Nemko Korea Co., Ltd.

(Designation Number : KR0026)

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPUBLIC OF
TEL : + 82 31 330 1700 FAX : + 82 31 322 2332

Declaration of Conformity

Applicant :

ANAM ELECTRONICS CO., LTD.
27, Digital-ro 27ga-gil, Guro-gu, Seoul, Korea
Attn : Mr. Byeongseob Lee

Dates of Issue : September 07, 2017
Test Report No. : NK-17-E-0586
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

Model	***DSB150BT***
Trade mark	**DENON**
Contact Person	**27, Digital-ro, 27ga-gil, Guro-gu, Seoul, Korea** **Mr. Byeongseob Lee** **Telephone No. : + 82 2 6424 4881**

Applied Standard : FCC Part 15 Subpart B & Part 2, ICES-003
Classification : FCC Class B Device
EUT Type : BT SPEAKER

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014.
The test results of this report are deemed satisfactory evidence of compliance with Industry Canada Interference-causing Equipment Standard ICES-003.
I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Sep 07. 2017
Tested By : Doseung Shin
Engineer

Sep. 07. 2017
Reviewed By : Changsoo Choi
Technical Manager

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DUTIES OF THE RESPONSIBLE PARTY

For DECLARATION of CONFORMITY (DoC)

The responsible party upon signing or accepting the Declaration of Conformity as specified in Section 2.906 of the FCC Rules hereby agrees to the duties listed below.

§2.1073(a).
The responsible party warrants that each unit of equipment marketed under DoC is identical to the unit tested and found acceptable with the standards and that the records maintained by the responsible party continue to reflect the equipment being produced is within the variation that can be expected due to quantity production and testing on a statistical basis.

§2.1073(b).
The responsible party must have a written statement from the manufacturer or accredited test laboratory that the equipment complies with the appropriate technical standards.

§2.1073(c).
In case of transfer of control of equipment, as in the case of sale or merger, the new responsible party shall bear the responsibility of continued compliance of the equipment.

§2.1073(d).
Equipment shall be retested if any modifications or changes are made that could adversely affect the emanation characteristics of the equipment.

§2.1073(e).
If any modifications or changes made by anyone other than the responsible party, the party making the modifications or changes, if located within the U.S., becomes the new responsible party. The new responsible party must comply with all provisions for the DoC, including having test data on file demonstrating that the product continues to comply with all of the applicable technical standards.

§2.1075(a)(1).
The responsible party shall maintain records of the original design drawings and specifications and all changes mode to the product that may affect compliance.

§2.1075(a)(2).
The responsible party shall maintain records of the procedures used for production inspection and testing to insure the conformance with the FCC Rules.

§2.946(a)(1).
The test report data shall be provided to the FCC within 14 days of delivery of request. The test sample(s) shall be provided within 60 days of delivery of request.

§2.946(b).
In case involving harmful interference or safety of life or property, the production sample must be provided within 60 days, but not less than 14 days. Failure to comply with such a request with the time frame shown may be cause for forfeiture, pursuant to Section 1.80 of Part 1 of the FCC Rules.

※The Responsible Party is the manufacturer, system integrator, or the importer as defined in Section 2.909 of the FCC Rules. The Responsible Party for a DoC must be located within the United States as specified in Section 2.1077.

SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

Responsible Party :	ANAM ELECTRONICS CO., LTD.
Contact Person :	Mr. Byeongseob Lee Tel No.: + 82 2 6424 4881
Manufacturer :	D&M HOLDINGS INC. D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa-ken, 210-8569, JAPAN

- Model: DSB150BT
- EUT Type: BT SPEAKER
- Trade Mark: DENON
- Electric Rating: d.c. 5 V, 2.1 A
- I/O Port: Micro USB (1 EA), AUX (1 EA)
- Classification: FCC Class B Device
- Applied Standard: FCC Part 15 Subpart B & Part 2, ICES-003
- Test Procedure(s): ANSI C63.4 (2014)
- Dates of Test: July 17, 2017 to August 11, 2017
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-17-E-0586

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 ㎑ to 40 ㎓ (ANSI C63.4-2014) was used in determining radiated and conducted emissions emanating from **ANAM ELECTRONICS CO., LTD.**
MODEL : **DSB150BT, BT SPEAKER.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory***.
The site address is 155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPUBLIC OF
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18 miles) south-southeast from central Seoul.
The Nemko Korea Co., Ltd. has been accredited as a Conformity Assessment Body (CAB).

Nemko Korea Co., Ltd.
155 & 159, Osan-Ro, Mohyeon-Myeon,
Cheoin-Gu, Yongin-Si, Gyeonggi-Do
16885 KOREA, REPUBLIC OF
Tel) + 82 31 330 1700
Fax) + 82 31 322 2332

Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test

AUX mode (1 ㎑ Audio Playback)	Bluetooth mode (1 ㎑ Audio Playback)

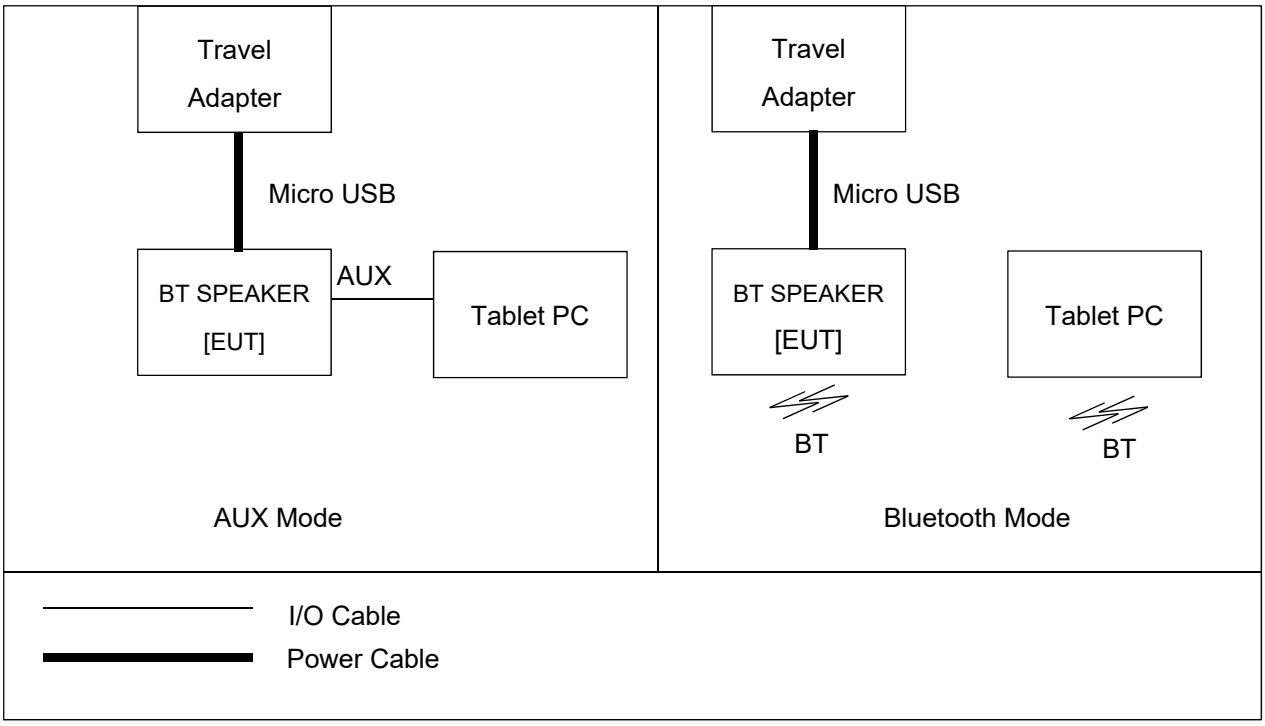
Support Equipment

BT SPEAKER (EUT)	D&M HOLDINGS INC. Model : DSB150BT 0.45 m shielded Micro USB cable 1.5 m shielded AUX cable	FCC DOC S/N : N/A
Tablet PC	SAMSUNG Model : SM-P900	S/N : N/A
Travel Adapter	Weihai Sunlin Electronics Co., Ltd Model : MCS-01KR	S/N : N/A

Component List

Item	Model	Manufacturer	Serial Number
MAIN PCB	CUP12944Z	ANAM Electronics Vietnam Co., Ltd.	N/A
KEY PCB	CUP12945Z	ANAM Electronics Vietnam Co., Ltd.	N/A
BT Module	CNVBTMC6R24-DSB150	FIHONEST TECHNOLOGY CO.	N/A

Setup Drawing



SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Conducted Emission	15.107(a)	Complies	
Radiated Emission	15.109(a)	Complies	Below 1 ㎓
Radiated Emission	15.109(a)	Complies	Above 1 ㎓

RECOMMENDATION/CONCLUSION

The data collected shows that the **ANAM ELECTRONICS CO., LTD.**
MODEL : DSB150BT, BT SPEAKER.
The highest emission observed was at **3.79** ㎒ for conducted emissions with a AV margin of **8.0** ㏈, at **30.59** ㎒ for radiated emissions with a QP margin of **7.21** ㏈.

SAMPLE CALCULATION

$$dB\mu V = 20 \log_{10} (\mu V/m)$$

$$\mu V = 10^{(dB\mu V/20)}$$

EX. 1.

@165.0 ㎒ Class B limit = 100 ㎶/m = 40.0 ㏈㎶/m

Reading = 38.2 ㏈㎶(calibrated level)
Antenna factor + Cable Loss + Amplifier Gain = -12.9 ㏈
Total = 25.30 ㏈㎶/m
Margin = 40.0 – 25.30 = 14.70
14.70 ㏈ below the limit

DESCRIPTION OF TESTS

Conducted Emissions

The Line conducted emission test facility is located inside a (4 x 7 x 2.5) m shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 0.5 m away from the side of wall of the shielded room Rohde & Schwarz (ENV216) and Rohde & Schwarz (ESH2-Z5) of the 50 ohm / 50 uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz (ENV216) LISN and the support equipment is powered from the Rohde & Schwarz (ESH2-Z5) LISN.
Power to the LISN s are filtered by high-current high insertion loss power line filters.
The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2 ”.
If d.c. power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs,
All interconnecting cables more than 1 m were shortened by non-inductive bundling (serpentine fashion) to a 1 m length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150 ㎑ to 30 ㎒ with 20 ms sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCI).
The detector functions were set to quasi-peak mode & average mode.
The bandwidth of receiver was set to 9 ㎑. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux a.c. outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

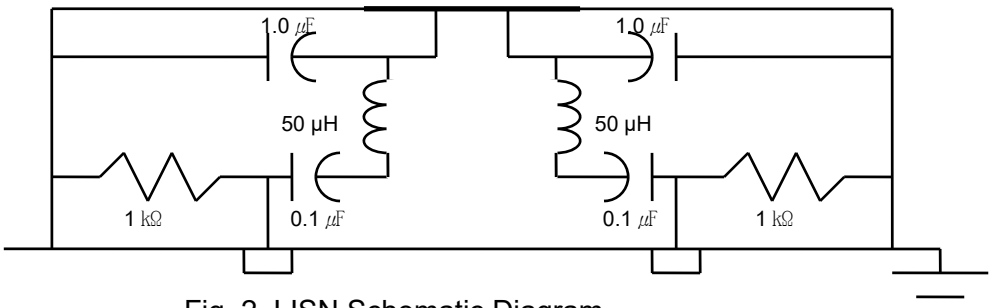


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Measurement were made indoors at 10 m & 3 m using antenna, signal conditioning unit and EMI test receiver to determine the frequency producing the maximum EME.
Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found.
The test receiver was scanned from 30 ㎒ to 1 000 ㎒ using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163). Above 1 ㎓, Double Ridged Broadband Horn Antenna (Schwarzbeck, HF907) was used.
The test equipment was placed on a wooden table.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
Each frequency found during scan measurements was reexamined and investigated using EMI test receiver. (ESW 8 (Below 1 ㎓), ESU 40(Above 1 ㎓)).
The detector function were set to CISPR quasi-peak and peak mode and the bandwidth of the receiver were set to 120 ㎑ and 1 ㎒ depending on the frequency or type of signal.
The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non- metallic 1.0 m x 1.5 m table.
The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.
The turn table containing the Technology was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux a.c. outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the R/S signal generator.

