FCC Test Report

Report No.: AGC01680160404FE03

FCC ID	:	2AC9LHW087A
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	HW087-2.4G Receiver
BRAND NAME	:	N/A
MODEL NAME	:	HW087
CLIENT	:	Shenzhen Hastech Industries Co., Ltd.
DATE OF ISSUE	:	May 23, 2016
STANDARD(S) **TEST PROCEDURE(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	/	May 23, 2016	Valid	Original Report

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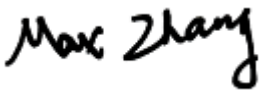
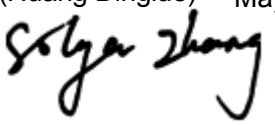
1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Hastech Industries Co., Ltd.
Address	3rd, 4th floor G-A1 Bldg &1st, 2nd floor G-A2 Bldg Democracy West Industry Park, Shajing Town, Bao'an District, Shenzhen, China
Manufacturer	Shenzhen Hastech Industries Co., Ltd.
Address	3rd, 4th floor G-A1 Bldg &1st, 2nd floor G-A2 Bldg Democracy West Industry Park, Shajing Town, Bao'an District, Shenzhen, China
Product Designation	HW087-2.4G Receiver
Brand Name	N/A
Test Model	HW087
Date of test	Apr.19, 2016 to Apr. 21, 2016
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:
The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Tested by 
Max Zhang(Zhang Yi) May 23, 2016

Reviewed by 
Rock Huang(Huang Dinglue) May 23, 2016

Approved by 
Solger Zhang(Zhang Hongyi) May 23, 2016
Authorized Officer

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.403 GHz to 2.474GHz
Maximum field strength	84.27dBuV/m@3m(AV)
Modulation	GFSK
Number of channels	72
Antenna Gain	0dBi
Antenna Designation	PCB Antenna (Met 15.203 Antenna requirement)
Hardware Version	6Z-RX-1602 V1.1 H06
Software Version	N/A
Power Supply	DC 5V by USB port

2.2. TABLE OF CARRIER FREQUENCY

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	25	2427	49	2451
2	2404	26	2428	50	2452
3	2405	27	2429	51	2453
4	2406	28	2430	52	2454
5	2407	29	2431	53	2455
6	2408	30	2432	54	2456
7	2409	31	2433	55	2457
8	2410	32	2434	56	2458
9	2411	33	2435	57	2459
10	2412	34	2436	58	2460
11	2413	35	2437	59	2461
12	2414	36	2438	60	2462
13	2415	37	2439	61	2463
14	2416	38	2440	62	2464
15	2417	39	2441	63	2465
16	2418	40	2442	64	2466
17	2419	41	2443	65	2467
18	2420	42	2444	66	2468
19	2421	43	2445	67	2469
20	2422	44	2446	68	2470
21	2423	45	2447	69	2471
22	2424	46	2448	70	2472
23	2425	47	2449	71	2473
24	2426	48	2450	72	2474

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±3.18dB
2	All emissions,radiated	±3.91dB
3	Temperature	±0.5°C
4	Humidity	±2%

4. DESCRIPTION OF TEST MODES

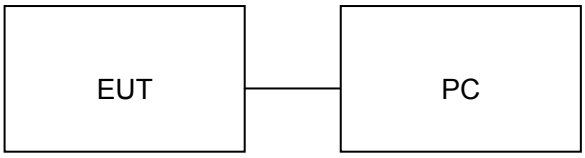
NO.	TEST MODE DESCRIPTION
1	Low channel TX in GFSK modulation
2	Middle channel TX in GFSK modulation
3	High channel TX in GFSK modulation
4	TX OFF

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure :



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	HW087-2.4G Receiver	HW087	FCC ID:2AC9LHW087A	EUT
2	PC	SONY	E1412AYCW	Support
3	PC adapter	SONY	A13-040A3A	Support

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D, Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China.
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.10:2013.

ALL TEST EQUIPMENT LIST

Radiated Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016
Spectrum analyzer	Agilent	E4407B	MY46185649	June 6, 2015	June 5, 2016
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 6, 2015	June 5, 2016
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016

Conducted Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 6,2015	June 5,2016

7. RADIATED EMISSION

7.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark： (1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. 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.
8. 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.
9. 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.
10. 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.

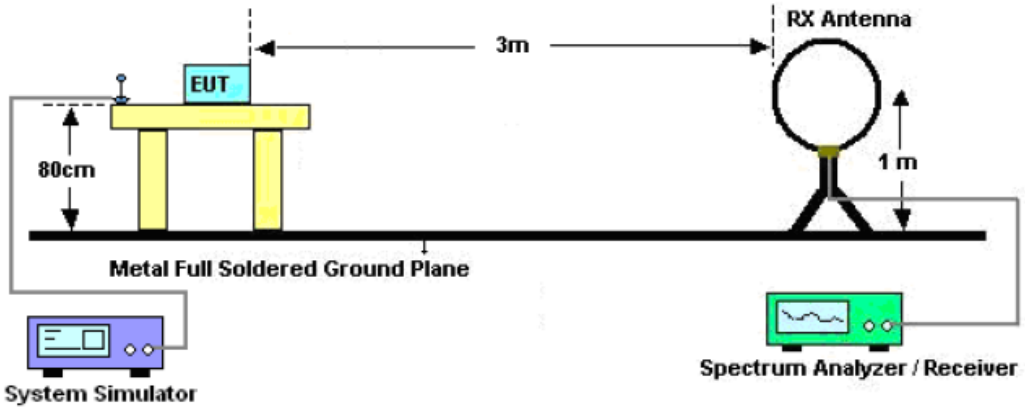
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

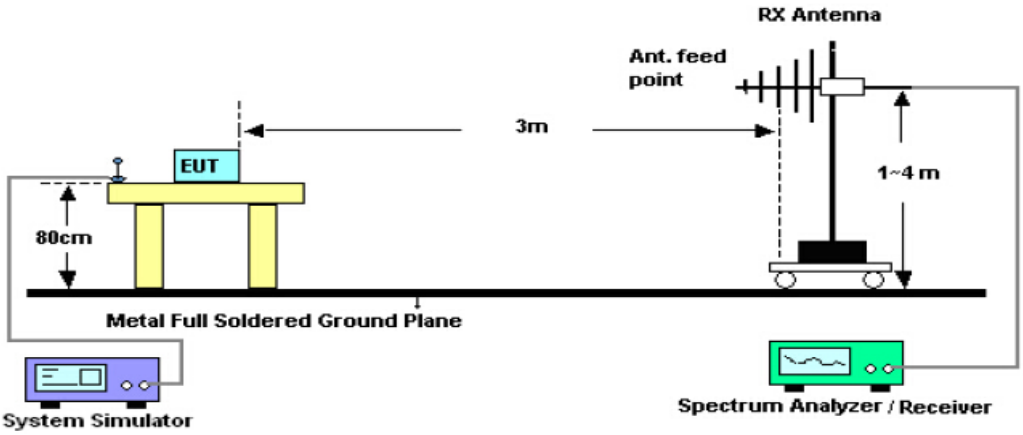
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

7.3. TEST SETUP

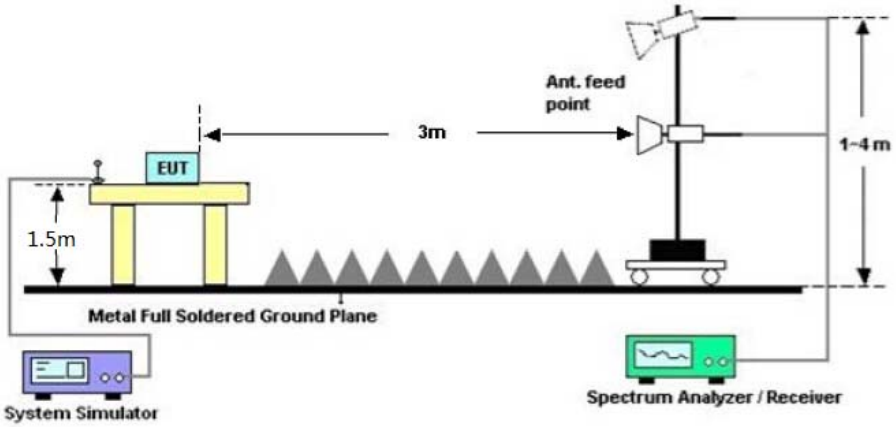
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



