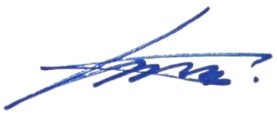
EMC TEST REPORT

Test Report No.	:	KES-EM-22T0892
Date of Issue	:	Nov. 04, 2022
Product name	:	InBirdie TEMPO Plus
Model/Type No.	:	InBirdie TEMPO Plus
Variant Mode	:	-
Applicant	:	DMBH Co., Ltd.
Applicant Address	:	#401-603, Bucheon Techno-park, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
Manufacturer	:	DMBH Co., Ltd.
Manufacturer Address	:	#401-603, Bucheon Techno-park, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
FCC ID	:	2A3CB-INBIRDIETP3
Date of Receipt	:	Oct. 26, 2022
Test date	:	Oct. 29, 2022
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Seon Ho, Choi
EMC Test Engineer

Reviewed by



Dong Hun, Jang
EMC Technical Manager

REPORT REVISION HISTORY

Date	Test Report No.	Revision History
Nov. 04, 2022	KES-EM-22T0892	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Division	Characteristic	
Communication method	Bluetooth	(2 402 ~ 2 480) ㎒
Power	DC 5 V (USB type C)	
Size	Product Size(WxHxD in)	13 * 12 * 1.5
	Mat Size(WxL in)	12 * 75
Product Weight	4 989 g	
Port	USB C Type x 1 EA	
Components	EUT x 1 EA	

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
InBirdie TEMPO Plus	InBirdie TEMPO Plus	-	DMBH Co., Ltd.	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adapter	-	-	-	-
SmartPhone	-	-	-	-

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
InBirdie TEMPO Plus (EUT)	USB C Type	Adapter	USB	1.2	U
	Wireless	SmartPhone	Wireless	-	-

* Unshielded = U, Shielded = S

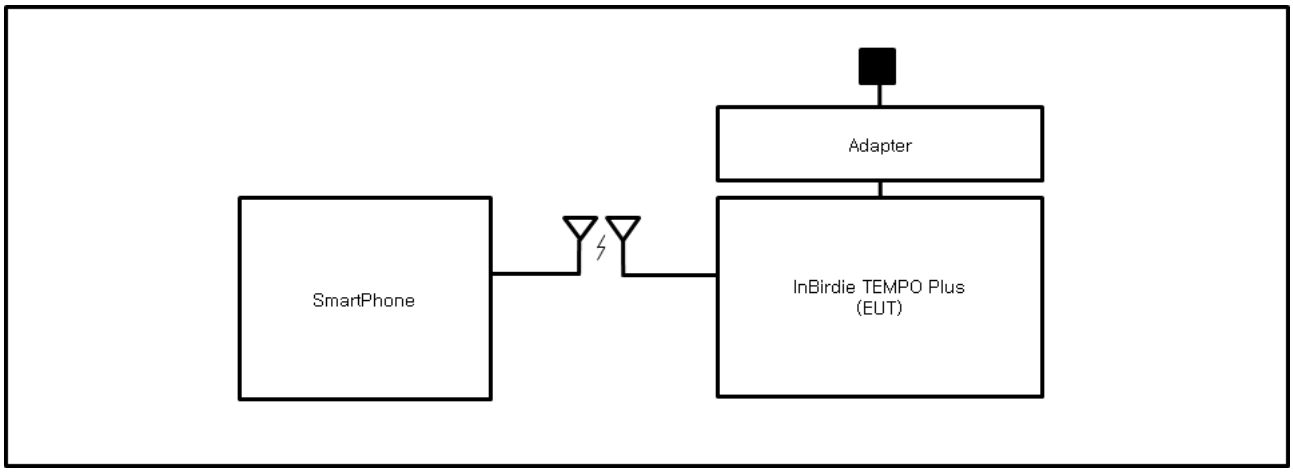
1.7 EUT Operating Mode(s)

Test mode	operating
Oprate	After connecting the power to the product, check the normal operation through the application on the smartphone.

