TEST REPORT

of

FCC PART 15 SUBPART E AND CANADA RSS-210

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

Limited Modular Approval

Product :	**USB WiFi adapter**
Brand:	**Acer**
Model:	**UWA2**
Model Difference:	**N/A**
FCC ID:	**HLZUWA2**
IC:	**1754F-UWA2**
FCC Rule Part:	**§15.407, Cat:NII**
IC Rule Part:	**RSS-210 issue 8:2010, Annex 9**
Applicant:	**Acer Incorporated**
Address:	**8F, 88, Sec 1, Hsin Tai Wu Rd, Hsichih, New Taipei City 22181, Taiwan, R.O.C.**

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-13LR039FE**

Issue Date : **2013/04/17**

VERIFICATION OF COMPLIANCE

Applicant:	Acer Incorporated
Product Description:	USB WiFi adapter
Brand Name:	Acer
Model No.:	UWA2
Model Difference:	N/A
FCC ID:	HLZUWA2
IC:	1754F-UWA2
FCC Rule Part:	§15.407, Cat: NII
IC Rule Part	RSS-210 issue 8:2010, Annex 9
Date of test:	2013/03/07 ~ 2013/03/22
Date of EUT Received:	2013/03/07

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:		***Date:***	2013/04/17
	Dion Chang / Engineer		
Prepared By:		***Date:***	2013/04/17
	Gigi Yeh / Specialist		
Approved By:		***Date:***	2013/04/17
	Vincent Su / Technical Manager		

Version

Version No.	Date	Description
00	2013/04/17	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name:	USB WiFi adapter
Brand Name:	acer
Model Name:	UWA2
Model Difference:	N/A
Power Supply:	5VDC form USB Port
Hardware Version:	N/A
Software Version:	N/A
Adhoc Mode	No
DFS Mode	N/A
TPC	No
Operation Environment	Indoor, the USB dongle with laptops/notebooks is prohibited.

WLAN: 2X2 SM-MIMO

Wi-Fi	Frequency Range (MHz)	Channels	Peak Rated Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	19.83dBm	DSSS
802.11g	2412 – 2462(DTS)	11	24.31dBm	DSSS, OFDM
802.11n	HT20 2412 – 2462(DTS)	11	25.99dBm	OFDM
	HT40 2422 – 2452(DTS)	7	26.09dBm	
802.11a	5180 – 5240(NII)	4	10.03dBm	OFDM
	5745 – 5825(DTS)	5	20.09dBm	
802.11n	HT20 5180 – 5240(NII)	4	13.66dBm	OFDM
	HT20 5745 – 5825(DTS)	5	20.42dBm	
	HT40 5190 – 5230(NII)	2	12.29dBm	
	HT40 5755 – 5795(DTS)	2	22.89dBm	
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM		
Transition Rate:		Upto 72Mbps		
Antenna Designation:		PCB Antenna 2.4GHz: -5.2dBi; 5GHz: 5.9dBi According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation. Directional gain = G_{ANT}		

The EUT is compliance with IEEE 802.11 a/b/g/n Standard.
This report applies for frequency band 5150 MHz– 5250 MHz

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: HLZUWA2** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules. and **IC: 1754F-UWA2** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 9. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

1.3. 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: 789033 D01 General UNII Test Procedures v01r03

1.4. 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.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. 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 30 MHz 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 and 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. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

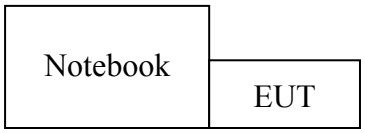


Table 1-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Notebook	IBM	X40	N/A	Shield	Non-shield

3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207 RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§15.407(a) RSS 210 A9.2 RSS-Gen §4.6.3	26dB/99% Emission Bandwidth	Compliant
§15.407(a) RSS 210 A9.2(1)(2)(3)	Peak Output Power Measurement	Compliant
§15.407(a) RSS 210 A9.2(1)(2)(3)	Peak Power Spectral Density Measurement	Compliant
15.407(a)(6)	Peak Excursion Measurement	Compliant
§15.407(b) RSS 210 A9.2(1)(2)(3)	Undesirable Emission – Conducted Measurement	Compliant
§15.407(b) RSS 210 A9.2(1)(2)(3)	Undesirable Emission – Radiated Measurement	Compliant
§15.407© RSS 210 A9.4(4)	Transmission in case of Absence of Information	Compliant
§15.407(g) RSS 210 A9.5(5)	Frequency Stability	Compliant
§15.407(a) RSS-GEN 7.1.2, RSS-210 issue 8,§A8.4	Antenna Requirement	Compliant
§15.407(d) RSS 210 A9.3	TPC and DFS Measurement	Compliant
MPE	Maximum Permissible Exposure	Compliant

4. DESCRIPTION OF TEST MODES

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

a mode: 5150MHz-5250MHz: Channel lowest (5180MHz)、Mid (5220MHz) and Highest (5240MHz) with 6Mbps data rate are chosen for full testing.

n HT 20 mode: 5150MHz-5250MHz: Channel lowest (5180MHz)、Mid (5220MHz) and Highest (5240MHz) with 6.5Mbps data rate are chosen for full testing

n HT 40 mode: 5150MHz-5250MHz: Channel lowest (5190MHz) 、Mid (5210MHz)and Highest (5230MHz) with 13.5Mbps data rate are chosen for full testing

The worst case 802.11 n HT20 (5GHz) was reported for Radiated Emission.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable

According to §15.207, frequency range within 150 KHz to 30 MHz 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.**
LISN 20	R&S	ENV216	101477	05/09/2012	05/09/2013
LISN 06	ROHDE&SCHWARZ	ESH3/Z5	828874/009	01/19/2013	01/19/2014
Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	06/28/2012	06/28/2013
EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	02/21/2012	02/21/2013
ISN T2 01	FCC	FCC-TLISN-T2-02	20253	11/10/2012	11/10/2013
ISN T4 03	FCC	FCC-TLISN-T4-02	20254	11/10/2012	11/10/2013
ISN T8 05	Teseq GmbH	ISN T800	30305	04/06/2012	04/06/2013

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.

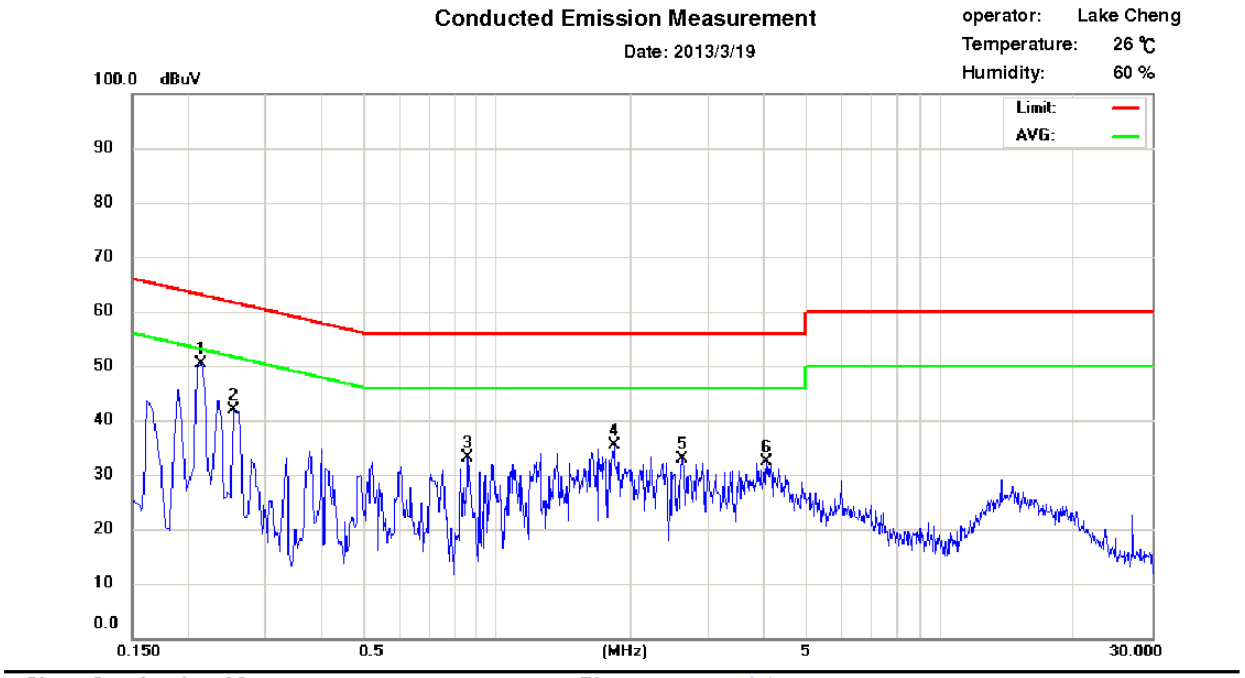
5.5. Measurement Result:

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

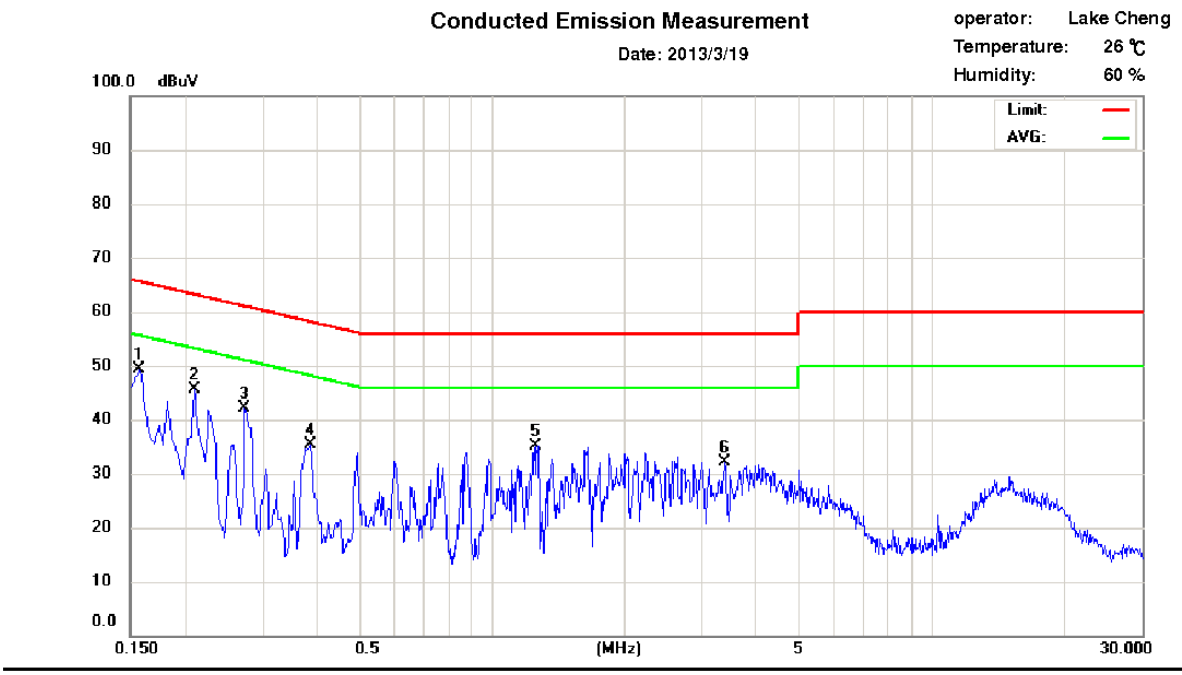
Operation Mode:	Operation Mode	Test Date:	2013/03/19
Test By:	Dino		



Site: Conduction 02 Phase: L1

Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.2140	9.74	41.85	63.05	-21.20	27.47	53.05	-25.58	
2	0.2540	9.74	37.45	61.63	-24.18	20.29	51.63	-31.34	
3	0.8580	9.66	28.33	56.00	-27.67	18.50	46.00	-27.50	
4	1.8300	9.74	29.68	56.00	-26.32	18.65	46.00	-27.35	
5	2.6140	9.77	30.09	56.00	-25.91	24.46	46.00	-21.54	
6	4.0620	9.79	27.17	56.00	-28.83	20.22	46.00	-25.78	



Site: Conduction 02 Phase: N

Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.1580	9.53	47.66	65.57	-17.91	32.54	55.57	-23.03	
2	0.2100	9.78	44.14	63.21	-19.07	34.32	53.21	-18.89	
3	0.2740	9.76	37.41	61.00	-23.59	23.96	51.00	-27.04	
4	0.3860	9.71	35.69	58.15	-22.46	34.21	48.15	-13.94	
5	1.2620	9.72	35.99	56.00	-20.01	32.19	46.00	-13.81	
6	3.3780	9.76	27.52	56.00	-28.48	20.15	46.00	-25.85	

6. PEAK OUTPUT POWER MEASUREMENT

6.1 Standard Applicable

According to §15.407(a)

1. For the band 5.15-5.25 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.
2. For the band 5.25-5.35 GHz and 5.47-5.725GMHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.
3. For the band 5.725-5.825 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 1W (30dBm) or 17 dBm + 10log B.

According to RSS-210 A9.2

1. For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10dBm in any 1.0 MHz band.

2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200mW shall comply with the following e.i.r.p. elevation mask where θ is the angle above the local horizontal plane (of the earth) as shown below:

   (i) -13 dB(W/MHz) for $0^o \leq \theta < 8^o$
   (ii) -13 – 0.716 (θ-8) dB(W/MHz) for $8^o \leq \theta < 40^o$
   (iii) -35.9 – 1.22 (θ-40) dB(W/MHz) for $40^o \leq \theta \leq 45^o$
   (iv) -42 dB(W/MHz) for $\theta > 45^o$

   For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 17dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4W e.i.r.p, under the same conditions as for point-to-point systems where B is the 26dB emission bandwidth in MHz

6.2 Measurement Procedure

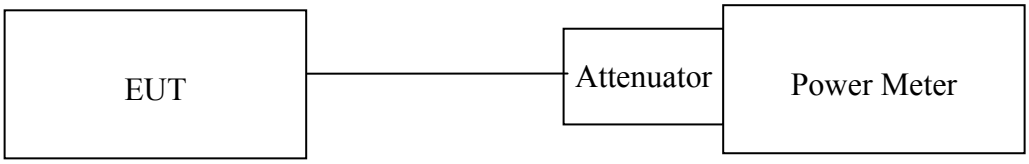
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

Refer to section E3 of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
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	03/15/2013	03/14/2014
DC Power supply	ABM	51850	N/A	06/17/2012	06/16/2013
AC Power supply	EXTECH	CFC105W	NA	12/19/2012	12/18/2013
Splitter	MCLI	PS4-199	12465	07/18/2012	07/17/2013
Spectrum analyzer	Agilent	N9030A	MY51360021	03/11/2013	03/10/2014

6.4 Measurement Equipment Used:



6.5 Measurement Result

Mode	Freq(MHz)	channel	Peak power (dBm)	limit(dBm)	result
802.11a	5180	36	10.03	16.98	pass
	5200	40	9.62	16.98	pass
	5240	48	8.65	16.98	pass

IC EIRP

Mode	Freq(MHz)	channel	Peak EIRP power (dBm)	EIRP limit(dBm)	result
802.11a	5180	36	15.93	23	pass
	5200	40	15.52	23	pass
	5240	48	14.55	23	pass

2*2 MIMO

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine Peak Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
N HT20	5180	36	11.42	9.72	13.66	16.98	Pass
	5200	40	10.71	10.09	13.42	16.98	Pass
	5240	48	10.09	10.17	13.14	16.98	Pass

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine Peak Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
N HT40	5190	38	9.67	8.86	12.29	16.98	Pass
	5210	42	8.85	9.06	11.97	16.98	Pass
	5230	46	8.56	9.12	11.86	16.98	Pass

IC EIRP

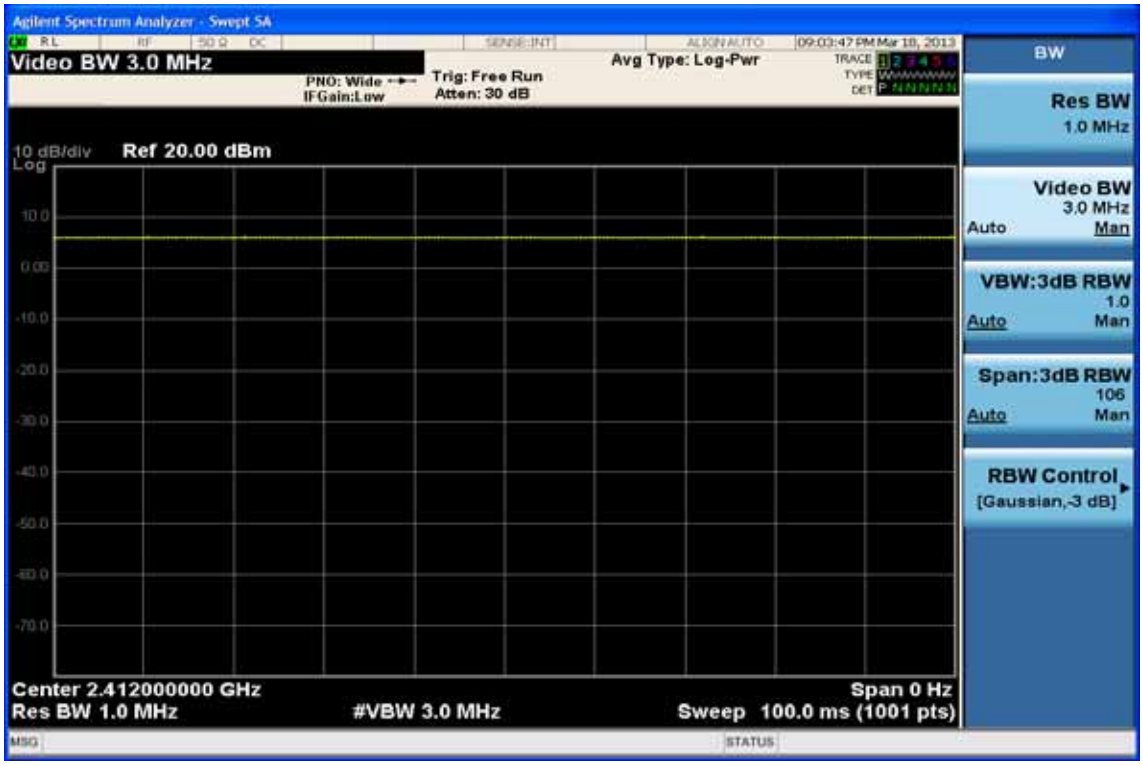
2*2 MIMO

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine EIRP Output Power (dBm)	EIRP Limit(dBm)	Result
			Chain A	chain B			
N HT20	5180	36	11.42	9.72	19.56	23	Pass
	5200	40	10.71	10.09	19.32	23	Pass
	5240	48	10.09	10.17	19.04	23	Pass

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine EIRP Output Power (dBm)	EIRP Limit(dBm)	Result
			Chain A	chain B			
N HT40	5190	38	9.67	8.86	18.19	23	Pass
	5210	42	8.85	9.06	17.87	23	Pass
	5230	46	8.56	9.12	17.76	23	Pass

Offset 10dB for insertion loss.

100% Duty Cycle



7. 26dB /99% EMISSION BANDWIDTH MEASUREMENT

7.1 Standard Applicable

According to §15.407(a). No Limit required.

According to RSS 210 A9.2(1), No Limit required

RSS-Gen §4.4.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

7.2 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 the spectrum analyzer as RBW=300KHz, VBW =1MHz, Span= 50MHz, Sweep=auto
4. Mark the peak frequency and –26dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

Refer to section D of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

7.3 Measurement Equipment Used:

Refer to section 6.3 for details.

7.4 Test Set-up:

Refer to section 6.4 for details.

7.5 Measurement Result

802.11a Mode

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.15	16.978	13.65	12.30
5220	23.32	16.908	13.68	12.28
5240	22.65	16.845	13.55	12.26

802.11n HT20 Mode chain a

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.40	18.026	13.69	12.56
5220	23.90	18.040	13.78	12.56
5240	24.15	18.088	13.83	12.57

802.11n HT20 Mode chain b

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.63	18.035	13.73	12.56
5220	22.93	17.998	13.60	12.55
5240	24.04	18.041	13.81	12.56

802.11n HT20 Mode combine

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	22.14	17.831	13.45	12.51
5220	22.19	17.814	13.46	12.51
5240	22.63	17.859	13.55	12.52

802.11n HT40 Mode chain a

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	42.72	36.595	16.31	15.63
5220	44.74	36.513	16.51	15.62
5240	45.57	36.524	16.59	15.63

802.11n HT40 Mode chain b

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	44.52	36.448	16.49	15.62
5220	42.13	36.378	16.25	15.61
5240	42.12	36.363	16.24	15.61

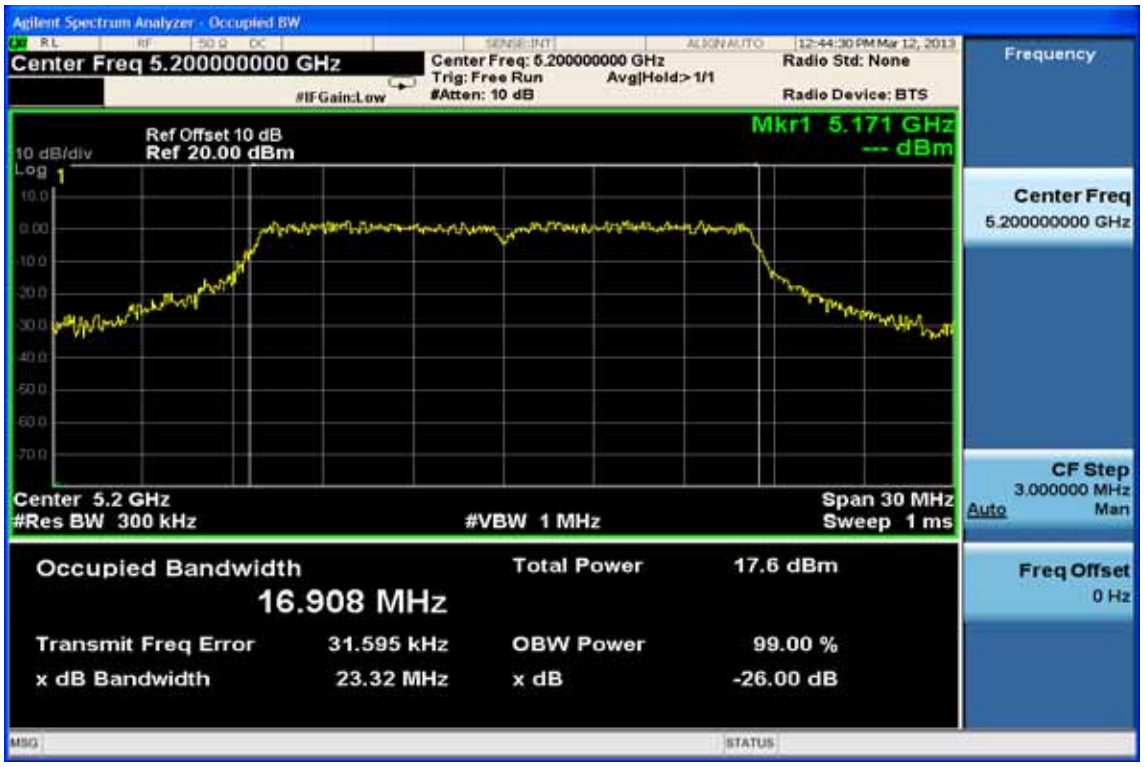
802.11n HT40 Mode combine

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	41.79	36.407	16.21	15.61
5220	42.02	36.541	16.23	15.63
5240	41.56	36.416	16.19	15.61

