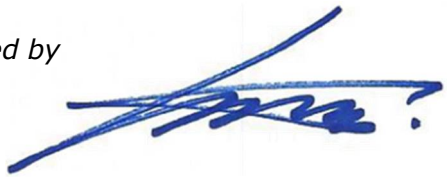
EMC TEST REPORT

Test Report No.	:	KES-E2-19T0096
Date of Issue	:	Oct. 01, 2019
Product name	:	Smart Ear Charger
Model/Type No.	:	DHFA2CWU
Variant Mode	:	DHFA2CBU, DHFA2CGU
Applicant	:	Olive Union inc
Applicant Address	:	15, Beobwon-ro, Seocho-gu, Seoul, Republic of Korea
Manufacturer	:	MOSTOP Co.,Ltd.
Manufacturer Address	:	9-9, Dongtansandan 4-gil, Dongtan-myeon, Hwasung-si, Gyeonggi-do, Korea
FCC ID	:	2AOLH-DHFA2CWU
Date of Receipt	:	Aug. 16, 2019
Test date	:	Aug. 29, 2019 ~ Aug. 30, 2019
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dae Hyun, Kim
EMC Test Engineer

Reviewed by



Dong-Hun, Jang
EMC Technical Manager

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Oct. 01, 2019	KES-E2-19T0096	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Item	spec
Power	DC 5 V (USB)
Size	(38 x 38 x 21) ㎜
Weight	60 g

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.

Voltage ☐ 230 Vac ☒ 120 Vac ☐ 12 Vdc ☐ DC 3.7 V (Battery)

Frequency ☐ 50 Hz ☒ 60 Hz ☐ Hz

1.2 Variant Model Differences

Color difference - DHFA2CBU(Black), DHFA2CGU(Gold)

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Smart Ear Charger	DHFA2CWU	-	MOSTOP Co.,Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
SmartPhone	SM-G955N	-	Samsung Electronics Co., Ltd	-
Smart Ear	DHFA2EWU	-	MOSTOP Co.,Ltd.	-
Adapter	-	-	-	-

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	**I/O Port**	**Description**	**I/O Port**	**Length**	**Shield**
Smart Ear Charger (EUT)	Charger Port	Smart Ear	Charger Port	-	-
Smart Ear	Micro 5 Pin	Adpater	USB	1.0	U

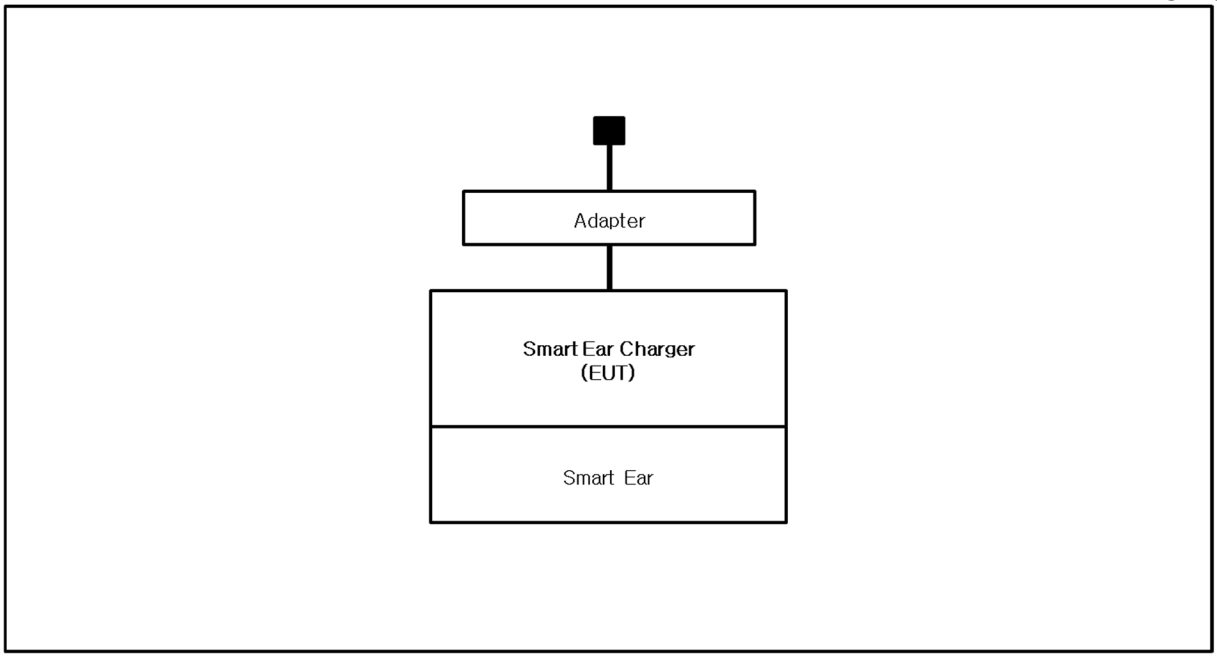
1.7 EUT Operating Mode(s)

