RF Exposure Compliance Requirement

Model no.: PUCK4

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

Bluetooth:

Peak Output Power = 0.83mW(max.value declared by client), antenna gain = 4dBi

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
2402-2480	2.51	0.83	0.00042	1	Complies

MPE ratio:

0.00042 (mW/cm^2)/1(mW/cm^2) = 0.00042

900MHz:

Field Strength of Fundamental is 91.9 dBuV/m @ 3m, antenna gain = 0.97dBi

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
915.85-927.10	1.25	0.47	0.00012	0.611	Complies

MPE ratio:

0.00012(mW/cm^2)/0.611(mW/cm^2) = 0.00019

NFC 13.56MHz:

Field Strength of Fundamental is 42.1 dBuV/m @ 3m, antenna gain = 0.97dBi

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
13.56	1.25	0.47	0.000005	0.979	Complies

MPE ratio:

0.000005 (mW/cm2)/ 0.979 (mW/cm2) = 0.000005

The EUT is composite device with NFC, 900M, Bluetooth and WPT function, NFC function MPE ratio is 0.000005, 900M function MPE ratio is 0.00019, Bluetooth function MPE ratio is 0.00042, WPT function MPE ratio is 0.15337

the test data please refer to FCC ID: 2AUTH-PUCK4, 240112077GZU-005 report.

Sum of the MPE ratio for all simultaneously transmitting antennas:

0.00042+0.00019+0.000005+0.15337= 0.153985 < 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