



EMC TEST REPORT For FCC

Test Report No. : KES-EM-22T0411
Date of Issue : May. 25, 2022
Product name : T-BOX FIT V1
Model/Type No. : T-BOX FIT V1
Variant Model : -
Applicant : The better exercise Co., Ltd
Applicant Address : 302 3F, 204 Convensia-daero, Yeonsu-gu, Incheon, Republic of Korea
Manufacturer : The better exercise Co., Ltd
Manufacturer Address : 302 3F, 204 Convensia-daero, Yeonsu-gu, Incheon, Republic of Korea
FCC ID : 2A6UC-TBOXFITV1
Date of Receipt : May. 12, 2022
Test date : May. 17, 2022
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

Dong Jun, Shin
EMC Test Engineer

Reviewed by

Dong Hun, Jang
EMC Technical Manager

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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
May. 25, 2022	KES-EM-22T0411	Issued

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1.0 General Product Description

Main Specifications of EUT are:

Division	Description
Wireless Operating Frequency	Bluetooth
Dimensions	(700 x 200 x 150) mm
Weight	5 kg
Smart speaker	Ble 4.0 / 3 w / built-in speaker 4 EA
Smart lighting	Ble 4.0 / 3 w / built-in LED 4 EA
Smart scale	Ble 4.0 / scale 150 kg
Application	Android 5.0 / IOS 10.0
Power	Charging : DC 5 V, 3 A (Adapter) Operating : DC 3.7 V, 3 500 mA (Battery 5 x EA)
Port	DC Jack
Components	EUT 1 EA / Adapter 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
T-BOX FIT V1	T-BOX FIT V1	-	The better exercise Co., Ltd	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Adapter	KS39DU-0500300CK	-	Shenzhen Keysun Technology Limited	-
Smart Phone	SM-A720S	-	Samsung	-

1.6 External I/O Cabling

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
T-BOX FIT V1 (EUT)	DC Jack	Adapter (EUT)	DC Jack	1.2	U
	Wireless	Smart Phone	Wireless	-	-

* Unshielded = U, Shielded = S

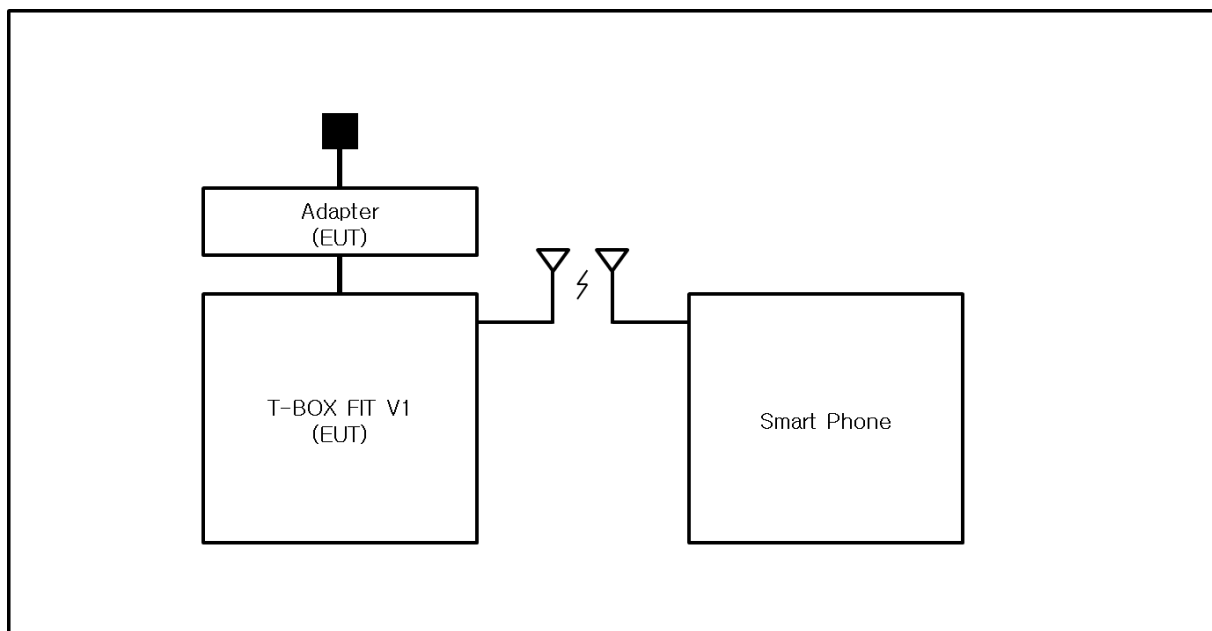
1.7 EUT Operating Mode(s)

Test mode	operating
Operating	The EUT was connected to a smart phone using Bluetooth wireless communication and then Communication between EUT and phone was confirmed using the 'T-Box Fit' program and 1 kHz tone.

