

# **BALI Series**

Host based Wi-Fi (802.11a/b/g/n/ac) Modules

## **EVIA PCIe M.2 1630 and 2230 Datasheet**

Version 1.0

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# 1 Overview

EVIA M.2 PCIe card is a high performance Wi-Fi certified wireless device supporting dual-band 1-stream (1T1R) Wi-Fi 802.11 a/b/g/n/ac. These devices are offered in industry standard 1630 and 2230 form factors. This small form-factor device provides superior throughputs and long range by integrating high performance baseband, MAC, fine-tuned RF front end, power amplifiers, filters, switches, diplexer and needed crystals. This device enables low-power designs by utilizing multiple advanced power-saving techniques including many host off-loading features. EVIA M.2 PCIe card is based on Qualcomm QCA9377 SoC and connects to host processor with PCIe (WiFi) host interface.

EVIA M.2 PCIe cards are offered with antenna diversity in Industrial and commercial temperature grades. They are certified for FCC, IC, ETSI/CE and TELEC. Approvals for other countries may be possible upon request.

## Module specifications

|                        |                                                                                                                                                                                                                        |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WLAN Technology        | 802.11 a/b/g/n, 1-stream MU-MIMO 802.11ac                                                                                                                                                                              |
| Frequency band         | 2.4GHz, 5GHz                                                                                                                                                                                                           |
| On air data rates      | <b>2.4GHz</b><br>11b - 1, 2, 5.5, 11Mbps<br>11g - 6, 9, 12, 18, 24, 36, 48, 54Mbps<br>11n - MCS0 to MCS7 or up-to 150Mbps<br><b>5GHz</b><br>11a - 6,9,12,18,24,36,48, 54Mbps<br>11n/ac - MCS0 to MCS9 or up-to 433Mbps |
| Security features      | WPA/WPA2 -PSK TKIP/AES, WPS 2.0, Enterprise Security (EAP) STA only.                                                                                                                                                   |
| Modulation schemes     | <b>2.4GHz</b><br>11b - BPSK,QPSK, CCK<br>11g - BPSK, QPSK, 16QAM, 64 QAM<br>11n-PSK, QPSK, 16QAM, 64 QAM<br><b>5GHz</b><br>11a/n/ac-BPSK,QPSK, 16QAM, 64 QAM                                                           |
| Antenna options        | Antenna Diversity with dual antenna connectors (MHF4)                                                                                                                                                                  |
| PCIe host interface    | Wi-Fi - PCIe 2.1                                                                                                                                                                                                       |
| Max throughput         | 330 Mbps                                                                                                                                                                                                               |
| Maximum Transmit Power | 18 dBm                                                                                                                                                                                                                 |
| Receive Sensitivity    | -97.5dBm                                                                                                                                                                                                               |
| WLAN bandwidths        | 20/40/80MHz                                                                                                                                                                                                            |

Table 1: EVIA Module specifications

## 2 Features

- Wi-Fi - Low power dual-band (2.4 and 5 GHz), 1-stream MU-MIMO 802.11ac
- WLAN TCP Throughput at 80 MHz 11ac : **330Mbps**
- WLAN Security
  - WPA/WPA2 Personal
  - Enterprise security (STA only)
  - WPS 2.0
- WLAN Encryption
  - WEP
  - TKIP
  - AES
- Operating modes
  - STA
  - SoftAP
  - P2P Group Owner and Client
  - STA + SoftAP
  - STA + P2P Group Owner
  - STA + P2P Client
  - Support for multiple BSSID (Two softAPs and a STA can operate concurrently)
- Power save
  - Module power saving features
    - Idle mode power save / Deep sleep
    - Legacy Protocol Power save / Beacon Mode Power Save
    - WMM-PS / UAPSD
    - Tx power-saving feature (Green TX)
  - Host power saving features
    - Offloading features : ARP, GTK , Neighbor solicitation (NS) offloading to the FW
- WMM and WMM-PS
- DFS Client
- Transmit beam forming
- 11r/FT roaming and Legacy fast roaming

