RF Exposure Evaluation

According to KDB 447498 D01 General RF Exposure Guidance v06 and part 2.1091，Unless specifically required by the *published RF exposure KDB procedures*, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding *SAR Test Exclusion Threshold* condition(s), listed below, is (are) satisfied.

Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

Friis transmission formula: **Pd = (Pout*G)/(4*pi*r^2)**

Where

Pd = power density in mW/cm^2, **Pout** = output power to antenna in mW;

G = gain of antenna in linear scale, **Pi** = 3.1416;

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

Test Result of RF Exposure Evaluation

Bluetooth

Channel	Output power to antenna (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
8DPSK-2480	1.02	1.58	0.0003	1.0	PASS

Remark: antenna gain=-0.58dBi

So a SAR test is not required

Product Name:	Screen Light
Product Model No.:	SY-037 SY-001, SY-002, SY-003, SY-004, SY-005, SY-006, SY-007, SY-008, SY-009, SY-010, SY-011, SY-012, SY-013, SY-014, SY-015, SY-016, SY-017, SY-018, SY-019, SY-020, SY-021, SY-022, SY-023, SY-024, SY-025, SY-026, SY-027, SY-028, SY-029, SY-030, SY-031, SY-032, SY-033, SY-034, SY-035, SY-036, SY-038, SY-039, SY-040, SY-041, SY-042, SY-043, SY-044, SY-045, SY-046, SY-047, SY-048, SY-049, SY-050, SY-051, SY-052, SY-053, SY-054, SY-055, SY-056, SY-057, SY-058, SY-059, SY-060, SY-061, SY-062, SY-063, SY-064, SY-065, SY-066, SY-067, SY-068
Model Difference:	All the model are of the same circuit and RF module, and only the Model name are different, all tests are based on SY-037.
Test Auxiliary:	AC Adapter, Smart watch, Smartphone, Smart headphone
Transmitting mode:	Keep the EUT in continuously wireless charging mode
Power supply:	Input : 5V⎓2A, 9V⎓2A, 12V⎓1.5A Output: Wireless charging port 1: 5W Wireless charging port 2: 10W Wireless charging port 3: 15W

Test Modes:	
Mode 1	Wireless charging mode(1%)
Mode 2	Wireless charging mode(50%)
Mode 3	Wireless charging mode(99%)
Note: All modes were tested, only the worst-case was recorded in the report. Mode 1 is the worst mode.	

RF Exposure Evaluation

1 Measuring Standard

KDB 680106 RF Exposure Wireless Charging Apps v03r01

2 Requirements

According to the item 5 of KDB 680106 v03r01:

Inductive wireless power transfer applications that meet all of the following requirements are excluded from submitting an RF exposure evaluation.

(1) Power transfer frequency is less than 1MHz.

The EUT frequency range is: 115kHz- 205kHz.

(2) Output power from each primary coil is less than or equal to 15 watts.

The output power is less than 15W.

(3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.

EUT has only one coil.

(4) Client device is placed directly in contact with the transmitter.

EUT can be directly charged.

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).

EUT is a mobile device

(6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

Fulfil requirements.

Remark: Meet all the above requirements.

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Remark: Meet all the above requirements.

Note:Wireless load is a device containing rechargeable batteries or resistive loads, connected via charge control circuit that receives power from a source via a coupling antenna. This device supports up to 15W of wireless charging load.

Limits

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300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) Limits for General Population/Uncontrolled Exposure				
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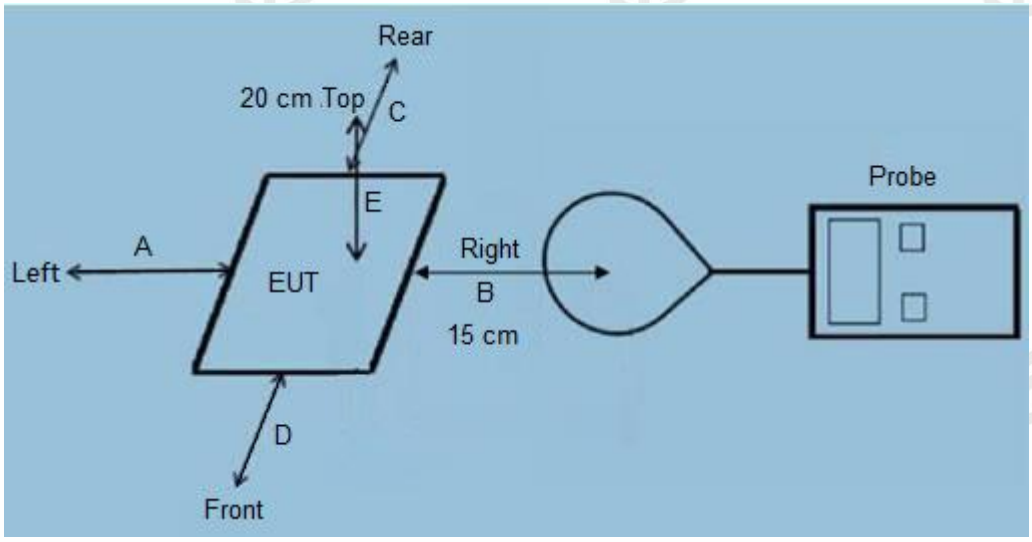
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

3 Test Setup



4 Test Procedure

1) The RF exposure test was performed in anechoic chamber.

2) The measurement probe was placed at test distance (15 cm from all sides and 20 cm from the top) which is between the edge of the charger and the geometric center of probe.

