TEST REPORT

Reference No.	:	WTS14S0413447E
FCC ID.....	:	2AAGEAV5-AV7
Applicant	:	Chengdu Vantron Technology, Ltd.
Address	:	No.5 Gaopeng Road, Hi-Tech Zone, Chengdu, Sichuan, P.R. China 610045
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	AirVend 5, AirVend 7
Model No.	:	AV 5, AV 7
Trademark	:	N/A
Standards.....	:	FCC CFR47 Part 15 C Section 15.247:2012
Date of Receipt sample.....	:	Apr.26, 2014
Date of Test.....	:	May 04 – Jun.05, 2014
Date of Issue	:	Jun.13, 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.

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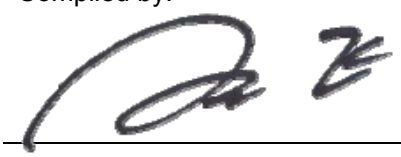
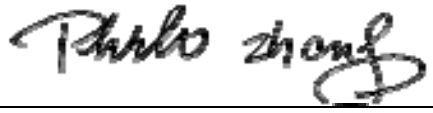
Compiled by:



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)	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
out of band emissions	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

4 General Information

4.1 General Description of E.U.T.

Product Name	: AirVend 5, AirVend 7
Model No.	: AV 5, AV 7
Model Difference	: The models are different in size and appearance. Two models were tested. The worst data of AV 5 is recorded in the report.
Operation Frequency	: 2412MHz ~ 2462MHz, 2422MHz~2452MHz
The Lowest Oscillator	: 32.768kHz
Antenna Gain	: 3dBi
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.)

4.2 Details of E.U.T.

Technical Data : DC 12-34V

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
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	108 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	108 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	108 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	108 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 .

4.5 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, 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, April 29, 2014.

5 Equipment Used during Test

5.1 Equipments List

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	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2014	Apr.18,2015
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.19,2014	Apr.18,2015
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2014	Apr.18,2015
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2014	Mar.16,2015
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.10,2014	Apr.09,2015

5.2 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)

5.3 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/Severity:	Class B
Remark:	This device powered by DC source, this test is not applicable.

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(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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

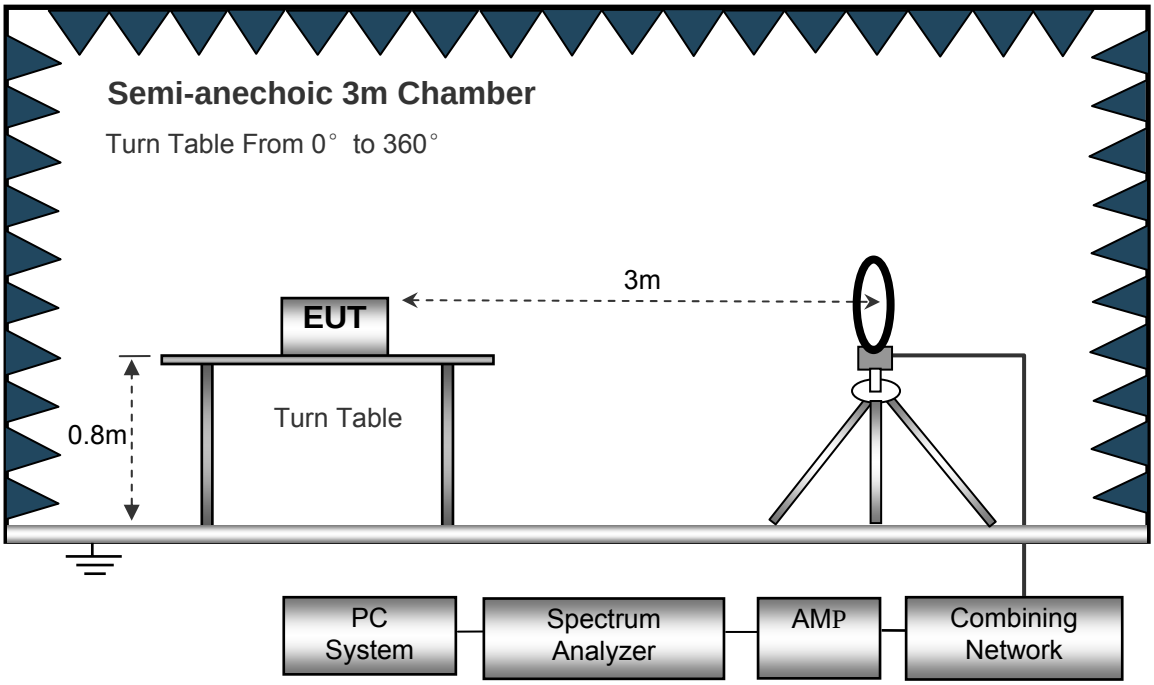
EUT Operation **:**

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

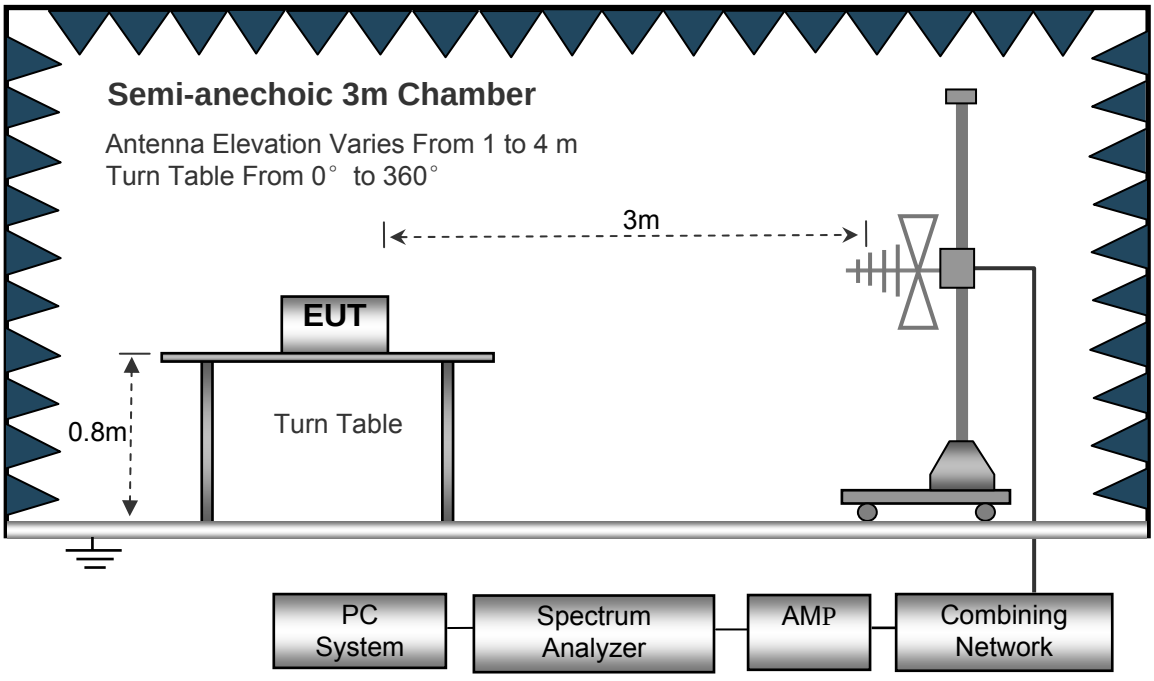
7.2 Test Setup

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

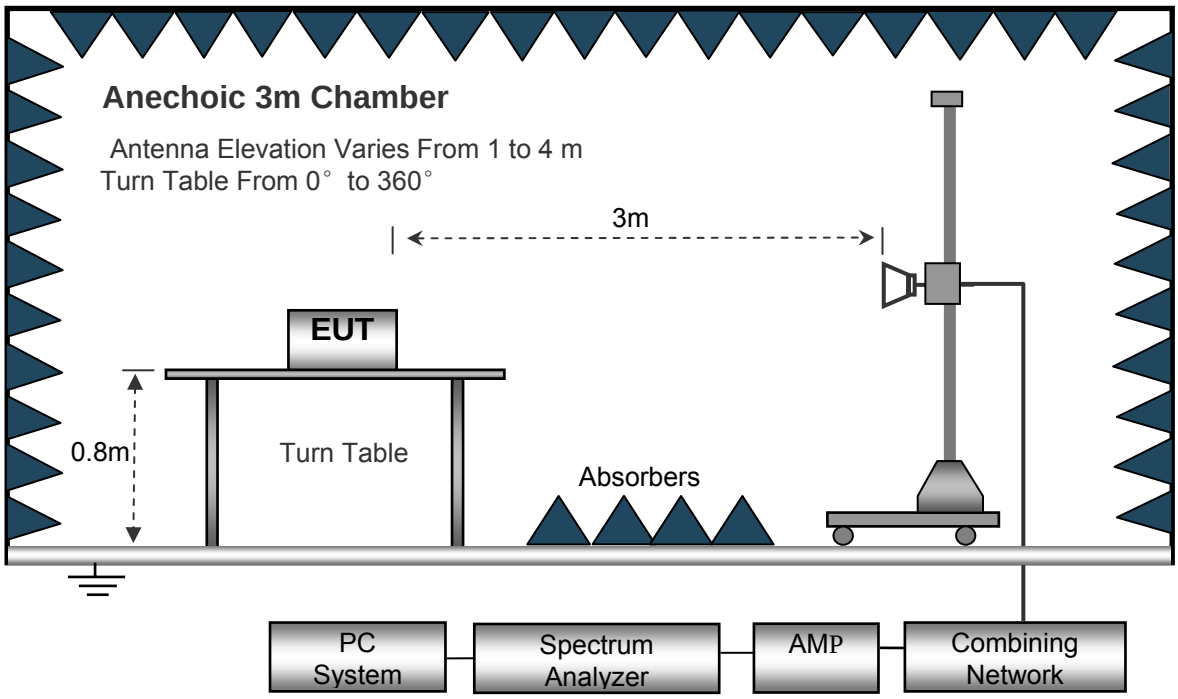
The test setup for emission measurement below 30MHz.



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

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

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 druing 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:

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

7.6 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)
802.11b low channel 2412MHz									
214.51	23.76	PK	155	1.6	H	12.50	36.26	40.00	-3.74
214.51	21.55	PK	37	1.0	V	12.50	34.05	40.00	-5.95
4824.00	53.70	PK	239	1.6	V	-1.06	52.64	74.00	-21.36
4824.00	44.96	Ave	239	1.6	V	-1.06	43.90	54.00	-10.10
7236.00	41.67	PK	257	1.1	H	1.33	43.00	74.00	-31.00
7236.00	38.83	Ave	257	1.1	H	1.33	40.16	54.00	-13.84
2338.32	45.24	PK	345	1.4	V	-13.19	32.05	74.00	-41.95
2338.32	39.73	Ave	345	1.4	V	-13.19	26.54	54.00	-27.46
2351.57	44.25	PK	20	1.7	H	-13.14	31.11	74.00	-42.89
2351.57	38.34	Ave	20	1.7	H	-13.14	25.20	54.00	-28.80
2488.84	42.05	PK	123	1.6	V	-13.08	28.97	74.00	-45.03
2488.84	38.96	Ave	123	1.6	V	-13.08	25.88	54.00	-28.12

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)
802.11b middle channel 2437MHz									
214.51	23.24	PK	85	1.4	H	12.50	35.74	40.00	-4.26
214.51	21.81	PK	138	1.6	V	12.50	34.31	40.00	-5.69
4874.00	49.33	PK	209	1.6	V	-0.62	48.71	74.00	-25.29
4874.00	41.71	Ave	209	1.6	V	-0.62	41.09	54.00	-12.91
7311.00	46.49	PK	189	1.1	H	2.21	48.70	74.00	-25.30
7311.00	39.73	Ave	189	1.1	H	2.21	41.94	54.00	-12.06
2331.27	45.01	PK	74	1.9	V	-13.19	31.82	74.00	-42.18
2331.27	37.36	Ave	74	1.9	V	-13.19	24.17	54.00	-29.83
2385.25	43.12	PK	285	2.0	H	-13.14	29.98	74.00	-44.02
2385.25	36.42	Ave	285	2.0	H	-13.14	23.28	54.00	-30.72
2490.78	44.75	PK	56	1.4	V	-13.08	31.67	74.00	-42.33
2490.78	36.57	Ave	56	1.4	V	-13.08	23.49	54.00	-30.51

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)
802.11b high channel 2462MHz									
214.51	23.31	PK	209	1.8	H	12.50	35.81	40.00	-4.19
214.51	21.95	PK	45	2.0	V	12.50	34.45	40.00	-5.55
4924.00	50.36	PK	245	1.5	V	-0.24	50.12	74.00	-23.88
4924.00	42.93	Ave	245	1.5	V	-0.24	42.69	54.00	-11.31
7386.00	48.60	PK	78	1.6	H	2.84	51.44	74.00	-22.56
7386.00	40.37	Ave	78	1.6	H	2.84	43.21	54.00	-10.79
2317.20	46.82	PK	193	1.6	V	-13.19	33.63	74.00	-40.37
2317.20	39.97	Ave	193	1.6	V	-13.19	26.78	54.00	-27.22
2354.02	43.58	PK	162	1.5	H	-13.14	30.44	74.00	-43.56
2354.02	36.95	Ave	162	1.5	H	-13.14	23.81	54.00	-30.19
2487.48	44.84	PK	84	1.7	V	-13.08	31.76	74.00	-42.24
2487.48	36.40	Ave	84	1.7	V	-13.08	23.32	54.00	-30.68

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)
802.11g low channel 2412MHz									
214.51	22.83	PK	197	1.7	H	12.50	35.33	40.00	-4.67
214.51	21.84	PK	142	1.8	V	12.50	34.34	40.00	-5.66
4824.00	54.11	PK	304	1.7	V	-1.06	53.05	74.00	-20.95
4824.00	44.08	Ave	304	1.7	V	-1.06	43.02	54.00	-10.98
7236.00	42.36	PK	210	1.6	H	1.33	43.69	74.00	-30.31
7236.00	38.97	Ave	210	1.6	H	1.33	40.30	54.00	-13.70
2318.28	46.10	PK	29	1.3	V	-13.19	32.91	74.00	-41.09
2318.28	39.06	Ave	29	1.3	V	-13.19	25.87	54.00	-28.13
2375.74	44.45	PK	167	1.2	H	-13.14	31.31	74.00	-42.69
2375.74	37.82	Ave	167	1.2	H	-13.14	24.68	54.00	-29.32
2497.36	44.62	PK	331	1.8	V	-13.08	31.54	74.00	-42.46
2497.36	38.78	Ave	331	1.8	V	-13.08	25.70	54.00	-28.30

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)
802.11g middle channel 2437MHz									
214.51	23.11	PK	330	1.2	H	12.50	35.61	40.00	-4.39
214.51	21.49	PK	52	1.4	V	12.50	33.99	40.00	-6.01
4874.00	49.26	PK	236	1.8	V	-0.62	48.64	74.00	-25.36
4874.00	41.34	Ave	236	1.8	V	-0.62	40.72	54.00	-13.28
7311.00	46.08	PK	251	1.5	H	2.21	48.29	74.00	-25.71
7311.00	38.80	Ave	251	1.5	H	2.21	41.01	54.00	-12.99
2345.47	45.54	PK	201	1.4	V	-13.19	32.35	74.00	-41.65
2345.47	37.38	Ave	201	1.4	V	-13.19	24.19	54.00	-29.81
2384.12	43.53	PK	251	1.4	H	-13.14	30.39	74.00	-43.61
2384.12	37.54	Ave	251	1.4	H	-13.14	24.40	54.00	-29.60
2498.88	43.67	PK	283	1.8	V	-13.08	30.59	74.00	-43.41
2498.88	36.70	Ave	283	1.8	V	-13.08	23.62	54.00	-30.38

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)
802.11g high channel 2462MHz									
214.51	23.08	PK	107	1.1	H	12.50	35.58	40.00	-4.42
214.51	21.95	PK	255	2.0	V	12.50	34.45	40.00	-5.55
4924.00	51.14	PK	218	1.1	V	-0.24	50.90	74.00	-23.10
4924.00	44.49	Ave	218	1.1	V	-0.24	44.25	54.00	-9.75
7386.00	48.25	PK	71	1.0	H	2.84	51.09	74.00	-22.91
7386.00	39.15	Ave	71	1.0	H	2.84	41.99	54.00	-12.01
2331.25	45.50	PK	187	1.5	V	-13.19	32.31	74.00	-41.69
2331.25	39.11	Ave	187	1.5	V	-13.19	25.92	54.00	-28.08
2360.26	44.78	PK	104	1.4	H	-13.14	31.64	74.00	-42.36
2360.26	36.23	Ave	104	1.4	H	-13.14	23.09	54.00	-30.91
2496.36	44.79	PK	158	1.7	V	-13.08	31.71	74.00	-42.29
2496.36	36.75	Ave	158	1.7	V	-13.08	23.67	54.00	-30.33

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)
802.11n(HT20) low channel 2412MHz									
214.51	23.18	PK	178	1.3	H	12.50	35.68	40.00	-4.32
214.51	21.41	PK	288	1.4	V	12.50	33.91	40.00	-6.09
4824.00	52.49	PK	83	1.3	V	-1.06	51.43	74.00	-22.57
4824.00	44.93	Ave	83	1.3	V	-1.06	43.87	54.00	-10.13
7236.00	42.98	PK	88	1.5	H	1.33	44.31	74.00	-29.69
7236.00	39.18	Ave	88	1.5	H	1.33	40.51	54.00	-13.49
2346.66	46.34	PK	189	1.1	V	-13.19	33.15	74.00	-40.85
2346.66	37.81	Ave	189	1.1	V	-13.19	24.62	54.00	-29.38
2372.17	43.13	PK	263	1.6	H	-13.14	29.99	74.00	-44.01
2372.17	37.64	Ave	263	1.6	H	-13.14	24.50	54.00	-29.50
2498.96	43.62	PK	271	1.4	V	-13.08	30.54	74.00	-43.46
2498.96	38.52	Ave	271	1.4	V	-13.08	25.44	54.00	-28.56

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)
802.11n(HT20) middle channel 2437MHz									
214.51	23.01	PK	287	1.3	H	12.50	35.51	40.00	-4.49
214.51	21.35	PK	56	1.8	V	12.50	33.85	40.00	-6.15
4874.00	50.77	PK	284	1.6	V	-0.62	50.15	74.00	-23.85
4874.00	40.57	Ave	284	1.6	V	-0.62	39.95	54.00	-14.05
7311.00	46.76	PK	317	1.1	H	2.21	48.97	74.00	-25.03
7311.00	38.80	Ave	317	1.1	H	2.21	41.01	54.00	-12.99
2314.17	46.98	PK	175	1.6	V	-13.19	33.79	74.00	-40.21
2314.17	37.43	Ave	175	1.6	V	-13.19	24.24	54.00	-29.76
2389.16	44.19	PK	56	1.5	H	-13.14	31.05	74.00	-42.95
2389.16	36.60	Ave	56	1.5	H	-13.14	23.46	54.00	-30.54
2488.78	44.00	PK	131	1.4	V	-13.08	30.92	74.00	-43.08
2488.78	38.24	Ave	131	1.4	V	-13.08	25.16	54.00	-28.84

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)
802.11n(HT20) high channel 2462MHz									
214.51	22.55	PK	285	1.5	H	12.50	35.05	40.00	-4.95
214.51	21.09	PK	158	1.6	V	12.50	33.59	40.00	-6.41
4924.00	51.26	PK	282	1.6	V	-0.24	51.02	74.00	-22.98
4924.00	44.39	Ave	282	1.6	V	-0.24	44.15	54.00	-9.85
7386.00	48.82	PK	167	1.9	H	2.84	51.66	74.00	-22.34
7386.00	38.70	Ave	167	1.9	H	2.84	41.54	54.00	-12.46
2324.47	45.81	PK	92	1.9	V	-13.19	32.62	74.00	-41.38
2324.47	39.24	Ave	92	1.9	V	-13.19	26.05	54.00	-27.95
2355.43	44.27	PK	281	1.5	H	-13.14	31.13	74.00	-42.87
2355.43	37.56	Ave	281	1.5	H	-13.14	24.42	54.00	-29.58
2495.47	42.69	PK	270	1.6	V	-13.08	29.61	74.00	-44.39
2495.47	37.62	Ave	270	1.6	V	-13.08	24.54	54.00	-29.46

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)
802.11n(HT40) low channel 2422MHz									
214.51	22.83	PK	202	1.7	H	12.50	35.33	40.00	-4.67
214.51	20.41	PK	96	1.7	V	12.50	32.91	40.00	-7.09
4844.00	53.22	PK	350	2.0	V	-1.06	52.16	74.00	-21.84
4844.00	44.56	Ave	350	2.0	V	-1.06	43.50	54.00	-10.50
7266.00	42.33	PK	135	1.9	H	1.33	43.66	74.00	-30.34
7266.00	39.48	Ave	135	1.9	H	1.33	40.81	54.00	-13.19
2331.00	45.48	PK	358	1.3	V	-13.19	32.29	74.00	-41.71
2331.00	39.17	Ave	358	1.3	V	-13.19	25.98	54.00	-28.02
2371.12	44.92	PK	341	1.9	H	-13.14	31.78	74.00	-42.22
2371.12	38.56	Ave	341	1.9	H	-13.14	25.42	54.00	-28.58
2490.70	43.49	PK	133	1.3	V	-13.08	30.41	74.00	-43.59
2490.70	37.23	Ave	133	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)
802.11n(HT40) middle channel 2437MHz									
214.51	23.42	PK	128	1.4	H	12.50	35.92	40.00	-4.08
214.51	20.85	PK	9	1.0	V	12.50	33.35	40.00	-6.65
4874.00	49.86	PK	89	1.3	V	-0.62	49.24	74.00	-24.76
4874.00	41.47	Ave	89	1.3	V	-0.62	40.85	54.00	-13.15
7311.00	45.98	PK	13	1.5	H	2.21	48.19	74.00	-25.81
7311.00	39.23	Ave	13	1.5	H	2.21	41.44	54.00	-12.56
2344.16	45.98	PK	5	1.9	V	-13.19	32.79	74.00	-41.21
2344.16	39.21	Ave	5	1.9	V	-13.19	26.02	54.00	-27.98
2353.85	42.16	PK	336	1.3	H	-13.14	29.02	74.00	-44.98
2353.85	37.22	Ave	336	1.3	H	-13.14	24.08	54.00	-29.92
2497.80	43.04	PK	294	1.2	V	-13.08	29.96	74.00	-44.04
2497.80	36.32	Ave	294	1.2	V	-13.08	23.24	54.00	-30.76

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)
802.11n(HT40) high channel 2452MHz									
214.51	22.76	PK	332	1.5	H	12.50	35.26	40.00	-4.74
214.51	20.86	PK	288	1.9	V	12.50	33.36	40.00	-6.64
4904.00	51.31	PK	107	1.2	V	-0.24	51.07	74.00	-22.93
4904.00	43.74	Ave	107	1.2	V	-0.24	43.50	54.00	-10.50
7356.00	48.31	PK	349	1.6	H	2.84	51.15	74.00	-22.85
7356.00	39.50	Ave	349	1.6	H	2.84	42.34	54.00	-11.66
2326.15	46.24	PK	40	1.5	V	-13.19	33.05	74.00	-40.95
2326.15	39.57	Ave	40	1.5	V	-13.19	26.38	54.00	-27.62
2354.59	44.39	PK	221	1.4	H	-13.14	31.25	74.00	-42.75
2354.59	37.19	Ave	221	1.4	H	-13.14	24.05	54.00	-29.95
2498.86	42.03	PK	291	1.7	V	-13.08	28.95	74.00	-45.05
2498.86	36.40	Ave	291	1.7	V	-13.08	23.32	54.00	-30.68

Test Frequency: 18GHz~25GHz

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
Test Mode:	Transmitting

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.

