

Nemko Korea Co., Ltd.

(Designation Number : KR0026)

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPUBLIC OF
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Declaration of Conformity**Applicant :**

HMLink Co., Ltd.

#1715, 126, Beolmal-ro, Dongan-gu, Anyang-si,

Gyeonggi-do, 14057, Korea

Attn : Mr. Donghyun Jung

Dates of Issue : August 22, 2016

Test Report No. : NK-16-E-0577

Test Site : Nemko Korea Co., Ltd.

EMC site, Korea

Model**HM-225****Contact Person**

HMLink Co., Ltd.

#1715, 126, Beolmal-ro, Dongan-gu, Anyang-si,

Gyeonggi-do, 14057, Korea

Mr. Donghyun Jung

Telephone No. : +82-31-429-7450

Applied Standard :

FCC Part 15 Subpart B & Part 2

Classification :

FCC Class B Device

EUT Type :

Bluepot

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.

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.


Aug 22, 2016

Tested By : Sangyun Lee
Engineer


Aug. 22, 2016

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 made 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 :	HMLink Co., Ltd.
Contact Person :	Mr. Donghyun Jung Tel No.: 82-31-429-7450
Manufacturer :	HMLink Co., Ltd. #1715, 126, Beolmal-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 14075, Korea

- Model : HM-225
- EUT Type: Bluepot
- Electric Rating: Input : d.c.5 V or d.c. 9 V, Output : d.c. 5.1 V
- Test Voltage: a.c. 120 V, 60 Hz (Host Unit)
- Internal Frequency 26 MHz
- Classification: FCC Class B Device
- Applied Standard: FCC Part 15 Subpart B & Part 2
- Test Procedure(s): ANSI C63.4 (2014)
- Dates of Test: July 26, 2016 to August 11, 2016
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK-16-E-0577

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 kHz to 40 GHz (ANSI C63.4-2014) was used in determining radiated and conducted emissions emanating from **HMLink Co., Ltd.**

Model : **HM-225, Bluepot**

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.
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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

The EUT was connected to a Laptop Computer and R-Load, I-Pod.
The test was performed at Charging and Discharging mode, Bluetooth Speaker with 1 kHz audio signal.

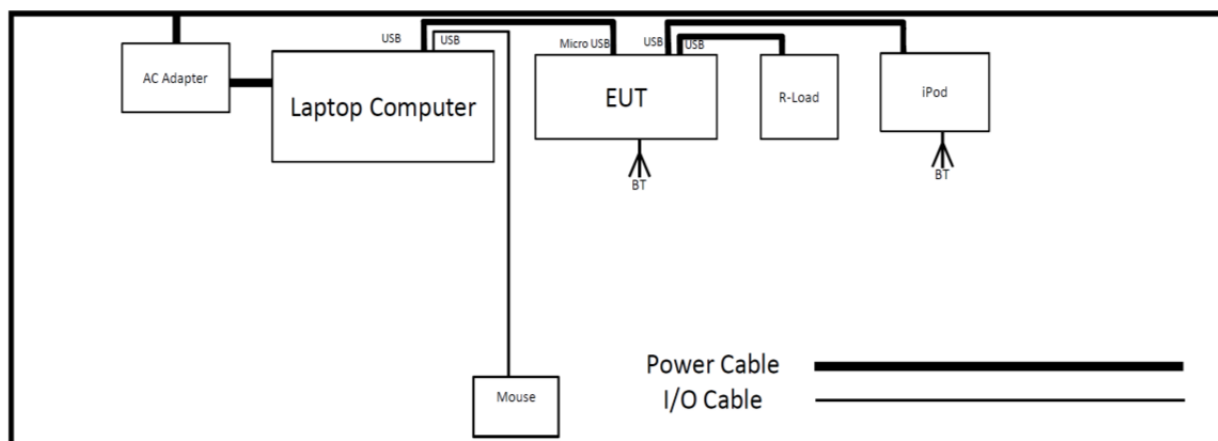
Support Equipment

Bluepot (EUT)	HMLink Co., Ltd. Model : HM-225 0.7 m shielded USB cable 1.3 m shielded USB cable 1.3 m shielded Micro USB cable	FCC DOC S/N : N/A
Laptop Computer	Samsung Co., Ltd. Model : NT-RF510 1.7 m shielded USB cable 1.7 m unshielded DC-Input cable	S/N : ZZVL93EB301733N
AC Adapter	Chicony Power Technology co., Ltd Model : A10-090P1A	S/N : CNBA4400215ADON812700LR
R-Load	Model : N/A	S/N : N/A
iPod	Apple Inc. Model : iPod(A1288)	S/N : 1B013NQ775J
Mouse	DELL Model : MO56UO	FCC DOC S/N : 425000654

Component List

Item	Model	Manufacturer	Serial Number
MAIN BOARD	HM-PB100 REV0.7	HMLink Co., Ltd.	N/A
Bluetooth BOARD	HM-BT205 REV0.8	HMLink Co., Ltd.	N/A
BATTERY	986113	N/A	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(g)	Complies	Below 1 GHz
Radiated Emission	15.109(a)	N/A	Above 1 GHz

RECOMMENDATION/CONCLUSION

The data collected shows that the **HMLink Co., Ltd.**

Model : HM-225, Bluepot.

The highest emission observed was at **0.16 MHz** for conducted emissions with a Average margin of **13.5 dB**, at **196.01 MHz** for radiated emissions with a QP margin of **3.0 dB**.

SAMPLE CALCULATION

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

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

EX.

@165.0 MHz

Class B limit = 30.0 dB $\mu V/m$

Reading = 38.2 dB μV (calibrated level)

Antenna factor + Cable Loss + Amplifier Gain = -12.9 dB

Total = 25.30 dB $\mu V/m$

Margin = 30.0 – 25.30 = 4.70

4.70 dB 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) 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.

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 kHz to 30 MHz 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 kHz. 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.

