

TEST REPORT

Reference No. : WTS14S0211293E
FCC ID : AZQKP100
Applicant : Shenzhen KOHO Technology Co., Ltd
Address : Building3, Jin Yuda Industrial Park, ShangLiao, Shajin, Baoan ,
Shenzhen
Manufacturer : Shenzhen Kanghai Electronics CO.,LTD
Address : 2 nd, 3rd Floor A, 3 Building, jinyudaindustrial park(I,II,3), 107 State
Road, Shajing Street, Baoan District, Shenzhen
Product Name : pico projector
Model No : KP100, P10
Standards : FCC CFR47 Part 15 C Section 15.247:2012
Date of Receipt sample : Feb.17, 2014
Date of Test : Feb.20-26, 2014
Date of Issue : Mar.17, 2014
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:

Waltek Services (Shenzhen) Co., Ltd.

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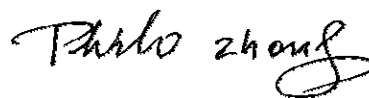
Fax:+86-755-83552400

Compiled by:



Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.247 15.205(a) 15.209(a)	PASS
Conducted Emissions	15.207(a)	PASS
6dB 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

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4 General Information

4.1 General Description of E.U.T.

Product Name	: pico projector
Model No.	: KP100, P10
Model Difference	: Only the model name is different. The model KP100 is test sample.
Operation Frequency	: 2412MHz ~ 2462MHz
Oscillator	: 32.768kHz
Antenna Gain	: 2dBi
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.)
Note	: All the modulation modes were tested, all the test data deeply conform to the rules and the data of the worst mode are recorded in the following pages.

4.2 Details of E.U.T.

Technical Data	: (1)DC 7.4V by build-in battery(Capacity: 2000mAh) (2)DC 12V, 1500mA by adapter (Adapter Input: AC 100-240V, 50/60Hz, 0.6A max)
Adapter	: SHENZHEN FUJIA APPLIANCE CO.,LTD, M/N: FJ-SW1201500N

4.3 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Earphone	leisheng	LS-120M	-

4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Test 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	72 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	72 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
6 dB Bandwidth	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	72 Mbps	1/11	TX
	802.11n HT40	150 Mbps	3/9	TX
Band Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	72 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Radiated Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	72 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 .

Table 2 Tests Carried Out Under FCC part 15.207 & FCC part 15.209

Test Item	Test Mode
Conduction Emission, 0.15MHz to 30MHz	Communication

4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) 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 880581, May 26, 2011.

4.6 Test Location

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

4.7 General condition

Ambient Condition: 25.5 °C 58 %RH

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions at Mains Terminals Disturbance Voltage						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.18,2013	Sep.17,2014
2.	LISN	R&S	ENV216	101215	Nov. 29,2013	Nov. 28,2014
3.	Cable	Top	TYPE16(3.5M)	-	Sep.18,2013	Sep.17,2014
3m Semi-anechoic Chamber for Radiation						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2	Active Loop Antenna (9kHz-30MHz)	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.20,2013	Apr.19,2014
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.20,2013	Apr.19,2014
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.20,2013	Apr.19,2014
8	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.20,2013	Apr.19,2014

5.2 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)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature:	25.5 °C
Humidity:	50 % RH
Atmospheric Pressure:	101.2 kPa

EUT Operation:

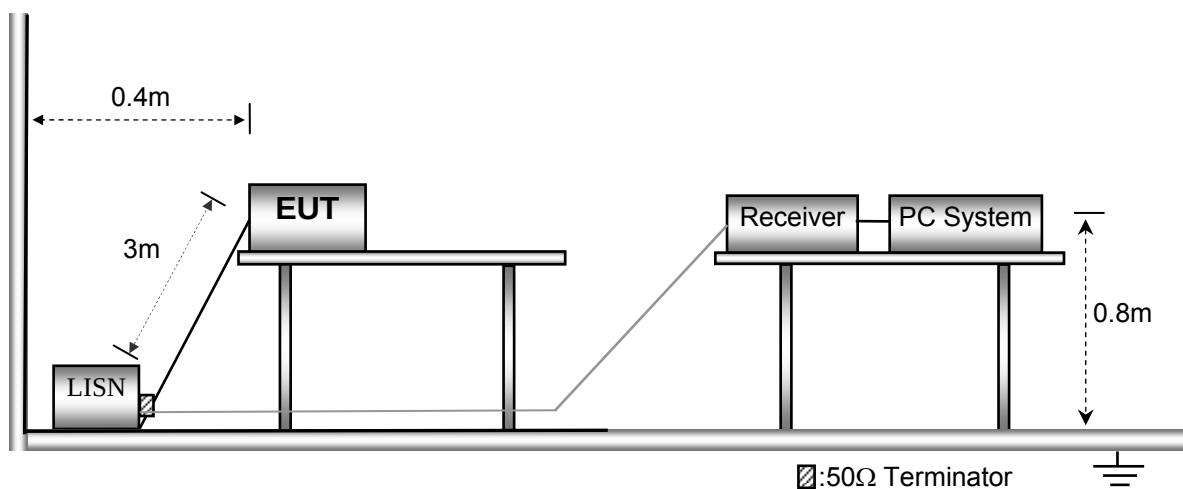
The pre-test was performed in communication mode, and the test data were shown as follow.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

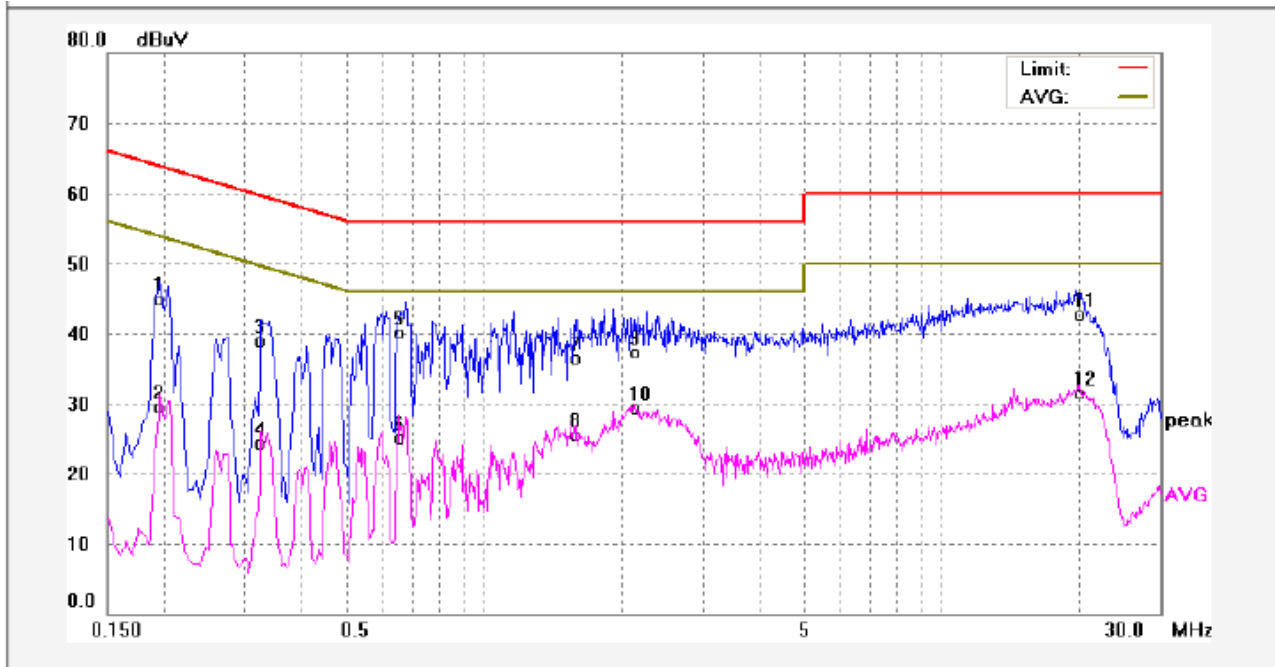
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.



6.3 Conducted Emission Test Result

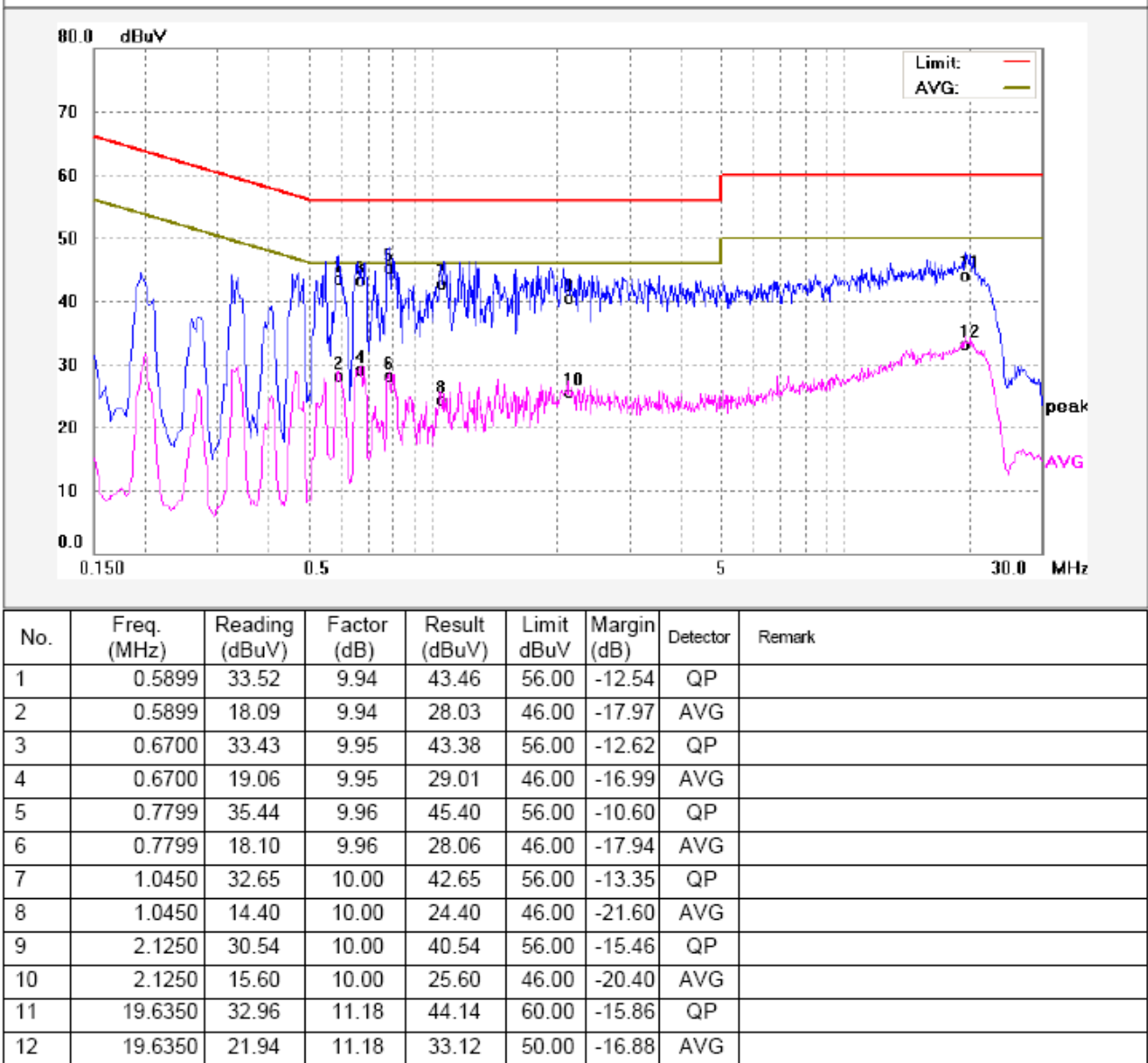
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1949	35.12	9.84	44.96	63.82	-18.86	QP	
2	0.1949	19.60	9.84	29.44	53.82	-24.38	AVG	
3	0.3250	28.98	9.88	38.86	59.58	-20.72	QP	
4	0.3250	14.33	9.88	24.21	49.58	-25.37	AVG	
5	0.6500	30.13	9.94	40.07	56.00	-15.93	QP	
6	0.6500	15.23	9.94	25.17	46.00	-20.83	AVG	
7	1.5850	26.46	10.00	36.46	56.00	-19.54	QP	
8	1.5850	15.50	10.00	25.50	46.00	-20.50	AVG	
9	2.1250	27.26	10.00	37.26	56.00	-18.74	QP	
10	2.1250	19.34	10.00	29.34	46.00	-16.66	AVG	
11	20.0350	31.60	11.20	42.80	60.00	-17.20	QP	
12	20.0350	20.31	11.20	31.51	50.00	-18.49	AVG	

Neutral line:



7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.4:2003

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	$20\log^{(500)}$

7.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C

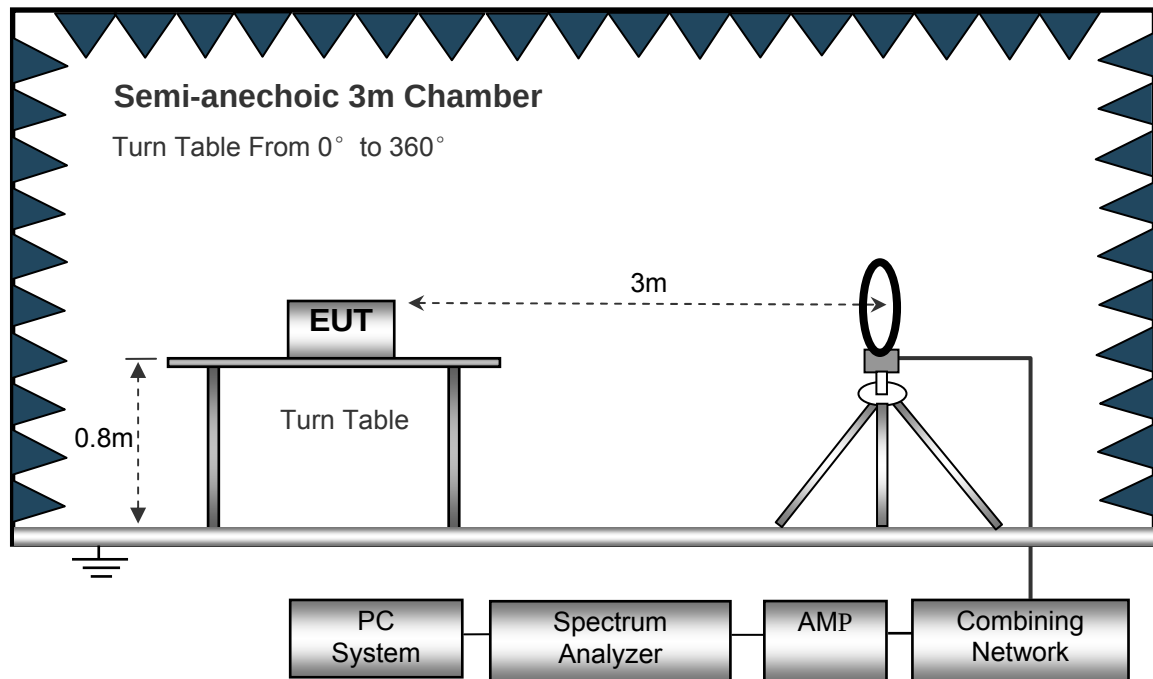
Humidity: 51 % RH

Atmospheric Pressure: 101.3 kPa

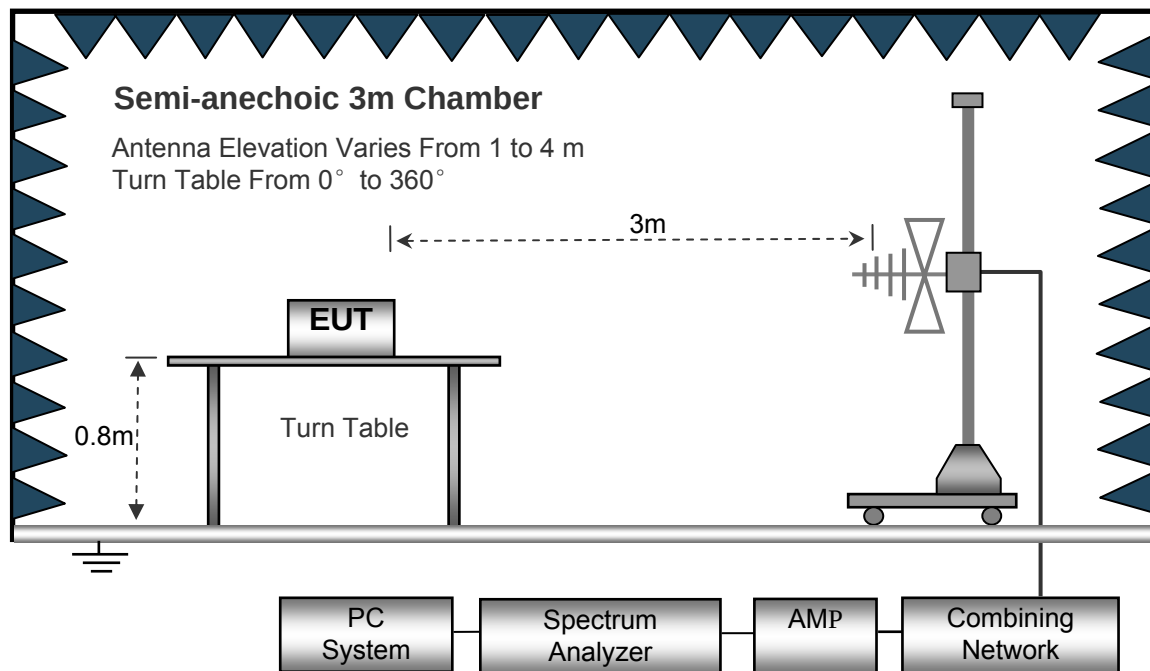
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

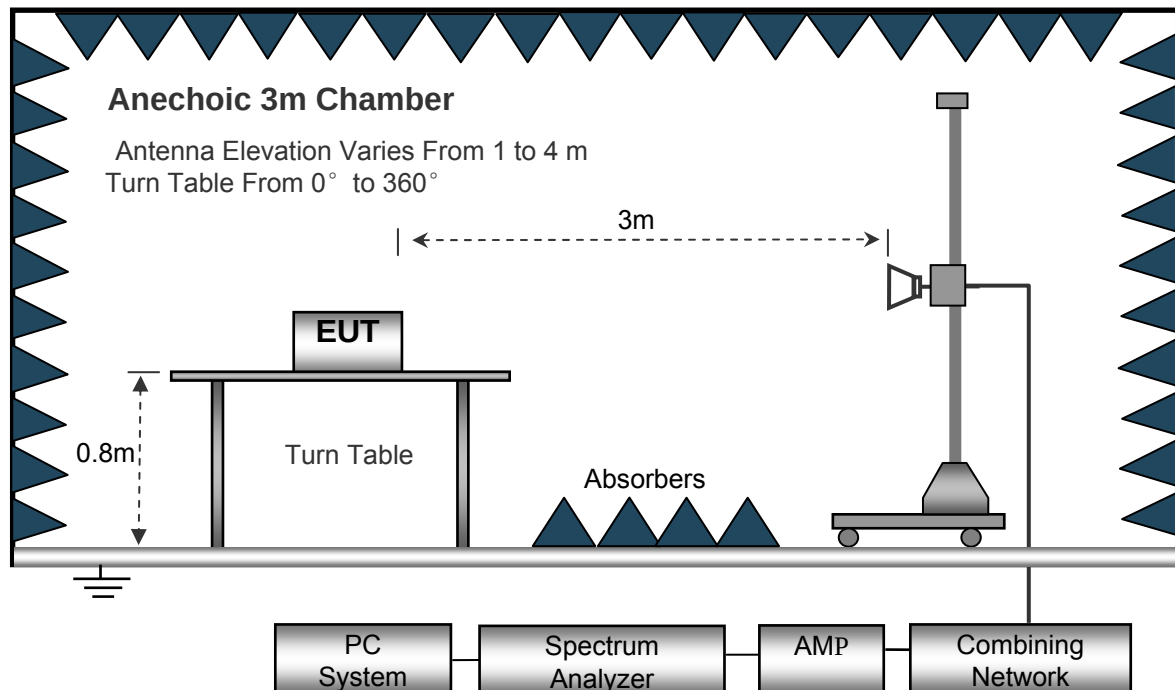
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 32.768kHz to 25000MHz.

