EMC TEST REPORT

Test Report No.	:	KES-EM-22T0488
Date of Issue	:	Jun. 20, 2022
Product name	:	SlowJec plus
Model/Type No.	:	DSD-PLA-0100
Variant Mode	:	-
Applicant	:	OSSTEM IMPLANT CO., LTD. Chair Business
Applicant Address	:	192, Haebong-ro, Danwon-gu, Ansan-si, Gyeonggi-do, 15428, Republic of Korea
Manufacturer	:	OSSTEM IMPLANT CO., LTD. Chair Business
Manufacturer Address	:	192, Haebong-ro, Danwon-gu, Ansan-si, Gyeonggi-do, 15428, Republic of Korea
FCC ID	:	2ASB7PLA-0100C
Date of Receipt	:	Jan. 20, 2022
Test date	:	Apr. 20, 2022 ~ Apr. 21, 2022
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Min Seong, 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
Jun. 20, 2022	KES-EM-22T0488	Issued

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1.0 General Product Description

Main Specifications of EUT are:

- Voltage : AC 100 V ~ 240 V
- Frequency : 50/60 Hz
- AC adapter : 5 V / 2 A
- Battery : 3.7 V, 500 mAh, Li-polymer
- Classification : Clase II B type

- EUT Internal Operating Frequencies:

Frequency (MHz)	Description
8 MHz	MCU Clock(ATmega 168PB)
21 kHz	Timer Clock(Inner MCU)
400 Hz	PWM Timer Clock(Inner MCU)
8 kHz	Single-Chip Voice Record/Playback Devices (ISD2130)
400 kHz	9-Segment LED Display Drivers(MAX6958)

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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
SlowJec plus (Main Body)	DSD-PLA-0100	-	OSSTEM IMPLANT CO., LTD. Chair Business	EUT
SlowJec plus (Cradle)	DSD-PLA-0100C	-	OSSTEM IMPLANT CO., LTD. Chair Business	
AC / DC MEDICAL ADAPTOR	GEM12I05	-	MEAN WELL	
Battery	-	-	-	

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
-	-	-	-	-

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1.6 External I/O Cabling

■ AC 230 V, 50 ㎐_Charging

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
SlowJec plus (Main Body) (EUT)	Power	Battery (EUT)	Power	-	-
	Wireless Charging	SlowJec plus (Cradle) (EUT)	Wireless Charging	-	-
SlowJec plus (Cradle) (EUT)	DC Jack	AC / DC MEDICAL ADAPTOR (EUT)	Line-Out (DC Jack)	0.5	U

* Unshielded = U, Shielded = S

■ Battery_Operating

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
SlowJec plus (Main Body) (EUT)	Power	Battery (EUT)	Power	-	-

* Unshielded = U, Shielded = S

1.7 EUT Operating Mode(s)

Test mode	Normal operating	Test Voltages
Charging	Check the normal operation by looking at the charging LED of SlowJec plus(Cradle)(EUT).	AC 120 V 60 ㎐
Operating	After continuous operation of SlowJec plus(Main Body)(EUT), check whether it operates normally.	Battery

EUT Test operating S/W		
Name	**Version**	**Manufacture Company**
-	-	-

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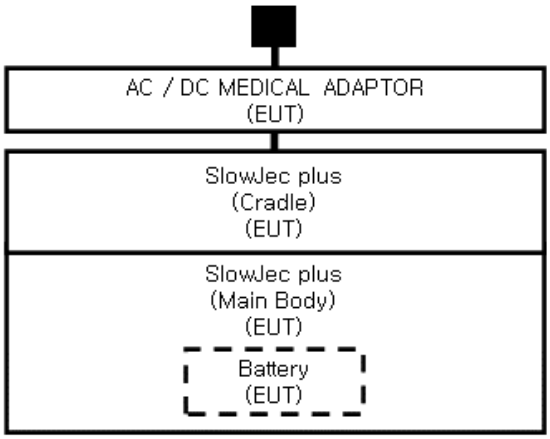
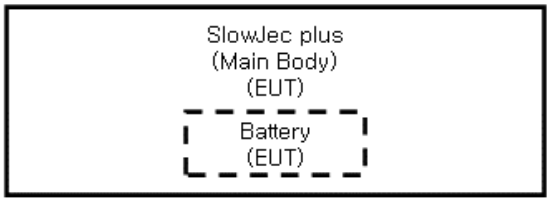
1.8 Configuration

