USRP-2955 Specifications

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Contents

USRP-2955 Specifications

This document lists specifications for the USRP-2955 Software Defined Radio Reconfigurable Device.

The USRP-2955 contains a GPS-disciplined oscillator (GPSDO), which enables you to lock the internal clocks to a GPS reference signal, synchronize using GPS timing information, and query GPS location information.

> **Caution** Do not operate the USRP-2955 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

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.

Pinout

Use the pinout to connect to terminals on the .

Figure 1. Front Panel

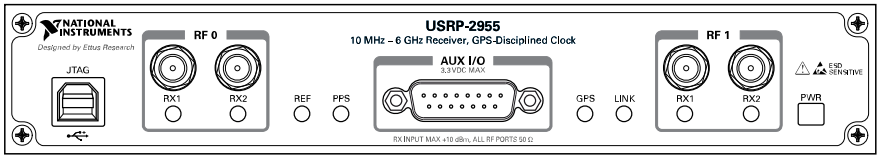

Table 1. Connector Descriptions

Connector		Use
JTAG		A USB port that connects the host computer to the device FPGA for recovery purposes. This port can be used with the Xilinx iMPACT configuration tool to temporarily load a new bitfile.
RF 0	RX1	Input terminal for the RF signal. RX1 is an SMA (f) connector with an impedance of 50 Ω and is a single-ended input channel.
	RX2	Input terminal for the RF signal. RX2 is an SMA (f) connector with an impedance of 50 Ω and is a single-ended input channel.
AUX I/O		General-purpose I/O (GPIO) port. AUX I/O is controlled by the FPGA.
RF 1	RX1	Input terminal for the RF signal. RX1 is an SMA (f) connector with an impedance of 50 Ω and is a

Connector		Use
		single-ended input channel.
	RX2	Input terminal for the RF signal. RX2 is an SMA (f) connector with an impedance of 50 Ω and is a single-ended input channel.

Note

Table 2. LED Indicators

LED		Description	Color	State	Indication
RF 0	RX1	Indicates the receive status of the module.	OFF	—	The module is not receiving.
			Green	Solid	The module is receiving data.
	RX2	Indicates the receive status of the module.	OFF	—	The module is not receiving.
			Green	Solid	The module is receiving.
REF		Indicates the status of the reference signal.	OFF	—	There is no reference signal, or the device is not locked to the reference signal.
			Green	Blinking	The device is not locked to the reference signal.
				Solid	The device is locked to the reference

LED		Description	Color	State	Indication
					signal.
PPS		Indicates the pulse per second (PPS).	OFF	—	There is no PPS timing reference signal, or the device is not locked to the reference signal.
			Green	Blinking	The device is locked to the PPS timing reference signal.
GPS		Indicates whether the GPSDO is locked.	OFF	—	There is no GPSDO or the GPSDO is not locked.
			Green	Solid	The GPSDO is locked.
LINK		Indicates the status of the link to a host computer.	OFF	—	There is no link to a host computer.
			Green, yellow, or red	Solid	The host is actively communicating with the device.
RF 1	RX1	Indicates the receive status of the module.	OFF	—	The module is not active.
			Green	Solid	The module is receiving data.
	RX2	Indicates the receive status of the module.	OFF	—	The module is not receiving.
			Green	Solid	The module is receiving.

Figure 2. Back Panel

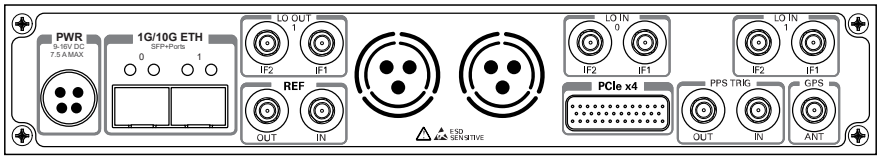

Table 3. Connector Descriptions

Connector	Use
PWR	Input that accepts a 9 V to 16 V, 6 A external DC power connector.
1G/10G ETH	Two SFP+ input terminals used for 1G ETH or 10G ETH connectivity with the host driver. Not currently supported in LabVIEW FPGA.
LO OUT 1 IF2	Output terminal for the IF LO signal exported by RF 1. LO OUT 1 IF2 is a female SMA connector with an impedance of 50 Ω.
LO OUT 1 IF1	Output terminal for the RF LO signal exported by RF 1. LO OUT 1 IF1 is a female SMA connector with an impedance of 50 Ω.
REF OUT	Output terminal for an external reference signal for the LO on the device. REF OUT is a female SMA connector with an impedance of 50 Ω, and it is a single-ended reference output. The output signal at this connector is 10 MHz at 3.3 V.
REF IN	Input terminal for an external reference signal for the LO on the device. REF IN is a female SMA connector with an impedance of 50 Ω, and it is a single-ended reference input. REF IN accepts a 10 MHz signal with a minimum input power of 0 dBm (0.632 V_{pk-pk}) and a maximum input power of 15 dBm (3.56 V_{pk-pk}) for a square wave or sine wave.
LO IN 0 IF2	Terminal for an external signal to the IF LO input on the RF 0 daughterboard. This signal can be used as the LO source for an RF 0 channel by selecting **external** on that channel's LO source setting. LO IN 0 IF2 is a female SMA connector with an impedance of 50 Ω.
LO IN 0 IF1	Terminal for an external signal to the IF LO input

