RF TEST REPORT

Report No.: 17070288-FCC-R

Supersede Report No.: N/A

Applicant	EDMI(Shenzhen)Co.,Ltd
Product Name	HD16
Model No.	HD16
Serial Model No.	N/A
Test Standard	FCC 15.231:2016, ANSI C63.4:2009
Test Date	May 17 to November 22, 2017
Issue Date	November 23, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Loren Luo	David Huang	
Loren Luo Test Engineer	David Huang Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070288-FCC-R	NONE	Original	November 23, 2017

2. Customer information

Applicant Name	EDMI(Shenzhen)Co.,Ltd
Applicant Add	Floor 2&3, Building 2, Zhong Yuntai Science&Technology Industrial Park, Tang Tou 1st Road, Tang Tou Community, Shi Yan Street, Bao An District, Shen Zhen.
Manufacturer	EDMI(Shenzhen)Co.,Ltd
Manufacturer Add	Floor 2&3, Building 2, Zhong Yuntai Science&Technology Industrial Park, Tang Tou 1st Road, Tang Tou Community, Shi Yan Street, Bao An District, Shen Zhen.

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	HD16
Main Model:	HD16
Serial Model:	N/A
Date EUT received:	May 16, 2017
Test Date(s):	May 17 to November 22, 2017
RF Operating Frequency (ies):	433.3-434.5MHz(TX/RX)
Number of Channels :	1 CH
Equipment Category:	DSC
Antenna Gain:	-4Bi
Input Power:	Adapter: Model: HKC0055010-4D INPUT: AC100-240V~50/60Hz, 0.2A OUTPUT: DC 5.0V, 1.0A
Trade Name :	EDMI
FCC ID:	2AC6HHD16
Port:	Power Port
Type of Modulation:	FSK

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

Test Results Summary

Test Standard CFR 47 Part 15.231: 2014	Description	Pass / Fail
15.203	Antenna Requirement	Pass
15.207	Conducted Emissions Voltage	N/A
15.231(e)	Fundamental & Radiated Spurious Emission	Pass
15.231(c)	20dB Bandwidth	Pass
15.231(e)	Deactivation	Pass
ANSI C63.4: 2009 PS: All measurement uncertainties are not taken into consideration for all presented test result.		

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

Test result: Pass

The antenna is permanently attached to the device which meets the requirement.

6.2 Conducted Emissions Voltage

Temperature	24°C
Relative Humidity	62%
Atmospheric Pressure	1012mbar
Test date :	------
Tested By :	Loren Luo

Requirement:

Frequency of emission (MHz)	Conducted limit (dBμ V)	
	Quasi-peak	Average
0.15– 0.5	66 to 56*	56 to 46*
0.5– 5	56	46
5– 30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty

   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.

Test result: N/A (Batteries operated)

6.3 20dB Occupied Bandwidth

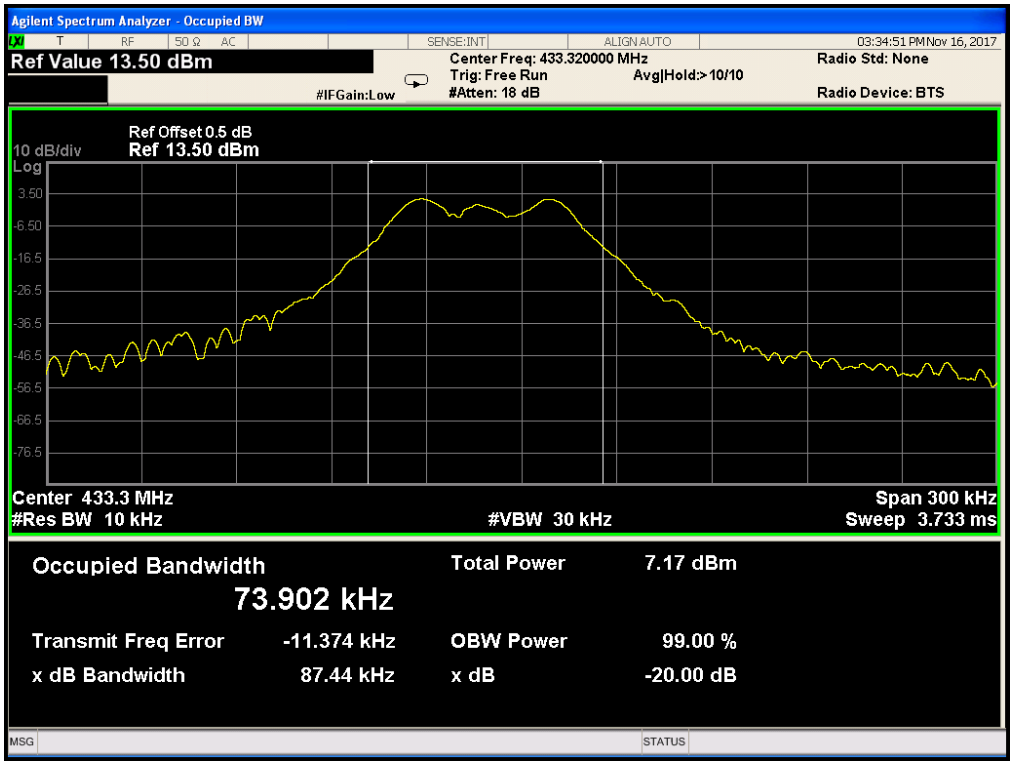
Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	November 16, 2017
Tested By :	Loren Luo

20dB bandwidth was measured by conducted method using a spectrum analyzer.

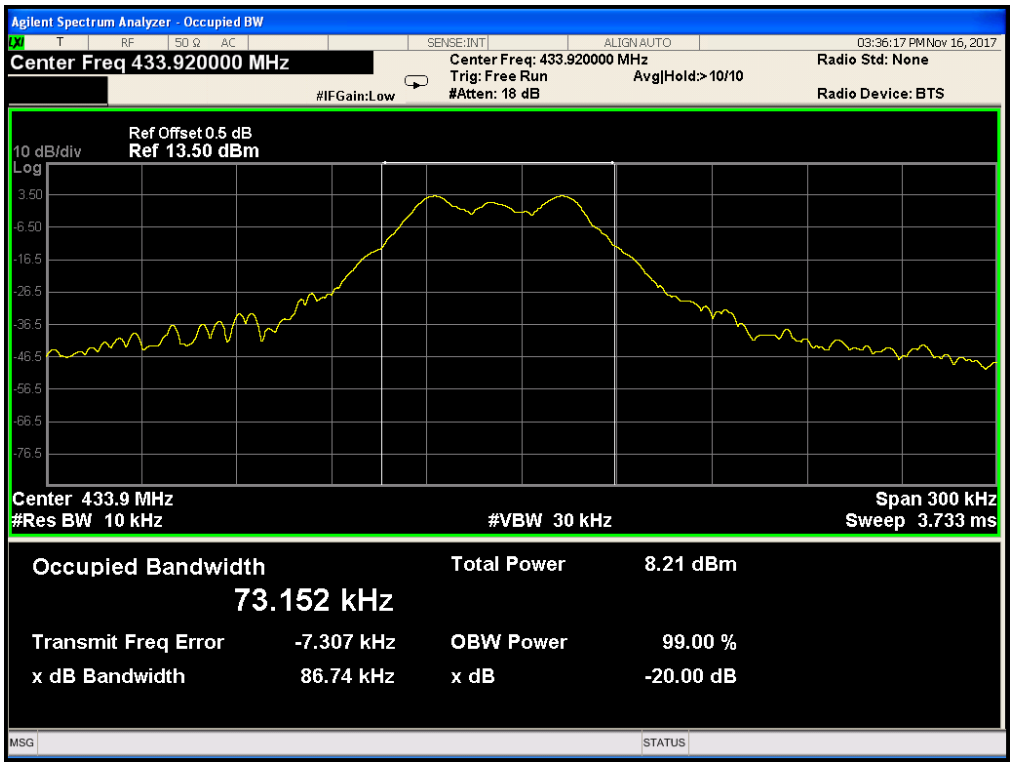
Test Result:

Fundamental Frequency (MHz)	Measured 20dB Bandwidth (kHz)	FCC 15.231 Limit (kHz)	Result
433.3	87.44	1084.80	Pass
433.9	86.74	1084.80	Pass
434.5	87.65	1084.80	Pass

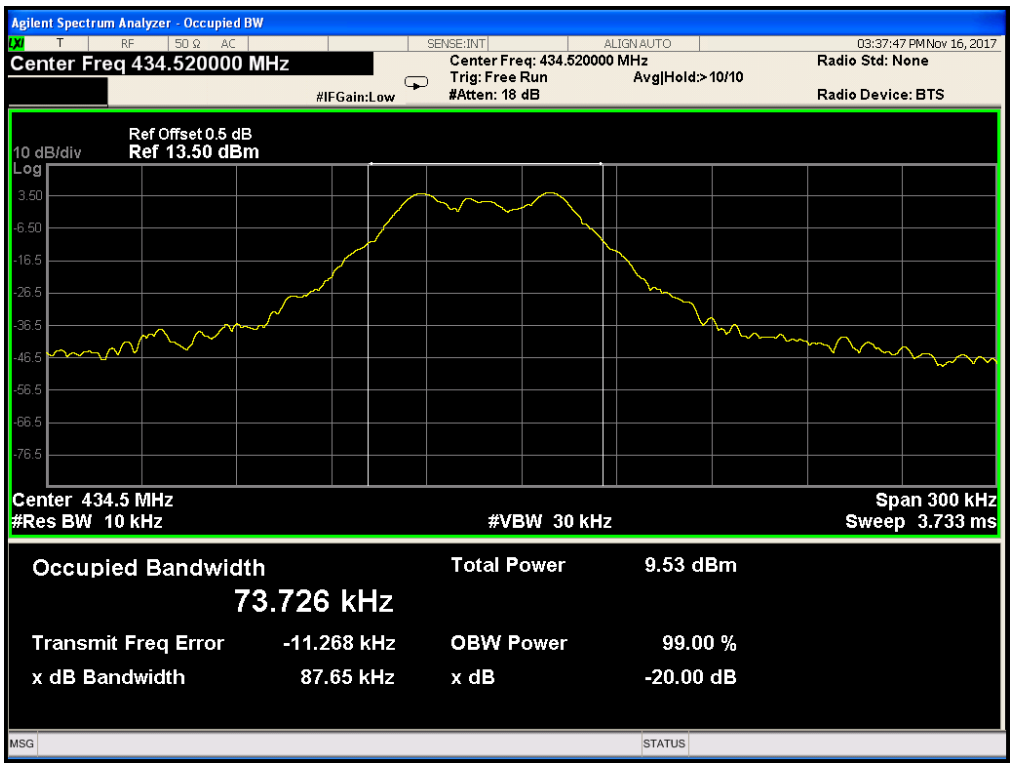
Low Channel (433.3 MHz)



Mid Channel (433.9 MHz)



High Channel (434.5 MHz)



6.4 Radiated Fundamental and Spurious Emission

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	November 16, 2017
Tested By :	Loren Luo

1. Radiated emissions were measured according to ANSI C63.4. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1meter above the ground from the center of the loop. The measuring bandwidth was set to 10kHz. All possible modes of operation were investigated. Only the worst case emissions measured, All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Sample Calculation: Corrected Amplitude=Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor.
   Sample Calculation:
   1) Corrected Amplitude= Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor
   2) Average = peak reading + 20log(duty cycle)
4. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz(QP only3m & 10m) is +5.6/-4.5dB(for EUTs<0.5m×0.5m×0.5m).In range of 1-40GHz) is ±3.6dB.

