FCC ID TEST REPORT

for

Micro PC

Model: VX2

FCC ID: 2ACXKVX2

Prepared for: Thread Technology Co., Ltd.
4F, A Block, CYG, No.2, Mid GaoXin Rd, NanShan, Shenzhen, China

Prepared by: Shenzhen TCT Testing Technology Co.,Ltd
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Report Number：TCT140730E020F2-1
Date of Test： Aug. 04-Aug. 11, 2014
Date of Report： Aug. 12, 2014

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1.0 General Details

1.1 Test Lab Details

Name :	Shenzhen Tongce Testing Lab
Address:	1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Telephone:	13410377511
Fax:	--

The test facility is recognized, certified, or accredited by the following organizations:

FCC Registration Number: 572331

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

Registration Number: 572331

Industry Canada (IC)

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Registration Number IC: 10668A-1

1.2 Applicant Details

Applicant:	Thread Technology Co., Ltd.
Address:	4F, A Block, CYG, No.2, Mid GaoXin Rd, NanShan, Shenzhen, China
Telephone:	0755-85259392
Fax:	0755-27219460

Manufacturer:	Thread Technology Co., Ltd.
Address:	4F, A Block, CYG, No.2, Mid GaoXin Rd, NanShan, Shenzhen, China
Telephone:	0755-85259392
Fax:	0755-27219460

1.3 Description of EUT

Product:	Micro PC
Model No.:	VX2
Additional Model No.:	VX2 X-X (X stand for A-Z)
Brand Name:	N.A.
Modulation Type:	WIFI: IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM Bluetooth 4.0: GFSK Bluetooth 3.0+EDR: GFSK, Pi/4 DQPSK, 8DPSK
Operation Frequency:	WIFI: IEEE 802.11b: 2412-2462 MHz IEEE 802.11g: 2412-2462 MHz IEEE 802.11n: 2412-2462 MHz(HT 20), 2422-2452 MHz(HT 40) Bluetooth : 2 402 MHz ~ 2 480 MHz
Number of Channel:	WIFI: IEEE 802.11b/g: 11, IEEE 802.11n: 11(HT 20), 7(HT 40) Bluetooth 4.0: 40 Bluetooth 3.0+EDR: 79
Antenna Designation:	WIFI: An internal antenna and the maximum antenna gain is 1.17dBi. Bluetooth: An internal antenna and the maximum antenna gain is 1.11dBi.
Power supply:	DC 19V via Adapter Adapter Information: Model: HKA03619021-8C Input: AC 100-240V, 50-60Hz Output: DC 19V, 2.1A

1.4 Statement

All models above are identical in the circuit, PCB layout, internal structure, all of the housing are made of plastic material, and just the appearance are different ,different model names are different for the marketing requirement.

1.5 Test Engineer

The sample tested by 

Printed name: Jack Kang

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 2, 2014	July 1, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 3, 2014	July 2, 2015
Power Meter	Agilent	E4416A	MY45101555	July 3, 2014	July 2, 2015
Power Sensor	Agilent	E9327A	MY44421198	July 3, 2014	July 2, 2015
System Controller	CT	SC100	-	July 3, 2014	July 2, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 3, 2014	July 2, 2015
Pre-amplifier	Teseq	LAN6900	--	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8447D	83153007374	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 3, 2014	July 2, 2015
Loop antenna	A.R.A.	PLA-1030/ B	1029	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 3, 2014	July 2, 2015
EMI Test Receiver	R&S	ESCS30	100139	July 2, 2014	July 1, 2015
LISN	AFJ	LS16C	16010222119	July 2, 2014	July 1, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015
Coaxial Cable	TCT	N/A	N/A	July 2, 2014	July 1, 2015

2.2 AE used during the test

Equipment type	Manufacturer	Model

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:		
Test Item	CFR 47 Section	Result
AC Power Line Conducted Emission	15.207(a)	Complies
Maximum Peak Output Power	15.247(b)(3)	Complies
6 dB bandwidth	15.247 (a)(2)	Complies
Maximum Power Density	15.247(e)	Complies
Band age Measurement	15.247 (d), 15.205 (a), 15.209 (a)	Complies
Radiated Emission	15.209	Complies
Antenna Requirement	15.203,15.247(c)	Complies
RF Exposure	15.247(b), 1.1307(b)	Complies

3.2 Test Standards

FCC Part 15:2013 Subpart C, Paragraph 15.247

KDB 558074 D01 DTS Meas Guidance v03r02

4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd.

5.0 Measurement Uncertainty（95% confidence levels, k=2)

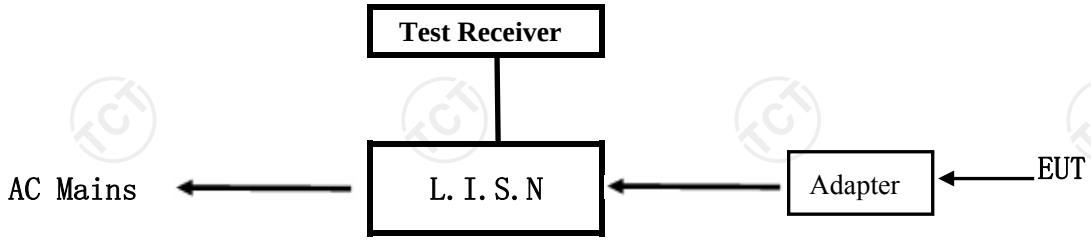
No.	Item	MU
1.	Radio Frequency	±1×10^{-9}
2.	Temperature	±0.1℃
3.	Humidity	±1.0%
4.	RF power, conducted	±0.34dB
5.	RF power density, conducted	±1.45dB
6.	Spurious emissions, conducted	±3.70dB
7.	All emissions, radiated	±4.50dB

Note: 1) For IEEE 802.11b/g/n (HT 20): Low channel: 2412MHz, Middle channel: 2437MHz, High channel: 2462MHz

For IEEE 802.11n (HT 40): Low channel: 2422MHz, Middle channel: 2437MHz, High channel: 2452MHz

6.0 Power Line Conducted Emission Test

6.1 Schematics of the test



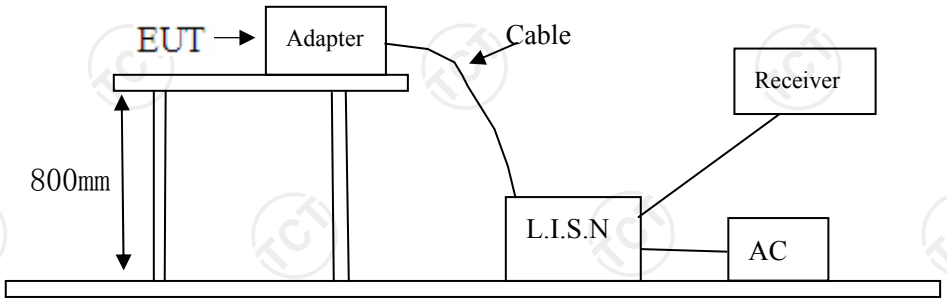
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009.The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz EUT

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009

A Setup the EUT and simulators as shown on the following

B Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
EMI Test Receiver	R&S	ESCS30	100139	July 3, 2014	July 2, 2015
LISN	AFJ	LS16C	16010222119	July 2, 2014	July 1, 2015

6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dBμV)		Class B Limits (dBμV)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

6.6 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 51% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- Tx mode

6.7 Test result

Min. limit margin 3.12 dB from 3.2266MHz

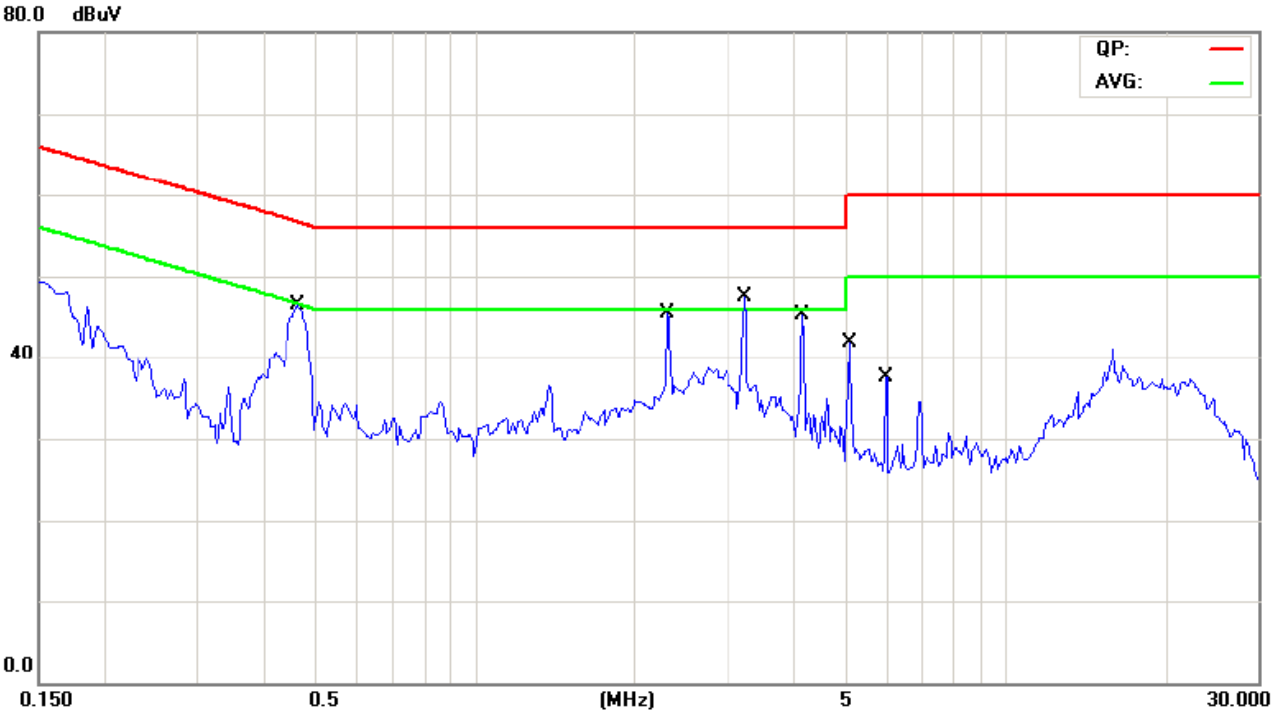
The requirements are FULFILLED

Remarks: According to FCC part 15.207.

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

EUT Description:	Micro PC
Operation Mode:	Tx mode
Tested By:	Beryl Zhao
Test date:	Aug. 08, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

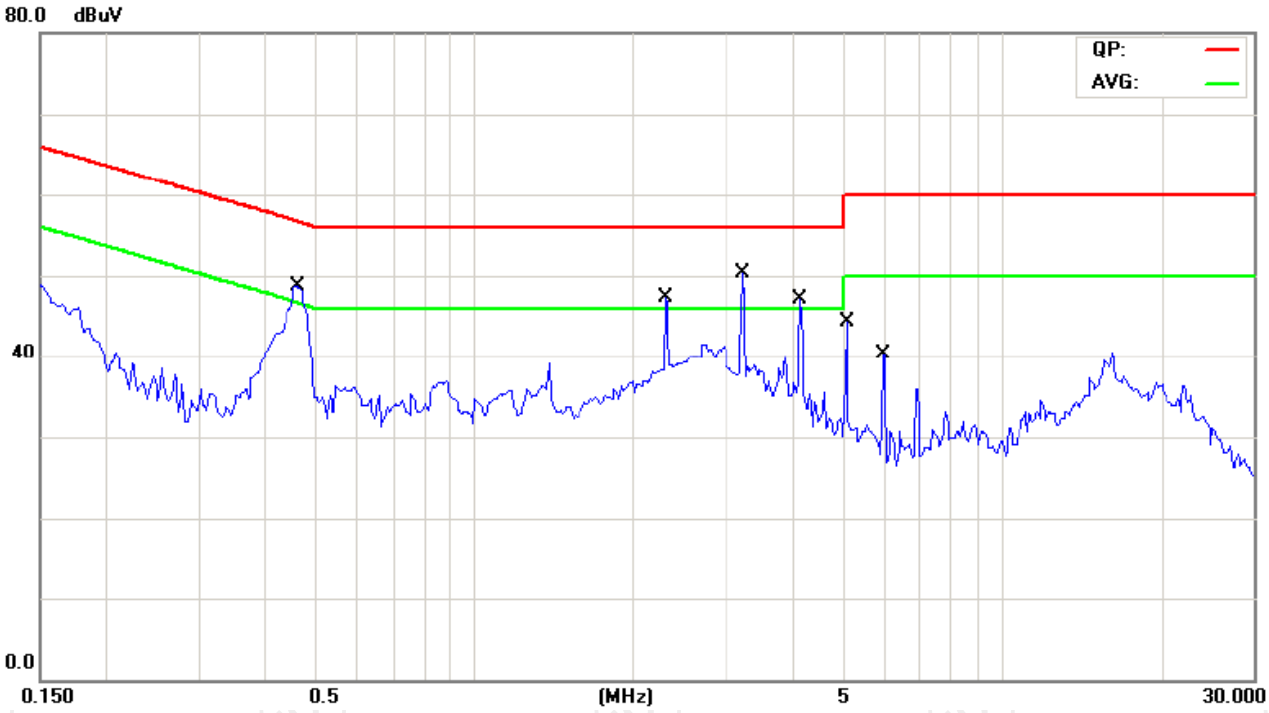


Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.4625	45.22	37.47	--	--	56.65	46.65
2.3062	43.25	40.87	--	--	56.00	46.00
3.2305	45.20	42.80	--	--	56.00	46.00
4.1483	45.99	41.39	--	--	56.00	46.00
5.0703	41.72	40.64	--	--	60.00	50.00
5.9922	36.57	34.47	--	--	60.00	50.00

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT Description:	Micro PC
Operation Mode:	Tx mode
Tested By:	Beryl Zhao
Test Date:	Aug. 08, 2014

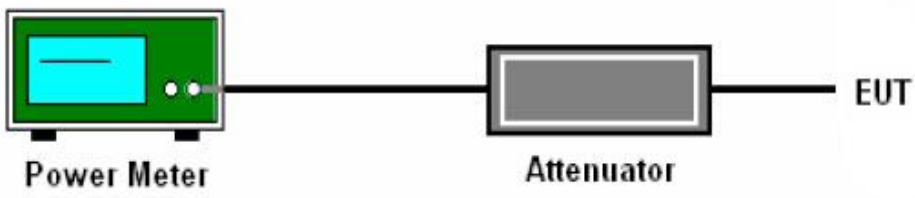
Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.4625	--	--	47.74	39.94	56.65	46.64
2.3062	--	--	46.17	42.32	56.00	46.00
3.2266	--	--	50.00	42.88	56.00	46.00
4.1483	--	--	48.49	42.86	56.00	46.00
5.0703	--	--	44.16	43.53	60.00	50.00
5.9922	--	--	39.57	38.31	60.00	50.00

7.0 Maximum Peak Output Power

7.1 Test Setup



7.2 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.