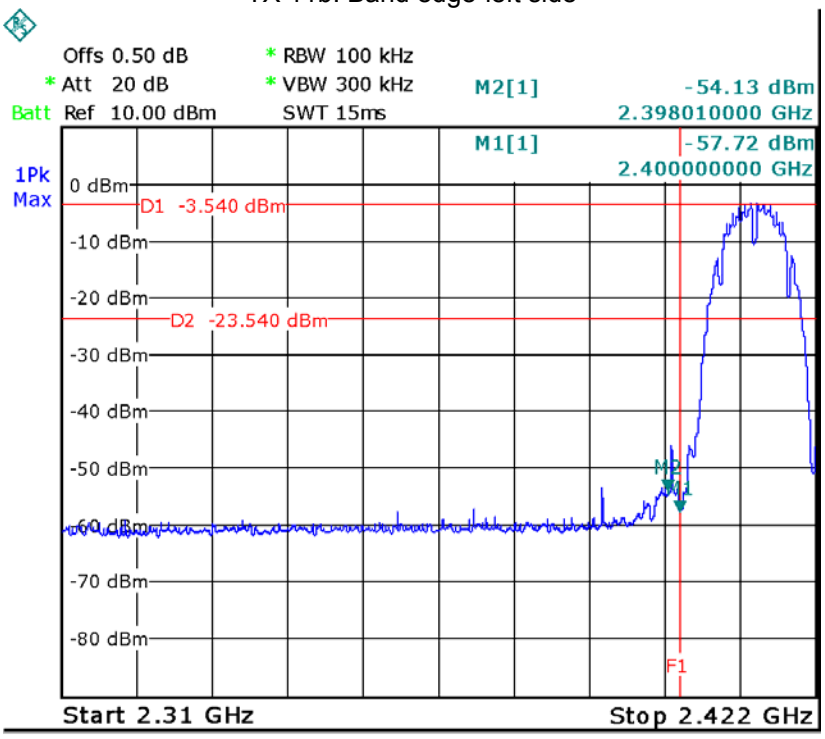
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

5. Repeat above procedures until all measured frequencies were complete.

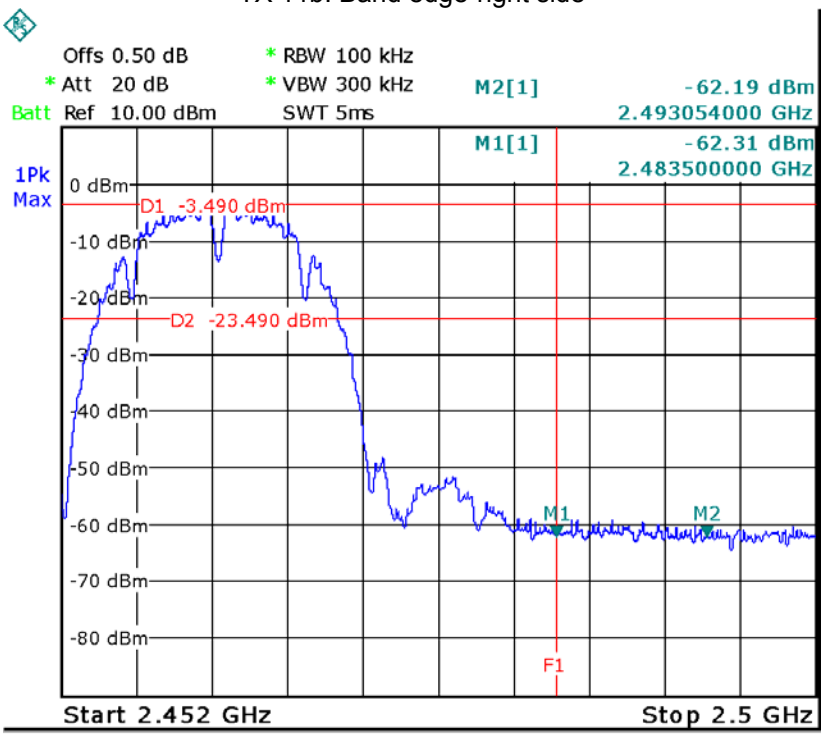
8.2 Test Result

Test result plots shown as follows:

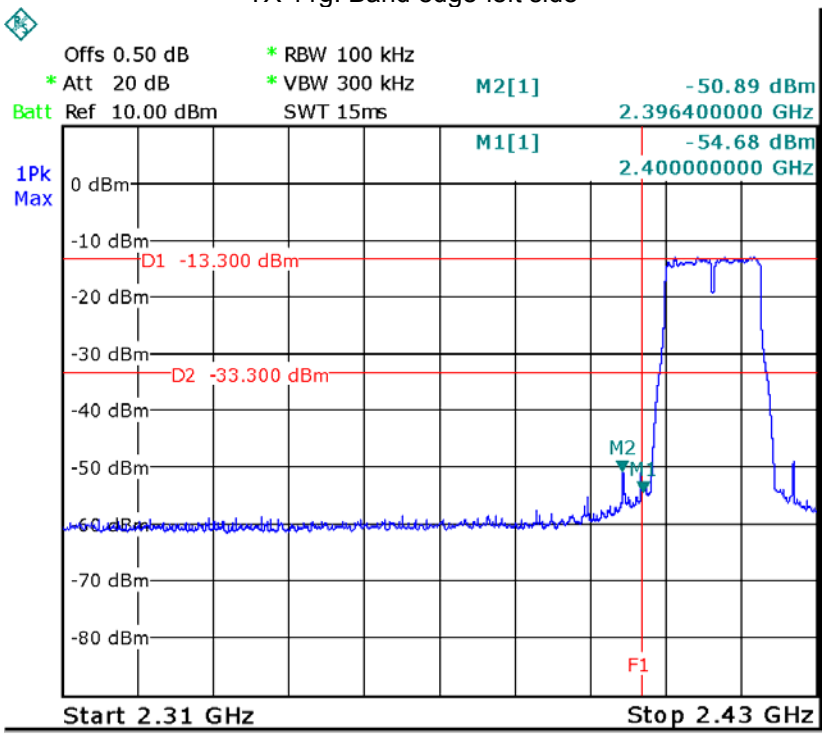
TX 11b: Band edge-left side



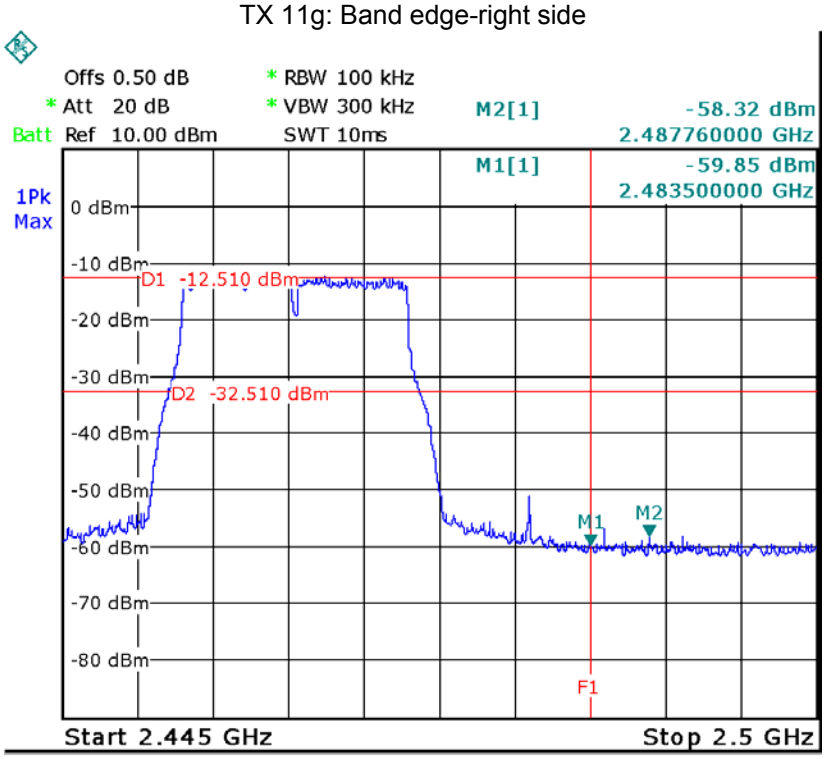
TX 11b: Band edge-right side



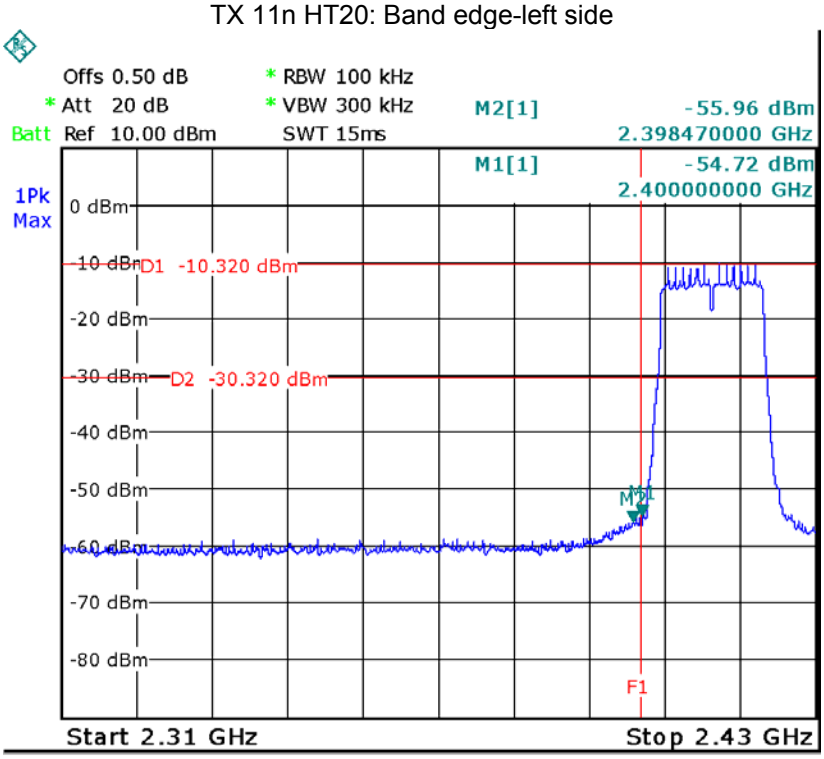
TX 11g: Band edge-left side



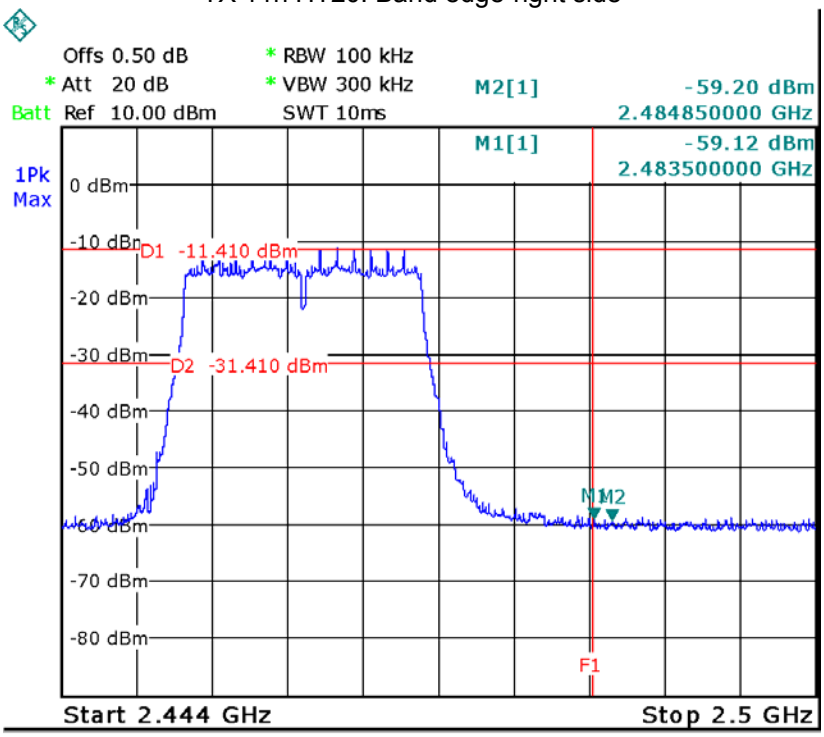
TX 11g: Band edge-right side



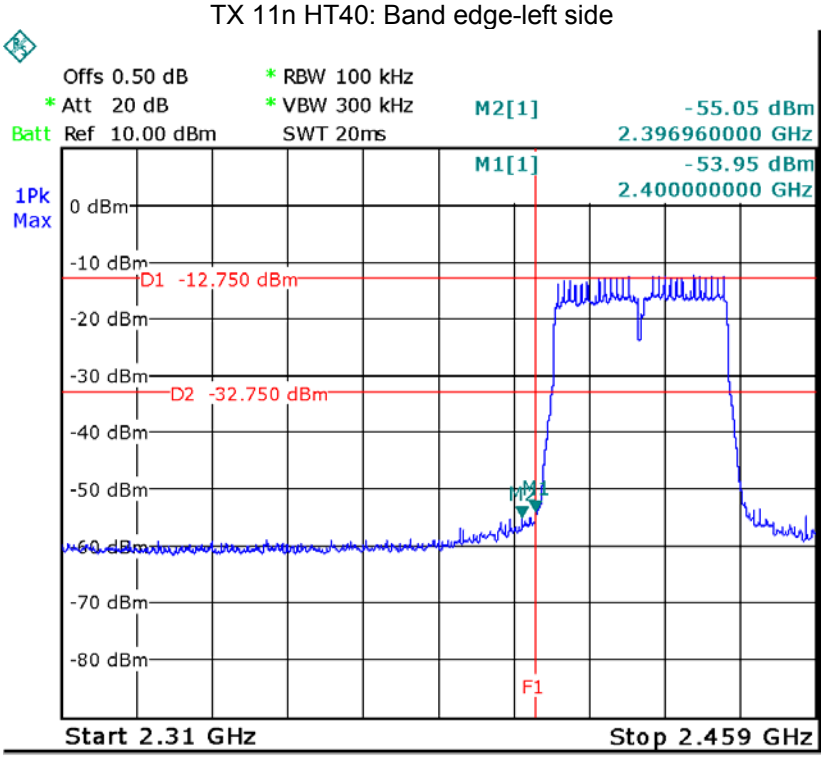
TX 11n HT20: Band edge-left side



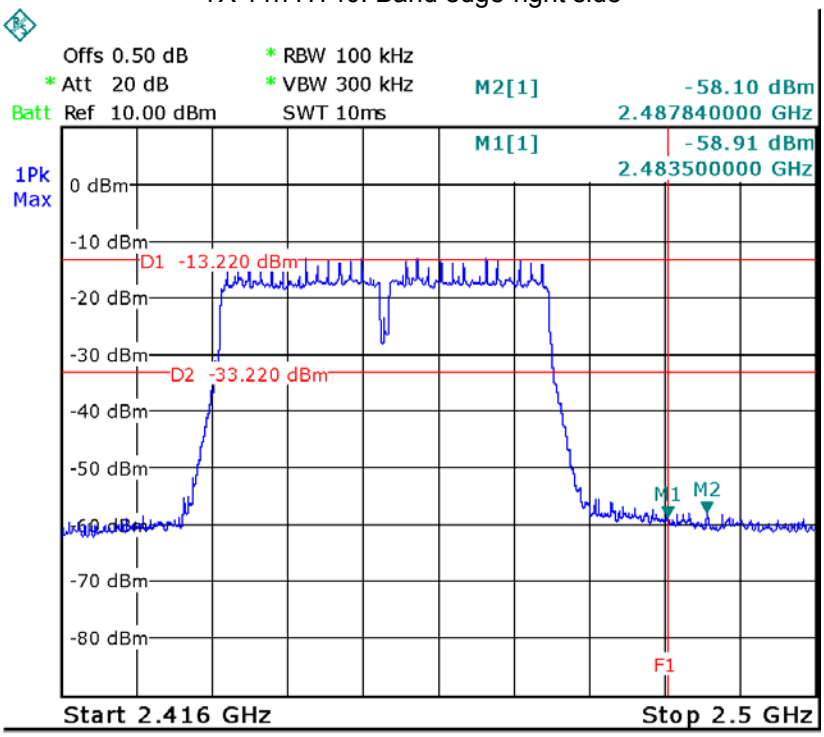
TX 11n HT20: Band edge-right side



TX 11n HT40: Band edge-left side



TX 11n HT40: Band edge-right side



9 Out of band emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247(d)
Test Method: KDB558074 D01 v03r01
Test Limit: Emissions produced by the device outside the authorized frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the fundamental.
Test Mode: Test in fixing operating frequency at low, middle, high channel.

9.1 Test Procedure:

KDB558074 D01 v03r01 04/09/2013 section 10.1 clause1

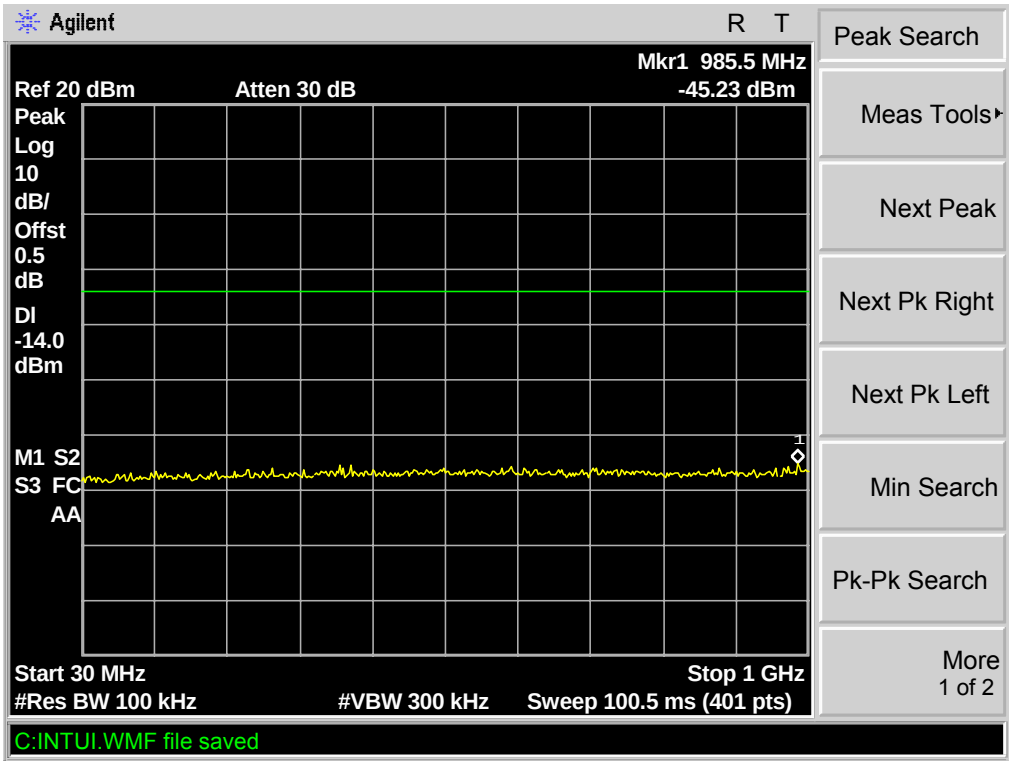
The maximum peak conducted output power procedure was used to demonstrate compliance to 15.247(b)(3) requirements, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz. This measurement was performed over a frequency range that spans from the lowest frequency generated in the device up to and including the tenth harmonic of the highest fundamental frequency.

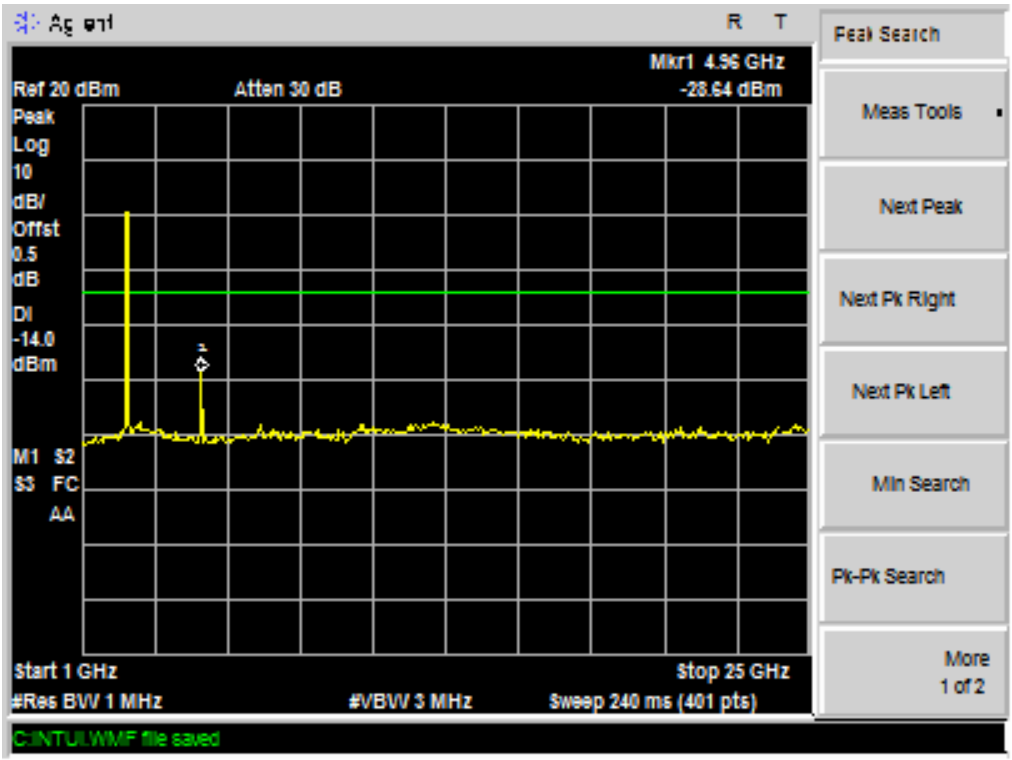
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set to span from the lowest frequency generated in the device up to and including the tenth harmonic of the highest fundamental frequency
3. For below 1GHz, Set RBW = 100kHz and VBW = 300kHz.Sweep =auto. For above1GHz, Set RBW = 1MHz and VBW = 3MHz.Sweep =auto.
4. Mark the worst point and record.

9.2 Test Result:

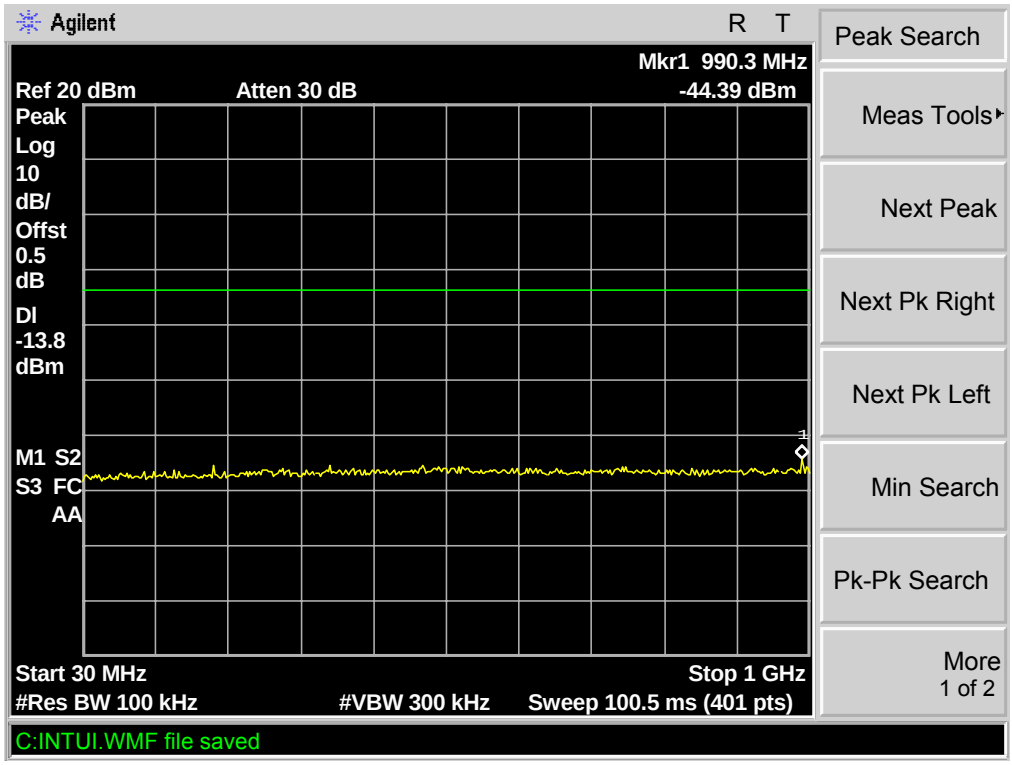
Re: The worst case in all mode are recoded in the report.