### 3 Block Diagram

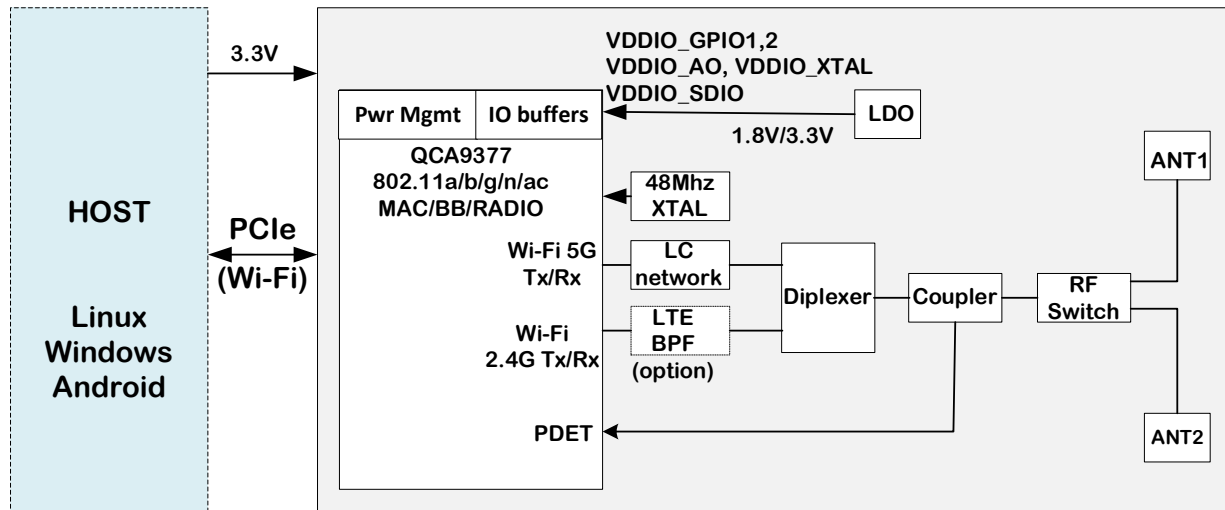


Figure 1: EVIA M.2 Block Diagram



## 4 Pin Definition

### 4.1 Pin Table

**Note:** Pins 58-75 are only available for 2230 form factor

| Pin Num | Pin Name | Pin Type | Description     |
|---------|----------|----------|-----------------|
| 1       | GND      | Ground   | Ground          |
| 2       | 3.3V     | Power    | 3.3V power      |
| 3       | NC       |          | No connect      |
| 4       | 3.3V     | Power    | 3.3V power      |
| 5       | NC       |          | No connect      |
| 6       | NC       |          | No connect      |
| 7       | GND      | Ground   | Ground          |
| 8       | GND      | Ground   | Ground          |
| 9       | NC       |          | No connect      |
| 10      | NC       |          | No connect      |
| 11      | NC       |          | No connect      |
| 12      | NC       |          | No connect      |
| 13      | NC       |          | No connect      |
| 14      | GND      | Ground   | Ground          |
| 15      | NC       |          | No connect      |
| 16      | NC       |          | No connect      |
| 17      | NC       |          | No connect      |
| 18      | GND      | Ground   | Ground          |
| 19      | NC       |          | No connect      |
| 20      | NC       |          | No connect      |
| 21      | NC       |          | No connect      |
| 22      | NC       |          | No connect      |
| 23      | NC       |          | No connect      |
| 24      | KEY E    | -        | Connector KEY E |
| 25      | KEY E    | -        | Connector KEY E |
| 26      | KEY E    | -        | Connector KEY E |
| 27      | KEY E    | -        | Connector KEY E |
| 28      | KEY E    | -        | Connector KEY E |
| 29      | KEY E    | -        | Connector KEY E |
| 30      | KEY E    | -        | Connector KEY E |
| 31      | KEY E    | -        | Connector KEY E |
| 32      | NC       |          | No connect      |

|    |               |        |                                                                                 |
|----|---------------|--------|---------------------------------------------------------------------------------|
| 33 | GND           | Ground | Ground                                                                          |
| 34 | NC            |        | No connect                                                                      |
| 35 | PERp0         | AI     | Connect to platform PCIe TX data positive                                       |
| 36 | NC            |        | No connect                                                                      |
| 37 | PERn0         | AI     | Connect to platform PCIe TX data negative                                       |
| 38 | NC            |        | No connect                                                                      |
| 39 | GND           | Ground | Ground                                                                          |
| 40 | NC            |        | No connect                                                                      |
| 41 | PETp0         | AO     | Connect to platform PCIe RX data positive                                       |
| 42 | NC            |        | No connect                                                                      |
| 43 | PETn0         | AO     | Connect to platform PCIe RX data negative                                       |
| 44 | NC            |        | No connect                                                                      |
| 45 | GND           | Ground | Ground                                                                          |
| 46 | NC            |        | No connect                                                                      |
| 47 | REFCLKp0      | AI     | PCIe reference clock positive                                                   |
| 48 | GND           | Ground | Ground                                                                          |
| 49 | REFCLKn0      | AI     | PCIe reference clock negative                                                   |
| 50 | SUSCLK(32KHz) | I      | Suspend clock. 32KHz                                                            |
| 51 | GND           | Ground | Ground                                                                          |
| 52 | PRST0#        | I      |                                                                                 |
| 53 | CLKREQ0#      | IO     | OD with a pull up on platform. Refclk request                                   |
| 54 | NC            |        | No connect                                                                      |
| 55 | PEWAKE0#      | IO     | GPIO29. Used only in Boot strap.<br>1 on this pin during boot gets WLAN to JTAG |
| 56 | W_DISABLE1#   | I      | WLAN Enable                                                                     |
| 57 | GND           | Ground | Ground                                                                          |
| 58 | NC            |        | No connect                                                                      |
| 59 | NC            |        | No connect                                                                      |
| 60 | NC            |        | No connect                                                                      |
| 61 | NC            |        | No connect                                                                      |
| 62 | NC            |        | No connect                                                                      |
| 63 | GND           | Ground | Ground                                                                          |
| 64 | NC            |        | No connect                                                                      |
| 65 | NC            |        | No connect                                                                      |
| 66 | NC            |        | No connect                                                                      |
| 67 | NC            |        | No connect                                                                      |
| 68 | NC            |        | No connect                                                                      |
| 69 | GND           | Ground | Ground                                                                          |
| 70 | NC            |        | No connect                                                                      |

|    |      |        |            |
|----|------|--------|------------|
| 71 | NC   |        | No connect |
| 72 | 3.3V | Power  | 3.3V power |
| 73 | NC   |        | No connect |
| 74 | 3.3V | Power  | 3.3V power |
| 75 | GND  | Ground | Ground     |

*Table 2: EVIA M.2 PCIe Pin Table*

## 5 Electrical Specification

### 5.1 Power Sources and Grounds

EVIA M.2 2230/1630 card utilizes a single 3.3 V power sources. The voltage source, 3.3 V, is expected to be available during the system's stand-by/suspend state to support wake event processing on the communications card.