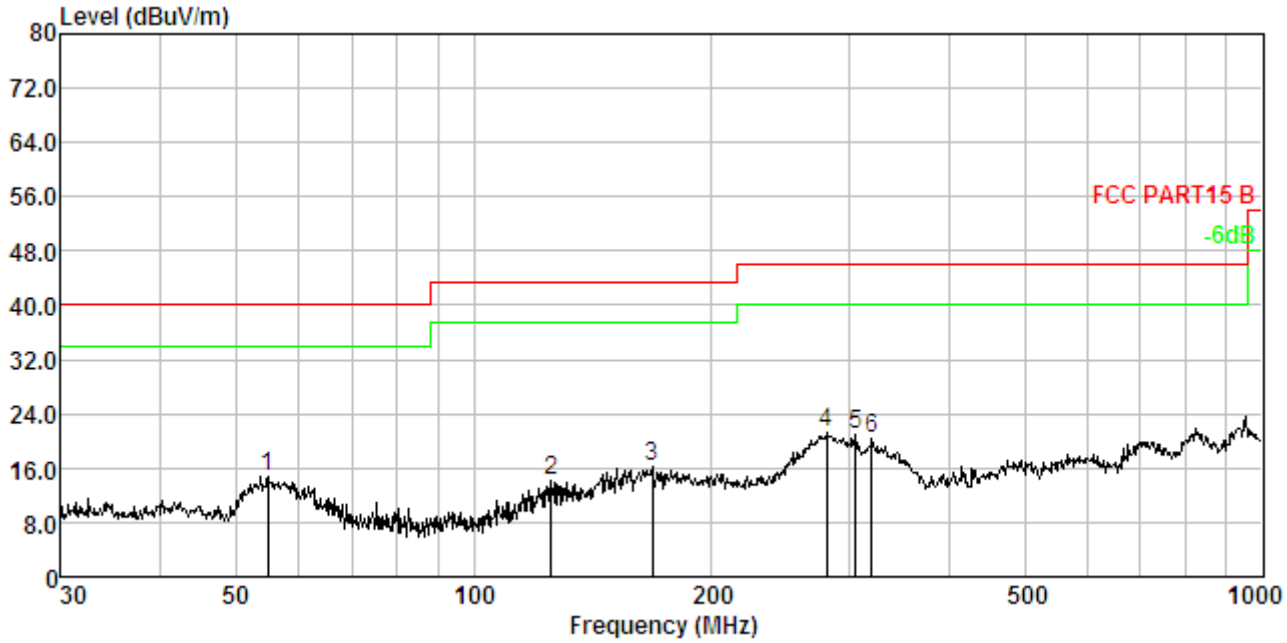
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION 30MHz- 1GHZ

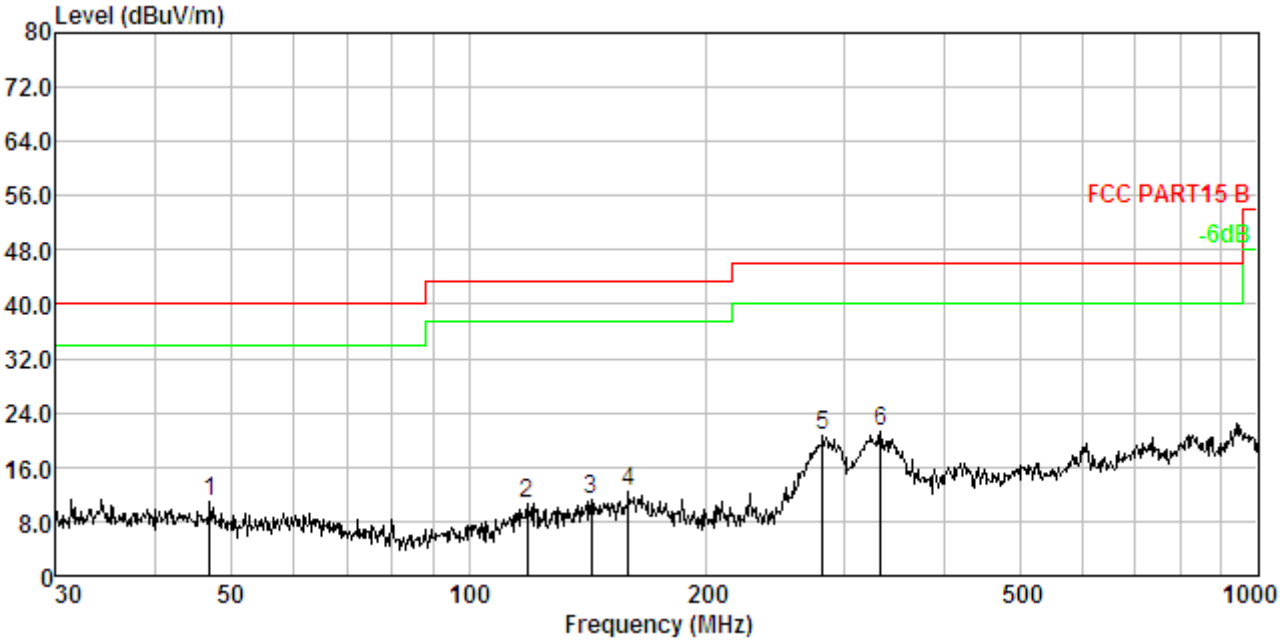
EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	54.835	1.60	11.91	31.36	30.18	14.69	40.00	-25.31	Peak
2.	125.446	2.35	12.36	29.89	30.47	14.13	43.50	-29.37	Peak
3.	168.414	2.62	13.42	30.66	30.57	16.13	43.50	-27.37	Peak
4.	280.024	3.08	12.81	36.25	30.75	21.39	46.00	-24.61	Peak
5.	304.610	3.15	13.30	35.42	30.78	21.09	46.00	-24.91	Peak
6.	319.937	3.20	13.65	34.43	30.79	20.49	46.00	-25.51	Peak

RESULT: PASS

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	46.995	1.46	12.85	26.81	30.13	10.99	40.00	-29.01	Peak
2.	118.601	2.30	11.90	26.91	30.45	10.66	43.50	-32.84	Peak
3.	142.824	2.47	13.52	25.74	30.51	11.22	43.50	-32.28	Peak
4.	159.225	2.57	13.88	26.41	30.55	12.31	43.50	-31.19	Peak
5.	281.008	3.08	12.83	35.37	30.75	20.53	46.00	-25.47	Peak
6.	332.519	3.23	13.93	34.82	30.81	21.17	46.00	-24.83	Peak

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

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

The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

RADIATED EMISSION ABOVE 1GHZ

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2403.013	96.58	-9.37	87.21	114	-26.79	peak
2403.013	92.46	-9.37	83.09	94	-10.91	AVG
4806.026	54.65	3.74	58.39	74	-15.61	peak
4806.026	47.15	3.74	50.89	54	-3.11	AVG
7209.039	41.38	8.14	49.52	74	-24.48	peak
7209.039	34.69	8.14	42.83	54	-11.17	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2403.013	93.58	-9.37	84.21	114	-29.79	peak
2403.013	88.43	-9.37	79.06	94	-14.94	AVG
4806.026	53.26	3.74	57	74	-17	peak
4806.026	46.03	3.74	49.77	54	-4.23	AVG
7209.039	42.56	8.14	50.7	74	-23.3	peak
7209.039	35.16	8.14	43.3	54	-10.7	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 2	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2442.016	97.54	-9.63	87.91	114	-26.09	peak
2442.016	91.68	-9.63	82.05	94	-11.95	AVG
4884.032	49.86	3.76	53.62	74	-20.38	peak
4884.032	42.34	3.76	46.1	54	-7.9	AVG
7326.048	41.58	8.17	49.75	74	-24.25	peak
7326.048	33.79	8.17	41.96	54	-12.04	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 2	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2442.016	95.16	-9.63	85.53	114	-28.47	peak
2442.016	89.34	-9.63	79.71	94	-14.29	AVG
4884.032	47.88	3.76	51.64	74	-22.36	peak
4884.032	41.55	3.76	45.31	54	-8.69	AVG
7326.048	40.69	8.17	48.86	74	-25.14	peak
7326.048	32.11	8.17	40.28	54	-13.72	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2474.021	99.12	-9.61	89.51	114	-24.49	peak
2474.021	93.88	-9.61	84.27	94	-9.73	AVG
4948.042	53.81	3.83	57.64	74	-16.36	peak
4948.042	46.73	3.83	50.56	54	-3.44	AVG
7422.063	42.42	8.21	50.63	74	-23.37	peak
7422.063	36.55	8.21	44.76	54	-9.24	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2474.021	96.93	-9.61	87.32	114	-26.68	peak
2474.021	91.74	-9.61	82.13	94	-11.87	AVG
4948.042	52.63	3.83	56.46	74	-17.54	peak
4948.042	44.11	3.83	47.94	54	-6.06	AVG
7422.063	42.06	8.21	50.27	74	-23.73	peak
7422.063	36.19	8.21	44.4	54	-9.6	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: Other emissions from 8G to 25 GHz are considered as ambient noise. 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.
The spurious emission of mode 4 are considered as ambient noise. No recording in the test report.