3) The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E) were completed.

4) The EUT was measured according to the dictates of KDB 680106 v03r01.

Remark：The EUT's test position A, B, C, D and E is valid for the E and H field measurements.

5 Test Instruments list

Test Equipment	Manufacturer	Model No.	SN.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
Exposure Level Tester	Narda	ELT-400	N-0231	May 12, 2023	May 11, 2024
Magnetic field probe 100cm^2	Narda	ELT probe 100cm^2	M0675	May 12, 2023	May 11, 2024
Isotropic Electric field probe	Narda	EP-601	611WX70332	May 12, 2023	May 11, 2024

6 Test Result

We have evaluated 1%, 50% and 99% battery charging mode, and the worst mode (1%) is showed in this report.

E-Filed Strength at 15 cm from the edges surrounding the EUT (V/m)

Frequency Range (MHz)	Test Position A	Test Position B	Test Position C	Test Position D	Limits (V/m)
0.110-0.205	0.60	0.56	0.53	0.51	614

E-Filed Strength at 20 cm from the top of the EUT (V/m)

Frequency Range (MHz)	Test Position E	Limits (V/m)
0.110-0.205	0.68	614

H-Filed Strength at 15 cm from the edges surrounding the EUT (A/m)

Frequency Range (MHz)	Test Position A	Test Position B	Test Position C	Test Position D	Limits (A/m)
0.110-0.205	0.15	0.17	0.11	0.15	1.63

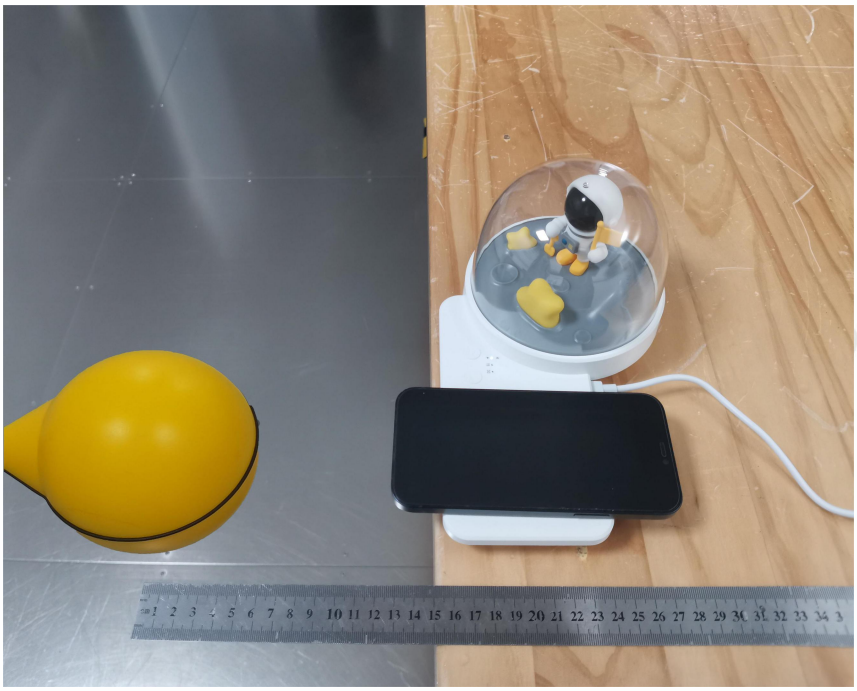
H-Filed Strength at 20 cm from the top of the EUT (A/m)

Frequency Range (MHz)	Test Position E	Limits (A/m)
0.110-0.205	0.13	1.63

7 Test photo

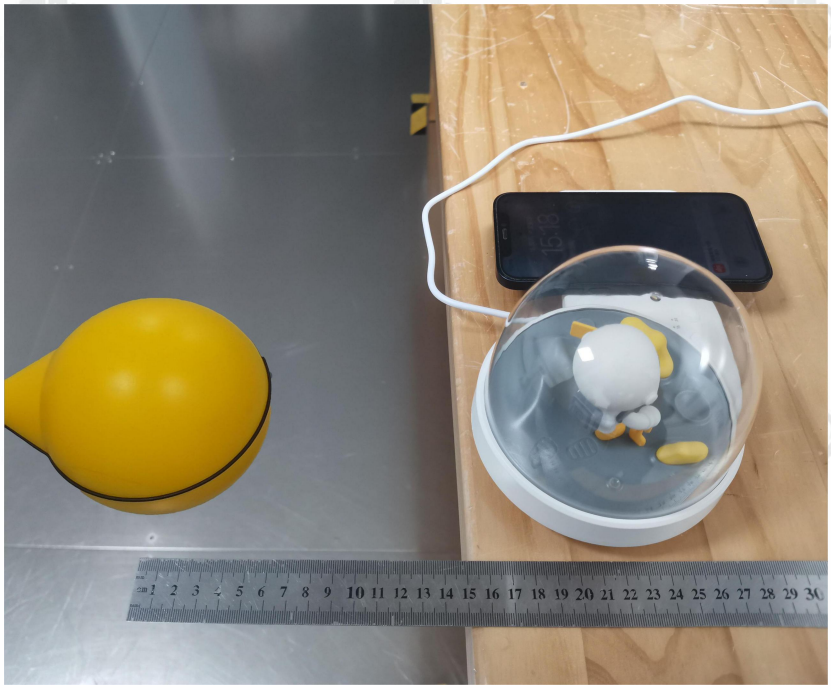
Position A

Position B



Position C

Position D



Position E