

FCC TEST REPORT

for

Shenzhen Wave Multimedia Co., Ltd

tablet PC

Model Number: Q88, Q88A, Q88H, Q88Z

FCC ID: 2AEMBYUNTABQ88

Prepared for : Shenzhen Wave Multimedia Co., Ltd
Address : Fuchuan Industrial Park, Oxbow Sector, Tiegang Community,
Xixiang Street, Bao'an, Shenzhen, China

Prepared by : Keyway Testing Technology Co., Ltd.
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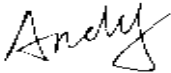
Fax: 86-769-8718 1058

Report No. : 15KWE042528F
Date of Test : Apr. 17~22, 2015
Date of Report : Apr. 23, 2015

TABLE OF CONTENTS

Test Report Declaration	Page
1. TEST SUMMARY	4
2. GENERAL PRODUCT INFORMATION	4
2.1. Product Function	4
2.2. Description of Device (EUT)	4
2.3. Independent Operation Modes	5
2.4. Difference between Model Numbers.....	5
2.5. Test Supporting System	5
3. TEST SITES	5
3.1. Test Facilities.....	5
3.2. Product Version	5
3.3. List of Test and Measurement Instruments.....	6
4. TEST SET-UP AND OPERATION MODES	7
4.1. Principle of Configuration Selection	7
4.2. Block Diagram of Test Set-up	7
4.3. Special Accessories and Auxiliary Equipment	7
4.4. Countermeasures to Achieve EMC Compliance.....	7
5. EMISSION TEST RESULTS.....	8
5.1. Conducted Emission at the Mains Terminals Test.....	8
5.2. Radiated Emission Test.....	11
6. 6DB OCCUPY BANDWIDTH.....	30
6.1. Limits	30
6.2. Test setup.....	30
6.3. Test result.....	30
7. BAND EDGE COMPLIANCE TEST	37
7.1. Limits	37
7.2. Test setup.....	37
8. OUTPUT POWER TEST	39
8.1. Limits	39
8.2. Test setup.....	39
8.3. Test result.....	39
9. POWER SPECTRAL DENSITY TEST	40
9.1. Limits	40
9.2. Test setup.....	40
9.3. Test result.....	40
10. ANTENNA REQUIREMENTS	47
10.1. Limits	47
10.2. Result	47

Keyway Testing Technology Co., Ltd.

Applicant:	Shenzhen Wave Multimedia Co., Ltd		
Address:	Fuchuan Industrial Park, Oxbow Sector, Tiegang Community, Xixiang Street, Bao'an, Shenzhen, China		
Manufacturer:	Shenzhen Wave Multimedia Co., Ltd		
Address:	Fuchuan Industrial Park, Oxbow Sector, Tiegang Community, Xixiang Street, Bao'an, Shenzhen, China		
E.U.T:	tablet PC		
Model Number:	Q88, Q88A, Q88H, Q88Z		
Trade Name:	YUNTAB	Serial No.:	01
Date of Receipt:	Apr. 17, 2015	Date of Test:	Apr. 17~22, 2015
Test Specification:	FCC Part 15, Subpart C: Oct. 1, 2014 ANSI C63.4:2014 KDB558074 D01 DTS Meas Guidance v03r02		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
Issue Date: Apr. 23, 2015			
Tested by:	Reviewed by:	Approved by:	
 	 	 	
Daisy Chen / Engineer	Andy Gao / Supervisor	Jade Yang / Supervisor	
Other Aspects:			
None.			
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.			

1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emissions	15.205(a) 15.209 15.247(d)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Power density	15.247(e)	PASS
Maximum Output Power	15.247(b)(3)	PASS
Emissions from out of band	15.247(d)	PASS
Antenna Requirement	15.203	PASS

2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	tablet PC
Model No.:	Q88, Q88A, Q88H, Q88Z
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40))
Channel numbers:	11 for 802.11b/802.11g/802.11n(H20) ,7 for 802.11n(H40)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	Internal
Antenna gain:	1dBi (declare by Applicant)
Power supply:	DC 5V from adapter
Adapter:	Manufacturer: Shenzhen Wave Multimedia Co., Ltd
	M/N: HT203-2000<IC>
	Input: AC 100~240V 50/60Hz
	Output: DC 5V/2A
Remark: The wireless module(RTL8723BS) only support WiFi 11b/g/n20/n40 without BT	

2.3. Independent Operation Modes

The basic operation modes are:

2.3.1. EUT work continues TX mode and frequency as below:

	Channel	Frequency
802.11b	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11g	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11n(HT20)	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11 n(HT40)	Low	2422MHz
	Middle	2437MHz
	High	2452MHz

Remark: 1: According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 1MHz for 802.11b, 6MHz for 802.11g, msc0 for 802.11n(H20), msc0 for 802.11n(H40).

2: The duty cycle of product is 100%.

2.4. Difference between Model Numbers

The product is different for model number and outlook color.

2.5. Test Supporting System

None.

3. TEST SITES

3.1. Test Facilities

Lab Qualifications : Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

3.2. Product Version

Product SW version	BORQS_VIZIO_141204_1213 40
Product HW version	DVT1
Radio SW version	80-WL007-1 Rev. D
Radio HW version	WCN3680B Rev. D
Test SW Version	TV1.0
RF power setting in TEST SW	11b: 8 dBm; 11g: 8 dBm; 11n(HT20): 8dBm; 11n(HT40): 7dBm

3.3. List of Test and Measurement Instruments

3.3.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,14	Apr. 27,15
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 27,14	Apr. 27,15
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 27,14	Apr. 27,15
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 27,14	Apr. 27,15

3.3.2. For radiated emission,6dB BW, band-edge, output power, power spectral density test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,14	Apr. 26,15
Bilog Antenna (30MHz~1GHz)	ETS-LINDGREEN	3142D	135452	Apr. 27,14	Apr. 26,15
Loop antenna (9kHz~30MHz)	teseq	HLA6120	22032	Apr. 30,14	Apr. 29,15
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 27,14	Apr. 26,15
Spectrum Analyzer	R&S	FSV40	132.1.3008K39-100967	Apr. 27,14	Apr. 27,15
Power Meter	R&S	NRVS	100692	Apr. 27,14	Apr. 26,15
Power Sensor	R&S	URV5-Z4	0395.1619.12	Apr. 27,14	Apr. 26,15
Signal Amplifier	SONOMA	310	187016	Apr. 27,14	Apr. 26,15
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 27,14	Apr. 26,15
RF Cable	IMRO	IMRO-400	966 Cable 1#	Apr. 27,14	Apr. 26,15
Antenna Connect	Keyway	KW032	032	Apr. 27,14	Apr. 26,15
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
High Pass filter	Micro	HPM50111	324216	Apr. 27,14	Apr. 27,15
Horn Antenna (1GHz ~18GHz)	DAZE	ZN30701	11003	Apr. 27,14	Apr. 26,15
Horn Antenna (18GHz ~26.5GHz)	SCHWARZBECK	BBHA9170	9170-068	Apr. 27,14	Apr. 26,15
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 27,14	Apr. 26,15
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 30,14	Apr. 29,15
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 27,14	Apr. 26,15

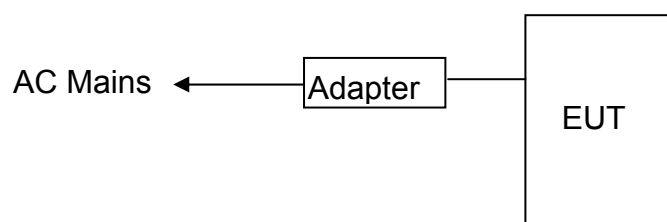
4. TEST SET-UP AND OPERATION MODES

4.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

4.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: tablet PC)

4.3. Special Accessories and Auxiliary Equipment

None.

4.4. Countermeasures to Achieve EMC Compliance

None.

5. EMISSION TEST RESULTS

5.1. Conducted Emission at the Mains Terminals Test

5.1.1. Limit 15.207 limits

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

5.1.2. Test Setup

The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

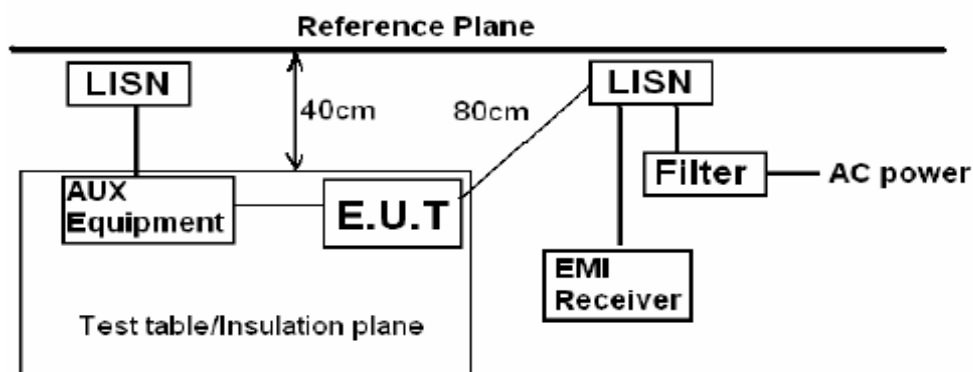
The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

Test voltage was AC 120V/60Hz

Pretest for all mode, The test data of the worst case condition(s) was 802.11b low channel and the data reported on the following page.

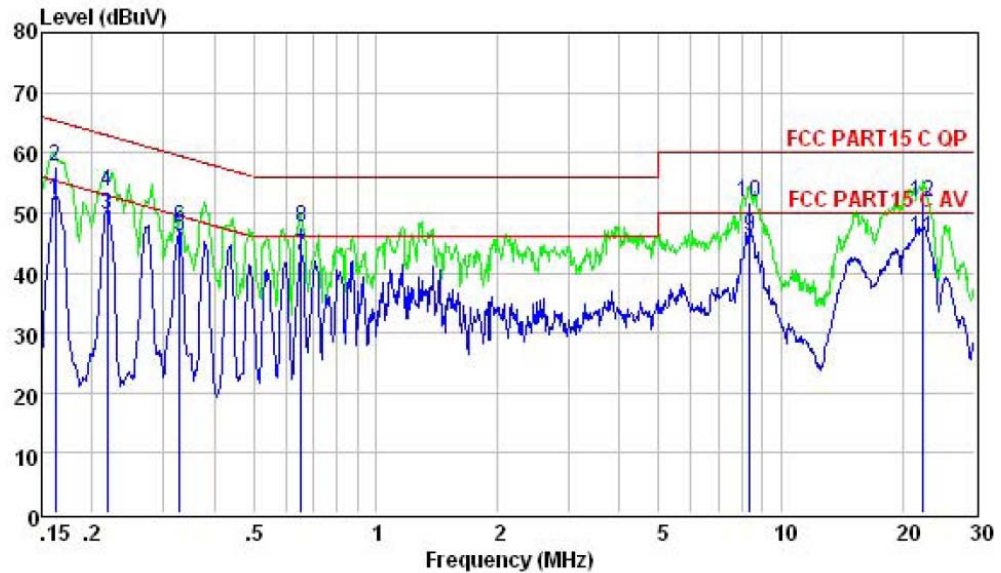


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedance Stabilization Network
Test table height=0.8m

Test Data

Test mode: 802.11b low channel

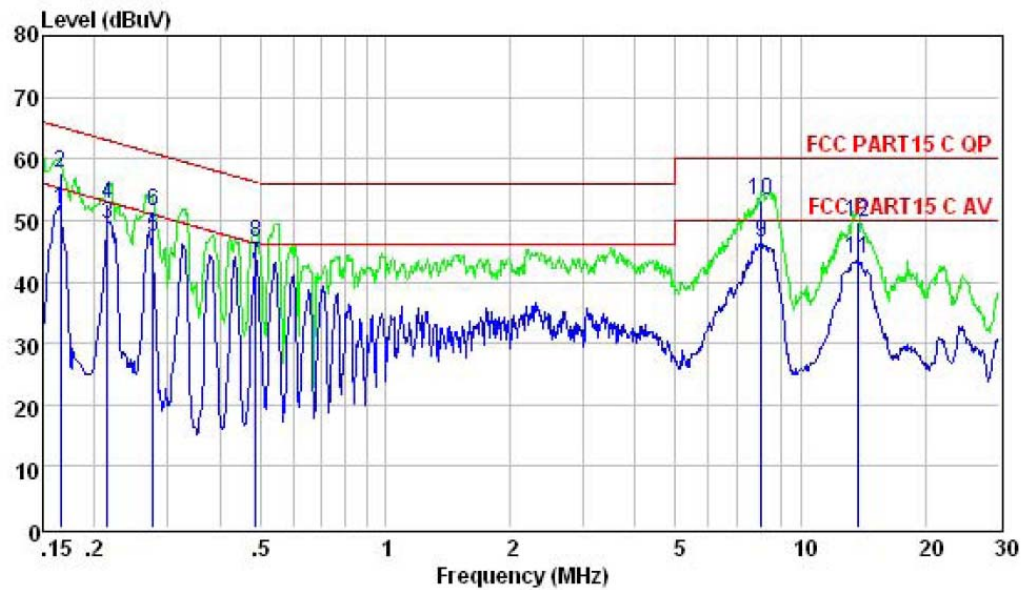
Test Line: LINE



	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
1	0.162	52.17	55.34	-3.17	Average
2	0.162	57.64	65.34	-7.70	QP
3	0.217	49.63	52.92	-3.29	Average
4	0.217	53.64	62.92	-9.28	QP
5	0.329	46.01	49.49	-3.48	Average
6	0.329	47.52	59.49	-11.97	QP
7	0.654	42.88	46.00	-3.12	Average
8	0.654	47.68	56.00	-8.32	QP
9	8.367	46.02	50.00	-3.98	Average
10	8.367	51.65	60.00	-8.35	QP
11	22.298	45.89	50.00	-4.11	Average
12	22.298	51.68	60.00	-8.32	QP

Test mode: 802.11b low channel

Test Line: NEUTRAL



	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
1	0.166	51.85	55.16	-3.31	Average
2	0.166	57.62	65.16	-7.54	QP
3	0.214	49.27	53.05	-3.78	Average
4	0.214	52.67	63.05	-10.38	QP
5	0.277	47.32	50.92	-3.60	Average
6	0.277	51.34	60.92	-9.58	QP
7	0.489	42.69	46.19	-3.50	Average
8	0.489	46.31	56.19	-9.88	QP
9	8.020	46.45	50.00	-3.55	Average
10	8.020	53.14	60.00	-6.86	QP
11	13.695	43.61	50.00	-6.39	Average
12	13.695	49.68	60.00	-10.32	QP

5.2. Radiated Emission Test

5.2.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

5.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector below 1GHz.

The bandwidth of the EMI test receiver is set at 10kHz for frequency range from 9kHz to 30 MHz, 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The frequency range from 9kHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record. For all test, used peak detector.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.