■ AC Main
□ DC Main

■ AC 120 V, 60 ㎐_Charging



■ Battery_Operating



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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, Yeoju-si, Gyeonggi-do, 12658, Korea. 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 ㎑ to 30 ㎒. 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㎓ at 10 m or 3 m distance and a Peak and Average detector above 1 ㎓ 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 C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

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1.13 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
KOREA	**RRA**	EMI (3 m & 10 m Semi-Aechoic 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-Aechoic Chamber , and conducted test site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	KT489
USA	**FCC**	3 m & 10 m Semi-Aechoic Chamber, 10 m Open Area and Conducted test site to perform FCC Part 15/18 measurements.	KR0100
Canada	**ISED**	3 m & 10 m Semi-Aechoic Chamber and Conducted test site	23298-1
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-Aechoic 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 C63.4-2014	☐ Class A	☒ Class B

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2.1 Conducted Emissions at Mains Power Ports

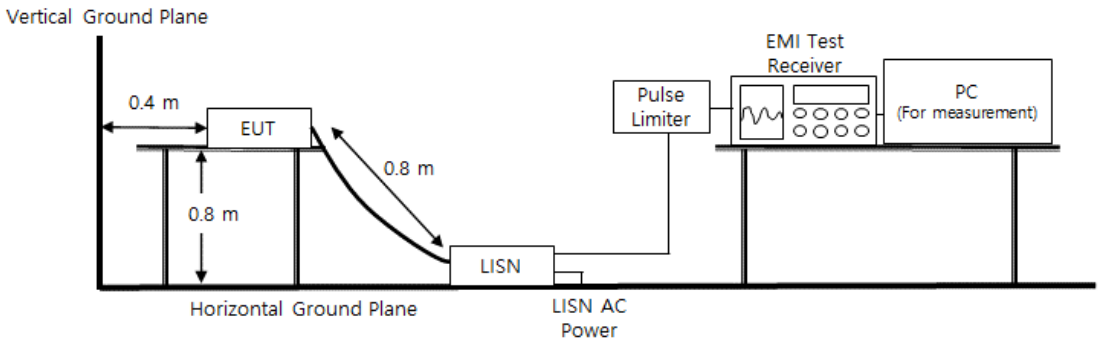
Test Date
Apr. 20, 2022

Test Location
Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EMC32	R & S	9.12.00	-	-
☒	EMI TEST RECEIVER	ESR3	R & S	101783	12, 28, 2022	1 Year
☒	LISN	ENV216	R & S	101787	12, 27, 2022	1 Year
☐	LISN	ESH2-Z5	R & S	100450	12, 27, 2022	1 Year
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 27, 2022	1 Year

Diagram of test setup



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Test Conditions

Temperature: (22,5 ± 0,2) ℃
Relative Humidity: (43,0 ± 0,3) % R.H.

Frequency Range of Measurement

150 ㎑ to 30 ㎒

Instrument Settings

IF Band Width: 9 ㎑

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 ㎓)

