FCC TEST REPORT

Test report
On Behalf of
Epiphan Systems Inc.
For
Webcaster x1
Model No.: Webcaster x1

FCC ID: 2AIDJ-WEBCASTER

Prepared for :	**Epiphan Systems Inc.** **400 March Road Suite 510, Ottawa, Ontario, Canada K2K 3H4**
Prepared By :	**WST Certification & Testing (HK) Limited** **12/F., San Toi Building,137-139 Connaught Road Central,HongKong**
Date of Test:	**Apr. 20, 2016 ~ Apr. 24, 2016**
Date of Report:	**Apr. 24, 2016**
Report Number:	**WST160422017-E**

TEST RESULT CERTIFICATION

Applicant's name	Epiphan Systems Inc.
Address	400 March Road Suite 510, Ottawa, Ontario, Canada K2K 3H4
Manufacture's Name.....	Shenzhen Zidoo Technology Co.,Ltd
Address	Room 12 D, Block A Central Great Searchings,Xixiang Ave, BaoAn District, Shenzhen.
Product description	
Trade Mark:	N/A
Product name	Webcaster x1
Model and/or type reference	Webcaster x1
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 ..... Apr. 20, 2016 ~ Apr. 24, 2016

Date of Issue..... Apr. 24, 2016

Test Result..... **Pass**

Testing Engineer : Eric Xie

(Eric Xie)

Technical Manager : Dora Qin

(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	Webcaster x1
Model Name	Webcaster x1
Serial No	N/A
FCC ID	2AIDJ-WEBCASTER
Model Difference	N/A
Modulation Type	WIFI:DBPSK,DQPSK,CCK,BPSK,
Antenna Type	External Antenna
Antenna Gain	1dBi
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 voltage
Power Rating	DC 12V, 2A from Adapter
Adapter Model	CS-1202000 Input: 100-240VAC, 50/60Hz, 1.5A Output:DC12V, 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

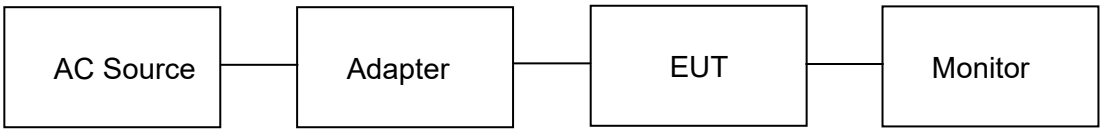
802.11n (HT20) Transmitting mode

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



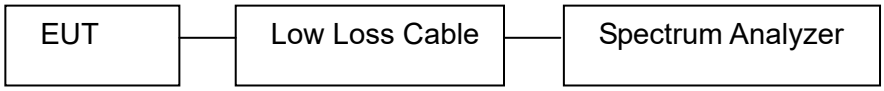
2.5 Measurement instruments list

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, X5	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	AX5080	SEL0073	N/A	N/A
53.	Antenna Tripod	Amplifier Reasearch	TP1000A	SEL0074	N/A	N/A
54.	High Gain Horn Antenna(0.8-5GHz)	Amplifier Reasearch	AT4002A	SEL0075	N/A	N/A

3. 6DB BANDWIDTH MEASUREMENT

3.1 Block diagram of test setup



3.2 Limit

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	10.12	>0.5MHz
Middle	2437	10.12	>0.5MHz
High	2462	10.12	>0.5MHz

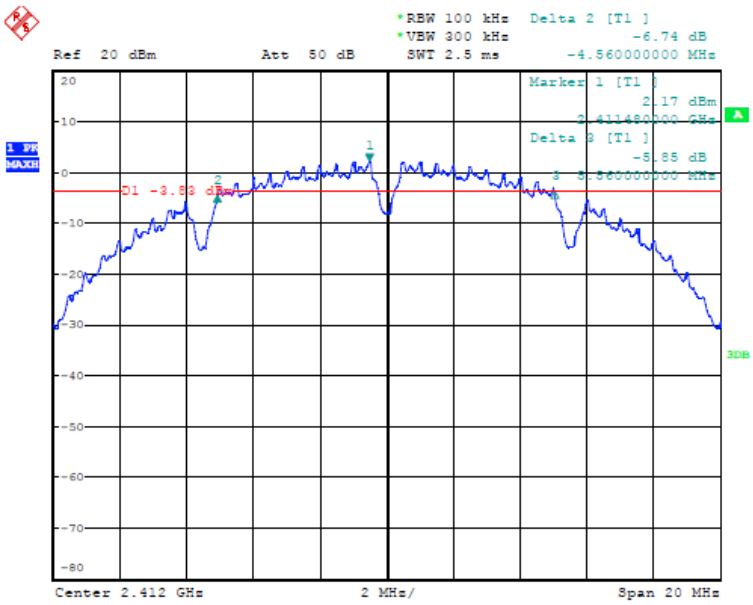
802.11g			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2412	16.60	>0.5MHz
Middle	2437	16.60	>0.5MHz
High	2462	16.60	>0.5MHz

802.11n (HT20)			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2412	17.84	>0.5MHz
Middle	2437	17.84	>0.5MHz
High	2462	17.84	>0.5MHz

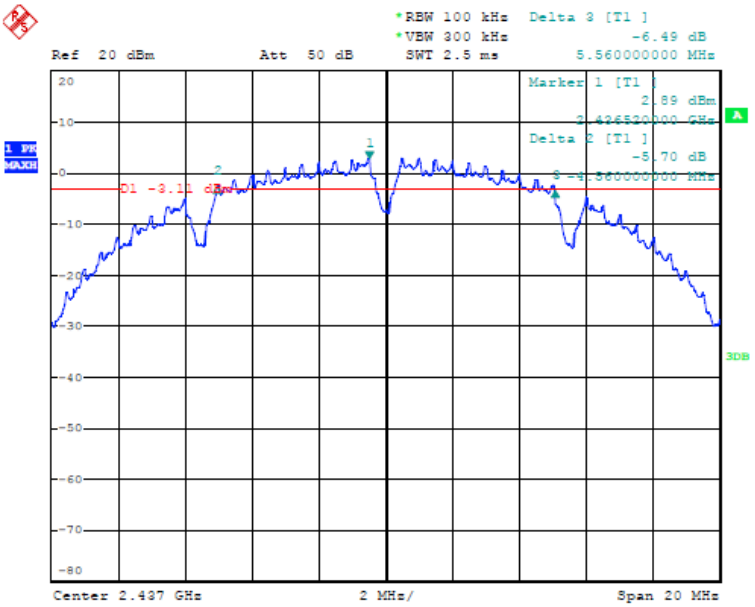
802.11n (HT40)			
Channel	**Frequency (MHz)**	**6DB Bandwidth(MHz)**	**Limit(MHz)**
Low	2422	36.56	>0.5MHz
Middle	2437	36.56	>0.5MHz
High	2452	36.56	>0.5MHz

The spectrum analyzer plots are attached as below.

