

Revision 1.0.2304

1. Introduction

1.1 Summary

The MWC-2142 is a complete USB 3.0 to 802.11ad module with advanced features for long range, outdoor applications. It utilizes the 802.11ad 60 GHz phased array chipset which includes a baseband processor and a high -power mmWave beamforming transceiver RFIC.

The MWC-2142 incorporates a 32-element phased array antenna. This antenna is integrated into the PCB and provides uniform performance over the entire 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 802.11ad defined channels.

1.2 Applications

- mmWave point-to-point backhaul links
- PtMP Fixed Wireless Access
- High performance 60 GHz access points and clients

1.3 Abbreviations and Acronym Definitions

| ВВ | Baseband | |
|--------------|---------------------------------------|--|
| MIB | Management Information Base | |
| EIRP | Equivalent Isotropic Radiated Power | |
| PtP | Point to point | |
| PtMP | Point to multipoint | |
| BPSK | Binary phase shift key modulation | |
| QPSK | Quadrature phase shift key modulation | |
| QAM | Quadrature Amplitude Modulation | |
| HPBW | Half power beamwidth | |
| BW | Bandwidth | |
| RSSI | Received Signal Strength Indicator | |
| SNR | Signal to Noise Ratio | |
| DMG-TM / DMG | Directional Multi-Gigabit Test Mode | |
| нвм | Human Body Model | |
| | | |

1.4 Common RF Parameters

The MWC-2142 can be tuned WiGig Channels 1-6. Refer to Table 1-1 for the channels and center frequencies.

Table 1-1: IEEE 802.11ad/ay channels and center frequencies

| Channel | Center Frequency (GHz) | Frequency Range (GHz) |
|-----------|------------------------|-----------------------|
| Channel 1 | 58.32 | 57.24 – 59.40 |
| Channel 2 | 60.48 | 59.40 – 61.56 |
| Channel 3 | 62.64 | 61.56 – 63.72 |
| Channel 4 | 64.80 | 63.72 – 65.88 |
| Channel 5 | 66.96 | 65.88 – 68.04 |
| Channel 6 | 69.12 | 68.04 - 70.2 |

Table 1-2:Modulation Code and raw PHY data rates

| MCS Index | Modulation | Code Rate | PHY Data Rate (Mbps) |
|-----------|------------|-----------|----------------------|
| MCS0 | DBPSK | 1/2 | 27.5 |
| MCS1 | ∏/2 BPSK | 1/2 | 385 |
| MCS2 | ∏/2 BPSK | 1/2 | 770 |
| MCS3 | ∏/2 BPSK | 5/8 | 962.5 |
| MCS4 | ∏/2 BPSK | 3/4 | 1155 |
| MCS5 | ∏/2 BPSK | 13/16 | 1251.25 |
| MCS6 | ∏/2 QPSK | 1/2 | 1540 |
| MCS7 | ∏/2 QPSK | 5/8 | 1925 |
| MCS8 | ∏/2 QPSK | 3/4 | 2310 |
| MCS9 | ∏/2 QPSK | 13/16 | 2502.5 |

2. Product Overview

2.1 General Description

The MWC-2142 operates from a single 5V supplied through the connector. The MWC-2142 provides all of the functionality of a multi-gigabit wireless transceiver compliant with the 802.11ad standard, supporting the complete solution from SuperSpeed USB connectivity to 60GHz wireless functionality.

The integrated 32-element antenna performs beamforming. This antenna can also operate with a quasi-omnidirectional antenna pattern. This module is not suitable for use with a reflector antenna.

No factory calibration is required, as all calibration is performed at run-time.

| Channel | Gain | -3dB Beamwidth (deg) | |
|-----------|-------|----------------------|---------|
| | (dBi) | Elevation | Azimuth |
| Channel 1 | 19.4 | 13 | 25 |
| Channel 2 | 19.8 | 13 | 24 |
| Channel 3 | 20.0 | 12 | 23 |
| Channel 4 | 20.1 | 12 | 23 |
| Channel 5 | 20.3 | 12 | 22 |

Table 3-6: Key Antenna Specifications

| Parameter | Value |
|------------------------------------|----------|
| Scan Range (-3dB) (Azimuth) | +/-450 |
| Scan Range (-3dB) (Elevation) | +/-250 |
| Maximum Side Lobe (boresight beam) | -12.5 dB |

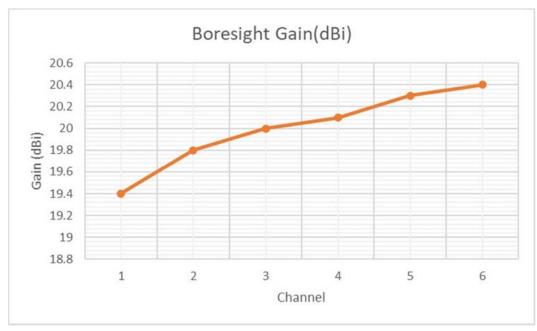


Figure 3-1: Peak antenna gain across all channels

5. Typical Performance Characteristics

Unless otherwise noted, all specifications are at 25 ${\rm \circ C}.$

5.1 Typical Antenna Performance

Figure 4-1 to Figure 4-2 show 2D integrated plots for the antenna gain and the drop from peak gain for all channels.