Standard Requirement:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1,500	50 to 150
174-260	1,500	150
260-470	1,500-5,000	150-500
Above 470	5,000	500

Test Result: Pass

Low Channel (433.32 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
433.32	-21.94	H	90.43	68.49	92.84	72.84	-2.41	-4.35
866.64	-21.94	H	45.56	23.62	72.84	52.84	-27.28	-29.22
1299.96	-21.94	H	50.01	28.07	72.84	52.84	-22.83	-24.77
1733.28	-21.94	H	42.8	20.86	72.84	52.84	-30.04	-31.98
2166.6	-21.94	H	40.85	18.91	72.84	52.84	-31.99	-33.93
2599.92	-21.94	H	45.63	23.69	72.84	52.84	-27.21	-29.15
3466.56	-21.94	H	46.71	24.77	72.84	52.84	-26.13	-28.07
4333.2	-21.94	H	47.51	25.57	72.84	52.84	-25.33	-27.27
433.32	-21.94	V	88.22	66.28	92.84	72.84	-4.62	-6.56
866.64	-21.94	V	61.07	39.13	72.84	52.84	-11.77	-13.71
1299.96	-21.94	V	46.9	24.96	72.84	52.84	-25.94	-27.88
1733.28	-21.94	V	47.74	25.8	72.84	52.84	-25.1	-27.04
2166.6	-21.94	V	42.36	20.42	72.84	52.84	-30.48	-32.42
2599.92	-21.94	V	45.04	23.1	72.84	52.84	-27.8	-29.74
3466.56	-21.94	V	47.11	25.17	72.84	52.84	-25.73	-27.67
4333.2	-21.94	V	49.42	27.48	72.84	52.84	-23.42	-25.36

Middle Channel (433.92 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
433.92	-21.94	H	90.31	68.37	92.87	72.87	-2.56	-4.5
867.84	-21.94	H	55.84	33.9	72.87	52.87	-17.03	-18.97
1301.76	-21.94	H	48.35	26.41	72.87	52.87	-24.52	-26.46
1735.68	-21.94	H	43.63	21.69	72.87	52.87	-29.24	-31.18
2410.307	-21.94	H	44.13	22.19	74	54	-29.87	-31.81
2603.52	-21.94	H	46.27	24.33	72.87	52.87	-26.6	-28.54
3037.44	-21.94	H	47.6	25.66	72.87	52.87	-25.27	-27.21
4339.2	-21.94	H	48.04	26.1	72.87	52.87	-24.83	-26.77
433.92	-21.94	V	88.5	66.56	92.87	72.87	-4.37	-6.31
867.84	-21.94	V	46.27	24.33	72.87	52.87	-26.6	-28.54
1301.76	-21.94	V	47.08	25.14	72.87	52.87	-25.79	-27.73
1735.68	-21.94	V	47.08	25.14	72.87	52.87	-25.79	-27.73
1919.761	-21.94	V	47.9	25.96	74	54	-26.1	-28.04
2603.52	-21.94	V	47	25.06	72.87	52.87	-25.87	-27.81
60.7	-21.94	V	37.35	15.41	74	54	-36.65	-38.59
3037.44	-21.94	V	45.77	23.83	72.87	52.87	-27.1	-29.04

High Channel (434.52 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
434.52	-21.94	H	89.91	67.97	92.89	72.89	-2.98	-4.92
869.04	-21.94	H	47.92	25.98	72.89	52.89	-24.97	-26.91
1303.56	-21.94	H	46.21	24.27	72.89	52.89	-26.68	-28.62
1738.08	-21.94	H	43.43	21.49	72.89	52.89	-29.46	-31.4
2172.6	-21.94	H	41.68	19.74	72.89	52.89	-31.21	-33.15
2607.12	-21.94	H	46.5	24.56	72.89	52.89	-26.39	-28.33
3041.64	-21.94	H	46.95	25.01	72.89	52.89	-25.94	-27.88
4408.687	-21.94	H	46.88	24.94	74	54	-27.12	-29.06
434.52	-21.94	V	87.99	66.05	92.89	72.89	-4.9	-6.84
869.04	-21.94	V	57.9	35.96	72.89	52.89	-14.99	-16.93
1303.56	-21.94	V	41.39	19.45	72.89	52.89	-31.5	-33.44
1738.08	-21.94	V	47.39	25.45	72.89	52.89	-25.5	-27.44
2172.6	-21.94	V	41.71	19.77	72.89	52.89	-31.18	-33.12
2607.12	-21.94	V	43.18	21.24	72.89	52.89	-29.71	-31.65
3041.64	-21.94	V	47.87	25.93	72.89	52.89	-25.02	-26.96
4223.122	-21.94	V	46.56	24.62	74	54	-27.44	-29.38

Notes:

1. Duty cycle is 8%, 20log (duty cycle) = -21.94dB correction was used to determine the average level from the peak
2. reading. Average = peak reading + 20log (duty cycle), Final Average= peak reading -21.94

3. All the data measurement of peak values.
4. FCC Limit for Average Measurement=
   Low channel: 3,750+(12,500-3,750)/(470-260)*(433.32-260) μ V/m =80.81dBμ V/m;
   Middle channel: 3,750+(12,500-3,750)/(470-260)*(433.92-260) μ V/m =80.83dBμ V/m;
   High channel: 3,750+(12,500-3,750)/(470-260)*(434.52-260) μ V/m =80.85dBμ V/m;

5. Average pulsed signal over one complete pulse train or 100 ms time frame if pulse train exceeds 100 ms
6. Maximum average in 100 ms
7. Calculate duty cycle for pulse train or 100 ms
8. Duty cycle = (t1 + t2 + t3+…tn)/T where tn = pulse width, T = pulse train length or 100 ms
9. Pulse width (PW) = 8ms
   2/PW = 2/8ms =0.25 kHz

RBW > 2/PW (0.25kHz)

Therefore PDCF is not needed.

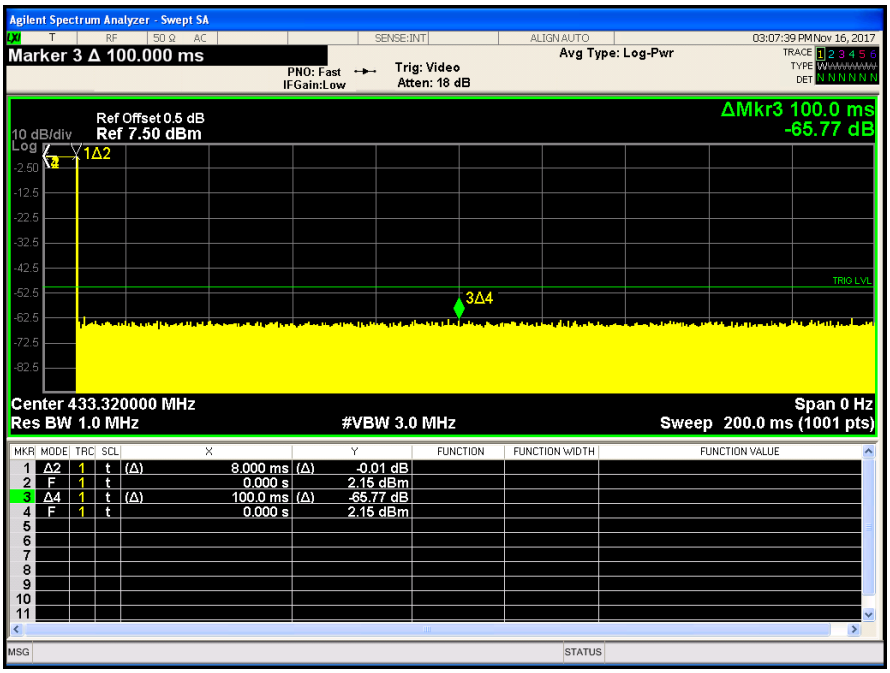
Pulse Duty Cycle:

Duty cycle= 8/100 =8%

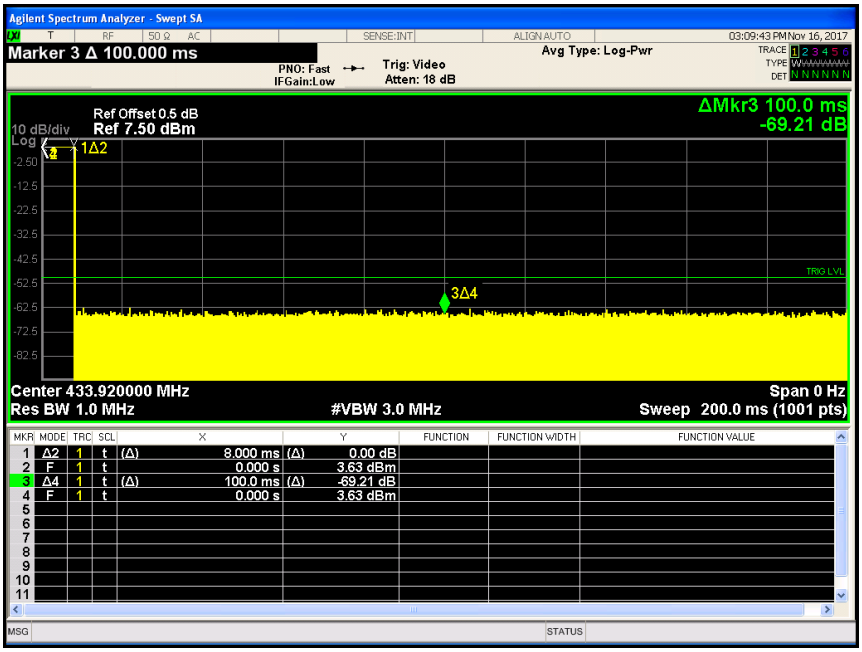
Average Duty Factor: 20*log (Duty Cycle) = -21.94dB

Duty Cycle

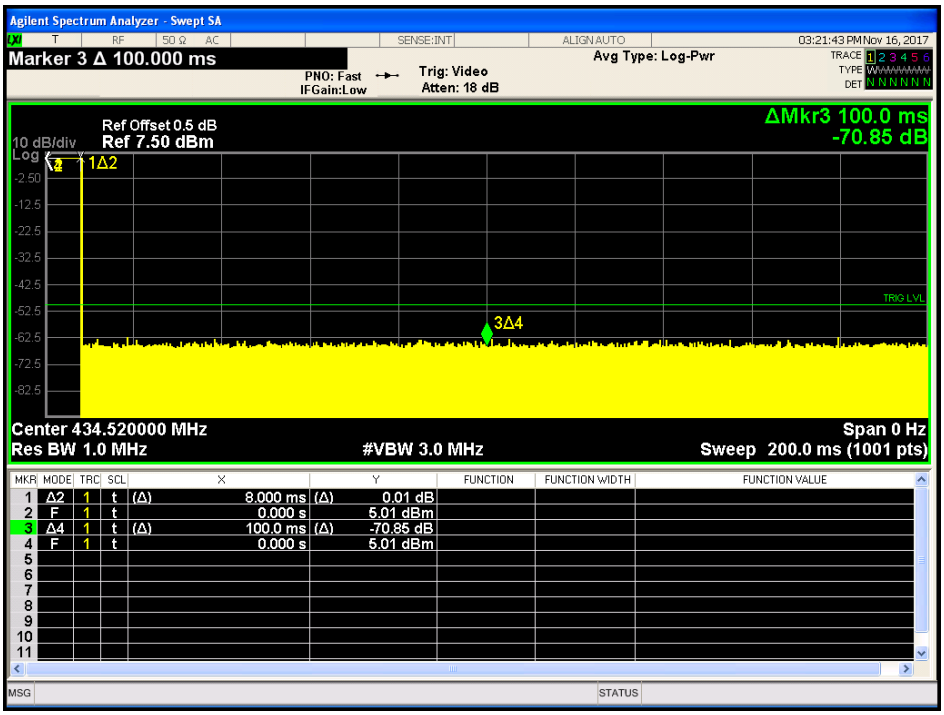
Low Channel (433.32 MHz)



Middle Channel (433.92 MHz)



High Channel (434.52 MHz)



6.5 Deactivation

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1016mbar
Test date :	November 16, 2017
Tested By :	Loren Luo

Deactivation was measured by conducted method using a spectrum analyzer.

Standard requirement: 47 CFR §15.231 (e)

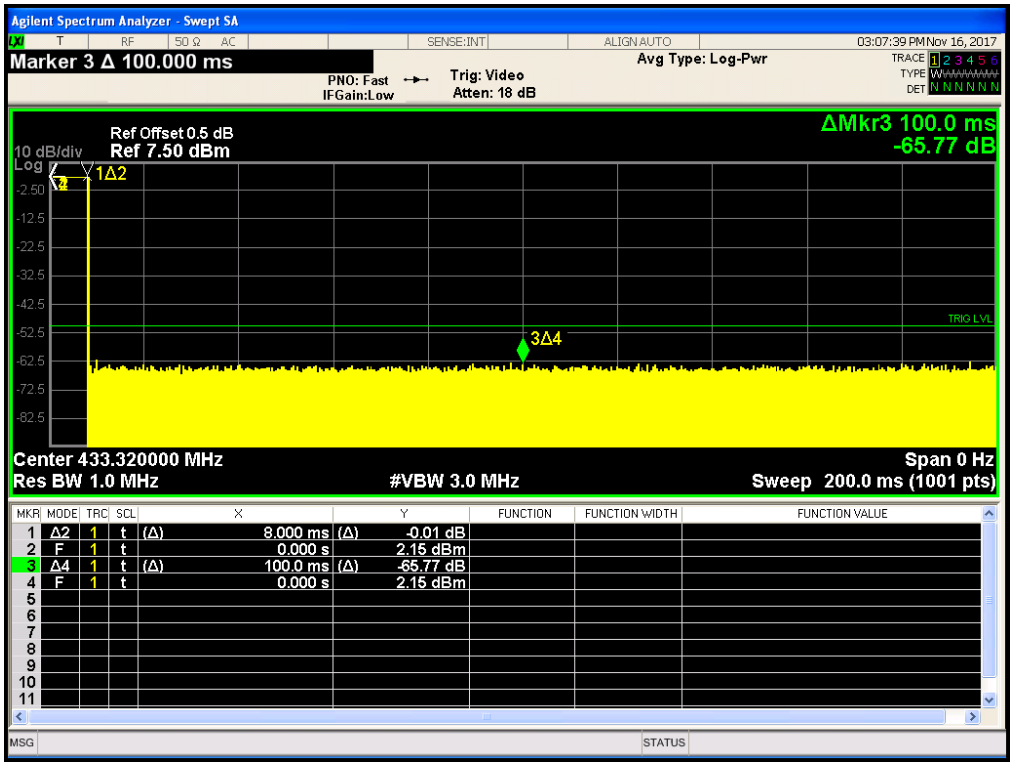
devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds

Test Result: Pass

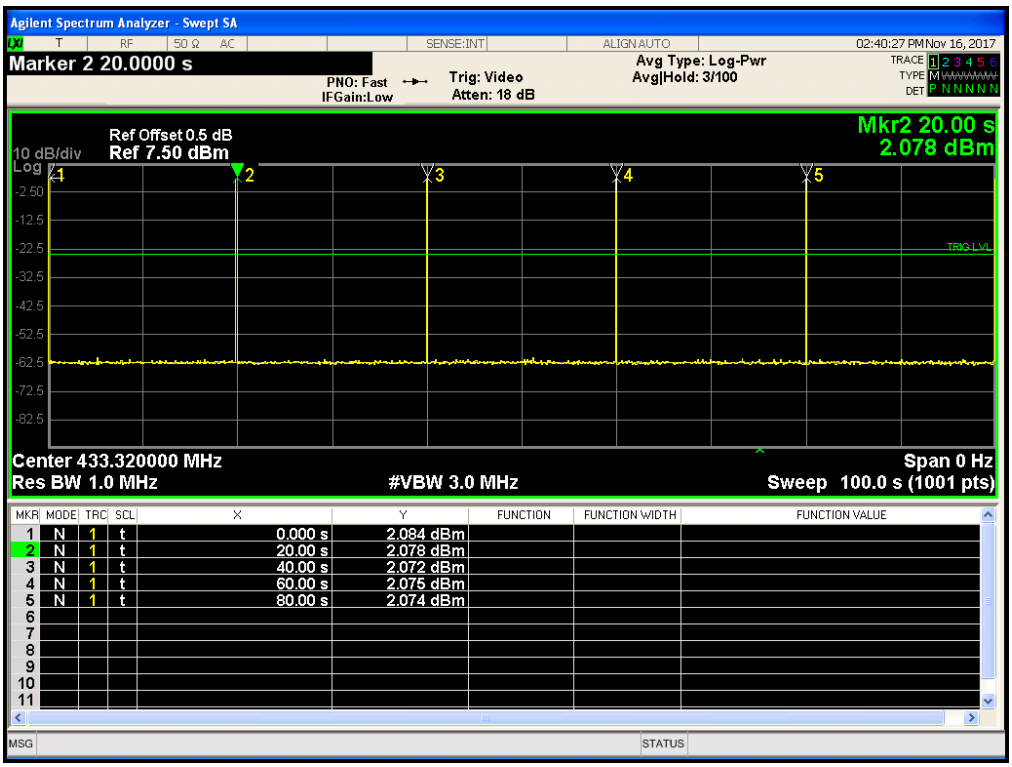
Frequency (MHz)	The duration of transmission	the silent period between transmissions	Limit(The duration of transmission)	Limit (the silent period between transmissions)	Verdict (Pass)
433.32	8(ms)	19.992	<=1s	≥ 30* the duration of transmission but in no case less than 10s	Pass
433.92	8(ms)	19.792	<=1s	≥ 30* the duration of transmission but in no case less than 10s	Pass
434.52	8(ms)	19.992	<=1s	≥ 30* the duration of transmission but in no case less than 10s	Pass

Note: The silent period between transmissions = The periodic time - The duration of transmission.

