TEST REPORT

of

FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product :	**MiniStation Air**
Brand:	**BUFFALO**
Model:	**HDW-PU3**
Model Difference:	**N/A**
FCC ID:	**FDI-01309347-0**
FCC Rule Part:	**§15.247, Cat: DTS**
Applicant:	**BUFFALO INC.**
Address:	**AKAMONDORI Bldg., 30-20, Ohsu 3-chome, Naka-ku, Nagoya, 460-8315, Japan**

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-12LR077FC**

Issue Date : **2012/07/10**

VERIFICATION OF COMPLIANCE

Applicant:	BUFFALO INC.
Product Description:	MiniStation Air
Brand Name:	BUFFALO
Model No.:	HDW-PU3
Model Difference:	N/A
FCC ID:	FDI-01309347-0
Date of test:	2012/05/16 ~ 2012/06/29
Date of EUT Received:	2012/05/16

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:	Dion Chen	***Date:***	2012/07/10
	Dion Chang / Engineer		
Prepared By:	Eva Kao	***Date:***	2012/07/10
	Eva Kao / Technical Supervisor		
Approved By:	Vincent Su	***Date:***	2012/07/10
	Vincent Su / Technical Manager		

Version

Version No.	Date	Description
00	2012/07/10	Initial creation of document

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1 GENERAL INFORMATION

General:

Product Name	MiniStation Air	
Brand Name	BUFFALO	
Model Name	HDW-PU3	
Model Difference	N/A	
Power Supply	3.7Vdc from Li-ion Battery or 5Vdc by Car Charge	
	Battery:	Model No: 1UF70345F-2, Supplier: BUFFALO
	Adapter:	Model No: WA-10L05RU
	Car Charge:	Model No.: GVCIG XXX

WLAN:

Frequency Range:	802.11b/g/n HT20: 2412 – 2462MHz 802.11n HT40: 2422 – 2452MHz
Channel number:	802.11b/g/n HT20: 11 channels 802.11n HT40: 7 channels
Transmit Power:	802.11b: 13.72dBm 802.11g: 20.76dBm 802.11n HT20: 20.31dBm 802.11n HT40: 20.03dBm
Modulation Technology	11b/g: DSSS, OFDM 11n: OFDM
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n HT20MHz: 6.5 – 65Mbps 802.11 n HT40MHz: 13.5 – 135Mbps
Antenna Designation:	Printed Antenna, 2.9dBi.

The EUT is compliance with IEEE 802.11 b/g/n Standard.

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: FDI-01309347-0** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document:

558074 D01 DTS Meas Guidance v01

1.3 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

2.4 Configuration of Tested System

Fig. 2-1 AC Power line Configuration

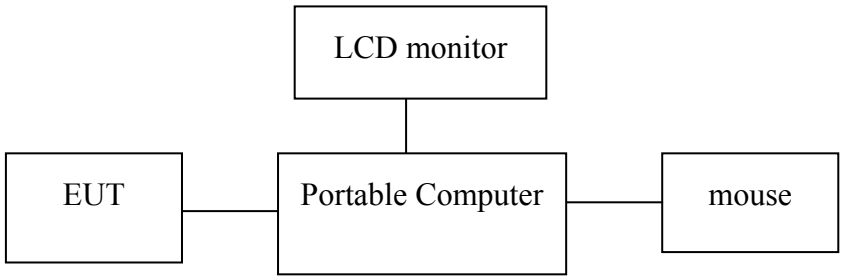
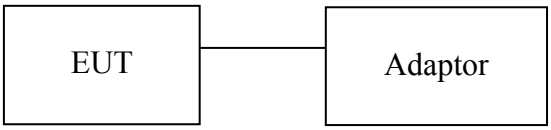


Fig. 2-2 Radiated Emission Configuration



Remote site

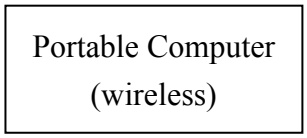


Table 1-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Adapter	BUFFALO K. S.	BSIPA08	N/A	Un-shielding	Shielding
2	Portable Com-puter	Dell	P18S	6VWSKT1	Un-shielding	Shielding
3	mouse	DELL	MOC5UO	10O00KY1	Un-shielding	N/A
4	LCD monitor	DELL	PP81L	N/A	Un-shielding	Shielding

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3),(4)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d)	Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

The EUT has been tested under engineering operating condition.
Test program used to control the EUT for staying in continuous transmitting mode is programmed.

802.11 b mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.
802.11 g mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.
802.11 n _20MHz: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.
802.11 n_40MHz: Lowest (2422MHz), Mid (2437MHz) and Highest (2452MHz) with 13.5Mbps lowest data rate are chosen for full testing.

5 CONDUCTED EMISSION TEST

5.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 0-1	06/27/2011	06/27/2012
EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	07/12/2011	07/12/2012
LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	07/13/2011	07/13/2012
LISN 08	FCC	FCC-LISN50-25-2-01	07039	07/13/2011	07/13/2012

5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

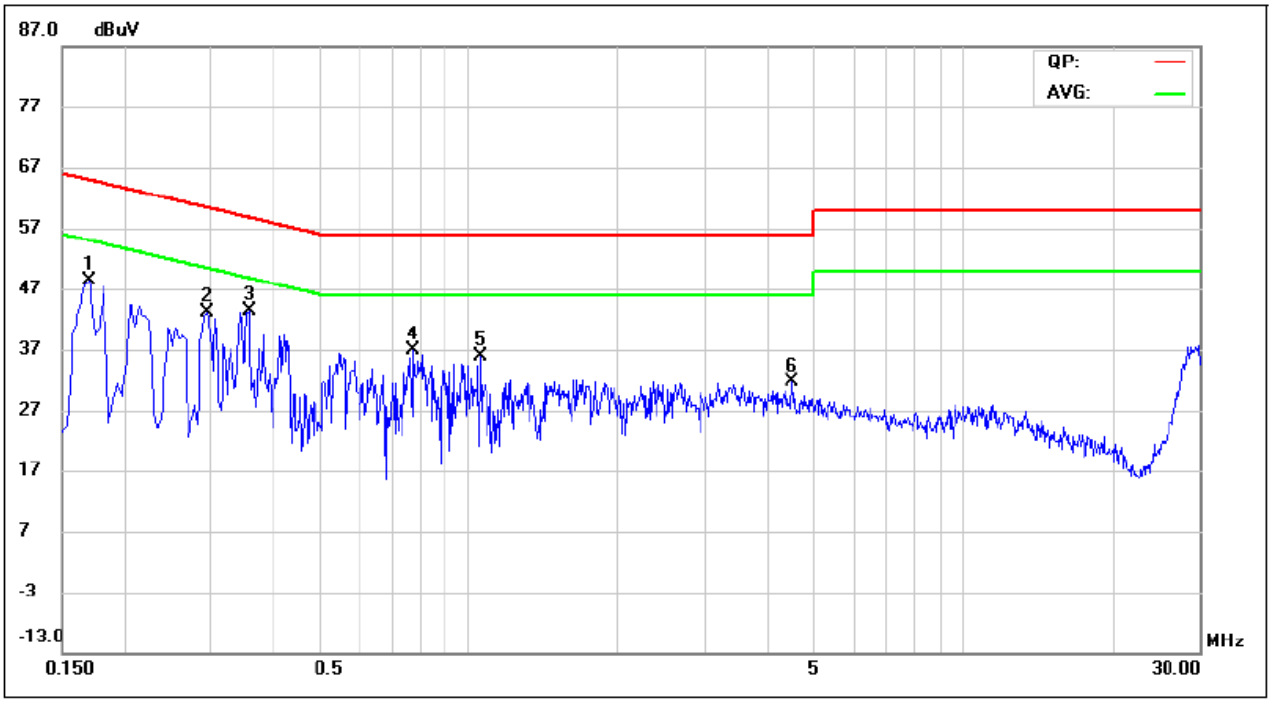
5.5 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

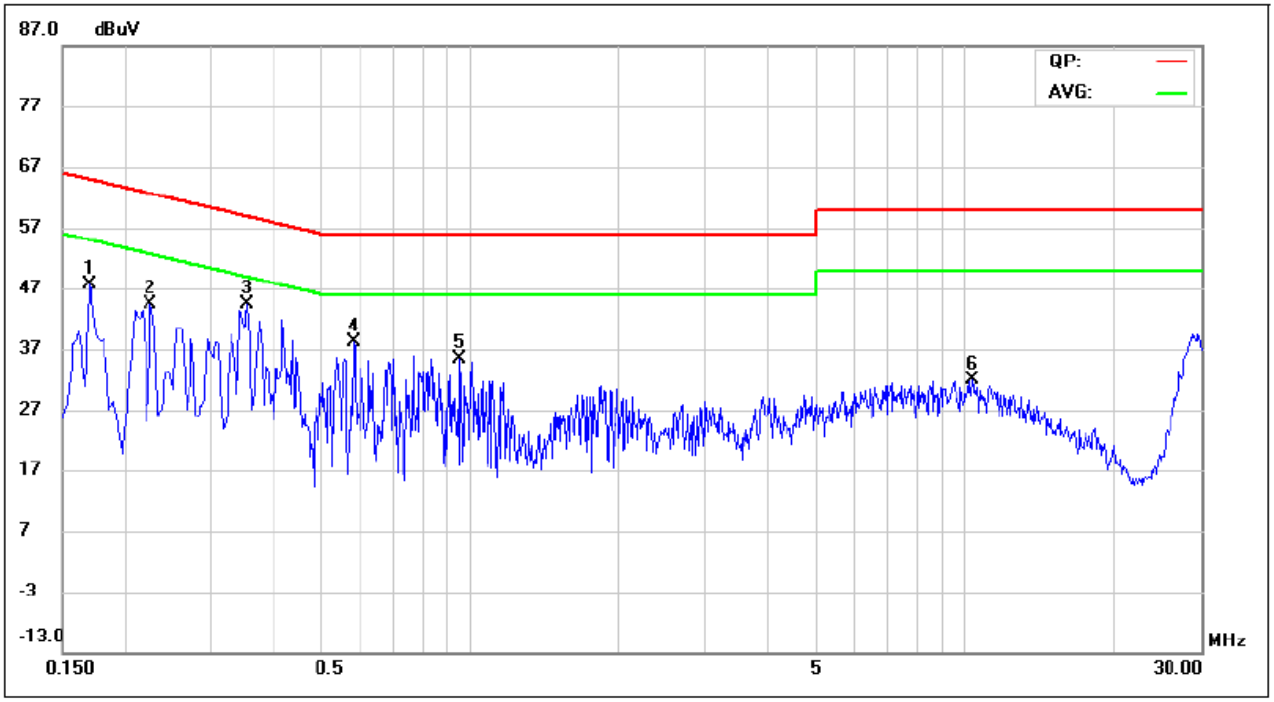
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Adapter Mode	Test Date:	2012/6/29
Test By:	Dino		



Site:	Conduction 04	Phase: L1	Temperature(℃):26(℃)
Power:	AC 110V/60Hz		Humidity:54%

No.	Frequency)	reading(dBuV)			Factor(dB)	Measurement(dBuV)			limit(dBuV)		margin(dB)		Comment
	(MHz)	Peak	QP	AVG	(dB)	Peak	QP	AVG	P/Q	AVG	P/Q	AVG	
1	0.1700	38.88	37.10	25.16	9.59	48.47	46.69	34.75	64.96	54.96	-18.27	-20.21	
2	0.2940	33.52	30.46	18.50	9.60	43.12	40.06	28.10	60.41	50.41	-20.35	-22.31	
3	0.3580	33.88	32.65	12.85	9.61	43.49	42.26	22.46	58.77	48.77	-16.51	-26.31	
4	0.7740	27.31	23.08	11.62	9.63	36.94	32.71	21.25	56.00	46.00	-23.29	-24.75	
5	1.0540	26.15	19.30	7.72	9.63	35.78	28.93	17.35	56.00	46.00	-27.07	-28.65	
6	4.5060	21.86	15.14	6.48	9.69	31.55	24.83	16.17	56.00	46.00	-31.17	-29.83	



Site:	Conduction 04	Phase: N	Temperature(℃):26(℃)
Power:	AC 110V/60Hz		Humidity:54%

No.	Frequency)	reading(dBuV)			Factor(dB)	Measurement(dBuV)			limit(dBuV)		margin(dB)		Comment
	(MHz)	Peak	QP	AVG	(dB)	Peak	QP	AVG	P/Q	AVG	P/Q	AVG	
1	0.1700	38.03	36.75	26.03	9.60	47.63	46.35	35.63	64.96	54.96	-18.61	-19.33	
2	0.2260	34.88	30.16	12.55	9.60	44.48	39.76	22.15	62.60	52.60	-22.84	-30.45	
3	0.3540	34.70	33.36	14.27	9.61	44.31	42.97	23.88	58.87	48.87	-15.90	-24.99	
4	0.5820	28.42	25.32	10.79	9.61	38.03	34.93	20.40	56.00	46.00	-21.07	-25.60	
5	0.9540	25.75	22.30	6.69	9.63	35.38	31.93	16.32	56.00	46.00	-24.07	-29.68	
6	10.3540	22.12	15.34	5.86	9.78	31.90	25.12	15.64	60.00	50.00	-34.88	-34.36	

6 PEAK /AVERAGE UTPUT POWER MEASUREMENT

6.1 Standard Applicable:

According to §15.247(b)(3),(4)

(b)

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

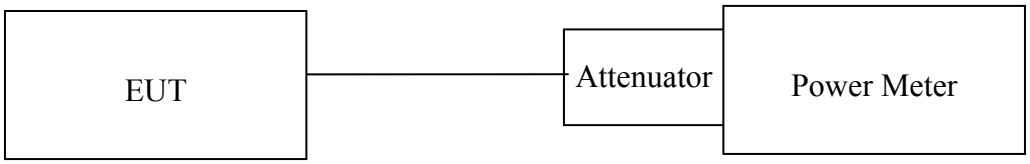
(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum analyzer (40GHz)	Agilent	N9030A	MY51360021	03/11/2012	03/10/2013
Power Meter 05	Anritsu	ML2495A	1116010	04/17/2012	04/16/2013
Power Sensor 05	Anritsu	MA2411B	34NKF50	04/16/2012	04/15/2013
Temperature Chamber	KSON	THS-B4H100	2287	03/03/2012	03/02/2013
DC Power supply	ABM	51850	N/A	06/17/2012	06/16/2013
AC Power supply	EXTECH	CFC105W	NA	12/19/2011	12/18/2012
Splitter	MCLI	PS4-199	12465	07/18/2011	07/17/2012

6.3 Test Set-up:



6.4 Measurement Procedure:

Refer to section 5.2.1.2 Measurement Procedure PK2:of KDB Document: 558074 D01 DTS Meas Guidance v01

1. This procedure provides an integrated measurement alternative when the maximum available RBW < EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Set the span to a value that is 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band 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 EBW of the spectrum.

Refer to section 5.2.2.2 Measurement Procedure AVG2 (trace averaging over the EBW): of KDB Document: 558074 D01 DTS Meas Guidance v01

1. Set the analyzer span to 5-30% greater than the EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW ≥ 3 MHz.
4. Ensure that the number of measurement points in the sweep ≥ 2 x (span/RBW).
5. Sweep time = auto couple.
6. Detector = power averaging (RMS) or sample.
7. Employ trace averaging in power averaging (RMS) mode over a minimum of 100 traces.
8. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges to determine the maximum conducted output power of the EUT over the EBW. If the analyzer does not have a band power function, sum the spectral levels (in linear power units) at 1 MHz intervals extending across the entire EBW.

6.5 Measurement Result:

802.11b

Cable loss = 0		Output Power		Limit (dBm)
CH	Frequency (MHz)	Detector		
		PK (dB)	AV (dB)	
1	2412	13.72	11.24	30
6	2437	13.63	11.18	
11	2462	13.59	11.11	

802.11g

Cable loss = 0		Output Power		Limit (dBm)
CH	Frequency (MHz)	Detector		
		PK (dB)	AV (dB)	
1	2412	20.52	10.79	30
6	2437	20.76	11.01	
11	2462	20.66	10.92	

802.11N 20MHz

Cable loss = 0		Output Power		Limit (dBm)
CH	Frequency (MHz)	Detector		
		PK (dB)	AV (dB)	
1	2412	19.51	10.62	30
6	2437	20.31	10.83	
11	2462	19.70	10.76	

802.11N 40MHz

Cable loss = 0		Output Power		Limit (dBm)
CH	Frequency (MHz)	Detector		
		PK (dB)	AV (dB)	
3	2422	19.95	10.71	30
6	2437	20.03	10.83	
9	2452	20.01	10.73	

7 6dB Bandwidth(EBW)

7.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz,2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

7.2 Measurement Equipment Used:

Refer to section 6.2 for details.

7.3 Test Set-up:

Refer to section 6.3 for details.

7.4 Measurement Procedure:

Refer to section 5.1.1 EBW Measurement Procedure of KDB Document: 558074 D01 DTS Meas Guidance v01

1. Set resolution bandwidth (RBW) = 1-5 % of the emission bandwidth (EBW). (802.11bgnHT20MHz =200KHz),(802.11Nht40=400KHz)
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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. Compare the resultant bandwidth with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is 1-5 %.

7.5 Measurement Result:

802.11b

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	12.13	> 500	PASS
2437	12.13	> 500	PASS
2462	12.13	> 500	PASS

802.11g

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	16.58	> 500	PASS
2437	16.56	> 500	PASS
2462	16.58	> 500	PASS

802.11n HT20

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	17.65	> 500	PASS
2437	17.66	> 500	PASS
2462	17.67	> 500	PASS

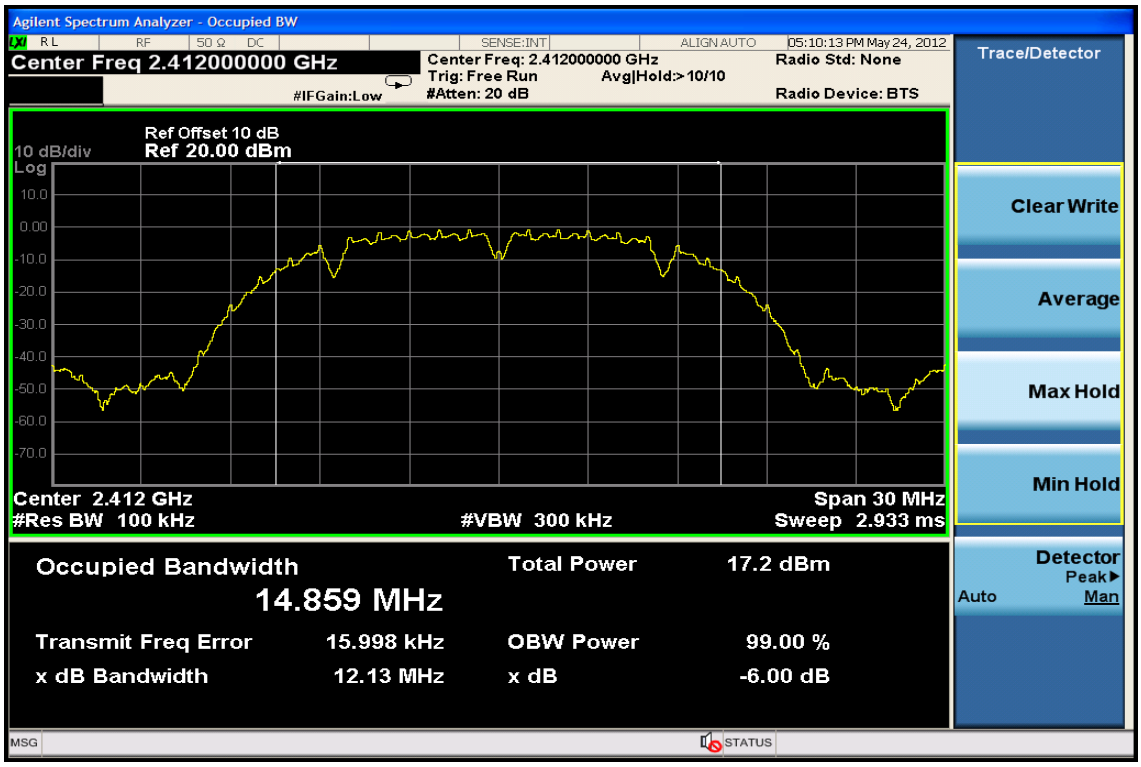
802.11n HT40

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2422	36.40	> 500	PASS
2437	36.40	> 500	PASS
2452	36.39	> 500	PASS

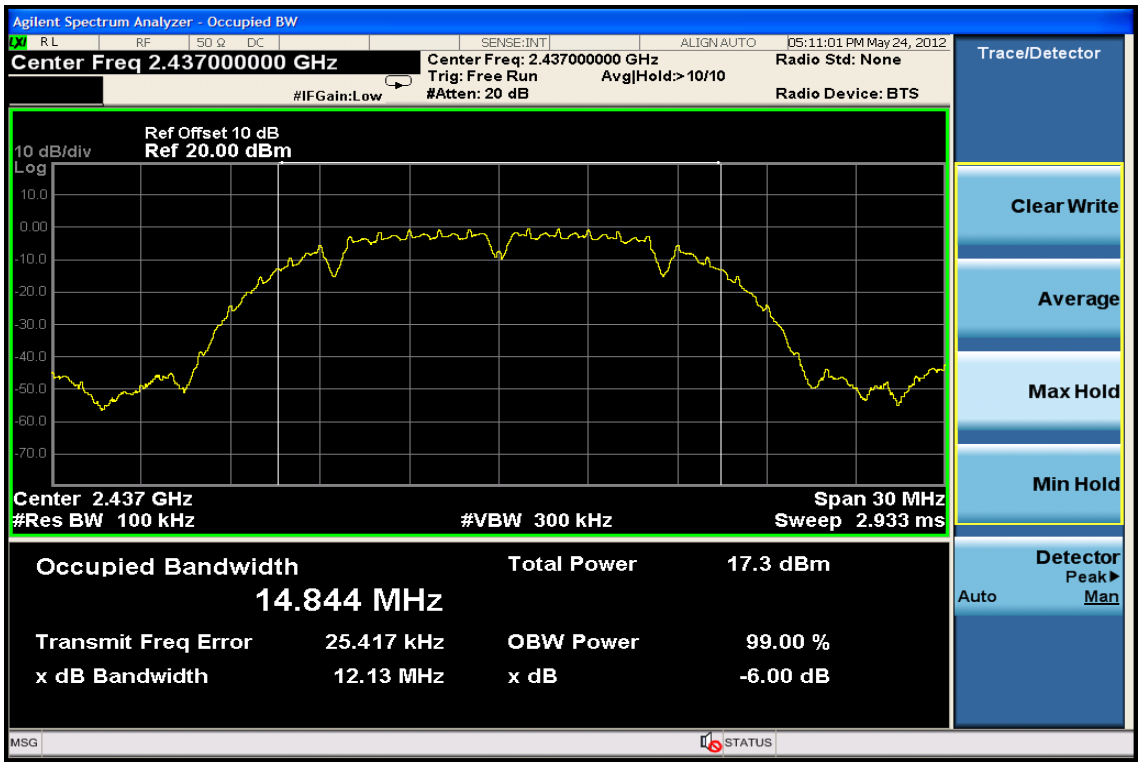
Note: Refer to next page for plots.