Some of the higher frequency signals require additional isolation from surrounding signals using the concept of interleaving GND pins separating signals within the connector. These pins should be treated as a normal ground pin with connections immediately made to the GND planes within a card design.

| Parameter          | Min | Max | Unit |
|--------------------|-----|-----|------|
| Power source 3.3 V | 0.0 | 3.6 | V    |

Table 3: Absolute max power ratings

**Note:** Do not exceed minimum or maximum voltage. Module will be damaged permanently above this limit.

### 5.2 Performance Specifications

#### 5.2.1 WLAN RF characteristics

| Symbol                                                   | Parameter                                                         | Conditions                        | Min   | Typ       | Max   | Unit |
|----------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------|-------|-----------|-------|------|
| <b>Synthesizer composite characteristics for 2.4 GHz</b> |                                                                   |                                   |       |           |       |      |
| $F_C$                                                    | Center channel frequency                                          | Center frequency at 5 MHz spacing | 2.412 | –         | 2.484 | GHz  |
| $F_{REF}$                                                | Reference oscillator frequency                                    | $\pm 20$ ppm                      | –     | 48        | –     | MHz  |
| $TS_{POWERUP}$                                           | Time for power up (from sleep)                                    |                                   | –     | 0.2       | –     | ms   |
| <b>Synthesizer composite characteristics for 5 GHz</b>   |                                                                   |                                   |       |           |       |      |
| $F_C$                                                    | Center channel frequency                                          | Center frequency at 5 MHz spacing | 4.90  |           | 5.925 | GHz  |
| $F_{REF}$                                                | Reference oscillator frequency                                    | $\pm 20$ ppm                      | –     | 48        | –     | MHz  |
| $TS_{POWERUP}$                                           | Time for power up (from sleep)                                    |                                   | –     | 0.2       | –     | ms   |
| <b>Transmit output power accuracy</b>                    |                                                                   |                                   |       |           |       |      |
| $A_{PC}$                                                 | Accuracy of transmit power control at 2.4 GHz at room temperature |                                   | –     | $\pm 1.9$ | –     | dB   |
| $A_{PC}$                                                 | Accuracy of transmit power control at 5 GHz at room               |                                   | –     | $\pm 2.4$ | –     | dB   |

|  |             |  |  |  |  |  |
|--|-------------|--|--|--|--|--|
|  | temperature |  |  |  |  |  |
|--|-------------|--|--|--|--|--|

Table 4: WLAN RF characteristics per chain operation

**Note:** All  $A_{PC}$  numbers assume a test conducted with a 50  $\Omega$  load.

### 5.2.1.1 Transmit Power at 2.4 GHz

**Note:** All typical values may vary  $\pm 1.5$  dB

| Standard   | Modulation | Data rates | 2.4 GHz: Transmit power with IEEE 802.11 EVM and spectral mask compliance at chip output at 25°C |                   |                   |      |
|------------|------------|------------|--------------------------------------------------------------------------------------------------|-------------------|-------------------|------|
|            |            | Index      | 802.11b/g                                                                                        | 802.11n/ac 20 MHz | 802.11n/ac 40 MHz | Unit |
|            |            |            | Typ                                                                                              | Typ               | Typ               |      |
| 802.11b    | BPSK       | 1 Mbps     | 16.0                                                                                             | –                 | –                 | dBm  |
|            | QPSK       | 2 Mbps     | 16.0                                                                                             | –                 | –                 | dBm  |
|            | CCK        | 5.5 Mbps   | 16.0                                                                                             | –                 | –                 | dBm  |
|            | CCK        | 11 Mbps    | 16.0                                                                                             | –                 | –                 | dBm  |
| 802.11g    | BPSK       | 6 Mbps     | 18.0                                                                                             | –                 | –                 | dBm  |
|            | BPSK       | 9 Mbps     | 18.0                                                                                             | –                 | –                 | dBm  |
|            | QPSK       | 12 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
|            | QPSK       | 18 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
|            | 16 QAM     | 24 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
|            | 16 QAM     | 36 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
|            | 64 QAM     | 48 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
|            | 64 QAM     | 54 Mbps    | 18.0                                                                                             | –                 | –                 | dBm  |
| 802.11n/ac | BPSK       | MCS0       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | QPSK       | MCS1       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | QPSK       | MCS2       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | 16 QAM     | MCS3       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | 16 QAM     | MCS4       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | 64 QAM     | MCS5       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | 64 QAM     | MCS6       | –                                                                                                | 18.0              | 16.0              | dBm  |
|            | 64 QAM     | MCS7       | –                                                                                                | 18.0              | 16.0              | dBm  |
| 802.11ac   | 256 QAM    | MCS8       | –                                                                                                | 15.0              | 16.0              | dBm  |
|            | 256 QAM    | MCS9       | –                                                                                                | 15.0              | 16.0              | dBm  |

