

RF EXPOSURE EVALUATION METHOD

According to FCC 1.1310: 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)

According to KDB 447498 D01 General RF Exposure Guidance v06, Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied.

EUT Specification

| | |
|-----------------------------------|--|
| EUT | Wireless Gaming Controller |
| Frequency band (Operating) | <input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input checked="" type="checkbox"/> Others BT:2402-2480MHz |
| Device category | <input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others |
| Exposure classification | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²) |
| Antenna diversity | <input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity |
| Max. output power | -5.452dBm (0.00028W) |
| Antenna gain (Max) | 1.8dBi |
| Evaluation applied | <input type="checkbox"/> MPE Evaluation <input checked="" type="checkbox"/> SAR Evaluation |

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SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

| MHz | 5 | 10 | 15 | 20 | 25 | mm |
|------|----|----|-----|-----|-----|-----------------------------------|
| 150 | 39 | 77 | 116 | 155 | 194 | SAR Test Exclusion Threshold (mW) |
| 300 | 27 | 55 | 82 | 110 | 137 | |
| 450 | 22 | 45 | 67 | 89 | 112 | |
| 835 | 16 | 33 | 49 | 66 | 82 | |
| 900 | 16 | 32 | 47 | 63 | 79 | |
| 1500 | 12 | 24 | 37 | 49 | 61 | |
| 1900 | 11 | 22 | 33 | 44 | 54 | |
| 2450 | 10 | 19 | 29 | 38 | 48 | |
| 3600 | 8 | 16 | 24 | 32 | 40 | |
| 5200 | 7 | 13 | 20 | 26 | 33 | |
| 5400 | 6 | 13 | 19 | 26 | 32 | |
| 5800 | 6 | 12 | 19 | 25 | 31 | |

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{\text{min. test separation distance, mm}} \right] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where } f(\text{GHz}) \text{ is the RF channel transmit frequency in GHz}$$

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Maximum measured transmitter power.

BLE+2.4G

| Operating Mode | Frequency | Measured Power | max. power | Antenna Gain | Antenna Gain (linear) | min. test separation distance | Result | Limit |
|----------------|-----------|----------------|------------|--------------|-----------------------|-------------------------------|--------|-------|
| | (MHz) | (dBm) | (mW) | (dBi) | / | (mm) | | |
| GFSK | 2402 | -5.452 | 0.28 | 1.8 | 1.51 | 5 | 0.1337 | 3 |
| | 2440 | -5.657 | 0.27 | 1.8 | 1.51 | 5 | 0.1285 | 3 |
| | 2480 | -6.214 | 0.24 | 1.8 | 1.51 | 5 | 0.1140 | 3 |

Remark: The best case gain of the antenna is 1.8dBi.

1.8dBi logarithmic terms convert to numeric result is nearly 1.51

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$

The test Result is less than 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR.

For 2.4G Measurement Data

| Operating Mode | Frequency | Field strength (dBuV/m@3) | Measured Power | max. power | Antenna Gain | min. test separation distance | $[\sqrt{f(\text{GHz})}]$ | Result | Limit |
|----------------|-----------|---------------------------|----------------|------------|--------------|-------------------------------|--------------------------|--------|-------|
| | (MHz) | | (dBm) | (mW) | (dBi) | (mm) | | | |
| GFSK | 2402 | 82.59 | -12.57 | 0.055 | 1.8 | 5 | 1.550 | 0.0260 | 3 |
| | 2441 | 79.42 | -15.74 | 0.027 | 1.8 | 5 | 1.562 | 0.0126 | 3 |
| | 2480 | 75.09 | -20.07 | 0.010 | 1.8 | 5 | 1.575 | 0.0047 | 3 |

$$\text{EIRP} = E_{\text{Meas}} + 20 \log(d_{\text{Meas}}) - 104.7$$

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBuV/m

d_{Meas} is the measurement distance, in m

$$\text{EIRP} = E + 20 \log(d) - 104.7$$

Conclusion: No SAR is required.