FCC Radio Test Report

FCC ID: 2ABQJ-SP360

Original Grant

Report No.	:	TB-FCC139063
Applicant	:	Shenzhen Sinopine Technology Co., Ltd
Equipment Under Test (EUT)		
EUT Name	:	Network Camera
Model No.	:	SP360
Serial No.	:	SP360PIR, SP370, SP380, SP390
Brand Name	:	Sinopine
Receipt Date	:	2013-12-10
Test Date	:	2013-12-11 to 2014-01-20
Issue Date	:	2014-02-10
Standards	:	FCC Part 15, Subpart C (15.247:2011)
Test Method	:	ANSI C63.4:2003
Conclusions	:	**PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC and IC requirements

Test/Witness Engineer : 

Approved& Authorized : 

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

1.1 Client Information

Applicant	:	Shenzhen Sinopine Technology Co., Ltd
Address	:	D Building, Huafeng Industrial Zone, Hangcheng Boulevard, Gushu Village, Xixiang Town, Bao'an District, Shenzhen City, China
Manufacturer	:	Shenzhen Sinopine Technology Co., Ltd
Address	:	D Building, Huafeng Industrial Zone, Hangcheng Boulevard, Gushu Village, Xixiang Town, Bao'an District, Shenzhen City, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Network Camera	
Models No.	:	SP360, SP360PIR, SP370, SP380, SP390	
Model Difference	:	The different models are identical in schematic, structure and critical component, the only different is the appearance.	
Product Description	:	Operation Frequency: 802.11b/g/n(HT20): 2412MHz~2462MHz	
		Number of Channel:	802.11b/g/n(HT20):11 channels **see note(3)**
		RF Output Power:	802.11b: 17.12 dBm 802.11g: 15.23 dBm 802.11n (HT20): 14.47 dBm
		Antenna Gain:	2 dBi (Integral Antenna)
		Modulation Type:	802.11b: DSSS (CCK, QPSK, BPSK) 802.11g: OFDM 802.11n: OFDM
		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:up to 150Mbps
Power Supply	:	DC Voltage supplied from AC/DC adapter	
Power Rating	:	AC/DC adapter : Input: 100~240V 50/60Hz 0.4A Output: 12V 1A	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

(1) This Test Report is FCC Part 15.247 for 802.11b/g/n, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v03r01.

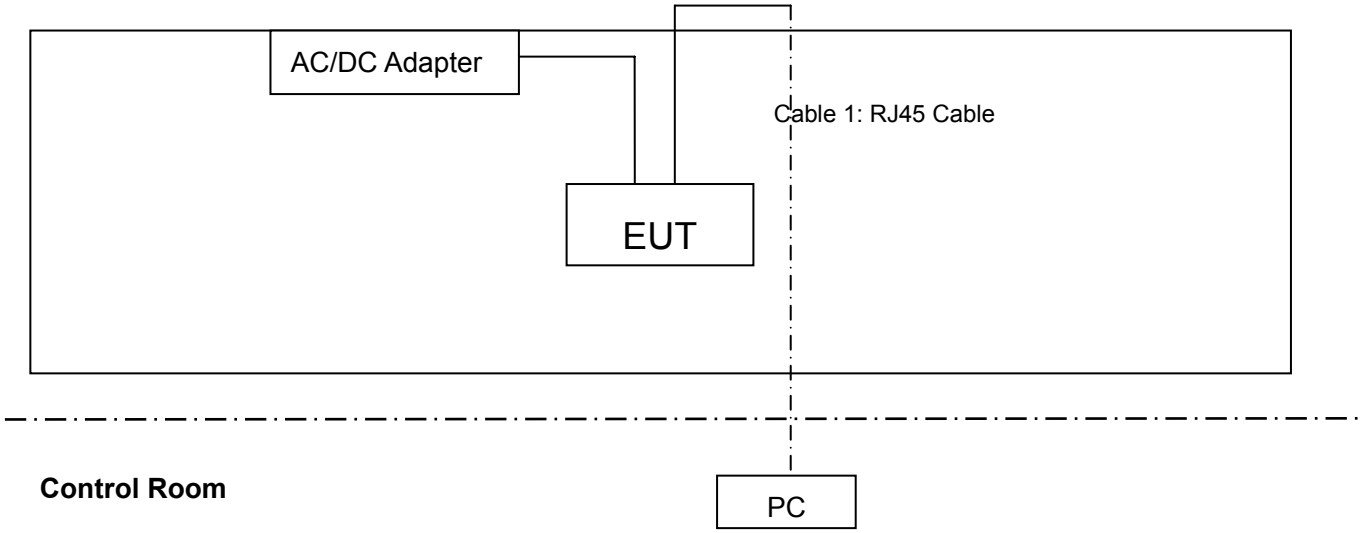
(2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(3) Antenna information provided by the applicant.
(4) Channel List:
CH 01~CH 11 for 802.11b/g/n(HT20)

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

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



1.4 Description of Support Units

Name	Model	S/N	Manufacturer	Used "√"
Notebook	T60P	42W3244	Lenovo	√
Cable Information				
Number	**Shielded Type**	**Ferrite Core**	**Length**	**Note**
Cable 1	Yes	No	10m	

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated

respectively.

For Conducted Test	
Final Test Mode	**Description**
Mode 1	TX B Mode

For Radiated Test	
Final Test Mode	**Description**
Mode 3	TX Mode B Mode Channel 01/06/11
Mode 4	TX Mode G Mode Channel 01/06/11
Mode 5	TX Mode N(HT20) Mode Channel 01/06/11

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.
According to ANSI C63.4 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:
802.11b Mode: CCK (1 Mbps)
802.11g Mode: OFDM (6 Mbps)
802.11n (HT20) Mode: MCS 0 (6.5 Mbps)

(2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.

(3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN.

Test Software Version	**Test Program: QART3070.exe**		
Channel	CH 01	CH 06	CH 11
IEEE 802.11b DSSS	Default	Default	Default
IEEE 802.11g OFDM	Default	Default	Default
IEEE 802.11n (HT20)	Default	Default	Default

1.7 Test Facility

The tests were performed at:
Shenzhen Certification Technology Service Co., Ltd
2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen, 518126, China
Tel: 86-755-86375552 Fax: 86-755-26736857

The test report was fulfilled by Shenzhen Toby Technology Co., Ltd. Shenzhen Toby Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements results.

2. Test Summary

FCC Part 15 Subpart C(15.247)/RSS-210: 2010				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203	/	Antenna Requirement	PASS	N/A
15.207	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A
15.205	RSS-GEN 7.2.2	Restricted Bands	PASS	N/A
15.247(a)(2)	RSS-210 A.8.2(a)	6dB Bandwidth	PASS	N/A
15.247(b)	RSS-210 A.8.4(4)	Peak Output Power	PASS	N/A
15.247(e)	RSS-210 A.8.2(b)	Power Spectral Density	PASS	N/A
15.247(d)	RSS-210 Annex 8 (A8.5)	Transmitter Radiated Spurious Emission	PASS	N/A
15.247(d)	RSS-210 Annex 8 (A8.5)	Antenna Conducted Spurious Emission	PASS	N/A
Note: "/" for no requirement for this test item. N/A is an abbreviation for Not Applicable.				

3. Conducted Emission Test

3.1 Test Standard and Limit

3.1.1Test Standard

FCC Part 15.207

3.1.2 Test Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

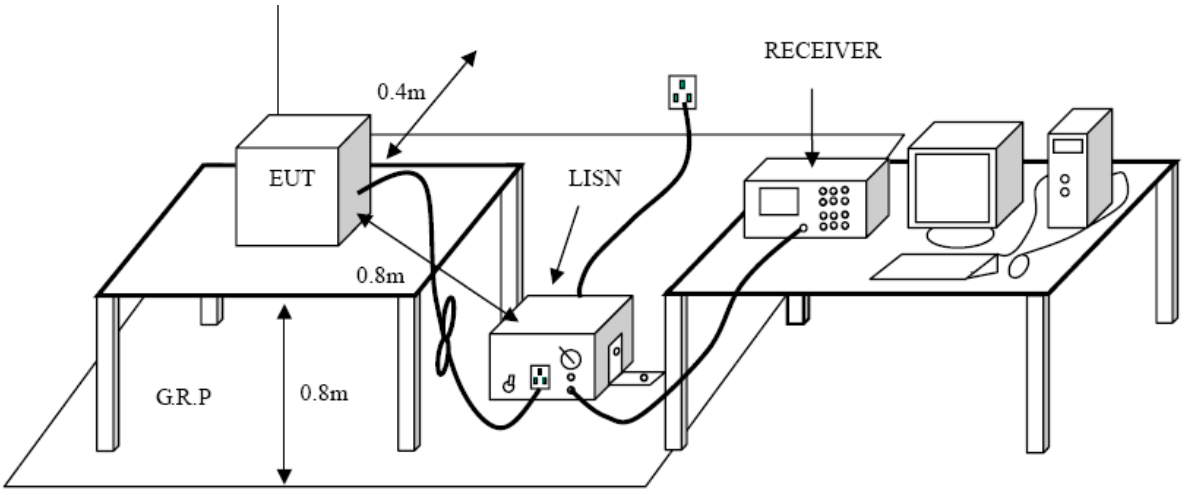
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.2 Test Setup



3.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

3.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	2013-08-10	2014-08-09
50ΩCoaxial Switch	Anritsu	MP59B	X10321	2013-08-10	2014-08-09
L.I.S.N	Rohde & Schwarz	ENV216	101131	2013-08-10	2014-08-09
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	2013-08-10	2014-08-09

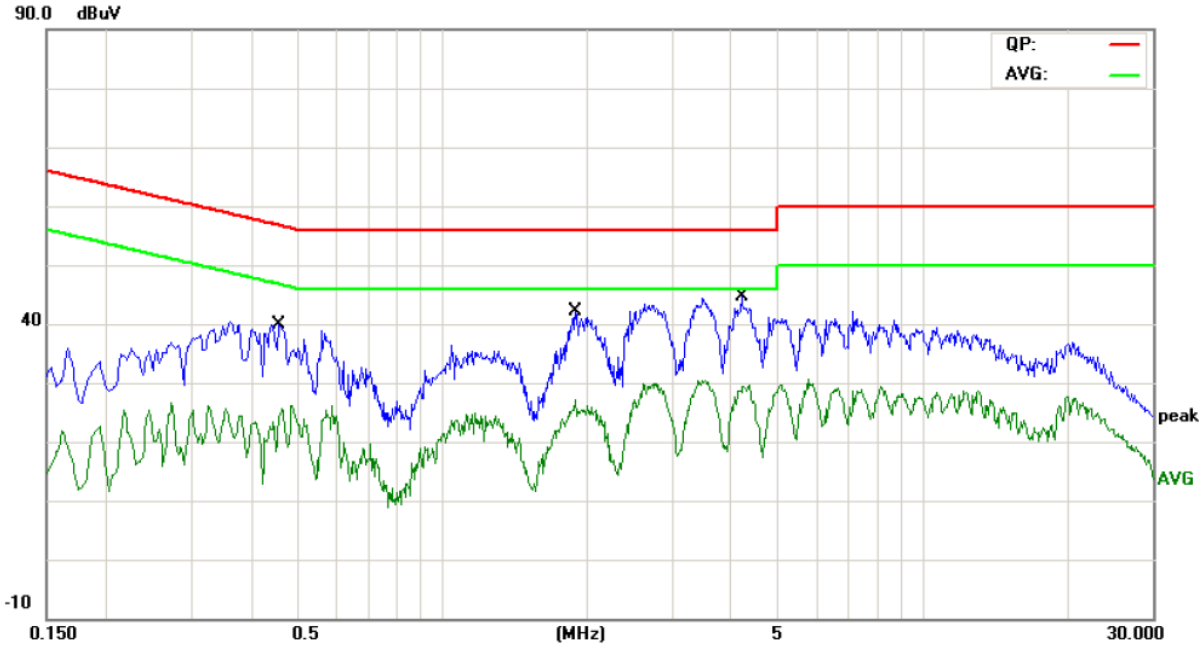
3.5 EUT Operating Mode

Please refer to the description of test mode.

3.6 Test Data

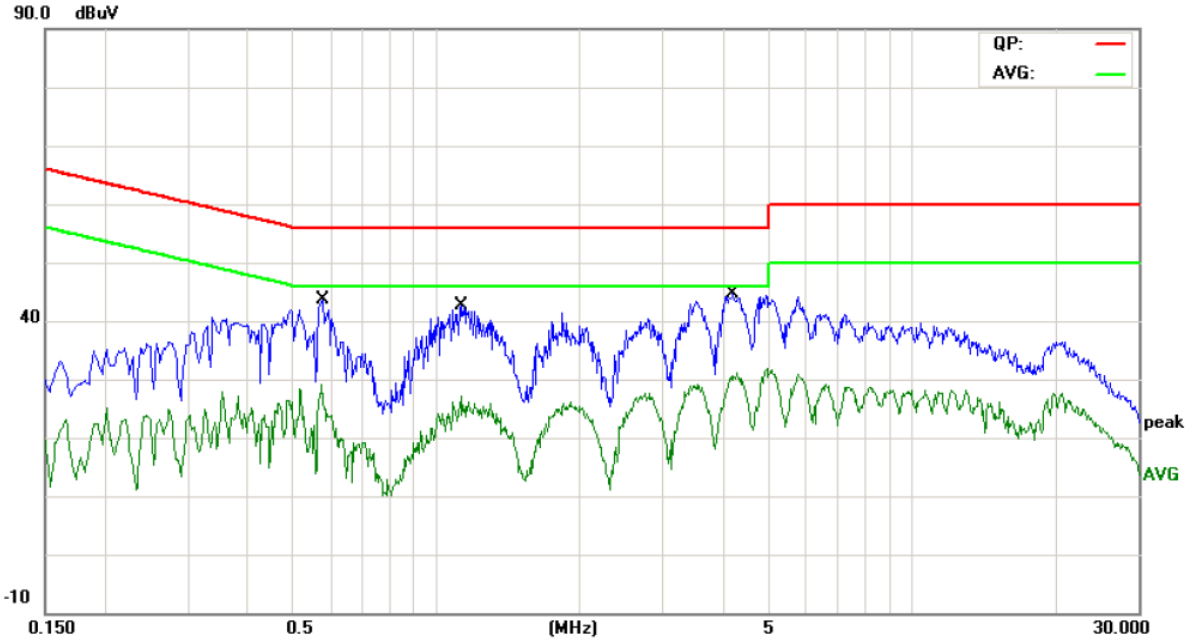
Please see the next page.

E.U.T :	Network Camera	Model Name :	SP360
Temperature :	23°C	Relative Humidity :	51 %
Terminal	Line		
Test Voltage :	AC 120 V / 60Hz		
Test Mode :	TX Mode (B Mode)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4580	21.22	10.03	31.25	56.73	-25.48	QP	
2		0.4580	11.76	10.03	21.79	46.73	-24.94	AVG	
3		1.8900	22.73	10.07	32.80	56.00	-23.20	QP	
4		1.8900	14.53	10.07	24.60	46.00	-21.40	AVG	
5		4.1940	27.99	10.06	38.05	56.00	-17.95	QP	
6	*	4.1940	18.19	10.06	28.25	46.00	-17.75	AVG	

E.U.T :	Network Camera	Model Name :	SP360
Temperature :	23°C	Relative Humidity :	51 %
Terminal	Neutral		
Test Voltage :	AC 120 V / 60Hz		
Test Mode :	TX Mode (B Mode)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.5780	25.31	10.02	35.33	56.00	-20.67	QP	
2		0.5780	14.94	10.02	24.96	46.00	-21.04	AVG	
3		1.1260	21.90	10.15	32.05	56.00	-23.95	QP	
4		1.1260	12.85	10.15	23.00	46.00	-23.00	AVG	
5		4.2179	25.71	10.06	35.77	56.00	-20.23	QP	
6	*	4.2179	17.03	10.06	27.09	46.00	-18.91	AVG	

4. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC Part 15.209

4.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

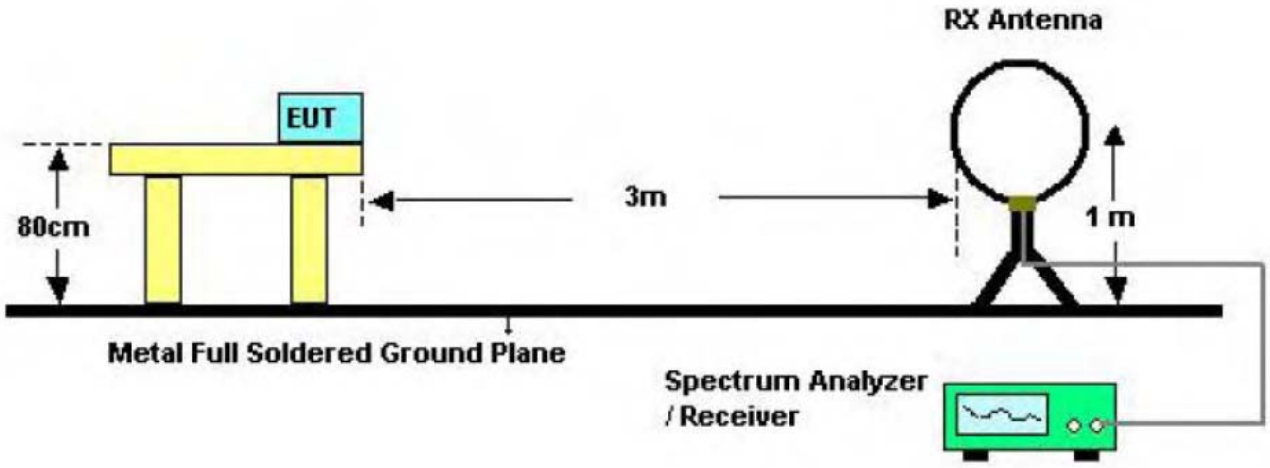
Frequency (MHz)	Class A (dBuV/m)(at 3 M)		Class B (dBuV/m)(at 3 M)	
	Peak	Average	Peak	Average
Above 1000	80	60	74	54