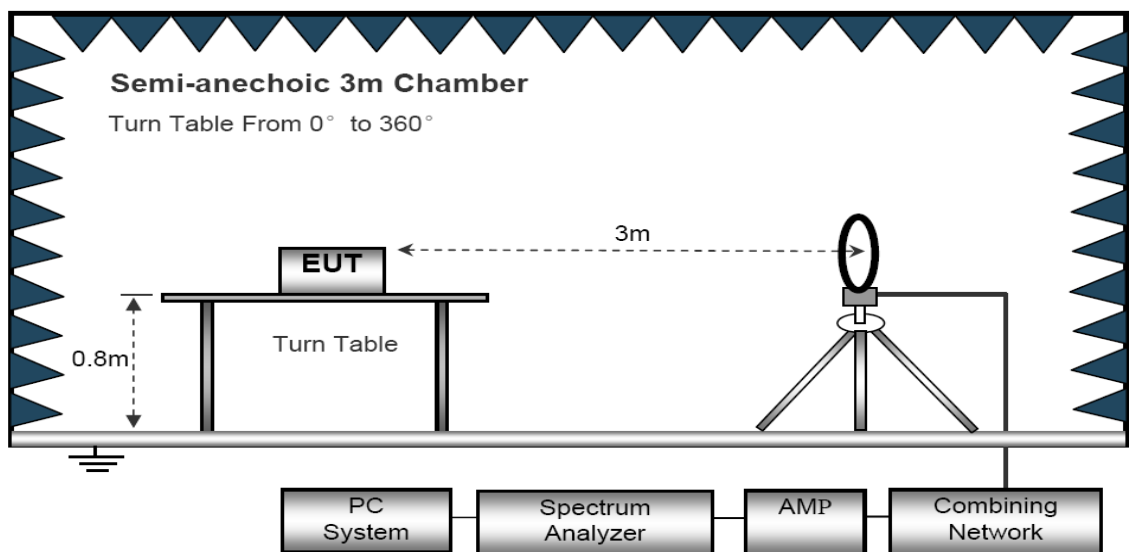
3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

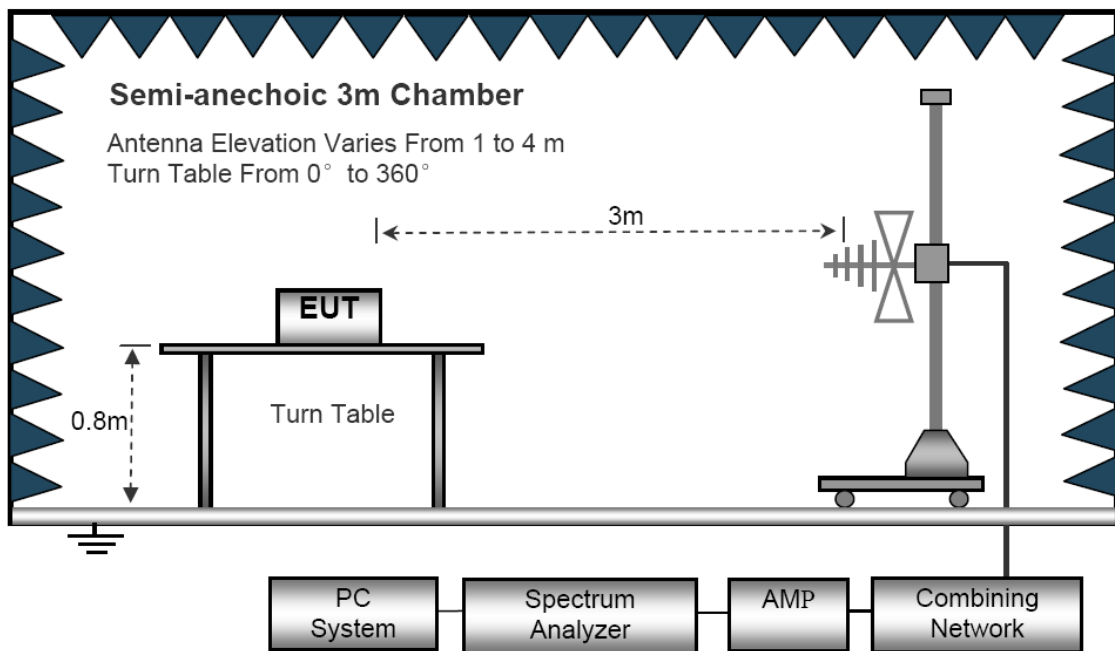
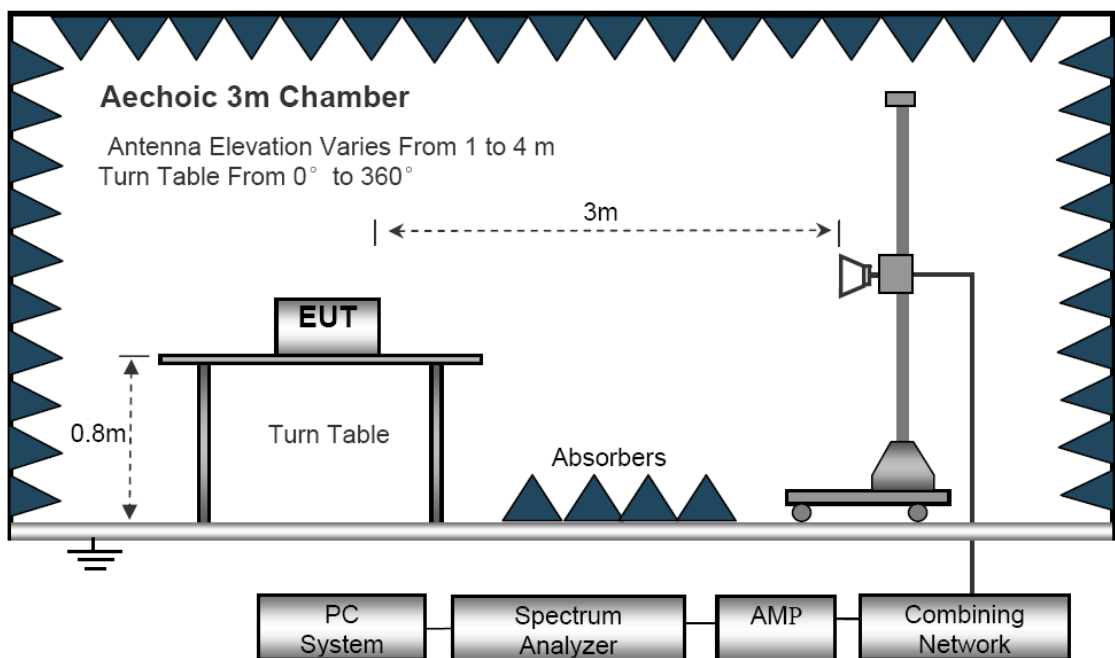
4. For emissions below 1GHz, the worst case was 802.11b low channel and the data was reported on the following page.

5. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis which it is worse case.

6. The emission below 30MHz was background noise and met the limit, so no data show it.

Below 30MHz

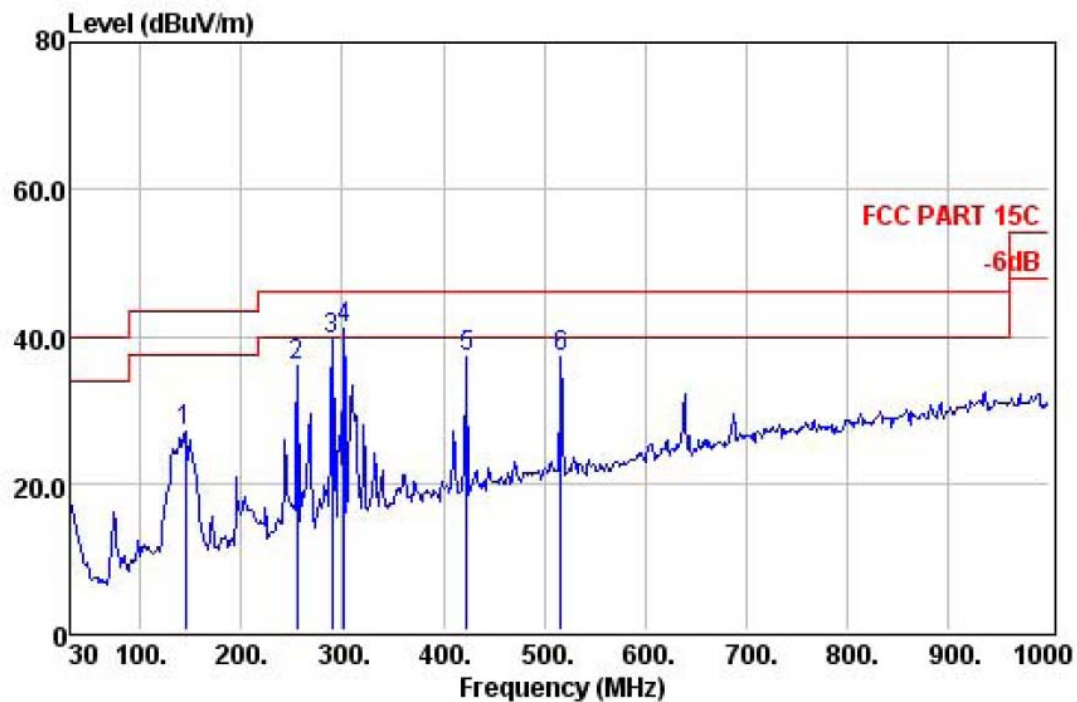


30MHz~1GHz**Above 1GHz**

Test Data

Test mode: TX Mode

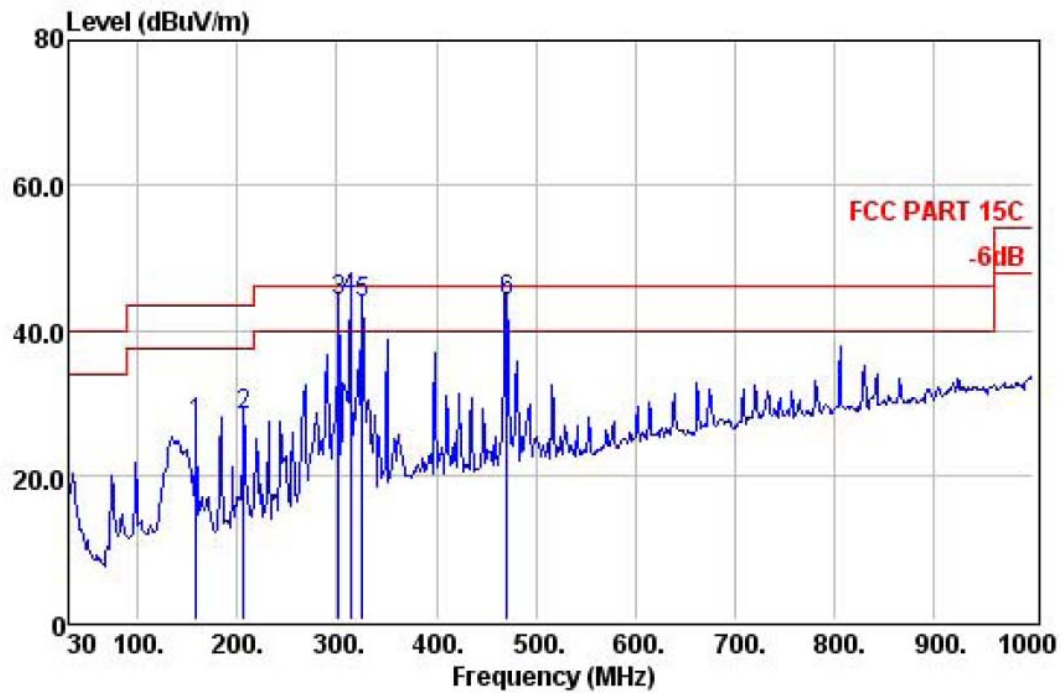
Polarization: VERTICAL



		Preamp	Read	Cable	Antenna		Limit	Over	
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	144.46	31.23	48.39	1.22	8.67	27.05	43.50	-16.45	QP
2	255.04	30.97	52.33	1.70	12.92	35.98	46.00	-10.02	QP
3	289.96	30.93	55.15	1.87	13.48	39.57	46.00	-6.43	QP
4	301.60	30.92	56.06	1.94	13.84	40.92	46.00	-5.08	QP
5	422.85	30.63	48.24	2.48	17.03	37.12	46.00	-8.88	QP
6	516.94	30.65	45.93	2.94	19.04	37.26	46.00	-8.74	QP

Test mode: TX Mode

Polarization: HORIZONTAL



	Preamp	Read	Cable&Antenna			Limit	Over	
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	158.04	31.23	47.72	1.30	9.16	26.95	43.50	-16.55
2	206.54	31.09	46.49	1.46	11.31	28.17	43.50	-15.33
3 !	301.60	30.92	59.24	1.94	13.84	44.10	46.00	-1.90
4 !	313.24	30.89	59.09	1.94	14.17	44.31	46.00	-1.69
5 !	325.85	30.81	58.01	2.02	14.53	43.75	46.00	-2.25
6 !	471.35	30.60	53.67	2.69	18.20	43.96	46.00	-2.04
								QP

Test mode: 802.11b 2412MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	30.84	12.01	32.99	48.34	74.00	-25.66	Peak
2	7236.00	27.95	23.40	16.61	37.30	49.36	74.00	-24.64	Peak
3	8736.00	28.32	18.54	16.82	37.08	44.12	74.00	-29.88	Peak
4	10196.00	28.82	22.21	17.00	38.72	49.11	74.00	-24.89	Peak
5	12116.00	29.02	18.02	17.47	39.42	45.89	74.00	-28.11	Peak
6	13048.00	29.21	16.56	18.28	40.94	46.57	74.00	-27.43	Peak

Test mode: 802.11b 2412MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	31.48	12.01	32.99	48.98	74.00	-25.02	Peak
2	7236.00	27.95	23.41	16.61	37.30	49.37	74.00	-24.63	Peak
3	8294.00	28.19	24.92	16.72	36.63	50.08	74.00	-23.92	Peak
4	9447.00	28.58	22.47	16.92	37.94	48.75	74.00	-25.25	Peak
5	10601.00	28.86	21.73	17.08	39.26	49.21	74.00	-24.79	Peak
6	12564.00	29.11	20.75	17.85	39.66	49.15	74.00	-24.85	Peak

Test mode: 802.11b 2437MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	29.61	12.14	33.11	47.33	74.00	-26.67	Peak
2	7311.00	27.96	19.39	16.62	37.32	45.37	74.00	-28.63	Peak
3	9089.00	28.43	19.16	16.88	37.50	45.11	74.00	-28.89	Peak
4	10345.00	28.84	18.03	17.03	38.96	45.18	74.00	-28.82	Peak
5	12268.00	29.05	17.68	17.59	39.46	45.68	74.00	-28.32	Peak
6	13368.00	29.27	13.57	18.63	42.44	45.37	74.00	-28.63	Peak

Test mode: 802.11b 2437MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	31.31	12.14	33.11	49.03	74.00	-24.97	Peak
2	7311.00	27.96	22.97	16.62	37.32	48.95	74.00	-25.05	Peak
3	8968.00	28.39	22.18	16.87	37.36	48.02	74.00	-25.98	Peak
4	10169.00	28.82	20.04	17.00	38.67	46.89	74.00	-27.11	Peak
5	12238.00	29.05	20.59	17.58	39.45	48.57	74.00	-25.43	Peak
6	14100.00	29.42	17.05	19.43	42.90	49.96	74.00	-24.04	Peak

Test mode: 802.11b 2462MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	30.72	12.28	33.23	48.67	74.00	-25.33	Peak
2	7386.00	27.98	23.11	16.62	37.36	49.11	74.00	-24.89	Peak
3	9517.00	28.61	21.39	16.92	38.01	47.71	74.00	-26.29	Peak
4	11115.00	28.91	19.79	17.19	39.59	47.66	74.00	-26.34	Peak
5	12067.00	29.01	21.19	17.43	39.41	49.02	74.00	-24.98	Peak
6	13495.00	29.30	16.88	18.77	43.00	49.35	74.00	-24.65	Peak

Test mode: 802.11b 2462MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	30.72	12.28	33.23	48.67	74.00	-25.33	Peak
2	7386.00	27.98	22.97	16.62	37.36	48.97	74.00	-25.03	Peak
3	9840.00	28.74	18.56	16.95	38.28	45.05	74.00	-28.95	Peak
4	11659.00	28.97	18.23	17.30	39.74	46.30	74.00	-27.70	Peak
5	13750.00	29.35	13.61	19.08	43.25	46.59	74.00	-27.41	Peak
6	15943.00	29.69	16.80	20.60	40.10	47.81	74.00	-26.19	Peak