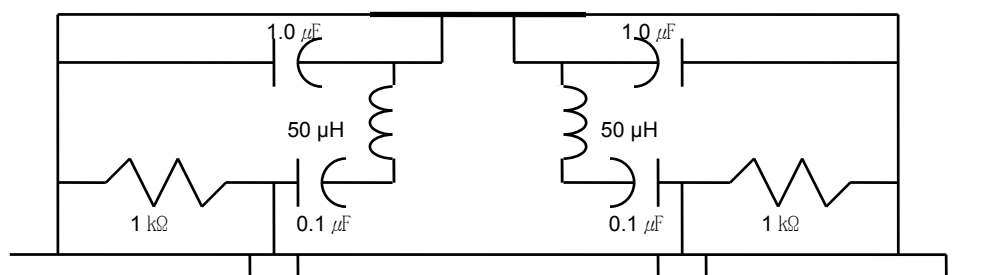


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Measurement were made indoors at 10 m 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 MHz to 1 000 MHz using TRILOG Broadband Test Antenna (Schwarzbeck, VULB 9163).

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. (ESU 40)

The detector function were set to Quasi-peak and peak mode and the bandwidth of the receiver were set to 120 kHz and 1 MHz 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.

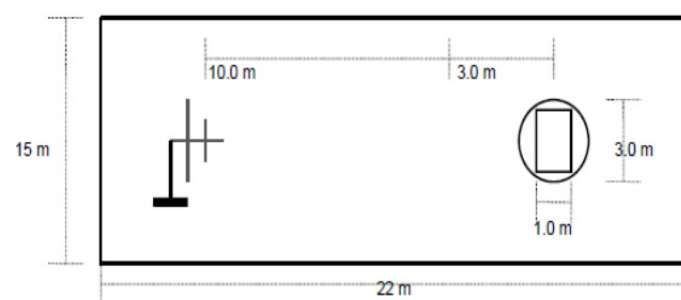
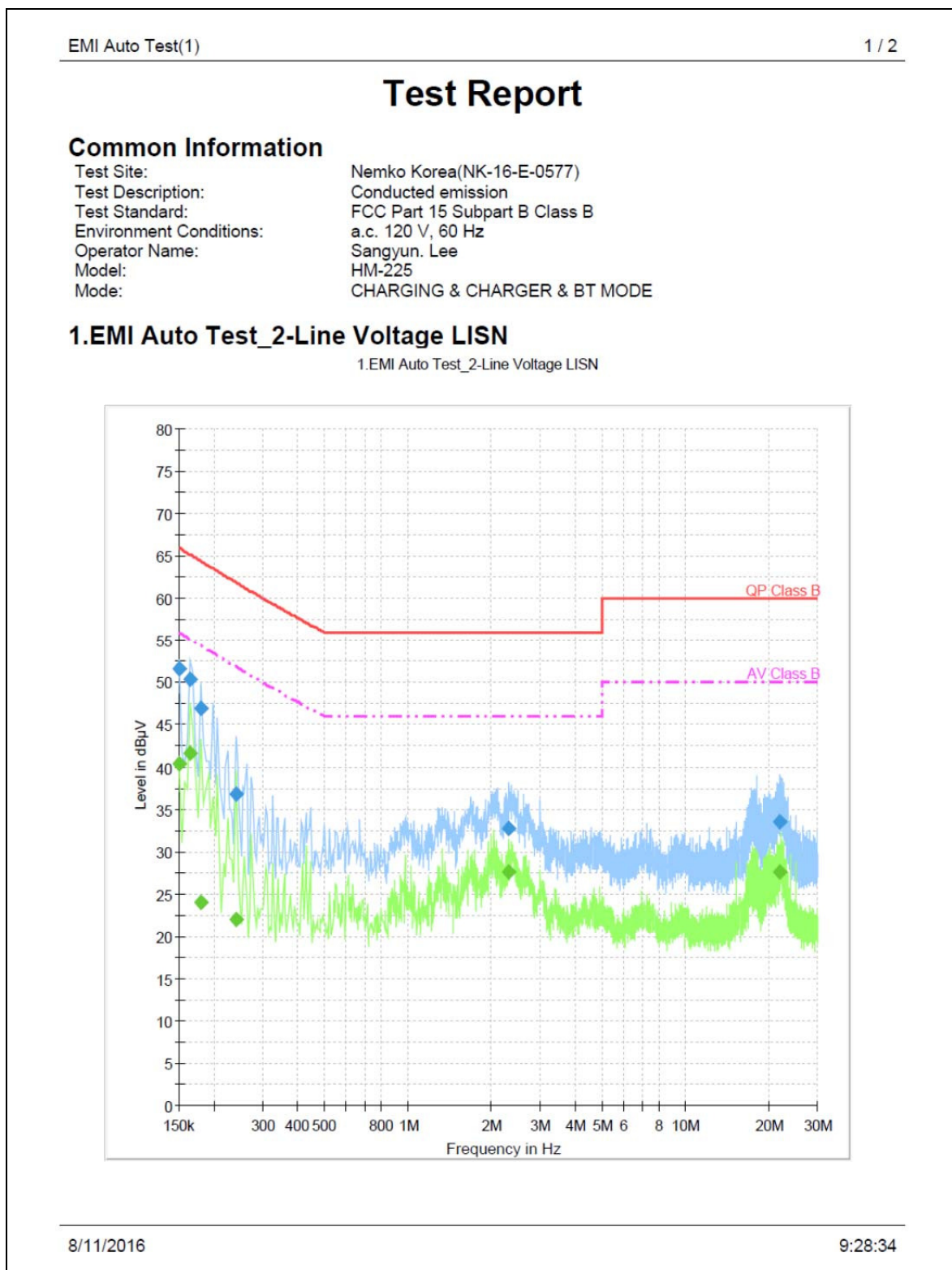


Fig. 3. Dimensions of 10 semi anechoic chamber

TEST DATA

Conducted Emissions



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
0.150000	51.6	15000.0	9.000	On	L1	9.8	14.4	66.0	
0.164925	50.4	15000.0	9.000	On	N	10.1	14.7	65.2	
0.179850	46.9	15000.0	9.000	On	N	10.0	17.5	64.4	
0.239550	36.8	15000.0	9.000	On	L1	9.8	25.1	61.9	
2.317856	32.7	15000.0	9.000	On	L1	9.8	23.3	56.0	
21.966619	33.5	15000.0	9.000	On	N	10.2	26.5	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	40.3	15000.0	9.000	On	L1	9.8	15.7	56.0	
0.164925	41.6	15000.0	9.000	On	N	10.1	13.5	55.1	
0.179850	24.0	15000.0	9.000	On	N	10.0	30.4	54.4	
0.239550	22.0	15000.0	9.000	On	L1	9.8	29.9	51.9	
2.317856	27.6	15000.0	9.000	On	L1	9.8	18.4	46.0	
21.966619	27.6	15000.0	9.000	On	N	10.2	22.4	50.0	

