

RF Exposure Evaluation

FCC ID: 2ASCK-BSCS5

1. Client Information

Applicant	:	Dongguan Green Power One Co.,Ltd
Address	:	No.26, Hongyun Street, Qingxi Town, Dongguan City, Guangdong province, China
Manufacturer	:	Dongguan Green Power One Co.,Ltd
Address	:	No.26, Hongyun Street, Qingxi Town, Dongguan City, Guangdong province, China

2. General Description of EUT

EUT Name	:	BSCS5
Models No.	:	BSCS5, GW09
Sample ID	:	20200831-11_1-01
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name for commercial.
Product Description	:	Operation Frequency: 110KHz-205KHz
	:	Modulation Type: ASK
	:	Antenna: Coil Antenna
Power Supply	:	Input: DC 5V, 2A or DC 9V, 2A Wireless Output: 12.5W Max
Software Version	:	GJX202003
Hardware Version	:	GJX802V3
Connecting I/O Port(S)	:	Please refer to the User's Manual

Note: More test information about the EUT please refer the RF Test Report.

RF Exposure Considerations

1. Measuring Standard

KDB 680106 D01 RF Exposure Wireless Charging App v03.

2. Requirements

According to the item 5.2 of KDB 680106 D01v03:

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

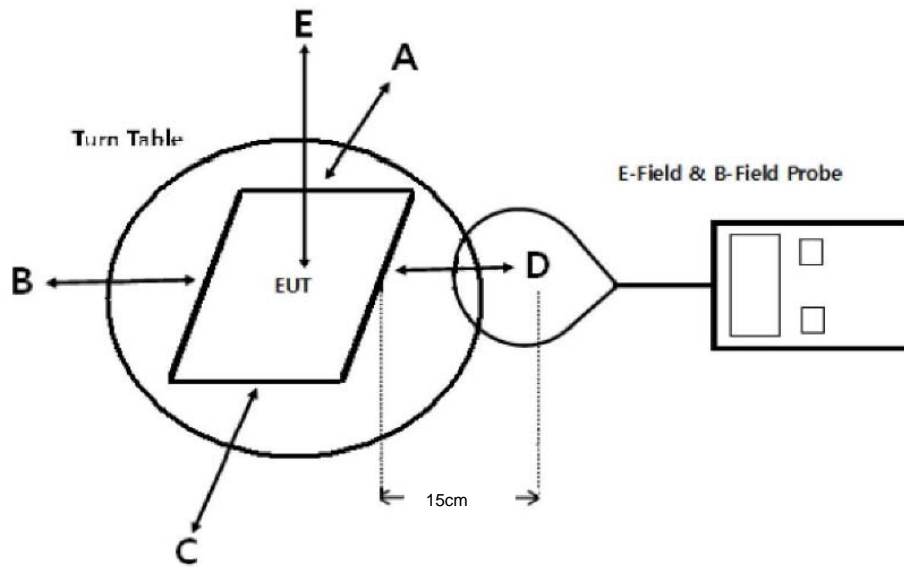
- (1) Power transfer frequency is less than 1 MHz.
- (2) Output power from each primary coil is less than or equal to 15 watts.
- (3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.
- (4) Client device is placed directly in contact with the transmitter.
- (5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
- (6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.

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
 *=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



Note: The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface.

4. Test Procedure

- 1) The RF exposure test was performed in anechoic chamber.
- 2) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface.
- 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 D01 v03.

Remark:

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

5. Test Equipment List

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Magnetic field meter	NARDA	ELT-400	EE030	Sep. 11, 2020	Sep. 10, 2021

5.4 Deviation From Test Standard

No deviation

6. Mode of operation during the test / Test peripherals used

Test Modes:		
TM1	AC/DC Adapter (9V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <1%)	Record
TM2	AC/DC Adapter (9V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <50%)	Pre-tested
TM3	AC/DC Adapter (9V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <99%)	Pre-tested
TM4	AC/DC Adapter (9V/2A) + EUT + Mobile Phone (Battery Status: <1%)	Pre-tested
TM5	AC/DC Adapter (9V/2A) + EUT + Mobile Phone (Battery Status: <50%)	Pre-tested
TM6	AC/DC Adapter (9V/2A) + EUT + Mobile Phone (Battery Status: <99%)	Pre-tested
TM7	AC/DC Adapter (9V/2A) + EUT + Watch (Battery Status: <1%)	Pre-tested
TM8	AC/DC Adapter (9V/2A) + EUT + Watch (Battery Status: <50%)	Pre-tested
TM9	AC/DC Adapter (9V/2A) + EUT + Watch (Battery Status: <99%)	Pre-tested
TM10	AC/DC Adapter (5V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <1%)	Pre-tested
TM11	AC/DC Adapter (5V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <50%)	Pre-tested
TM12	AC/DC Adapter (5V/2A) + EUT + Mobile Phone +Watch) (Battery Status: <99%)	Pre-tested
TM13	AC/DC Adapter (5V/2A) + EUT + Mobile Phone (Battery Status: <1%)	Pre-tested
TM14	AC/DC Adapter (5V/2A) + EUT + Mobile Phone (Battery Status: <50%)	Pre-tested
TM15	AC/DC Adapter (5V/2A) + EUT + Mobile Phone (Battery Status: <99%)	Pre-tested
TM16	AC/DC Adapter (5V/2A) + EUT + Watch (Battery Status: <1%)	Pre-tested
TM17	AC/DC Adapter (5V/2A) + EUT + Watch (Battery Status: <50%)	Pre-tested
TM18	AC/DC Adapter (5V/2A) + EUT + Watch (Battery Status: <99%)	Pre-tested