Table 5: Transmit power at 2.4 GHz

### 5.2.1.2 Transmit Power at 5 GHz

**Note:** All typical values may vary  $\pm 1.5$  dB

| Standard   | Modulation | Data rates | 5 GHz: Transmit power with IEEE 802.11 EVM and spectral mask compliance at chip output at 25°C |                   |                   |                   |      |
|------------|------------|------------|------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|------|
|            |            | Index      | 802.11a                                                                                        | 802.11n/ac 20 MHz | 802.11n/ac 40 MHz | 802.11n/ac 80 MHz | Unit |
|            |            |            | Typ                                                                                            | Typ               | Typ               | Typ               |      |
| 802.11a    | BPSK       | 6 Mbps     | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | BPSK       | 9 Mbps     | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | QPSK       | 12 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | QPSK       | 18 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | 16 QAM     | 24 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | 16 QAM     | 36 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | 64 QAM     | 48 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
|            | 64 QAM     | 54 Mbps    | 14.0                                                                                           | –                 | –                 | –                 | dBm  |
| 802.11n/ac | BPSK       | MCS0       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | QPSK       | MCS1       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | QPSK       | MCS2       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | 16 QAM     | MCS3       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | 16 QAM     | MCS4       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | 64 QAM     | MCS5       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | 64 QAM     | MCS6       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
|            | 64 QAM     | MCS7       | –                                                                                              | 14.0              | 12.0              | –                 | dBm  |
| 802.11ac   | 256 QAM    | MCS8       | –                                                                                              | 14.0              | 14.0              | 14.0              | dBm  |
|            | 256 QAM    | MCS9       | –                                                                                              | 14.0              | 14.0              | 14.0              | dBm  |

Table 6: Transmit power at 5 GHz

### Receiver minimum sensitivity for 2.4 GHz at 25°C

**Note:** All typical values may vary  $\pm 1.0$  dB

| Standard | Modulation | Data rates | 2.4 GHz: IEEE receive minimum input level sensitivity at chip input with 10% packet error rate (100 bytes at 11b and 1000 bytes at OFDM) at 25°C, LDPC enabled |                   |                   |      |
|----------|------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|------|
|          |            | Index      | 802.11b/g                                                                                                                                                      | 802.11n/ac 20 MHz | 802.11n/ac 40 MHz | Unit |

|            |         |          | Typ   | Typ   | Typ   |     |
|------------|---------|----------|-------|-------|-------|-----|
| 802.11b    | BPSK    | 1 Mbps   | -99.5 | –     | –     | dBm |
|            | CCK     | 11 Mbps  | -92.0 | –     | –     | dBm |
| 802.11g    | BPSK    | 6 Mbps   | -94.0 | –     | –     | dBm |
|            | 64 QAM  | 54 Mbps  | -78.0 | –     | –     | dBm |
| 802.11n/ac | BPSK    | 1SS MCS0 | –     | -94.0 | -91.0 | dBm |
|            | 64 QAM  | 1SS MCS7 | –     | -77.0 | -72.0 | dBm |
| 802.11ac   | 256 QAM | 1SS MCS8 | –     | -73.0 | -70.0 | dBm |
|            | 256 QAM | 1SS MCS9 | –     | –     | -69.0 | dBm |

Table 7: Receive minimum sensitivity for 2.4 GHz at 25°C

## Receiver minimum sensitivity for 5 GHz at 25°C

**Note:** All typical values may vary  $\pm 1.0$  dB

| Standard   | Mod     | Data rates | 5 GHz: IEEE receive minimum input level sensitivity at chip input with 10% packet error rate (1000 bytes) at 25°C, LDPC enabled |                   |                   |                   |      |
|------------|---------|------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|------|
|            |         | Index      | 802.11a                                                                                                                         | 802.11n/ac 20 MHz | 802.11n/ac 40 MHz | 802.11n/ac 80 MHz | Unit |
|            |         |            | Typ                                                                                                                             | Typ               | Typ               | Typ               |      |
| 802.11a    | BPSK    | 6 Mbps     | -94.0                                                                                                                           | –                 | -                 | –                 | dBm  |
|            | 64 QAM  | 54 Mbps    | -77.0                                                                                                                           | –                 | -                 | –                 | dBm  |
| 802.11n/ac | BPSK    | 1SS MCS0   | –                                                                                                                               | -94.0             | -91.0             | -88.0             | dBm  |
|            | 64 QAM  | 1SS MCS7   | –                                                                                                                               | -76.5             | -74.0             | -70.0             | dBm  |
| 802.11ac   | 256 QAM | 1SS MCS8   | –                                                                                                                               | –                 | -72.5             | -68.0             | dBm  |
|            | 256 QAM | 1SS MCS9   | –                                                                                                                               | –                 | –                 | -64.0             | dBm  |

