



RF TEST REPORT

Report No.: SET2015-05326

Product Name: EFTPOS

FCC ID: VWZT1000I

Model No. : SPECTRA T1000

Applicant: SPECTRA Technologies Holdings Co., Ltd.

Address: Unit 1301-09, 19-20, Tower II, Grand Century Place, 193 Prince Edward Road West, Kowloon, Hong Kong

Dates of Testing: 04/02/2015 — 04/14/2015

Issued by: CCIC-SET

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China

Tel: 86 755 26627338 **Fax:** 86 755 26627238

This test report consists of 60 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CCIC-SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CCIC-SET within 20 days since the date when the report is received. It will not be taken into consideration beyond this limit.



Test Report

Product Name : EFTPOS

Brand Name : N/A

Trade Name : SPECTRA

Applicant : SPECTRA Technologies Holdings Co., Ltd.

Applicant Address : Unit 1301-09, 19-20, Tower II, Grand Century Place, 193
Prince Edward Road West, Kowloon, Hong Kong

Manufacturer : SPECTRA Technologies Holdings Co., Ltd.

Manufacturer Address : Unit 1301-09, 19-20, Tower II, Grand Century Place, 193
Prince Edward Road West, Kowloon, Hong Kong

Test Standards : 47 CFR Part 15 Subpart C / ANSI C63.10:2013
RSS-210 Issue 8, Dec 2010 / RSS-GEN Issue4, Nov 2014
KDB558074 D01 DTS Meas Guidance v03r02

Test Result : PASS

Tested by : Haigang He 2015.04.15
Haigang He, Test Engineer

Reviewed by : Zhu Qi 2015.04.15
Zhu Qi, Senior Engineer

Approved by : Wu Lian 2015.04.15
Wu Li'an, Manager



TABLE OF CONTENTS

1.	GENERAL INFORMATION	5
1.1	EUT Description	5
1.2	Test Standards and Results	6
1.3	Table for Supporting Units	7
1.4	Facilities and Accreditations	7
1.5	Test Environment Conditions	7
2.	47 CFR PART 15C REQUIREMENTS.....	8
2.1	Antenna requirement	8
2.1.1	Applicable Standard	8
2.1.2	Antenna Information	8
2.1.3	Result: comply	8
2.2	Peak Output Power	9
2.2.1	Requirement	9
2.2.2	Test Description	9
2.2.3	Test Result	9
2.3	Bandwidth	11
2.3.1	Requirement	11
2.3.2	Test Description	11
2.3.3	Test Result	11
2.4	Conducted Spurious Emissions	18
2.4.1	Requirement	18
2.4.2	Test Description	18
2.4.3	Test Result	18
2.5	Power spectral density (PSD)	30
2.5.1	Requirement	30
2.5.2	Test Description	30
2.5.3	Test Result	30
2.6	Band Edge	37
2.6.1	Requirement	37
2.6.2	Test Description	37



2.6.3 Test Procedure38

2.6.4 Test Result38

2.7 Conducted Emission44

2.7.1 Requirement44

2.7.2 Test Description44

2.7.3 Test Result45

2.8 Radiated Emission48

2.8.1 Requirement48

2.8.2 Test Description49

2.8.3 Test Result51

**** END OF REPORT **60**

Change History		
Issue	Date	Reason for change
1.0	2015-04-15	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	EFTPOS
Hardware Version	REV 10
Software Version	T1000_SystemPack_v1_9R0_pre_release
EUT supports Radios application	WLAN2.4GHz 802.11b/g/n (HT20)
Frequency Range	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz
Channel Number	802.11b/g/n-20MHz: 11
Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n(SISO): MCS 0/1/2/3/4/5/6/7
Modulation Type	DSSS (802.11b), OFDM (802.11g/n)
Antenna Type	FPC Antenna
Antenna Gain	1.2dBi
Product Type	802.11b: 1TX ,1RX 802.11g: 1TX ,1RX 802.11n(20MHz): 1TX ,1RX
Output Power (Max.)	802.11b: 21.38dBm 802.11g: 19.94dBm 802.11n(20MHz): 18.49dBm

Note 1: The EUT is a EFTPOS, it contains WIFI operating at 2.4GHz ISM band; it supports 802.11b, 802.11g, 802.11n and they are all tested in this report.

Note 2: The frequencies allocated is $F \text{ (MHz)} = 2412 + 5 * (n - 1)$ ($1 \leq n \leq 9$). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6(2437MHz) and 11(2462MHz) for 802.11b/g/n-20MHz.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 3: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C 2012	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Standard(s) Section	Description	Result
	FCC		
1	15.203	Antenna Requirement	PASS
2	15.247(b)(3)	Peak Output Power	PASS
3	15.247(a)(2)	Bandwidth	PASS
4	15.247(d)	Conducted Spurious Emission	PASS
5	15.247(e)	Power spectral density (PSD)	PASS
6	15.247(d)	Band Edge	PASS
7	15.207	Conducted Emission	PASS
8	15.209 ,15.247(c)	Radiated Emission	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item.

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

The bandwidth systems:

For 20MHz bandwidth systems, use Channel 1~ Channel 11

Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
1	2412MHz	5	2432MHz	9	2452MHz
2	2417MHz	6	2437MHz	10	2457MHz
3	2422MHz	7	2442MHz	11	2462MHz
4	2427MHz	8	2447MHz		



Test Items	Mode	Data Rate	Channel
Peak Conducted Output Power Power Spectral Density Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	MCS 0(SISO)	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	MCS 0(SISO)	1/11

1.3 Table for Supporting Units

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.	Note
1	Notebook	DELL	PP11L	DELL	H5914A03	FCC DOC

1.4 Facilities and Accreditations

CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

1.5 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 °C - 35 °C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa



2. 47 CFR PART 15C REQUIREMENTS

2.1 Antenna requirement

2.1.1 Applicable Standard

According to FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

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

2.1.2 Antenna Information

Antenna Category: External antenna

An External antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

Antenna	EUT Model	Ant. Type	Gain(dBi)
A	EFTPOS	FPC	1.2

2.1.3 Result: comply

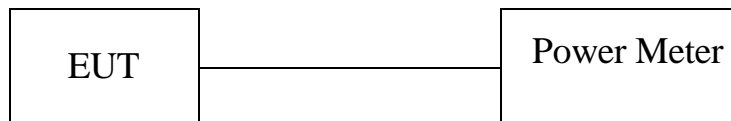
The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2 Peak Output Power

2.2.1 Requirement

For systems using digital modulation in the 2400-2483.5 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

2.2.2 Test Description



The measured output power was calculated by the reading of the spectrum analyzer and calibration.

A. Test Setup:

The EUT was directly connected to the power meter by 20dB Atten and antenna output port as show in the block diagram as test Configuration shows.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Power Meter	R&S	NRVS	1020.1809.02	2014.06.07	2015.06.06
Power Sensor	R&S	NRV-Z4	823.3618.03	2014.06.07	2015.06.06

2.2.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

Note: All data rates are testing, but the worse case data rate was record in the report.

2.2.3.1 802.11b Test mode

Test Verdict:

Channel	Frequency (MHz)	Output Power(dBm)	Limits (dBm)	Result
1	2412	19.41	30	PASS
6	2437	19.29	30	PASS
11	2462	19.22	30	PASS

**2.2.3.2 802.11g Test mode****Test Verdict:**

Channel	Frequency (MHz)	Output Power(dBm)	Limits (dBm)	Result
1	2412	14.98	30	PASS
6	2437	14.82	30	PASS
11	2462	14.91	30	PASS

2.2.3.3 802.11n-20MHz Test mode**Test Verdict:**

Channel	Frequency (MHz)	Output Power(dBm)	Limits (dBm)	Result
1	2412	12.39	30	PASS
6	2437	12.28	30	PASS
11	2462	12.21	30	PASS

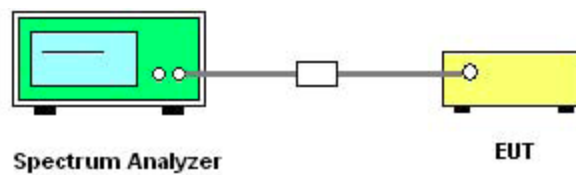
2.3 Bandwidth

2.3.1 Requirement

Systems using digital modulation techniques may operate in the 2400 - 2483.5MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2 Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.3.3 Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

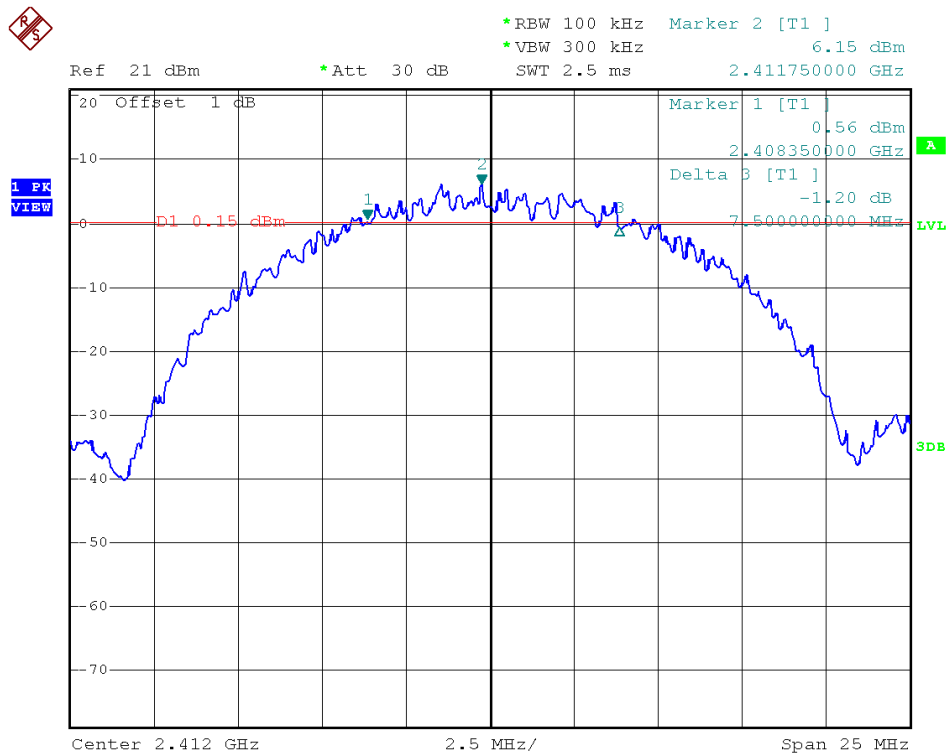


2.3.3.1 802.11b Test mode

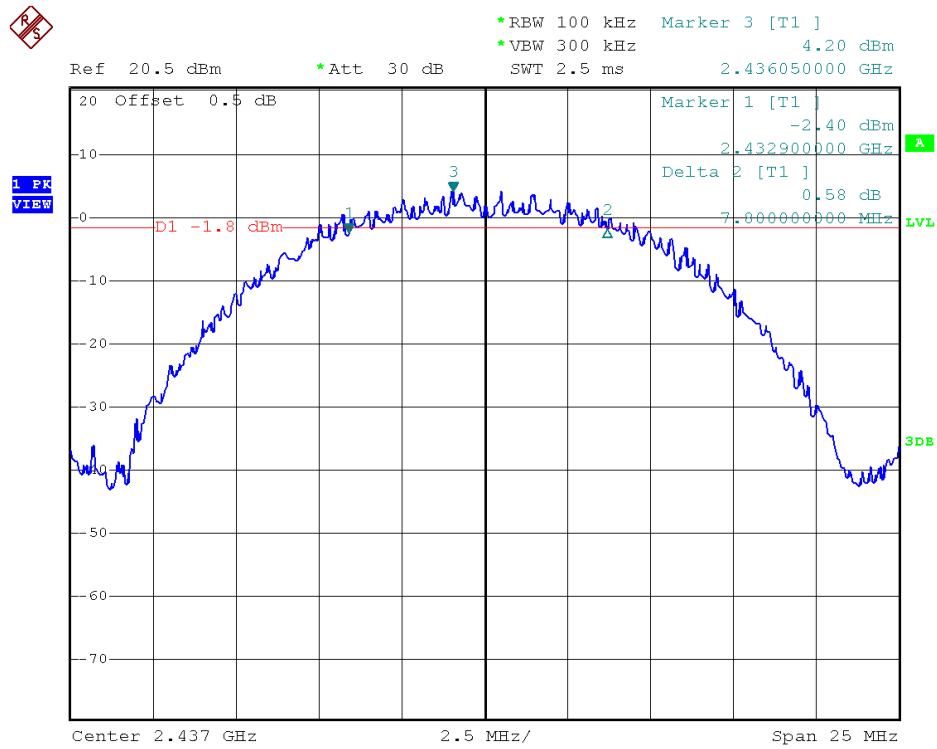
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	7.50	≥500	PASS
6	2437	7.80	≥500	PASS
11	2462	7.15	≥500	PASS

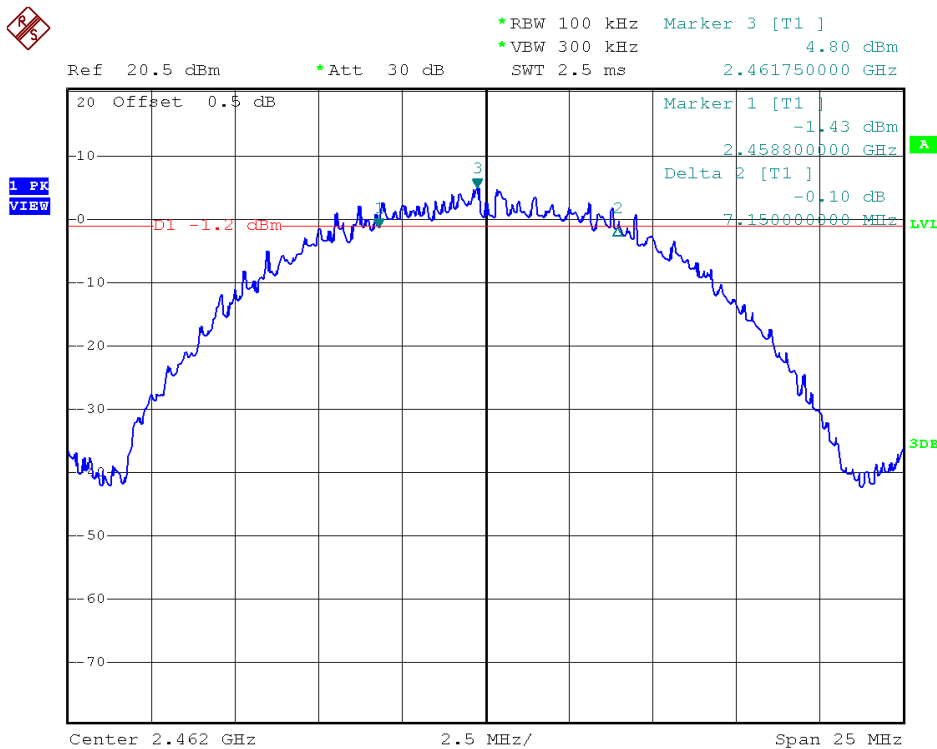
B. Test Plots:



Channel 1: 6 dB Bandwidth



Channel 6: 6 dB Bandwidth



Channel 11: 6 dB Bandwidth

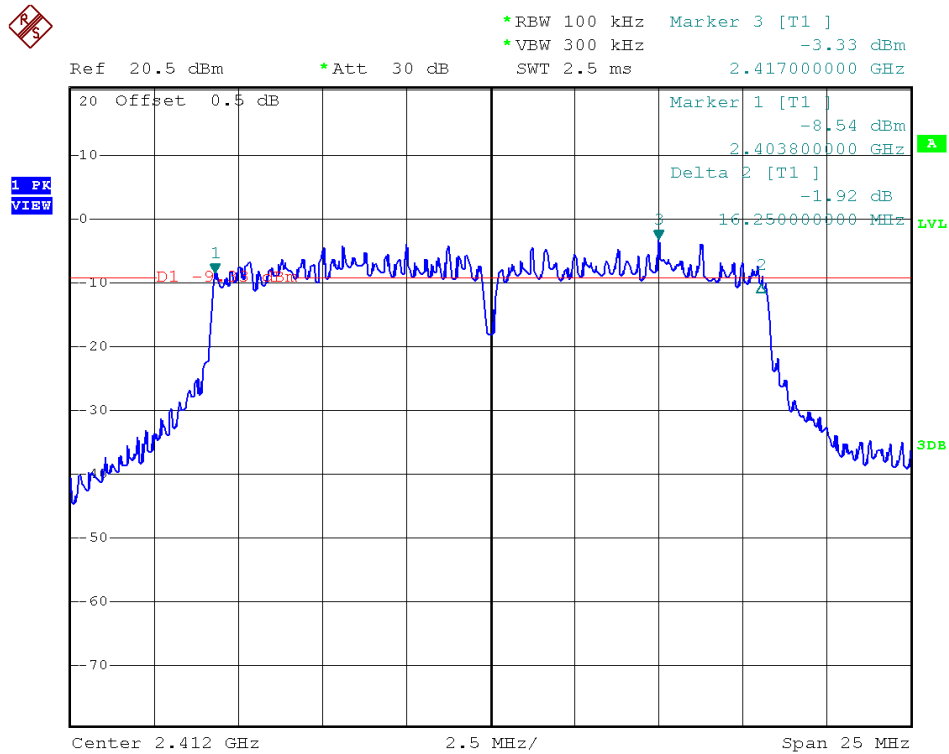


2.3.3.2 802.11g Test mode

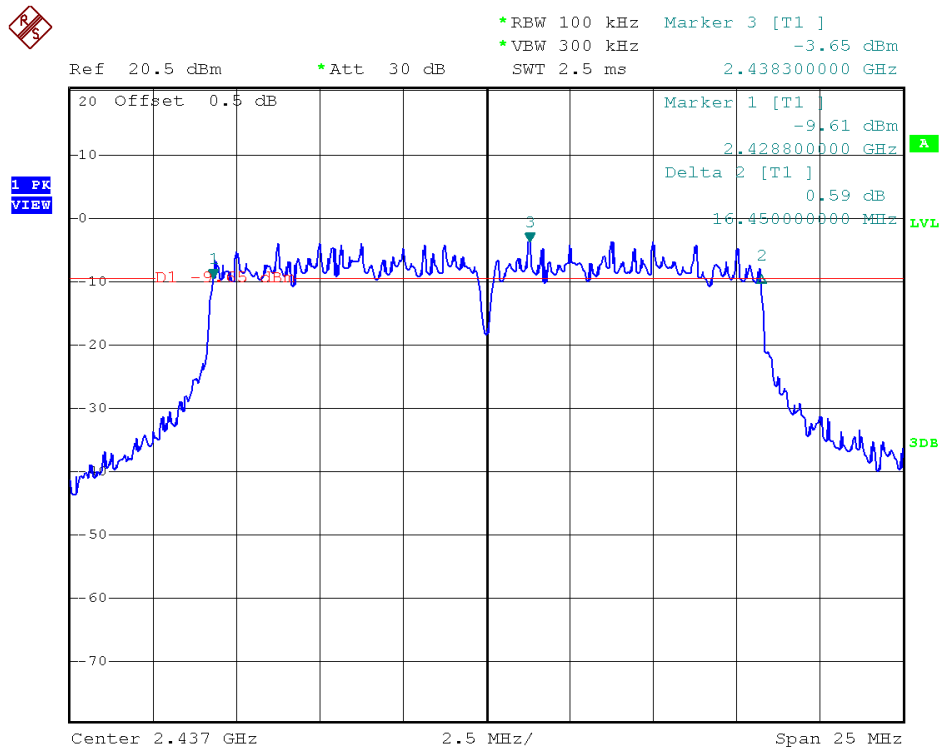
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.25	≥500	PASS
6	2437	16.45	≥500	PASS
11	2462	16.45	≥500	PASS