Connector	Use
	on the RF 0 daughterboard. This signal can be used as the LO source for an RF 0 channel by selecting **external** on that channel's LO source setting. LO IN 0 IF1 is a female SMA connector with an impedance of 50 Ω.
PCIe x4	Port for a PCI Express Generation 1, x4 bus connection through an MXI Express four-lane cable.
LO IN 1 IF2	Terminal for an external signal to the IF LO input on the RF 0 daughterboard. This signal can be used as the LO source for an RF 0 channel by selecting **external** on that channel's LO source setting. LO IN 1 IF2 is a female SMA connector with an impedance of 50 Ω.
LO IN 1 IF1	Terminal for an external signal to the IF LO input on the RF 0 daughterboard. This signal can be used as the LO source for an RF 0 channel by selecting **external** on that channel's LO source setting. LO IN 1 IF1 is a female SMA connector with an impedance of 50 Ω.
PPS TRIG OUT	Output terminal for the pulse per second (PPS) timing reference. PPS TRIG OUT is a female SMA connector with an impedance of 50 Ω, and it is a single-ended input. The output signal is 0 V to 3.3 V TTL. You can also use this port as triggered output (TRIG OUT) that you program with the PPS Trig Out I/O signal.
PPS TRIG IN	Input terminal for pulse per second (PPS) timing reference. PPS TRIG IN is a female SMA connector with an impedance of 50 Ω, and it is a single-ended input channel. PPS TRIG IN accepts 0 V to 3.3 V TTL and 0 V to 5 V TTL signals. You can also use this port as a triggered input (TRIG IN) that you control using NI-USRP.
GPS ANT	Input terminal for the GPS antenna signal. GPS ANT is a female SMA connector with a maximum input power of -15 dBm and an output of DC 5 V to power an active antenna.

Connector	Use
	Notice Do not terminate the GPS ANT port if you do not use it.

Receiver

Number of channels	4
Frequency range	10 MHz to 6 GHz
Frequency step	<1 kHz
Gain range[1]	0 dB to 95 dB
Gain step	1 dB
Maximum input power (P_{in})	+10 dBm
Frequency accuracy[2]	2.5 ppm
Maximum instantaneous real-time bandwidth[3]	80 MHz
Maximum I/Q sample rate	100 MS/s
Analog-to-digital converter (ADC) resolution	14 bit

Table 4. Noise Figure

Frequency	Noise Figure[4] (dB)
10 MHz to 3 GHz	<5
3 GHz to 5 GHz	<4
5 GHz to 6 GHz	<8

1. The received signal amplitude 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. Each USRP-2955 receiver path has 80 MHz of bandwidth throughout the full frequency range of the device.
4. Noise figure values are based on 0 dB RF attenuation and maximum gain settings.

LO Input/Export Connectors

Table 5. LO OUT 1

IF2	
Minimum RF power level	0 dBm
Nominal RF power level	+3 dBm
IF1	
Minimum RF power level	-12 dBm
Nominal RF power level	+5 dBm

Table 6. LO IN 0

IF2	
Minimum RF power level	0 dBm
Nominal RF power level	+2 dBm
Maximum RF power level	+20 dBm
IF1	
Minimum RF power level	-10 dBm
Nominal RF power level	-5 dBm
Maximum RF power level	+10 dBm

Table 7. LO IN 1

IF2	
Minimum RF power level	0 dBm
Nominal RF power level	+2 dBm
Maximum RF power level	+20 dBm
IF1	
Minimum RF power level	-10 dBm
Nominal RF power level	-5 dBm
Maximum RF power level	+10 dBm

GPS Disciplined Oscillator (GPSDO)

Table 8. Frequency Accuracy

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

Note ***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.

Table 9. Active Antenna

Voltage	5 V
Power	0.7 W

Note NI recommends periodically locking the GPS for at least 1 hour to recalibrate the GPSDO module accuracy.

Power Requirements

Input voltage	9 V to 16 V, DC
Input current	7.5 A, maximum
Typical power consumption	38 W to 44 W, varies by application

Caution You must use an LPS or Class 2 power supply with the device. The power supply must also meet any safety and compliance requirements for the country of use.

Attention Vous devez utiliser avec l'appareil une alimentation LPS ou de classe 2. L'alimentation doit également satisfaire aux exigences de sécurité et de conformité en vigueur dans le pays d'utilisation.

Onboard DRAM

Memory size	1,024 MB

Physical Characteristics

Table 10. Physical Dimensions

(L × W × H)	26.67 cm × 4.06 cm × 21.84 cm (10.5 in. × 1.6 in. × 8.6 in.)
Weight	1.588 kg (3.50 lb)

Environment

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

Indoor use only.

Operating Environment

Operating temperature	23 °C ± 5 °C, room temperature
Relative humidity range	10% to 90%, noncondensing (tested in accordance with IEC 60068-2-56)