

# FCC TEST REPORT

**Test report  
On Behalf of  
Shenzhen Yunlink Technology Co., Ltd  
For  
Wireless Access Point  
Model No.: CPE-870, CPE-880, CPE-860, CPE-3200,  
AP80, CPE-970, CPE-980, CPE-960, AP21, AP20, AP28,  
XD-9341, LT-9341  
FCC ID: 2ADUG-CPE870**

**Prepared for :** Shenzhen Yunlink Technology Co., Ltd  
B2 Building, An'le Industrial Zone, Hangcheng Road, gushu, xixiang town,  
Baoan, Shenzhen Guangdong Province China

**Prepared By :** Shenzhen WST Testing Technology Co., Ltd.  
1F, No.9 Building, TGK Science & Technology Park, Yangtian Rd., NO.72  
Bao'an Dist., Shenzhen, Guangdong, China. 518101

**Date of Test:** August 07-18, 2015

**Date of Report:** August 18, 2015

**Report Number:** WST15081202

## TEST RESULT CERTIFICATION

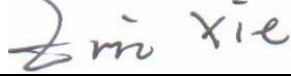
**Applicant's name** ..... : Shenzhen Yunlink Technology Co., Ltd  
Address ..... : B2 Building, An'le Industrial Zone, Hangcheng Road, gushu,  
xixiang town, Baoan, Shenzhen Guangdong Province China  
**Manufacture's Name** ..... : Shenzhen Yunlink Technology Co., Ltd  
Address ..... : B2 Building, An'le Industrial Zone, Hangcheng Road, gushu,  
xixiang town, Baoan, Shenzhen Guangdong Province China

### Product description


Trade Mark: N/A  
Product name..... : Wireless Access Point  
Model and/or type reference : CPE-870, CPE-880, CPE-860, AP80, CPE-970, CPE-980,  
CPE-960, CPE-3200, AP21, AP20, AP28, XD-9341, LT-9341  
**Standards** ..... : FCC Rules and Regulations Part 15 Subpart C Section 15.247  
ANSI C63.4: 2009

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**Date of Test** ..... :  
Date (s) of performance of tests ..... : August 07-18, 2015  
Date of Issue ..... : August 18, 2015  
Test Result ..... : **Pass**

Testing Engineer :   
\_\_\_\_\_  
(Eric Xie)

Technical Manager :   
\_\_\_\_\_  
(Dora Qin)

Authorized Signatory :   
\_\_\_\_\_  
(Kait Chen)

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## 1. TEST SUMMARY

FCC Rules	Description of Test	Result
Section 15.247(a)2)	6dB Bandwidth Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(d)	Band Edge Compliance Tes	Compliant
Section 15.247(d) Section 15.209)	Radiated Spurious Emission Test	Compliant
Section 15.247(d)	Conducted Spurious Emission Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

## 1.1 TEST FACILITY

Test Firm : Shenzhen WST Testing Technology Co., Ltd.  
Certificated by FCC, Registration No.: 939433  
Address : 1F, No.9 Building, TGK Science & Technology Park, Yangtian Rd., NO.72  
Bao'an Dist., Shenzhen, Guangdong, China. 518101  
Tel : (86)755-33916437  
Fax : (86)755-27822175

## 1.2 MEASUREMENT UNCERTAINTY

Measurement Uncertainty  
Conducted Emission Expanded Uncertainty = 2.23dB, k=2  
Radiated emission expanded uncertainty(9kHz-30MHz) = 3.08dB, k=2  
Radiated emission expanded uncertainty(30MHz-1000MHz) = 4.42dB, k=2  
Radiated emission expanded uncertainty(Above 1GHz) = 4.06dB, k=2

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Access Point
Model Name	CPE-870
Serial No	CPE-880, CPE-860, CPE-3200, AP80,CPE-970,CPE-980, CPE-960, AP21, AP20, AP28, XD-9341, LT-9341
FCC ID	2ADUG-CPE870
Model Difference	All the model are the same circuit and RF module,except the appearance colour, this report only test mode name: CPE-870.
Modulation Type	OFDM(64-QAM, 16-QAM, QPSK,BPSK)
Antenna Type	Internal
WLAN Operation frequency	802.11b: 2412-2462MHz 802.11g: 2412-2462MHz 802.11n HT20: 2412-2462MHz 802.11n HT40: 2462-2452MHz
Number of Channels	802.11b/g/n (20MHz):11 802.11n (40MHz): 7
Data Rate	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 300Mbps
Modulation Type	CCK, OFDM
Power Source	AC Voltage
Power Rating	Input 100-240V, 50/60Hz,0.8A Output DC 12V,1A
Adapter Model	GRT-240100

## 2.2 Carrier Frequency of Channels

### 802.11b, 802.11g, 802.11n (20MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

### 802.11n (40MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
---	---	07	2442
---	---	08	2447
03	2422	09	2452
04	2427	---	---
05	2432	---	---
06	2437	---	---

## Operation of EUT during testing

### Operating Mode

The mode is used: **802.11b Transmitting mode**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

### **802.11g Transmitting mode**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

### **802.11n (HT20) Transmitting mode**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

### **802.11n (HT40) Transmitting mode**

Low Channel: 2422MHz

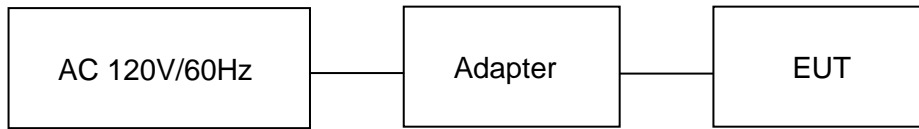
Middle Channel: 2437MHz

High Channel: 2452MHz



### 2.3 DESCRIPTION OF TEST SETUP

#### OPERATION OF EUT DURING TESTING



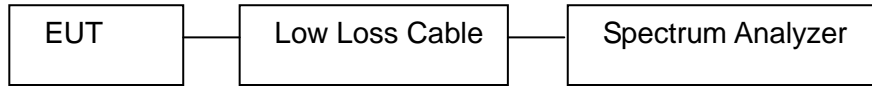
## 2.4 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2015	1 Year
2.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2015	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2015	1 Year
4.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
5.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2015	1 Year
6.	Trilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 17, 2015	1 Year
7.	Pre-amplifier	Compliance Direction	PAP-0203	22008	May 19, 2015	1 Year
8.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
9.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2015	1 Year
10.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2015	1 Year
11.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2015	1 Year
12.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
13.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2015	1 Year
14.	EMI Receiver	Rohde & Schwarz	ESCI	100627	May 19, 2015	1 Year
15.	LISN	SchwarzBeck	NSLK 8126	8126377	May 19, 2015	1 Year
16.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2015	1 Year
17.	EMI Test Software ES-K1	Rohde & Schwarz	N/A	N/A	N/A	N/A
18.	Programmable AC Power source	SOPH POWER	PAG-1050	630250	May 26, 2015	1 Year
19.	Harmonic and Flicker Analyzer	LAPLACE	AC2000A	272629	May 26, 2015	1 Year
20.	Harmonic and Flicker Test Software AC 2000A	LAPLACE	N/A	N/A	N/A	N/A
21.	ESD Simulators	KIKUSUI	KES4021	LJ003477	May 25, 2015	1 Year
22.	EFT Generator	EMPEK	EFT-4040B	0430928N	May 19, 2015	1 Year
23.	Shielding Room	ChangZhou ZhongYu	JB88	SEL0166	May 19, 2015	1 Year
24.	Signal Generator 9KHz~2.2GHz	R&S	SML02	SEL0143	May 19, 2015	1 Year
25.	Signal Generator 9KHz~1.1GHz	R&S	SML01	SEL0135	May 19, 2015	1 Year
26.	Power Meter	R&S	NRVS	SEL0144	May 19, 2015	1 Year
27.	RF Level Meter		URV35	SEL0137	May 19, 2015	1 Year
28.	Audio Analyzer	R&S	UPL	SEL0136	May 19, 2015	1 Year

29.	RF-Amplifier 150KHz~150MH z	BONN Elektronik	BSA1515-25	SEL0157	May 19, 2015	1 Year
30.	Stripline Test Cell	Erika Fiedler	VDE0872	SEL0167	N/A	N/A
31.	TV Test Transmitter	R&S	SFM	SEL0159	May 17, 2015	1 Year
32.	TV Generator PAL	R&S	SGPF	SEL0138	May 19, 2015	1 Year
33.	TV Generator Ntsc	R&S	SGMF	SEL0140	May 19, 2015	1 Year
34.	TV Generator Secam	R&S	SGSF	SEL0139	May 19, 2015	1 Year
35.	TV Test Transmitter 0.3MHz~3300MHz	R&S	SFQ	SEL0142	May 19, 2015	1 Year
36.	MPEG2 Measurement Generator	R&S	DVG	SEL0141	May 19, 2015	1 Year
37.	Spectrum Analyzer	R&S	FSP	SEL0177	May 19, 2015	1 Year
38.	Matching	R&S	RAM	SEL0146	N/A	N/A
39.	Matching	R&S	RAM	SEL0148	N/A	N/A
40.	Absorbing Clamp	R&S	MDS21	SEL0158	May 17, 2015	1 Year
41.	Coupling Set	Erika Fiedler	Rco, Rci, MC, AC, LC	SEL0149	N/A	N/A
42.	Filters	Erika Fiedler	Sr, LBS	SEL0150	N/A	N/A
43.	Matching Network	Erika Fiedler	MN, T1	SEL0151	N/A	N/A
44.	Fully Anechoic Room	ChangZhou ZhongYu	854	SEL0169	Jun. 10, 2015	1 Year
45.	Signal Generator	R&S	SML03	SEL0068	May 17, 2015	1 Year
46.	RF-Amplifier 30M~1GHz	Amplifier Reasearch	250W1000A	SEL0066	Oct. 24, 2014	1 Year
47.	RF-Amplifier 0.8~3.0GHz	Amplifier Reasearch	60S1G3	SEL0065	Oct. 24, 2014	1 Year
48.	Power Meter	R&S	NRVD	SEL0069	May 17, 2015	1 Year
49.	Power Sensor	R&S	URV5-Z2	SEL0071	May 17, 2015	1 Year
50.	Power Sensor	R&S	URV5-Z2	SEL0072	May 17, 2015	1 Year
51.	Software EMC32	R&S	EMC32-S	SEL0082	N/A	N/A
52.	Log-periodic Antenna	Amplifier Reasearch	AT1080	SEL0073	N/A	N/A
53.	Antenna Tripod	Amplifier Reasearch	TP1000A	SEL0074	N/A	N/A
54.	High Gain Horn Antenna(0.8-5G Hz)	Amplifier Reasearch	AT4002A	SEL0075	N/A	N/A

### 3. 6DB BANDWIDTH MEASUREMENT

#### 3.1 Block Diagram of Test Setup



#### 3.2 Limits

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

#### 3.3 Test Procedure

3.3.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

3.3.2. Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz

3.3.3. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### 3.4 Test Result

802.11b			
Channel	Frequency (MHz)	6DB Bandwidth(MHz)	Limit(MHz)
Low	2412	10.096	>0.5MHz
Middle	2437	10.096	>0.5MHz
High	2462	10.096	>0.5MHz

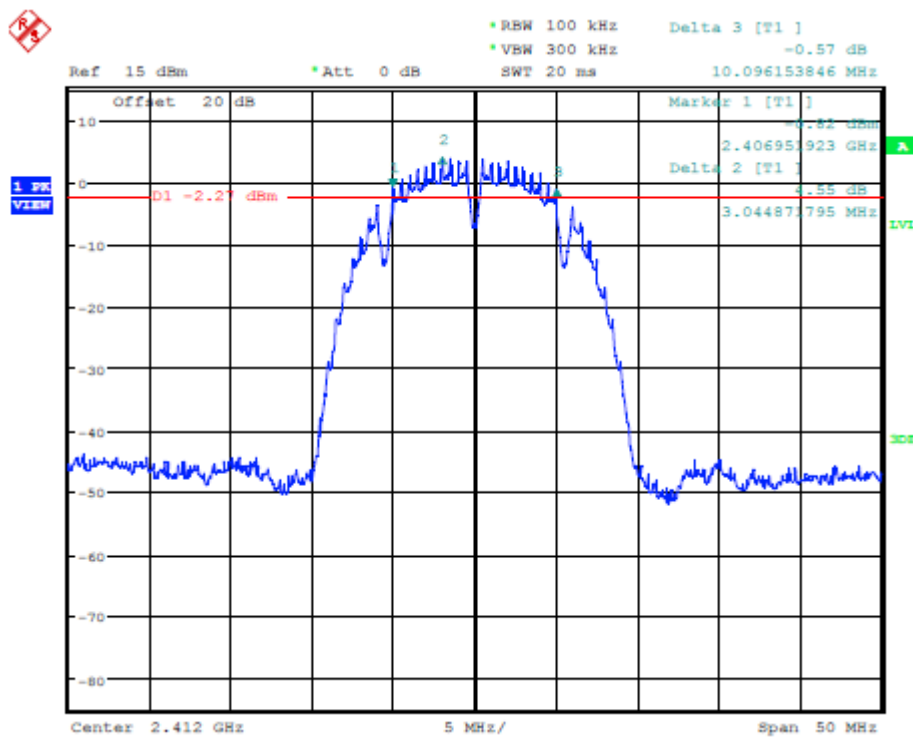
802.11g			
Channel	Frequency (MHz)	6DB Bandwidth(MHz)	Limit(MHz)
Low	2412	16.587	>0.5MHz
Middle	2437	16.587	>0.5MHz
High	2462	16.587	>0.5MHz

802.11n (Bandwidth: 20MHz)			
Channel	Frequency (MHz)	6DB Bandwidth(MHz)	Limit(MHz)
Low	2412	17.869	>0.5MHz
Middle	2437	17.869	>0.5MHz
High	2462	17.869	>0.5MHz

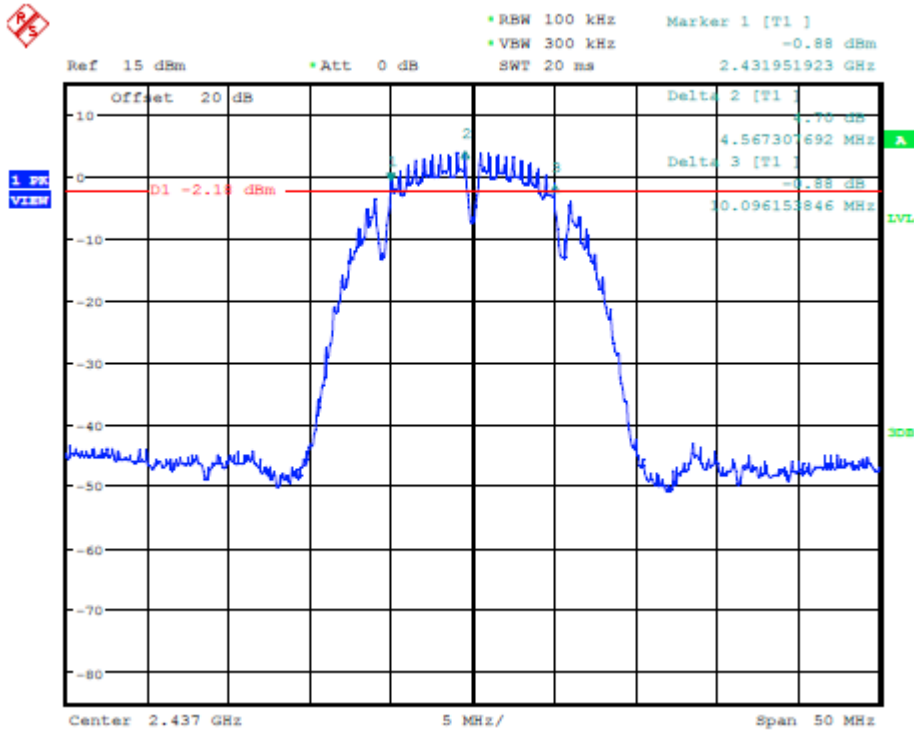
802.11n (Bandwidth: 40MHz)			
Channel	Frequency (MHz)	6DB Bandwidth(MHz)	Limit(MHz)
Low	2422	36.699	>0.5MHz
Middle	2437	36.699	>0.5MHz
High	2452	36.699	>0.5MHz

The spectrum analyzer plots are attached as below.

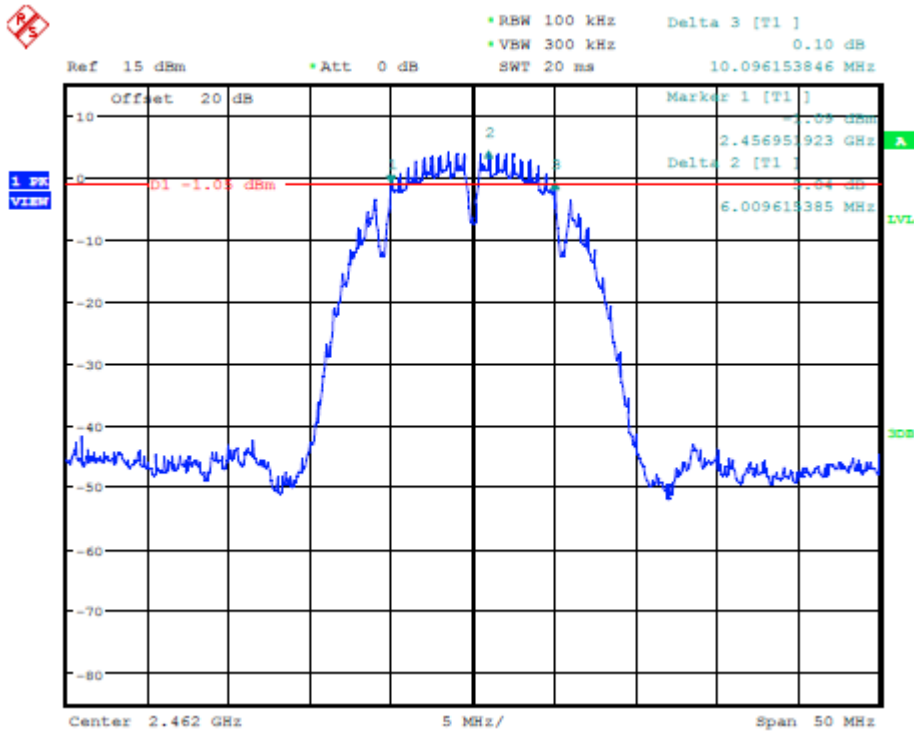
802.11b Channel Low 2412MHz



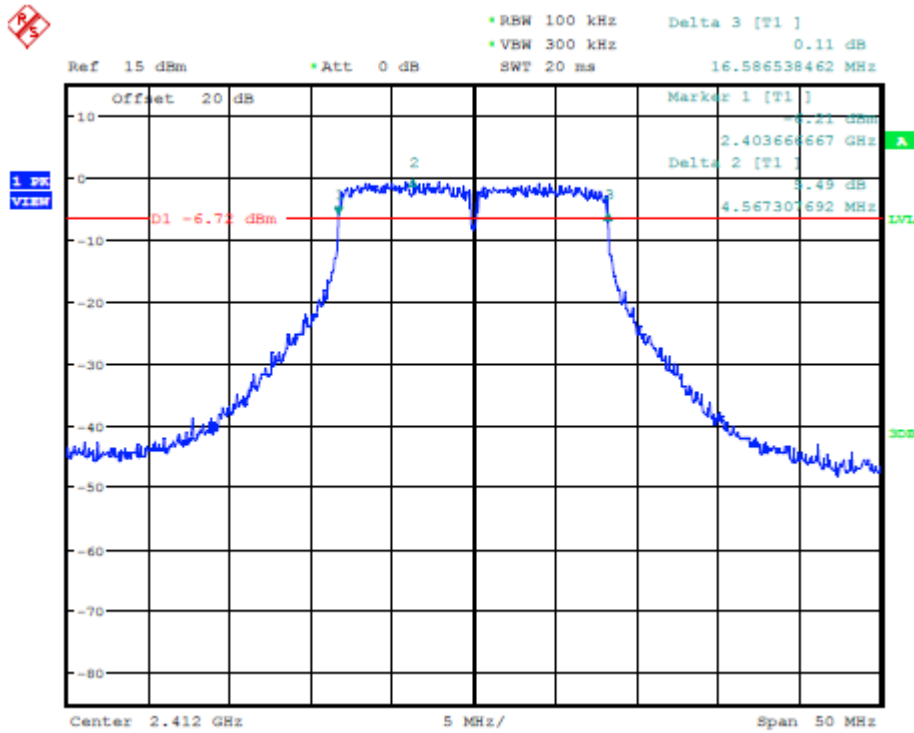
### 802.11b Channel Middle 2437MHz



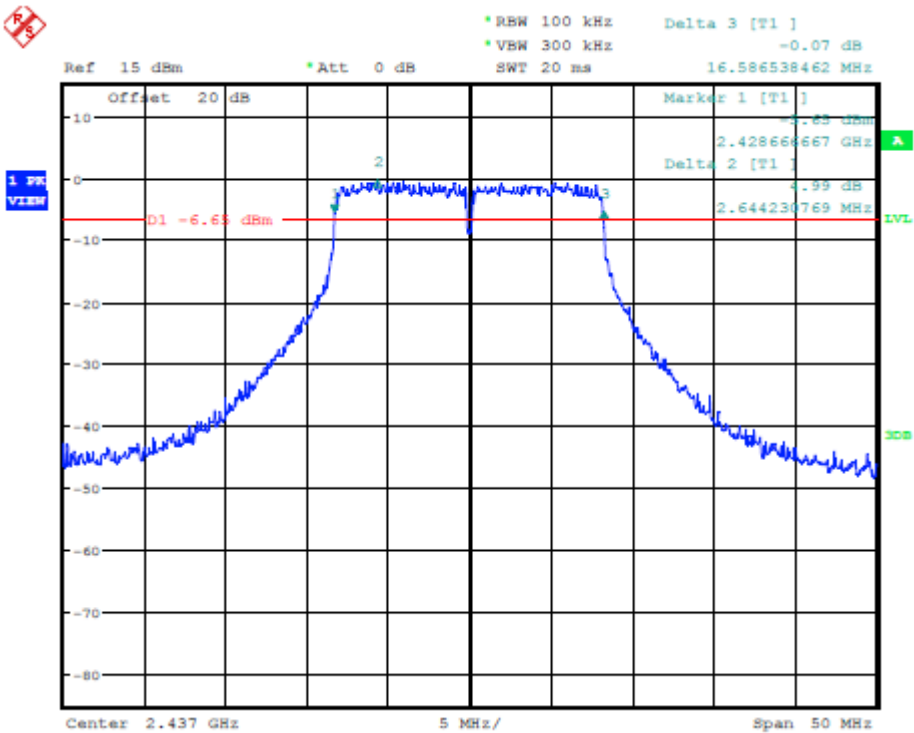
### 802.11b Channel High 2462MHz



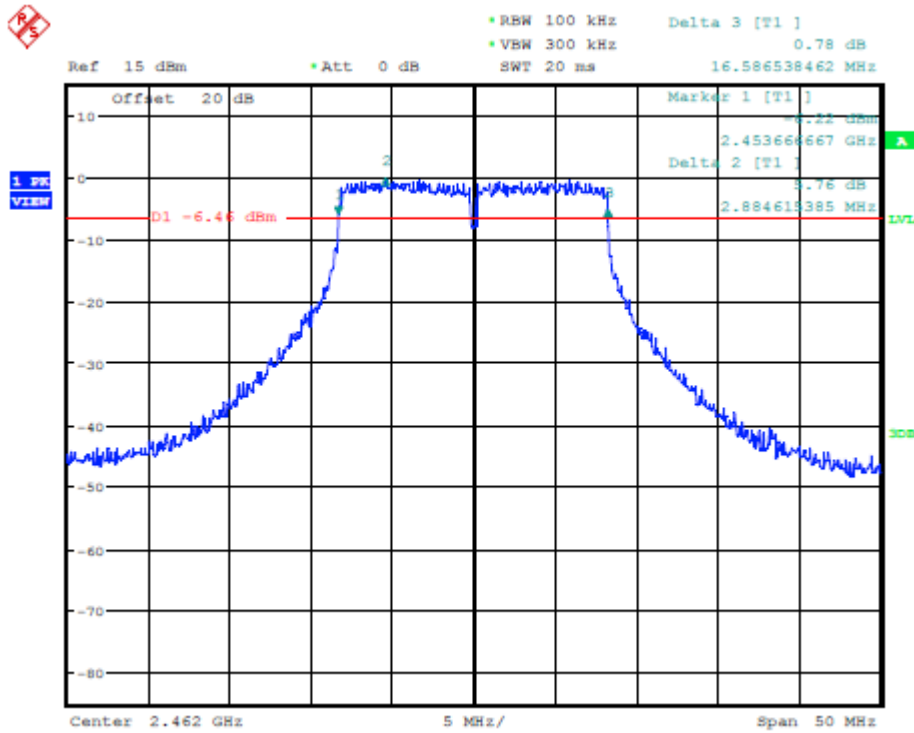
802.11g Channel Low 2412MHz



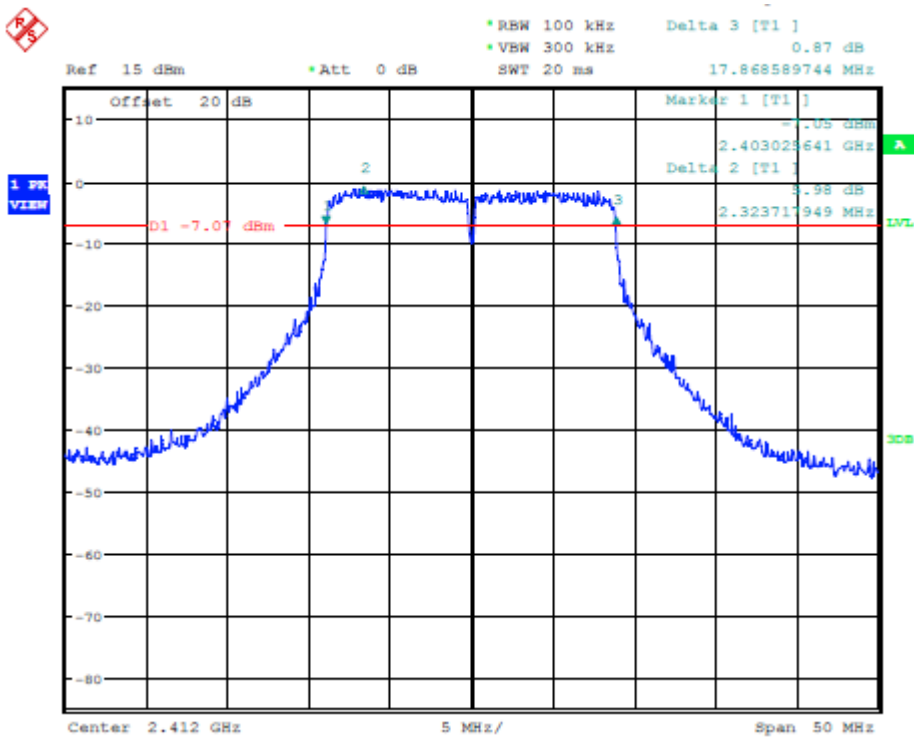
802.11g Channel Middle 2437MHz



802.11g Channel High 2462MHz

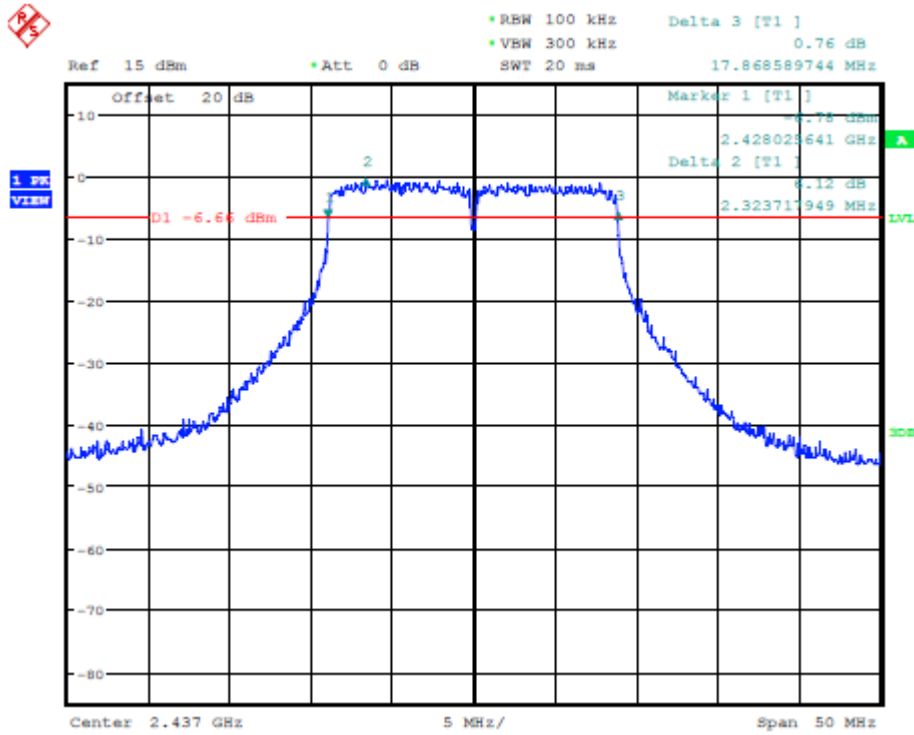


802.11n Channel Low 2412MHz (20MHz)