Note:

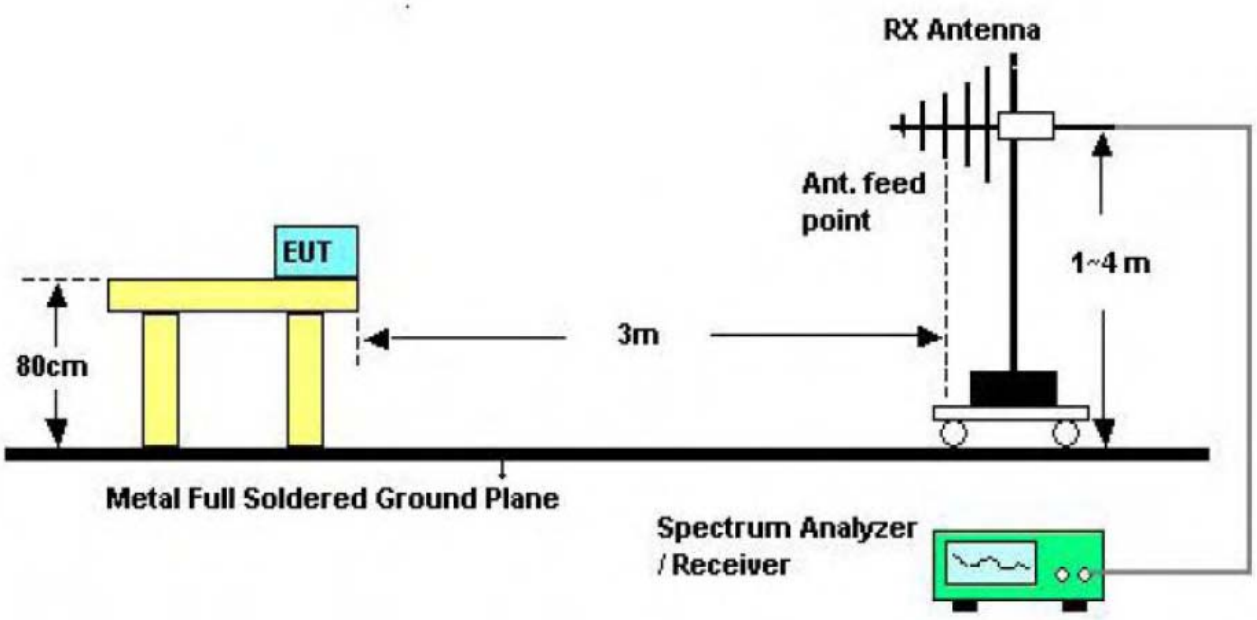
(1) The tighter limit applies at the band edges.

(2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

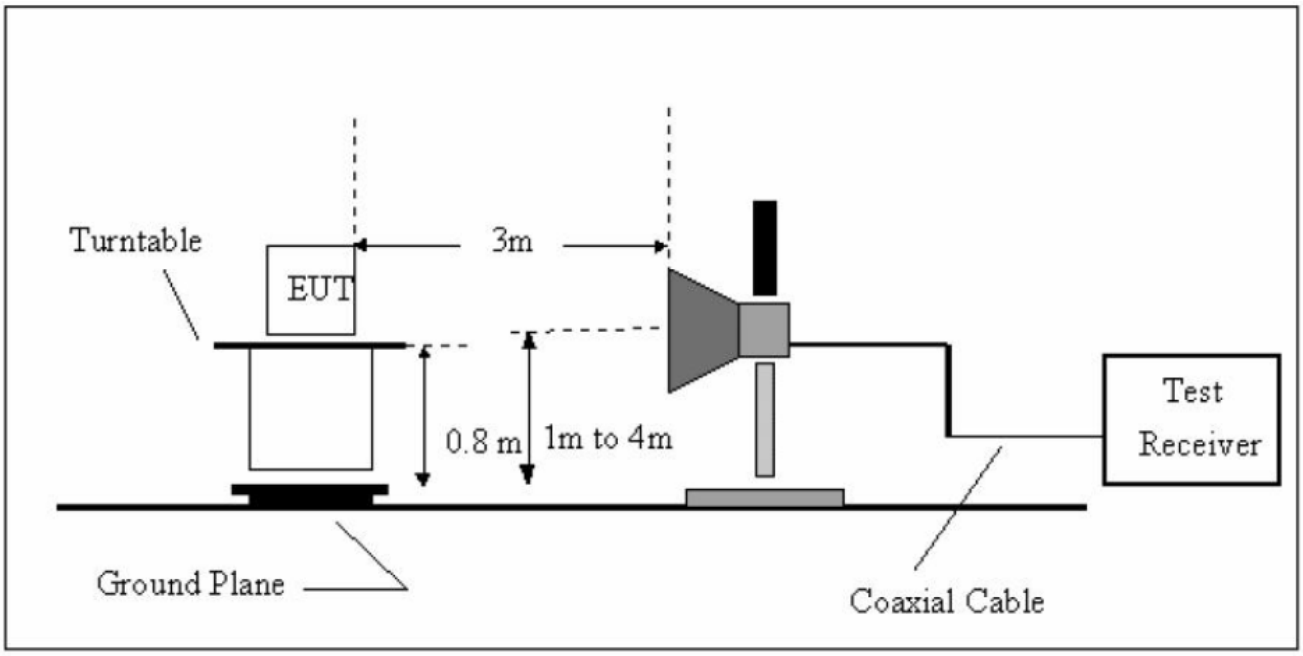
4.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Above 1GHz Test Setup

4.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
(2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
(3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
(5) For the actual test configuration, please see the test setup photo.

4.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

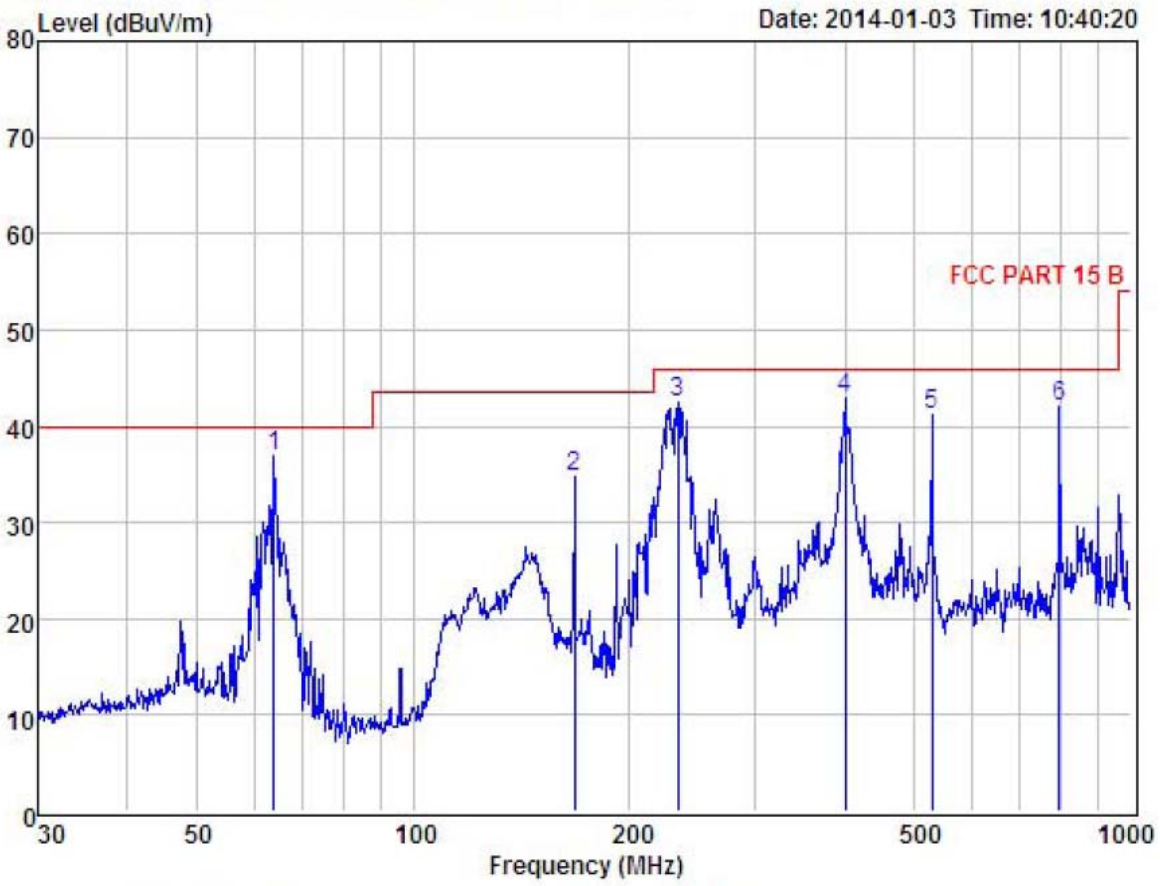
4.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2013-12-30	2014-12-29
Spectrum Analyzer	Agilent	E4407B	MY49510055	2013-12-30	2014-12-29
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	101165	2013-12-30	2014-12-29
Bilog Antenna	SCHWARZBECK	VULB9168	9168-438	2013-02-12	2014-02-11
Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA9120D	2013-02-12	2014-02-11
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170D	2013-02-12	2014-02-11
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2013-02-12	2014-02-11
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2013-10-30	2014-10-29
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2013-10-30	2014-10-29

4.6 Test Data

Please see the next page.

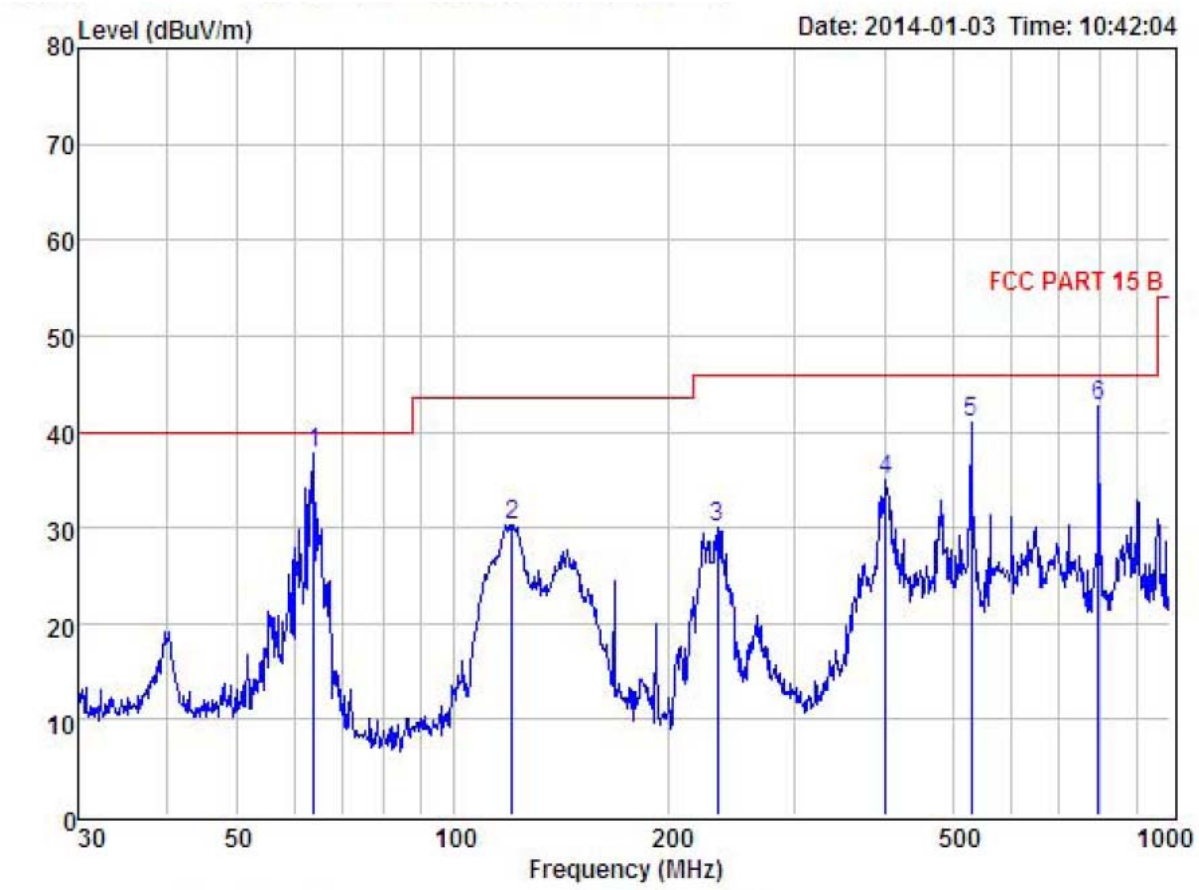
Operation Mode:	802.11b TX 2412MHz	Test Date :	Jan. 03, 2014
Frequency Range:	30~1000MHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Ant. Pol.	Horizontal		
Test Voltage:	DC 5V		



Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	63.98	52.16	11.98	27.43	0.24	36.95	40.00	-3.05	Peak
2	167.82	47.96	13.37	26.92	0.42	34.83	43.50	-8.67	Peak
3	234.17	57.66	11.31	27.08	0.49	42.38	46.00	-3.62	Peak
4	400.43	54.89	14.74	27.43	0.71	42.91	46.00	-3.09	Peak
5	528.25	50.85	17.03	27.68	1.07	41.27	46.00	-4.73	Peak
6	793.40	47.76	20.66	27.66	1.35	42.11	46.00	-3.89	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Operation Mode:	802.11b TX 2412MHz	Test Date :	Jan. 03, 2014
Frequency Range:	30~1000MHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Ant. Pol.	Vertical		
Test Voltage:	DC 5V		



Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	63.98	52.97	11.98	27.43	0.24	37.76	40.00	-2.24	Peak
2	120.70	44.58	12.24	26.88	0.40	30.34	43.50	-13.16	Peak
3	234.17	45.30	11.31	27.08	0.49	30.02	46.00	-15.98	Peak
4	401.84	46.97	14.79	27.43	0.72	35.05	46.00	-10.95	Peak
5	528.25	50.56	17.03	27.68	1.07	40.98	46.00	-5.02	Peak
6	793.40	48.41	20.66	27.66	1.35	42.76	46.00	-3.24	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Operation Mode:	802.11b TX 2412MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4824.150	V	50.61	45.28	74.00	54.00	23.39	8.72
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4824.150	H	52.97	48.05	74.00	54.00	21.03	5.95
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11b TX 2437MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4874.110	V	49.62	44.11	74.00	54.00	24.38	9.89
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4874.110	H	52.75	47.77	74.00	54.00	21.25	6.23
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11b TX 2462MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4924.250	V	49.82	45.12	74.00	54.00	24.18	8.88
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4924.250	H	51.06	46.85	74.00	54.00	22.94	7.15
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11g TX 2412MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4824.360	V	46.25	40.14	74.00	54.00	27.75	13.86
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4824.360	H	48.75	42.36	74.00	54.00	25.25	11.64
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11g TX 2437MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4874.250	V	46.71	40.36	74.00	54.00	27.29	13.64
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4874.250	H	48.39	43.06	74.00	54.00	25.61	10.94
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11g TX 2462MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4925.360	V	45.67	39.70	74.00	54.00	28.33	14.30
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4925.360	H	48.28	42.83	74.00	54.00	25.72	11.17
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11n (HT20) TX 2412MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4826.110	V	46.21	40.14	74.00	54.00	27.79	13.86
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4826.110	H	48.02	43.42	74.00	54.00	25.98	10.58
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11n (HT20) TX 2437MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4926.200	V	46.44	40.23	74.00	54.00	27.56	13.66
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4926.200	H	48.36	42.71	74.00	54.00	25.64	11.29
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11n (HT20) TX 2462MHz	Test Date :	Jan. 03, 2014
Frequency Range:	1-25GHz	Temperature :	22 ℃
Measured Distance:	3m	Humidity :	65 %
Test Voltage:	AC 120V/60Hz		

