FCC TEST REPORT
for
Shenzhen Bominwell Robotics Co., Ltd.

Multi-Robot Control Panel
Model No.: MCP

Prepared for	:	Shenzhen Bominwell Robotics Co., Ltd.
Address	:	JK Units, 5F, Building 7, Baoneng Sci&Tech Park, Longhua Dist., Shenzhen, China

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China Tel: (86) 755-26066544 Fax: (86) 755-26014772

Report Number	:	R011605878Z
Date of Test	:	Jun. 02~ 21, 2016
Date of Report	:	Jun. 22, 2016

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TEST REPORT

Applicant	:	Shenzhen Bominwell Robotics Co., Ltd.
Manufacturer	:	Shenzhen Bominwell Robotics Co., Ltd.
EUT	:	Multi-Robot Control Panel
Model No.	:	MCP
Serial No.	:	N.A.
Trade Mark	:	Bominwell
Rating	:	DC 12V, 2.5A Via Adapter (Input: AC 100-240V, 50-60Hz, 1.0A, Output: DC 13.0V, 3A)

Measurement Procedure Used:
FCC Part15 Subpart C 2015, Paragraph 15.231

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited

Date of Test : Jun. 02~ 21, 2016

Prepared by : kebo zhang
(Tested Engineer / Kebo Zhang)

Reviewer : Amy Ding
(Project Manager / Amy Ding)

Approved & Authorized Signer : Tom Chen
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Multi-Robot Control Panel
Model Number	:	MCP
Test Power Supply	:	AC 120V, 60Hz for adapter/ AC 240V, 60Hz for adapter/ DC 12V Battery Inside
Adapter	:	Model: EA10301 Input: 100-240V~, 50-60Hz, 1.0A Output: DC 12V, 2.5A
RF Transmission Frequency	:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40)) 433.92MHz
Channels	:	11 For (802.11b/802.11g/802.11n(HT20)) 7 For (802.11n(HT40)) 1 For (433.92MHz)
Modulation		WiFi: 802.11b CCK; 802.11g OFDM; 802.11n MCS 433.92MHz: ASK
Antenna Gain:	:	5 dBi for WiFi 1 dBi For (433.92MHz)
Applicant	:	Shenzhen Bominwell Robotics Co., Ltd.
Address	:	JK Units, 5F, Building 7, Baoneng Sci&Tech Park, Longhua Dist., Shenzhen, China
Manufacturer	:	Shenzhen Bominwell Robotics Co., Ltd.
Address	:	JK Units, 5F, Building 7, Baoneng Sci&Tech Park, Longhua Dist., Shenzhen, China
Factory	:	Shenzhen Bominwell Robotics Co., Ltd.
Address	:	JK Units, 5F, Building 7, Baoneng Sci&Tech Park, Longhua Dist., Shenzhen, China
Date of receiver	:	Jun. 02, 2016
Date of Test	:	Jun. 02~ 21, 2016

1.2. Description of Test Facility

N/A

1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 06, 2016.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, Jun 13, 2016.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal) Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.5. Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart C Section 15.231 for Emissions

Tests Carried Out Under FCC Part 15 Subpart C

Standard	Test Items	Status	Application
Part 15 Subpart C Section 15.231	Disturbance Voltage at The Mains Terminals	x	N/A, without AC power supply
	Conducted Emission Test	√	
	Radiation Emission	√	
	20dB Bandwidth	√	
	Duty Cycle	√	

√ Indicates that the test is applicable.
x Indicates that the test is not applicable.

2. MEASURING DEVICE AND TEST EQUIPMENT

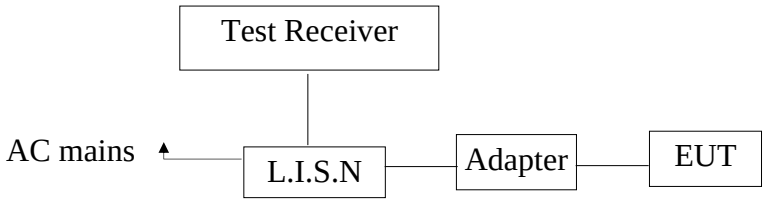
The following test equipments were used during test:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2016	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2016	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2016	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2016	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 20, 2016	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2016	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
8	Power Sensor	DAER	RPR3006W	15I00041SN046	Jun 30, 2015	1 Year
9	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun 30, 2015	1 Year
10	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun 30, 2015	1 Year
11	Signal Generator	Agilent	E4421B	MY41000743	Jun 30, 2015	1 Year
12	DC Power supply	IV	IV-8080	YQSB0096	Jun 30, 2015	1 Year
13	TEMP&HUMI PROGRAMMABLE CHAMBER	Bell Group	BE-THK-150M8	SE-0137	Mar. 16, 2016	1 Year

3. Conducted Emission Test

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown as Section 3.1.

3.4.2. Turn on the power of all equipment.

3.4.3. Let the EUT work in test mode (Charging) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

3.6. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 17, 2016	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 17, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 17, 2016	1 Year

3.7. Power Line Conducted Emission Measurement Results

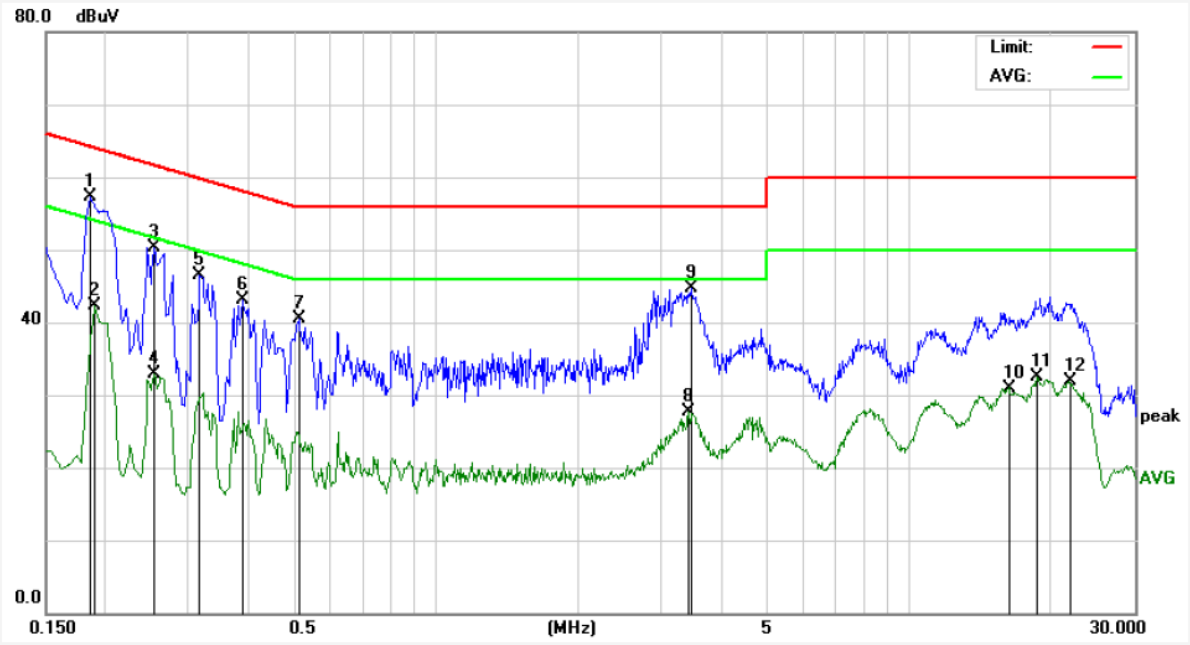
PASS.

The frequency range from 150KHz to 30 MHz is investigated.

Please refer the following pages.

CONDUCTED EMISSION TEST DATA

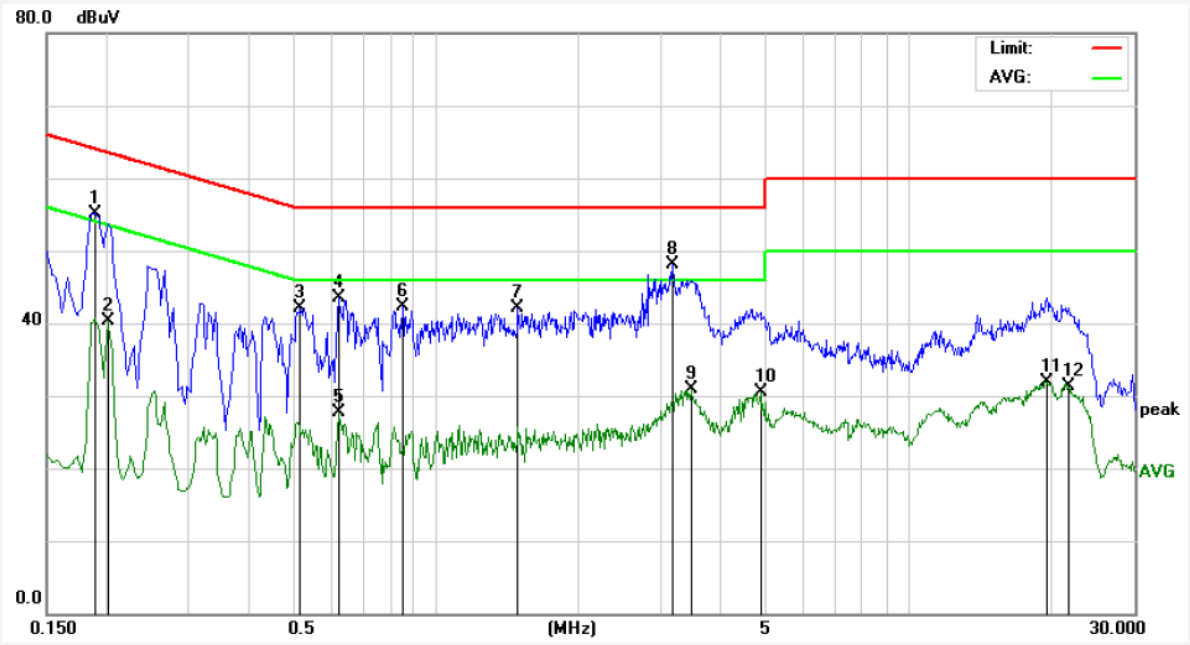
Test Site:	1# Shielded Room
Operating Condition:	Charging
Test Specification:	AC 120V, 60Hz for adapter
Comment:	Live Line
	Tem.:24℃ Hum.:49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1860	37.36	20.00	57.36	64.21	-6.85	QP	
2	0.1900	22.25	20.00	42.25	54.03	-11.78	AVG	
3	0.2540	30.23	20.00	50.23	61.62	-11.39	QP	
4	0.2540	12.94	20.00	32.94	51.62	-18.68	AVG	
5	0.3180	26.51	20.00	46.51	59.76	-13.25	QP	
6	0.3899	23.09	20.00	43.09	58.06	-14.97	QP	
7	0.5140	20.55	20.00	40.55	56.00	-15.45	QP	
8	3.4300	7.76	20.00	27.76	46.00	-18.24	AVG	
9	3.4660	24.75	20.00	44.75	56.00	-11.25	QP	
10	16.2260	11.00	20.00	31.00	50.00	-19.00	AVG	
11	18.6620	12.58	20.00	32.58	50.00	-17.42	AVG	
12	21.7380	11.97	20.00	31.97	50.00	-18.03	AVG	

