

# Ruggedized and Weatherproof SDR Platforms

## RX310



### KEY FEATURES

- Ruggedized version of National Instruments (Ettus Research brand) X310 Series Software Defined Radio
- Conduction-cooled construction optionally designed to meet MIL 810 for shock/vibration and MIL 461 for EMI
- IP67 weatherproof sealed unit (except air cooled version)
- Other similar National Instruments (NI) small form factor SDR versions are available upon request
- Customizable I/O options
- Anti-vandal pushbutton on/off switch
- Pole-mount and other mounting options available
- Contact Pixus for ruggedization options for other NI SDRs

The Pixus Technologies RX310 is a ruggedized version of National Instruments (Ettus Research brand) X310 Software Defined Radio. Working with NI, Pixus redesigned the commercial version of the product to create a hardened, sealed, conduction-cooled unit to meet IP67 specifications. There are options to further ruggedize the unit to MIL 810 for shock/vibration and MIL 461 for EMI.

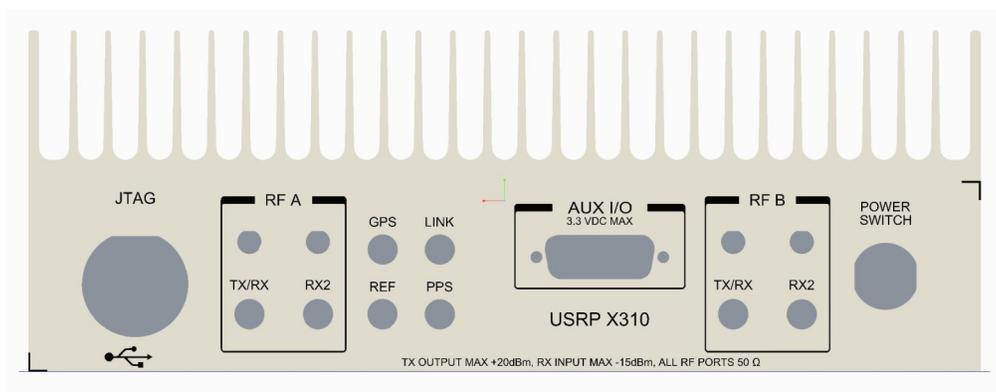
The NI hardware architecture combines two extended bandwidth daughterboard slots covering DC – 6 GHz with up to 120 MHz of baseband bandwidth, multiple high-speed interface options (PCIe, Dual 1/10 GigE), and a large user-programmable Kintex-7 FPGA. The RX310 series can be used in various types of airborne, shipboard, ground vehicle, or outdoor designs. Example applications include SIG-INT, passive RADAR, Drone Deterrence/ Spoofing and prototyping systems for advanced wireless (WiFi/Cell/ MIMO).

**Contact Pixus for ruggedization inquiries for other SDRs from NI.** Visit [www.ettusresearch.com](http://www.ettusresearch.com) for SDR specifications.

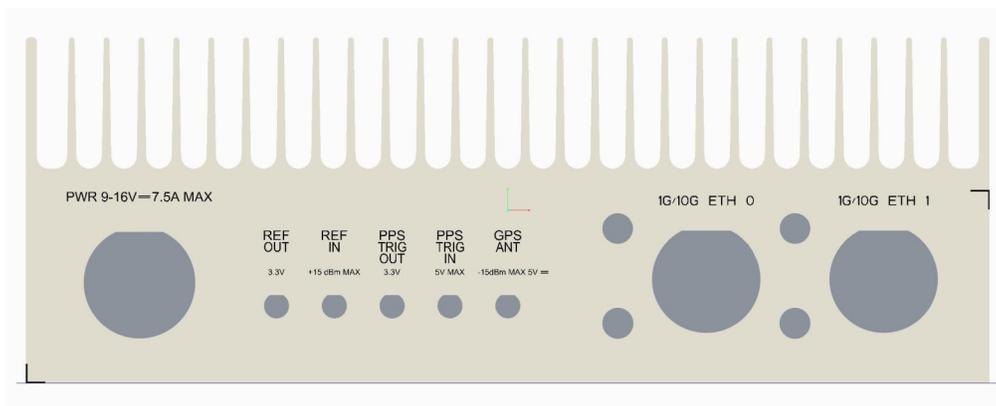
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## I/O Configurations & Power

