

## 5.8. EXPOSURE OF HUMANS TO RF FIELD [[§§ 1.1310 & 2.1091]

§ 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

### Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

### 5.8.1. Method of Measurements

#### Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where,  
P: power input to the antenna in mW  
EIRP: Equivalent (effective) isotropic radiated power.  
S: power density mW/cm<sup>2</sup>  
G: numeric gain of antenna relative to isotropic radiator  
r: distance to centre of radiation in cm

$$r = \sqrt{\frac{PG}{4\pi \cdot S}} = \sqrt{\frac{EIRP}{4\pi \cdot S}}$$

### 5.8.2. Evaluation of RF Exposure Compliance Requirements

The EUT is evaluated in stand-alone and in specific host (FCC ID: GM38516) for collocation MPE.

#### 5.8.2.1. Stand-alone MPE Evaluation

Maximum RF Power conducted, <b>P<sub>conducted</sub>[dBm]:</b>	30
Maximum Antenna Gain, <b>G[dBi]:</b>	12
Maximum EIRP, <b>P<sub>EIRP</sub>[dBm]:</b>	42
MPE Limit for General Population/Uncontrolled Exposure, <b>S<sub>controlled</sub>[mW/cm<sup>2</sup>]:</b>	0.29
Calculated RF Safety Distance for General Population/Uncontrolled Exposure, <b>r<sub>safety_controlled</sub>[cm]:</b>	66 cm

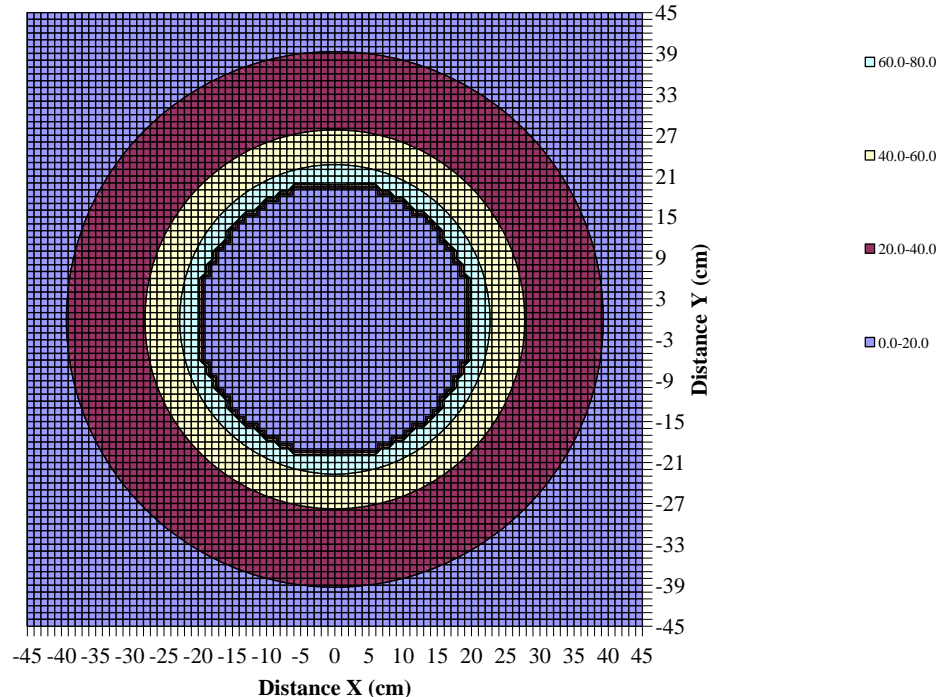
### 5.8.2.2. EUT Collocated with Specific Host (FCC ID: GM38516) MPE Evaluation

Using the spreadsheet for Mobile Multi-transmitter MPE Estimation from KDB 447498, below is worst case evaluation for the EUT with 0 dBi (Antenna No. 1) and the transmitters in the host device (Antenna No. 2)

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		435	2412
MPE Limit	mW/cm <sup>2</sup>		0.29	1.00
Max % MPE	%	77.0	68.6	8.4
Power	(W)	1.134	1.000	0.134
Antenna Gain	dBi		0.00	5.00
EIRP	(W)	1.42	1.000	0.424
X	(cm)		0.0	0.0
Y	(cm)		0.0	0.0
Sector			FALSE	FALSE
Arc			FALSE	FALSE
$\theta_1$	degs	input	-120	-120
$\theta_2$			60	60
$\theta_1$		actual	-120	-120
$\theta_2$			60	60

% MPE Contour

**Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas**



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