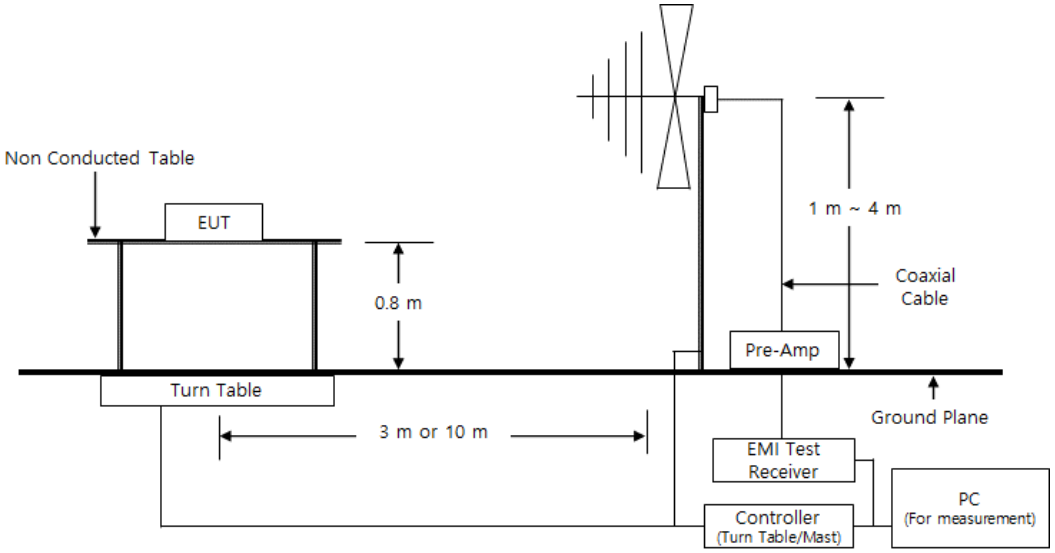
Test Date
Apr. 20, 2022

Test Location
☐ OPEN AREA TEST SITE #2 ☒ SEMI ANECHOIC CHAMBER #4(10 m)

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	03, 31, 2023	1 Year
☒	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022	1 Year
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022	2 Year
☒	ATTENUATOR	8491A	HP	32173	03, 08, 2023	1 Year

Diagram of test setup



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Test Conditions

Temperature: (23,2 ± 0,2) ℃
Relative Humidity: (42,9 ± 0,4) % R.H.

Frequency Range of Measurement

30 ㎒ to 1 ㎓

Instrument Settings

IF Band Width: 120 ㎑

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 ㎓)

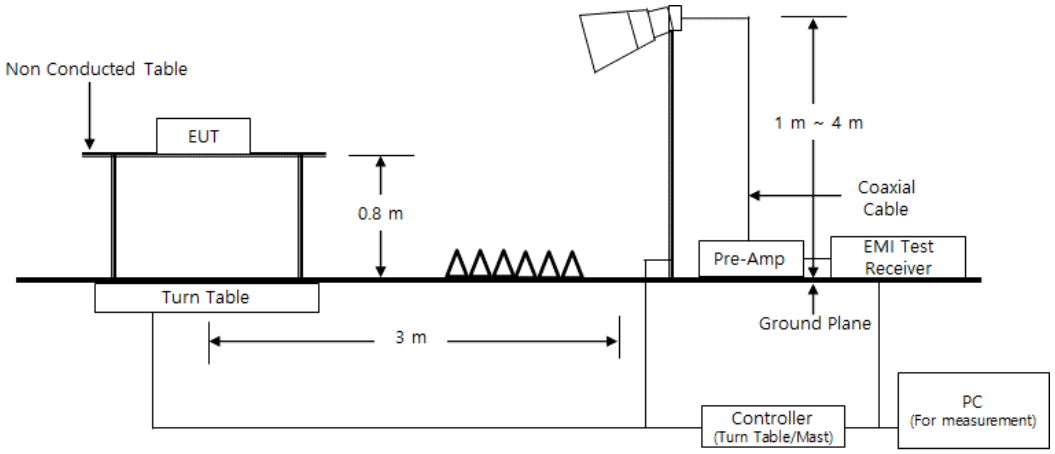
Test Date
Apr. 21, 2022

Test Location
SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due	calibration interval
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.120	-	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 31, 2023	1 Year
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022	1 Year
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 21, 2022	1 Year

Diagram of test setup



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Test Conditions

Temperature: (23,8 ± 0,1) ℃
Relative Humidity: (44,0 ± 0,2) % R.H.