Note: All test modes were pre-tested, but we only recorded the worst case in this report.

7. Test Result

E-Filed Strength at 15 cm from the edges surrounding the EUT and 15 cm above the top surface

Charge Port	Charging Battery Level	Frequency Range (MHz)	Measured E-Field Strength Values (V/m)					FCC E-Field Strength 50% Limits (V/m)	FCC E-Field Strength Limits (V/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
E1	1%	0.113	47.050	48.859	46.446	50.367	47.351	307.0	614.0
	50%	0.113	43.129	47.351	45.843	47.653	44.938	307.0	614.0
	99%	0.113	40.414	38.906	39.510	41.018	41.319	307.0	614.0
E2	1%	0.113	42.827	44.335	43.430	41.922	44.034	307.0	614.0
	50%	0.113	36.494	37.097	35.890	38.303	37.398	307.0	614.0
	99%	0.113	31.970	30.763	32.271	33.478	33.779	307.0	614.0

Note: V/m= A/m *377

H-Filed Strength at 15 cm from the edges surrounding the EUT and 15 cm above the top surface

Charge Port	Charging Battery Level	unit	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)					FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
				Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
H ₁	1%	uT	0.113	0.156	0.162	0.154	0.167	0.157	--	--
	1%	A/m	0.113	0.1248	0.1296	0.1232	0.1336	0.1256	0.815	1.63
	50%	uT	0.113	0.143	0.157	0.152	0.158	0.149	--	--
	50%	A/m	0.113	0.1144	0.1256	0.1216	0.1264	0.1192	0.815	1.63
	99%	uT	0.113	0.134	0.129	0.131	0.136	0.137	--	--
	99%	A/m	0.113	0.1072	0.1032	0.1048	0.1088	0.1096	0.815	1.63
H ₂	1%	uT	0.113	0.142	0.147	0.144	0.139	0.146	--	--
	1%	A/m	0.113	0.1136	0.1176	0.1152	0.1112	0.1168	0.815	1.63
	50%	uT	0.113	0.121	0.123	0.119	0.127	0.124	--	--
	50%	A/m	0.113	0.0968	0.0984	0.0952	0.1016	0.0992	0.815	1.63
	99%	uT	0.113	0.106	0.102	0.107	0.111	0.112	--	--
	99%	A/m	0.113	0.0848	0.0816	0.0856	0.0888	0.0896	0.815	1.63

H-Field Strength at 20cm from the top surface of the EUT

Charge Port	Charging Battery Level	Unit	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)	FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
				Test Position E		
H ₁	1%	uT	0.113	0.152	--	--
	1%	A/m	0.113	0.1216	0.815	1.63
	50%	uT	0.113	0.131	--	--
	50%	A/m	0.113	0.1048	0.815	1.63
	99%	uT	0.113	0.113	--	--
	99%	A/m	0.113	0.0904	0.815	1.63
H ₂	1%	uT	0.113	0.124	--	--
	1%	A/m	0.113	0.0992	0.815	1.63
	50%	uT	0.113	0.116	--	--
	50%	A/m	0.113	0.0928	0.815	1.63
	99%	uT	0.113	0.105	--	--
	99%	A/m	0.113	0.084	0.815	1.63

Note: A/m=uT/1.25

For Simultaneous E-Filed Strength and H-Filed Strength

KDB 447498 points for simultaneous transmission on far-filed measurement, while for below 30 MHz usually measured at near-filed. KDB680106 require aggregate leakage fields at 15 cm surrounding the device from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit;

KDB680106 can accept using field strength, power density, SAR measurements or computational modeling etc., the specific authorization requirements will be determined based on the results of the RF exposure evaluation.

