

Overview

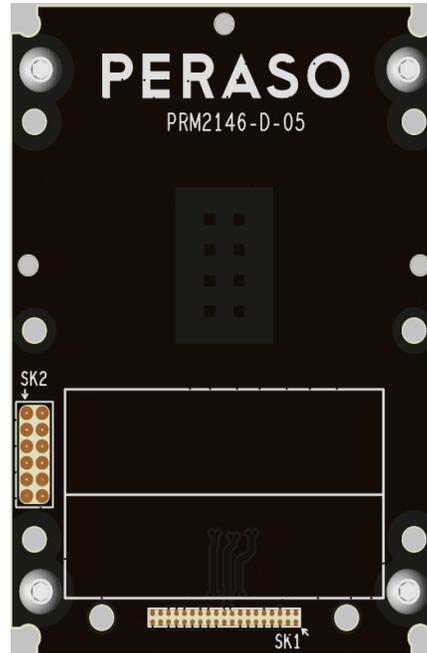
The PRM2146X-D is the first module in Peraso’s Perspectus module product to offer dual polarization. The 8-element antenna array can be configured to operate on horizontal or vertical polarization and changes in polarization can be made seamlessly during operation. This capability enables the PRM2146X-D to work in networks where antenna orientation is dynamically changing due to mobility.

The EVK-PRM2146X-D is an evaluation kit containing the PRM2146X-D module, the PER6145 adapter board, heatsink and power supply and tri-pod mount to facilitate lab test setup.

The PRM2146X-D utilizes the Peraso X720 IEEE 802.11ad 60 GHz phased array chipset which includes a baseband processor and a high-power mmWave beamforming transceiver RFIC. The PRS1165 RFIC provides 16 RF chains with high transmit power levels. It supports all 6 of the WiGig defined channels. The module utilizes a USB 3.0 interface for data and control.

The PRM2146X-D incorporates an 8-element phased array antenna which can be used with or without a dish reflector. This antenna is capable of both horizontal and vertical polarizations. The antenna is integrated into the PCB and provides uniform performance over the entire IEEE 802.11ad band from 57 to 71 GHz.

The Baseband processor is the PRS4601 B2E. This provides all MAC and PHY layer functionality necessary for IEEE 802.11ad operation and supports point-to-point or point-to-multipoint capability.



Features

- Operates in the unlicensed 57 to 71 GHz band
- Full and ½ channel support
- MCS 1 (BPSK) to MCS 12 (16QAM) support
- Fully integrated MAC, PHY, radio, and antenna
- IEEE 802.11ad MAC and PHY compliance
- Automatic calibrations
- Dynamic directional beamforming
- AES 128 bit data encryption
- Automatic calibrations
- WPA2 and WPA3 Authentication
- 1PPS synchronization support
- A-MSDU, A-MPDU data aggregation
- Peraso Directional Beam Scan and Connect (DBSC) for establishing long-range PtP links
- USB 3.0 data and control interface
- Integrated power management
- Substrate integrated 8-element dual-polarized antenna array (H/V)
- -70 dBm receive sensitivity@MCS4
- 3Gbps maximum data rate
- 38 dBm EIRP with 8-elements active (higher gains supported using a dish reflector)
- Total system DC power
 - Tx: 8.1 - 11.75 W (QPSK)
 - Rx: 4.9 W (QPSK)
- -40°C to 85°C operation
- Single 5V power supply input
- Compact 35mm x 50mm form

Evaluation Kit Components

The EVK-PRM2146X-D includes:

- 1) PRM2146X-D module
- 2) PER6145 adaptor board with a USB interface and a 5V dc power jack
- 3) Heatsink with fan
- 4) 5V power adaptor
- 5) USB-A to micro-USB cable
- 6) Tripod

Applications

- mmWave point-to-point small cell backhaul links
- PtMP fixed wireless access
- High performance 60 GHz access points and clients
- Can be used with or without a dish antenna

