



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-9242/19-01-12 MPE (FCC_ISED)

Certification numbers and labeling requirements	
FCC ID	LCGFWR3XWEL
ISED number	2519A-WEL
HVIN (Hardware Version Identification Number)	FWR30
PMN (Product Marketing Name)	FWR30
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

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Document authorised:



Alexander Hnatovskiy
Lab Manager
Radio Communications & EMC



Marco Scigliano
Testing Manager
Radio Communications & EMC

EUT technologies:

Technologies:	Max. measured EIRP [dBm]	Max. declared EIRP [dBm]	#
GSM 850	32.4 (slotted peak) 29.4 (avg)	30.0 (avg)	A
PCS 1900	29.6 (slotted peak) 26.6 (avg)	27.0 (avg)	
LTE FDD 2 Cat M1 / NB-IoT 1900 MHz	19.2 dBm	20.0	B
LTE FDD 4 Cat M1 / NB-IoT 1750 MHz	22.7 dBm	23.0	
LTE FDD 5 Cat M1 / NB-IoT 850 MHz	21.5 dBm	22.0	
80 GHz Radar	20.52 (peak)	21 (peak)	C

Details and origins of the measurements shown in the table above:

#	Results from:		Additional information
A	1-9242/19-01-07	CTC Advanced GmbH	Max measured EIRP GSM 850 page 18, Max measured EIRP PCS 1900 page 26
B	1-9242/19-01-08	CTC Advanced GmbH	Max measured EIRP LTE FDD 2 page 17, 24 Max measured EIRP LTE FDD 4 page 32, 39 Max measured EIRP LTE FDD 5 page 47, 54
C	TR-50511-74558-02 (Edition 2)	TÜV SÜD Product Service GmbH	Max peak EIRP page 22

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:		GSM	LTE	RADAR	
	Frequency (MHz)	850	850	80000	
PG	Declared max power (EIRP)	30	22	21	dBm
R	Distance	20	20	20	cm
S	MPE limit for uncontrolled exposure	0.5667	0.5667	1.0000	mW/cm ²
	Calculated Power density:	0.1990	0.0315	0.0251	mW/cm ²
	Calculated percentage of Limit:	35.13%	5.57%	2.51%	

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

		GSM	LTE	RADAR	
	Frequency	850	850	80000	MHz
R	Distance	20	20	20	cm
PG	Maximum EIRP	30	22	21	dBm
PG	Maximum EIRP	1000.0	158.5	125.9	mW
	Exclusion Limit from above:	1.32	1.32	5.00	W
	Calculated percentage of Limit:	75.99%	12.04%	2.52%	

Conclusion: RF exposure evaluation is not required.