



RF Exposure Evaluation according to KDB 447498 D01 v06

Report identification number: 1-3977/22-03-23_MPE_FCC

Certification numbers and labeling requirements	
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1. MPE at given distance (KDB 447498 D01 General RF Exposure Guidance v06)

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

where: S = Power density
 P = Power input to the antenna
 G = Antenna gain
 R = Distance to the center of radiation of the antenna
 PG = Output Power including antenna gain

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled "Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure"

Frequency Range (MHz)	Power Density (mW/cm ²)	Averaging Time (minutes)
300 -1500	f/1500	30
1500 - 100000	1.0	30

where f = Frequency (MHz)

2. EUT technologies

Declared minimum safety distance: **31cm**

SRD Technology	Frequency [MHz]		Reference #	Output Power [dBm]			Power Density [mW/cm ²]		Share of Limit
	f _{Min}	f _{Max}		P _{ERP}	P _{EIRP}	P _{RF Exp}	S _{Result}	S _{Limit}	%
Bluetooth LE	2402	2480	A	N/A	11.7	11.7	0.001	1.000	0.12%
WLAN 2.4 GHz	2412	2462	B	N/A	36.0	36.0	0.329	1.000	32.89%
WLAN U-NII-1	5180	5240	C	N/A	35.2	35.2	0.272	1.000	27.23%
WLAN U-NII-2A	5260	5320	C	N/A	30.0	30.0	0.082	1.000	8.22%
WLAN U-NII-2C	5500	5700	C	N/A	30.1	30.1	0.084	1.000	8.42%
WLAN U-NII-3	5745	5825	C	N/A	36.0	36.0	0.327	1.000	32.74%

Note:

- EIRP Output Power [dBm] = Conducted Output Power [dBm] + Antenna Gain (dBi)
- Worst case of WLAN 5 GHz is marked green.

Referenced Documents:

#	Results from:
A	Test Report 1-3977/22-03-02; pp. 20, 24
B	Test Report 1-3977/22-03-03; pp. 22, 24-26
C	Test Report 1-3977/22-03-04; pp. 30, 33-35

Cellular Technology	Frequency [MHz]		Reference	Output Power [dBm]					Power Density [mW/cm²]		Share of Limit
				Conducted		Radiated		Corrected			
	f _{Min}	f _{Max}	#	P _{Meas}	P _{Max}	P _{ERP}	P _{EIRP}	P _{RF Exp}	S _{Result}	S _{Limit}	%
LTE Band 2	1850	1910	D	22.4	24.0	N/A	25.8	27.4	0.05	1.00	4.55%
LTE Band 4	1710	1755	E	22.2	24.0	N/A	27.0	28.8	0.06	1.00	6.28%
LTE Band 5	824	849	F	22.4	24.0	24.3	N/A	28.1	0.05	0.55	9.62%
LTE Band 12	699	716	G	23.0	23.9	23.3	N/A	26.4	0.04	0.47	7.67%
LTE Band 25	1850	1915	H	22.4	24.0	N/A	25.9	27.5	0.05	1.00	4.66%
LTE Band 26	814	849	I, J	22.3	24.0	24.2	N/A	28.1	0.05	0.54	9.74%
LTE Band 41	2496	2690	K	25.5	27.0	N/A	29.8	31.3	0.11	1.00	11.17%
LTE Band 66	1710	1780	L	22.7	24.0	N/A	27.4	28.7	0.06	1.00	6.14%
LTE Band 71	663	698	M	21.5	23.5	22.6	N/A	26.8	0.04	0.44	8.86%
5G n25	1850	1915	N	24.5	25.0	N/A	28.0	28.5	0.06	1.00	5.81%
5G n41	2496	2690	O	28.2	28.5	N/A	32.1	32.4	0.14	1.00	14.39%
5G n66	1710	1780	P	24.5	25.0	N/A	29.2	29.7	0.08	1.00	7.66%
5G n71	663	698	Q	24.2	25.0	25.3	N/A	28.3	0.06	0.44	12.52%
5G n77	3450	3550	R	25.8	26.5	N/A	30.0	30.7	0.10	1.00	9.73%
5G n77	3550	3700	R		18.0	N/A		18.0	0.01	1.00	0.52%
5G n77	3700	3980	R	25.8	26.5	N/A	30.0	30.7	0.10	1.00	9.73%
LTE CA_41_C	2496	2690	S	25.2	27.0	N/A	29.5	31.3	0.11	1.00	11.17%
LTE CA_2A_4A	N/A	N/A	D, E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.83%
LTE CA_2A_12A	N/A	N/A	D, G	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.22%
LTE CA_2A_66A	N/A	N/A	D, L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.69%
LTE CA_12A_66A	N/A	N/A	G, L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13.81%

Note:

- Max rated conducted output power taken from customer's tune up info as attached in this filing.
- Worst case is marked green.

Referenced Documents:

#	Results from:
D	Test Report 1-3977/22-03-06; pp. 20-23
E	Test Report 1-3977/22-03-07; pp. 19-22
F	Test Report 1-3977/22-03-08; pp. 14-16
G	Test Report 1-3977/22-03-09; pp. 19-21
H	Test Report 1-3977/22-03-10; pp. 20-23
I	Test Report 1-3977/22-03-11; pp. 14-17
J	Test Report 1-3977/22-03-12; pp. 17-19
K	Test Report 1-3977/22-03-13; pp. 20-22
L	Test Report 1-3977/22-03-15; pp. 19-22
M	Test Report 1-3977/22-03-16; pp. 18-21
N	Test Report 1-3977/22-03-17; pp. 20-23
O	Test Report 1-3977/22-03-18; pp. 20-25 & 27
P	Test Report 1-3977/22-03-19; pp. 19-22
Q	Test Report 1-3977/22-03-20; pp. 19-21
R	Test Report 1-3977/22-03-21; pp. 22-30 (3450-3550 MHz) & 34-42 (3550-3700 MHz)
S	Test Report 1-3977/22-03-14; pp. 13-17

3. Collocation overview:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density.

Technology	Share of Limit [%]
5G n41	14.39%
Bluetooth LE	0.12%
WLAN 2.4 GHz	32.89%
WLAN U-NII-3	32.74%
Sum	80.14%

4. Conclusion

This prediction demonstrates the following:

The power density levels for FCC at a distance of 31 cm are below the maximum levels allowed by regulations.

Conclusion: RF exposure evaluation is not required.