Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.247

Report Reference No. .....:	**CTL1612210301-WF**	
Compiled by: (position+printed name+signature)	Allen Wang (File administrators)	Allen Wang
Tested by: (position+printed name+signature)	Nice Nong (Test Engineer)	Nice Nong
Approved by: (position+printed name+signature)	Tracy Qi (Manager)	Tracy Qi

Product Name.....:	DASHCAM
Model/Type reference .....:	4SKX1
List Model(s).....:	4SKX2, 4SKX3, 4SKX4, 4SKX5, 4SKXS, 4SKXG, 4SKXR, 4SKXB, 4SKXP
Trade Mark.....:	N/A
FCC ID.....:	2AKUS-4SKX1
Applicant's name .....:	**ZIMING PLASTIC HARDWARE(SHENZHEN)CO.,LTD.**
Address of applicant .....:	90 Xingye Ave, Fenghuang, Fuyong, Baoan, Shenzhen, Guangdong, China
Test Firm .....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm .....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification.....:	
Standard.....:	**FCC Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
TRF Originator .....:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF .....:	Dated 2011-01
Date of Receipt.....:	Dec. 21, 2016
Date of Test Date.....:	Dec. 21, 2016–Jan. 05, 2017
Data of Issue.....:	Jan. 05, 2017
Result.....:	Pass

TEST REPORT

Test Report No. :	CTL1612210301-WF	Jan. 05, 2017 Date of issue

Equipment under Test	:	DASHCAM
Model /Type	:	4SKX1
Listed Models	:	4SKX2, 4SKX3, 4SKX4, 4SKX5, 4SKXS, 4SKXG, 4SKXR, 4SKXB, 4SKXP
Applicant	:	**ZIMING PLASTIC HARDWARE(SHENZHEN)CO.,LTD.**
Address	:	90 Xingye Ave, Fenghuang, Fuyong, Baoan, Shenzhen, Guangdong, China
Manufacturer	:	**ZIMING PLASTIC HARDWARE(SHENZHEN)CO.,LTD.**
Address	:	90 Xingye Ave, Fenghuang, Fuyong, Baoan, Shenzhen, Guangdong, China

Test result	Pass *

* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2017-01-05	CTL1612210301-WF	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices

ANSI C63.4: 2014: –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz Range of 9 kHz to 40GHz

KDB558074 D01 V03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

1.3.2 Laboratory accreditation

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

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	DASHCAM
Model/Type reference:	4SKX1
Power supply:	DC 3.7V from battery
Adapter information:	Model: JLT-05020B Input: DC 12-48V Output: 5V⎓2A
WIFI :	
Supported type:	802.11b/802.11g/802.11n(H20)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11
Channel separation:	5MHz
Antenna type:	Internal antenna
Antenna gain:	2dBi

Note: For more details, please refer to the user's manual of the EUT.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

There are 11 channels provided to the EUT and Channel 01/06/11 were selected for WIFI test.

Operation Frequency WIFI：

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	**2412**	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	**11**	**2462**
5	2432		
6	**2437**		
7	2442		

Note: The line display in grey were the channel selected for testing

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.12	2016/06/02	2017/06/01
LISN	R&S	ESH2-Z5	860014/010	2016/06/02	2017/06/01
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2016/05/21	2017/05/20
Spectrum Analyzer	Agilent	N9020	US46220290	2016/01/17	2017/01/16
Power Meter	Anritsu	ML2487B	110553	2016/06/02	2017/06/01
Power Sensor	Anritsu	MA2411B	100345	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
Coaxial Cables	HUBER+SUHN	SUCOFLEX	10m	2016/06/02	2017/06/01

	ER	104PEA-10M			
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
RF Cable	Megalon	RF-A303	N/A	2016/06/02	2017/06/01

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

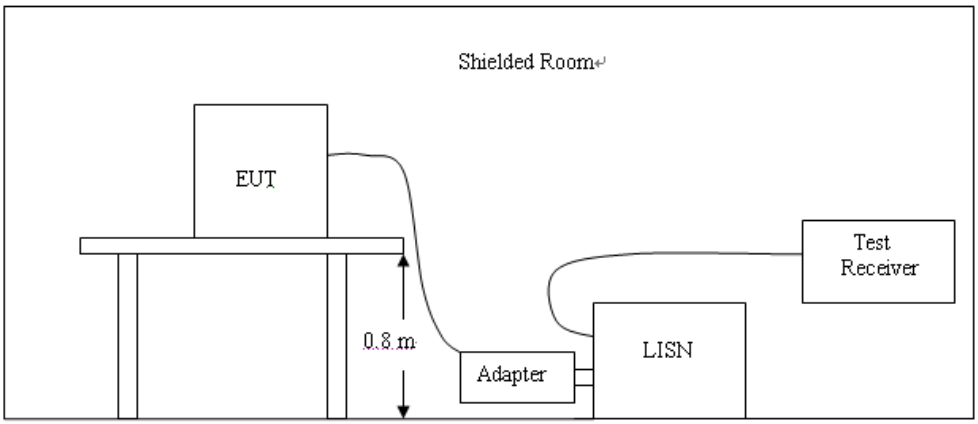
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	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.

TEST CONFIGURATION



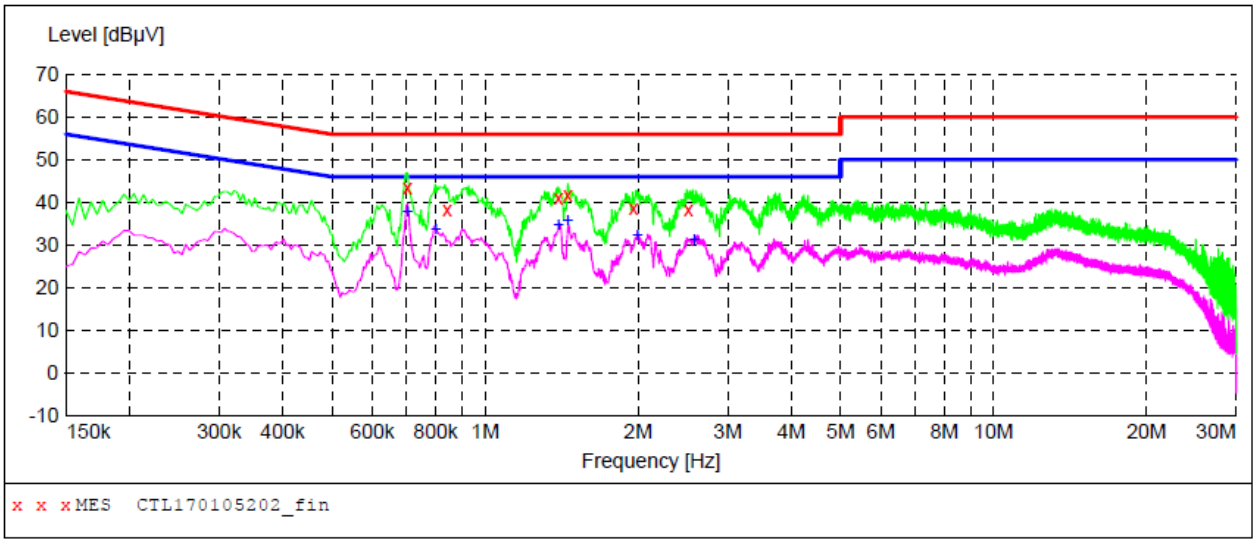
TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. 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 C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/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.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL170105202_fin"

1/5/2017 9:45AM

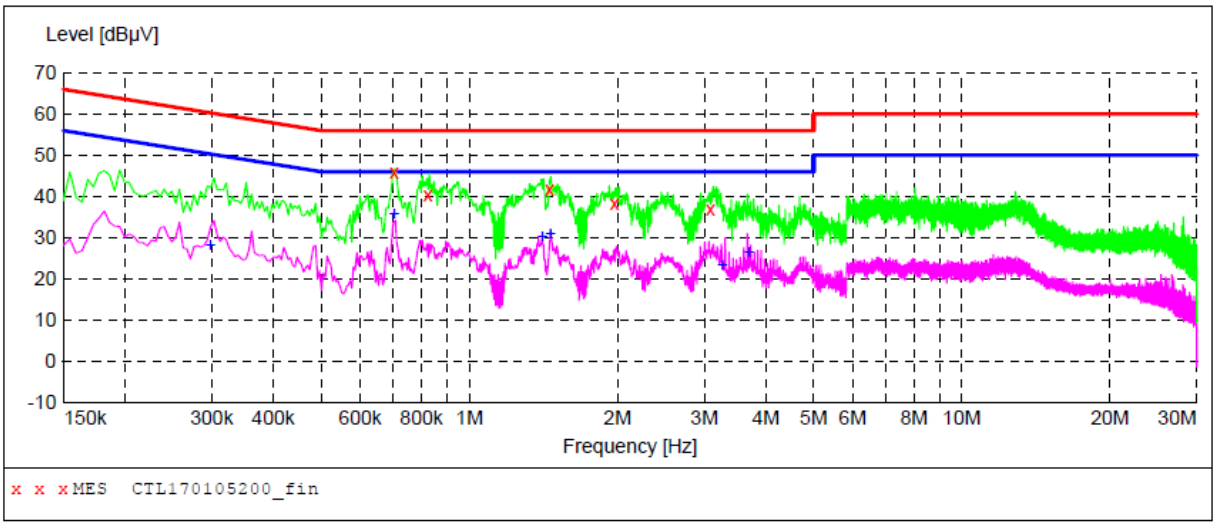
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.704000	43.50	10.2	56	12.5	QP	N	GND
0.842000	38.30	10.2	56	17.7	QP	N	GND
1.394000	40.90	10.3	56	15.1	QP	N	GND
1.454000	41.90	10.3	56	14.1	QP	N	GND
1.958000	38.50	10.3	56	17.5	QP	N	GND
2.510000	38.30	10.4	56	17.7	QP	N	GND

MEASUREMENT RESULT: "CTL170205202_fin2"

1/5/2017 9:45AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.704000	38.00	10.2	46	8.0	AV	N	GND
0.800000	33.90	10.2	46	12.1	AV	N	GND
1.394000	34.80	10.3	46	11.2	AV	N	GND
1.454000	35.70	10.3	46	10.3	AV	N	GND
1.994000	32.30	10.3	46	13.7	AV	N	GND
2.576000	31.50	10.4	46	14.5	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL170105200_fin"

1/5/2017 9:41AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.704000	46.00	10.2	56	10.0	QP	L1	GND
0.824000	40.30	10.2	56	15.7	QP	L1	GND
1.454000	41.60	10.3	56	14.4	QP	L1	GND
1.970000	38.40	10.3	56	17.6	QP	L1	GND
3.086000	36.90	10.4	56	19.1	QP	L1	GND

MEASUREMENT RESULT: "CTL170105200_fin2"

1/5/2017 9:41AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.298000	28.30	10.2	50	22.0	AV	L1	GND
0.704000	36.00	10.2	46	10.0	AV	L1	GND
1.406000	30.40	10.3	46	15.6	AV	L1	GND
1.460000	31.20	10.3	46	14.8	AV	L1	GND
3.266000	23.40	10.4	46	22.6	AV	L1	GND
3.698000	26.40	10.4	46	19.6	AV	L1	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