802.11a

26dB Band Width Test Data CH-Low

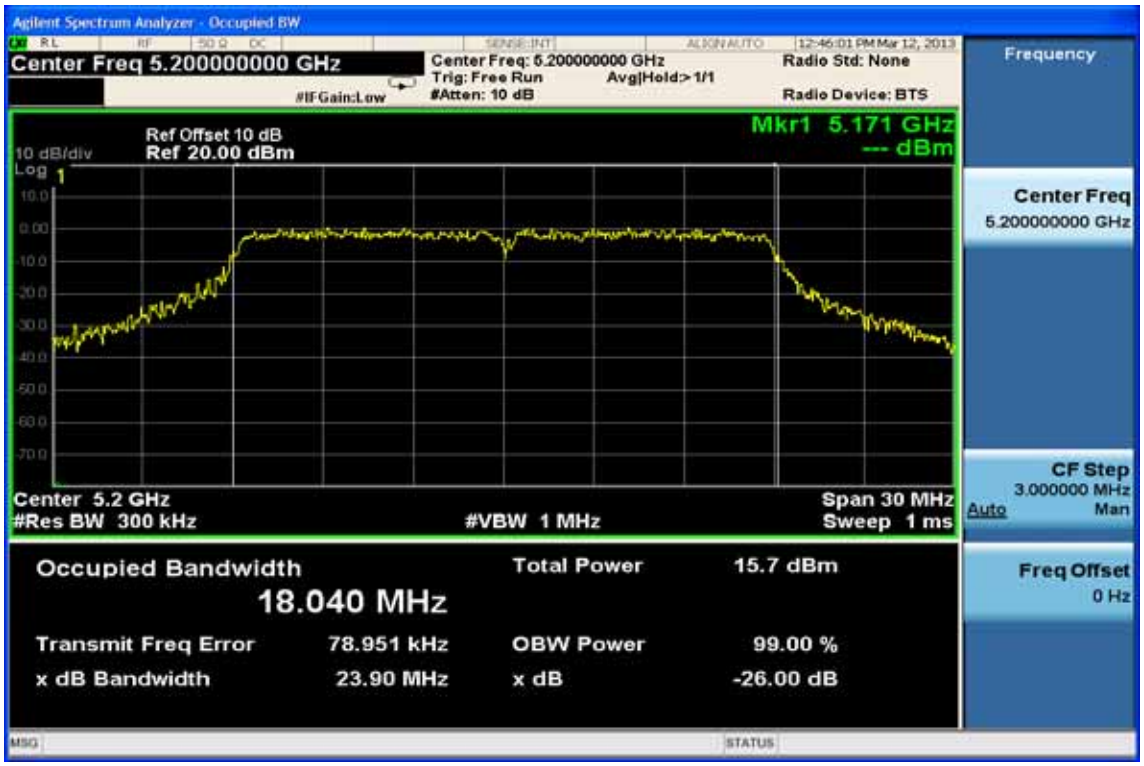
26dB Band Width Test Data CH-Mid



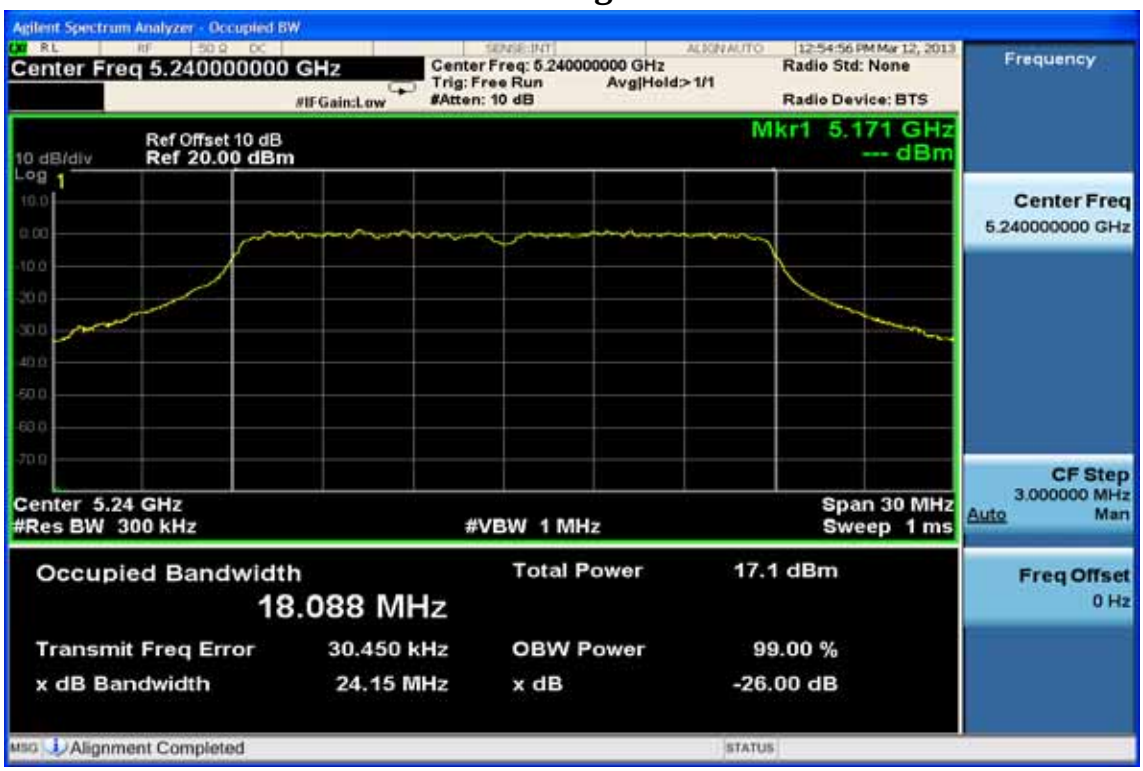
26dB Band Width Test Data CH-High

802.11n HT20 chain a
26dB Band Width Test Data CH-Low

26dB Band Width Test Data CH-Mid



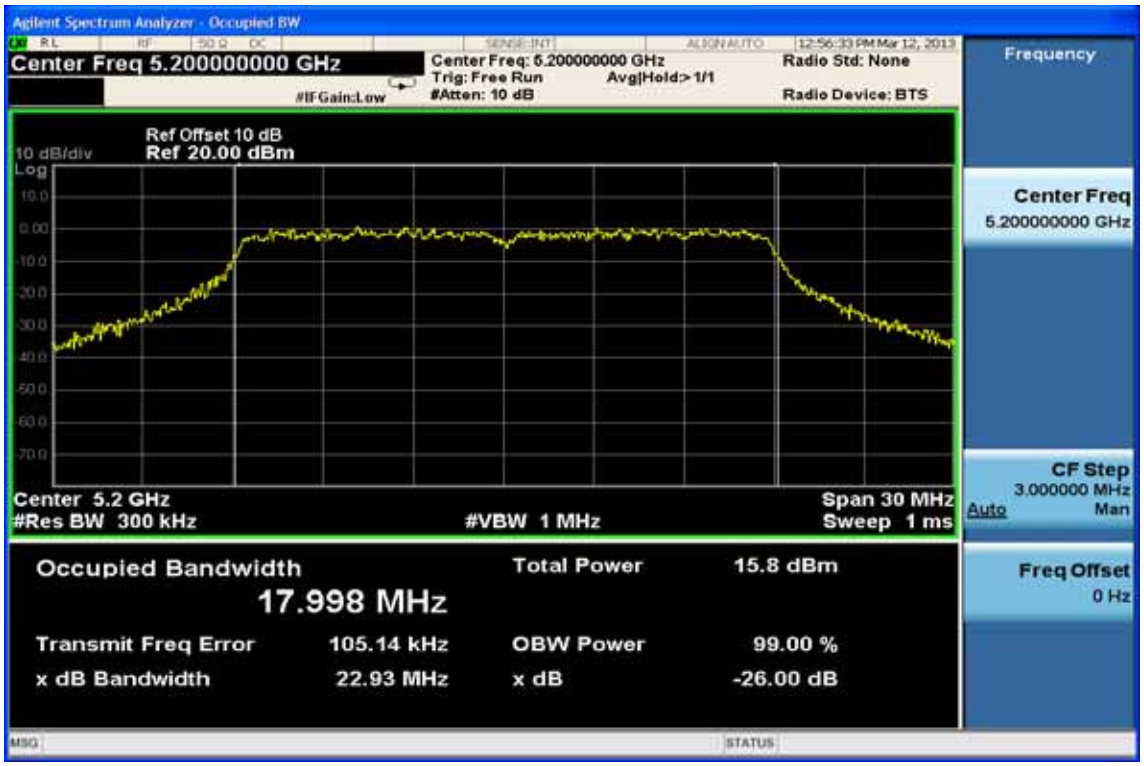
26dB Band Width Test Data CH-High



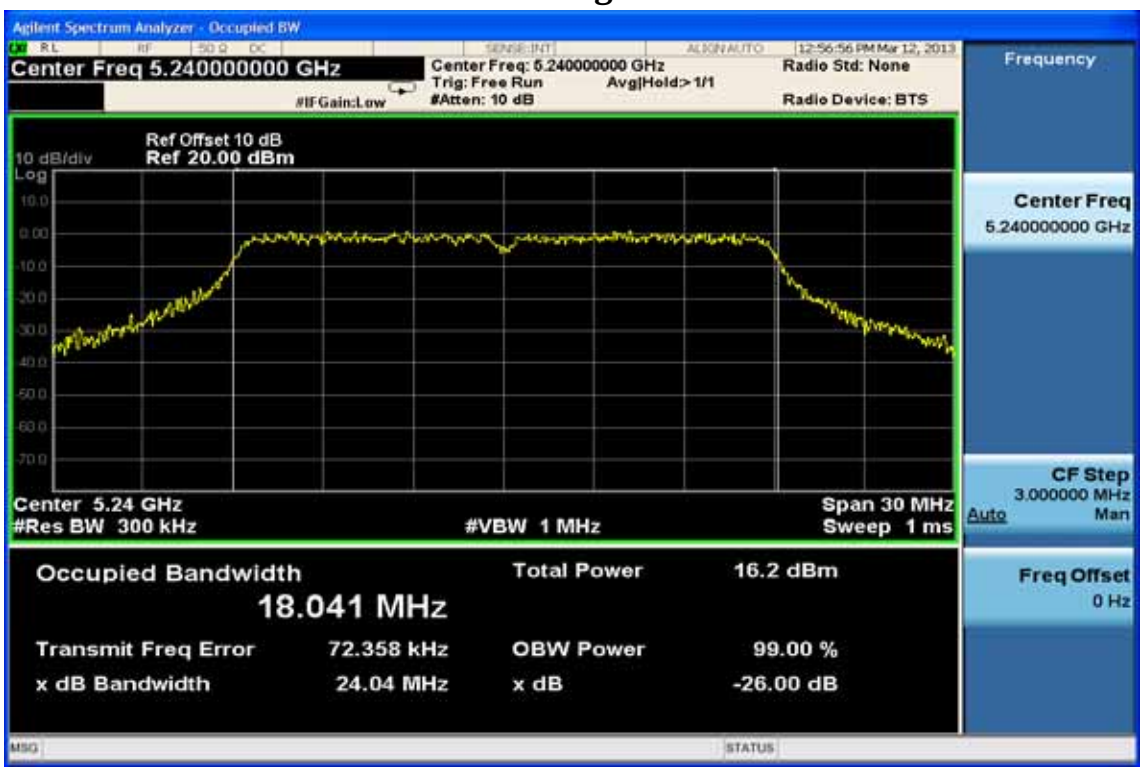
802.11n HT20 chain b

26dB Band Width Test Data CH-Low

26dB Band Width Test Data CH-Mid

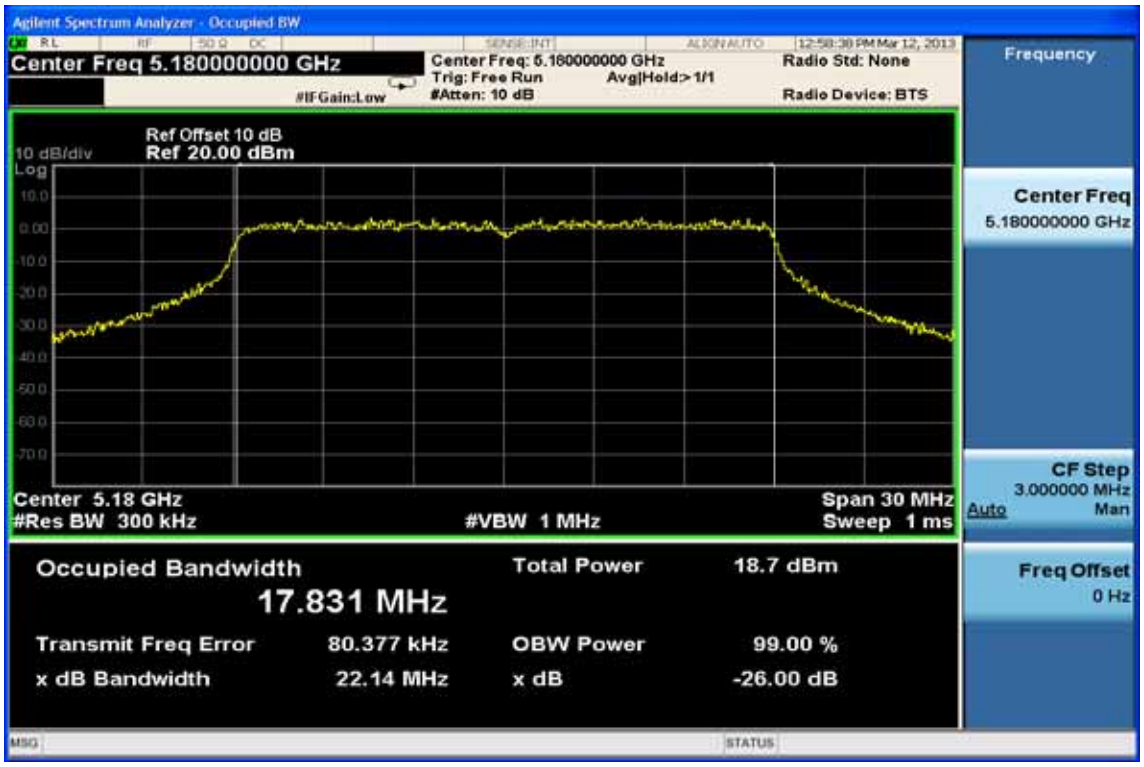


26dB Band Width Test Data CH-High

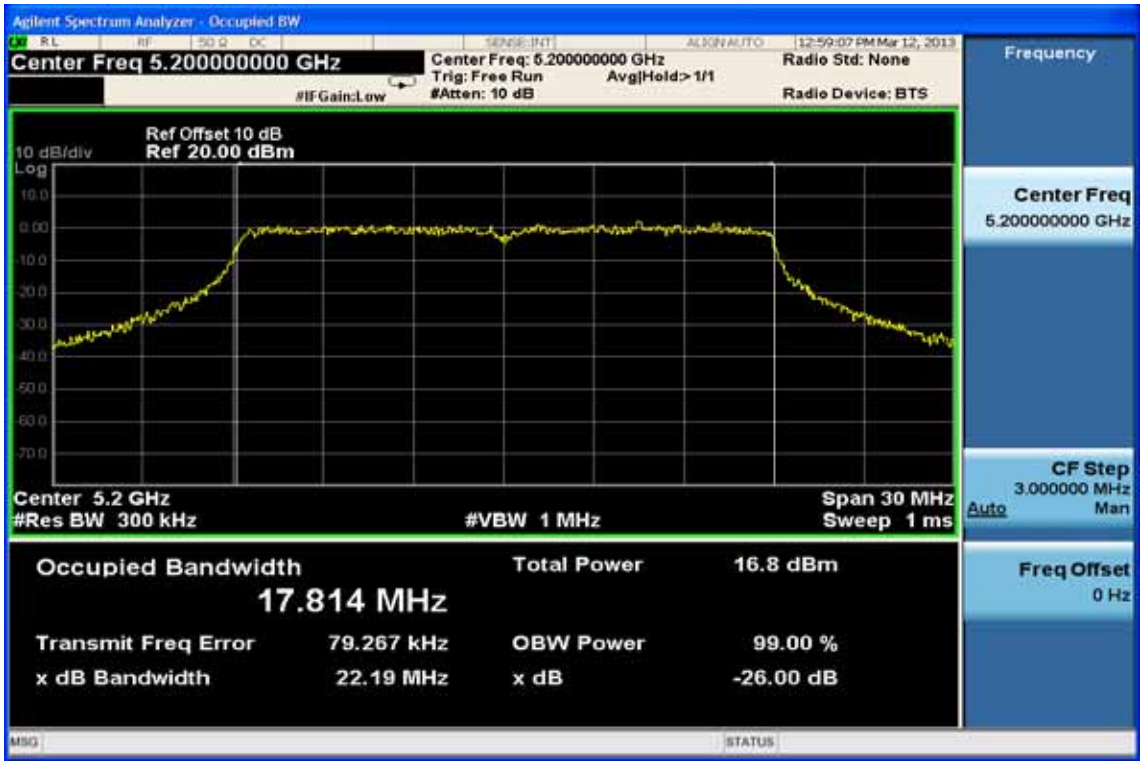


802.11n HT20 combine

26dB Band Width Test Data CH-Low



26dB Band Width Test Data CH-Mid



26dB Band Width Test Data CH-High

802.11n HT40 chain a

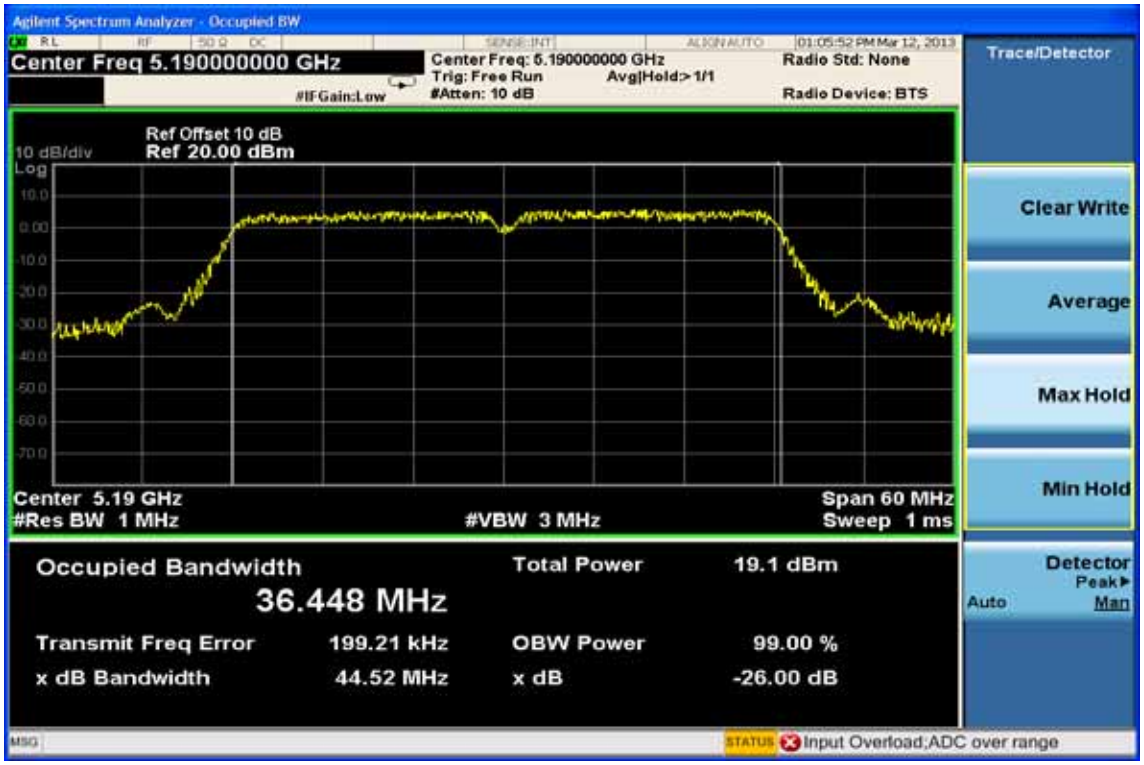
26dB Band Width Test Data CH-Low

26dB Band Width Test Data CH-Mid

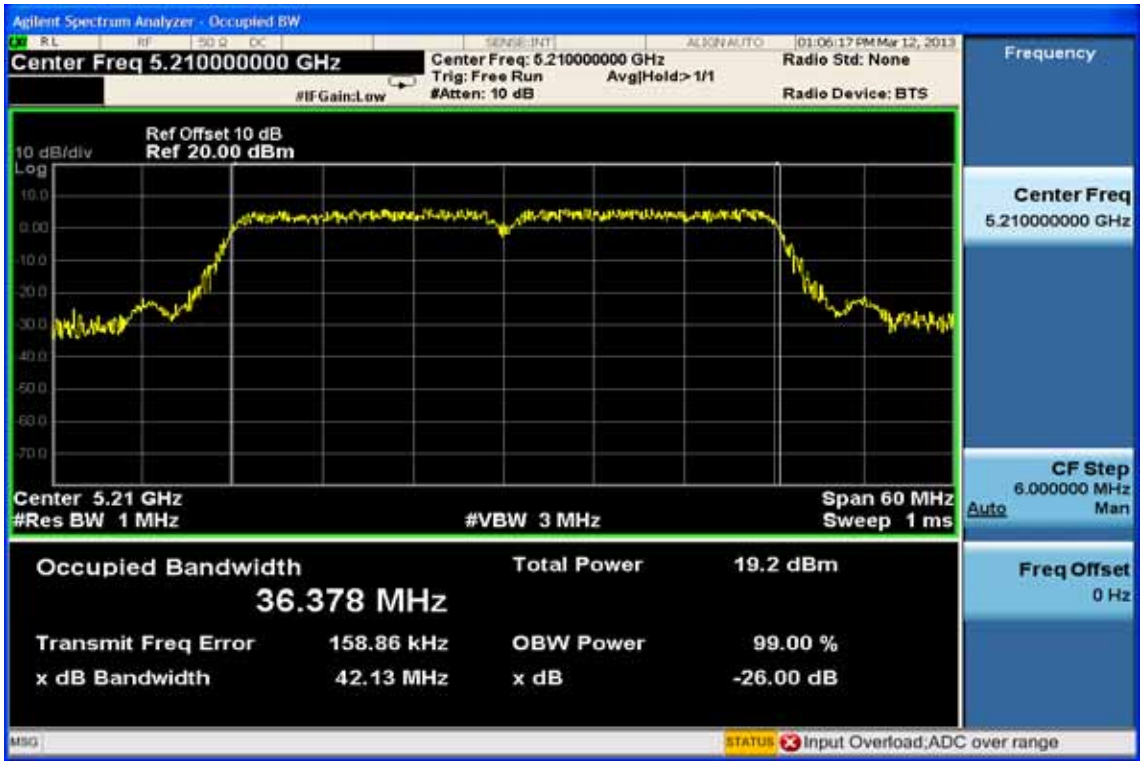
26dB Band Width Test Data CH-High

802.11n HT40 chain b

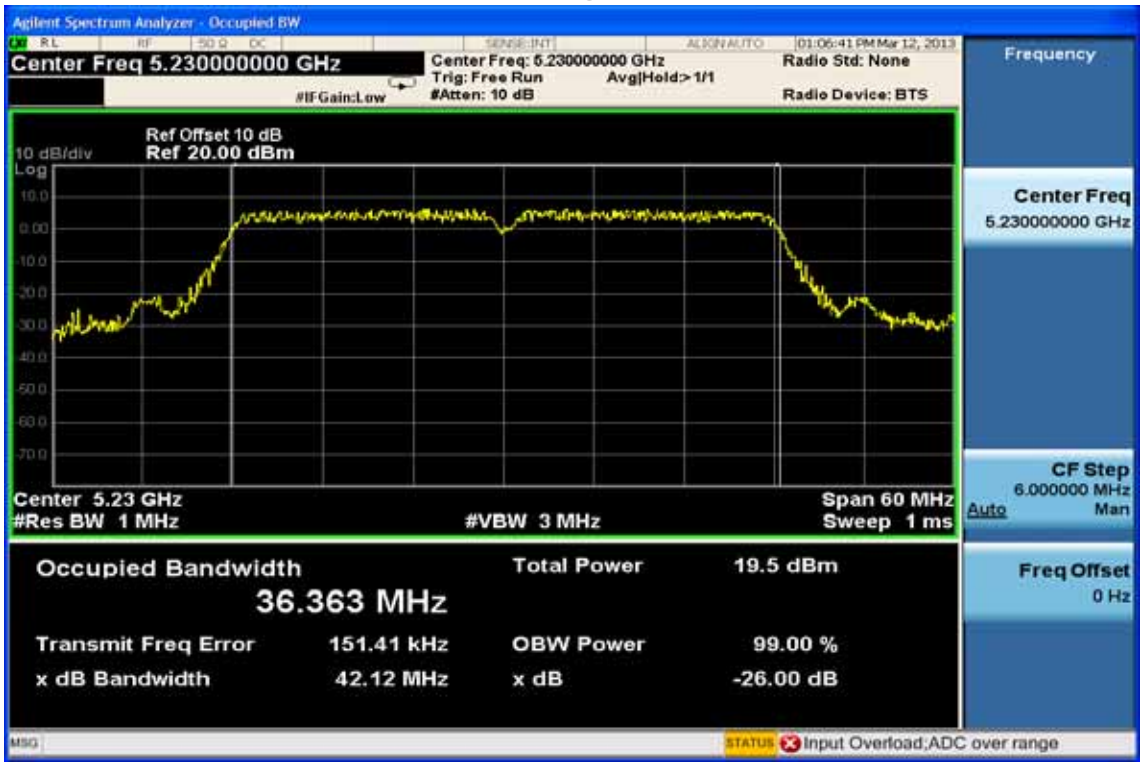
26dB Band Width Test Data CH-Low



26dB Band Width Test Data CH-Mid



26dB Band Width Test Data CH-High



802.11n HT40 combine

26dB Band Width Test Data CH-Low

26dB Band Width Test Data CH-Mid

26dB Band Width Test Data CH-High

8. PEAK POWER SPECTRAL DENSITY

8.1 Standard Applicable

According to §15.407(a)

1. For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.
2. For the band 5.25-5.35 GHz and 5.47-5.725GMHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.
3. For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

According to RSS-210 A9.2

1. For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where θ is the angle above the local horizontal plane (of the earth) as shown below:
   (i) -13 dB(W/MHz) for $0^o \leq \theta < 8^o$
   (ii) -13 – 0.716 (θ-8) dB(W/MHz) for $8^o \leq \theta < 40^o$
   (iii) -35.9 – 1.22 (θ-40) dB(W/MHz) for $40^o \leq \theta \leq 45^o$
   (iv) -42dB (W/MHz) for $\theta > 45^o$

3. For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to-point systems. B is the 99% emission bandwidth in MHz.

8.2 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 Spectrum.
3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging.
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

Refer to section F of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

8.3 Measurement Equipment Used:

Refer to section 6.3 for details.

8.4 Test Set-up:

Refer to section 6.4 for details.

8.5 Measurement Result

802.11a Mode

Frequency MHz	RF Power Density Reading (dBm)	Cable loss (dB)	Maximum Limit (dBm)
5180	-1.555	0.00	4
5220	-1.709	0.00	4
5240	-1.665	0.00	4

802.11n HT20

Frequency MHz	Chain A RF Power Density Reading (dBm)	Chain B RF Power Density Reading (dBm)	Cable loss (dB)	Combine RF Power Density Level (dBm)	Maximum Limit (dBm)
5180	-0.243	-1.448	0.00	2.21	4
5220	-0.571	-1.229	0.00	2.12	4
5240	-0.570	-0.824	0.00	2.32	4

802.11n HT40 Mode

Frequency MHz	Chain A RF Power Density Reading Reading (dBm)	Chain B RF Power Density Reading Reading (dBm)	Cable loss (dB)	Combine RF Power Density Level (dBm)	Maximum Limit (dBm)
5190	-4.236	-5.059	0.00	-1.62	4
5210	-4.436	-4.676	0.00	-1.54	4
5230	-4.478	-4.319	0.00	-1.39	4

Offset: 10dB for insertion loss.

IC EIRP

802.11a Mode

Frequency MHz	RF EIRP Power Density Reading (dBm)	Cable loss (dB)	EIRP Maximum Limit (dBm)
5180	4.35	0.00	10
5220	4.19	0.00	10
5240	4.24	0.00	10

802.11n HT20

Frequency MHz	Chain A RF Power Density Reading (dBm)	Chain B RF Power Density Reading (dBm)	Cable loss (dB)	Combine RF EIRP Power Density Level (dBm)	EIRP Maximum Limit (dBm)
5180	-0.243	-1.448	0.00	8.11	10
5220	-0.571	-1.229	0.00	8.02	10
5240	-0.570	-0.824	0.00	8.22	10

802.11n HT40 Mode

Frequency MHz	Chain A RF Power Density Reading Reading (dBm)	Chain B RF Power Density Reading Reading (dBm)	Cable loss (dB)	Combine RF EIRP Power Density Level (dBm)	EIRP Maximum Limit (dBm)
5190	-4.236	-5.059	0.00	4.28	10
5210	-4.436	-4.676	0.00	4.36	10
5230	-4.478	-4.319	0.00	4.51	10

Offset: 10dB for insertion loss.

802.11a

Peak Power Spectral Density Data Plot (CH Low)

Peak Power Spectral Density Data Plot (CH Mid)

Peak Power Spectral Density Data Plot (CH High)

802.11n HT20 (chain a)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

802.11n HT20 for 5GHz (chain b)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

802.11n HT40 (chain a)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

802.11n HT40 for 5GHz (chain b)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

9. PEAK EXCURSION MEASUREMENT

9.1 Standard Applicable

15.407(a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

9.2 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 spectrum.
3. Trace A, Set RBW=1MHz, VBW = 3MHz, Span = 26dBc, Max. hold.
4. Trace B, Set RBW=1MHz, VBW = 3MHz, Span = 26dBc, traces 100 sweeps of RMS averaging. Max. hold..
5. Delta Mark trace A center frequency and trace B center frequency.
6. Repeat above procedures until all frequency measured were complete.

Refer to section G of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

9.3 Measurement Equipment Used:

Refer to section 6.3 for details.

9.4 Test Set-up:

Refer to section 6.4 for details.

