FCC 47 CFR PART 15 SUBPART E AND ANSI C63.4:2003 TEST REPORT

For

11n Dual-Band USB Dongle

Mode (BPSK)l : WU318d

Trade Name : E-TOP

Issued for

E-Top Network Technology Inc.

No. 82 , Gongye 2nd Rd., Tainan City 70955, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)
TEL: 886-6-580-2201
FAX: 886-6-580-2202

Issued Date: April 17, 2012

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	December 15, 2011	Initial Issue	ALL	Sunny Chang
01	March 02, 2012	Delete MPE	Page 89	Sunny Chang
02	April 05, 2012	Add test data	ALL	Sunny Chang
03	April 17, 2012	Change OFDM to BPSK	Page 45 ~ 54	Sunny Chang

TABLE OF CONTENTS

TITLE PAGE NO.

1. TEST REPORT CERTIFICATION

Applicant	：	E-Top Network Technology Inc.
Address	：	No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan, R.O.C.
Manufacturer	：	E-Top Network Technology Inc.
Address	：	No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan, R.O.C.
Equipment Under Test	：	11n Dual-Band USB Dongle
Model	：	WU318d
Trade Name	：	E-TOP
Tested Date	：	September 28, 2011 ~ April 04, 2012

APPLICABLE STANDARD	
Standard	**Test Result**
FCC Part 15 Subpart E AND ANSI C63.4:2003	PASS

WE HEREBY CERTIFY THAT: The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by: ***Reviewed by:***

Jeter Wu
Assistant Manager

Eric Huang
Assistant Section Manager

2. EUT DESCRIPTION

Product Name	11n Dual-Band USB Dongle
Model Number	WU318d
Brand Name	E-TOP
Identify Number	T110914407
Received Date	September 14, 2011
Frequency Range	IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5220MHz, IEEE 802.11n HT40 : 5190MHz ~ 5210MHz,
Transmit Power	IEEE 802.11a : 12.36dBm (17.2187mW) IEEE 802.11n HT20 : 13.25dBm (21.1545mW) IEEE 802.11n HT40 : 11.03dBm (12.6831mW)
Channel Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40 : 20MHz
Channel Number	IEEE 802.11a, 802.11n HT20 : 4 Channels IEEE 802.11n HT40 : 3 Channels
Transmit Data Rate	IEEE 802.11a : 54, 48 ,36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 : 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps IEEE 802.11n HT40 : 150 ,135, 121.5, 108, 81, 54, 40.5, 27, 13.5 Mbps
Type of Modulation	IEEE 802.11a : OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40 : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	**Two antennas (2TX2RX)** Manufacture: Master Wave Tech. Co., Ltd. Type: PCB antenna Gain: 2dBi for 2.4GHz & 3dBi for 5GHz
Power Rating	5Vdc
RF Exposure Evaluation	Since the EUT is classed portable device, and the maximum peak power is 13.25 dBm (>10.6dBm), the MPE evaluation is not required and the SAR consideration applied.
Test Voltage	120Vac, 60Hz

Operation Frequency:

IEEE 802.11a, 802.11n HT20

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)			
CHANNEL	**MHz**	**CHANNEL**	**MHz**
36	5180	44	5220
40	5200		

IEEE 802.11n HT40

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)			
CHANNEL	**MHz**	**CHANNEL**	**MHz**
38	5190	42	5210

Remark :

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. For more details, please refer to the User's manual of the EUT.
3. This submittal(s) (test report) is intended for FCC ID: U6A-WU318D filing to comply with Section 15.407, of the FCC Part 15, Subpart E Rules.
4. To add a series model is for business necessary. The different of the each model is shown as bellows:

Multiple listing:

Company Name/Address	Brand name	Model	Product Name
E-Top Network Technology Inc. No. 82 ,Gongye 2nd Rd.,Tainan City 70955,Taiwan,R.O.C.	E-TOP	WU318d	11n Dual-Band USB Dongle
Amigo Technology Inc. 5F., No.63, Lane 77, Xing-Ai Road, Neihu Dist., Taipei City 114, Taiwan (R.O.C.)	Amigo	WU318d	11n Dual-Band USB Dongle
Sapido Technology Inc. No. 383., Sec. 2, Minsheng Rd., West Central District, Tainan 700, Taiwan, R.O.C.	SAPIDO	AU-4515; AU-5015	Wireless N Dual-band USB Adapter

3. DESCRIPTION OF TEST MODES

Conducted Emission / Radiated Emission Test (Below 1 GHz)

1. The following test modes were scanned during the preliminary test:

No.	Pre-Test Mode
1	TX Mode

2. After the preliminary scan, the following test mode was found to produce the highest emission level.

Final Test Mode		
Emission	Radiated Emission	TX Mode
	Conducted Emission	TX Mode

Remark : *Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.*

Conducted / Radiated Emission Test (Above 1 GHz)

IEEE 802.11a, 802.11n HT20 mode / 5180MHz ~ 5220MHz

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	5180
Middle	5200
High	5220

IEEE 802.11a mode : 6Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT20 mode : 13Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT40 mode / 5190MHz ~ 5210MHz

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	5190
High	5210

IEEE 802.11n HT40 mode : 27Mbps data rate (worst case) were chosen for full testing.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 and FCC CFR 47, 15.207, 15.209 and 15.407.

5. FACILITIES AND ACCREDITATION

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

5.3 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2.

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.38dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±3.04dB
Radiated Emission, 1 to 26.5 GHz	± 3.20dB
Power Line Conducted Emission	± 2.01dB

Uncertainty figures are valid to a confidence level of 95%, K=2

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Note Book	IBM	T43	DoC	Power cable, unshd, 1.6m

No.	Signal cable description	
A	N/A	---

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Note Book	IBM	R51	R33026	Power cable, unshd, 1.6m

No.	Signal cable description	
A	N/A	---

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

RF Setup

1. Set up all computers like the setup diagram.
2. The “Realtek 11n Dual MAC 9xD USB WLAN NIC Massproduction Kit” software was used for testing
3. MAC , select [DMSP] from the command list.
4. Setting , Testing item select [Continuous Tx] from the command list.
5. Setting , Modulation select [5G] from the command list.

TX Mode:

- ⇨ **Tx Mode:CCK 、OFDM、 HT MixMode** (Bandwidth: 20、40)
- ⇨ **Tx Data Rate: 6Mbps** (IEEE 802.11a mode ,chain 0 TX)
  13Mbps (IEEE 802.11n HT20 mode ,chain 0, chain 1 TX)
  27Mbps (IEEE 802.11n HT40 mode, chain 0, chain 1 TX**)**

Power control mode

Target Power: IEEE 802.11a Channel Low (5180MHz) = **38**
IEEE 802.11a Channel Middle (5200MHz) = **38**
IEEE 802.11a Channel High (5220MHz) = **38**
Target Power: IEEE 802.11n HT20 Channel Low (5180MHz) = **36 (Chain 0)**
IEEE 802.11n HT20 Channel Middle (5200MHz) = **36 (Chain 0)**
IEEE 802.11 n HT20 Channel High (5220MHz) = **36 (Chain 0)**
IEEE 802.11n HT20 Channel Low (5180MHz) = **36 (Chain 1)**
IEEE 802.11n HT20 Channel Middle (5200MHz) = **36 (Chain 1)**
IEEE 802.11 n HT20 Channel High (5220MHz) = **36 (Chain 1)**
Target Power: IEEE 802.11n HT40 Channel Low (5190MHz) = **34 (Chain 0)**
IEEE 802.11 n HT40 Channel High (5210MHz) = **34 (Chain 0)**
IEEE 802.11n HT40 Channel Low (5190MHz) = **34 (Chain 1)**
IEEE 802.11 n HT40 Channel High (5210MHz) = **34 (Chain 1)**

(2) **RX Mode：**

Start RX

3. All of the function are under run.
4. Start test.

Normal Link Setup

1. Set up all computers like the setup diagram.
2. All of the function are under run.
3. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
4. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
5. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).

Start test.

7. FCC PART 15.407 REQUIREMENTS

7.1 26dB BANDWIDTH

LIMITS

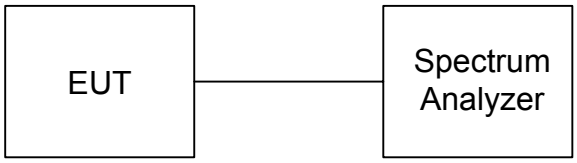
§ 15.303 (c) (2), For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

1. Place the EUT on the table and set it in the 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 > 1%EBW, VBW > RBW, Span = 50MHz and Sweep = auto.
4. Mark the –26dBc (upper and lower) frequency of the peak value.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

IEEE 802.11a Mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Pass / Fail
Low	5180	24.349	PASS
Middle	5200	24.449	PASS
High	5220	24.449	PASS

IEEE 802.11 n HT20 Mode / 5180MHz ~ 5220MHz

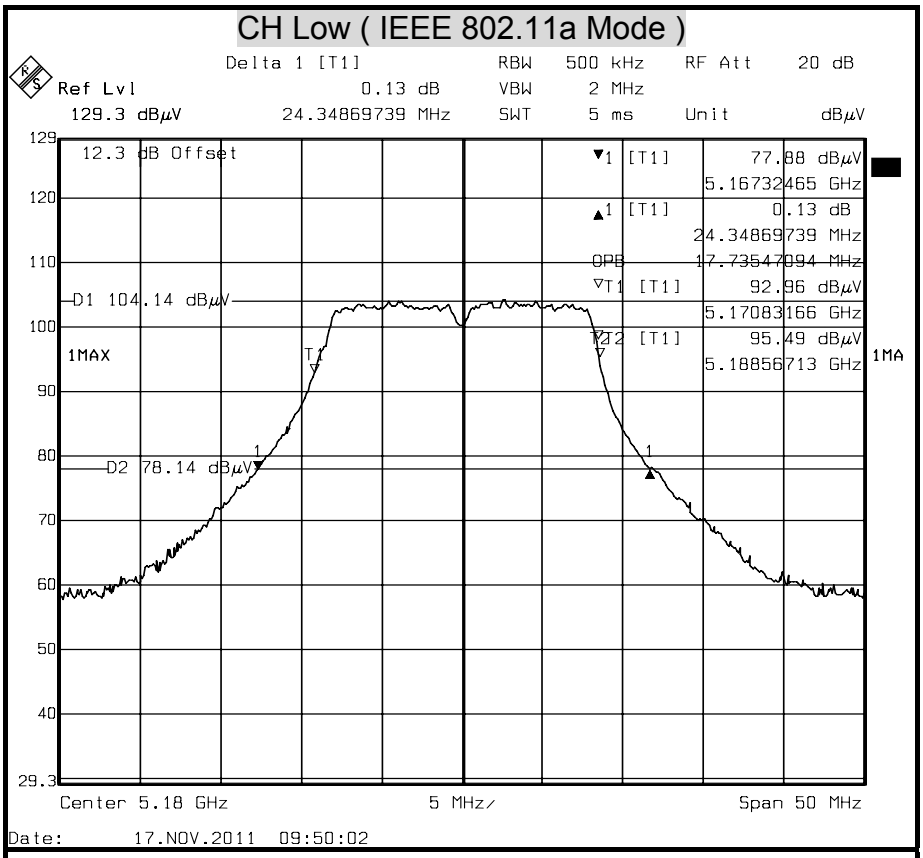
Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
Low	5180	24.749	24.549	PASS
Middle	5200	24.449	23.447	PASS
High	5220	23.447	23.547	PASS

IEEE 802.11 n HT40 Mode / 5190MHz ~ 5210MHz

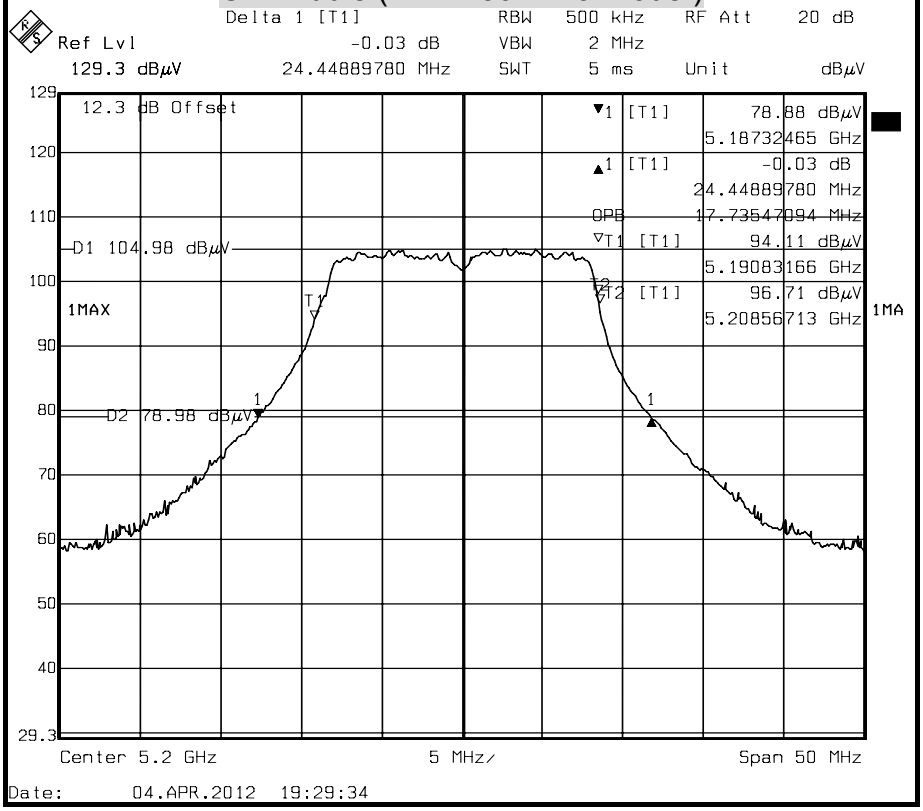
Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
Low	5190	42.885	42.724	PASS
High	5210	42.484	42.324	PASS

26dB BANDWIDTH

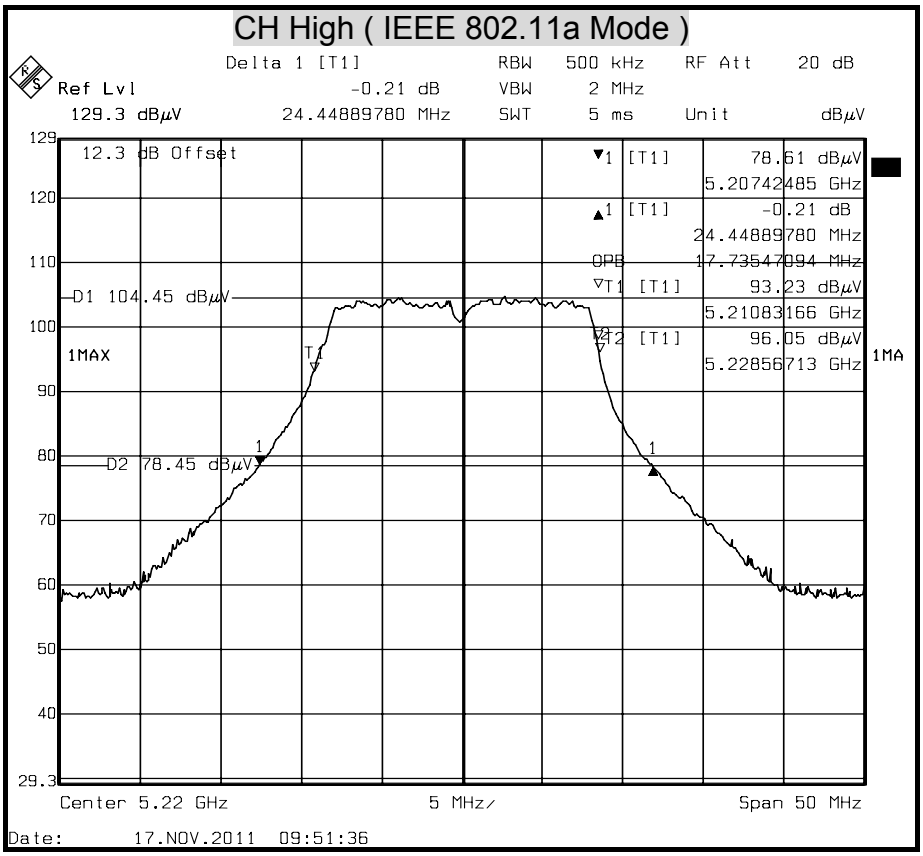
CH Low (IEEE 802.11a Mode)



