Maximum Permissible Exposure Evaluation

1. General information

Product: Quad band GSM/GPRS Module

FCC ID: T5ZN701-AT

Device category: Mobile device per part 2.1091

Environment: General Population/Uncontrolled Exposure

2. Antenna

Model	Type	Max. Gain (dBi)	Remarks
HA-AS1	λ/4 Fixed Helical Antenna	0.0	-

3. GSM 850 Mode Radio Frequency Exposure Evaluation

The highest RF output power of the unit was measured at 28.7 dBm at 848.8 MHz. According to 47 CFR section 1.1310 of the FCC rules, the power density limit for General Population/Uncontrolled Exposure at 848.8 MHz is 0.566 mW/cm^2. The MPE is calculated to show the required separation distance that must be maintained during installation to maintain compliance with the power density limit.

The following formula was used to calculated the power density.

$$S = PG/4\pi R^2$$

where,

S: power density (mW/cm^2)

P: output power at the antenna terminal (mW)

G: gain of transmit antenna (numeric)

R: distance from transmitting antenna (cm)

To solve for the minimum mounting distance required;

$$R = \sqrt{(PG/4\pi S)}$$

For this device, the calculation is as follows;

$S = 0.566$ mW/cm^2

$P = 741.3$ mW

$G = $ max. gain of antenna $= 0$ dBi $= 1.0$ (numeric)

$R = \sqrt{(741.3 \times 1 / 4\pi \times 0.566)} = 10.2$ cm (Based on continuous transmission)

Based on the above calculation the Quad band GSM/GPRS Module antenna must be mounted such that it provides a minimum separation distance of 10.2 cm. The user's manual addresses the mounting location in the instructions for mounting the Quad band GSM/GPRS Module.

4. GSM 1900 Mode Radio Frequency Exposure Evaluation

The highest RF output power of the unit was measured at 29.8 dBm at 1909.8 MHz. According to 47 CFR section 1.1310 of the FCC rules, the power density limit for General Population/Uncontrolled Exposure at 1909.8 MHz is 0.566 mW/cm^2. The MPE is calculated to show the required separation distance that must be maintained during installation to maintain compliance with the power density limit.

The following formula was used to calculated the power density.

$S = PG/4\pi R^2$

where,

S: power density (mW/cm^2)

P: output power at the antenna terminal (mW)

G: gain of transmit antenna (numeric)

R: distance from transmitting antenna (cm)

To solve for the minimum mounting distance required;

$R = \sqrt{(PG/4\pi S)}$

For this device, the calculation is as follows;

$S = 1.0$ mW/cm^2

$P = 955.0$ mW

G = max. gain of antenna = 0 dBi = 1.0 (numeric)

R = $\sqrt{}$ (955.0 x 1 / 4π x 1.0) = 8.71 cm (Based on continuous transmission)

Based on the above calculation the Quad band GSM/GPRS Module antenna must be mounted such that it provides a minimum separation distance of 8.71 cm. The user's manual addresses the mounting location in the instructions for mounting the Quad band GSM/GPRS Module.