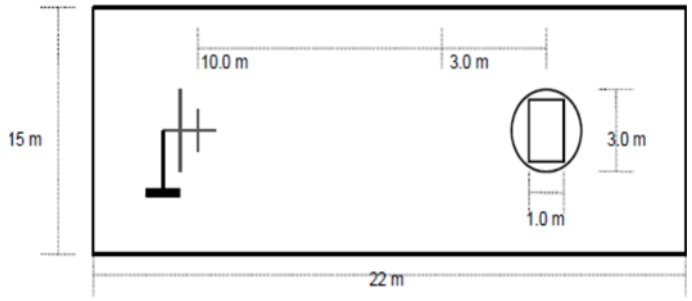


Fig. 3. Dimensions of 10 semi anechoic chamber

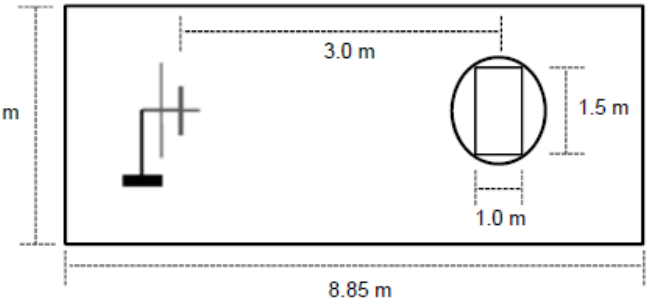


Fig. 4. Dimensions of 3 m full anechoic chamber

TEST DATA

Conducted Emissions

[AUX mode]

EMI Auto Test(1) 1 / 2

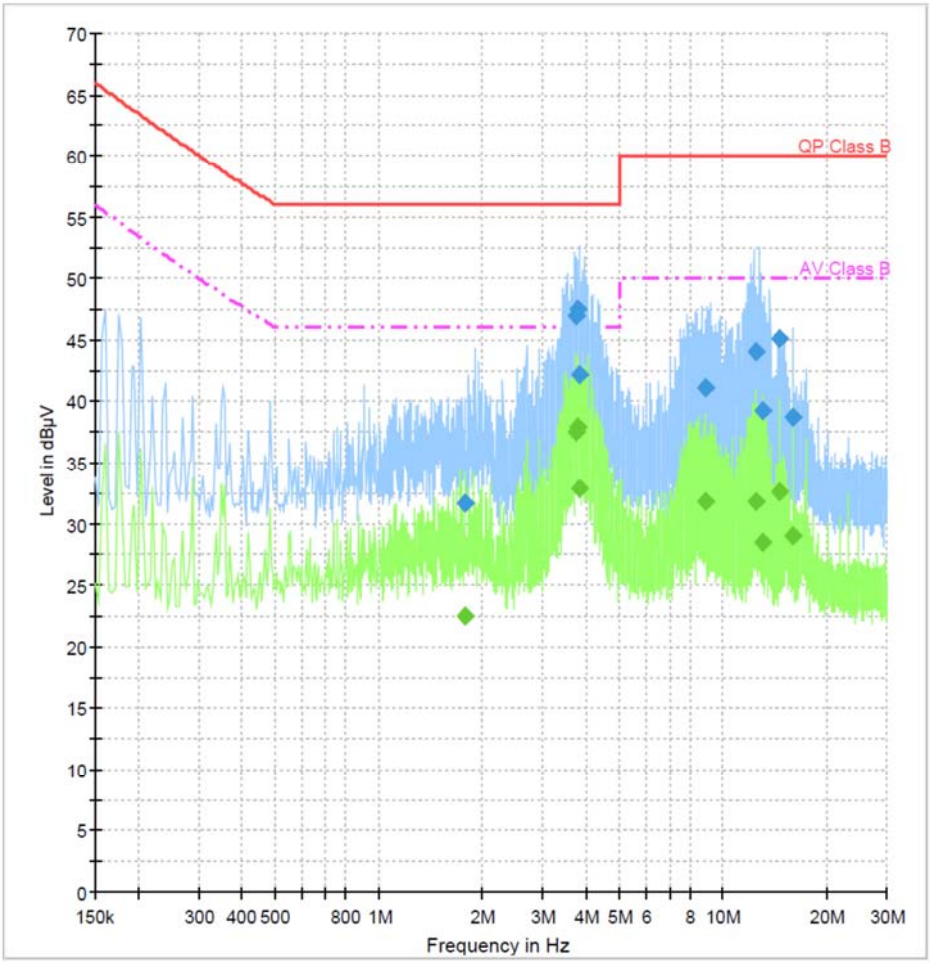
Test Report

Common Information

Test Site:	Nemko Korea(NK-17-E-0586)
Test Description:	Conducted emission
Test Standard:	FCC Part 15 Subpart B Class B
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung,Shin
	Charging & AUX mode

1.EMI Auto Test_2-Line Voltage LISN

1.EMI Auto Test_2-Line Voltage LISN



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EMI Auto Test(1) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.784288	31.7	15000.0	9.000	On	L1	9.8	24.3	56.0	
3.761850	47.0	15000.0	9.000	On	N	9.9	9.0	56.0	
3.791700	47.5	15000.0	9.000	On	N	9.9	8.5	56.0	
3.825281	42.2	15000.0	9.000	On	L1	9.9	13.8	56.0	
8.877394	41.2	15000.0	9.000	On	N	10.1	18.8	60.0	
12.451931	44.1	15000.0	9.000	On	N	10.1	15.9	60.0	
13.075050	39.2	15000.0	9.000	On	N	10.2	20.8	60.0	
14.533969	45.2	15000.0	9.000	On	N	10.2	14.8	60.0	
15.985425	38.8	15000.0	9.000	On	N	10.2	21.2	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.784288	22.5	15000.0	9.000	On	L1	9.8	23.5	46.0	
3.761850	37.6	15000.0	9.000	On	N	9.9	8.4	46.0	
3.791700	38.0	15000.0	9.000	On	N	9.9	8.0	46.0	
3.825281	32.8	15000.0	9.000	On	L1	9.9	13.2	46.0	
8.877394	31.8	15000.0	9.000	On	N	10.1	18.2	50.0	
12.451931	31.8	15000.0	9.000	On	N	10.1	18.2	50.0	
13.075050	28.4	15000.0	9.000	On	N	10.2	21.6	50.0	
14.533969	32.6	15000.0	9.000	On	N	10.2	17.4	50.0	
15.985425	29.0	15000.0	9.000	On	N	10.2	21.0	50.0	

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Table 1. Line Conducted Emissions Tabulated Data

[Bluetooth mode]

EMI Auto Test(1) 1 / 2

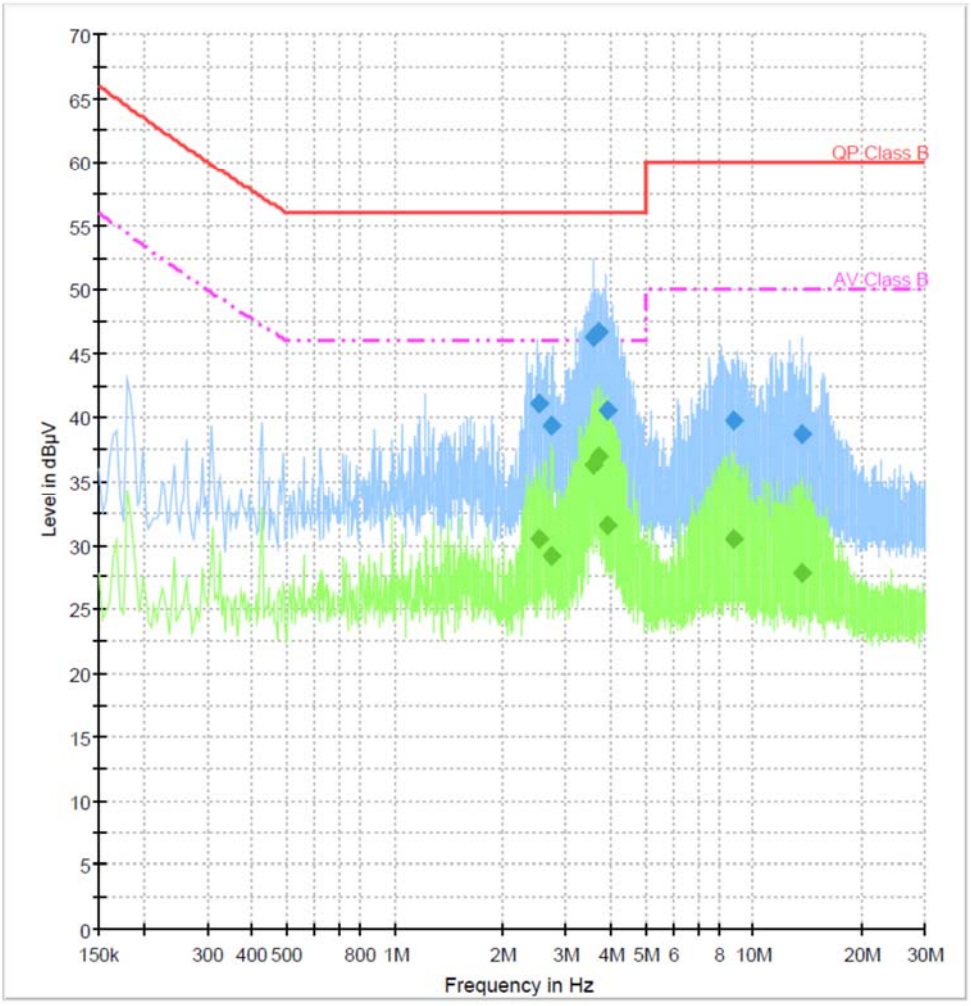
Test Report

Common Information

Test Site:	Nemko Korea(NK-17-E-0586)
Test Description:	Conducted emission
Test Standard:	FCC Part 15 Subpart B Class B
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung,Shin
	Charging & BT mode

1.EMI Auto Test_2-Line Voltage LISN

1.EMI Auto Test_2-Line Voltage LISN



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EMI Auto Test(1) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
2.515612	41.1	15000.0	9.000	On	N	9.8	14.9	56.0	
2.728294	39.4	15000.0	9.000	On	N	9.8	16.6	56.0	
3.575288	46.4	15000.0	9.000	On	N	9.9	9.6	56.0	
3.720806	46.7	15000.0	9.000	On	N	9.9	9.3	56.0	
3.899906	40.6	15000.0	9.000	On	L1	9.9	15.4	56.0	
8.836350	39.8	15000.0	9.000	On	N	10.1	20.2	60.0	
13.690706	38.8	15000.0	9.000	On	N	10.2	21.2	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
2.515612	30.4	15000.0	9.000	On	N	9.8	15.6	46.0	
2.728294	29.1	15000.0	9.000	On	N	9.8	16.9	46.0	
3.575288	36.4	15000.0	9.000	On	N	9.9	9.6	46.0	
3.720806	37.0	15000.0	9.000	On	N	9.9	9.0	46.0	
3.899906	31.5	15000.0	9.000	On	L1	9.9	14.5	46.0	
8.836350	30.4	15000.0	9.000	On	N	10.1	19.6	50.0	
13.690706	27.9	15000.0	9.000	On	N	10.2	22.1	50.0	

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Table 2. Line Conducted Emissions Tabulated Data

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.