Frequency Range of Measurement

1 ㎓ to 12,5 ㎓

Instrument Settings

IF Band Width: 1 ㎒

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

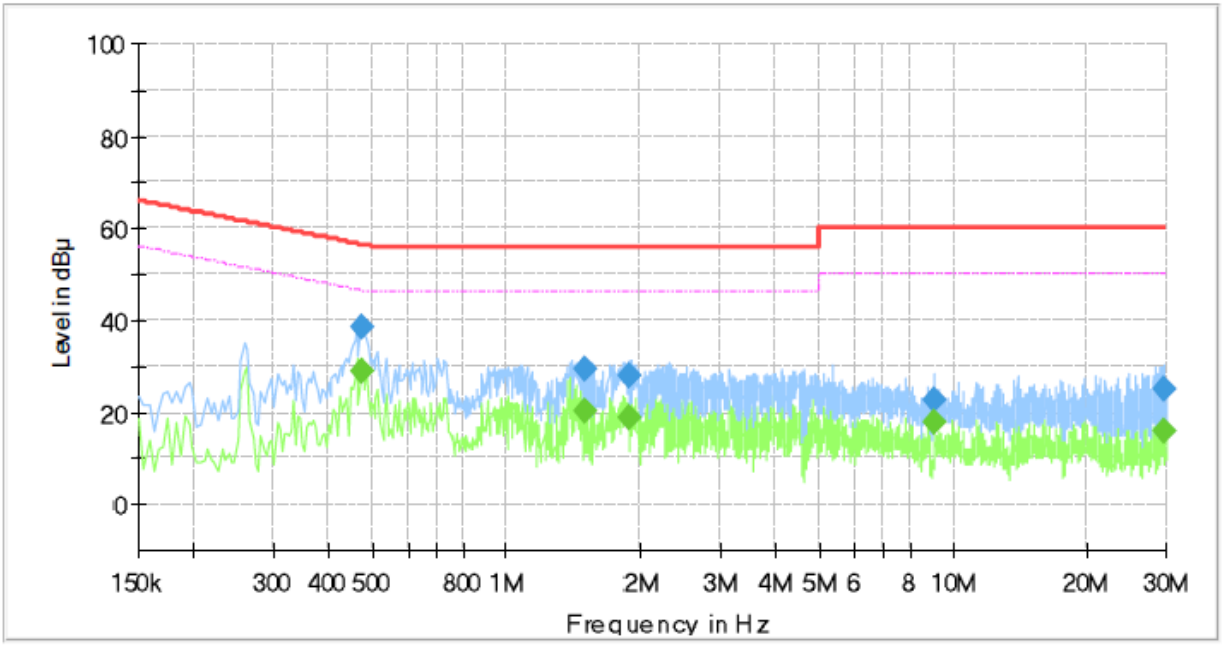
Conducted Emissions at Mains Power Ports

■ AC 120 V, 60 Hz_Charging

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	DSD-PLA-0100
Phase:	L1
Mode:	AC 120 V, 60 Hz_Charging
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.474000	---	29.12	46.44	17.32	1000.0	9.000	L1	19.9
0.474000	38.54	---	56.44	17.90	1000.0	9.000	L1	19.9
1.494000	---	20.20	46.00	25.80	1000.0	9.000	L1	20.4
1.494000	29.18	---	56.00	26.82	1000.0	9.000	L1	20.4
1.874000	---	19.06	46.00	26.94	1000.0	9.000	L1	20.5
1.874000	28.17	---	56.00	27.83	1000.0	9.000	L1	20.5
9.026000	---	17.70	50.00	32.30	1000.0	9.000	L1	20.1
9.026000	22.81	---	60.00	37.19	1000.0	9.000	L1	20.1
29.518000	---	15.77	50.00	34.23	1000.0	9.000	L1	21.2
29.518000	24.83	---	60.00	35.17	1000.0	9.000	L1	21.2