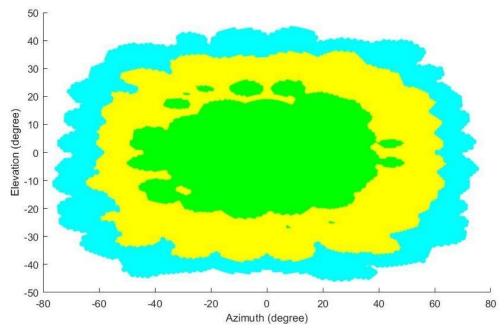


Figure 4-1: 2D surface plot showing gain drop from peak for Ch. 1

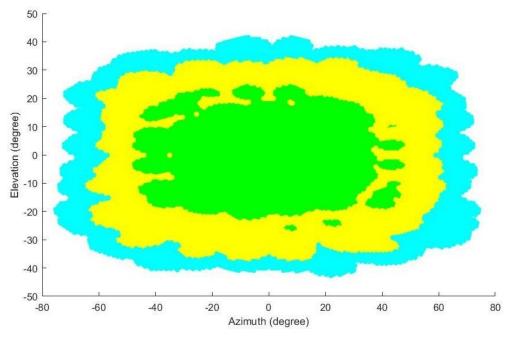


Figure 4-2: 2D surface plot showing gain drop from peak for Ch. 2

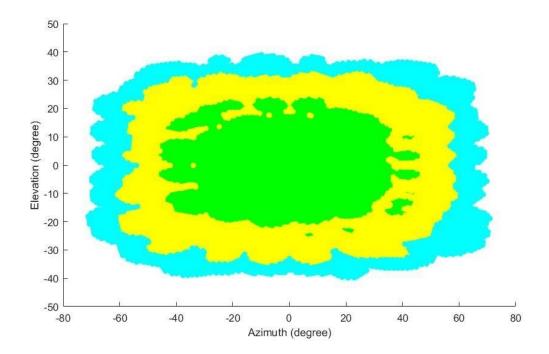


Figure 4-3: 2D surface plot showing gain drop from peak for Ch. 3

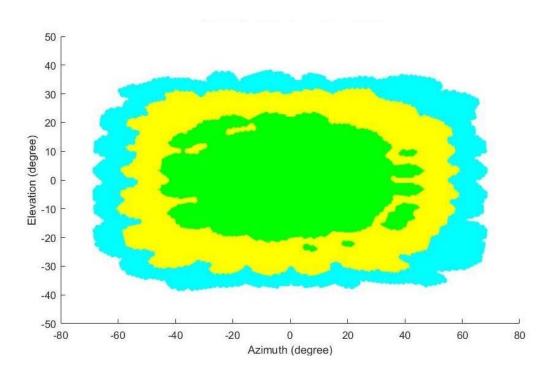


Figure 4-4: 2D surface plot showing gain drop from peak for Ch. 4

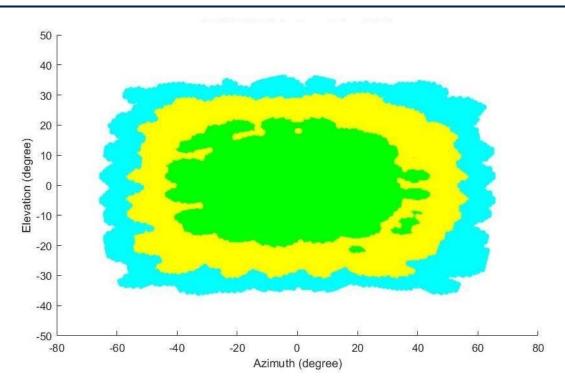


Figure 4-5: 2D surface plot showing gain drop from peak for Ch. 5

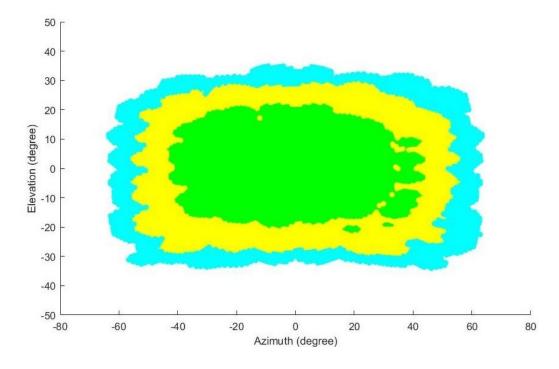


Figure 4-6: 2D surface plot showing gain drop from peak for Ch. 6

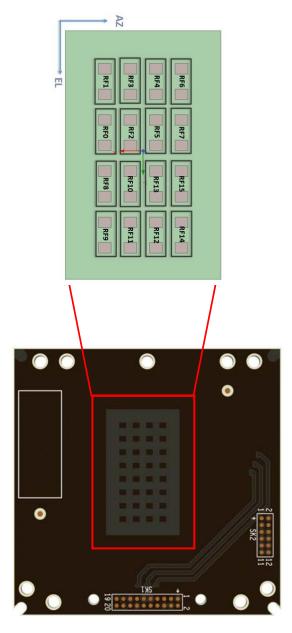


Figure 6-1: Diagram of the MWC-2142 32-element antenna and position on the module