Pixus offers a standard I/O configuration for the IP67 RX310 (see below) and other SDRs. The modular front and rear faceplates are also customizable. Consult Pixus to discuss your specific requirement. The RX310 comes with a loose connector that can be terminated by the user to the application's power source (via crimp or solder). For powering the unit in a lab/test environment, see P/N SPS0006 in the Accessories section. Please note that the MIL rugged version requires modification to the I/O details below. The unit standardly runs on 12V power. For versions that require an internal heater for low-temp applications, the power will utilize 24V.



Front I/O

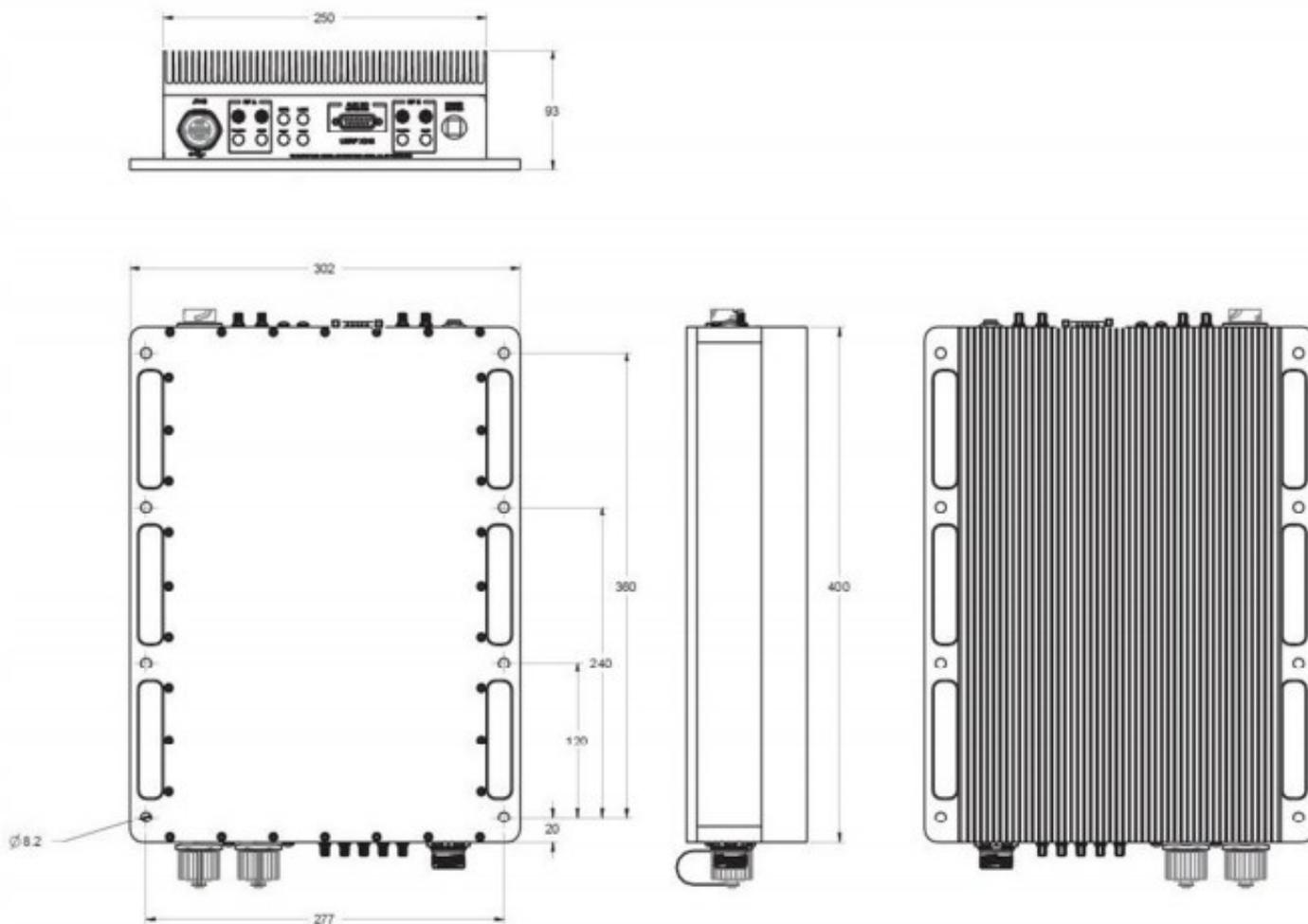


Rear I/O



# Ruggedized and Weatherproof SDR Platforms

## Drawings—IP67 Version



The drawings above are for the IP67 version. The MIL-spec version is slightly larger (contact factory for details).

**MIL version—Front**



**MIL version—Rear**



# Ruggedized and Weatherproof SDR Platforms

## Air Cooled Version

The air cooled version is designed for Transport grade ruggedization. They may be installed in shock isolated transit cases or shock isolated equipment racks hosted in mobile equipment shelters. During operation, the racks should be climate controlled. When transported, the SDRs are typically installed in the transit cases or equipment racks and transported via military aircraft, over improved roads, or via ship. While in transit, the units do not typically need to be in climate-controlled spaces, but the transit cases or shelters should be closed and latched/locked. The air cooled version is designed to meet the specifications below:

<b>Operational Environmental limits</b>		
Operating Altitude	At least 7500 ft	
Operating low temp	-20C	
Operating high temp	+60C	
Operating humidity range	20 % - 90%	
Shipboard Vibration	Yes	Vibration as specified in MIL-STD-167-1, Type 1, over a ship blade rate induced frequency range up to 33 Hz.
Vertical Lift Survive	Yes	2.0 g acceleration vertically with a simultaneous acceleration of 0.2 g in any perpendicular direction when lifted from the top or bottom. MIL-HDBK-810.
