RF Exposure Compliance Requirement

Model no.: ePro 100A-4

1. Standard requirement

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm^2)	Averaging Times $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f^2)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100000	--	--	5	6

(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 Times $\|E\|^2$,$\|H\|^2$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
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2. MPE Calculation Method

$E\ (V/m)=(30*P*G)^{0.5}/d$ Power Density: $Pd(W/m^2)=E^2/377$

E=Electric Field (V/m)

P=Peak RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

The formula can be changed to

$Pd= (30*P*G)/(377*d^2)$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

3. Calculated Result and Limit

13.56 RFID:

E=44.5dB μ V/m@3m(max. value provided by client), antenna gain = 0dBi

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
13.56	1	-50.7	0.00000851	0.00000000169	0.98	Complies

MPE ratio:

0.00000000169 (mW/cm2)/0.98(mW/cm2) = 0.0000000017

WIFI:

Max Output Power = 26dBm(max.value declared by client), antenna gain = 3.4dBi

Frequency (MHz)	Antenna Gain (Numeric)	Max Output Power (dBm)	Max Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2412-2462	2.19	26	398.11	0.1734	1	Complies

MPE ratio:

0.01734 (mW/cm^2)/1(mW/cm^2) = 0.1734

BLE:

Max Output Power = 8dBm(max.value declared by client), antenna gain = 3.4dBi

Frequency (MHz)	Antenna Gain (Numeric)	Max Output Power (dBm)	Max Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2402-2480	2.19	8	6.31	0.0027	1	Complies

MPE ratio:

0.0027 (mW/cm^2)/1(mW/cm^2) = 0.0027

BT:

Max Output Power = 10dBm(max.value declared by client), antenna gain = 3.4dBi

Frequency (MHz)	Antenna Gain (Numeric)	Max Output Power (dBm)	Max Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2402-2480	2.19	10	10	0.0044	1	Complies

MPE ratio:

0.0044 (mW/cm^2)/1(mW/cm^2) = 0.0044

The sample support one Bluetooth& WIFI modular and one antenna, Not need consider simultaneous Transmission of Bluetooth& WIFI. The maximum MPE ratio of WIFI was selected as the evaluation.

Sum of the MPE ratio for all simultaneously transmitting antennas of NFC and WIFI:

Sum of the MPE ratio for all simultaneously transmitting antennas:

0.0000000017+ 0.1734 = 0.1734000017 < 1

According to MPE test Exclusion condition in KDB 447498 (D01) General RF Exposure Guidance D01 v06, the MPE report is not required.

Test Location:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

All tests were performed at:

Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China