Table 8: Receive minimum sensitivity for 5 GHz at 25°C

## Maximum input level sensitivity at 25°Cs

| Maximum input level sensitivity at chip input |         |            |                      |                               |      |
|-----------------------------------------------|---------|------------|----------------------|-------------------------------|------|
| Standard                                      | Band    | Modulation | IEEE max input level | Max input level at chip input | Unit |
| 802.11b                                       | 2.4 GHz | DBPSK      | -4                   | -5.5                          | dBm  |
| 802.11b                                       | 2.4 GHz | CCK        | -10                  | -5                            | dBm  |

|          |         |      |     |     |     |
|----------|---------|------|-----|-----|-----|
| 802.11g  | 2.4 GHz | OFDM | -20 | -10 | dBm |
| 802.11a  | 5 GHz   | OFDM | -30 | -10 | dBm |
| 802.11n  | 2.4 GHz | OFDM | -20 | -10 | dBm |
|          | 5 GHz   | OFDM | -30 | -10 | dBm |
| 802.11ac | 2.4 GHz | OFDM | -30 | -10 | dBm |
|          | 5 GHz   | OFDM | -30 | -10 | dBm |

*Table 9: Maximum input level sensitivity at 25°C*



## 6 Software

### 6.1 Software Architecture

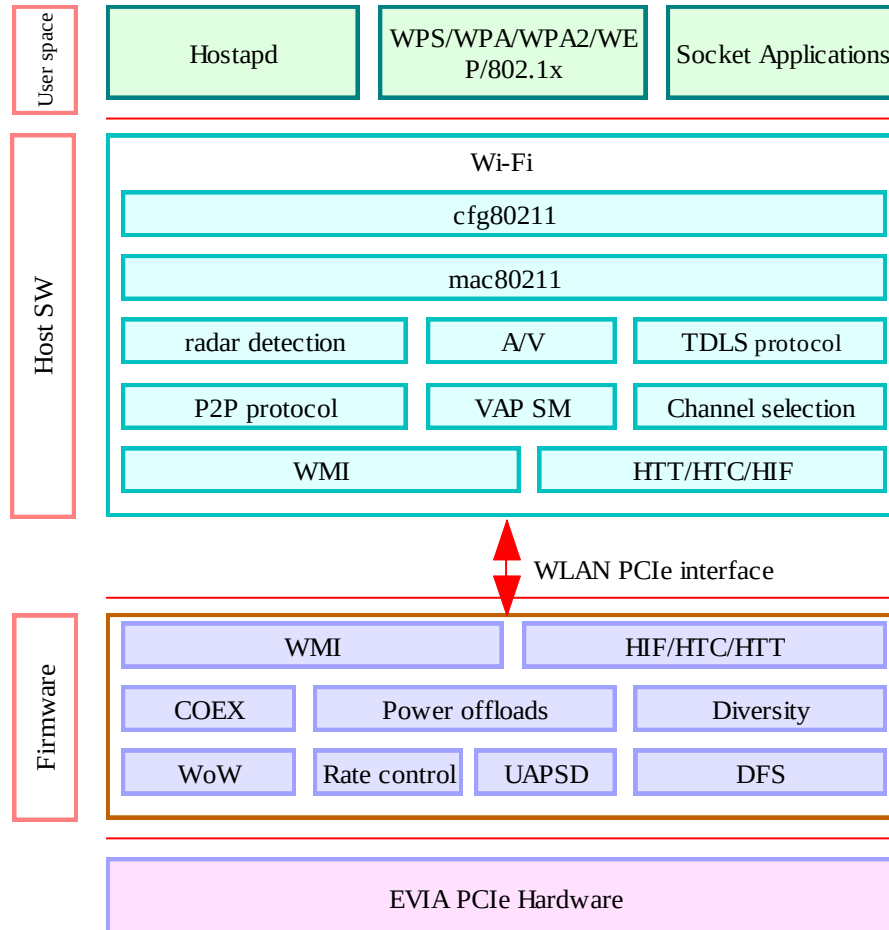


Figure 2: EVIA M.2 PCIe Card Software Architecture

### 6.2 WLAN

Drivers are available for Linux (Kernel Version 4.4.15, 4.9.11 and 4.11), Android Nougat and Windows 10

- Refer to PCIe DVK User Guide for more details about driver and testing procedures

## 7 Package Description

### 7.1 EVIA M.2 2230

#### 7.1.1 Mechanical characteristics

EVIA M.2 2230 module is available in 2230-S3-E (Tmax 1.5mm)

| Parameter         | Value (L X W X H)    | Units |
|-------------------|----------------------|-------|
| Module Dimensions | 22 X 30 X 1.5 (Tmax) | mm    |
| Tolerance         | +/- 0.15             | mm    |

