

TEST REPORT

Reference No. : WTS19S09068009W
FCC ID..... : 2AOT9-NBDVR380GWX
Applicant..... : Portable Multimedia Limited
Address : Unit 2,Caerphilly Business Park, Caerphilly, Mid Glamorgan
CF833ED, United Kingdom
Manufacturer : Shenzhen Samoon Technology Co.,Ltd
Address : Floor5-6&9, Building 7, Zhongyuntai Ind. Park, Yingrenshi Road
Crossing,Shiyan Town, Bao'an District, Shenzhen, Guangdong,China.
Post code: 518108.
Product..... : 380GWX
Model(s)..... : NBDVR380GWX, FE-NBDVR380GWX, NBDVR380GWX-WHT,
FE-NBDVR380GWX-WHT, VYDVR380GWX, FE-VYDVR380GWX,
NBDVR381GWX, FE-NBDVR381GWX, NBDVR382GWX,
FE-NBDVR382GWX, NBDVR380GWXRCB,
FE-NBDVR380GWXRCB
Brand Name : Nextbase & Voyager
Standards..... : FCC CFR47 Part 15 C Section 15.247:2019
Date of Receipt sample..... : 2019-10-10
Date of Test..... : 2019-10-10 to 2019-10-23
Date of Issue : 2019-10-24
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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2. Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS19S09068009W	2019-10-10	2019-10-10 to 2019-10-23	2019-10-24	original	-	Valid

3. General Information

3.1 General Description of E.U.T

Product Name:	380GWX
Model No.:	NBDVR380GWX, FE-NBDVR380GWX, NBDVR380GWX-WHT, FE-NBDVR380GWX-WHT, VYDVR380GWX, FE-VYDVR380GWX, NBDVR381GWX, FE-NBDVR381GWX, NBDVR382GWX, FE-NBDVR382GWX, NBDVR380GWXRCB, FE-NBDVR380GWXRCB
Model Difference:	Only the model names and brand names are different. The model NBDVR380GWX is the tested sample.
Operation Frequency:	802.11b/g/n HT20/n HT40: 2412MHz ~ 2462MHz
RF output power:	9.98dBm
Antenna installation:	PCB Printed Antenna
Type of modulation:	IEEE 802.11b (CCK/QPSK/BPSK, 11Mbps max.) IEEE 802.11g (BPSK/QPSK/16QAM/64QAM, 54Mbps max.) IEEE 802.11n (BPSK/QPSK/16QAM/64QAM, HT20: 72Mbps max., HT40: 150Mbps max.)

3.2 Details of E.U.T

Ratings:	5Vdc /1.5A power by 12-24Vdc Car Power Cable
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3.3 Channel List

WIFI

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	-

3.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Frequency Range	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
	802.11n HT40	150 Mbps	3/9	TX
Transmitter Spurious Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

4. Equipment Used during Test

4.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2019-04-19	2020-04-18
2	Amplifier	Agilent	8447D	2944A10178	2019-04-19	2020-04-18
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2019-04-28	2020-04-27
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2019-10-14	2020-10-13
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2019-04-19	2020-04-18
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2018-10-25	2019-10-24
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2019-04-19	2020-04-18
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2019-04-19	2020-04-18
9	Broad-band Horn Antenna	SCHWARZBECK	BBV 9721	100472	2019-09-17	2020-09-16
10	Spectrum Analyzer	R&S	FSP40	100501	2018-11-13	2019-11-12
11	Coaxial Cable	ZT40-2.92J-2.92J-2.0M	10MHz-40GHz	17100919	2019-10-14	2020-10-13
12	Spectrum Analyzer	R&S	FSP30	100091	2019-04-19	2020-04-18
3m Semi-anechoic Chamber for Radiation Emissions(TDK)						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2019-04-20	2020-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2019-05-24	2020-05-23
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2019-04-28	2020-04-27
4	Amplifier	ANRITSU	MH648A	M43381	2019-04-19	2020-04-18
5	Cable	HUBER+SUHNER	CBL2	525178	2019-04-20	2020-04-19
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2019-09-12	2020-09-11
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2019-09-10	2020-09-09
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2019-09-10	2020-09-09

4.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

4.4 Test Facility

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

5. Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.247 15.205(a) 15.209(a)	Pass
Bandwidth	15.247(a)(2)	Pass
Maximum Peak Output Power	15.247(b)(3),(4)	Pass
Power Spectral Density	15.247(e)	Pass
Band Edge	15.247(d)	Pass
Antenna Requirement	15.203	Pass
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

Remark: Conducted Emissions testing are inapplicable for EUT powered by battery.

6. Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

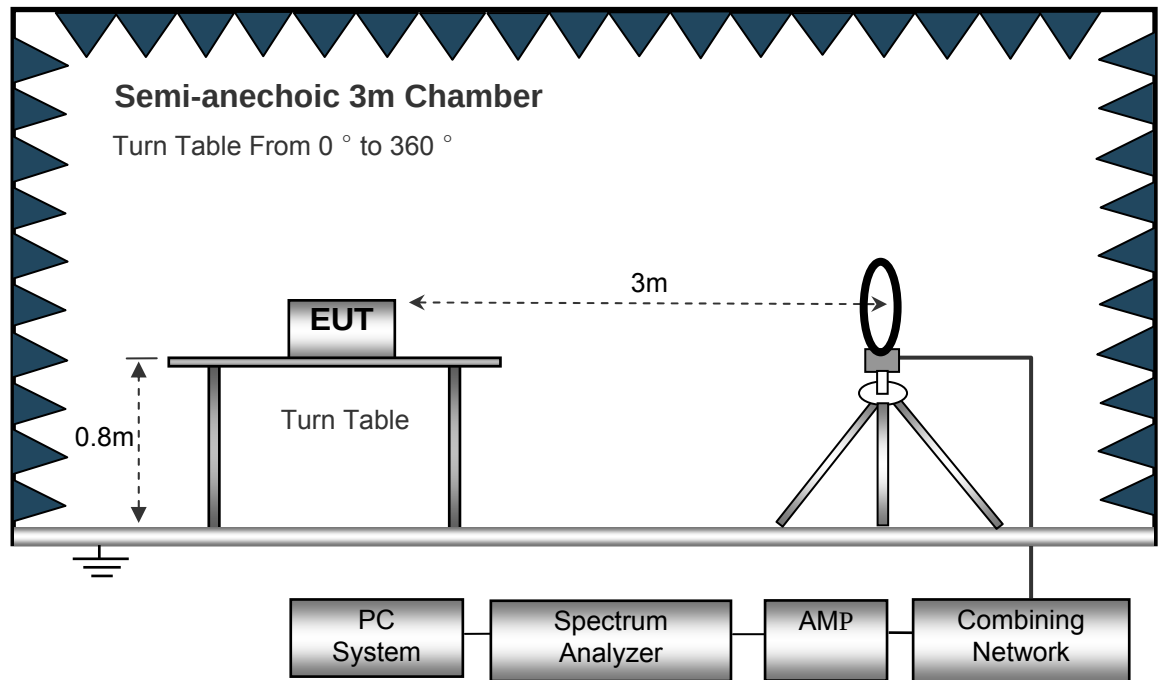
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

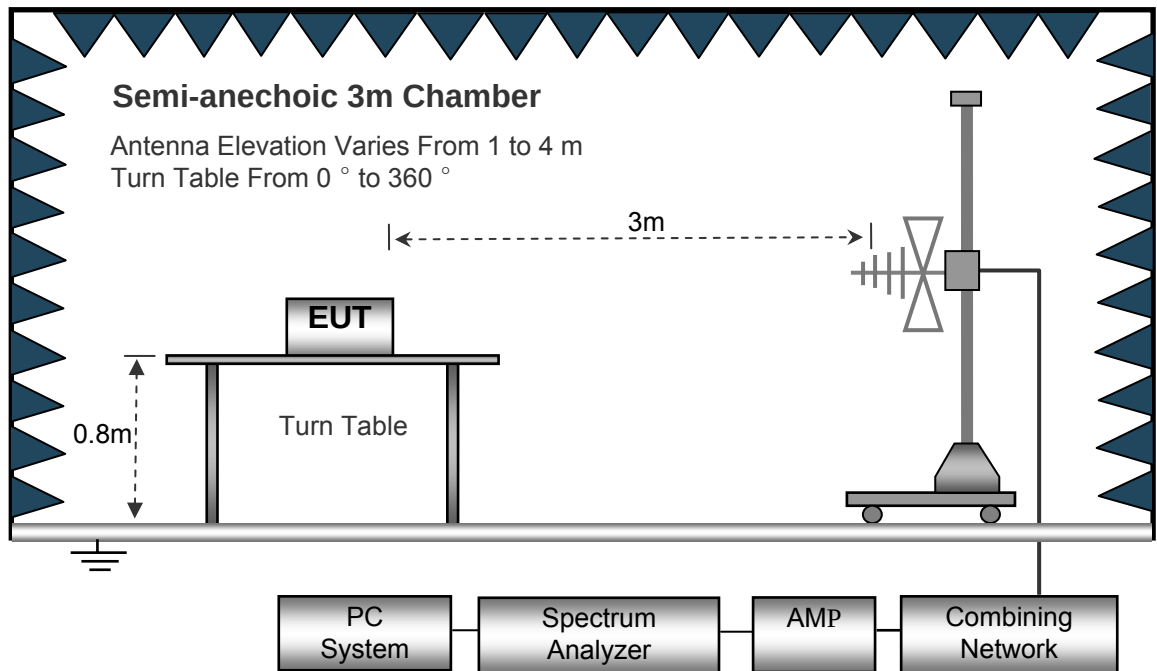
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

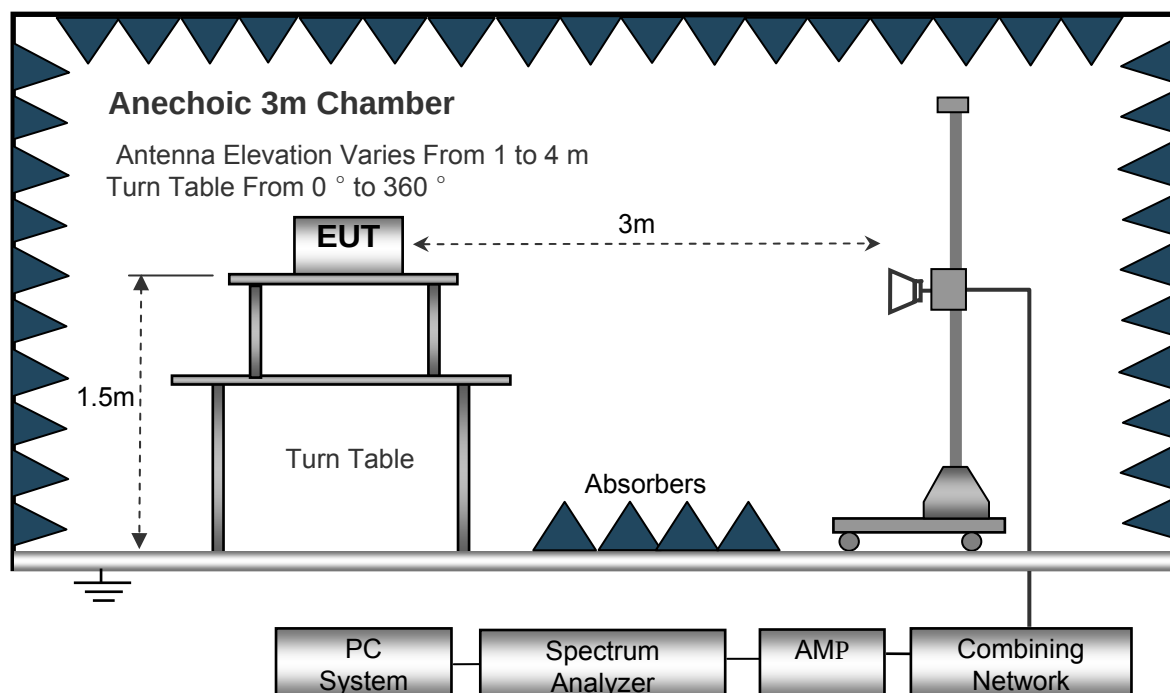
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



6.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
 IF Bandwidth..... 10kHz
 Video Bandwidth..... 10kHz
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 3MHz
 Detector Ave.
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 10Hz

6.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

6.6 Summary of Test Results

Test Frequency : 9kHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
485.88	13.65	PK	23	1.2	H	21.09	34.74	45.00	-10.26
485.88	12.64	PK	1	1.1	V	21.09	33.73	45.00	-11.27
4824.00	51.36	PK	5	1.3	V	-1.05	50.31	74.00	-23.69
4824.00	42.80	Ave	5	1.3	V	-1.05	41.75	54.00	-12.25
7236.00	46.72	PK	113	1.9	H	1.34	48.06	74.00	-25.94
7236.00	41.67	Ave	113	1.9	H	1.34	43.01	54.00	-10.99
2325.93	49.37	PK	179	1.6	V	-13.19	36.18	74.00	-37.82
2325.93	37.04	Ave	179	1.6	V	-13.19	23.85	54.00	-30.15
2382.96	49.55	PK	166	1.8	H	-13.15	36.40	74.00	-37.60
2382.96	37.54	Ave	166	1.8	H	-13.15	24.39	54.00	-29.61
2495.81	48.03	PK	12	1.4	V	-13.08	34.95	74.00	-39.05
2495.81	36.54	Ave	12	1.4	V	-13.08	23.46	54.00	-30.54

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
485.88	14.23	PK	226	1.3	H	21.09	35.32	45.00	-9.68
485.88	14.09	PK	91	1.5	V	21.09	35.18	45.00	-9.82
4874.00	49.46	PK	120	1.7	V	-0.63	48.83	74.00	-25.17
4874.00	44.24	Ave	120	1.7	V	-0.63	43.61	54.00	-10.39
7311.00	45.24	PK	146	1.4	H	2.21	47.45	74.00	-26.55
7311.00	42.79	Ave	146	1.4	H	2.21	45.00	54.00	-9.00
2339.71	52.52	PK	133	1.9	V	-13.19	39.33	74.00	-34.67
2339.71	37.34	Ave	133	1.9	V	-13.19	24.15	54.00	-29.85
2386.52	48.26	PK	77	1.7	H	-13.14	35.12	74.00	-38.88
2386.52	38.84	Ave	77	1.7	H	-13.14	25.70	54.00	-28.30
2489.07	49.77	PK	177	1.7	V	-13.09	36.68	74.00	-37.32
2489.07	36.13	Ave	177	1.7	V	-13.09	23.04	54.00	-30.96

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
485.88	13.77	PK	81	1.2	H	21.09	34.86	45.00	-10.14
485.88	14.09	PK	125	1.1	V	21.09	35.18	45.00	-9.82
4924.00	50.34	PK	109	1.2	V	-0.25	50.09	74.00	-23.91
4924.00	44.75	Ave	109	1.2	V	-0.25	44.50	54.00	-9.50
7386.00	48.22	PK	143	1.7	H	2.85	51.07	74.00	-22.93
7386.00	41.31	Ave	143	1.7	H	2.85	44.16	54.00	-9.84
2317.65	51.33	PK	234	1.9	V	-13.19	38.14	74.00	-35.86
2317.65	37.21	Ave	234	1.9	V	-13.19	24.02	54.00	-29.98
2355.11	49.97	PK	297	1.3	H	-13.14	36.83	74.00	-37.17
2355.11	36.66	Ave	297	1.3	H	-13.14	23.52	54.00	-30.48
2494.86	49.20	PK	303	1.2	V	-13.09	36.11	74.00	-37.89
2494.86	36.85	Ave	303	1.2	V	-13.09	23.76	54.00	-30.24

