

**KES Co., Ltd.**

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Report No.:

KES-EM-22T0792-R1

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EMC TEST REPORT

Test Report No. : KES-EM-22T0792-R1
Date of Issue : Sep. 30, 2022
Product name : SMART INSOLE
Model/Type No. : ST-BTIN003R
Variant Model : -
Applicant : Salted Co., Ltd.
Applicant Address : 6F, 603, Eonju-ro, Gangnam-gu, Seoul, Republic of Korea
Manufacturer : Salted Co., Ltd.
Manufacturer Address : 6F, 603, Eonju-ro, Gangnam-gu, Seoul, Republic of Korea
FCC ID : 2AL6N-ST-BTIN003R
Date of Receipt : Jul. 27, 2022
Test date : Sep. 07, 2022 ~ Sep. 29, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by

Dong-Hun, Jang
EMC Technical Manager

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Sep. 21, 2022	KES-EM-22T0792	Issued
Sep. 30, 2022	KES-EM-22T0792-R1	Re-issuance of EMC TEST REPORT due to retest (Radiated Electric Field emissions (Above 1 GHz))

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1.0 General Product Description

Main Specifications of EUT are:

Division	Characteristic	
Communication method	Bluetooth	(2 402 ~ 2 480) MHz
Power	Charge : Wireless Charge Operating : DC 3.7 V (Battery)	
Size	(250 x 88 x 24) mm	
Weight	127 g	
Components	EUT x 1 EA	

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1.1 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

☒ AC 120 V, 60 Hz

1.2 Variant Model Differences

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
SMART INSOLE	ST-BTIN003R	-	Salted Co., Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adapter	ETA-U90KWK	-	RFTech Bac Ninh Co.,Ltd	-
Wireless Charger for SMART INSOLE	ST-WPAD001	-	Salted Co., Ltd.	-
SmartPhone	SM-G955	-	Samsung Elctronics Co., Ltd	-

1.6 External I/O Cabling

■ Wireless Charge Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
SMART INSOLE (EUT)	Wireless Area	Wireless Charger for SMART INSOLE	Wireless Area	-	-
Wireless Charger for SMART INSOLE	USB C Type	Adapter	USB	0.5	U

* Unshielded = U, Shielded = S

■ Operating Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
SMART INSOLE (EUT)	Wireless	SmartPhone	Wireless	-	-

* Unshielded = U, Shielded = S

1.7 EUT Operating Mode(s)

Test mode	operating
Wireless Charge Mode	EUT were placed on Wireless Charger for SMART INSOLE and tested in the maximum operating state.
Operating	Connect EUT and Smartphone wirelessly. The normal operation state was confirmed through the application of Smartphone.

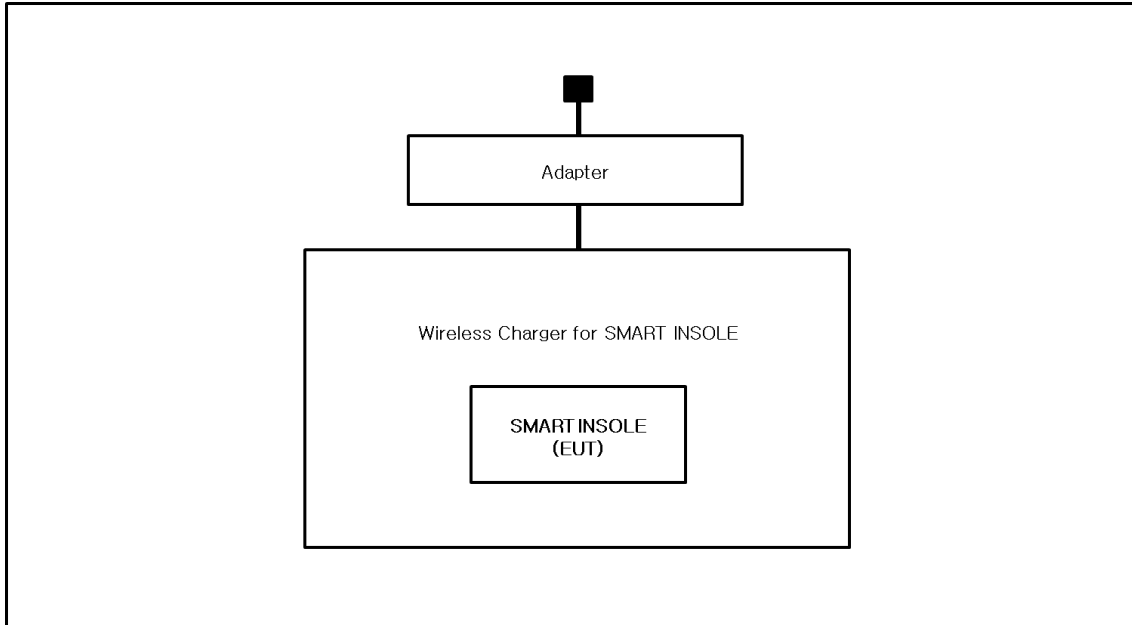
EUT Test operating S/W		
Name	Version	Manufacture Company
SALTED GOLF	3.00.39	Salted Co., Ltd.