Operating pitch or roll	+/- 45 degrees	
<b>Transportation Environmental limits</b>		
Low temp	-40C	
High temp	+65C	Direct solar radiation of 1120 W/m <sup>2</sup> , for a period of 3 hours, per MIL-STD-810
Survive (transport) level altitude	At least 13,000 ft	
Road Transport Vibration	Yes	1.04 Grms (Vertical), 0.20 Grms (Transverse) and 0.74 Grms (Longitudinal) vibration levels in accordance with transportation via truck over US highways per MIL-STD-810G, Method 514.7, Procedure I, Category 4.
Air Transport Vibration	Yes	4.02 Grms of vibration in accordance with general exposure of jet aircraft cargo per MIL-STD-810G, Method 514.7, Procedure I, Category 7.
Road Shock	Yes	7.6G (peak), 11ms shock event in accordance with on road transportation per MIL-STD-810G, Method 516.7, Procedure II.
Transit Drop Survive	Yes	6 inches, per MIL-HDBK-810, Procedure IV

# Ruggedized and Weatherproof SDR Platforms

The air cooled version features a more rugged design than the standard Ettus/NI enclosures and superior airflow. The RX310 has a standard 7.2 CFM to 9 CFM fans with other options available. It is designed for the -20C to 71C operating temperature range.

## Air cooled version—Front



## Air cooled version—Rear



## 1U rackmount, air cooled version, dual unit in one —front



The Pixus air cooled systems provide superior cooling with an efficient front-to-rear airflow path, and higher CFM airflow over hotter components in the chassis. The enclosures are also a thicker, more rugged design for Transport grade military applications.

# Ruggedized and Weatherproof SDR Platforms

## Ruggedization Levels

The RX310 was initially designed to meet IP67 waterproof specifications in a rugged, conduction-cooled design. The unit standardly meets -20C to 50C temperature ranges with the powerful Kintex FPGA installed. There are options to extend the temp range to +70C with an external fan or with customization. Alternatively, if a lower-power FPGA is selected, the higher ambient temperature range can also be met.