8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

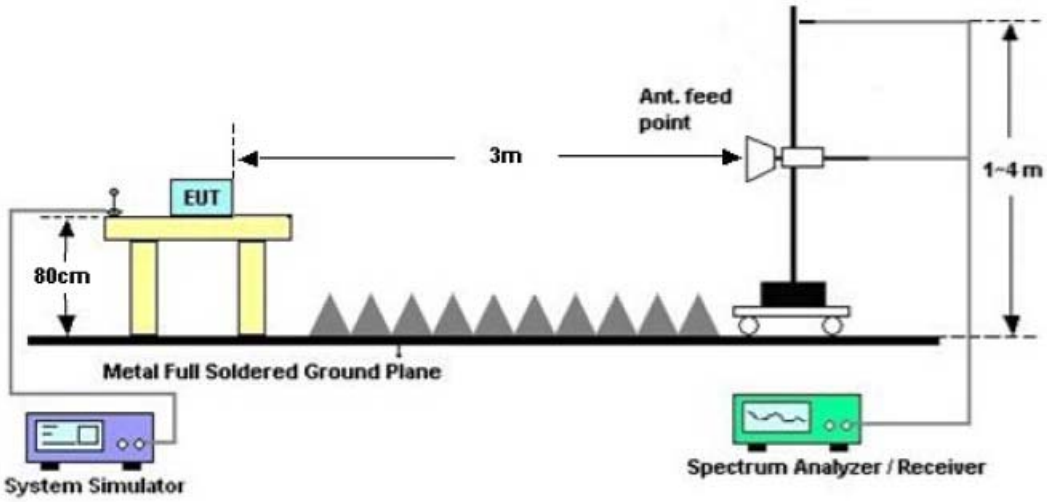
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

3. Other procedures refer to clause 7.2.

8.2 TEST SETUP

RADIATED EMISSION TEST SETUP



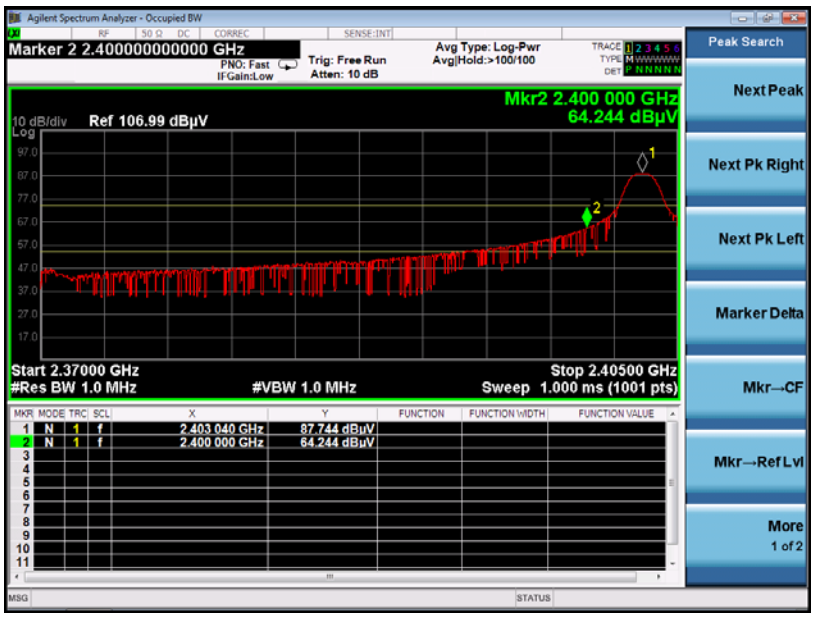
8.3 RADIATED TEST RESULT

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Horizontal

PK Value

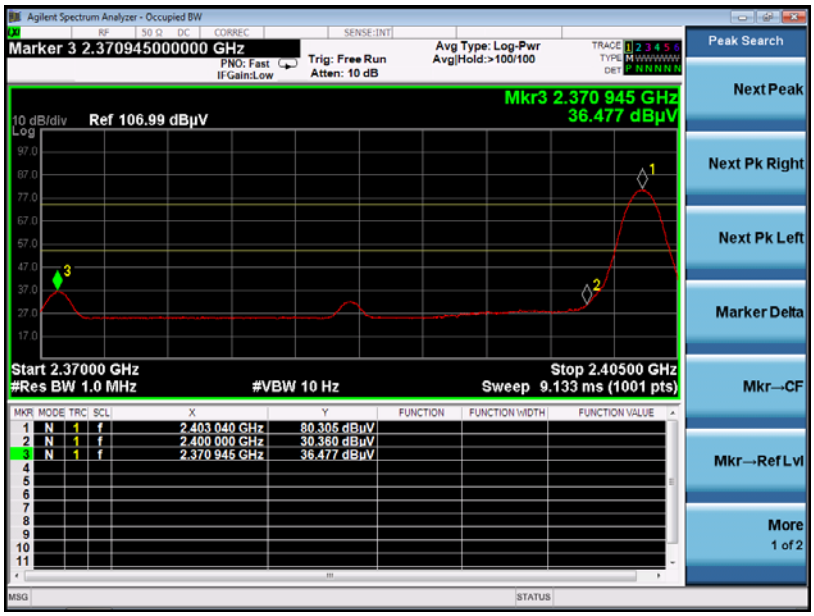


AV Value

EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Vertical

PK Value

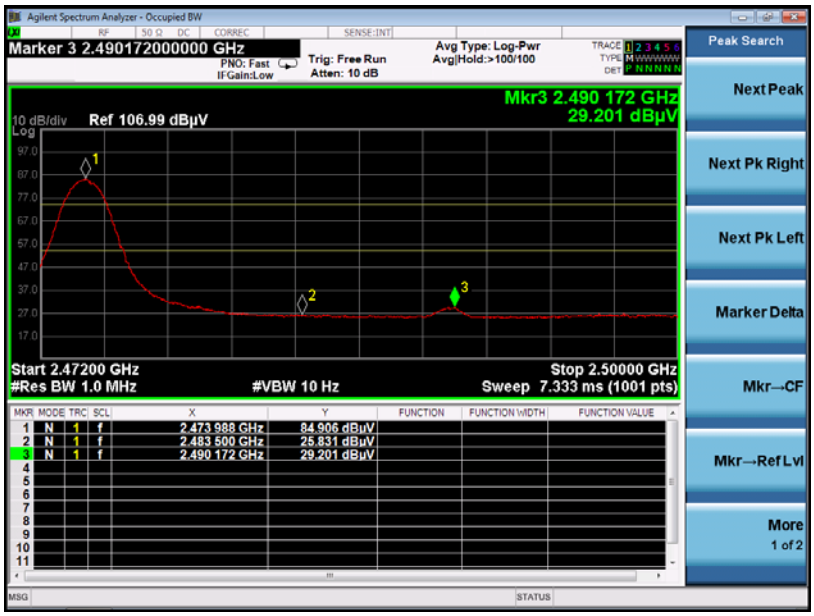
AV Value



EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization：	Horizontal

PK Value

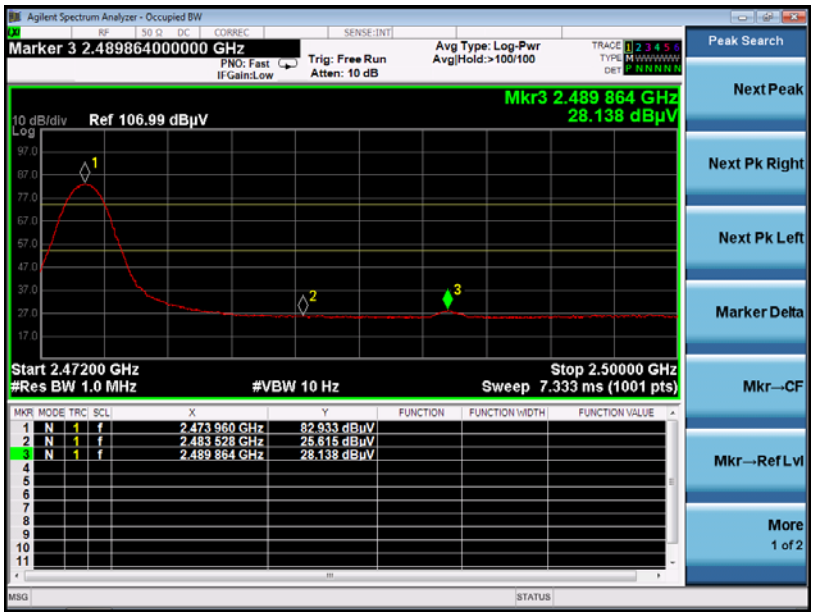
AV Value



EUT：	HW087-2.4G Receiver	Model Name. ：	HW087
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization：	Vertical

PK Value

AV Value



Note:

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

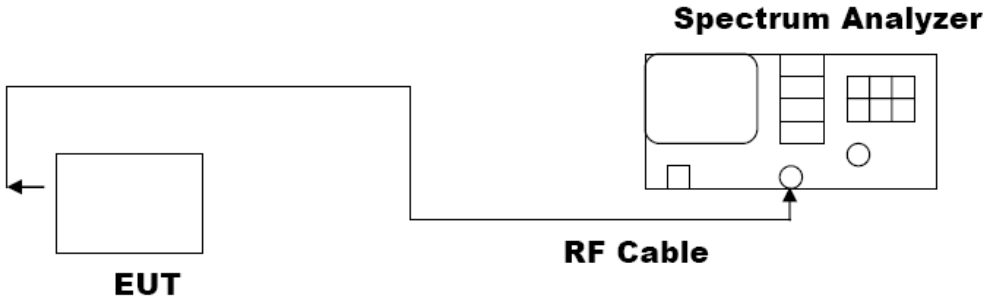
The “Factor” value can be calculated automatically by software of measurement system.