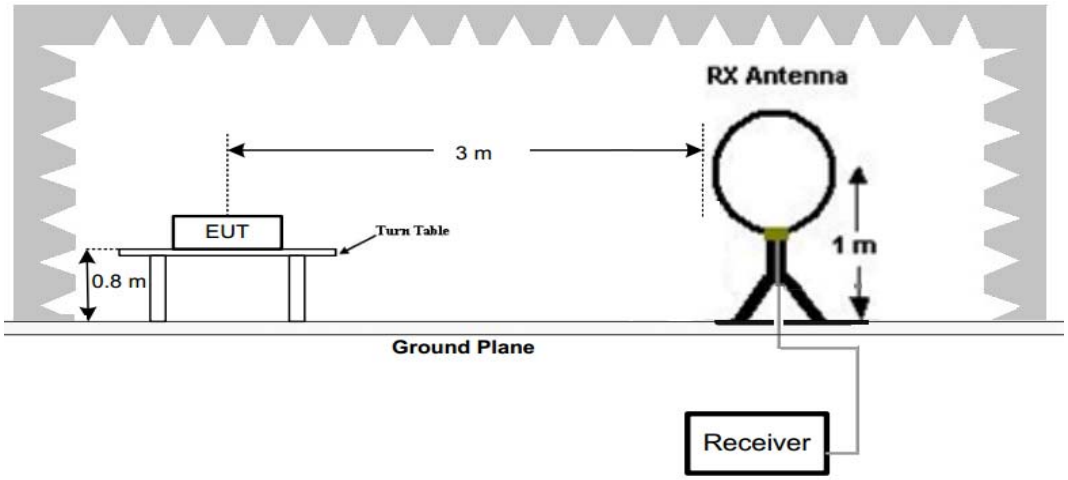
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

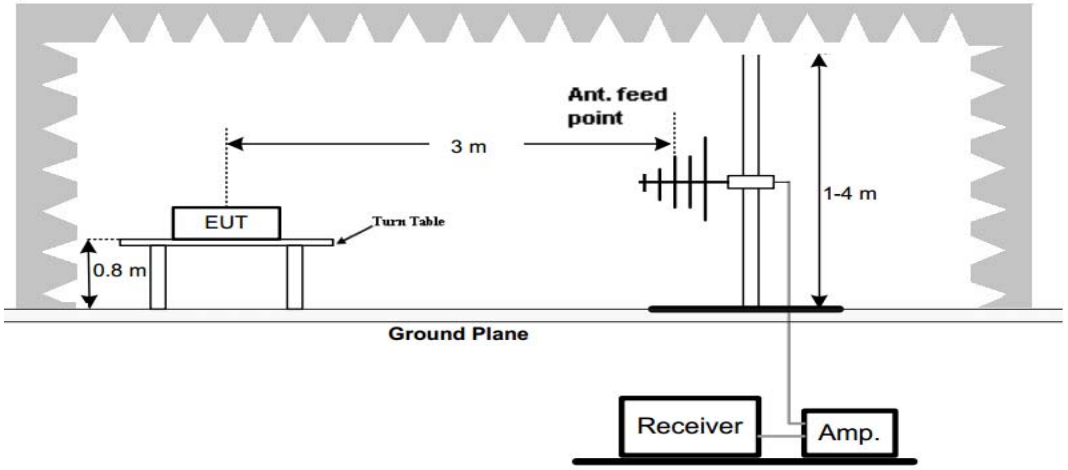
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

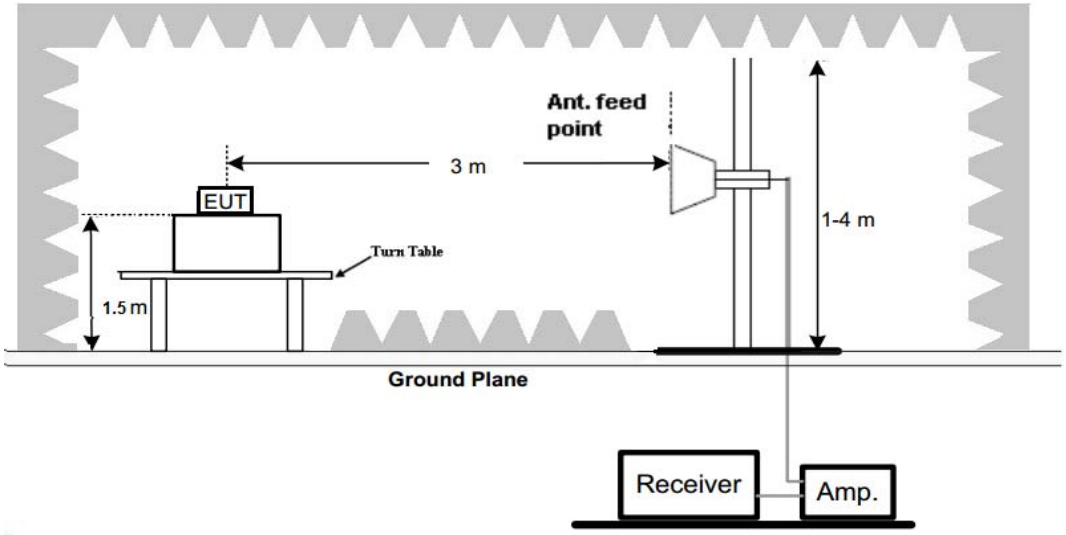
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

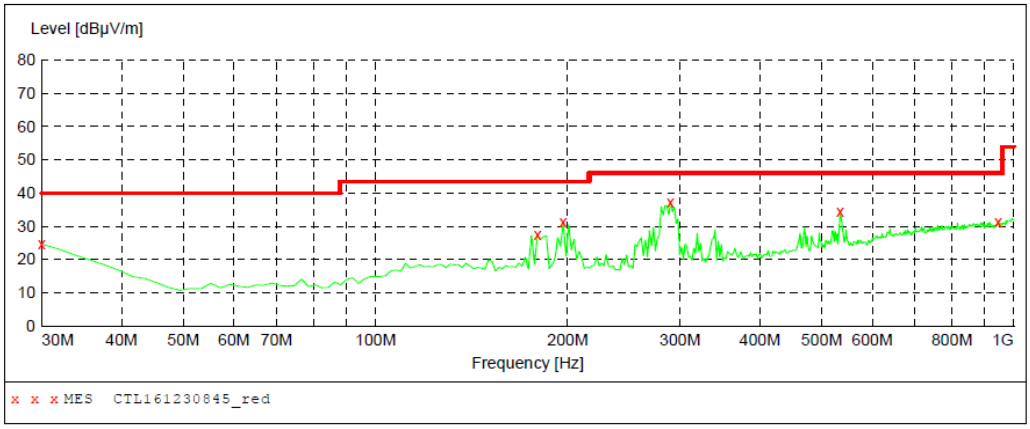
TEST RESULTS

Remark:
1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. All three channels (lowest/middle/highest) of each mode were measured above1GHz and recorded worst case at 802.11b mode.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Test mode:	WIFI	Polarization:	Horizontal

```
SWEEP TABLE: "test (30M-1G)"
Short Description:          Field Strength
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
30.0 MHz   1.0 GHz    MaxPeak   300.0 ms  120 kHz   JB1
```



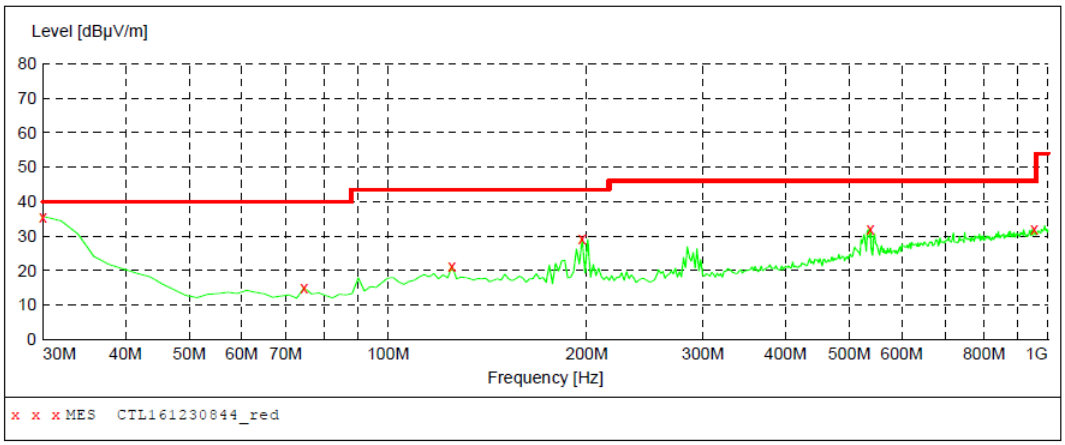

```
MEASUREMENT RESULT: "CTL161230845_red"

1/3/2017  10:18AM
   Frequency     Level  Transd   Limit  Margin  Det.  Height  Azimuth  Polarization
         MHz    dBµV/m      dB  dBµV/m      dB          cm      deg

    30.000000    24.60    20.8    40.0    15.4  ---      0.0     0.00  HORIZONTAL
   179.380000    27.60    13.0    43.5    15.9  ---      0.0     0.00  HORIZONTAL
   196.840000    31.30    13.6    43.5    12.2  ---      0.0     0.00  HORIZONTAL
   289.960000    37.20    15.2    46.0     8.8  ---      0.0     0.00  HORIZONTAL
   534.400000    34.30    20.5    46.0    11.7  ---      0.0     0.00  HORIZONTAL
   945.680000    31.40    26.5    46.0    14.6  ---      0.0     0.00  HORIZONTAL
```

Test mode:	WIFI	Polarization:	Vertical

```
SWEEP TABLE: "test (30M-1G)"
Short Description:          Field Strength
Start      Stop       Detector  Meas.     IF        Transducer
Frequency  Frequency            Time      Bandw.
30.0 MHz   1.0 GHz    MaxPeak   300.0 ms  120 kHz   JB1
```




```
MEASUREMENT RESULT: "CTL161230844_red"

1/3/2017  10:16AM
   Frequency     Level  Transd   Limit  Margin  Det.  Height  Azimuth  Polarization
         MHz    dBµV/m      dB  dBµV/m      dB          cm      deg

    30.000000    35.70    20.8    40.0     4.3  ---      0.0     0.00  VERTICAL
    74.620000    14.90     8.3    40.0    25.1  ---      0.0     0.00  VERTICAL
   125.060000    21.20    14.6    43.5    22.3  ---      0.0     0.00  VERTICAL
   196.840000    29.30    13.6    43.5    14.2  ---      0.0     0.00  VERTICAL
   538.280000    32.20    20.6    46.0    13.8  ---      0.0     0.00  VERTICAL
   953.440000    31.90    26.6    46.0    14.1  ---      0.0     0.00  VERTICAL
```

For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Note: 802.11b/802.11g/802.11n (H20) all have been tested, only worse case 802.11b is reported

