MPE Calculation Method

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

Power Density: $Pd \ (W/m2) = E^2/377$

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

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

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)**

| Antenna Gain (Numeric) | Peak Output Power (mW) | Power Density (S) (mW/cm2) | Limit of Power Density (S) (mW/cm2) | Test Result |
|---|---|---|---|---|
| 3.251 （5.12dBi） | 162.55 （22.11dBm） | 0.1051 | 1 | Compiles |

Note:

Antenna Gain: 2.11dBi (2.4G Band)

Assembly Antenna Gain: 5.12dBi

Assembly Antenna Gain (Numeric): 3.251dBi

ERP=22.11+5.12-2.15=25.08dBm(322.11mW)

WIFI 2.4G band and 5G band cannot transmit Simultaneously

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

$eirp = pt \ x \ gt = (EXd)^2/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, --- $10^{((dBuV/m)/20)}/10^6$

d = measurement distance in meters (m)---3m

$Sopt = (EXd)^2/30 \ x \ gt$

Ant gain =2.11dBi  so Ant numeric gain= 1.626

Field strength =92.58dBµV/m @3m@2480MHz

So Pt={[10$^{(92.58/20)}$/10$^6$  x3]$^2$/30x1.626}x1000 mW = 0.884mW

| Antenna Gain (Numeric) | Peak Output Power (mW) | Power Density (S) (mW/cm2) | Limit of Power Density (S) (mW/cm2) | Test Result |
|---|---|---|---|---|
| 1.626（2.11dBi） | 0.884 (-0.535dBm) | 0.0002 | 1 | Compiles |

Note:

Antenna Gain: 2.11dBi (2.4G Band)

Assembly Antenna Gain (Numeric): 1.626dBi

ERP=-0.535-2.15=-2.685dBm(0.539mW)

BT BDR/EDR and BLE cannot transmit Simultaneously

$$\sum_{i=1}^{a} \frac{P_i}{P_{\mathrm{th},i}}$$

=162.55/3060 +0.884/3060=0.0534

$$\sum_{j=1}^{b} \frac{ERP_j}{ERP_{\mathrm{th},j}}$$

=(322.11+0.539)/3060 =0.1054

$$\sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k}$$

=（0.1051+0.0002）/1=0.1053

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

**0.0534+0.1054+0.1053=0.2641<1**