



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-5906/18-02-03

Certification numbers and labeling requirements	
FCC ID	2ASYV-WDR77-VES
IC number	24358-WDR77VES
HVIN (Hardware Version Identification Number)	WDR77-VES
PMN (Product Marketing Name)	WDR77-VES
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

This report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.



Thomas Vogler
Lab Manager
Radio Communications & EMC

EUT technologies:

Technologies:	Max. power EIRP: (AVG)
Automotive Radar @ 77 GHz	27.8 dBm

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)	77 GHz	
PG	Declared max power (EIRP)	28.7 dBm
R	Distance	20 cm
S	MPE limit for uncontrolled exposure	1 mW/cm ²
Calculated Power density:	0.1476 mW/cm ²	
Calculated percentage of Limit:	14.76%	

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

		> 6 GHz	
	Frequency	77000	MHz
R	Distance	20	cm
PG	Maximum EIRP	28.7	dBm
PG	Maximum EIRP	741.3	mW
	Exclusion Limit from above:	5.00	W
	Calculated percentage of Limit:	14.83%	

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.