Test mode	operating
Operating	The normal charging state was confirmed by led of EUT.

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

1.8 Configuration

■ AC Main
□ DC Main



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 C63.4:2014 and CISPR 16-1-4:2012

1.12 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 0003

2.0 Test Regulations

The emissions tests were performed according to following regulations:

☐ **EMC – Directive 2014/30/EU**

☐ EN 61000-6-3:2011

☐ EN 61000-6-1:2007

☐ EN 61000-6-4:2007 +A1:2011

☐ EN 61000-6-2:2005

☐ EN 55011:2007 +A1:2010 ☐ Group 1 ☐ Class A ☐ Group 2 ☐ Class B

☐ EN 55014-1:2006 +A2:2011

☐ EN 55014-2:1997 +A2:2008

☐ EN 55015:2013

☐ EN 55032:2015 ☐ Class A ☐ Class B

☐ EN 55024:2010

☐ EN 50130-4:2011 +A1:2014

☐ EN 61000-3-2:2014

☐ EN 61000-3-3:2013

☐ EN 61326-1:2013

☐ **VCCI V-3 / 2015.04**	☐ Class A	☐ Class B
☐ **AS/NZS:2013**	☐ Class A	☐ Class B
☒ **47 CFR Part 15, Subpart B**		
☐ CISPR 22:2009 +A1:2010	☐ Class A	☐ Class B
☒ ANSI C63.4-2014	☐ Class A	☒ Class B
☐ **IC Regulation ICES-003 : 2016**		
☐ CAN/CSA CISPR 22-10	☐ Class A	☐ Class B
☐ ANSI C63.4-2014	☐ Class A	☐ Class B

☐ **RE– Directive 2014/53/EU**

☐ EN 301 489-1 V1.9.2

- ☐ Equipment for fixed use
- ☐ Equipment for vehicular use
- ☐ Equipment for portable use

☐ EN 301 489-3 V1.6.1

☐ EN 301 489-17 V2.2.1

☐ EN 60945:2002

2.1 Conducted Emissions at Mains Power Ports

Test Date
Aug. 29, 2019

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	101781	04, 22, 2020
☒	LISN	ENV216	R & S	101787	01, 04, 2020
☐	LISN	ESH2-Z5	R & S	100450	04, 22, 2020
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 26, 2019

Test Conditions
Temperature: 23.2 ℃
Relative Humidity: 53.5 % 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.

2.2 Radiated Electric Field Emissions(Below 1 ㎓)

Test Date
Aug. 29, 2019

Test Location
☐ OPEN AREA TEST SITE #2 ☒ 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	04, 09, 2020
☒	AMPLIFIER	SCU 01	R & S	100603	11, 26, 2019
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 29, 2020
☒	ATTENUATOR	8491A	HP	32173	03, 11, 2020

Test Conditions
Temperature: 23.4 ℃
Relative Humidity: 53.7 % 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.

2.3 Radiated Electric Field Emissions(Above 1 ㎓)

Test Date
Aug. 30, 2019

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	04, 09, 2020
☒	PREAMPLIFIER	8449B	AGILENT	3008A01742	01, 08, 2020
☒	ATTENUATOR	8491A	HP	35496	03, 11, 2020
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	03, 12, 2020

Test Conditions
Temperature: 23.2 ℃
Relative Humidity: 52.9 % R.H.

