FCC Test Report

Report No.: AGC00610141202FE01

FCC ID		2AC9LHW098-R
PRODUCT DESIGNATION	:	2.4G wireless receiver
BRAND NAME	:	N/A
MODEL NAME	:	HW098-R
CLIENT	:	Shenzhen Hastech industries Co., Ltd.
DATE OF ISSUE	:	Dec 11, 2014
STANDARD(S)	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec.11,2014	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Hastech industries Co., Ltd.
Address	G-A1 BLDG, Democracy West Industry Park, Shajing Town, Baoan District, Shenzhen, China
Manufacturer	Shenzhen Hastech industries Co., Ltd.
Address	G-A1 BLDG, Democracy West Industry Park, Shajing Town, Baoan District, Shenzhen, China
Product Designation	2.4G wireless receiver
Brand Name	N/A
Test Model	HW098-R
Measurement Procedure	ANSI C63.4: 2003
Date of test	Dec.05, 2014 to Dec.10, 2014
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-IT/AC(2013-03-01)

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 C63.4:2003. 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.

Prepared By	Max Zhang	
	Max Zhang	Dec.11,2014
Checked By	Kidd Yang	
	Kidd Yang	Dec.11,2014
Authorized By	Solger Zhang	
	Solger Zhang	Dec.11,2014

2. SYSTEM DESCRIPTION

TEST MODE DESCRIPTION		
NO.	**TEST MODE DESCRIPTION**	**WORST**
1	USB(connection for data exchange)	V
Note: 1. V means EMI worst mode		

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. PRODUCT INFORMATION

Housing Type	Plastic and metal
EUT Input Rating	DC 5V
Highest frequency of the EUT	2476MHz

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

I/O Port of EUT			
I/O Port Type	**Number**	**Cable Description**	**Tested With**
USB	1	N/A	1

5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
PC	Apple Inc	Macbook Pro	N/A	0.8m Unshielded	0.8m Unshielded

6. TEST FACILITY

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	B112-B113，Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China

TEST EQUIPMENT OF LINE CONDUCTED EMISSION TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	100694	04/01/2014	03/31/2015
LISN	R&S	ESH3-Z5	8389791009	07/16/2014	07/15/2015
Conduction Cable	Sat	CE1	N/A	07/15/2014	07/14/2015

TEST EQUIPMENT OF RADIATED EMISSION

Description	Manufacturer	Model	Cal. Date	Cal. Due
RF ATTENUATOR	WEINSCHEL CORP	58-30-33	07/25/2014	07/24/2015
SPECTRUM ANALYZER	AGILENT	E4440A	07/16/2014	07/15/2015
AMPLIFIER	EM	BBV 9718	07/30/2014	07/29/2015
HORN ANTENNA	EM	EM-AH-10180	07/16/2014	07/15/2015
BILOGICAL ANTENNA	EMCO	3142C	08/17/2014	08/16/2015
LOOP ANTENNA	DAZE	ZN30900N	07/30/2014	07/29/2015
ISOLATION TRANSFORMER	LETEAC	LTBK	07/16/2014	07/15/2015
RF CABLE	SUIRONG	30MHZ-18GHZ	07/15/2014	07/14/2015
RF CABLE	SAT	9KHZ-30MHZ	07/15/2014	07/14/2015

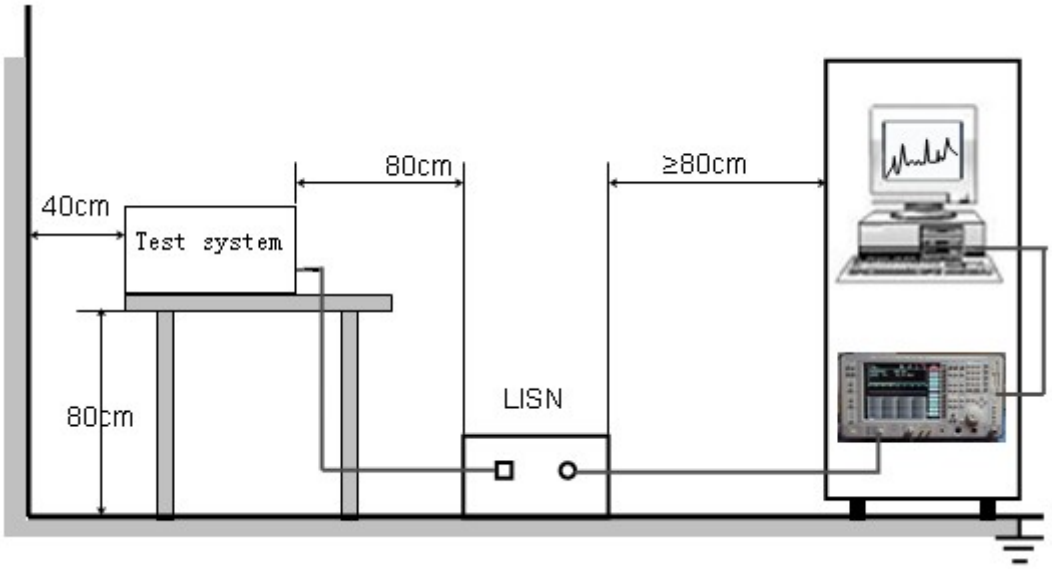
7. FCC LINE CONDUCTED EMISSION TEST

7.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

Note:
1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

7.2. BLOCK DIAGRAM OF TEST SETUP



7.3. PROCEDURE OF LINE CONDUCTED 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 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 DC 5V from PC which received AC120V/60Hz power from a LISN.

(5) 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.

(6) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

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

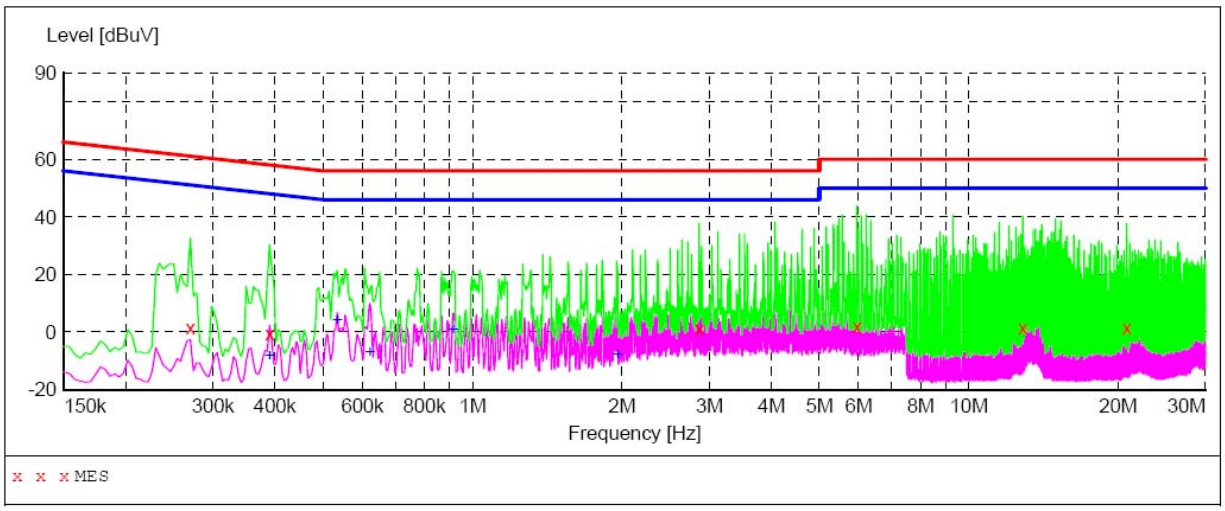
(8) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.