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Low Channel 2412MHz									
485.88	15.23	PK	132	1.6	H	21.09	36.32	45.00	-8.68
485.88	13.38	PK	90	1.1	V	21.09	34.47	45.00	-10.53
4824.00	51.66	PK	272	1.3	V	-1.06	50.60	74.00	-23.40
4824.00	48.37	Ave	272	1.3	V	-1.06	47.31	54.00	-6.69
7236.00	47.10	PK	318	1.7	H	1.35	48.45	74.00	-25.55
7236.00	46.46	Ave	318	1.7	H	1.35	47.81	54.00	-6.19
2323.09	52.15	PK	18	1.2	V	-13.19	38.96	74.00	-35.04
2323.09	38.94	Ave	18	1.2	V	-13.19	25.75	54.00	-28.25
2383.54	49.33	PK	175	1.1	H	-13.14	36.19	74.00	-37.81
2383.54	36.45	Ave	175	1.1	H	-13.14	23.31	54.00	-30.69
2485.57	48.20	PK	313	1.7	V	-13.08	35.12	74.00	-38.88
2485.57	37.99	Ave	313	1.7	V	-13.08	24.91	54.00	-29.09

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
485.88	14.13	PK	287	1.6	H	21.09	35.22	45.00	-9.78
485.88	12.82	PK	35	1.7	V	21.09	33.91	45.00	-11.09
4874.00	49.64	PK	95	1.8	V	-0.62	49.02	74.00	-24.98
4874.00	48.79	Ave	95	1.8	V	-0.62	48.17	54.00	-5.83
7311.00	47.47	PK	98	1.4	H	2.20	49.67	74.00	-24.33
7311.00	46.28	Ave	98	1.4	H	2.20	48.48	54.00	-5.52
2320.37	51.03	PK	42	1.4	V	-13.19	37.84	74.00	-36.16
2320.37	37.74	Ave	42	1.4	V	-13.19	24.55	54.00	-29.45
2385.15	49.83	PK	205	1.0	H	-13.15	36.68	74.00	-37.32
2385.15	36.97	Ave	205	1.0	H	-13.15	23.82	54.00	-30.18
2490.78	51.87	PK	238	1.3	V	-13.09	38.78	74.00	-35.22
2490.78	38.71	Ave	238	1.3	V	-13.09	25.62	54.00	-28.38

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: High Channel 2462MHz									
485.88	14.54	PK	149	1.5	H	21.09	35.63	45.00	-9.37
485.88	13.49	PK	258	1.6	V	21.09	34.58	45.00	-10.42
4924.00	50.76	PK	306	1.0	V	-0.25	50.51	74.00	-23.49
4924.00	46.47	Ave	306	1.0	V	-0.25	46.22	54.00	-7.78
7386.00	47.69	PK	278	1.7	H	2.86	50.55	74.00	-23.45
7386.00	42.41	Ave	278	1.7	H	2.86	45.27	54.00	-8.73
2311.97	49.07	PK	222	1.6	V	-13.19	35.88	74.00	-38.12
2311.97	37.79	Ave	222	1.6	V	-13.19	24.60	54.00	-29.40
2362.66	51.17	PK	223	1.2	H	-13.14	38.03	74.00	-35.97
2362.66	38.78	Ave	223	1.2	H	-13.14	25.64	54.00	-28.36
2497.14	47.79	PK	258	1.7	V	-13.08	34.71	74.00	-39.29
2497.14	37.05	Ave	258	1.7	V	-13.08	23.97	54.00	-30.03

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Low Channel 2412MHz									
485.88	14.61	PK	41	1.4	H	21.09	35.70	45.00	-9.30
485.88	13.73	PK	283	1.7	V	21.09	34.82	45.00	-10.18
4824.00	50.58	PK	311	1.6	V	-1.06	49.52	74.00	-24.48
4824.00	48.90	Ave	311	1.6	V	-1.06	47.84	54.00	-6.16
7236.00	47.07	PK	201	1.2	H	1.34	48.41	74.00	-25.59
7236.00	41.23	Ave	201	1.2	H	1.34	42.57	54.00	-11.43
2325.22	49.48	PK	239	1.6	V	-13.19	36.29	74.00	-37.71
2325.22	39.91	Ave	239	1.6	V	-13.19	26.72	54.00	-27.28
2354.90	51.20	PK	36	1.1	H	-13.14	38.06	74.00	-35.94
2354.90	37.03	Ave	36	1.1	H	-13.14	23.89	54.00	-30.11
2486.15	50.66	PK	277	1.8	V	-13.08	37.58	74.00	-36.42
2486.15	39.00	Ave	277	1.8	V	-13.08	25.92	54.00	-28.08

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: Middle Channel 2437MHz									
485.88	13.66	PK	189	1.3	H	21.09	34.75	45.00	-10.25
485.88	14.56	PK	145	1.8	V	21.09	35.65	45.00	-9.35
4874.00	50.37	PK	358	1.8	V	-0.61	49.76	74.00	-24.24
4874.00	48.41	Ave	358	1.8	V	-0.61	47.80	54.00	-6.20
7311.00	47.65	PK	88	1.8	H	2.21	49.86	74.00	-24.14
7311.00	45.35	Ave	88	1.8	H	2.21	47.56	54.00	-6.44
2328.06	50.62	PK	230	1.8	V	-13.19	37.43	74.00	-36.57
2328.06	37.74	Ave	230	1.8	V	-13.19	24.55	54.00	-29.45
2375.07	49.91	PK	196	1.8	H	-13.14	36.77	74.00	-37.23
2375.07	36.06	Ave	196	1.8	H	-13.14	22.92	54.00	-31.08
2485.83	49.50	PK	281	1.5	V	-13.09	36.41	74.00	-37.59
2485.83	38.55	Ave	281	1.5	V	-13.09	25.46	54.00	-28.54

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: High Channel 2462MHz									
485.88	15.18	PK	358	2.0	H	21.09	36.27	45.00	-8.73
485.88	12.80	PK	157	1.9	V	21.09	33.89	45.00	-11.11
4924.00	50.65	PK	226	1.8	V	-0.24	50.41	74.00	-23.59
4924.00	43.92	Ave	226	1.8	V	-0.24	43.68	54.00	-10.32
7386.00	47.37	PK	258	1.5	H	2.83	50.20	74.00	-23.80
7386.00	40.82	Ave	258	1.5	H	2.83	43.65	54.00	-10.35
2336.40	52.52	PK	118	1.1	V	-13.19	39.33	74.00	-34.67
2336.40	39.34	Ave	118	1.1	V	-13.19	26.15	54.00	-27.85
2352.53	50.41	PK	143	1.8	H	-13.14	37.27	74.00	-36.73
2352.53	37.13	Ave	143	1.8	H	-13.14	23.99	54.00	-30.01
2496.49	49.92	PK	203	1.9	V	-13.08	36.84	74.00	-37.16
2496.49	36.64	Ave	203	1.9	V	-13.08	23.56	54.00	-30.44

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
N40: Low Channel 2422MHz									
485.88	14.35	PK	119	1.1	H	21.09	35.44	45.00	-9.56
485.88	14.07	PK	198	1.6	V	21.09	35.16	45.00	-9.84
4844.00	50.74	PK	287	1.5	V	-1.06	49.68	74.00	-24.32
4844.00	48.56	Ave	287	1.5	V	-1.06	47.50	54.00	-6.50
7266.00	48.27	PK	92	1.6	H	1.34	49.61	74.00	-24.39
7266.00	42.83	Ave	92	1.6	H	1.34	44.17	54.00	-9.83
2315.59	51.62	PK	222	1.9	V	-13.19	38.43	74.00	-35.57
2315.59	38.81	Ave	222	1.9	V	-13.19	25.62	54.00	-28.38
2374.37	51.01	PK	178	1.1	H	-13.15	37.86	74.00	-36.14
2374.37	37.02	Ave	178	1.1	H	-13.15	23.87	54.00	-30.13
2485.96	51.87	PK	331	1.5	V	-13.08	38.79	74.00	-35.21
2485.96	37.99	Ave	331	1.5	V	-13.08	24.91	54.00	-29.09

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
N40: Middle Channel 2437MHz									
485.88	14.58	PK	149	2.0	H	21.09	35.67	45.00	-9.33
485.88	13.94	PK	48	1.4	V	21.09	35.03	45.00	-9.97
4874.00	49.37	PK	320	1.1	V	-0.62	48.75	74.00	-25.25
4874.00	43.82	Ave	320	1.1	V	-0.62	43.20	54.00	-10.80
7311.00	47.37	PK	296	1.4	H	2.21	49.58	74.00	-24.42
7311.00	43.73	Ave	296	1.4	H	2.21	45.94	54.00	-8.06
2345.15	52.24	PK	183	1.5	V	-13.19	39.05	74.00	-34.95
2345.15	38.69	Ave	183	1.5	V	-13.19	25.50	54.00	-28.50
2356.81	52.66	PK	196	1.2	H	-13.16	39.50	74.00	-34.50
2356.81	38.99	Ave	196	1.2	H	-13.16	25.83	54.00	-28.17
2484.58	50.53	PK	103	1.1	V	-13.08	37.45	74.00	-36.55
2484.58	38.29	Ave	103	1.1	V	-13.08	25.21	54.00	-28.79

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
N40: High Channel 2452MHz									
485.88	13.81	PK	340	1.9	H	21.09	34.90	45.00	-10.10
485.88	13.17	PK	261	1.6	V	21.09	34.26	45.00	-10.74
4904.00	51.69	PK	263	1.5	V	-0.24	51.45	74.00	-22.55
4904.00	44.59	Ave	263	1.5	V	-0.24	44.35	54.00	-9.65
7356.00	49.17	PK	87	1.3	H	2.85	52.02	74.00	-21.98
7356.00	42.87	Ave	87	1.3	H	2.85	45.72	54.00	-8.28
2314.16	52.78	PK	260	1.8	V	-13.19	39.59	74.00	-34.41
2314.16	37.09	Ave	260	1.8	V	-13.19	23.90	54.00	-30.10
2360.95	51.88	PK	103	1.9	H	-13.14	38.74	74.00	-35.26
2360.95	37.17	Ave	103	1.9	H	-13.14	24.03	54.00	-29.97
2490.25	51.59	PK	312	1.7	V	-13.08	38.51	74.00	-35.49
2490.25	38.46	Ave	312	1.7	V	-13.08	25.38	54.00	-28.62

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

7. Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Regulation 15.247 (d), 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 conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies 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. 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) (see §15.205(c)).
Test Mode:	Transmitting

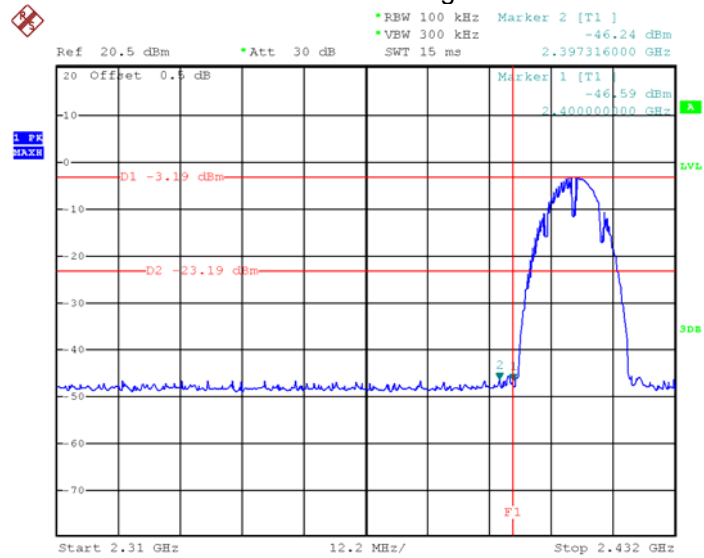
7.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

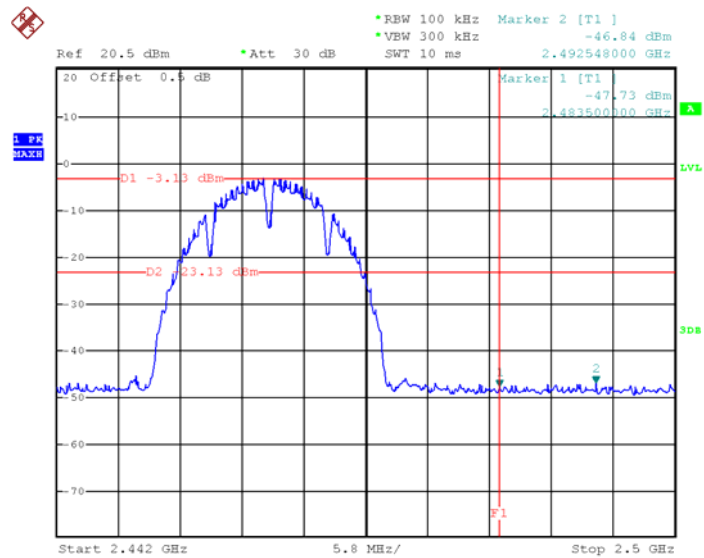
7.2 Test Result

Test result plots shown as follows:

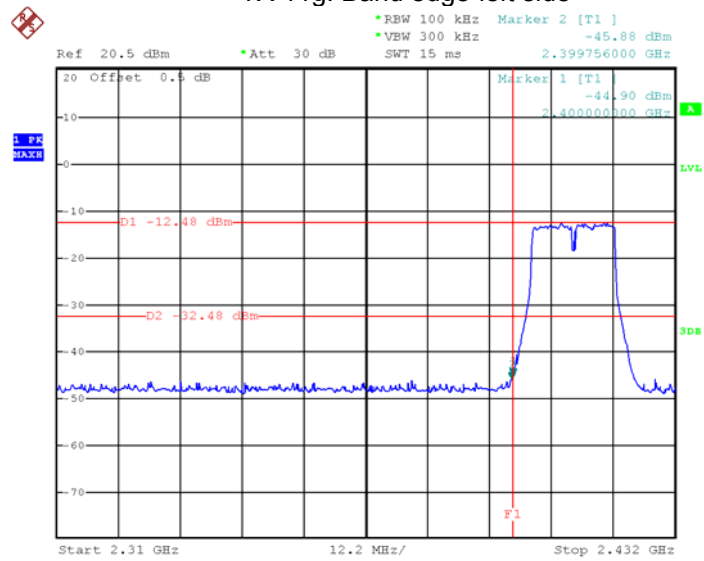
TX 11b: Band edge-left side



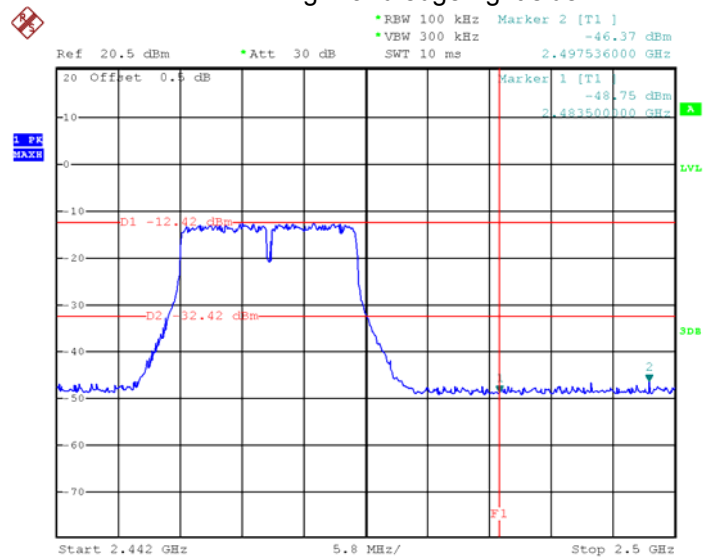
TX 11b: Band edge-right side



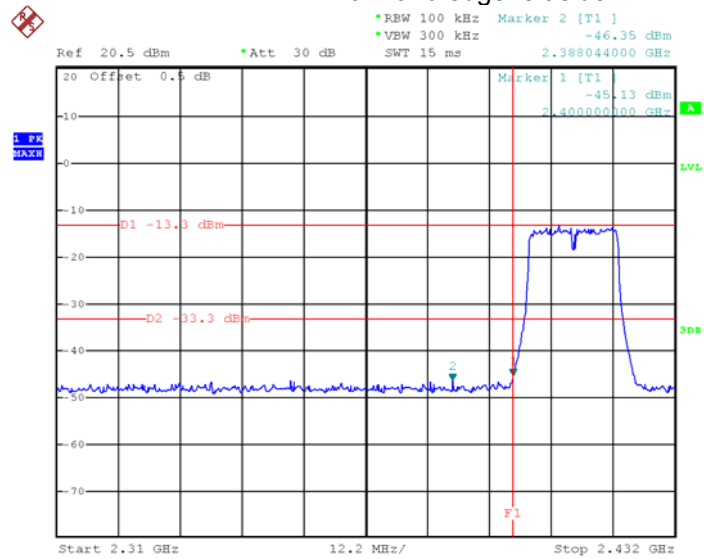
TX 11g: Band edge-left side



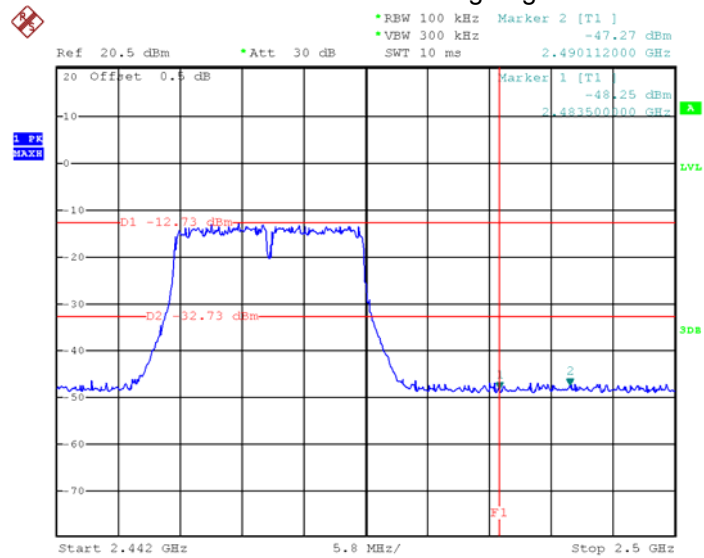
TX 11g: Band edge-right side



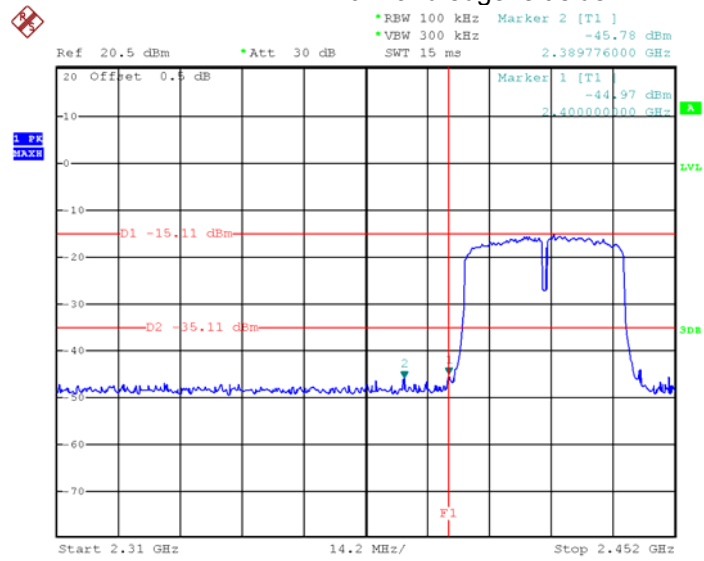
TX 11n HT20: Band edge-left side



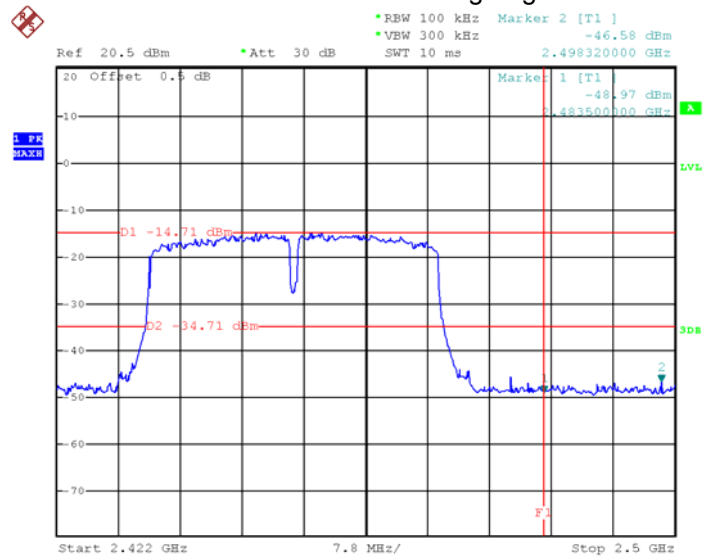
TX 11n HT20: Band edge-right side



TX 11n HT40: Band edge-left side



TX 11n HT40: Band edge-right side



8. Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

8.1 Test Procedure:

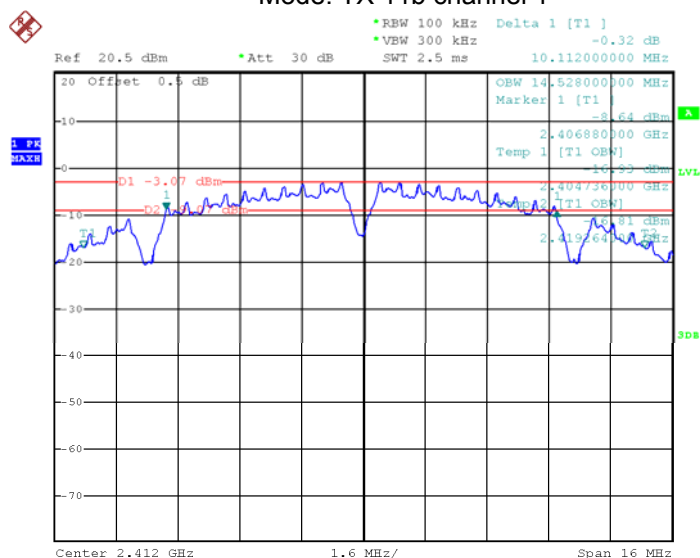
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

8.2 Test Result:

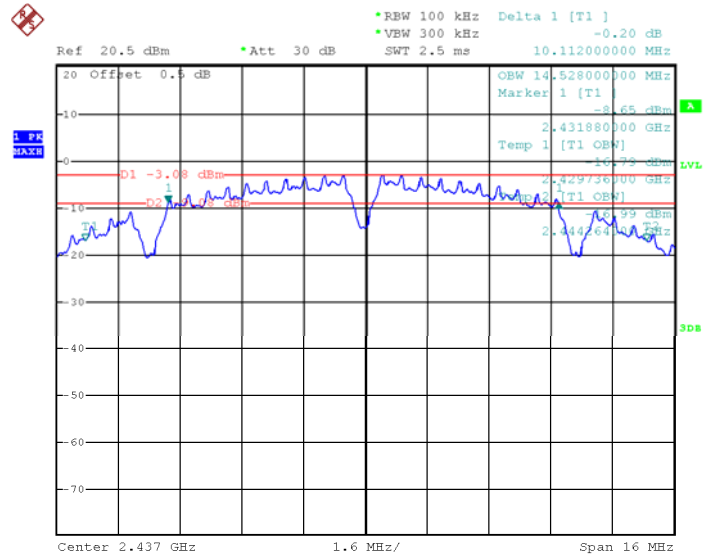
Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	10.112	10.112	10.112	14.528	14.528	14.496
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.600	16.600	16.592	16.500	16.500	16.500
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.808	17.820	17.820	17.712	17.712	17.712
TX 11n HT40	Channel 3	Channel 6	Channel 9	Channel 3	Channel 6	Channel 9
	36.410	36.370	36.440	36.080	35.970	35.970

Wifi: Test result plot as follows:

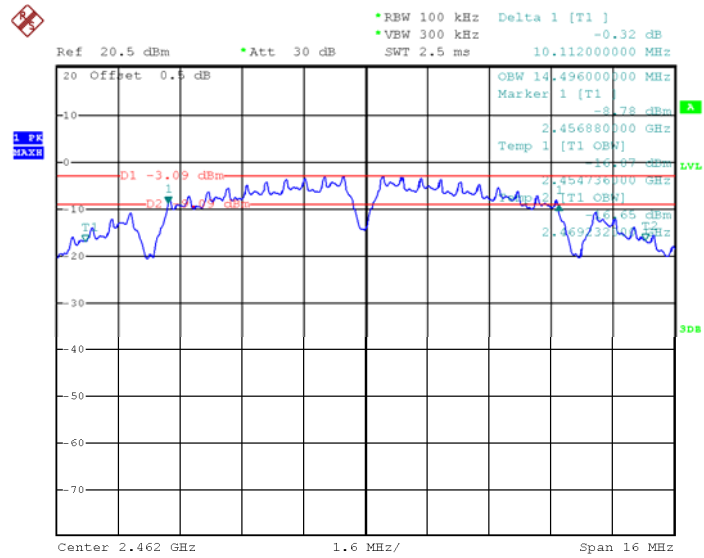
Mode: TX 11b channel 1

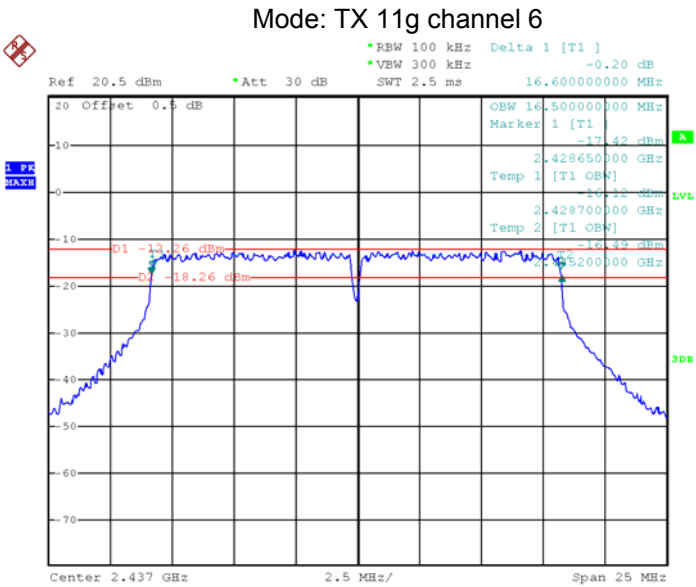
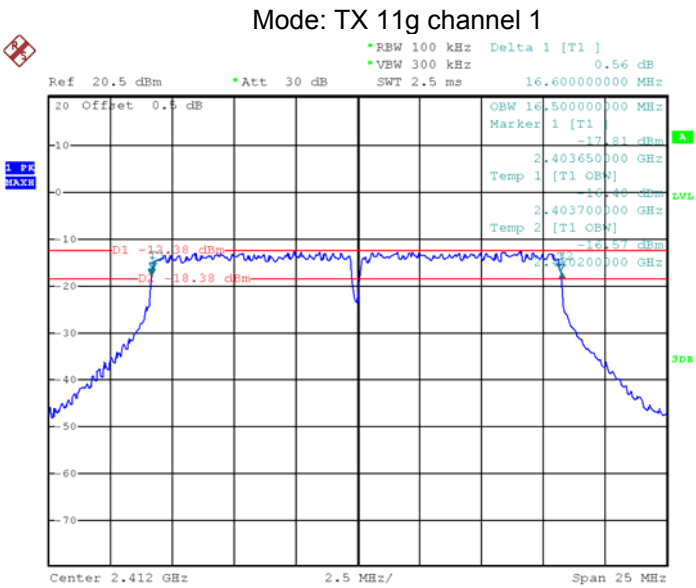


