AIO-3682

2025-03-14

Contents

AIO-3682 Specifications

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.

Conditions

Dual-output, first Nyquist zone specifications are valid under the following conditions unless otherwise noted.

- Input DAC sampling clock: 2.5 GHz
- Input power level: 1.5 dBm
- Digital filter enable and selection
  - Register name: Data Mode Ctrl
    - Address: x18
    - Value: xE0
- Full scale current register
  - Register name: FSC_1
    - Address: x20
    - Value: x00
  - Register name: FSC_2
    - Address: x21
    - Value: x01
- Set operation mode register: baseband

    - Register name: Decode Ctrl
        - Address: x19
        - Value: x00

Dual-output, second Nyquist zone specifications are valid under the following conditions unless otherwise noted.

- Input DAC sampling clock: 2.0 GHz
- Input power level: 1.5 dBm
- Digital filter enable and selection: Mix Mode
    - Register name: Data Mode Ctrl
        - Address: x18
        - Value: xE0
- Digital filter enable and selection: baseband
    - Register name: Data Mode Ctrl
        - Address: x18
        - Value: xC0
- Full scale current register
    - Register name: FSC_1
        - Address: x20
        - Value: x02
- Set operation mode register: baseband
    - Register name: Decode Ctrl
        - Address: x19
        - Value: x00
- Set operation mode register: Mix Mode
    - Register name: Decode Ctrl
        - Address: x19
        - Value: x01

General

Number of channels	2 DACs, single-ended, simultaneously sampled
Connector	SMA

Output impedance	50 Ω, per connector
Sample rate	1,400 MSPS to 2,850 MSPS
DAC part number	AD9129[1]; 14-bit resolution

Dual Output, First Nyquist Zone

AC-Coupled

Output range (normal operating conditions)	-0.5 dBm (0.6 V_{pk-pk})
Bandwidth (-3 dB)	900 MHz
Frequency range	0.1 MHz to 900 MHz
SFDR (70 MHz Out, 2.5 GS/s, no PLL)	
Non-harmonic	75 dBc
Second harmonic	56 dBc
Third harmonic	58 dBc
Channel-to-channel isolation	
1 MHz	95 dB

10 MHz	100 dB
50 MHz	97 dB
100 MHz	100 dB
251 MHz	99 dB
500 MHz	100 dB
700 MHz	94 dB

Spectral Measurements (Dual Output, First Nyquist Zone)

Figure 1. Output Bandwidth (Baseband Mode)

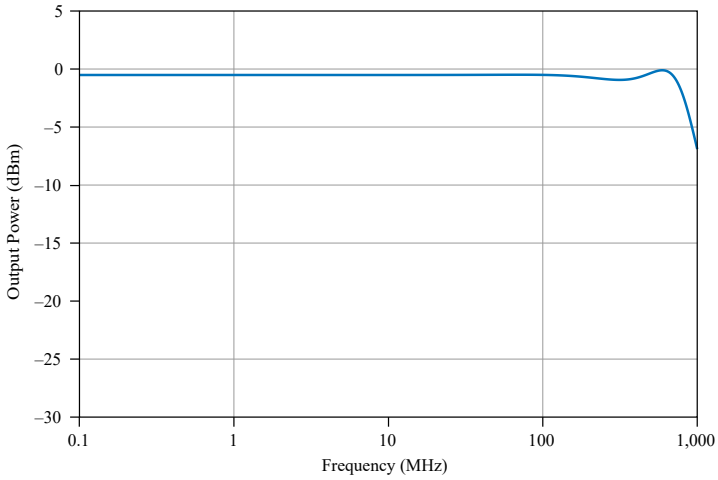


Figure 2. 1.0 MHz Tone Spectral Measurement (100 MHz Bandwidth)

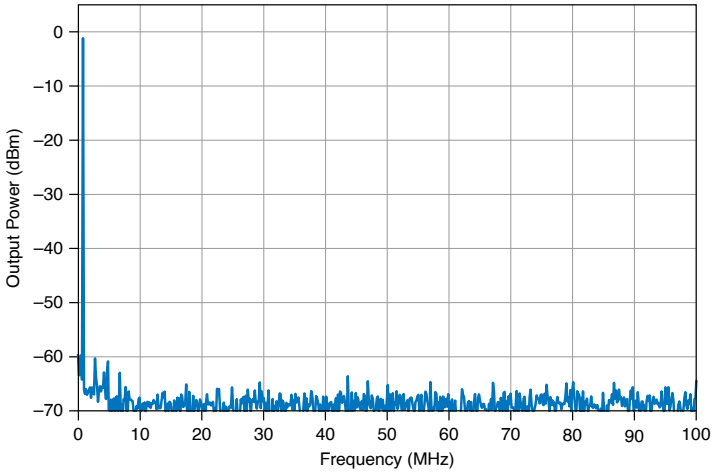


Figure 3. 10.0 MHz Tone Spectral Measurement (100 MHz Bandwidth)

