

## 1.8 RF ENERGY EXPOSURE INFORMATION FOR FIXED OPERATION

### 1.8.1 Maximum Permissible Exposure Limits

**DO NOT TRANSMIT** with this Client and antenna when persons are within the MAXIMUM PERMISSIBLE EXPOSURE (MPE) Radius of the antenna. The MPE Radius is the minimum distance from the antenna axis that ALL persons should maintain in order to avoid RF exposure higher than the allowable MPE level set by the FCC.



FAILURE TO OBSERVE THESE LIMITS MAY ALLOW ALL PERSONS WITHIN THE MPE RADIUS TO EXPERIENCE RF RADIATION ABSORPTION, WHICH EXCEEDS THE FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMIT. IT IS THE RESPONSIBILITY OF THE STATION LICENSEE TO ENSURE THAT THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS ARE OBSERVED AT ALL TIMES DURING STATION TRANSMISSION. THE STATION LICENSEE IS TO ENSURE THAT NO BYSTANDERS ARE WITHIN THE RADIUS LIMITS.

### 1.8.2 Determining MPE Radius

**THE MAXIMUM PERMISSIBLE EXPOSURE RADIUS** is unique for each site and is determined based on the complete installation environment (i.e. co-location, antenna type, transmit power level, etc.). Determination of the MPE distance is the responsibility of the VIDA Broadband user. Calculation of the MPE radius is required as part of the installation. The Limit for **Uncontrolled Exposure Power Density** ( $P_d$ ) is 10 W/m<sup>2</sup> for fixed mounted device.

The M/A-COM 4.9 GHz VIDA Broadband Client may be installed as a fixed mounted radio. After installation and commissioning, the safe distance from the 9 dBi omni-directional antenna is greater than 20 cm (8-inches).

#### 1.8.2.1 **MPE Calculation for omni-directional Antenna**

This MPE Minimum Distance Calculation is based on using a 9 dBi gain omni-directional antenna mounted directly to the Client RF port.

Basic M/A-COM 4.9 GHz VIDA Broadband Client specifications:

**P:** Maximum Peak Conducted Power = 27 dBm

**G:** Maximum Omni Antenna Gain = 9 dBi

Frequency Range = 4.94 to 4.99 GHz

**R:** Minimum Distance between User and Antenna = 0.2 m

**Equation from FCC:**

$$P_d = P * G_N / (4 * \pi * R_{min}^2)$$

$$P_d = 0.5 \text{ W} * 7.94 / (4 * 3.1415926 * 0.2^2) = 7.9 \text{ W} / \text{m}^2 < 10 \text{ W} / \text{m}^2$$

The calculation indicates that the minimum 0.2 meter distance between user and the omni-directional antenna (directly mounted to the Client RF port) is required when operating the M/A-COM 4.9 GHz VIDA Broadband Client.

### 1.8.2.2 MPE Calculation for Directional Antenna

This MPE Minimum Distance Calculation is based on using a directional antenna with more than 9 dBi antenna gain.

Basic M/A-COM 4.9 GHz VIDA Broadband Client specifications:

**P:** Maximum Peak Conducted Power = 27 dBm;

**G:** Maximum Omni Antenna Gain – Cable Loss = 27 dBi – 1 dB = 26 dBi; (Use numerical  $G_N$  value for the calculation):  $G_N = 10^{(G/10)}$ ; For  $G = 26$  dBi,  $G_N = 10^{(26/10)} = 398$

Frequency Range = 4.94 to 4.99 GHz;

**R<sub>min</sub>:** Minimum Distance between user and antenna to comply with FCC MPE Level (10 W / m<sup>2</sup>);

#### Equation from FCC:

$$P_d = P * G_N / (4 * \pi * R_{min}^2)$$

$$R_{min} = \text{SQRT}(0.5 \text{ W} * G_N / (4 * 3.1415926 * 10))$$

$$R_{min} = 1.26 \text{ m, for } G = 26 \text{ (i.e., } G_N = 398\text{)}$$

The calculation provides guidelines for users to estimate the minimum safe distance when a high gain antenna is connected to the M/A-COM 4.9 GHz VIDA Broadband Client. The user should always keep a safe distance from antenna greater than 20 cm or  $\text{SQRT}(3.9789E-3 * G_N)$ .

The following table lists fixed installation's minimum distance for different Effective Antenna Gain Levels (Antenna Gain – Feeder Cable Loss). In all cases, the minimum safe distance defined in Table 1-2 or 0.2 meters (8 inches), whichever is greater, is the recommended minimum safe distance for fixed installations.

**Table 1-2: MPE Minimum Distance Calculation for Fixed Client Installations Using High Gain Antennas**

Effective Antenna Gain (dBi)	Low Power Fixed Clients (0.1 Watts)		High Power Fixed Clients (0.5 Watts)	
	Minimum Safe Distance (Meters)	Minimum Safe Distance (Feet)	Minimum Safe Distance (Meters)	Minimum Safe Distance (Feet)
<10	0.20	0.65	0.20	0.65
11	0.20	0.65	0.22	0.73
12	0.20	0.65	0.25	0.82
13	0.20	0.65	0.28	0.92
14	0.20	0.65	0.32	1.04
15	0.20	0.65	0.35	1.16
16	0.20	0.65	0.40	1.31
17	0.20	0.65	0.45	1.47
18	0.22	0.73	0.50	1.64
19	0.25	0.82	0.56	1.84
20	0.28	0.92	0.63	2.07
21	0.32	1.04	0.71	2.32
22	0.35	1.16	0.79	2.61
23	0.40	1.31	0.89	2.92
24	0.45	1.47	1.00	3.28
25	0.50	1.64	1.12	3.68
26	0.56	1.84	1.26	4.13
>26	Reduce Transmitter Power as required by FCC			