9.5 Test Results:

802.11a Mode

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	8.270	13.00	-4.73
5220	8.230	13.00	-4.77
5240	7.950	13.00	-5.05

802.11n HT20 Mode chain a

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	8.210	13.00	-4.79
5220	8.770	13.00	-4.23
5240	8.010	13.00	-4.99

802.11n HT20 Mode chain b

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	7.710	13.00	-5.29
5220	8.160	13.00	-4.84
5240	8.530	13.00	-4.47

802.11n HT20 Mode combine

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	10.950	13.00	-2.05
5220	9.120	13.00	-3.88
5240	10.100	13.00	-2.90

802.11n HT40 Mode chain a

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	7.550	13.00	-5.45
5220	7.260	13.00	-5.74
5240	8.180	13.00	-4.82

802.11n HT20 Mode chain b

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	8.360	13.00	-4.64
5220	7.730	13.00	-5.27
5240	8.230	13.00	-4.77

802.11n HT20 Mode combine

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	8.200	13.00	-4.80
5220	9.620	13.00	-3.38
5240	10.380	13.00	-2.62

802.11a mode

Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT20 Mode chain a
Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT20 Mode chain b

Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT20 Mode combine

Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT40 Mode chain a
Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT40 Mode chain b

Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

802.11n HT40 Mode combine

Peak Excursion Data Plot (CH Low)

Peak Excursion Data Plot (CH Mid)

Peak Excursion Data Plot (CH High)

10. UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT

10.1 Standard Applicable

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

(5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

(7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

According to RSS-210 A9.2

(1) For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.

(2) For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled “for indoor use only”.

(3) For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.

(4) For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.

10.2 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 spectrum.
3. Set Spectrum RBW=1MHz, VBW = 1MHz for peak measurement and 10Hz for average measurement.
4. Set Spectrum at lower/upper band edge and the restricted band adjacent to the lower/upper edge of the authorized band, with the transmitter set to the lowest/highest channel.
5. Set Spectrum over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

Refer to section H of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

Conducted RF measurements of the transmitter output were made at the band edges and the adjacent restricted bands.

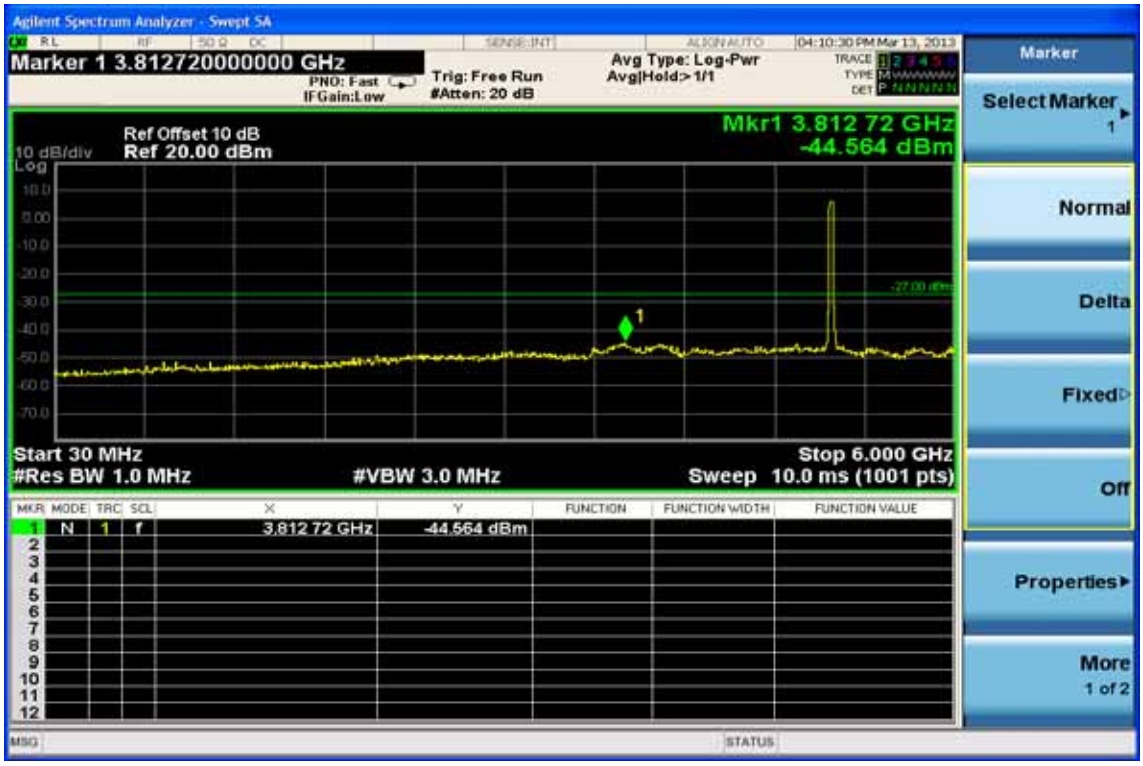
Also, conducted RF measurements of the transmitter output over the 30 MHz to 40 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

10.3 Measurement Equipment Used:

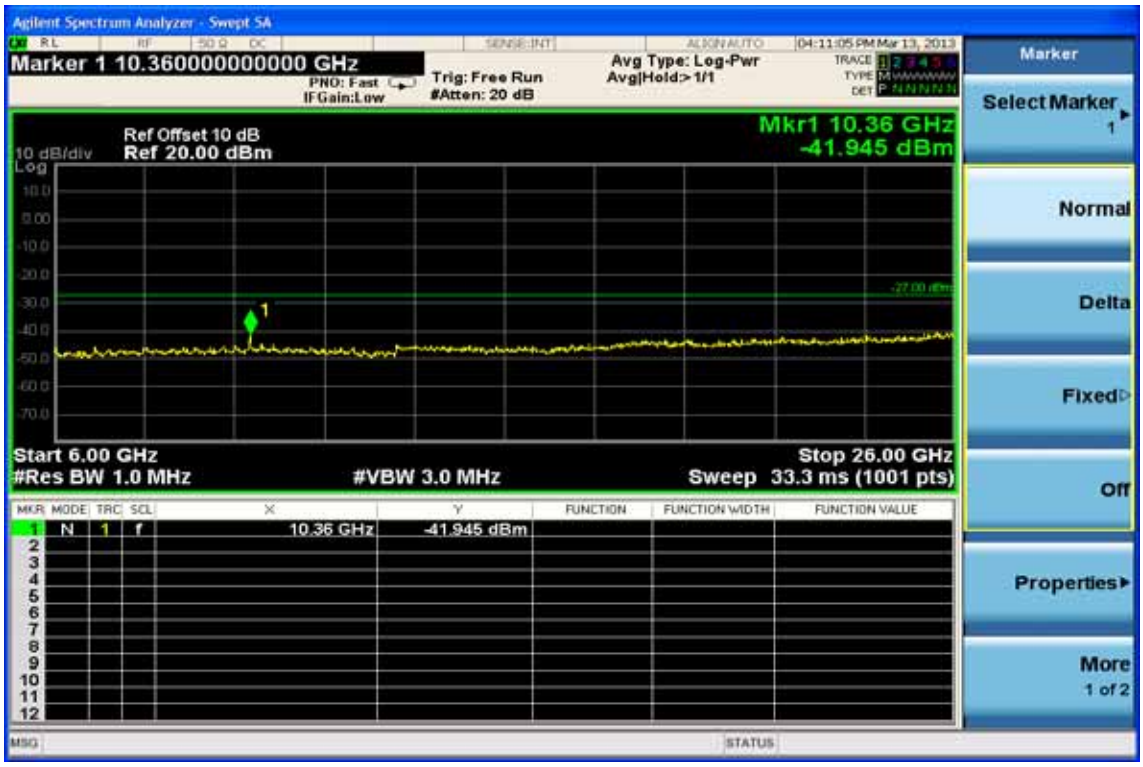
Refer to section 6.3 for details.