Low Channel (433.32MHz)

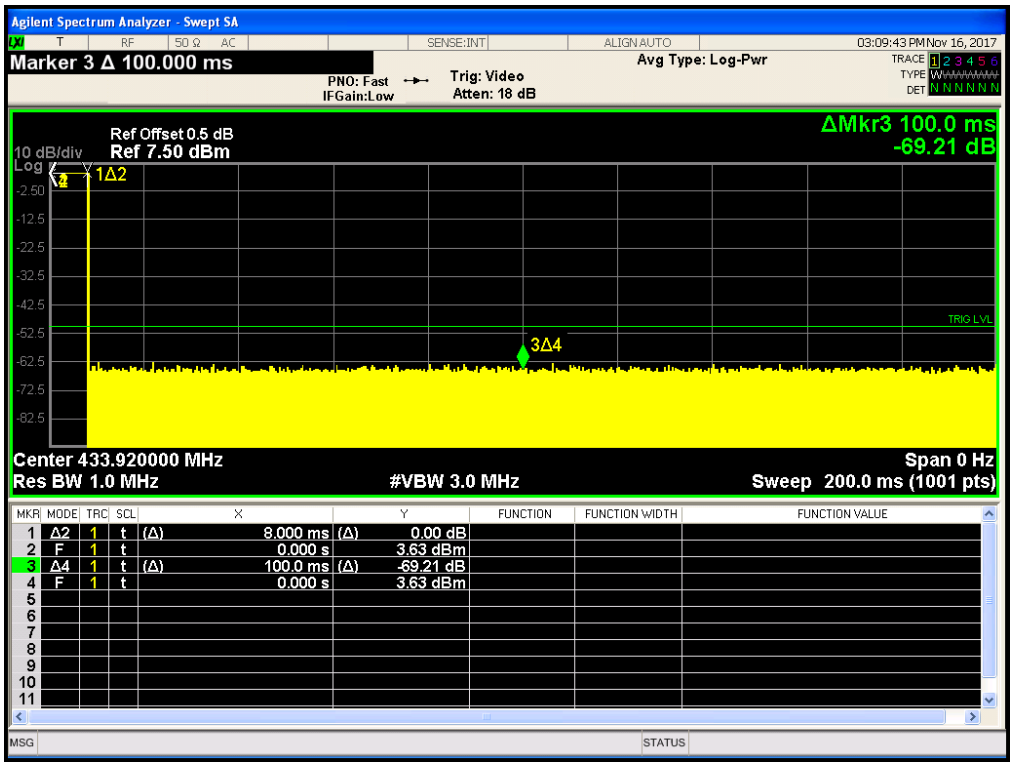


The duration of transmission

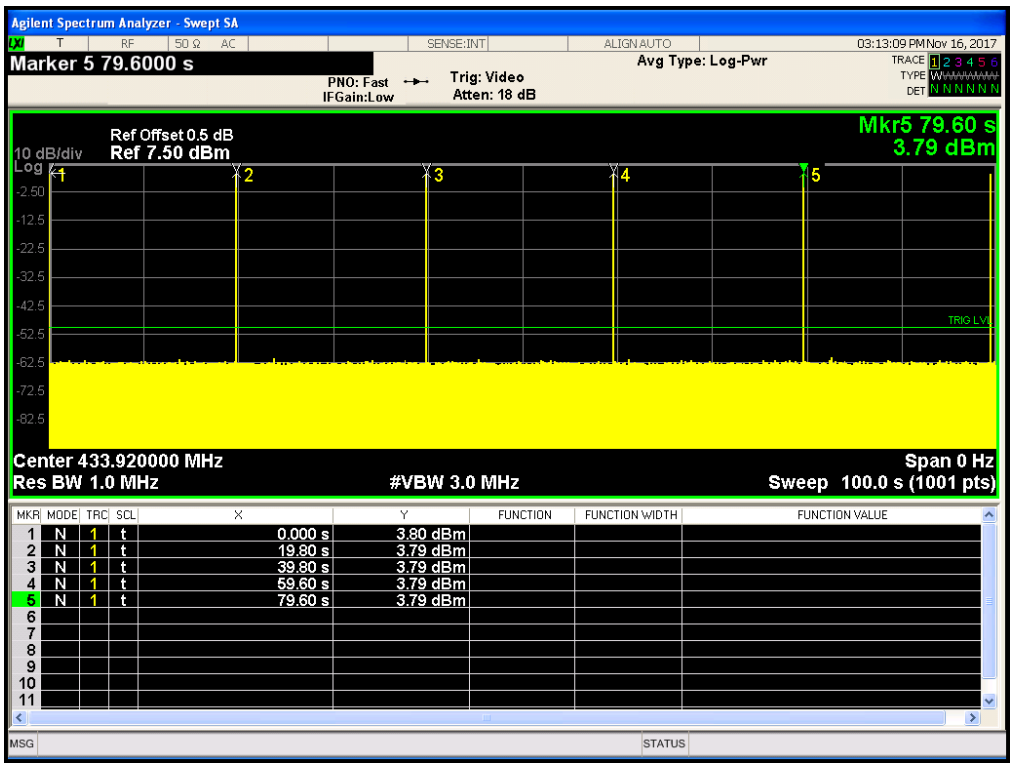


The periodic time

Middle Channel (433.92MHz)

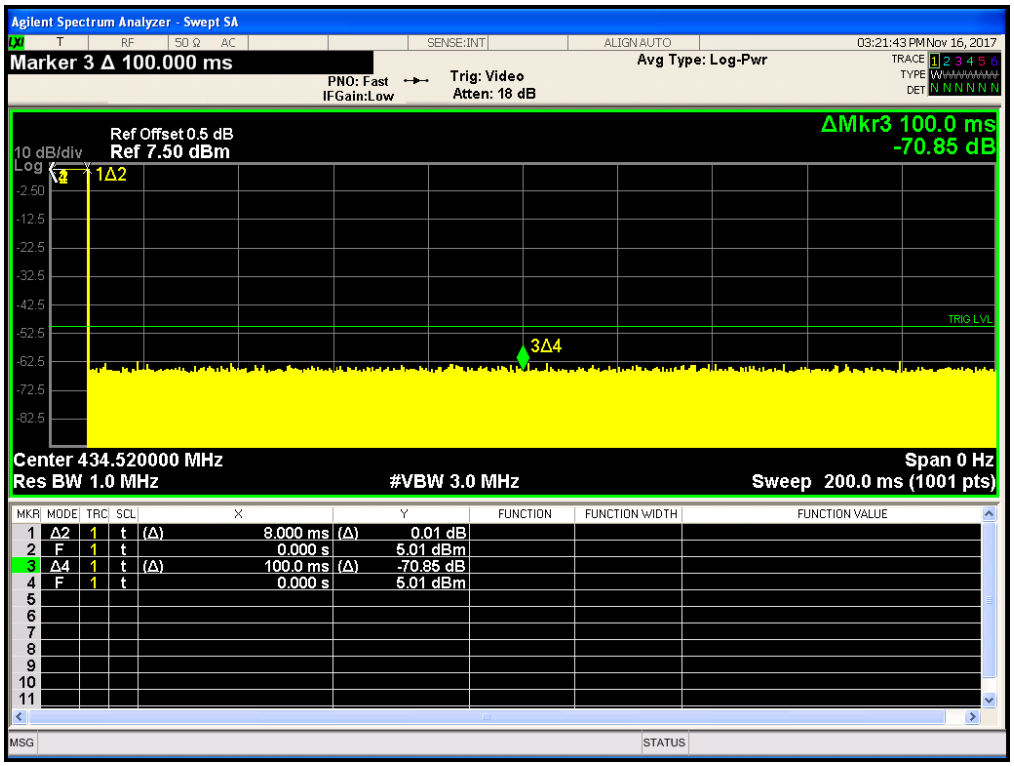


The duration of transmission

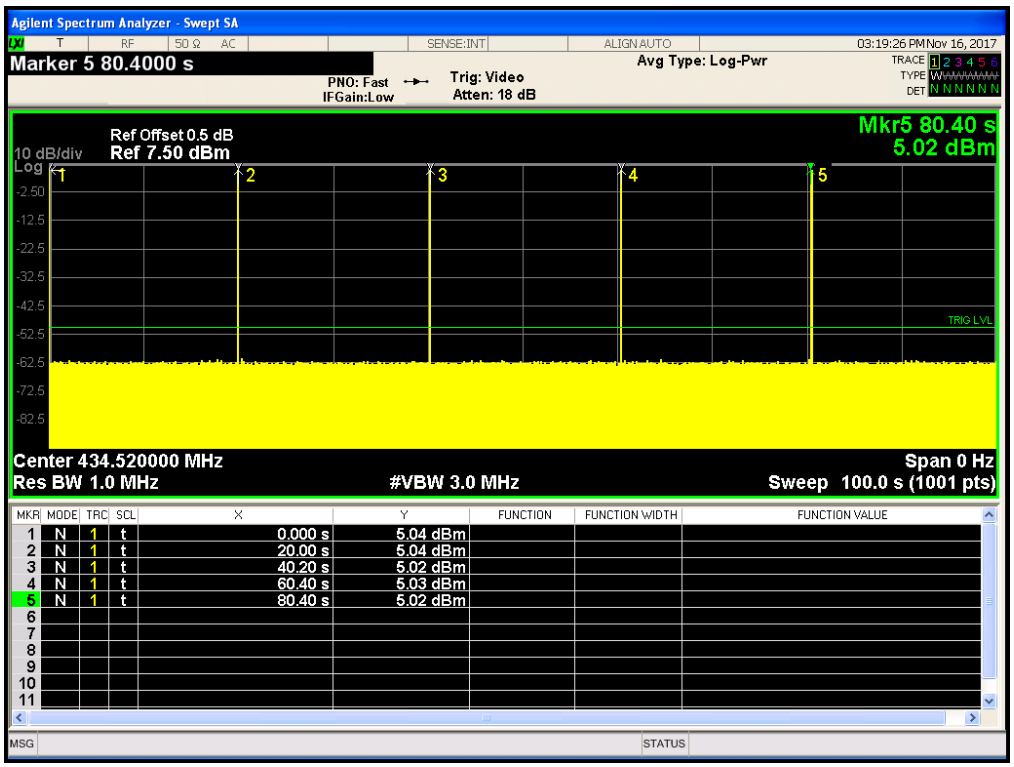


The periodic time

High Channel (434.52MHz)



