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USRP-2974

SPECIFICATIONS

USRP-2974

10 MHz to 6 GHz, x86 Processor, GPS-Disciplined OCXO, USRP
Software Defined Radio Stand-Alone Device

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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.

Controller

System on module (SoM)	Congatec COM Express conga-TS170
CPU	Intel Core i7 6822EQ (2 GHz Quad Core)
Memory ¹	SO-DIMM DDR4 16 GB
NVMe SSD ²	500 GB
SFP+ ³	10G ETH connection to the SoM
Cabled PCIe	PCIe Gen 2 x 4
MicroUSB ⁴	USB-to-UART to the SoM
RJ45	1G ETH host connection

Related Information

Refer to the [USRP Software Defined Radio Stand-Alone Device Manual](#) for information about identifying your USRP-2974 hardware module revision.

FPGA and Baseband

FPGA	Kintex-7 XC7K410T
DRAM	1 GB
Baseband analog-to-digital converter (ADC) resolution	14 bit
Baseband digital-to-analog converter (DAC) resolution	16 bit
ADC spurious-free dynamic range (sFDR)	88 dB
DAC sFDR	80 dB

¹ Module assembly A has a memory of 8 GB. All other module assemblies have a memory of 16 GB.

² Module assembly A has an NVMe SSD of 250 GB. All other module assemblies have an NVMe SSD of 500 GB.

³ Can be bypassed to the FPGA.

⁴ Device port for external host.

Maximum I/Q sample rate	200 MS/s
SFP+ ⁵	High speed serial link to one of the FPGA GTX transceivers

RF

Transmitter

Number of channels	2
Frequency range	10 MHz to 6 GHz
Frequency step	<1 kHz
Maximum output power (P_{out})	5 mW to 100 mW (7 dBm to 20 dBm)
Gain range ⁶	0 dB to 31.5 dB
Gain step	0.5 dB
Maximum instantaneous real-time bandwidth ⁷	160 MHz

Receiver

Number of channels	2
Frequency range	10 MHz to 6 GHz
Frequency step	<1 kHz
Gain range ⁸	0 dB to 37.5 dB
Gain step	0.5 dB
Maximum input power (P_{in})	+10 dBm
Noise figure	5 dB to 7 dB
Maximum instantaneous real-time bandwidth ⁹	160 MHz

⁵ Can be bypassed to the SoM if using the 10 GbE as protocol.

⁶ The output power resulting from the gain setting varies over the frequency band and among devices.

⁷ The USRP-2974 transmitter path has 160 MHz of bandwidth throughout the full frequency range of the device.

⁸ The received signal amplitude resulting from the gain setting varies over the frequency band and among devices.

⁹ The USRP-2974 receiver path has 84 MHz of bandwidth for center frequencies from 10 MHz to 500 MHz.

GPS Disciplined Oscillator (GPSDO)

Frequency accuracy¹⁰

OCXO (not locked to GPS)	25 ppb
OCXO (locked to GPS)	5 ppb

Active antenna

Voltage	5 V
Power	0.7 W

Power



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

Voltage range	14.25 V to 15.75 V DC
Current	10 A, maximum
Power	150 W, maximum



Notice The power supply must also meet any safety and compliance requirements for the country of use.



Note NI recommends using the USRP-2974 with the provided power supply (Power Supply, part number 723613-01). Contact NI if a replacement is needed.

Physical Characteristics

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

Physical dimensions

(L × W × H)	29.08 cm × 21.84 cm × 7.98 cm (11.45 in. × 8.60 in. × 3.14 in.)
Weight	3.34 kg (7.35 lb)

¹⁰ *Frequency accuracy* is based on oven-controlled crystal oscillator (OCXO) 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.

Environment

Operating temperature range	0 °C to 50 °C
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Relative humidity range	10% to 90%, noncondensing
Pollution Degree	2

Indoor use only.

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 UL and other 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
- 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 [Product Certifications and Declarations](#) section.

Radio Equipment Compatibility Standards

This product meets the requirements of the following Radio Equipment standards:

- EN 301 489-1: Common Technical Requirements for Radio Equipment
- EN 301 489-19: Specific conditions for Receive Only Mobile Earth Stations (ROMES)
- EN 303 413: Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers

This radio equipment is for use in accordance with the following parameters:

Antenna	5V GPS receiver antenna, part number 783480-01
Software	LabVIEW Communications System Design Suite - USRP-2974 Single-Device Streaming sample project
Frequency band(s)	1,575.42 MHz



Notice Every country has different laws governing the transmission and reception of radio signals. Users are solely responsible for using their USRP system in compliance with all applicable laws and regulations. Before you attempt to transmit and/or receive on any frequency, National Instruments recommends that you determine what licenses may be required and what restrictions may apply. National Instruments does not accept any responsibility for the user's use of our products. The user is solely responsible for complying with local laws and regulations.

CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2011/65/EU; Restriction of Hazardous Substances (RoHS)
- 2014/53/EU; Radio Equipment Directive (RED)

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 *Commitment to the Environment* 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.

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377417C-01 May 22, 2019