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Table 1. Line Conducted Emissions Tabulated Data

NOTES:

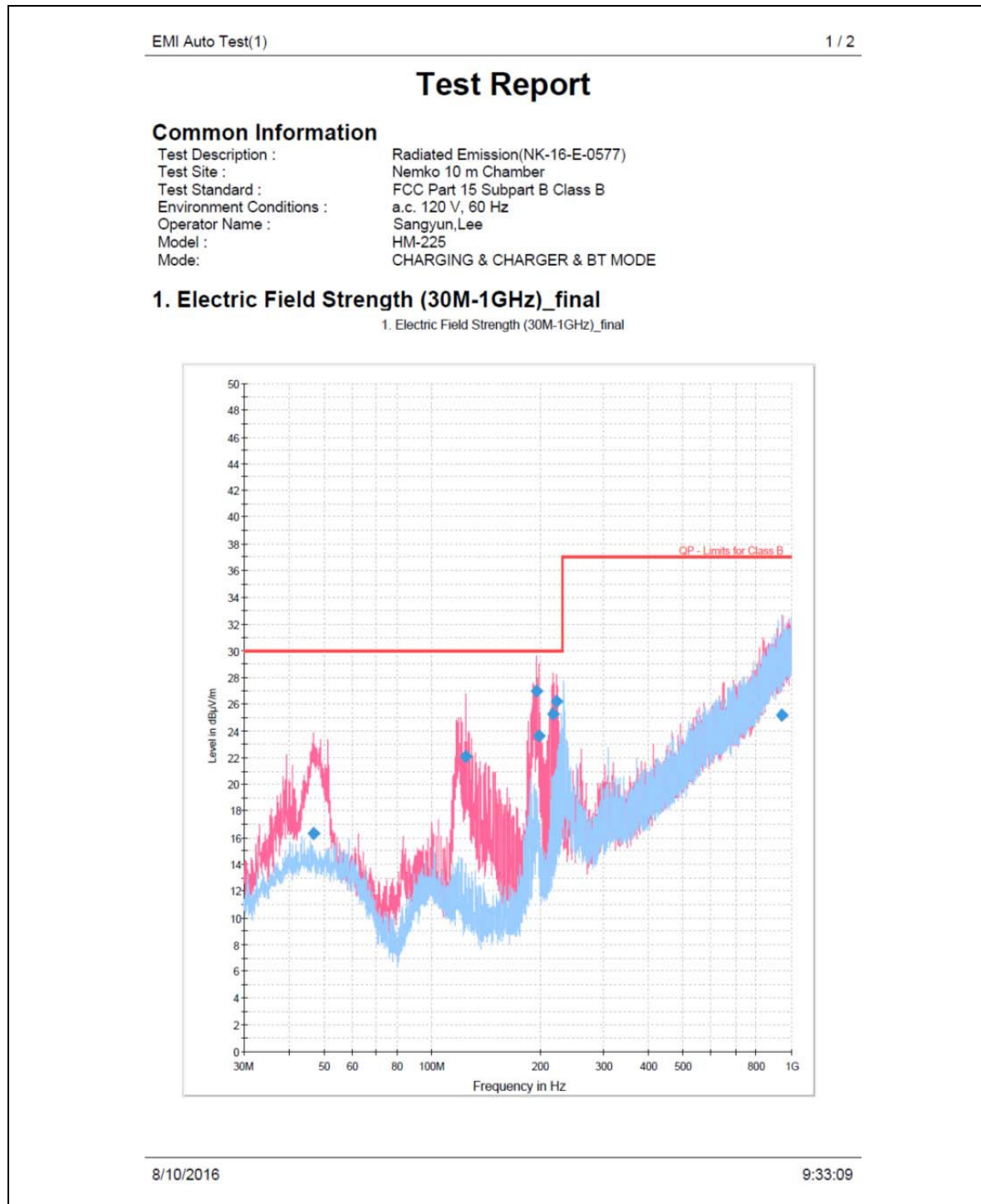
- 1. Measurements using Quasi-peak mode & average mode.**
- 2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.**
- 3. LINE : L1 = Line , N = Neutral**
- 4. The limit for Class B device is on the FCC Part section 15.107(a).**

A handwritten signature in blue ink, appearing to be 'Sangyun Lee', is written above a horizontal line.

Tested by : Sangyun Lee

TEST DATA

Radiated Emissions (Below 1 GHz)



EMI Auto Test(1)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
46.878000	16.4	15000.0	120.000	230.0	V	0.0	-21.2	13.6
124.478000	22.1	15000.0	120.000	130.0	V	102.0	-25.7	7.9
196.015500	27.0	15000.0	120.000	100.0	V	36.0	-23.1	3.0
198.974000	23.6	15000.0	120.000	116.0	V	36.0	-22.9	6.4
217.501000	25.3	15000.0	120.000	130.0	V	130.0	-21.8	4.7
221.769000	26.2	15000.0	120.000	100.0	V	130.0	-21.6	3.8
940.733000	25.2	15000.0	120.000	309.0	H	255.0	-4.3	11.8

(continuation of the "Final Result 1" table from column 9 ...)

Frequency (MHz)	Limit (dBμV/m)	Comment
46.878000	30.0	
124.478000	30.0	
196.015500	30.0	
198.974000	30.0	
217.501000	30.0	
221.769000	30.0	
940.733000	37.0	

8/10/2016

9:33:09

Table 2. Radiated Measurements at 10 meters

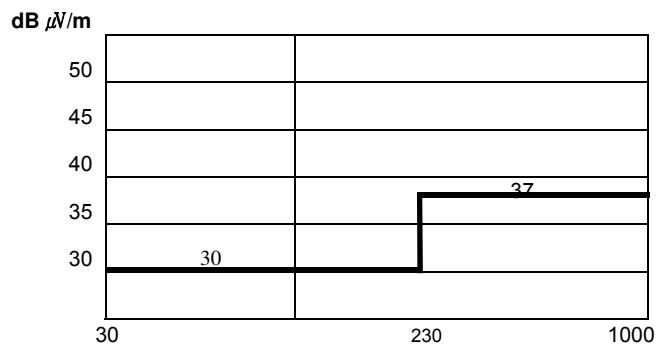


Fig. 4. Limits at 10 meters

NOTES:

1. All modes were measured and the worst-case emission was reported.
2. Below 1 GHz, the radiated limits are shown on Figure 4.
3. CISPR 22 limit will be applied for radiated emission test.

