Excellence in Compliance Testing

# Certification Exhibit

**FCC ID: VEYXVMR1**

**FCC Rule Part: 15.247**

**ACS Project Number: 13-2121**

Manufacturer: xG Technology, Inc.
Model: xVM

# RF Exposure

**General Information:**

| | |
|---|---|
| Applicant: | xG Technology, Inc. |
| ACS Project: | 13-2121 |
| Device Category: | Mobile |
| Environment: | General Population/Uncontrolled Exposure |

**Transmitter Signal Correlation Information:**

The xVM 900 MHz output signals are correlated using cyclic delay diversity (CDD). The maximum output power listed corresponds to the summation of the output power at both TX antenna ports. The directional gain is calculated per FCC KDB Publication No. 662911 D01 Multiple Transmitter Output v01r02.

*Directional Gain = $G_{ANT}$ + Array Gain*
*Array Gain = 10*log($N_{ANT}$/$N_{SS}$) dB*

Where,
$G_{ANT}$ = Antenna Gain
$N_{ANT}$ = number of transmit antennas and
$N_{SS}$ = number of spatial streams. (Assume $N_{SS}$ = *1* unless you have specific information to the contrary.)

The xVM is professionally installed and uses different antenna gains. The transmitter output power is adjusted based on the antenna used. The technical information for the xVM for each output power / antenna configuration is provided below.

**Technical Information:**

| | |
|---|---|
| Antenna Type: | Monopole |
| Individual Antenna Gain: | 5.5 dBi |
| Directional Antenna Gain: | 8.51 dBi |

Maximum Transmitter Conducted Power: 26.74 dBm, 472.1 mW
Maximum System EIRP: 35.25 dBm, 3349.654 mW
Exposure Conditions: Greater than 23 centimeters

| | |
|---|---|
| Antenna Type: | Monopole |
| Antenna Gain: | 7 dBi |
| Directional Antenna Gain: | 10.01 dBi |

Maximum Transmitter Conducted Power: 25.826 dBm, 382.47 mW
Maximum System EIRP: 35.836 dBm, 3833.54 mW
Exposure Conditions: Greater than 23 centimeters

**MPE Calculations**

The Power Density (mW/cm$^2$) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

**Table 1: xMax 900 MHz MPE Calculations Antenna Model MA9-5N: 5.5dBi**

| MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Transmit Frequency (MHz)** | **Radio Power (dBm)** | **Power Density Limit (mW/Cm2)** | **Radio Power (mW)** | **Antenna Gain (dBi)** | **Antenna Gain (mW eq.)** | **Distance (cm)** | **Power Density (mW/cm^2)** |
| 900 | 26.74 | 0.60 | 472.06 | 8.51 | 7.096 | 23 | 0.504 |

**Table 2: xMax 900 MHz MPE Calculations Antenna Model MA9-7N: 7 dBi**

| MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Transmit Frequency (MHz)** | **Radio Power (dBm)** | **Power Density Limit (mW/Cm2)** | **Radio Power (mW)** | **Antenna Gain (dBi)** | **Antenna Gain (mW eq.)** | **Distance (cm)** | **Power Density (mW/cm^2)** |
| 900 | 25.826 | 0.60 | 382.47 | 10.01 | 10.023 | 23 | 0.577 |

**Summation of Power Density Ratios**

The xVM contains a WLAN module model xMaxW (FCC ID: VEYXMODR1W1). The module uses a 3 dBi stubby monopole antenna. The MPE calculations for the xMaxW operating single-handedly are provided below:

**Table 3: WLAN 2.4 GHz MPE Calculations**

| MPE Calculator for Mobile Equipment<br>Limits for General Population/Uncontrolled Exposure* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Transmit Frequency (MHz)** | **Radio Power (dBm)** | **Power Density Limit (mW/Cm2)** | **Radio Power (mW)** | **Antenna Gain (dBi)** | **Antenna Gain (mW eq.)** | **Distance (cm)** | **Power Density (mW/cm^2)** |
| 2400 | 14.77 | 1.00 | 29.99 | 3 | 1.995 | 20 | 0.012 |

The 900 MHz and 2.4 GHz radios can operate simultaneously. Therefore, the maximum RF exposure is determined by the summation of the MPE ratios. The limits is such that the total MPE ratio is less or equal to 1.0

The maximum MPE ratio is calculated as such:

900 MHz xMax and 2.4 GHz WLAN Operating Simultaneously:
900 MHz xMax MPE Ratio + 2.4 GHz WLAN MPE Ratio
(0.577/0.6) + (0.012/1) =
(0.9617 + 0.012) =
0.974 < 1

**Installation Guidelines**
The installation manual should contain text similar to the following advising how to install the equipment to maintain compliance with the FCC RF exposure requirements:

**RF Exposure**
In accordance with FCC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 23 centimeters will be maintained.

**Conclusion**
This device complies with the MPE requirements by providing adequate separation between the device, any radiating structure and the general population.