
OBX-160

Specifications

2025-09-03



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These specifications apply to the OBX-160 when installed within the USRP X300 or USRP X310 software-defined radio unless otherwise noted.

Revision History

Version	Date changed	Description
379234A-01	September 2025	Initial release.

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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**—describes the performance met by a majority of models.

- **Nominal**—describes an attribute that is based on design, conformance testing, or supplemental testing.
- **Measured**—describes the measured performance of a representative model.

Values are **Measured** unless otherwise noted.

Conditions

Specifications are valid at 25 °C ambient temperature unless otherwise noted.

Specifications were collected using the USRP X310.

OBX-160 Pinout

The OBX-160 is an internal daughterboard for the USRP X300 and USRP X310 software-defined radios.

Each USRP X300 or USRP X310 can accommodate two OBX-160 daughterboards. A single OBX-160 provides connectivity for a single group, either the RF A group or the RF B group, on the USRP X300 or USRP X310 front panel.

Table 1. OBX-160 Connectors

Connector	Connector Type	Description
TX/RX	SMA (f), 50 Ω	Single-ended input or output terminal for the RF signal Provides the connection for the USRP X300 or USRP X310 port of the same name with a bulkhead SMA cable that is included with the USRP X300 or USRP X310.
RX2	SMA (f), 50 Ω	Single-ended input terminal for the RF signal Provides the connection for the

Connector	Connector Type	Description
		USRP X300 or USRP X310 port of the same name with a bulkhead SMA cable that is included with the USRP X300 or USRP X310.

Physical Characteristics

Table 2. Physical Characteristics

Dimensions	<p>27.7 cm × 21.8 cm × 3.9 cm</p> <p>(10.9 in. × 8.6 in. × 1.5 in.)</p> <p>(USRP X300 or USRP X310 chassis with 2× OBX-160 installed)</p> <p>For more information, visit ni.com/dimensions and search by module number.</p>
Weight	2.24 kg (4.94 lbs) (USRP X300 or USRP X310 chassis with 2× OBX-160 installed)

Related information:

- [Dimensional Drawings](#)

RF Transmitter Specifications

Number of channels	1
Frequency range	10 MHz to 8.4 GHz
Frequency step ¹	<2 kHz
Gain range ²	0 dB to 31.5 dB
Gain step	0.5 dB

1. Frequency accuracy decreases when the center frequency is below 6 GHz.
2. The output power resulting from the gain setting varies over the frequency band and among devices.

Frequency accuracy ³	2.5 ppm
Maximum instantaneous real-time bandwidth	160 MHz
Maximum I/Q sample rate	200 MSa/s
DAC resolution	16 bits
Residual sideband image ⁴	<-33 dBc

Table 3. Maximum Output Power, Typical

Frequency	Maximum Output Power
10 MHz to <500 MHz	17.5 dBm to 19 dBm
500 MHz to <2.5 GHz	>20 dBm
2.5 GHz to <4.5 GHz	18 dBm to 20 dBm
4.5 GHz to <6 GHz	16 dBm to 18 dBm
6 GHz to <7 GHz	13.5 dBm to 16 dBm
7 GHz to 8.4 GHz	9.5 dBm to 13.5 dBm

Table 4. TX Output Third-Order Intercept Point (OIP₃), 31.5 dB Gain, Measured

Frequency	Output Third-Order Intercept Point (OIP ₃)
<60 MHz	>24 dBm
60 MHz to <500 MHz	>30 dBm
500 MHz to <2 GHz	28 dBm to 30 dBm
2 GHz to 4.5 GHz	26 dBm to 28 dBm
>4.5 GHz to 6.5 GHz	28 dBm to 32 dBm
>6.5 GHz to 8.4 GHz	25 dBm to 28 dBm

Figure 1. TX EVM Bathtub Curves: 5G NR, UL, FDD, SISO, 100 MHz Bandwidth, 30 kHz SCS, 256 QAM,

- Frequency accuracy is dependent on the configuration of the USRP X300 series motherboard. An external reference source can also be used to provide a more precise frequency reference clock and to achieve better frequency accuracy.
- Measured with a 10 MHz tone offset and UHD TX IQ balance corrections applied.

