FCC TEST REPORT

Test report
On Behalf of
TYT Electronics Co., Ltd.
For
Analog Transceiver
Model No.: TH-350
FCC-ID:POD-THREEBANDS

Prepared for :	**TYT Electronics Co., Ltd.** **Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**Oct. 15, 2018~Dec. 17, 2018**
Date of Report:	**Dec. 18, 2018**
Report Number:	**HK1812171901E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	TYT Electronics Co., Ltd.
Address..... :	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Manufacture's Name..... :	TYT Electronics Co., Ltd.
Address..... :	Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China.
Product description	Analog Transceiver
Brand Name	TYT, Radioddity
Mode Name	TH-350
Series model	GA-3X
Difference Description	a) All the same except for brand name and model name, the corresponding relationship are as follow: b) **TYT** is corresponding **TH-350**; **Radioddity** is corresponding **GA-3X**;
Standards ..... :	FCC Rules and Regulations Part 15B

Date of Test ..... :	
Date (s) of performance of tests..... :	**Oct. 15, 2018~Dec. 17, 2018**
Date of Issue ..... :	**Dec. 18, 2018**
Test Result..... :	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

Revision	Issue Date	Revisions	Revised By
V1.0	Dec. 18, 2018	Initial Issue	Jason Zhou

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1. VERIFICATION OF COMPLIANCE

Hardware Version	V1.01
Software Version	V1.09
Measurement Procedure	ANSI C63.4: 2014
Deviation:	None
Condition of Test Sample	Normal

The above equipment was tested by Attestation Of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2014. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

2. PRODUCT INFORMATION

The EUT is a Analog Transceiver designed for voice communication. It is designed by way of utilizing the F3E modulation achieves the system operating.
A major technical description of EUT is described as following:

Communication Type	Voice / Tone only
Modulation	FM
RX Frequency Range	Rx: 136MHz -174MHz Rx: 220MHz -260MHz Rx: 400MHz -480MHz
Emission Type	F3E
Antenna Designation	Detachable
Antenna frequency range	Antenna 1：Rx: 136MHz -174MHz , 400MHz-480MHz Antenna 2：Rx: 220MHz -260MHz
Antenna Gain	1.5dBi
Power Supply	DC 7.4V 1600mAh, charging with DC 8.4V.
Adapter Parameter	INPUT：AC 100V-260V , 50/60Hz OUTPUT：DC 12V , 750mA
Charger Parameter	INPUT:DC 12V 0.75A OUTPUT:DC 8.4V 0.5A

Note：This product supports two kinds of antennas, one is the receiving frequency of 136MHz-174MHz and 400MHz-480MHz antenna, and the other is the receiving frequency of 220MHz-260MHz antenna, the details are based on the manual.

I/O Port Information (☒Applicable ☐Not Applicable)

I/O Port of EUT			
I/O Port Type	**Q'TY**	**Cable**	**Tested with**
Microphone	0	0	0
Antenna Connect Port	1	0	1

3. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Site	Shenzhen HUAK Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

List Of Test Equipment:

Conducted Emission Shielding Room Test Site (744)					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal. Date**	**Cal. Due**
Receiver	R&S	ESCI 7	HKE-010	Dec. 29, 2017	Dec. 28, 2018
LISN	R&S	ENV216	HKE-002	Dec. 29, 2017	Dec. 28, 2018
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	**Manufacturer**	**Model**	**S/N**	**Cal. Date**	**Cal. Due**
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 29, 2017	Dec. 28, 2018
Receiver	R&S	ESCI 7	HKE-010	Dec. 29, 2017	Dec. 28, 2018
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 29, 2017	Dec. 28, 2018
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 29, 2017	Dec. 28, 2018
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 29, 2017	Dec. 28, 2018
Vector Analyzer	Agilent	E4440A	HKE-101	Mar.01,2018	Feb.28,2019
RF Communication Test Set	HP	HP8920B	HKE-089	June 12, 2018	June 11, 2019

4. SUPPORT EQUIPMENT LIST

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
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5. SYSTEM DESCRIPTION

EUT test procedure:

1. Connect EUT and peripheral devices.
2. Power on the EUT, the EUT begins to work.
3. Make sure the EUT normal working.

EMC TEST MODES

No.	TEST MODES
1	Scanning mode
2	Scanning stopped/Receiving at low channel of 136 MHz -174 MHz
3	Scanning stopped/Receiving at middle channel of 136 MHz -174 MHz
4	Scanning stopped/Receiving at high channel of 136 MHz -174 MHz
5	Scanning stopped/Receiving at low channel of 220 MHz -260 MHz
6	Scanning stopped/Receiving at middle channel of 220 MHz -260 MHz
7	Scanning stopped/Receiving at high channel of 220 MHz -260 MHz
8	Scanning stopped/Receiving at low channel of 400 MHz -480 MHz
9	Scanning stopped/Receiving at middle channel of 400 MHz -480 MHz
10	Scanning stopped/Receiving at high channel of 400 MHz -480 MHz

Note: Only the result of the worst case was recorded in the report.

6. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.107	Conduction Emission	Compliant
§15.109	Radiated Emission	Compliant
§15.111	Antenna Conducted Power for receivers	Compliant
§15.121(b)	Scanning receivers and frequency converters used with scanning receivers	Compliant

7. FCC RADIATED EMISSION TEST

7.1. TEST EQUIPMENT OF RADIATED EMISSION

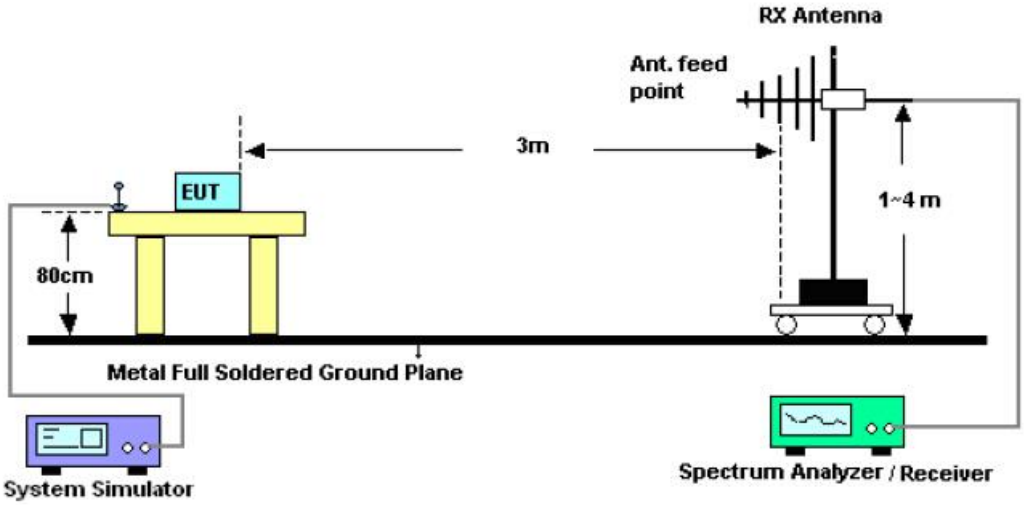
7.2. LIMITS OF RADIATED EMISSION TEST

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	41.0
88~216	3	45.0
216~960	3	48.0
960~2000	3	53.5

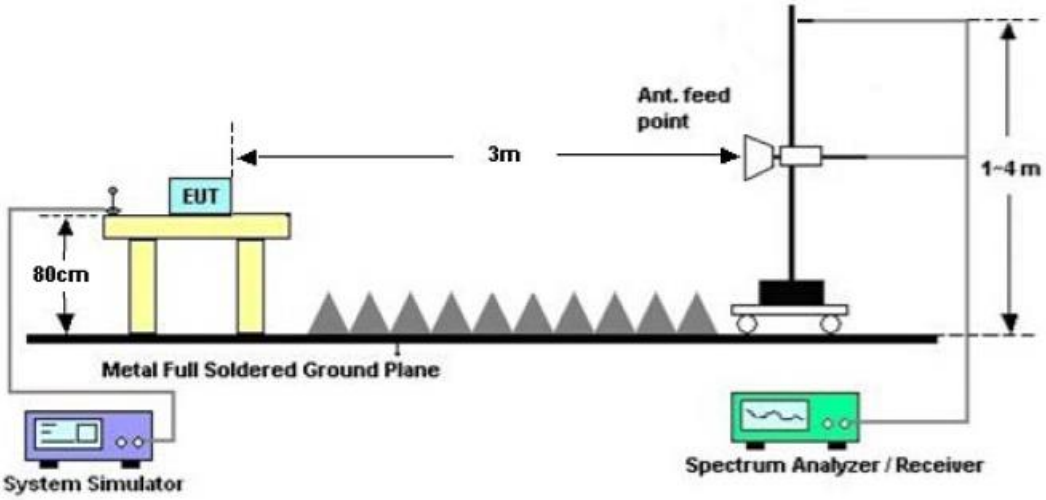
**Note: The lower limit shall apply at the transition frequency. Because the EUT RX frequency range up to 480 MHz, so the upper the frequency range up to 2 GHz.