7.3 Test Procedure

1. The testing follows FCC KDB Publication NO558074 (Measurement Guidance of DTS)
2. The RF output of EUT was connected to the power meter by a low loss cable
3. Measure the power by power meter

7.4 Test Equipment:

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Power Meter	Agilent	E4416A	MY45101555	July 3, 2014	July 2, 2015
Power Sensor	Agilent	E9327A	MY44421198	July 3, 2014	July 2, 2015

7.5 Test Result

IEEE 802.11b

Test channel	Peak output power (dBm)	Limit (dBm)	Result
Lowest	17.17	30	Pass
Middle	16.22	30	Pass
Highest	15.26	30	Pass

IEEE 802.11g

Test channel	Peak output power (dBm)	Limit (dBm)	Result
Lowest	14.28	30	Pass
Middle	13.85	30	Pass
Highest	12.94	30	Pass

IEEE 802.11n

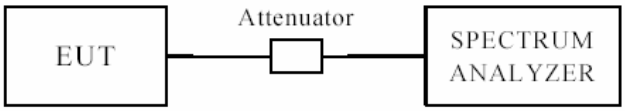
Test channel	Peak output power (dBm)	Limit (dBm)	Result
Lowest	13.62	30	Pass
Middle	12.88	30	Pass
Highest	12.00	30	Pass

IEEE 802.11n(40MHz)

Test channel	Peak output power (dBm)	Limit (dBm)	Result
Lowest	13.08	30	Pass
Middle	12.45	30	Pass
Highest	11.92	30	Pass

8.0 6dB Bandwidth Measurement

8.1 Test Setup



8.2 Limits of 6dB Bandwidth Measurement

The minimum of 6 dB Bandwidth is >500 kHz

8.3 Test Procedure

According to KDB 558074 D01 DTS Meas Guidance v03r02，the transmitter output was connected to the spectrum analyzer through an attenuator. The spectrum analyzer is setting as follows: RBW=100 kHz, VBW=300 kHz, Detector=Peak, Trace mode=max hold, Sweep=auto couple. The 6dB bandwidth is defined as the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.4 Test Equipment:

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU	1166.1660.03	July 3, 2014	July 2, 2015

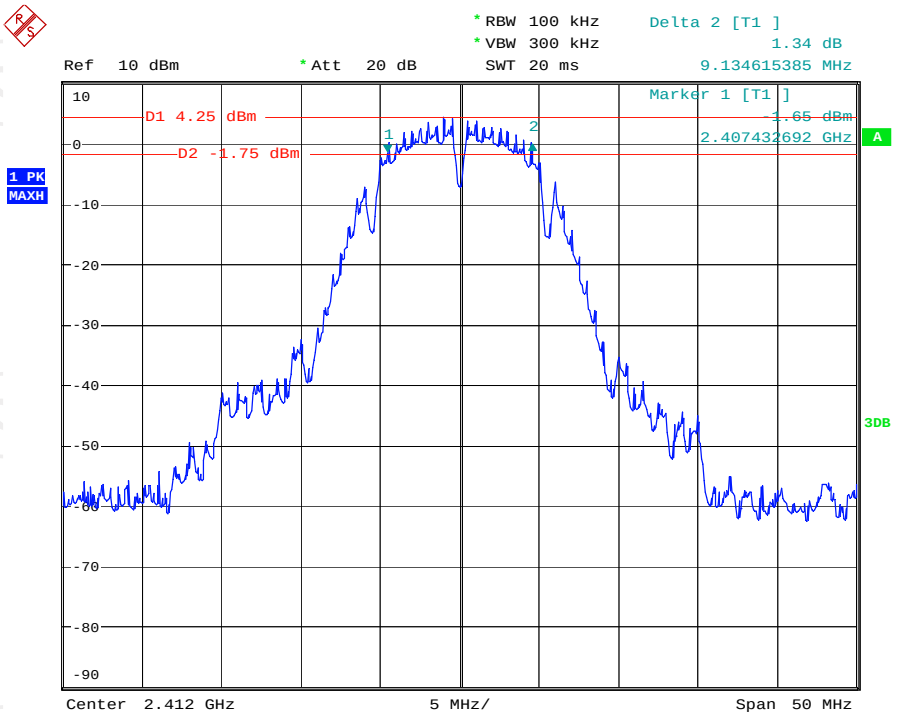
8.5 Test Result

IEEE 802.11b mode			
Test channel	6 dB occupied bandwidth (MHz)	Limit (kHz)	Result
Lowest	9.13	500	Pass
Middle	9.94	500	Pass
Highest	9.94	500	Pass
IEEE 802.11g mode			
Test channel	6 dB occupied bandwidth (MHz)	Limit (kHz)	Result
Lowest	16.43	500	Pass
Middle	16.43	500	Pass
Highest	16.43	500	Pass
IEEE 802.11n(HT 20) mode			
Test channel	6 dB occupied bandwidth (MHz)	Limit (kHz)	Result
Lowest	17.71	500	Pass
Middle	17.63	500	Pass
Highest	17.71	500	Pass
IEEE 802.11n(HT 40) mode			
Test channel	6 dB occupied bandwidth (MHz)	Limit (kHz)	Result
Lowest	35.82	500	Pass
Middle	35.82	500	Pass
Highest	35.74	500	Pass

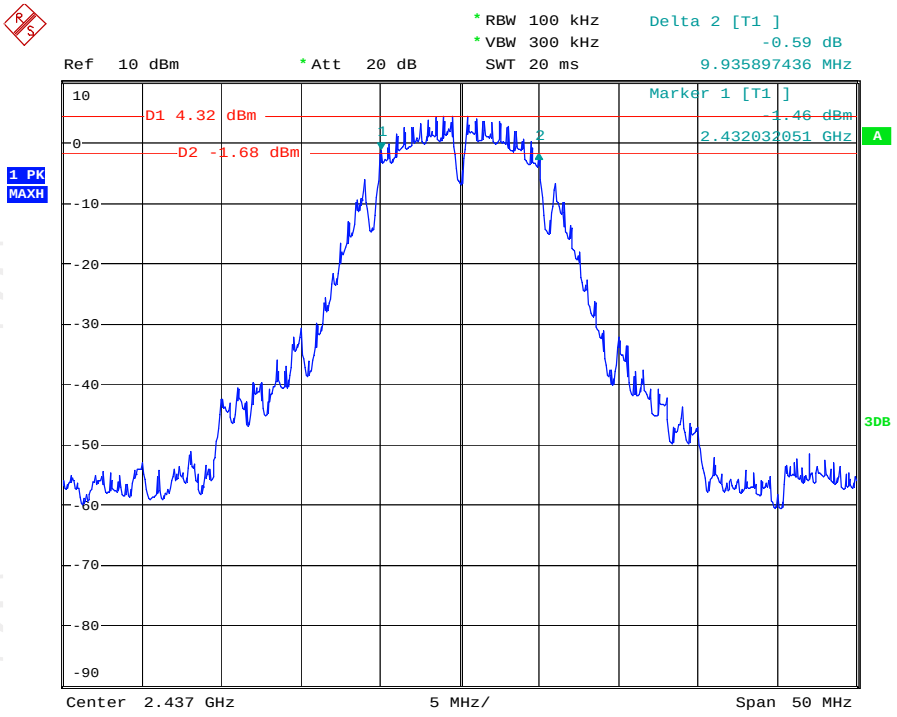
Test plot :

