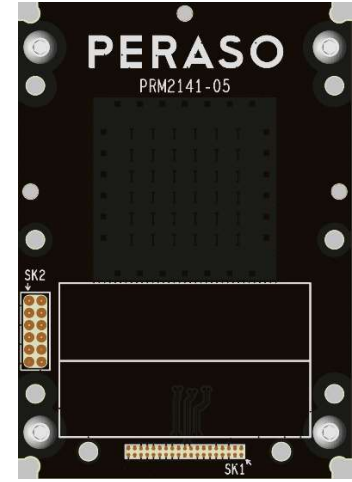
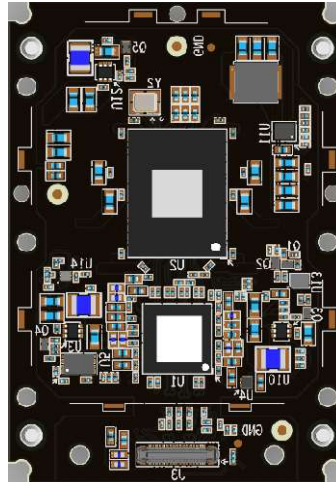


### Overview

The PRM2141X-V is a member of the *Perspectus* module series which provides a complete USB 3.0 to IEEE 802.11ad module with advanced features for long range, outdoor applications. It 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 PRM2141X-V incorporates a 16-element phased array antenna which can be used with or without a dish reflector. The antenna is integrated into the PCB and provides uniform performance over the entire IEEE 802.11ad/ay 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.

The PRS1165 RFIC provides 16 RF chains with high transmit power levels. It supports all 6 of the IEEE 802.11ad defined channels. Selectable RF filters allow it to also support 1/2 bandwidth channels.

### Target Applications

- Point-to-multipoint Fixed Wireless Access Networks
- Point-to-Point Backhaul / Fiber alternative