802.11b

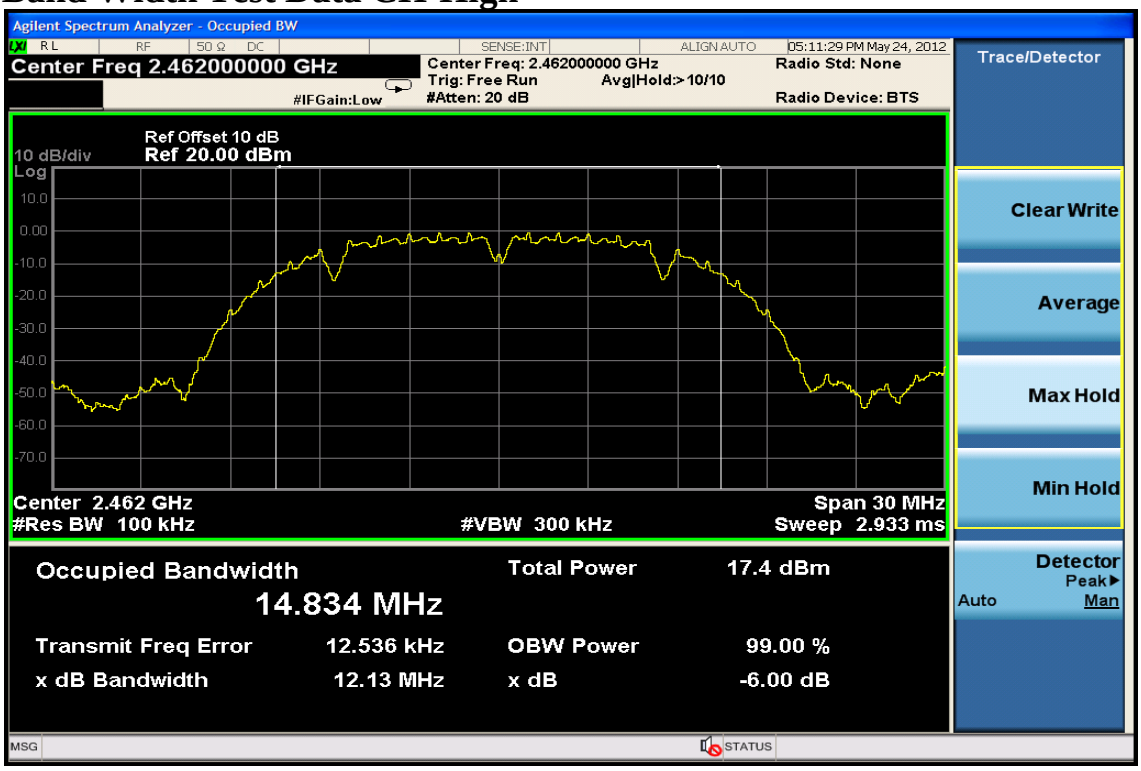
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

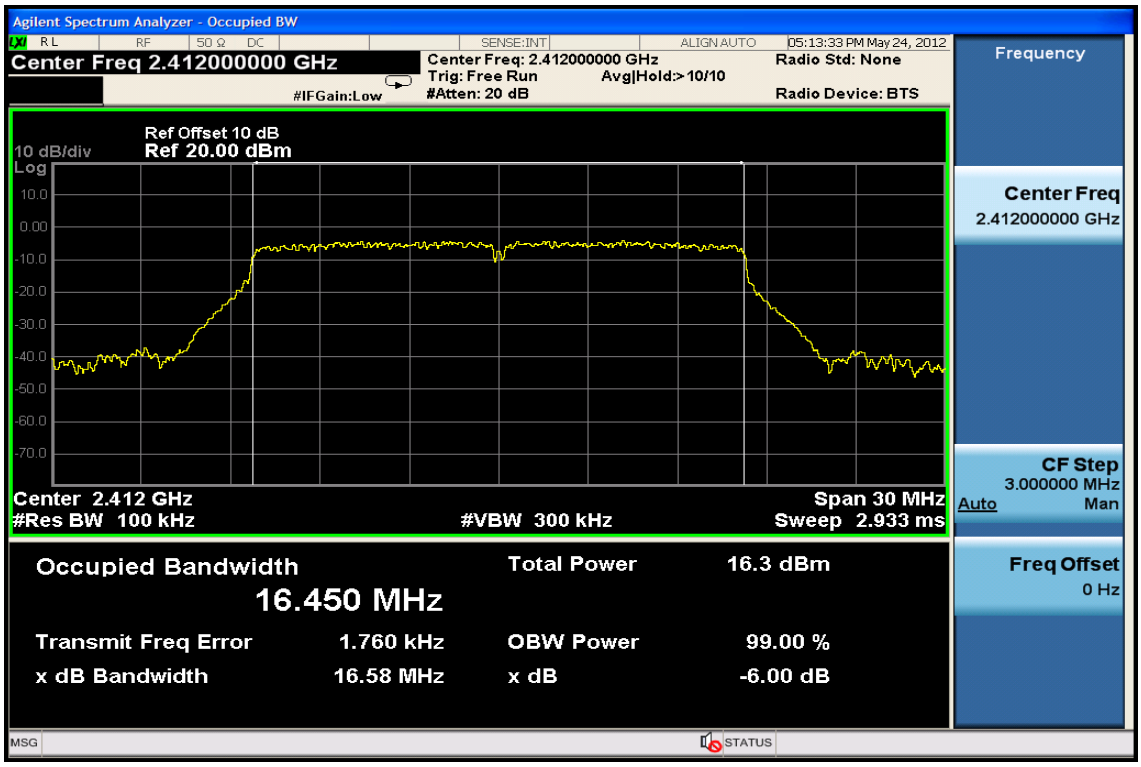


6dB Band Width Test Data CH-High

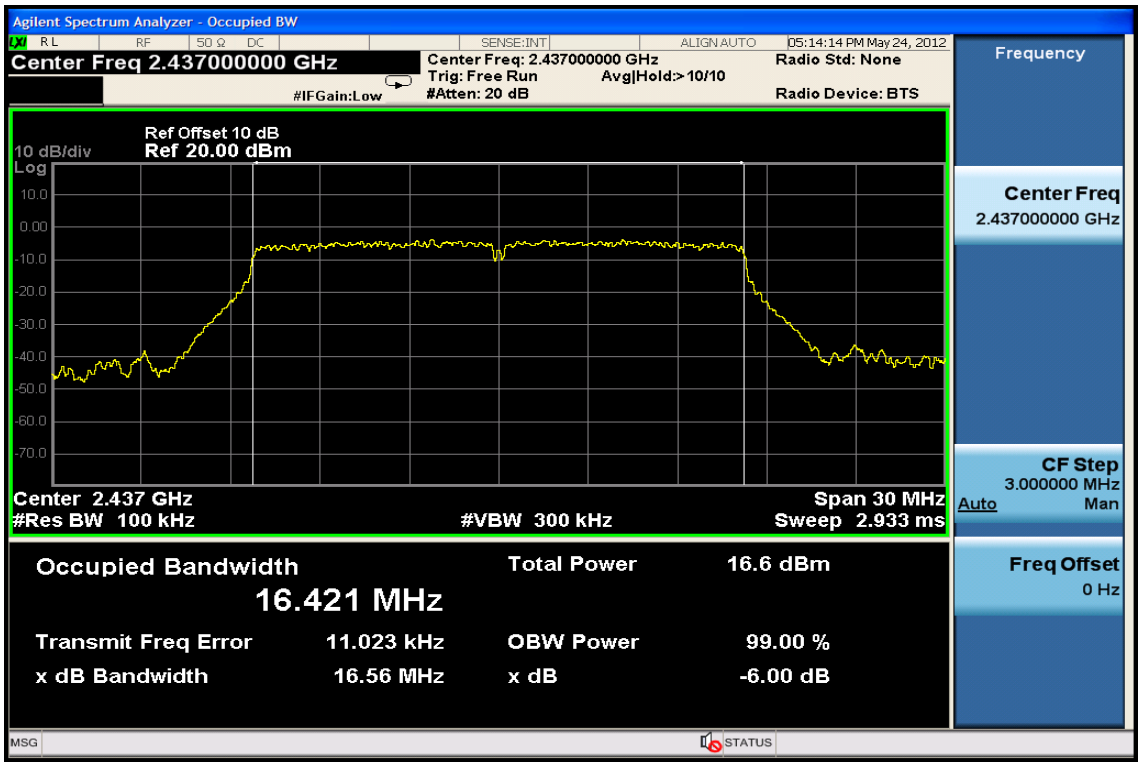


802.11g

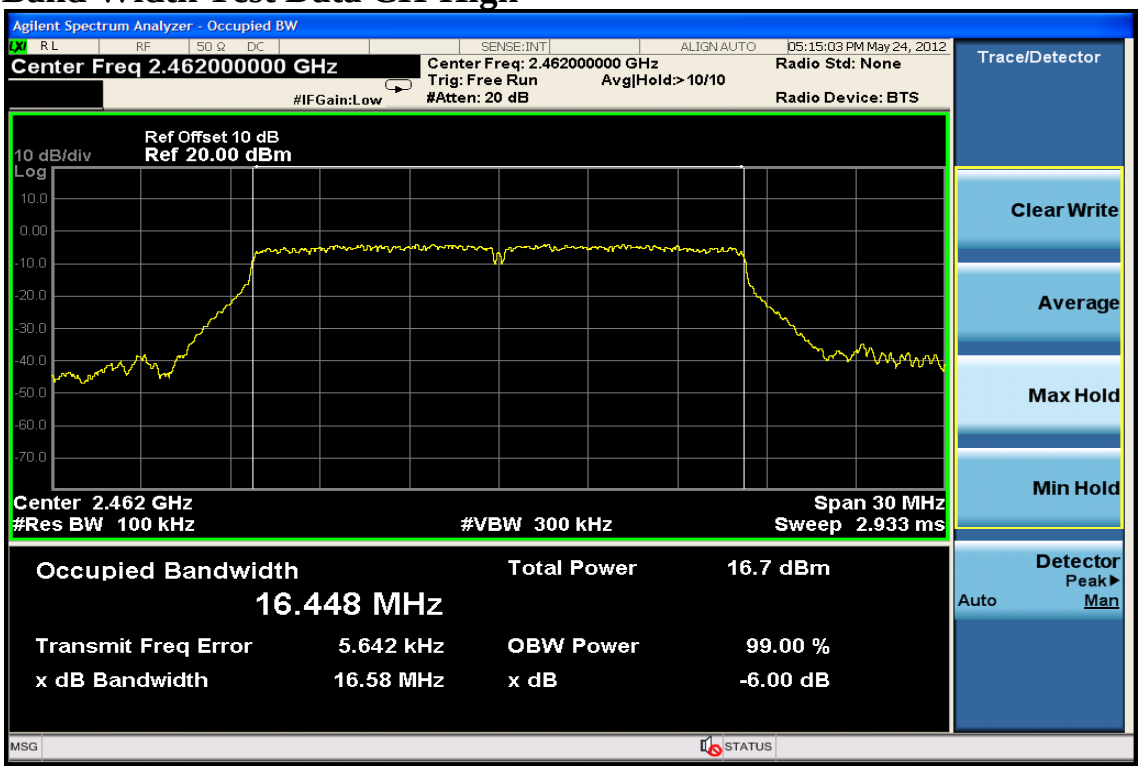
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

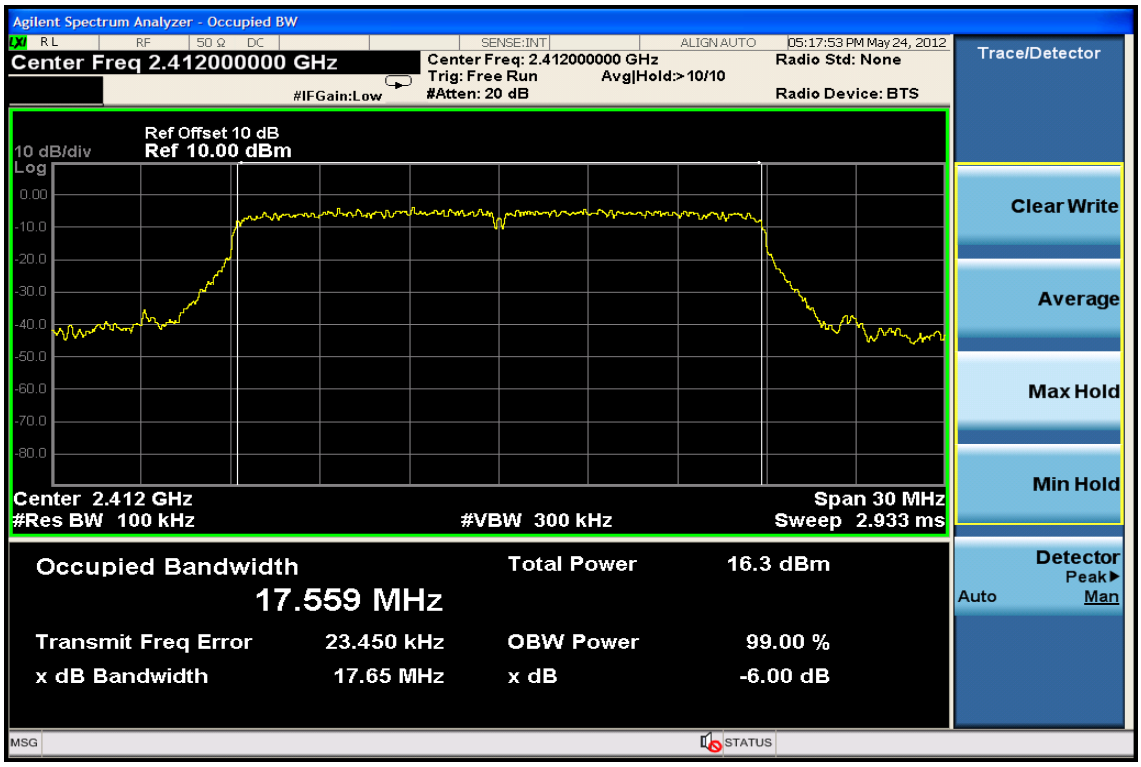


6dB Band Width Test Data CH-High

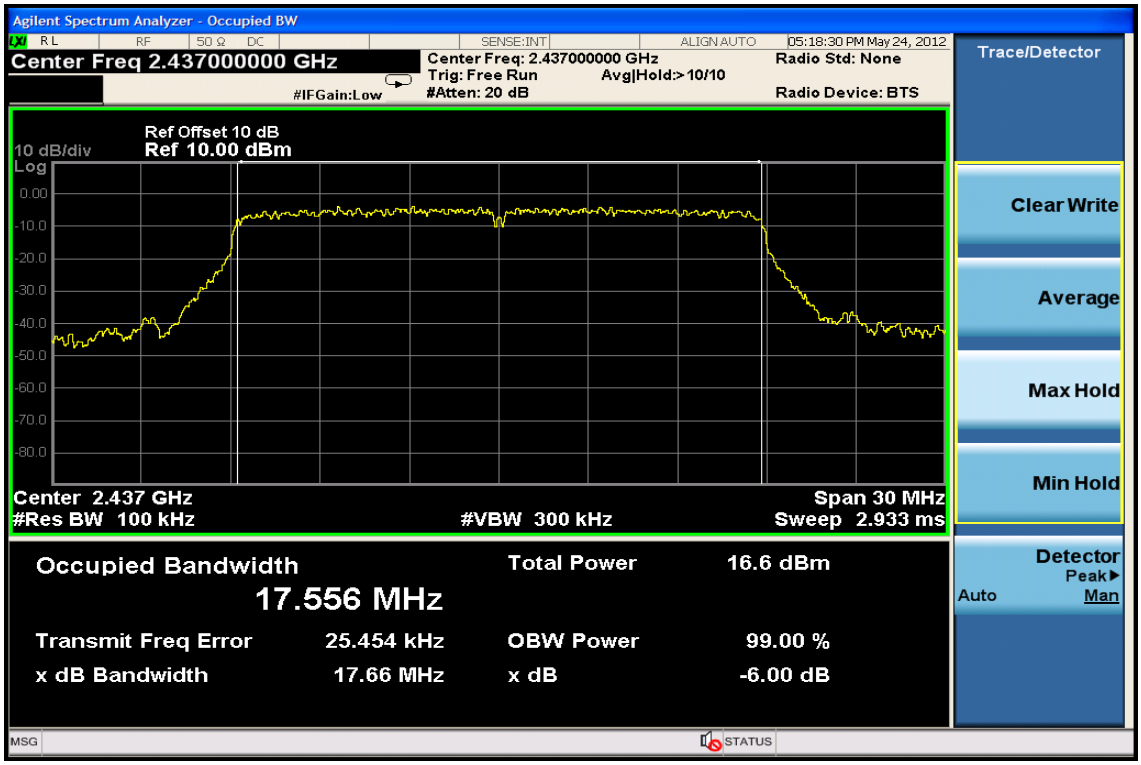


802.11n_20M

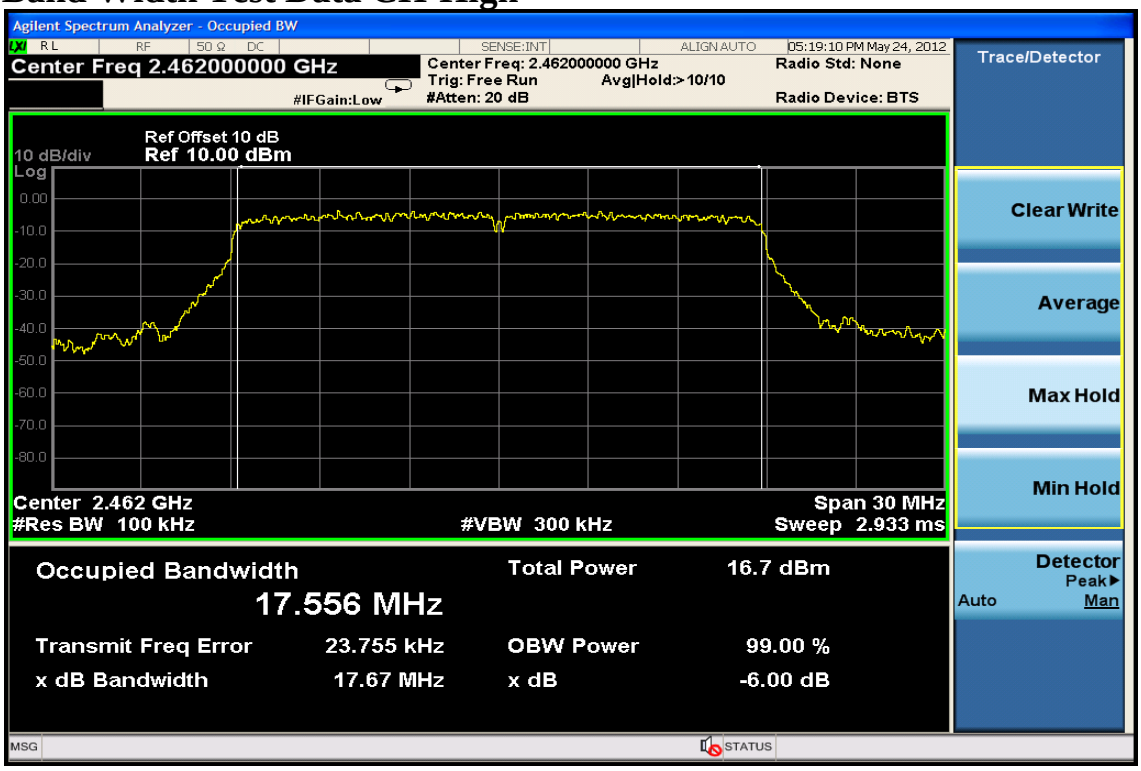
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

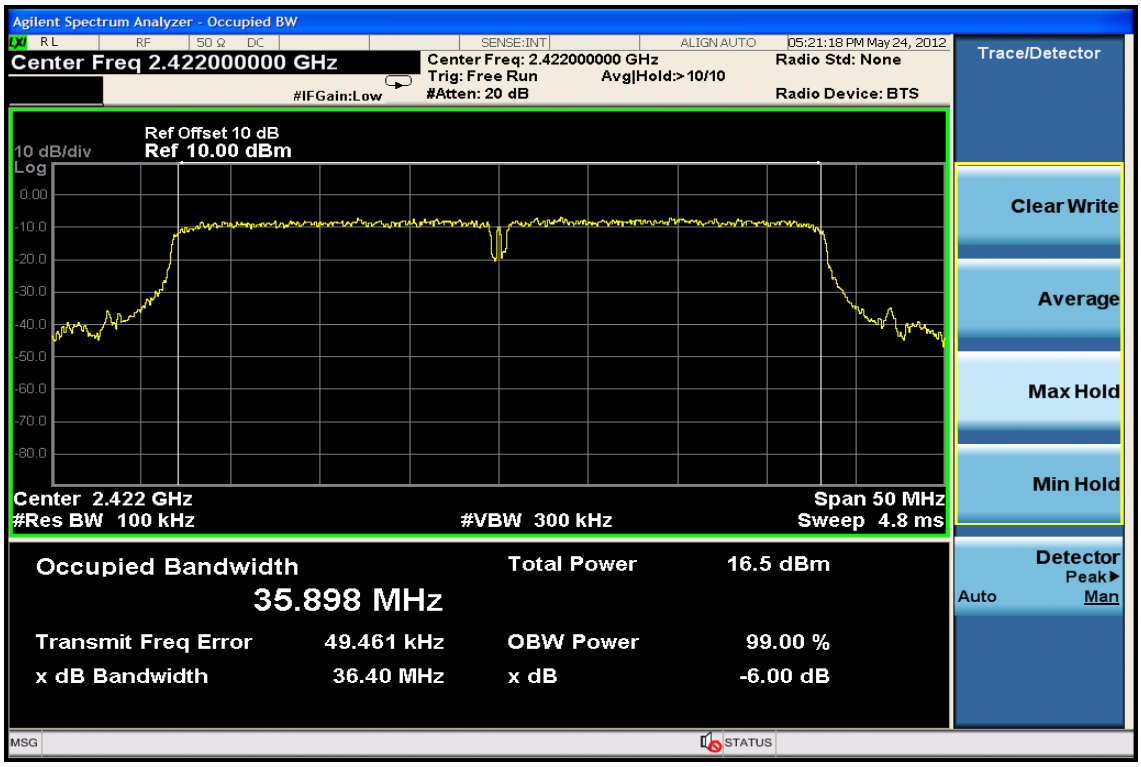


6dB Band Width Test Data CH-High

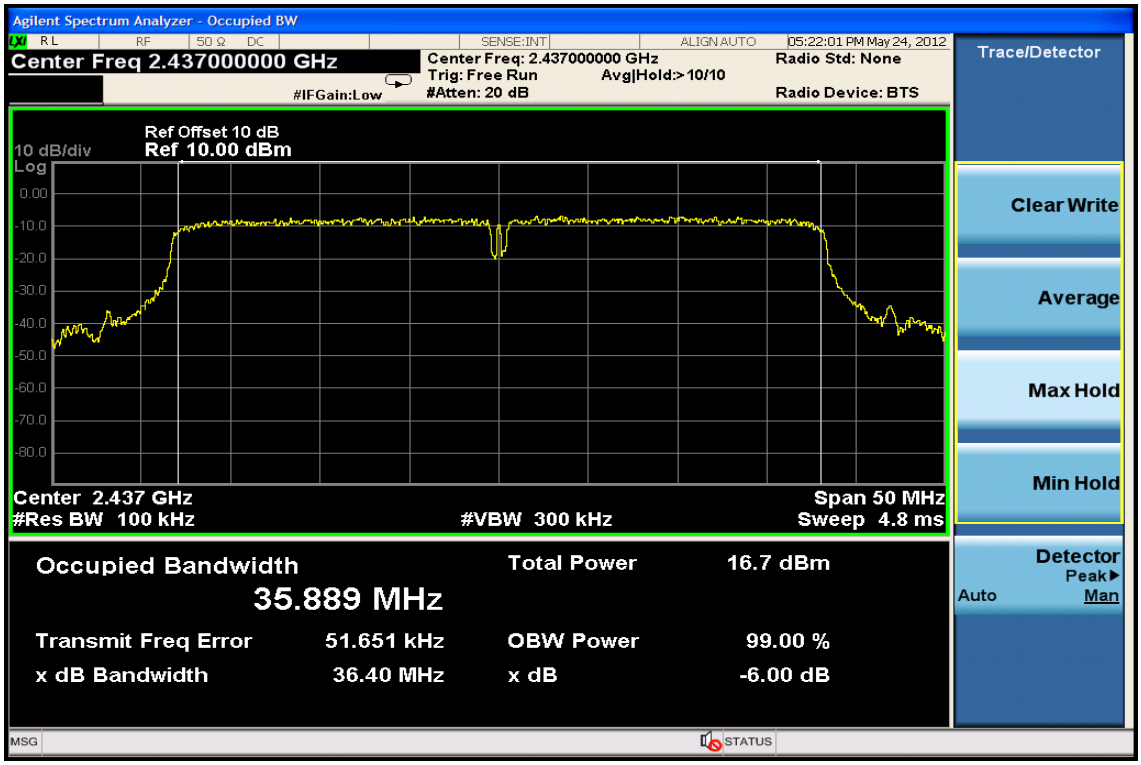


802.11n_40M

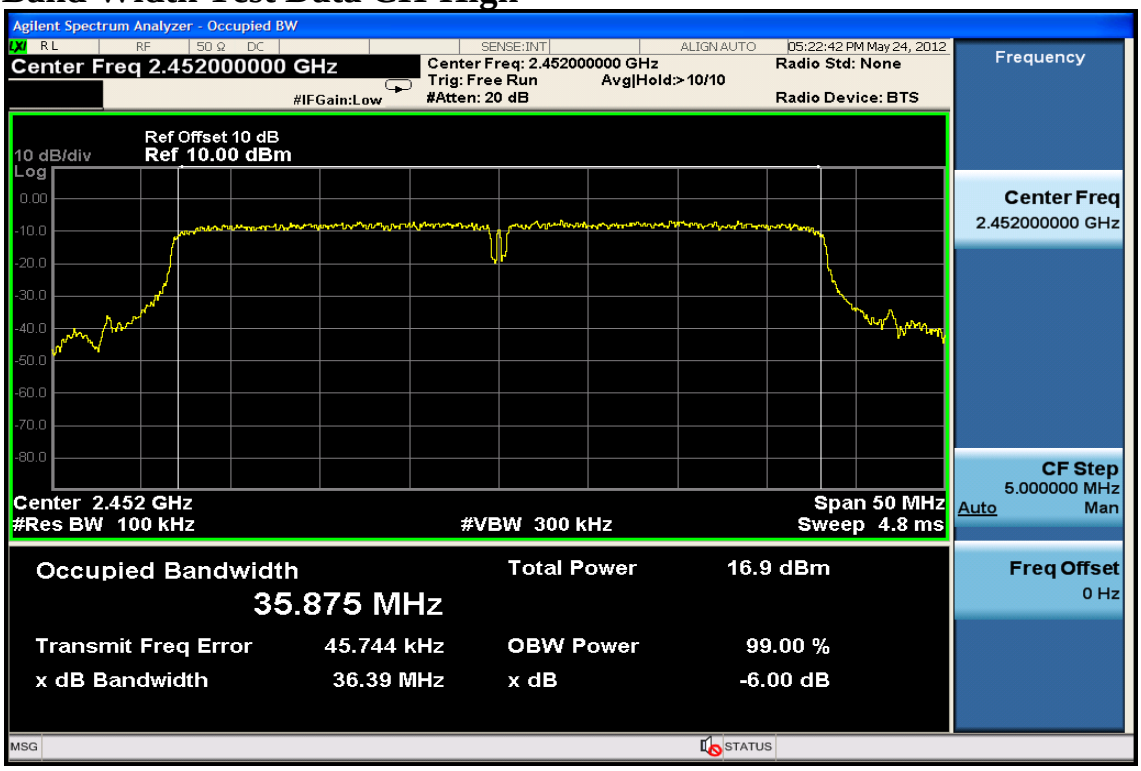
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1 Standard Applicable:

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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 in15.209(a).