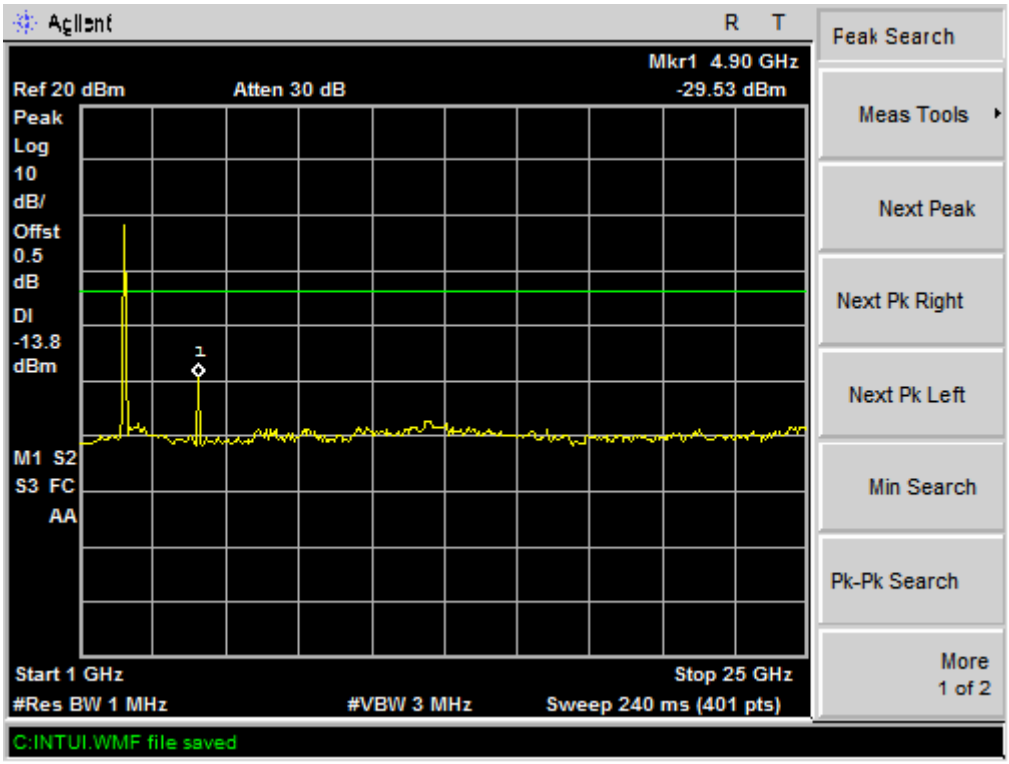
Test mode: TX 11b High channel



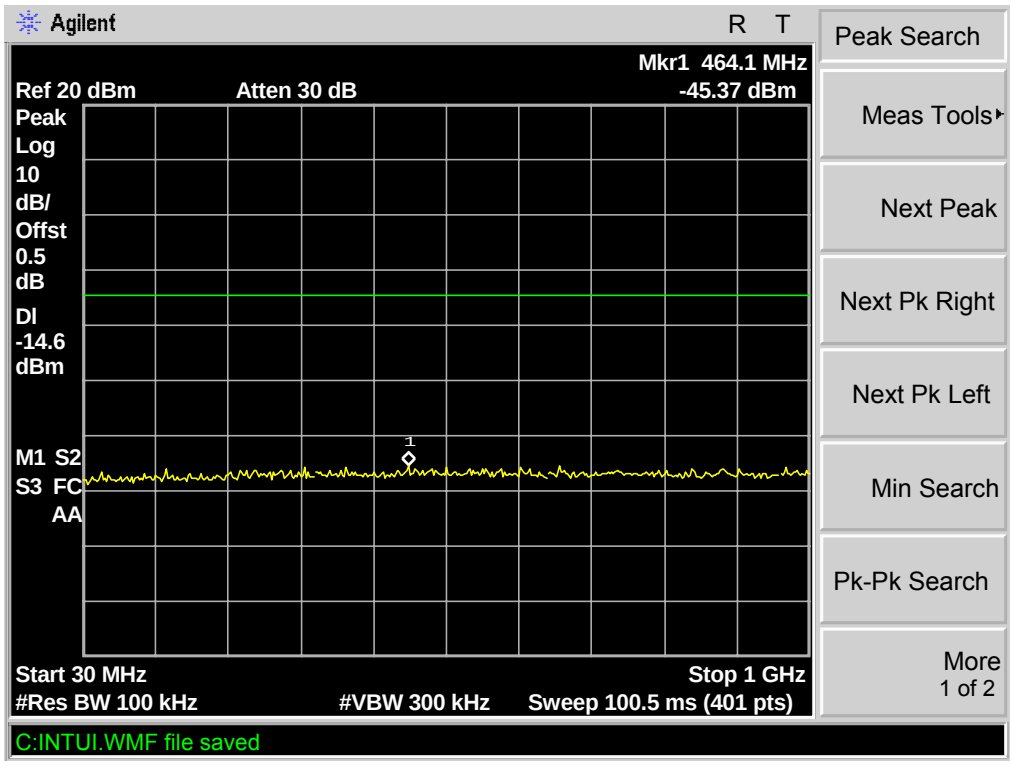


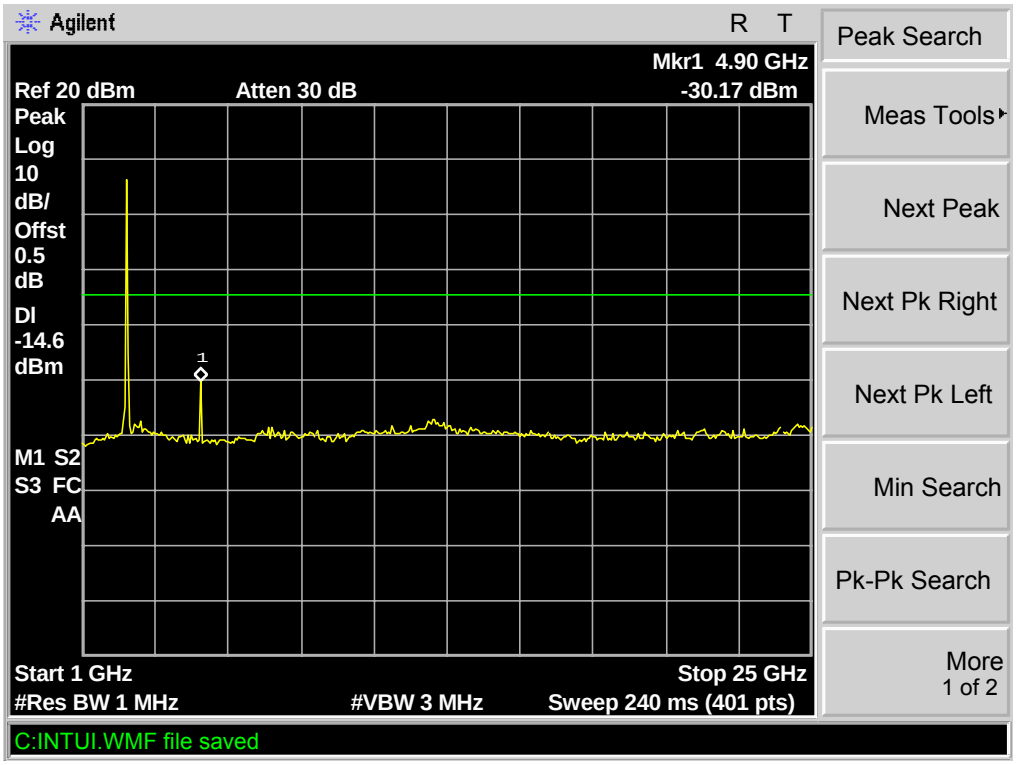
Test mode: TX 11g Middle channel



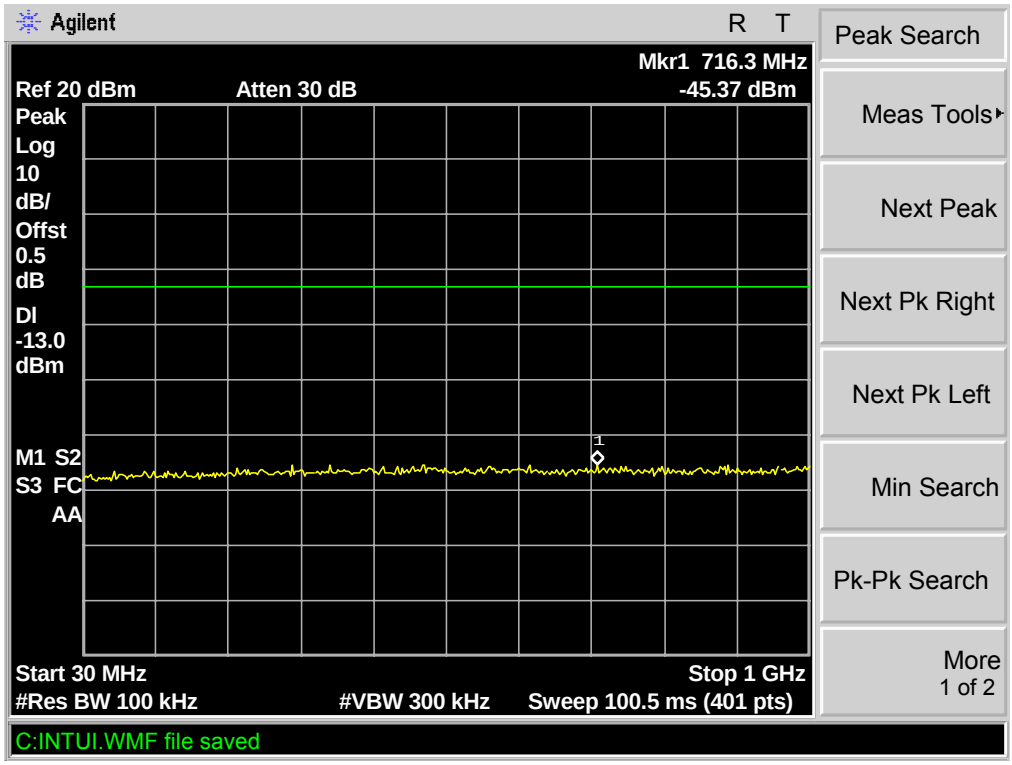


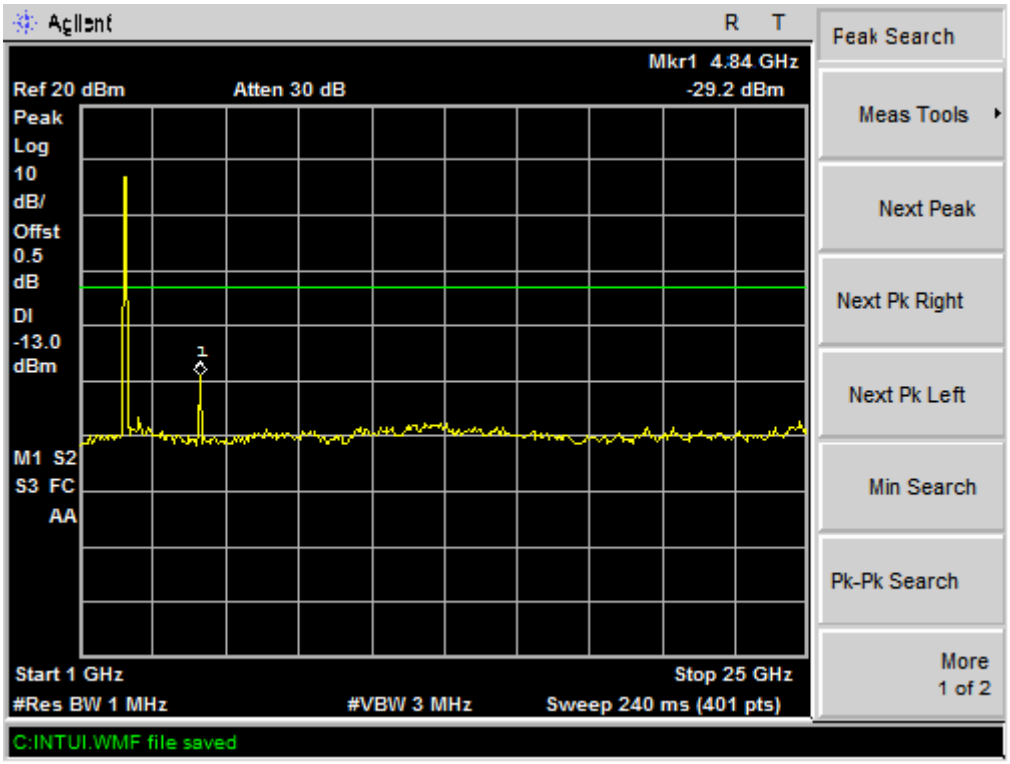
Test mode: TX 11n HT20 Middle channel





Test mode: TX 11n HT40 Low channel




Agilent
R T
Mkr1 4.84 GHz
-29.2 dBm
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
Offst
0.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 25 GHz
Sweep 240 ms (401 pts)
C:INTUI.WMF file saved
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

10 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

10.1 Test Procedure:

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

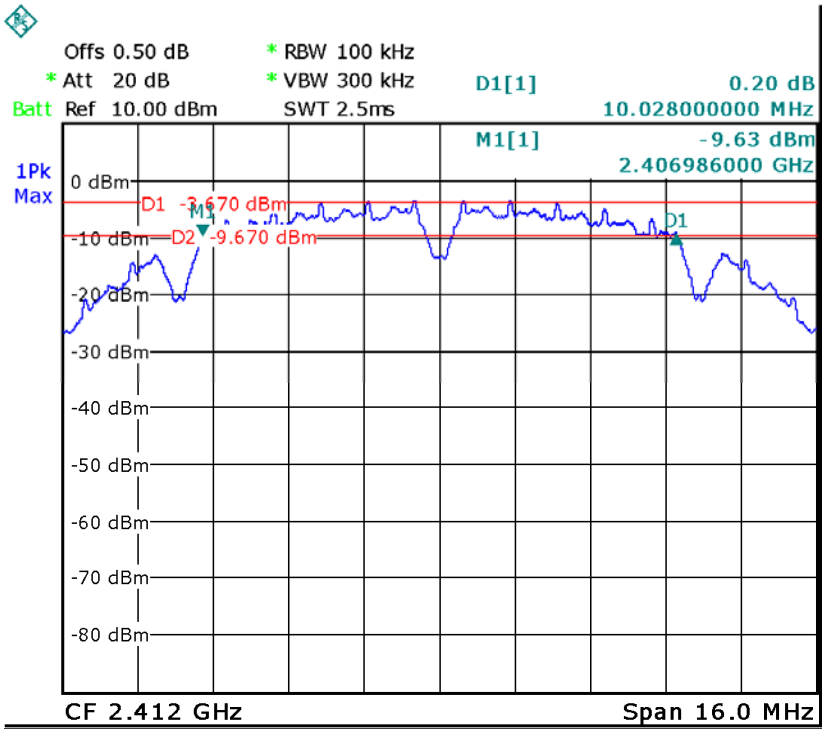
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result:

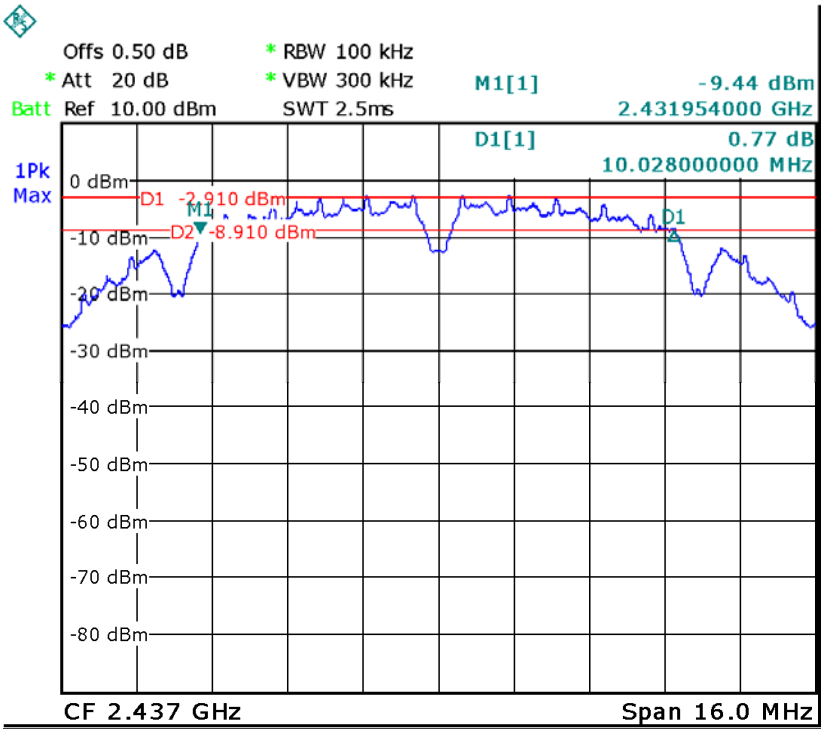
Operation mode	Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	10.03	10.03	10.03
TX 11g	Channel 1	Channel 6	Channel 11
	16.62	16.62	16.62
TX 11n HT20	Channel 1	Channel 6	Channel 11
	17.68	17.68	17.68
TX 11n HT40	Channel 3	Channel 6	Channel 9
	36.23	36.23	36.23

Test result plot as follows:

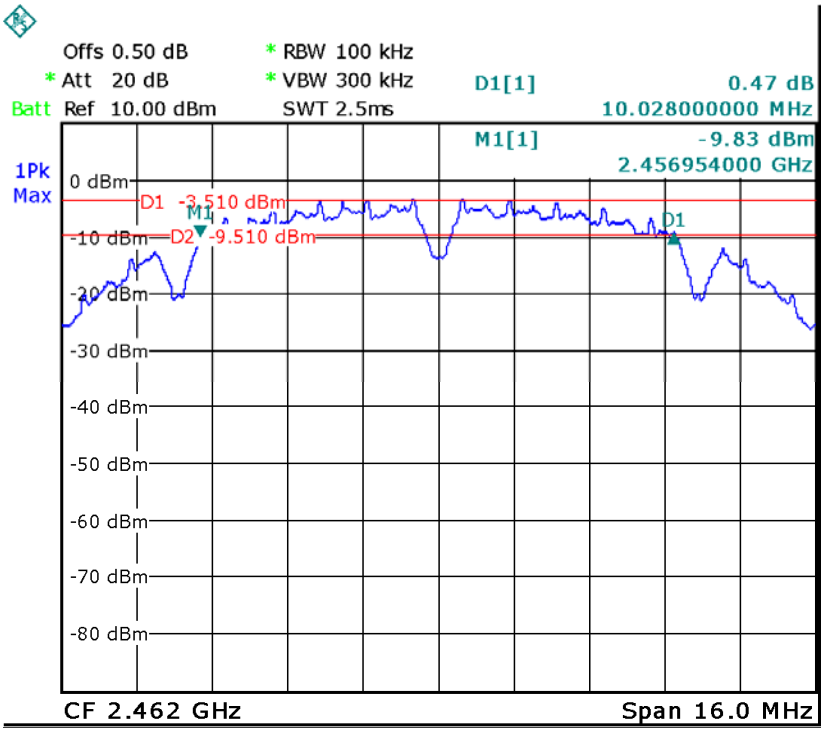
Mode: TX 11b channel 1



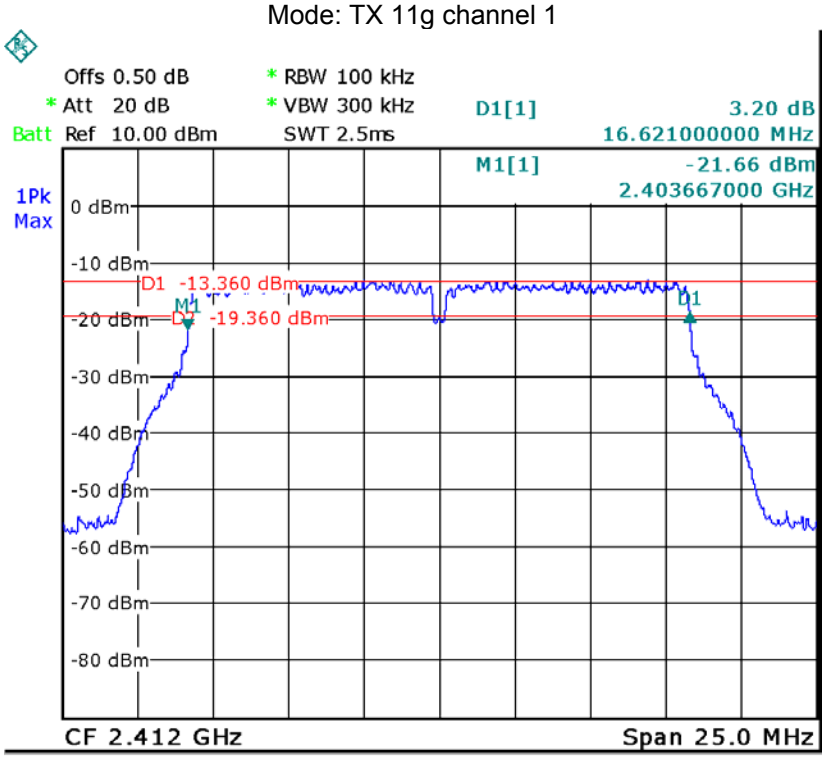
Mode: TX 11b channel 6



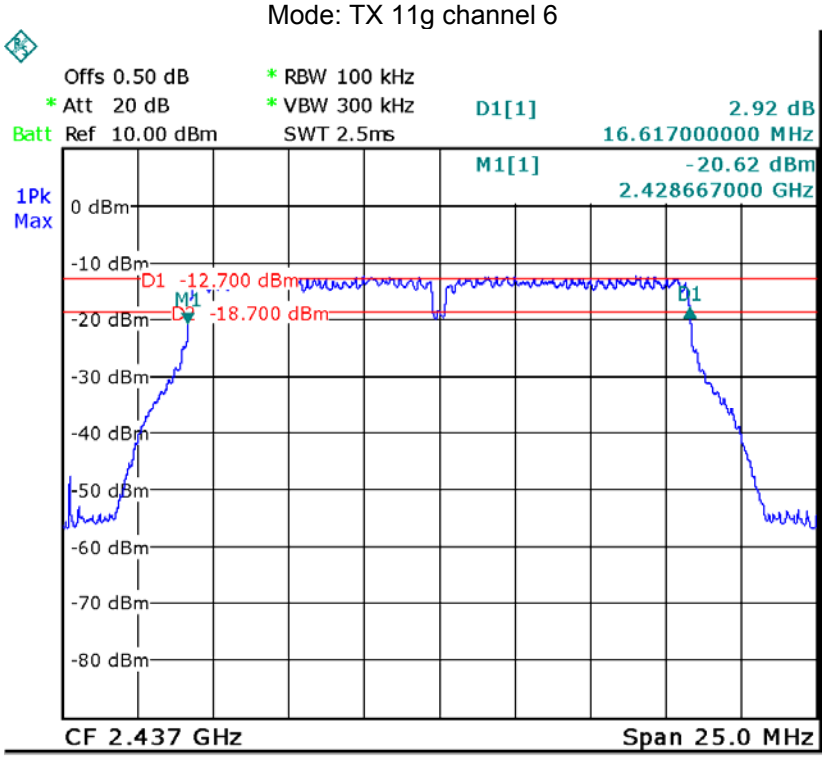
Mode: TX 11b channel 11



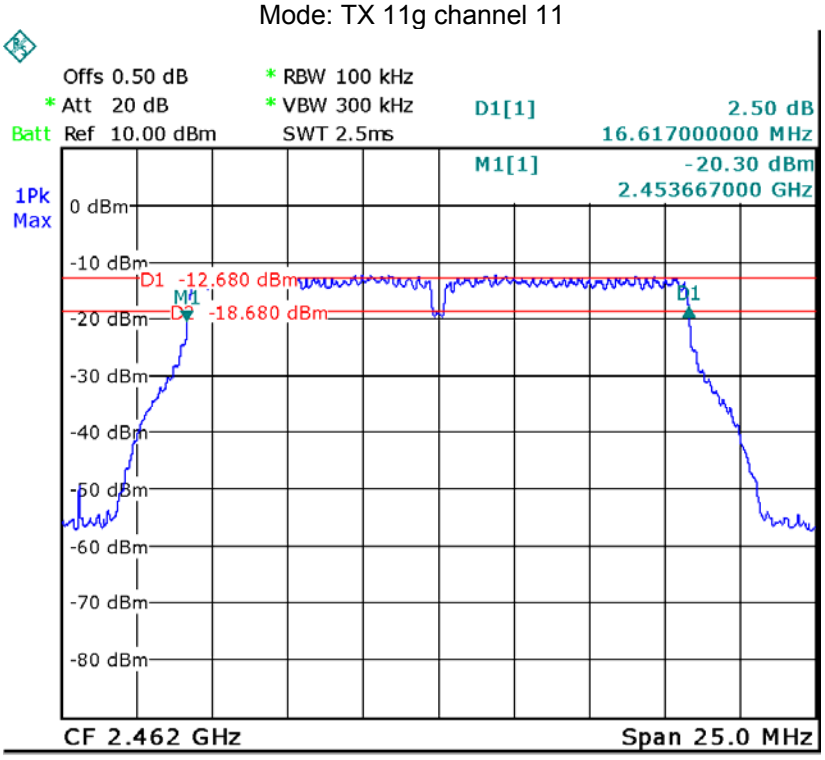
Mode: TX 11g channel 1



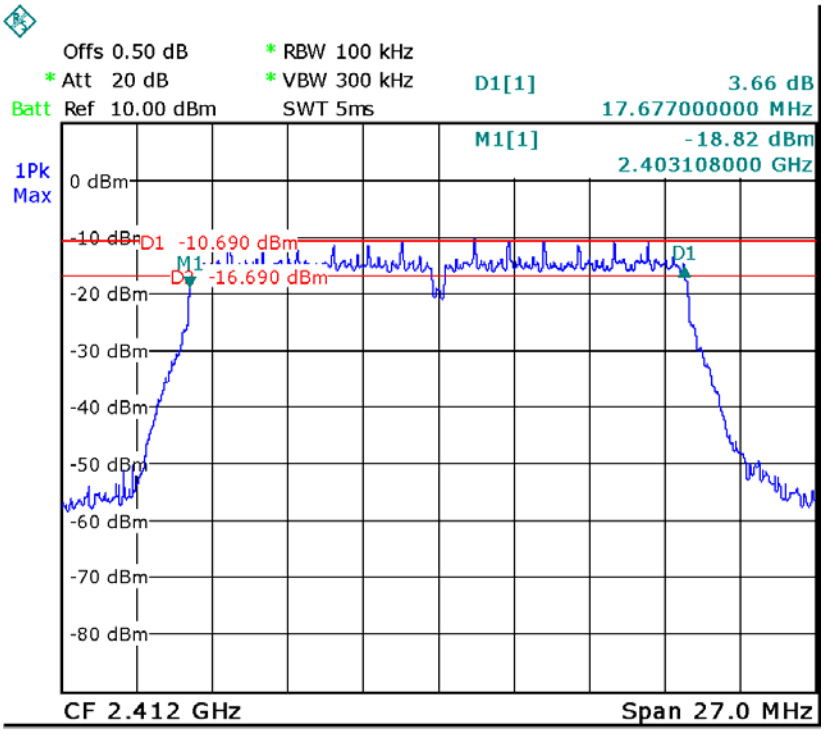
Mode: TX 11g channel 6



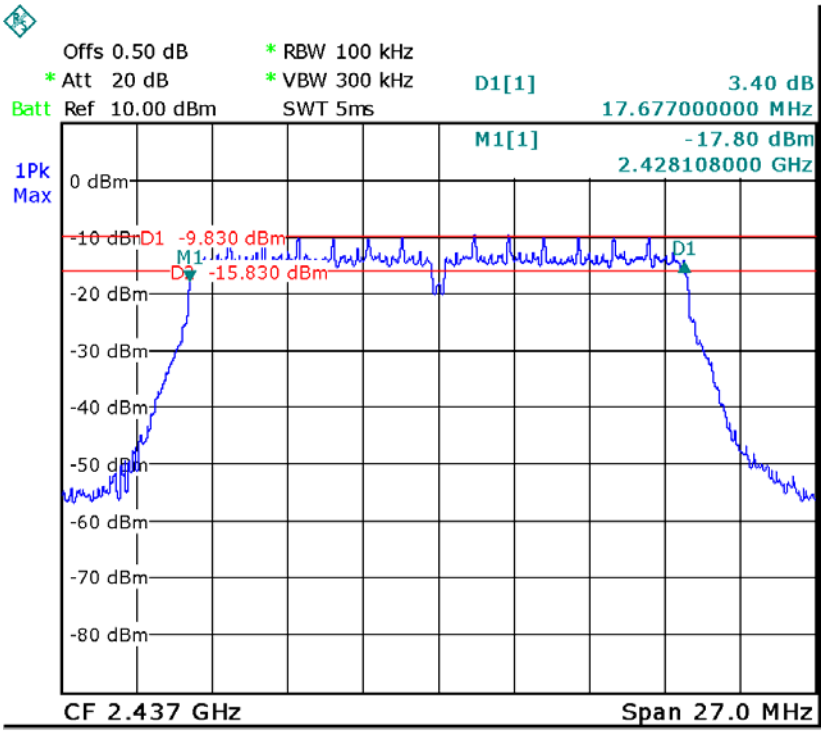
Mode: TX 11g channel 11



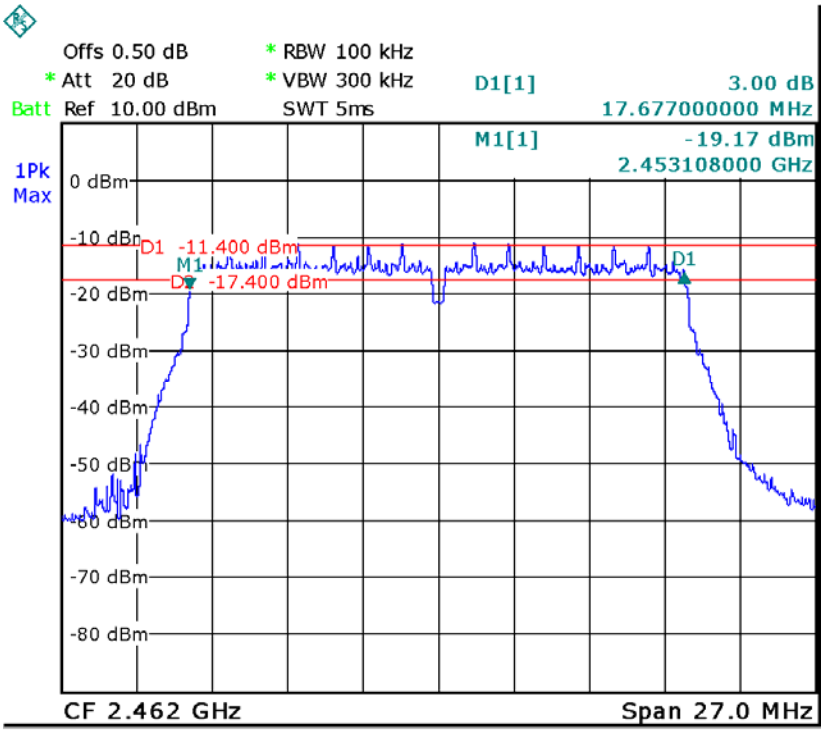
Mode: TX 11n HT20 channel 1



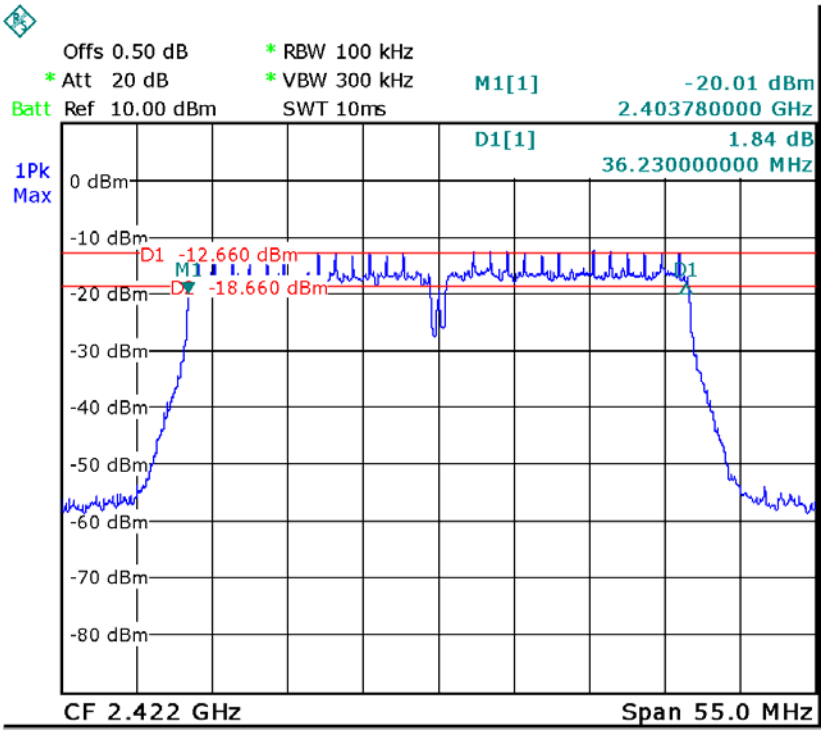
Mode: TX 11n HT20 channel 6



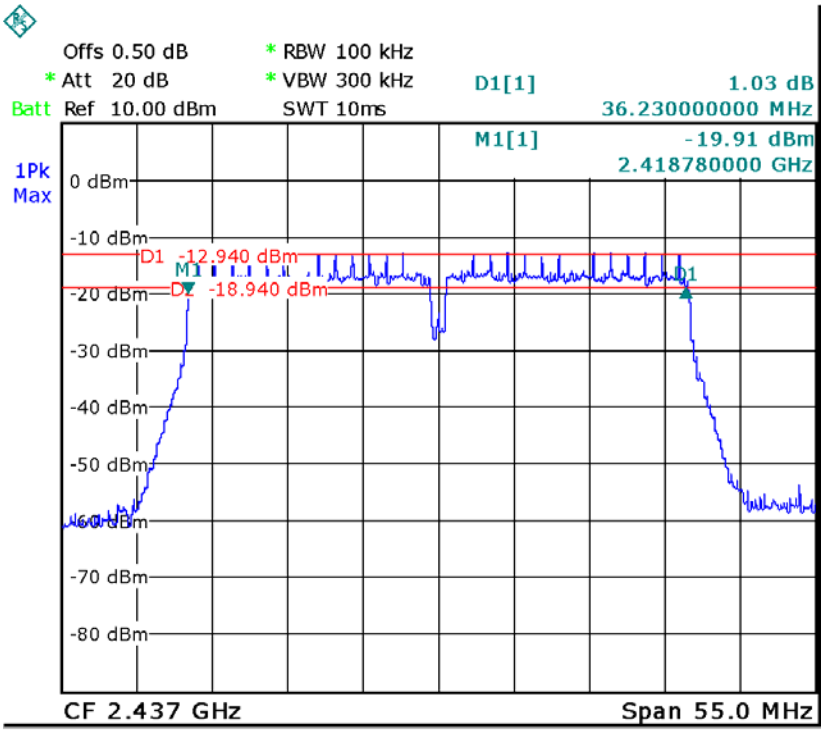
Mode: TX 11n HT20 channel 11



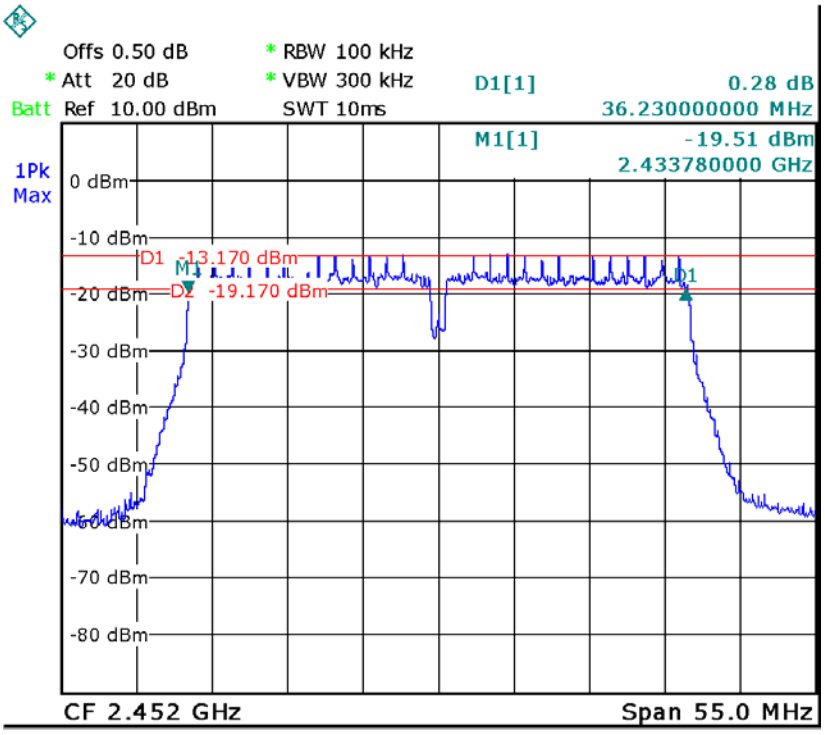
Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9



11 Maximum Peak Output Power

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 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.

11.2 Test Result:

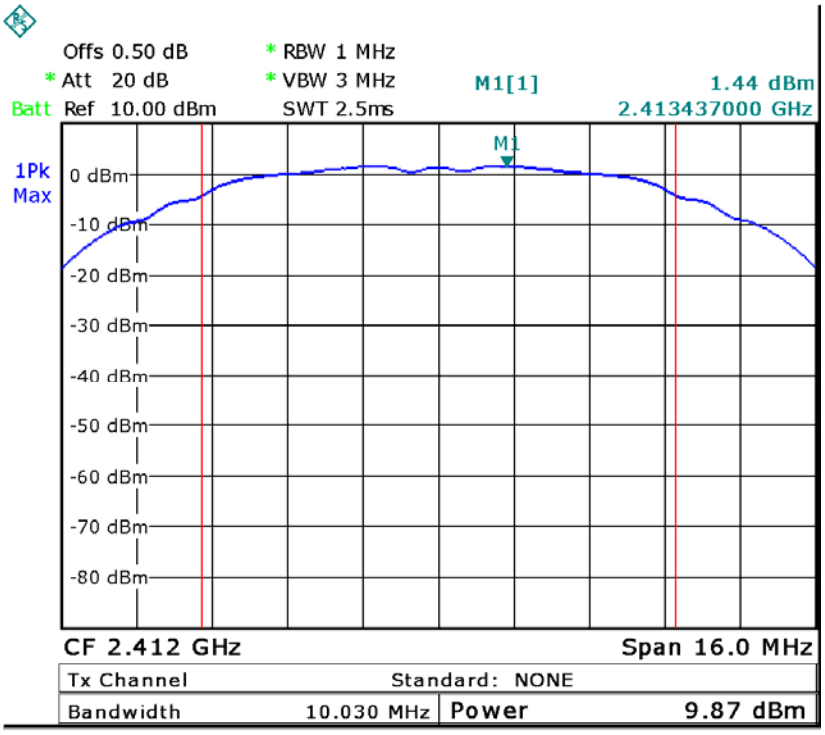
Test mode :TX 11b		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.87	9.85	9.95
Limit: 1W/30dBm		
1W/30dBm		

Test mode :TX 11g		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
8.87	9.62	9.74
Limit		
1W/30dBm		

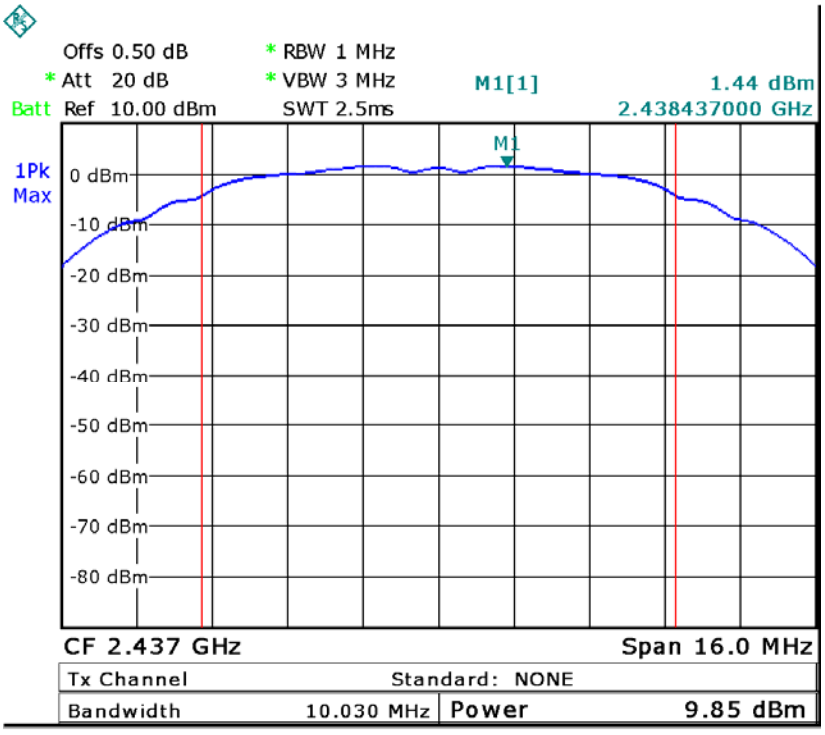
Test mode :TX 11n HT20		
10 Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.13	9.96	8.48
Limit		
1W/30dBm		

Test mode : TX 11n HT40		
10 Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
9.91	9.63	9.29
Limit		
1W/30dBm		