NOTES:

1. *Pol. 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 : Sangyun Lee

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	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	RS	0.10	normal 1	1.00	0.10	1	0.10
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	M	+ 0.81 - 0.89	U-Shaped	$\sqrt{3}$	0.60	1	0.60
Remark	Using 50 Ω / 50 uH AMN						
Combined Standard Uncertainty	Normal			uc = 1.29 dB			
Expanded Uncertainty U	Normal (k = 2)			U = 2.6 dB (CL is 95 %)			

2. Radiation Uncertainty Calculation (Below 1 GHz)

Source of Uncertainty	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability 1)	R_s	0.67	normal 1	1.00	0.67	1	0.67
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	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
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	V_d	0.33	normal 1	1.00	0.33	1	0.11
Combined Standard Uncertainty	Normal			$u_c = 2.72$ dB			
Expanded Uncertainty U	Normal ($k = 2$)			5.4 dB (CL is 95 %)			

LIST OF TEST EQUIPMENT

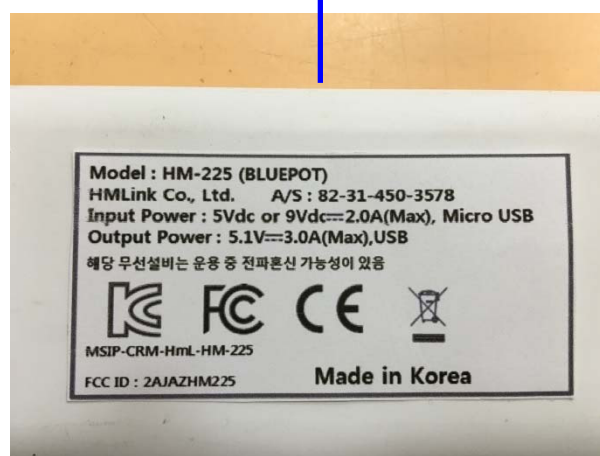
No.	Instrument	Manufacturer	Model	Serial No.	Due to Calibration	Calibration Interval
1	EMI Test Receiver	R&S	ESCI	101041	Apr. 04 2017	1 year
2	Software	R&S	EMC32	Version 8.53.0	-	-
3	TWO-LINE V-NETWORK	R&S	ENV216	101156	Apr. 04 2017	1 year
4	EMI Test Receiver	R&S	ESU 40	100202	Apr. 04 2017	1 year
5	Software	R&S	EMC32	Version 8.53.0	-	-
6	TRILOG Broadband Test Antenna	SCHWARZBECK	VULB 9163	9163-454	Jun. 09 2017	2 year
7	ATTENUATOR	FAIRVIEW	SA3N5W-06	N/A	Apr. 04 2017	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. 04 2017	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.