EUT Test operating S/W		
Name	Version	Manufacture Company
T-Box Fit	1.2.2	-

1.8 Configuration

■ AC Main
 □ DC Main



EUT – Smart Phone : Bluetooth

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. 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 C63.4-2014 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	 23298-1
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



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

May. 17, 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

Test Conditions

Temperature: (23,7 ± 0,1) °C
Relative Humidity: (43,0 ± 0,1) % 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.



2.2 Radiated Electric Field Emissions(Below 1 GHz)

Test Date

May. 17, 2022

Test Location

☐ OPEN AREA TEST SITE #2

☒ 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
☒	BILOG ANTENNA	VULB 9168	SCHWARZBECK	9168-461	04, 27, 2024	2 Year
☒	AMPLIFIER	310N	SONOMA INSTRUMENT	401123	06, 07, 2022	1 Year
☒	ATTENUATOR	6806.17.A	HUBER+SUHNER	-	04, 01, 2023	1 Year

Test Conditions

Temperature: (22,9 ± 0,1) °C

Relative Humidity: (42,4 ± 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.



2.3 Radiated Electric Field Emissions(Above 1 GHz)

Test Date

May. 17, 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
☒	ATTENUATOR	8491A	HP	35496	03, 08, 2023	1 Year

Test Conditions

Temperature: (22,9 ± 0,1) °C

Relative Humidity: (42,4 ± 0,1) % R.H.

Frequency Range of Measurement

1 GHz to 12,5 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.



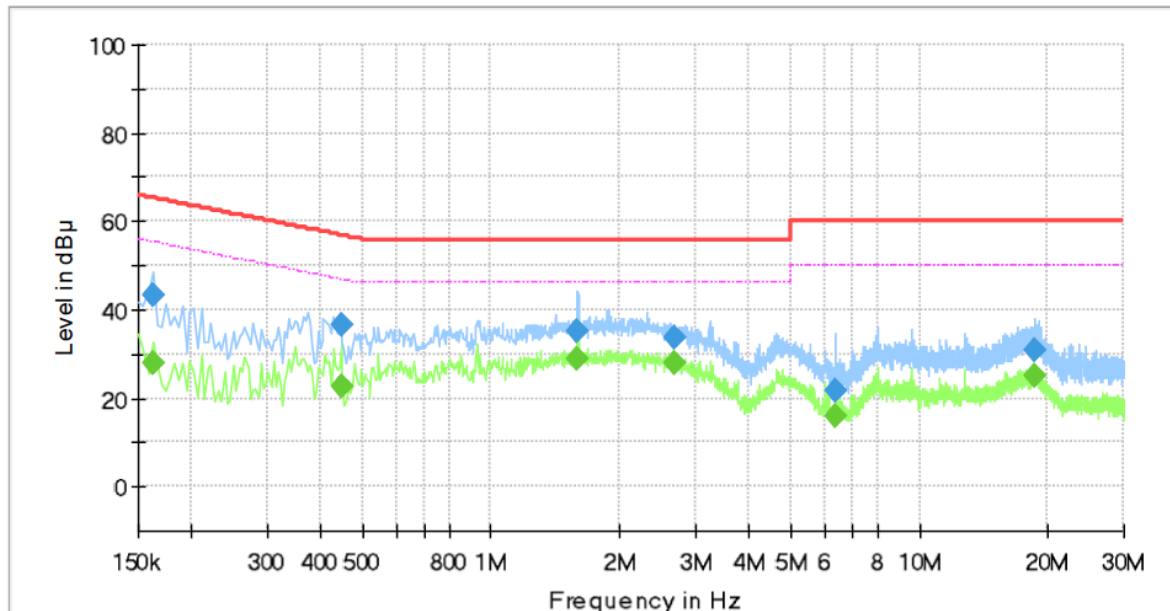
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description: Conducted Emission
Model No.: T-BOX FIT V1
Phase:
Mode: L1
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.162000	43.55	---	65.36	21.81	1000.0	9.000	L1	19.6
0.162000	---	28.17	55.36	27.19	1000.0	9.000	L1	19.6
0.446000	36.46	---	56.95	20.49	1000.0	9.000	L1	19.8
0.446000	---	22.90	46.95	24.05	1000.0	9.000	L1	19.8
1.594000	35.28	---	56.00	20.72	1000.0	9.000	L1	20.4
1.594000	---	28.68	46.00	17.32	1000.0	9.000	L1	20.4
2.666000	---	27.97	46.00	18.03	1000.0	9.000	L1	20.4
2.666000	33.68	---	56.00	22.32	1000.0	9.000	L1	20.4
6.374000	---	16.12	50.00	33.88	1000.0	9.000	L1	19.8
6.374000	21.87	---	60.00	38.13	1000.0	9.000	L1	19.8
18.538000	---	25.17	50.00	24.83	1000.0	9.000	L1	20.7
18.538000	30.79	---	60.00	29.21	1000.0	9.000	L1	20.7