EUT Test operating S/W		
Name	**Version**	**Manufacture Company**
InBirdie Game	3.092	DMBH Co., Ltd

1.8 Configuration

■ AC Main
□ DC Main



EUT – SmartPhone : Bluetooth 2.4 ㎓ 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, Yeoju-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 ㎑ 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

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
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

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

2.1 Conducted Emissions at Mains Power Ports

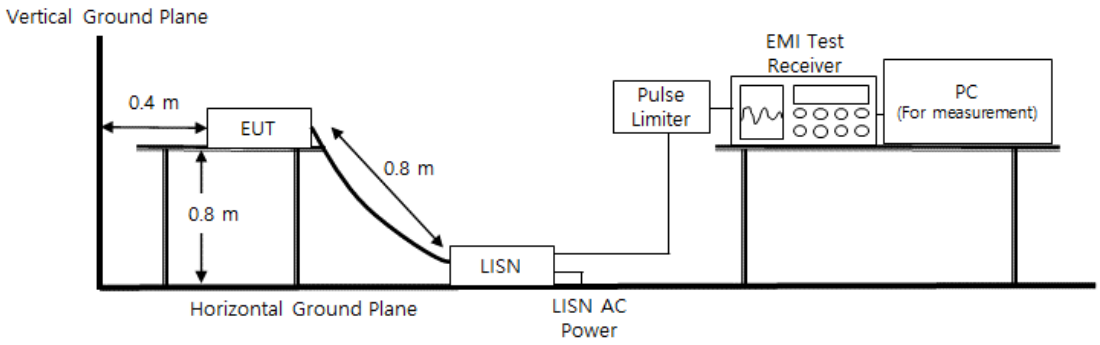
Test Date
Oct. 29, 2022

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



Test Conditions

Temperature: (22,8 ± 0,2) ℃
Relative Humidity: (47,2 ± 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.

2.2 Radiated Electric Field Emissions(Below 1 ㎓)

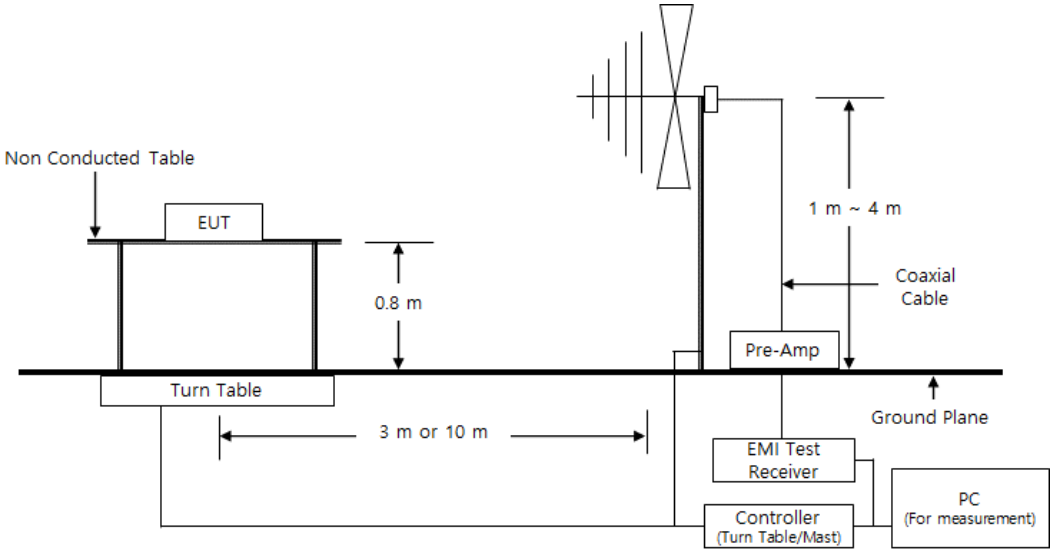
Test Date
Oct. 29, 2022

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

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



Test Conditions

Temperature: (22,2 ± 0,3) ℃
Relative Humidity: (47,8 ± 0,3) % 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 ㎓)