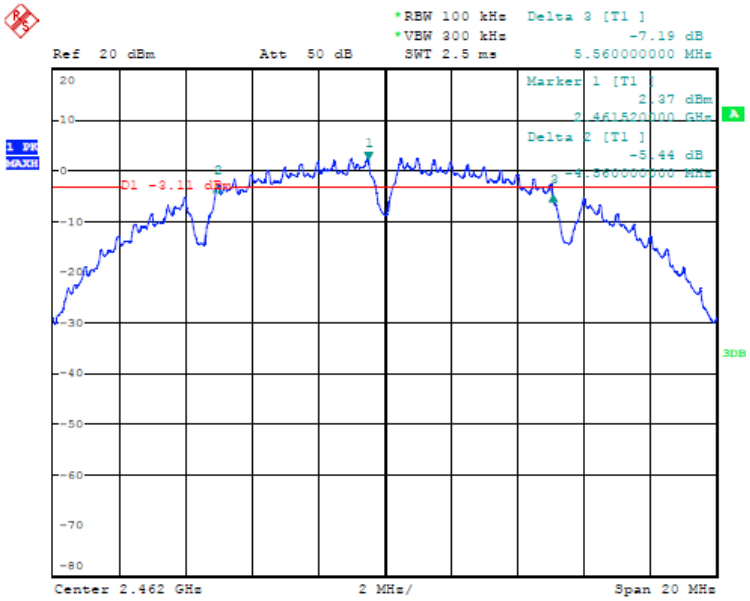
802.11b Channel Low 2412MHz



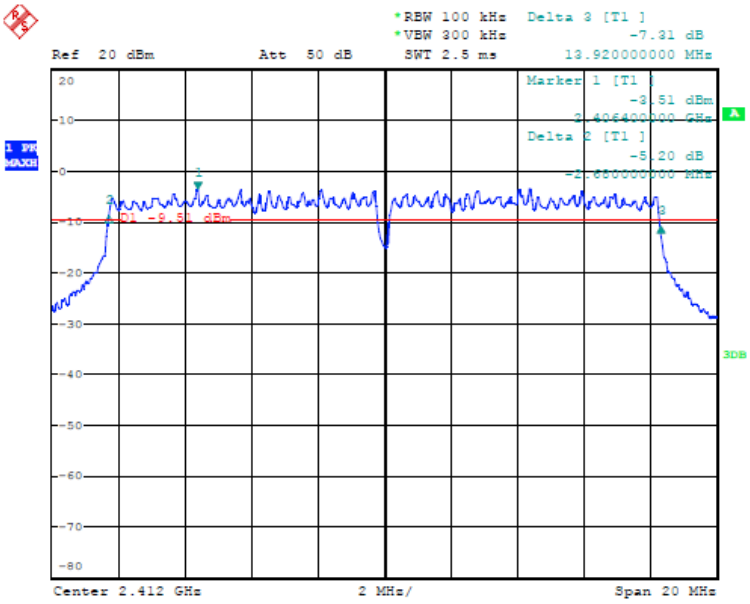
802.11b Channel Middle 2437MHz



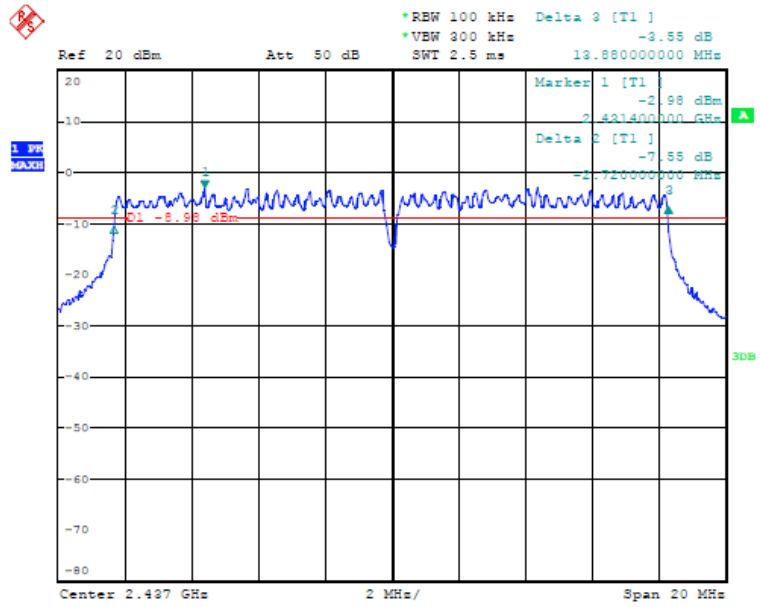
802.11b Channel High 2462MHz



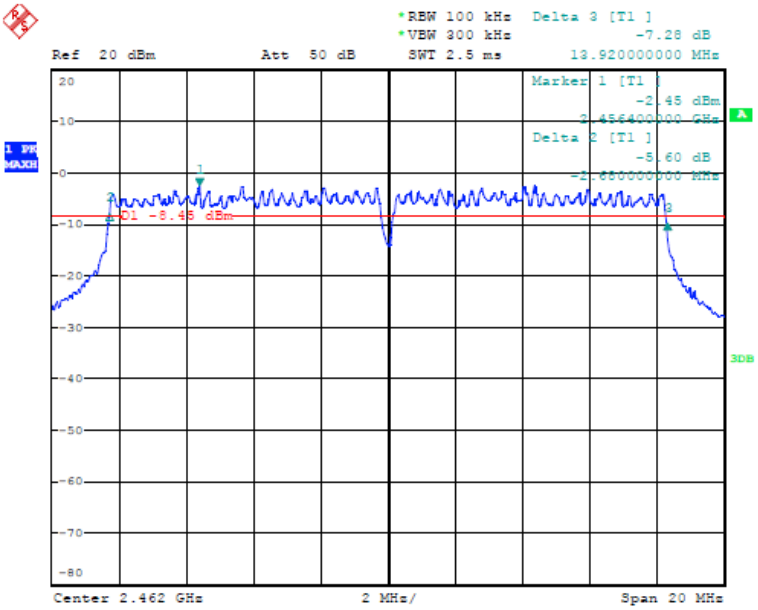
802.11g Channel Low 2412MHz



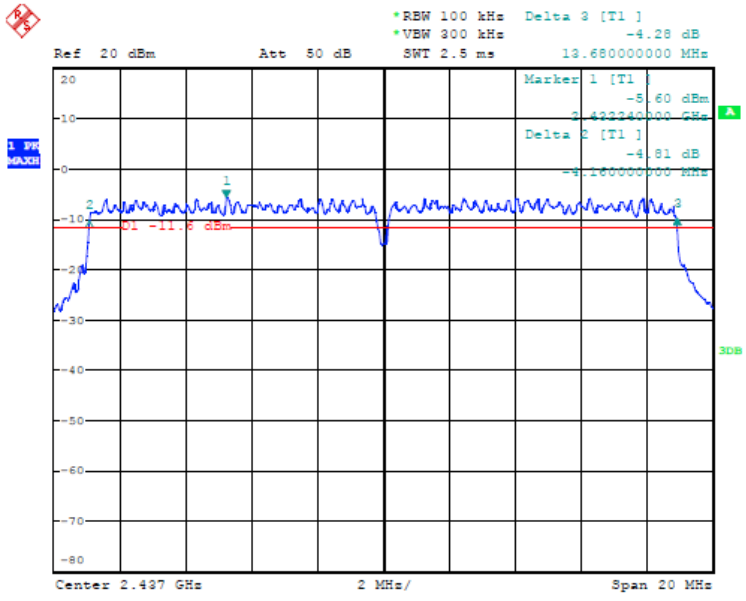
802.11g Channel Middle 2437MHz



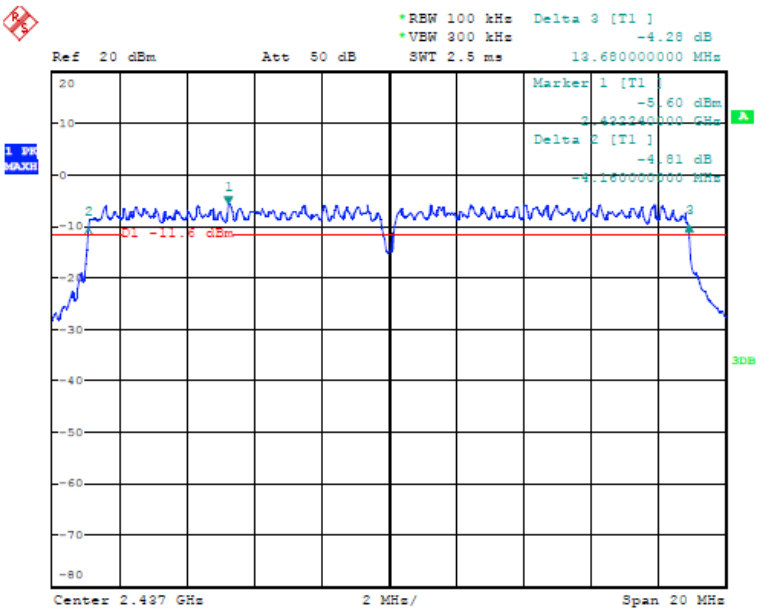
802.11g Channel High 2462MHz



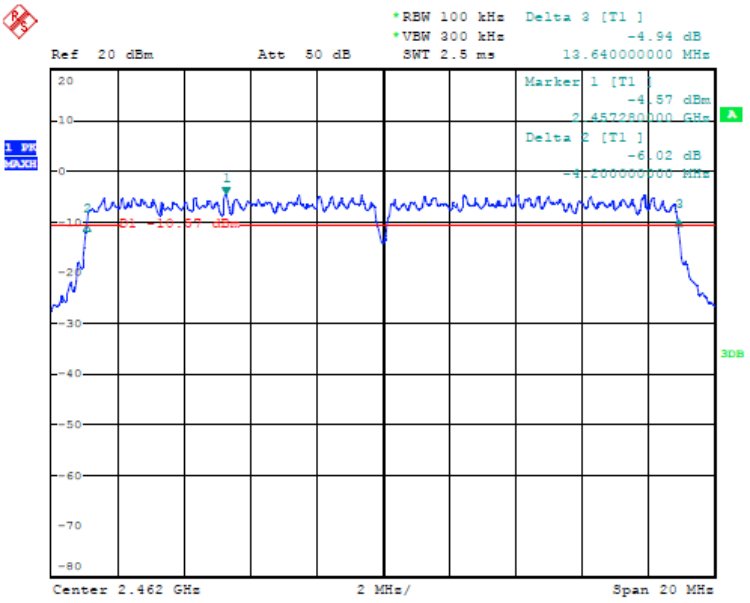
802.11n(HT20) Channel Low 2412MHz



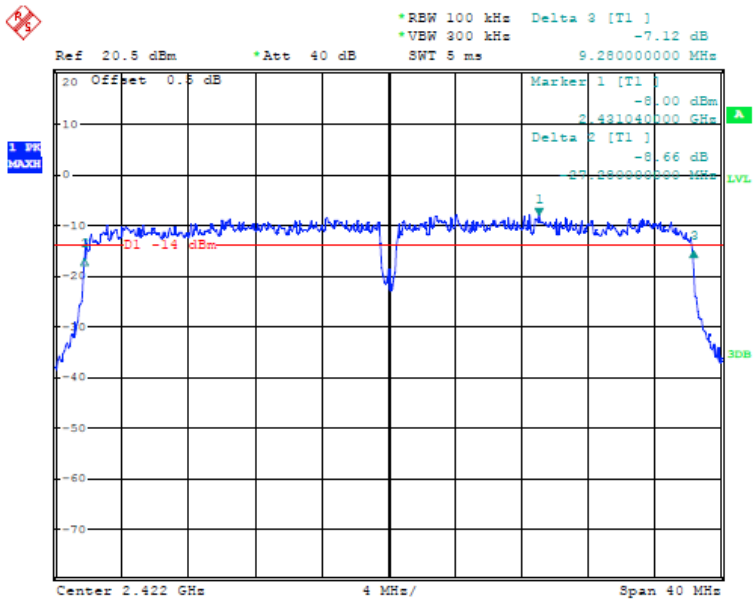
802.11n(HT20) Channel Middle 2437MHz



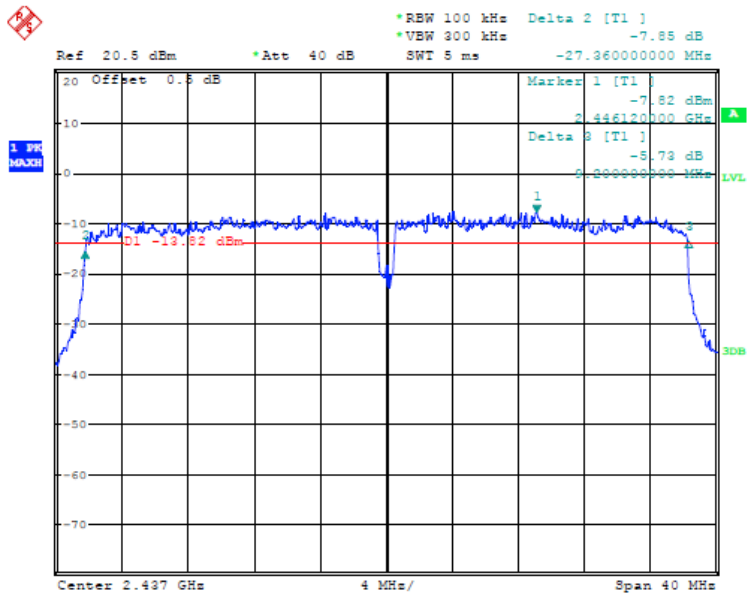
802.11n(HT20) Channel High 2462MHz



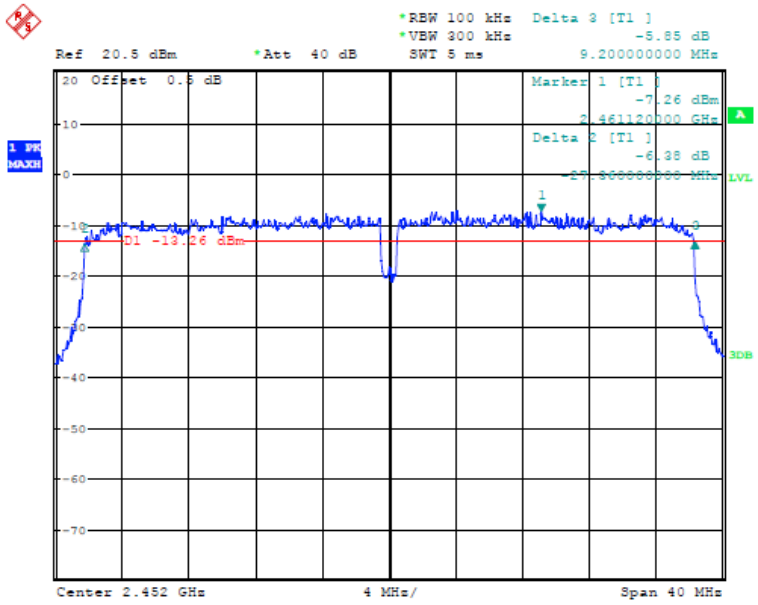
802.11n(HT40) Channel Low 2422MHz



802.11n(HT40) Channel Middle 2437MHz

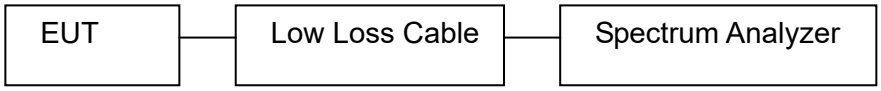


802.11n(HT40) Channel High 2452MHz



4. MAXIMUM PEAK OUTPUT POWER

4.1 Block diagram of test setup



4.2 Limits

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. According to section 15.247(b)-power output of the KDB NO. 558074 DTS D01 Meas. Guidance v03r04.(channel integration method) When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth

b. Set span to at least 1.5 times the OBW
c. Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
d. Set VBW ≥ 3 x RBW
e. Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f. Sweep time = auto
g. Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
h. If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only On full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run
i. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
j. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

4.4 Test result

Pass

802.11b_1Mbps

Channel	Frequency (MHz)	Ave output power (dBm)	Limit (dBm)
Low	2412	9.20	30
Middle	2437	9.14	30
High	2462	9.26	30

802.11g_6Mbps

Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	8.23	30
Middle	2437	8.12	30
High	2462	8.46	30

802.11n (HT20) _6.5Mbps

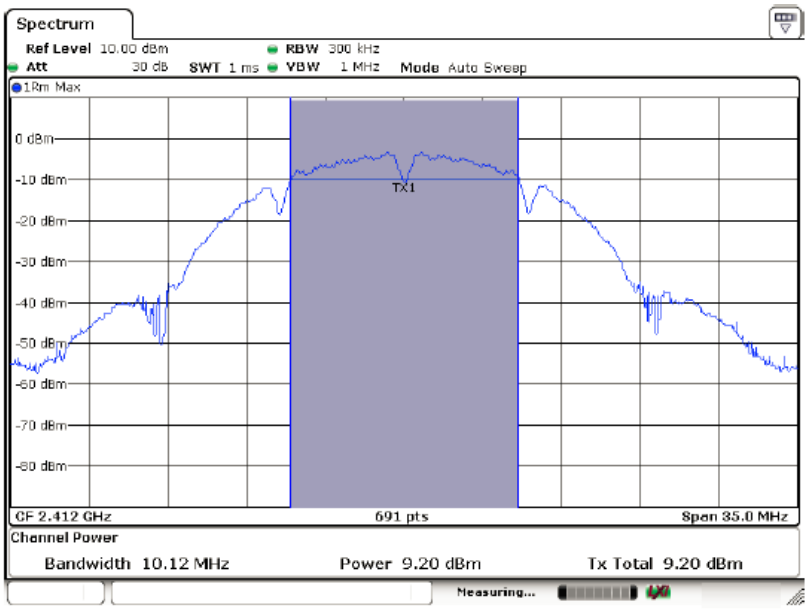
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2412	8.26	30
Middle	2437	7.92	30
High	2462	7.63	30

802.11n (HT40) 136.5Mbps

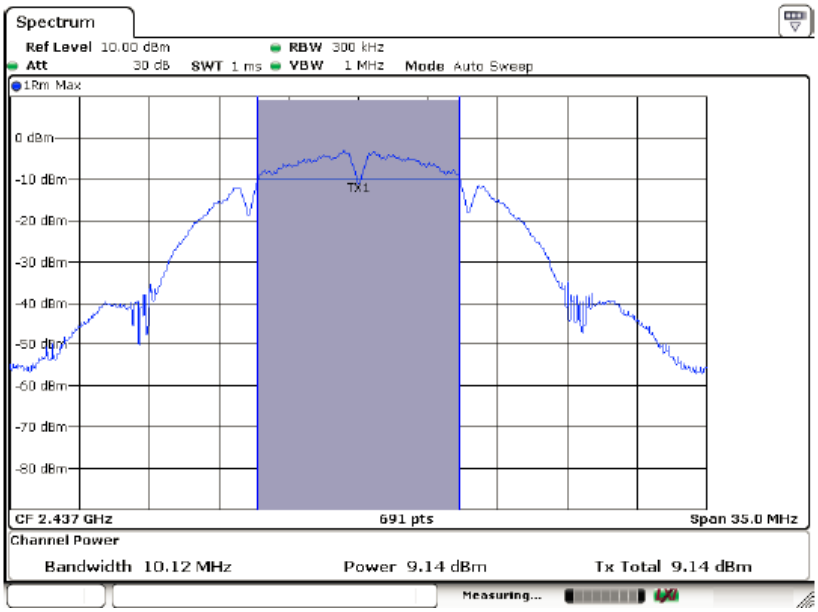
Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2422	6.88	30
Middle	2437	6.82	30
High	2452	6.83	30