(9) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.

7.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT:

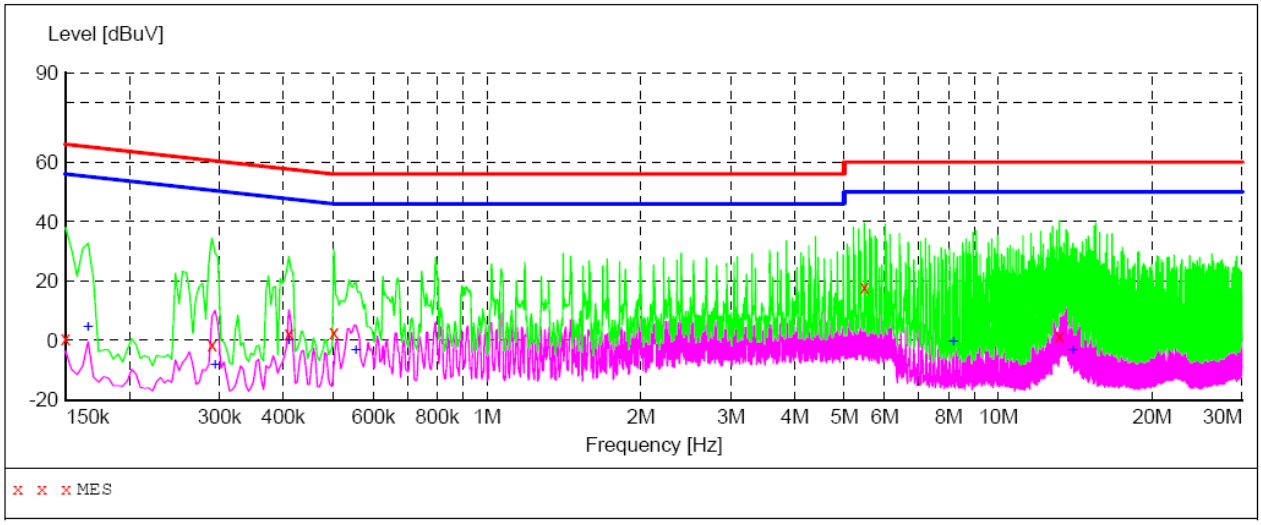
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.270000	1.60	0.2	61	59.5	PK	L1	FLO
0.390000	-0.50	0.2	58	58.6	PK	L1	FLO
2.862000	1.10	0.3	56	54.9	PK	L1	FLO
5.950000	1.90	0.4	60	58.1	PK	L1	FLO
12.850000	1.40	0.5	60	58.6	PK	L1	FLO
20.826000	1.60	0.8	60	58.4	PK	L1	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.390000	-8.40	0.2	48	56.5	AV	L1	FLO
0.534000	3.80	0.2	46	42.2	AV	L1	FLO
0.622000	-7.00	0.2	46	53.0	AV	L1	FLO
0.914000	0.60	0.2	46	45.4	AV	L1	FLO
1.962000	-8.10	0.3	46	54.1	AV	L1	FLO

RESULT: PASS

LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	0.50	0.2	66	65.5	PK	N	FLO
0.290000	-1.30	0.2	61	61.8	PK	N	FLO
0.410000	2.50	0.2	58	55.1	PK	N	FLO
0.502000	2.70	0.2	56	53.3	PK	N	FLO
5.470000	18.10	0.4	60	41.9	PK	N	FLO
13.174000	1.30	0.5	60	58.7	PK	N	FLO

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.166000	4.20	0.2	55	51.0	AV	N	FLO
0.294000	-8.30	0.2	50	58.7	AV	N	FLO
0.410000	-0.20	0.2	48	47.8	AV	N	FLO
0.554000	-3.40	0.2	46	49.4	AV	N	FLO
8.182000	-0.50	0.4	50	50.5	AV	N	FLO
14.014000	-3.30	0.6	50	53.3	AV	N	FLO

RESULT: PASS

8. FCC RADIATED EMISSION TEST

8.1. LIMITS OF RADIATED EMISSION TEST

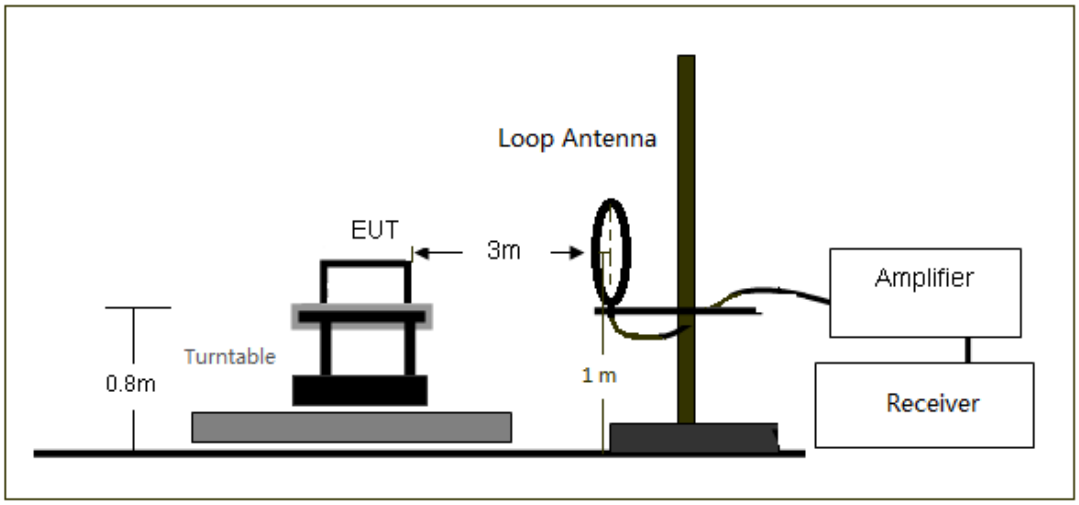
Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	40.0
88~216	3	43.5
216~960	3	46.0
Above 960	3	54.0

Note: The lower limit shall apply at the transition frequency.

