FCC Test Report

Report No.: AGC01680170102FE05

FCC ID	:	2AKHJ-HW087-1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	2.4G Receiver
BRAND NAME	:	N/A
MODEL NAME	:	HW087-1
CLIENT	:	Shenzhen Hangshi Technology Co., Ltd.
DATE OF ISSUE	:	Mar. 10, 2017
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	/	Mar. 10, 2017	Valid	Original Report

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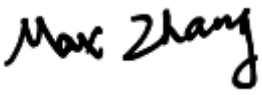
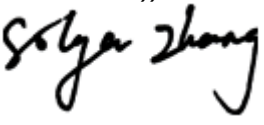
1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Hastech Industries Co., Ltd.
Address	Hangshi Technology Park, Democracy West Industry Area, Shajing Town, Bao'an Distric, Shenzhen, China
Manufacturer	Shenzhen Hastech Industries Co., Ltd.
Address	Hangshi Technology Park, Democracy West Industry Area, Shajing Town, Bao'an Distric, Shenzhen, China
Product Designation	2.4G Receiver
Brand Name	N/A
Test Model	HW087-1
Date of test	Mar. 09, 2017 to Mar. 10, 2017
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) Mar. 10, 2017

Reviewed by 
Bart Xie(Xie Xiaobin)) Mar. 10, 2017

Approved by 
Solger Zhang(Zhang Hongyi) Mar. 10, 2017
Authorized Officer

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.404 GHz to 2.479GHz
Maximum field strength	80.46dBuV/m@3m(AV)
Modulation	GFSK
Number of channels	64
Antenna Gain	0dBi
Antenna Designation	Integrated Antenna (Met 15.203 Antenna requirement)
Hardware Version	HK-2.4G RX
Software Version	V1.0
Power Supply	DC 5V by USB port

2.2. TABLE OF CARRIER FREQUENCY

Channel Number	Frequency	Channel Number	Frequency	Channel Number	Frequency	Channel Number	Frequency
1	2404MHz	17	2423MHz	33	2442MHz	49	2461MHz
2	2405MHz	18	2424MHz	34	2443MHz	50	2462MHz
3	2406MHz	19	2425MHz	35	2444MHz	51	2466MHz
4	2407MHz	20	2426MHz	36	2445MHz	52	2467MHz
5	2408MHz	21	2427MHz	37	2446MHz	53	2468MHz
6	2409MHz	22	2428MHz	38	2450MHz	54	2469MHz
7	2410MHz	23	2429MHz	39	2451MHz	55	2470MHz
8	2411MHz	24	2430MHz	40	2452MHz	56	2471MHz
9	2412MHz	25	2434MHz	41	2453MHz	57	2472MHz
10	2413MHz	26	2435MHz	42	2454MHz	58	2473MHz
11	2414MHz	27	2436MHz	43	2455MHz	59	2474MHz
12	2418MHz	28	2437MHz	44	2456MHz	60	2475MHz
13	2419MHz	29	2438MHz	45	2457MHz	61	2476MHz
14	2420MHz	30	2439MHz	46	2458MHz	62	2477MHz
15	2421MHz	31	2440MHz	47	2459MHz	63	2478MHz
16	2422MHz	32	2441MHz	48	2460MHz	64	2479MHz

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

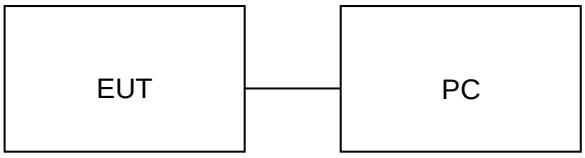
NO.	TEST MODE DESCRIPTION
1	Low channel TX in GFSK modulation
2	Middle channel TX in GFSK modulation
3	High channel TX in GFSK modulation

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.
3. The EUT had been programmed in continuous transmission conditions for the test modes.

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	2.4G Receiver	HW086-1	2AKHJ-HW087-1	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 C63.4:2014.

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 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 3, 2016	June 2, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 3, 2016	June 2, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 3, 2016	June 2, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 3, 2016	June 2, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 3, 2016	June 2, 2017

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Artificial Mains Network	Narda	L2-16B	000WX31025	July 3, 2016	July 2, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
Shielded Room	CHENGYU	843	PTS-002	June 3, 2016	June 2, 2017

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	
		μ V/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 dBμ V = 20 log Emission level μ V/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.

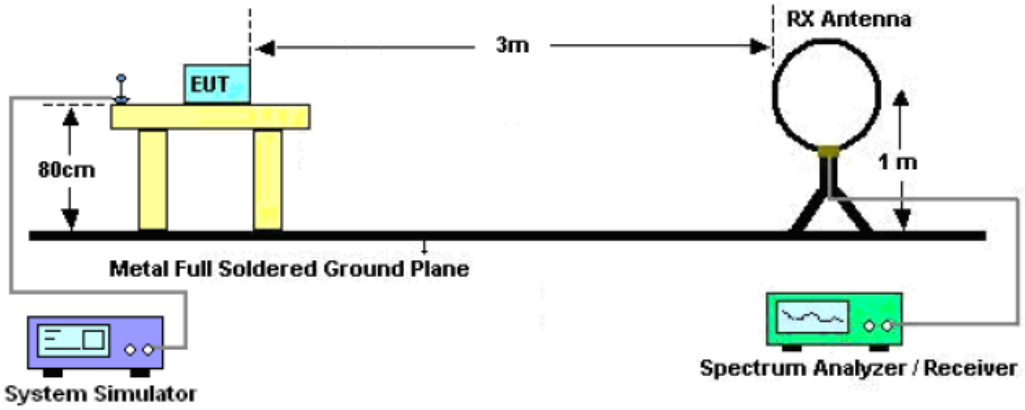
The following table is the setting of spectrum analyzer and receiver.

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

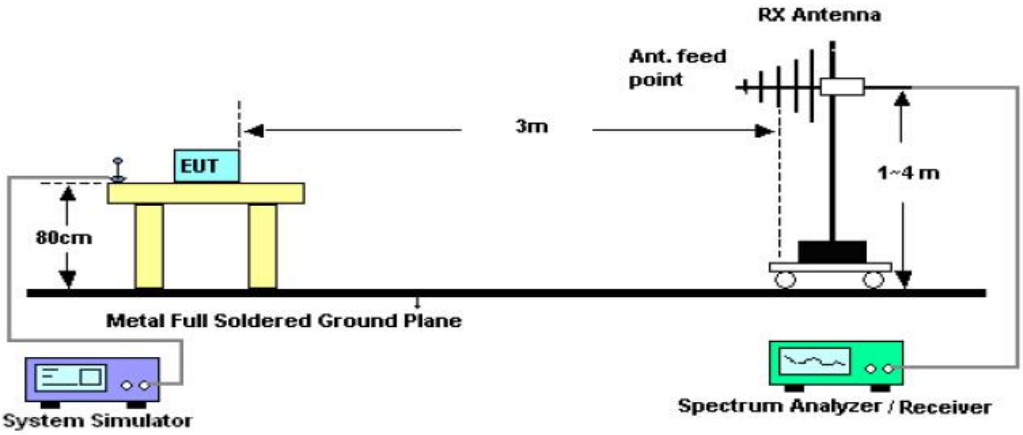
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

7.3. TEST SETUP

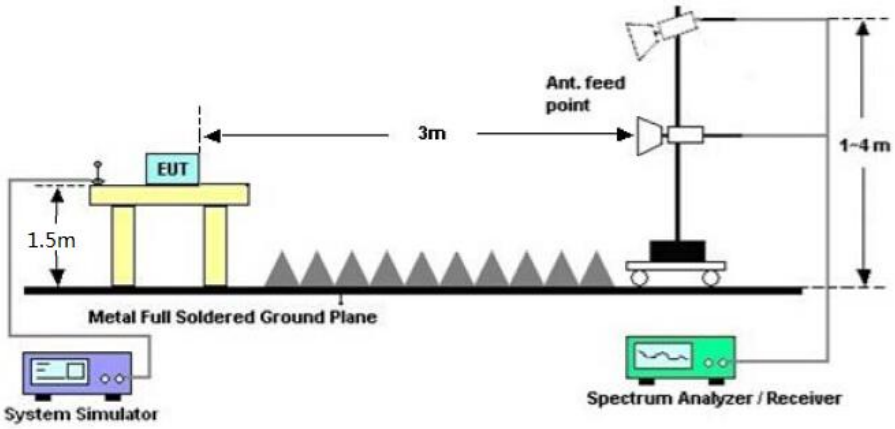
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



