



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-8822/19-01-01 MPE (FCC_IC)

Certification numbers and labeling requirements	
FCC ID	XK5-NGF24
IC number	5158A-NGF24
HVIN (Hardware Version Identification Number)	1473157 1471759
PMN (Product Marketing Name)	Funkneigungsgeber (NGF)
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

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EUT technologies:

Technologies:	Max antenna gain	Max conducted output power
2.4 GHz Proprietary Transceiver	7.6 dBi	17.6 dBm

NOTE: Values taken from from CTC advanced test report 1-8822/19-01-05.

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

Technology	Proprietary @ 2450 MHz
Max power input to the antenna	17.6 dBm
Distance	20 cm
Antenna gain	7.6 dBi
MPE limit for uncontrolled exposure	1 mW/cm ²
Calculated Power density:	0.0659 mW/cm²

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 - IC

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
	Technology	Proprietary 2.4 GHz
	Frequency	2450 MHz
P	Max power input to the antenna	17.6 dBm
R	Distance	20 cm
G	Antenna gain	7.6 dBi
	Maximum EIRP	331.1 mW
	Exclusion Limit from above:	2.71 W

Conclusion: RF exposure evaluation is not required.

For applications where minimum distance to radiating element is 20cm Annex C of RSS-102 should be filled out.