8.2 Measurement Equipment Used:

8.2.1 Conducted Emission at antenna port:

Refer to section 6.2 for details.

8.2.2 Radiated emission:

Chamber 14(966)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/18/2011	07/17/2012
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/24/2012	05/23/2013
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	04/25/2012	04/24/2013
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	02/28/2011	02/27/2013
Bilog Antenna30-1G	Schaffner	CBL 6111B	2756	12/27/2011	12/26/2012
Horn antenna1-18G	COM-POWER	AH118	2011071401	03/01/2012	02/29/2013
Horn antenna1-18G(06)	EMCO	3117	0006665	09/21/2011	09/20/2012
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/04/2012	05/03/2013
Preamplifier9-1000M	HP	8447D	NA	02/10/2012	02/09/2013
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/19/2011	07/18/2012
Preamplifier1-26G	EM	EM01M26G	NA	02/21/2012	02/20/2013
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	02/10/2012	02/09/2013
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	12/14/2011	12/13/2012
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	09/21/2011	09/20/2012
2.4G Filter	Micro-Tronics	Brm50702	76	10/22/2011	10/21/2012

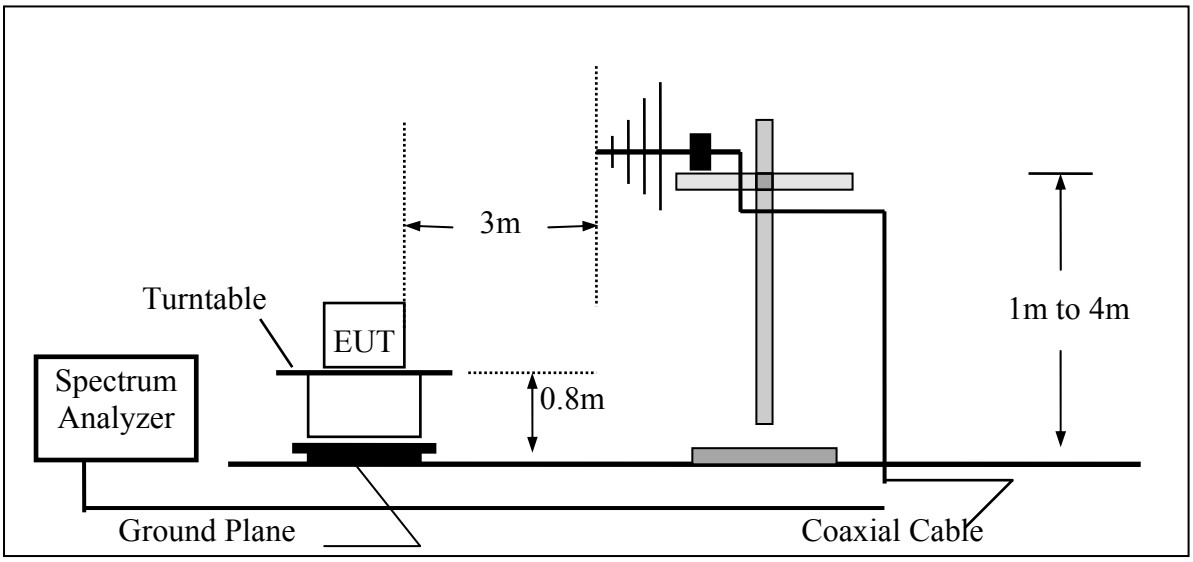
8.3 Test SET-UP:

8.3.1 Conducted Emission at antenna port:

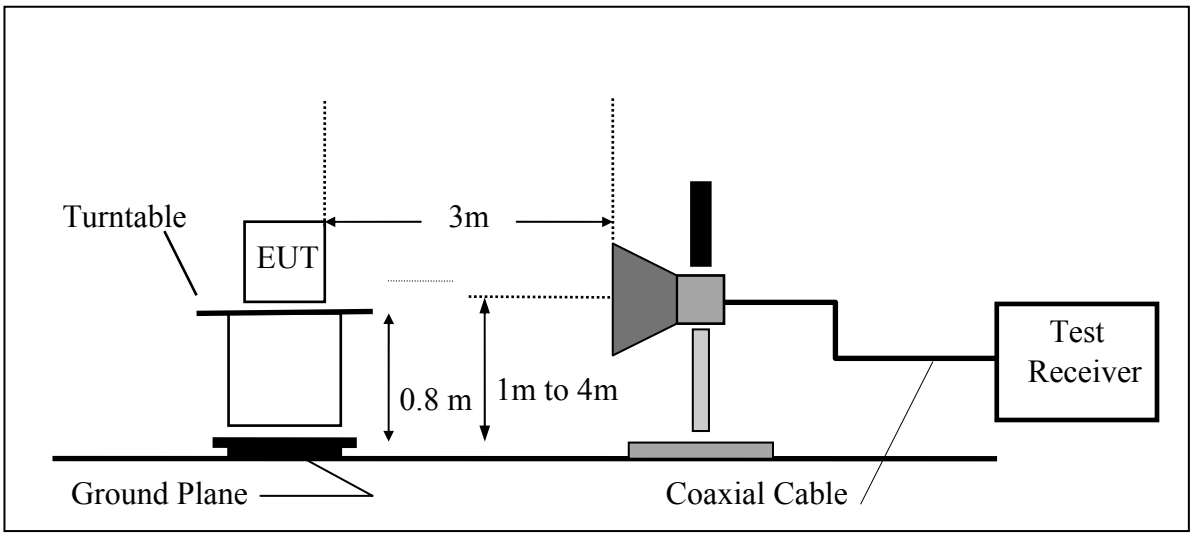
Refer to section 6.3 for details.

8.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

Refer to section 5.4.2 and 5.4.2.2.4 Band-Edge Measurements of KDB Document: 558074 D01 DTS Meas Guidance v01

The measurement of unwanted emissions at the edge of the authorized frequency bands can be complicated by the leakage of RF energy from the fundamental emission into the RBW passband. Thus, for measurements at the band edges, a narrower resolution bandwidth (no less than 10 kHz) can be used within the first 1 MHz beyond the fundamental emission, provided that that measured energy is subsequently integrated over the appropriate reference bandwidth (i.e., 100 kHz or 1 MHz). This integration can be performed using the band power function of the spectrum analyzer or by summing the spectral levels (in linear power units) over the appropriate reference bandwidth.

8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

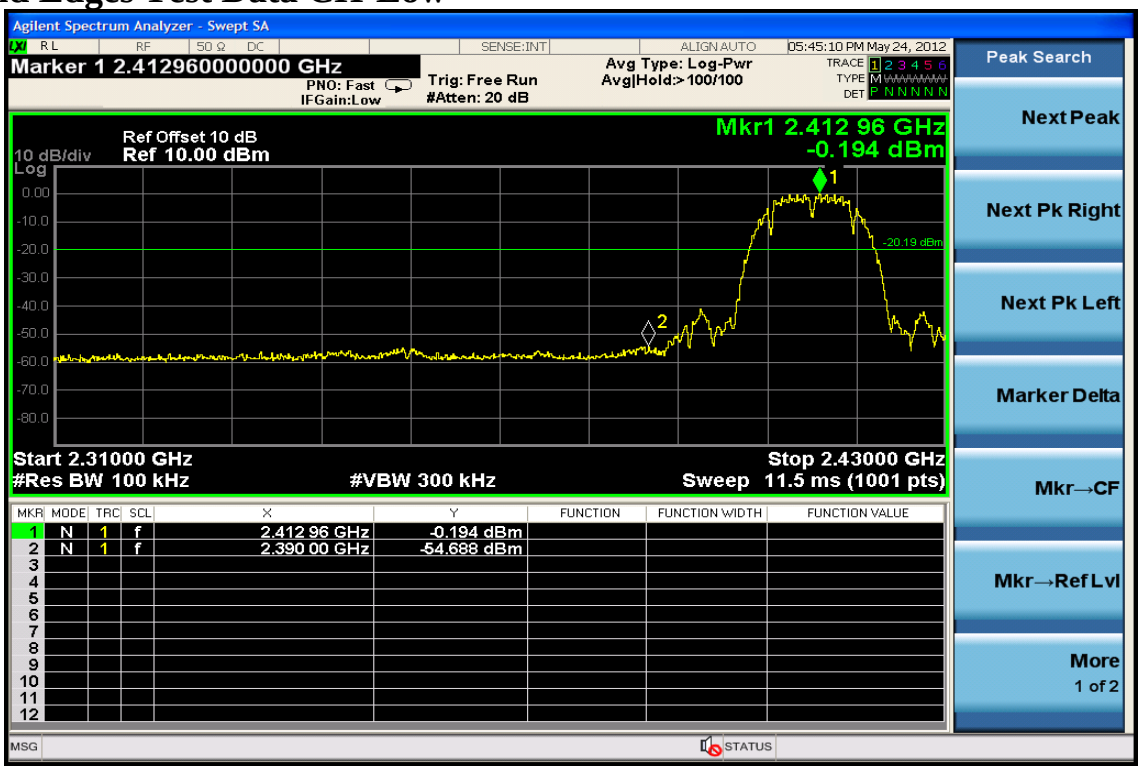
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

802.11b

Band Edges Test Data CH-Low



Band Edges Test Data CH-High

Radiated Emission: 802.11 b mode

Operation Mode	TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2387.96	61.76	-11.49	50.27	74.00	-23.73	Peak	VERTICAL
2	2390.00	60.77	-11.48	49.29	74.00	-24.71	Peak	VERTICAL
1	2350.75	61.05	-11.58	49.47	74.00	-24.53	Peak	HORIZONTAL
2	2390.00	60.00	-11.48	48.52	74.00	-25.48	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2483.50	60.02	-11.25	48.77	74.00	-25.23	Peak	VERTICAL
2	2484.40	61.15	-11.25	49.90	74.00	-24.10	Peak	VERTICAL
1	2483.50	59.25	-11.25	48.00	74.00	-26.00	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

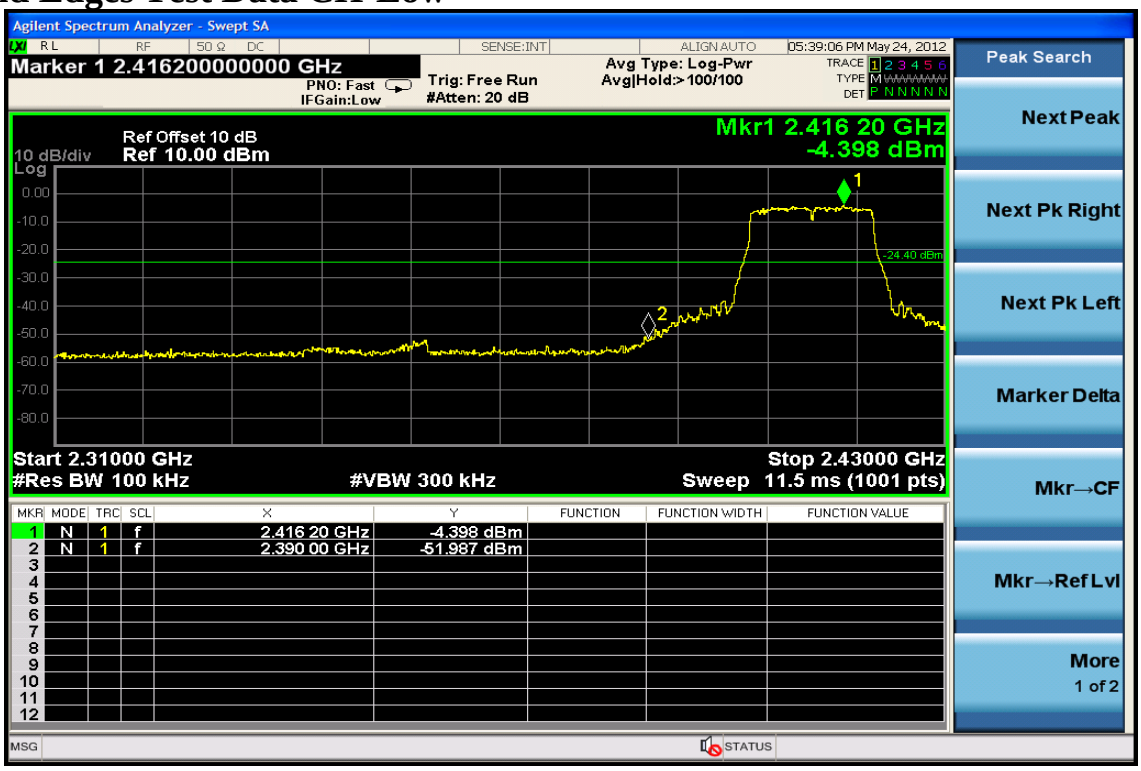
3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

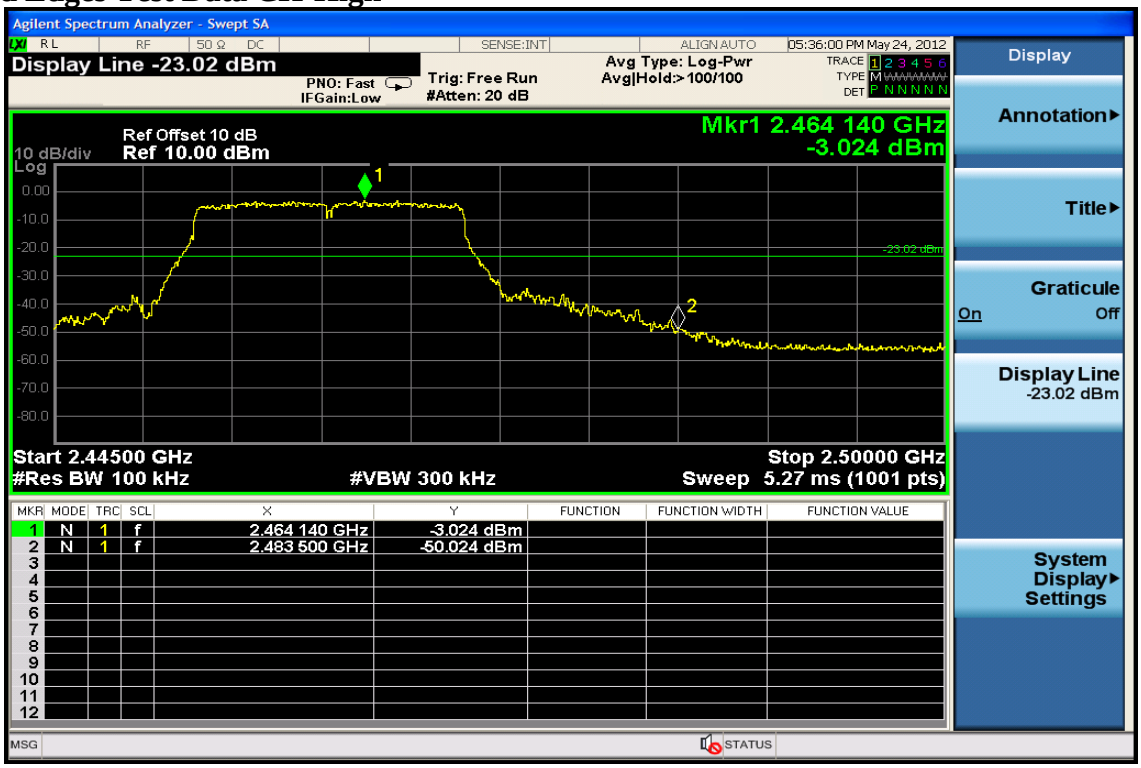
5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

802.11g

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11 g mode

Operation Mode	TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2387.47	62.55	-11.49	51.06	74.00	-22.94	Peak	VERTICAL
2	2390.00	61.41	-11.48	49.93	74.00	-24.07	Peak	VERTICAL
1	2390.00	63.58	-11.48	52.10	74.00	-21.90	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2483.50	50.19	-11.25	38.94	54.00	-15.06	Average	VERTICAL
2	2483.50	68.92	-11.25	57.67	74.00	-16.33	Peak	VERTICAL
3	2484.22	49.91	-11.25	38.66	54.00	-15.34	Average	VERTICAL
4	2484.22	70.31	-11.25	59.06	74.00	-14.94	Peak	VERTICAL
1	2483.50	53.22	-11.25	41.97	54.00	-12.03	Average	HORIZONTAL
2	2483.50	71.45	-11.25	60.20	74.00	-13.80	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

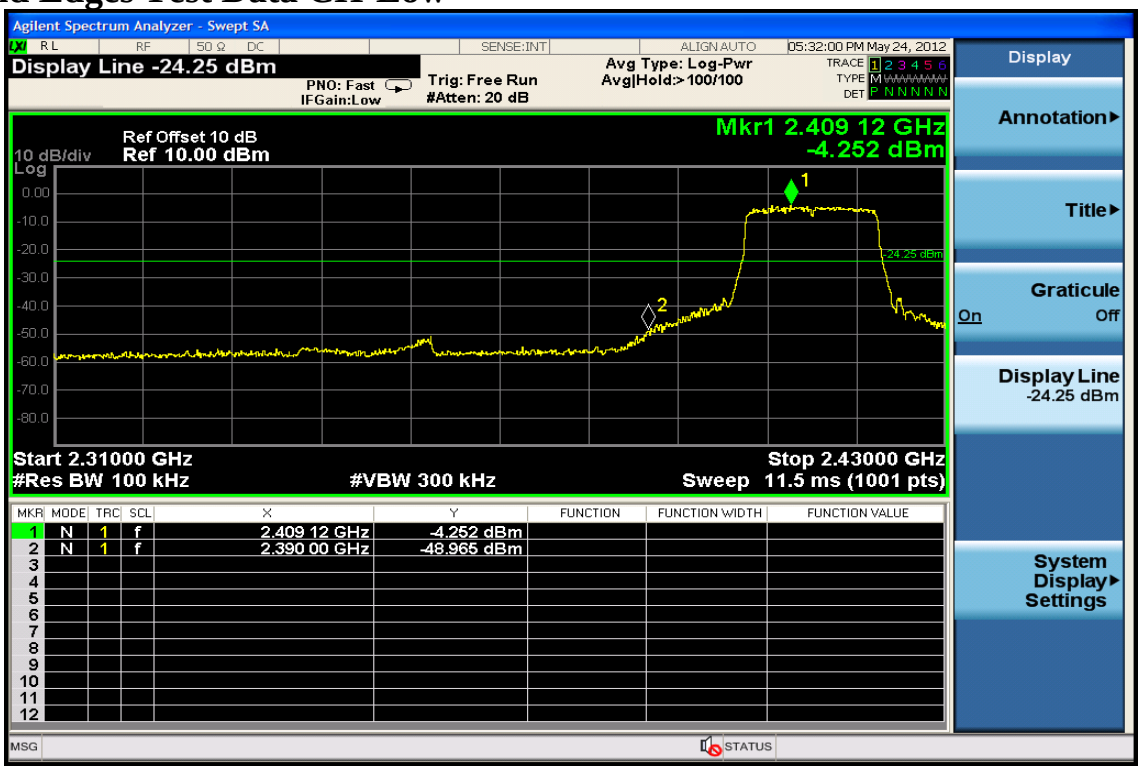
3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

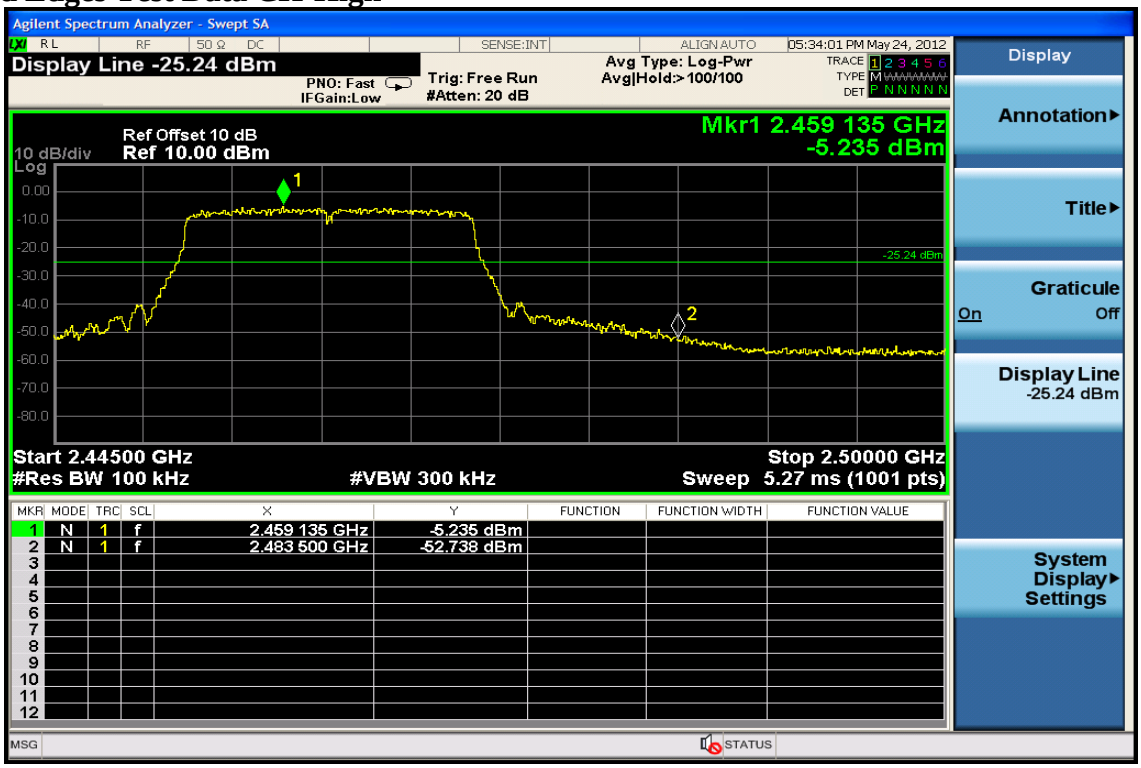
5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

802.11n_20M

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11 n_20M mode

Operation Mode	TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2390.00	51.35	-11.48	39.87	54.00	-14.13	Average	VERTICAL
2	2390.00	68.75	-11.48	57.27	74.00	-16.73	Peak	VERTICAL
1	2390.00	51.65	-11.48	40.17	54.00	-13.83	Average	HORIZONTAL
2	2390.00	66.64	-11.48	55.16	74.00	-18.84	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2483.50	52.70	-11.25	41.45	54.00	-12.55	Average	VERTICAL
2	2483.50	68.34	-11.25	57.09	74.00	-16.91	Peak	VERTICAL
1	2483.50	55.90	-11.25	44.65	54.00	-9.35	Average	HORIZONTAL
2	2483.50	72.07	-11.25	60.82	74.00	-13.18	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

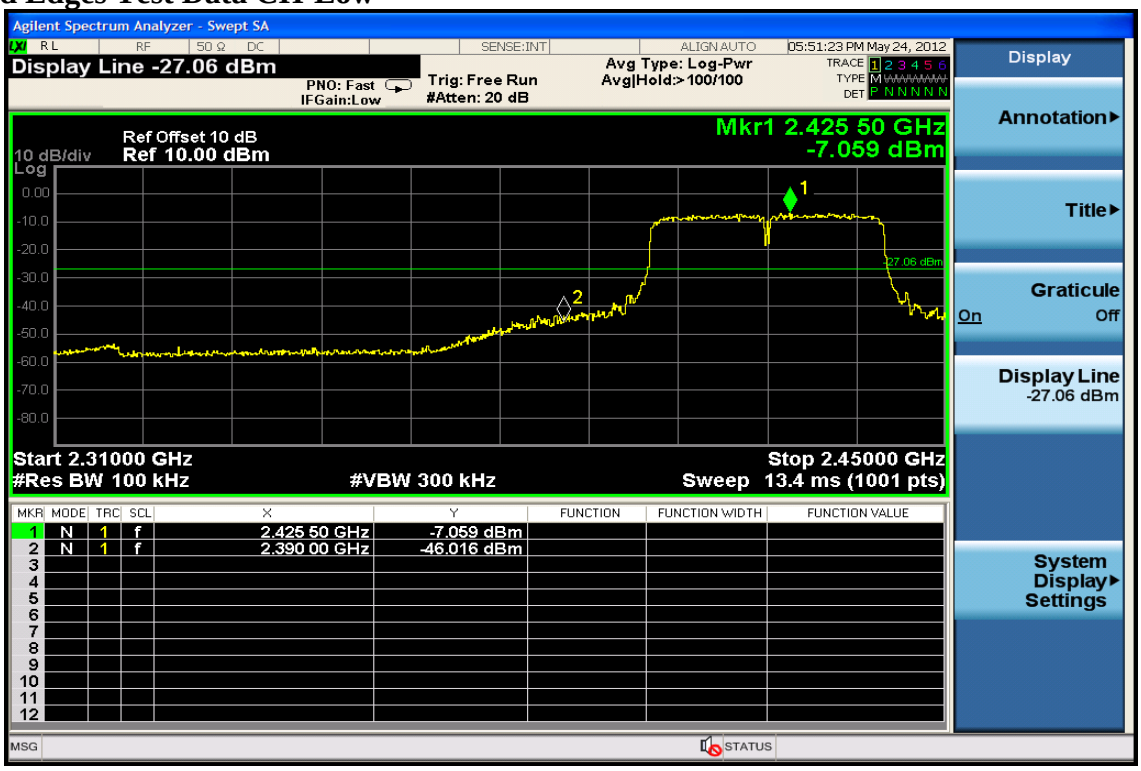
3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