7.3 BLOCK DIAGRAM OF RADIATED EMISSION TEST

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz

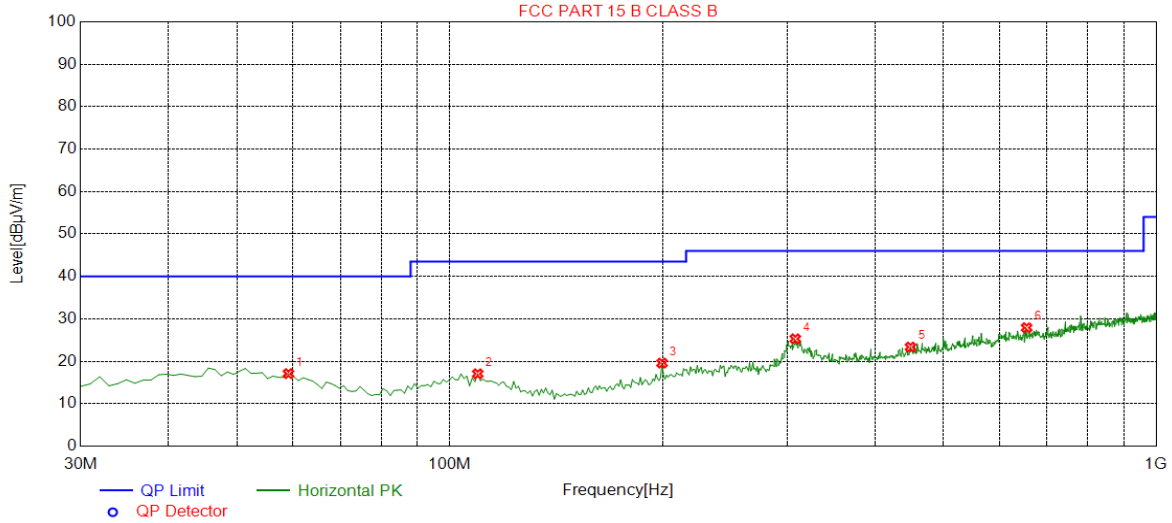


7.4 PROCEDURE OF RADIATED EMISSION TEST

1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2) Support equipment, if needed, was placed as per ANSI C63.4.
3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4) The EUT received power by AC 120V/60Hz.
5) The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
7) The test mode(s) were scanned during the test:
8) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented. For emissions below 1GHz, use 120KHz RBW and VBW>=3RBW for QP reading.
9) For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10) When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
11) If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
12) For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
13) In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
14) The test data of the worst case condition (mode 1) was reported on the following Data page

7.5 TEST RESULT OF RADIATED EMISSION TEST

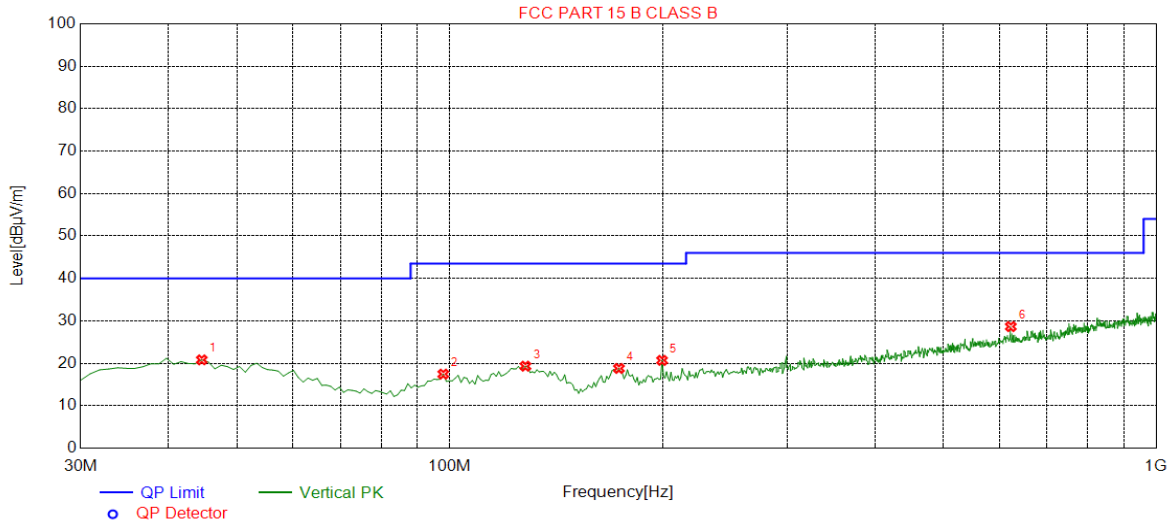
Radiated Emission Test –Horizontal -3m Below 1G



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	59.1000	17.10	-15.02	40.00	22.90	100	12	Horizontal
2	109.540	17.06	-15.43	43.50	26.44	100	319	Horizontal
3	199.750	19.59	-15.08	43.50	23.91	100	217	Horizontal
4	308.390	25.30	-12.63	46.00	20.70	100	95	Horizontal
5	449.040	23.35	-9.03	46.00	22.65	100	98	Horizontal
6	655.650	27.92	-5.46	46.00	18.08	100	179	Horizontal

RESULT: PASS

Radiated Emission Test –Vertical -3m Below 1G



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.5500	20.81	-13.73	40.00	19.19	100	15	Vertical
2	97.9000	17.46	-15.75	43.50	26.04	100	264	Vertical
3	127.970	19.33	-18.27	43.50	24.17	100	261	Vertical
4	173.560	18.79	-17.14	43.50	24.71	100	4	Vertical
5	199.750	20.69	-15.08	43.50	22.81	100	6	Vertical
6	622.670	28.65	-5.51	46.00	17.35	100	9	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. Emissions range from 1GHz to 2GHz have 20dB margin. No recording in the test report.
4. Only the data of the worst case would be record in this test report.

8. CONDUCTED EMISSION TEST

8.1 PROVISIONS APPLICABLE

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the, the radio frequency voltage that is conducted back onto the AC power line on any frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

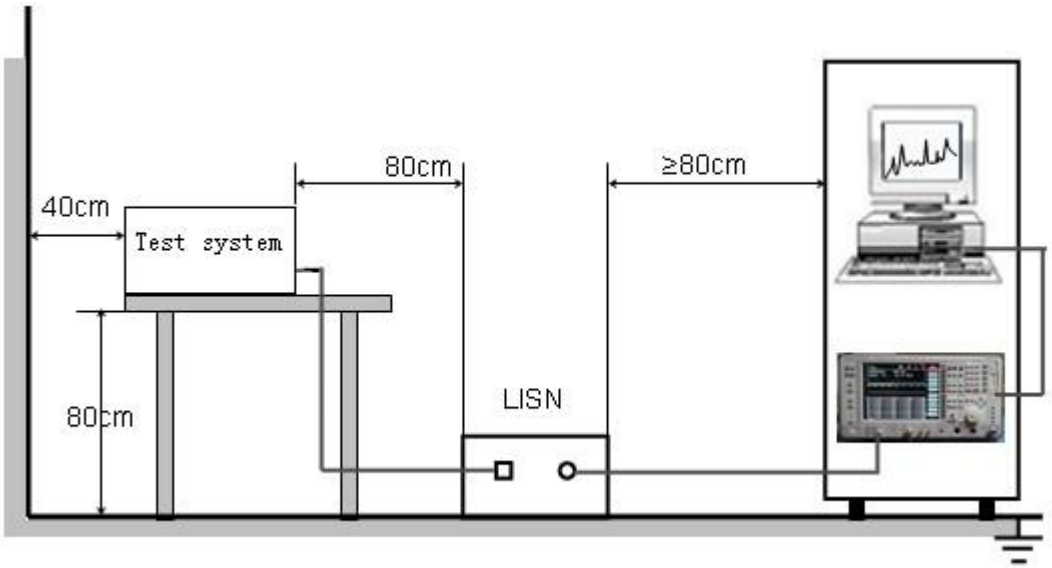
* Decreases with the logarithm of the frequency.

8.2 MEASUREMENT PROCEDURE

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
(2) Support equipment, if needed, was placed as per ANSI C63.4.
(3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
(4) The EUT received AC 120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
(5) All support equipments received AC power from a second LISN, if any.
(6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
(7) Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

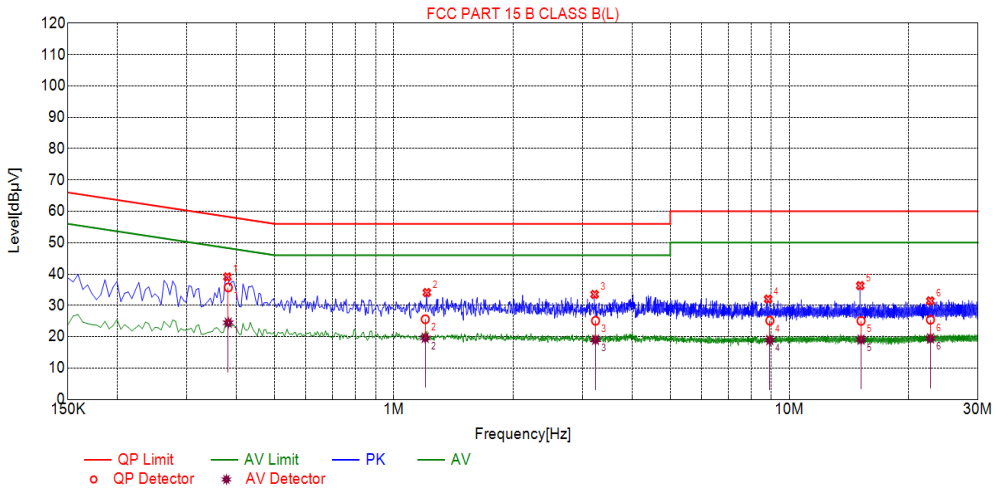
During the above scans, the emissions were maximized by cable manipulation.

