

SAR evaluation
FCC ID: 2A4G813P13S

MPE Calculation Method

$$E \text{ (V/m)} = (30 \cdot P \cdot G)^{0.5} / d$$

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

E = Electric Field (V/m)

P = Peak 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

$$Pd = (30 \cdot P \cdot G) / (377 \cdot d^2)$$

From the peak 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.

Calculated WIFI Result and Limit (WORSE CASE IS AS BELOW)

2.4G Band

Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
0.31 (1.074dBi)	8.590 (9.34dBm)	0.001835	1	Compiles

Note:

Antenna Gain: 0.31dBi (2.4G Band)

$$\text{ERP} = 9.34 + 0.31 - 2.15 = 7.5 \text{ dBm} (5.623 \text{ mW})$$

5G Band

Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.22 (2.642dBi)	5.848 (7.67dBm)	0.003074	1	Compiles

Note:

Antenna Gain: 4.22dBi (2.4G Band)

$$\text{ERP} = 7.67 + 4.22 - 2.15 = 9.74 \text{ dBm} (9.419 \text{ mW})$$

WIFI 2.4G band and 5G Band cannot transmit Simultaneously

Calculated Bluetooth Result and Limit (WORSE CASE IS AS BELOW)

Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
0.31 (1.074dBi)	2.109 (3.24dBm)	0.000451	1	Compiles

Note:

Antenna Gain: 0.31dBi (2.4G Band)

ERP=3.24+0.31-2.15=1.4dBm(1.380mW)

BT BDR/EDR and BLE cannot transmit Simultaneously

2.4G WIFI +BT

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} = 8.590/3060 + 2.109/3060 = 0.003496$$

$$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} = (5.623+1.380)/3060 = 0.002289$$

$$\sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} = (0.001835+0.000451) / 1 = 0.002286$$

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

$$0.003496 + 0.002289 + 0.002286 = 0.008071 < 1$$

5G WIFI +BT

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} = 5.848/3060 + 2.109/3060 = 0.002600$$

$$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} = (9.419 + 1.380) / 3060 = 0.003529$$

$$\sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} = (0.003074 + 0.000451) / 1 = 0.003525$$

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

$$0.002600 + 0.003529 + 0.003525 = 0.009654 < 1$$