

## Maximum Permissible Exposure Report

### 1. Product Information

|                                 |                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC ID:                         | 2AVTH-HTN4020MPC                                                                                                                                                                                                                                      |
| Product name                    | HYUNDAI Mini PC                                                                                                                                                                                                                                       |
| Test Model                      | HTN4020MPC                                                                                                                                                                                                                                            |
| Model List No.                  | HTN4020MPC                                                                                                                                                                                                                                            |
| Power Supply                    | DC 12V 2.0A<br>Adapter parameters: Input: AC 100-240V 50/60Hz 0.8A<br>Output: DC 12V 2.0A                                                                                                                                                             |
| Bluetooth Operation frequency   | 2402MHz-2480MHz                                                                                                                                                                                                                                       |
| Bluetooth Version               | Bluetooth 5.0                                                                                                                                                                                                                                         |
| Channel Number                  | 79 channels for Bluetooth 5.0 (BT Classics)<br>40 channels for Bluetooth 5.0 (BT LE)                                                                                                                                                                  |
| Channel Spacing                 | 1MHz for Bluetooth 5.0 (BT Classics)<br>2MHz for Bluetooth 5.0 (BT LE)                                                                                                                                                                                |
| Modulation Type                 | GFSK, $\pi/4$ -DQPSK, 8-DPSK for 5.0 (BT Classics)<br>GFSK for Bluetooth 5.0 (BT LE)                                                                                                                                                                  |
| WIFI(2.4G Band) Frequency Range | 2412MHz-2462MHz                                                                                                                                                                                                                                       |
| Channel Spacing                 | 5MHz                                                                                                                                                                                                                                                  |
| Channel Number                  | 11 channels for 20MHz bandwidth (2412~2462MHz)<br>7 channels for 40MHz bandwidth (2422~2452MHz)                                                                                                                                                       |
| Modulation Type                 | IEEE 802.11b: DSSS (CCK,DQPSK,DBPSK);<br>IEEE 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)                                                                                                                                                              |
| WIFI(5.2G Band) Frequency Range | 5180MHz-5240MHz                                                                                                                                                                                                                                       |
| Channel Number                  | 4 channels for 20MHz bandwidth (5180-5240MHz)<br>2 channels for 40MHz bandwidth (5190~5230MHz)<br>1 channels for 80MHz bandwidth (5210MHz)                                                                                                            |
| Modulation Type                 | IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)                                                                                                                                                                                                     |
| WIFI(5.8G Band) Frequency Range | 5745MHz-5825MHz                                                                                                                                                                                                                                       |
| Channel Number                  | 5 channels for 20MHz bandwidth (5745-5825MHz)<br>2 channels for 40MHz bandwidth (5755~5795MHz)<br>1 channels for 80MHz bandwidth (5775MHz)                                                                                                            |
| Modulation Type                 | IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)                                                                                                                                                                                                     |
| Antenna Type                    | ANT 1: Internal Antenna, used for Bluetooth TX/RX, WIFI TX/RX, 2.0 dBi(Max.) for Bluetooth and WIFI 2.4G, 2.0 dBi(Max.) for WIFI 5G Band<br>ANT 2: Internal Antenna, used for WIFI TX/RX, 2.0 dBi(Max.) for WIFI 2.4G, 2.0 dBi(Max.) for WIFI 5G Band |
| Hardware version                | IP3-GB3B                                                                                                                                                                                                                                              |
| Software version                | Windows10 20H2                                                                                                                                                                                                                                        |
| Exposure category               | General population/uncontrolled environment                                                                                                                                                                                                           |
| EUT Type                        | Production Unit                                                                                                                                                                                                                                       |
| Device Type                     | Mobile Equipment                                                                                                                                                                                                                                      |

## 2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is  $\leq 1.0$ . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

## 3. Limit

### 3.1 Refer evaluation method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

### 3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

| Frequency Range(MHz)                        | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minute) |
|---------------------------------------------|------------------------------|------------------------------|-------------------------------------|-------------------------|
| Limits for Occupational/Controlled Exposure |                              |                              |                                     |                         |
| 0.3 – 3.0                                   | 614                          | 1.63                         | (100) *                             | 6                       |
| 3.0 – 30                                    | 1842/f                       | 4.89/f                       | (900/f <sup>2</sup> )*              | 6                       |
| 30 – 300                                    | 61.4                         | 0.163                        | 1.0                                 | 6                       |
| 300 – 1500                                  | /                            | /                            | f/300                               | 6                       |
| 1500 – 100,000                              | /                            | /                            | 5                                   | 6                       |