CONDUCTED EMISSION TEST DATA

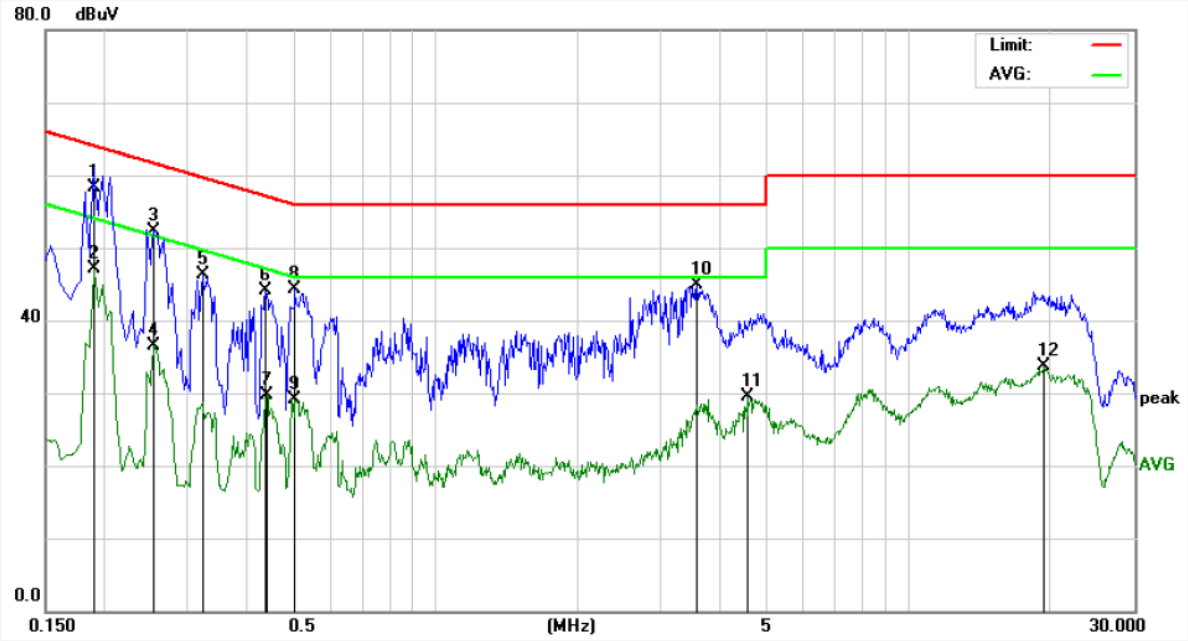
Test Site:	1# Shielded Room
Operating Condition:	Charging
Test Specification:	AC 120V, 60Hz for adapter
Comment:	Neutral Line
	Tem.:24℃ Hum.:49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1900	35.20	20.00	55.20	64.03	-8.83	QP	
2	0.2020	20.38	20.00	40.38	53.52	-13.14	AVG	
3	0.5180	22.16	20.00	42.16	56.00	-13.84	QP	
4	0.6220	23.43	20.00	43.43	56.00	-12.57	QP	
5	0.6260	7.62	20.00	27.62	46.00	-18.38	AVG	
6	0.8500	22.27	20.00	42.27	56.00	-13.73	QP	
7	1.4900	22.11	20.00	42.11	56.00	-13.89	QP	
8	3.1619	28.02	20.00	48.02	56.00	-7.98	QP	
9	3.4660	10.86	20.00	30.86	46.00	-15.14	AVG	
10	4.8540	10.44	20.00	30.44	46.00	-15.56	AVG	
11	19.6020	11.98	20.00	31.98	50.00	-18.02	AVG	
12	21.7580	11.40	20.00	31.40	50.00	-18.60	AVG	

CONDUCTED EMISSION TEST DATA

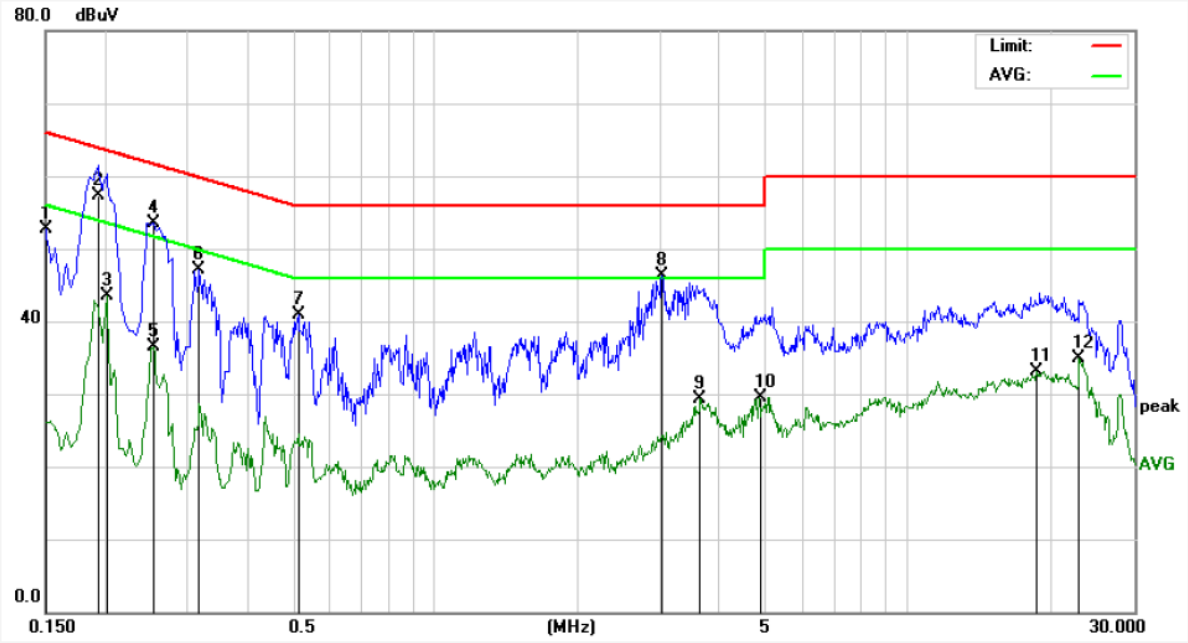
Test Site:	1# Shielded Room
Operating Condition:	Charging
Test Specification:	AC 240V, 60Hz for adapter
Comment:	Live Line
	Tem.:24℃ Hum.:49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1900	38.37	20.00	58.37	64.03	-5.66	QP	
2	0.1900	27.19	20.00	47.19	54.03	-6.84	AVG	
3	0.2540	32.37	20.00	52.37	61.62	-9.25	QP	
4	0.2540	16.55	20.00	36.55	51.62	-15.07	AVG	
5	0.3220	26.32	20.00	46.32	59.65	-13.33	QP	
6	0.4380	24.13	20.00	44.13	57.10	-12.97	QP	
7	0.4420	9.74	20.00	29.74	47.02	-17.28	AVG	
8	0.5060	24.32	20.00	44.32	56.00	-11.68	QP	
9	0.5060	9.10	20.00	29.10	46.00	-16.90	AVG	
10	3.5660	24.95	20.00	44.95	56.00	-11.05	QP	
11	4.5739	9.43	20.00	29.43	46.00	-16.57	AVG	
12	19.4020	13.73	20.00	33.73	50.00	-16.27	AVG	

CONDUCTED EMISSION TEST DATA

Test Site:	1# Shielded Room
Operating Condition:	Charging
Test Specification:	AC 240V, 60Hz for adapter
Comment:	Neutral Line
	Tem.:24℃ Hum.:49%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	32.74	20.00	52.74	65.99	-13.25	QP	
2	0.1940	37.24	20.00	57.24	63.86	-6.62	QP	
3	0.2020	23.52	20.00	43.52	53.52	-10.00	AVG	
4	0.2540	33.43	20.00	53.43	61.62	-8.19	QP	
5	0.2540	16.58	20.00	36.58	51.62	-15.04	AVG	
6	0.3180	27.08	20.00	47.08	59.76	-12.68	QP	
7	0.5140	20.87	20.00	40.87	56.00	-15.13	QP	
8	3.0220	26.28	20.00	46.28	56.00	-9.72	QP	
9	3.6380	9.28	20.00	29.28	46.00	-16.72	AVG	
10	4.8300	9.58	20.00	29.58	46.00	-16.42	AVG	
11	18.7180	13.07	20.00	33.07	50.00	-16.93	AVG	
12	22.9660	14.81	20.00	34.81	50.00	-15.19	AVG	

4. Test Procedure

JUSTIFICATION
ANSI C63.10 2013 section 12.1.4.1 requires that hand-held or body-worn devices shall include rotation of the EUT through three orthogonal axes to determine the attitude that maximizes the emissions. The EUT is a hand-held device. As such, preliminary tests were performed to determine the orientation that produced the highest level of emissions. This was with the DUT orientated vertically as shown in Section 7.1.