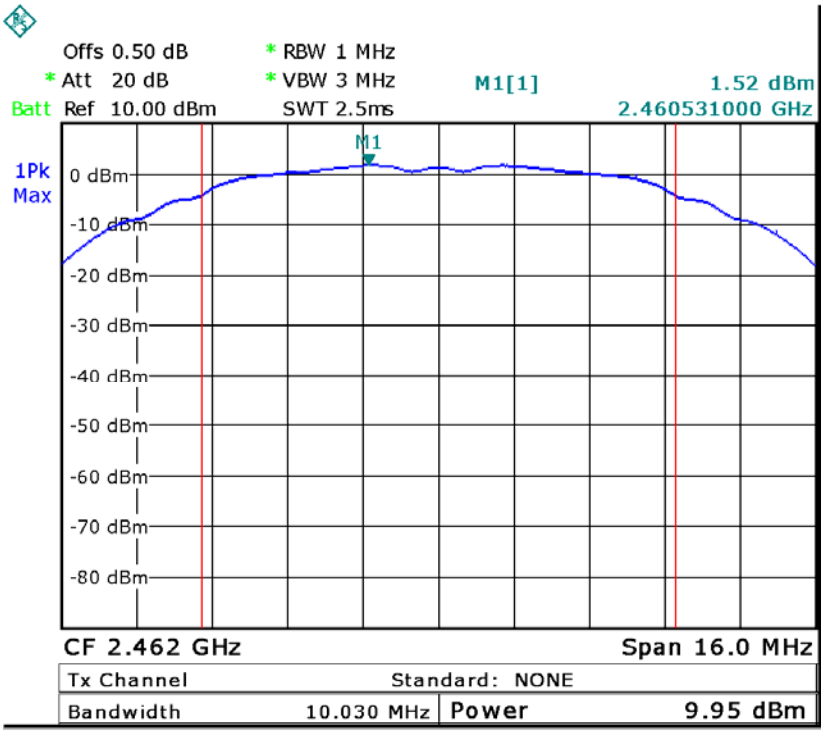
Mode: TX 11b channel 1



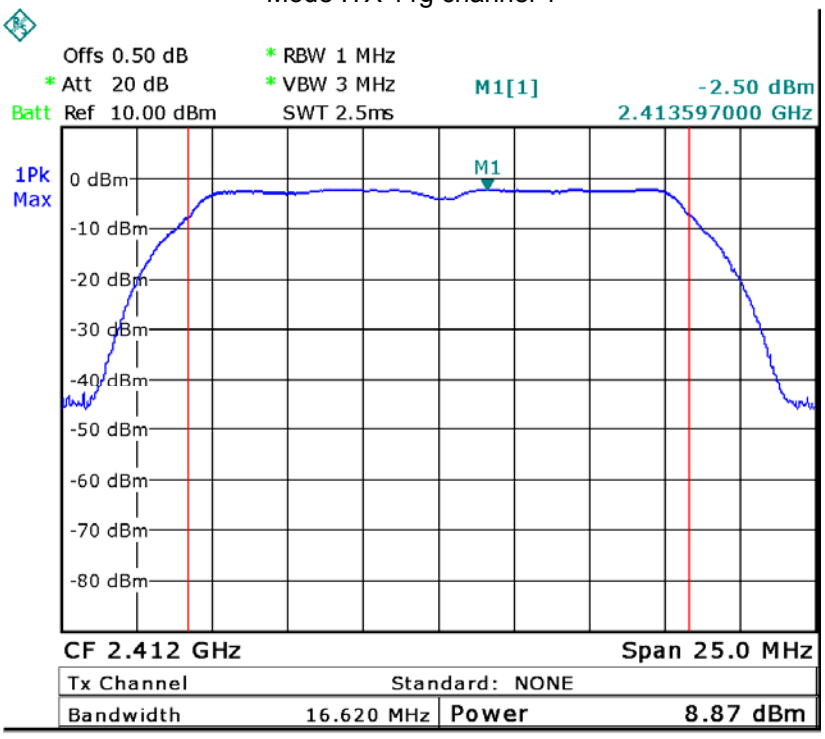
Mode: TX 11b channel 6



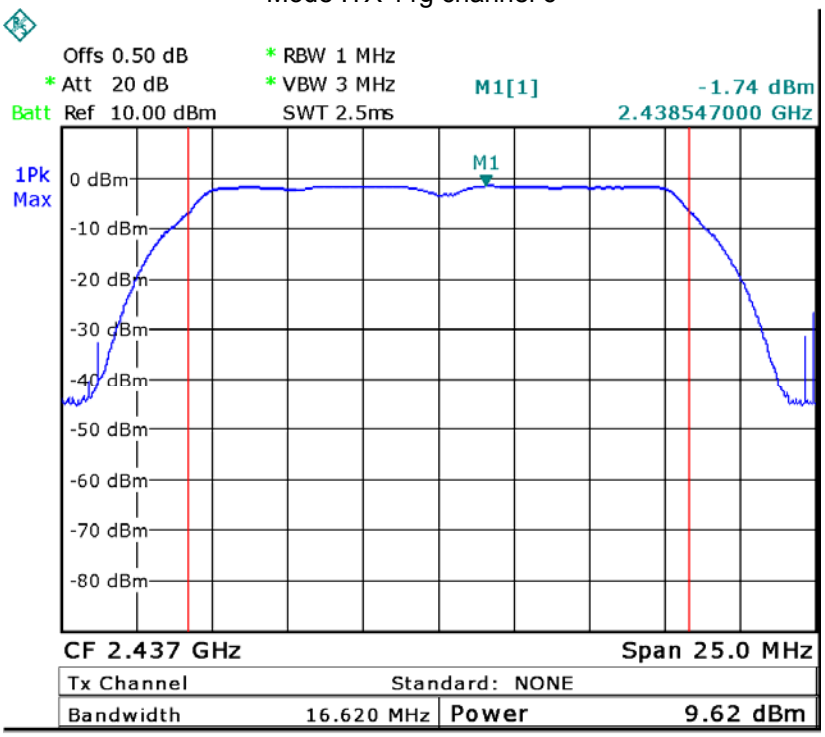
Mode: TX 11b channel 11



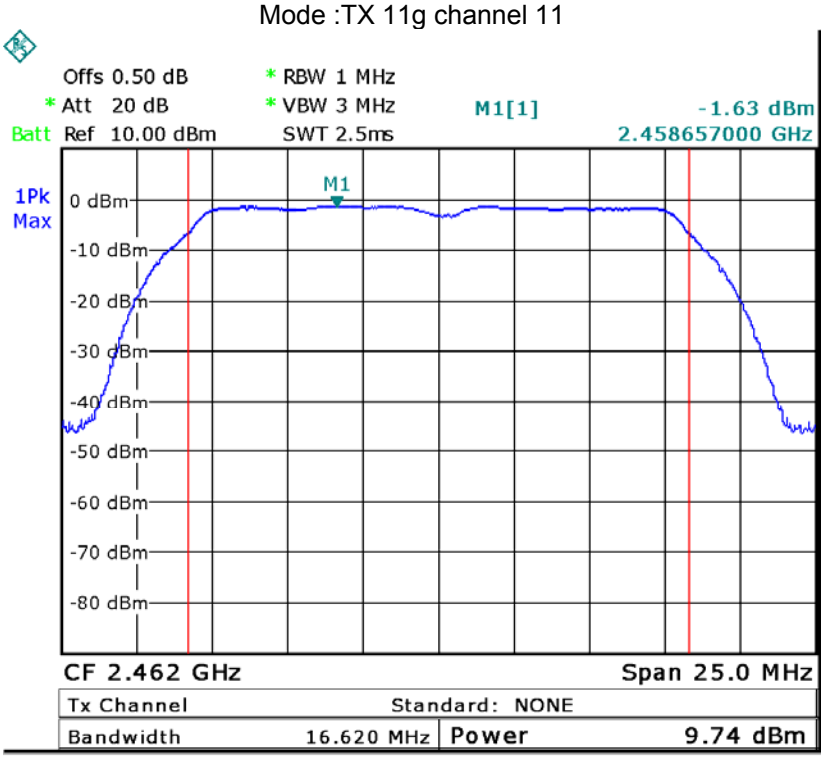
Mode :TX 11g channel 1



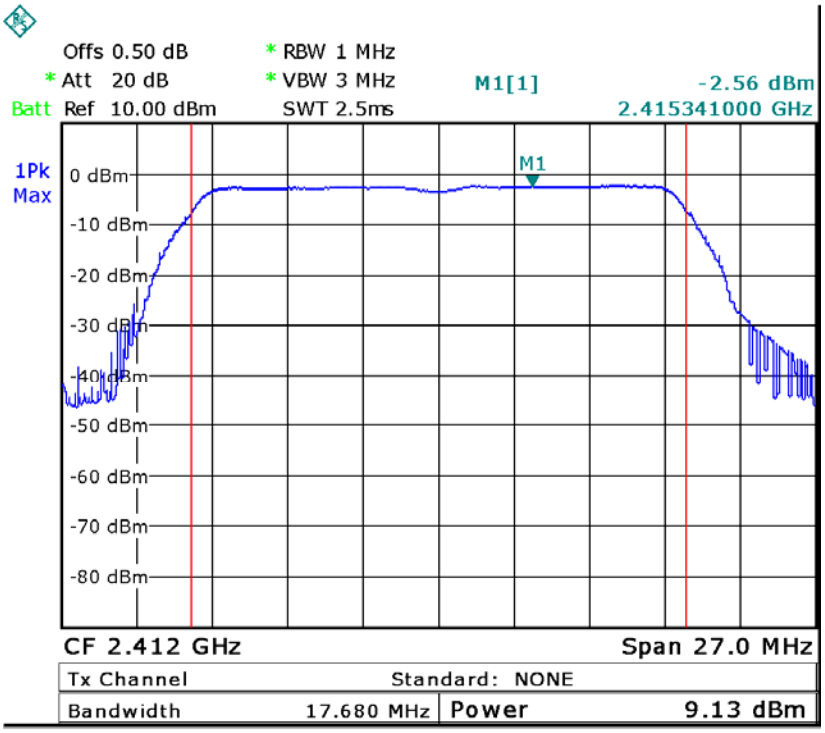
Mode :TX 11g channel 6



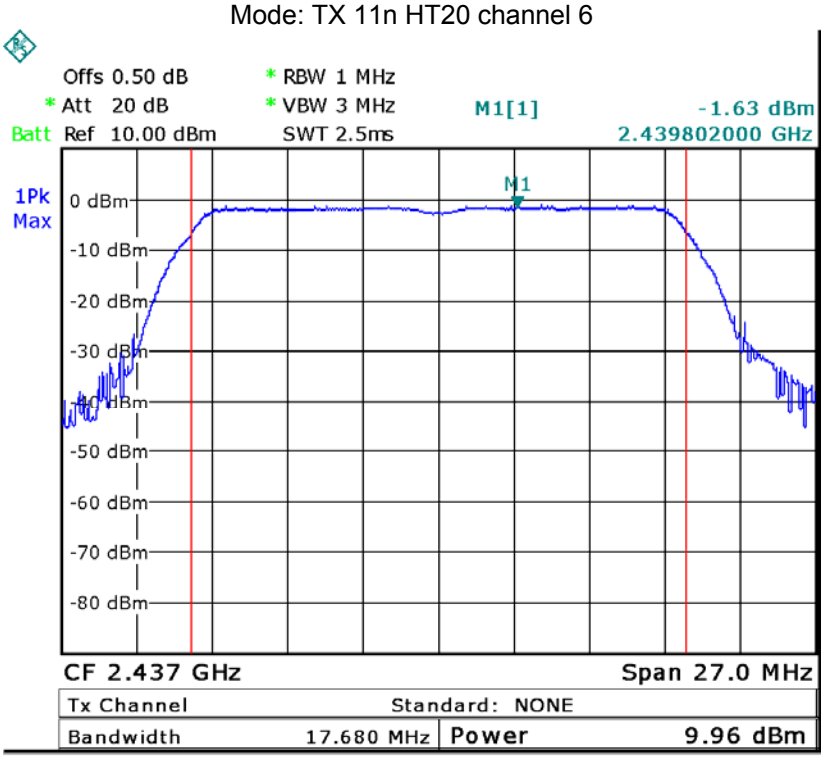
Mode :TX 11g channel 11



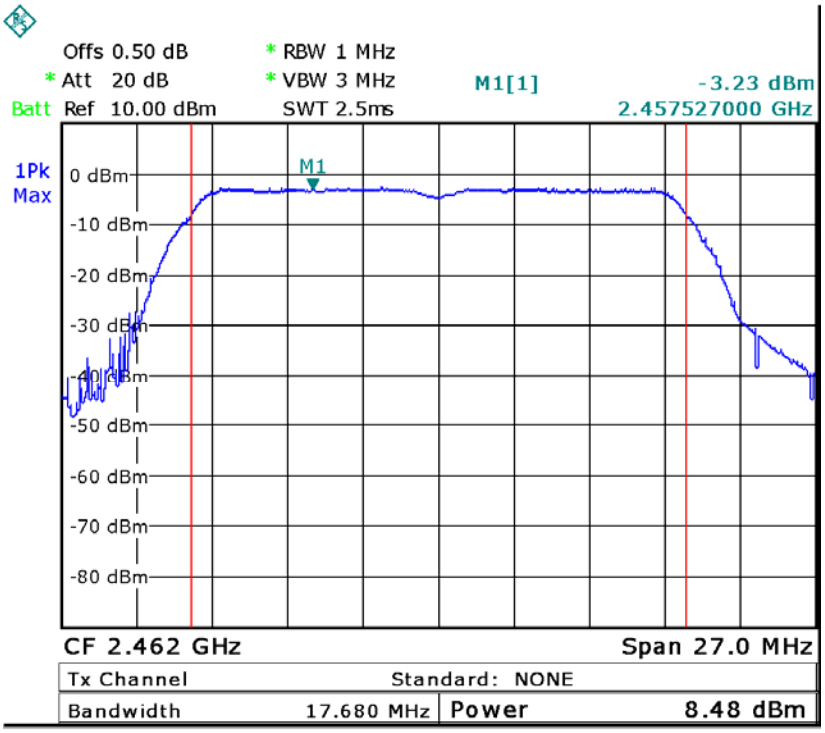
Mode: TX 11n HT20 channel 1



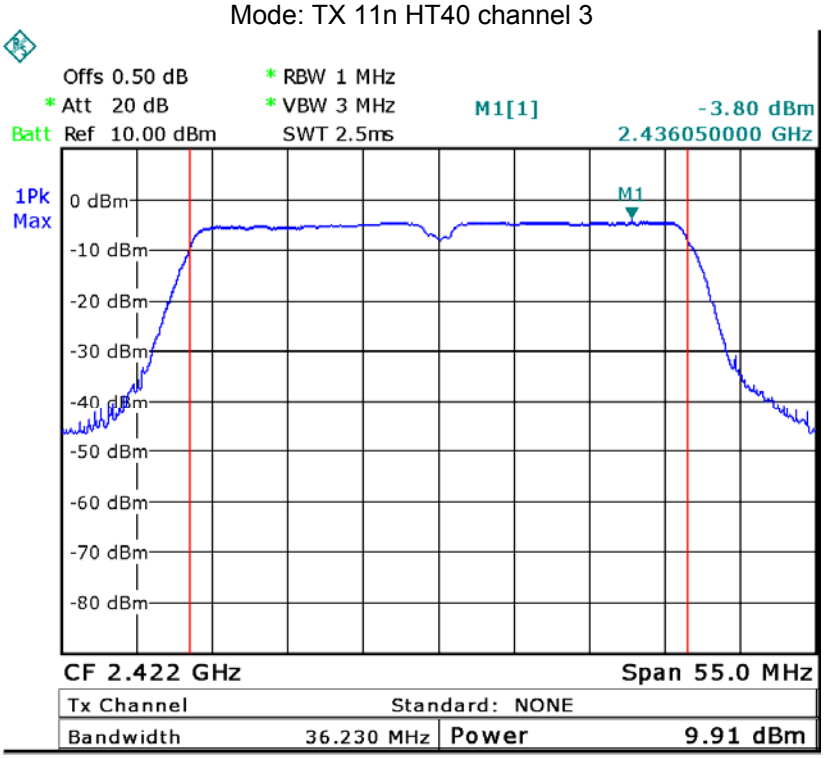
Mode: TX 11n HT20 channel 6



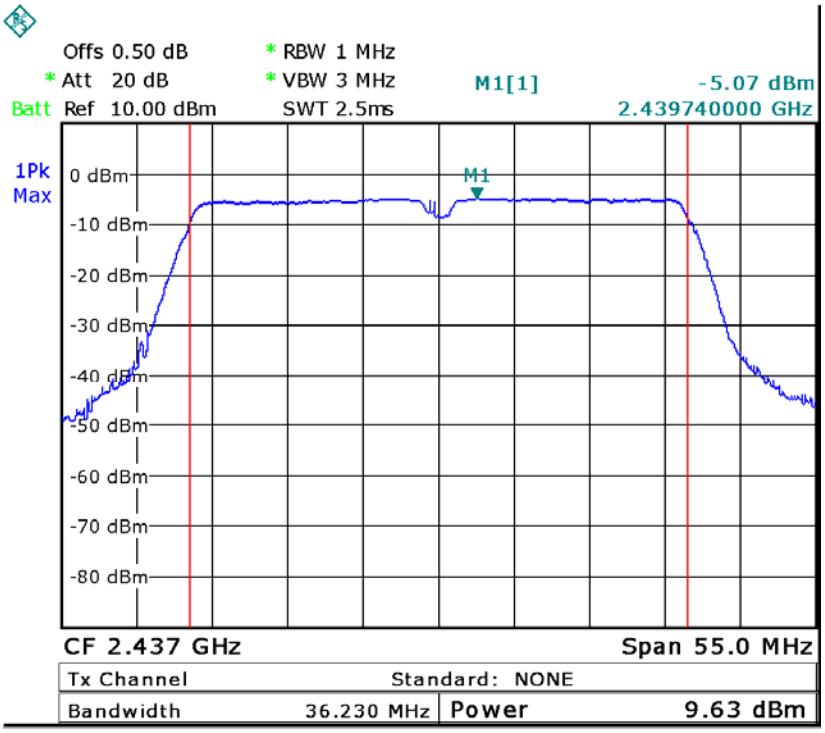
Mode: TX 11n HT20 channel 11



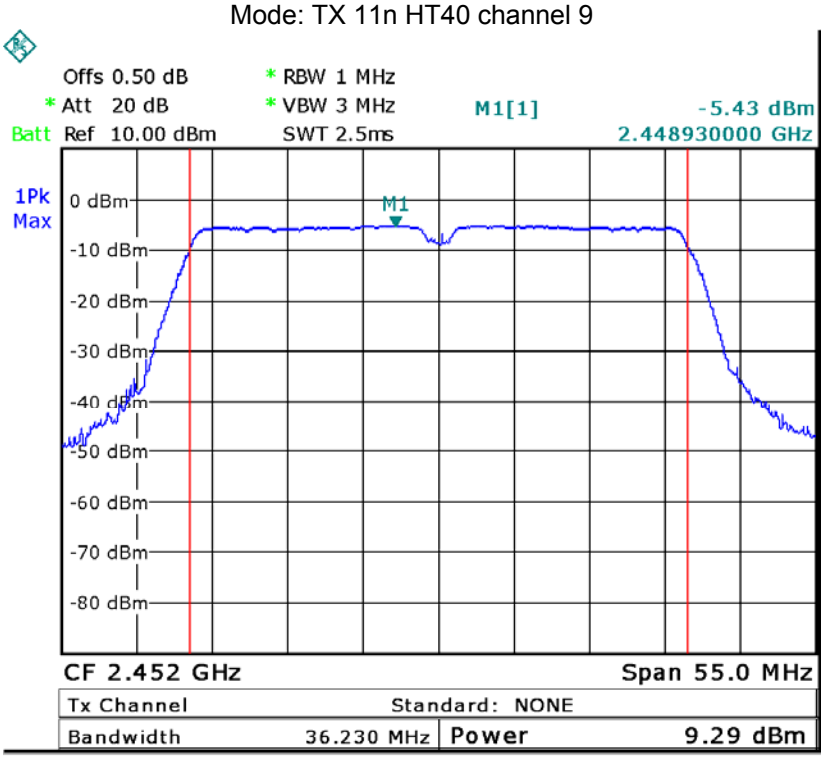
Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9



12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 v03r01 04/09/2013

12.1 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.

12.2 Test Result:

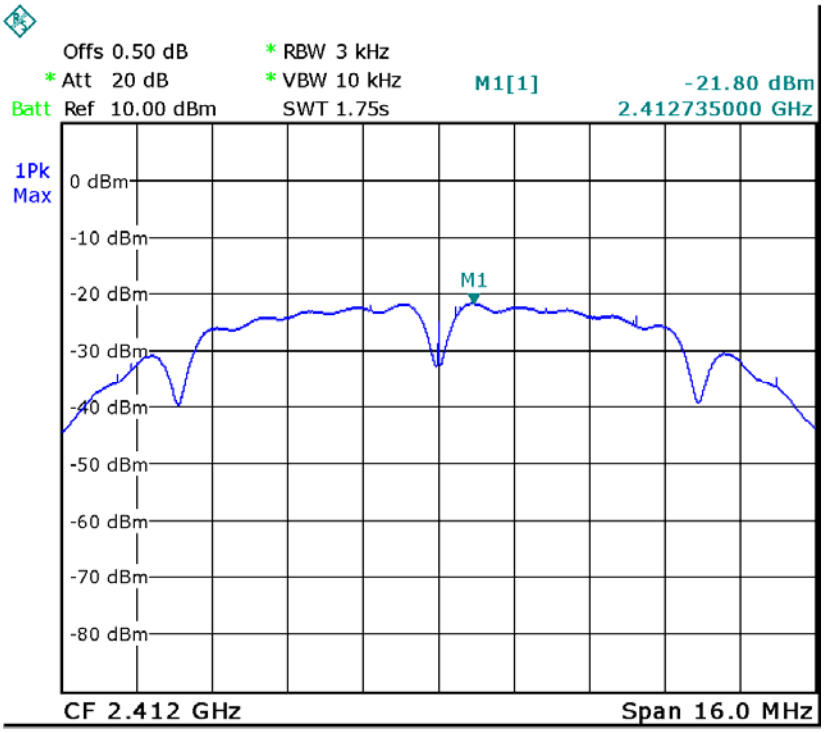
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-21.80	-22.04	-21.80
Limit: 1W/30dBm		
8dBm per 3kHz		

Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.66	-24.94	-24.76
Limit		
8dBm per 3kHz		

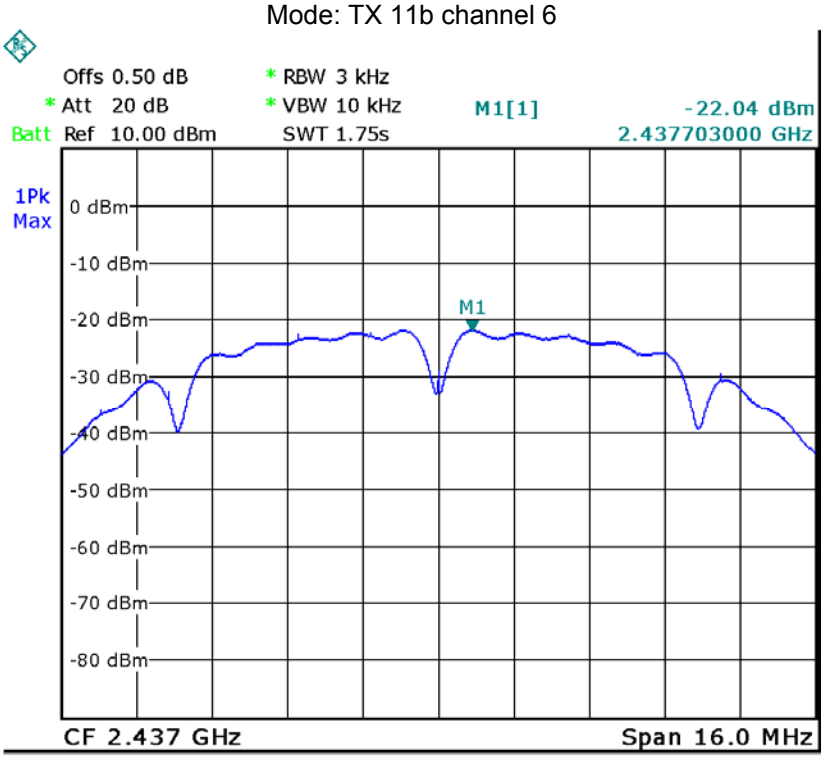
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.38	-24.59	-27.57
Limit		
8dBm per 3kHz		

Test mode : TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-26.42	-28.74	-29.01
Limit		
8dBm per 3kHz		