Below 30MHz

Sweep SpeedAuto
 IF Bandwidth10kHz
 Video Bandwidth10kHz
 Resolution Bandwidth10kHz

30MHz ~ 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth100kHz
 Video Bandwidth300kHz

Above 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth1MHz
 Video Bandwidth3MHz
 DetectorAve.
 Resolution Bandwidth1MHz
 Video Bandwidth10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m 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.

7.5 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:

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

7.6 Summary of Test Results

Test Frequency : Below 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									
199.99	24.21	QP	299	1.5	H	11.26	35.47	40.00	-4.53
199.99	22.31	QP	296	2.0	V	11.26	33.57	40.00	-6.43
4824.00	53.79	PK	173	1.9	V	-1.06	52.73	74.00	-21.27
4824.00	44.65	Ave	173	1.9	V	-1.06	43.59	54.00	-10.41
7236.00	43.32	PK	195	1.4	H	1.33	44.65	74.00	-29.35
7236.00	39.14	Ave	195	1.4	H	1.33	40.47	54.00	-13.53
2310.70	45.58	PK	171	1.9	V	-13.19	32.39	74.00	-41.61
2310.70	38.85	Ave	171	1.9	V	-13.19	25.66	54.00	-28.34
2383.04	44.91	PK	259	2.0	H	-13.14	31.77	74.00	-42.23
2383.04	38.43	Ave	259	2.0	H	-13.14	25.29	54.00	-28.71
2492.85	42.73	PK	300	1.9	V	-13.08	29.65	74.00	-44.35
2492.85	36.37	Ave	300	1.9	V	-13.08	23.29	54.00	-30.71

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									
199.99	24.58	QP	175	1.1	H	11.26	35.84	40.00	-4.16
199.99	21.69	QP	97	1.1	V	11.26	32.95	40.00	-7.05
4874.00	53.22	PK	87	1.3	V	-0.62	52.60	74.00	-21.40
4874.00	44.38	Ave	87	1.3	V	-0.62	43.76	54.00	-10.24
7311.00	43.43	PK	295	1.3	H	2.21	45.64	74.00	-28.36
7311.00	39.96	Ave	295	1.3	H	2.21	42.17	54.00	-11.83
2341.83	45.38	PK	225	1.7	V	-13.19	32.19	74.00	-41.81
2341.83	37.81	Ave	225	1.7	V	-13.19	24.62	54.00	-29.38
2367.68	42.20	PK	94	1.4	H	-13.14	29.06	74.00	-44.94
2367.68	37.16	Ave	94	1.4	H	-13.14	24.02	54.00	-29.98
2495.06	44.70	PK	200	1.3	V	-13.08	31.62	74.00	-42.38
2495.06	37.38	Ave	200	1.3	V	-13.08	24.30	54.00	-29.70

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									
199.99	23.66	QP	74	1.3	H	11.26	34.92	40.00	-5.08
199.99	21.49	QP	159	1.5	V	11.26	32.75	40.00	-7.25
4924.00	53.52	PK	13	1.9	V	-0.24	53.28	74.00	-20.72
4924.00	44.52	Ave	13	1.9	V	-0.24	44.28	54.00	-9.72
7386.00	42.67	PK	36	1.4	H	2.84	45.51	74.00	-28.49
7386.00	39.67	Ave	36	1.4	H	2.84	42.51	54.00	-11.49
2313.86	46.60	PK	130	1.4	V	-13.19	33.41	74.00	-40.59
2313.86	39.32	Ave	130	1.4	V	-13.19	26.13	54.00	-27.87
2383.55	43.10	PK	143	1.8	H	-13.14	29.96	74.00	-44.04
2383.55	38.46	Ave	143	1.8	H	-13.14	25.32	54.00	-28.68
2497.84	44.31	PK	170	1.3	V	-13.08	31.23	74.00	-42.77
2497.84	37.09	Ave	170	1.3	V	-13.08	24.01	54.00	-29.99

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									
199.99	22.82	QP	336	1.4	H	11.26	34.08	40.00	-5.92
199.99	21.61	QP	344	1.4	V	11.26	32.87	40.00	-7.13
4824.00	52.93	PK	16	1.1	V	-1.06	51.87	74.00	-22.13
4824.00	44.71	Ave	16	1.1	V	-1.06	43.65	54.00	-10.35
7236.00	42.41	PK	5	1.4	H	1.33	43.74	74.00	-30.26
7236.00	39.14	Ave	5	1.4	H	1.33	40.47	54.00	-13.53
2329.57	45.43	PK	338	1.0	V	-13.19	32.24	74.00	-41.76
2329.57	38.18	Ave	338	1.0	V	-13.19	24.99	54.00	-29.01
2387.64	42.36	PK	202	1.3	H	-13.14	29.22	74.00	-44.78
2387.64	37.13	Ave	202	1.3	H	-13.14	23.99	54.00	-30.01
2493.18	42.93	PK	4	1.3	V	-13.08	29.85	74.00	-44.15
2493.18	38.94	Ave	4	1.3	V	-13.08	25.86	54.00	-28.14

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									
199.99	22.62	QP	42	1.1	H	11.26	33.88	40.00	-6.12
199.99	22.21	QP	302	1.8	V	11.26	33.47	40.00	-6.53
4874.00	53.86	PK	109	1.2	V	-0.62	53.24	74.00	-20.76
4874.00	45.65	Ave	109	1.2	V	-0.62	45.03	54.00	-8.97
7311.00	42.23	PK	247	1.1	H	2.21	44.44	74.00	-29.56
7311.00	38.45	Ave	247	1.1	H	2.21	40.66	54.00	-13.34
2316.32	46.46	PK	82	1.6	V	-13.19	33.27	74.00	-40.73
2316.32	39.55	Ave	82	1.6	V	-13.19	26.36	54.00	-27.64
2374.31	42.61	PK	92	1.3	H	-13.14	29.47	74.00	-44.53
2374.31	37.51	Ave	92	1.3	H	-13.14	24.37	54.00	-29.63
2496.69	44.40	PK	125	1.3	V	-13.08	31.32	74.00	-42.68
2496.69	36.13	Ave	125	1.3	V	-13.08	23.05	54.00	-30.95

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									
199.99	22.72	QP	297	1.6	H	11.26	33.98	40.00	-6.02
199.99	22.94	QP	1	1.1	V	11.26	34.20	40.00	-5.80
4924.00	53.03	PK	165	1.7	V	-0.24	52.79	74.00	-21.21
4924.00	45.96	Ave	165	1.7	V	-0.24	45.72	54.00	-8.28
7386.00	42.21	PK	53	1.3	H	2.84	45.05	74.00	-28.95
7386.00	37.97	Ave	53	1.3	H	2.84	40.81	54.00	-13.19
2310.60	45.57	PK	226	1.1	V	-13.19	32.38	74.00	-41.62
2310.60	38.33	Ave	226	1.1	V	-13.19	25.14	54.00	-28.86
2352.87	42.76	PK	17	1.9	H	-13.14	29.62	74.00	-44.38
2352.87	36.20	Ave	17	1.9	H	-13.14	23.06	54.00	-30.94
2490.28	44.40	PK	43	1.6	V	-13.08	31.32	74.00	-42.68
2490.28	38.54	Ave	43	1.6	V	-13.08	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: Low Channel 2412MHz									
199.99	23.07	QP	247	1.2	H	11.26	34.33	40.00	-5.67
199.99	23.23	QP	221	1.5	V	11.26	34.49	40.00	-5.51
4824.00	52.99	PK	33	1.0	V	-1.06	51.93	74.00	-22.07
4824.00	46.92	Ave	33	1.0	V	-1.06	45.86	54.00	-8.14
7236.00	41.41	PK	76	1.8	H	1.33	42.74	74.00	-31.26
7236.00	38.45	Ave	76	1.8	H	1.33	39.78	54.00	-14.22
2332.77	45.69	PK	192	1.4	V	-13.19	32.50	74.00	-41.50
2332.77	39.57	Ave	192	1.4	V	-13.19	26.38	54.00	-27.62
2378.39	44.08	PK	313	1.7	H	-13.14	30.94	74.00	-43.06
2378.39	38.27	Ave	313	1.7	H	-13.14	25.13	54.00	-28.87
2498.01	43.63	PK	19	2.0	V	-13.08	30.55	74.00	-43.45
2498.01	36.09	Ave	19	2.0	V	-13.08	23.01	54.00	-30.99

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									
199.99	23.45	QP	217	1.1	H	11.26	34.71	40.00	-5.29
199.99	23.42	QP	238	2.0	V	11.26	34.68	40.00	-5.32
4874.00	53.05	PK	146	1.0	V	-0.62	52.43	74.00	-21.57
4874.00	46.05	Ave	146	1.0	V	-0.62	45.43	54.00	-8.57
7311.00	42.01	PK	284	1.4	H	2.21	44.22	74.00	-29.78
7311.00	38.61	Ave	284	1.4	H	2.21	40.82	54.00	-13.18
2338.94	46.27	PK	336	1.6	V	-13.19	33.08	74.00	-40.92
2338.94	37.99	Ave	336	1.6	V	-13.19	24.80	54.00	-29.20
2370.47	44.19	PK	150	1.1	H	-13.14	31.05	74.00	-42.95
2370.47	37.51	Ave	150	1.1	H	-13.14	24.37	54.00	-29.63
2497.66	42.65	PK	353	1.7	V	-13.08	29.57	74.00	-44.43
2497.66	38.83	Ave	353	1.7	V	-13.08	25.75	54.00	-28.25

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									
199.99	23.96	QP	50	1.3	H	11.26	35.22	40.00	-4.78
199.99	23.49	QP	343	1.5	V	11.26	34.75	40.00	-5.25
4924.00	53.63	PK	69	1.4	V	-0.24	53.39	74.00	-20.61
4924.00	45.65	Ave	69	1.4	V	-0.24	45.41	54.00	-8.59
7386.00	41.54	PK	88	1.9	H	2.84	44.38	74.00	-29.62
7386.00	37.77	Ave	88	1.9	H	2.84	40.61	54.00	-13.39
2314.51	46.79	PK	175	1.9	V	-13.19	33.60	74.00	-40.40
2314.51	37.69	Ave	175	1.9	V	-13.19	24.50	54.00	-29.50
2358.53	42.71	PK	151	1.2	H	-13.14	29.57	74.00	-44.43
2358.53	37.68	Ave	151	1.2	H	-13.14	24.54	54.00	-29.46
2491.53	43.96	PK	219	1.5	V	-13.08	30.88	74.00	-43.12
2491.53	36.78	Ave	219	1.5	V	-13.08	23.70	54.00	-30.30

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									
199.99	23.43	QP	59	1.5	H	11.26	34.69	40.00	-5.31
199.99	24.31	QP	185	1.6	V	11.26	35.57	40.00	-4.43
4844.00	53.03	PK	114	1.2	V	-1.06	51.97	74.00	-22.03
4844.00	46.04	Ave	114	1.2	V	-1.06	44.98	54.00	-9.02
7266.00	42.24	PK	187	1.6	H	1.33	43.57	74.00	-30.43
7266.00	37.75	Ave	187	1.6	H	1.33	39.08	54.00	-14.92
2344.20	45.93	PK	29	1.3	V	-13.19	32.74	74.00	-41.26
2344.20	38.85	Ave	29	1.3	V	-13.19	25.66	54.00	-28.34
2376.81	42.54	PK	114	1.1	H	-13.14	29.40	74.00	-44.60
2376.81	38.89	Ave	114	1.1	H	-13.14	25.75	54.00	-28.25
2496.28	43.87	PK	146	1.3	V	-13.08	30.79	74.00	-43.21
2496.28	37.23	Ave	146	1.3	V	-13.08	24.15	54.00	-29.85

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									
199.99	23.32	QP	90	1.5	H	11.26	34.58	40.00	-5.42
199.99	23.84	QP	185	1.7	V	11.26	35.10	40.00	-4.90
4874.00	52.56	PK	278	1.3	V	-0.62	51.94	74.00	-22.06
4874.00	46.09	Ave	278	1.3	V	-0.62	45.47	54.00	-8.53
7311.00	41.62	PK	187	1.0	H	2.21	43.83	74.00	-30.17
7311.00	36.90	Ave	187	1.0	H	2.21	39.11	54.00	-14.89
2328.50	46.81	PK	241	1.1	V	-13.19	33.62	74.00	-40.38
2328.50	39.33	Ave	241	1.1	V	-13.19	26.14	54.00	-27.86
2386.54	44.23	PK	21	1.6	H	-13.14	31.09	74.00	-42.91
2386.54	38.19	Ave	21	1.6	H	-13.14	25.05	54.00	-28.95
2492.58	44.67	PK	169	2.0	V	-13.08	31.59	74.00	-42.41
2492.58	38.36	Ave	169	2.0	V	-13.08	25.28	54.00	-28.72

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									
199.99	24.29	QP	124	2.0	H	11.26	35.55	40.00	-4.45
199.99	23.41	QP	260	1.1	V	11.26	34.67	40.00	-5.33
4904.00	53.52	PK	72	1.6	V	-0.24	53.28	74.00	-20.72
4904.00	45.97	Ave	72	1.6	V	-0.24	45.73	54.00	-8.27
7356.00	41.40	PK	129	1.7	H	2.84	44.24	74.00	-29.76
7356.00	37.23	Ave	129	1.7	H	2.84	40.07	54.00	-13.93
2332.18	46.44	PK	322	1.6	V	-13.19	33.25	74.00	-40.75
2332.18	38.79	Ave	322	1.6	V	-13.19	25.60	54.00	-28.40
2370.00	42.83	PK	58	1.7	H	-13.14	29.69	74.00	-44.31
2370.00	38.85	Ave	58	1.7	H	-13.14	25.71	54.00	-28.29
2484.56	44.09	PK	119	1.0	V	-13.08	31.01	74.00	-42.99
2484.56	38.20	Ave	119	1.0	V	-13.08	25.12	54.00	-28.88

Test Frequency: Above 18GHz

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

8 Band Edge Measurement

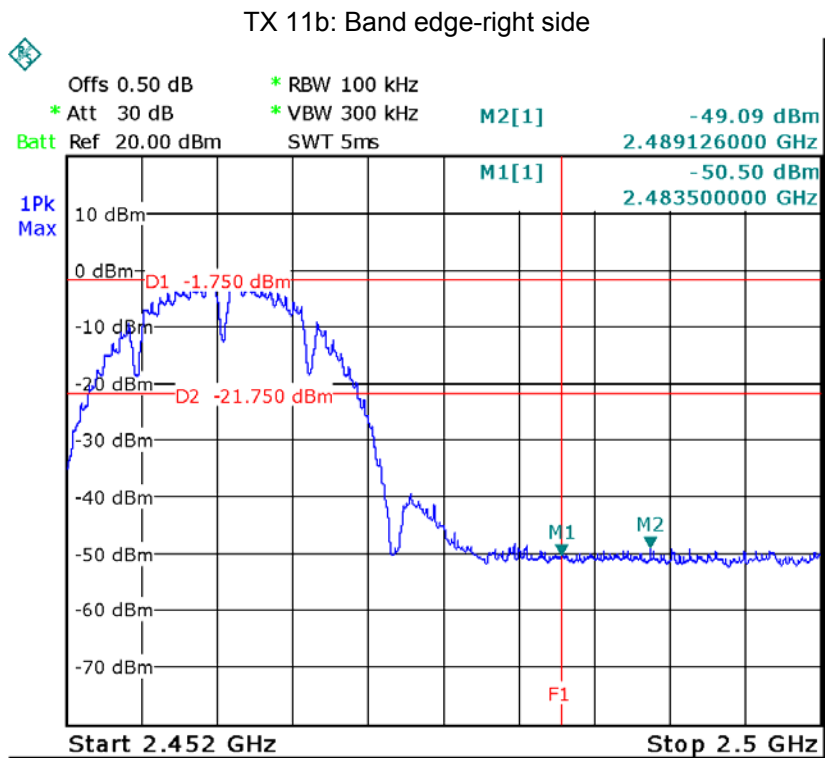
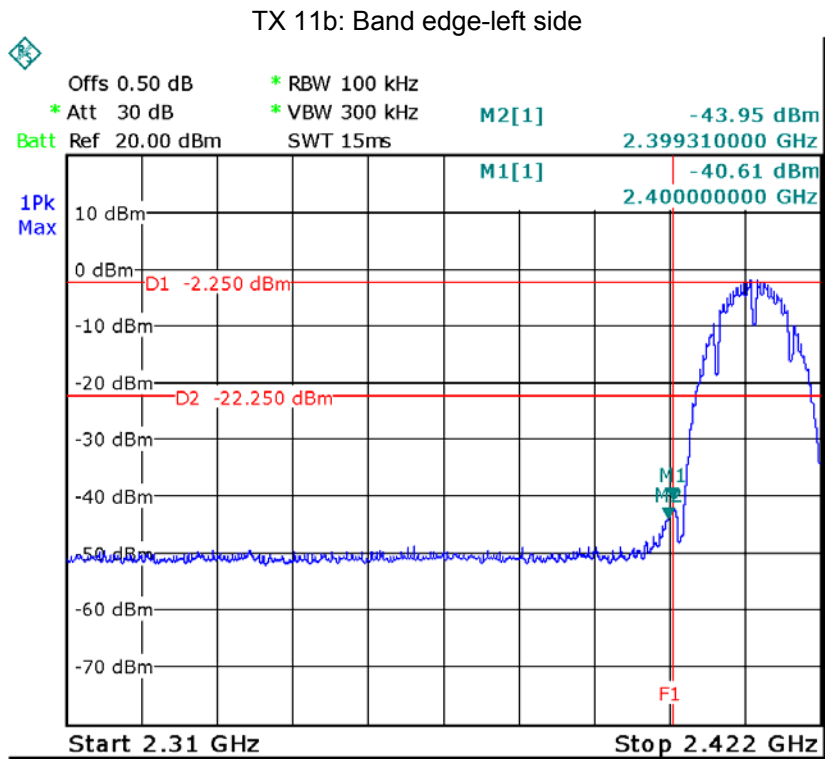
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB558074 D01 v03r01 04/09/2013
Detector:	For Peak value: RBW = 100kHz VBW = 300kHz; Sweep = auto Detector function = p Trace = max hold

