SPECIFICATIONS

USRP-2901

Software Defined Radio Device

Contents

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 expected performance met by a majority of the models.
- *Nominal* specifications describe parameters and attributes that may be useful in operation.

Specifications are *Characteristics* unless otherwise noted.

Conditions

Specifications are valid at 25 °C unless otherwise noted.

Transmitter

Frequency range	70 MHz to 6 GHz
Frequency step	<1 kHz
Maximum output power (P_{out})	20 dBm
Gain range[1]	89.75 dB
Gain step	0.25 dB
Frequency accuracy[2]	2.5 ppm
Maximum instantaneous real-time bandwidth	56 MHz
Maximum I/Q rate[3]	
Streaming[4]	15 MS/s
Burst	
One channel	61.44 MS/s
Two channels	30.72 MS/s
Digital-to-analog converter (DAC)[5]	12 bits

Receiver

Frequency range	70 MHz to 6 GHz
Frequency step	<1 kHz
Gain range[6]	76 dB
Gain step	1.0 dB
Maximum input power (P_{in})	-15 dBm

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[1] The output power resulting from the gain setting varies over the frequency band and among devices.

[2] *Frequency accuracy* is based on temperature-compensated crystal oscillator (TCXO) vendor specifications and is not measured. Alternatively, you can incorporate an external reference source to provide a more precise frequency Reference Clock and to achieve better frequency accuracy.

[3] I/Q sample rate depends on many factors including, but not limited to, USB3 chipset, number of active channels, and host computer performance. Data throughput may vary.

[4] Benchmark setup: LabVIEW Communications 2.0 Tx Continuous Async example running in Windows 7 configured for a single RF channel and a graph refresh rate set to once per 128 cycles. Benchmark hardware: Asus Z97 motherboard, 16 GB memory, 4GHz i7 4790k CPU, and a ASMedia XHCI 1.0 USB controller.

[5] The DAC rate changes with the sample rate.

[6] The received signal amplitude resulting from the gain setting varies over the frequency band and among devices.

Noise figure	5 dB to 7 dB
Frequency accuracy[7]	2.5 ppm
Maximum instantaneous real-time bandwidth	56 MHz
Maximum I/Q rate[8]	
Streaming[9]	15 MS/s
Burst	
One channel	61.44 MS/s
Two channels	30.72 MS/s
Analog-to-digital converter (ADC)[10]	12 bits

Note The USRP-2901 has two local oscillators, one for the transmit (Tx) channels and one for the receive (Rx) channels. While different frequencies can be used for the Tx and Rx channels, the two Tx channels are locked to the same frequency, and the two Rx channels are locked to the same frequency.

Power

Total power, typical operation	
Typical	3 W to 3.5 W
Maximum	4.5 W
Power requirement	Accepts a 6 V, 3 A external DC power connector

Caution You must use either the power supply provided in the shipping kit, or another UL listed ITE power supply marked *LPS*, with the USRP-2901.

Caution The protection provided by this product may be impaired if it is used in a manner not described in this document.

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7 *Frequency accuracy* is based on temperature-compensated crystal oscillator (TCXO) vendor specifications and is not measured. Alternatively, you can incorporate an external reference source to provide a more precise frequency Reference Clock and to achieve better frequency accuracy.

8 I/Q sample rate depends on many factors including, but not limited to, USB3 chipset, number of active channels, and host computer performance. Data throughput may vary.

9 Benchmark setup: LabVIEW Communications 2.0 Rx Continuous Async example running in Windows 7 configured for a single RF channel and a graph refresh rate set to once per 128 cycles. Benchmark hardware: Asus Z97 motherboard, 16 GB memory, 4GHz i7 4790k CPU, and a ASMedia XHCI 1.0 USB controller.

10 The ADC rate changes with the sample rate.

Physical Characteristics

If you need to clean the module, wipe it with a dry towel.

Physical dimensions	
(L × W × H)	12.5 cm × 9.4 cm × 3.8 cm (7.0 in. × 4.9 in. × 1.5 in.)
Weight	676 g (1.5 lb)

Environment

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

Indoor use only.

Operating Environment

Ambient temperature range	23 °C ± 5 °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 $C \in$

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`.)