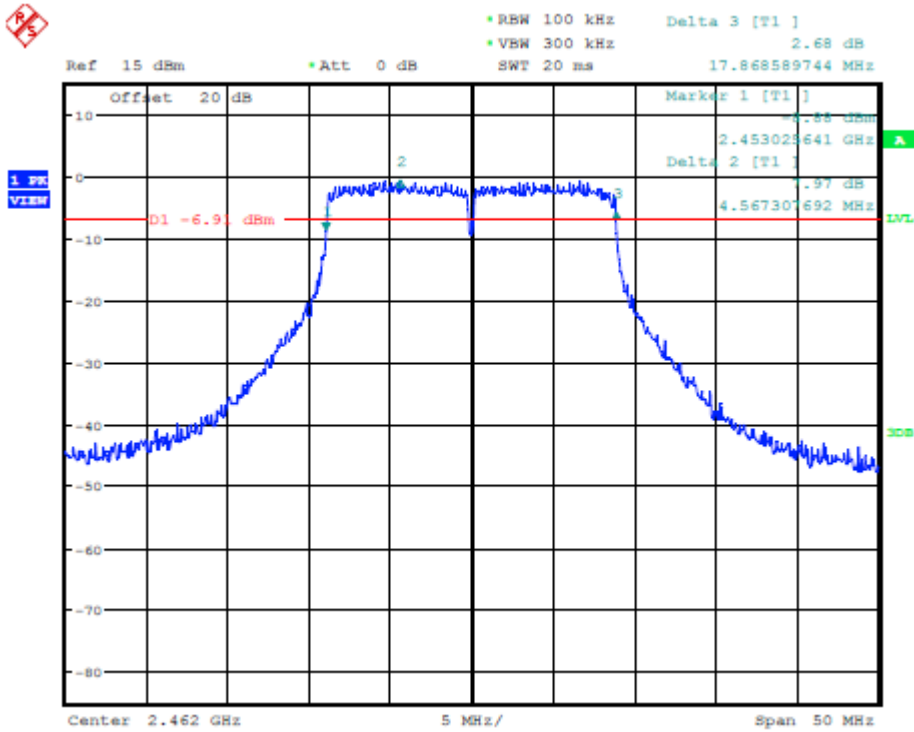




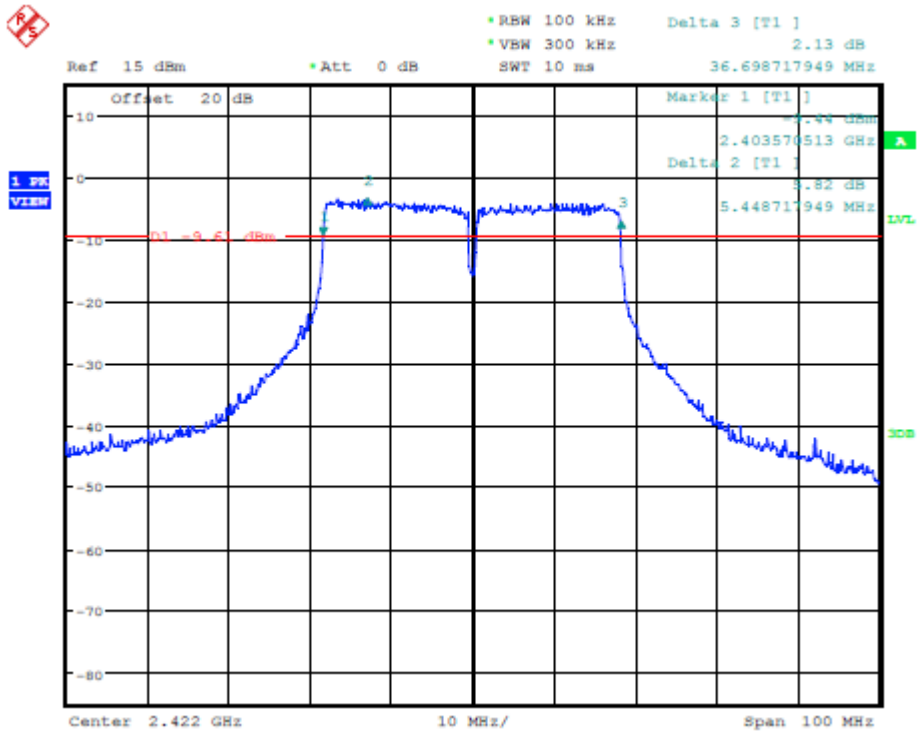
802.11n Channel Middle 2437MHz(20MHz)



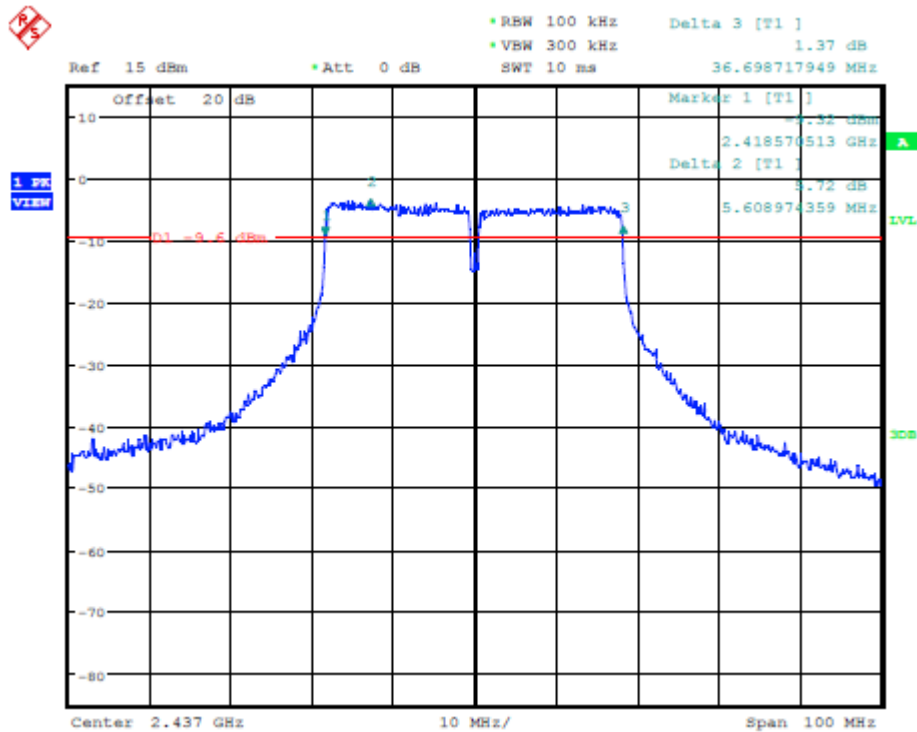
802.11n Channel High 2462MHz(20MHz)



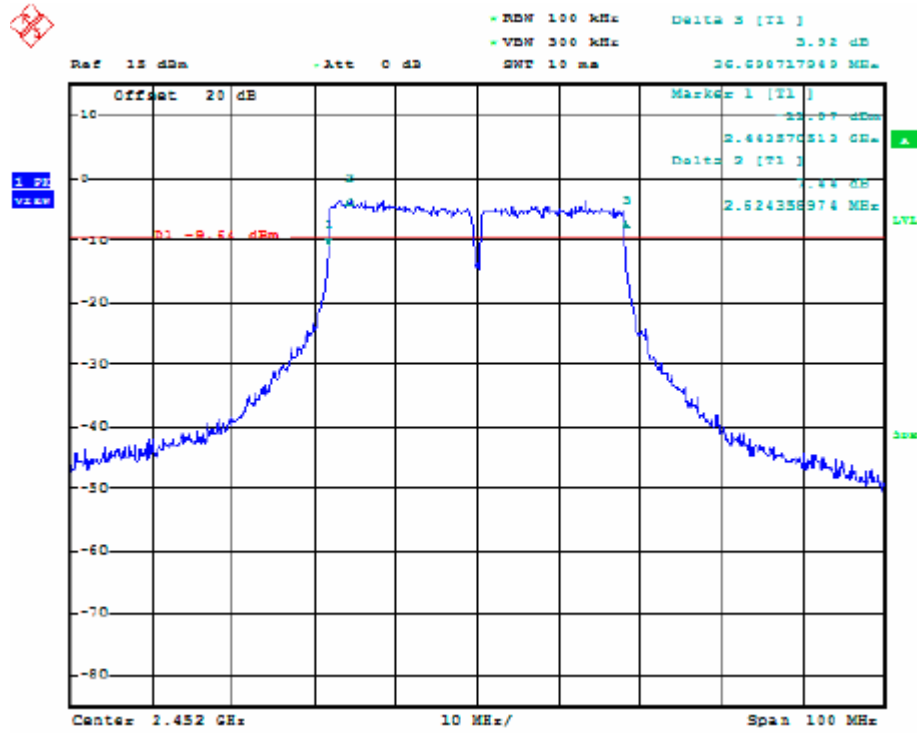
### 802.11n Channel Low 2422MHz (40MHz)



### 802.11n Channel Middle 2437MHz(40MHz)

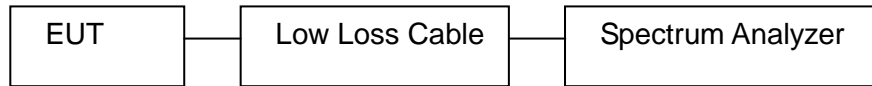


802.11n Channel High 2452MHz(40MHz)



## 4 Maximum Peak Output Power

### 4.1 Block Diagram of Test Setup



### 4.2 Limits

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

### 4.3 Test Procedure

- a. The transmitter output was connected to the spectrum analyzer through a low
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz
- c. Measurement the maximum peak output power.

4.4 Test Result  
**PASS**

802.11b			
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	17.04	30
Middle	2437	16.95	30
High	2462	16.66	30

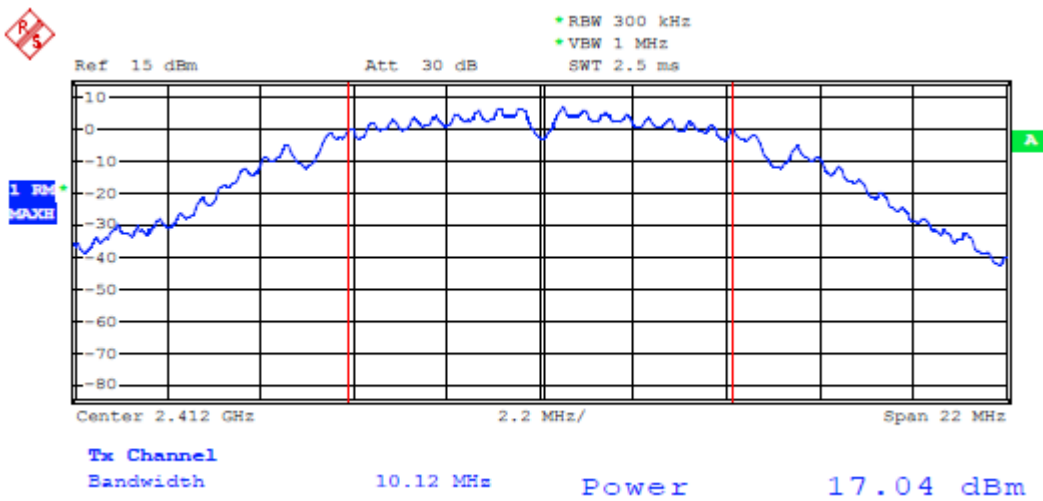
802.11g			
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	16.48	30
Middle	2437	16.44	30
High	2462	16.26	30

802.11n (20MHz)			
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	15.72	30
Middle	2437	15.78	30
High	2462	16.82	30

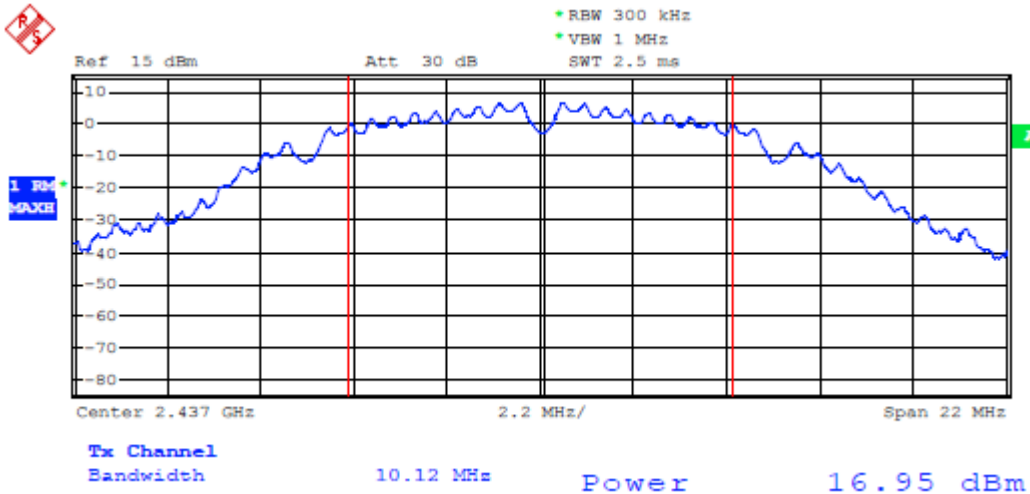
802.11n(40MHz)			
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2422	13.42	30
Middle	2437	13.65	30
High	2452	14.25	30

The spectrum analyzer plots are attached as below.

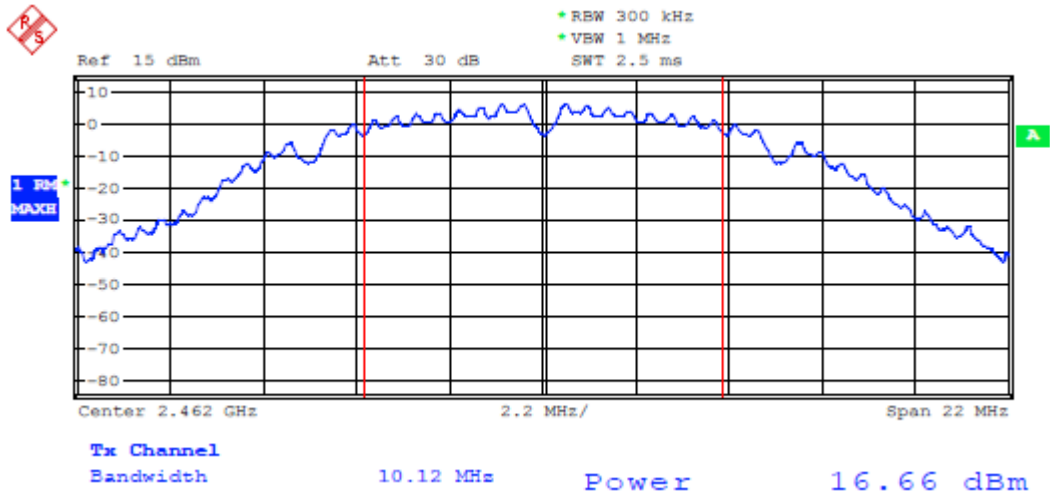
802.11b Channel Low 2412MHz



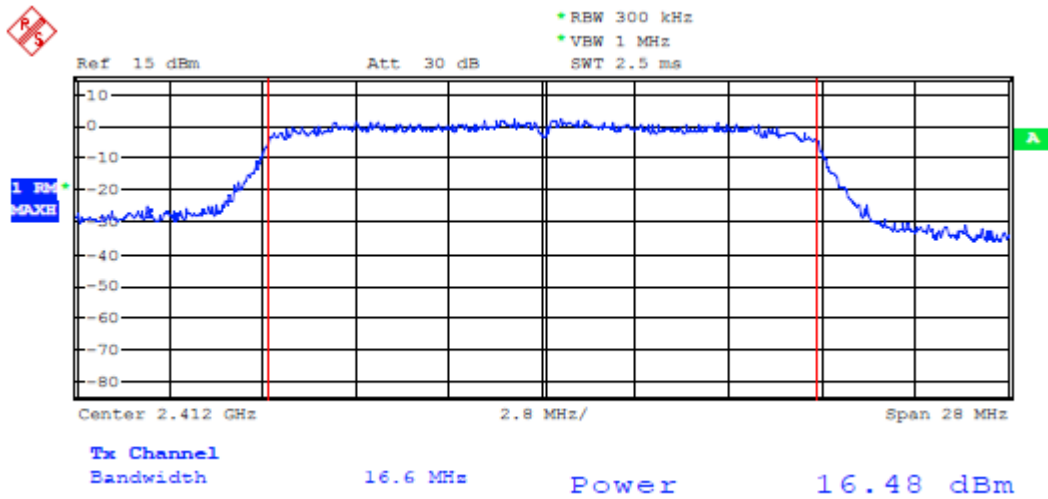
802.11b Channel Middle 2437MHz



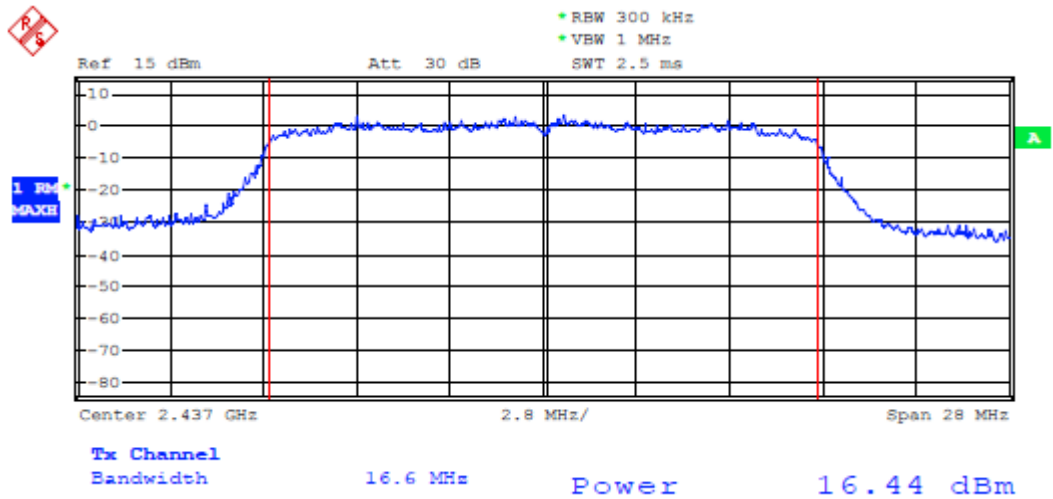
802.11b Channel High 2462MHz



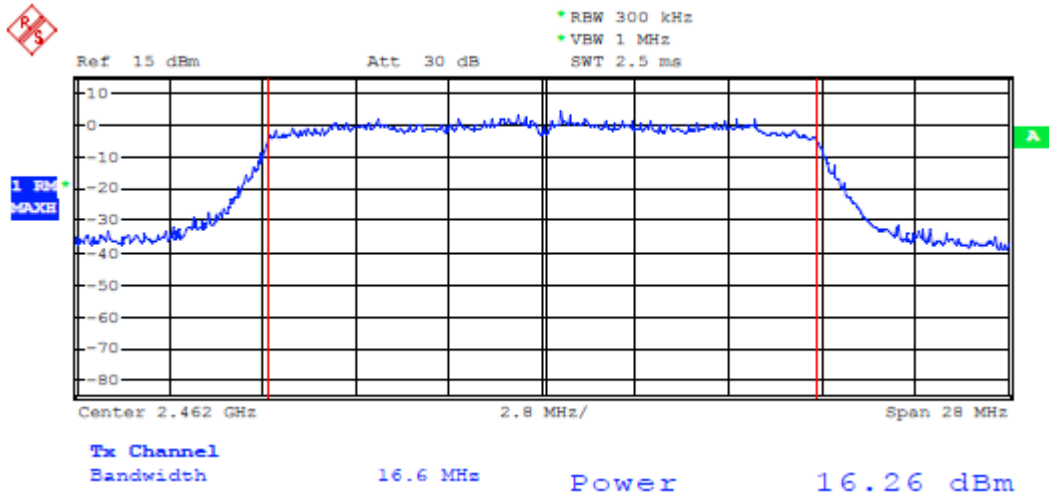
802.11g Channel Low 2412MHz



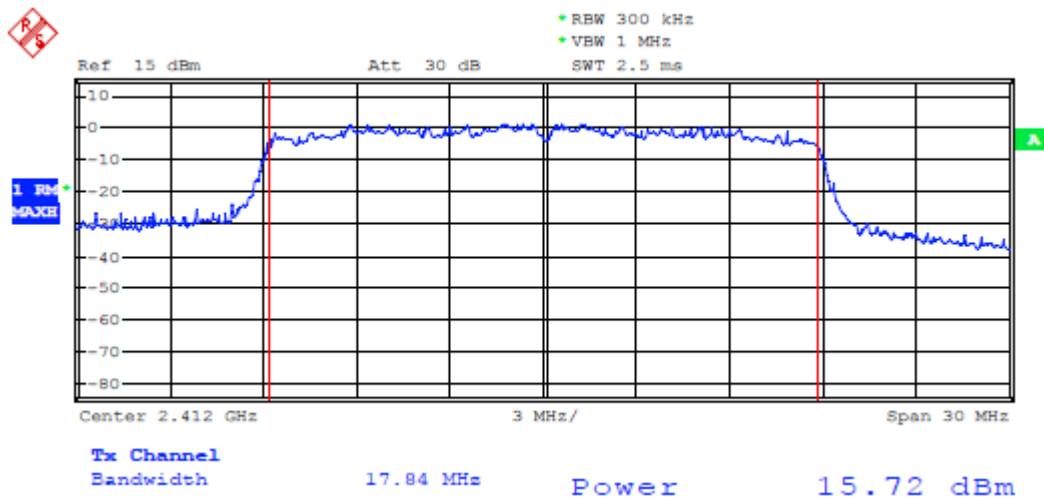
802.11g Channel Middle 2437MHz



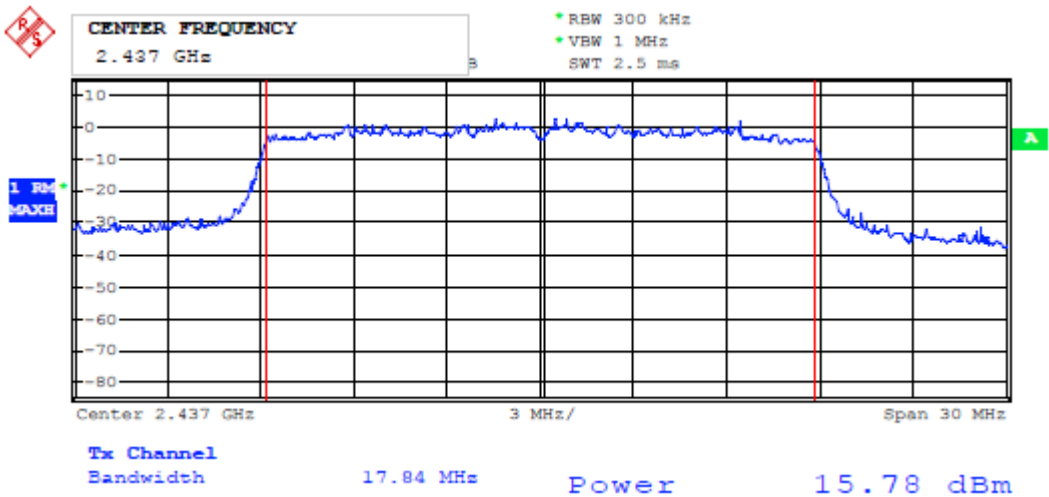
802.11g Channel High 2462MHz



802.11g Channel Low 2412MHz (20MHz)