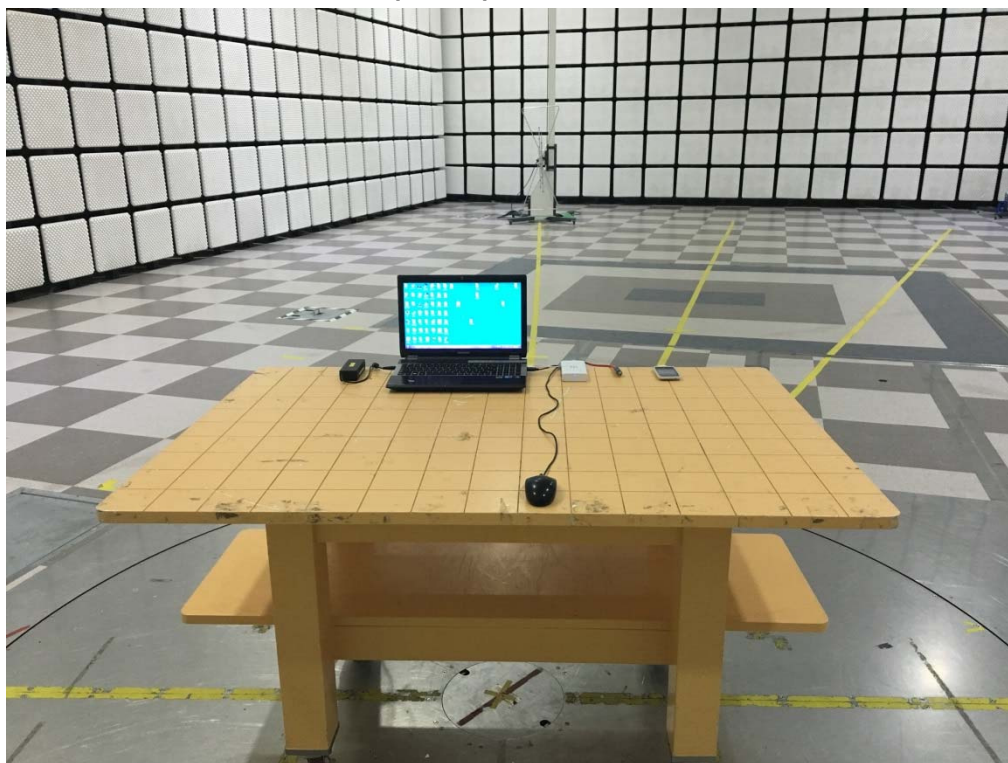
- **Conducted Test Picture(Front)**



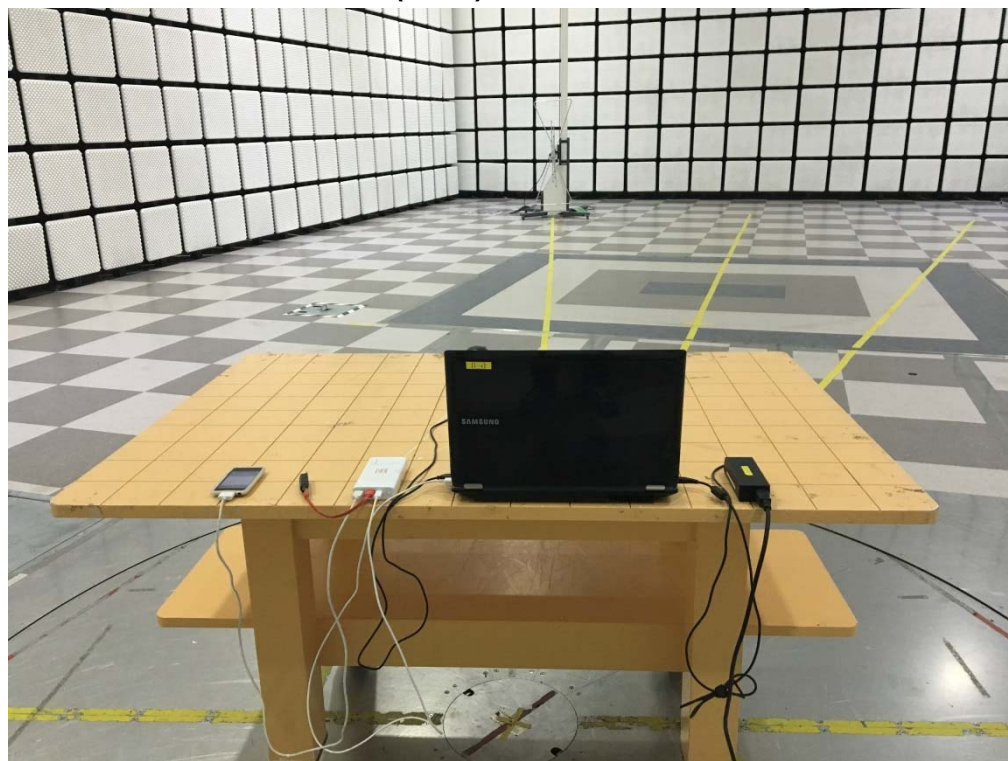
- **Conducted Test Picture(Side)**



- Radiated Test Picture(Front)

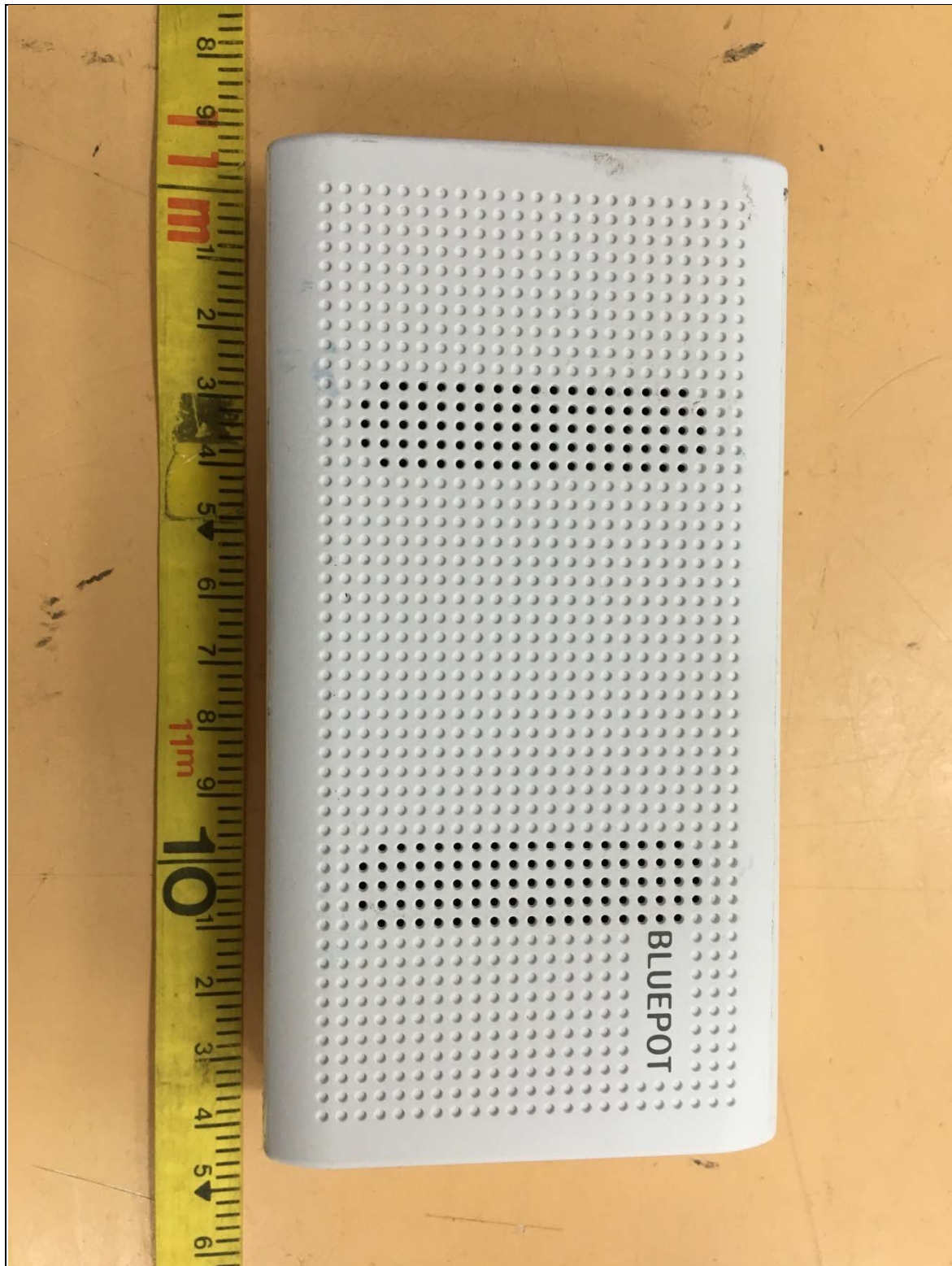


- Radiated Test Picture(Rear)



