TEST REPORT

Reference No.	:	WTD15S1239228E
FCC ID.....	:	N3ITS03
Applicant	:	Teamforce Company Limited
Address	:	6FL, No. 190, Section 2, Chung Hsin Road, Hsin Tien District, New Taipei City, Taiwan
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	TOOLSMART VIDEO INSPECTION CAMERA
Model No.	:	TS03, TF3002LW, TF3002LWX
Standards.....	:	FCC CFR47 Part 15 C Section 15.247:2015
Date of Receipt sample.....	:	Dec. 08, 2015
Date of Test.....	:	Dec. 09, 2015 – Dec. 16, 2015
Date of Issue	:	Dec.17, 2015
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.
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China
Tel :+86-755-83551033
Fax:+86-755-83552400

Compiled by:

Zero Zhou / Test 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)	N/A
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

3 Contents

Page

1 COVER PAGE 1
2 TEST SUMMARY 2
3 CONTENTS 3
4 GENERAL INFORMATION 4
4.1 GENERAL DESCRIPTION OF E.U.T. 4
4.2 DETAILS OF E.U.T. 4
4.3 CHANNEL LIST 4
4.4 TEST MODE 5
4.5 TEST FACILITY 6
5 EQUIPMENT USED DURING TEST 7
5.1 EQUIPMENTS LIST 7
5.2 DESCRIPTION OF SUPPORT UNITS 7
5.3 MEASUREMENT UNCERTAINTY 8
5.4 TEST EQUIPMENT CALIBRATION 8
6 RADIATED EMISSIONS 9
6.1 EUT OPERATION 9
6.2 TEST SETUP 10
6.3 SPECTRUM ANALYZER SETUP 11
6.4 TEST PROCEDURE 12
6.5 CORRECTED AMPLITUDE & MARGIN CALCULATION 12
6.6 SUMMARY OF TEST RESULTS 13
7 BAND EDGE MEASUREMENT 19
7.1 TEST PRODUCE 19
7.2 TEST RESULT 20
8 6 DB BANDWIDTH MEASUREMENT 22
8.1 TEST PROCEDURE: 22
8.2 TEST RESULT: 22
9 MAXIMUM PEAK OUTPUT POWER 26
9.1 TEST PROCEDURE: 26
9.2 TEST RESULT: 26
10 POWER SPECTRAL DENSITY 30
10.1 TEST PROCEDURE 30
10.2 TEST RESULT 30
11 ANTENNA REQUIREMENT 34
12 RF EXPOSURE 35
12.1 REQUIREMENTS 35
12.2 THE PROCEDURES / LIMIT 35
13 PHOTOGRAPHS – MODEL TF3002LW TEST SETUP 36
13.1 RADIATED EMISSION 36
14 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 38
14.1 MODEL TF3002LW - EXTERNAL VIEW 38
14.2 MODEL TF3002LW - INTERNAL VIEW 41

4 General Information

4.1 General Description of E.U.T.

Product Name:	TOOLSMART VIDEO INSPECTION CAMERA
Model No.:	TS03, TF3002LW, TF3002LWX
Model Difference:	The models TF3002LW, TF3002LWX, TS03 are identical to each other except for the model names and the shape of handle. The models TF3002LW and TS03 used with the fixed lens tube, model TF3002LWX used with the detachable lens tube.
Operation Frequency:	2412MHz ~ 2462MHz
The Lowest 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.)

4.2 Details of E.U.T.

Technical Data: DC 1.5V*4AA

4.3 Channel List

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	-

4.4 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
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
Band Edge	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
Transmitter Spurious Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	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 .

4.5 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-1,October 15, 2015

- **FCC Test Site 1#– 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, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

  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 328995, December 3, 2014.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.14,2015	Sep.13,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.14,2015	Sep.13,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.18,2015	Apr.17,2016
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.14,2015	Sep.13,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.18,2015	Apr.17,2016
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.18,2015	Apr.17,2016
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.16,2015	Mar.15,2016
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.09,2015	Apr.08,2016
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	Sep.14,2015	Sep.13,2016
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.14,2015	Sep.13,2016
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.14,2015	Sep.13,2016
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.14,2015	Sep.13,2016
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	Sep.14,2015	Sep.13,2016
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.14,2015	Sep.13,2016
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.14,2015	Sep.13,2016

5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

5.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 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)

5.4 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 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(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
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

