FCC TEST REPORT

Test report
On Behalf of
Shenzhen Zidoo Technology Co.,Ltd
For
SMART TV BOX
Model No.: X1Ⅱ

FCC ID: 2AGN7-X1

Prepared for :	**Shenzhen Zidoo Technology Co.,Ltd** **Central Avenue building A m, Unit 12D Xixiang Ave,BaoAn District,Shenzhen.**
Prepared By :	**WST Certification & Testing (HK) Limited** **12/F., San Toi Building,137-139 Connaught Road Central,HongKong**
Date of Test:	**Mar. 23, 2016 ~Apr. 05, 2016**
Date of Report:	**Apr. 05, 2016**
Report Number:	**WST160323118-E**

TEST RESULT CERTIFICATION

Applicant's name ..... Shenzhen Zidoo Technology Co.,Ltd

Address ..... Central Avenue building A m, Unit 12D Xixiang Ave,BaoAn District,Shenzhen.

Manufacture's Name ..... Shenzhen Zidoo Technology Co.,Ltd

Address ..... Central Avenue building A m, Unit 12D Xixiang Ave,BaoAn District,Shenzhen.

Product description

Trade Mark: ZIDOO

Product name..... SMART TV BOX

Model and/or type reference ..... X1 II

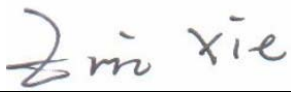
Standards..... FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

Date of Test.....

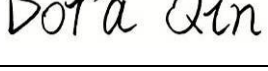
Date (s) of performance of tests..... **Mar. 23, 2016 ~Apr. 05, 2016**

Date of Issue..... **Apr. 05, 2016**

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) And Part 2.1049	6dB Bandwidth Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(b) And Part 2.1046	Maximum Peak Output Power Test	Compliant
Section 15.247(d) And Part 2.1051, Part 2.1057	Band Edge Compliance Tes	Compliant
Section 15.247(d) Section 15.209) Part 2.1051, Part 2.1053, Part 2.1057	Radiated Spurious Emission Test	Compliant
Section 15.247(d) Part 2.1051, Part 2.1053, Part 2.1057	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	SMART TV BOX
Model Name	X1Ⅱ
Serial No	N/A
FCC ID	2AGN7-X1
Model Difference	N/A
Modulation Type	WIFI:DBPSK,DQPSK,CCK,BPSK,
Antenna Type	Internal Antenna
WLA□ Operation frequency	802.11b: 2412-2462MHz 802.11g: 2412-2462MHz 802.11n HT20: 2412-2462MHz 802.11n HT40: 2422-2452MHz
Number of Channels	802.11b/g/n (HT20):11 802.11n (HT40): 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 150Mbps
Modulation Type	CCK, OFDM
Power Source	DC 5V from Adapter
Power Rating	/
Adapter Model	KA23-0502000DES Input: AC 100-240V, 0.35A, Output: DC5V, 2A

2.2 Carrier frequency of channels

Channel List for 802.11b/g/n(20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	06	2437	09	2452		
04	2427	07	2442				
05	2432	08	2447				

2.3 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

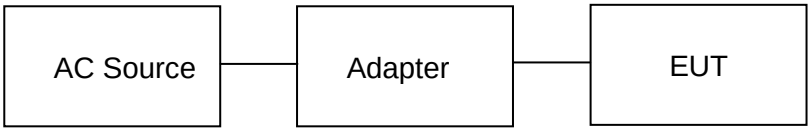
802.11n (HT20) Transmitting mode

Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

802.11n (HT40) Transmitting mode

Low Channel: 2422MHz
Middle Channel: 2437MHz
High Channel: 2452MHz

2.4 Description of test setup



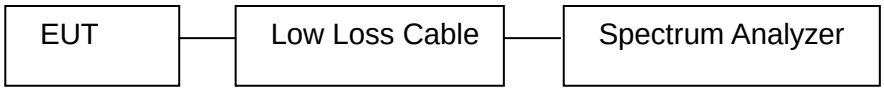
2.5 Measurement instruments list

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~150MHz	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, X1Ⅱ	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, 2015	1 Year
47.	RF-Amplifier 0.8~3.0GHz	Amplifier Reasearch	60S1G3	SEL0065	Oct. 24, 2015	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	AX1Ⅱ080	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 Limit

Part 2.1049 and 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 Block diagram of test setup

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	9.942	>0.5MHz
Middle	2437	8.374	>0.5MHz
High	2462	6.771	>0.5MHz

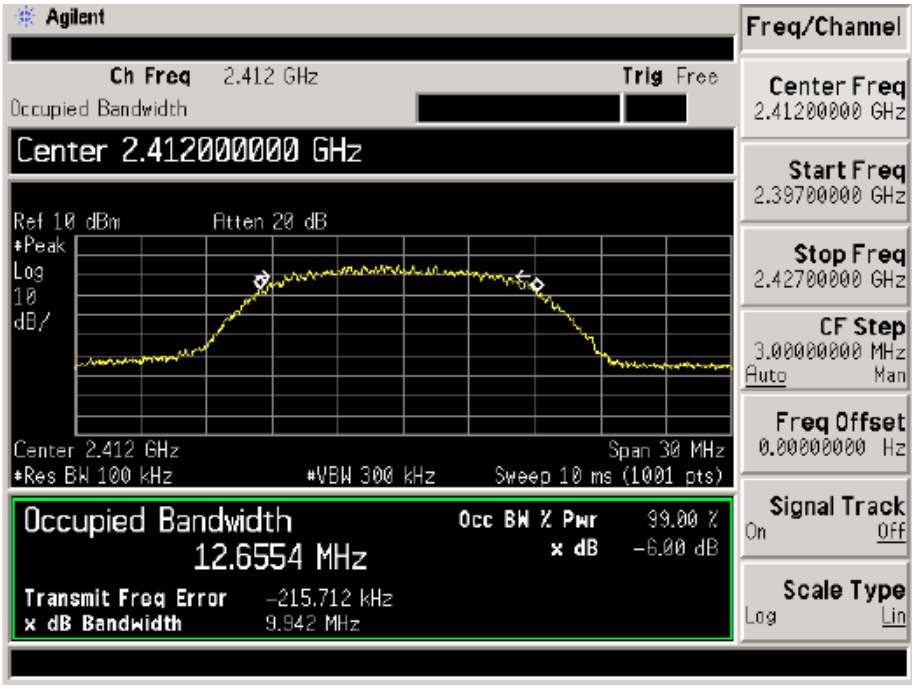
802.11g			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2412	16.545	>0.5MHz
Middle	2437	12.668	>0.5MHz
High	2462	10.038	>0.5MHz

802.11n (HT20)			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2412	17.713	>0.5MHz
Middle	2437	13.460	>0.5MHz
High	2462	8.631	>0.5MHz

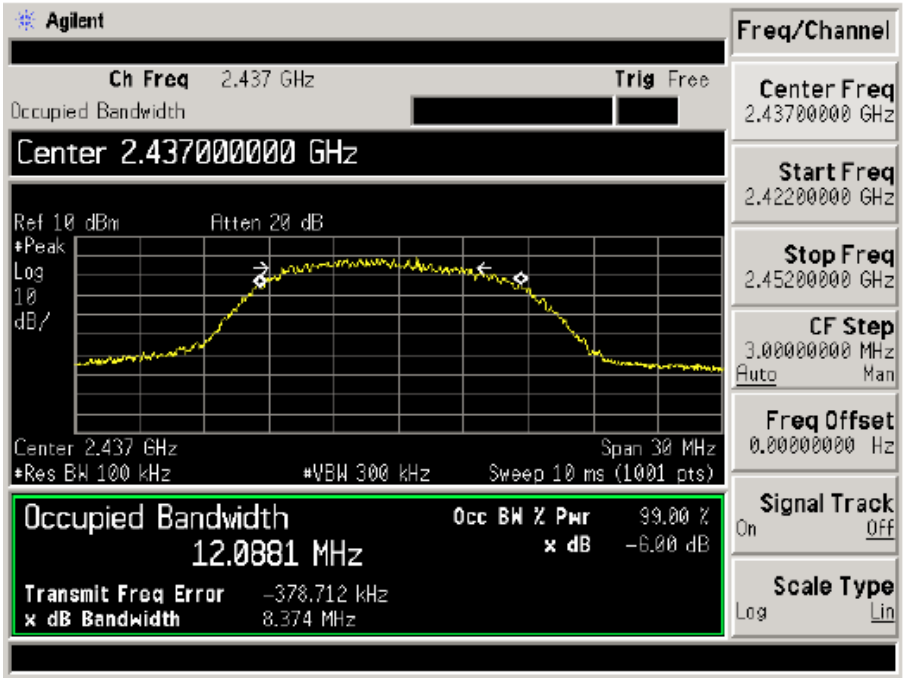
802.11n (HT40)			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2422	15.282	>0.5MHz
Middle	2437	17.842	>0.5MHz
High	2452	34.494	>0.5MHz

The spectrum analyzer plots are attached as below.