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m) PK	Emission Level (dBuV/m) AV	Limit3m (dBuV/m) PK	Limit3m (dBuV/m) AV	Margin(dB) PK	Margin(dB) AV
4925.610	V	45.69	39.87	74.00	54.00	28.31	14.13
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
--	V	--	--	74.00	54.00	--	--
4925.610	H	48.06	42.33	74.00	54.00	25.94	11.67
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--
--	H	--	--	74.00	54.00	--	--

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. Restricted Bands Requirement

5.1 Test Standard and Limit

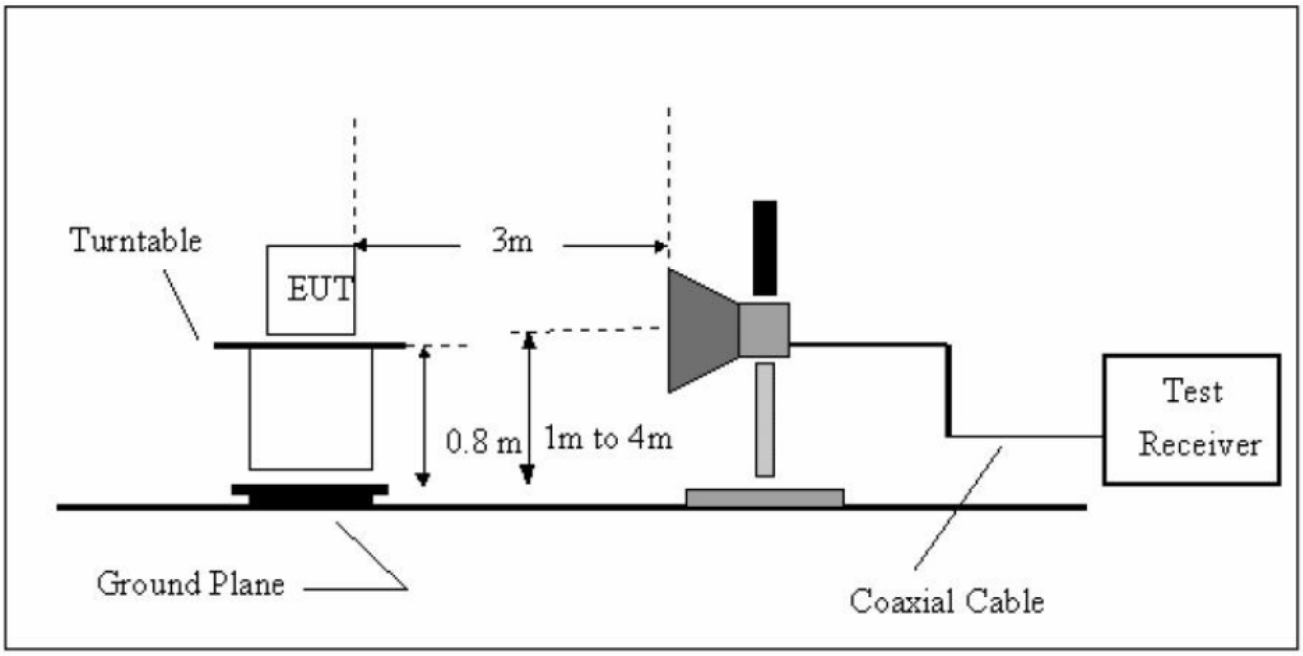
5.1.1 Test Standard

FCC Part 15.209 FCC Part 15.205

5.1.2 Test Limit

Restricted Frequency Band (MHz)	Class B (dBuV/m)(at 3 M)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

5.2 Test Setup



5.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.

(2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

(3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit

Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.

Peak Detection:

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is Peak, then use band power function to measure the Bandwidth of 1 MHz.

Average Detection (EUT transmitting continuously and duty cycle>=98 percent):

Set the center frequency of the emission to be measured (within 2 MHz of the authorized band edge), set span to 2 MHz, with RBW/VBW=100 kHz/300 kHz, detector mode is RMS or Average, then use band power function to measure the Bandwidth of 1 MHz.

(5) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2013-12-30	2014-12-29
Spectrum Analyzer	Agilent	E4407B	MY49510055	2013-12-30	2014-12-29
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	101165	2013-12-30	2014-12-29
Bilog Antenna	SCHWARZBECK	VULB9168	9168-438	2013-02-12	2014-02-11
Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA9120D	2013-02-12	2014-02-11
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170D	2013-02-12	2014-02-11
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2013-02-12	2014-02-11
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2013-12-30	2014-12-29
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2013-12-30	2014-12-29

5.6 Test Data

Please see the next page.

Spectrum Detector:	PK	Test Date :	December 17, 2013
Temperature :	22 ℃	Humidity :	65 %

802.11b Mode

1. Conducted Test

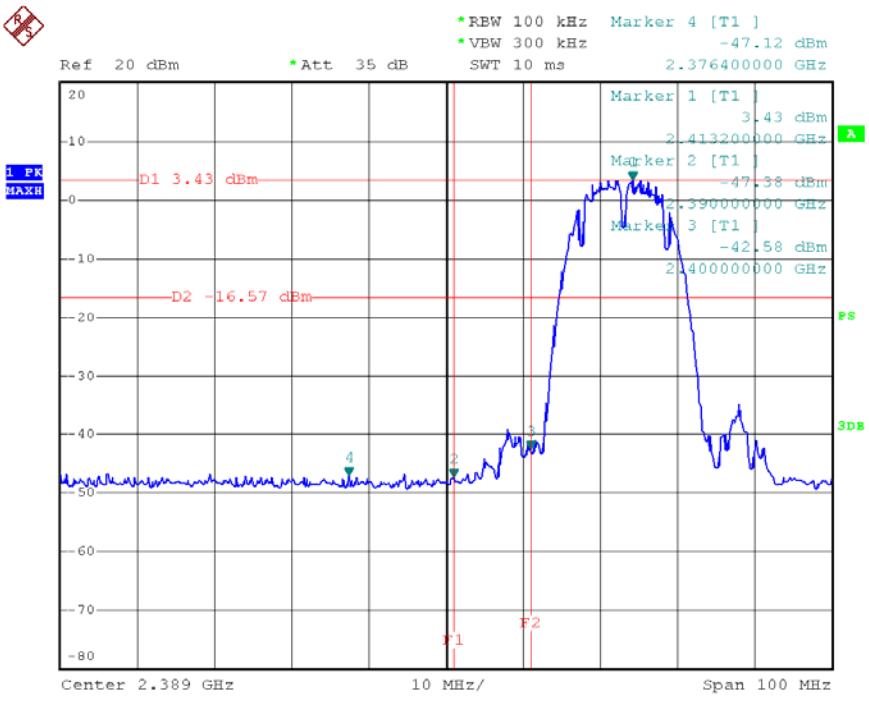
Frequency (MHz)	Peak Power Output(dBm)	Emission Read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)
<2400	3.43	-47.12	50.55	>20dBc
>2483.5	1.22	-48.43	49.65	>20dBc

Spectrum Detector:	PK	Test Date :	January 03, 2014
Temperature :	22 ℃	Humidity :	65 %

2. Radiated emission test

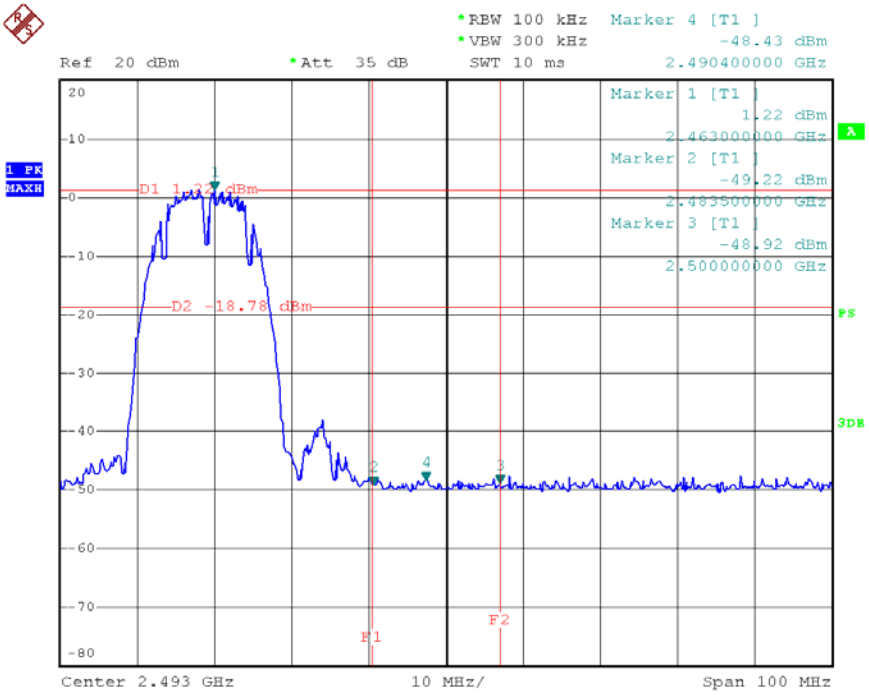
BAND EDGE					
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)	
		PEAK	AV	PEAK	AV
<2400	H	56.82	46.12	74.00	54.00
<2400	V	54.36	43.98	74.00	54.00
>2483.5	H	57.79	46.86	74.00	54.00
>2483.5	V	55.39	45.20	74.00	54.00

B Mode TX 2412MHz



Date: 17.DEC.2013 13:55:18

B Mode TX 2462MHz



Date: 17.DEC.2013 15:01:10

Spectrum Detector:	PK	Test Date :	December 17, 2013
Temperature :	22 ℃	Humidity :	65 %

802.11g Mode

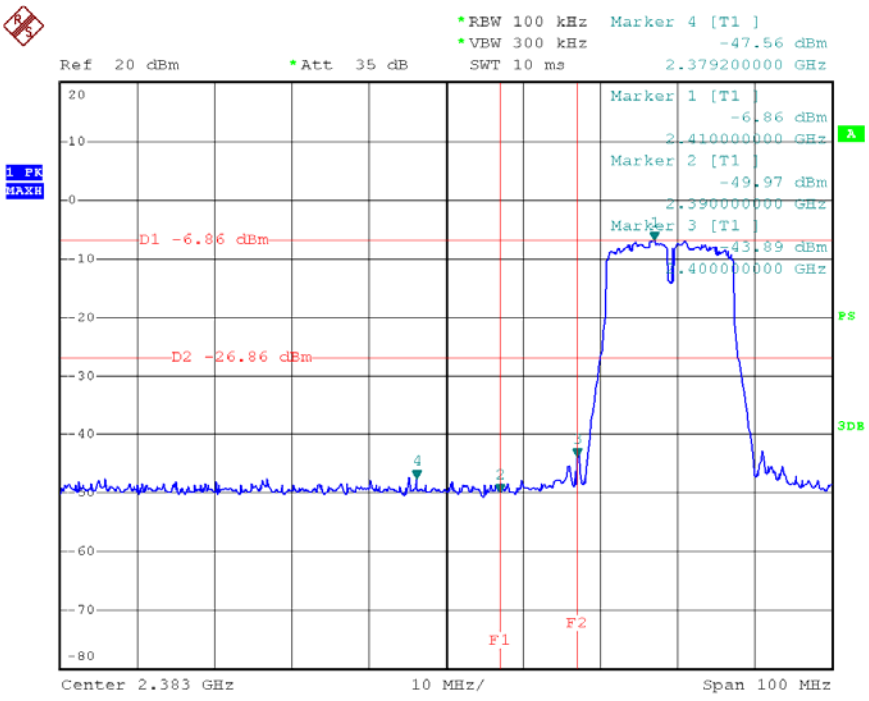
1. Conducted Test

Frequency (MHz)	Peak Power Output(dBm)	Emission Read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)
<2400	-6.86	-47.56	40.70	>20dBc
>2483.5	-4.92	-43.01	38.09	>20dBc

Spectrum Detector:	PK	Test Date :	January 03, 2014
Temperature :	22 ℃	Humidity :	65 %

2. Radiated emission test

BAND EDGE					
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)	
		PEAK	AV	PEAK	AV
<2400	H	56.97	46.21	74.00	54.00
<2400	V	55.15	45.31	74.00	54.00
>2483.5	H	58.73	47.78	74.00	54.00
>2483.5	V	56.40	46.03	74.00	54.00



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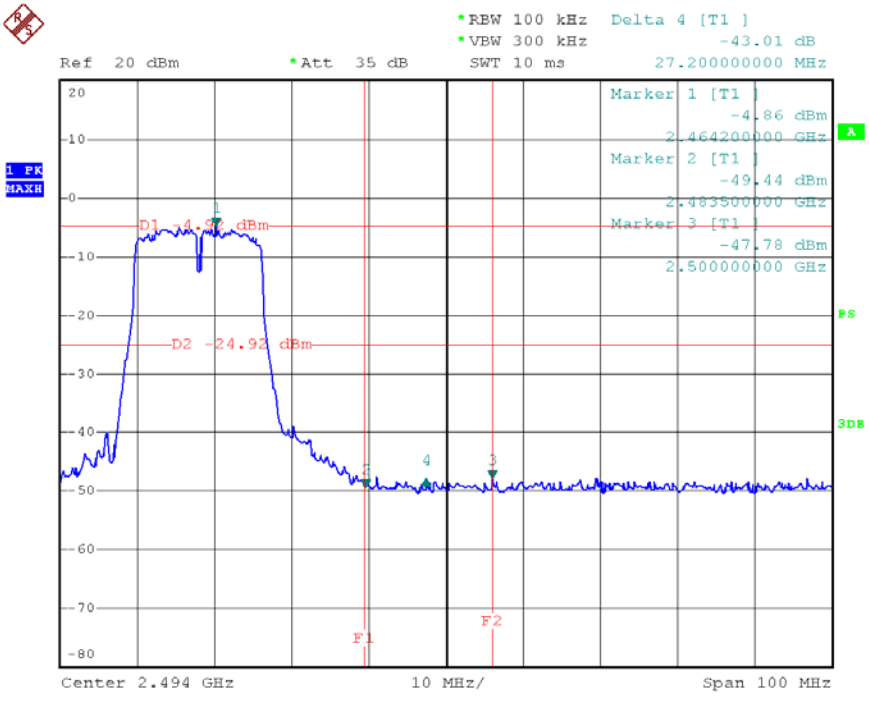


Date: 17.DEC.2013 15:44:45

Spectrum Detector:	PK	Test Date :	December 17, 2013
Temperature :	22 ℃	Humidity :	65 %

802.11n (HT20) Mode

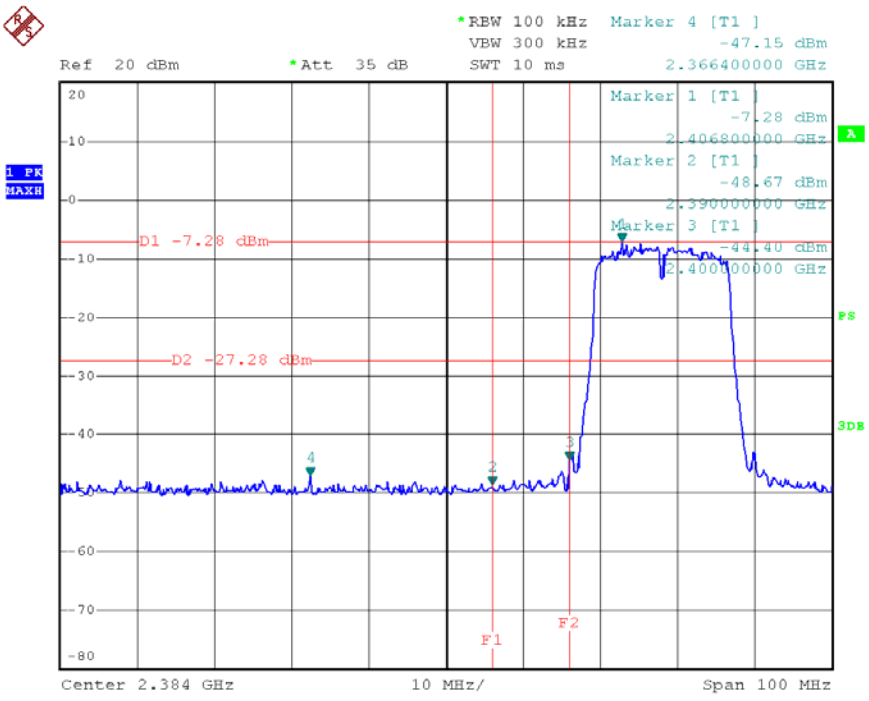
1. Conducted Test

Frequency (MHz)	Peak Power Output(dBm)	Emission Read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)
<2400	-7.28	-47.15	39.87	>20dBc
>2483.5	-6.79	-47.69	40.90	>20dBc

Spectrum Detector:	PK	Test Date :	January 03, 2014
Temperature :	22 ℃	Humidity :	65 %

2. Radiated emission test

BAND EDGE					
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)	
		PEAK	AV	PEAK	AV
<2400	H	57.15	46.89	74.00	54.00
<2400	V	55.33	45.02	74.00	54.00
>2483.5	H	59.17	48.40	74.00	54.00
>2483.5	V	56.84	45.72	74.00	54.00



