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# USRP-2901

# Specifications

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# USRP-2901 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.
- **Nominal** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

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 <sup>1</sup>	89.75 dB

<sup>1</sup> The output power resulting from the gain setting varies over the frequency band and among devices.

Gain step	0.25 dB
Frequency accuracy <sup>2</sup>	2.5 ppm
Maximum instantaneous real-time bandwidth	56 MHz
<b>Maximum I/Q rate<sup>3</sup></b>	
Streaming <sup>4</sup>	15 MS/s
<b>Burst</b>	
One channel	61.44 MS/s
Two channels	30.72 MS/s
Digital-to-analog converter (DAC) <sup>5</sup>	12 bits

## Receiver

Frequency range	70 MHz to 6 GHz
Frequency step	<1 kHz

<sup>2</sup> **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.

<sup>3</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> The DAC rate changes with the sample rate.

Gain range <sup>6</sup>	76 dB
Gain step	1.0 dB
Maximum input power ( $P_{in}$ )	-15 dBm
Noise figure	5 dB to 7 dB
Frequency accuracy <sup>7</sup>	2.5 ppm
Maximum instantaneous real-time bandwidth	56 MHz
<b>Maximum I/Q rate<sup>8</sup></b>	
Streaming <sup>9</sup>	15 MS/s
<b>Burst</b>	
One channel	61.44 MS/s
Two channels	30.72 MS/s
Analog-to-digital converter (ADC) <sup>10</sup>	12 bits

<sup>6</sup> The received signal amplitude resulting from the gain setting varies over the frequency band and among devices.

<sup>7</sup> **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.

<sup>8</sup> 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.

<sup>9</sup> 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.

<sup>10</sup> The ADC rate changes with the sample rate.



**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 Requirements

Total power, typical operation	
Typical	12 W to 15 W
Maximum	18 W
Power requirement	Accepts a 6 V, 3 A external DC power source



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



**Attention** Vous devez utiliser avec l'appareil soit l'alimentation livrée dans le kit, soit une autre alimentation ITE (équipement informatique) agréée, portant le symbole **LPS**.



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

## Physical Characteristics

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)
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## 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 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](https://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](https://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](https://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](https://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china).)