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COMMERCIAL-IN-CONFIDENCE

SAR EXCLUSION DOCUMENT

Document 75955217-10 Issue 01
FCC ID: QOQ-MGM240L

2400 MHz 802.15.4 Transmitter:

FCC General RF Exposure Test Exemption Guidance (KDB 447498 D04 v01 Appendix B)

SAR or MPE based evaluation is not required if any of the applicable Steps 1, 2 or 3 are met (Ref: KDB 447448 Figure A.1).

Step 1: All Devices: Blanket 1 mW Exemption (100 kHz – 100 GHz)

Reference: FCC CFR 47 Part 1.1307(b)(3)(i)(A).

Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance (mm)	All devices: 1.1307(b)(3)(i)(A) Blanket 1 mW Exemption (Yes/No)* (100 kHz to 100 GHz)
2405	10	100	10	1.159	11.59	7.07	13.5	No

*Based on conducted power output or ERP whichever is greater, compared to the 1 mW exemption threshold.

Step 2: All devices: MPE Exemption (300 kHz to 100 GHz)

Reference: FCC CFR 47 Part 1.1307(b)(3)(i)(C).

Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance (mm)	Threshold ERP at separation distance R (W)	All devices: 1.1307(b)(3)(i)(C) MPE Exemption (Yes/No)** (300 kHz to 100 GHz)
2405	10	100	10	1.159	11.59	7.07	13.5	Less than minimum separation distance	No

**Based on ERP compared to the KDB 447498 Table B.1 Threshold ERP calculated for the separation distance R.

Approved by 
Matthew Russell
Authorised Signatory

Date 17 June 2022

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Step 3: All Devices: (if Step 1 & 2 not met): SAR Exemption (300 MHz to 6 GHz, 0.5 cm to 40 cm)

Reference: FCC CFR 47 Part 1.1307(b)(3)(i)(B).

Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Test Separation Distance (mm)	Threshold Pth (mW)	All devices: 1.1307(b)(3)(i)(B) SAR Exemption (Yes/No)* (300 MHz to 6 GHz, 0.5 cm to 40 cm)
2405	10	100	10	1.159	11.59	7.07	13.5	10.6	Yes

*Based on conducted power output or ERP whichever is greater, compared to the Pth KDB 447498 B.2 formula;

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).

The SAR and MPE exclusion thresholds have been evaluated using the formula described above from information supplied by the manufacturer below. Based on the calculations above, the product is categorically excluded from SAR or MPE evaluation at any supported power level and at any distance from the human body above 13.5 mm.



Manufacturer's Declaration of Product information:

Technical Description

Internally regulated, and shielded, PCB radio module implementing the Bluetooth Low Energy (BLE) and 802.15.4 wireless standard protocols, to enable low-power wireless communication for IoT applications. The BLE portion supports the 1M, 2M, and 125/500K coded PHYs from the spec, all based on the GFSK modulation. The 802.15.4 portion provides the base wireless protocol for higher-level communication standards like Zigbee and Thread. The product comes in a single hardware variant with an integral antenna, a meandered inverted F PCB trace.

Transmitter Description

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
802.15.4	2400 – 2483.5	2405	10	100

Transmitter Description

Antenna Description

The following antennas are supported by the equipment under test.

Radio Access Technology	Antenna Model	Gain (dBi)	Antenna length (cm)
802.15.4	Integrated PCB trace antenna	+0.64	3.5

Antenna Description