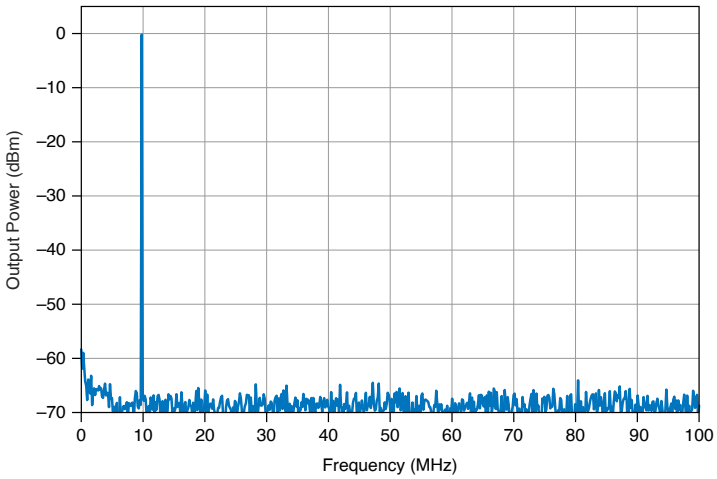


Figure 4. 70.0 MHz Tone Spectral Measurement (600 MHz Bandwidth)

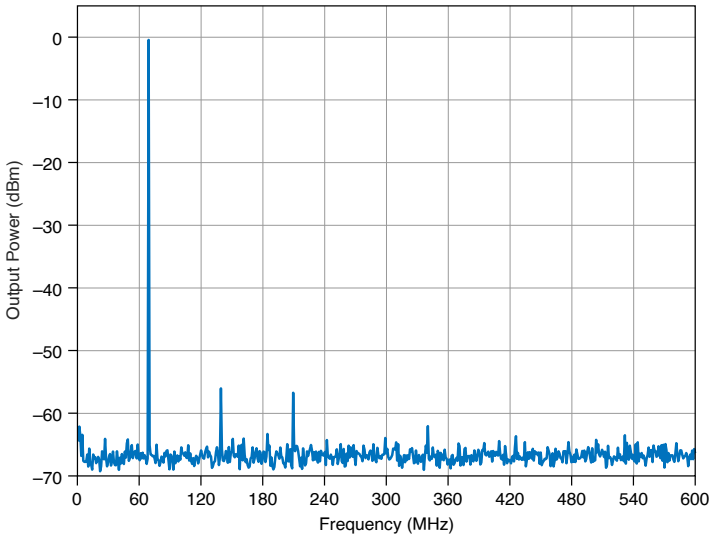


Figure 5. 150.0 MHz Tone Spectral Measurement (1,200 MHz Bandwidth)

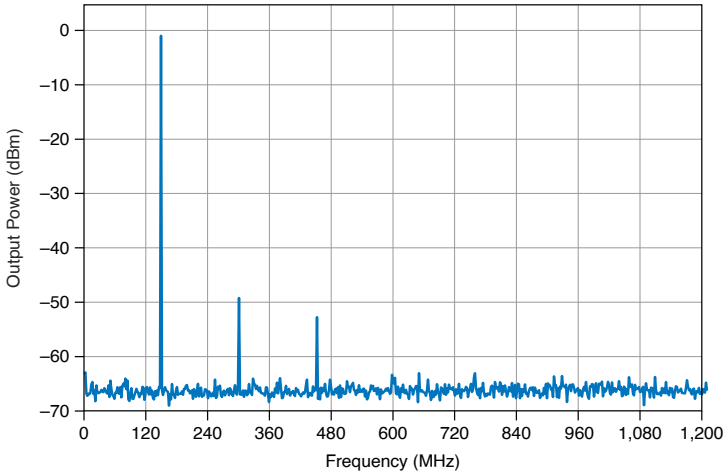
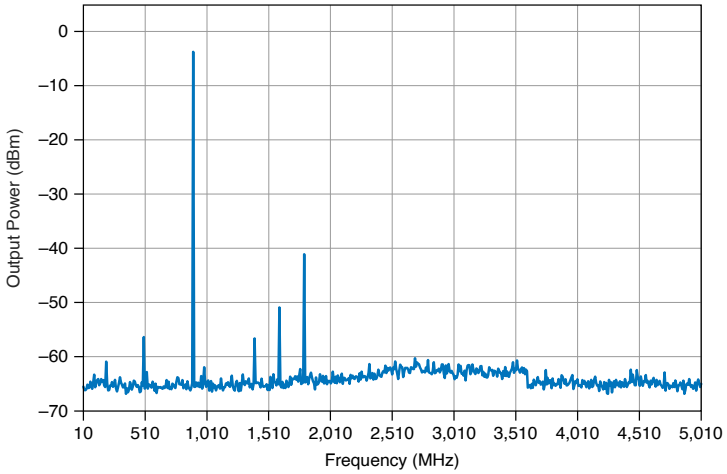