Test mode: 802.11g 2412MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	31.46	12.01	32.99	48.96	74.00	-25.04	Peak
2	7236.00	27.95	23.71	16.61	37.30	49.67	74.00	-24.33	Peak
3	10129.00	28.81	20.30	16.99	38.61	47.09	74.00	-26.91	Peak
4	11693.00	28.97	19.25	17.30	39.71	47.29	74.00	-26.71	Peak
5	15603.00	29.64	18.25	20.39	38.79	47.79	74.00	-26.21	Peak
6	16521.00	29.91	14.07	21.00	43.44	48.60	74.00	-25.40	Peak

Test mode: 802.11g 2412MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	31.44	12.01	32.99	48.94	74.00	-25.06	Peak
2	7236.00	27.95	23.15	16.61	37.30	49.11	74.00	-24.89	Peak
3	10044.00	28.81	20.51	16.98	38.48	47.16	74.00	-26.84	Peak
4	11234.00	28.92	19.11	17.21	39.69	47.09	74.00	-26.91	Peak
5	12730.00	29.15	18.87	17.99	40.06	47.77	74.00	-26.23	Peak
6	14124.00	29.42	15.88	19.44	42.80	48.70	74.00	-25.30	Peak

Test mode: 802.11g 2437MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	31.04	12.14	33.11	48.76	74.00	-25.24	Peak
2	7311.00	27.96	23.36	16.62	37.32	49.34	74.00	-24.66	Peak
3	8633.00	28.29	21.63	16.80	36.96	47.10	74.00	-26.90	Peak
4	10979.00	28.90	20.03	17.16	39.49	47.78	74.00	-26.22	Peak
5	12373.00	29.07	19.42	17.68	39.48	47.51	74.00	-26.49	Peak
6	14107.00	29.42	15.07	19.43	42.90	47.98	74.00	-26.02	Peak

Test mode: 802.11g 2437MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	30.67	12.14	33.11	48.39	74.00	-25.61	Peak
2	7311.00	27.96	22.27	16.62	37.32	48.25	74.00	-25.75	Peak
3	8633.00	28.29	20.63	16.80	36.96	46.10	74.00	-27.90	Peak
4	9466.00	28.59	19.96	16.92	37.96	46.25	74.00	-27.75	Peak
5	11234.00	28.92	19.11	17.21	39.69	47.09	74.00	-26.91	Peak
6	13325.00	29.26	15.27	18.59	42.21	46.81	74.00	-27.19	Peak

Test mode: 802.11g 2462MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	30.72	12.28	33.23	48.67	74.00	-25.33	Peak
2	7386.00	27.98	22.02	16.62	37.36	48.02	74.00	-25.98	Peak
3	9704.00	28.68	22.32	16.94	38.17	48.75	74.00	-25.25	Peak
4	12424.00	29.08	20.83	17.73	39.49	48.97	74.00	-25.03	Peak
5	14583.00	29.49	18.76	19.73	40.25	49.25	74.00	-24.75	Peak
6	16300.00	29.82	15.99	20.84	42.16	49.17	74.00	-24.83	Peak

Test mode: 802.11g 2462MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	29.14	12.28	33.23	47.09	74.00	-26.91	Peak
2	7386.00	27.98	21.15	16.62	37.36	47.15	74.00	-26.85	Peak
3	9670.00	28.67	17.03	16.94	38.14	43.44	74.00	-30.56	Peak
4	11336.00	28.93	16.16	17.23	39.77	44.23	74.00	-29.77	Peak
5	12764.00	29.15	15.83	18.02	40.14	44.84	74.00	-29.16	Peak
6	14413.00	29.46	15.03	19.63	41.10	46.30	74.00	-27.70	Peak

Test mode: 802.11n(HT20) 2412MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	28.81	12.01	32.99	46.31	74.00	-27.69	Peak
2	7236.00	27.95	22.35	16.61	37.30	48.31	74.00	-25.69	Peak
3	8837.00	28.35	21.04	16.84	37.20	46.73	74.00	-27.27	Peak
4	9670.00	28.67	20.03	16.94	38.14	46.44	74.00	-27.56	Peak
5	13937.00	29.39	13.58	19.29	43.43	46.91	74.00	-27.09	Peak
6	14906.00	29.54	17.80	19.94	38.92	47.12	74.00	-26.88	Peak

Test mode: 802.11n(HT20) 2412MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	29.08	12.01	32.99	46.58	74.00	-27.42	Peak
2	7236.00	27.95	19.93	16.61	37.30	45.89	74.00	-28.11	Peak
3	8293.00	28.19	21.10	16.72	36.63	46.26	74.00	-27.74	Peak
4	10316.00	28.83	19.57	17.03	38.91	46.68	74.00	-27.32	Peak
5	11812.00	28.98	19.28	17.33	39.59	47.22	74.00	-26.78	Peak
6	12152.00	29.03	19.17	17.50	39.43	47.07	74.00	-26.93	Peak

Test mode: 802.11n(HT20) 2437MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	27.67	12.14	33.11	45.39	74.00	-28.61	Peak
2	7311.00	27.96	20.20	16.62	37.32	46.18	74.00	-27.82	Peak
3	9313.00	28.52	18.93	16.91	37.77	45.09	74.00	-28.91	Peak
4	10316.00	28.83	18.57	17.03	38.91	45.68	74.00	-28.32	Peak
5	13206.00	29.24	15.22	18.44	41.65	46.07	74.00	-27.93	Peak
6	15637.00	29.65	16.50	20.41	38.92	46.18	74.00	-27.82	Peak

Test mode: 802.11n(HT20) 2437MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	27.31	12.14	33.11	45.03	74.00	-28.97	Peak
2	7311.00	27.96	21.55	16.62	37.32	47.53	74.00	-26.47	Peak
3	8276.00	28.18	19.20	16.72	36.62	44.36	74.00	-29.64	Peak
4	9279.00	28.51	18.21	16.90	37.73	44.33	74.00	-29.67	Peak
5	11166.00	28.92	18.45	17.20	39.63	46.36	74.00	-27.64	Peak
6	13784.00	29.36	14.01	19.12	43.28	47.05	74.00	-26.95	Peak

Test mode: 802.11n(HT20) 2462MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	26.94	12.28	33.23	44.89	74.00	-29.11	Peak
2	7386.00	27.98	19.38	16.62	37.36	45.38	74.00	-28.62	Peak
3	8514.00	28.25	18.42	16.77	36.82	43.76	74.00	-30.24	Peak
4	10129.00	28.81	16.05	16.99	38.61	42.84	74.00	-31.16	Peak
5	10996.00	28.90	16.96	17.16	39.50	44.72	74.00	-29.28	Peak
6	14022.00	29.40	12.30	19.38	43.40	45.68	74.00	-28.32	Peak

Test mode: 802.11n(HT20) 2462MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	26.07	12.28	33.23	44.02	74.00	-29.98	Peak
2	7386.00	27.98	19.01	16.62	37.36	45.01	74.00	-28.99	Peak
3	9398.00	28.56	16.62	16.91	37.88	42.85	74.00	-31.15	Peak
4	10843.00	28.88	15.55	17.13	39.41	43.21	74.00	-30.79	Peak
5	11387.00	28.94	15.39	17.24	39.81	43.50	74.00	-30.50	Peak
6	15059.00	29.56	15.80	20.03	38.49	44.76	74.00	-29.24	Peak

Test mode: 802.11n(HT40) 2422MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4844.00	27.51	26.44	12.05	33.03	44.01	74.00	-29.99	Peak
2	7266.00	27.95	19.05	16.61	37.31	45.02	74.00	-28.98	Peak
3	9092.00	28.43	17.28	16.89	37.50	43.24	74.00	-30.76	Peak
4	11302.00	28.93	15.29	17.22	39.74	43.32	74.00	-30.68	Peak
5	14022.00	29.40	12.30	19.38	43.40	45.68	74.00	-28.32	Peak
6	14328.00	29.45	13.47	19.57	41.60	45.19	74.00	-28.81	Peak

Test mode: 802.11n(HT40) 2422MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4844.00	27.51	25.40	12.05	33.03	42.97	74.00	-31.03	Peak
2	7266.00	27.95	18.67	16.61	37.31	44.64	74.00	-29.36	Peak
3	10656.00	28.87	15.67	17.10	39.29	43.19	74.00	-30.81	Peak
4	13002.00	29.20	13.31	18.22	40.70	43.03	74.00	-30.97	Peak
5	14022.00	29.40	11.30	19.38	43.40	44.68	74.00	-29.32	Peak
6	16317.00	29.83	12.20	20.85	42.26	45.48	74.00	-28.52	Peak

Test mode: 802.11n(HT40) 2437MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	26.33	12.14	33.11	44.05	74.00	-29.95	Peak
2	7311.00	27.96	18.91	16.62	37.32	44.89	74.00	-29.11	Peak
3	8667.00	28.30	17.06	16.81	37.00	42.57	74.00	-31.43	Peak
4	11115.00	28.91	14.75	17.19	39.59	42.62	74.00	-31.38	Peak
5	12900.00	29.18	13.16	18.12	40.46	42.56	74.00	-31.44	Peak
6	14107.00	29.42	10.33	19.43	42.90	43.24	74.00	-30.76	Peak

Test mode: 802.11n(HT40) 2437MHz

Polarization: VERTICAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	25.39	12.14	33.11	43.11	74.00	-30.89	Peak
2	7311.00	27.96	18.04	16.62	37.32	44.02	74.00	-29.98	Peak
3	9857.00	28.74	15.36	16.95	38.29	41.86	74.00	-32.14	Peak
4	12152.00	29.03	14.34	17.50	39.43	42.24	74.00	-31.76	Peak
5	13495.00	29.30	11.18	18.77	43.00	43.65	74.00	-30.35	Peak
6	14107.00	29.42	11.33	19.43	42.90	44.24	74.00	-29.76	Peak

Test mode: 802.11n(HT40) 2452MHz

Polarization: HORIZONTAL

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4904.00	27.55	27.15	12.23	33.19	45.02	74.00	-28.98	Peak
2	7356.00	27.97	18.18	16.62	37.34	44.17	74.00	-29.83	Peak
3	8514.00	28.25	17.42	16.77	36.82	42.76	74.00	-31.24	Peak
4	12424.00	29.08	16.03	17.73	39.49	44.17	74.00	-29.83	Peak
5	14022.00	29.40	12.30	19.38	43.40	45.68	74.00	-28.32	Peak
6	15518.00	29.63	16.72	20.33	38.47	45.89	74.00	-28.11	Peak

Test mode: 802.11n(HT40) 2452MHz

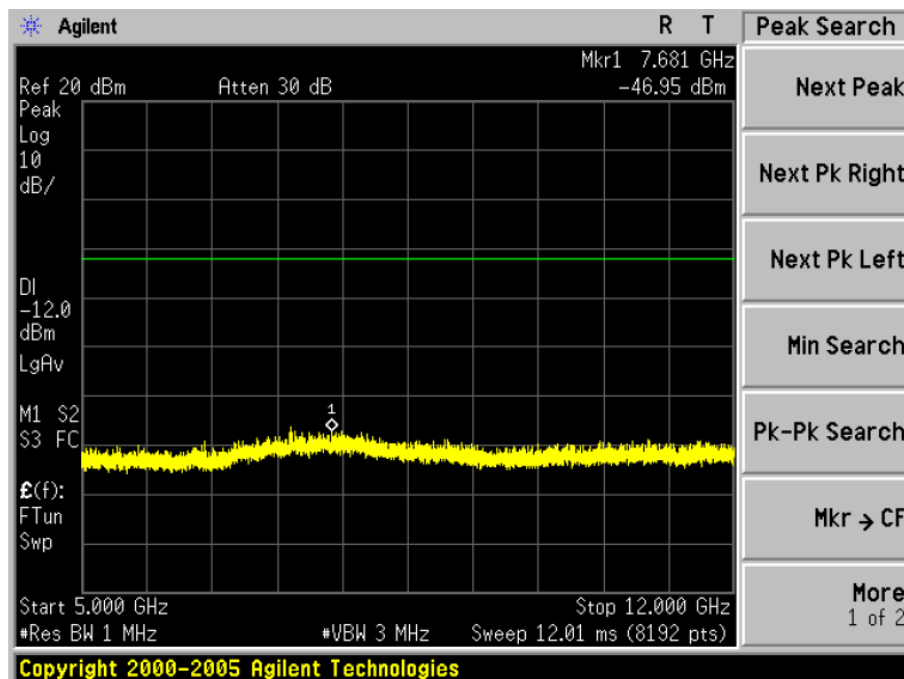
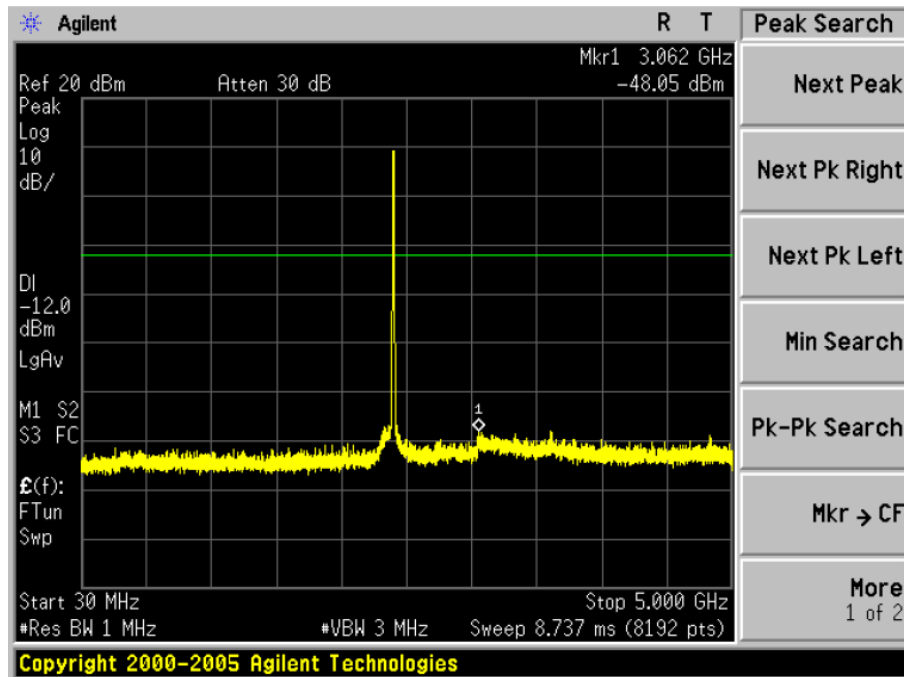
Polarization: VERTICAL