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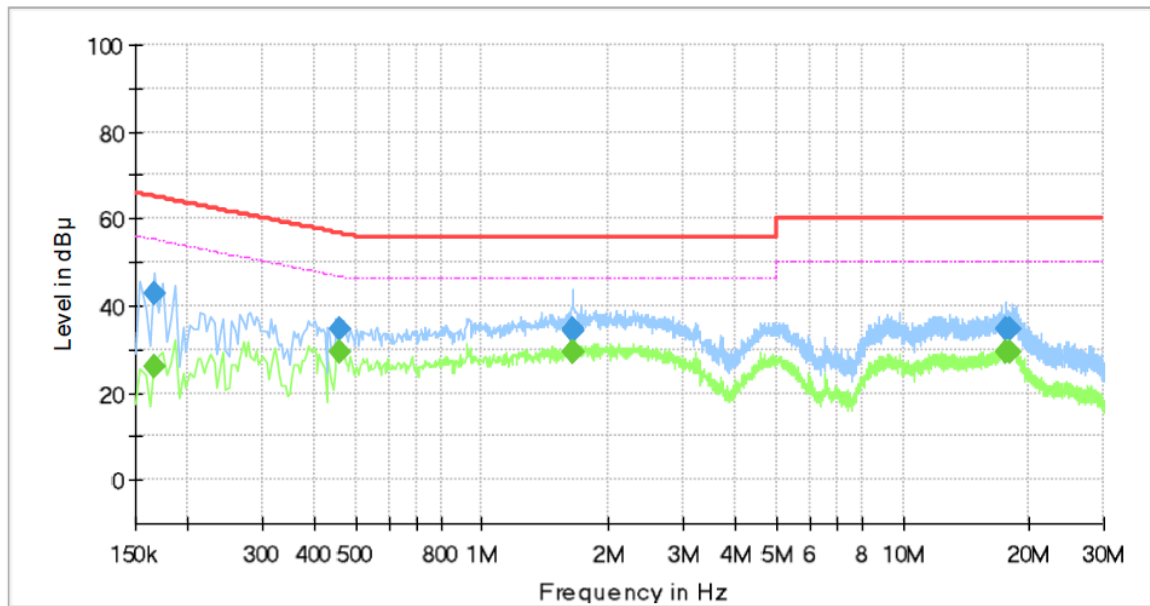
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NEUTRAL LINE

Common Information

Test Description: Conducted Emission
Model No.: T-BOX FIT V1
Phase:
Mode: N
Operator Name: KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.166000	---	26.06	55.16	29.10	1000.0	9.000	N	19.5
0.166000	42.93	---	65.16	22.23	1000.0	9.000	N	19.5
0.458000	---	29.37	46.73	17.36	1000.0	9.000	N	19.8
0.458000	34.90	---	56.73	21.83	1000.0	9.000	N	19.8
1.642000	---	29.37	46.00	16.63	1000.0	9.000	N	20.4
1.642000	34.38	---	56.00	21.62	1000.0	9.000	N	20.4
1.646000	---	29.38	46.00	16.62	1000.0	9.000	N	20.4
1.646000	34.47	---	56.00	21.53	1000.0	9.000	N	20.4
17.490000	---	29.23	50.00	20.77	1000.0	9.000	N	20.6
17.490000	34.46	---	60.00	25.54	1000.0	9.000	N	20.6
17.922000	---	29.39	50.00	20.61	1000.0	9.000	N	20.7
17.922000	34.73	---	60.00	25.27	1000.0	9.000	N	20.7