Figure 6. 900.0 MHz Tone Spectral Measurement (5,000 MHz Bandwidth)



Dual Output, Second Nyquist Zone

AC-Coupled

Output range (normal operating conditions)	-0.5 dBm (0.6 V_{pk-pk})

Table 1. Bandwidth (-3 dB)

	Bandwidth	Frequency Range
Baseband	850 MHz	150 MHz to 1,000 MHz
Mix Mode	1,750 MHz	1,000 MHz to 2,750 MHz

SFDR (70 MHz Out, 2 GS/s, no PLL)	
Non-harmonic	76 dBc
Second harmonic	61 dBc
Third harmonic	72 dBc
Channel-to-channel isolation	
150.4 MHz	92 dB
251.2 MHz	95 dB
500 MHz	98 dB
700 MHz	99 dB
1,250.4 MHz	93 dB
1,500 MHz	95 dB
2,500 MHz	78 dB
2,700 MHz	78 dB

Spectral Measurements (Dual Output, Second Nyquist Zone)

Figure 7. Output Bandwidth (Baseband Mode)

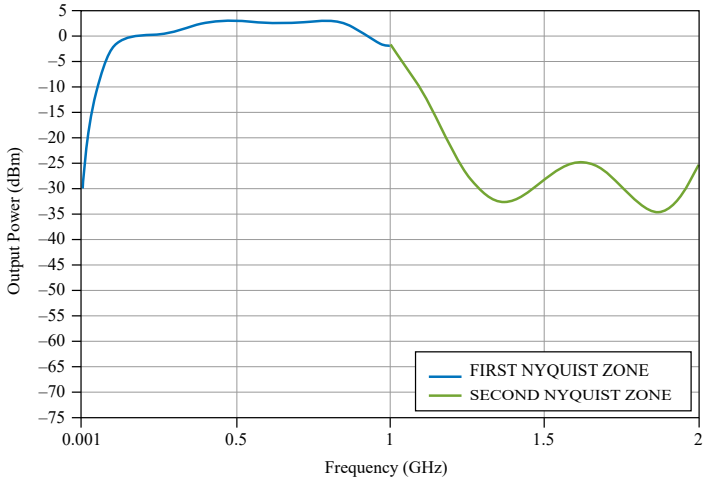


Figure 8. Output Bandwidth (Mix Mode)

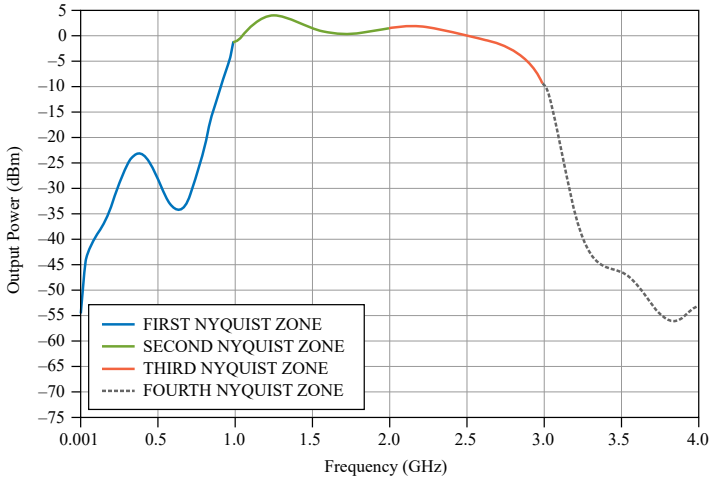


Figure 9. 70.0 MHz Tone Spectral Measurement (2,000 MHz Bandwidth)

