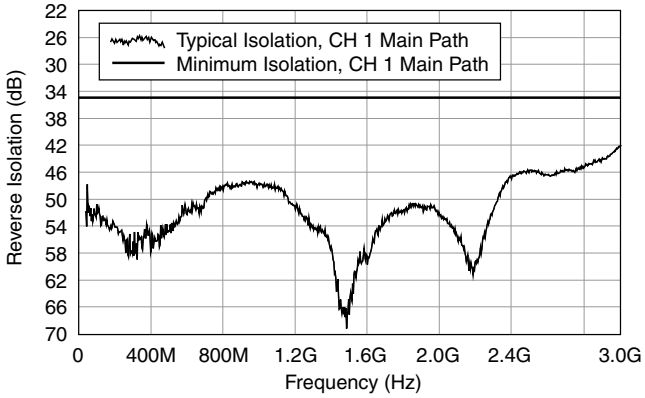


Figure 9. Output TOI ¹⁰



¹⁰ For all frequencies, typical TOI variation of ≤ 2.5 dB across entire operating temperature range.

Figure 10. Reverse Isolation



Channel 1 (CH 1) Direct Path

| | |
|-------------------------------------|-------------------------------------|
| Insertion loss calibration accuracy | ± 0.4 dB ¹¹ |
| Survival input power | +20 dBm, maximum (with attenuation) |
| DC voltage at input | ± 20 V, maximum ¹² |

¹¹ Under 500 kHz, ± 1.5 dB. For all frequencies, degrades by ± 0.03 dB/°C outside by 15 °C to 35 °C temperature range.

¹² Nondamaging for steady-state DC only. Direct path passes input DC level to output.

Channel 1 Performance, Direct Path

Figure 11. Insertion Loss

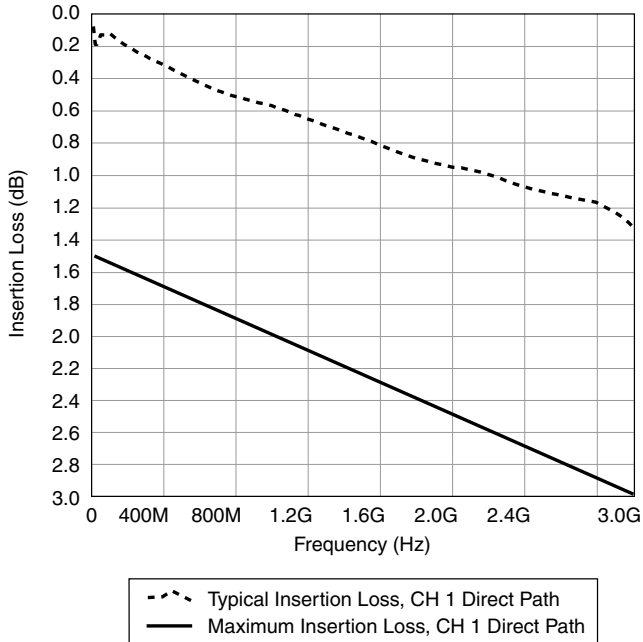
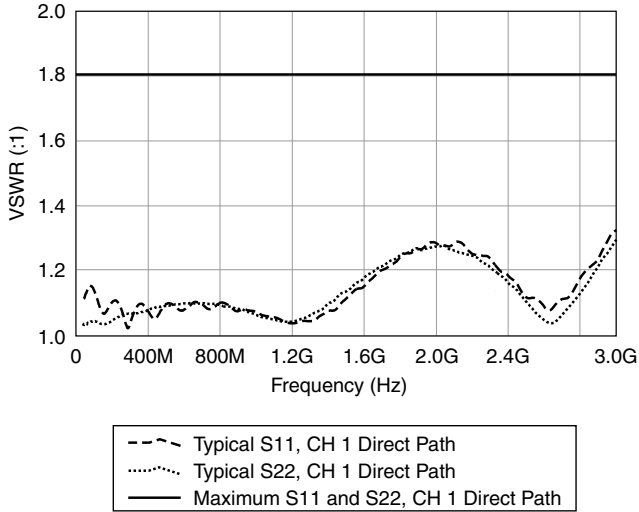


Figure 12. Input and Output VSWR



Power Requirements

| Power Rail (V _{DC}) | Maximum Current (mA) | Typical Current (mA) |
|-------------------------------|----------------------|----------------------|
| +3.3 | 150 | 110 |
| +5 | 0 | 0 |
| +12 | 350 | 300 |
| -12 | 10 | 3 |

Calibration

Interval 1 year

Physical Characteristics

Front Panel Connectors

CH 0 IN

| | |
|-----------------|------------------|
| Connector | SMA female |
| Impedance | 50 Ω |
| Coupling | AC |
| Input amplitude | -10 dBm, maximum |

CH 0 OUT

| | |
|------------------|------------------|
| Connector | SMA female |
| Impedance | 50 Ω |
| Output amplitude | +20 dBm, maximum |

CH 1 IN

| | |
|--------------------|---|
| Connector | SMA female |
| Impedance | 50 Ω |
| Main path coupling | AC ¹³ |
| Input amplitude | +20 dBm, maximum (with attenuation) ¹⁴ |

CH 1 OUT

| | |
|------------------|------------------|
| Connector | SMA female |
| Impedance | 50 Ω |
| Output amplitude | +20 dBm, maximum |

Physical Dimensions

| | |
|------------|--|
| Dimensions | 3U, One Slot, PXI/cPCI Module 21.6 cm \times 2.0 cm \times 13.0 cm (8.5 in. \times 0.8 in. \times 5.1 in.) |
| Weight | 263 g (9.2 oz) |

¹³ Direct path passes input DC level to output.

¹⁴ To achieve required level of attenuation, set gain to ≤ 15 dB for input frequencies ≤ 1.5 GHz or set gain to ≤ 10 dB for input frequencies > 1.5 GHz.

Environment

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

Indoor use only.

Operating Environment

| | |
|---------------------------|---|
| Ambient temperature range | 0 to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.) |
| Relative humidity range | 10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.) |

Storage Environment

| | |
|---------------------------|--|
| Ambient temperature range | -40 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.) |
| Relative humidity range | 5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.) |

Shock and Vibration

| | |
|-------------------|---|
| Operational shock | 30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.) |
| Random vibration | |
| Operating | 5 Hz to 500 Hz, 0.3 g _{rms} |
| Nonoperating | 5 Hz to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC 60068-2-64. Nonoperating 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
- AS/NZS CISPR 11: Group 1, 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

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.

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