8.3 TEST SETUP BLOCK DIAGRAM



8.4 TEST RESULT

CONDUCTED EMISSION TEST – LINE L

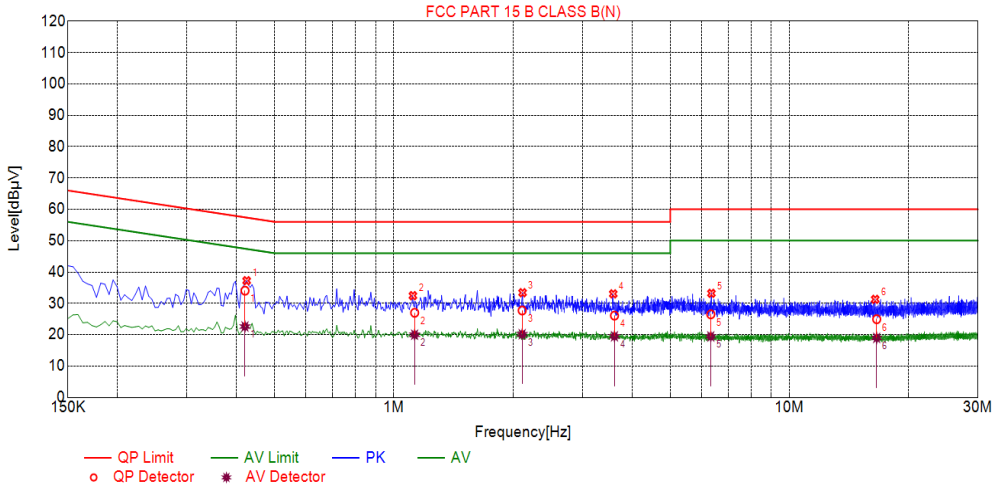


Suspected List						
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.3795	39.08	10.05	58.29	19.21	PK
2	1.2120	34.09	10.09	56.00	21.91	PK
3	3.2190	33.50	10.23	56.00	22.50	PK
4	8.8440	32.00	10.11	60.00	28.00	PK
5	15.1170	36.29	9.96	60.00	23.71	PK
6	22.7355	31.44	10.18	60.00	28.56	PK

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.3813	10.05	35.73	58.25	22.52	24.48	48.25	23.77
2	1.2004	10.09	25.59	56.00	30.41	19.65	46.00	26.35
3	3.2362	10.23	25.08	56.00	30.92	19.03	46.00	26.97
4	8.9292	10.11	25.13	60.00	34.87	18.94	50.00	31.06
5	15.1883	9.96	25.06	60.00	34.94	19.09	50.00	30.91
6	22.7480	10.18	25.42	60.00	34.58	19.48	50.00	30.52

RESULT: PASS

CONDUCTED EMISSION TEST – LINE N



Suspected List						
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.4245	37.23	10.04	57.36	20.13	PK
2	1.1175	32.46	10.08	56.00	23.54	PK
3	2.1165	33.40	10.16	56.00	22.60	PK
4	3.5880	33.04	10.25	56.00	22.96	PK
5	6.3555	33.21	10.22	60.00	26.79	PK
6	16.4940	31.29	9.99	60.00	28.71	PK

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.4203	10.04	34.06	57.44	23.38	22.61	47.44	24.83
2	1.1287	10.08	27.00	56.00	29.00	20.02	46.00	25.98
3	2.1110	10.16	27.73	56.00	28.27	20.16	46.00	25.84
4	3.6136	10.25	26.09	56.00	29.91	19.50	46.00	26.50
5	6.3312	10.22	26.51	60.00	33.49	19.46	50.00	30.54
6	16.6329	9.99	24.96	60.00	35.04	18.99	50.00	31.01

RESULT: PASS

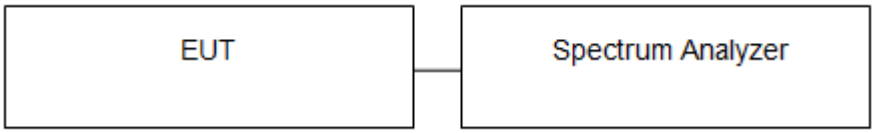
9. ANTENNA CONDUCTED POWER FOR RECEIVERS

LIMIT

The antenna conducted power of the receiver as defined in §15.111 shall not exceed the values given in the following tables

Frequency Range	9 KHz to 2GHz
Limit	2.0 nW (-57 dBm)

TEST CONFIGURATION

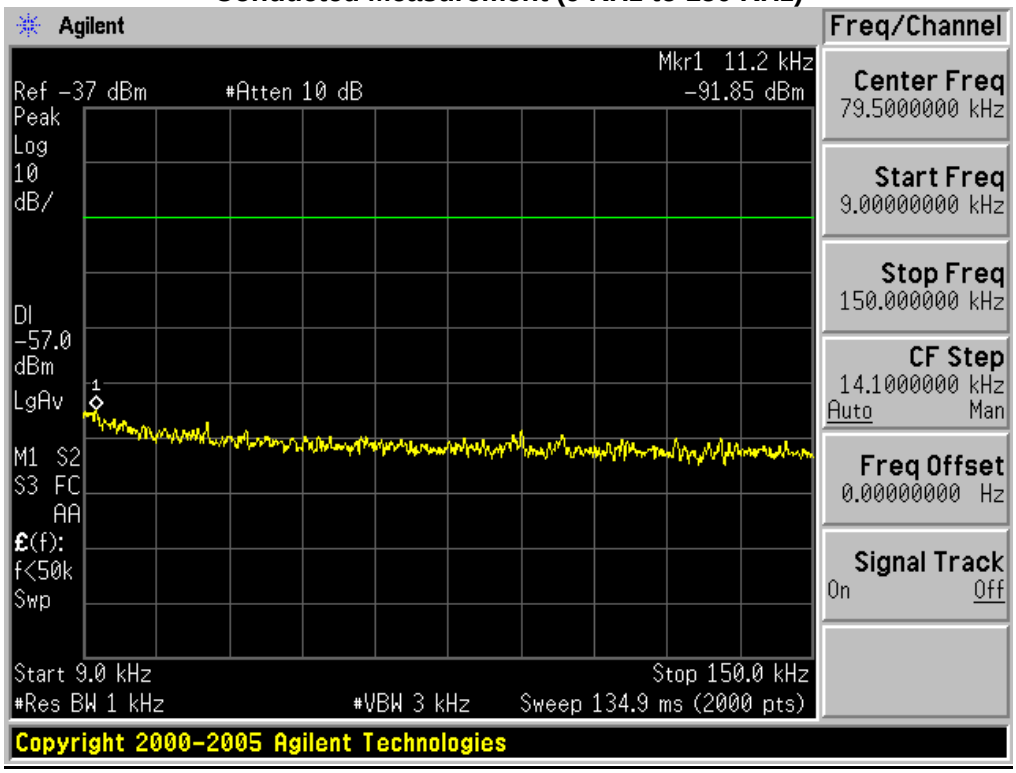


TEST PROCEDURE

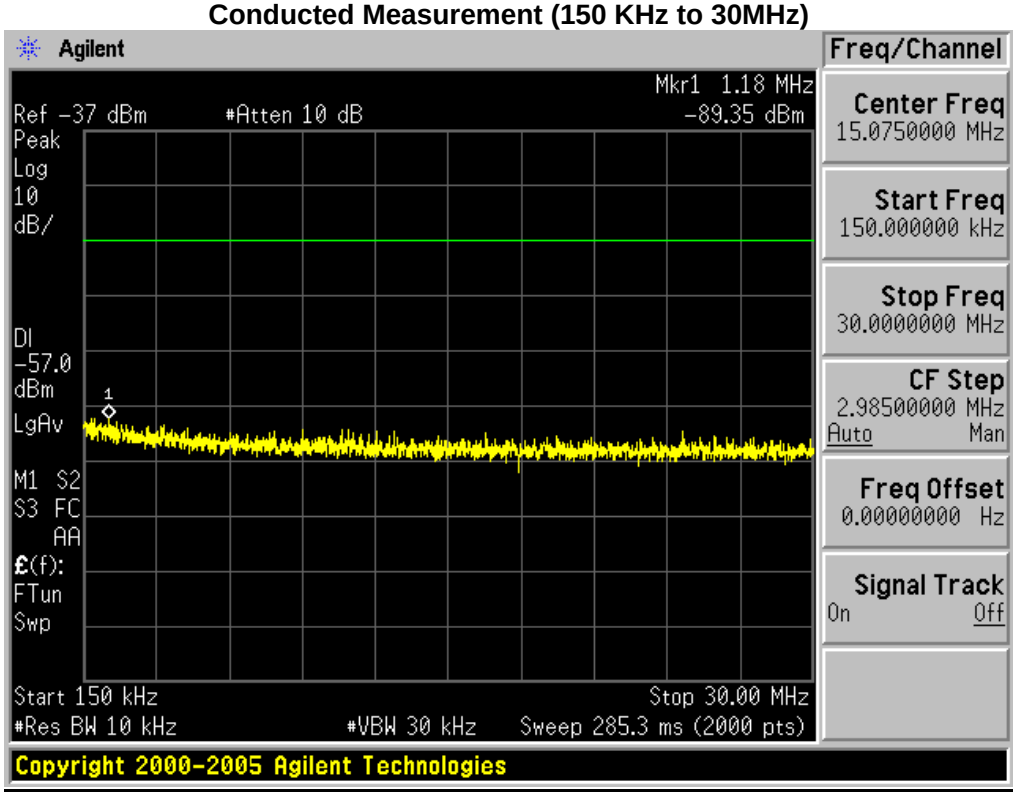
1. The receiver antenna terminal connected to a spectrum analyzer.
2. The test data of the worst case condition (mode 1) was reported on the following Data page.