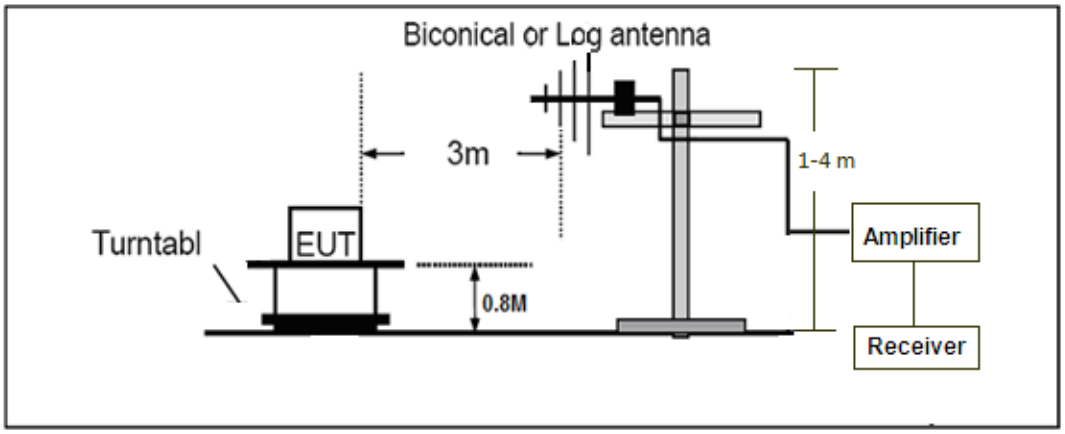
8.2. BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators

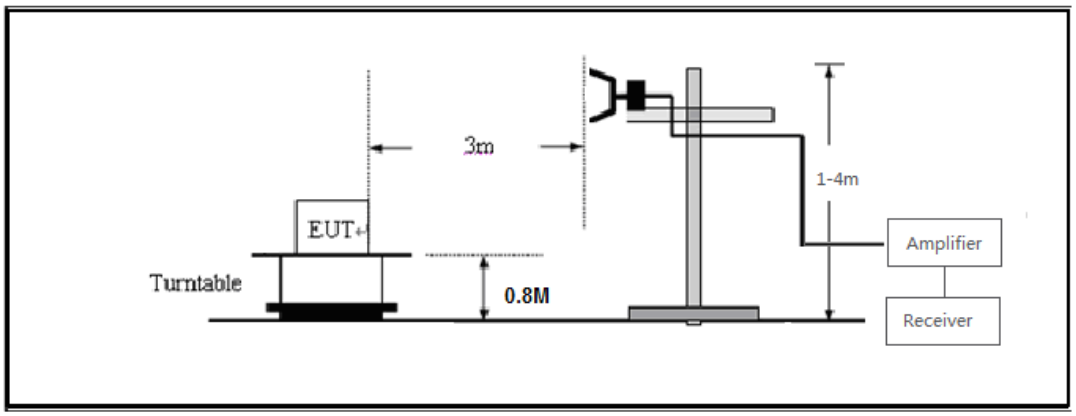
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



8.3. 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 was connected to PC for date exchange.

(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.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.

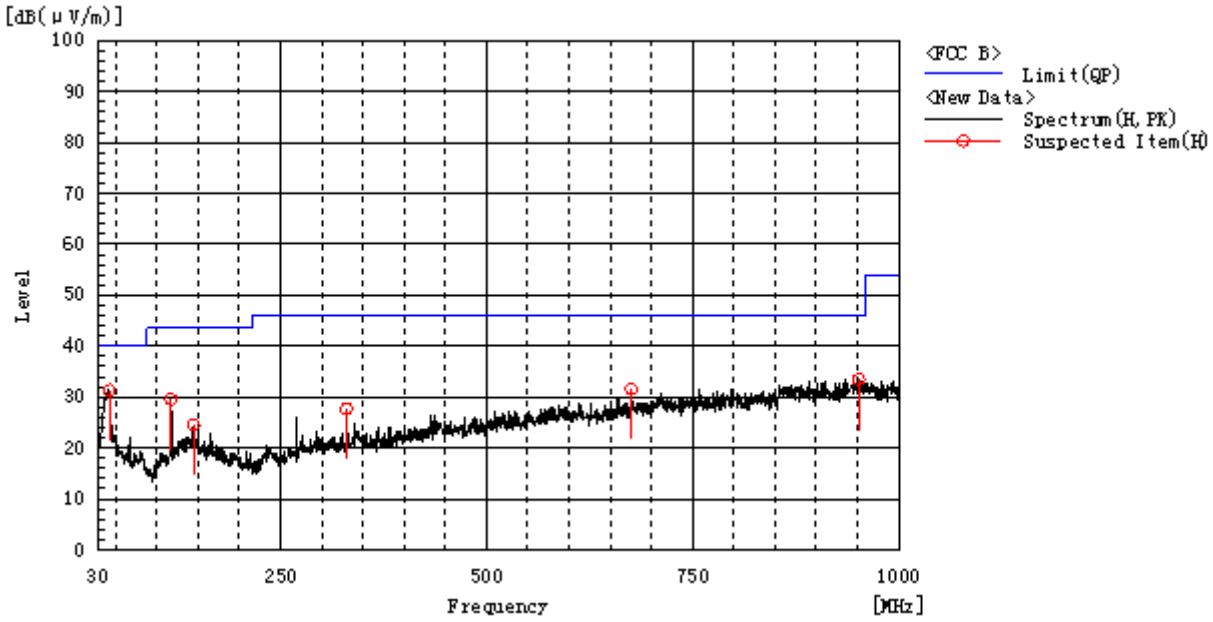
8.4. TEST RESULT OF RADIATED EMISSION TEST

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz

RADIATED EMISSION 30-1000MHZ

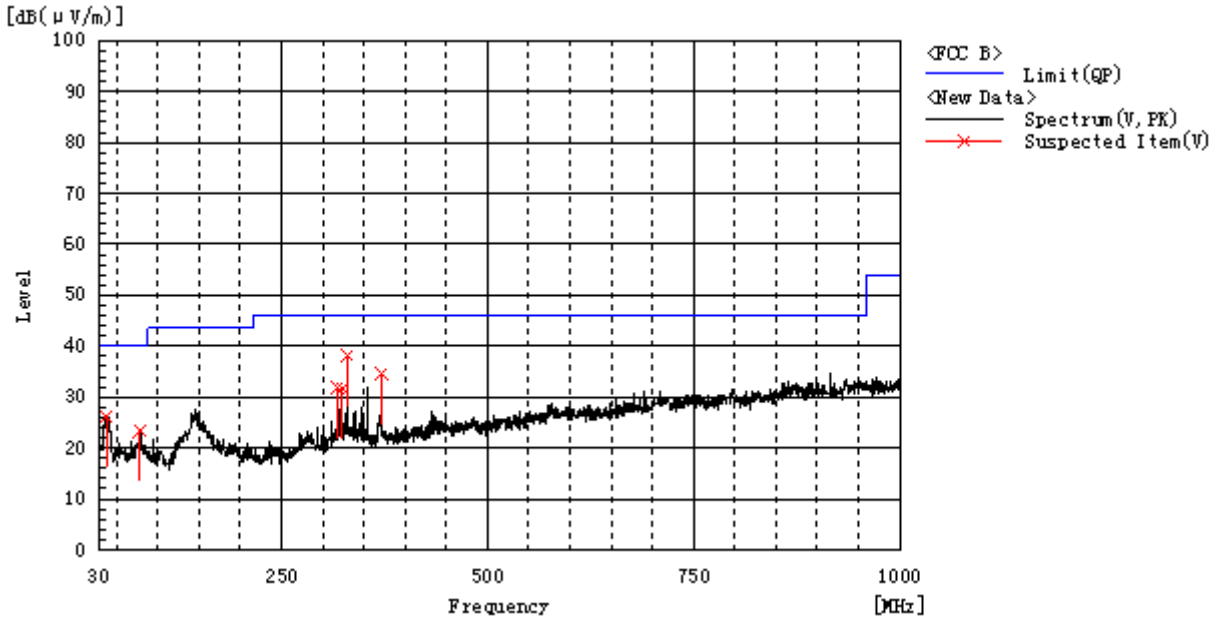
RADIATED EMISSION BELOW 1GHZ-Horizontal



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
42.610	H	12.9	18.5	31.4	40.0	8.6	Pass	200.0	38.9
117.300	H	17.4	12.1	29.5	43.5	14.0	Pass	200.0	180.8
144.945	H	9.7	14.9	24.6	43.5	18.9	Pass	100.0	72.3
330.215	H	10.5	17.2	27.7	46.0	18.3	Pass	100.0	35.1
951.500	H	4.8	28.7	33.5	46.0	12.5	Pass	200.0	74.4
675.535	H	7.4	24.2	31.6	46.0	14.4	Pass	200.0	3.9