UHD Corrections Applied, Measured

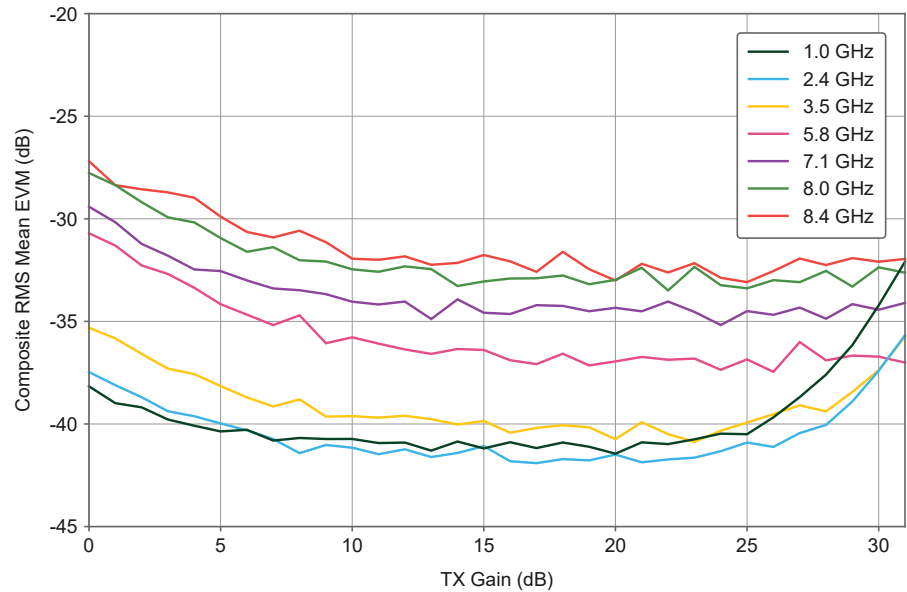


Figure 2. TX EVM Bathtub Curves: WLAN 802.11ax, 160 MHz Bandwidth, MSC 11, 1024 QAM, UHD Corrections Applied, Measured