To meet MIL specifications for shock/vibration, there are modifications required to utilize 38999 connectors and internal bracing. Pixus also offers a light-rugged solution providing -20C to +50C temperature range and transport grade shock/vibration levels in an air-cooled configuration.

The RX310 is a chassis platform for the end customer/integrator to incorporate their software, interface, and mounting options. As such, it is up to the integrator to provide end application testing to the applications' requirements. Pixus will guarantee that we will meet agreed upon ruggedization levels. Contact Pixus for more details or to discuss co-testing options.

	Air cooled	Conduction cooled	Shock/vibration	IP67	Environmental/EMI
<b>Light-rugged</b>	Temp: - 20C to 60C	N/A	Transport grade	N/A	Not sealed. Various EMI level options.
<b>Rugged IP67, not MIL-grade</b>	See Conduction Cooled	-10C to 50C, With heater/fan: - 40C to 71C	~ 15G shock, above Transport grade	Yes	Fully sealed, MIL461 EMI
<b>MIL Spec Rugged</b>	See Conduction Cooled	-10C to 50C, With heater/fan: - 40C to 71C	~ 20-25G shock, meet various MIL810 specs	Yes	Fully sealed, MIL461 EMI

## Specification Notes

Dimensions of the IP version are 302mm wide x 400mm long x 98mm tall. The weight is ~24 lbs.

Dimensions of MIL-rugged RX310 are 302mm wide x 400mm long x 108mm tall. The optional fan assembly (fan/cover/etc) adds ~ 3.5 lbs and the MIL 38999 connectors add ~ 0.5 lbs.

Dimensions of the Air Cooled RX310 are 240mm wide x 305.6mm long (including mounting tabs, 265.8mm without tabs) x 45mm tall. The weight is ~8.5 lbs.

## Interface Connectors

Pixus provides the mating connectors to the external I/O interfaces except for the fiber connector. Contact Pixus to discuss what mating fiber connector options are available by 3rd parties.

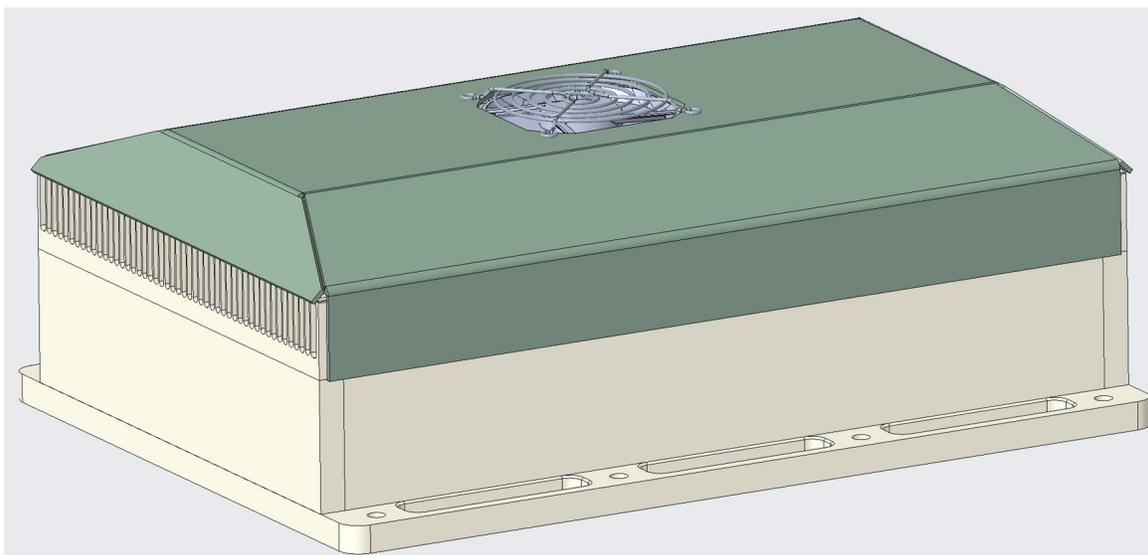
In all versions except the Semi-rugged air cooled configuration, Pixus uses interface cables/connectors from NI's unit to the front and rear I/O panels. Pixus uses components that are expected to match the end performance of the NI SDR, however, some degree of loss may arise as a result of these interfaces. Contact Pixus for cable rating details.