802.11b

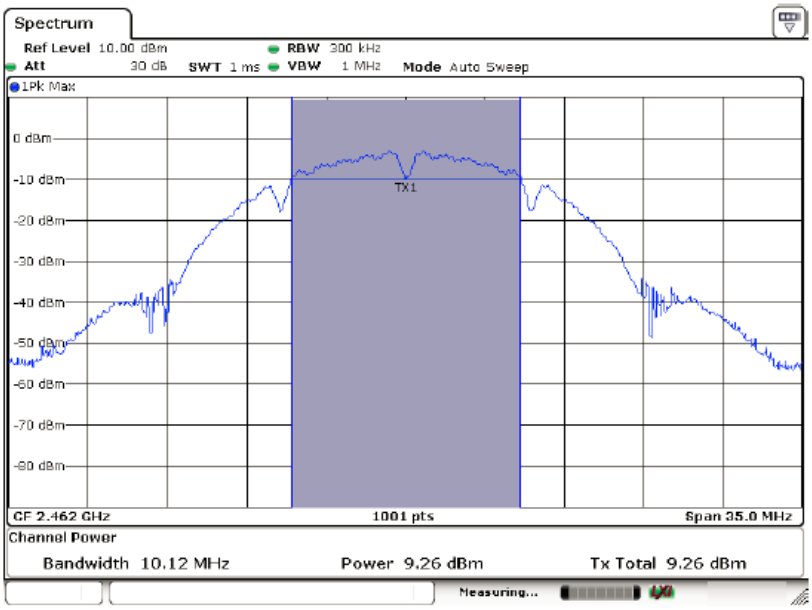
Low CH



Middle CH

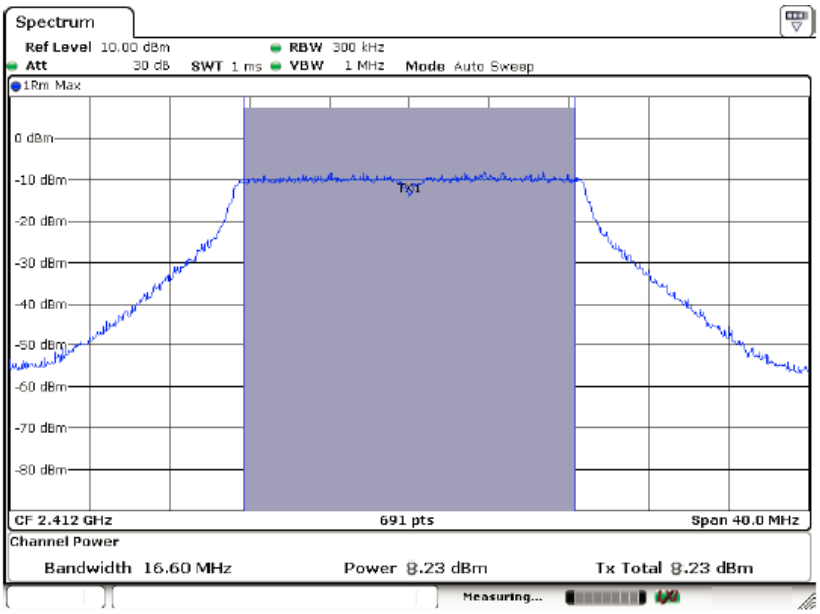


High CH

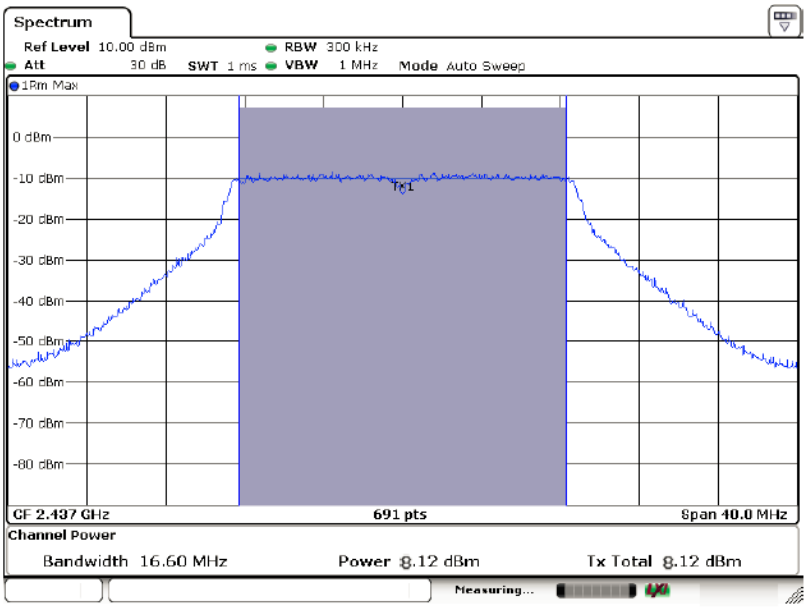


802.11g

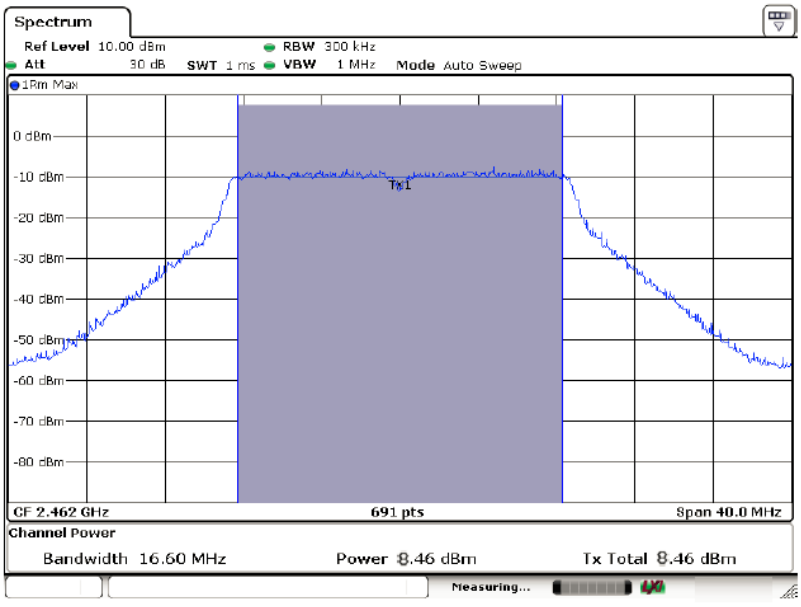
Low CH



Middle CH

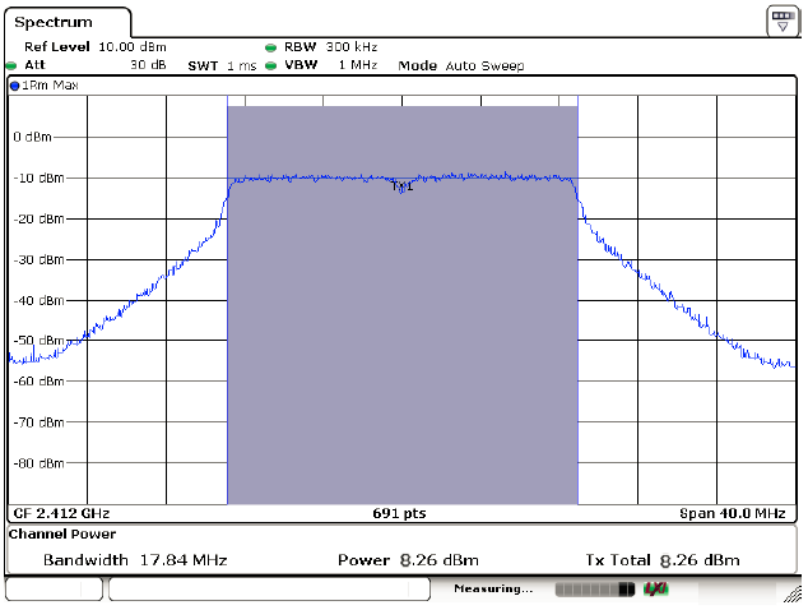


High CH

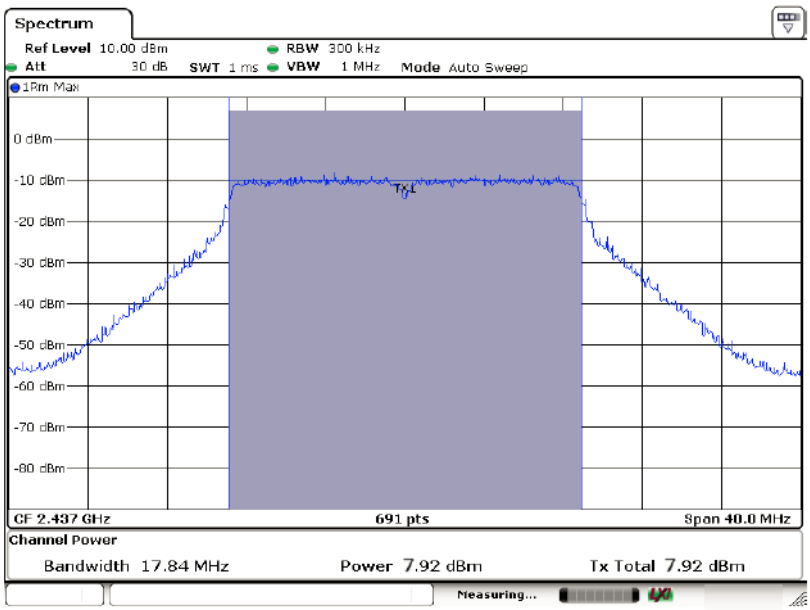


802.11n (HT20)

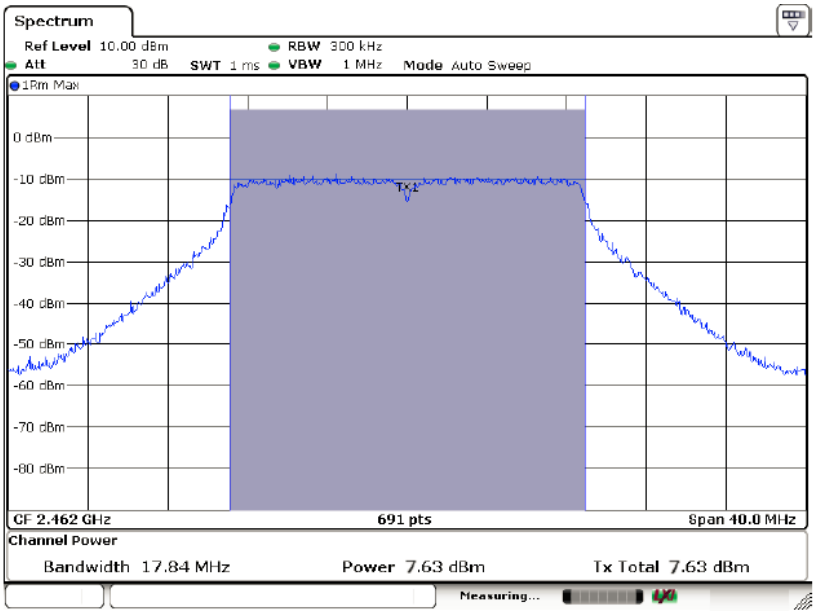
Low CH



Middle CH

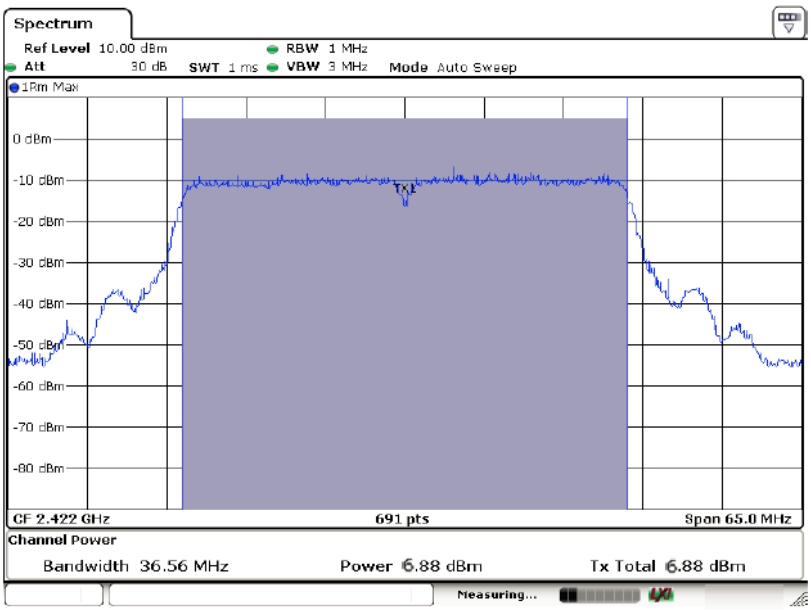


High CH

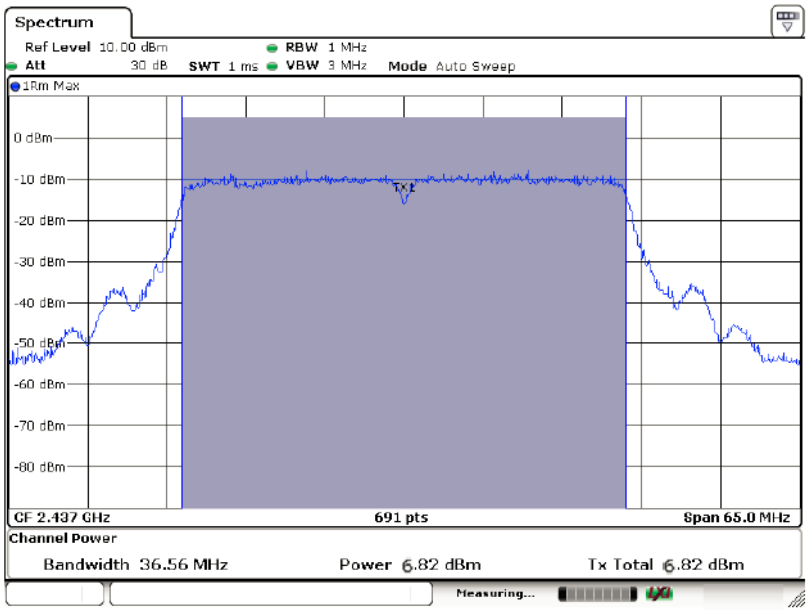


802.11n (HT40)