Frequency Range of Measurement
1 ㎓ to 12.4 ㎓

Instrument Settings
IF Band Width: 1 ㎒

Test Results
The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

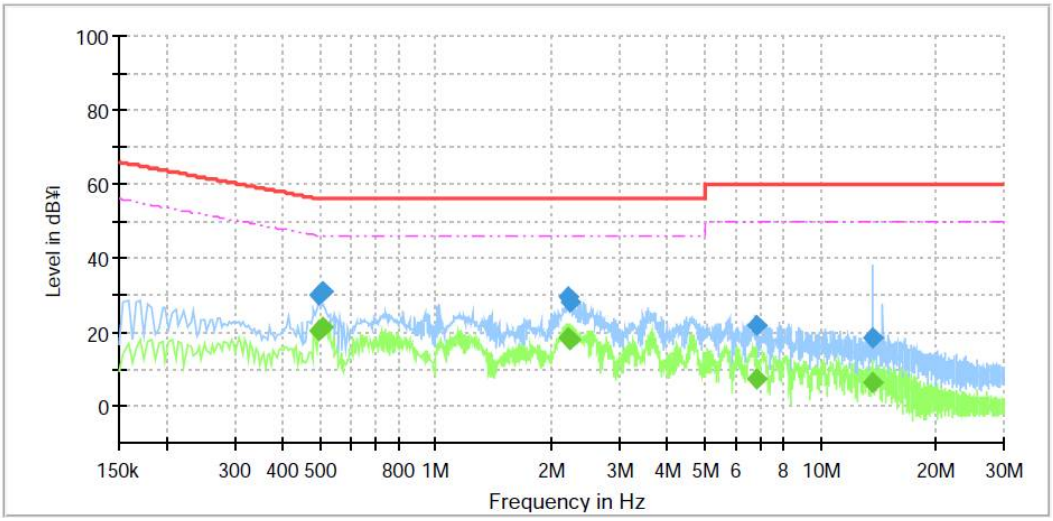
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	DHFA2EWU / DHFA2CWU
Phase:	
Mode:	Charge
Operator Name:	KES



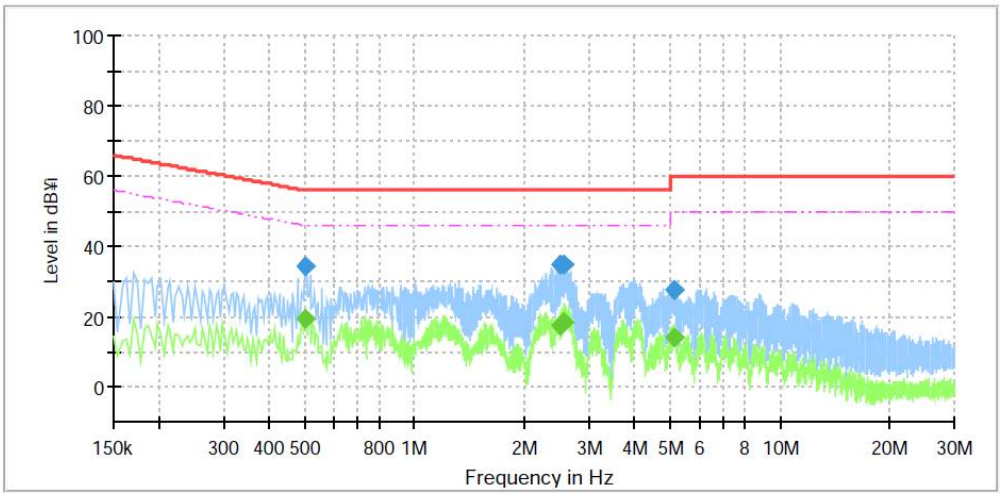
Final_Result

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.498000	---	20.21	46.03	25.82	1000.0	9.000	L1	9.7
0.498000	29.91	---	56.03	26.12	1000.0	9.000	L1	9.7
0.506000	---	21.43	46.00	24.57	1000.0	9.000	L1	9.7
0.506000	31.23	---	56.00	24.77	1000.0	9.000	L1	9.7
2.214000	---	18.24	46.00	27.76	1000.0	9.000	L1	9.7
2.214000	29.34	---	56.00	26.66	1000.0	9.000	L1	9.7
2.222000	---	18.14	46.00	27.86	1000.0	9.000	L1	9.7
2.222000	28.22	---	56.00	27.78	1000.0	9.000	L1	9.7
6.802000	---	7.13	50.00	42.87	1000.0	9.000	L1	9.9
6.802000	21.85	---	60.00	38.15	1000.0	9.000	L1	9.9
13.726000	---	6.22	50.00	43.78	1000.0	9.000	L1	10.1
13.726000	18.52	---	60.00	41.48	1000.0	9.000	L1	10.1