9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 1% of SPAN, VBW≥ 3×RBW.
4. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



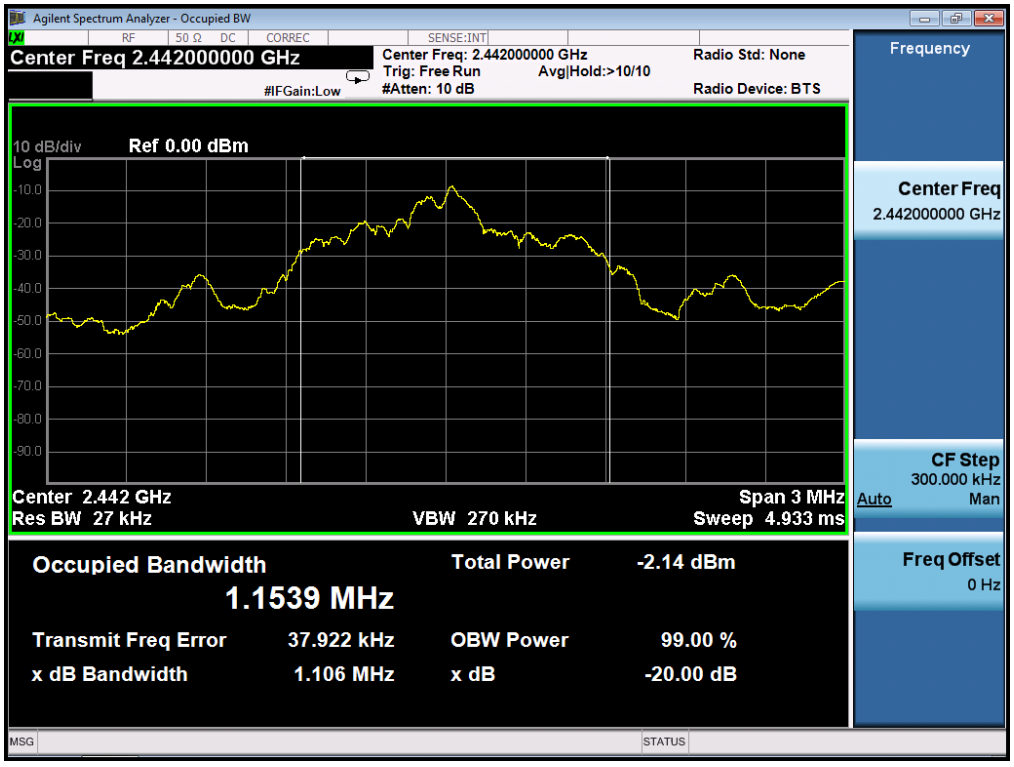
9.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODE	Mode1;Mode2;Mode3

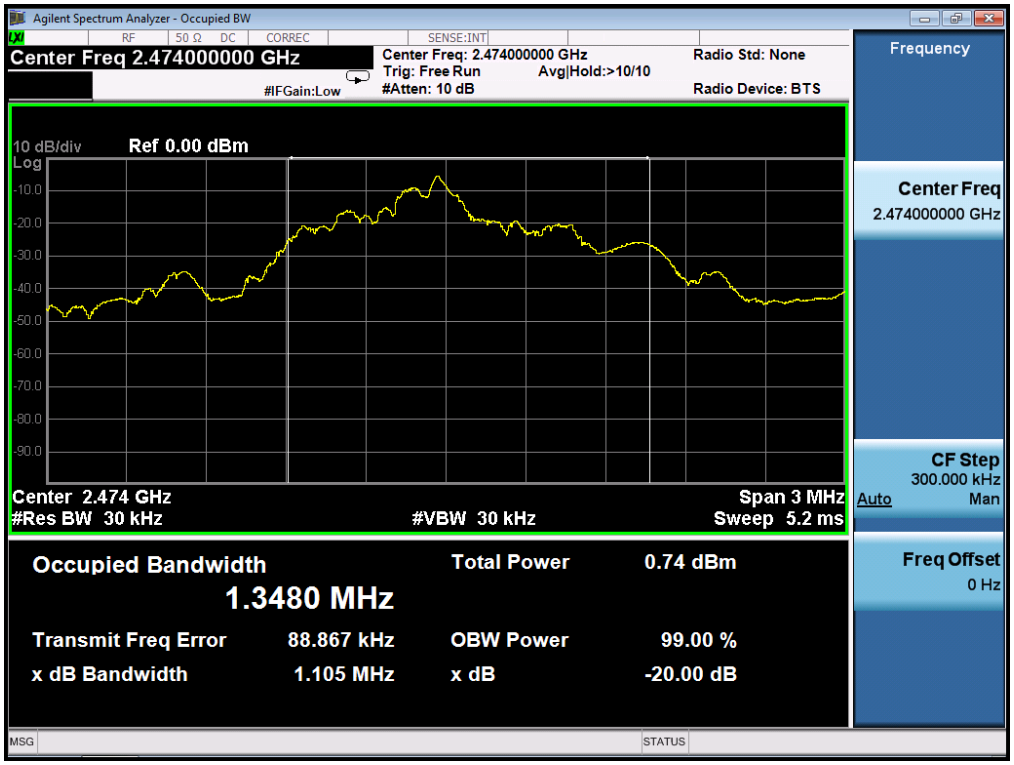
Test Data (MHz)		Criteria
Low Channel	1.097	PASS
Middle Channel	1.106	PASS
High Channel	1.105	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



10. FCC LINE CONDUCTED EMISSION TEST

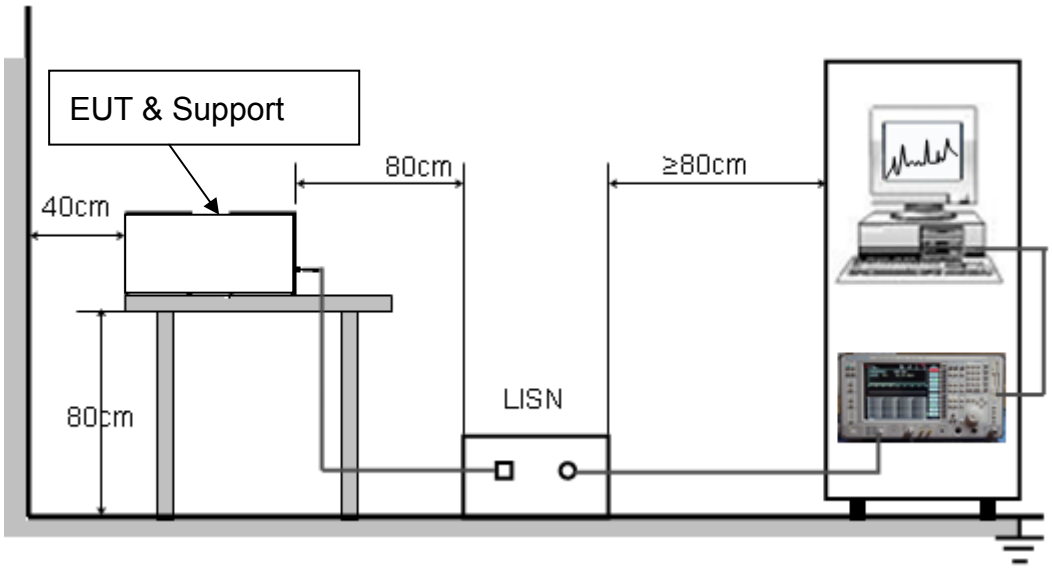
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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 0.50 MHz.