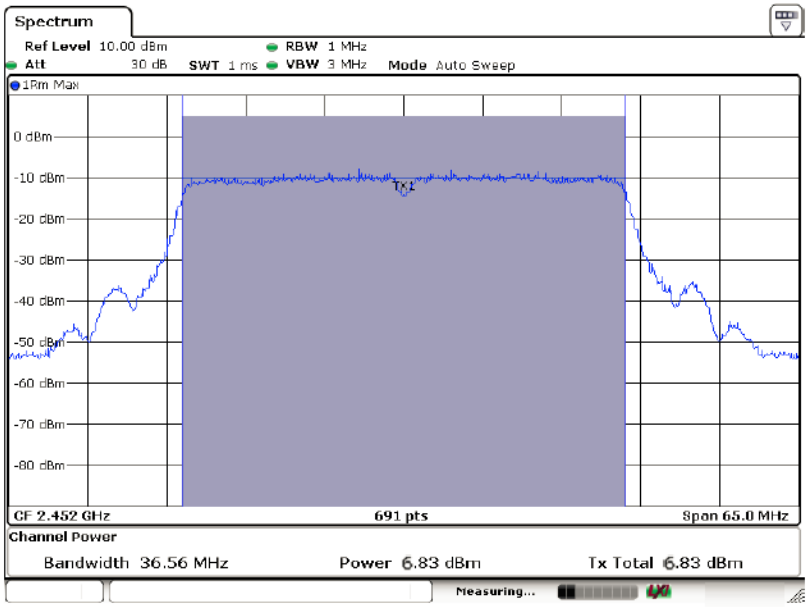
Low CH



Middle CH

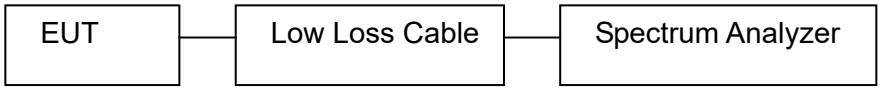


High CH



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 DTS Meas Guidance v03r04, 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 = Peak
f. Sweep time = auto couple.
g. Use the peak marker function to determine the maximum amplitude level within the RBW.
h. Use the peak marker function to determine the maximum amplitude level.
i. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

5.4 Test result

Pass

802.11b			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm)**	**Limit (dBm)**
Low	2412	-19.36	8
Middle	2437	-19.20	8
High	2462	-20.11	8

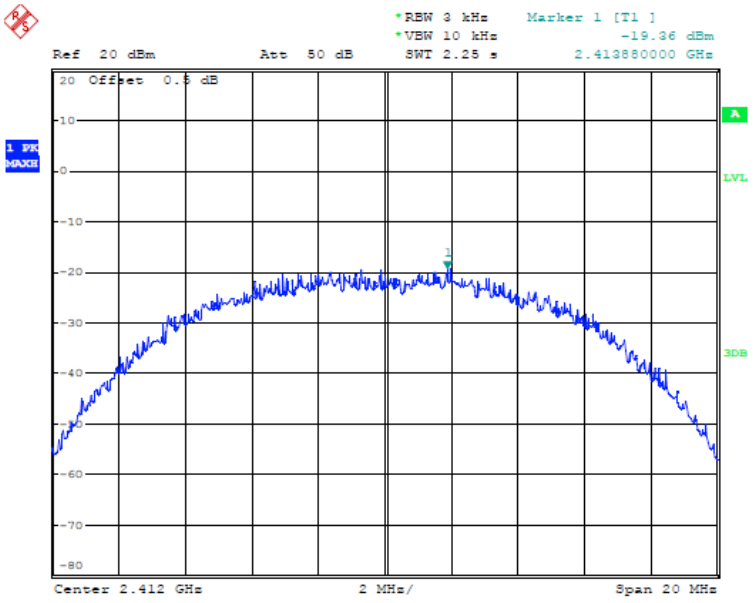
802.11g			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm)**	**Limit (dBm)**
Low	2412	-23.88	8
Middle	2437	-24.52	8
High	2462	-23.79	8

802.11n(HT20)			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm)**	**Limit (dBm)**
Low	2412	-24.54	8
Middle	2437	-25.50	8
High	2462	-24.74	8

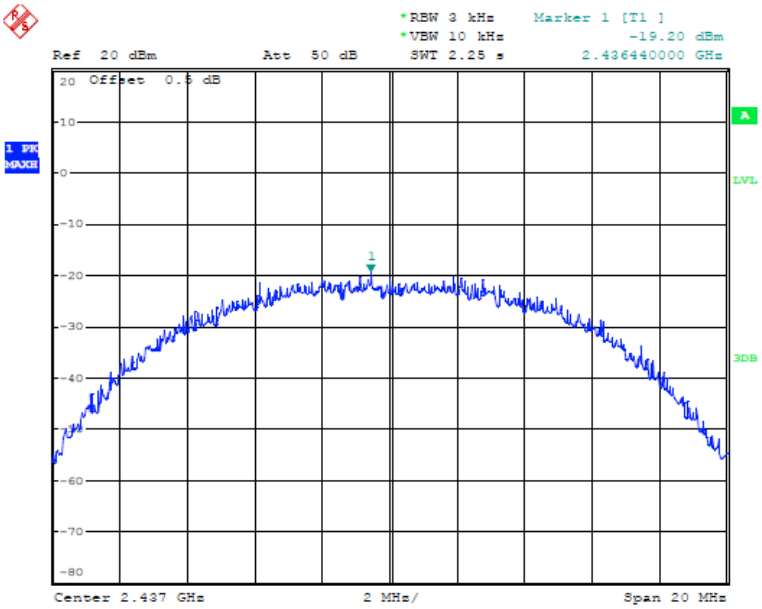
802.11n(HT40)			
Channel	**Frequency (MHz)**	**Power Spectral Density (dBm)**	**Limit (dBm)**
Low	2422	-29.52	8
Middle	2437	-29.55	8
High	2452	-30.52	8

The spectrum analyzer plots are attached as below.