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	58.25	PK	74	15.75	53.7	33.52	6.92	35.89	4.55
4824.00	51.46	AV	54	2.54	46.91	33.52	6.92	35.89	4.55
5125.75	48.21	PK	74	25.79	41.01	34.38	7.10	34.28	7.20
5125.75	--	AV	54	--	--	--	--	--	--
7236.00	50.04	PK	74	23.96	38.77	37.1	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	59.04	PK	74	14.96	54.49	33.52	6.92	35.89	4.55
4824.00	52.56	AV	54	1.44	48.01	33.52	6.92	35.89	4.55
5125.75	47.81	PK	74	26.19	40.61	34.38	7.10	34.28	7.20
5125.75	--	AV	54	--	--	--	--	--	--
7236.00	49.23	PK	74	24.77	37.96	37.1	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	58.11	PK	74	15.89	51.87	33.59	6.95	34.3	6.24
4874.00	51.27	AV	54	2.73	45.03	33.59	6.95	34.3	6.24
5215.50	48.02	PK	74	25.98	40.42	34.56	7.15	34.11	7.60
5215.50	--	AV	54	--	--	--	--	--	--
7311.00	48.96	PK	74	25.04	37.30	37.44	9.22	35	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	59.02	PK	74	14.98	52.68	33.59	6.95	34.2	6.34
4874.00	51.29	AV	54	2.71	44.95	33.59	6.95	34.2	6.34
5215.50	47.96	PK	74	26.04	41.06	34.07	7.05	34.22	6.90
5215.50	--	AV	54	--	--	--	--	--	--
7311.00	47.34	PK	74	26.66	35.68	37.44	9.22	35	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	58.93	PK	74	15.07	53.55	33.71	6.98	35.91	4.78
4924.00	50.45	AV	54	3.55	43.73	33.71	6.98	35.91	4.78
5105.50	47.81	PK	74	26.19	41.24	34.34	7.09	34.27	7.17
5105.50	--	AV	54	--	--	--	--	--	--
7386.00	48.86	PK	74	25.14	37.4	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	59.17	PK	74	14.83	54.39	33.71	6.98	35.91	4.78
4924.00	52.04	AV	54	1.96	47.26	33.71	6.98	35.91	4.78
5105.50	48.02	PK	74	25.98	40.85	34.34	7.09	34.27	7.17
5105.50	--	AV	54	--	--	--	--	--	--
7386.00	47.38	PK	74	26.62	35.50	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RMS detector is for AV value.

Results of Band Edges Test (Radiated)

Note: 802.11b/802.11g/802.11n (H20) all have been tested, only worse case 802.11b is reported

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2412.00	116.83	PK	--	--	83.44	28.78	4.61	0	33.39
2412.00	110.01	AV	--	--	76.62	28.78	4.61	0	33.39
2357.75	43.76	PK	74	30.24	10.68	28.52	4.56	0	33.08
2357.75	--	AV	54	--	--	--	--	--	--
2390.00	58.08	PK	74	15.92	24.76	28.72	4.60	0	33.32
2390.00	50.44	AV	54	3.56	17.12	28.72	4.60	0	33.32
2400.00	60.01	PK	74	13.99	26.62	28.78	4.61	0	33.39
2400.00	51.78	AV	54	2.22	18.39	28.78	4.61	0	33.39

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2412.00	116.01	PK	--	--	82.62	28.78	4.61	0	33.39
2412.00	109.87	AV	--	--	76.48	28.78	4.61	0	33.39
2357.75	44.24	PK	74	29.76	11.16	28.52	4.56	0	33.08
2357.75	--	AV	54	--	--	--	--	--	--
2390.00	57.05	PK	74	16.95	23.73	28.72	4.60	0	33.32
2390.00	50.49	AV	54	3.51	17.17	28.72	4.60	0	33.32
2400.00	61.67	PK	74	12.33	28.28	28.78	4.61	0	33.39
2400.00	50.42	AV	54	3.58	17.03	28.78	4.61	0	33.39

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2462.00	117.08	PK	--	--	83.46	28.92	4.7	0	33.62
2462.00	110.51	AV	--	--	76.89	28.92	4.7	0	33.62
2483.50	43.93	PK	74	30.07	10.3	28.93	4.7	0	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2486.75	43.26	PK	74	30.74	9.62	28.94	4.71	0	33.64
2486.75	--	AV	54	--	--	--	--	--	--
2500.00	44.32	PK	74	29.68	10.64	28.96	4.72	0	33.68
2500.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2462.00	117.86	PK	--	--	84.24	28.92	4.7	0	33.62
2462.00	110.32	AV	--	--	76.7	28.92	4.7	0	33.62
2483.50	43.91	PK	74	30.09	10.28	28.93	4.7	0	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2486.75	43.04	PK	74	30.96	9.4	28.94	4.71	0	33.64
2486.75	--	AV	54	--	--	--	--	--	--
2500.00	42.70	PK	74	31.30	9.02	28.96	4.72	0	33.68
2500.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RMS detector is for AV value.

3.3. Maximum Conducted Output Power

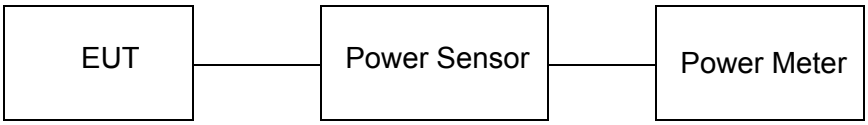
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

WIFI

Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
802.11b	01	20.97	30.00	Pass
	06	20.86		
	11	20.92		
802.11g	01	23.28	30.00	Pass
	06	23.16		
	11	23.19		
802.11n(HT20)	01	23.18	30.00	Pass
	06	22.98		
	11	22.91		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

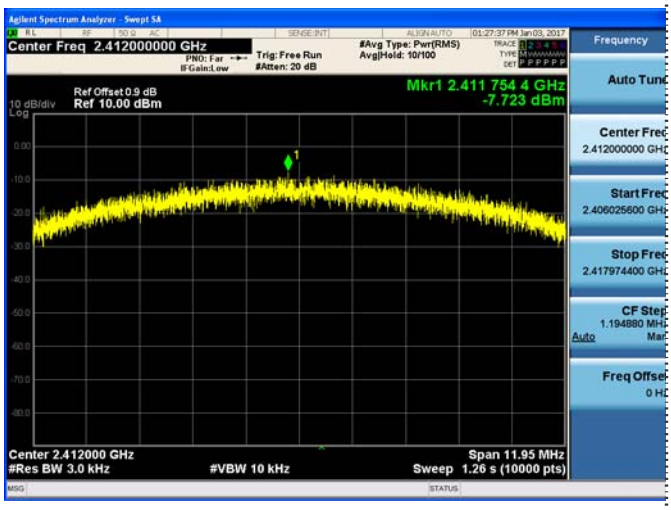
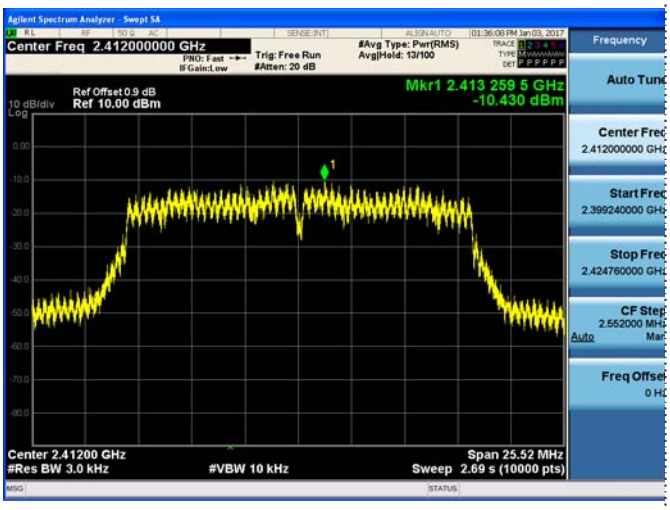
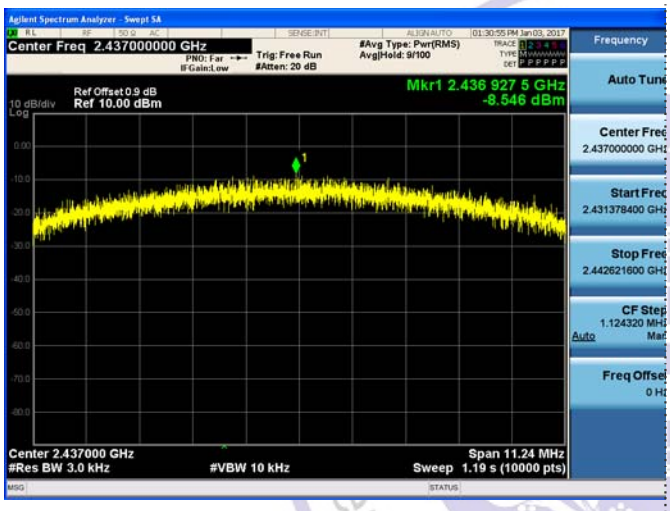
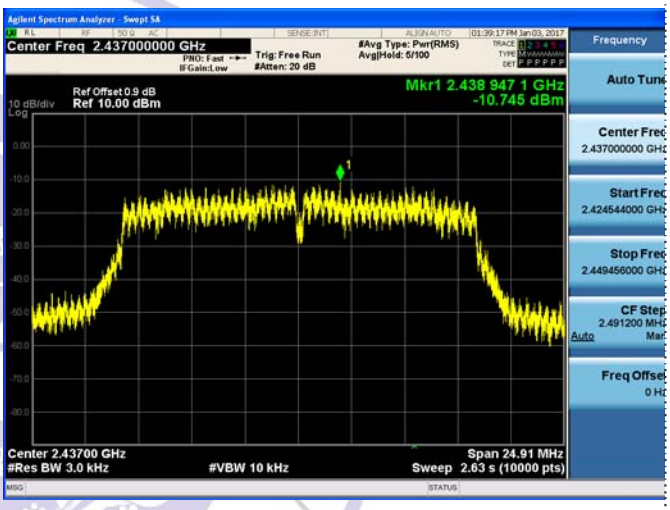
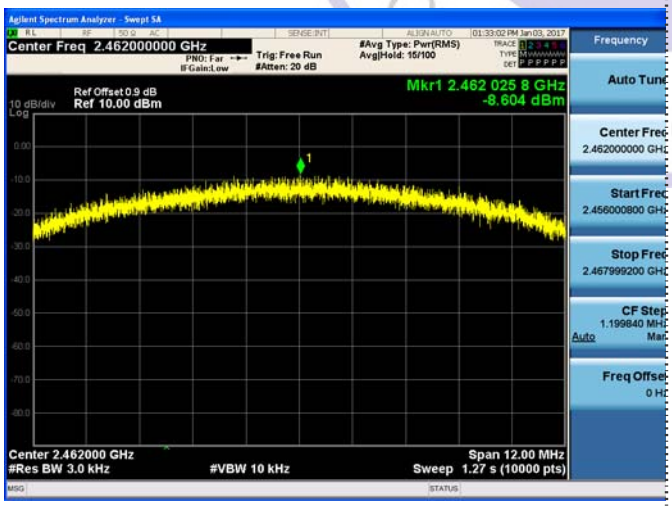
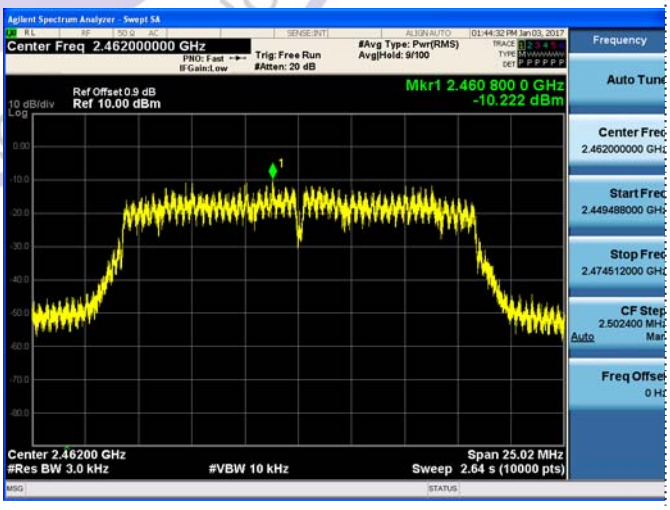
Test Configuration