Block Diagram

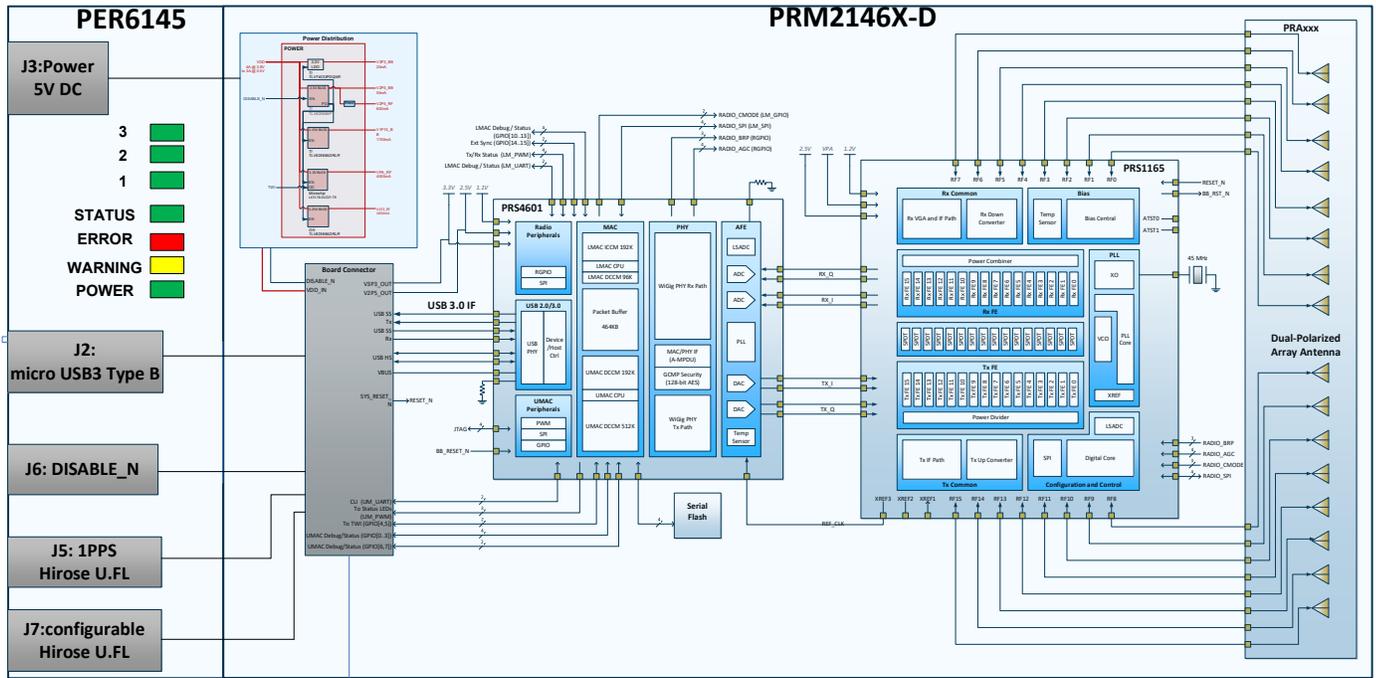


Figure 1: Functional Block Diagram

Key Specifications

Unless otherwise noted, all specifications are at 25 °C. Please refer the PRM2146X-D datasheet for complete performance specifications.

Table 1 gives the DC power consumption as a stand-alone antenna. Table 2 gives the DC power consumption when configured for use with a dish reflector antenna.

Table 1: DC Power Consumption when using a directive antenna sector

Parameter/Pin	Description	Conditions	Min	Typ	Max	Units
Tx DC Power Consumption				8.1		W
Rx DC Power Consumption				4.9		W

Table 2: DC Power Consumption when using the Omni sector

Parameter/Pin	Description	Conditions	Min	Typ	Max	Units
Tx DC Power Consumption				11.75		W
Rx DC Power Consumption				4.9		W

Connectors

The interface to the EVK-PRM2146X-D is through a micro-USB Type B connector. This connection is provided through the PER6145 adapter board to facilitate testing and evaluation of the PRM2146X-D module.

Power is provided over the 2.5 mm power jack.

The USB data signals are connected through the Micro USB 3.0 Type-B connector.

Switches

There are five switches. The functionality of the switches is in the table below.

Table 3: Description of Switches

Switch	Type	Connection	On	Description
SW1	Push Button	SYS_RESET_N	GND	Push to reset module
SW2:1	Dip	1PPS level shifter DIR	GND	Default: Open, Direction is Host to module Close to set 1PPS signal to an output, Direction is module to Host. This signal is pulled to VCCA=1.8V with a 10K resistor.
SW2: 2	Dip	GPIO_0	V2P5	Default: Open, Boot from on-board Flash. Close(High) to force boot from host.
SW3: CW	Rotary	VCCB_U2	V1P8	Sets the 1PPS signal level to 1.8V
SW3: CCW	Rotary	VCCB_U2	V3P3	Sets the 1PPS signal level to 3.3V
SW4: CW	Rotary	VCCB_U3	V3P3	Setting the voltage level for the fan Default = 3.3V
SW4: CCW	Rotary	VCCB_U3	VDD	Voltage for fan= VDD
SW5: 1-2	Slide	DISABLE_N	GND	DISABLE_N connection to GND or Open.

CW=clockwise, CCW=counter-clockwise

LEDs

Table 4 gives details regarding the LEDs on the PER6145 adapter board.