GENERAL:
This report shall NOT be reproduced except in full without the written approval of Anbotek Compliance Lavoratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.10-2013 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.10-2013 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.
When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

5. Radiation Interference

5.1. Requirements (15.231):

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	47.04	225
70 - 130	61.94	1,250	41.94	125
130 - 174	* 61.94 - 71.48	* 1,250 -3,750	* 41.94 - 51.48	* 125 - 375
174 - 260	71.48	3,750	51.48	375
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 51.48 - 61.94	* 375 - 1,250
above 470	81.94	12,500	61.94	1,250

5.2. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane. For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

5.3. Test Results

PASS.

The test data please refer the following pages. Only the worst case (x orientation).

Data:

fundamental

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Average Factor	Corrected Level	Limits	Det
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
433.92	H	97.45	1.52	12.53	41.33	--	70.17	100.82	PK
433.92	H	97.45	1.52	12.53	41.33	-7.49	62.68	80.82	AV
433.92	V	95.29	1.52	12.53	41.33	--	68.01	100.82	PK
433.92	V	95.29	1.52	12.53	41.33	-7.49	60.52	80.82	AV

Radiated Emission

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Corrected Level	Limits	Margin	Det
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode
138.78	H	61.52	0.87	12.45	41.25	33.59	43.50	-9.91	PK
286.39	H	63.58	1.39	14.54	42.33	37.18	46.00	-8.82	PK
620.68	H	57.41	1.77	14.86	38.56	32.48	46.00	-10.52	PK
171.45	V	55.87	1.25	12.01	39.85	29.28	43.50	-14.22	PK
259.67	V	59.32	1.64	12.68	41.11	31.53	46.00	-13.47	PK
703.52	V	60.01	1.86	13.36	40.25	34.98	46.00	-11.02	PK

Harmonics Emissions

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Average Factor	Corrected Level	Limits	Det
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
867.84	H	79.85	1.52	12.53	41.42	--	52.48	80.82	PK
867.84	H	79.85	1.52	12.53	41.42	-7.49	44.99	60.82	AV
867.84	V	76.33	1.52	12.53	41.42	--	48.96	80.82	PK
867.84	V	76.33	1.52	12.53	41.42	-7.49	41.47	60.82	AV
1301.76	H	72.10	2.38	18.56	39.95	--	53.09	74.00	PK
1301.76	H	72.10	2.38	18.56	39.95	-7.49	45.60	54.00	AV
1301.76	V	68.01	2.38	18.56	39.95	--	49.00	74.00	PK
1301.76	V	68.01	2.38	18.56	39.95	-7.49	41.51	54.00	AV
1735.68	H	64.68	2.85	21.32	38.3	--	50.55	74.00	PK
1735.68	H	64.68	2.85	21.32	38.3	-7.49	43.06	54.00	AV
1735.68	V	67.24	2.85	21.32	38.3	--	53.11	74.00	PK
1735.68	V	67.24	2.85	21.32	38.3	-7.49	45.62	54.00	AV
2169.6	H	--						74.00	PK
2169.6	H	--						54.00	AV
2169.6	V	--						74.00	PK
2169.6	V	--						54.00	AV

Remark ：

1. Corrected Level = Reading + Cable Loss+Ant Factor-Amplifier+Correction Factor
2. Correction Factor = 20 log (duty cycle) Pls refer to section 6.3
3. AV=PK+20 log (duty cycle)
4. “ -- ” Mark indicated Background Noise Level
5. Pulse Desensitization Correction Factor
   Pulse Width (PW)= 0.234ms
   2/PW=2/0.234=8.55kHz
   RBW(100kHz)＞ 2/PW (8.55Hz)
   Therefore PDCF is not needed.

6. 20dB Bandwidth

6.1. Requirements (15.231):

In accordance with Part15.231(c), the fundamental frequency bandwidth was kept within 0.25% of the center frequency for devices operating>70MHz and <900MHz.

Fundamental Frequency (MHz)	Limit of 20dB Bandwidth (kHz)
433.92	433920x0.0025=1084.8

6.2. EUT Setup

The radiated emission tests were performed in the in the 3m Semi-anechoic chamber, using the setup accordance with the ANSI C63.10-2013.

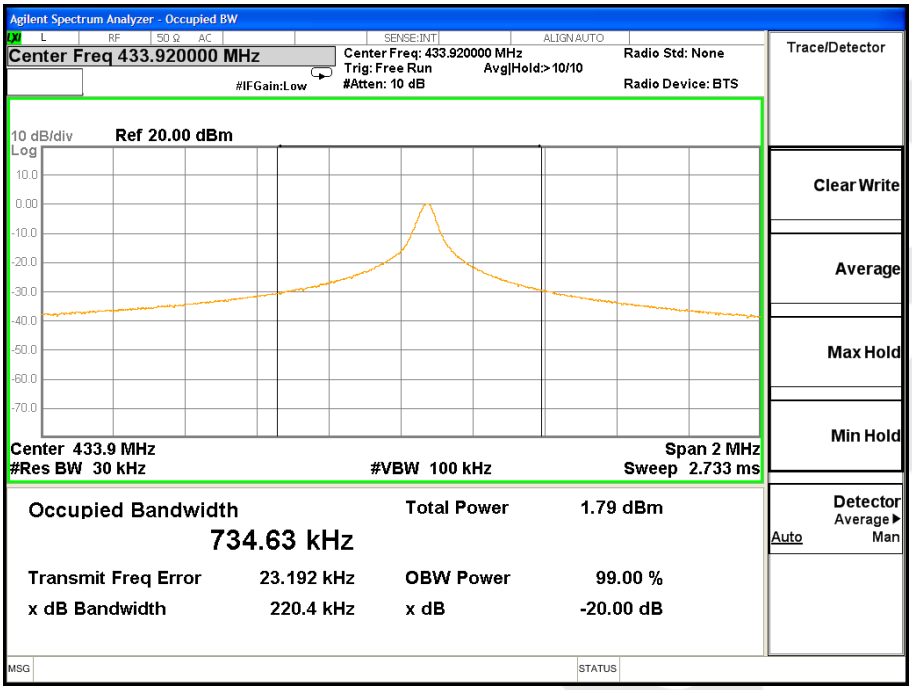
The EUT was placed on the center of the nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

6.3. Test Results

Pass.
Please refer the following plot.

Channel Frequency (MHz)	Measured 20dB Bandwidth(kHz)	Limit(kHz)	Result
433.92	220.4	1084.8	PASS



7. DEACTIVATION TIME

7.1. EUT Setup

The radiated emission tests were performed in the in the 3m Semi-anechoic chamber, using the setup accordance with the ANSI C63.10-2013.
The EUT was placed on the center of the nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level.

7.2. Test Procedure

The EUT was placed on a turntable which is 0.8m above ground plane.
Set EUT operating in continuous transmitting mode
Set Test Receiver into spectrum analyzer mode, Tune the spectrum analyzer to the transmitter carrier frequency, and set the spectrum analyzer resolution bandwidth(RBW) to 100kHz and video bandwidth(VBW) to 100kHz, Span was set to 0Hz.
The Duty Cycle was measured and recorded.

7.3. Requirements & Result

1. Regulation 15.231(a) The provisions of this Section are restricted to periodic operation within the band 40.66 -40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted.
Result:
The EUT is a remote switch without audio or video transmitted.
The EUT meets the requirements of this section.

2. Regulation 15.231(a2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
Result:
The EUT doesn't have automatic transmission.

3. Regulation 15.231(a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than one seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed one seconds per hour.
Result:
The EUT doesn't employ periodic transmission.

4. Regulation 15.231(a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

Result:

This section is not applicable to the EUT.

5. Regulation 15.231(a1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Result:

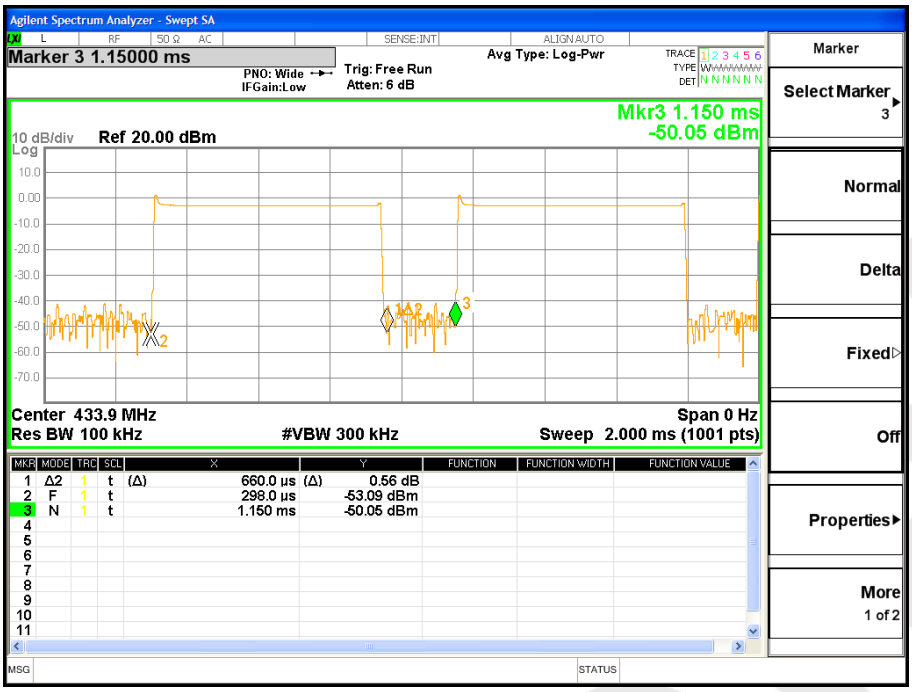
Averaging factor in dB =20 log (duty cycle)
The duration of one cycle =28.00ms
Duty Cycle = (0.660ms*14+0.234ms*11)=11.814 ms / 28.00ms=0.422
Therefore, the averaging factor is found by 20 log 0.422 = -7.49dB
Please see the diagrams below.