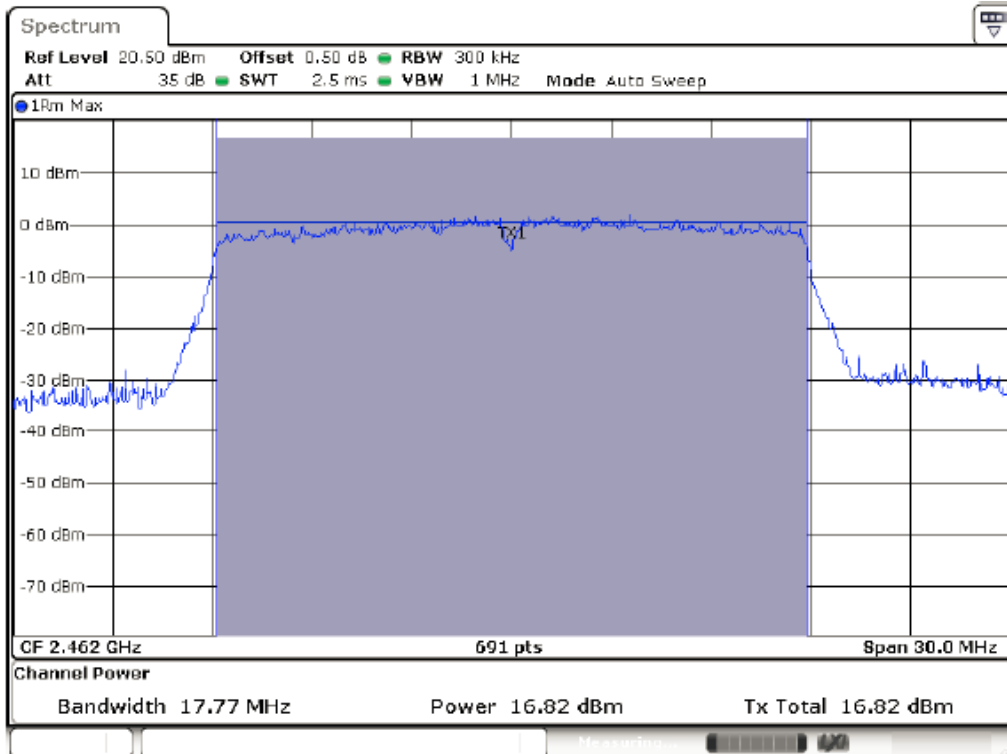


802.11g Channel Middle 2437MHz (20MHz)

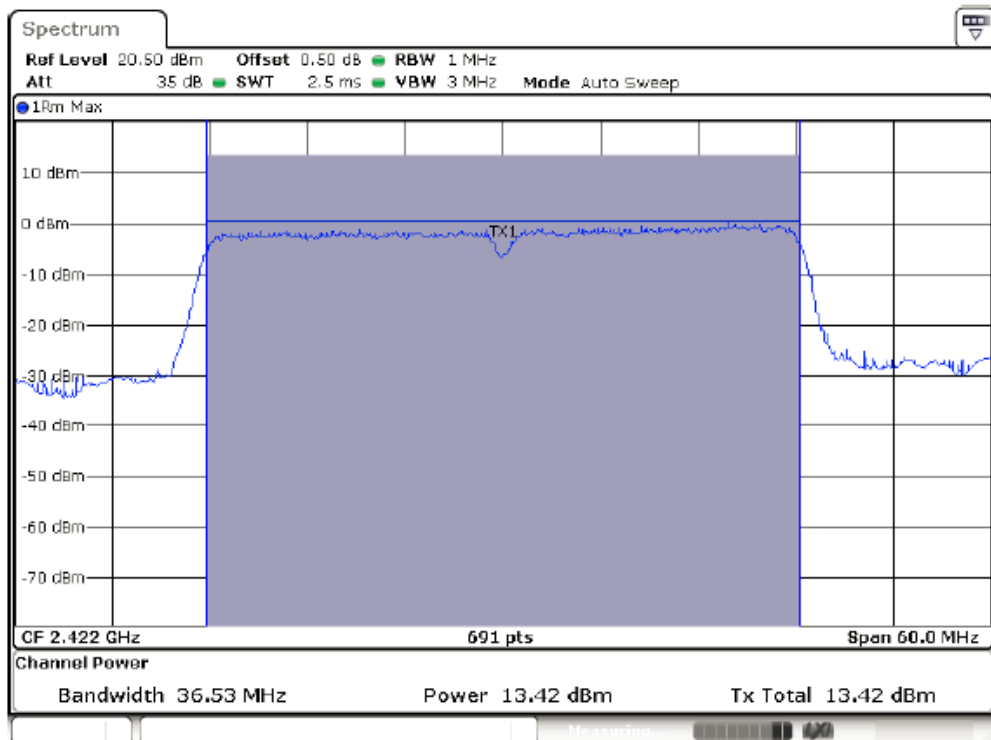




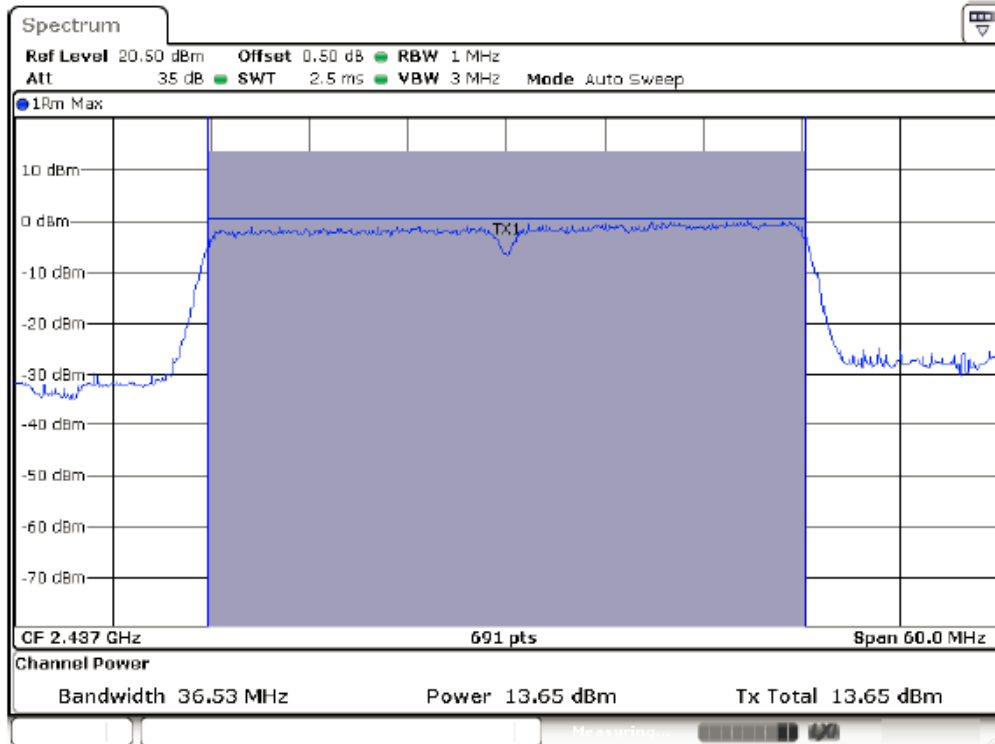
802.11g Channel High 2462MHz (20MHz)



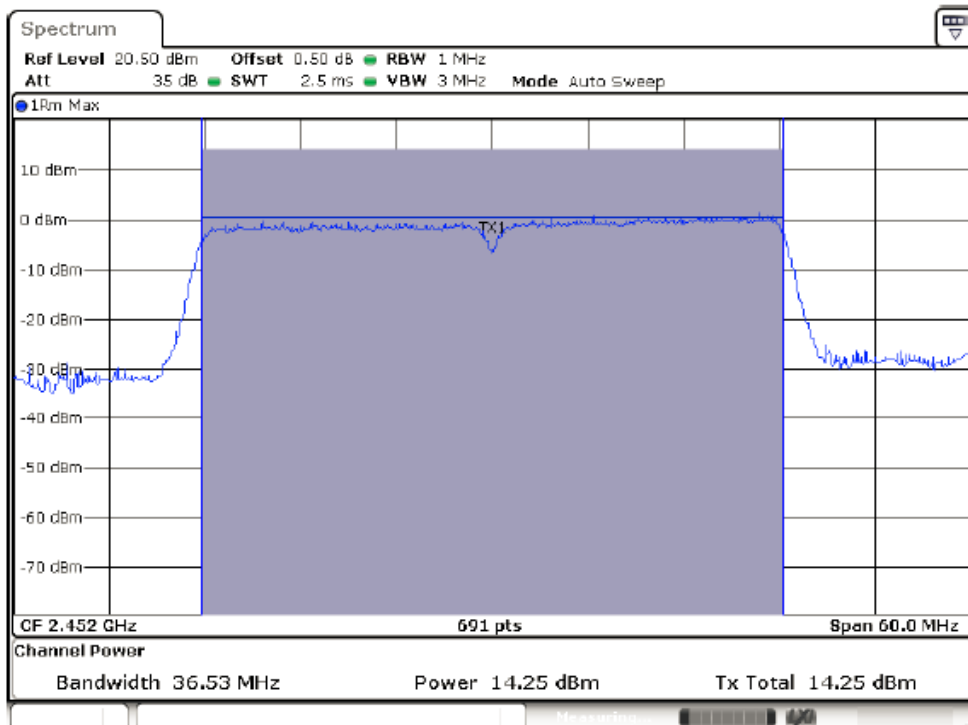
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz (40MHz)

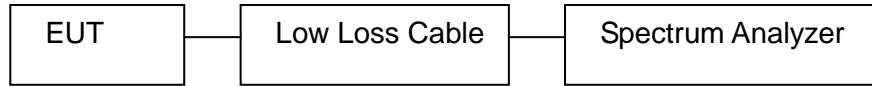


802.11n Channel High 2452MHz (40MHz)



## 5 Power Spectral Density Measurement

### 5.1 Block Diagram of Test Setup



### 5.2 Limits

According to 15.247(a)(1)(iii), For digitally modulated systems, the power spectral density Conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz Band during any time interval of continuous transmission

### 5.3 Test Procedure

According to the KDB 558074 D01 V03r02, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

- a. Set instrument center frequency to DTS channel center frequency.
- b. Set span to at least 1.5 times the OBW.
- c. Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = power averaging (RMS) or sample detector (when RMS not available)
- f. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- g. Sweep time = auto couple.
- h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- i. Use the peak marker function to determine the maximum amplitude level.
- j. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.4 Test Result

**PASS**

802.11b			
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)
Low	2412	-13.67	8
Middle	2437	-14.32	8
High	2462	-14.83	8

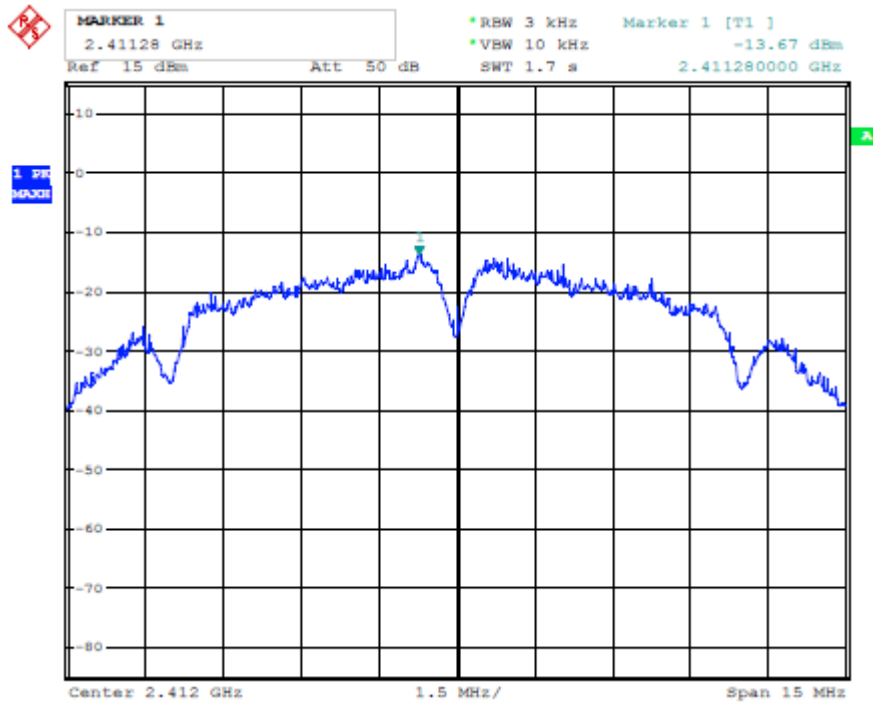
802.11g			
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)
Low	2412	-17.79	8
Middle	2437	-17.17	8
High	2462	-17.74	8

802.11n(H20)			
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)
Low	2412	-18.56	8
Middle	2437	-18.58	8
High	2462	-17.65	8

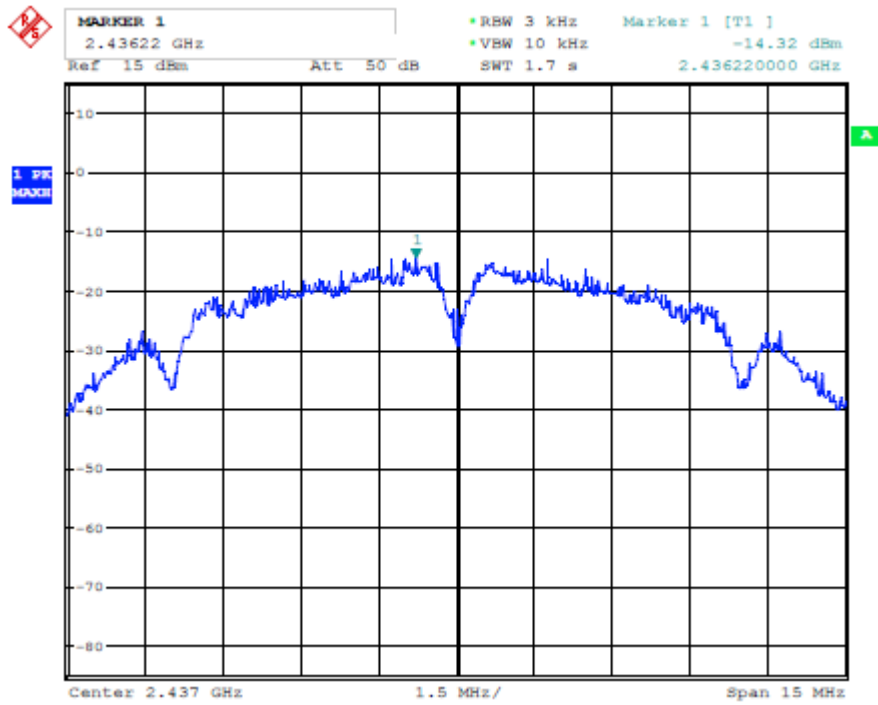
802.11n(H40)			
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)
Low	2422	-22.88	8
Middle	2437	-21.01	8
High	2452	-21.16	8

The spectrum analyzer plots are attached as below.