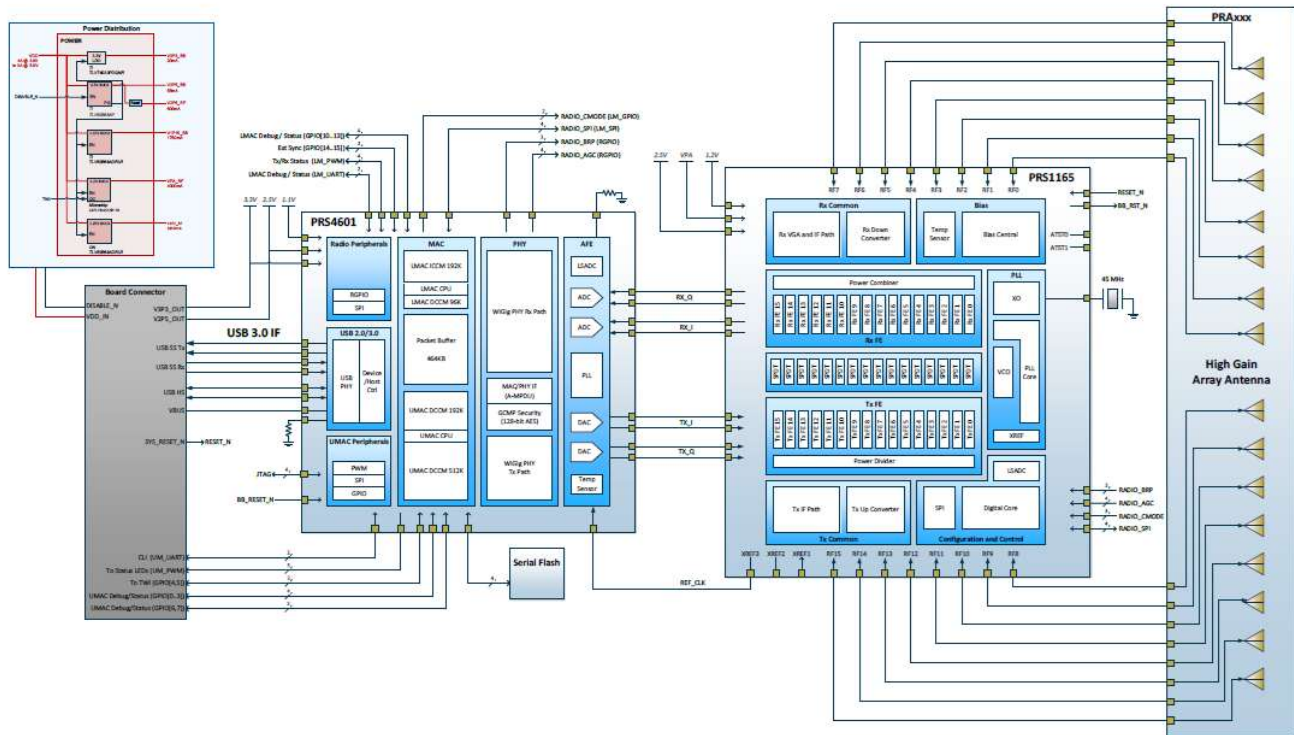
### Features

- Operates in the unlicensed 57 to 71 GHz band
- Full and 1/2 channel support
- 16-element integrated phased array antenna
- MCS 1 (BPSK) to MCS 12 (16QAM) support
- Fully integrated MAC, PHY, radio, and antenna
- IEEE 802.11ad MAC and PHY compliance
- 40 dBm EIRP with 16-elements active
  - (higher gains supported using a dish reflector)
- Total system DC power
  - Tx: 11.75W (at QPSK, 16 elements active)
  - Rx: 4.5W (at QPSK, 16 elements active)
  - Tx: 4.25W (at QPSK, 4 elements active)
  - Rx: 3.3W (at QPSK, 4 elements active)
- Automatic rate adaptation
- Dynamic beamforming
- AES 128-bit data encryption
- WPA2 and WPA3 Authentication
- ATPC- Automatic Transmit Power Control
- 1PPS synchronization support\*
- Multi-user support up to 48 STA
- A-MSDU, A-MPDU data aggregation
- Peraso Directional Beam Scan and Connect (DBSC)
- STA focus
- USB 3.0 data and control interface
- Integrated power management
- -89 dBm receive sensitivity@MCS1\*\*
- Up to 3.5 Gbps bidirectional TCP/UDP throughput
- -40°C to 85°C operation
- Single 5V power supply input
- Compact 35mm x 50mm form factor

\* Optional firmware enabled feature.

\*\* Incident at the module antenna

# Block Diagram



## General Description

The PRM2141X-V high performance, 60GHz transceiver module provides full IEEE 802.11ad functionality from a USB data and control interface to an over-the-air antenna. The module has a compact 35mm x 50mm form factor.

The baseband connector provides the interface for USB3.0 data and additional control signals. The module is powered from a single 5-volt supply on the same connector.

The PRM2141X-V uses the PRS4601-B2E baseband processor, and the PRS1165 RFIC.

The PRS4601 IEEE 802.11ad Baseband incorporates the Analog Front End, BB PHY/ MAC, and two RISC CPU cores. It utilizes a highly flexible, dual CPU soft MAC integrates all IEEE 802.11ad MAC functions. This includes A-MSDU, A-MPDU, and WPA2 security.

This module operates in the unlicensed 57 to 71 GHz band and can be tuned to 2.16 and 1.08GHz channel bandwidths and spacing.

The PRM2141X-V utilizes a phased array antenna. This antenna can be used with a parabolic dish reflector, or in a stand-alone application. Peraso provides antenna sector tables that are preconfigured and optimized for each application. The PRM2141X-V antenna is capable of beamforming to optimize the wireless connection. In the stand-alone application, the antenna is capable of steering the beam +/-45 degrees in both the elevation and azimuth directions. When used in a dish, the beam steering is dependent on the characteristics of the dish reflector.

The PRM2141X-V is fully tested to an over-the-air antenna input/output specification, thus relieving OEMs from the complexities of ensuring the integrity of the mmWave RF performance.

## Key Specifications

Parameter	Value		
Data Interface	USB3.0		
Air Protocol	IEEE 802.11ad		
Modulation Schemes	MCS 1 (BPSK) to MCS 12 (16QAM)		
Multiple Access Modes	CBAP, proprietary Long Range CBAP and Controlled Access protocols		
Security Modes	128-bit AES WPA2 WPA3		
Networking Support	Infrastructure, peer-to-peer, standard WLAN		
	Conditions	Value (Typ.)	Units
RF Frequency		57 to 71	GHz
Channel bandwidth	IEEE 802.11ad Channels 1-6	2.16, or 1.08	GHz
Module size	Length x Width	50 x 35	mm
Operating Temperature Range		-40 to 85	°C
<b>TX Parameters</b>			
EIRP	T <sub>amb</sub> =25°C, @MCS1	40	dBm
<b>RX Parameters</b>			
Sensitivity	T <sub>amb</sub> =25°C, @MCS1	-89	dBm
<b>Beam Forming Parameters</b>			
Azimuth Scan Range	-3dB edge, Channel 4	+/-45	deg
Elevation Scan Range	-3dB edge, Channel 4	+/-45	deg
<b>DC Power Consumption</b>			
16 antenna elements (QPSK)	TX DC Power	11.75	W
	RX DC power	4.5	W
4 antenna elements (QPSK)	TX DC Power	4.25	W
	RX DC power	3.3	W

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