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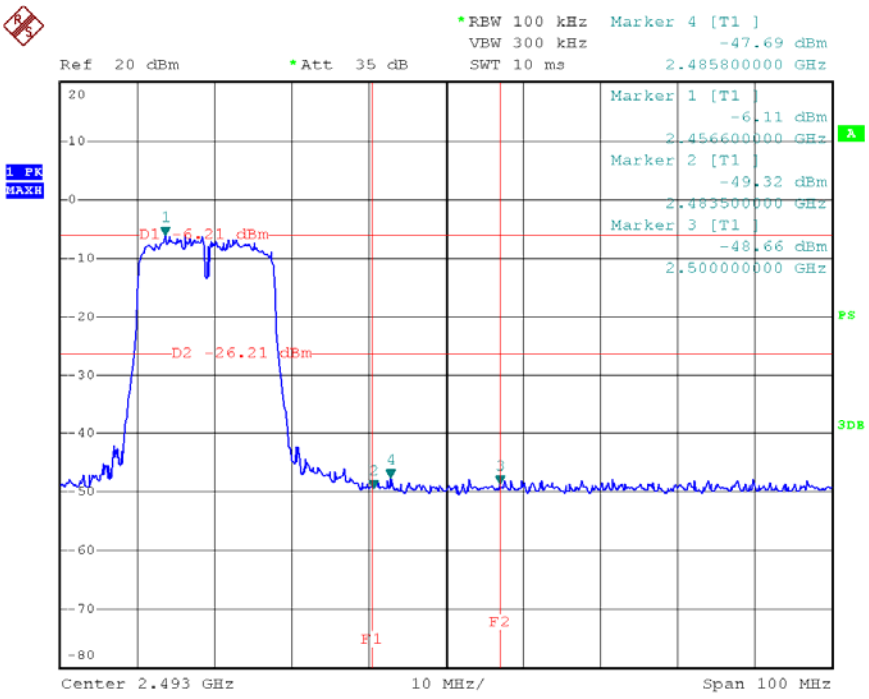


Date: 17.DEC.2013 16:57:04

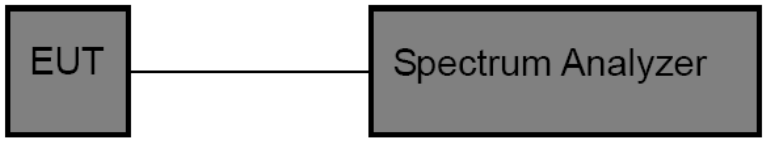
6. Bandwidth Test

6.1 Test Standard and Limit

8.1.1 Test Standard
FCC Part 15.247 (a)(2)
8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	**Limit**	**Frequency Range(MHz)**
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

6.2 Test Setup



6.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
(2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
(3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

6.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

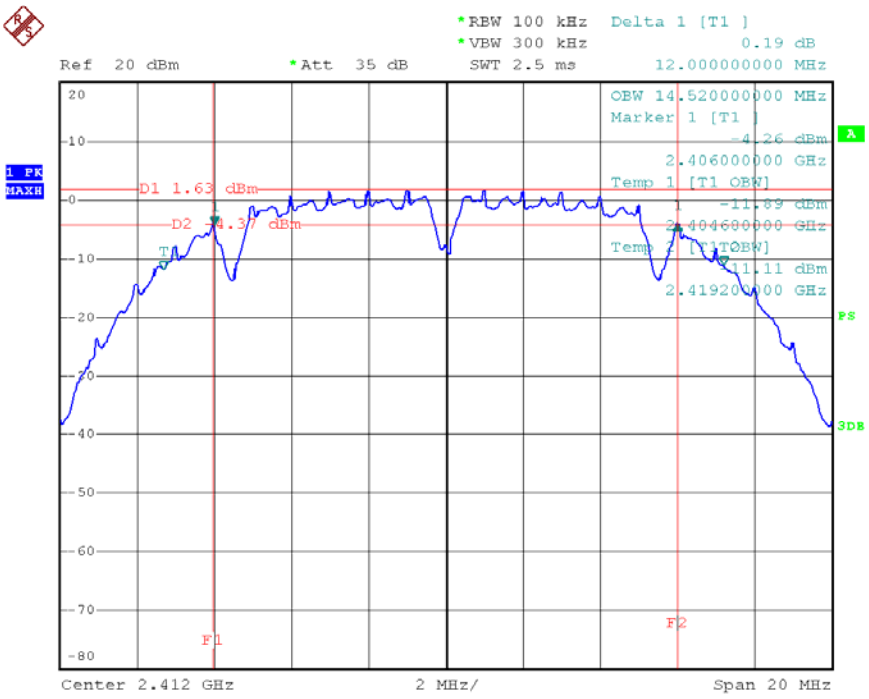
6.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2014-12-30	2014-12-29

6.6 Test Data

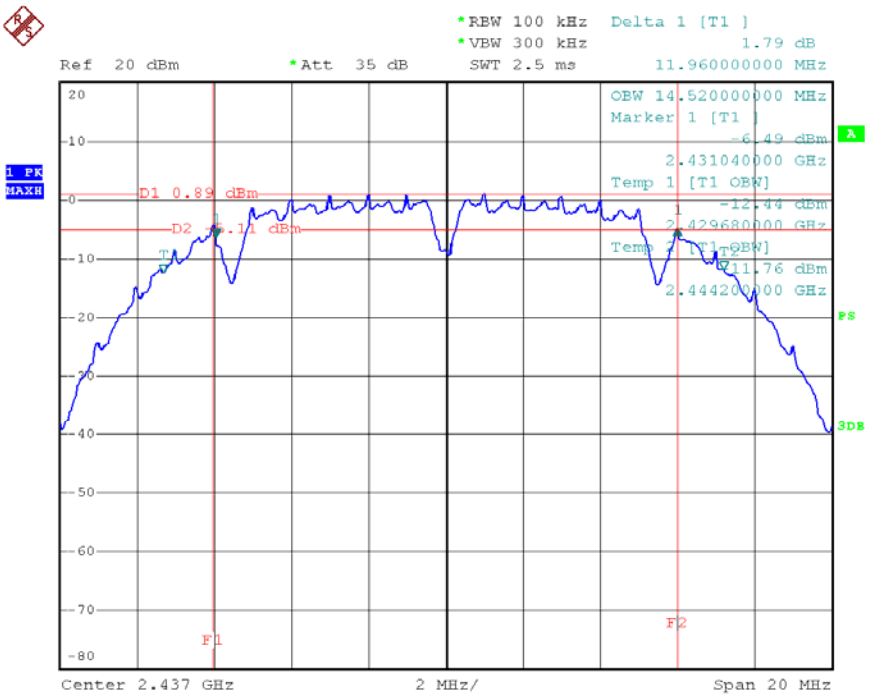
802.11b			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**	**Limit**
2412	12.00	14.52	>=500 kHz
2437	11.96	14.52	>=500 kHz
2462	11.96	14.52	>=500 kHz

2412 MHz



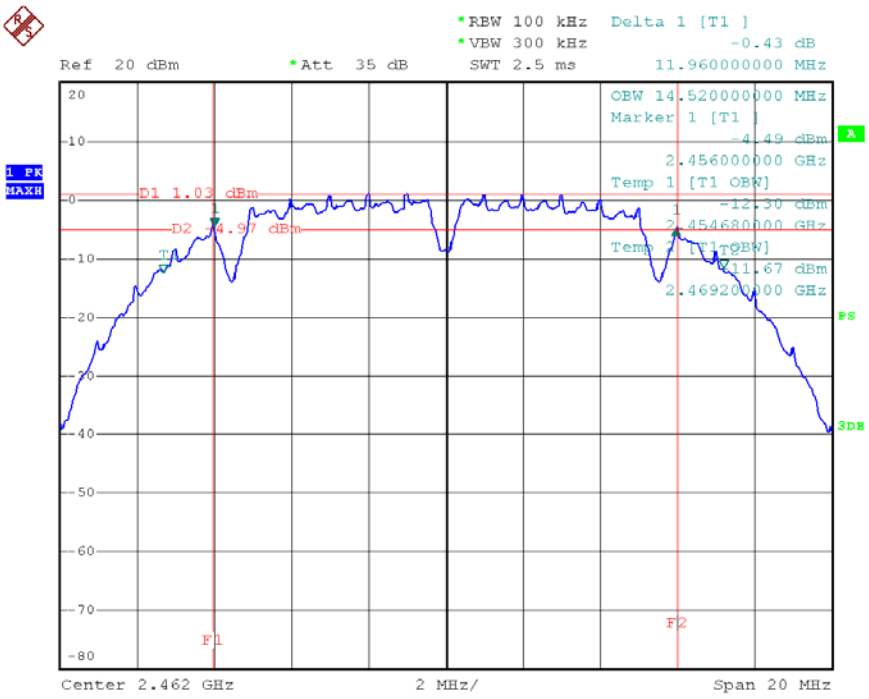
Date: 17.DEC.2013 15:12:23

2437 MHz



Date: 17.DEC.2013 15:10:17

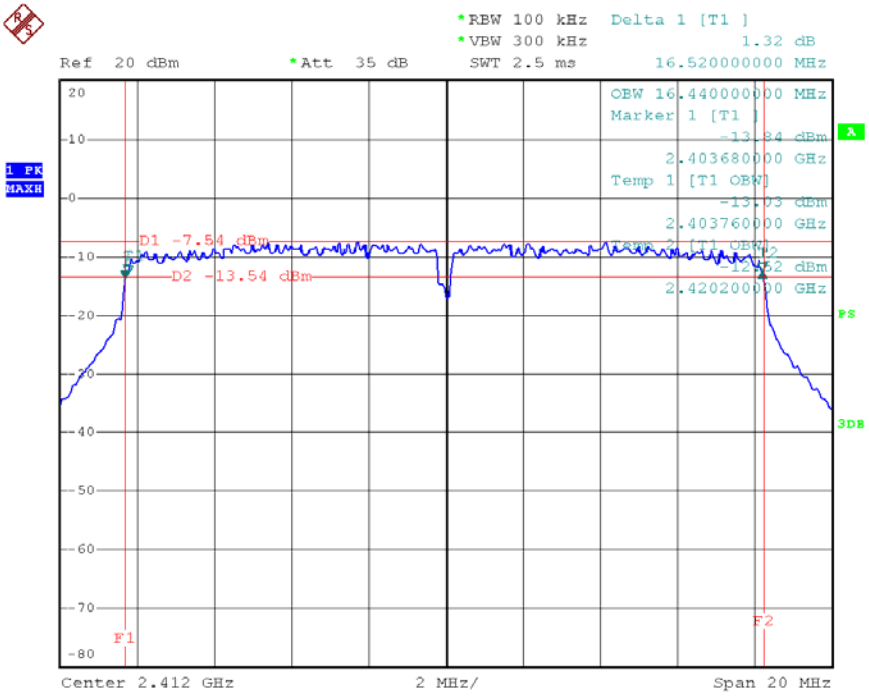
2462 MHz



Date: 17.DEC.2013 15:06:44

802.11g			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**	**Limit**
2412	16.52	16.44	>=500 kHz
2437	16.52	16.40	>=500 kHz
2462	16.52	16.44	>=500 kHz

2412 MHz



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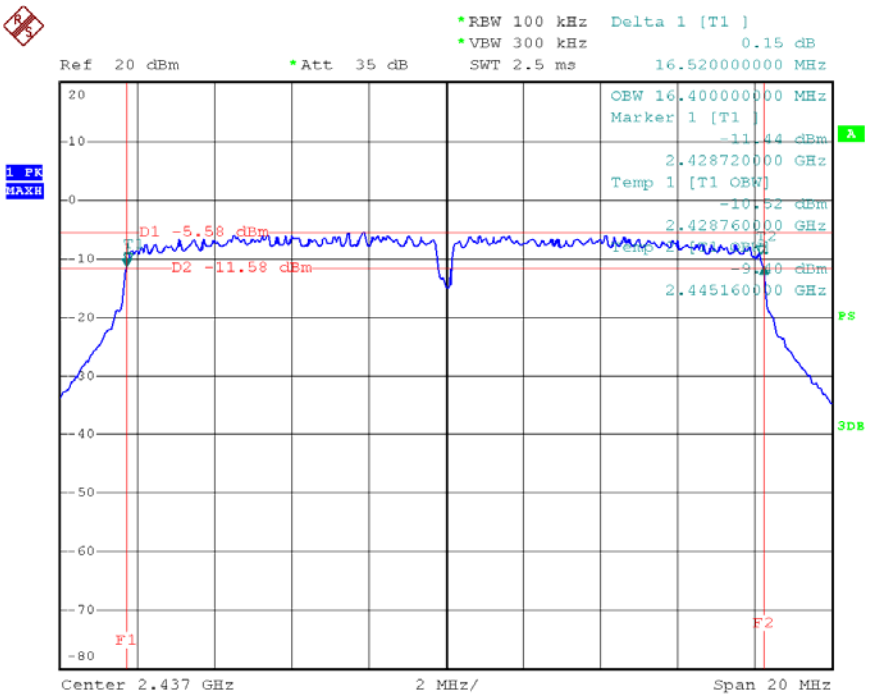
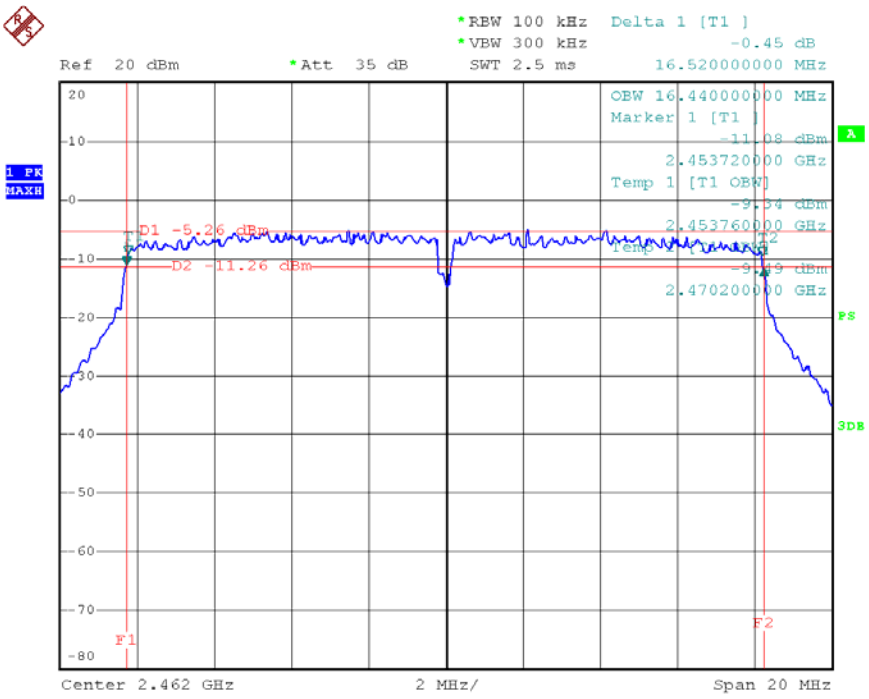
2437 MHz



Date: 17.DEC.2013 15:48:22

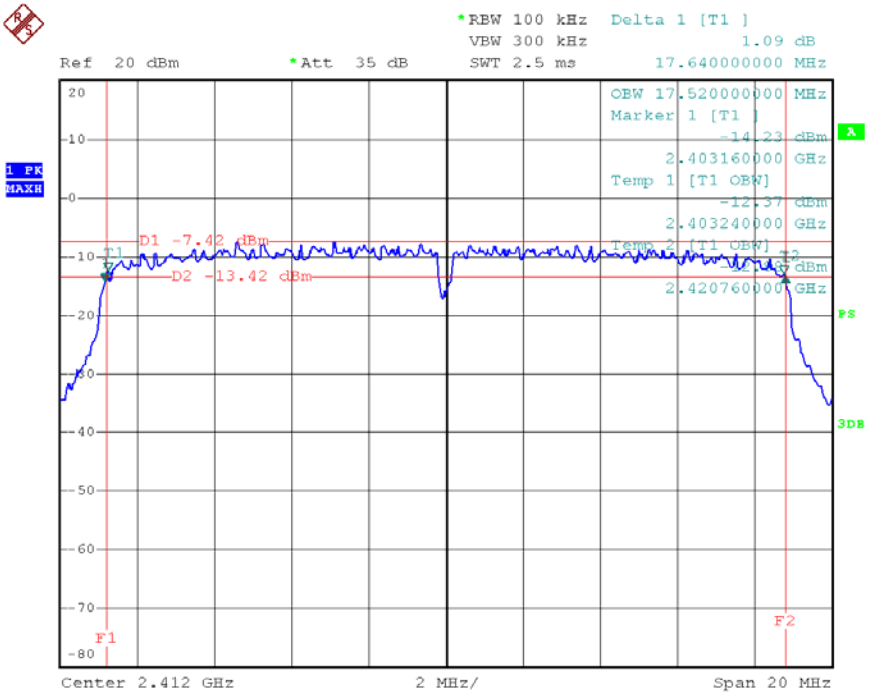
2462 MHz



Date: 17.DEC.2013 15:46:49

802.11n(HT20)			
Channel frequency (MHz)	**6dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**	**Limit**
2412	17.64	17.52	>=500 kHz
2437	17.64	17.52	>=500 kHz
2462	17.64	17.52	>=500 kHz