2. All modes of operation were investigated and the worst -case emission are reported.
See attached Plots.

3. LINE : L1 = Line , N = Neutral

4. The limit for Class B device is on the FCC Part section 15.107(a).

Tested by : Doseung Shin

TEST DATA

Radiated Emissions (Below 1 ㎓)

[AUX mode]

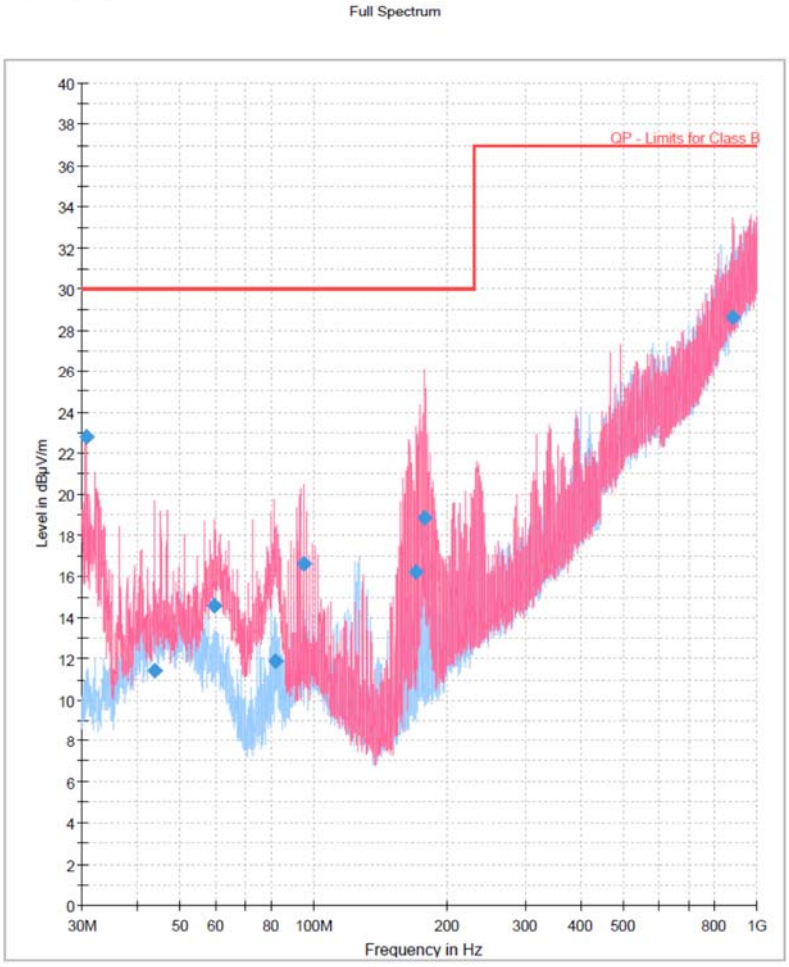
EMI Auto Test(1) 1 / 2

Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0586)
Test Site :	Nemko 10 m Chamber
Test Standard :	FCC Part 15 Subpart B Class B
Environment Conditions :	a.c. 120 V, 60 Hz
Operator Name :	Doseung Shin
	Charging & AUX mode

Full Spectrum



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EMI Auto Test(1) 2 / 2

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.594263	22.79	30.00	7.21	15000.0	120.000	198.0	V	189.0	-24.8
43.618567	11.40	30.00	18.60	15000.0	120.000	330.0	V	33.0	-21.4
59.697053	14.56	30.00	15.44	15000.0	120.000	400.0	V	226.0	-22.5
81.742673	11.89	30.00	18.11	15000.0	120.000	170.0	V	307.0	-27.1
94.659533	16.60	30.00	13.40	15000.0	120.000	270.0	V	270.0	-23.1
170.479287	16.23	30.00	13.77	15000.0	120.000	106.0	V	252.0	-24.4
177.695027	18.84	30.00	11.16	15000.0	120.000	106.0	V	226.0	-23.9
883.616360	28.64	37.00	8.36	15000.0	120.000	314.0	V	253.0	-3.5

7/27/2017

Table 3. Radiated Measurements at 10 meters

[Bluetooth mode]

EMI Auto Test(1) 1 / 2

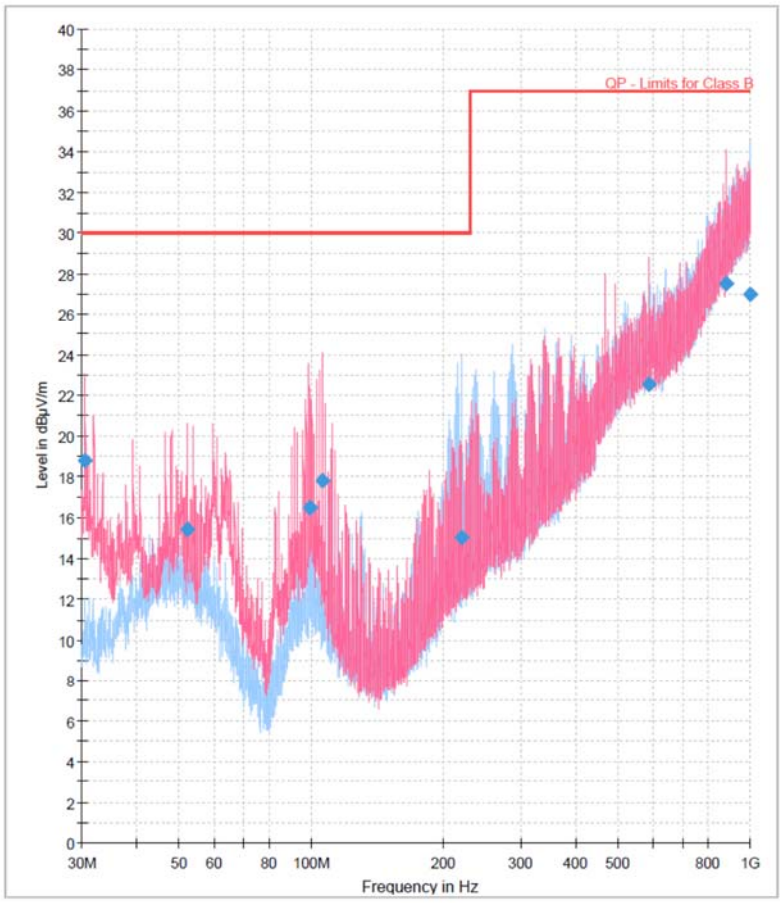
Test Report

Common Information

Test Description :	Radiated Emission(NK-17-E-0586)
Test Site :	Nemko 10 m Chamber
Test Standard :	FCC Part 15 Subpart B Class B
Environment Conditions :	a.c. 120 V, 60 Hz
Operator Name :	Doseung Shin
	BT mode

Full Spectrum

Full Spectrum



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EMI Auto Test(1) 2 / 2

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.496876	18.78	30.00	11.22	15000.0	120.000	170.0	V	116.0	-24.8
52.244900	15.42	30.00	14.58	15000.0	120.000	130.0	V	346.0	-21.4
98.842180	16.47	30.00	13.53	15000.0	120.000	130.0	V	325.0	-22.8
106.087900	17.78	30.00	12.22	15000.0	120.000	230.0	V	98.0	-23.6
219.462847	15.07	30.00	14.93	15000.0	120.000	230.0	H	123.0	-20.9
589.091980	22.52	37.00	14.48	15000.0	120.000	400.0	V	30.0	-8.2
883.589120	27.50	37.00	9.50	15000.0	120.000	297.0	V	335.0	-3.5
998.589767	27.00	37.00	10.00	15000.0	120.000	277.0	H	276.0	-2.0

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Table 4. Radiated Measurements at 10 meters

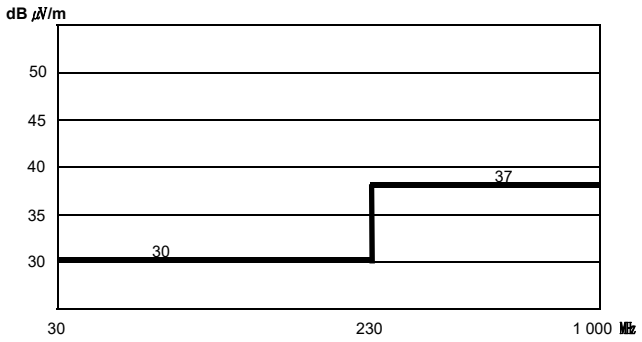


Fig. 5. Limits at 10 meters

NOTES:

1. ***All modes were measured and the worst-case emission was reported.***
2. ***Below 1 GHz, the radiated limits are shown on Figure 5.***
3. ***CISPR 22 limit will be applied for radiated* emission test.**

NOTES : 1. Polarization : H = Horizontal, V = Vertical

2. Corr. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using quasi-peak mode below 1 GHz.

4. The limit for Class B device is on the FCC Part section 15.109(g).

Tested by : Doseung Shin

TEST DATA

Radiated Emissions (Above 1 ㎓)