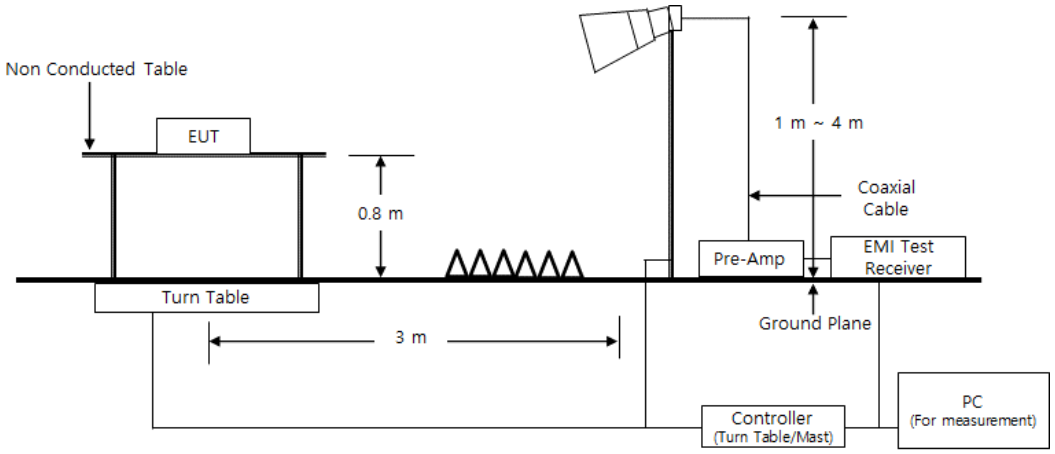
Test Date
Oct. 29, 2022

Test Location
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
☒	PREAMPLIFIER	8449B	AGILENT	3008A01742	12, 27, 2022	1 Year
☐	ATTENUATOR	8491A	HP	35496	03, 08, 2023	1 Year
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	12, 16, 2022	1 Year

Diagram of test setup



Test Conditions

Temperature: (22,2 ± 0,3) ℃
Relative Humidity: (47,8 ± 0,4) % R.H.

Frequency Range of Measurement

1 ㎓ to 5 ㎓

Instrument Settings

IF Band Width: 1 ㎒

Test Results

The requirements are:

☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

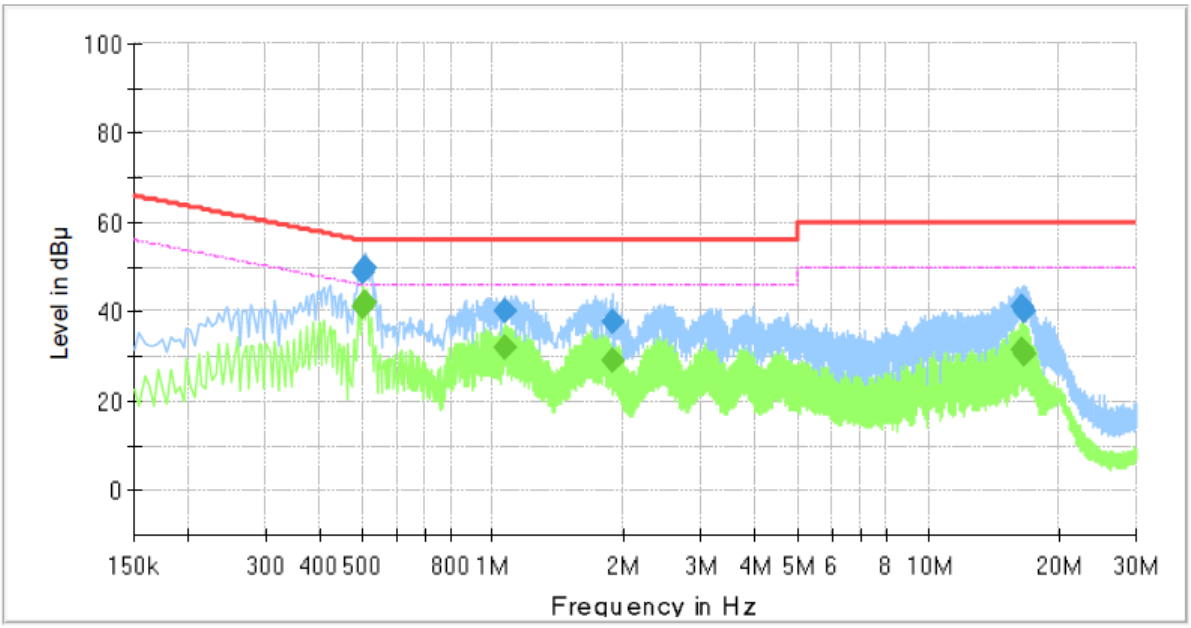
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description:	Conducted Emission
Model No.:	InBirdie TEMPO Plus
Phase:	H
Mode:	
Operator Name:	KES