Mode: TX 11b channel 6

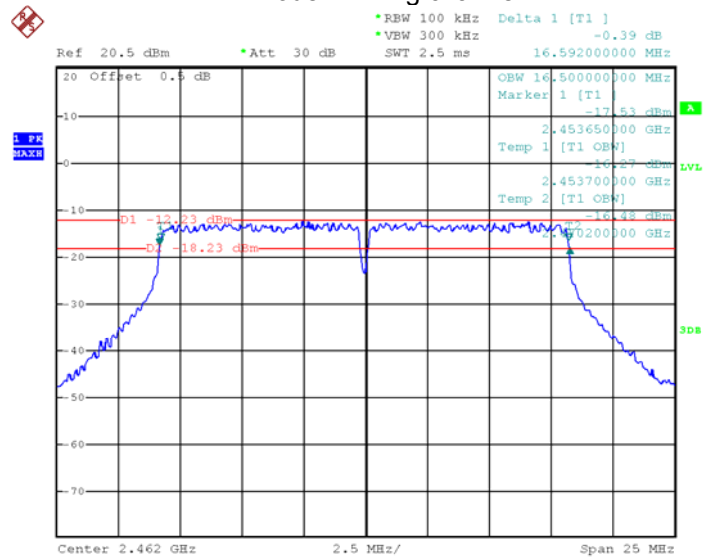


Mode: TX 11b channel 11

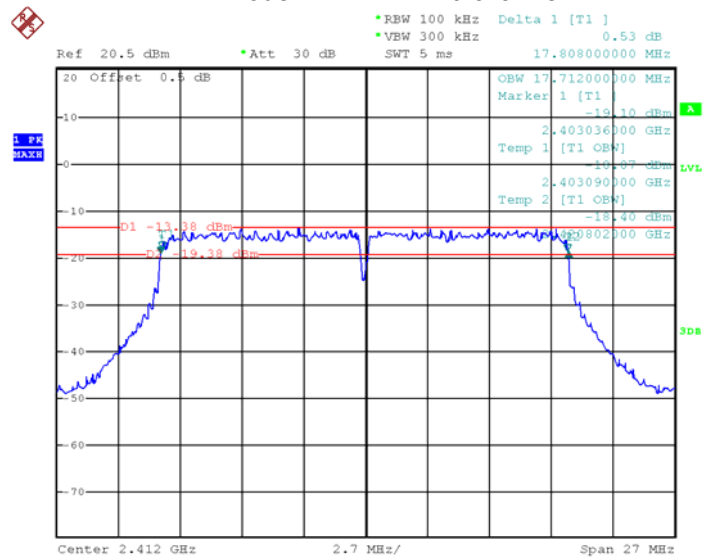


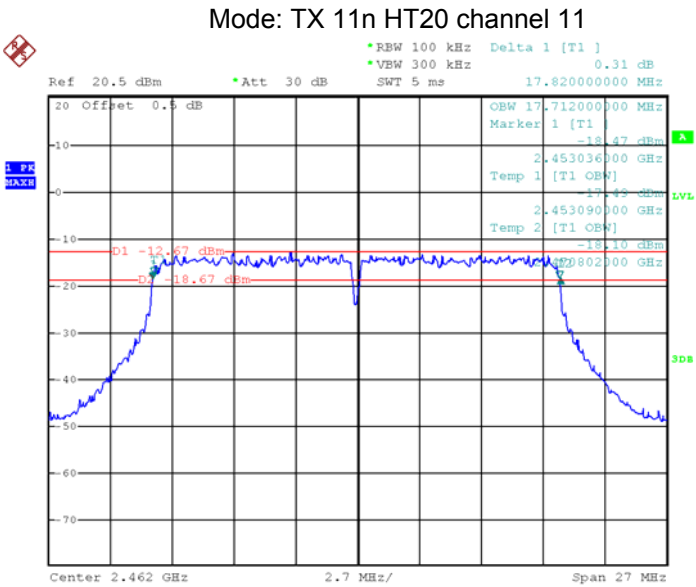
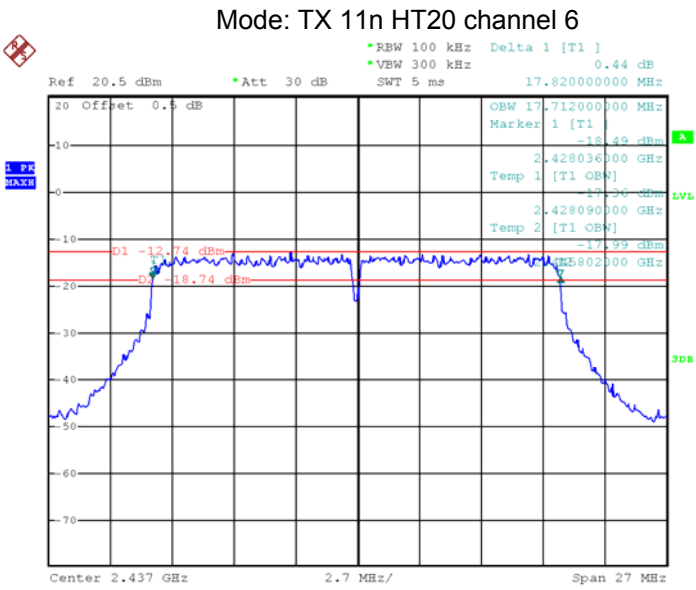


Mode: TX 11g channel 11

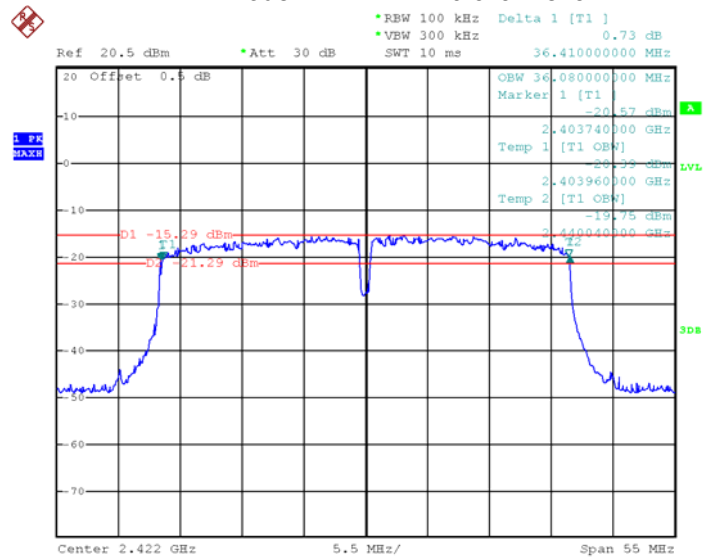


Mode: TX 11n HT20 channel 1

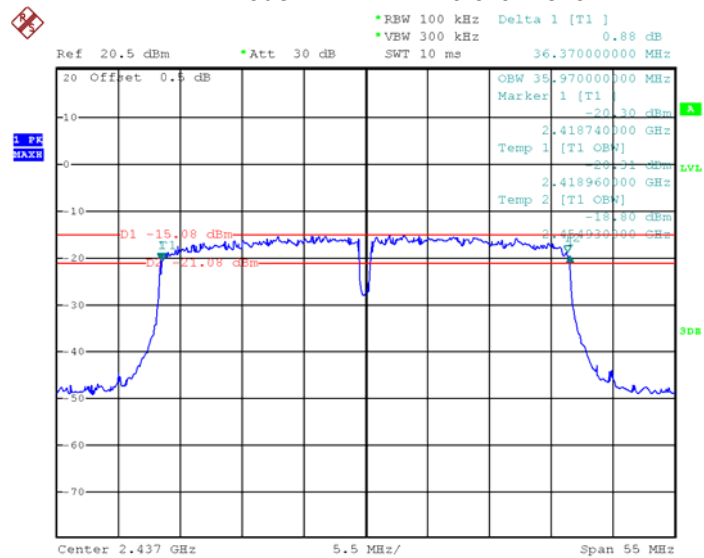


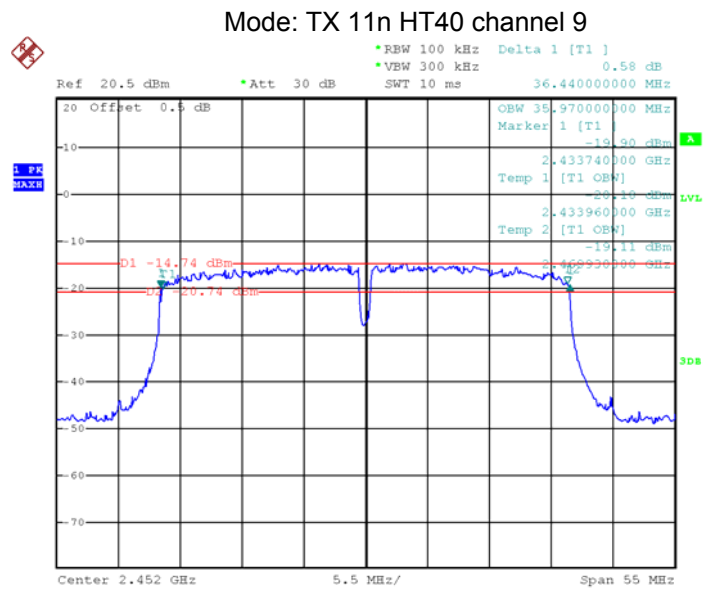


Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6





9. Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

9.1 Test Procedure:

558074 D01 DTS Meas Guidance V04

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

9.2 Test Result:

Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.72	9.81	9.78
Limit: 1W/30dBm		

Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.48	9.59	9.50
Limit: 1W/30dBm		

Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.40	9.90	9.83
Limit: 1W/30dBm		

Test mode :TX 11n HT40		
Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
9.56	9.98	9.92
Limit: 1W/30dBm		

10. Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05r02

10.1 Test Procedure:

558074 D01 DTS Meas Guidance V04

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section
Submit this plot.

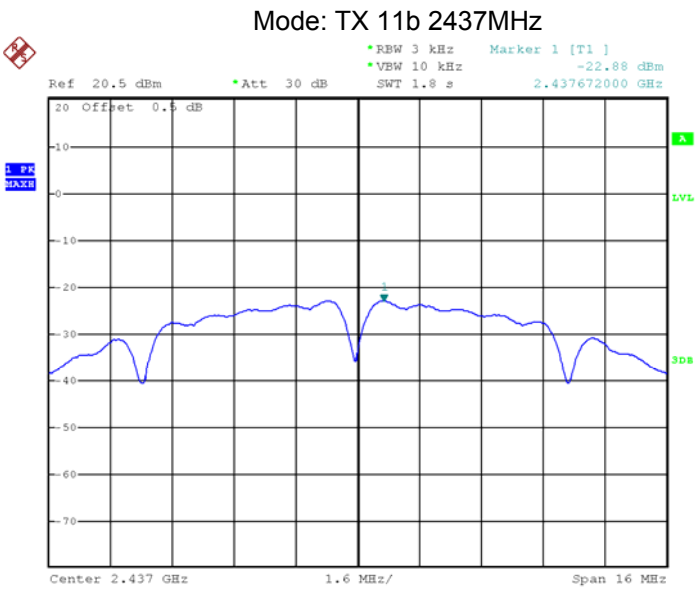
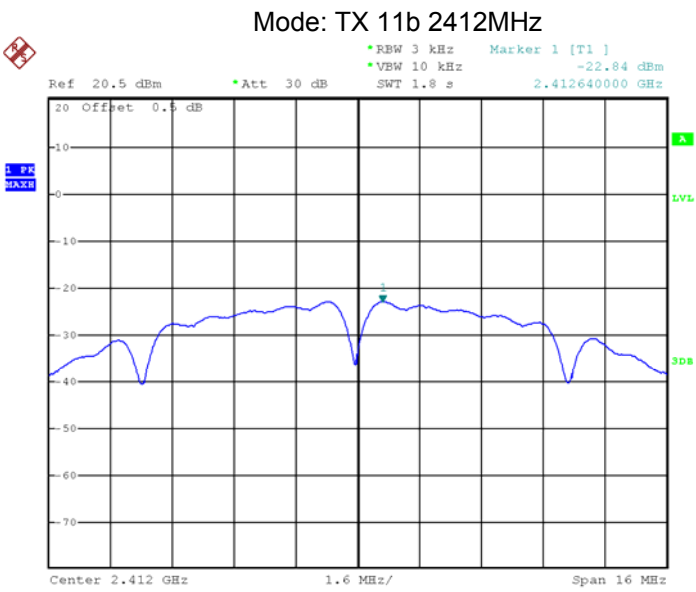
10.2 Test Result:

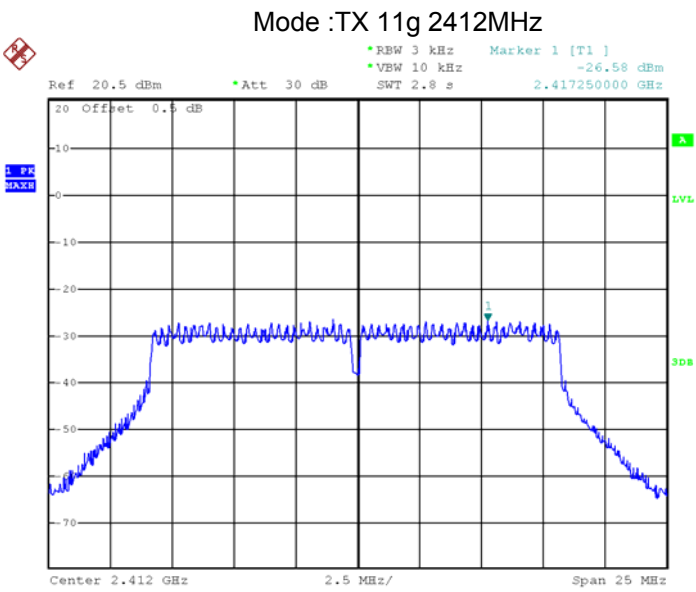
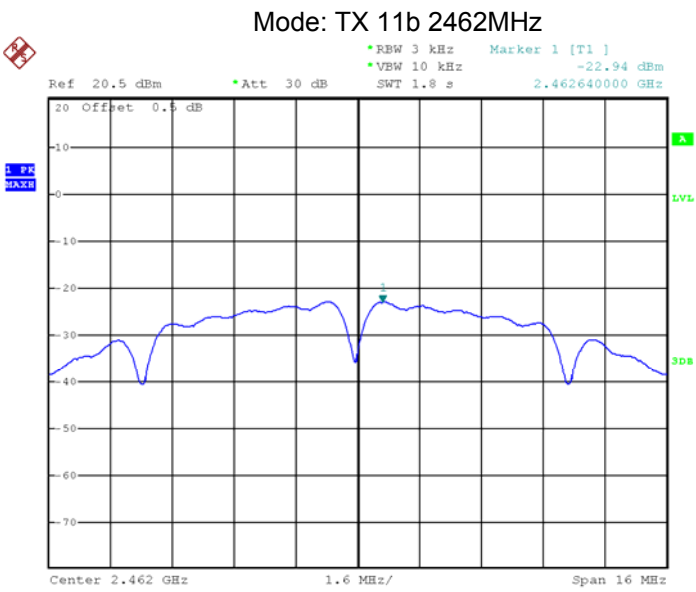
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-22.84	-22.88	-22.94
Limit: 8dBm per 3kHz		

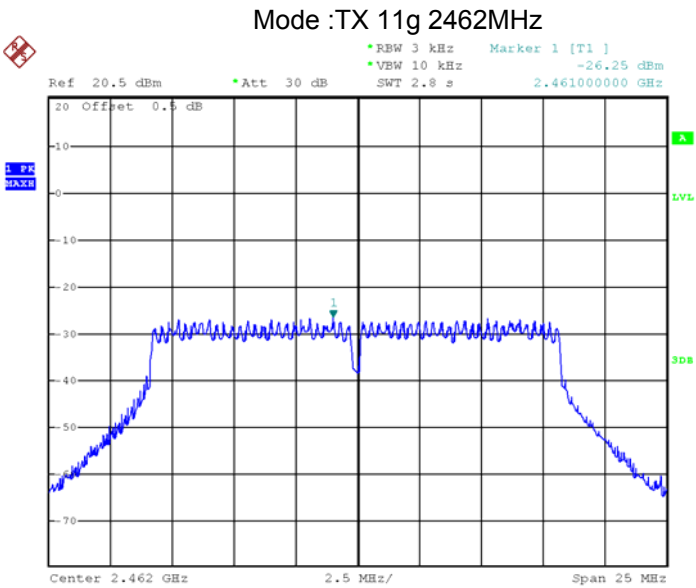
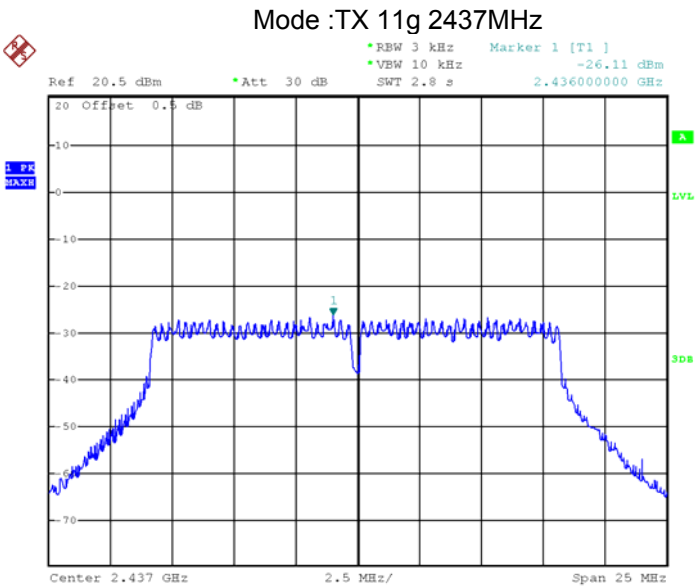
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-26.58	-26.11	-26.25
Limit: 8dBm per 3kHz		