10.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



10.3. PRELIMINARY 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 C63.10 (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 C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received 120V/60Hzpower by a LISN..
6. The 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.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

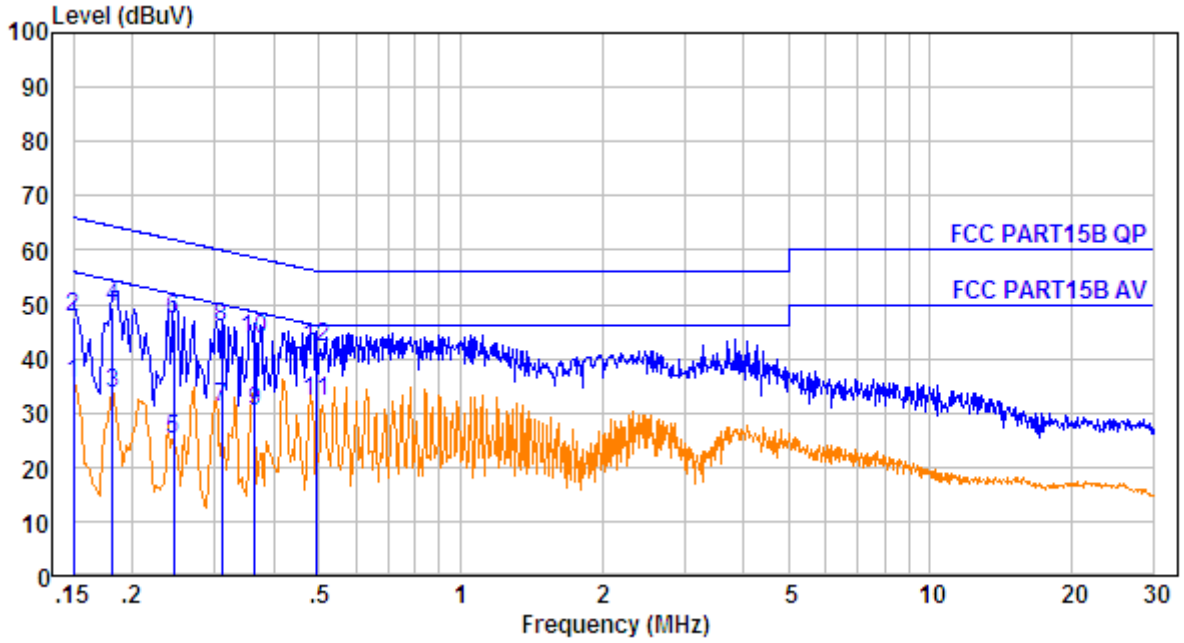
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. 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.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

10.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

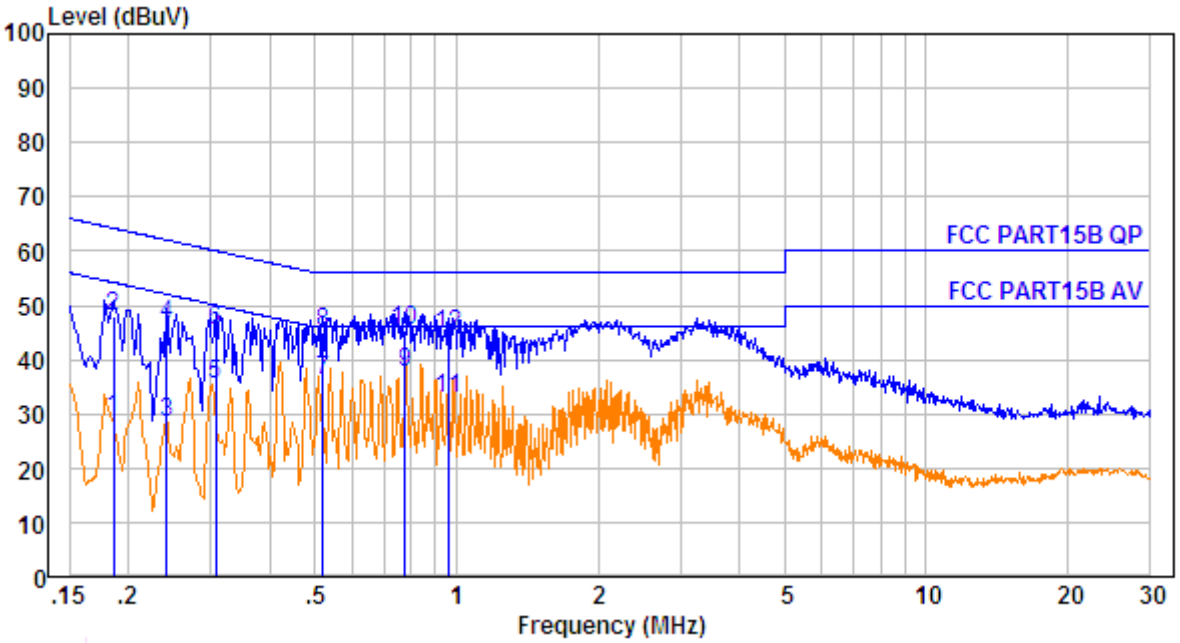
Line Conducted Emission Test Line 1-L



No.	Freq MHz	Cable Loss dB	MAG-ANT Factor dB	Receiver Reading dBuA	Emission Level dBuA	Limit dBuA	Over Limit dB	Remark
1.	0.150	10.60	0.60	24.30	35.50	56.00	-20.50	Average
2.	0.150	10.60	0.60	36.30	47.50	66.00	-18.50	Peak
3.	0.182	10.61	0.60	22.28	33.49	54.42	-20.93	Average
4.	0.182	10.61	0.60	38.28	49.49	64.42	-14.93	Peak
5.	0.246	10.62	0.60	13.99	25.21	51.91	-26.70	Average
6.	0.246	10.62	0.60	35.99	47.21	61.91	-14.70	Peak
7.	0.310	10.63	0.60	19.65	30.88	49.97	-19.09	Average
8.	0.310	10.63	0.60	34.65	45.88	59.97	-14.09	Peak
9.	0.365	10.63	0.60	19.19	30.42	48.61	-18.19	Average
10.	0.365	10.63	0.60	32.19	43.42	58.61	-15.19	Peak
11.	0.494	10.64	0.60	20.74	31.98	46.10	-14.12	Average
12.	0.494	10.64	0.60	30.74	41.98	56.10	-14.12	Peak

RESULT: PASS

Line Conducted Emission Test Line 2-N

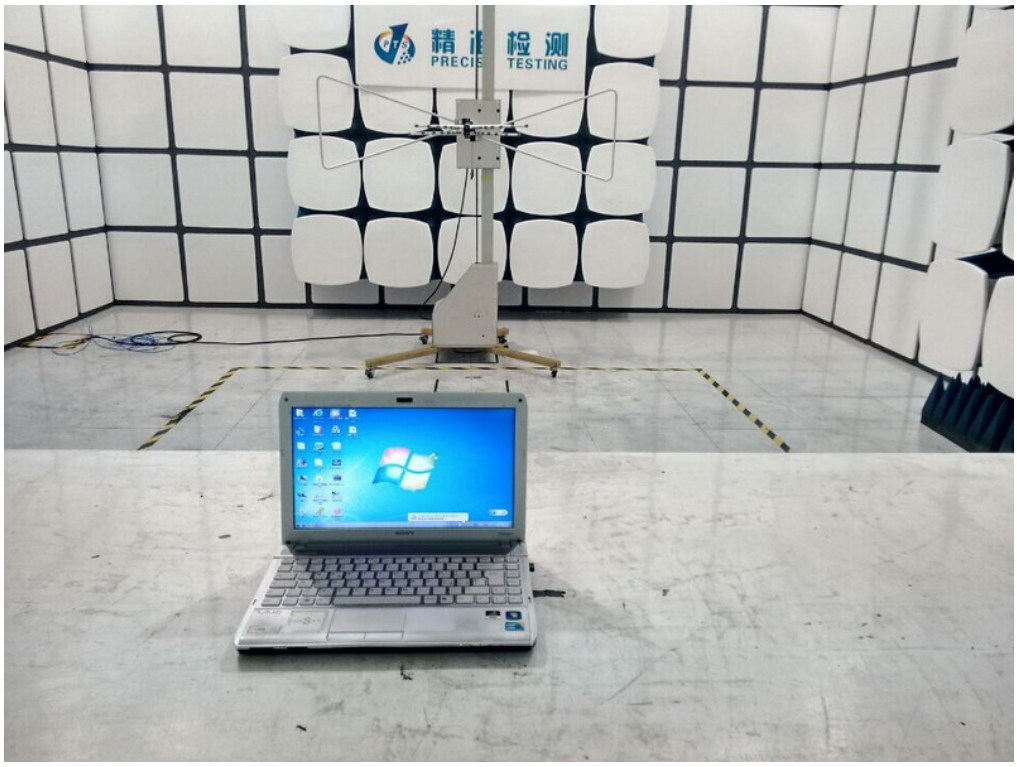


No.	Freq MHz	Cable Loss dB	MAG-ANT Factor dB	Receiver Reading dBuA	Emission Level dBuA	Limit dBuA	Over Limit dB	Remark
1.	0.186	10.61	0.60	17.83	29.04	54.20	-25.16	Average
2.	0.186	10.61	0.60	36.83	48.04	64.20	-16.16	Peak
3.	0.242	10.62	0.60	17.26	28.48	52.04	-23.56	Average
4.	0.242	10.62	0.60	35.26	46.48	62.04	-15.56	Peak
5.	0.307	10.63	0.60	24.02	35.25	50.06	-14.81	Average
6.	0.307	10.63	0.60	34.02	45.25	60.06	-14.81	Peak
7.	0.518	10.65	0.60	24.87	36.12	46.00	-9.88	Average
8.	0.518	10.65	0.60	33.87	45.12	56.00	-10.88	Peak
9.	0.775	10.66	0.60	26.30	37.56	46.00	-8.44	Average
10.	0.775	10.66	0.60	34.30	45.56	56.00	-10.44	Peak
11.	0.958	10.67	0.60	21.42	32.69	46.00	-13.31	Average
12.	0.958	10.67	0.60	33.42	44.69	56.00	-11.31	Peak