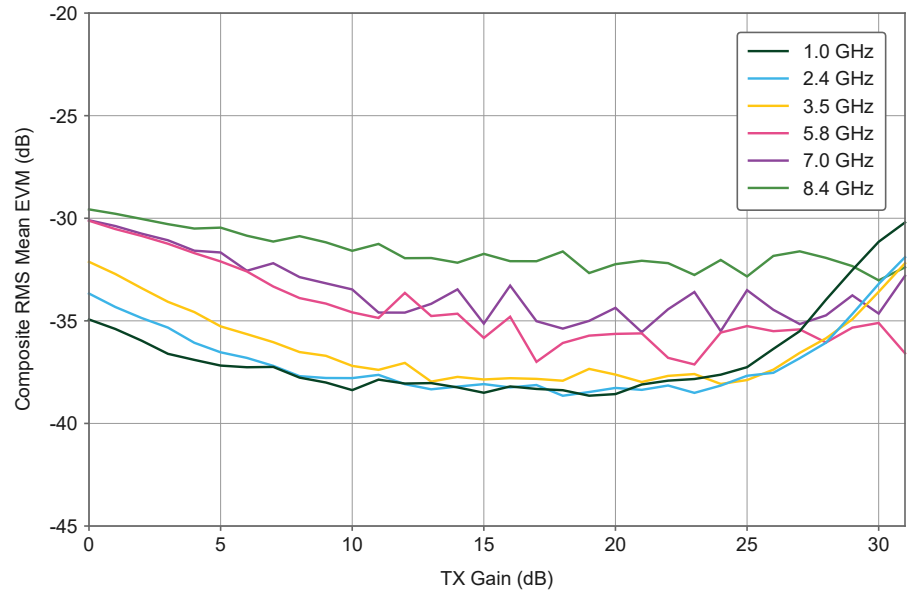


Figure 3. TX Maximum Output Power

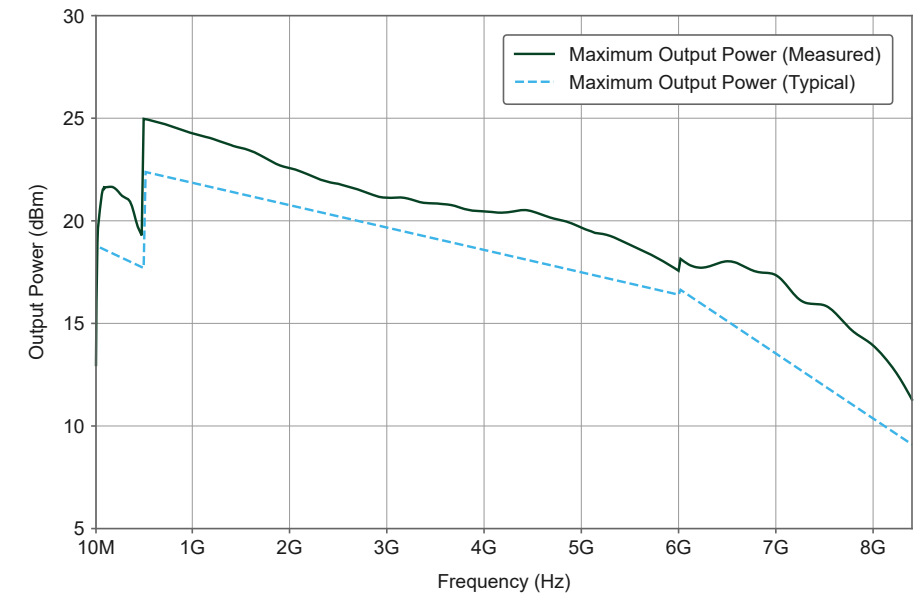
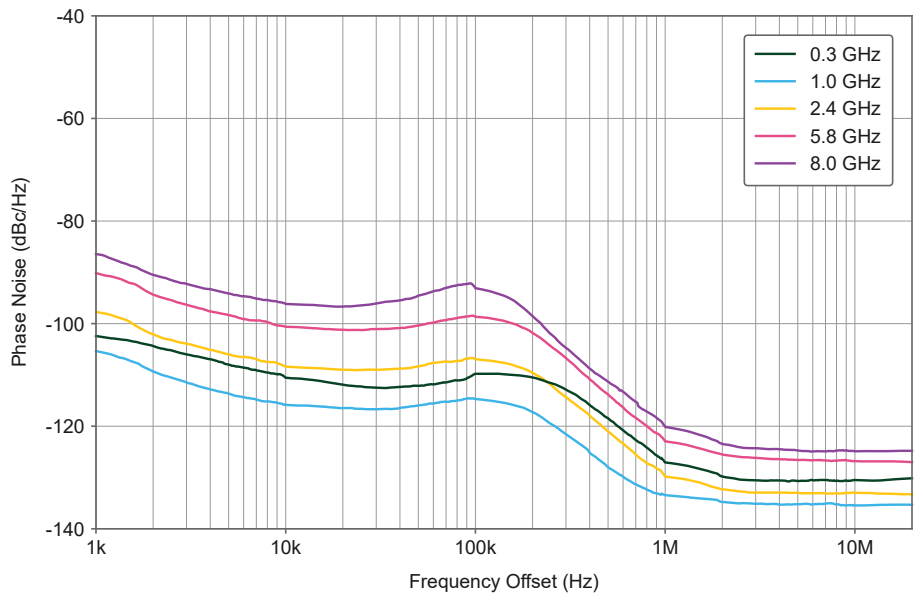


Figure 4. TX Phase Noise, Measured



Measurement conditions: Measured using the internal reference clock of the USRP X310.