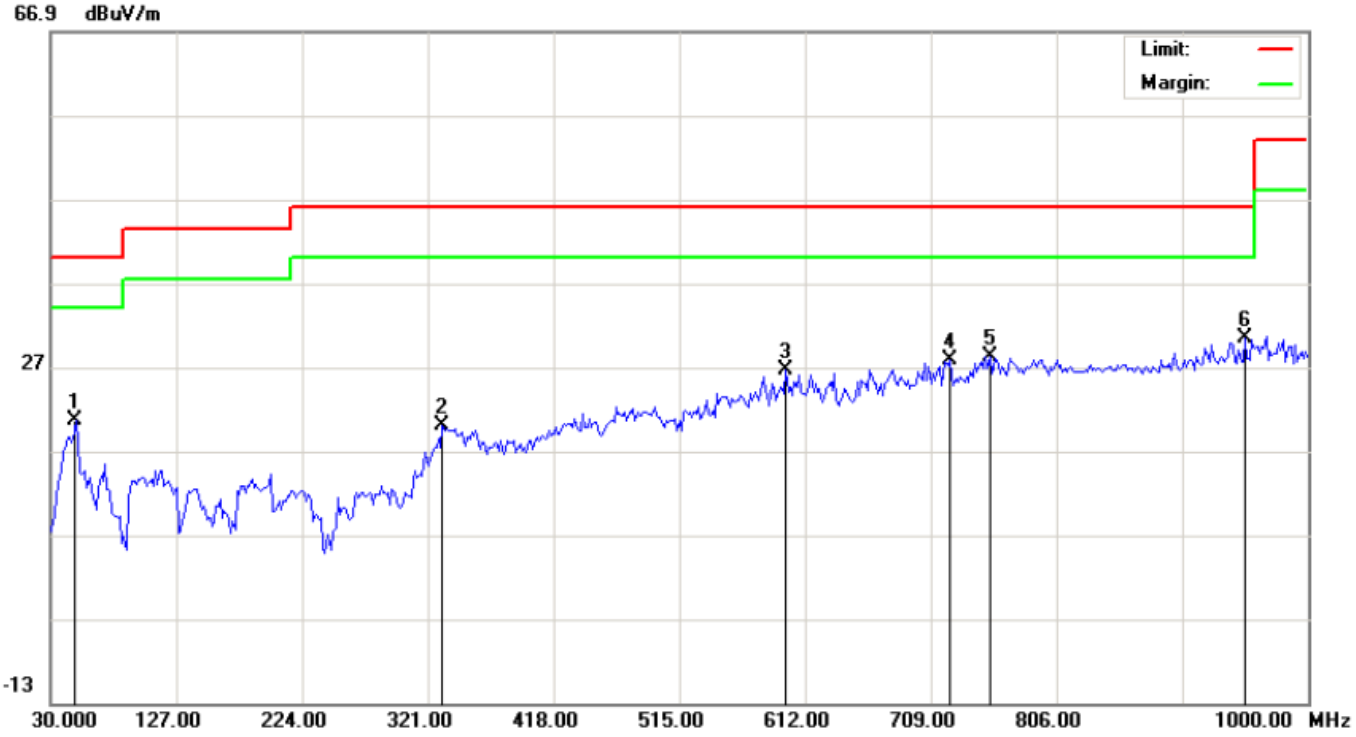
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION 30MHz- 1GHZ

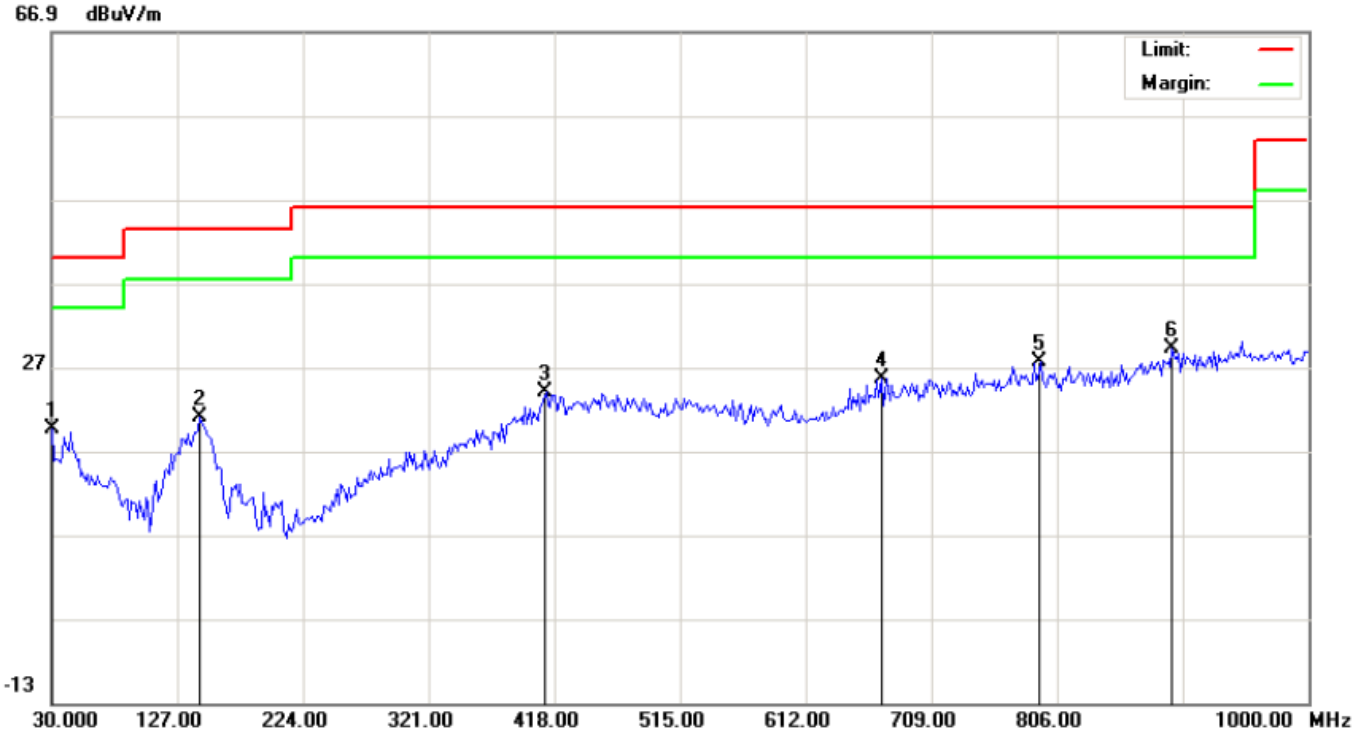
EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization :	Horizontal



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		49.3998	9.37	11.28	20.65	40.00	-19.35	peak			
2		332.3167	2.43	17.56	19.99	46.00	-26.01	peak			
3		597.4500	2.87	23.67	26.54	46.00	-19.46	peak			
4		723.5499	1.87	25.87	27.74	46.00	-18.26	peak			
5		754.2667	1.59	26.69	28.28	46.00	-17.72	peak			
6	*	951.5000	0.43	29.99	30.42	46.00	-15.58	peak			

RESULT: PASS

EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Vertical



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		30.0000	23.75	-4.20	19.55	40.00	-20.45	peak			
2		144.7831	5.85	15.23	21.08	43.50	-22.42	peak			
3		411.5332	4.53	19.42	23.95	46.00	-22.05	peak			
4		670.2000	1.30	24.39	25.69	46.00	-20.31	peak			
5		793.0666	0.38	27.22	27.60	46.00	-18.40	peak			
6	*	894.9166	0.64	28.48	29.12	46.00	-16.88	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：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2404.013	95.62	-9.37	86.25	114	-27.75	peak
2404.013	89.83	-9.37	80.46	94	-13.54	AVG
4808.026	45.16	3.74	48.9	74	-25.1	peak
4808.026	39.54	3.74	43.28	54	-10.72	AVG
7212.039	40.06	8.14	48.2	74	-25.8	peak
7212.039	34.71	8.14	42.85	54	-11.15	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2404.013	93.51	-9.37	84.14	114	-29.86	peak
2404.013	87.72	-9.37	78.35	94	-15.65	AVG
4808.026	44.85	3.74	48.59	74	-25.41	peak
4808.026	39.16	3.74	42.9	54	-11.1	AVG
7212.039	39.25	8.14	47.39	74	-26.61	peak
7212.039	33.94	8.14	42.08	54	-11.92	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4G Receiver	Model Name. ：	HW086-1
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	95.12	-9.63	85.49	114	-28.51	peak
2442.016	89.36	-9.63	79.73	94	-14.27	AVG
4884.032	46.27	3.76	50.03	74	-23.97	peak
4884.032	40.78	3.76	44.54	54	-9.46	AVG
7326.048	41.53	8.17	49.7	74	-24.3	peak
7326.048	36.06	8.17	44.23	54	-9.77	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4G Receiver	Model Name. ：	HW086-1
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	92.85	-9.63	83.22	114	-30.78	peak
2442.016	87.06	-9.63	77.43	94	-16.57	AVG
4884.032	45.75	3.76	49.51	74	-24.49	peak
4884.032	40.26	3.76	44.02	54	-9.98	AVG
7326.048	41.45	8.17	49.62	74	-24.38	peak
7326.048	35.82	8.17	43.99	54	-10.01	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4G Receiver	Model Name. ：	HW086-1
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)	
2479.021	94.78	-9.61	85.17	114	-28.83	peak
2479.021	89.05	-9.61	79.44	94	-14.56	AVG
4958.042	45.72	3.83	49.55	74	-24.45	peak
4958.042	40.18	3.83	44.01	54	-9.99	AVG
7437.063	41.24	8.21	49.45	74	-24.55	peak
7437.063	35.76	8.21	43.97	54	-10.03	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4G Receiver	Model Name. ：	HW086-1
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)	
2479.021	92.82	-9.61	83.21	114	-30.79	peak
2479.021	87.12	-9.61	77.51	94	-16.49	AVG
4958.042	45.33	3.83	49.16	74	-24.84	peak
4958.042	39.76	3.83	43.59	54	-10.41	AVG
7437.063	40.54	8.21	48.75	74	-25.25	peak
7437.063	35.07	8.21	43.28	54	-10.72	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.

