

FCC TEST REPORT
for
SHENZHEN APEXIS ELECTRONIC CO., LTD.

IP Camera

Model No.: APM-J805-WS, APM-JP8055-WS, APM-HP805-WS,
APM-HP802-WS, APM-HP401-WS, APM-HP702-WS, APM-HP803-WS,
APM-HP701-WS, APM-HP903-WS, APM-HP403-WS

Prepared for : SHENZHEN APEXIS ELECTRONIC CO., LTD.
Address : 502 East Keji Building, ShenZhen High-Tech Ind-Park, Nanshan
District. ShenZhen, 518057, China


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Report Number : 201303713F
Date of Test : Mar. 14~28, 2013
Date of Report : Apr. 03, 2013

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TEST REPORT

Applicant : SHENZHEN APEXIS ELECTRONIC CO., LTD.
Manufacturer : SHENZHEN APEXIS ELECTRONIC CO., LTD.
EUT : IP Camera
Model No. : APM-J805-WS, APM-JP8055-WS, APM-HP805-WS,
APM-HP802-WS, APM-HP401-WS, APM-HP702-WS,
APM-HP803-WS, APM-HP701-WS, APM-HP903-WS,
APM-HP403-WS
Serial No. : N/A
Rating : DC 5V, 2.0A
Trade Mark : 

Measurement Procedure Used:
FCC Part15 Subpart C, Paragraph 15.247: 2011

The device described above is tested by Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotech Compliance Laboratory Limited.

Date of Test : Mar. 14~28, 2013

Prepared by :



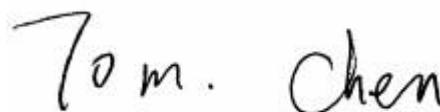
(Engineer / Rock Zeng)

Reviewer :



(Project Manager / Sally Zhang)

Approved & Authorized Signer :



(Manager / Henry Yang)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: IP Camera
Model Number	: APM-J805-WS, APM-JP8055-WS, APM-HP805-WS, APM-HP802-WS, APM-HP401-WS, APM-HP702-WS, APM-HP803-WS, APM-HP701-WS, APM-HP903-WS, APM-HP403-WS (Note: All samples are the same except the model number & shape of appliances, so we prepare “APM-J805-WS” for EMC test only.)
Test Power Supply	: 120V~, 60Hz for Adapter
Adapter	: Power Supply Model: CW0502000 Input: 100-240V~, 50-60Hz, 0.4A Max Output: 5V $\overline{\text{---}}$, 2A
RF Transmission Frequency Channels	: 2412-2462MHz(802.11b/g/n) : 802.11b, 802.11g, 802.11n,(HT20) 11 Channels 802.11n(HT40) 7 Channels
Antenna Type	: Integrated Antenna
Antenna Gain	: 2dBi
Applicant Address	: SHENZHEN APEXIS ELECTRONIC CO., LTD. : 502 East Keji Building, ShenZhen High-Tech Ind-Park, Nanshan District. ShenZhen, 518057, China
Manufacturer Address	: SHENZHEN APEXIS ELECTRONIC CO., LTD. : 502 East Keji Building, ShenZhen High-Tech Ind-Park, Nanshan District. ShenZhen, 518057, China
Date of receiver	: Mar. 14, 2013
Date of Test	: Mar. 14~28, 2013

1.2.Auxiliary Equipment Used during Test

PC	: Manufacturer: DELL M/N: OPTIPLEX 380 S/N: 1J63X2X CE , FCC: DOC
MONITOR	: Manufacturer: DELL M/N: E170Sc S/N: CN-00V539-64180-055-0UPS CE , FCC: DOC
KEYBOARD	: Manufacturer: DELL M/N: SK-8115 S/N: CN-0DJ313-71616-06C-02XN CE , FCC: DOC Cable: 1m, unshielded
MOUSE	: Manufacturer: DELL M/N: M-UARDEL7 S/N: N/A CE , FCC: DOC Cable: 1m, unshielded
Printer	: Manufacturer:Brother M/N: MFC-3360C S/N: N/A CE, FCC:DOC
Power Line	: Non-Shielded, 1.5m
VGA Cable	: Non-Shielded, 1.5m
Network Cable	: Non-Shielded, 1.5m

1.3. Description of Test Facility

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

CNAS - LAB Code: L3503

Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Anbotek Compliance Laboratory Limited, 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 752021, August 20, 2010.

IC-Registration No.: 8058A-1

Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, August 30, 2010.

Test Location

All Emissions tests were performed at
Anbotek Compliance Laboratory Limited. at 1/F, 1 /Building, SEC Industrial Park,
No.4 Qianhai Road, Nanshan District, Shenzhen, 518054, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.3dB
Conduction Uncertainty	:	Uc = 3.4dB

2. MEASURING DEVICE AND TEST EQUIPMENT

The following test equipments were used during test:

Equipment	Manufacturer	Model #	Serial #	Data of Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 12, 2012	1 Year
Two-Line V-network	Rohde & Schwarz	ENV216	10055	May 19, 2012	1 Year
Absorbing Clamp	FCC	F-102-23MM	08166	May 19, 2012	1 Year
RF Switching Unit	Compliance Direction	RSU-M2	38303	May 19, 2012	1 Year
Triple-Loop Antenna(2M)	EVERFINE	LLA-2	905003	May 19, 2012	1 Year
Bilog Broadband Antenna	Schwarzbeck	VULB9163	100015	May 17, 2012	1 Year
Pre-amplifier	Compliance Direction	PAEFV03	22008	May 19, 2012	1 Year
Programmable AC Power source	SOPH POWER	PAG-1050	630250	May 26, 2012	1 Year
Harmonic and Flicker Analyzer	LAPLACE	AC2000A	272629	May 26, 2012	1 Year
ESD Simulators	KIKUSUI	KES4021	LJ003477	May 25, 2012	1 Year
Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	906002	May 19, 2012	1 Year
EFT Burst Simulator	PRIMA	EFT61004B	PR10114282	Dec. 20, 2012	1 Year
CYCLE SAG Simulator	PRIMA	DRP61011A	PR10106201	Dec. 20, 2012	1 Year
6kV Surge Generator	EMPEK	LSG-5060G	06010017N	Jul. 22, 2012	1 Year
DIPS Simulators	EMPEK	VDS-1105G	11510006N	May 19, 2012	1 Year
EFT Generator	EMPEK	EFT-4040B	0430928N	May 19, 2012	1 Year
EFT/SURGE/DIPS Simulators	SCHAFFNER	BEST E.M.C. V2.3	200030 -002SC	May 19, 2012	1 Year
EMI Test Software	ES-K1	N/A	N/A	N/A	N/A
EMI Test Software	SHURPLE	N/A	N/A	N/A	N/A
Harmonic and Flicker Test Software	LAPLACE	N/A	N/A	N/A	N/A

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC Part 15, Paragraph 15.247

3.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.247(b)(1)	Peak Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(2)	6dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(1)	Frequency Separation	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Number of Hopping Frequency	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Time of Occupancy	-	N/A
FCC Part 15, Paragraph 15.247(c)	Peak Power Density	PASS	Complies

* The digital circuit porting of the EUT has been tested and verified to comply with FCC Part 15, Subpart B., Class B Digital Devices and the associated Radio Receiver has also been tested and found to comply with FCC Part 15, Subpart B – Radio Receivers.

3.2. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 11Mbps highest data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 54Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n(HT20): Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 7Mbps Worst data rate (worst case) are chosen for the final testing.

IEEE802.11n(HT40): Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9 (2452MHz) with 7Mbps data rate (the worst case) are chosen for the final testing.

3.3. List of channels:

✓ - available

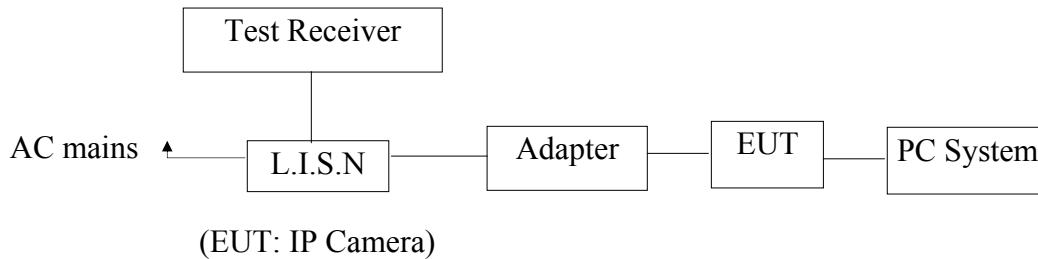
X - tested

Number	Frequency(MHz)		802.11 b/g/n (HT20)	802.11 n (HT40)
1	2412	✓	X	
2	2417	✓		
3	2422	✓		X
4	2427	✓		
5	2432	✓		
6	2437	✓	X	X
7	2442	✓		
8	2447	✓		
9	2452	✓		X
10	2457	✓		
11	2462	✓	X	

4. Conducted Emission Test

4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



4.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

4.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : IP Camera
Model Number : APM-J805-WS
Applicant : SHENZHEN APEXIS ELECTRONIC CO., LTD.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in test mode (ON) and measure it.

4.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

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

The test results are reported on Section 4.6.

4.6. Power Line Conducted Emission Measurement Results

PASS.

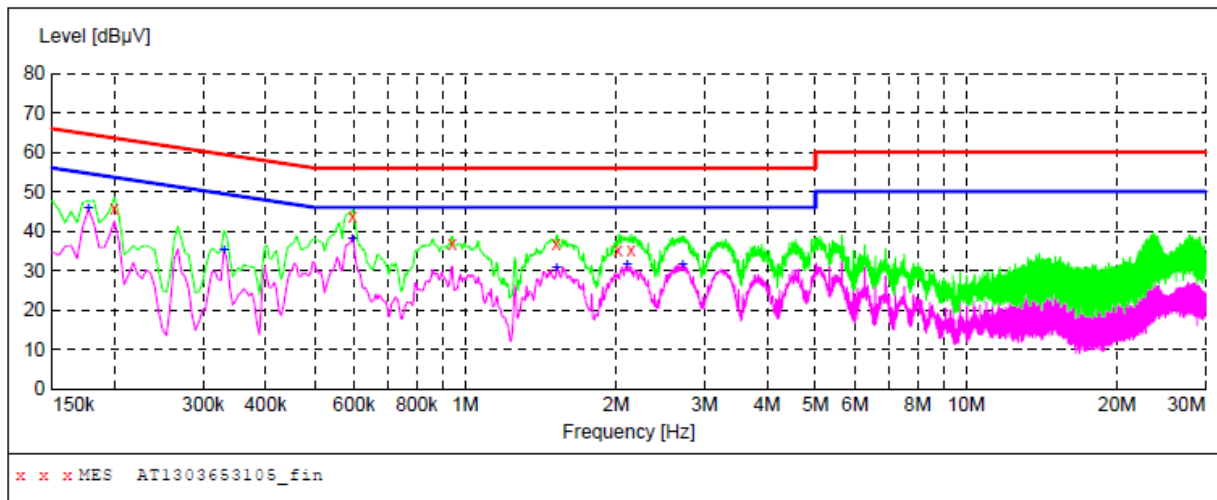
The frequency range from 150KHz to 30 MHz is investigated.

Please refer the following pages.

CONDUCTED EMISSION TEST DATA

EUT: IP Camera M/N: APM-J805-WS
Operating Condition: On
Test Site: 1# Shielded Room
Operator: Finley Li
Test Specification: AC 120V/60Hz for Adapter
Comment: Live Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"
Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1303653105_fin"

3/18/2013 10:46AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.199500	46.00	20.1	64	17.6	QP	L1	GND
0.595500	43.60	20.1	56	12.4	QP	L1	GND
0.942000	36.70	20.1	56	19.3	QP	L1	GND
1.522000	36.80	20.3	56	19.2	QP	L1	GND
2.021500	35.00	20.3	56	21.0	QP	L1	GND
2.143000	35.30	20.3	56	20.7	QP	L1	GND

MEASUREMENT RESULT: "AT1303653105_fin2"

3/18/2013 10:46AM

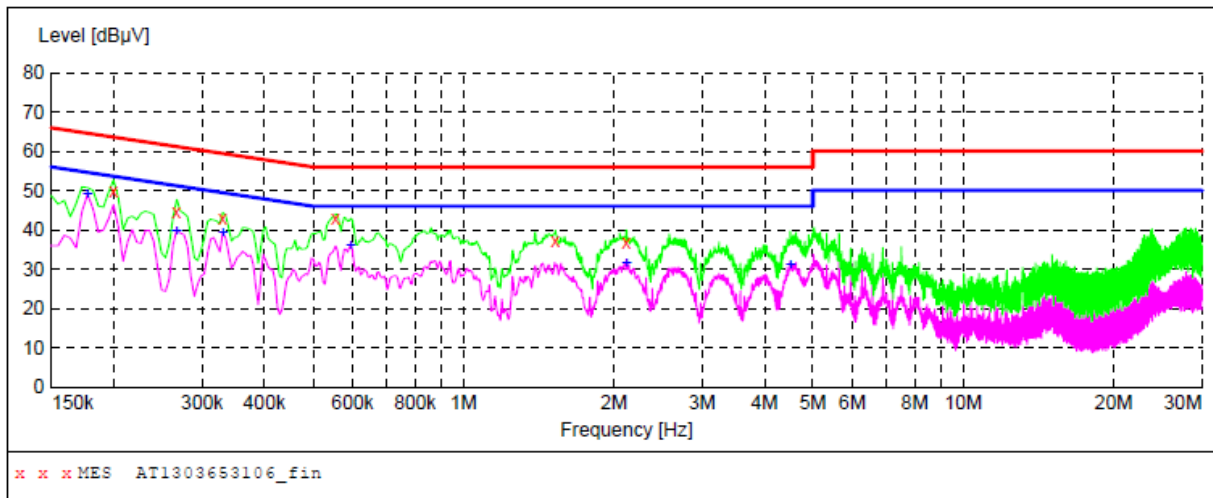
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	45.70	20.1	55	8.9	AV	L1	GND
0.330000	35.30	20.1	50	14.2	AV	L1	GND
0.595500	38.00	20.1	46	8.0	AV	L1	GND
1.522000	30.90	20.3	46	15.1	AV	L1	GND
2.102500	31.40	20.3	46	14.6	AV	L1	GND
2.714500	31.60	20.4	46	14.4	AV	L1	GND

CONDUCTED EMISSION TEST DATA

EUT: IP Camera M/N: APM-J805-WS
Operating Condition: On
Test Site: 1# Shielded Room
Operator: Finley Li
Test Specification: AC 120V/60Hz for Adapter
Comment: Neutral Line
Tem:25℃ Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"

Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1303653106_fin"

3/18/2013 10:49AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.199500	50.00	20.1	64	13.6	QP	N	GND
0.267000	44.80	20.1	61	16.4	QP	N	GND
0.330000	43.00	20.1	60	16.5	QP	N	GND
0.555000	43.10	20.1	56	12.9	QP	N	GND
1.526500	37.20	20.3	56	18.8	QP	N	GND
2.120500	36.70	20.3	56	19.3	QP	N	GND

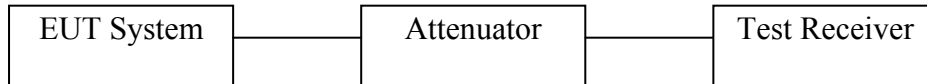
MEASUREMENT RESULT: "AT1303653106_fin2"

3/18/2013 10:49AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	49.10	20.1	55	5.5	AV	N	GND
0.267000	39.80	20.1	51	11.4	AV	N	GND
0.330000	39.20	20.1	50	10.3	AV	N	GND
0.595500	36.00	20.1	46	10.0	AV	N	GND
2.120500	31.60	20.3	46	14.4	AV	N	GND
4.505500	31.10	20.5	46	14.9	AV	N	GND

5. FCC Part 15.247 Requirements for DSSS & OFDM Modulation

5.1 Test Setup



5.2 6dB Bandwidth

a. Limit

For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

b. Test Procedure

This test was according the KDB558074 DTS D01 meas guidance v02.