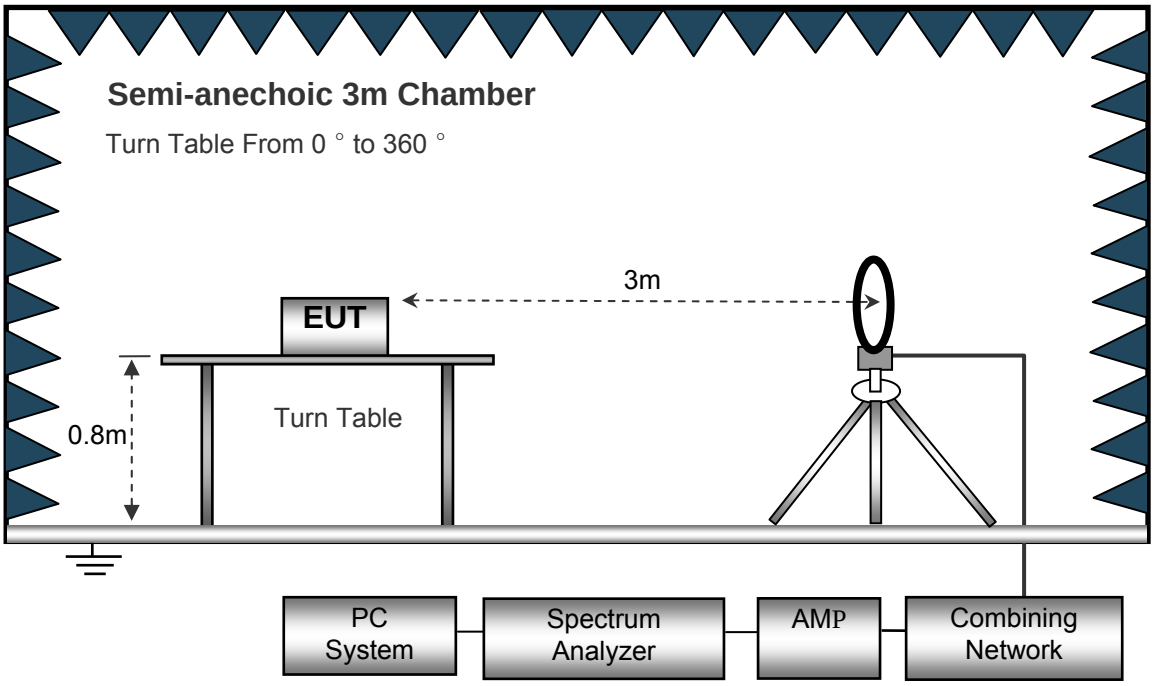
EUT Operation **:**

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

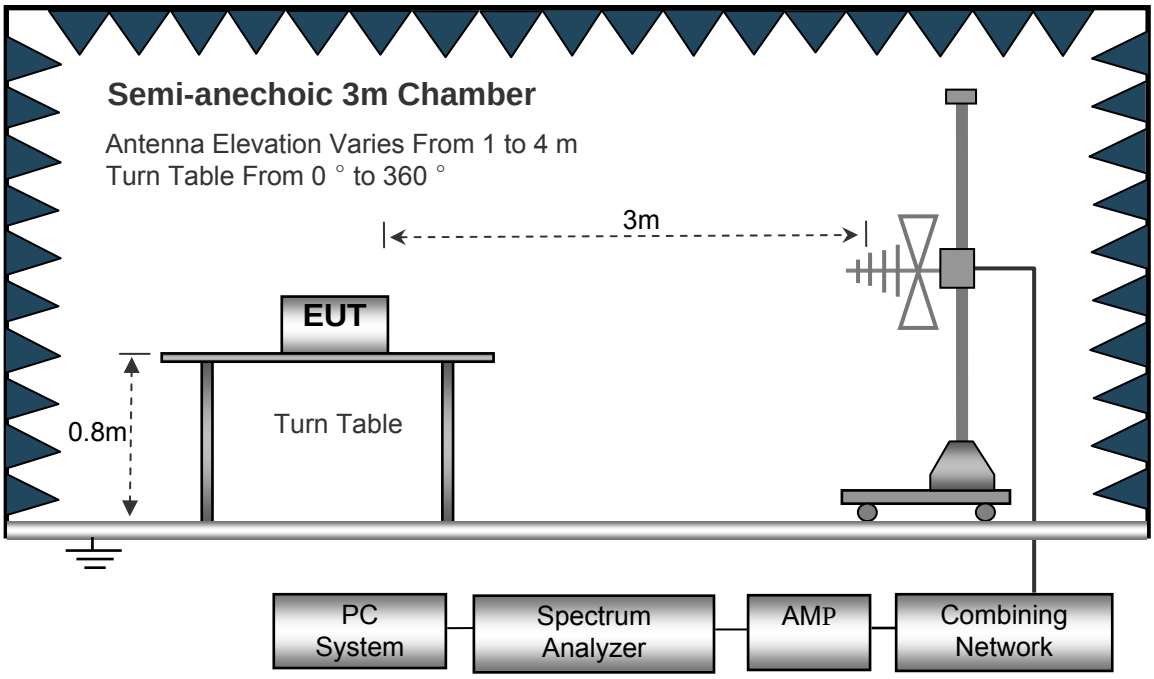
6.2 Test Setup

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

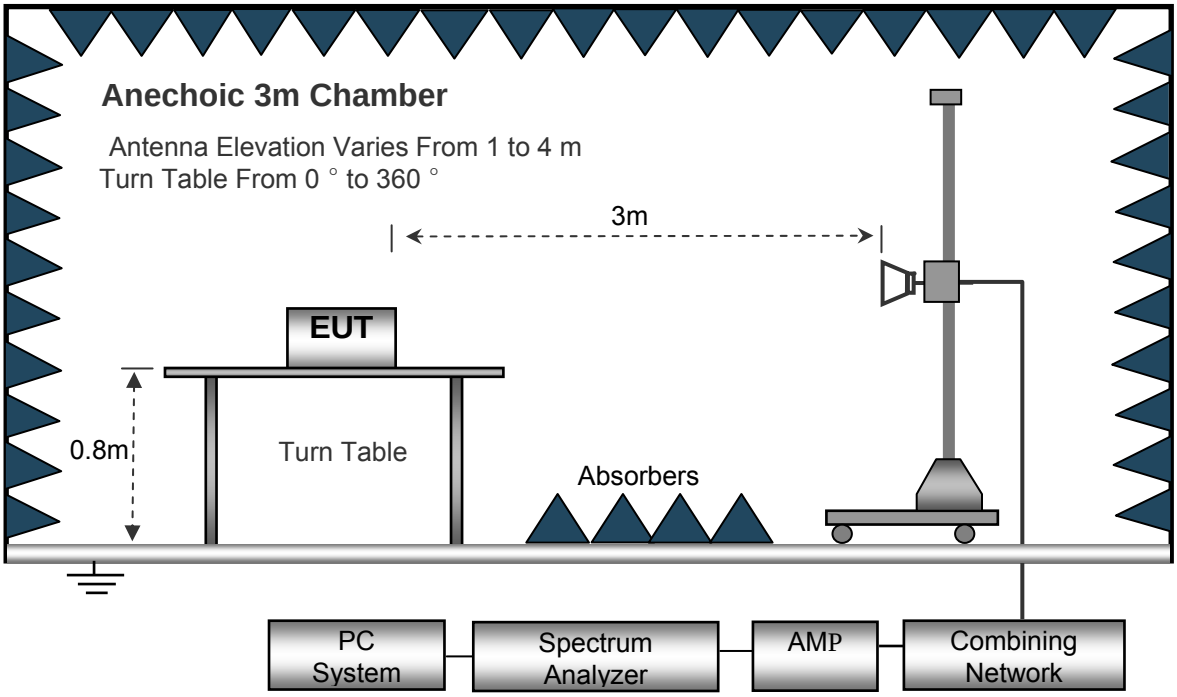
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



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, 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 druing 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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:

Margin = Corr. Ampl. – Limit

6.6 Summary of Test Results

Test Frequency : 32.768kHz ~ 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									
223.49	41.06	QP	254	1.9	H	-11.62	29.44	46.00	-16.56
223.49	36.27	QP	119	1.5	V	-11.62	24.65	46.00	-21.35
4824.00	50.43	PK	188	1.6	V	-1.06	49.37	74.00	-24.63
4824.00	46.35	Ave	188	1.6	V	-1.06	45.29	54.00	-8.71
7236.00	41.08	PK	263	1.1	H	1.33	42.41	74.00	-31.59
7236.00	41.92	Ave	263	1.1	H	1.33	43.25	54.00	-10.75
2323.45	45.36	PK	298	1.1	V	-13.19	32.17	74.00	-41.83
2323.45	37.51	Ave	298	1.1	V	-13.19	24.32	54.00	-29.68
2361.30	43.06	PK	271	1.4	H	-13.14	29.92	74.00	-44.08
2361.30	37.34	Ave	271	1.4	H	-13.14	24.20	54.00	-29.80
2491.32	42.40	PK	157	1.6	V	-13.08	29.32	74.00	-44.68
2491.32	37.26	Ave	157	1.6	V	-13.08	24.18	54.00	-29.82

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									
223.49	39.99	QP	226	1.8	H	-11.62	28.37	46.00	-17.63
223.49	37.18	QP	329	1.4	V	-11.62	25.56	46.00	-20.44
4874.00	49.15	PK	46	1.4	V	-0.62	48.53	74.00	-25.47
4874.00	46.20	Ave	46	1.4	V	-0.62	45.58	54.00	-8.42
7311.00	40.35	PK	196	1.9	H	2.21	42.56	74.00	-31.44
7311.00	42.06	Ave	196	1.9	H	2.21	44.27	54.00	-9.73
2324.52	46.71	PK	166	1.1	V	-13.19	33.52	74.00	-40.48
2324.52	38.75	Ave	166	1.1	V	-13.19	25.56	54.00	-28.44
2372.06	44.72	PK	120	1.8	H	-13.14	31.58	74.00	-42.42
2372.06	37.97	Ave	120	1.8	H	-13.14	24.83	54.00	-29.17
2489.03	43.71	PK	147	2.0	V	-13.08	30.63	74.00	-43.37
2489.03	38.73	Ave	147	2.0	V	-13.08	25.65	54.00	-28.35

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									
223.49	38.76	QP	223	1.4	H	-11.62	27.14	46.00	-18.86
223.49	36.12	QP	351	1.3	V	-11.62	24.50	46.00	-21.50
4924.00	48.70	PK	293	1.4	V	-0.24	48.46	74.00	-25.54
4924.00	46.80	Ave	293	1.4	V	-0.24	46.56	54.00	-7.44
7386.00	40.54	PK	193	1.4	H	2.84	43.38	74.00	-30.62
7386.00	40.64	Ave	193	1.4	H	2.84	43.48	54.00	-10.52
2318.17	46.34	PK	9	1.0	V	-13.19	33.15	74.00	-40.85
2318.17	39.63	Ave	9	1.0	V	-13.19	26.44	54.00	-27.56
2364.47	43.56	PK	53	1.6	H	-13.14	30.42	74.00	-43.58
2364.47	38.54	Ave	53	1.6	H	-13.14	25.40	54.00	-28.60
2489.73	43.23	PK	163	1.0	V	-13.08	30.15	74.00	-43.85
2489.73	37.33	Ave	163	1.0	V	-13.08	24.25	54.00	-29.75

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									
223.49	39.63	QP	355	1.5	H	-11.62	28.01	46.00	-17.99
223.49	37.42	QP	62	1.7	V	-11.62	25.80	46.00	-20.20
4824.00	49.01	PK	225	1.8	V	-1.06	47.95	74.00	-26.05
4824.00	45.44	Ave	225	1.8	V	-1.06	44.38	54.00	-9.62
7236.00	41.08	PK	218	1.6	H	1.33	42.41	74.00	-31.59
7236.00	39.65	Ave	218	1.6	H	1.33	40.98	54.00	-13.02
2324.73	45.67	PK	297	1.9	V	-13.19	32.48	74.00	-41.52
2324.73	37.34	Ave	297	1.9	V	-13.19	24.15	54.00	-29.85
2350.75	42.76	PK	329	1.2	H	-13.14	29.62	74.00	-44.38
2350.75	36.43	Ave	329	1.2	H	-13.14	23.29	54.00	-30.71
2493.21	44.57	PK	69	1.1	V	-13.08	31.49	74.00	-42.51
2493.21	37.48	Ave	69	1.1	V	-13.08	24.40	54.00	-29.60

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									
223.49	39.19	QP	44	1.4	H	-11.62	27.57	46.00	-18.43
223.49	36.68	QP	203	2.0	V	-11.62	25.06	46.00	-20.94
4874.00	50.01	PK	59	1.3	V	-0.62	49.39	74.00	-24.61
4874.00	46.89	Ave	59	1.3	V	-0.62	46.27	54.00	-7.73
7311.00	39.60	PK	44	1.0	H	2.21	41.81	74.00	-32.19
7311.00	38.31	Ave	44	1.0	H	2.21	40.52	54.00	-13.48
2344.33	45.99	PK	38	1.5	V	-13.19	32.80	74.00	-41.20
2344.33	39.40	Ave	38	1.5	V	-13.19	26.21	54.00	-27.79
2381.58	42.93	PK	345	1.5	H	-13.14	29.79	74.00	-44.21
2381.58	38.13	Ave	345	1.5	H	-13.14	24.99	54.00	-29.01
2497.51	42.17	PK	43	1.4	V	-13.08	29.09	74.00	-44.91
2497.51	36.15	Ave	43	1.4	V	-13.08	23.07	54.00	-30.93

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									
223.49	37.70	QP	173	1.2	H	-11.62	26.08	46.00	-19.92
223.49	35.33	QP	125	1.9	V	-11.62	23.71	46.00	-22.29
4924.00	49.10	PK	124	1.0	V	-0.24	48.86	74.00	-25.14
4924.00	47.00	Ave	124	1.0	V	-0.24	46.76	54.00	-7.24
7386.00	41.00	PK	50	1.8	H	2.84	43.84	74.00	-30.16
7386.00	38.91	Ave	50	1.8	H	2.84	41.75	54.00	-12.25
2336.75	45.08	PK	291	2.0	V	-13.19	31.89	74.00	-42.11
2336.75	39.40	Ave	291	2.0	V	-13.19	26.21	54.00	-27.79
2370.35	43.81	PK	84	2.0	H	-13.14	30.67	74.00	-43.33
2370.35	37.73	Ave	84	2.0	H	-13.14	24.59	54.00	-29.41
2491.09	42.92	PK	133	1.7	V	-13.08	29.84	74.00	-44.16
2491.09	38.57	Ave	133	1.7	V	-13.08	25.49	54.00	-28.51

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 DTS Meas Guidance v03r03
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

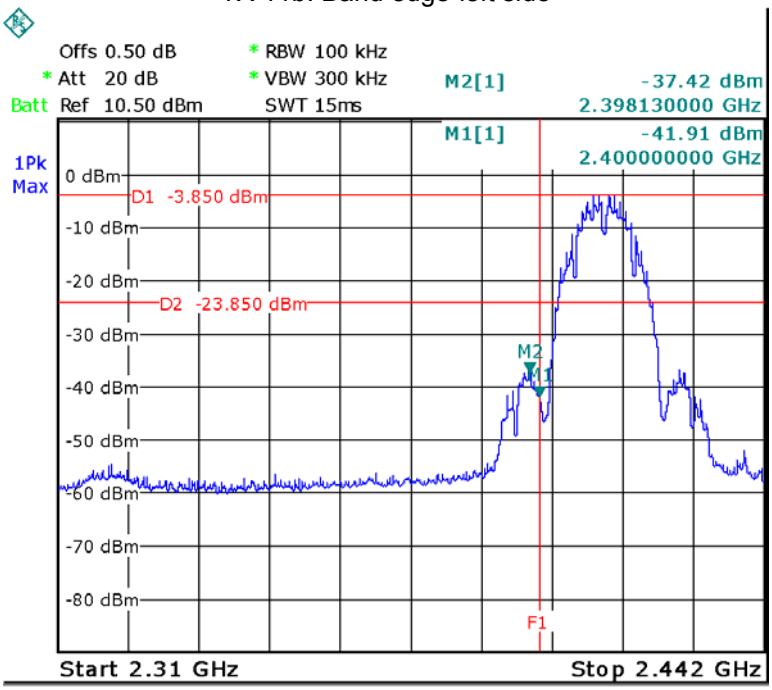
7.1 Test Produce

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.