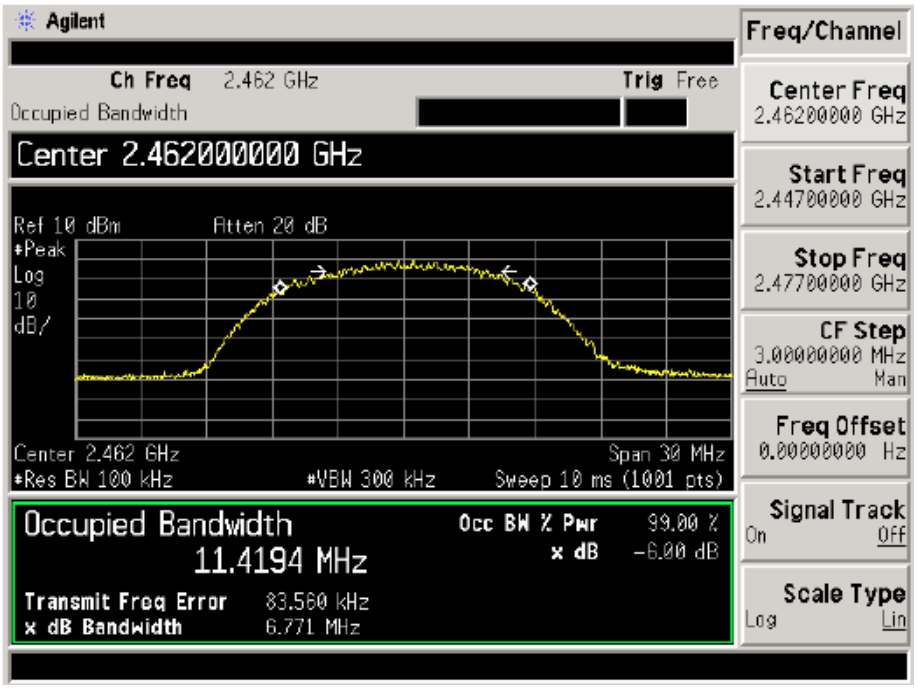
802.11b Channel Low 2412MHz



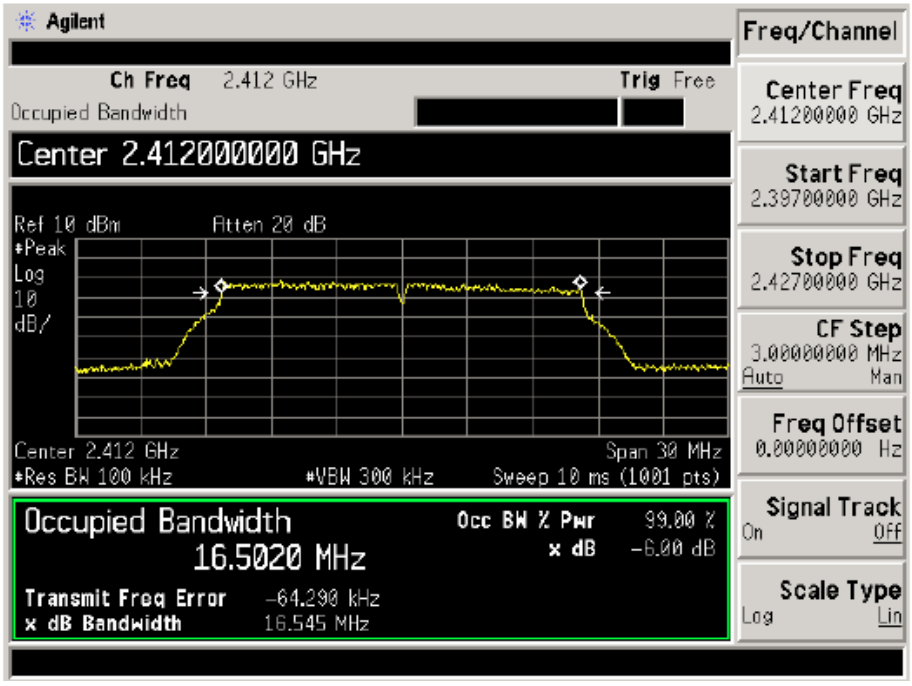
802.11b Channel Middle 2437MHz



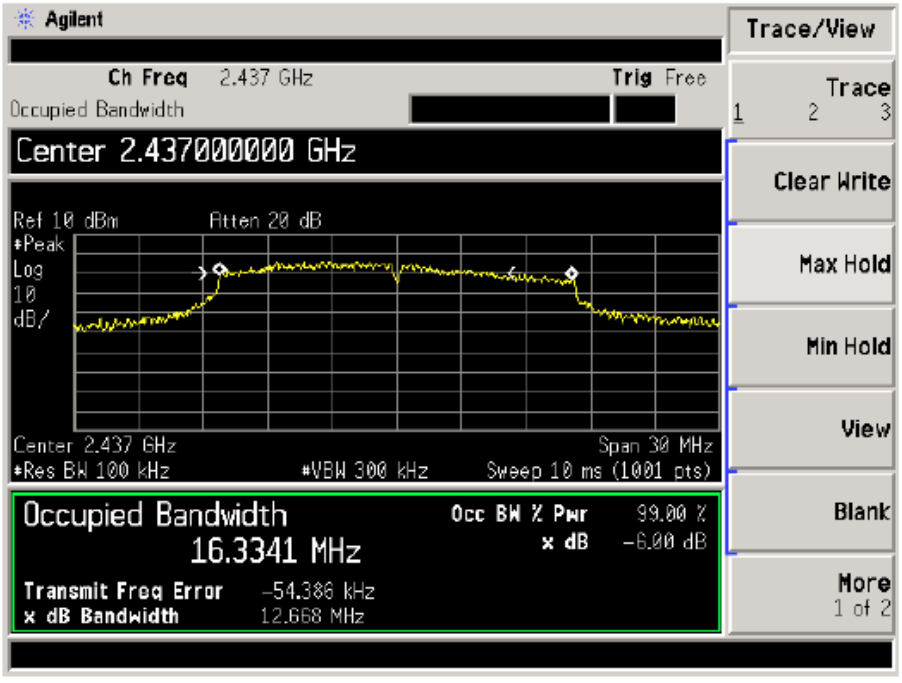
802.11b Channel High 2462MHz



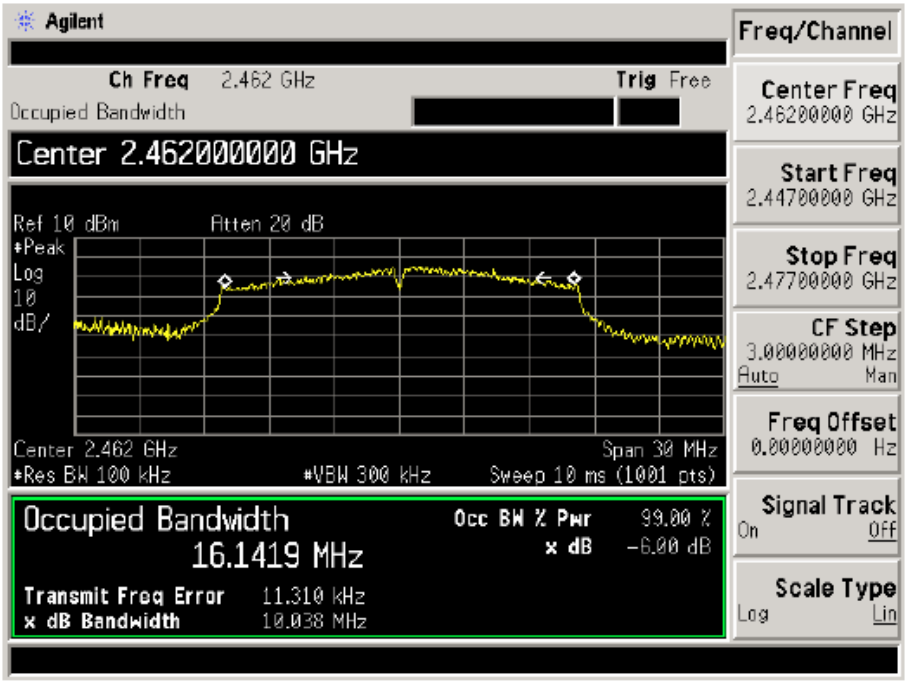
802.11g Channel Low 2412MHz



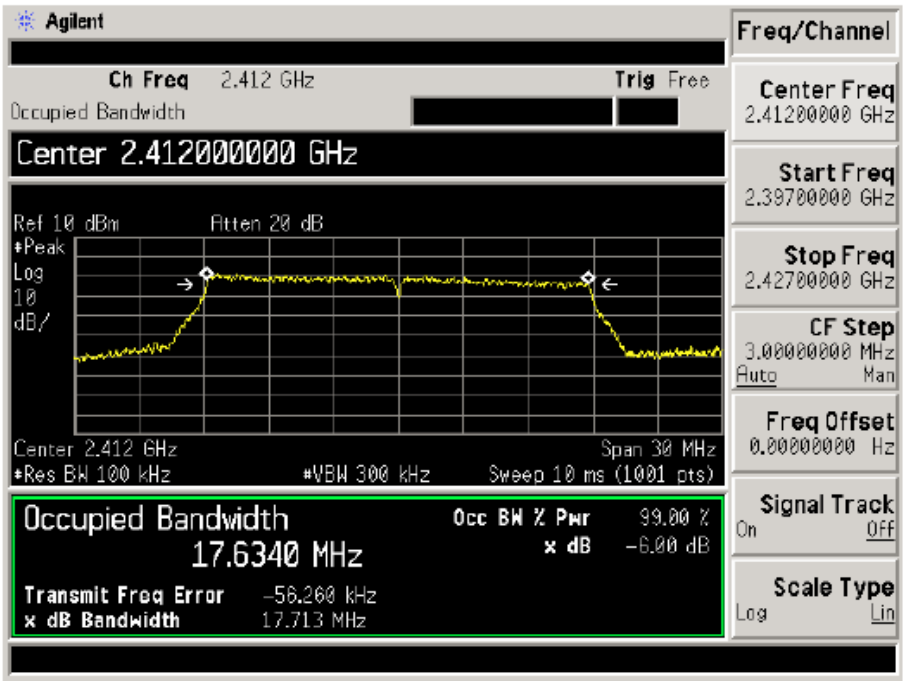
802.11g Channel Middle 2437MHz



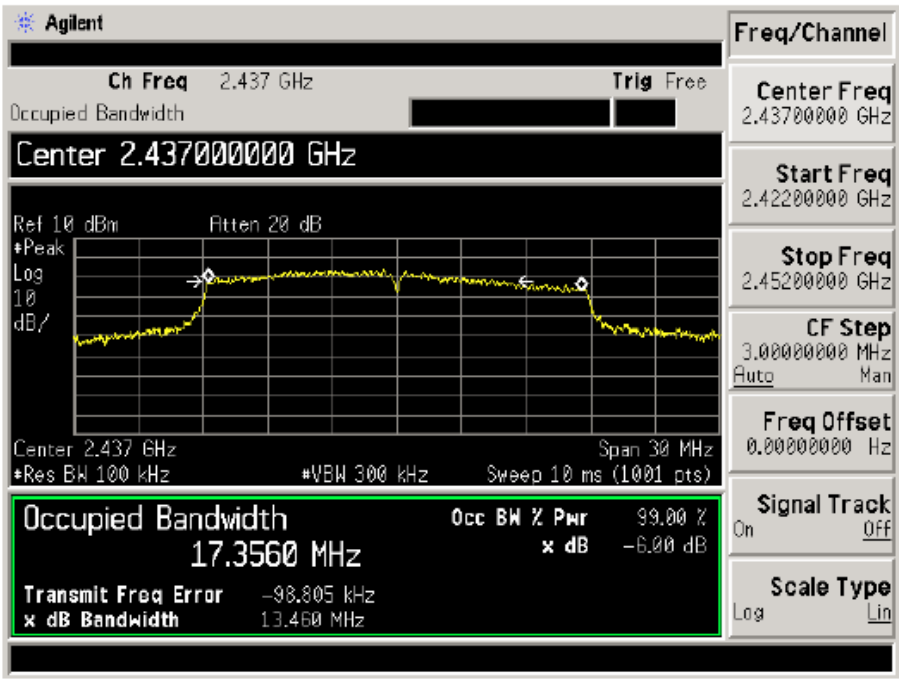
802.11g Channel High 2462MHz



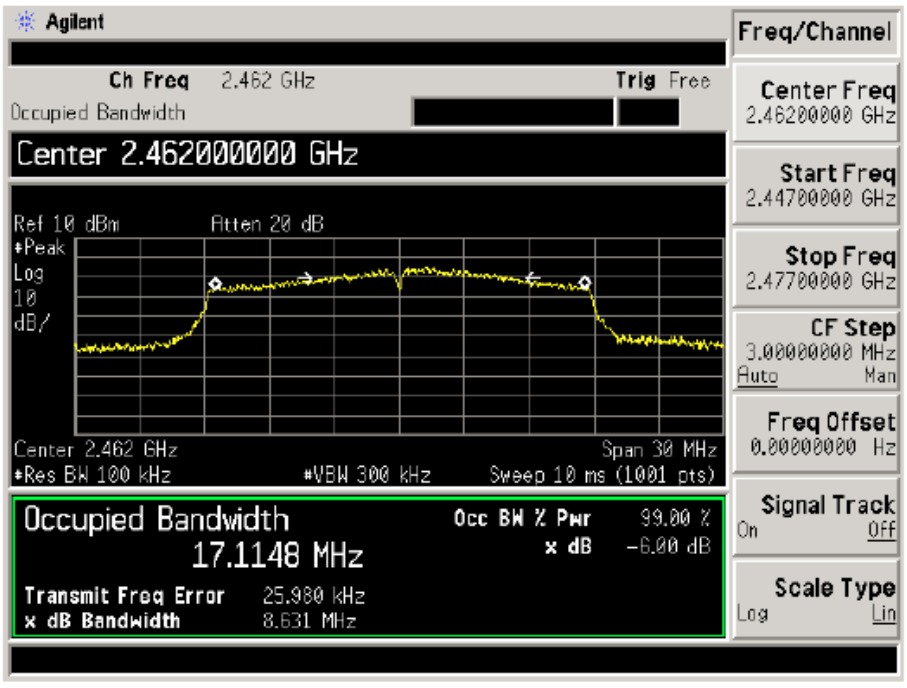
802.11n(HT20) Channel Low 2412MHz



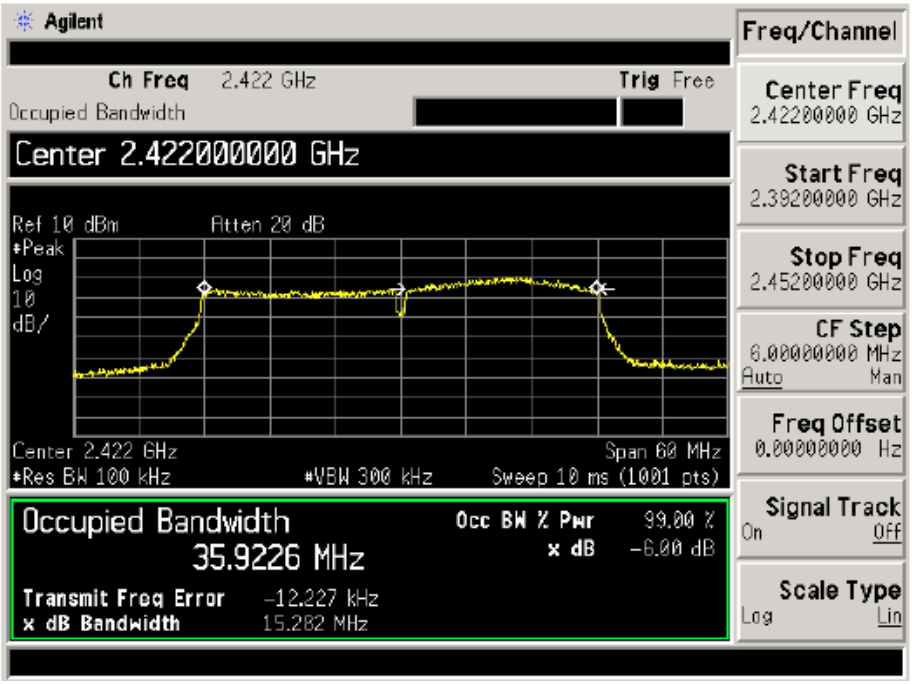
802.11n(HT20) Channel Middle 2437MHz



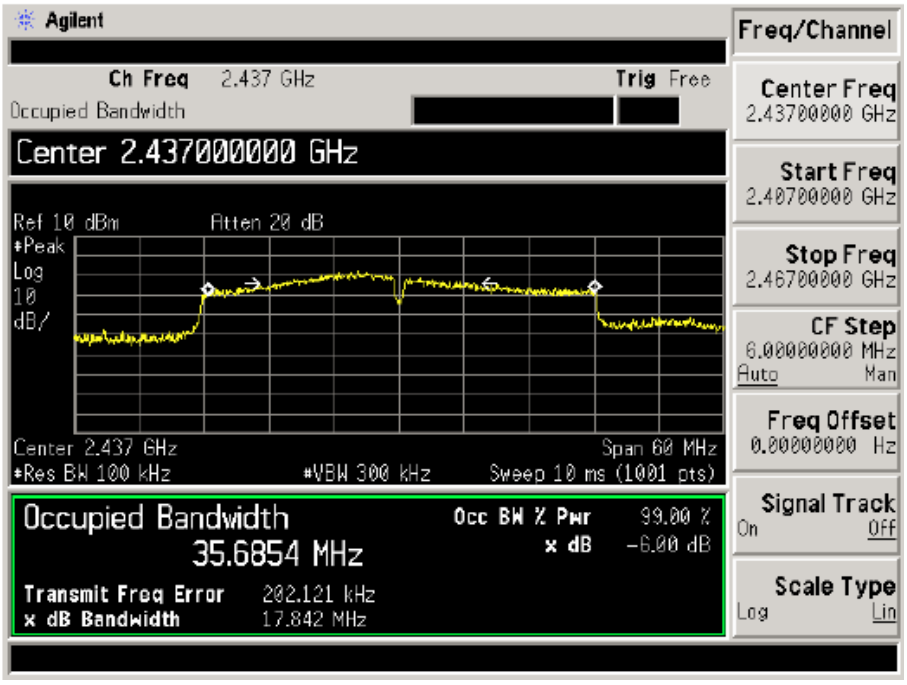
802.11n(HT20) Channel High 2462MHz



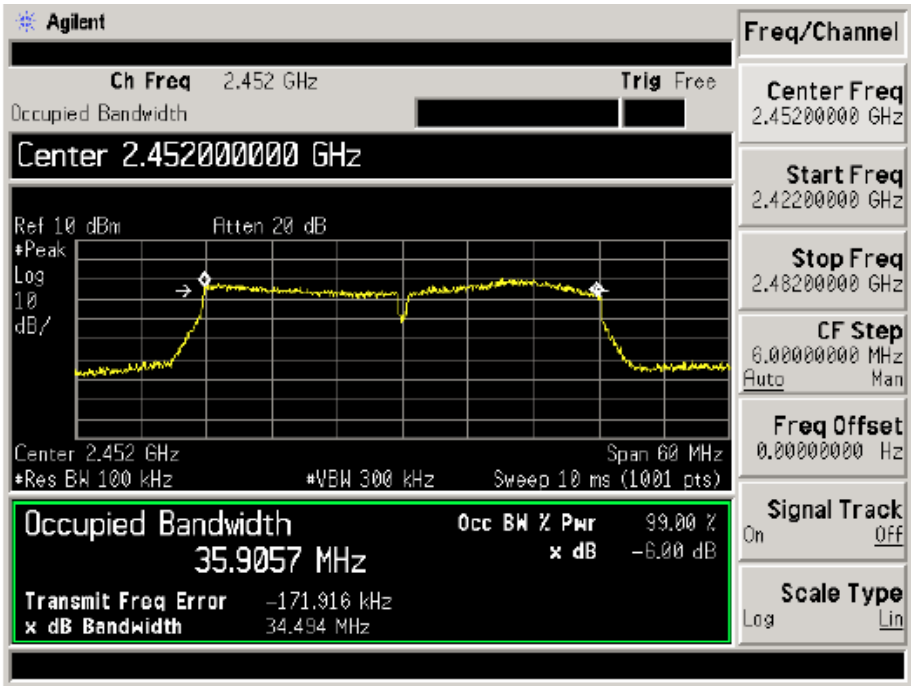
802.11n(HT40) Channel Low 2422MHz



802.11n(HT40) Channel Middle 2437MHz

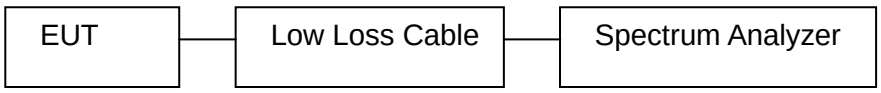


802.11n(HT40) Channel High 2452MHz



4. MAXIMUM PEAK OUTPUT POWER

4.1 Block diagram of test setup



4.2 Limits

Part 2.1046 and 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	8.22	30
Middle	2437	10.01	30
High	2462	8.57	30

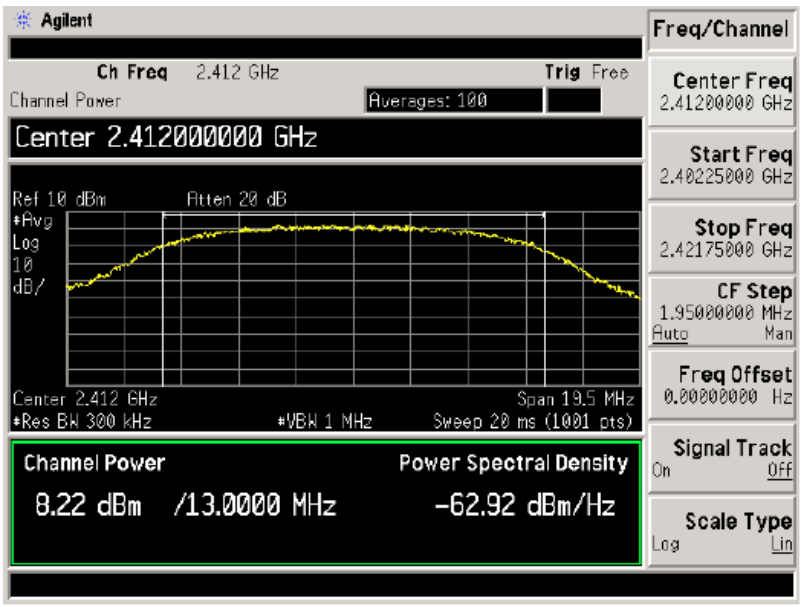
802.11g

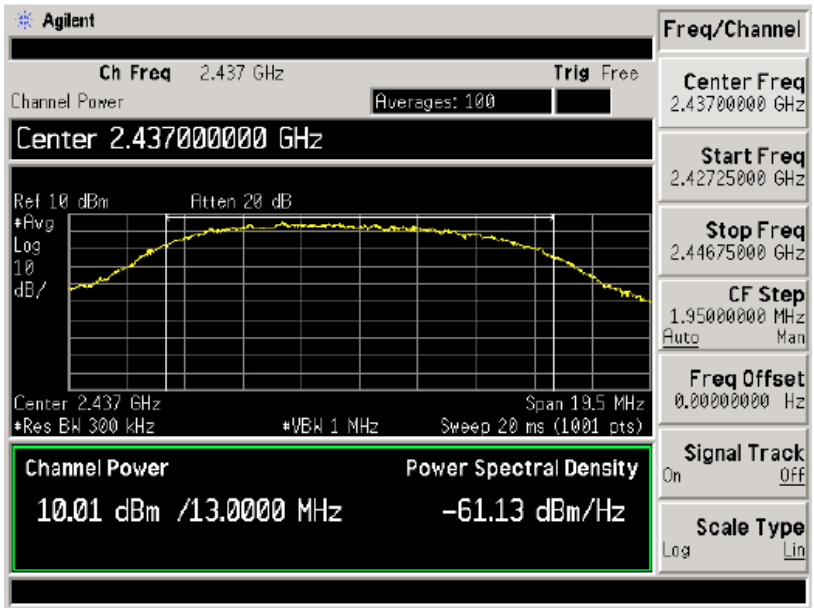
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	3.85	30
Middle	2437	5.91	30
High	2462	5.09	30

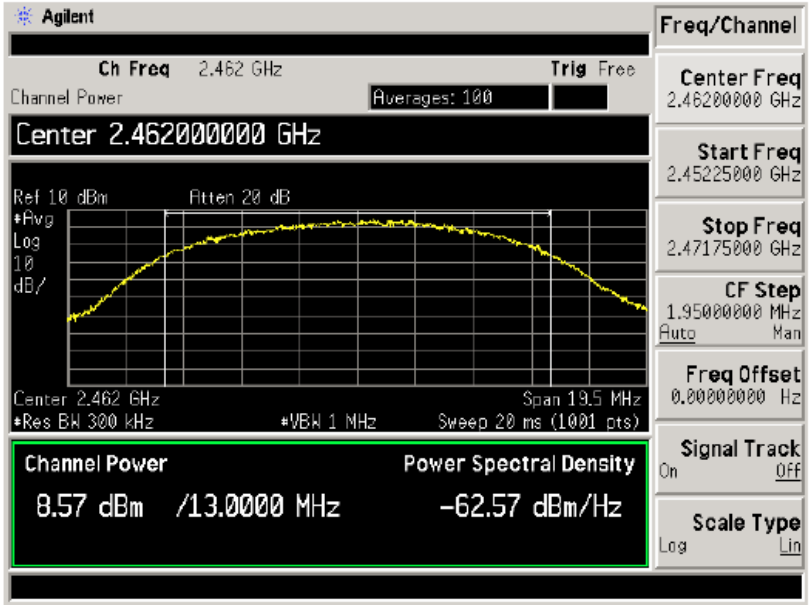
802.11n (HT20)			
Channel	**Frequency (MHz)**	**Peak output power (dBm)**	**Limit (dBm)**
Low	2412	3.28	30
Middle	2437	4.91	30
High	2462	4.48	30