TEST RESULTS

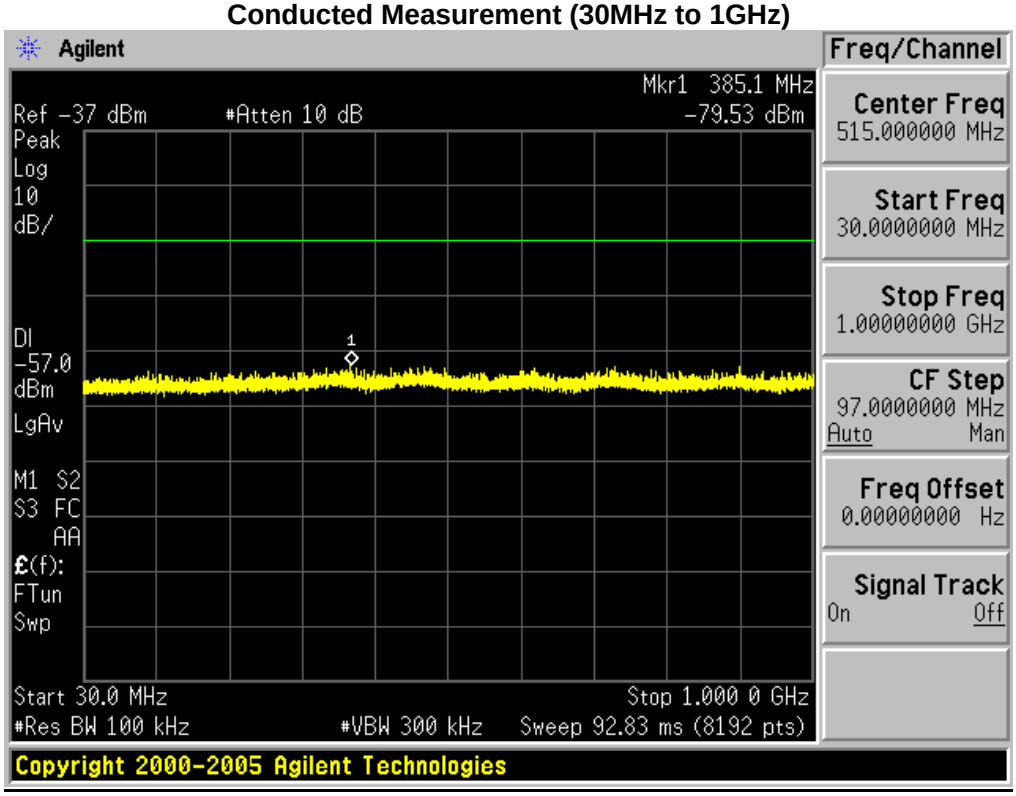
Conducted Measurement (9 KHz to 150 KHz)



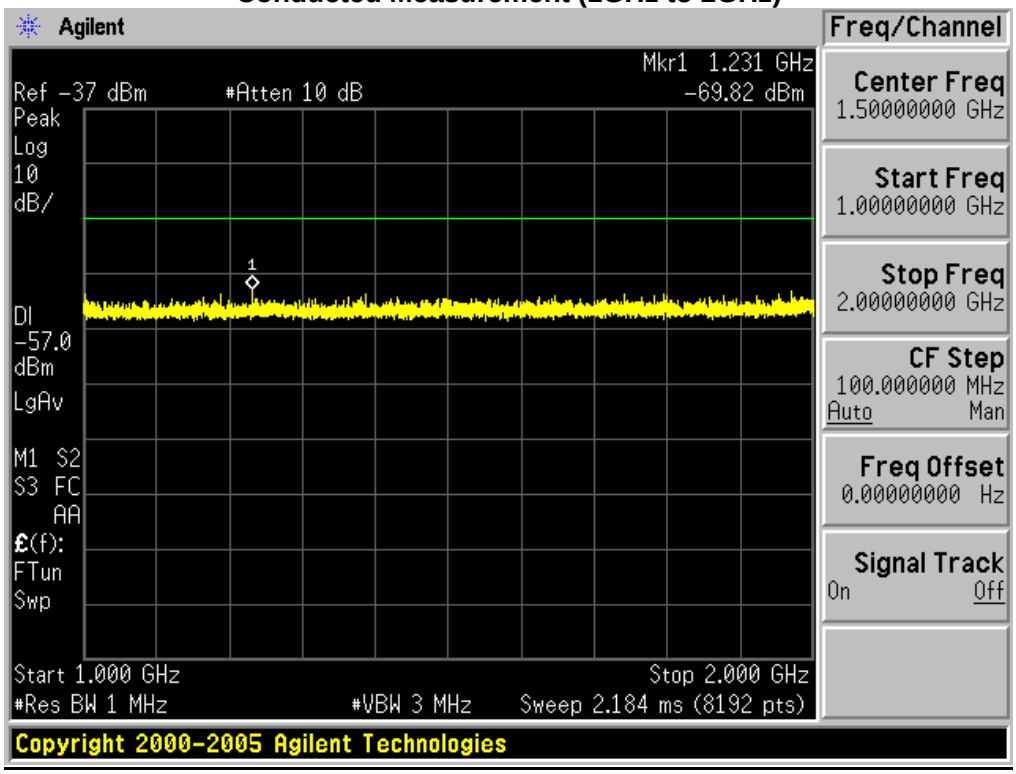
Conducted Measurement (150 KHz to 30MHz)



Conducted Measurement (30MHz to 1GHz)



Conducted Measurement (1GHz to 2GHz)



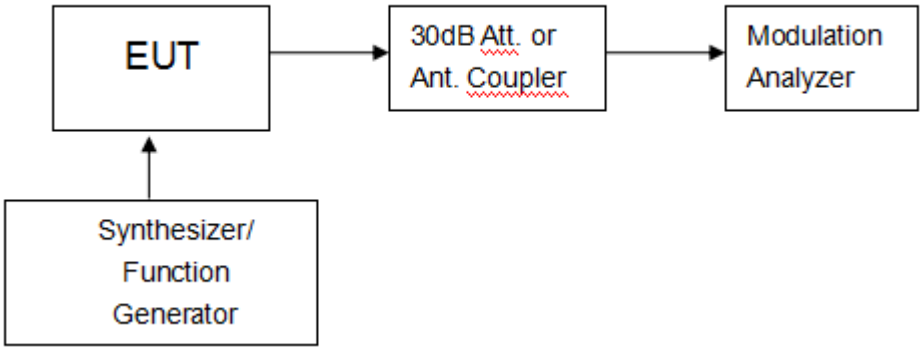
PASS

10. SCANNING RECEIVERS AND FREQUENCY CONVERTERS USED WITH SCANNING RECEIVERS.

LIMIT

Except as provided in paragraph (c) of this section, scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency bands that are 38 dB or lower based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

TEST CONFIGURATION



TEST PROCEDURE

Please review the FCC Part 15.121 b section requirements to meet the testing process

TEST RESULTS

VHF:

Frequency Range(MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
136-174	Bottom	47	＞38	Pass
136-174	Middle	51	＞38	Pass
136-174	Top	49	＞38	Pass

UHF:

Frequency Range(MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
220-260	Bottom	49	＞38	Pass
220-260	Middle	49	＞38	Pass
220-260	Top	52	＞38	Pass

Frequency Range(MHz)	Channel	Measurement Result (dB)	Limit(dB)	Result
400-480	Bottom	53	＞38	Pass
400-480	Middle	48	＞38	Pass
400-480	Top	52	＞38	Pass

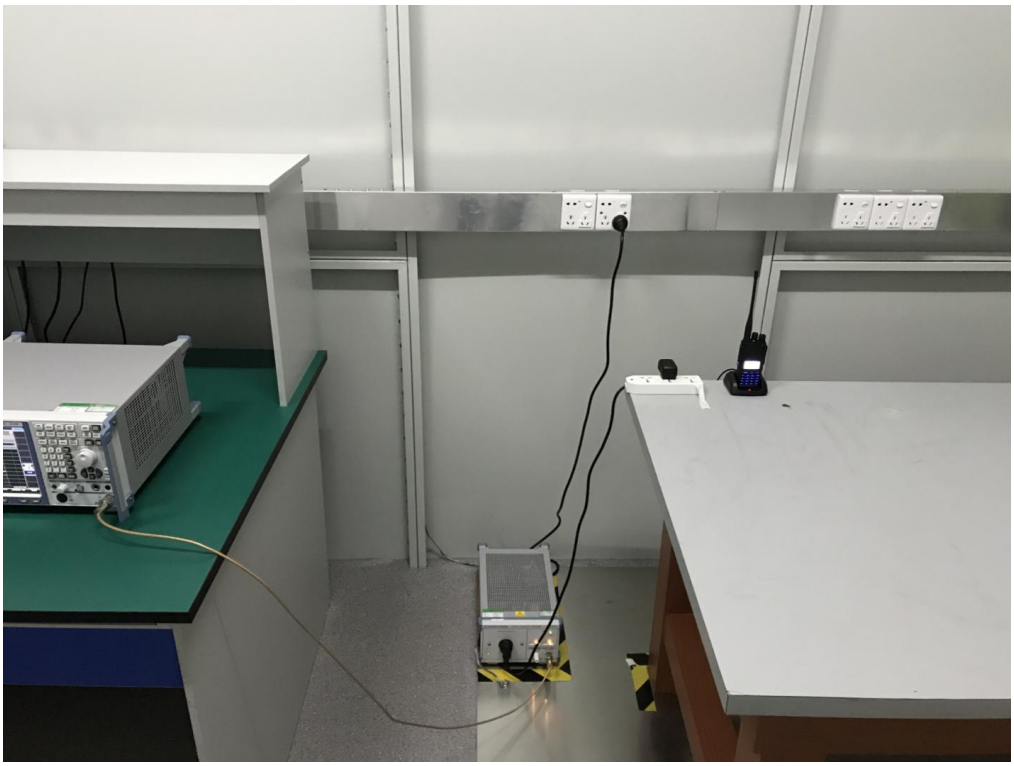
Note:1.This device meets the requirements of FCC PART 15.121.b