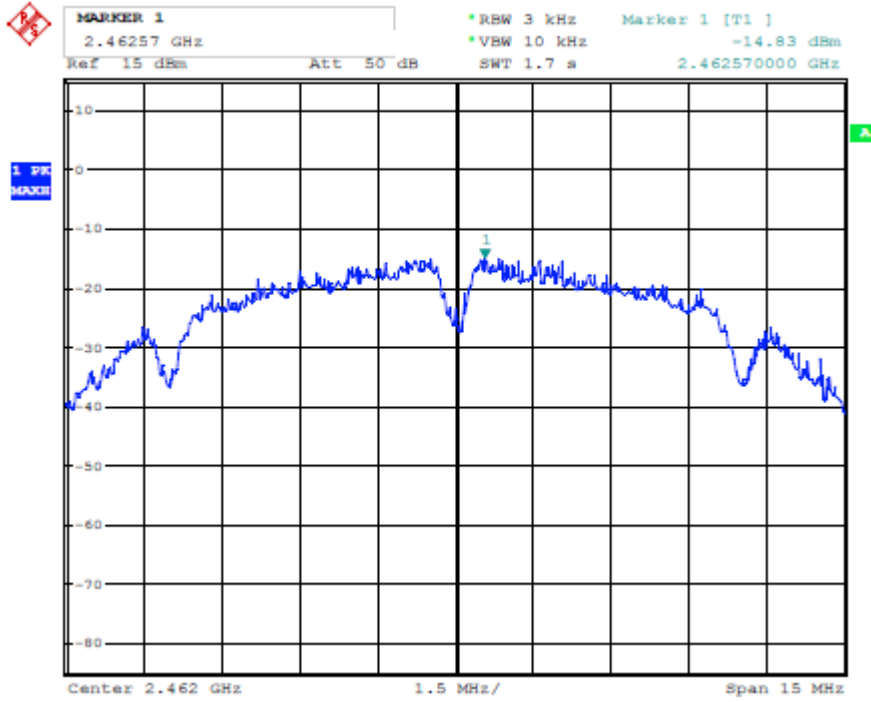
802.11b Channel Low 2412MHz



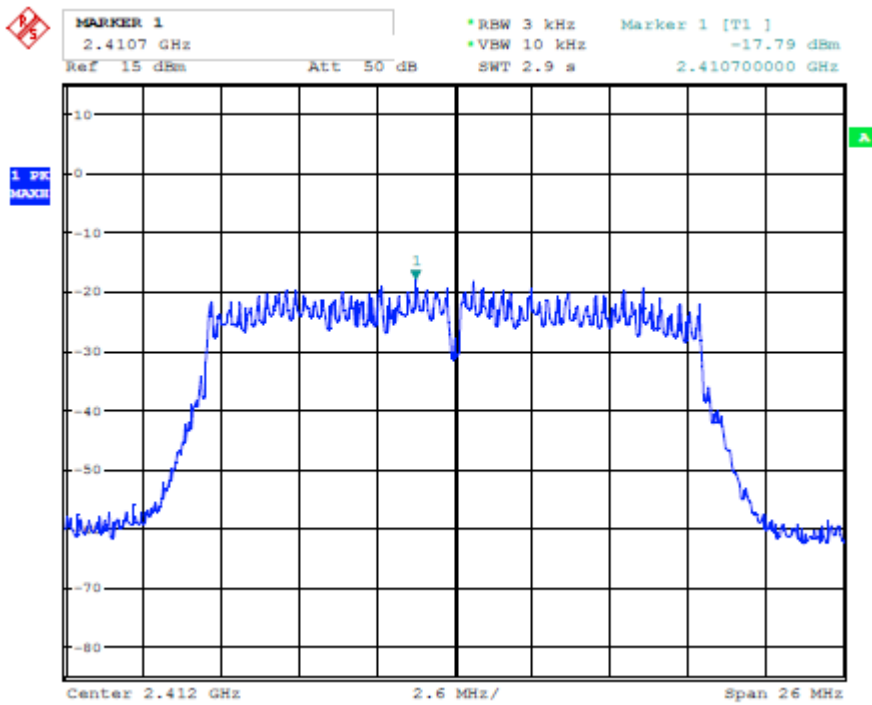
802.11b Channel Middle 2437MHz



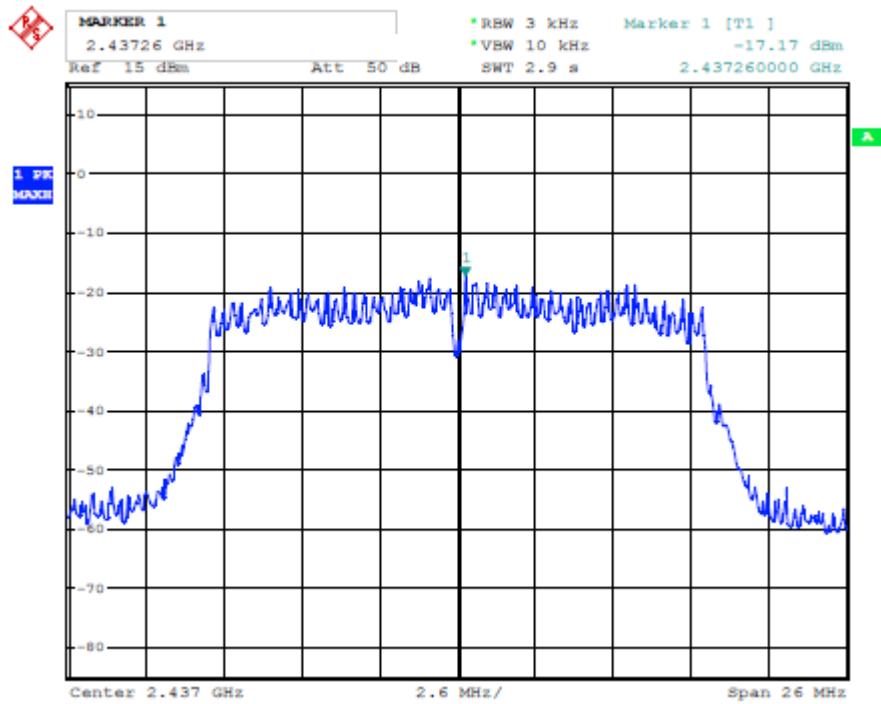
802.11b Channel High 2462MHz



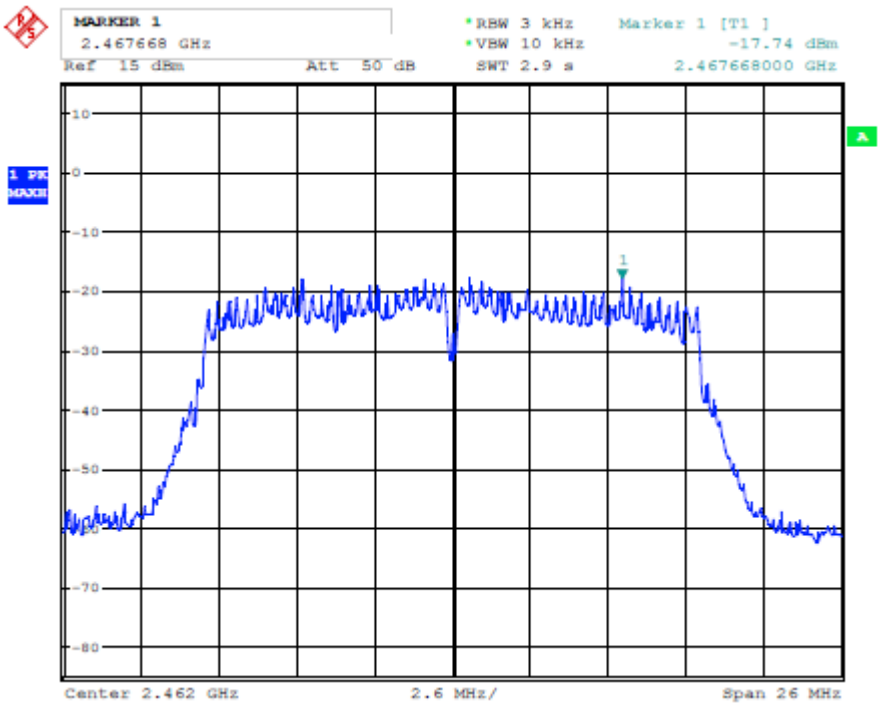
802.11g Channel Low 2412MHz



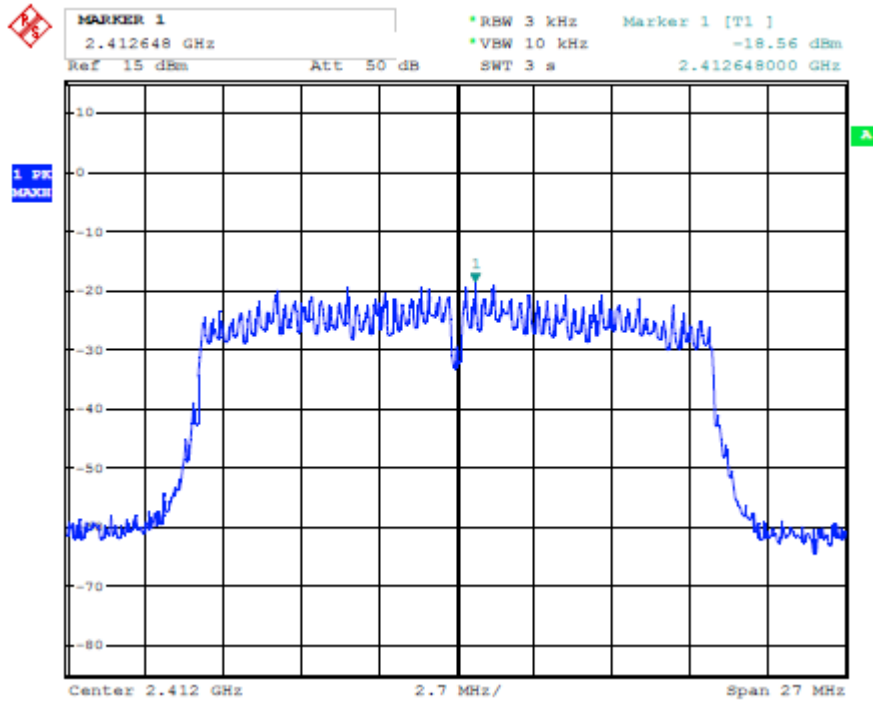
802.11g Channel Middle 2437MHz



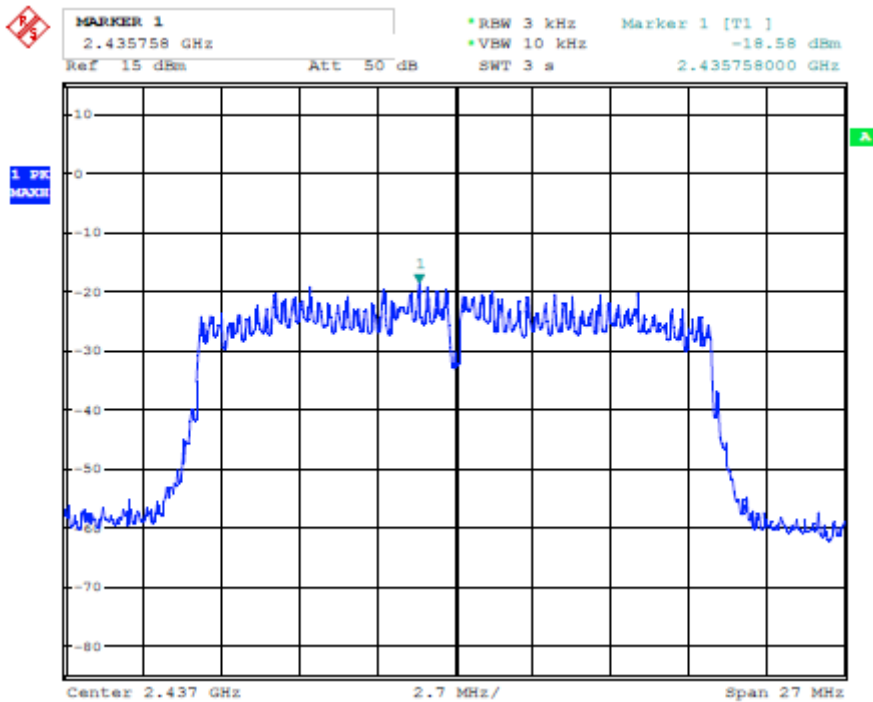
802.11g Channel High 2462MHz



802.11n (H20) Channel High 2412MHz

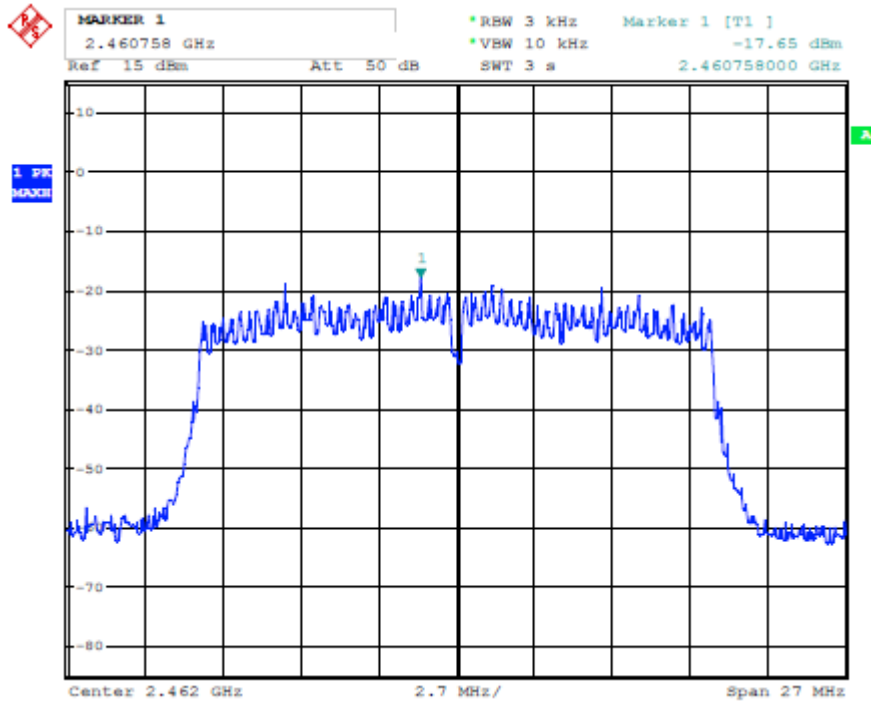


802.11n(H20) Channel High 2437MHz

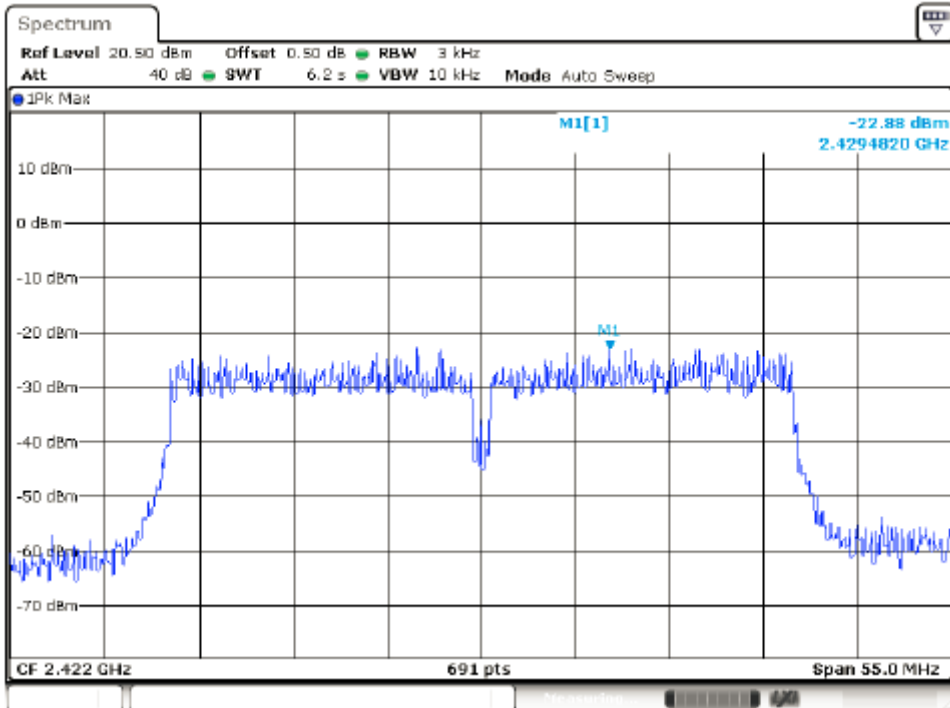




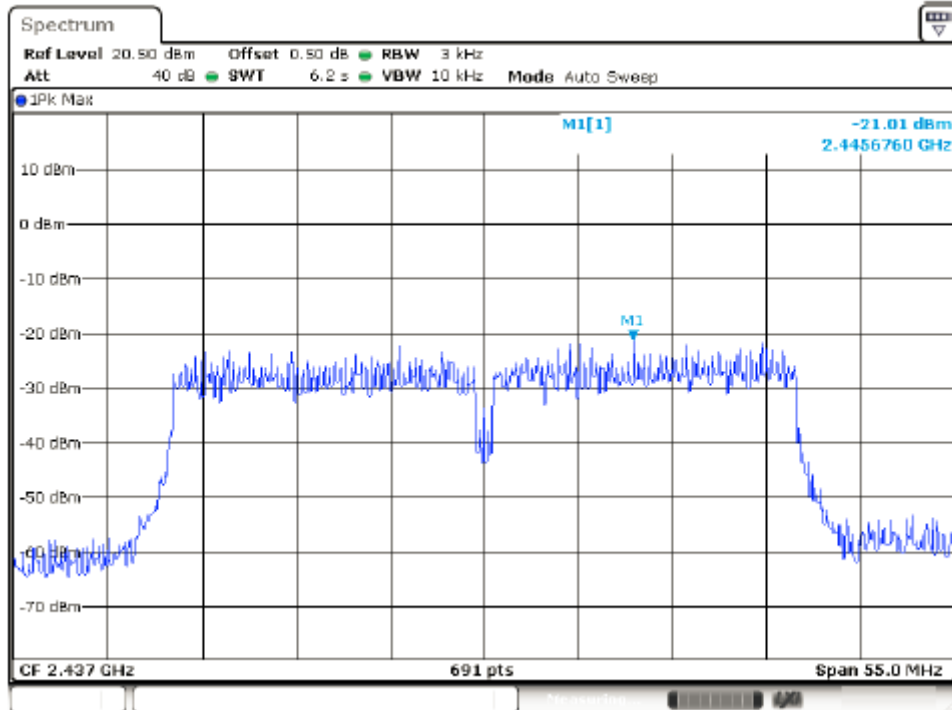
802.11n(H20) Channel High 2462MHz



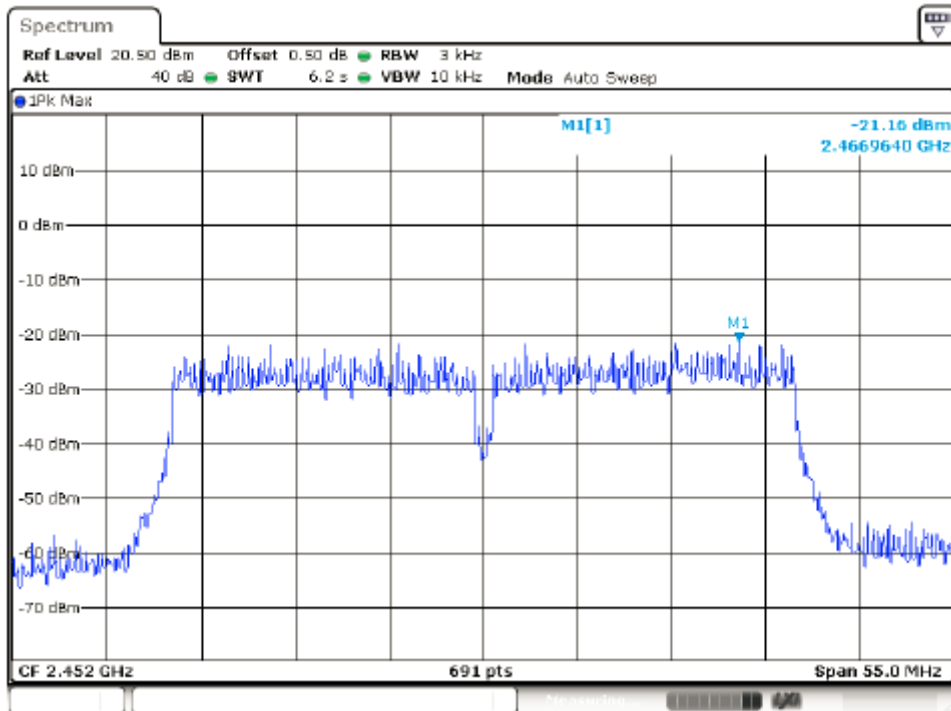
802.11n (H40) Channel High 2422MHz



802.11n (H40)Channel High 2437MHz

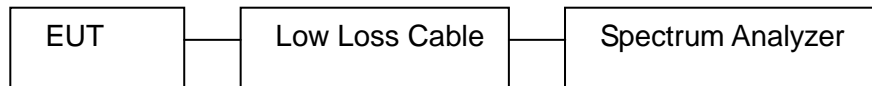


802.11n (H40) Channel High 2452MHz



## 6 Band Edge Compliance Test

### 6.1 Block Diagram of Test Setup



### 6.2 Limits

Section 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

### 6.3 Test Procedure

#### Conducted Band Edge:

- a. The transmitter output was connected to the spectrum analyzer via a low loss cable.
- b. Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.

#### Radiate Band Edge:

- a. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
- b. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
- c. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- d. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: RBW=1MHz, VBW=1MHz
- e. The band edges was measured and recorded.

6.4 Test Result  
**PASS**

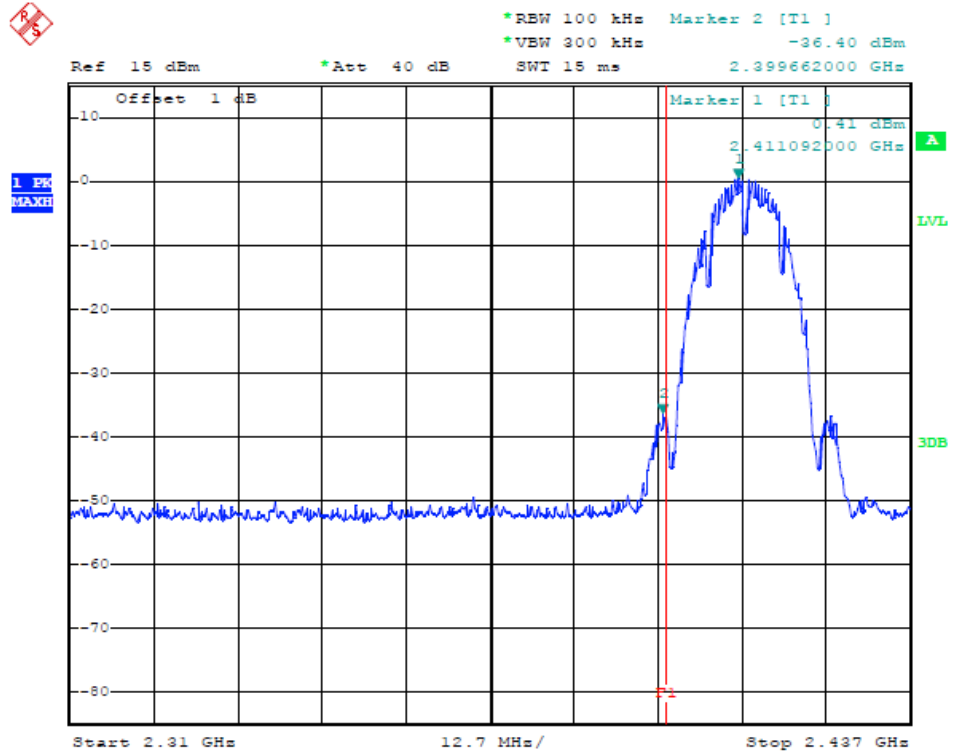
802.11b			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2412	36.81	>20dBc
High	2462	50.12	> 20dBc

802.11g			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2412	32.63	>20dBc
High	2462	44.59	> 20dBc

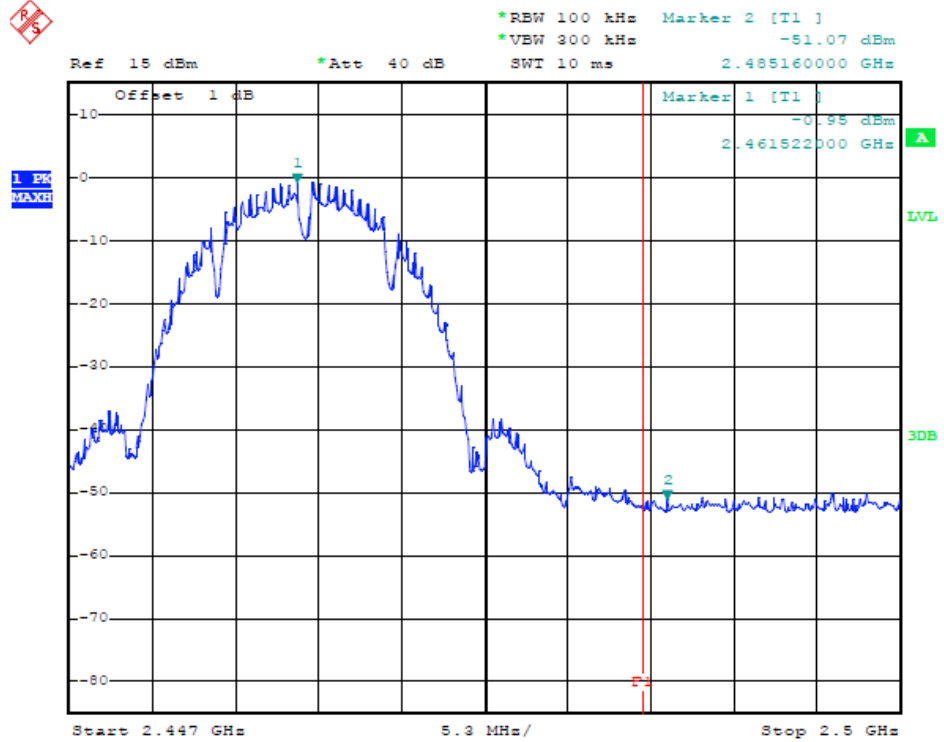
802.11n (20MHz)			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2412	30.32	>20dBc
High	2462	44.17	> 20dBc

802.11n (40MHz)			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2422	27.13	>20dBc
High	2452	43.12	> 20dBc

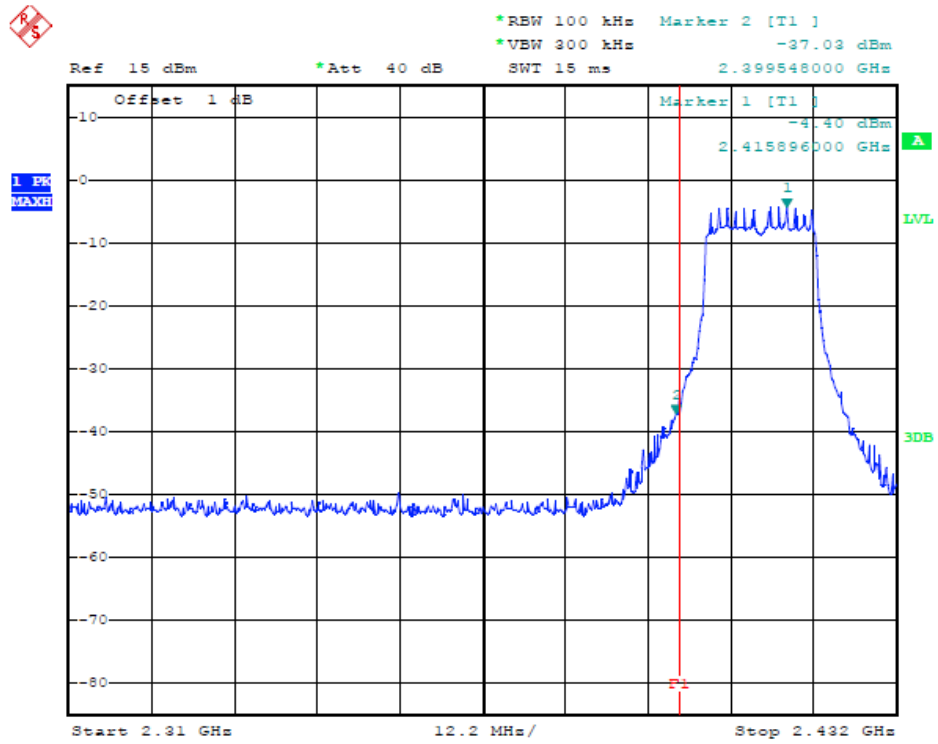
802.11b Channel Low 2412MHz



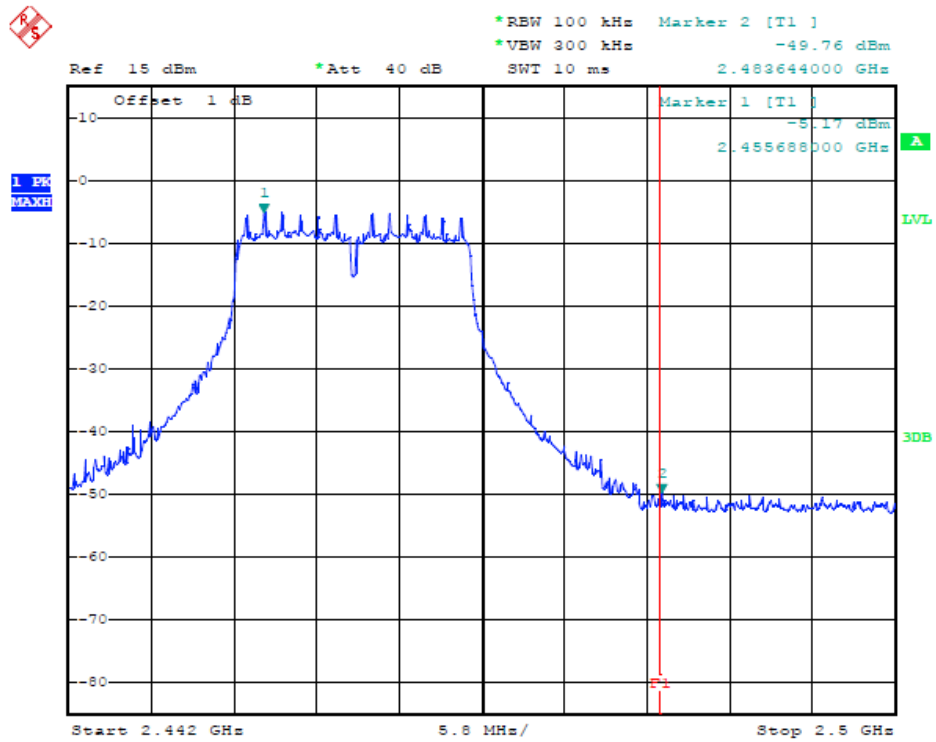
802.11b Channel High 2462MHz



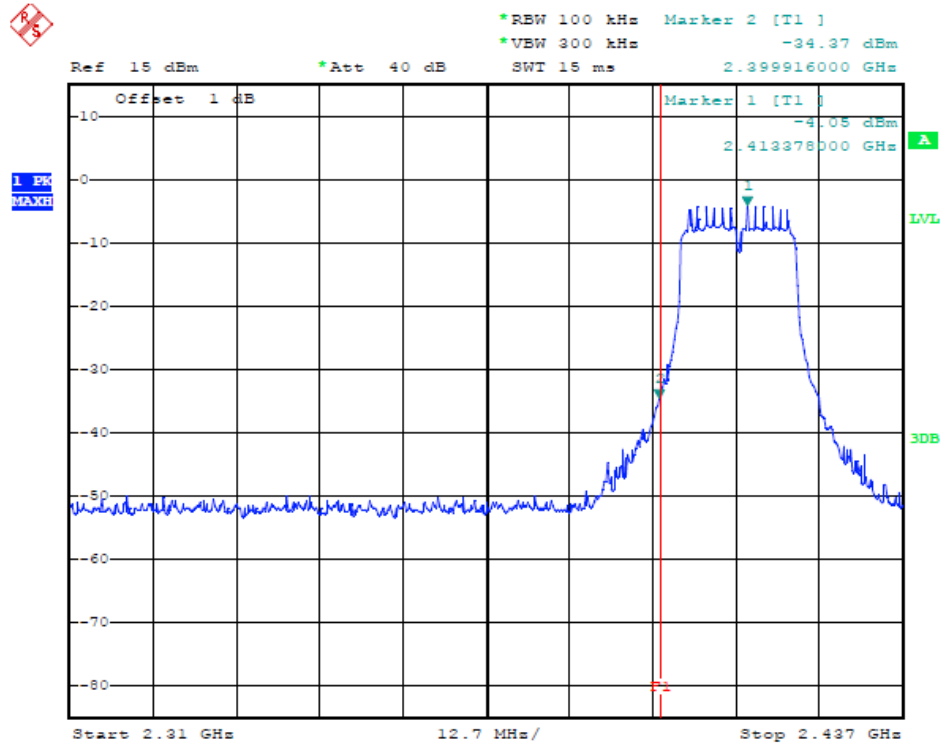
802.11g Channel Low 2412MHz



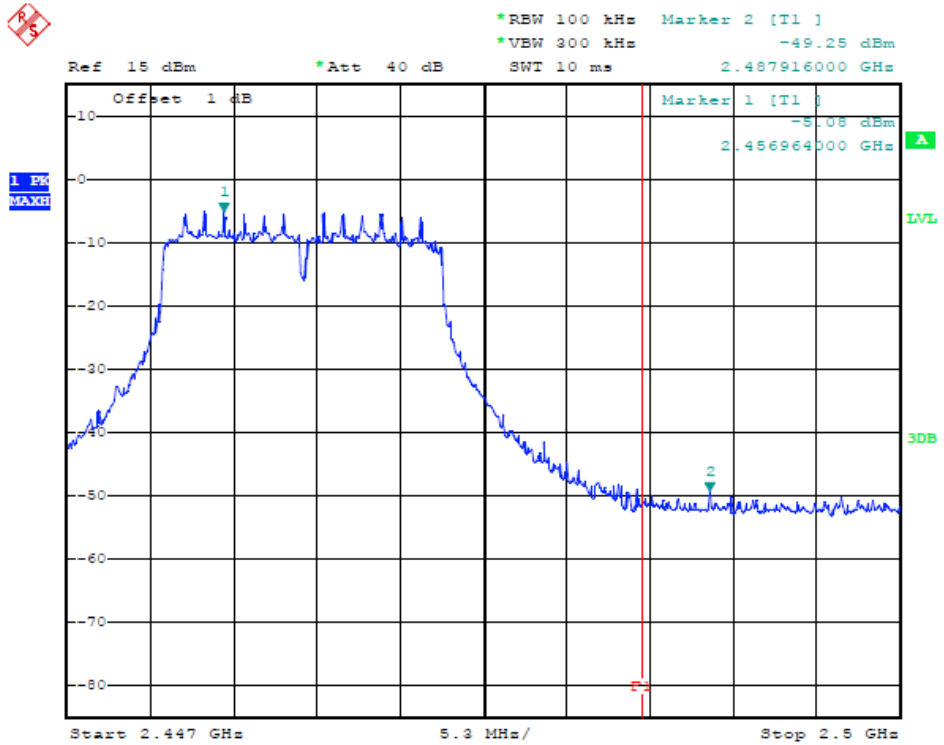
802.11g Channel High 2462MHz



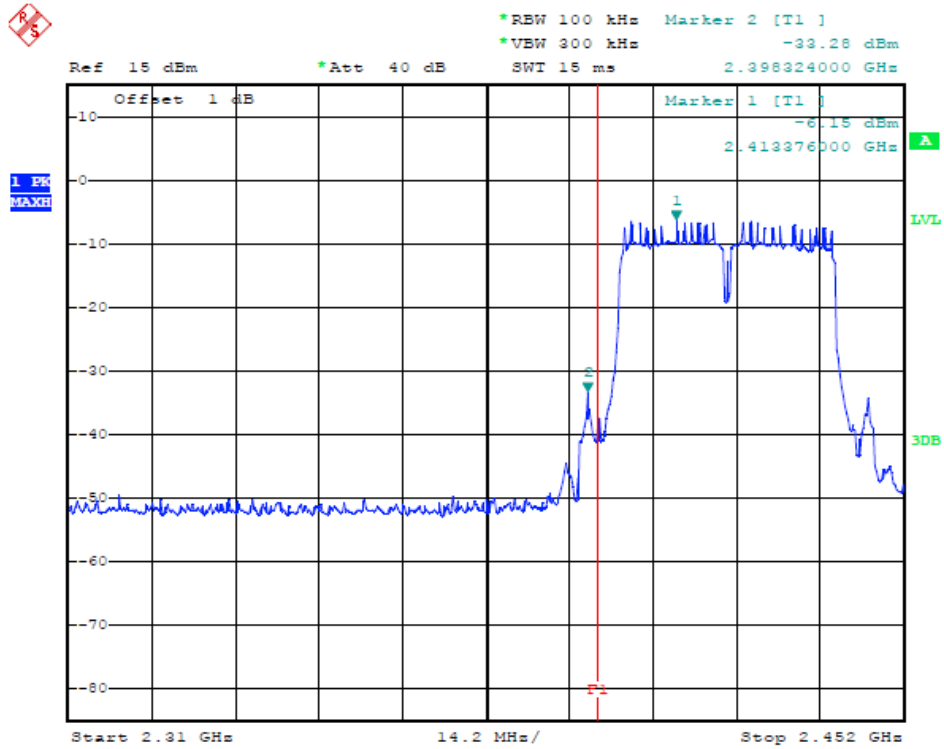
802.11n Channel High 2412MHz (20MHz)