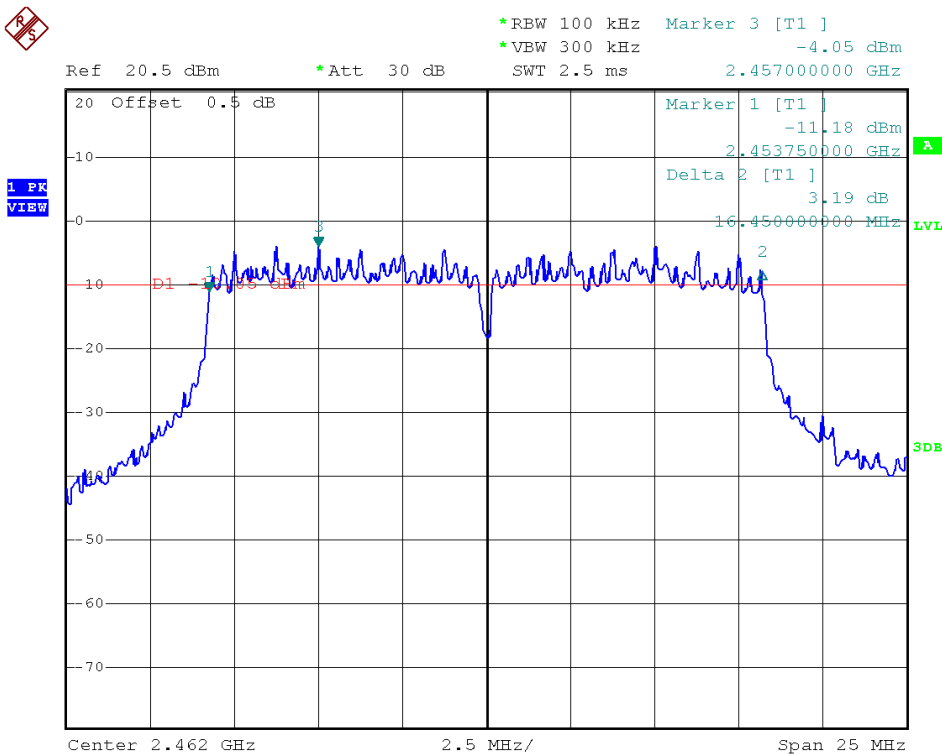
B. Test Plots:



Channel 1: 6 dB Bandwidth



Channel 6: 6 dB Bandwidth



Channel 11: 6 dB Bandwidth

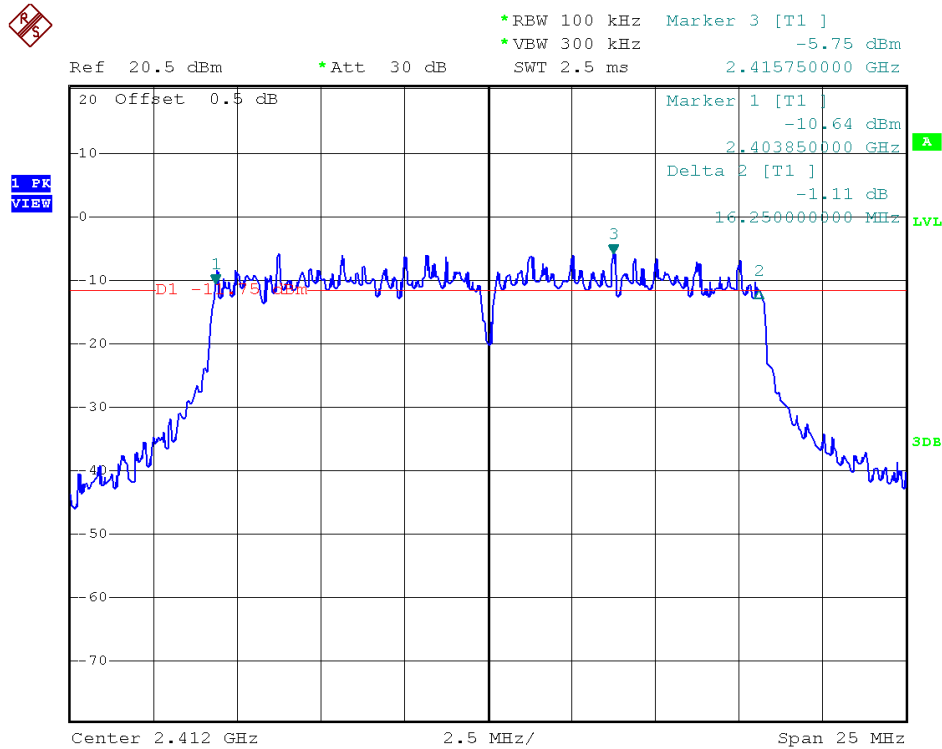


2.3.3.3 802.11n-20 Test mode

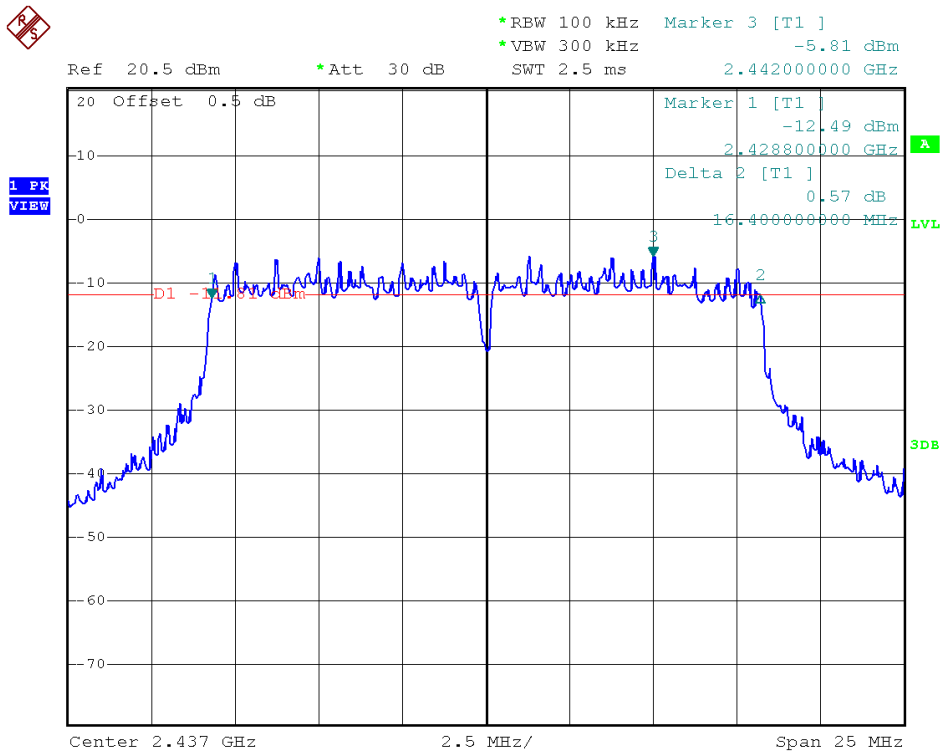
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.25	≥500	PASS
6	2437	16.40	≥500	PASS
11	2462	16.40	≥500	PASS

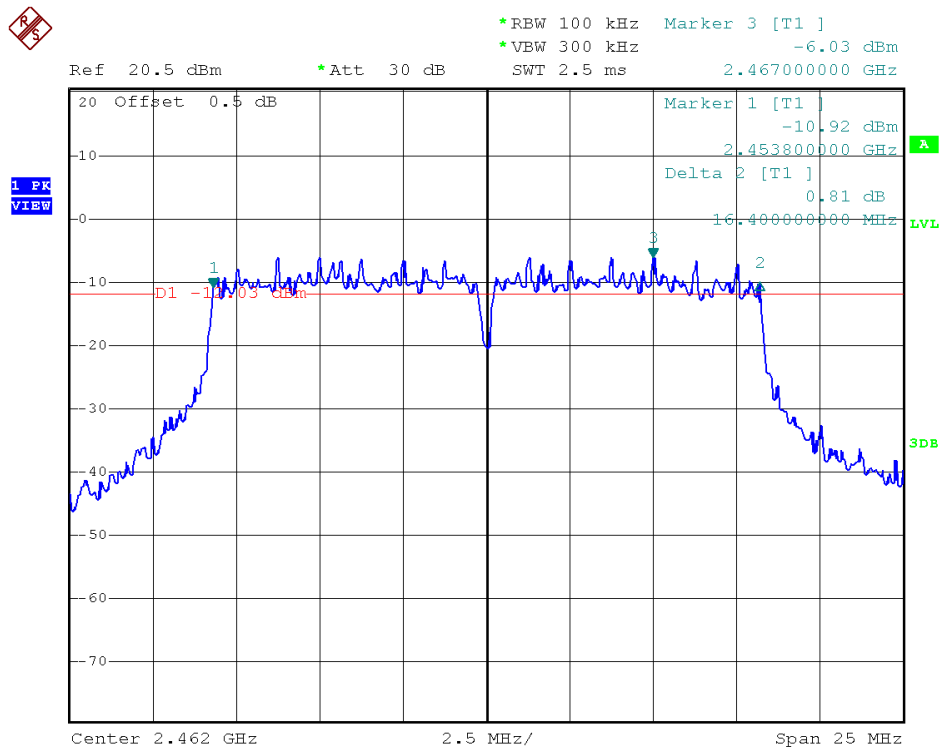
B. Test Plots:



Channel 1: 6 dB Bandwidth



Channel 6: 6 dB Bandwidth



Channel 11: 6 dB Bandwidth

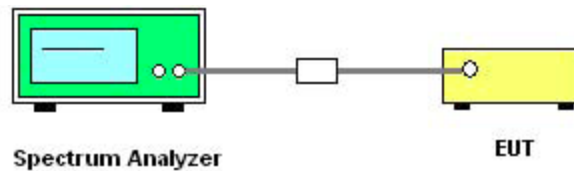
2.4 Conducted Spurious Emissions

2.4.1 Requirement

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.4.2 Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

2.4.3.1 802.11b Test mode

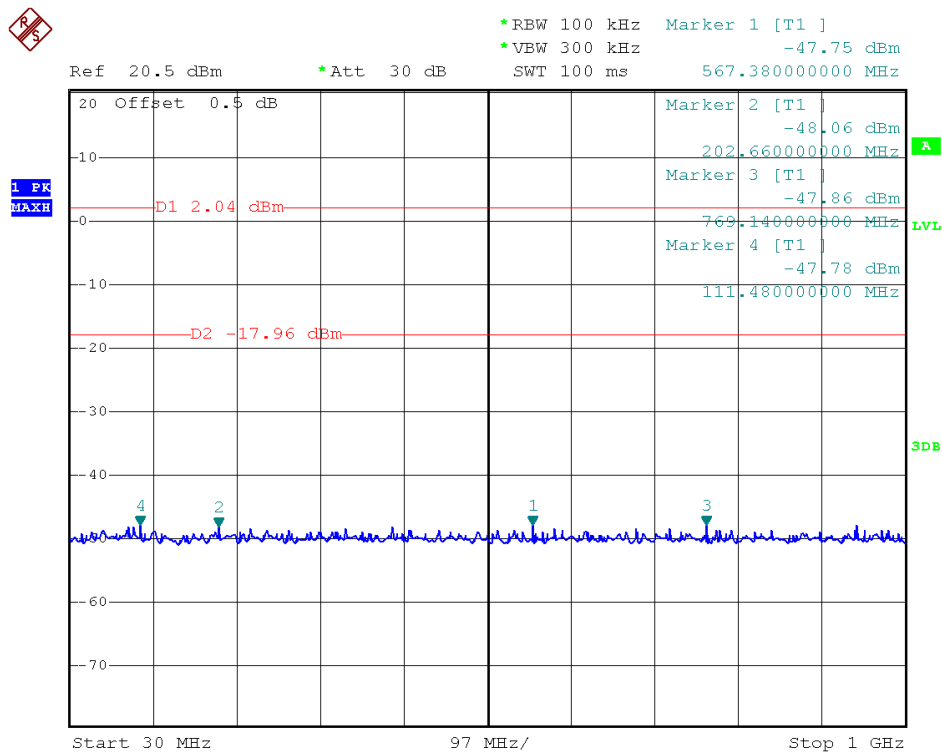


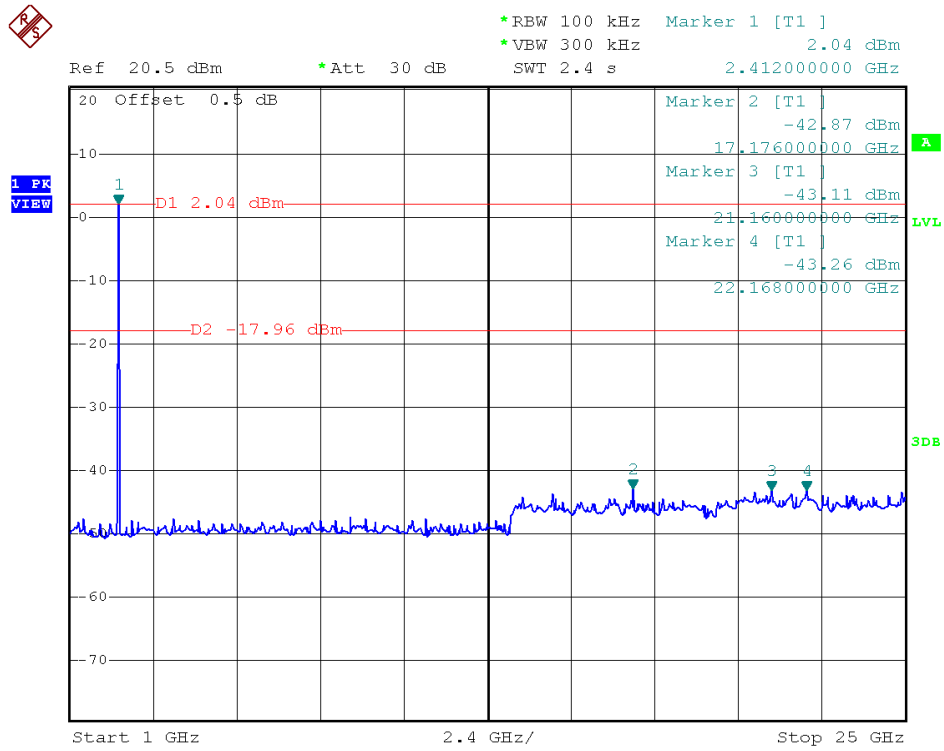
A. Test Verdict:

Channel	Frequency (MHz)	Refer to Plot	Limits (dBc)	Result
1	2412	Plot 2.4 A1	-20	PASS
6	2437	Plot 2.4 B1	-20	PASS
11	2462	Plot 2.4 C1	-20	PASS

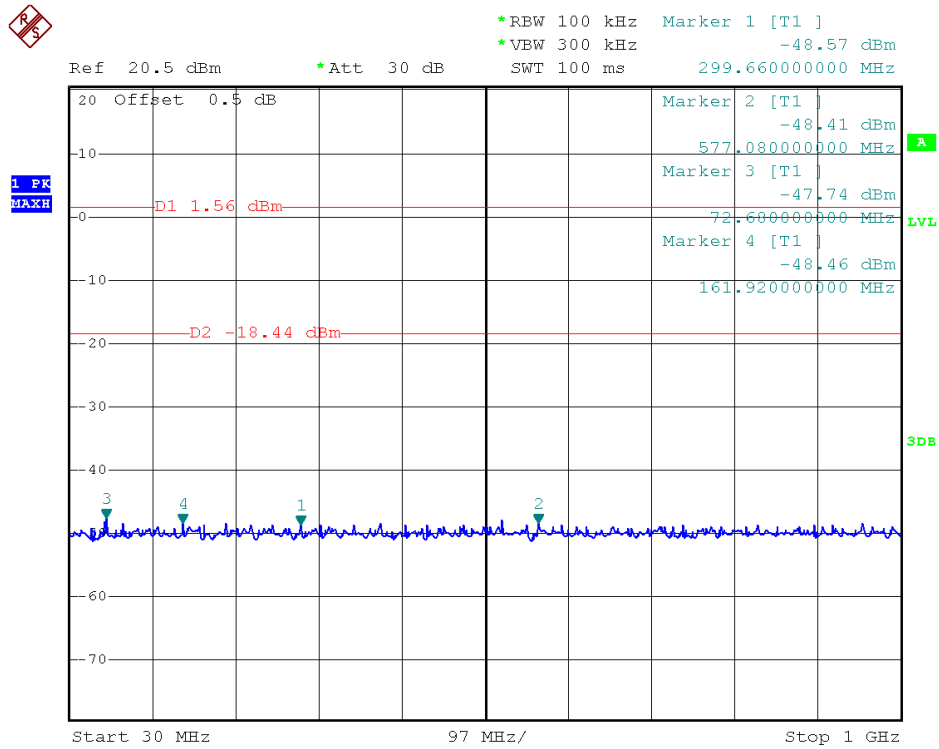
B. Test Plots:

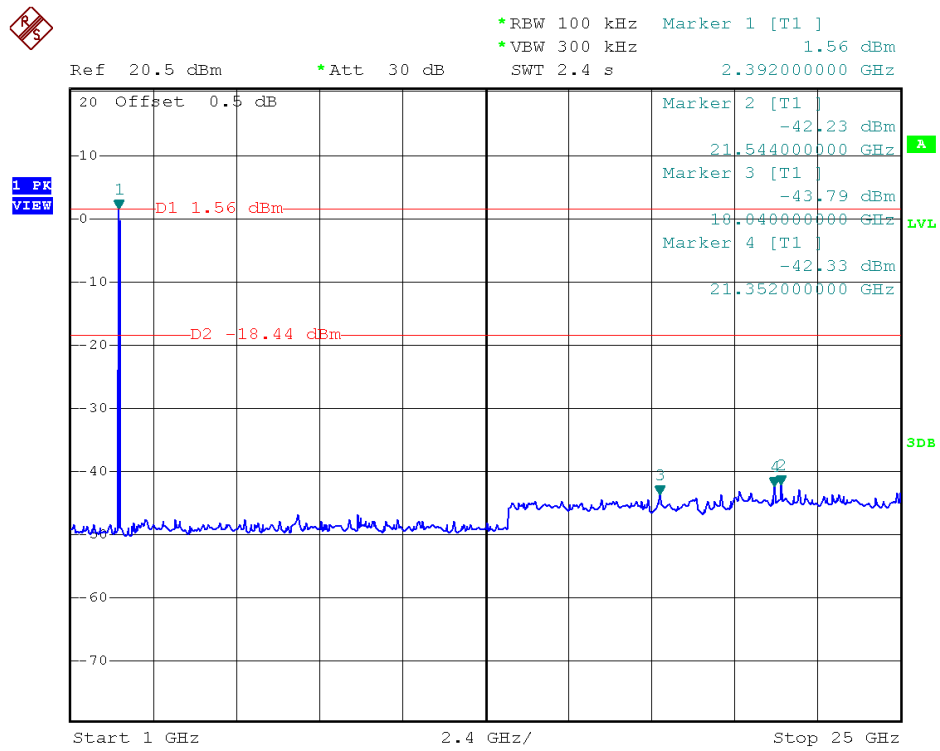
Note: the power of the Module transmitting frequency should be ignored.