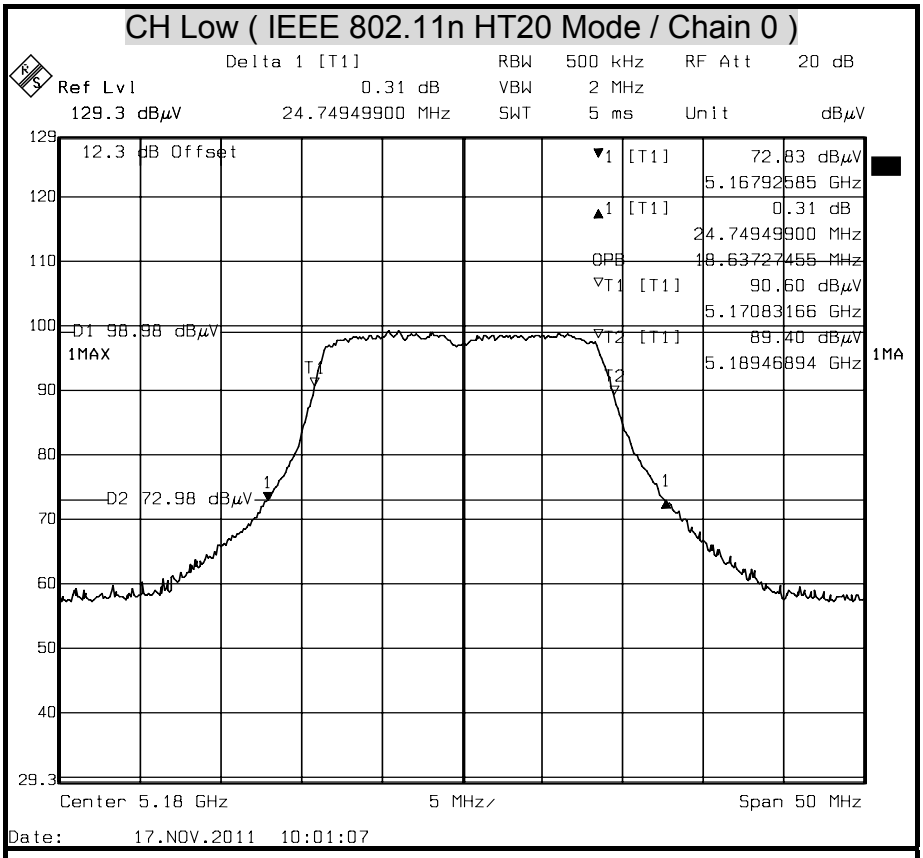
CH Middle (IEEE 802.11a Mode)



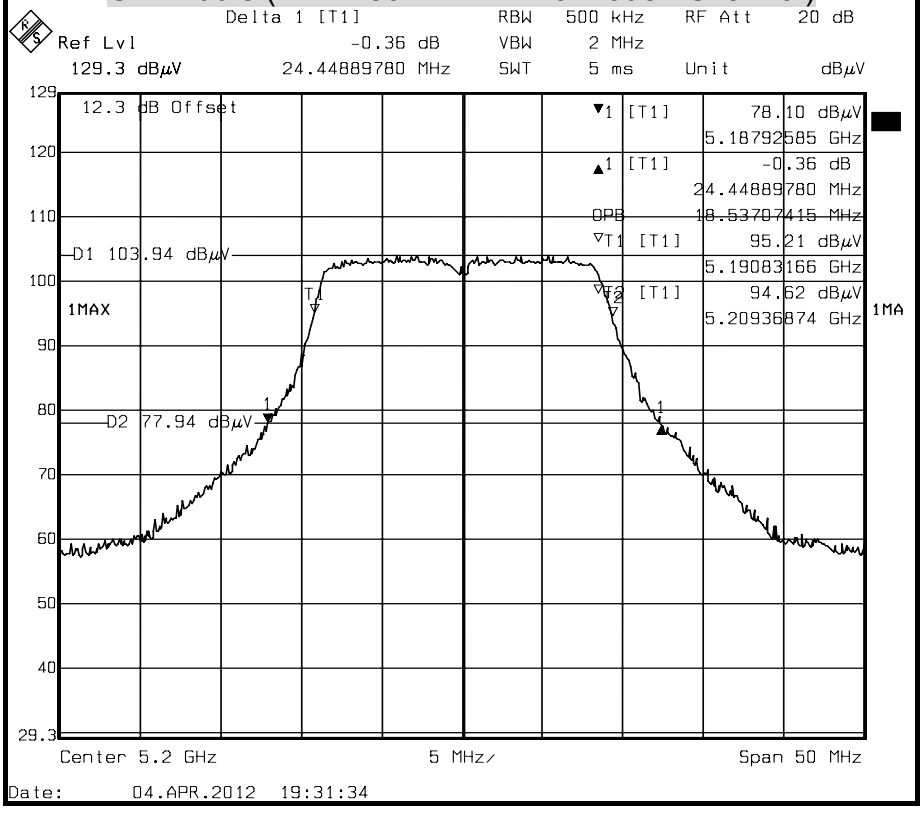
CH High (IEEE 802.11a Mode)



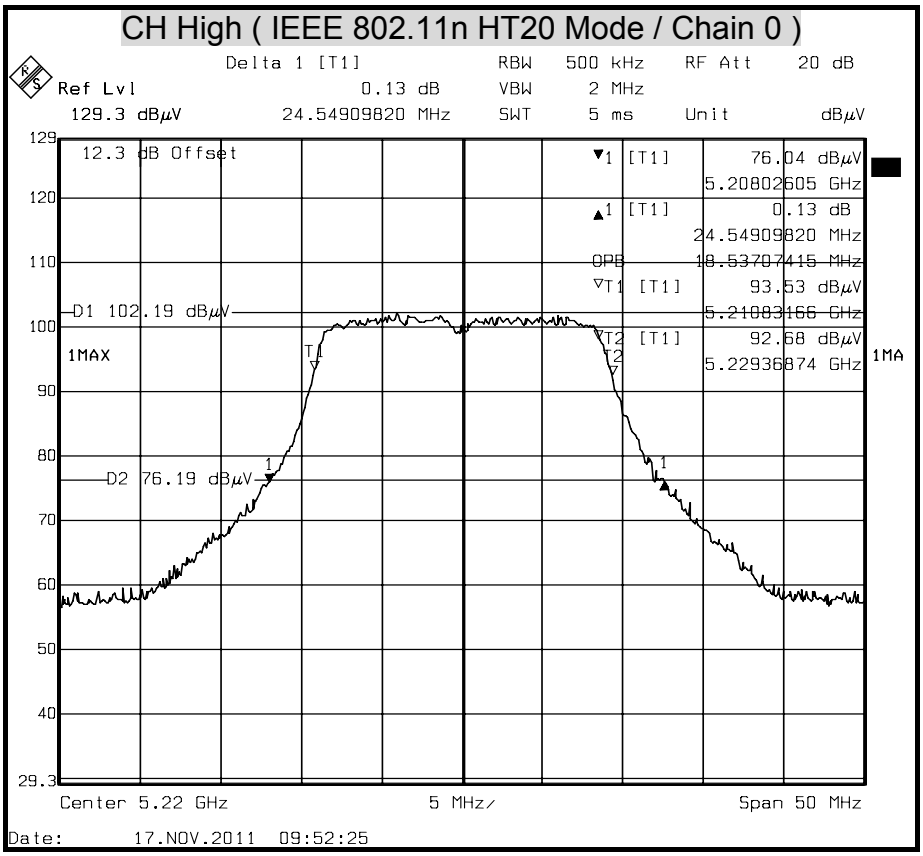
CH Low (IEEE 802.11n HT20 Mode / Chain 0)



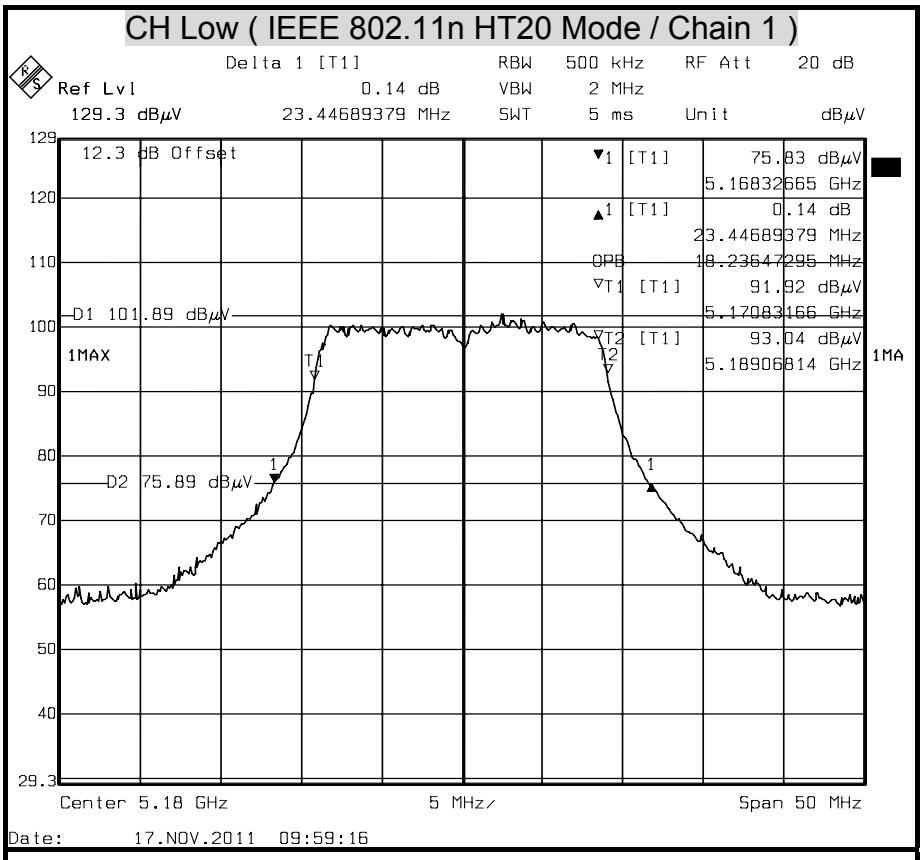
CH Middle (IEEE 802.11n HT20 Mode / Chain 0)



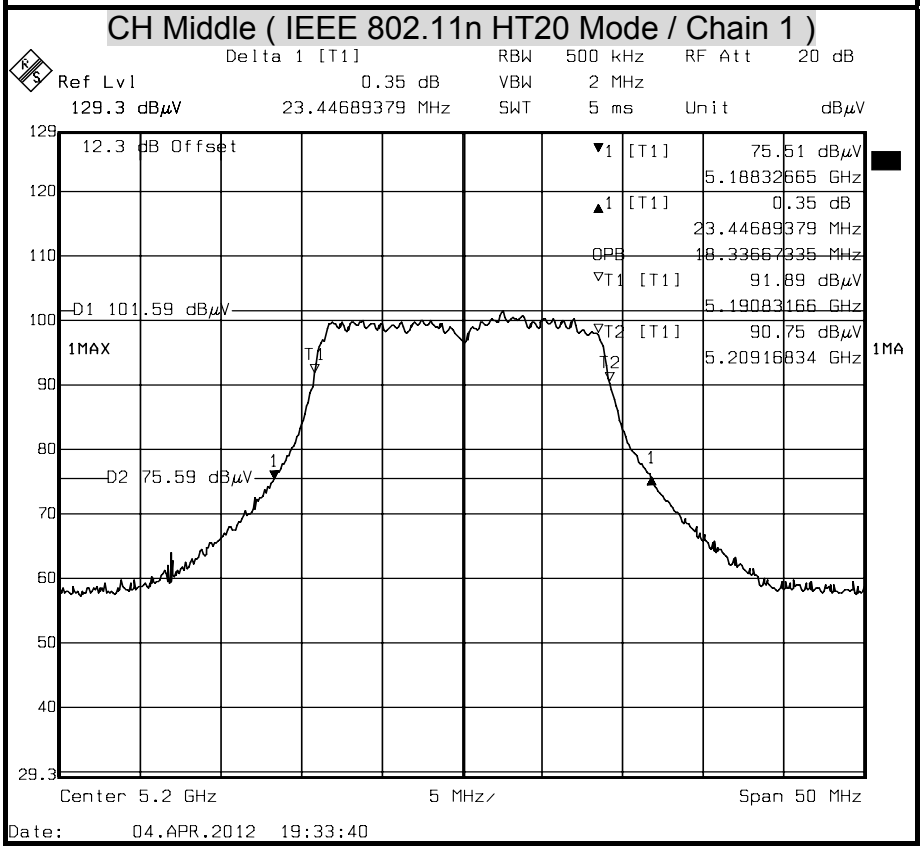
CH High (IEEE 802.11n HT20 Mode / Chain 0)



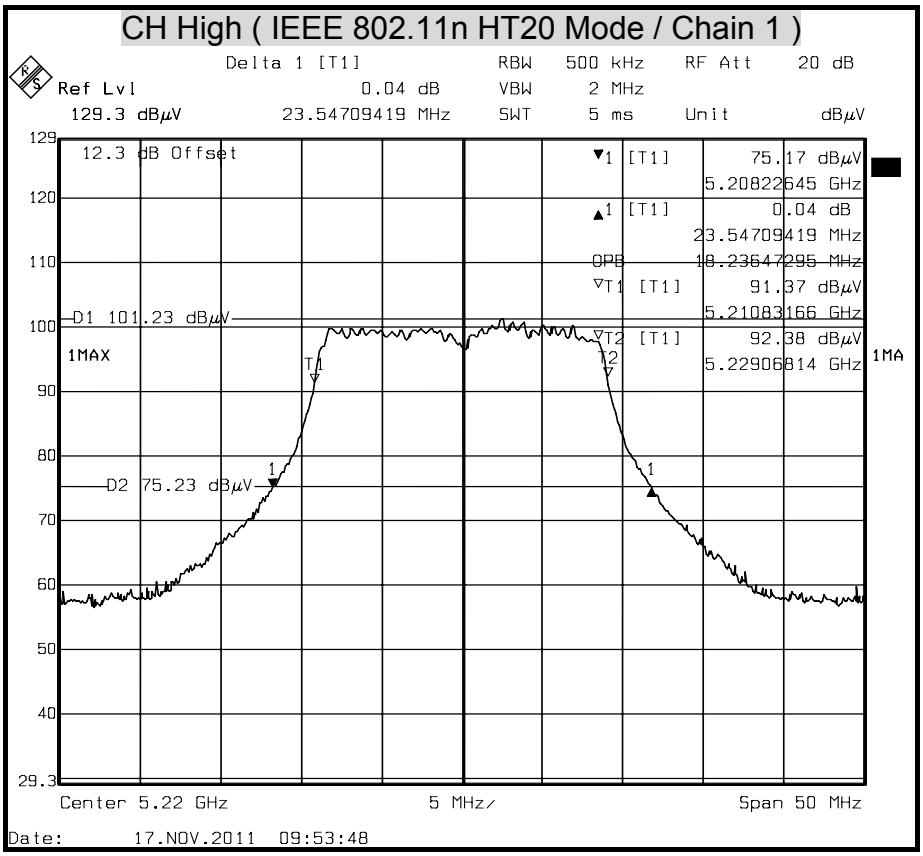
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



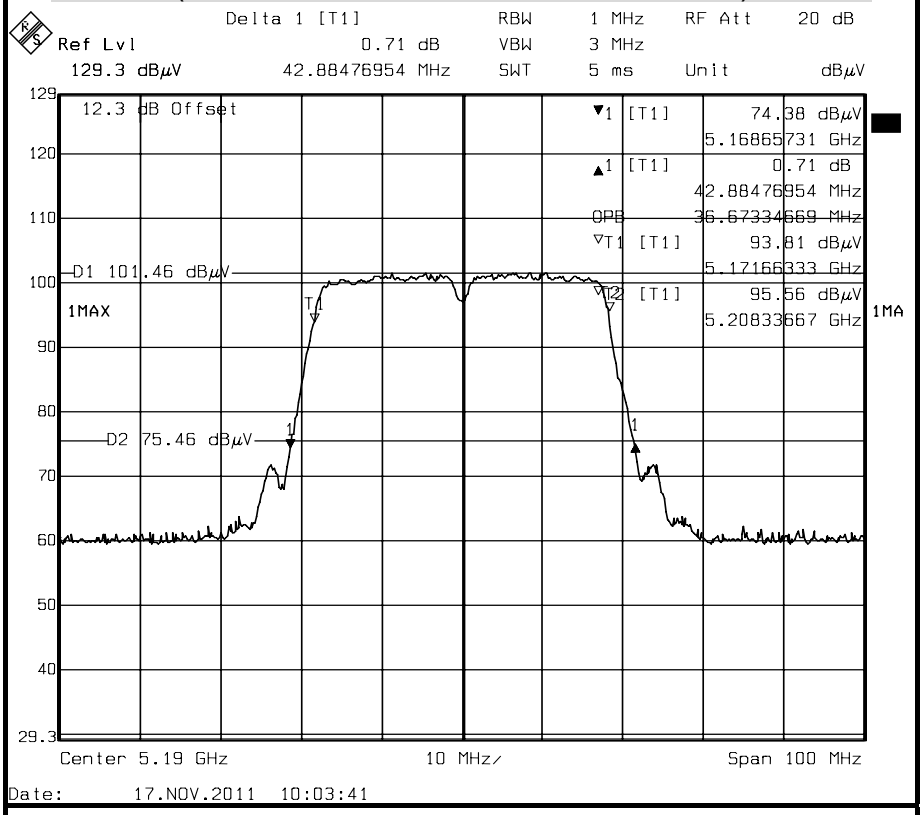
CH Middle (IEEE 802.11n HT20 Mode / Chain 1)