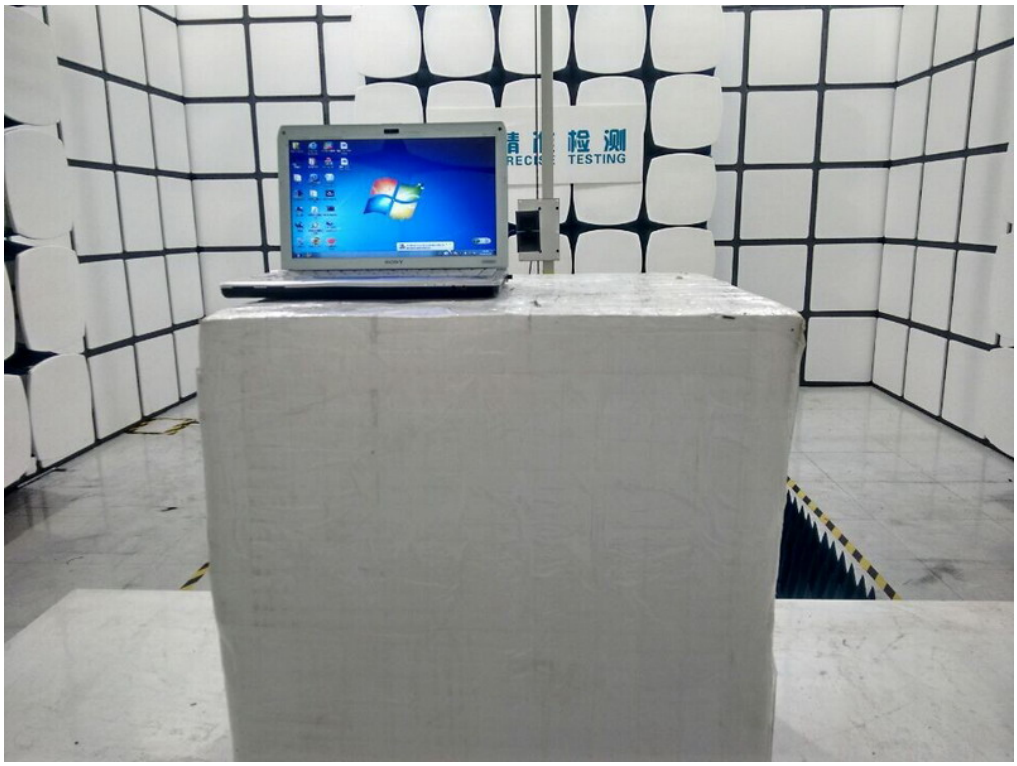
RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHz



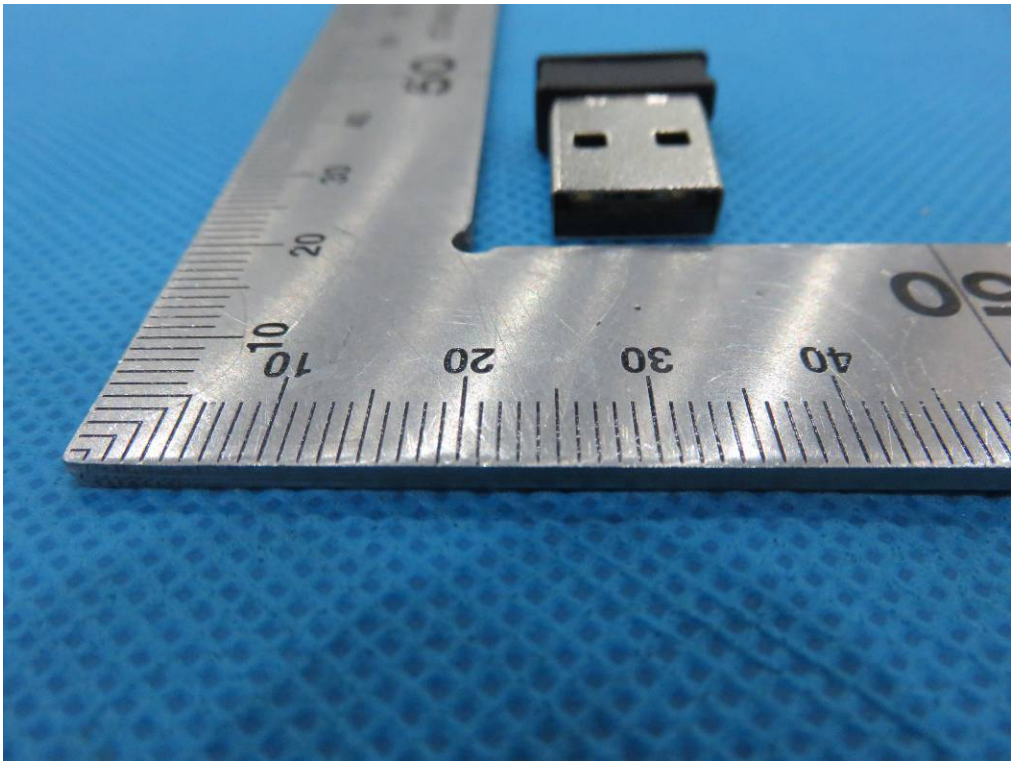
RADIATED EMISSION TEST SETUP ABOVE 1GHz



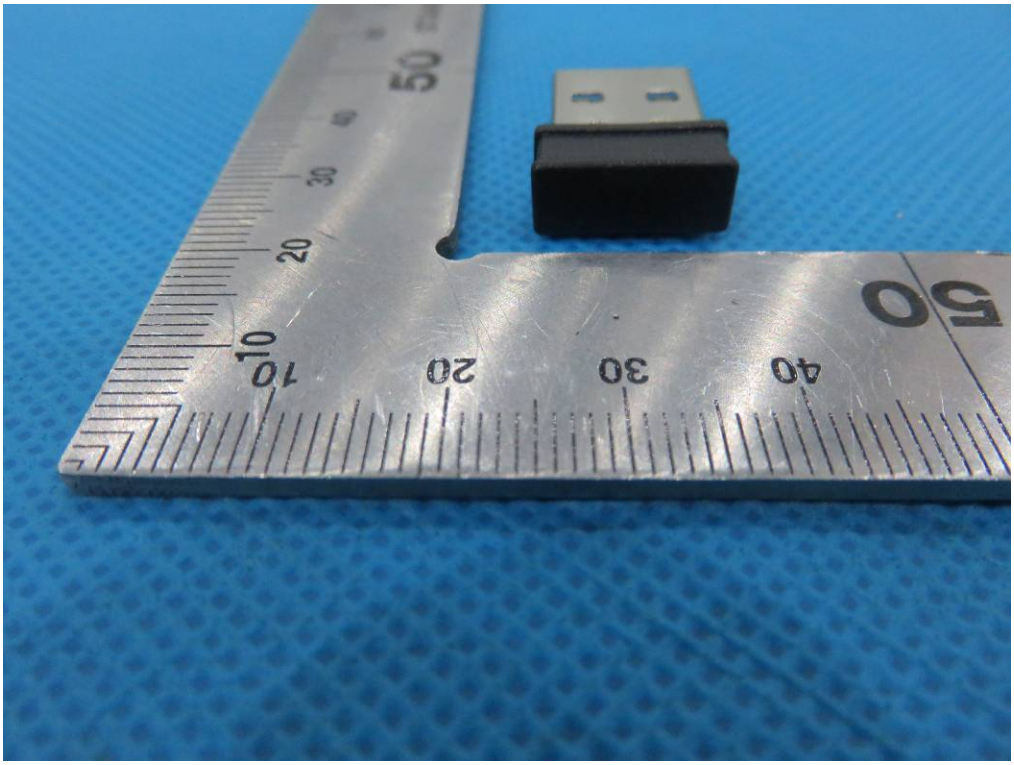
CONDUCTED EMISSION TEST SETUP

APPENDIX B: PHOTOGRAPHS OF EUT

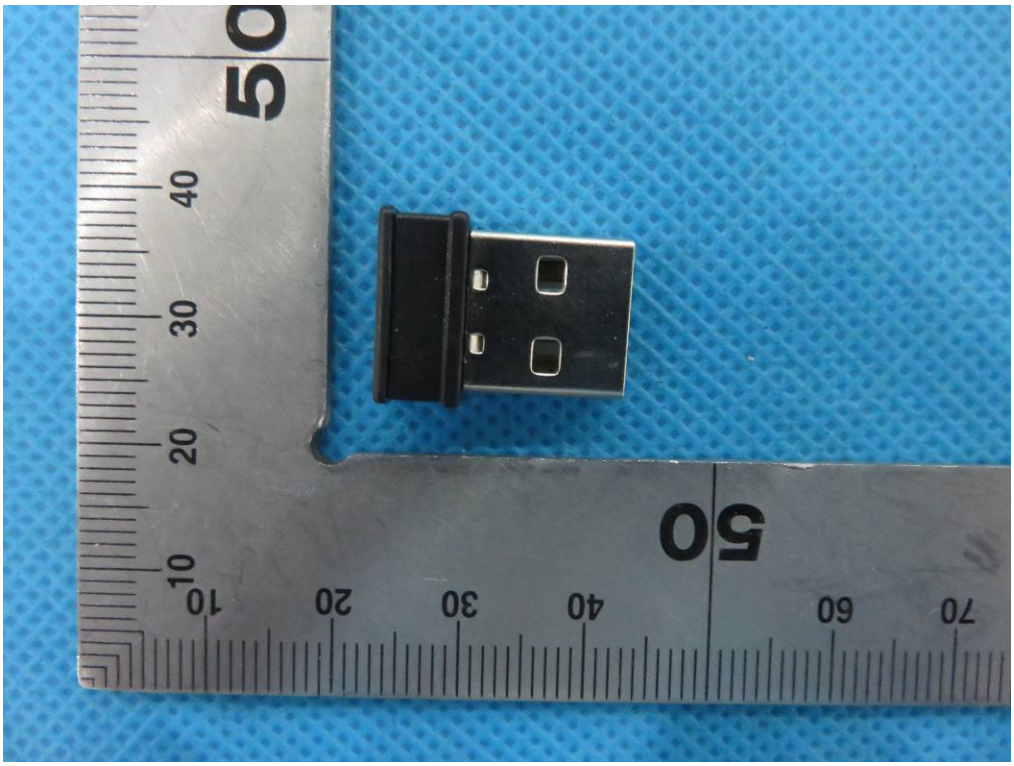
TOP VIEW OF EUT



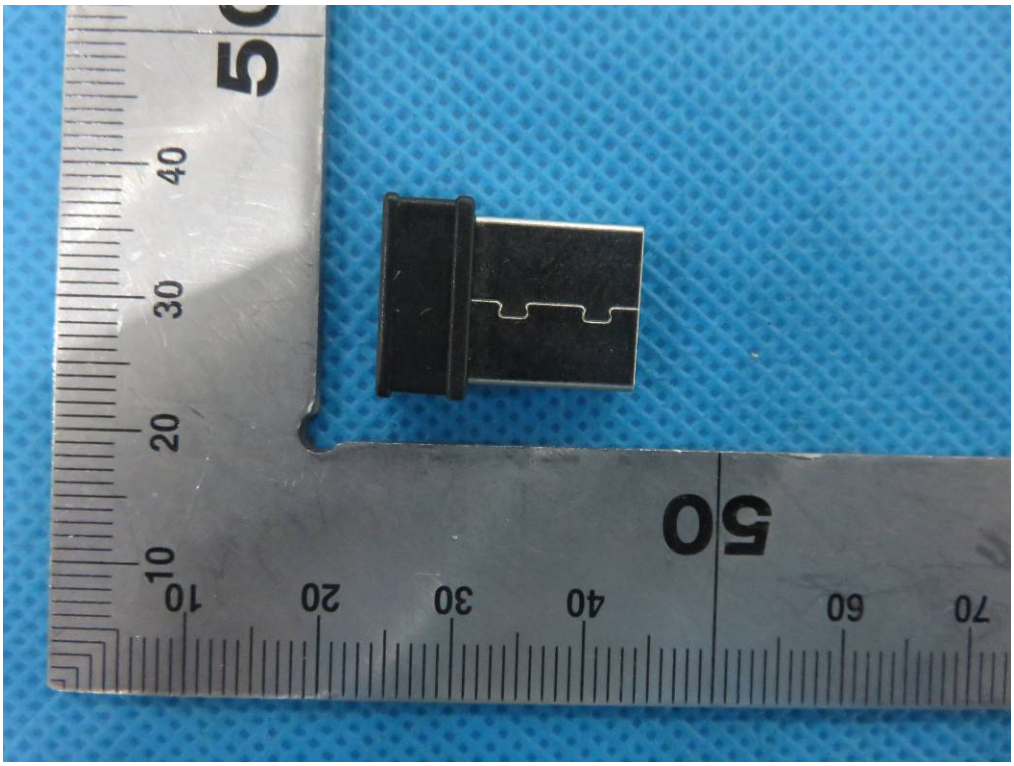
BOTTOM VIEW OF EUT



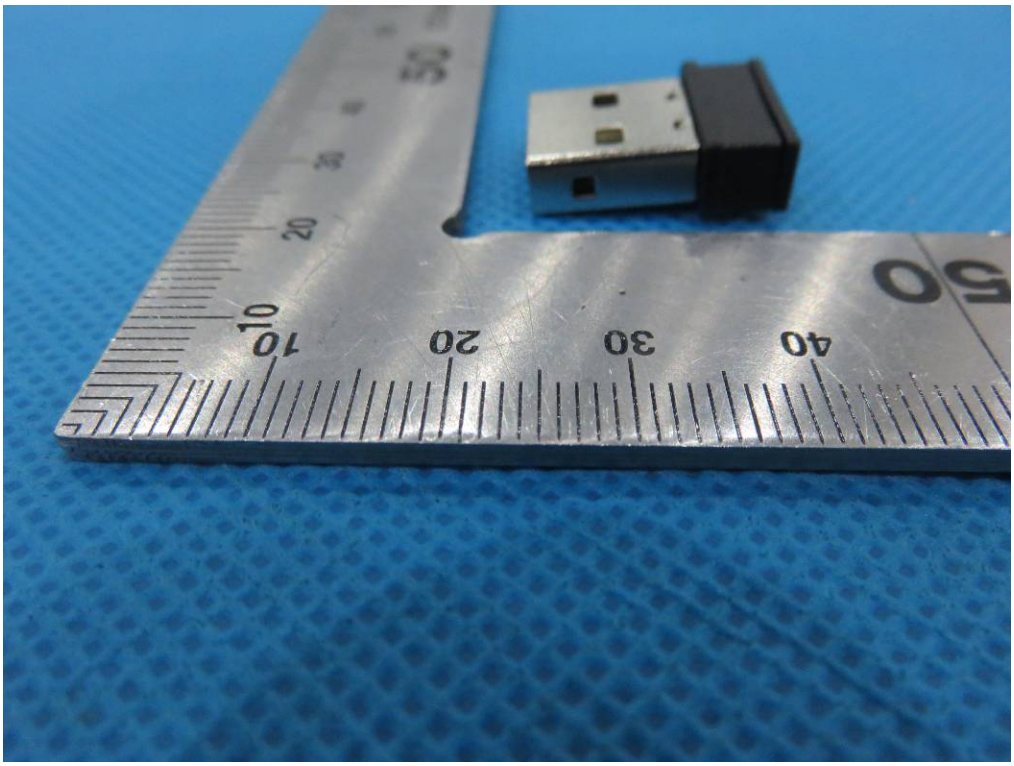