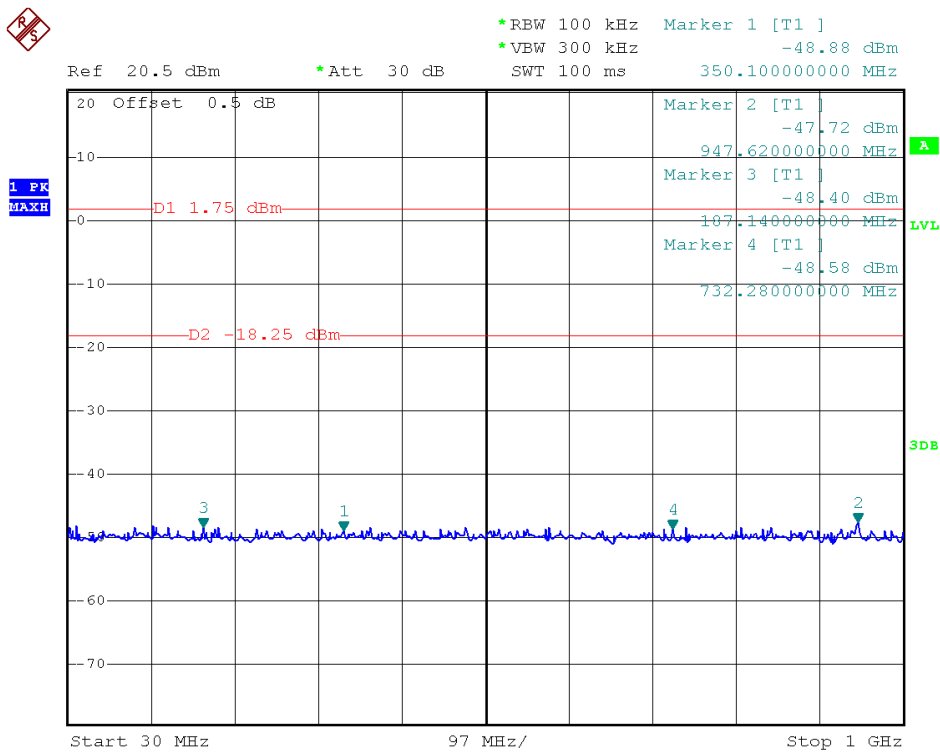


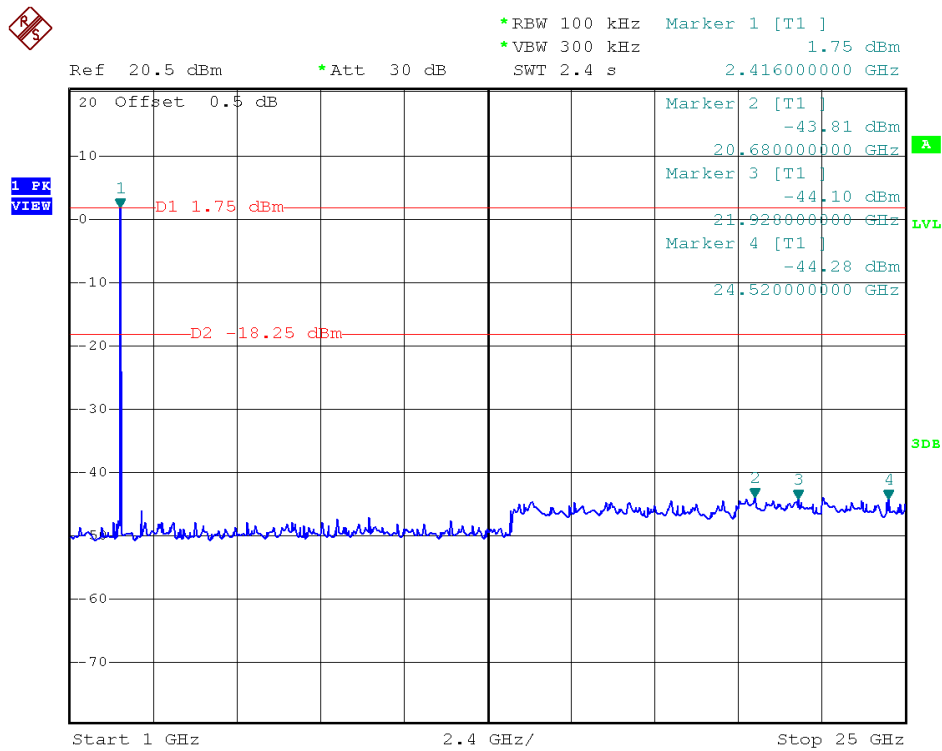
(Plot 2.4 A1: Channel = 1, 30MHz to 25GHz@ 802.11b)





(Plot 2.4 B1: Channel = 6, 30MHz to 25GHz@ 802.11b)





(Plot 2.4 C1: Channel = 11, 30MHz to 25GHz@ 802.11b)

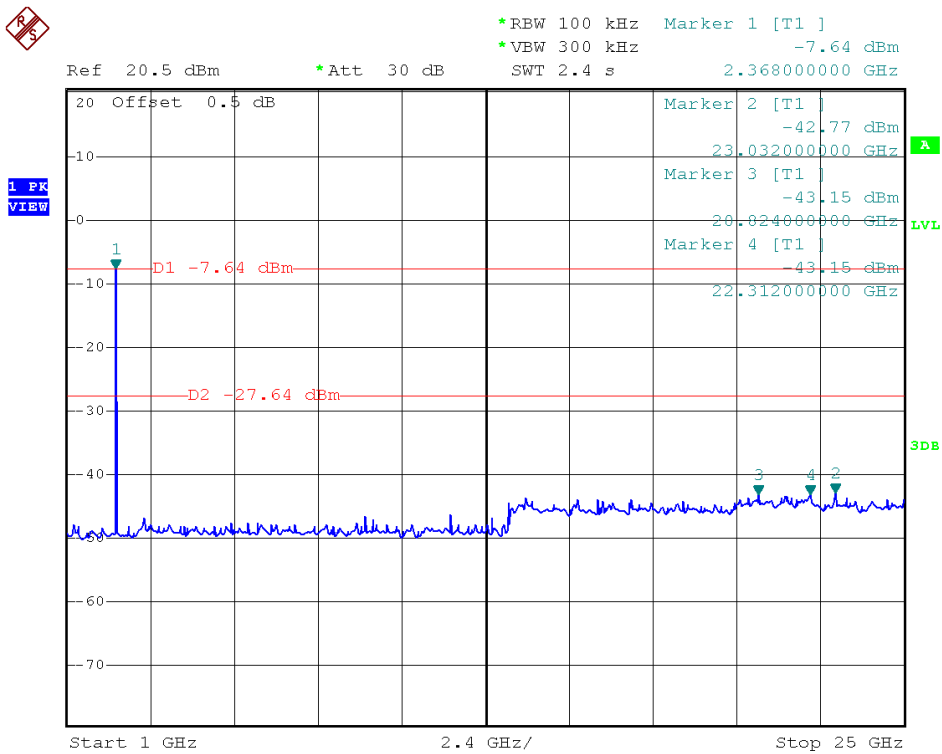
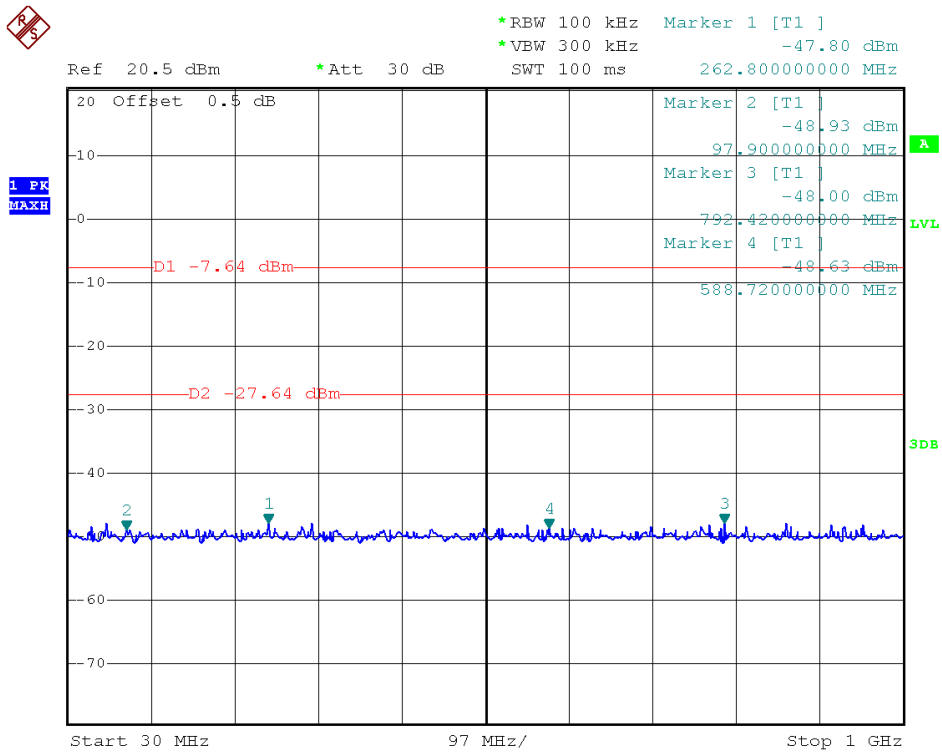
2.4.3.2 802.11g Test mode

A. Test Verdict:

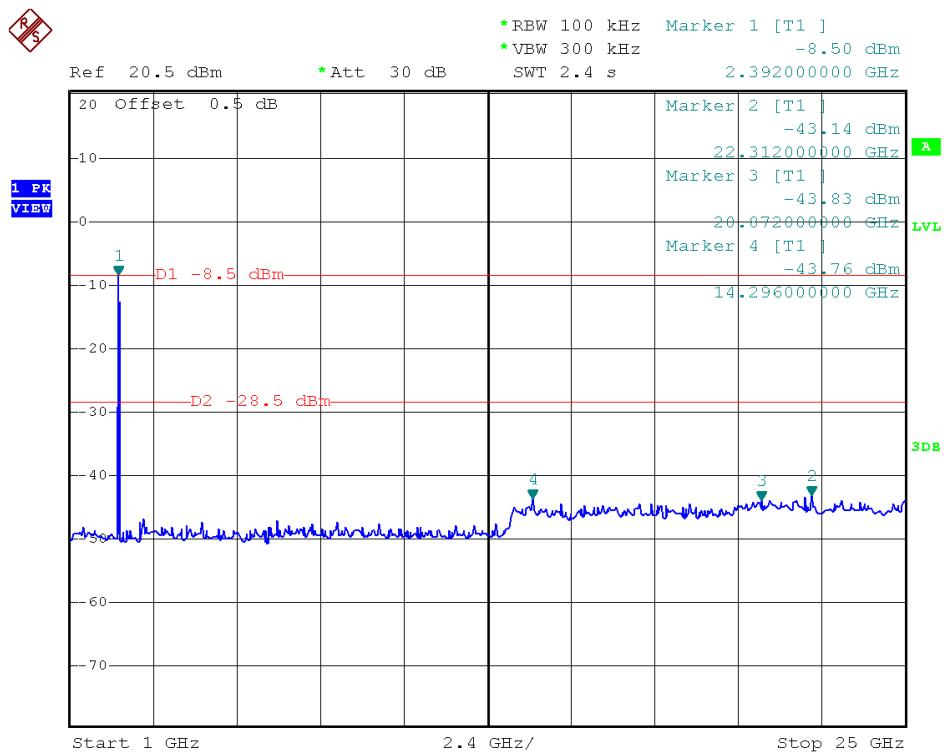
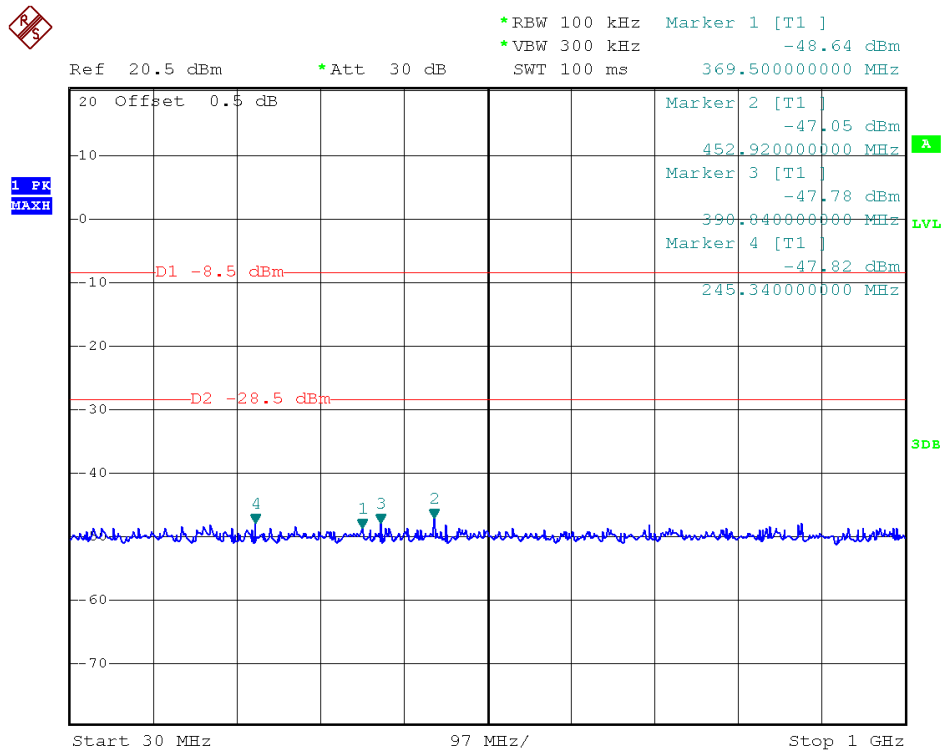
Channel	Frequency (MHz)	Refer to Plot	Limits (dBc)	Result
1	2412	Plot 2.4 D1	-20	PASS
6	2437	Plot 2.4 E1	-20	PASS
11	2462	Plot 2.4 F1	-20	PASS

B. Test Plots:

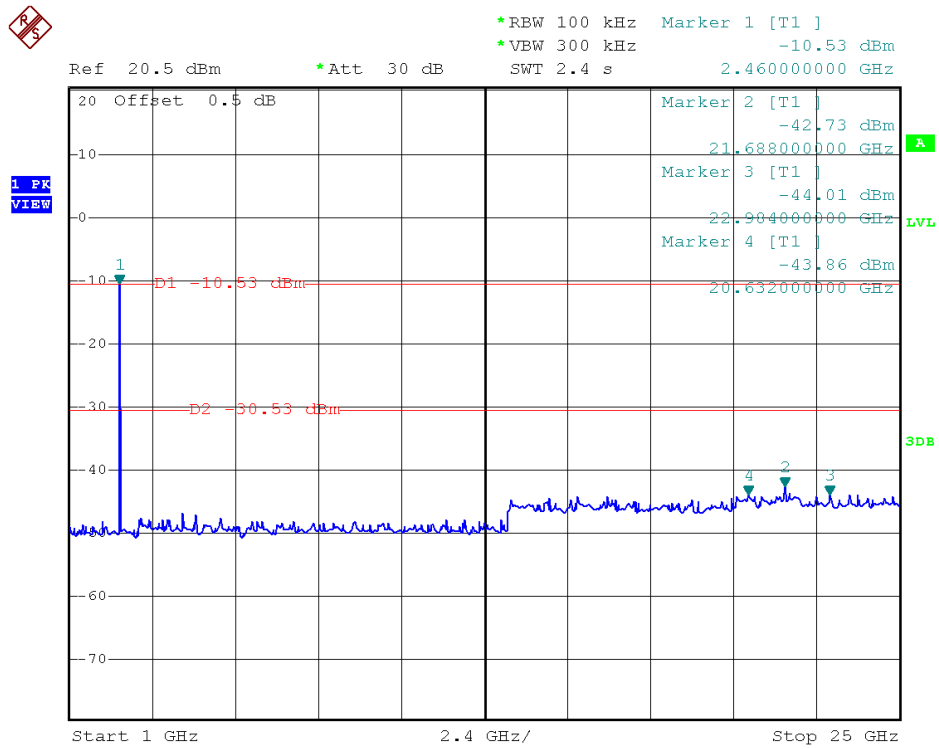
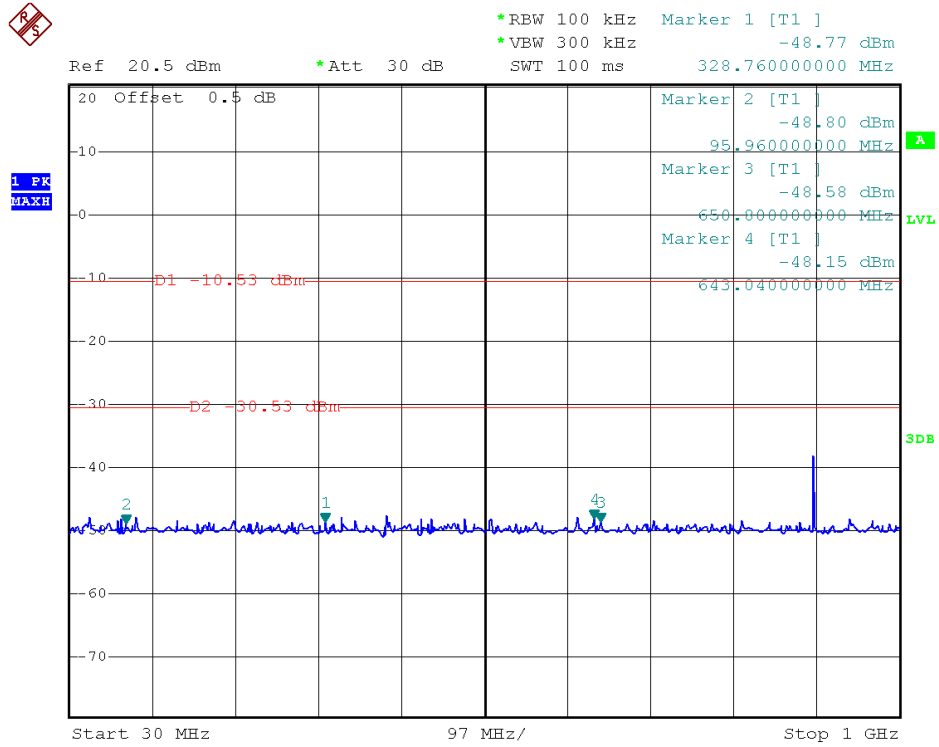
Note: the power of the Module transmitting frequency should be ignored.