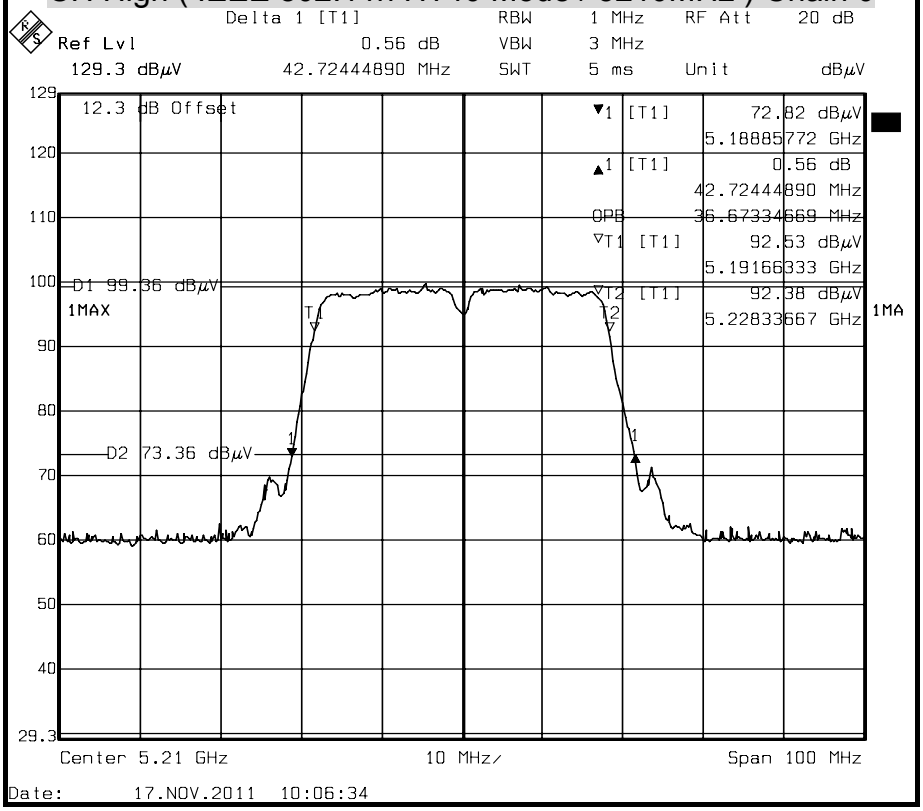
CH High (IEEE 802.11n HT20 Mode / Chain 1)



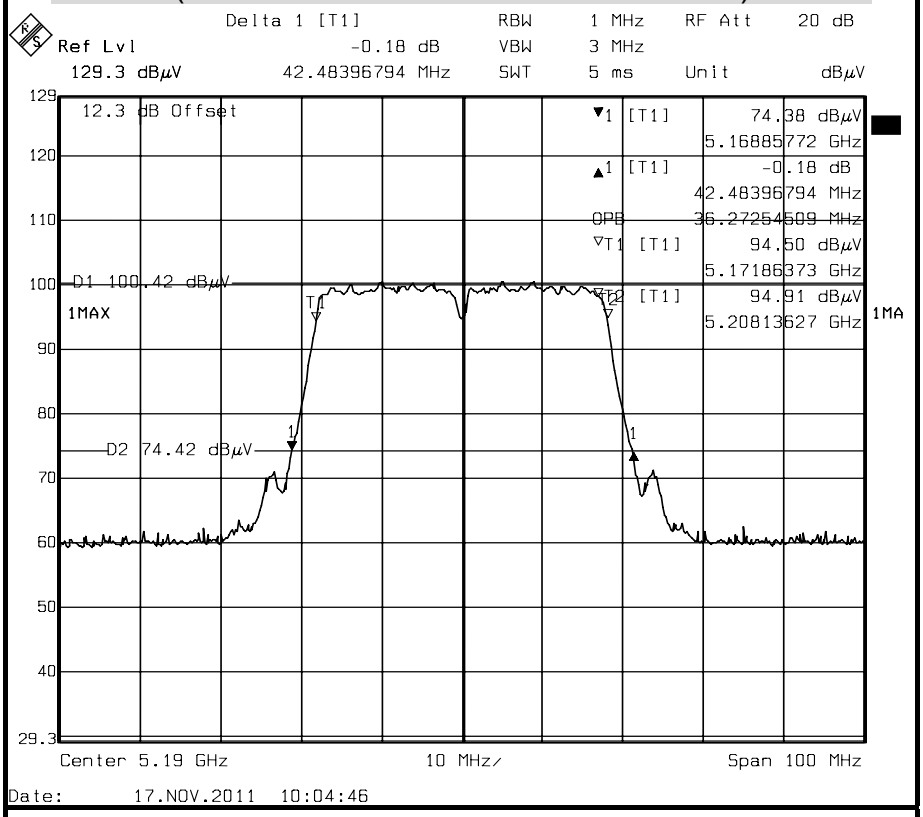
CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 0



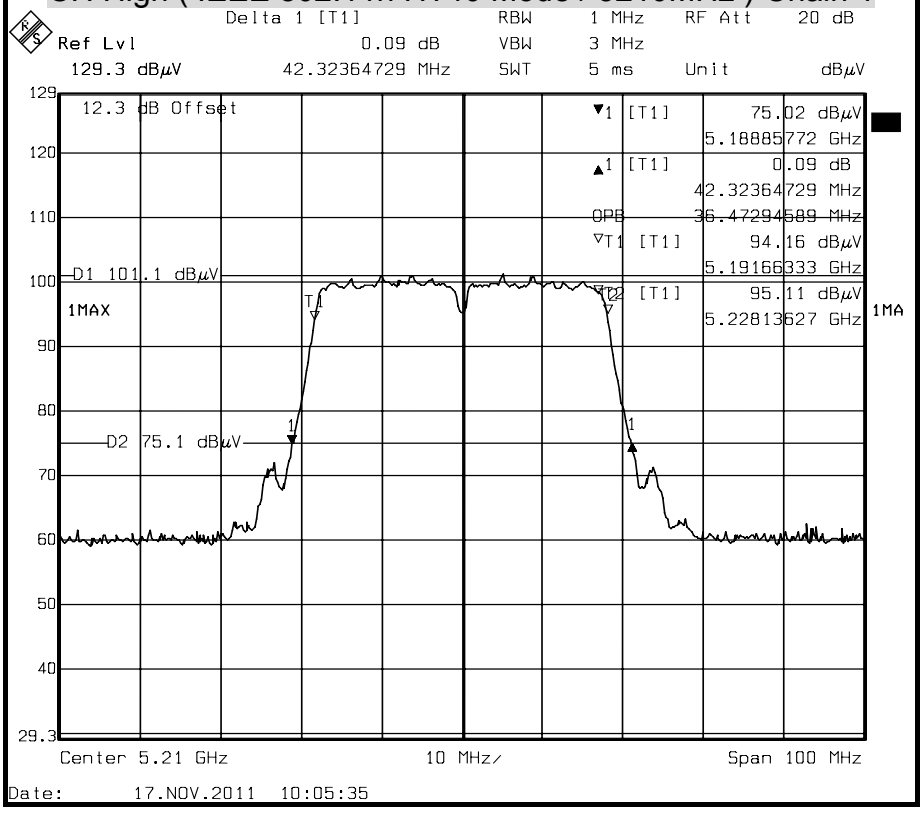
CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 0



CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 1



CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 1



7.2 MAXIMUM CONDUCTED OUTPUT POWER

LIMITS

§ 15.407(a)

(1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50mW (17dBm) or 4dBm + 10log B, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4dBm in any 1 MHz band.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The peak power shall not exceeded the limit as follows:

IEEE 802.11a mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log B (dB)	4dBm + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	24.349	13.86	17.86	17
Middle	5200	24.449	13.88	17.88	17
High	5220	24.449	13.88	17.88	17

IEEE 802.11n HT20 mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	26dB Bandwidth (B) (MHz)		10 Log B (dB)	4dBm + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
		Chain 0	Chain 1			
Low	5180	24.749	24.549	13.94	17.94	17
Middle	5200	24.449	23.447	13.88	17.88	17
High	5220	23.447	23.547	13.72	17.72	17

IEEE 802.11n HT40 mode / 5190MHz ~ 5210MHz

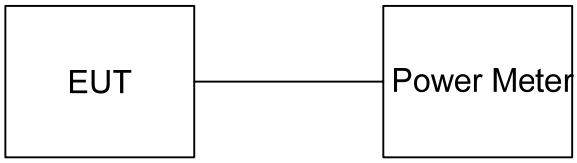
Channel	Channel Frequency (MHz)	26dB Bandwidth (B) (MHz)		10 Log B (dB)	4dBm + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
		Chain 0	Chain 1			
Low	5190	42.885	42.724	16.32	20.32	17
High	5210	42.484	42.324	16.28	20.28	17

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power Meter	Anritsu	ML2487A	6K00003888	MAY 30, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

IEEE 802.11a Mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	5180	11.86	17	PASS
Middle	5200	12.20	17	PASS
High	5220	12.36	17	PASS

Remark:
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	Peak Power			Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Total		
Low	5180	9.35	9.51	12.44	16.99	PASS
Middle	5200	11.54	7.54	13.00	16.99	PASS
High	5220	8.88	11.28	13.25	16.99	PASS

Remark:
1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

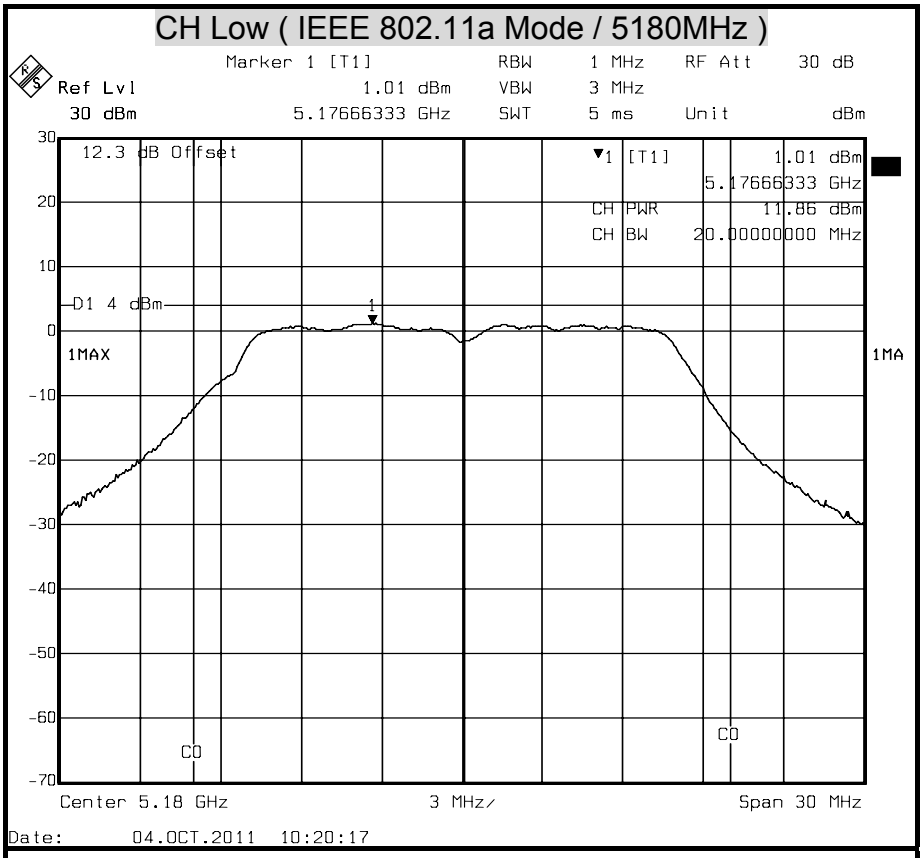
IEEE 802.11n HT40 Mode / 5190MHz ~ 5210MHz

Channel	Channel Frequency (MHz)	Peak Power			Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Total		
Low	5190	8.16	7.58	10.89	16.99	PASS
High	5210	7.89	8.15	11.03	16.99	PASS

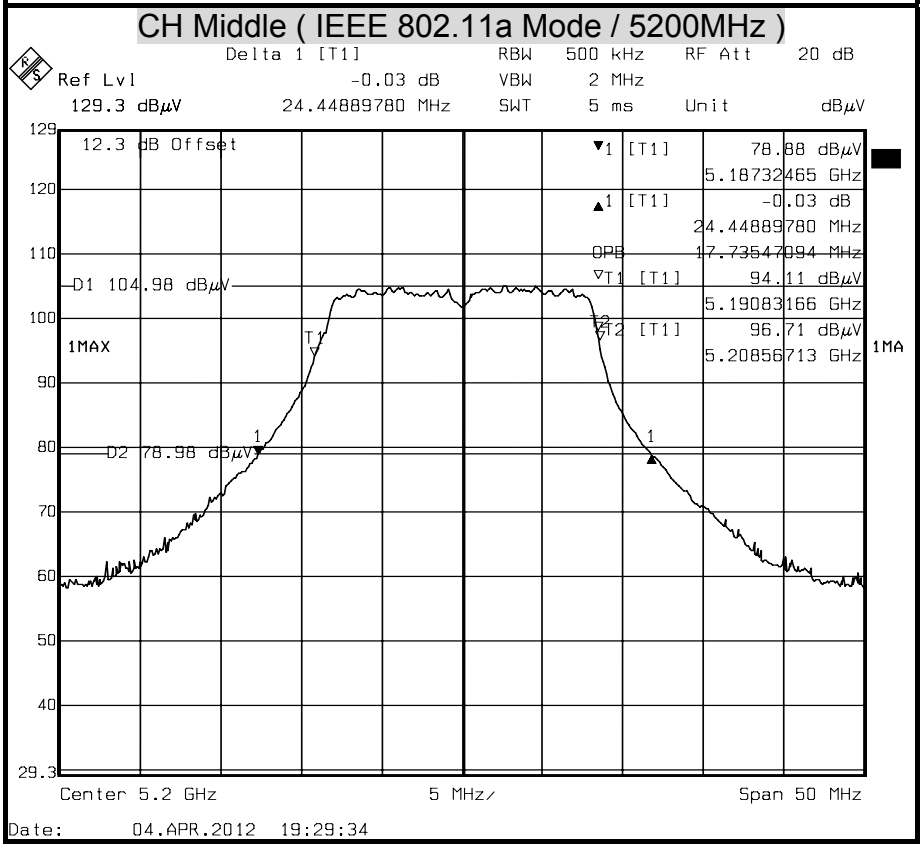
Remark:
1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

MAXIMUM CONDUCTED OUTPUT POWER

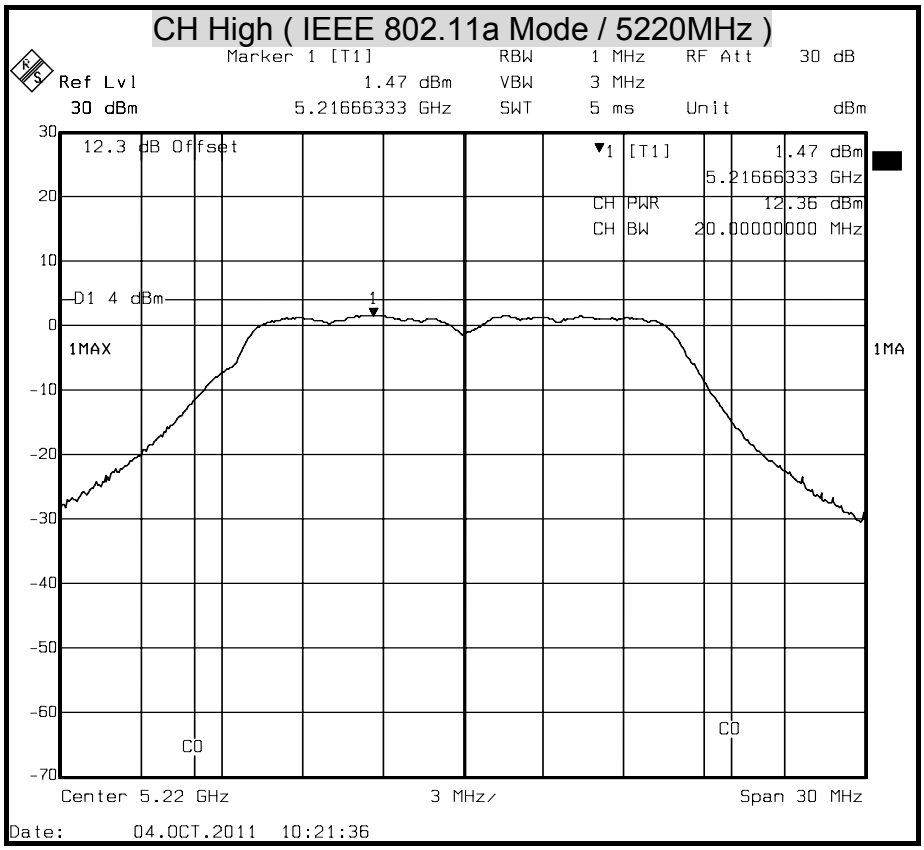
CH Low (IEEE 802.11a Mode / 5180MHz)



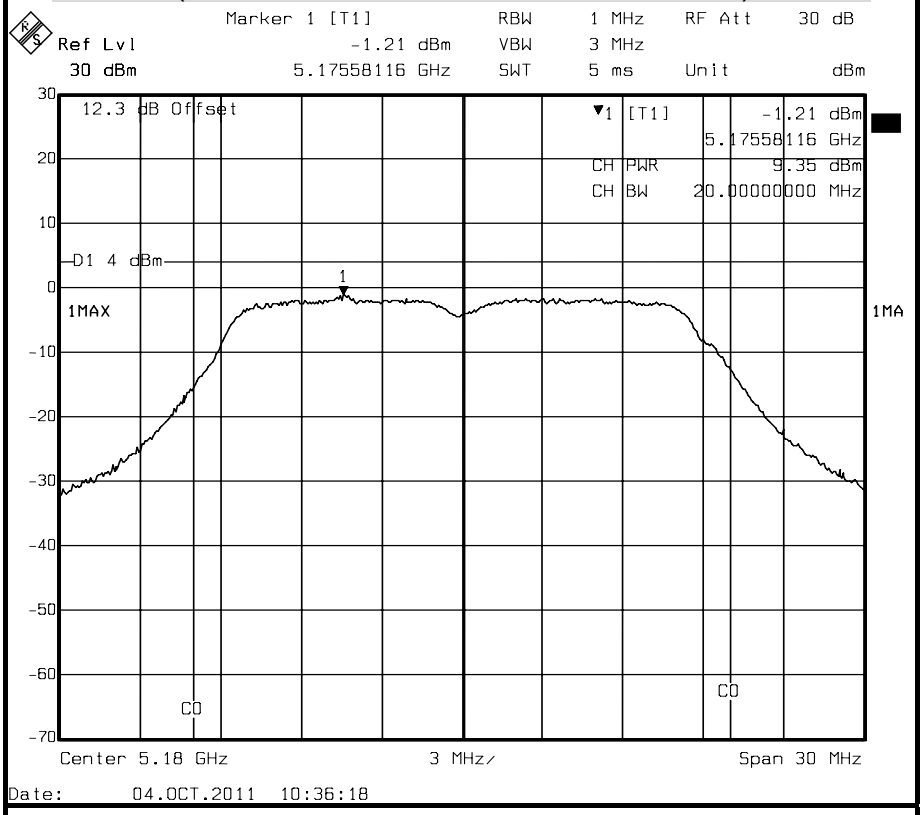
CH Middle (IEEE 802.11a Mode / 5200MHz)



