



RF Exposure Evaluation according to KDB 447498 D01 v06

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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: **20 cm**

Cellular Technology	Frequency [MHz]		Reference	Output Power [dBm]					Power Density [mW/cm²]		Share of Limit
	f _{Min}	f _{Max}		Conducted		Radiated		Corrected	S _{Result}	S _{Limit}	%
			P _{Meas}	P _{Max}	P _{ERP}	P _{EIRP}	P _{RF Exp}				
GSM 850	824	849	A	N/A	N/A	32.5	N/A	25.7	0.07	0.55	13.30%
GSM 1900	1850	1910	A	N/A	N/A	N/A	32.0	23.0	0.04	1.00	3.97%
WCDMA Band II	1850	1910	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
WCDMA Band IV	1710	1755	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
WCDMA Band V	824	849	A	N/A	N/A	22.9	N/A	25.0	0.06	0.55	11.45%
LTE Band 2	1850	1910	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
LTE Band 4	1710	1755	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
LTE Band 5	824	849	A	N/A	N/A	22.9	N/A	25.0	0.06	0.55	11.45%
LTE Band 7	2500	2570	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
LTE Band 12	699	716	A	N/A	N/A	22.9	N/A	25.0	0.06	0.47	13.50%
LTE Band 13	777	787	A	N/A	N/A	22.9	N/A	25.0	0.06	0.52	12.15%
LTE Band 25	1850	1915	A	N/A	N/A	22.9	N/A	25.0	0.06	1.00	6.29%
LTE Band 26	814	849	A	N/A	N/A	22.9	N/A	25.0	0.06	0.54	11.59%
LTE Band 38	2570	2620	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%
LTE Band 41	2496	2690	A	N/A	N/A	N/A	25.0	25.0	0.06	1.00	6.29%

Notes:

- GSM corrected by $10 \log (1/8) = -9 \text{ dB}$ (time slots considerations)

Referenced Documents:

#	Results from:
A	Module data sheet

SRD Technology	Frequency [MHz]		Reference #	Output Power [dBm]			Power Density [mW/cm²]		Share of Limit %
	f _{Min}	f _{Max}		P _{ERP}	P _{EIRP}	P _{RF Exp}	S _{Result}	S _{Limit}	
Bluetooth Classic	2402	2480	B, C	N/A	15.1	15.1	0.01	1.00	0.64%
Bluetooth LE	2402	2480	D, C	N/A	11.4	11.4	0.00	1.00	0.27%
WLAN 2.4 GHz	2412	2462	E, C	N/A	29.6	29.6	0.18	1.00	18.14%
WLAN 5 GHz	5180	5240	F, C	N/A	23.6	23.6	0.05	1.00	4.56%
WLAN 5 GHz	5260	5320	F, C	N/A	21.6	21.6	0.03	1.00	2.88%
WLAN 5 GHz	5500	5700	F, C	N/A	21.5	21.5	0.03	1.00	2.81%

Referenced Documents:

#	Results from:
B	Test Report 1-5731/23-01-10, page 20
C	Antenna Data Sheet
D	Test Report 1-5731/23-01-11, page 19
E	Test Report 1-5731/23-01-03, page 22
F	Test Report 1-5731/23-01-04, page 28 (ff.)

3. Collocation overview:

LTE Band 12	13.50%
Bluetooth Classic/LE	0.64%
WLAN 2.4 GHz	18.14%
WLAN 5 GHz	4.56%
Sum	36.85%

4. Conclusion

This prediction demonstrates the following:

The power density levels for FCC at a distance of 20 cm are below the maximum levels allowed by regulations.

Conclusion: RF exposure evaluation is not required.