(Plot 2.4 D1: Channel = 1, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 E1: Channel = 6, 30MHz to 25GHz@ 802.11g)



(Plot 2.4 F1: Channel = 11, 30MHz to 25GHz@ 802.11g)



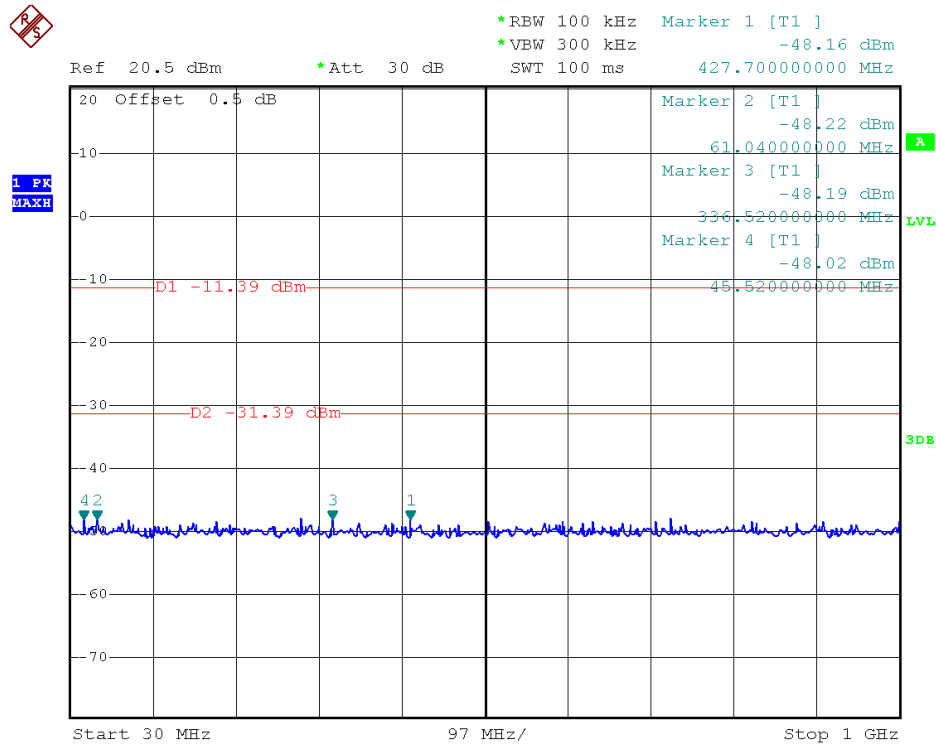
2.4.3.3 802.11n -20MHz Test mode

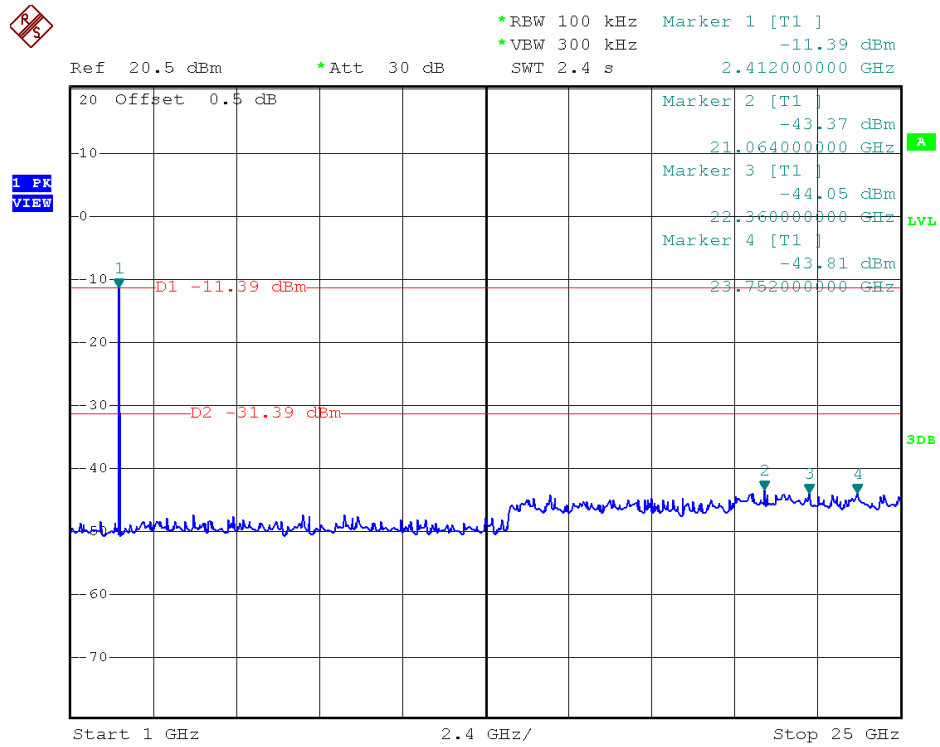
A. Test Verdict:

Channel	Frequency (MHz)	Refer to Plot	Limits (dBc)	Result
1	2412	Plot 2.4 G1	-20	PASS
6	2437	Plot 2.4 H1	-20	PASS
11	2462	Plot 2.4 I1	-20	PASS

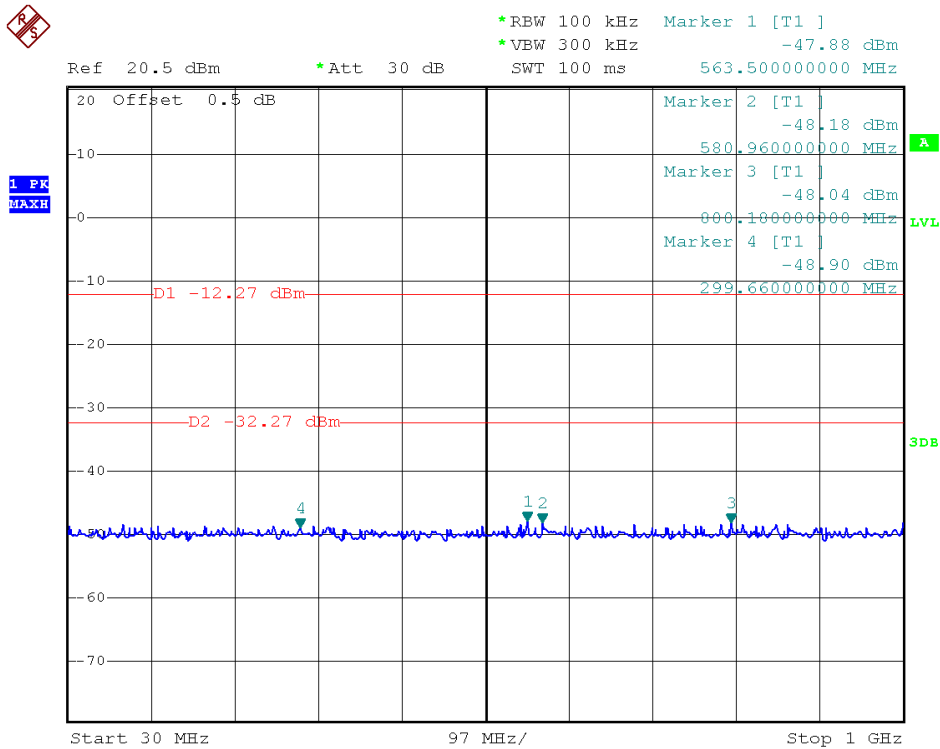
B. Test Plots:

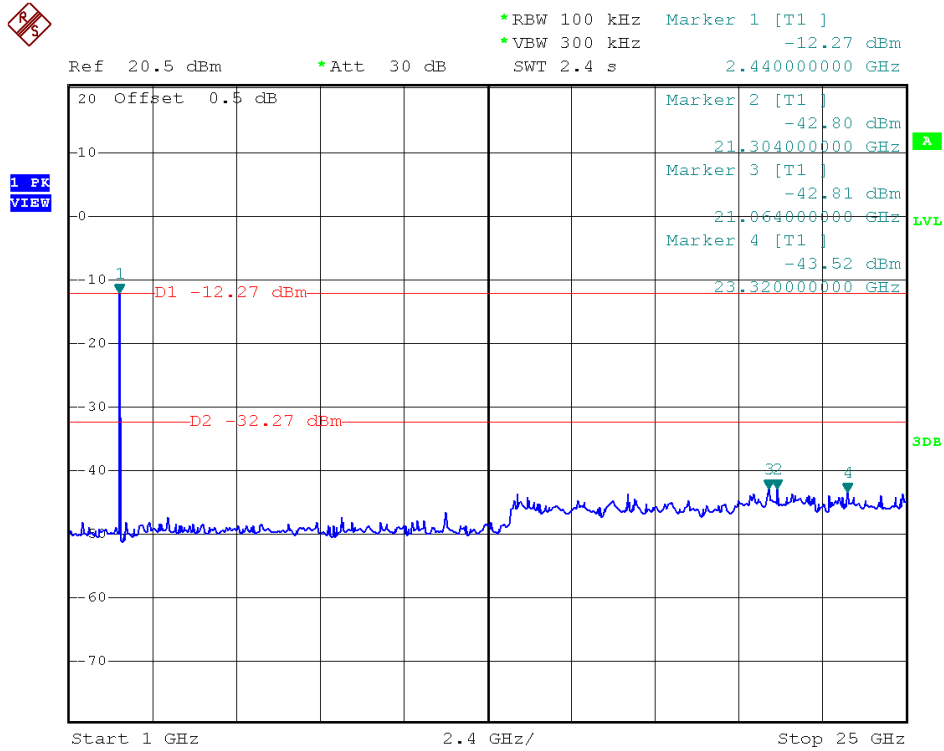
Note: the power of the Module transmitting frequency should be ignored.



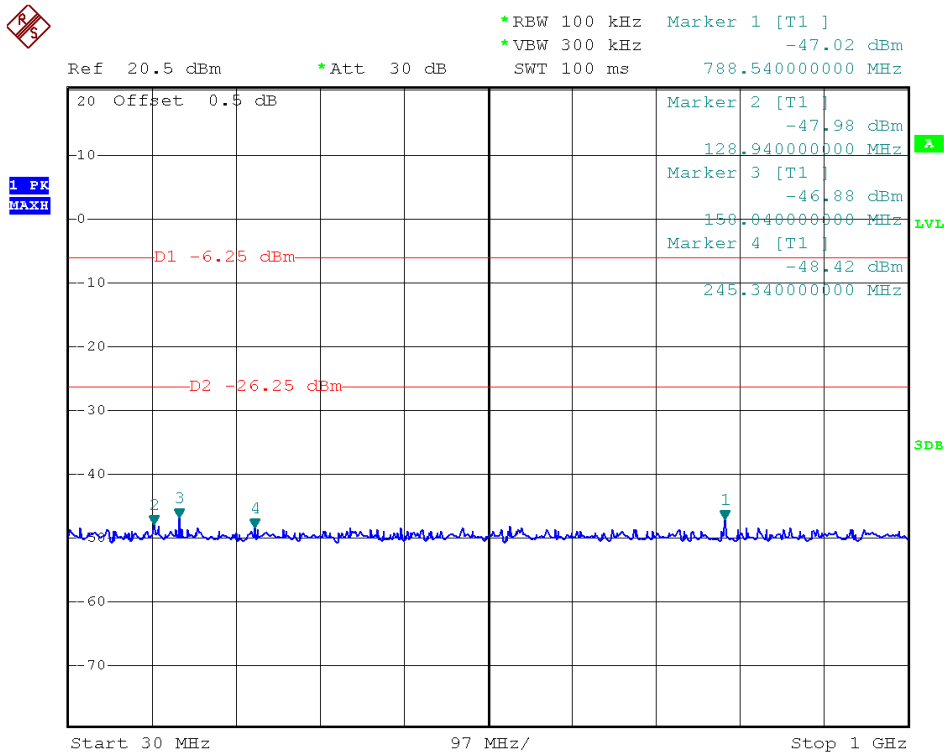


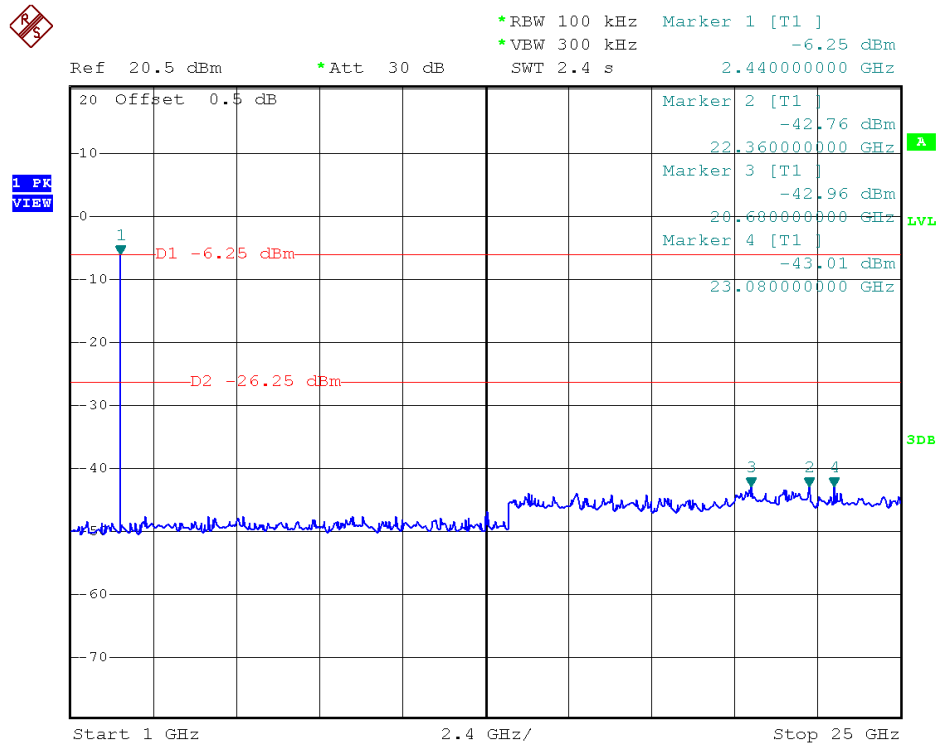
(Plot 2.4 G1: Channel = 1, 30MHz to 25GHz@ 802.11n-20)





(Plot 2.4 H1: Channel = 6, 30MHz to 25GHz@ 802.11n-20)





(Plot 2.4 I1: Channel = 11, 30MHz to 25GHz@ 802.11n-20)

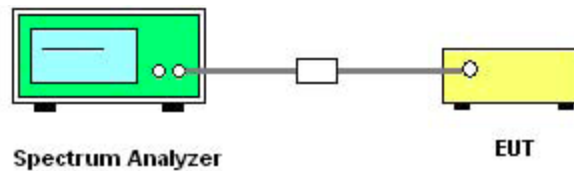
2.5 Power spectral density (PSD)

2.5.1 Requirement

The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

2.5.2 Test Description

A. Test Set:



The EUT which is powered by the Battery is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss and Atten as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Test Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.5.3 Test Result

The lowest, middle and highest channels are tested to verify the band edge emissions.



Bandwidth correction: $10\log(3\text{kHz}/100\text{kHz})=-15.2\text{dB}$

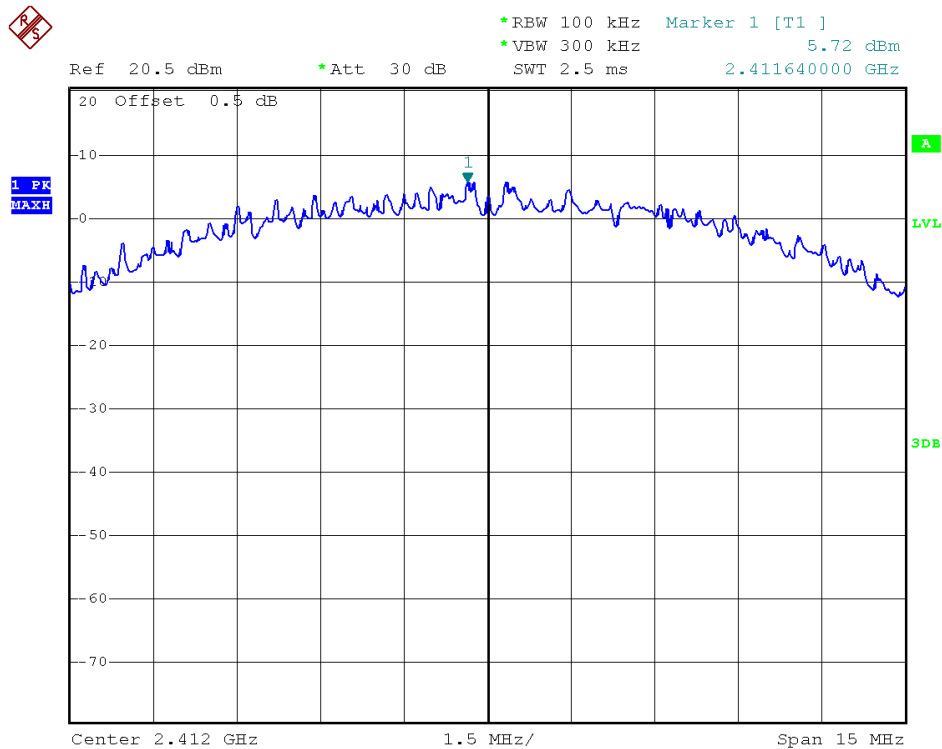
2.5.3.1 802.11b Test mode

A. Test Verdict:

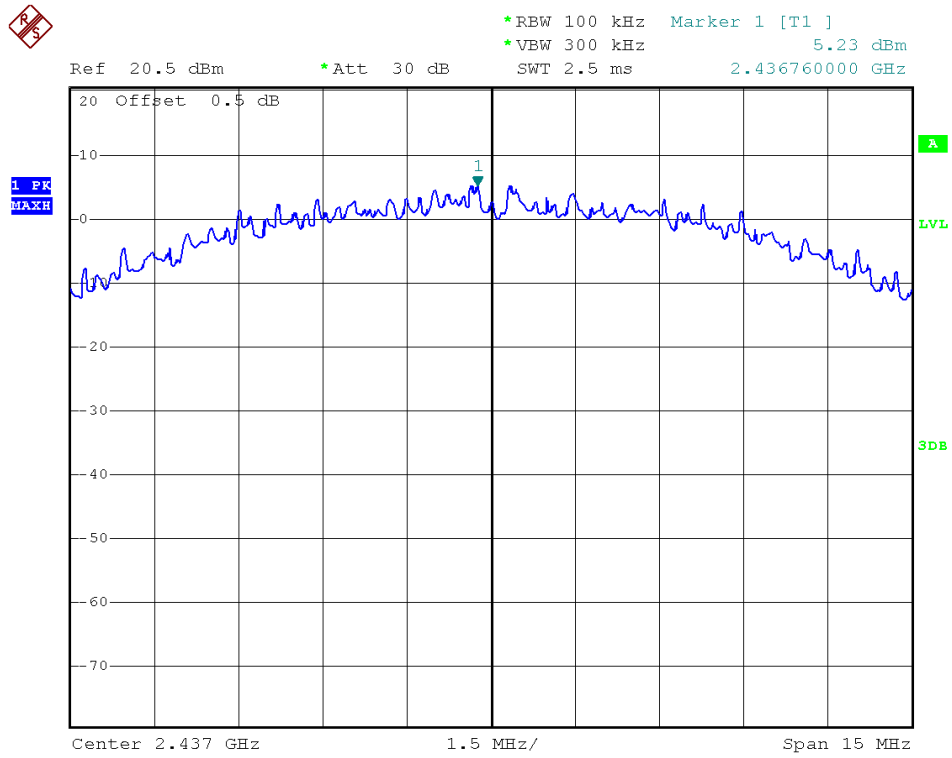
Spectral power density						
Channel	Frequency (MHz)	Measured PSD (dBm/100kHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	5.72	-9.48	Plot 2.5 A1	8	PASS
6	2437	5.23	-9.97	Plot 2.5 B1	8	PASS
11	2462	4.01	-11.19	Plot 2.5 C1	8	PASS