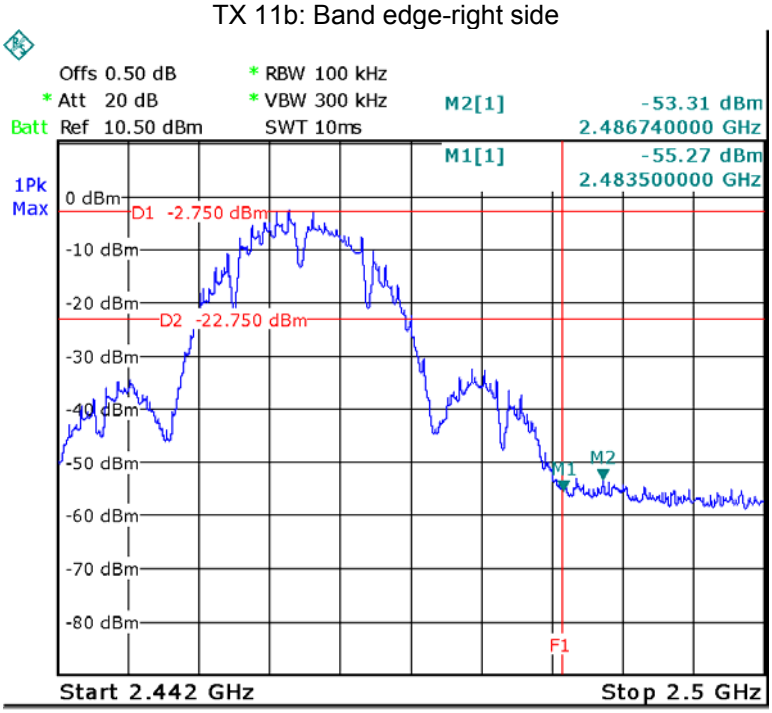
7.2 Test Result

Test result plots shown as follows:

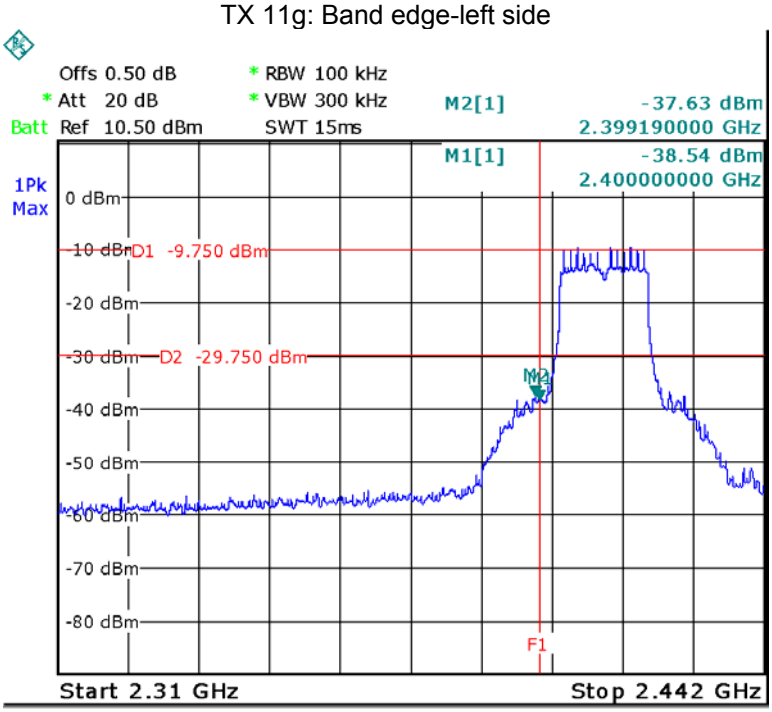
TX 11b: Band edge-left side



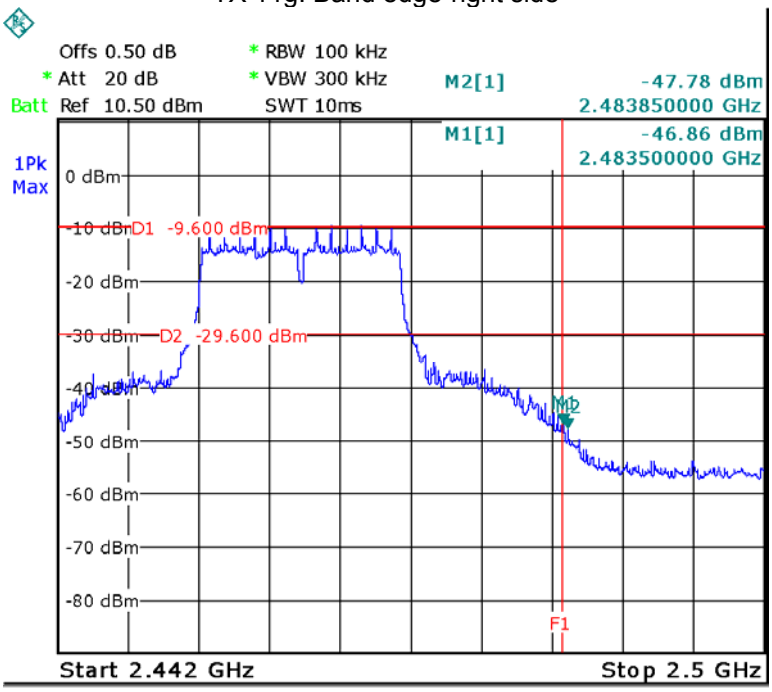
TX 11b: Band edge-right side



TX 11g: Band edge-left side



TX 11g: Band edge-right side



8 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v03r03

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;

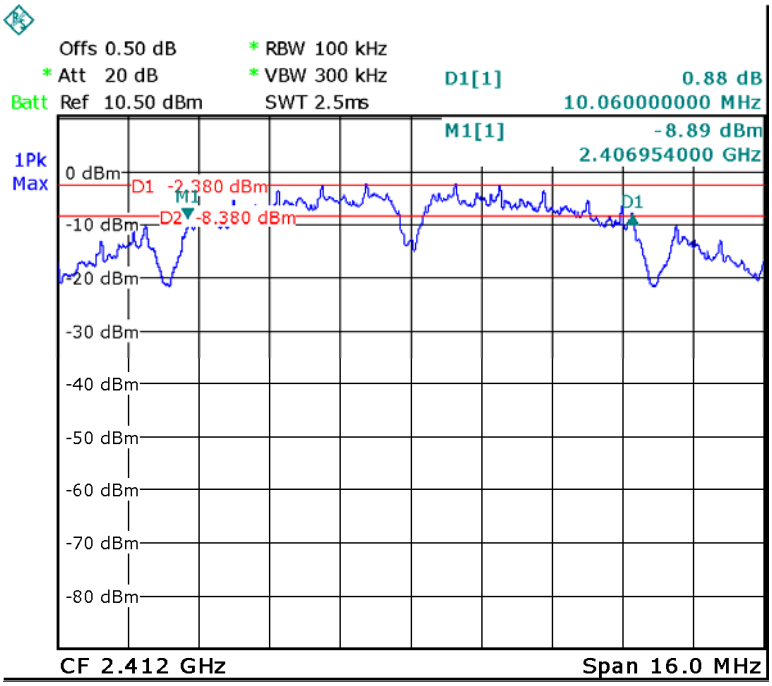
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

8.2 Test Result:

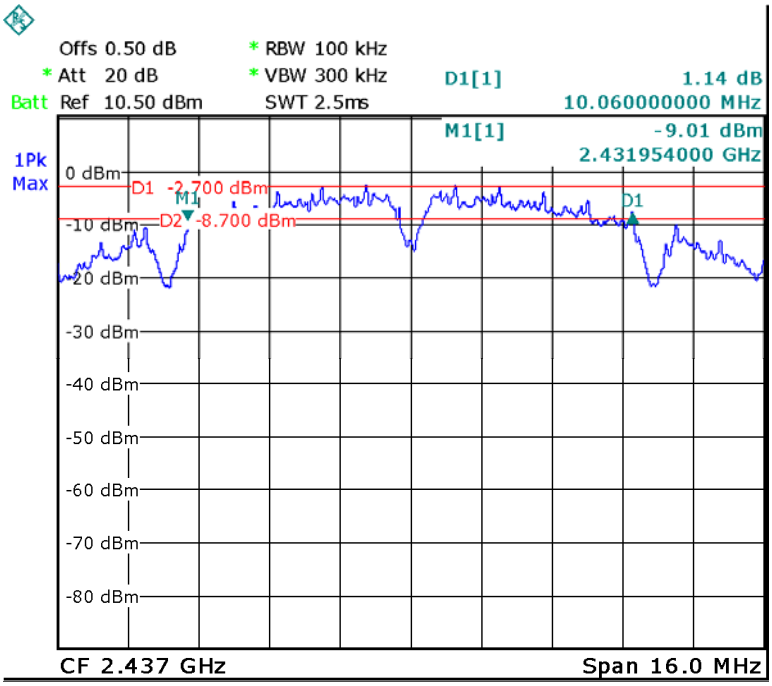
Operation mode	Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	10.060	10.060	10.060
TX 11g	Channel 1	Channel 6	Channel 11
	16.417	16.417	16.417

Test result plot as follows:

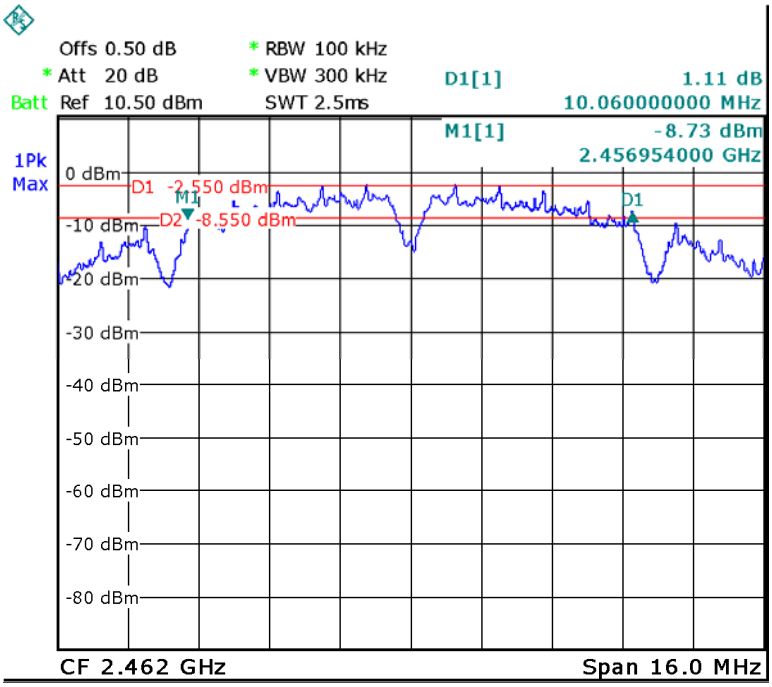
Mode: TX 11b channel 1



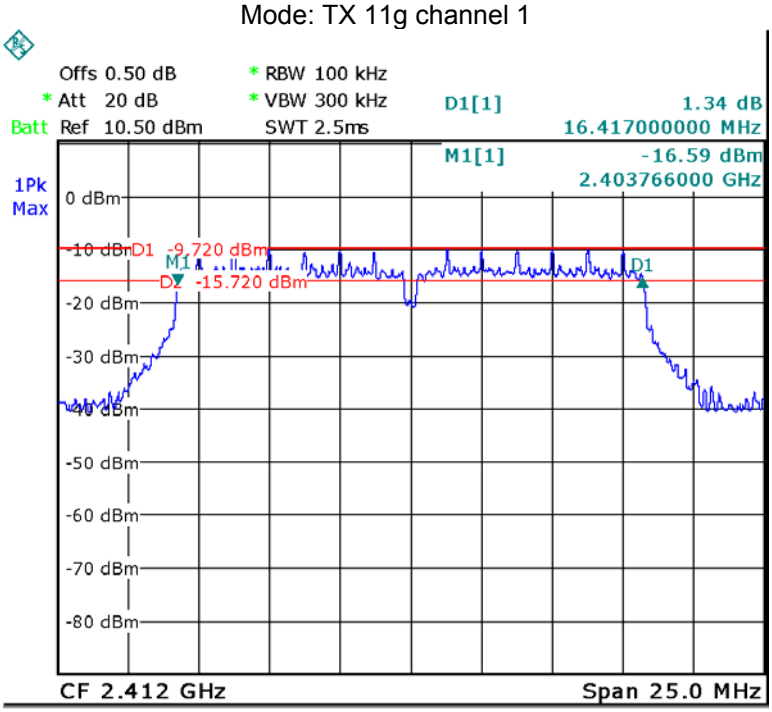
Mode: TX 11b channel 6



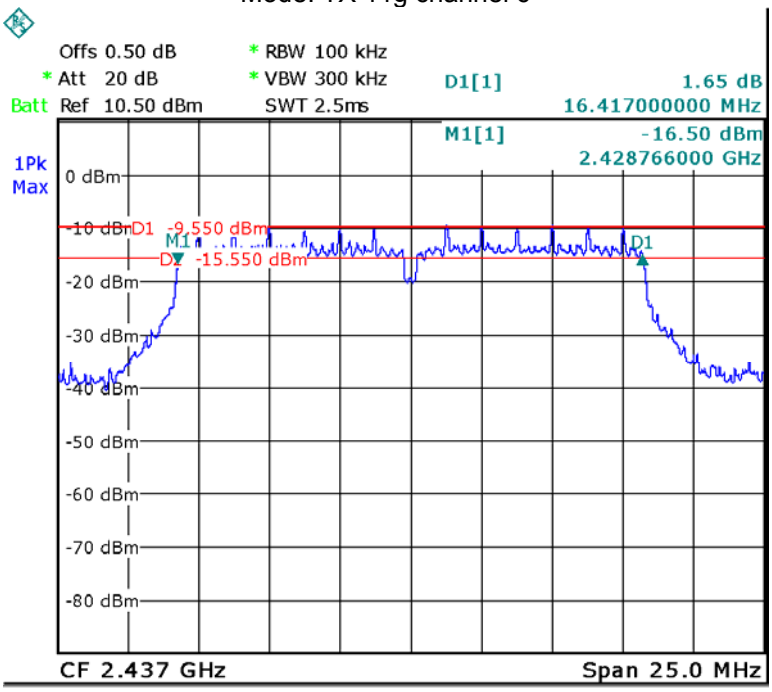
Mode: TX 11b channel 11



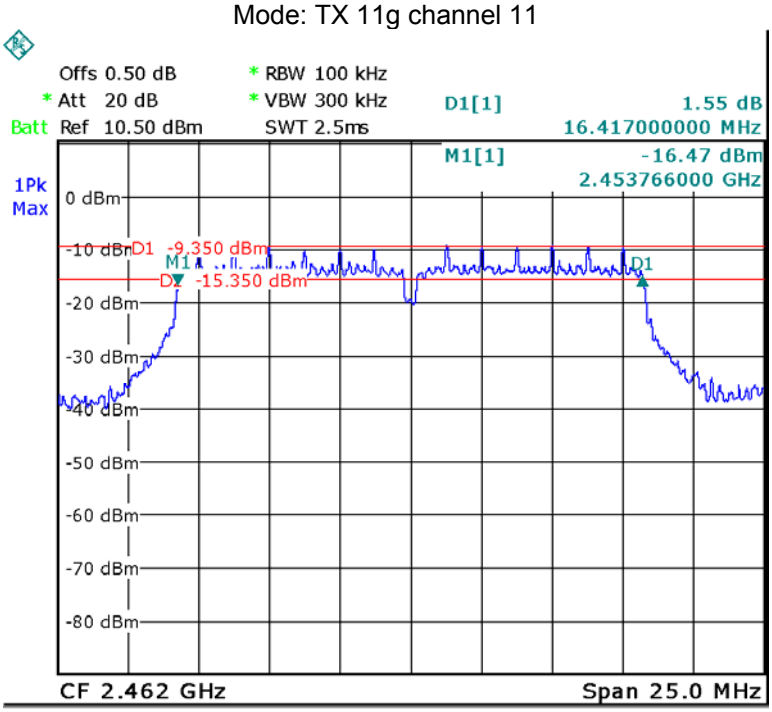
Mode: TX 11g channel 1



Mode: TX 11g channel 6



Mode: TX 11g channel 11



9 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v03r03

9.1 Test Procedure:

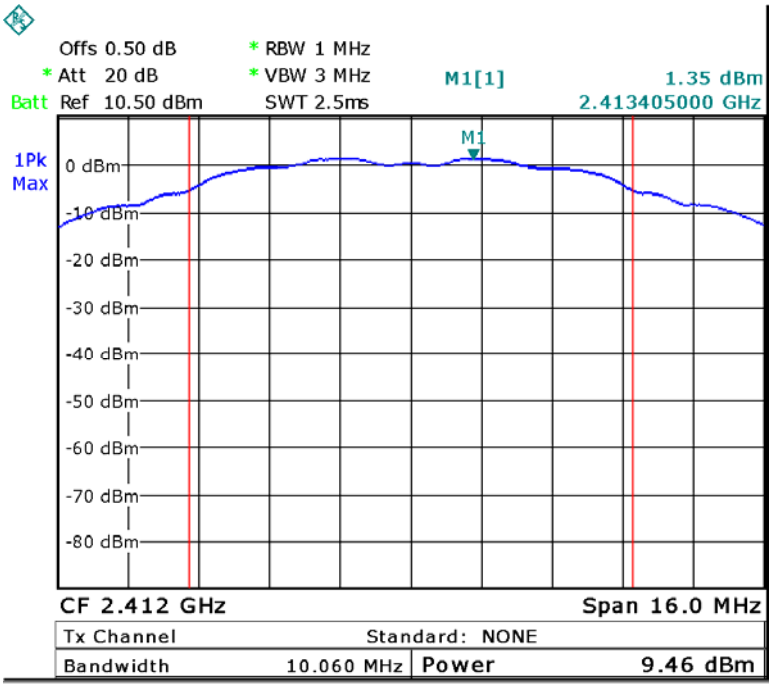
KDB558074 D01 v03r03 section 9.1.2

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.

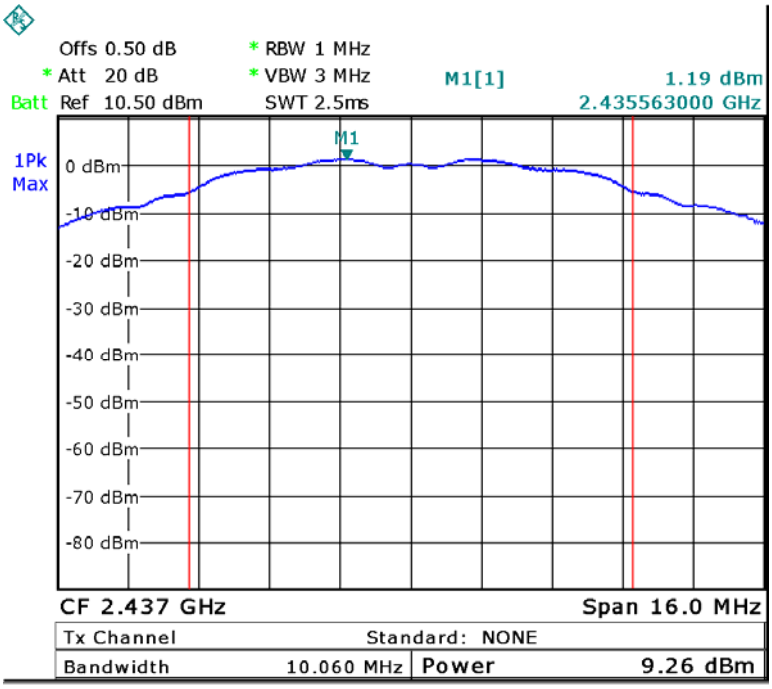
9.2 Test Result:

Test Mode	Data Rate	Channel	Frequency	Peak Power
			(MHz)	(dBm)
802.11b	1Mbps	CH 01	2412	**9.46**
		CH 06	2437	9.26
		CH 11	2462	9.43
802.11g	54Mbps	CH 01	2412	9.24
		CH 06	2437	9.30
		CH 11	2462	9.37