RF Receiver Specifications

Number of channels	1
Frequency range	10 MHz to 8.4 GHz

Frequency step ⁵	<2 kHz
Analog gain range ⁶	0 dB to 31.5 dB
Gain step	0.5 dB
Frequency accuracy ⁷	2.5 ppm
Maximum instantaneous real-time bandwidth	160 MHz ⁸
Maximum I/Q sample rate	200 MSa/s
ADC resolution	14 bits

Table 5. RX Input Third-Order Intercept Point (IIP₃), 0 dB Gain, Measured

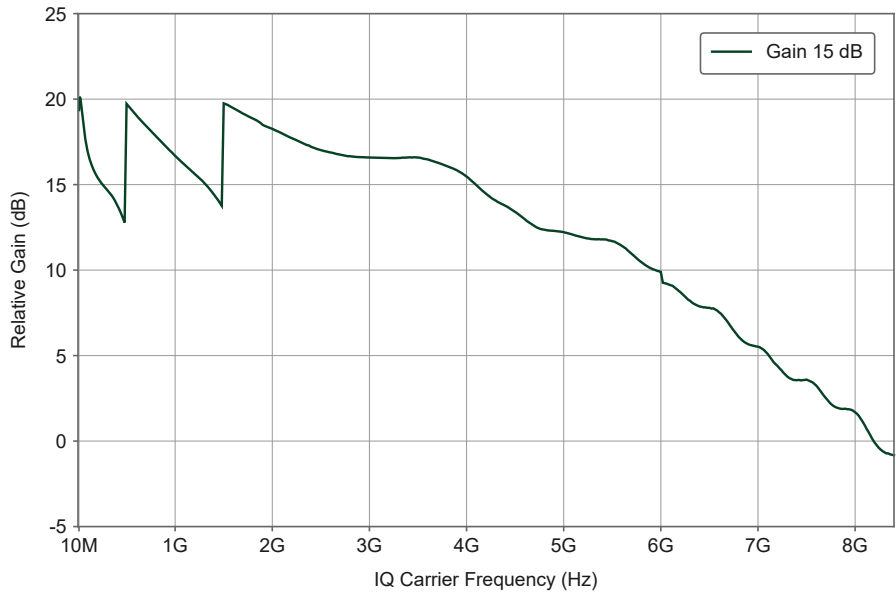
Frequency	Input Third-Order Intercept Point (IIP ₃)
<60 MHz	0.5 dBm to 8 dBm
60 MHz to <600 MHz	8 dBm to 12 dBm
600 MHz to <1.5 GHz	12 dBm to 19.5 dBm
1.5 GHz to 8.4 GHz	9.5 dBm to 14 dBm

Table 6. RX Noise Figure, 31.5 dB Gain, Measured

Frequency	Noise Figure
<2 GHz	<4 dB
2 GHz to <5.5 GHz	<6 dB
5.5 GHz to <7.5 GHz	<10 dB
7.5 GHz to 8.4 GHz	<14 dB

5. Frequency accuracy decreases when the center frequency is below 6 GHz.
6. The received signal amplitude resulting from the gain setting varies over the frequency band and among devices.
7. Frequency accuracy is dependent on the configuration of the USRP X300 series motherboard. An external reference source can also be used to provide a more precise frequency reference clock and to achieve better frequency accuracy.
8. For center frequencies from 10 MHz to 500 MHz, bandwidth is reduced to 84 MHz.

Figure 5. RX Frequency Response, 15 dB Gain, -45 dBm Input Power, Measured



Relative gain (dB) is equal to the input power (dBm) subtracted from the measured response (dBFS).

Figure 6. RX EVM Bathtub Curves: 5G NR, UL, FDD, SISO, 100 MHz Bandwidth, 30 kHz SCS, 256 QAM, UHD Corrections Applied, Measured