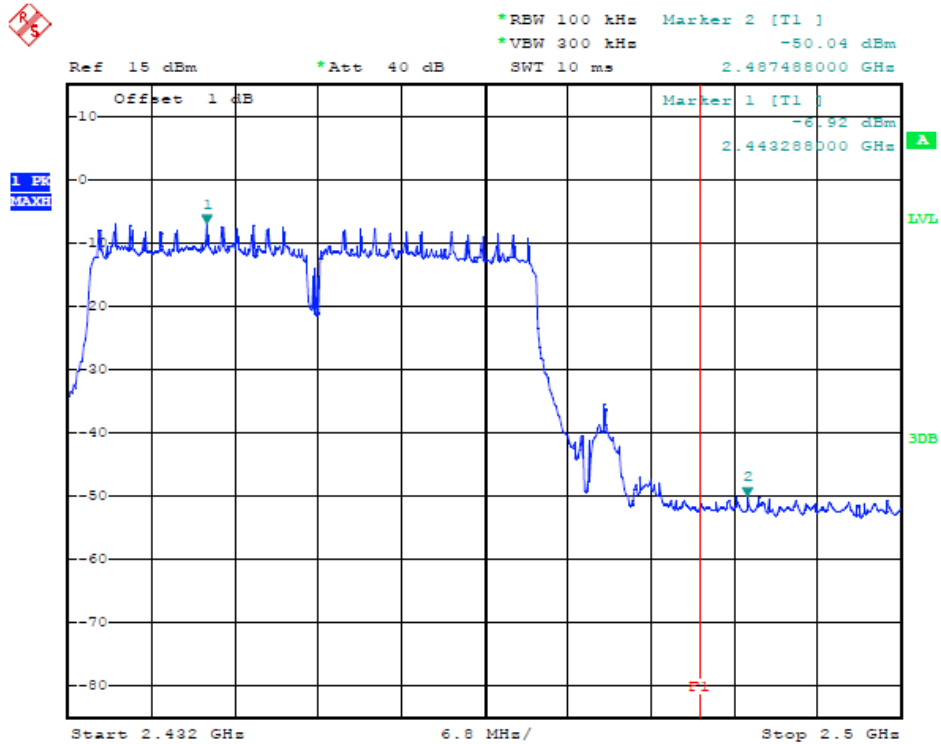
802.11n Channel High 2462MHz (20MHz)



802.11n Channel low 2422MHz (40MHz)



802.11n Channel High 2452MHz (40MHz)





**Radiated Band Edge Result**

**802.11b Channel Low 2412MHz**

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2310.000	35.74	43.27	-6.99	28.75	36.28	54.00	74.00	-25.25	-37.72	Vertical
2390.000	36.19	44.15	-6.78	29.41	37.37	54.00	74.00	-24.59	-36.63	Vertical
2310.000	33.75	42.84	-6.99	26.76	35.85	54.00	74.00	-27.24	-38.15	Horizontal
2390.000	34.29	42.53	-6.78	27.51	35.75	54.00	74.00	-26.49	-38.25	Horizontal

**802.11b Channel High 2462MHz**

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2483.500	36.00	43.57	-6.54	29.46	37.03	54.00	74.00	-24.54	-36.97	Vertical
2500.000	34.77	43.19	-6.50	28.27	36.69	54.00	74.00	-25.73	-37.31	Vertical
2483.500	36.77	45.66	-6.54	30.23	39.12	54.00	74.00	-23.77	-34.88	Horizontal
2500.000	33.48	42.25	-6.50	26.98	35.75	54.00	74.00	-27.02	-38.25	Horizontal

**802.11g Channel Low 2412MHz**

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2310.000	35.28	43.00	-6.99	28.29	36.01	54.00	74.00	-25.71	-37.99	Vertical
2390.000	44.69	53.13	-6.78	37.91	46.35	54.00	74.00	-16.09	-27.65	Vertical
2310.000	35.41	43.34	-6.99	28.42	36.35	54.00	74.00	-25.58	-37.65	Horizontal
2390.000	38.99	47.03	-6.78	32.21	40.25	54.00	74.00	-21.79	-33.75	Horizontal

**802.11g Channel High 2462MHz**

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2483.500	46.80	52.61	-6.54	40.26	46.07	54.00	74.00	-13.74	-27.93	Vertical
2500.000	35.99	43.91	-6.50	29.49	37.41	54.00	74.00	-24.51	-36.59	Vertical
2483.500	39.85	48.16	-6.54	33.31	41.62	54.00	74.00	-20.69	-32.38	Horizontal
2500.000	34.71	43.00	-6.50	28.21	36.50	54.00	74.00	-25.79	-37.50	Horizontal

802.11n Channel Low 2412MHz (20MHz)

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2310.000	34.70	42.38	-6.99	27.71	35.39	54.00	74.00	-26.29	-38.61	Vertical
2390.000	43.69	52.10	-6.78	36.91	45.32	54.00	74.00	-17.09	-28.68	Vertical
2310.000	37.25	45.08	-6.99	30.26	38.09	54.00	74.00	-23.74	-35.91	Horizontal
2390.000	41.69	49.16	-6.78	34.91	42.38	54.00	74.00	-19.09	-31.62	Horizontal

802.11n Channel High 2462MHz (20MHz)

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2483.500	48.96	56.14	-6.54	42.42	49.60	54.00	74.00	-11.58	-24.40	Vertical
2500.000	38.54	45.30	-6.50	32.04	38.80	54.00	74.00	-21.96	-35.20	Vertical
2483.500	44.66	52.54	-6.54	38.12	46.00	54.00	74.00	-15.88	-28.00	Horizontal
2500.000	36.24	44.24	-6.50	29.74	37.74	54.00	74.00	-24.26	-36.28	Horizontal

802.11n Channel Low 2422MHz (40MHz)

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2310.000	34.18	42.55	-6.99	27.19	35.56	54.00	74.00	-26.81	-38.44	Vertical
2390.000	44.60	52.15	-6.78	37.82	45.37	54.00	74.00	-16.18	-28.63	Vertical
2310.000	35.14	42.25	-6.99	28.15	35.26	54.00	74.00	-25.85	-38.74	Horizontal
2390.000	38.55	46.42	-6.78	31.77	39.64	54.00	74.00	-22.23	-34.36	Horizontal

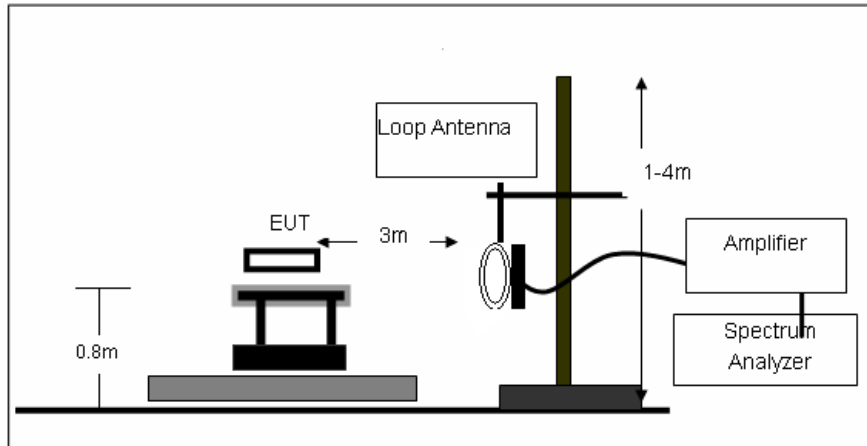
802.11n Channel High 2452MHz (40MHz)

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2483.500	36.47	44.12	-6.54	29.93	37.58	54.00	74.00	-24.07	-36.42	Vertical
2500.000	34.52	43.29	-6.50	28.02	36.79	54.00	74.00	-25.98	-37.21	Vertical
2483.500	35.69	43.04	-6.54	29.15	36.50	54.00	74.00	-24.85	-37.50	Horizontal
2500.000	34.90	42.09	-6.50	28.40	35.59	54.00	74.00	-25.60	-38.41	Horizontal

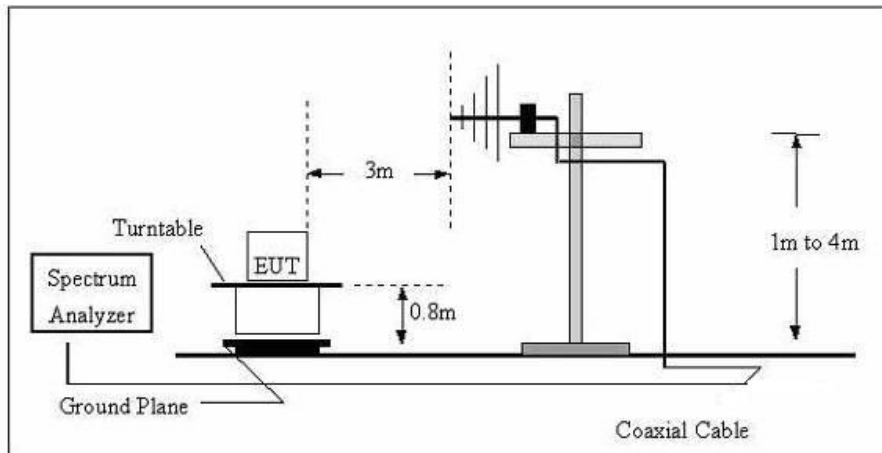
## 7 Radiated Spurious Emission Test

### 7.1 Block Diagram of Test Setup

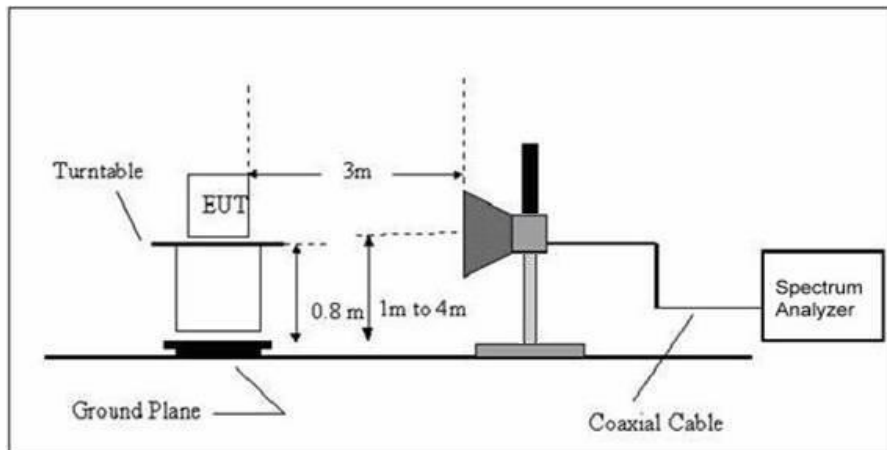
#### (1) Radiated Emission Test-Up Frequency Below 30MHz



#### (2) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### (3) Radiated Emission Test-Up Frequency Above 1GHz



## 7.2 Limits

Section 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

## 7.3 Restricted bands of operation

### 9.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36-13.41			

<sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510  
<sup>2</sup>Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 7.3 Test Procedure

- a. The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The worst-case data rate for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and 300Mbps for 802.11n mode, based on previous with 802.11 WLAN product design architectures.

The bandwidth of test receiver is set at 9kHz in below 30MHz. and set at 120kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9kHz to 25GHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

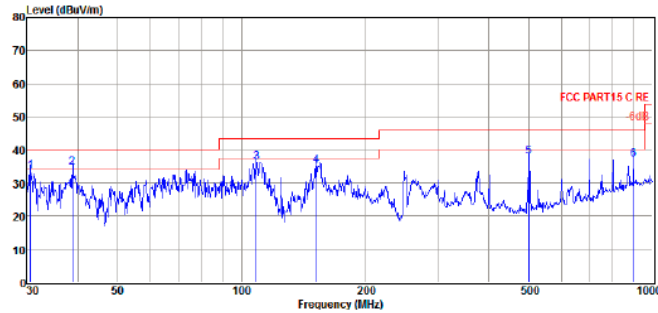
Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

7.4 Test Result  
**PASS**

802.11b Channel Low 2412MHz  
For Below 30MHz

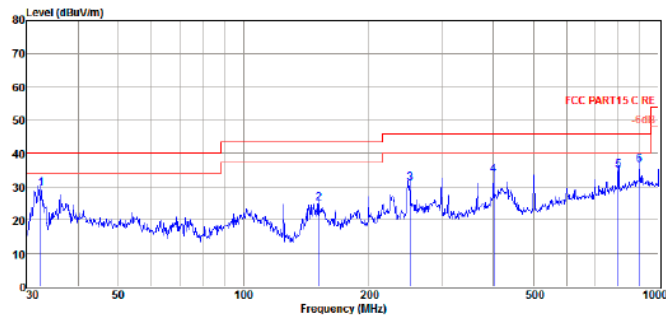
Freq.(MHz)	Reading (dBuV/m) (QP)	Factor(dB) Corr.	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

For 30MHz-1000MHz



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	30.64	20.70	11.95	0.92	33.57	40.00	-6.43	QP	VERTICAL
2	38.75	20.53	13.15	0.98	34.66	40.00	-5.34	QP	VERTICAL
3	108.65	22.56	12.30	1.52	36.38	43.50	-7.12	QP	VERTICAL
4	151.60	24.80	8.60	1.85	35.25	43.50	-8.25	QP	VERTICAL
5	501.18	18.23	16.00	3.67	37.90	46.00	-8.10	QP	VERTICAL
6	900.15	10.00	22.10	4.96	37.06	46.00	-8.94	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

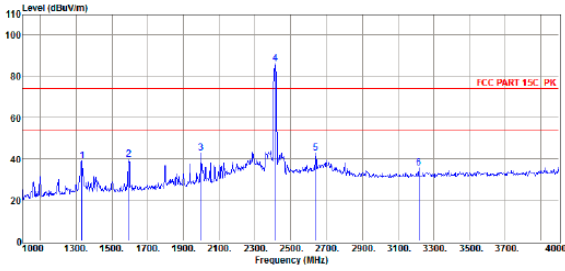


Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	32.52	16.59	11.95	0.93	29.47	40.00	-10.53	QP	HORIZONTAL
2	151.60	14.53	8.60	1.85	24.98	43.50	-18.52	QP	HORIZONTAL
3	252.06	17.08	11.64	2.45	31.17	46.00	-14.83	QP	HORIZONTAL
4	400.43	14.49	15.90	3.23	33.62	46.00	-12.38	QP	HORIZONTAL
5	798.98	9.87	20.37	4.69	34.93	46.00	-11.07	QP	HORIZONTAL
6	900.15	9.57	22.10	4.96	36.63	46.00	-9.37	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

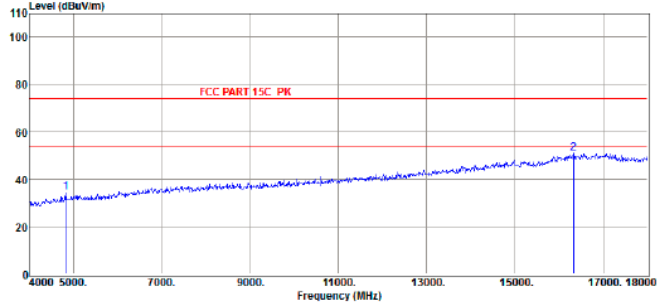
For 1GHz-18GHz

Polarization: Vertical



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1333.00	52.97	25.77	43.53	3.64	38.85	74.00	-35.15	Peak	VERTICAL
2	1594.00	52.21	26.80	43.60	4.16	39.57	74.00	-34.43	Peak	VERTICAL
3	1999.00	52.90	28.80	43.60	4.72	42.82	74.00	-31.18	Peak	VERTICAL
4	2413.00	94.68	30.04	43.85	5.17	86.04	/	/	Peak	VERTICAL
5	2641.00	50.43	30.81	43.96	5.55	42.83	74.00	-31.17	Peak	VERTICAL
6	3217.00	41.40	32.25	44.19	6.19	35.65	74.00	-38.35	Peak	VERTICAL

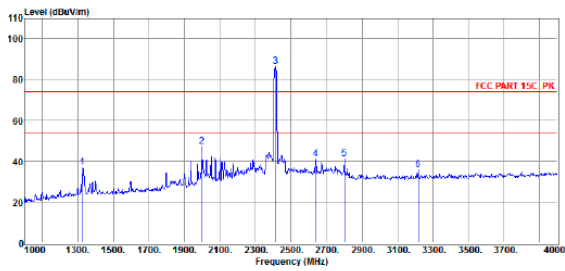
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4824.00	35.34	35.42	44.37	8.09	34.48	74.00	-39.52	Peak	VERTICAL
2	16334.00	34.05	43.50	40.31	13.74	50.98	74.00	-23.02	Peak	VERTICAL

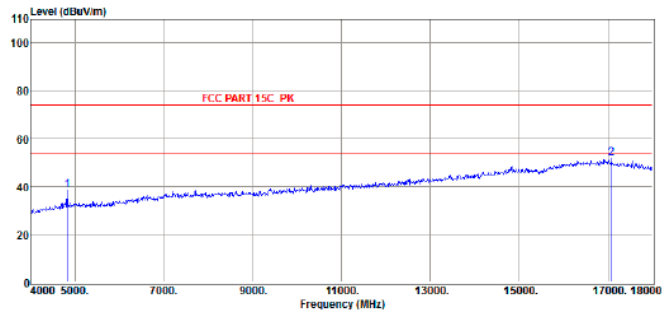
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

Polarization: Horizontal



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1327.00	51.13	25.71	43.53	3.64	36.95	74.00	-37.05	Peak	HORIZONTAL
2	1999.00	57.26	28.80	43.60	4.72	47.18	74.00	-26.82	Peak	HORIZONTAL
3	2413.00	95.37	30.04	43.85	5.17	86.73	/	/	Peak	HORIZONTAL
4	2641.00	48.82	30.81	43.96	5.55	41.22	74.00	-32.78	Peak	HORIZONTAL
5	2800.00	48.24	31.32	44.02	5.73	41.27	74.00	-32.73	Peak	HORIZONTAL
6	3217.00	41.69	32.25	44.19	6.19	35.94	74.00	-38.06	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



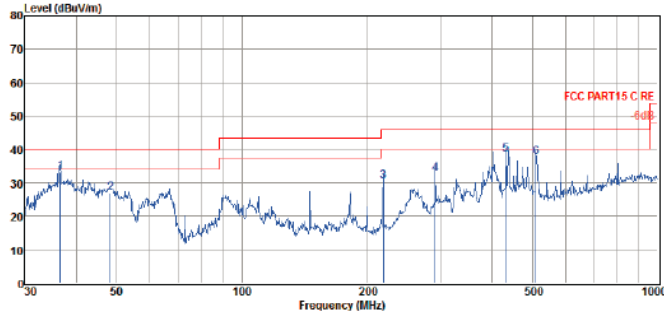
Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4824.00	39.41	35.42	44.37	8.09	38.55	74.00	-35.45	Peak	HORIZONTAL
2	17076.00	34.97	43.47	40.44	13.94	51.94	74.00	-22.06	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

802.11b Channel Middle 2437MHz  
For Below 30MHz

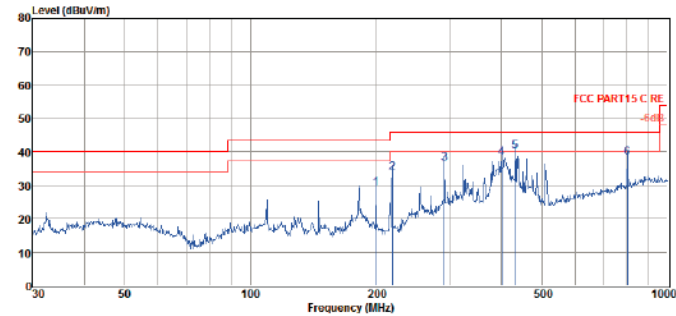
Freq.(MHz)	Reading (dBuV/m) (QP)	Factor(dB) Corr.	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

For 30MHz-1000MHz



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	36.51	19.25	13.15	0.96	33.36	40.00	-6.64	QP	VERTICAL
2	48.33	11.42	14.50	1.06	26.98	40.00	-13.02	QP	VERTICAL
3	219.08	17.36	10.90	2.21	30.47	46.00	-15.53	QP	VERTICAL
4	292.06	15.25	14.70	2.68	32.63	46.00	-13.37	QP	VERTICAL
5	432.55	19.17	15.93	3.33	38.43	46.00	-7.57	QP	VERTICAL
6	510.04	17.90	16.13	3.69	37.72	46.00	-8.28	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

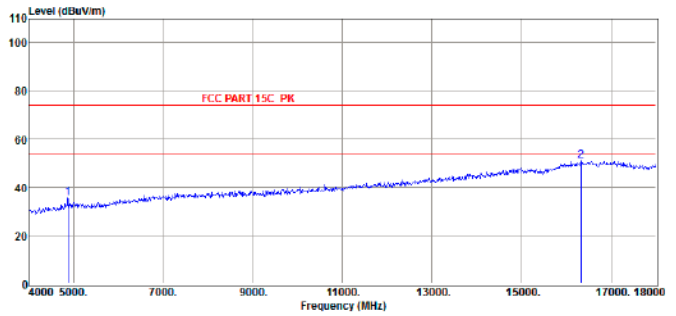
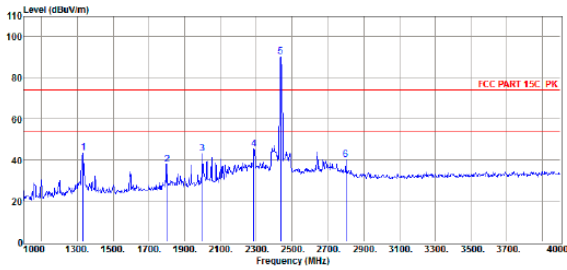


Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	199.99	17.30	9.80	2.15	29.25	43.50	-14.25	QP	HORIZONTAL
2	219.08	20.67	10.90	2.21	33.78	46.00	-12.22	QP	HORIZONTAL
3	292.06	19.29	14.70	2.68	36.67	46.00	-9.33	QP	HORIZONTAL
4	400.43	19.00	15.90	3.23	38.13	46.00	-7.87	QP	HORIZONTAL
5	432.55	20.77	15.93	3.33	40.03	46.00	-5.97	QP	HORIZONTAL
6	801.79	13.14	20.40	4.69	38.23	46.00	-7.77	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



For 1GHz-18GHz  
Polarization: Vertical



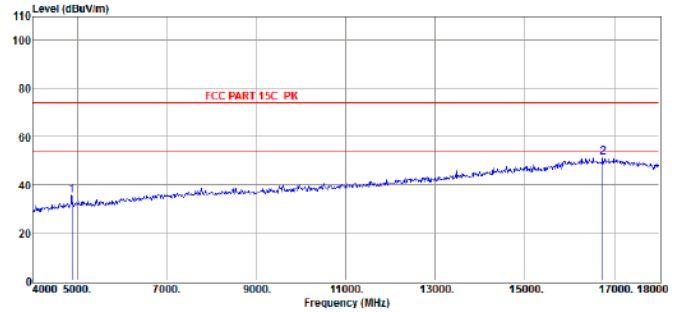
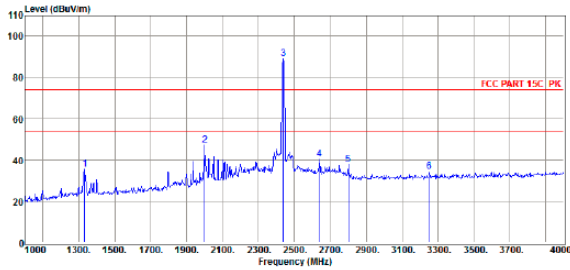
Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1333.00	57.49	25.77	43.53	3.64	43.37	74.00	-30.63	Peak	VERTICAL
2	1801.00	49.14	27.80	43.60	4.48	37.82	74.00	-36.18	Peak	VERTICAL
3	1999.00	53.06	28.80	43.60	4.72	42.98	74.00	-31.02	Peak	VERTICAL
4	2287.00	54.26	29.68	43.77	5.01	45.18	74.00	-28.82	Peak	VERTICAL
5	2437.00	98.76	30.14	43.86	5.24	90.28	74.00	16.28	Peak	VERTICAL
6	2800.00	46.88	31.32	44.02	5.73	39.91	74.00	-34.09	Peak	VERTICAL

Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4874.00	36.35	35.51	44.35	8.14	35.65	74.00	-38.35	Peak	VERTICAL
2	16334.00	34.05	43.50	40.31	13.74	50.98	74.00	-23.02	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

Polarization: Horizontal



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1333.00	49.49	25.77	43.53	3.64	35.37	74.00	-38.63	Peak	HORIZONTAL
2	2002.00	57.32	28.80	43.60	4.72	47.24	74.00	-26.76	Peak	HORIZONTAL
3	2440.00	97.65	30.14	43.87	5.24	89.16	74.00	15.16	Peak	HORIZONTAL
4	2641.00	48.04	30.81	43.96	5.55	40.44	74.00	-33.56	Peak	HORIZONTAL
5	2800.00	44.62	31.32	44.02	5.73	37.65	74.00	-36.35	Peak	HORIZONTAL
6	3250.00	40.22	32.29	44.20	6.25	34.56	74.00	-39.44	Peak	HORIZONTAL

Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4874.00	36.25	35.51	44.35	8.14	35.55	74.00	-38.45	Peak	HORIZONTAL
2	16740.00	34.26	43.65	40.30	13.82	51.43	74.00	-22.57	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

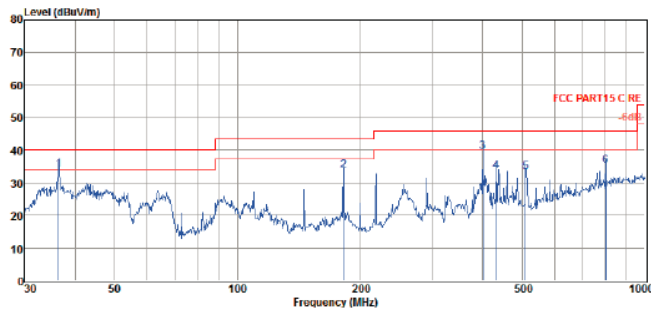
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

802.11b Channel High 2462MHz

For Below 30MHz

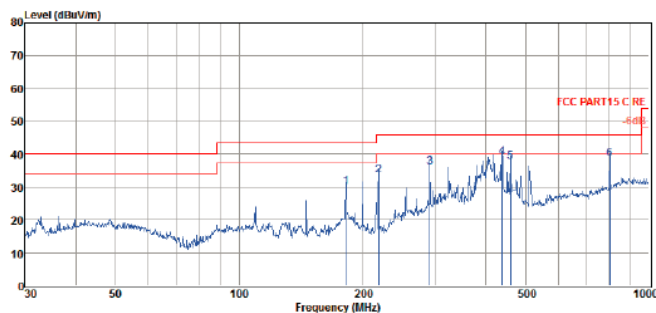
Freq.(MHz)	Reading (dBuV/m) (QP)	Factor(dB) Corr.	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

