

RF Exposure evaluation

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

$$ERP/EIRP = P_T + G_T - L_C$$

ERP/EIRP is the equivalent (or effective) radiated power [in same units as P_T , typically dBW, dBm, or power spectral density (psd)], relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP).

P_T is the transmitter output power, in dBW, dBm, or psd (power over a specified reference bandwidth).

G_T is the gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP).

L_C is the signal attenuation in the connecting cable between the transmitter and the antenna, in dB.

$$\text{Directional Gain 2.4G WIFI (MIMO)} = 10 \cdot \log[(10^{3.6/20} + 10^{2.7/20})^2/2] = 6.17 \text{ dBi}$$

$$\text{Directional Gain 5G WIFI (MIMO)} = 10 \cdot \log[(10^{3.5/20} + 10^{4.4/20})^2/2] = 6.97 \text{ dBi}$$

$$\text{Directional Gain 6G WIFI (MIMO)} = 10 \cdot \log[(10^{3.6/20} + 10^{4/20})^2/2] = 6.81 \text{ dBi}$$

Mode	Frequency (MHz)	Output power (dBm)	Output power (mw)	Ant gain/DG (dBi)	EIRP (dBm)	EIRP (mw)	ERP (dBm)	ERP (mw)	Distance (cm)	P_{th} (mW)
Bluetooth	2402	14.50	28.18	3.60	18.10	64.57	15.95	39.36	20	3060
2.4GWIFI(MIMO)	2412	21.00	125.89	6.17	27.17	521.19	25.02	317.69	20	3060
5GWIFI(MIMO)	5180	20.50	112.20	6.97	27.47	558.47	25.32	340.41	20	3060
WIFI6E(MIMO)	5955	13.50	22.39	6.81	20.31	107.40	18.16	65.46	20	3060

WCDMA Band2	1852.4	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
WCDMA Band4	1712.4	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
WCDMA Band5	826.4	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 2 LTE CA_2C	1850.7	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
LTE Band 4	1710.7	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
LTE Band 5/LTE CA_5B	824.7	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 7/LTE CA_7C	2502.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
LTE Band 12	699.7	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 13	779.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 14	790.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 17	706.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 25	1850.7	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
LTE Band 26(814-824)	814.7	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 26(824-849)	824.7	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
LTE Band 30	2307.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
LTE Band 38/LTE CA_38C	2572.5	28.00	630.96	5.00	33.00	1995.26	30.85	1216.19	20	3060
LTE Band 41 LTE CA_41C	2498.5	28.00	630.96	5.00	33.00	1995.26	30.85	1216.19	20	3060
LTE Band 42(3450-3550)/LTE CA_42C	3452.5	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
LTE Band 43(3700-3800)/LTE CA_43C	3702.5	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
LTE Band 48/LTE CA_48C	3552.5	25.00	316.23	3.40	28.40	691.83	26.25	421.70	20	3060
LTE Band 66/LTE CA_66B/ LTE CA_66C	1710.7	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060

LTE Band 71	665.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n2	1852.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n5	826.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n7	2502.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n12	701.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n13	779.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n14	790.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n25	1852.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n26(814-824)	816.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n26(824-849)	826.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n30	2307.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n38	2575	28.00	630.96	5.00	33.00	1995.26	30.85	1216.19	20	3060
NR Band n38(MIMO)	2575	28.00	630.96	5.00	33.00	1995.26	30.85	1216.19	20	3060
NR Band n41	2506	28.00	630.96	5.00	33.00	1995.26	30.85	1216.19	20	3060
NR Band n41(MIMO)	2506	30.00	1000.00	5.00	35.00	3162.28	32.85	1927.52	20	3060
NR Band n48	3555	25.00	316.23	3.40	28.40	691.83	26.25	421.70	20	3060
NR Band n48(MIMO)	3555	25.00	316.23	3.40	28.40	691.83	26.25	421.70	20	3060
NR Band n66	1712.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n70	1697.5	25.00	316.23	5.00	30.00	1000.00	27.85	609.54	20	3060
NR Band n71	665.5	25.00	316.23	-0.10	24.90	309.03	22.75	188.36	20	3060
NR Band n77 (3450-3550)	3455	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
NR Band n77 (3450-3550) (MIMO)	3455	30.00	1000.00	3.40	33.40	2187.76	31.25	1333.52	20	3060
NR Band n77 (3700-3980)	3707.5	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
NR Band n77 (3700-3980) (MIMO)	3707.5	30.00	1000.00	3.40	33.40	2187.76	31.25	1333.52	20	3060

NR Band n78 (3450-3550)	3455	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
NR Band n78 (3450-3550) (MIMO)	3455	30.00	1000.00	3.40	33.40	2187.76	31.25	1333.52	20	3060
NR Band n78 (3700-3980)	3705	28.00	630.96	3.40	31.40	1380.38	29.25	841.40	20	3060
NR Band n78 (3700-3980) (MIMO)	3705	30.00	1000.00	3.40	33.40	2187.76	31.25	1333.52	20	3060

ERP = EIRP -2.15 dB

WORSE CASE

Remark:

Then SAR evaluation is not required