Table 4: LED Signals

LED	Active High/ Low	Colour	Notes
PWR	High	Green	Active if power is applied.
WARNING	High	Yellow	
ERROR	High	Red	Indicates and error state, or bootloader state
STATUS	High	Green	Indicates successful enumeration of USB
1	High	Green	Currently not used
2	High	Green	Currently not used
3	High	Green	Currently not used

Antenna

The antenna of the PRM2146X-D is a PCB integrated antenna. This design allows for a broad frequency response that encompasses IEEE 802.11ad/ay channels 1 to 6.

The antenna is designed with 8 elements, and is capable of beamforming in both the elevation and azimuth axes.

This antenna has been designed for use as a stand-alone antenna, or to be used with a dish reflector. The difference between these two applications is a different antenna beam table. Refer to the PRM2146X-D datasheet for more details regarding antenna performance.

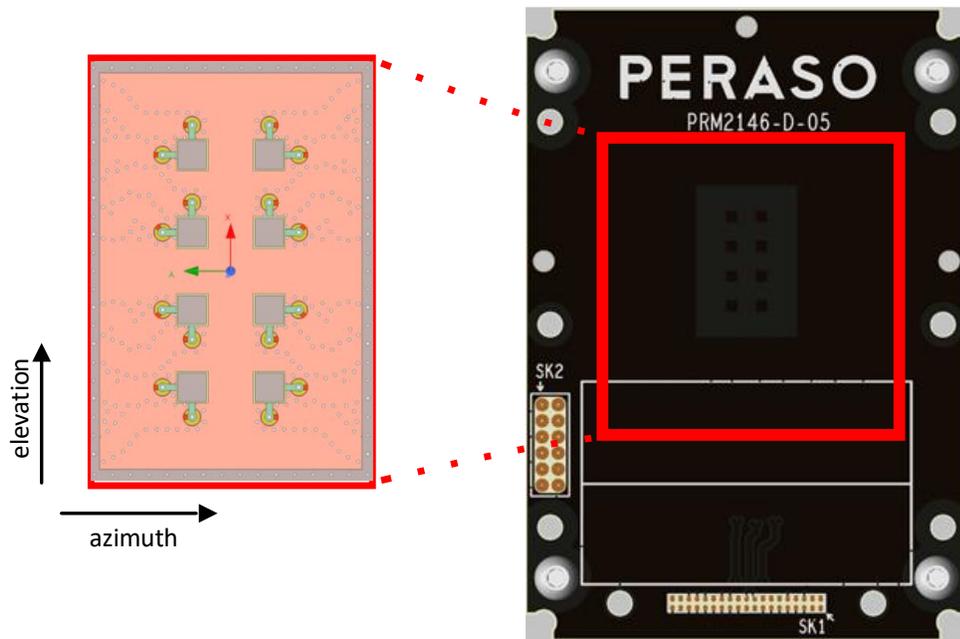


Figure 2: Diagram of the 16-element antenna and position on the PRM2146X-D module

Mechanical Specifications

The EVK-PRM2146X-D consists of two PCBs, the PRM2146X-D and the PER6145. The PRM2146X-D is the module that provides all the functionality. The PER6145 is an adapter board that allows connection through a USB micro-B 3.0 port.

Below are the mechanical drawings of each board, including dimensions.

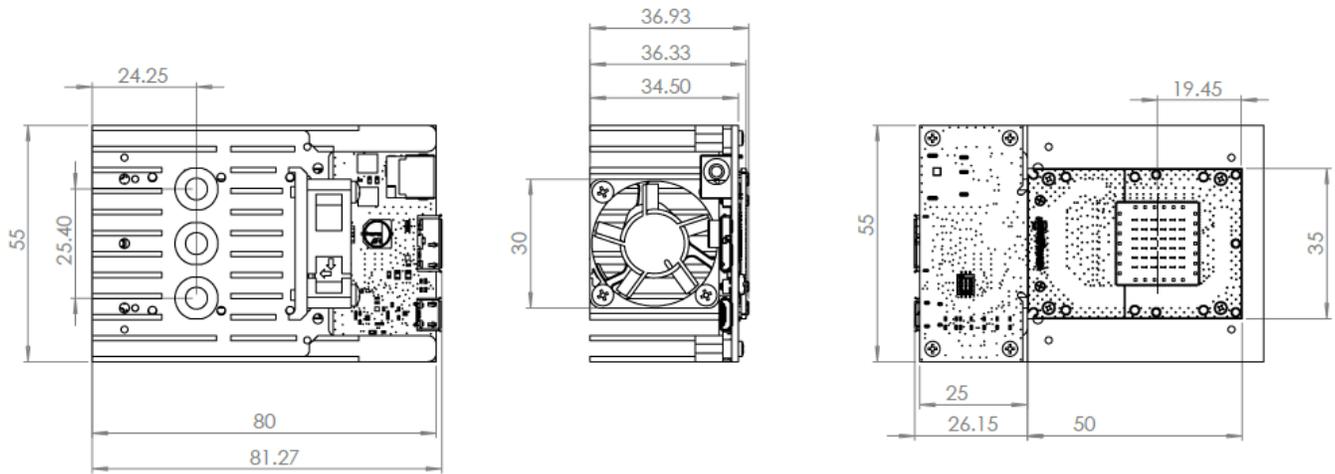


Figure 3: Mechanical drawing of the assembled EVK-2141X-V with heatsink and fan (top, bottom, and side view)