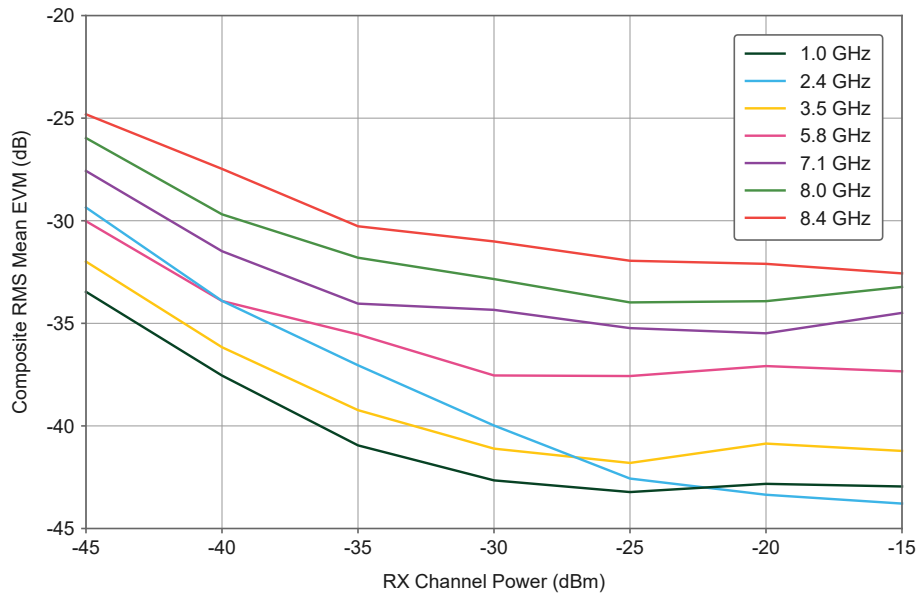


Figure 7. RX EVM Bathtub Curves: WLAN 802.11ax, 160 MHz Bandwidth, MSC 11, 1024 QAM, UHD