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	DHFA2EWU / DHFA2CWU
Phase:	
Mode:	Charge
Operator Name:	KES



Final_Result

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.502000	---	19.48	46.00	26.52	1000.0	9.000	N	9.6
0.502000	34.21	---	56.00	21.79	1000.0	9.000	N	9.6
2.490000	---	17.28	46.00	28.72	1000.0	9.000	N	9.7
2.490000	34.75	---	56.00	21.25	1000.0	9.000	N	9.7
2.574000	---	18.40	46.00	27.60	1000.0	9.000	N	9.7
2.574000	34.93	---	56.00	21.07	1000.0	9.000	N	9.7
5.130000	---	14.08	50.00	35.92	1000.0	9.000	N	9.8
5.130000	27.60	---	60.00	32.40	1000.0	9.000	N	9.8

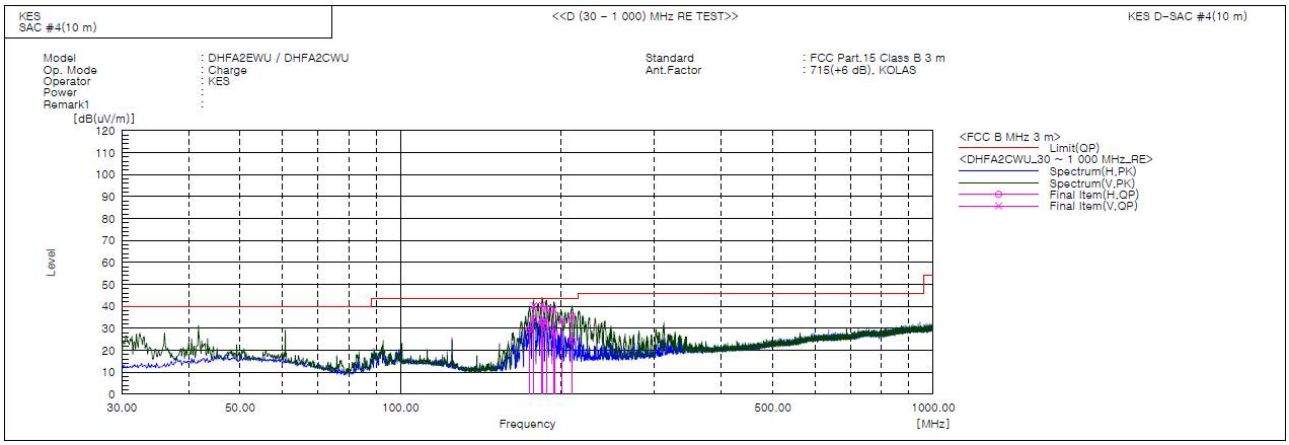
♦ Calculation
QuasiPeak[dBuV] / CAverage [dBuV] = Reading Value[dBuV] + Corr. [dB]
QuasiPeak / CAverage : The Final Value
Reading Value : Not shown in the table.
Corr. : Correction values (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

Uncertainty of measurement

HOT Line : Uncertainty of measurement 2.38 dB
(Confidence level: Approx. 95 %, *k*=2)

Neutral Line : Uncertainty of measurement 2.38 dB
(Confidence level: Approx. 95 %, *k*=2)

Radiated Electric Field Emissions(Below 1 ㎓)



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	174.422	H	54.8	-25.2	29.6	43.5	13.9	322.0	257.0	
2	177.923	V	65.4	-25.0	40.4	43.5	3.1	110.0	353.0	
3	177.929	H	59.3	-25.0	34.3	43.5	9.2	314.0	233.0	
4	184.359	V	65.2	-24.5	40.7	43.5	2.8	129.0	341.0	
5	184.718	H	57.4	-24.4	33.0	43.5	10.5	274.0	257.0	
6	187.750	H	55.7	-24.1	31.6	43.5	11.9	386.0	249.0	
7	187.868	V	63.4	-24.1	39.3	43.5	4.2	100.0	337.0	
8	194.051	V	62.1	-23.5	38.6	43.5	4.9	107.0	358.0	
9	194.536	H	51.5	-23.4	28.1	43.5	15.4	346.0	237.0	
10	200.963	V	56.2	-22.8	33.4	43.5	10.1	111.0	310.0	
11	210.178	V	57.7	-22.2	35.5	43.5	8.0	102.0	358.0	
12	210.420	H	46.5	-22.2	24.3	43.5	19.2	17.2	253.0	