1.8 Configuration

■ AC Main

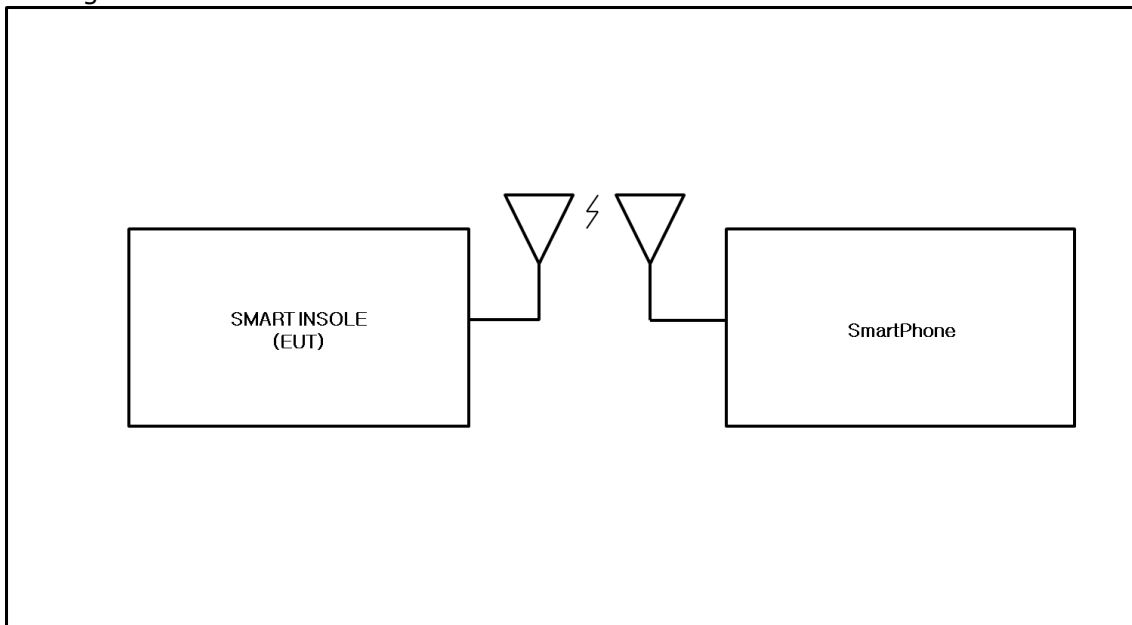
□ DC Main

■ Wireless Charge Mode



EUT - Wireless Charger for SMART INSOLE : 200 kHz Band

■ Operating Mode



EUT - SmartPhone : Bluetooth 2.4 GHz Band

1.9 Remarks when standards applied

N/A

1.10 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

1.11 Test Facility

The measurement facility is located at 473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, 12658, Korea, Republic of. The sites are constructed in conformance with the requirements of ANSI C63.4a-2017 and CISPR 16-1-4:2019

1.12 Measurement Procedure

- Conducted Emissions

The conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

- Radiated Electric Field Emissions

The test was done at a SEMI ANECHOIC CHAMBER with quasi-peak detector. The final test data was measured using a Quasi-Peak detector below 1 GHz at 10 m or 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Test was proceeded worst case test mode and cable configuration. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Measurement procedures was In accordance with ANSI C63.4a:2017 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

1.13 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	RRA	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KR0100
International	KOLAS	EMI (3 m & 10 m Semi-Anechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 KT489
USA	FCC	3 m & 10 m Semi-Anechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	 KR0100
Canada	ISED	3 m & 10 m Semi-Anechoic Chamber and Conducted test site	 23298
JAPAN	VCCI	Mains Ports Conducted Interference Measurement, Telecommunication Ports Conducted Disturbance Measurement and Radiation 10 meter site, Facility for measuring radiated disturbance above 1 GHz	 R-20056, C-20036, T-20040, G-20057
Europe	TÜV SÜD	EMI (3 m & 10 m Semi-Anechoic Chamber , 10 m Open Area and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 CARAT 001633 0004



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2.0 Test Regulations

The emissions tests were performed according to following regulations:

☒ **47 CFR Part 15, Subpart B**

☐ CISPR 22:2009 +A1:2010

☐ Class A

☐ Class B

☒ ANSI C63.4a-2017

☐ Class A

☒ Class B

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Sep. 08, 2022

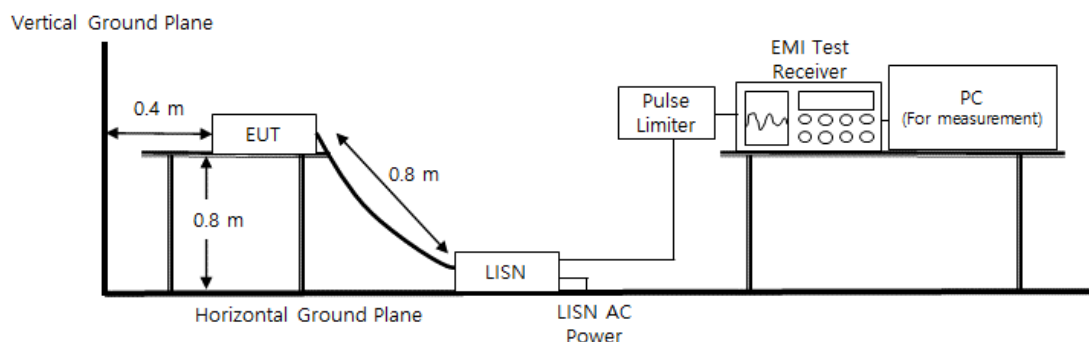
Test Location

Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EMC32	R & S	9.12.00	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022
☒	LISN	ENV216	R & S	101787	12, 27, 2022
☐	LISN	ESH2-Z5	R & S	100450	12, 27, 2022
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022

Diagram of test setup





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Test Conditions

Temperature: (23,5 ± 0,1) °C

Relative Humidity: (45,8 ± 0,0) % R.H.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

- ☒ PASS
- ☐ NOT PASS
- ☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

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2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

Sep. 07, 2022

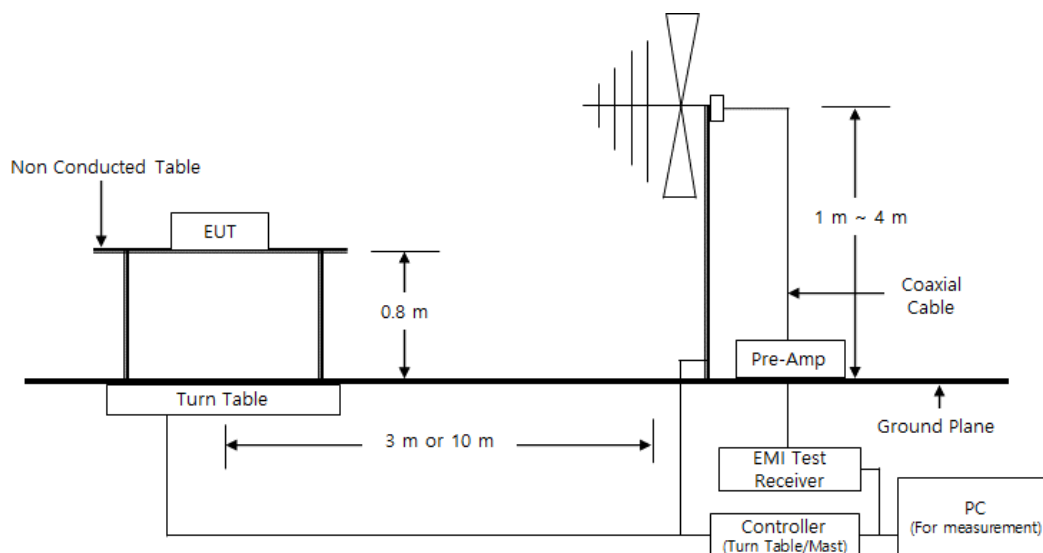
Test Location

SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	03, 31, 2023
☒	AMPLIFIER	SCU 01	R & S	100603	11, 22, 2022
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
☒	ATTENUATOR	8491A	HP	32173	03, 08, 2023

Diagram of test setup





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Test Conditions

Temperature: (23,8 ± 0,1) °C

Relative Humidity: (46,9 ± 0,1) % R.H.

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

- ☒ PASS
- ☐ NOT PASS
- ☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

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2.3 Radiated Electric Field Emissions(Above 1 GHz)

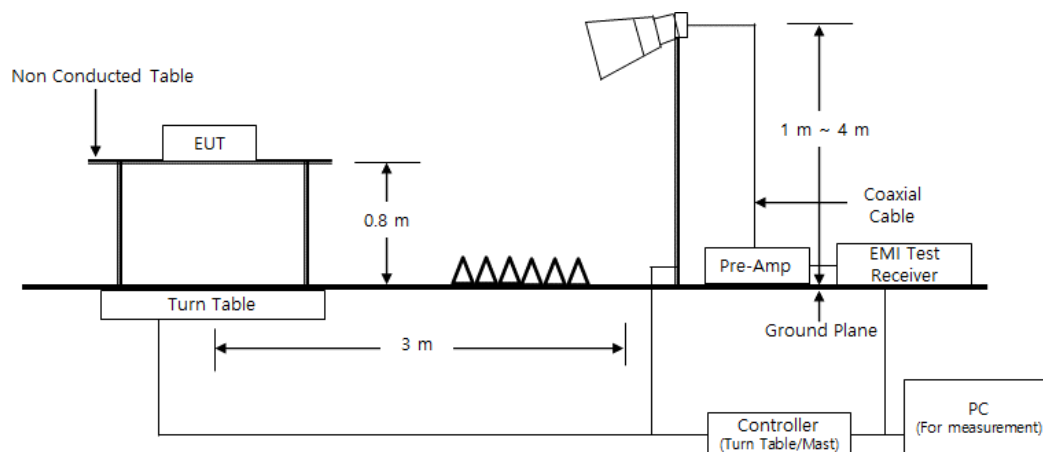
Test Date
 Sep. 29, 2022

Test Location
 SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	03, 31, 2023
☒	PREAMPLIFIER	8449B	AGILENT	3008A01742	12, 27, 2022
☐	ATTENUATOR	8491A	HP	35496	03, 08, 2023
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022