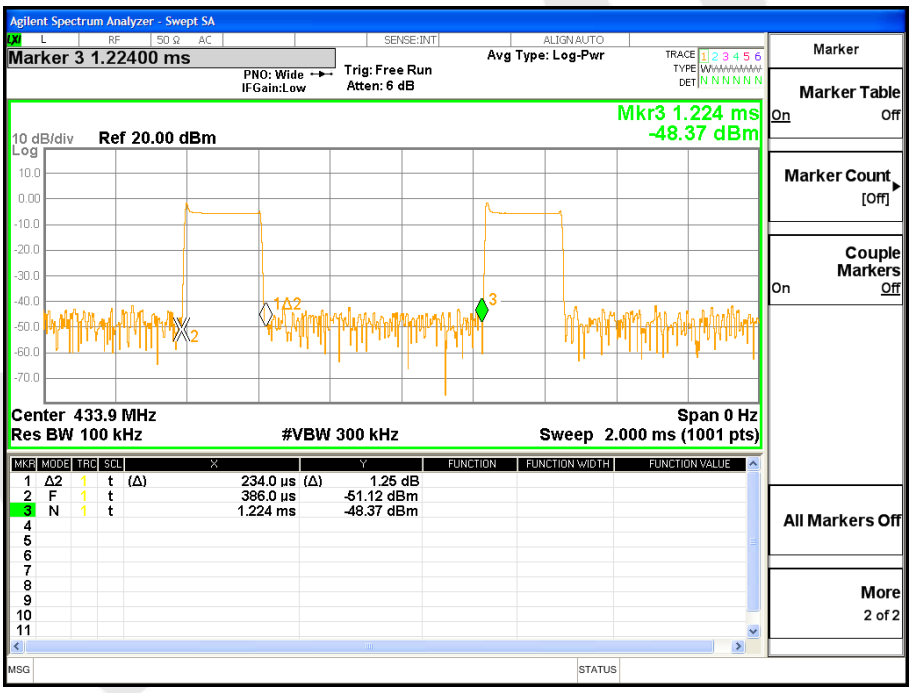
Time Slot


Agilent Spectrum Analyzer - Swept SA
Marker 3 28.0000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
Mkr3 28.00 ms
-40.27 dBm
10 dB/div
Log
Ref 20.00 dBm
Center 433.9 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 50.00 ms (1001 pts)
1 Δ2 1 t (Δ) 20.70 ms (Δ) -1.09 dB
2 F 1 t 900.0 µs -41.72 dBm
3 N 1 t 28.00 ms -40.27 dBm
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More 1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 20.5800 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
ΔMkr1 20.58 ms
0.73 dB
10 dB/div
Log
Ref 20.00 dBm
Center 433.9 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 30.00 ms (1001 pts)
1 Δ2 1 t (Δ) 20.58 ms (Δ) 0.73 dB
2 F 1 t 4.800 ms -42.72 dBm
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2

Duty Cycle


Agilent Spectrum Analyzer - Swept SA
Marker 3 1.15000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
Mkr3 1.150 ms
-50.05 dBm
10 dB/div
Log
Ref 20.00 dBm
Center 433.9 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 2.000 ms (1001 pts)
1 Δ2 660.0 µs (Δ) 0.56 dB
2 F 298.0 µs -53.09 dBm
3 N 1.150 ms -50.05 dBm
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More 1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 3 1.22400 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
Mkr3 1.224 ms
-48.37 dBm
10 dB/div
Log
Ref 20.00 dBm
Center 433.9 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 2.000 ms (1001 pts)
1 Δ2 234.0 µs (Δ) 1.25 dB
2 F 386.0 µs -51.12 dBm
3 N 1.224 ms -48.37 dBm
Marker
Marker Table On Off
Marker Count [Off]
Couple Markers On Off
All Markers Off
More 2 of 2

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Result:Pass

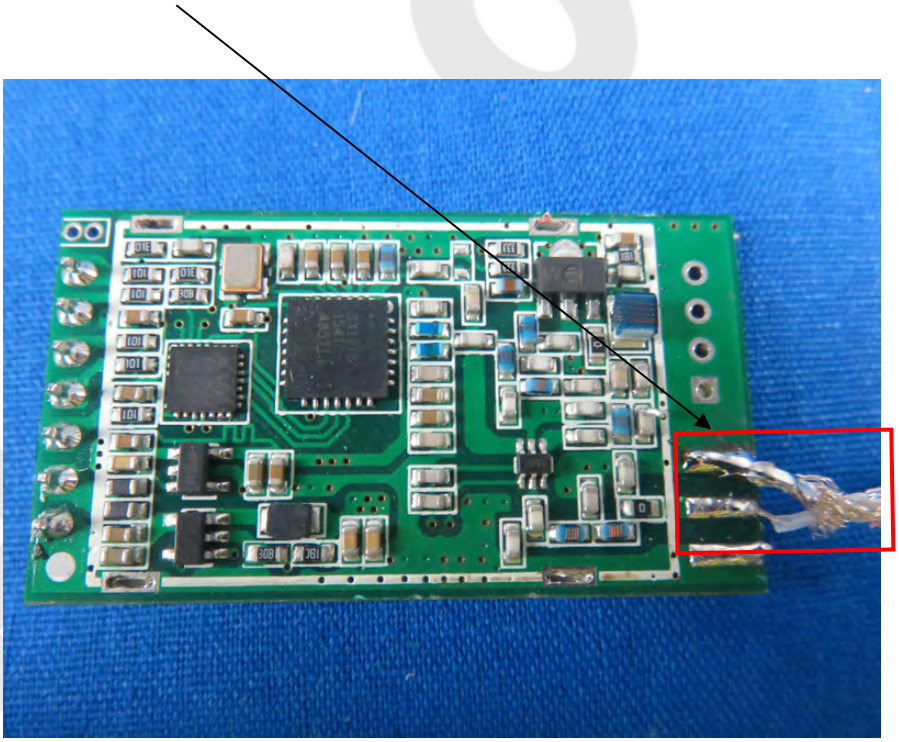
8. Antenna Application

8.1. Antenna Requirement

The EUT'S antenna should meet the requirement of FCC part 15C section 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:
1) Antenna must be permanently attached to device.
2) The antenna must use a unique type of connector to attach to the device.
3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

8.2. Result

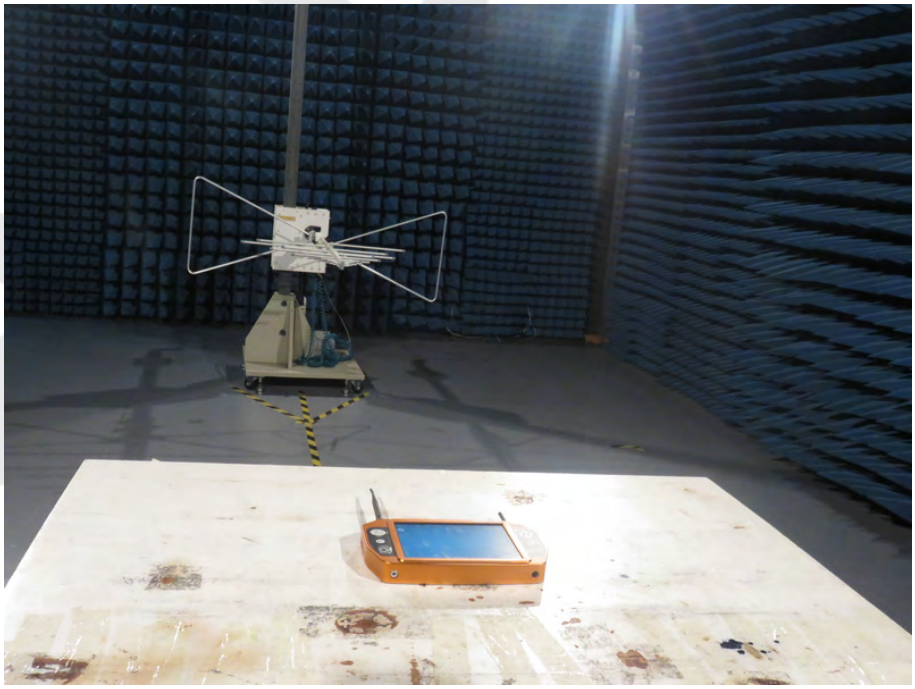
The EUT's antenna used a external antenna which is welded permanently to the PCB, so it can not be replaced with other antennas, The antenna's gain is 1dBi and meets the requirement.

