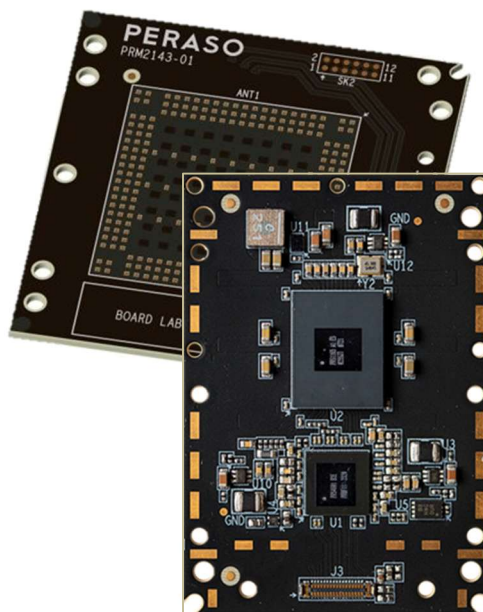


mmWave Products

Peraso Inc. develops semiconductors and modules for the millimeter-wave market and has been a leader in providing RF solutions for more than 10 years. It has made essential contributions to the IEEE 802.11ad/ay standard and holds several patents in the field.

The company's IC products include baseband ICs and mmWave RFICs. When combined with its patented antenna technology, the result is two compelling families of module products. Peraso offers its *Perspectus 60* and *Versatus 60* module series for the 60 GHz band.

These modules offer low latency, high reliability, multi-gigabit throughput and can be configured to support Fixed Peraso's unique capabilities enable point-to-point and point-to-multipoint Fixed Wireless applications with link ranges exceeding 20 kilometers. Enterprise and consumer applications, such as wireless UHD video streaming, untethered augmented reality and virtual reality can also be supported.



60 GHz Modules Overview

Peraso's mmWave modules provide complete USB 3.0 to 802.11ad solutions for high-speed wireless applications including Fixed Wireless and Enterprise data networking infrastructure. The modules utilize the Peraso X720 and X130 60 GHz phased-array chipsets which include a baseband processor and mmWave beamforming transceiver RFICs.

The modules incorporate phased array antennas which offer a variety of gain and field-of-view options. The antenna is integrated into the PCB and provides uniform performance over the entire license-free 60 GHz band.

The Baseband processor, the PRS4601 B2E, provides MAC and PHY layer functionality necessary for IEEE 802.11ad operation and supports point-to-point or point-to-multipoint capability. Peraso offers a variety of software/firmware versions which are optimized for common applications.

Common Module Features

- Operates in the license-free 60 GHz band
- IEEE 802.11ad MAC and PHY compliance
- Integrated phased-array antenna
- Dynamic beamforming
- Up to 4.6 Gbps OTA data rate
- Extremely low (< 5 ms) link latency
- USB 3.0 data and control interface
- Automatic rate adaptation
- Automatic calibrations
- AES 128-bit data encryption
- Network synchronization support
- A-MSDU, A-MPDU data aggregation
- Integrated power management
- -40°C to 85°C operation
- Single 5V power supply input
- Application Software Modules
- Scanned for FCC compliance

Perspectus 60 Series

The Perspectus series of modules utilize Peraso's high power X720 chipset. The modules are supported by Peraso's Perspectus Infrastructure software and firmware packages.

The PRS1165 RFIC provides 16 RF chains with high transmit power levels and supports all 6 of the IEEE 802.11ad/ay defined channels. Channels 5 and 6 are outside the oxygen absorption band thereby allowing for long range operation. Selectable RF filters allow it to also support ½ bandwidth channels.

With a variety of integrated antenna options, and the ability to add a high gain parabolic reflector, the Perspectus system can achieve gigabit data rates at ranges exceeding 20km.

Target Applications

- Point-to-multipoint Fixed Wireless Access Networks
- Secure communication networks
- Point-to-Point Backhaul / Fiber alternative
- Industrial Automation

Features

- 57-71 GHz, Channels 1-6
- ½ Channel capability
- High-power 16 RF chains
- 16 to 128 element antenna arrays
- MCS 1-12
- Total user data capacity up to 3.5 Gbps
- Multi-user support up to 48 STA
- Peraso smart BSS separation and interference avoidance
- Peraso Directional Beam Scan and Connect (DBSC) for establishing long-range Fixed Wireless links
- Peraso STA Focus for long-range Fixed Wireless Access point-to-multipoint systems
- EDCA tuning to optimize channel utilization
- -40°C to 85°C operation
- 5VDC power input
- Scanned for FCC compliance