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

| Frequency Range(MHz)                        | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minute) |
|---------------------------------------------|------------------------------|------------------------------|-------------------------------------|-------------------------|
| Limits for Occupational/Controlled Exposure |                              |                              |                                     |                         |
| 0.3 – 3.0                                   | 614                          | 1.63                         | (100) *                             | 30                      |
| 3.0 – 30                                    | 824/f                        | 2.19/f                       | (180/f <sup>2</sup> )*              | 30                      |
| 30 – 300                                    | 27.5                         | 0.073                        | 0.2                                 | 30                      |
| 300 – 1500                                  | /                            | /                            | f/1500                              | 30                      |
| 1500 – 100,000                              | /                            | /                            | 1.0                                 | 30                      |

F=frequency in MHz

\*=Plane-wave equivalent power density

## 4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

## 5. Antenna Information

HTN4020MPC can only use antennas certificated as follows provided by manufacturer;

| Internal Identification | Antenna type and antenna number | Operate frequency band | Maximum antenna gain |
|-------------------------|---------------------------------|------------------------|----------------------|
| ANT 1                   | Internal Antenna                | 2402 MHz – 2480 MHz    | 2.0 dBi              |
| ANT 1                   | Internal Antenna                | 5180 MHz – 5825 MHz    | 2.0 dBi              |
| ANT 2                   | Internal Antenna                | 2412 MHz – 2462 MHz    | 2.0 dBi              |
| ANT 2                   | Internal Antenna                | 5180 MHz – 5825 MHz    | 2.0 dBi              |

## 6. Conducted Power

*BT*

| Mode          | Channel | Frequency(MHz) | Peak Conducted Output Power (dBm) |
|---------------|---------|----------------|-----------------------------------|
| GFSK          | 0       | 2402           | 1.792                             |
|               | 39      | 2441           | 2.476                             |
|               | 78      | 2480           | 2.257                             |
| $\pi/4$ DQPSK | 0       | 2402           | 2.685                             |
|               | 39      | 2441           | 3.118                             |
|               | 78      | 2480           | 2.855                             |
| 8DPSK         | 0       | 2402           | 2.705                             |
|               | 39      | 2441           | 3.140                             |
|               | 78      | 2480           | 2.857                             |
| LE GFSK       | 0       | 2402           | -0.930                            |
|               | 19      | 2440           | -0.139                            |
|               | 39      | 2480           | 0.013                             |

[2.4GWLAN Max Conducted Power]

| Mode              | Channel | Frequency(MHz) | Max Peak Conducted Power (dBm) |       |
|-------------------|---------|----------------|--------------------------------|-------|
|                   |         |                | ANT1                           | ANT2  |
| IEEE 802.11b      | 1       | 2412           | 17.10                          | 17.43 |
|                   | 6       | 2437           | 17.17                          | 16.93 |
|                   | 11      | 2462           | 17.23                          | 16.60 |
| IEEE 802.11g      | 1       | 2412           | 17.66                          | 16.40 |
|                   | 6       | 2437           | 17.02                          | 17.42 |
|                   | 11      | 2462           | 17.41                          | 17.10 |
| IEEE 802.11n HT20 | 1       | 2412           | 17.30                          | 17.11 |
|                   | 6       | 2437           | 17.12                          | 16.57 |
|                   | 11      | 2462           | 17.50                          | 16.25 |
| IEEE 802.11n HT40 | 3       | 2422           | 17.04                          | 16.75 |
|                   | 6       | 2437           | 16.97                          | 16.68 |
|                   | 9       | 2452           | 17.12                          | 16.68 |