APPENDIX C – EUT PHOTOGRAPHS

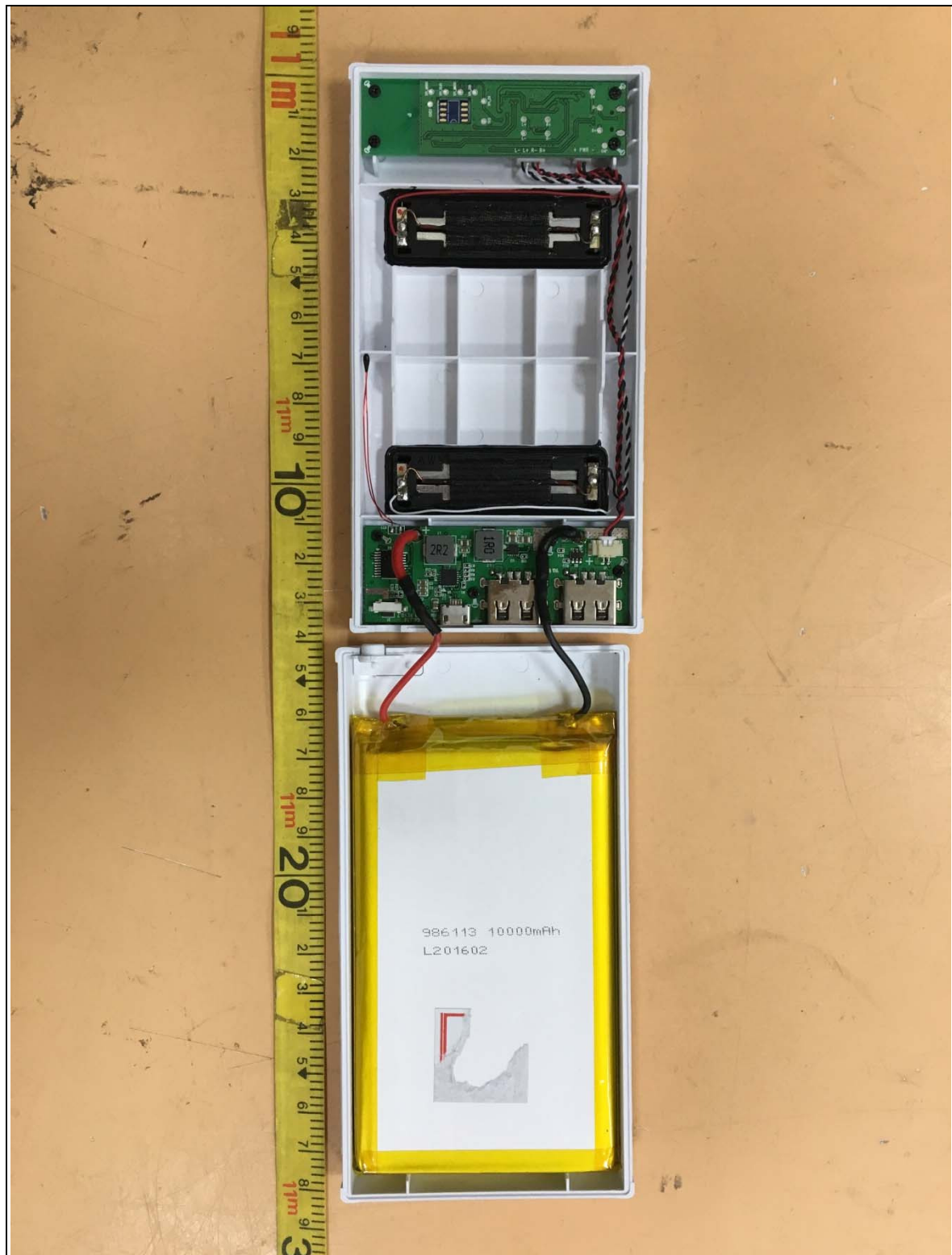
Front View of EUT



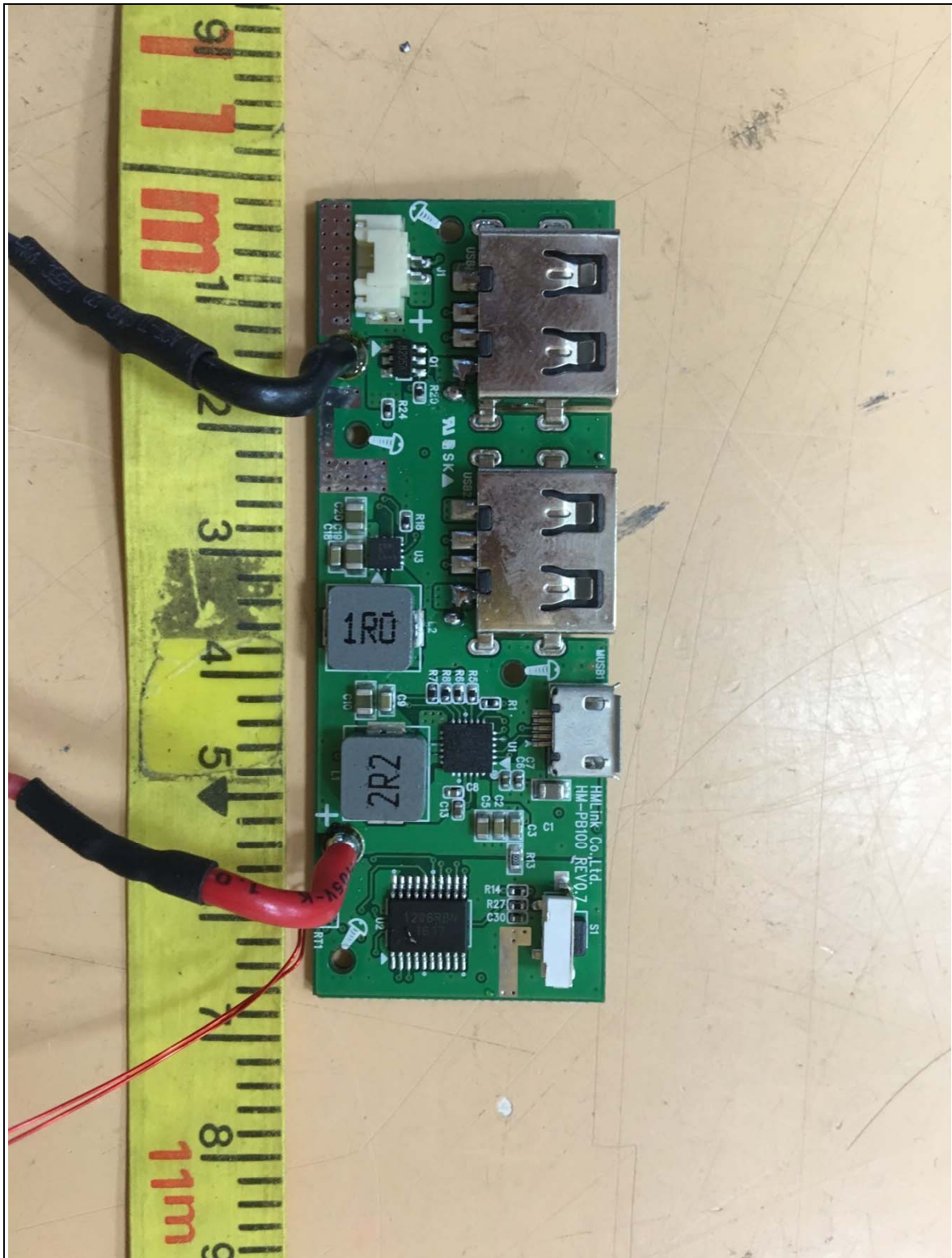
Rear View of EUT



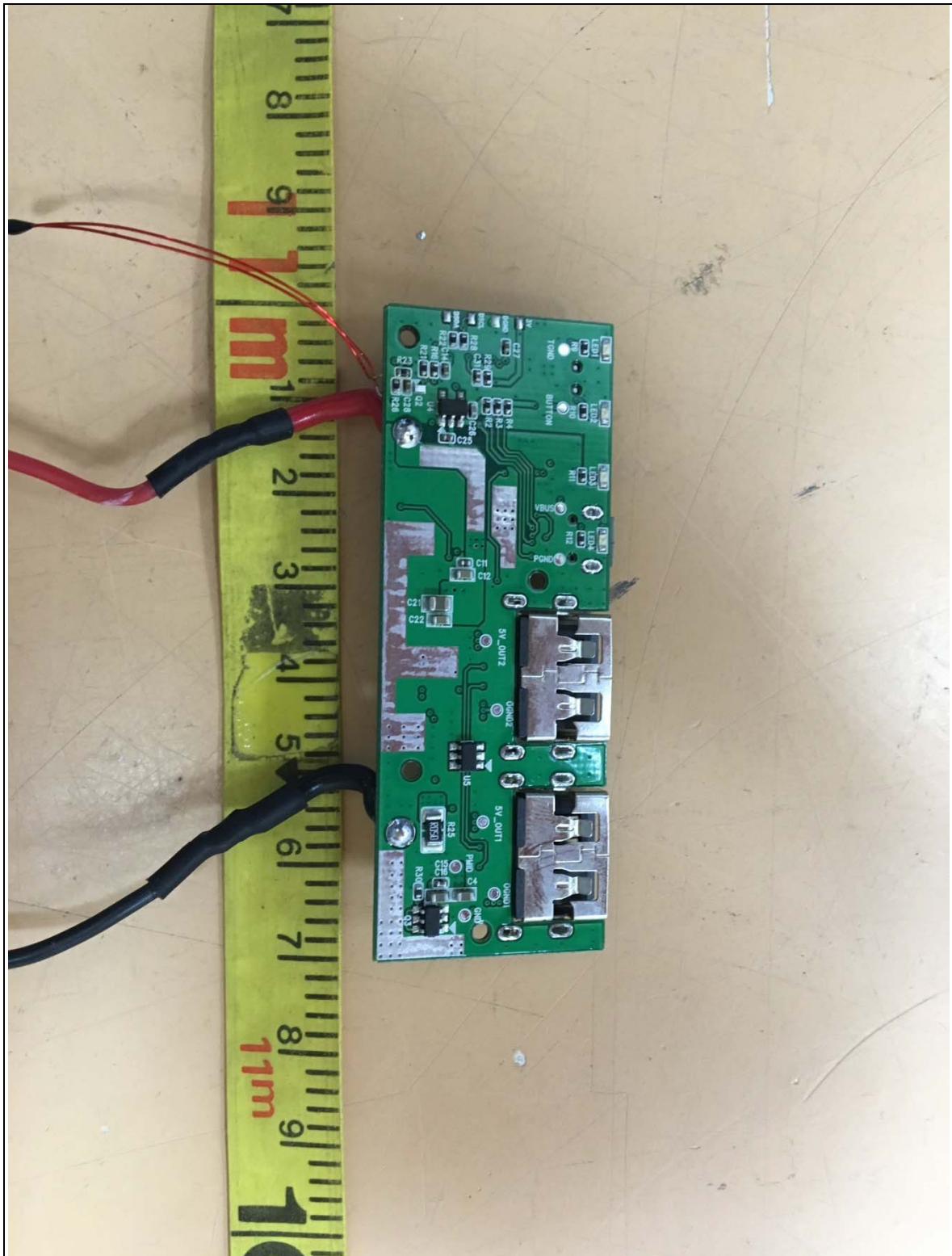