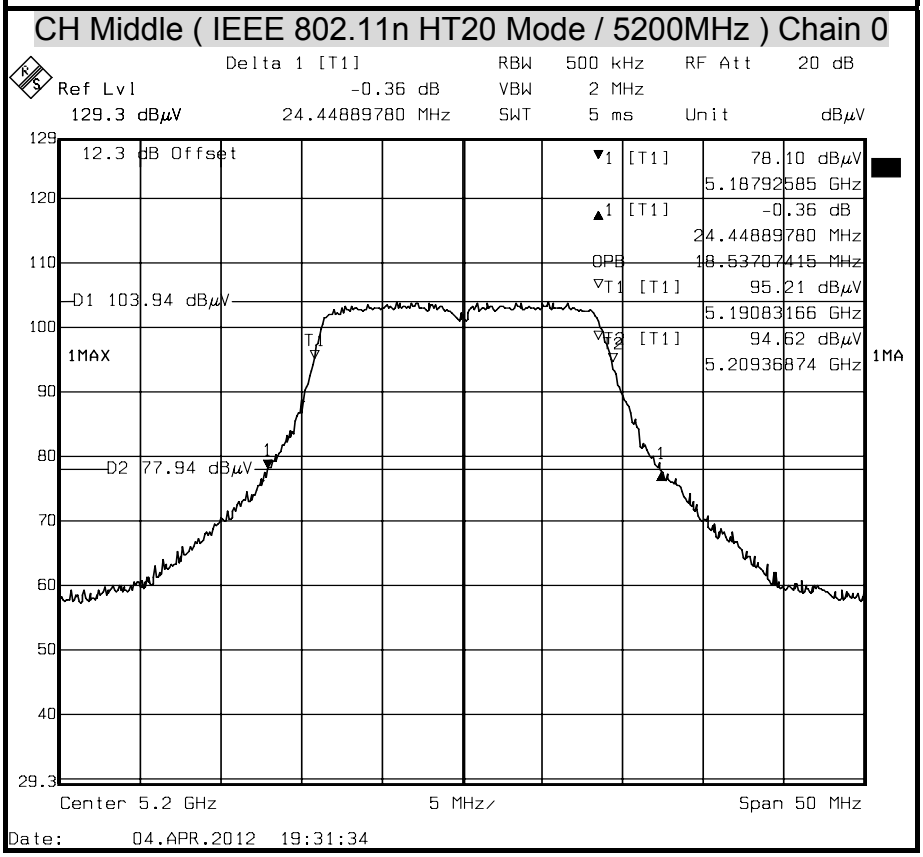
CH High (IEEE 802.11a Mode / 5220MHz)