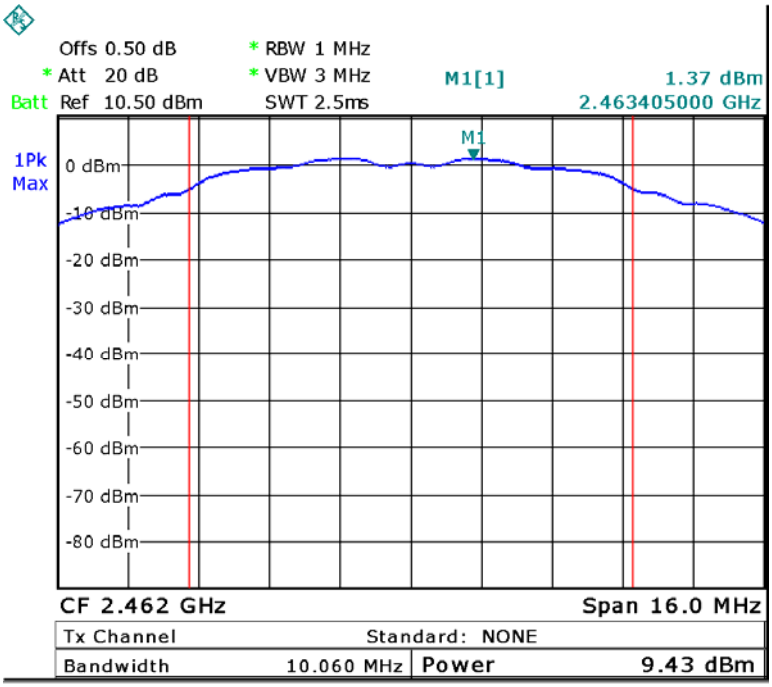
Mode: TX 11b channel 1



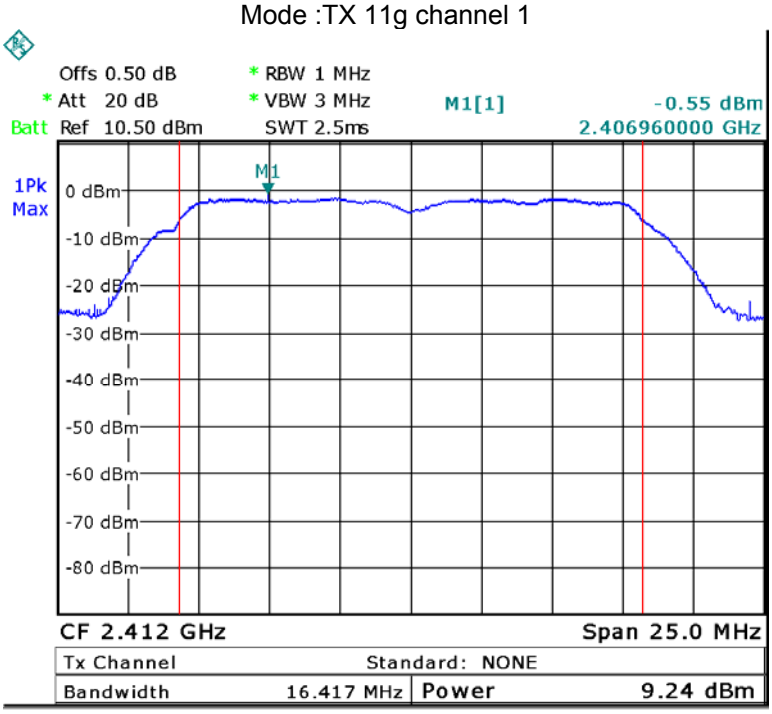
Mode: TX 11b channel 6



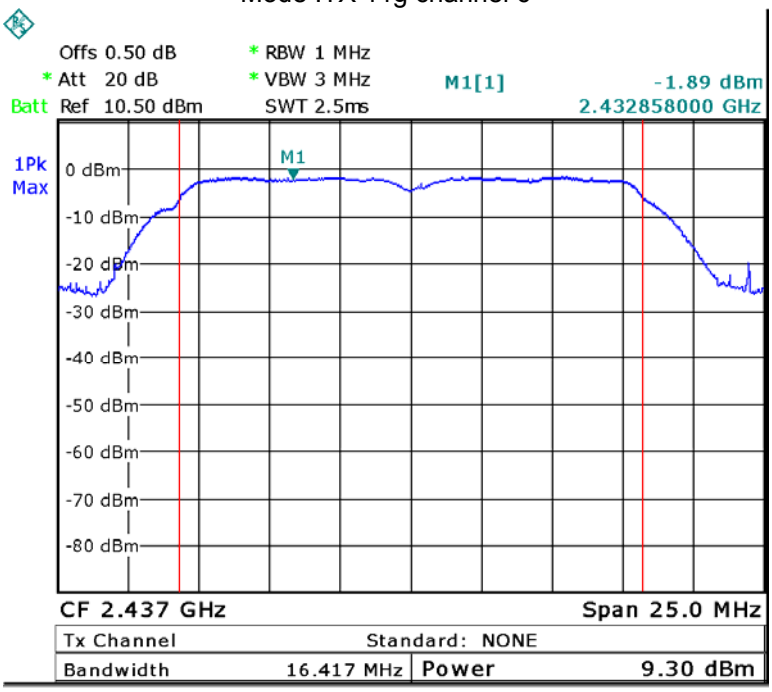
Mode: TX 11b channel 11



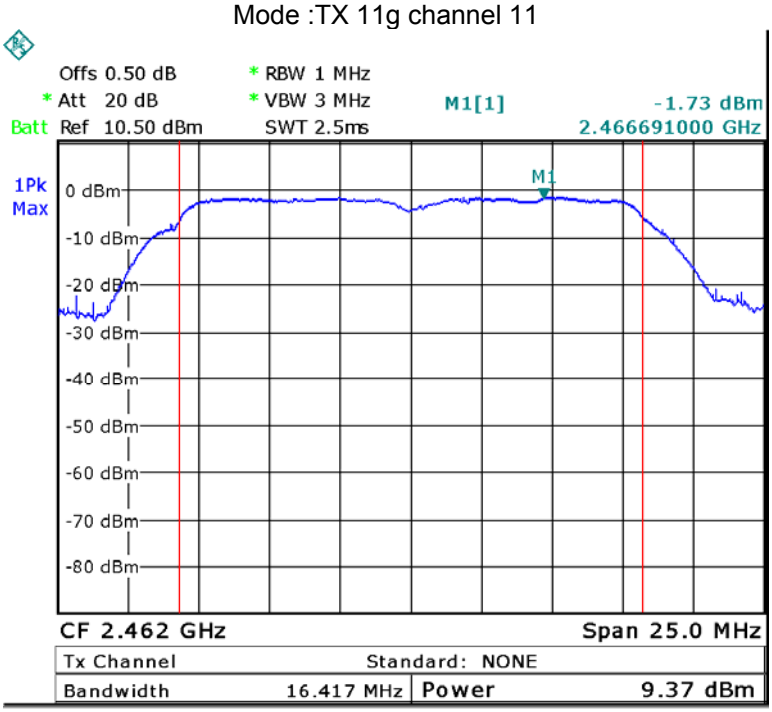
Mode :TX 11g channel 1



Mode :TX 11g channel 6



Mode :TX 11g channel 11



10 Power Spectral Density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v03r03

10.1 Test Procedure

KDB558074 D01 v03r03 section 10.2

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

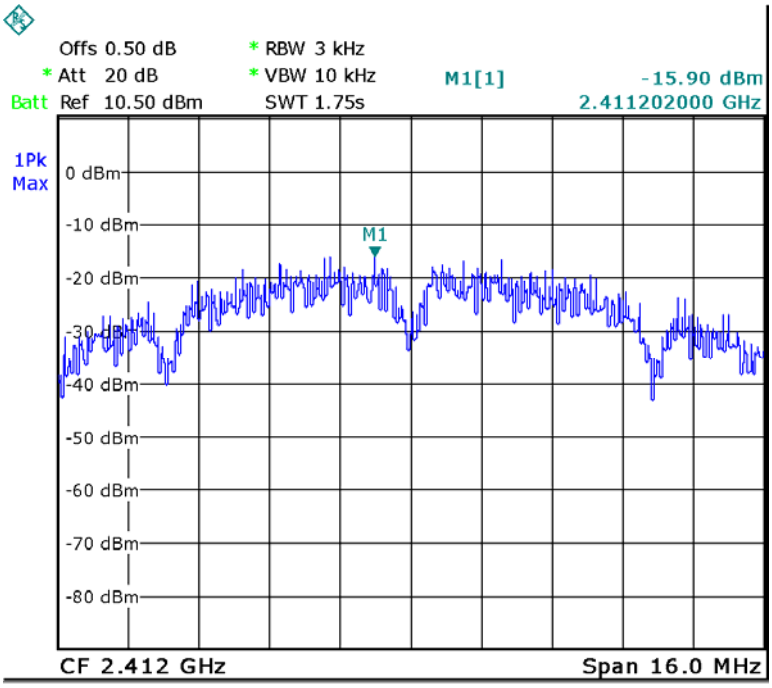
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

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.