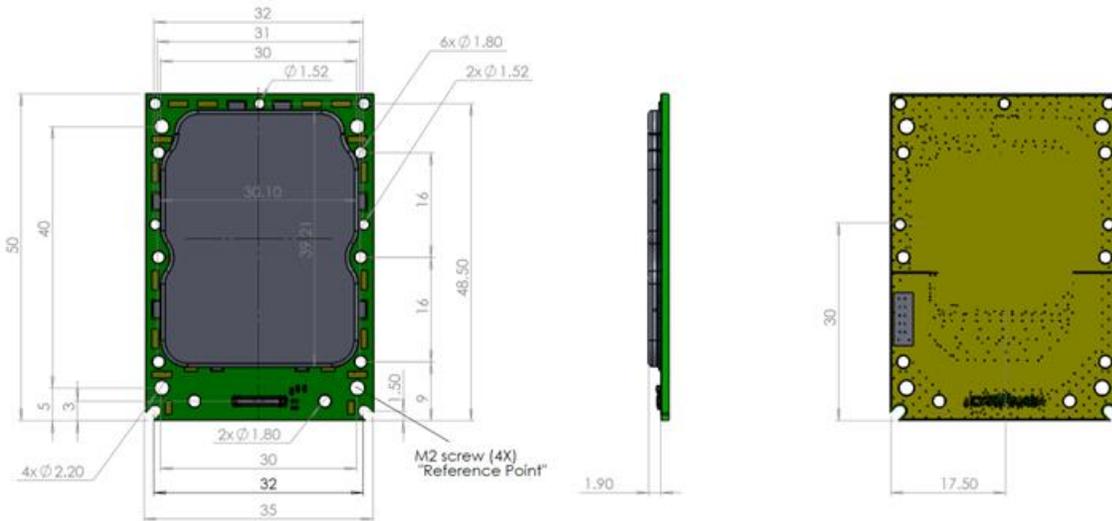


Figure 4: Mechanical drawing of the PRM2146X-D-EGS with dimensions

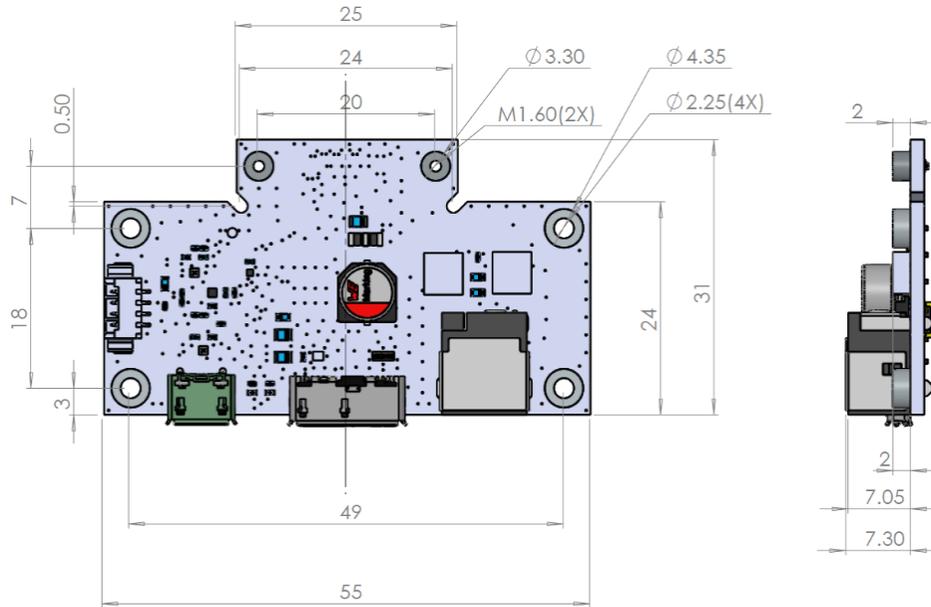


Figure 5: Mechanical drawing of the PER6145 adapter board with dimensions

Ordering Information

Part #: EVK2146X-D-EWUB5V-PN

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