RF Exposure Compliance Requirement

Model no.: SEA240/48I-U-HW, SEA240/40I-U-6W, SEA240/40I-U-14W

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/cm²)	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/cm²)	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=42.62dB 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/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
13.56	1	-52.58	0.00000552	0.0000000011	0.98	Complies

MPE ratio:

0.0000000011(mW/cm2)/0.98(mW/cm2) = 0.00000000112

WIFI:

Peak Output Power = 23.72dBm(max.value declared by client), antenna gain = 3.74dBi

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
2412-2462	2.37	24.00	251.19	0.1182	1	Complies

MPE ratio:

0.1182 (mW/cm²)/1(mW/cm²) = 0.1182

BLE:

Peak Output Power = 1.59dBm(max.value declared by client), antenna gain = 3.74dBi

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
2402-2480	2.37	2.00	1.58	0.0007	1	Complies

MPE ratio:

0.0007 (mW/cm^2)/1(mW/cm^2) = 0.0007

BT:

Peak Output Power = 5.05dBm(max.value declared by client), antenna gain = 3.74dBi

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
2402-2480	2.37	5.50	3.55	0.0017	1	Complies

MPE ratio:

0.0017 (mW/cm^2)/1(mW/cm^2) = 0.0017

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:

0.00000000112+0.1182=0.11820000112<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