

## Single Band 5GHz 2x2 802.11ac Wave 2 MiniPCle WiFi Module Designed for Next Generation 802.11ac Wave 2 Access Points

**Model: WLE650V5-25A-I**



### KEY FEATURES

- Qualcomm Atheros QCA9898
- 5GHz, 2x2 MU-MIMO OFDM Technology, up to 867Mbps physical data rate
- Single Band 5GHz 2x2 WiFi 5 (802.11ac Wave 2)
- MiniPCle interface with PCIe 2.0
- 2 spatial streams (2SS) at 80MHz bandwidth
- 1 spatial stream (1SS) at 80+80MHz bandwidth
- Heat sink allows free air operation
- Built-in ESD Protection with ESD/EMP Immunity Threshold: 15KeV<sup>[1]</sup>
- Supports Spatial Multiplexing, Cyclic Delay Diversity (CDD), Low-Density Parity-Check (LDPC) Codes, Maximal Ratio Combining (MRC), Space Time Block Code (STBC)
- Supports IEEE 802.11d, e, h, i, r, v time stamp, and w standards
- Supports Dynamic Frequency Selection (DFS)

## Specifications

Chipset	Qualcomm Atheros QCA9898 'Besra' Series
System Memory	256Kbit serial I <sup>2</sup> C bus EEPROM
Reference Design	Qualcomm Atheros BSR02
Host Interface	MiniPCle interface with PCIe 2.0
Operating Voltage	3.3V, 5V
Power Consumption	9.49W (Max)
Wireless	5GHz 802.11a/n/ac, max 25dBm per chain 2x MMCX Connectors
Frequency Range	5.150~5.825GHz
Modulation Techniques	OFDM: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
Channel Spectrum Widths for WLAN	Supports 20/40/80/80+80MHz at 5GHz
ESD Sensitivity	Class 1B
Supported Operating System	CompexWRT ≥ v3.1.3 or OpenWRT/LEDE kernel ≥ v4.13.0 on WPJ558/WPJ563/WPJ564 with 5V jumper, WPQ864, and WPQ865
Certification	REACH and RoSH Compliance
Environmental Temperature (Industrial Grade)	Operating: -40°C to 85°C, Storage: -40°C to 90°C
Environmental Humidity, Non-Condensing	Operating: 5% to 95%, Storage: Max. 90%
Dimensions (W x H x D) in mm	29.9 x 50.8 x 12.2

[1] Module grounding cable included.

[2] The 5V is for the power amplifier (PA). The 5V jumper labels are J5, R309, and J18 on the WPJ558-A, WPJ563-A, and WPJ564-A boards respectively. Please enable 5V supply to the mPCle card by shorting the 5V jumper next to the card slot on these boards.

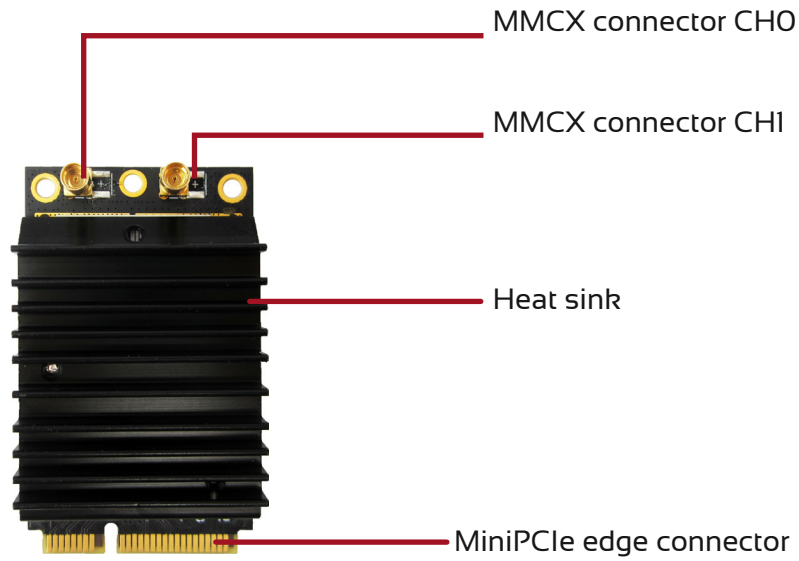
\*Configurations are subject to change without notifications.