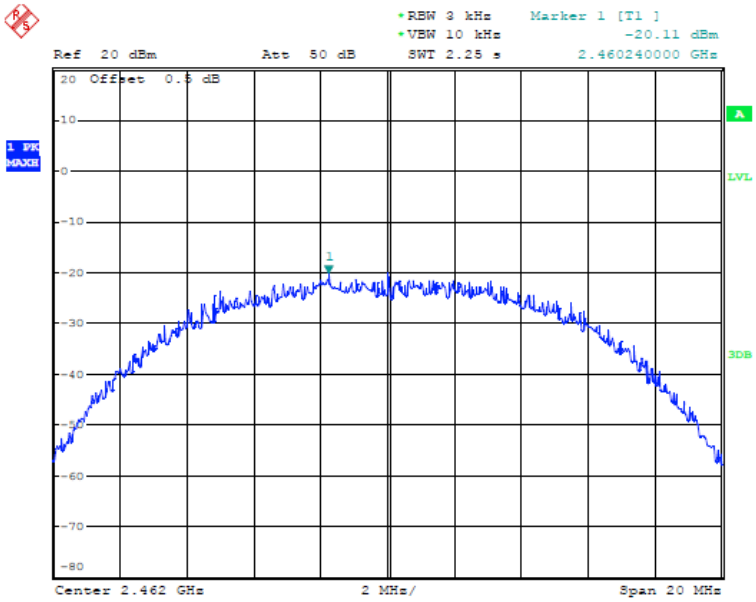
802.11b Channel Low 2412MHz



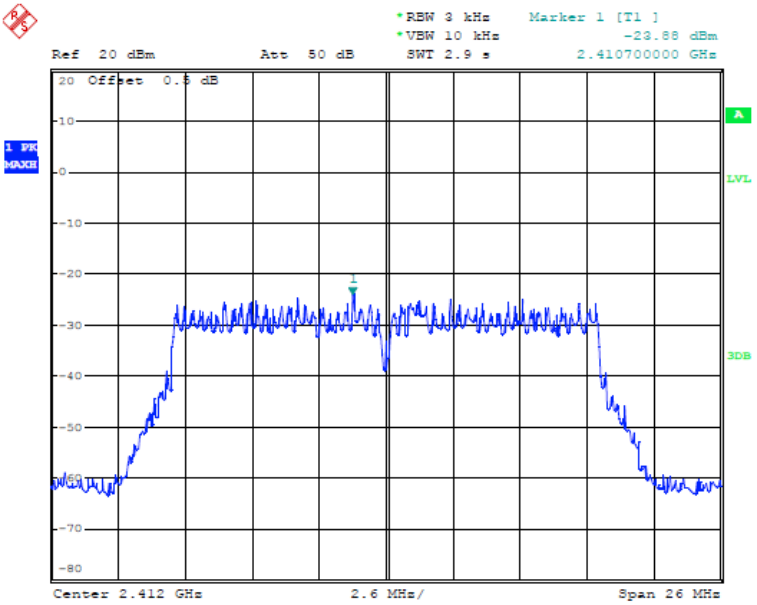
802.11b Channel Middle 2437MHz



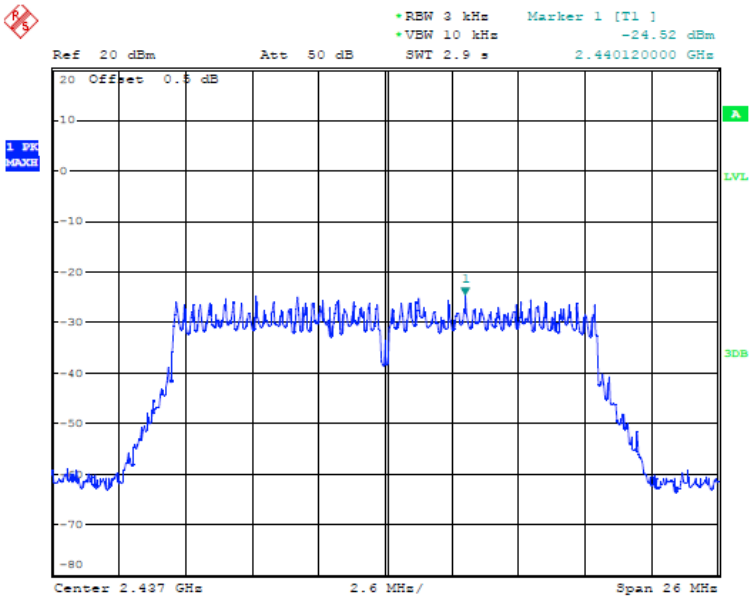
802.11b Channel High 2462MHz



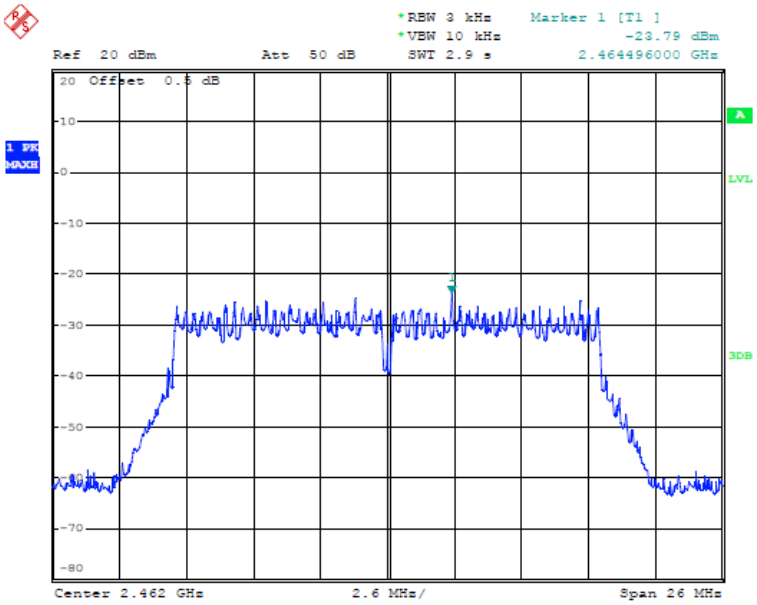
802.11g Channel Low 2412MHz



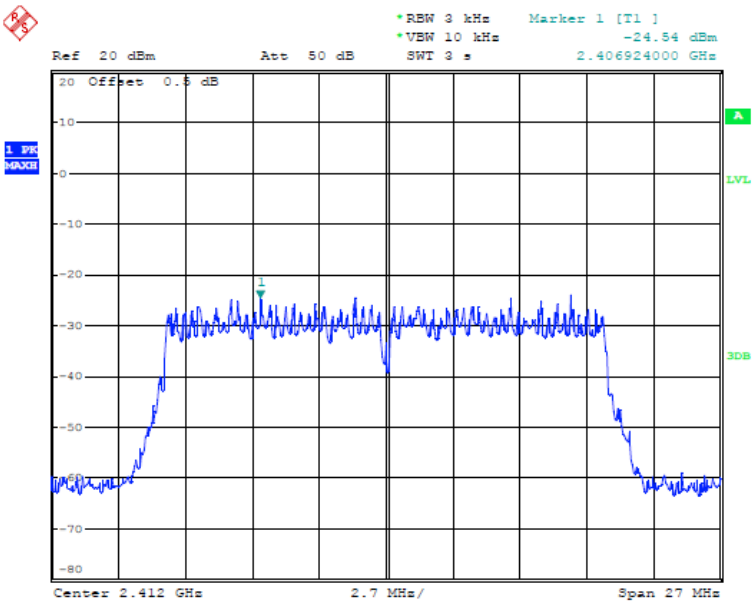
802.11g Channel Middle 2437MHz



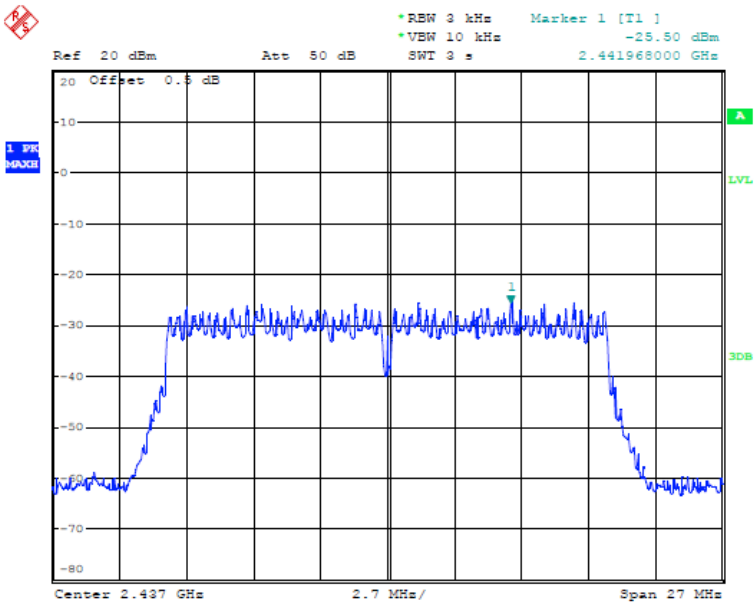
802.11g Channel High 2462MHz



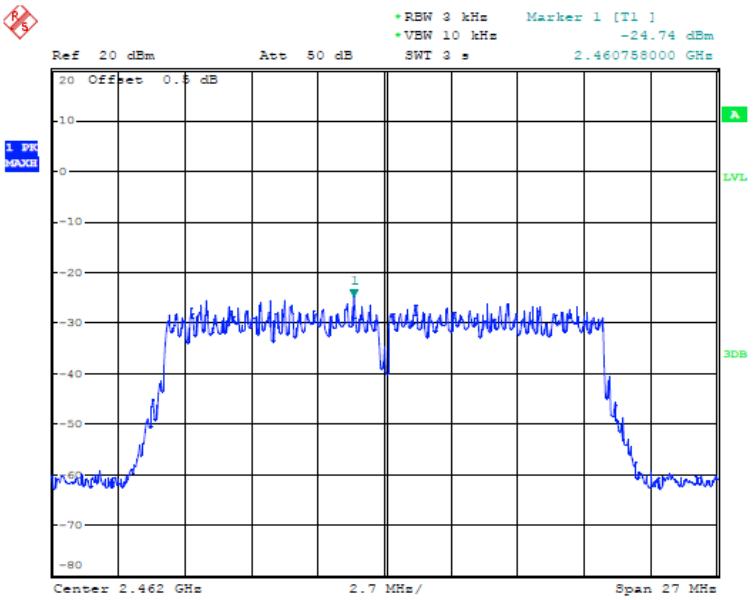
802.11n (HT20M) Channel Low 2412MHz



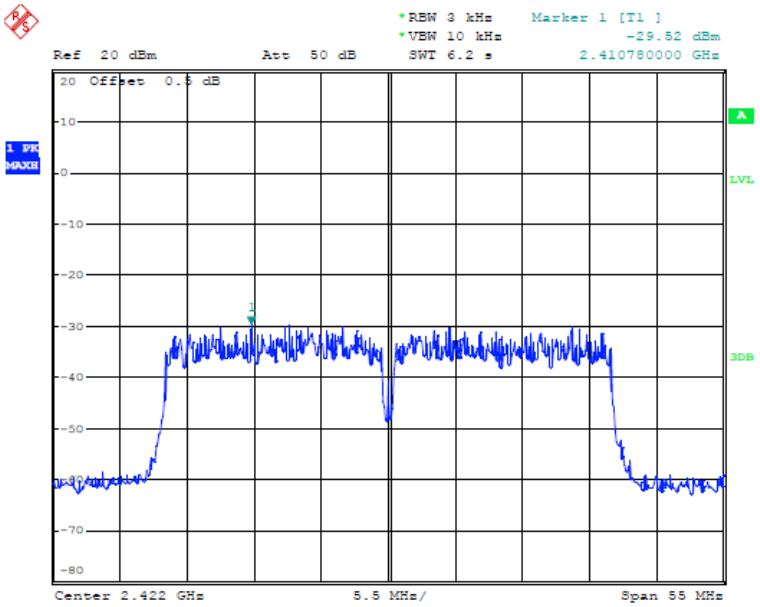
802.11n (HT20) Channel Middle 2437MHz



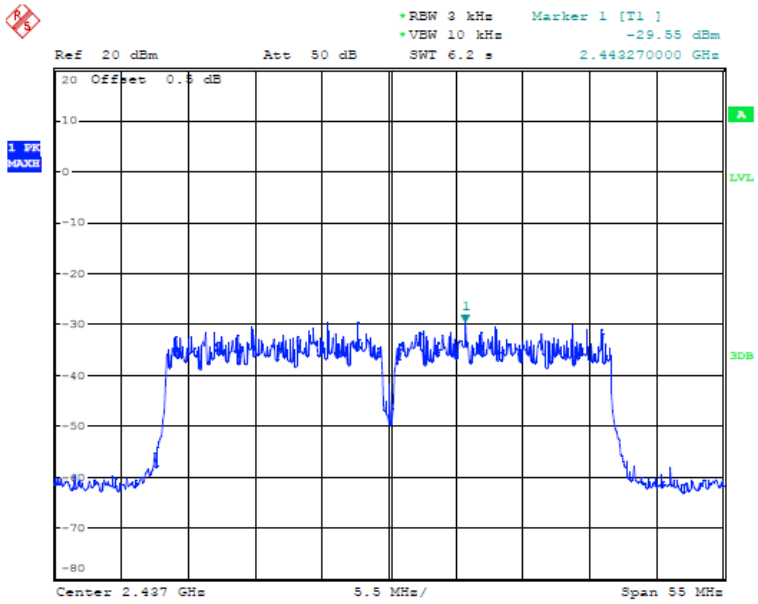
802.11n (HT20) Channel High 2462MHz



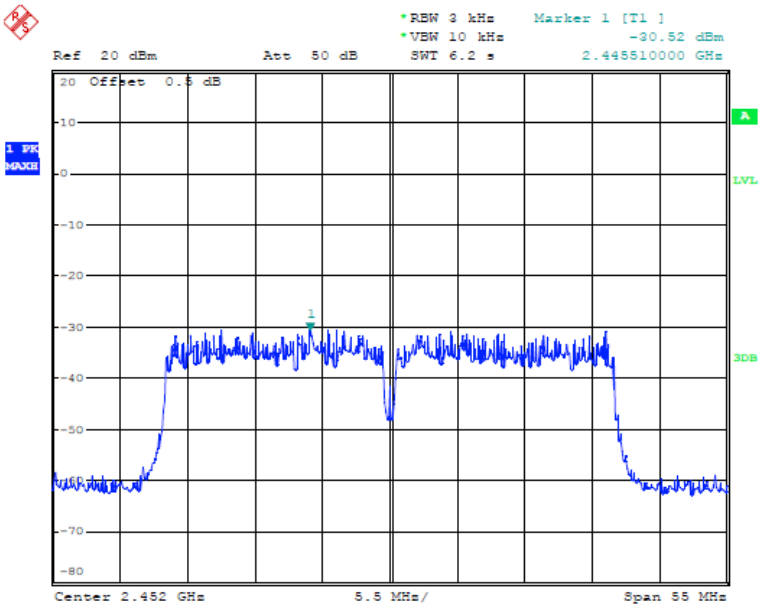
802.11n (HT40) Channel Low 2422MHz



802.11n (HT40) Middle High 2437MHz

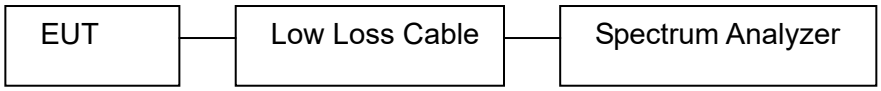


802.11n (20M) Channel High 2452MHz



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	37.32	>30dBc
High	2462	36.98	>30dBc

802.11g			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2412	33.63	>30dBc
High	2462	33.11	>30dBc

802.11n (20MHz)			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2412	34.39	>30dBc
High	2462	33.21	>30dBc

802.11n (40MHz)			
Channel	Frequency (MHz)	Result of Band Edge (dBc)	Limit (dBc)
Low	2422	33.31	>30dBc
High	2452	34.26	>30dBc

Radiated Band Edge Result

802.11 b, low CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	44.53	-6.99	37.54	74.00	-36.46	peak			
2	2310.000	35.90	-6.99	28.91	54.00	-25.09	peak			
3	2390.000	44.09	-6.78	37.31	74.00	-36.69	peak			
4	2390.000	36.78	-6.78	30.00	54.00	-24.00	peak			
5	2400.000	53.07	-6.76	46.31	74.00	-27.69	peak			
6	2400.000	44.79	-6.76	38.03	54.00	-15.97	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	42.48	-6.99	35.49	74.00	-38.51	peak			
2	2310.000	36.87	-6.99	29.88	54.00	-24.12	peak			
3	2390.000	45.24	-6.78	38.46	74.00	-35.54	peak			
4	2390.000	37.88	-6.78	31.10	54.00	-22.90	peak			
5	2400.000	55.06	-6.76	48.30	74.00	-25.70	peak			
6	2400.000	47.15	-6.76	40.39	54.00	-13.61	peak			

802.11 g, low CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	45.14	-6.99	38.15	74.00	-35.85	peak			
2	2310.000	37.88	-6.99	30.89	54.00	-23.11	peak			
3	2390.000	52.98	-6.78	46.20	74.00	-27.80	peak			
4	2390.000	41.22	-6.78	34.44	54.00	-19.56	peak			
5	2400.000	61.71	-6.76	54.95	74.00	-19.05	peak			
6	2400.000	50.69	-6.76	43.93	54.00	-10.07	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	42.54	-6.99	35.55	74.00	-38.45	peak			
2	2310.000	35.87	-6.99	28.88	54.00	-25.12	peak			
3	2390.000	54.51	-6.78	47.73	74.00	-26.27	peak			
4	2390.000	44.14	-6.78	37.36	54.00	-16.64	peak			
5	2400.000	66.06	-6.76	59.30	74.00	-14.70	peak			
6	2400.000	55.67	-6.76	48.91	54.00	-5.09	peak			