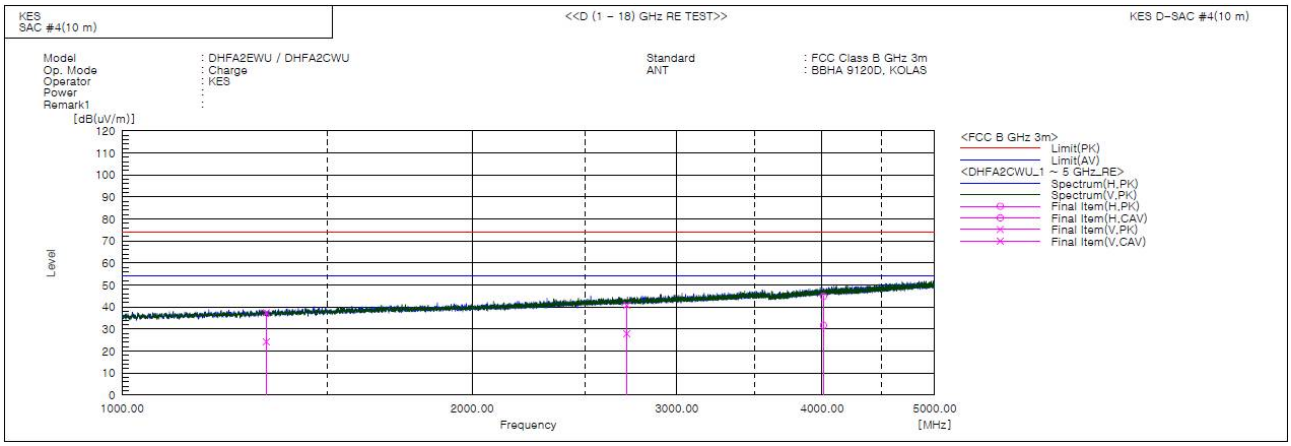
♦ Calculation – SAC #4(10 m)
Result(QP) [dB(㎶/m)] = (Reading(QP)[dB(㎶)] + c.f[dB(1/m)]
Margin(QP)[dB] = Limit[dB(㎶/m)] - Result(QP) [dB(㎶/m)]
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value
Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss - Preamp Factor), Margin: Margin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

Uncertainty of measurement

Horizontal : Uncertainty of measurement 4.16 dB
(Confidence level: Approx. 95 %, *k*=2)

Vertical : Uncertainty of measurement 4.24 dB
(Confidence level: Approx. 95 %, *k*=2)

Radiated Electric Field Emissions(Above 1 ㎓)



Final Result

No.	Frequency	(P)	Reading PK	Reading CAV	c.f	Result PK	Result CAV	Limit PK	Limit AV	Margin PK	Margin CAV	Height	Angle	Remark
	[MHz]		[dB(uV)]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[dB]	[cm]	[deg]	
1	1330.625	V	41.3	28.1	-3.9	37.4	24.2	74.0	54.0	36.6	29.8	121.0	0.0	
2	2717.400	V	38.1	25.2	2.7	40.8	27.9	74.0	54.0	33.2	26.1	106.0	37.0	
3	4011.685	H	37.0	23.9	7.8	44.8	31.7	74.0	54.0	29.2	22.3	294.0	183.0	

♦ Calculation

Result(PK/CAV) [㏈(㎶/m)] = (Reading(PK/CAV)[㏈(㎶)] + c.f[㏈(1/m)]
Margin(PK/CAV)[㏈] = Limit[㏈(㎶/m)] - Result(PK/CAV) [㏈(㎶/m)]
Reading(PK/CAV) : Reading value, Result(PK/CAV) : Reading value + Factor value
Limit(QP) : Limit value, c.f : (ANT Factor + Cable Loss + ATT Factor - Preamp Factor), Margin: Marjin value

* No spurious emission were detected above 5 ㎓.

Uncertainty of measurement

Uncertainty of measurement 5.76 ㏈
(Confidence level: Approx. 95 %, *k*=2)