



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-0764/20-01-16 MPE (FCC_ISED)

Certification numbers and labeling requirements	
FCC ID	S9I-MRGEN21
ISED number	5860A-MRGEN21
HVIN (Hardware Version Identification Number)	MRGEN21
PMN (Product Marketing Name)	MRGEN21
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

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EUT technologies:

Technologies:	Max measured avg. EIRP: [dBm]
Automotive Radar 76 GHz	25.98

NOTE:

Test results taken from CTC advanced GmbH report 1-0764/20-01-02 (page21).

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:	Radar	
Frequency (MHz)	76000	
PG Declared max power (EIRP)	25.98	dBm
R Distance	20	cm
S MPE limit for uncontrolled exposure	1	mW/cm ²
Calculated Power density:	0.0789	mW/cm ²
Calculated percentage of Limit:	7.89%	

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

		0.3 - 6 GHz	
	Frequency	76000	MHz
R	Distance	20	cm
P	Max power input to the antenna	25.98	dBm
G	Antenna gain	0	dBi
PG	Maximum EIRP	25.98	dBm
PG	Maximum EIRP	396.3	mW
	Exclusion Limit from above:	5.00	W
	Calculated percentage of Limit:	7.93%	

Conclusion: RF exposure evaluation is not required.