Test Mode: IEEE 802.11b mode

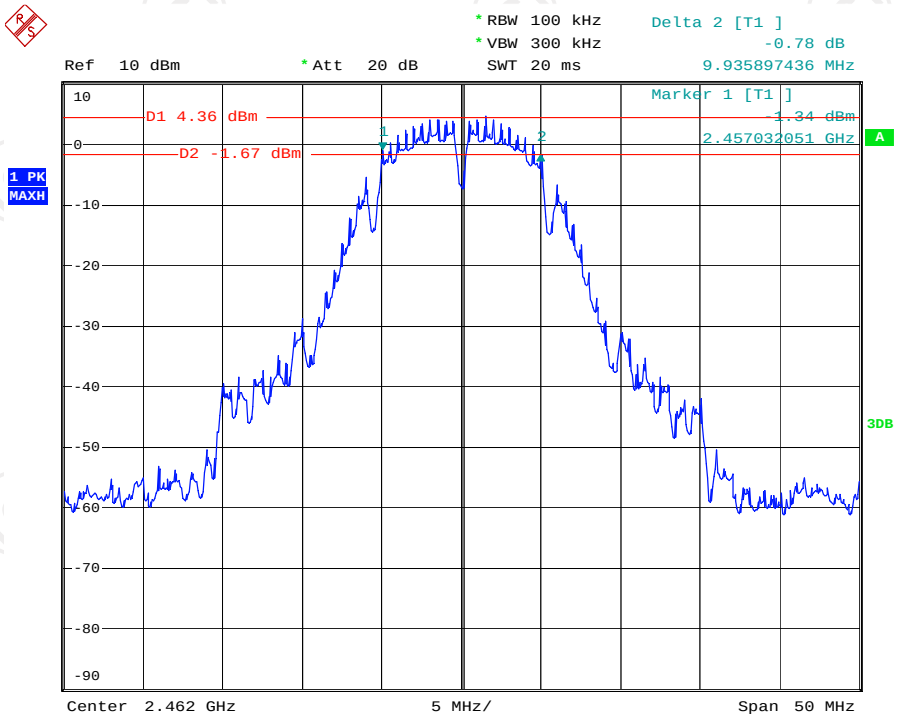
Low channel



Middle channel

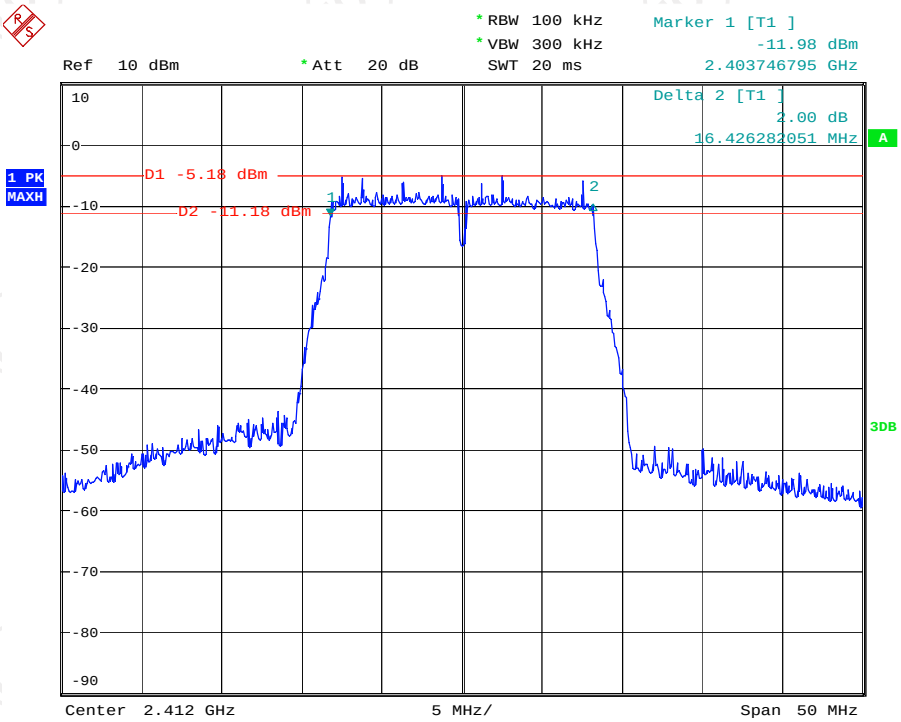


High channel

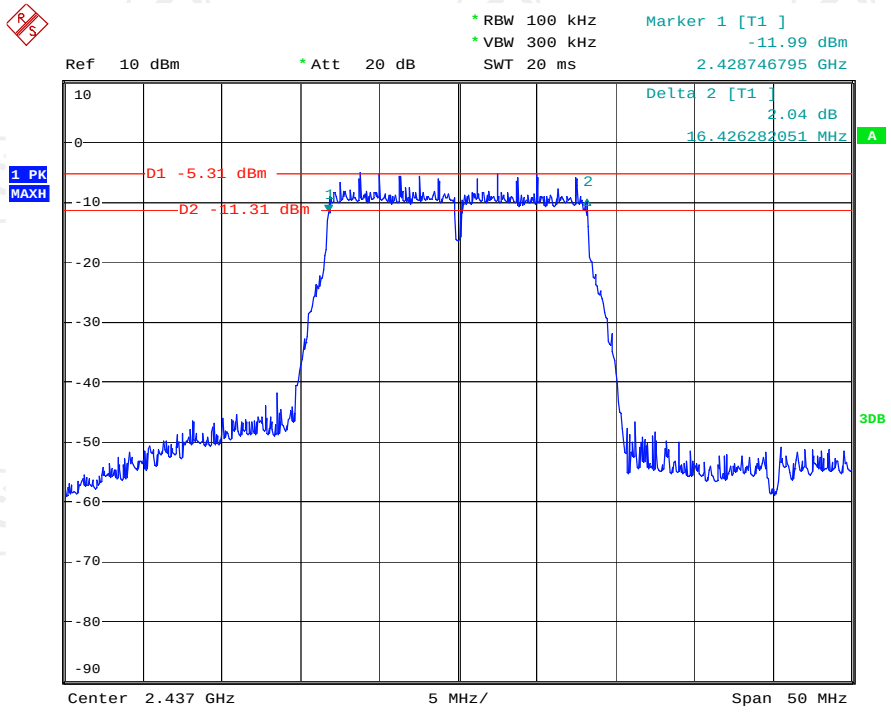


Test Mode: IEEE 802.11g mode

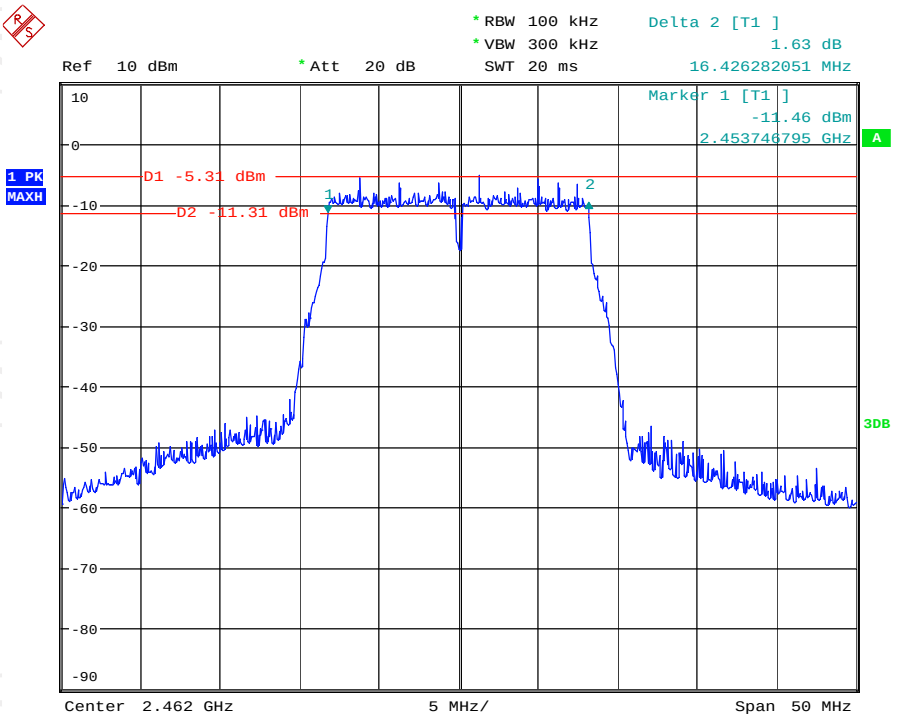
Low channel



Middle channel

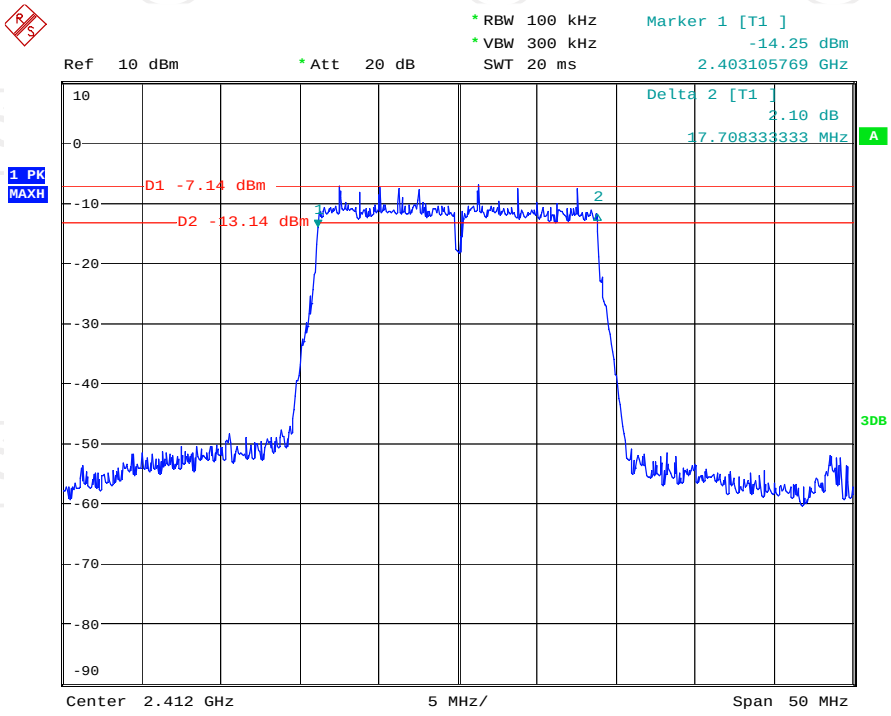


High channel

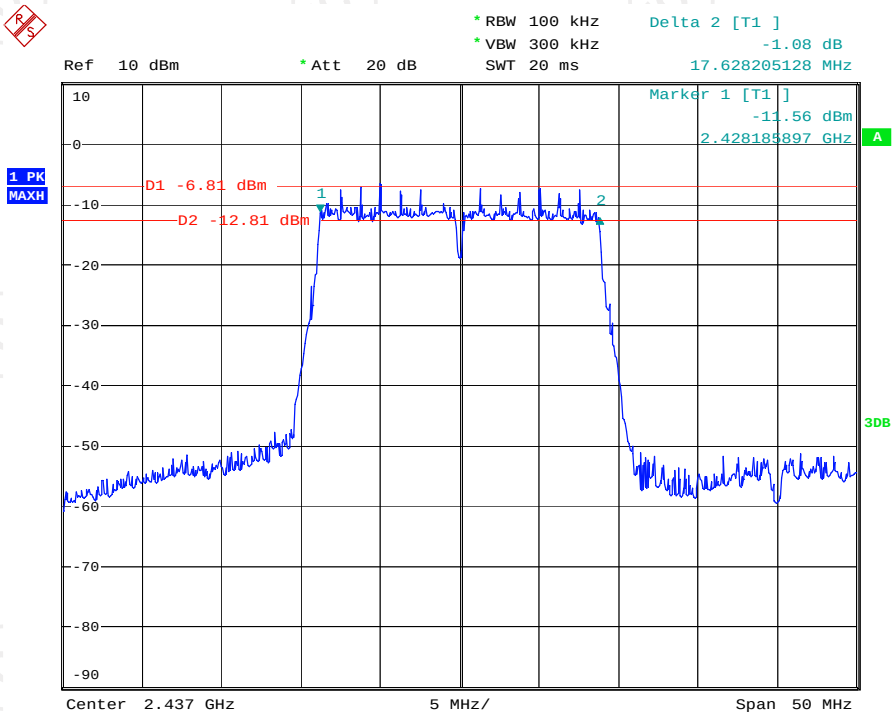


Test Mode: IEEE 802.11n (HT 20) mode

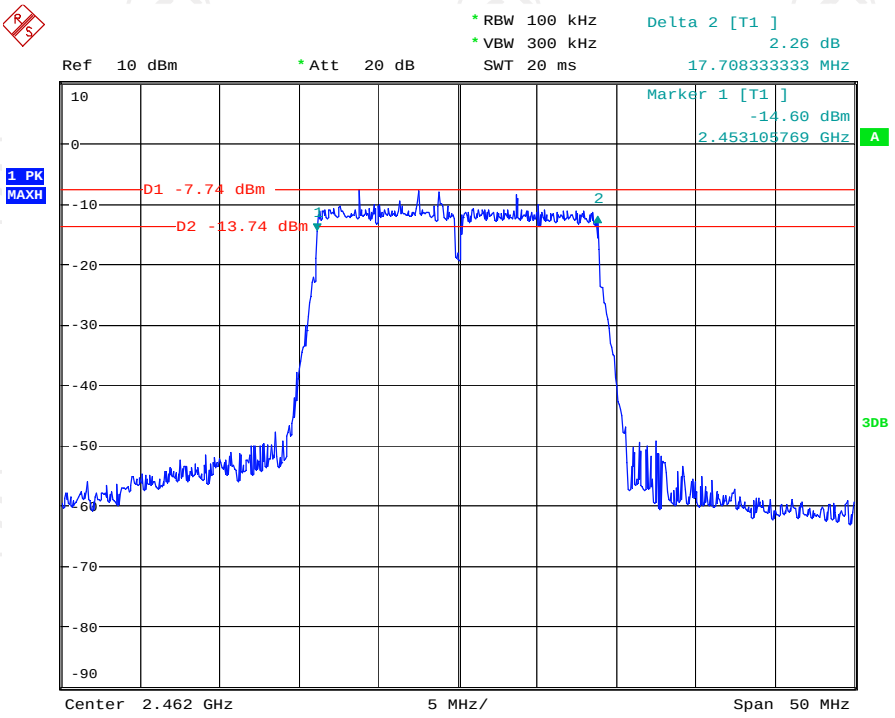
Low channel



Middle channel

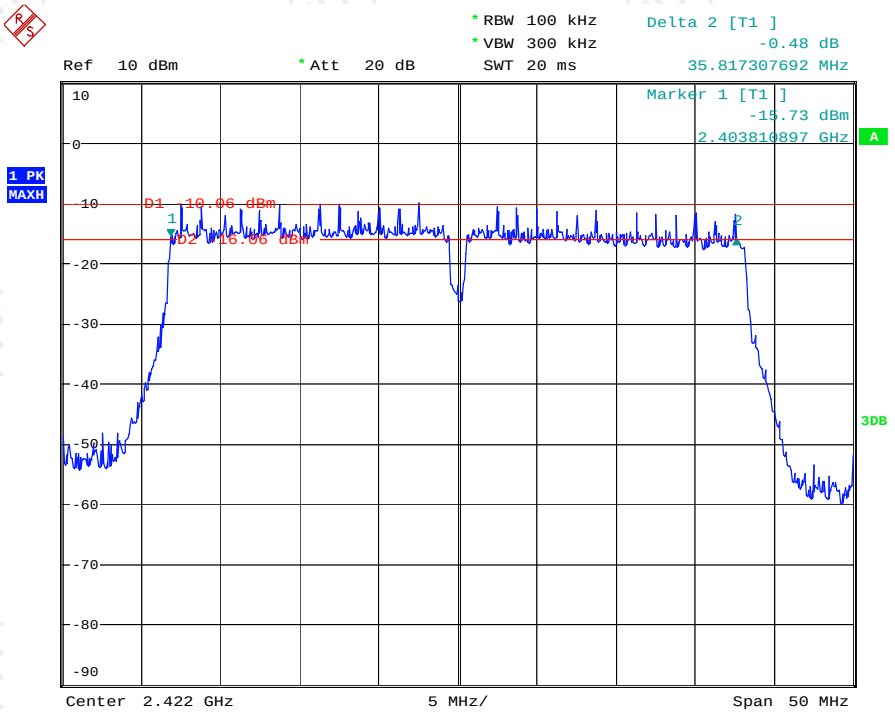


High channel

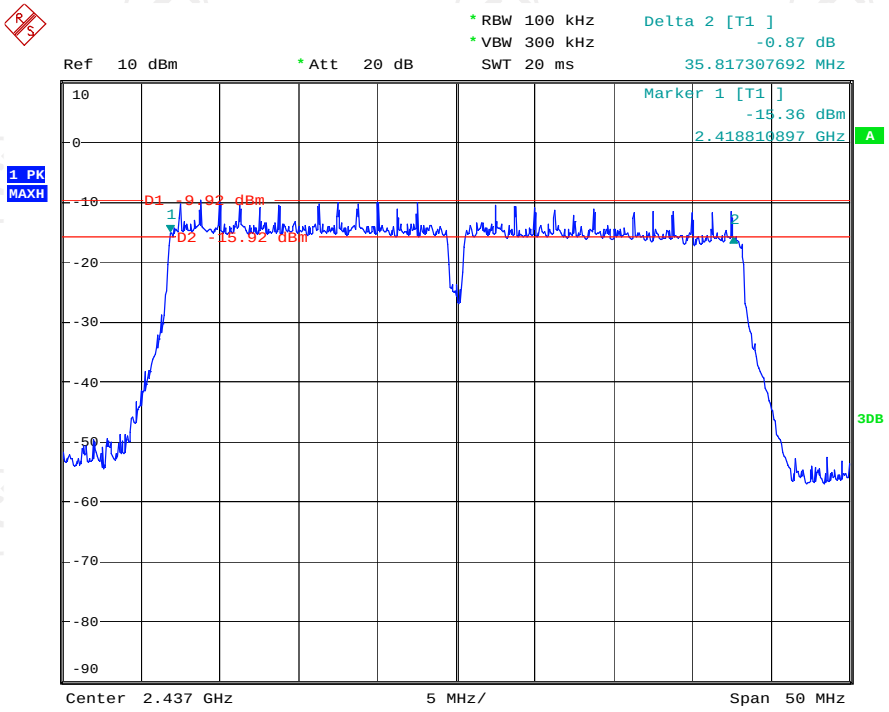


Test Mode: IEEE 802.11n(HT 40) mode

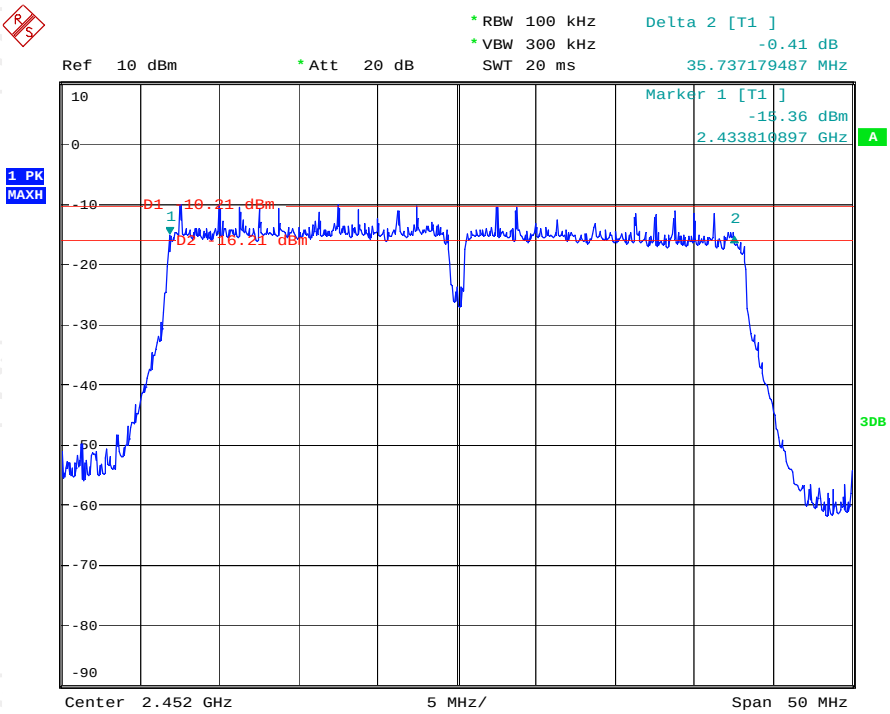
Low channel



Middle channel

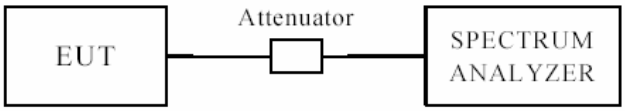


High channel



9.0 Power Spectral Density Measurement

9.1 Test Setup



9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density is 8 dBm in any 3 kHz.

9.3 Test Procedure

According to KDB 558074 D01 DTS Meas Guidance v03r02，the transmitter output was connected to the spectrum analyzer through an attenuator.

The spectrum analyzer is setting as follows:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the *DTS bandwidth*.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

9.4 Test Equipment:

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU	1166.1660.03	July 3, 2014	July 2, 2015

9.5 Test Result

IEEE 802.11b

Test channel	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-9.01	8	Pass
Middle	-9.61	8	Pass
Highest	-9.69	8	Pass

IEEE 802.11g

Test channel	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-18.95	8	Pass
Middle	-18.73	8	Pass
Highest	-18.44	8	Pass

IEEE 802.11n(20MHz)

Test channel	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-16.29	8	Pass
Middle	-16.16	8	Pass
Highest	-16.33	8	Pass

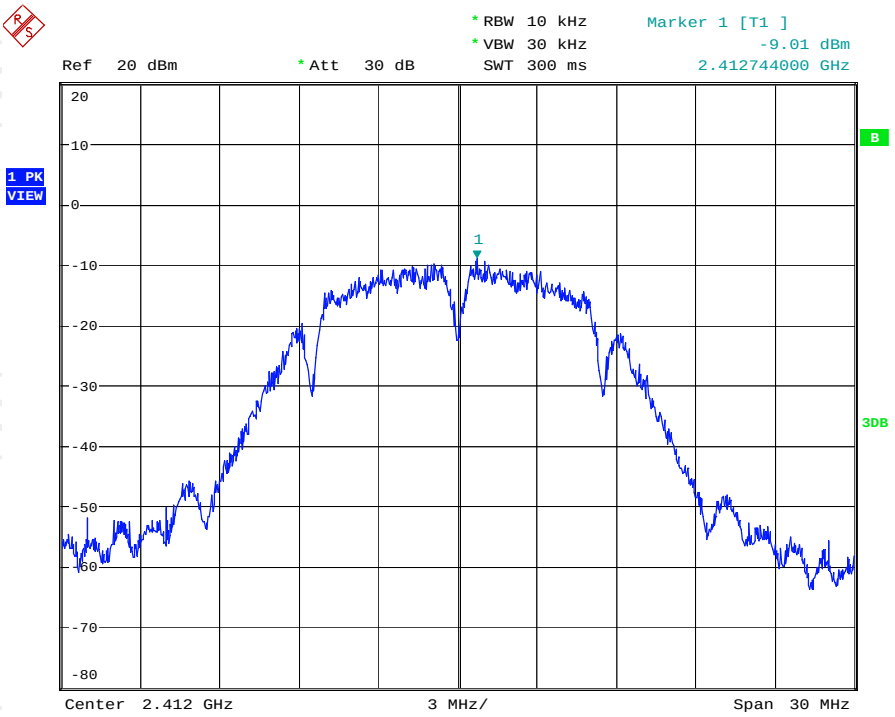
IEEE 802.11n(40MHz)

Test channel	Peak Power Spectral Density (dBm)	Limit (dBm)	Result
Lowest	-19.49	8	Pass
Middle	-18.77	8	Pass
Highest	-18.75	8	Pass

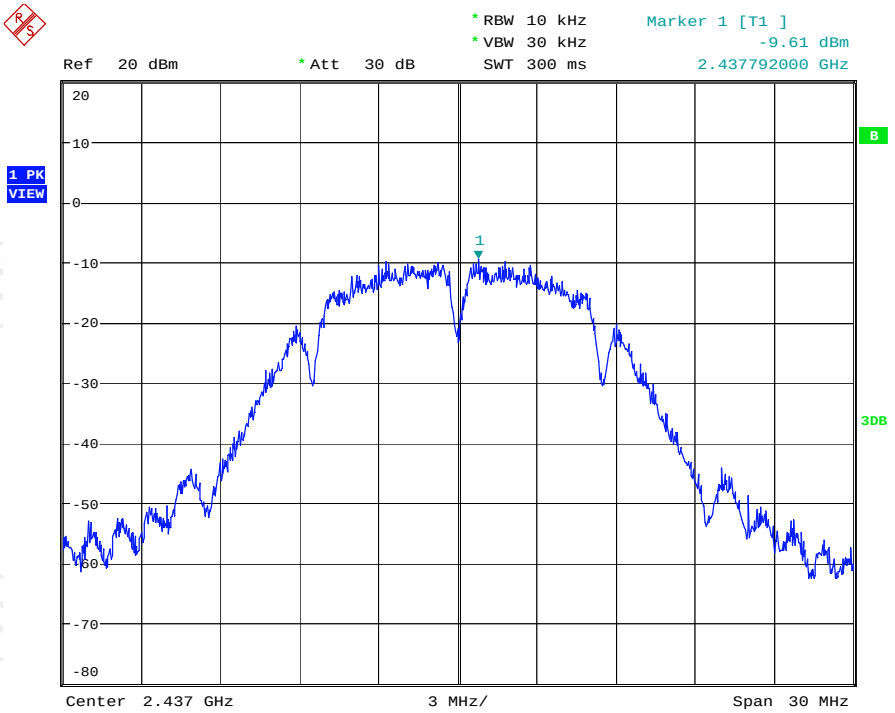
Test plots:

