

RF Exposure evaluation

FCC ID:2AHYV-FLOWKB

According to 447498 D04 Interim General RF Exposure Guidance v01

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
		5	10	15	20	25	30	35	40	45	50
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

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

where:

pt = transmitter output power in watts,

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

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

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

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

$$\text{Ant gain} = -0.71 \text{ dBi}$$

$$-0.71-2.15=-2.86 \text{ } [-2.86\text{dBd}(0.5176) \text{ }]$$

$$\text{Field strength} = 93.40 \text{ dBuV/m @3m @2439MHz}$$

$$\text{So } Pt=\{ [10^{(93.40/20)}/10^6 \times 3]^2/30\} \times 1000 \text{ mW} =0.656\text{mW}<2.75\text{mW}$$

$$\text{So } ERP=0.656 \times 0.5176=0.340<2.75\text{mW}$$

Then SAR evaluation is not required

Ant gain = -0.71 dBi

Max Output power = 0.327dBm @ BLE1M@ 2480MHz

ERP = 0.327dBm - 0.71dBi - 2.15 = -2.533dBm

So

worse case:

$10^{-0.2533} = 0.5581\text{mW} < 2.72\text{ mW}$

Comply with RF exposure exemption limit.