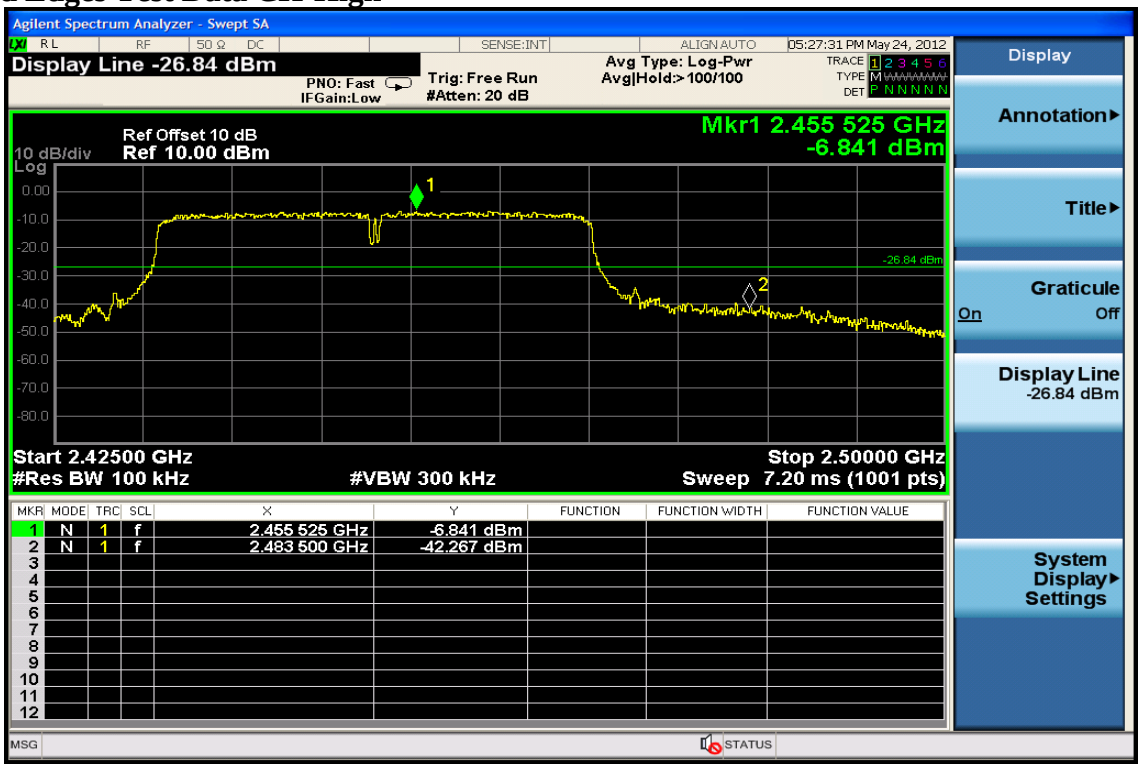
5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

802.11n_40M

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11 n_40M mode

Operation Mode	TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2422 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2386.11	55.16	-11.50	43.66	54.00	-10.34	Average	VERTICAL
2	2386.11	69.88	-11.50	58.38	74.00	-15.62	Peak	VERTICAL
3	2390.00	55.11	-11.48	43.63	54.00	-10.37	Average	VERTICAL
4	2390.00	66.18	-11.48	54.70	74.00	-19.30	Peak	VERTICAL
1	2388.95	54.17	-11.48	42.69	54.00	-11.31	Average	HORIZONTAL
2	2388.95	71.80	-11.48	60.32	74.00	-13.68	Peak	HORIZONTAL
3	2390.00	55.13	-11.48	43.65	54.00	-10.35	Average	HORIZONTAL
4	2390.00	68.29	-11.48	56.81	74.00	-17.19	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2012/05/24
Fundamental Frequency	2452 MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2483.50	56.71	-11.25	45.46	54.00	-8.54	Average	VERTICAL
2	2483.50	71.13	-11.25	59.88	74.00	-14.12	Peak	VERTICAL
3	2487.60	55.08	-11.24	43.84	54.00	-10.16	Average	VERTICAL
4	2487.60	73.68	-11.24	62.44	74.00	-11.56	Peak	VERTICAL
1	2483.50	61.48	-11.25	50.23	54.00	-3.77	Average	HORIZONTAL
2	2483.50	75.21	-11.25	63.96	74.00	-10.04	Peak	HORIZONTAL
3	2487.60	59.54	-11.24	48.30	54.00	-5.70	Average	HORIZONTAL
4	2487.60	76.09	-11.24	64.85	74.00	-9.15	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

9 SPURIOUS RADIATED EMISSION TEST

9.1 Standard Applicable

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

9.2 Measurement Equipment Used:

9.2.1 Conducted Emission at antenna port:

Refer to section 6.2 for details.

9.2.2 Radiated emission:

Refer to section 7.2 for details.

9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

Refer to section 6.3 for details.

9.3.2 Radiated emission:

Refer to section 7.3 for details.

9.4 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

Refer to section 5.4.2 Unwanted Emissions into Restricted Frequency Bands of KDB Document: 558074 D01 DTS Meas Guidance v01

9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

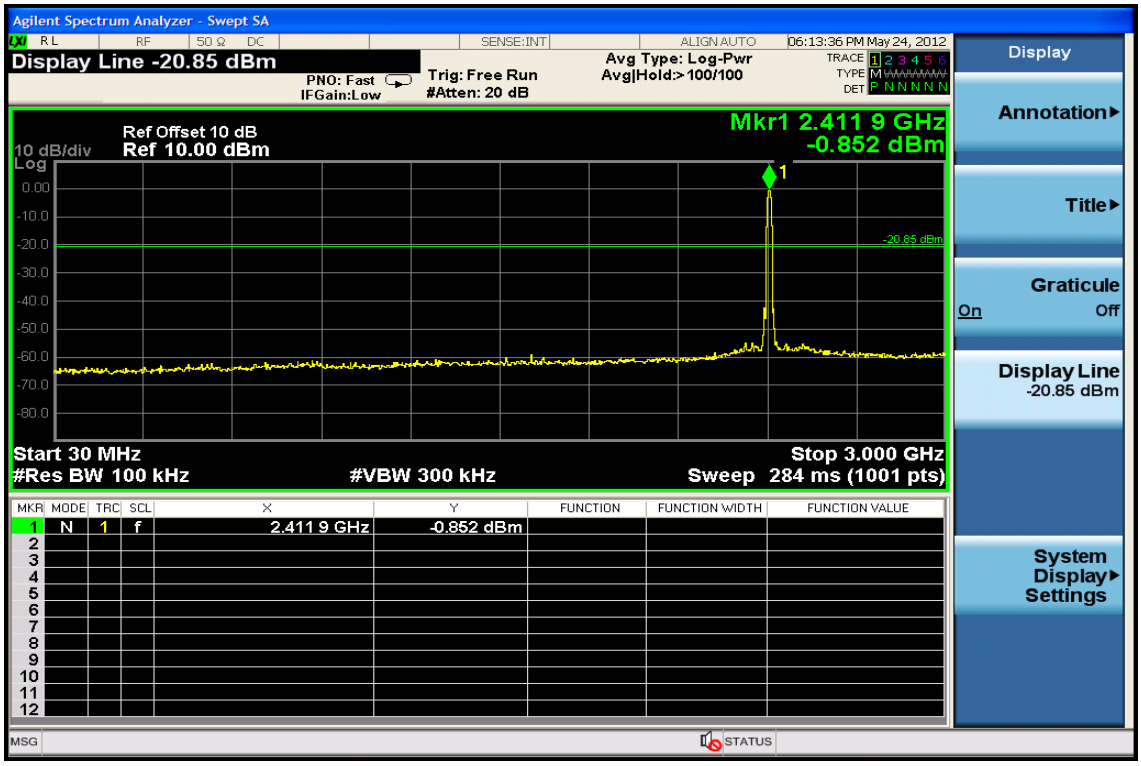
FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

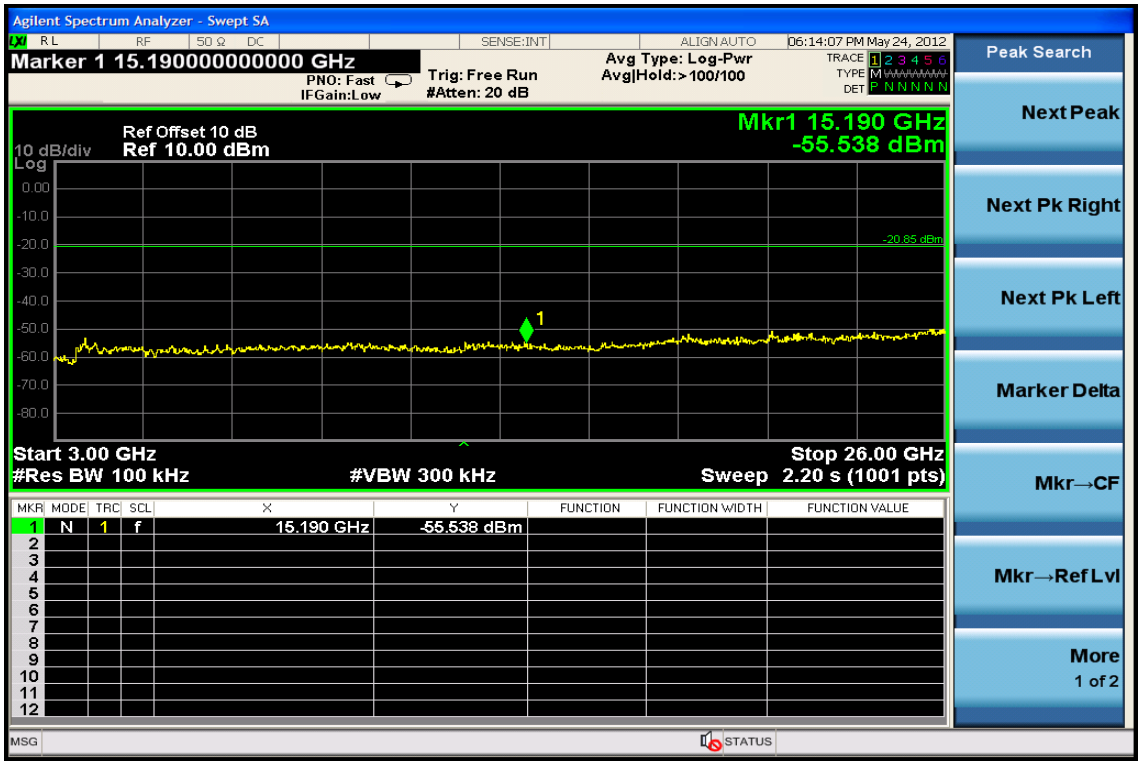
9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

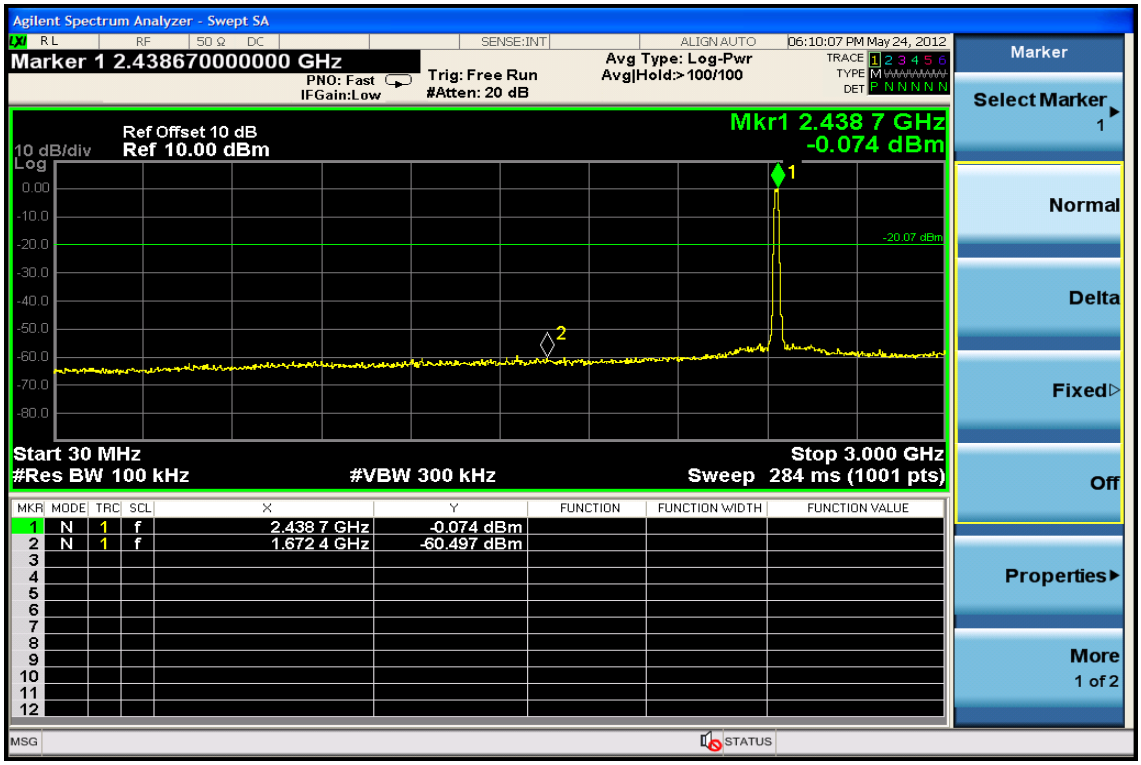
Conducted Spurious Emission Measurement Result (802.11b)
Ch Low 30MHz – 3GHz