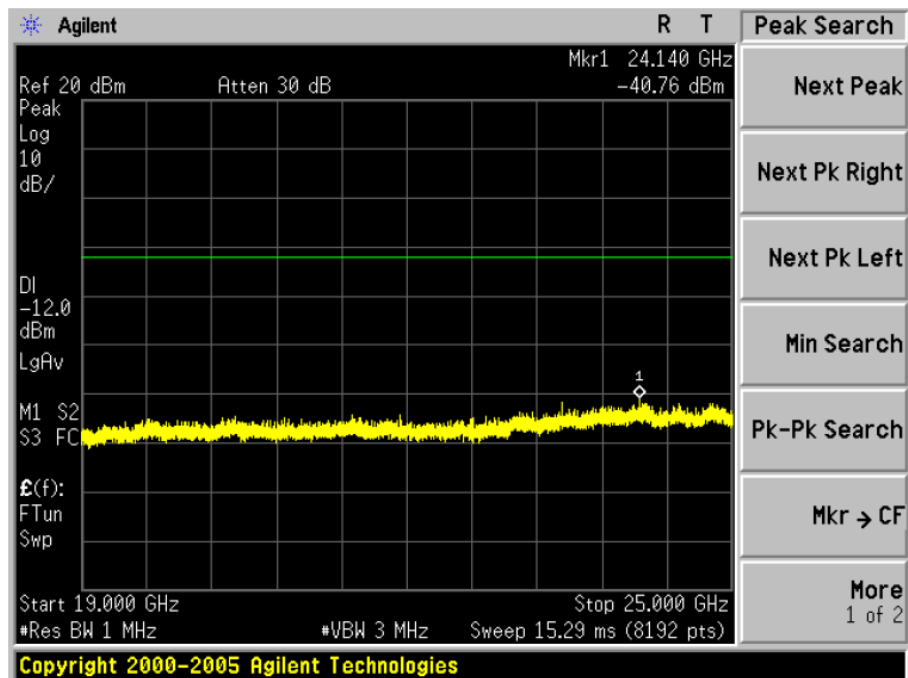
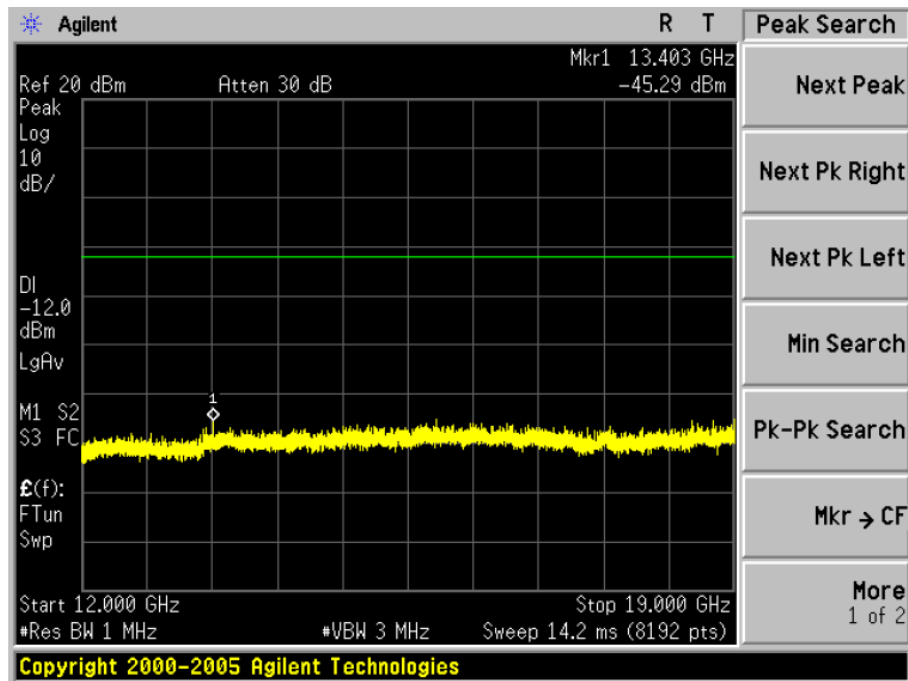
	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4904.00	27.55	27.30	12.23	33.19	45.17	74.00	-28.83	Peak
2	7356.00	27.97	19.03	16.62	37.34	45.02	74.00	-28.98	Peak
3	9398.00	28.56	17.62	16.91	37.88	43.85	74.00	-30.15	Peak
4	10129.00	28.81	17.10	16.99	38.61	43.89	74.00	-30.11	Peak
5	11506.00	28.95	16.79	17.27	39.90	45.01	74.00	-28.99	Peak
6	13869.00	29.37	11.75	19.20	43.37	44.95	74.00	-29.05	Peak

For conducted test

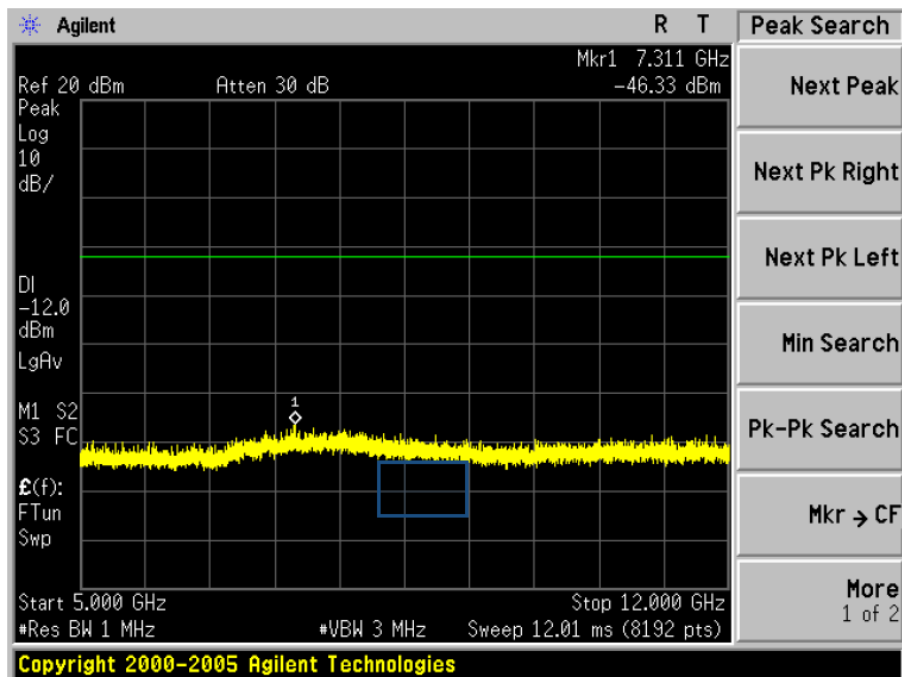
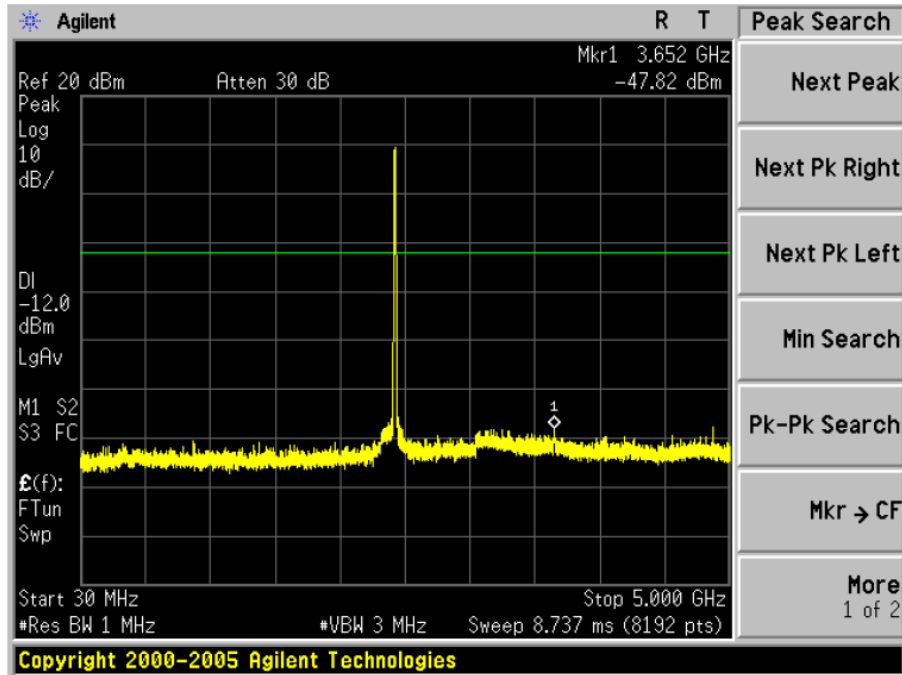
All modes for 802.11b/g/n have tested, and the worst result 802.11b recorded as below.

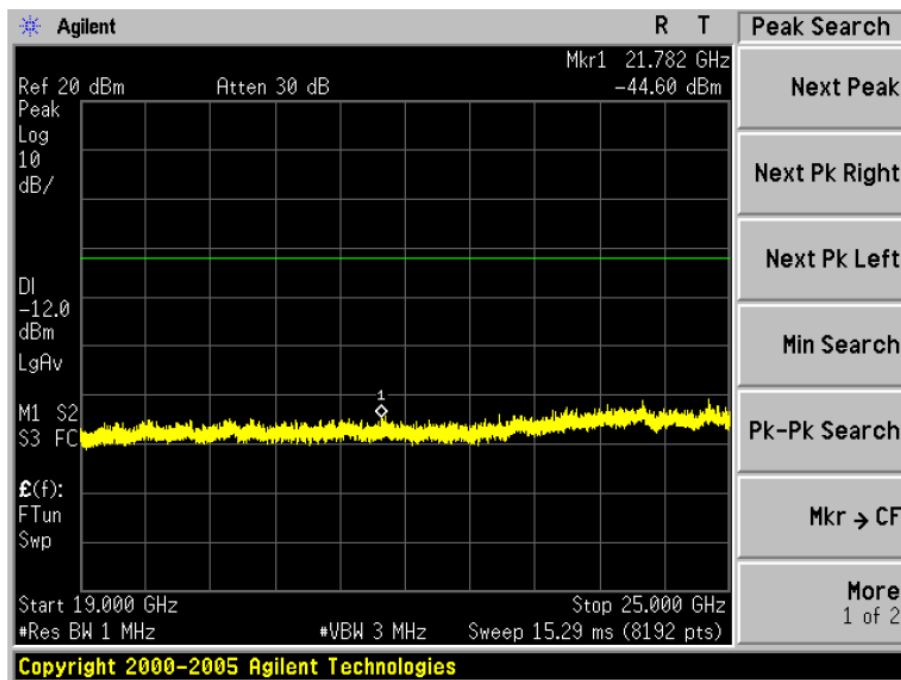
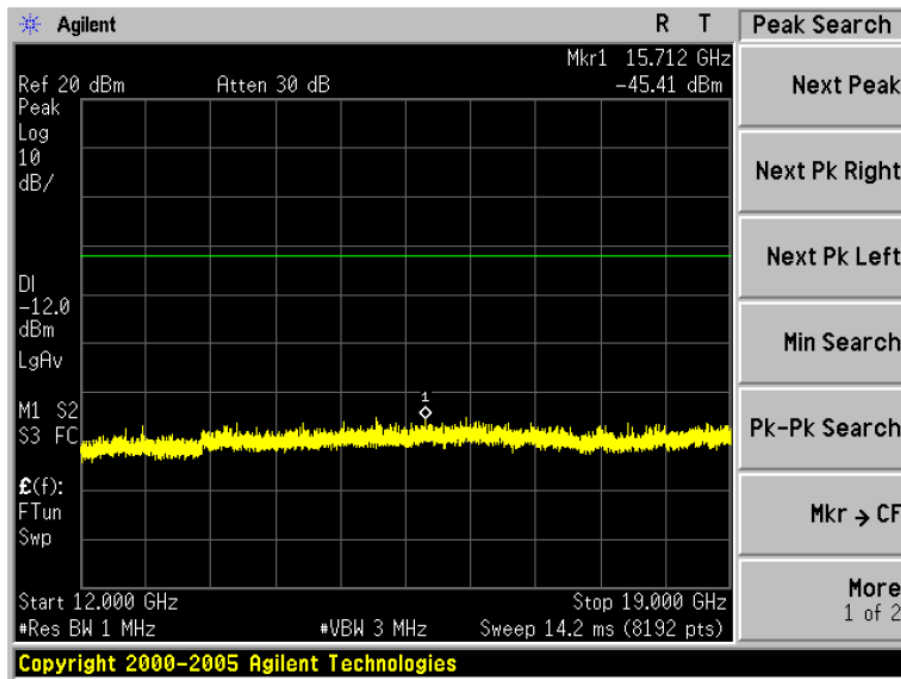
802.11b 2412MHz



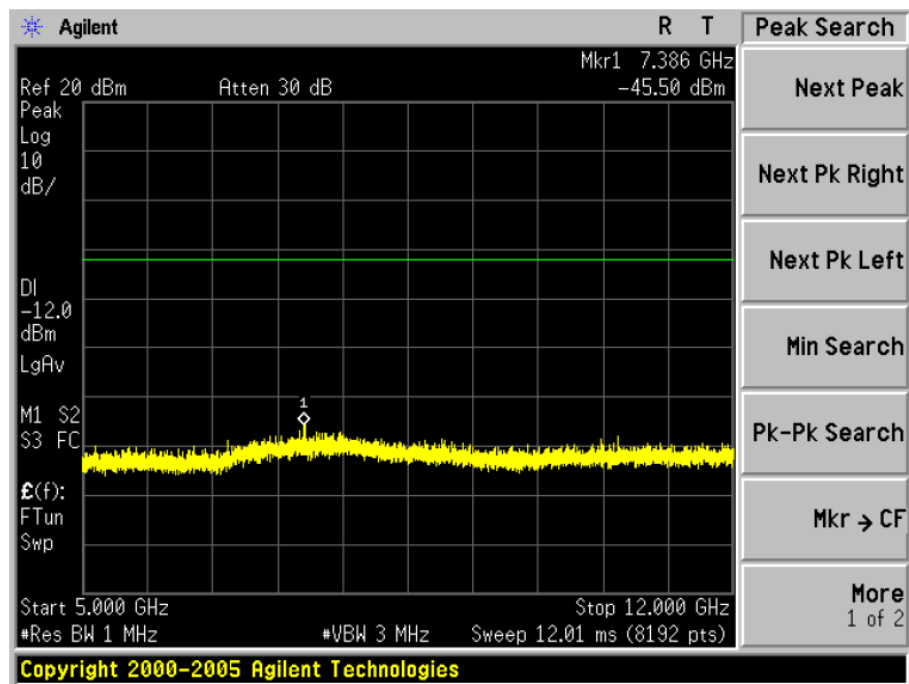
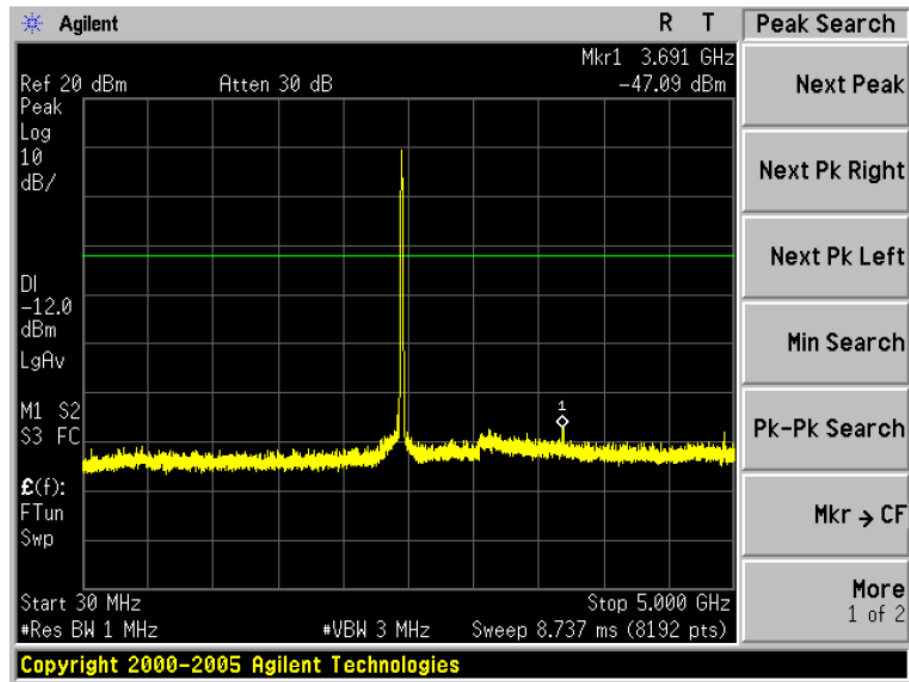