One of the following procedures can be used to determine the modulated DTS channel bandwidth:

7.1. Option 1:

Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.

Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

c. Test Setup See 5.1

d. Test Results

Pass

Please refer to the following data.

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	10.16		Pass
Mid	2437	10.20	>500	Pass
High	2462	10.20		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	15.28		Pass
Mid	2437	15.20	>500	Pass
High	2462	15.68		Pass

Test mode: IEEE 802.11n(HT20)

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17.04		Pass
Mid	2437	16.96	>500	Pass
High	2462	16.96		Pass

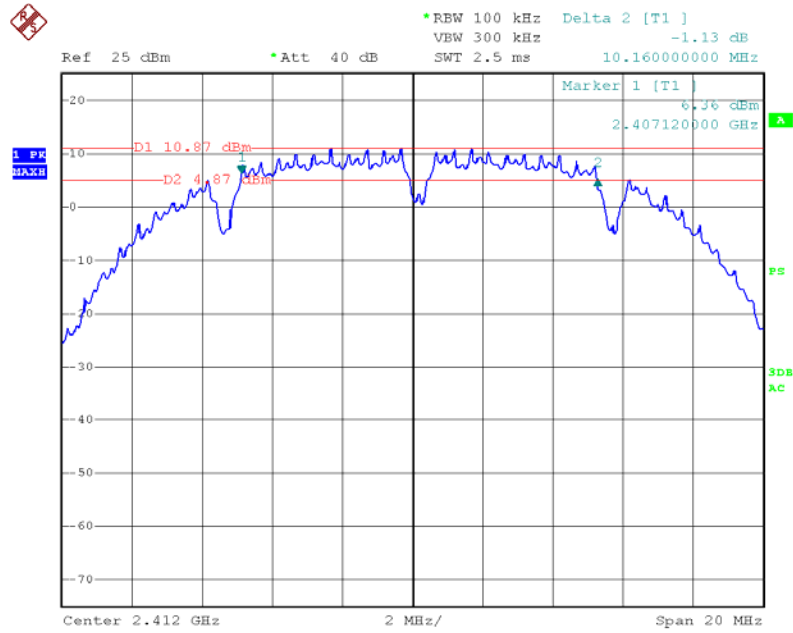
Test mode: IEEE 802.11n(HT40)

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	25.28		Pass
Mid	2437	35.36	>500	Pass
High	2452	35.28		Pass

Test Plots

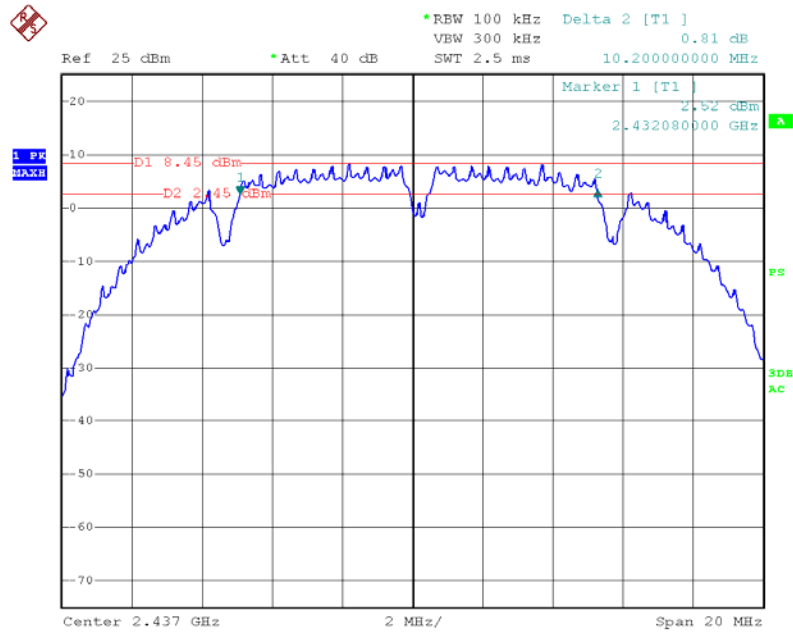
See the following page.