802.11n (HT40)			
Channel	**Frequency (MHz)**	**Peak output power (dBm)**	**Limit (dBm)**
Low	2422	2.94	30
Middle	2437	3.35	30
High	2452	2.85	30

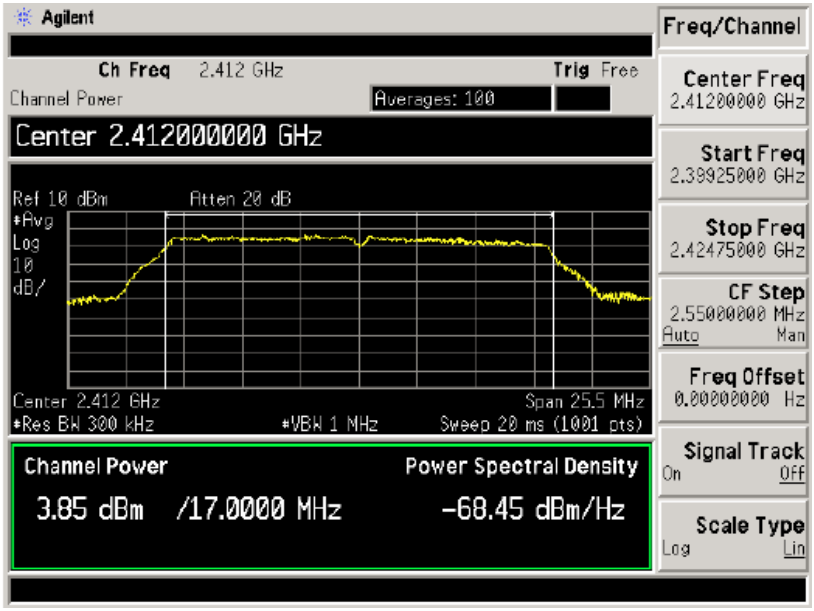
802.11b

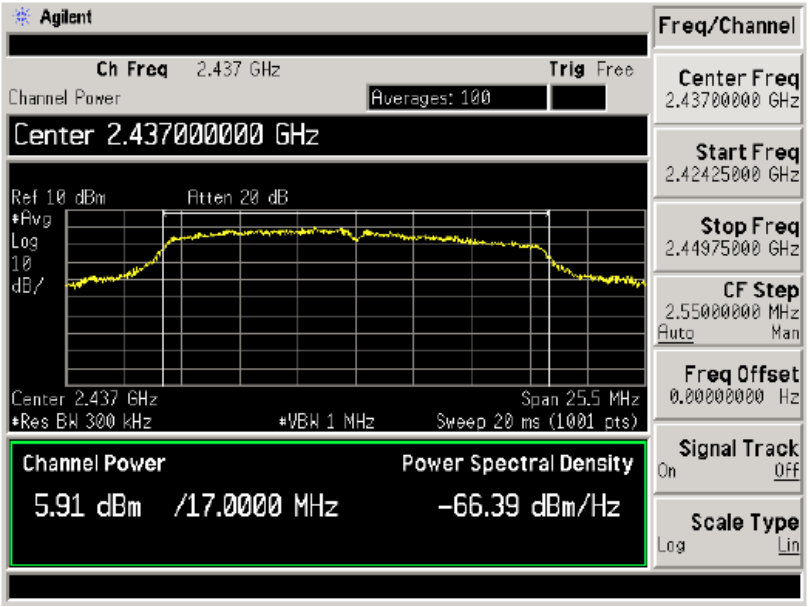

Agilent
Ch Freq 2.412 GHz
Trig Free
Channel Power
Averages: 100
Center 2.412000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.412 GHz
Span 19.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
8.22 dBm /13.0000 MHz
Power Spectral Density
-62.92 dBm/Hz
Freq/Channel
Center Freq
2.41200000 GHz
Start Freq
2.40225000 GHz
Stop Freq
2.42175000 GHz
CF Step
1.95000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

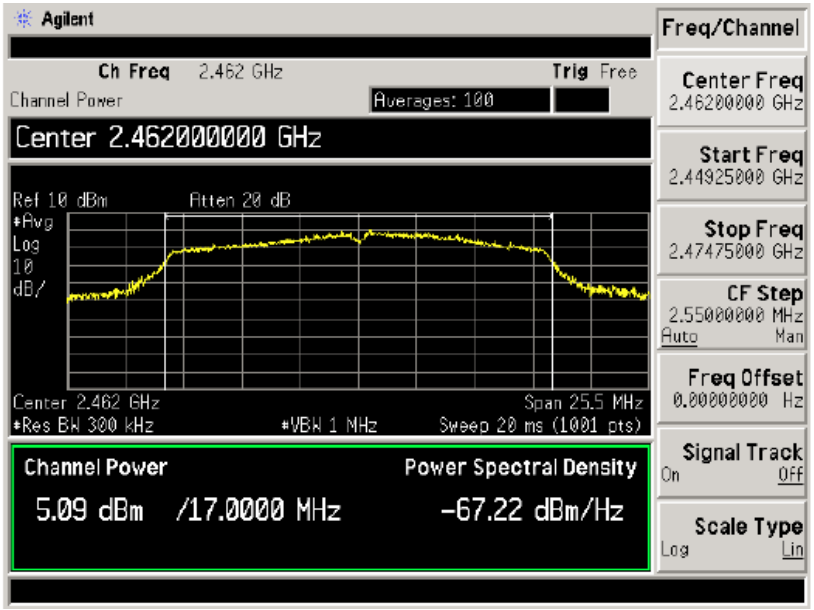

Agilent
Ch Freq 2.437 GHz
Trig Free
Channel Power
Averages: 100
Center 2.437000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.437 GHz
Span 19.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
10.01 dBm /13.0000 MHz
Power Spectral Density
-61.13 dBm/Hz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.42725000 GHz
Stop Freq
2.44675000 GHz
CF Step
1.95000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.462 GHz
Trig Free
Channel Power
Averages: 100
Center 2.462000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.462 GHz
Span 19.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
8.57 dBm /13.0000 MHz
Power Spectral Density
-62.57 dBm/Hz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.45225000 GHz
Stop Freq
2.47175000 GHz
CF Step
1.95000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

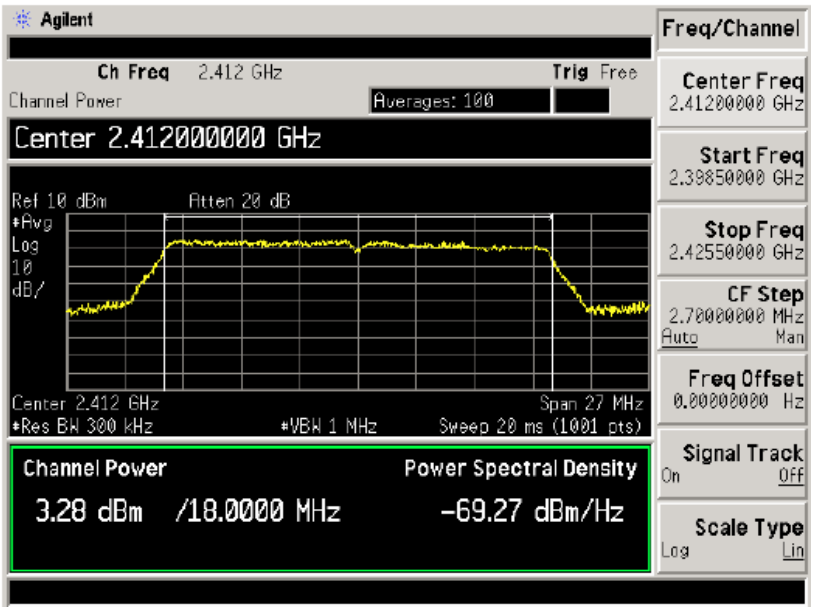
802.11g

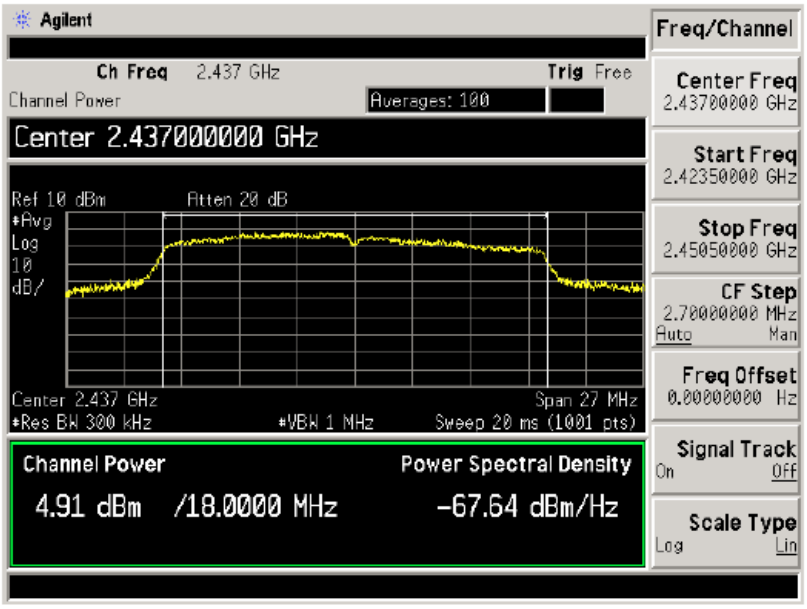

Agilent
Ch Freq 2.412 GHz
Trig Free
Channel Power
Averages: 100
Center 2.412000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.412 GHz
Span 25.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
3.85 dBm /17.0000 MHz
Power Spectral Density
-68.45 dBm/Hz
Freq/Channel
Center Freq
2.41200000 GHz
Start Freq
2.39925000 GHz
Stop Freq
2.42475000 GHz
CF Step
2.55000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

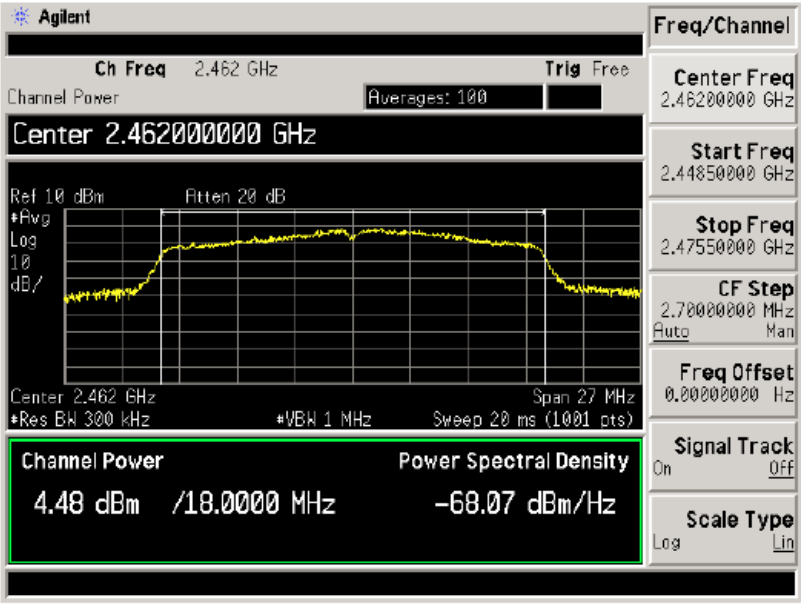

Agilent
Ch Freq 2.437 GHz
Trig Free
Channel Power
Averages: 100
Center 2.437000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.437 GHz
Span 25.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
5.91 dBm /17.0000 MHz
Power Spectral Density
-66.39 dBm/Hz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.42425000 GHz
Stop Freq
2.44975000 GHz
CF Step
2.55000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.462 GHz
Trig Free
Channel Power
Averages: 100
Center 2.462000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.462 GHz
Span 25.5 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
5.09 dBm /17.0000 MHz
Power Spectral Density
-67.22 dBm/Hz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.44925000 GHz
Stop Freq
2.47475000 GHz
CF Step
2.55000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

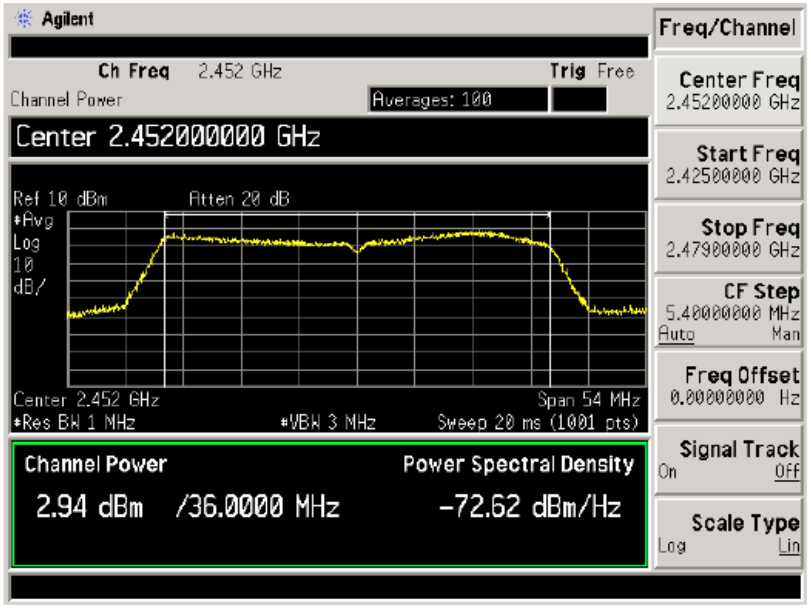
802.11n HT20

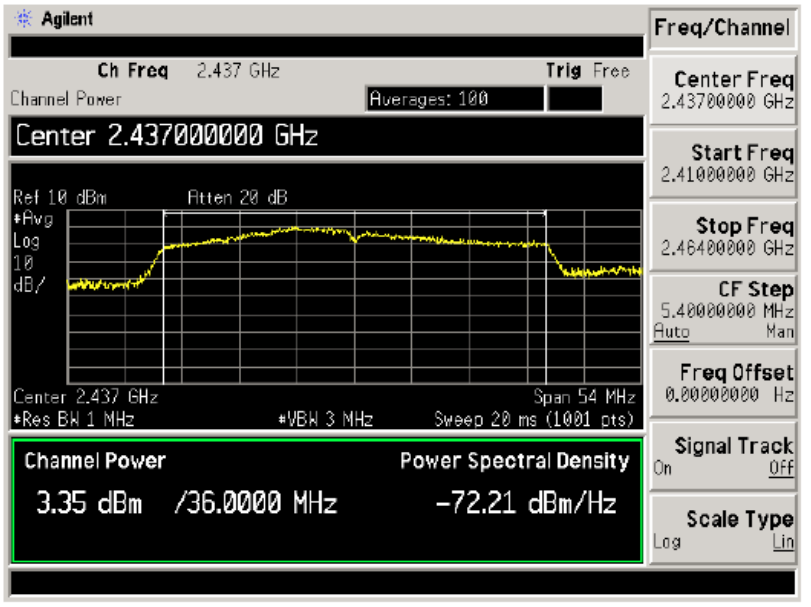

Agilent
Ch Freq 2.412 GHz
Trig Free
Channel Power
Averages: 100
Center 2.412000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.412 GHz
Span 27 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
3.28 dBm /18.0000 MHz
Power Spectral Density
-69.27 dBm/Hz
Freq/Channel
Center Freq
2.41200000 GHz
Start Freq
2.39850000 GHz
Stop Freq
2.42550000 GHz
CF Step
2.70000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