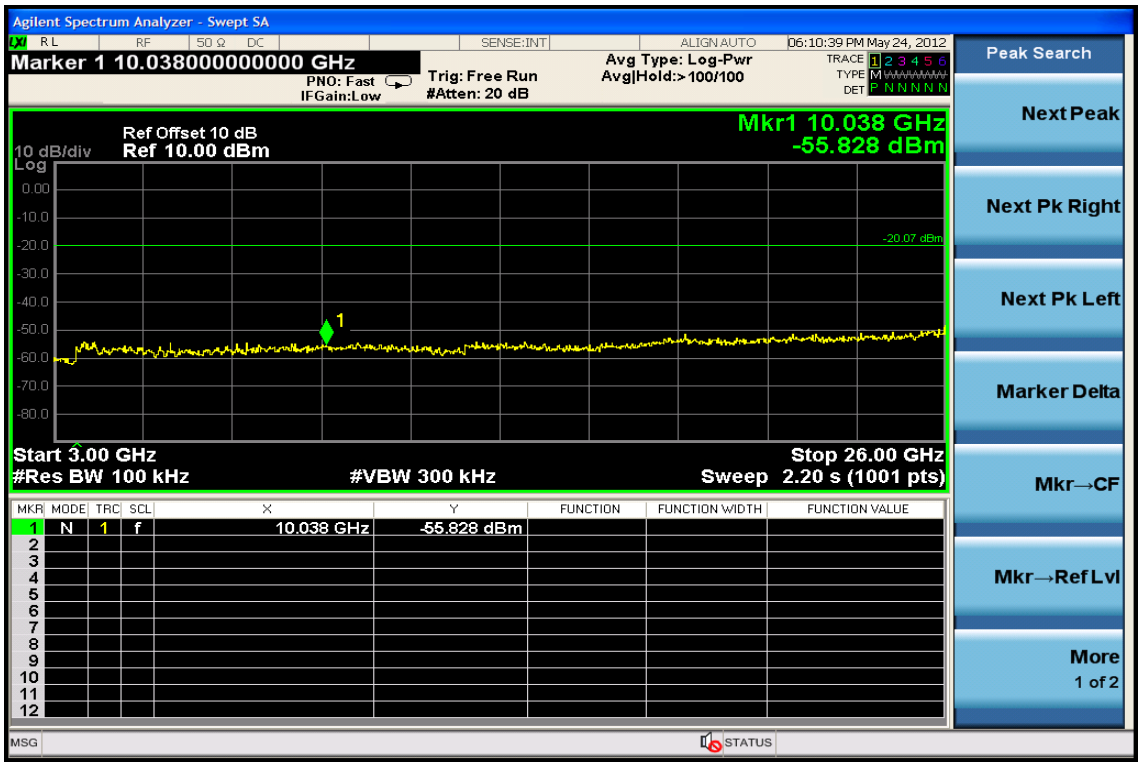
Ch Low 3GHz – 26.5GHz



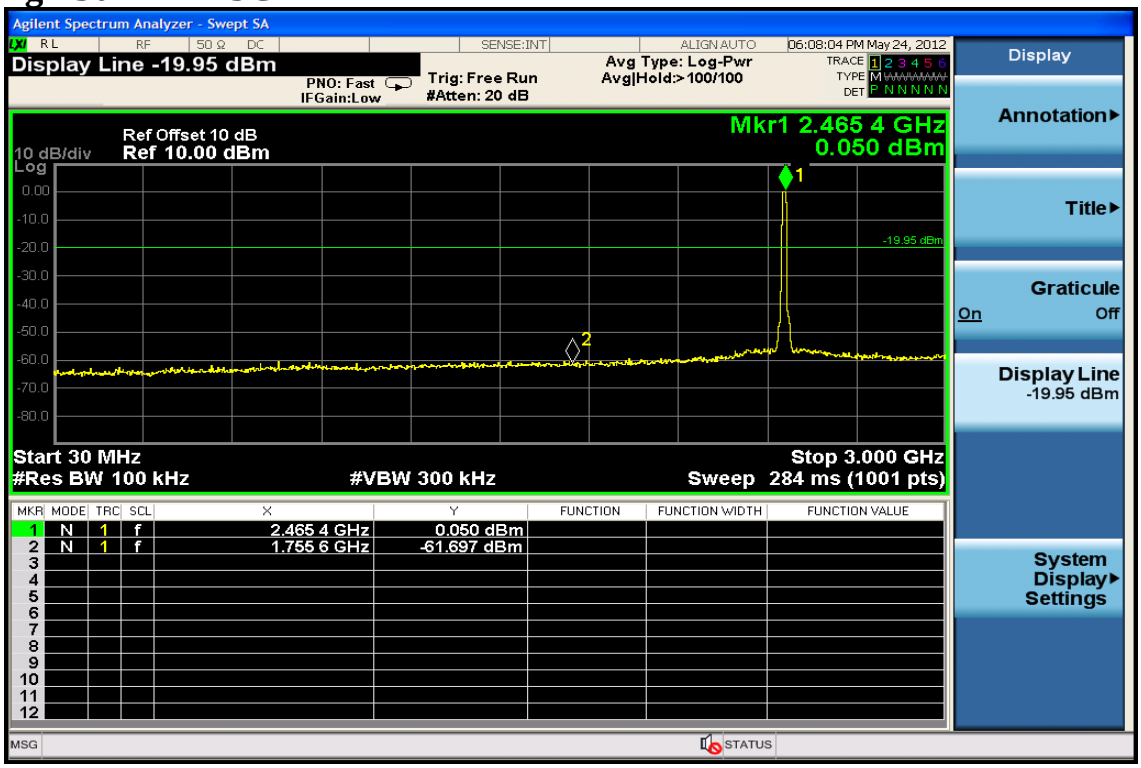
Ch Mid 30MHz – 3GHz



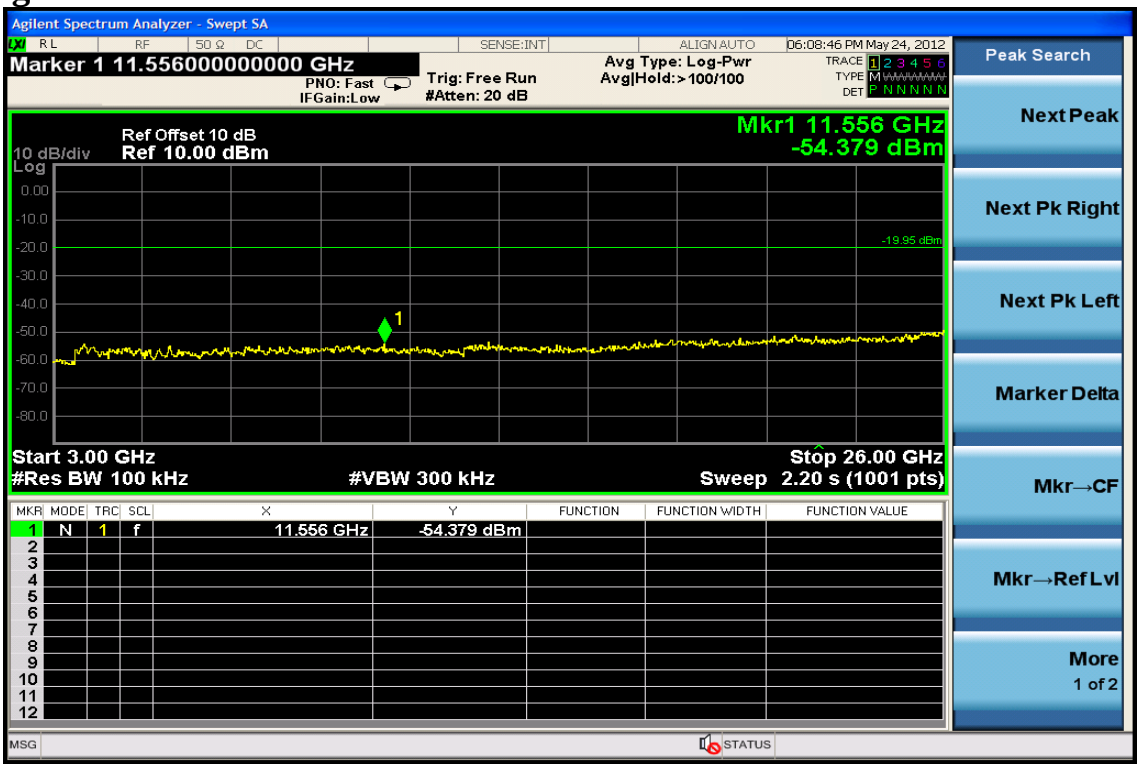
Ch Mid 3GHz – 26.5GHz



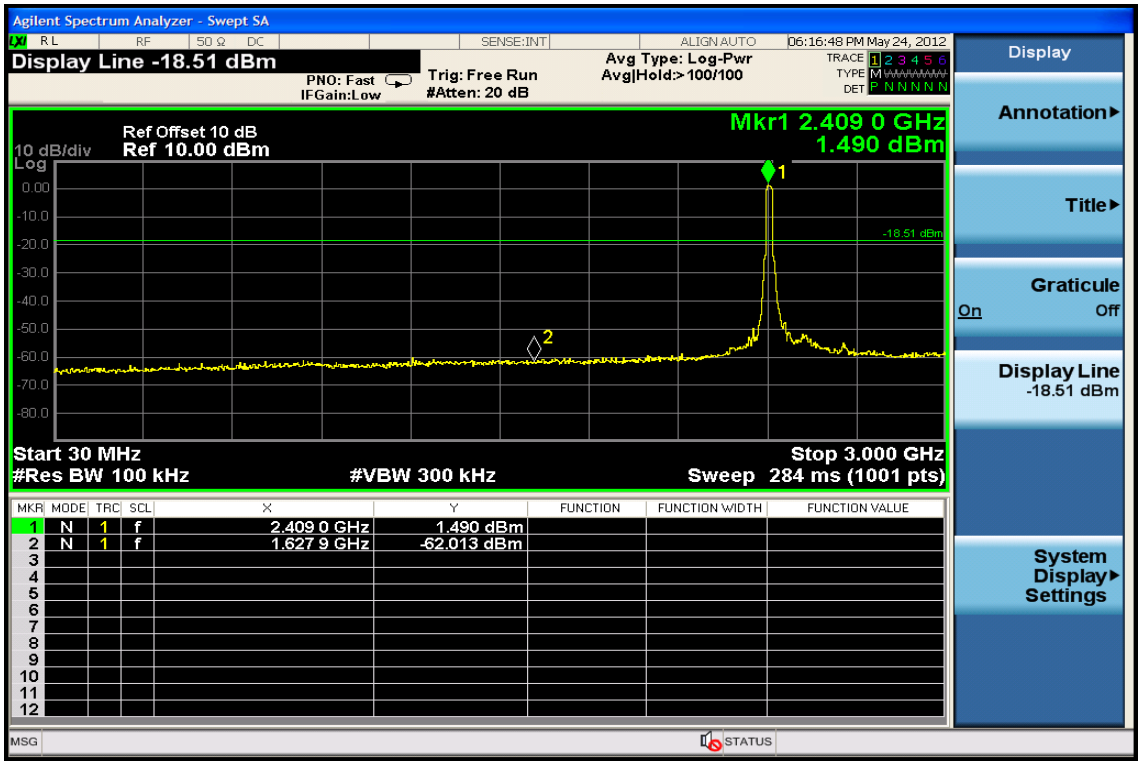
Ch High 30MHz – 3GHz



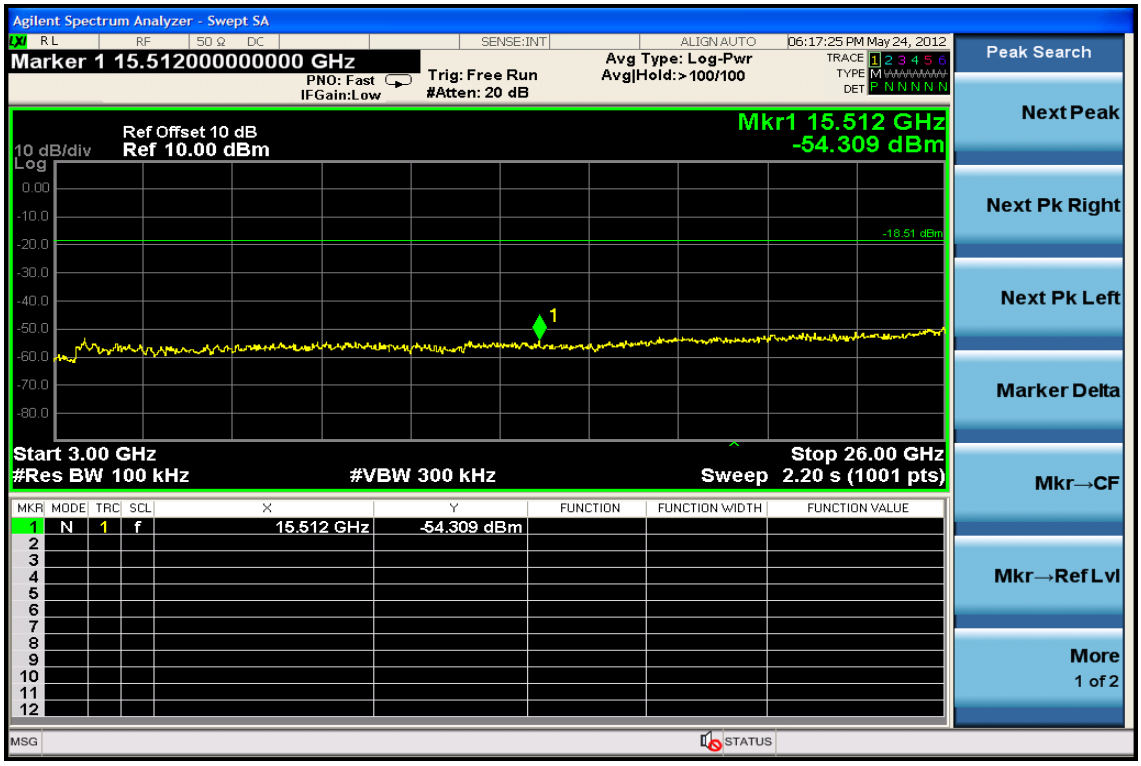
Ch High 3GHz – 26.5GHz



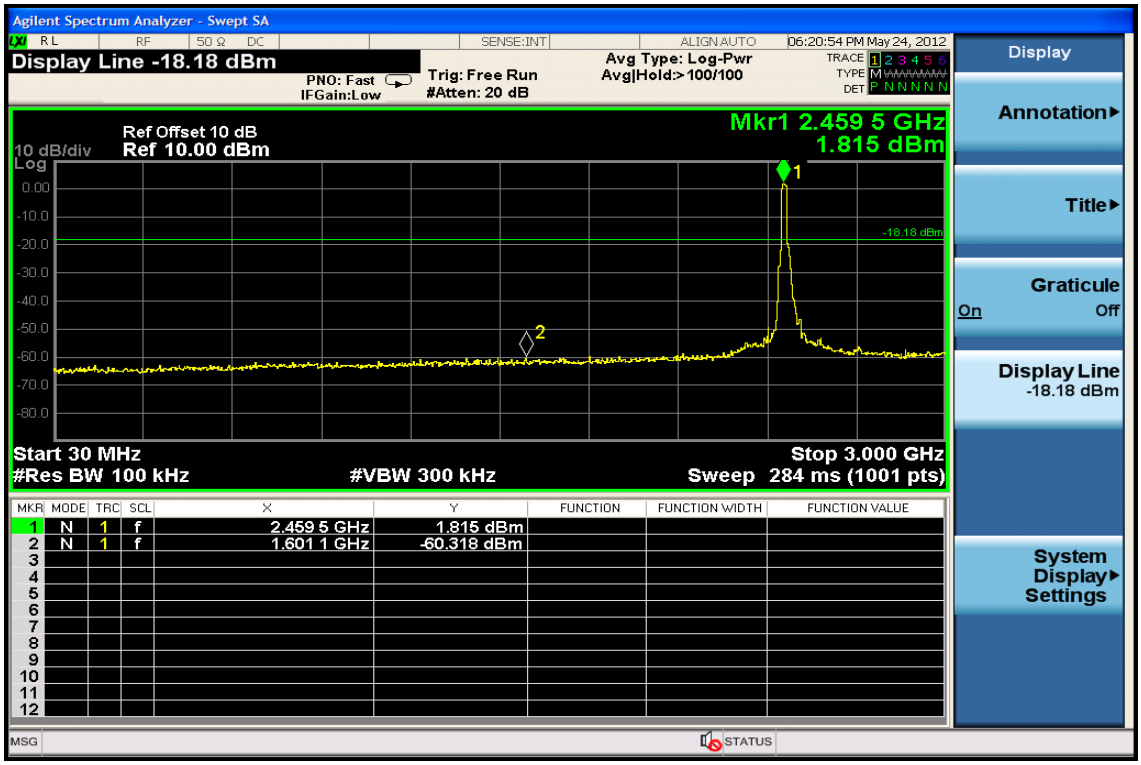
Conducted Spurious Emission Measurement Result (802.11g)
Ch Low 30MHz – 3GHz



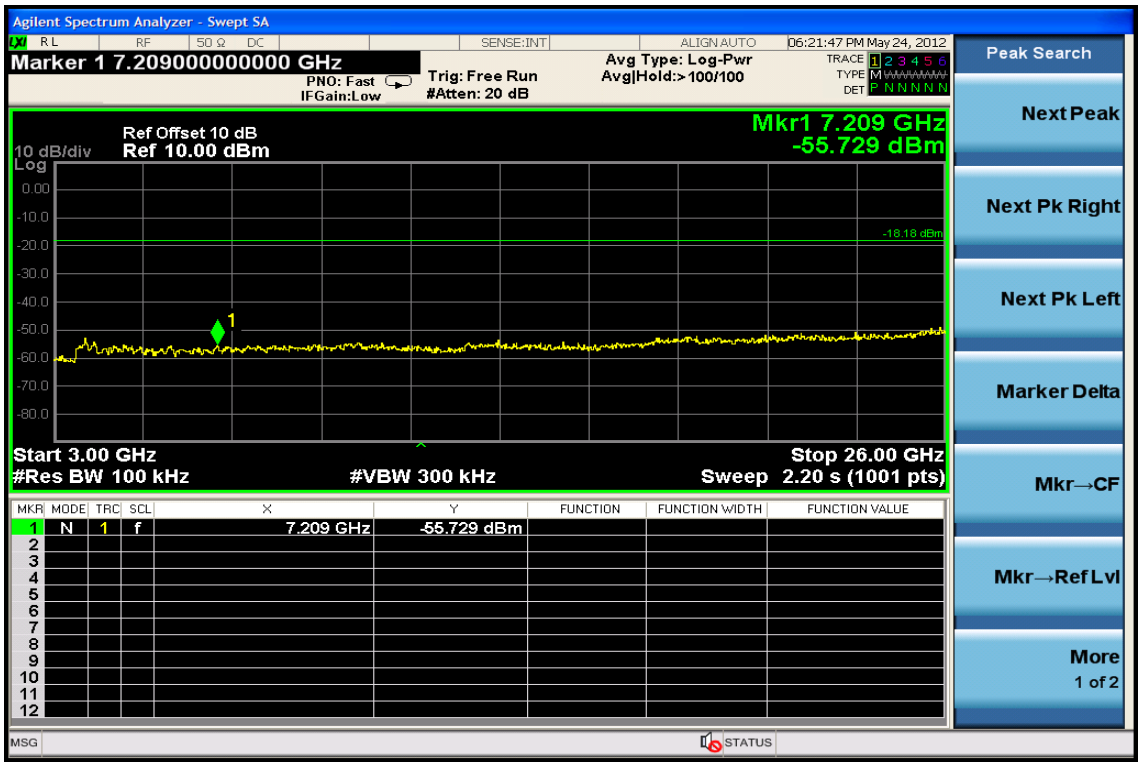
Ch Low 3GHz – 26.5GHz



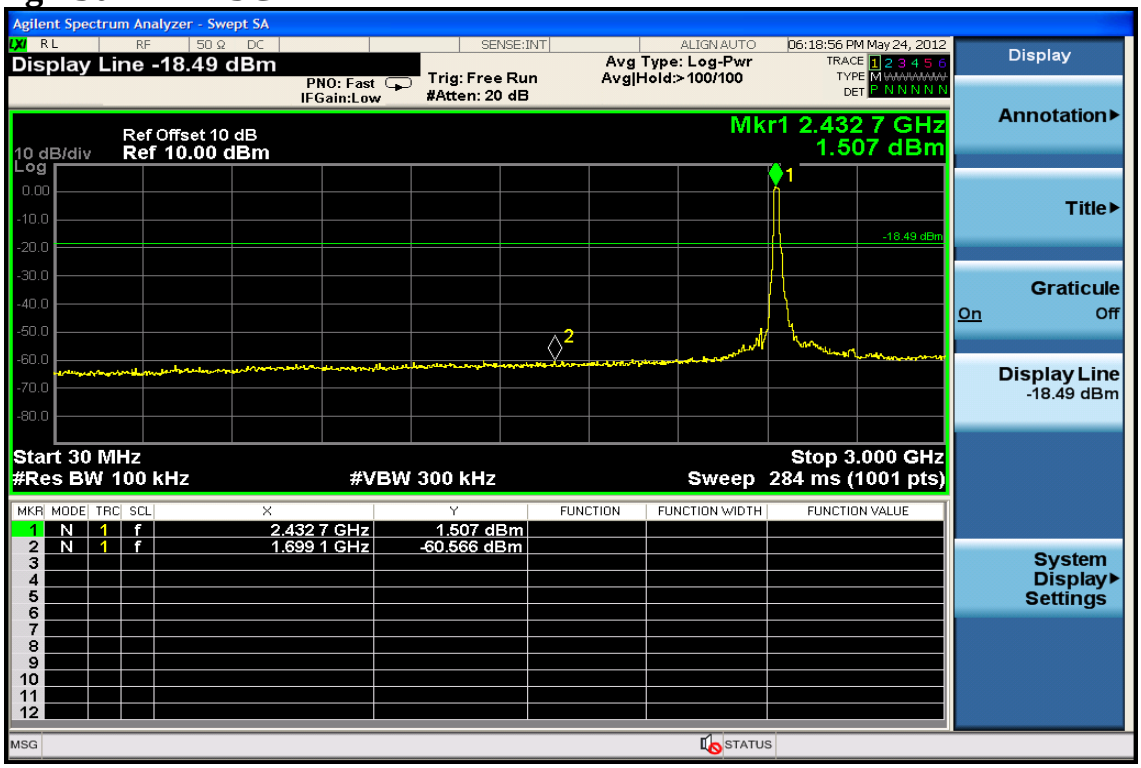
Ch Mid 30MHz – 3GHz



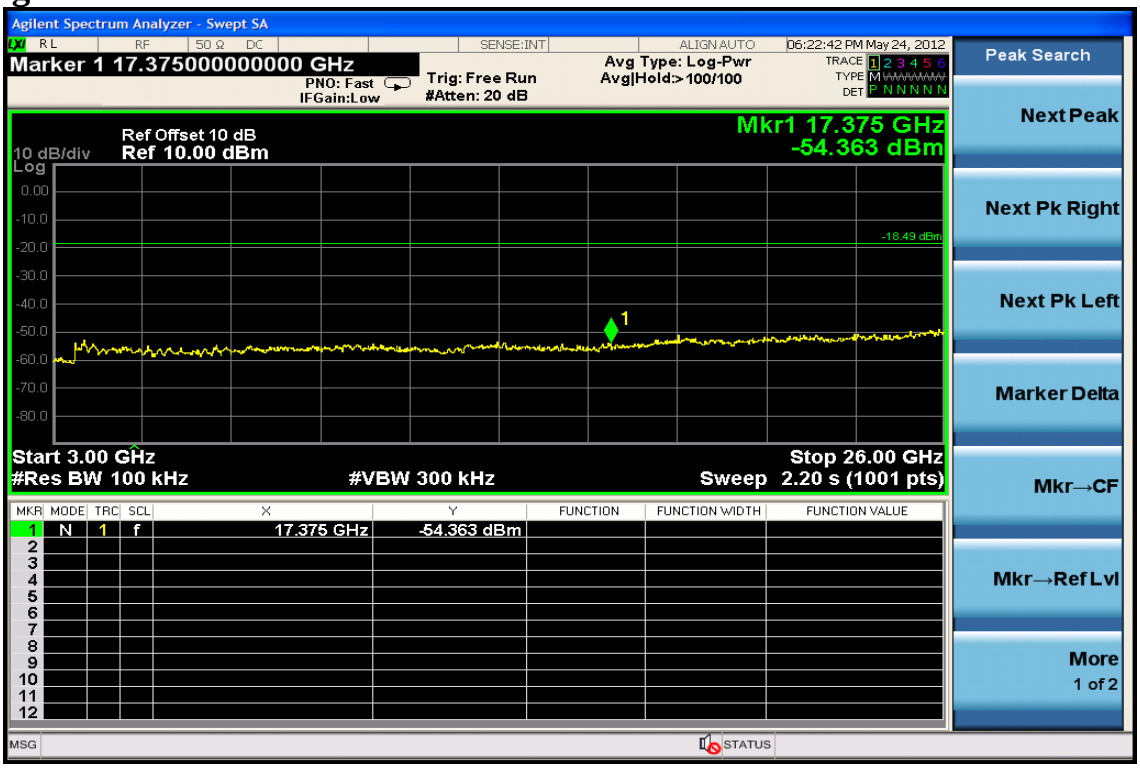
Ch Mid 3GHz – 26.5GHz



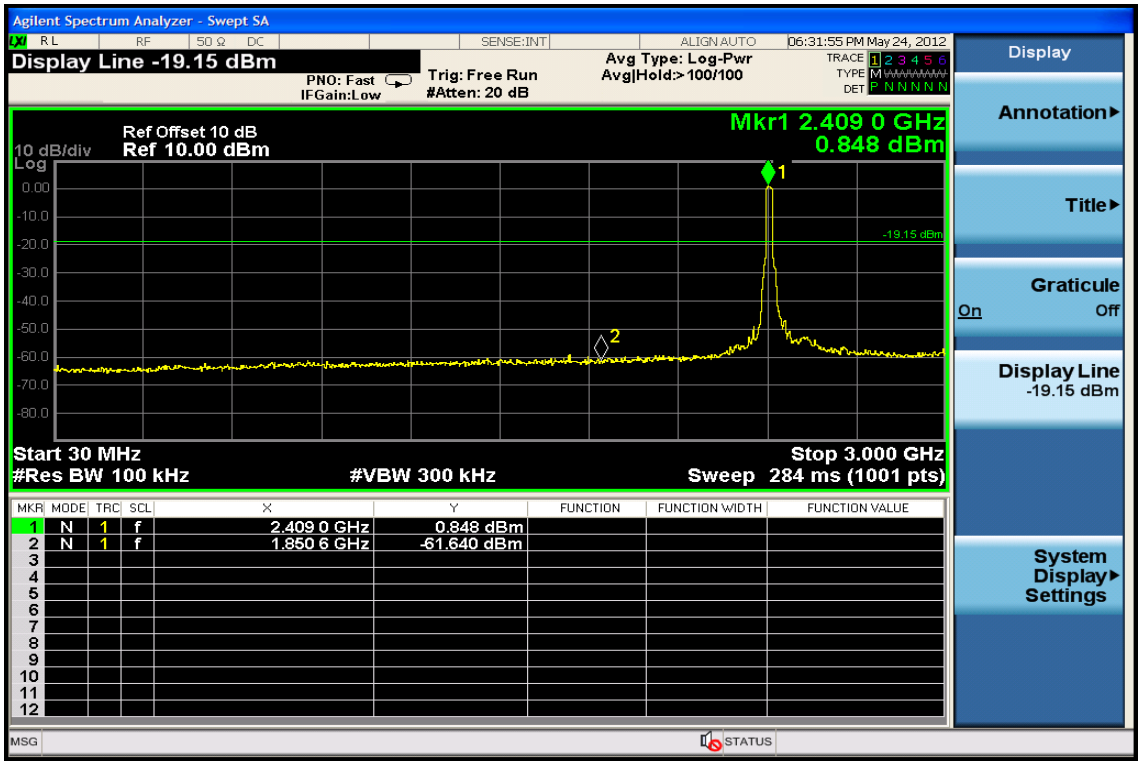
Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz

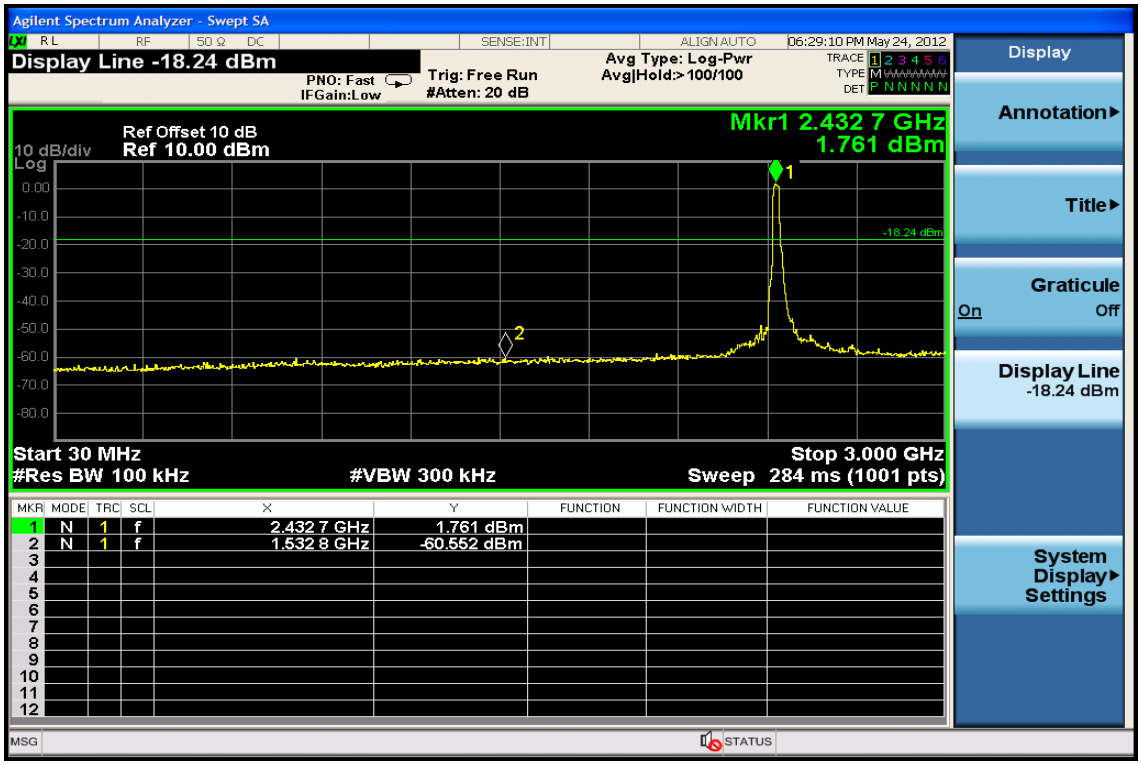


Conducted Spurious Emission Measurement Result (802.11n_20M)
Ch Low 30MHz – 3GHz

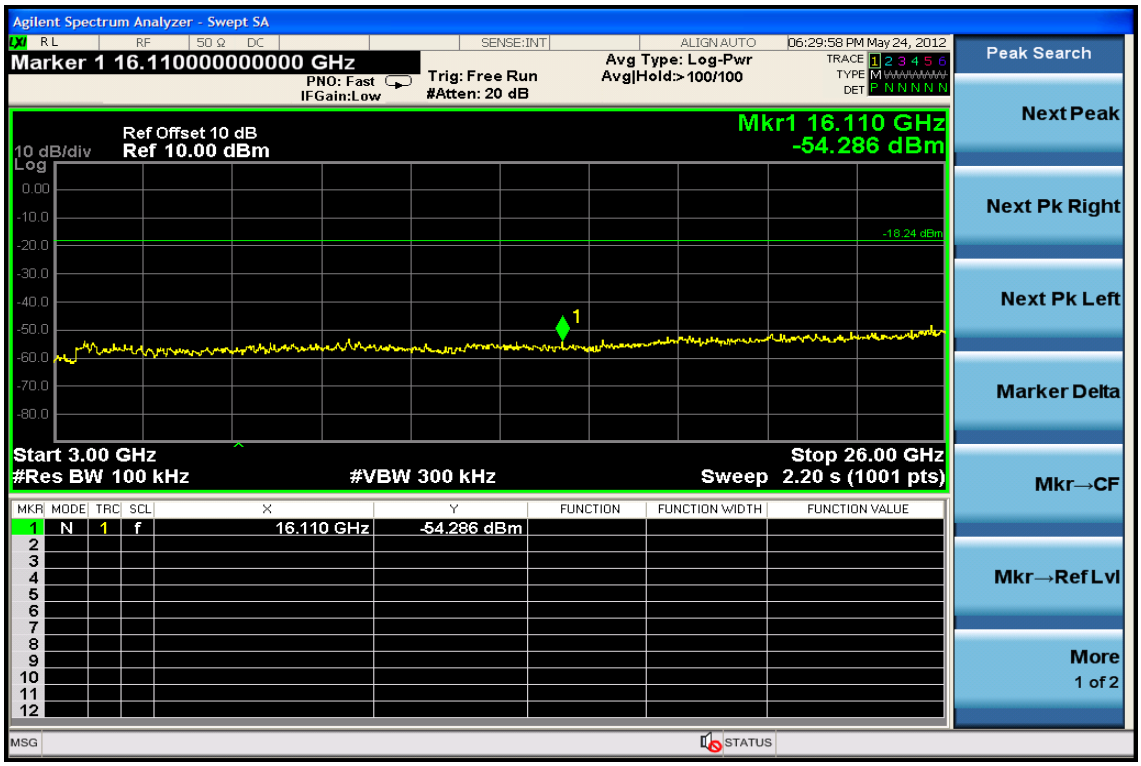


Ch Low 3GHz – 26.5GHz

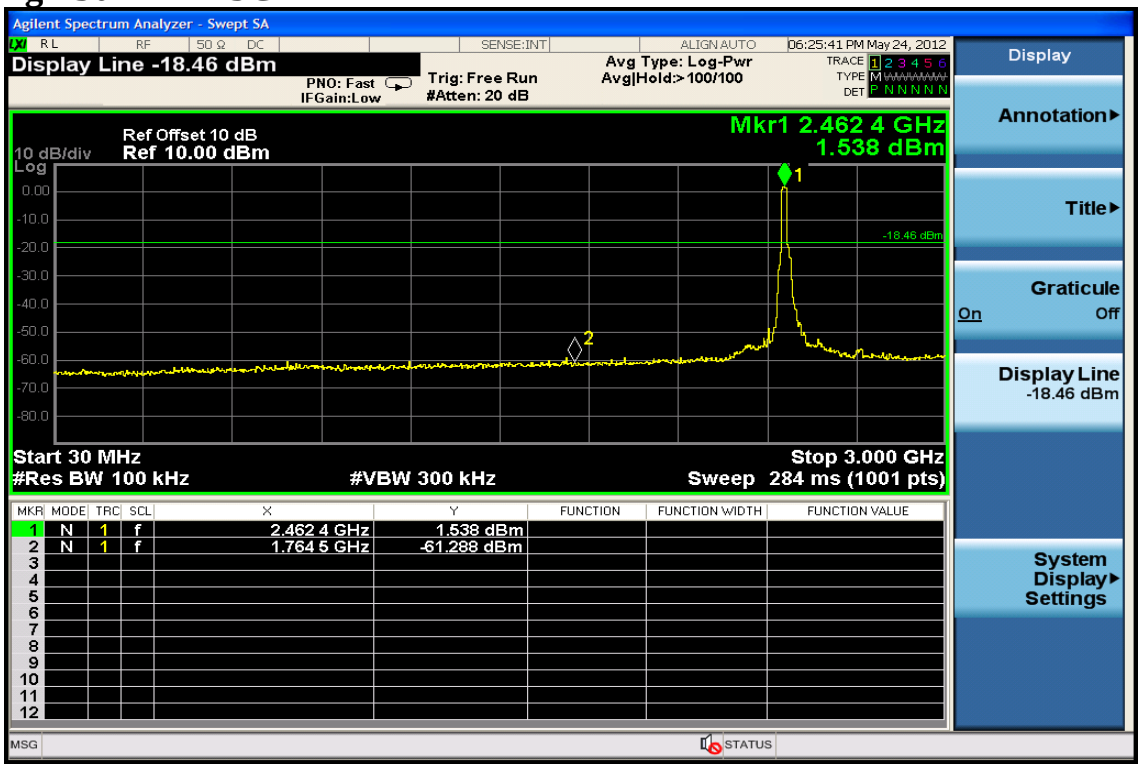
Ch Mid 30MHz – 3GHz



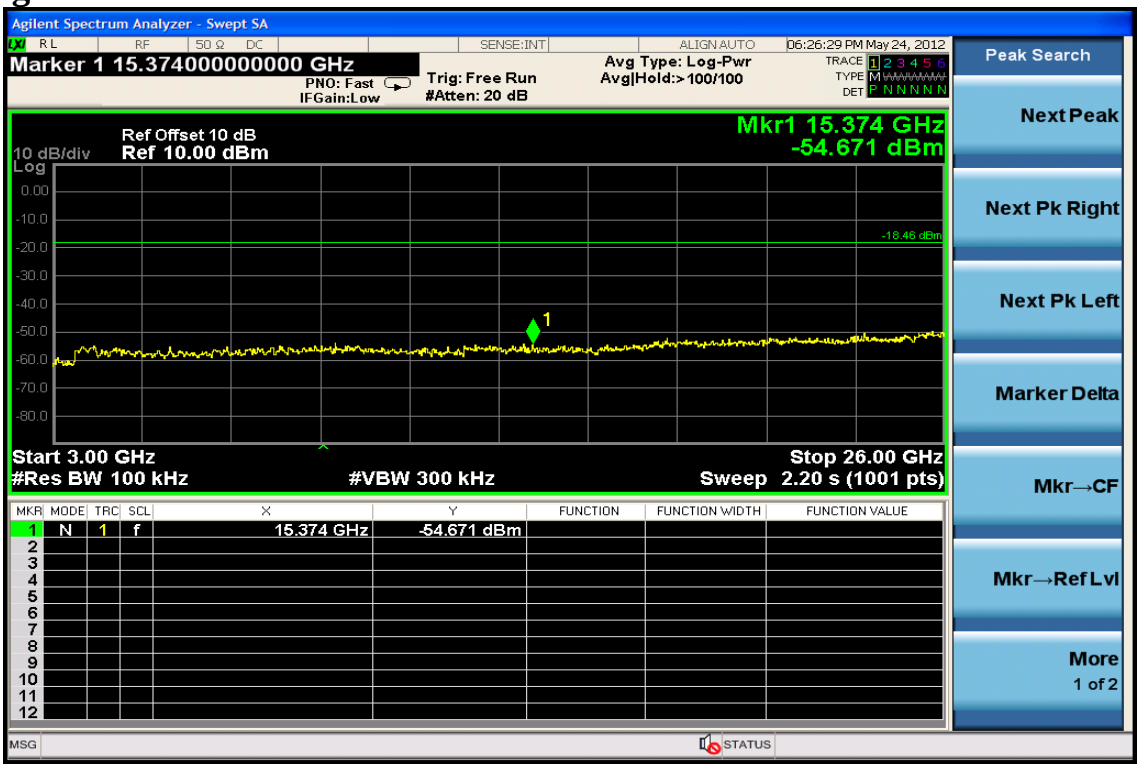
Ch Mid 3GHz – 26.5GHz



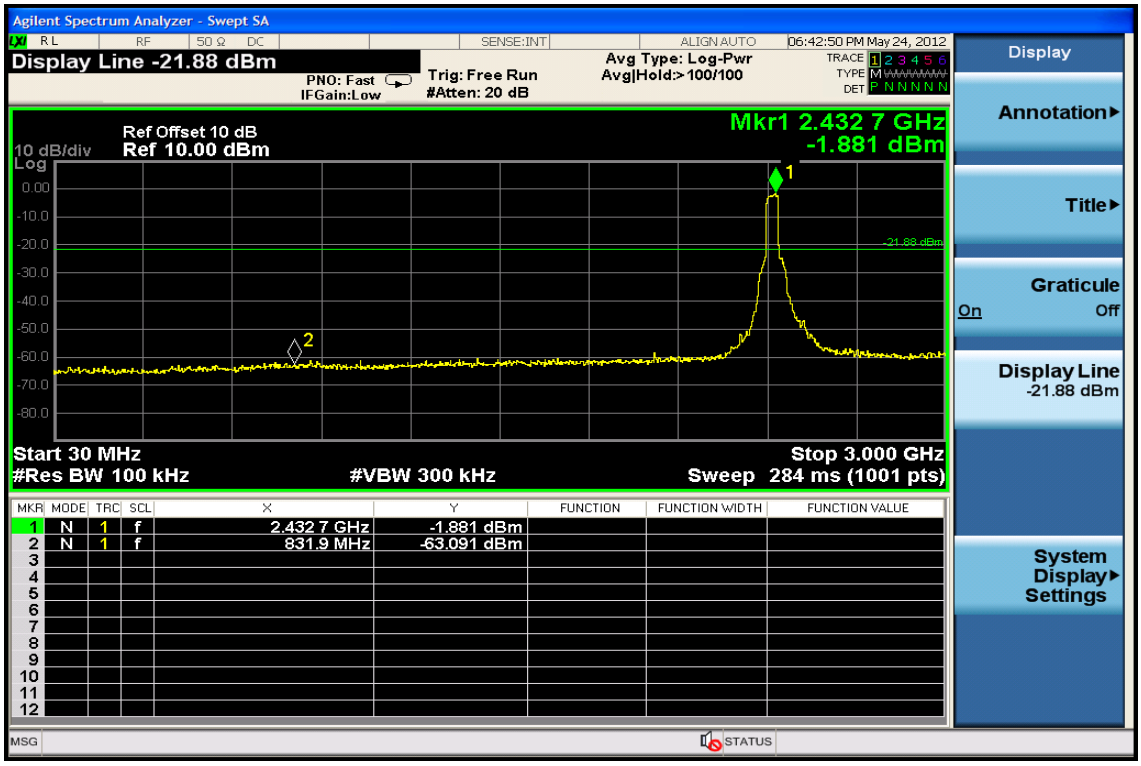
Ch High 30MHz – 3GHz



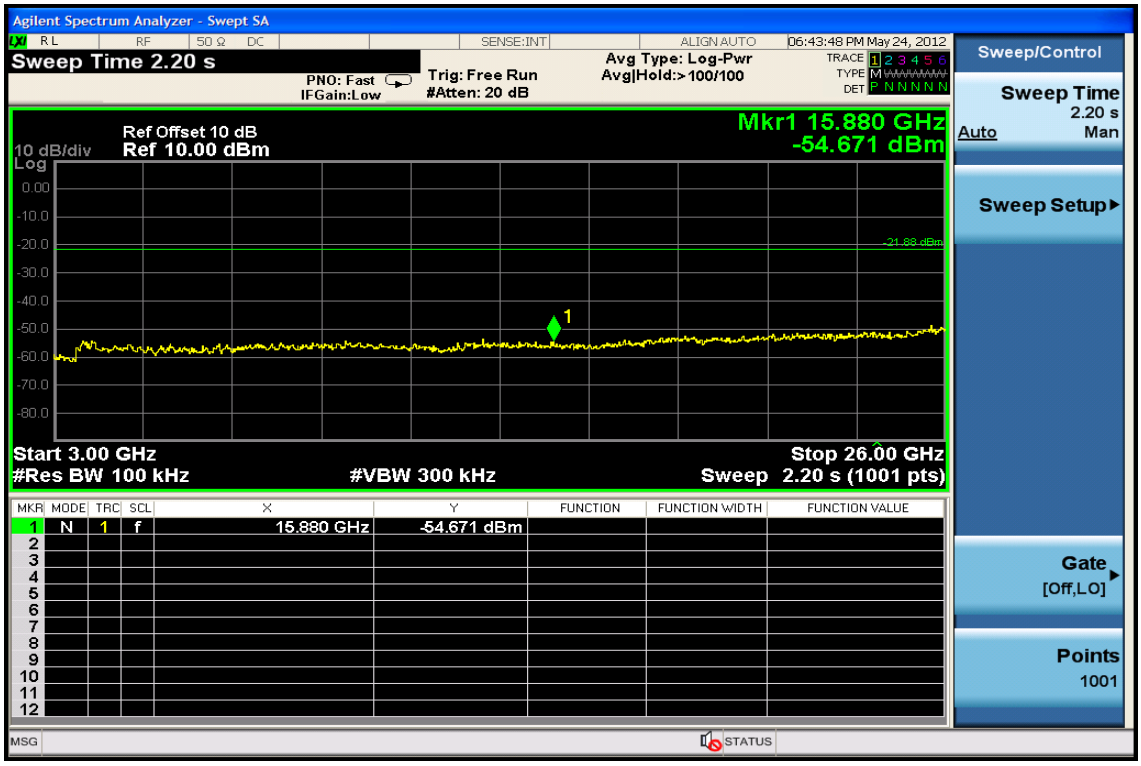
Ch High 3GHz – 26.5GHz



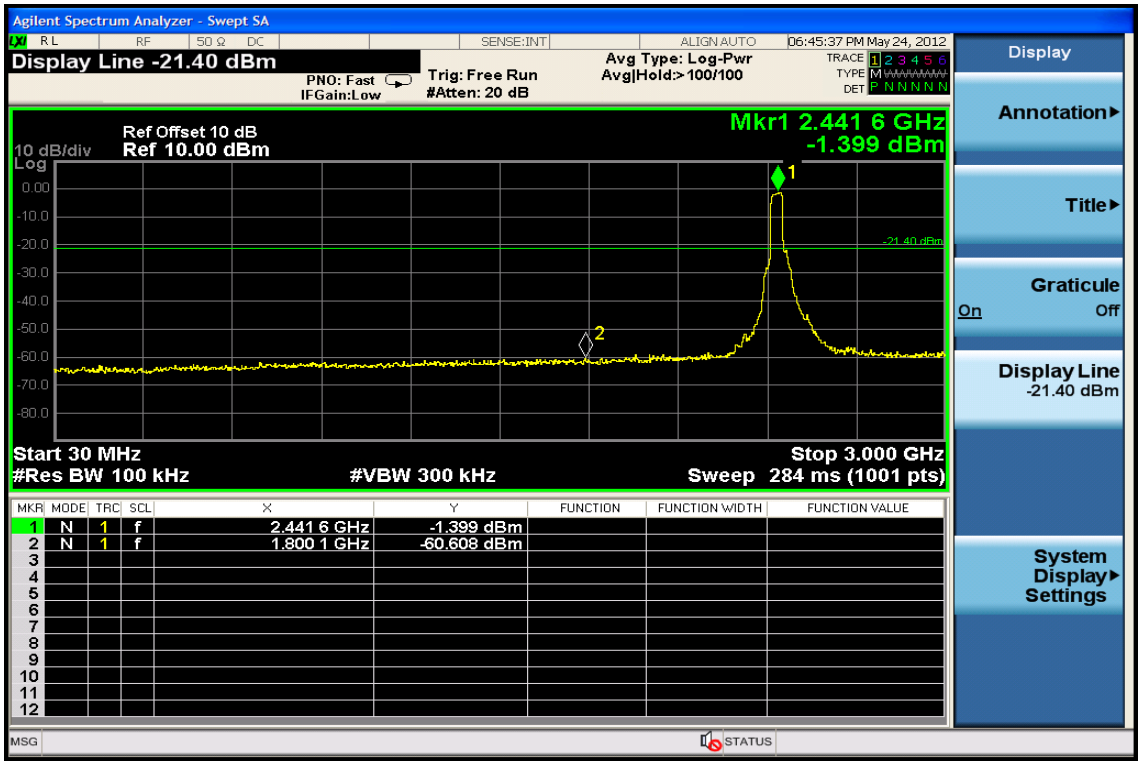
Conducted Spurious Emission Measurement Result (802.11n_40M)
Ch Low 30MHz – 3GHz