Test Mode: 802.11b---Low



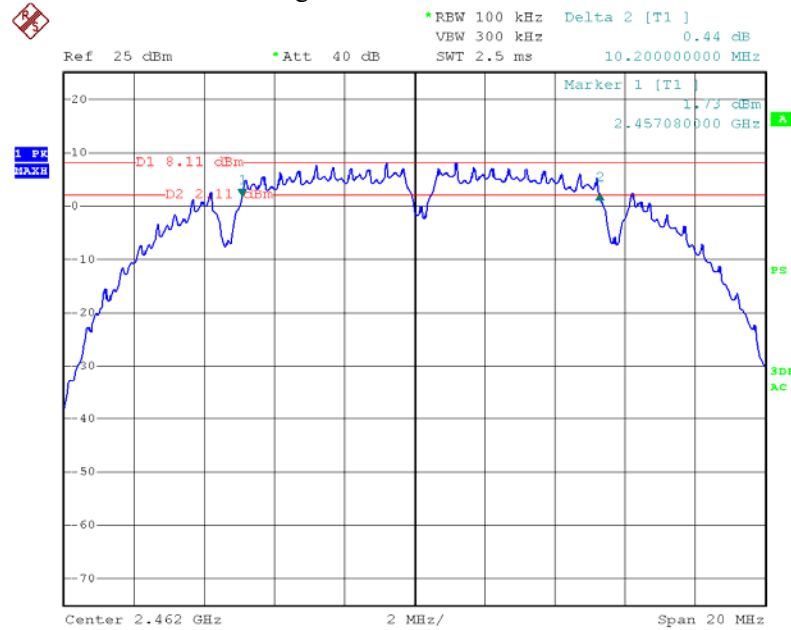
Date: 20.MAR.2013 16:24:30

Test Mode: 802.11b---Mid



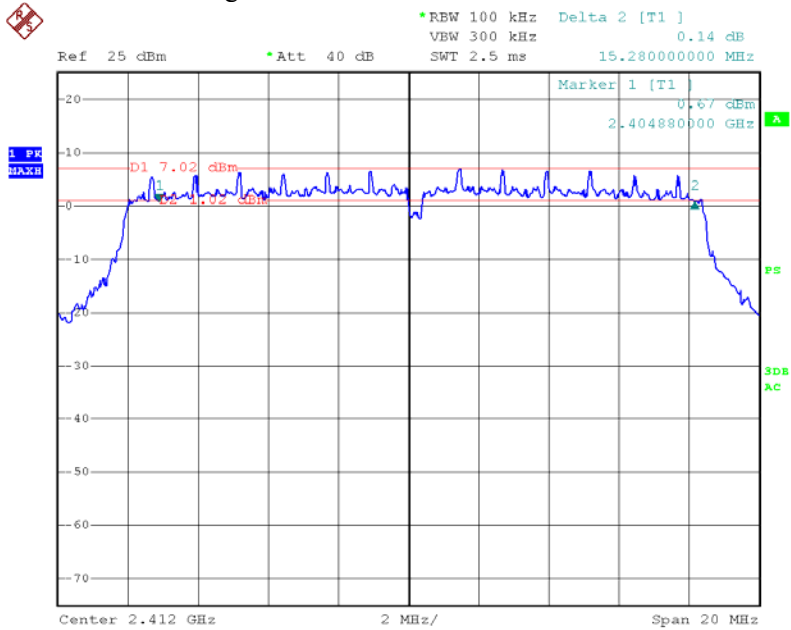
Date: 20.MAR.2013 16:35:03

Test Mode: 802.11b---High



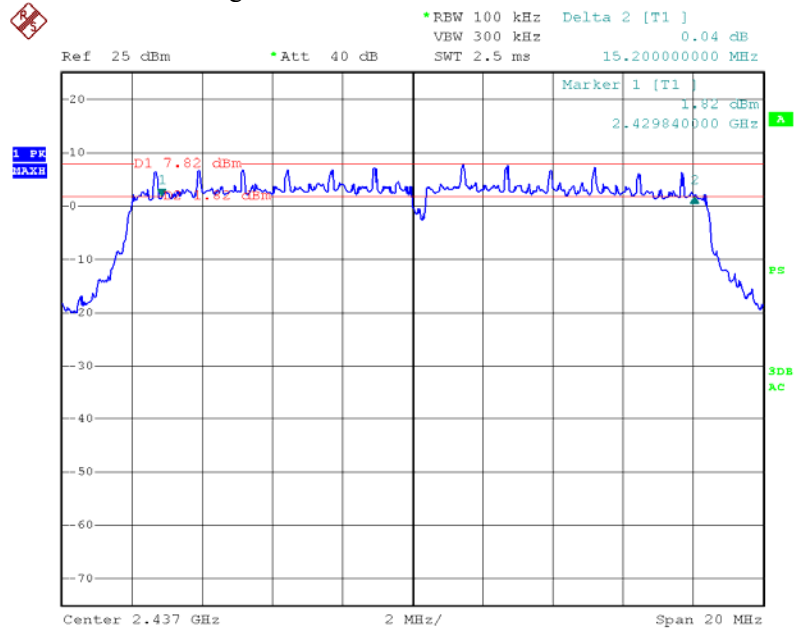
Date: 20.MAR.2013 16:36:17

Test Mode: 802.11g---Low



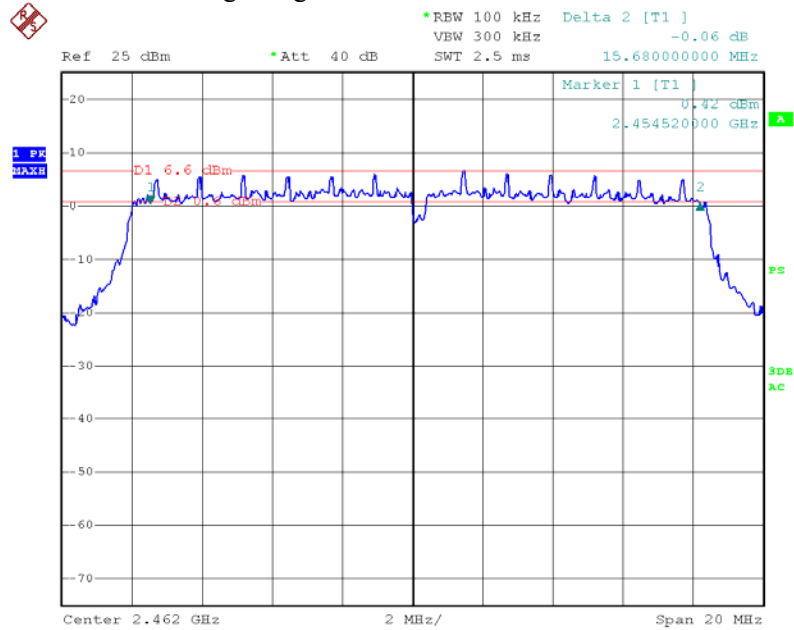
Date: 20.MAR.2013 16:41:11

Test Mode: 802.11g---Mid



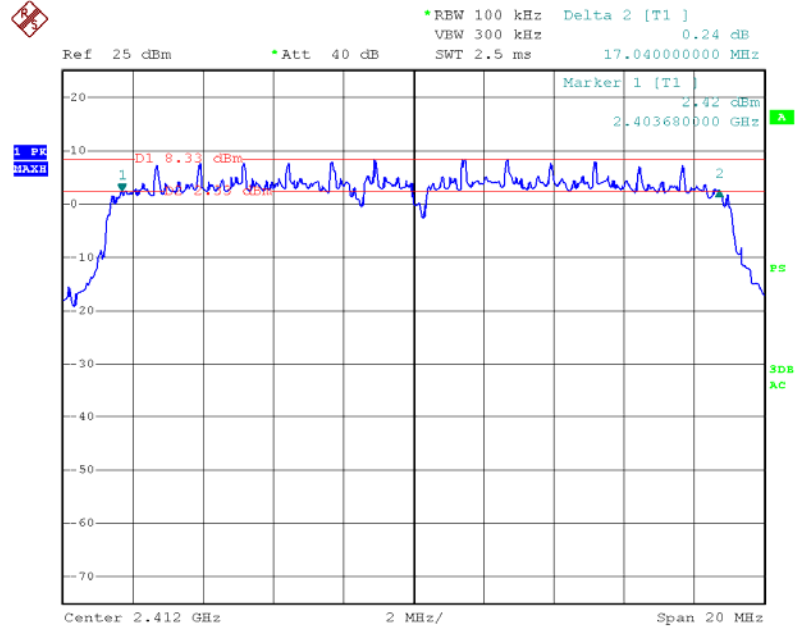
Date: 20.MAR.2013 16:39:19

Test Mode: 802.11g---High



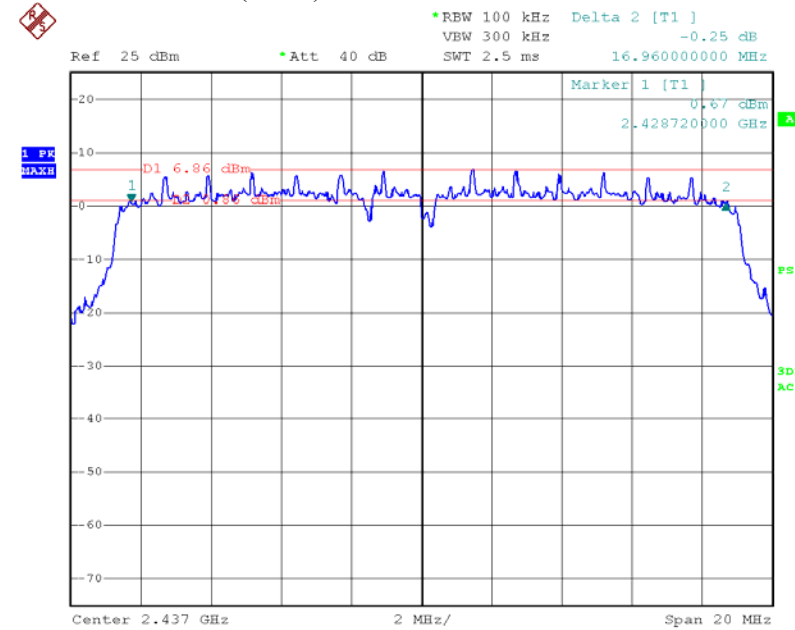
Date: 20.MAR.2013 16:37:40

Test Mode: 802.11n(HT20)---Low



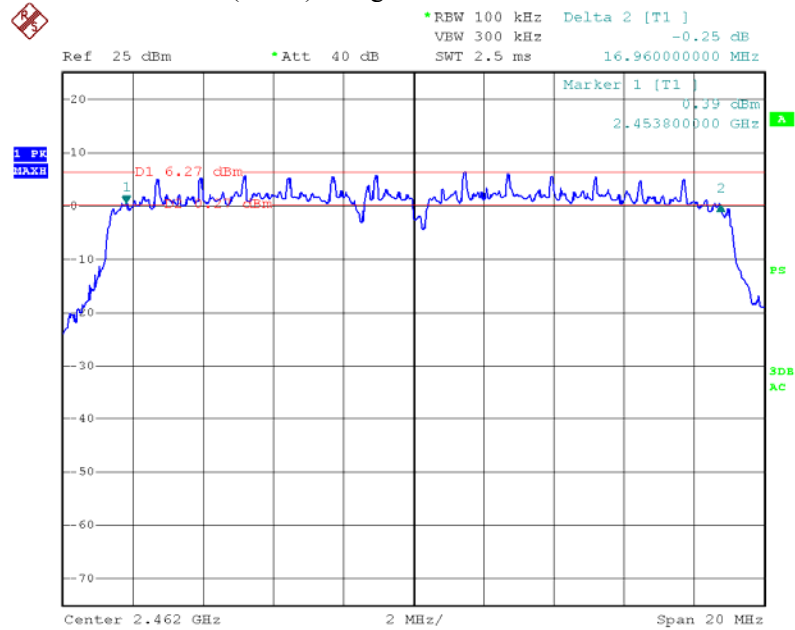
Date: 20.MAR.2013 16:55:49

Test Mode: 802.11n(HT20)---Mid



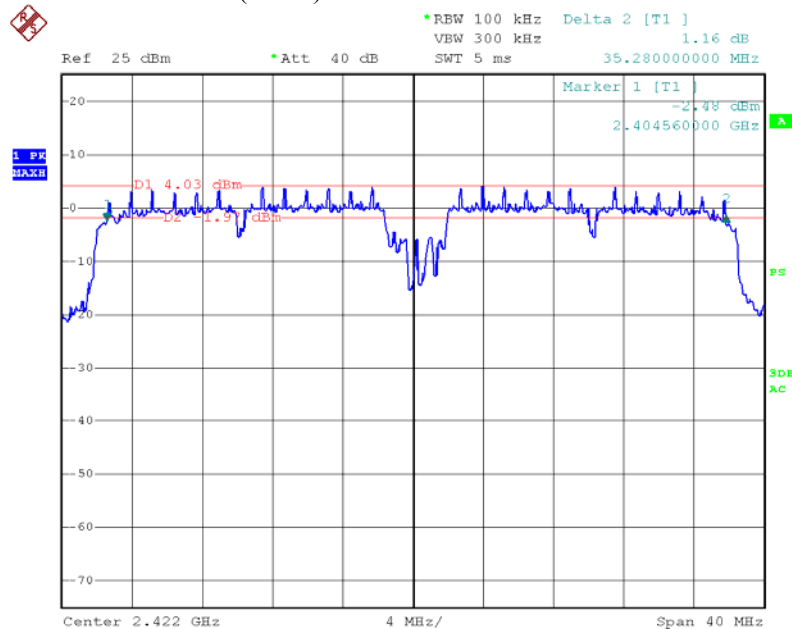
Date: 20.MAR.2013 16:57:18

Test Mode: 802.11n(HT20)---High



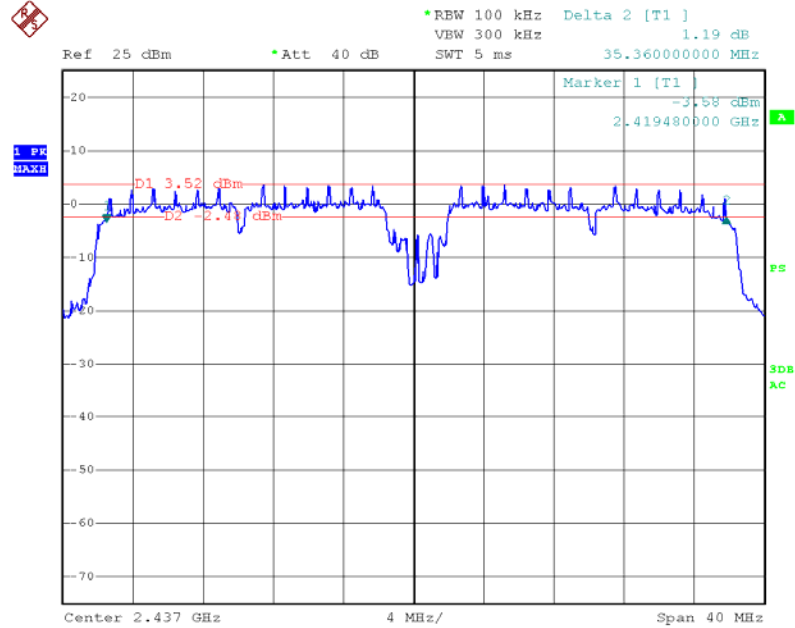
Date: 20.MAR.2013 16:58:41

Test Mode: 802.11n(HT40)---Low



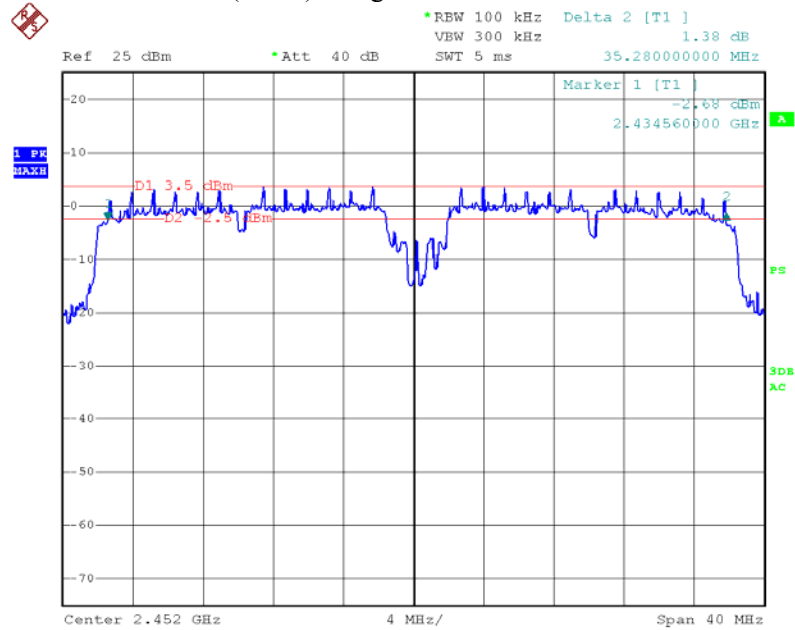
Date: 20.MAR.2013 17:07:19

Test Mode: 802.11n(HT40)---Mid



Date: 20.MAR.2013 17:04:02

Test Mode: 802.11n(HT40)---High



Date: 20.MAR.2013 17:01:26

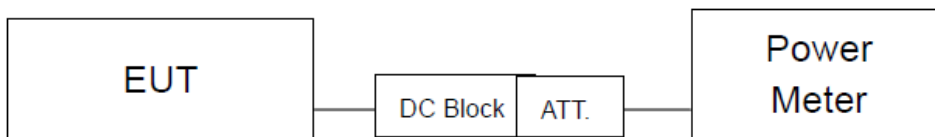
5.3 Maximum Peak output power test

a. Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt (30dBm).
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antenna of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

b. Configuration of Measurement



c. Test Procedure

This test was according the KDB558074 DTS D01 meas guidance v02.

7.2.1.2 Option 2 (integrated band power method)

This procedure provides an integrated measurement alternative for use with a spectrum analyzer where the maximum available RBW < the DTS bandwidth.

1. Set the RBW = 1 MHz.
2. Set the VBW = 3 MHz.
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1 MHz intervals extending across the DTS bandwidth.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 25, 2012	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	July 03, 2012	1 Year
3.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 07, 2012	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

d. Test Results

Pass

Please refer to the following data.

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Maximum transmit power		Limit		Result
		(dBm)	(watts)	(dBm)	(watts)	
Low	2412	22.57	0.18	30	1	Pass
Mid	2437	23.98	0.25			Pass
High	2462	22.87	0.19			Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power		Limit		Result
		(dBm)	(watts)	(dBm)	(watts)	
Low	2412	27.17	0.52	30	1	Pass
Mid	2437	26.70	0.47			Pass
High	2462	26.74	0.47			Pass

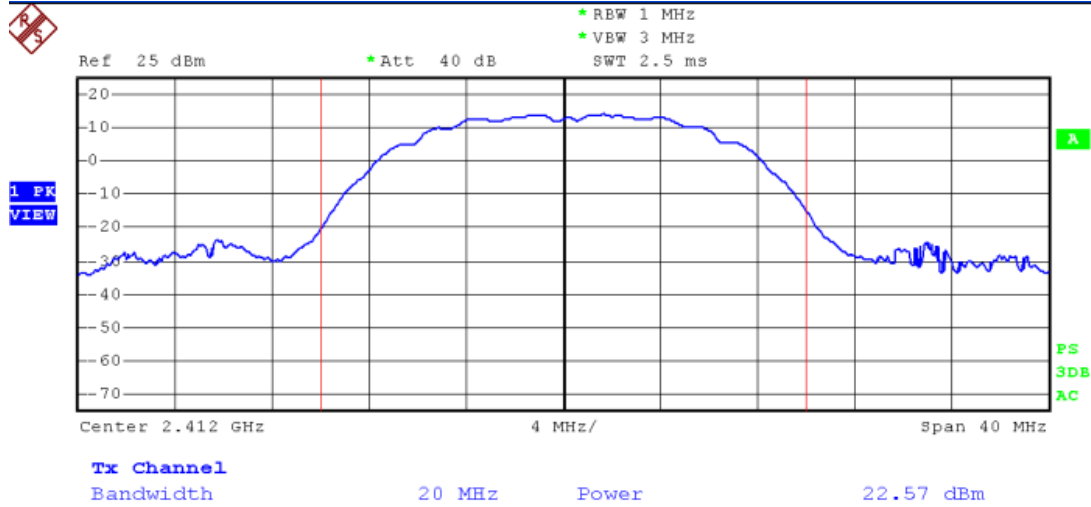
Test mode: IEEE 802.11n(HT20)

Channel	Frequency (MHz)	Maximum transmit power		Limit		Result
		(dBm)	(watts)	(dBm)	(watts)	
Low	2412	27.50	0.56	30	1	Pass
Mid	2437	27.65	0.58			Pass
High	2462	27.48	0.56			Pass

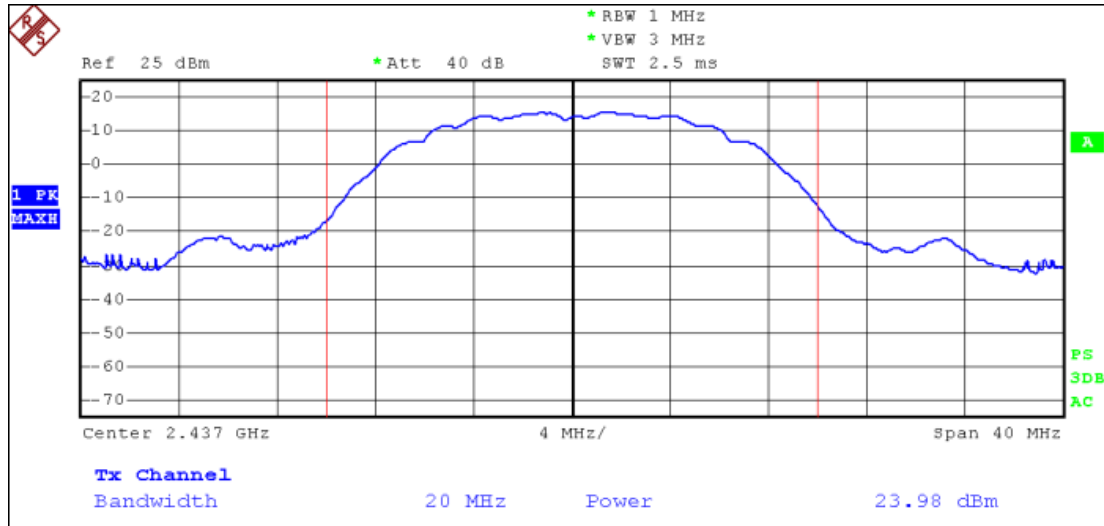
Test mode: IEEE 802.11n(HT40)

Channel	Frequency (MHz)	Maximum transmit power		Limit		Result
		(dBm)	(watts)	(dBm)	(watts)	
Low	2422	27.70	0.59	30	1	Pass
Mid	2437	27.21	0.53			Pass
High	2452	26.86	0.49			Pass