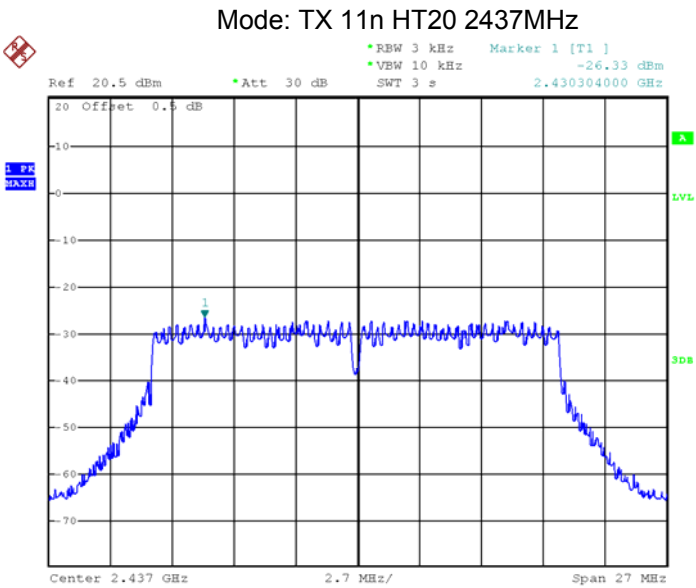
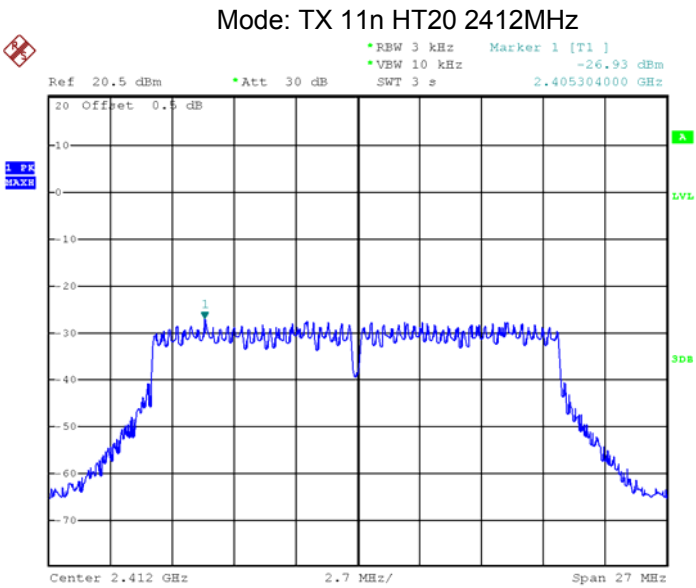
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-26.93	-26.33	-27.16
Limit: 8dBm per 3kHz		

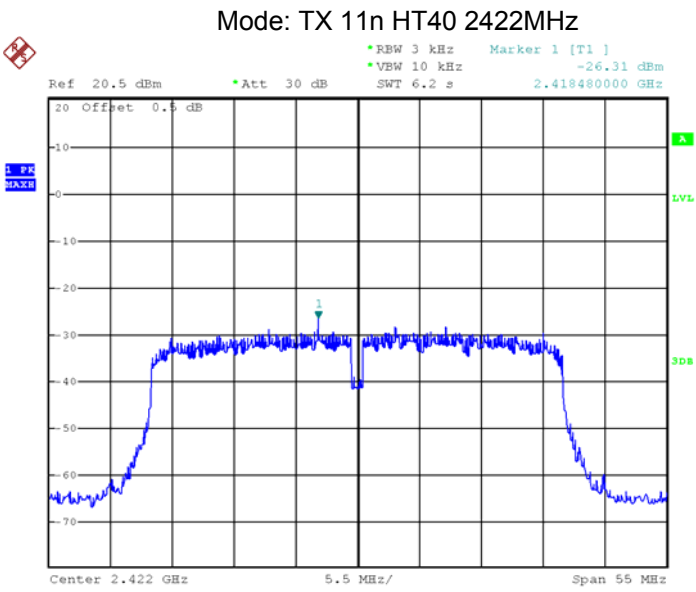
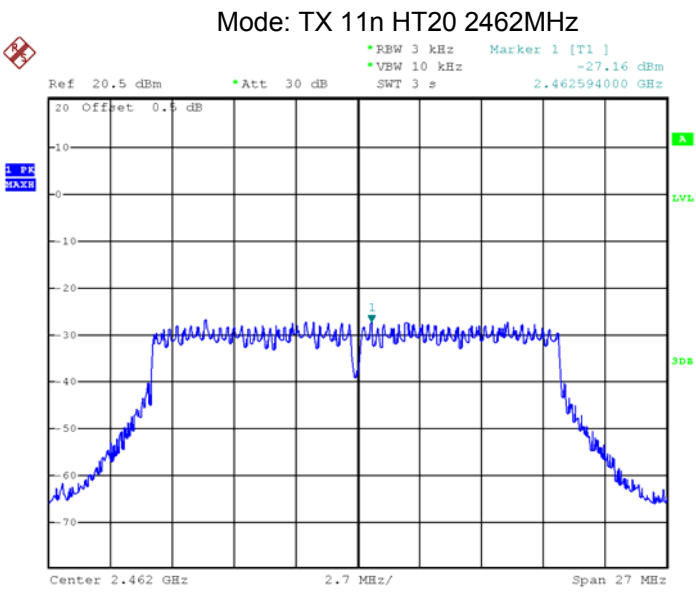
Test mode :TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-26.31	-26.24	-25.22
Limit: 8dBm per 3kHz		

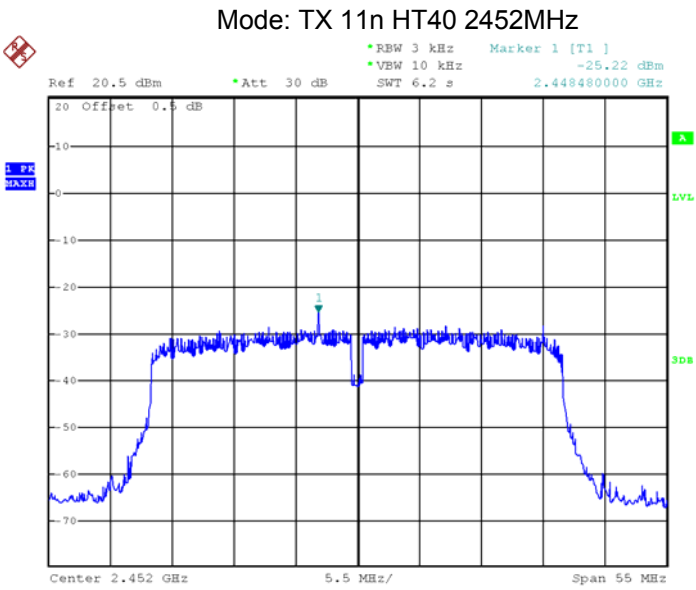
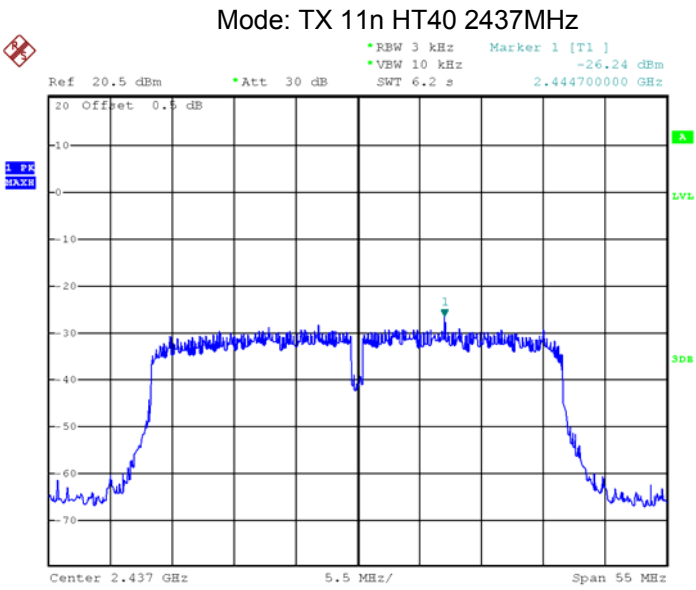












11. Antenna Requirement

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

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.

Result:

The EUT has a PCB Printed Antenna, meets the requirements of FCC 15.203.



12. RF Exposure

Test Requirement:

FCC Part 1.1307

Evaluation Method:

FCC Part 2.1091

12.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

12.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

12.3 MPE Calculation Method

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = P_{out} * G / (4 * \pi * R^2)$$

From the peak EUT RF output power, the minimum mobile separation distance, $d=0.2\text{m}$, as well as the gain of the used antenna, the RF power density can be obtained.

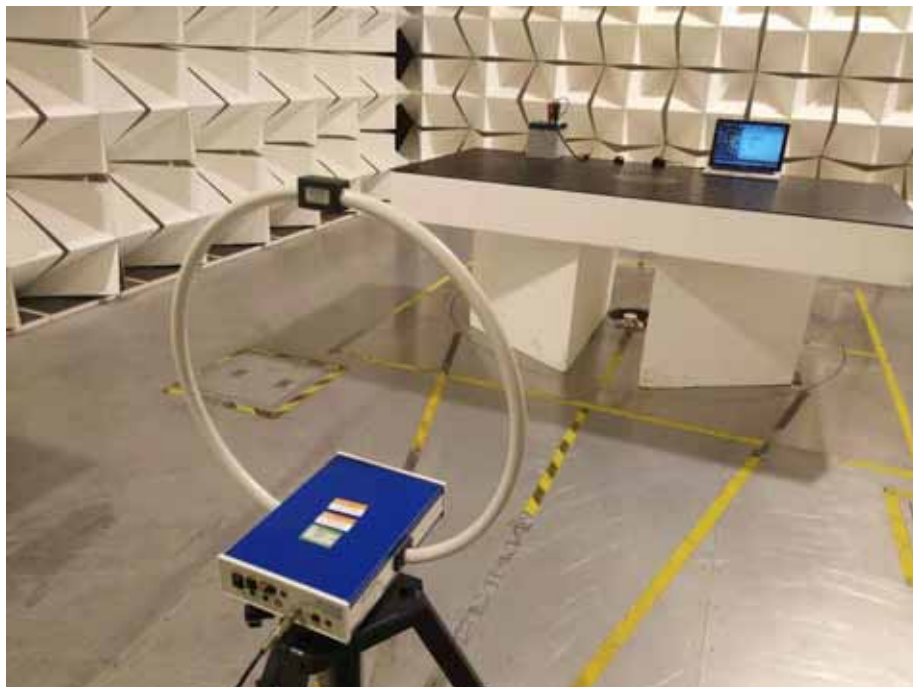
Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
3.00	1.995	9.98	9.95	0.00395	1

Compliance.

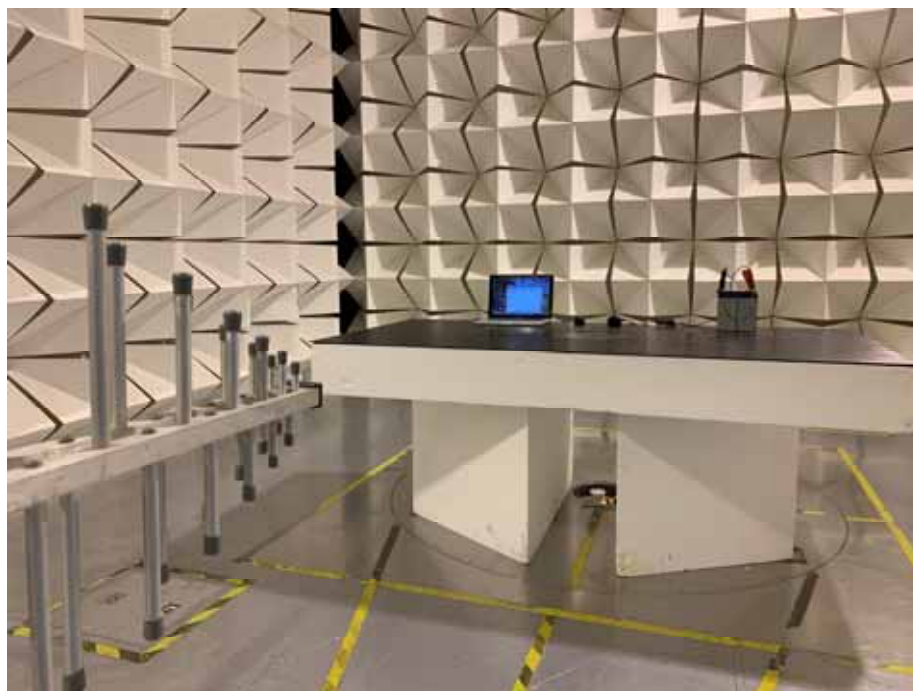
13. Photographs – Test Setup Photos

13.1 Radiated Emission

Test frequency Below 30MHz



Test frequency from 30MHz to 1GHz



Test frequency above 1GHz



14. Photographs - Constructional Details

14.1 EUT – External View

















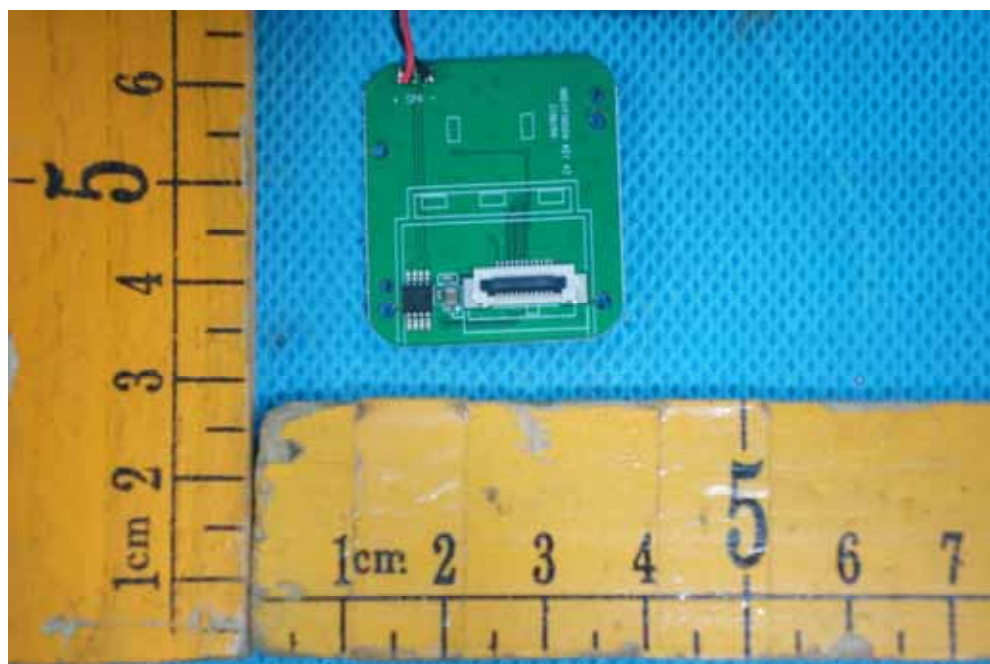
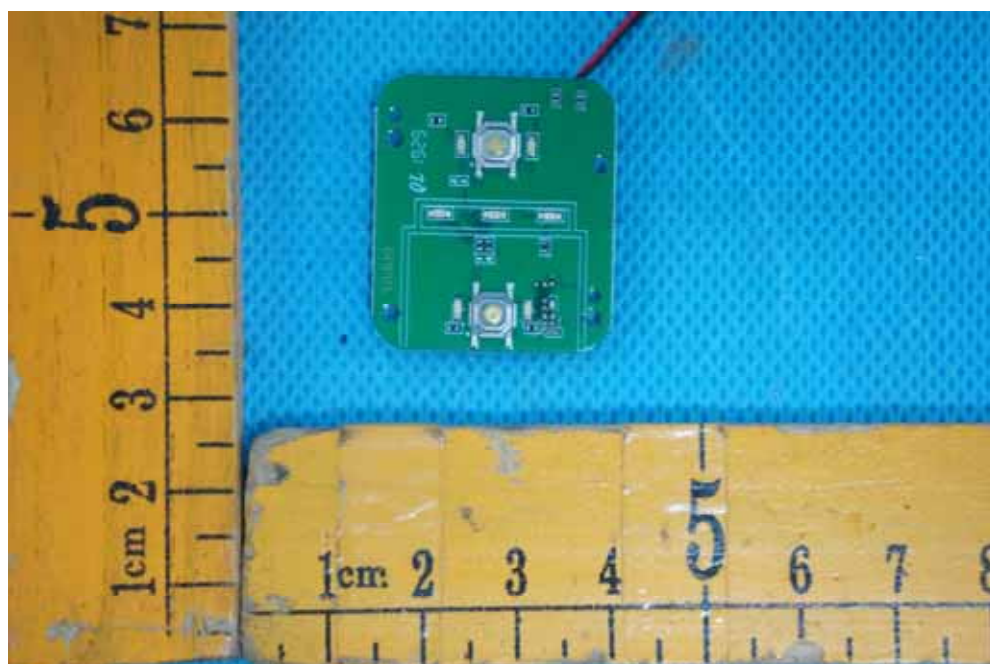