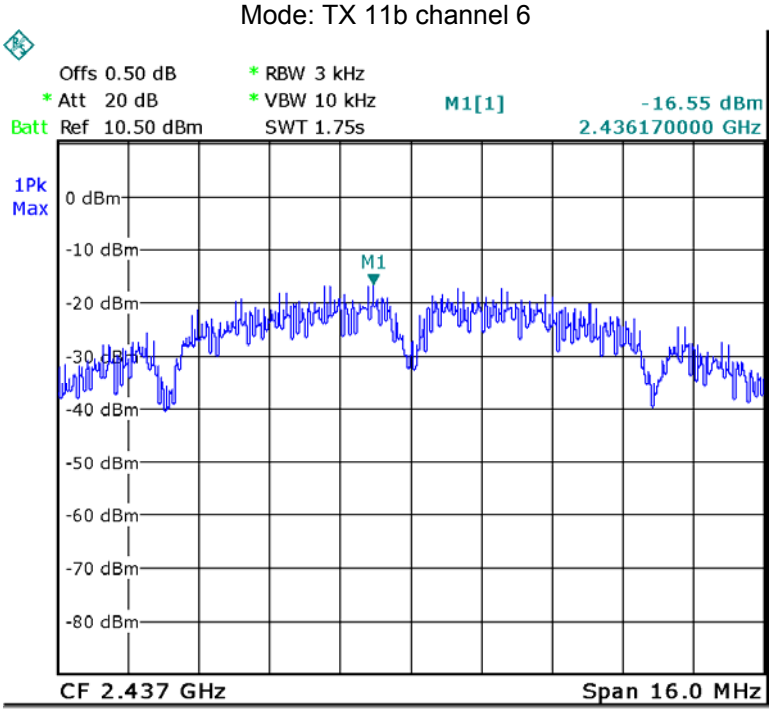
10.2 Test Result

Test Mode	Data Rate	Channel	Frequency	Power Spectral Density
			(MHz)	(dBm)
802.11b	1Mbps	CH 01	2412	-15.90
		CH 06	2437	-16.55
		CH 11	2462	-16.06
802.11g	54Mbps	CH 01	2412	-25.54
		CH 06	2437	-26.12
		CH 11	2462	-25.52

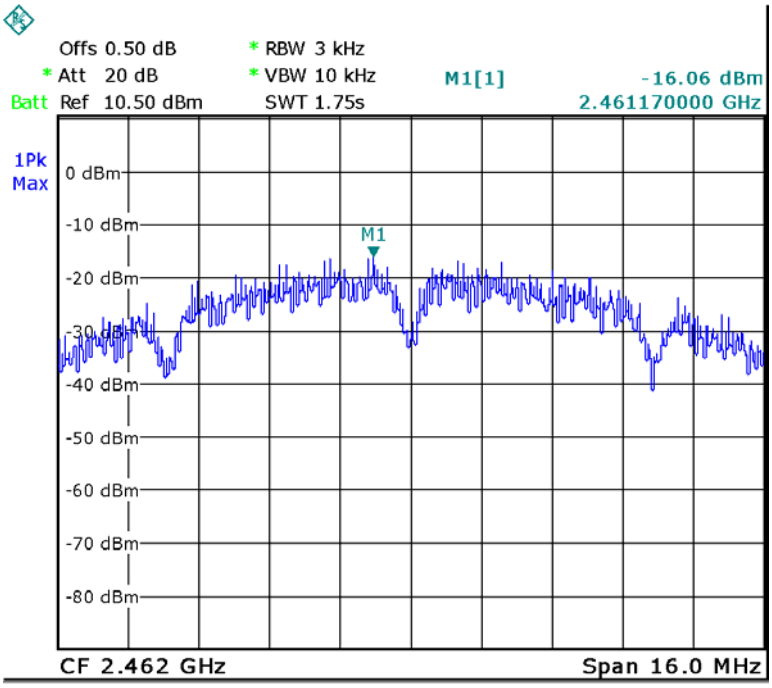
Mode: TX 11b channel 1



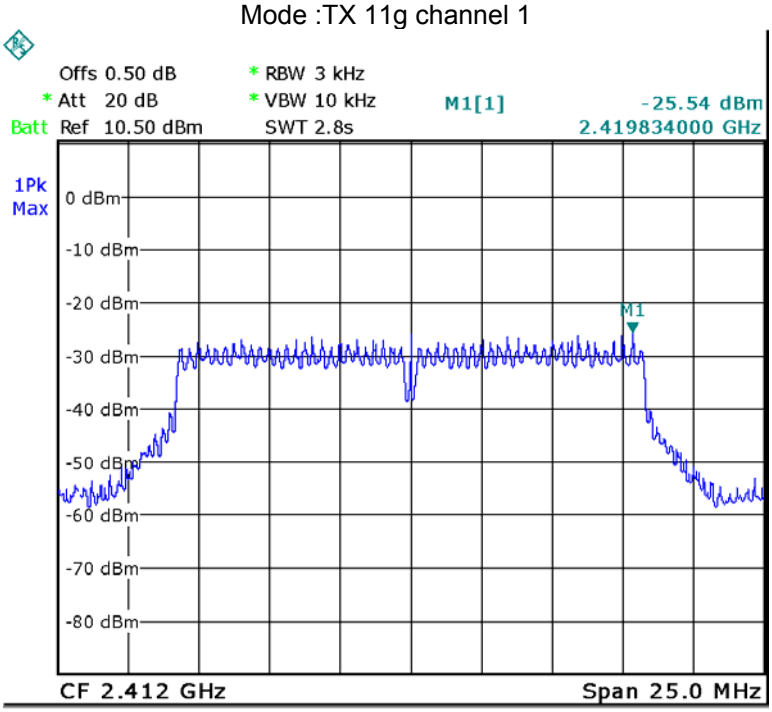
Mode: TX 11b channel 6



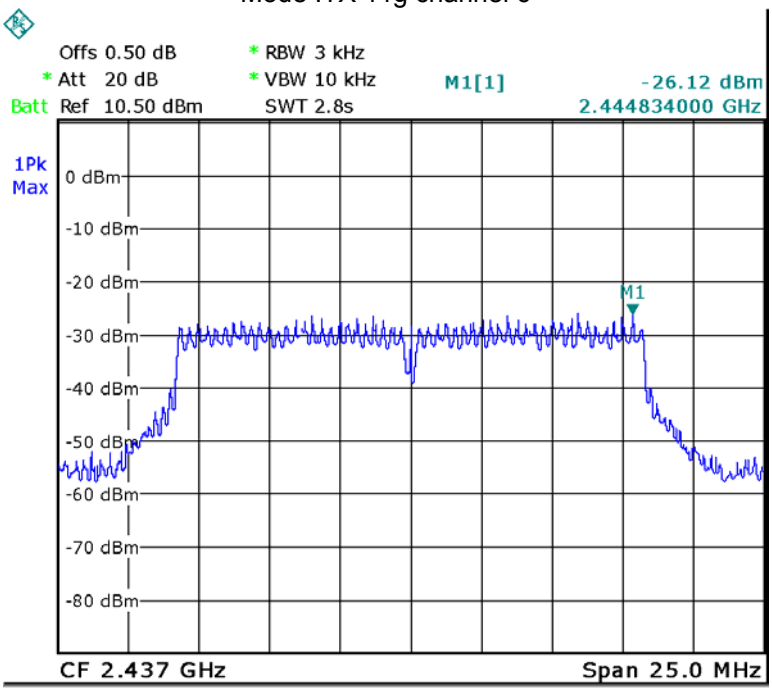
Mode: TX 11b channel 11



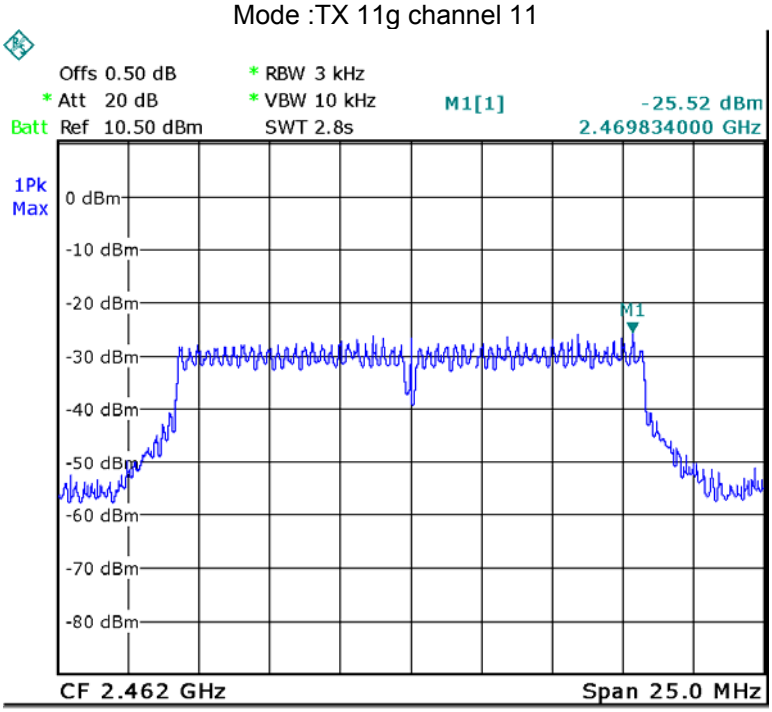
Mode :TX 11g channel 1



Mode :TX 11g channel 6



Mode :TX 11g channel 11



11 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 integrated antenna fulfill the requirement of this section.

12 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method KDB 447498 D01 General RF Exposure Guidance v05

12.1 Requirements

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:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR where

1. f(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.

12.2 The procedures / limit

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)	10-g extremity SAR Test Exclusion Thresholds(mW)
9.46	8.831	8.831	5	10