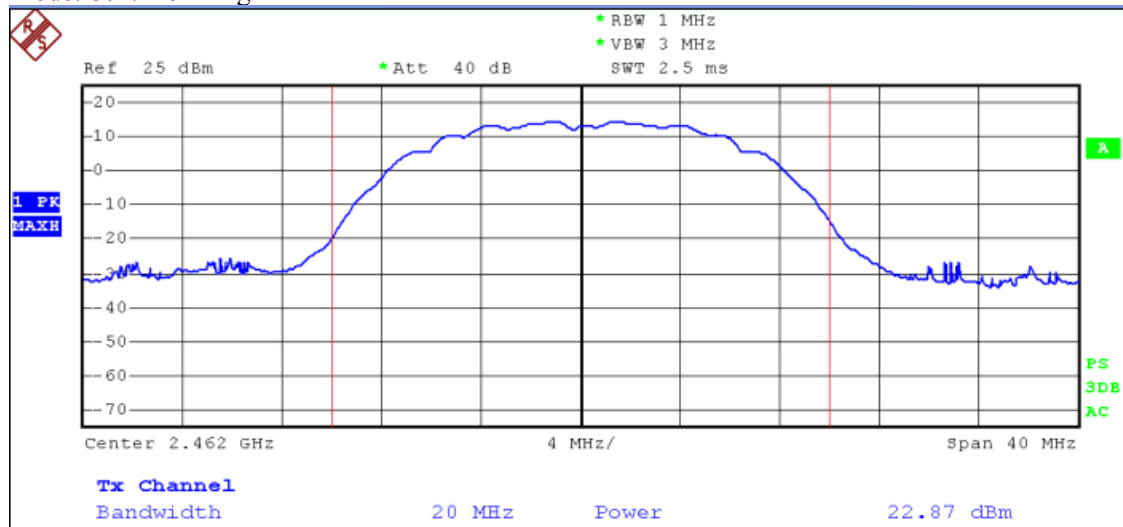
Test Mode: 802.11b ---Low



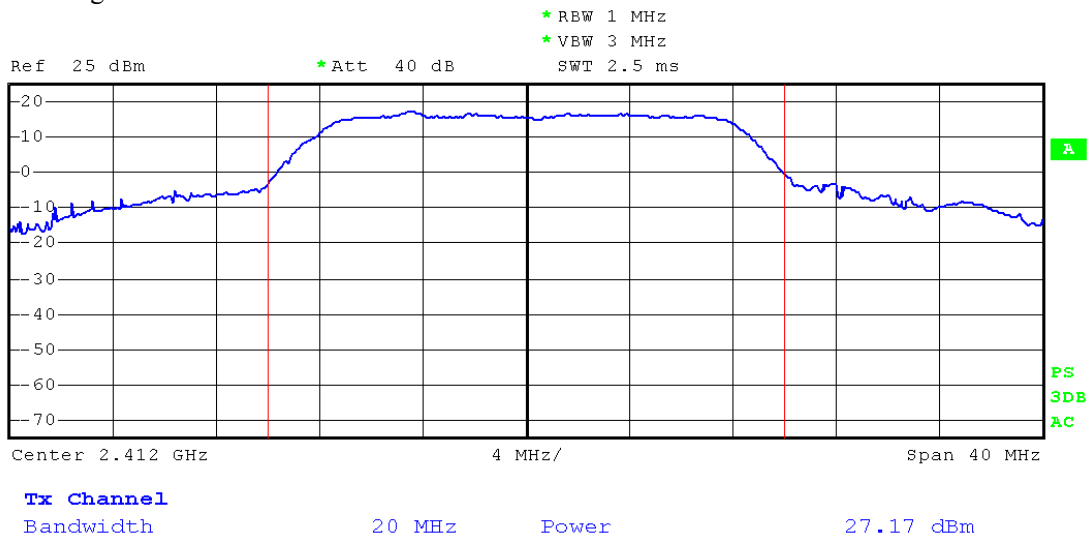
Test Mode: 802.11b---Mid



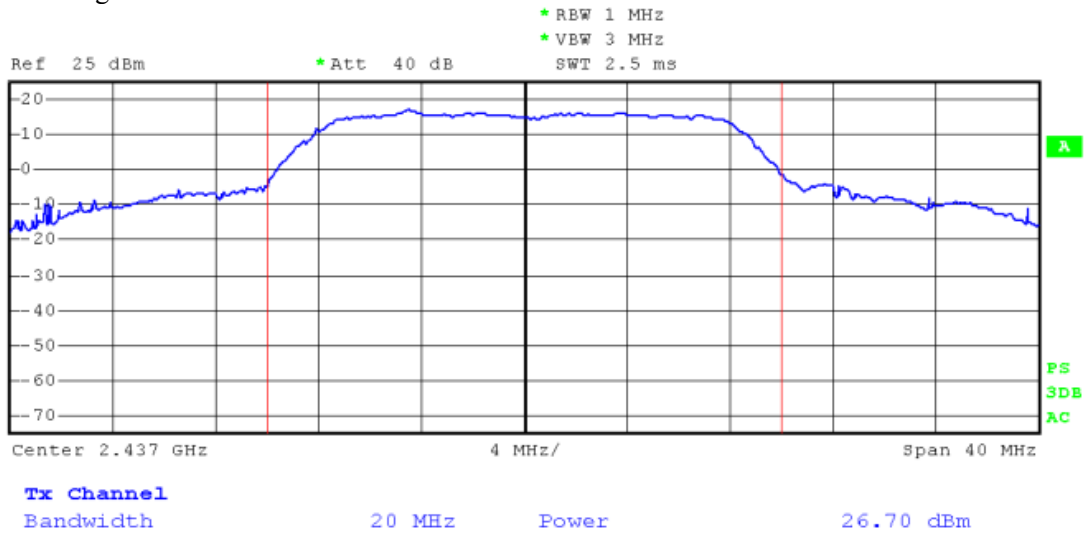
Test Mode: 802.11b---High



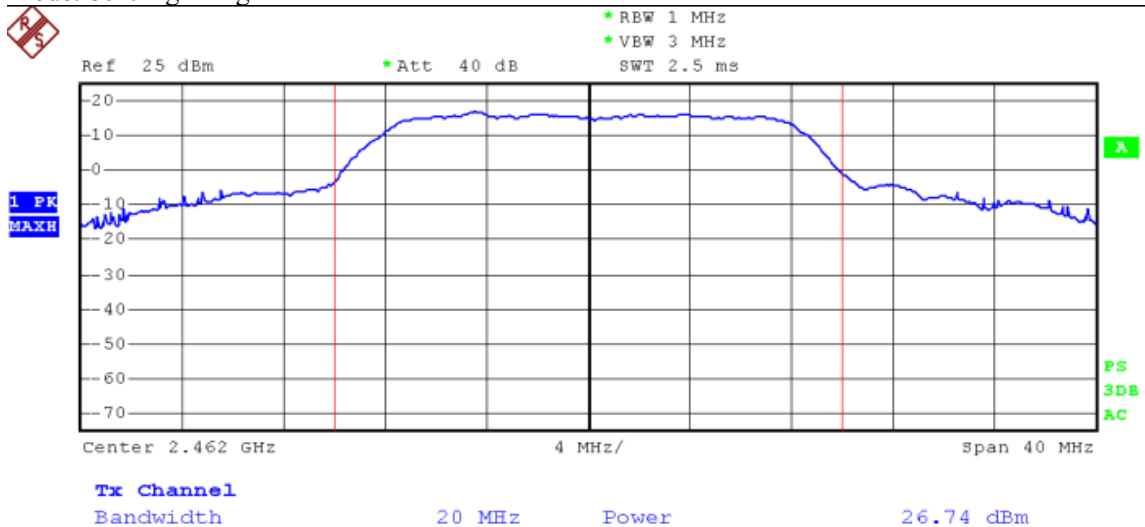
Test Mode: 802.11g ---Low



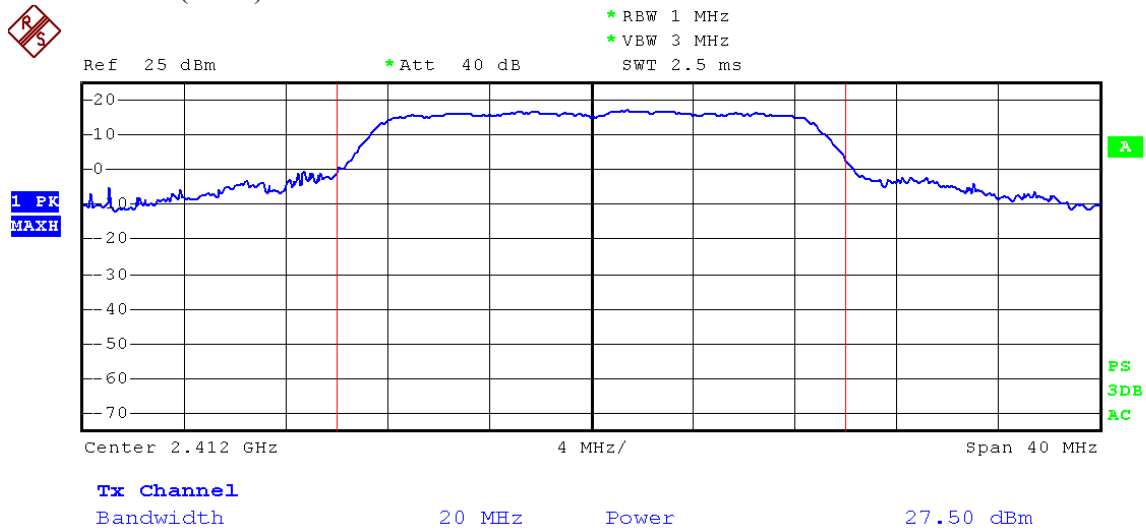
Test Mode: 802.11g---Mid



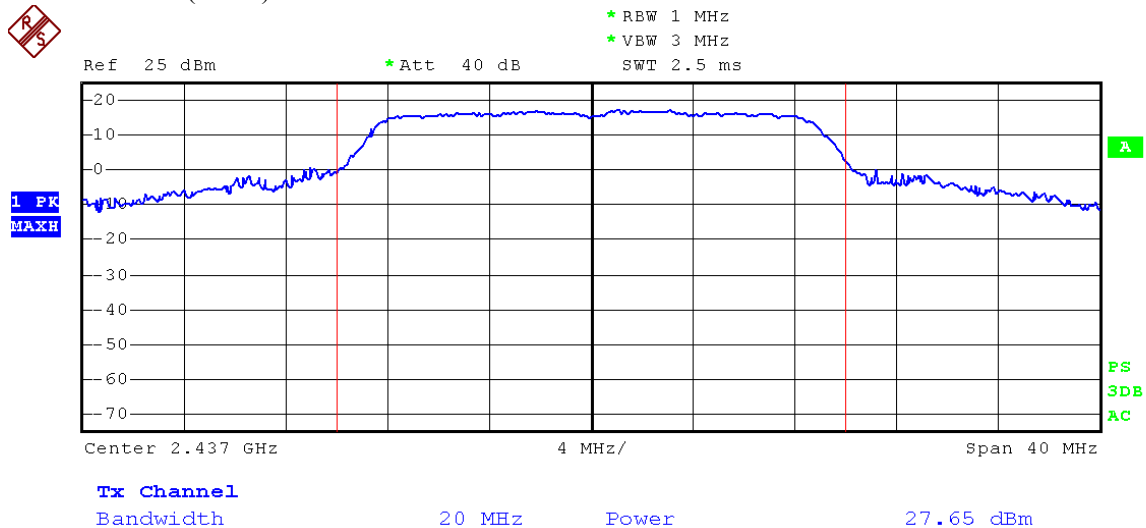
Test Mode: 802.11g---High



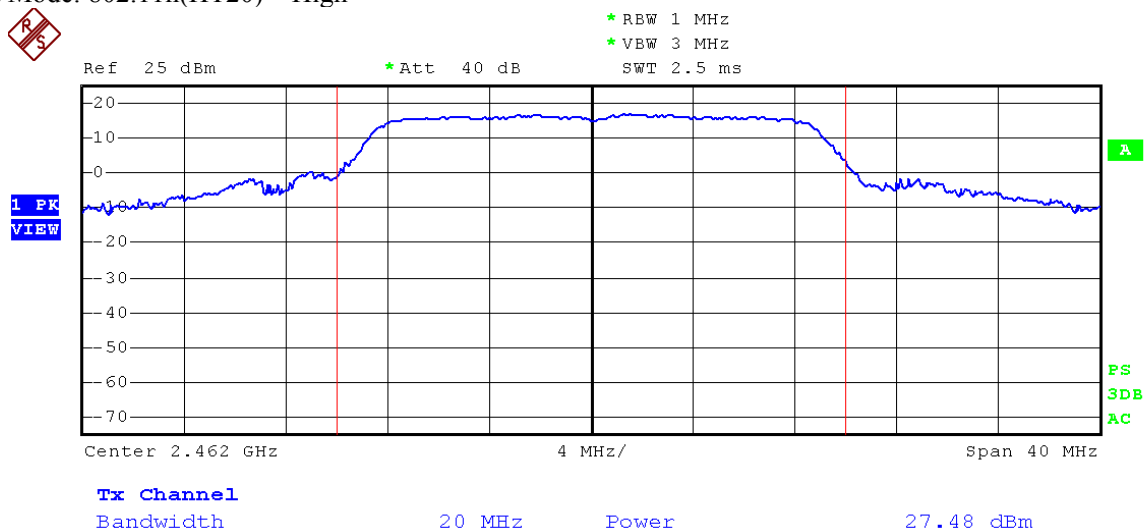
Test Mode: 802.11n(TH20) ---Low



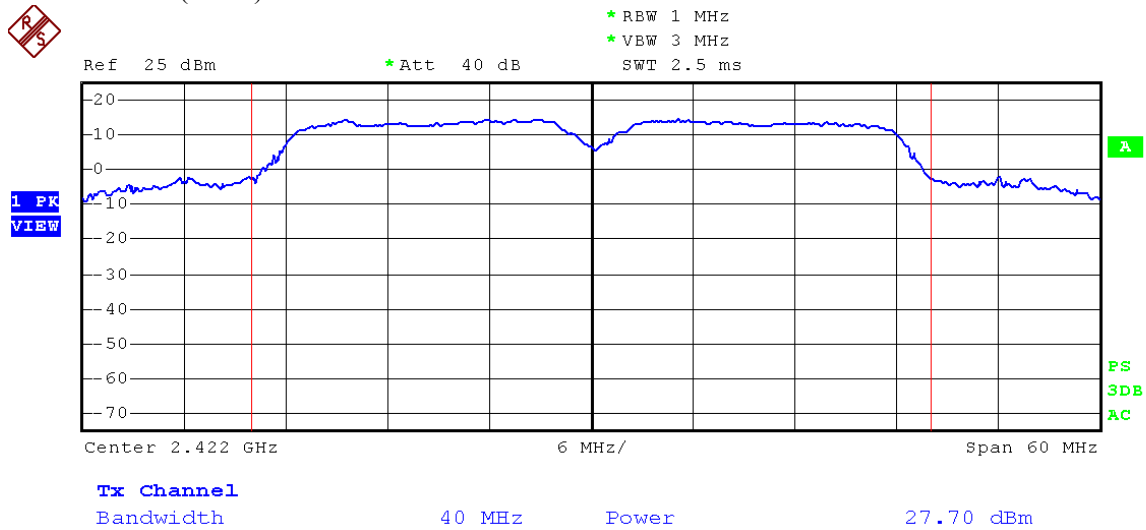
Test Mode: 802.11 n(TH20) ---Mid



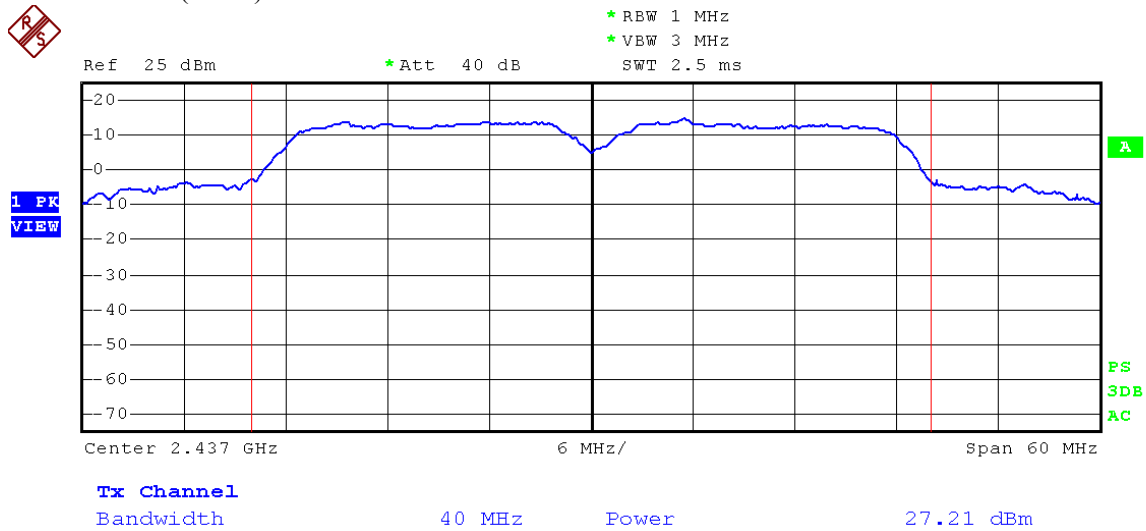
Test Mode: 802.11n(HT20)---High



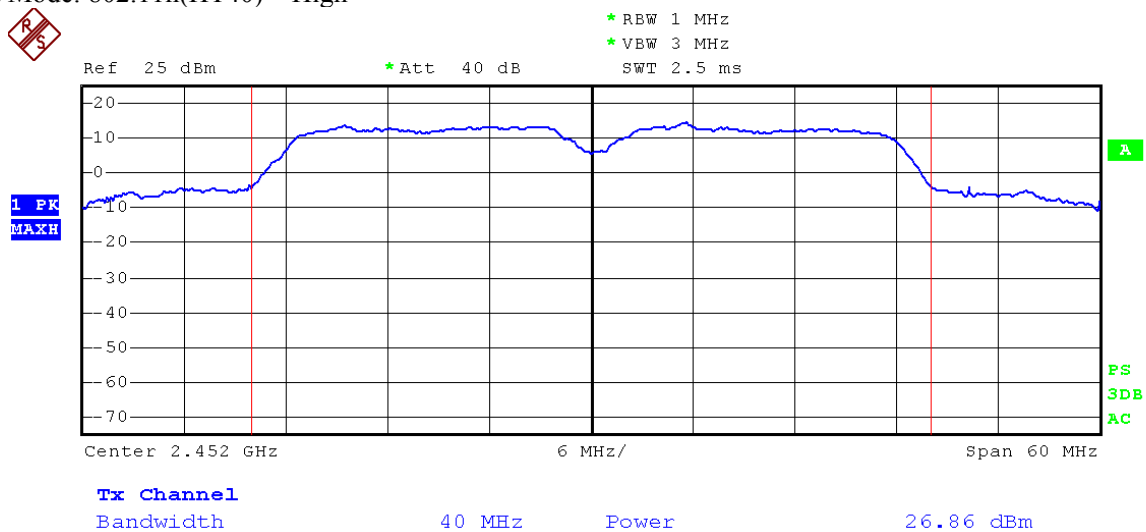
Test Mode: 802.11n(HT40) ---Low



Test Mode: 802.11n(HT40)---Mid



Test Mode: 802.11n(HT40)---High



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5.4 Band Edges Measurement

a. Limit

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

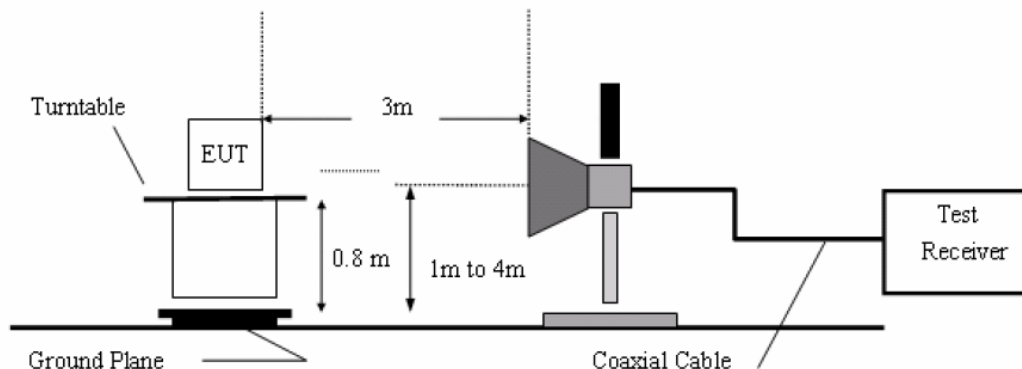
b. Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Peak detector: RBW=100KHz, VBW=100KHz, SWT=AUTO
Average detector: RBW=1MHz, VBW=10Hz, SWT=AUTO
The EUT is tested in 9*6*6 Chamber.
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 25, 2012	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	July 03, 2012	1 Year
3.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 07, 2012	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