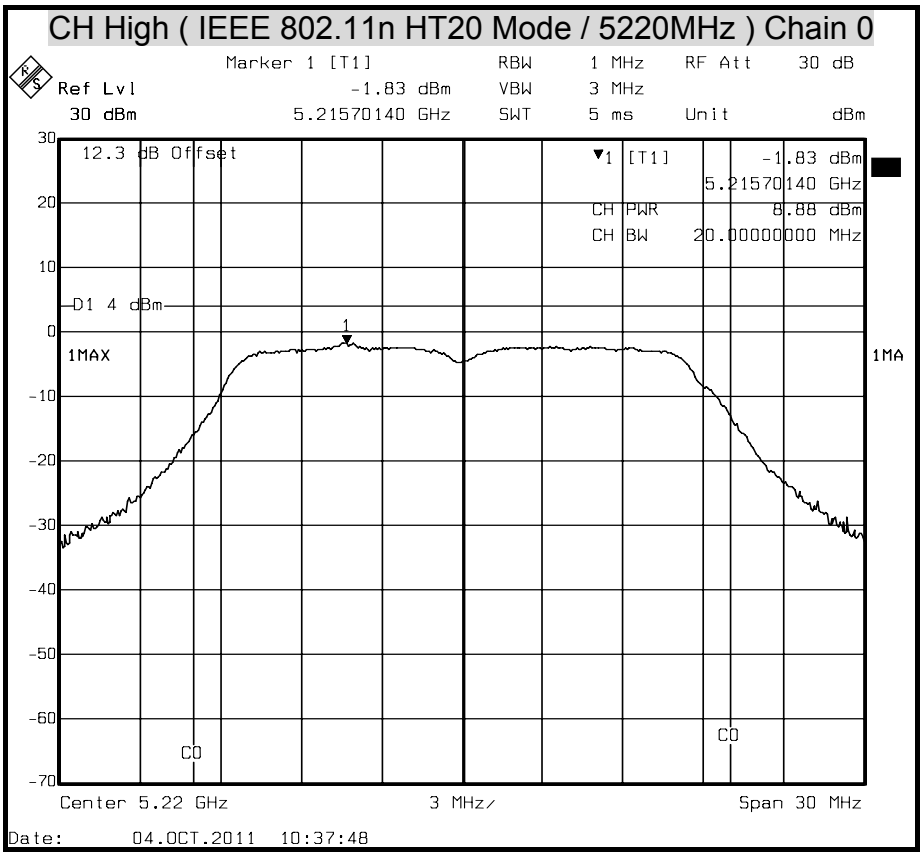


CH Low (IEEE 802.11n HT20 Mode / 5180MHz) Chain 0

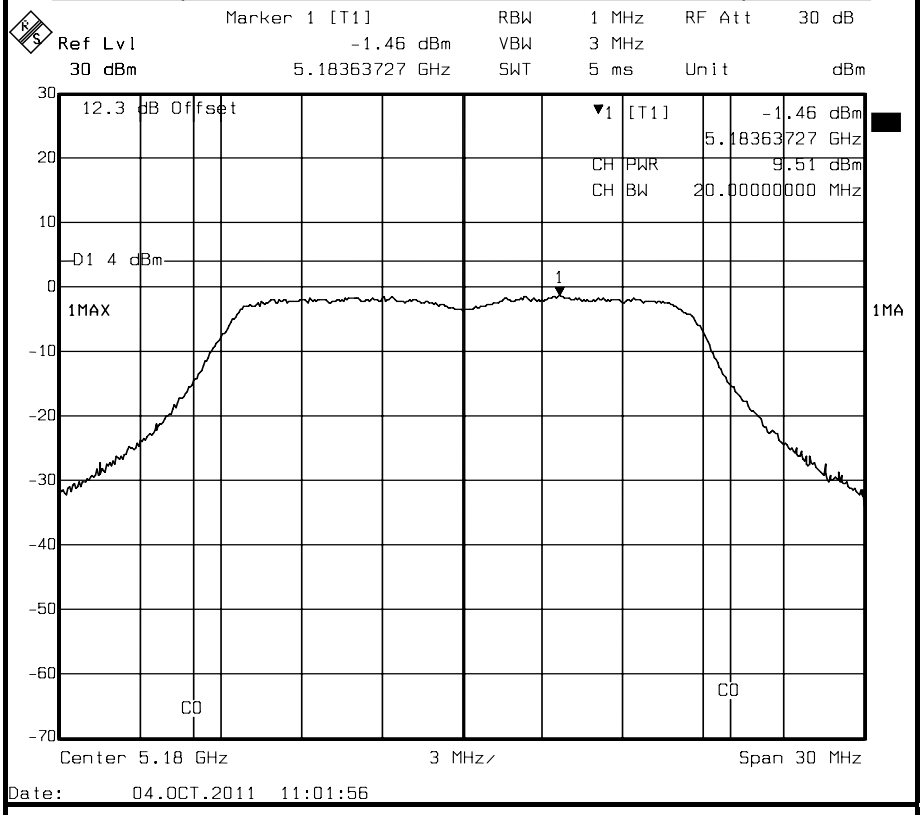


CH Middle (IEEE 802.11n HT20 Mode / 5200MHz) Chain 0

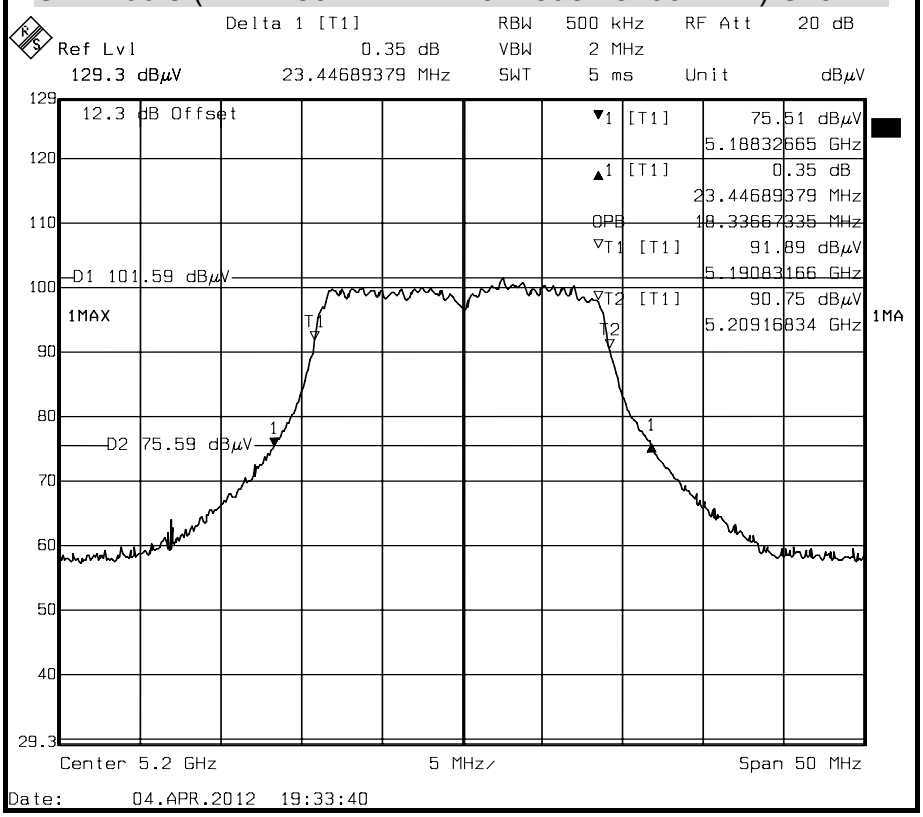


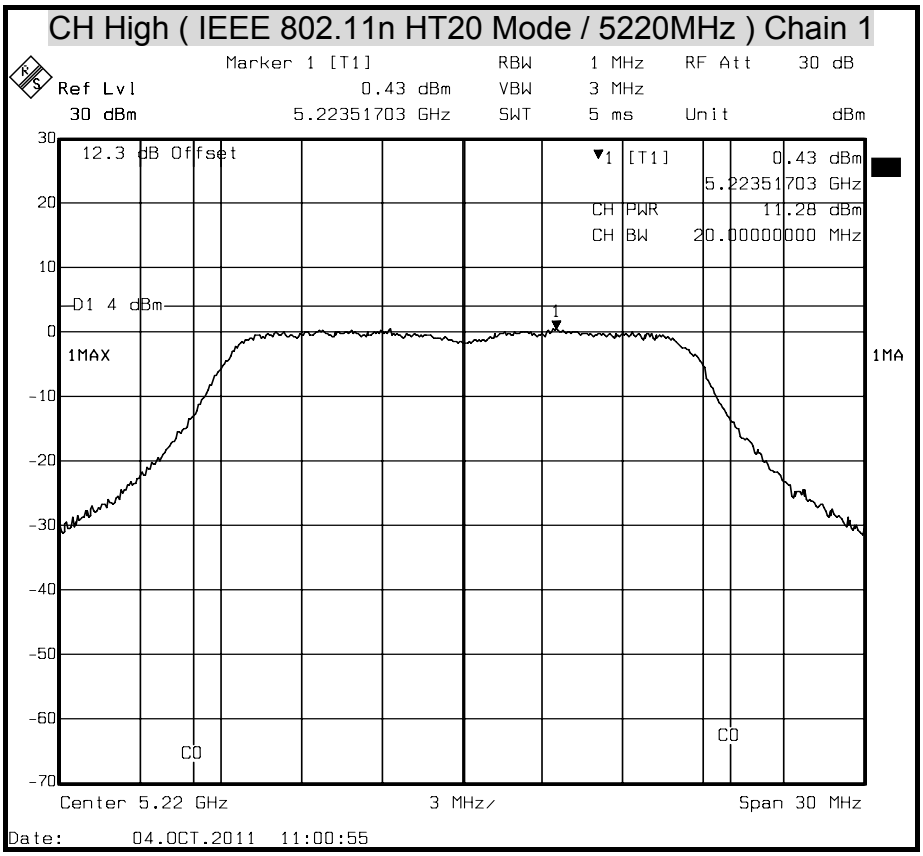


CH Low (IEEE 802.11n HT20 Mode / 5180MHz) Chain 1

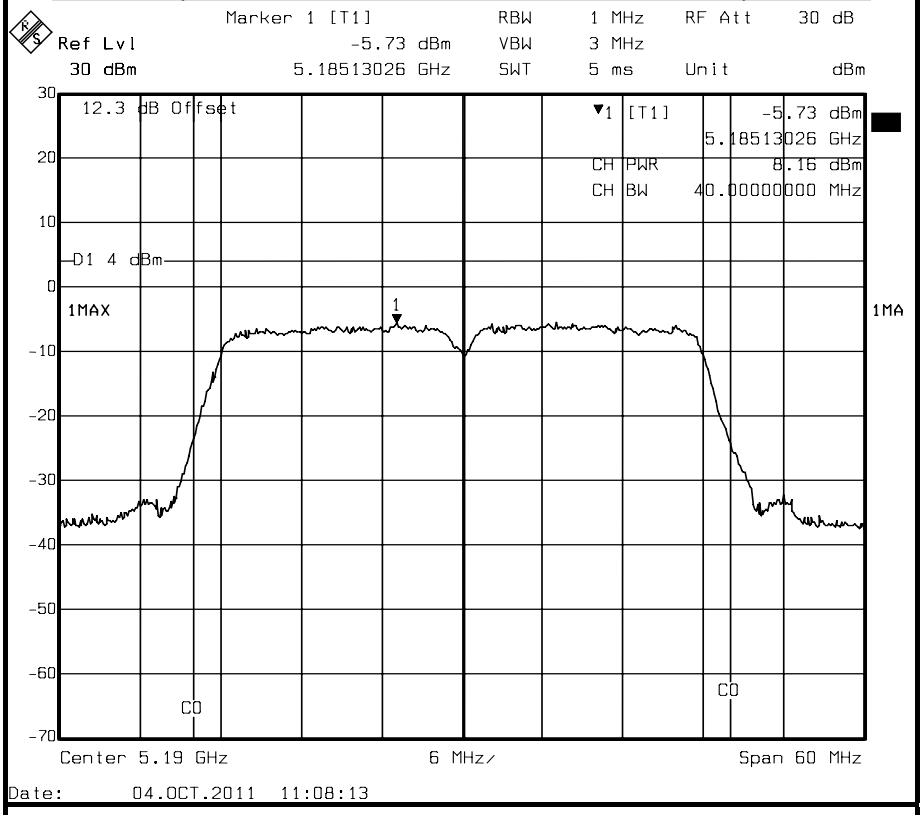


CH Middle (IEEE 802.11n HT20 Mode / 5200MHz) Chain 1

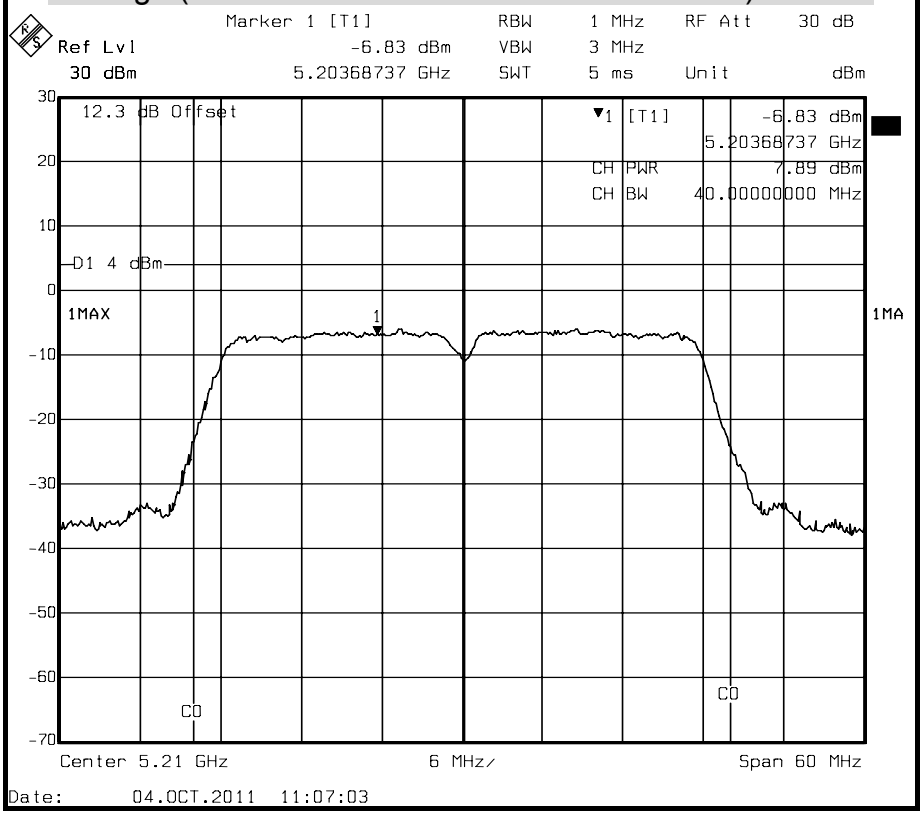




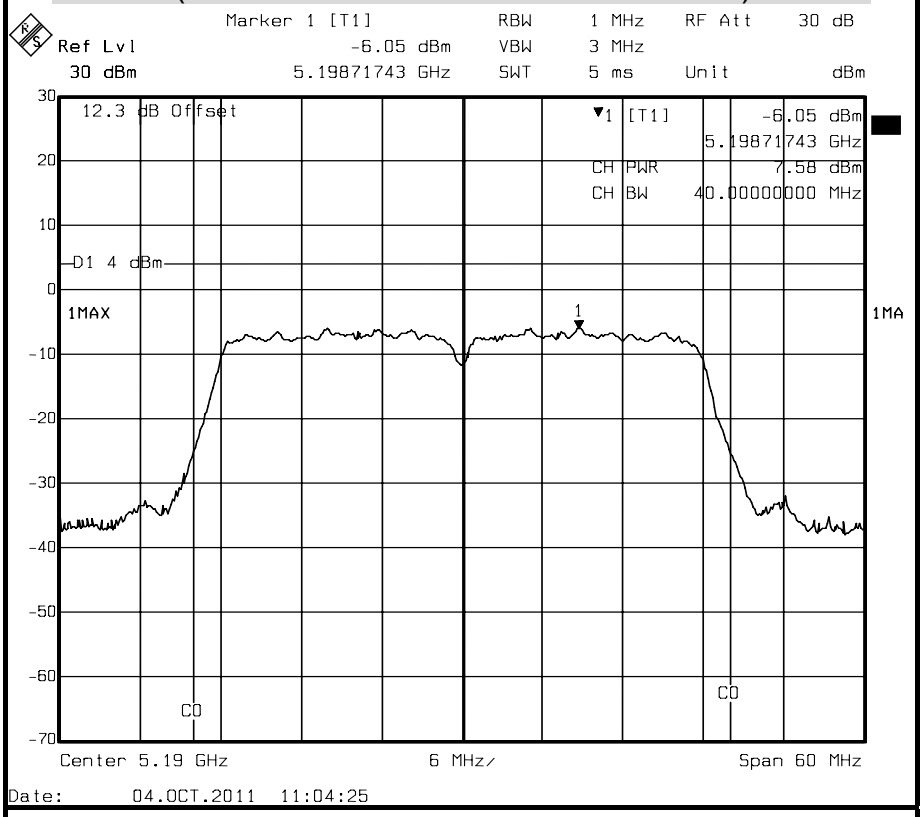
CH Low (IEEE 802.11n HT40 Mode / 5190MHz) Chain 0



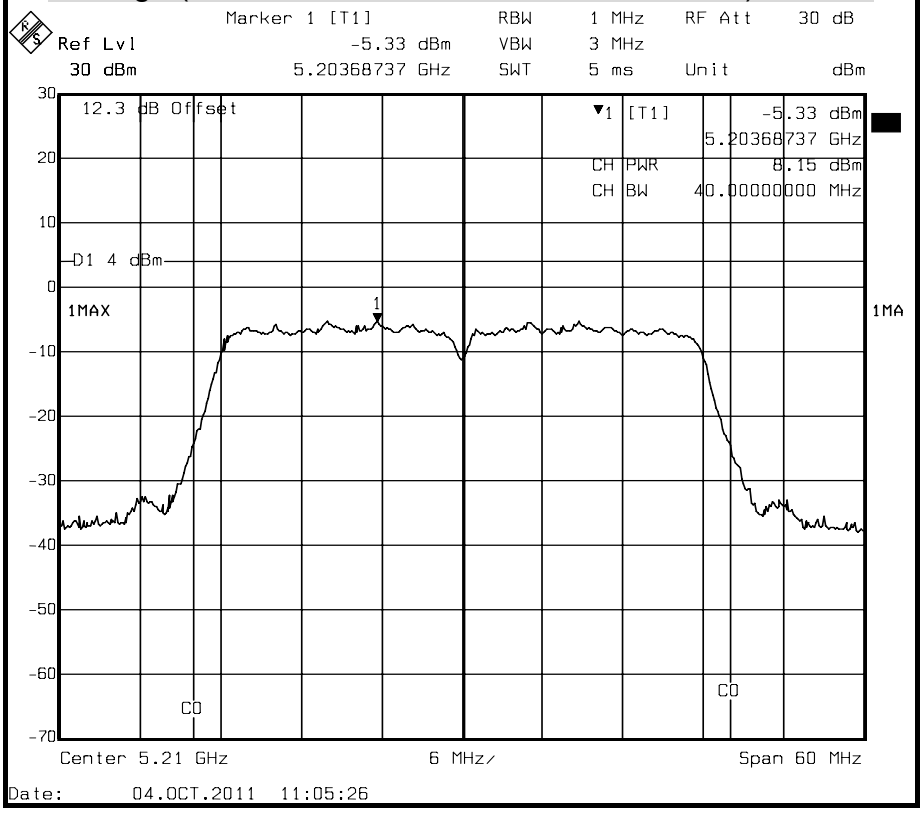
CH High (IEEE 802.11n HT40 Mode / 5210MHz) Chain 0



CH Low (IEEE 802.11n HT40 Mode / 5190MHz) Chain 1



CH High (IEEE 802.11n HT40 Mode / 5210MHz) Chain 1



7.3 PEAK POWER SPECTRAL DENSITY

LIMITS

§ 15.407 (a)

(1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.

(2) For the band 5.25-5.35 GHz and 5.47-5725 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

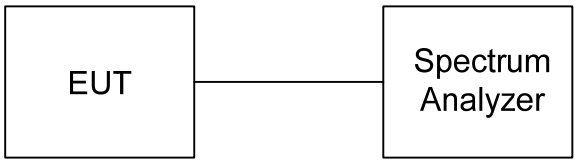
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = Sweep= AUTO
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

IEEE 802.11a Mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	1.010	4.00	-2.99	PASS
Middle	5200	1.280		-2.72	PASS
High	5220	1.470		-2.53	PASS

Remark:

1. At finial test to get the worst-case emission at 6Mbps.

2. The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 Mode / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin (dB)	Pass / Fail
		Chain 0	Chain 1	Tatol			
Low	5180	-1.210	-1.460	1.68	3.99	-2.31	PASS
Middle	5200	0.780	-3.440	2.17		-1.82	PASS
High	5220	-1.830	0.430	2.46		-1.53	PASS

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps

2. The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Mode / 5190MHz ~ 5210MHz

Channel	Channel Frequency (MHz)	PPSD (dBm)			Limit (dBm)	Margin (dB)	Pass / Fail
		Chain 0	Chain 1	Tatol			
Low	5190	-5.730	-6.050	-2.88	3.99	-6.87	PASS
High	5210	-6.830	-5.330	-3.01		-7.00	PASS

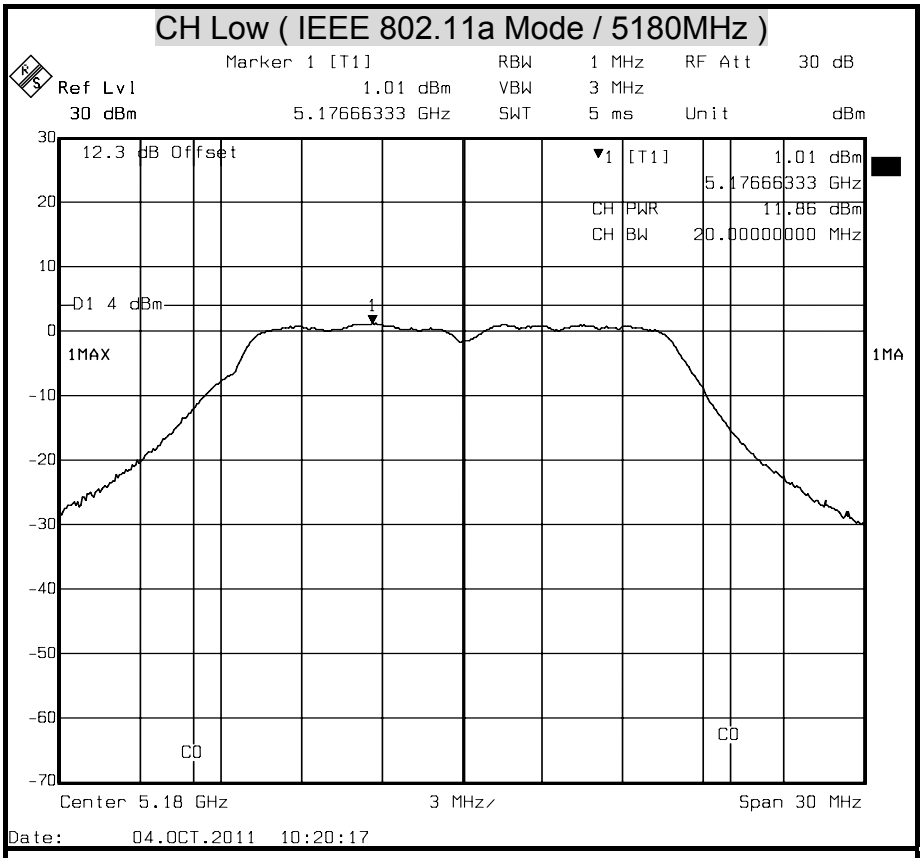
Remark:

1. At finial test to get the worst-case emission at 6.5Mbps

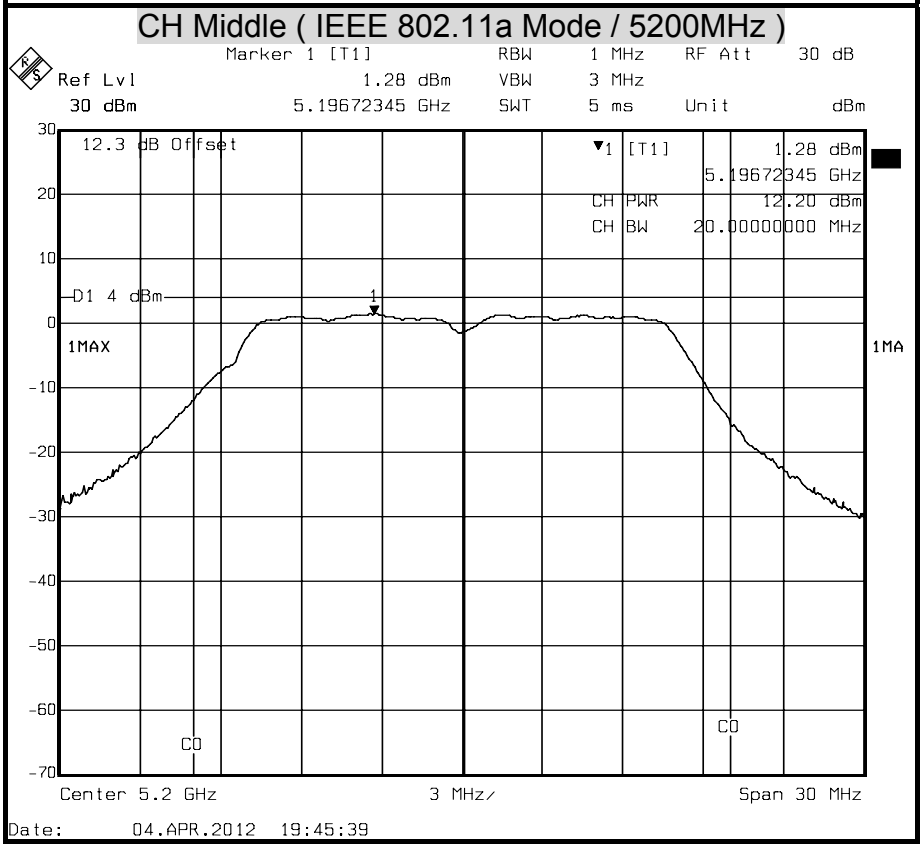
2. The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

PEAK POWER SPECTRAL DENSITY

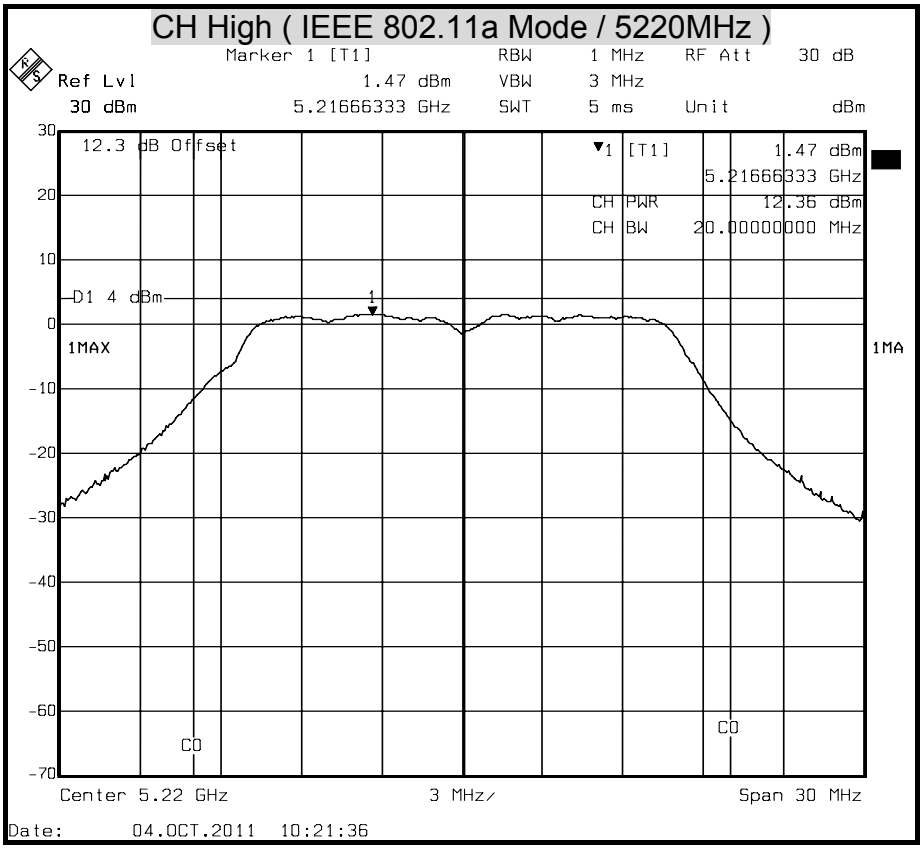
CH Low (IEEE 802.11a Mode / 5180MHz)



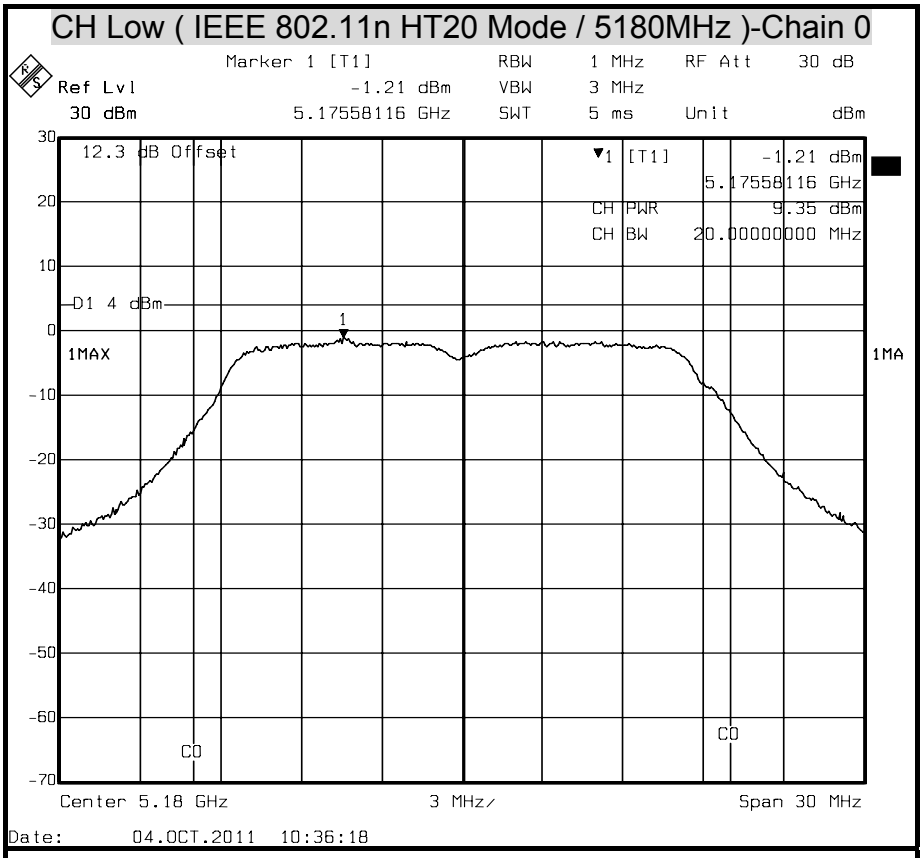
CH Middle (IEEE 802.11a Mode / 5200MHz)