◆ 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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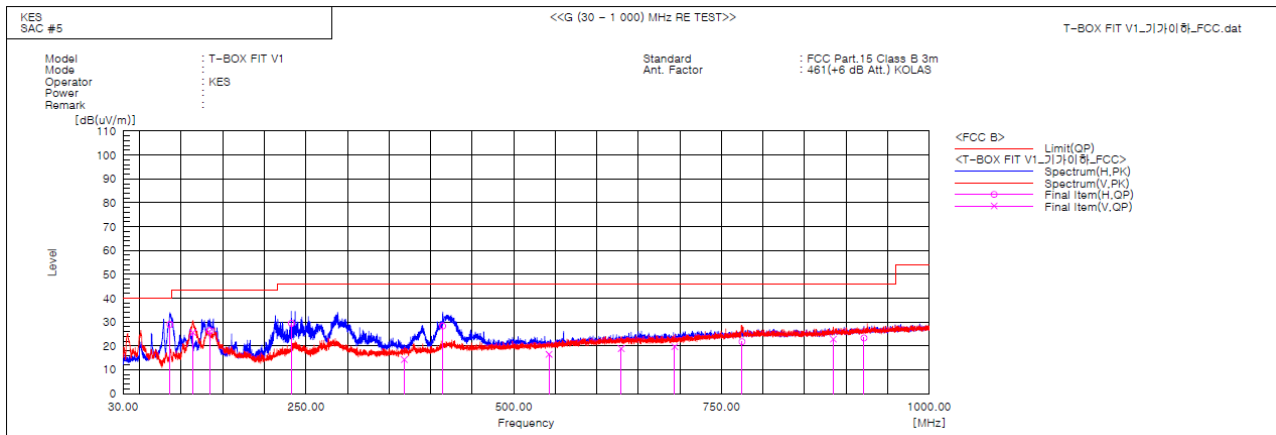


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Radiated Electric Field Emissions(Below 1 GHz)



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	86.503	H	47.2	-18.2	29.0	40.0	11.0	319.0	10.1	
2	113.905	V	41.8	-16.2	25.6	43.5	17.9	122.0	163.5	
3	134.033	H	40.2	-13.8	26.4	43.5	17.1	318.0	182.2	
4	232.488	H	44.2	-14.7	29.5	46.0	16.5	249.0	314.4	
5	368.288	V	24.9	-10.6	14.3	46.0	31.7	141.0	41.6	
6	414.605	H	37.5	-9.2	28.3	46.0	17.7	281.0	117.5	
7	542.524	V	23.3	-6.8	16.5	46.0	29.5	103.0	277.3	
8	629.460	V	23.7	-4.8	18.9	46.0	27.1	108.0	181.1	
9	693.601	V	23.8	-4.1	19.7	46.0	26.3	126.0	13.3	
10	774.718	H	23.5	-1.7	21.8	46.0	24.2	224.0	356.8	
11	884.449	V	23.3	-0.4	22.9	46.0	23.1	153.0	0.9	
12	921.430	H	22.6	0.7	23.3	46.0	22.7	352.0	264.9	

◆ Calculation

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 - Preamp Factor), Margin: Margin value

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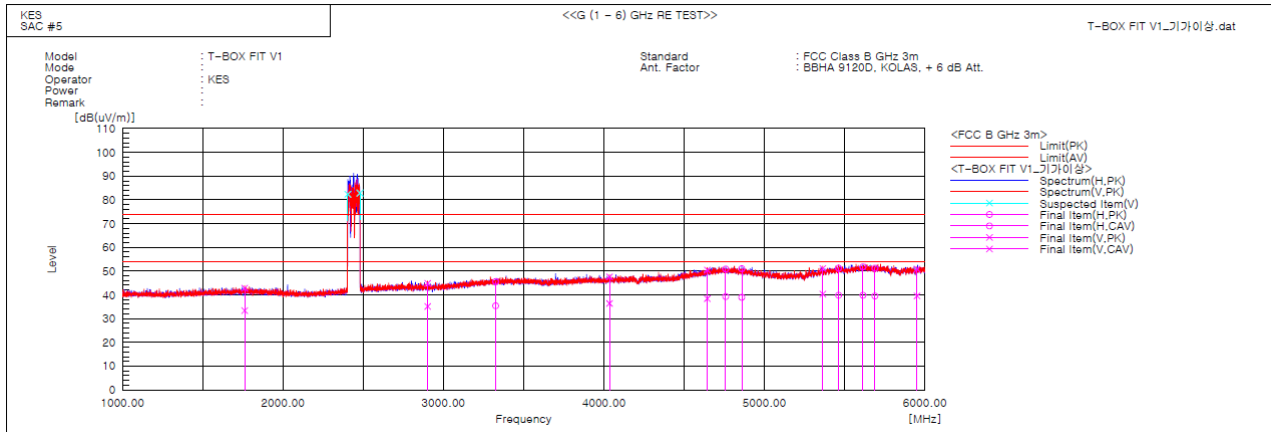
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Radiated Electric Field Emissions(Above 1 GHz)