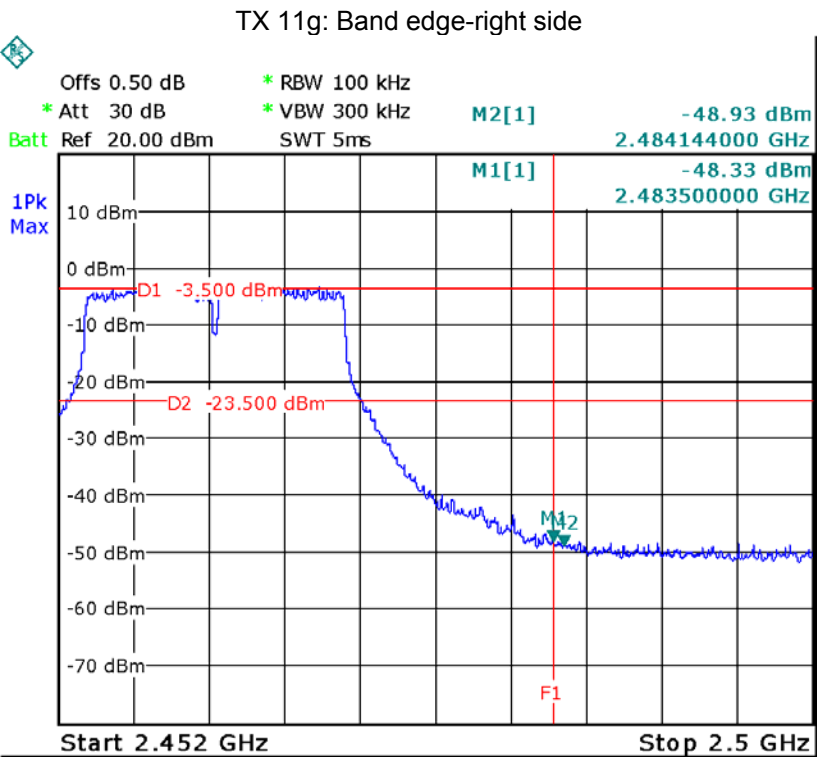
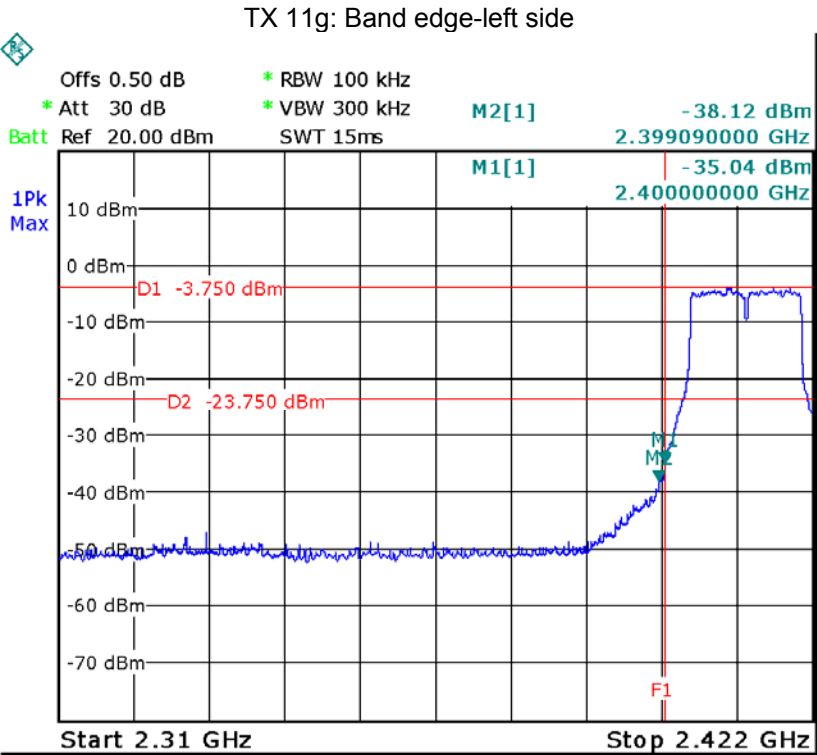
8.1 Test Produce

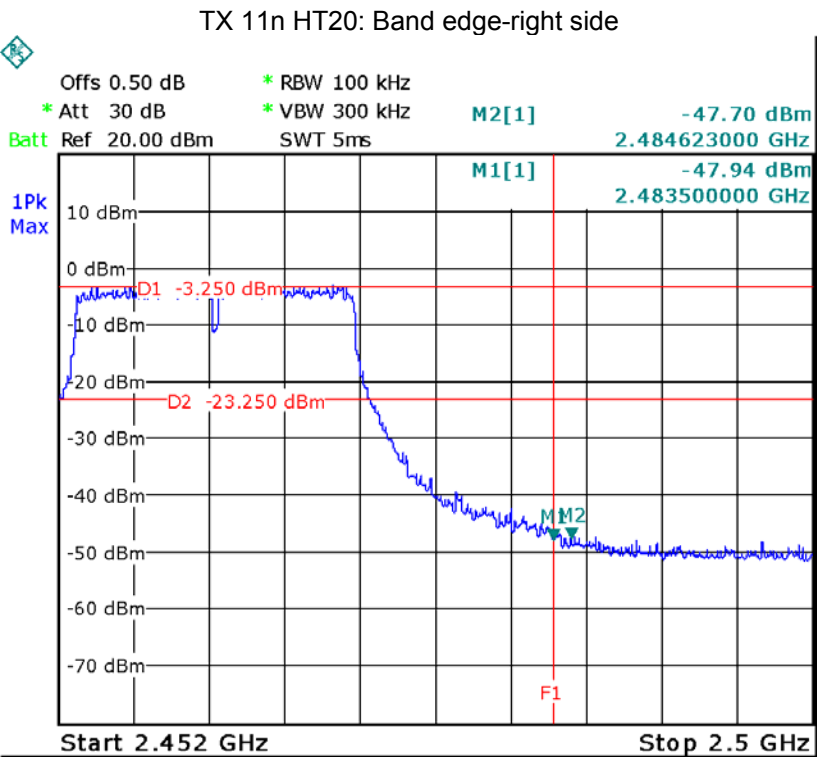
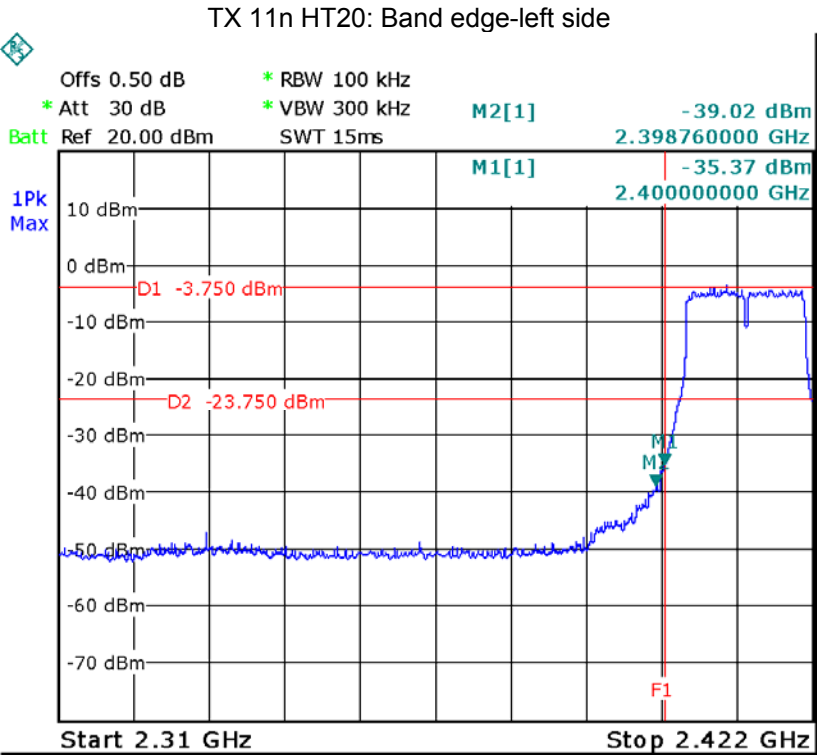
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

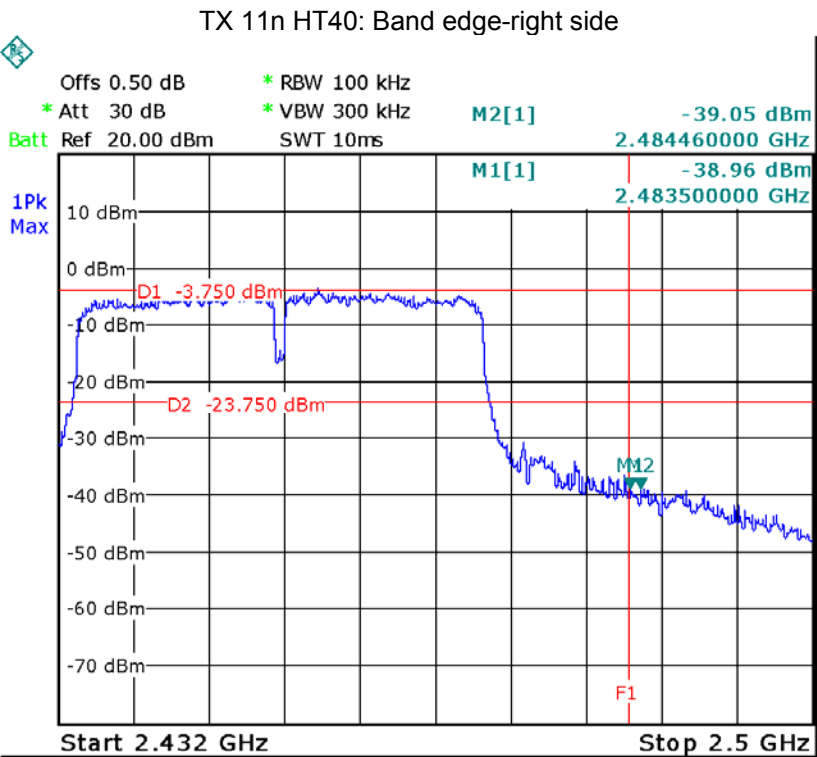
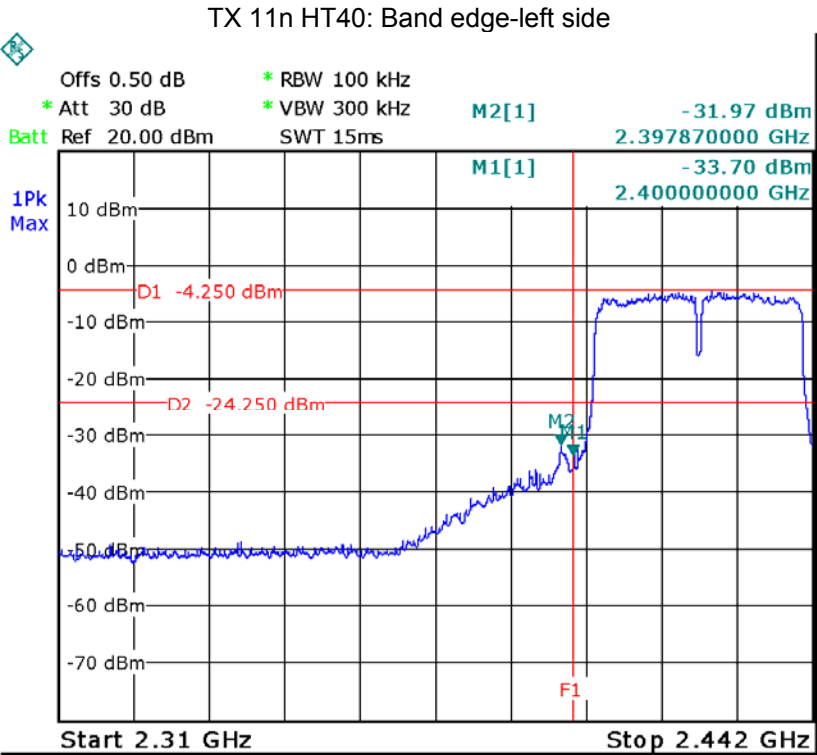
8.2 Test Result

Test result plots shown as follows:









9 6 dB Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB558074 D01 v03r01 04/09/2013

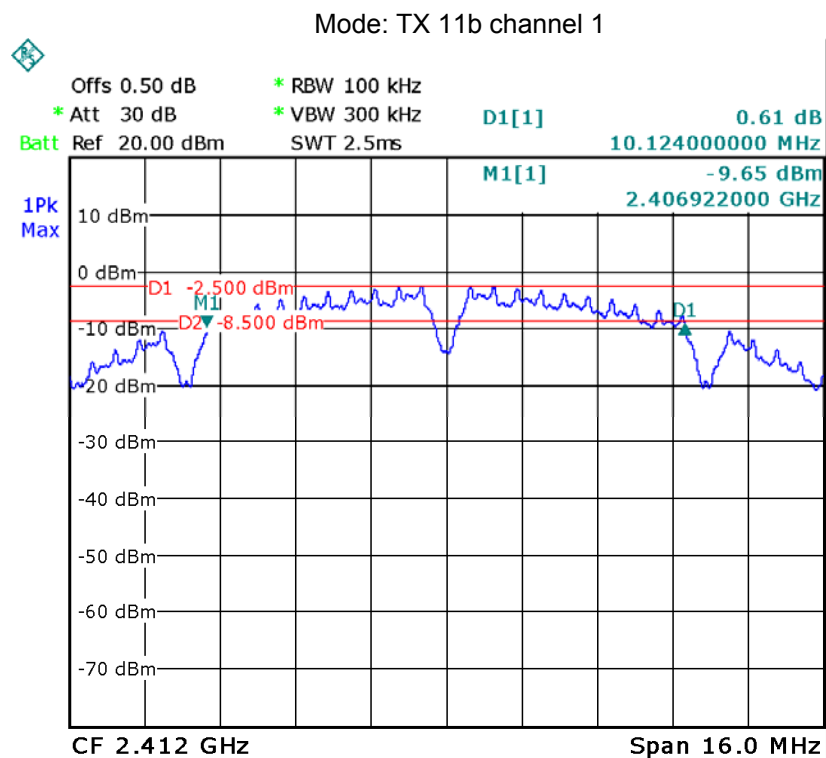
9.1 Test Procedure:

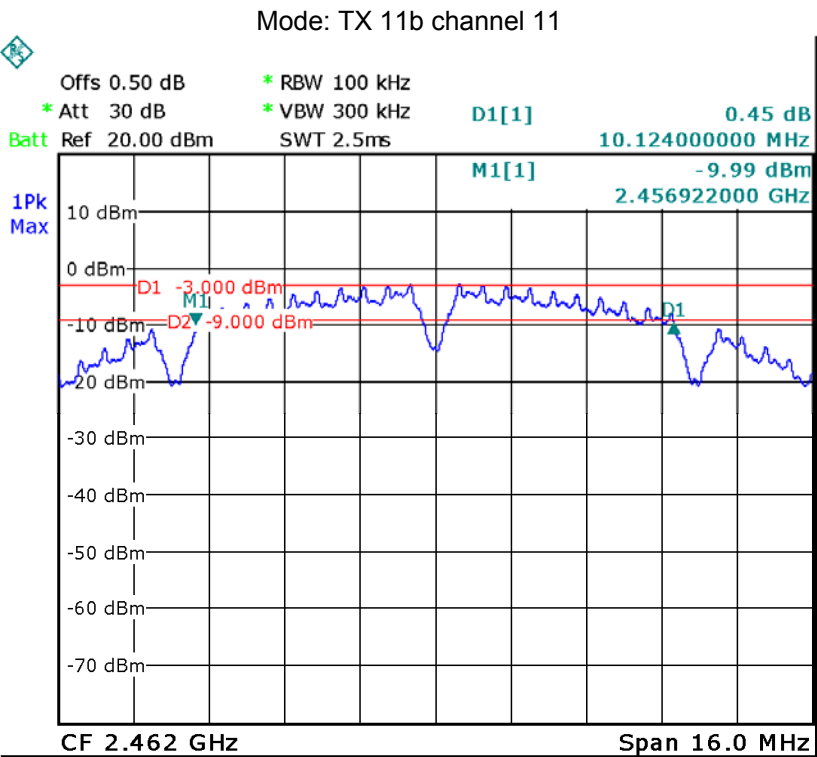
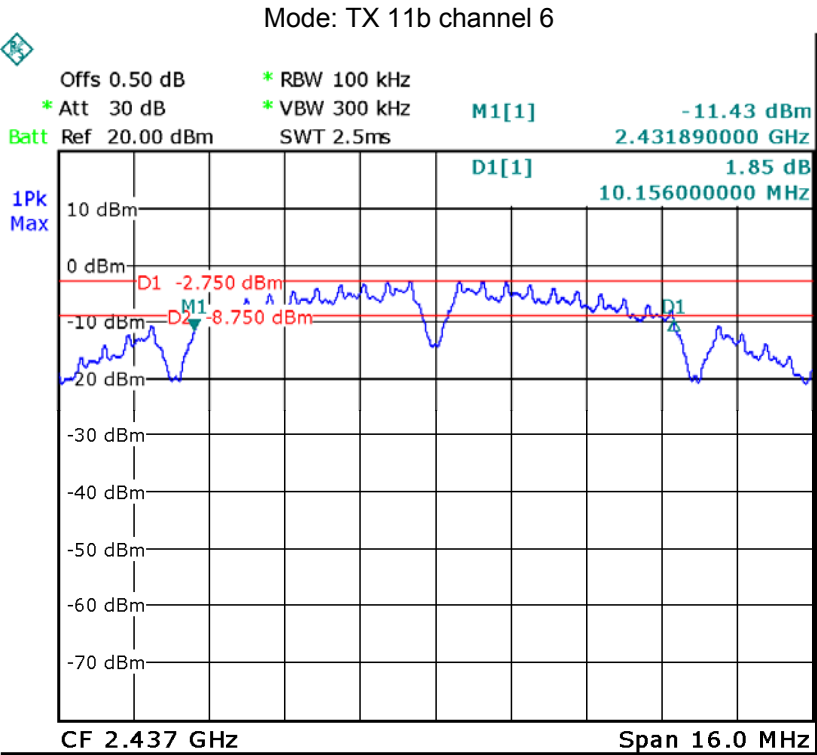
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

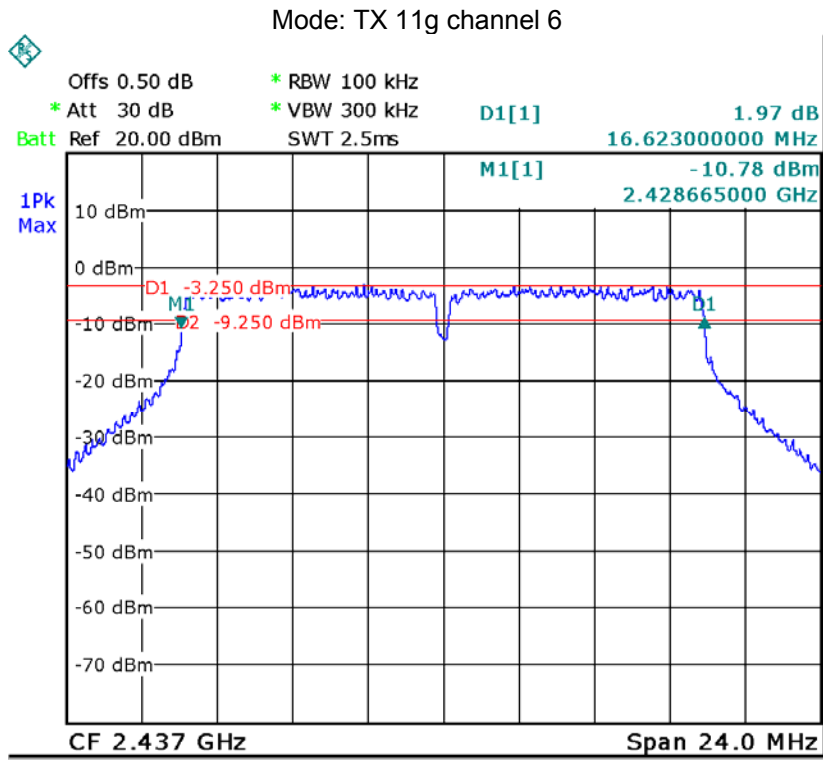
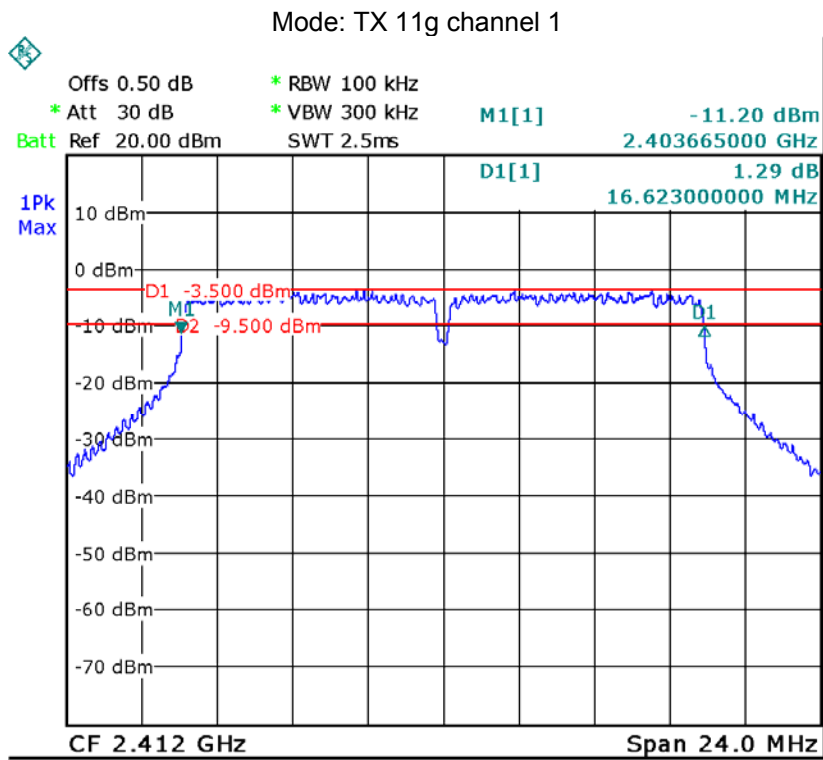
9.2 Test Result:

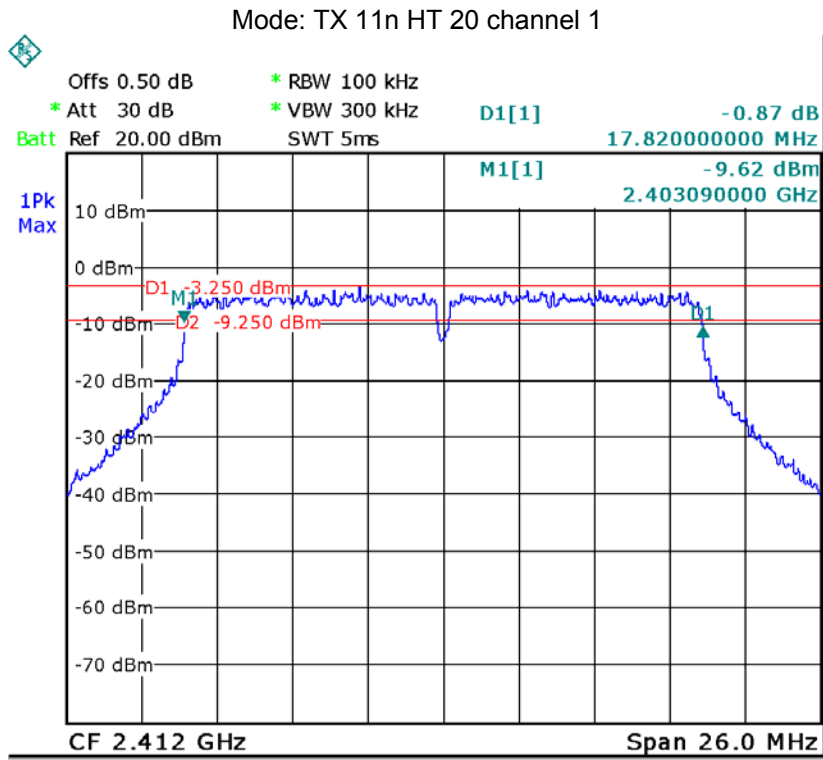
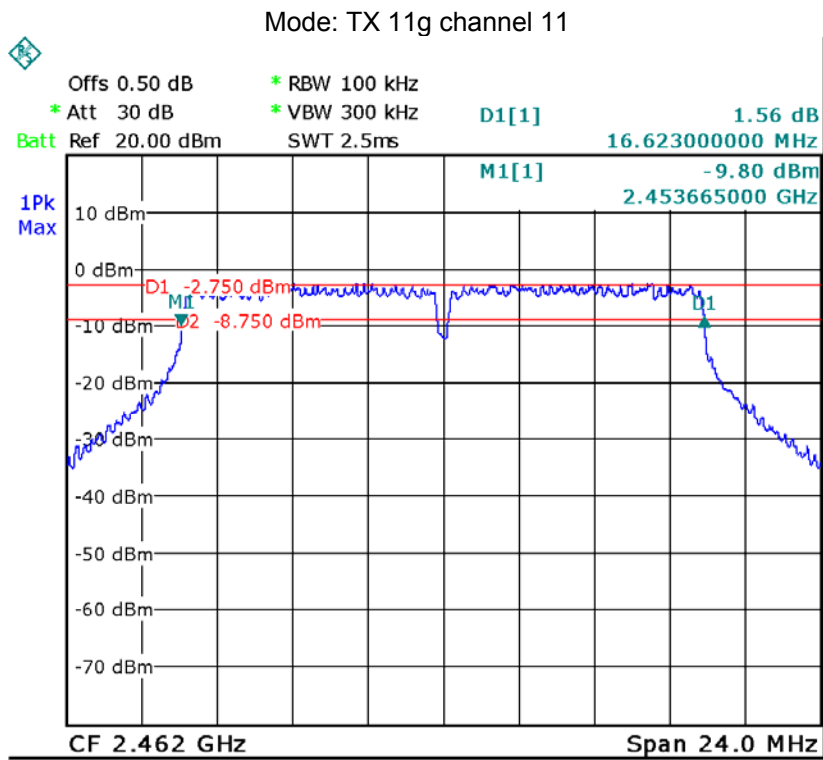
Operation mode	Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	10.124	10.156	10.124
TX 11g	Channel 1	Channel 6	Channel 11
	16.623	16.623	16.623
TX 11n HT 20	Channel 1	Channel 6	Channel 11
	17.800	17.820	17.852
TX 11n HT 40	Channel 3	Channel 6	Channel 9
	36.400	36.410	36.430

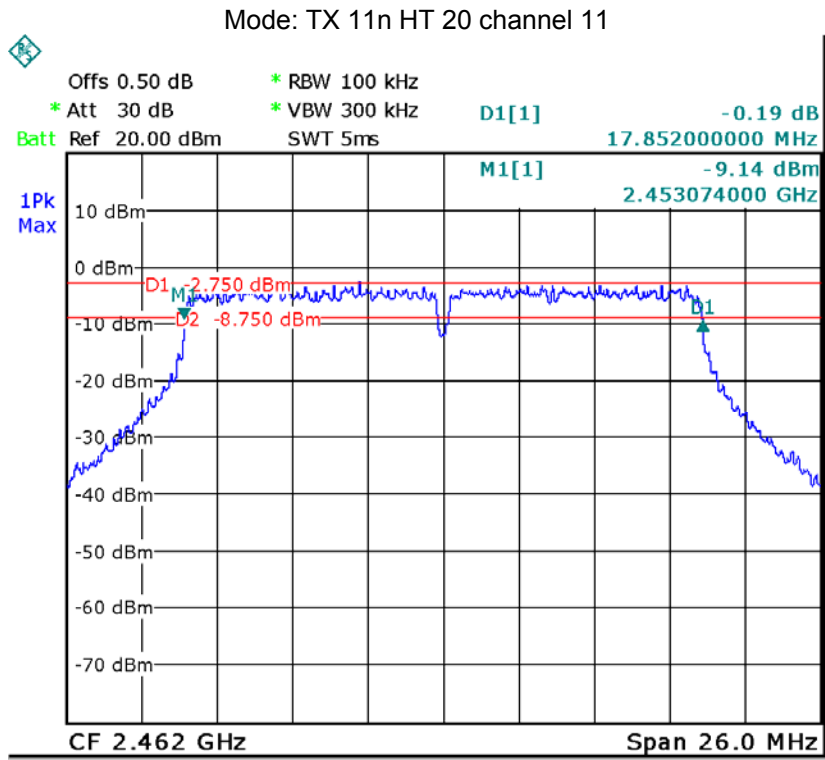
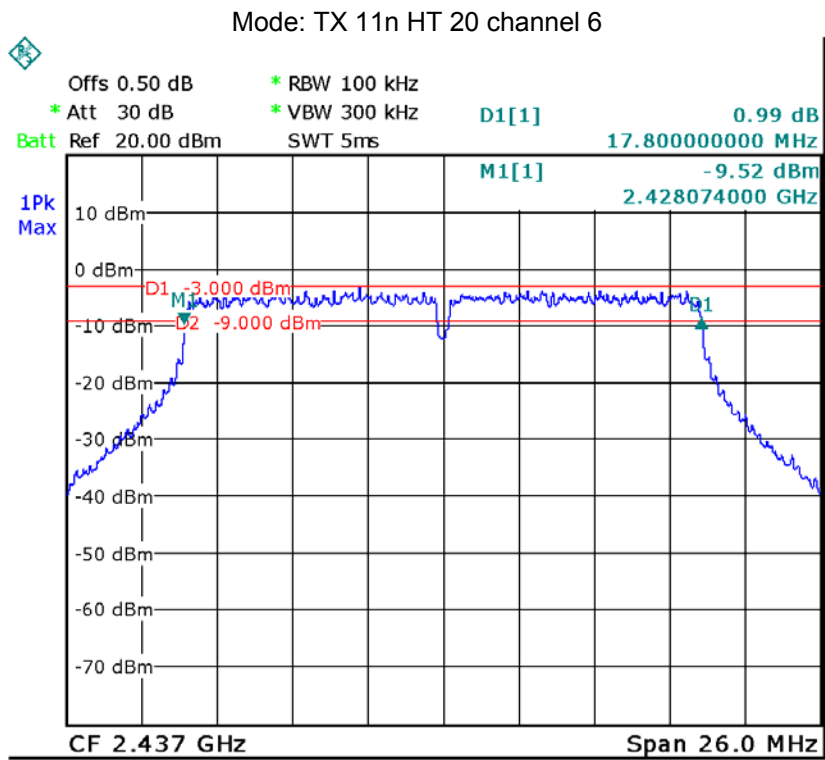
Test result plot as follows:

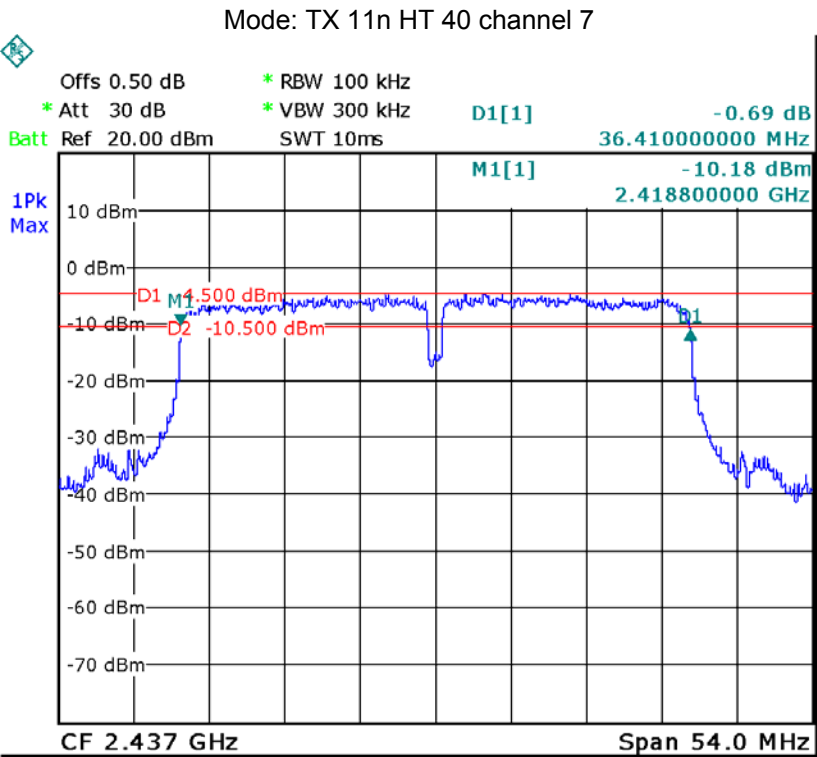
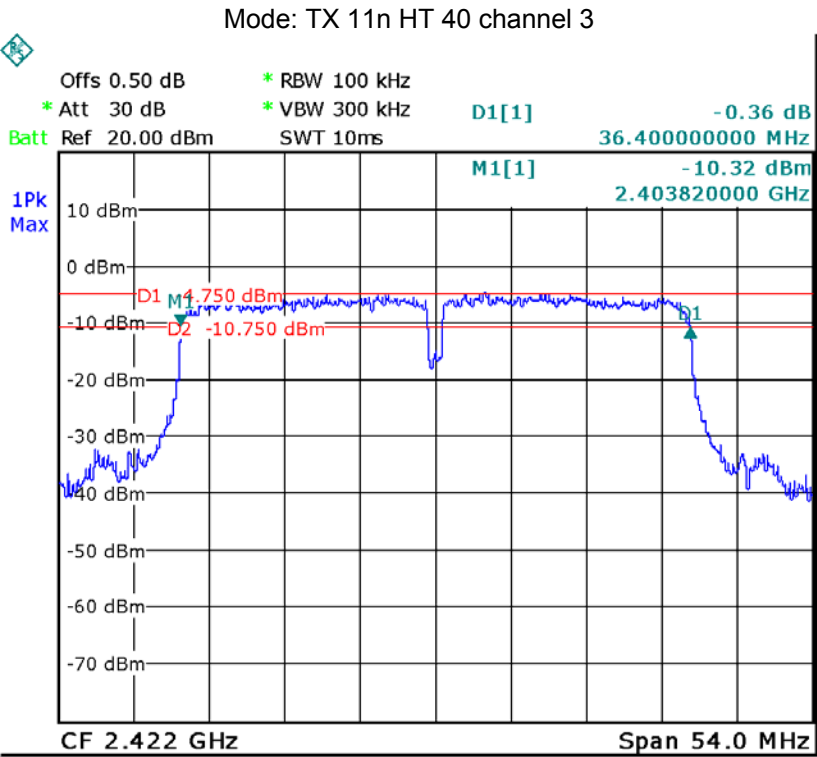




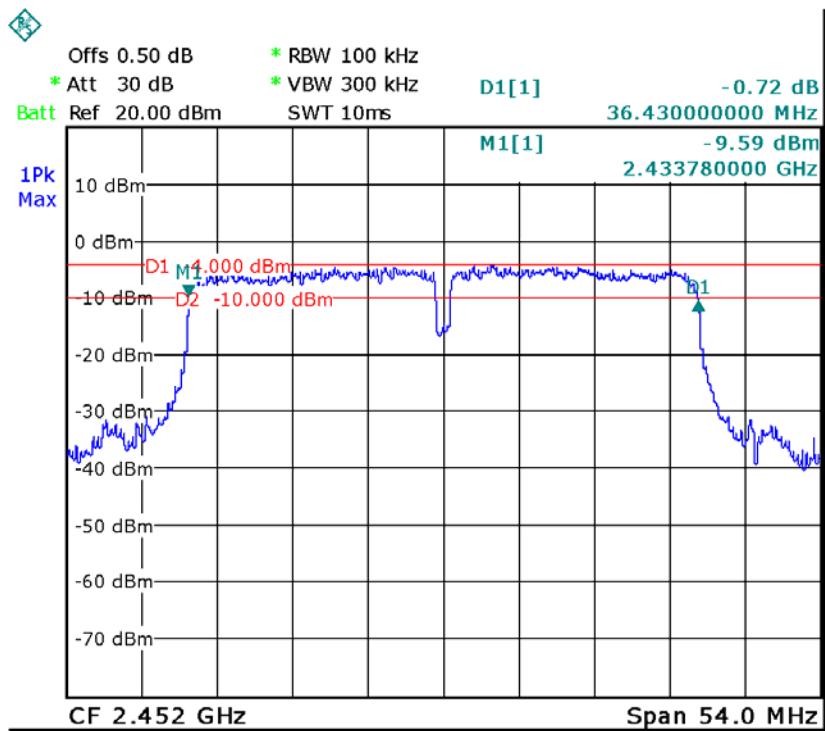








Mode: TX 11n HT 40 channel 9



10 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

10.1 Test Procedure:

KDB558074 D01 v03r01 04/09/2013 section 9.1.2

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.

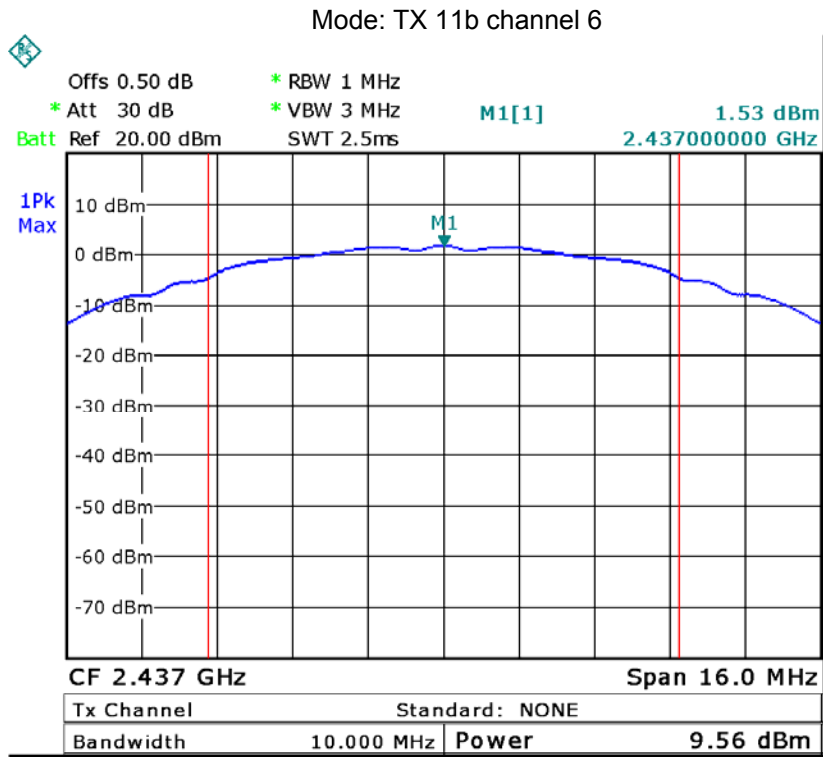
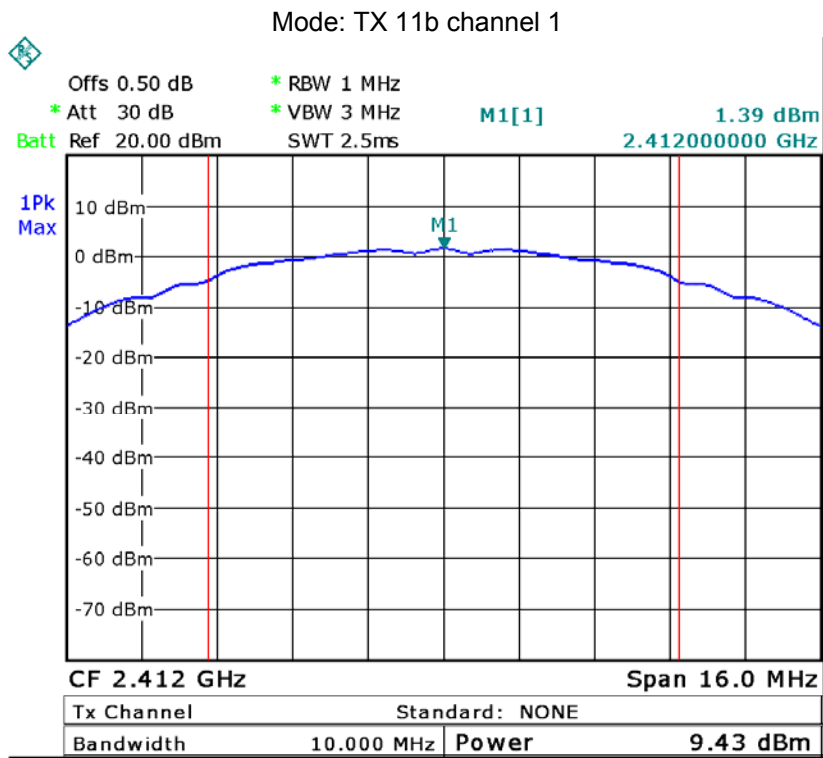
10.2 Test Result:

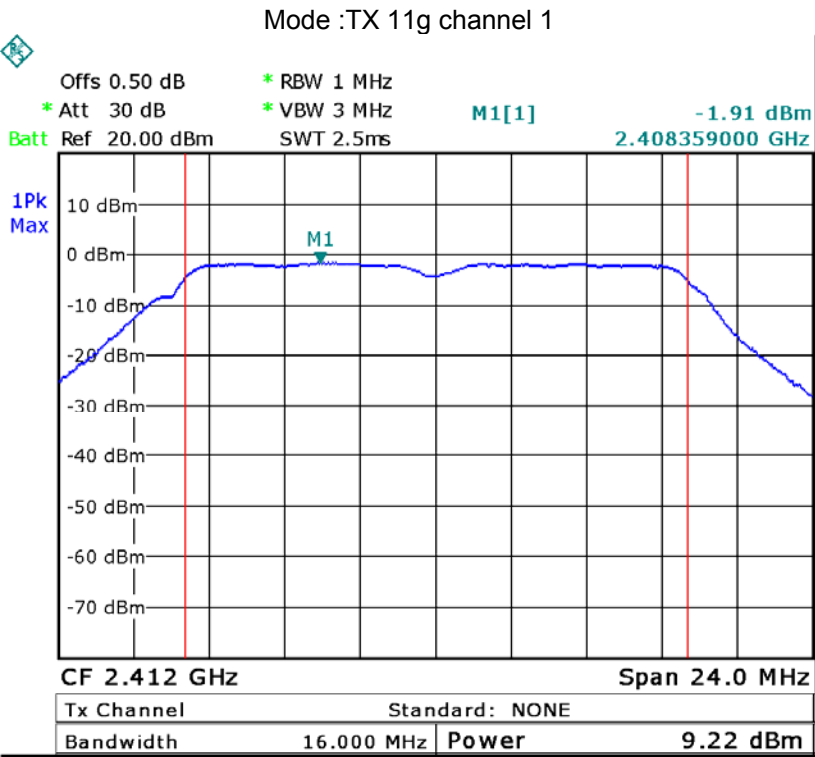
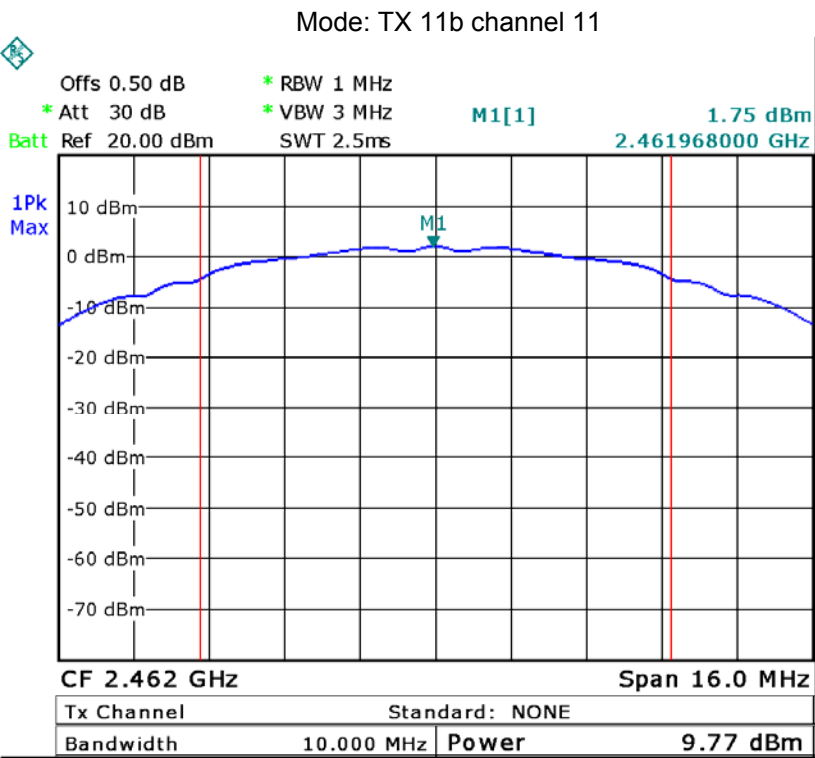
Test mode :TX 11b		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.43	9.56	9.77
Limit		
1W/30dBm		

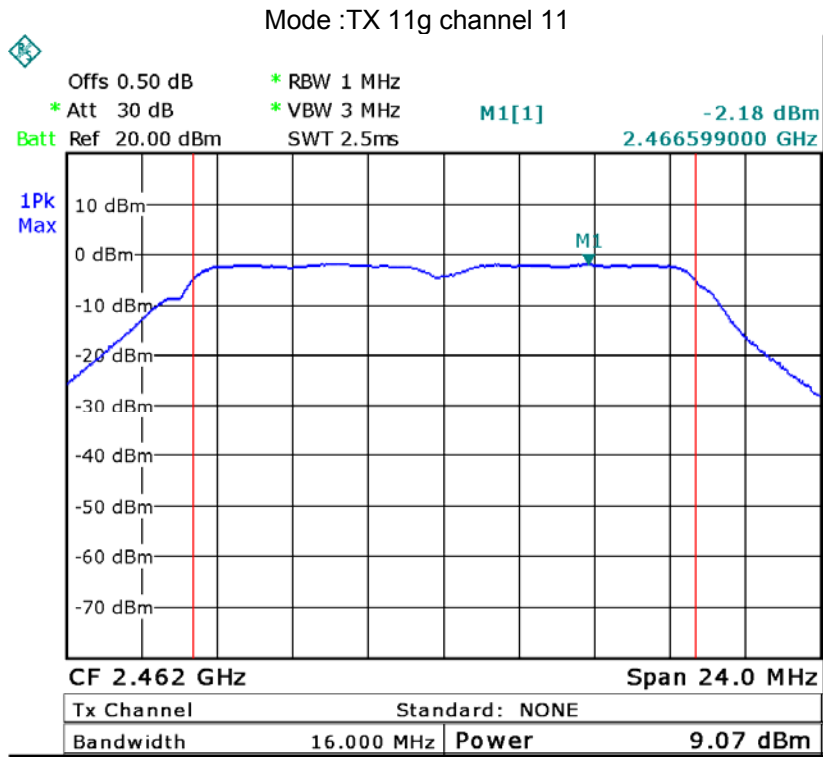
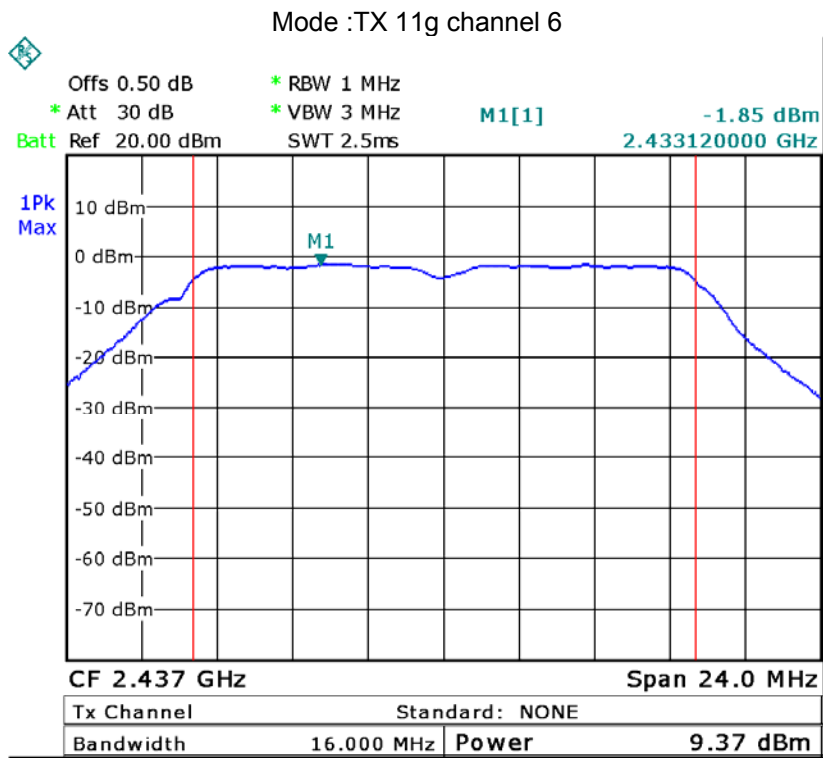
Test mode :TX 11g		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.22	9.37	9.07
Limit		
1W/30dBm		

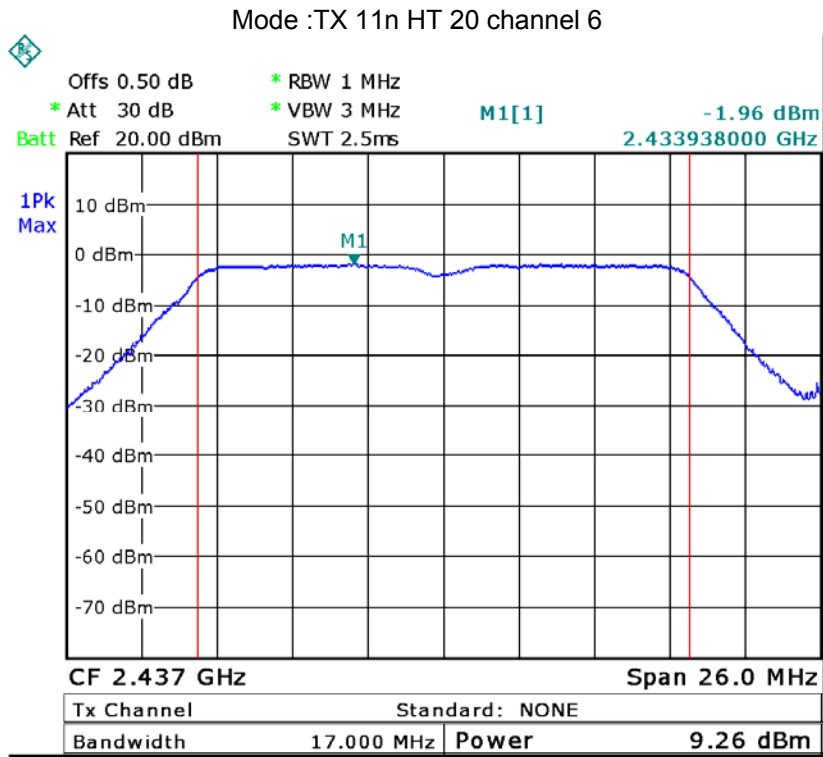
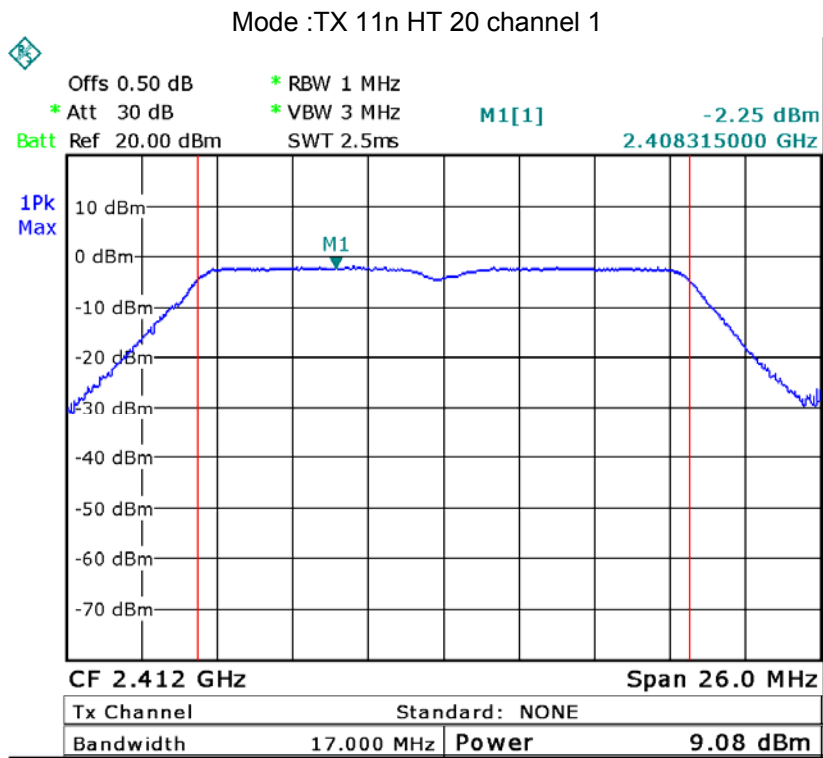
Test mode :TX 11n HT 20		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.08	9.26	9.33
Limit		
1W/30dBm		

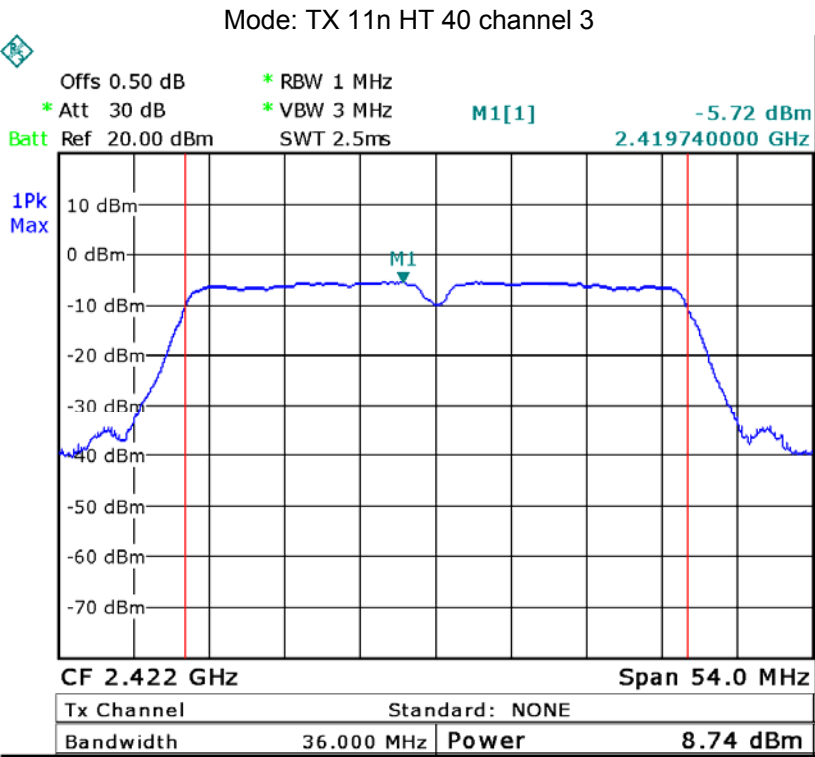
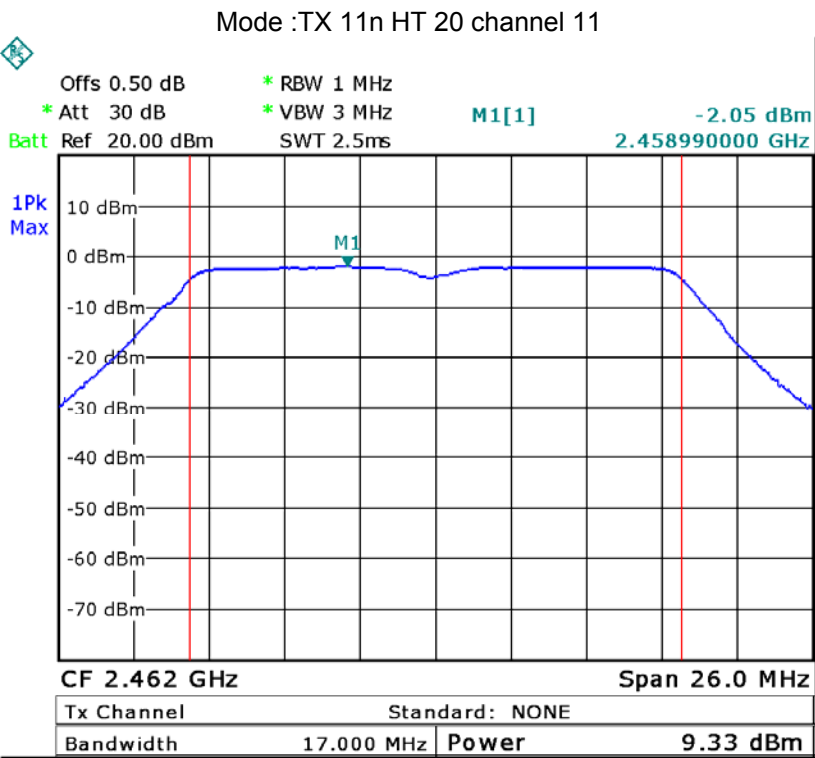
Test mode :TX 11n HT 40		
10 Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
8.74	8.80	8.90
Limit		
1W/30dBm		

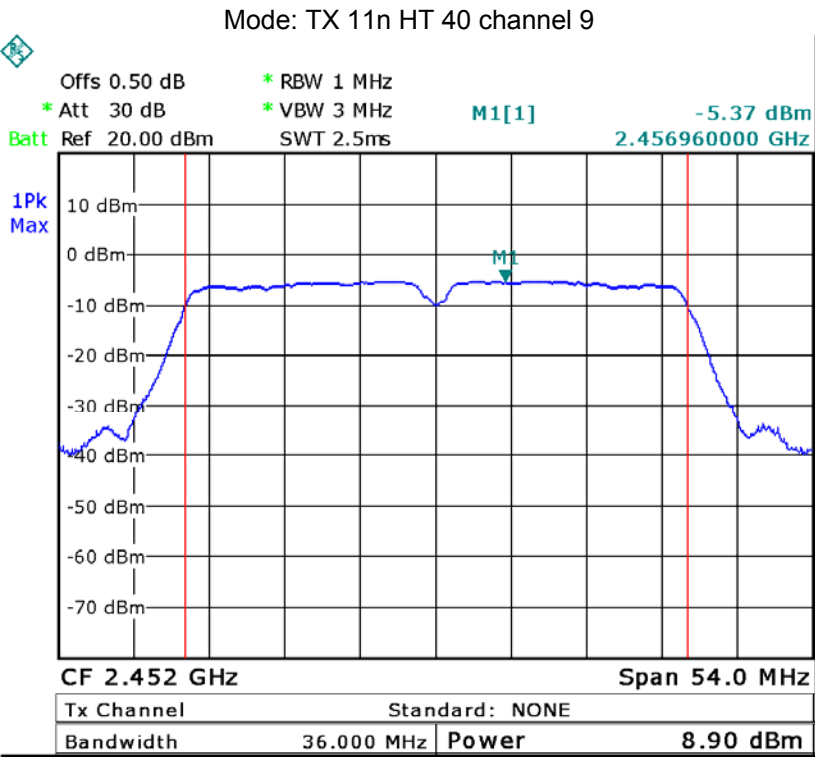
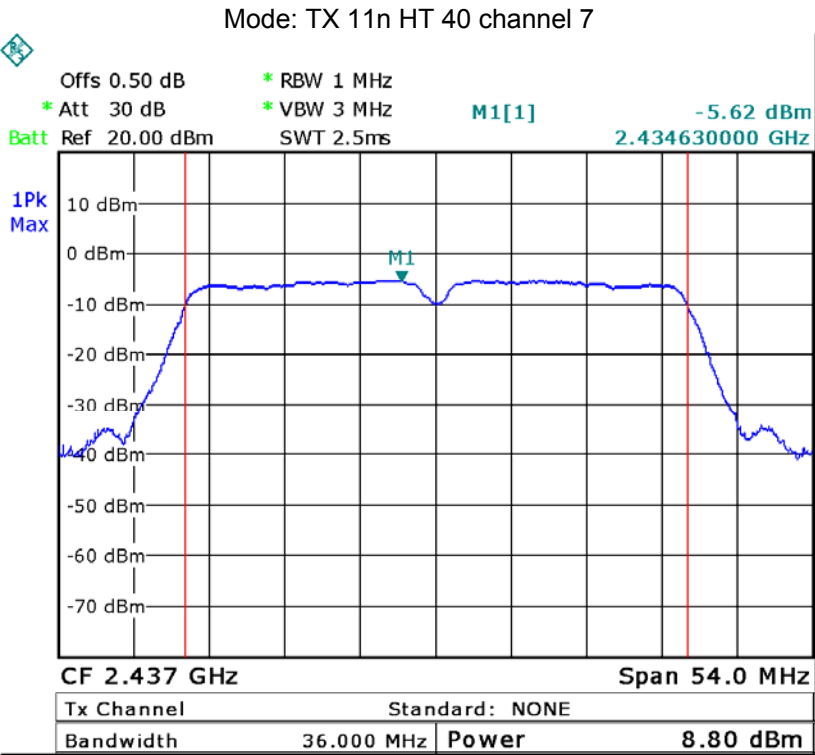












11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

11.1 Test Procedure:

KDB558074 D01 v03r01 04/09/2013 section 10.2

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.