[5.2GWLAN Max Conducted Power]

| Mode               | Channel | Frequency(MHz) | Max Average Conducted Power(dBm) |       |
|--------------------|---------|----------------|----------------------------------|-------|
|                    |         |                | ANT1                             | ANT2  |
| IEEE 802.11a       | 36      | 5180           | 14.30                            | 13.26 |
|                    | 40      | 5200           | 14.43                            | 13.07 |
|                    | 48      | 5240           | 14.35                            | 13.06 |
| IEEE 802.11n HT20  | 36      | 5180           | 14.47                            | 13.63 |
|                    | 40      | 5200           | 14.67                            | 13.38 |
|                    | 48      | 5240           | 14.17                            | 13.38 |
| IEEE 802.11n HT40  | 38      | 5190           | 13.31                            | 12.23 |
|                    | 46      | 5230           | 13.89                            | 12.45 |
| IEEE 802.11ac HT20 | 36      | 5180           | 13.45                            | 13.63 |
|                    | 40      | 5200           | 13.69                            | 12.44 |
|                    | 48      | 5240           | 13.39                            | 12.08 |
| IEEE 802.11ac HT40 | 38      | 5190           | 14.01                            | 13.27 |
|                    | 46      | 5230           | 13.74                            | 13.31 |
| IEEE 802.11ac HT80 | 42      | 5210           | 12.40                            | 13.53 |

[5.8GWLAN Max Conducted Power]

| Mode                  | Channel | Frequency(MHz) | Max Average Conducted Power(dBm) |       |
|-----------------------|---------|----------------|----------------------------------|-------|
|                       |         |                | ANT1                             | ANT2  |
| IEEE 802.11a          | 149     | 5745           | 14.09                            | 12.36 |
|                       | 157     | 5785           | 13.73                            | 13.11 |
|                       | 165     | 5825           | 13.87                            | 13.48 |
| IEEE 802.11n<br>HT20  | 149     | 5745           | 13.78                            | 13.51 |
|                       | 157     | 5785           | 14.63                            | 13.68 |
|                       | 165     | 5825           | 13.08                            | 13.67 |
| IEEE 802.11n<br>HT40  | 151     | 5755           | 14.06                            | 12.58 |
|                       | 159     | 5795           | 14.52                            | 12.59 |
| IEEE 802.11ac<br>HT20 | 149     | 5745           | 13.45                            | 13.63 |
|                       | 157     | 5785           | 13.69                            | 12.44 |
|                       | 165     | 5825           | 13.39                            | 12.08 |
| IEEE 802.11ac<br>HT40 | 151     | 5755           | 14.01                            | 13.27 |
|                       | 159     | 5795           | 13.74                            | 13.31 |
| IEEE 802.11ac<br>HT80 | 155     | 5775           | 14.3                             | 13.4  |

## 7. Manufacturing Tolerance

BT

| GFSK (Peak)           |           |            |            |
|-----------------------|-----------|------------|------------|
| Channel               | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm)          | 2.0       | 2.0        | 2.0        |
| Tolerance $\pm$ (dB)  | 1.0       | 1.0        | 1.0        |
| $\pi/4$ -DQPSK (Peak) |           |            |            |
| Channel               | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm)          | 3.0       | 3.0        | 3.0        |
| Tolerance $\pm$ (dB)  | 1.0       | 1.0        | 1.0        |
| 8DPSK (Peak)          |           |            |            |
| Channel               | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm)          | 3.0       | 3.0        | 3.0        |
| Tolerance $\pm$ (dB)  | 1.0       | 1.0        | 1.0        |
| GFSK – BT LE(Peak)    |           |            |            |
| Channel               | Channel 0 | Channel 19 | Channel 39 |
| Target (dBm)          | 0         | 0          | 0          |
| Tolerance $\pm$ (dB)  | 1.0       | 1.0        | 1.0        |

ANT1:

*WIFI(2.4G Band)*

| IEEE 802.11b (Peak)      |           |           |            |
|--------------------------|-----------|-----------|------------|
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11g (Peak)      |           |           |            |
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11n HT20 (Peak) |           |           |            |
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11n HT40 (Peak) |           |           |            |
| Channel                  | Channel 3 | Channel 6 | Channel 9  |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |

## WIFI 5GWLAN (5.2G Band)

| IEEE 802.11a (Average)       |            |            |            |
|------------------------------|------------|------------|------------|
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 14.0       | 14.0       | 14.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11n HT20 (Average)  |            |            |            |
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 14.0       | 14.0       | 14.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11n HT40 (Average)  |            |            |            |
| Channel                      | Channel 38 | ---        | Channel 46 |
| Target (dBm)                 | 14.0       | ---        | 14.0       |
| Tolerance $\pm$ (dB)         | 1.0        | ---        | 1.0        |
| IEEE 802.11ac HT20 (Average) |            |            |            |
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 14.0       | 14.0       | 14.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11ac HT40 (Average) |            |            |            |
| Channel                      | Channel 38 | ---        | Channel 46 |
| Target (dBm)                 | 14.0       | ---        | 14.0       |
| Tolerance $\pm$ (dB)         | 1.0        | ---        | 1.0        |
| IEEE 802.11ac HT80 (Average) |            |            |            |
| Channel                      | ---        | Channel 42 | ---        |
| Target (dBm)                 | ---        | 13.0       | ---        |
| Tolerance $\pm$ (dB)         | ---        | 1.0        | ---        |