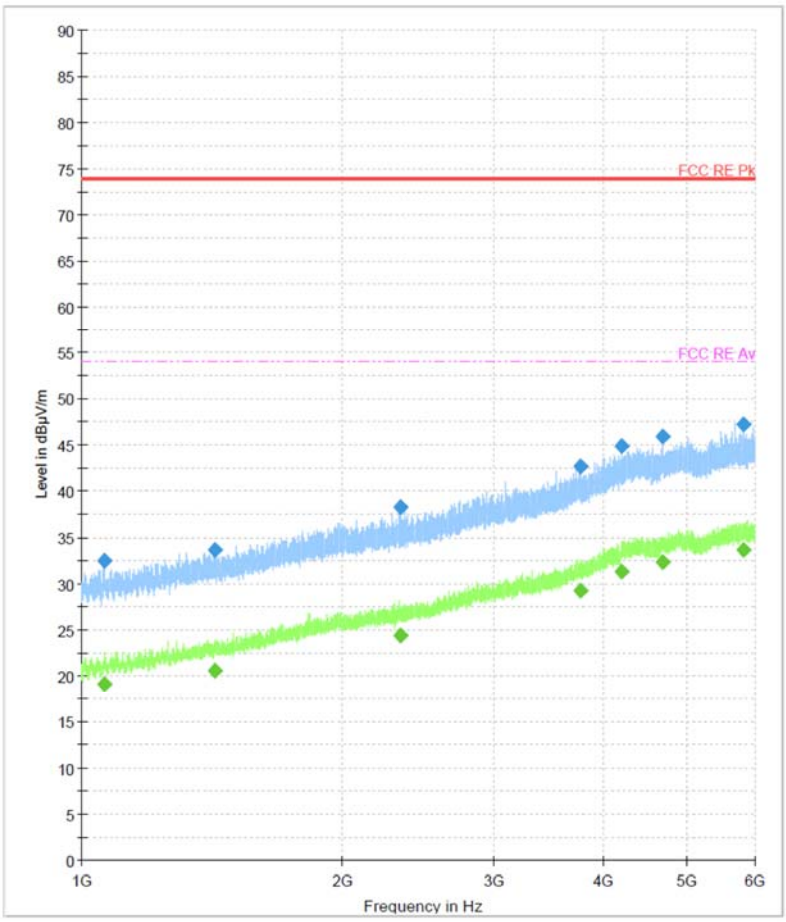
[AUX mode]

Test Report

Common Information

Test Description:	Radiated Emission(NK-17-E-0586)
Test Site:	Nemko 3m Chamber
Test Standard:	FCC Part 15 Subpart B Class B
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung Shin
	Charging & AUX mode

Full Spectrum



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Test 2 / 2

Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1061.166667	32.54	74.00	41.46	15000.0	1000.000	99.9	H	180.0	-19.2
1427.000000	33.75	74.00	40.26	15000.0	1000.000	200.1	H	0.0	-16.9
2336.000000	38.20	74.00	35.80	15000.0	1000.000	200.1	V	45.0	-12.3
3767.500000	42.60	74.00	31.40	15000.0	1000.000	300.2	V	180.0	-6.4
4209.666667	44.79	74.00	29.21	15000.0	1000.000	99.9	H	90.0	-4.3
4696.500000	45.94	74.00	28.06	15000.0	1000.000	399.9	V	135.0	-3.1
5826.333333	47.17	74.00	26.83	15000.0	1000.000	99.9	H	45.0	-1.0

(continuation of the "Final_Result_PK+" table from column 10 ...)

Frequency (MHz)	Comment
1061.166667	
1427.000000	
2336.000000	
3767.500000	
4209.666667	
4696.500000	
5826.333333	

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1061.166667	19.09	54.00	34.91	15000.0	1000.000	99.9	H	180.0	-19.2
1427.000000	20.56	54.00	33.44	15000.0	1000.000	200.1	H	0.0	-16.9
2336.000000	24.42	54.00	29.58	15000.0	1000.000	200.1	V	45.0	-12.3
3767.500000	29.20	54.00	24.80	15000.0	1000.000	300.2	V	180.0	-6.4
4209.666667	31.39	54.00	22.61	15000.0	1000.000	99.9	H	90.0	-4.3
4696.500000	32.30	54.00	21.70	15000.0	1000.000	399.9	V	135.0	-3.1
5826.333333	33.74	54.00	20.26	15000.0	1000.000	99.9	H	45.0	-1.0

(continuation of the "Final_Result_CAV" table from column 10 ...)

Frequency (MHz)	Comment
1061.166667	
1427.000000	
2336.000000	
3767.500000	
4209.666667	
4696.500000	
5826.333333	

11/8/2017

Table 5. Radiated Measurements at 3 meters

[Bluetooth mode]

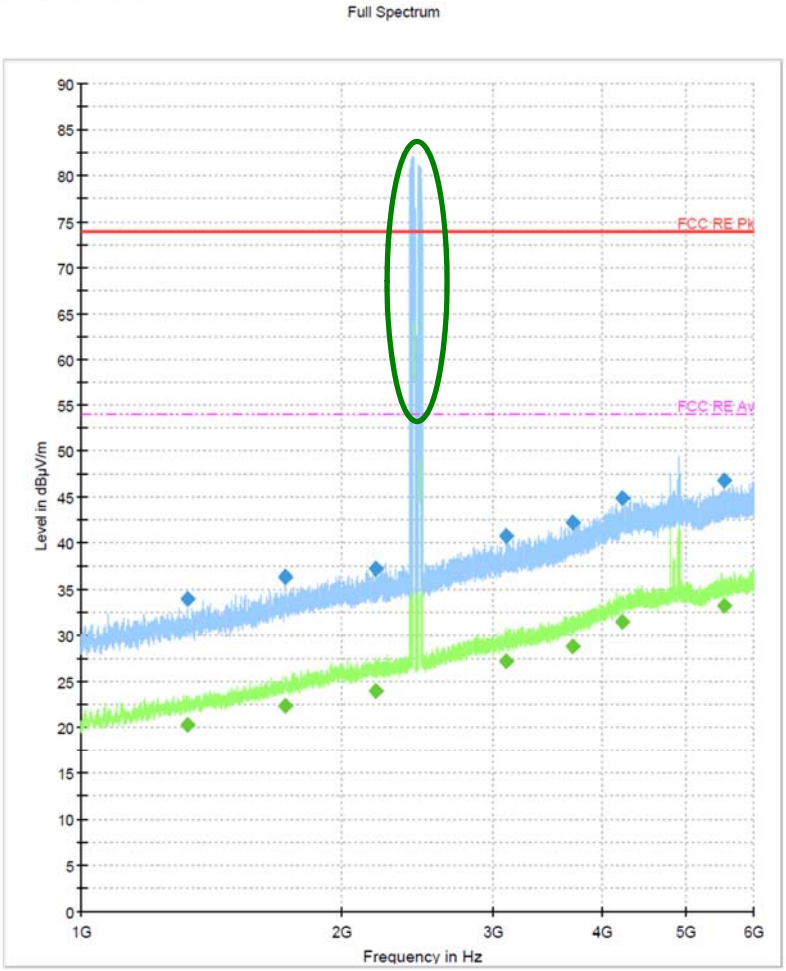
Test 1 / 2

Test Report

Common Information

Test Description:	Radiated Emission(NK-17-E-0586)
Test Site:	Nemko 3m Chamber
Test Standard:	FCC Part 15 Subpart B Class B
Environment Conditions:	a.c. 120 V, 60 Hz
Operator Name:	Doseung Shin
	Charging & BT mode

Full Spectrum



Exclusion Band

11/8/2017

Test 2 / 2

Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1328.333333	34.02	74.00	39.98	15000.0	1000.000	300.1	H	0.0	-17.5
1721.500000	36.36	74.00	37.64	15000.0	1000.000	99.9	V	180.0	-14.9
2189.833333	37.27	74.00	36.73	15000.0	1000.000	100.0	H	225.0	-12.9
3097.833333	40.79	74.00	33.21	15000.0	1000.000	200.1	V	90.0	-8.8
3706.833333	42.17	74.00	31.83	15000.0	1000.000	400.0	H	180.0	-6.7
4230.166667	44.82	74.00	29.18	15000.0	1000.000	100.0	H	270.0	-4.2
5543.666667	46.83	74.00	27.17	15000.0	1000.000	300.1	H	270.0	-1.5

(continuation of the "Final_Result_PK+" table from column 10 ...)

Frequency (MHz)	Comment
1328.333333	
1721.500000	
2189.833333	
3097.833333	
3706.833333	
4230.166667	
5543.666667	

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1328.333333	20.30	54.00	33.71	15000.0	1000.000	300.1	H	0.0	-17.5
1721.500000	22.31	54.00	31.69	15000.0	1000.000	99.9	V	180.0	-14.9
2189.833333	23.91	54.00	30.09	15000.0	1000.000	100.0	H	225.0	-12.9
3097.833333	27.20	54.00	26.80	15000.0	1000.000	200.1	V	90.0	-8.8
3706.833333	28.83	54.00	25.17	15000.0	1000.000	400.0	H	180.0	-6.7
4230.166667	31.42	54.00	22.58	15000.0	1000.000	100.0	H	270.0	-4.2
5543.666667	33.26	54.00	20.74	15000.0	1000.000	300.1	H	270.0	-1.5

(continuation of the "Final_Result_CAV" table from column 10 ...)

Frequency (MHz)	Comment
1328.333333	
1721.500000	
2189.833333	
3097.833333	
3706.833333	
4230.166667	
5543.666667	

11/8/2017

Table 6. Radiated Measurements at 3 meters

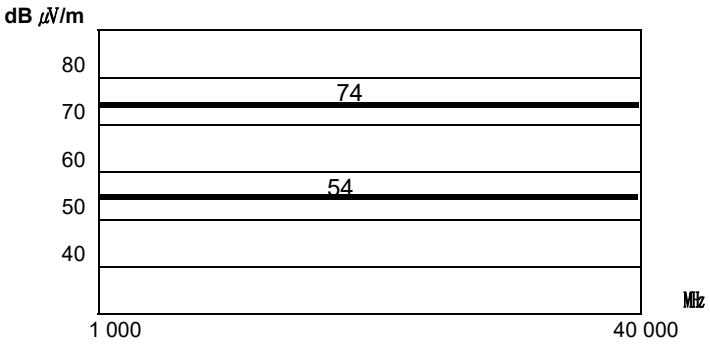


Fig. 6. Limits at 3 meters

NOTES:

1. All modes were measured and the worst-case emission was reported.

2. Above 1 GHz, the radiated limits are shown on Figure 6.

NOTES : 1. Polarization : H = Horizontal, V = Vertical

2. Corr. = Antenna Factor + Cable Loss + Amplifier.

3. The limit for Class B device is on the FCC Part section 15.109(a).

4. Above 1 GHz, peak detector function mode is used using a resolution bandwidth of 1 MHz and a video bandwidth of 1 MHz, average detector function mode is used using a resolution bandwidth of 1 MHz and a video bandwidth of 1 MHz. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

Tested by : Doseung Shin

ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95 %

1. Conducted Uncertainty Calculation

Source of Uncertainty	*Xi*	Uncertainty of *Xi*		Coverage factor *k*	*u(Xi)* (dB)	*Ci*	*Ci u(Xi)* (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	***RS***	0.24	normal 1	1.00	0.24	1	0.24
Receiver reading	***Ri***	± 0.02	normal 2	2.00	0.01	1	0.01
Attenuation AMN-Receiver	***LC***	± 0.10	rectangular	$\sqrt{3}$	0.06	1	0.06
AMN Voltage division factor	***LAMN***	± 0.09	normal 2	2.00	0.05	1	0.05
Sine wave voltage	***dVSW***	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	***dVPA***	± 0.92	normal 2	2.00	0.50	1	0.50
Pulse repetition rate response	***dVPR***	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity	***dVNF***	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
AMN Impedance	***dZ***	± 2.00	normal 2	2.00	1.00	1	1.00
Mismatch : AMN-Receiver	***M***	+ 0.81 - 0.89	U-Shaped	$\sqrt{2}$	0.60	1	0.60
Remark	Using 50 Ω / 50 uH AMN						
Combined Standard Uncertainty	Normal			*uc* = 1.30 dB			
Expended Uncertainty U	Normal (*k* = 2)			*U* = 2.6 dB (CL is 95 %)			