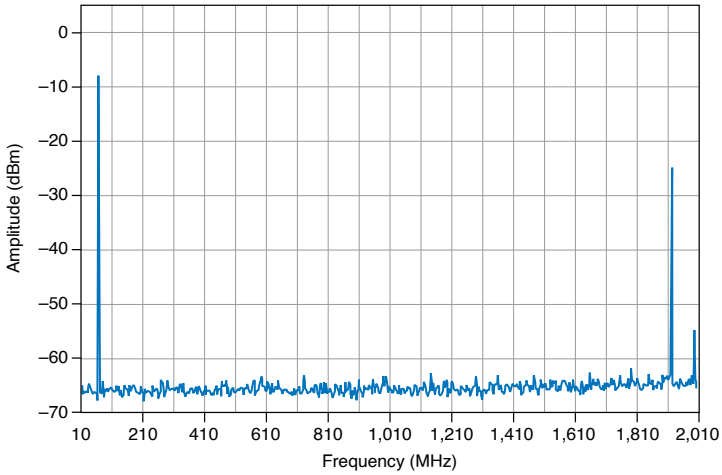


Figure 10. 70.0 MHz Tone Spectral Measurement (4,000 MHz Bandwidth)

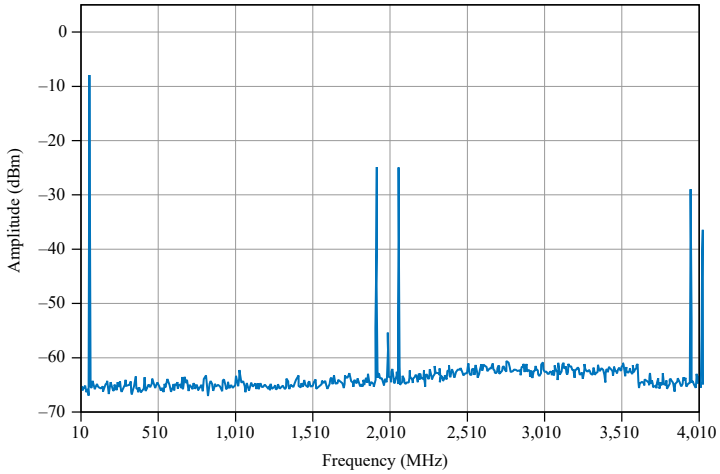


Figure 11. 210.4 MHz Tone Spectral Measurement (0.1 MHz Bandwidth)

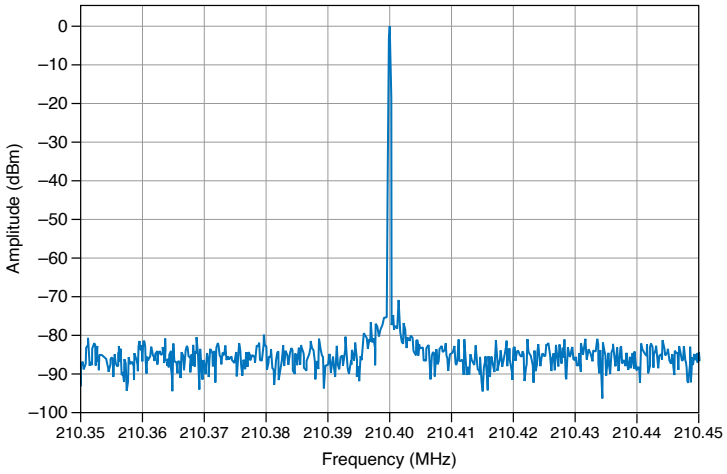


Figure 12. 210.4 MHz Tone Spectral Measurement (1.0 MHz Bandwidth)

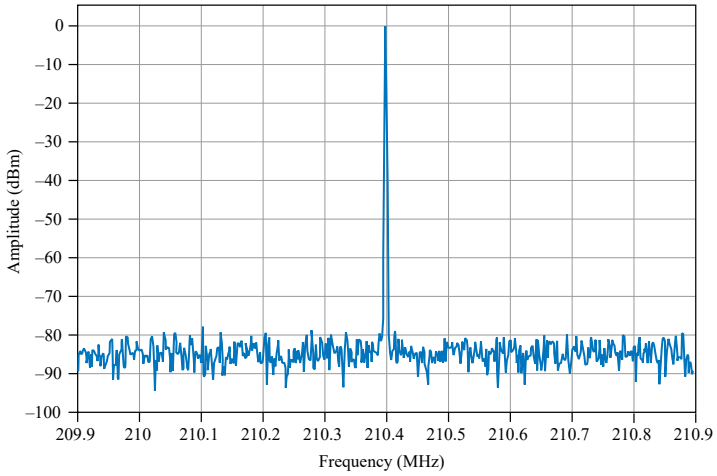


Figure 13. 210.4 MHz Tone Spectral Measurement (20.0 MHz Bandwidth)