Diagram of test setup



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Test Conditions

Temperature: (23,1 ± 0,1) °C

Relative Humidity: (49,9 ± 0,0) % R.H.

Frequency Range of Measurement

1 GHz to 5 GHz

Instrument Settings

IF Band Width: 1 MHz

Test Results

The requirements are:

- ☒ PASS
- ☐ NOT PASS
- ☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

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APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

■ Wireless Charge Mode

HOT LINE

Common Information

Test Description:

Conducted Emission

Model No.:

ST-BTIN003R

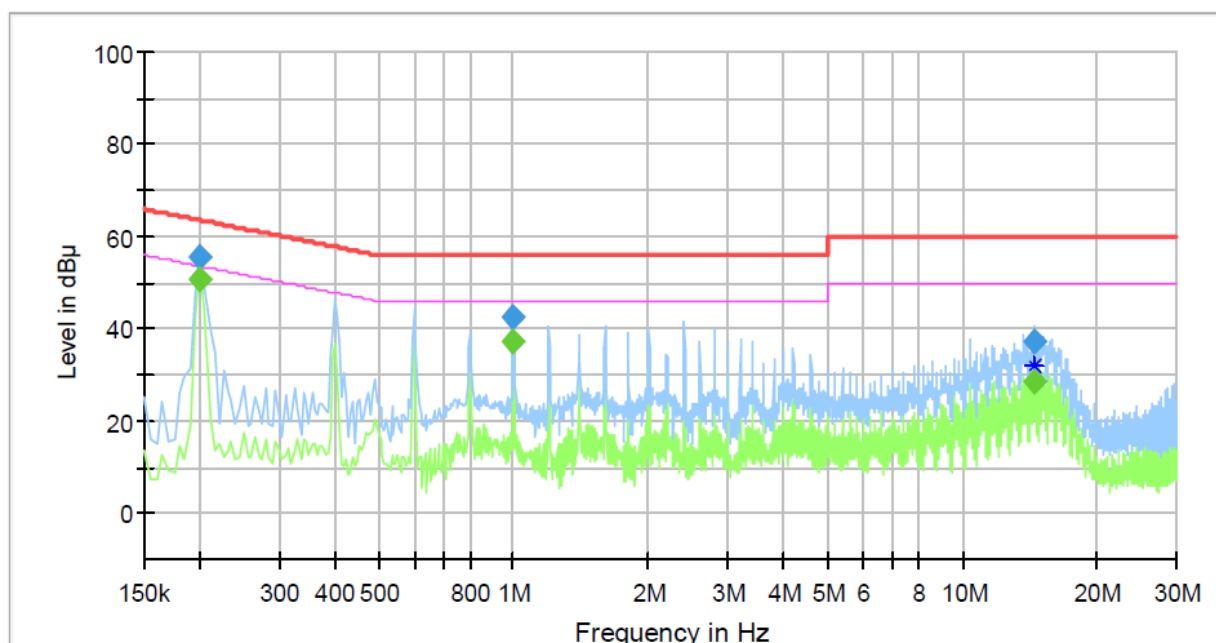
Phase:

Mode:

Wireless Charge

Operator Name:

KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.200000	---	50.83	53.61	2.78	1000.0	9.000	L1	19.4
0.200000	55.61	---	63.61	8.00	1000.0	9.000	L1	19.4
1.000000	---	37.27	46.00	8.73	1000.0	9.000	L1	20.0
1.000000	42.60	---	56.00	13.40	1000.0	9.000	L1	20.0
14.400000	---	28.75	50.00	21.25	1000.0	9.000	L1	19.9
14.400000	37.26	---	60.00	22.74	1000.0	9.000	L1	19.9