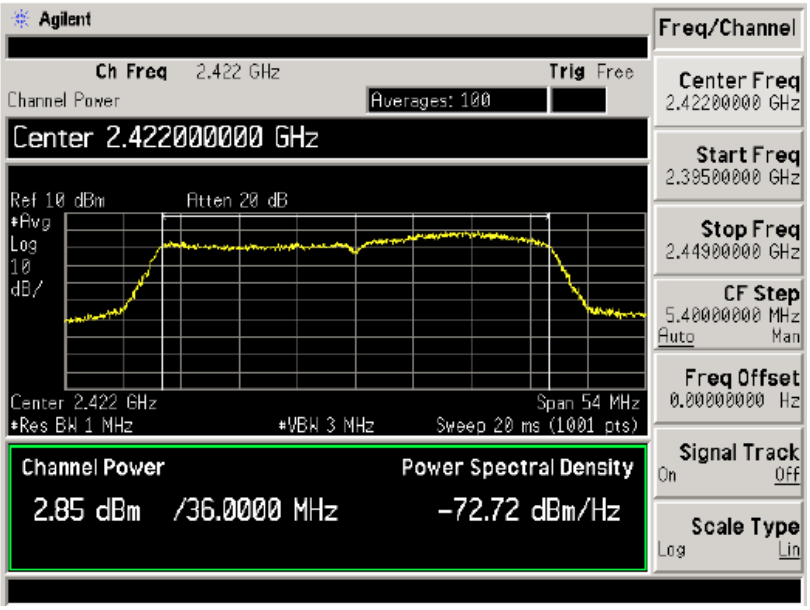

Agilent
Ch Freq 2.437 GHz
Trig Free
Channel Power
Averages: 100
Center 2.437000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.437 GHz
Span 27 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
4.91 dBm /18.0000 MHz
Power Spectral Density
-67.64 dBm/Hz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.42350000 GHz
Stop Freq
2.45050000 GHz
CF Step
2.70000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.462 GHz
Trig Free
Channel Power
Averages: 100
Center 2.462000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.462 GHz
Span 27 MHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 20 ms (1001 pts)
Channel Power
4.48 dBm /18.0000 MHz
Power Spectral Density
-68.07 dBm/Hz
Freq/Channel
Center Freq
2.46200000 GHz
Start Freq
2.44850000 GHz
Stop Freq
2.47550000 GHz
CF Step
2.70000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

802.11n HT40

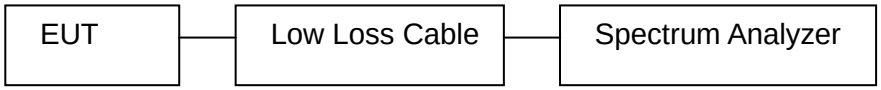

Agilent
Ch Freq 2.452 GHz
Trig Free
Channel Power
Averages: 100
Center 2.452000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.452 GHz
Span 54 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (1001 pts)
Channel Power
2.94 dBm
/36.0000 MHz
Power Spectral Density
-72.62 dBm/Hz
Freq/Channel
Center Freq
2.45200000 GHz
Start Freq
2.42500000 GHz
Stop Freq
2.47900000 GHz
CF Step
5.40000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.437 GHz
Trig Free
Channel Power
Averages: 100
Center 2.437000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.437 GHz
Span 54 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (1001 pts)
Channel Power
3.35 dBm
/36.0000 MHz
Power Spectral Density
-72.21 dBm/Hz
Freq/Channel
Center Freq
2.43700000 GHz
Start Freq
2.41000000 GHz
Stop Freq
2.46400000 GHz
CF Step
5.40000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.422 GHz
Trig Free
Channel Power
Averages: 100
Center 2.422000000 GHz
Ref 10 dBm
Atten 20 dB
#Avg
Log
10
dB/
Center 2.422 GHz
Span 54 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (1001 pts)
Channel Power
2.85 dBm
/36.0000 MHz
Power Spectral Density
-72.72 dBm/Hz
Freq/Channel
Center Freq
2.42200000 GHz
Start Freq
2.39500000 GHz
Stop Freq
2.44900000 GHz
CF Step
5.40000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

5. POWER SPECTRAL DENSITY TEST

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 3 kHz 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 kHz ≤ RBW ≤ 100 kHz.
d. Set VBW ≥3 x RBW.
e. Detector = power averaging (RMS) or sample detector (when RMS not available)
f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g. Sweep time = auto couple.
h. Use the peak marker function to determine the maximum amplitude level.
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/3KHz)**	**Limit (dBm/3KHz)**
Low	2412	-5.230	8
Middle	2437	-4.292	8
High	2462	-5.444	8

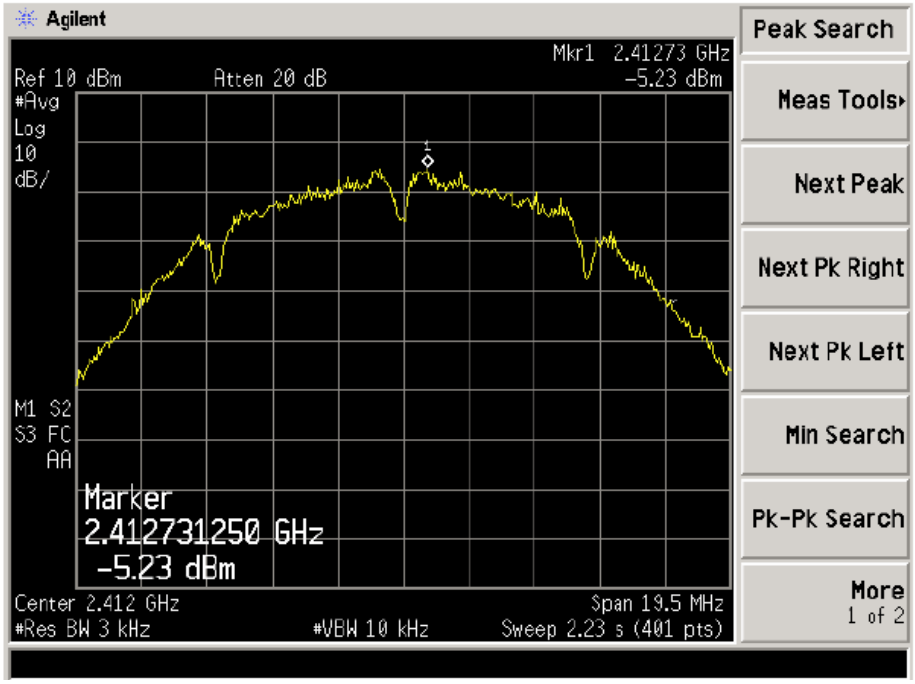
802.11g			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm/3KHz)**	**Limit (dBm/3KHz)**
Low	2412	-8.664	8
Middle	2437	-7.596	8
High	2462	-8.991	8

802.11n(HT20)			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm/3KHz)**	**Limit (dBm/3KHz)**
Low	2412	-8.340	8
Middle	2437	-9.620	8
High	2462	-8.842	8

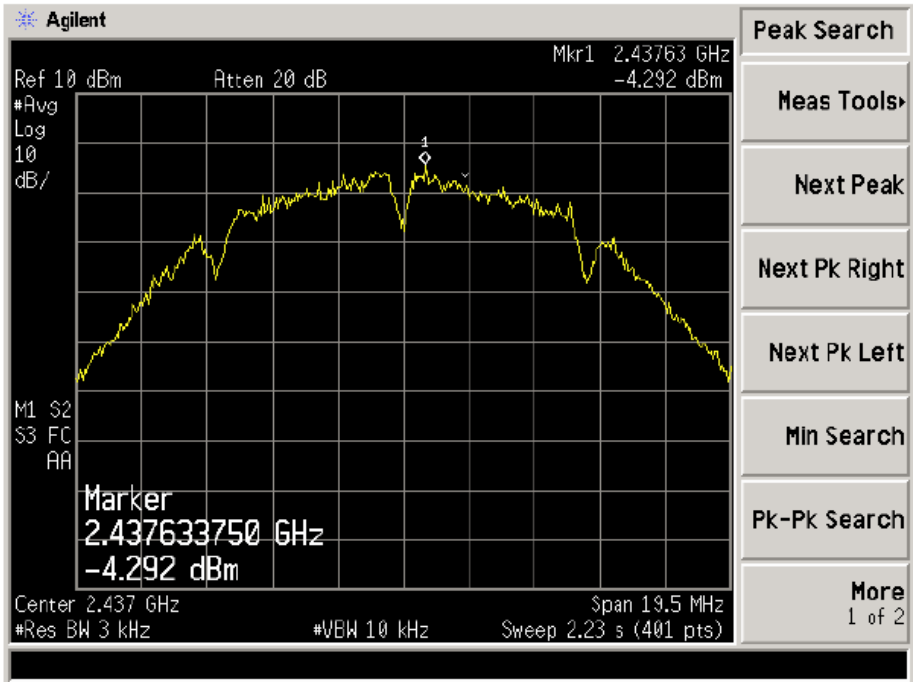
802.11n(HT40)			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm/3KHz)**	**Limit (dBm/3KHz)**
Low	2422	-19.66	8
Middle	2437	-20.44	8
High	2452	-20.18	8

The spectrum analyzer plots are attached as below.