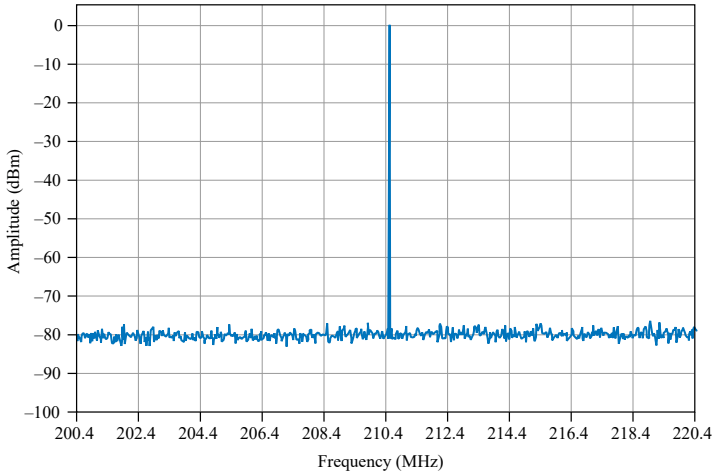


Figure 14. 210.4 MHz Tone Spectral Measurement (100.0 MHz Bandwidth)

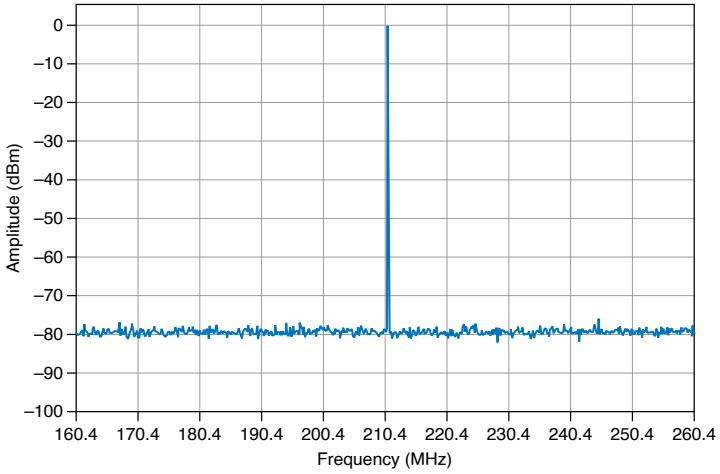


Figure 15. 300.0 MHz Tone Spectral Measurement (2,000 MHz Bandwidth)

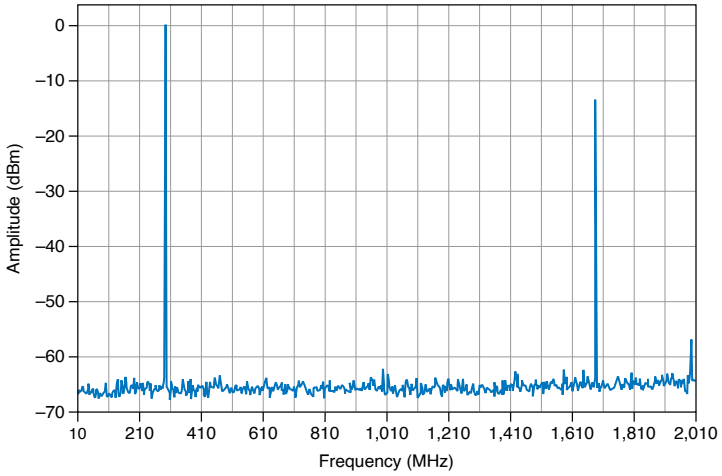


Figure 16. 300.0 MHz Tone Spectral Measurement (4,000 MHz Bandwidth)

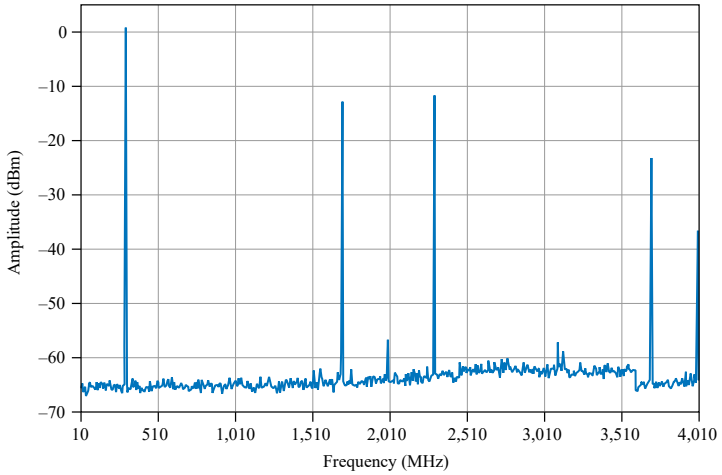


Figure 17. 700.0 MHz Tone Spectral Measurement (2,000 MHz Bandwidth)