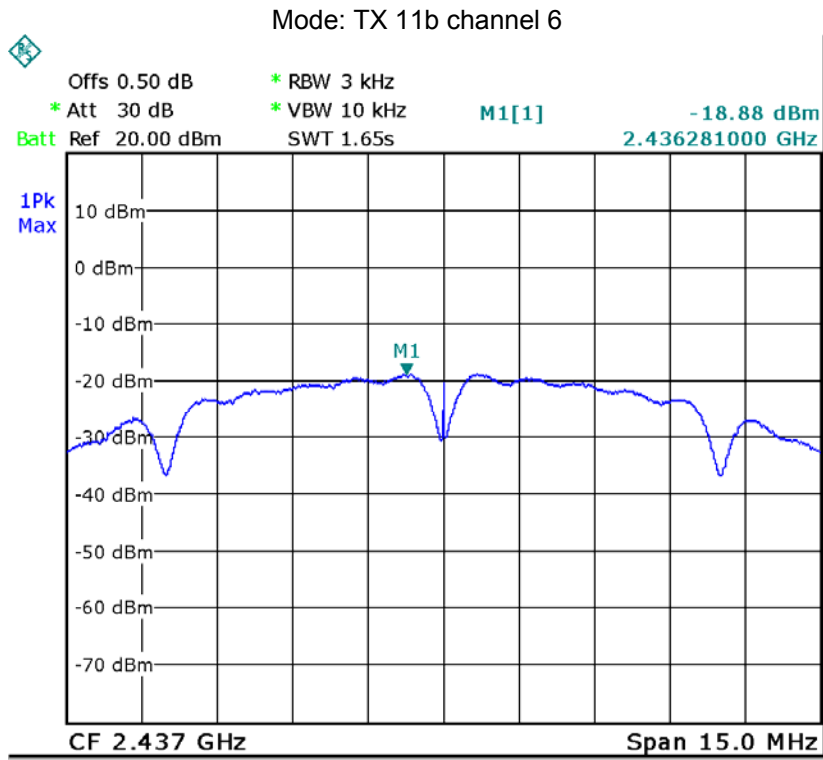
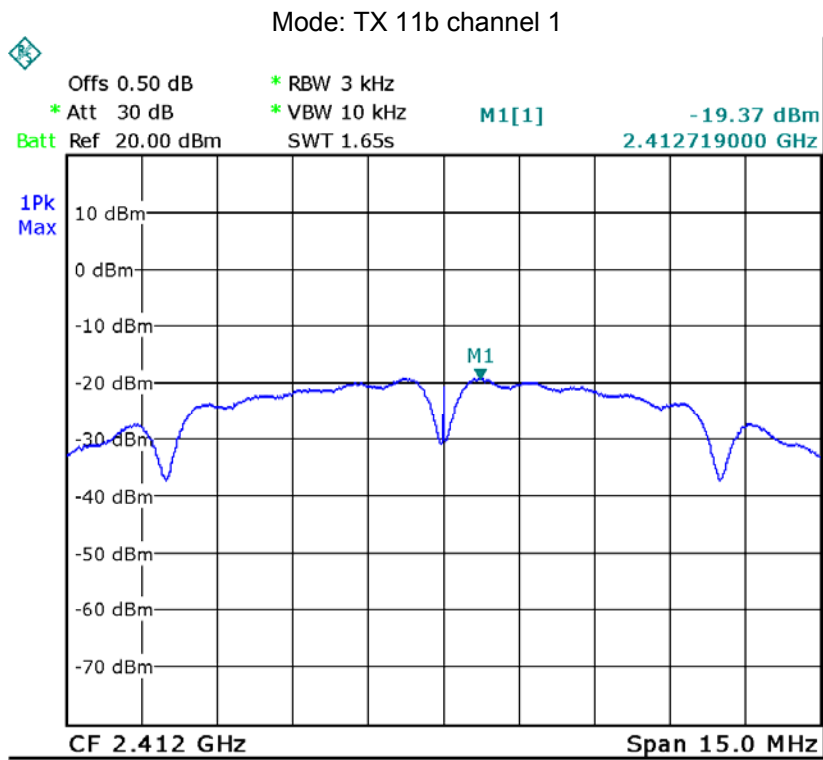
11.2 Test Result:

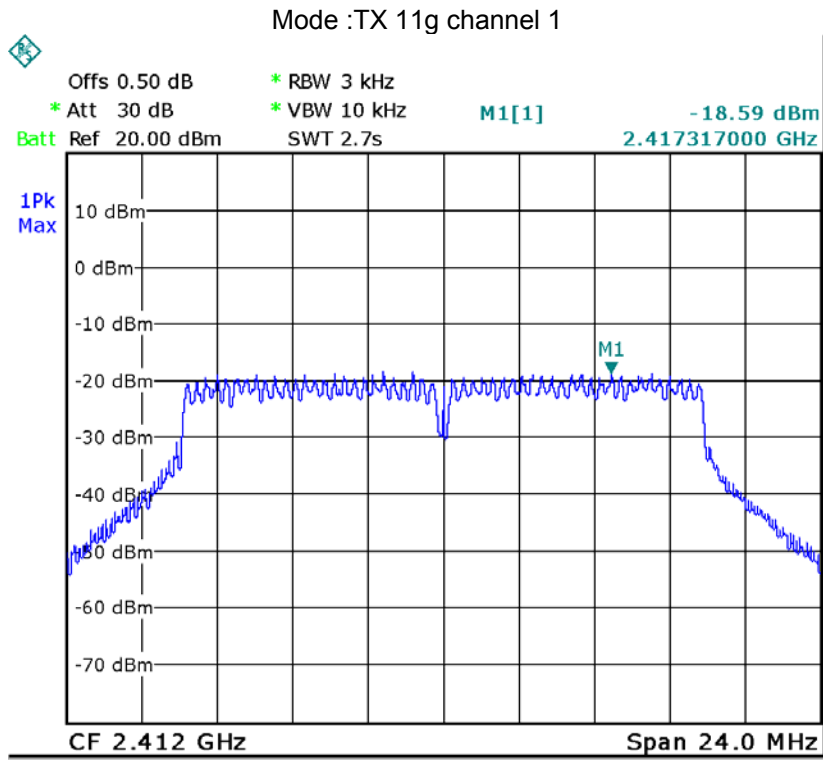
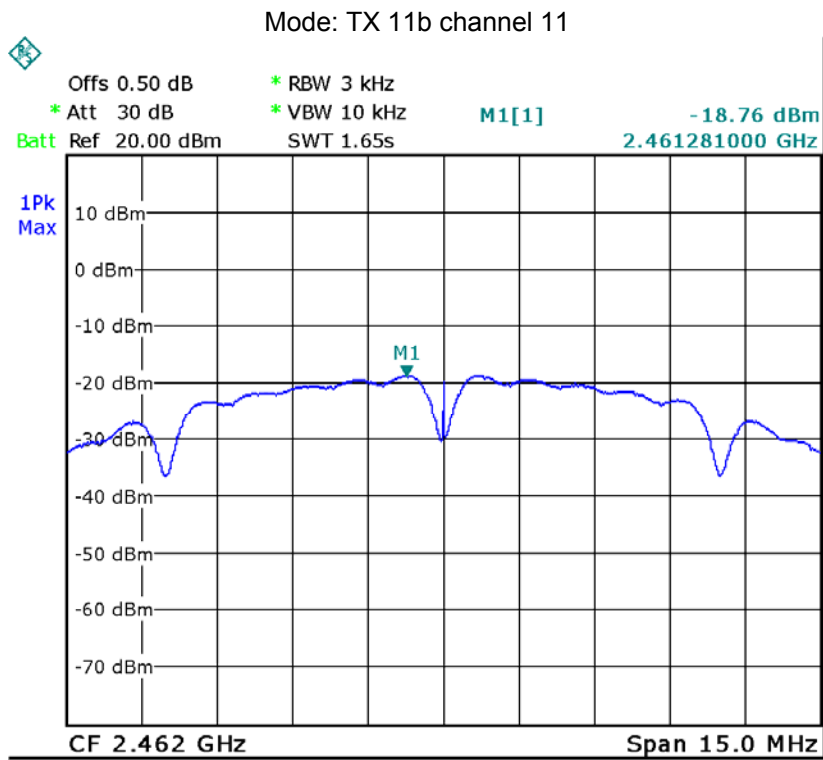
Test mode :TX 11b		
10 Maximum Peak Output Power (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-19.37	-18.88	-18.76
Limit		
8dBm per 3kHz		

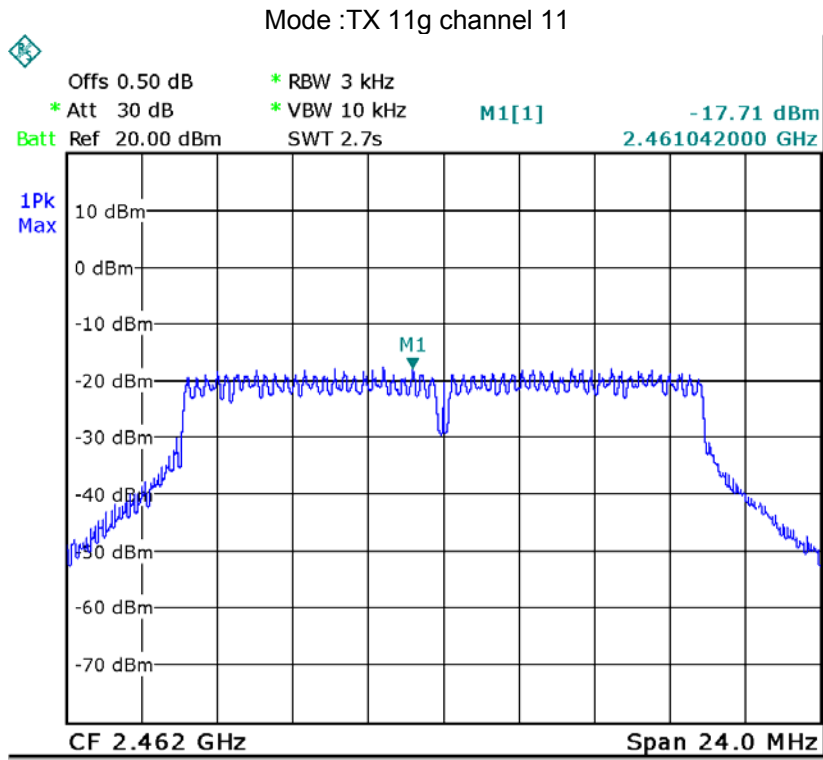
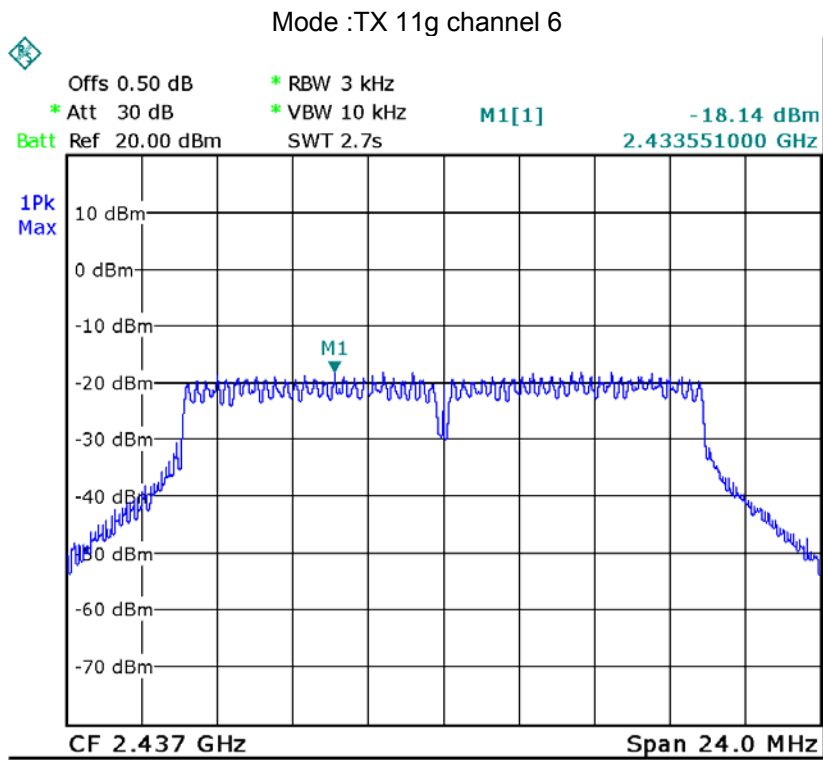
Test mode :TX 11g		
10 Maximum Peak Output Power (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.14	-18.59	-17.71
Limit		
8dBm per 3kHz		

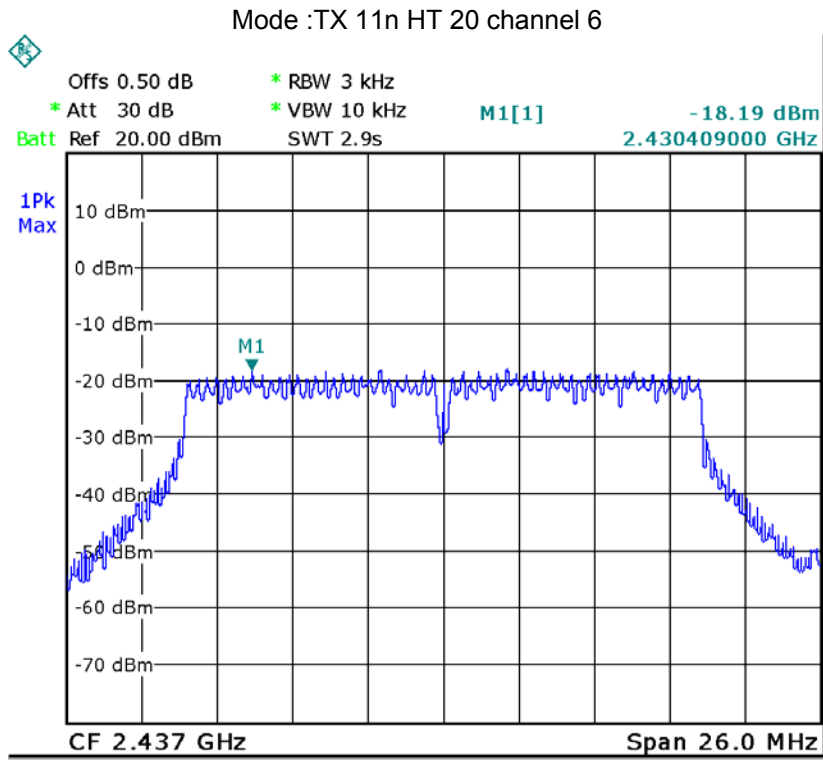
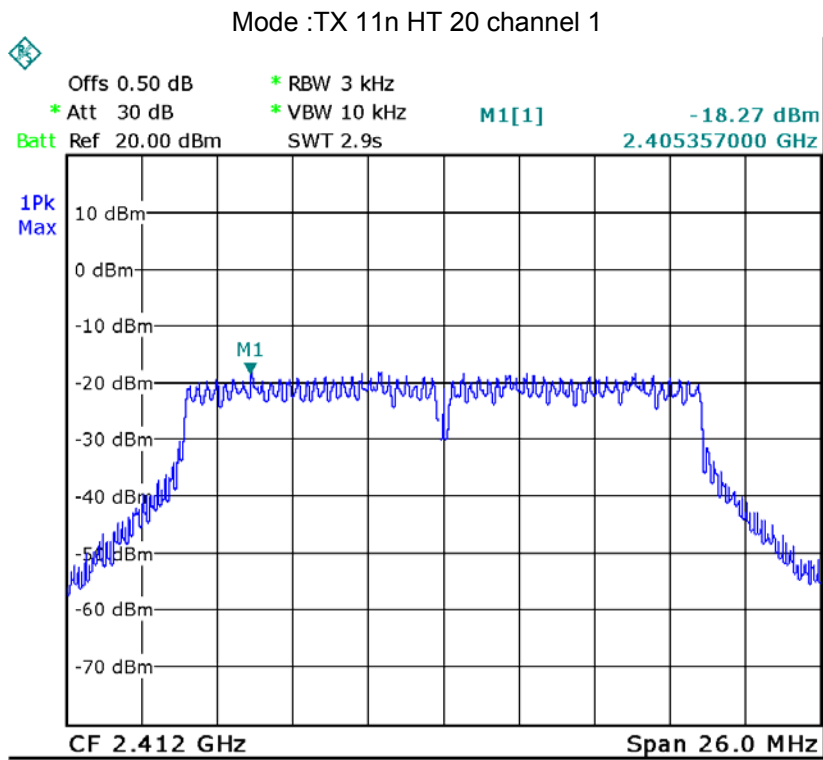
Test mode :TX 11n HT 20		
10 Maximum Peak Output Power (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.27	-18.19	-17.77
Limit		
8dBm per 3kHz		

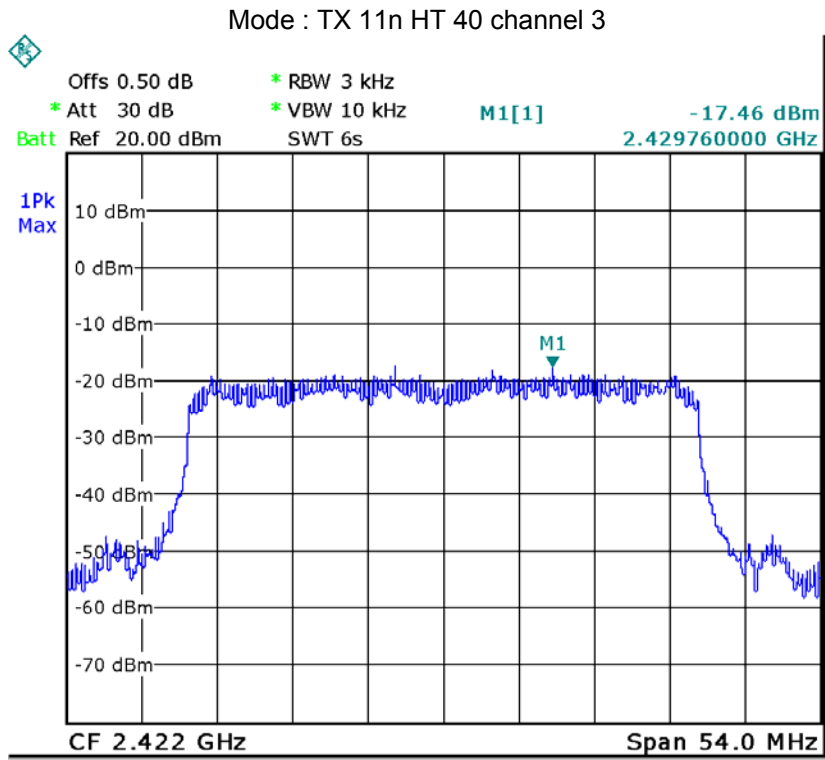
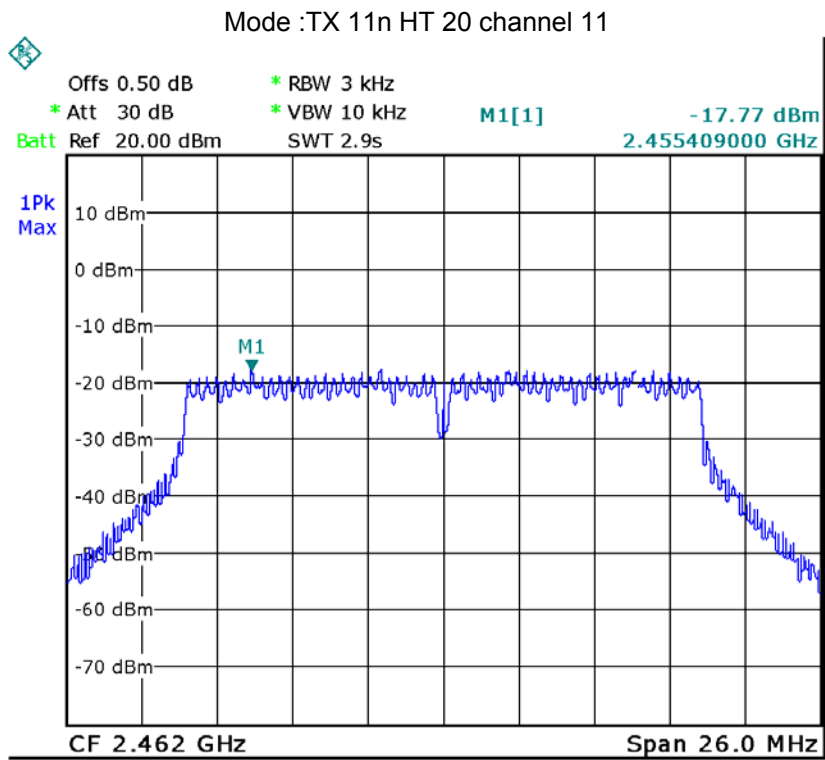
Test mode :TX 11n HT 40		
10 Maximum Peak Output Power (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-17.46	-17.48	-18.20
Limit		
8dBm per 3kHz		