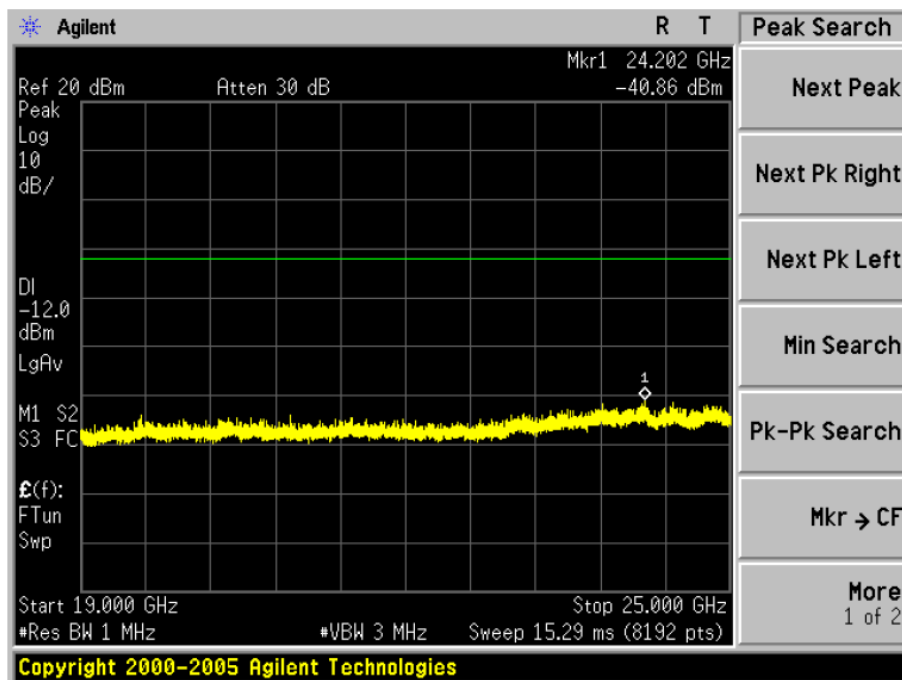
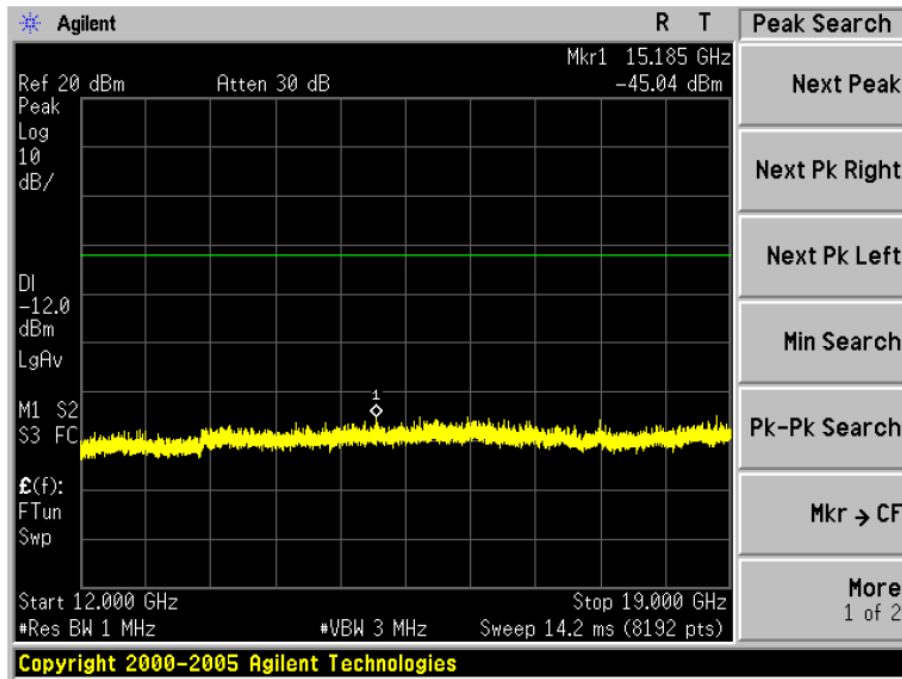
802.11b 2437MHz





802.11b 2462MHz





6. 6DB OCCUPY BANDWIDTH

6.1. Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz Test data:

6.2. Test setup

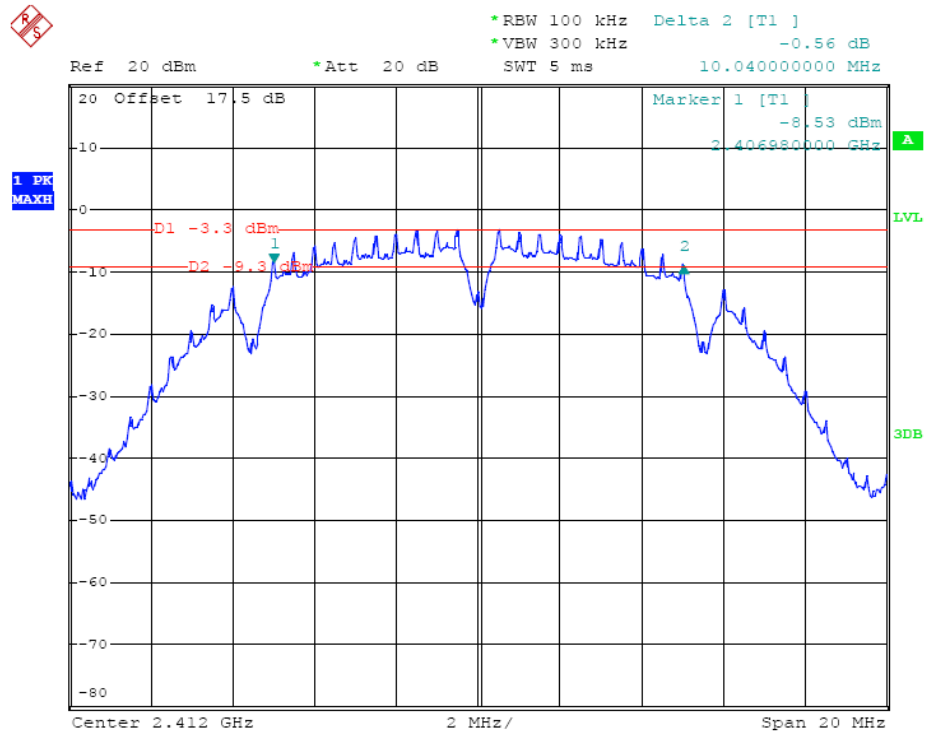
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the RBW =100kHz.
3. Set the VBW = 300kHz
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Measure and record the result in the test report.

6.3. Test result

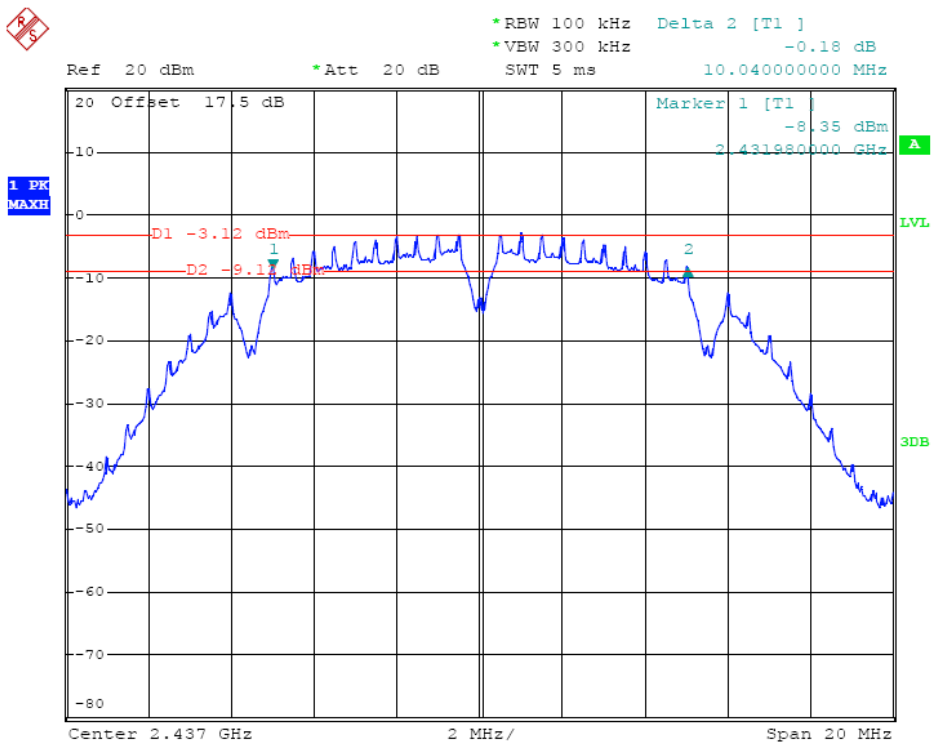
	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	2412	10.04	>0.5	Pass
	2437	10.04	>0.5	Pass
	2462	10.04	>0.5	Pass
802.11g	2412	16.32	>0.5	Pass
	2437	16.36	>0.5	Pass
	2462	16.32	>0.5	Pass
802.11n(HT20)	2412	17.60	>0.5	Pass
	2437	17.60	>0.5	Pass
	2462	17.60	>0.5	Pass
802.11n(HT40)	2422	35.12	>0.5	Pass
	2437	35.04	>0.5	Pass
	2452	35.12	>0.5	Pass

Test plot as follows:

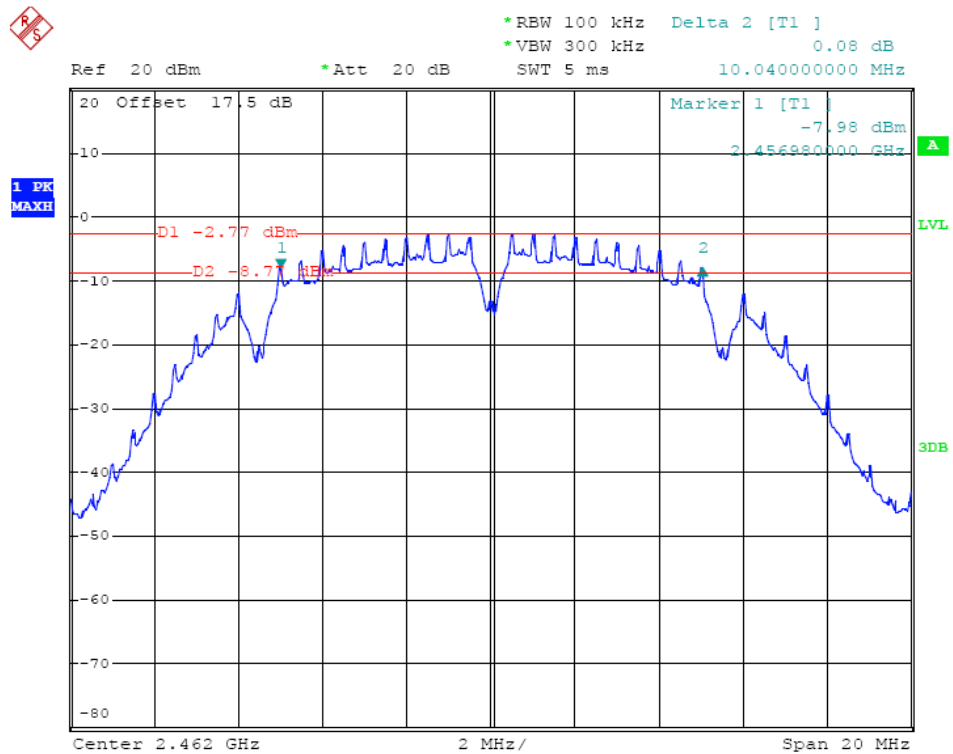
802.11b 2412MHz



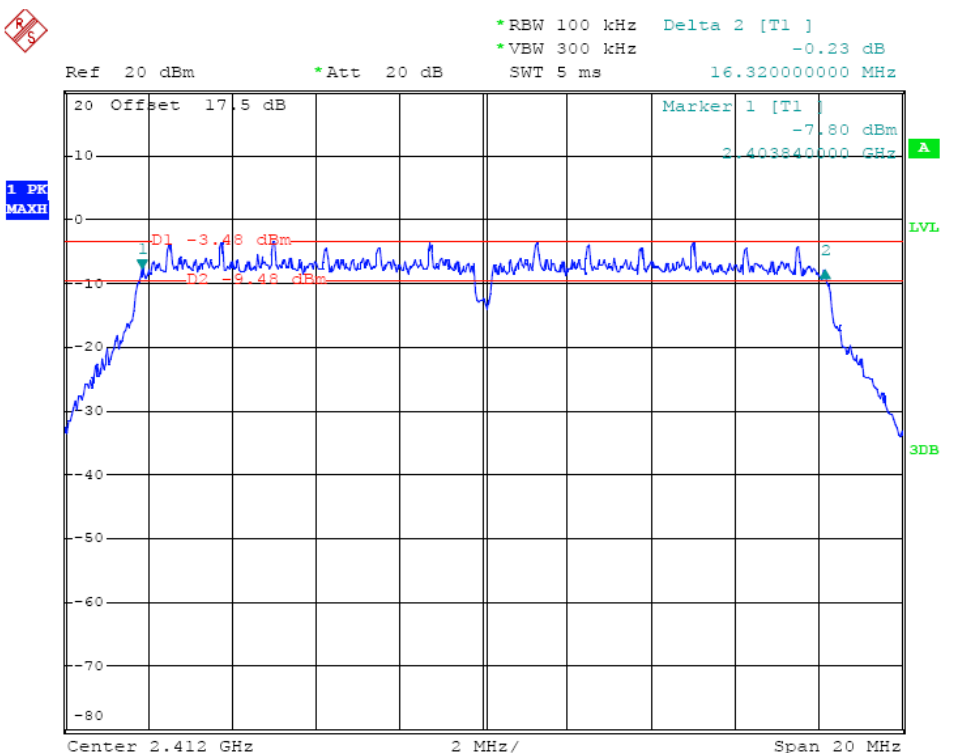
802.11b 2437MHz



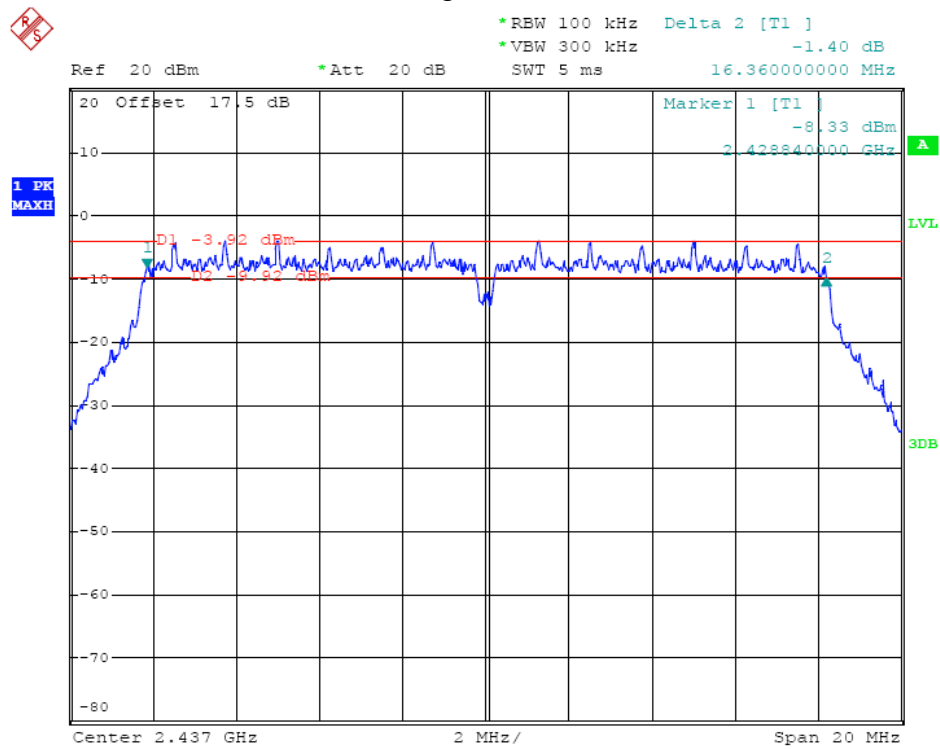
802.11b 2462MHz



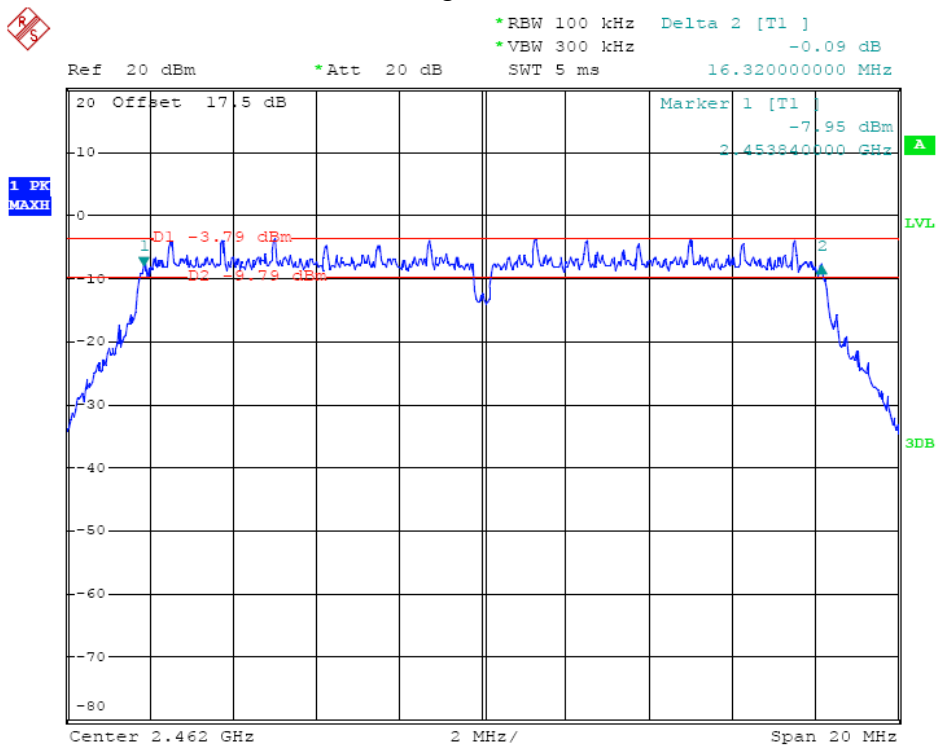
802.11g 2412MHz



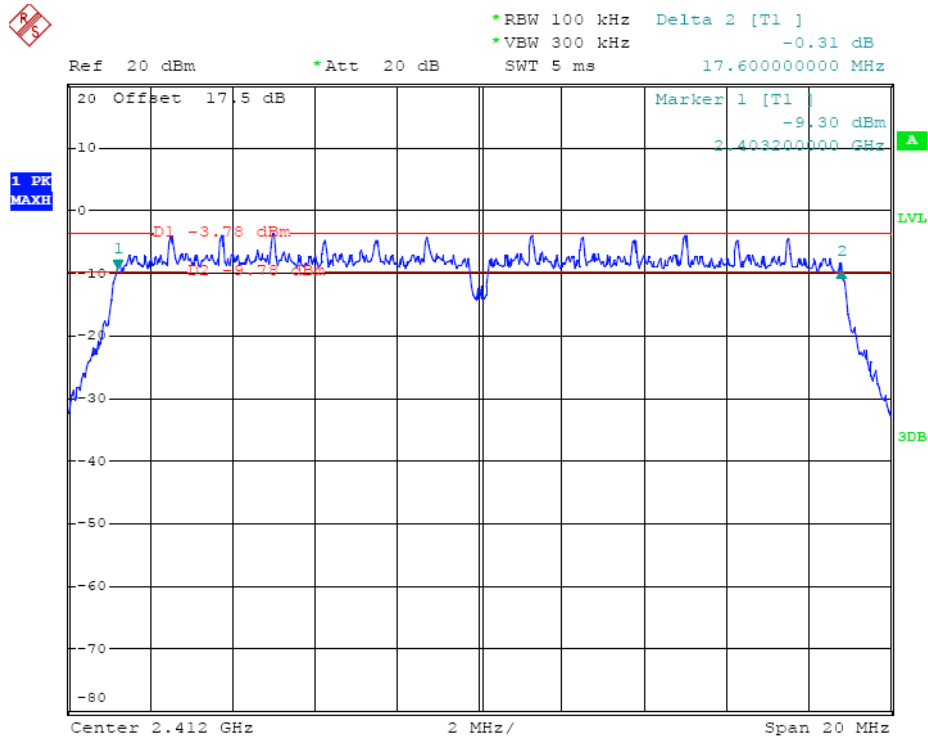
802.11g 2437MHz



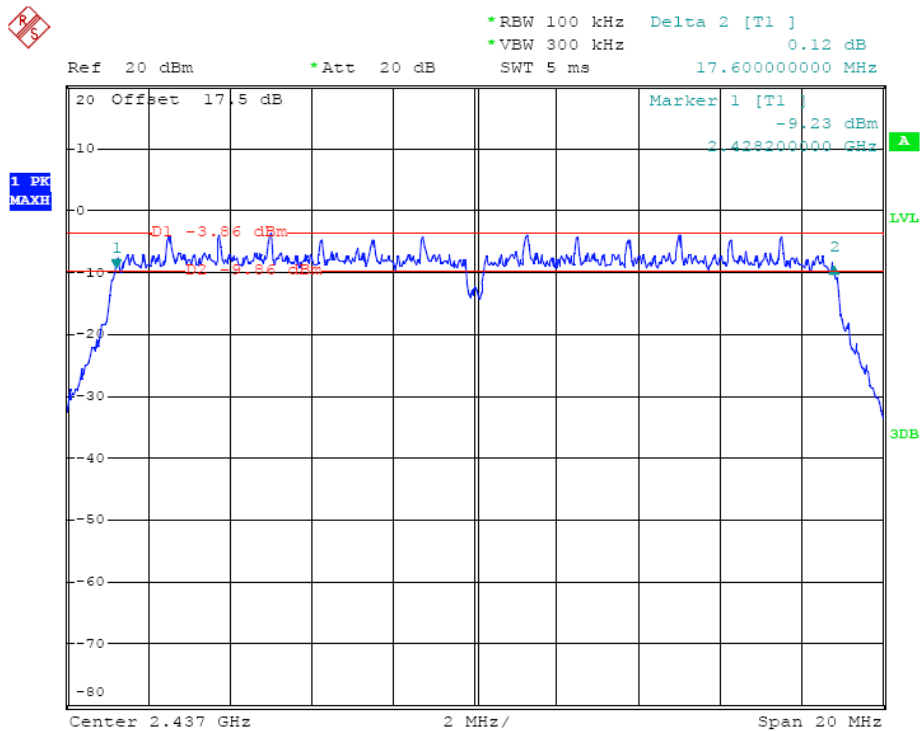
802.11g 2462MHz



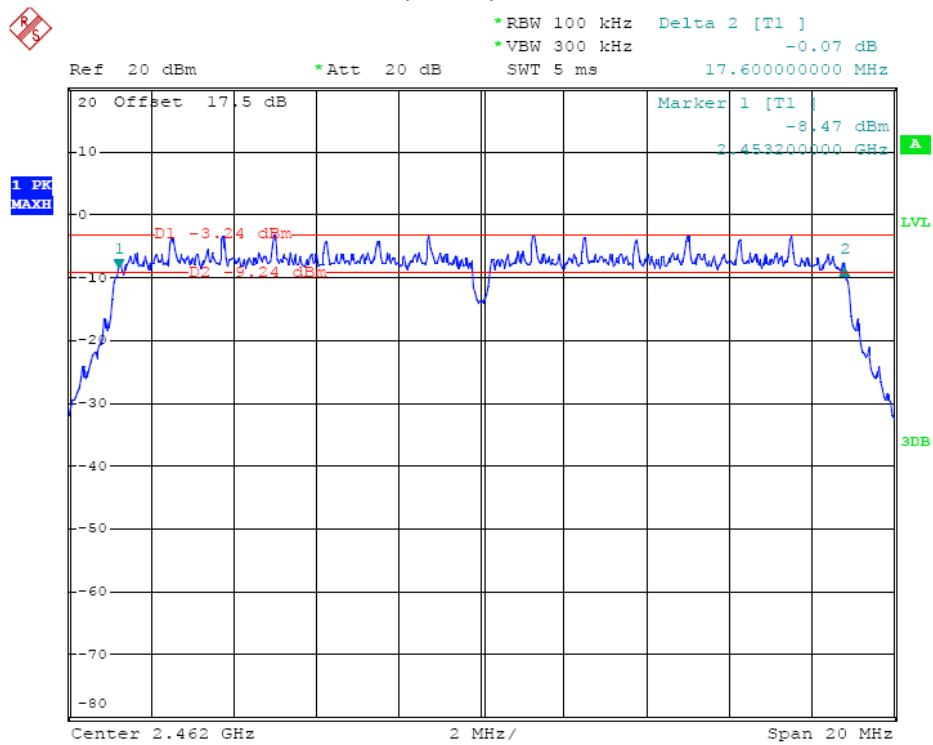
802.11n(HT20) 2412MHz



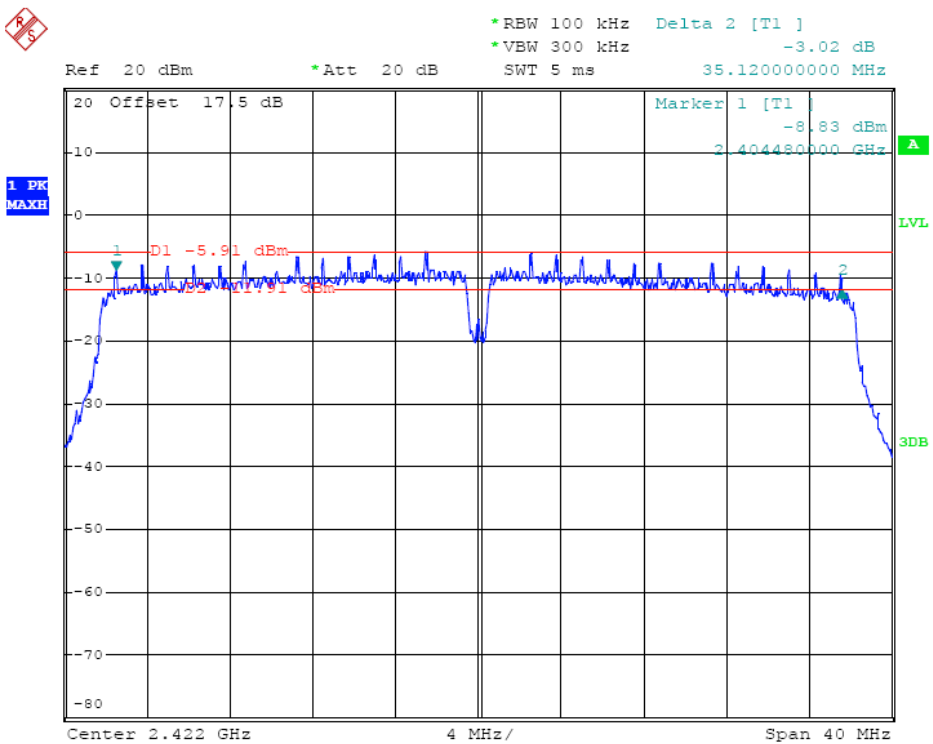
802.11n(HT20) 2437MHz



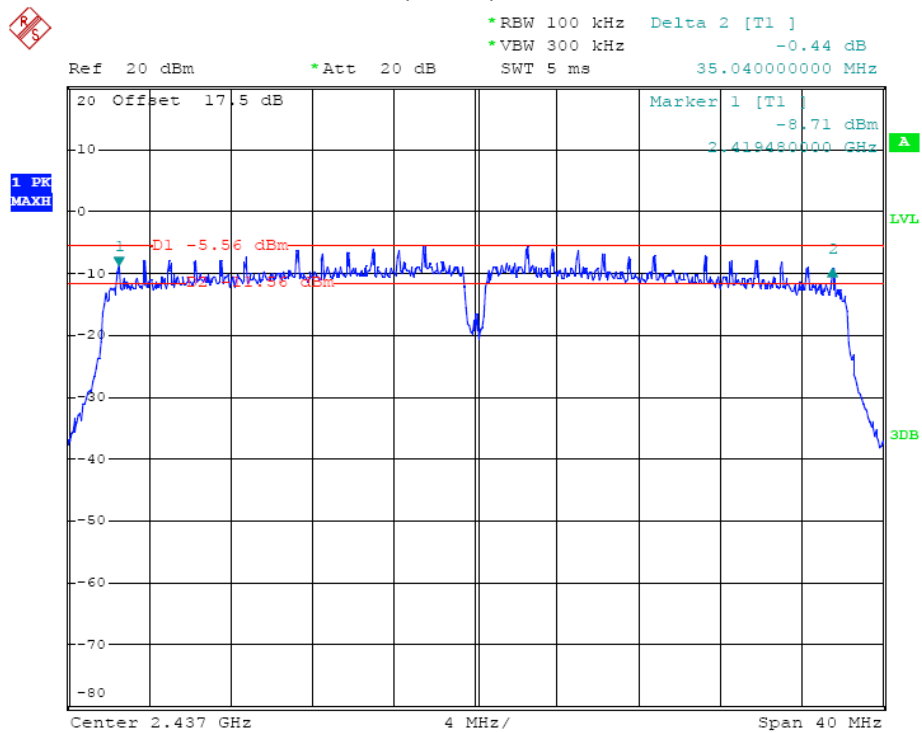
802.11n(HT20) 2462MHz



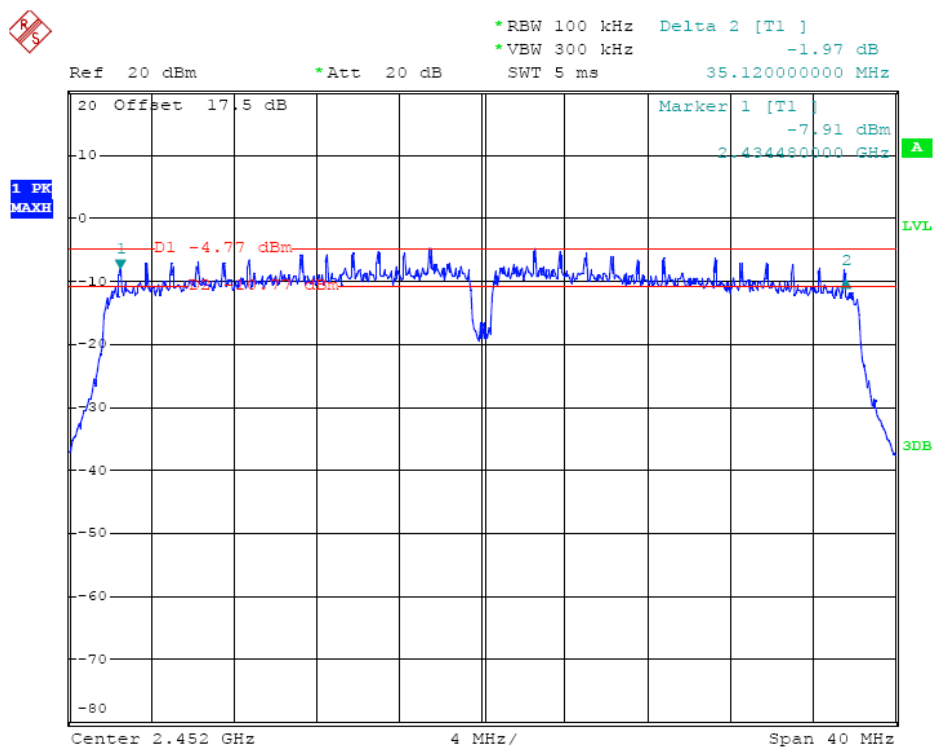
802.11n(HT40) 2422MHz



802.11n(HT40) 2437MHz



802.11n(HT40) 2452MHz



7. BAND EDGE COMPLIANCE TEST

7.1. Limits

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

7.2. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure.

