

## RF EXPOSURE EVALUATION

According to FCC 1.1310 and KDB 447498 D01 V06, The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 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                        |
| 300-1,500                                                      |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1,500                                                      |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                  |                               |                               | 1.0                                 | 30                       |

f = frequency in MHz \* = Plane-wave equivalent power density

## MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

## Measurement Result

BT:

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm<sup>2</sup>

Antenna Type:

Main Bluetooth : Chip Antenna

Secondary Bluetooth:PCB Antenna

Antenna gain:

Main Bluetooth :3.0dBi

Secondary Bluetooth:-1.14dBi

R=20cm

mW=10<sup>^(dBm/10)</sup>

antenna gain Numeric=10<sup>^(dBi/10)</sup>

### Main Bluetooth

| Channel Freq. (MHz) | modulation | conducted power | Tune-up power (dBm) | Max           |       | Antenna |         | Evaluation result | Power density Limits |
|---------------------|------------|-----------------|---------------------|---------------|-------|---------|---------|-------------------|----------------------|
|                     |            | (dBm)           |                     | tune-up power |       | Gain    |         | (mW/cm2 )         | (mW/cm2)             |
|                     |            |                 |                     | (dBm)         | (mW)  | (dBi)   | Numeric |                   |                      |
| 2402                | DH5        | -5.78           | -6±1                | -5            | 0.316 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2441                |            | -7.81           | -8±1                | -7            | 0.200 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2480                |            | -8.34           | -8±1                | -7            | 0.200 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2402                | 2DH5       | -5.19           | -6±1                | -5            | 0.316 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2441                |            | -6.51           | -7±1                | -6            | 0.251 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2480                |            | -7.04           | -7±1                | -6            | 0.251 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2402                | 3DH5       | -4.98           | -5±1                | -4            | 0.398 | 3.00    | 2.00    | 0.0002            | 1                    |
| 2441                |            | -6.27           | -6±1                | -5            | 0.316 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2480                |            | -6.59           | -6±1                | -5            | 0.316 | 3.00    | 2.00    | 0.0001            | 1                    |

| Channel Freq. (MHz) | modulation | conducted power | Tune-up power (dBm) | Max           |       | Antenna |         | Evaluation result | Power density Limits |
|---------------------|------------|-----------------|---------------------|---------------|-------|---------|---------|-------------------|----------------------|
|                     |            | (dBm)           |                     | tune-up power |       | Gain    |         |                   |                      |
|                     |            |                 |                     | (dBm)         | (mW)  | (dBi)   | Numeric | (mW/cm2 )         | (mW/cm2)             |
| 2402                | BLE 1M     | -8.76           | -9±1                | -8            | 0.158 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2440                |            | -9.62           | -9±1                | -8            | 0.158 | 3.00    | 2.00    | 0.0001            | 1                    |
| 2480                |            | -9.92           | -9±1                | -8            | 0.158 | 3.00    | 2.00    | 0.0001            | 1                    |

## Secondary Bluetooth

| Channel Freq. (MHz) | modulation | conducted power | Tune-up power (dBm) | Max           |       | Antenna |         | Evaluation result | Power density Limits |
|---------------------|------------|-----------------|---------------------|---------------|-------|---------|---------|-------------------|----------------------|
|                     |            | (dBm)           |                     | tune-up power |       | Gain    |         |                   |                      |
|                     |            |                 |                     | (dBm)         | (mW)  | (dBi)   | Numeric | (mW/cm2 )         | (mW/cm2)             |
| 2402                | DH5        | 4.3             | 5±1                 | 6             | 3.981 | -1.14   | 0.77    | 0.0006            | 1                    |
| 2441                |            | 5.26            | 5±1                 | 6             | 3.981 | -1.14   | 0.77    | 0.0006            | 1                    |
| 2480                |            | 5.42            | 5±1                 | 6             | 3.981 | -1.14   | 0.77    | 0.0006            | 1                    |
| 2402                | 2DH5       | 7.14            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2441                |            | 7.32            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2480                |            | 7.44            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2402                | 3DH5       | 6.86            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2441                |            | 7.13            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2480                |            | 7.26            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |

| Channel Freq. (MHz) | modulation | conducted power | Tune-up power (dBm) | Max           |       | Antenna |         | Evaluation result | Power density Limits |
|---------------------|------------|-----------------|---------------------|---------------|-------|---------|---------|-------------------|----------------------|
|                     |            | (dBm)           |                     | tune-up power |       | Gain    |         |                   |                      |
|                     |            |                 |                     | (dBm)         | (mW)  | (dBi)   | Numeric | (mW/cm2 )         | (mW/cm2)             |
| 2402                | BLE 1M     | 7.28            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2440                |            | 7.46            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2480                |            | 7.58            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2402                | BLE 2M     | 7.44            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2440                |            | 7.59            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |
| 2480                |            | 7.72            | 7±1                 | 8             | 6.310 | -1.14   | 0.77    | 0.0010            | 1                    |

## 5G WIFI

802.11a/n20:5745-5825MHz

802.11n40: 5755-5795MHz

Power density limited: 1mW/cm

Antenna Type: Chip Antenna

Antenna Gain:

Antenna : 3.3 dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)

## 5.8G

| Antenna | Channel Freq. (MHz) | modulation  | conducted power | Tune-up power (dBm) | Max           |        | Antenna |         | Evaluation result | Power density |          |
|---------|---------------------|-------------|-----------------|---------------------|---------------|--------|---------|---------|-------------------|---------------|----------|
|         |                     |             | (dBm)           |                     | tune-up power |        | Gain    |         |                   | (mW/cm2 )     | (mW/cm2) |
|         |                     |             |                 |                     | (dBm)         | (mW)   | (dBi)   | Numeric |                   |               |          |
| Ant1    | 5745                | 802.11A     | 12.79           | 12±1                | 13            | 19.953 | 3.3     | 2.14    | 0.0085            | 1             |          |
| Ant1    | 5785                |             | 11.57           | 12±1                | 13            | 19.953 | 3.3     | 2.14    | 0.0085            | 1             |          |
| Ant1    | 5825                |             | 11.36           | 12±1                | 13            | 19.953 | 3.3     | 2.14    | 0.0085            | 1             |          |
| Ant1    | 5745                | 802.11n H20 | 11.84           | 11±1                | 12            | 15.849 | 3.3     | 2.14    | 0.0067            | 1             |          |
| Ant1    | 5785                |             | 10.55           | 10±1                | 11            | 12.589 | 3.3     | 2.14    | 0.0054            | 1             |          |
| Ant1    | 5825                |             | 9.96            | 10±1                | 11            | 12.589 | 3.3     | 2.14    | 0.0054            | 1             |          |
| Ant1    | 5755                | 802.11n H40 | 10.80           | 10±1                | 11            | 12.589 | 3.3     | 2.14    | 0.0054            | 1             |          |
| Ant1    | 5795                |             | 10.19           | 10±1                | 11            | 12.589 | 3.3     | 2.14    | 0.0054            | 1             |          |

## SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of  $E^2$ ,  $H^2$  (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

### Worst case is Simultaneous Transmissions for 5.8G Wi-Fi +BT

| Band                      | Mode      | Standalone        | Standalone           | Simultaneous      |       | Verdict |
|---------------------------|-----------|-------------------|----------------------|-------------------|-------|---------|
|                           |           | Evaluation result | Power density Limits | Evaluation result | Limit |         |
|                           |           | (mW/cm2 )         | (mW/cm2)             | raio              |       |         |
| 5.6G Wi-Fi+Main BT+aux BT | Main BT   | 0.0002            | 1                    | 0.0097            | 1     | PASS    |
|                           | aux BT    | 0.0010            | 1                    |                   |       |         |
|                           | 5.8G WIFI | 0.0085            | 1                    |                   |       |         |

#### Conclusion:

For the max result :  $0.0097 \leq 1.0$ , SAR is not required.

Signature:

Date: 2026-03-17



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