2.The test report only shows the worst test results

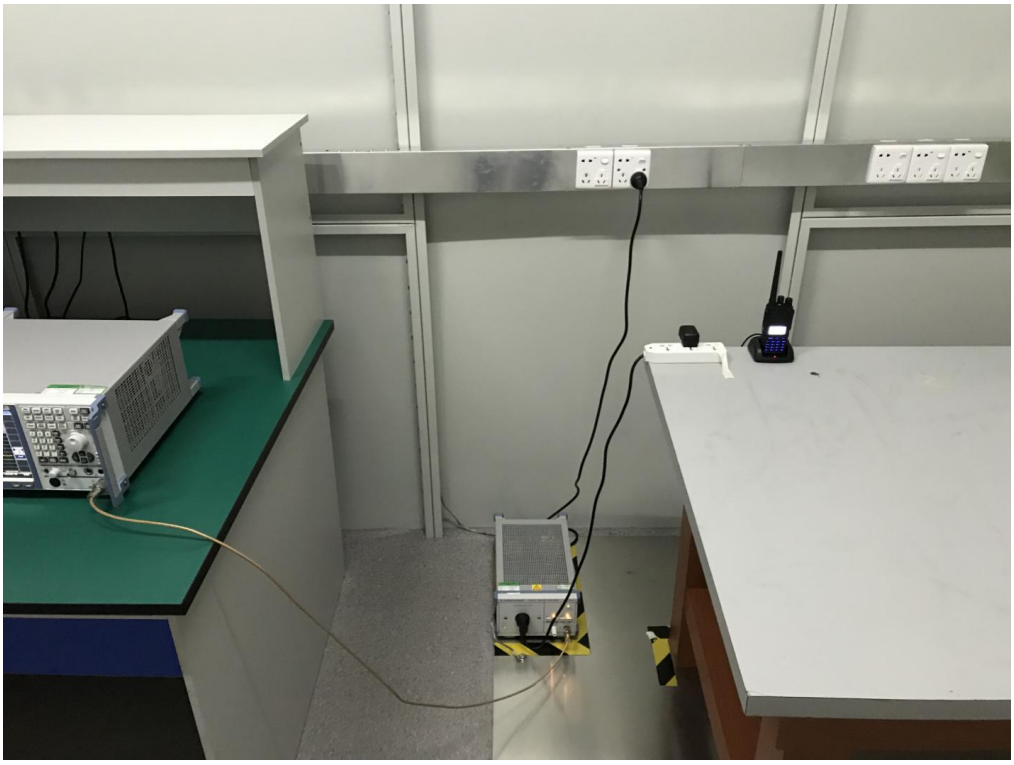
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION TEST SETUP