Inside View of EUT



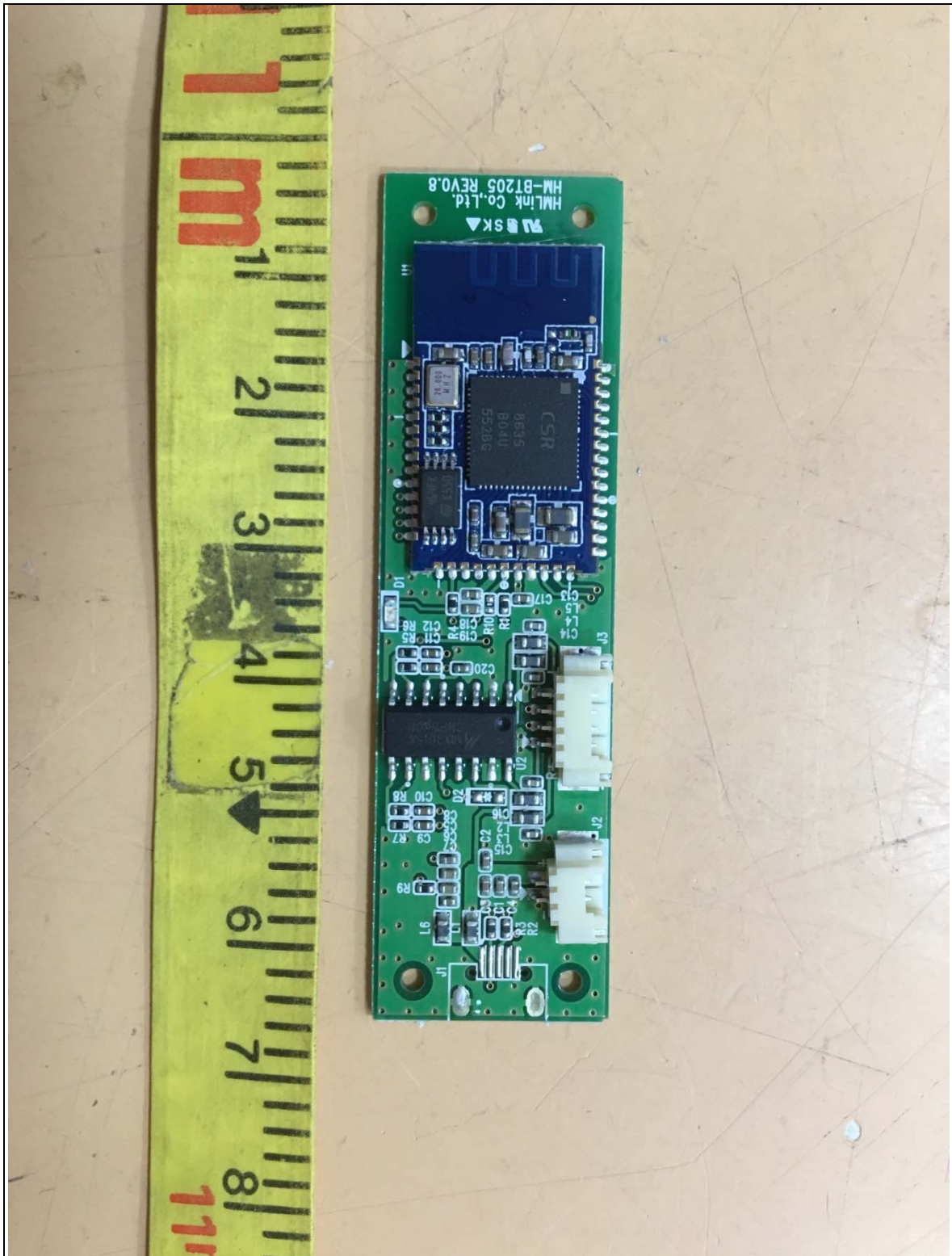
Front View of Main BOARD



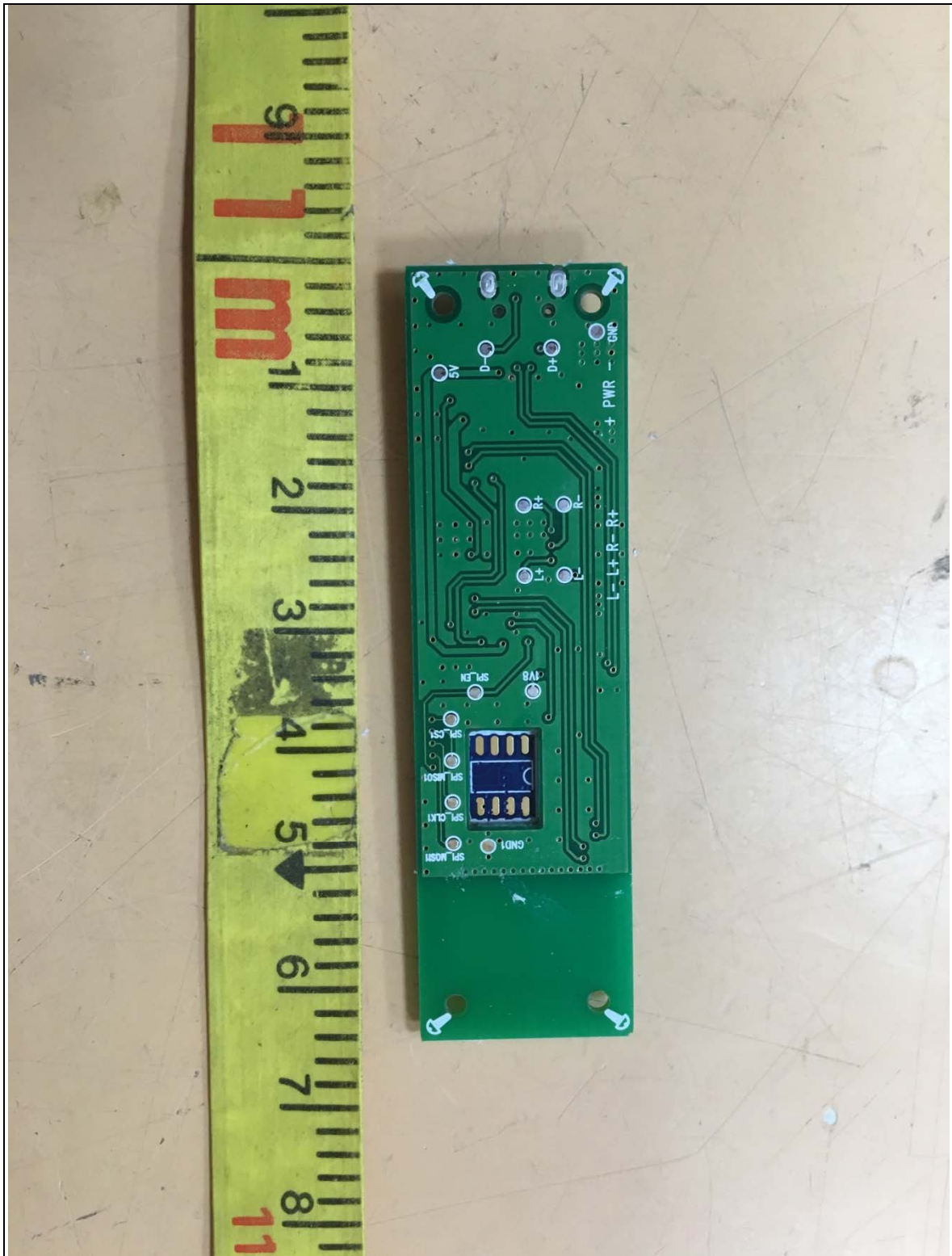
Rear View of Main BOARD



Front View of Bluetooth BOARD



Rear View of Bluetooth BOARD



Front View of BATTERY



Rear View of BATTERY



APPENDIX D – BLOCK DIAGRAM

APPENDIX E – USER’S MANUAL

APPENDIX F – SCHEMATIC DIAGRAM