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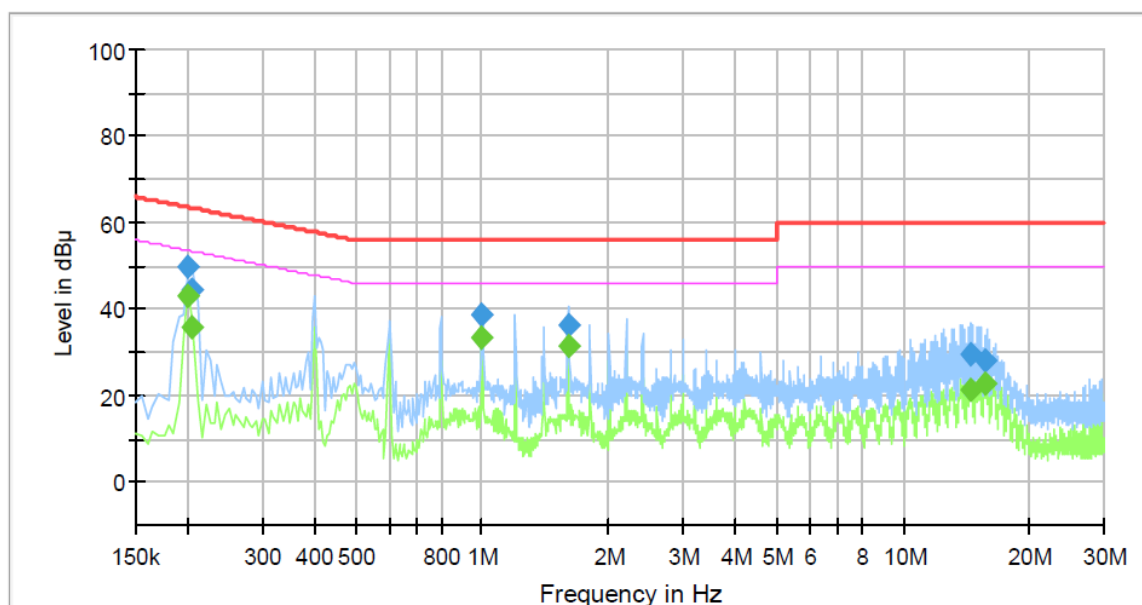
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NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	ST-BTIN003R
Phase:	
Mode:	Wireless Charge
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.200000	---	43.17	53.61	10.44	1000.0	9.000	N	19.4
0.200000	49.70	---	63.61	13.91	1000.0	9.000	N	19.4
0.205000	---	35.82	53.41	17.59	1000.0	9.000	N	19.4
0.205000	44.37	---	63.41	19.04	1000.0	9.000	N	19.4
1.000000	---	33.51	46.00	12.49	1000.0	9.000	N	20.0
1.000000	38.82	---	56.00	17.18	1000.0	9.000	N	20.0
1.600000	---	31.29	46.00	14.71	1000.0	9.000	N	20.2
1.600000	36.41	---	56.00	19.59	1000.0	9.000	N	20.2
14.490000	---	21.48	50.00	28.52	1000.0	9.000	N	19.9
14.490000	29.46	---	60.00	30.54	1000.0	9.000	N	19.9
15.730000	---	22.68	50.00	27.32	1000.0	9.000	N	19.9
15.730000	27.92	---	60.00	32.08	1000.0	9.000	N	19.9

◆ Calculation

QuasiPeak [dBuV] / CAverage [dBuV] = Reading Value [dBuV] + Corr. [dB]

QuasiPeak / Caverage : The Final Value

Reading Value : Not shown in the table.

Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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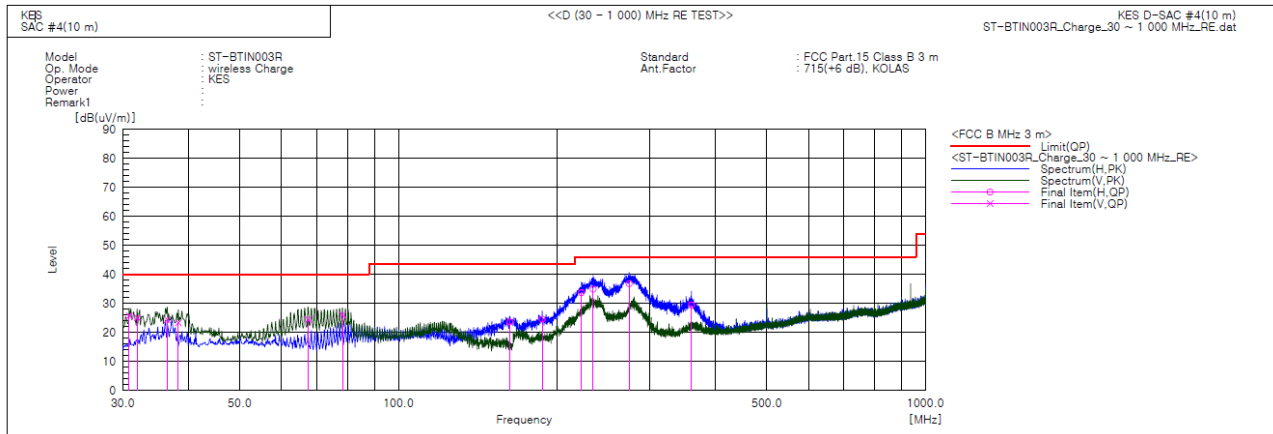
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Radiated Electric Field Emissions(Below 1 GHz)