Measurement uncertainty: $\pm 1.3\text{dB}$

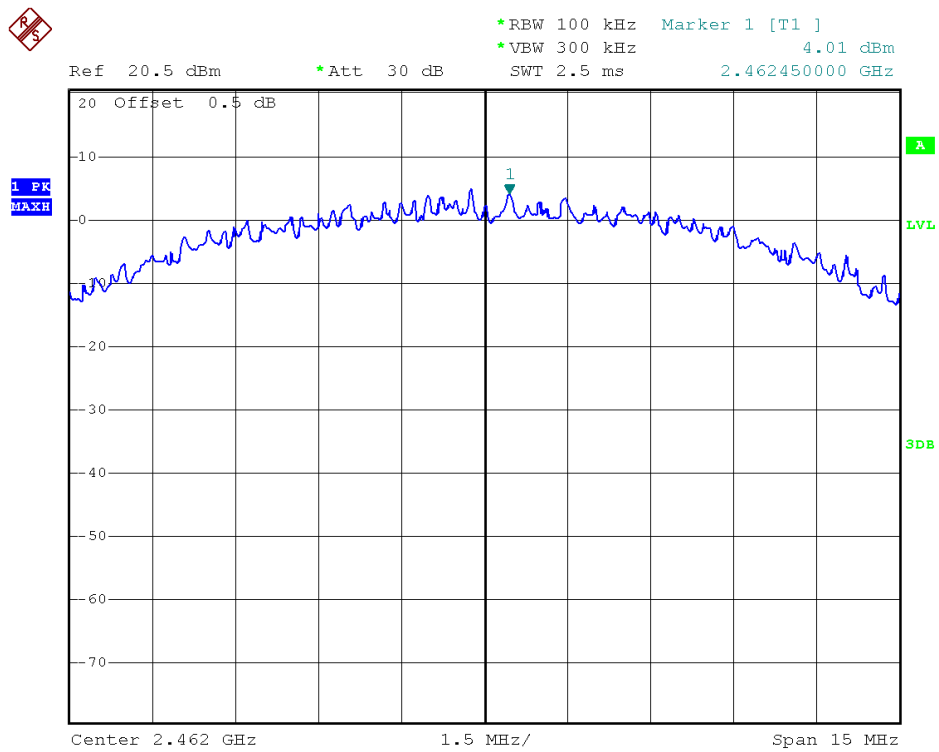
B. Test Plots:



(Plot 2.5 A1: Channel = 1 @ 802.11b)



(Plot 2.5 B1: Channel = 6 @ 802.11b)



(Plot 2.5 C1: Channel = 11 @ 802.11b)



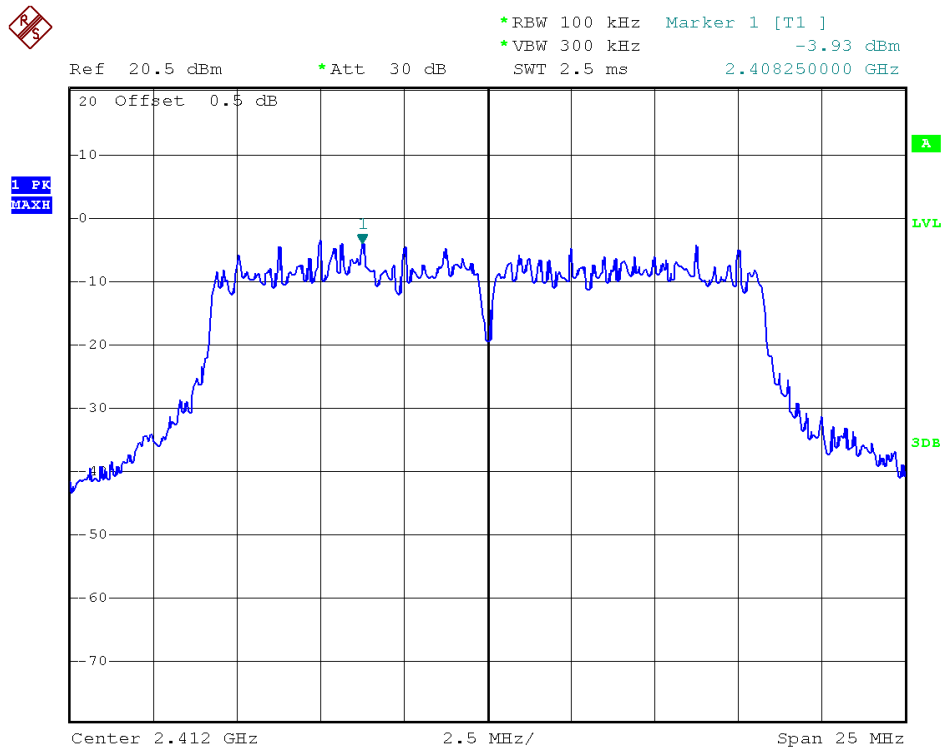
2.5.3.2 802.11g Test mode

A. Test Verdict:

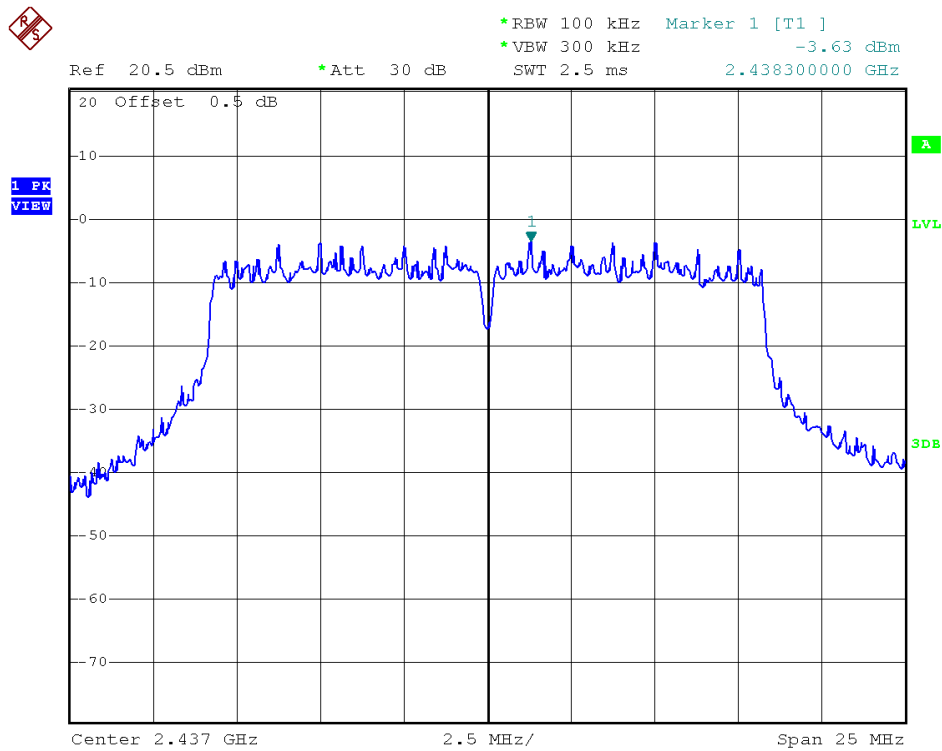
Spectral power density						
Channel	Frequency (MHz)	Measured PSD (dBm/100kHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-3.93	-19.13	Plot 2.5 D1	8	PASS
6	2437	-3.63	-18.83	Plot 2.5 E1	8	PASS
11	2462	-3.89	-19.09	Plot 2.5 F1	8	PASS

Measurement uncertainty: $\pm 1.3\text{dB}$

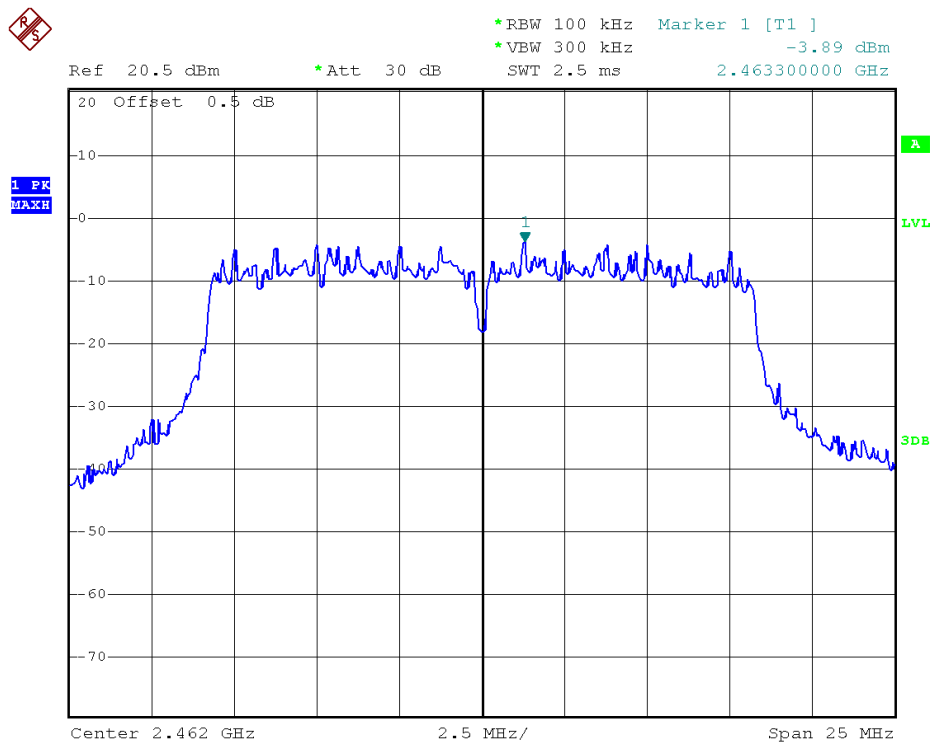
B. Test Plots:



(Plot 2.5 D1:Channel = 1 @ 802.11g)



(Plot 2.5 E1: Channel = 6 @ 802.11g)



(Plot 2.5 F1: Channel = 11 @ 802.11g)

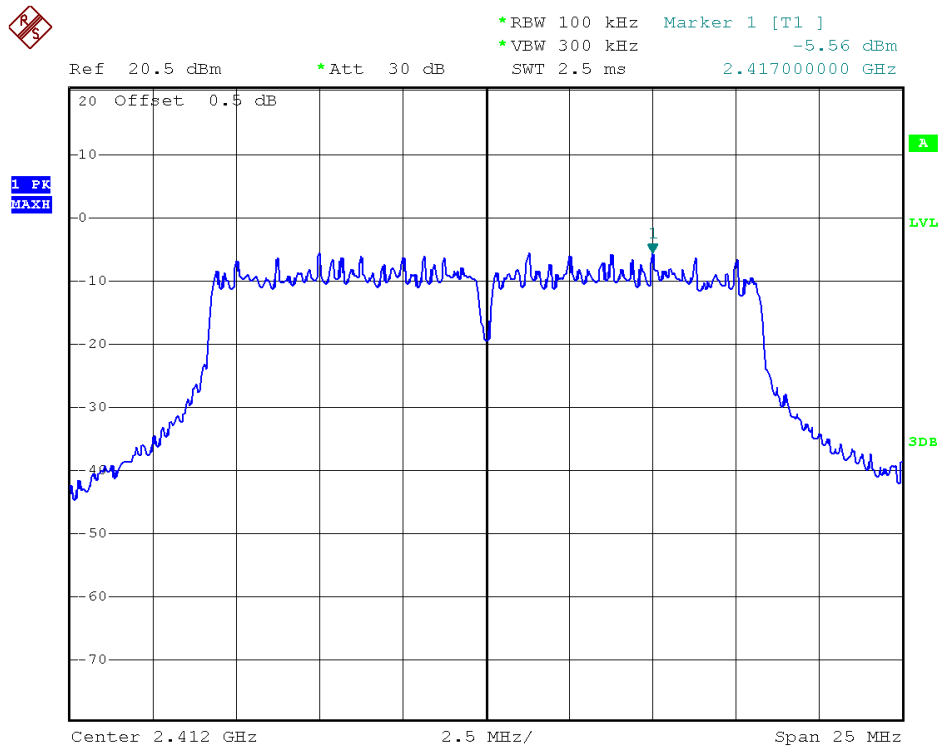
2.5.3.3 802.11n-20 Test mode

A. Test Verdict:

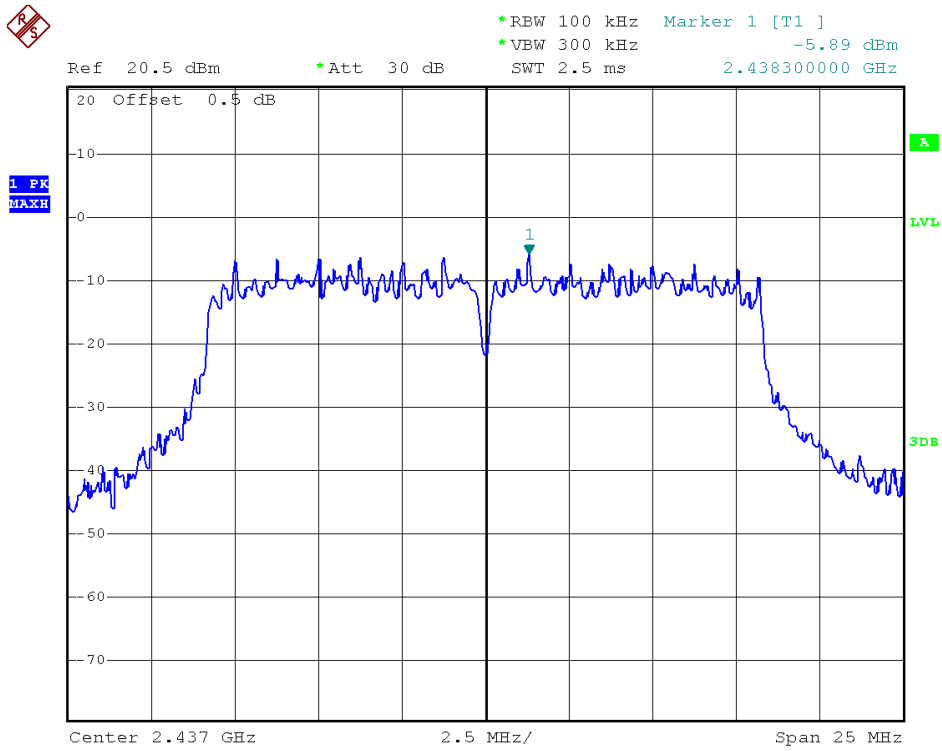
Spectral power density						
Channel	Frequency (MHz)	Measured PSD (dBm/100kHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
1	2412	-5.56	-20.76	Plot2.5 G1	8	PASS
6	2437	-5.89	-21.09	Plot2.5 H1	8	PASS
11	2462	-6.00	-21.20	Plot2.5 I1	8	PASS

Measurement uncertainty: ± 1.3 dB

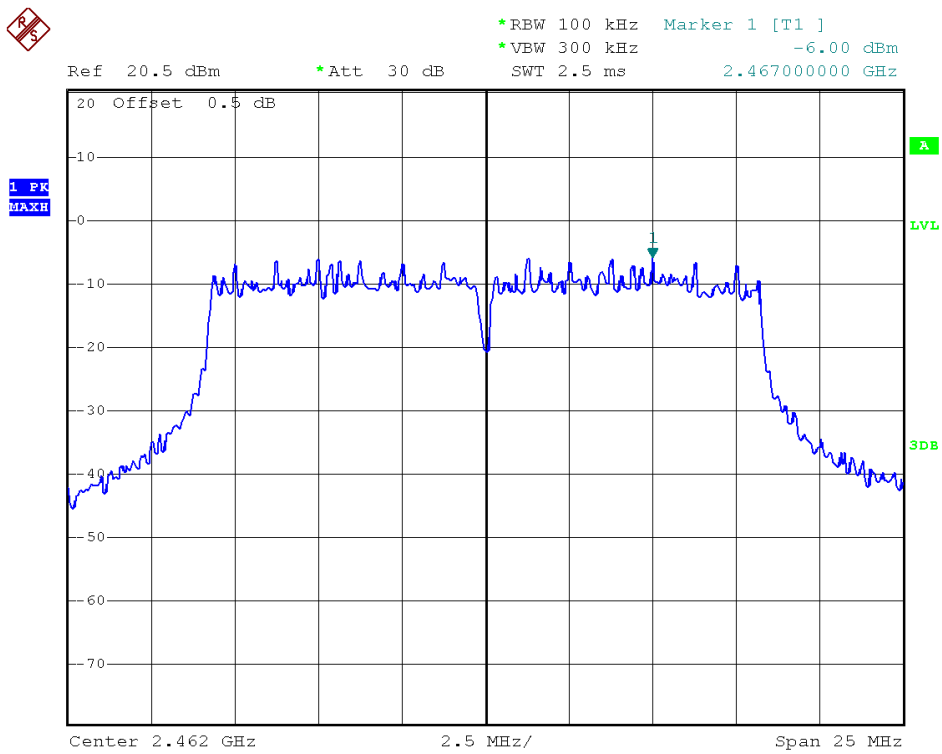
B. Test Plots:



(Plot 2.5 G1:Channel = 1 @ 802.11n-20)



(Plot 2.5 H1: Channel = 5 @ 802.11n-20)



(Plot 2.5 I1: Channel = 9 @ 802.11n-20)

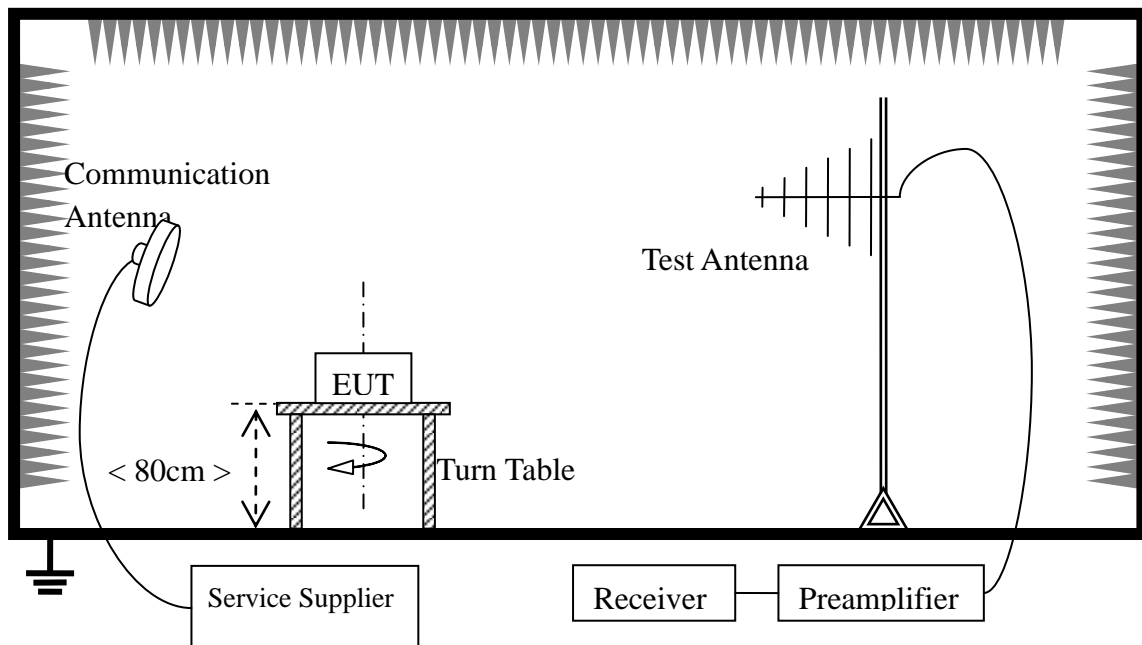
2.6 Band Edge

2.6.1 Requirement

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.6.2 Test Description

A. Test Setup



The Module of the EUT is powered by the Battery charged with the AC Adapter. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

**B. Equipments List:**

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2014.06.07	2015.06.06
Full-Anechoic Chamber	Albatross	12.8m*6.8m *6.4m	A0412372	2014.06.07	2015.06.06
Double ridge horn antenna	R&S	HF906	100150	2014.06.10	2015.06.09
Ultra-wideband antenna	R&S	HL562	100089	2014.06.10	2015.06.09
Ampilier 1G~18GHz	R&S	MITEQ AFS42-001 01800	25-S-42	2014.06.05	2015.06.04
Combiner	COM-MW Technology Co., Ltd.	ZPD-2M0.6 8-12-512	1411009803	2014.11.29	2015.11.28
Cable	SUNHNER	SUCOFLE X 100	/	2014.06.05	2015.06.04
Cable	SUNHNER	SUCOFLE X 104	/	2014.06.05	2015.06.04

2.6.3 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

For radiated test

RBW =1MHz ,VBW=3MHz PK detector for PK value ,

RBW=1MHz VBW=10Hz , PK detector for AV value

Trace = max hold

Allow the trace to stabilize

2.6.4 Test Result

Band edge were measurement for 802.11b,802.11g, 802.11n(20MHz) and 802.11n(40MHz) mode at difference date, recording worst case in test report.