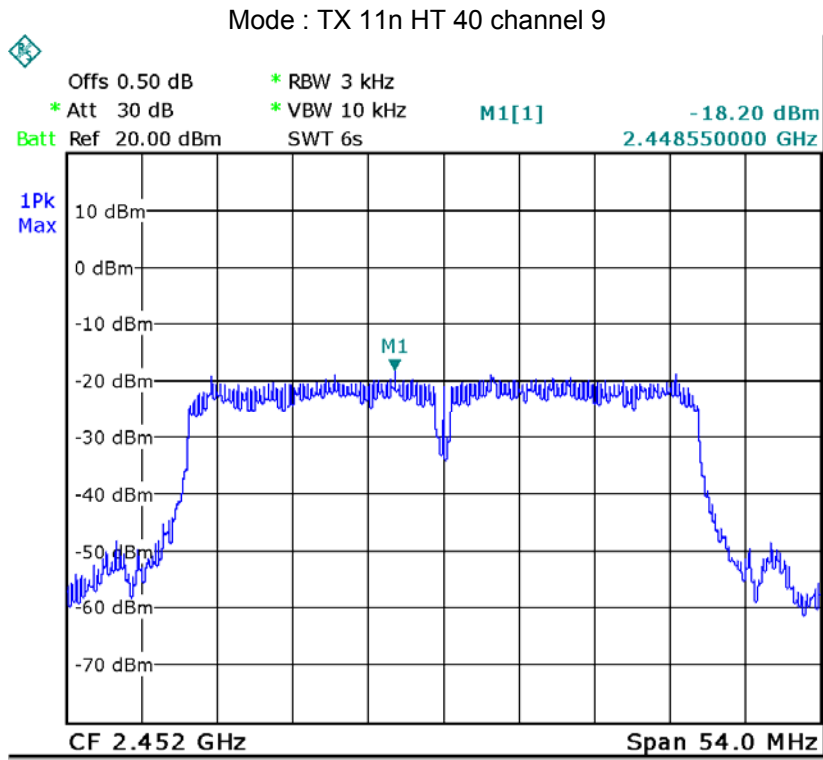
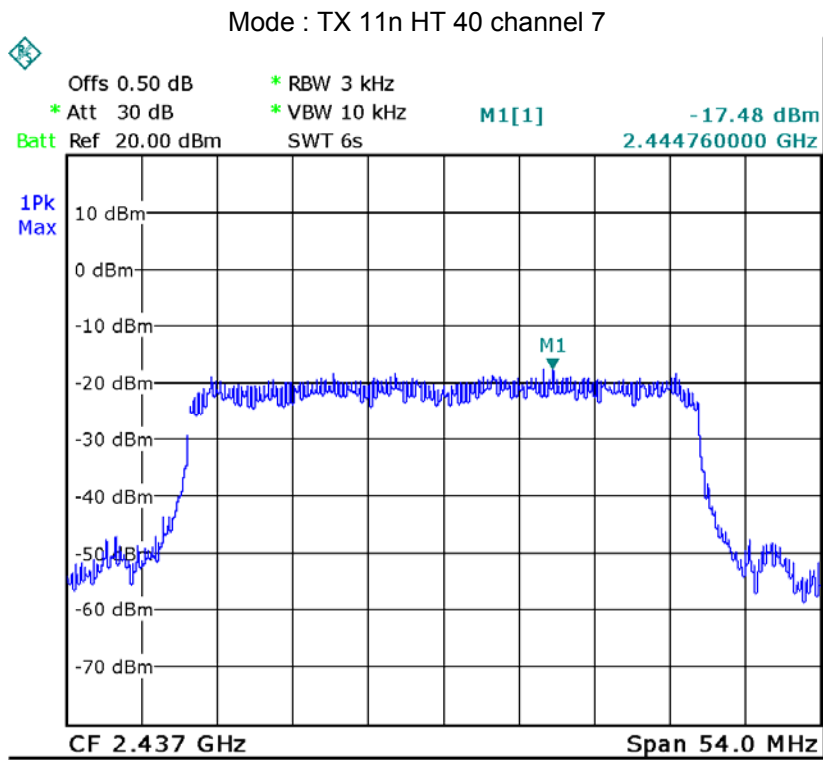












12 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a internal permanent antenna, fulfill the requirement of this section.

13 RF Exposure

Test Requirement:	FCC Part 1.1307
Test Method	KDB 447498 D01 General RF Exposure Guidance v05
Test Mode:	The EUT work in test mode(Tx).

13.1 Requirments:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] \cdot \left[\sqrt{f(\text{GHz})} \right] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR where}$$

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

13.2 Test Result

Conducted Peak power(dBm)	Conducted Peak power(mW)	Source-based time-averaged maximum conducted output power(mW)	Minimum test separation distance required for the exposure conditions (mm)	SAR Test Exclusion Thresholds(mW)
9.77	9.48	9.48	5	10

Remark: Duty factor is 100%

Calculation formula: Source-based time-averaged maximum conducted output power(mW) =Conducted peak power(mW)*Duty factor

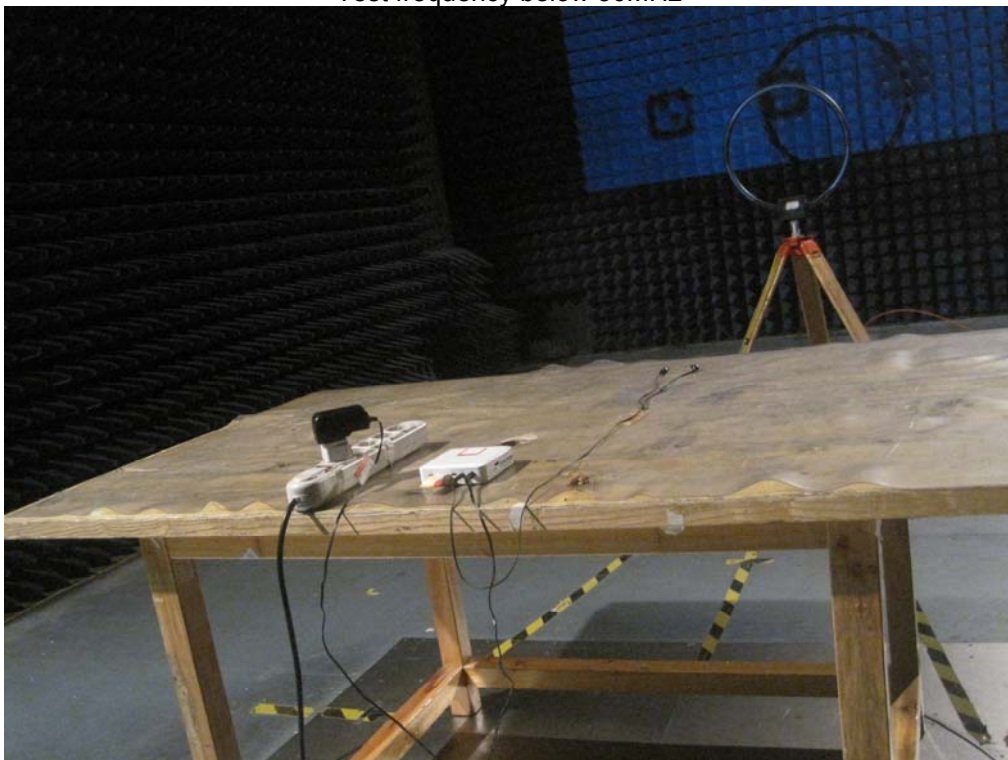
14 Photographs – Test Setup

14.1 Conducted Emission

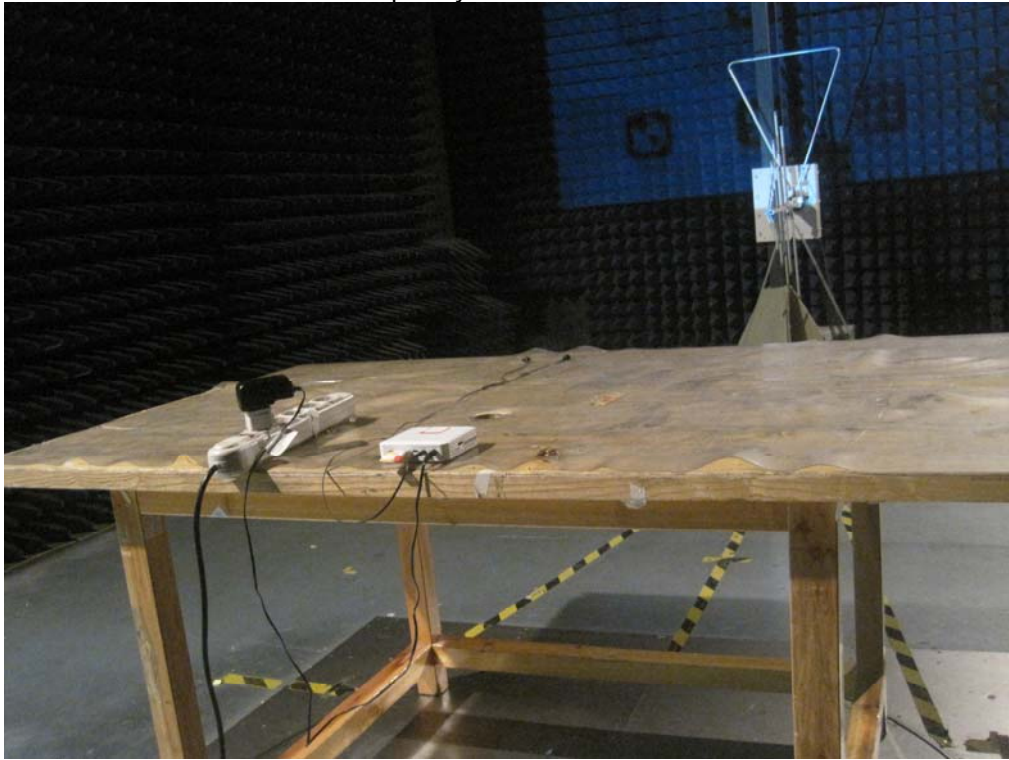


14.2 Radiated Emission

Test frequency below 30MHz



Test frequency from 30MHz to 1GHz



Test frequency above 1GHz



15 Photographs - Constructional Details

15.1 EUT –External View



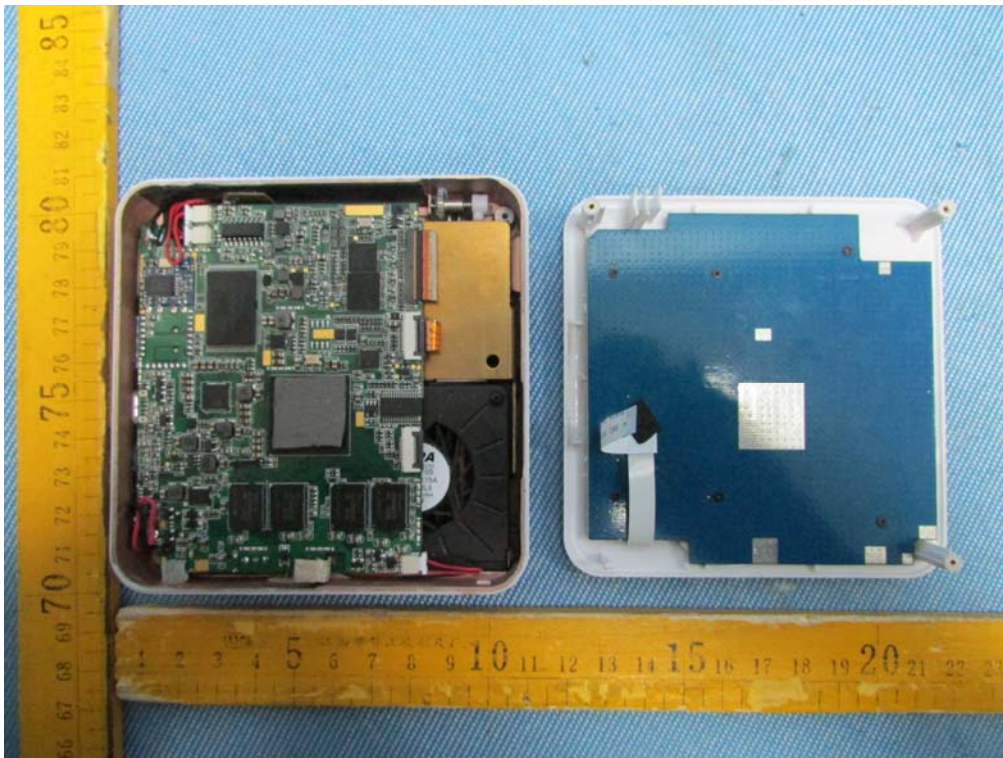


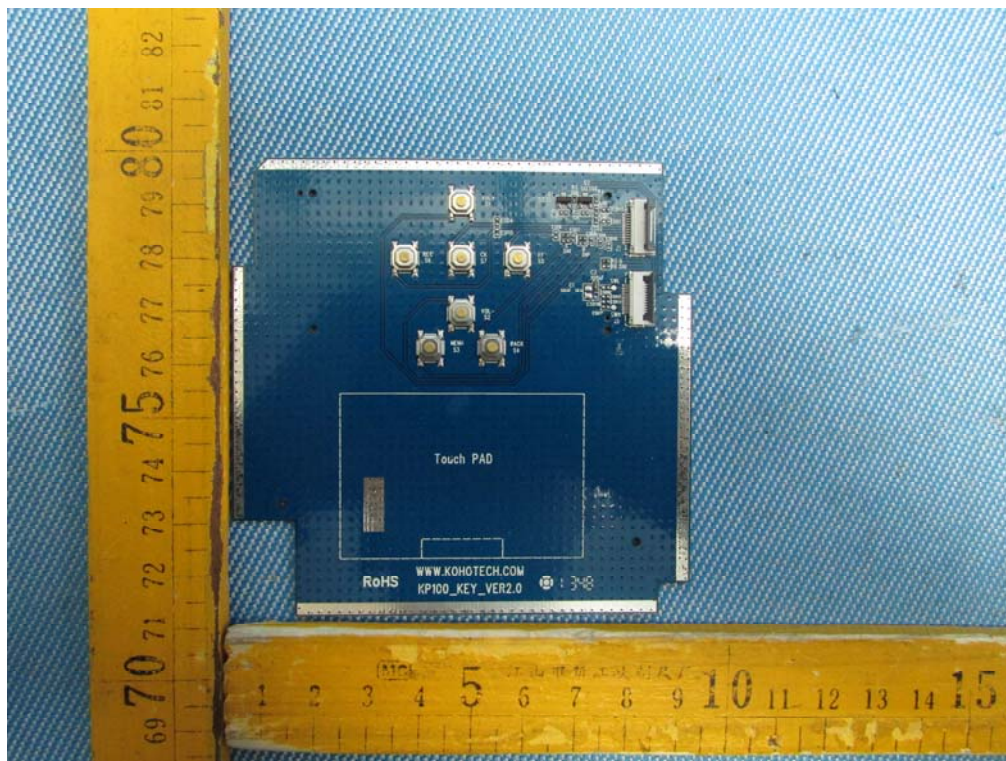
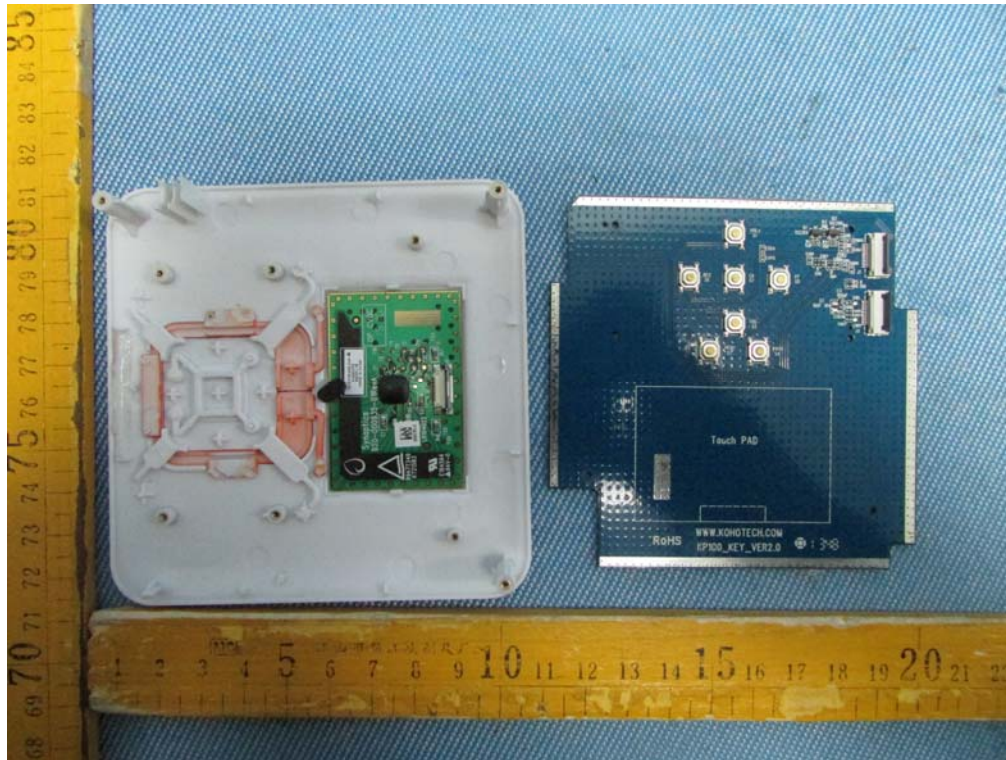