■ Wireless Charge Mode



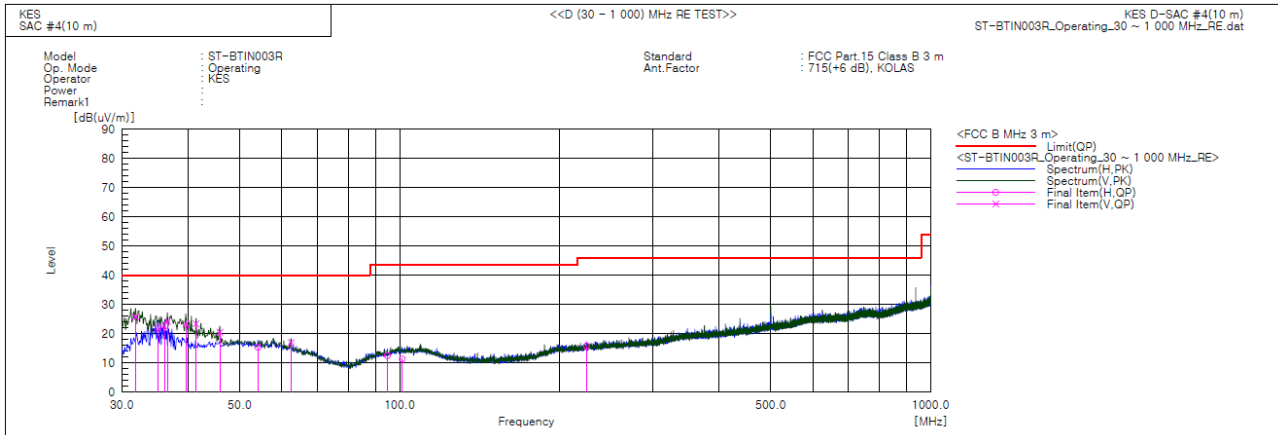
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	30.849	V	51.1	-25.3	25.8	40.0	14.2	100.0	208.0	
2	31.940	V	50.2	-25.1	25.1	40.0	14.9	123.0	208.0	
3	36.426	V	48.9	-24.5	24.4	40.0	15.6	100.0	215.0	
4	38.245	V	46.9	-23.6	23.3	40.0	16.7	132.0	189.0	
5	67.466	V	48.8	-24.3	24.5	40.0	15.5	145.0	278.0	
6	78.379	V	54.0	-27.9	26.1	40.0	13.9	159.0	86.0	
7	162.769	H	48.7	-25.1	23.6	43.5	19.9	400.0	5.0	
8	187.504	H	47.7	-23.1	24.6	43.5	18.9	299.0	26.0	
9	222.424	H	54.6	-20.9	33.7	46.0	12.3	346.0	27.0	
10	234.185	H	55.3	-20.5	34.8	46.0	11.2	350.0	23.0	
11	273.955	H	56.2	-19.5	36.7	46.0	9.3	100.0	12.0	
12	359.558	H	45.3	-15.9	29.4	46.0	16.6	400.0	335.0	

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Operating Mode



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	31.819	V	50.9	-25.1	25.8	40.0	14.2	100.0	197.0	
2	35.093	H	46.8	-24.8	22.0	40.0	18.0	400.0	29.0	
3	36.184	H	47.3	-24.6	22.7	40.0	17.3	400.0	26.0	
4	36.548	V	48.6	-24.4	24.2	40.0	15.8	100.0	275.0	
5	39.579	V	46.2	-22.9	23.3	40.0	16.7	127.0	26.0	
6	41.398	V	45.6	-22.2	23.4	40.0	16.6	100.0	26.0	
7	45.884	V	42.0	-21.5	20.5	40.0	19.5	132.0	201.0	
8	54.129	H	36.9	-21.5	15.4	40.0	24.6	326.0	126.0	
9	62.495	V	39.8	-22.8	17.0	40.0	23.0	159.0	81.0	
10	94.869	H	36.3	-23.8	12.5	43.5	31.0	330.0	108.0	
11	101.174	H	34.1	-22.8	11.3	43.5	32.2	370.0	253.0	
12	225.091	H	36.6	-20.8	15.8	46.0	30.2	400.0	201.0	

* Operation Mode Orientation Worst Case : X

◆ Calculation – SAC #4(10 m)

Result(QP) [dB(μV/m)] = (Reading(QP)[dB(μV)] + c.f[dB(1/m)])

Margin(QP)[dB] = Limit[dB(μV/m)] – Result(QP) [dB(μV/m)]

Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss + ATT Factor - Preamp Factor), Margin:

Margin value



KES Co., Ltd.