c. Test Setup



d. Test Results

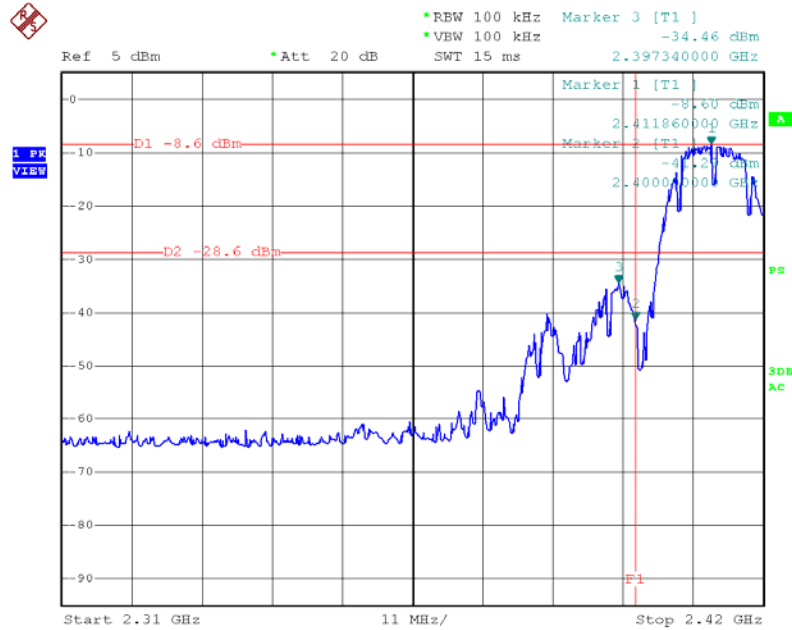
Pass
Please refer to the following data.

e. Test Plots

See the following page.

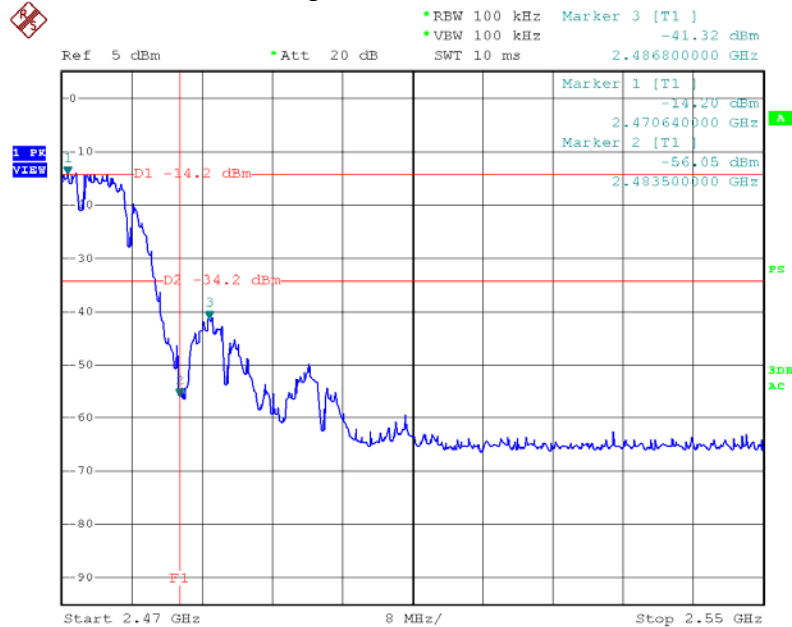
(1) The Conducted Bandedge Emission Test

Test Mode: 802.11b ---Low



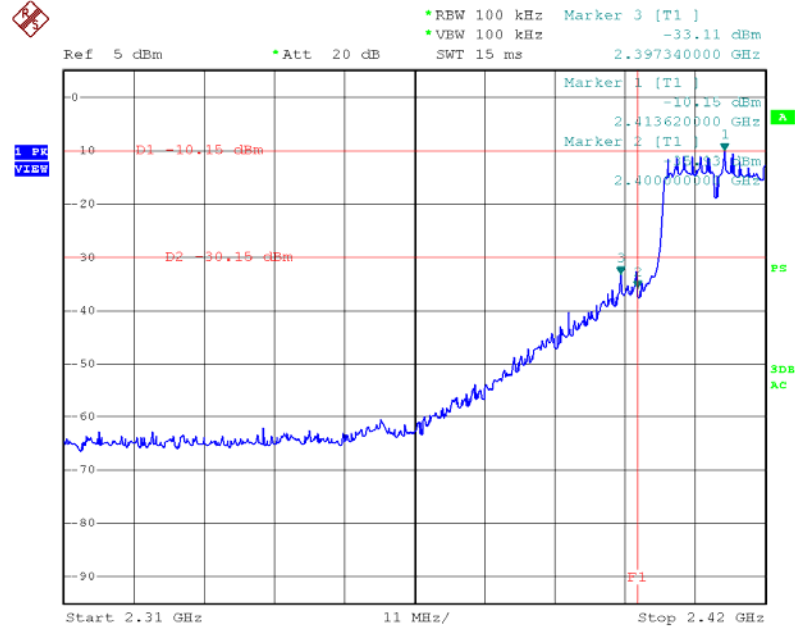
Date: 28.MAR.2013 08:26:09

Test Mode: 802.11b ---High



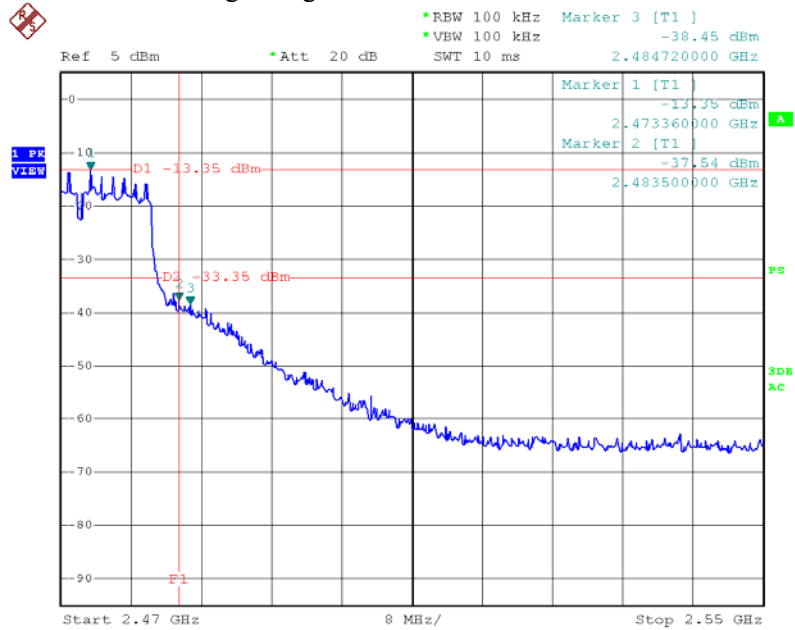
Date: 28.MAR.2013 08:29:56

Test Mode: 802.11g ---Low



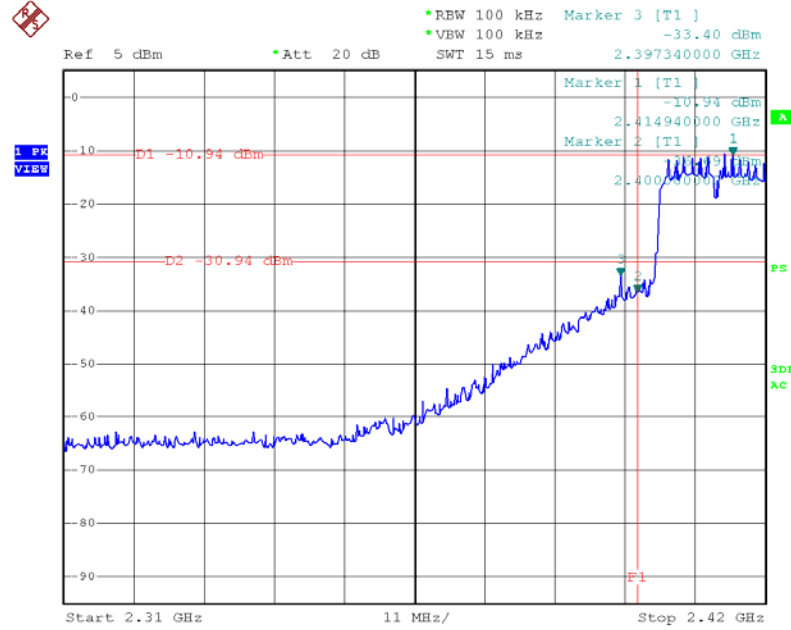
Date: 28.MAR.2013 08:34:37

Test Mode: 802.11g ---High



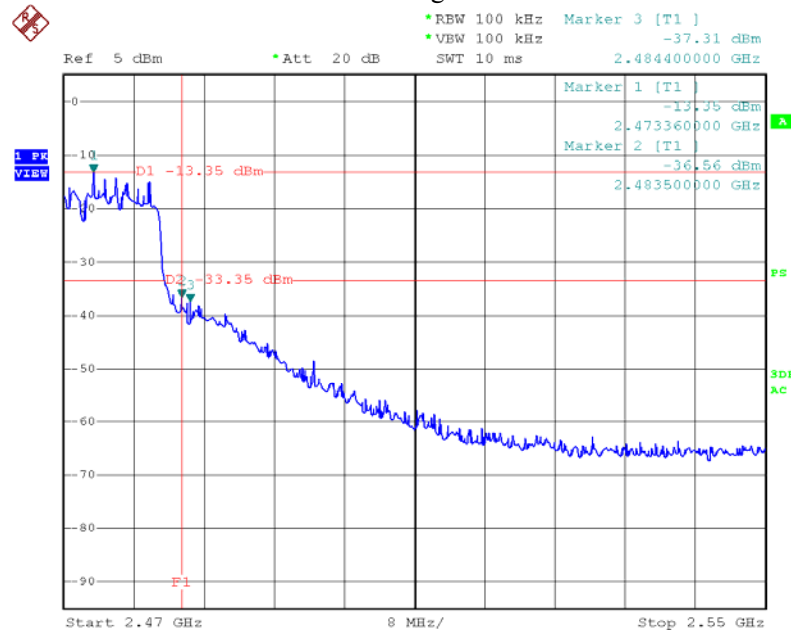
Date: 28.MAR.2013 08:31:42

Test Mode: 802.11n (HT20) ---Low



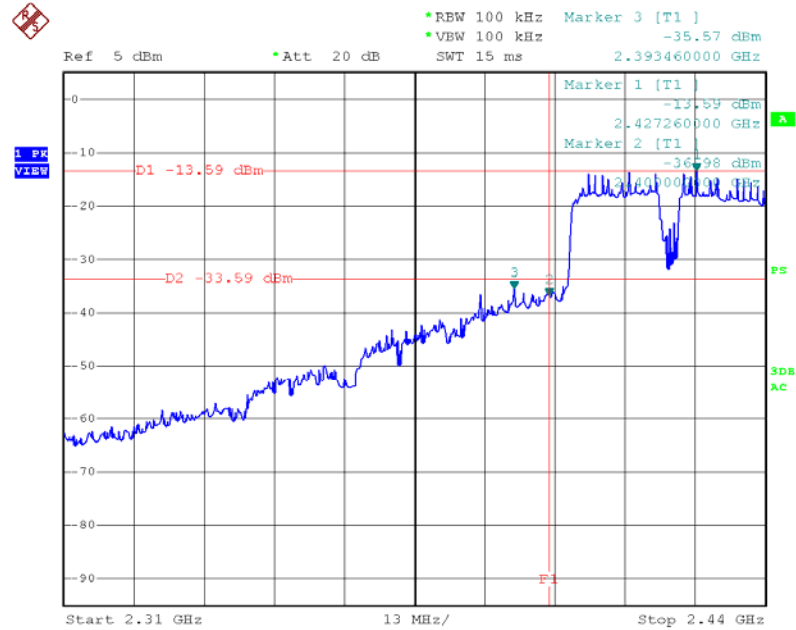
Date: 28.MAR.2013 08:35:52

Test Mode: 802.11n (HT20) ---High



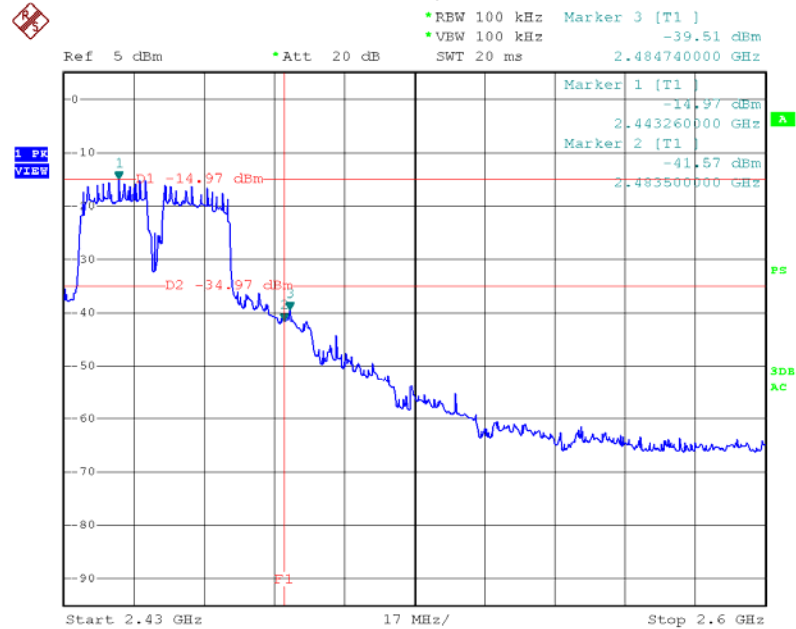
Date: 28.MAR.2013 08:38:13

Test Mode: 802.11n (HT40) ---Low



Date: 28.MAR.2013 08:41:32

Test Mode: 802.11n (HT40) ---High



Date: 28.MAR.2013 08:39:52

(2) The Radiated Bandedge Emission Test

802.11b

Frequency (MHz)	Antenna Polarization (H/V)	Emission (dBuV/m)		Bandage Limit (dBuV/m)	
		Peak	AV	Peak	AV
<2400	H	57.79	42.32	74	54
<2400	H	52.31	40.78	74	54
>2483.5	V	54.65	39.69	74	54
>2483.5	V	58.25	44.21	74	54

802.11g

Frequency (MHz)	Antenna Polarization (H/V)	Emission (dBuV/m)		Bandage Limit (dBuV/m)	
		Peak	AV	Peak	AV
<2400	H	55.58	41.32	74	54
<2400	H	51.19	38.75	74	54
>2483.5	V	50.44	39.51	74	54
>2483.5	V	54.02	39.69	74	54

802.11n(20)

Frequency (MHz)	Antenna Polarization (H/V)	Emission (dBuV/m)		Bandage Limit (dBuV/m)	
		Peak	AV	Peak	AV
<2400	H	54.56	41.32	74	54
<2400	H	50.72	37.22	74	54
>2483.5	V	51.58	39.61	74	54
>2483.5	V	56.50	38.13	74	54

802.11n(40)

Frequency (MHz)	Antenna Polarization (H/V)	Emission (dBuV/m)		Bandage Limit (dBuV/m)	
		Peak	AV	Peak	AV
<2400	H	50.33	38.32	74	54
<2400	H	49.21	37.01	74	54
>2483.5	V	48.79	36.58	74	54
>2483.5	V	45.03	35.10	74	54

5.5 Peak Power Spectral Density

a. Limit

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

b. Test Procedure

This test was according the KDB558074 DTS D01 meas guidance v02.