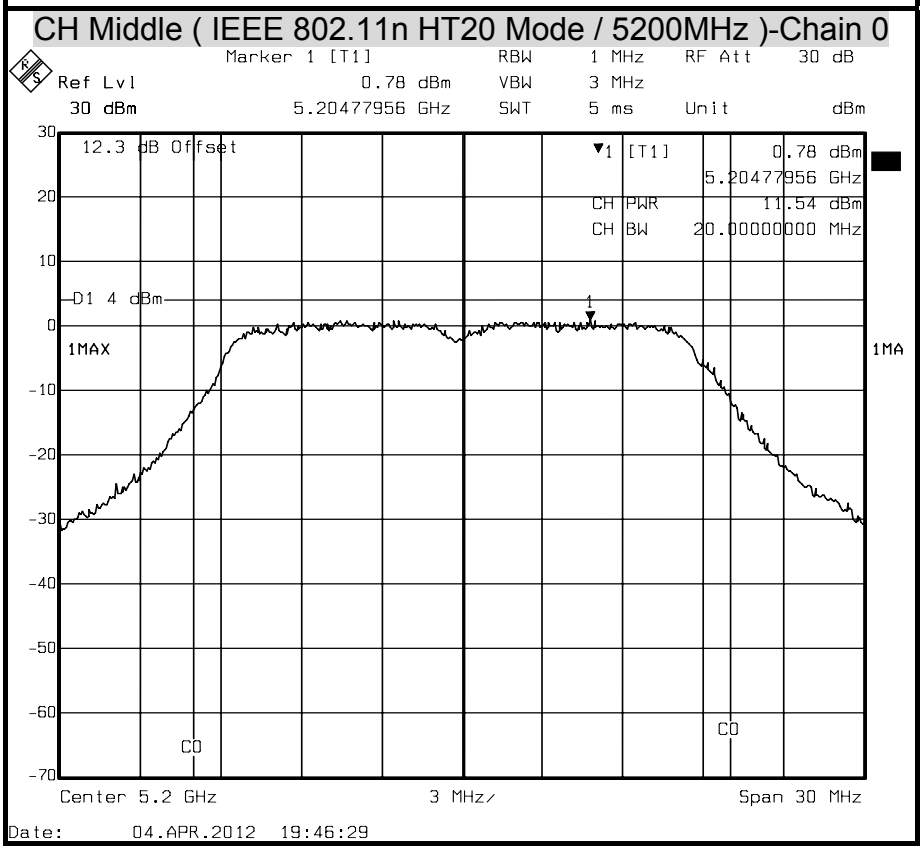
CH High (IEEE 802.11a Mode / 5220MHz)

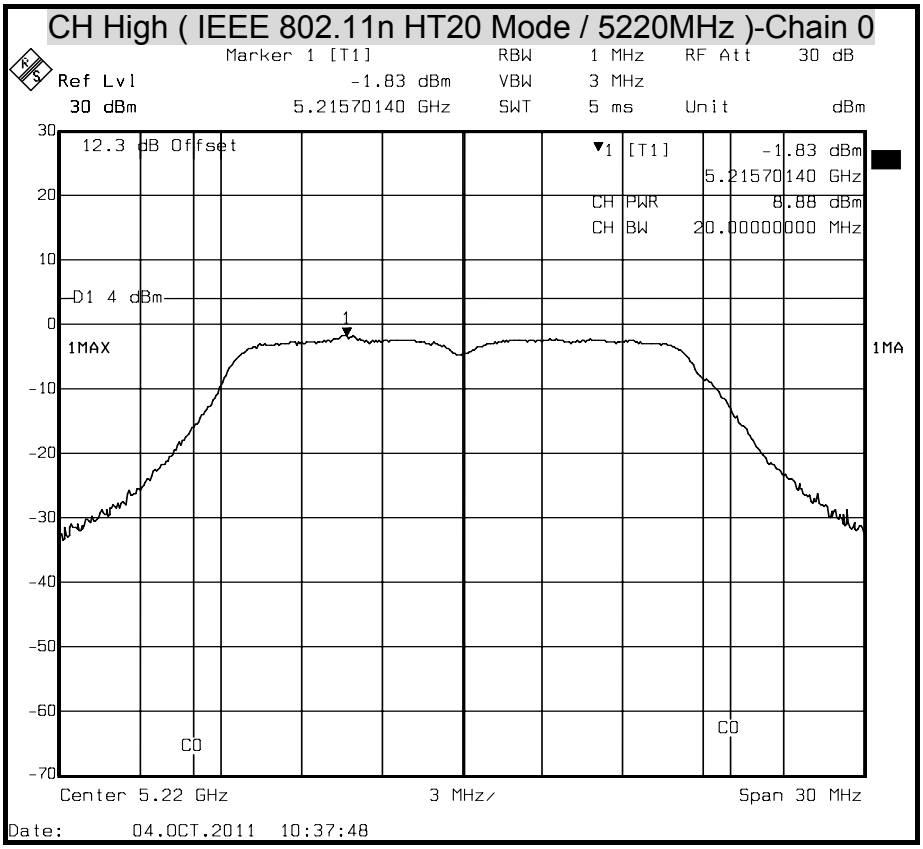


CH Low (IEEE 802.11n HT20 Mode / 5180MHz)-Chain 0

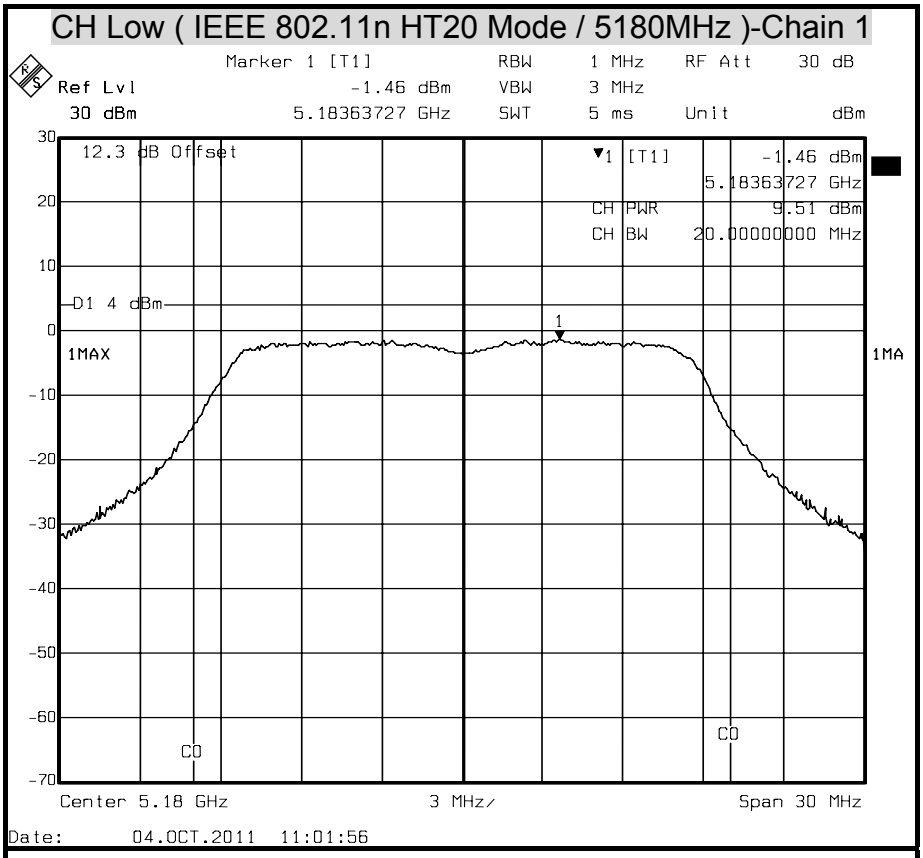


CH Middle (IEEE 802.11n HT20 Mode / 5200MHz)-Chain 0

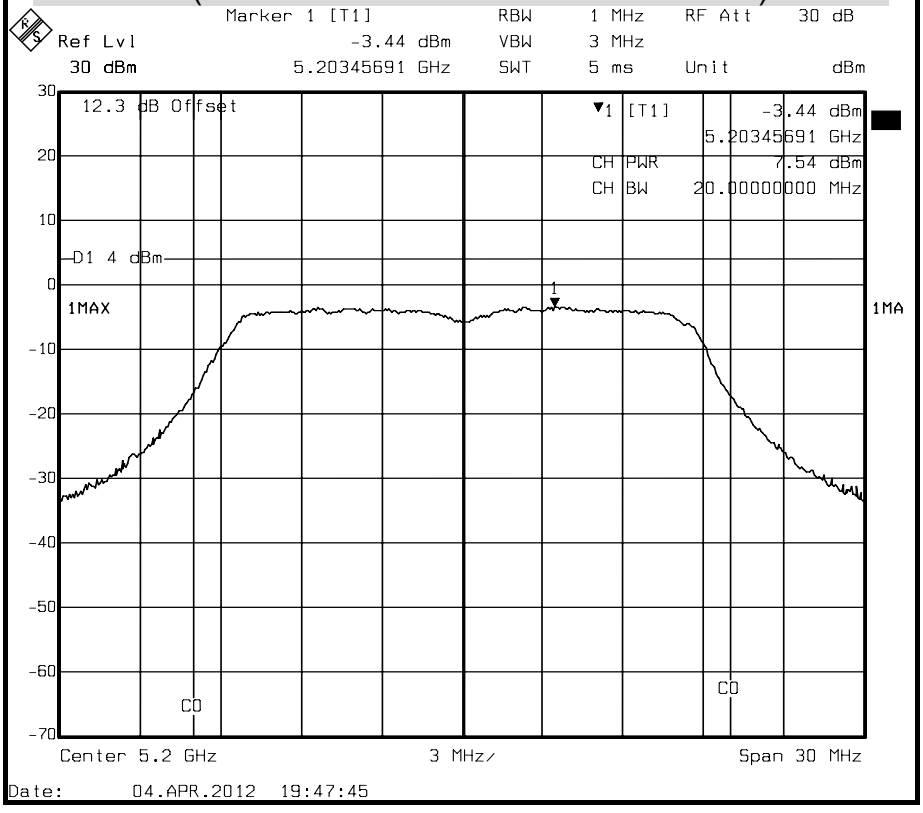




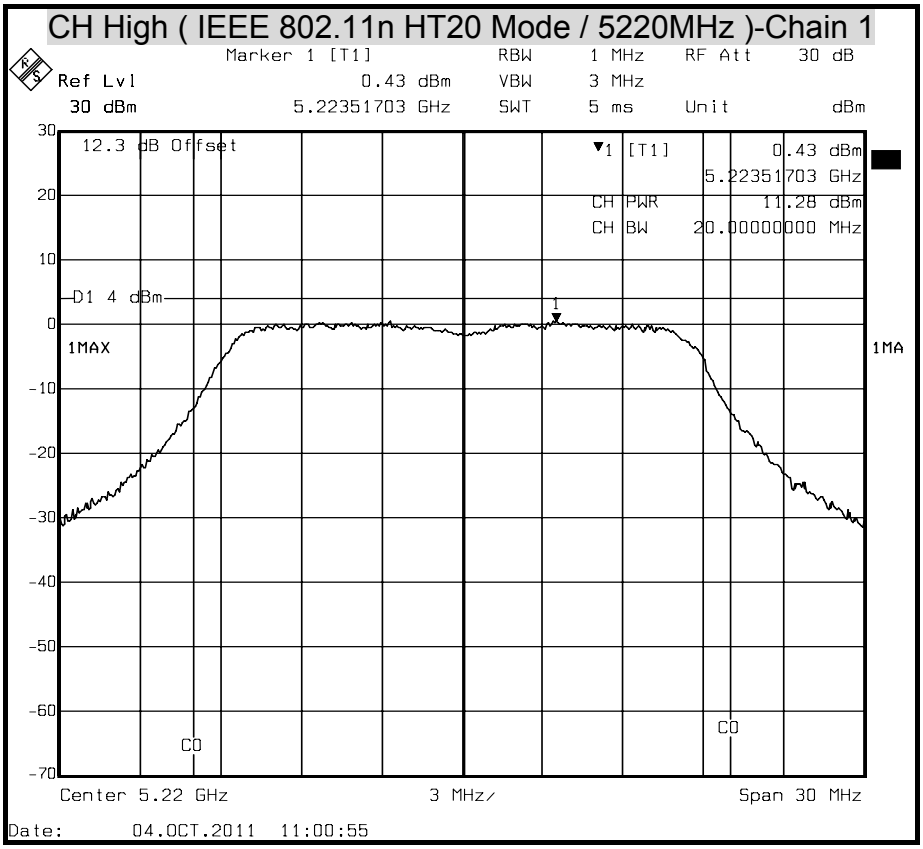
CH Low (IEEE 802.11n HT20 Mode / 5180MHz)-Chain 1



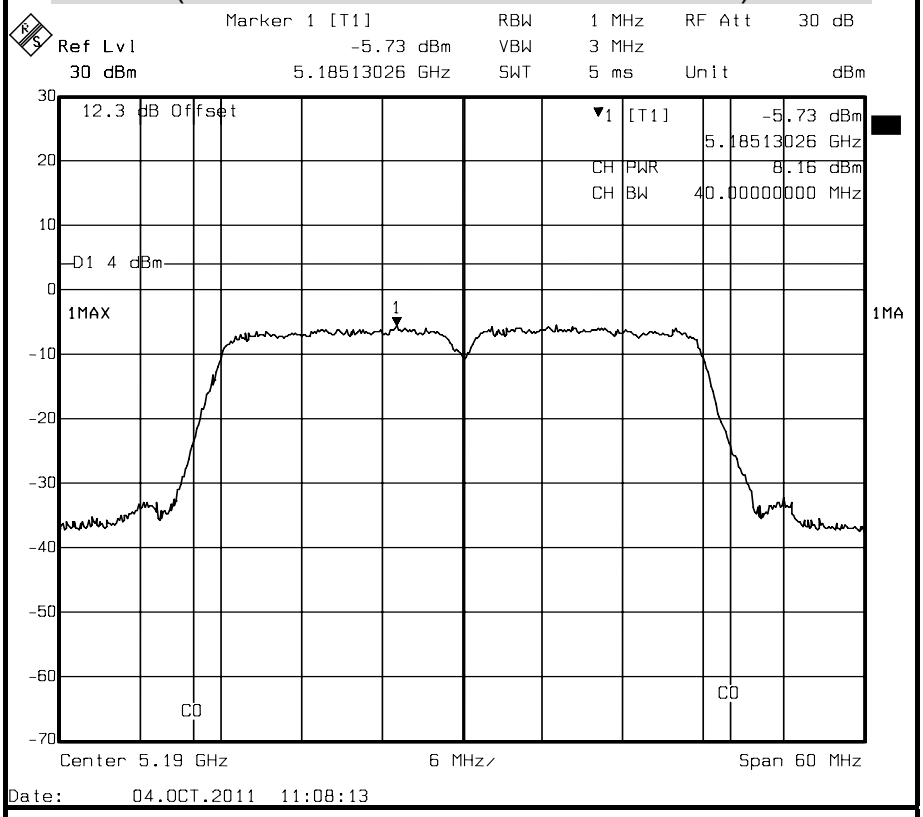
CH Middle (IEEE 802.11n HT20 Mode / 5200MHz)-Chain 1



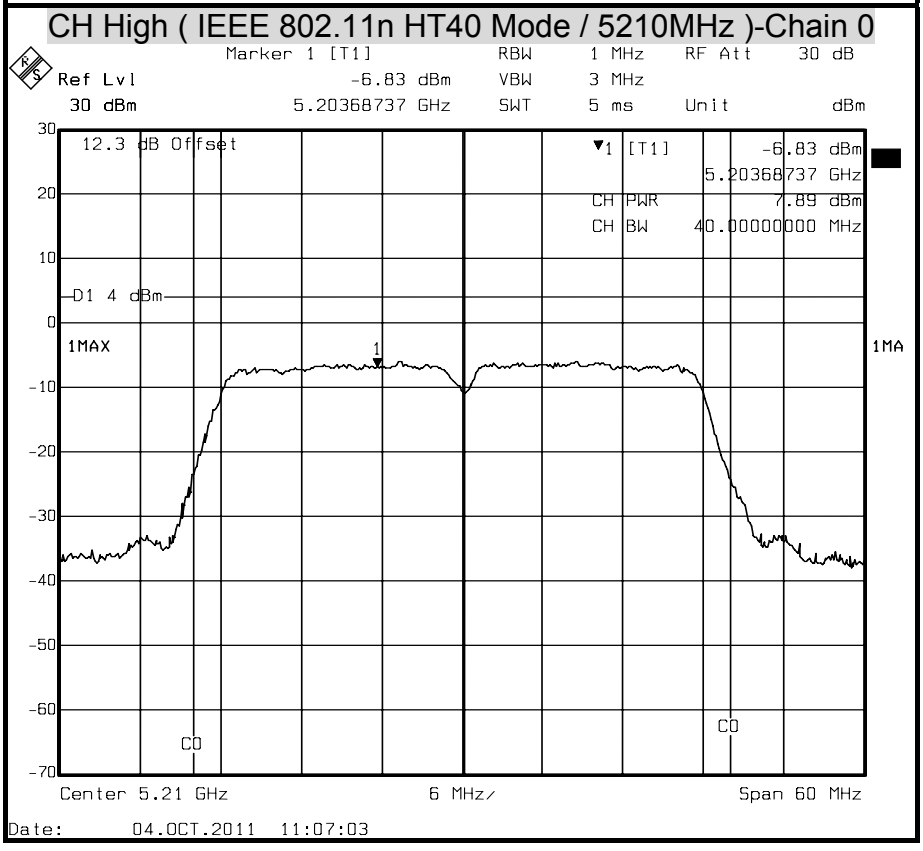
CH High (IEEE 802.11n HT20 Mode / 5220MHz)-Chain 1