2. Radiation Uncertainty Calculation (Below 1 ㎓)

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor	u(Xi)	Ci	Ci u(Xi)
		Value (dB)	Probability Distribution	k	(dB)		(dB)
Measurement System Repeatability 1)	R_S	0.15	normal 1	1.00	0.15	1	0.15
Receiver reading 2)	R_i	± 0.02	normal 2	2.00	0.01	1	0.01
Sine wave voltage 3)	dV_{sw}	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response 4)	dV_{pa}	± 0.92	normal 2	2.00	0.46	1	0.46
Pulse repetition rate response 5)	dV_{pr}	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity 6)	dV_{nf}	± 0.50	normal 2	2.00	0.25	1	0.25
Antenna Factor Calibration 7)	A_F	± 1.50	rectangular	$\sqrt{3}$	0.87	1	0.87
Cable Loss 8)	C_L	± 1.00	normal 2	2.00	0.50	1	0.50
Antenna Directivity 9)	A_D	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Antenna Factor Height Dependence 10)	A_H	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Antenna Phase Centre Variation 11)	A_P	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation 12)	A_i	± 0.25	rectangular	$\sqrt{3}$	0.14	1	0.14
Site Imperfections 13)	S_i	± 4.00	triangular	$\sqrt{6}$	1.63	1	1.63
Measurement Distance Variation 14)	D_V	± 0.60	rectangular	$\sqrt{3}$	0.35	1	0.35
Antenna Balance 15)	D_{bal}	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Cross Polarisation 16)	D_{Cross}	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Mismatch 17)	M	+ 0.98 - 1.11	U-Shaped	$\sqrt{2}$	0.74	1	0.74
EUT Volume Diameter 18)	Vd	0.33	normal 1	1.00	0.33	1	0.11
Combined Standard Uncertainty	Normal			*uc* = 2.53 dB			
Expended Uncertainty U	Normal (*k* = 2)			5.1 dB (CL is 95 %)			

3. Radiation Uncertainty Calculation (Above 1 ㎓)

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability 1)	R_S	0.25	normal 1	1.00	0.25	1	0.25
Receiver Reading 2)	R_I	± 0.27	normal 2	2	0.14	1	0.14
Attenuation (antenna-receiver) 3)	a_C	± 0.30	normal 2	2	0.15	1	0.15
Preamplifier gain 4)	G_P	± 0.23	normal 2	2	0.12	1	0.12
Receiver Sine Wave 5)	$dVsw$	± 0.17	normal 2	2	0.08	1	0.08
Instability of preamp gain 6)	dG_P	± 1.2	rectangular	$\sqrt{3}$	0.70	1	0.70
Noise Floor Proximity 7)	$dVnf$	± 0.70	rectangular	$\sqrt{3}$	0.40	1	0.40
Antenna Factor Calibration 8)	A_F	± 2.0	normal 2	2	1.00	1	1.00
Directivity difference 9)	DF_{adir}	± 1.00	rectangular	$\sqrt{3}$	0.58	1	0.58
Phase Centre location 10)	A_P	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Antenna Factor Frequency Interpolation 11)	A_I	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Site Imperfections 12)	S_I	± 3.00	triangular	$\sqrt{6}$	1.22	1	1.22
Effect of setup table material 13)	dA_{NT}	± 1.50	rectangular	$\sqrt{3}$	0.87	1	0.87
Separation distance 14)	d_D	± 0.30	rectangular	$\sqrt{3}$	0.17	1	0.17
Cross Polarization 15)	D_{Cross}	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Table height 16)	d_h	± 0.00	normal 2	2	0.00	1	0.00
Mismatch (antenna-Preamplifier) 17)	M	+ 1.30 - 1.50	U-Shaped	$\sqrt{2}$	1.00	1	1.00
Mismatch (preamplifier-receiver) 18)	M	+ 1.20 - 1.40	U-Shaped	$\sqrt{2}$	0.92	1	0.92
Combined Standard Uncertainty	Normal			uc = 2.51 dB			
Expended Uncertainty U	Normal (k = 2)			U = 5.0 dB (CL is 95 %)			

LIST OF TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Due to Calibration	Calibration Interval
1	EMI Test Receiver	R&S	ESCI	101041	Apr. 03 2018	1 year
2	Software	R&S	EMC32	Version 8.53.0	-	-
3	TWO-LINE V-NETWORK	R&S	ENV216	101156	Apr. 04 2018	1 year
4	EMI Test Receiver	R&S	ESU 40	100202	Apr. 04 2018	1 year
5	Software	R&S	EMC32	Version 10.10.01	-	-
6	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-01027	Apr. 18 2019	2 year
7	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Apr. 03 2018	1 year
8	Controller	innco systems GmbH	CO2000-G	CO2000/562/ 23890210/L	N/A	N/A
9	Open Switch and Control Unit	R&S	OSP-120	100015	N/A	N/A
10	Antenna Mast (Left)	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
11	Turn Table	innco systems GmbH	DT3000-3T	N/A	N/A	N/A
12	Signal Conditioning Unit	R&S	SCU 01	10030	Apr. 03 2018	1 year
13	EMI Test Receiver	R&S	ESW8	100994	Apr. 03 2018	1 year
14	DOUBLE RIDGED HORN ANTENNA	SCHWARZBECK	HF907	102585	Apr. 18 2019	2 year
15	CONTROLLER	innco systems GmbH	CO3000	CO3000/937/3 8330516/L	N/A	N/A
16	TILT ANTENNA MAST	innco systems GmbH	MA4640-XP-EP	N/A	N/A	N/A
17	SWITCH AND POWER DETECTOR UNIT	R&S	OSP120	101766	N/A	N/A
18	WiFi Filter Bank	R&S	U082	N/A	N/A	N/A
19	Turntable	innco systems GmbH	DT2000-2t	N/A	N/A	N/A
20	Signal Conditioning Unit	Rohde & Schwarz	SCU 18	10065	May. 29 2018	1 year

APPENDIX A – SAMPLE LABEL

Labeling Requirements

The sample label shown shall be *permanently affixed* at a conspicuous location on the device and be readily visible to the user at the time of purchase.

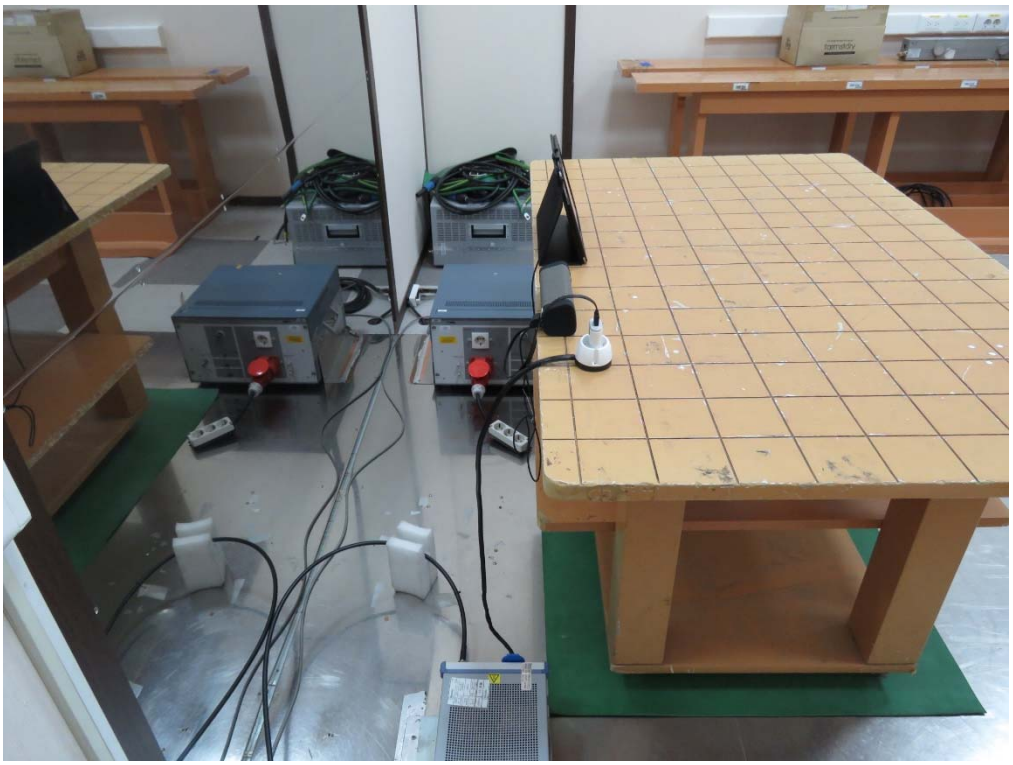
- **Label Location of EUT**

APPENDIX B – PHOTOGRAPHS OF TEST SET-UP

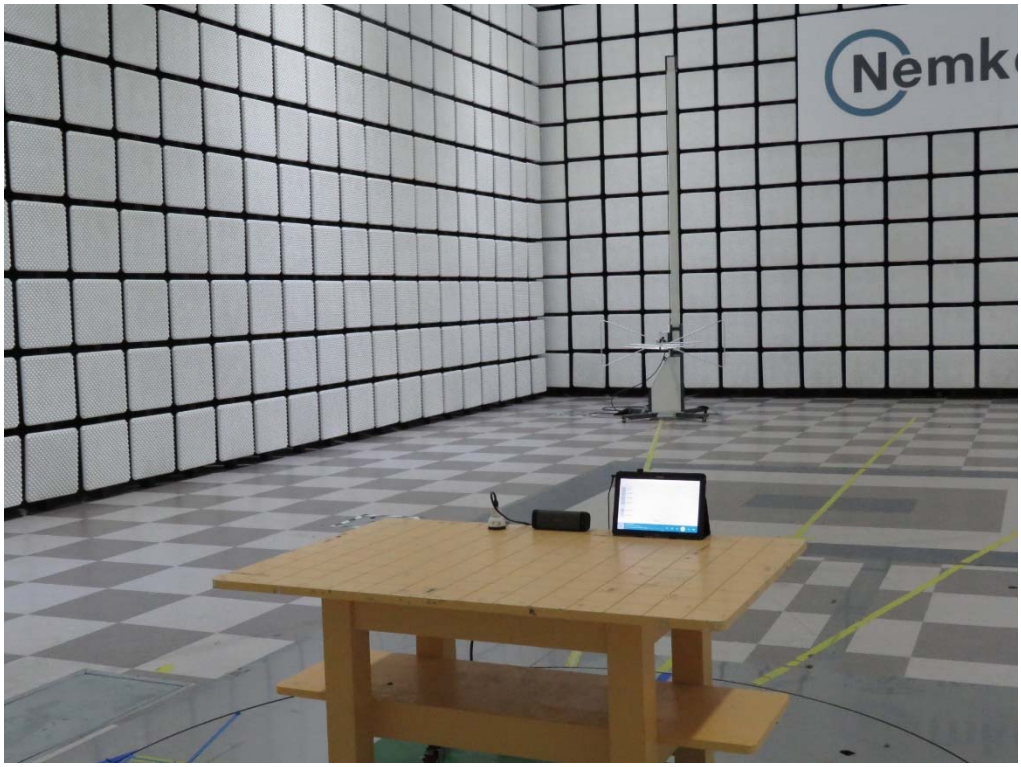
The **Conducted Test Picture** and **Radiated Test Picture** and show the worst-case configuration and cable placement.