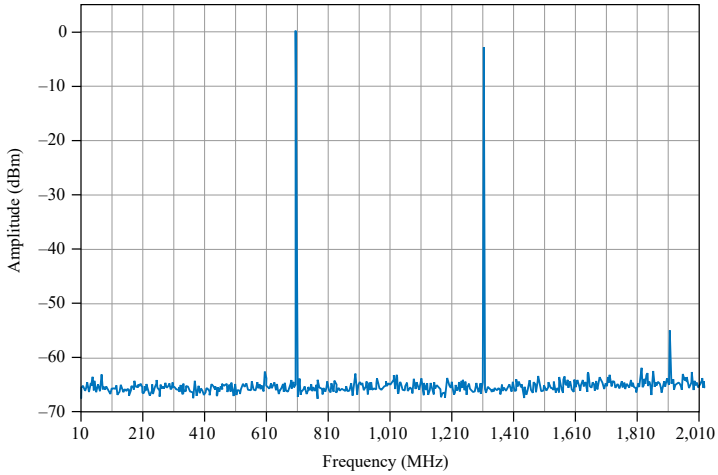


Figure 18. 700.0 MHz Tone Spectral Measurement (4,000 MHz Bandwidth)

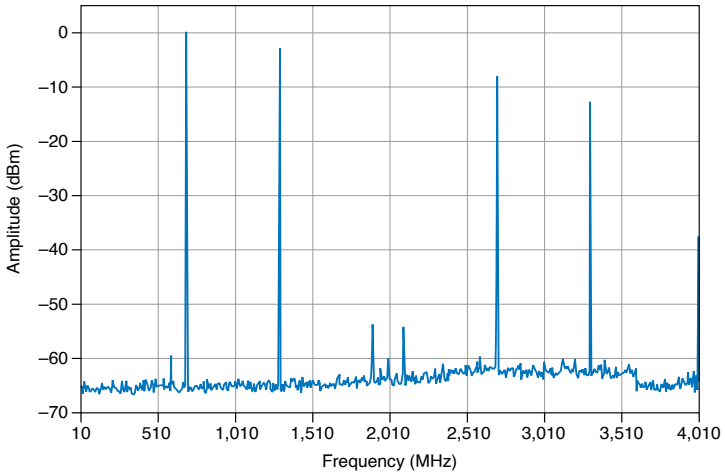


Figure 19. 1,789.6 MHz Tone Spectral Measurement (0.1 MHz Bandwidth)

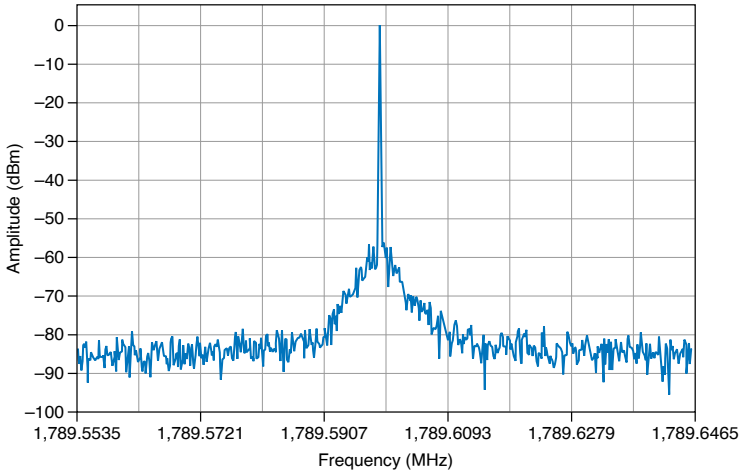


Figure 20. 1,789.6 MHz Tone Spectral Measurement (1.0 MHz Bandwidth)

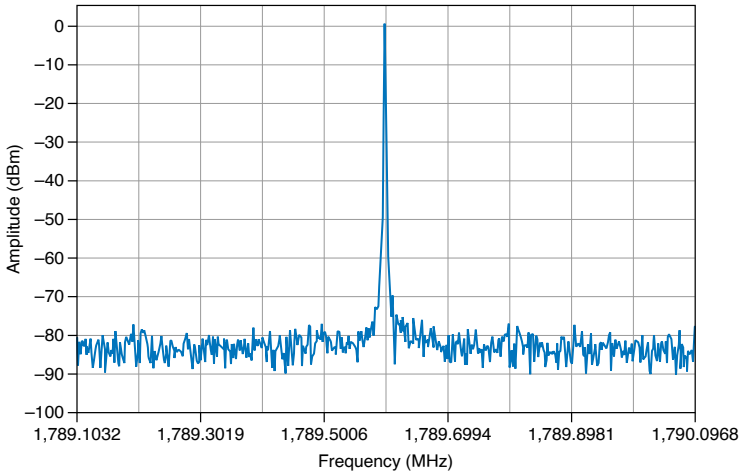


Figure 21. 1,789.6 MHz Tone Spectral Measurement (20.0 MHz Bandwidth)

