MPE CALCULATION

IC ID: 24038-BLNFN100001

RF Exposure Requirements: RSS-102 Issue-5
RF Radiation Exposure Limits: RSS-102 Issue-5
RF Radiation Exposure Guidelines: RSS-102 Issue-5

EUT Frequency Band: 2412-2462 MHz, 2402-2480 MHz,
5180- 5320MHz, 5500-5720MHz, 5745-5825MHz
5210-5290MHz, 5530-5610MHz, 5690-5775MHz

Limits for General Population/Uncontrolled Exposure in the band of:

Power Density Limit: $0.02619\ f^{0.6834}$ W/m²

1 mW / cm²

Equation: $S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

Where, S = Power Density

P = Power Input to Antenna

G = Antenna Gain

R = distance to the center of radiated antenna

EUT: Raspberry Compute Module 3 Lite , **Model No.: Balena Fin**

1) External Omni Antenna :

Prediction distance 20cm

(BT): Power = 0.31 dBm, Antenna Gain = 2 dBi, Power density = 0.003 W/cm²

(BLE): Power = 1.65 dBm, Antenna Gain = 2 dBi, Power density = 0.005 W/m²

(WLan 2.4GHz): Power = 15.9 dBm, Antenna Gain = 2 dBi, Power density = 0.122 W/m²

(WLan 5GHz): Power = 11.7 dBm, Antenna Gain = 2 dBi, Power density = 0.046 W/m²

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Directional Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (W/m²)	MPE Limit (W/m²)	Pass/ Fail
BT	2441	0.31	2	1	±1dB	1.31	20	0.003	5.409	Pass
BLE	2440	1.65	2	1	±1dB	2.65	20	0.005	5.409	Pass
WLAN 2.4GHz	2437	15.9	2	1	±1dB	16.9	20	0.122	5.404	Pass
WLAN 5GHz	5775	11.7	2	1	±1dB	12.7	20	0.046	9.744	Pass

2) Embedded Chip Antenna :

Prediction distance 20cm

(BT): Power = 0.31 dBm, Antenna Gain = 1 dBi, Power density = 0.002 W/m^2

(BLE): Power = 1.65 dBm, Antenna Gain = 1 dBi, Power density = 0.003 W/m^2

(WLan 2.4GHz): Power = 15.9 dBm, Antenna Gain = 1 dBi, Power density = 0.098 W/m^2

(WLan 5GHz): Power = 11.7 dBm, Antenna Gain = 1 dBi, Power density = 0.037 W/m^2

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Directional Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (W/m^2)	MPE Limit (W/m^2)	Pass/ Fail
BT	2441	0.31	1	0	±1dB	1.31	20	0.002	5.409	Pass
BLE	2440	1.65	1	0	±1dB	2.65	20	0.003	5.409	Pass
WLAN 2.4GHz	2437	15.9	1	0	±1dB	16.9	20	0.098	5.404	Pass
WLAN 5GHz	5775	11.7	1	0	±1dB	12.7	20	0.037	9.744	Pass

3) WiFi, BT, and BLE Co-location MPE :

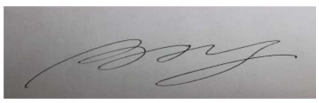
Note 1 : BT radio, BLE radio, and WiFi radio are co-located, and transmit simultaneously.
Note 2 : External antenna and embedded antenna do not work simultaneously.
Note 3 : WiFi 2.4 GHZ and 5GHz radio do not transmit simultaneously.
Note 4 : Worst-Case Co-location MPE is BT, BLE, and 2.4GHz Wi-Fi transmitting via external antenna simultaneously**.**

Worst-Case Co-location MPE Calculation :

BT = (0.003/5.409) x 100 = 0.05%
BLE = (0.005/5.409) x 100 = 0.09%
2.4GHz WLAN = (0.122/5.404) x 100 = 2.26%

Total MPE Percentage = (0.05 + 0.09 + 2.26) % = 2.4% < 100%

The Above Result had shown that the Device complied with MPE requirement at 20 cm measurement distance.



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