The duration of transmission



The periodic time

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/15/2017	09/14/2018	☑
Line Impedance	LI-125A	191106	09/23/2017	09/22/2018	☑
Line Impedance	LI-125A	191107	09/23/2017	09/22/2018	☑
ISN	ISN T800	34373	09/23/2017	09/22/2018	☐
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	☑
Transient Limiter	LIT-153	531118	08/30/2017	08/29/2018	☑
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/15/2017	09/14/2018	☑
Power Splitter	1#	1#	08/30/2017	08/29/2018	☑
DC Power Supply	E3640A	MY40004013	09/15/2017	09/14/2018	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/15/2017	09/14/2018	☑
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/30/2017	08/29/2018	☑
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/19/2017	09/18/2018	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	☑
Universal Radio Communication Tester	CMU200	121393	09/23/2017	09/22/2018	☑

Annex B. EUT And Test Setup Photographs

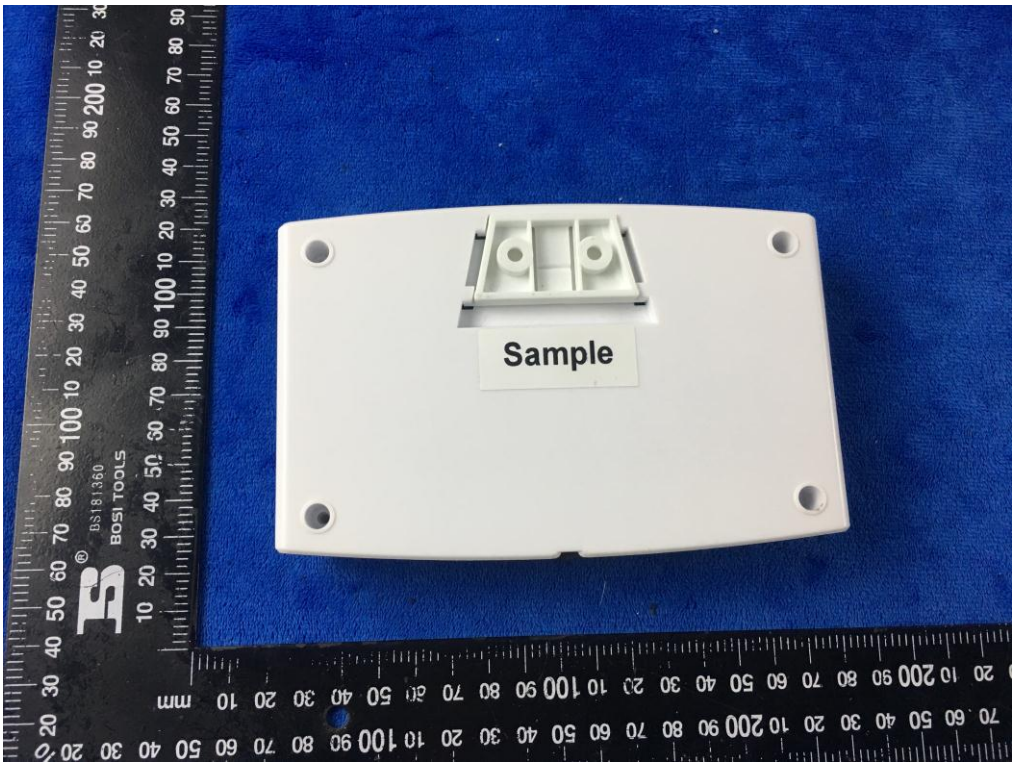
Annex B.i. Photograph: EUT External Photo