RESULT: PASS

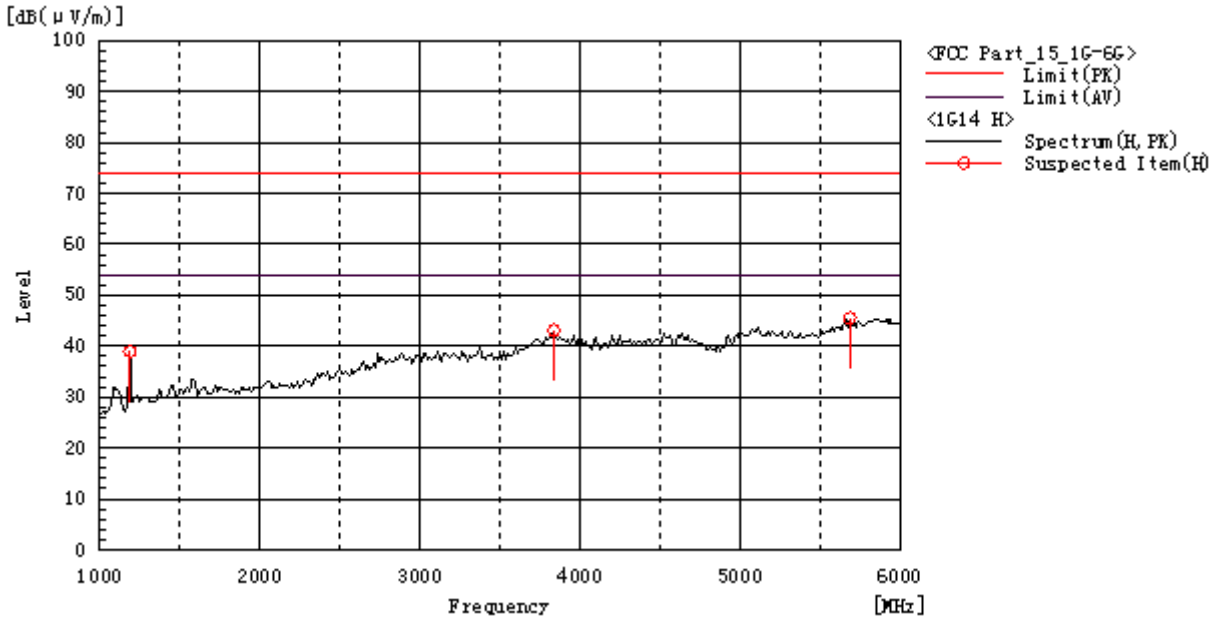
RADIATED EMISSION BELOW 1GHZ-Vertical



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
37.760	V	4.9	21.2	26.1	40.0	13.9	Pass	200.0	356.1
78.015	V	13.4	10.0	23.4	40.0	16.6	Pass	100.0	107.0
318.090	V	14.9	16.8	31.7	46.0	14.3	Pass	100.0	286.2
323.910	V	14.7	17.0	31.7	46.0	14.3	Pass	100.0	323.0
330.215	V	20.8	17.2	38.0	46.0	8.0	Pass	200.0	285.5
371.925	V	16.5	18.0	34.5	46.0	11.5	Pass	100.0	323.0

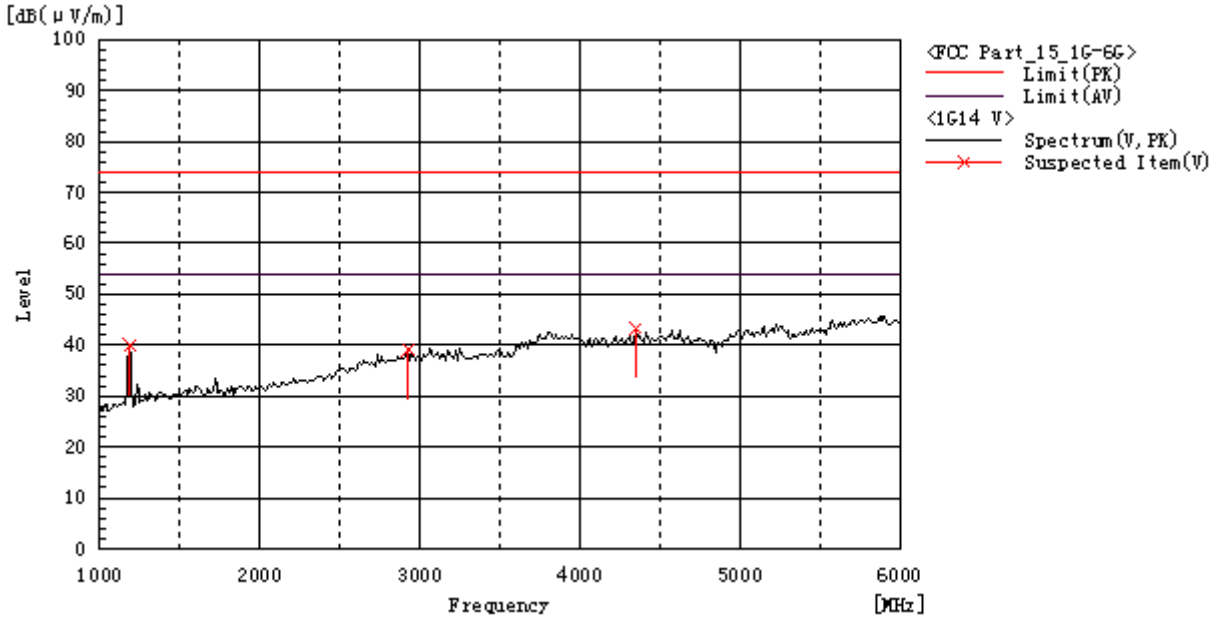
RADIATED EMISSION ABOVE 1GHz

RADIATED EMISSION ABOVE 1GHZ-Horizontal



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB PK	Pass/Fail	Height cm	Angle deg
1187.500	H	41.2	-6.3	37.9	74.0	36.1	Pass	200.0	216.3
3837.500	H	37.0	6.1	43.1	74.0	30.9	Pass	200.0	358.2
5687.500	H	34.9	10.6	45.5	74.0	28.5	Pass	200.0	145.5

RADIATED EMISSION ABOVE 1GHZ- Vertical



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB PK	Pass/Fail	Height cm	Angle deg
1187.500	V	46.4	-6.3	40.1	74.0	33.9	Pass	100.0	287.6
4350.000	V	36.3	7.1	43.4	74.0	30.6	Pass	200.0	165.0
2925.000	V	35.7	3.4	39.1	74.0	34.9	Pass	100.0	216.8

RESULT: PASS

Note: 6~12.38GHz at least have 20dB margin. No recording in the test report.