Antenna 1:Rx：136MHz-174MHz , 400MHz-480MHz

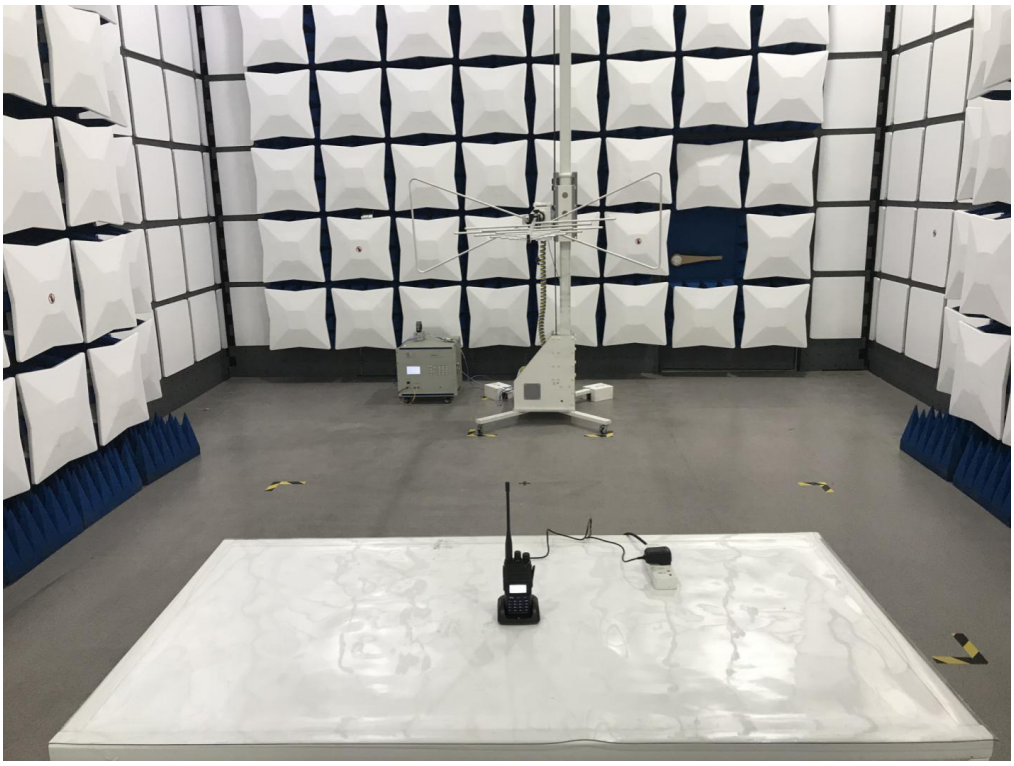


Antenna 2:Rx：220MHz-260MHz

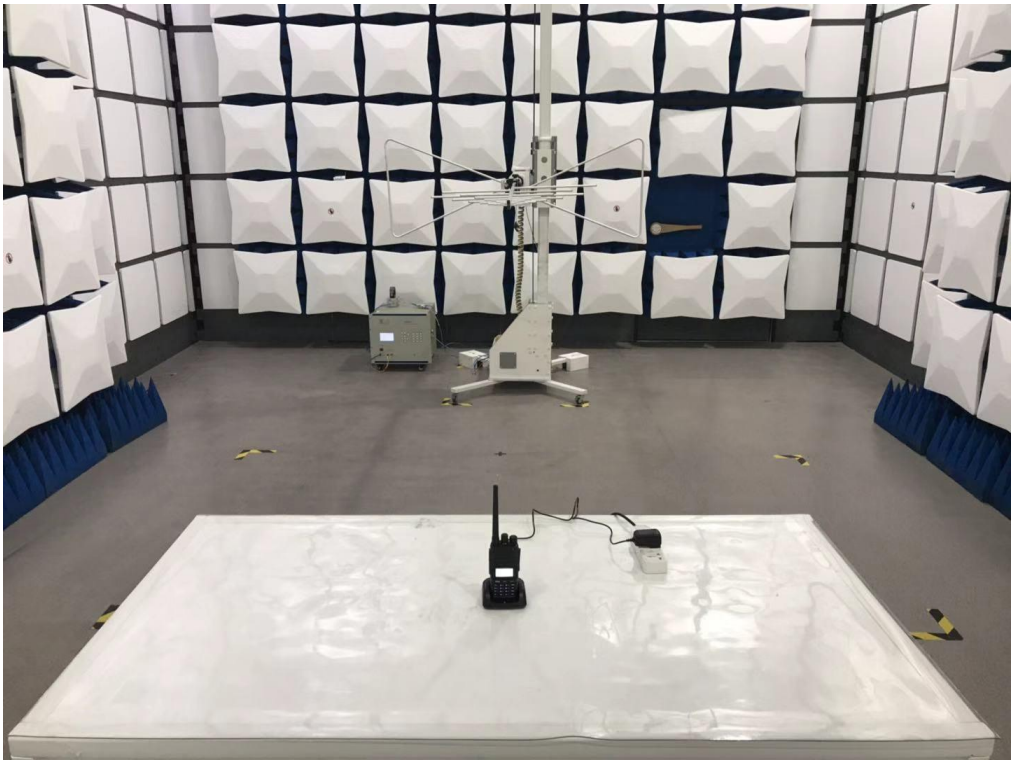


RADIATED EMISSION TEST SETUP

Antenna 1:Rx：136MHz-174MHz , 400MHz-480MHz

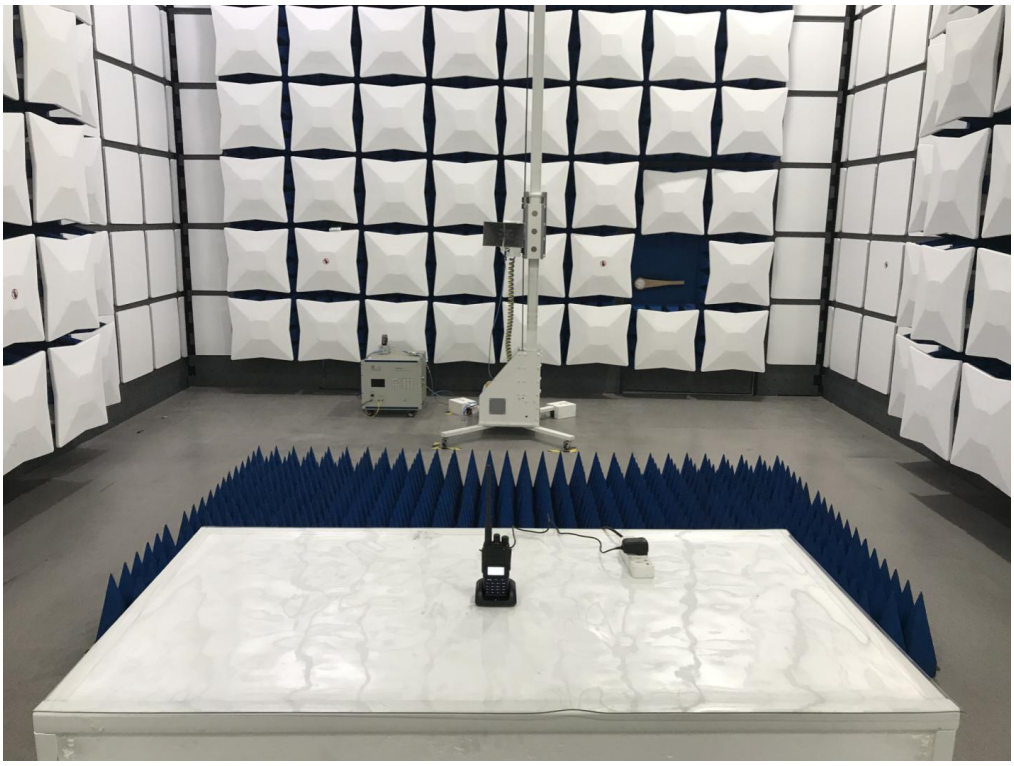


Antenna 2:Rx：220MHz-260MHz

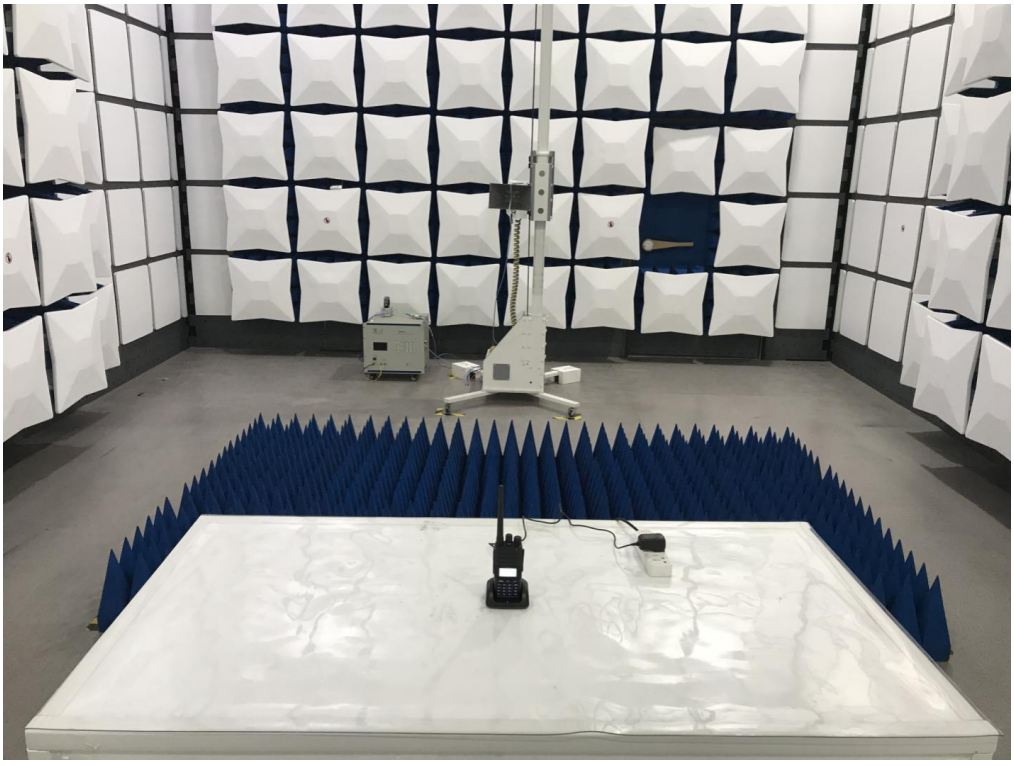


RADIATED EMISSION ABOVE 1G TEST SETUP

Antenna 1:Rx：136MHz-174MHz , 400MHz-480MHz