802.11a mode

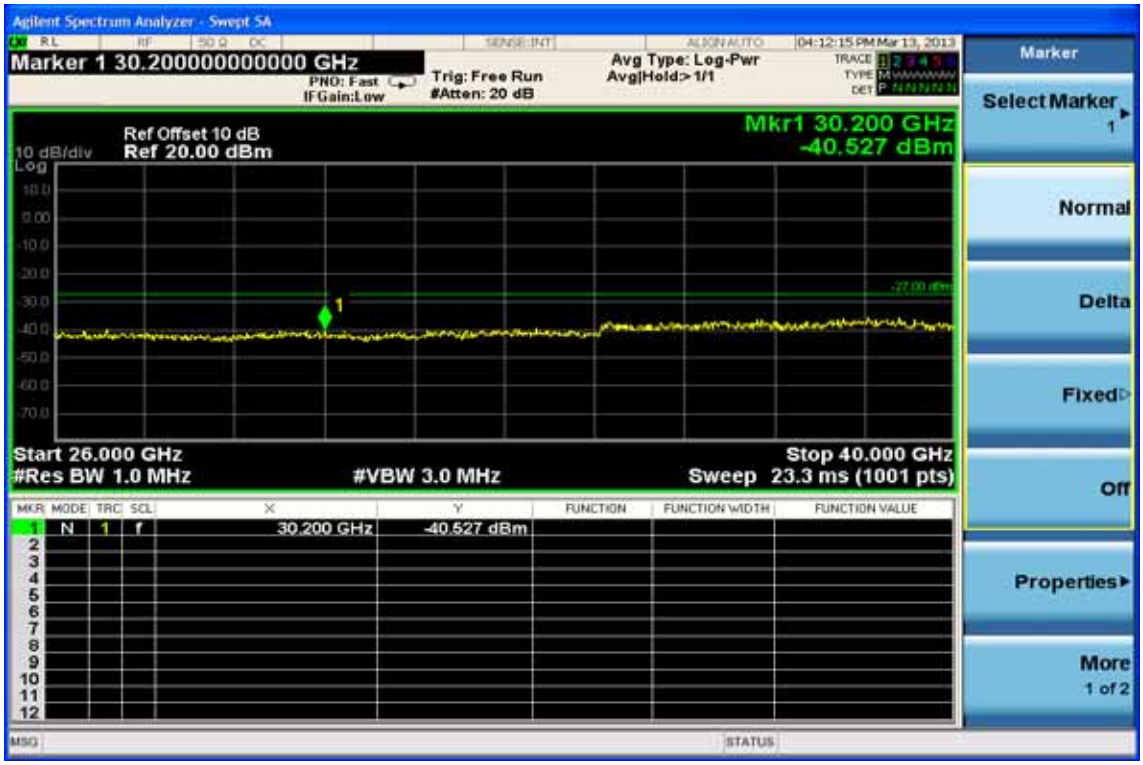
Ch Low 30MHz – 6GHz



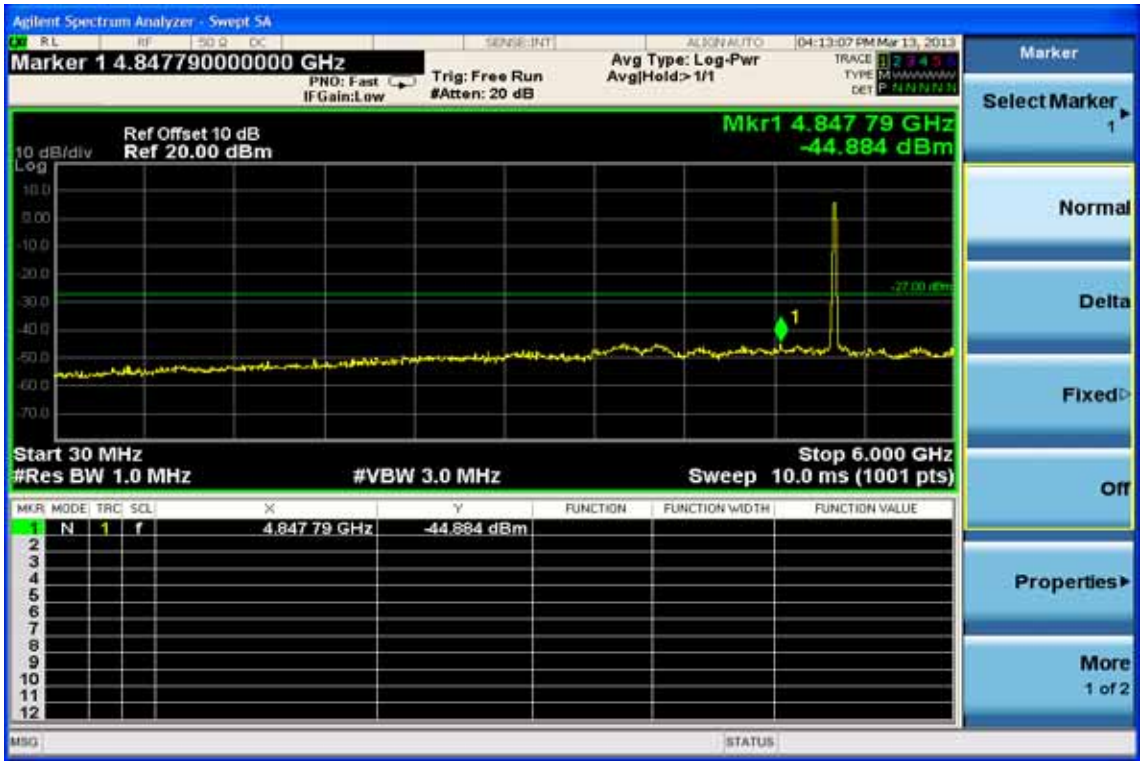
Ch Low 6GHz – 18GHz



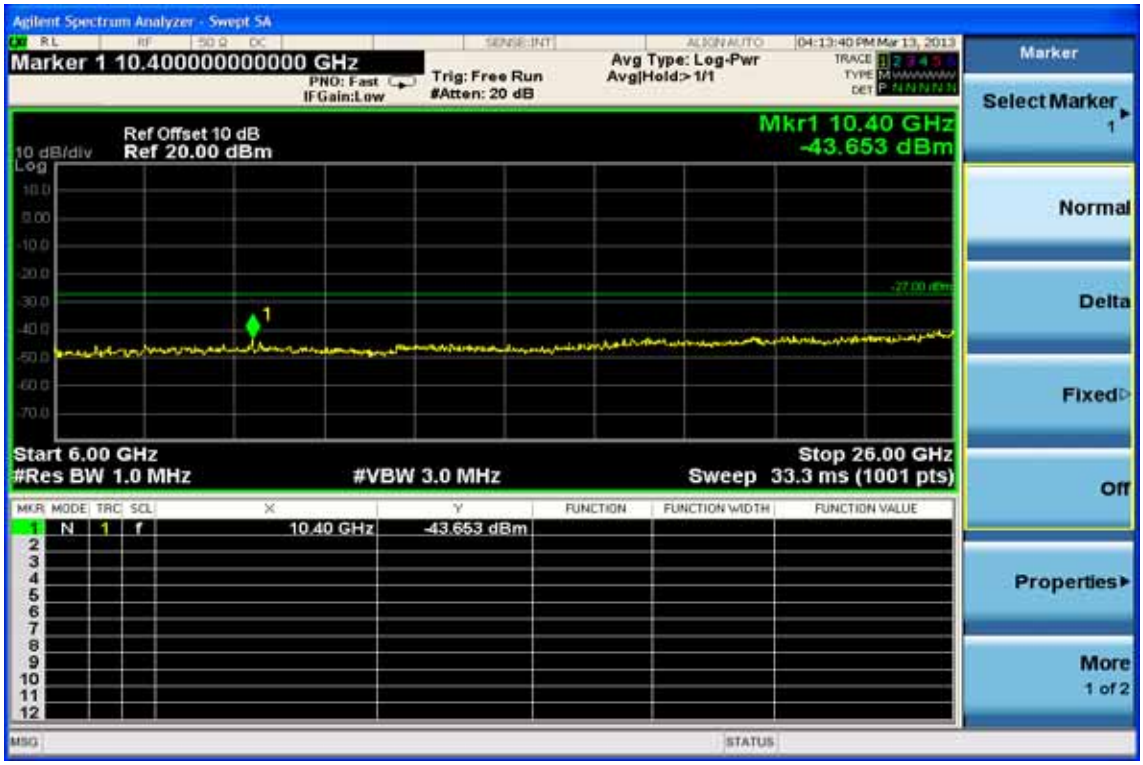
Ch Low 18GHz – 40GHz



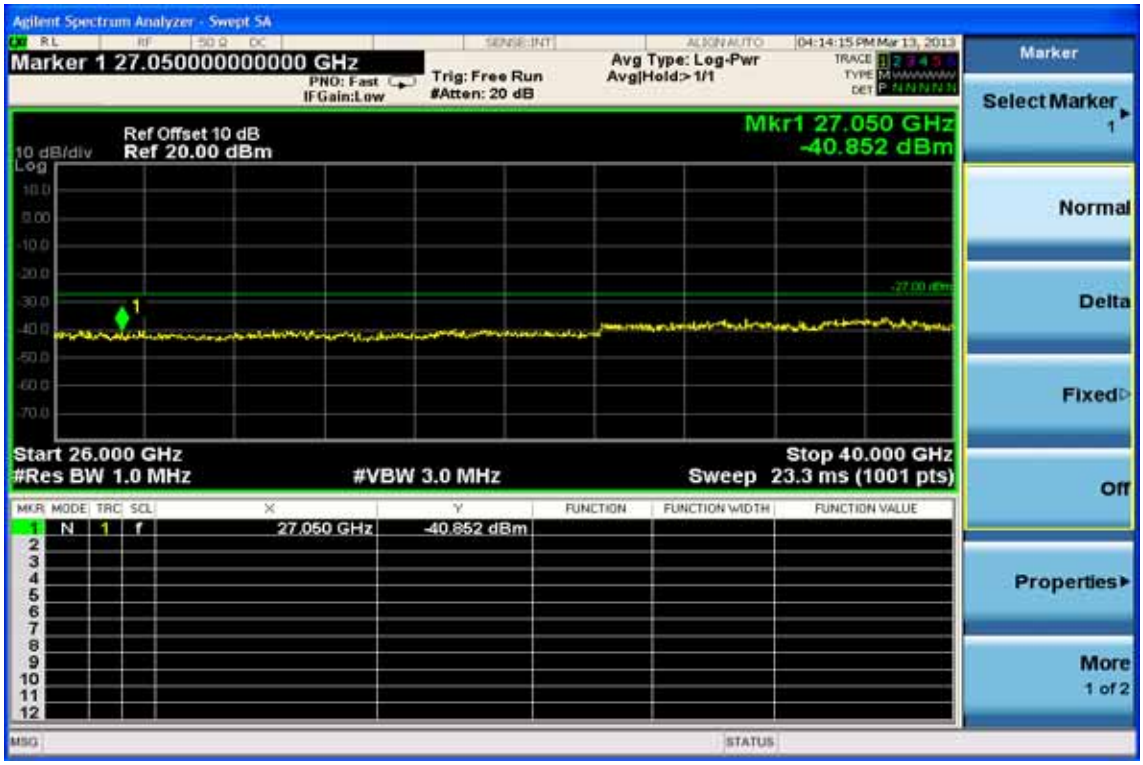
Ch Mid 30MHz – 6GHz



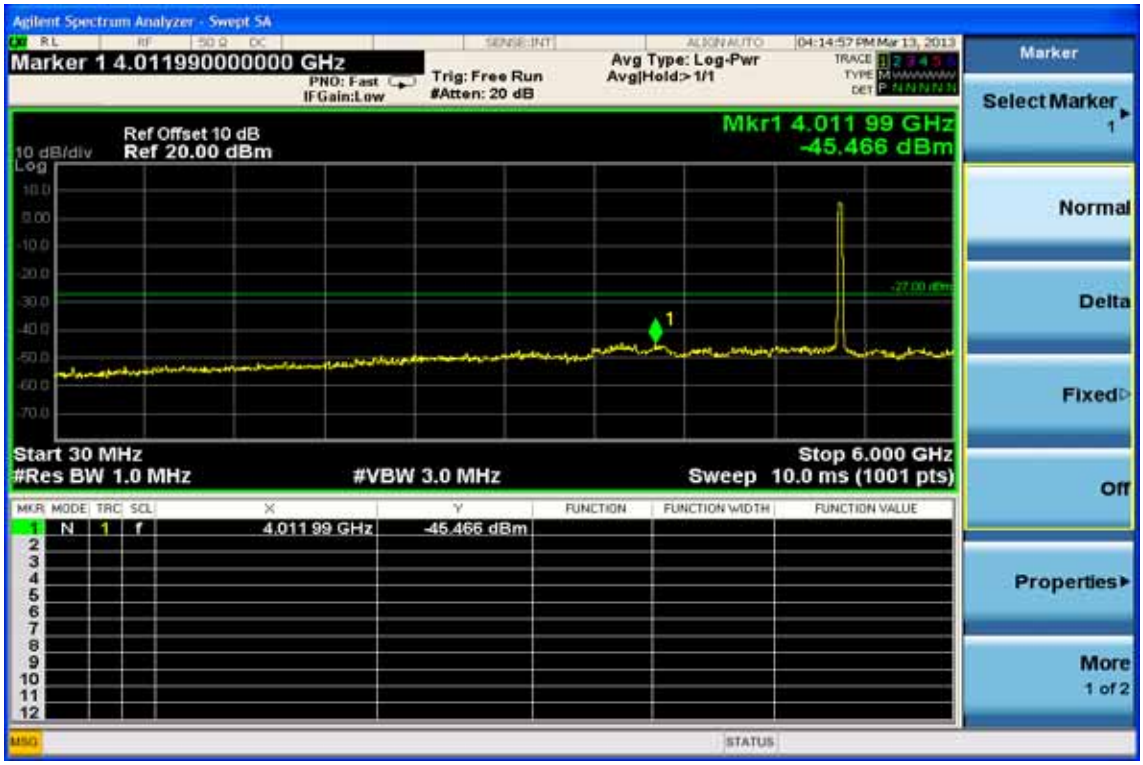
Ch Mid 6GHz – 18GHz



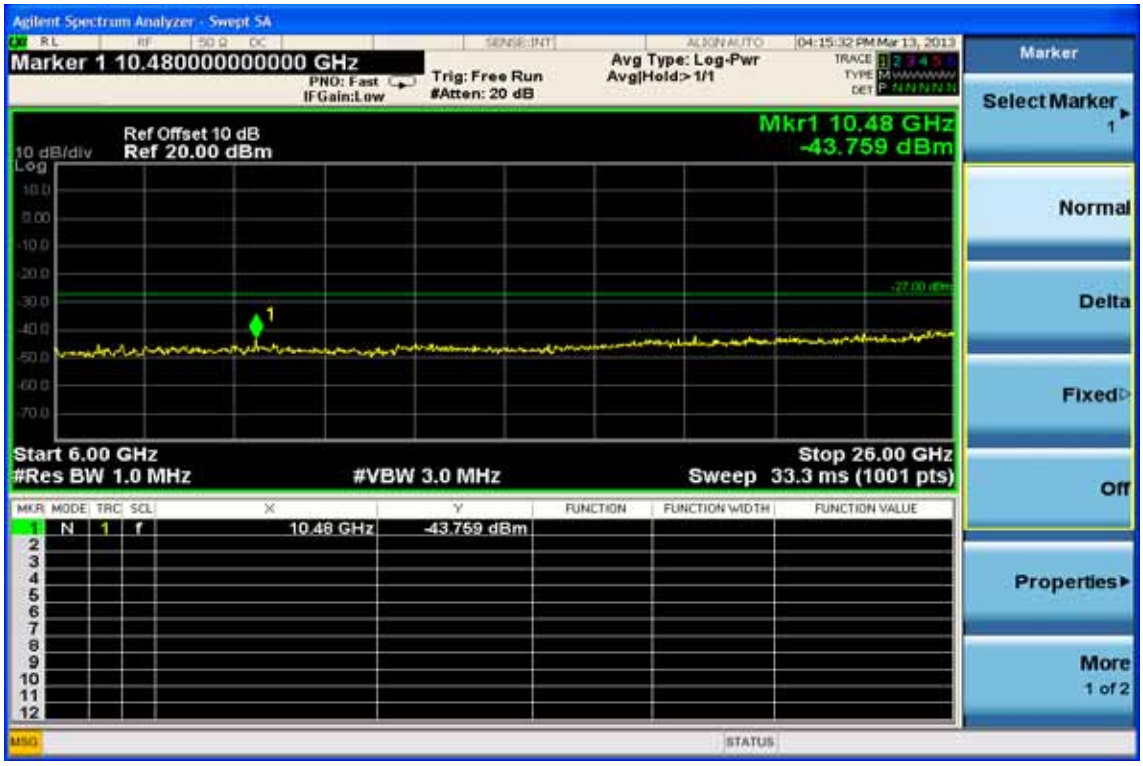
Ch Mid 18GHz – 40GHz



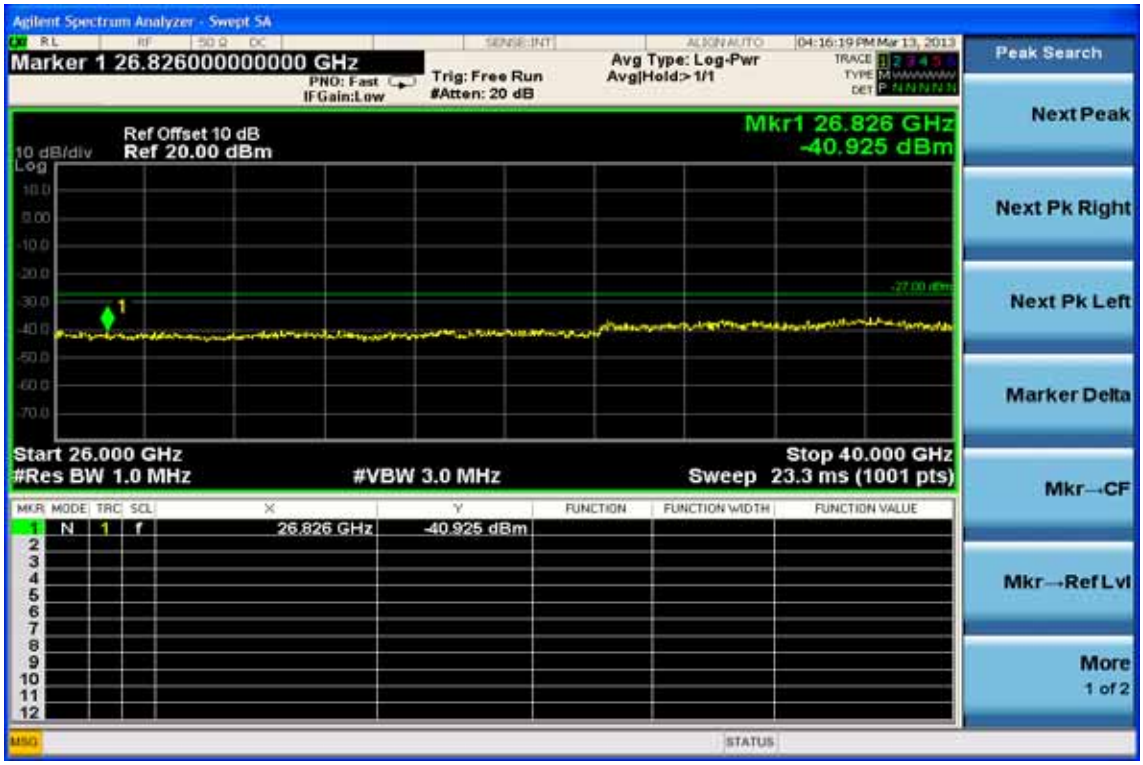
Ch High 30MHz – 6GHz



Ch High 6GHz – 18GHz

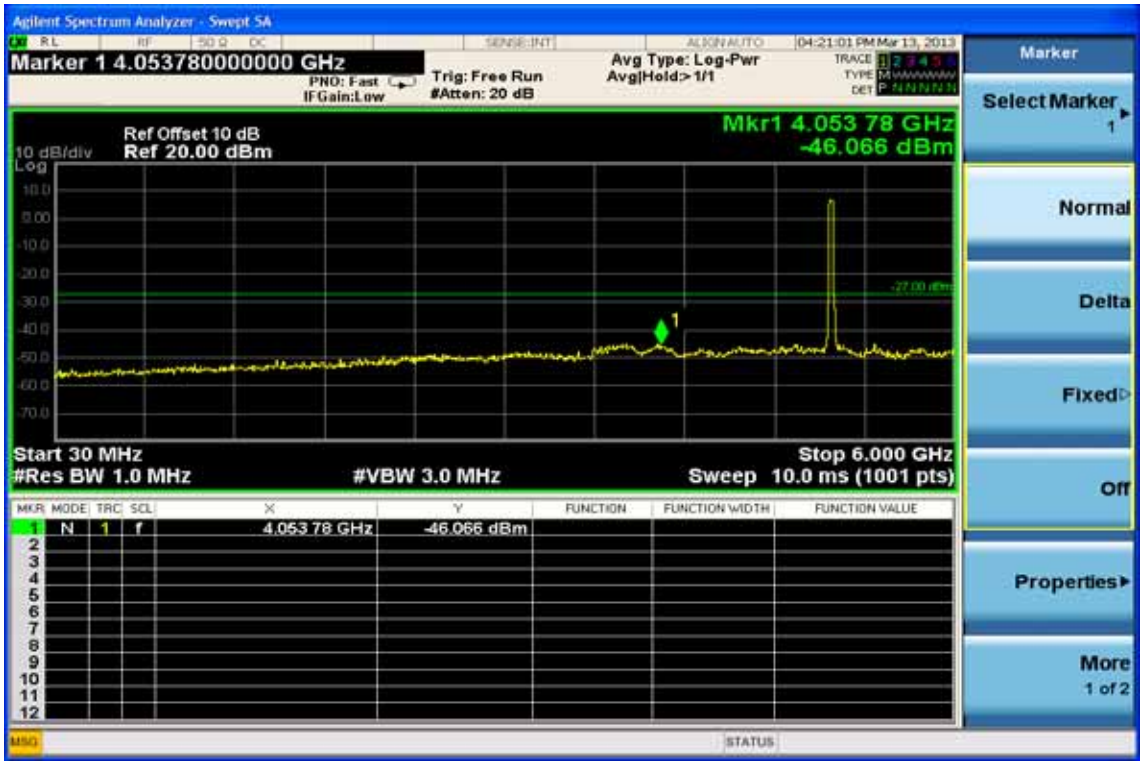


Ch High 18GHz – 40GHz

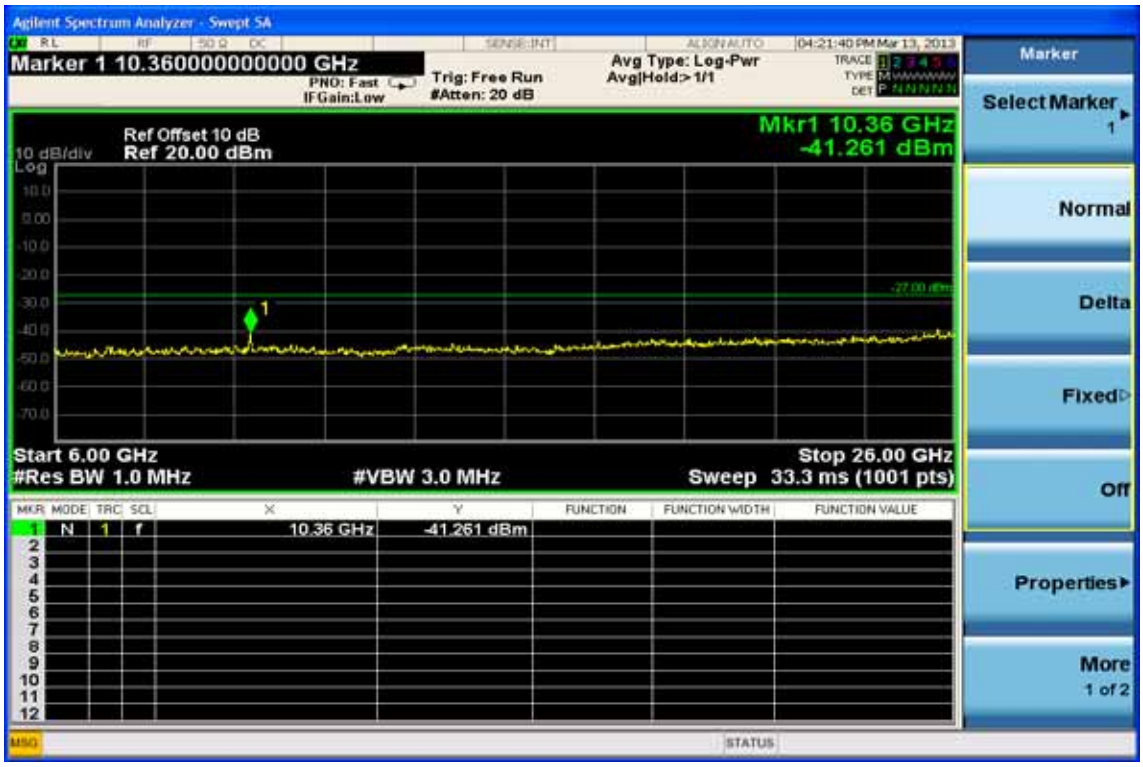


802.11n HT20 Mode (chain a)

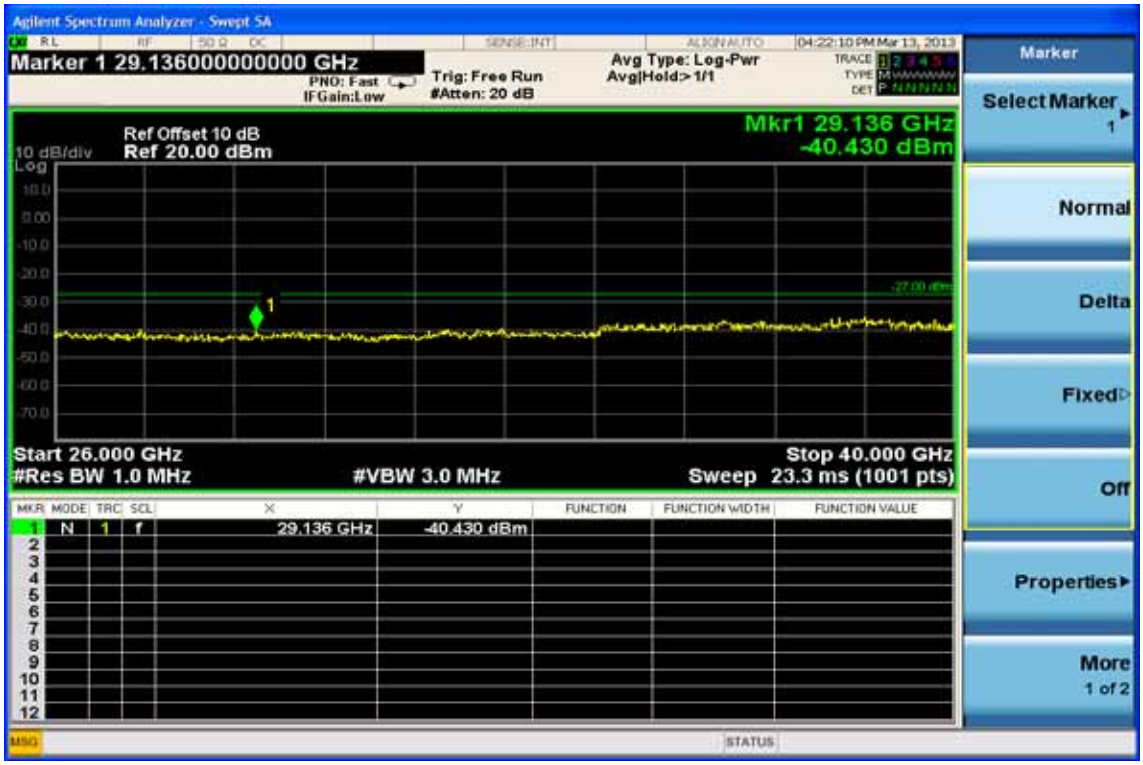
Ch Low 30MHz – 6GHz



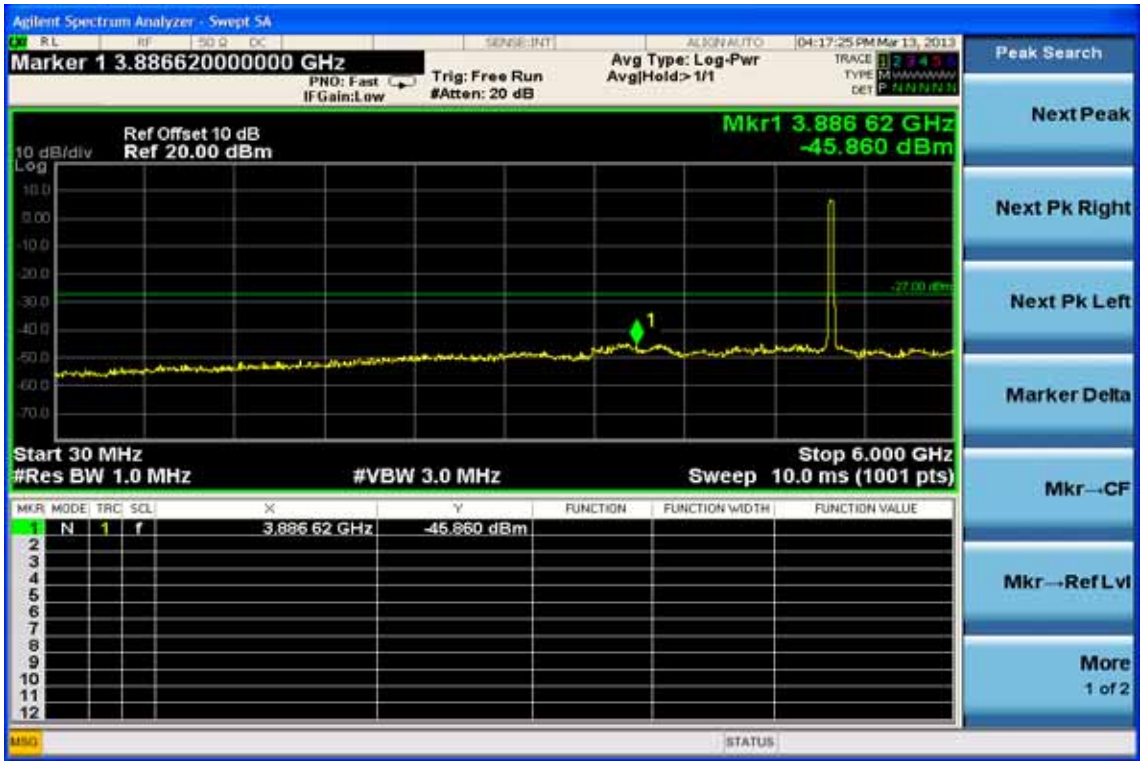
Ch Low 6GHz – 18GHz



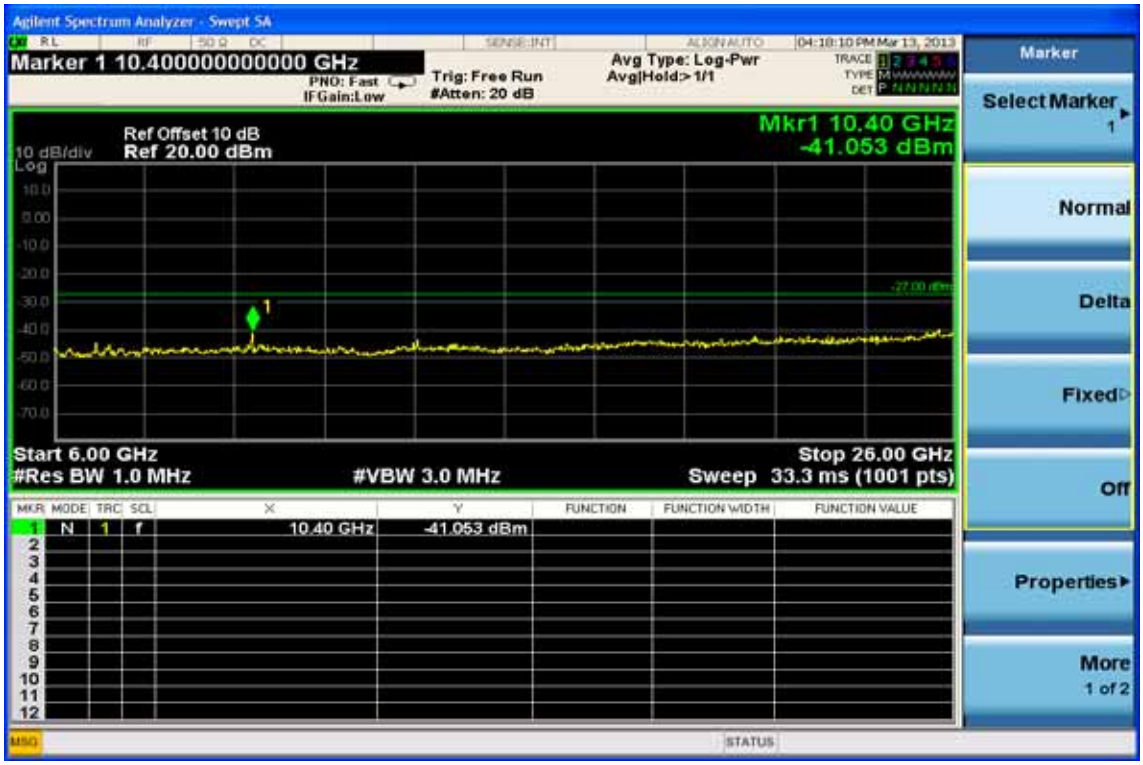
Ch Low 18GHz – 40GHz



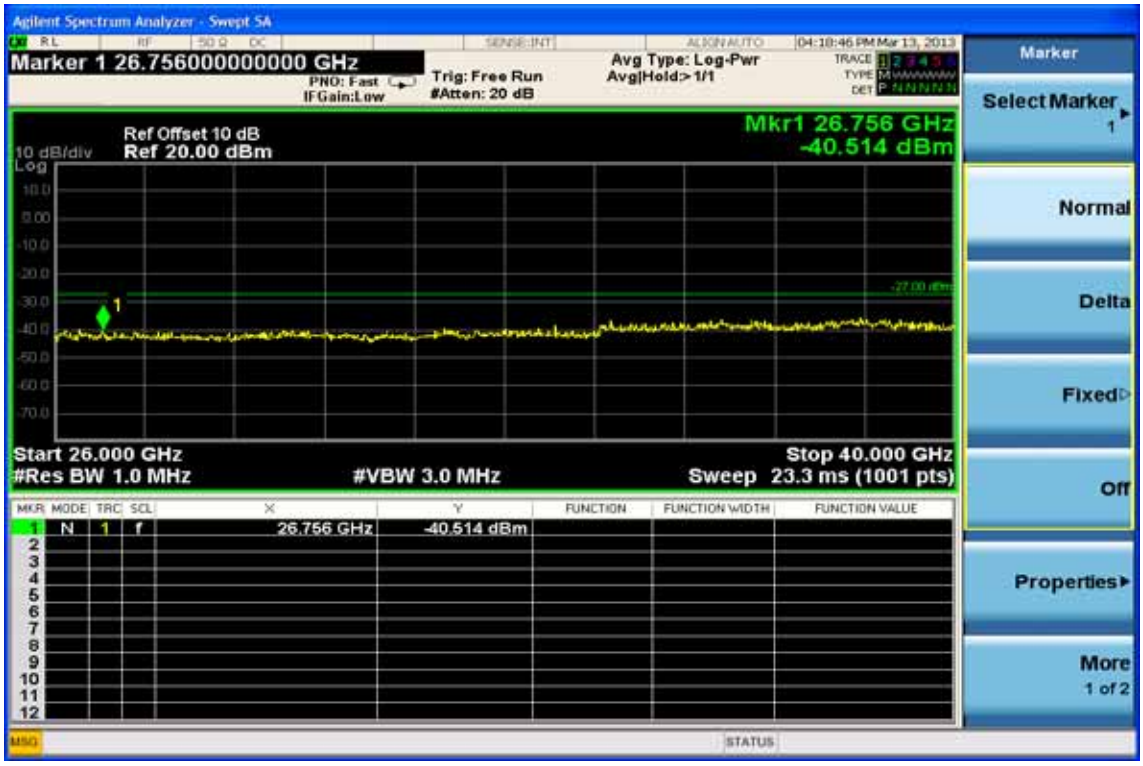
Ch Mid 30MHz – 6GHz



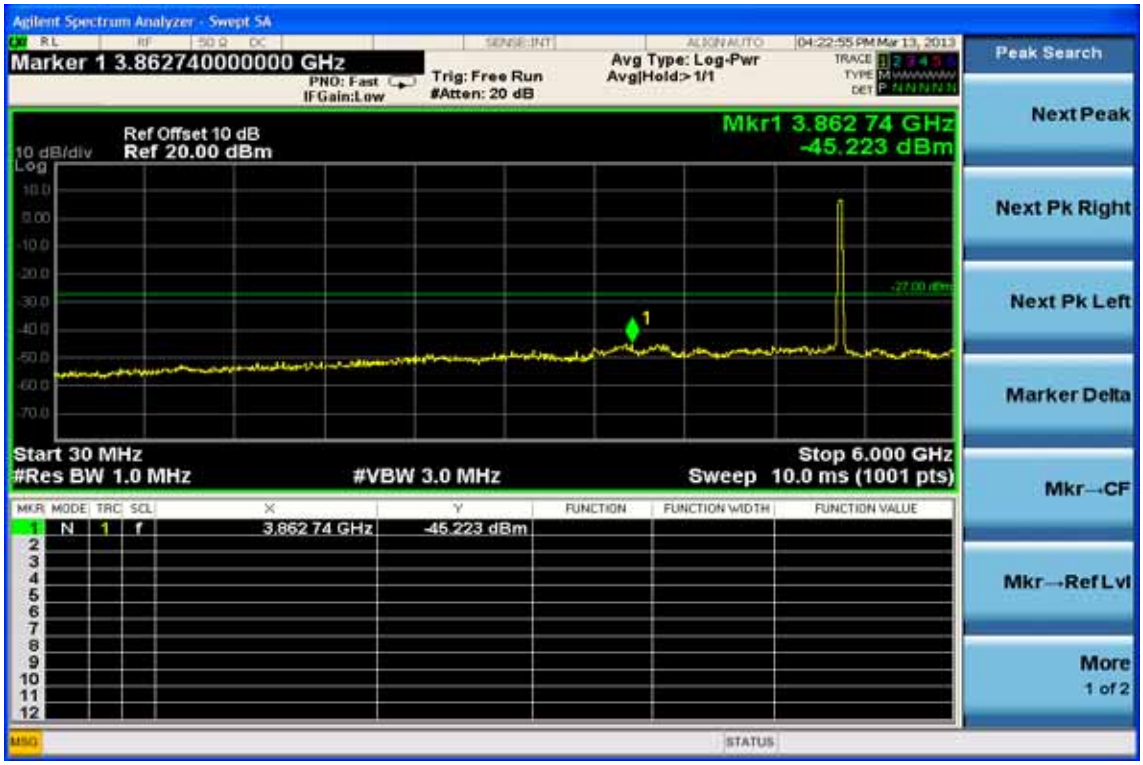
Ch Mid 6GHz – 18GHz



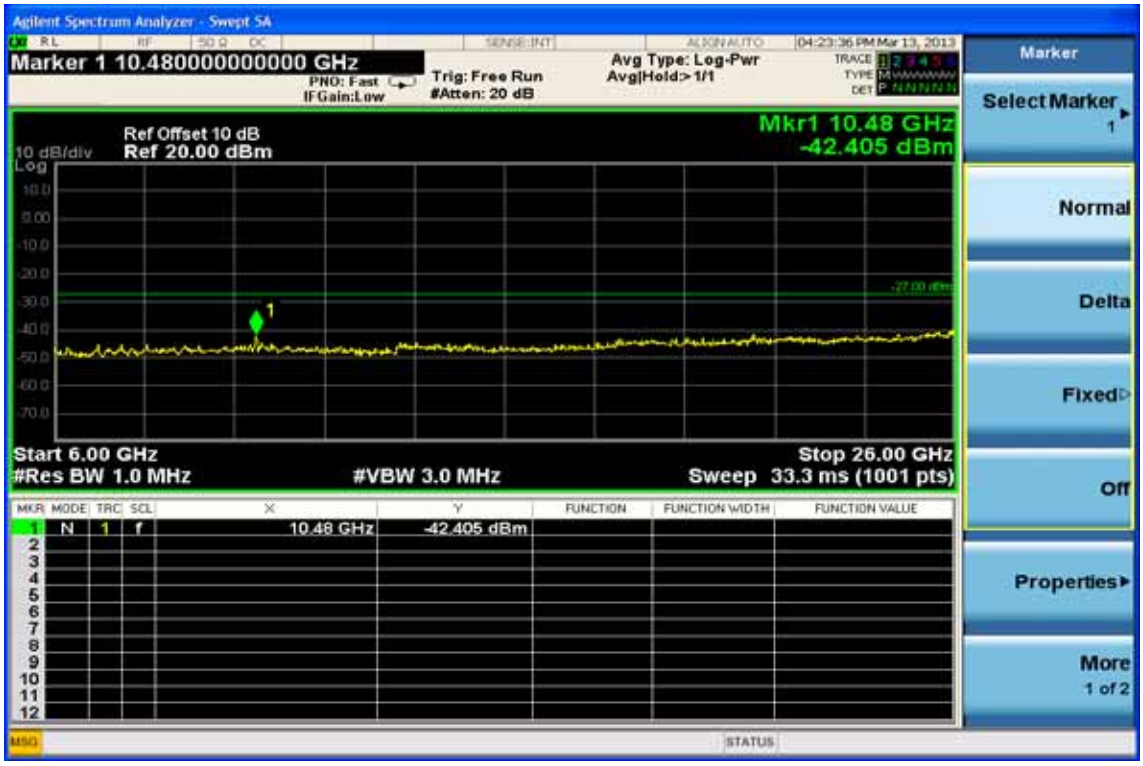
Ch Mid 18GHz – 40GHz



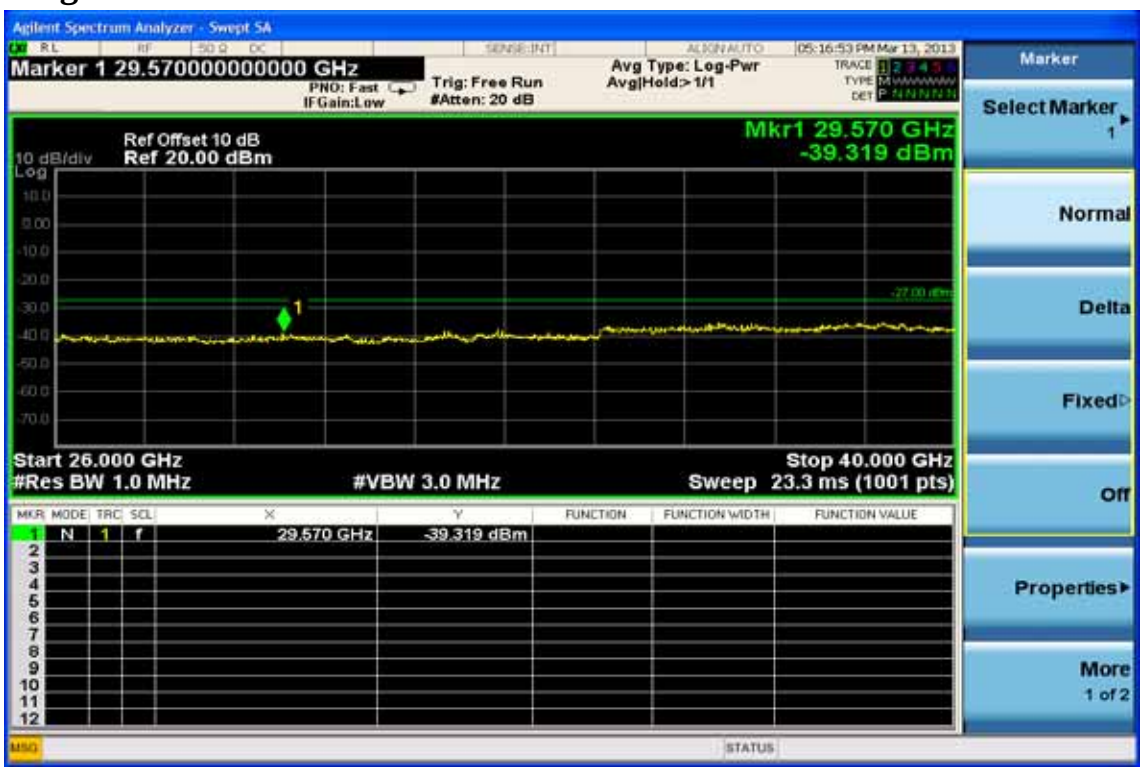
Ch High 30MHz – 6GHz



Ch High 6GHz – 18GHz

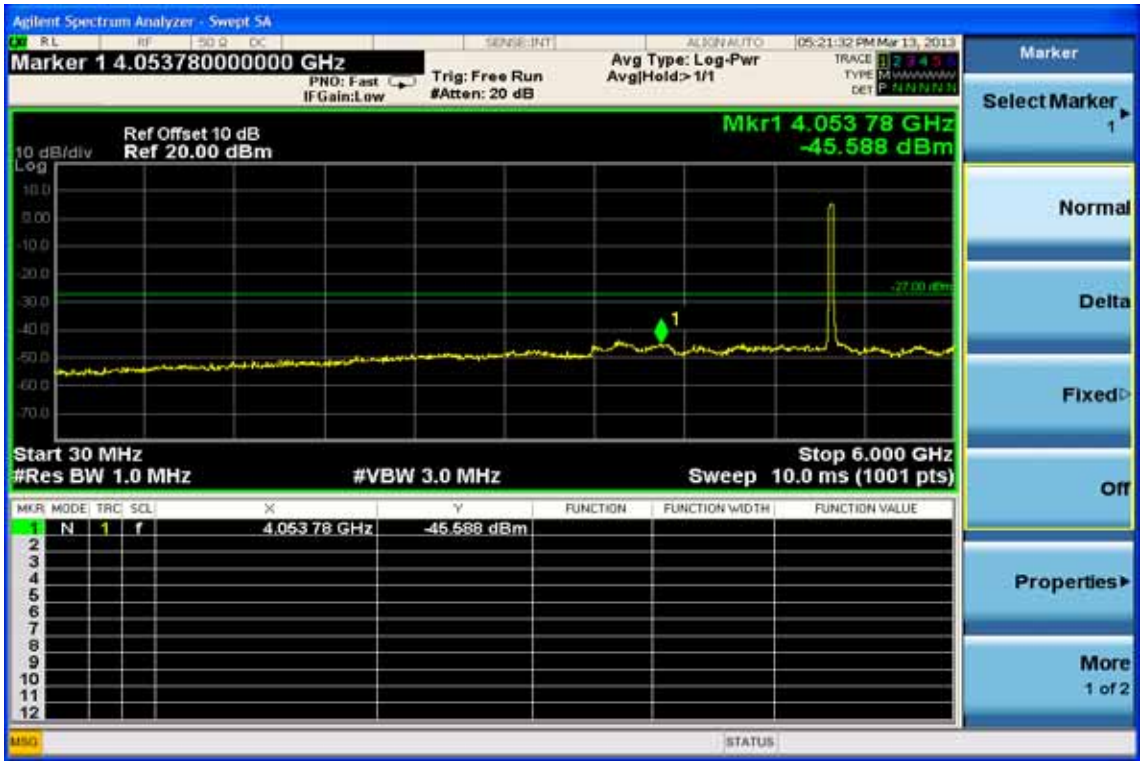


Ch High 18GHz – 40GHz

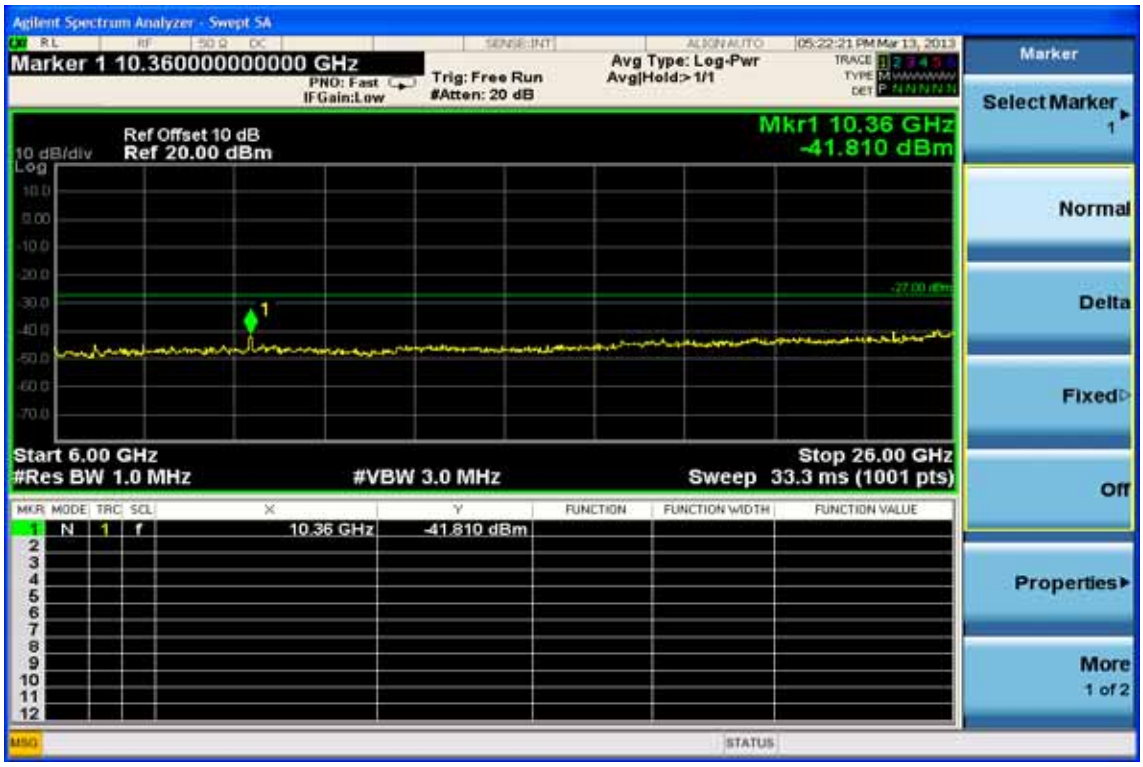


802.11n HT20 Mode (chain b)