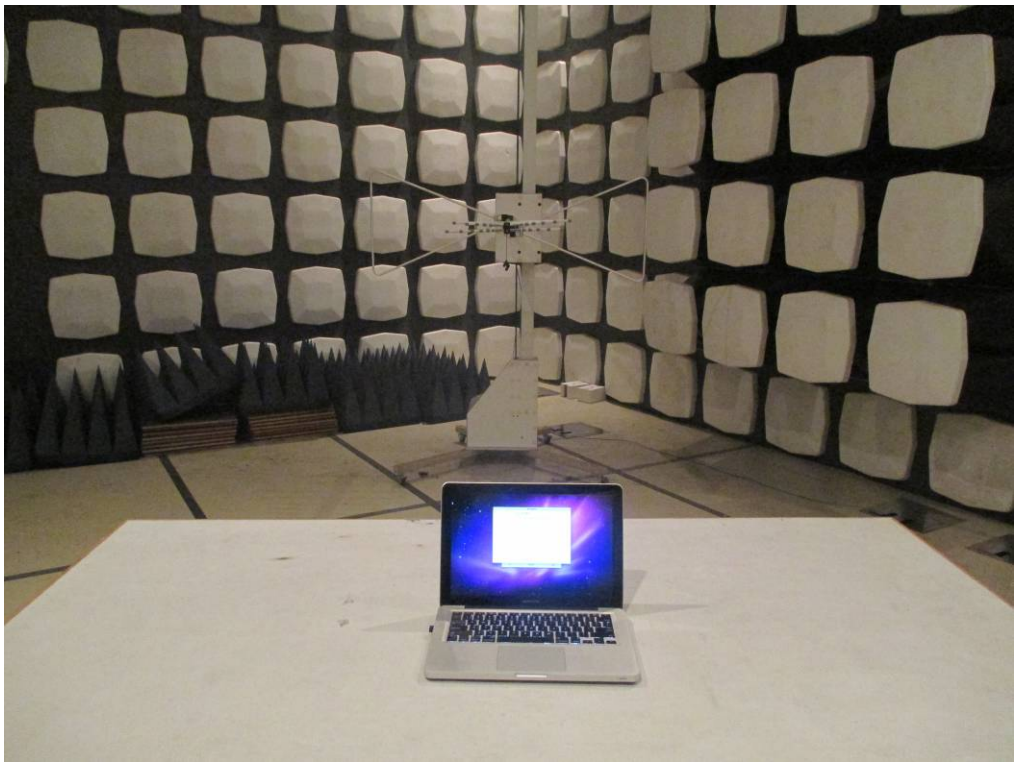
Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