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.

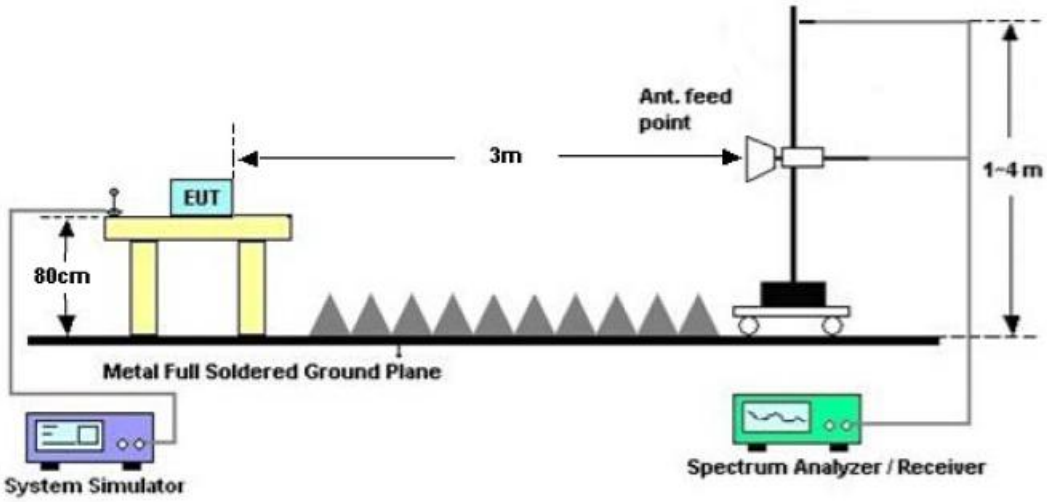
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(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



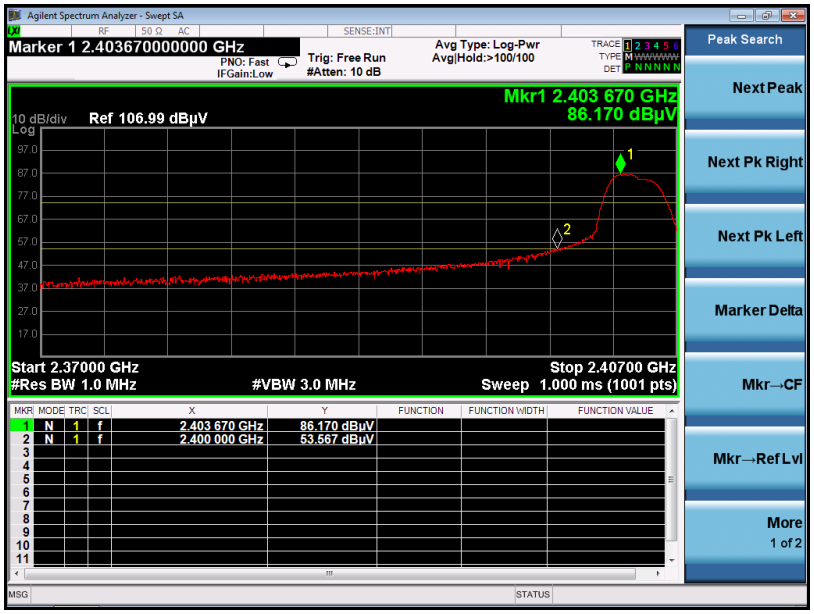
8.3 RADIATED TEST RESULT

Note:

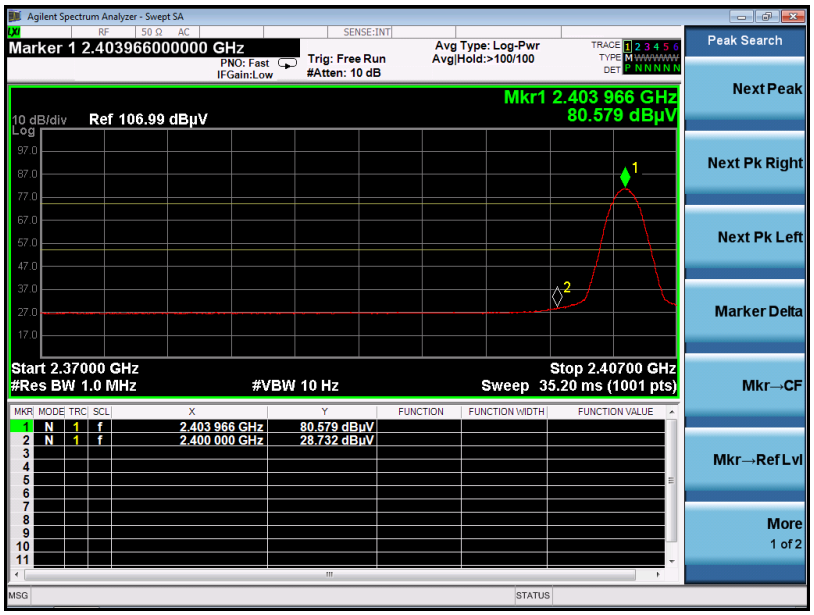
1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude.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

EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Horizontal

PK Value

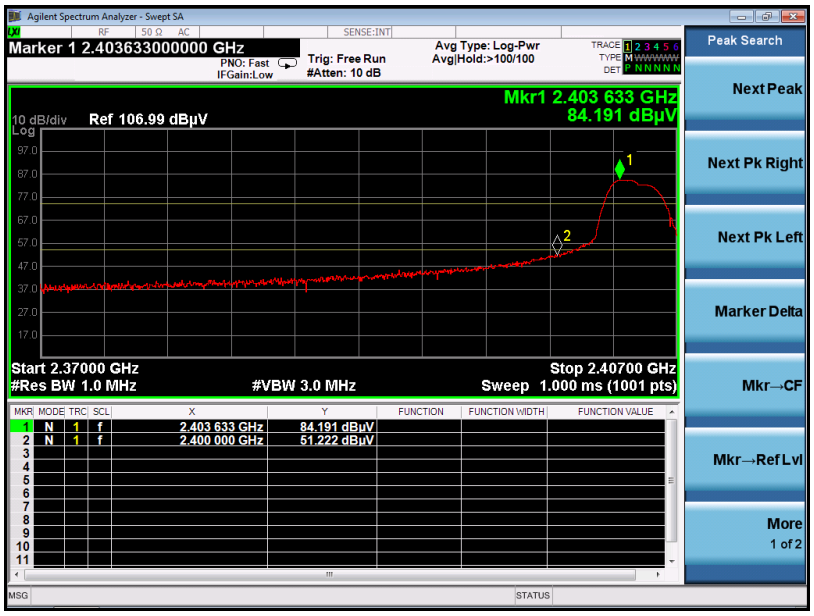


AV Value



EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 1	Polarization：	Vertical

PK Value

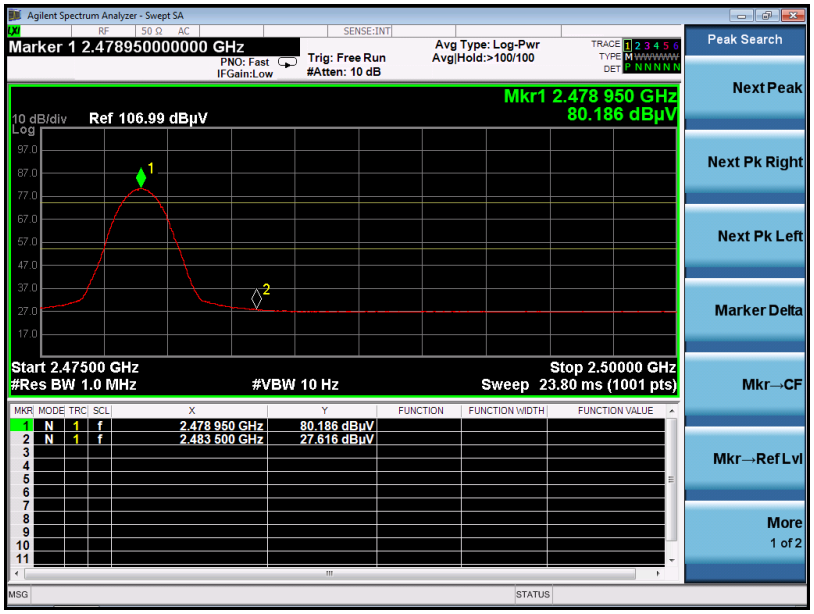


AV Value

EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization：	Horizontal

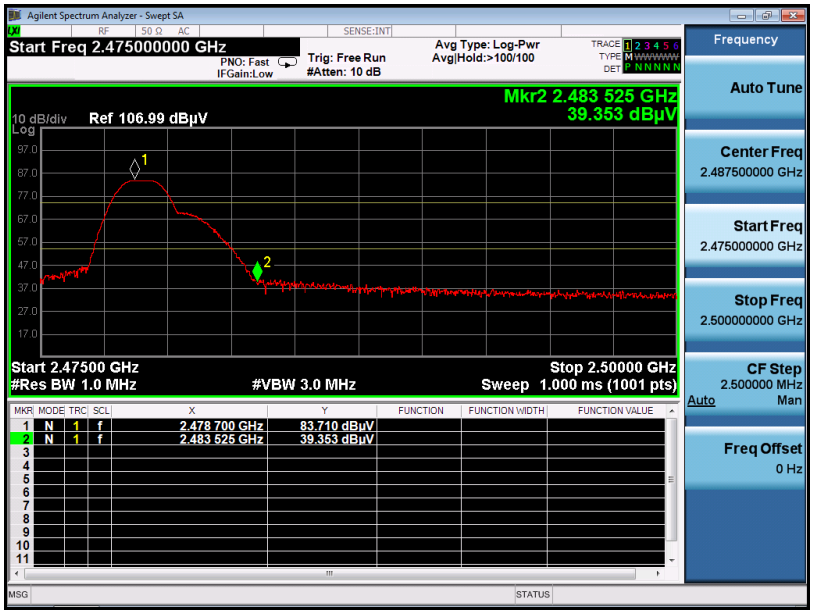
PK Value

AV Value



EUT：	2.4G Receiver	Model Name. ：	HW086-1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC5V
Test Mode ：	Mode 3	Polarization：	Vertical