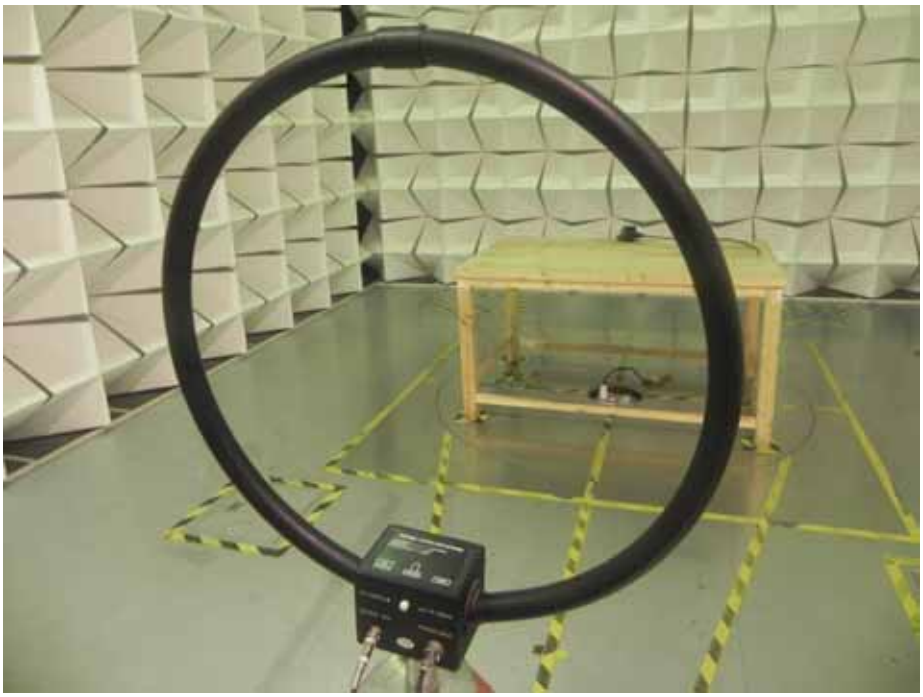
Remark: Max. duty factor is 100%

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

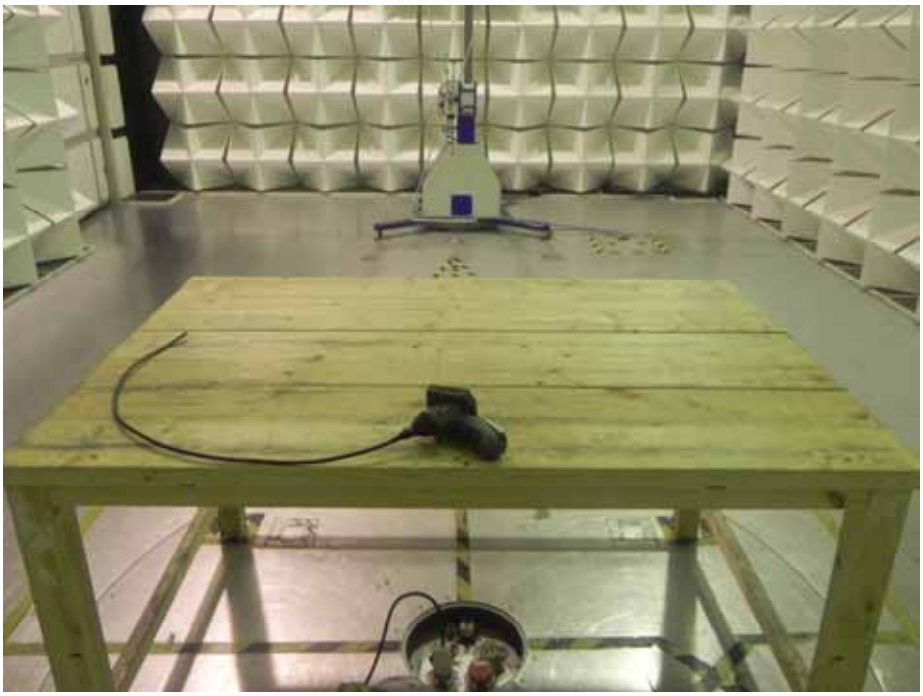
13 Photographs – Model TF3002LW Test Setup

13.1 Radiated Emission

Test frequency below 30MHz at Test Site 2#



Test frequency from 30MHz to 1GHz at Test Site 2#

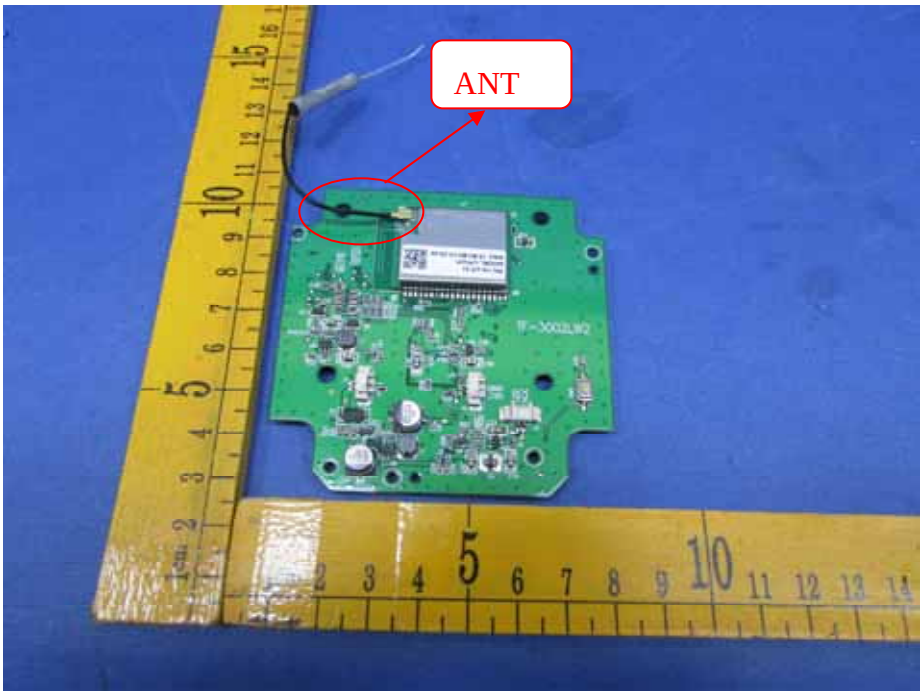


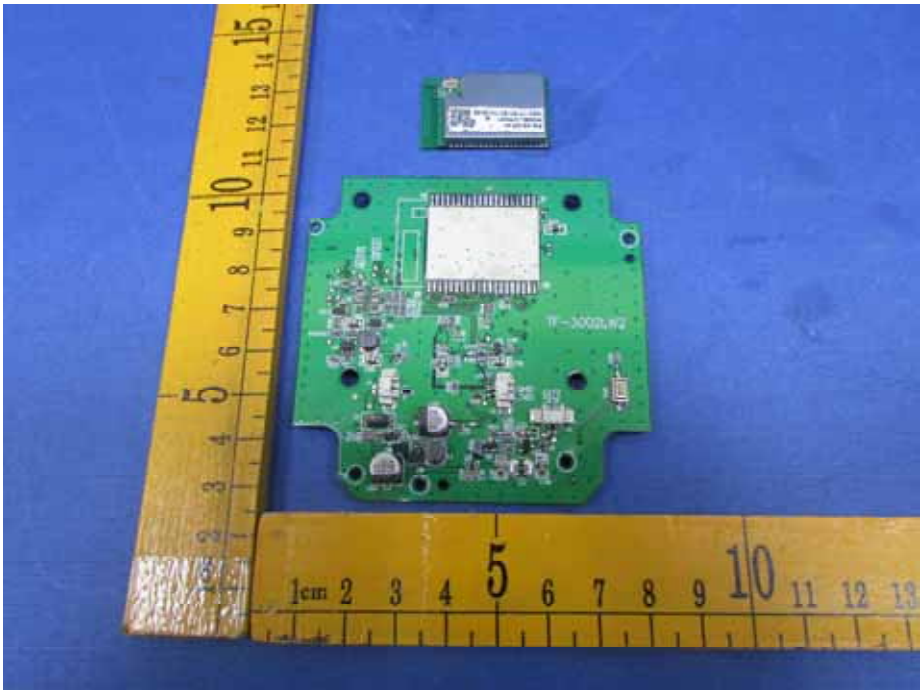
Test frequency above 1GHz at Test Site 1#