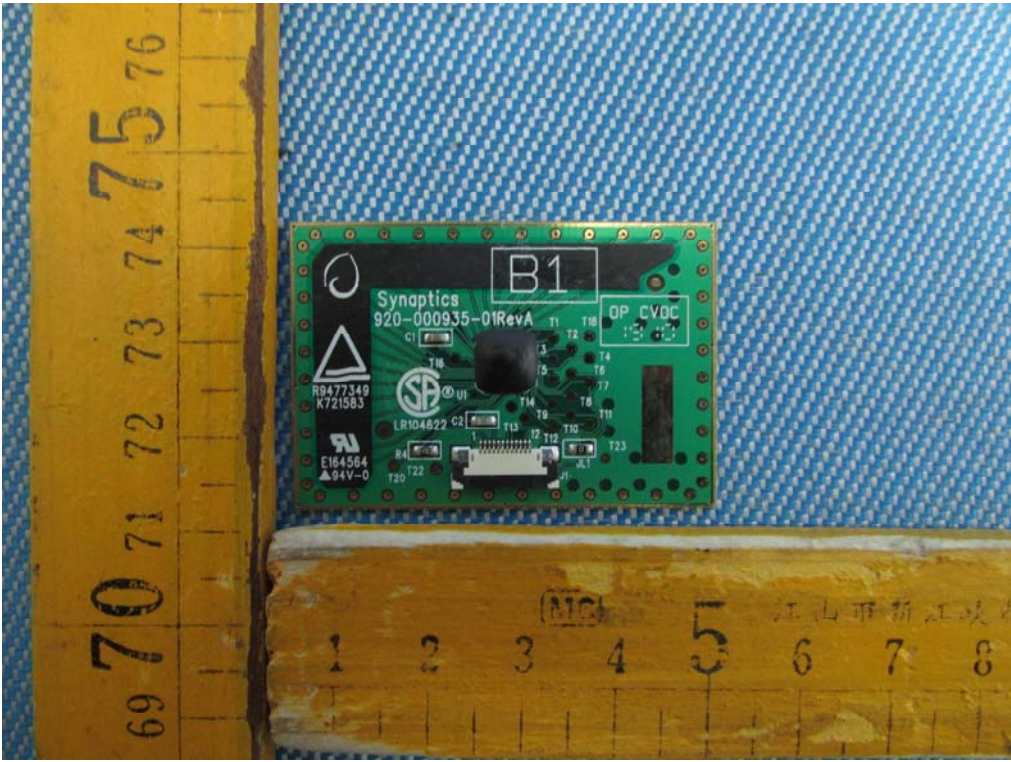
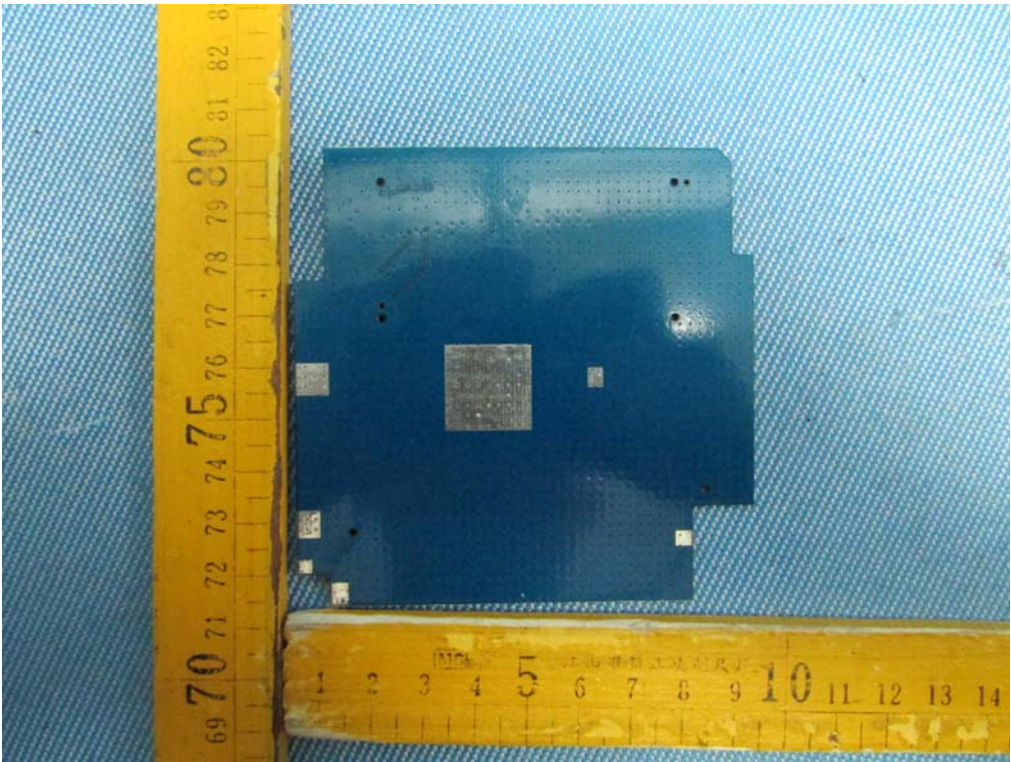


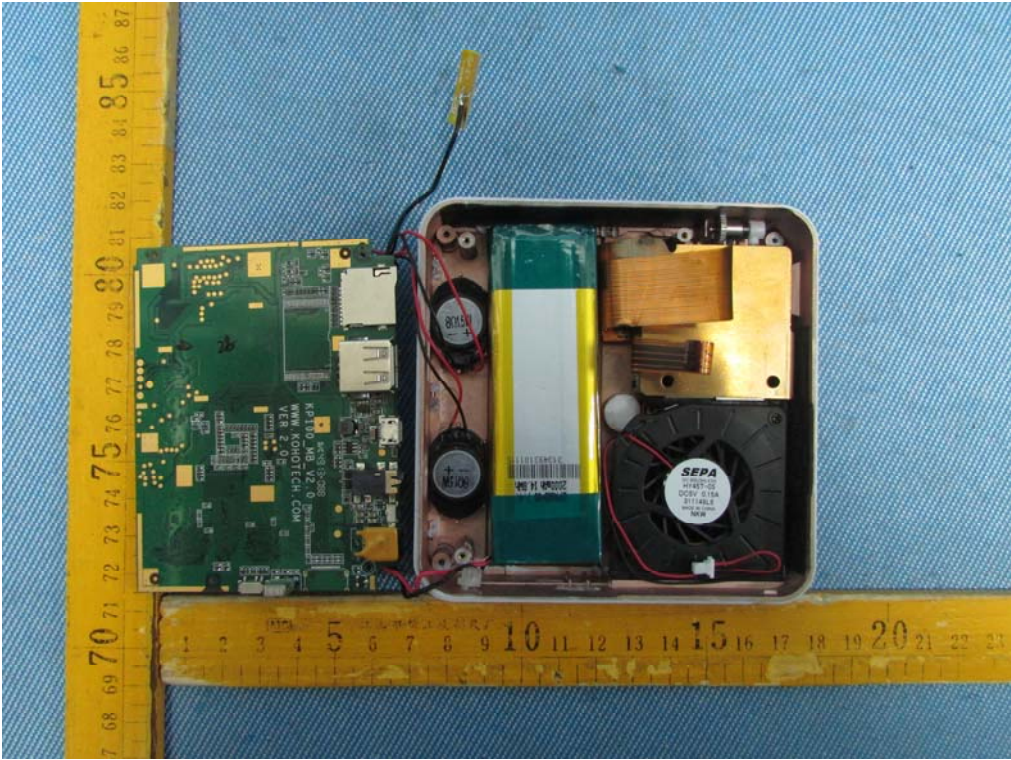
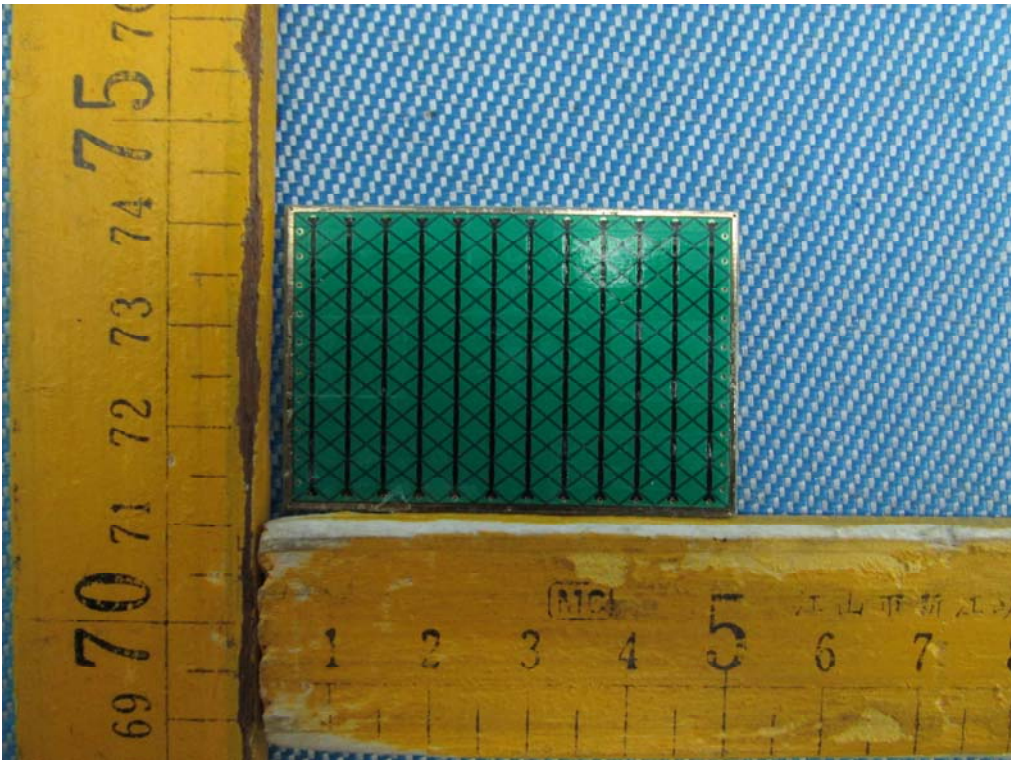


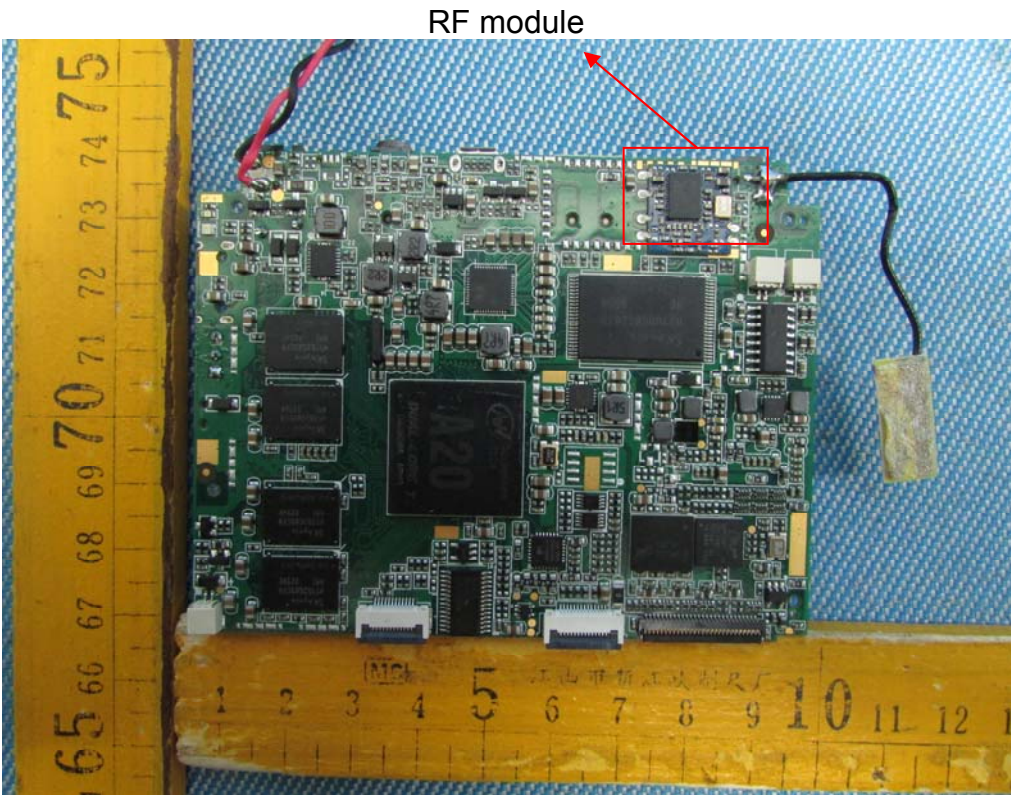
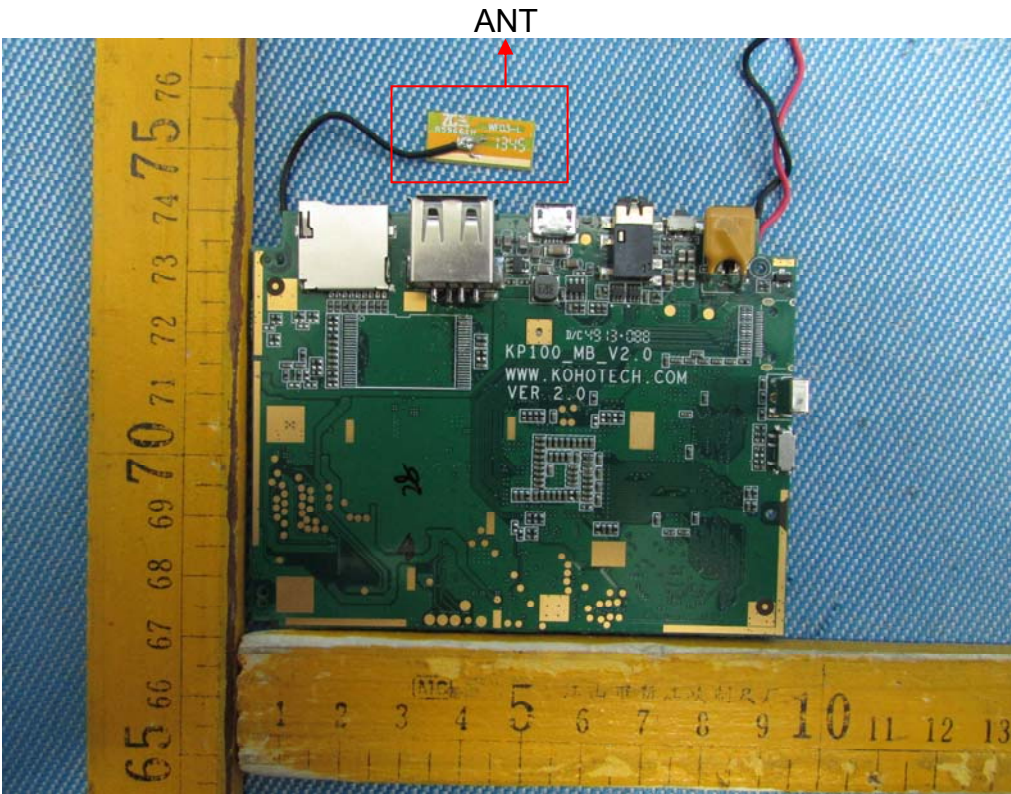
2.1 EUT – Internal View

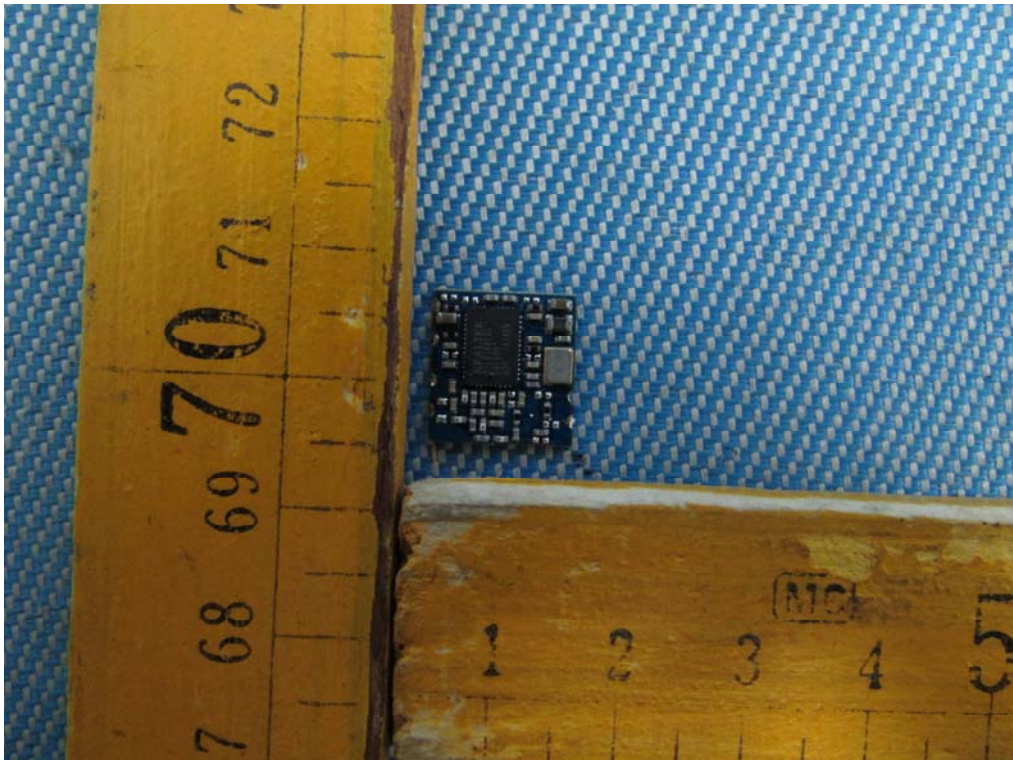


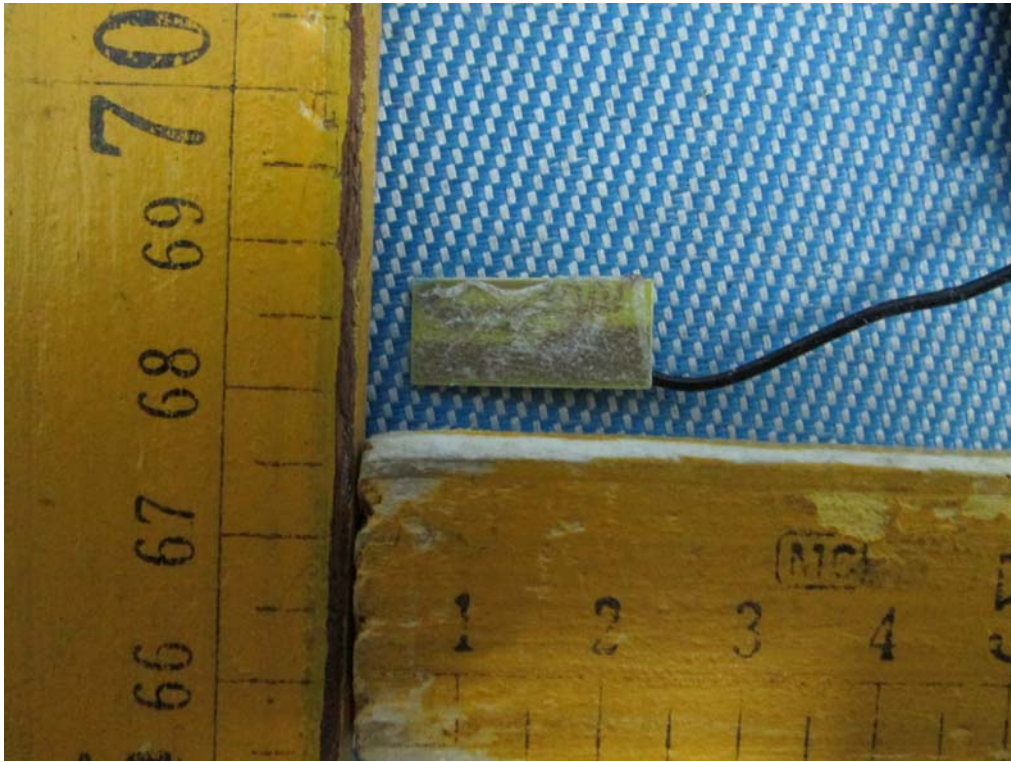














=====End of Report=====