PK Value



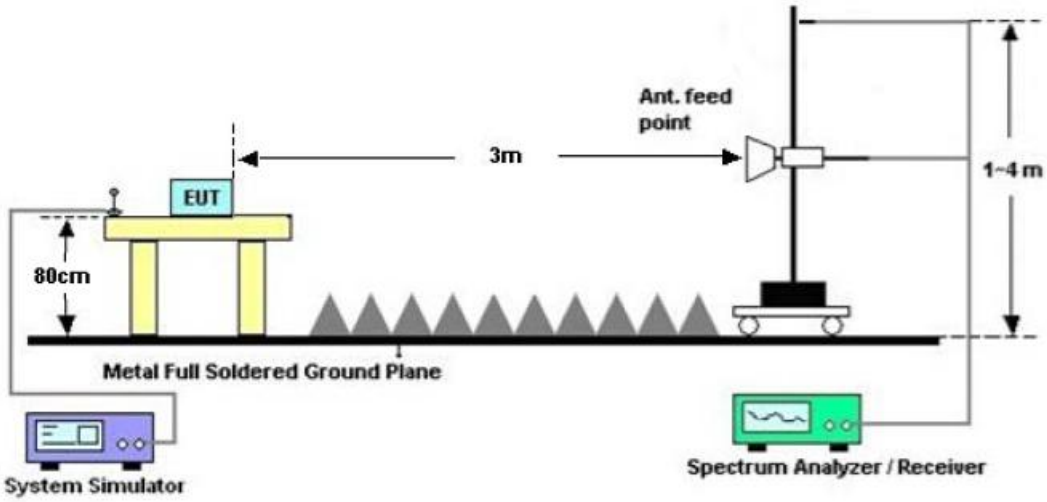
AV Value

9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 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, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

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

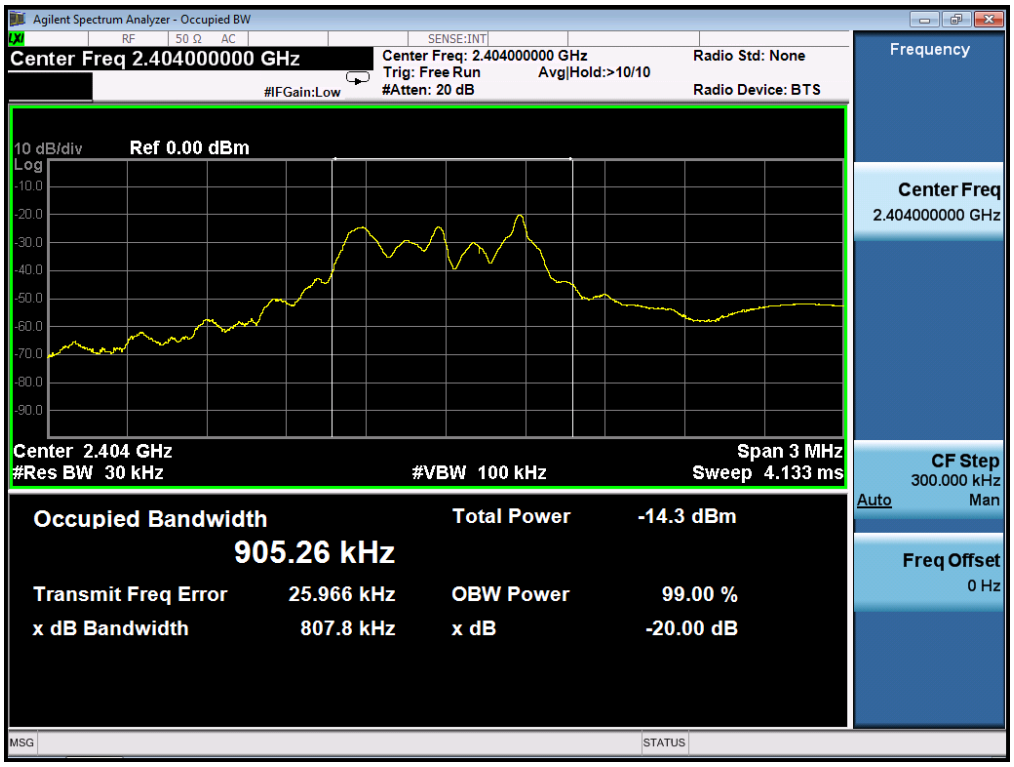


9.3. MEASUREMENT RESULTS

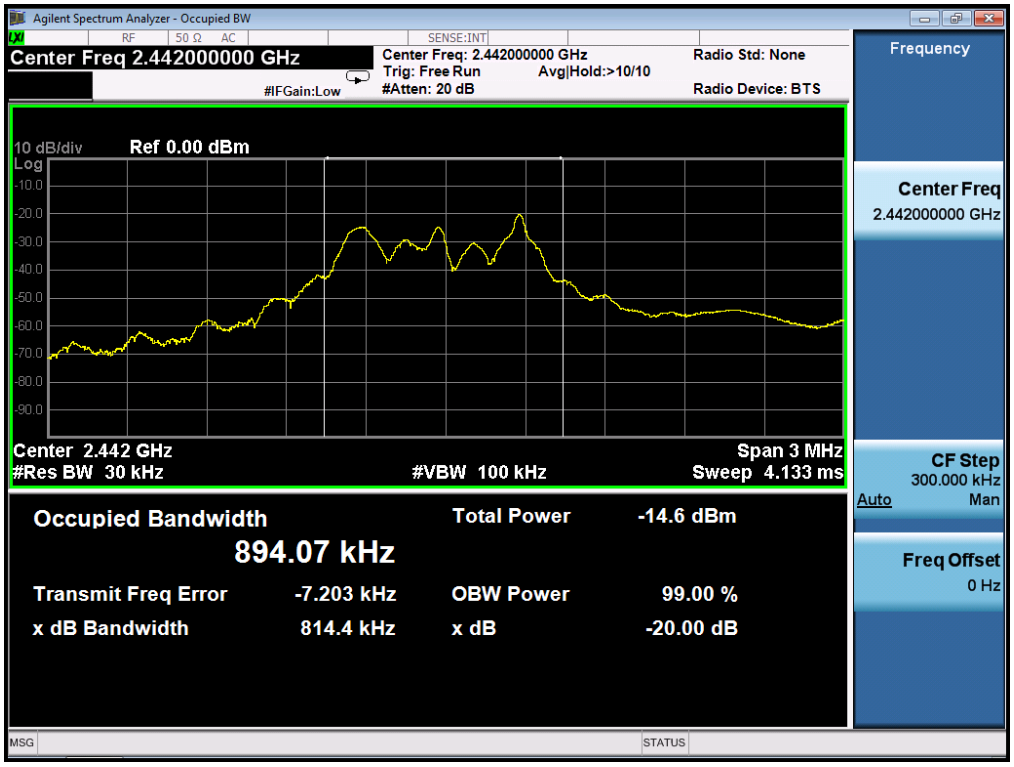
TEST ITEM	20DB BANDWIDTH
TEST MODE	Mode1;Mode2;Mode3

Test Data (MHz)		**Criteria**
Low Channel	0.8078	PASS
Middle Channel	0.8144	PASS
High Channel	0.8205	PASS