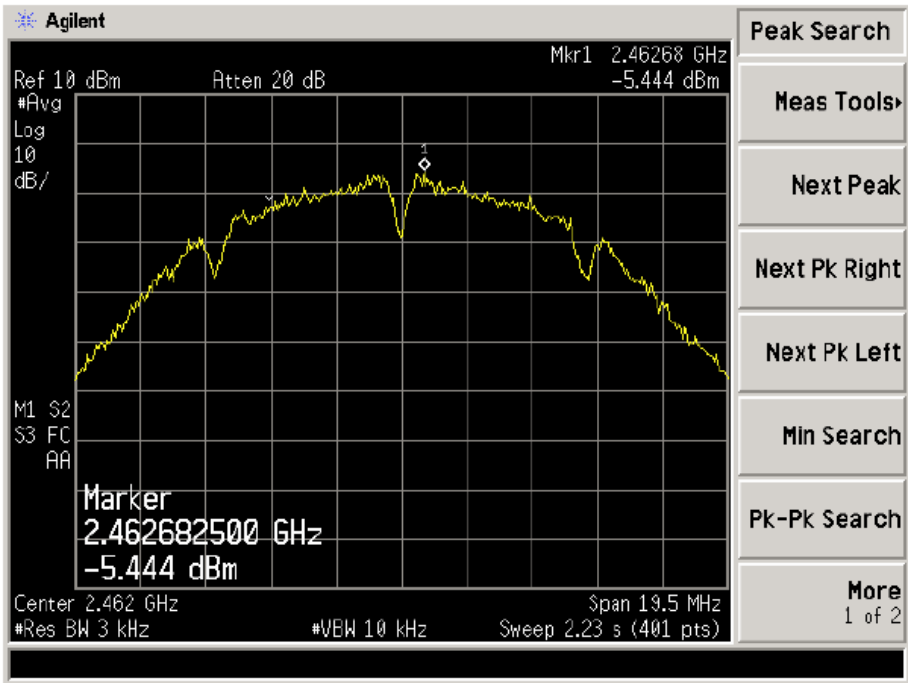
802.11b Channel Low 2412MHz



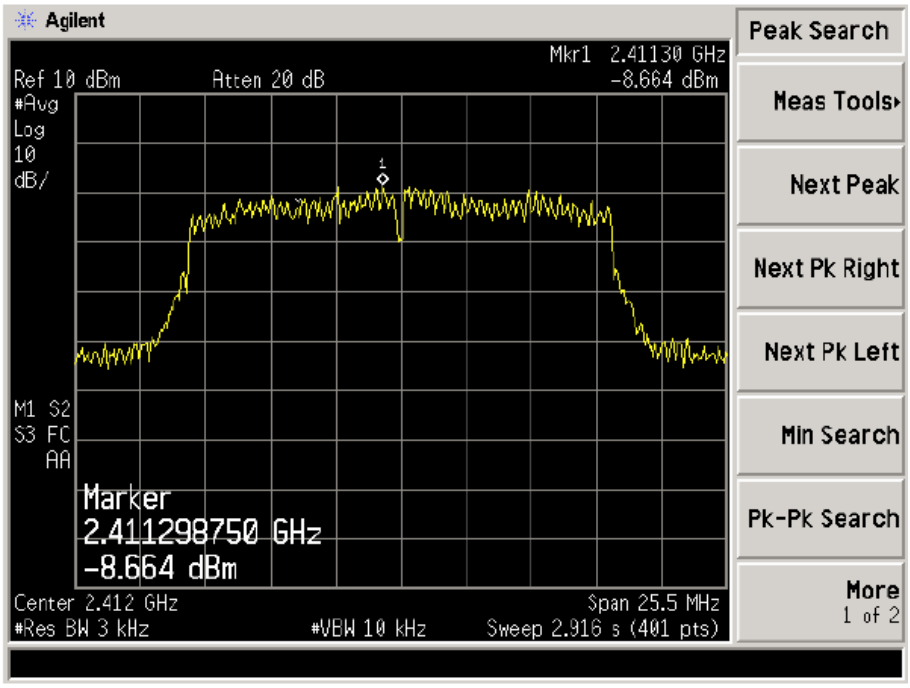
802.11b Channel Middle 2437MHz



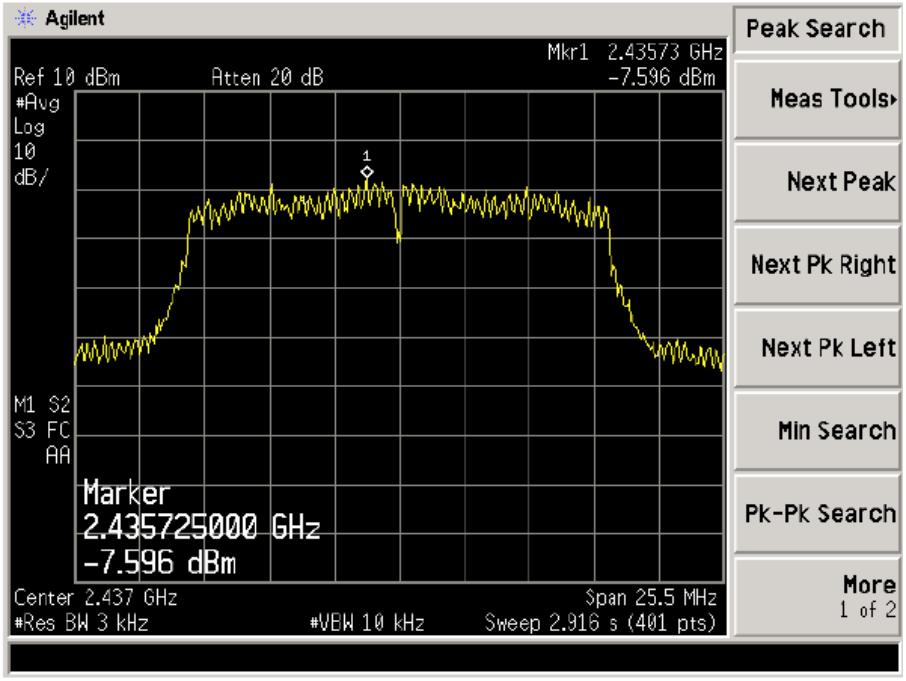
802.11b Channel High 2462MHz



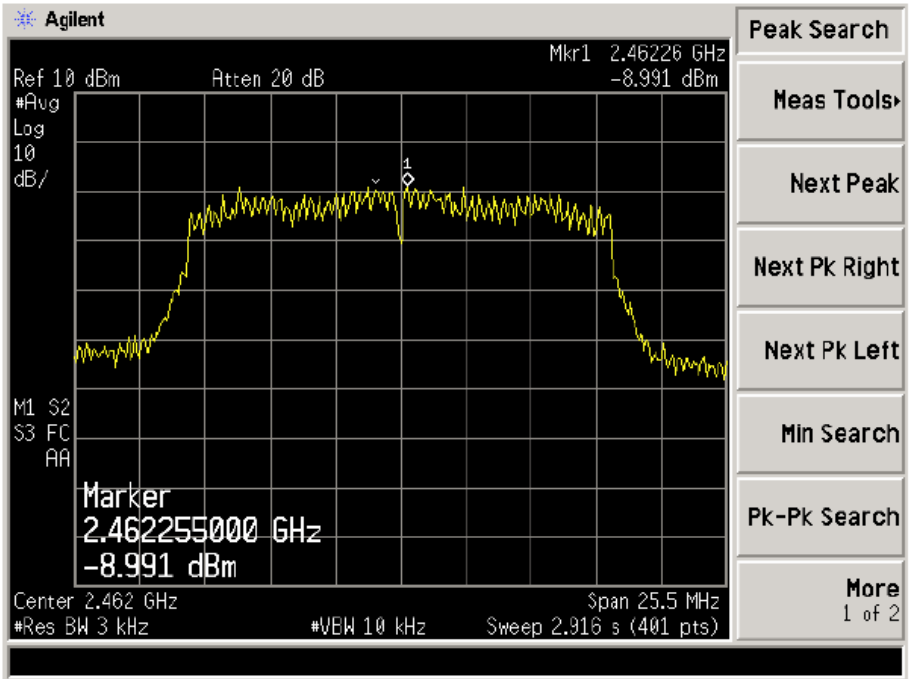
802.11g Channel Low 2412MHz



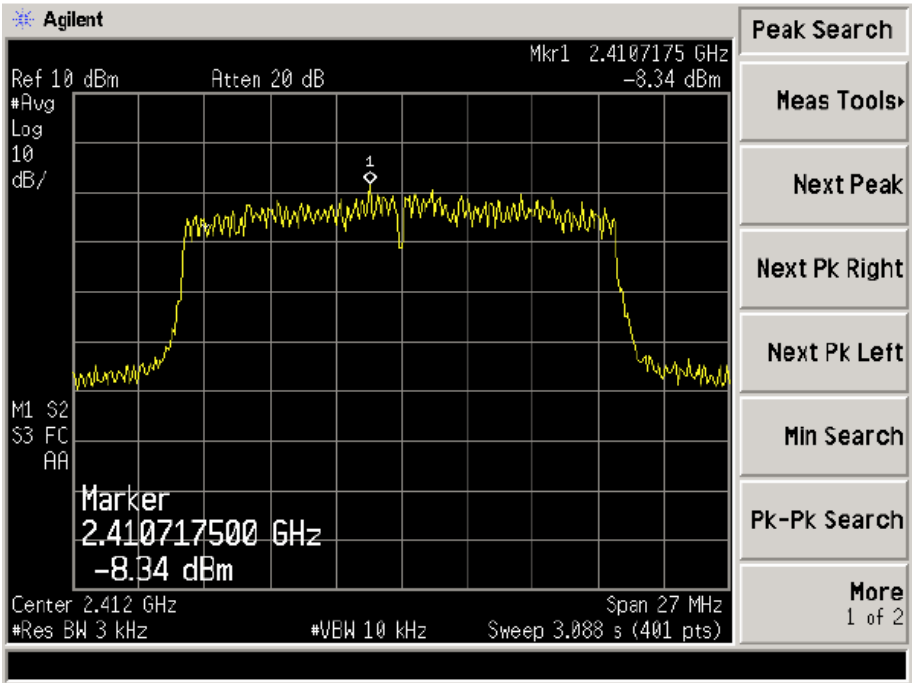
802.11g Channel Middle 2437MHz



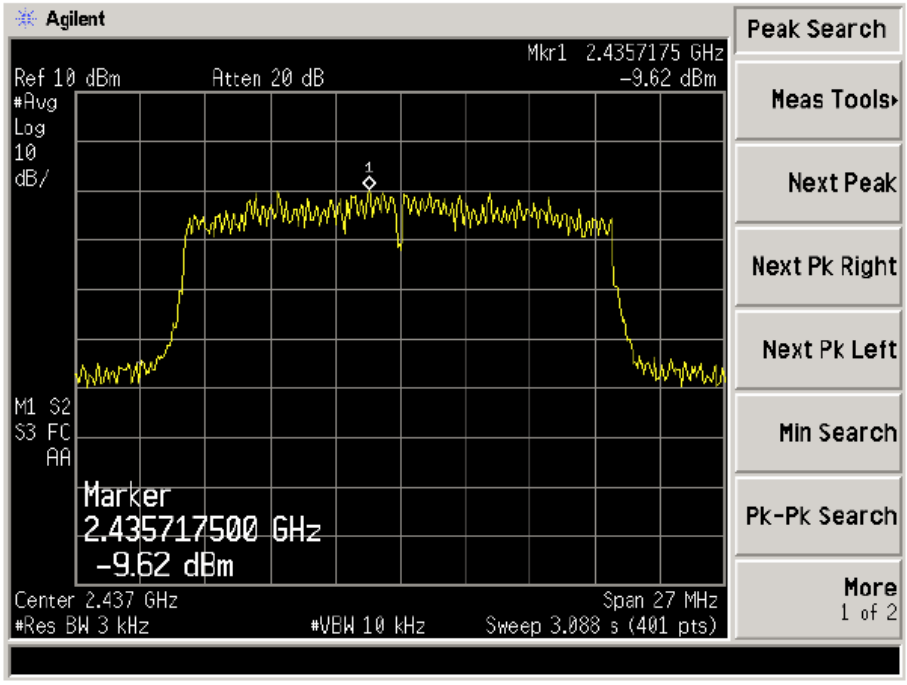
802.11g Channel High 2462MHz



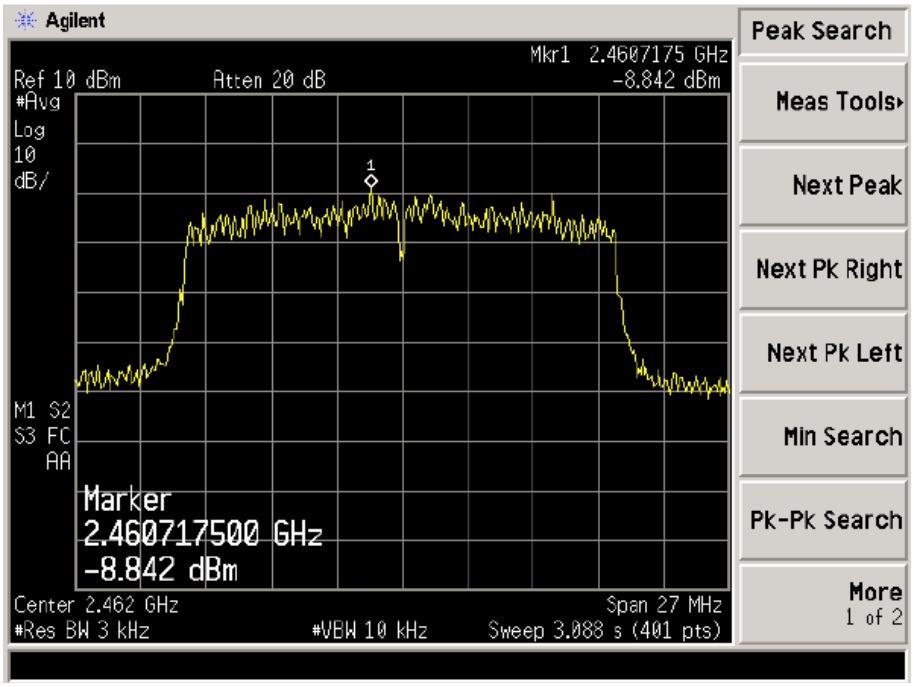
802.11n(HT20M) Channel Low 2412MHz



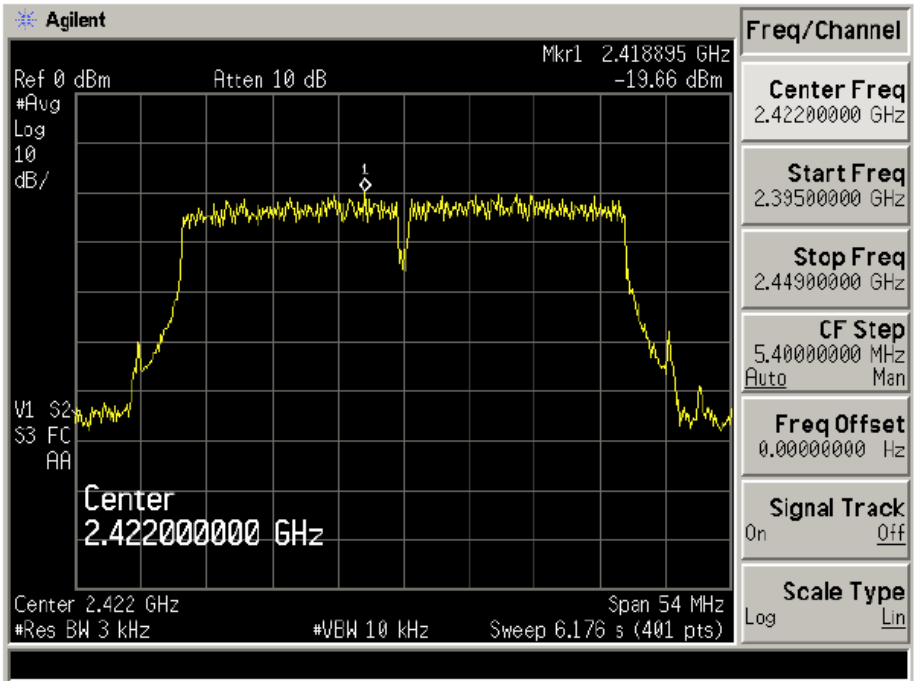
802.11n (HT20) Channel Middle 2437MHz



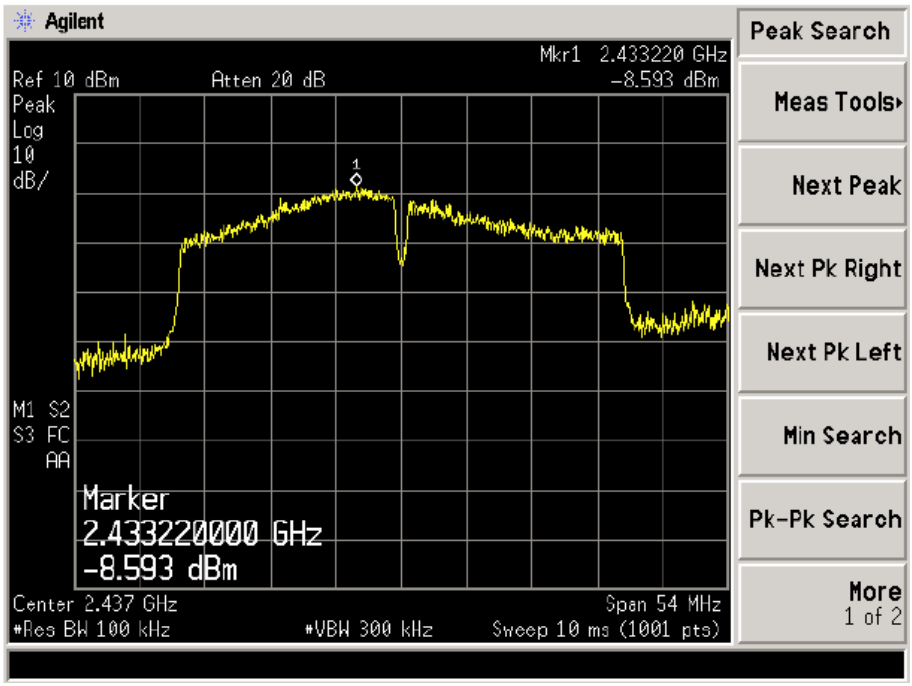
802.11n(HT20) Channel High 2462MHz



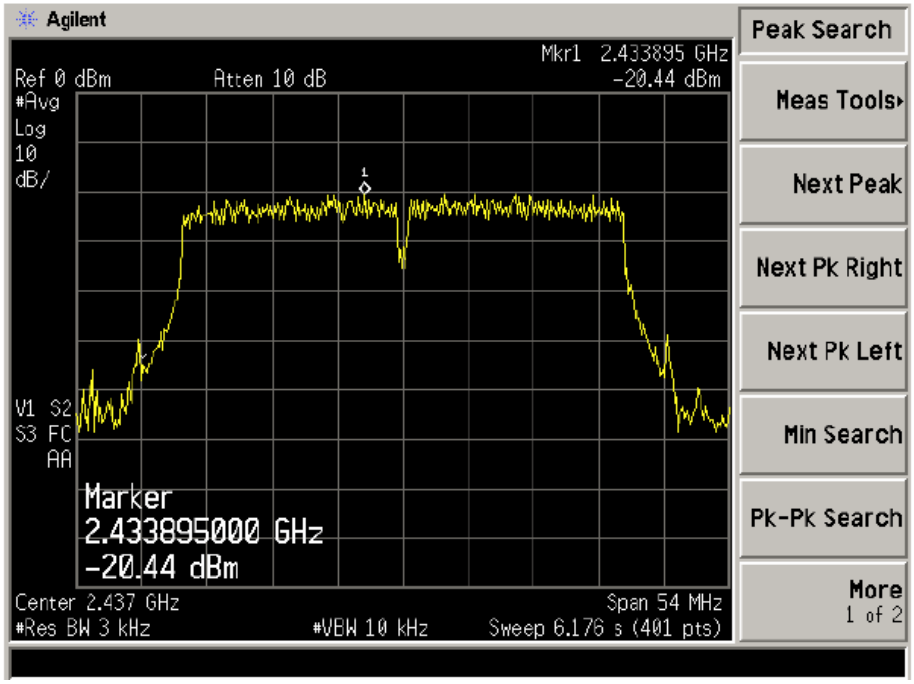
802.11n(HT40) Channel Low 2422MHz



802.11n (HT40) Middle High 2437MHz

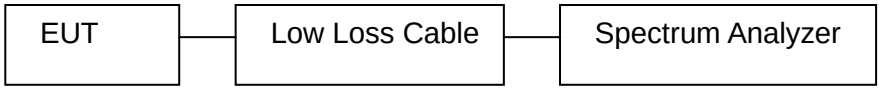


802.11n (HT40) Channel High 2452MHz



6. BAND EDGE COMPLIANCE TEST

6.1 Block diagram of test setup



6.2 Limits

Part 2.1051, Part 2.105 and 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:

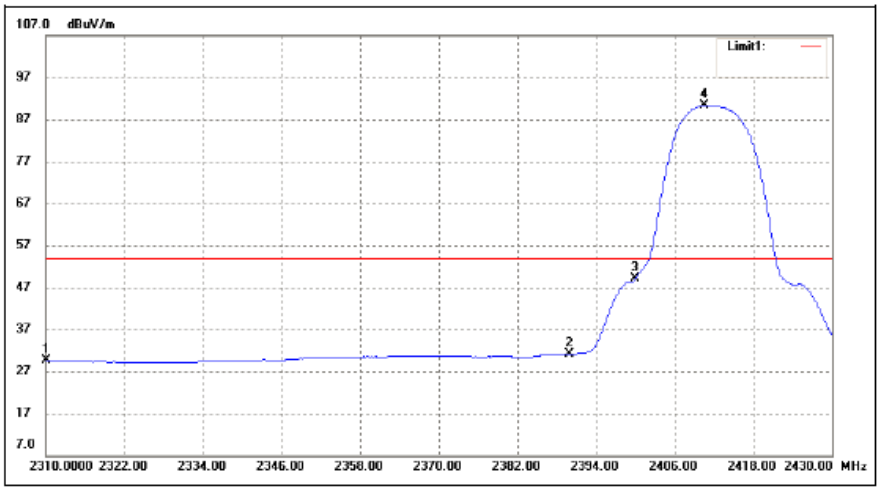
a. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
b. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
c. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out 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

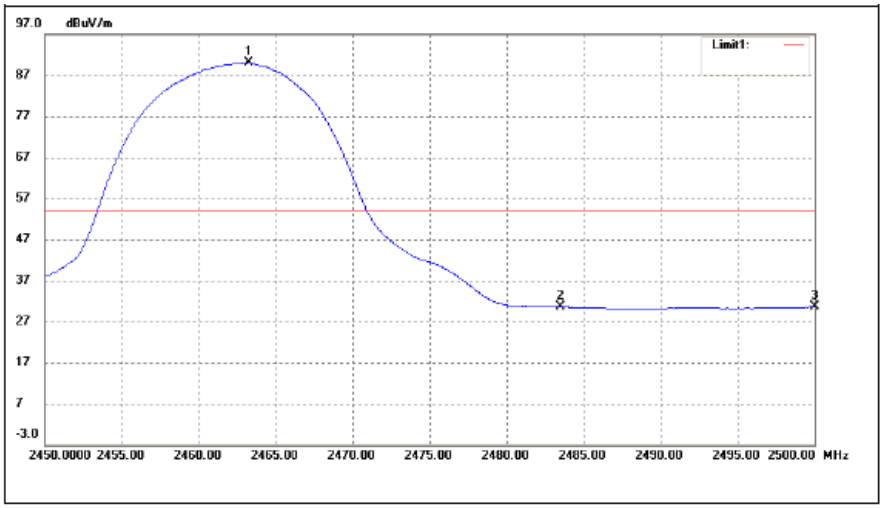
Radiated Band Edge Result

802.11b Channel Low 2412MHz
Vertical（Worst case）



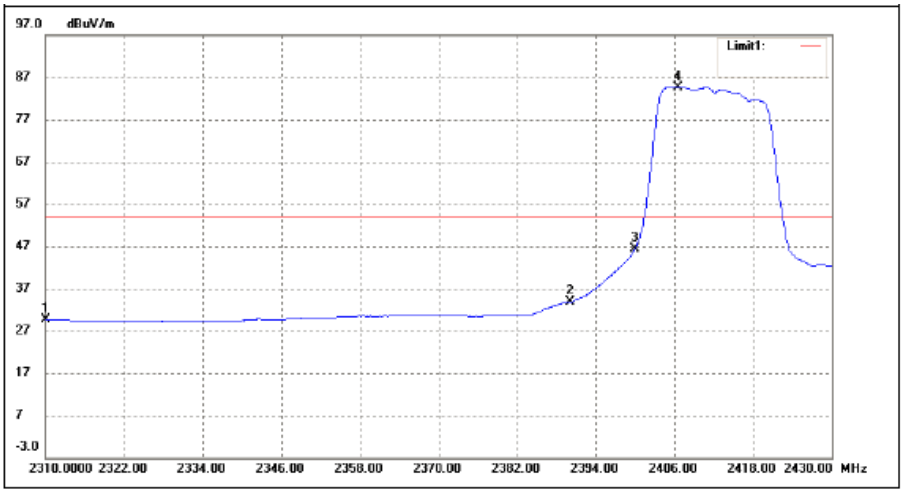
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.99	-4.42	29.57	54.00	-24.43	Average Detector
	2310.000	45.54	-4.42	41.12	74.00	-32.88	Peak Detector
2	2390.000	34.92	-3.72	31.20	54.00	-22.80	Average Detector
	2390.000	48.21	-3.72	44.49	74.00	-29.51	Peak Detector
3	2400.000	52.72	-3.64	49.08	Delta =41.34dBc		Average Detector
4	2410.560	93.98	-3.56	90.42			Average Detector

