

RF Exposure evaluation

FCC ID:YI6RL-33TX

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

$$e_{irp} = p_t \times g_t = (E \cdot d)^2 / 30$$

where:

p_t = transmitter output power in watts,

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

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

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

$$S_{opt} = (E \cdot d)^2 / 30 \times g_t$$

$$\text{Ant gain} = 0 \text{ dBi (1)} \quad [-0.05 \text{ dBd (0.99)}]$$

$$\text{Field strength} = 85.69 \text{ dB}\mu\text{V/m @3m @433.92MHz}$$

$$\text{So } P_t = \{ [10^{(85.69/20)}/10^6 \times 3]^2 / (30 \times 1) \} \times 1000 \text{ mW} = 0.111 \text{ mW} < 22 \text{ mW}$$

$$\text{So } ERP = 0.111 \times 0.99 = 0.110 < 22 \text{ mW}$$

Then SAR evaluation is not required