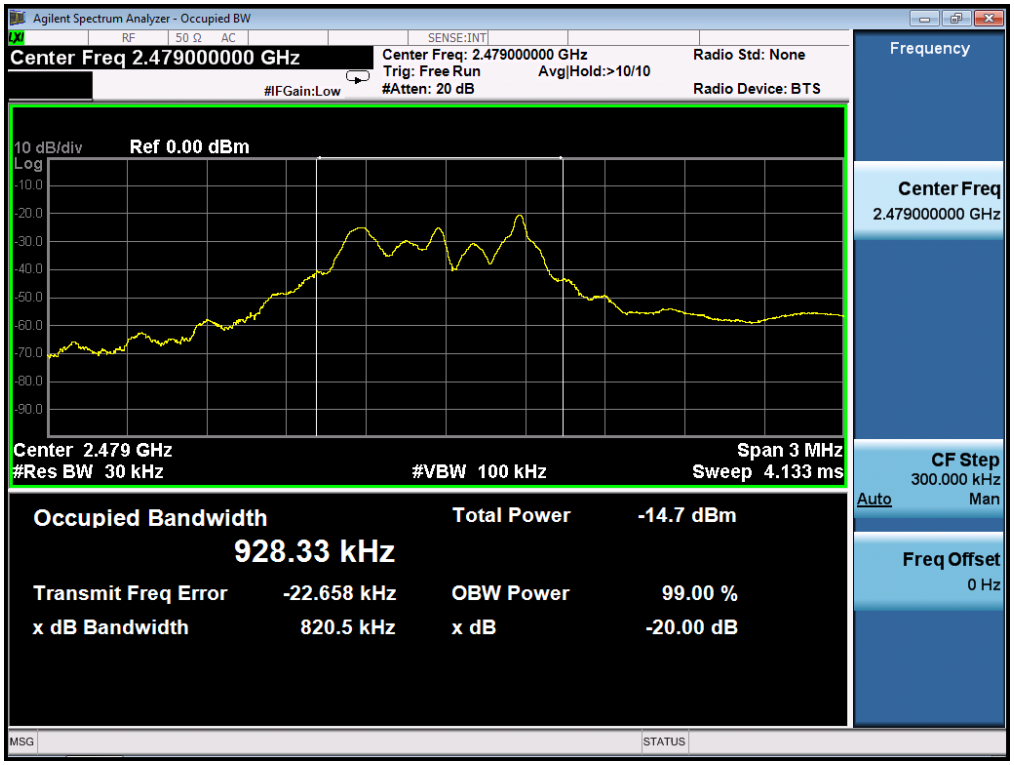
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



10. FCC LINE CONDUCTED EMISSION TEST

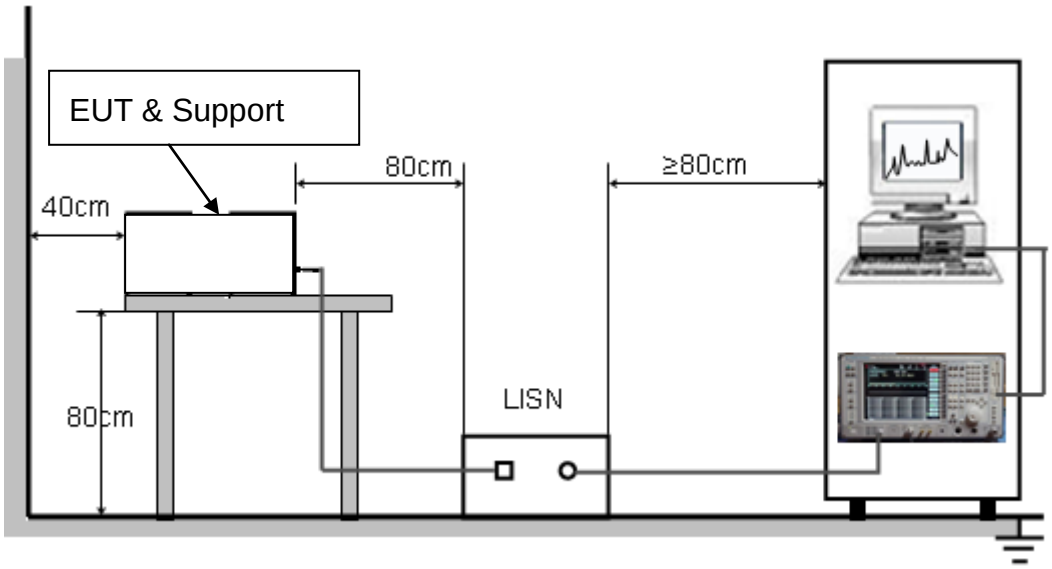
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

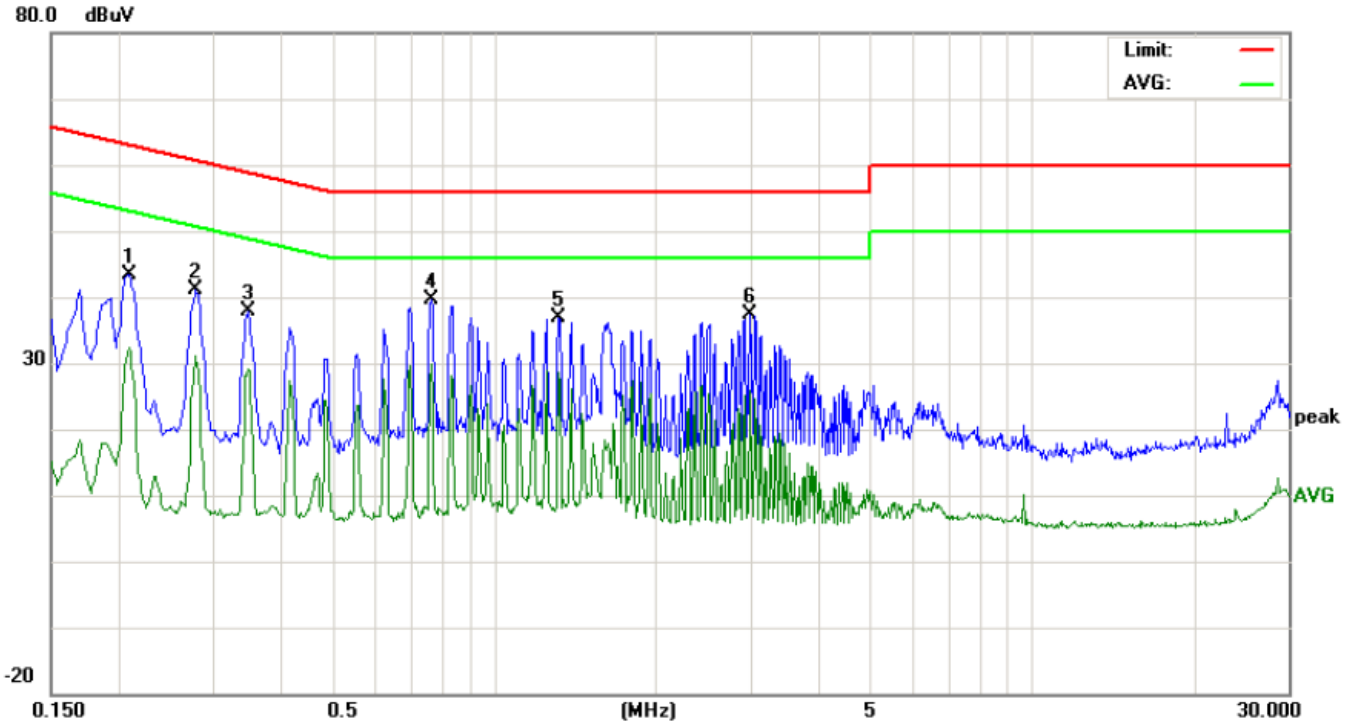
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

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

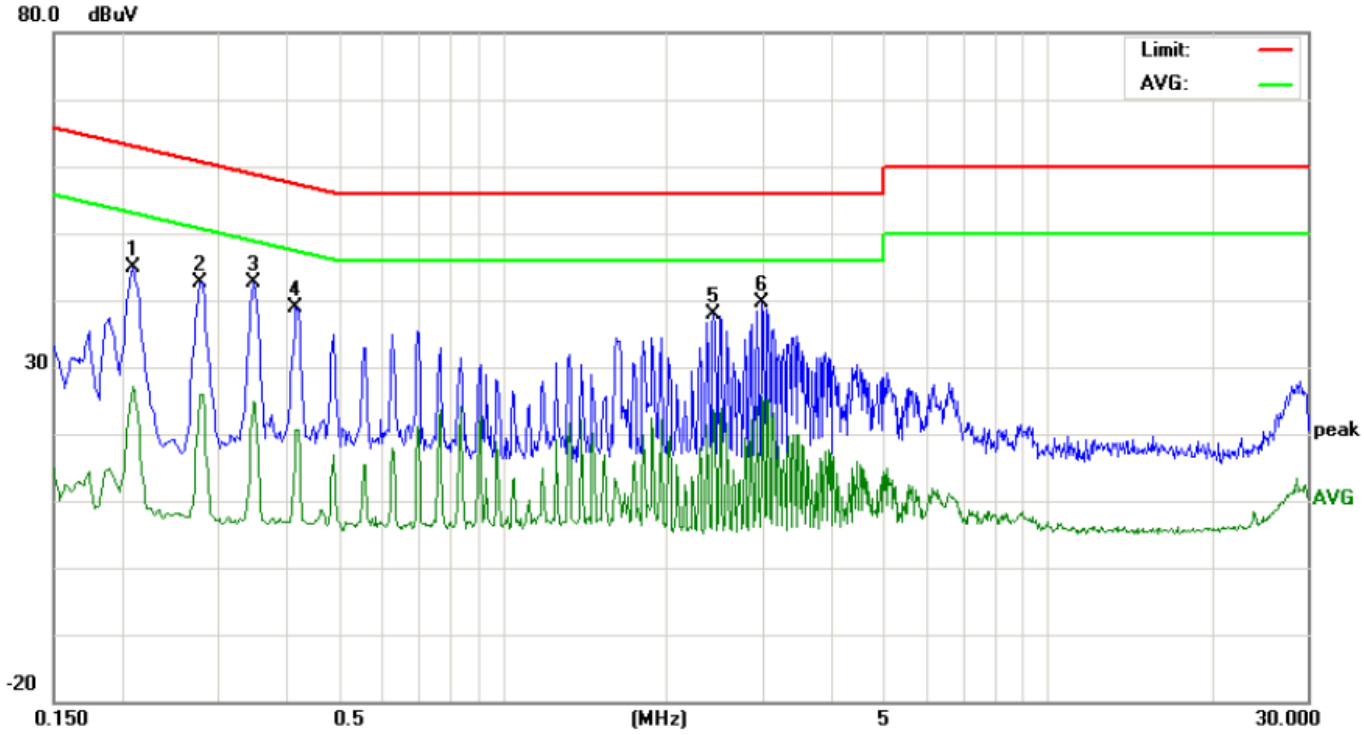
Line Conducted Emission Test Line 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2099	33.21		22.27	10.23	43.44		32.50	63.21	53.21	-19.77	-20.71	P	
2	0.2787	30.75		20.41	10.28	41.03		30.69	60.85	50.85	-19.82	-20.16	P	
3	0.3499	27.60		18.85	10.31	37.91		29.16	58.96	48.96	-21.05	-19.80	P	
4	0.7660	29.42		19.63	10.30	39.72		29.93	56.00	46.00	-16.28	-16.07	P	
5	1.3220	26.41		18.33	10.38	36.79		28.71	56.00	46.00	-19.21	-17.29	P	
6	2.9940	26.87		15.22	10.55	37.42		25.77	56.00	46.00	-18.58	-20.23	P	