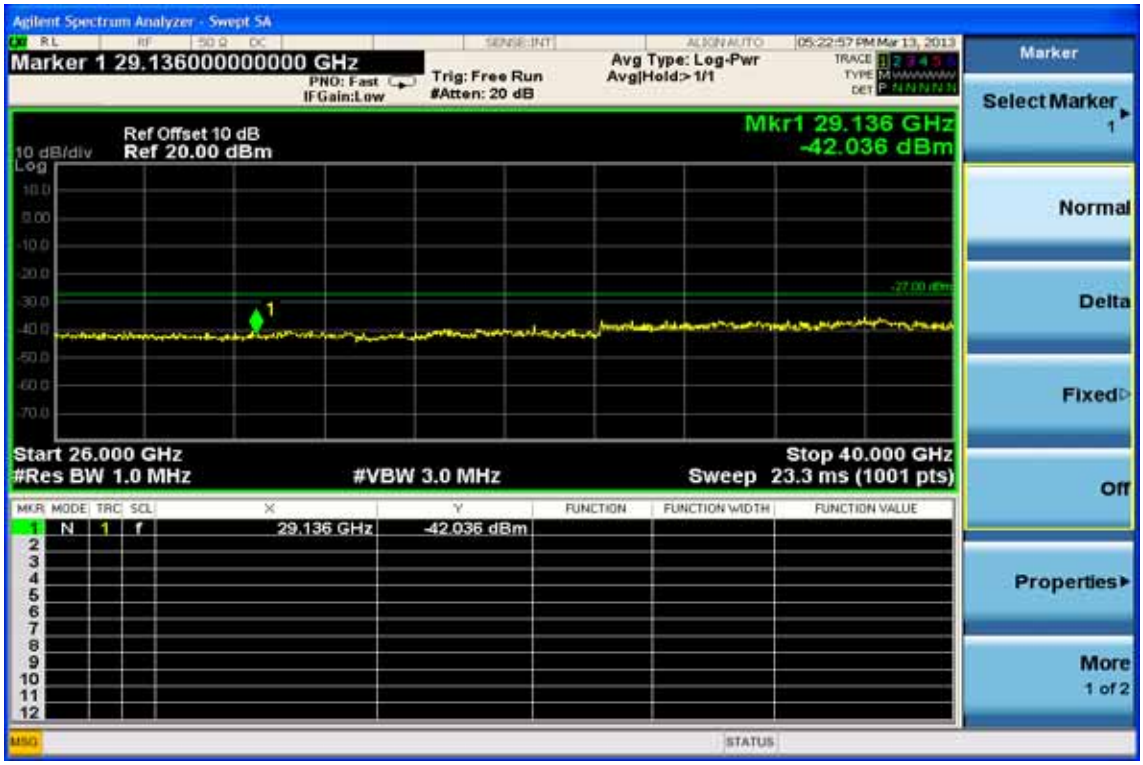
Ch Low 30MHz – 6GHz



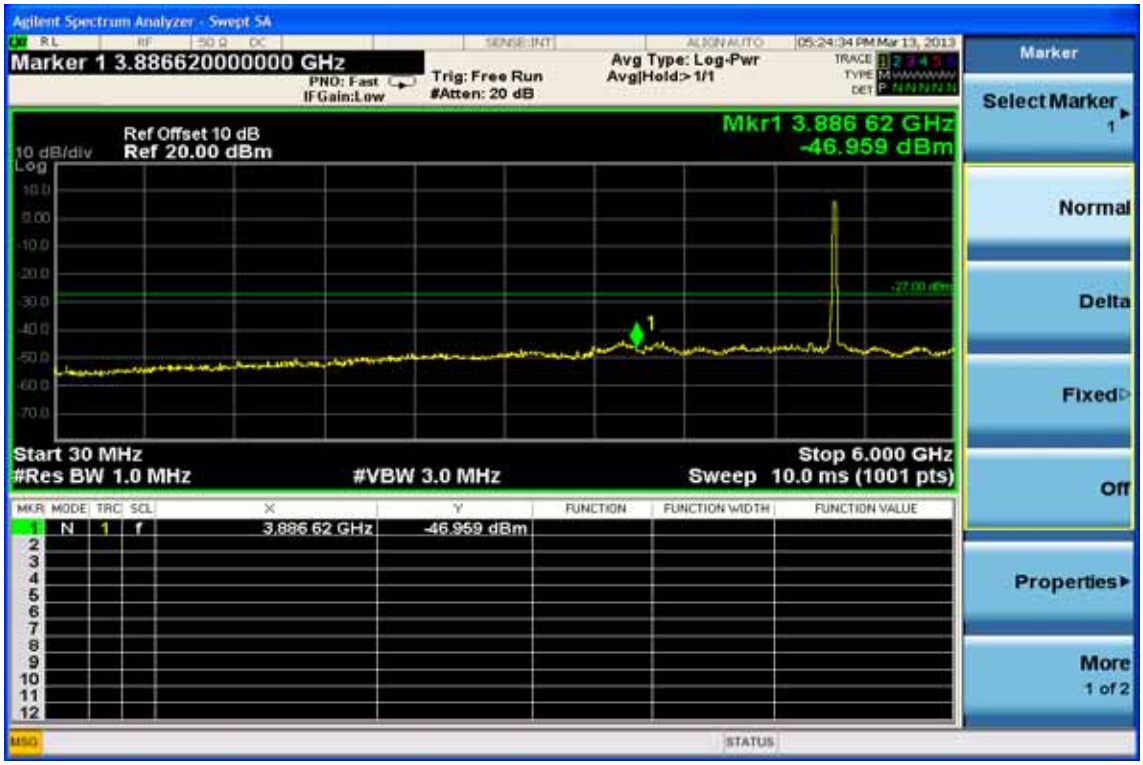
Ch Low 6GHz – 18GHz



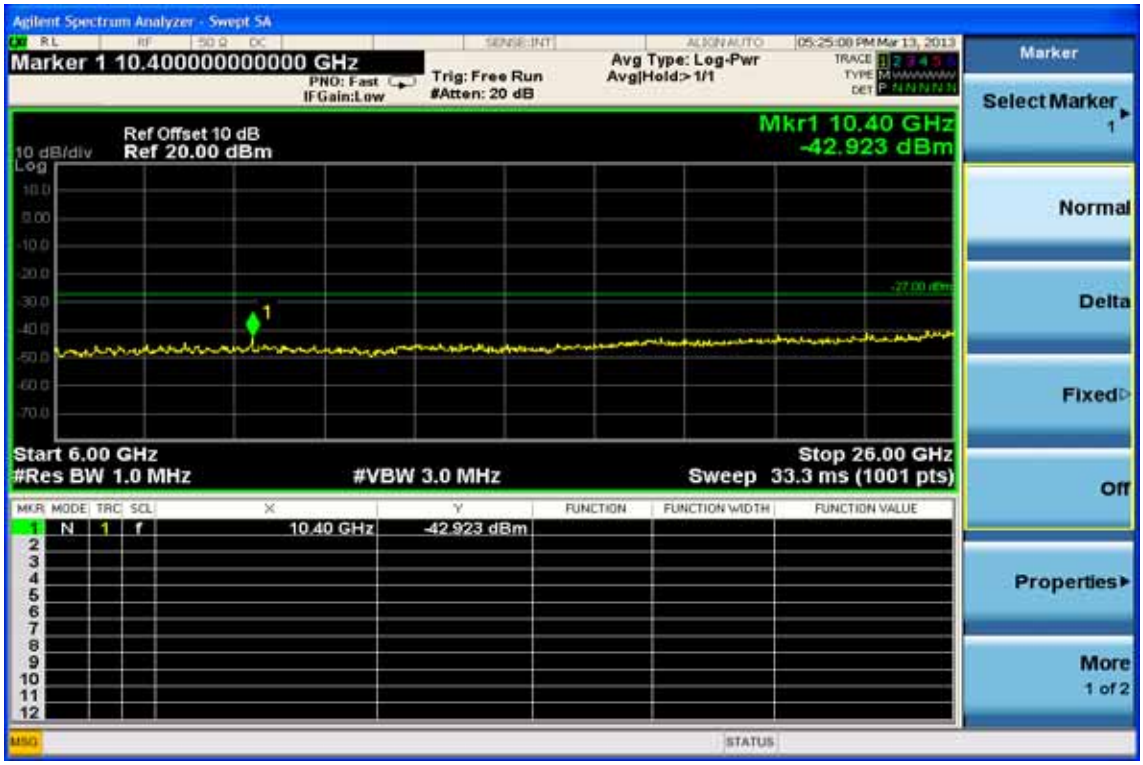
Ch Low 18GHz – 40GHz



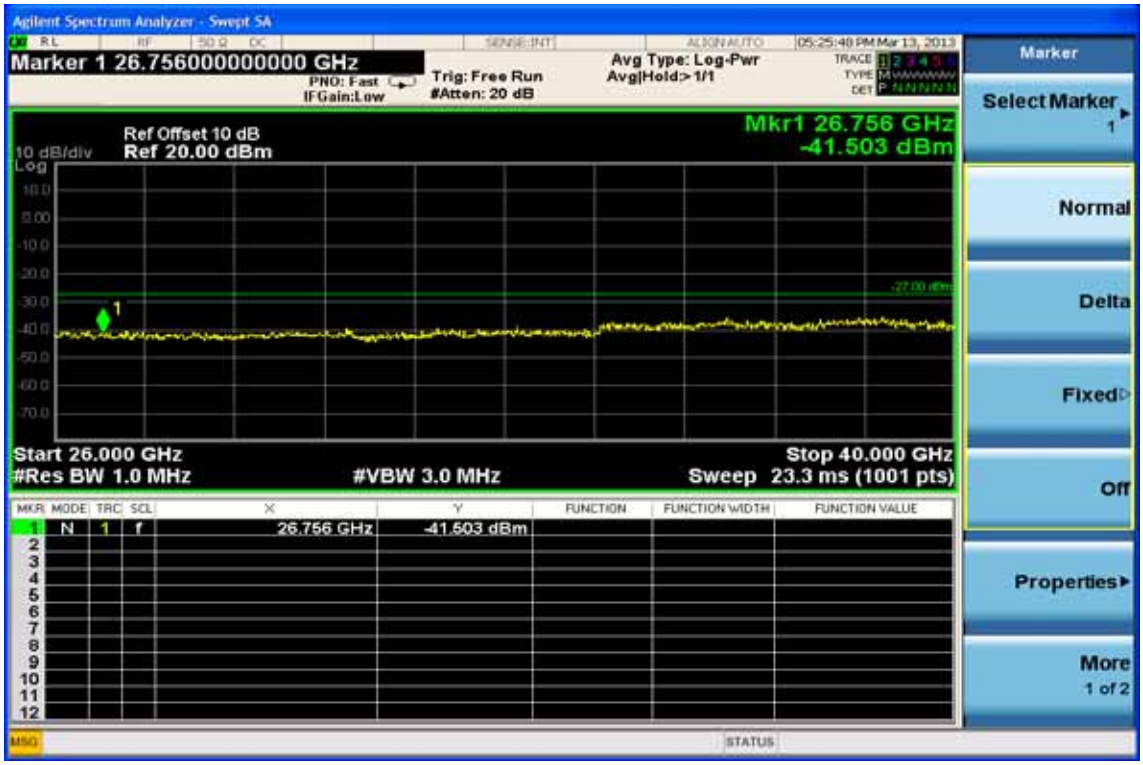
Ch Mid 30MHz – 6GHz



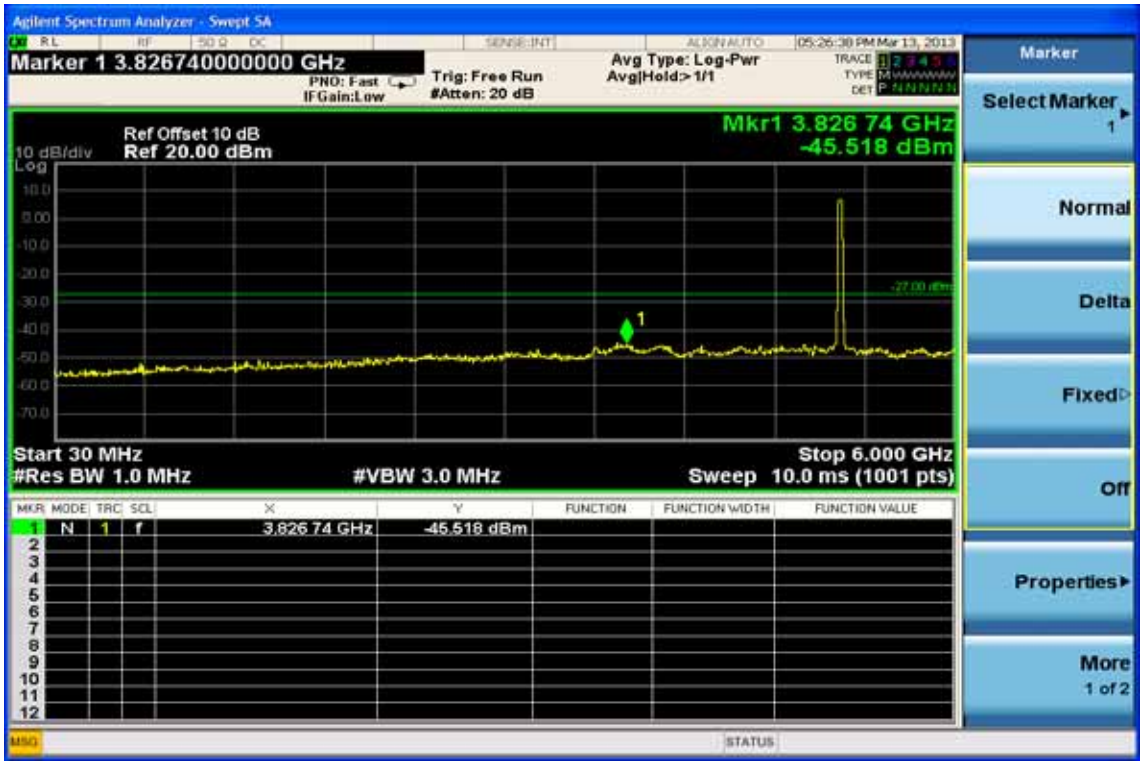
Ch Mid 6GHz – 18GHz



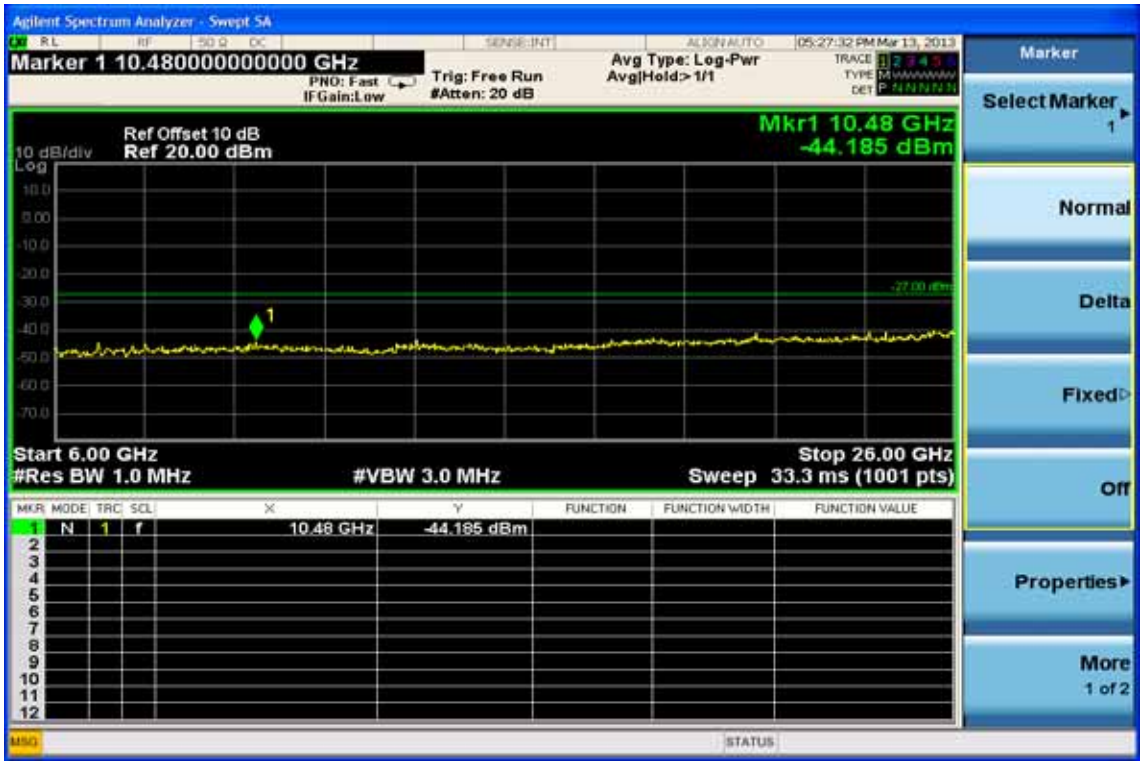
Ch Mid 18GHz – 40GHz



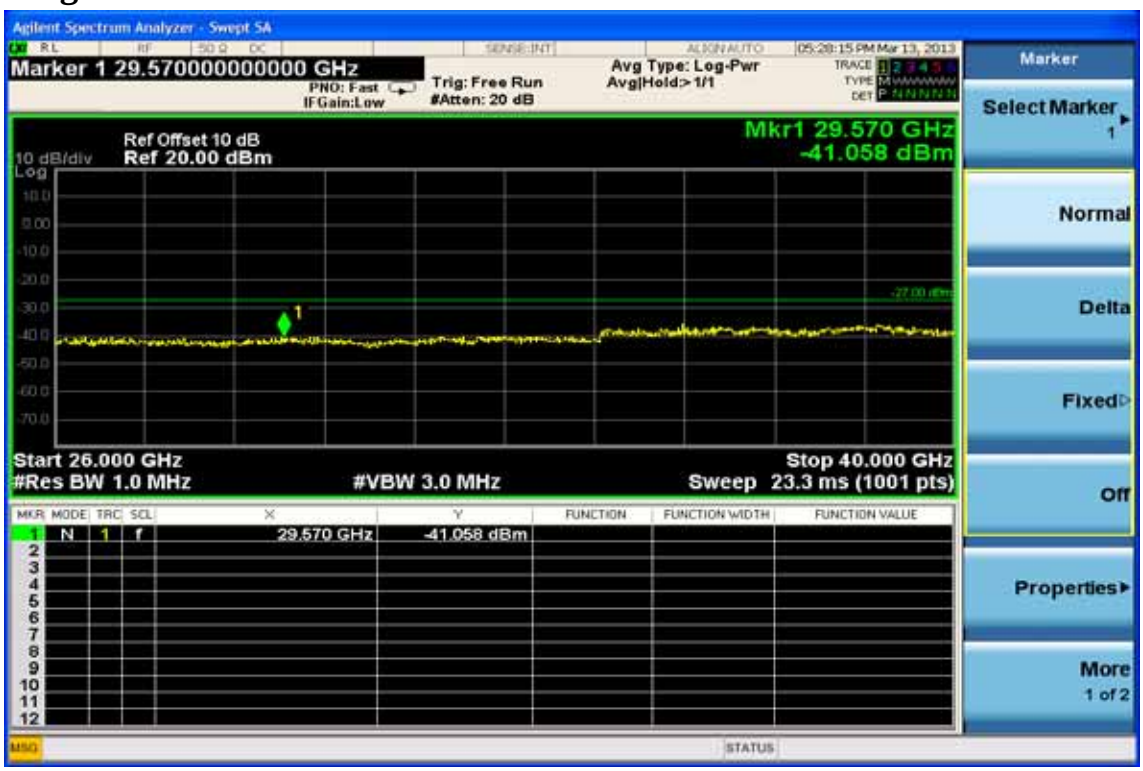
Ch High 30MHz – 6GHz



Ch High 6GHz – 18GHz

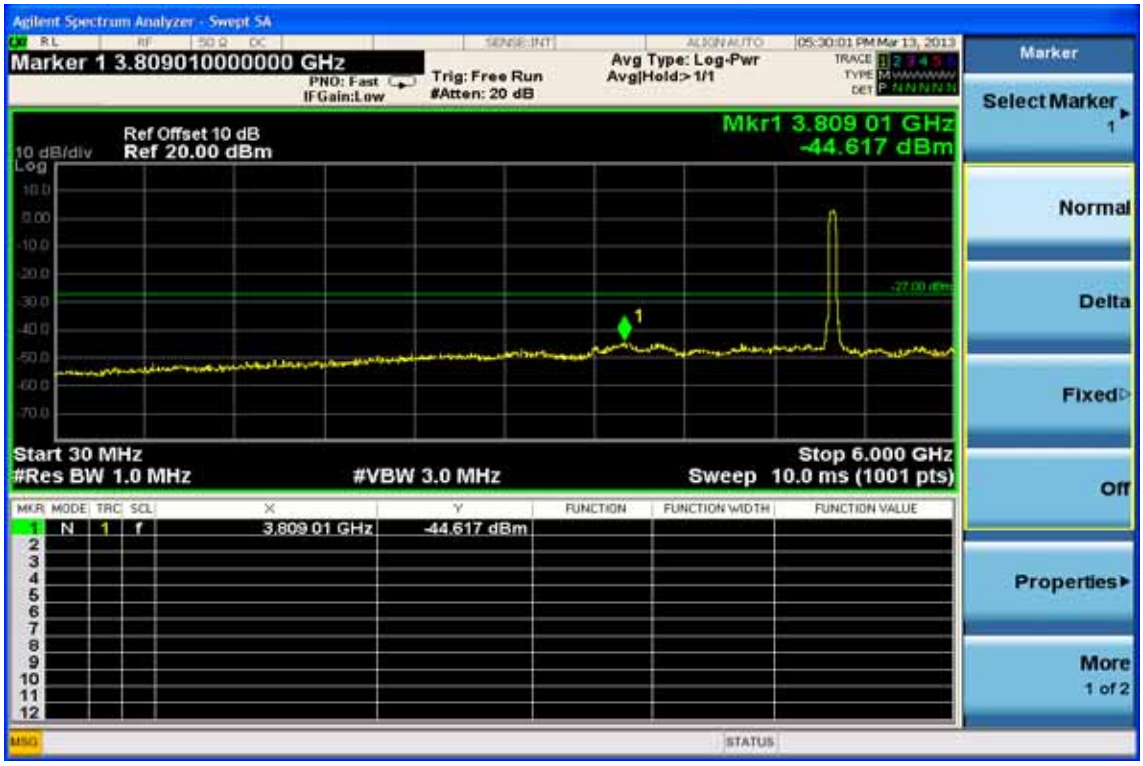


Ch High 18GHz – 40GHz

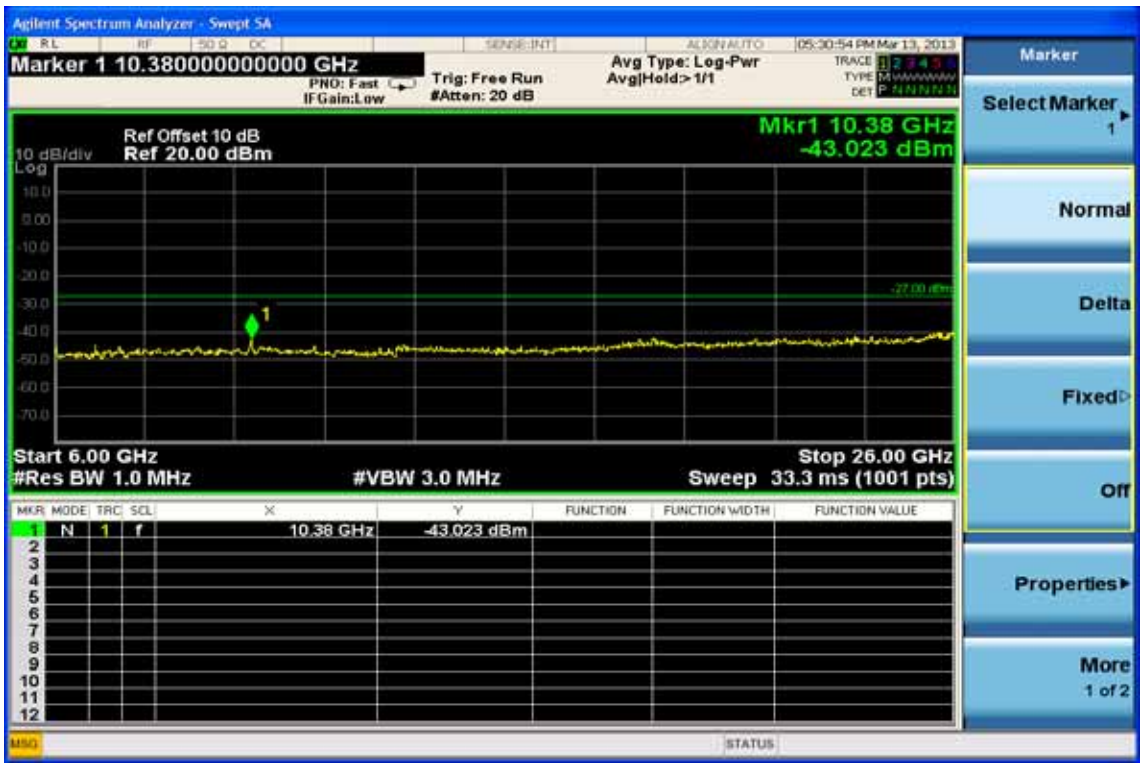


802.11n HT40 Mode (chain a)