Whole Package View

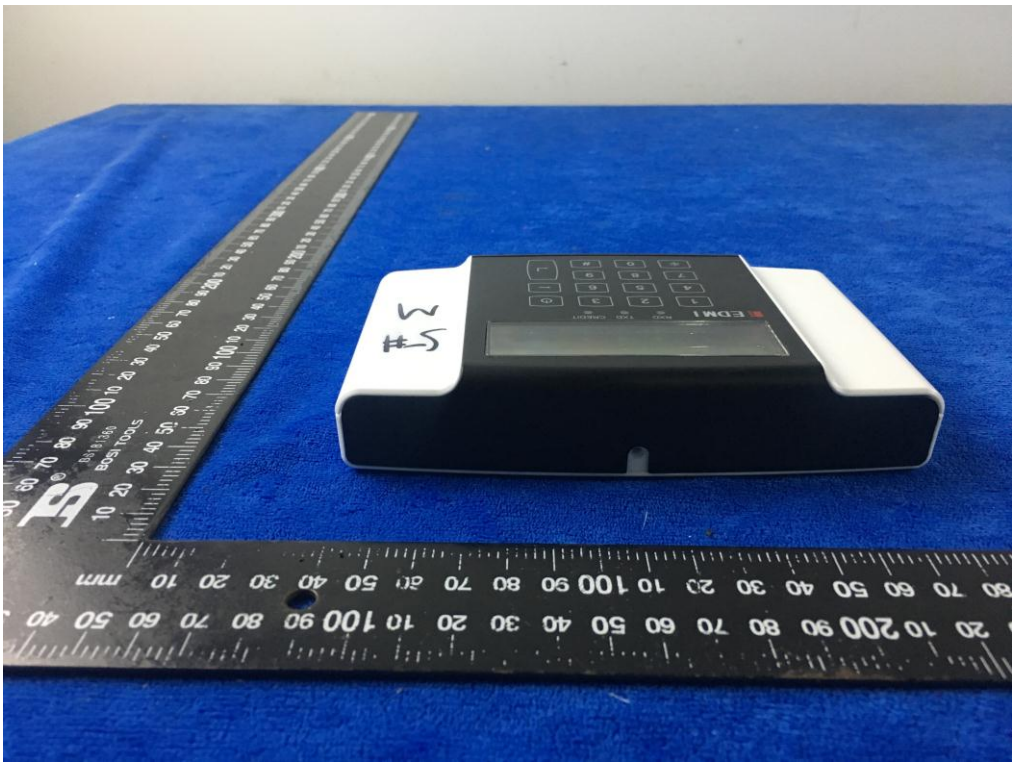
Adapter LableView

EUT - Front View

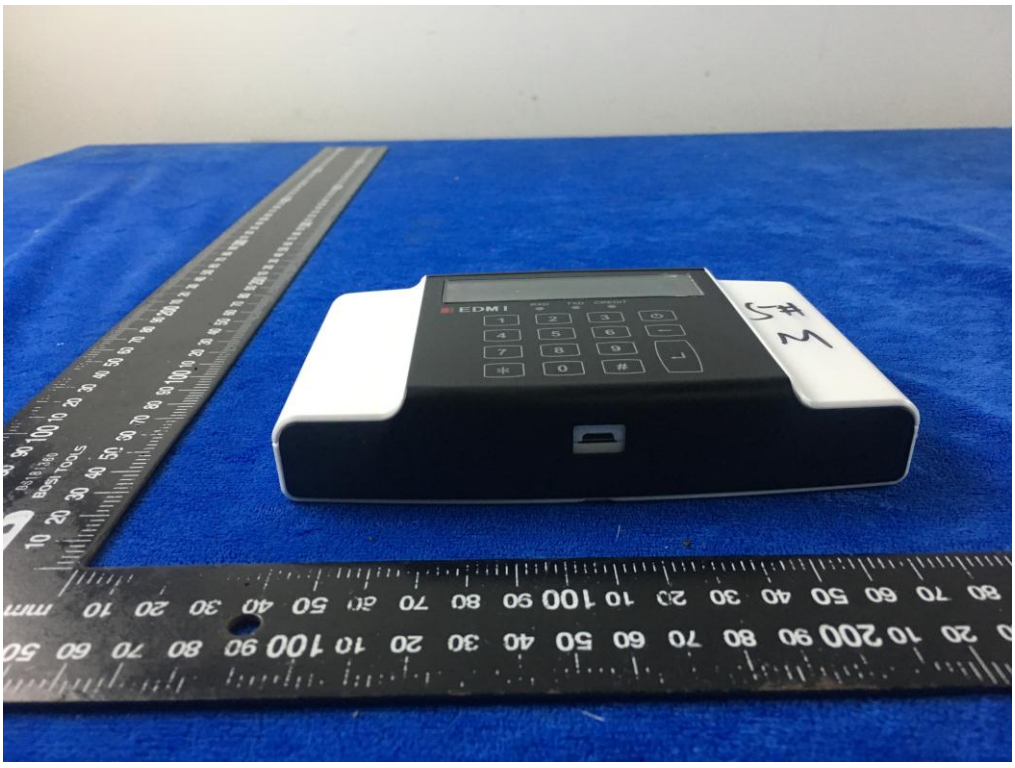
EUT - Rear View



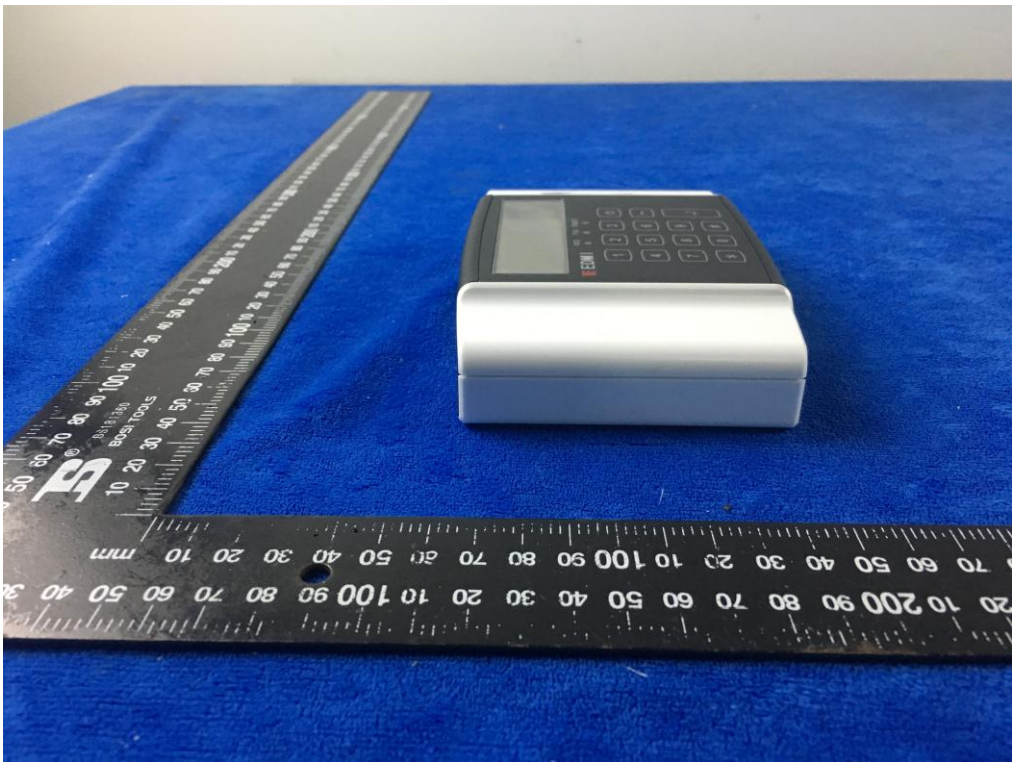
EUT - Top View



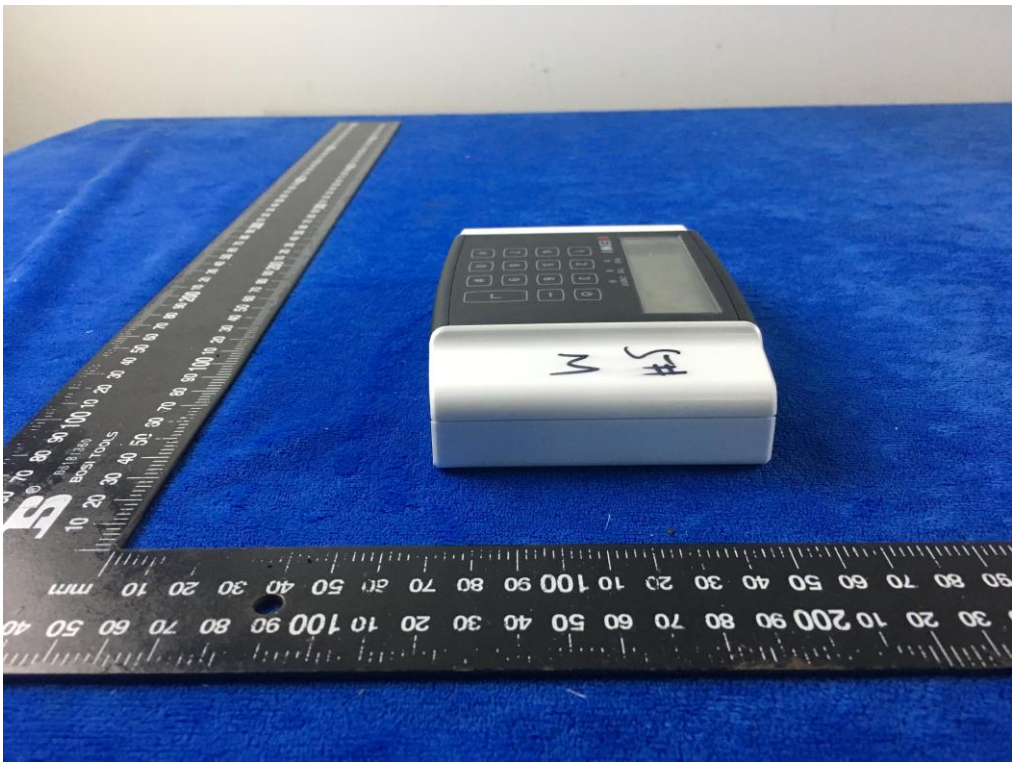
EUT - Bottom View



EUT - Left View

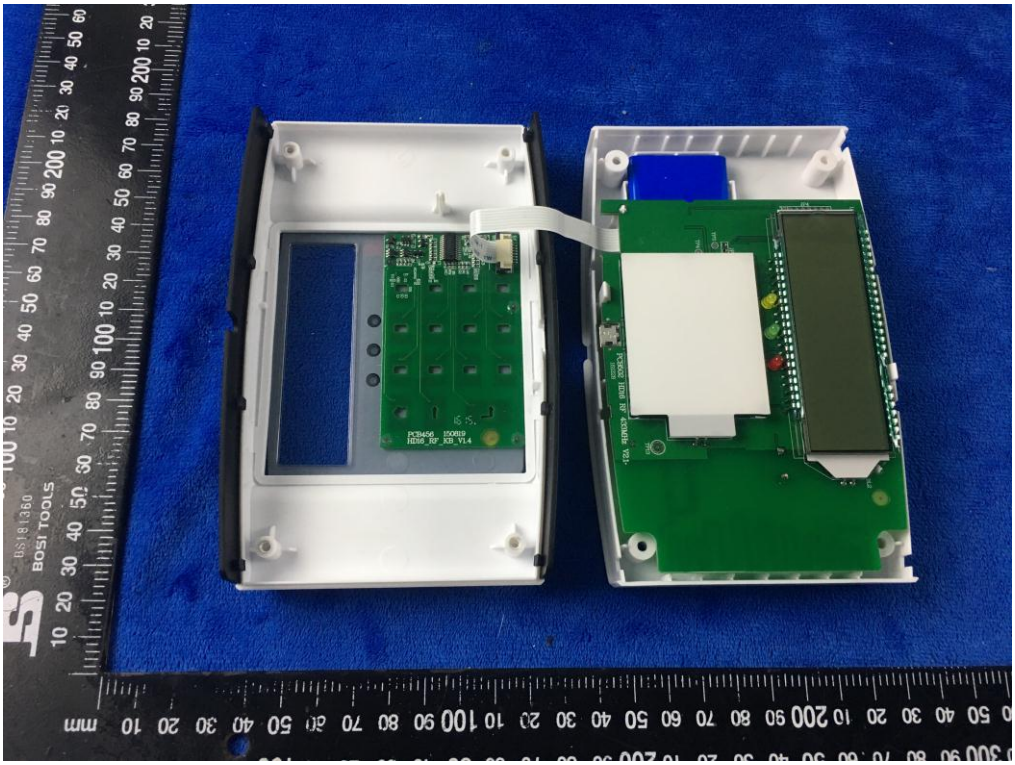


EUT - Right View

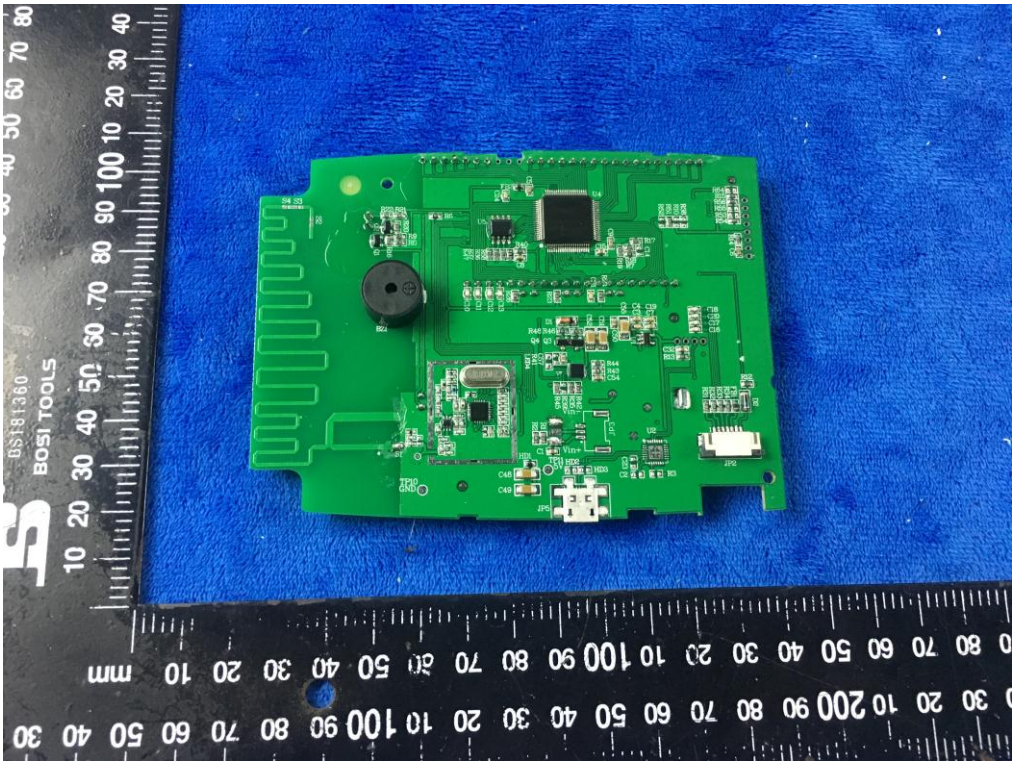


Annex B.ii. Photograph: EUT Internal Photo