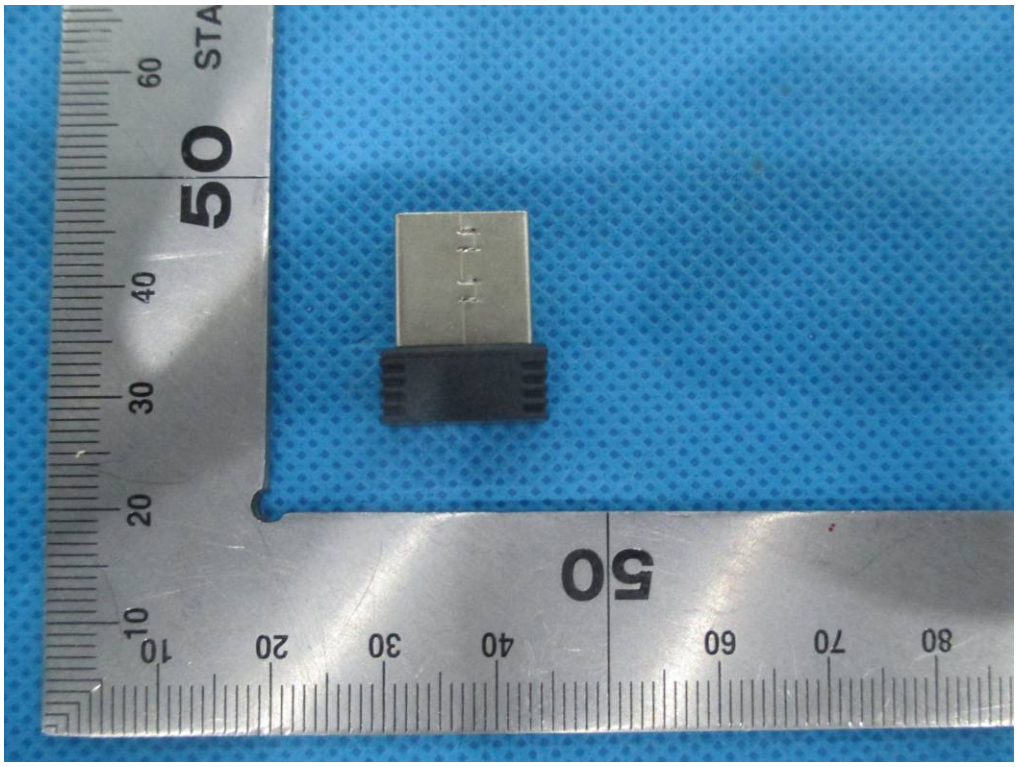
FCC CONDUCTED EMISSION TEST SETUP

FCC RADIATED EMISSION TEST SETUP

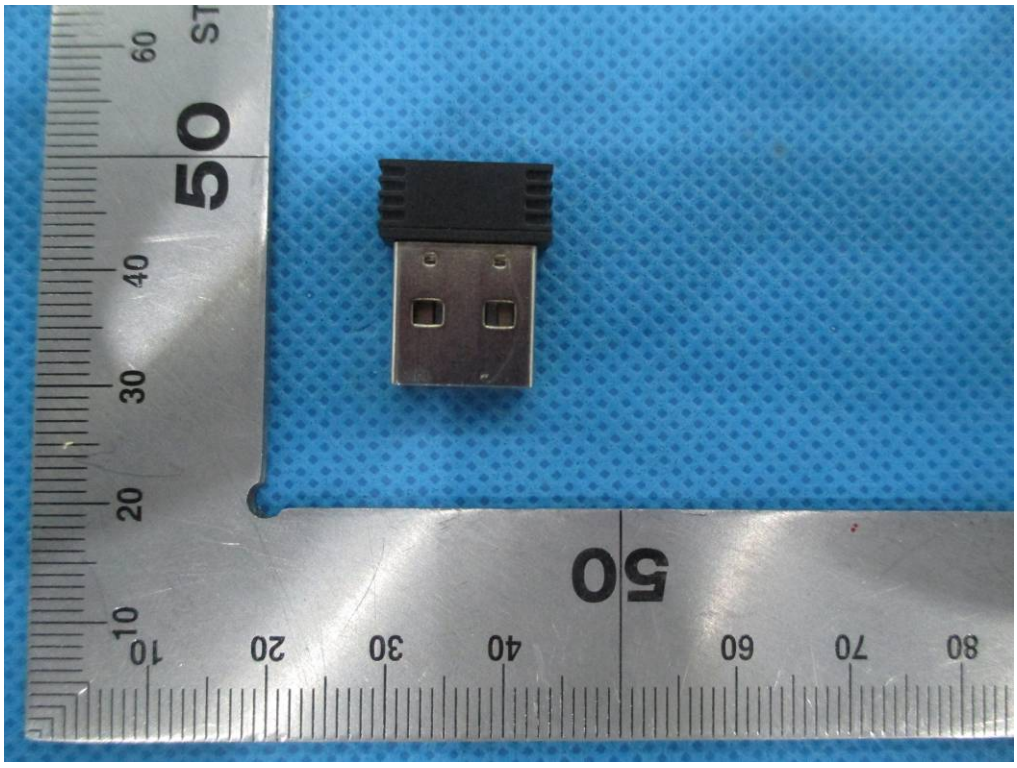


APPENDIX B: PHOTOGRAPHS OF EUT

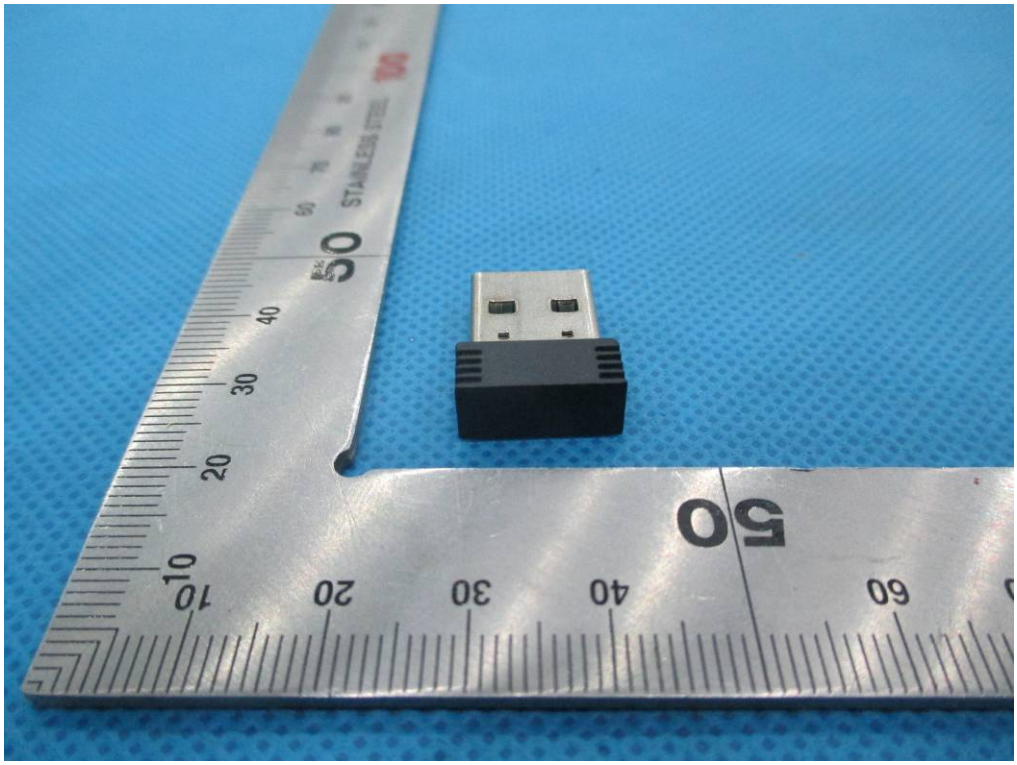
TOP VIEW OF EUT