Antenna 2:Rx：220MHz-260MHz



APPENDIX 2 PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT

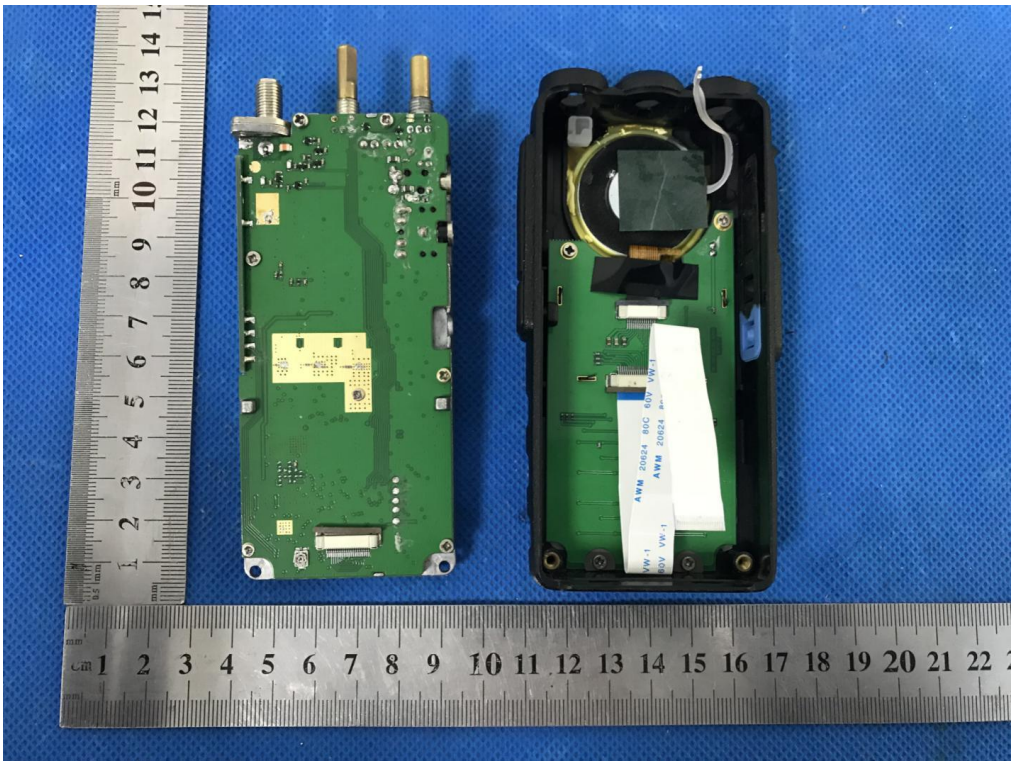
BACK VIEW OF EUT

LEFT VIEW OF EUT

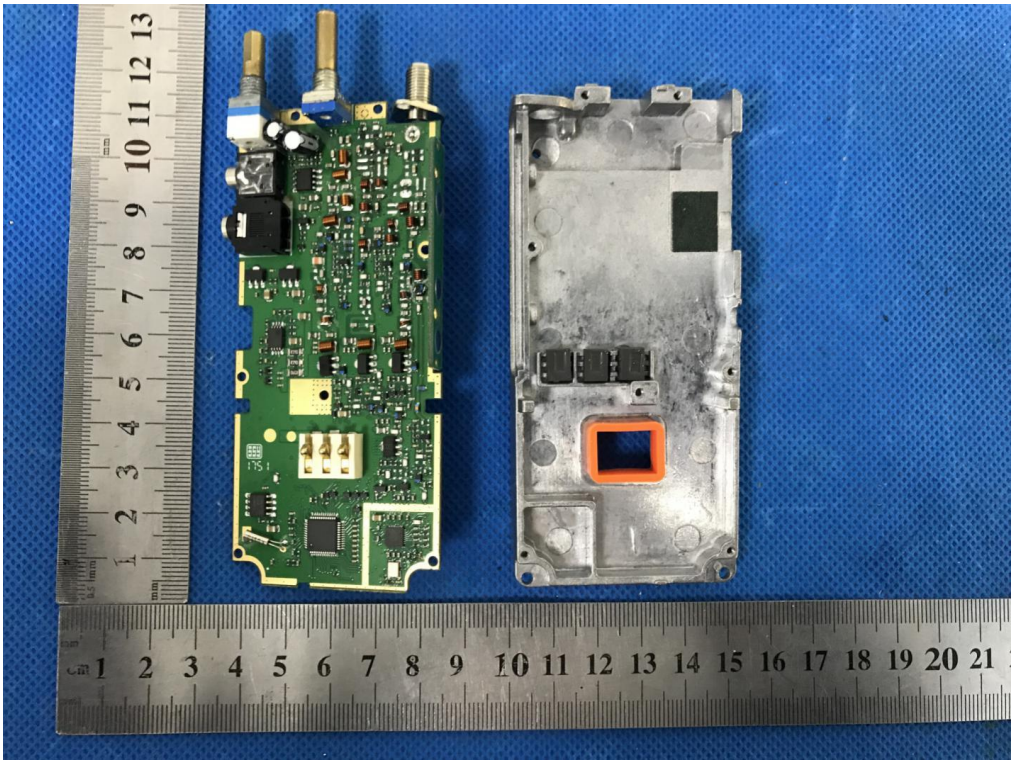
RIGHT VIEW OF EUT

OPEN VIEW-1 OF EUT

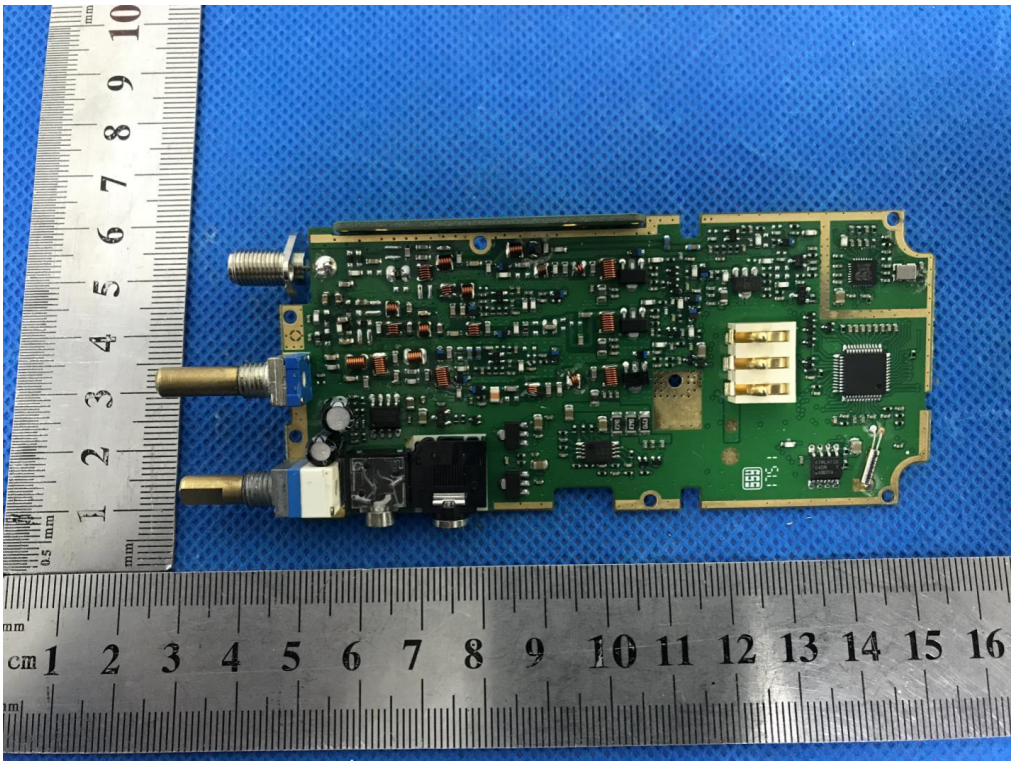
OPEN VIEW-2 OF EUT



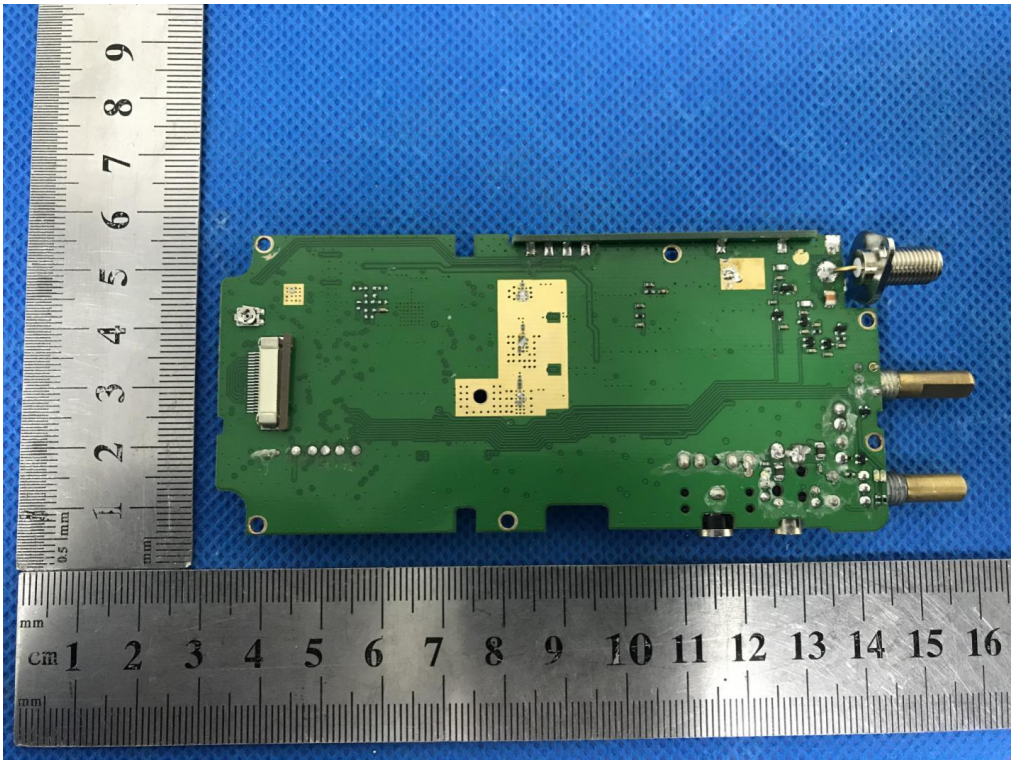
OPEN VIEW-3 OF EUT



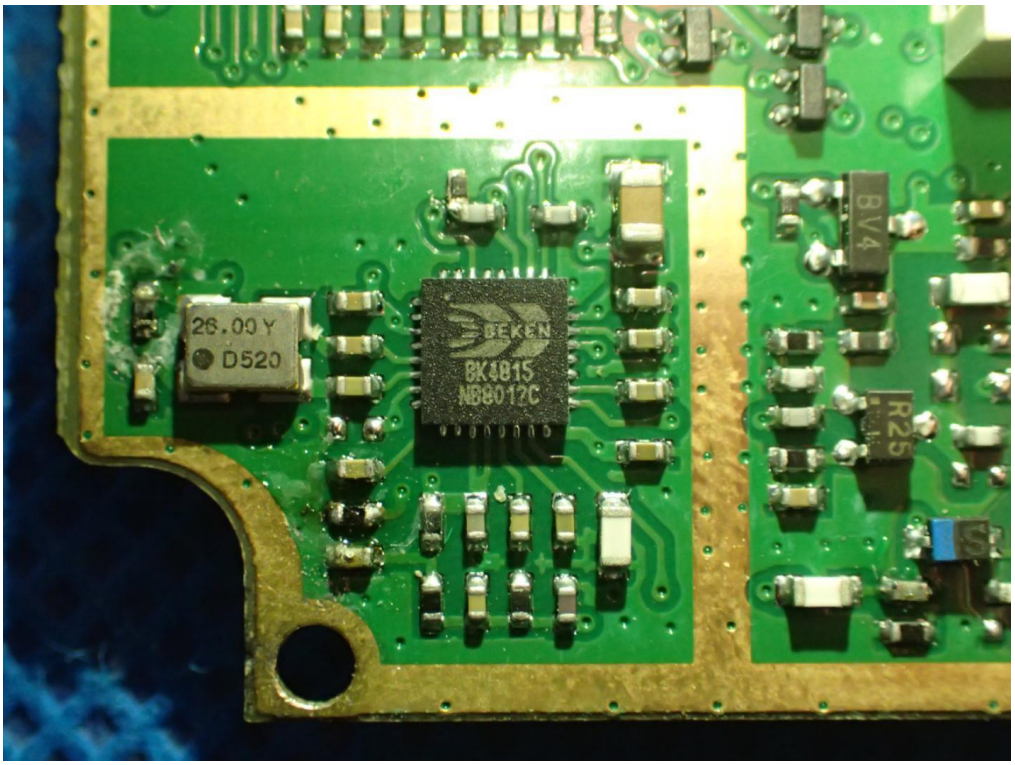