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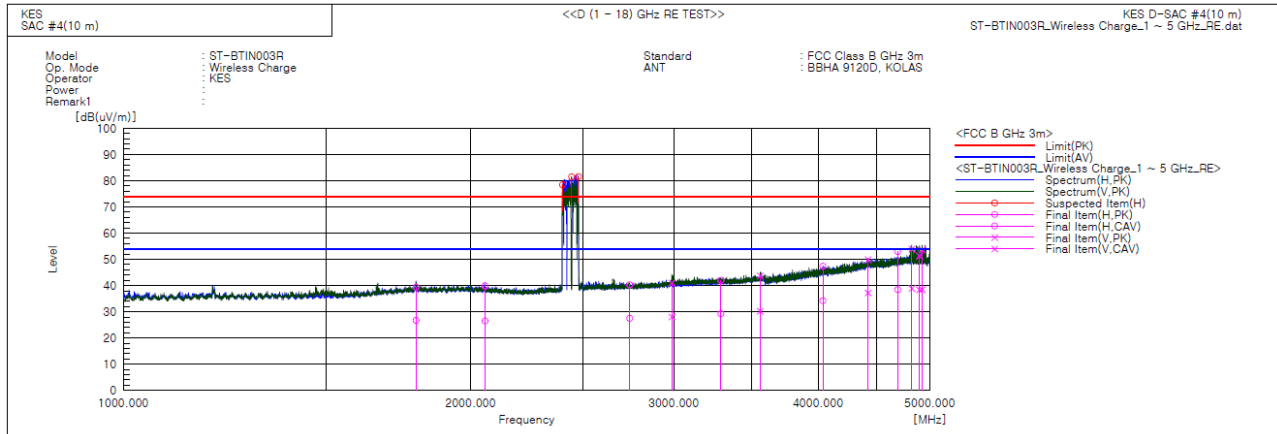
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Radiated Electric Field Emissions(Above 1 GHz)

■ Wireless Charge Mode



Final Result

No.	Frequency	(P)	Reading	Reading	c.f	Result	Result	Limit	Limit	Margin	Margin	Height	Angle	Remark
	[MHz]		PK	CAV		PK	CAV	PK	AV	PK	CAV	[cm]	[deg]	
			[dB(uV)]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[dB]			
1	2988.125	V	37.7	24.8	3.3	41.0	28.1	74.0	54.0	33.0	25.9	100.0	304.0	
2	3564.339	V	37.4	23.9	6.3	43.7	30.2	74.0	54.0	30.3	23.8	122.0	205.0	
3	4419.935	V	36.6	23.9	13.3	49.9	37.2	74.0	54.0	24.1	16.8	139.0	315.0	
4	4824.356	V	38.4	23.4	15.5	53.9	38.9	74.0	54.0	20.1	15.1	105.0	181.0	
5	4897.766	V	35.7	22.8	15.6	51.3	38.4	74.0	54.0	22.7	15.6	100.0	331.0	
6	4925.332	V	38.0	22.8	15.7	53.7	38.5	74.0	54.0	20.3	15.5	100.0	185.0	
7	1793.429	H	40.0	27.3	-0.6	39.4	26.7	74.0	54.0	34.6	27.3	400.0	260.0	
8	2057.865	H	40.1	26.7	-0.2	39.9	26.5	74.0	54.0	34.1	27.5	400.0	5.0	
9	2747.122	H	38.2	25.4	2.1	40.3	27.5	74.0	54.0	33.7	26.5	374.0	19.0	
10	3295.250	H	37.4	24.7	4.6	42.0	29.3	74.0	54.0	32.0	24.7	340.0	171.0	
11	4038.936	H	37.2	24.0	10.2	47.4	34.2	74.0	54.0	26.6	19.8	400.0	11.0	
12	4690.004	H	38.3	23.8	14.7	53.0	38.5	74.0	54.0	21.0	15.5	400.0	164.0	
13	2402.500	H			0.5			74.0	54.0			100.0	356.0	
14	2446.000	H			0.8			74.0	54.0			100.0	346.0	
15	2480.000	H			0.9			74.0	54.0			100.0	353.0	

* Mode Exclusion bands

- Fundamental Frequency : 2.4 GHz

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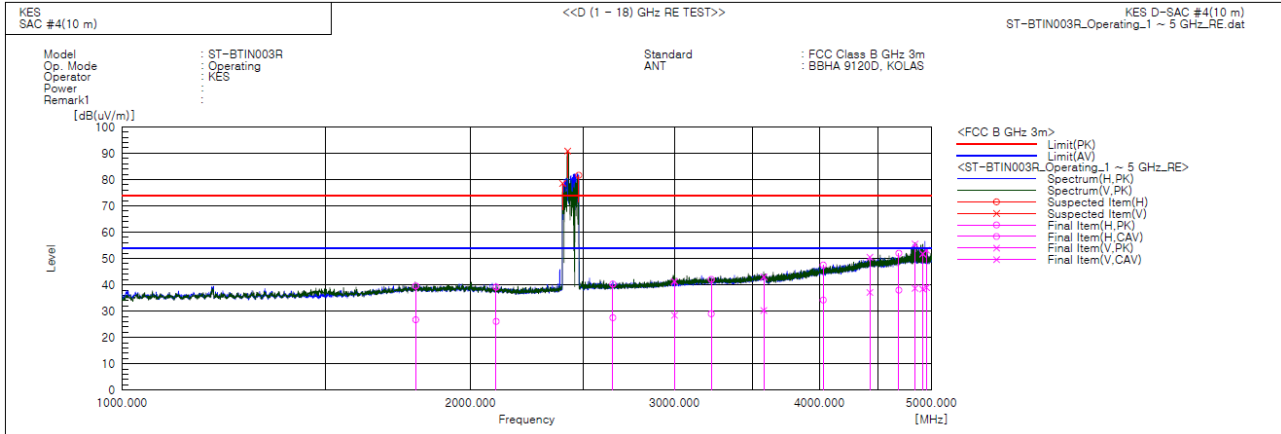
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■ Operating Mode