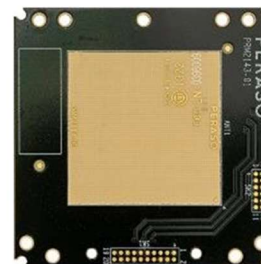
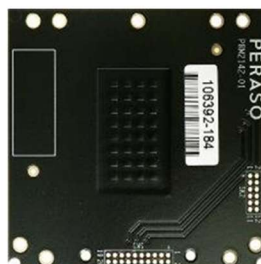
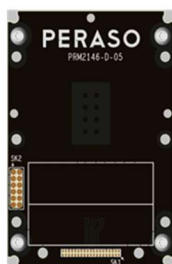
Perspectus 60 Module Comparison Table

	PRM2146X-D	PRM2141X-V	PRM2142X-V	PRM2143X-V	PRM2144X-V
Antenna Array	8-element dual-polarized (H/V)	16-element patch array	32-element patch array	64-element patch array	128-element patch array
Max EIRP ¹	37 dBm	39 dBm	40 dBm ³	44 dBm ³	47.5 dBm ³
Antenna Gain	15 dBi (H) / 13.5 dBi (V)	15 dBi	18 dBi	22 dBi	25.5 dBi
Scan range ²	±45° azimuth ±45° elevation	±45° azimuth ±45° elevation	±45° azimuth ±20° elevation	±25° azimuth ±15° elevation	±10° azimuth ±20° elevation
Power consumption	Tx: 8.1 – 11.75 W Rx: 4.5 - 4.9 W	Tx: 7 - 11.5 W Rx: 3.3 - 4.5 W	Tx: 11.5 W Rx: 4.5 W	Tx: 11.5 W Rx: 4.5 W	Tx: 11.5 W Rx: 4.5 W
Size	35mm × 50mm	35mm × 50mm	50mm × 50mm	50mm × 50mm	55mm × 55mm
Additional information	For challenging dynamic and high-mobility deployments	Dish (reflector) antenna supported	Higher gain for AP in PtMP configuration	Higher gain for STA in PtMP configuration	Highest gain for STA or PtP.

Typical Specifications

Notes:

- 1) Boresight channel
- 2) -3dB
- 3) Regulatory limit



Notes:

- 1) EIRP may be limited for regulatory compliance.
- 2) Antenna gain referenced to Channel 5, boresight
- 3) Azimuth -3dB beamwidth. Varies over channels; low channels wider than upper channels.
- 4) Azimuth, boresight sidelobe.

Versatus 60 Series

Versatus 60 series modules are targeted for enterprise, industrial and consumer applications which demand reliable, low latency, multi-gigabit data rates.

The modules incorporate antenna arrays which can switch between vertical and horizontal polarizations to match any installation or operational scenario.

The modules are supported by Peraso's Software and Firmware packages which include features such as roaming and the ability to service up to 32 associated and active STA.

Target Applications

- Enterprise networking
- Industrial automation
- Multi-AP and STA networks with fast roaming
- Wireless display
- Untethered AR/VR
- Secure/tactical communications

Module Features

- 57-66 GHz, Channels 1-4
- 8 active RF chains
- Wide field-of-view beam-steering range
- Automatic polarization switching
- $\pi/2$ -BPSK, $\pi/2$ -QPSK, $\pi/2$ -16QAM modulations
- Total user data capacity up to 3.5 Gbps
- Multi-user support up to 48 STA
- Fast roaming between APs
- 0°C to 50°C operation
- Scanned for FCC compliance

Versatus 60 Module

	PRM2136X
Status	In Production
Application	Consumer electronics, AR/VR, tactical communications
Antenna Array	8 + 8 dual-polarized patch
Max EIRP ¹	29 dBm
Antenna Gain	13 dBi
Scan range	$\pm 45^\circ$ azimuth $\pm 40^\circ$ elevation
Boresight Beamwidth (-3dB)	40° azimuth 25° elevation
Boresight Side Lobe	-15 dB max. azimuth -15 dB max. elevation
Coverage (-6dB)	$\pm 60^\circ$ azimuth $\pm 60^\circ$ elevation
Power consumption	Tx: 2.5 – 3.2 W Rx: 2.4 – 2.9 W Idle: < 500mW
Size	22mm × 45mm
Interface	36-pin Hirose board-to-board