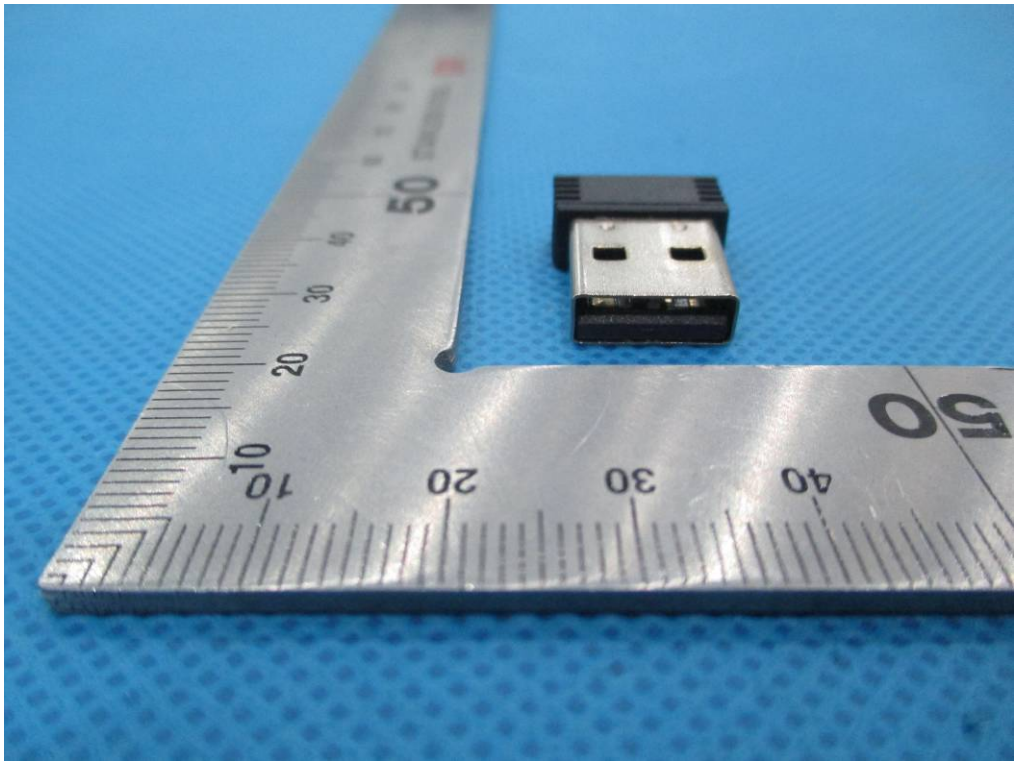
BOTTOM VIEW OF EUT



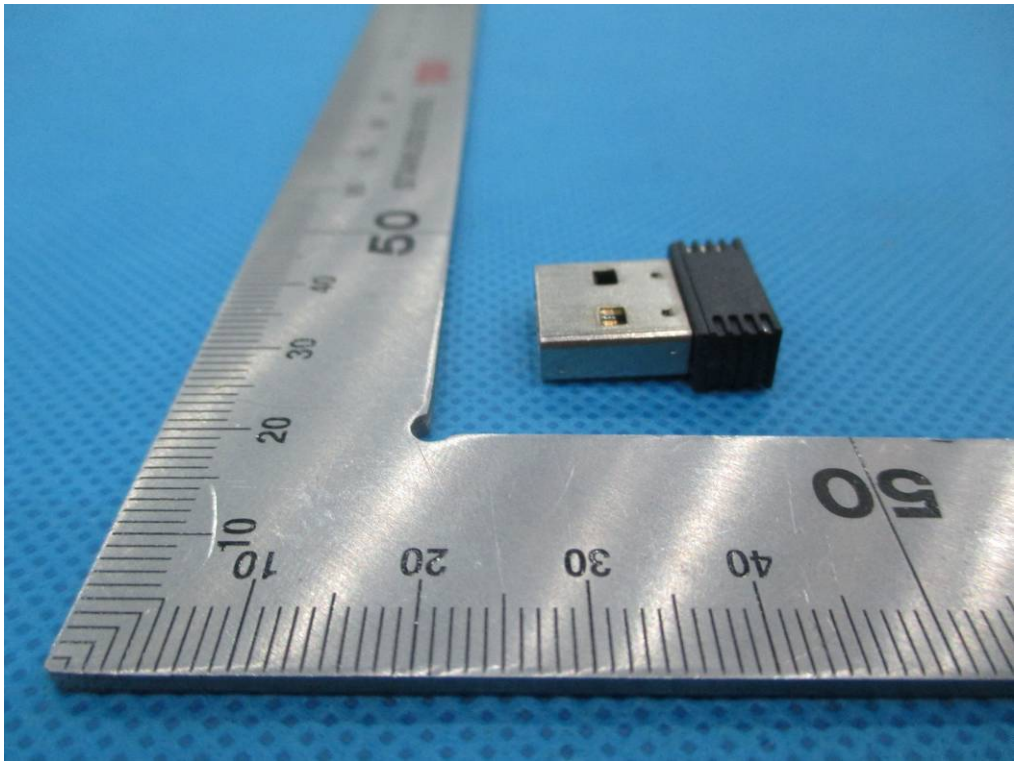
FRONT VIEW OF EUT



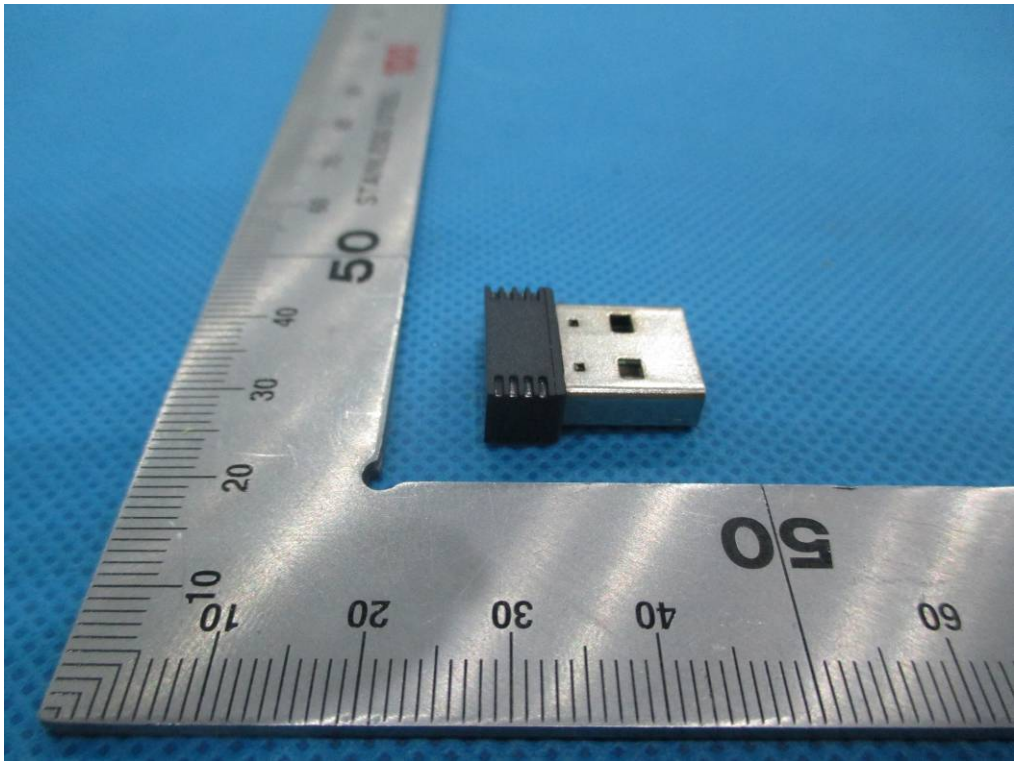
BACK VIEW OF EUT



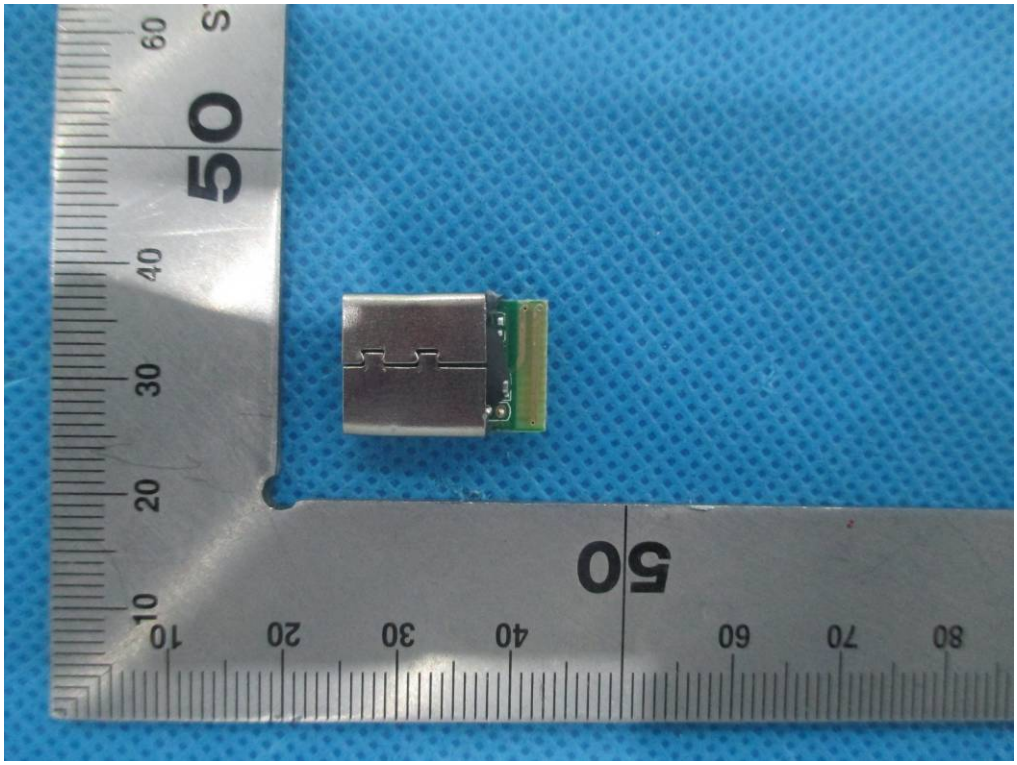
LEFT VIEW OF EUT



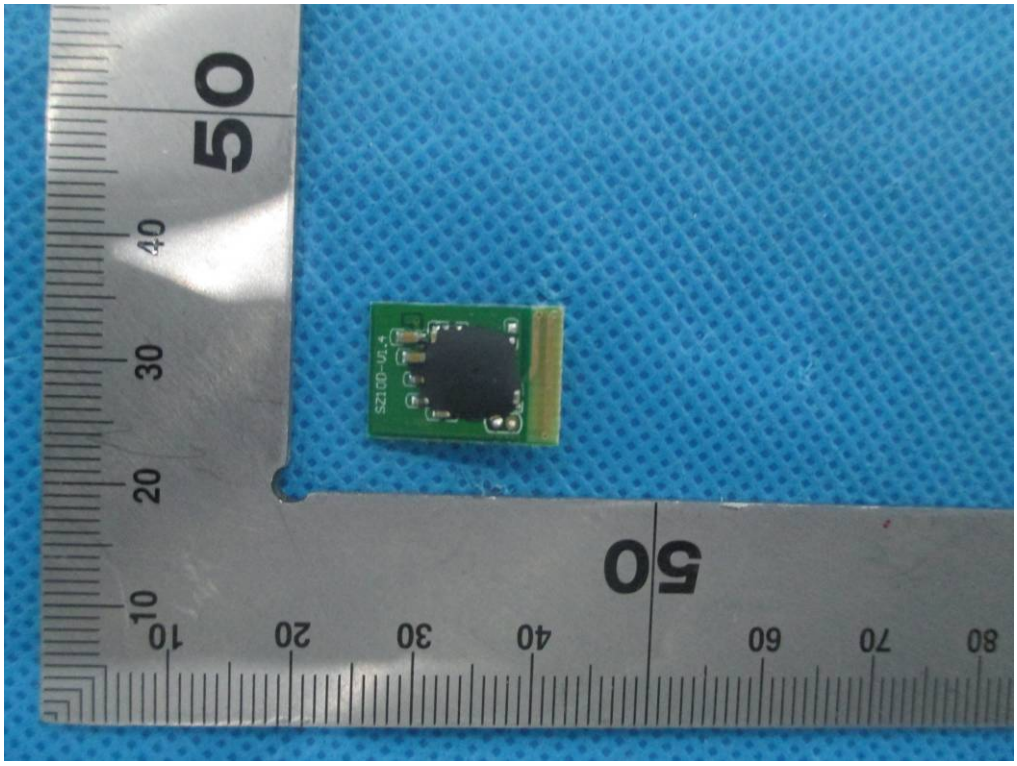