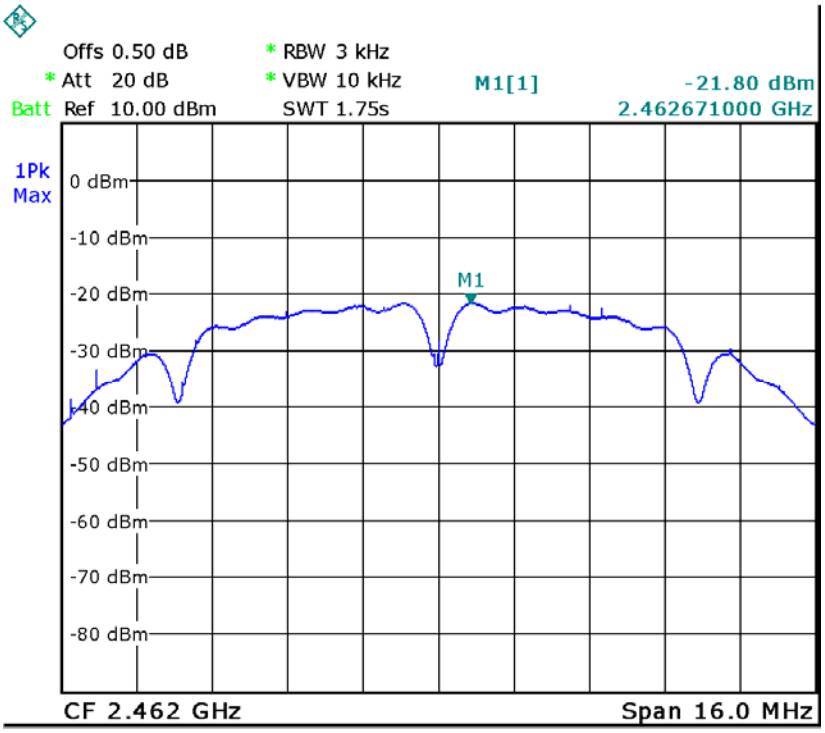
Mode: TX 11b channel 1



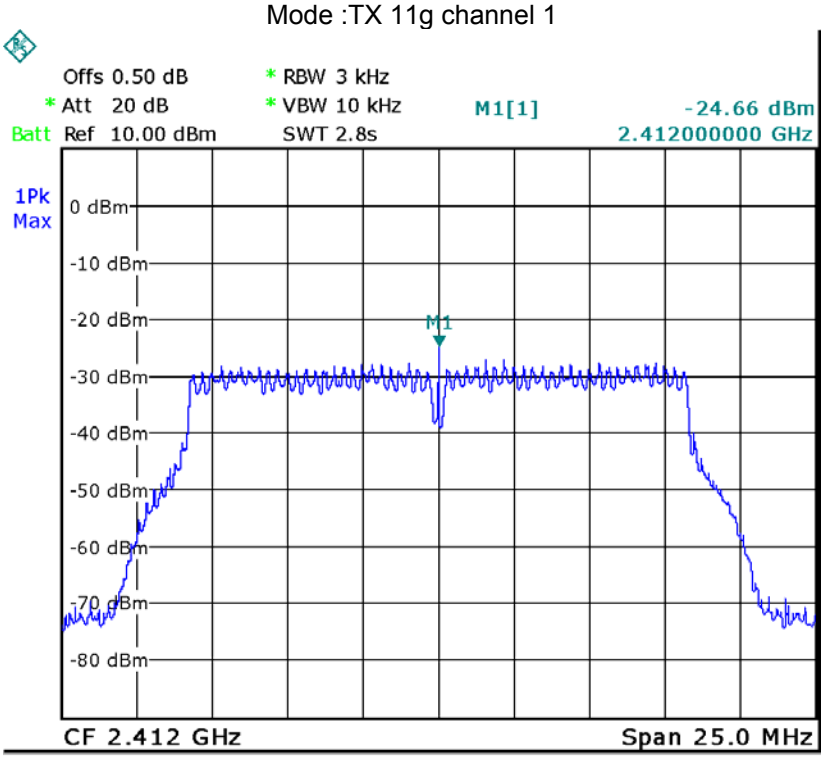
Mode: TX 11b channel 6



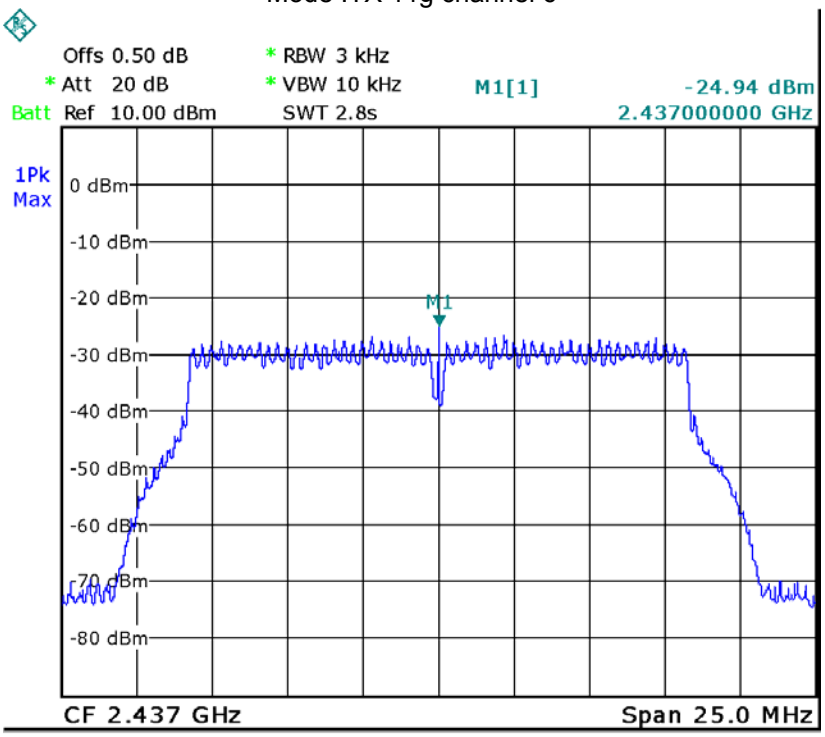
Mode: TX 11b channel 11



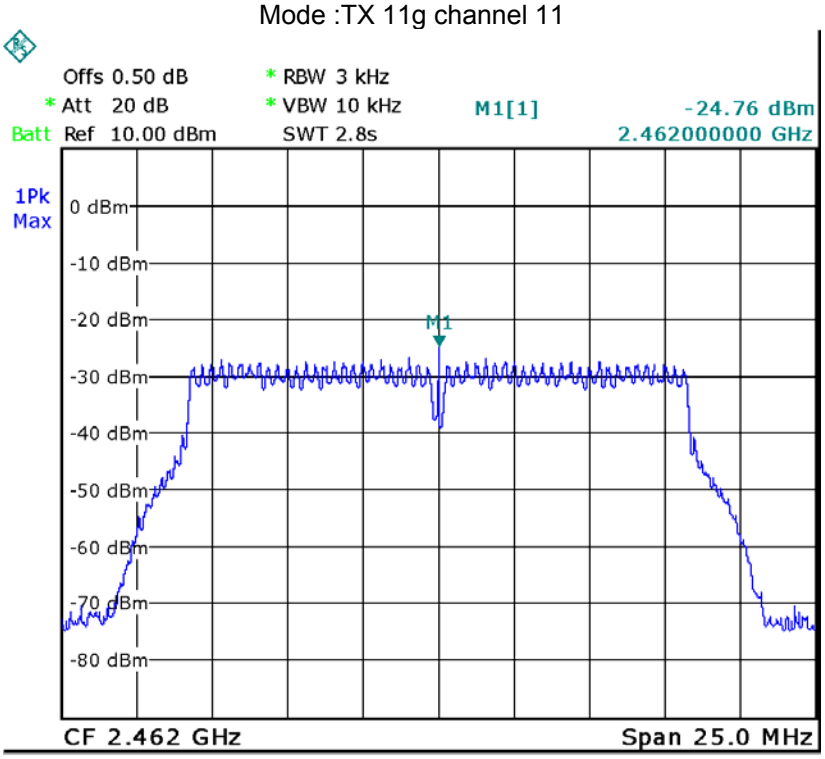
Mode :TX 11g channel 1



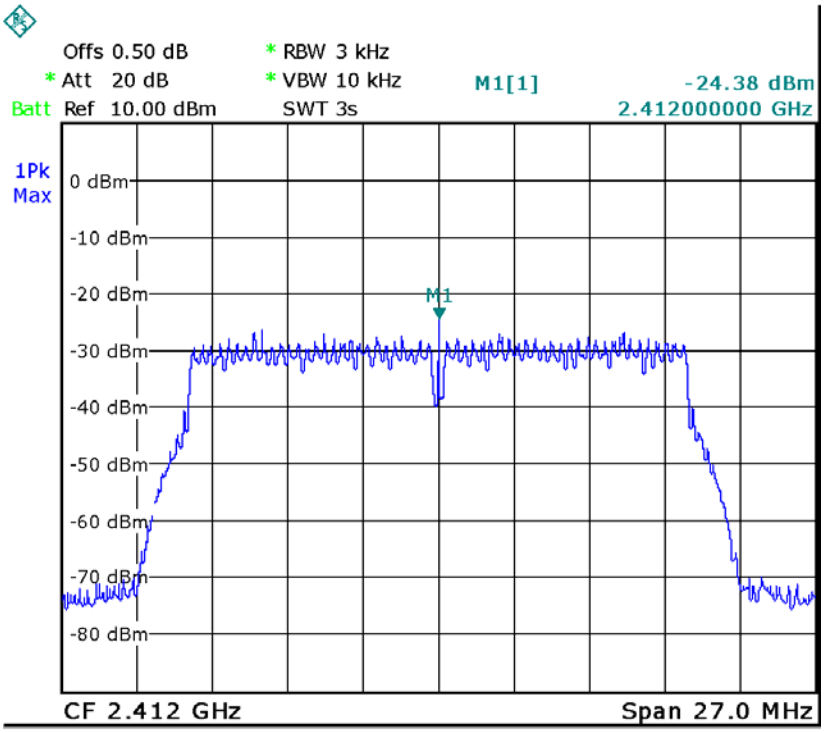
Mode :TX 11g channel 6



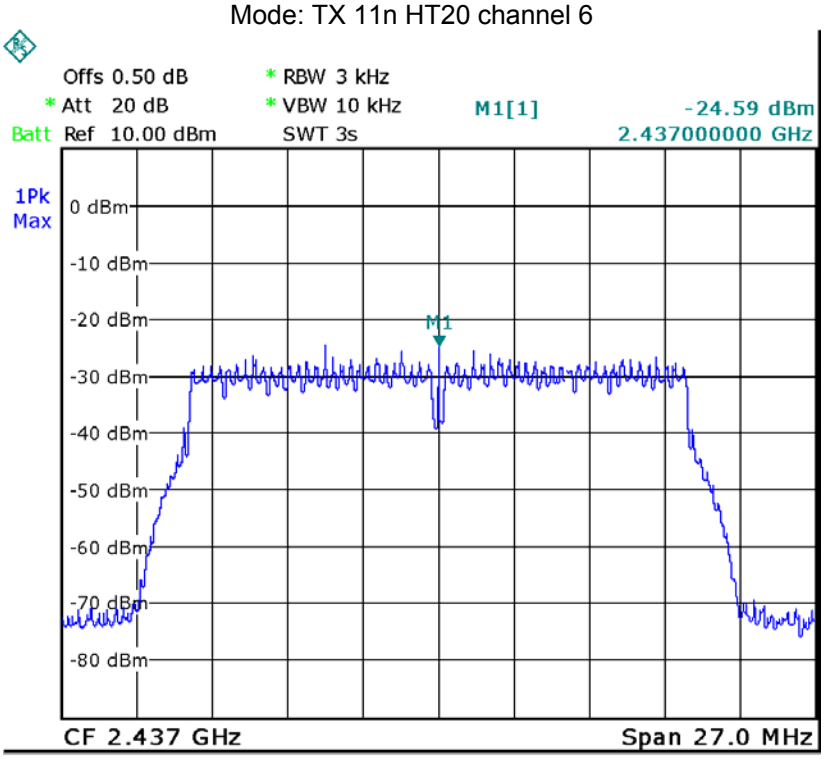
Mode :TX 11g channel 11



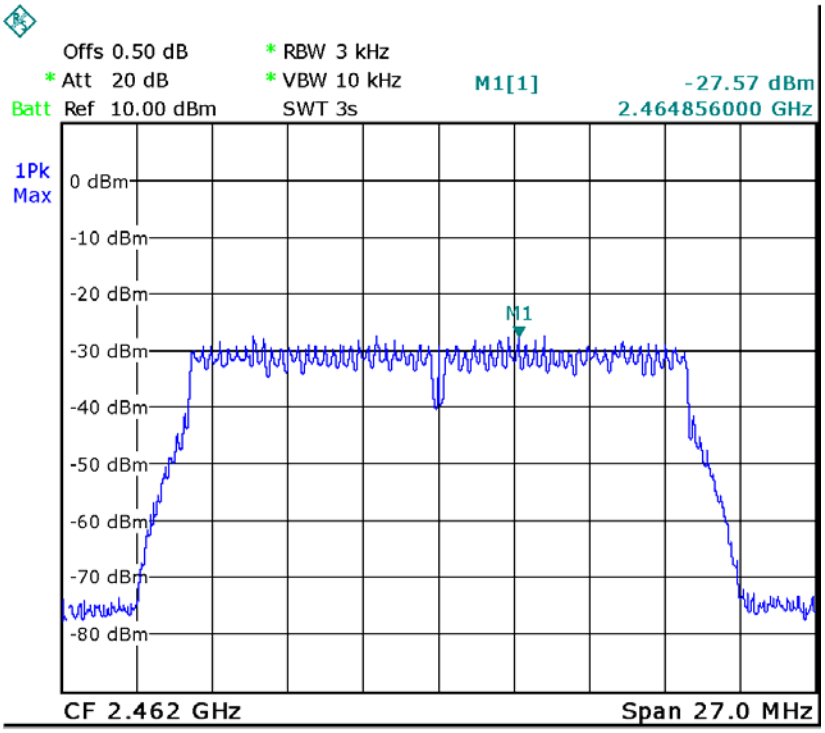
Mode: TX 11n HT20 channel 1



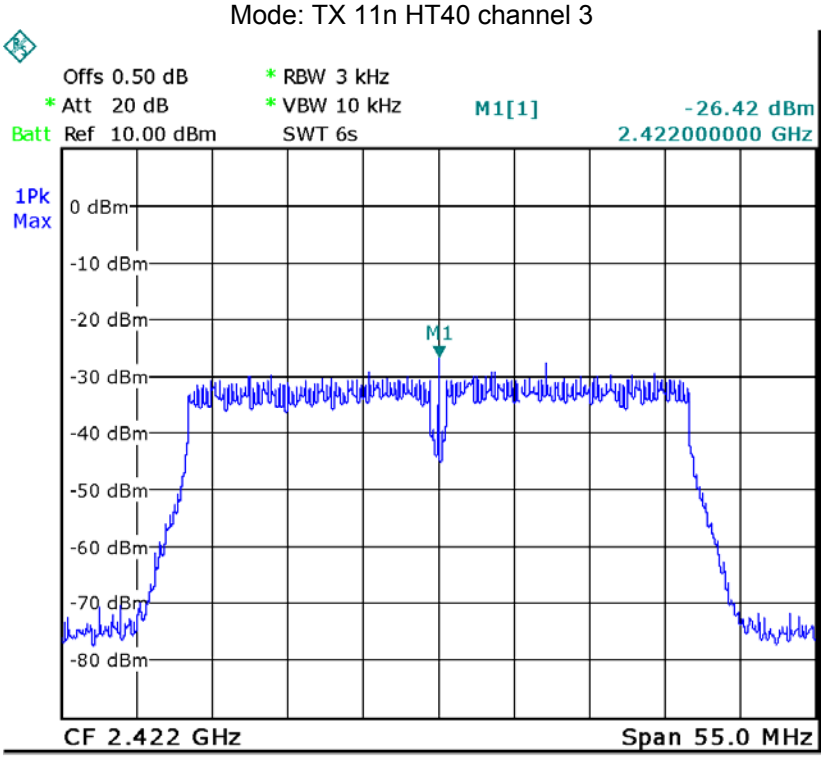
Mode: TX 11n HT20 channel 6



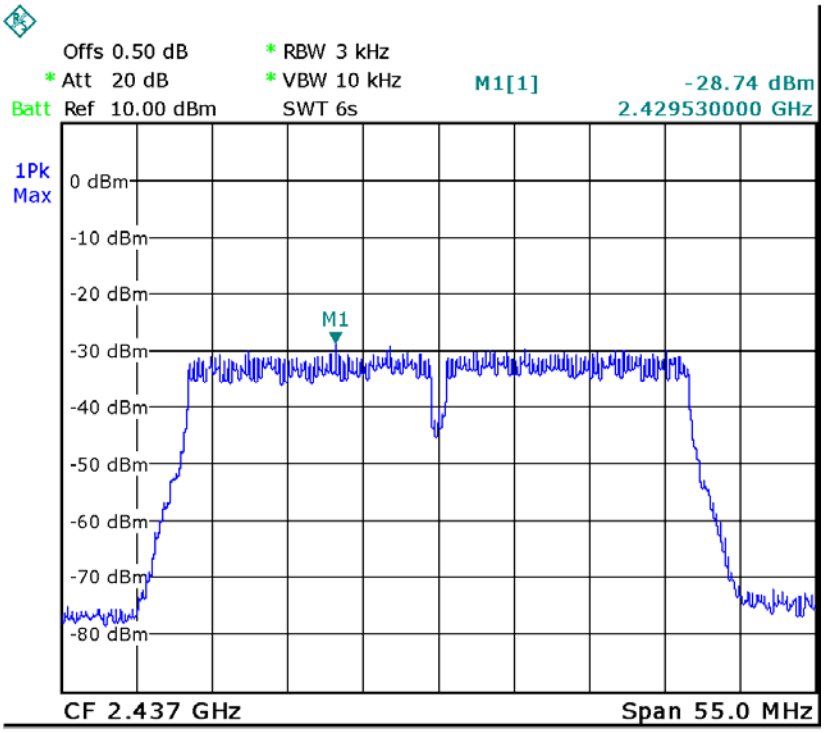
Mode: TX 11n HT20 channel 11



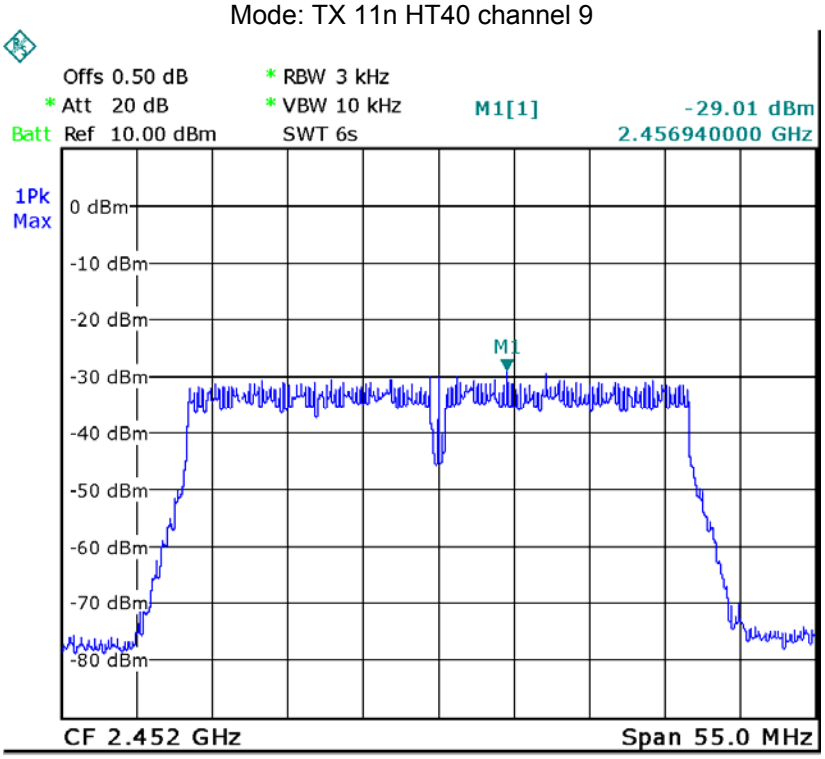
Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9



13 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 integrated antenna fulfill the requirement of this section.

14 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

14.1 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.

14.2 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

14.3 MPE Calculation Method

$$\text{E (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m²)} = \frac{E^2}{377}$$

E = Electric field (V/m)
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

$$\boldsymbol{Pd} = \frac{30 \times P \times G}{377 \times d^2}$$

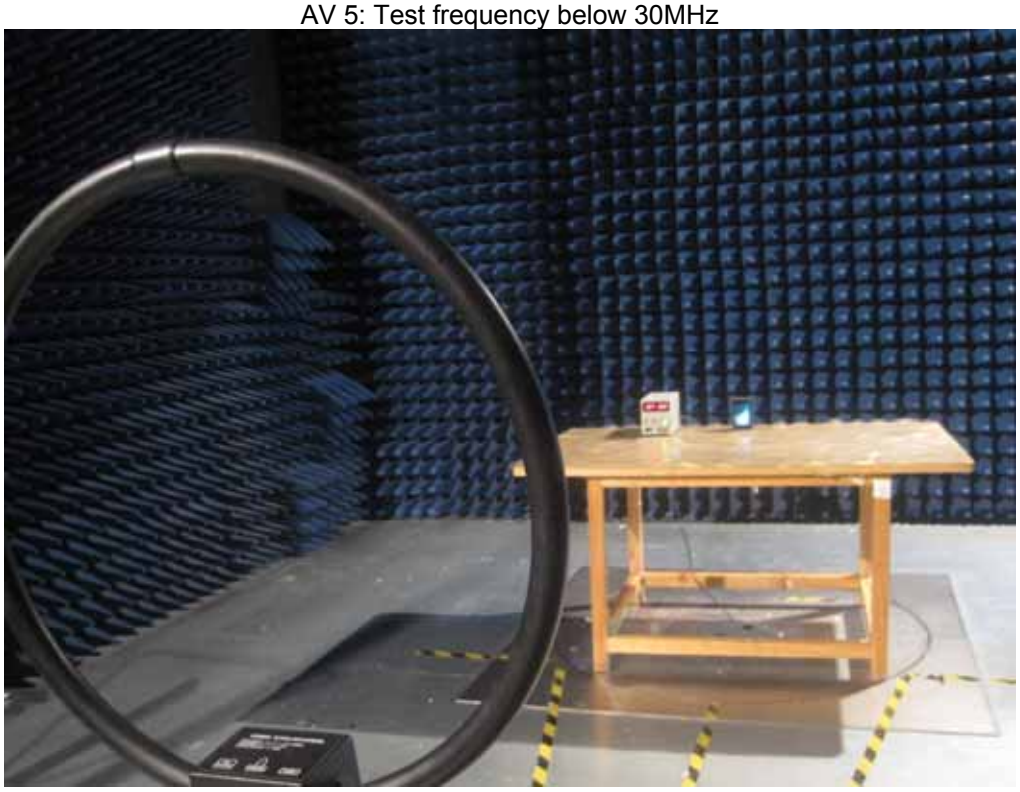
From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm2)	Limit of Power Density (mW/cm2)
1.778	9.96	9.908	0.003505	1