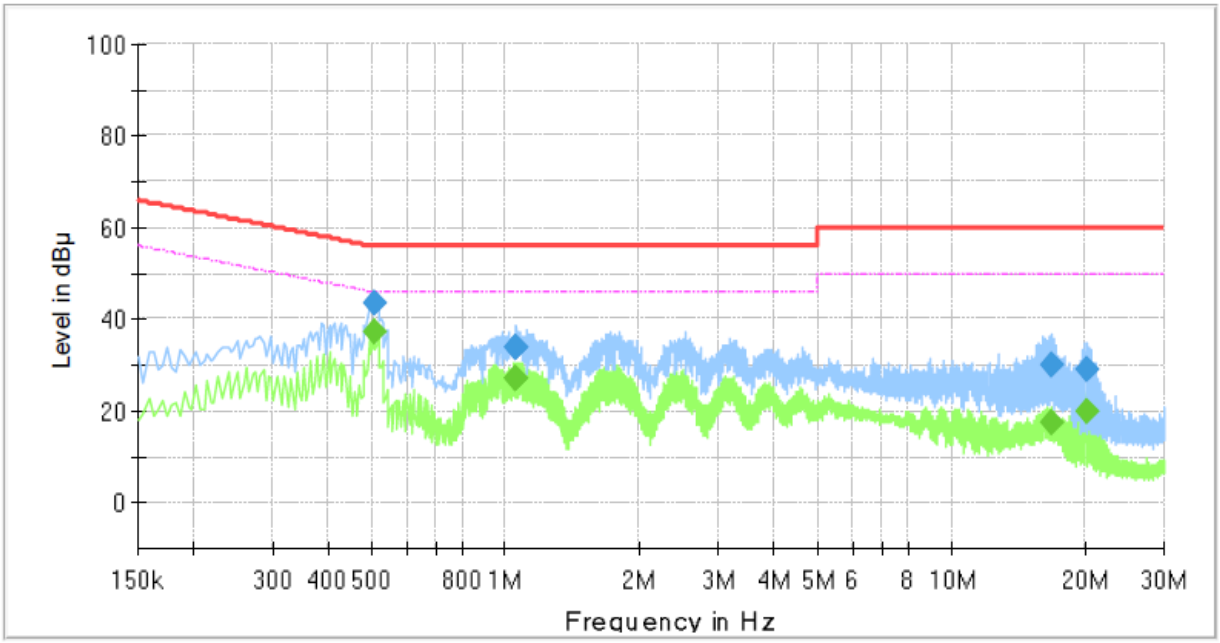
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.502000	---	41.27	46.00	4.73	1000.0	9.000	L1	19.7
0.502000	49.06	---	56.00	6.94	1000.0	9.000	L1	19.7
0.510000	---	41.96	46.00	4.04	1000.0	9.000	L1	19.7
0.510000	49.90	---	56.00	6.10	1000.0	9.000	L1	19.7
1.062000	---	32.08	46.00	13.92	1000.0	9.000	L1	20.1
1.062000	39.96	---	56.00	16.04	1000.0	9.000	L1	20.1
1.882000	---	29.18	46.00	16.82	1000.0	9.000	L1	20.3
1.882000	37.97	---	56.00	18.03	1000.0	9.000	L1	20.3
16.330000	---	31.45	50.00	18.55	1000.0	9.000	L1	19.9
16.330000	40.99	---	60.00	19.01	1000.0	9.000	L1	19.9
16.550000	---	30.55	50.00	19.45	1000.0	9.000	L1	19.9
16.550000	40.37	---	60.00	19.63	1000.0	9.000	L1	19.9

NEUTRAL LINE

Common Information

Test Description:	Conducted Emission
Model No.:	InBirdie TEMPO Plus
Phase:	N
Mode:	
Operator Name:	KES