For conduct test, VBW is set at 300kHz and RBW is set at 100kHz for measurement.

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

For radiated test as follows:

	Frequency (MHz)	Antenna polarization (H/V)	Frequency (MHz)	Emission (dBuV/m)	Band edge Limit (dBuV/m)	
				PK	PK	AV
802.11b	<2400	H	2398.67	47.31	74.00	54.00
	<2400	V	2397.84	48.25	74.00	54.00
	>2483.5	H	2486.38	47.12	74.00	54.00
	>2483.5	V	2485.94	46.42	74.00	54.00
802.11g	<2400	H	2398.65	47.33	74.00	54.00
	<2400	V	2397.29	46.26	74.00	54.00
	>2483.5	H	2485.58	47.43	74.00	54.00
	>2483.5	V	2487.43	46.26	74.00	54.00
802.11n(HT20)	<2400	H	2397.69	47.45	74.00	54.00
	<2400	V	2398.11	46.31	74.00	54.00
	>2483.5	H	2486.59	47.26	74.00	54.00
	>2483.5	V	2485.94	46.28	74.00	54.00
802.11n(HT40)	<2400	H	2397.86	47.34	74.00	54.00
	<2400	V	2398.06	46.14	74.00	54.00
	>2483.5	H	2485.34	47.27	74.00	54.00
	>2483.5	V	2486.06	46.31	74.00	54.00

8. OUTPUT POWER TEST

8.1. Limits

For systems using digital modulation in the 2400~2483.5MHz, The Peak out put Power shall not exceed 1W(30dBm)

8.2. Test setup

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the peak power value.
3. Repeat above procedures on all channels needed to be tested.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.3. Test result

	Channel Frequency (MHz)	Peak output Power(dBm)	Limit (dBm)	Result
802.11b	2412	8.52	30	Pass
	2437	8.57	30	Pass
	2462	8.48	30	Pass
802.11g	2412	8.37	30	Pass
	2437	8.26	30	Pass
	2462	8.55	30	Pass
802.11n(HT20)	2412	8.41	30	Pass
	2437	8.39	30	Pass
	2462	8.42	30	Pass
802.11n(HT40)	2422	7.95	30	Pass
	2437	7.89	30	Pass
	2452	7.86	30	Pass

9. POWER SPECTRAL DENSITY TEST

9.1. Limits

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

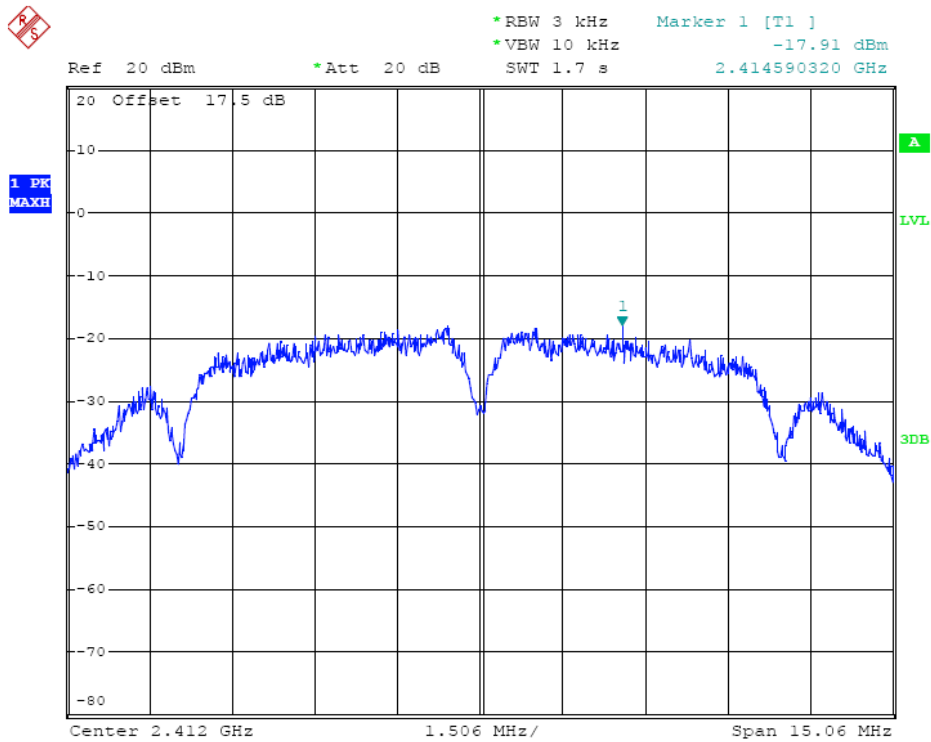
9.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW = 3kHz.
4. Set the VBW = 3 times RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

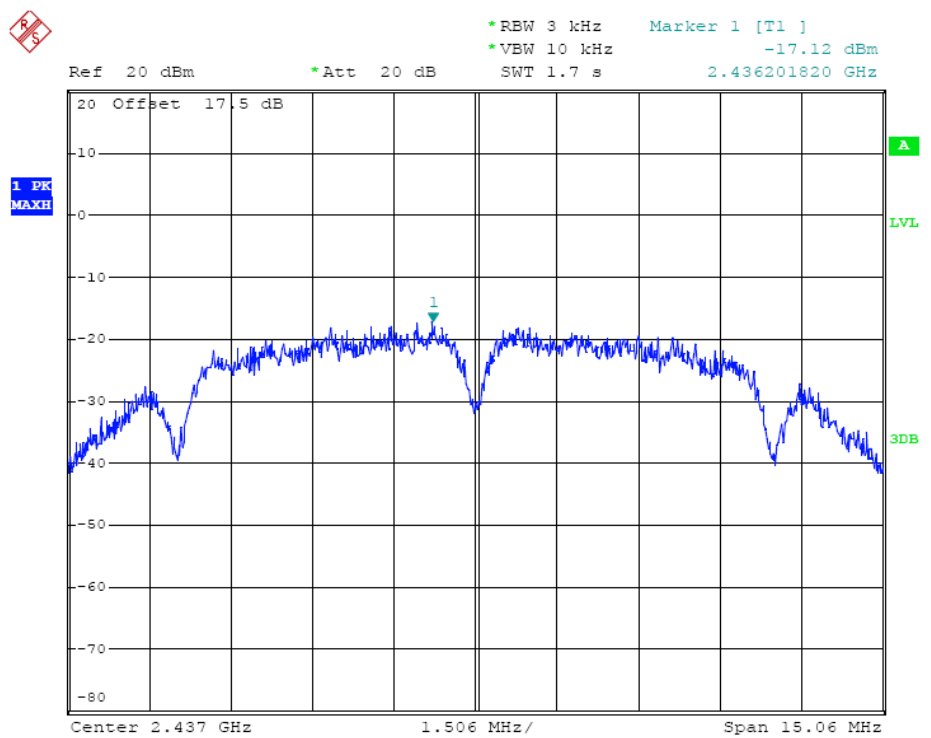
9.3. Test result

	Channel Frequency (MHz)	Power density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	2412	-17.91	<8	Pass
	2437	-17.12	<8	Pass
	2462	-14.66	<8	Pass
802.11g	2412	-16.90	<8	Pass
	2437	-18.12	<8	Pass
	2462	-17.38	<8	Pass
802.11n (HT20)	2412	-17.81	<8	Pass
	2437	-18.57	<8	Pass
	2462	-16.92	<8	Pass
802.11n (HT40)	2422	-20.17	<8	Pass
	2437	-19.99	<8	Pass
	2452	-18.33	<8	Pass