Corrections Applied, Measured

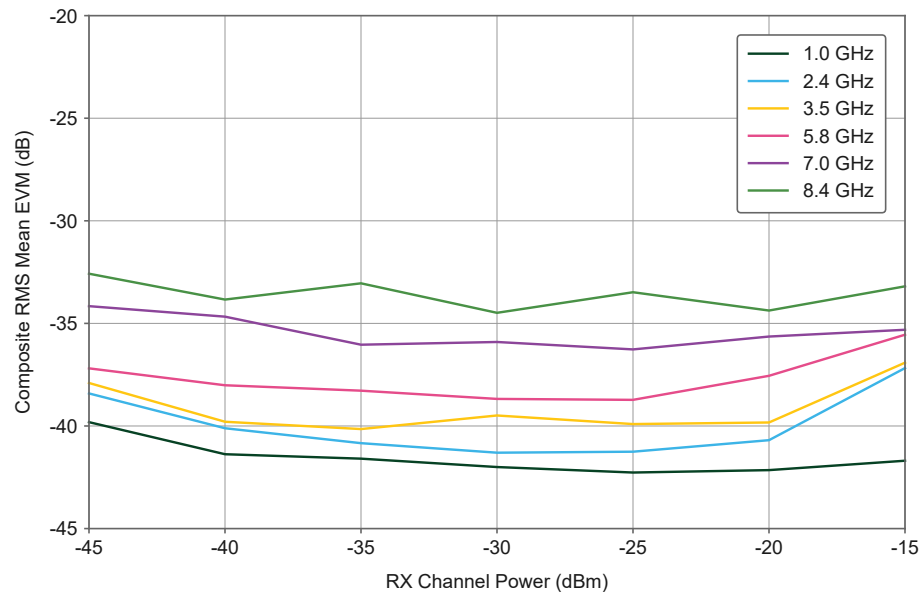


Figure 8. RX Noise Figure, 31.5 dB Gain, Measured

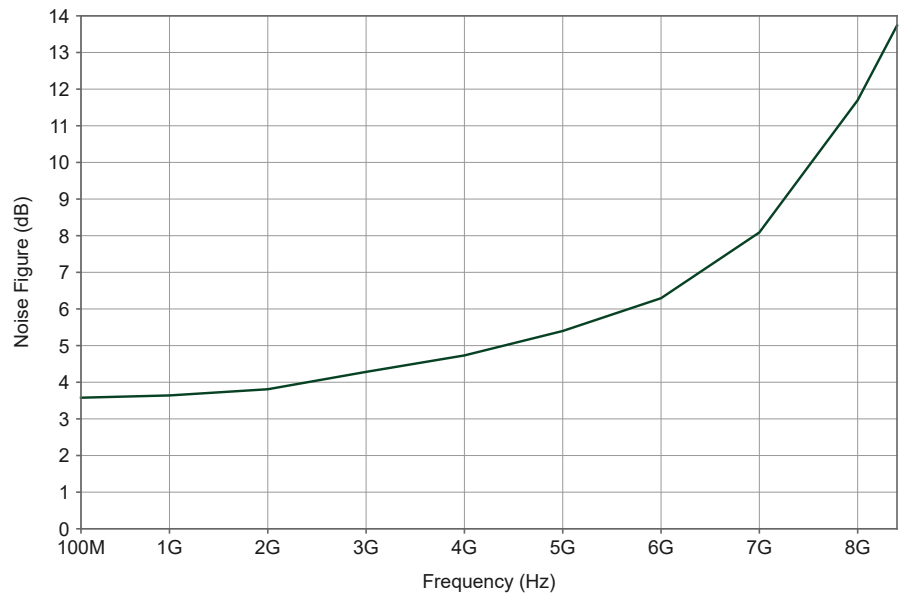
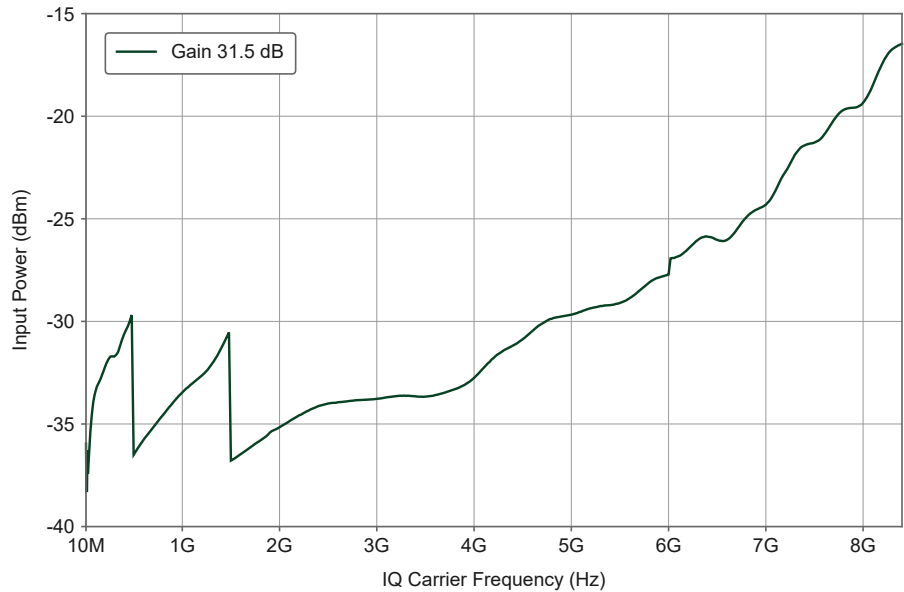


Figure 9. Input Power for 0 dBFS, 31.5 dB Gain, Measured



Power Requirements

Table 7. Power Specifications



Voltage rating	12 V DC
Power rating	50 W to 60 W (USRP X310 with 2× OBX-160 ⁹)

Safety Voltages

Table 8. Rated Voltages

TX/RX	Maximum input power: -15 dBm
RX2	Maximum input power: -15 dBm

Environmental Guidelines

- **Notice** Failure to follow the mounting instructions in the product documentation can cause temperature derating.
- **Notice** This product is intended for use in indoor applications only.

9. Power varies based on the bitfile and functionality utilized on the device.

Environmental Characteristics

Table 9. Temperature

Operating	0 °C to 40 °C
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Table 10. Humidity

Operating	10% RH to 90% RH, noncondensing
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Table 11. Pollution Degree

Pollution degree	2
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Table 12. Maximum Altitude

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