- **Conducted Test Picture(Front)**

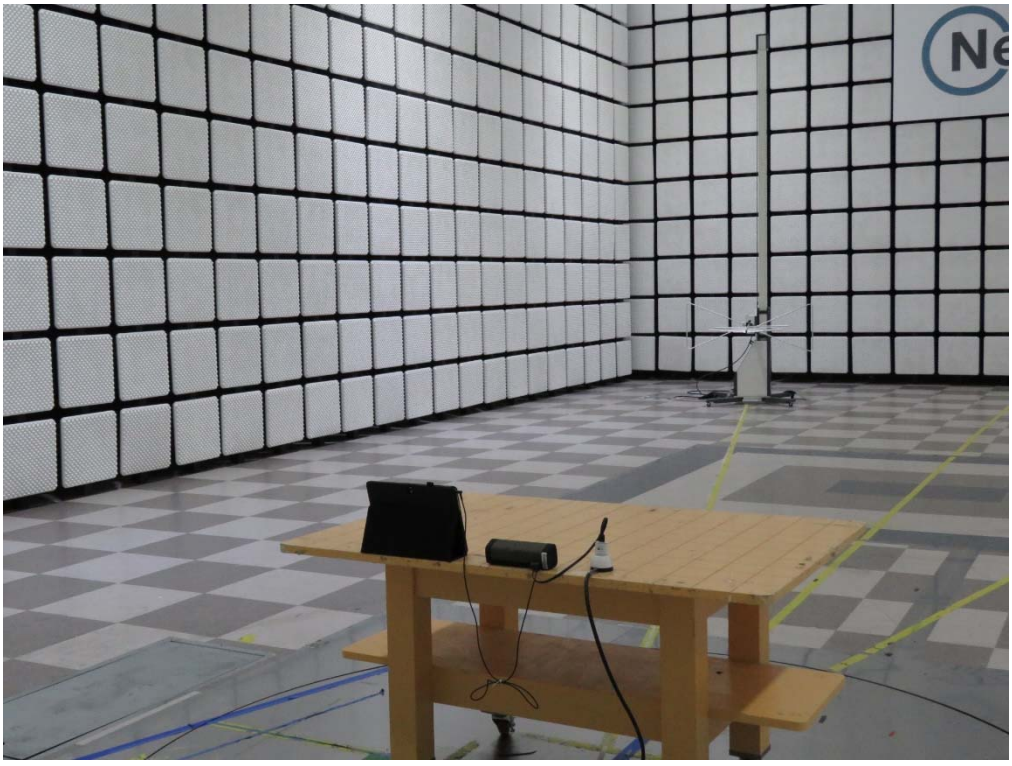
- **Conducted Test Picture(Side)**



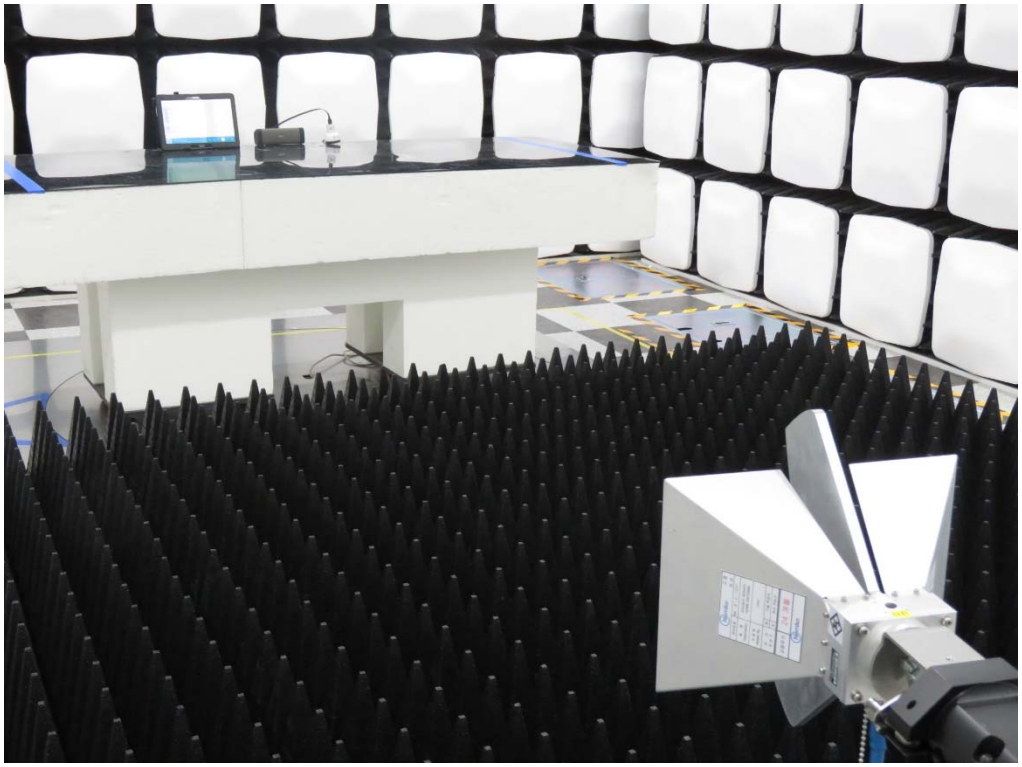
- **Radiated Test Picture(Below 1 ㎓_Front)**



- **Radiated Test Picture(Below 1 ㎓_Rear)**



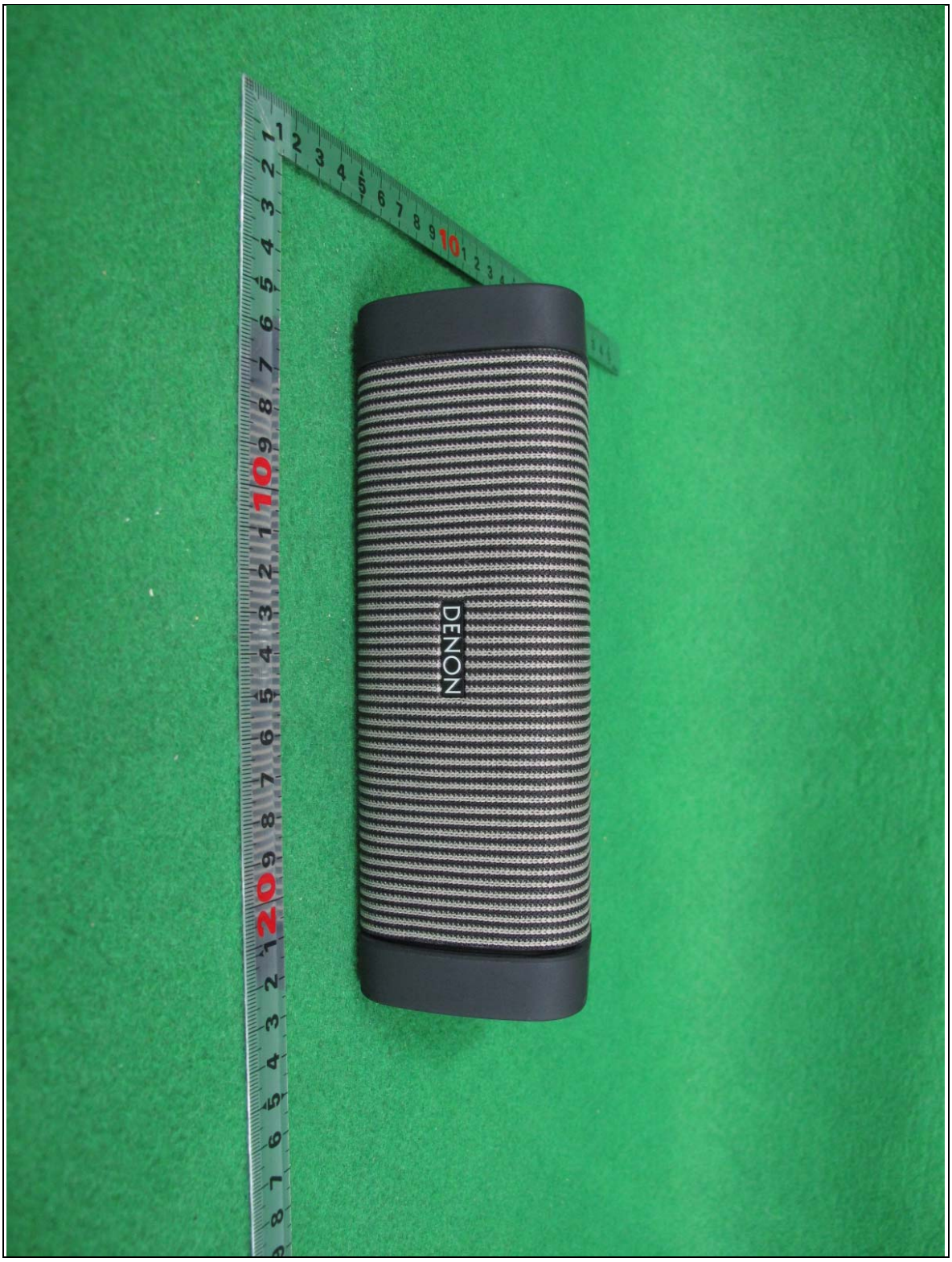
- **Radiated Test Picture(Above 1 ㎓_Front)**