## WIFI 5GWLAN (5.8G Band)

| IEEE 802.11a (Average)       |             |             |             |
|------------------------------|-------------|-------------|-------------|
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 14.0        | 14.0        | 14.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11n HT20 (Average)  |             |             |             |
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 14.0        | 14.0        | 14.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11n HT40 (Average)  |             |             |             |
| Channel                      | Channel 151 | ---         | Channel 159 |
| Target (dBm)                 | 14.0        | ---         | 14.0        |
| Tolerance $\pm$ (dB)         | 1.0         | ---         | 1.0         |
| IEEE 802.11ac HT20 (Average) |             |             |             |
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 14.0        | 14.0        | 14.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11ac HT40 (Average) |             |             |             |
| Channel                      | Channel 151 | ---         | Channel 159 |
| Target (dBm)                 | 14.0        | ---         | 14.0        |
| Tolerance $\pm$ (dB)         | 1.0         | ---         | 1.0         |
| IEEE 802.11ac HT80 (Average) |             |             |             |
| Channel                      | ---         | Channel 155 | ---         |
| Target (dBm)                 | ---         | 14.0        | ---         |
| Tolerance $\pm$ (dB)         | ---         | 1.0         | ---         |



ANT2:

*WIFI(2.4G Band)*

| IEEE 802.11b (Peak)      |           |           |            |
|--------------------------|-----------|-----------|------------|
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11g (Peak)      |           |           |            |
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11n HT20 (Peak) |           |           |            |
| Channel                  | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |
| IEEE 802.11n HT40 (Peak) |           |           |            |
| Channel                  | Channel 3 | Channel 6 | Channel 9  |
| Target (dBm)             | 17.0      | 17.0      | 17.0       |
| Tolerance $\pm$ (dB)     | 1.0       | 1.0       | 1.0        |

## WIFI 5GWLAN (5.2G Band)

| IEEE 802.11a (Average)       |            |            |            |
|------------------------------|------------|------------|------------|
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 13.0       | 13.0       | 13.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11n HT20 (Average)  |            |            |            |
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 13.0       | 13.0       | 13.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11n HT40 (Average)  |            |            |            |
| Channel                      | Channel 38 | ---        | Channel 46 |
| Target (dBm)                 | 13.0       | ---        | 13.0       |
| Tolerance $\pm$ (dB)         | 1.0        | ---        | 1.0        |
| IEEE 802.11ac HT20 (Average) |            |            |            |
| Channel                      | Channel 36 | Channel 40 | Channel 48 |
| Target (dBm)                 | 13.0       | 13.0       | 13.0       |
| Tolerance $\pm$ (dB)         | 1.0        | 1.0        | 1.0        |
| IEEE 802.11ac HT40 (Average) |            |            |            |
| Channel                      | Channel 38 | ---        | Channel 46 |
| Target (dBm)                 | 13.0       | ---        | 13.0       |
| Tolerance $\pm$ (dB)         | 1.0        | ---        | 1.0        |
| IEEE 802.11ac HT80 (Average) |            |            |            |
| Channel                      | ---        | Channel 42 | ---        |
| Target (dBm)                 | ---        | 13.0       | ---        |
| Tolerance $\pm$ (dB)         | ---        | 1.0        | ---        |