Radiated band edge Measurement:



The lowest and highest channels are tested to verify the band edge emissions.

The measurement results are obtained as below:

$$E \text{ [dB}\mu \text{ V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

AT: Total correction Factor except Antenna

UR: Receiver Reading

G preamp: Preamplifier Gain

A Factor: Antenna Factor at 3m

NOTE 1: The red vertical lines “F1” in the following charts is to indicate the frequencies 2400MHz and 2483.5MHz respectively

NOTE 2: Both horizontal and vertical polarity direction of the test antenna has been performed, only the worst case recorded in this report.

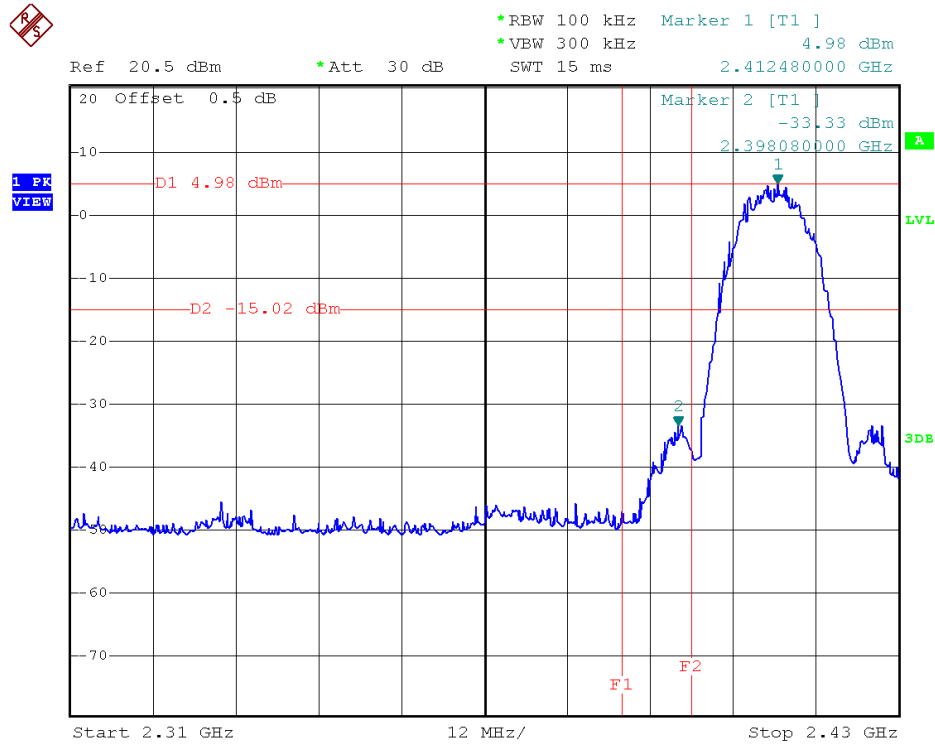
802.11b Test mode

Band edge – Radiated

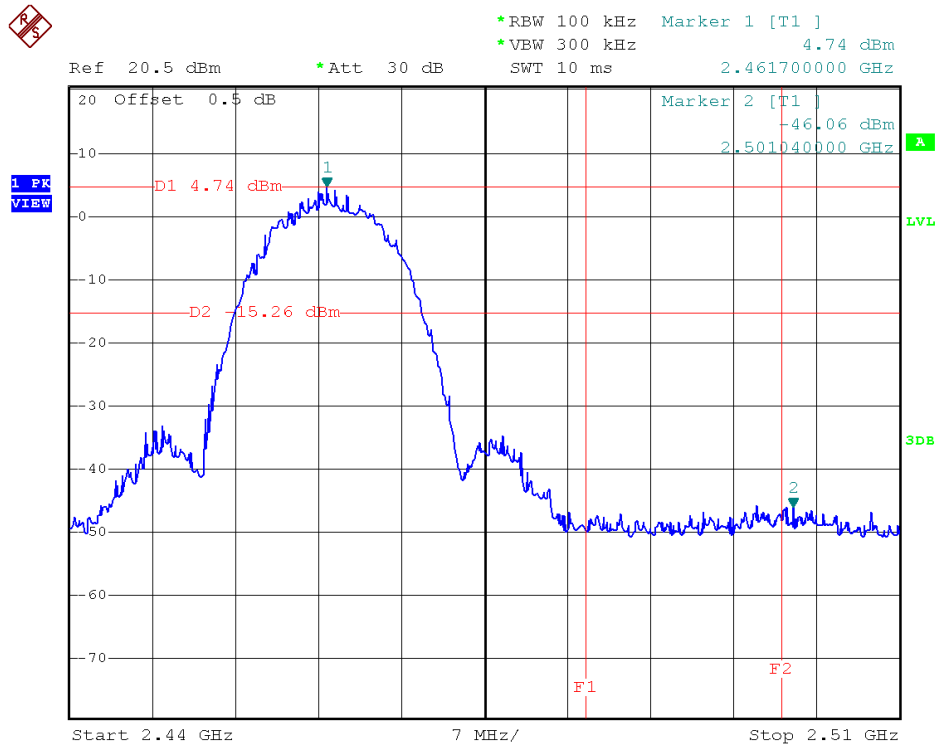
Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	A Factor (dB@3m)	Max. Emission E (dB μV/m)	Limit (dB μV/m)	Verdict
		PK/ AV						
1	2387.465	PK	54.89	-31.70	28.30	51.49	74.00	Pass
1	2387.465	AV	47.75	-31.70	28.30	44.35	54.00	Pass
11	2494.235	PK	54.41	-29.45	29.20	54.16	74.00	Pass
11	2494.235	AV	45.67	-29.45	29.20	45.42	54.00	Pass



Band edge - Conducted



Channel = 1 @ 802.11b



Channel = 11 @ 802.11b

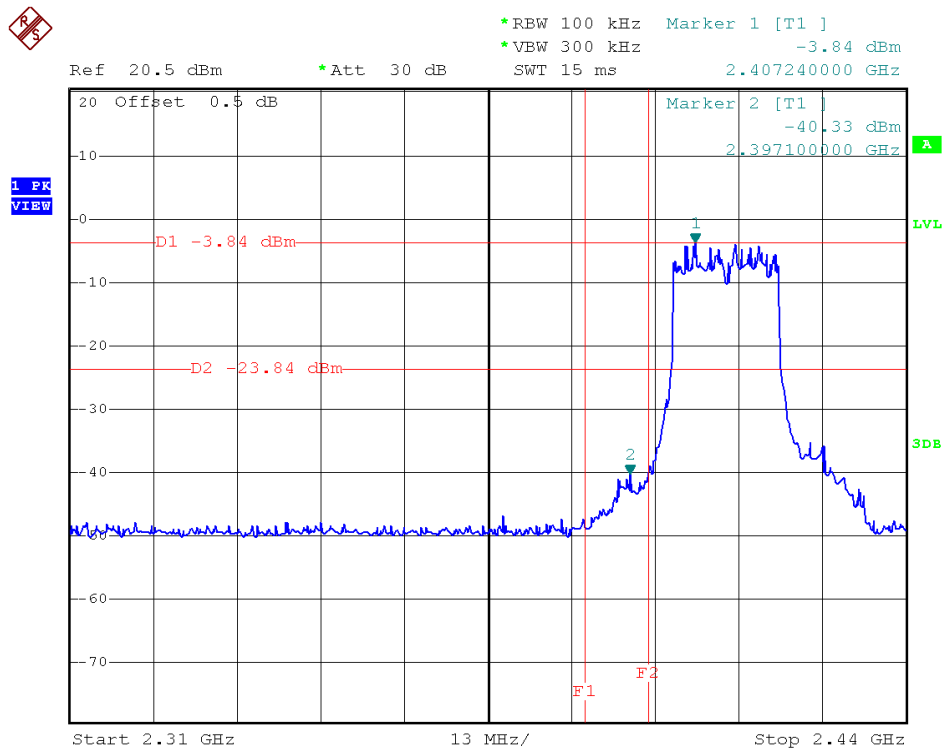


802.11g Test mode

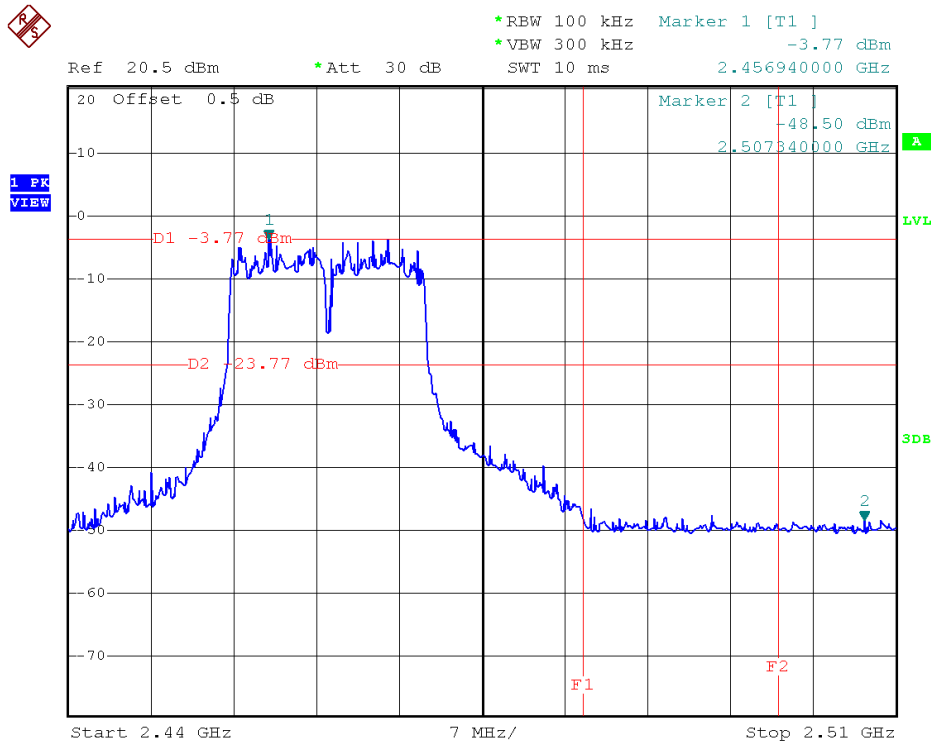
Band edge – Radiated

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dB μV/m)	Limit (dB μV/m)	Verdict
		PK/ AV						
1	2375.625	PK	53.31	-31.70	28.30	49.91	74.00	Pass
1	2375.625	AV	44.04	-31.70	28.30	40.64	54.00	Pass
11	2491.462	PK	52.54	-29.45	29.20	52.29	74.00	Pass
11	2491.462	AV	42.67	-29.45	29.20	42.42	54.00	Pass

Band edge - Conducted



Channel = 1 @ 802.11g



Channel = 11 @ 802.11g

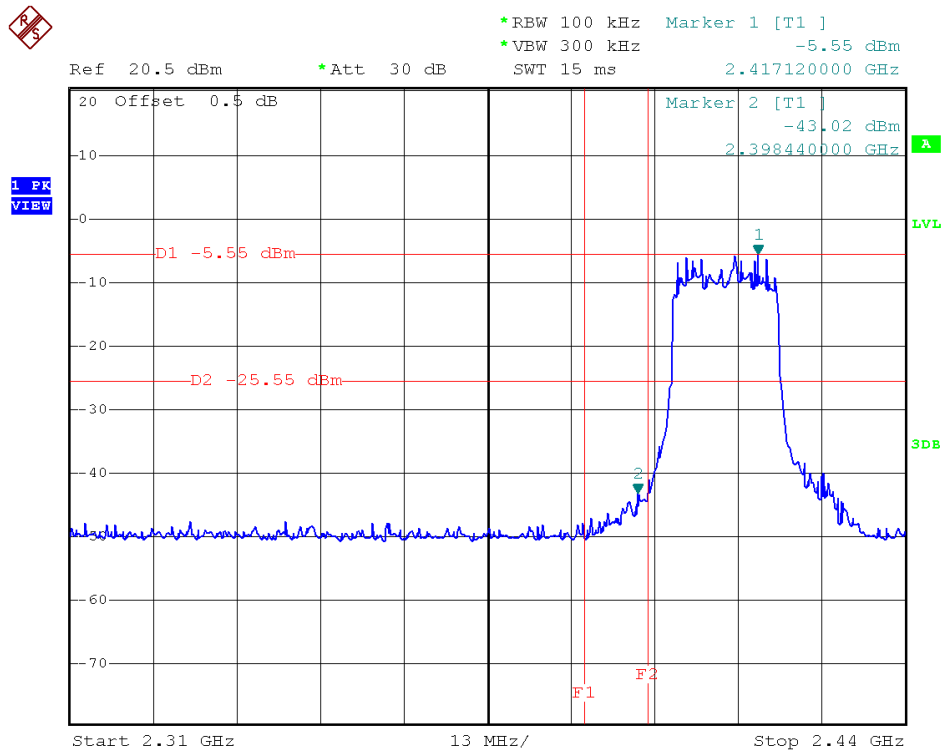
802.11n-20 Test mode

Band edge – Radiated

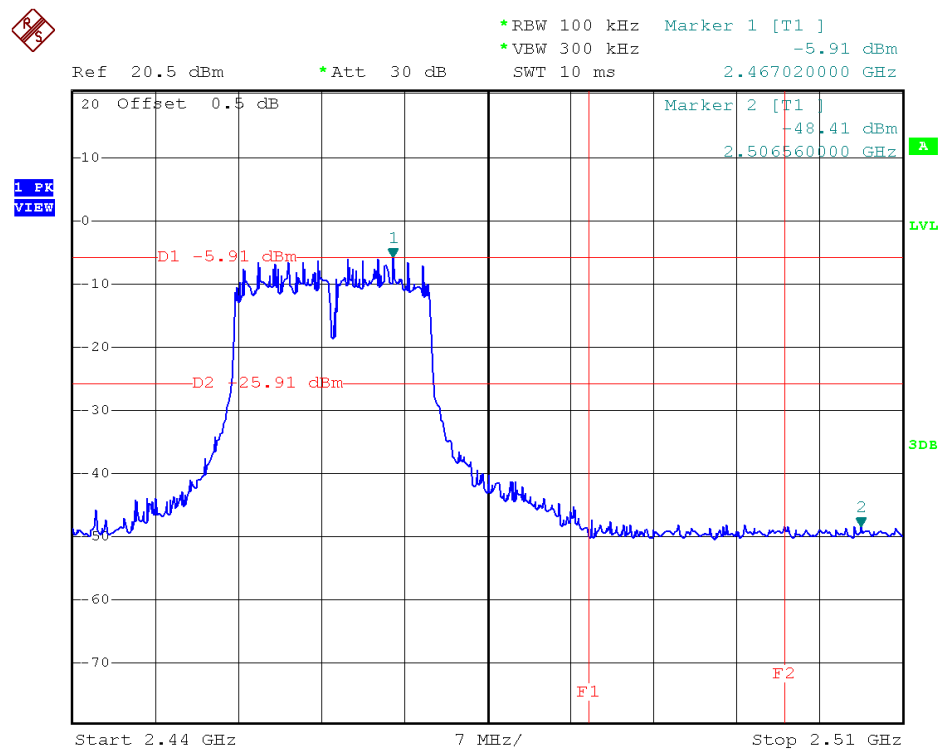
Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dB μV/m)	Limit (dB μV/m)	Verdict
		PK/ AV						
1	2398.159	PK	53.37	-31.70	28.30	49.97	74.00	Pass
1	2398.159	AV	43.05	-31.70	28.30	39.65	54.00	Pass
11	2485.351	PK	52.24	-29.45	29.20	51.99	74.00	Pass
11	2485.351	AV	42.31	-29.45	29.20	42.06	54.00	Pass



Band edge - Conducted



Channel = 1 @ 802.11n-20



Channel = 11 @ 802.11n-20

2.7 Conducted Emission

2.7.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

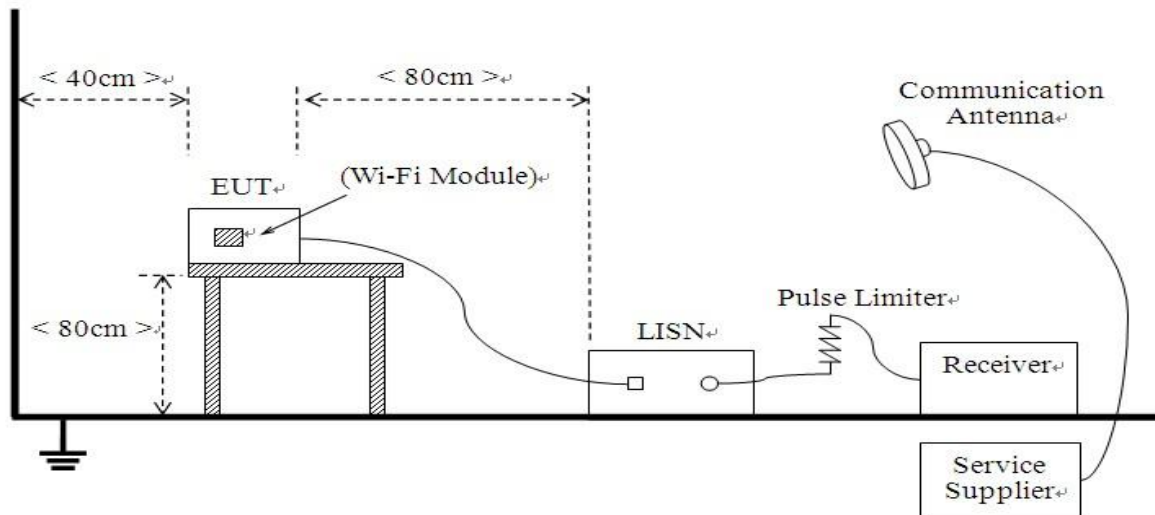
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2 Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009

The EUT is powered by a PC. The factors of the site are calibrated to correct the reading. During the measurement, the EUT is activated and controlled by the Wi-Fi Service Supplier (SS) via a Common Antenna.



