

RF Exposure evaluation

FCC ID: 2AJFX-RANGER

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

$d=15\text{mm}$ (Customer claim)

Ant gain = -0.23 dBi (BLE)

Max Output power = 8.165 dBm @ BLE1M @ 2442 MHz

ERP = 8.165 dBm - 0.23 dBi - 2.15 = 5.7850 dBm

So worse case:

$10^{0.8165} = 6.5539 \text{ mW} < 22.22 \text{ mW}$

Comply with RF exposure exemption limit.

Ant gain = 2.12 dBi (5GWIFI)

Max Output power = 8.265 dBm @ N40 @ 5230 MHz

ERP = 8.265 dBm + 2.12 dBi - 2.15 = 8.2350 dBm

So worse case:

$10^{0.8265} = 6.7066 \text{ mW} < 14.48 \text{ mW}$

Comply with RF exposure exemption limit.