Table 10: Mechanical Characteristics

#### 7.1.2 Physical Dimensions

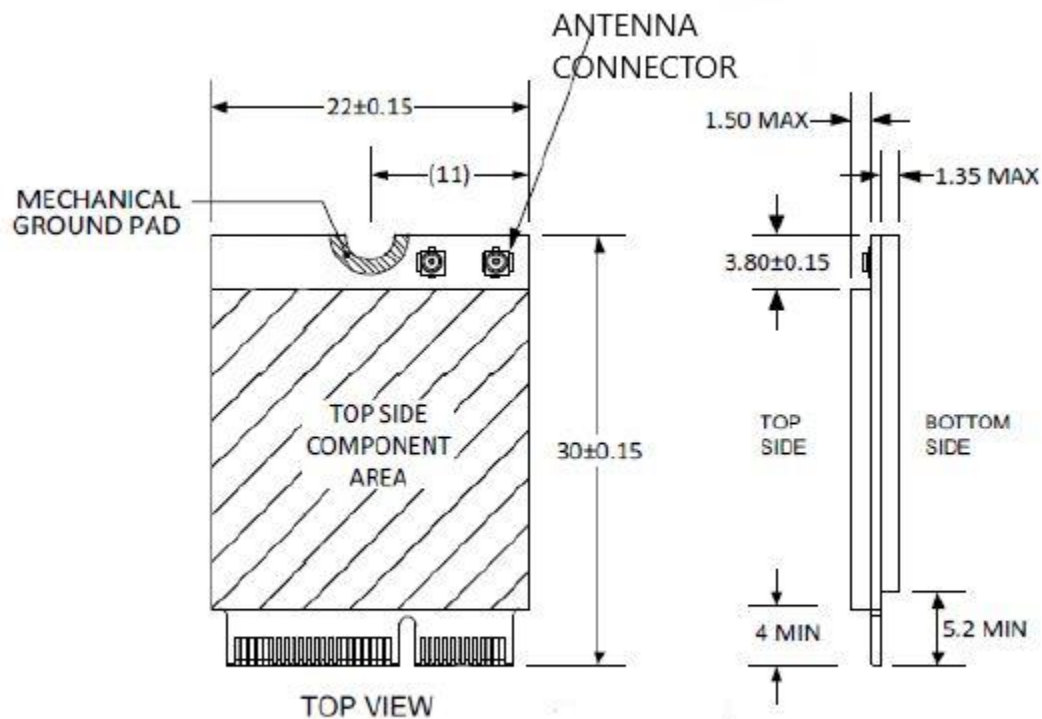


Figure 3: EVIA M.2 2230 Dimensions in mm

## 7.2 EVIA M.2 1630

### 7.2.1 Mechanical characteristics

EVIA M.2 1630 module is available in 1630-S3-E (Tmax 1.5mm).

| Parameter         | Value (L X W X H)    | Units |
|-------------------|----------------------|-------|
| Module Dimensions | 16 X 30 X 1.5 (Tmax) | mm    |
| Tolerance         | +/- 0.15             | mm    |