B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Test Receiver	ROHDE&SCHWARZ	ESCS30	A0304260	2014.06.10	2015.06.09
LISN	ROHDE&SCHWARZ	ESH2-Z5	A0304221	2014.06.10	2015.06.09
Cable	MATCHING PAD	W7	/	2014.06.05	2015.06.04

2.7.3 Test Result

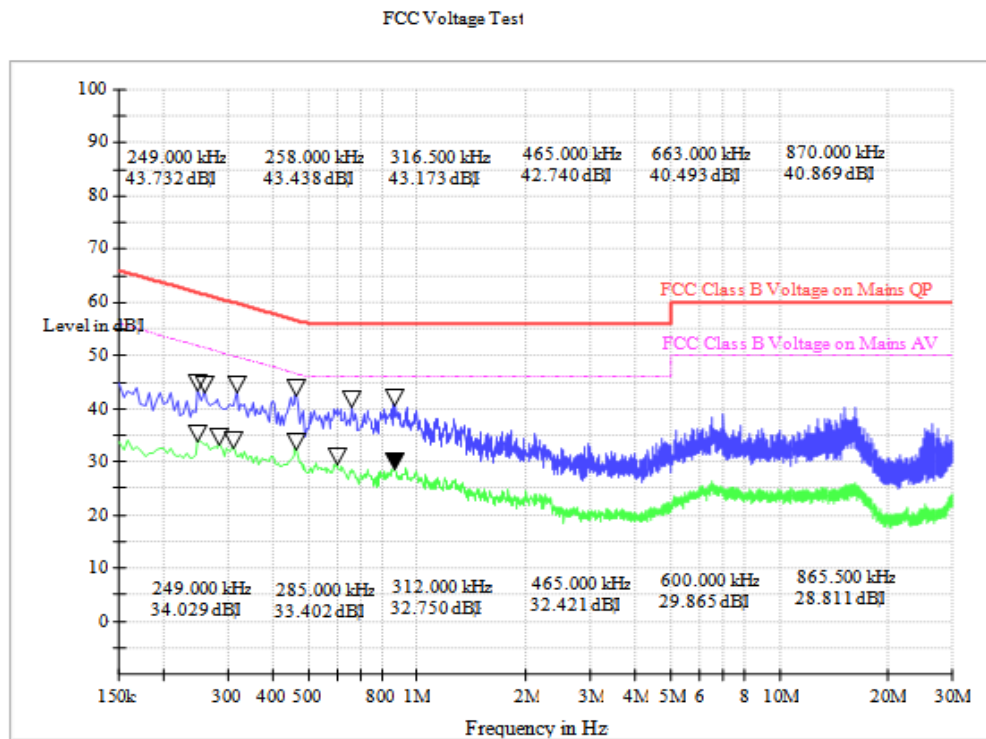
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Note: The worst case was selected to record in this test report.

A. Test setup:

The EUT configuration of the emission tests is EUT + Adapter.

B. Test Plots:



(Plot A: L Phase)



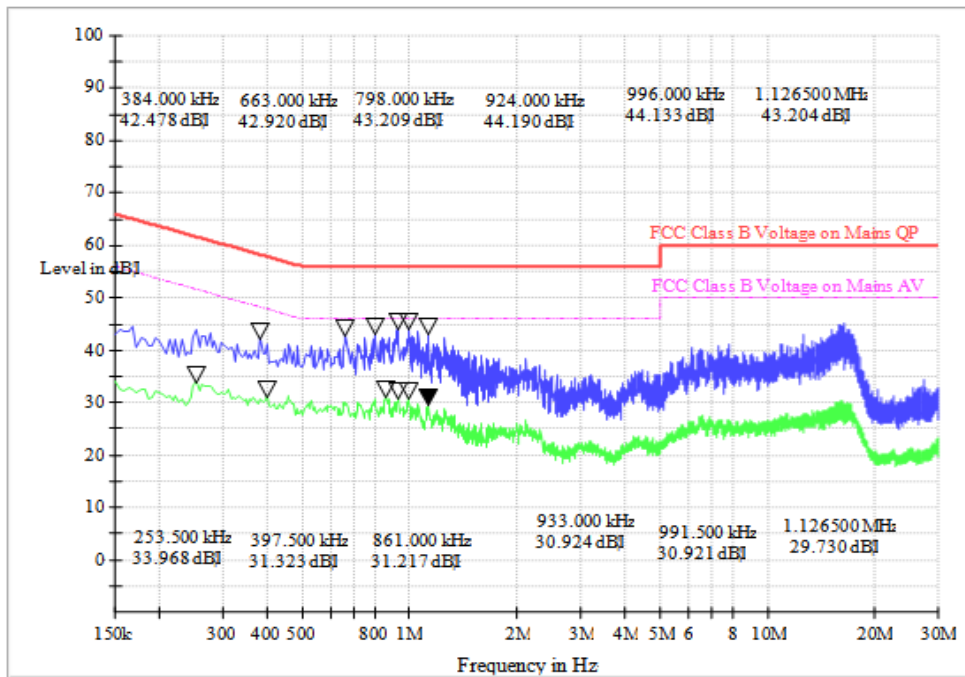
Conducted Disturbance at Mains Terminals

L Test Data

QP			AV		
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)
0.249	61.8	43.732	0.249	51.8	34.029
0.258	61.5	73.438	0.285	50.7	33.402
0.317	59.8	43.173	0.312	49.9	32.750
0.465	56.6	42.740	0.465	46.6	32.421
0.663	56.0	40.493	0.600	46.0	29.865
0.870	56.0	40.869	0.866	46.0	28.811

L Test Curve

FCC Voltage Test



(Plot B: N Phase)



Conducted Disturbance at Mains Terminals					
N Test Data					
QP			AV		
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)
0.384	58.2	42.478	0.254	51.6	33.968
0.663	56.0	42.920	0.398	47.9	31.323
0.789	56.0	43.209	0.861	46.0	31.217
0.924	56.0	44.190	0.933	46.0	30.924
0.996	56.0	44.133	0.992	46.0	30.921
1.127	56.0	43.204	1.127	46.0	29.730
N Test Curve					

Test Result: PASS



2.8 Radiated Emission

2.8.1 Requirement

According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Field Strength ($\text{dB } \mu\text{V}/\text{m}$)	Measurement Distance (m)
0.009 - 0.490	$2400/\text{F}(\text{kHz})$	$20\log(2400/\text{F}(\text{kHz}))+80$	300
0.490 - 1.705	$24000/\text{F}(\text{kHz})$	$20\log(24000/\text{F}(\text{kHz}))+40$	30
1.705 - 30.0	30	$20\log(30)+40$	30
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

Note:

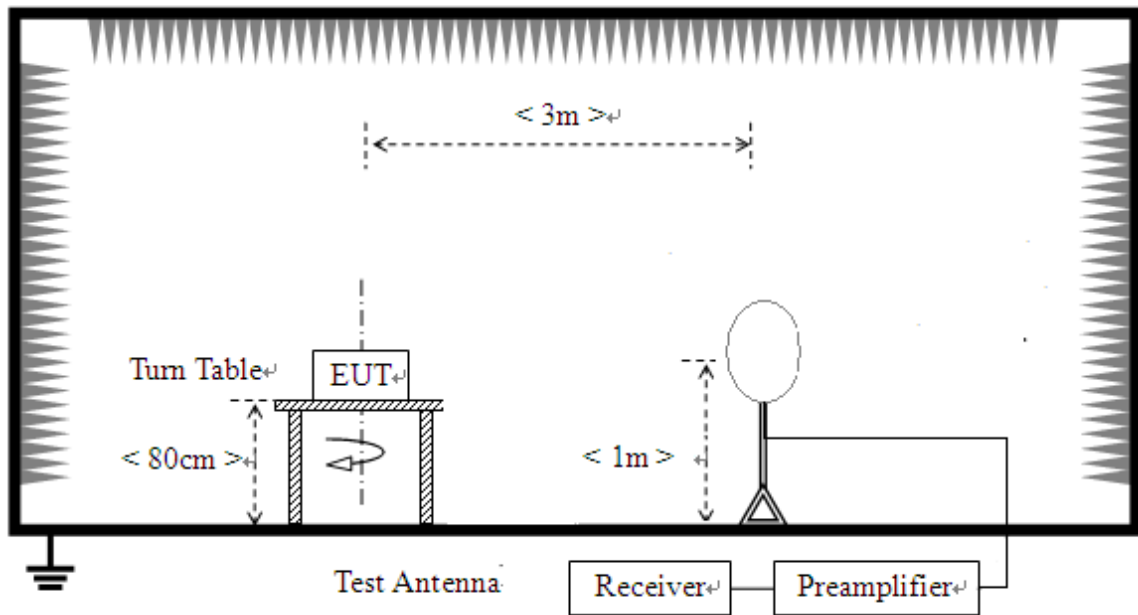
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

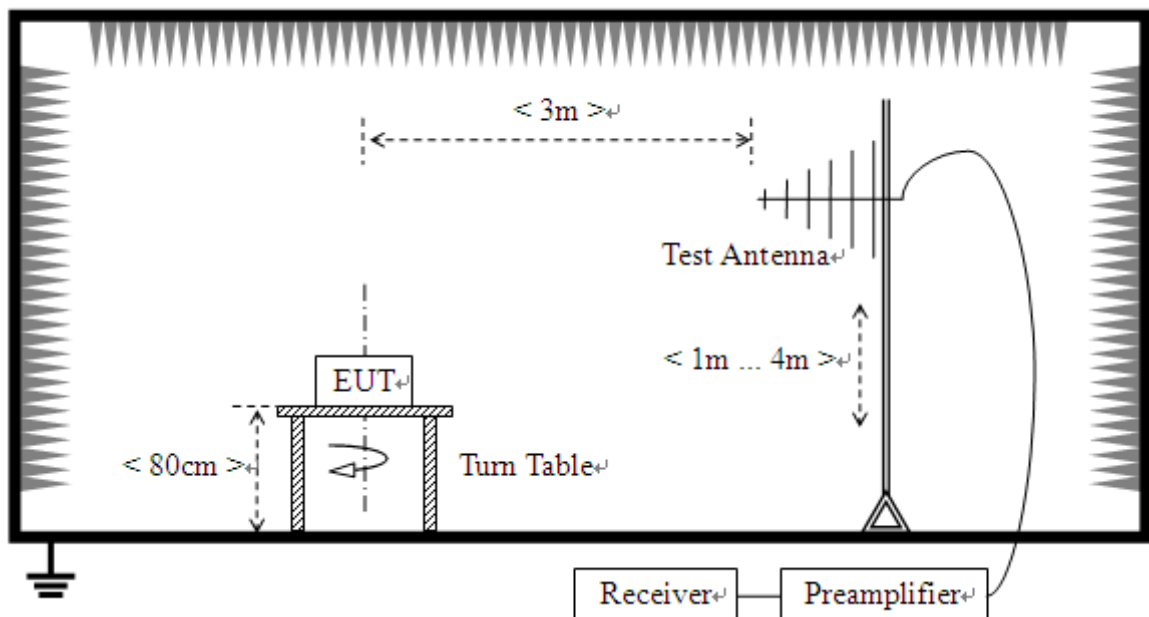
2.8.2 Test Description

A. Test Setup:

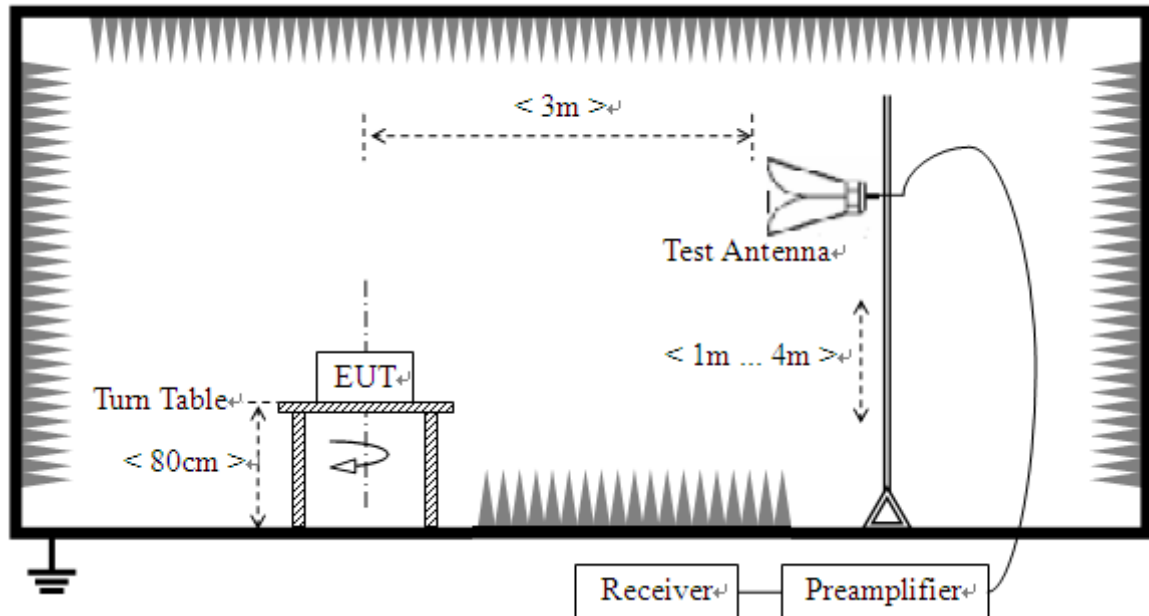
(1) For radiated emissions from 9kHz to 30MHz



(2) For radiated emissions from 30MHz to 1GHz



(3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The EUT was powered by the PC. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, the EUT is activated and controlled by the PC, set to operate under WIFI test mode.

For the Test Antenna:

- (a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.



B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2014.06.07	2015.06.06
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2014.06.07	2015.06.06
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2014.06.09	2015.06.08
Test Antenna - Horn	R&S	BBHA 9120D	9120C-963	2014.06.09	2015.06.08
Test Antenna - Horn	R&S	HF960	100150	2014.06.09	2015.06.08
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2014.06.05	2015.06.04
Test Antenna -Loop	Schwarzbeck	HFH2-Z2	100047	2014.06.02	2015.06.01
Ampilier 1G~18GHz	R&S	MITEQ AFS42-0010 1800	25-S-42	2014.06.05	2015.06.04
Ampilier 18G~40GHz	R&S	JS42-180026 00-28-5A	12111.0980.00	2014.06.05	2015.06.04
amplifier 20M~3GHz	R&S	PAP-0203H	22018	2014.06.10	2015.06.09
Cable	SUNHNER	SUCOFLEX 100	/	2014.06.05	2015.06.04
Cable	SUNHNER	SUCOFLEX 104	/	2014.06.05	2015.06.04

2.8.3 Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$$E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

$L_{Cable loss}$: Cable loss

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

The minimum clock frequency was 24MHz, the radiated frequency range from 9kHz to 25GHz.

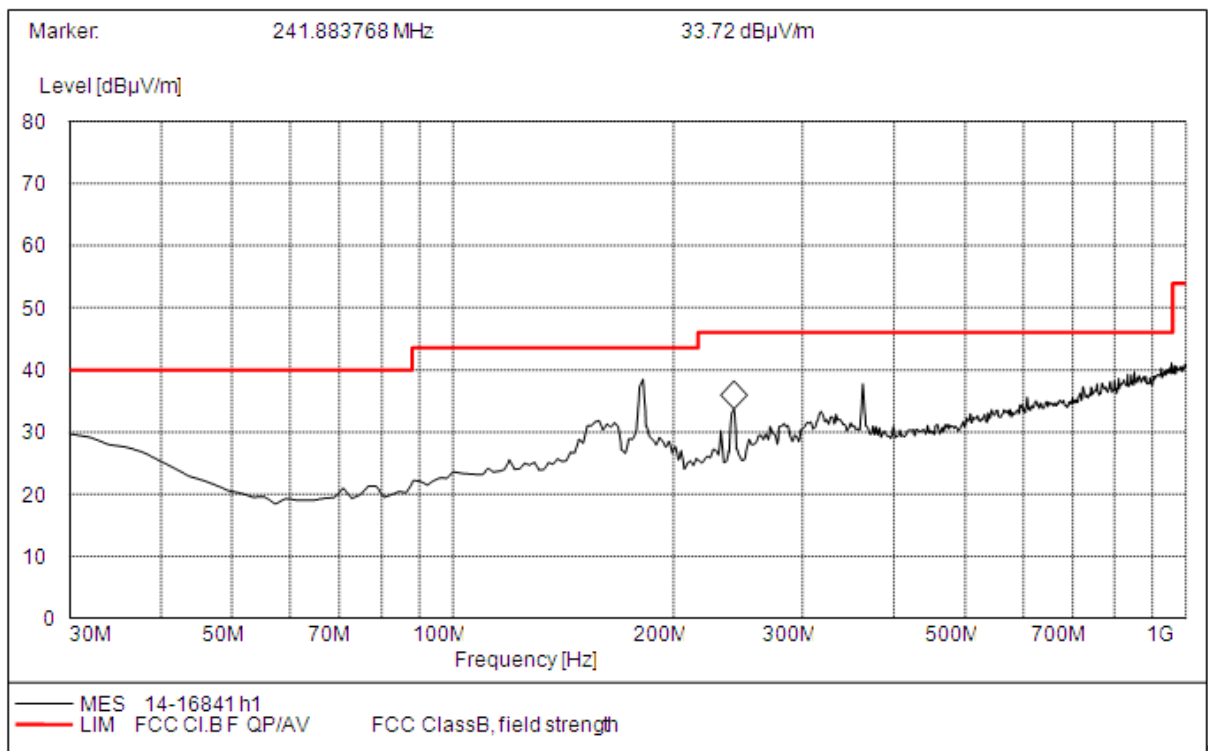
- Note:
1. The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channels, the worst case was selected to record in this report.
 2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
 3. HORN ANTENNA for the radiation emission test above 1G.

