



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-1804/21-02-09 MPE (FCC_ISED)

Certification numbers and labeling requirements	
FCC ID	LCGFWR3XXEL
ISED number	2519A-XEL
HVIN (Hardware Version Identification Number)	FWR30-C
PMN (Product Marketing Name)	FWR30
FVIN (Firmware Version Identification Number)	01.00.01
HMN (Host Marketing Name)	-/-

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EUT technologies:

Technologies:	Declared by customer
E GPRS 850 MHz	25.15 dBm +1/-3 dB
E GPRS 1900 MHz	22.15 dBm +1/-3 dB
LTE FDD 2 Cat M1/Cat NB1 1900 MHz	23.0 dBm ±2 dB
LTE FDD 4 Cat M1/Cat NB1 1750 MHz	22.0 dBm ±2 dB
LTE FDD 5 Cat M1/Cat NB1 850 MHz	23.0 dBm ±2 dB
LTE FDD 12 Cat M1/Cat NB1 700 MHz	23.0 dBm ±2 dB
LTE FDD 13 Cat M1/Cat NB1 700 MHz	23.0 dBm ±2 dB
LTE FDD 26 Cat M1/Cat NB1 850 MHz	23.0 dBm ±2 dB
80 GHz Radar	21 dBm (peak)

Collocation overview:

Active scenario: Technology	1	2	3
E GPRS / LTE	x		x
80 GHz Radar	x	x	

Prediction of MPE limit at given distance - FCC

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)

Prediction: worst case

Technologies:		E GPRS	LTE	RADAR	
	Frequency (MHz)	850	1900	80000	
PG	Declared max power (EIRP)	26.2	25.0	21.0	dBm
R	Distance	20	20	20	cm
S	MPE limit for uncontrolled exposure	0.567	1	1	mW/cm ²
	Calculated Power density:	0.082	0.063	0.025	mW/cm ²
	Calculated percentage of Limit:	14.48%	6.29%	2.51%	
Collocation:					
	Scenario 1: E GPRS 850 + 80GHz Radar				
	Calculated percentage of Limit:	16.98%			

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.

Prediction of MPE limit at given distance - ISED

RSS-102, Issue 5, 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Prediction: worst case

		E GPRS	LTE	RADAR	
	Frequency	850	1900	80000	MHz
R	Distance	20	20	20	cm
PG	Maximum EIRP	26.15	25	21	dBm
PG	Maximum EIRP	412.1	316.2	125.9	mW
	Exclusion Limit from above:	1.32	2.28	5.00	W
	Calculated percentage of Limit:	31.32%	13.87%	2.52%	
Collocation:					
	Scenario 1: LTE 700 + 80 GHz Radar				
	Calculated percentage of Limit:	33.83%			

Conclusion: RF exposure evaluation is not required.