802.11b Channel High 2462MHz
Vertical（Worst case）



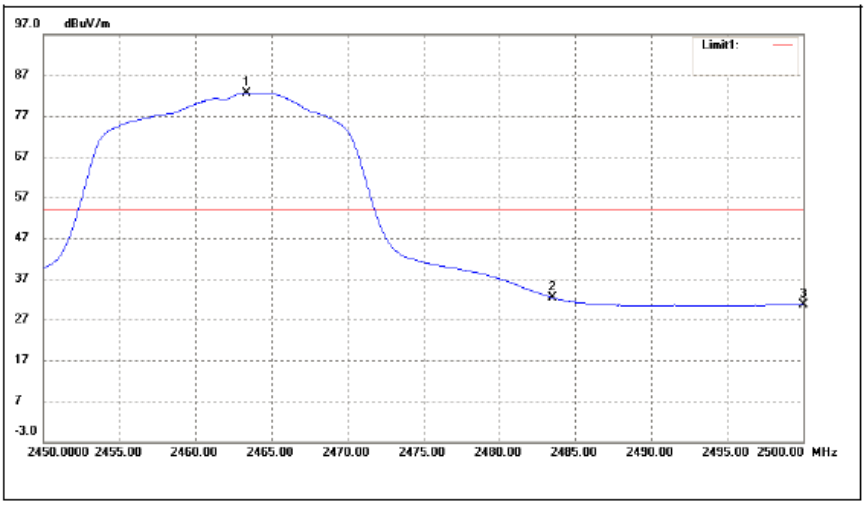
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2463.250	93.19	-3.16	90.03	/	/	Average Detector
	2463.150	104.73	-3.16	101.57	/	/	Peak Detector
2	2483.500	33.54	-3.01	30.53	54.00	-23.47	Average Detector
	2483.500	47.43	-3.01	44.42	74.00	-29.58	Peak Detector
3	2500.000	33.43	-2.88	30.55	54.00	-23.45	Average Detector
	2500.000	44.64	-2.88	41.76	74.00	-32.24	Peak Detector

802.11g Channel Low 2412MHz
Vertical（Worst case）



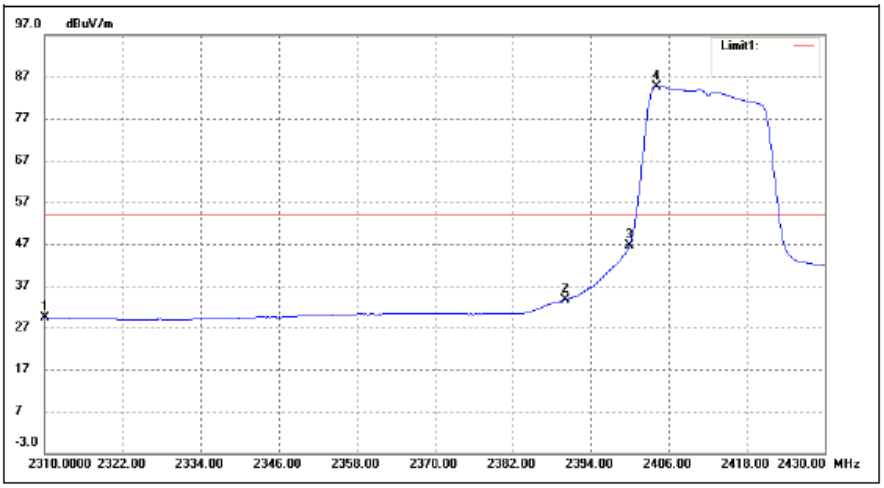
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.06	-4.42	29.64	54.00	-24.36	Average Detector
	2310.000	46.01	-4.42	41.59	74.00	-32.41	Peak Detector
2	2390.000	37.50	-3.72	33.78	54.00	-20.22	Average Detector
	2390.000	53.12	-3.72	49.40	74.00	-24.60	Peak Detector
3	2400.000	50.07	-3.64	46.43	Delta =38.31dBc		Average Detector
4	2406.480	88.33	-3.59	84.74			Average Detector

802.11g Channel High 2462MHz
Vertical（Worst case）



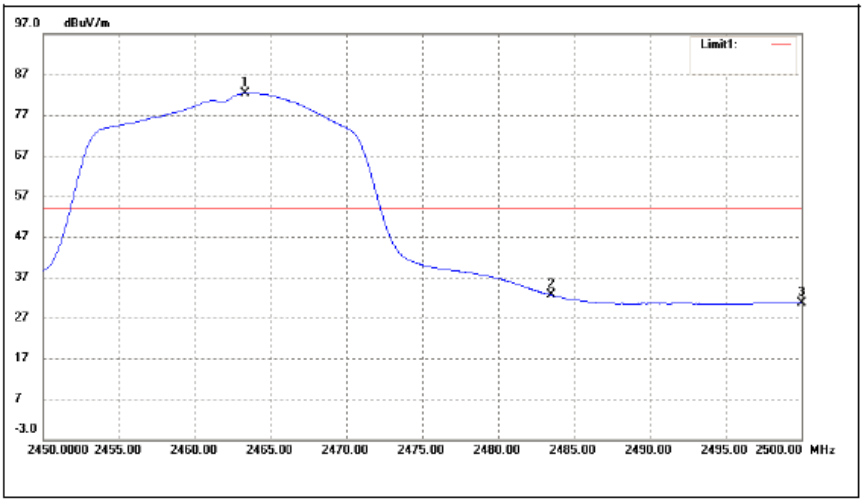
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2463.350	85.83	-3.16	82.67	/	/	Average Detector
	2463.700	98.03	-3.16	94.87	/	/	Peak Detector
2	2483.500	35.33	-3.01	32.32	54.00	-21.68	Average Detector
	2483.500	52.97	-3.01	49.96	74.00	-24.04	Peak Detector
3	2500.000	33.55	-2.88	30.67	54.00	-23.33	Average Detector
	2500.000	46.13	-2.88	43.25	74.00	-30.75	Peak Detector

802.11n(20M) Channel Low 2412MHz
Vertical（Worst case）



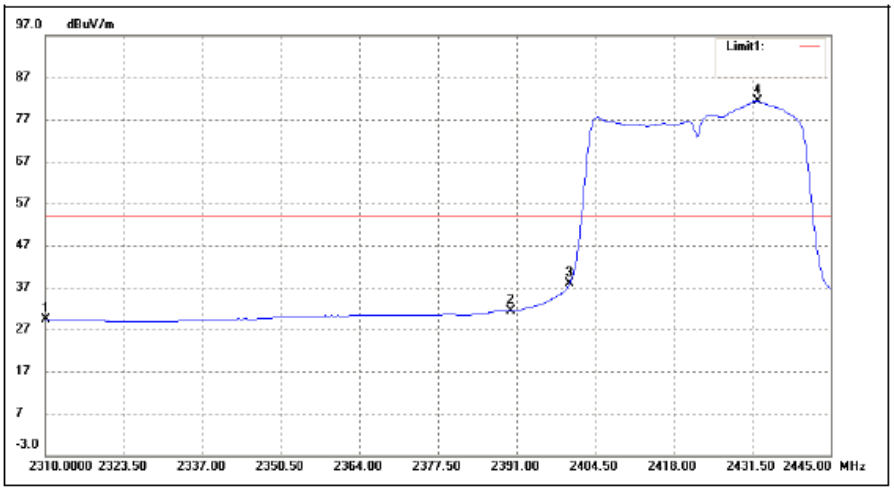
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.81	-4.42	29.39	54.00	-24.61	Average Detector
	2310.000	45.57	-4.42	41.15	74.00	-32.85	Peak Detector
2	2390.000	37.35	-3.72	33.63	54.00	-20.37	Average Detector
	2390.000	52.63	-3.72	48.91	74.00	-25.09	Peak Detector
3	2400.000	50.36	-3.64	46.72	Delta =37.95dBc		Average Detector
4	2404.200	88.27	-3.60	84.67			Average Detector

802.11n(20M) Channel High 2462MHz
Vertical（Worst case）



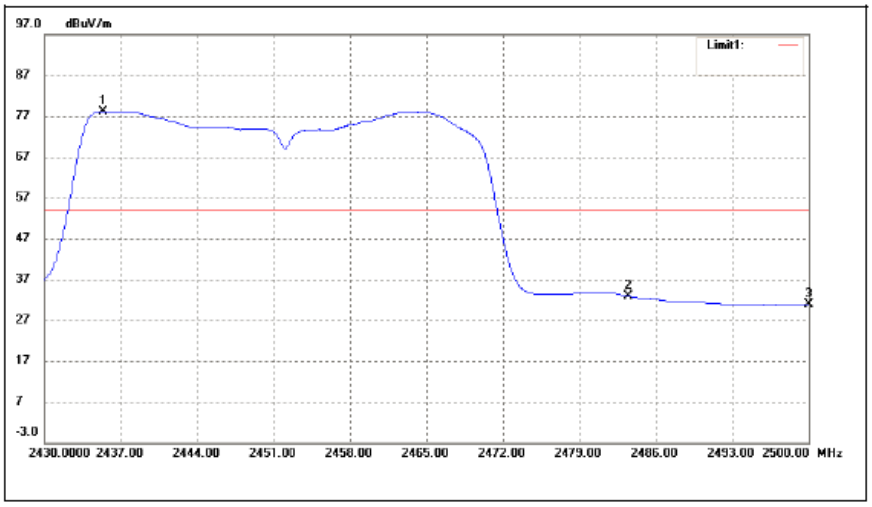
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2463.300	85.49	-3.16	82.33	/	/	Average Detector
	2463.300	96.27	-3.16	93.11	/	/	Peak Detector
2	2483.500	35.60	-3.01	32.59	54.00	-21.41	Average Detector
	2483.500	54.00	-3.01	50.99	74.00	-23.01	Peak Detector
3	2500.000	33.62	-2.88	30.74	54.00	-23.26	Average Detector
	2500.000	45.89	-2.88	43.01	74.00	-30.99	Peak Detector

802.11n(HT40) Channel Low 2422MHz
Vertical（Worst case）



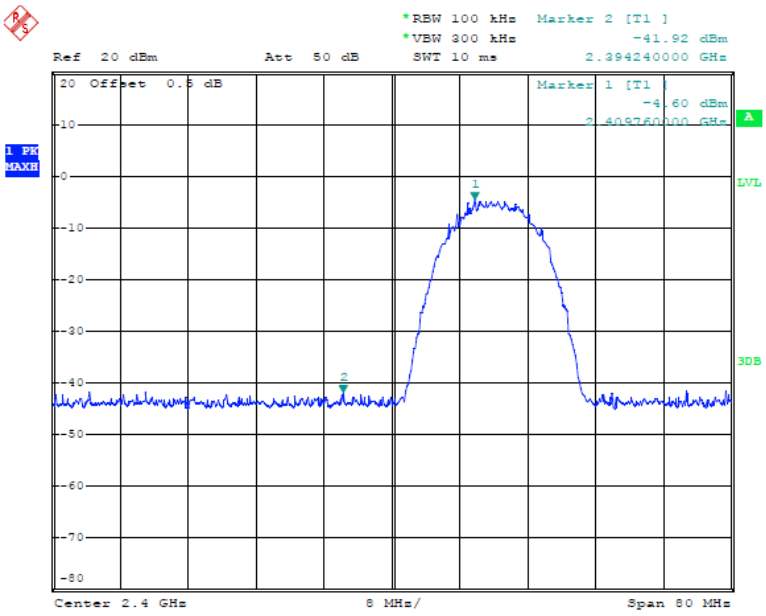
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.80	-4.42	29.38	54.00	-24.62	Average Detector
	2310.000	45.65	-4.42	41.23	74.00	-32.77	Peak Detector
2	2390.000	35.20	-3.72	31.48	54.00	-22.52	Average Detector
	2390.000	47.24	-3.72	43.52	74.00	-30.48	Peak Detector
3	2400.000	41.49	-3.64	37.85	Delta =43.46dBc		Average Detector
4	2432.445	84.71	-3.40	81.31			Average Detector

802.11n(HT40) Channel High 2452MHz
Vertical（Worst case）

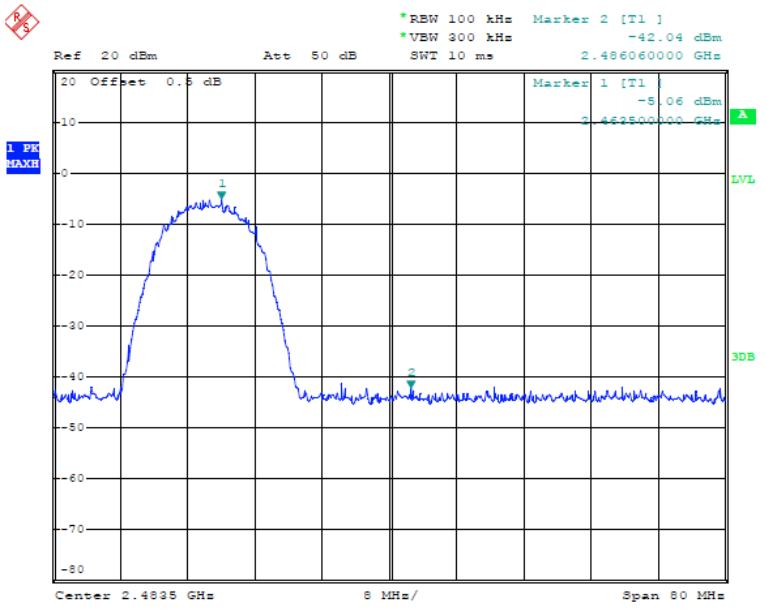


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2435.320	81.62	-3.37	78.25	/	/	Average Detector
	2434.760	92.68	-3.38	89.30	/	/	Peak Detector
2	2483.500	35.87	-3.01	32.86	54.00	-21.14	Average Detector
	2483.500	48.76	-3.01	45.75	74.00	-28.25	Peak Detector
3	2500.000	33.81	-2.88	30.93	54.00	-23.07	Average Detector
	2500.000	44.87	-2.88	41.99	74.00	-32.01	Peak Detector