Test Mode: IEEE 802.11b mode

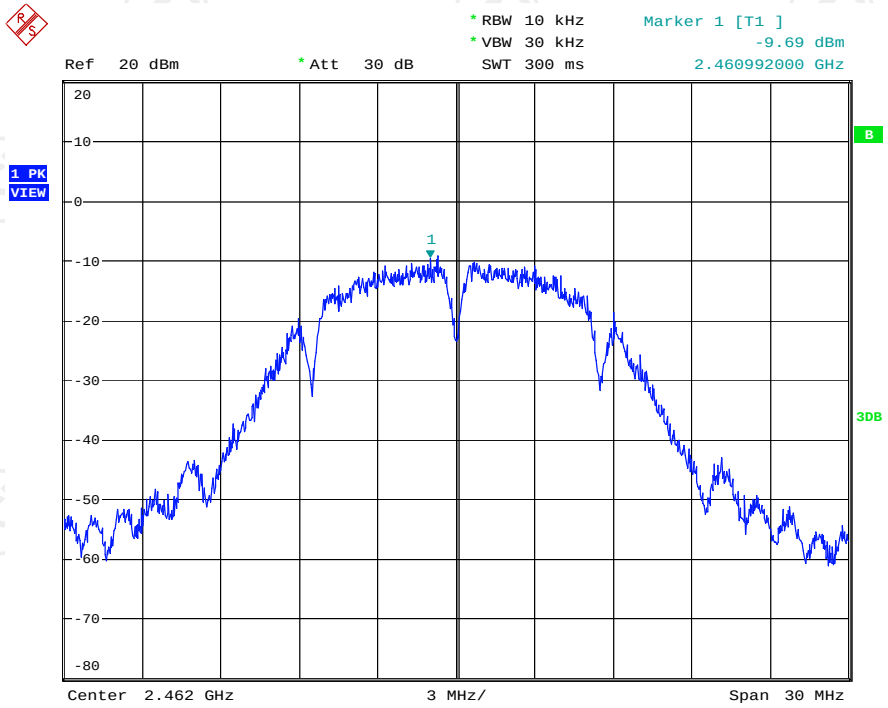
Low channel



Middle channel

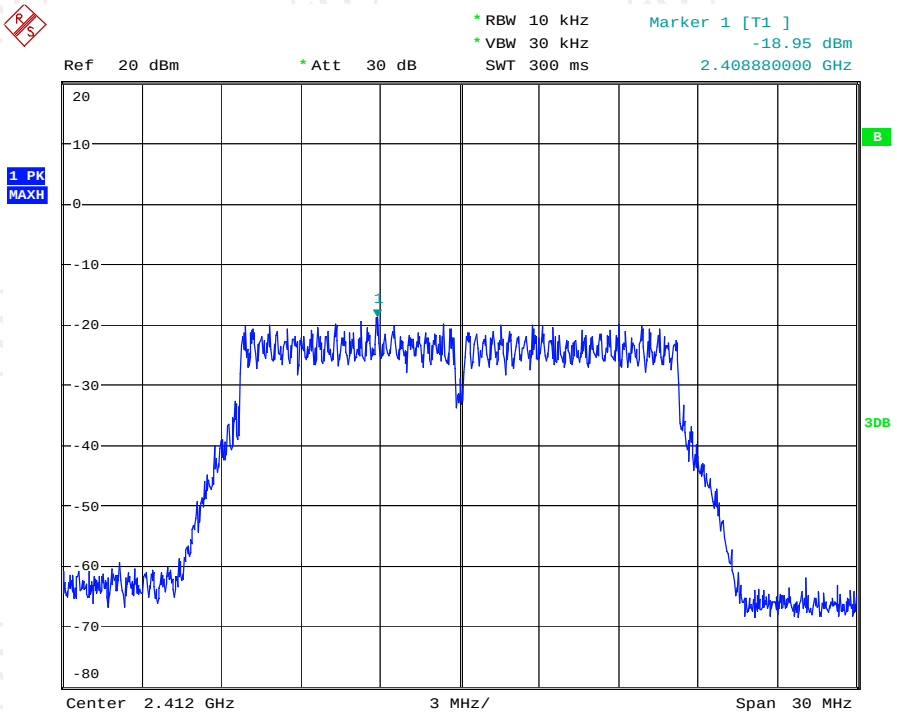


High channel

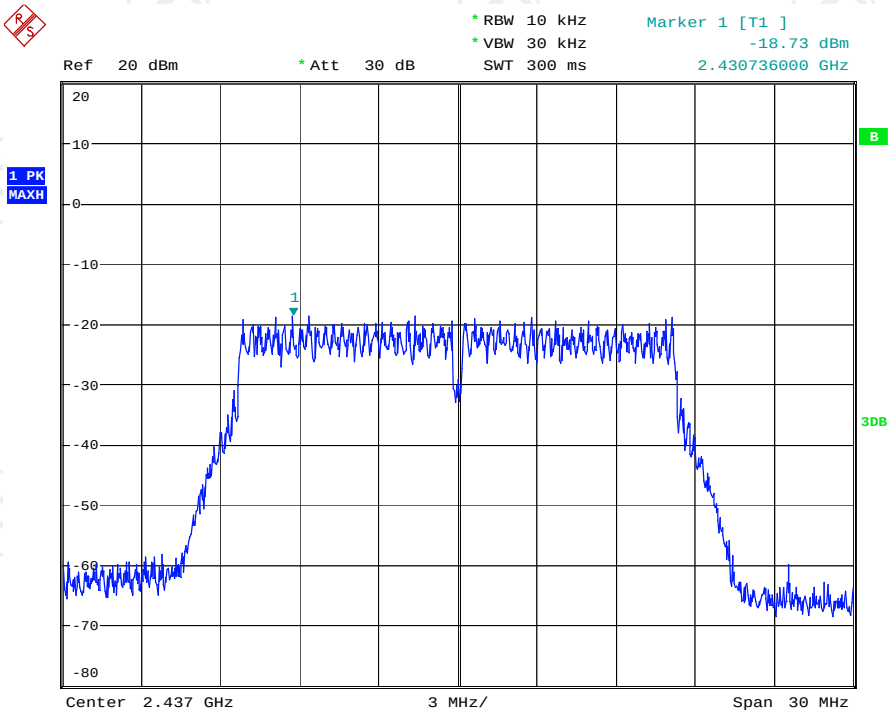


Test Mode: IEEE 802.11g mode

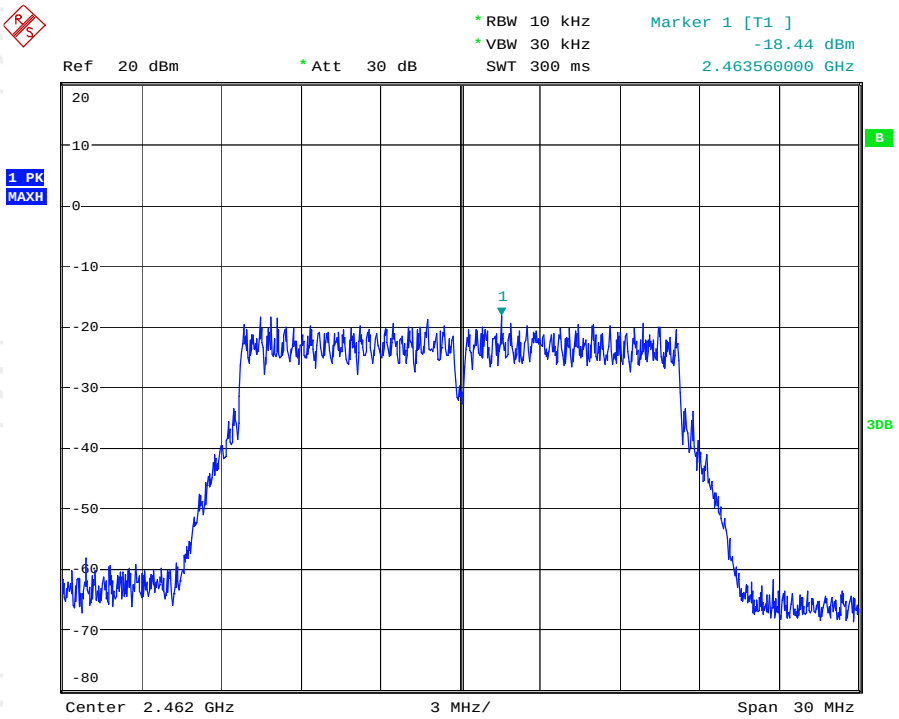
Low channel



Middle channel

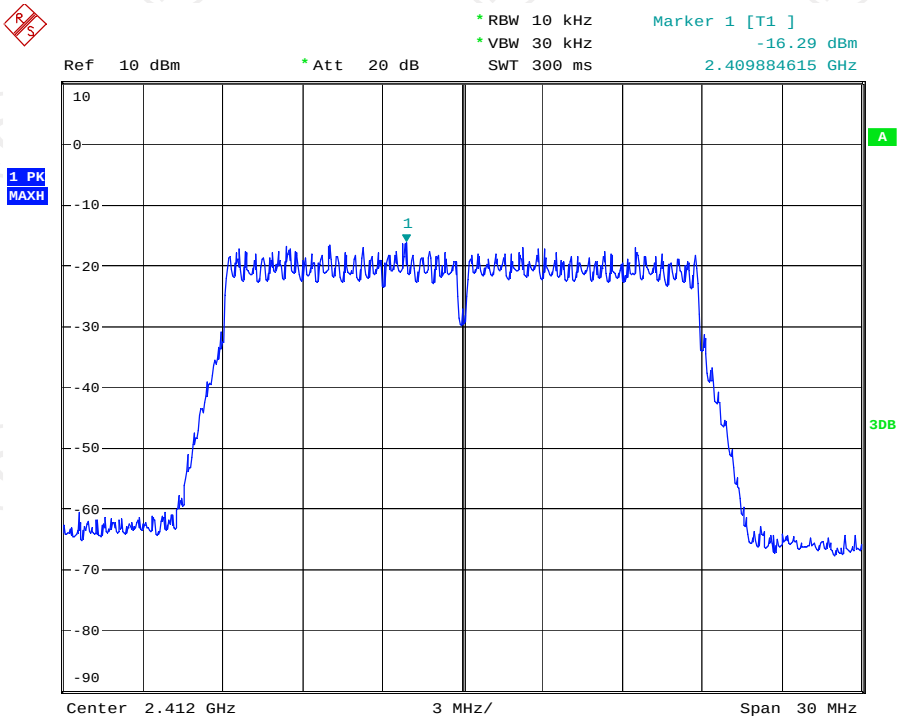


High channel

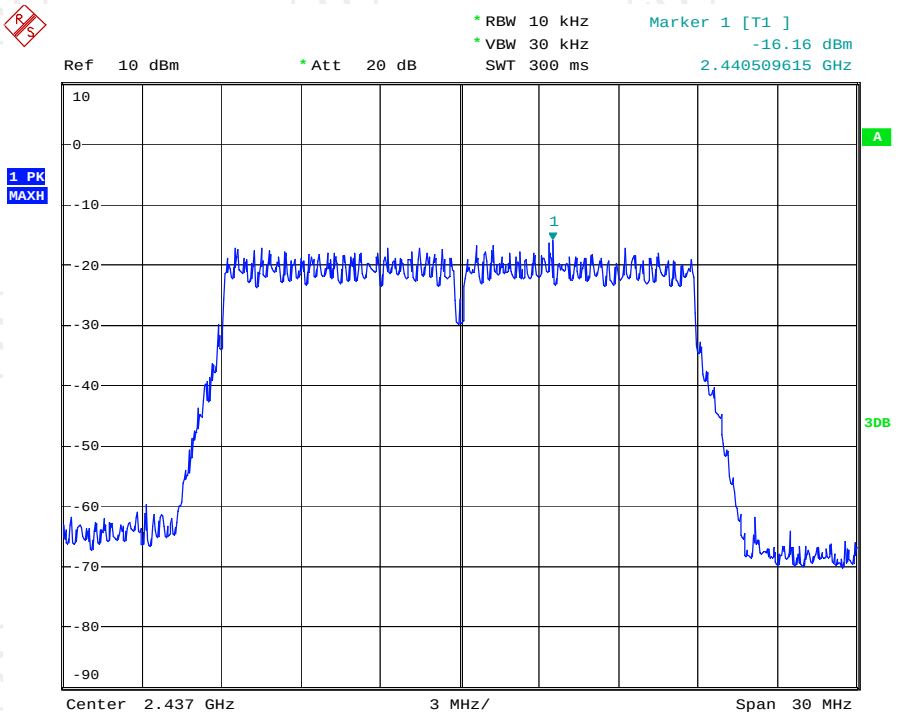


Test Mode: IEEE 802.11n (HT 20) mode

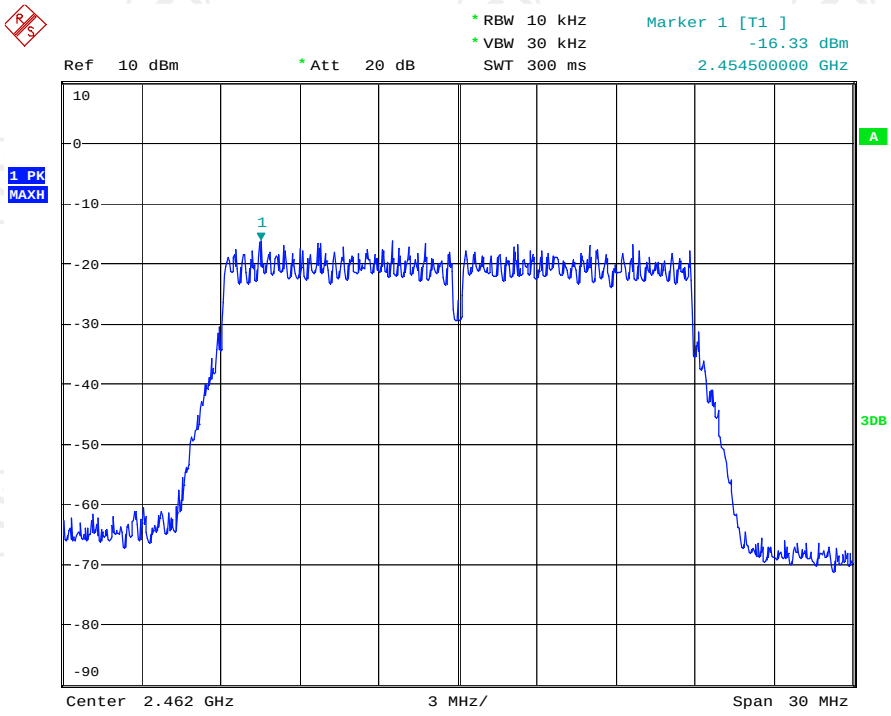
Low channel



Middle channel

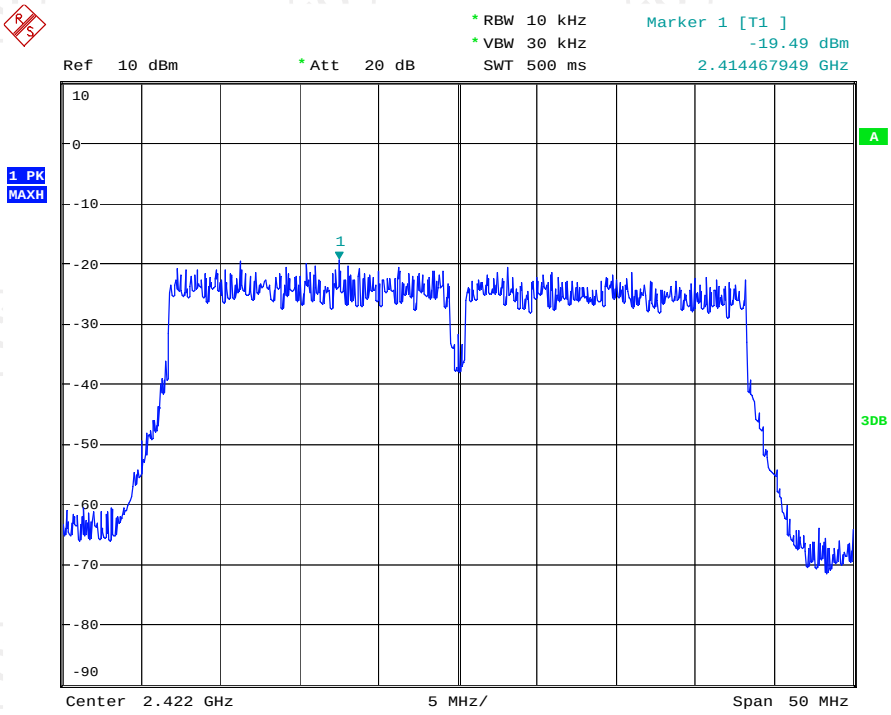


High channel

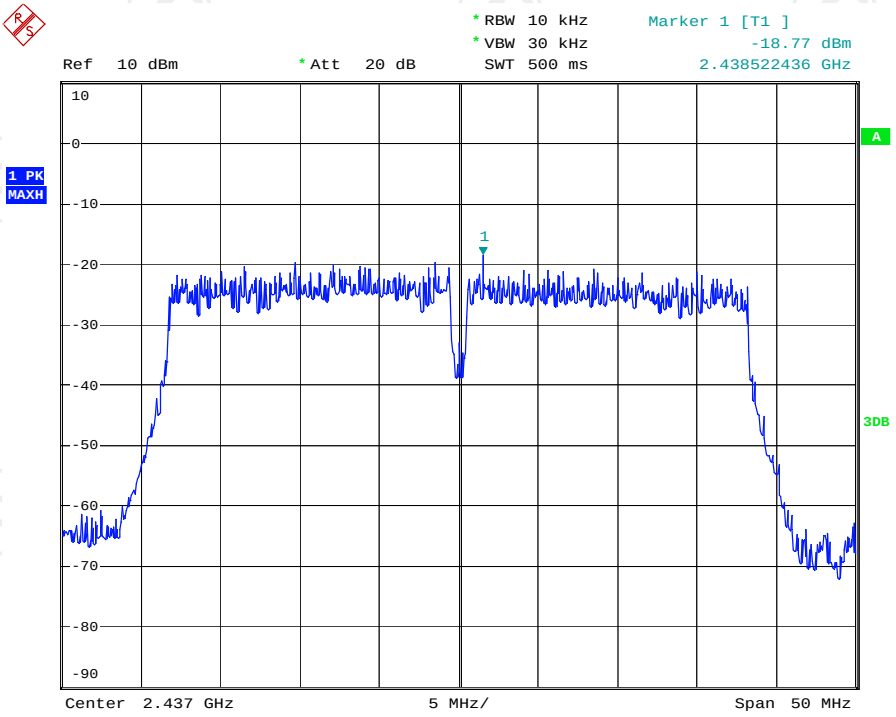


Test Mode: IEEE 802.11n(HT 40) mode

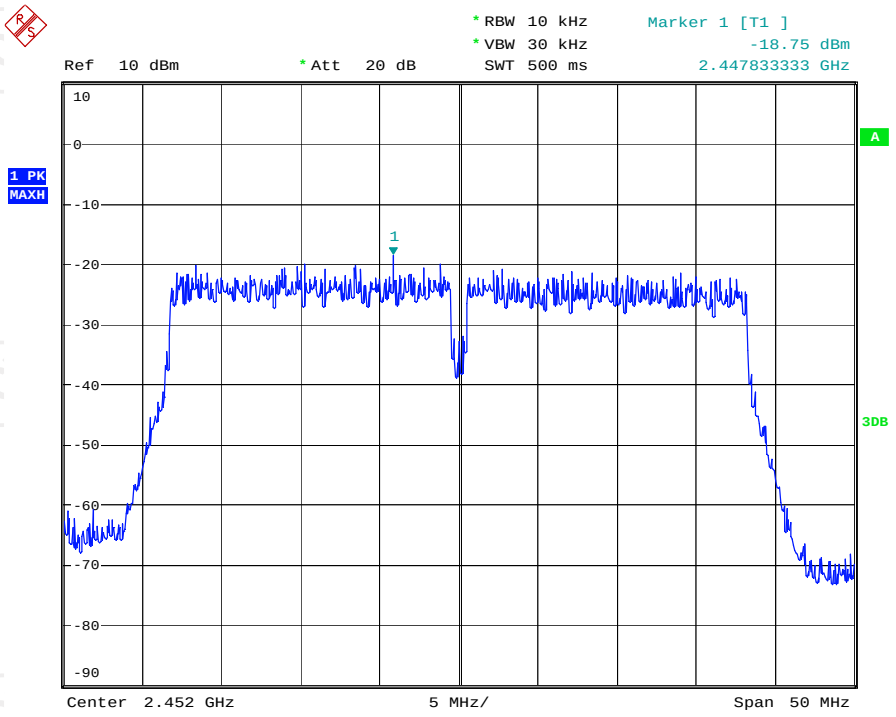
Low channel



Middle channel



High channel



10.0 Band-edge Measurement

10.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU	1166.1660.03	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 2, 2014	July 1, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 1, 2014	July 1, 2015