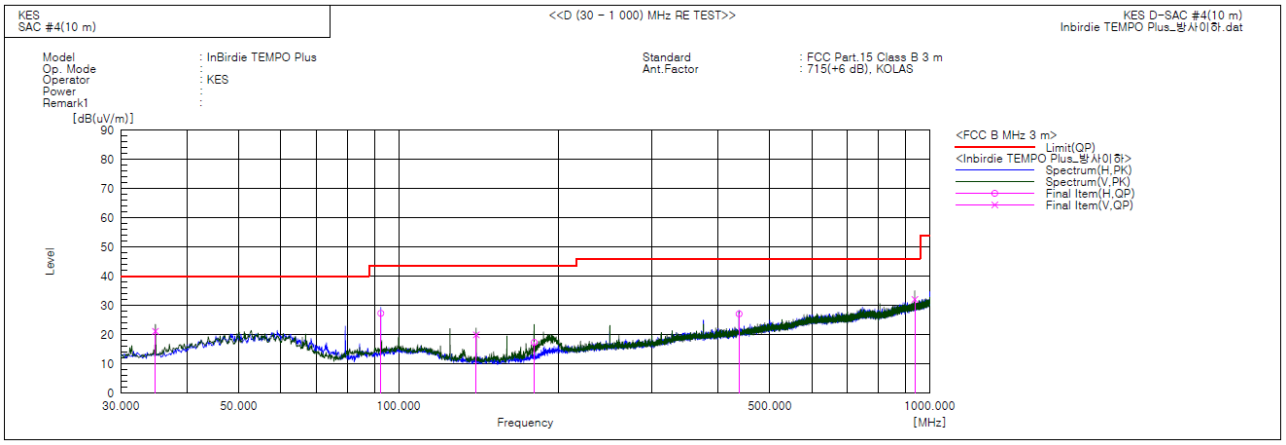


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.506000	---	37.24	46.00	8.76	1000.0	9.000	N	19.7
0.506000	43.68	---	56.00	12.32	1000.0	9.000	N	19.7
1.054000	---	27.12	46.00	18.88	1000.0	9.000	N	20.1
1.054000	33.75	---	56.00	22.25	1000.0	9.000	N	20.1
1.058000	---	27.11	46.00	18.89	1000.0	9.000	N	20.1
1.058000	33.76	---	56.00	22.24	1000.0	9.000	N	20.1
16.702000	---	17.73	50.00	32.27	1000.0	9.000	N	19.9
16.702000	30.16	---	60.00	29.84	1000.0	9.000	N	19.9
20.090000	---	20.06	50.00	29.94	1000.0	9.000	N	20.2
20.090000	29.17	---	60.00	30.83	1000.0	9.000	N	20.2

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

Radiated Electric Field Emissions(Below 1 ㎓)



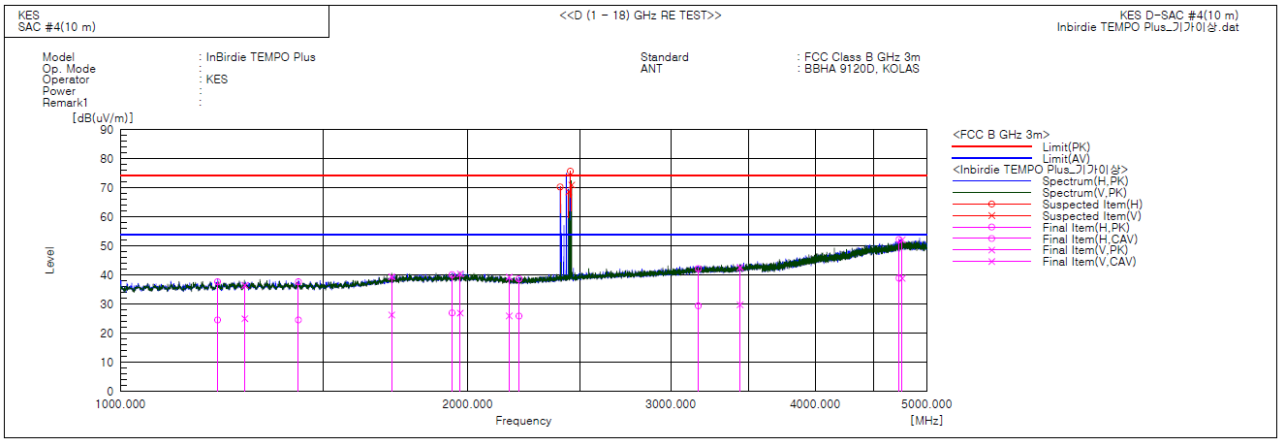
Final Result

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	34.850	V	46.0	-24.8	21.2	40.0	18.8	100.0	5.0	
2	92.565	H	51.4	-24.1	27.3	43.5	16.2	306.0	42.0	
3	139.974	V	45.9	-25.9	20.0	43.5	23.5	101.0	1.0	
4	179.986	H	41.5	-24.1	17.4	43.5	26.1	400.0	119.0	
5	437.521	H	41.4	-14.3	27.1	46.0	18.9	395.0	359.0	
6	937.556	V	37.2	-5.1	32.1	46.0	13.9	185.0	167.0	

♦ Calculation – SAC #4(10 m)
Result(QP) [㏈(㎶/m)] = (Reading(QP)[㏈(㎶)] + c.f[㏈(1/m)]
Margin(QP)[㏈] = Limit[㏈(㎶/m)] - Result(QP) [㏈(㎶/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