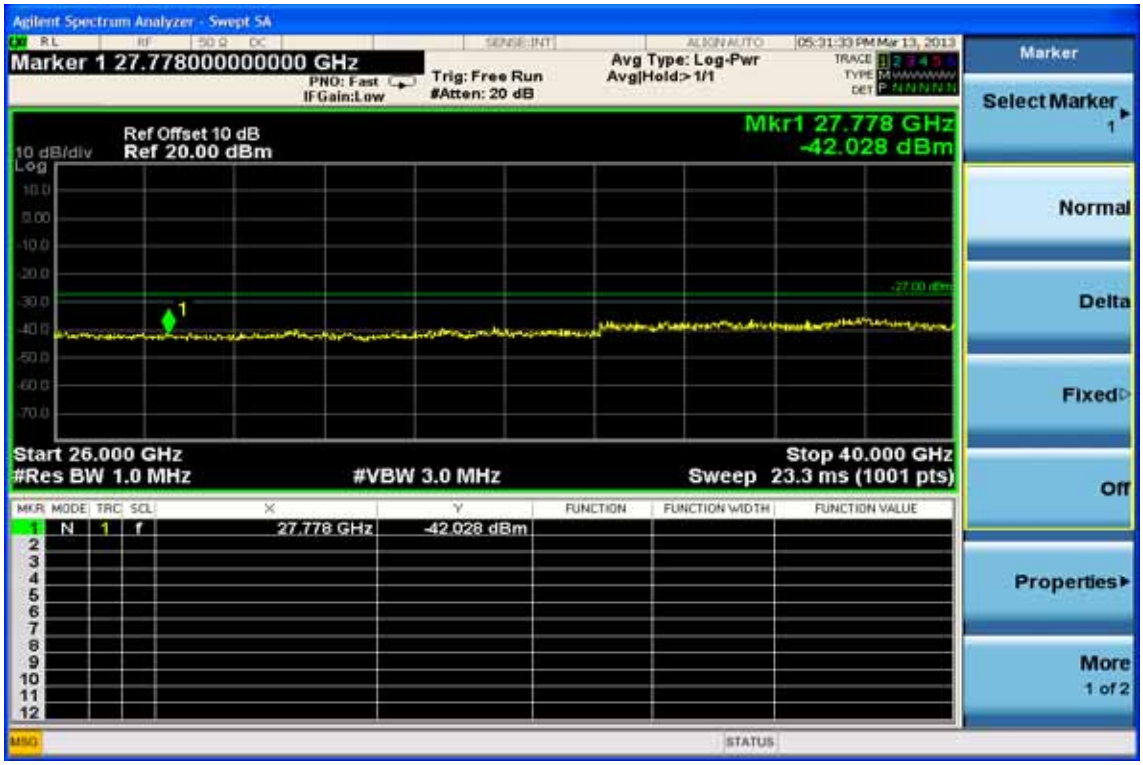
Ch Low 30MHz – 6GHz



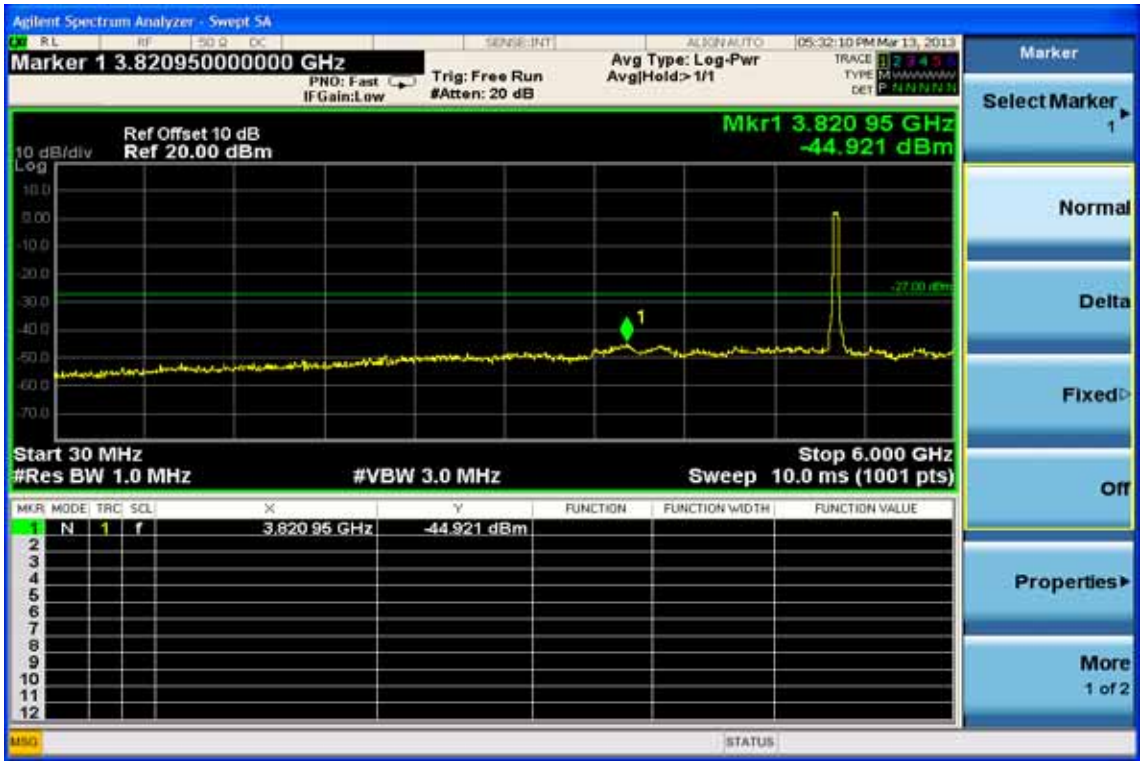
Ch Low 6GHz – 18GHz



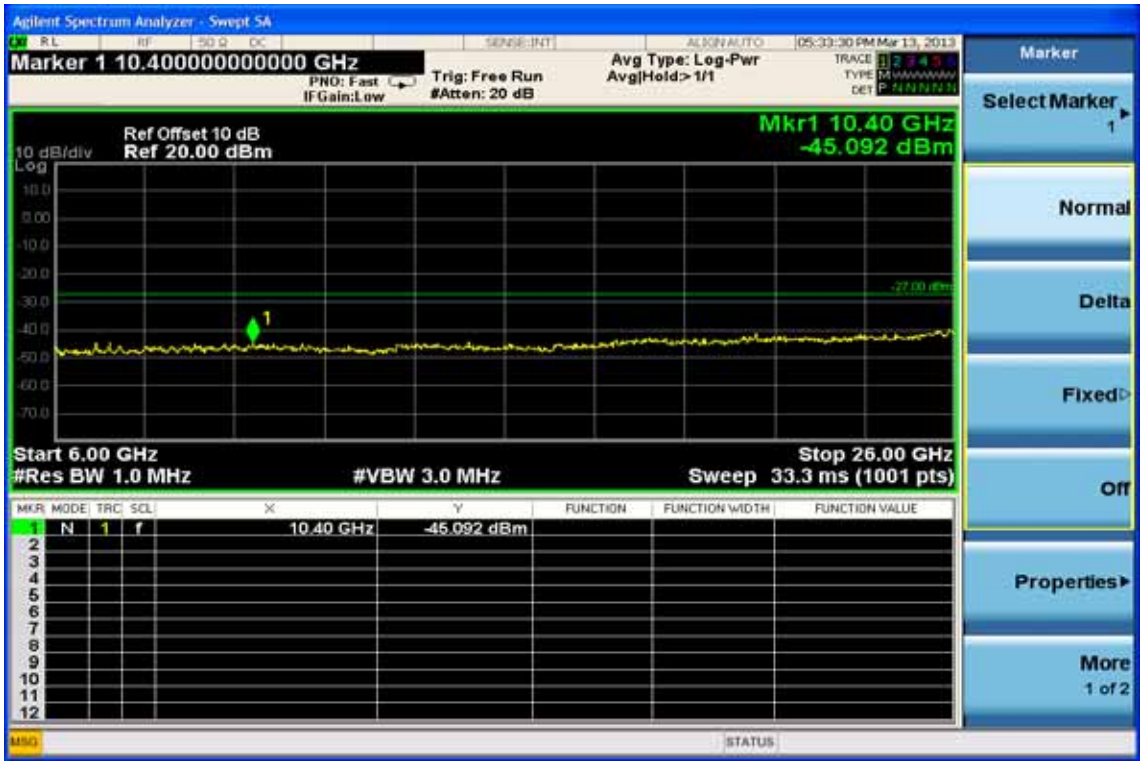
Ch Low 18GHz – 40GHz



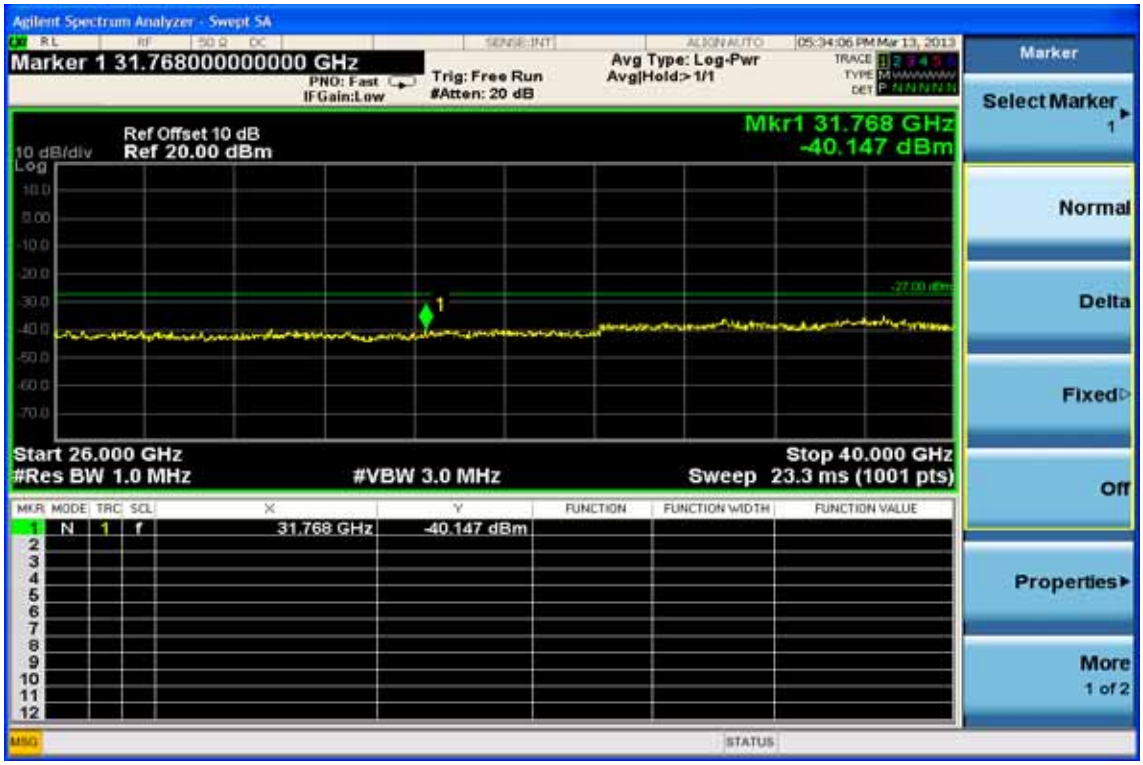
Ch Mid 30MHz – 6GHz



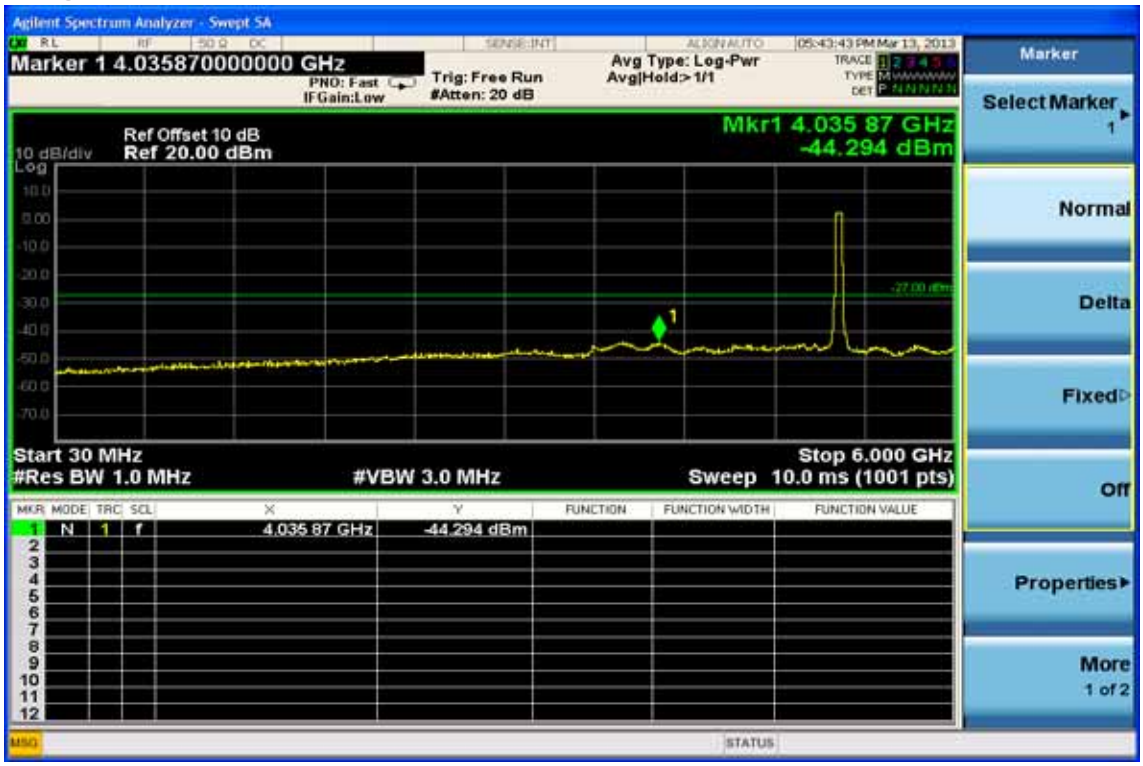
Ch Mid 6GHz – 18GHz



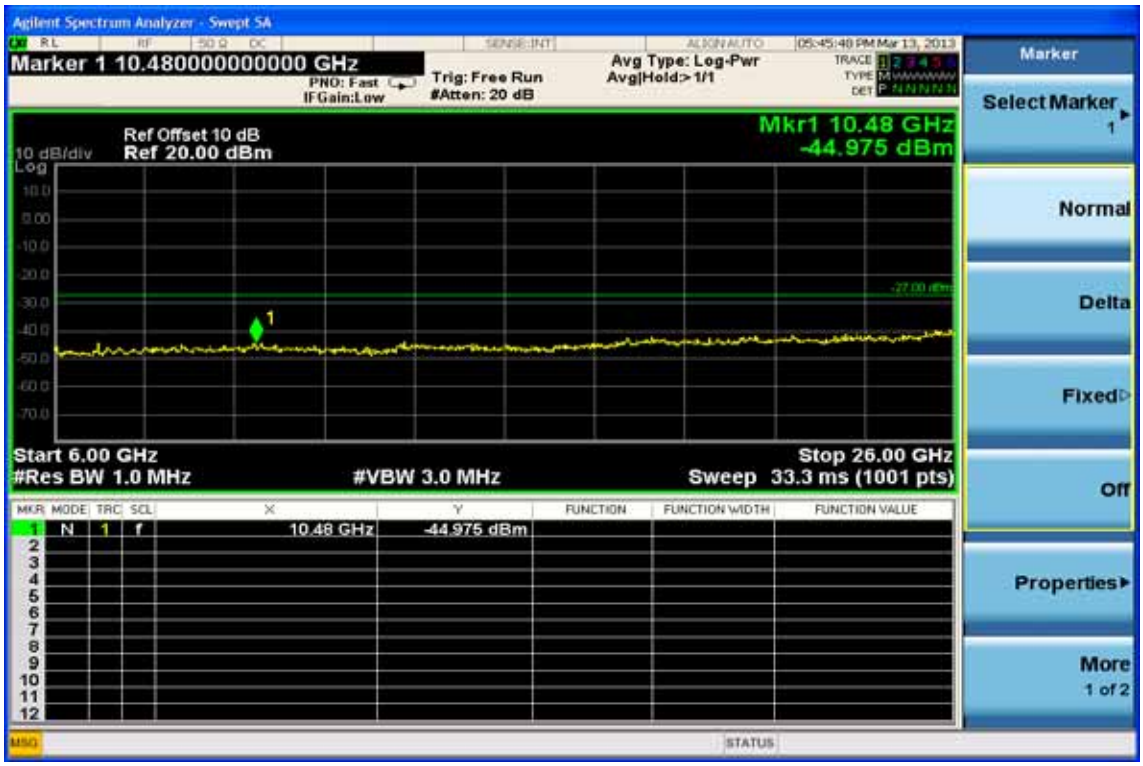
Ch Mid 18GHz – 40GHz



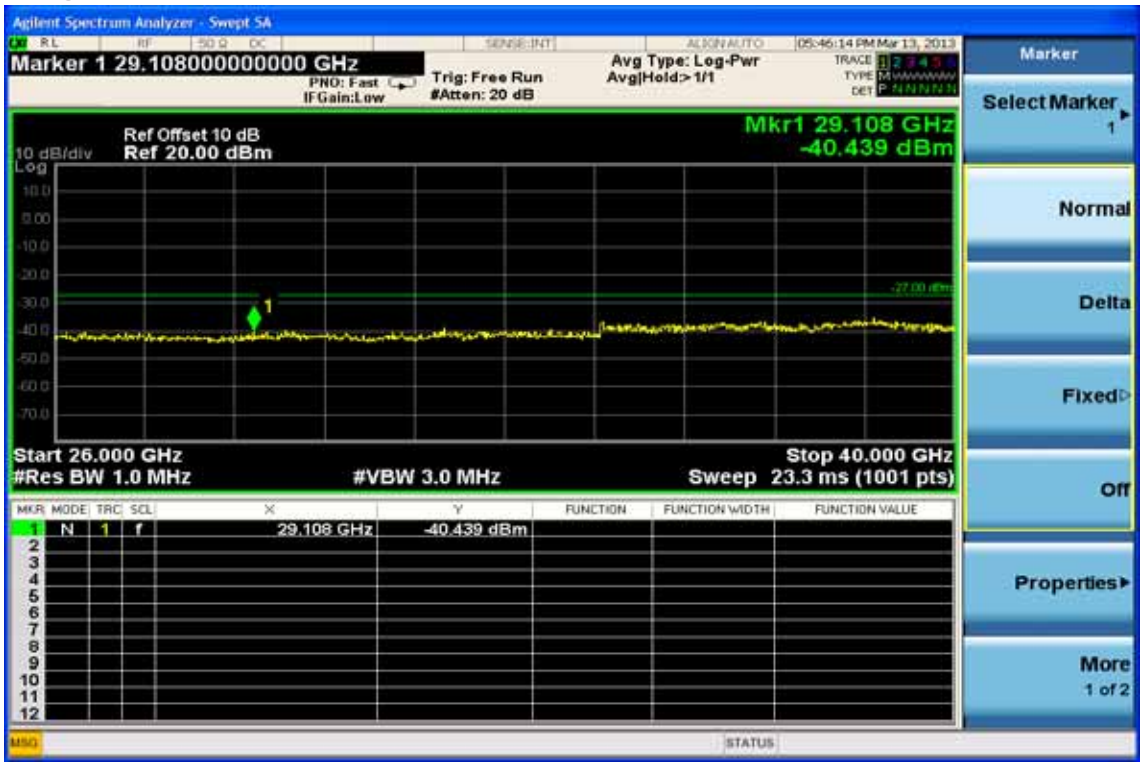
Ch High 30MHz – 6GHz



Ch High 6GHz – 18GHz

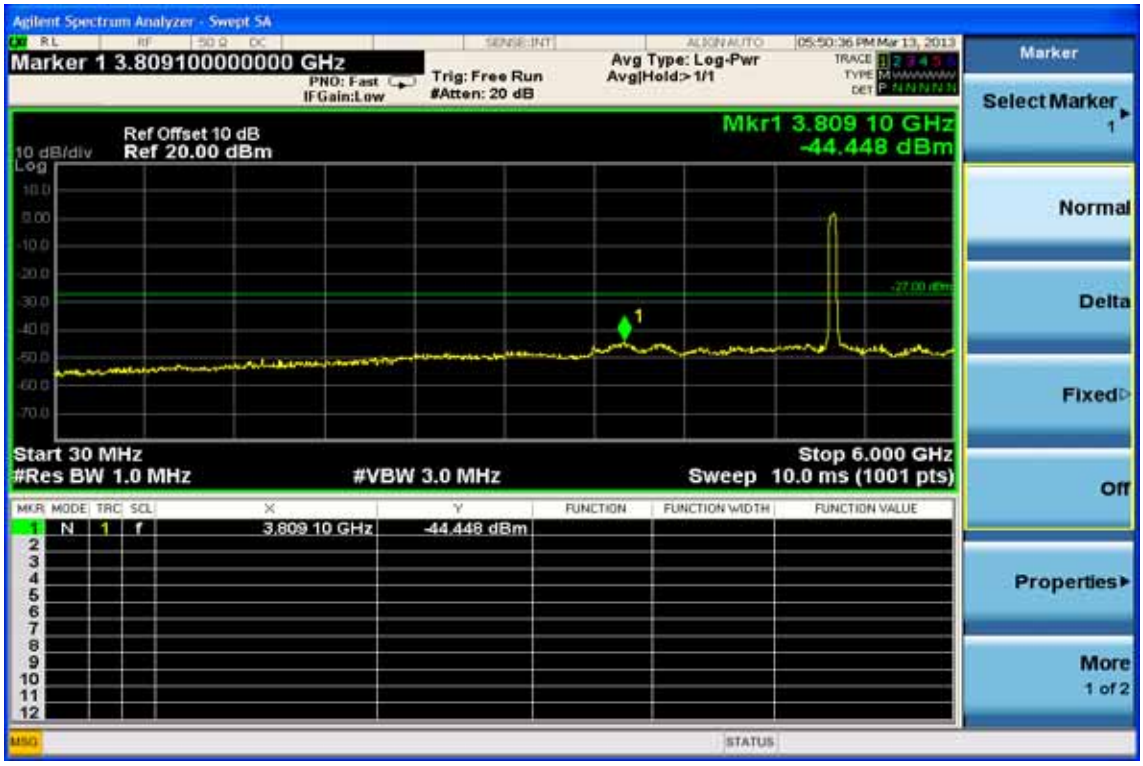


Ch High 18GHz – 40GHz

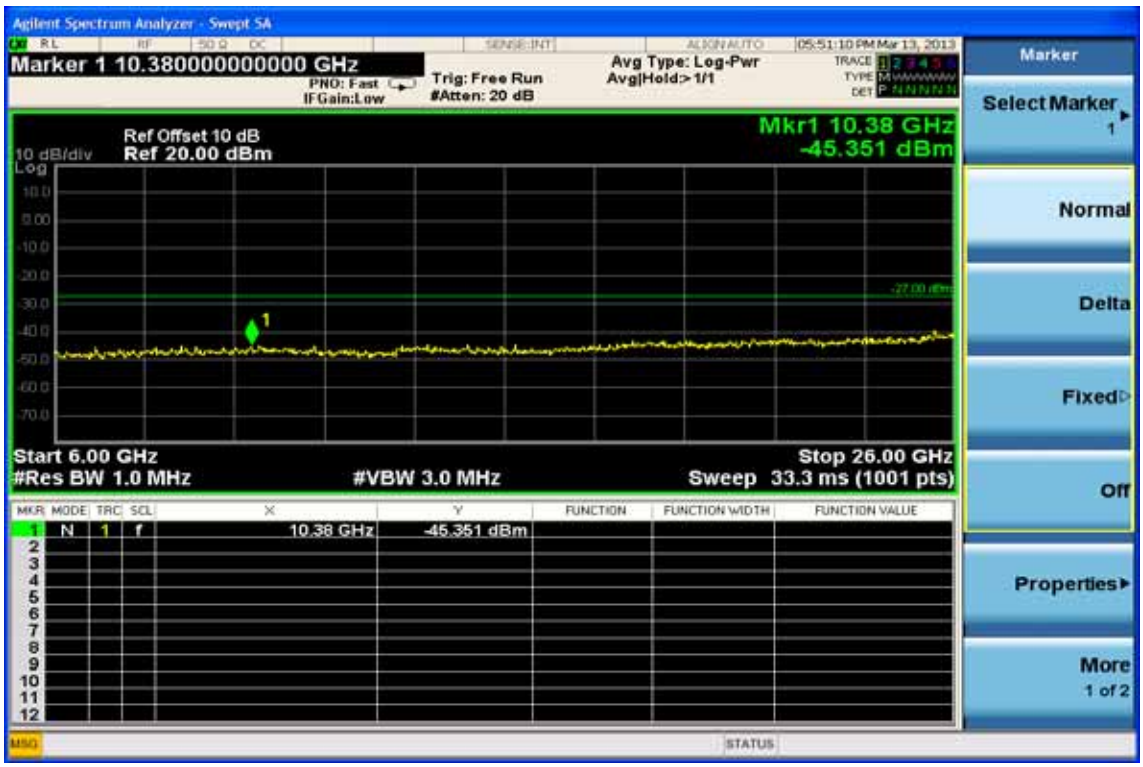


802.11n HT40 Mode (chain b)