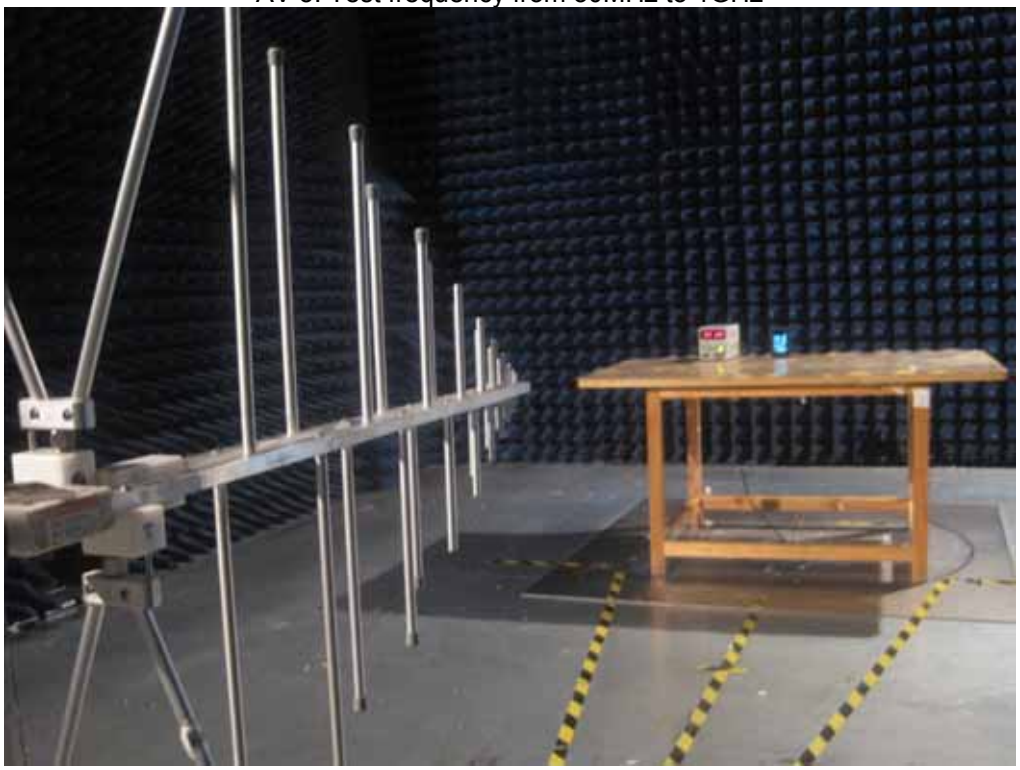
15 Photographs –Test Setup

15.1 Radiated Emission

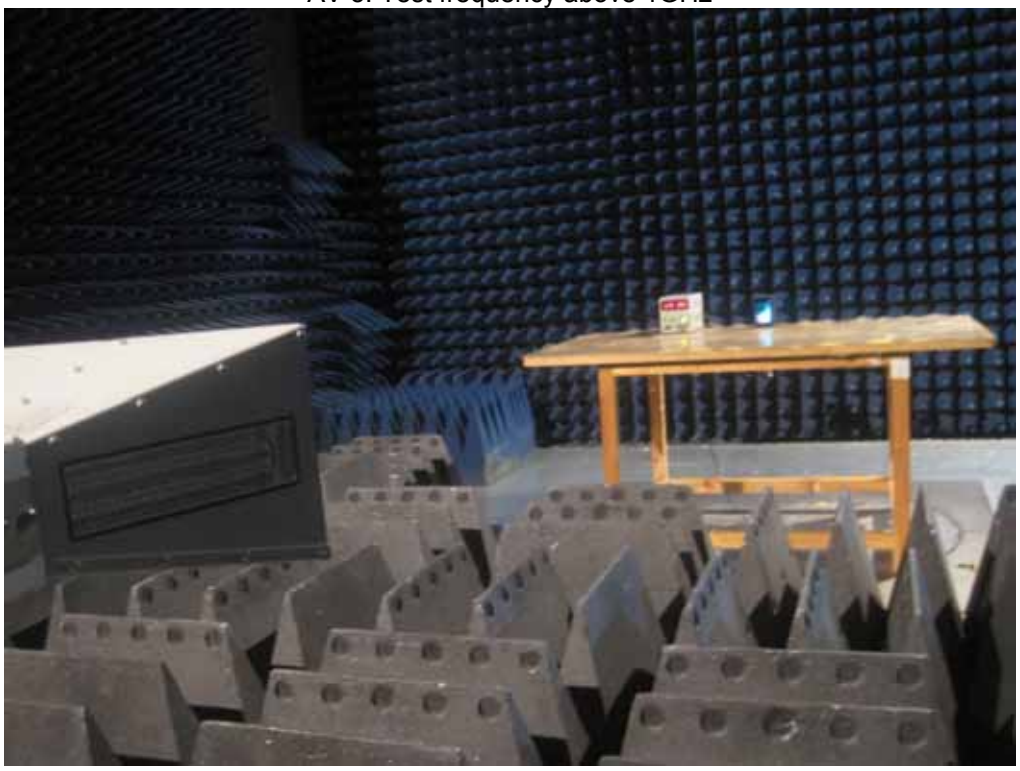
AV 5: Test frequency below 30MHz



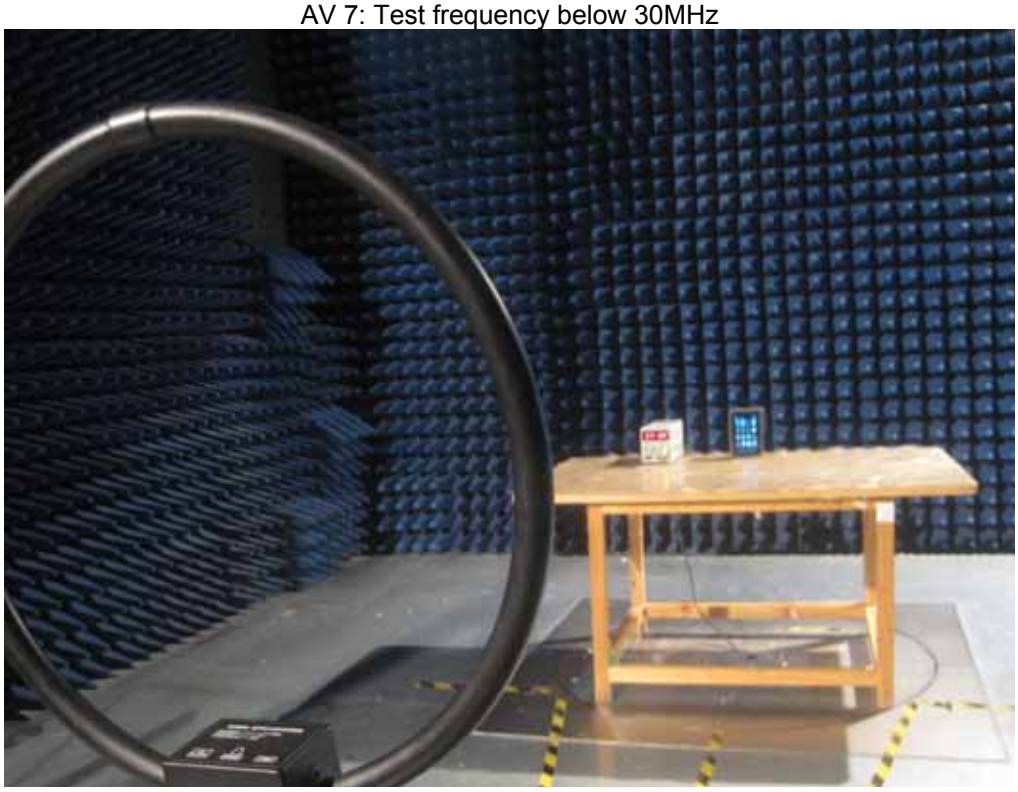
AV 5: Test frequency from 30MHz to 1GHz



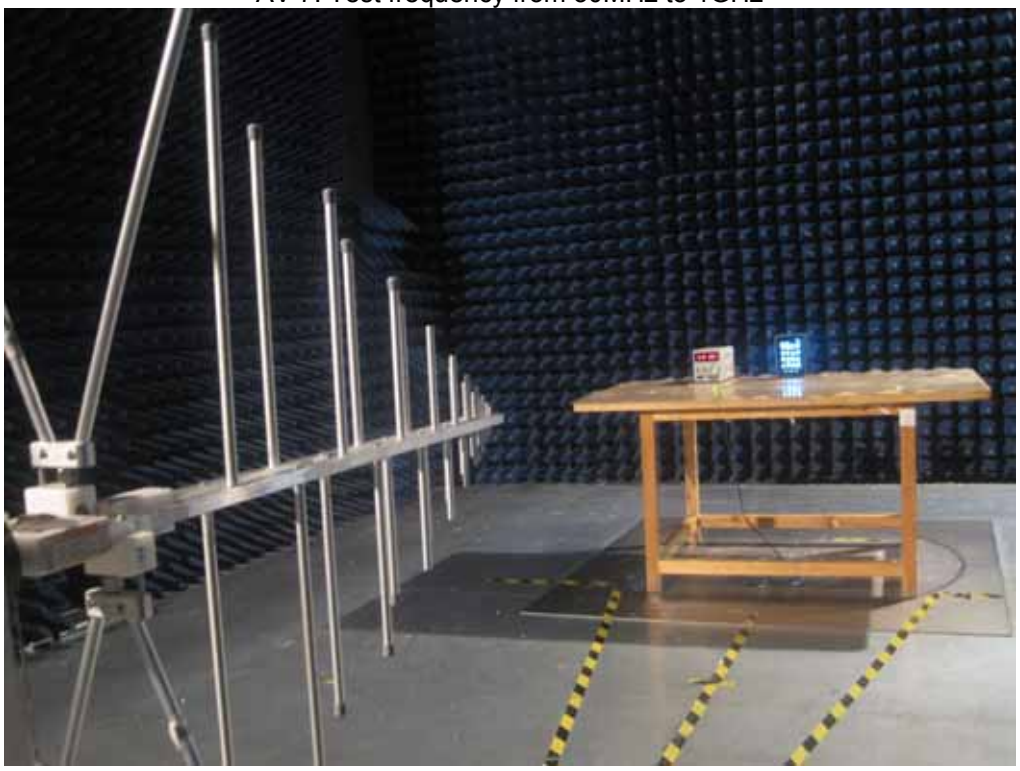
AV 5: Test frequency above 1GHz



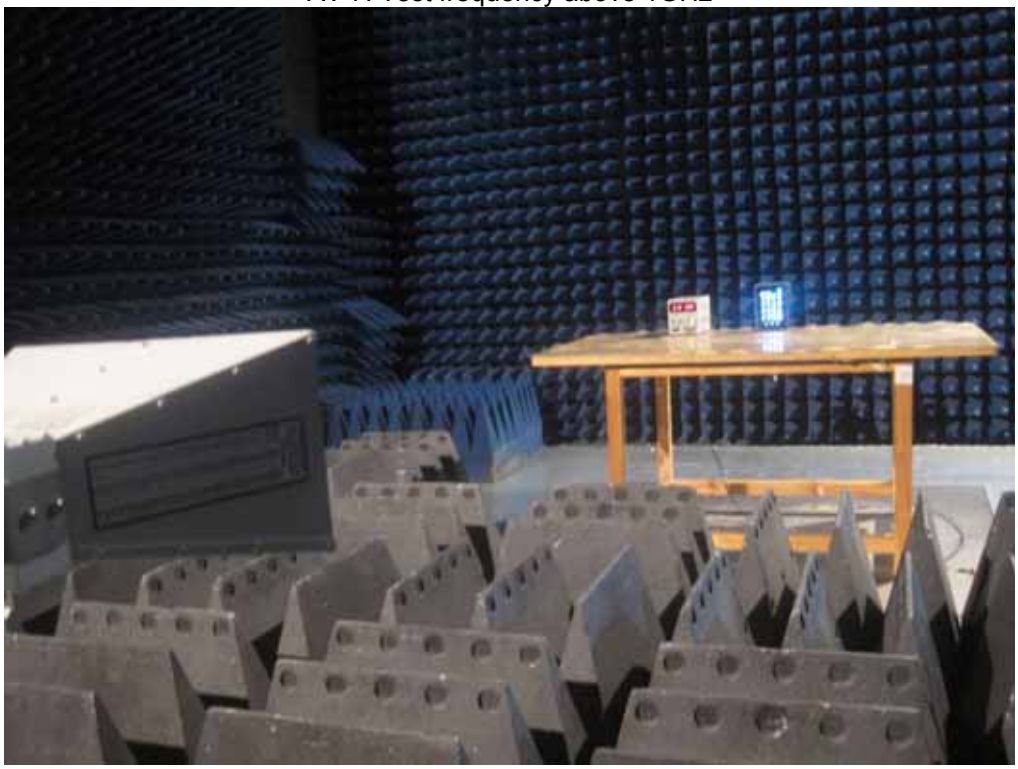
AV 7: Test frequency below 30MHz



AV 7: Test frequency from 30MHz to 1GHz



AV 7: Test frequency above 1GHz

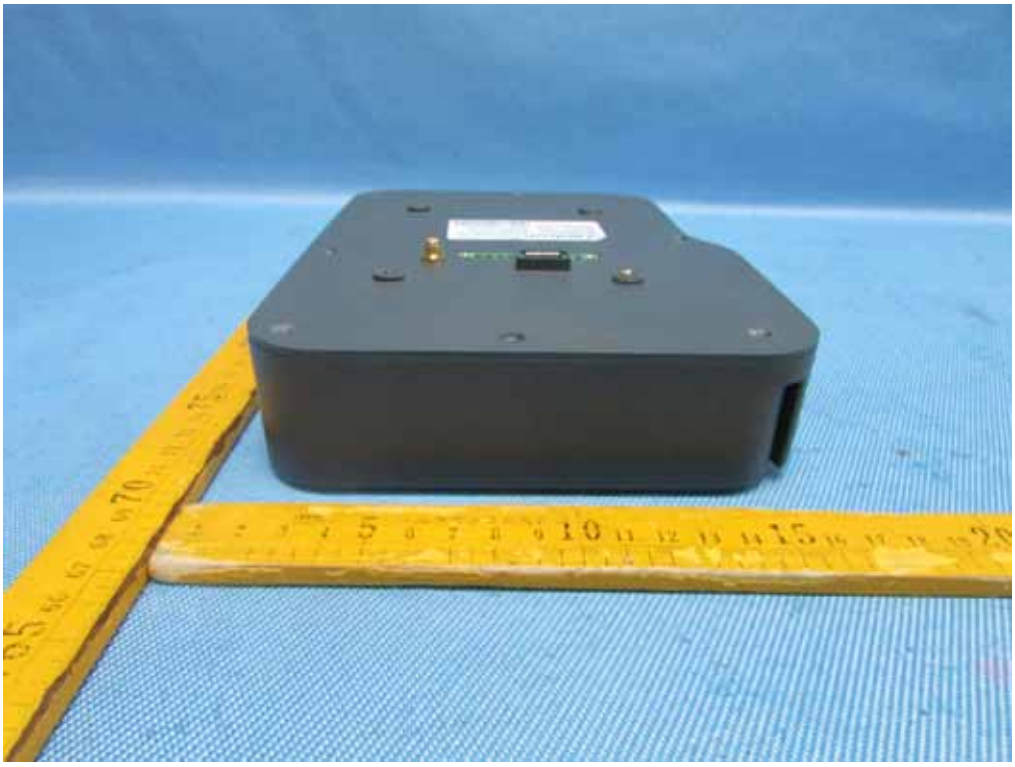


16 Photographs - Constructional Details

16.1 Model AV 5 –External View

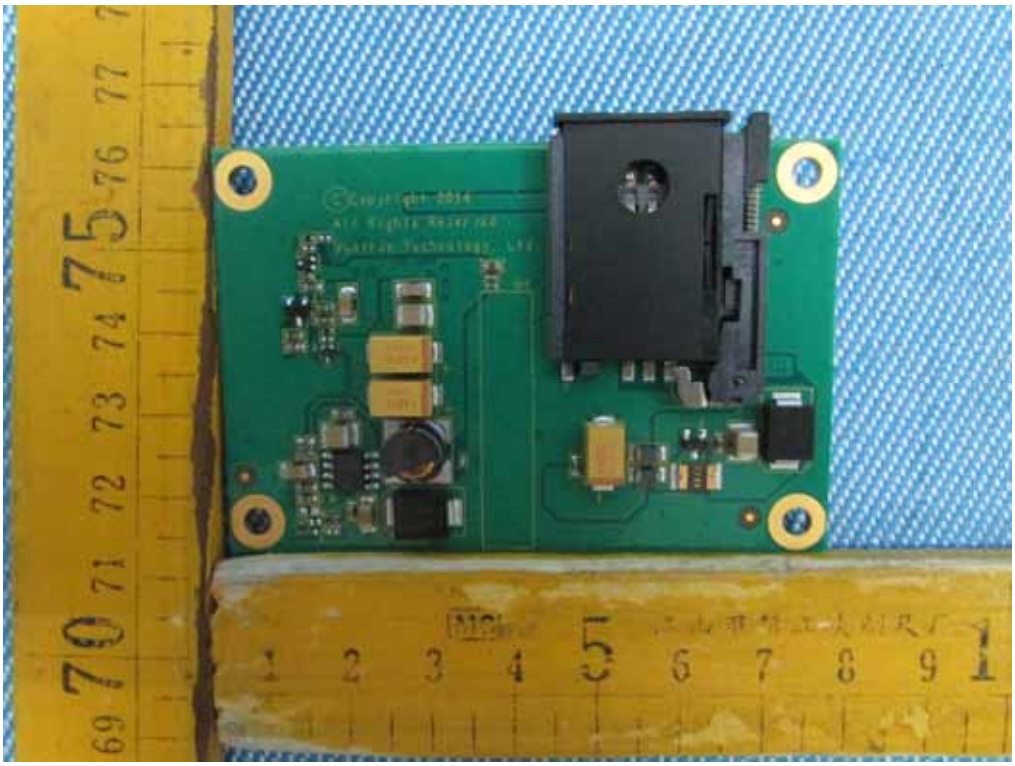
GSM & CDMA ANT

16.2 Model AV 7 –External View

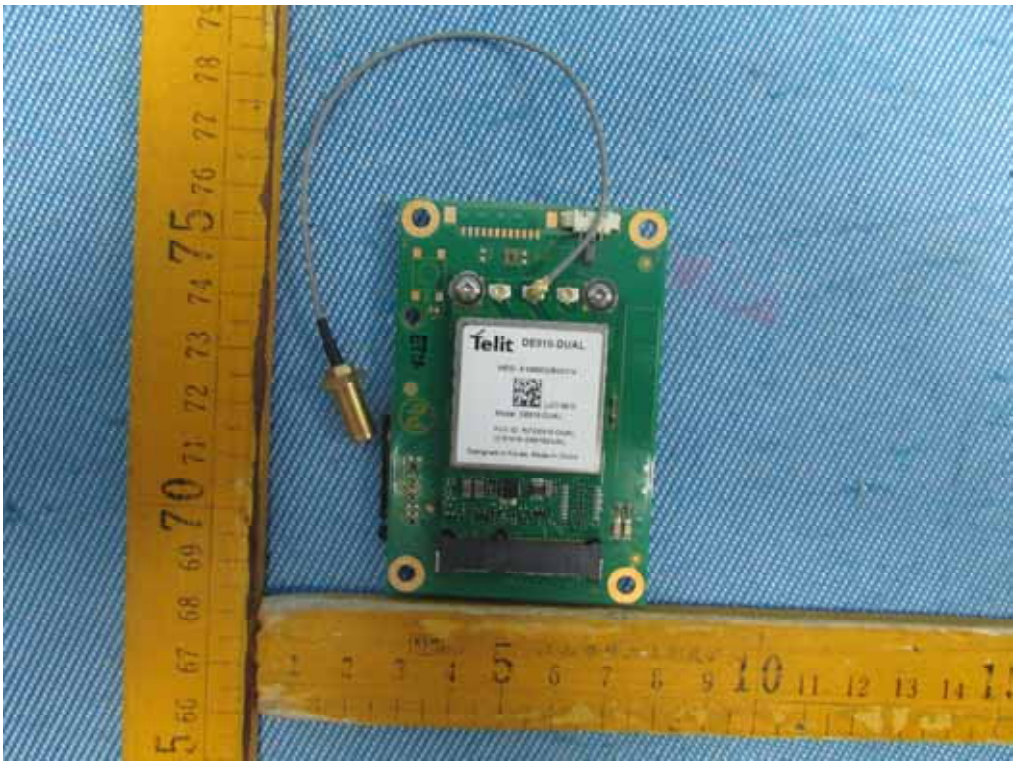


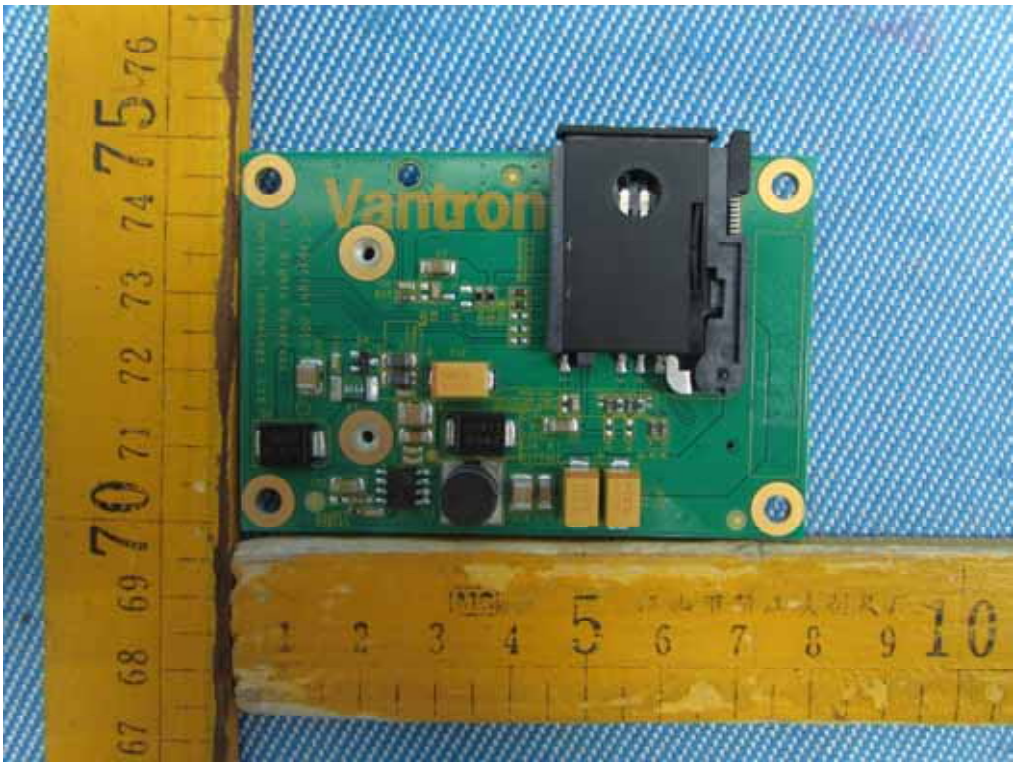
16.3 Model AV 5 – Internal View

AV 5-1



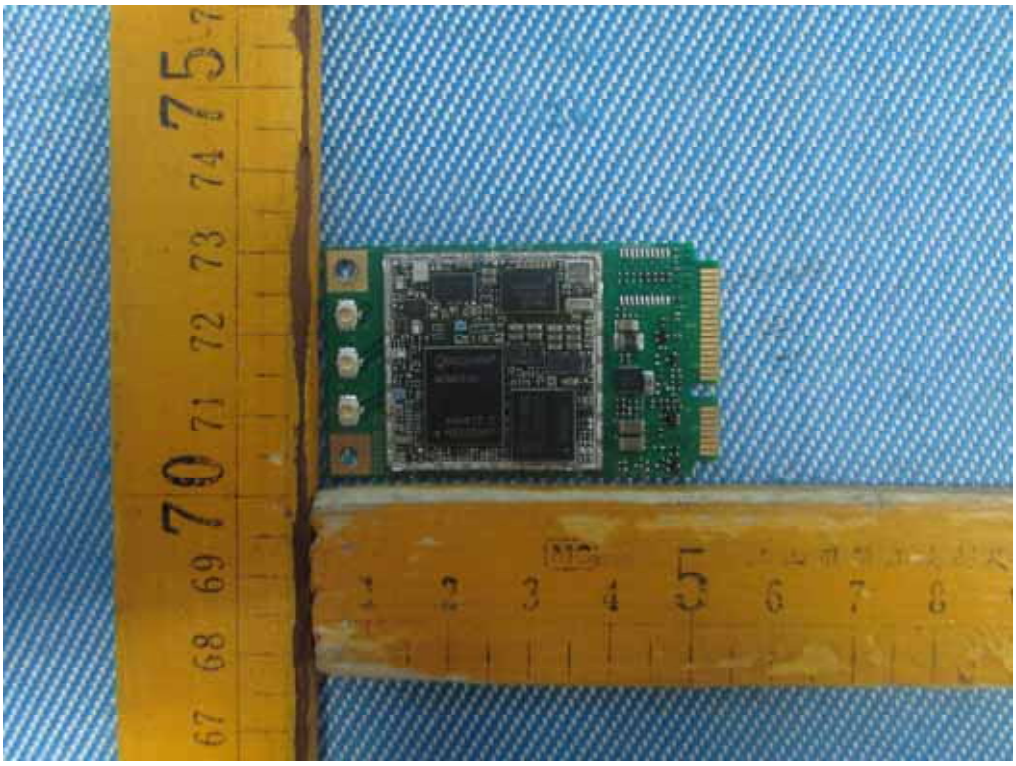
AV 5-2

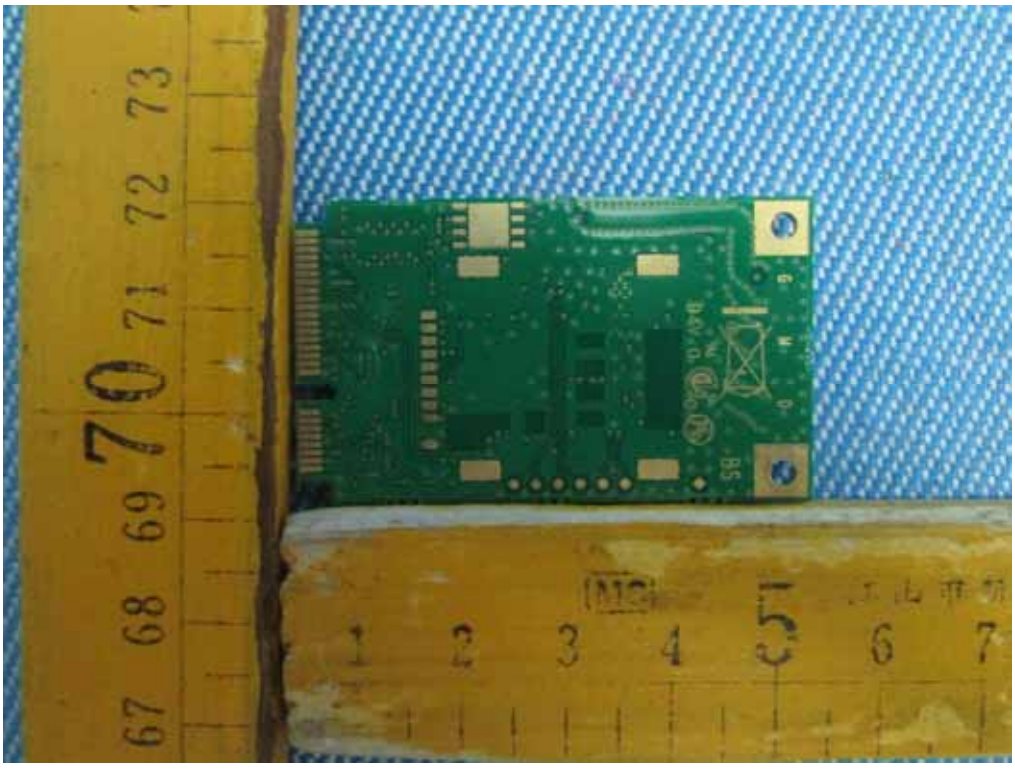

Telit


Vantron


Telit
DE910-DUAL


Telit
DE910-DUAL

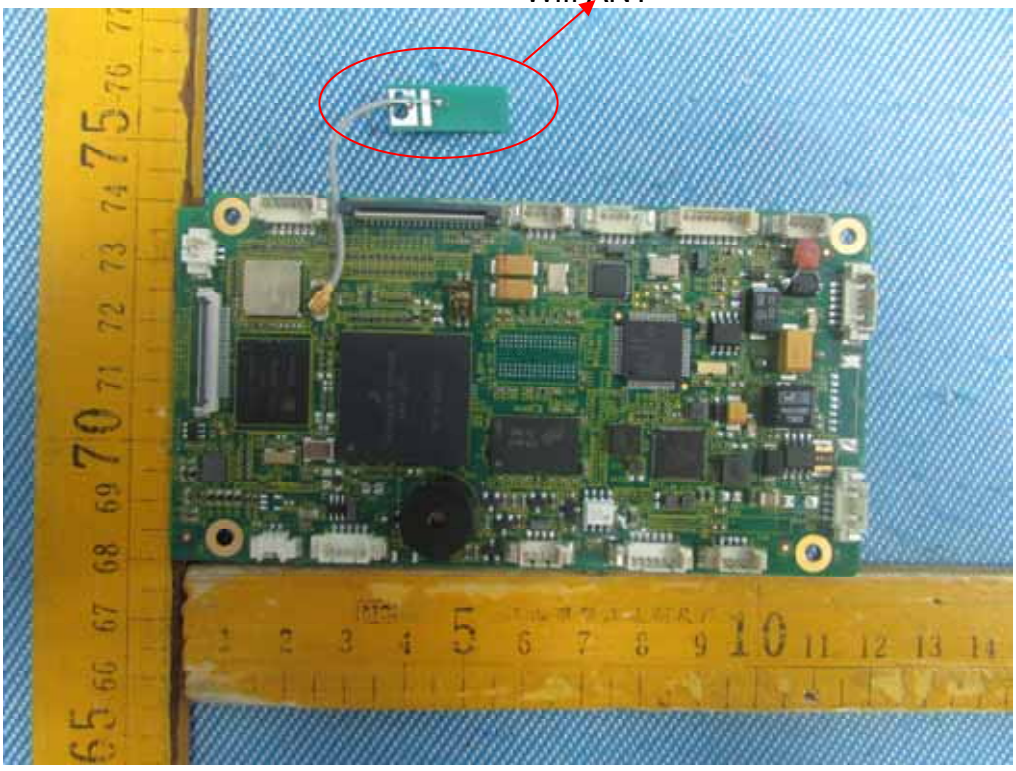