Test Results

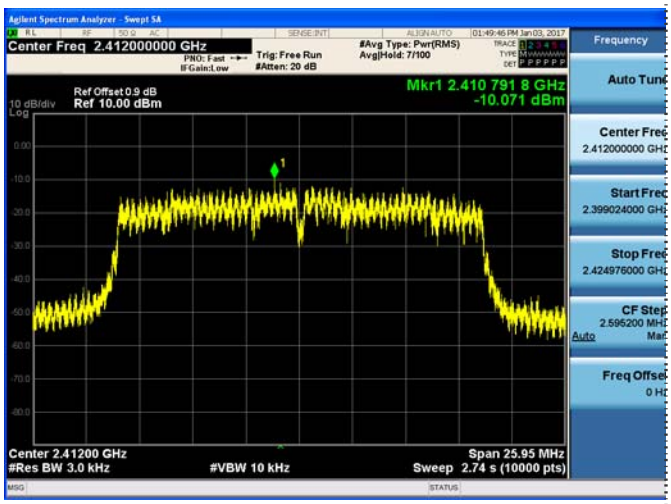
WIFI

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-7.723	8.00	Pass
	06	-8.546		
	11	-8.604		
802.11g	01	-10.430	8.00	Pass
	06	-10.745		
	11	-10.222		
802.11n(HT20)	01	-10.071	8.00	Pass
	06	-10.483		
	11	-11.134		

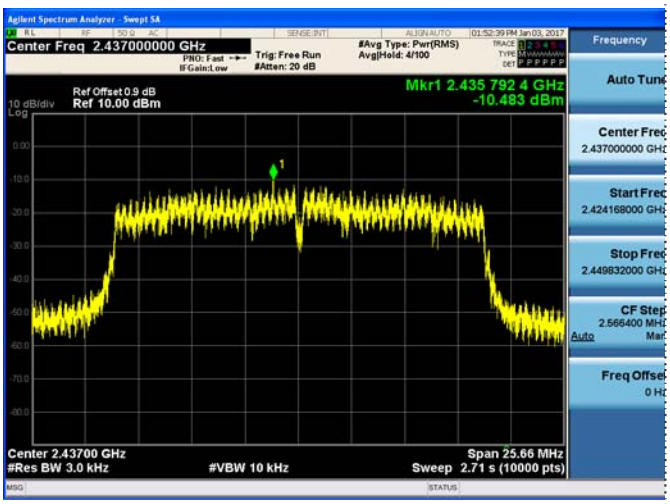
Test plot as follows:

802.11b	802.11g
	
CH01	CH01
	
CH06	CH06
	
CH11	CH11

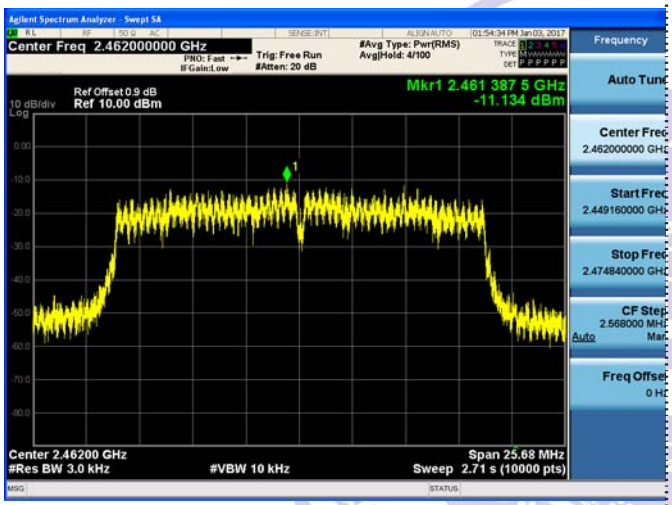
802.11n(HT20)



CH01



CH03



CH11

3.5. 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

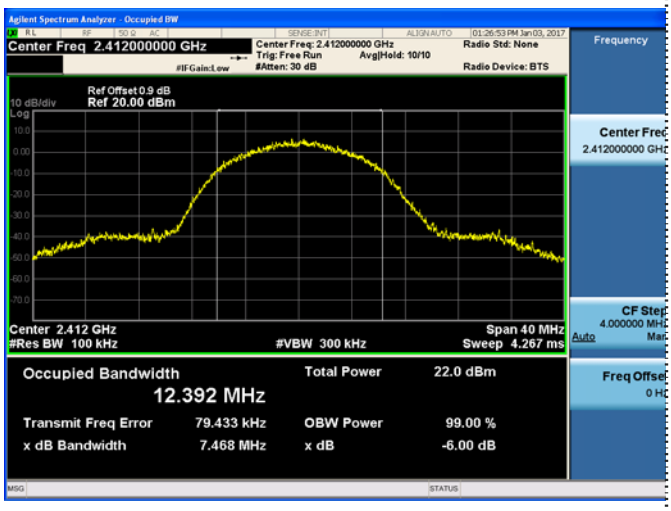
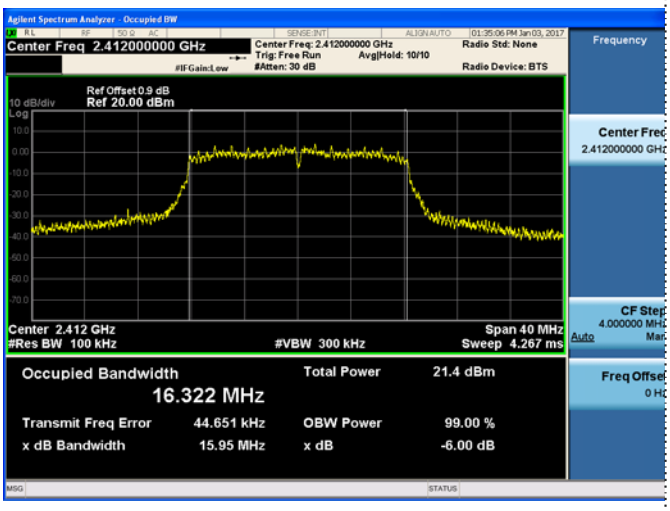
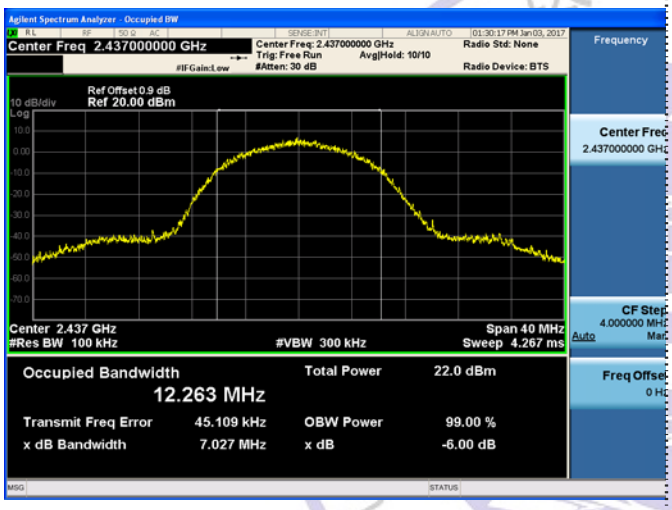
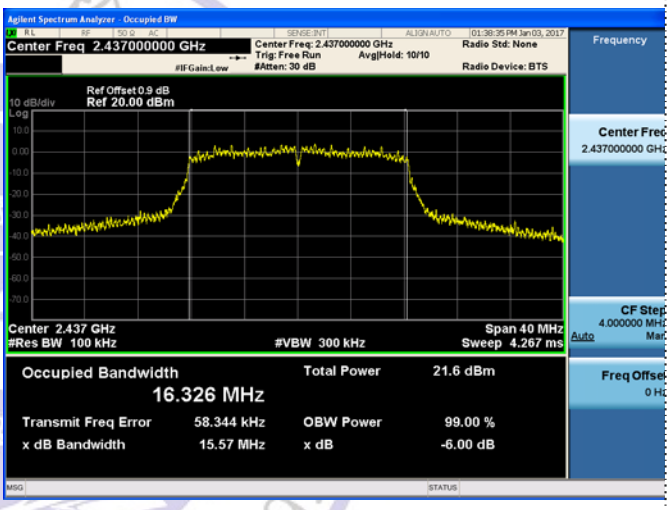
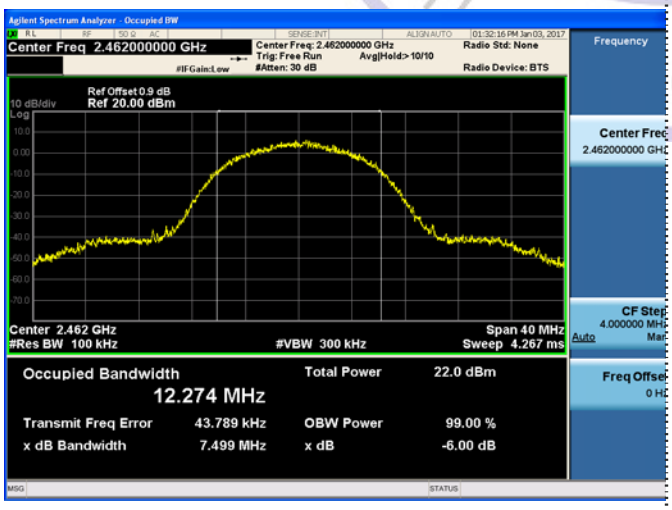
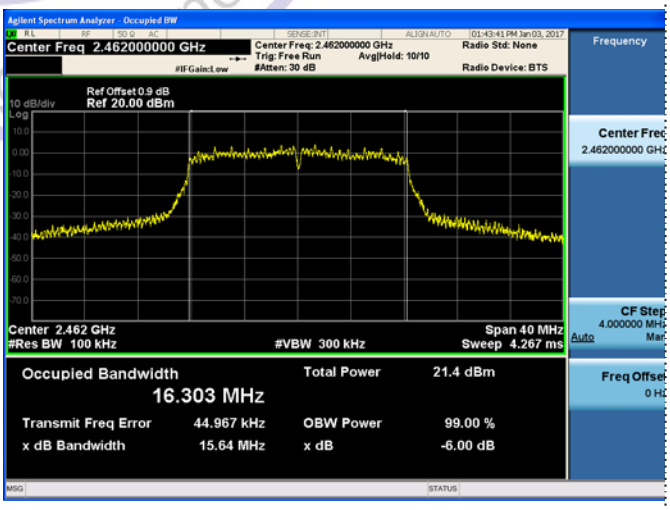
Test Configuration