Table 11: Mechanical Characteristics

### 7.2.2 Physical Dimensions

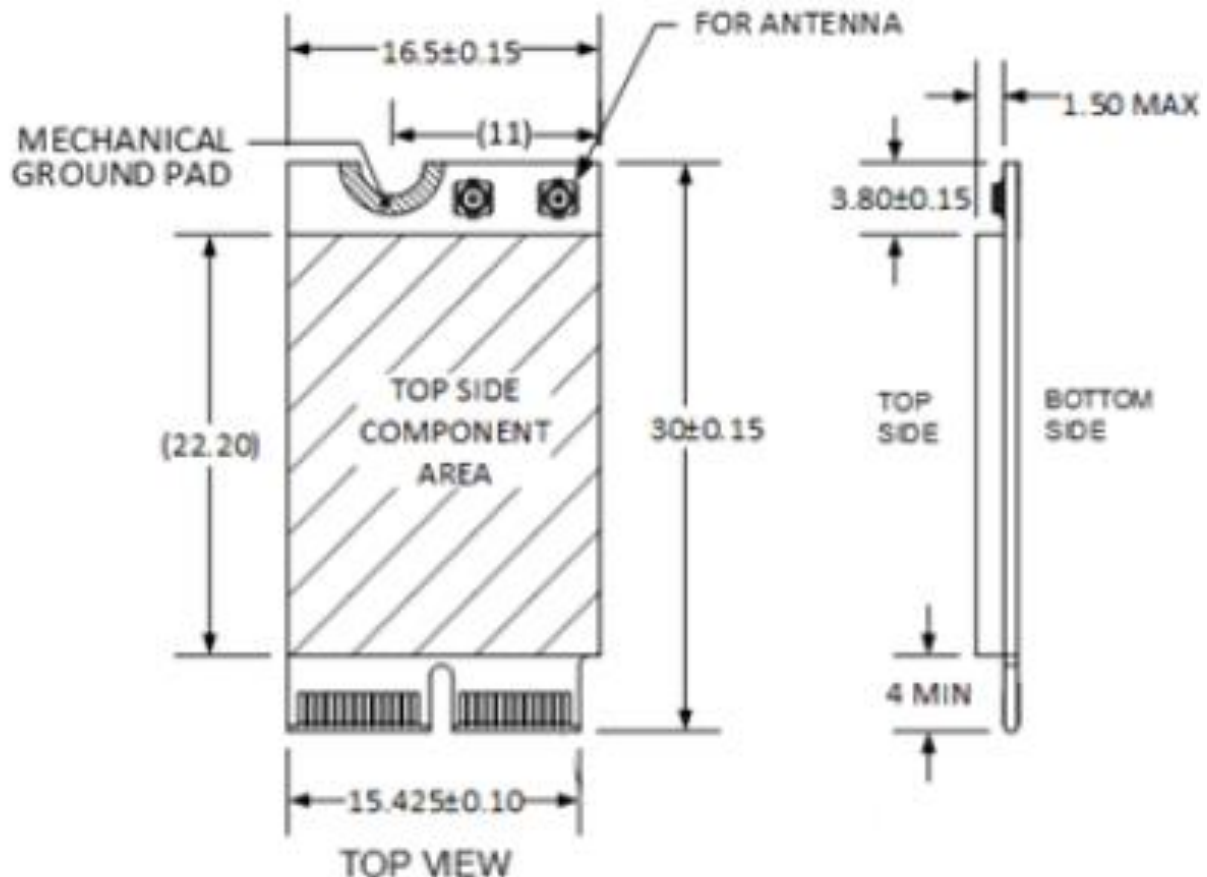


Figure 4: EVIA M.2 1630 Dimensions in mm

## 8 Regulatory Qualifications and Approvals

BALI series modules hold full modular approvals and are certified for FCC, IC, CE/ETSI and TELEC for use in USA, Canada, Europe and Japan respectively. End product manufacturers can inherit the module approvals for compliance testing of their device by strictly following grantee's compliance guidelines for module integration and operation and can avoid further testing of module transmitter function.

For detailed information on how to integrate BALI series modules for leveraging the module certification, please see 'BALI series Regulatory Compliance App Note'.

### 8.1 FCC Compliance

BALI series modules are intended for OEM integrators only. These integrators should make sure that the end product using BALI series module uses only authorized antennas and is compliant to all rules. End user manual shall include all the required regulatory information given in this manual.

#### 8.1.1 FCC Compliance Statement

*This equipment has been tested and found to compliant with part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### §15.19 Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### §15.21 Information to user:

**Warning:** changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### 8.1.2 RF Exposure compliance statement

This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter guidelines.

### 8.1.3 Labelling Instruction for Host Product Integrator

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

**“Contains FCC ID: 2AYLDI95” or**

**“Contains Transmitter Module FCC ID: 2AYLDI95”**

§ 15.19 Labelling requirements shall be complied on end user device.

Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.

### 8.1.4 Installation Notice to Host Product Manufacturer

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

#### **RF exposure compliance instruction**

The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1093, co-location with another transmitter and difference in antenna configurations.

Host product manufacturer shall at least provide information of minimum separation distance to end users in RF exposure compliance statement to end users in their end-product manuals.

### 8.1.5 Antenna Change Notice to Host manufacturer

Module integrators are recommend using antenna which is certified with this module mentioned in this manual. Module integrators can use their own antenna but must ensure it is of same type and of equal or less gain as of certified antenna. No retesting of this system configuration is required. Refer to FCC Part 15.20 (c)(4).

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application based on new emissions testing. Please perform testing on frequency bands where the antenna gain is highest, worst-case band-edges based on original filing, and only on frequency bands where the antenna gain is highest. See §2.1043. Contact Ivativ representative before adding different antennas.

## 8.1.6 FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished in the user manual of the end-user product shall include statement set out in §15.105 *Information to the user* or such similar statement and place it in a prominent location of host product manual. Original texts from FCC Rules are as following you may refer to:

For Class B

*Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For Class A

*Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

Additionally, investigative spot check measurements are strongly recommended to verify the full system compliance after module integration and operating in intended use case. For more information on end product test guidance please check KDB 996369 D04 Module Integration Guide V02.

## 8.2 IC

BALI series radio transmitter IC:26840-I95 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

A list of all antenna types

| Item # | Part Number | Manufacturer | Description                                                     | Gain dBi                                   |
|--------|-------------|--------------|-----------------------------------------------------------------|--------------------------------------------|
| 1      | GW.59.3153  | Taoglas      | 2.4GHz/5.1~5.85GHz RP_SMA male dipole antenna. 50 Ohm impedance | 2.4 - 2.5GHz: 3dBi<br>5.15 - 5.85GHz: 3dBi |

Cet émetteur radio IC:26840-I95 a été approuvé par innovation, sciences et développement économique Canada pour fonctionner avec les types d'antennes énumérés ci - dessous et afficher le gain maximal autorisé. Les types d'antennes qui ne sont pas inclus dans cette liste sont strictement interdits avec cet appareil si leur gain est supérieur au gain maximal de l'un des types énumérés.

Liste de tous les types d'antennes

| Item # | Part Number | Manufacturer | Description                                                     | Gain dBi                                   |
|--------|-------------|--------------|-----------------------------------------------------------------|--------------------------------------------|
| 1      | GW.59.3153  | Taoglas      | 2.4GHz/5.1~5.85GHz RP_SMA male dipole antenna. 50 Ohm impedance | 2.4 - 2.5GHz: 3dBi<br>5.15 - 5.85GHz: 3dBi |

## 8.2.1 ISED compliance statement

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

- i. the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

- i. le dispositif utilisé dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur afin de réduire le risque de brouillage préjudiciable aux systèmes mobiles par satellite dans le même canal;

### 8.2.2 ISED Radiation Exposure statement

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

### 8.2.3 End Product Labeling instruction

Please notice that if the IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

“Contains IC:26840-I95” or any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :

“Contient IC:26840-I95” est le numéro d'homologation du module

## 8.3 CE

BALI series modules comply with the essential requirements and other relevant provisions of the Radio Equipment Directive (RED) 2014/53/EU. BALI series modules are compliant with directive 2011/65/EU (EU RoHS 2) and its amendment directive 2015/863 (EU RoHS 3). In European market, it is the end product manufacturer who is ultimately responsible for the compliance of their device.