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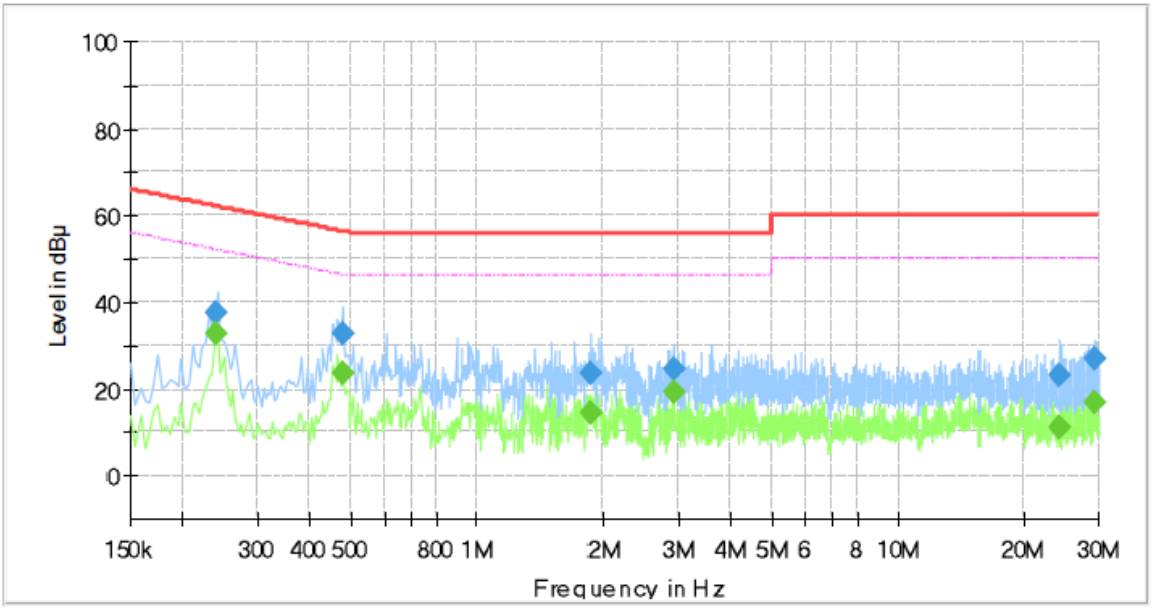
NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	DSD-PLA-0100
Phase:	N
Mode:	AC 120 V, 60 Hz_Charging
Operator Name:	KES



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.238000	---	32.95	52.17	19.22	1000.0	9.000	N	19.6
0.238000	37.54	---	62.17	24.63	1000.0	9.000	N	19.6
0.478000	---	23.44	46.37	22.93	1000.0	9.000	N	19.8
0.478000	32.89	---	56.37	23.48	1000.0	9.000	N	19.8
1.862000	---	14.72	46.00	31.28	1000.0	9.000	N	20.4
1.862000	23.48	---	56.00	32.52	1000.0	9.000	N	20.4
2.922000	---	19.23	46.00	26.77	1000.0	9.000	N	20.4
2.922000	24.49	---	56.00	31.51	1000.0	9.000	N	20.4
24.290000	---	10.93	50.00	39.07	1000.0	9.000	N	20.9
24.290000	23.29	---	60.00	36.71	1000.0	9.000	N	20.9
29.262000	---	17.06	50.00	32.94	1000.0	9.000	N	21.2
29.262000	26.97	---	60.00	33.03	1000.0	9.000	N	21.2

♦ 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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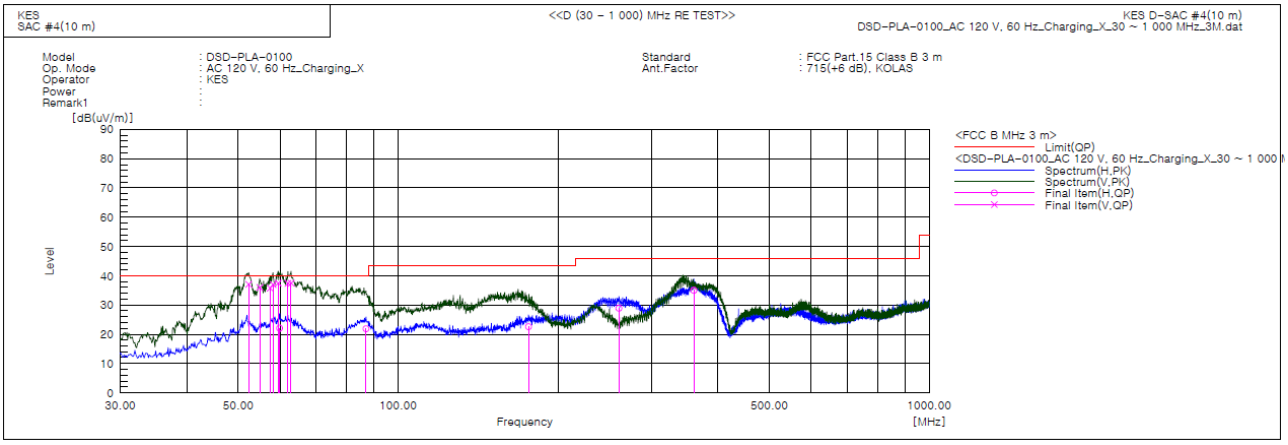
Radiated Electric Field Emissions(Below 1 ㎓)