- (1 ~ 6) 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	1760.492	V	40.7	31.2	2.2	42.9	33.4	74.0	54.0	31.1	20.6	137.0	1.6	
2	2900.792	V	38.1	28.4	6.8	44.9	35.2	74.0	54.0	29.1	18.8	141.0	197.9	
3	3324.973	H	37.9	27.7	7.7	45.6	35.4	74.0	54.0	28.4	18.6	249.0	233.0	
4	4034.082	V	38.3	27.1	9.3	47.6	36.4	74.0	54.0	26.4	17.6	341.0	172.1	
5	4643.307	V	38.6	26.5	11.9	50.5	38.4	74.0	54.0	23.5	15.6	279.0	337.1	
6	4758.681	H	38.4	26.8	12.5	50.9	39.3	74.0	54.0	23.1	14.7	276.0	161.7	
7	4858.710	H	38.2	26.2	12.8	51.0	39.0	74.0	54.0	23.0	15.0	392.0	124.6	
8	5363.484	V	36.7	26.0	14.4	51.1	40.4	74.0	54.0	22.9	13.6	121.0	72.6	
9	5462.287	H	36.9	25.4	14.4	51.3	39.8	74.0	54.0	22.7	14.2	296.0	232.5	
10	5613.418	H	37.6	25.6	14.2	51.8	39.8	74.0	54.0	22.2	14.2	268.0	14.4	
11	5688.073	H	37.1	25.3	14.2	51.3	39.5	74.0	54.0	22.7	14.5	342.0	151.3	
12	5950.166	V	36.2	24.9	14.7	50.9	39.6	74.0	54.0	23.1	14.4	142.0	171.0	
13	2403.125	V			4.5			74.0	54.0			99.8	347.5	
14	2478.750	V			4.9			74.0	54.0			149.9	2.7	

* Exclusion Bands

- Fundamental Frequency: 2.4 GHz Band

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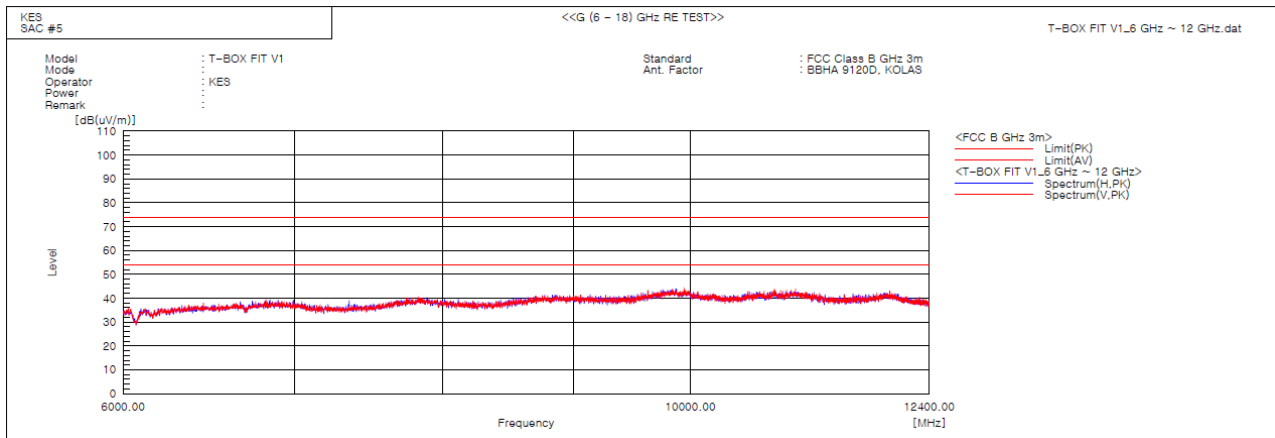


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- (6 ~ 12.5) GHz



- No spurious emission were detected above 5 GHz.

◆ Calculation

$$\text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})] = (\text{Reading(PK/CAV)}[\text{dB}(\mu\text{V})] + \text{c.f}[\text{dB}(1/\text{m})])$$

$$\text{Margin(PK/CAV)}[\text{dB}] = \text{Limit}[\text{dB}(\mu\text{V/m})] - \text{Result(PK/CAV)} [\text{dB}(\mu\text{V/m})]$$

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

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