2412 MHz



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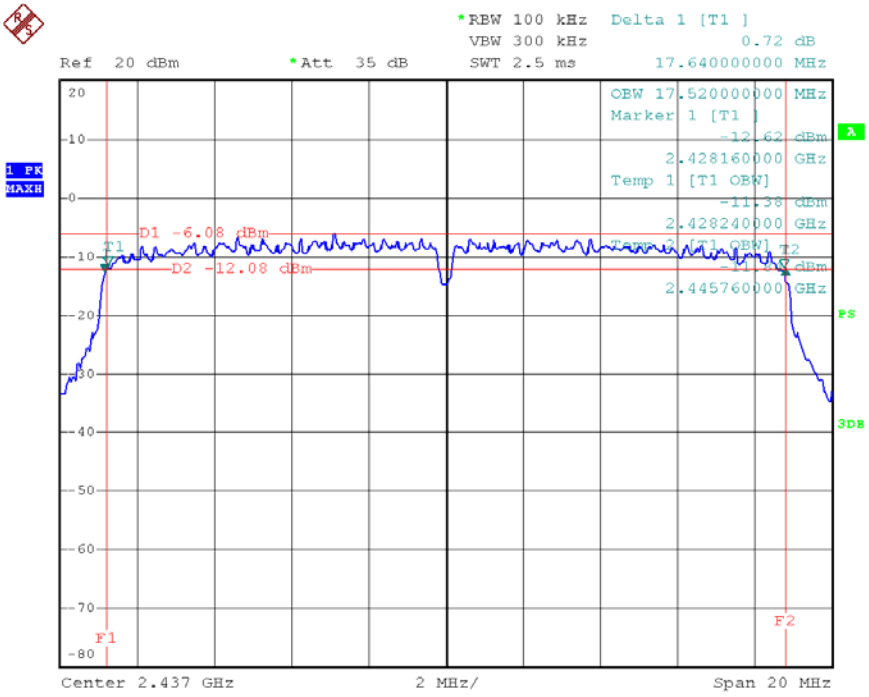
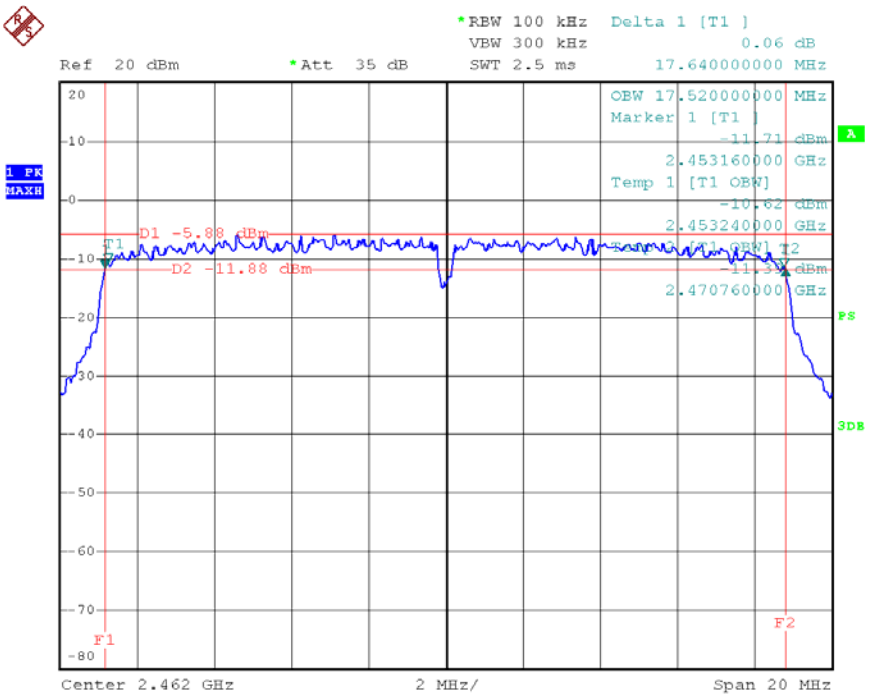
2437 MHz



Date: 17.DEC.2013 16:51:06

2462 MHz



Date: 17.DEC.2013 16:49:03

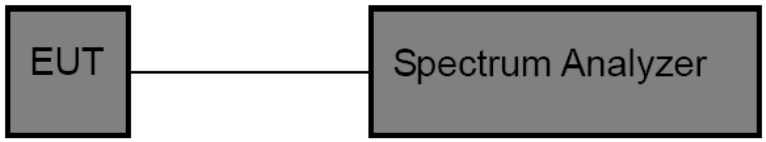
7. Peak Output Power Test

7.1 Test Standard and Limit

9.1.1 Test Standard
FCC Part 15.247 (b)
9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-210		
Test Item	**Limit**	**Frequency Range(MHz)**
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

7.2 Test Setup



7.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above.

7.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

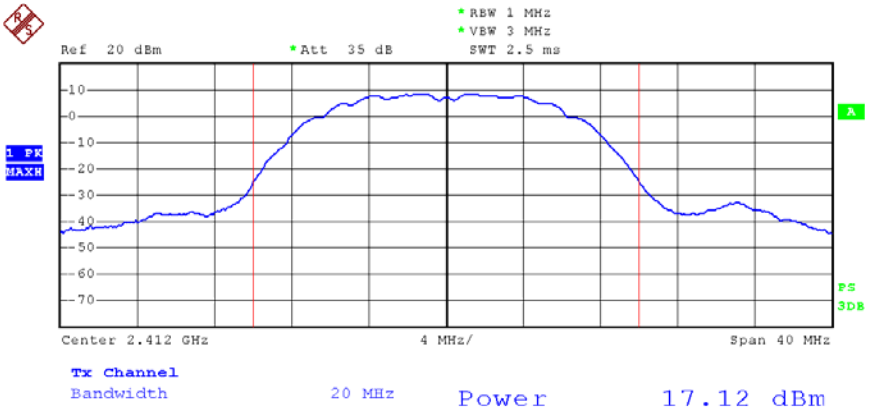
7.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2014-12-30	2014-12-29

7.6 Test Data

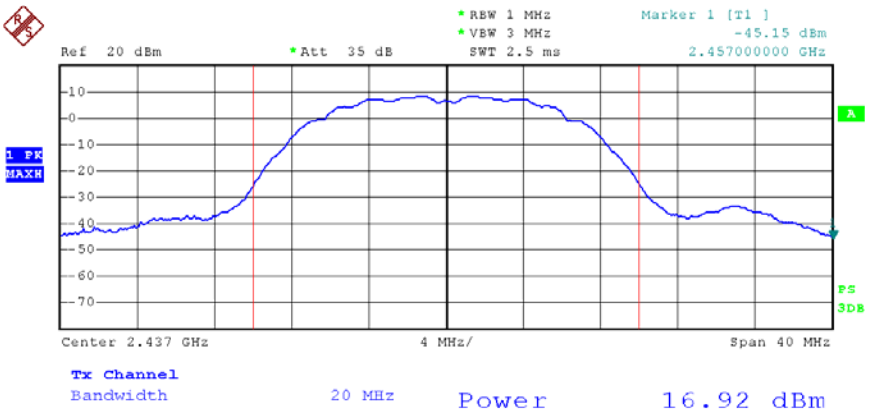
801.11b Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	17.12	30
CH 06	2437	16.92	30
CH11	2462	16.73	30

2412 MHz



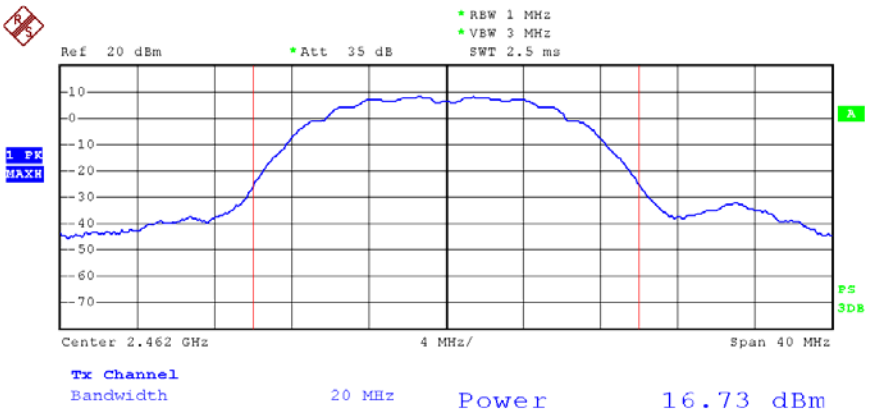
Date: 17.DEC.2013 10:58:20

2437 MHz



Date: 17.DEC.2013 14:56:23

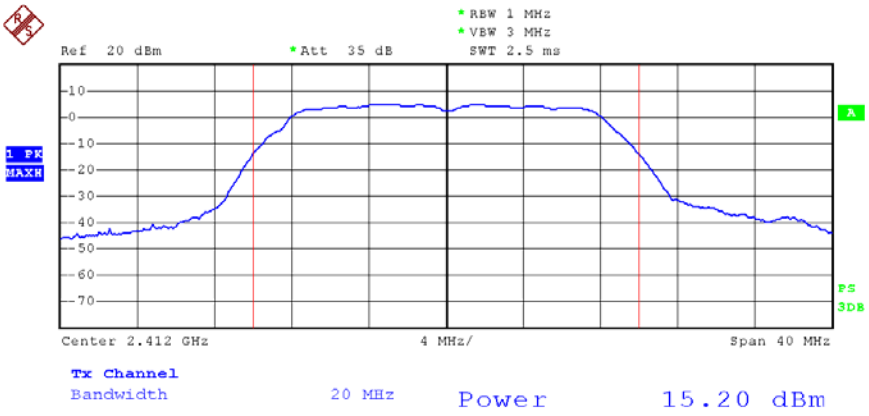
2462 MHz



Date: 17.DEC.2013 14:57:53

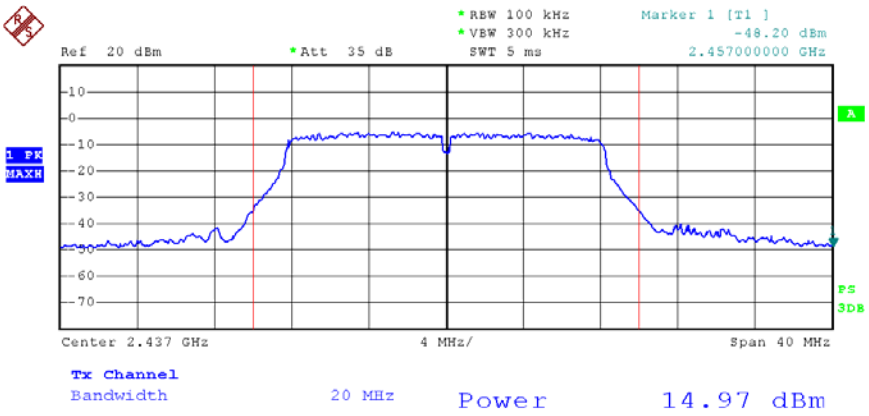
801.11g Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	15.20	30
CH 06	2437	14.97	30
CH11	2462	15.23	30

2412 MHz



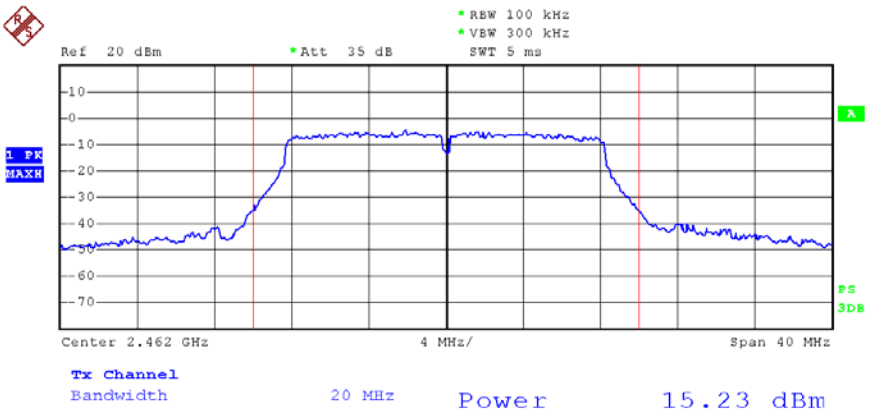
Date: 17.DEC.2013 11:02:42

2437 MHz



Date: 17.DEC.2013 15:36:17

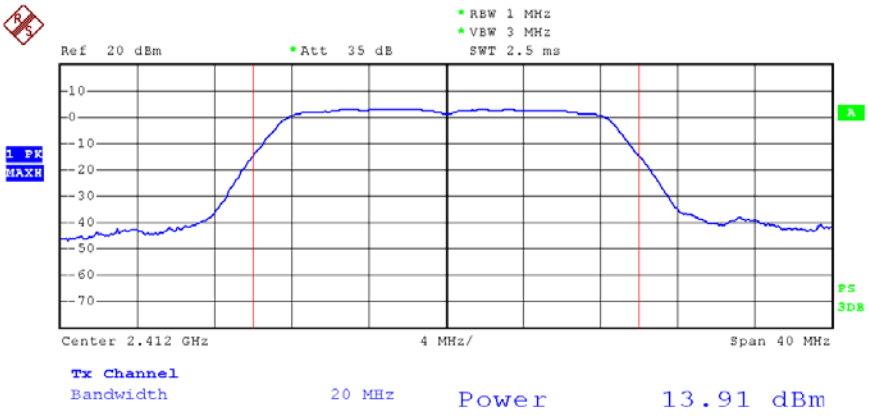
2462 MHz



Date: 17.DEC.2013 15:38:24

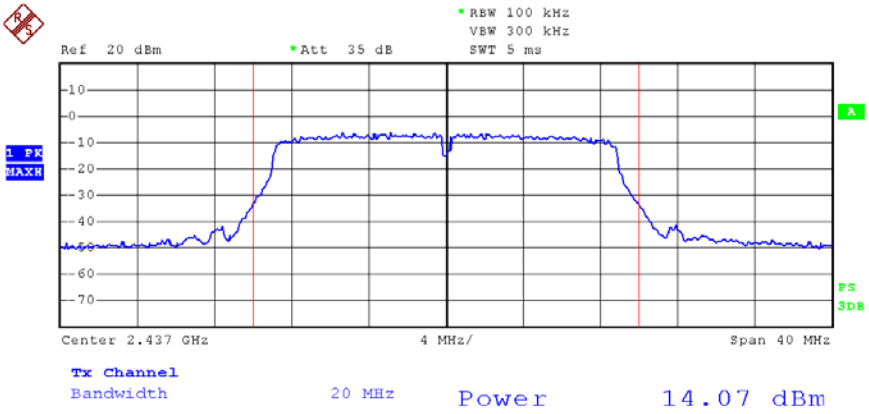
801.11n(HT20) Mode			
Test Channel	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
CH01	2412	13.91	30
CH 06	2437	14.07	30
CH11	2462	14.47	30

2412 MHz



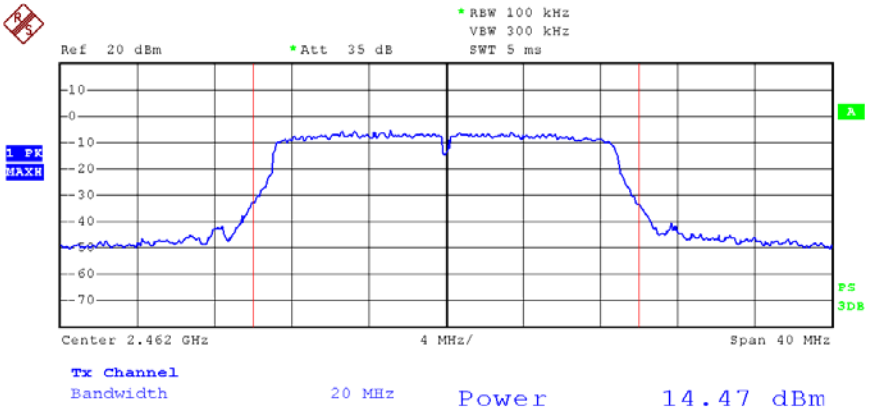
Date: 17.DEC.2013 11:20:20

2437 MHz



Date: 17.DEC.2013 16:45:06

2462 MHz



Date: 17.DEC.2013 16:47:31

8. Power Spectral Density Test

8.1 Test Standard and Limit

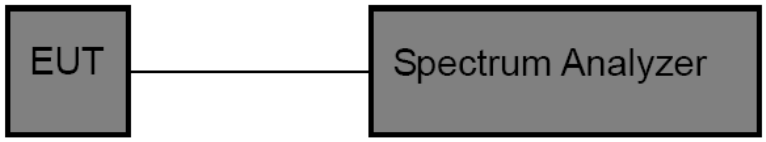
8.1.1 Test Standard

FCC Part 15.247 (e)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	**Limit**	**Frequency Range(MHz)**
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

8.2 Test Setup



8.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

(2) Measure the spectral power density the spectrum analyzer was set to Resolution Bandwidth=100 kHz, and Video Bandwidth≥300 kHz, Detector: Peak, Span to 5%~30% greater than EBW, Sweep time auto.