■ AC 120 V, 60 ㎐_Charging



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	52.310	V	58.6	-21.5	37.1	40.0	2.9	100.0	189.0	
2	54.856	V	57.8	-21.8	36.0	40.0	4.0	100.0	144.0	
3	57.403	V	57.8	-22.0	35.8	40.0	4.2	103.0	133.0	
4	58.130	V	59.1	-22.1	37.0	40.0	3.0	100.0	267.0	
5	59.464	V	59.8	-22.3	37.5	40.0	2.5	100.0	31.0	
6	59.828	H	44.4	-22.3	22.1	40.0	17.9	301.0	98.0	
7	62.010	V	60.2	-22.8	37.4	40.0	2.6	100.0	20.0	
8	62.859	V	60.5	-23.0	37.5	40.0	2.5	105.0	99.0	
9	86.988	H	47.6	-25.7	21.9	40.0	18.1	400.0	200.0	
10	175.985	H	47.2	-24.6	22.6	43.5	20.9	274.0	173.0	
11	260.496	H	48.8	-19.9	28.9	46.0	17.1	312.0	16.0	
12	360.406	H	51.2	-16.2	35.0	46.0	11.0	236.0	158.0	

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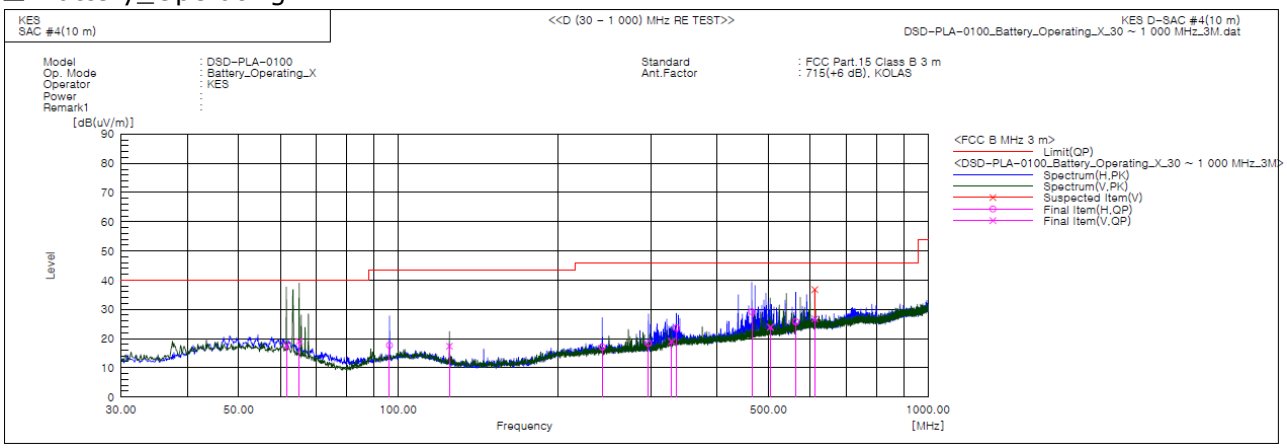
■ Battery_Operating



