

MPE CALCULATION

BT module FCC ID: APV-SC1204

WIFI module FCC ID: 2AC7Z- ESPWROOM02

Cellular module FCC ID: XMR201707BG96

RF Exposure Requirements:
RF Radiation Exposure Limits:
RF Radiation Exposure Guidelines:

47 CFR §1.1307(b)
47 CFR §1.1310
FCC OST/OET Bulletin Number 65

EUT Frequency Band:

699-716MHz, 777-787MHz, 824-849MHz, 1710-1755MHz,
1850-1910MHz, 2412-2462 MHz, 2402-2480 MHz

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

300-1500MHz, 1500-100,000 MHz

Power Density Limit:

f/1500; 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: Tracking Device, Model No.: SC1204, SC1204V

PCB Trace Antenna

Prediction distance 20cm

(WLAN 2.4GHz): Power = 23.23 dBm, Antenna Gain = 2 dBi, Power density = 0.0663mW/cm²

BLE: Power= -0.61 dBm, Antenna Gain = 2 dBi, Power density = 0.00028mW/cm²

LTE Band II: Power=26 dBm, Antenna Gain = 1.6 dBi, Power density = 0.1145mW/cm²

LTE Band IV: Power=25 dBm, Antenna Gain = 1.6 dBi, Power density = 0.090mW/cm²

LTE Band V: Power=26 dBm, Antenna Gain = 1 dBi, Power density = 0.1145mW/cm²

LTE Band XII: Power=26 dBm, Antenna Gain = 0.5 dBi, Power density = 0.089mW/cm²

LTE Band XIII: Power=26 dBm, Antenna Gain = 0.5 dBi, Power density = 0.089mW/cm²

LTE Band XXVI: Power=26 dBm, Antenna Gain = 1.0 dBi, Power density = 0.01mW/cm²

GSM 850: Power= 25.97 dBm, Antenna Gain = 1.0 dBi, Power density = 0.099 mW/cm²

GSM 1900: Power= 22.97 dBm, Antenna Gain = 1.6 dBi, Power density = 0.057 mW/cm²

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (mW/cm ²)	MPE Limit (mW/cm ²)	Pass/Fail
WLAN 2.4GHz	2462	22.23	2.0	±1dB	23.23	20	0.0663	1	Pass
BLE	2402	-1.61	2.0	±1dB	-0.61	20	0.00028	1	Pass
LTE (Band II)	1880	24	1.6	±2dB	26	20	0.1145	1	Pass
LTE (Band IV)	1732.5	23	1.6	±2dB	25	20	0.090	1	Pass
LTE (Band V)	836.5	24	1.0	±2dB	26	20	0.1145	0.557	Pass
LTE (Band XII)	707.5	24	0.5	±2dB	26	20	0.089	0.471	Pass
LTE (Band XIII)	782	24	0.5	±2dB	26	20	0.089	0.521	Pass

LTE (Band XXVI)	831.5	24	1.0	±2dB	26	20	0.01	0.554	Pass
GSM 850	836.5	23.97	1.0	±2dB	25.97	20	0.099	0.557	Pass
GSM 1900	1880	20.97	1.6	±2dB	22.97	20	0.057	1	Pass

Co-location worse case (WLAN & BLE):

$$2.4G \text{ WLAN} = (0.0663/1) \times 100\% = 6.63\%$$

$$\text{BLE} = (0.00028/1) \times 100\% = 0.028\%$$

Total MPE Percentage = $(6.63 + 0.028)\% = 6.658\% < 100\%$ for **WLAN & BLE** transmit simultaneously.

Co-location worse case (LTE & BLE):

$$\text{BLE} = (0.00028/1) \times 100\% = 0.028\%$$

$$\text{LTE Band V} = (0.1145/0.557) \times 100\% = 20.556\%$$

Total MPE Percentage = $(20.556 + 0.028)\% = 20.58\% < 100\%$ for **LTE & BLE** transmit simultaneously.

Co-location worse case (GSM & BLE):

$$\text{BLE} = (0.00028/1) \times 100\% = 0.028\%$$

$$\text{GSM} = (0.099/0.557) \times 100\% = 17.77\%$$

Total MPE Percentage = $(17.77 + 0.028)\% = 17.798\% < 100\%$ for **GSM & BLE** transmit simultaneously.

The Above Result had shown that the device complied with MPE requirement at a prediction distance of 20cm.

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