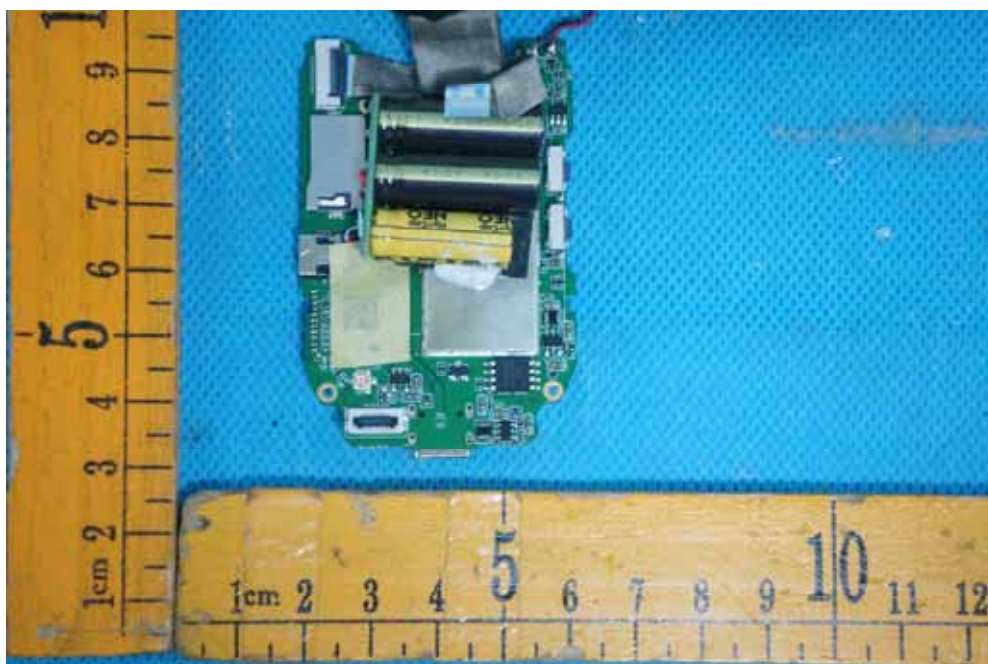




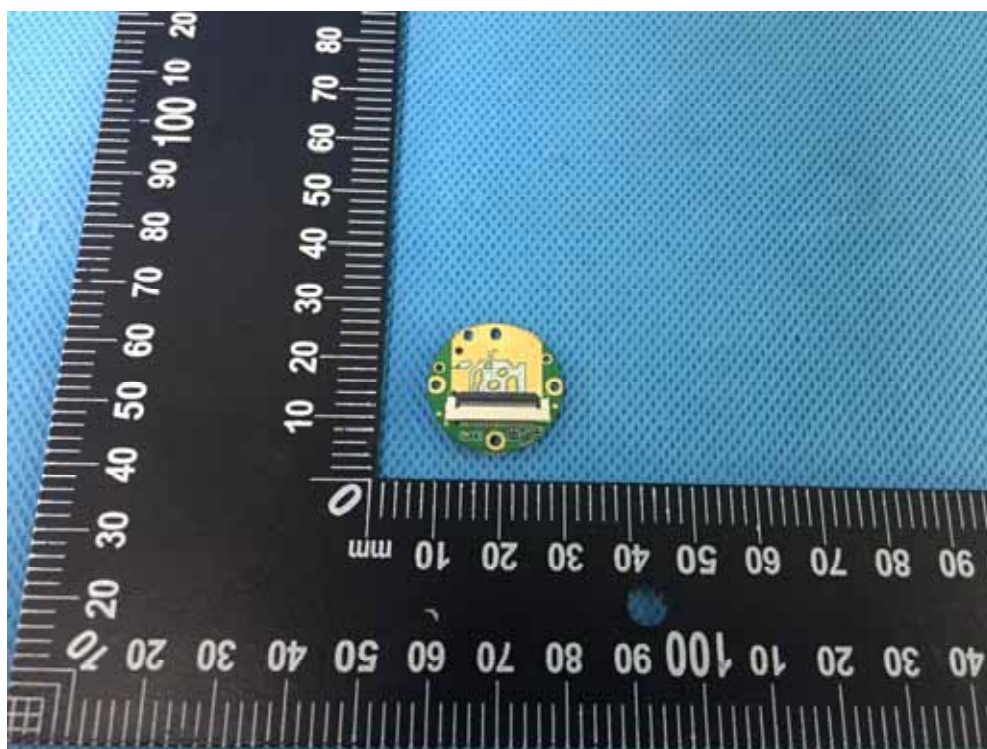
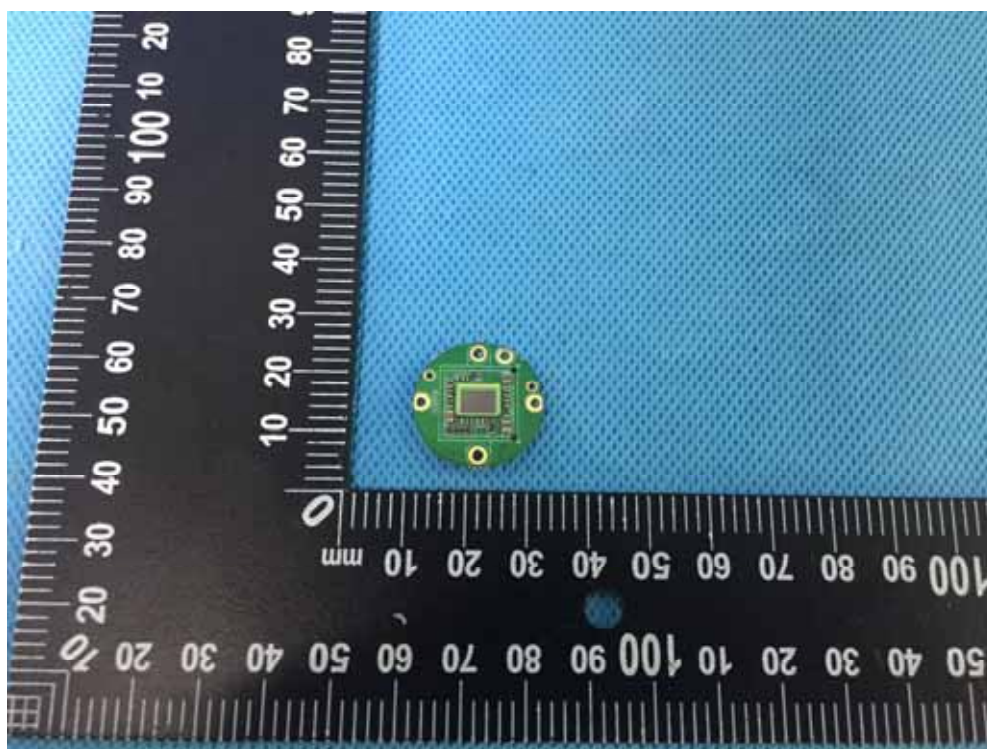
14.2 EUT – Internal View

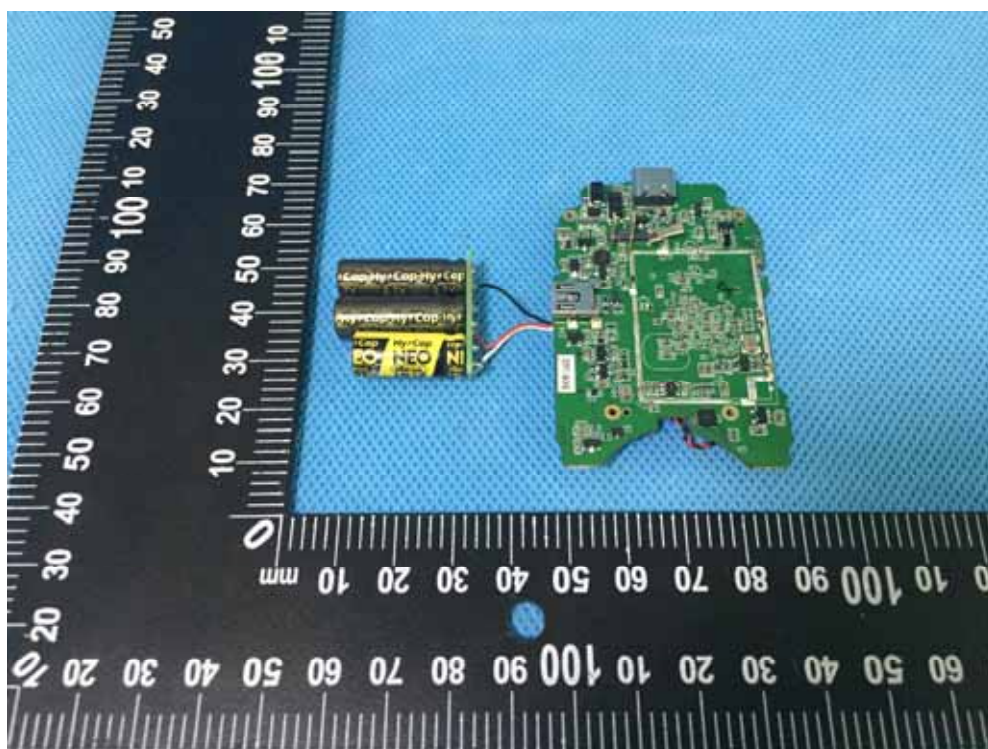
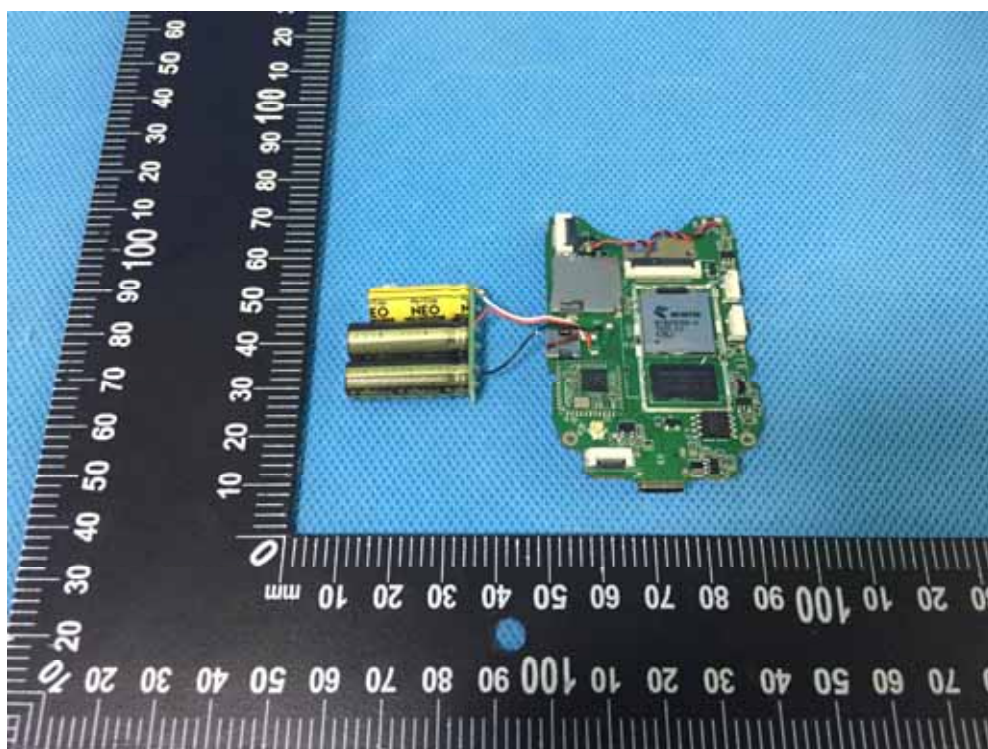