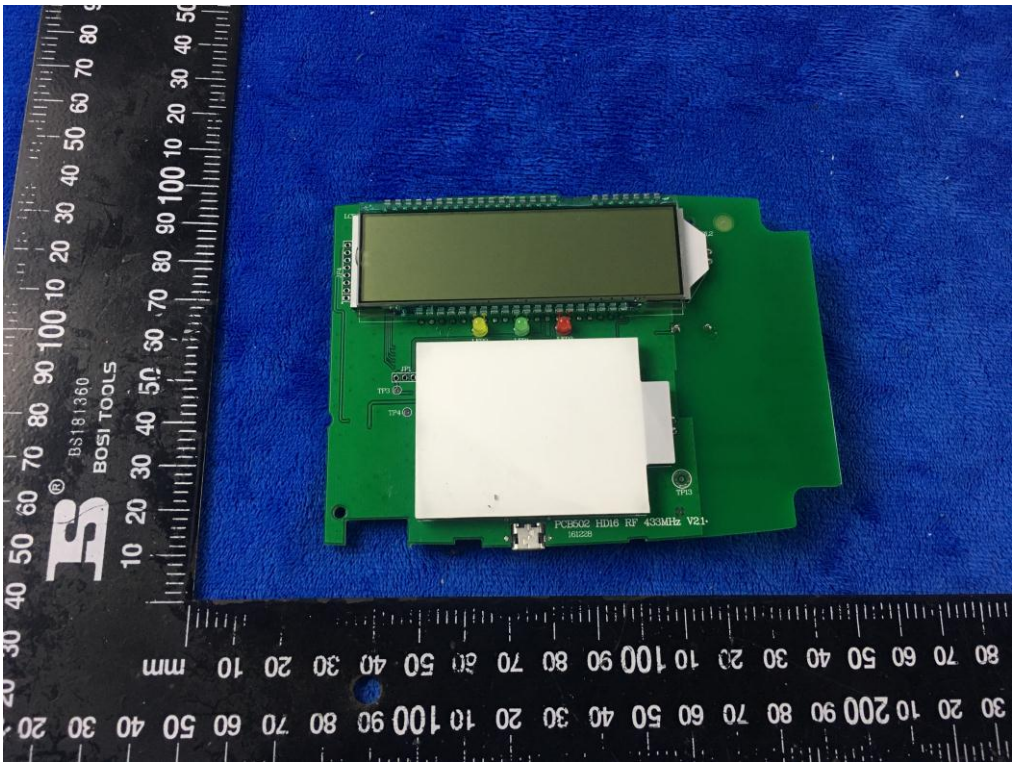
Cover Off - Top View



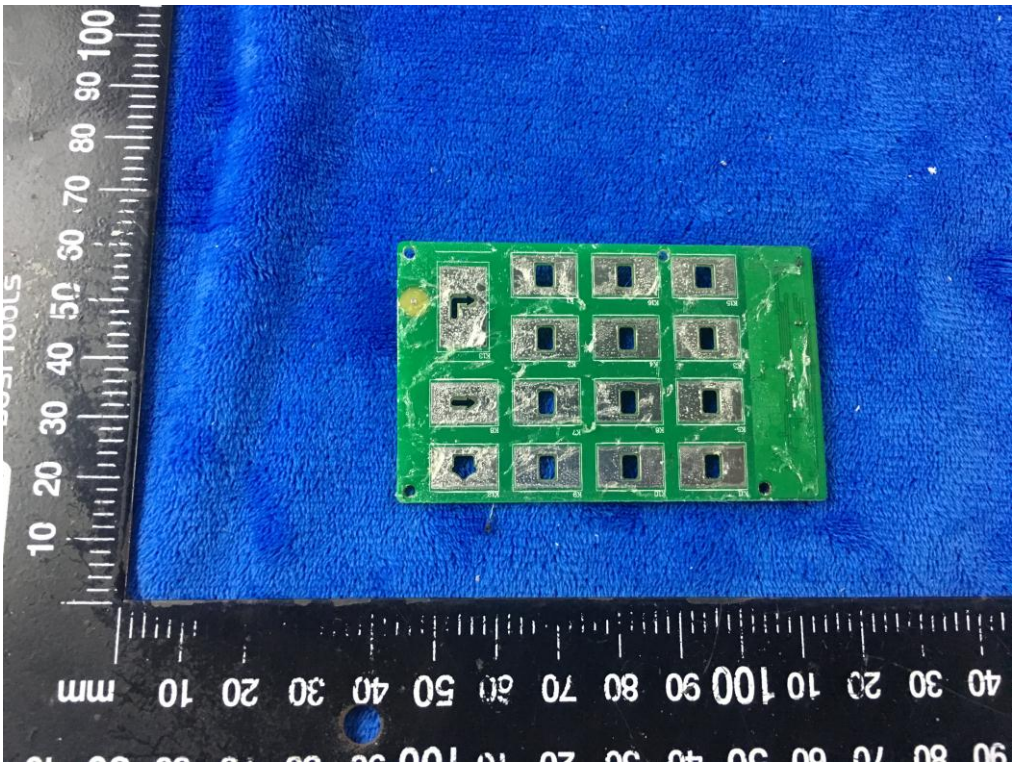
Mainboard - Front View



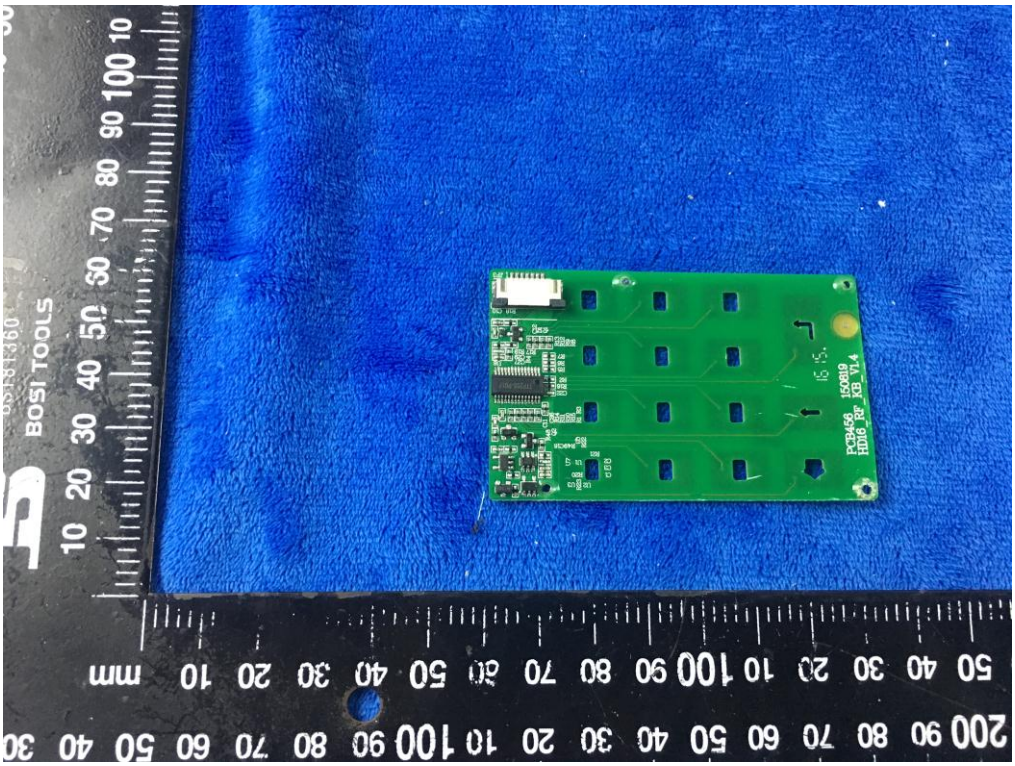
Mainboard – Rear View



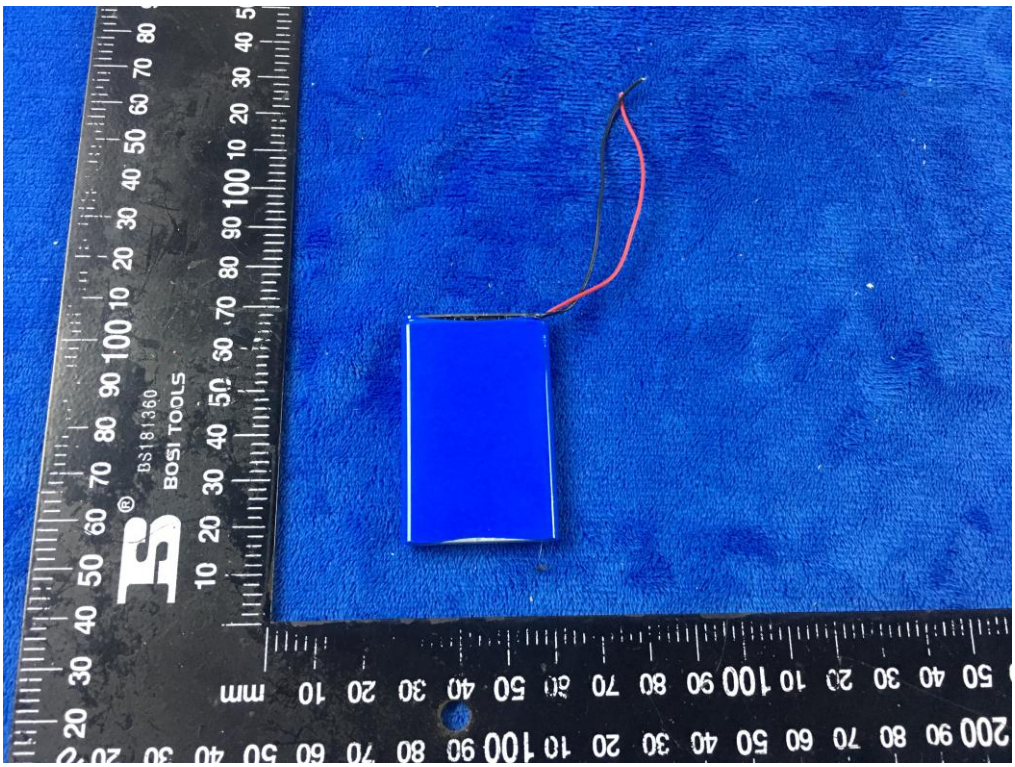
Smallboard - Front View



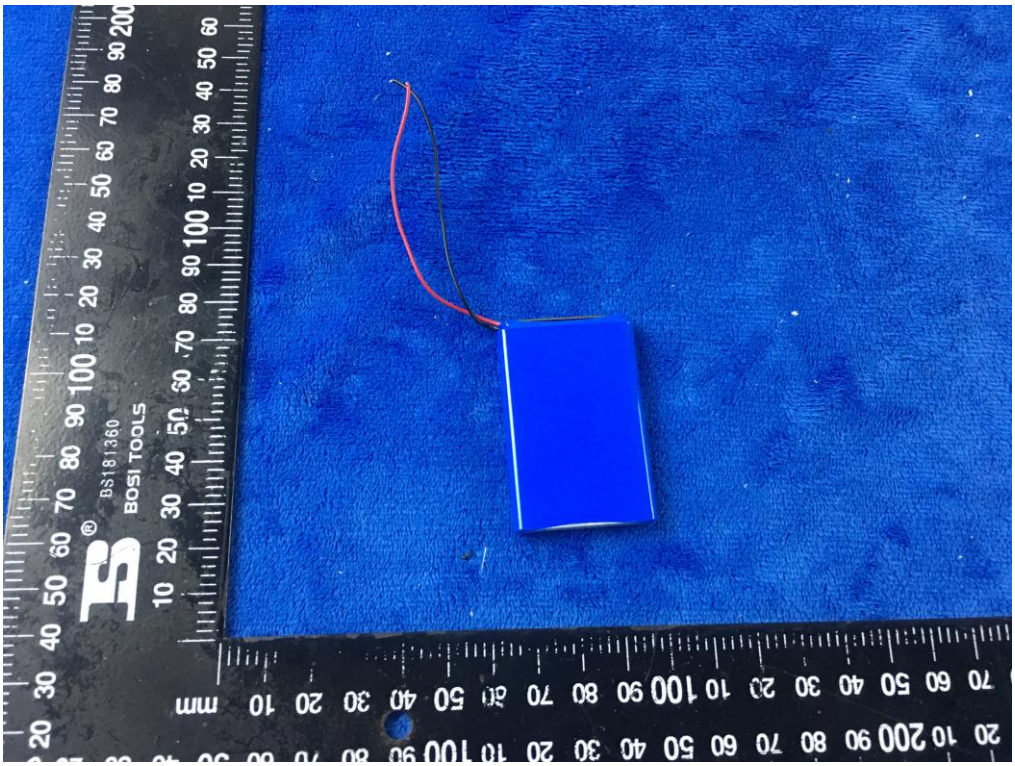
Smallboard – Rear View



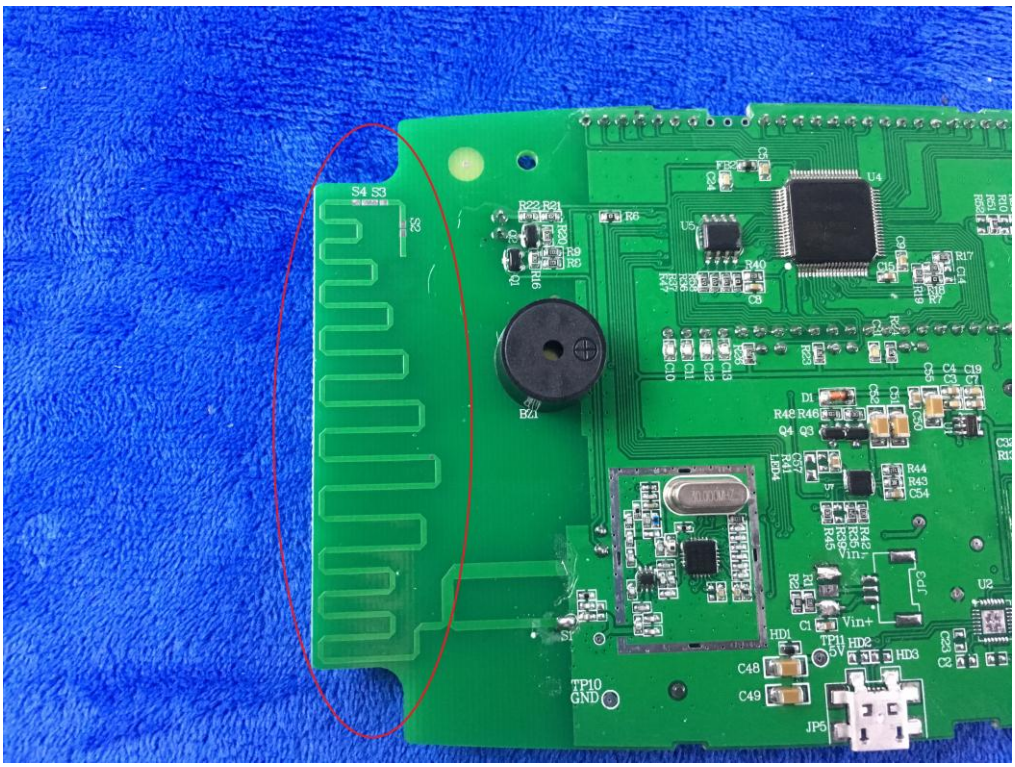
Battery – Front View



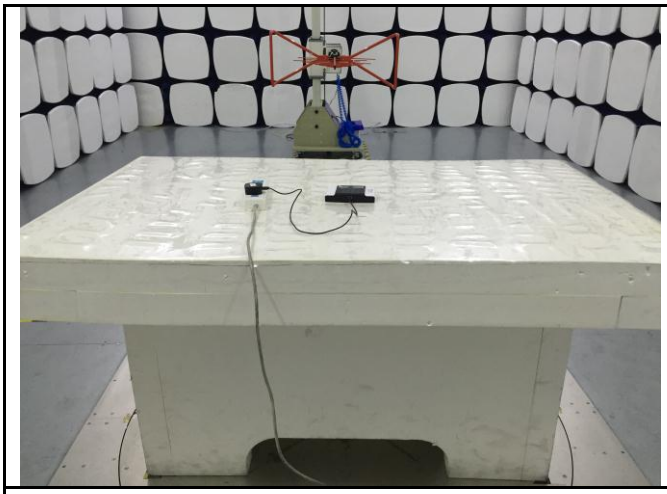