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	61.525	V	40.3	-22.7	17.6	40.0	22.4	136.0	27.0	
2	65.041	V	42.7	-23.7	19.0	40.0	21.0	192.0	27.0	
3	96.324	H	41.4	-23.7	17.7	43.5	25.8	310.0	128.0	
4	124.939	V	42.9	-25.5	17.4	43.5	26.1	178.0	80.0	
5	242.794	H	37.5	-20.4	17.1	46.0	28.9	296.0	150.0	
6	296.750	H	37.5	-19.1	18.4	46.0	27.6	331.0	25.0	
7	328.033	V	36.2	-17.2	19.0	46.0	27.0	100.0	315.0	
8	335.065	H	40.6	-16.9	23.7	46.0	22.3	386.0	33.0	
9	465.045	H	42.9	-13.7	29.2	46.0	16.8	317.0	112.0	
10	503.845	V	36.5	-12.6	23.9	46.0	22.1	134.0	105.0	
11	562.651	H	36.9	-11.1	25.8	46.0	20.2	400.0	33.0	
12	611.758	V	36.6	-9.8	26.8	46.0	19.2	132.0	113.0	

♦ Calculation – SAC #4(10 m)
Result(QP) [dB(㎶/m)] = (Reading(QP)[dB(㎶)] + c.f[dB(1/m)]
Margin(QP)[dB] = Limit[dB(㎶/m)] - Result(QP) [dB(㎶/m)]
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value
Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin value

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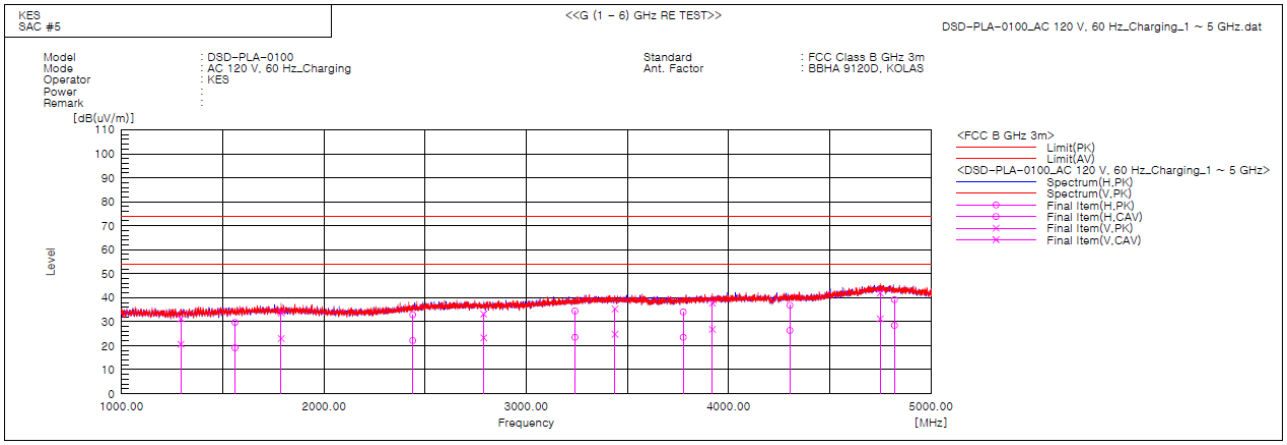
Radiated Electric Field Emissions(Above 1 GHz)

■ AC 120 V, 60 Hz_Charging

- (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	1293.763	V	37.3	26.6	-6.0	31.3	20.6	74.0	54.0	42.7	33.4	162.0	285.0	
2	1561.265	H	34.4	23.8	-4.7	29.7	19.1	74.0	54.0	44.3	34.9	389.0	79.3	
3	1788.801	V	37.3	26.7	-3.7	33.6	23.0	74.0	54.0	40.4	31.0	100.0	244.3	
4	2438.817	H	34.3	23.6	-1.4	32.9	22.2	74.0	54.0	41.1	31.8	276.0	270.9	
5	2789.357	V	32.8	22.9	0.4	33.2	23.3	74.0	54.0	40.8	30.7	194.0	49.8	
6	3241.232	H	32.9	21.9	1.6	34.5	23.5	74.0	54.0	39.5	30.5	332.0	254.5	
7	3438.737	V	33.7	23.0	1.7	35.4	24.7	74.0	54.0	38.6	29.3	108.0	75.0	
8	3776.256	H	31.7	21.1	2.4	34.1	23.5	74.0	54.0	39.9	30.5	400.0	47.7	
9	3919.347	V	34.8	23.9	2.9	37.7	26.8	74.0	54.0	36.3	27.2	100.0	145.9	
10	4302.617	H	32.5	22.0	4.4	36.9	26.4	74.0	54.0	37.1	27.6	331.0	219.3	
11	4749.369	V	35.5	24.8	6.4	41.9	31.2	74.0	54.0	32.1	22.8	117.0	272.2	
12	4820.000	H	32.6	21.9	6.6	39.2	28.5	74.0	54.0	34.8	25.5	285.0	146.9	