RESULT: PASS

Line Conducted Emission Test Line 2-N

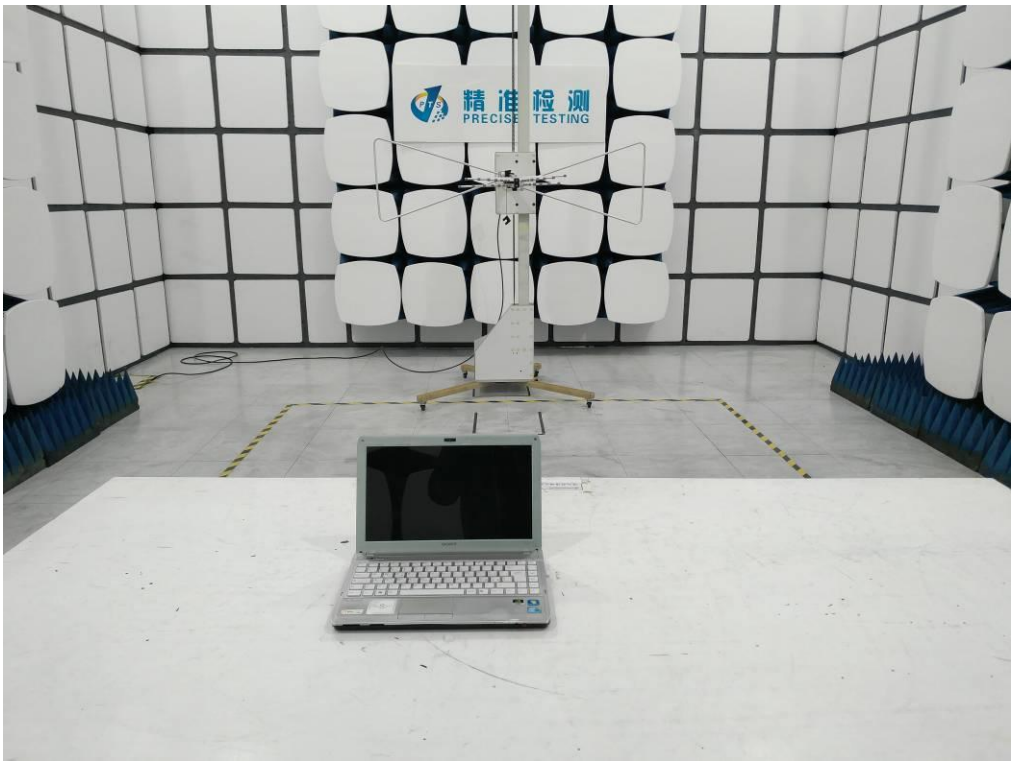


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2100	34.60		16.89	10.23	44.83		27.12	63.20	53.20	-18.37	-26.08	P	
2	0.2779	32.36		15.51	10.28	42.64		25.79	60.88	50.88	-18.24	-25.09	P	
3	0.3500	32.33		14.51	10.31	42.64		24.82	58.96	48.96	-16.32	-24.14	P	
4	0.4180	28.43		10.20	10.34	38.77		20.54	57.49	47.49	-18.72	-26.95	P	
5	2.4460	27.57		13.11	10.41	37.98		23.52	56.00	46.00	-18.02	-22.48	P	
6	3.0059	29.05		15.19	10.55	39.60		25.74	56.00	46.00	-16.40	-20.26	P	

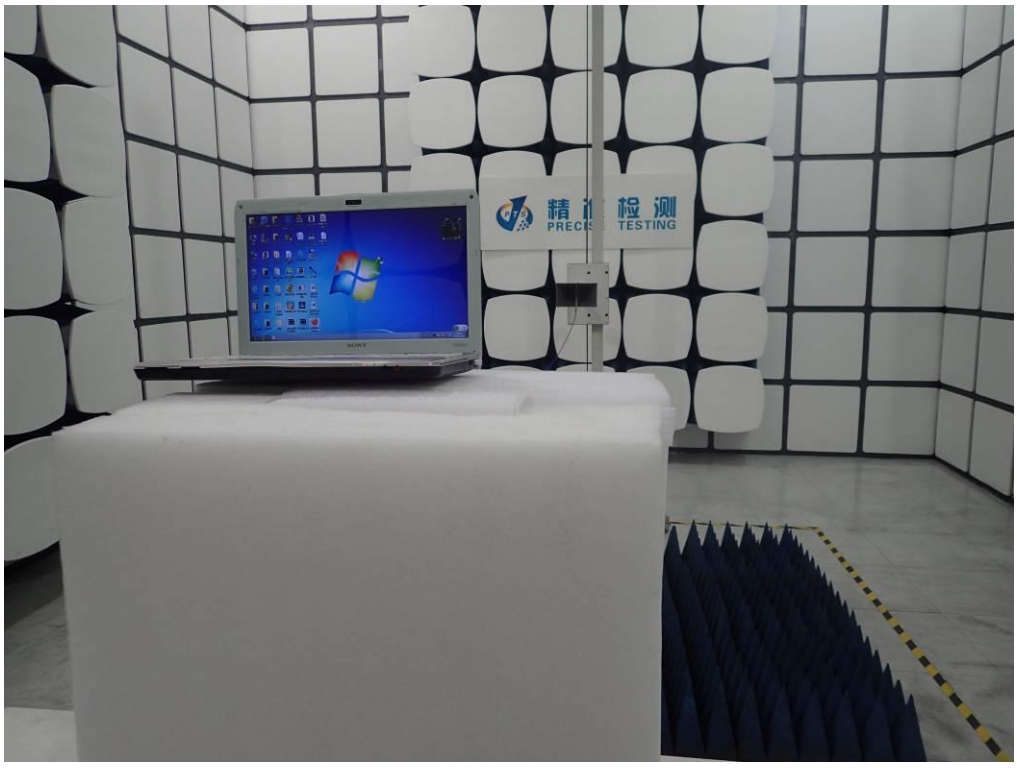
RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHz



RADIATED EMISSION TEST SETUP ABOVE 1GHz

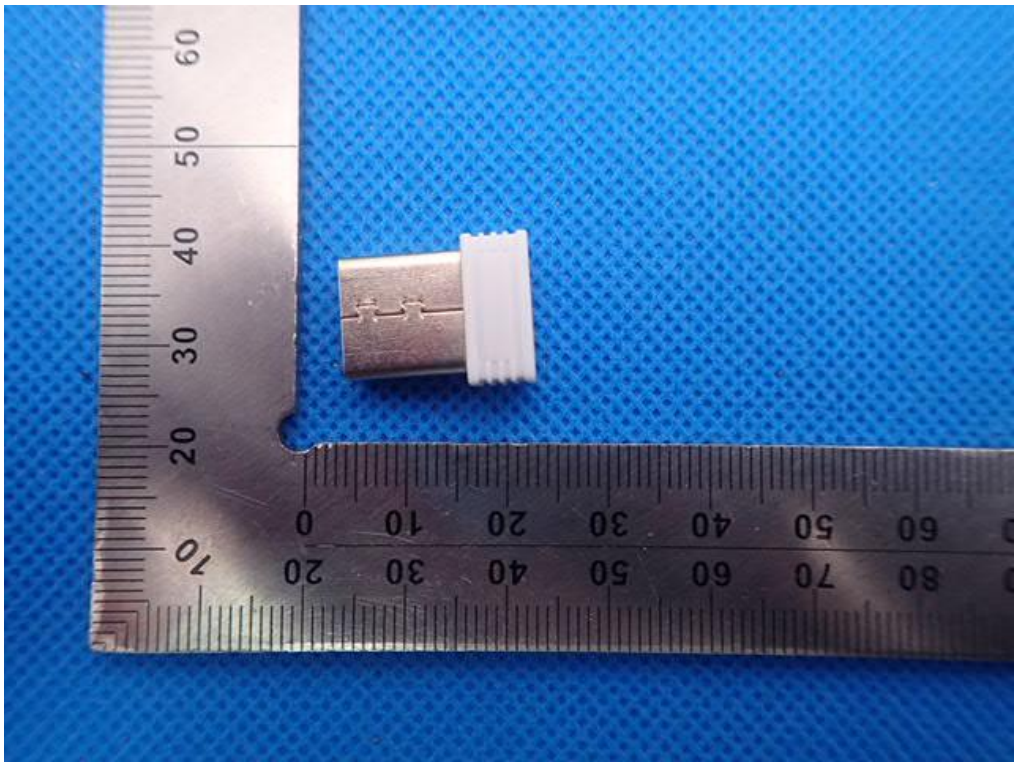


CONDUCTED EMISSION TEST SETUP

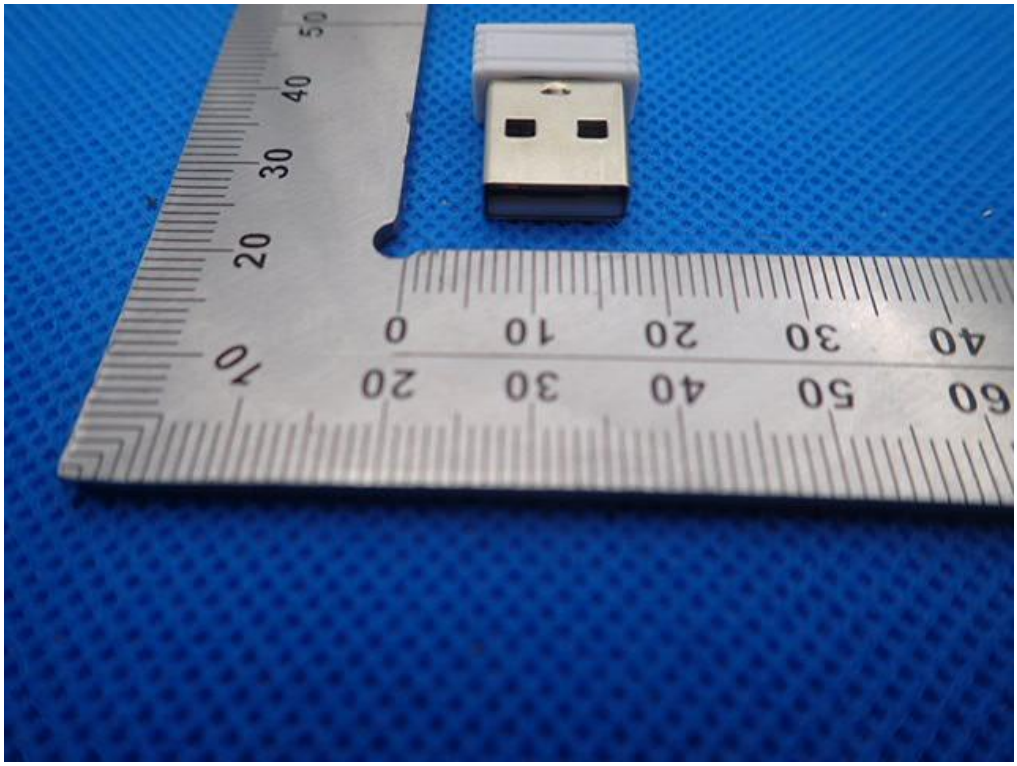
APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