RIGHT VIEW OF EUT



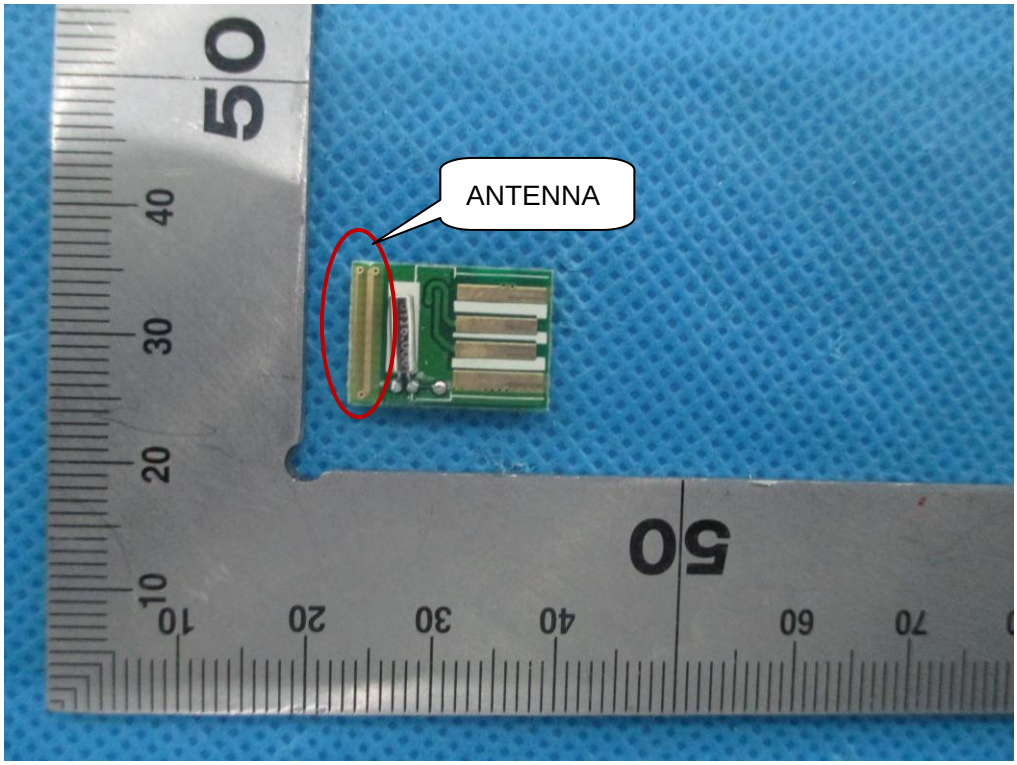
INTERNAL VIEW OF EUT-1



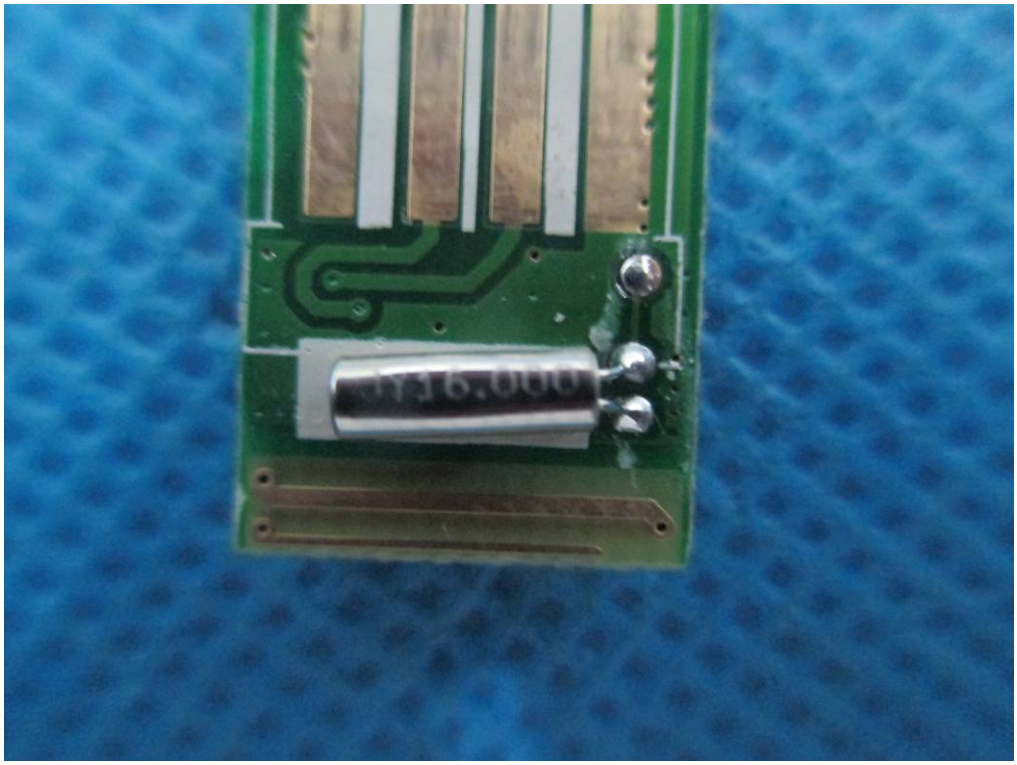
INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



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