Test Results

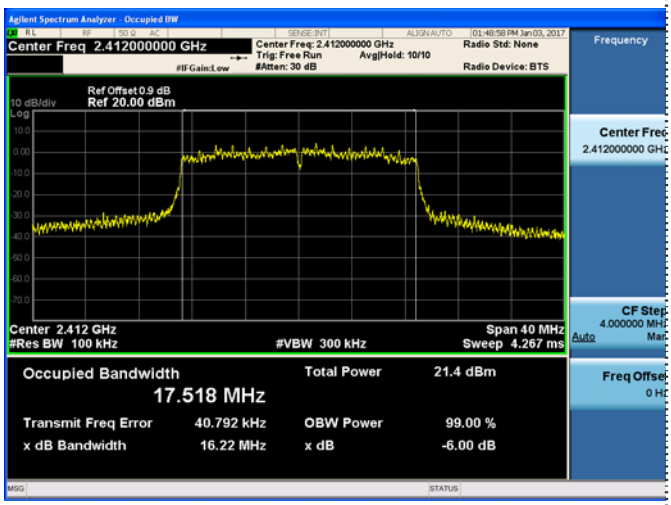
WIFI

Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
802.11b	01	7.468	12.392	≥500	Pass
	06	7.027	12.263		
	11	7.499	12.274		
802.11g	01	15.95	16.322	≥500	Pass
	06	15.57	16.326		
	11	15.64	16.303		
802.11n(HT20)	01	16.22	17.518	≥500	Pass
	06	16.04	17.499		
	11	16.05	17.508		

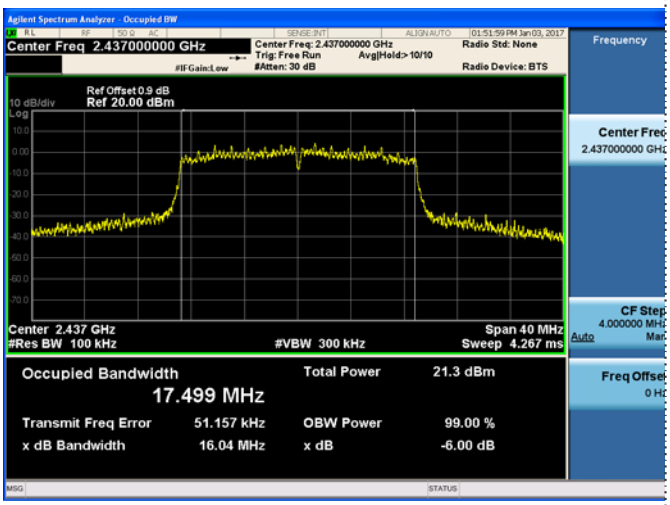
Test plot as follows:

802.11b	802.11g
	
CH01	CH01
	
CH06	CH06
	
CH11	CH11

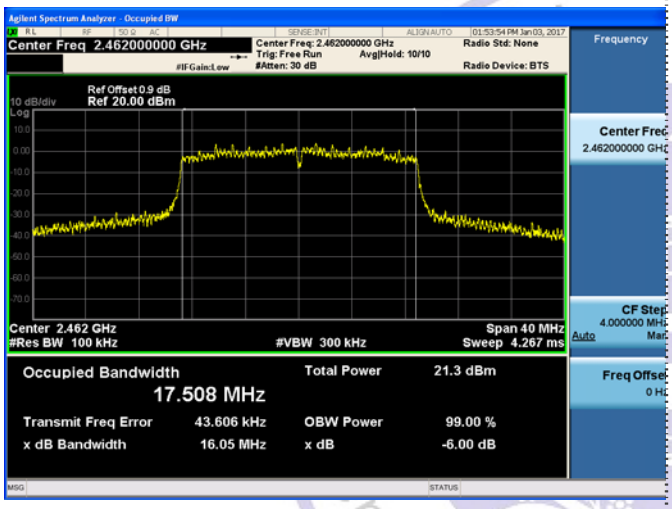
802.11n(HT20)



CH01



CH06



CH11

3.6. Out-of-band Emissions

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

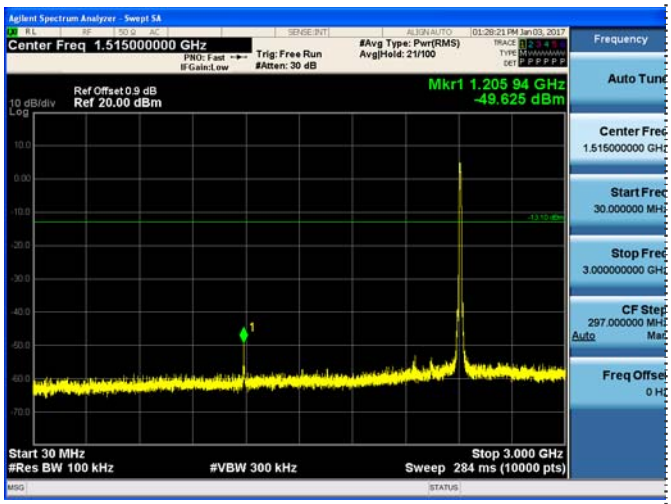
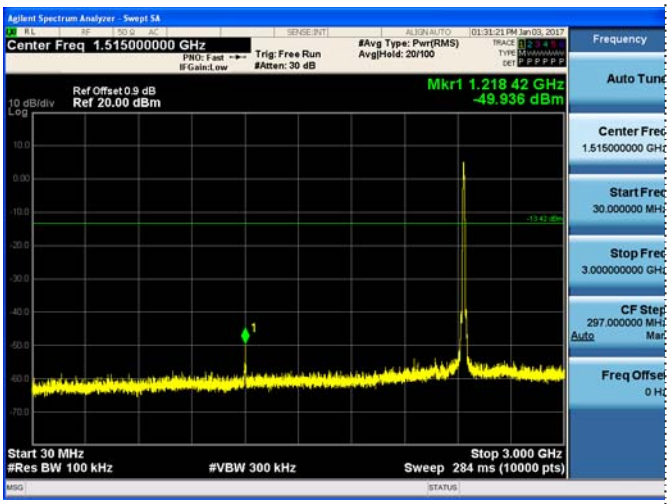
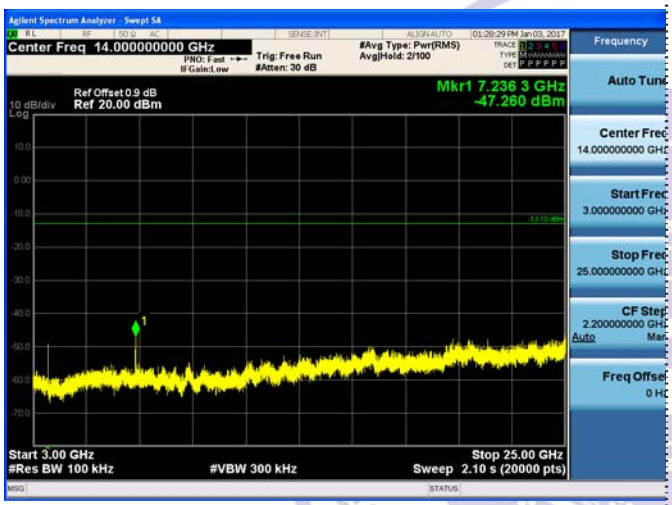
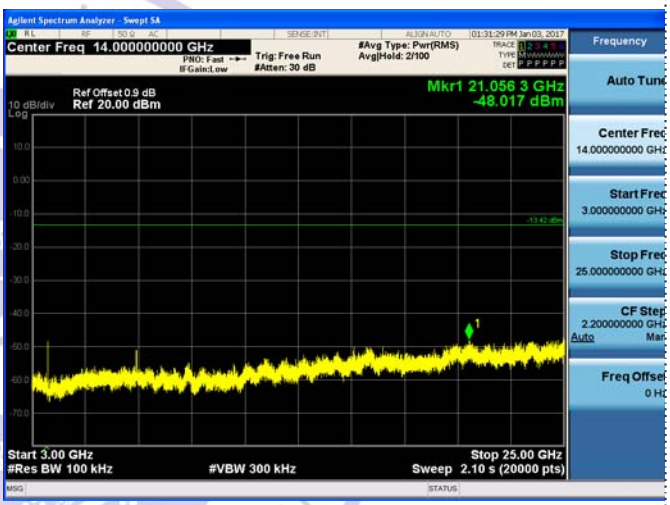
Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

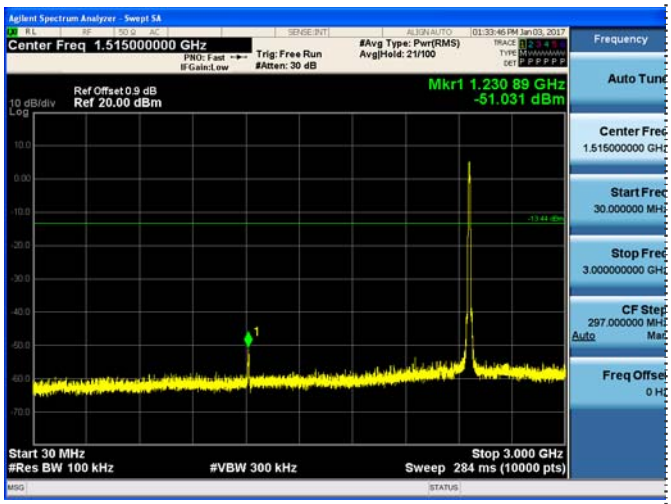
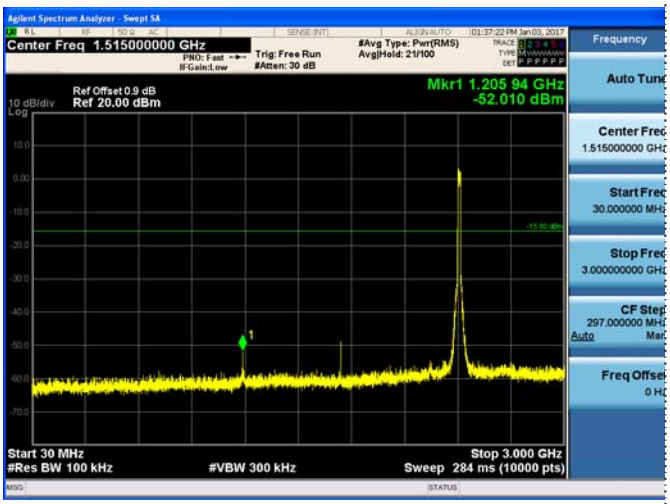
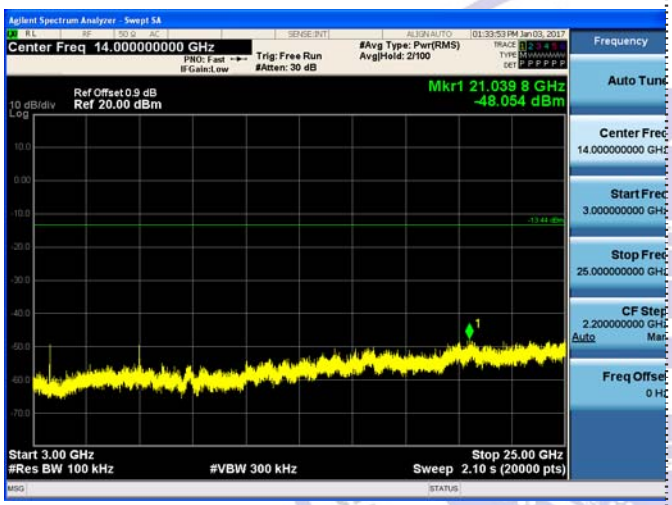
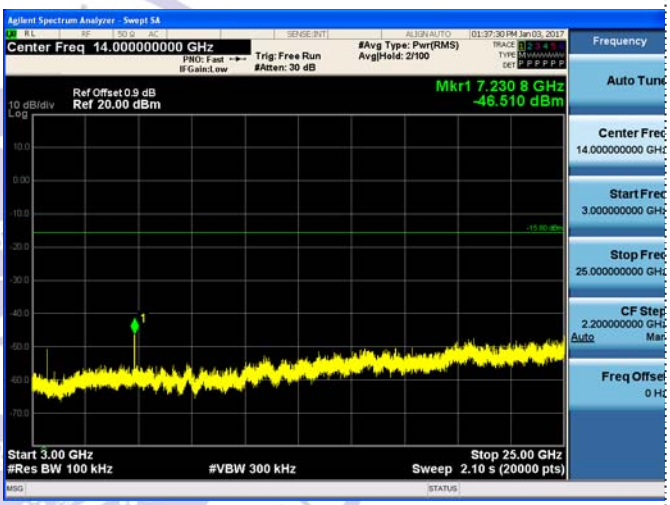
Test Configuration