9.1 Option 1

This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS channel bandwidth.

Set the RBW ≥ 3 kHz.

Set the VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	July 03, 2012	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	July 03, 2012	1 Year
3.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 07, 2012	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

c. Test Setup

See 5.1

d. Test Results

Pass

e. Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-8.36	8.00	Pass
Mid	2437	-7.13		Pass
High	2462	-7.51		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-6.85	8.00	Pass
Mid	2437	-8.94		Pass
High	2462	-8.41		Pass

Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	4.20	8.00	Pass
Mid	2437	3.31		Pass
High	2462	2.94		Pass

Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2422	-7.96	8.00	Pass
Mid	2437	-7.70		Pass
High	2452	-7.44		Pass

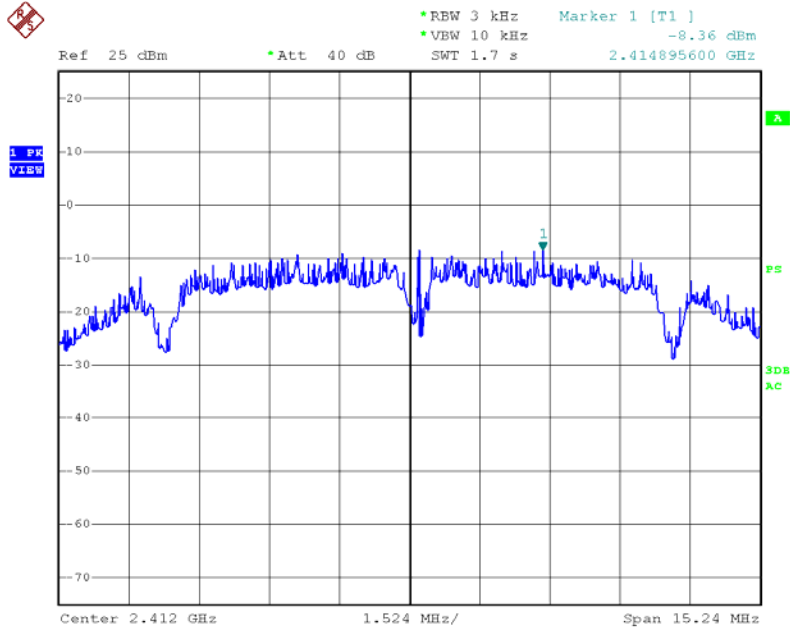
f. **Test Plot** See the following pages

g.

