RESOLUTION PRODUCTS

Wireless Security Solutions

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U5X-RE927
Maximum Permissible Exposure Analysis

Introduction

This document details the MPE calculations for U5X-RE927. These calculations show that this device is in compliance with the MPE requirements set out by the FCC in §1.1307 & §1.1310 & Industry Canada in RSS-102 issue 4.

Power Density Limits

General Population/Uncontrolled Exposure limits are assumed for this application. The determination of the limits is given in the following table.

(B)   Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $|E|^2$, $|H|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f^2)*	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

Device

The device consists of a 319.5MHz transmitter compliant with 15.231, and a Huawei MU509C cellular module with external antenna. The determination of MPE levels for each of these is given below:

15.231 Transmitter

The following table gives power density calculations for this transmitter, based on measured field strength data.

Band (MHz)	Field Strength, dBuV/m, 3m	Field Strength, uV/m, 3m	Field Strength, V/m, 3m	Field Strength, V/m, cm	Power Density, mW/cm^2	Power Density Limit, mW/cm^2	Percent of MPE Used
319.505	90.900	35075.187	0.035	7.892	0.017	0.213	7.76%

Cellular Module

The following table gives power density calculations for the cellular module, based on conducted power measurements from the module's FCC certification reports (FCC ID QISMU509C)

Band (MHz)	Conducted Power, dBm	Conducted Power, W	Antenna Gain, dB	Power Density, W/cm^2	Power Density, mW/cm^2	Power Density Limit, mW/cm^2	Percent of MPE Used
824.200	31.770	1.503	0.850	0.000	0.254	0.549	46.26%
837.000	31.810	1.517	0.850	0.000	0.257	0.558	45.97%
848.800	31.550	1.429	0.850	0.000	0.242	0.566	42.70%
1850.200	29.990	0.998	0.850	0.000	0.169	1.000	16.87%
1880.000	29.780	0.951	0.850	0.000	0.161	1.000	16.07%
1909.800	29.360	0.863	0.850	0.000	0.146	1.000	14.59%

Conclusion

Based on the calculations in the above section, the maximum Percent of MPE Used for this device is 7.76 + 46.26 = 54.02%. Therefore, the device complies with the MPE power density limits.