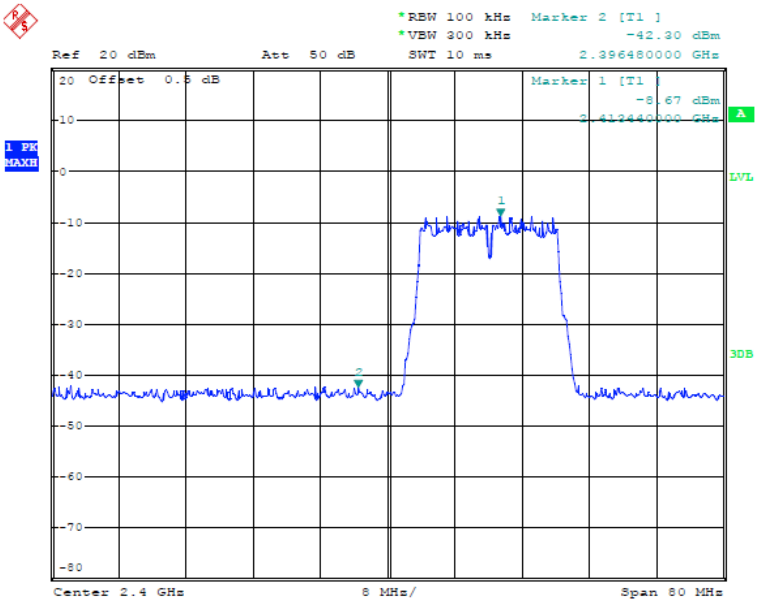
802.11b Channel Low 2412MHz



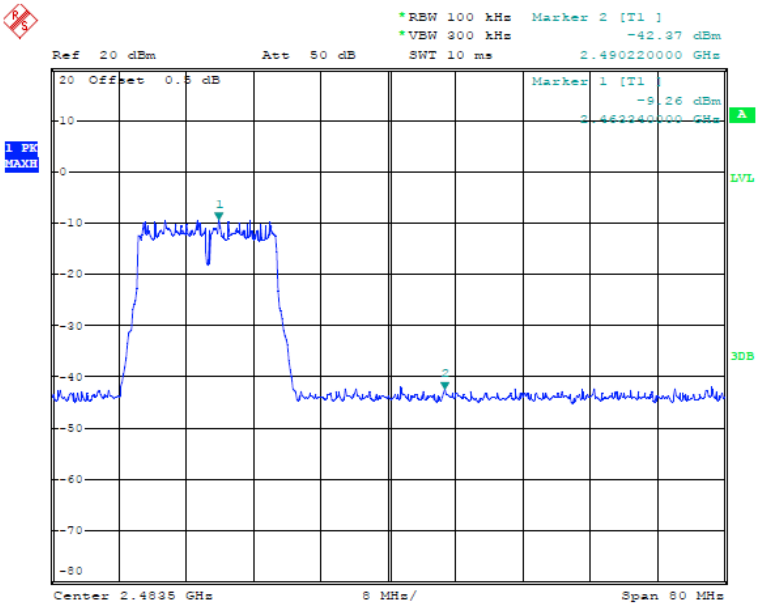
802.11b Channel High 2462MHz



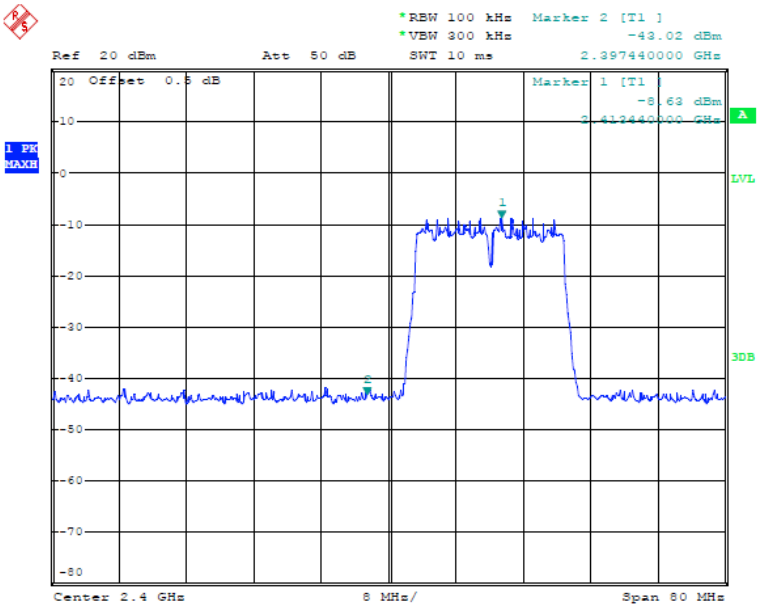
802.11g Channel Low 2412MHz



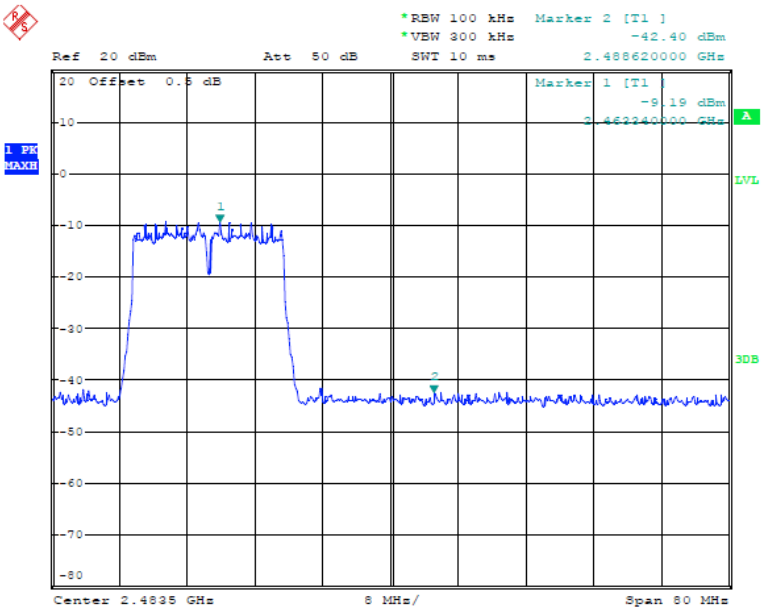
802.11g Channel High 2462MHz



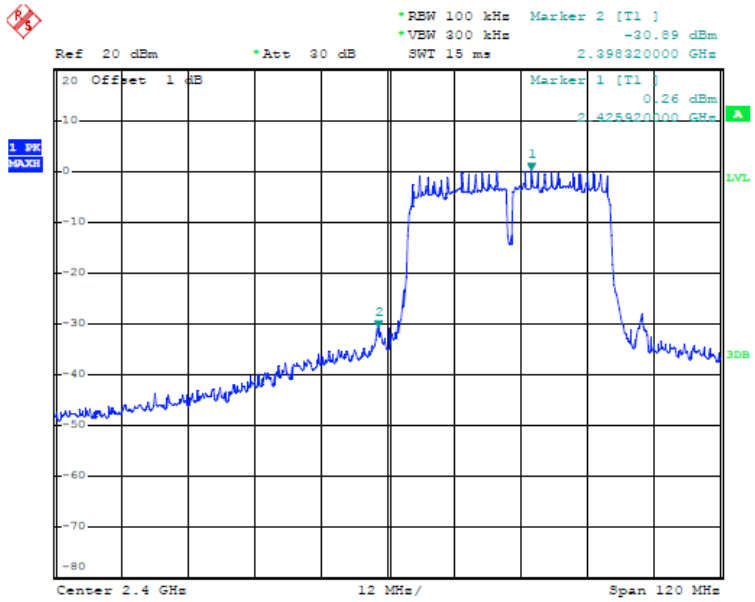
802.11n (HT20) Channel Low 2412MHz



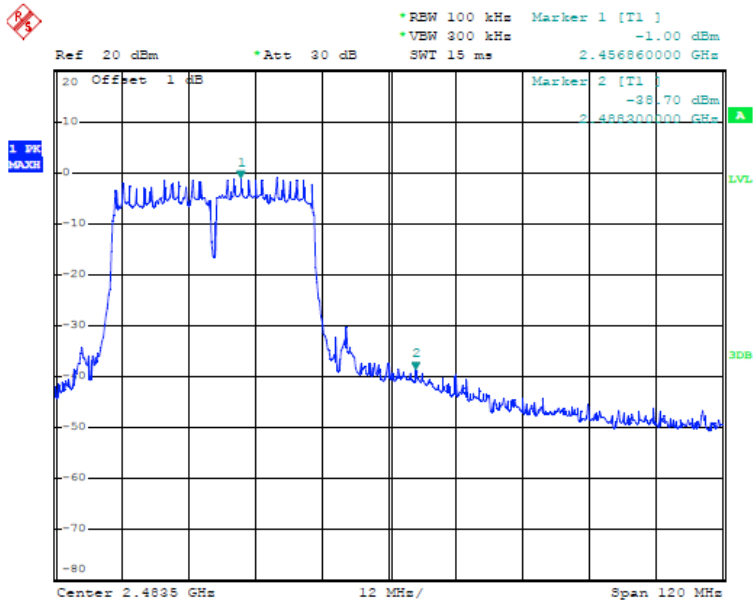
802.11n(HT20) Channel High 2462MHz



802.11n (HT40) Channel Low 2422MHz



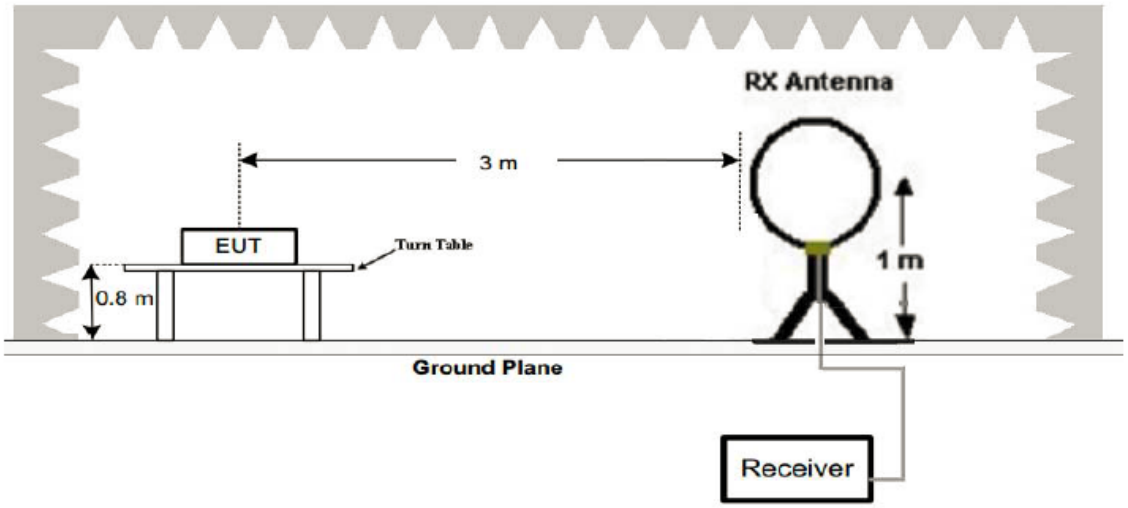
802.11n (HT40) Channel High 2452MHz



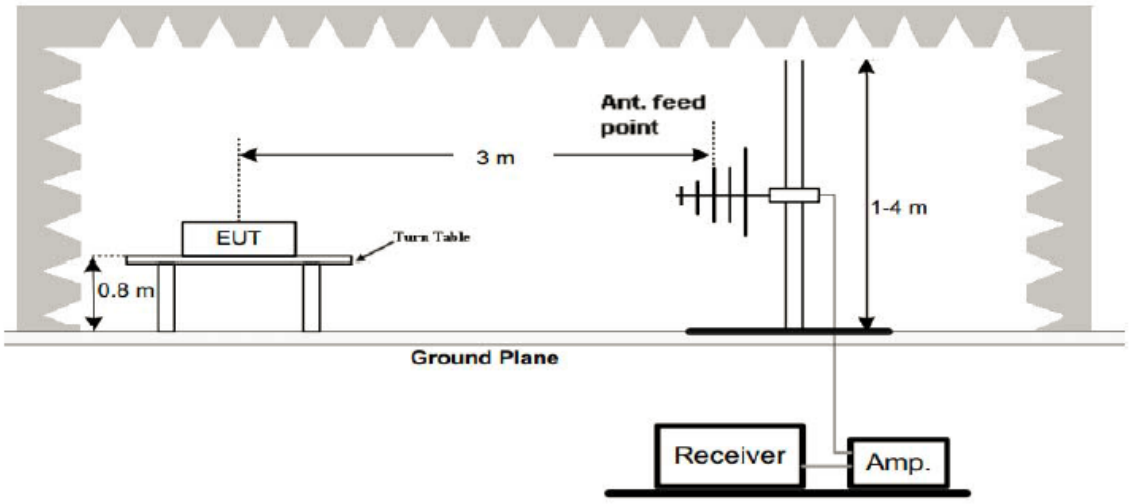
7. RADIATED SPURIOUS EMISSION TEST

7.1 Block diagram of test setup

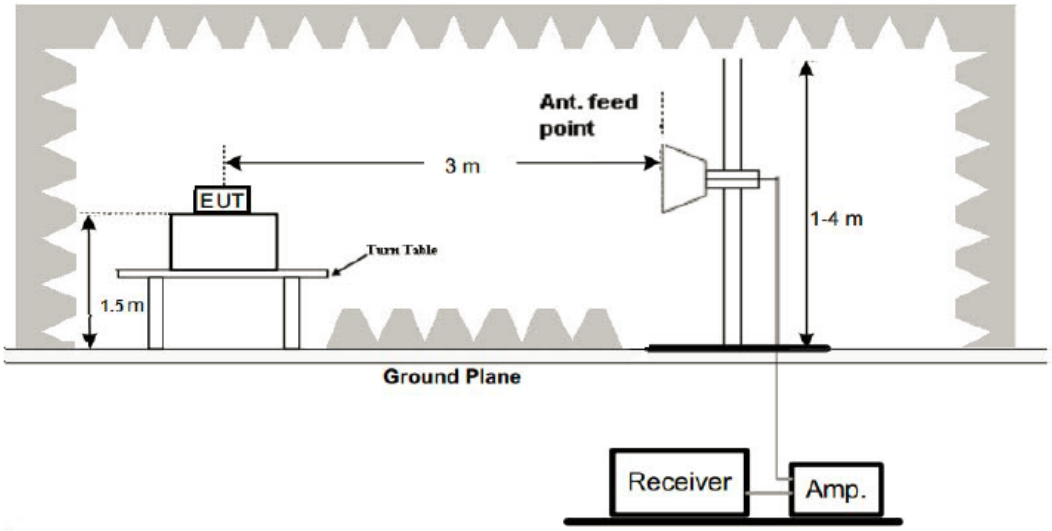
（1） Radiated Emission Test-Up Frequency Below 30MHz



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



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



7.2 Limits

Part 2.1051, Part 2.1053, Part 2.1057 and 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

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
[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])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]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 Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

7.4 Test procedure

1, The EUT is placed on a turntable, which is 0.8m above ground plane below 1GHz and 1.5m above ground plane above 1GHz..
2, The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3, EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions
4, For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
5, Maximum procedure was performed on the six highest emissions to ensure EUT compliance
6, And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical
7, Repeat above procedures until the measurements for all frequencies are complete.
8, Based on the Frequency Generator in the device include 16MHz.The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a)

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

7.5 Test result

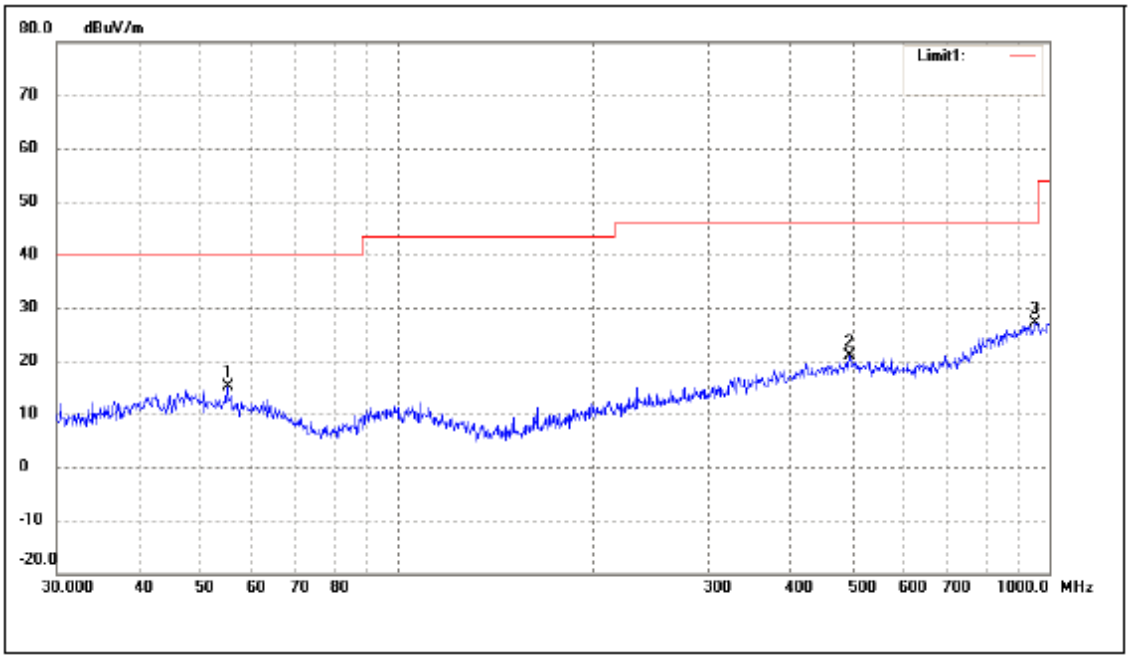
Pass

Test mode: 802.11b
For Below 30MHz

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

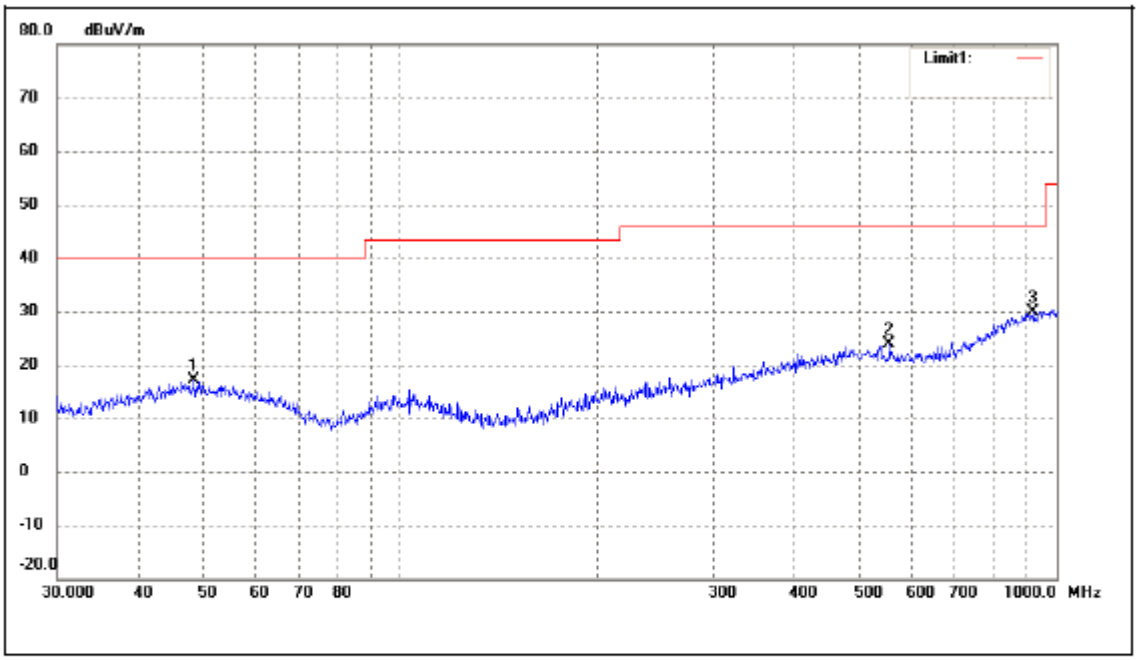
Test mode: 802.11b （Worst case）
For 30MHz-1000MHz

H



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	54.8348	23.04	-7.93	15.11	40.00	-24.89	162	100	QP
2	494.1984	22.02	-1.26	20.76	46.00	-25.24	200	100	QP
3	952.0937	21.23	5.96	27.19	46.00	-18.81	359	200	QP

V



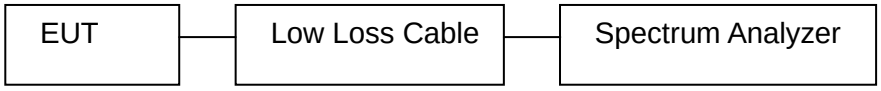
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	48.5016	24.70	-7.45	17.25	40.00	-22.75	240	100	QP
2	556.7744	23.61	0.27	23.88	46.00	-22.12	187	100	QP
3	922.5157	24.30	5.63	29.93	46.00	-16.07	220	100	QP

Test mode: 802.11b （Worst case）
For 1GHz-25GHz

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2412MHz							
4824.000	42.23	12.37	54.60	74.00	-19.40	H	PK
4824.000	31.60	12.37	43.97	54.00	-10.03	H	AV
7236.000	34.01	15.49	49.50	74.00	-24.50	H	PK
7236.000	25.20	15.49	40.69	54.00	-13.31	H	AV
4824.000	42.85	12.37	55.22	74.00	-18.78	V	PK
4824.000	31.59	12.37	43.96	54.00	-10.04	V	AV
7236.000	33.99	15.49	49.48	74.00	-24.52	V	PK
7236.000	24.34	15.49	39.83	54.00	-14.17	V	AV
Middle Channel-2437MHz							
4874.000	42.68	12.46	55.14	74.00	-18.86	H	PK
4874.000	31.62	12.46	44.08	54.00	-9.92	H	AV
7311.000	37.32	15.56	52.88	74.00	-21.12	H	PK
7311.000	24.39	15.56	39.95	54.00	-14.05	H	AV
4874.000	43.57	12.46	56.03	74.00	-17.97	V	PK
4874.000	31.62	12.46	44.08	54.00	-9.92	V	AV
7311.000	36.39	15.56	51.95	74.00	-22.05	V	PK
7311.000	25.78	15.56	41.34	54.00	-12.66	V	AV
High Channel-2462MHz							
4924.000	46.69	12.55	59.24	74.00	-14.76	H	PK
4924.000	33.48	12.55	46.03	54.00	-7.97	H	AV
7386.000	37.06	15.64	52.70	74.00	-21.30	H	PK
7386.000	26.20	15.64	41.84	54.00	-12.16	H	AV
4924.000	48.73	12.55	61.28	74.00	-12.72	V	PK
4924.000	34.75	12.55	47.30	54.00	-6.70	V	AV
7386.000	37.23	15.64	52.87	74.00	-21.13	V	PK
7386.000	26.33	15.64	41.97	54.00	-12.03	V	AV

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

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.

c. The Conducted Spurious Emission was measured and recorded.