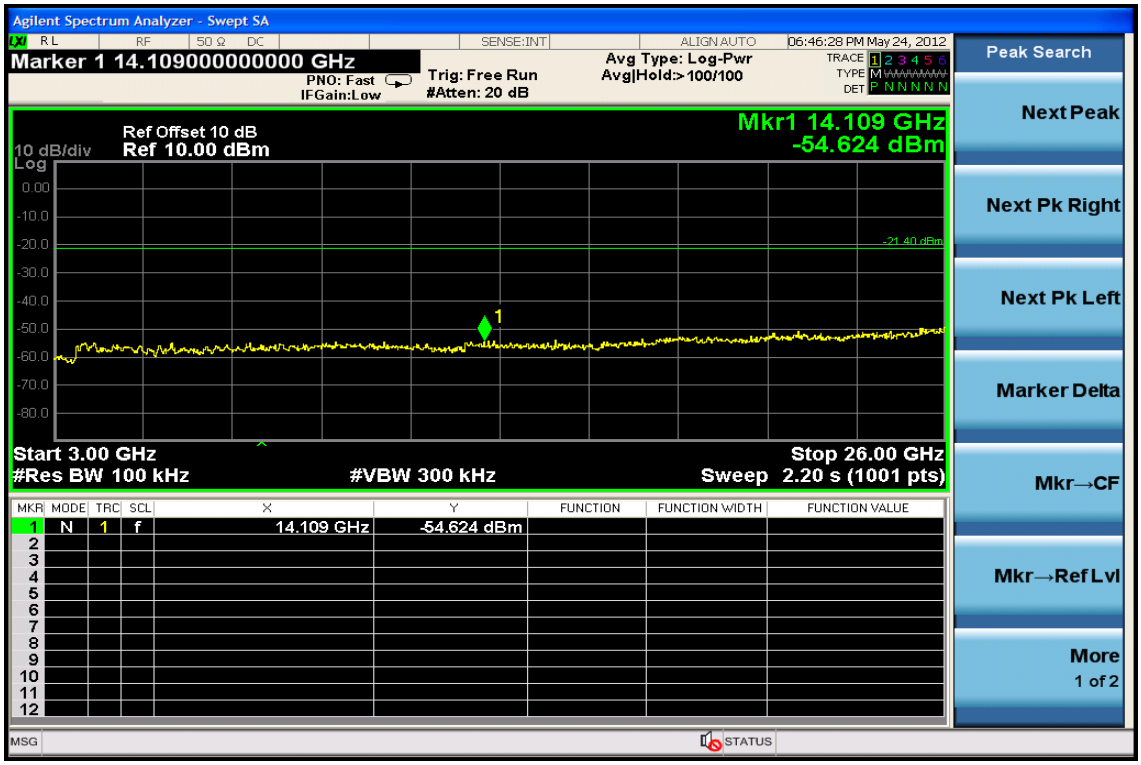
Ch Low 3GHz – 26.5GHz



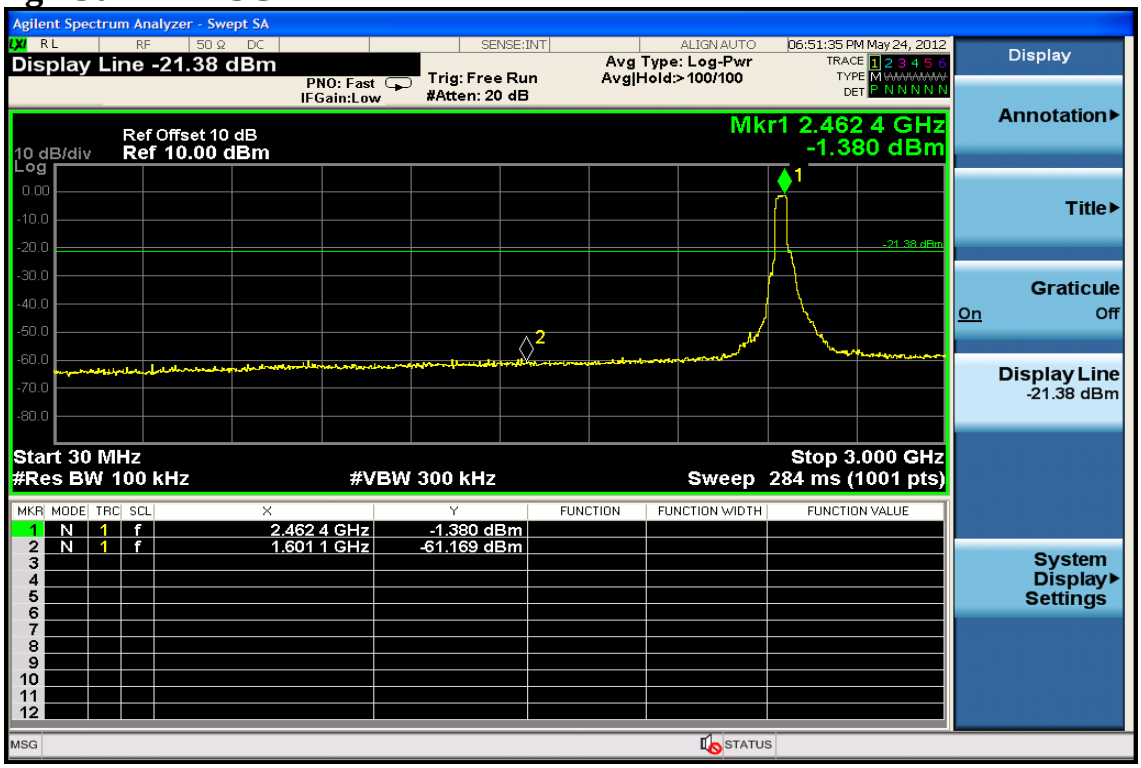
Ch Mid 30MHz – 3GHz



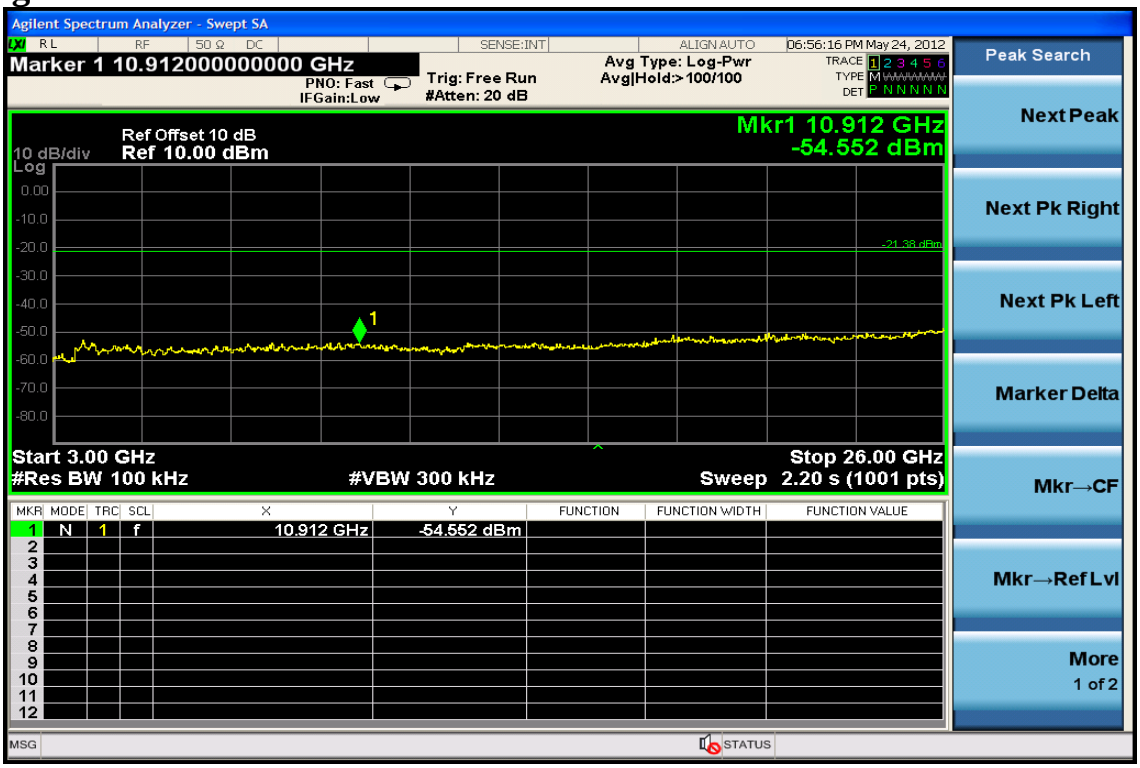
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	95.96	56.69	-16.24	40.45	43.50	-3.05	Peak	VERTICAL
2	120.21	53.99	-13.66	40.33	43.50	-3.17	Peak	VERTICAL
3	191.99	56.05	-16.29	39.76	43.50	-3.74	Peak	VERTICAL
4	250.19	55.08	-12.92	42.16	46.00	-3.84	Peak	VERTICAL
5	719.67	42.38	-6.29	36.09	46.00	-9.91	Peak	VERTICAL
6	874.87	38.50	-4.53	33.97	46.00	-12.03	Peak	VERTICAL
1	96.93	56.75	-16.04	40.71	43.50	-2.79	Peak	HORIZONTAL
2	120.21	51.06	-13.66	37.40	43.50	-6.10	Peak	HORIZONTAL
3	192.96	55.12	-16.22	38.90	43.50	-4.60	Peak	HORIZONTAL
4	250.19	55.38	-12.92	42.46	46.00	-3.54	Peak	HORIZONTAL
5	500.45	42.10	-8.74	33.36	46.00	-12.64	Peak	HORIZONTAL
6	874.87	33.88	-4.53	29.35	46.00	-16.65	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	96.93	55.95	-16.04	39.91	43.50	-3.59	Peak	VERTICAL
2	120.21	52.71	-13.66	39.05	43.50	-4.45	Peak	VERTICAL
3	191.99	55.08	-16.29	38.79	43.50	-4.71	Peak	VERTICAL
4	250.19	54.50	-12.92	41.58	46.00	-4.42	Peak	VERTICAL
5	500.45	41.12	-8.74	32.38	46.00	-13.62	Peak	VERTICAL
6	874.87	38.32	-4.53	33.79	46.00	-12.21	Peak	VERTICAL
1	95.96	56.52	-16.24	40.28	43.50	-3.22	Peak	HORIZONTAL
2	120.21	51.54	-13.66	37.88	43.50	-5.62	Peak	HORIZONTAL
3	144.46	51.67	-14.78	36.89	43.50	-6.61	Peak	HORIZONTAL
4	191.02	56.06	-16.35	39.71	43.50	-3.79	Peak	HORIZONTAL
5	250.19	55.85	-12.92	42.93	46.00	-3.07	Peak	HORIZONTAL
6	874.87	38.39	-4.53	33.86	46.00	-12.14	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	95.96	57.61	-16.24	41.37	43.50	-2.13	Peak	VERTICAL
2	143.49	52.44	-14.72	37.72	43.50	-5.78	Peak	VERTICAL
3	192.96	55.66	-16.22	39.44	43.50	-4.06	Peak	VERTICAL
4	250.19	55.54	-12.92	42.62	46.00	-3.38	Peak	VERTICAL
5	396.66	42.44	-9.66	32.78	46.00	-13.22	Peak	VERTICAL
6	874.87	40.00	-4.53	35.47	46.00	-10.53	Peak	VERTICAL
1	95.96	55.97	-16.24	39.73	43.50	-3.77	Peak	HORIZONTAL
2	120.21	52.47	-13.66	38.81	43.50	-4.69	Peak	HORIZONTAL
3	191.02	56.82	-16.35	40.47	43.50	-3.03	Peak	HORIZONTAL
4	250.19	56.06	-12.92	43.14	46.00	-2.86	Peak	HORIZONTAL
5	500.45	39.43	-8.74	30.69	46.00	-15.31	Peak	HORIZONTAL
6	874.87	37.86	-4.53	33.33	46.00	-12.67	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	95.96	56.85	-16.24	40.61	43.50	-2.89	Peak	VERTICAL
2	120.21	52.24	-13.66	38.58	43.50	-4.92	Peak	VERTICAL
3	142.52	51.33	-14.67	36.66	43.50	-6.84	Peak	VERTICAL
4	191.99	54.87	-16.29	38.58	43.50	-4.92	Peak	VERTICAL
5	250.19	56.24	-12.92	43.32	46.00	-2.68	Peak	VERTICAL
6	874.87	39.86	-4.53	35.33	46.00	-10.67	Peak	VERTICAL
1	96.93	56.73	-16.04	40.69	43.50	-2.81	Peak	HORIZONTAL
2	120.21	52.31	-13.66	38.65	43.50	-4.85	Peak	HORIZONTAL
3	191.99	54.59	-16.29	38.30	43.50	-5.20	Peak	HORIZONTAL
4	250.19	55.91	-12.92	42.99	46.00	-3.01	Peak	HORIZONTAL
5	395.69	42.55	-9.67	32.88	46.00	-13.12	Peak	HORIZONTAL
6	874.87	39.94	-4.53	35.41	46.00	-10.59	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	96.93	56.96	-16.04	40.92	43.50	-2.58	Peak	VERTICAL
2	191.99	56.94	-16.29	40.65	43.50	-2.85	Peak	VERTICAL
3	250.19	56.33	-12.92	43.41	46.00	-2.59	Peak	VERTICAL
4	398.60	42.71	-9.61	33.10	46.00	-12.90	Peak	VERTICAL
5	500.45	40.93	-8.74	32.19	46.00	-13.81	Peak	VERTICAL
6	874.87	38.24	-4.53	33.71	46.00	-12.29	Peak	VERTICAL
1	95.96	57.10	-16.24	40.86	43.50	-2.64	Peak	HORIZONTAL
2	190.05	57.06	-16.42	40.64	43.50	-2.86	Peak	HORIZONTAL
3	250.19	56.74	-12.92	43.82	46.00	-2.18	Peak	HORIZONTAL
4	393.75	39.81	-9.71	30.10	46.00	-15.90	Peak	HORIZONTAL
5	500.45	41.43	-8.74	32.69	46.00	-13.31	Peak	HORIZONTAL
6	874.87	37.87	-4.53	33.34	46.00	-12.66	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	96.93	56.66	-16.04	40.62	43.50	-2.88	Peak	VERTICAL
2	120.21	52.16	-13.66	38.50	43.50	-5.00	Peak	VERTICAL
3	191.02	55.97	-16.35	39.62	43.50	-3.88	Peak	VERTICAL
4	250.19	56.16	-12.92	43.24	46.00	-2.76	Peak	VERTICAL
5	500.45	40.07	-8.74	31.33	46.00	-14.67	Peak	VERTICAL
6	874.87	38.54	-4.53	34.01	46.00	-11.99	Peak	VERTICAL
1	96.93	55.63	-16.04	39.59	43.50	-3.91	Peak	HORIZONTAL
2	120.21	52.55	-13.66	38.89	43.50	-4.61	Peak	HORIZONTAL
3	144.46	52.54	-14.78	37.76	43.50	-5.74	Peak	HORIZONTAL
4	191.99	55.42	-16.29	39.13	43.50	-4.37	Peak	HORIZONTAL
5	250.19	55.86	-12.92	42.94	46.00	-3.06	Peak	HORIZONTAL
6	874.87	37.79	-4.53	33.26	46.00	-12.74	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_20M TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	94.99	56.95	-16.44	40.51	43.50	-2.99	Peak	VERTICAL
2	191.99	54.98	-16.29	38.69	43.50	-4.81	Peak	VERTICAL
3	250.19	55.33	-12.92	42.41	46.00	-3.59	Peak	VERTICAL
4	500.45	39.23	-8.74	30.49	46.00	-15.51	Peak	VERTICAL
5	719.67	34.62	-6.29	28.33	46.00	-17.67	Peak	VERTICAL
6	874.87	35.41	-4.53	30.88	46.00	-15.12	Peak	VERTICAL
1	96.93	57.06	-16.04	41.02	43.50	-2.48	Peak	HORIZONTAL
2	191.99	55.08	-16.29	38.79	43.50	-4.71	Peak	HORIZONTAL
3	250.19	56.70	-12.92	43.78	46.00	-2.22	Peak	HORIZONTAL
4	500.45	41.94	-8.74	33.20	46.00	-12.80	Peak	HORIZONTAL
5	719.67	36.41	-6.29	30.12	46.00	-15.88	Peak	HORIZONTAL
6	874.87	35.61	-4.53	31.08	46.00	-14.92	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_20M TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	94.99	57.62	-16.44	41.18	43.50	-2.32	Peak	VERTICAL
2	120.21	52.02	-13.66	38.36	43.50	-5.14	Peak	VERTICAL
3	191.99	56.13	-16.29	39.84	43.50	-3.66	Peak	VERTICAL
4	250.19	56.76	-12.92	43.84	46.00	-2.16	Peak	VERTICAL
5	396.66	43.63	-9.66	33.97	46.00	-12.03	Peak	VERTICAL
6	874.87	37.66	-4.53	33.13	46.00	-12.87	Peak	VERTICAL
1	95.96	56.89	-16.24	40.65	43.50	-2.85	Peak	HORIZONTAL
2	191.99	55.63	-16.29	39.34	43.50	-4.16	Peak	HORIZONTAL
3	250.19	56.21	-12.92	43.29	46.00	-2.71	Peak	HORIZONTAL
4	394.72	43.23	-9.70	33.53	46.00	-12.47	Peak	HORIZONTAL
5	500.45	40.41	-8.74	31.67	46.00	-14.33	Peak	HORIZONTAL
6	874.87	38.12	-4.53	33.59	46.00	-12.41	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_20M TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	96.93	56.74	-16.04	40.70	43.50	-2.80	Peak	VERTICAL
2	120.21	52.76	-13.66	39.10	43.50	-4.40	Peak	VERTICAL
3	191.99	54.95	-16.29	38.66	43.50	-4.84	Peak	VERTICAL
4	250.19	55.83	-12.92	42.91	46.00	-3.09	Peak	VERTICAL
5	500.45	39.88	-8.74	31.14	46.00	-14.86	Peak	VERTICAL
6	874.87	37.26	-4.53	32.73	46.00	-13.27	Peak	VERTICAL
1	94.99	57.69	-16.44	41.25	43.50	-2.25	Peak	HORIZONTAL
2	191.99	54.55	-16.29	38.26	43.50	-5.24	Peak	HORIZONTAL
3	250.19	56.15	-12.92	43.23	46.00	-2.77	Peak	HORIZONTAL
4	397.63	40.65	-9.63	31.02	46.00	-14.98	Peak	HORIZONTAL
5	500.45	40.24	-8.74	31.50	46.00	-14.50	Peak	HORIZONTAL
6	874.87	35.13	-4.53	30.60	46.00	-15.40	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_40M TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2422MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	95.96	56.17	-16.24	39.93	43.50	-3.57	Peak	VERTICAL
2	120.21	53.42	-13.66	39.76	43.50	-3.74	Peak	VERTICAL
3	191.99	56.53	-16.29	40.24	43.50	-3.26	Peak	VERTICAL
4	250.19	56.18	-12.92	43.26	46.00	-2.74	Peak	VERTICAL
5	500.45	40.41	-8.74	31.67	46.00	-14.33	Peak	VERTICAL
6	874.87	36.99	-4.53	32.46	46.00	-13.54	Peak	VERTICAL
1	96.93	56.83	-16.04	40.79	43.50	-2.71	Peak	HORIZONTAL
2	192.96	54.97	-16.22	38.75	43.50	-4.75	Peak	HORIZONTAL
3	250.19	56.77	-12.92	43.85	46.00	-2.15	Peak	HORIZONTAL
4	500.45	39.17	-8.74	30.43	46.00	-15.57	Peak	HORIZONTAL
5	719.67	37.47	-6.29	31.18	46.00	-14.82	Peak	HORIZONTAL
6	874.87	35.32	-4.53	30.79	46.00	-15.21	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_40M TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	94.99	57.00	-16.44	40.56	43.50	-2.94	Peak	VERTICAL
2	191.99	55.82	-16.29	39.53	43.50	-3.97	Peak	VERTICAL
3	250.19	55.61	-12.92	42.69	46.00	-3.31	Peak	VERTICAL
4	500.45	41.35	-8.74	32.61	46.00	-13.39	Peak	VERTICAL
5	719.67	37.03	-6.29	30.74	46.00	-15.26	Peak	VERTICAL
6	874.87	36.47	-4.53	31.94	46.00	-14.06	Peak	VERTICAL
1	96.93	57.43	-16.04	41.39	43.50	-2.11	Peak	HORIZONTAL
2	143.49	52.38	-14.72	37.66	43.50	-5.84	Peak	HORIZONTAL
3	191.99	55.75	-16.29	39.46	43.50	-4.04	Peak	HORIZONTAL
4	250.19	56.39	-12.92	43.47	46.00	-2.53	Peak	HORIZONTAL
5	500.45	40.45	-8.74	31.71	46.00	-14.29	Peak	HORIZONTAL
6	874.87	37.22	-4.53	32.69	46.00	-13.31	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 n_40M TX CH High	Test Date	2012/05/24
Fundamental Frequency	2452MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	94.99	57.59	-16.44	41.15	43.50	-2.35	Peak	VERTICAL
2	191.99	55.58	-16.29	39.29	43.50	-4.21	Peak	VERTICAL
3	250.19	55.98	-12.92	43.06	46.00	-2.94	Peak	VERTICAL
4	375.32	44.57	-10.06	34.51	46.00	-11.49	Peak	VERTICAL
5	500.45	41.62	-8.74	32.88	46.00	-13.12	Peak	VERTICAL
6	874.87	38.23	-4.53	33.70	46.00	-12.30	Peak	VERTICAL
1	95.96	57.25	-16.24	41.01	43.50	-2.49	Peak	HORIZONTAL
2	120.21	52.31	-13.66	38.65	43.50	-4.85	Peak	HORIZONTAL
3	191.99	55.07	-16.29	38.78	43.50	-4.72	Peak	HORIZONTAL
4	250.19	56.53	-12.92	43.61	46.00	-2.39	Peak	HORIZONTAL
5	719.67	36.71	-6.29	30.42	46.00	-15.58	Peak	HORIZONTAL
6	874.87	37.25	-4.53	32.72	46.00	-13.28	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result 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 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11b TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	47.79	-13.02	34.77	74.00	-39.23	Peak	VERTICAL
2	4824.00	47.61	-2.59	45.02	74.00	-28.98	Peak	VERTICAL
1	1441.00	53.91	-15.84	38.07	74.00	-35.93	Peak	HORIZONTAL
2	4824.00	41.84	-2.59	39.25	74.00	-34.75	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11b TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1203.00	51.00	-16.49	34.51	74.00	-39.49	Peak	VERTICAL
2	4874.00	45.05	-2.42	42.63	74.00	-31.37	Peak	VERTICAL
1	1917.00	50.54	-13.02	37.52	74.00	-36.48	Peak	HORIZONTAL
2	4874.00	41.01	-2.42	38.59	74.00	-35.41	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11b TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	46.73	-13.02	33.71	74.00	-40.29	Peak	VERTICAL
2	4924.00	42.86	-2.25	40.61	74.00	-33.39	Peak	VERTICAL
1	1441.00	54.01	-15.84	38.17	74.00	-35.83	Peak	HORIZONTAL
2	4924.00	42.33	-2.25	40.08	74.00	-33.92	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	48.23	-13.02	35.21	74.00	-38.79	Peak	VERTICAL
2	4824.00	37.78	-2.59	35.19	74.00	-38.81	Peak	VERTICAL
1	1441.00	54.29	-15.84	38.45	74.00	-35.55	Peak	HORIZONTAL
2	4824.00	38.03	-2.59	35.44	74.00	-38.56	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	48.73	-13.02	35.71	74.00	-38.29	Peak	VERTICAL
2	4874.00	37.15	-2.42	34.73	74.00	-39.27	Peak	VERTICAL
1	1441.00	55.09	-15.84	39.25	74.00	-34.75	Peak	HORIZONTAL
2	4874.00	38.39	-2.42	35.97	74.00	-38.03	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	47.72	-13.02	34.70	74.00	-39.30	Peak	VERTICAL
2	4924.00	37.32	-2.25	35.07	74.00	-38.93	Peak	VERTICAL
1	1441.00	54.00	-15.84	38.16	74.00	-35.84	Peak	HORIZONTAL
2	4924.00	38.67	-2.25	36.42	74.00	-37.58	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_20M TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1203.00	50.79	-16.49	34.30	74.00	-39.70	Peak	VERTICAL
2	4824.00	39.18	-2.59	36.59	74.00	-37.41	Peak	VERTICAL
1	1441.00	53.77	-15.84	37.93	74.00	-36.07	Peak	HORIZONTAL
2	4824.00	38.64	-2.59	36.05	74.00	-37.95	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_20M TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	47.51	-13.02	34.49	74.00	-39.51	Peak	VERTICAL
2	4874.00	38.50	-2.42	36.08	74.00	-37.92	Peak	VERTICAL
1	1441.00	54.22	-15.84	38.38	74.00	-35.62	Peak	HORIZONTAL
2	4874.00	37.01	-2.42	34.59	74.00	-39.41	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_20M TX CH High	Test Date	2012/05/24
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	47.81	-13.02	34.79	74.00	-39.21	Peak	VERTICAL
2	4924.00	38.01	-2.25	35.76	74.00	-38.24	Peak	VERTICAL
1	1441.00	53.66	-15.84	37.82	74.00	-36.18	Peak	HORIZONTAL
2	4924.00	38.19	-2.25	35.94	74.00	-38.06	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_40M TX CH Low	Test Date	2012/05/24
Fundamental Frequency	2422MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	49.20	-13.02	36.18	74.00	-37.82	Peak	VERTICAL
2	4844.00	38.37	-2.52	35.85	74.00	-38.15	Peak	VERTICAL
1	1441.00	53.25	-15.84	37.41	74.00	-36.59	Peak	HORIZONTAL
2	4844.00	38.64	-2.52	36.12	74.00	-37.88	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_40M TX CH Mid	Test Date	2012/05/24
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1497.00	51.06	-15.69	35.37	74.00	-38.63	Peak	VERTICAL
2	4874.00	38.30	-2.42	35.88	74.00	-38.12	Peak	VERTICAL
1	1441.00	53.64	-15.84	37.80	74.00	-36.20	Peak	HORIZONTAL
2	4874.00	38.12	-2.42	35.70	74.00	-38.30	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n_40M TX CH High	Test Date	2012/05/24
Fundamental Frequency	2452MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	1917.00	47.51	-13.02	34.49	74.00	-39.51	Peak	VERTICAL
2	4904.00	37.23	-2.32	34.91	74.00	-39.09	Peak	VERTICAL
1	1917.00	51.09	-13.02	38.07	74.00	-35.93	Peak	HORIZONTAL
2	4904.00	37.56	-2.32	35.24	74.00	-38.76	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data 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.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

10 Peak Power Spectral Density

10.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

10.2 Measurement Equipment Used:

Refer to section 6.2 for details.

10.3 Test Set-up:

Refer to section 6.3 for details.

10.4 Measurement Procedure:

Refer to section 5.3.1 Measurement Procedure PKPSD:of KDB Document: 558074 D01 DTS Meas Guidance v01

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (3 kHz/100 kHz = -15.2 dB).
11. The resulting peak PSD level must be ≤ 8 dBm.

10.5 Measurement Result:

802.11b Mode

Frequency MHz	Power Density Reading (dBm)/100KHz	BWCF (dB)	Power Density Level (dBm)/3KHz	Maximum Limit (dBm)
2412	0.107	-15.2	-15.093	8
2437	0.18	-15.2	-15.02	8
2462	0.16	-15.2	-15.04	8

BWCF(bandwidth correction factor)=10log (3 kHz/100KHz)
kHz = -15.2 dB)

802.11g Mode

Frequency MHz	Power Density Reading (dBm)/100KHz	BWCF (dB)	Power Density Level (dBm)/3KHz	Maximum Limit (dBm)
2412	1.43	-15.2	-13.77	8
2437	1.754	-15.2	-13.446	8
2462	2.37	-15.2	-12.83	8

BWCF(bandwidth correction factor)=10log (3 kHz/100KHz)
kHz = -15.2 dB)

802.11n HT20 Mode

Frequency MHz	Power Density Reading (dBm)/100KHz	BWCF (dB)	Power Density Level (dBm)/3KHz	Maximum Limit (dBm)
2412	1.442	-15.2	-13.758	8
2437	1.955	-15.2	-13.245	8
2462	1.597	-15.2	-13.603	8

BWCF(bandwidth correction factor)=10log (3 kHz/100KHz)
kHz = -15.2 dB)

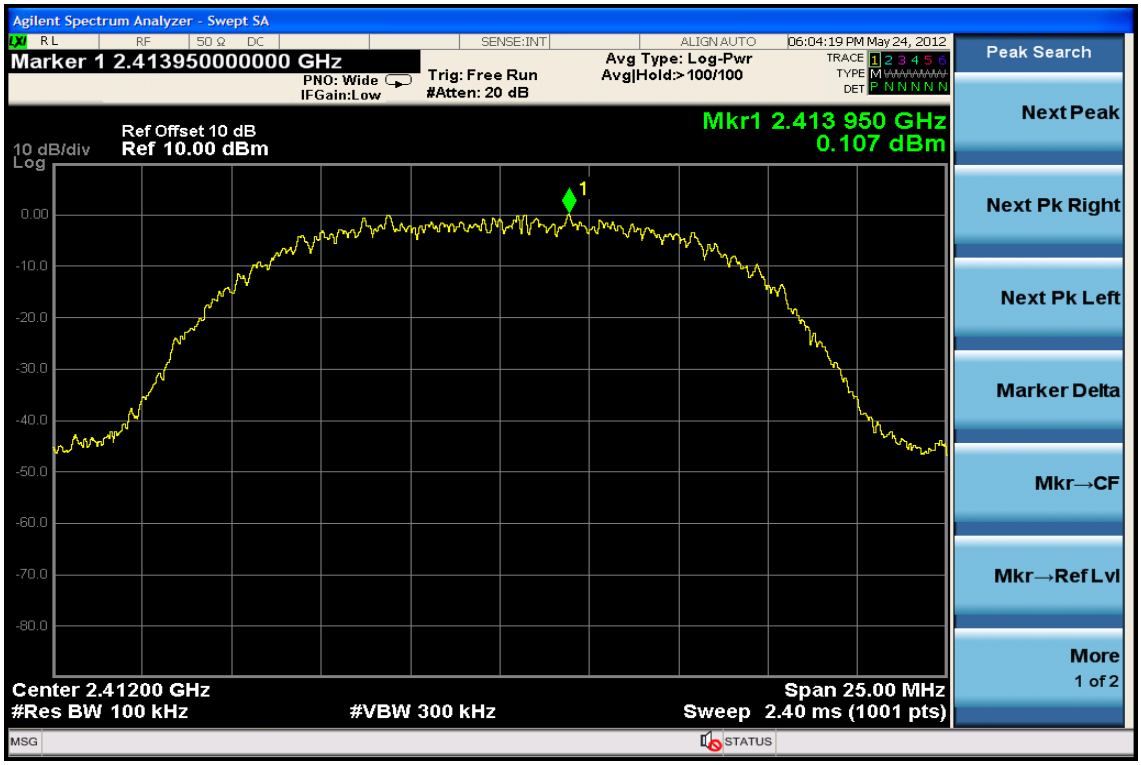
802.11n HT40 Mode

Frequency MHz	Power Density Reading (dBm)/100KHz	BWCF (dB)	Power Density Level (dBm)/3KHz	Maximum Limit (dBm)
2422	-7.226	-15.2	-22.426	8
2437	-7.092	-15.2	-22.292	8
2452	-7.018	-15.2	-22.218	8

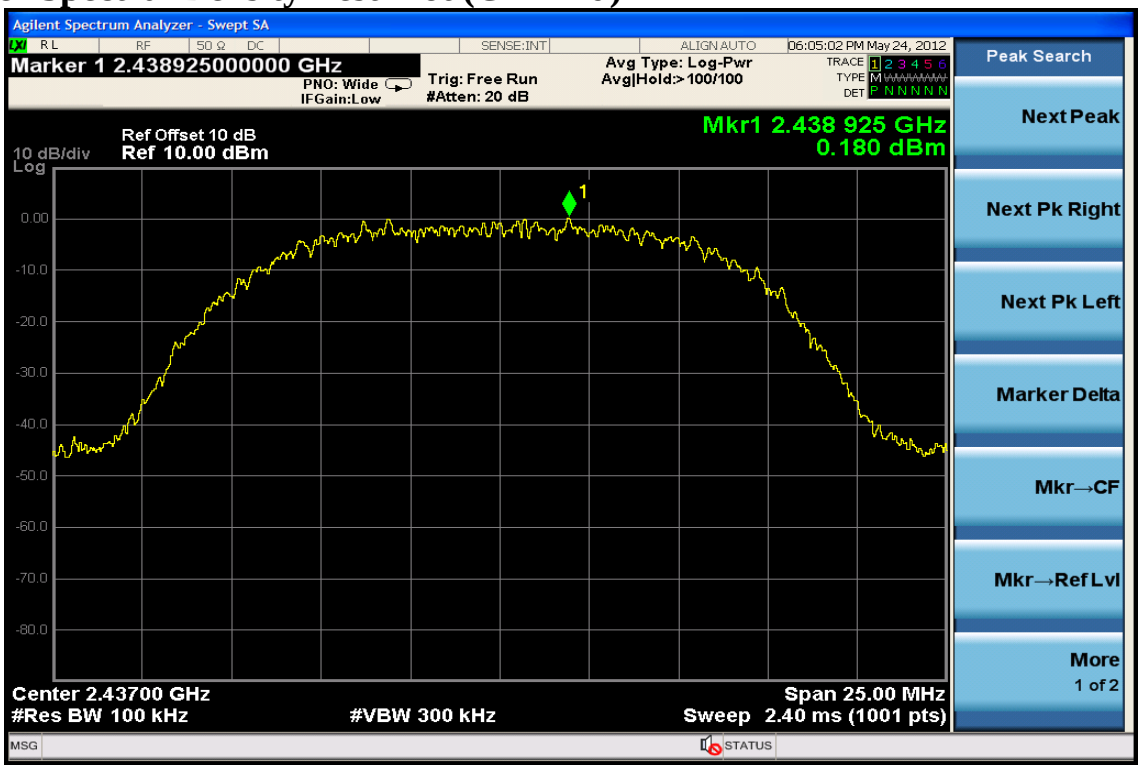
BWCF(bandwidth correction factor)=10log (3 kHz/100KHz)
kHz = -15.2 dB)

802.11b

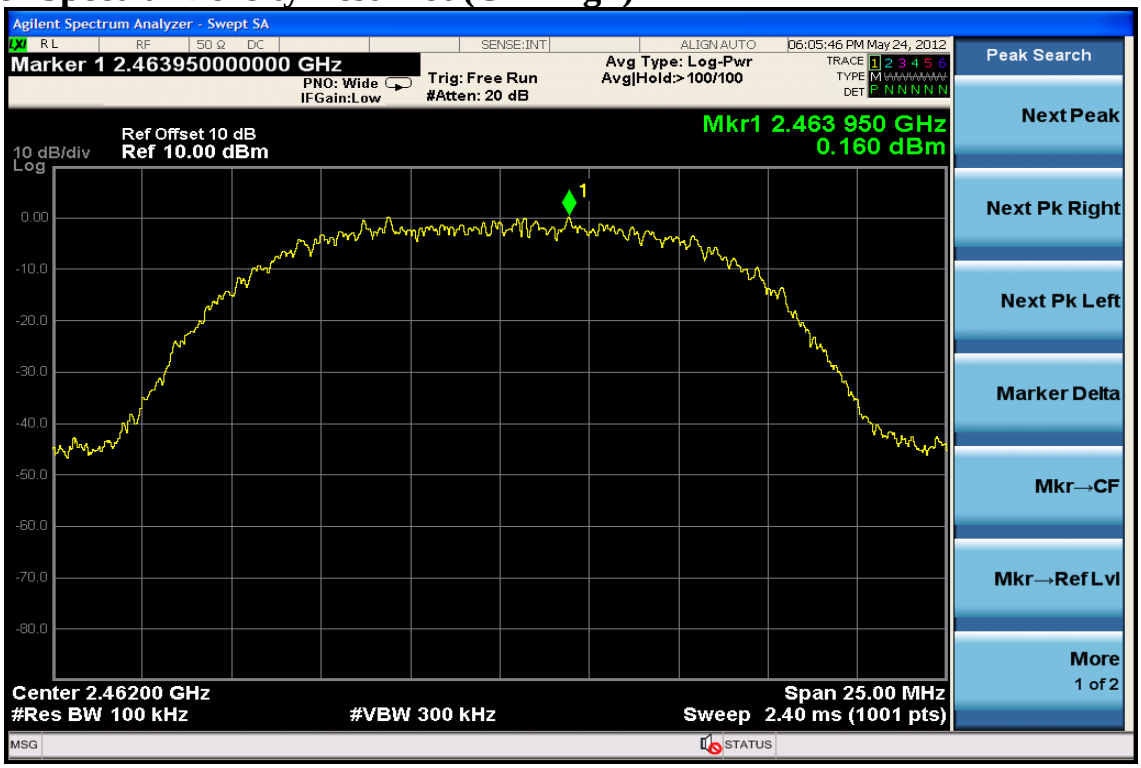
Power Spectral Density Test Plot (CH-Low)