(3) Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a BWCF=-15.2 dB.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

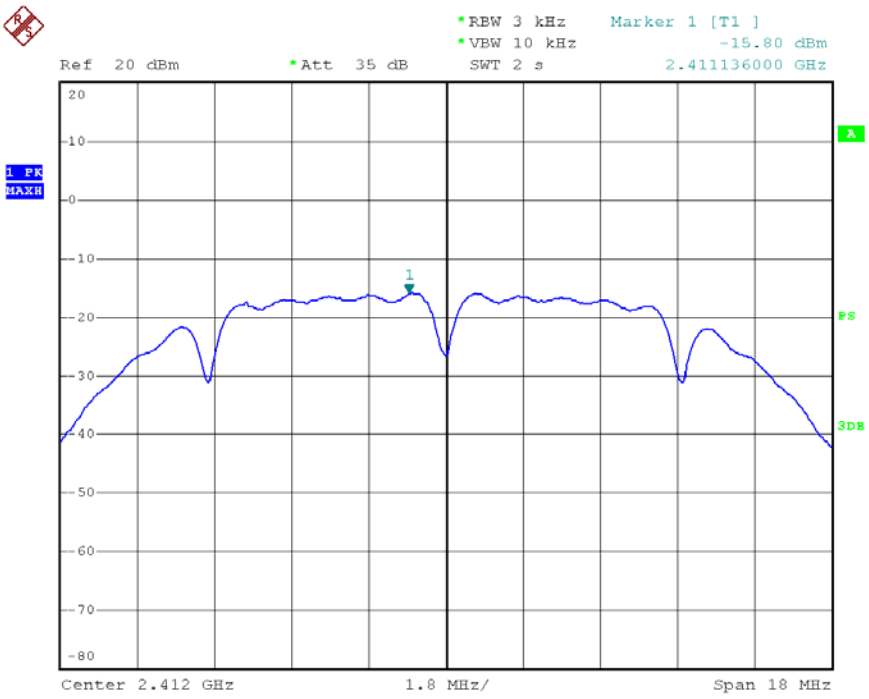
8.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2014-12-30	2014-12-29

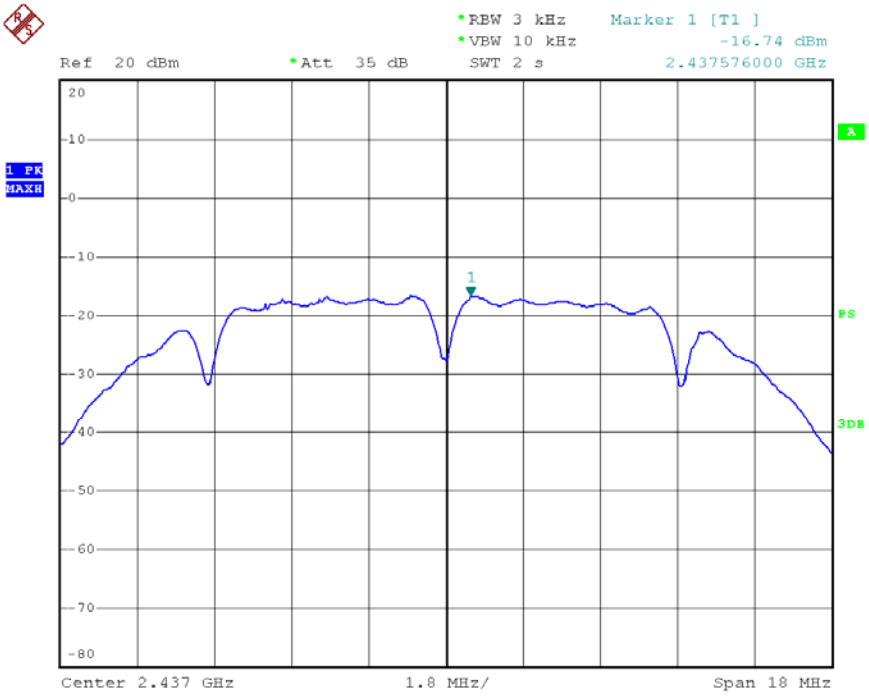
8.6 Test Data

802.11b Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-15.80	8
CH 06	2437	-16.74	8
CH 11	2462	-16.95	8

2412 MHz

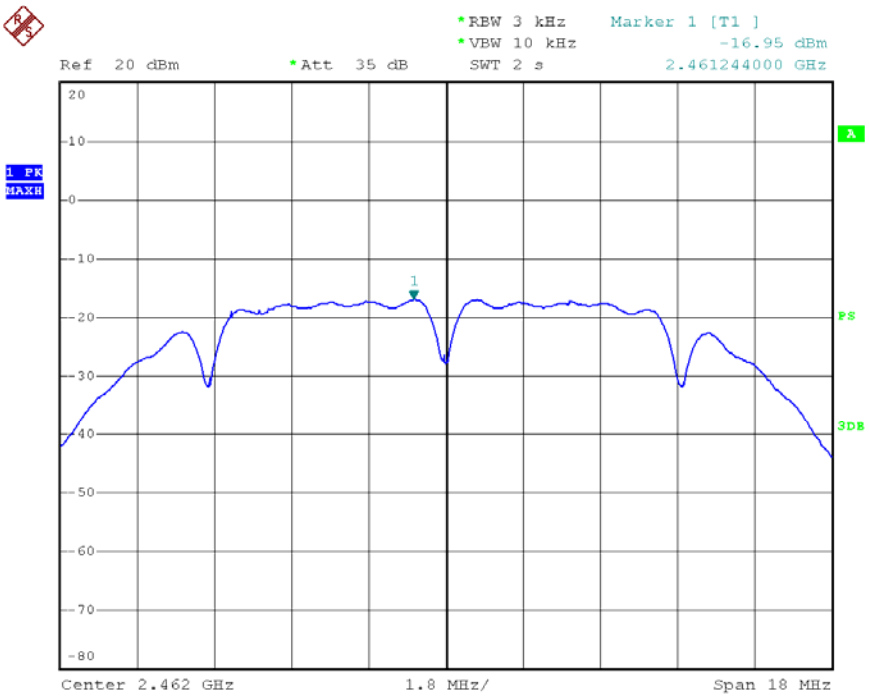


2437 MHz



Date: 17.DEC.2013 15:17:02

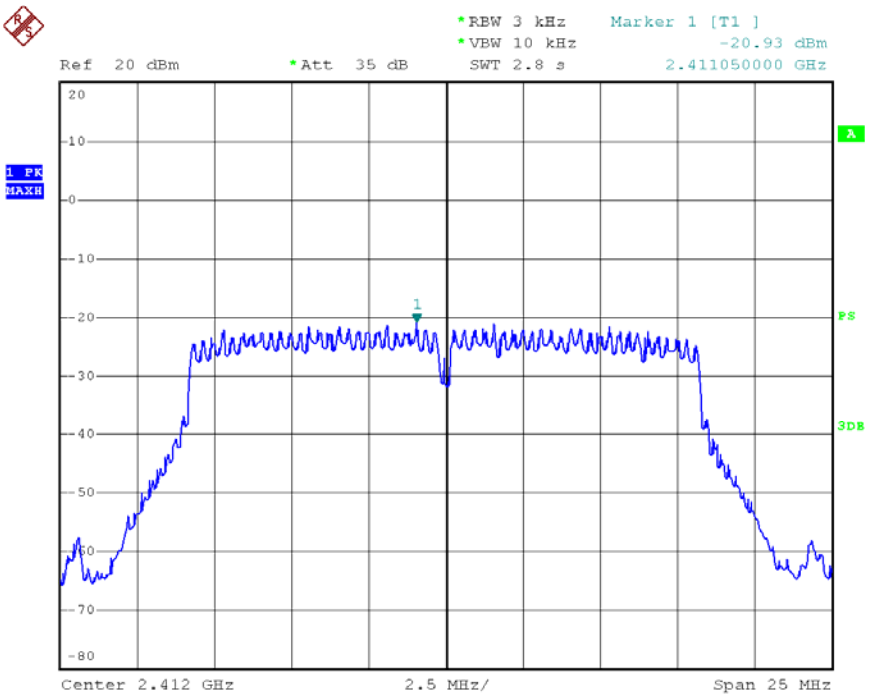
2462 MHz



Date: 17.DEC.2013 15:17:44

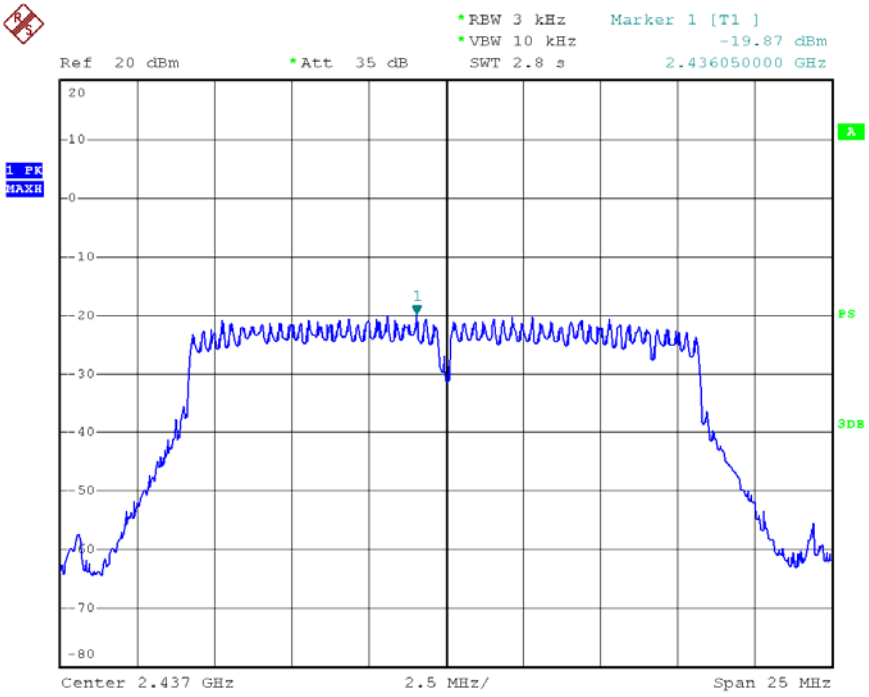
802.11g Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-20.93	8
CH 06	2437	-19.87	8
CH 11	2462	-19.87	8

2412 MHz



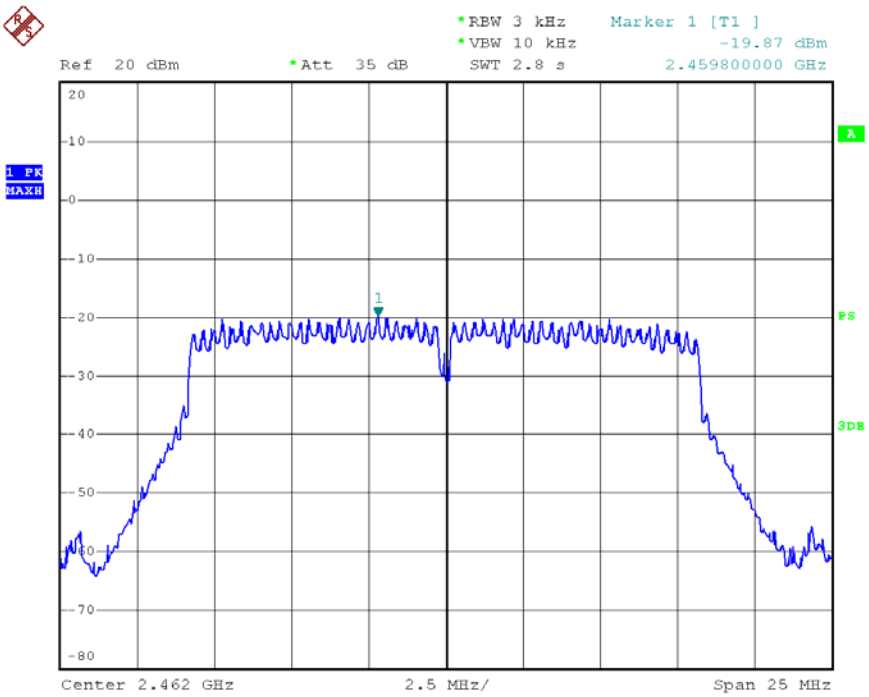
Date: 17.DEC.2013 14:12:04

2437 MHz



Date: 17.DEC.2013 15:52:10

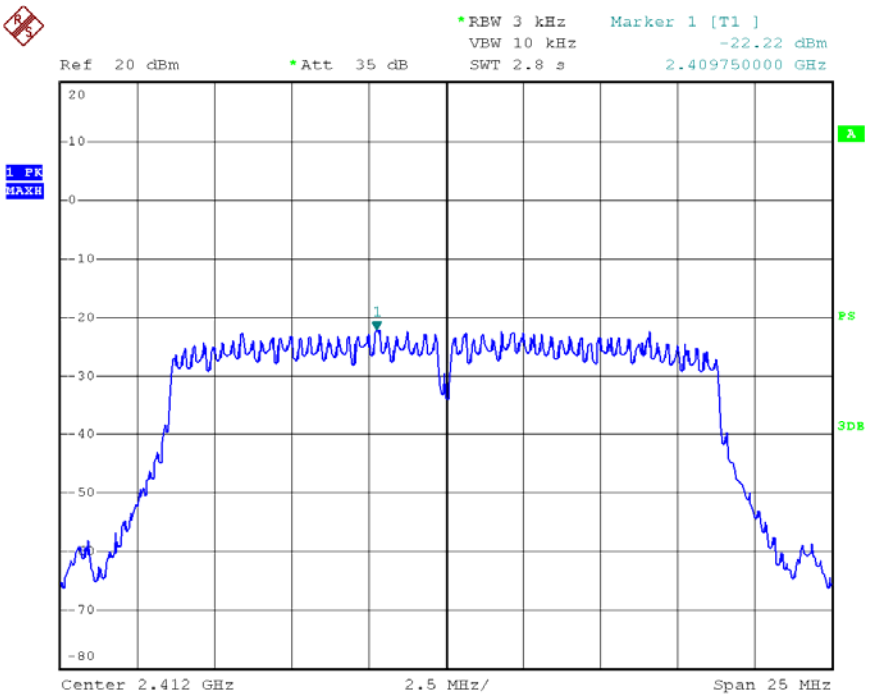
2462 MHz



Date: 17.DEC.2013 15:52:57

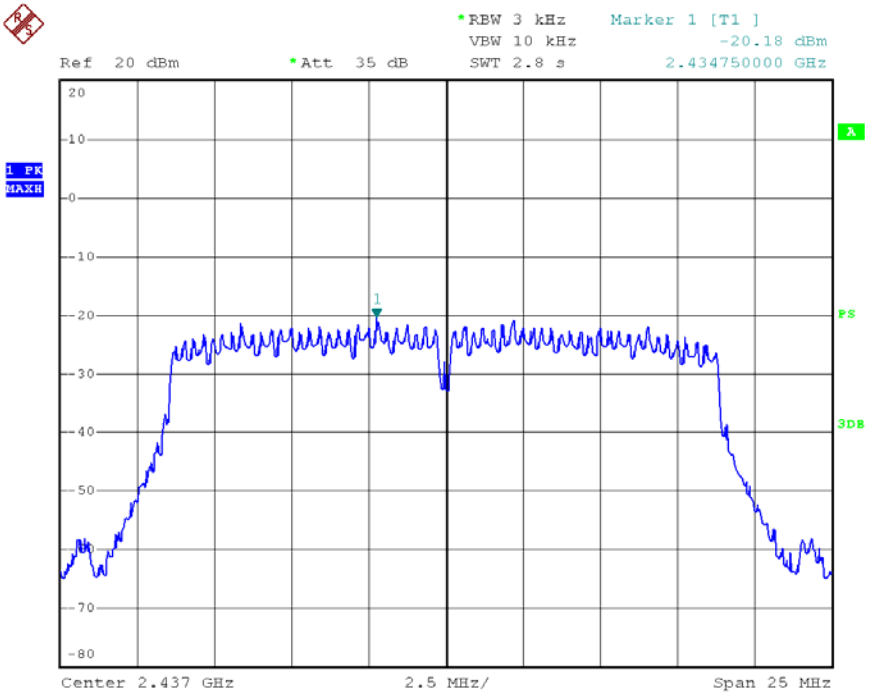
802.11n(HT20) Mode			
Test Channel	**Frequency (MHz)**	**Power Density (3 kHz/dBm)**	**Limit (dBm)**
CH 01	2412	-22.22	8
CH 06	2437	-20.18	8
CH 11	2462	-20.58	8