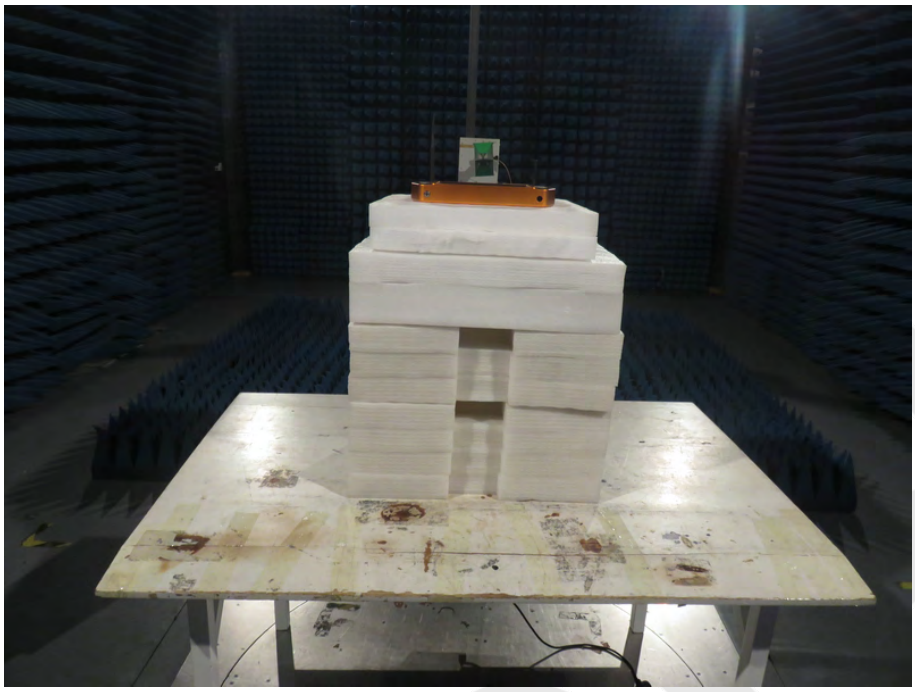


9. TEST PHOTO

9.1. Photo of Conducted Emission Measurement

9.2. Photo of Radiation Emission Test



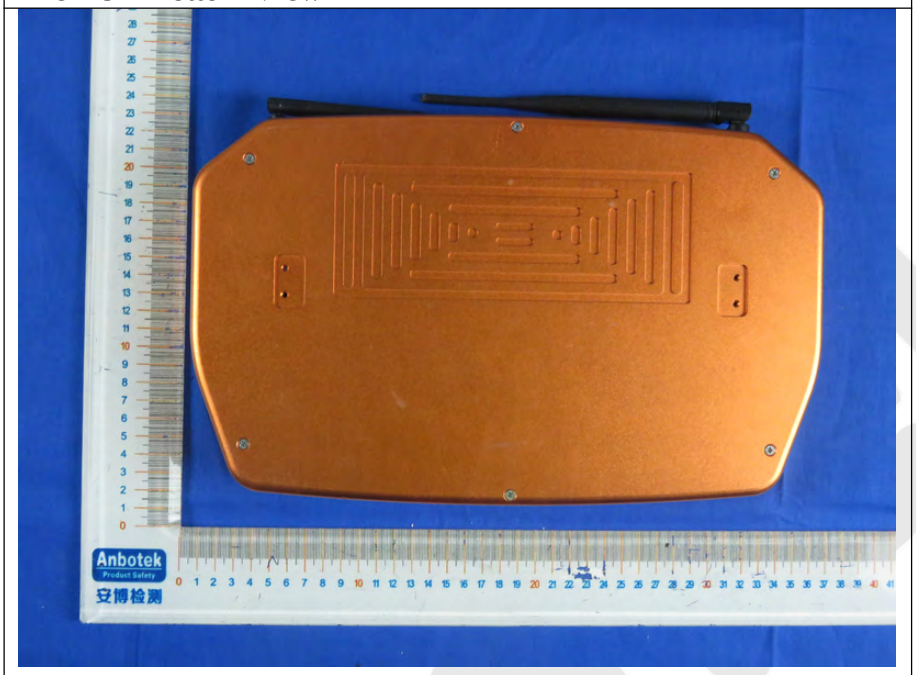


APPENDIX I (EXTERNAL PHOTOS)

1. Figure
The EUT-Overall View

2. Figure
The EUT-Top View

3. Figure
The EUT-Bottom View



4. Figure
The EUT-Front View

5. Figure
The EUT-Back View

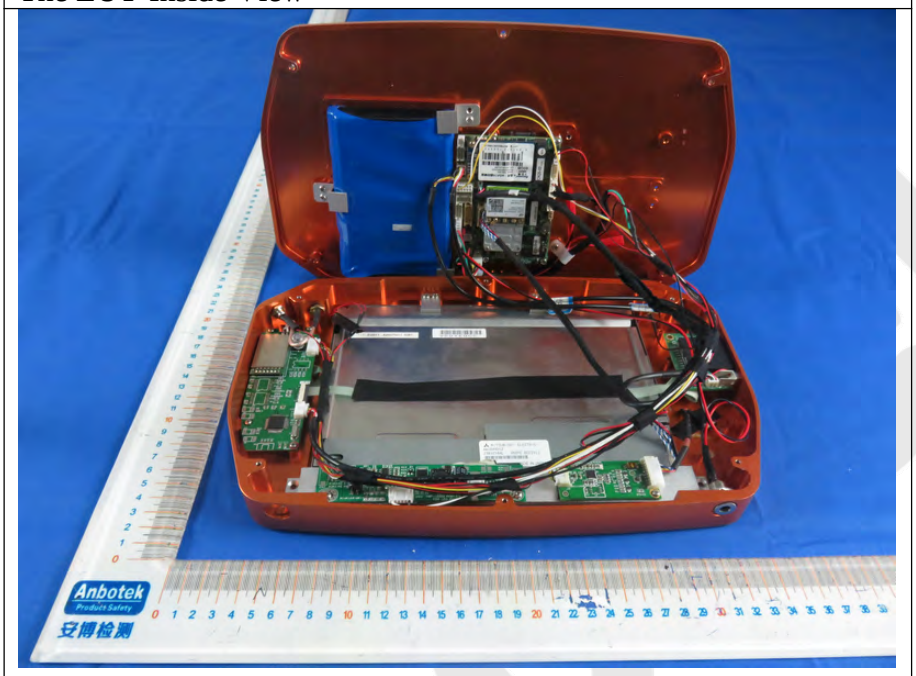
6. Figure
The EUT-Right View

7. Figure

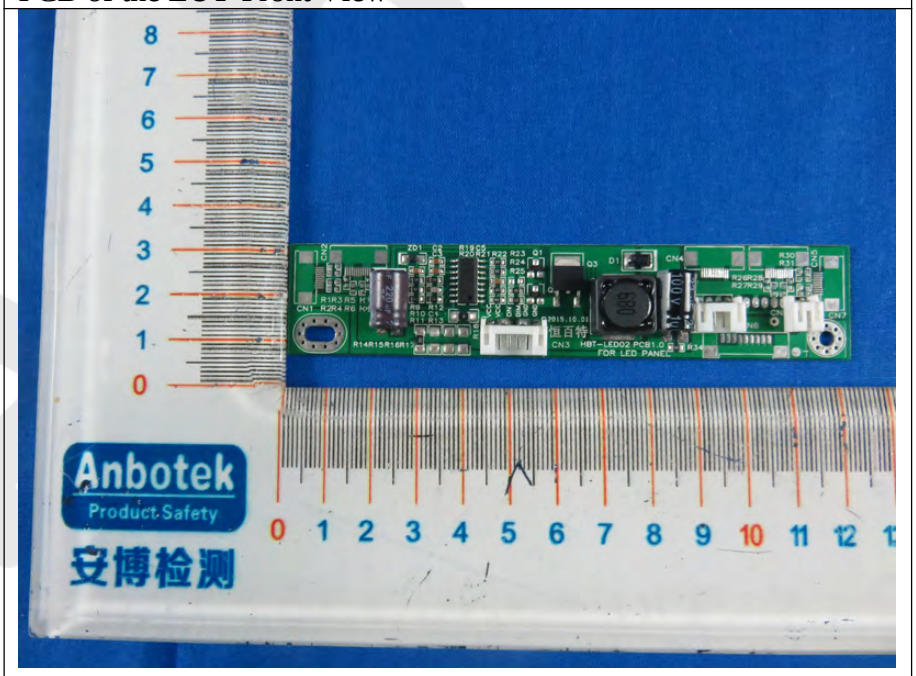
The EUT-Left View

APPENDIX Ⅱ(INTERNAL PHOTOS)

