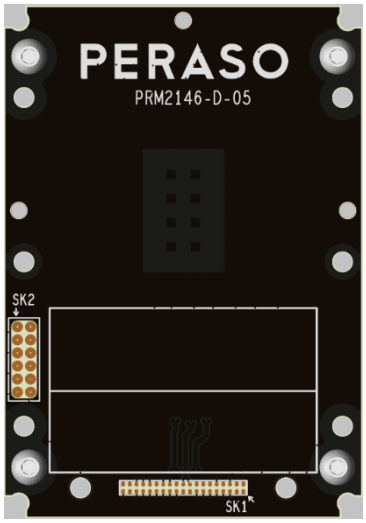
Overview

The PRM2146X-D is a complete wireless adapter module supporting the IEEE 802.11ad standard 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 module utilizes a USB 3.0 interface for data and control.

The PRM2146X-D incorporates an 8-element phased array antenna. 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 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 IEEE802.11ad defined channels.



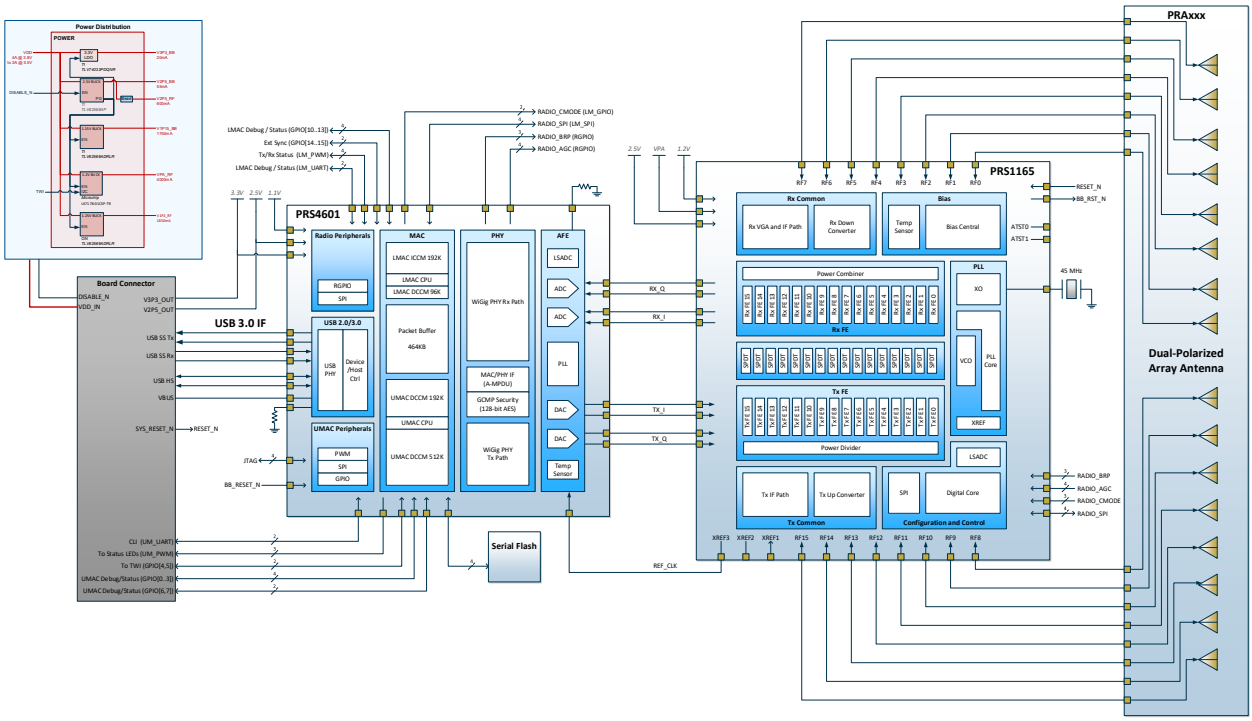
Target Applications

- mmWave point-to-point small cell backhaul links
- PtMP fixed wireless access
- High performance 60 GHz access points and clients
- Challenging dynamic and high-mobility deployments

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
- 37 dBm EIRP with 8-elements active (higher gains supported using a dish reflector)
- Total system DC power
  - Tx: 8.1 W (QPSK)
  - Rx: 4.9 W (QPSK)
- -40°C to 85°C operation
- Single 5V power supply input
- Compact 35mm x 50mm form factor

Block Diagram



General Description

The PRM2146X-D 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 PRM2146X-D 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 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 integrated 8-element antenna performs beamforming. This antenna can also operate with a quasi-omnidirectional antenna pattern. No factory calibration is required, as all calibration is performed at run-time.

This module meets the compliance requirements of European Union Directive 2011/65/EU (RoHS).

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. An encrypted HFSS file of the PRM2146X-D antenna is available to aid in dish design. Contact Peraso sales support.

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 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
TX Parameters			
EIRP	T_{amb}=25˚C, Channel 4, MCS9	37	dBm
RX Parameters			
Sensitivity	T_{amb}=25˚C, Channel 6, MCS4	-70	dBm
Beam Forming Parameters			
Azimuth Scan Range	-3dB edge, Channel 4	+/-45	deg
Elevation Scan Range	-3dB edge, Channel 4	+/-45	deg
DC Power Consumption			
DC Power Consumption when using a directive antenna sector	TX DC Power	8.1	W
	RX DC power	4.9	W
DC Power Consumption when using the omni sector	TX DC Power	11.75	W
	RX DC power	4.9	W

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