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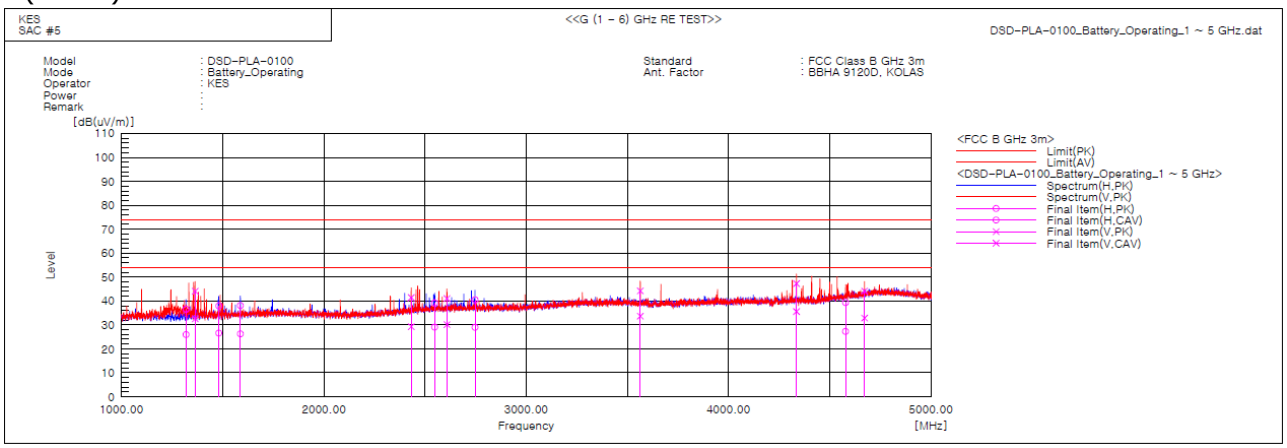
■ Battery_Operating

- (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	1319.332	H	42.4	31.8	-5.8	36.6	26.0	74.0	54.0	37.4	28.0	324.0	269.1	
2	1363.698	V	49.6	38.1	-5.5	44.1	32.6	74.0	54.0	29.9	21.4	100.0	16.1	
3	1481.312	H	42.9	31.5	-4.9	38.0	26.6	74.0	54.0	36.0	27.4	287.0	277.8	
4	1587.418	H	42.7	30.9	-4.6	38.1	26.3	74.0	54.0	35.9	27.7	330.0	277.8	
5	2431.894	V	42.9	30.7	-1.4	41.5	29.3	74.0	54.0	32.5	24.7	194.0	357.5	
6	2547.542	H	40.1	30.0	-0.9	39.2	29.1	74.0	54.0	34.8	24.9	280.0	282.2	
7	2608.139	V	41.7	30.8	-0.6	41.1	30.2	74.0	54.0	32.9	23.8	132.0	357.1	
8	2746.881	H	40.3	28.8	0.2	40.5	29.0	74.0	54.0	33.5	25.0	309.0	255.6	
9	3563.769	V	42.5	31.9	1.8	44.3	33.7	74.0	54.0	29.7	20.3	181.0	357.1	
10	4335.624	V	42.7	31.0	4.6	47.3	35.6	74.0	54.0	26.7	18.4	210.0	357.1	
11	4578.123	H	33.9	21.8	5.5	39.4	27.3	74.0	54.0	34.6	26.7	299.0	46.1	
12	4671.882	V	38.2	26.9	6.0	44.2	32.9	74.0	54.0	29.8	21.1	100.0	358.8	

* No spurious emission were detected above 6 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: Marjin value

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