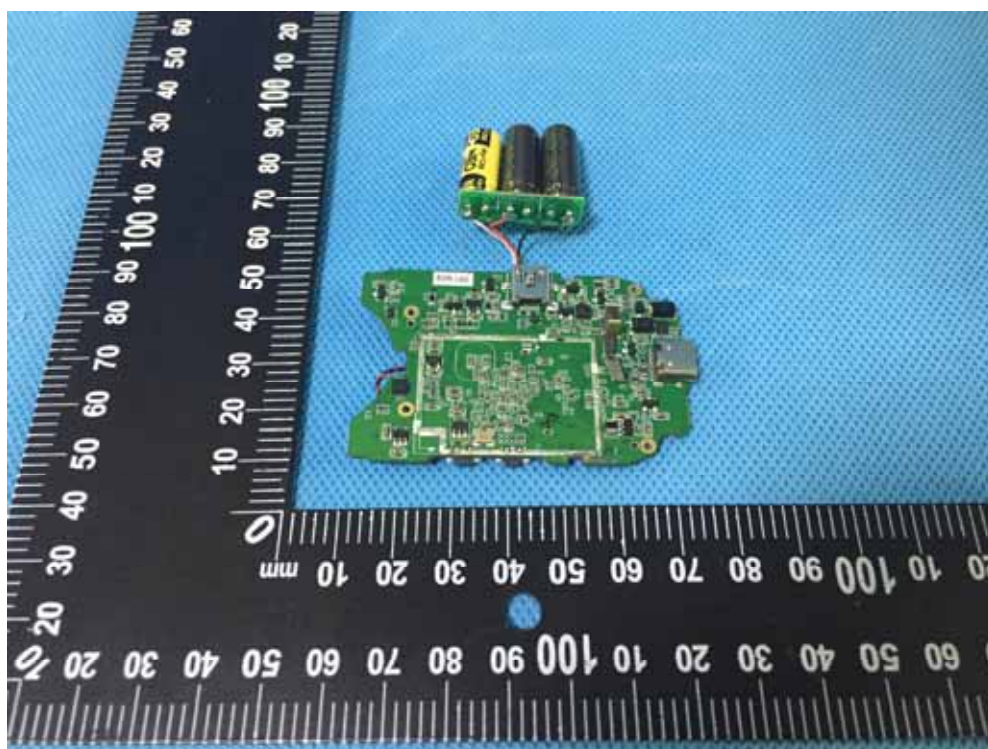


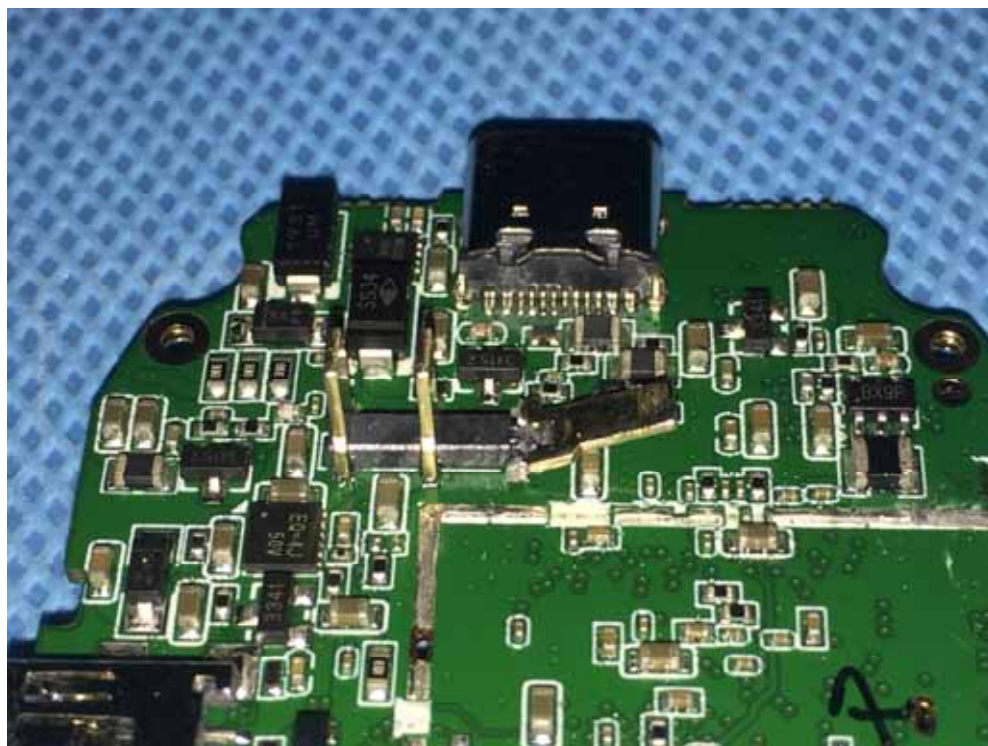






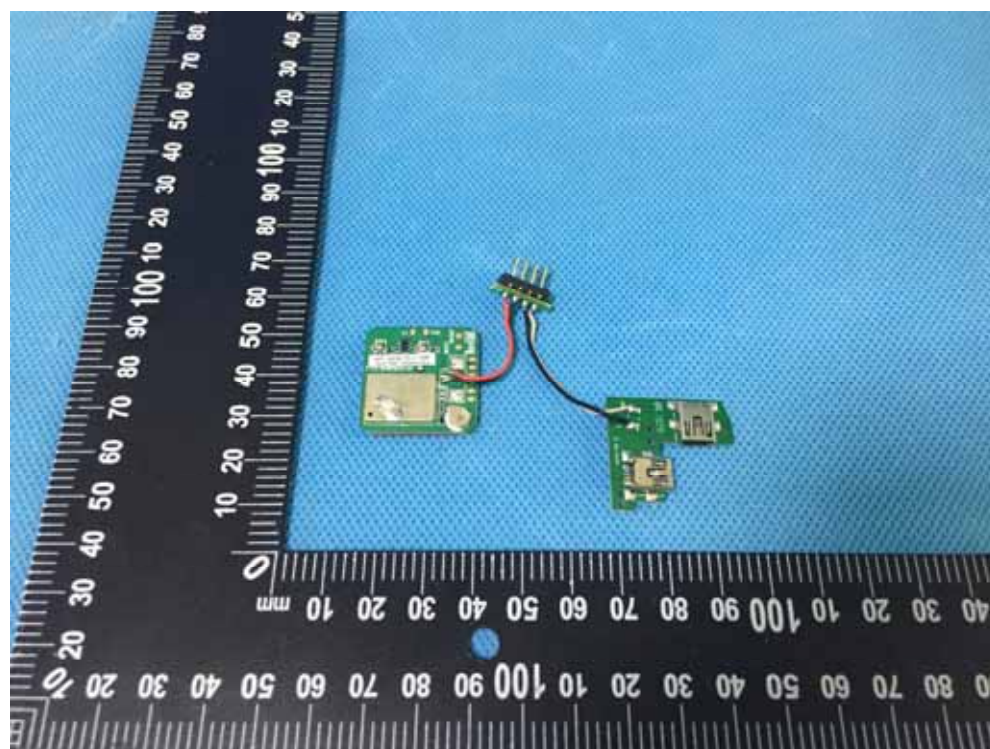


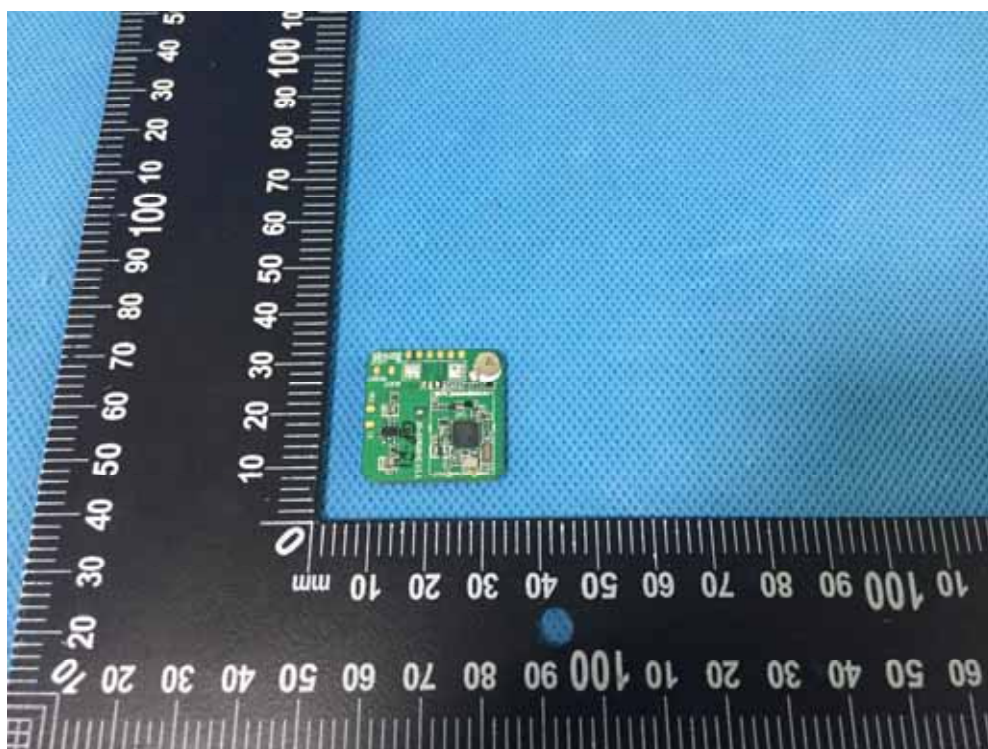
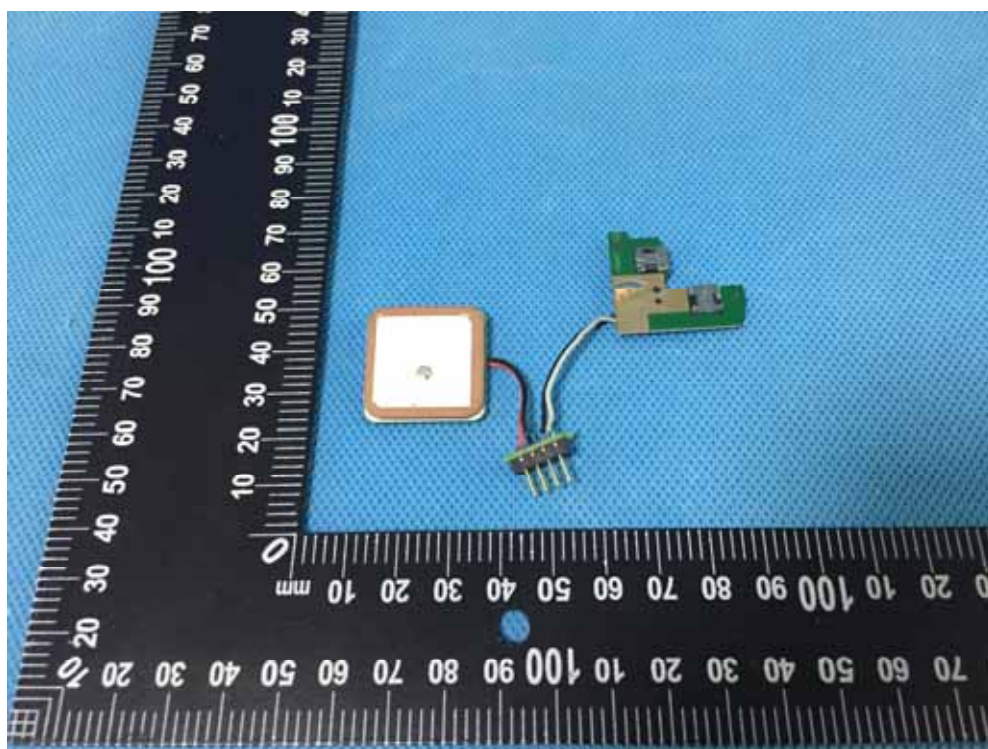