h. Test Plot

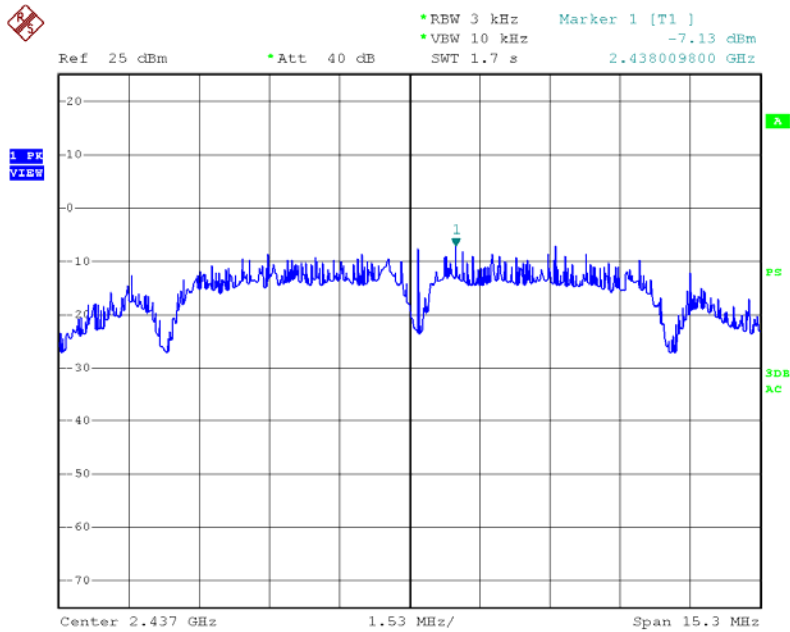
See the following pages

802.11 b CH--Low



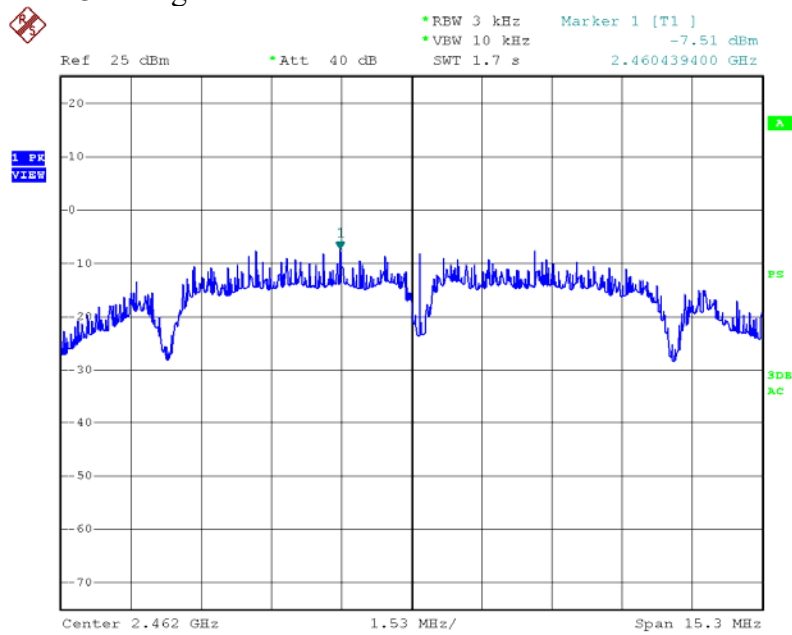
Date: 20.MAR.2013 18:25:55

802.11 b CH--Mid



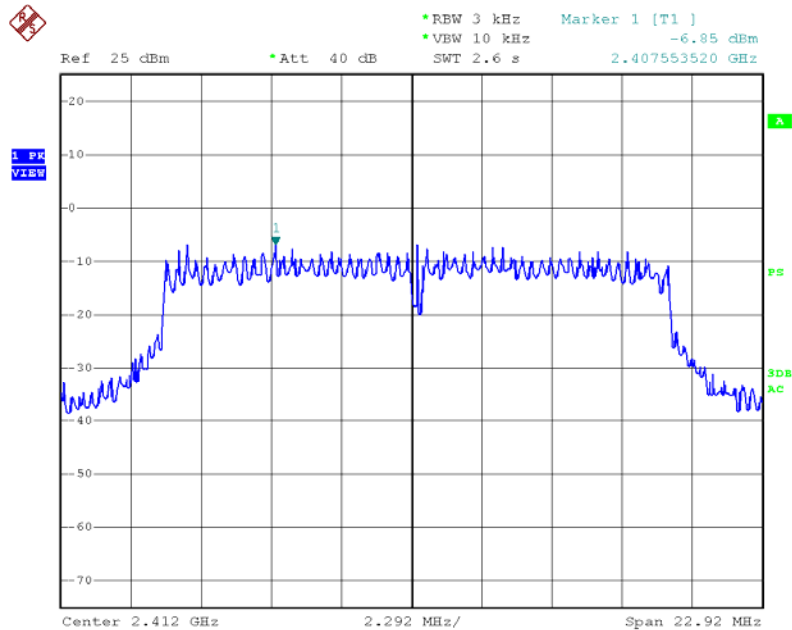
Date: 20.MAR.2013 18:28:34

802.11 b CH--High



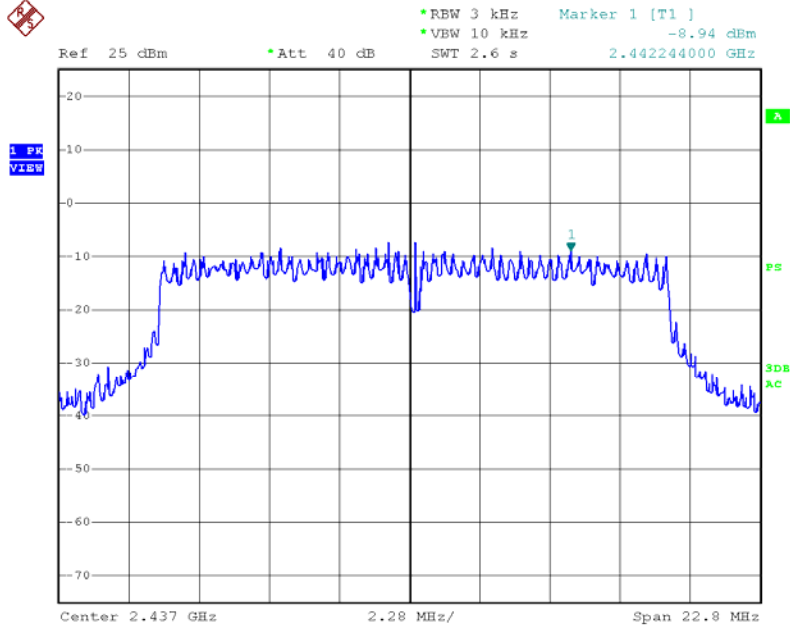
Date: 20.MAR.2013 18:29:17

802.11g CH--Low



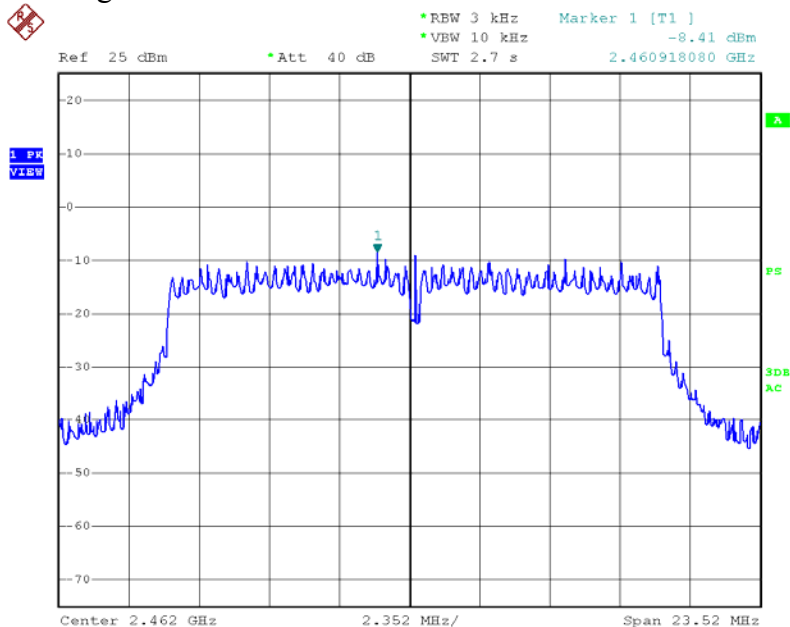
Date: 20.MAR.2013 18:32:44

802.11g CH--Mid



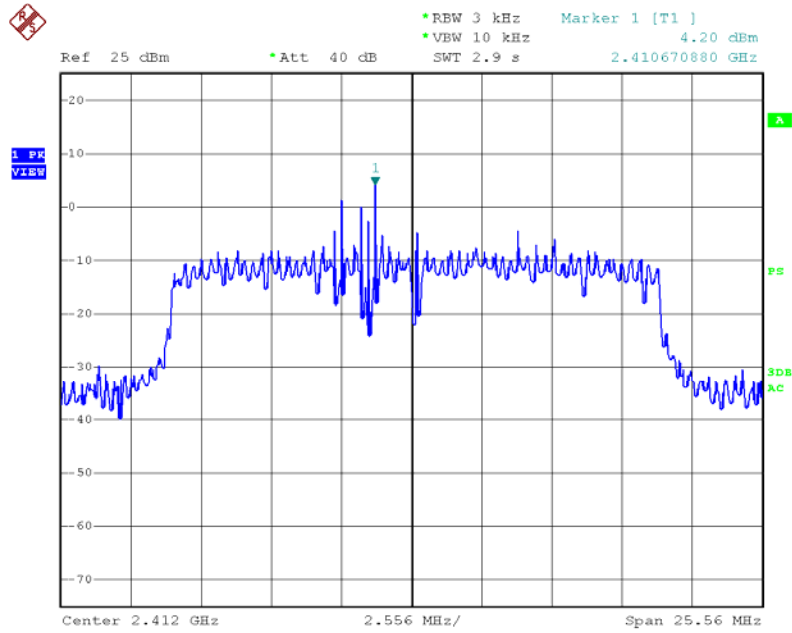
Date: 20.MAR.2013 18:31:46

802.11g CH--High



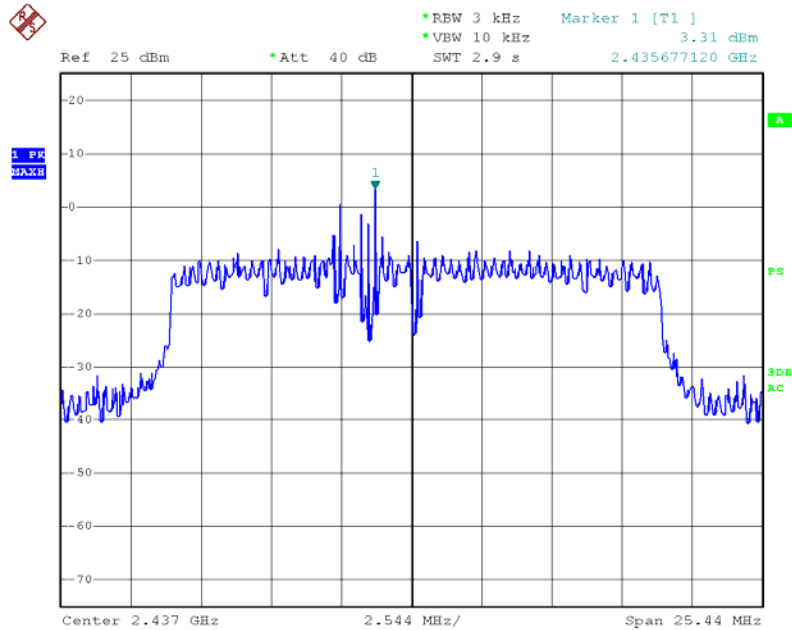
Date: 20.MAR.2013 18:30:56

802.11n (HT20) CH—Low



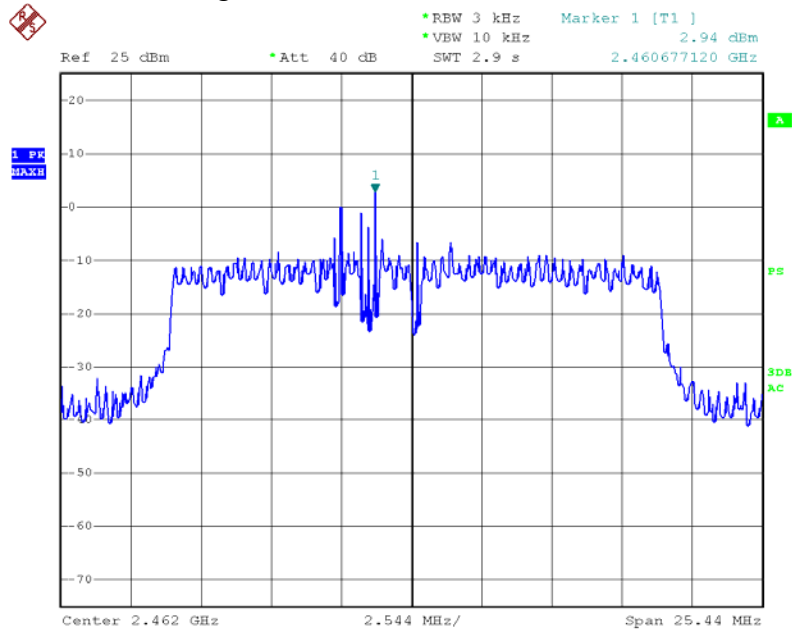
Date: 20.MAR.2013 18:36:39

802.11n (HT20) CH—Mid



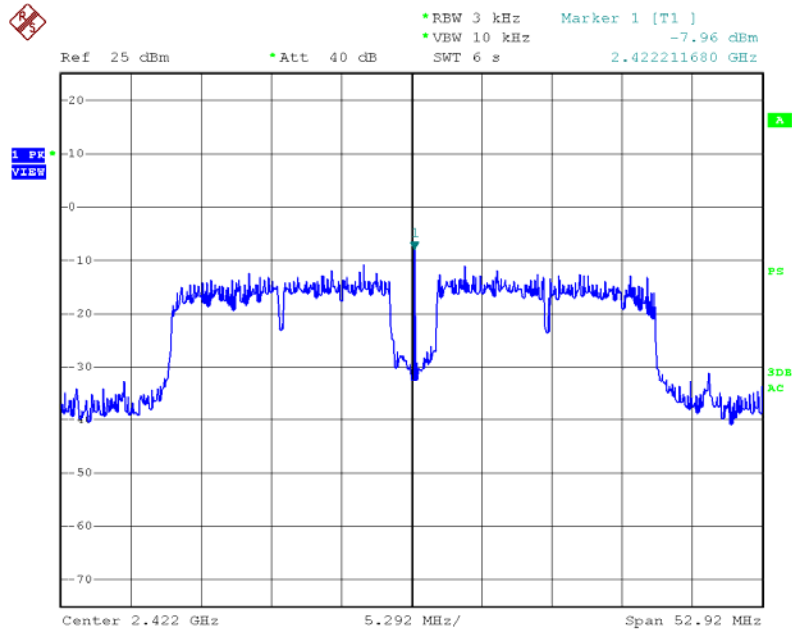
Date: 20.MAR.2013 18:37:58

802.11n (HT20) CH—High



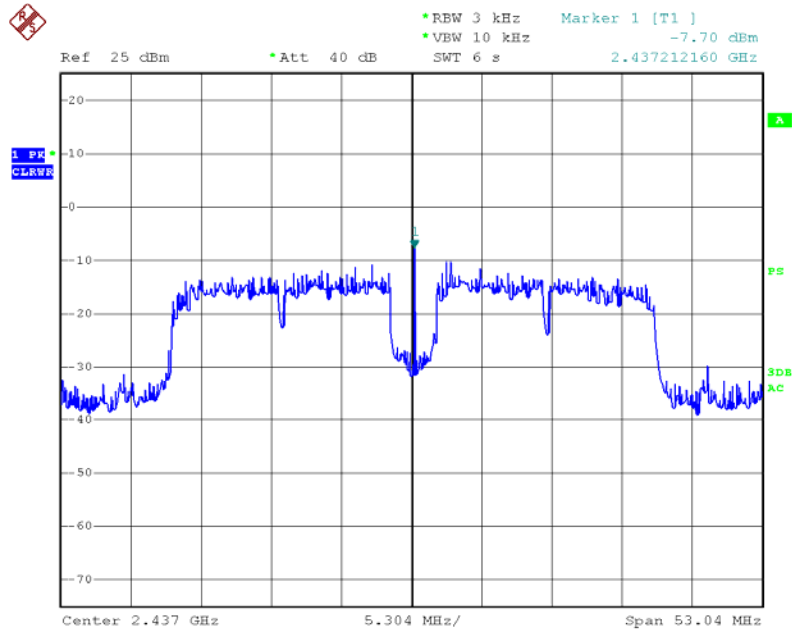
Date: 20.MAR.2013 18:39:22

802.11n (HT40) CH—Low



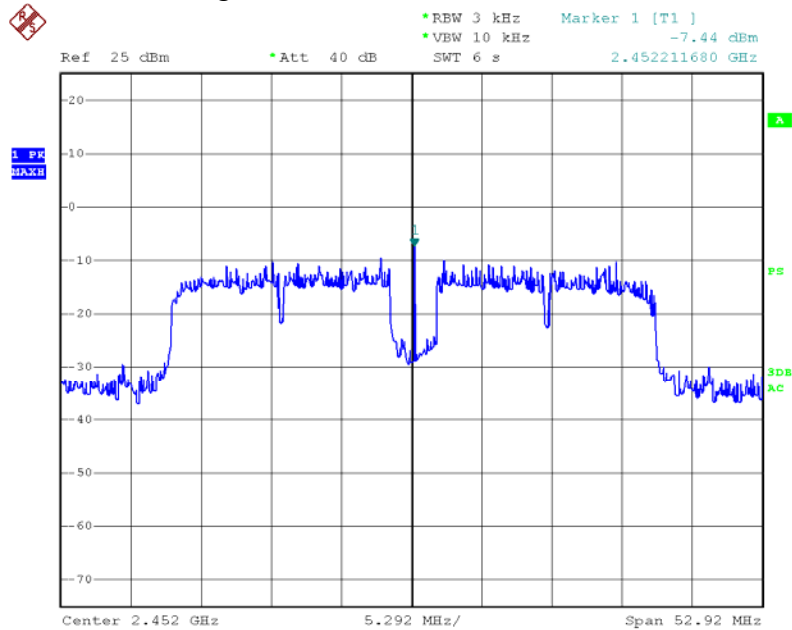
Date: 20.MAR.2013 18:44:03

802.11n (HT40) CH—Mid



Date: 20.MAR.2013 18:43:04

802.11n (HT40) CH—High



Date: 20.MAR.2013 18:42:02

5.6 Radiated Emissions

5.6.1. Requirements (15.209 & 15.205):

5.6.1.1. Test Limits (< 30 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

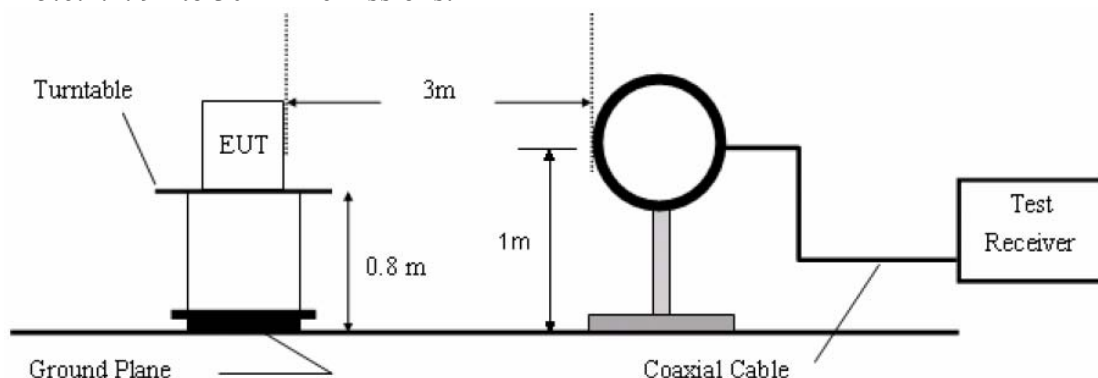
5.6.1.2. Test Limits (\geq 30 MHz)

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209	
902-928 MHz		30 - 88 MHz	40 dBuV/m @3M
2.4-2.4835 GHz		88 - 216 MHz	43.5
94 dBuV/m @3m	54 dBuV/m @3m	216 - 960 MHz	46
		ABOVE 960 MHz	54dBuV/m

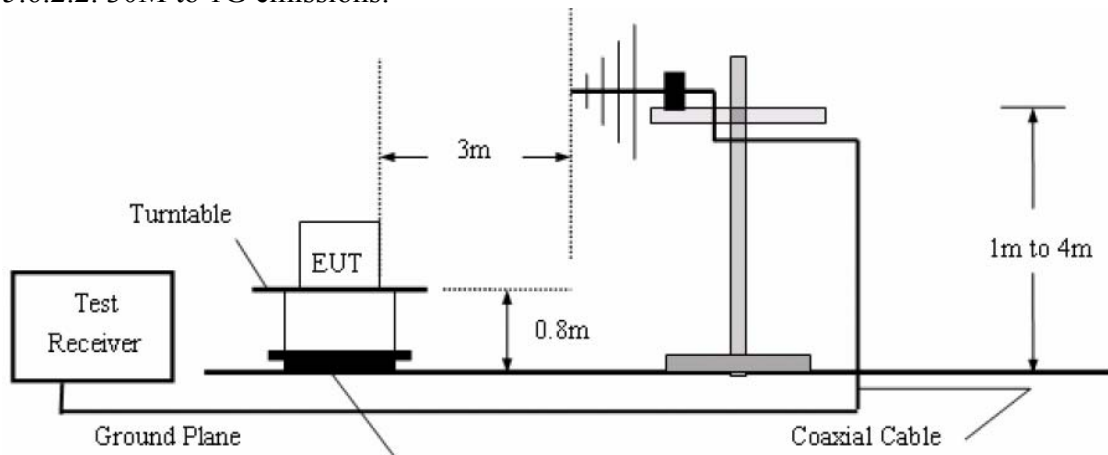
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.6.2. Test Configuration:

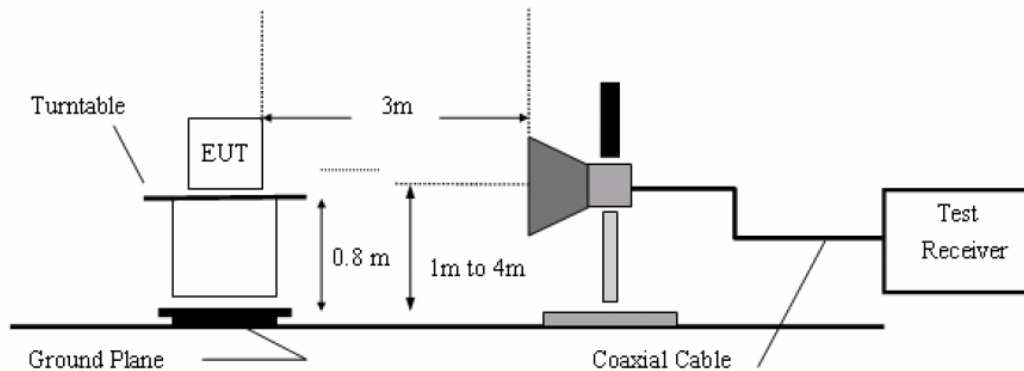
5.6.2.1. 9k to 30MHz emissions:



5.6.2.2. 30M to 1G emissions:



5.6.2.3. 1G to 40G emissions:



5.6.3. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Measurements are made on 9KHz to 30MHz and 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 5.6.4.

5.6.4. Test Results

Below 30MHz

There is no emissions were detected below 30MHz

From 30MHz to 1 GHz

Operation Mode: Normal link

Temperature: 25°C

Humidity: 50 % RH

Test Date: Mar. 25, 2013

Tested by: Rock Zeng

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV/m)	Factor (dB/m)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
46.995	V	Peak	48.54	-13.23	35.31	40.00	-4.69
143.829	V	Peak	54.43	-18.43	36.00	43.50	-7.50
239.987	V	Peak	51.69	-14.09	37.60	43.50	-8.40
400.432	V	Peak	50.11	-11.86	38.25	46.00	-7.75
480.528	V	Peak	51.02	-11.53	39.49	46.00	-6.51
640.611	V	Peak	48.64	-8.92	39.72	46.00	-6.28
49.881	H	Peak	49.58	-14.51	35.07	40.00	-4.93
51.662	H	Peak	49.77	-14.69	35.08	40.00	-4.92
127.218	H	Peak	54.40	-17.40	37.00	43.50	-6.50
195.137	H	Peak	51.69	-15.89	35.80	43.50	-7.70
560.693	H	Peak	50.69	-9.92	40.77	46.00	-5.23
640.611	H	Peak	50.37	-8.92	41.45	46.00	-4.55

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz and the IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/Quasi-peak detector mode.
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.

Above 1 GHz (The worst Mode)

Operation Mode: TX / IEEE 802.11g / CH Low

Temperature: 25°C

Humidity: 50 % RH

Test Date: Mar. 25, 2013

Tested by: Andy Chen

Polarity: Ver. / Hor.

Item	Freq. (MHz)	Ant.Pol H/V	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level		Peak Limit (dBuV/)	AV Limit (dBuV/)	Margin (dB)	Remark
							Peak (dBuV/)	AV (dBuV/)				
1.	4824	H	46.20	35.76	4.58	34.94	51.60	---	74.00	54.00	-22.40	Peak
2.	4824	H	38.55	35.76	4.58	34.94	---	43.91	74.00	54.00	-10.09	AVG
3.	7240	H	43.48	37.85	5.63	35.25	51.71	---	74.00	---	-22.29	Peak
4.	9648	H	44.48	39.39	6.34	35.70	54.51	---	74.00	---	-19.49	Peak
5.	12060	H	---	---	---	---	---	---	---	---	---	---
6.	14472	H	---	---	---	---	---	---	---	---	---	---
7.	16884	H	---	---	---	---	---	---	---	---	---	---
8.	19296	H	---	---	---	---	---	---	---	---	---	---
9.	21708	H	---	---	---	---	---	---	---	---	---	---
10.	24120	H	---	---	---	---	---	---	---	---	---	---

Note: An item 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission

1.	4824	V	46.38	35.13	4.58	34.94	---	51.15	74.00	54.00	-2.85	AVG
2.	4824	V	51.24	35.13	4.58	34.94	56.01	---	74.00	54.00	-17.99	Peak
3.	7240	V	41.45	36.90	5.63	35.25	48.73	---	74.00	---	-25.27	Peak
4.	9648	V	43.14	38.57	6.34	35.70	52.35	---	74.00	---	-21.65	Peak
5.	12060	V	---	---	---	---	---	---	---	---	---	---
6.	14472	V	---	---	---	---	---	---	---	---	---	---
7.	16884	V	---	---	---	---	---	---	---	---	---	---
8.	19296	V	---	---	---	---	---	---	---	---	---	---
9.	21708	V	---	---	---	---	---	---	---	---	---	---
10.	24120	V	---	---	---	---	---	---	---	---	---	---

Note: An item 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission

Operation Mode: TX / IEEE 802.11g / CH Mid
Temperature: 25°C
Humidity: 50 % RH

Test Date: Mar. 25, 2013
Tested by: Andy Chen
Polarity: Ver. / Hor.