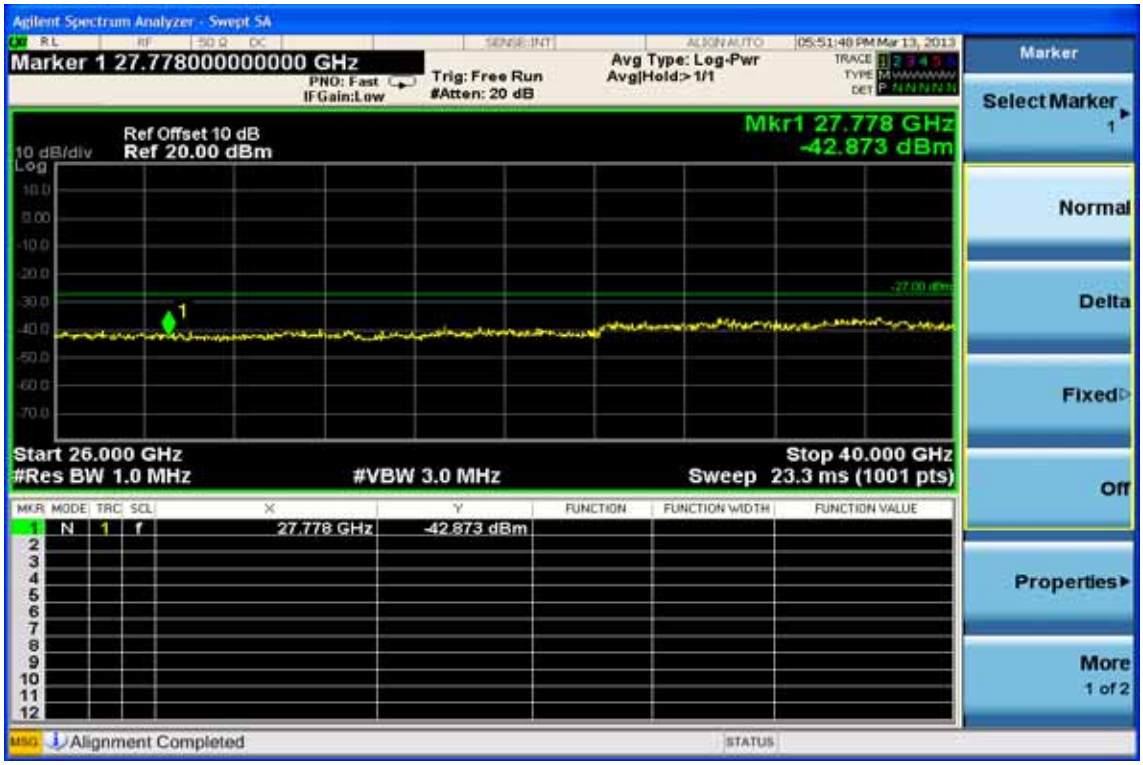
Ch Low 30MHz – 6GHz



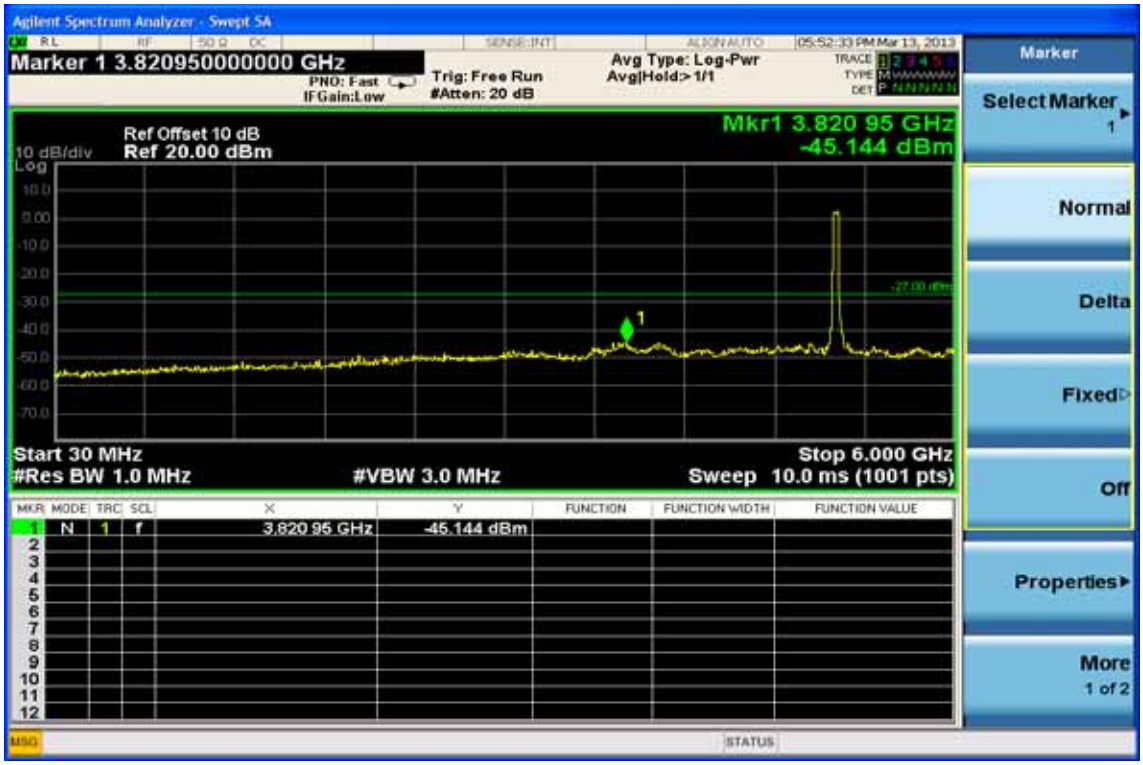
Ch Low 6GHz – 18GHz



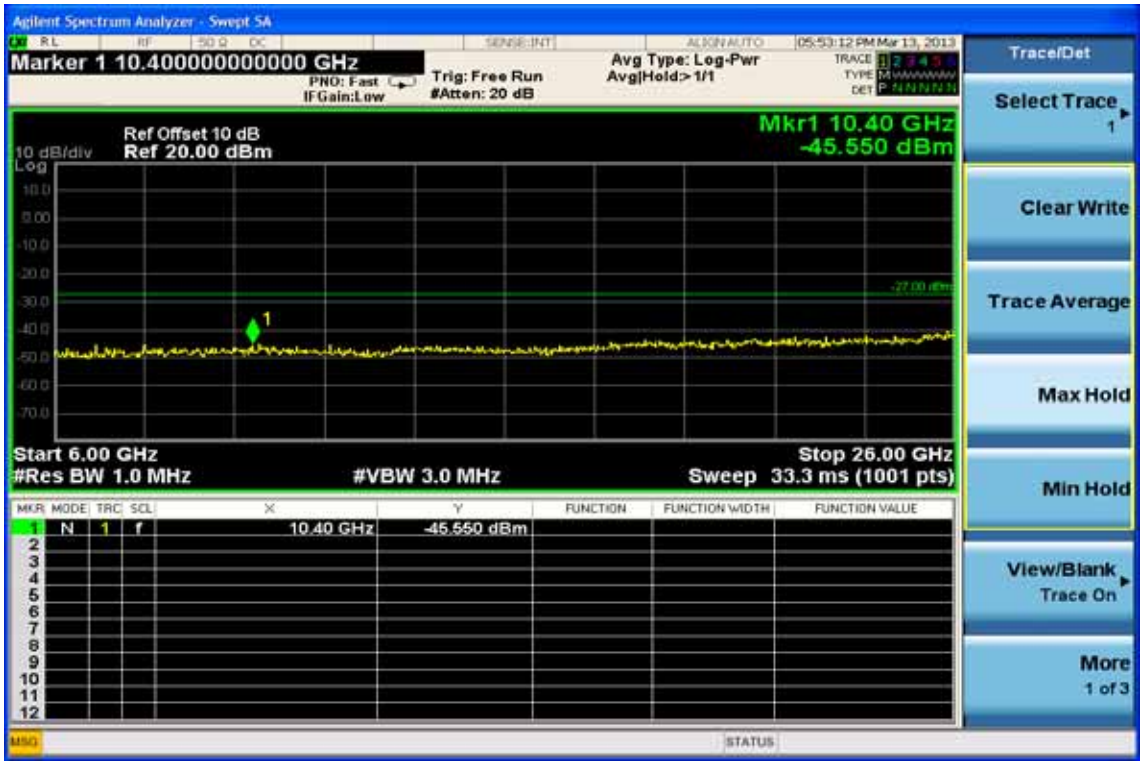
Ch Low 18GHz – 40GHz



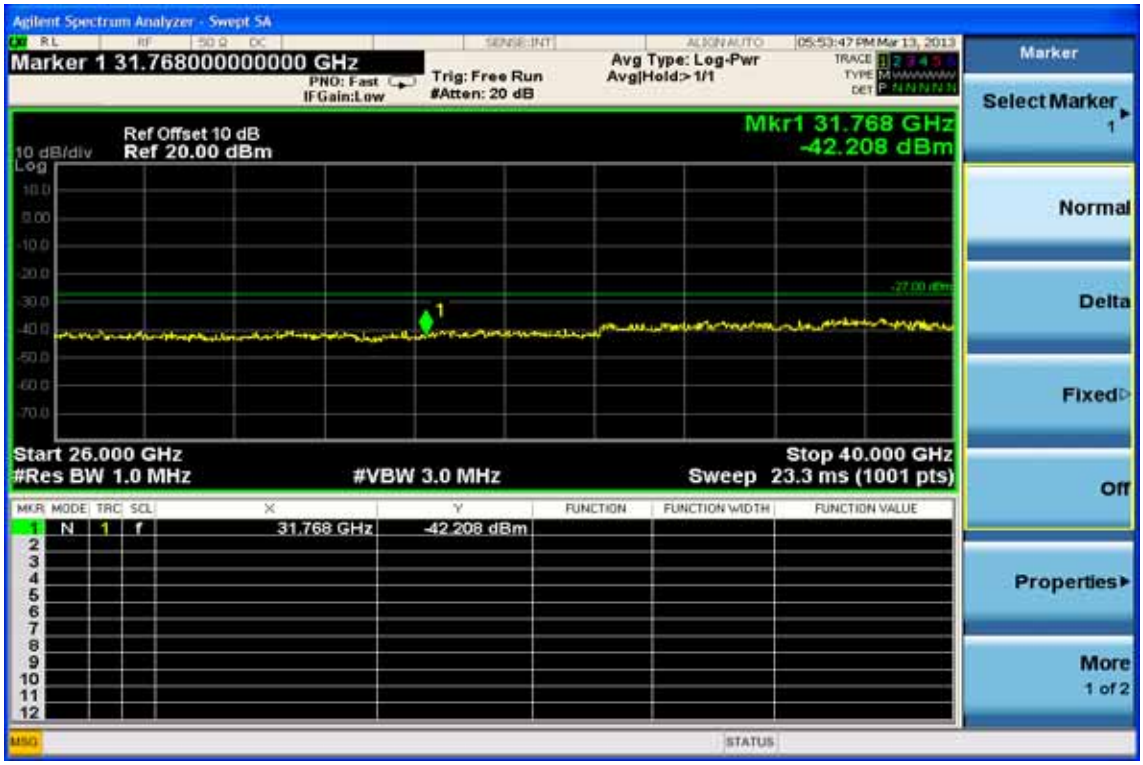
Ch Mid 30MHz – 6GHz



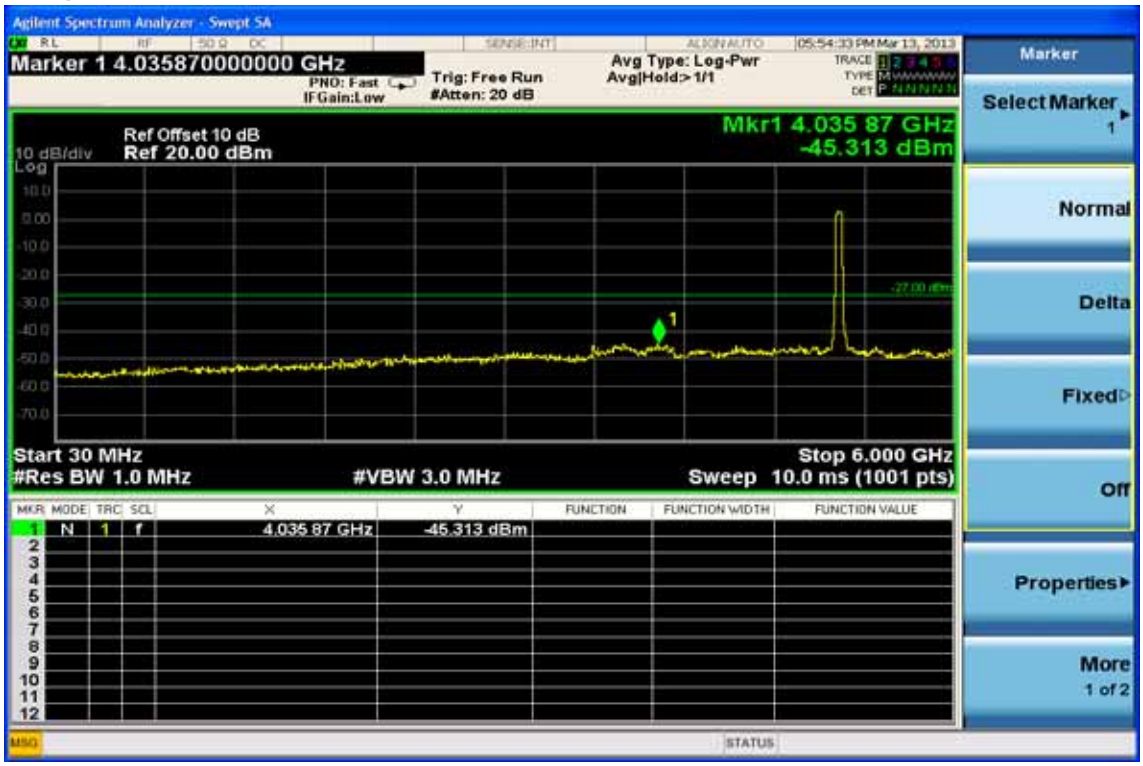
Ch Mid 6GHz – 18GHz



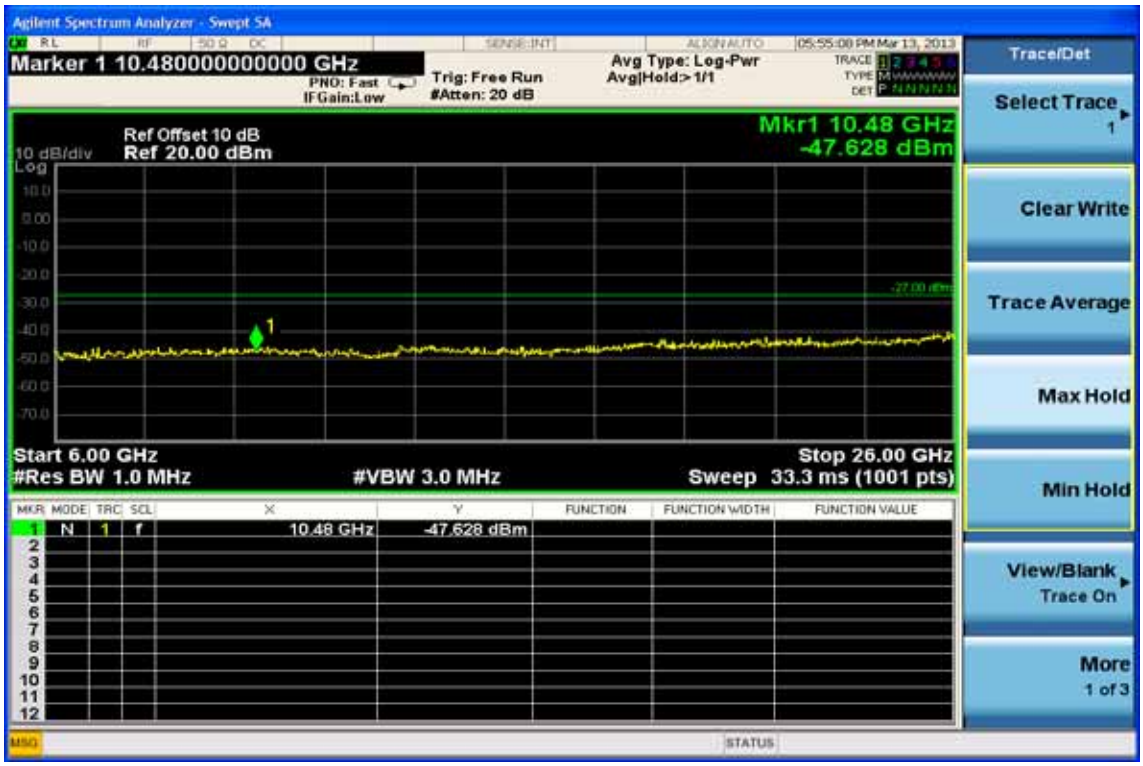
Ch Mid 18GHz – 40GHz



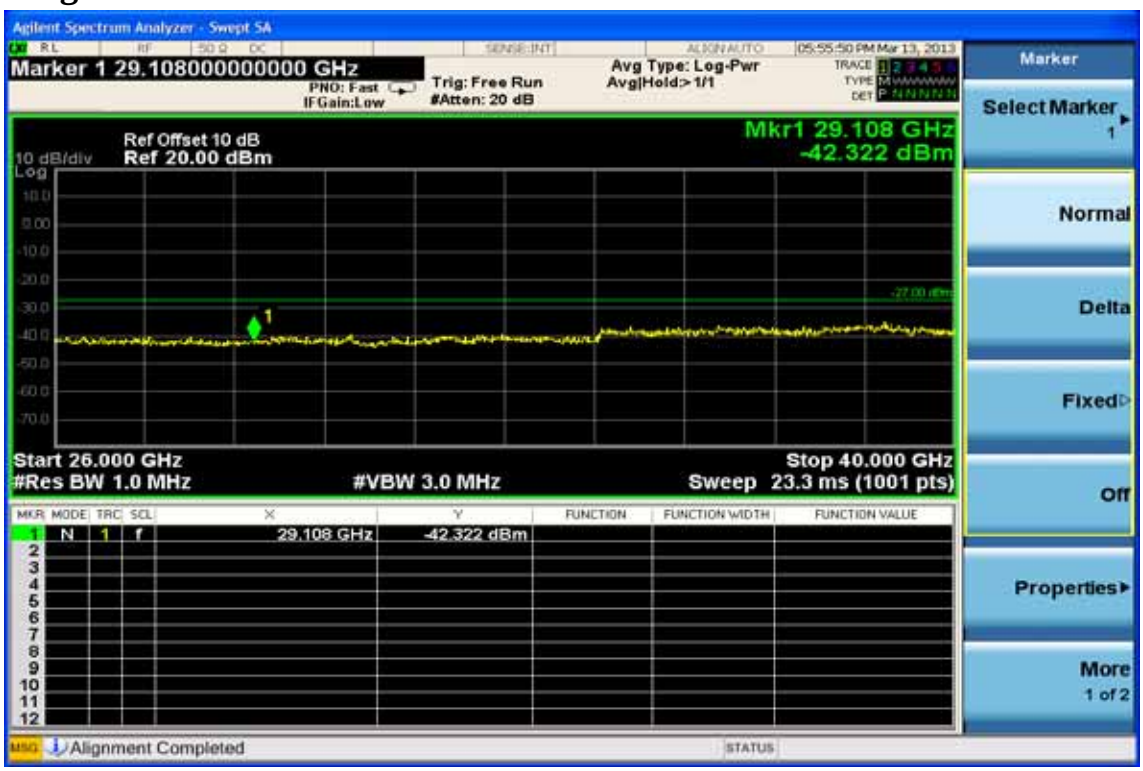
Ch High 30MHz – 6GHz



Ch High 6GHz – 18GHz



Ch High 18GHz – 40GHz



11. UNDESIRABLE EMISSION - RADICTED MEASUREMENT

11.1 Standard Applicable

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

(5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

(7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

§15.205- RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

According to RSS-210 A9.2

1. For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.
2. For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled “for indoor use only”.
3. For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.
4. For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.

11.2 EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front table-top. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when neces-sary.
6. The host PC system was connected with 120Vac/60Hz power source.

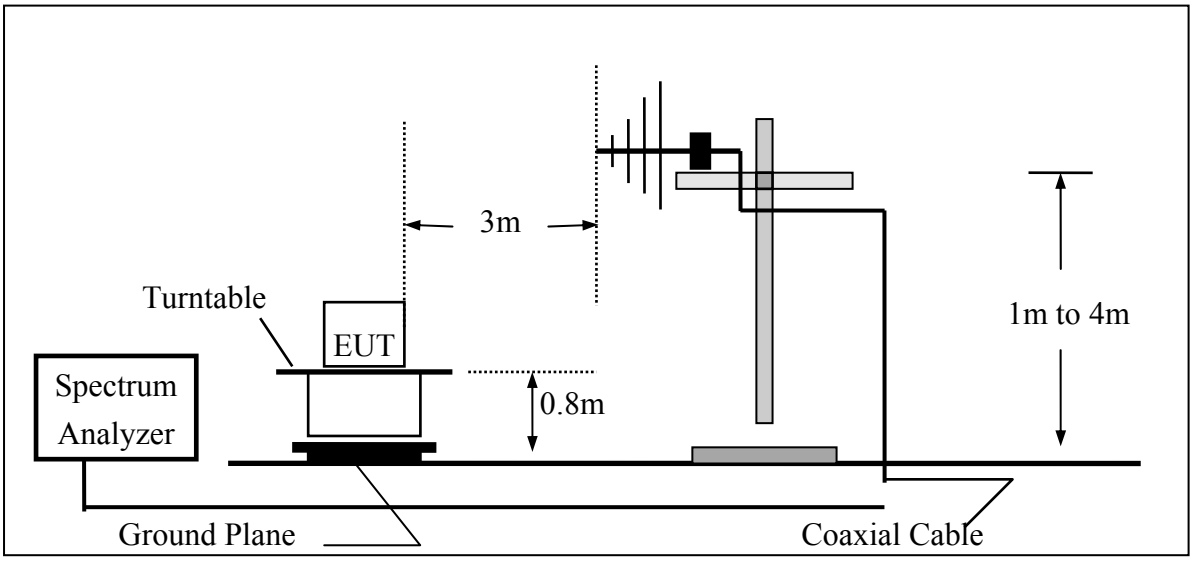
11.3 Measurement Procedure

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. Maximum procedure was performed on the six highest emissions to ensure EUT com-pliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

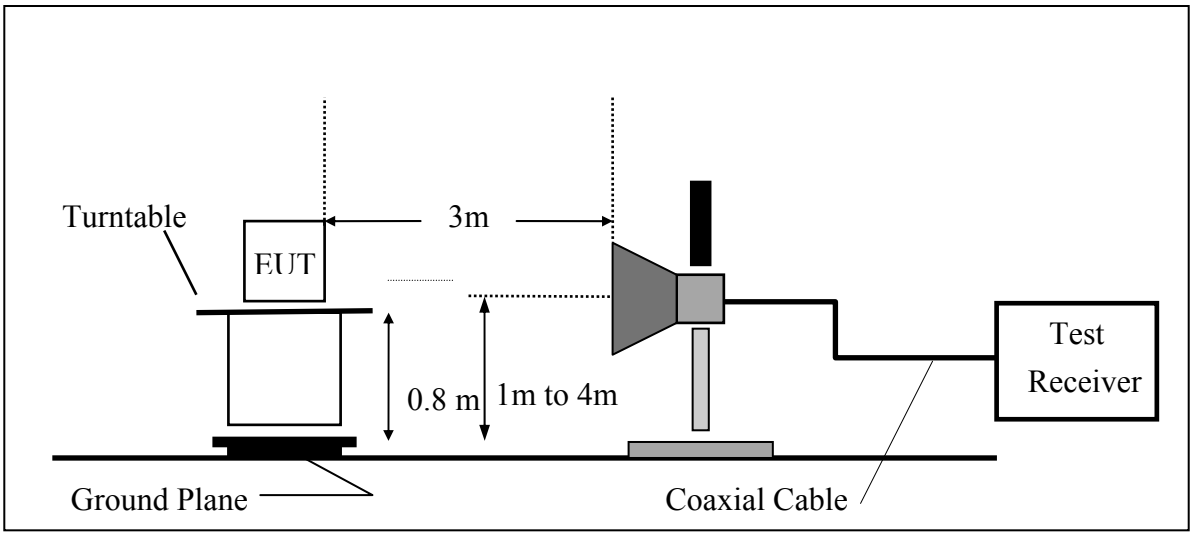
Refer to section F of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

11.4 Test SET-UP (Block Diagram of Configuration)

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



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



11.5 Measurement Equipment Used:

Chamber 14(966)					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/17/2012	07/16/2013
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	02/28/2012	02/27/2014
Bilog Antenna30-1G	Schaffner	CBL 6111B	2756	01/13/2013	01/12/2014
Horn antenna1-18G	COM-POWER	AH118	2011071401	03/01/2013	02/29/2014
Horn antenna1-18G(06)	EMCO	3117	0006665	10/15/2012	10/14/2013
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/09/2013	01/08/2015
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/04/2011	05/03/2013
Preamplifier9-1000M	HP	8447D	NA	02/19/2013	02/18/2014
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/23/2012	07/22/2013
Preamplifier1-26G	EM	EM01M26G	NA	02/26/2013	02/25/2014
Preamplifier26-40G	MITEQ	JS-26004000-27-5A	818471	05/21/2011	05/20/2013
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	09/07/2012	09/06/2013
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/08/2012	10/07/2013
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	09/21/2011	09/20/2013
2.4G Filter	Micro-Tronics	Brm50702	76	12/27/2012	12/26/2013
5G Filter	Micro-Tronics	Brm50716	005	12/27/2012	12/26/2013

11.6 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	

11.7 Measurement Result

Refer to attach tabular data sheets.