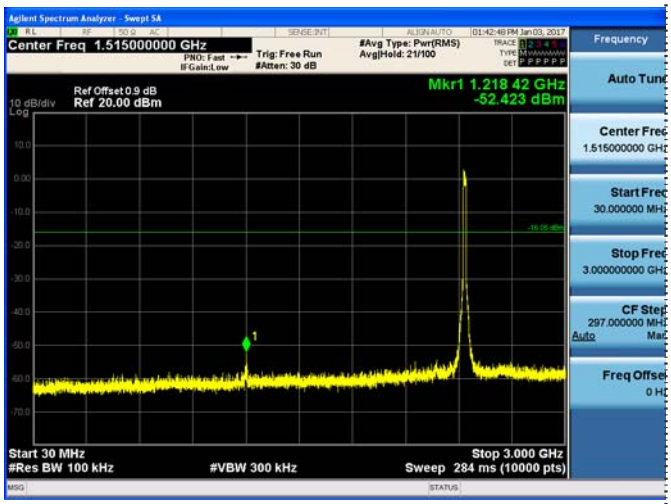
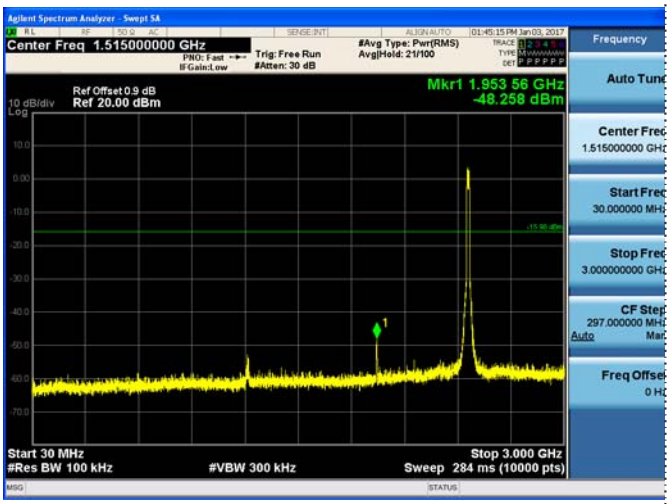
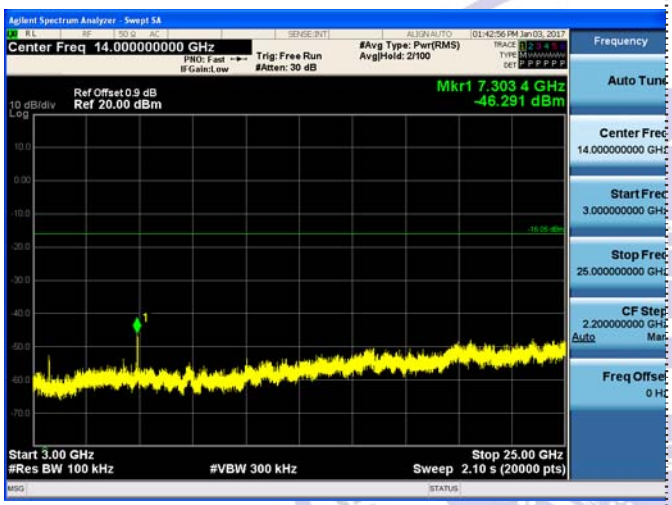
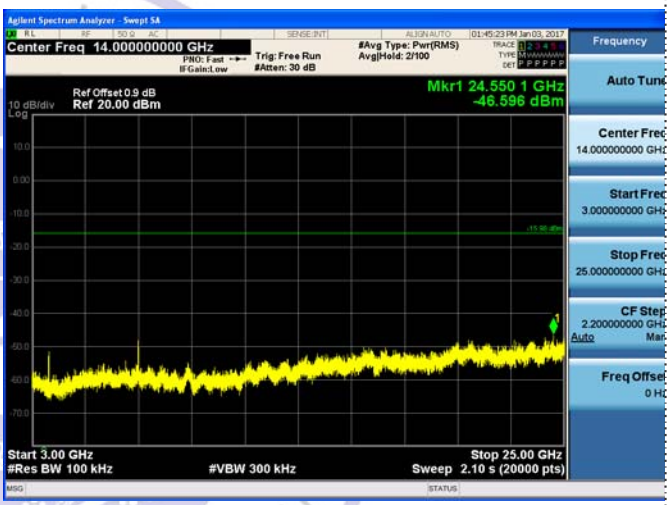
Test Results

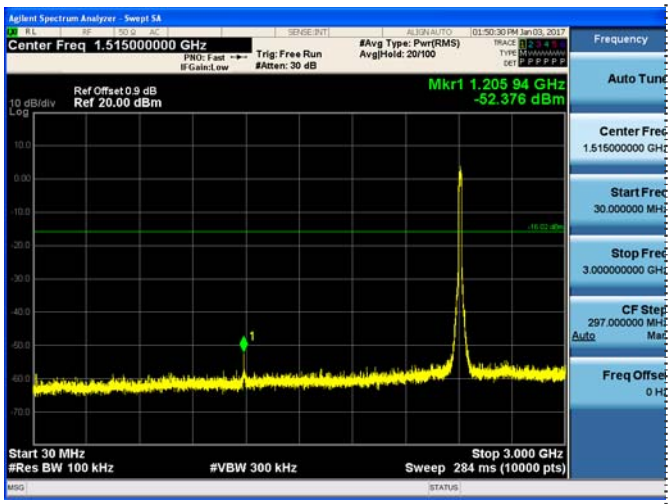
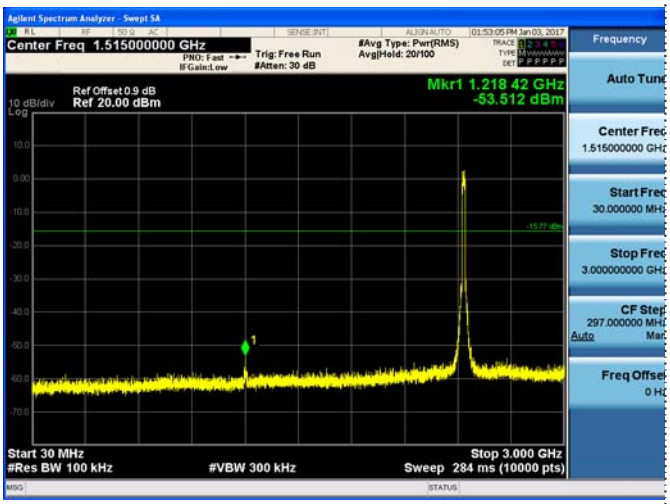
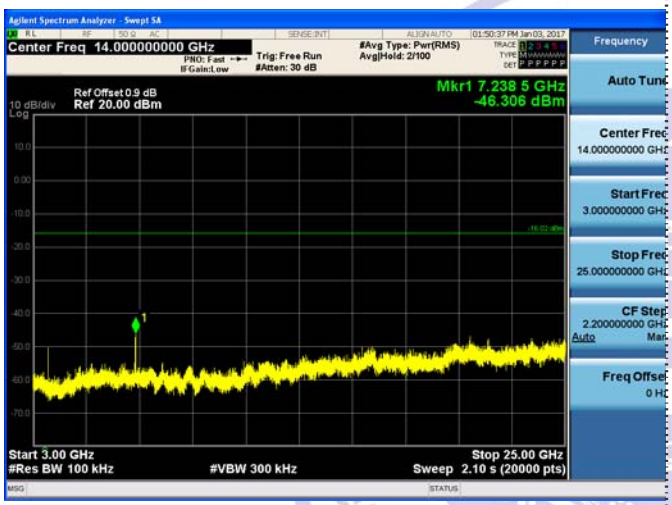
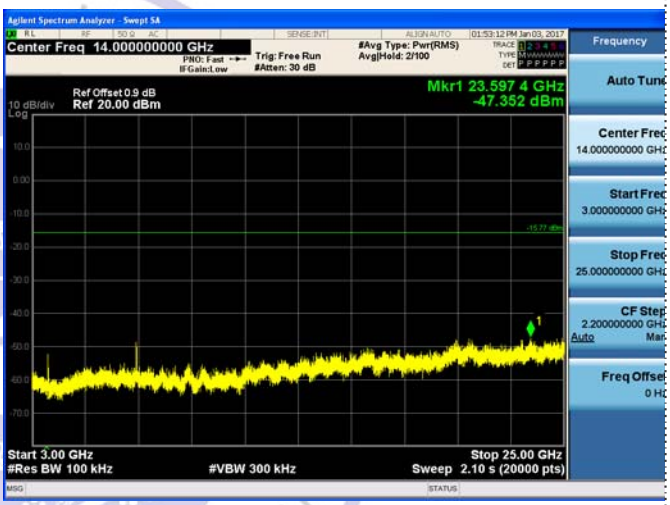
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

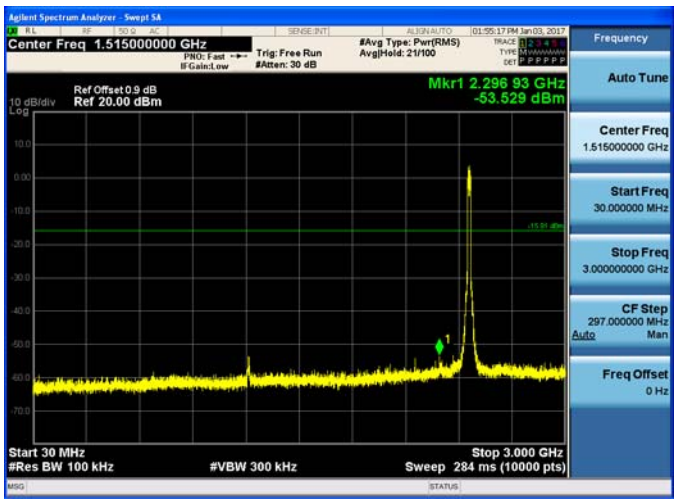
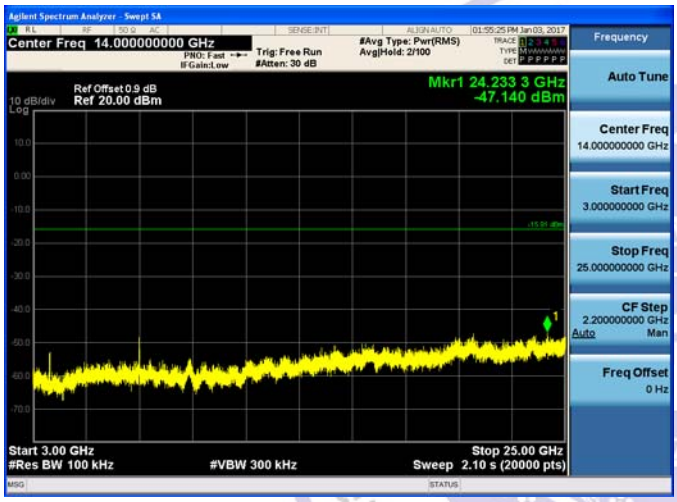
Test plot as follows:

802.11b CH01	*802.11b CH06*
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

802.11b CH11	*802.11g CH01*
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

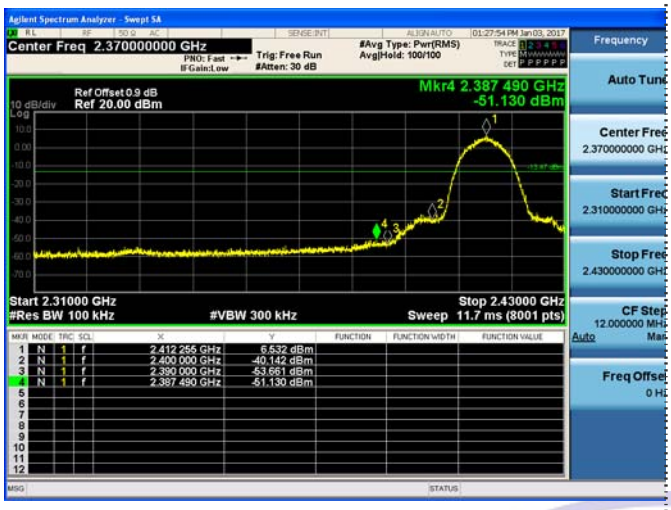
802.11g CH06	*802.11g CH11*
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

802.11n(HT20) CH01	*802.11n(HT20) CH06*
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

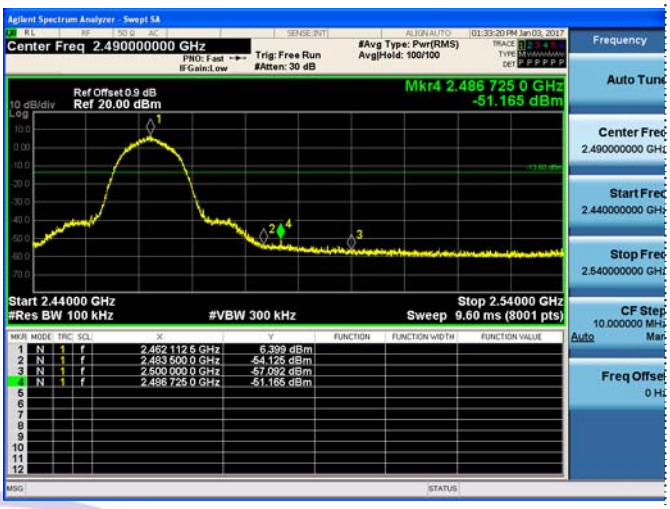
802.11n(HT20) CH11	
	
30MHz-3GHz	
	
3GHz-25GHz	

Band-edge Measurements for RF Conducted Emissions:

802.11b



Left bandedge



Right bandedge

802.11g

Left bandedge

Right bandedge

802.11n(HT20)

Left bandedge

Right bandedge

3.7. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

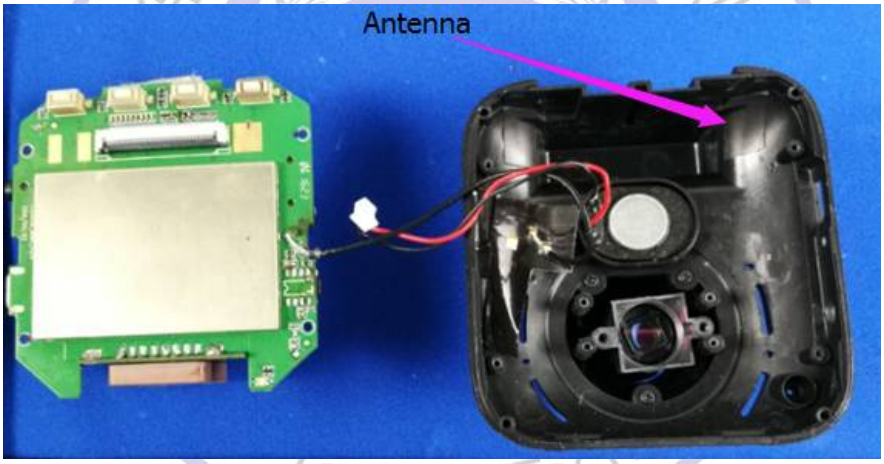
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

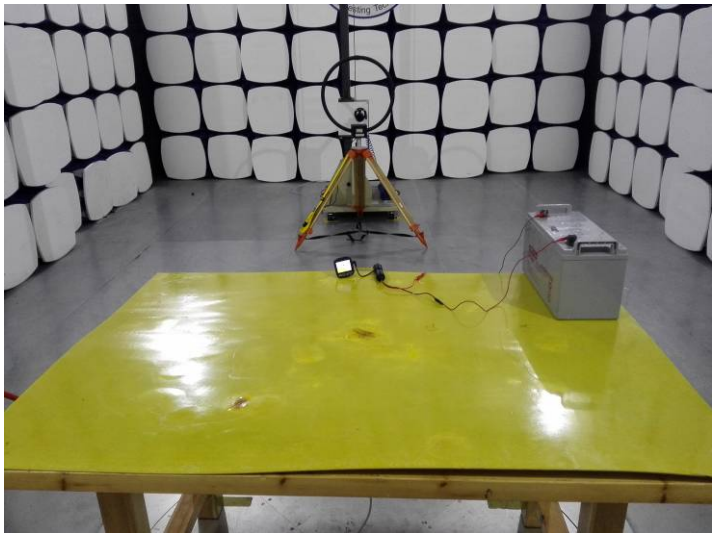
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

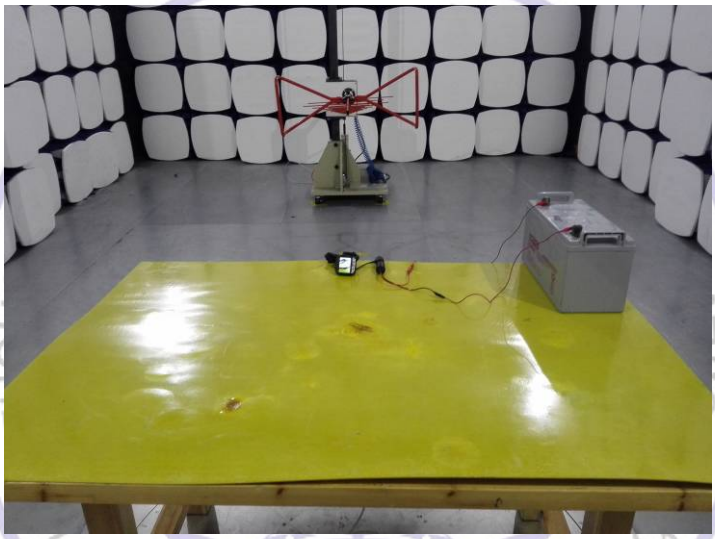
Test Result:

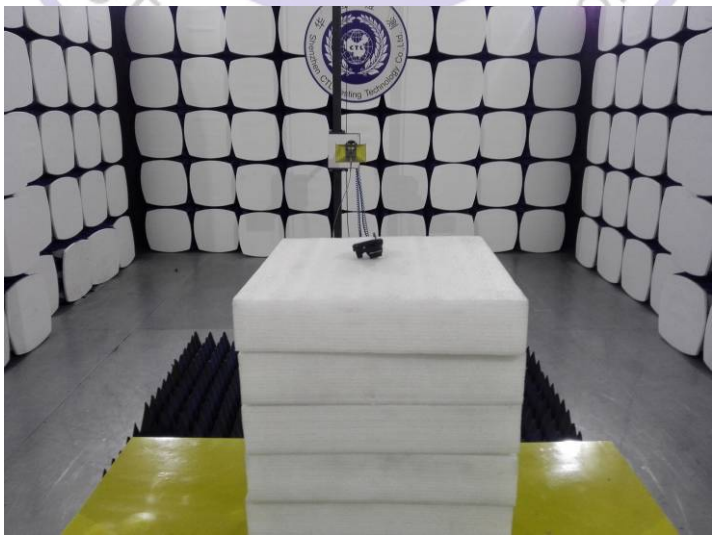
The maximum gain of antenna was 2dBi.