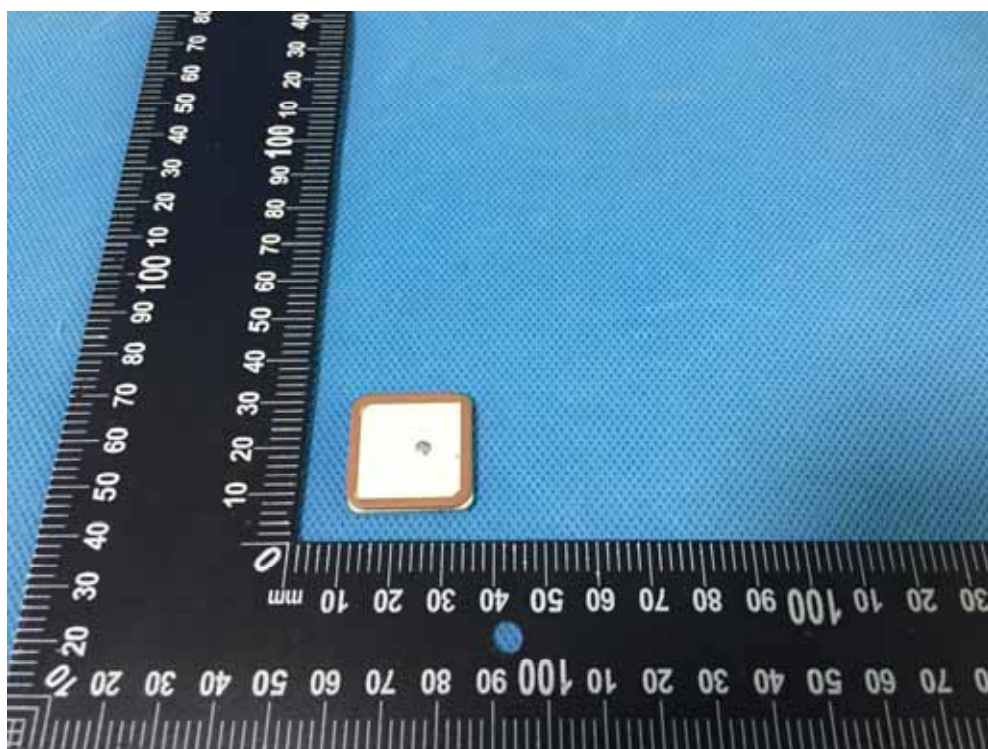


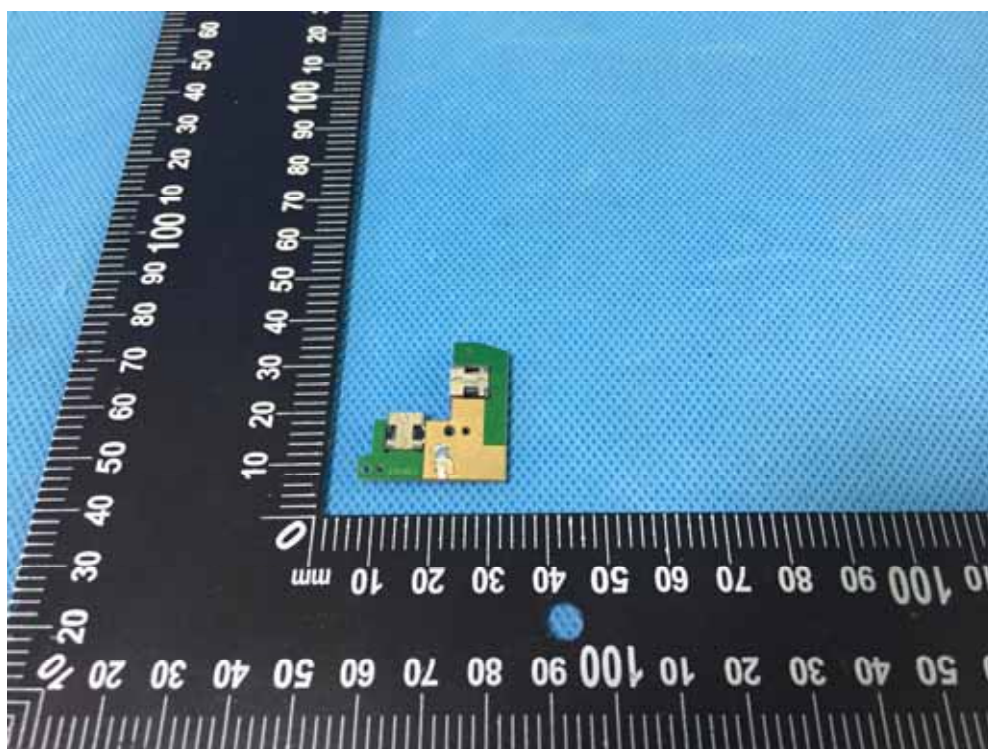


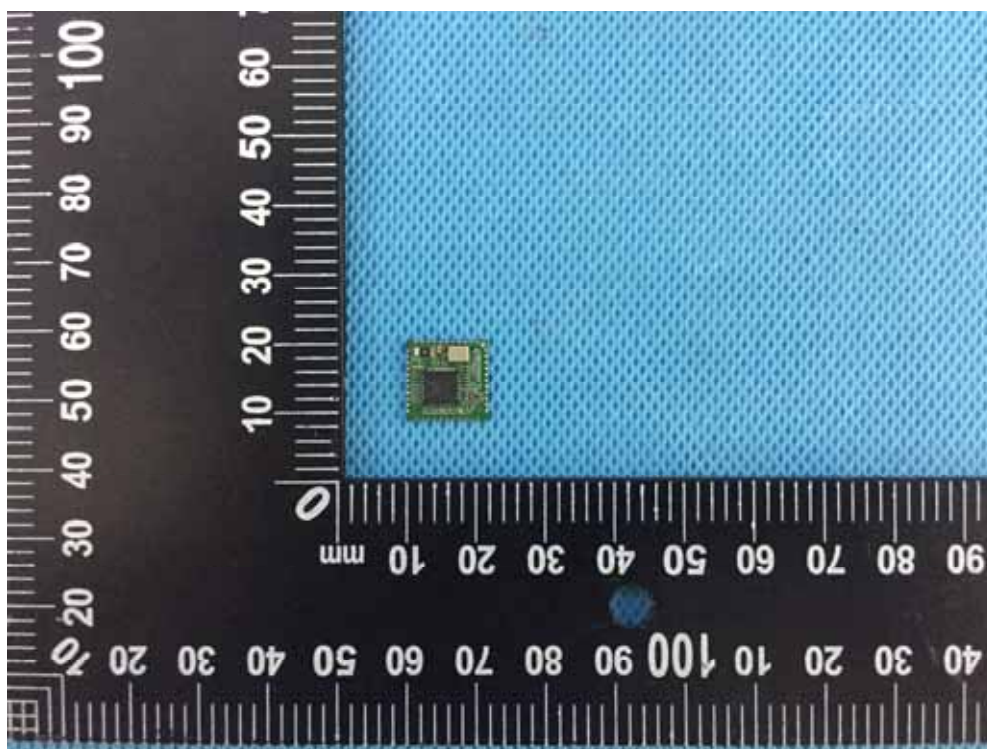
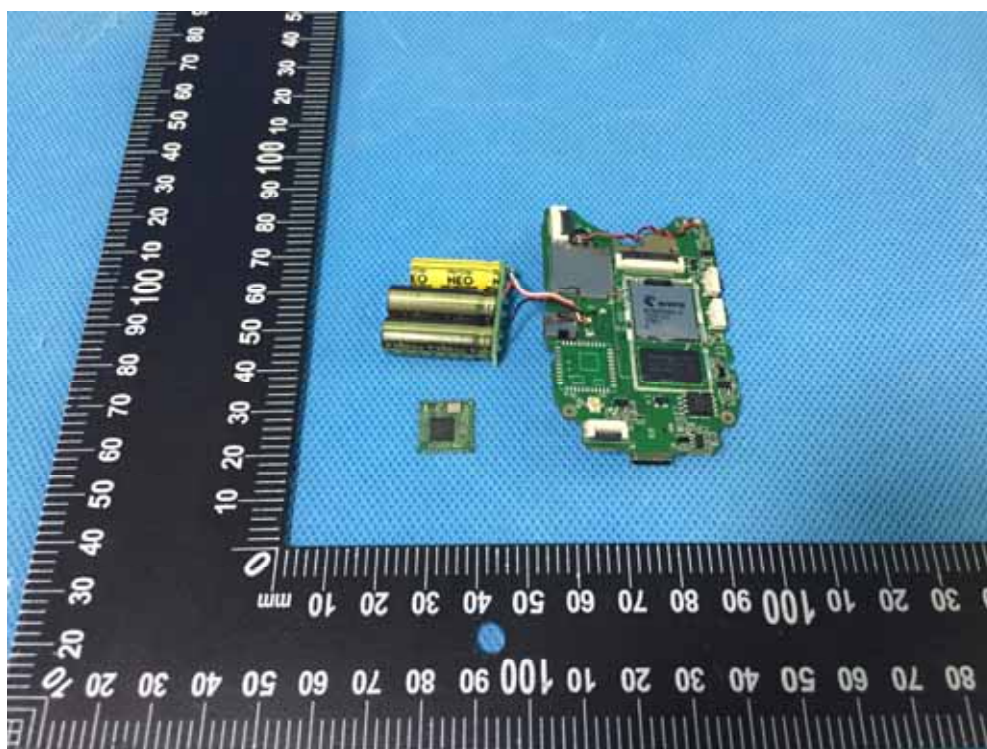


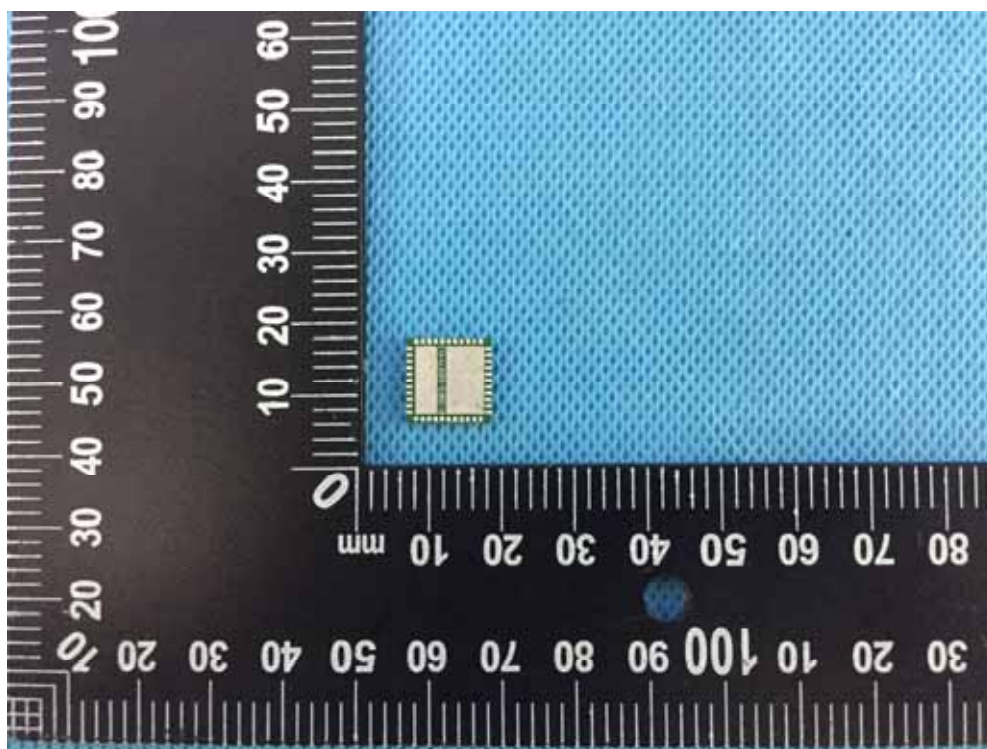


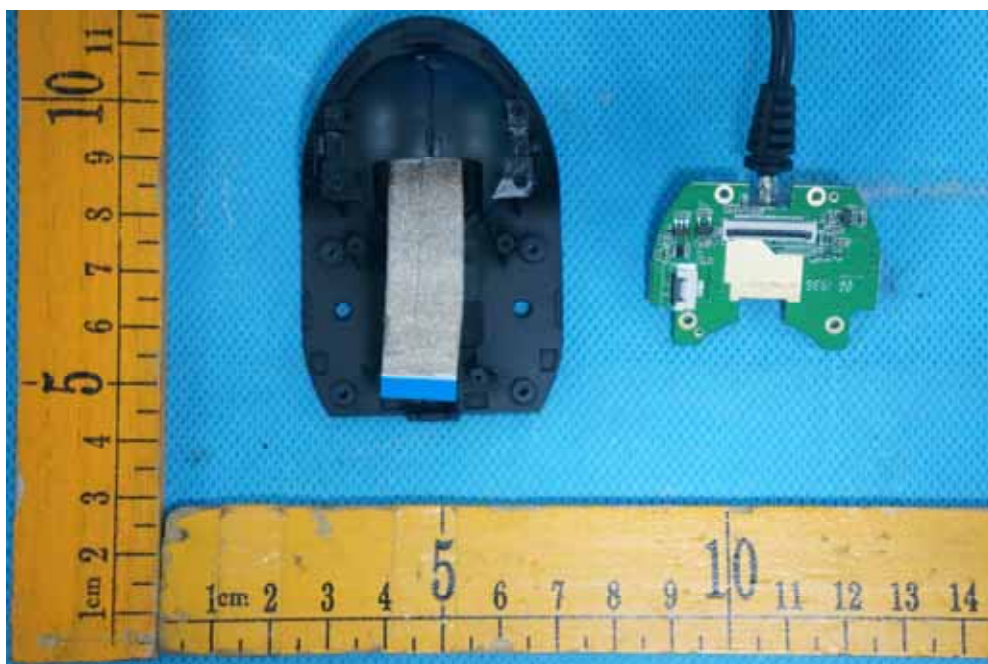


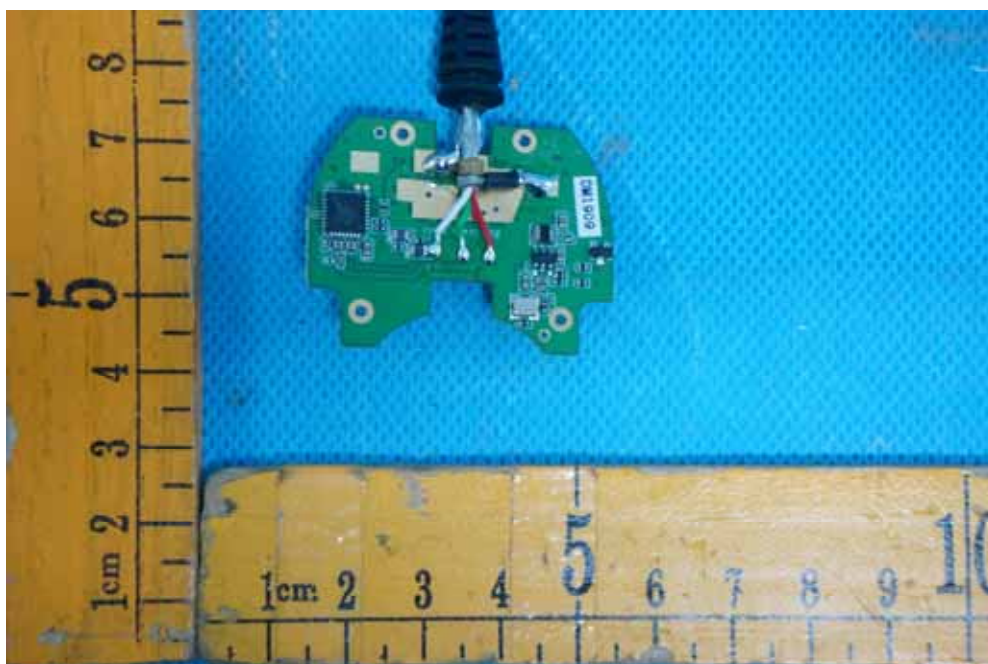
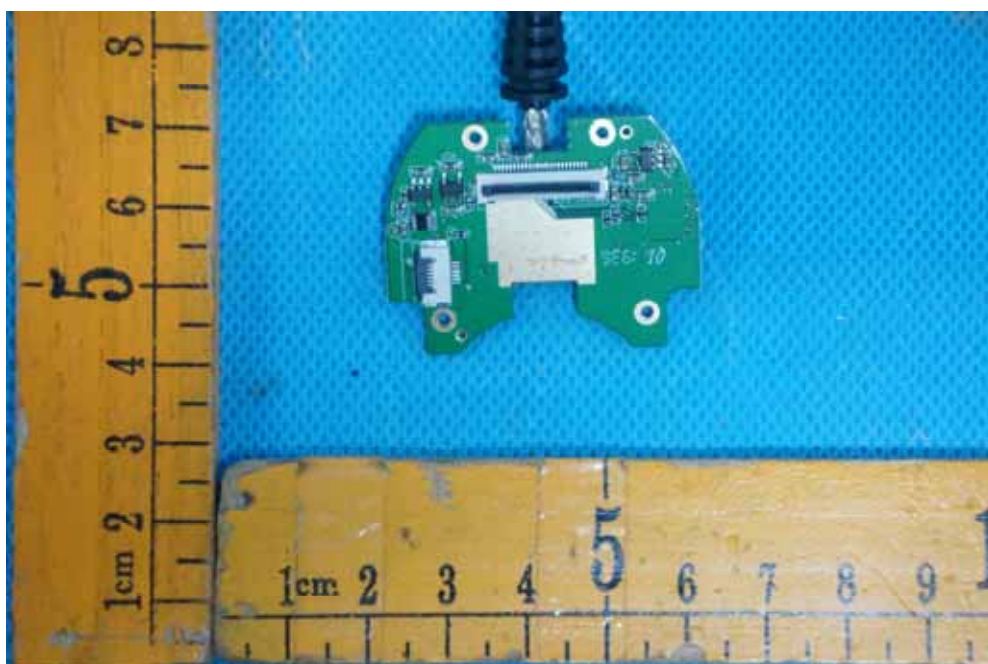


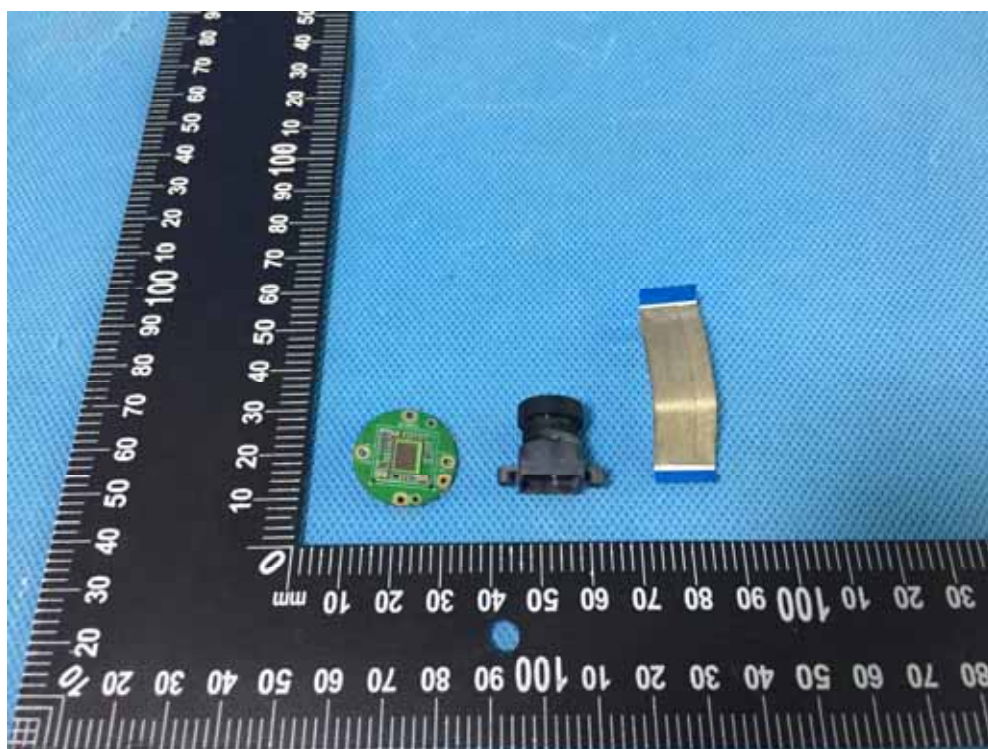














=====End of Report=====