## RF Performance Table for 5GHz

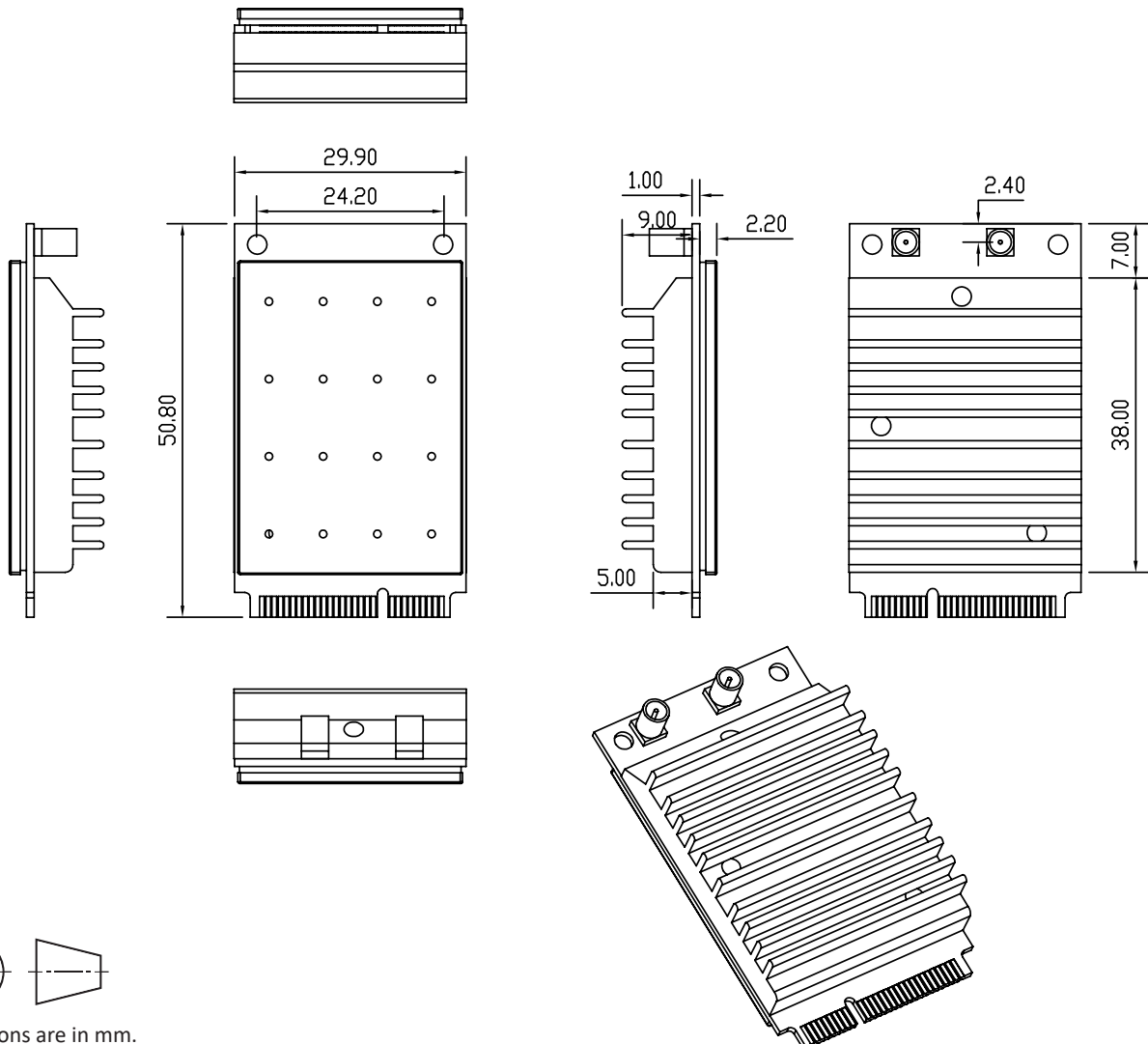
	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
5GHz 802.11a	6Mbps	25dBm	28dBm	±2dB
	9Mbps	25dBm	28dBm	±2dB
	12Mbps	25dBm	28dBm	±2dB
	18Mbps	25dBm	28dBm	±2dB
	24Mbps	24dBm	27dBm	±2dB
	36Mbps	23dBm	26dBm	±2dB
	48Mbps	22dBm	25dBm	±2dB
	54Mbps	21dBm	24dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	25dBm	28dBm	±2dB
	MCS 1	25dBm	28dBm	±2dB
	MCS 2	25dBm	28dBm	±2dB
	MCS 3	24dBm	27dBm	±2dB
	MCS 4	23dBm	26dBm	±2dB
	MCS 5	22dBm	25dBm	±2dB
	MCS 6	21dBm	24dBm	±2dB
	MCS 7	20dBm	23dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 0	25dBm	28dBm	±2dB
	MCS 1	25dBm	28dBm	±2dB
	MCS 2	25dBm	28dBm	±2dB
	MCS 3	24dBm	27dBm	±2dB
	MCS 4	23dBm	26dBm	±2dB
	MCS 5	22dBm	25dBm	±2dB
	MCS 6	21dBm	24dBm	±2dB
	MCS 7	20dBm	23dBm	±2dB
	MCS 8	19dBm	22dBm	±2dB
	MCS 9	18dBm	21dBm	±2dB
5GHz 802.11ac VHT80	MCS 0	25dBm	28dBm	±2dB
	MCS 1	25dBm	28dBm	±2dB
	MCS 2	25dBm	28dBm	±2dB
	MCS 3	24dBm	27dBm	±2dB
	MCS 4	23dBm	26dBm	±2dB
	MCS 5	22dBm	25dBm	±2dB
	MCS 6	21dBm	24dBm	±2dB
	MCS 7	20dBm	23dBm	±2dB
	MCS 8	19dBm	22dBm	±2dB
	MCS 9	18dBm	21dBm	±2dB
5GHz 802.11ac VHT80+80	MCS 0	24dBm	27dBm	±2dB
	MCS 1	24dBm	27dBm	±2dB
	MCS 2	24dBm	27dBm	±2dB
	MCS 3	24dBm	27dBm	±2dB
	MCS 4	23dBm	26dBm	±2dB
	MCS 5	22dBm	25dBm	±2dB
	MCS 6	21dBm	24dBm	±2dB
	MCS 7	20dBm	23dBm	±2dB
	MCS 8	18dBm	21dBm	±2dB
	MCS 9	17dBm	20dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
5GHz 802.11a	6Mbps	-96dBm	±2dB
	9Mbps	-95dBm	±2dB
	12Mbps	-94dBm	±2dB
	18Mbps	-92dBm	±2dB
	24Mbps	-90dBm	±2dB
	36Mbps	-86dBm	±2dB
	48Mbps	-82dBm	±2dB
	54Mbps	-79dBm	±2dB
5GHz 802.11n/ac VHT20	MCS 0	-94dBm	±2dB
	MCS 1	-91dBm	±2dB
	MCS 2	-89dBm	±2dB
	MCS 3	-85dBm	±2dB
	MCS 4	-82dBm	±2dB
	MCS 5	-78dBm	±2dB
	MCS 6	-76dBm	±2dB
	MCS 7	-74dBm	±2dB
5GHz 802.11n/ac VHT40	MCS 0	-90dBm	±2dB
	MCS 1	-86dBm	±2dB
	MCS 2	-84dBm	±2dB
	MCS 3	-81dBm	±2dB
	MCS 4	-78dBm	±2dB
	MCS 5	-73dBm	±2dB
	MCS 6	-71dBm	±2dB
	MCS 7	-70dBm	±2dB
	MCS 8	-66dBm	±2dB
	MCS 9	-65dBm	±2dB
5GHz 802.11ac VHT80	MCS 0	-87dBm	±2dB
	MCS 1	-84dBm	±2dB
	MCS 2	-82dBm	±2dB
	MCS 3	-79dBm	±2dB
	MCS 4	-74dBm	±2dB
	MCS 5	-71dBm	±2dB
	MCS 6	-69dBm	±2dB
	MCS 7	-67dBm	±2dB
	MCS 8	-63dBm	±2dB
	MCS 9	-60dBm	±2dB