Test labs suggest use Computational modelling to calculate Nerve Stimulation BRs; Computational modelling, such as finite-difference time-domain (FDTD) may be used to demonstrate compliance with FCC § 1.1310 limits requirement,

Basic Calculations - The following calculations may be used to evaluate systems without consideration for the effects of phase resulting from multiple frequency and/or multiple antennas co-located in the measurement space, which may overestimate the actual result. If the result exceeds the limits, the advanced calculations described in follows may be used.

$$E_{AVE} = \frac{1}{N} \sum_{i=1}^N (E_{MaxRMS})_i$$

Where:

E-field measurements

E_{AVG} = Spatial average

E_{MaxRMS} = E-field at a measurement point

N = Number of spatially averaged points

And

$$H_{AVE} = \frac{1}{N} \sum_{i=1}^N (H_{MaxRMS})_i$$

Where:

H-field levels of magnetic field strength

H_{AVG} = Spatial average

H_{MaxRMS} = H-field at a measurement point

N = Number of spatially averaged points

E-Filed Strength at 15 cm from the edges surrounding the EUT and 15 cm above the top surface

Spatial Average	Charging Battery Level	Frequency Range (MHz)	Measured E-Field Strength Values (V/m)					FCC E-Field Strength 50% Limits (V/m)	FCC E-Field Strength Limits (V/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
E _{AVG}	1%	0.113	44.939	46.597	44.938	46.145	45.693	307.0	614.0
	50%	0.113	39.812	42.224	40.867	42.978	41.168	307.0	614.0
	99%	0.113	36.192	34.835	35.891	37.248	37.549	307.0	614.0

H-Filed Strength at 15 cm from the edges surrounding the EUT and 15 cm above the top surface

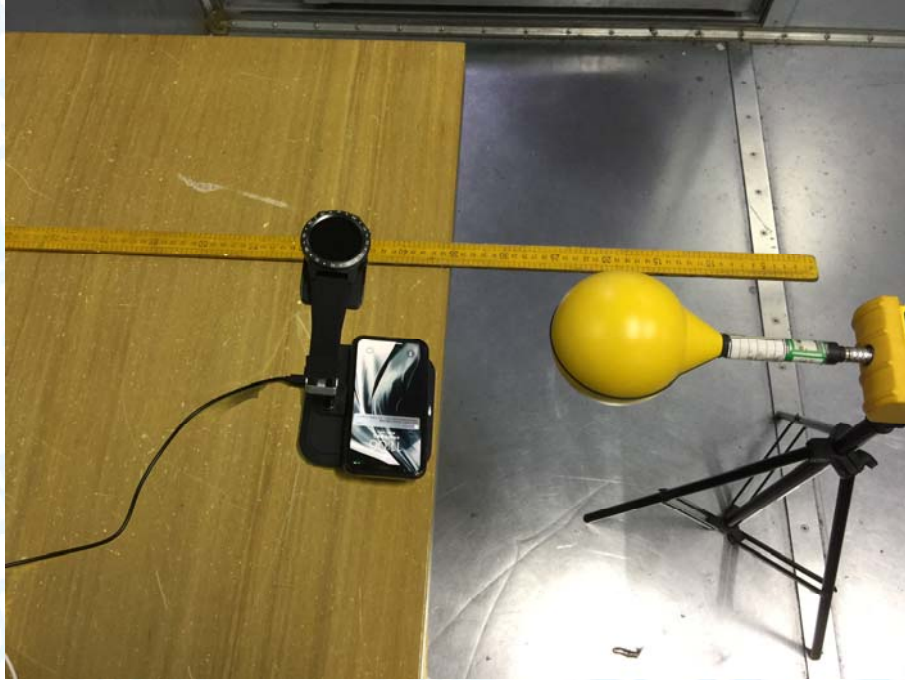
Spatial Average	Charging Battery Level	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)					FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
			Test Position A	Test Position B	Test Position C	Test Position D	Test Position E		
H _{AVG}	1%	0.113	0.1192	0.1236	0.1192	0.1224	0.1212	0.815	1.63
	50%	0.113	0.1056	0.112	0.1084	0.114	0.1092	0.815	1.63
	99%	0.113	0.096	0.0924	0.0952	0.0988	0.0996	0.815	1.63

H-Field Strength at 20cm from the top surface of the EUT

Charge Port	Charging Battery Level	Frequency Range (MHz)	Measured H-Field Strength Values (A/m)	FCC H-Field Strength 50% Limits (A/m)	FCC H-Field Strength Limits (A/m)
			Test Position E		
H _{AVG}	1%	0.113	0.1104	0.815	1.63
	50%	0.113	0.0988	0.815	1.63
	99%	0.113	0.0872	0.815	1.63

8. Test Set-up Photo

Test Set-up Photo



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