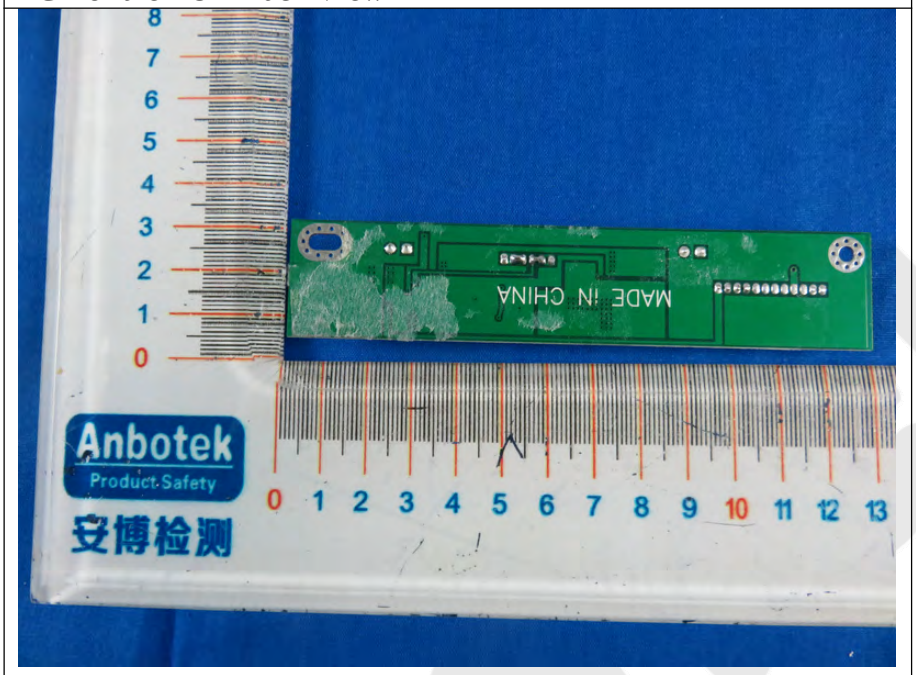
1. Figure
The EUT-Inside View



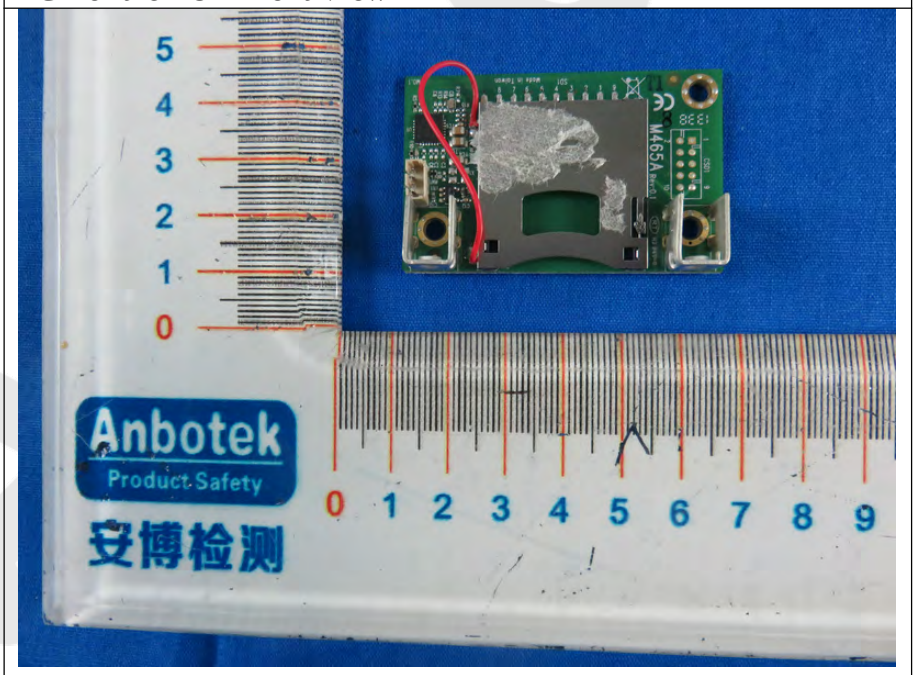
2. Figure
PCB of the EUT-Front View



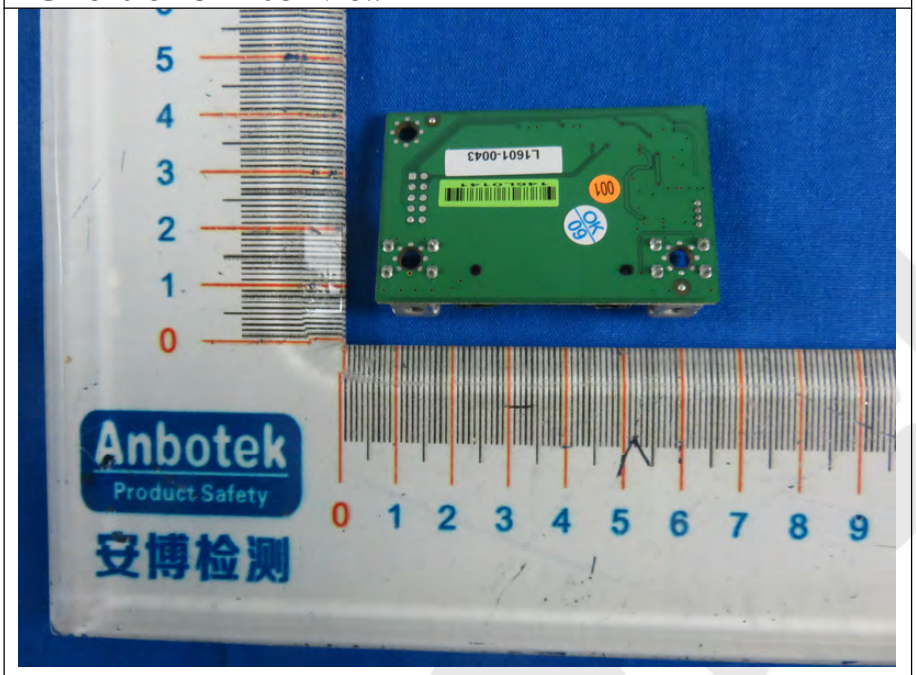
3. Figure
PCB of the EUT-Back View



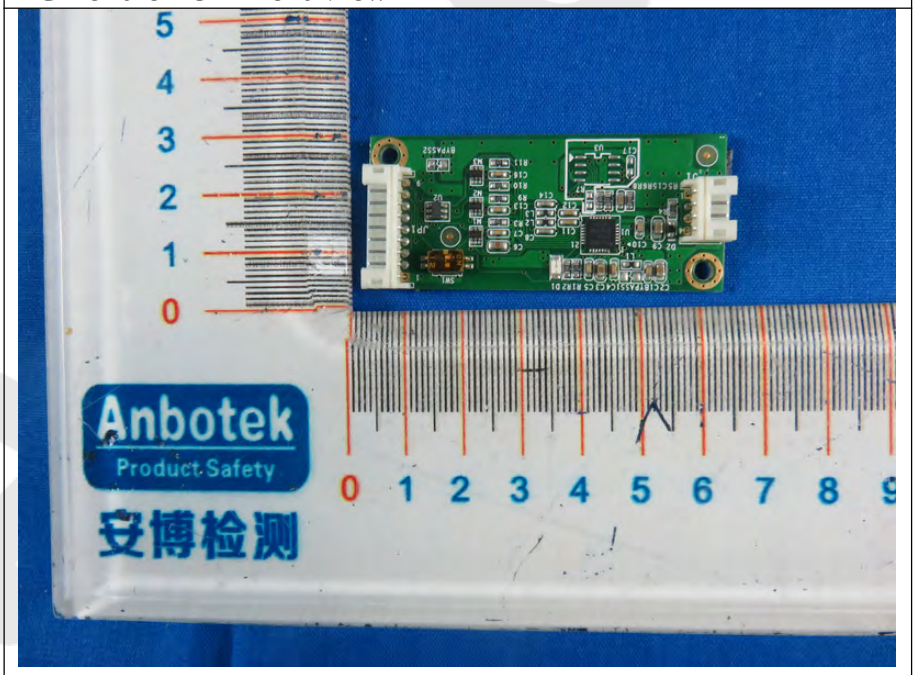
4. Figure
PCB of the EUT-Front View



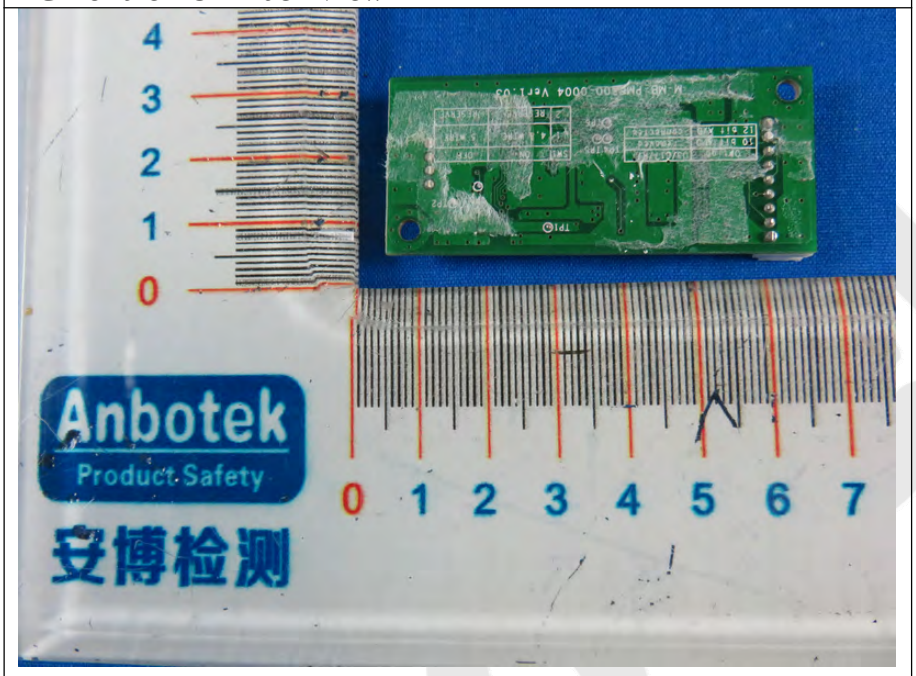
5. Figure
PCB of the EUT-Back View