For 30MHz-1000MHz



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	36.38	20.93	12.30	0.95	34.18	40.00	-5.82	QP	VERTICAL
2	181.92	21.89	9.90	2.08	33.87	43.50	-9.63	QP	VERTICAL
3	400.43	20.46	15.90	3.23	39.59	46.00	-6.41	QP	VERTICAL
4	432.55	14.37	15.93	3.33	33.63	46.00	-12.37	QP	VERTICAL
5	510.04	13.40	16.13	3.69	33.22	46.00	-12.78	QP	VERTICAL
6	801.79	10.09	20.40	4.69	35.18	46.00	-10.82	QP	VERTICAL

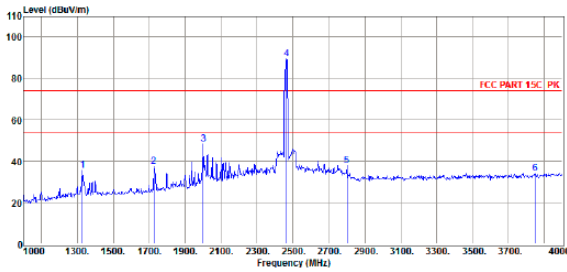
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	Cable Loss (dB)	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	182.56	17.70	10.23	2.09	30.02	43.50	-13.48	QP	HORIZONTAL
2	219.08	20.50	10.90	2.21	33.61	46.00	-12.39	QP	HORIZONTAL
3	292.06	18.66	14.70	2.68	36.04	46.00	-9.96	QP	HORIZONTAL
4	437.12	19.75	15.93	3.35	39.03	46.00	-6.97	QP	HORIZONTAL
5	459.11	18.23	15.96	3.53	37.72	46.00	-8.28	QP	HORIZONTAL
6	801.79	13.29	20.40	4.69	38.38	46.00	-7.62	QP	HORIZONTAL

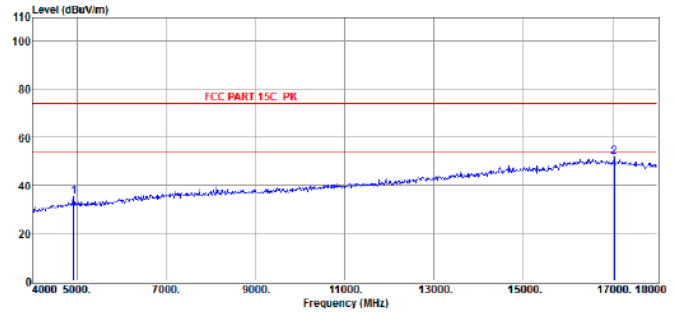
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.  
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

For 1GHz-18GHz  
Polarization: Vertical



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor dB	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1330.00	49.60	25.71	43.53	3.64	35.42	74.00	-38.58	Peak	VERTICAL
2	1726.00	49.18	27.47	43.60	4.37	37.42	74.00	-36.58	Peak	VERTICAL
3	2002.00	58.58	28.80	43.60	4.72	48.50	74.00	-25.50	Peak	VERTICAL
4	2464.00	98.13	30.20	43.88	5.31	89.76	/	/	Peak	VERTICAL
5	2800.00	44.93	31.32	44.02	5.73	37.96	74.00	-36.04	Peak	VERTICAL
6	3847.00	37.87	33.08	44.23	7.33	34.05	74.00	-39.95	Peak	VERTICAL

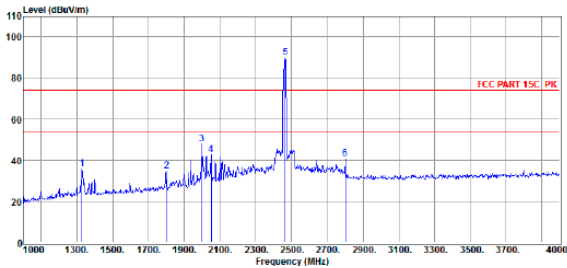
Note: 1. Result Level = Read Level - Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor dB	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4924.00	35.56	35.59	44.33	8.16	34.98	74.00	-39.02	Peak	VERTICAL
2	17034.00	34.87	43.55	40.41	13.92	51.93	74.00	-22.07	Peak	VERTICAL

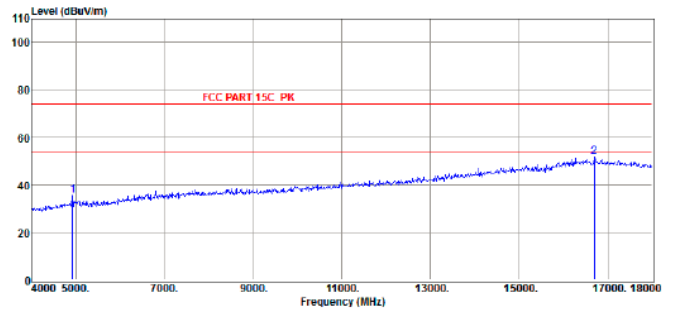
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

Polarization: Horizontal



Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor dB	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1330.00	50.11	25.71	43.53	3.64	35.93	74.00	-38.07	Peak	HORIZONTAL
2	1801.00	46.08	27.80	43.60	4.48	34.76	74.00	-39.24	Peak	HORIZONTAL
3	1999.00	58.21	28.80	43.60	4.72	48.13	74.00	-25.87	Peak	HORIZONTAL
4	2050.00	52.80	28.96	43.63	4.75	42.88	74.00	-31.12	Peak	HORIZONTAL
5	2464.00	98.27	30.20	43.88	5.31	89.90	/	/	Peak	HORIZONTAL
6	2800.00	47.71	31.32	44.02	5.73	40.74	74.00	-33.26	Peak	HORIZONTAL

Note: 1. Result Level = Read Level - Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



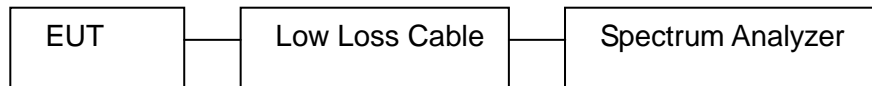
Item (Mark)	Freq (MHz)	Read Level (dBuV)	Antenna Factor (dBm)	PRM Factor dB	Cable Loss dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4924.00	36.04	35.59	44.33	8.16	35.46	74.00	-38.54	Peak	HORIZONTAL
2	16698.00	34.45	43.66	40.28	13.81	51.64	74.00	-22.36	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.  
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

Note: "802.11b" mode is worst mode

## 8 Conducted Spurious Emission Compliance Test

### 8.1 Block Diagram of Test Setup



### 8.2 Limits

Se Section 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

### 8.3 Test Procedure

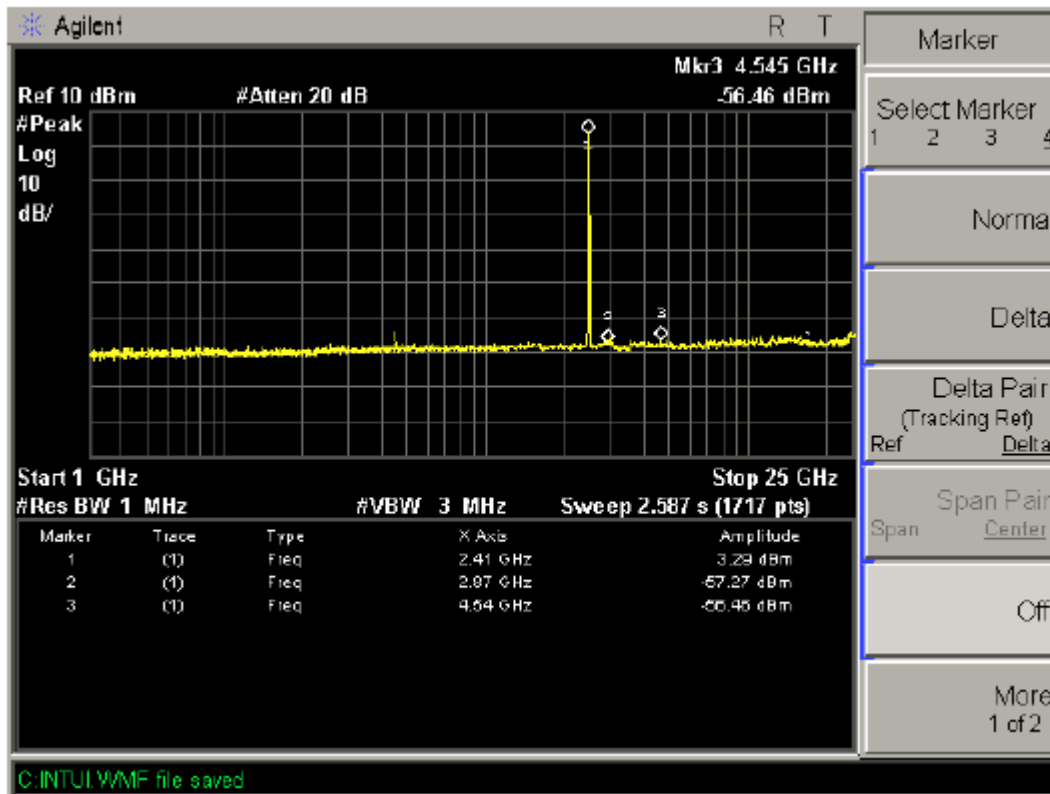
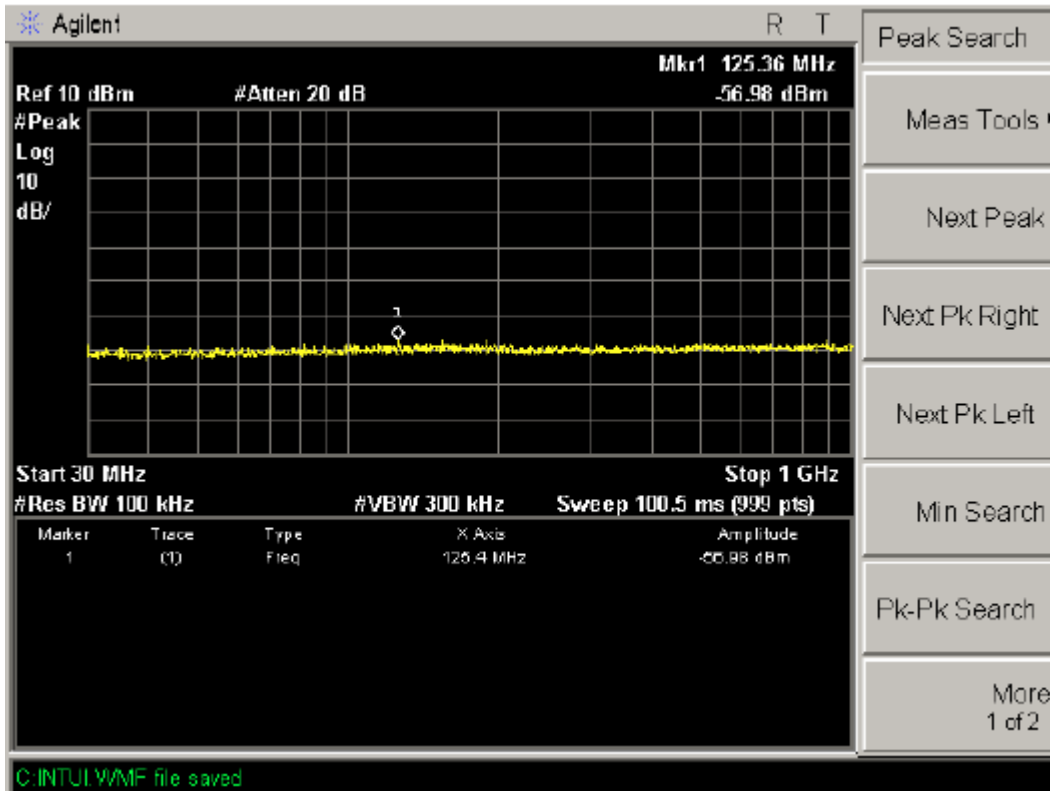
- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.
- The Conducted Spurious Emission was measured and recorded.

### 8.4 Test Result

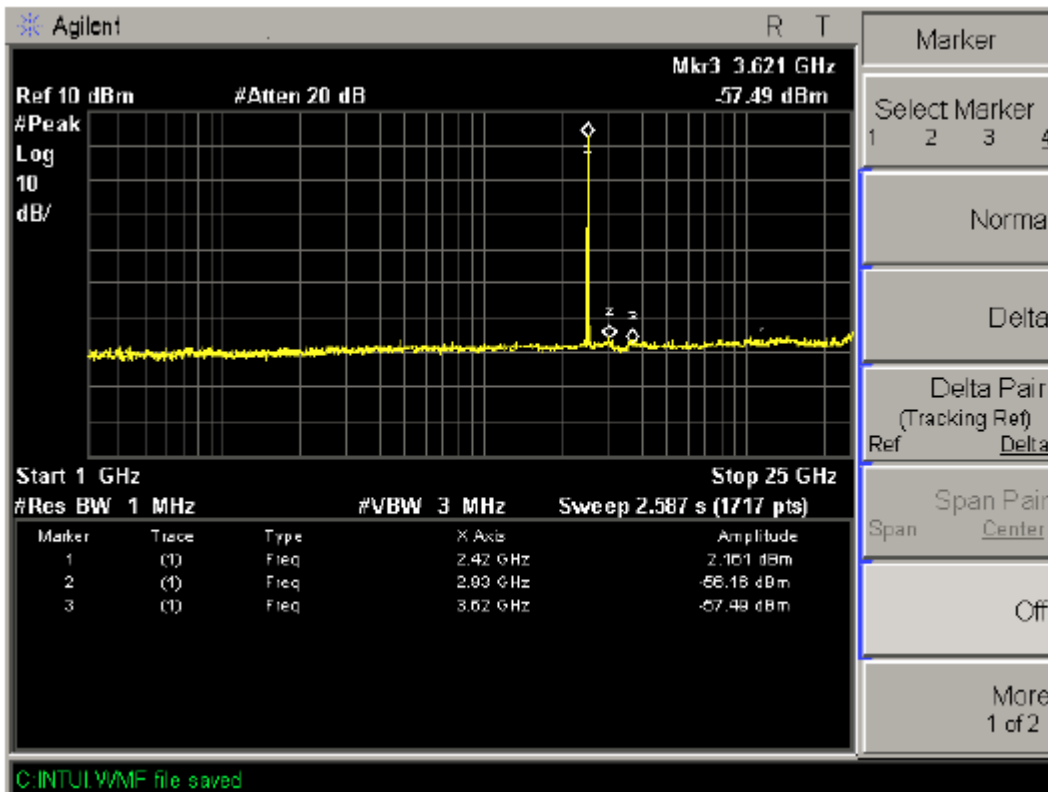
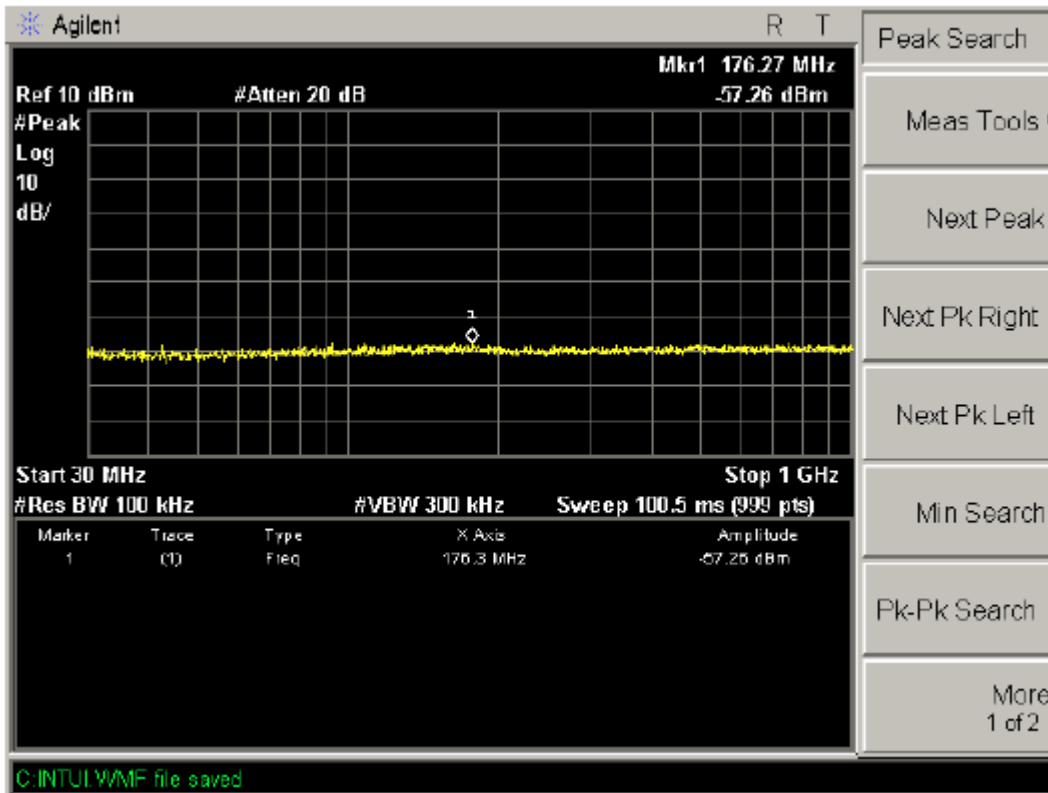
**PASS**

The spectrum analyzer plots are attached as below.

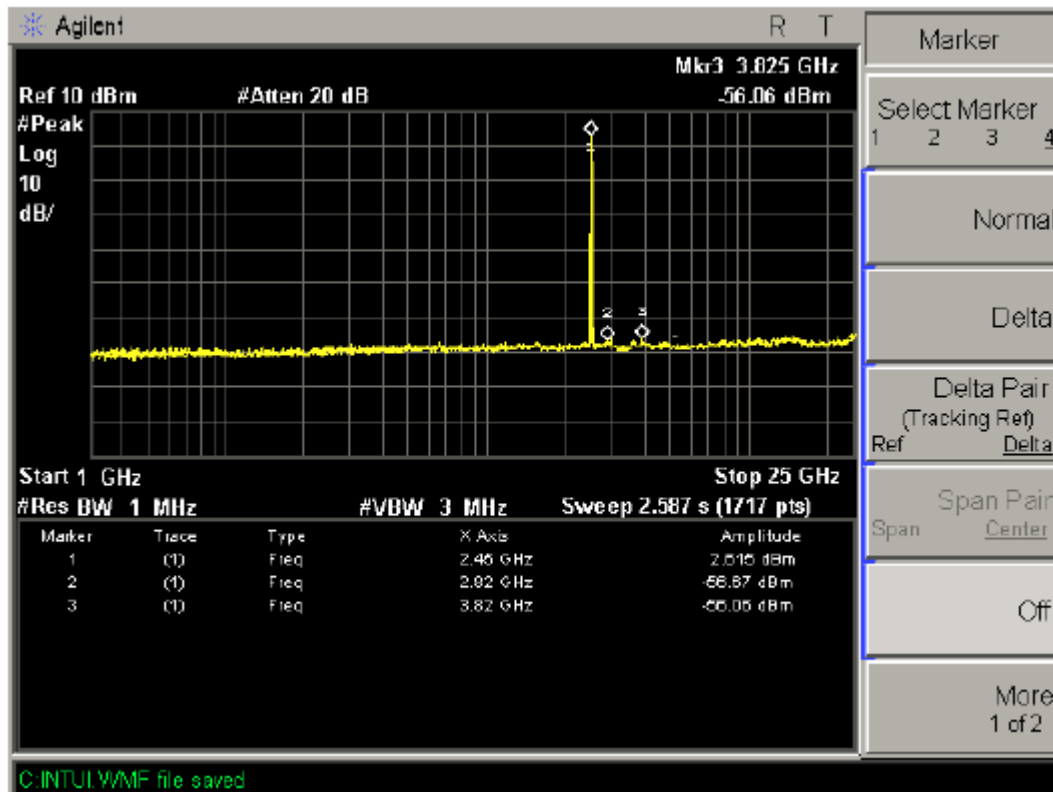
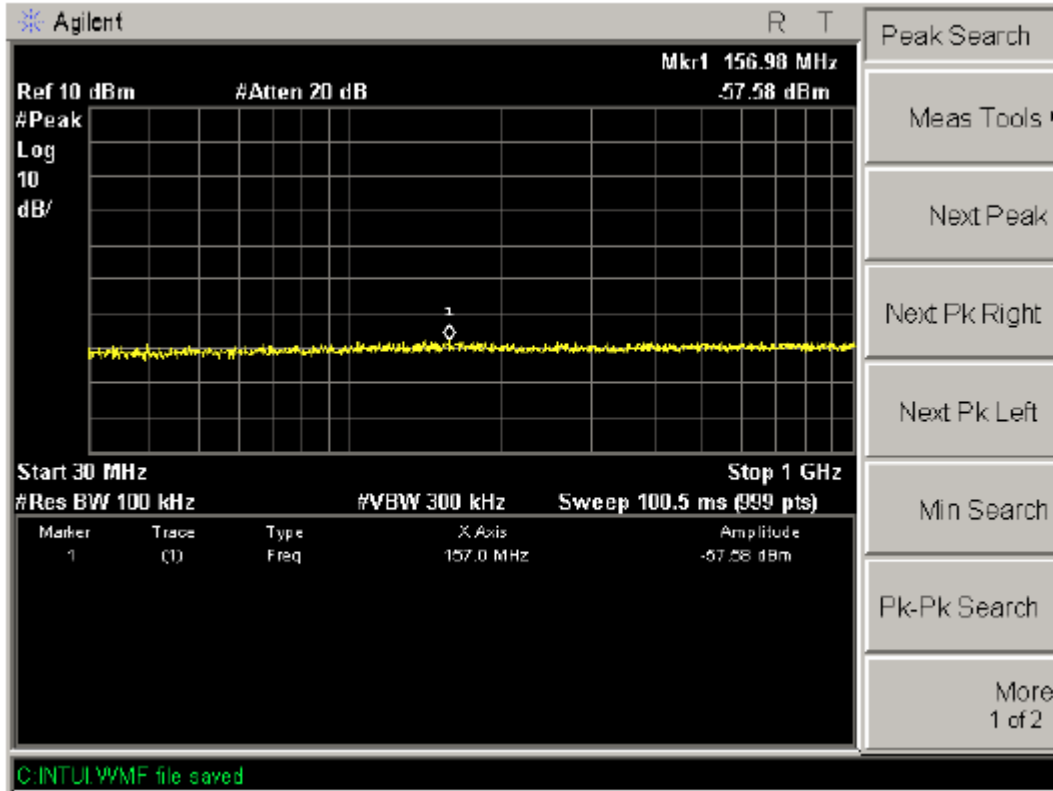
TX 802.11b Channel Low 2412MHz



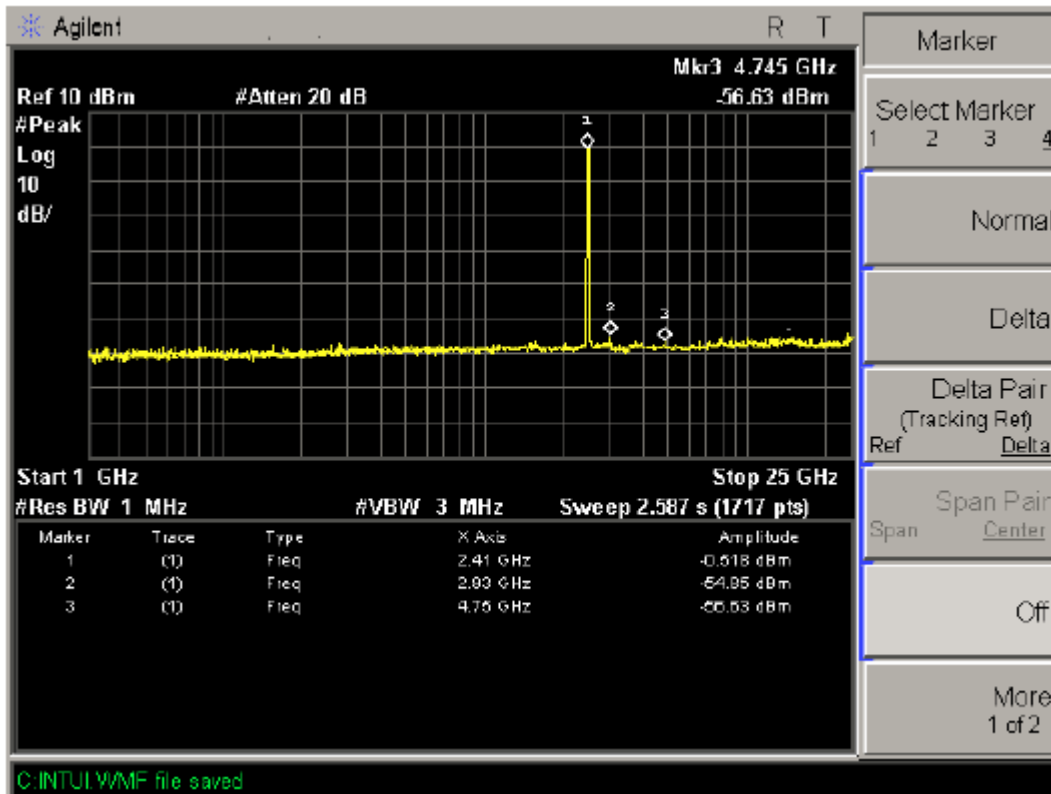
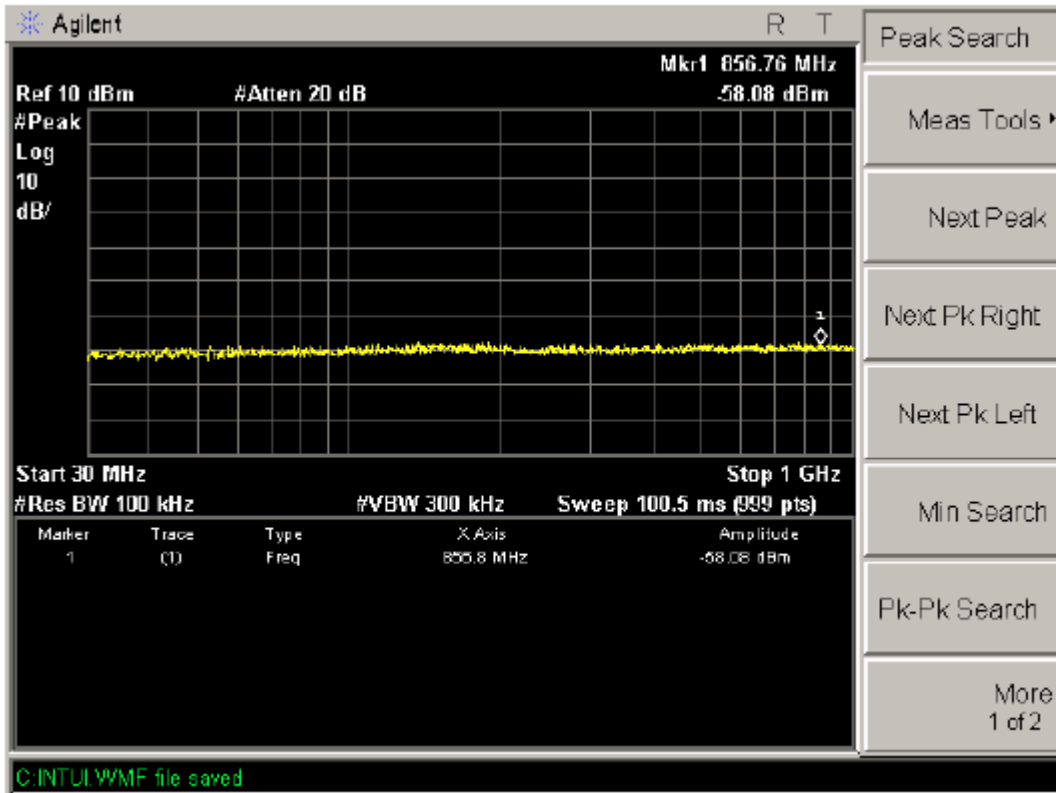
TX 802.11b Channel Middle 2437MHz