- (1 ~ 5) GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]	Remark
1	1793.294	H	40.2	27.3	-0.6	39.6	26.7	74.0	54.0	34.4	27.3	400.0	264.0	
2	2104.035	H	39.5	26.4	-0.3	39.2	26.1	74.0	54.0	34.8	27.9	340.0	12.0	
3	2653.742	H	38.6	25.8	1.7	40.3	27.5	74.0	54.0	33.7	26.5	380.0	156.0	
4	2999.465	V	37.9	25.0	3.4	41.3	28.4	74.0	54.0	32.7	25.6	100.0	305.0	
5	3227.593	H	37.7	24.6	4.4	42.1	29.0	74.0	54.0	31.9	25.0	400.0	2.0	
6	3582.526	V	36.5	23.8	6.5	43.0	30.3	74.0	54.0	31.0	23.7	100.0	5.0	
7	4033.160	H	37.3	24.0	10.2	47.5	34.2	74.0	54.0	26.5	19.8	400.0	10.0	
8	4424.199	V	37.2	23.8	13.3	50.5	37.1	74.0	54.0	23.5	16.9	137.0	116.0	
9	4685.994	H	37.3	23.3	14.7	52.0	38.0	74.0	54.0	22.0	16.0	400.0	18.0	
10	4840.208	V	40.0	23.2	15.5	55.5	38.7	74.0	54.0	18.5	15.3	100.0	186.0	
11	4913.732	V	36.2	22.8	15.6	51.8	38.4	74.0	54.0	22.2	15.6	165.0	338.0	
12	4951.098	V	37.5	23.3	15.7	53.2	39.0	74.0	54.0	20.8	15.0	100.0	342.0	
13	2402.000	V			0.5			74.0	54.0			100.0	294.0	
14	2426.000	V			0.7			74.0	54.0			100.0	164.0	
15	2480.000	H			0.9			74.0	54.0			100.0	358.0	

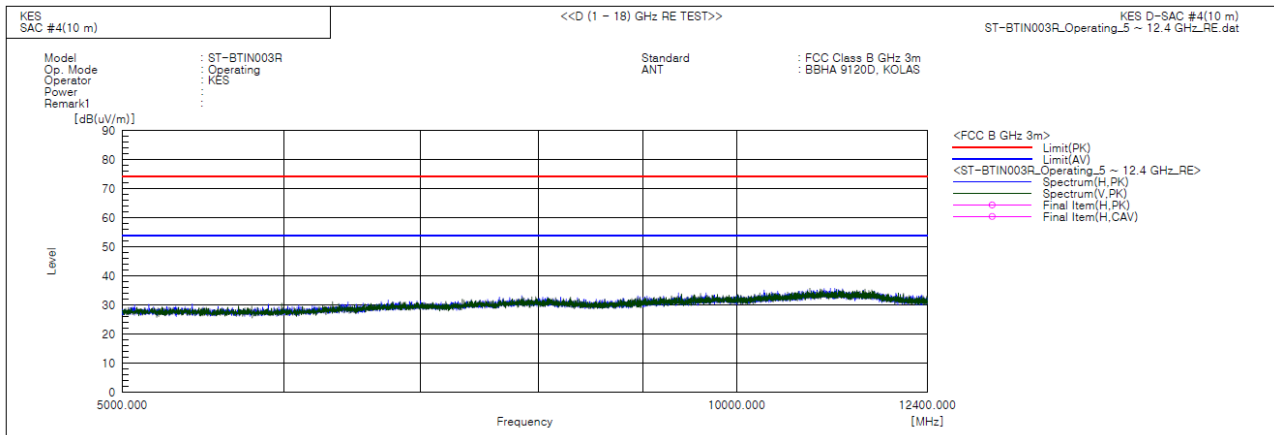
* Mode Exclusion bands

- Fundamental Frequency : 2.4 GHz

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- (5 ~ 12.4) GHz



* No Spurious emission were detected above 5 GHz.

◆ Calculation

Result(PK/CAV) [dB(μV/m)] = (Reading(PK/CAV)[dB(μV)] + c.f[dB(1/m)])

Margin(PK/CAV)[dB] = Limit[dB(μV/m)] - Result(PK/CAV) [dB(μV/m)]

Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value

Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value