802.11 n(H20), low CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	43.84	-6.99	36.85	74.00	-37.15	peak			
2	2310.000	35.97	-6.99	28.98	54.00	-25.02	peak			
3	2390.000	51.19	-6.78	44.41	74.00	-29.59	peak			
4	2390.000	40.25	-6.78	33.47	54.00	-20.53	peak			
5	2400.000	61.11	-6.76	54.35	74.00	-19.65	peak			
6	2400.000	51.46	-6.76	44.70	54.00	-9.30	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	43.54	-6.99	36.55	74.00	-37.45	peak			
2	2310.000	36.90	-6.99	29.91	54.00	-24.09	peak			
3	2390.000	51.16	-6.78	44.38	74.00	-29.62	peak			
4	2390.000	43.25	-6.78	36.47	54.00	-17.53	peak			
5	2400.000	62.34	-6.76	55.58	74.00	-18.42	peak			
6	2400.000	52.76	-6.76	46.00	54.00	-8.00	peak			

802.11 n(H40), low CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	43.99	-6.99	37.00	74.00	-37.00	peak			
2	2310.000	36.90	-6.99	29.91	54.00	-24.09	peak			
3	2390.000	55.21	-6.78	48.43	74.00	-25.57	peak			
4	2390.000	47.55	-6.78	40.77	54.00	-13.23	peak			
5	2400.000	55.29	-6.76	48.53	74.00	-25.47	peak			
6	2400.000	47.78	-6.76	41.02	54.00	-12.98	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	42.88	-6.99	35.89	74.00	-38.11	peak			
2	2310.000	35.88	-6.99	28.89	54.00	-25.11	peak			
3	2390.000	45.89	-6.78	39.11	74.00	-34.89	peak			
4	2390.000	38.71	-6.78	31.93	54.00	-22.07	peak			
5	2400.000	49.45	-6.76	42.69	74.00	-31.31	peak			
6	2400.000	41.25	-6.76	34.49	54.00	-19.51	peak			

802.11 b, High CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	49.62	-6.54	43.08	74.00	-30.92	peak			
2	2483.500	41.55	-6.54	35.01	54.00	-18.99	peak			
3	2488.000	51.04	-6.52	44.52	74.00	-29.48	peak			
4	2488.000	43.50	-6.52	36.98	54.00	-17.02	peak			
5	2500.000	46.91	-6.50	40.41	74.00	-33.59	peak			
6	2500.000	39.67	-6.50	33.17	54.00	-20.83	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	47.85	-6.54	41.31	74.00	-32.69	peak			
2	2483.500	40.00	-6.54	33.46	54.00	-20.54	peak			
3	2488.000	49.86	-6.52	43.34	74.00	-30.66	peak			
4	2488.000	42.37	-6.52	35.85	54.00	-18.15	peak			
5	2500.000	46.53	-6.50	40.03	74.00	-33.97	peak			
6	2500.000	38.92	-6.50	32.42	54.00	-21.58	peak			

802.11 g, High CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	55.18	-6.54	48.64	74.00	-25.36	peak			
2	2483.500	47.58	-6.54	41.04	54.00	-12.96	peak			
3	2489.920	49.15	-6.52	42.63	74.00	-31.37	peak			
4	2489.920	42.50	-6.52	35.98	54.00	-18.02	peak			
5	2500.000	45.82	-6.50	39.32	74.00	-34.68	peak			
6	2500.000	38.00	-6.50	31.50	54.00	-22.50	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	52.61	-6.54	46.07	74.00	-27.93	peak			
2	2483.500	46.80	-6.54	40.26	54.00	-13.74	peak			
3	2487.040	47.44	-6.53	40.91	74.00	-33.09	peak			
4	2487.040	40.00	-6.53	33.47	54.00	-20.53	peak			
5	2500.000	43.91	-6.50	37.41	74.00	-36.59	peak			
6	2500.000	35.99	-6.50	29.49	54.00	-24.51	peak			

802.11 n(HT20), High CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	60.36	-6.54	53.82	74.00	-20.18	peak			
2	2483.500	53.57	-6.54	47.03	54.00	-6.97	peak			
3	2486.080	55.24	-6.54	48.70	74.00	-25.30	peak			
4	2486.080	48.34	-6.54	41.80	54.00	-12.20	peak			
5	2500.000	46.79	-6.50	40.29	74.00	-33.71	peak			
6	2500.000	38.99	-6.50	32.49	54.00	-21.51	peak			

Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	56.25	-6.54	49.71	74.00	-24.29	peak			
2	2483.500	46.11	-6.54	39.57	54.00	-14.43	peak			
3	2486.560	53.21	-6.53	46.68	74.00	-27.32	peak			
4	2486.560	44.50	-6.53	37.97	54.00	-16.03	peak			
5	2500.000	45.51	-6.50	39.01	74.00	-34.99	peak			
6	2500.000	38.25	-6.50	31.75	54.00	-22.25	peak			

802.11 n(HT40), High CH, Horizontal

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	58.31	-6.54	51.77	74.00	-22.23	peak			
2	2483.500	50.60	-6.54	44.06	54.00	-9.94	peak			
3	2494.000	56.29	-6.51	49.78	74.00	-24.22	peak			
4	2494.000	48.99	-6.51	42.48	54.00	-11.52	peak			
5	2500.000	50.50	-6.50	44.00	74.00	-30.00	peak			
6	2500.000	42.99	-6.50	36.49	54.00	-17.51	peak			

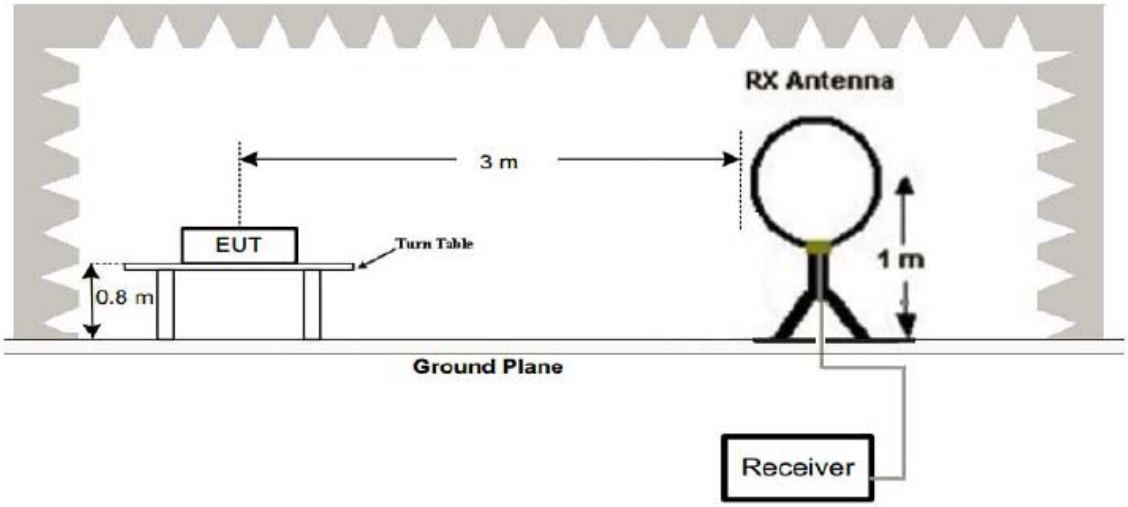
Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	57.18	-6.54	50.64	74.00	-23.36	peak			
2	2483.500	49.88	-6.54	43.34	54.00	-10.66	peak			
3	2490.400	56.31	-6.51	49.80	74.00	-24.20	peak			
4	2490.400	48.75	-6.51	42.24	54.00	-11.76	peak			
5	2500.000	49.59	-6.50	43.09	74.00	-30.91	peak			
6	2500.000	42.57	-6.50	36.07	54.00	-17.93	peak			

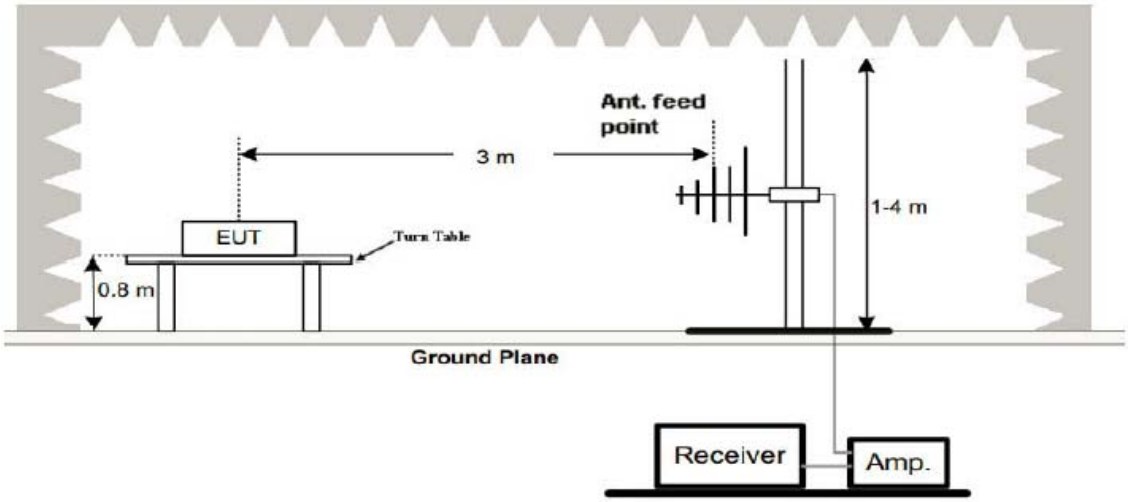
7. RADIATED SPURIOUS EMISSION TEST

7.1 Block diagram of test setup

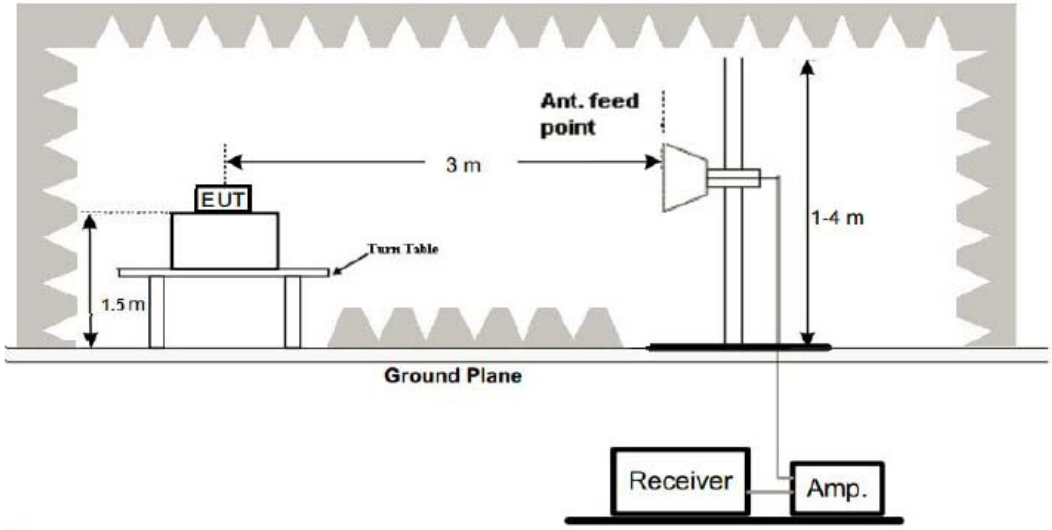
（1） Radiated Emission Test-Up Frequency Below 30MHz



（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

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, Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2, Support equipment, if needed, was placed as per ANSI C63.10
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