10.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 50% Atmospheric pressure: 103kPa

10.3 Limit:

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 15.209(a)

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:7

a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (*i.e.*, 20 dBc).

b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (*i.e.*, 30 dBc).

c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

10.4 Test Procedure

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

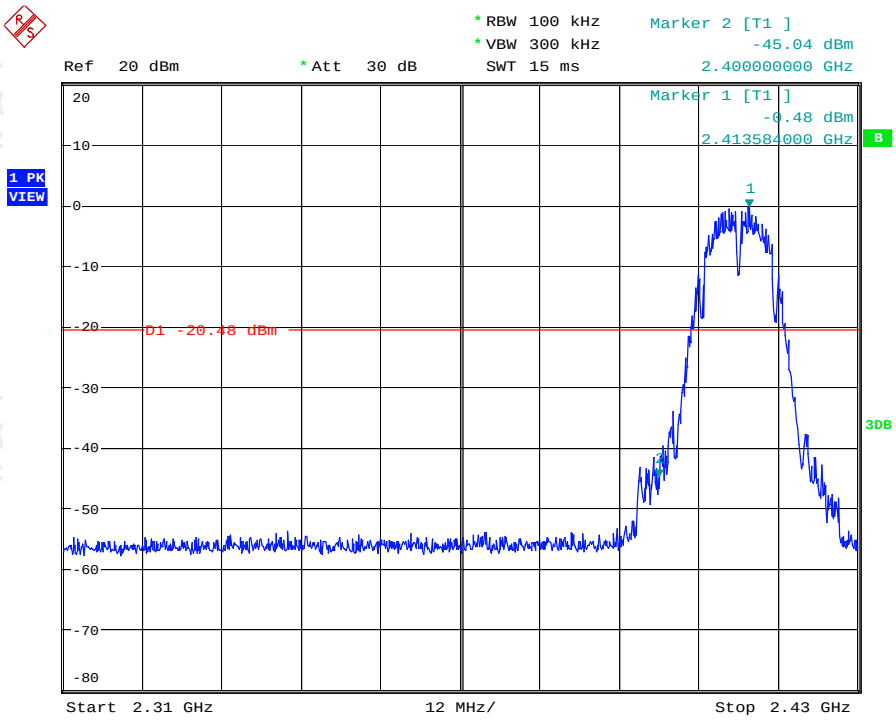
10.5 Test Result:

Conducted Emission Method

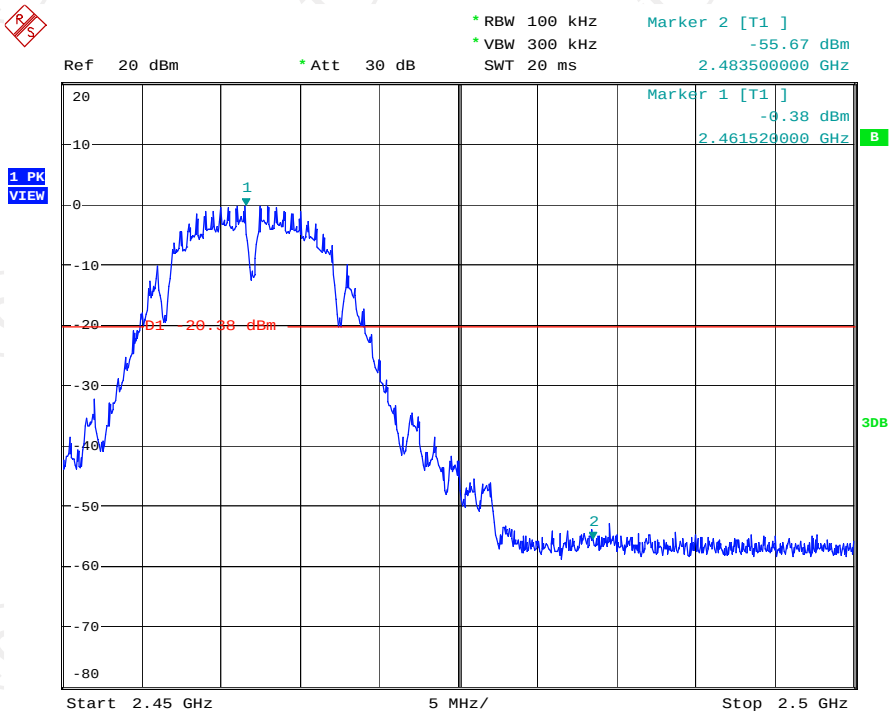
Test plots:

Test Mode: IEEE 802.11b mode

Low channel

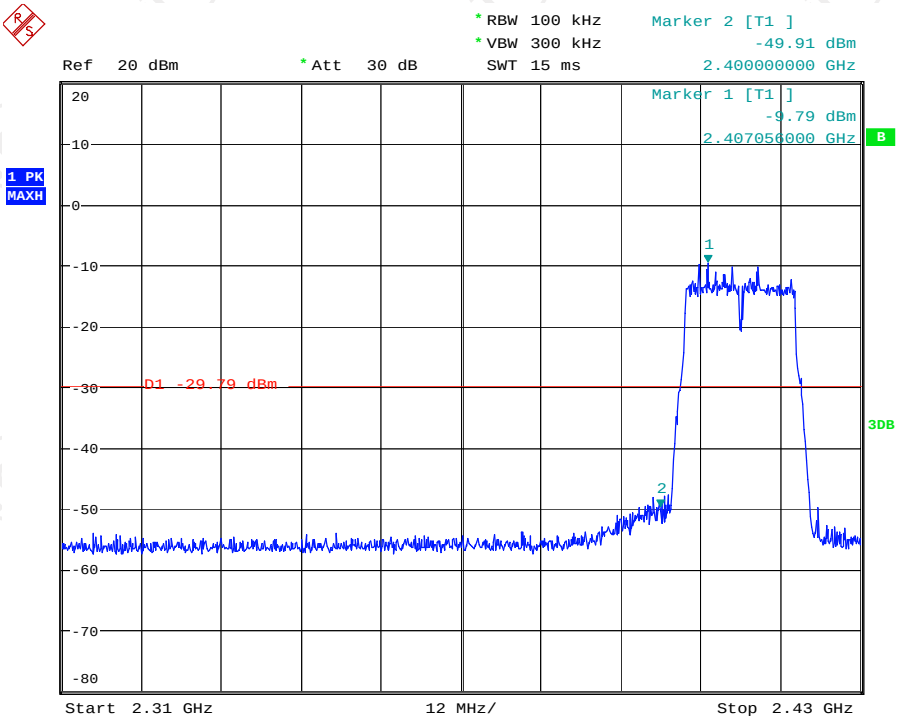


High channel

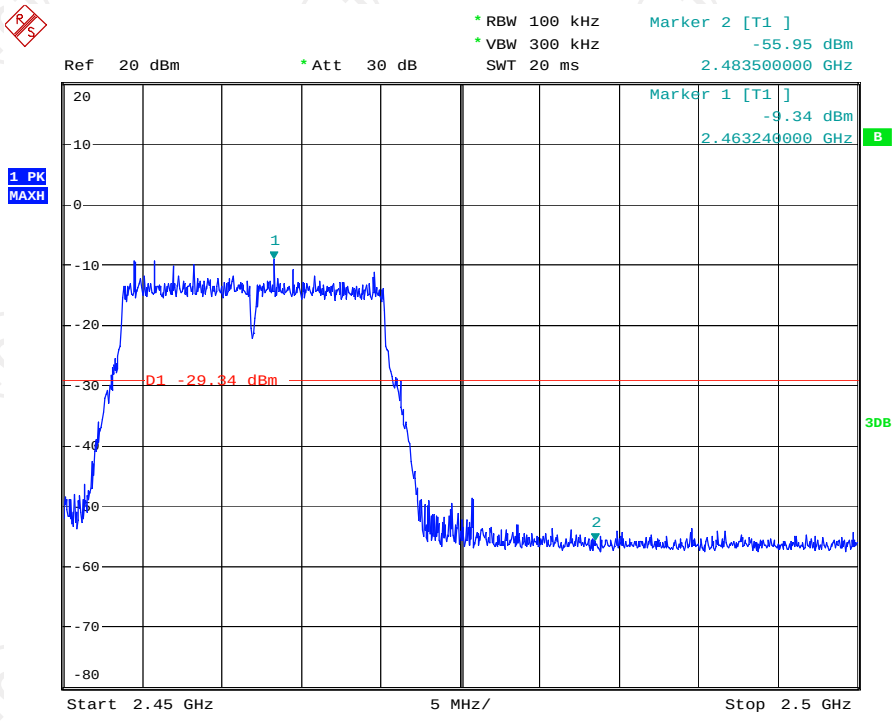


Test Mode: IEEE 802.11g mode

Low channel

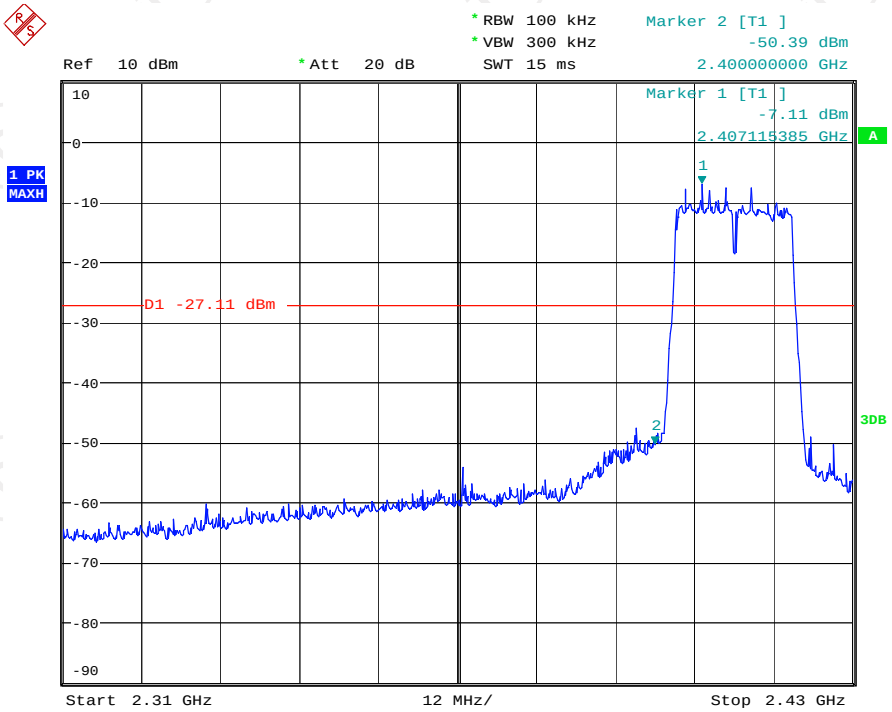


High channel

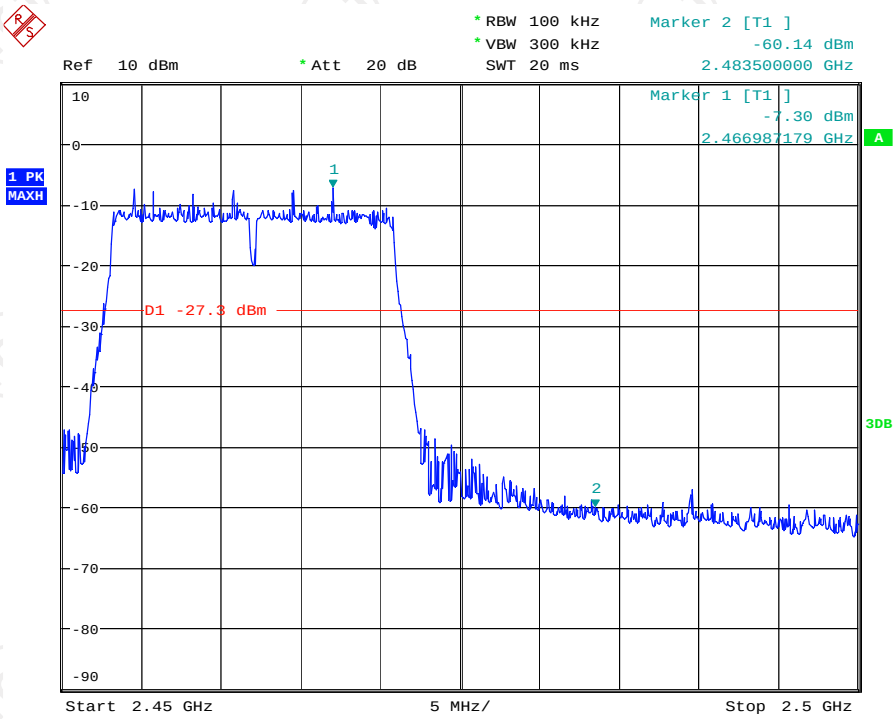


Test Mode: IEEE 802.11n (HT 20) mode

Low channel

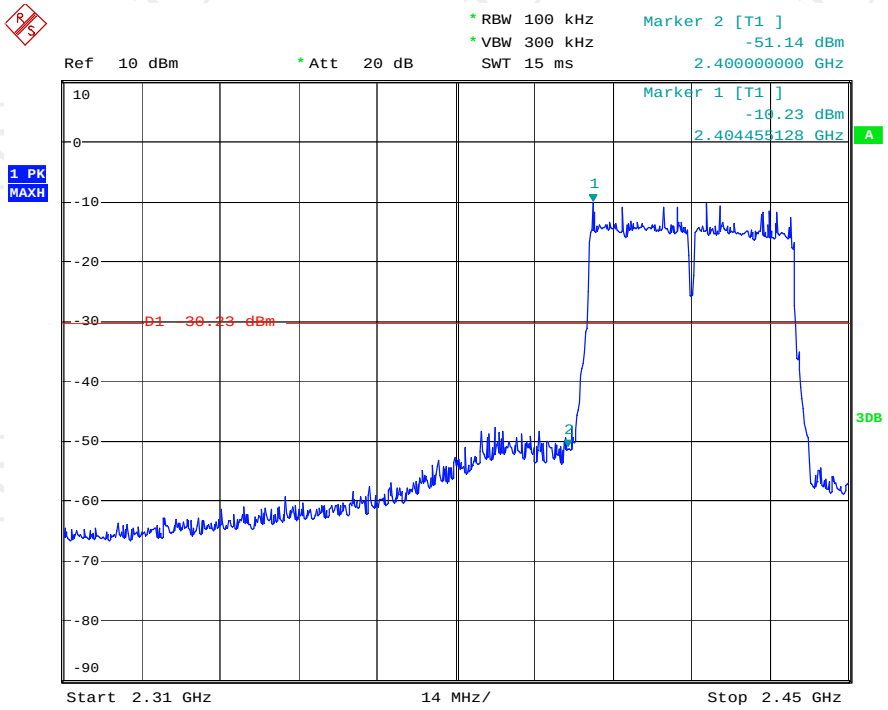


High channel

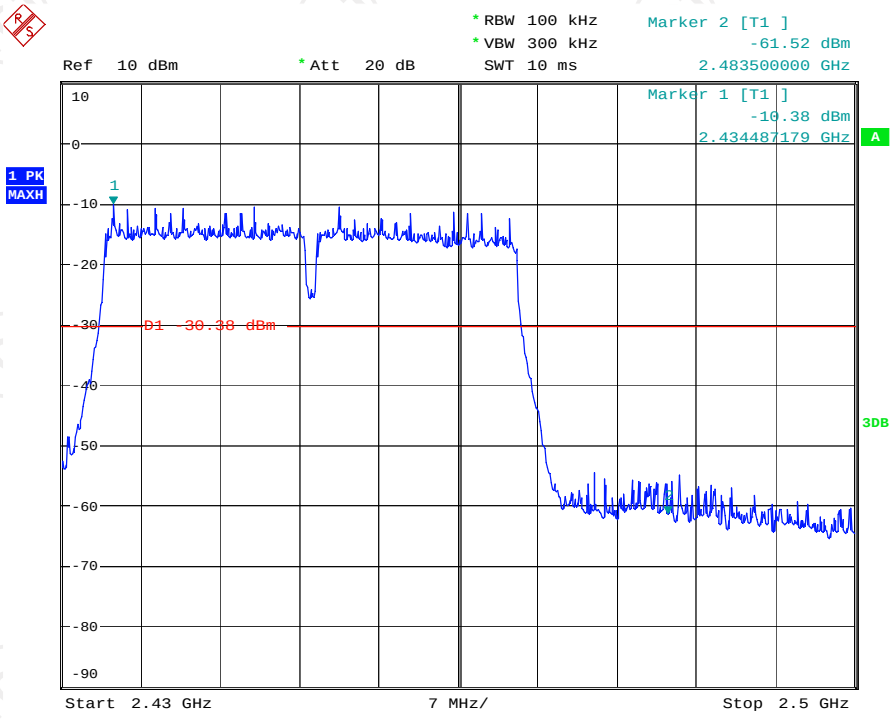


Test Mode: IEEE 802.11n (HT 40) mode

Low channel



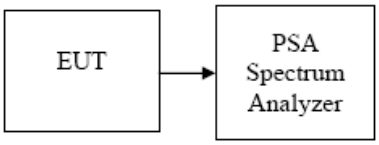
High channel



11.0 Spurious Emission Test

11.1 Conducted emissions Measurement

11.1.1 Test configuration



11.1.2 Limit:

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. 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) (see Section 15.205(c)).