2412 MHz



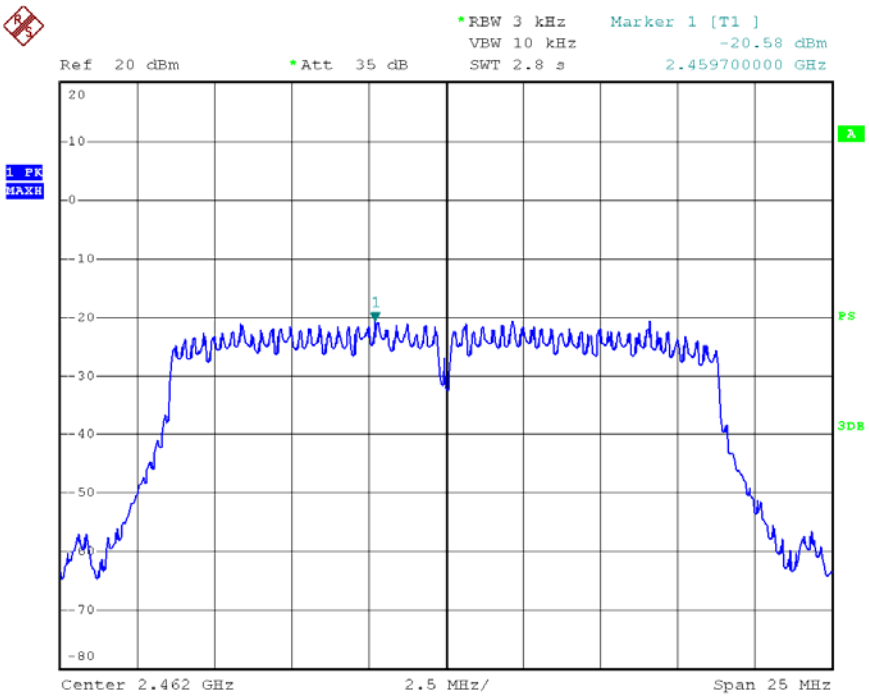
Date: 17.DEC.2013 17:07:54

2437 MHz



Date: 17.DEC.2013 16:59:32

2462 MHz



Date: 17.DEC.2013 16:58:41

9. Antenna Conducted Spurious Emission

9.1 Test Standard and Limit

10.1.1 Test Standard

FCC Part 15.247 (d)

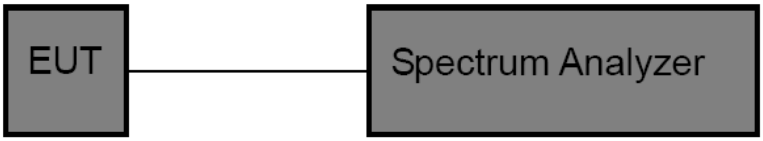
10.1.2 Test Limit

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. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above~960	500	3

(2)If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

9.2 Test Setup



9.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

(2) Spectrum Setting:
RBW=100 KHz, VBW=300 KHz.
Frequency range: from 30MHz to 26.5 GHz.

9.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

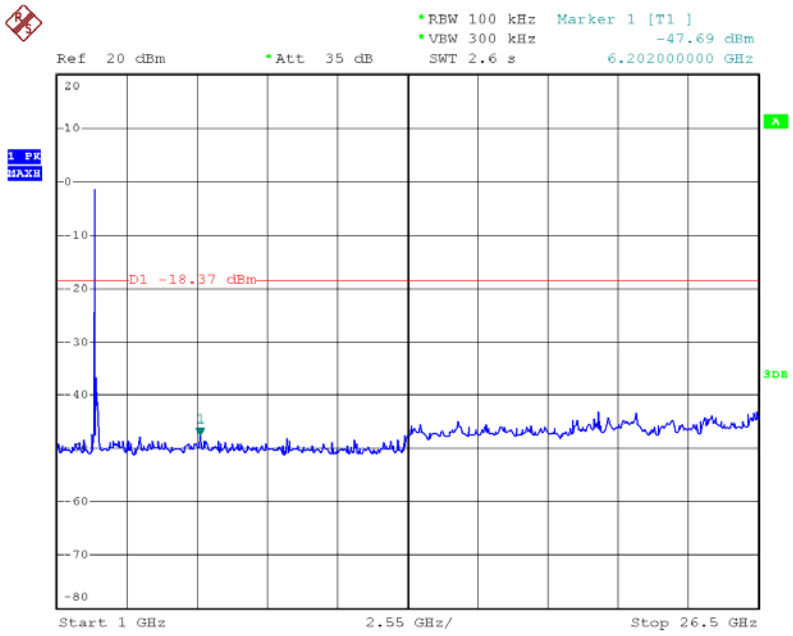
9.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSP30	DE25181	2014-12-30	2014-12-29