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

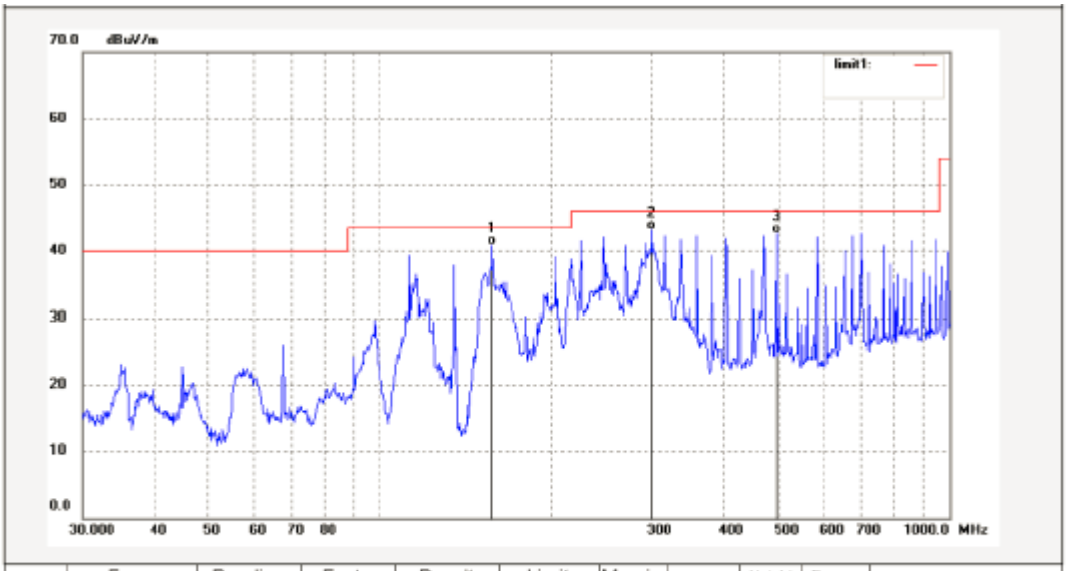
7.5 Test result

Pass

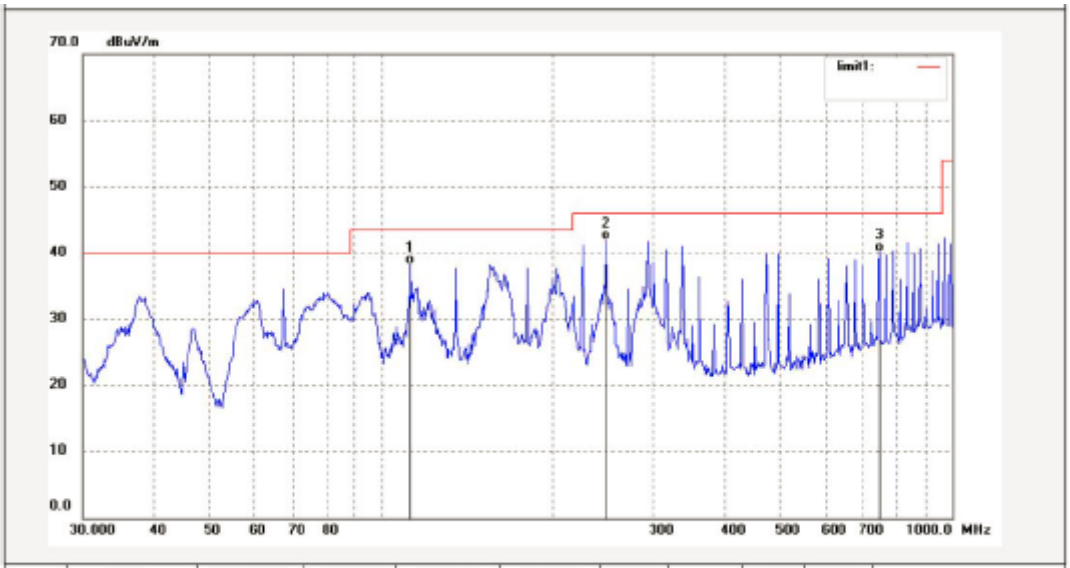
Test mode: 802.11b
For Below 30MHz

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

Test mode: 802.11b
For 30MHz-1000MHz



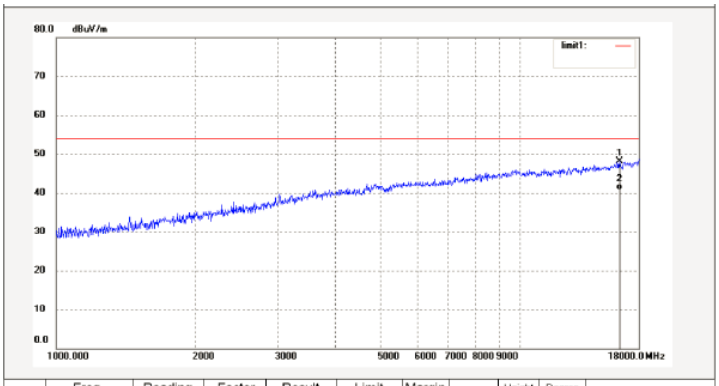
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	157.5586	55.70	-14.82	40.88	43.50	-2.62	QP			
2	300.3672	52.35	-9.29	43.06	46.00	-2.94	QP			
3	495.9343	47.68	-5.01	42.67	46.00	-3.33	QP			



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	112.5242	51.81	-13.52	38.29	43.50	-5.21	QP			
2	247.6819	52.63	-10.79	41.84	46.00	-4.16	QP			
3	744.8659	41.34	-1.11	40.23	46.00	-5.77	QP			

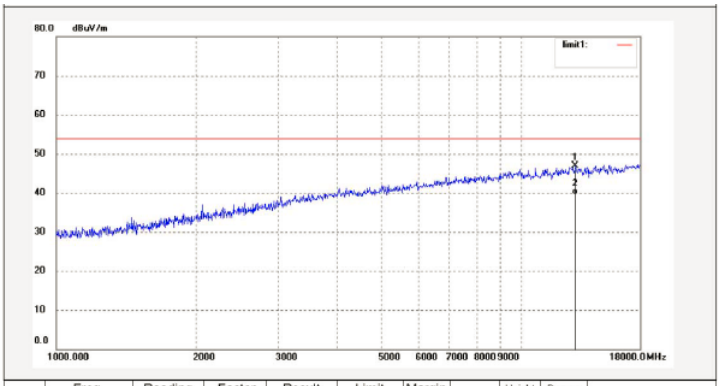
Test mode: 802.11b
For 1GHz-25GHz

CH low
Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	16362.457	36.10	12.01	48.11	74.00	-25.89	peak			
2	16362.457	28.63	12.01	40.64	54.00	-13.36	peak			

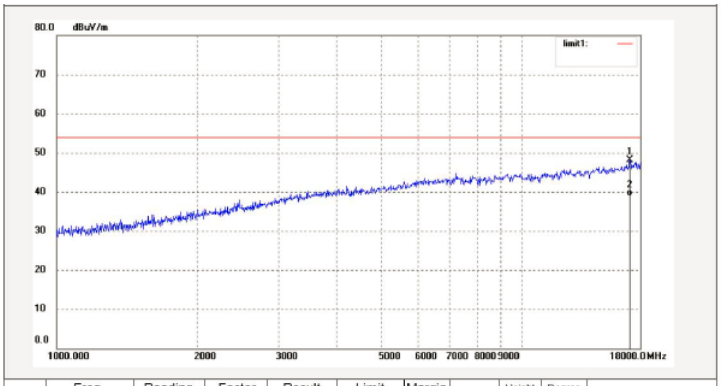
Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	13059.822	38.98	8.02	47.00	74.00	-27.00	peak			
2	13059.822	31.47	8.02	39.49	54.00	-14.51	peak			

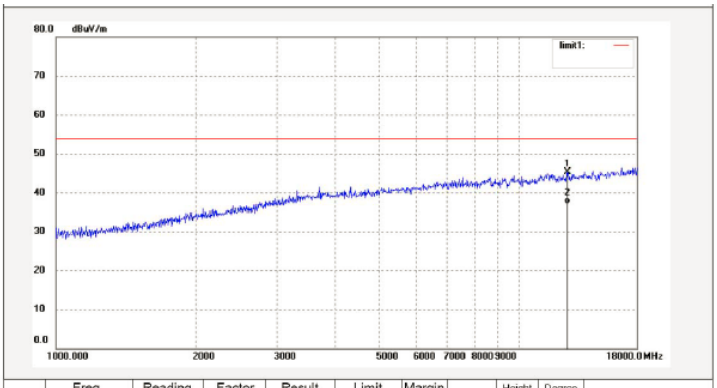
CH Middle

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	17087.464	33.87	14.19	48.06	74.00	-25.94	peak			
2	17087.464	24.70	14.19	38.89	54.00	-15.11	peak			

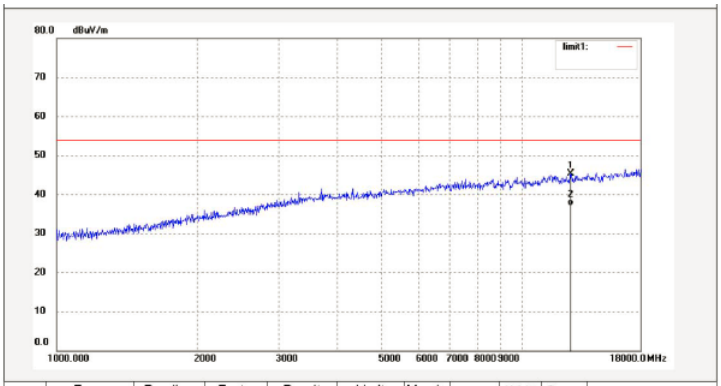
Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	12724.473	37.77	7.49	45.26	74.00	-28.74	peak			
2	12724.473	29.68	7.49	37.17	54.00	-16.83	peak			

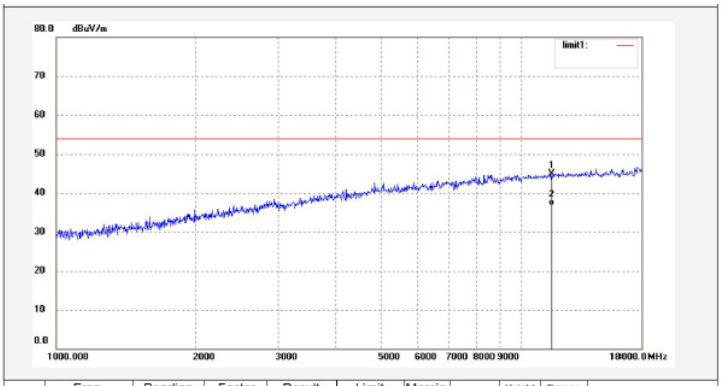
CH High

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	12724.473	37.77	7.49	45.26	74.00	-28.74	peak			
2	12724.473	29.68	7.49	37.17	54.00	-16.83	peak			

Vertical

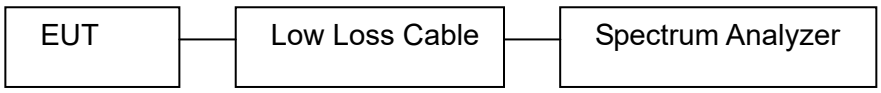


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	11600.350	38.77	6.14	44.91	74.00	-29.09	peak			
2	11600.350	30.55	6.14	36.69	54.00	-17.31	peak			

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

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.

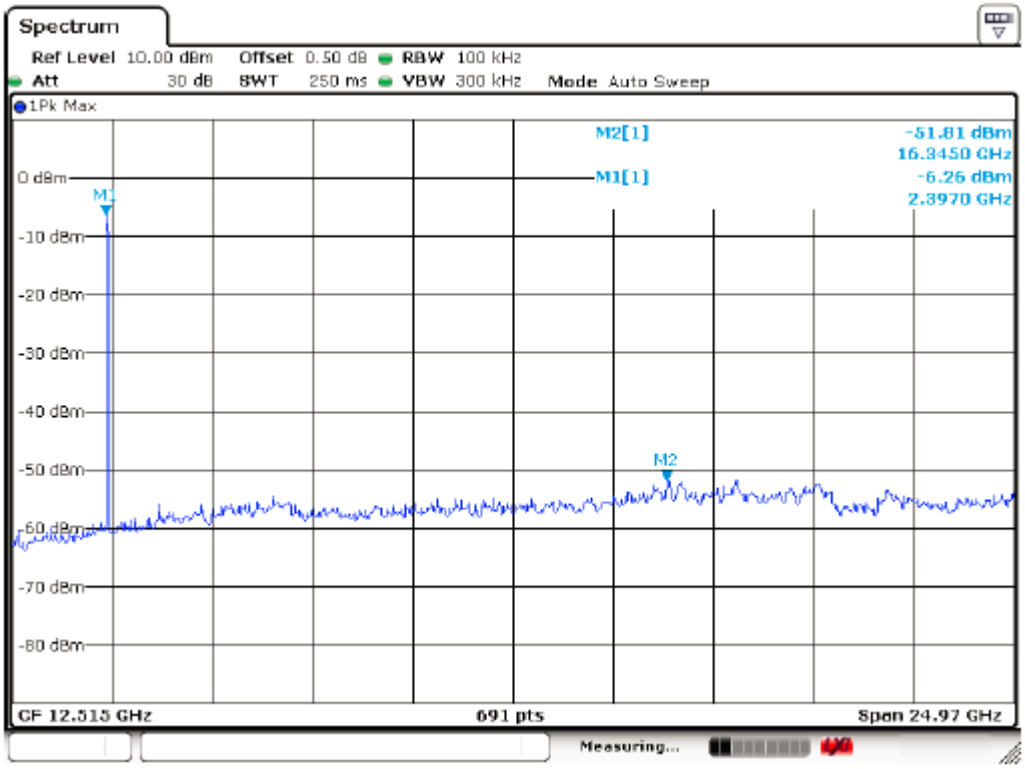
8.4 Test Result

Pass

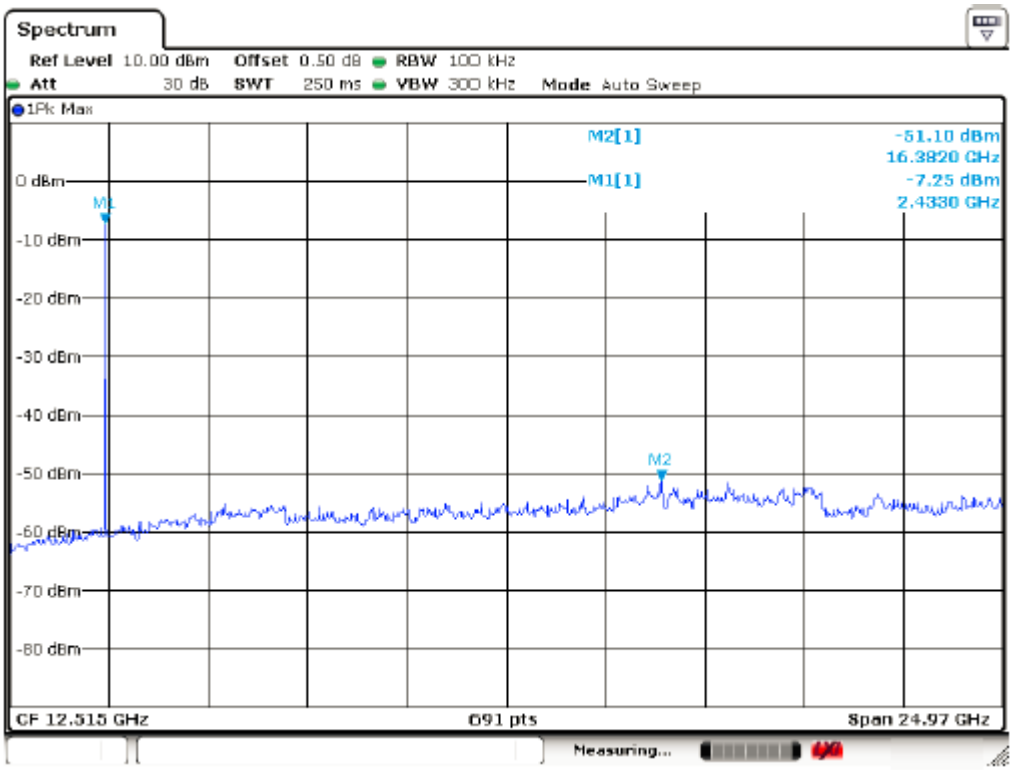
The spectrum analyzer plots are attached as below.