11.1.3 Test procedure:

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz. Measurements are made over the 30MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

11.1.4 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 3, 2014	July 2, 2015

11.1.5 Test Result:

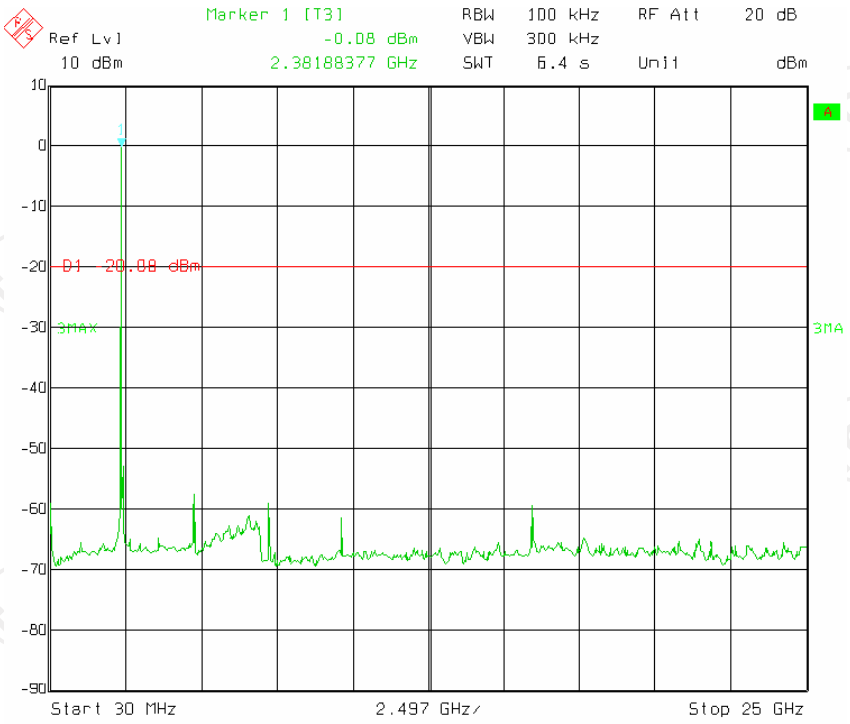
Test plots please refer to next pages.

Note: 1.Conducted emissions measurements below 30 MHz were made, and the maximum peak was detected, which is much less the limit. So it is not submitted in the report.

Test plots:

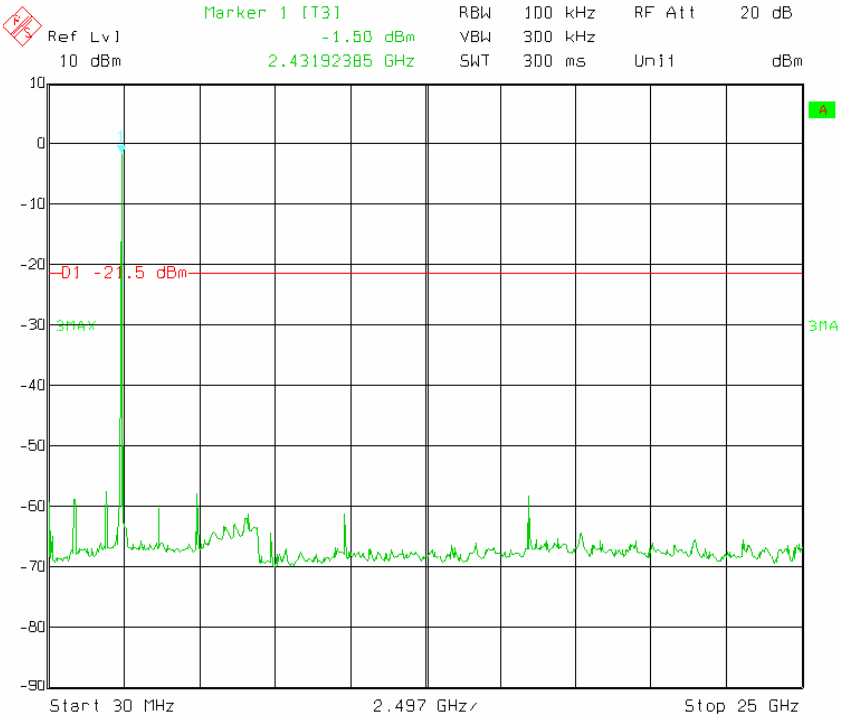
Test Mode: IEEE 802.11b mode

Low channel



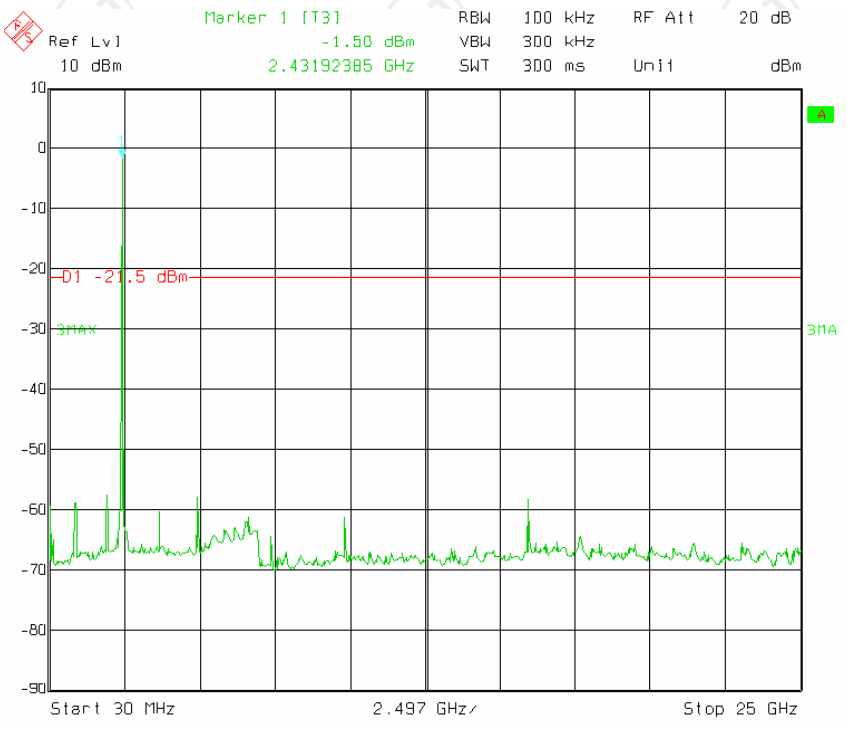
Note: Sweep points=1001pts

Middle channel



Note: Sweep points=1001pts

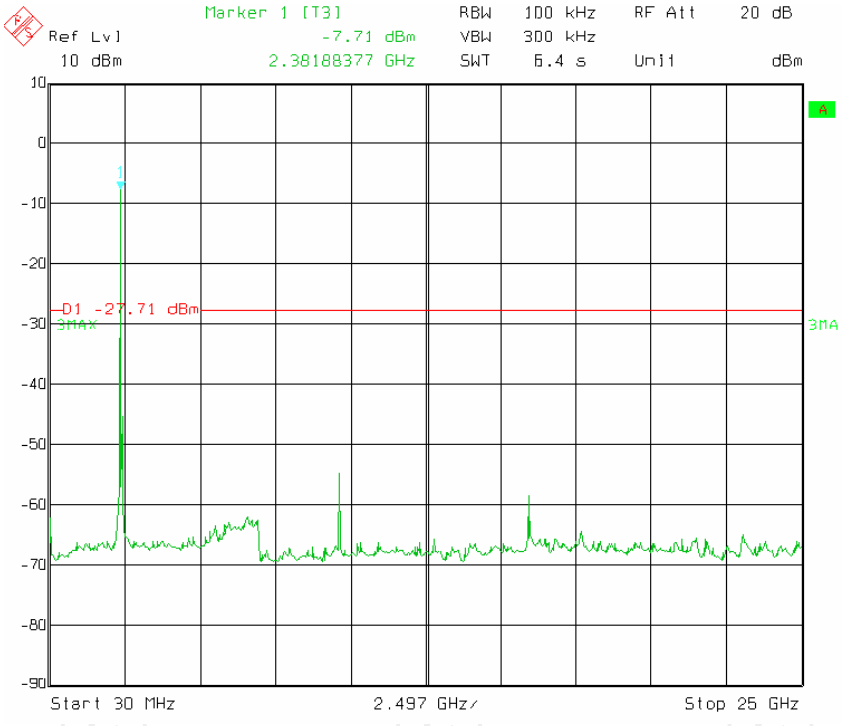
High channel



Note: Sweep points=1001pts

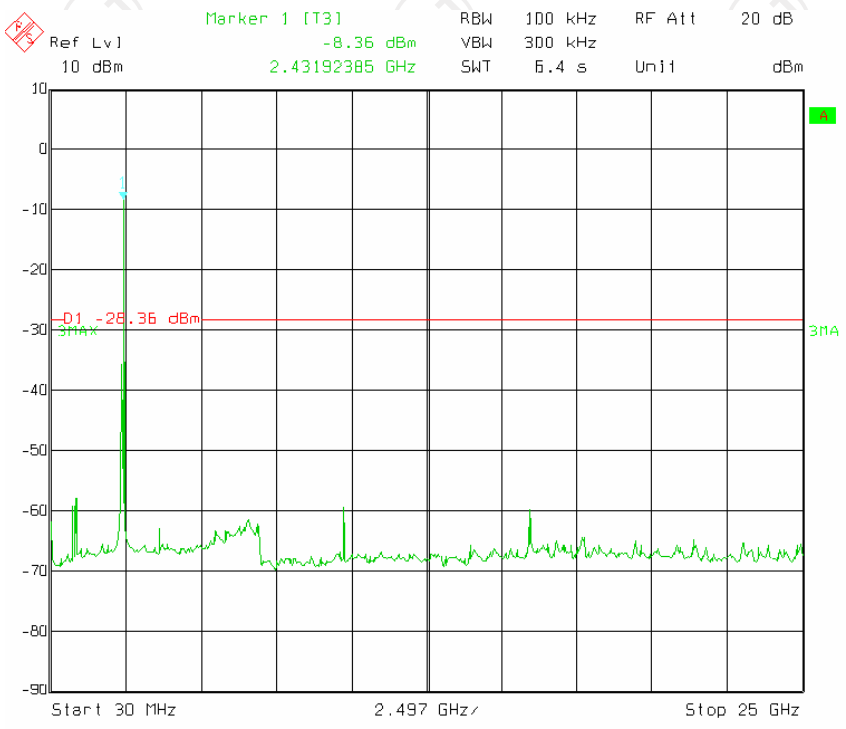
Test Mode: IEEE 802.11g mode

Low channel



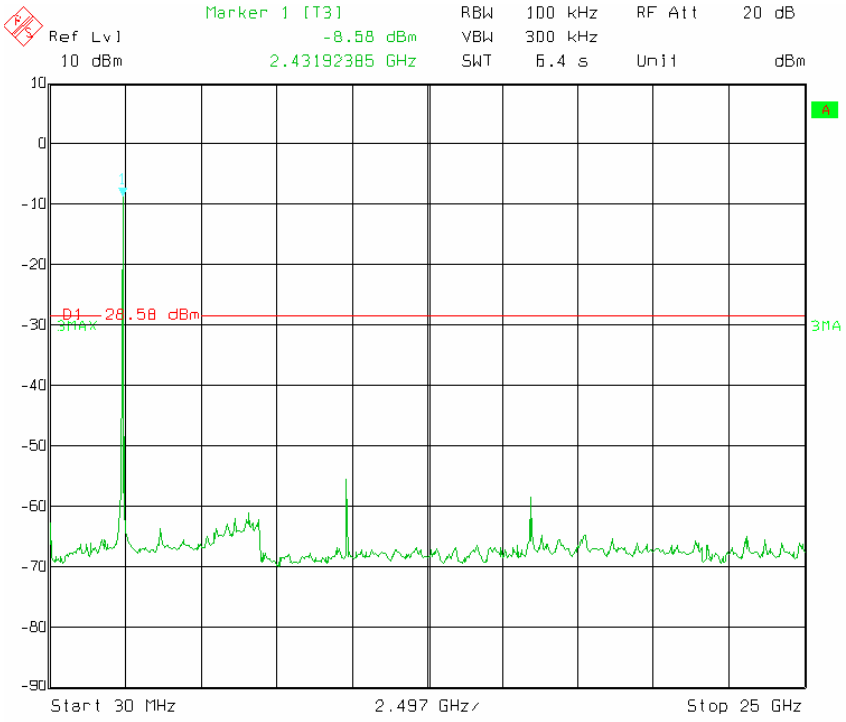
Note: Sweep points=1001pts

Middle channel



Note: Sweep points=1001pts

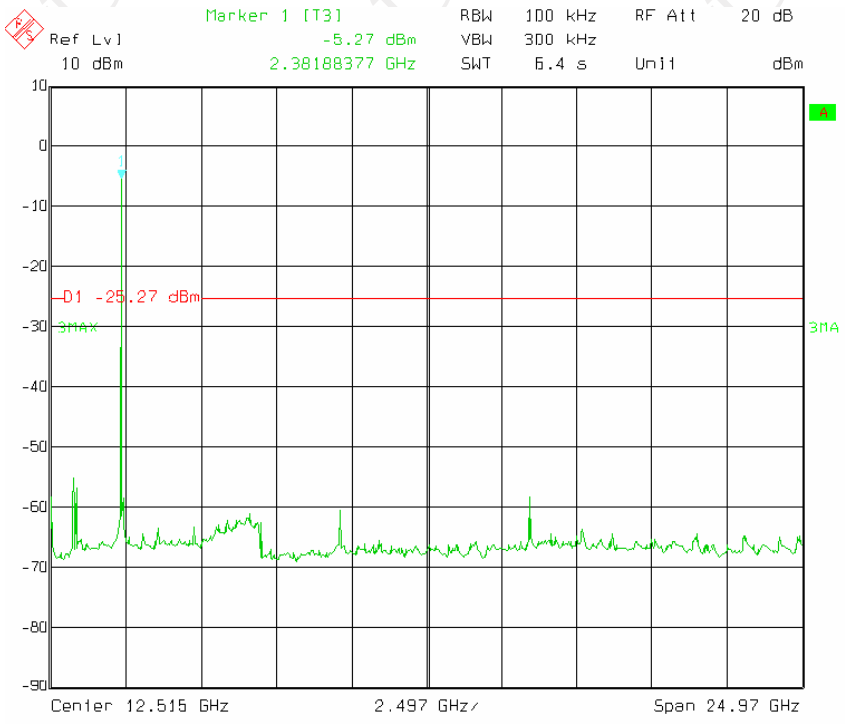
High channel



Note: Sweep points=1001pts

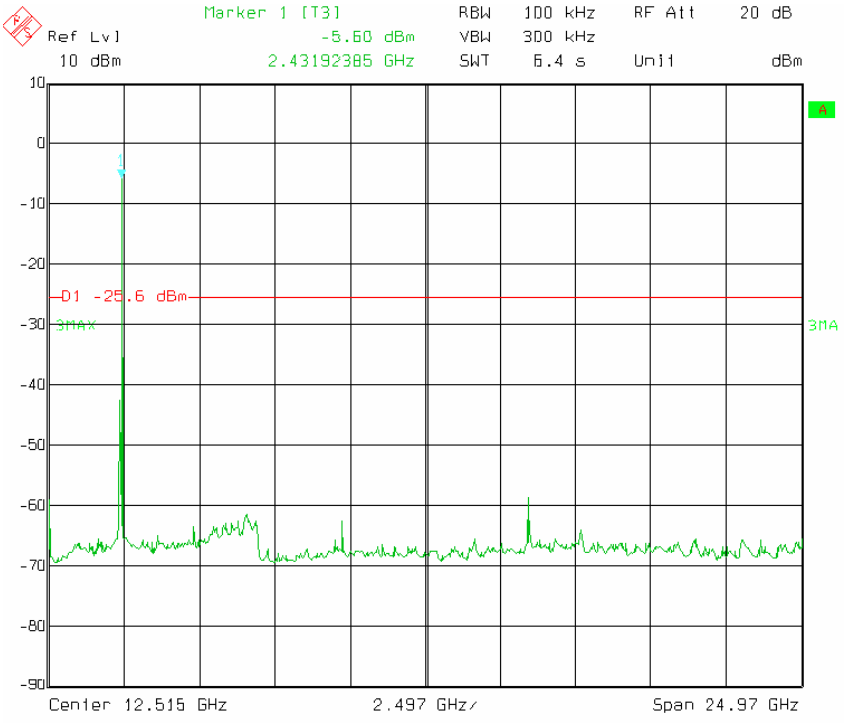
Test Mode: IEEE 802.11n(HT 20) mode

Low channel



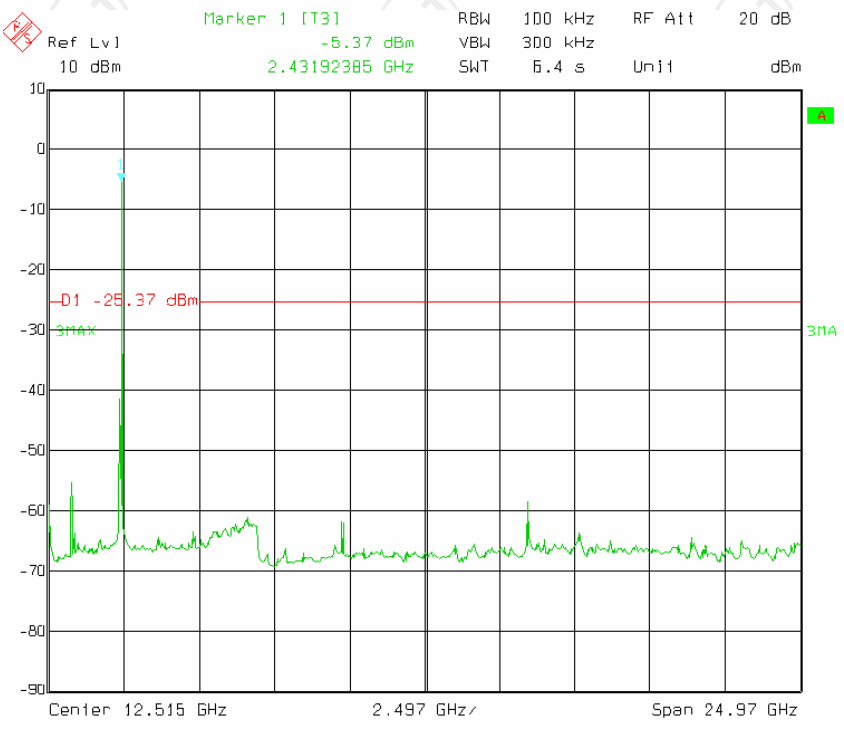
Note: Sweep points=1001pts

Middle channel



Note: Sweep points=1001pts

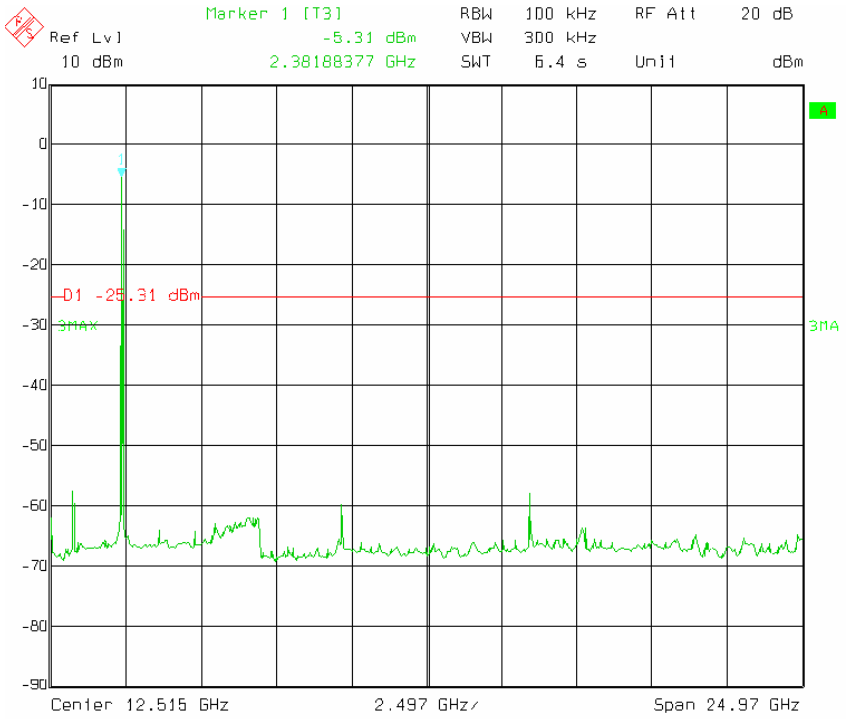
High channel



Note: Sweep points=1001pts

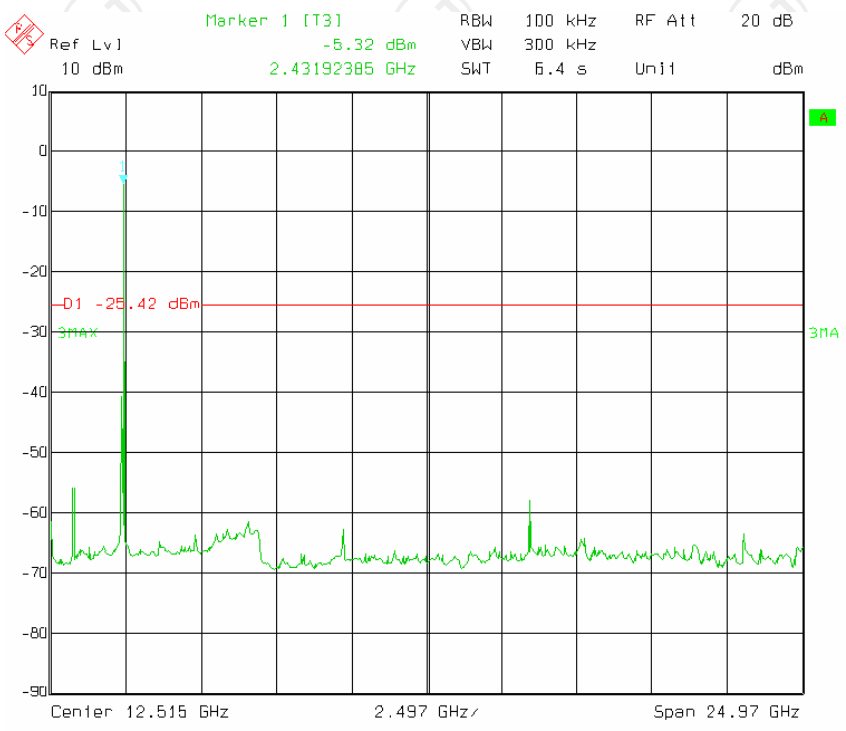
Test Mode: IEEE 802.11n(HT 40) mode

Low channel



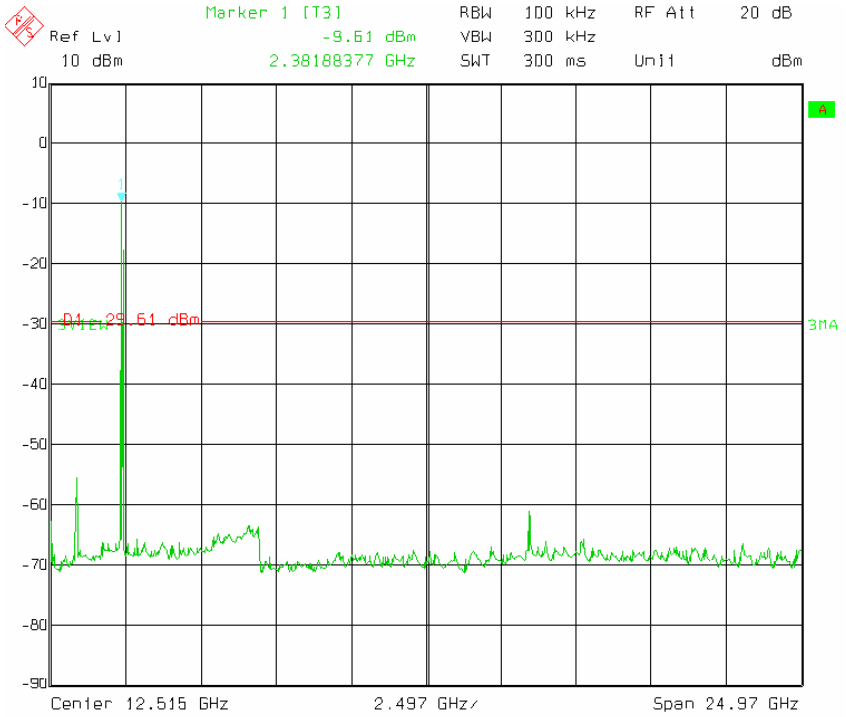
Note: Sweep points=1001pts

Middle channel



Note: Sweep points=1001pts

High channel



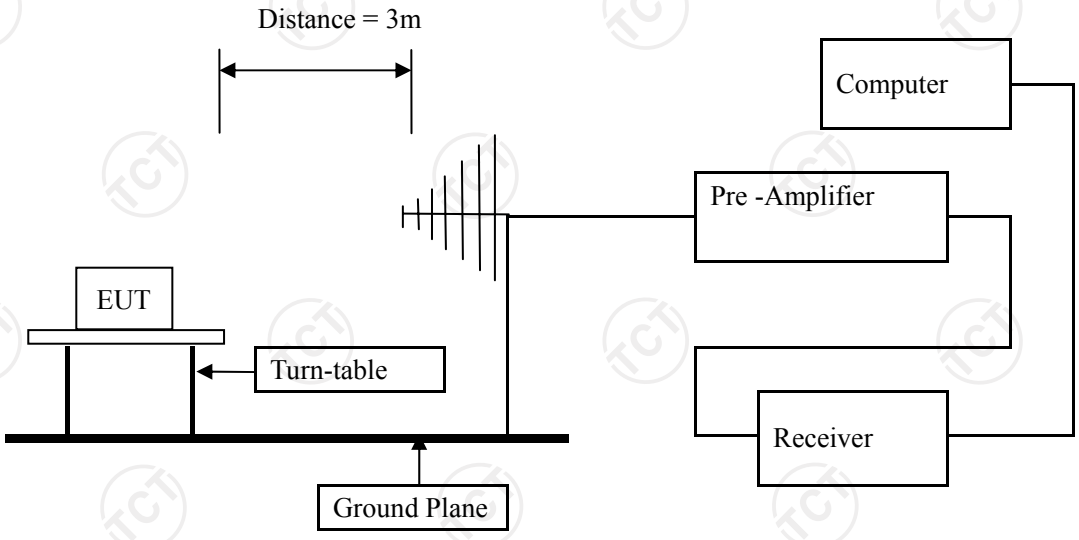
Note: Sweep points=1001pts

11.2 Radiated emissions Measurement

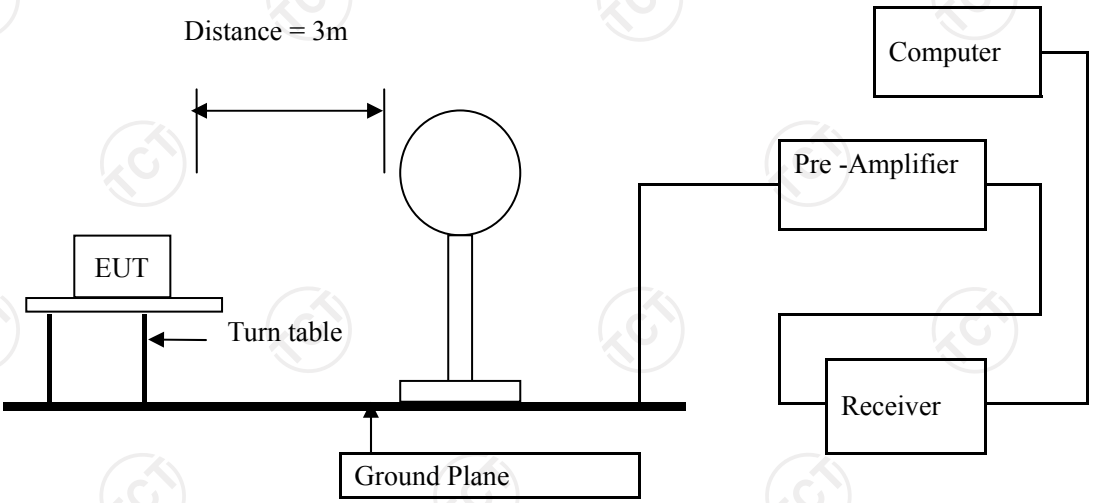
11.2.1 Test Method and test Procedure:

1) The EUT was tested according to ANSI C63.10 –2009.
2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009.
3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz quasi-peak values with a resolution bandwidth of 120 kHz.
   All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
   Set the spectrum as follows:
   1): Peak: RBW=1MHz, VBW=1MHz, Sweep=Auto
   2): Average: RBW=1MHz, VBW=10Hz, Sweep=Auto
4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5) The antenna polarization: Vertical polarization and Horizontal polarization.

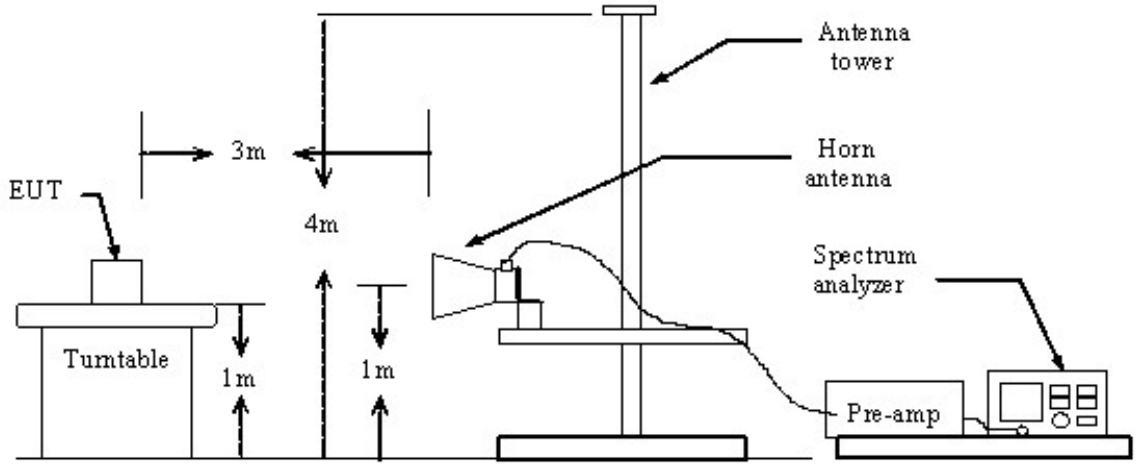
Block diagram of Test setup



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



11.2.2 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009

11.2.3 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)

2) In the Above Table, the tighter limit applies at the band edges.

3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4) This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-25G, the final emission level got using PK and AV detector.