- **Radiated Test Picture(Above 1 ㎓_Rear)**

APPENDIX C – EUT PHOTOGRAPHS

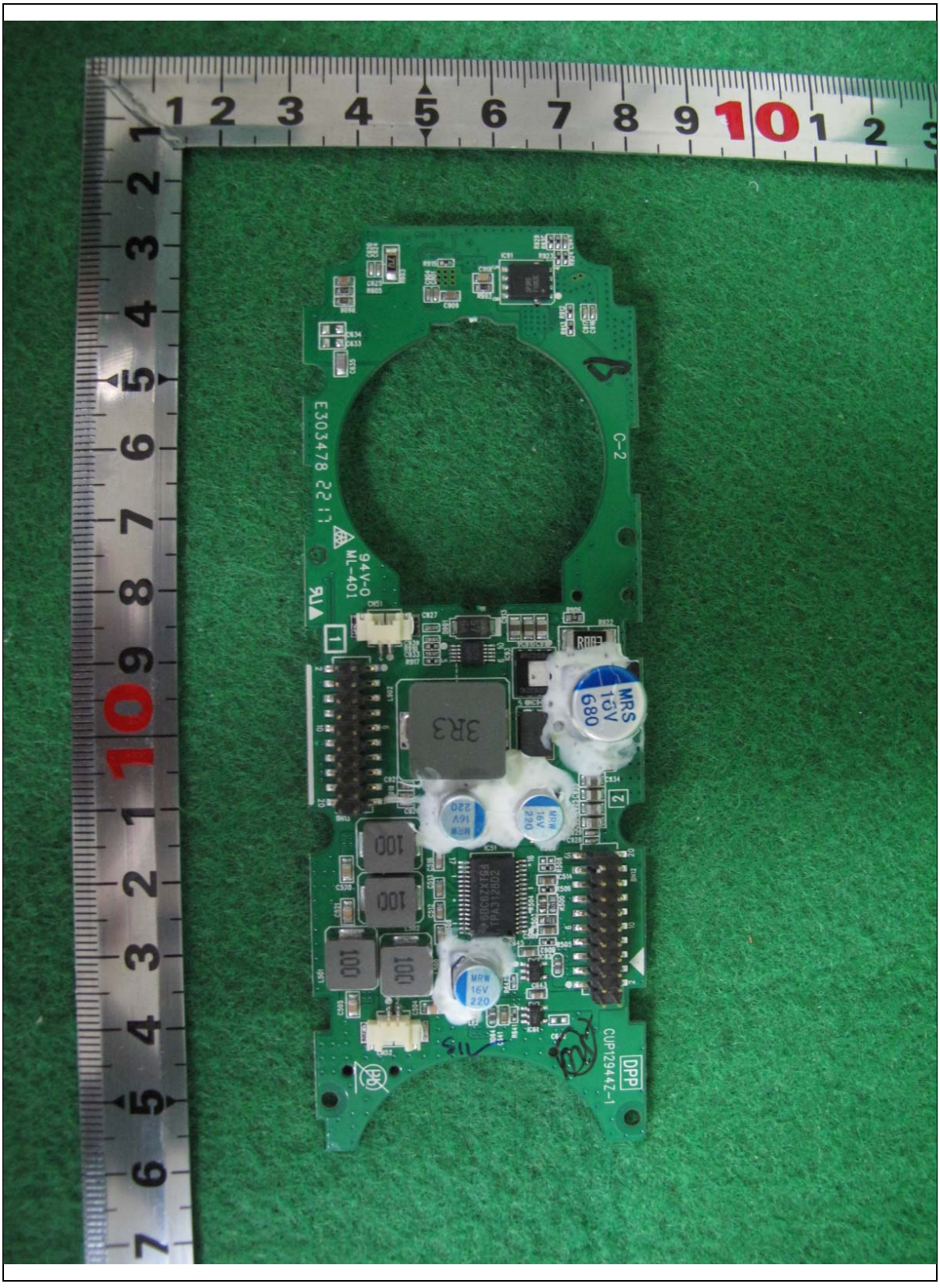
Front View of EUT



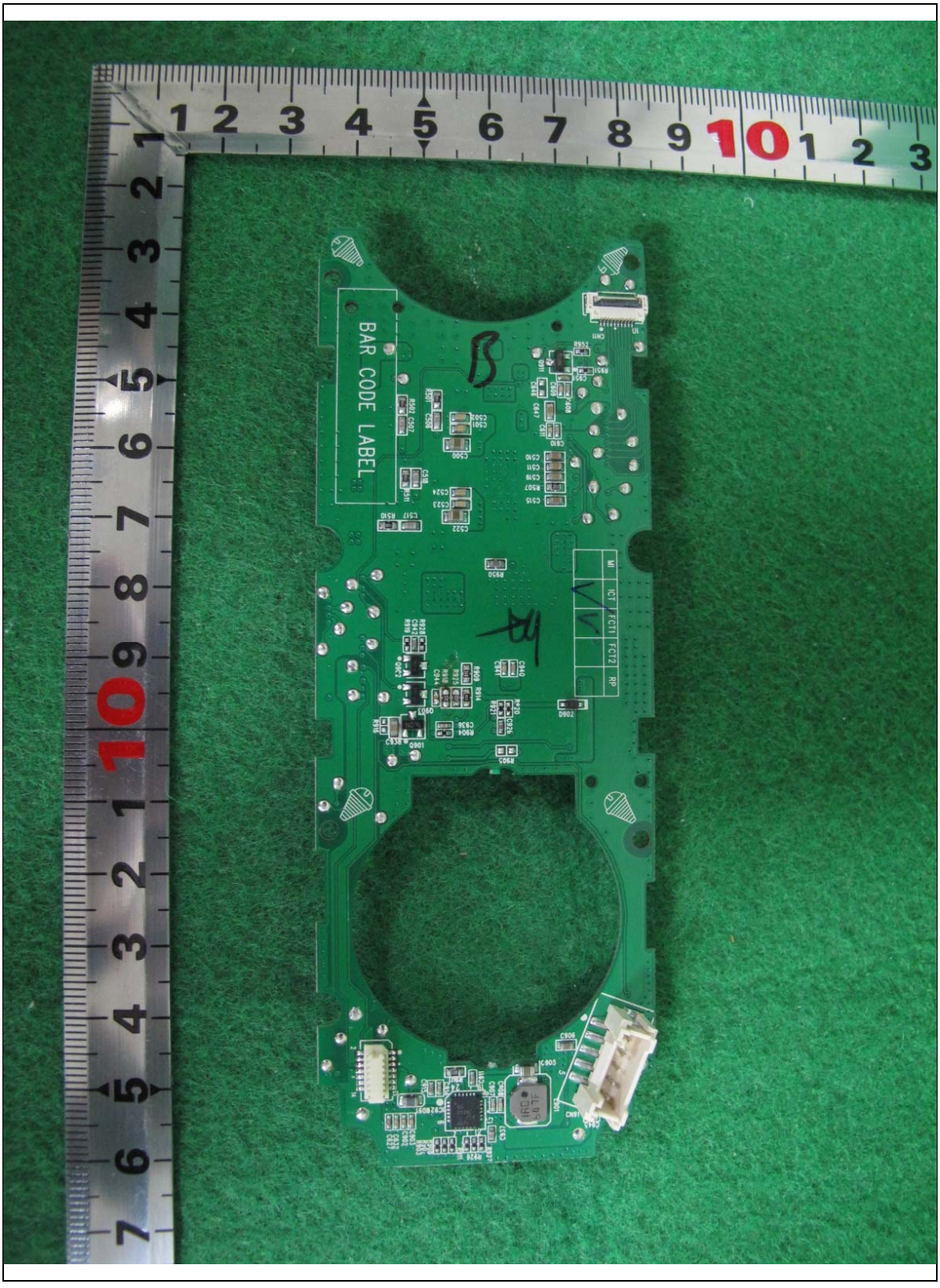
Rear View of EUT

Inside View of EUT

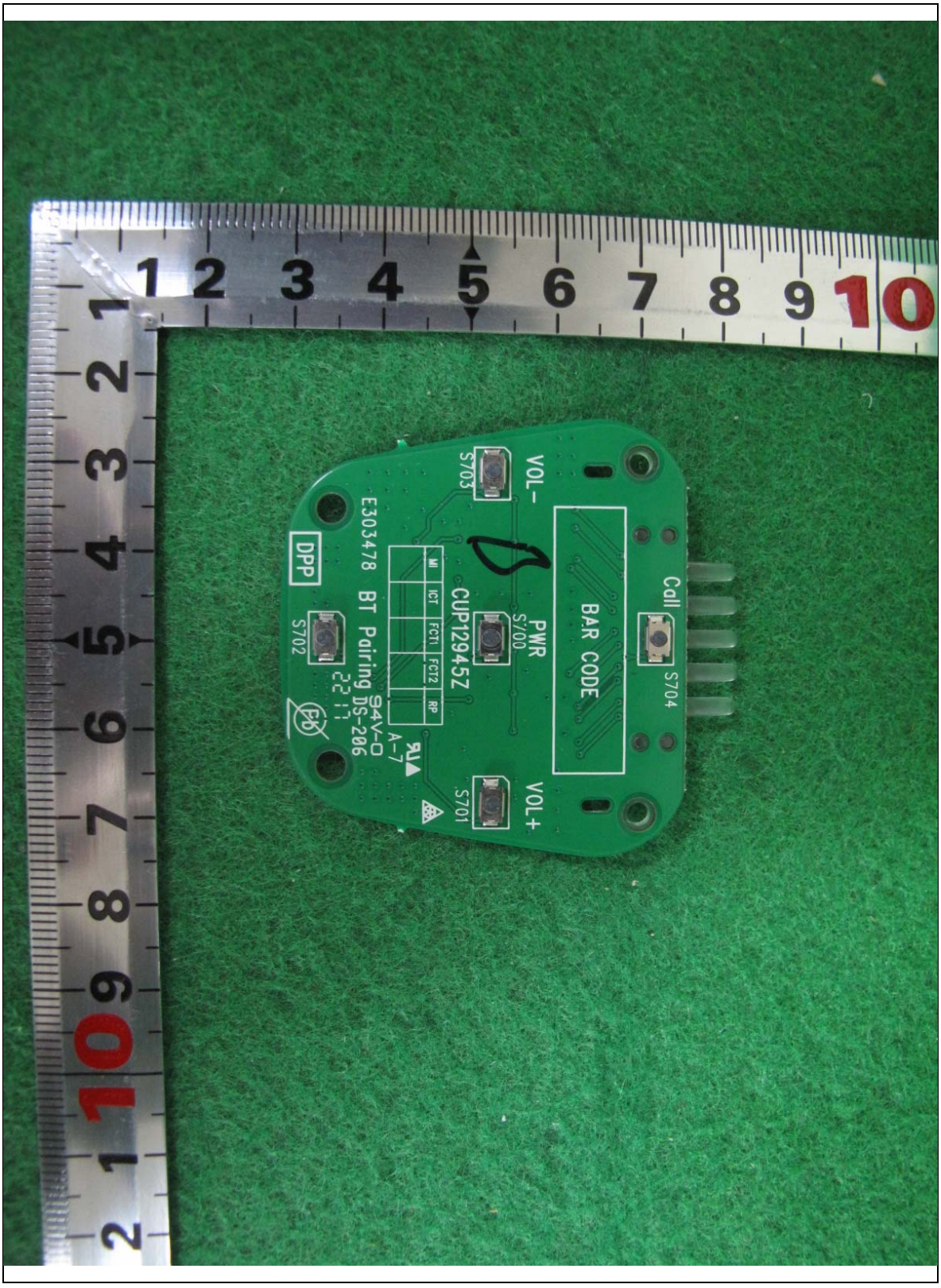
Front View of MAIN PCB



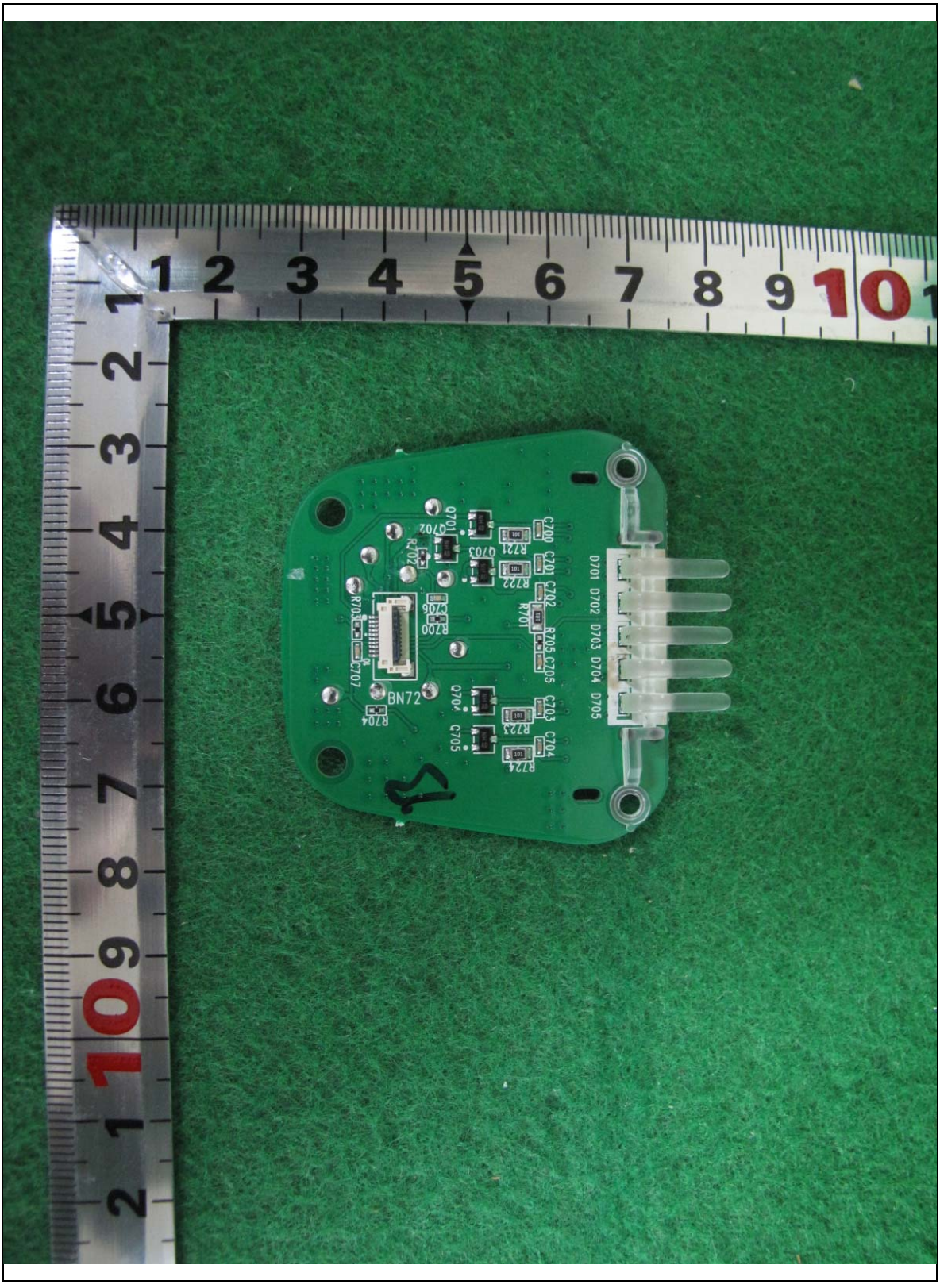