# Ruggedized and Weatherproof SDR Platforms

## Heater and/or Fan Options for IP67 or MIL Rugged Versions

The Rugged series of Ettus/NI enclosures from Pixus are designed to run in environments from  $-10\text{C}$  to  $50\text{C}$  without a fan or a heater. The optional MIL grade fan pulls airflow over the external fins of the conduction-cooled chassis. No airflow goes through the inside of the unit. The heater is an internal device running on either 24VDC power or 48VDC options. Whether an application requires a heater depends on the end application. Factors include whether the device will run from a cold start, the time intervals in the cold environment, altitudes, etc. The approximate time for the heater to bring the chassis from  $-40\text{C}$  to  $+10\text{C}$  is 30 minutes.

To ensure safe operation, the 24VDC and 48VDC versions have different power connector interfaces. Below is a model showing the fan interface. It is recommended to leave at least 40mm gap between the top of the unit and the fan (27mm minimum clearance required).



The example shown above is the RX410 version

## Terms of Use\*

### The Customer agrees that the Products will not be re-exported, resold, or transferred to:

- (a) any country subject to export restrictions under the Export Administration Act of 1979 (EAR).
  - (b) any end-user who has been denied participation in export transactions by any federal agency of the United States government.
  - (c) an end-user who the Customer knows or has reason to believe will utilize the Products directly or indirectly in nuclear activities listed in the EAR 778.3(b)(1), (2) & (3), whether the items are specifically designed or modified for such activities.
  - (d) an end-use destined for the design, development, production, or use of missiles or missile projects, or activities related to nuclear, chemical, or biological weapons.
- The Customer acknowledges that "Products" include technical data subject to the export and re-export restrictions of the EAR.

\* Pixus' other standard terms and conditions apply.

# Ruggedized and Weatherproof SDR Platforms

## ORDERING OPTIONS

## RX310-ABC-DEF-XX

### A = Type

0 = UBX  
2 = TwinRX  
4 = Other

1 = TwinRX with GPSDO oscillator  
3 = UBX with GPSDO oscillator

### 2 digit customization code

Blank = standard, no customization

### B = I/O Configuration

0 = Standard I/O as shown page 2  
1 = Other

### C = Ruggedization Level

0 = IP67, Rugged (standard)  
2 = Reserved  
4 = Other

1 = Semi-Rugged, air cooled w/filter  
3 = MIL 810/410 Rugged, IP67  
5 = 1U rackmount, air cooled, dual unit

### D = Light Indicator Setting

0 (or blank) = Light indicators connected, lit  
1 = Light indicators not connected, dark

### E = Ethernet Type

C (or blank) = Copper  
F = Fiber (multi-mode, 300m)

D = Other

### F = Heater Installation

0 (or blank) = no heater or fan installed, 12V power  
1 = Heater installed for low-temp apps, 24V power  
2 = Heater and MIL grade fans over fins for extreme temp apps, 24V power  
3 = Other

## ACCESSORIES

### Power Supply Kit P/N: SPS0006

The SPS0006 comes with a C13 IEC inlet for AC input and an RX310 compatible connector for the DC output. The part number for the air cooled version is SPS0009. <https://www.ettus.com/all-products/12v-pwr/> Note that versions with an internal heater will utilize 24V power.



### Pole Mount Kit P/N: SPS0007

### Mating I/O Interface Connectors

Pixus provides the mating power connector for all IP67 and MIL rugged models. Plastic caps on the MIL rugged I/O connectors are also supplied. The other mating I/O connectors are available upon request. External cabling is not supplied by Pixus but available depending on business case. Consult Pixus for details.