Radiated Electric Field Emissions(Above 1 ㎓)

- (1 ~ 5) ㎓

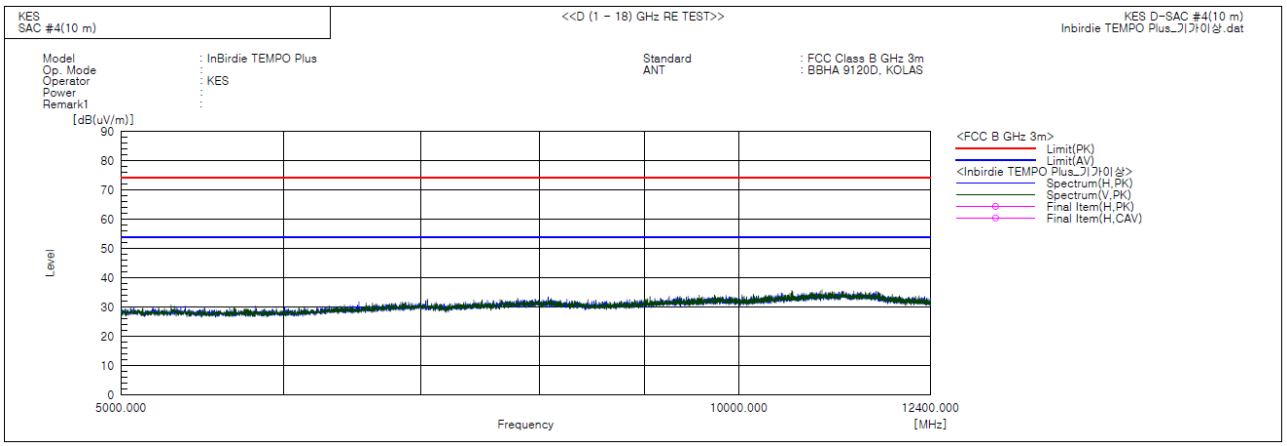


Final Result

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	1214.156	H	42.7	29.6	-5.0	37.7	24.6	74.0	54.0	36.3	29.4	302.0	100.0	
2	1281.696	V	41.2	29.7	-4.7	36.5	25.0	74.0	54.0	37.5	29.0	195.0	157.0	
3	1426.556	H	41.8	28.7	-4.1	37.7	24.6	74.0	54.0	36.3	29.4	400.0	204.0	
4	1718.046	V	40.7	27.6	-1.3	39.4	26.3	74.0	54.0	34.6	27.7	105.0	290.0	
5	1938.652	H	40.4	27.3	-0.3	40.1	27.0	74.0	54.0	33.9	27.0	395.0	342.0	
6	1970.566	V	40.6	27.1	-0.2	40.4	26.9	74.0	54.0	33.6	27.1	192.0	113.0	
7	2172.117	V	39.8	26.5	-0.5	39.3	26.0	74.0	54.0	34.7	28.0	185.0	56.0	
8	2215.884	H	39.2	26.4	-0.5	38.7	25.9	74.0	54.0	35.3	28.1	306.0	85.0	
9	3168.125	H	38.0	25.2	4.2	42.2	29.4	74.0	54.0	31.8	24.6	385.0	40.0	
10	3443.345	V	37.3	24.5	5.3	42.6	29.8	74.0	54.0	31.4	24.2	181.0	161.0	
11	4729.502	H	37.1	23.8	15.1	52.2	38.9	74.0	54.0	21.8	15.1	311.0	242.0	
12	4760.699	V	36.8	23.5	15.3	52.1	38.8	74.0	54.0	21.9	15.2	100.0	271.0	
13	2405.500	H	--------	--------	0.6	--------	--------	74.0	54.0	--------	--------	200.0	290.0	
14	2446.500	V	--------	--------	0.8	--------	--------	74.0	54.0	--------	--------	200.0	342.0	
15	2454.500	H	--------	--------	0.8	--------	--------	74.0	54.0	--------	--------	100.0	219.0	
16	2461.000	V	--------	--------	0.8	--------	--------	74.0	54.0	--------	--------	200.0	131.0	

* Mode Exclusion bands
- Fundamental Frequency: 2.4 ㎓ Band

- (5 ~ 12.4) ㎓



* No Spurious emission were dectected above 5 ㎓.

♦ 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 - Preamp Factor), Margin: Margin value