Rear View of MAIN PCB



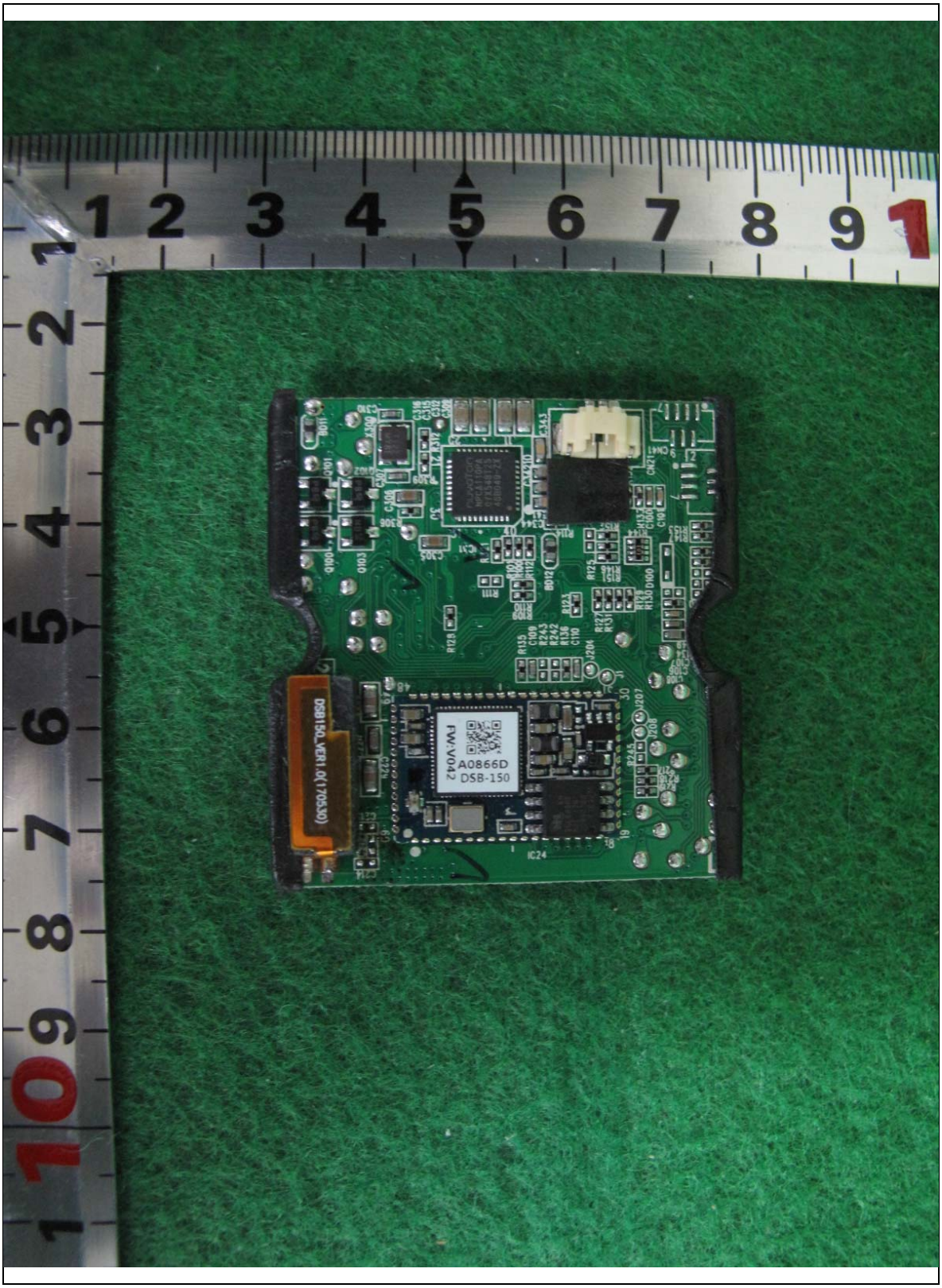
Front View of KEY PCB



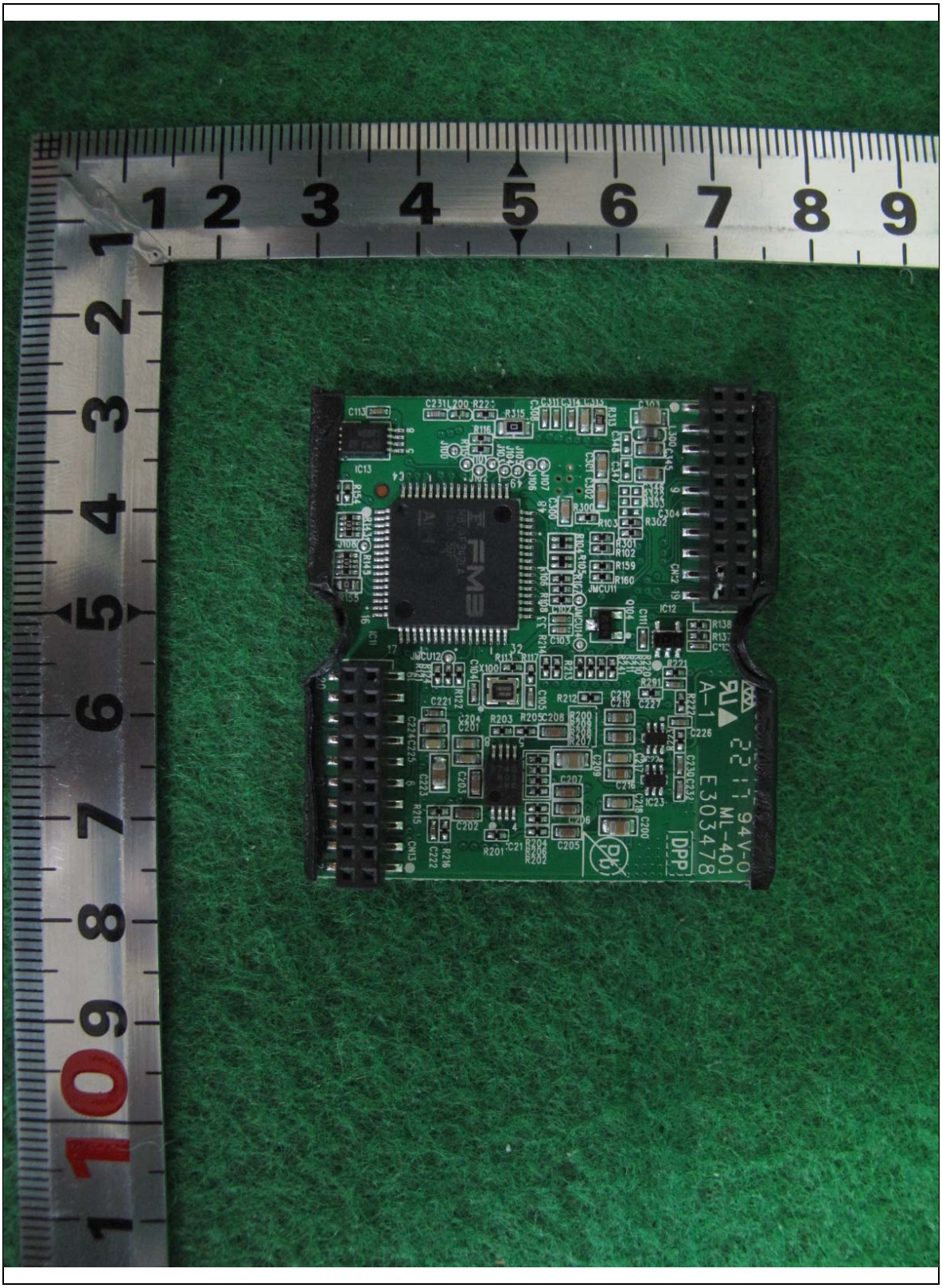
Rear View of KEY PCB



Front View of BT Module



Rear View of BT Module



APPENDIX D – BLOCK DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – SCHEMATIC DIAGRAM