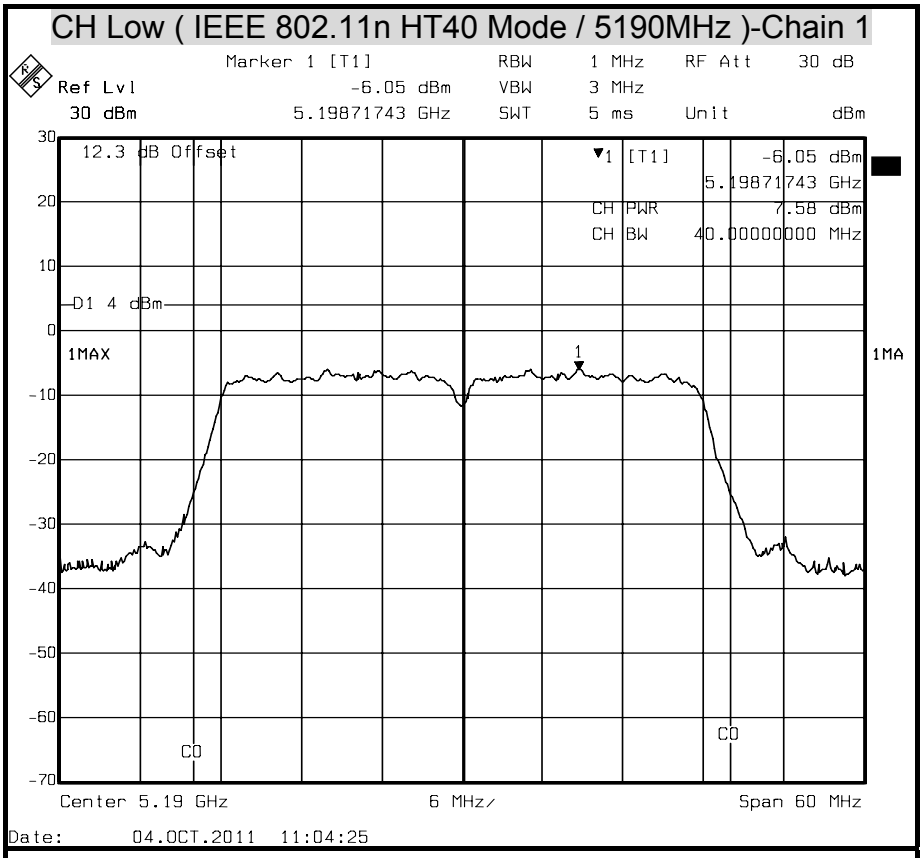
CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 0



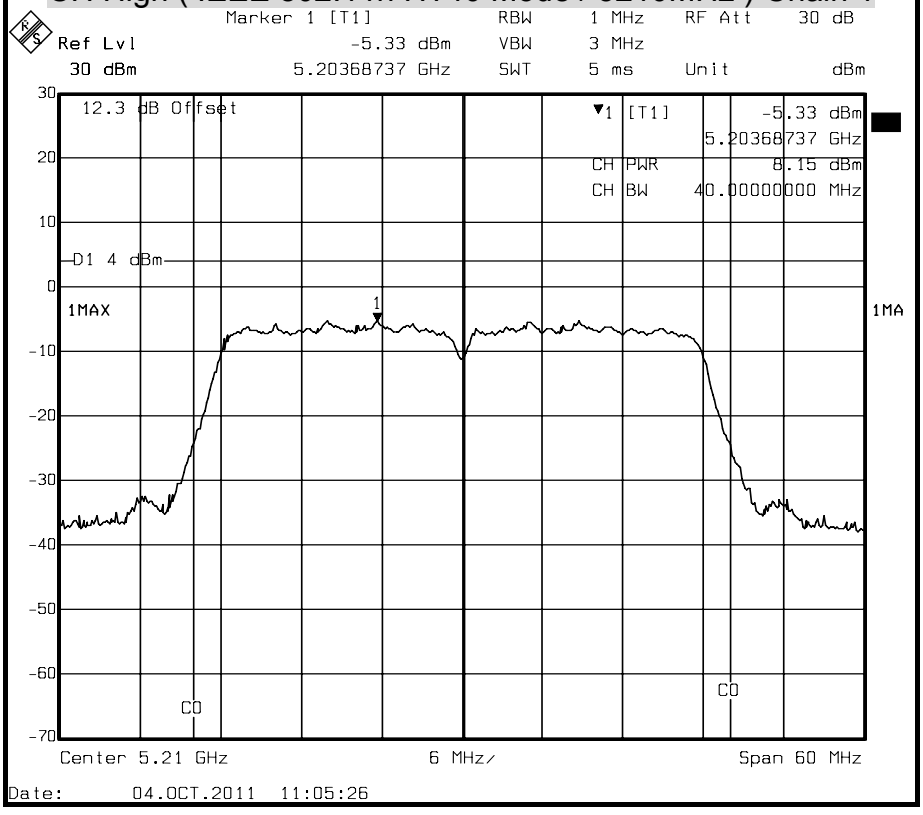
CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 0



CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 1



CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 1



7.4 PEAK EXCURSION

LIMITS

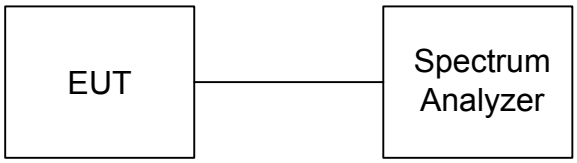
§ 15.407 (a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

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 > 26dB Bandwidth, Max. hold.
   Trace B, Set RBW =1MHz, VBW = 30kHz, Span > 26dB Bandwidth, Max. hold.
4. Delta Mark trace A Maximum frequency and trace B same frequency.
5. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

IEEE 802.11a Mode (BPSK) / 5180MHz ~ 5220MHz

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.58	13	-3.42	PASS
Middle	5200	8.32		-4.68	PASS
High	5220	8.59		-4.41	PASS

Remark:
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode (BPSK) / 5180MHz ~ 5220MHz / Chain 0

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	10.20	13	-2.80	PASS
Middle	5200	9.34		-3.66	PASS
High	5220	9.57		-3.43	PASS

Remark:
1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT20 Mode (BPSK) / 5180MHz ~ 5220MHz / Chain 1

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.90	13	-3.10	PASS
Middle	5200	9.21		-3.79	PASS
High	5220	10.69		-2.31	PASS

Remark:
1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11n HT40 Mode (BPSK) / 5190MHz ~ 5210MHz / Chain 0

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5190	9.33	13	-3.67	PASS
High	5210	9.87		-3.13	PASS

Remark:

1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 Mode (BPSK) / 5190MHz ~ 5210MHz / Chain 1

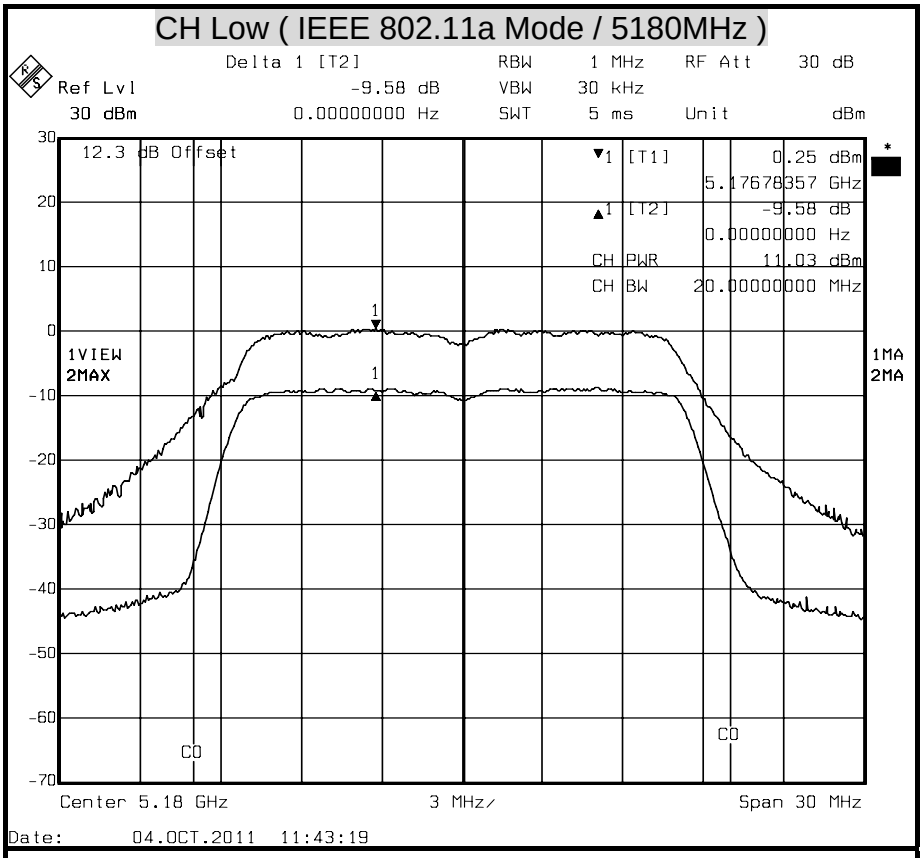
Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5190	10.10	13	-2.90	PASS
High	5210	9.80		-3.20	PASS

Remark:

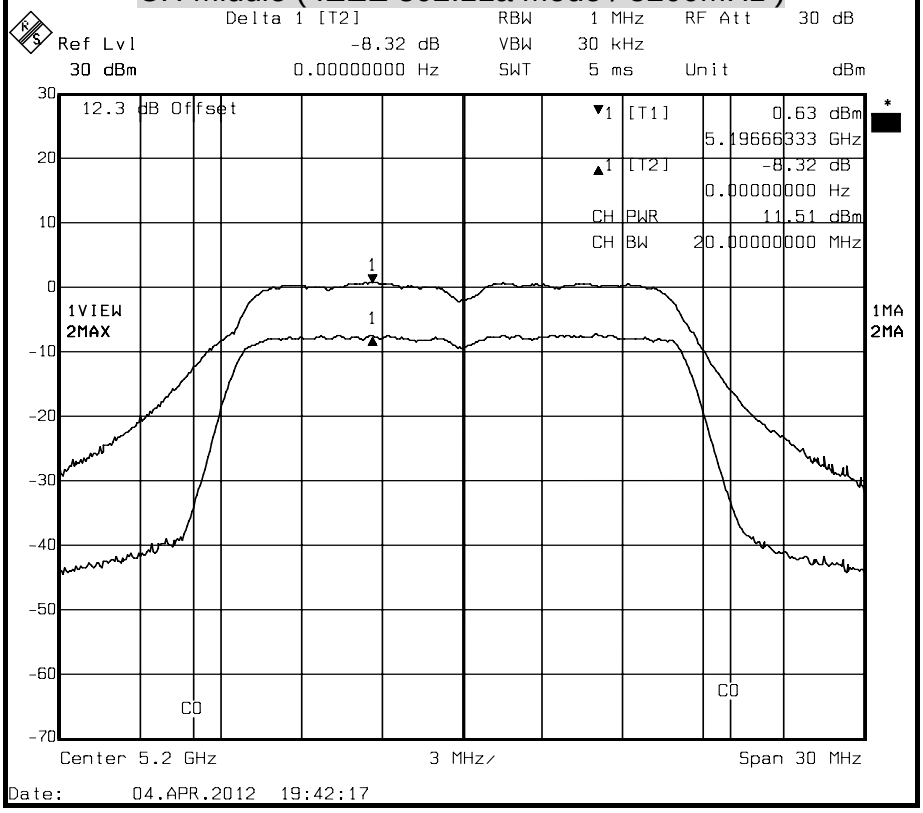
1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 12.3dB (including 10 dB pad and 2.3 dB cable)was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

PEAK EXCURSION

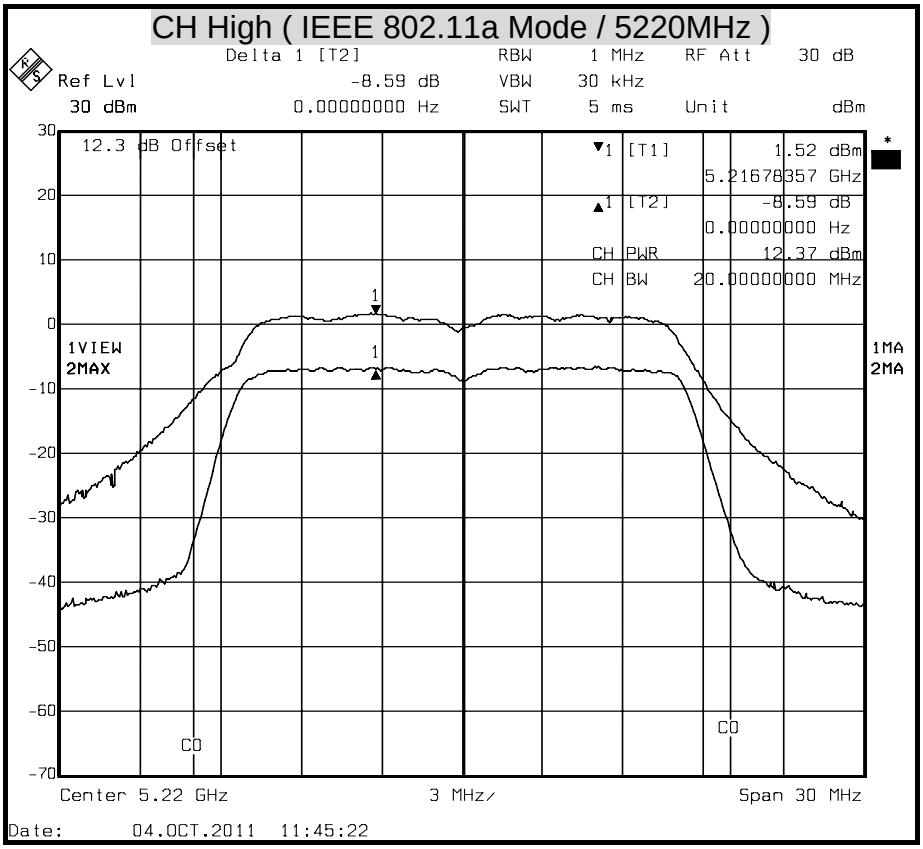
CH Low (IEEE 802.11a Mode / 5180MHz)



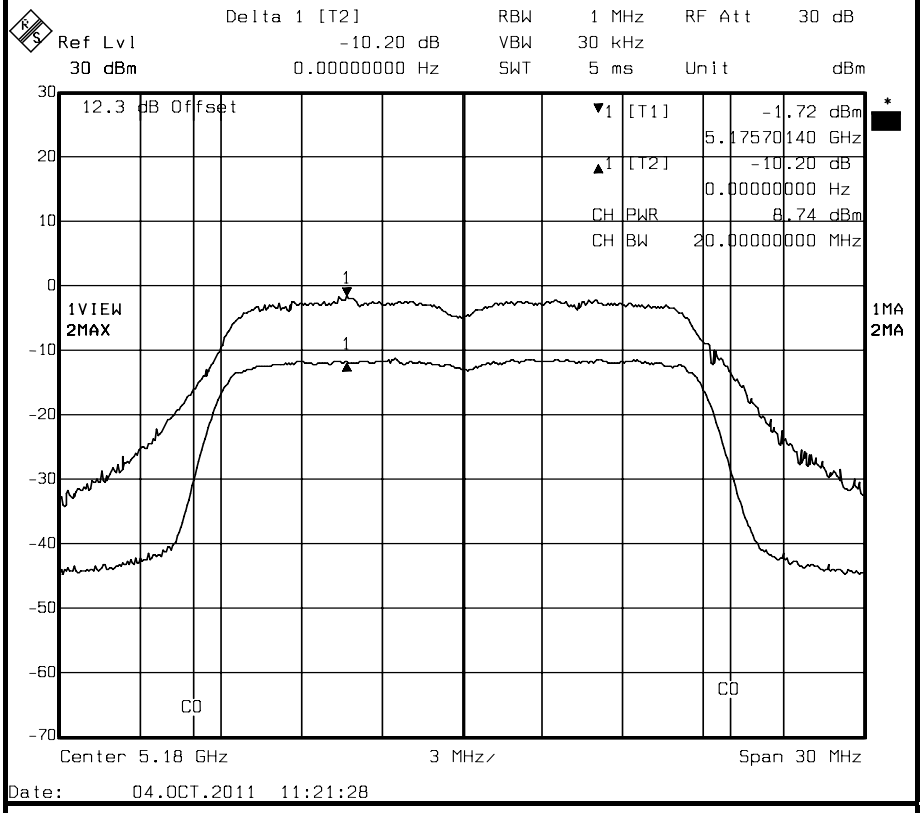
CH Middle (IEEE 802.11a Mode / 5200MHz)