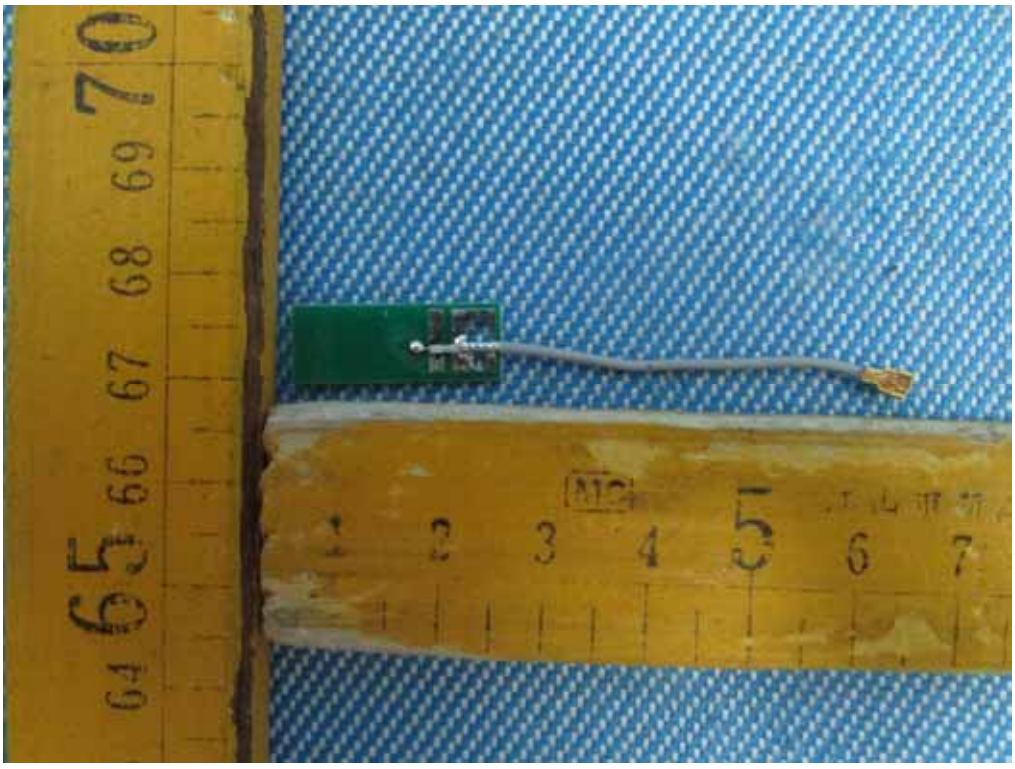
AV 5-1 & AV 5-2

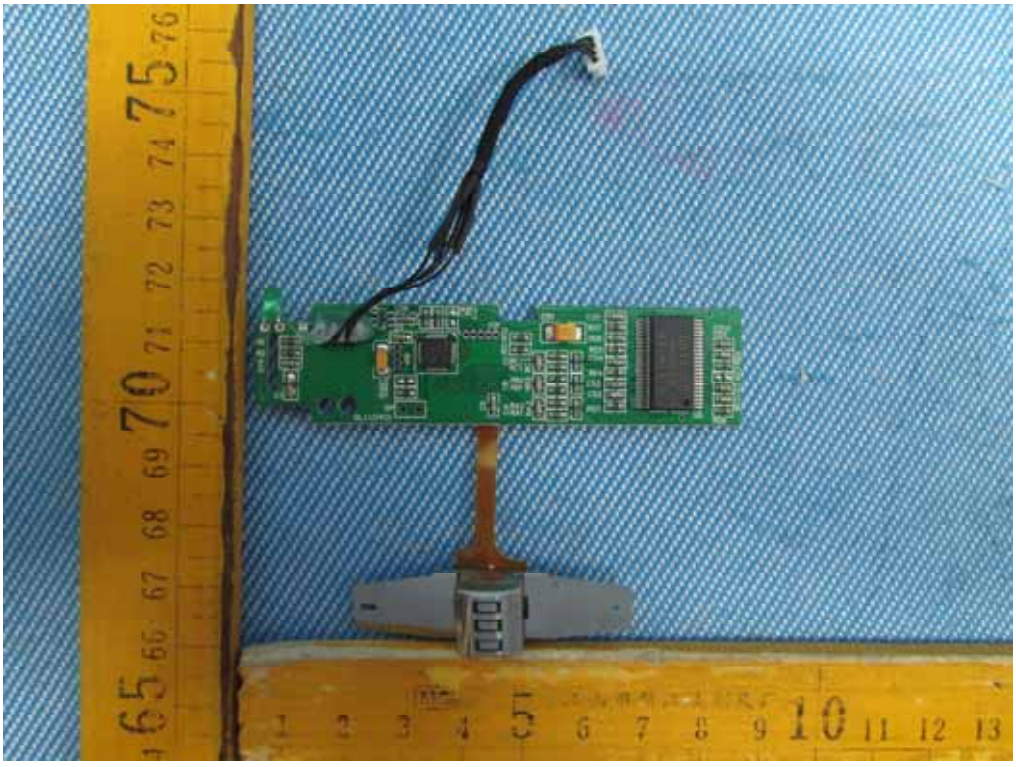
NFC ANT

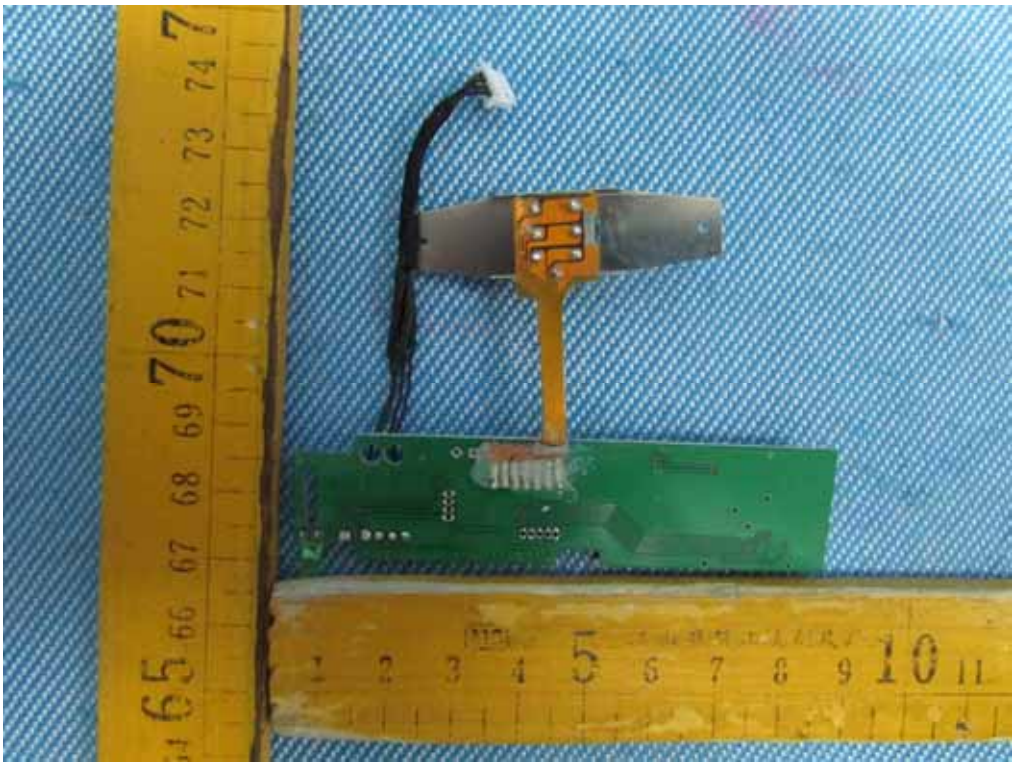
Wifi ANT

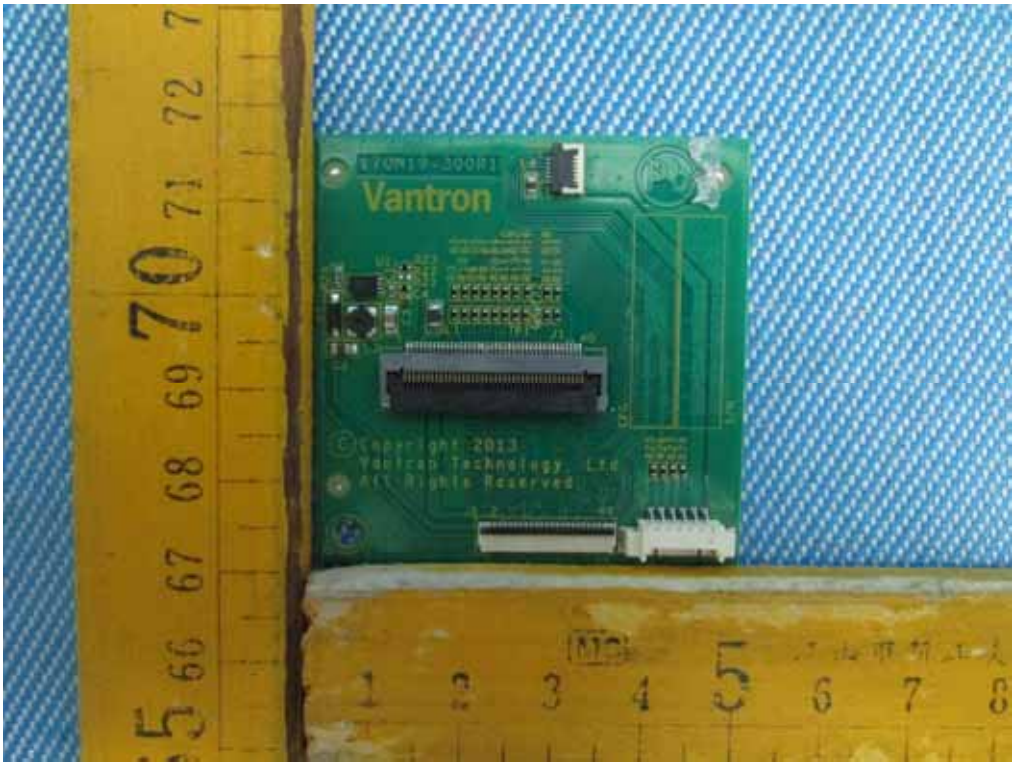


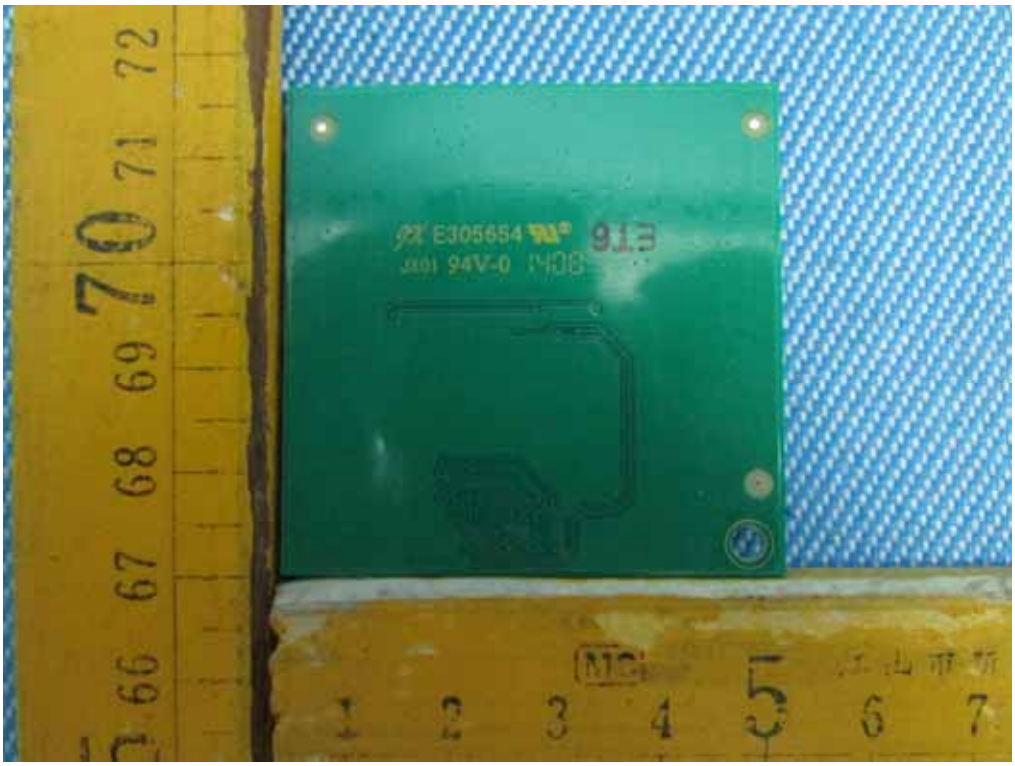

Vantron

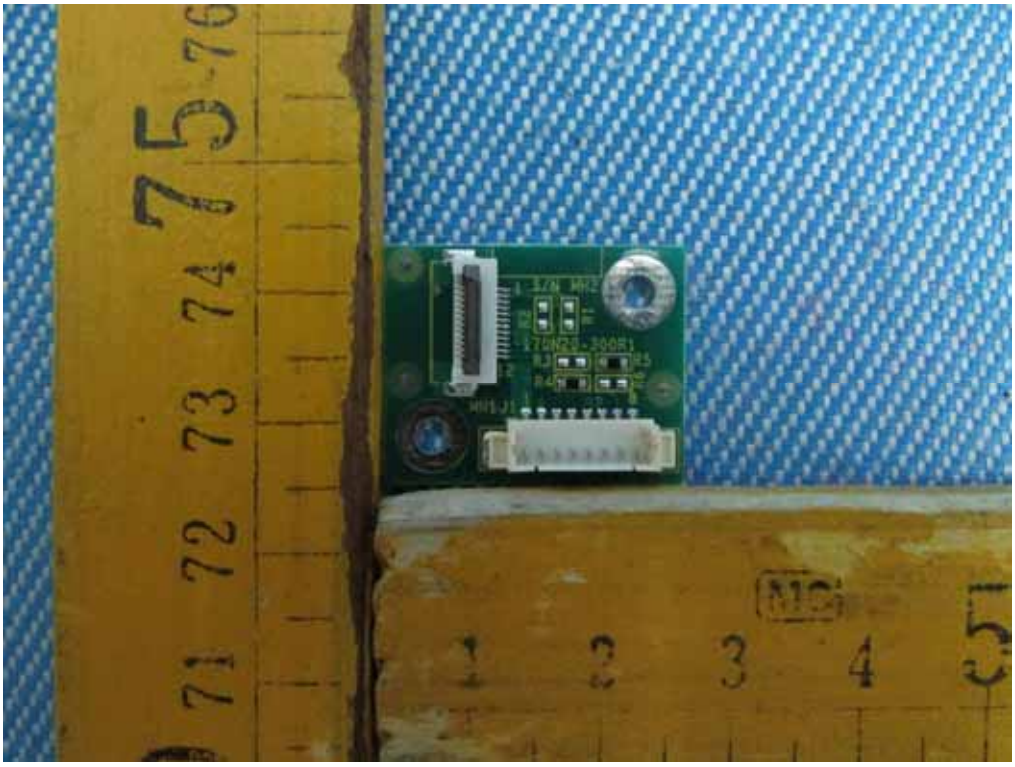




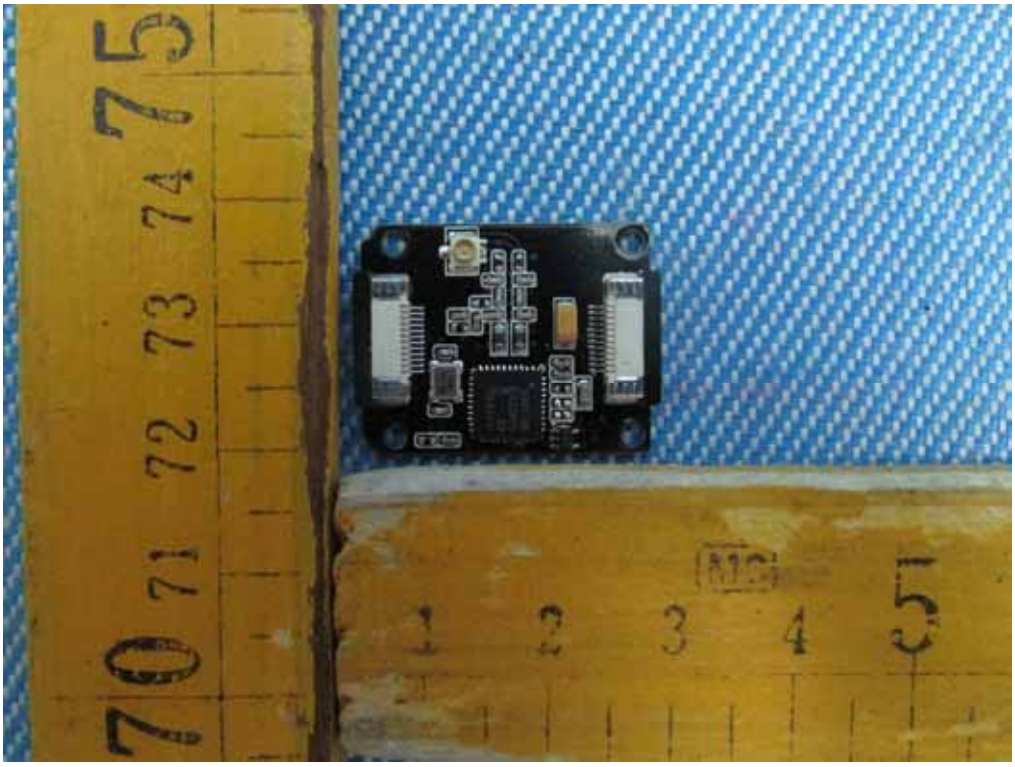


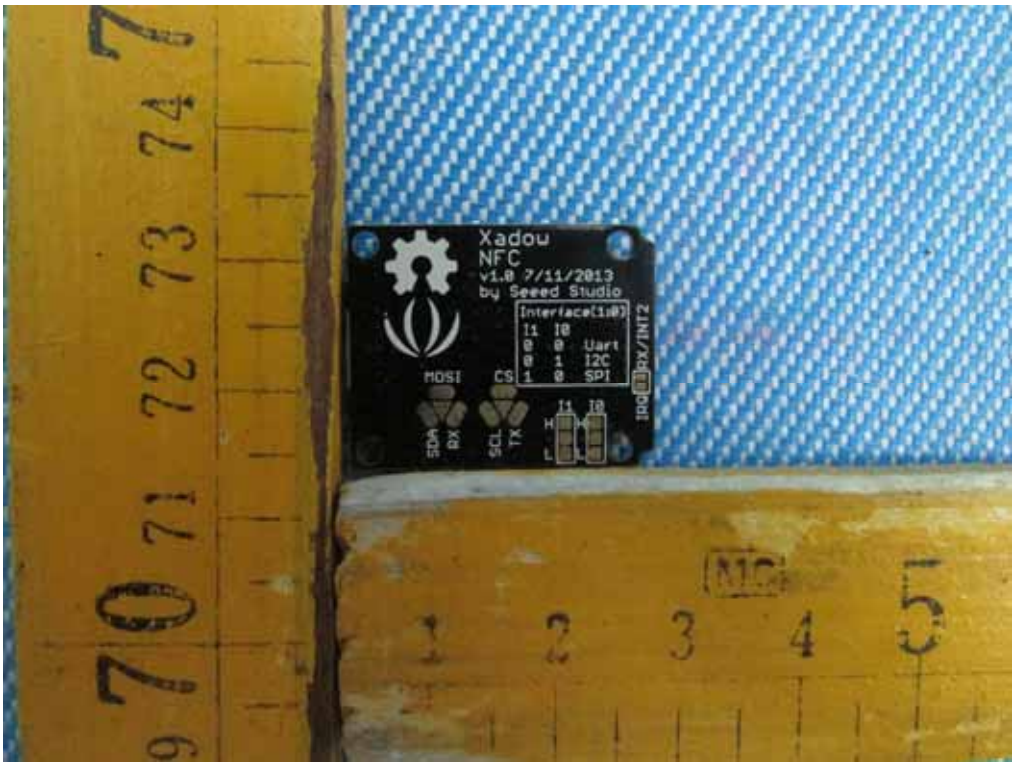

Vantron

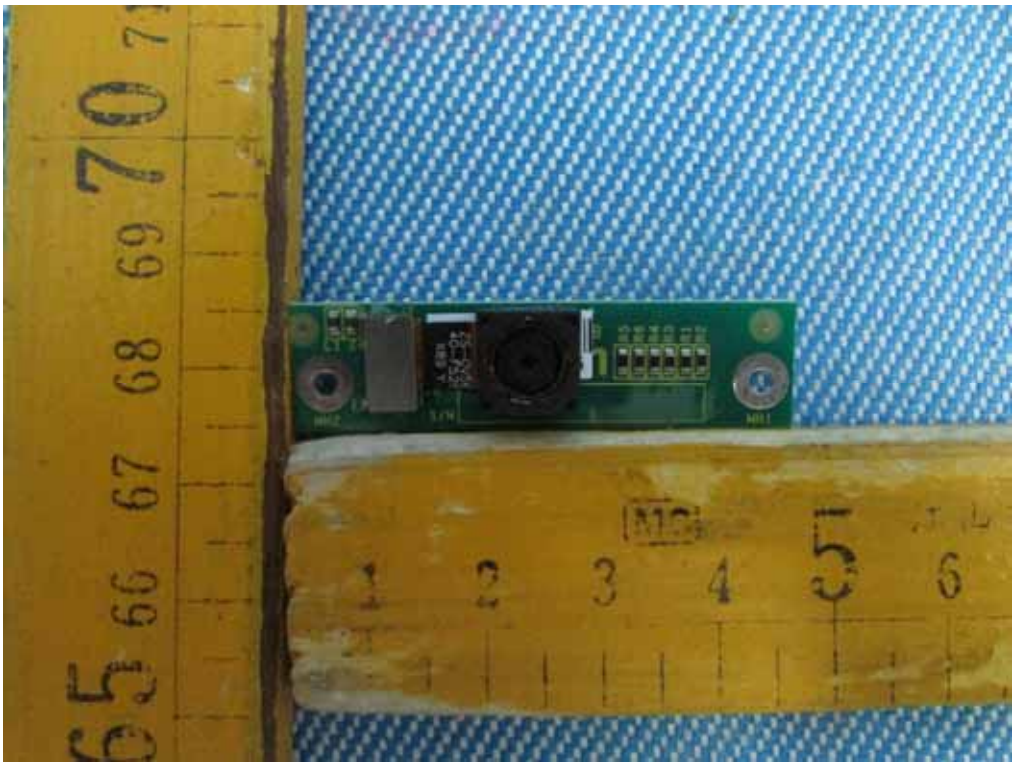

E305654
94V-0




Vantron




Xadou
NFC
v1.0 7/11/2013
by Seeed Studio
Interface[1:0]
I1 I0
0 0 Uart
0 1 I2C
1 0 SPI
MOSI
CS
SDA
RX
SCL
TX
I1 I0
H
L
IRQ
RX/INT2




Xadow
NFC Antenna
v1.0 07/29/2013
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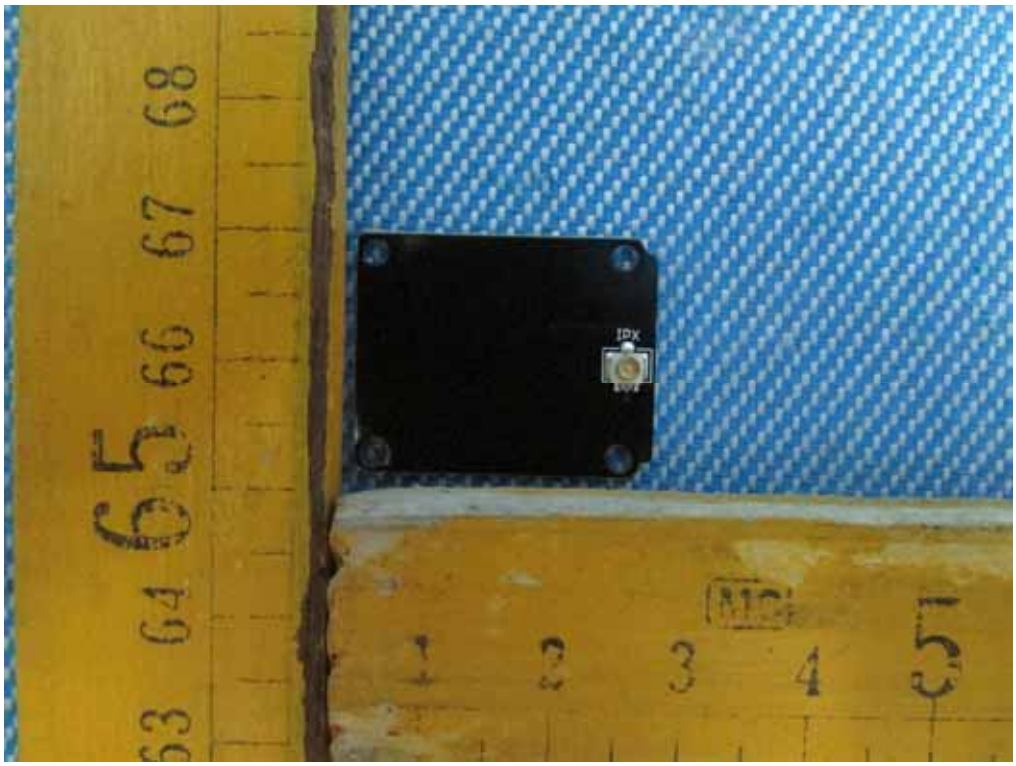
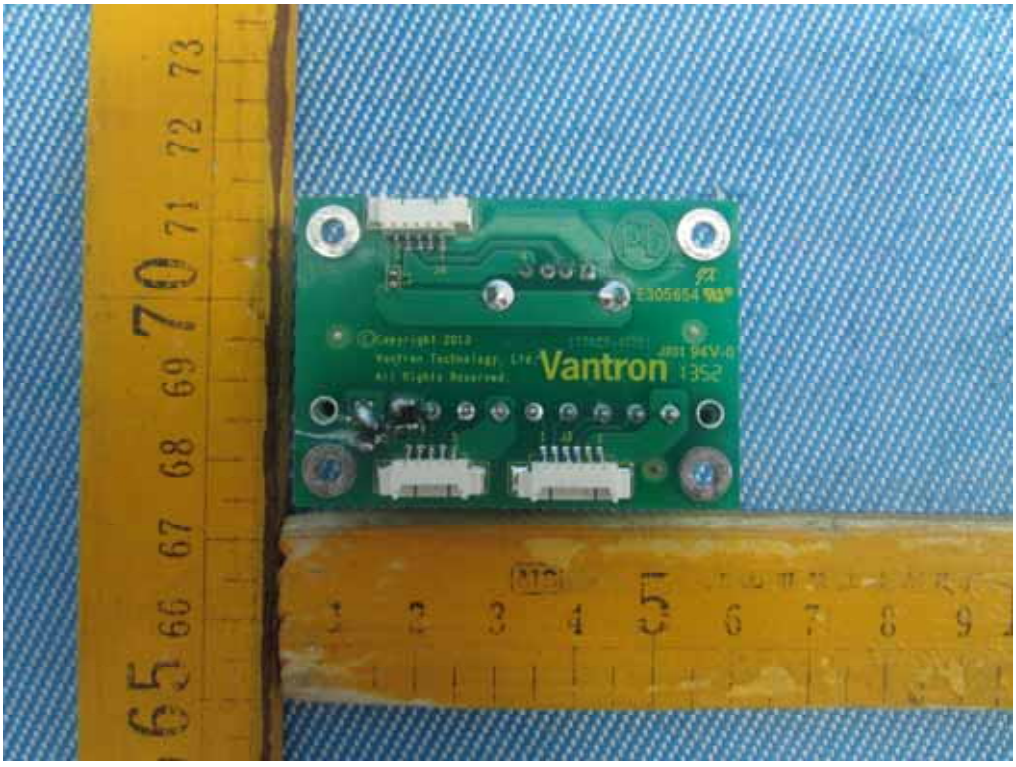
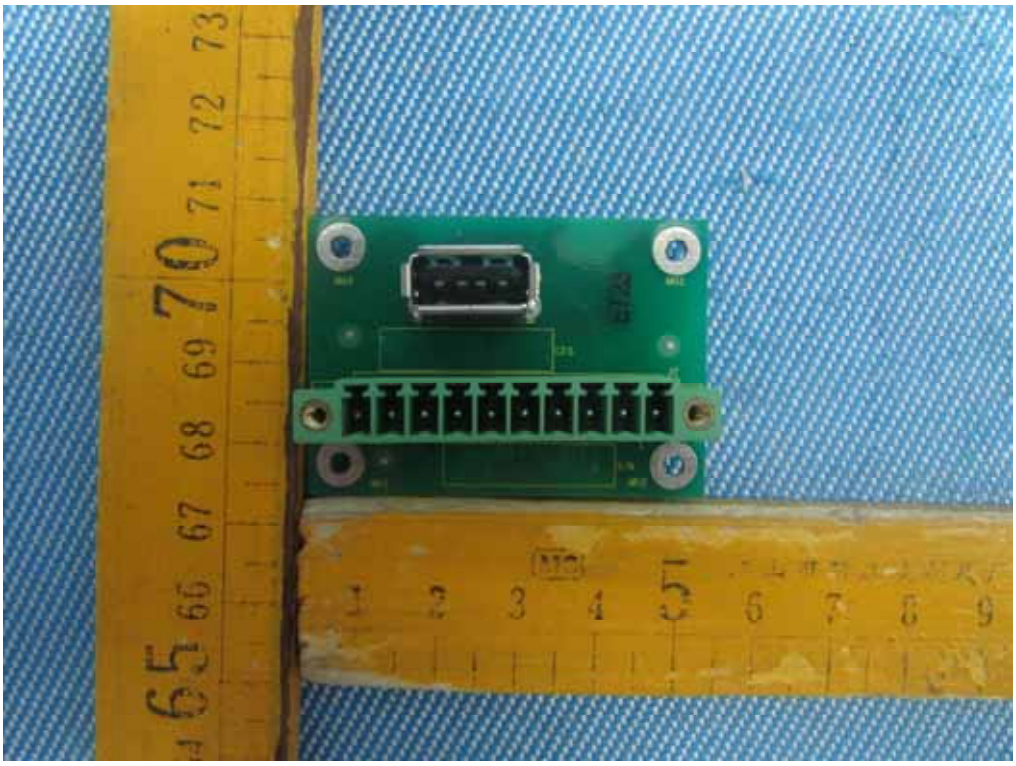



Vantron



16.4 Model AV7 – Internal View

AV 7-1

Other Internal photos refer to AV5-1 See page 66-68 & 70-79

AV 7-2

Other Internal photos refer to AV5-2 See page 66-68 & 70-79

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