## Component Map



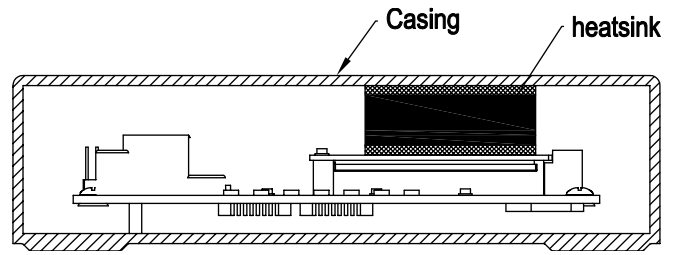
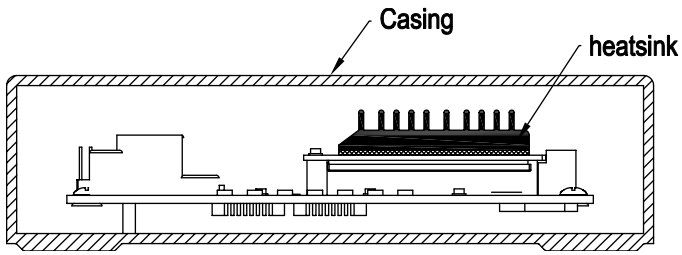
## Mechanical Dimensions



All dimensions are in mm.

Copyright © Complex Systems. All rights reserved. COMPEX and the COMPEX logo, are registered trademarks of Complex Systems Pte. Ltd. While every effort is made to ensure the information is accurate, Complex does not accept liability for any errors or mistakes that may arise. All specifications are subject to change without notice.

## Heatsink Options



## Ordering Configuration

Item Code	Model	Description
WLE650V5-25 7B0000-I	WLE650V5-25A-I	Industrial Grade 2x2 802.11a/n/ac 5GHz miniPCIe card with MMCX connectors