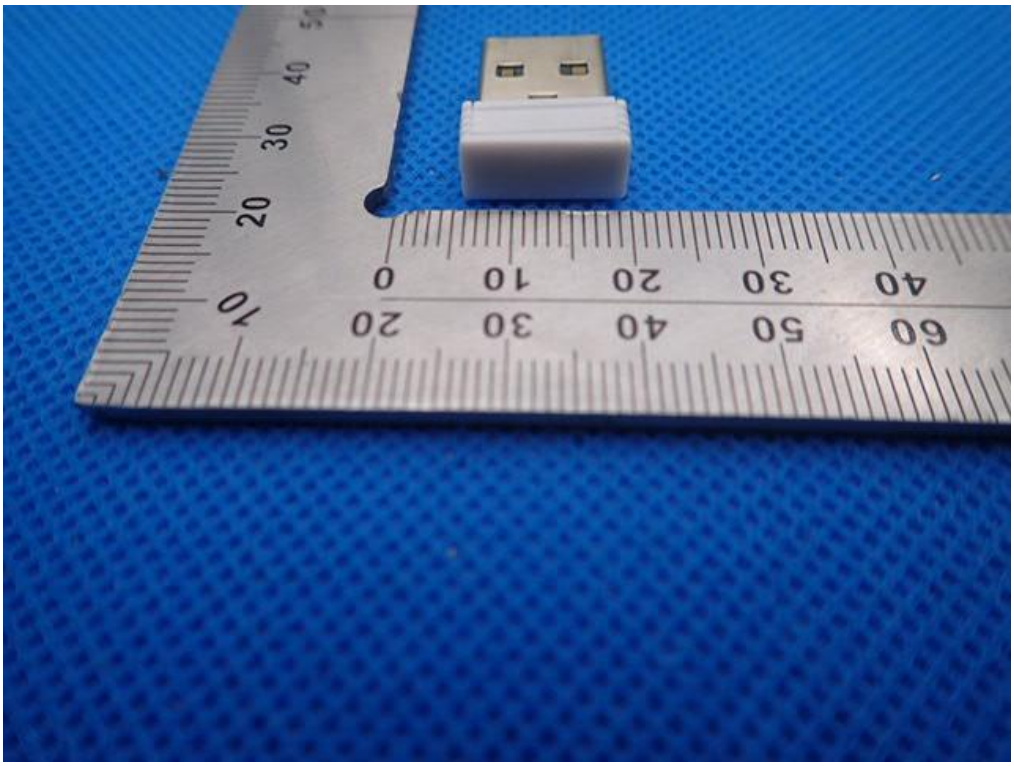
BOTTOM VIEW OF EUT



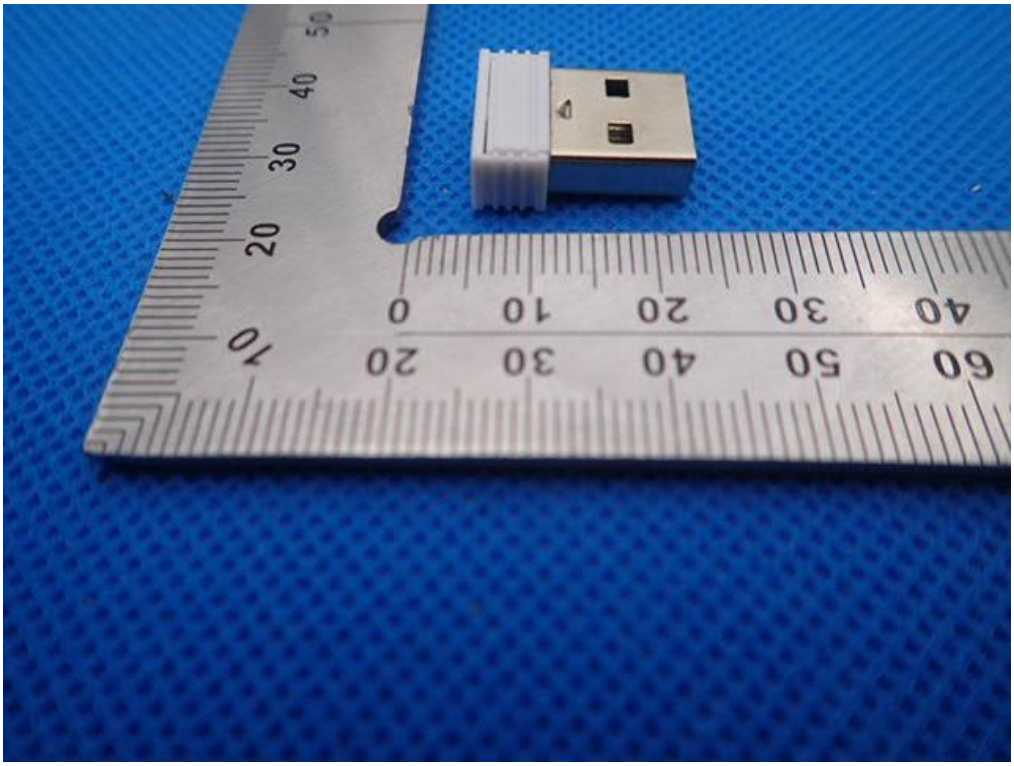
FRONT VIEW OF EUT



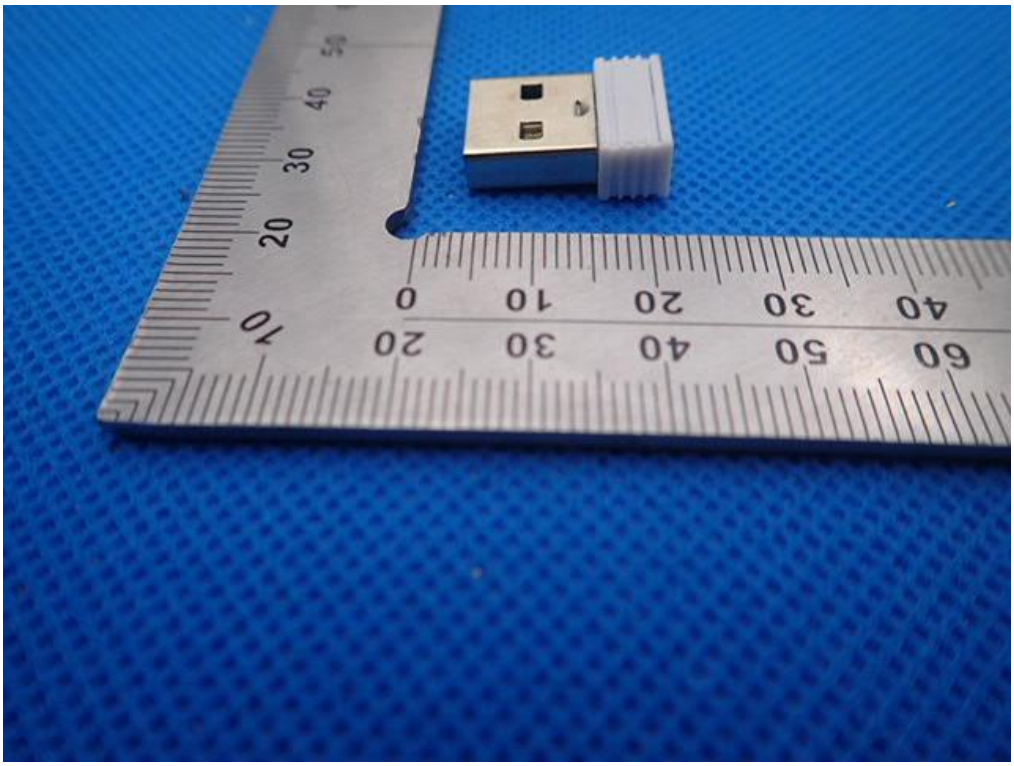
BACK VIEW OF EUT



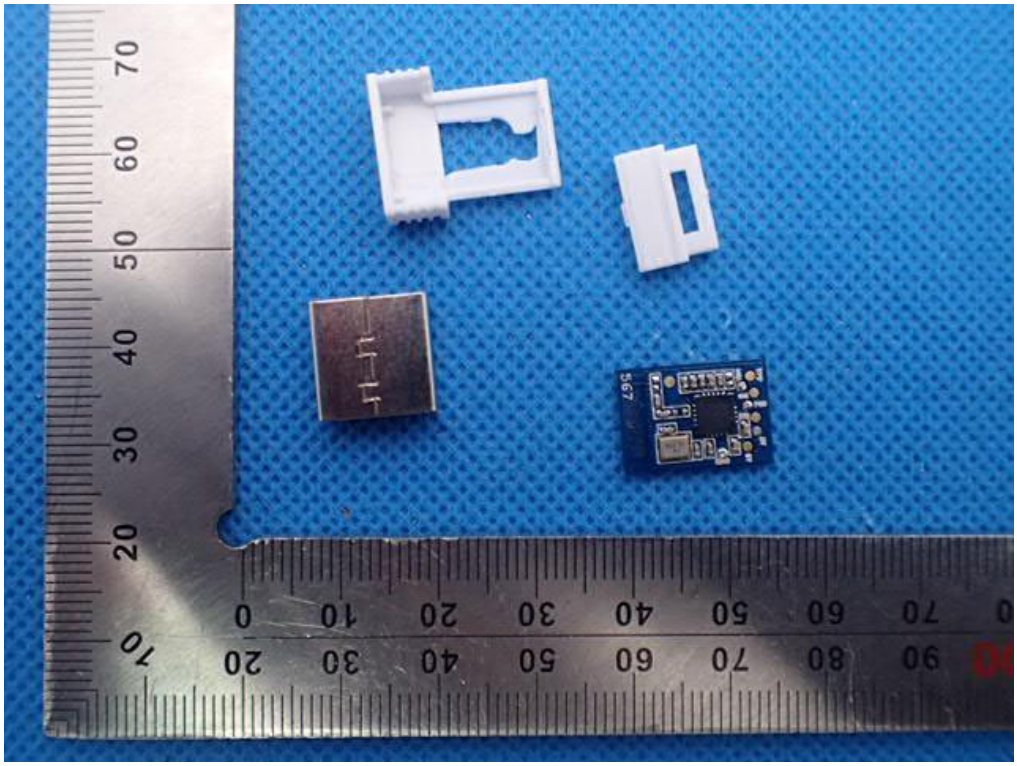
LEFT VIEW OF EUT



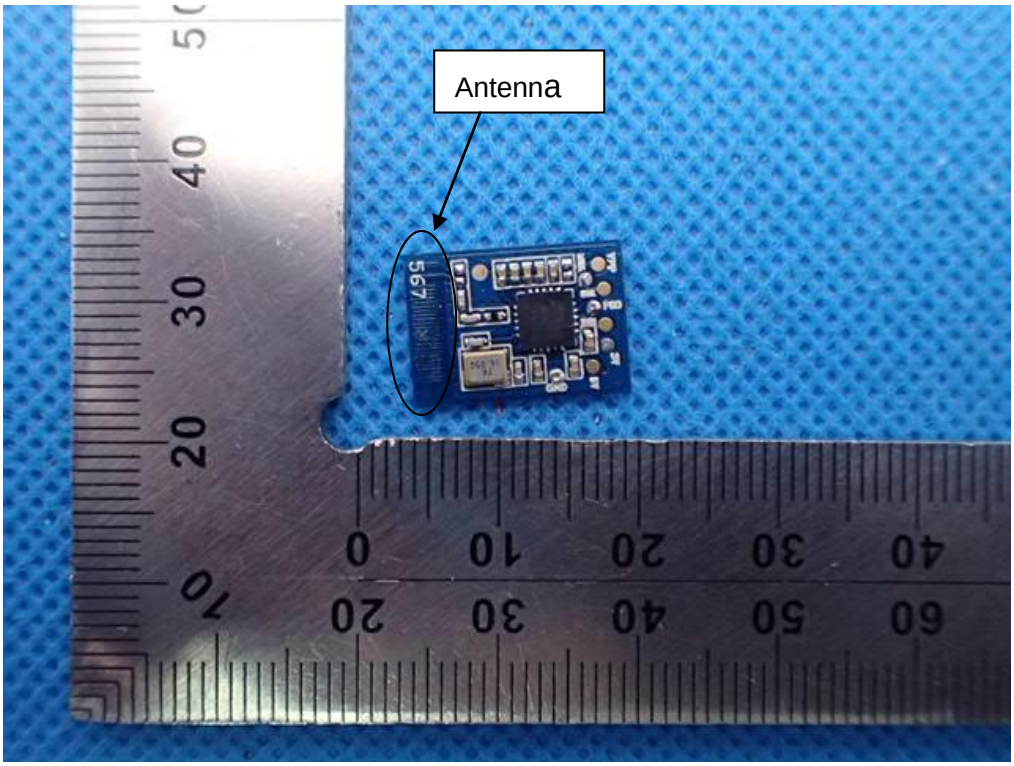
RIGHT VIEW OF EUT



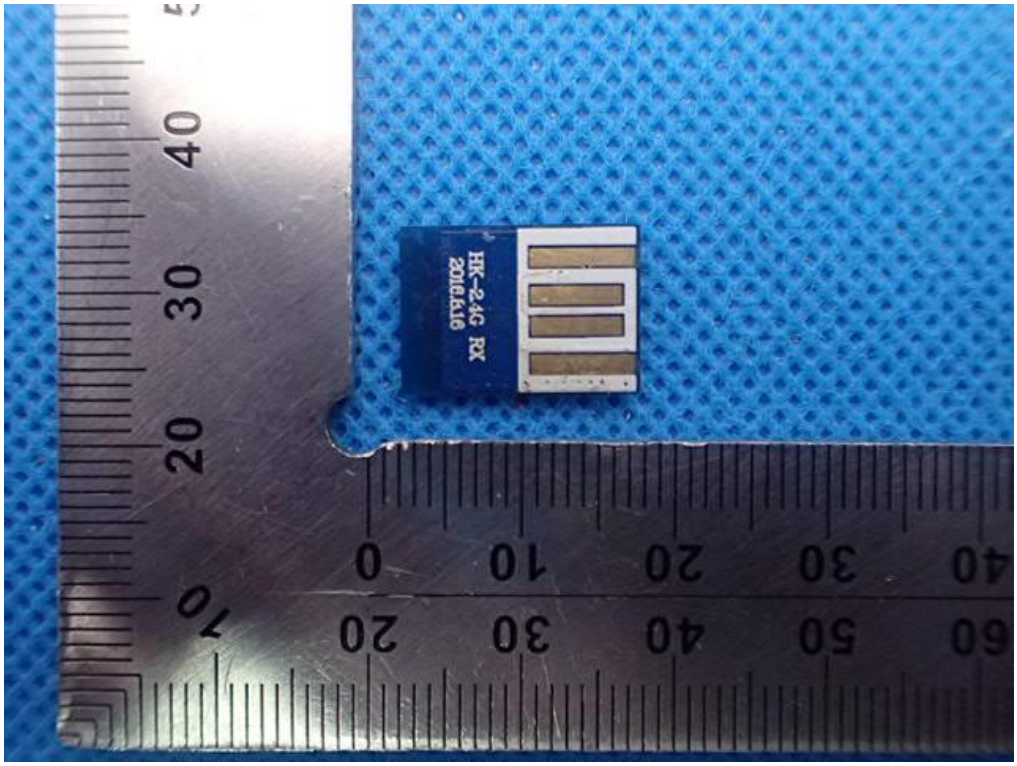
OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



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