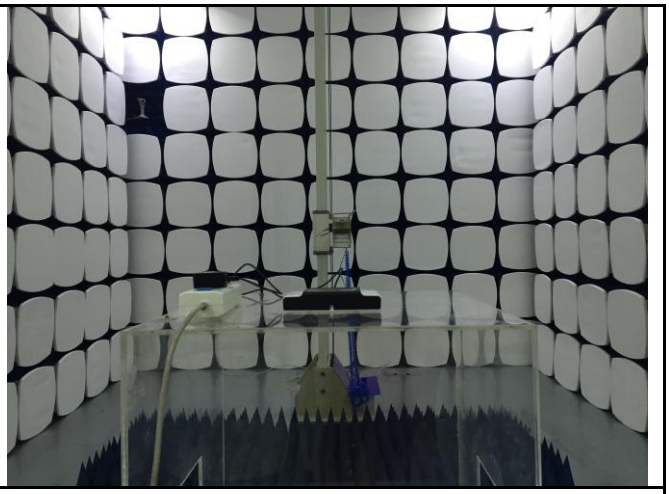
Battery – Rear View



Antenna View



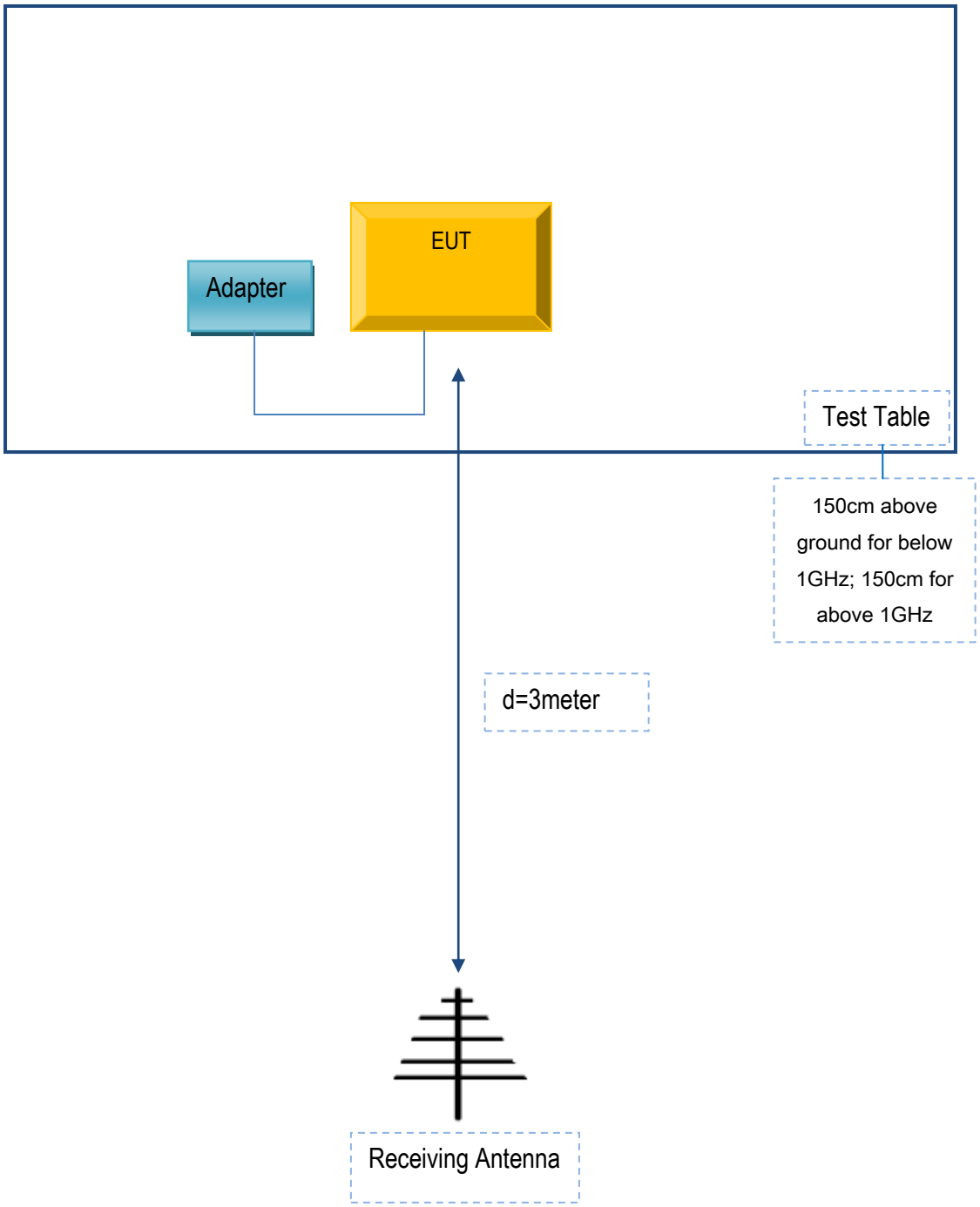
Annex B.iii. Photograph: Test Setup Photo

	
Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
EDMI(Shenzhen)Co., Ltd	Adapter	HKC0055010-4D	D05A90167V000854

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
Power Cables	Un-shielding	No	0.8m	D05A90167V000854

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A