Test plots for the whole measurement frequency range:

For 9KHz to 30MHz

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

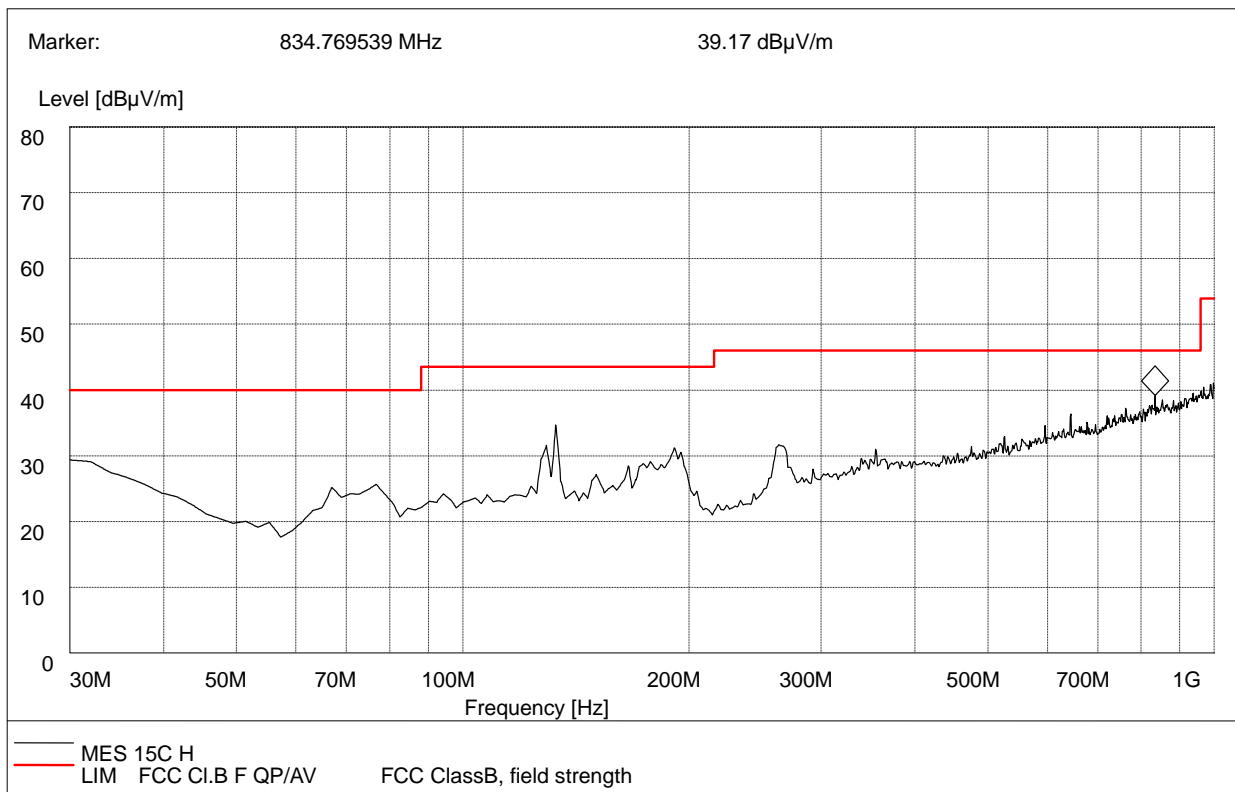
For 30MHz to 1000 MHz



(Plot A: 30MHz to 1GHz, Antenna Vertical)



Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Antenna	Verdict
181.36000	37.10	120.000	100.0	43.50	Vertical	Pass
241.45000	31.29	120.000	100.0	46.00	Vertical	Pass
362.22000	36.59	120.000	100.0	46.00	Vertical	Pass



(Plot B: 30MHz to 1GHz, Antenna Horizontal)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Antenna	Verdict
133.7200	33.17	120.000	100.0	43.5	Horizontal	Pass
834.7695	39.17	120.000	100.0	46.0	Horizontal	Pass



For 1GHz to 25GHz

802.11b Mode

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2412MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	108.63	PK	/	/	1.00 H	118	112.03	28.30	4.90	-36.60
1	*2412.00	97.89	AV	/	/	1.00 H	118	101.29	28.30	4.90	-36.60
2	4824.00	51.52	PK	74.00	22.48	1.00 H	24	48.32	32.70	7.00	-36.50
2	4824.00	45.84	AV	54.00	8.16	1.00 H	24	42.64	32.70	7.00	-36.50
3	7236.00	50.27	PK	74.00	23.73	1.00 H	107	40.87	35.80	8.90	-35.30
3	7236.00	42.98	AV	54.00	11.02	1.00 H	107	33.58	35.80	8.90	-35.30
4	9648.00	50.11	PK	74.00	23.89	1.00 H	39	37.51	37.20	10.20	-34.80
4	9648.00	44.37	AV	54.00	9.63	1.00 H	39	31.77	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2412MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	108.95	PK	/	/	1.00 V	109	112.35	28.30	4.90	-36.60
1	*2412.00	98.40	AV	/	/	1.00 V	109	101.80	28.30	4.90	-36.60
2	4824.00	52.07	PK	74.00	21.93	1.00 V	62	48.87	32.70	7.00	-36.50
2	4824.00	45.24	AV	54.00	8.76	1.00 V	62	42.04	32.70	7.00	-36.50
3	7236.00	50.91	PK	74.00	23.09	1.00 V	349	41.51	35.80	8.90	-35.30
3	7236.00	43.59	AV	54.00	10.41	1.00 V	349	34.19	35.80	8.90	-35.30
4	9648.00	54.40	PK	74.00	19.60	1.00 V	211	41.80	37.20	10.20	-34.80
4	9648.00	45.42	AV	54.00	8.58	1.00 V	211	32.82	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2437MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	106.95	PK	/	/	1.00 H	202	110.15	28.30	5.10	-36.60
1	*2437.00	99.28	AV	/	/	1.00 H	202	102.48	28.30	5.10	-36.60
2	4874.00	53.18	PK	74.00	20.82	1.00 H	187	49.78	32.30	7.60	-36.50
2	4874.00	47.42	AV	54.00	6.58	1.00 H	187	44.02	32.30	7.60	-36.50
3	7311.00	53.91	PK	74.00	20.09	1.00 H	107	44.51	36.10	8.60	-35.30
3	7311.00	47.61	AV	54.00	6.39	1.00 H	107	38.21	36.10	8.60	-35.30
4	9748.00	49.28	PK	74.00	24.72	1.00 H	144	36.68	37.20	10.20	-34.80
4	9748.00	42.82	AV	54.00	11.18	1.00 H	144	30.22	37.20	10.20	-34.80



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2437MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	107.86	PK	/	/	1.00 V	104	111.06	28.30	5.10	-36.60
1	*2437.00	97.23	AV	/	/	1.00 V	104	100.43	28.30	5.10	-36.60
2	4874.00	50.59	PK	74.00	23.41	1.00 V	304	47.19	32.30	7.60	-36.50
2	4874.00	47.37	AV	54.00	6.63	1.00 V	304	43.97	32.30	7.60	-36.50
3	7311.00	49.00	PK	74.00	25.00	1.00 V	203	39.60	36.10	8.60	-35.30
3	7311.00	46.50	AV	54.00	7.50	1.00 V	203	37.10	36.10	8.60	-35.30
4	9748.00	48.79	PK	74.00	25.21	1.00 V	172	36.19	37.20	10.20	-34.80
4	9748.00	43.86	AV	54.00	10.14	1.00 V	172	31.26	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	110.00	PK	/	/	1.00 H	325	113.30	28.60	4.70	-36.60
1	*2462.00	99.65	AV	/	/	1.00 H	325	102.95	28.60	4.70	-36.60
2	4924.00	51.96	PK	74.00	22.04	1.00 H	311	48.16	33.00	7.00	-36.20
2	4924.00	46.94	AV	54.00	7.06	1.00 H	311	43.14	33.00	7.00	-36.20
3	7386.00	49.93	PK	74.00	24.07	1.00 H	330	40.53	36.20	8.50	-35.30
3	7386.00	46.15	AV	54.00	7.85	1.00 H	330	36.75	36.20	8.50	-35.30
4	9848.00	50.98	PK	74.00	23.02	1.00 H	42	38.38	37.20	10.20	-34.80
4	9848.00	48.15	AV	54.00	5.85	1.00 H	42	35.55	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	112.14	PK	/	/	1.00 V	34	115.44	28.60	4.70	-36.60
1	*2462.00	99.33	AV	/	/	1.00 V	34	102.63	28.60	4.70	-36.60
2	4924.00	50.29	PK	74.00	23.71	1.00 V	55	46.49	33.00	7.00	-36.20
2	4924.00	42.93	AV	54.00	11.07	1.00 V	55	39.13	33.00	7.00	-36.20
3	7386.00	50.93	PK	74.00	23.07	1.00 V	258	41.53	36.20	8.50	-35.30
3	7386.00	47.34	AV	54.00	6.66	1.00 V	258	37.94	36.20	8.50	-35.30
4	9848.00	50.09	PK	74.00	23.91	1.00 V	254	37.49	37.20	10.20	-34.80
4	9848.00	47.97	AV	54.00	6.03	1.00 V	254	35.37	37.20	10.20	-34.80



802.11g Mode

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2412MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	108.87	PK	/	/	1.00 H	19	112.17	28.30	5.00	-36.60
1	*2412.00	98.87	AV	/	/	1.00 H	19	102.17	28.30	5.00	-36.60
2	4824.00	52.32	PK	74.00	21.68	1.00 H	321	48.52	32.70	7.30	-36.20
2	4824.00	47.16	AV	54.00	6.84	1.00 H	321	43.36	32.70	7.30	-36.20
3	7236.00	51.09	PK	74.00	22.91	1.00 H	207	41.69	35.80	8.90	-35.30
3	7236.00	47.73	AV	54.00	6.27	1.00 H	207	38.33	35.80	8.90	-35.30
4	9648.00	50.27	PK	74.00	23.73	1.00 H	304	37.67	37.20	10.20	-34.80
4	9648.00	43.81	AV	54.00	10.19	1.00 H	304	31.21	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2412MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	106.31	PK	/	/	1.00 V	174	109.61	28.30	5.00	-36.60
1	*2412.00	95.96	AV	/	/	1.00 V	174	99.26	28.30	5.00	-36.60
2	4824.00	53.25	PK	74.00	20.75	1.00 V	68	49.45	32.70	7.30	-36.20
2	4824.00	47.18	AV	54.00	6.82	1.00 V	68	43.38	32.70	7.30	-36.20
3	7236.00	51.82	PK	74.00	22.18	1.00 V	169	42.42	35.80	8.90	-35.30
3	7236.00	46.69	AV	54.00	7.31	1.00 V	169	37.29	35.80	8.90	-35.30
4	9648.00	49.92	PK	74.00	24.08	1.00 V	298	37.32	37.20	10.20	-34.80
4	9648.00	46.42	AV	54.00	7.58	1.00 V	298	33.82	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2437MHz)											
No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.01	PK	/	/	1.00 H	54	111.21	28.30	5.10	-36.60
1	*2437.00	97.32	AV	/	/	1.00 H	54	100.52	28.30	5.10	-36.60
2	4874.00	50.67	PK	74.00	23.33	1.00 H	117	47.27	32.80	7.10	-36.50
2	4874.00	46.21	AV	54.00	7.79	1.00 H	117	42.81	32.80	7.10	-36.50
3	7311.00	49.52	PK	74.00	24.48	1.00 H	328	40.12	36.10	8.60	-35.30
3	7311.00	44.62	AV	54.00	9.38	1.00 H	328	35.22	36.10	8.60	-35.30
4	9748.00	50.73	PK	74.00	23.27	1.00 H	19	38.13	37.20	10.20	-34.80
4	9748.00	44.67	AV	54.00	9.33	1.00 H	19	32.07	37.20	10.20	-34.80



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2437MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	107.78	PK	/	/	1.00 V	122	110.98	28.30	5.10	-36.60
1	*2437.00	97.35	AV	/	/	1.00 V	122	100.55	28.30	5.10	-36.60
2	4874.00	51.57	PK	74.00	22.43	1.00 V	156	48.17	32.80	7.10	-36.50
2	4874.00	46.78	AV	54.00	7.22	1.00 V	156	43.38	32.80	7.10	-36.50
3	7311.00	49.77	PK	74.00	24.23	1.00 V	98	40.37	36.10	8.60	-35.30
3	7311.00	45.64	AV	54.00	8.36	1.00 V	98	36.24	36.10	8.60	-35.30
4	9748.00	48.67	PK	74.00	25.33	1.00 V	197	36.07	37.20	10.20	-34.80
4	9748.00	44.68	AV	54.00	9.32	1.00 V	197	32.08	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	106.75	PK	/	/	1.00 V	103	110.05	28.20	5.10	-36.60
1	*2462.00	99.44	AV	/	/	1.00 V	103	102.74	28.20	5.10	-36.60
2	4924.00	50.76	PK	74.00	23.24	1.00 V	342	46.96	33.00	7.00	-36.20
2	4924.00	43.69	AV	54.00	10.31	1.00 V	342	39.89	33.00	7.00	-36.20
3	7386.00	50.59	PK	74.00	23.41	1.00 V	179	41.19	36.20	8.50	-35.30
3	7386.00	45.63	AV	54.00	8.37	1.00 V	179	36.23	36.20	8.50	-35.30
4	9848.00	49.81	PK	74.00	24.19	1.00 V	293	37.21	37.30	10.10	-34.80
4	9848.00	45.41	AV	54.00	8.59	1.00 V	293	32.81	37.30	10.10	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	107.10	PK	/	/	1.00 H	220	110.40	28.20	5.10	-36.60
1	*2462.00	97.63	AV	/	/	1.00 H	220	100.93	28.20	5.10	-36.60
2	4924.00	51.86	PK	74.00	22.14	1.00 H	343	48.06	33.00	7.00	-36.20
2	4924.00	46.82	AV	54.00	7.18	1.00 H	343	43.02	33.00	7.00	-36.20
3	7386.00	50.16	PK	74.00	23.84	1.00 H	135	40.76	36.20	8.50	-35.30
3	7386.00	46.21	AV	54.00	7.79	1.00 H	135	36.81	36.20	8.50	-35.30
4	9848.00	48.08	PK	74.00	25.92	1.00 H	177	35.48	37.30	10.10	-34.80
4	9848.00	43.77	AV	54.00	10.23	1.00 H	177	31.17	37.30	10.10	-34.80



802.11n-20 Mode

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2412MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	106.35	PK	/	/	1.00 H	71	109.65	28.30	5.00	-36.60
1	*2412.00	96.56	AV	/	/	1.00 H	71	99.86	28.30	5.00	-36.60
2	4824.00	51.32	PK	74.00	22.68	1.00 H	150	47.52	32.70	7.30	-36.20
2	4824.00	45.19	AV	54.00	8.81	1.00 H	150	41.39	32.70	7.30	-36.20
3	7236.00	50.17	PK	74.00	23.83	1.00 H	337	40.77	35.80	8.90	-35.30
3	7236.00	46.32	AV	54.00	7.68	1.00 H	337	36.92	35.80	8.90	-35.30
4	9648.00	49.83	PK	74.00	24.17	1.00 H	12	37.23	37.20	10.20	-34.80
4	9648.00	44.49	AV	54.00	9.51	1.00 H	12	31.89	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2412MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2412.00	109.07	PK	/	/	1.00 V	189	112.37	28.30	5.00	-36.60
1	*2412.00	97.93	AV	/	/	1.00 V	189	101.23	28.30	5.00	-36.60
2	4824.00	50.40	PK	74.00	23.60	1.00 V	96	46.60	32.70	7.30	-36.20
2	4824.00	44.33	AV	54.00	9.67	1.00 V	96	40.53	32.70	7.30	-36.20
3	7236.00	51.07	PK	74.00	22.93	1.00 V	233	41.67	35.80	8.90	-35.30
3	7236.00	47.76	AV	54.00	6.24	1.00 V	233	38.36	35.80	8.90	-35.30
4	9648.00	48.71	PK	74.00	25.29	1.00 V	304	36.11	37.20	10.20	-34.80
4	9648.00	44.96	AV	54.00	9.04	1.00 V	304	32.36	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2437MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.03	PK	/	/	1.00 H	349	111.23	28.30	5.10	-36.60
1	*2437.00	99.12	AV	/	/	1.00 H	349	102.32	28.30	5.10	-36.60
2	4874.00	52.08	PK	74.00	21.92	1.00 H	309	48.68	32.30	7.60	-36.50
2	4874.00	48.33	AV	54.00	5.67	1.00 H	309	44.93	32.30	7.60	-36.50
3	7311.00	51.42	PK	74.00	22.58	1.00 H	188	42.02	36.10	8.60	-35.30
3	7311.00	48.30	AV	54.00	5.70	1.00 H	188	38.90	36.10	8.60	-35.30
4	9748.00	49.73	PK	74.00	24.27	1.00 H	74	37.13	37.20	10.20	-34.80
4	9748.00	46.01	AV	54.00	7.99	1.00 H	74	33.41	37.20	10.20	-34.80



ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2437MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2437.00	108.83	PK	/	/	1.00 V	205	112.03	28.30	5.10	-36.60
1	*2437.00	98.51	AV	/	/	1.00 V	205	101.71	28.30	5.10	-36.60
2	4874.00	52.85	PK	74.00	21.15	1.00 V	262	49.45	32.30	7.60	-36.50
2	4874.00	48.63	AV	54.00	5.37	1.00 V	262	45.23	32.30	7.60	-36.50
3	7311.00	51.50	PK	74.00	22.50	1.00 V	338	42.10	36.10	8.60	-35.30
3	7311.00	45.96	AV	54.00	8.04	1.00 V	338	36.56	36.10	8.60	-35.30
4	9748.00	50.37	PK	74.00	23.63	1.00 V	152	37.77	37.20	10.20	-34.80
4	9748.00	42.31	AV	54.00	11.69	1.00 V	152	29.71	37.20	10.20	-34.80

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n-20--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	108.21	PK	/	/	1.00 H	235	111.51	28.20	5.10	-36.60
1	*2462.00	99.59	AV	/	/	1.00 H	235	102.89	28.20	5.10	-36.60
2	4924.00	51.78	PK	74.00	22.22	1.00 H	104	47.98	33.00	7.00	-36.20
2	4924.00	46.27	AV	54.00	7.73	1.00 H	104	42.47	33.00	7.00	-36.20
3	7386.00	51.42	PK	74.00	22.58	1.00 H	329	42.02	36.20	8.50	-35.30
3	7386.00	46.17	AV	54.00	7.83	1.00 H	329	36.77	36.20	8.50	-35.30
4	9848.00	51.85	PK	74.00	22.15	1.00 H	190	39.25	37.30	10.10	-34.80
4	9848.00	46.02	AV	54.00	7.98	1.00 H	190	33.42	37.30	10.10	-34.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n-20--2462MHz)

No.	Frequency (MHz)	Emssion Level		Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor	Cable Factor	Pre-amplifier
1	*2462.00	109.29	PK	/	/	1.00 V	176	112.59	28.20	5.10	-36.60
1	*2462.00	99.44	AV	/	/	1.00 V	176	102.74	28.20	5.10	-36.60
2	4924.00	50.02	PK	74.00	23.98	1.00 V	117	46.22	33.00	7.00	-36.20
2	4924.00	44.31	AV	54.00	9.69	1.00 V	117	40.51	33.00	7.00	-36.20
3	7386.00	51.26	PK	74.00	22.74	1.00 V	294	41.86	36.20	8.50	-35.30
3	7386.00	47.21	AV	54.00	6.79	1.00 V	294	37.81	36.20	8.50	-35.30
4	9848.00	49.59	PK	74.00	24.41	1.00 V	84	36.99	37.30	10.10	-34.80
4	9848.00	43.54	AV	54.00	10.46	1.00 V	84	30.94	37.30	10.10	-34.80



- REMARKS:**
1. Emission level (dBuV/m) =Raw Value (dBuV) +Antenna Factor (dB/m) + Cable Factor (dB) +Pre-amplifier Factor
 2. The other emission levels were more than 20dB below the permissible value has no need to be reported.
 3. The other emission levels were more than 20dB below the permissible value has no need to be reported.
 4. Margin value = Limit value- Emission level.
 5. The limit value is defined as per 15.247
 6. “ * ” : Fundamental frequency

**** END OF REPORT ****