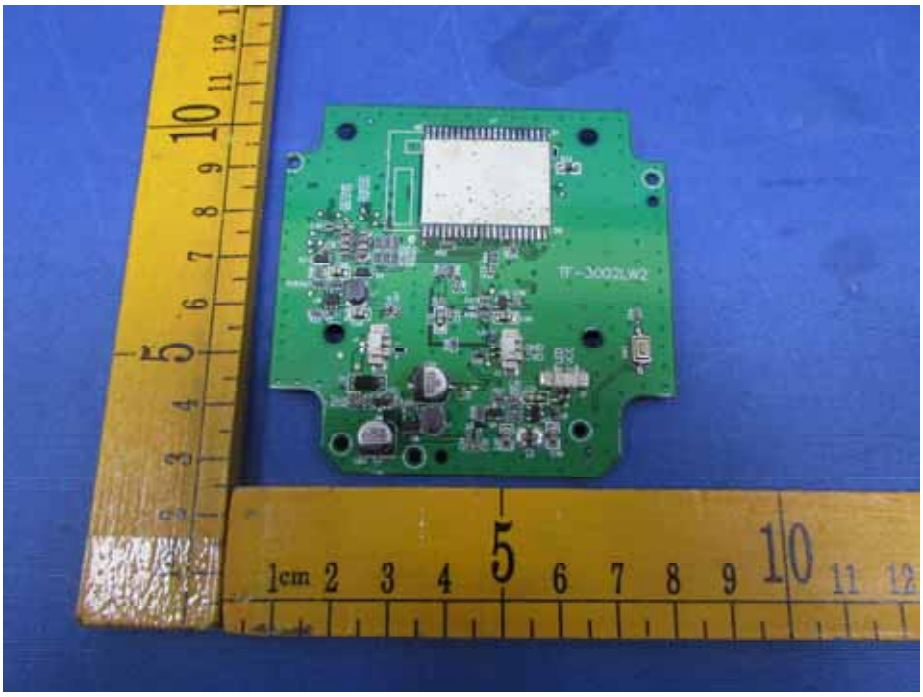
14 Photographs - Constructional Details

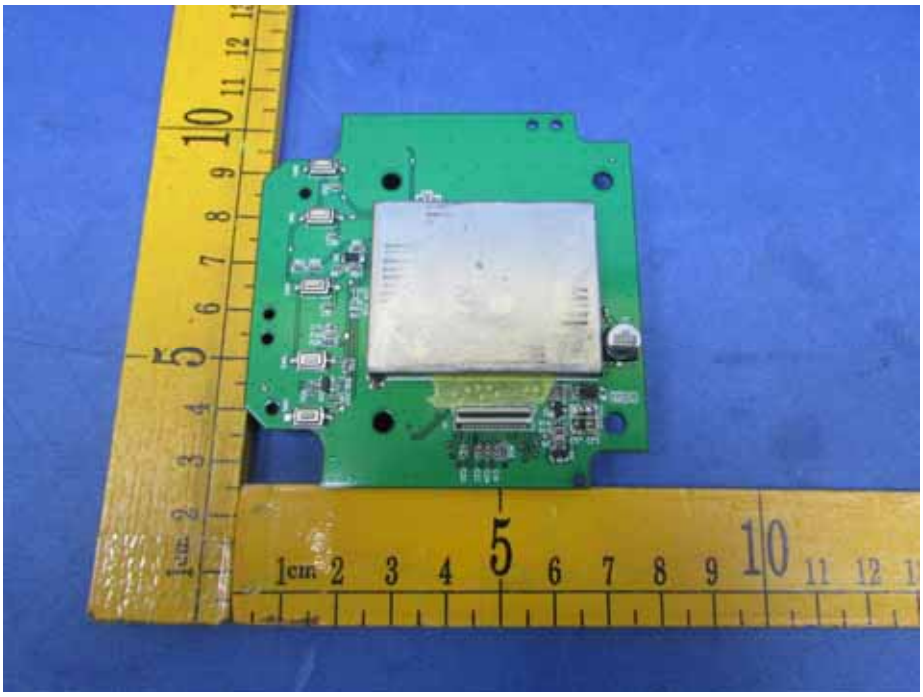
14.1 Model TF3002LW - External View

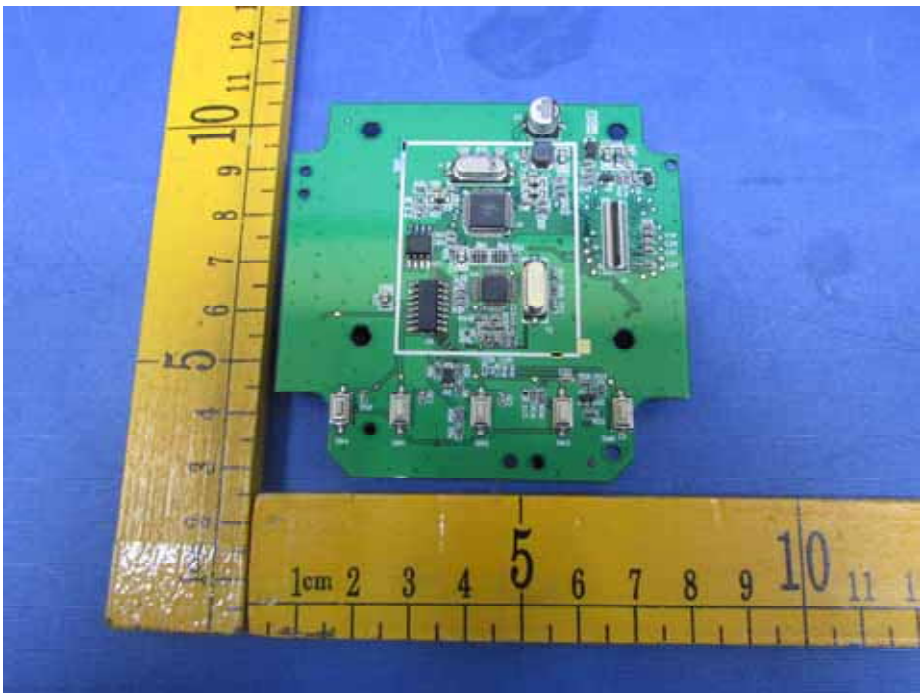
14.2 Model TF3002LW - Internal View

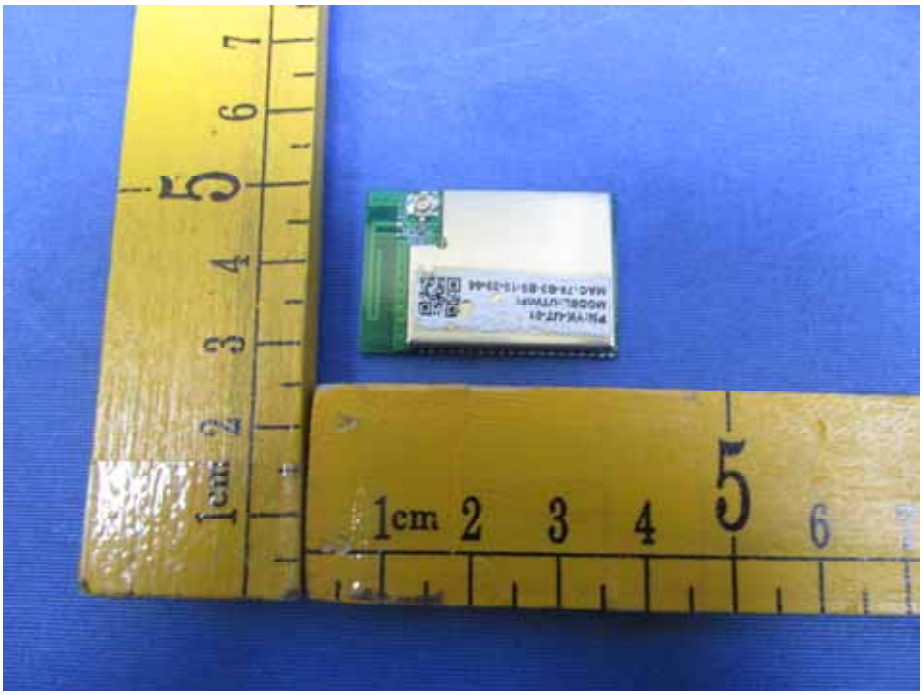


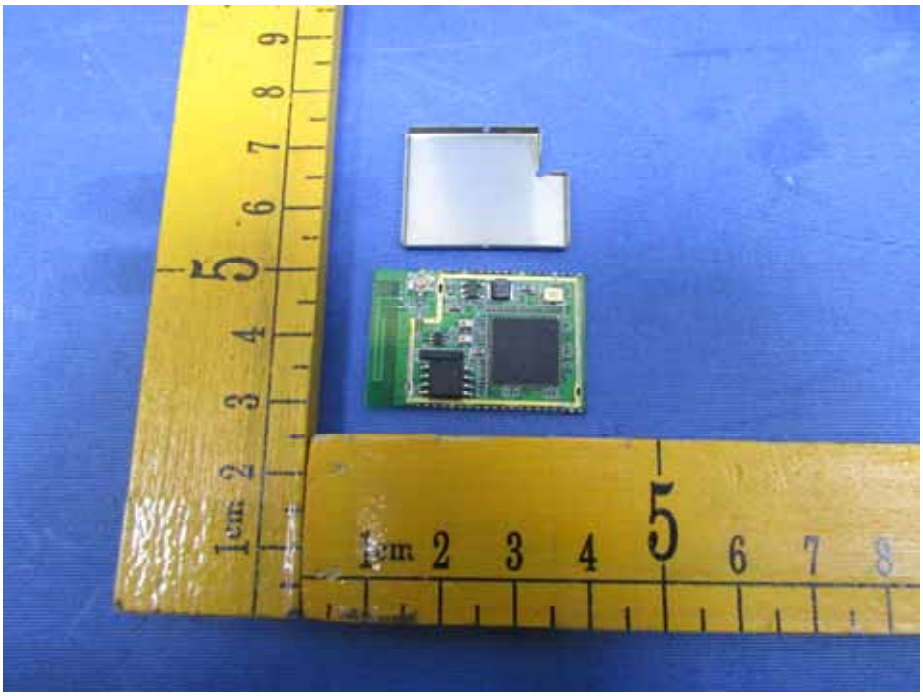

TF-3002LW2

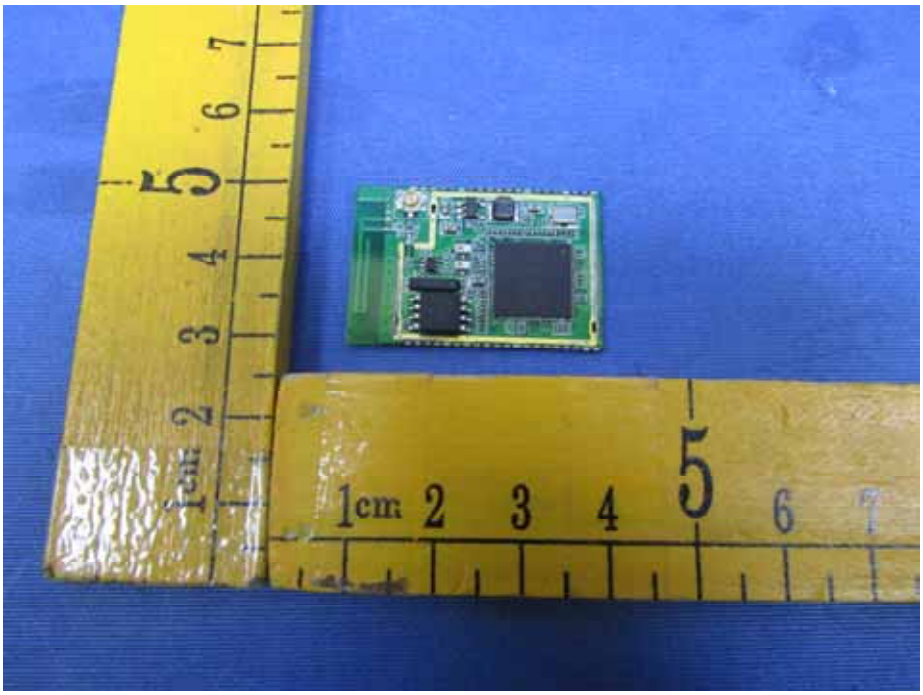

TF-3002LW2

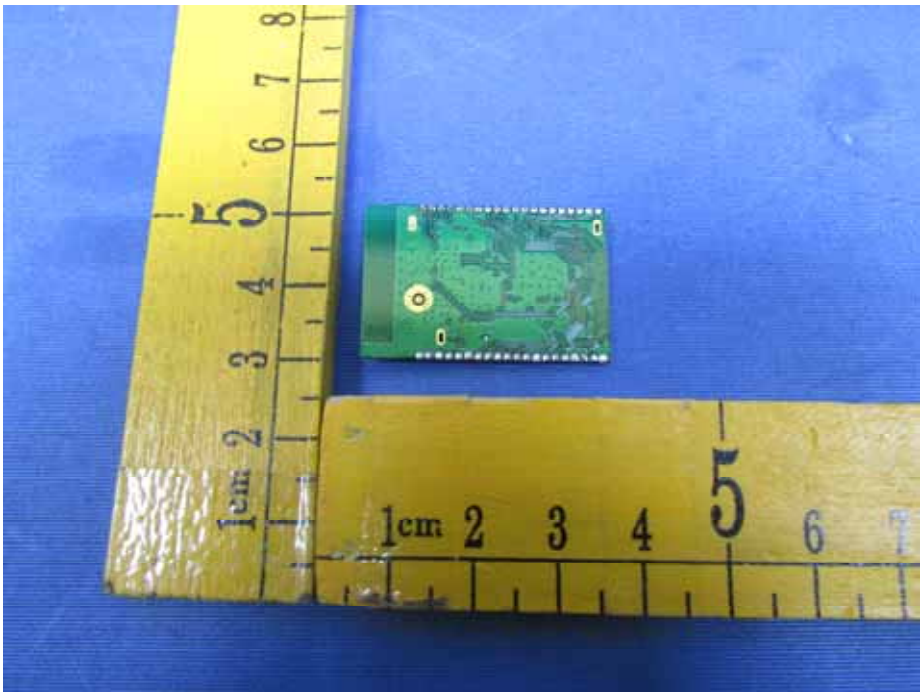












======End of Report======