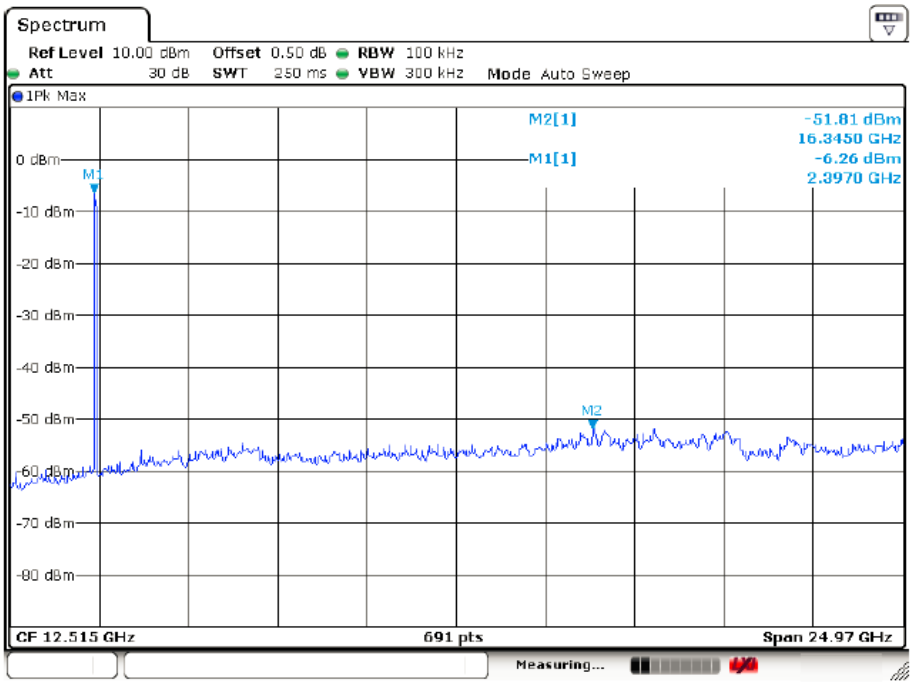
8.4 Test Result

Pass

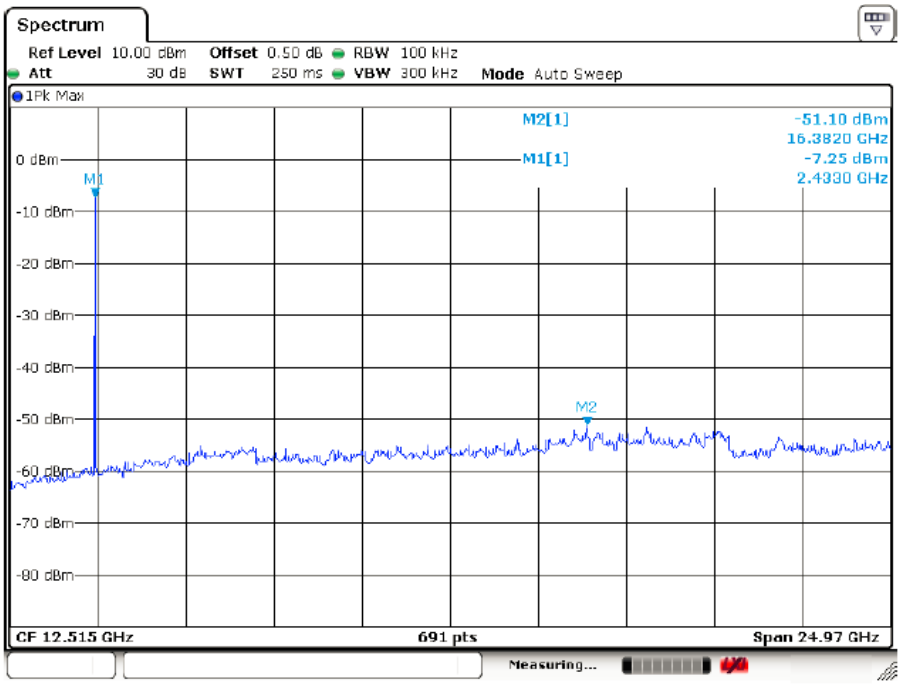
The spectrum analyzer plots are attached as below.

The worst test mode: 802.11b

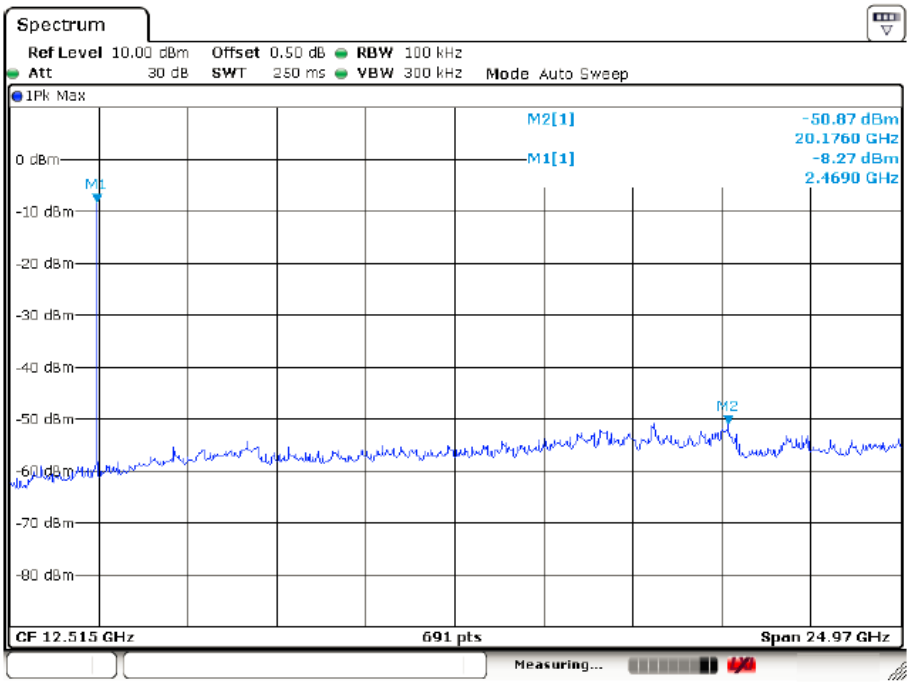
TX 802.11b Channel Low 2412MHz



TX 802.11b Channel Middle 2437MHz

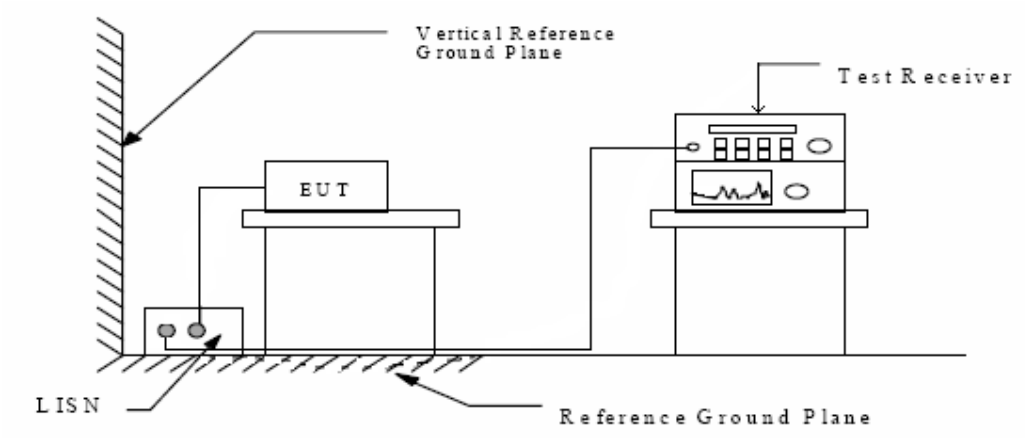


TX 802.11b Channel High 2462MHz



9. AC POWER LINE CONDUCTED EMISSION

9.1 Block diagram of test setup



9.2 Limits

Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency MHz	Limits (dBμV)	
	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.

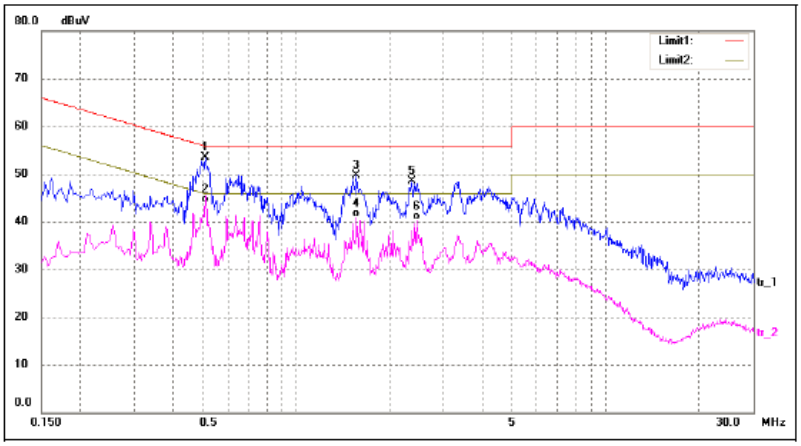
The bandwidth of test receiver (R & S ESPI) is set at 9kHz.

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

9.4 Test Result

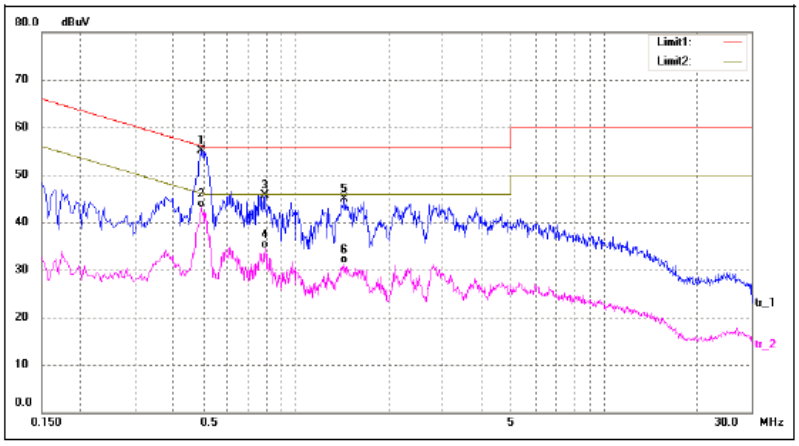
PASS

L



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.5100	40.96	12.51	53.47	56.00	-2.53	peak
2*	0.5100	31.40	12.51	43.91	46.00	-2.09	AVG
3	1.5660	36.73	13.00	49.73	56.00	-6.27	peak
4	1.5660	27.90	13.00	40.90	46.00	-5.10	AVG
5	2.3780	35.55	13.00	48.55	56.00	-7.45	peak
6	2.4540	27.30	13.00	40.30	46.00	-5.70	AVG

N



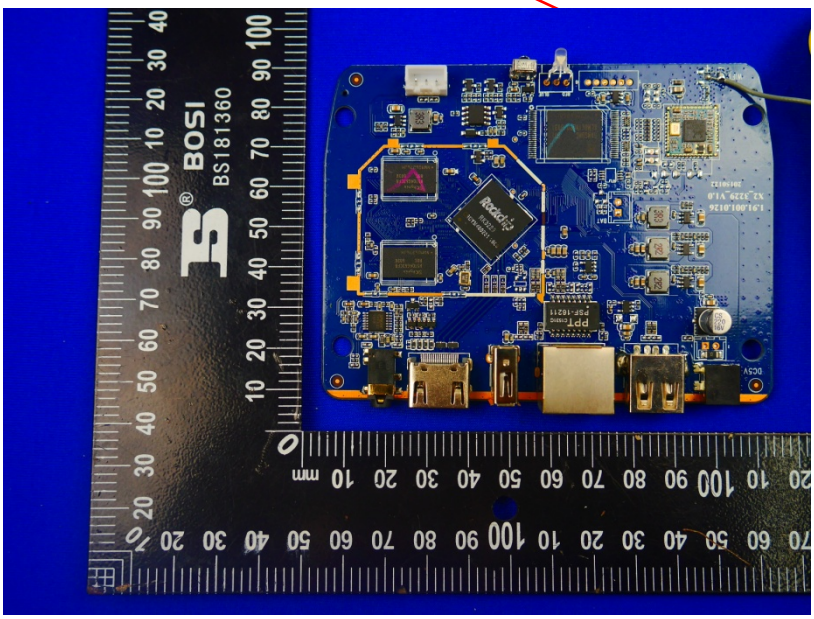
No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.4940	42.68	12.50	55.18	56.10	-0.92	peak
2	0.4940	30.51	12.50	43.01	46.10	-3.09	AVG
3	0.7940	32.91	12.79	45.70	56.00	-10.30	peak
4	0.7940	21.71	12.79	34.50	46.00	-11.50	AVG
5	1.4340	31.98	13.00	44.98	56.00	-11.02	peak
6	1.4340	18.24	13.00	31.24	46.00	-14.76	AVG

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.

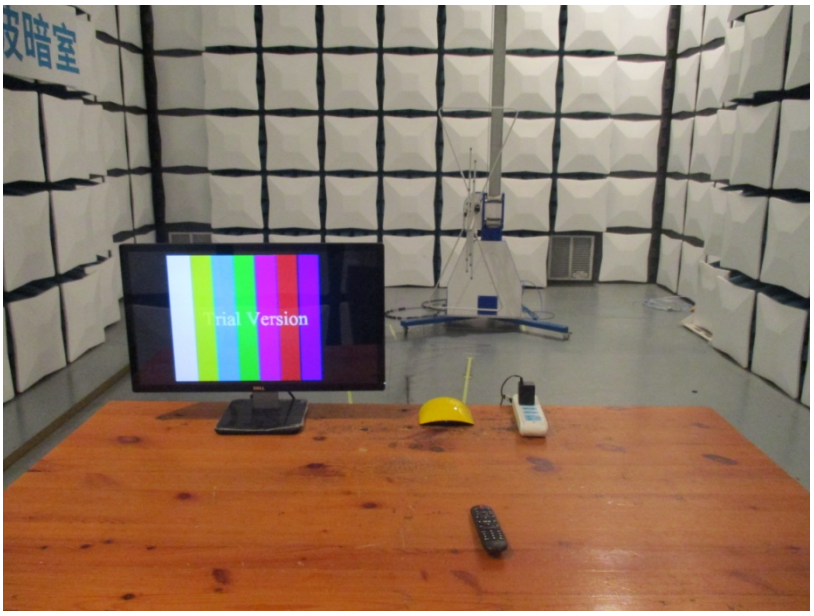
Antenna is fixed by enclosure, can not be changed except take apart the product.

Antenna



11. POTOGRAPH OF TEST

11.1 Radiated Emission



11.2 Conducted Emission