## WIFI 5GWLAN (5.8G Band)

| IEEE 802.11a (Average)       |             |             |             |
|------------------------------|-------------|-------------|-------------|
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 13.0        | 13.0        | 13.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11n HT20 (Average)  |             |             |             |
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 13.0        | 13.0        | 13.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11n HT40 (Average)  |             |             |             |
| Channel                      | Channel 151 | ---         | Channel 159 |
| Target (dBm)                 | 13.0        | ---         | 13.0        |
| Tolerance $\pm$ (dB)         | 1.0         | ---         | 1.0         |
| IEEE 802.11ac HT20 (Average) |             |             |             |
| Channel                      | Channel 149 | Channel 157 | Channel 165 |
| Target (dBm)                 | 13.0        | 13.0        | 13.0        |
| Tolerance $\pm$ (dB)         | 1.0         | 1.0         | 1.0         |
| IEEE 802.11ac HT40 (Average) |             |             |             |
| Channel                      | Channel 151 | ---         | Channel 159 |
| Target (dBm)                 | 13.0        | ---         | 13.0        |
| Tolerance $\pm$ (dB)         | 1.0         | ---         | 1.0         |
| IEEE 802.11ac HT80 (Average) |             |             |             |
| Channel                      | ---         | Channel 155 | ---         |
| Target (dBm)                 | ---         | 13.0        | ---         |
| Tolerance $\pm$ (dB)         | ---         | 1.0         | ---         |

## 8. Measurement Results

### 8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance,  $r=20\text{cm}$ , as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

## ANT1:

| Modulation Type        | Output power |       | Antenna Gain (dBi) | Antenna Gain (linear) | Duty Cycle | MPE (mW/cm <sup>2</sup> ) | MPE Limits (mW/cm <sup>2</sup> ) |
|------------------------|--------------|-------|--------------------|-----------------------|------------|---------------------------|----------------------------------|
|                        | dBm          | mW    |                    |                       |            |                           |                                  |
| GFSK                   | 3.0          | 2.00  | 2.0                | 1.58                  | 100%       | 0.0006                    | 1.0000                           |
| $\pi/4$ DQPSK          | 4.0          | 2.51  | 2.0                | 1.58                  | 100%       | 0.0008                    | 1.0000                           |
| 8DPSK                  | 4.0          | 2.51  | 2.0                | 1.58                  | 100%       | 0.0008                    | 1.0000                           |
| BT LE                  | 1.0          | 1.26  | 2.0                | 1.58                  | 100%       | 0.0004                    | 1.0000                           |
| IEEE 802.11b           | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11g           | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11n HT20      | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11n HT40      | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11a (5.2G)    | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11n20 (5.2G)  | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11n40 (5.2G)  | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac20 (5.2G) | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac40 (5.2G) | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac80 (5.2G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11a (5.8G)    | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11n20 (5.8G)  | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11n40 (5.8G)  | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac20 (5.8G) | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac40 (5.8G) | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |
| IEEE 802.11ac80 (5.8G) | 15.00        | 31.62 | 2.0                | 1.58                  | 100%       | 0.0099                    | 1.0000                           |

## ANT2:

| Modulation Type        | Output power |       | Antenna Gain (dBi) | Antenna Gain (linear) | Duty Cycle | MPE (mW/cm <sup>2</sup> ) | MPE Limits (mW/cm <sup>2</sup> ) |
|------------------------|--------------|-------|--------------------|-----------------------|------------|---------------------------|----------------------------------|
|                        | dBm          | mW    |                    |                       |            |                           |                                  |
| IEEE 802.11b           | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11g           | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11n HT20      | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11n HT40      | 18.00        | 63.10 | 2.0                | 1.58                  | 100%       | 0.0198                    | 1.0000                           |
| IEEE 802.11a (5.2G)    | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11n20 (5.2G)  | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11n40 (5.2G)  | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac20 (5.2G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac40 (5.2G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac80 (5.2G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11a (5.8G)    | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11n20 (5.8G)  | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11n40 (5.8G)  | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac20 (5.8G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac40 (5.8G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |
| IEEE 802.11ac80 (5.8G) | 14.00        | 25.12 | 2.0                | 1.58                  | 100%       | 0.0079                    | 1.0000                           |

## Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.

## 8.2 Simultaneous Transmission MPE

The sample support one Bluetooth/WLAN modular with two same antenna and not support MIMO technology, need consider simultaneous transmission;

The EUT operating at 2.4GWIFI has the highest emission measured value,

$MPE_{ANT1} = 0.0198$ ;  $MPE_{ANT2} = 0.0198$ ;

$\sum MPE = \sum$  of (the highest measured or estimated  $MPE_{ANT1} + MPE_{ANT2}$ ) =  $(0.0198 + 0.0198) = 0.0396 < 1.0$ ;

## 9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----