INTERNAL VIEW-1 OF EUT



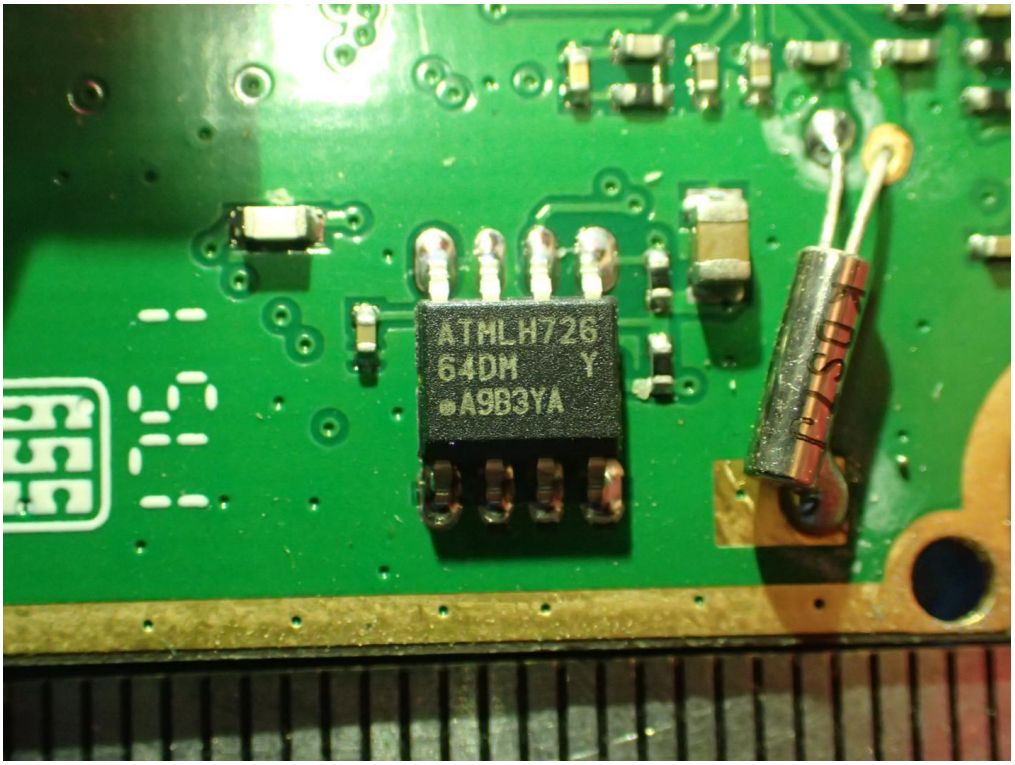
INTERNAL VIEW-2 OF EUT



INTERNAL VIEW-3 OF EUT

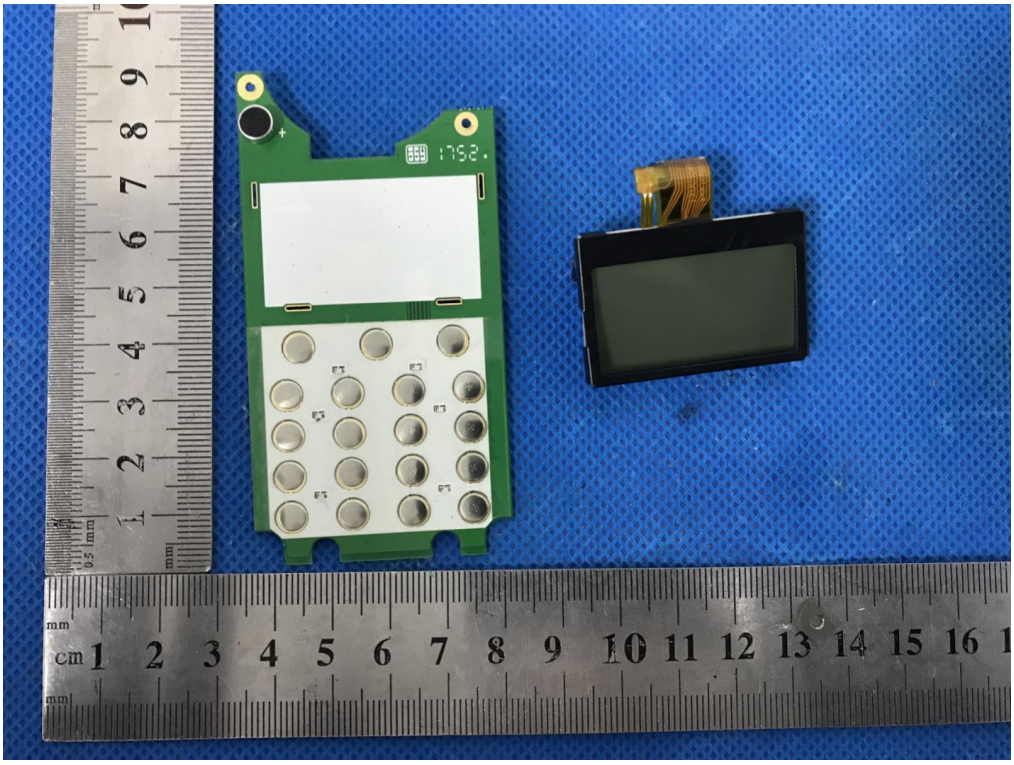


INTERNAL VIEW-4 OF EUT

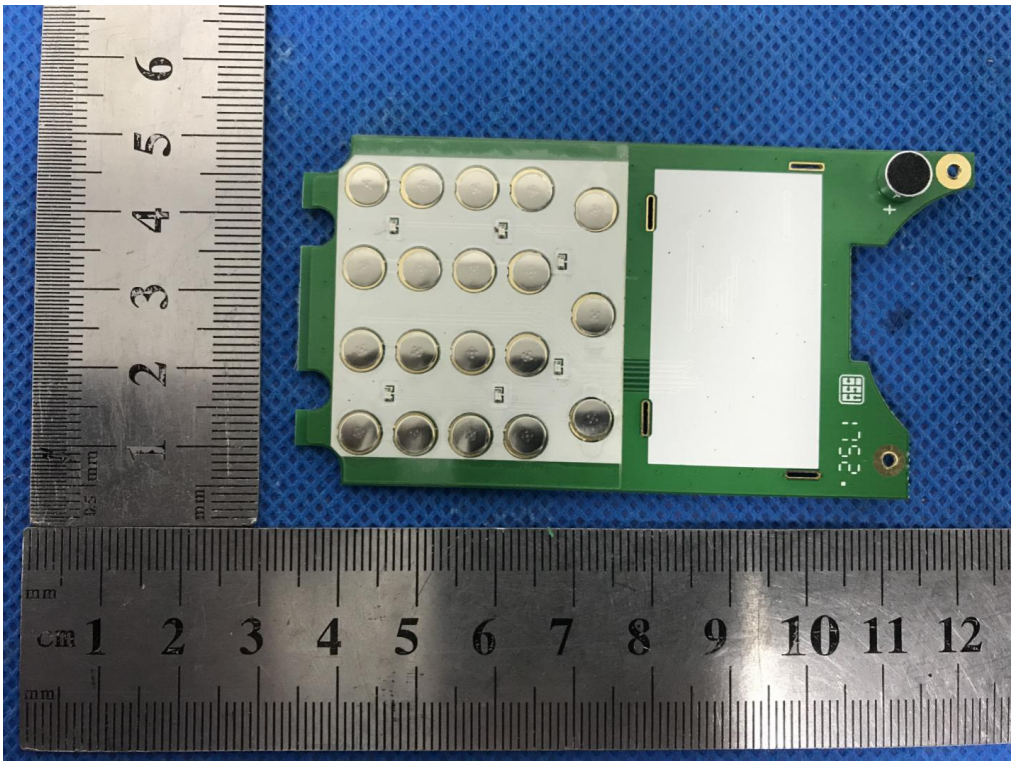


OPEN VIEW-4 OF EUT

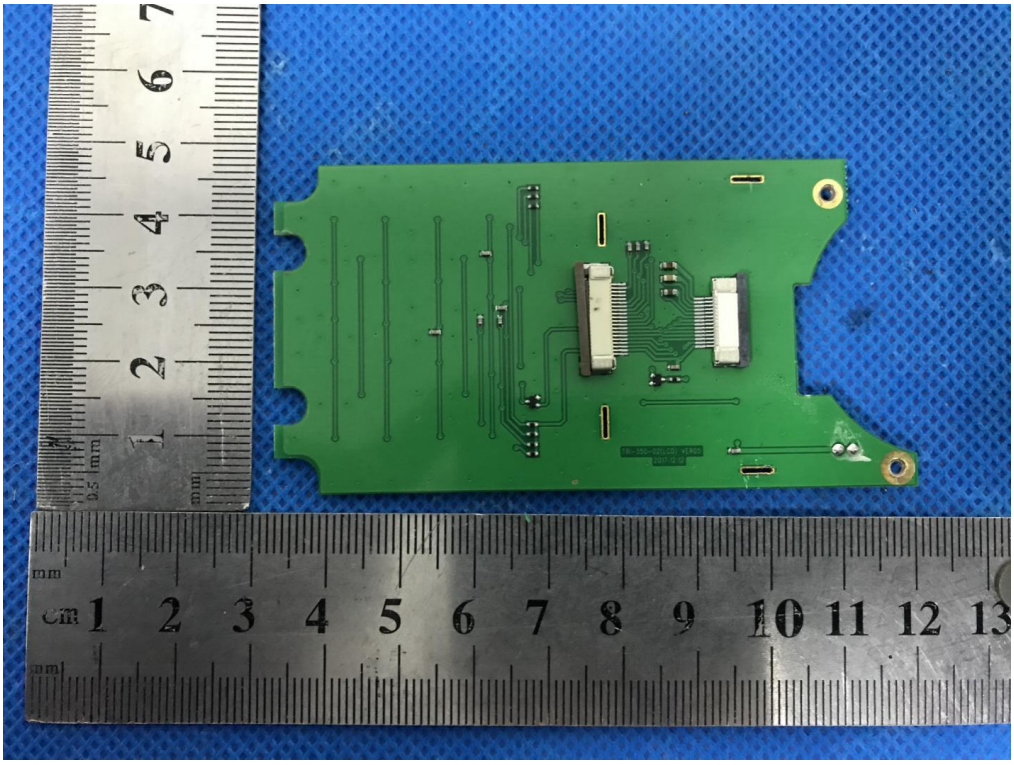
INTERNAL VIEW-5 OF EUT



INTERNAL VIEW-6 OF EUT



INTERNAL VIEW-7 OF EUT



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