Item	Freq. (MHz)	Ant.Pol H/V	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level		Peak Limit (dBuV/)	AV Limit (dBuV/)	Margin (dB)	Remark
							Peak (dBuV/)	AV (dBuV/)				
1.	4874	H	41.17	35.83	4.61	34.93	---	46.68	74.00	54.00	-7.32	AVG
2.	4874	H	45.34	35.83	4.61	34.93	50.85	---	74.00	54.00	-23.15	Peak
3.	7311	H	42.14	37.86	5.64	35.26	50.38	---	74.00	54.00	-23.64	Peak
4.	9748	H	42.15	39.51	6.36	35.70	52.32	---	74.00	---	-21.68	Peak
5.	12185	H	---	---	---	---	---	---	---	---	---	---
6.	14622	H	---	---	---	---	---	---	---	---	---	---
7.	17059	H	---	---	---	---	---	---	---	---	---	---
8.	19496	H	---	---	---	---	---	---	---	---	---	---
9.	21933	H	---	---	---	---	---	---	---	---	---	---
10.	24370	H	---	---	---	---	---	---	---	---	---	---
Note: An item 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission												
1.	4874	V	45.20	35.18	4.61	34.93	---	49.56	74.00	54.00	-4.04	AVG
2.	4874	V	51.26	35.18	4.61	34.93	56.12	---	74.00	54.00	-17.88	Peak
3.	7311	V	42.27	36.92	5.64	35.26	49.57	---	74.00	54.00	-24.43	Peak
4.	9748	V	41.28	38.71	6.36	35.70	50.65	---	74.00	---	-23.35	Peak
5.	12185	V	---	---	---	---	---	---	---	---	---	---
6.	14622	V	---	---	---	---	---	---	---	---	---	---
7.	17059	V	---	---	---	---	---	---	---	---	---	---
8.	19496	V	---	---	---	---	---	---	---	---	---	---
9.	21933	V	---	---	---	---	---	---	---	---	---	---
10.	24370	V	---	---	---	---	---	---	---	---	---	---
Note: An item 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission												

Operation Mode: TX / IEEE 802.11g / CH High
Temperature: 25°C
Humidity: 50 % RH

Test Date: Mar. 25, 2013
Tested by: Andy Chen
Polarity: Ver. / Hor.

Item	Freq. (MHz)	Ant.Pol H/V	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level		Peak Limit (dBuV/)	AV Limit (dBuV/)	Margin (dB)	Remark
							Peak (dBuV/)	AV (dBuV/)				
1.	4924	H	39.25	35.90	4.68	34.92	---	44.95	74.00	54.00	-9.05	AVG
2.	4924	H	46.21	35.90	4.68	34.92	51.87	---	74.00	54.00	-22.13	Peak
3.	7386	H	41.12	37.88	5.65	35.28	49.37	---	74.00	54.00	-24.63	Peak
4.	9848	H	42.20	39.61	6.38	35.70	52.49	---	74.00	---	-21.87	Peak
5.	12310	H	---	---	---	---	---	---	---	---	---	---
6.	14772	H	---	---	---	---	---	---	---	---	---	---
7.	17234	H	---	---	---	---	---	---	---	---	---	---
8.	19696	H	---	---	---	---	---	---	---	---	---	---
9.	22158	H	---	---	---	---	---	---	---	---	---	---
10.	24620	H	---	---	---	---	---	---	---	---	---	---

Note: An item 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission

1.	4924	V	48.12	35.23	4.68	34.92	53.11	---	74.00	54.00	-20.89	Peak
2.	4924	V	44.44	35.23	4.68	34.92	---	49.43	74.00	54.00	-4.77	AVG
3.	7386	V	42.36	36.96	5.65	35.28	49.69	---	74.00	54.00	-24.31	Peak
4.	9848	V	42.24	38.81	6.38	35.70	51.73	---	74.00	---	-22.27	Peak
5.	12310	V	---	---	---	---	---	---	---	---	---	---
6.	14772	V	---	---	---	---	---	---	---	---	---	---
7.	17234	V	---	---	---	---	---	---	---	---	---	---
8.	19696	V	---	---	---	---	---	---	---	---	---	---
9.	22158	V	---	---	---	---	---	---	---	---	---	---
10.	24620	V	---	---	---	---	---	---	---	---	---	---

Note: An item 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emission

6. ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

Antenna Connector Construction

The EUT have a antenna, is a internal antenna for WIFI, The gain is 2dBi, Which in accordance to section 15.203, please refer to the internal photos.

Result: Compliance

7. PHOTOGRAPH

7.1. Photo of Conducted Emission Measurement

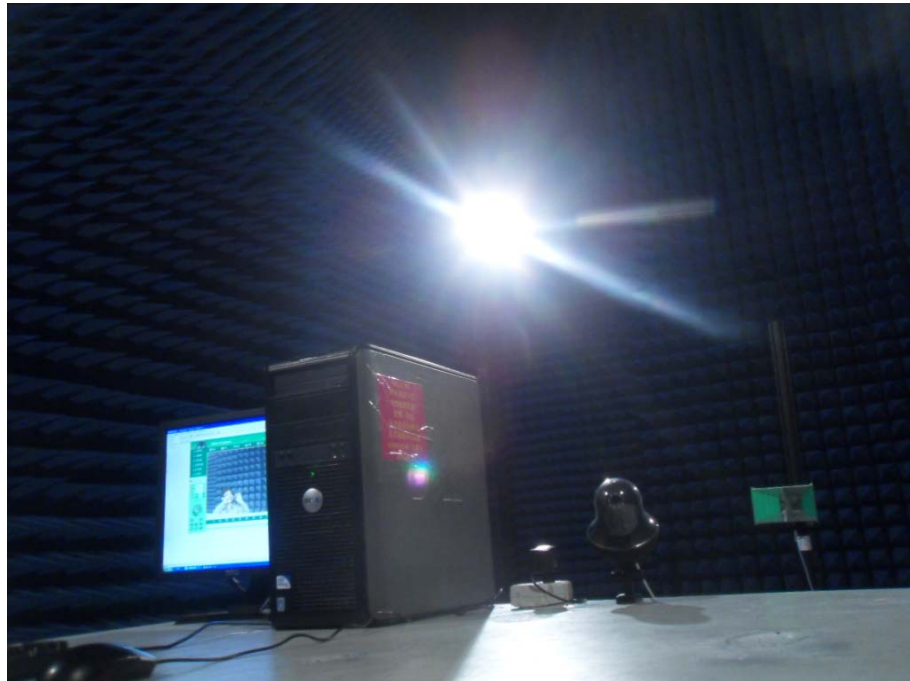


7.2. Photo of Radiation Emission Test

30MHz-1GHz



Above 1GHz



Appendix I (External Photos)

Figure 1
The EUT-Overall View



Figure 2
The EUT-Side View



Figure 3
The EUT View



Figure 4
The Label of Adapter View



Appendix II (Internal Photos)

Figure 5
The EUT-Inside View



Figure 6
PCB of the EUT-Front View

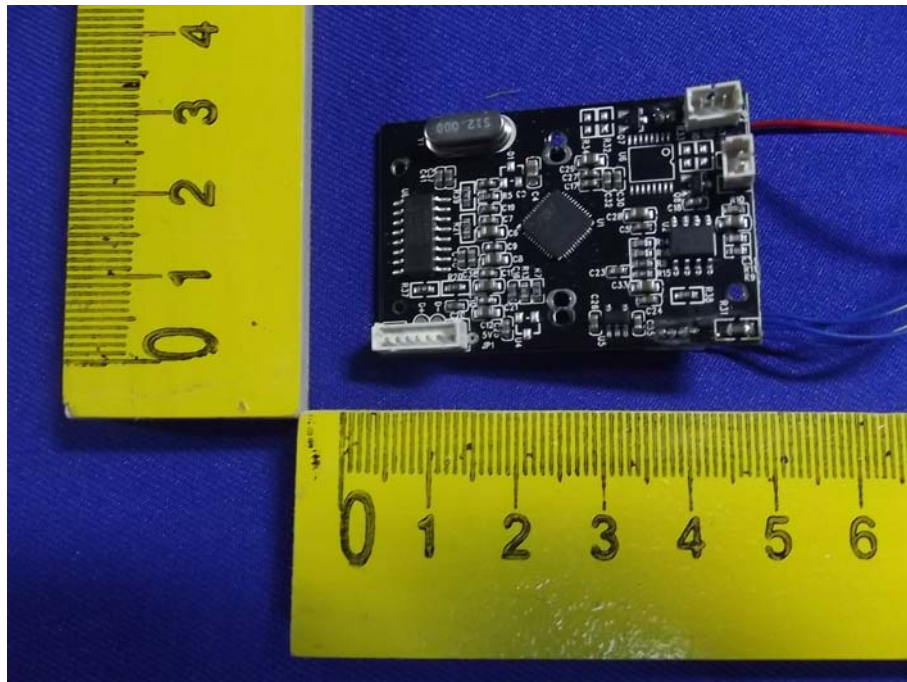


Figure 7
PCB of the EUT-Back View

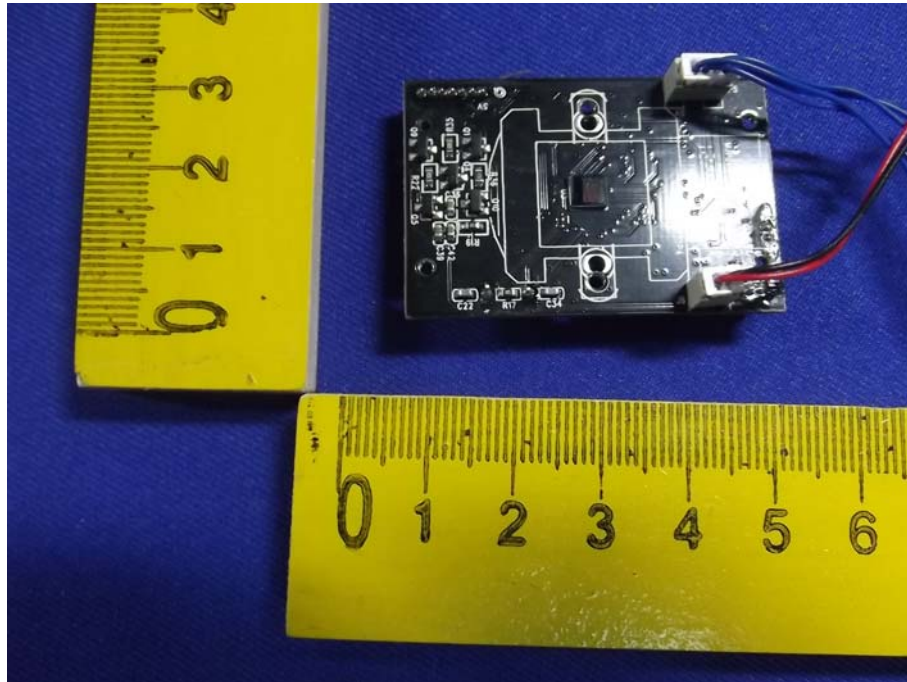


Figure 8
PCB of the EUT-Front View

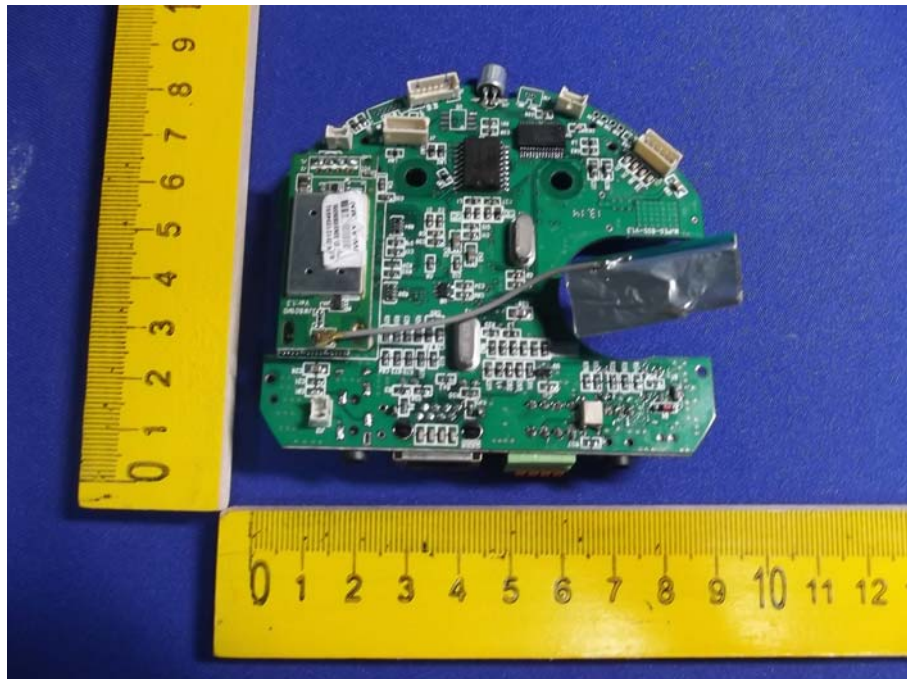


Figure 9
PCB of the EUT-Back View

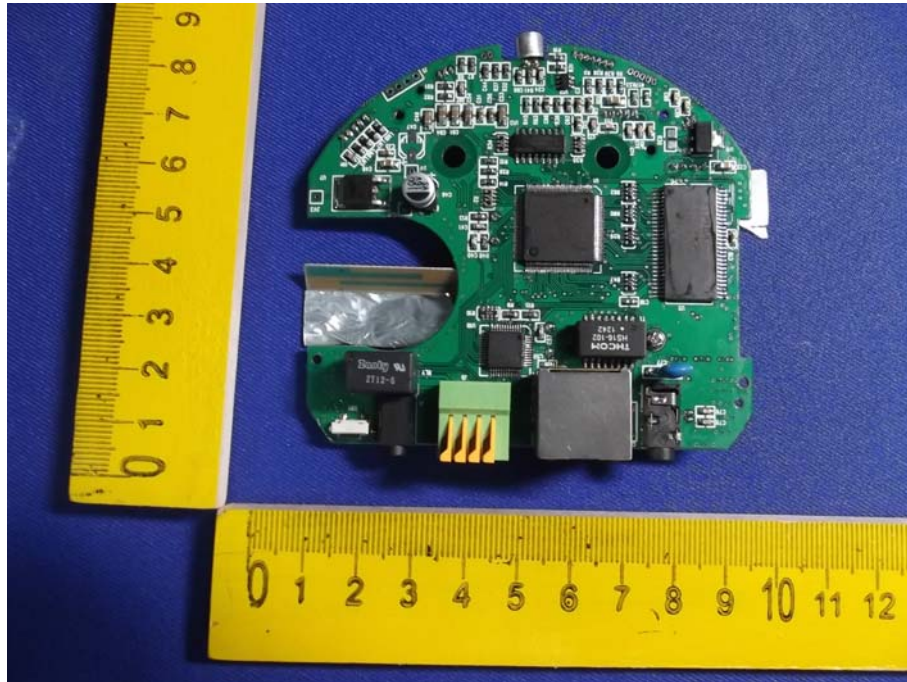


Figure 10
PCB of the EUT-Front View (Shielding)



Figure 11
PCB of the EUT-Front View (Un-Shielding)



Figure 12
PCB of the EUT-Back View