For more information on EU regulatory compliance of BALI series modules, please see BALI series Declaration of Conformity and RoHS Declaration. Test reports are available on request.

## 8.4 TELECOM

BALI Series modules comply with Japanese regulatory requirements of MIC certification Item 19, Article 2, Paragraph 1. Test reports are available on request.

## 8.5 Pre-Approved antennas

BALI series modules are certified with the following antennas.



| Item # | Part Number | Manufacturer | Description                                                     | Gain dBi                                   |
|--------|-------------|--------------|-----------------------------------------------------------------|--------------------------------------------|
| 1      | GW.59.3153  | Taoglas      | 2.4GHz/5.1~5.85GHz RP_SMA male dipole antenna. 50 Ohm impedance | 2.4 - 2.5GHz: 3dBi<br>5.15 - 5.85GHz: 3dBi |

Table 12: Approved Antennas

## 9 Product Handling and Ordering

### 9.1 Packaging Information

The EVIA M.2 cards are delivered as hermetically sealed trays. For more information, please refer to 'Ivativ Package Shipping, Storage and Handling Guide'.

### 9.2 Storage and Baking Instructions

EVIA M.2 cards are moisture sensitive devices and are rated at MSL 3. The new packages contain desiccant to absorb moisture and humidity indicator card to display the moisture level maintained during storage and shipment. If the card recommends baking, bake the parts in accordance with JEDEC standard J-STD-033. Floor life for these modules is 168 hours of factory conditions ( $\leq 30^{\circ}\text{C}$ , 60% RH). For more information, please refer to 'Ivativ Package Shipping, Storage and Handling Guide'.

### 9.3 Moisture sensitivity levels and Baking instructions

The BALI/EVIA M.2 series modules are rated at moisture sensitivity level 3. Please refer to J-STD-033B standard for bake procedure.

## 10 Product label and ordering information

The label of EVIA includes important product information.

Below figure illustrates EVIA USB Product labeling, it includes: The Data code, Lot number, Certifications, Model number and Logo. Table 11 illustrates the complete description about EVIA Product labeling.

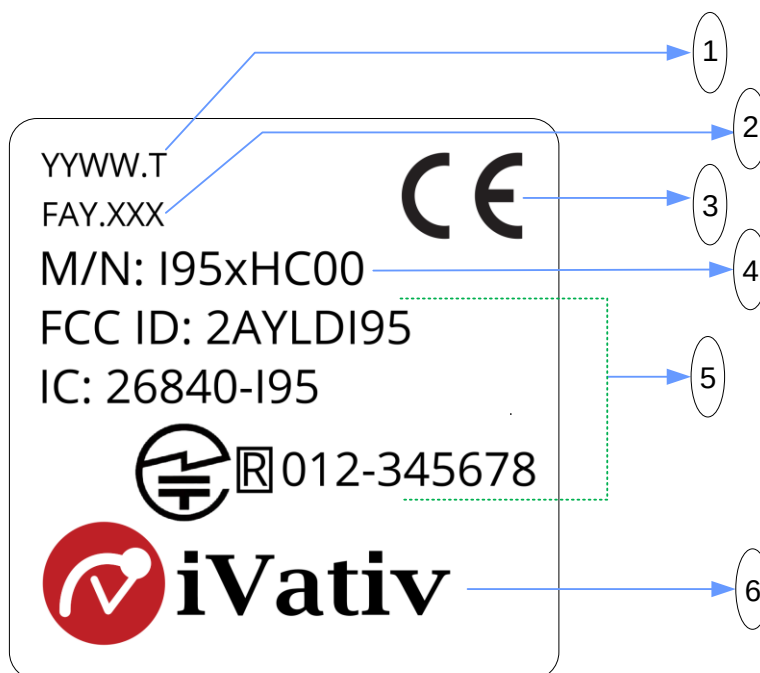


Figure 5: EVIA Product Labeling

The table below describes the markings on the label.

| Reference | Description                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------|
| 1         | Date Code. YYWW.T: Year/Week/Temp Grade                                                                        |
| 2         | Lot Number. FAY.XXX<br>FAY: Fab, assembly and single digit year of make<br>XXX: Lot number                     |
| 3         | CE Mark                                                                                                        |
| 4         | Model number. Where 'x' indicates host interface<br>0- SDIO interface<br>1- PCIe interface<br>2- USB interface |
| 5         | Certification IDs and GITEKI mark                                                                              |
| 6         | Ivativ Logo. Round logo symbol indicates the pin 1, unless marked specifically                                 |

Table 13: Module Label Description

## 10.1 Part ordering

### EVIA M.2

|               |                                                                |
|---------------|----------------------------------------------------------------|
| I951HC00-C62T | EVIA PCIe M.2 1630 module with Antenna Diversity, Tray packing |
| I951HC00-C63T | EVIA PCIe M.2 2230 module with Antenna Diversity, Tray packing |

*Table 14: Part Ordering for EVIA M.2 PCIe Cards*

## Contact Information

Please contact [info@ivativ.com](mailto:info@ivativ.com)

# Mouser Electronics

Authorized Distributor

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[I951HC00-C62B](#) [I951HC00-C63B](#)