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

Radiated Spurious Emission Measurement Result (below 1GHz) (worst case)

Operation Mode	802.11n HT20 TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	65 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	108.57	44.83	-16.62	28.21	43.50	-15.29	Peak	VERTICAL
2	217.21	39.33	-15.80	23.53	46.00	-22.47	Peak	VERTICAL
3	270.56	40.86	-13.37	27.49	46.00	-18.51	Peak	VERTICAL
4	380.17	43.07	-10.83	32.24	46.00	-13.76	Peak	VERTICAL
5	498.51	38.28	-9.06	29.22	46.00	-16.78	Peak	VERTICAL
6	756.53	41.62	-3.79	37.83	46.00	-8.17	Peak	VERTICAL
1	108.57	42.05	-16.62	25.43	43.50	-18.07	Peak	HORIZONTAL
2	269.59	36.15	-13.41	22.74	46.00	-23.26	Peak	HORIZONTAL
3	379.20	36.80	-10.83	25.97	46.00	-20.03	Peak	HORIZONTAL
4	499.48	38.08	-9.06	29.02	46.00	-16.98	Peak	HORIZONTAL
5	666.32	32.04	-5.74	26.30	46.00	-19.70	Peak	HORIZONTAL
6	839.95	35.01	-3.06	31.95	46.00	-14.05	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	802.11n HT20 TX CH Mid	Test Date	2013/03/16
Fundamental Frequency	5200MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	65 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	108.57	45.32	-16.62	28.70	43.50	-14.80	Peak	VERTICAL
2	174.53	38.80	-14.52	24.28	43.50	-19.22	Peak	VERTICAL
3	275.41	43.66	-13.13	30.53	46.00	-15.47	Peak	VERTICAL
4	379.20	42.58	-10.83	31.75	46.00	-14.25	Peak	VERTICAL
5	499.48	39.84	-9.06	30.78	46.00	-15.22	Peak	VERTICAL
6	759.44	41.62	-3.77	37.85	46.00	-8.15	Peak	VERTICAL
1	108.57	41.93	-16.62	25.31	43.50	-18.19	Peak	HORIZONTAL
2	271.53	36.29	-13.32	22.97	46.00	-23.03	Peak	HORIZONTAL
3	379.20	36.98	-10.83	26.15	46.00	-19.85	Peak	HORIZONTAL
4	498.51	38.79	-9.06	29.73	46.00	-16.27	Peak	HORIZONTAL
5	665.35	31.05	-5.76	25.29	46.00	-20.71	Peak	HORIZONTAL
6	839.95	34.91	-3.06	31.85	46.00	-14.15	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	802.11n HT20 TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	Test By	Dino
Temperature	25 ℃	Pol	Ver./Hor
Humidity	65 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	108.57	45.68	-16.62	29.06	43.50	-14.44	Peak	VERTICAL
2	270.56	42.51	-13.37	29.14	46.00	-16.86	Peak	VERTICAL
3	378.23	43.79	-10.85	32.94	46.00	-13.06	Peak	VERTICAL
4	499.48	41.13	-9.06	32.07	46.00	-13.93	Peak	VERTICAL
5	573.20	37.02	-7.43	29.59	46.00	-16.41	Peak	VERTICAL
6	759.44	42.69	-3.77	38.92	46.00	-7.08	Peak	VERTICAL
1	108.57	41.28	-16.62	24.66	43.50	-18.84	Peak	HORIZONTAL
2	271.53	36.74	-13.32	23.42	46.00	-22.58	Peak	HORIZONTAL
3	299.66	37.72	-12.49	25.23	46.00	-20.77	Peak	HORIZONTAL
4	378.23	36.60	-10.85	25.75	46.00	-20.25	Peak	HORIZONTAL
5	499.48	41.88	-9.06	32.82	46.00	-13.18	Peak	HORIZONTAL
6	839.95	34.83	-3.06	31.77	46.00	-14.23	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) (worst case)

Operation Mode	802.11n HT20 TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180MHz	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	1168.00	59.97	-16.42	43.55	74.00	-30.45	Peak	VERTICAL
2	1826.00	55.66	-13.39	42.27	74.00	-31.73	Peak	VERTICAL
1	10360.00	35.24	6.98	42.22	74.00	-31.78	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) (worst case)

Operation Mode	802.11n HT20 TX CH Mid	Test Date	2013/03/16
Fundamental Frequency	5200MHz	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	1168.00	59.45	-16.42	43.03	74.00	-30.97	Peak	VERTICAL
2	6908.00	46.99	3.89	50.88	74.00	-23.12	Peak	VERTICAL
1	10360.00	35.17	6.98	42.15	74.00	-31.85	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) (worst case)

Operation Mode	802.11n HT20 TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	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	1161.00	64.49	-16.44	48.05	74.00	-25.95	Peak	VERTICAL
2	6768.00	45.78	3.57	49.35	74.00	-24.65	Peak	VERTICAL
1	10400.00	35.10	7.04	42.14	74.00	-31.86	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.

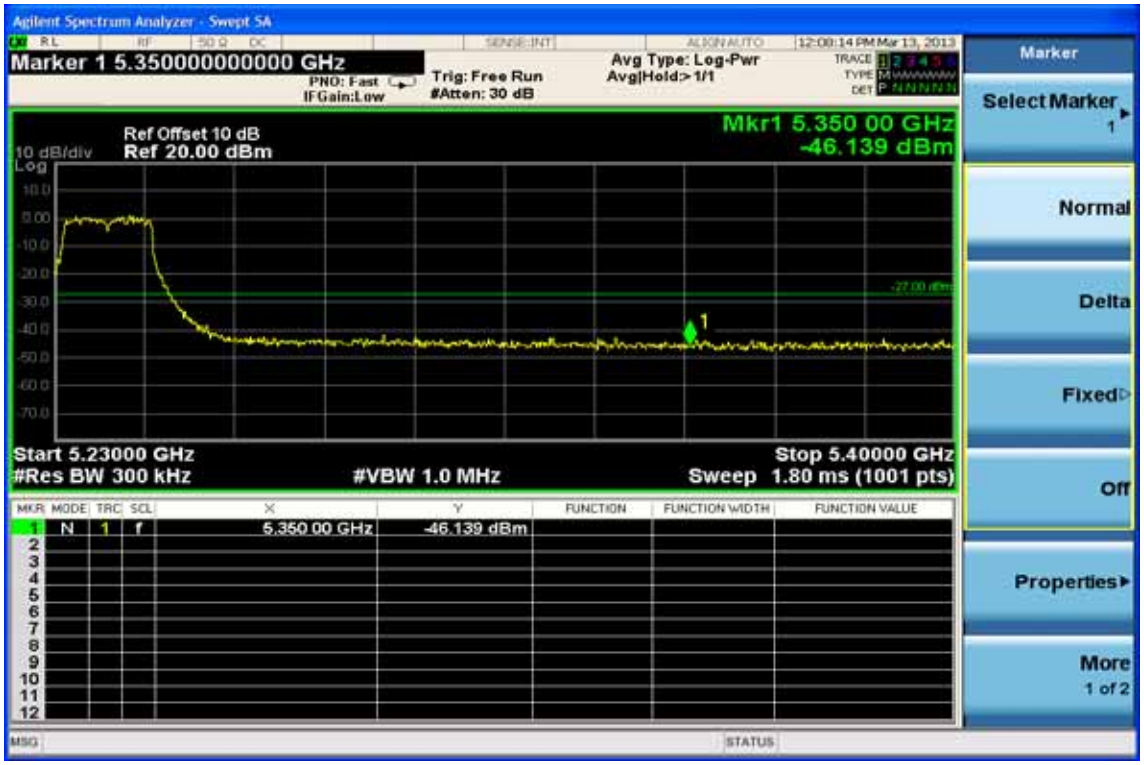
4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

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

Band Edges test

802.11a mode CH-Low

Band Edges Test Data CH-High



Radiated Emission: 802.11a mode

Operation Mode	TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180 MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5068.02	47.09	-1.49	45.60	74.00	-28.40	Peak	VERTICAL
2	5150.00	44.73	-1.27	43.46	74.00	-30.54	Peak	VERTICAL
1	5145.92	48.95	-1.28	47.67	74.00	-26.33	Peak	HORIZONTAL
2	5150.00	47.43	-1.27	46.16	74.00	-27.84	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5350.00	45.67	-0.75	44.92	74.00	-29.08	Peak	VERTICAL
2	5374.84	47.54	-0.68	46.86	74.00	-27.14	Peak	VERTICAL
1	5350.00	45.80	-0.75	45.05	74.00	-28.95	Peak	HORIZONTAL
2	5352.06	47.94	-0.74	47.20	74.00	-26.80	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.

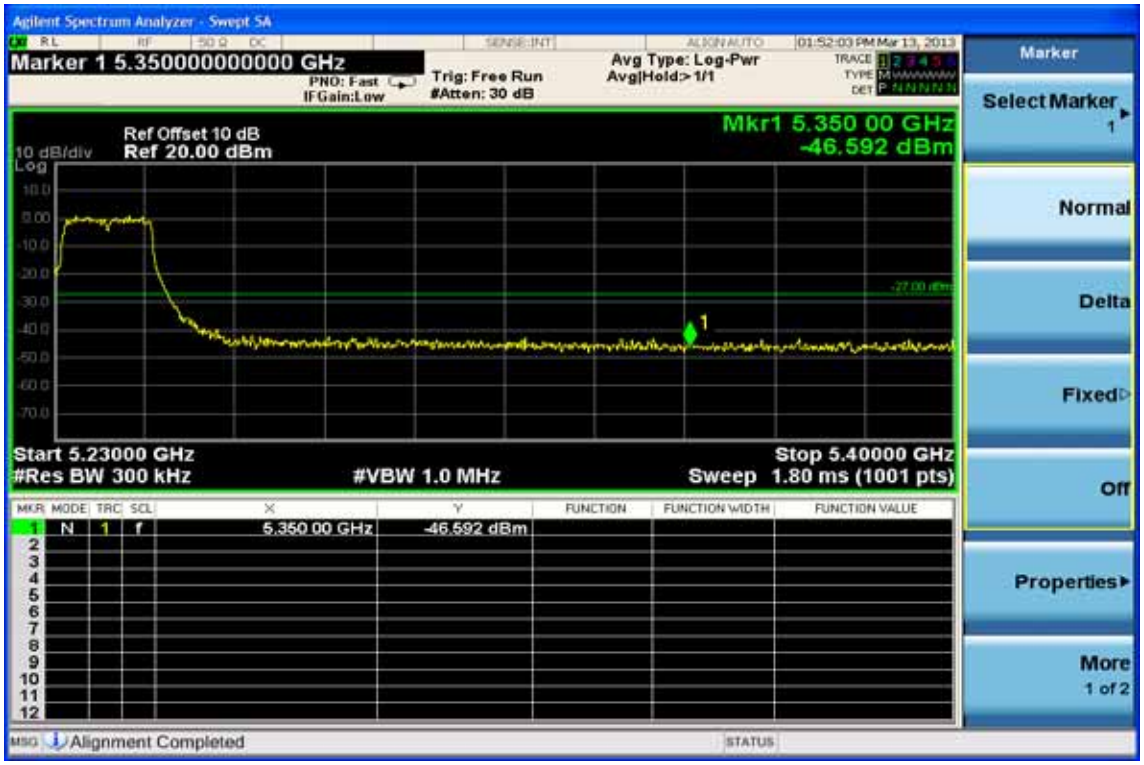
4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

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

802.11n HT20 mode (chain a)

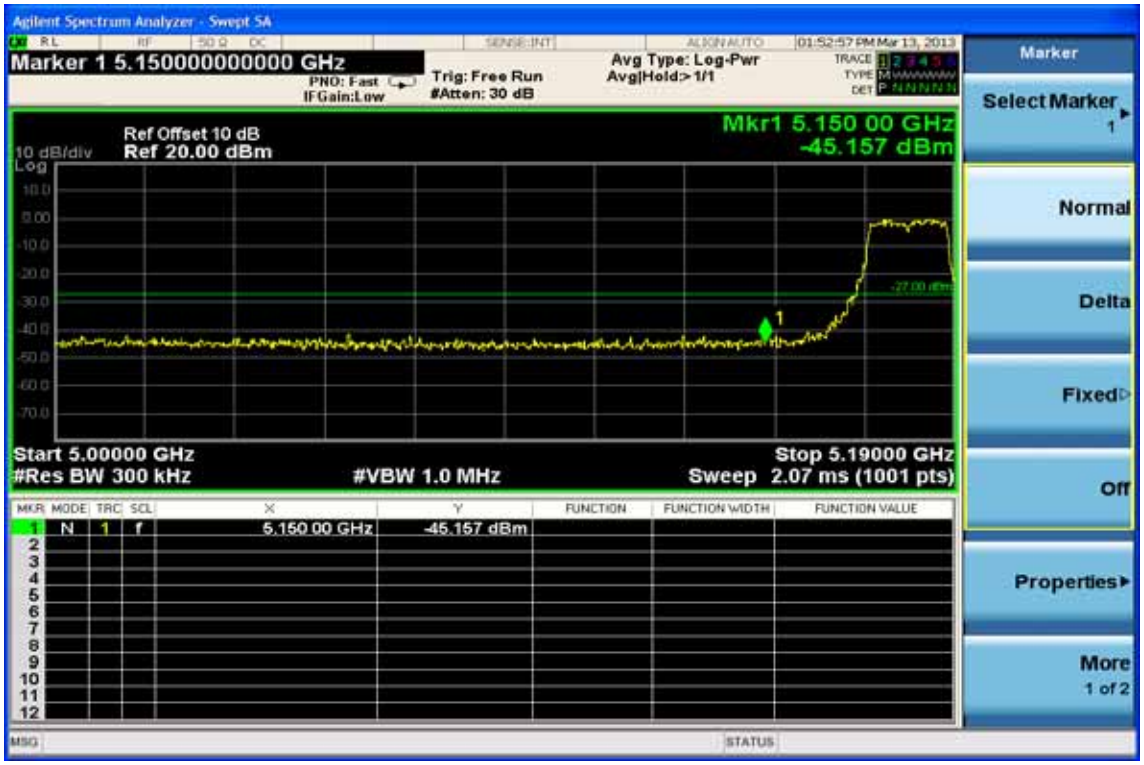
Band Edges Test Data CH-Low

Band Edges Test Data CH-High

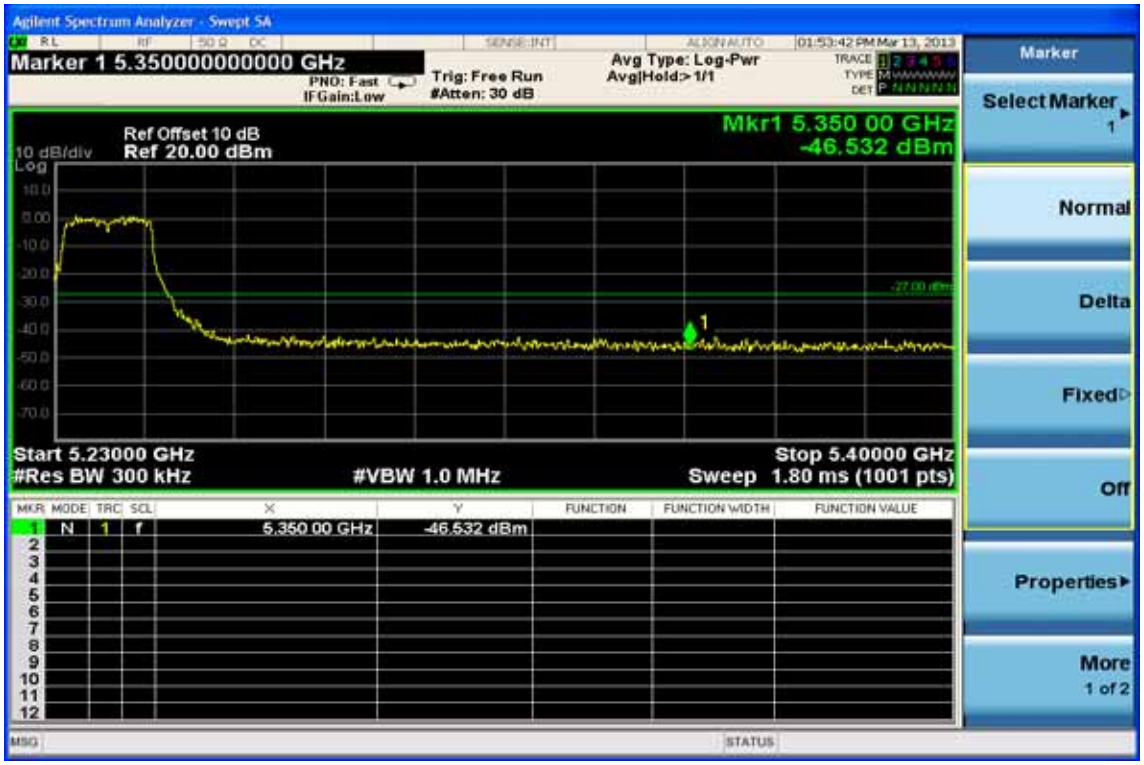


802.11n HT20 mode (chain b)

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11n HT20 mode, Antenna A+B

Operation Mode	TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180 MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5143.83	47.23	-1.29	45.94	74.00	-28.06	Peak	VERTICAL
2	5150.00	45.71	-1.27	44.44	74.00	-29.56	Peak	VERTICAL
1	5149.15	48.00	-1.27	46.73	74.00	-27.27	Peak	HORIZONTAL
2	5150.00	47.74	-1.27	46.47	74.00	-27.53	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5350.00	45.98	-0.75	45.23	74.00	-28.77	Peak	VERTICAL
2	5390.31	47.41	-0.63	46.78	74.00	-27.22	Peak	VERTICAL
1	5350.00	46.24	-0.75	45.49	74.00	-28.51	Peak	HORIZONTAL
2	5357.84	47.53	-0.72	46.81	74.00	-27.19	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.

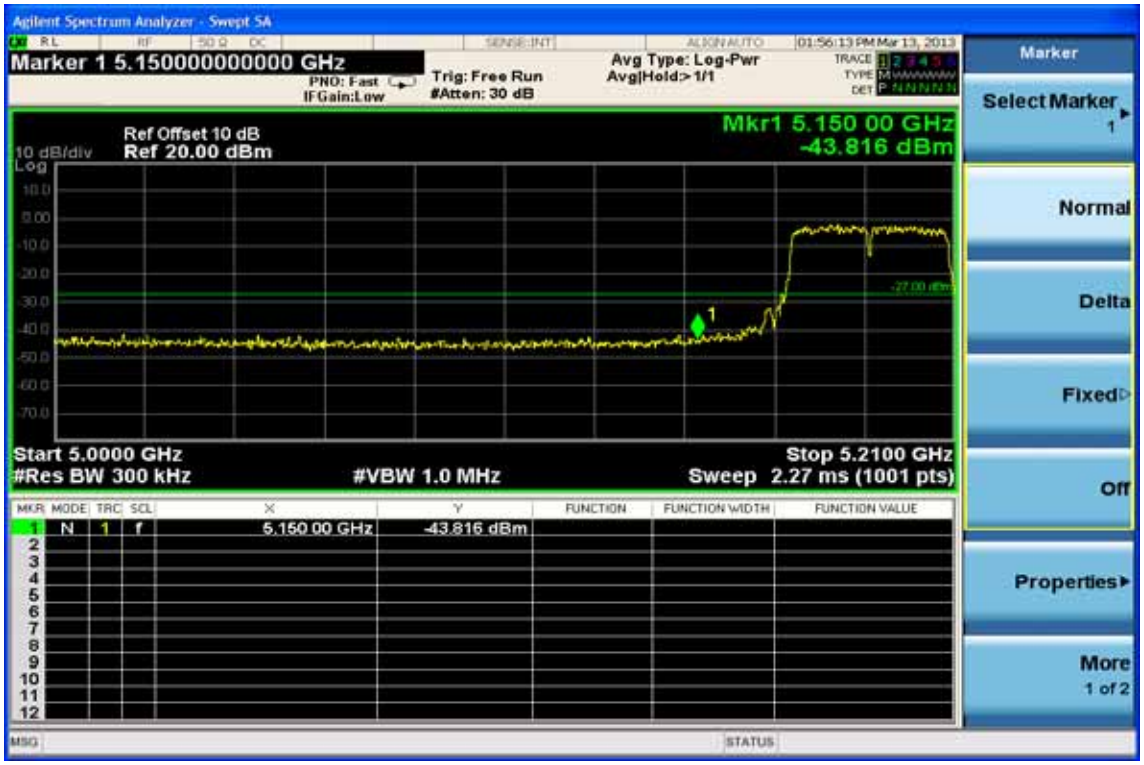
3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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 HT40 mode (Antenna A Port)

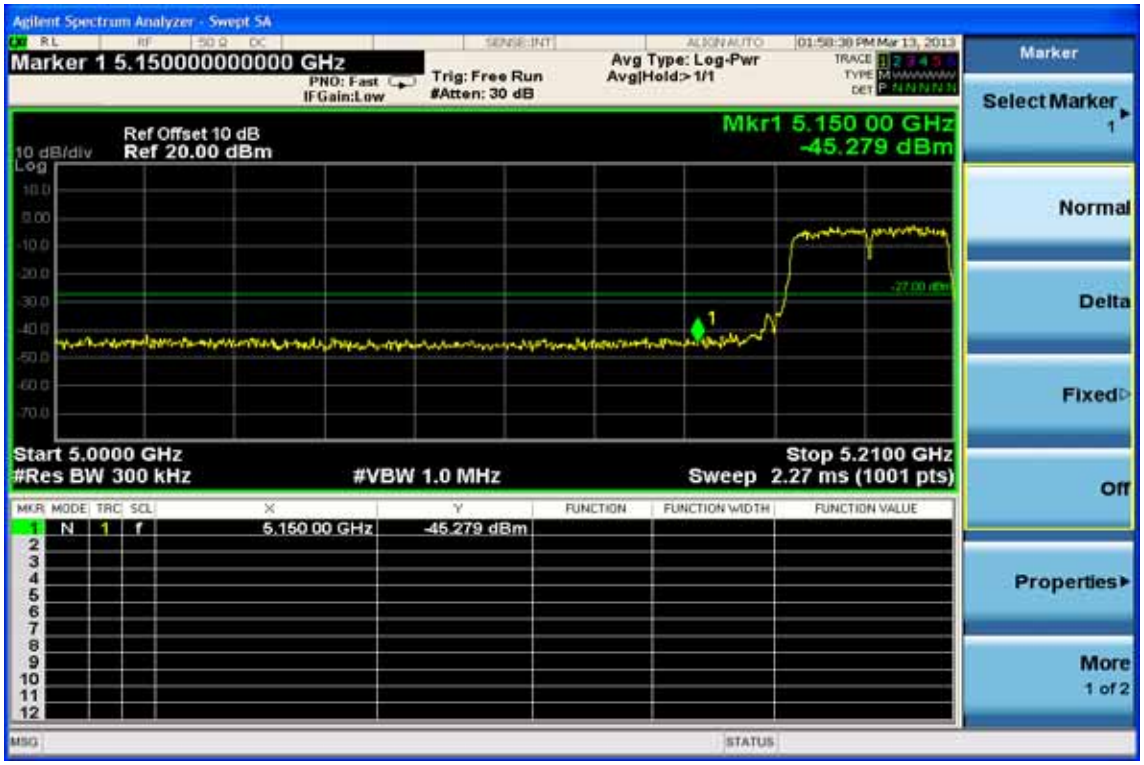
Band Edges Test Data CH-Low



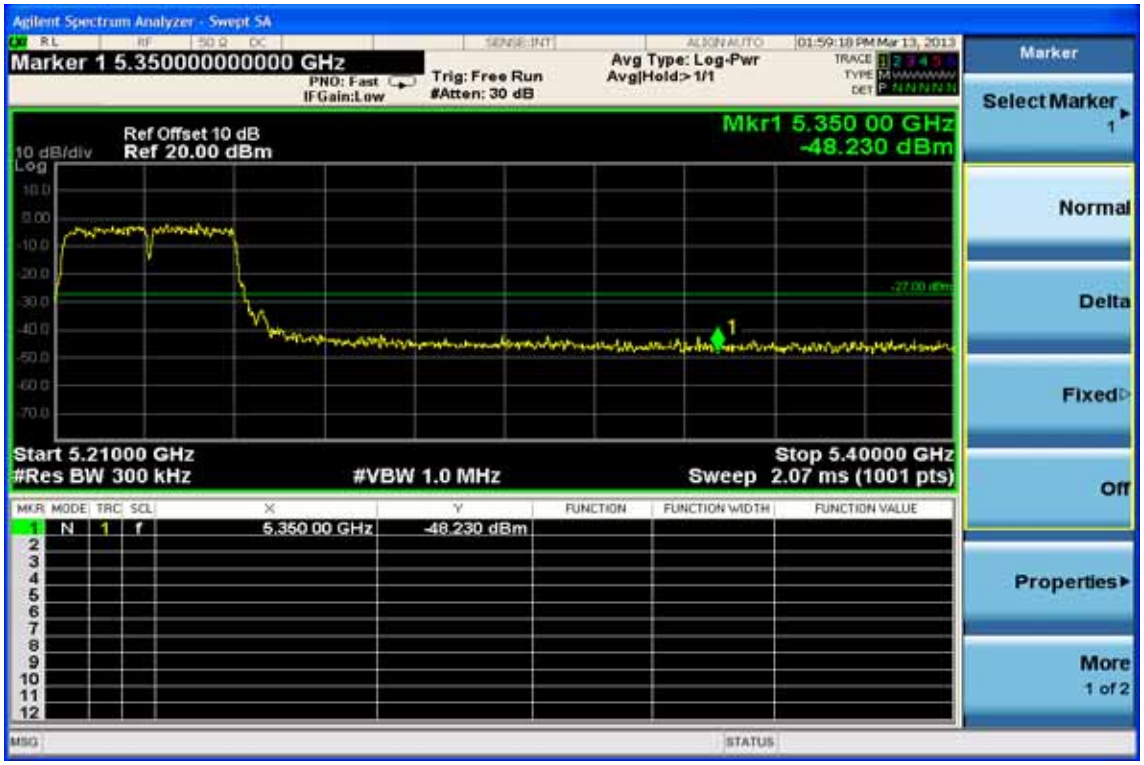
Band Edges Test Data CH-High

802.11n HT40 mode (Antenna B Port)

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11n HT40 mode, Antenna A+B

Operation Mode	TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5190 MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5147.84	49.21	-1.28	47.93	74.00	-26.07	Peak	VERTICAL
2	5150.00	46.82	-1.27	45.55	74.00	-28.45	Peak	VERTICAL
1	5148.05	44.19	-1.28	42.91	54.00	-11.09	Average	HORIZONTAL
2	5148.05	61.83	-1.28	60.55	74.00	-13.45	Peak	HORIZONTAL
3	5150.00	45.35	-1.27	44.08	54.00	-9.92	Average	HORIZONTAL
4	5150.00	60.17	-1.27	58.90	74.00	-15.10	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2013/03/16
Fundamental Frequency	5230MHz	Test By	Dino
Temperature	25 ℃	Humidity	65 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5350.00	44.98	-0.75	44.23	74.00	-29.77	Peak	VERTICAL
2	5387.65	47.65	-0.64	47.01	74.00	-26.99	Peak	VERTICAL
1	5350.00	44.93	-0.75	44.18	74.00	-29.82	Peak	HORIZONTAL
2	5355.35	47.87	-0.72	47.15	74.00	-26.85	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.

12. TRANSMISSION IN THE ABSENCE OF DATA

12.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

According to RSS-210 A9.4(4)

The device shall automatically discontinue transmission in case of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology

12.2 Result:

No non-compliance noted:

Refer to the theory of operation.

13. FREQUENCY STABILITY

13.1 Standard Applicable

According to §15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

According to A9.5

(5) The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.

13.2 Result:

No non-compliance noted:

±20ppm ppm was defined in product specification.

14. ANTENNA REQUIREMENT

14.1 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.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

14.2 Antenna Connected Construction

The directional gins of antenna used for transmitting is -5.2dBi for 2.4G / 5.9dBi for 5G, 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.

According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation.

Directional gain = G_{ANT}

15. Maximum Permissible Exposure (MPE)

15.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

15.2 Maximum Permissible Exposure (MPE) Evaluation

The worst case of Peak power N HT20 mode: refer to section 6.5 for detail measurement date.

Power measurement:

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine Peak Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
N HT20	5180	36	11.42	9.72	13.66	16.98	Pass
	5200	40	10.71	10.09	13.42	16.98	Pass
	5240	48	10.09	10.17	13.14	16.98	Pass

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	13.66	(dBm)
Maximum peak output power at antenna input terminal:	23.22736796	(mW)
Duty cycle:	100	(%)
Maximum Pav :	23.22736796	(mW)
Antenna gain (typical):	5.9	(dBi)
Maximum antenna gain:	3.89045145	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5180	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.0179867	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0179 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2 at 5180MHz.