TX 802.11b Channel High 2462MHz

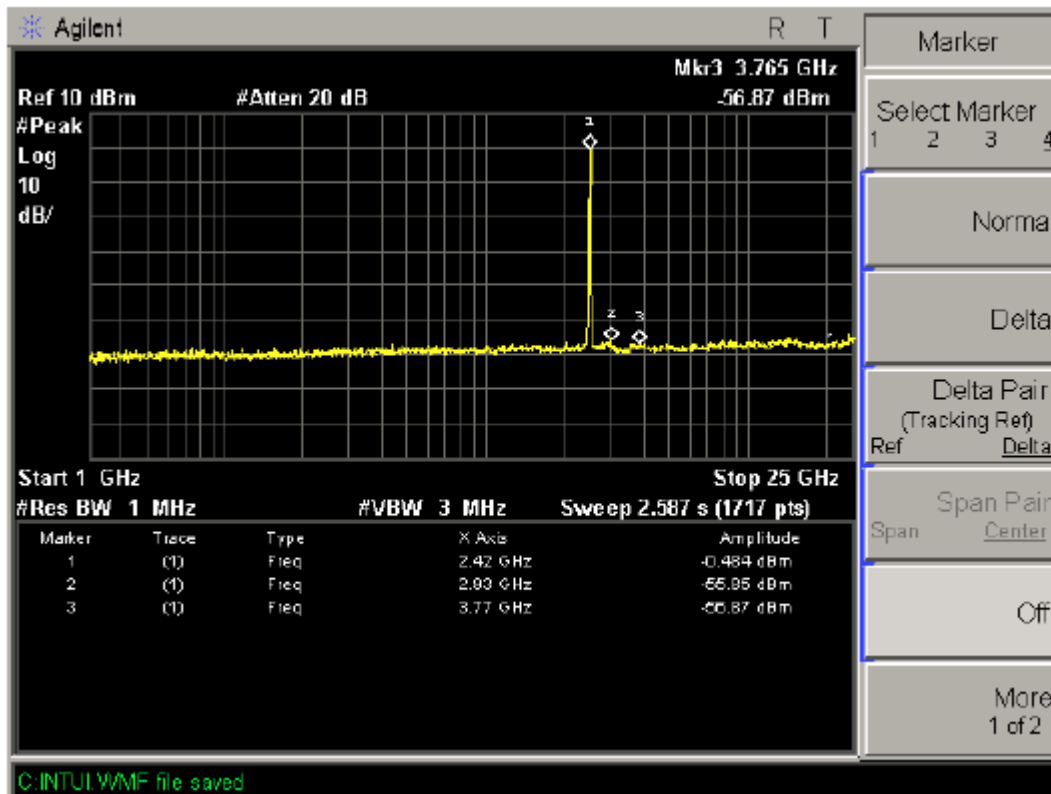
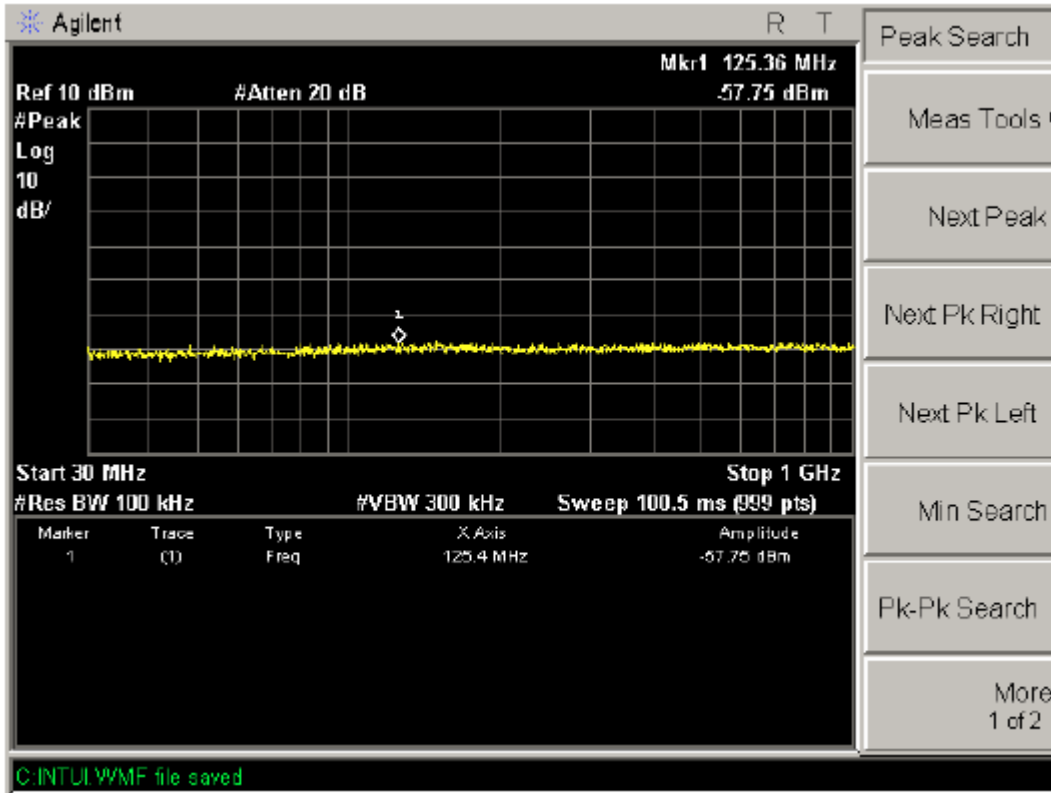


TX 802.11g Channel Low 2412MHz

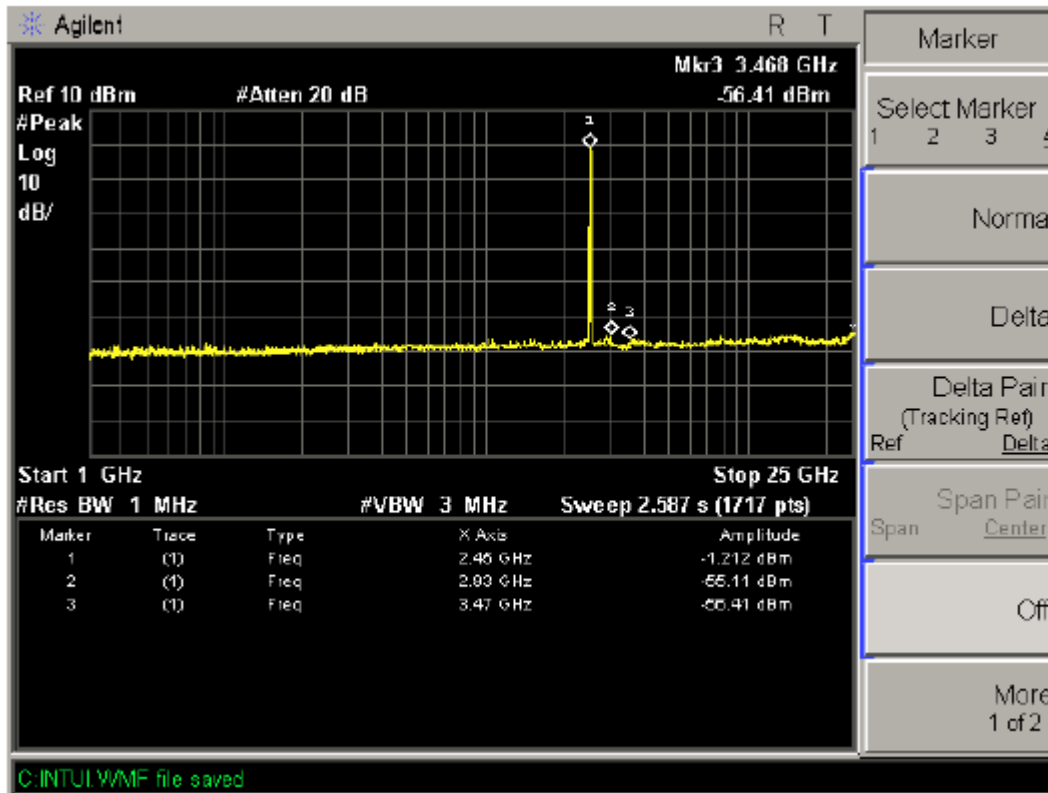
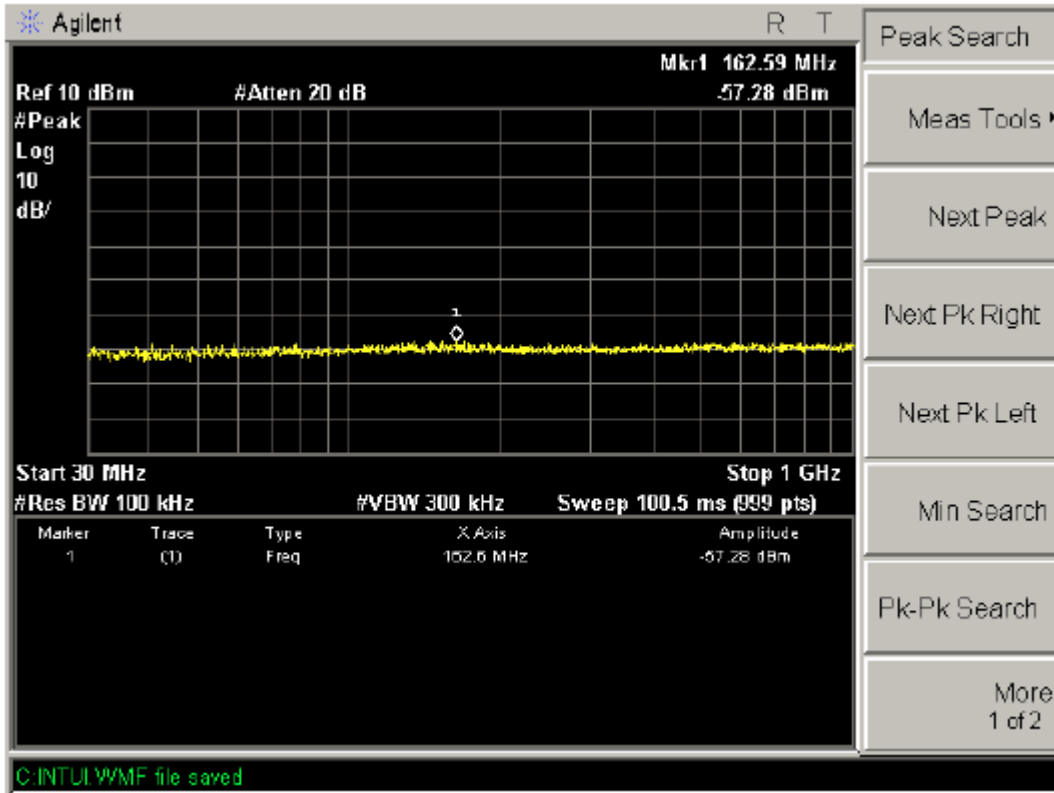




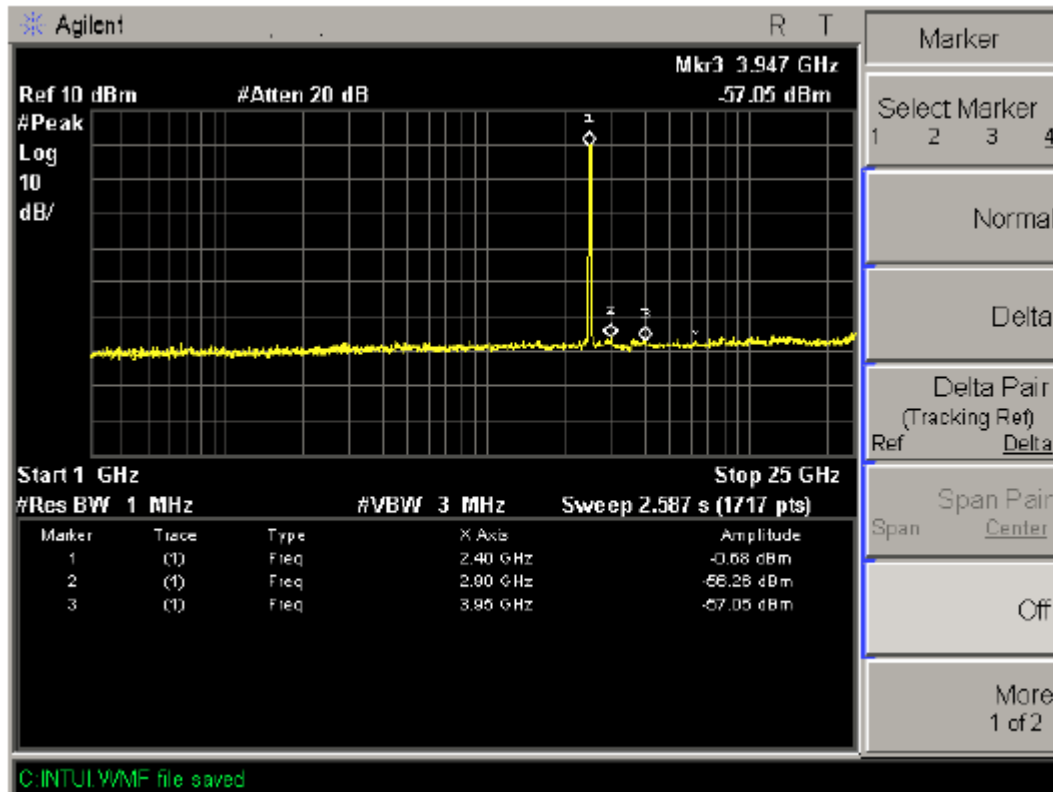
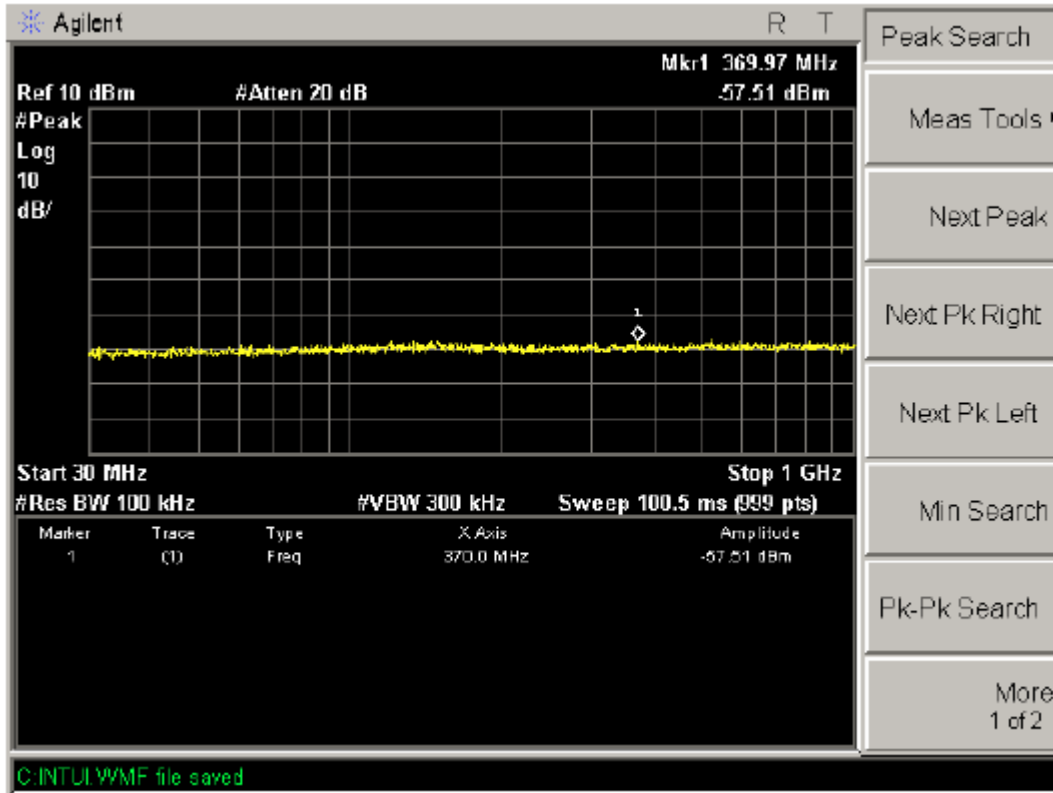
TX 802.11g Channel Middle 2437MHz



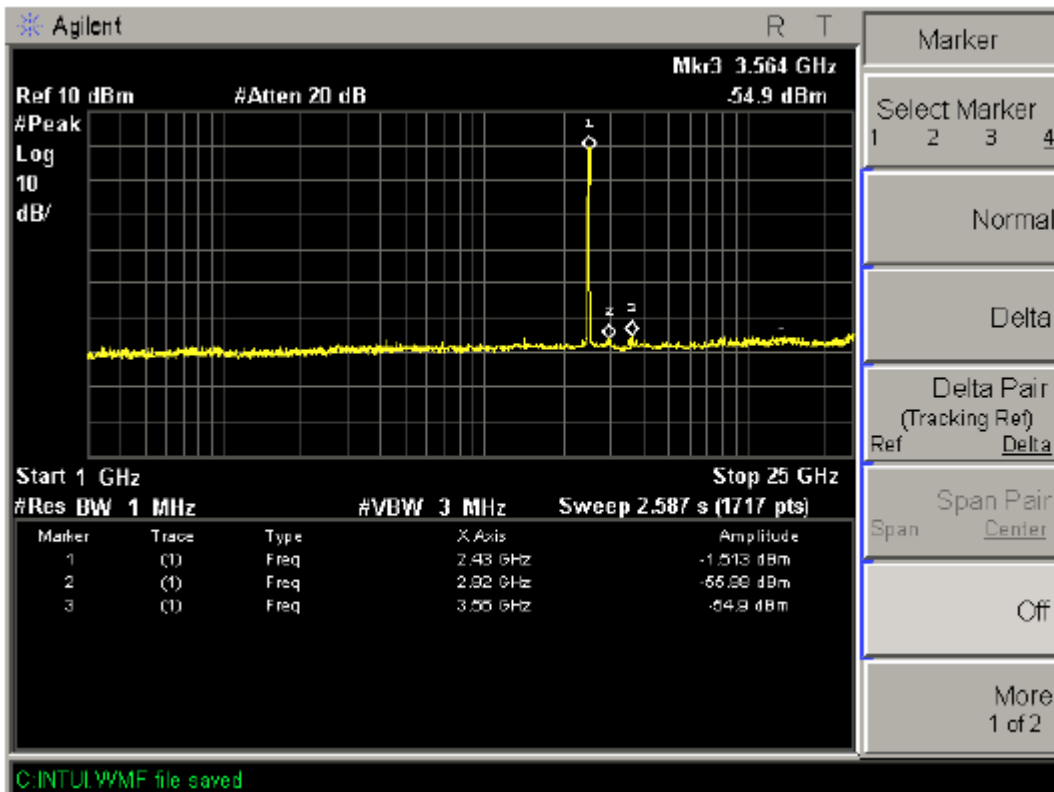
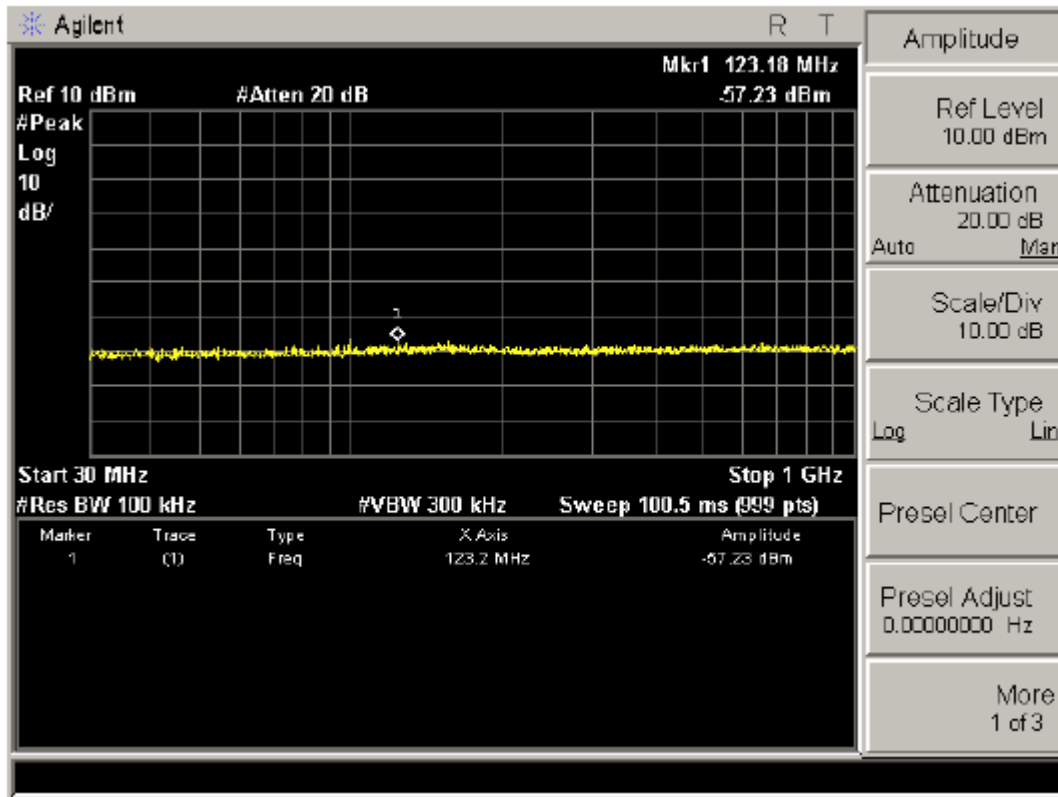
TX 802.11b Channel High 2462MHz



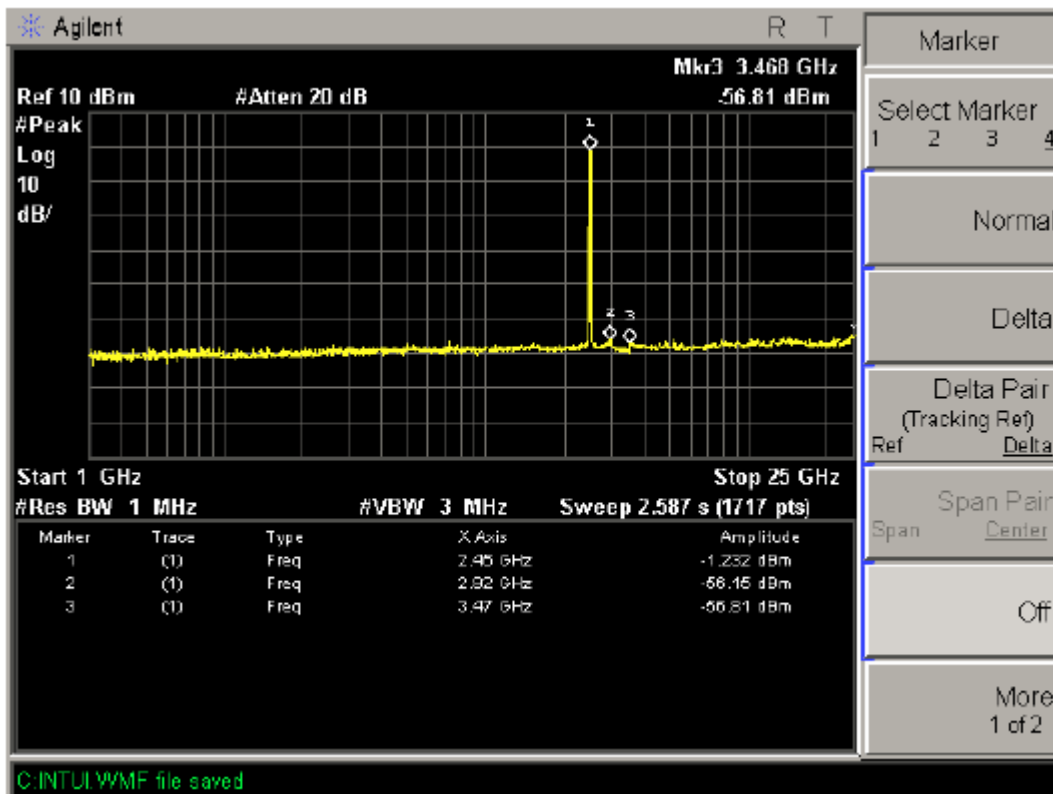
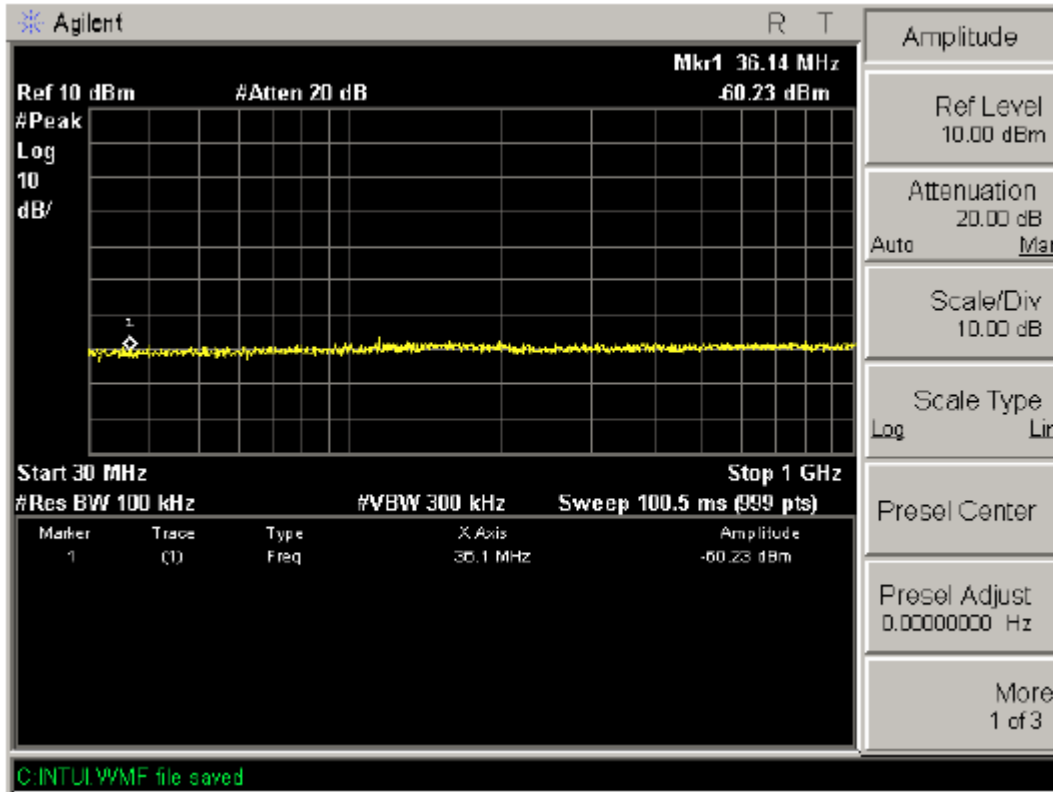
TX 802.11nChannel Low 2412MHz (20MHz)