4. Test Setup Photos of the EUT





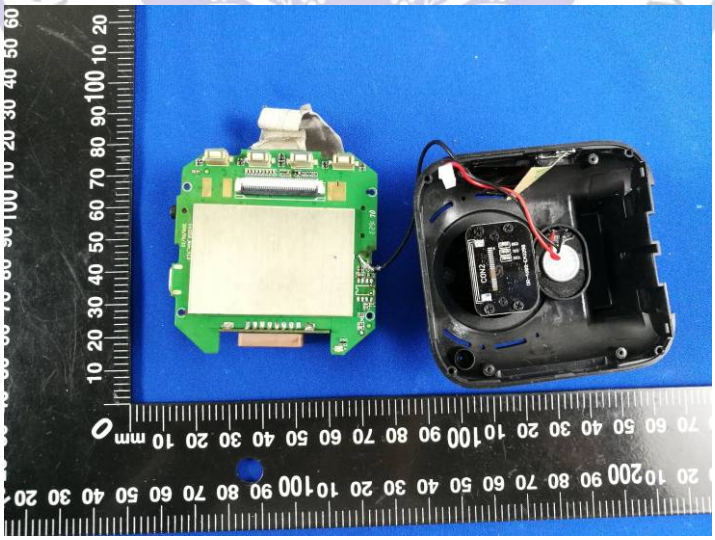


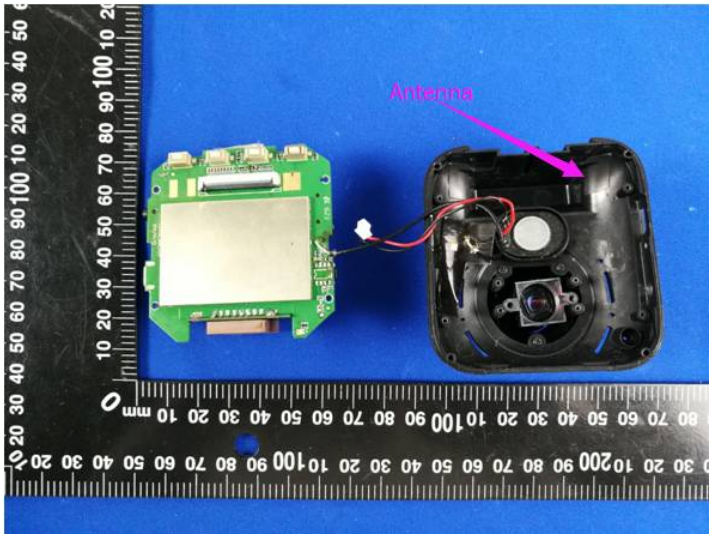
5. Photos of the EUT

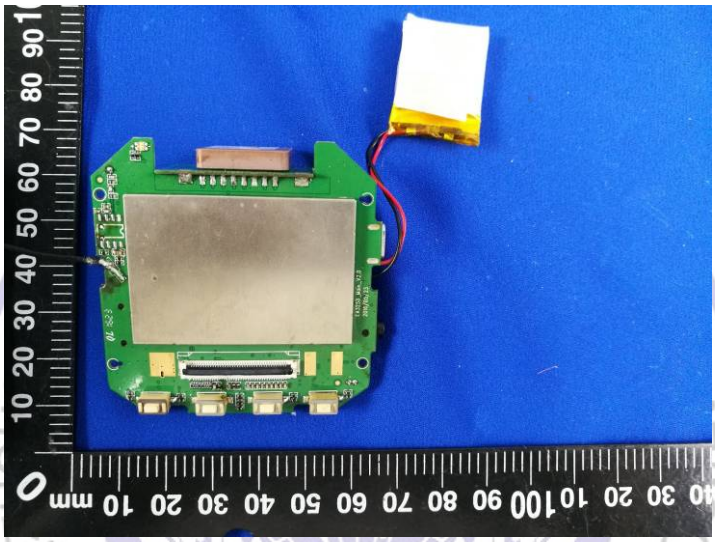
External Photos of EUT

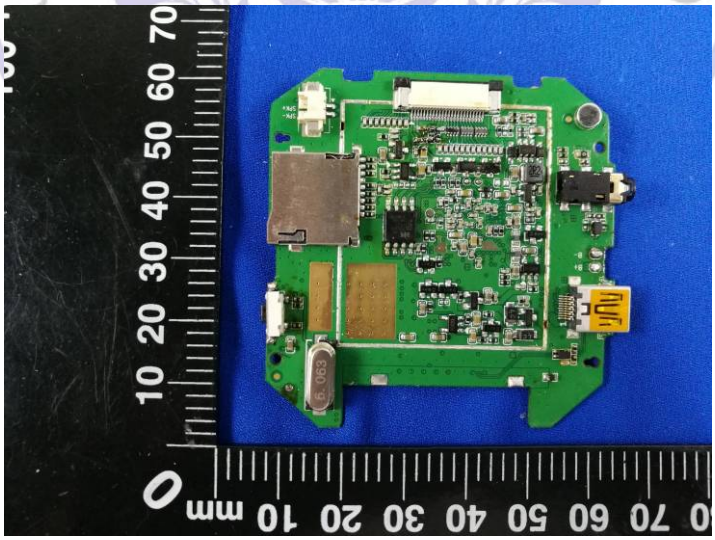

GPS

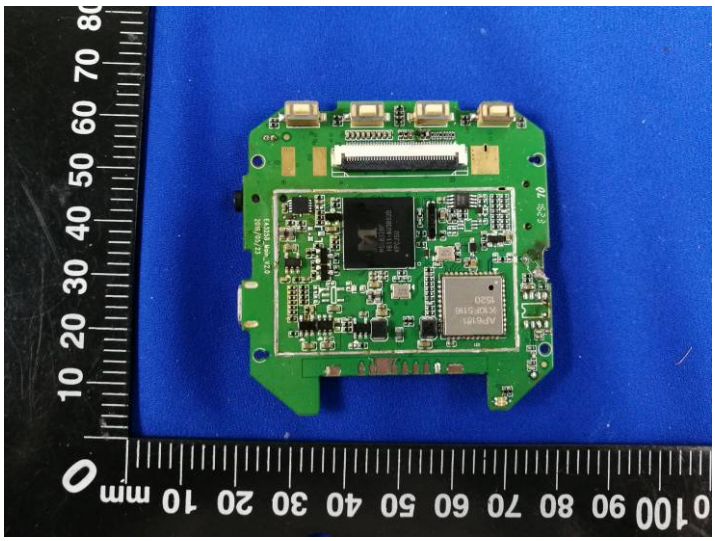
Internal Photos of EUT

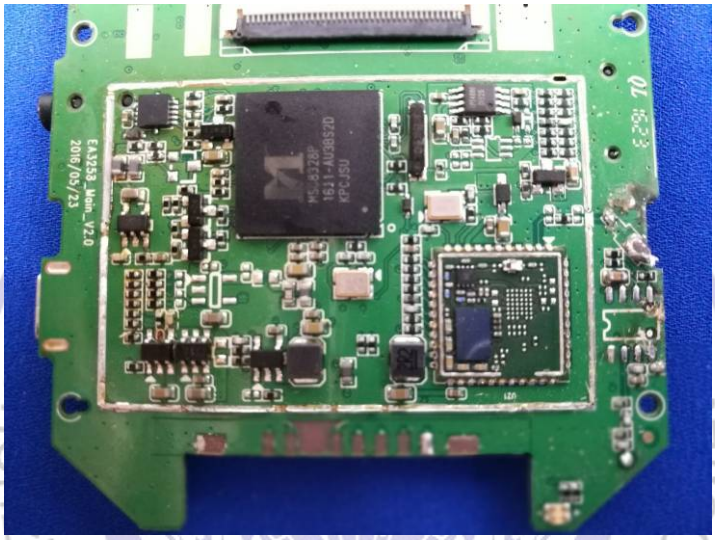


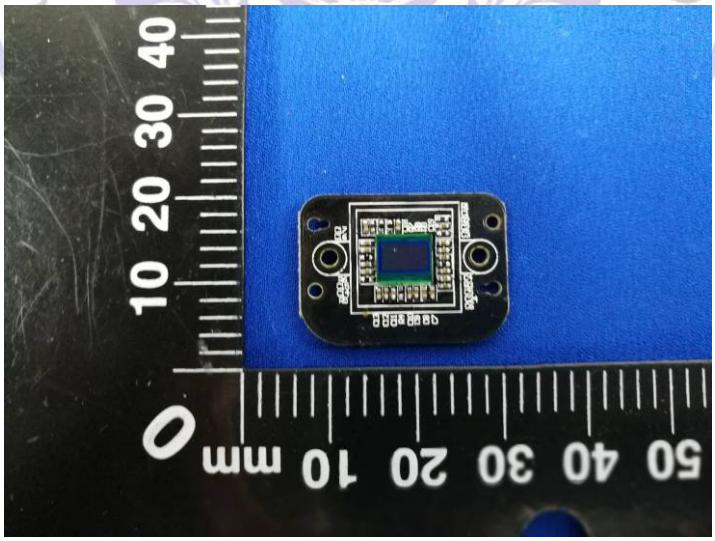

Antenna

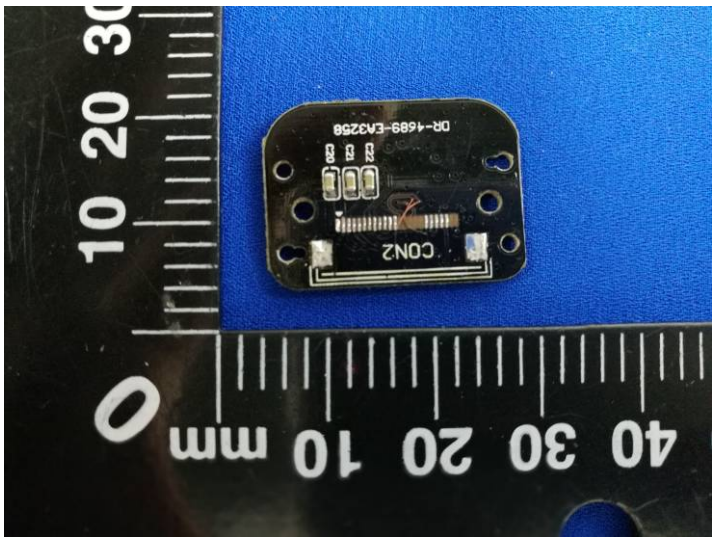


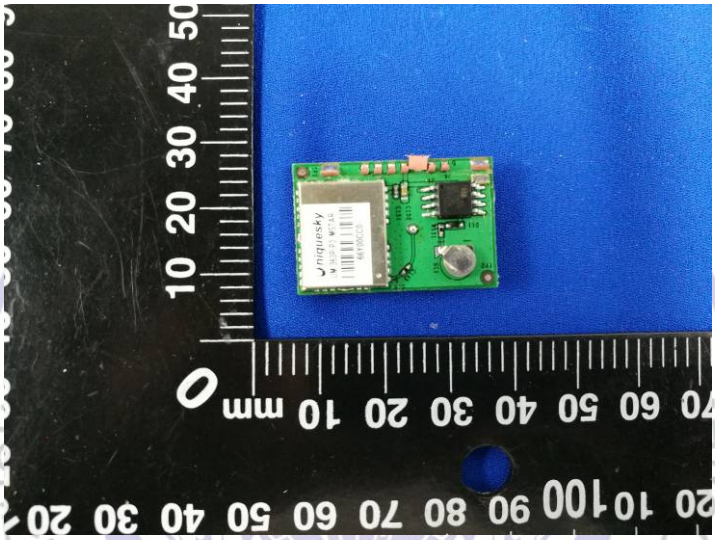


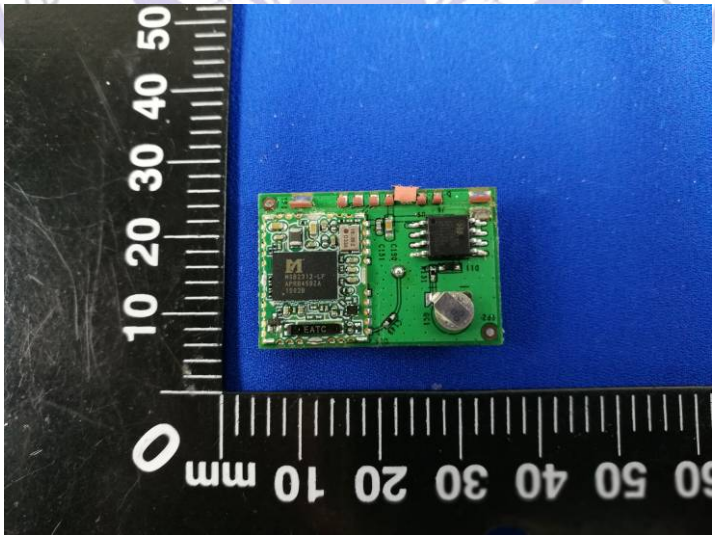


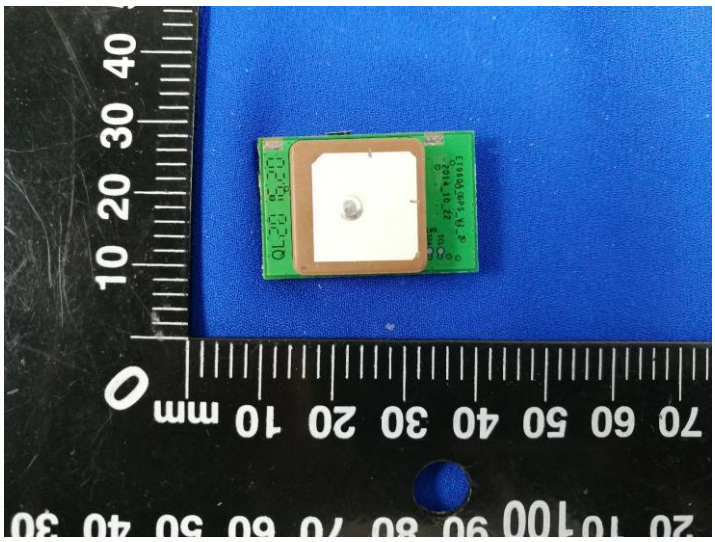





CON2







********** End of Report **********