The worst test mode: 802.11b

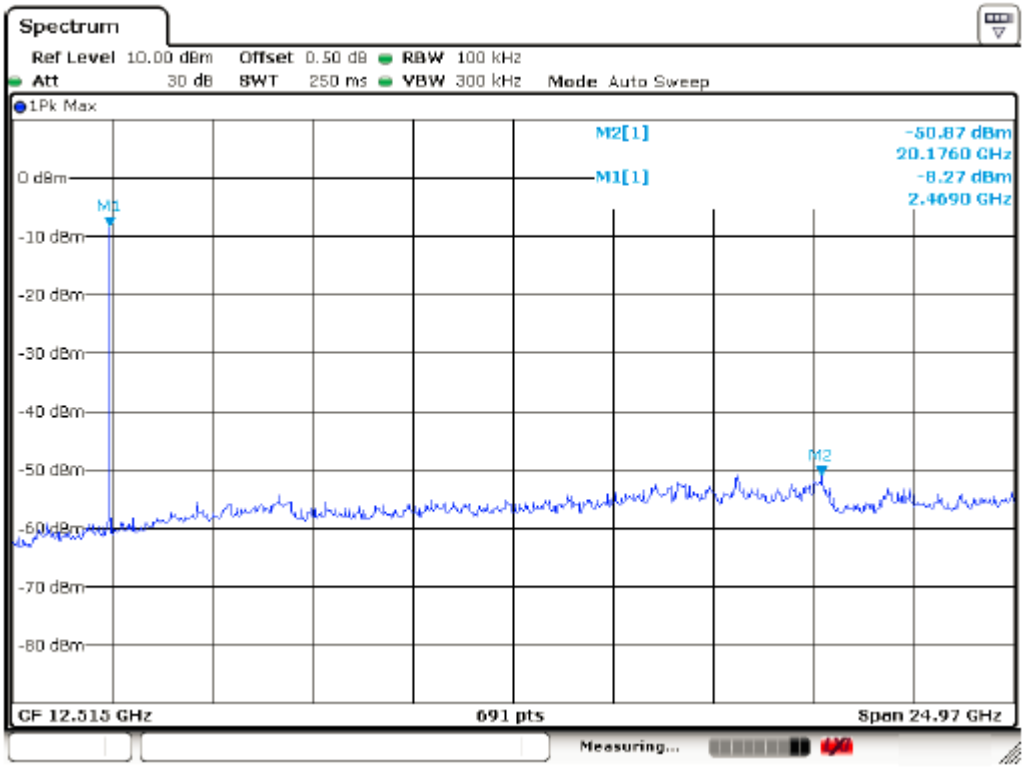
TX 802.11b Channel Low 2412MHz



TX 802.11b Channel Middle 2437MHz

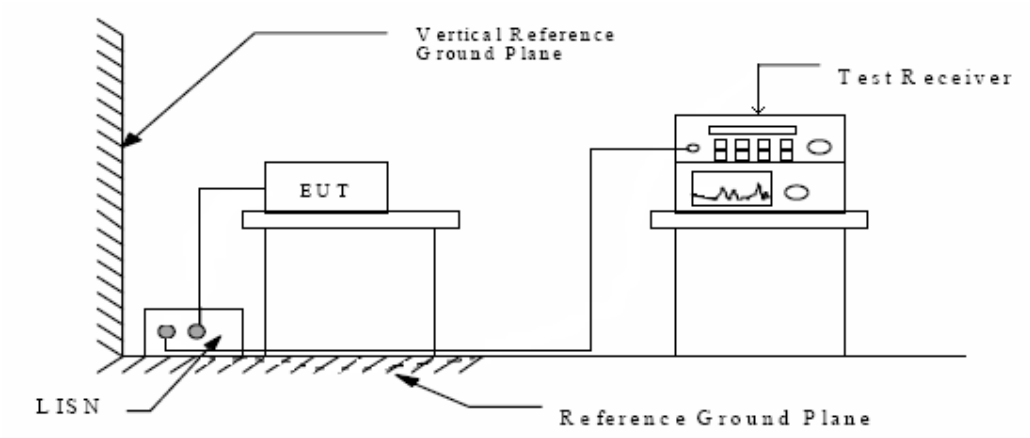


TX 802.11b Channel High 2462MHz



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

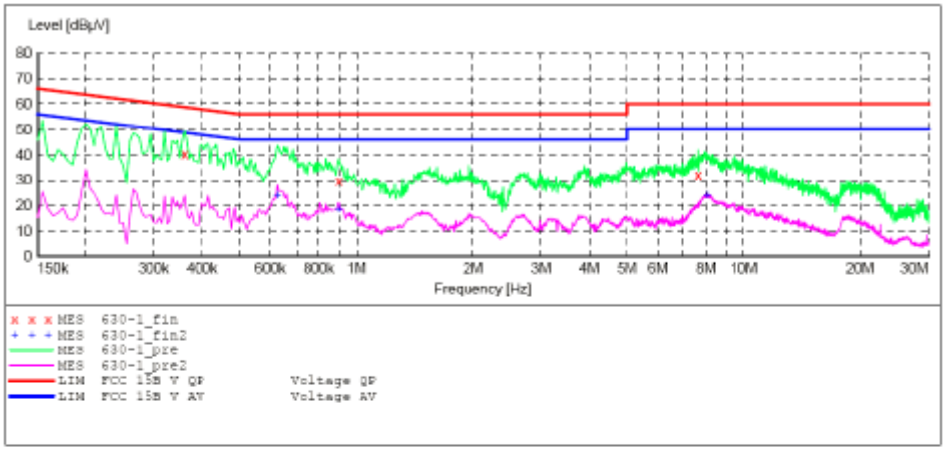
The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both 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

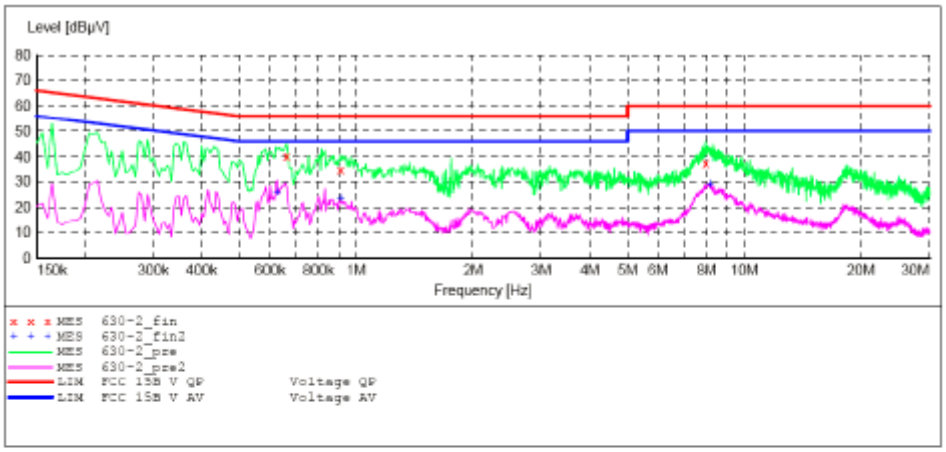


MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.360000	40.30	10.6	59	18.4	QP	N	GND
0.900000	29.80	10.8	56	26.2	QP	N	GND
7.630000	32.30	11.2	60	27.7	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.625000	24.00	10.8	46	22.0	AV	N	GND
0.900000	18.70	10.8	46	27.3	AV	N	GND
8.050000	23.90	11.2	50	26.1	AV	N	GND



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.660000	40.40	10.8	56	15.6	QP	L1	GND
0.910000	34.80	10.8	56	21.2	QP	L1	GND
7.930000	37.50	11.2	60	22.5	QP	L1	GND

MEASUREMENT RESULT:

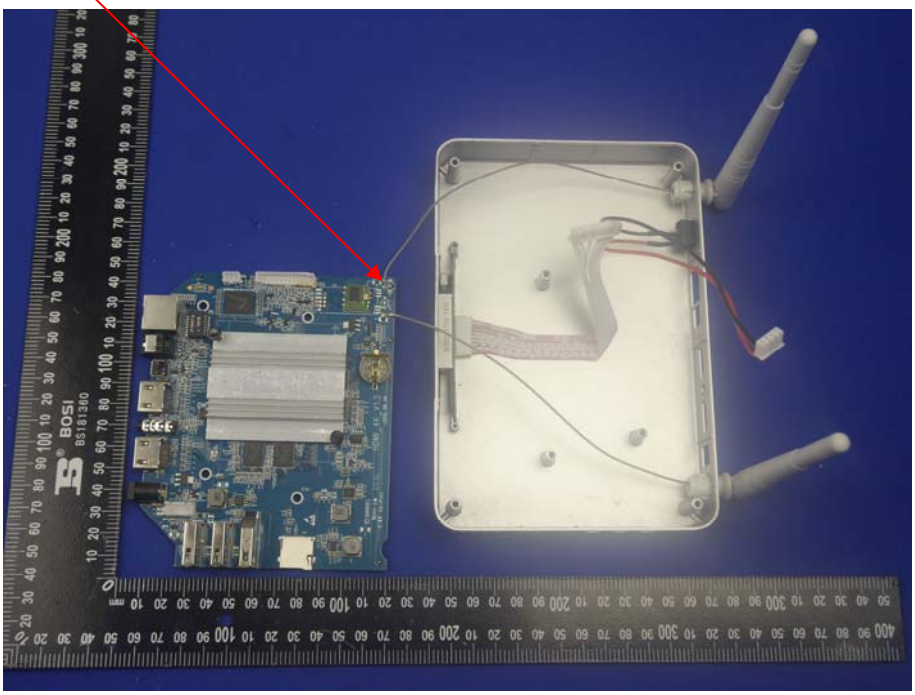
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.625000	25.90	10.8	46	20.1	AV	L1	GND
0.910000	23.50	10.8	46	22.5	AV	L1	GND
8.180000	29.20	11.2	50	20.8	AV	L1	GND

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, can not be changed except take apart the product.

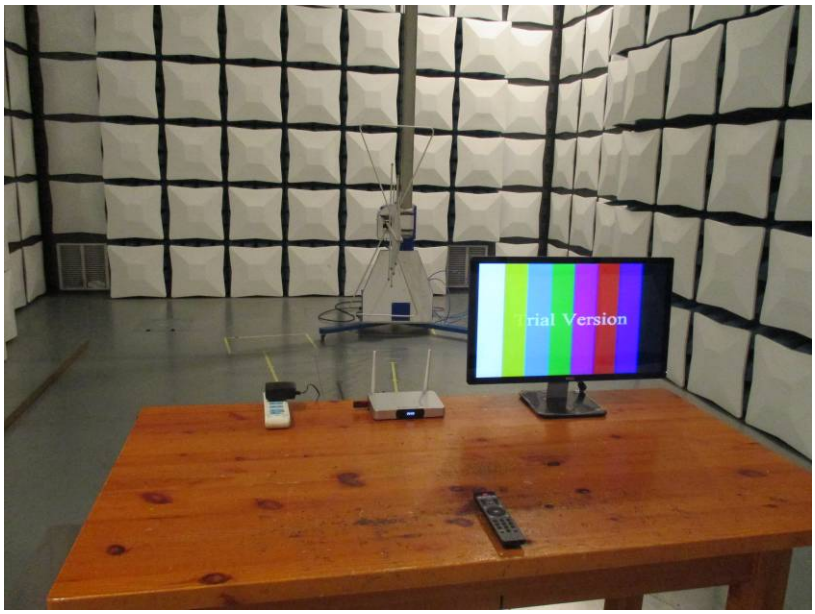
Antenna



Note: Only one antenna, the other antenna is decorated, without transmit.

11. POTOGRAPH OF TEST

11.1 Radiated Emission



11.2 Conducted Emission