6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

7)The DTS rules specify that emissions which fall into restricted frequency bands shall comply with the general radiated emission limits.9

11.2.4 Test Equipment:

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 2, 2014	July 1, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 3, 2014	July 2, 2015
Pre-amplifier	Teseq	LNA6900	--	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8447D	83153007374	July 3, 2014	July 2, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 3, 2014	July 2, 2015
Loop antenna	A.R.A.	PLA-1030/B	1029	July 3, 2014	July 2, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 3, 2014	July 2, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 3, 2014	July 2, 2015

11.2.5 Test specification:

Environmental conditions: Temperature 22° C Humidity: 51% Atmospheric pressure: 103kPa

11.2.6 Test result

A Radiated Emission (9 kHz----30 MHz)

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor
2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

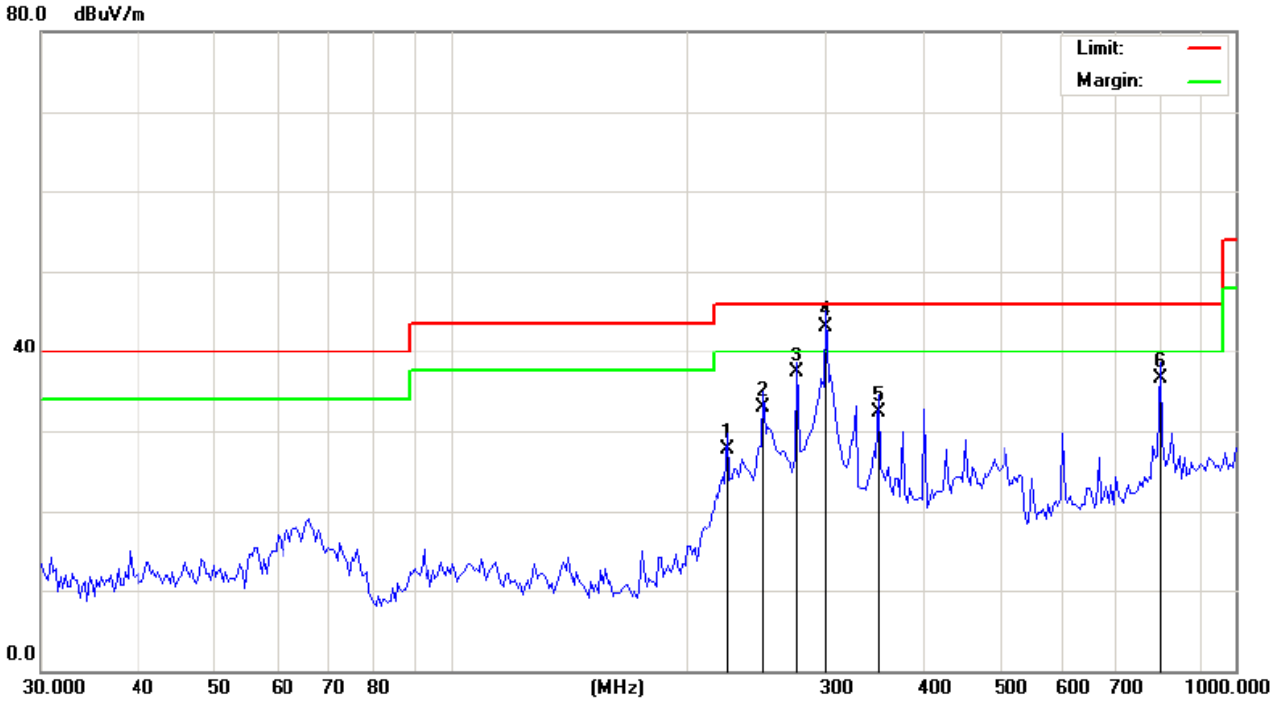
Result: Pass

Frequency (MHz)	Level@3m (dB μ V/m)	Limit@3m (dB μ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

B General Radiated Emissions Data

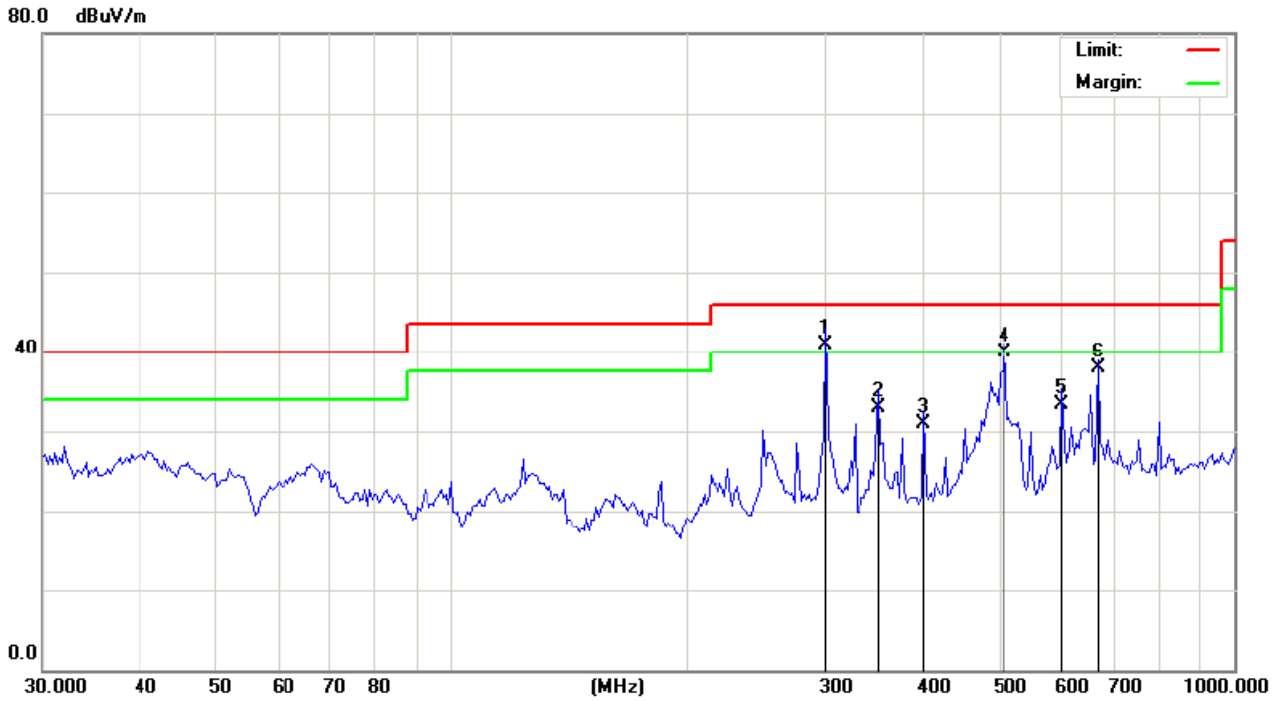
Please refer to following diagram for individual

Radiated Emission In Horizontal (30MHz----1000MHz)



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
225.4267	27.71	H	46.00
250.4858	32.87	H	46.00
276.3817	37.38	H	46.00
300.6988	43.18	H	46.00
350.9721	32.34	H	46.00
804.2522	36.50	H	46.00

Radiated Emission In Vertical (30MHz----1000MHz)



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
300.6988	40.98	V	46.00
350.9721	32.94	V	46.00
401.1050	30.85	V	46.00
509.3560	39.96	V	46.00
602.9287	33.22	V	46.00
669.9523	37.83	V	46.00

Note: Measurements were conducted in all three channels (high, middle, low) with IEEE 802.11b mode, IEEE 802.11g mode, IEEE 802.11n(HT20), IEEE 802.11n(HT40), and the worst case (high channel in IEEE 802.11b mode) was submitted only.

C Fundamental & Harmonics Radiated Emission Data (1000MHz-25000MHz)

IEEE 802.11b mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2387.01	H	71.86	---	-4.20	67.66	---	74.00	54.00	-6.34
2387.01	H	---	52.80	-4.20	---	48.60	74.00	54.00	-5.40
4824.00	H	49.03	---	-3.94	45.09	---	74.00	54.00	-8.91
7236.00	H	47.37	---	0.52	47.89	---	74.00	54.00	-6.11
---	---	---	---	---	---	---	---	---	---
2387.01	V	71.03	---	-4.20	66.83	---	74.00	54.00	-7.17
2387.01	V	---	51.11	-4.20	---	46.91	74.00	54.00	-7.09
4824.00	V	49.52	---	-3.94	45.58	---	74.00	54.00	-8.42
7236.00	V	45.06	---	0.52	45.58	---	74.00	54.00	-8.42
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11b mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	48.03	---	-3.98	44.05	---	74.00	54.00	-9.95
7311.00	H	45.37	---	0.57	45.94	---	74.00	54.00	-8.06
---	---	---	---	---	---	---	---	---	---
4874.00	V	51.71	---	-3.98	47.73	---	74.00	54.00	-6.27
7311.00	V	48.14	---	0.57	48.71	---	74.00	54.00	-5.29
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11b mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2493.51	H	71.99	---	-2.38	69.61	---	74.00	54.00	-4.39
2493.51	H	---	51.81	-2.38	---	49.43	74.00	54.00	-4.57
4924.00	H	52.72	---	-3.98	48.74	---	74.00	54.00	-5.26
7386.00	H	47.69	---	0.57	48.26	---	74.00	54.00	-5.74
---	---	---	---	---	---	---	---	---	---
2493.51	H	72.00	---	-2.38	69.62	---	74.00	54.00	-4.38
2493.51	H	---	51.06	-2.38	---	48.68	74.00	54.00	-5.32
4924.00	V	52.92	---	-3.98	48.94	---	74.00	54.00	-5.06
7386.00	V	48.00	---	0.57	48.57	---	74.00	54.00	-5.43
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2387.01	H	71.34	---	-4.20	67.14	---	74.00	54.00	-6.86
2387.01	H	---	51.82	-4.20	---	47.62	74.00	54.00	-6.38
4824.00	H	48.88	---	-3.94	44.94	---	74.00	54.00	-9.06
7236.00	H	46.36	---	0.52	46.88	---	74.00	54.00	-7.12
---	---	---	---	---	---	---	---	---	---
2387.01	V	70.74	---	-4.20	66.54	---	74.00	54.00	-7.46
2387.01	V	---	51.09	-4.20	---	46.89	74.00	54.00	-7.11
4824.00	V	49.25	---	-3.94	45.31	---	74.00	54.00	-8.69
7236.00	V	44.71	---	0.52	45.23	---	74.00	54.00	-8.77
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	48.47	---	-3.98	44.49	---	74.00	54.00	-9.51
7311.00	H	45.11	---	0.57	45.68	---	74.00	54.00	-8.32
---	---	---	---	---	---	---	---	---	---
4874.00	V	50.96	---	-3.98	46.98	---	74.00	54.00	-7.02
7311.00	V	46.79	---	0.57	47.36	---	74.00	54.00	-6.64
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11g mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2493.51	H	70.57	---	-2.38	68.19	---	74.00	54.00	-5.81
2493.51	H	---	51.25	-2.38	---	48.87	74.00	54.00	-5.13
4924.00	H	51.26	---	-3.98	47.28	---	74.00	54.00	-6.72
7386.00	H	47.08	---	0.57	47.65	---	74.00	54.00	-6.35
---	---	---	---	---	---	---	---	---	---
2493.51	H	70.88	---	-2.38	68.5	---	74.00	54.00	-5.50
2493.51	H	---	49.89	-2.38	---	47.51	74.00	54.00	-6.49
4924.00	V	51.16	---	-3.98	47.18	---	74.00	54.00	-6.82
7386.00	V	46.67	---	0.57	47.24	---	74.00	54.00	-6.76
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: Low channel: 2412 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2387.01	H	70.54	---	-4.20	66.34	---	74.00	54.00	-7.66
2387.01	H	---	52.10	-4.20	---	47.90	74.00	54.00	-6.10
4824.00	H	48.69	---	-3.94	44.75	---	74.00	54.00	-9.25
7236.00	H	45.47	---	0.52	45.99	---	74.00	54.00	-8.01
---	---	---	---	---	---	---	---	---	---
2387.01	V	70.27	---	-4.20	66.07	---	74.00	54.00	-7.93
2387.01	V	---	50.65	-4.20	---	46.45	74.00	54.00	-7.55
4824.00	V	49.15	---	-3.94	45.21	---	74.00	54.00	-8.79
7236.00	V	44.64	---	0.52	45.16	---	74.00	54.00	-8.84
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	48.56	---	-3.98	44.58	---	74.00	54.00	-9.42
7311.00	H	44.73	---	0.57	45.30	---	74.00	54.00	-8.70
---	---	---	---	---	---	---	---	---	---
4874.00	V	50.80	---	-3.98	46.82	---	74.00	54.00	-7.18
7311.00	V	46.54	---	0.57	47.11	---	74.00	54.00	-6.89
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(20MHz) mode: High channel: 2462 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2493.51	H	69.79	---	-2.38	67.41	---	74.00	54.00	-6.59
2493.51	H	---	50.48	-2.38	---	48.10	74.00	54.00	-5.90
4924.00	H	51.81	---	-3.98	47.83	---	74.00	54.00	-6.17
7386.00	H	47.10	---	0.57	47.67	---	74.00	54.00	-6.33
---	---	---	---	---	---	---	---	---	---
2493.51	H	70.17	---	-2.38	67.79	---	74.00	54.00	-6.21
2493.51	H	---	50.3	-2.38	---	47.92	74.00	54.00	-6.08
4924.00	V	51.53	---	-3.98	47.55	---	74.00	54.00	-6.45
7386.00	V	46.71	---	0.57	47.28	---	74.00	54.00	-6.72
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(HT40) mode: Low channel: 2422 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2387.01	H	70.49	---	-4.20	66.29	---	74.00	54.00	-7.71
2387.01	H	---	51.81	-4.20	---	47.61	74.00	54.00	-6.39
4844.00	H	49.12	---	-3.94	45.18	---	74.00	54.00	-8.82
7266.00	H	45.33	---	0.52	45.85	---	74.00	54.00	-8.15
---	---	---	---	---	---	---	---	---	---
2387.01	V	70.36	---	-4.20	66.16	---	74.00	54.00	-7.84
2387.01	V	---	50.55	-4.20	---	46.35	74.00	54.00	-7.65
4844.00	V	49.44	---	-3.94	45.50	---	74.00	54.00	-8.50
7266.00	V	44.52	---	0.52	45.04	---	74.00	54.00	-8.96
---	---	---	---	---	---	---	---	---	--

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(HT40) mode: Middle channel: 2437 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
4874.00	H	48.95	---	-3.98	44.97	---	74.00	54.00	-9.03
7311.00	H	44.85	---	0.57	45.42	---	74.00	54.00	-8.58
---	---	---	---	---	---	---	---	---	---
4874.00	V	50.23	---	-3.98	46.25	---	74.00	54.00	-7.75
7311.00	V	46.21	---	0.57	46.78	---	74.00	54.00	-7.22
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

IEEE 802.11n(H40) mode: High channel: 2452 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
2493.51	H	69.95	---	-2.38	67.57	---	74.00	54.00	-6.43
2493.51	H	---	50.68	-2.38	---	48.3	74.00	54.00	-5.70
4904.00	H	51.70	---	-3.98	47.72	---	74.00	54.00	-6.28
7356.00	H	46.92	---	0.57	47.49	---	74.00	54.00	-6.51
---	---	---	---	---	---	---	---	---	---
2493.51	H	70.13	---	-2.38	67.75	---	74.00	54.00	-6.25
2493.51	H	---	50.22	-2.38	---	47.84	74.00	54.00	-6.16
4904.00	V	51.30	---	-3.98	47.32	---	74.00	54.00	-6.68
7356.00	V	46.63	---	0.57	47.20	---	74.00	54.00	-6.80
---	---	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

12.0 Antenna Requirement

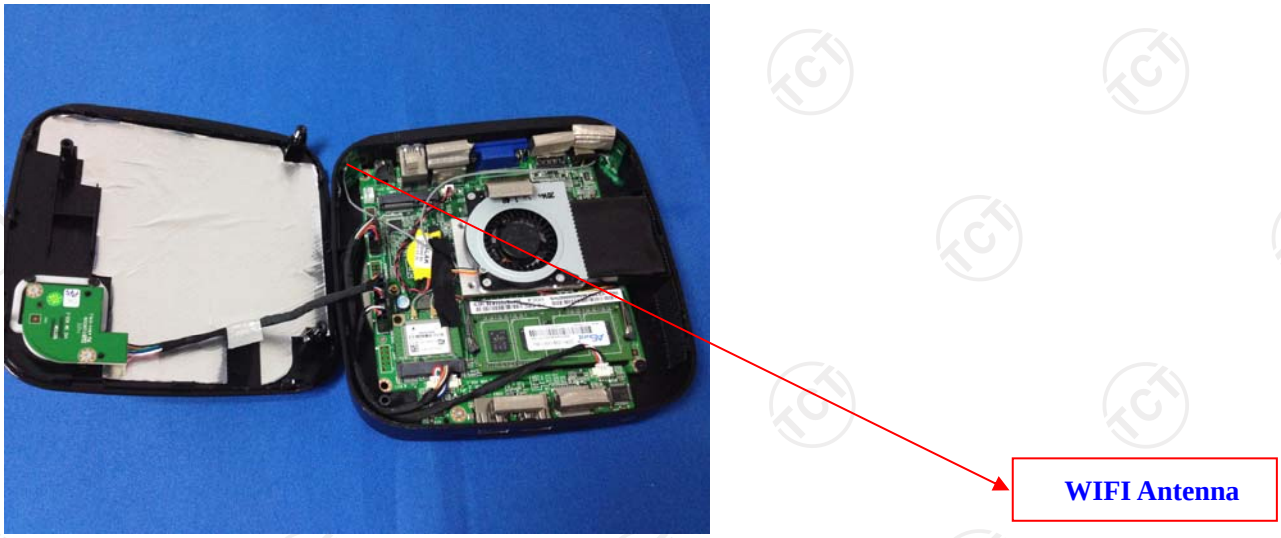
12.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

12.2 Antenna Specification

According to the manufacturer declared, the EUT has a internal antenna; the directional gain of antenna is 1.17 dBi, and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



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