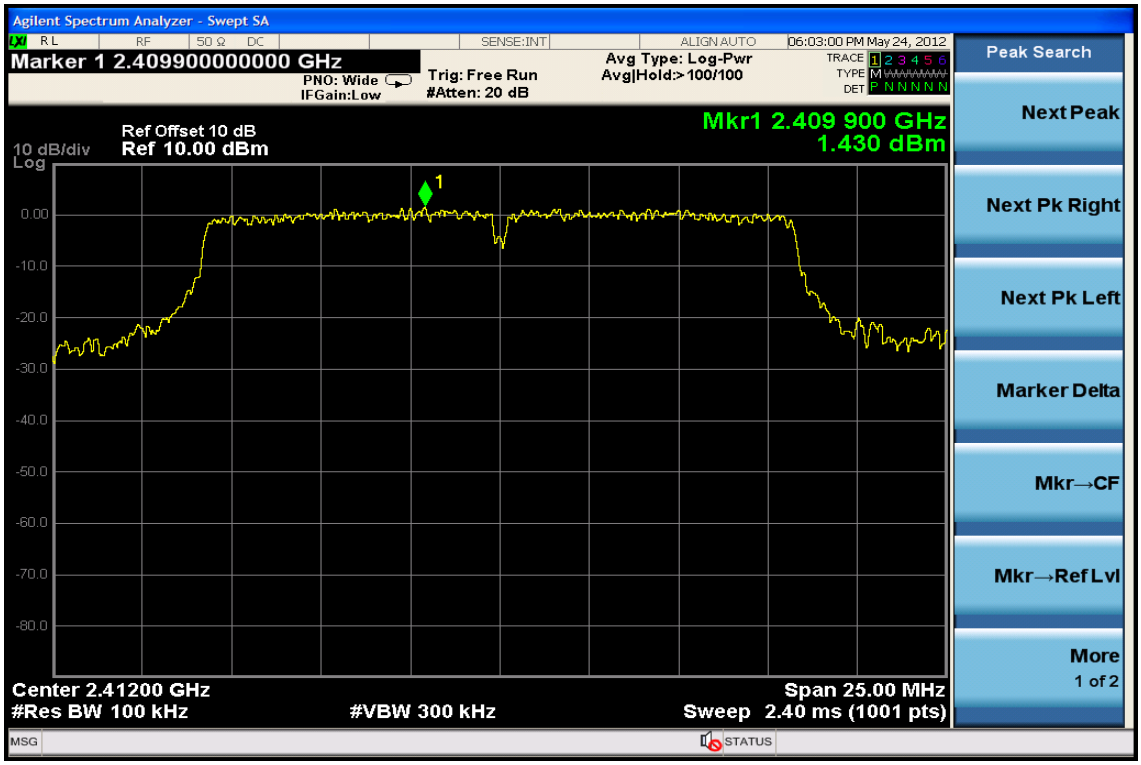
Power Spectral Density Test Plot (CH-Mid)



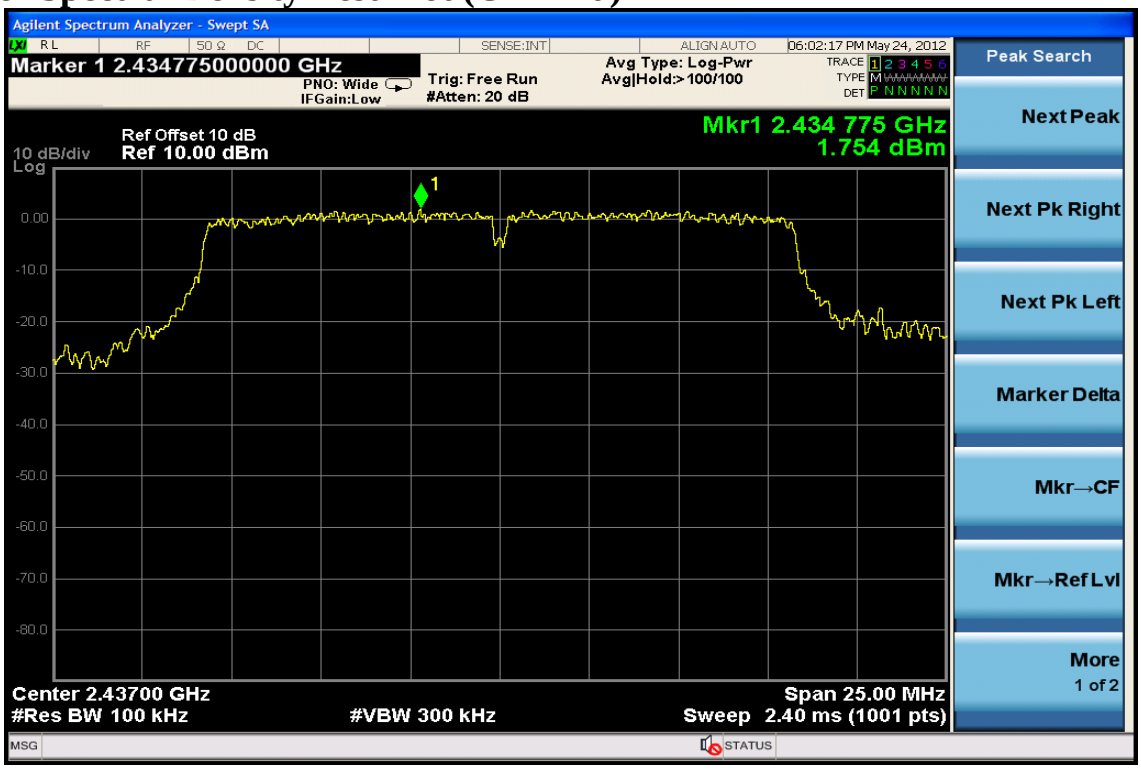
Power Spectral Density Test Plot (CH-High)



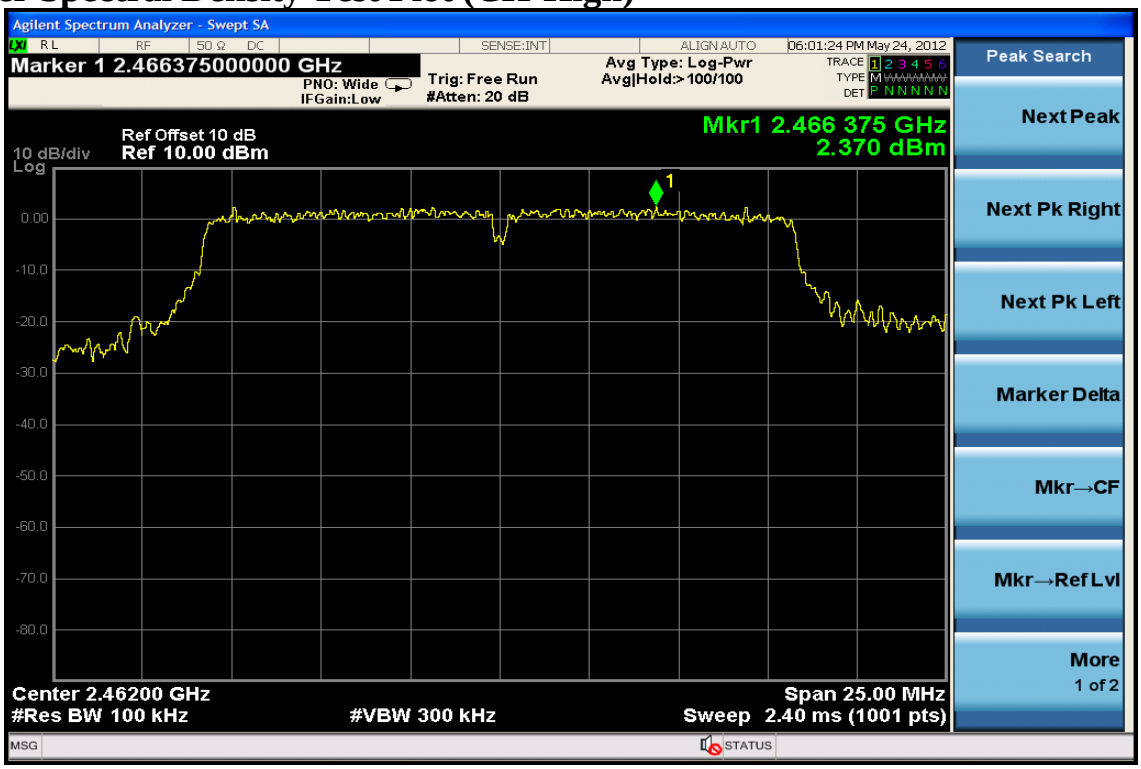
802.11g
Power Spectral Density Test Plot (CH-Low)



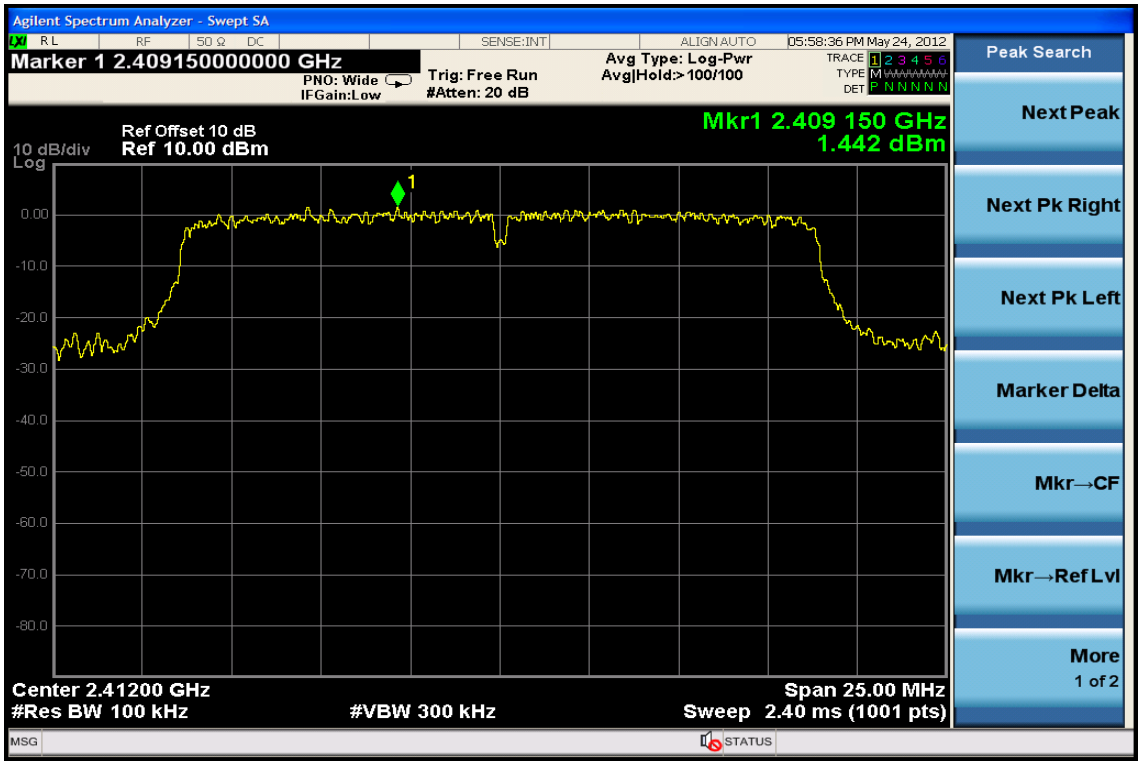
Power Spectral Density Test Plot (CH-Mid)



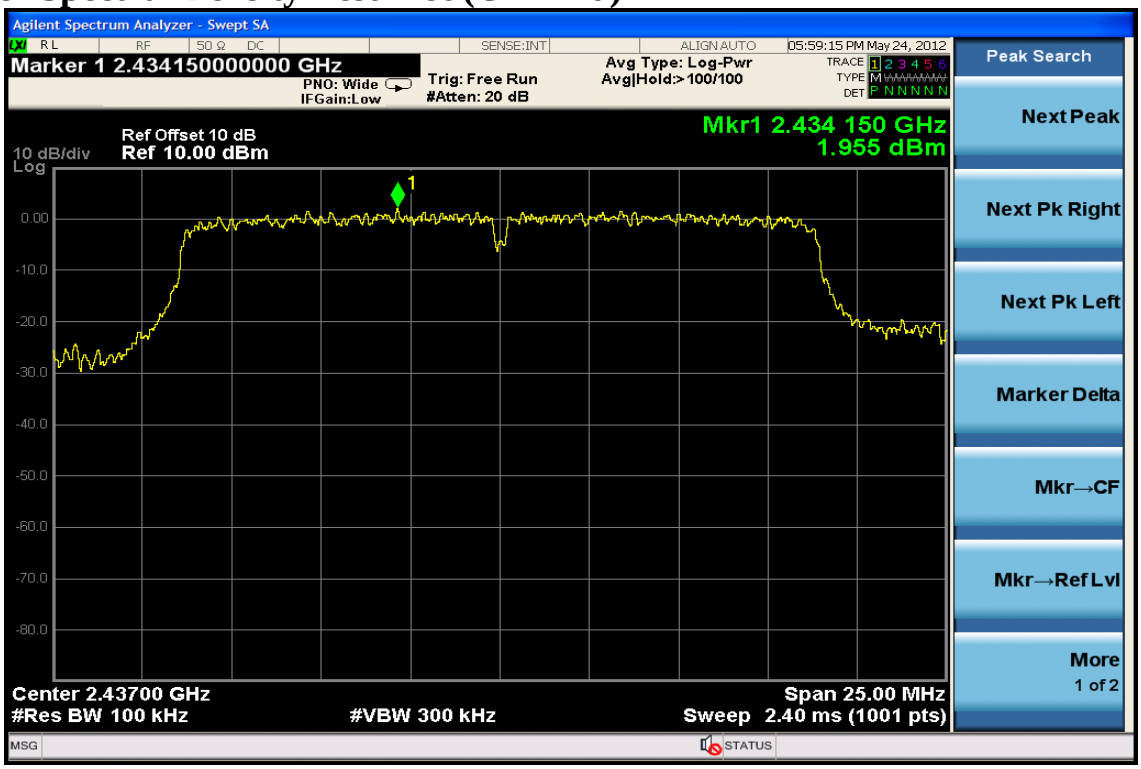
Power Spectral Density Test Plot (CH-High)



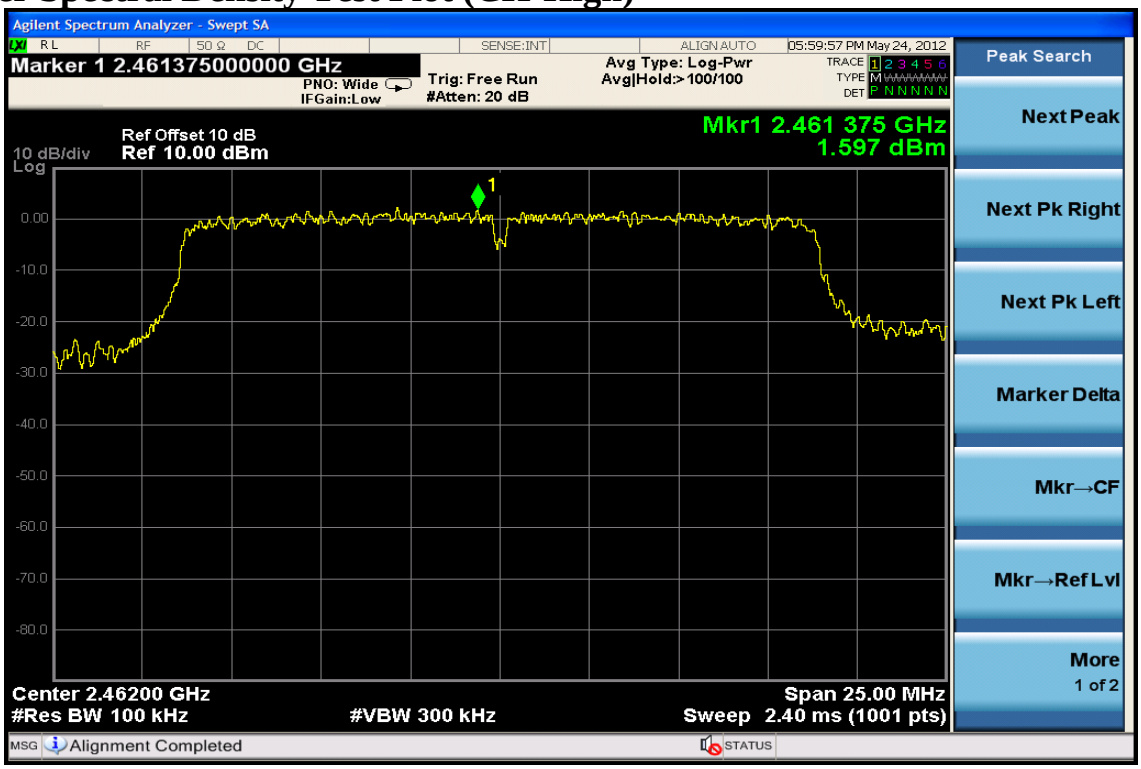
802.11n_20M
Power Spectral Density Test Plot (CH-Low)



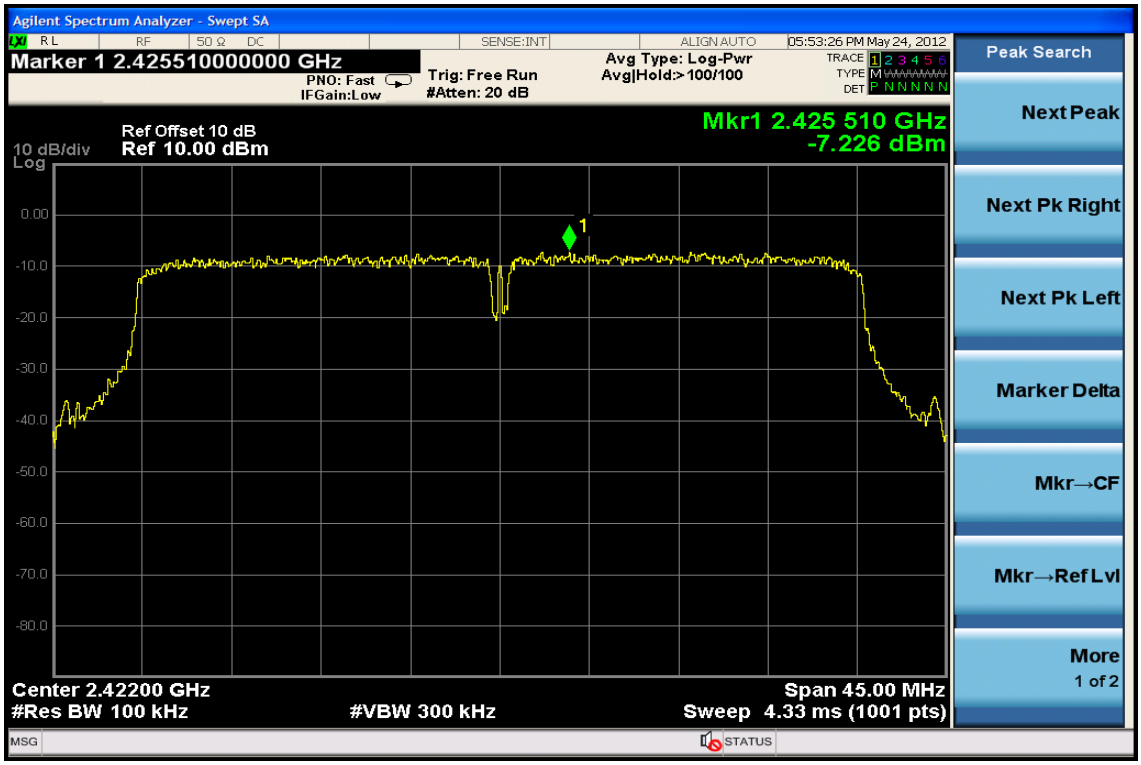
Power Spectral Density Test Plot (CH-Mid)



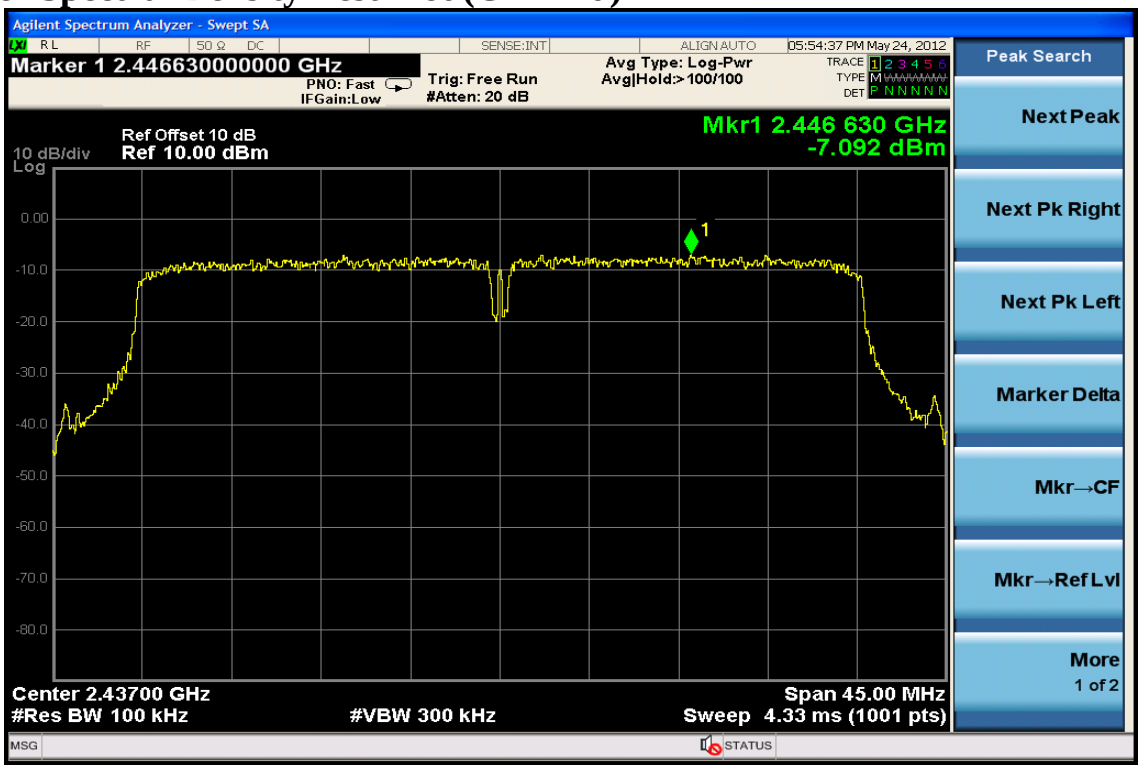
Power Spectral Density Test Plot (CH-High)



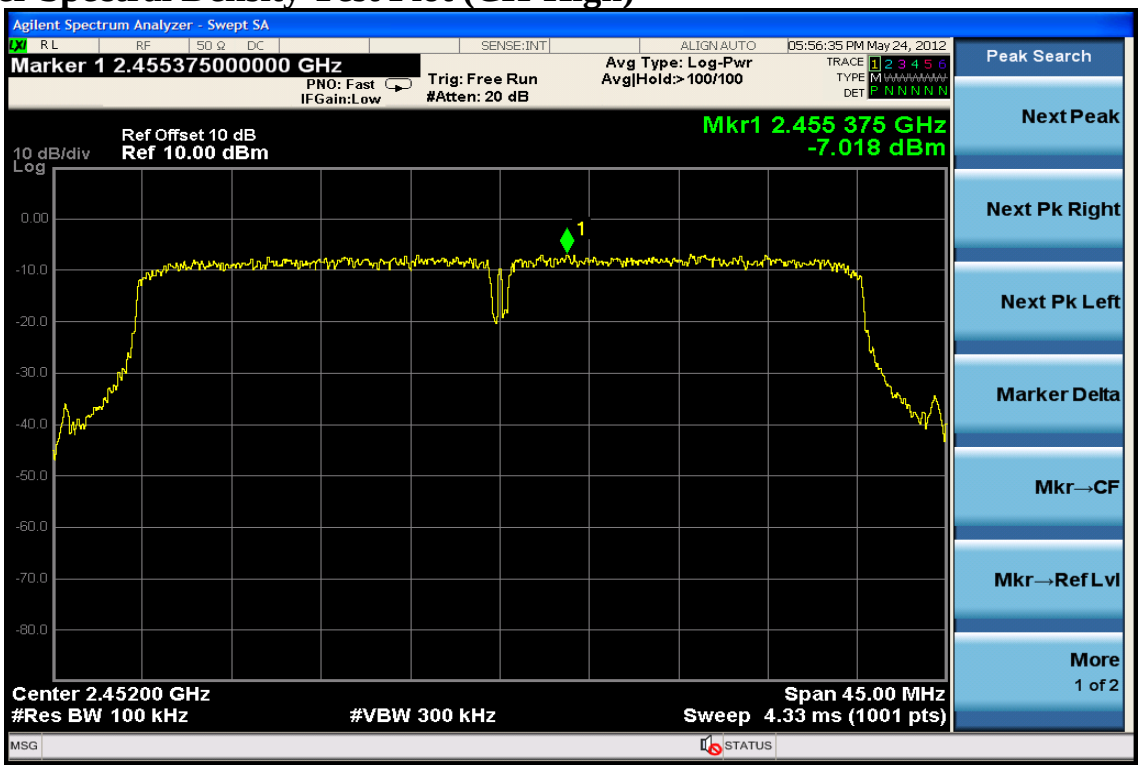
802.11n_40M
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



11 ANTENNA REQUIREMENT

11.1 Standard Applicable:

According to §15.203, Antenna 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

11.2 Antenna Connected Construction:

The directional gins of antenna used for transmitting is 2.9 dBi, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.