9.6 Test Data

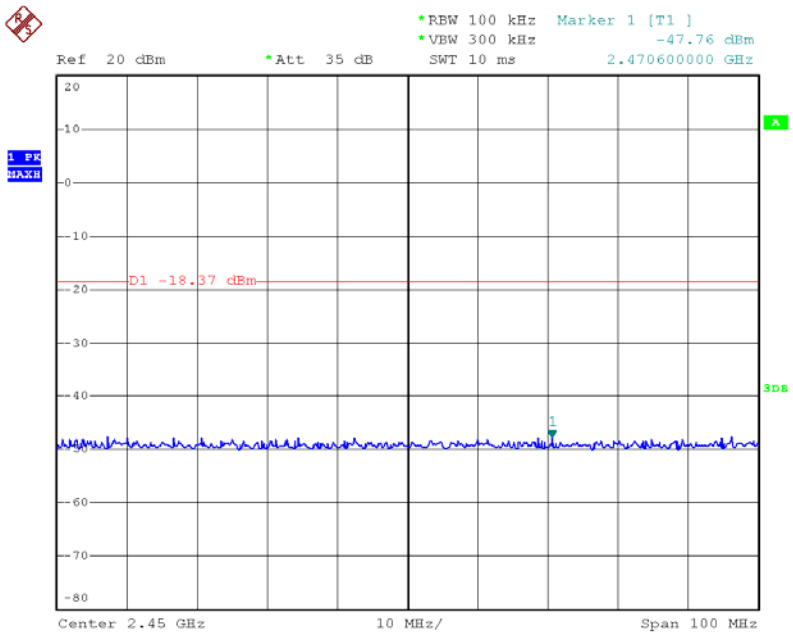
802.11b Mode TX CH 01 2412MHz

Above 1 GHz



Date: 18.JAN.2014 14:28:01

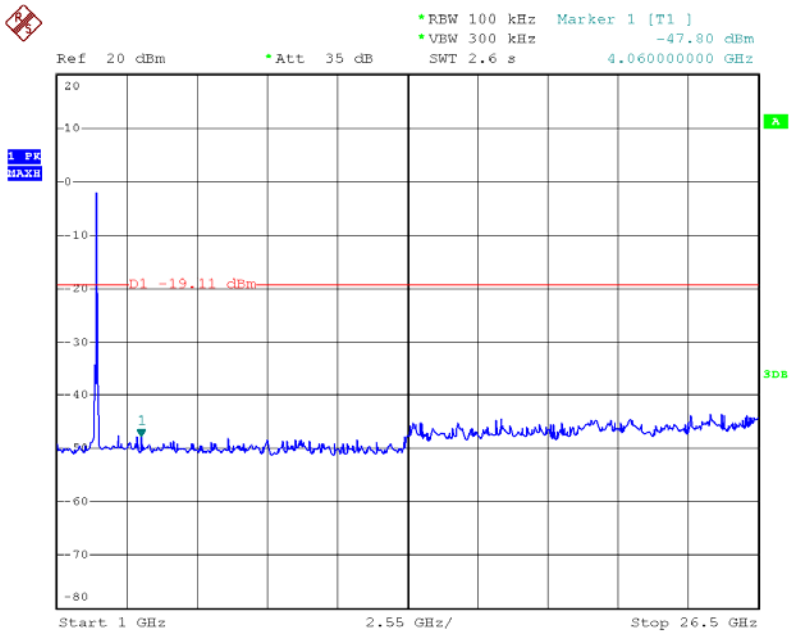
Below 1 GHz



Date: 18.JAN.2014 14:24:27

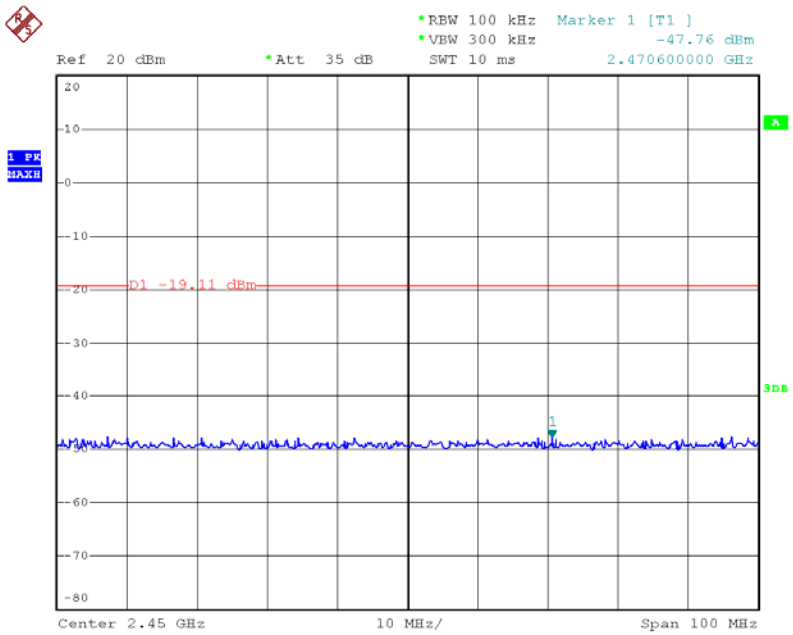
802.11b Mode TX CH 06 2437MHz

Above 1 GHz



Date: 18.JAN.2014 14:29:05

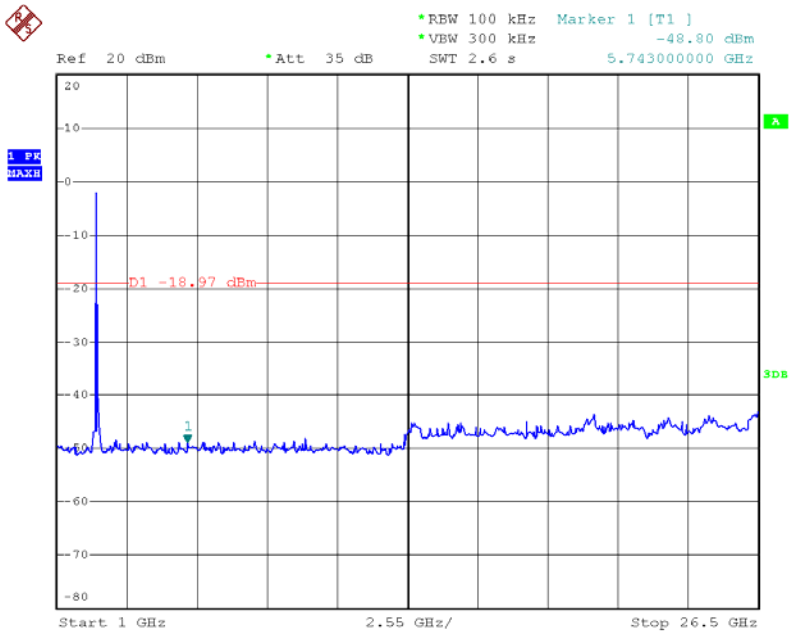
Below 1 GHz



Date: 18.JAN.2014 14:24:56

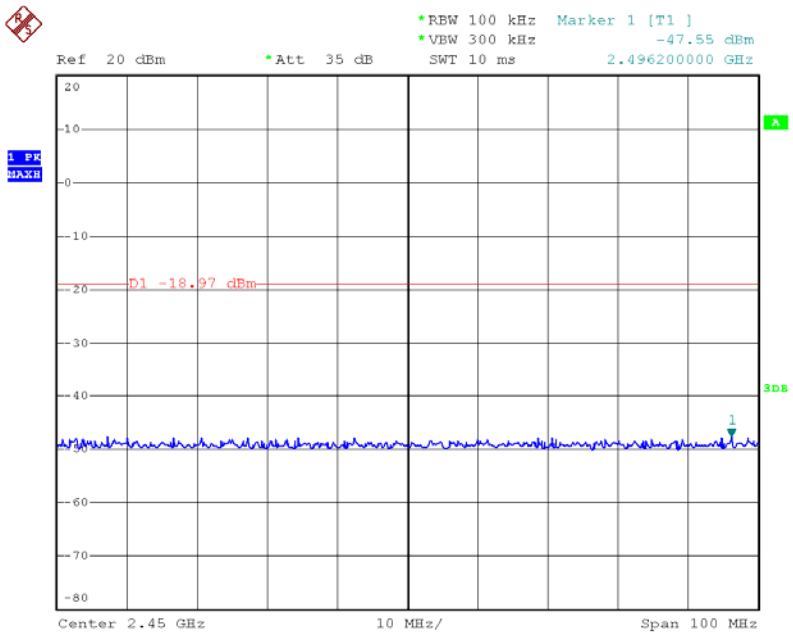
802.11b Mode TX CH 11 2462MHz

Above 1 GHz



Date: 18.JAN.2014 14:32:56

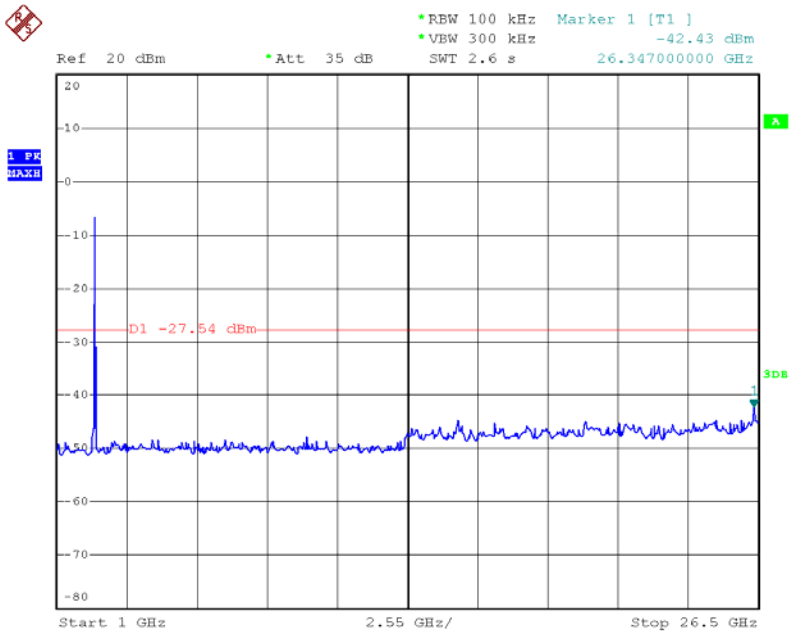
Below 1 GHz



Date: 18.JAN.2014 14:25:15

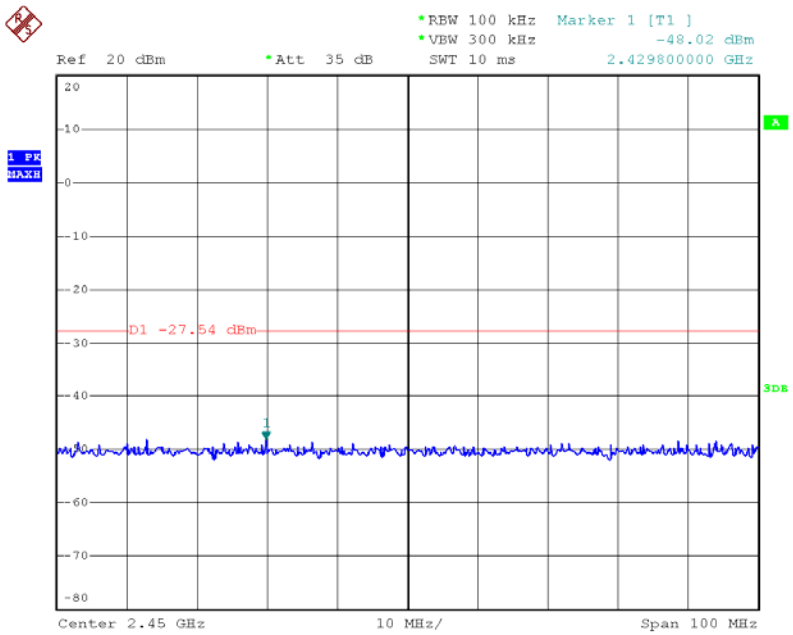
802.11g Mode TX CH 01 2412MHz

Above 1 GHz



Date: 18.JAN.2014 14:47:47

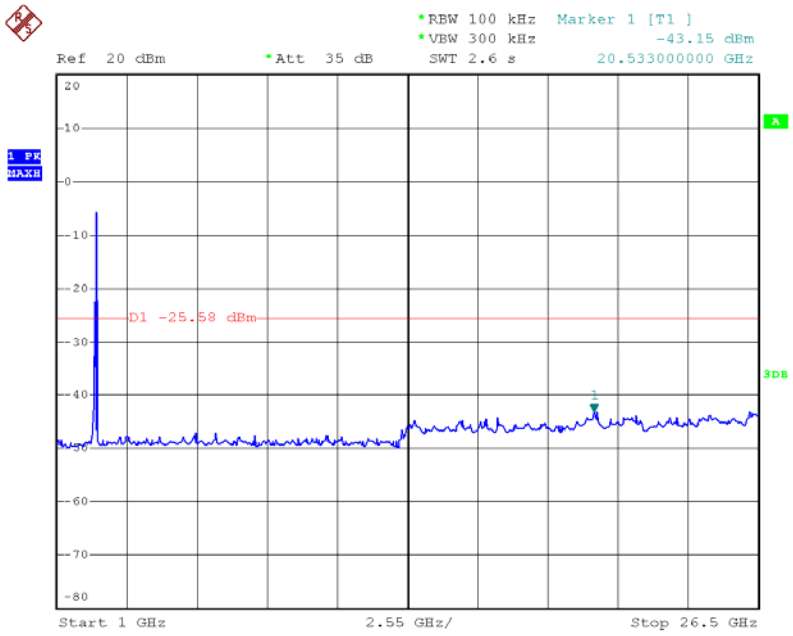
Below 1 GHz



Date: 18.JAN.2014 14:25:42

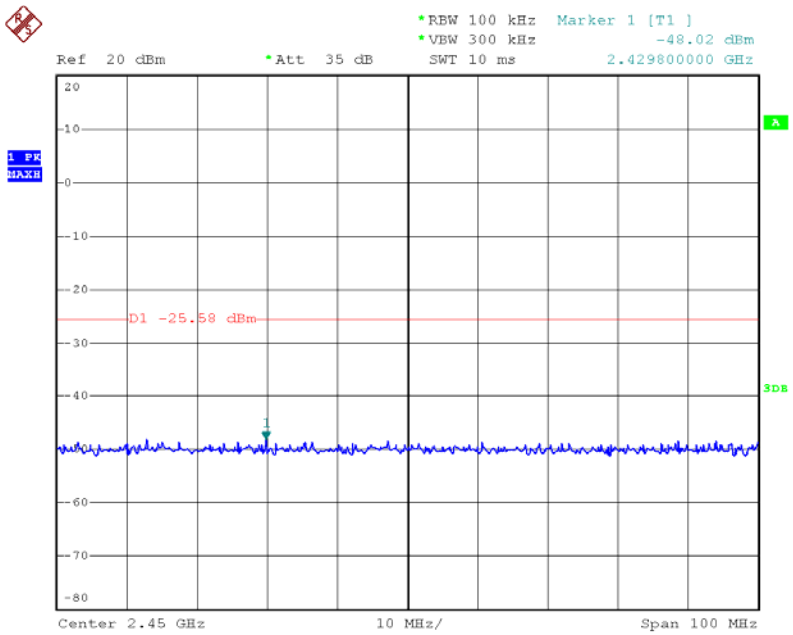
802.11g Mode TX CH 06 2437MHz

Above 1 GHz



Date: 18.JAN.2014 14:35:18

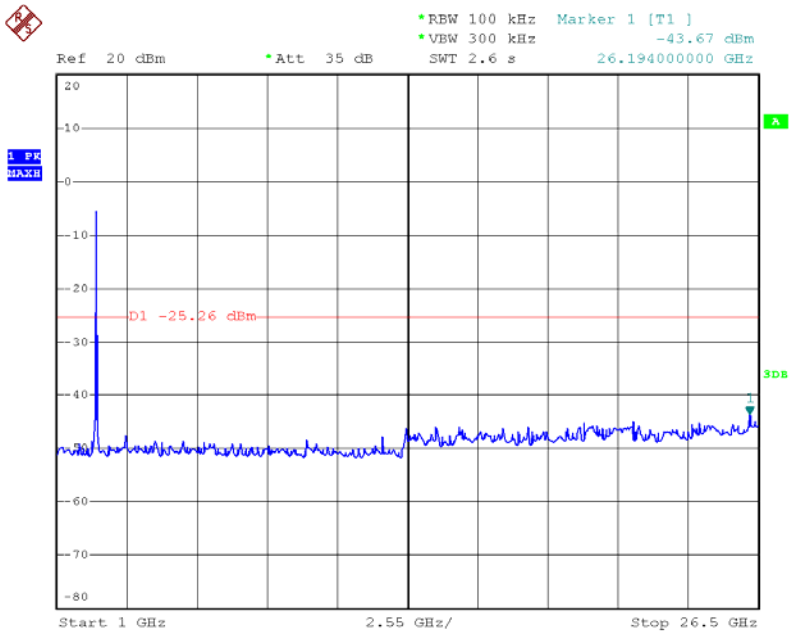
Below 1 GHz



Date: 18.JAN.2014 14:26:03

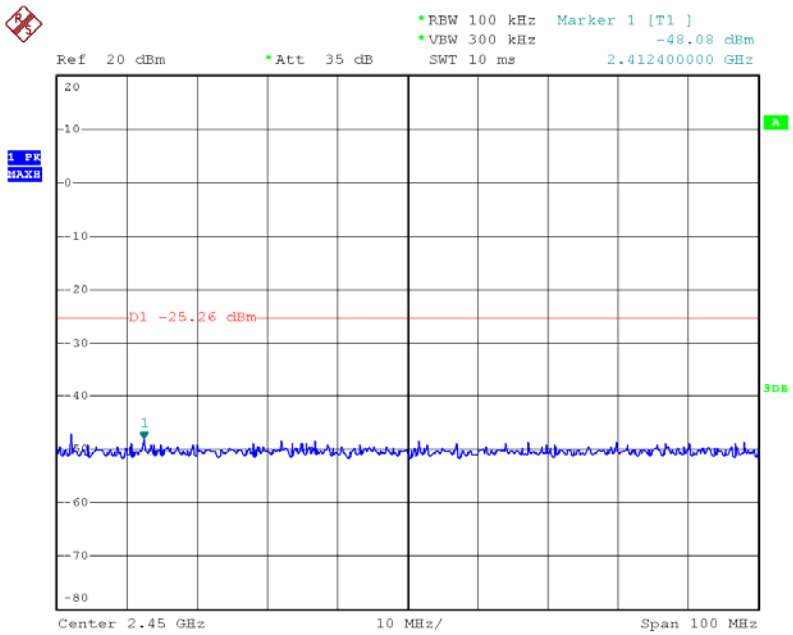
802.11g Mode TX CH 11 2462MHz

Above 1 GHz



Date: 18.JAN.2014 14:37:41

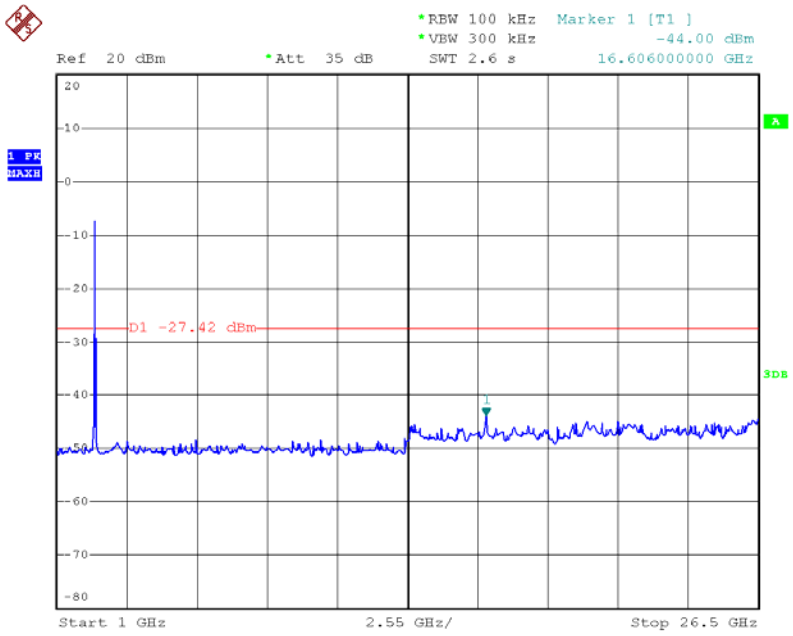
Below 1 GHz



Date: 18.JAN.2014 14:26:28

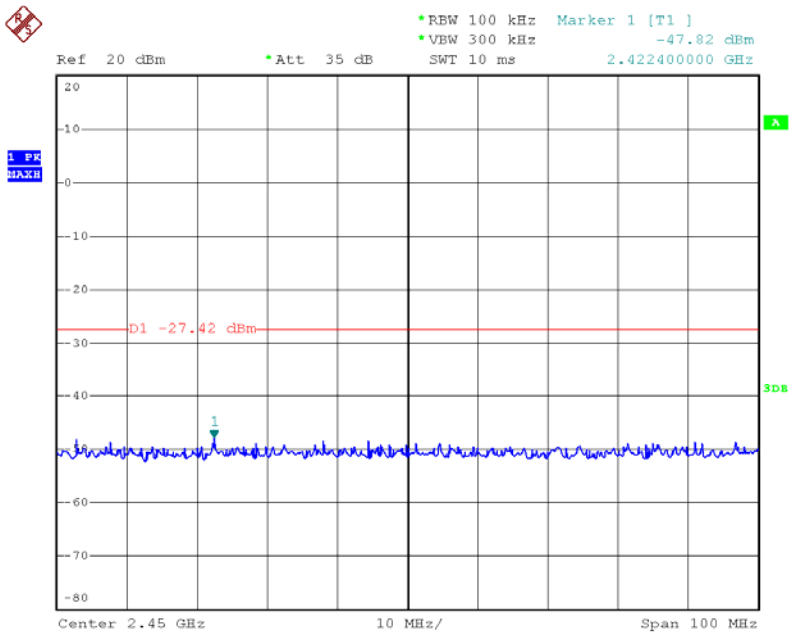
802.11n (HT20) Mode TX CH 01 2412MHz

Above 1 GHz



Date: 18.JAN.2014 14:45:42

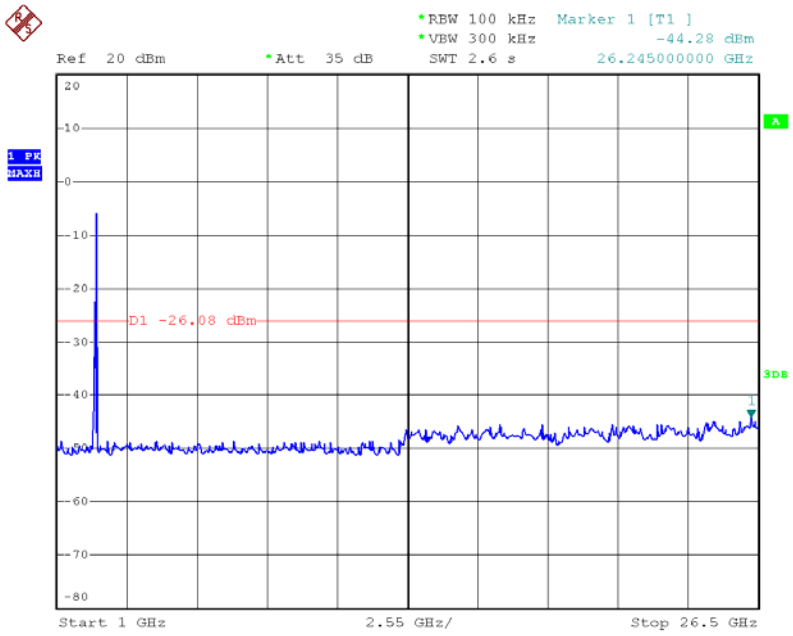
Below 1 GHz



Date: 18.JAN.2014 14:28:20

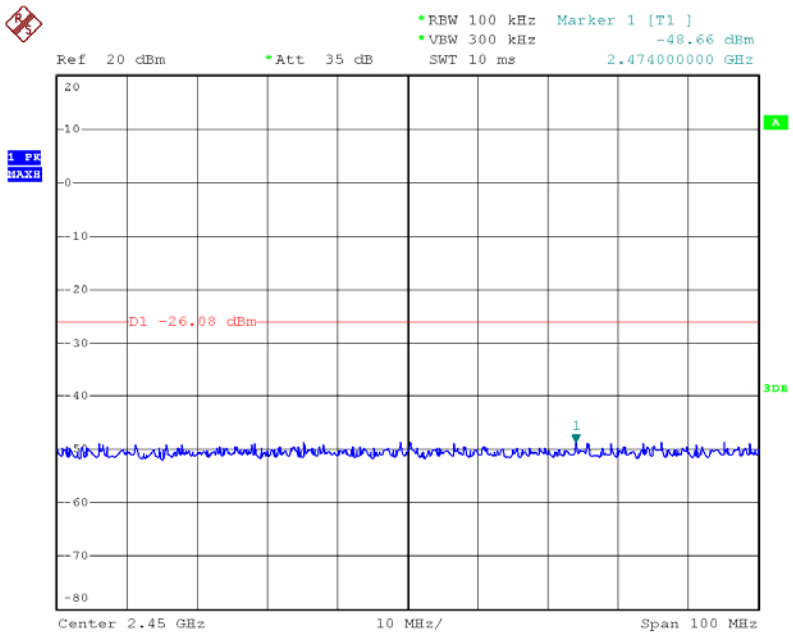
802.11n (HT20) Mode TX CH 06 2437MHz

Above 1 GHz



Date: 18.JAN.2014 14:32:50

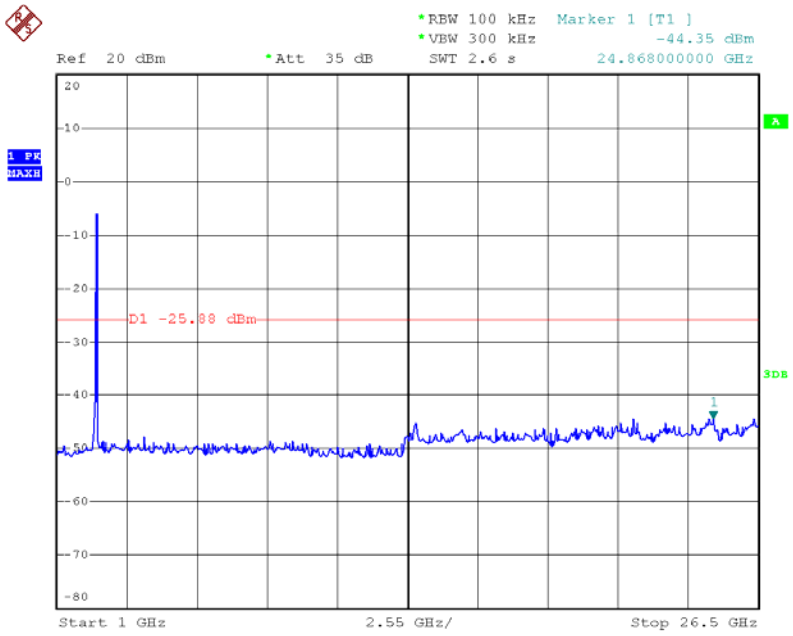
Below 1 GHz



Date: 18.JAN.2014 14:28:42

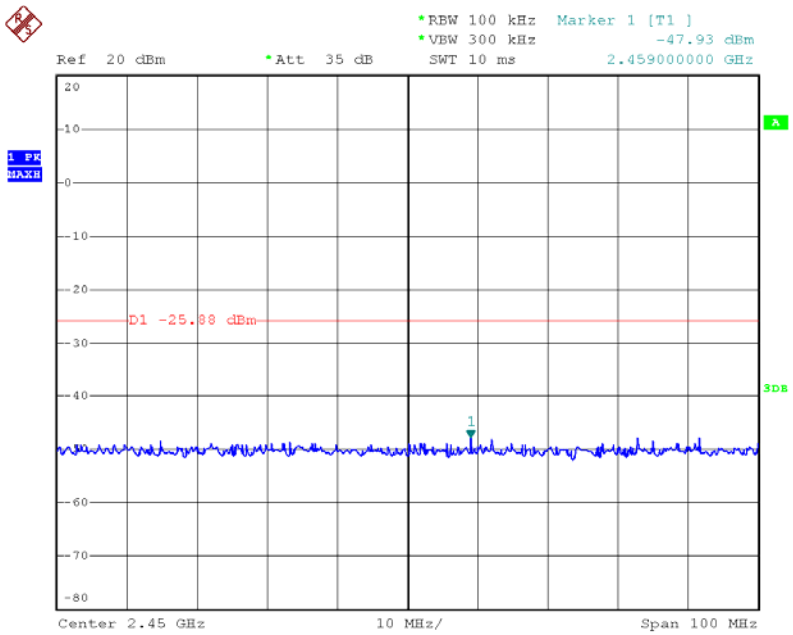
802.11n (HT20) Mode TX CH 11 2462MHz

Above 1 GHz



Date: 18.JAN.2014 14:18:30

Below 1 GHz



Date: 18.JAN.2014 14:29:13

10. Antenna Requirement

10.1 Standard Requirement

11.1.1 Standard

FCC Part 15.203

11.1.2 Requirement

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 2dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

10.2 Result

The EUT antenna is an Integrated Antenna. It complies with the standard requirement.