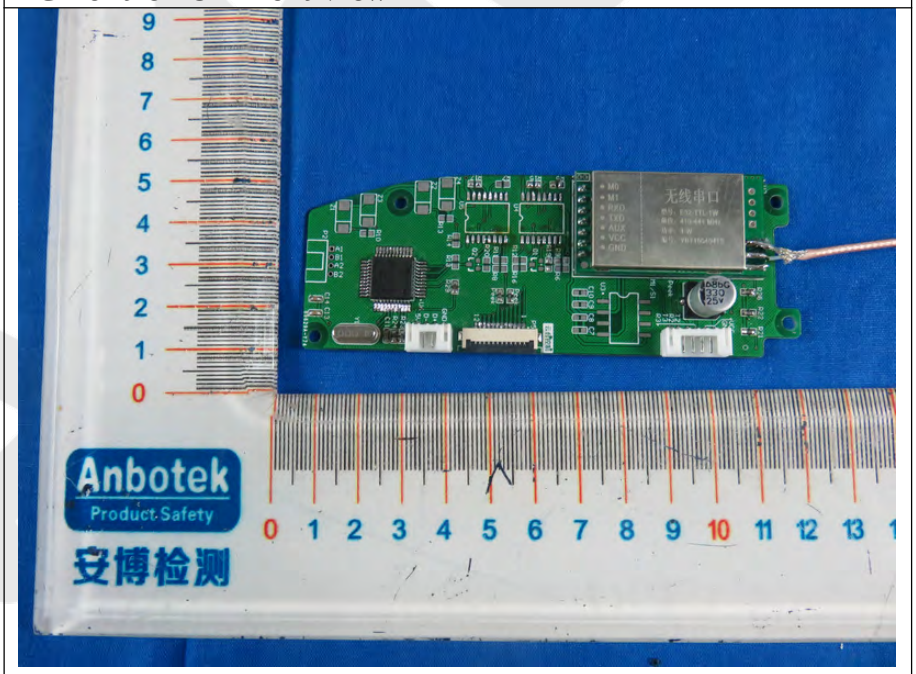
6. Figure
PCB of the EUT-Front View



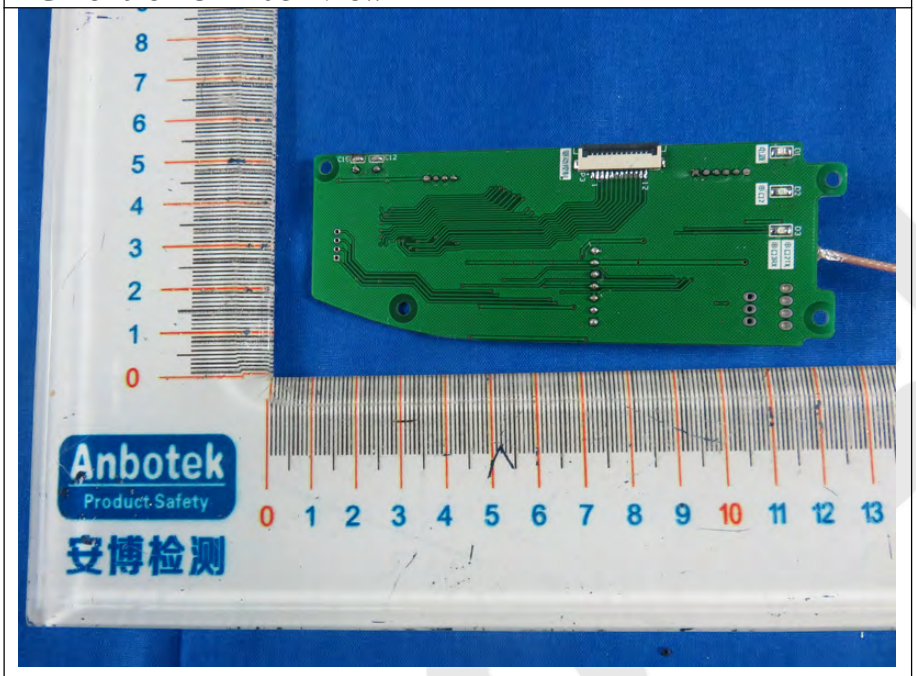
7. Figure
PCB of the EUT-Back View



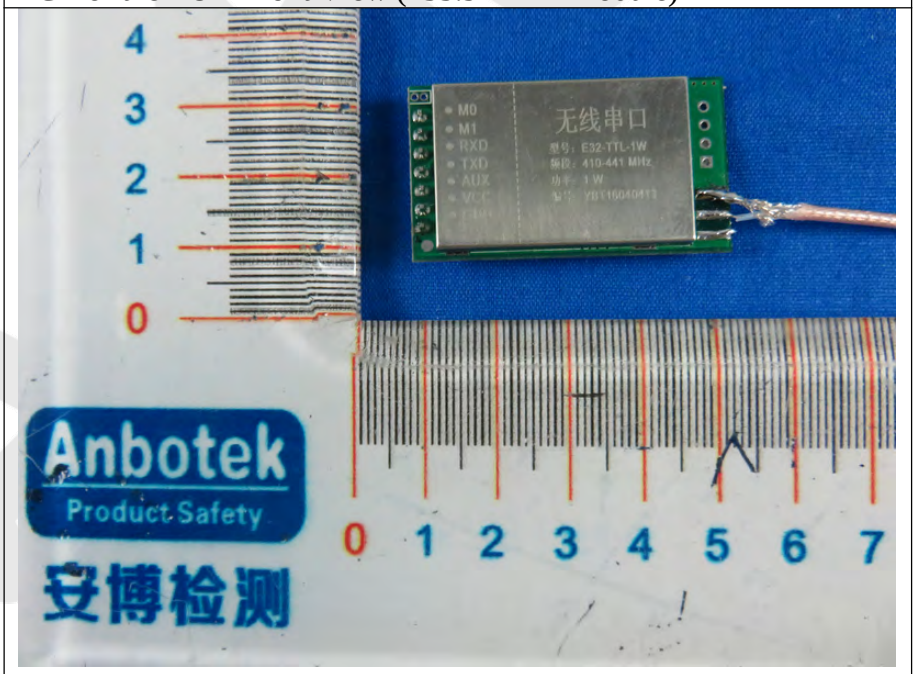
8. Figure
PCB of the EUT-Front View



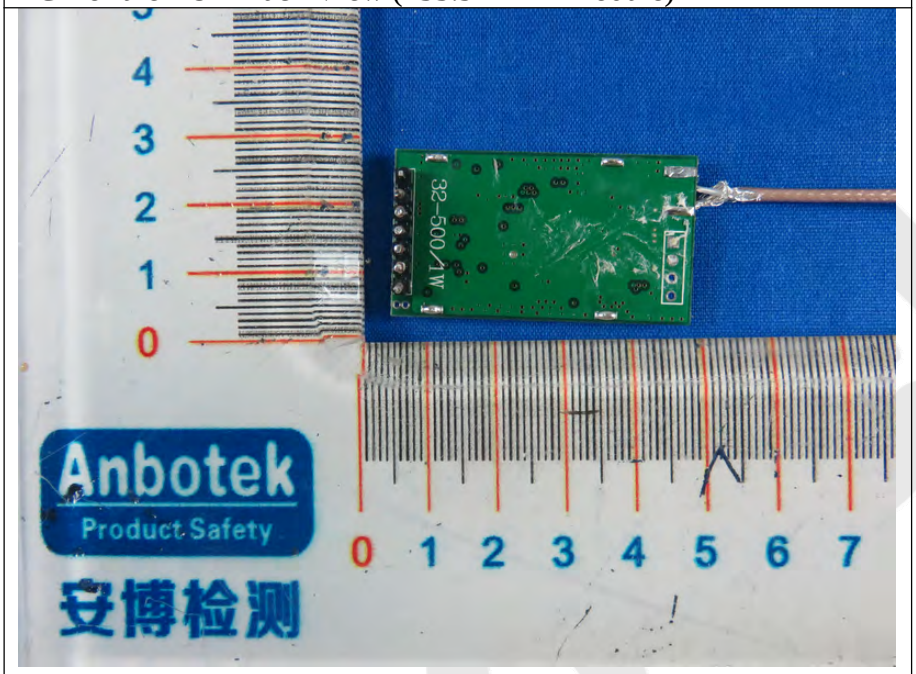
9. Figure
PCB of the EUT-Back View



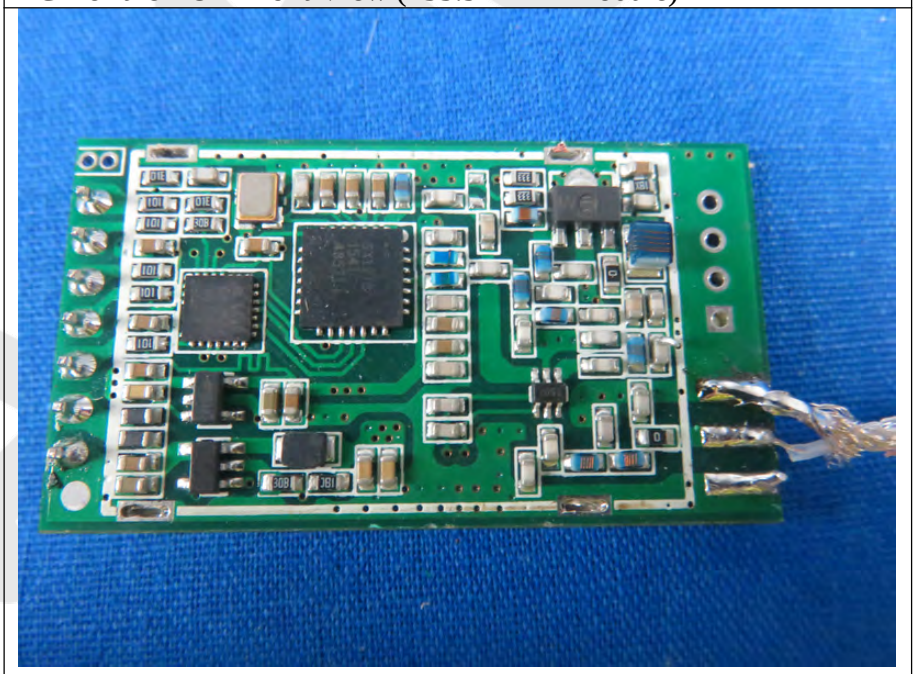
10. Figure
PCB of the EUT-Front View (433.92MHz Module)