FRONT VIEW OF EUT



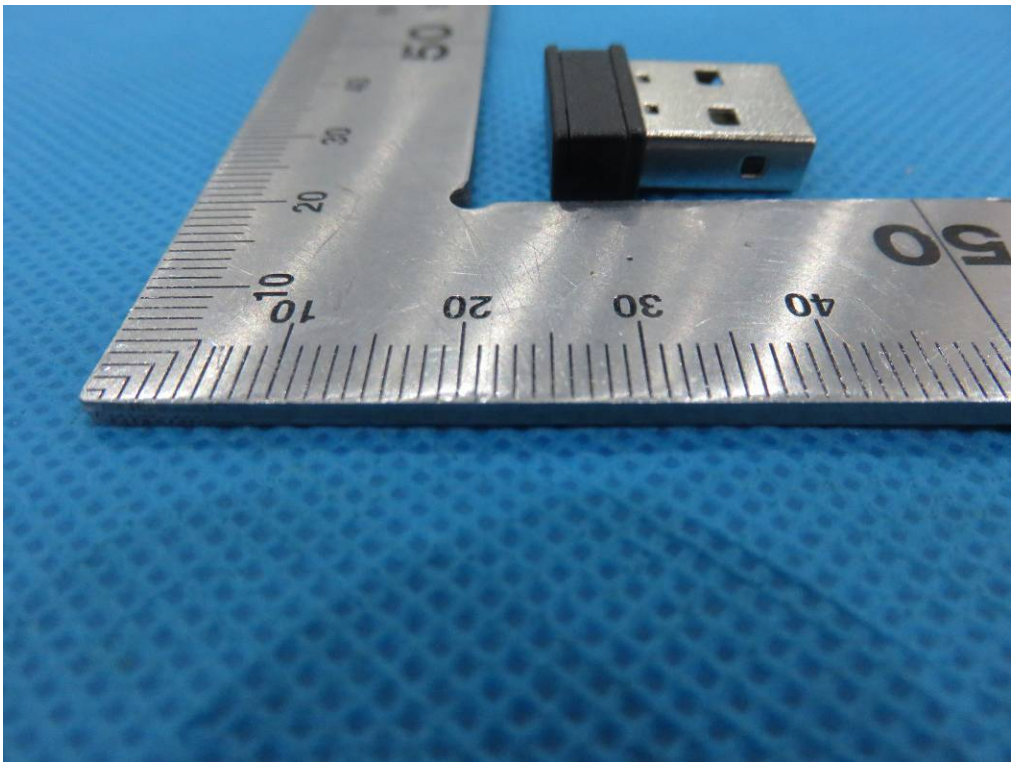
BACK VIEW OF EUT



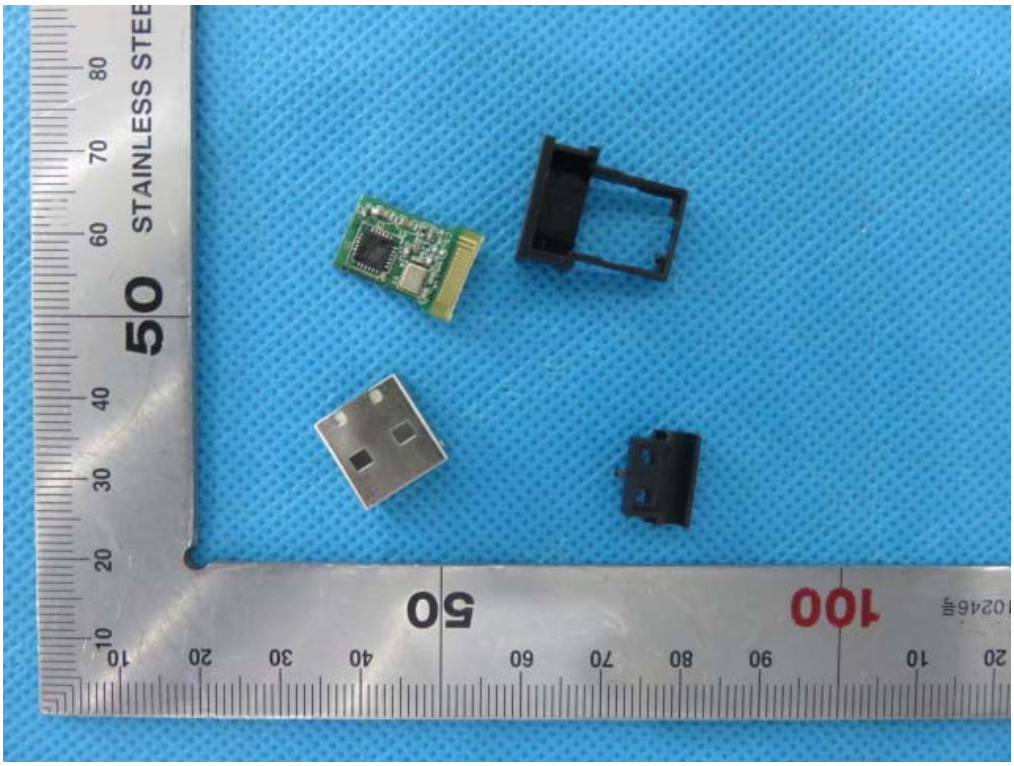
LEFT VIEW OF EUT



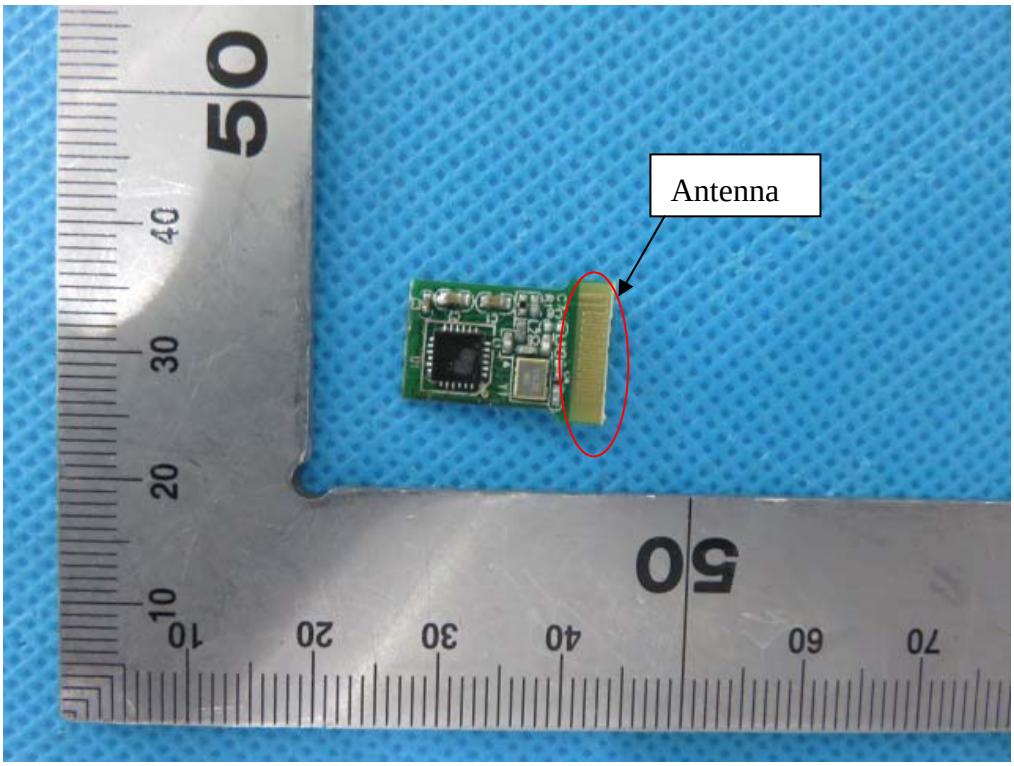
RIGHT VIEW OF EUT



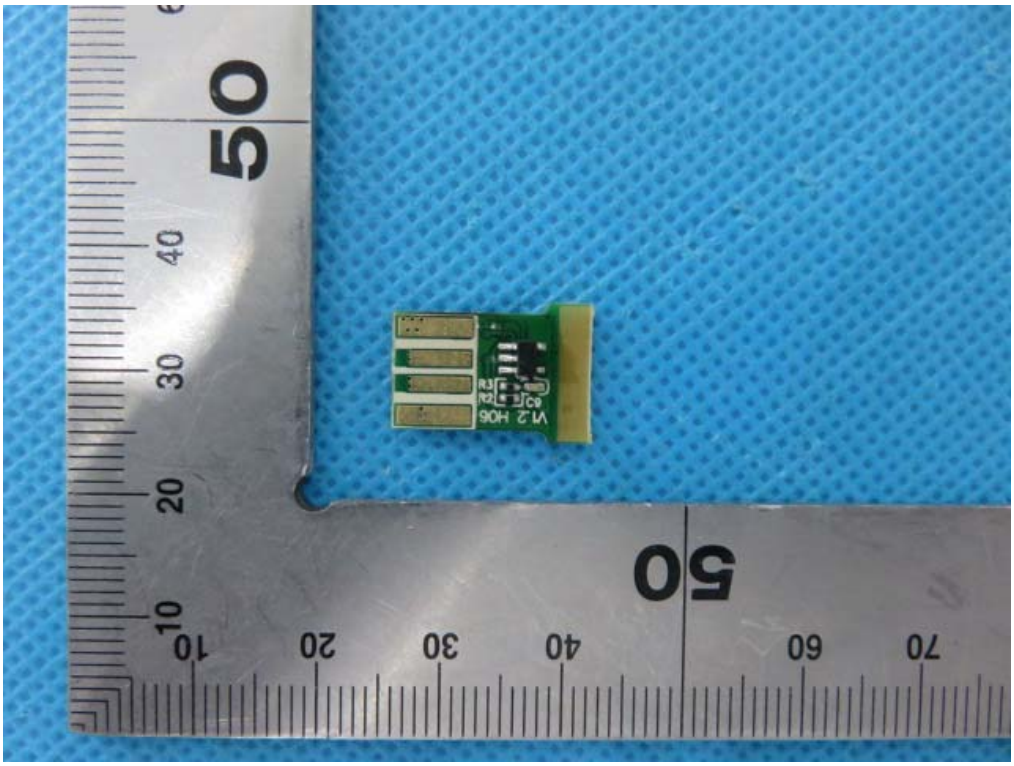
OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



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