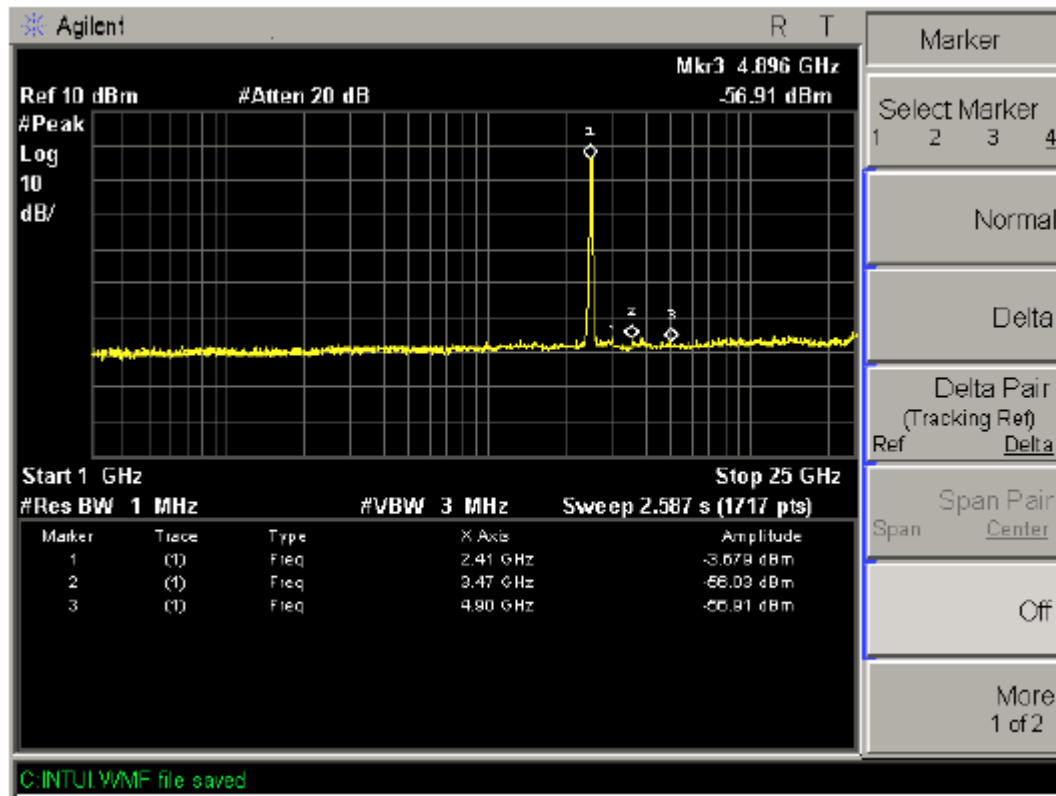
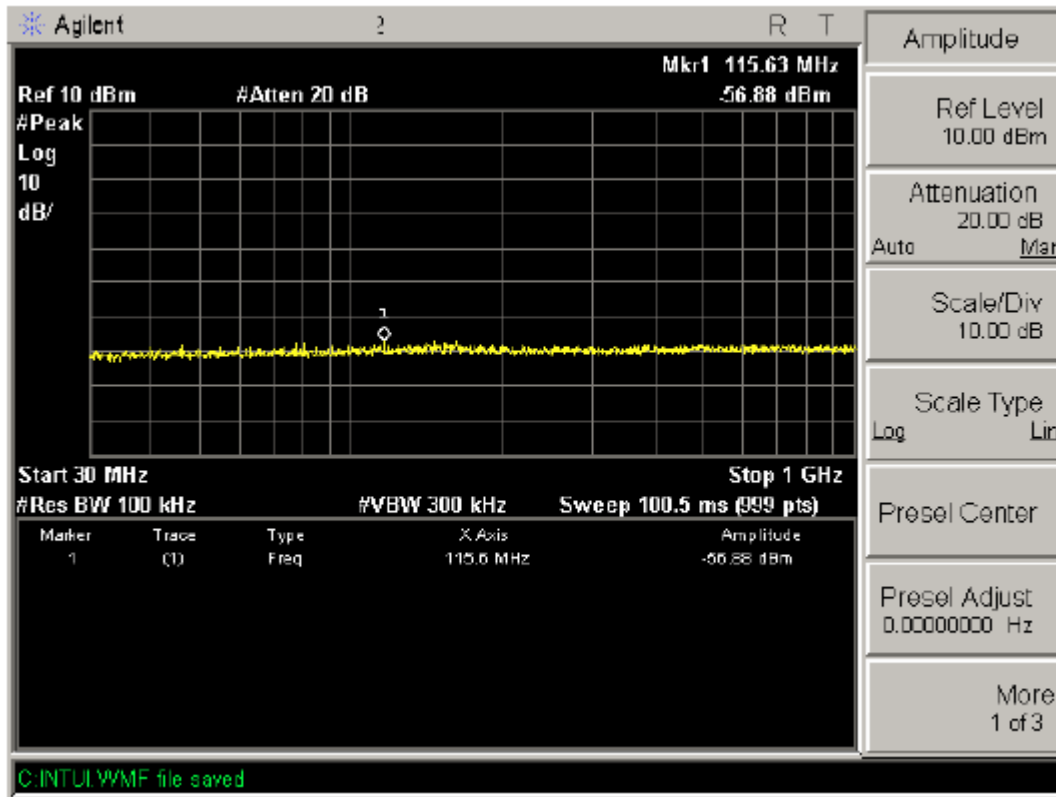
TX 802.11n Channel Middle 2437MHz (20MHz)



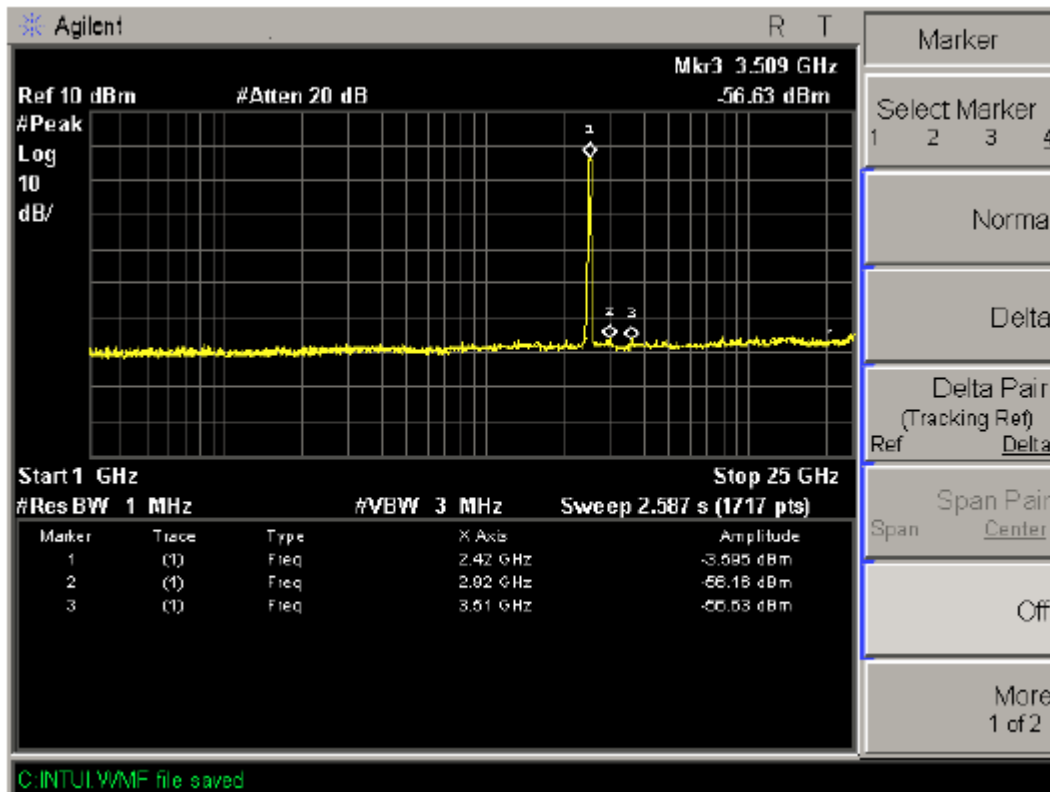
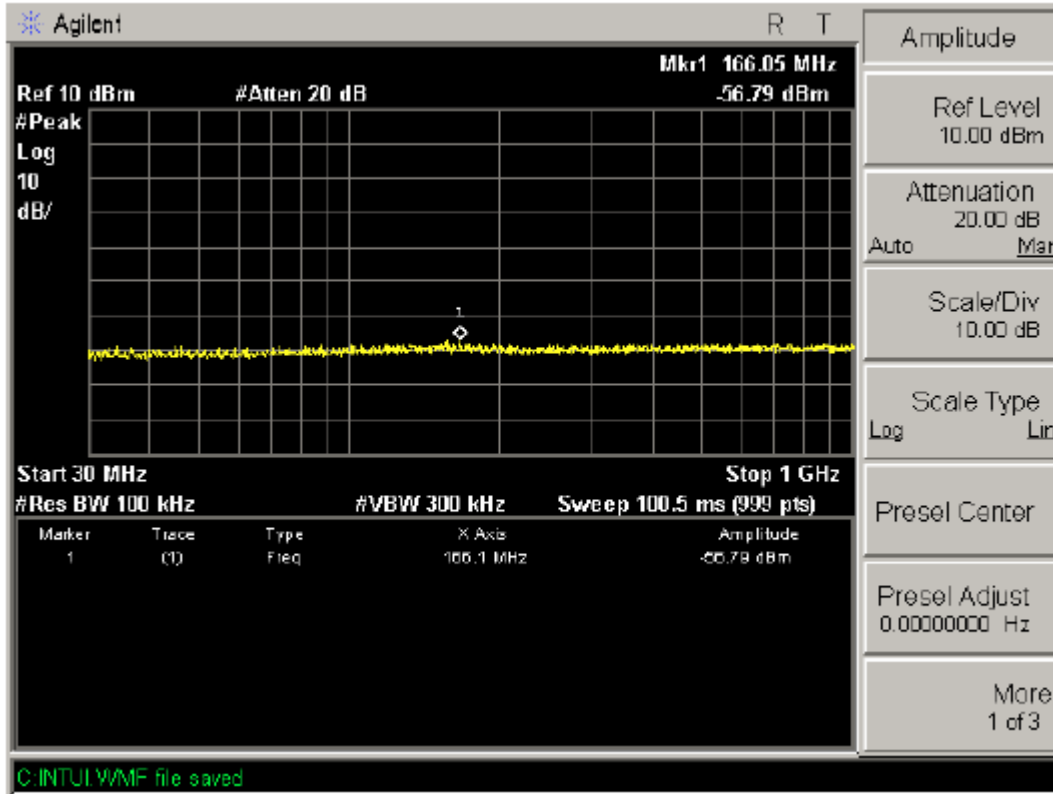
TX 802.11n Channel High 2462MHz (20MHz)



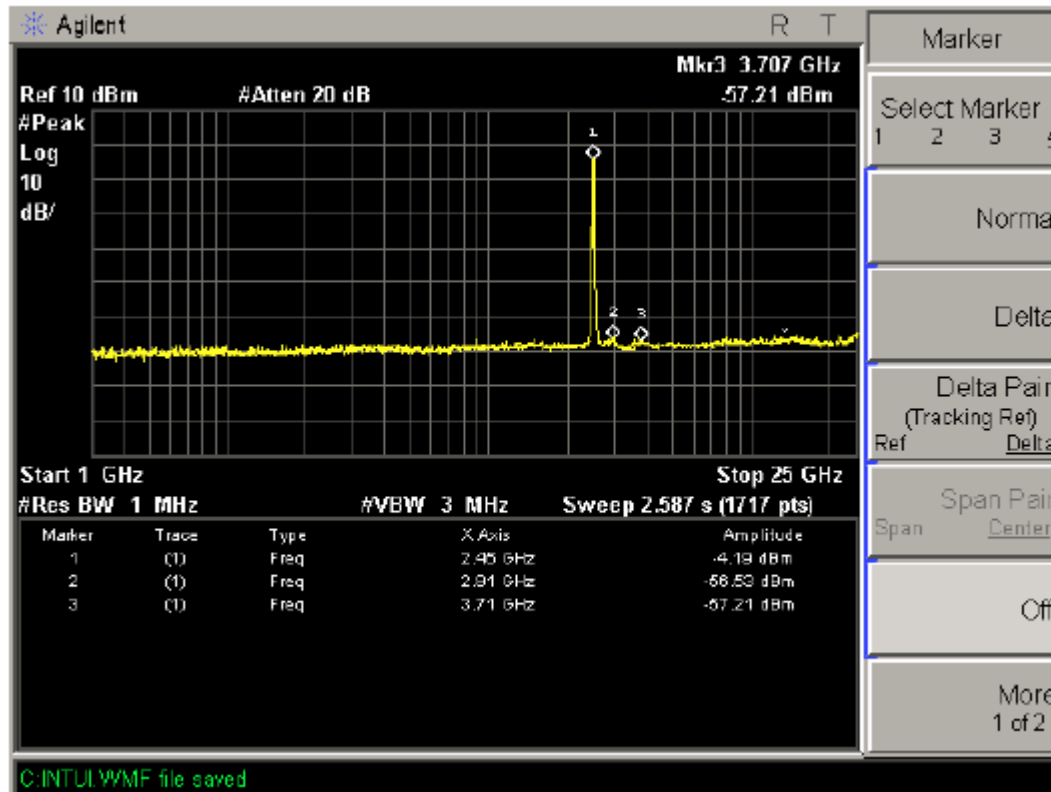
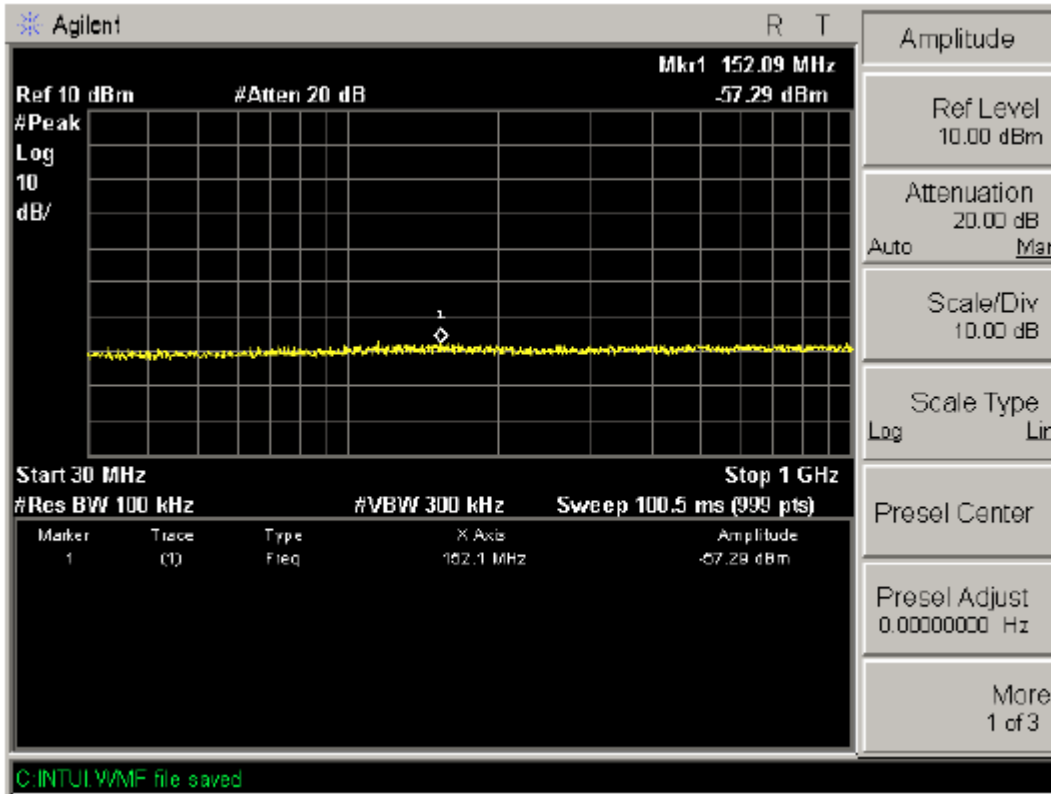
TX 802.11nChannel Low 2422MHz (40MHz)



TX 802.11n Channel Middle 2437MHz (40MHz)



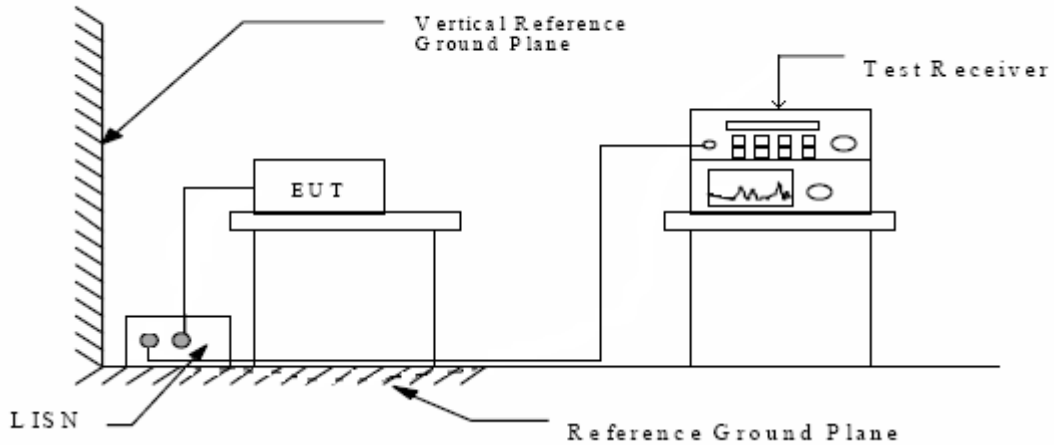
TX 802.11n Channel High 2452MHz (40MHz)





9 AC Power Line Conducted Emission For Part 15 Section 15.207(A)

9.1 Block Diagram of Test Setup



9.2 Limits

Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency MHz	Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

\* Decreases with the logarithm of the frequency.

9.3 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2003 on Conducted Emission Measurement.

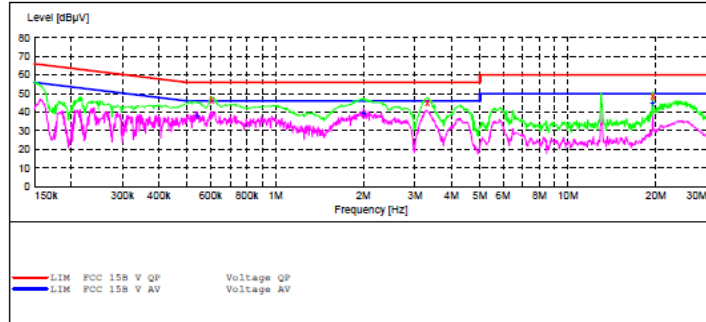
The bandwidth of test receiver (R & S ESPI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

9.4 Test Result

**PASS**

N



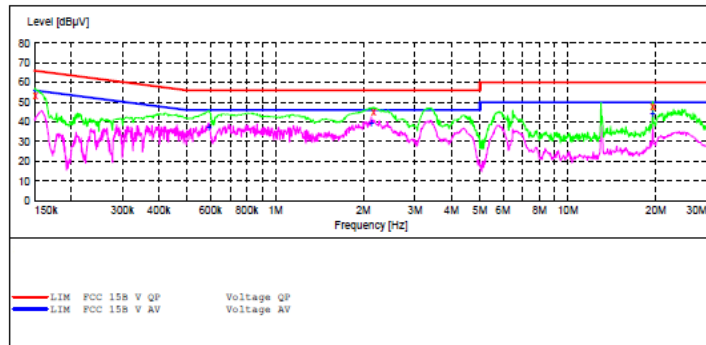
**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.606584	46.50	12.0	56	9.5	QP	N	GND
3.309167	45.30	11.5	56	10.7	QP	N	GND
19.475435	48.70	11.1	60	11.3	QP	N	GND

**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.540273	37.80	12.0	46	8.2	AV	N	GND
2.001110	39.60	11.7	46	6.4	AV	N	GND
19.475435	45.20	11.1	50	4.8	AV	N	GND

L



**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.151202	53.40	11.0	66	12.5	QP	L1	GND
2.167430	44.90	11.6	56	11.1	QP	L1	GND
19.475435	48.00	11.1	60	12.0	QP	L1	GND

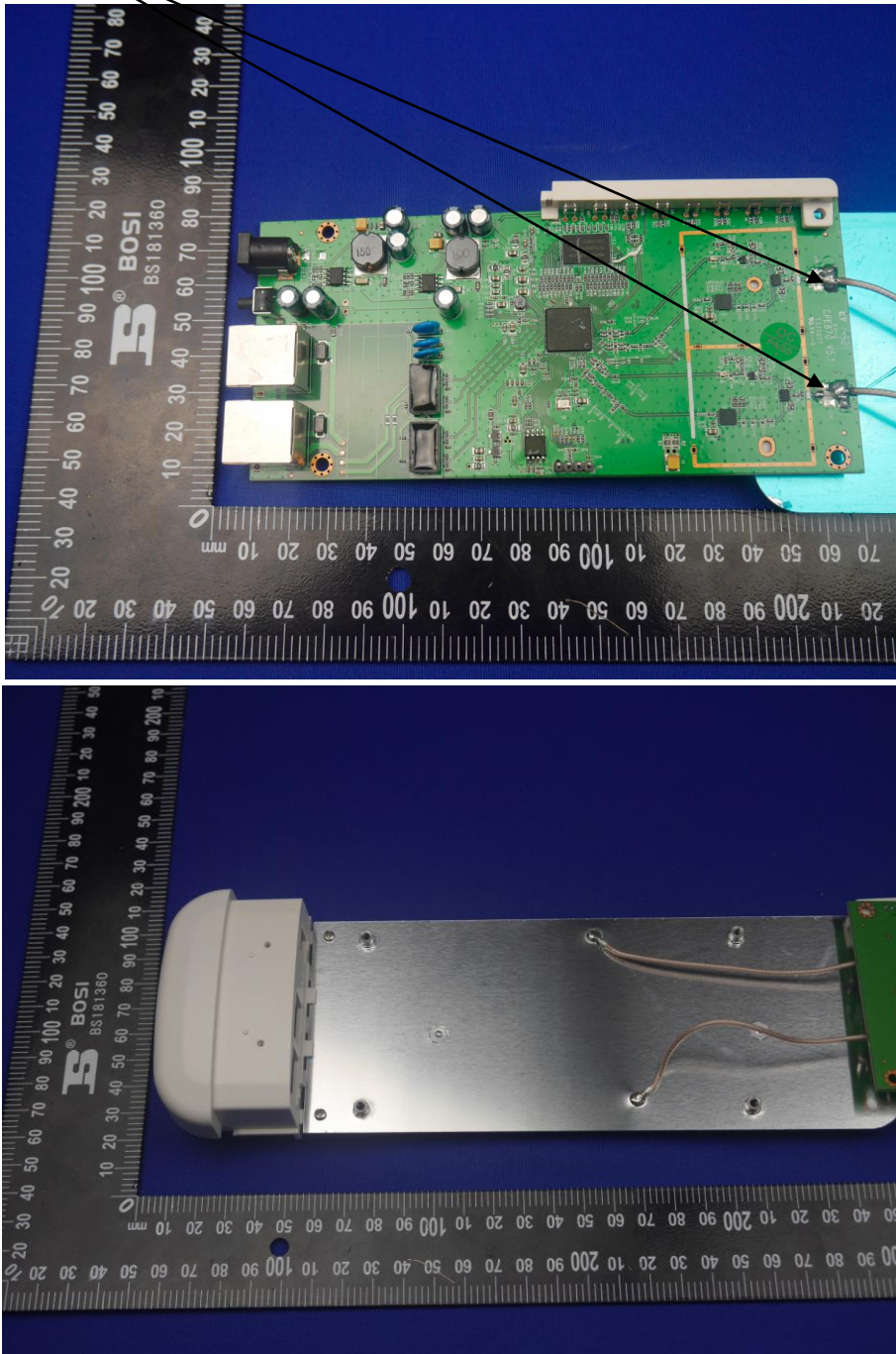
**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	FE
0.592227	37.40	12.0	46	8.6	AV	L1	GND
2.124597	39.70	11.6	46	6.3	AV	L1	GND
19.475435	44.40	11.1	50	5.6	AV	L1	GND

### 10 Antenna Requirement

According to 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. Antenna is fixed by enclosure, cannot be changed except take apart the product.

#### Antenna



Note: The antennas to transmitter at the same time.

11 Photograph of Test

11.1 Radiated Emission



### 11.2 AC Power Line Conducted Emission