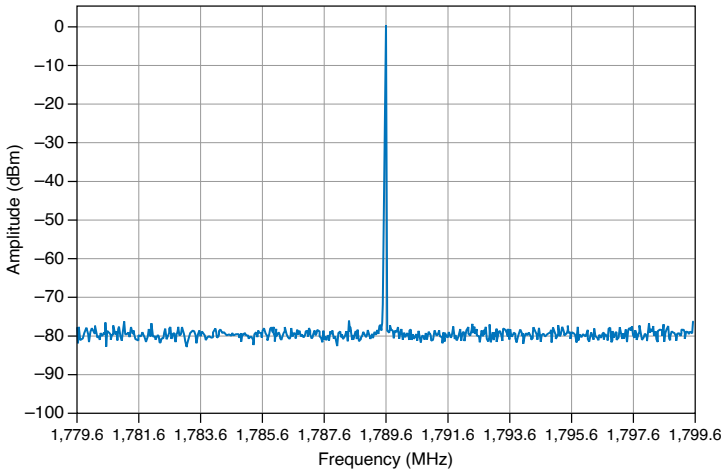


Figure 22. 1,789.6 MHz Tone Spectral Measurement (100.0 MHz Bandwidth)

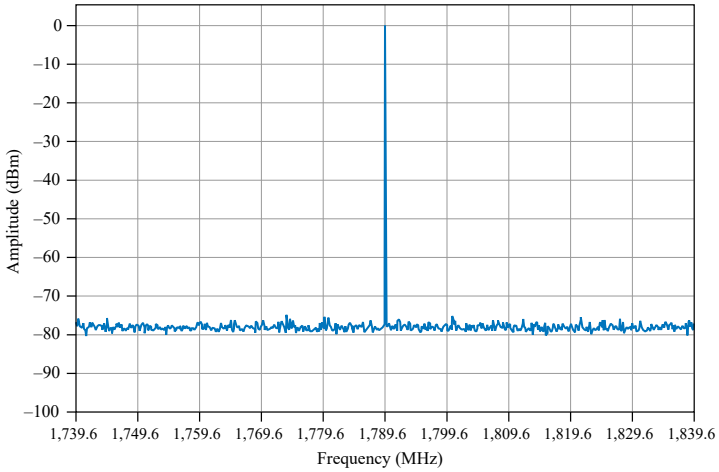


Figure 23. 2,210.4 MHz Tone Spectral Measurement (0.1 MHz Bandwidth)

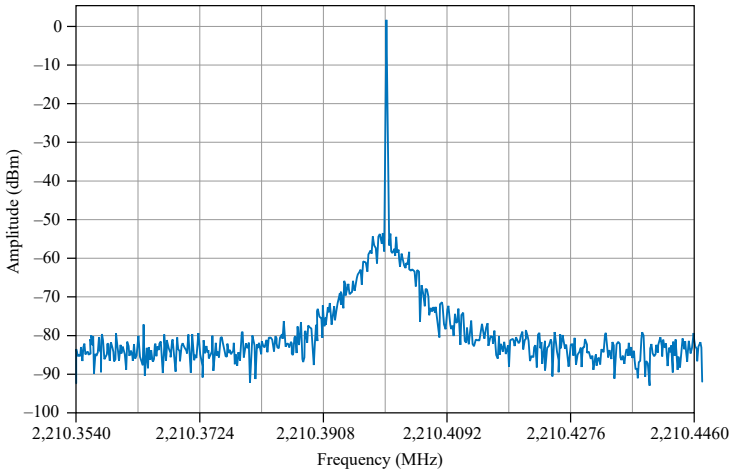


Figure 24. 2,210.4 MHz Tone Spectral Measurement (1.0 MHz Bandwidth)

