

Section 9. Radio Frequency Exposure

Name of Test:	<i>Radio Frequency Exposure</i>	Test Standard:	<i>FCC OET Bulletin 65</i>
Tested By:	WEI LI	Test Date:	08/24-10/16/2020

Minimum Standard: Public Exposure to Radio Frequency Energy Levels (1.1307 (b)(1)) Limits:

From §1.1310 Table 1 (B),
 for Public S = 1.0 mW/cm²
 for Professional, S = 5.0 mW/cm²

Method of Measurement: $d = 0.282 * 10^{((P + G) / 20) / \sqrt{S}}$ Equation (1)
 $S = 0.0795 * 10^{((P + G) / 10) / d^2}$ Equation (2)

where
 d = MPE distance in cm
 P = Power in dBm
 G = Antenna Gain in dBi
 S = Power Density Limit in mW/cm²

Equation (1) and the measured peak power is used to calculate the MPE distance.
 Equation (2) and the measured peak power is used to calculate the Power density.

Test Result: **Complies**

Test Data: **Calculation**

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric

antenna gain

d = Distance in
meters

S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of Power to mW and Distance to
cm, using: P(mW) = P (W) / 1000 and

$$d (\text{cm}) = 100 * d (\text{m})$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW/cm²

Substituting the logarithmic form of power and
gain using: P (mW) = 10^{(P (dBm) /}

10) and

$$G (\text{numeric}) = 10^{(G (\text{dBi}) / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20) / \sqrt{S}}$$

Equation (1)

$$S = 0.0795 * 10^{((P + G) / 10) / d^2}$$

Equation (2)

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Equation (1) and the measured peak power is used to calculate the MPE distance.

Equation (2) and the measured peak power is used to calculate the Power density.

APPLICABLE LIMITS for separation $\geq 20\text{cm}$

FCC: From §1.1310 Table 1 (B), for Public $S = 1.0 \text{ mW/cm}^2$; for Professional, $S = 5.0 \text{ mW/cm}^2$

RESULTS

No non-compliance noted:

For FCC, the worst case for this EUT, $P+G=23.30+1.2=24.50\text{dBm}$, and $d=20\text{cm}$

Plug all three items into equation (2), yielding,

Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	Meet min. PD Limit
1.0/5.0	23.30	1.2	0.0564	Yes

Therefore, all of results are below the FCC limit.

NOTE: For mobile or fixed location transmitters, the minimum separation distance between the antenna & radiating structures of the device and nearby persons is 20 cm, even if calculations indicate that the MPE distance would be less.