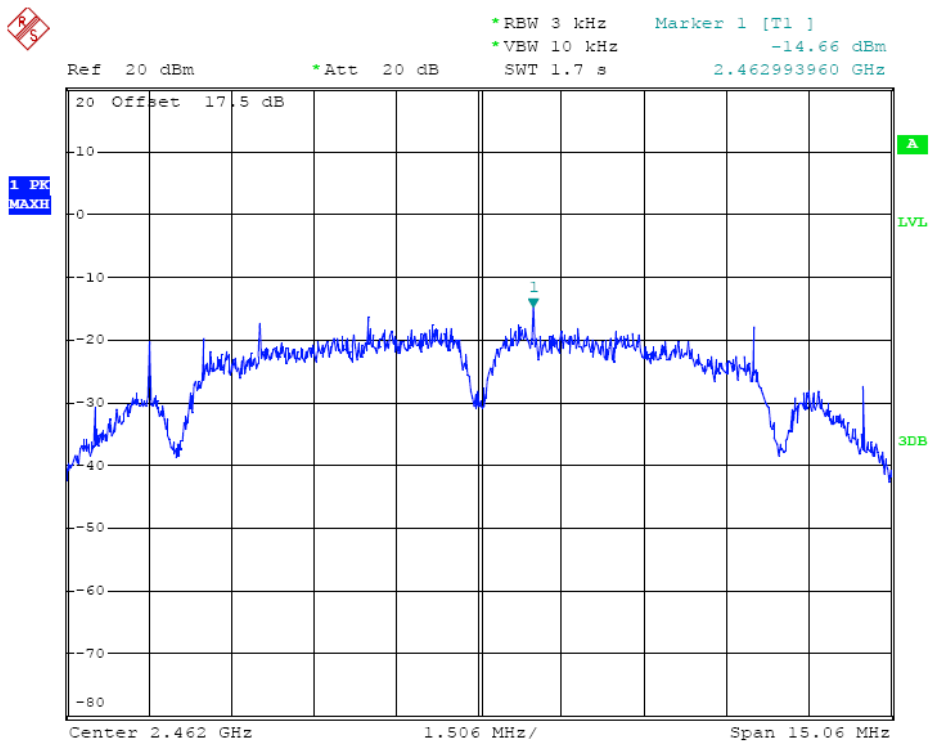
802.11b 2412MHz



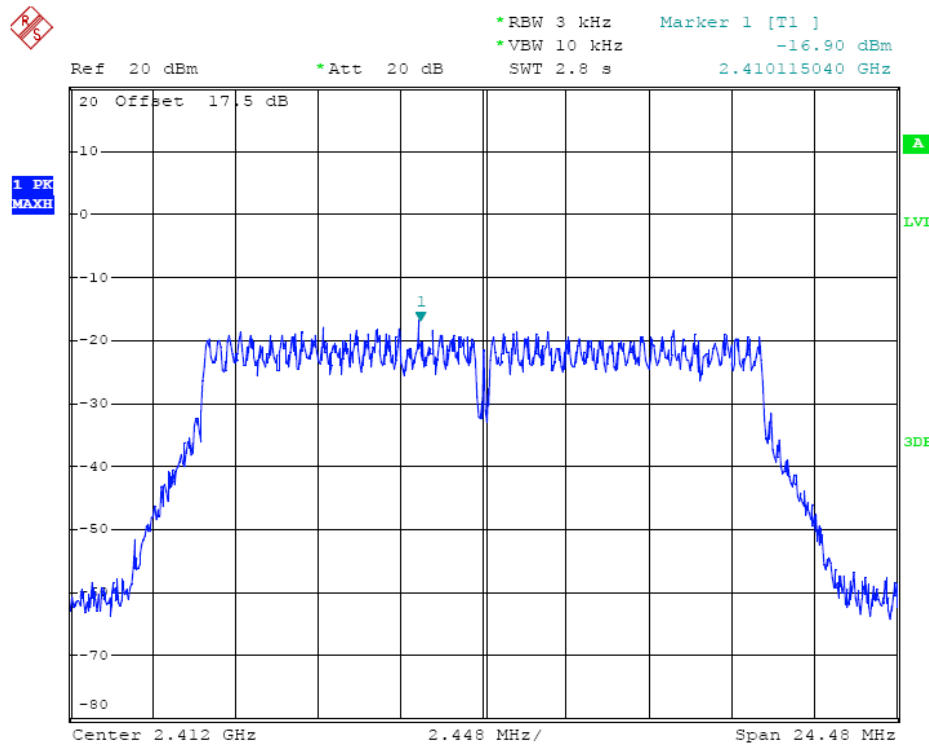
802.11b 2437MHz



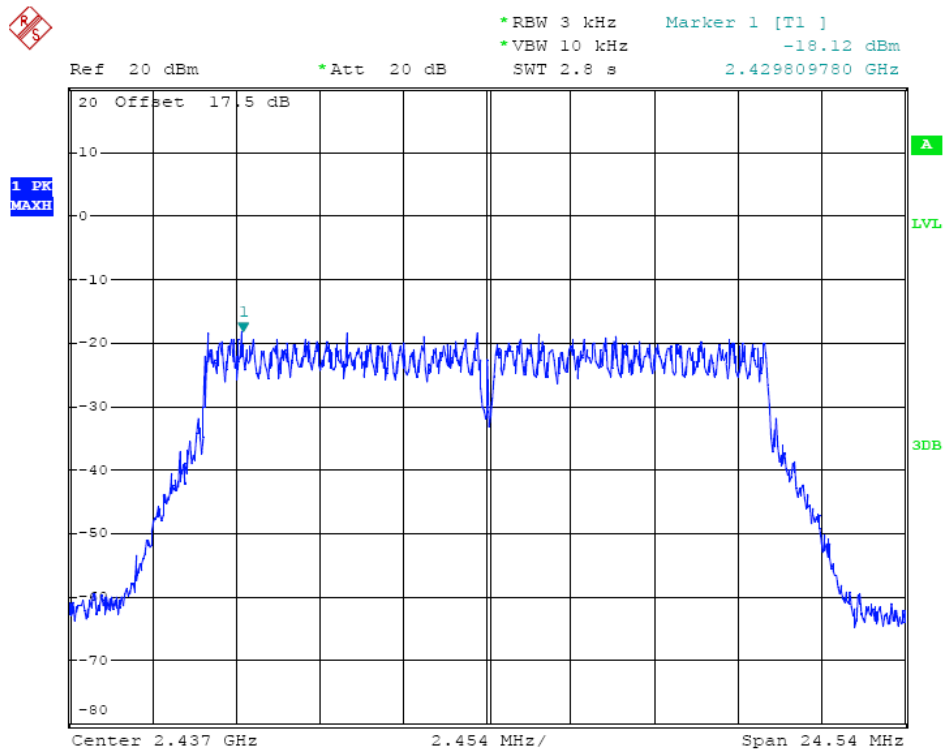
802.11b 2462MHz



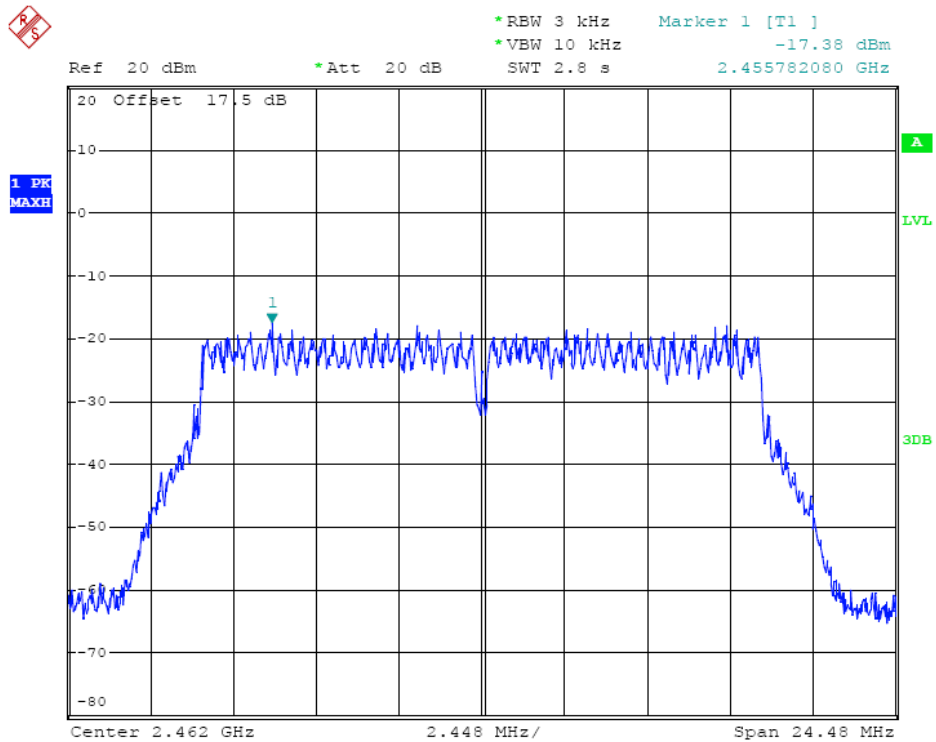
802.11g 2412MHz



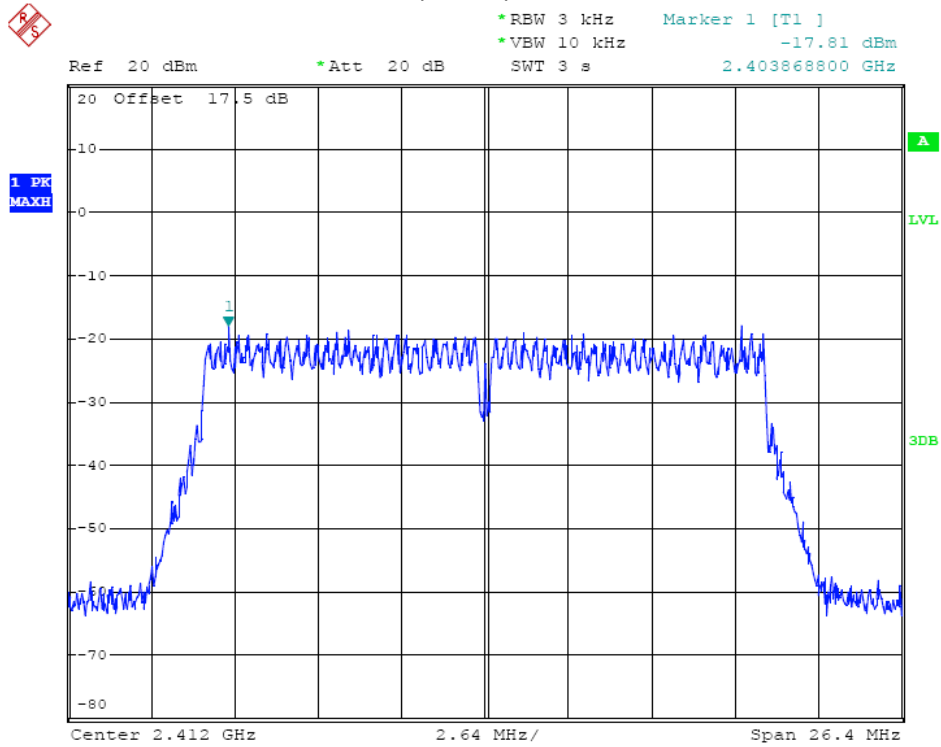
802.11g 2437MHz



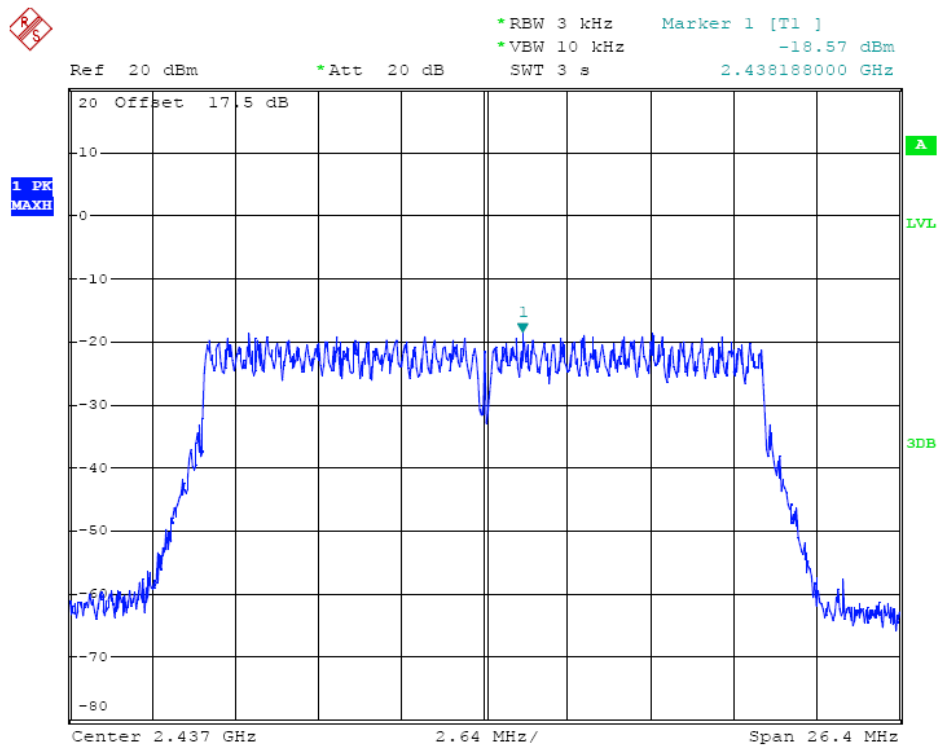
802.11g 2462MHz



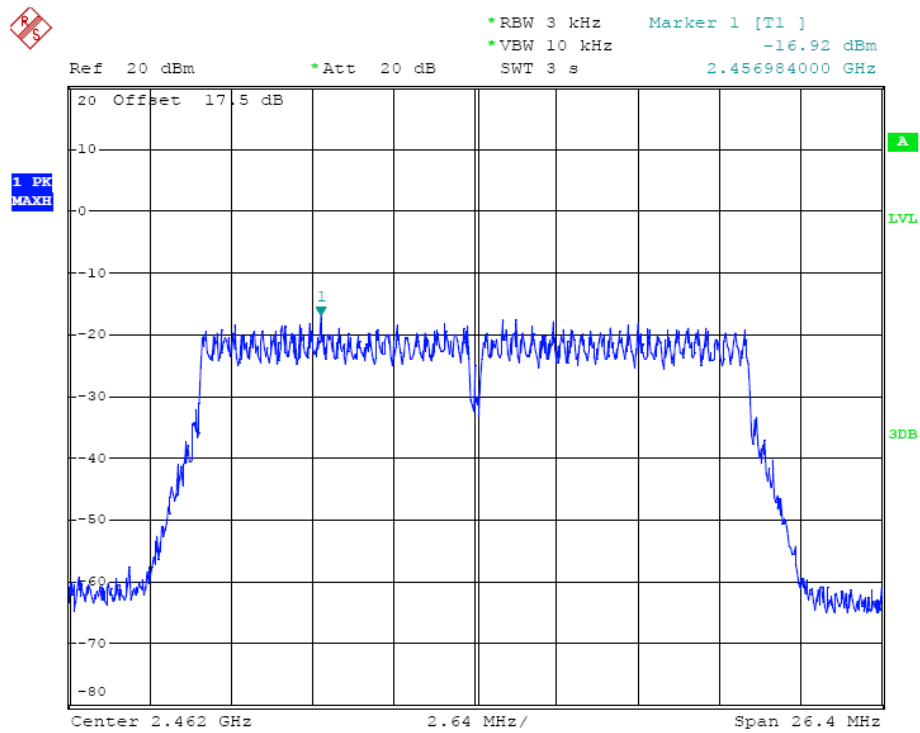
802.11n (HT20) 2412MHz



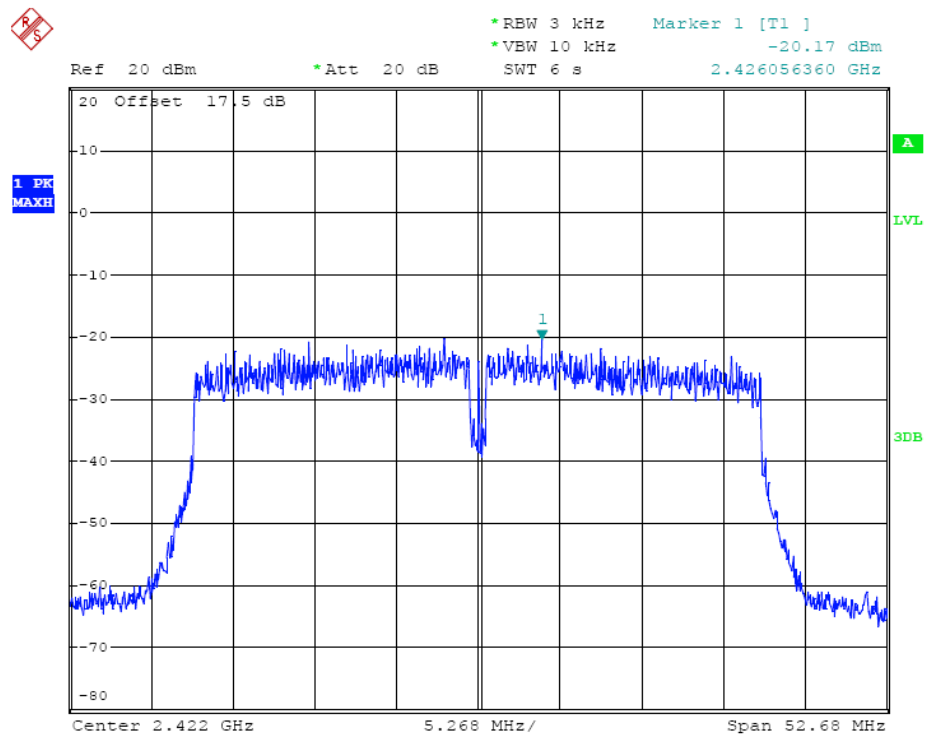
802.11n (HT20) 2437MHz



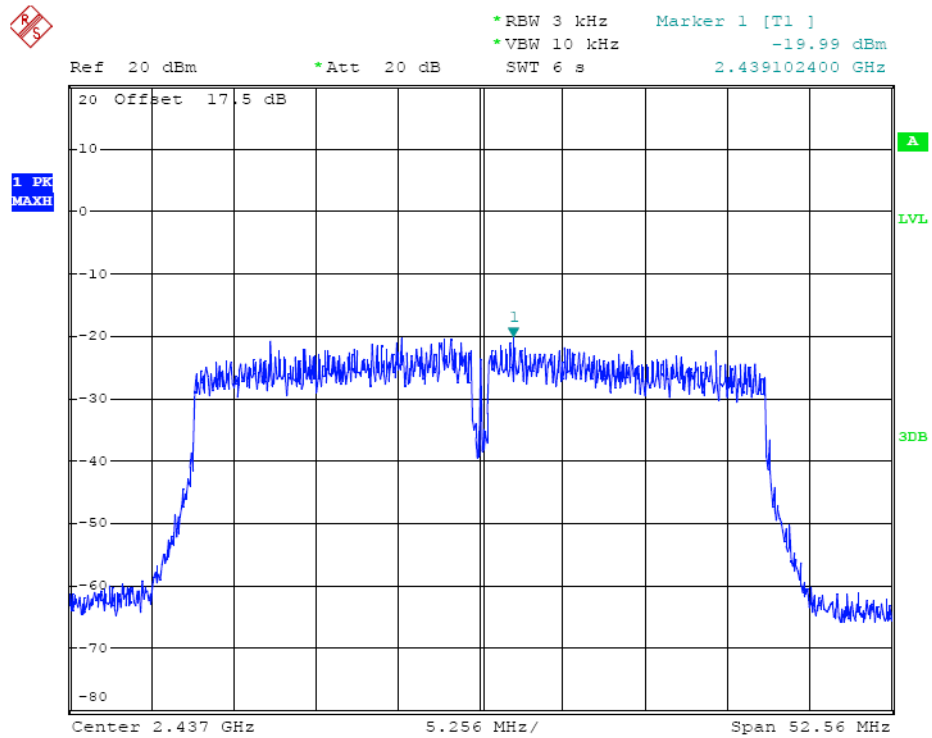
802.11n(HT20) 2462MHz



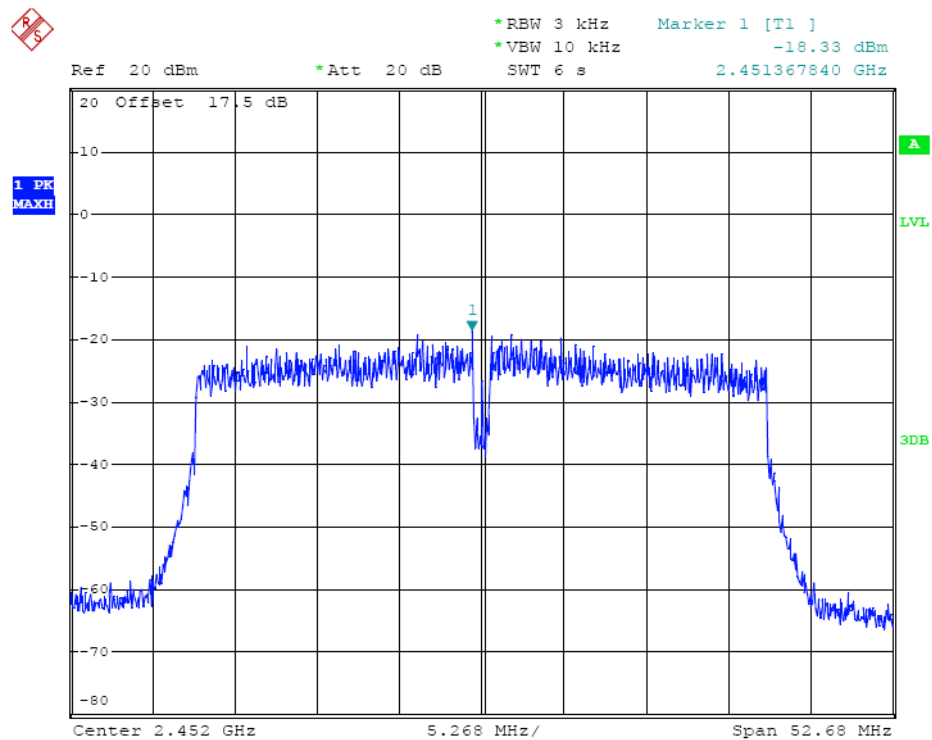
802.11 n (HT40) 2422MHz



802.11 n (HT40) 2437MHz



802.11 n (HT40) 2452MHz



10. ANTENNA REQUIREMENTS

10.1. Limits

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. Result

The antennas used for this product are Internal Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.0 dBi.

END.