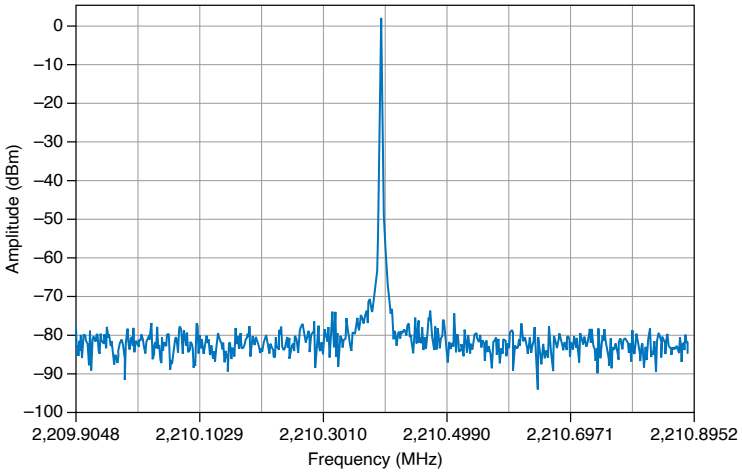


Figure 25. 2,210.4 MHz Tone Spectral Measurement (20.0 MHz Bandwidth)

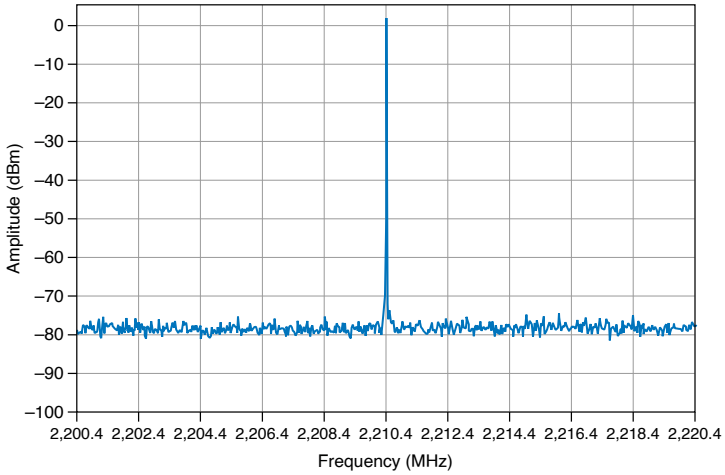
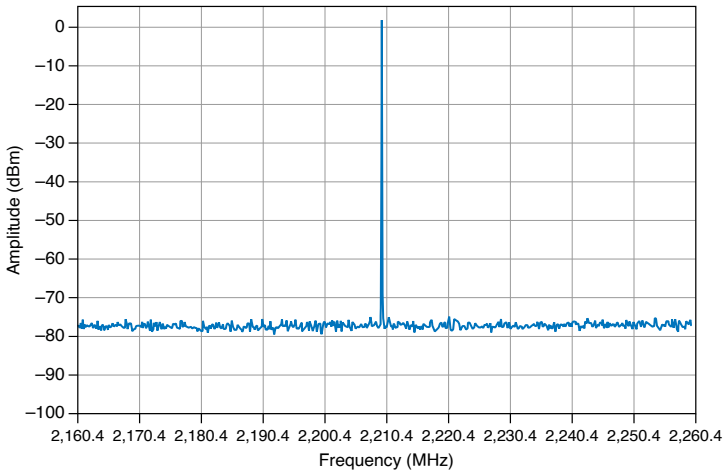


Figure 26. 2,210.4 MHz Tone Spectral Measurement (100.0 MHz Bandwidth)



CLK IN

General Characteristics

Number of channels[2]	2, single-ended
Connector	SMA
Input impedance	50 Ω

Input coupling	AC

External Sample Clock

Input voltage range	800 mV_{p-p} to 1,575 mV_{pk-pk}
Input frequency range	0.71 GHz to 2.85 GHz
Absolute maximum input	-0.3 V to 2.1 V

Maximum Power Requirements

Note Power requirements are dependent on the adapter modules installed and contents of the FPGA application.

Power supply	3.3 V
Current	760 mA (2.5 GSPS), 850 mA (5.7 GSPS)

Physical

Dimensions (not including connectors)	7.65 cm × 6.91 cm × 0.68 cm (3.01 in. × 2.72 in. × 0.27 in.)
Weight	0.05 kg (0.11 lb)

Note Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free of contaminants before returning it to service.

Maximum Working Voltage

Note Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth	0 V to 3.3 V, Measurement Category I
Channel-to-channel	0 V to 3.3 V, Measurement Category I

Caution Do not use this device for connecting to signals in Measurement Categories II, III, or IV.

Environment

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

Indoor use only.

Operating Environment

Operating temperature	-20 °C to 85 °C

Relative humidity range	10% to 90%, noncondensing (tested in accordance with IEC 60068-2-56)

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.)