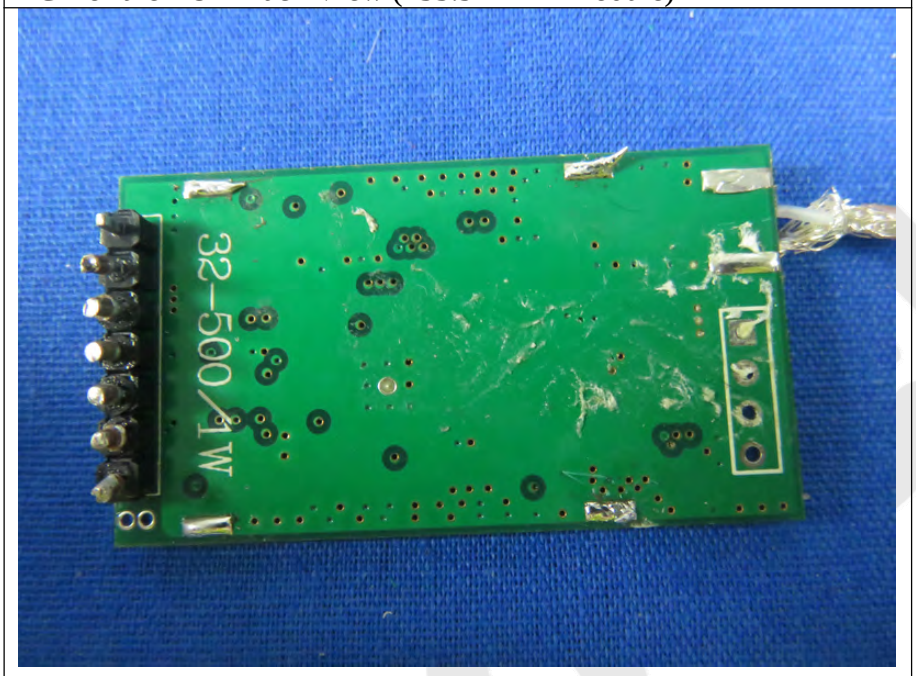
11. Figure
PCB of the EUT-Back View (433.92MHz Module)



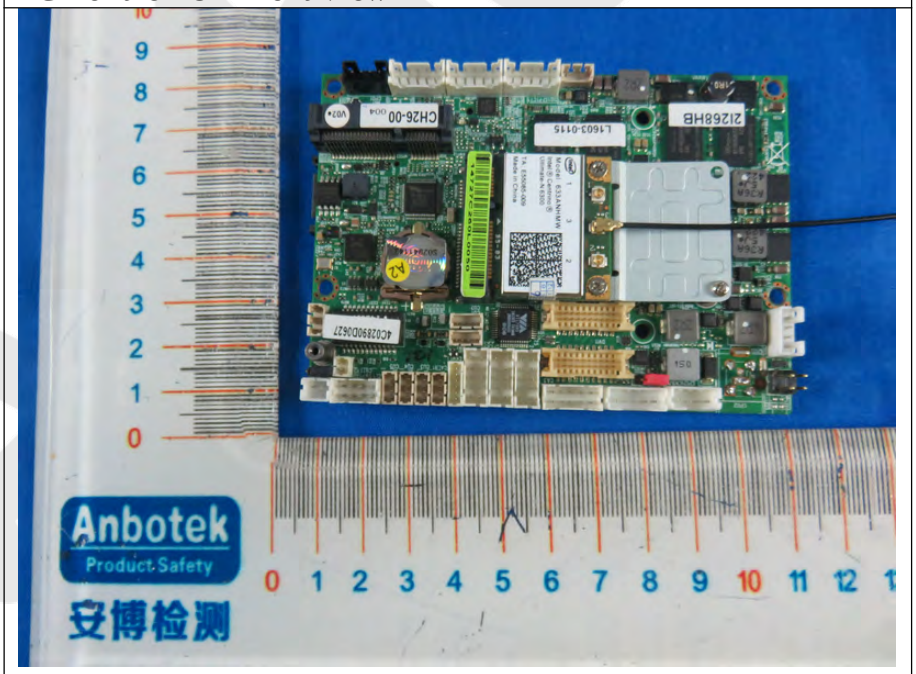
12. Figure
PCB of the EUT-Front View (433.92MHz Module)



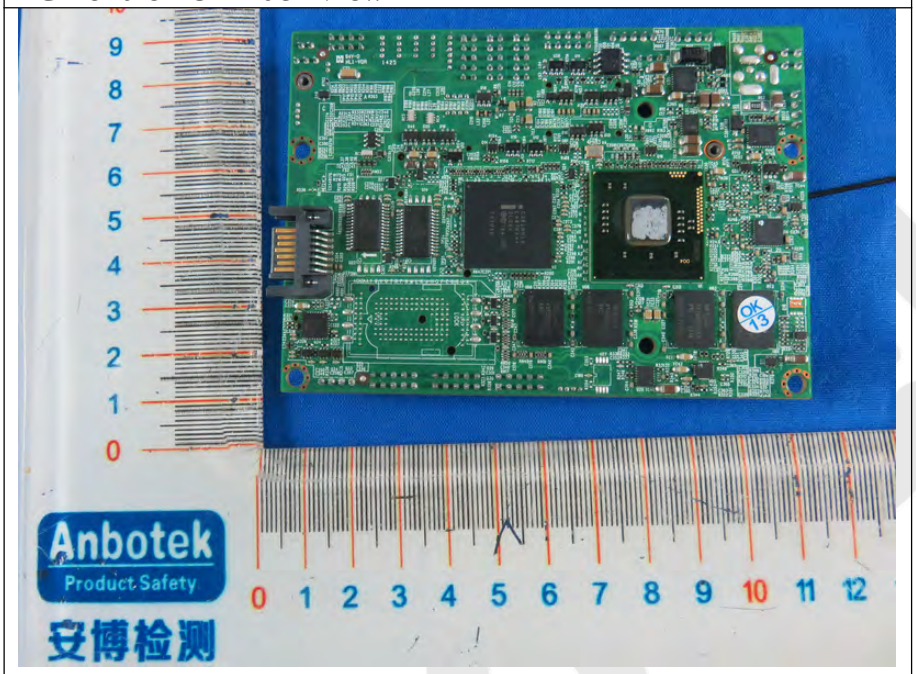
13. Figure
PCB of the EUT-Back View (433.92MHz Module)



14. Figure
PCB of the EUT-Front View

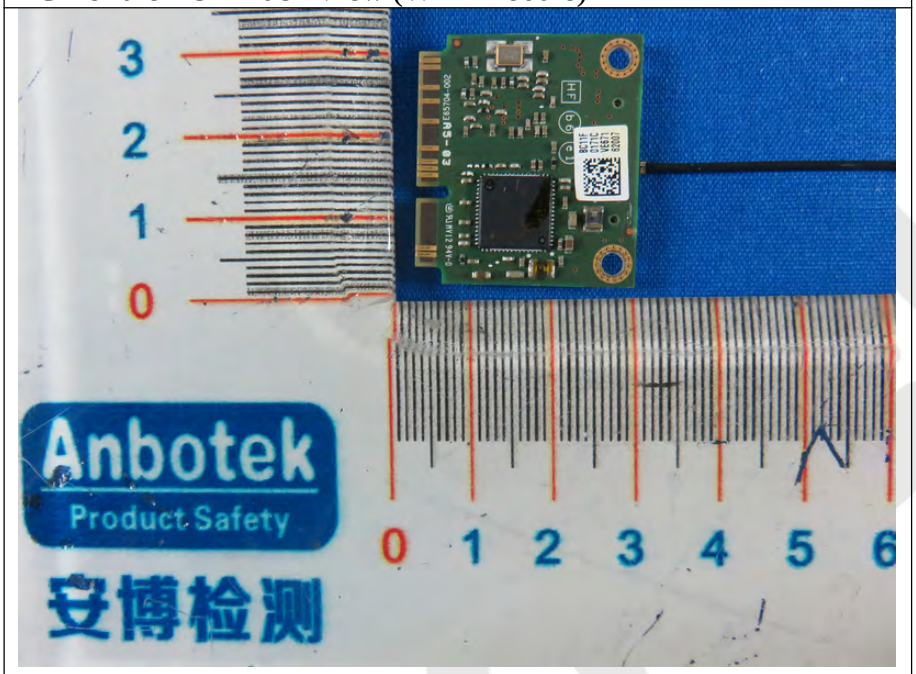


15. Figure
PCB of the EUT-Back View

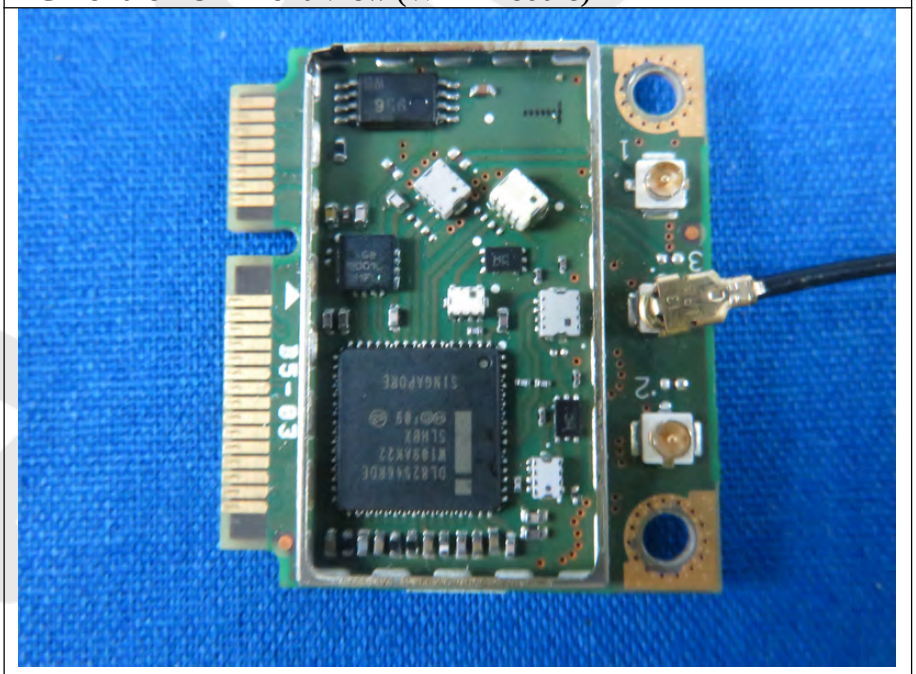


16. Figure
PCB of the EUT-Front View (WiFi Module)

17. Figure
PCB of the EUT-Back View (WiFi Module)



18. Figure
PCB of the EUT-Front View (WiFi Module)



19. Figure

PCB of the EUT-Back View (WiFi Module)