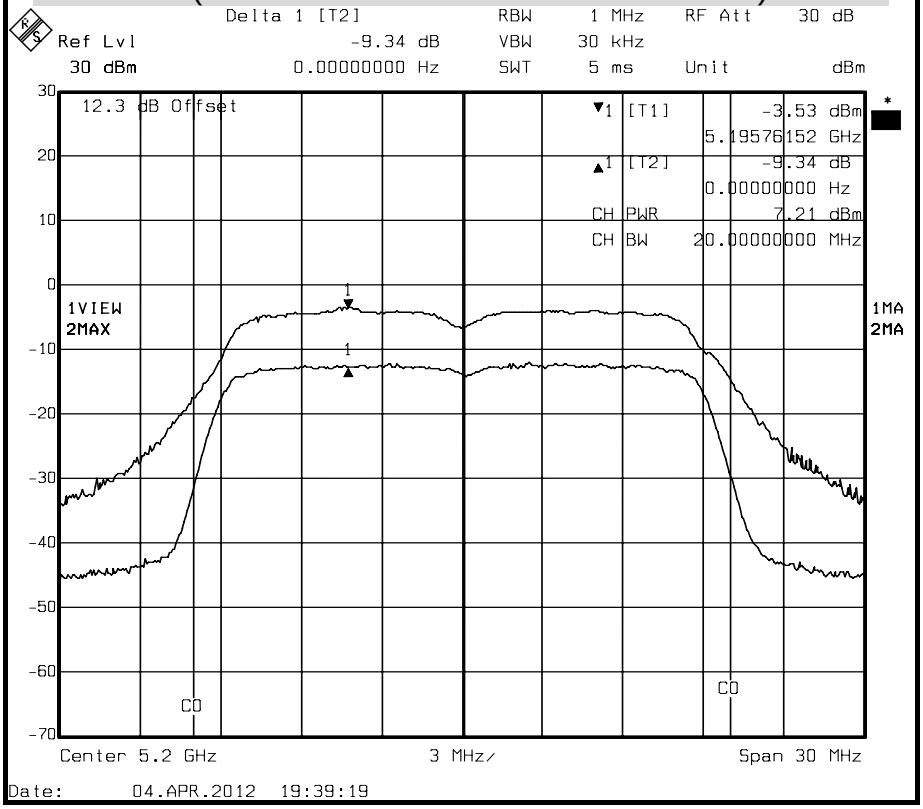
CH High (IEEE 802.11a Mode / 5220MHz)



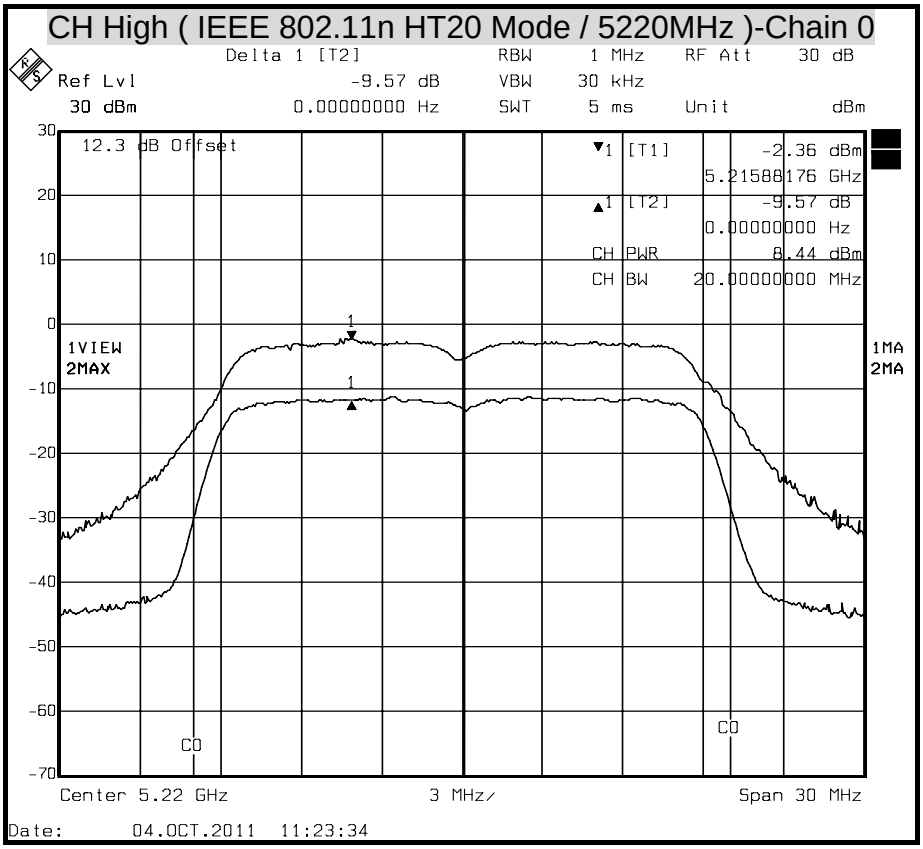
CH Low (IEEE 802.11n HT20 Mode / 5180MHz)-Chain 0



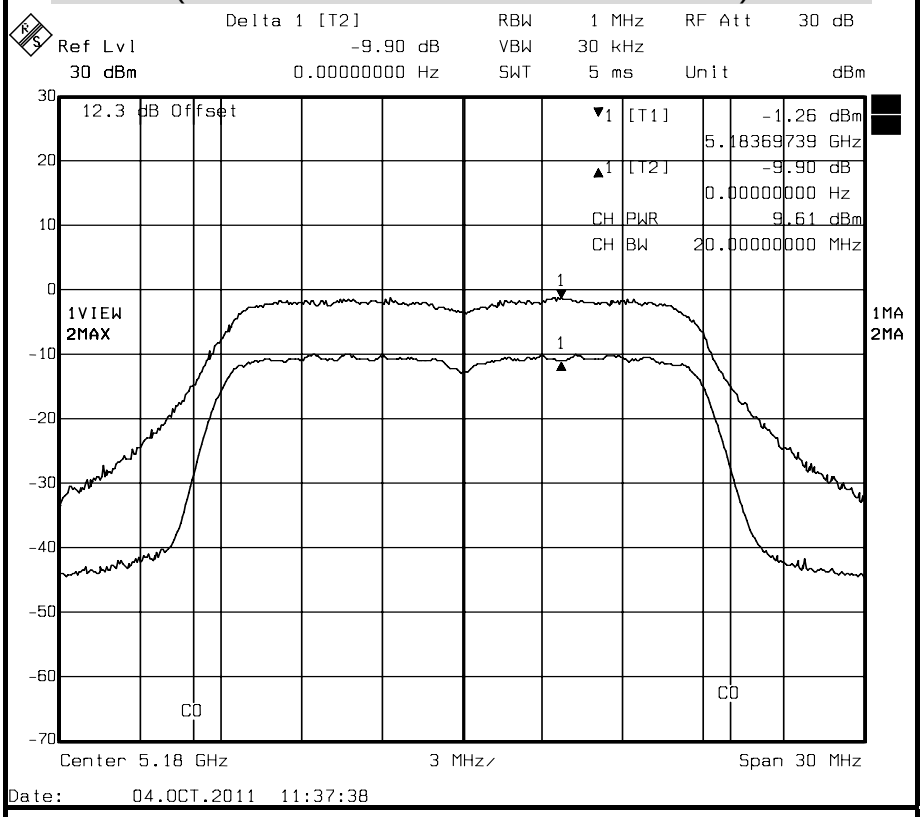
CH Middle (IEEE 802.11n HT20 Mode / 5200MHz)-Chain 0



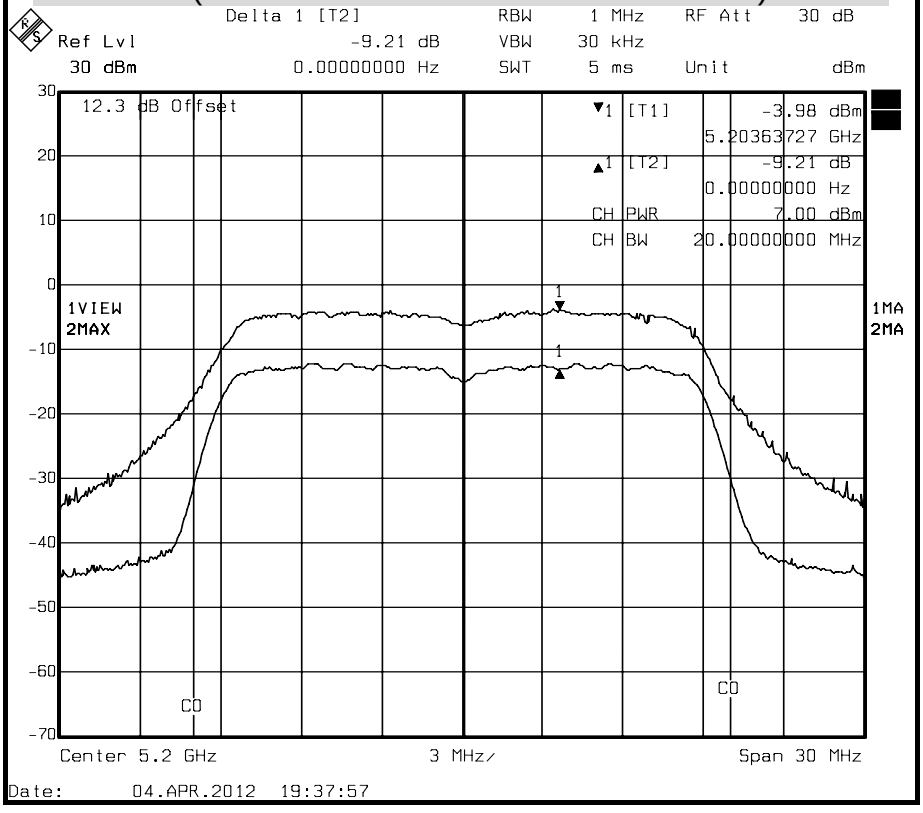
CH High (IEEE 802.11n HT20 Mode / 5220MHz)-Chain 0



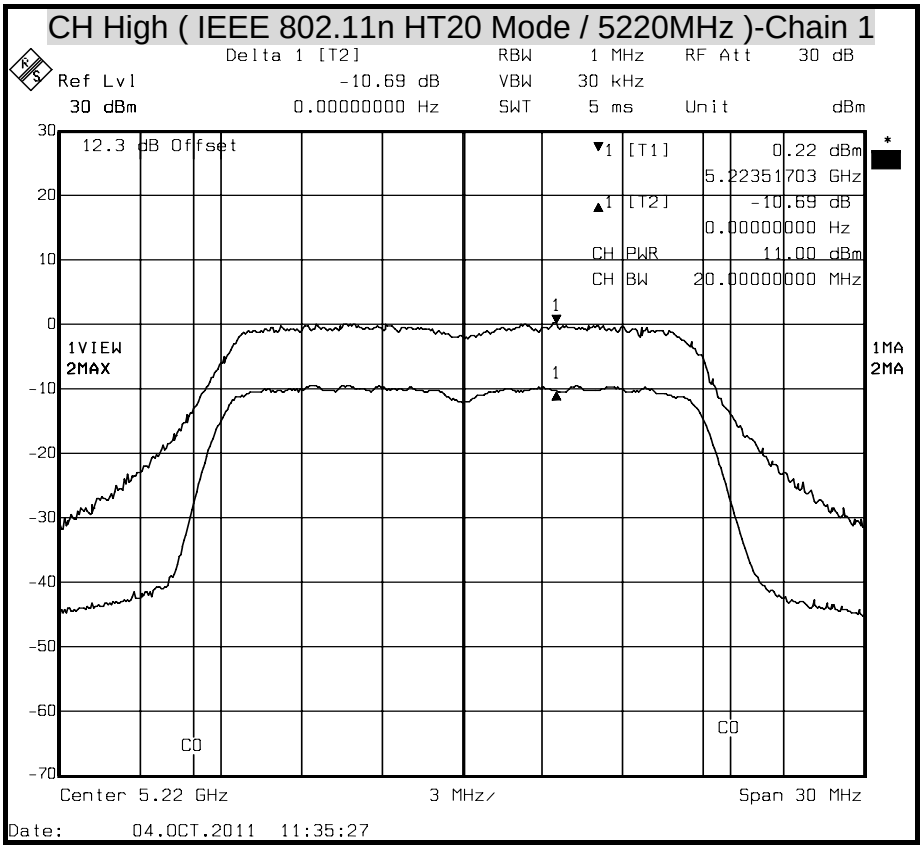
CH Low (IEEE 802.11n HT20 Mode / 5180MHz)-Chain 1



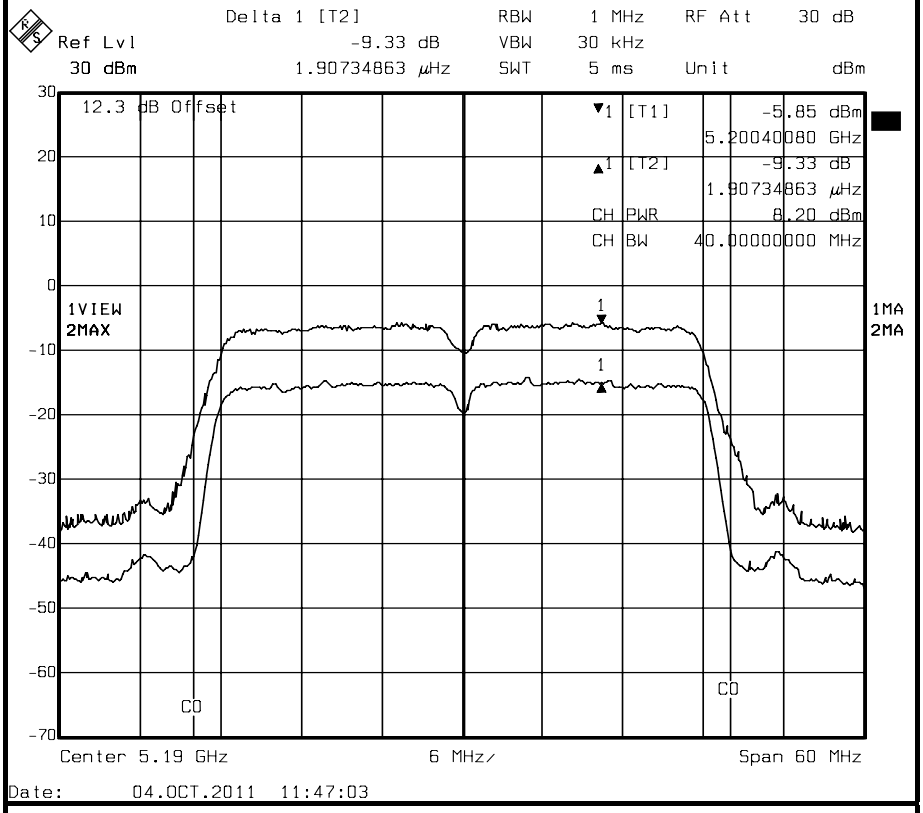
CH Middle (IEEE 802.11n HT20 Mode / 5200MHz)-Chain 1



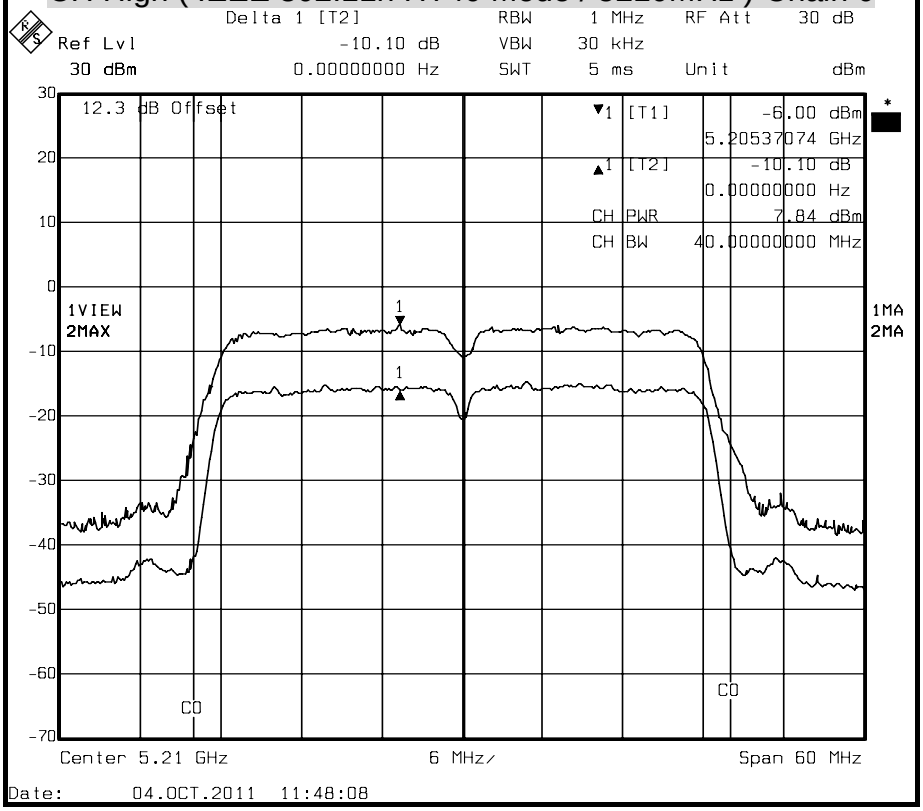
CH High (IEEE 802.11n HT20 Mode / 5220MHz)-Chain 1



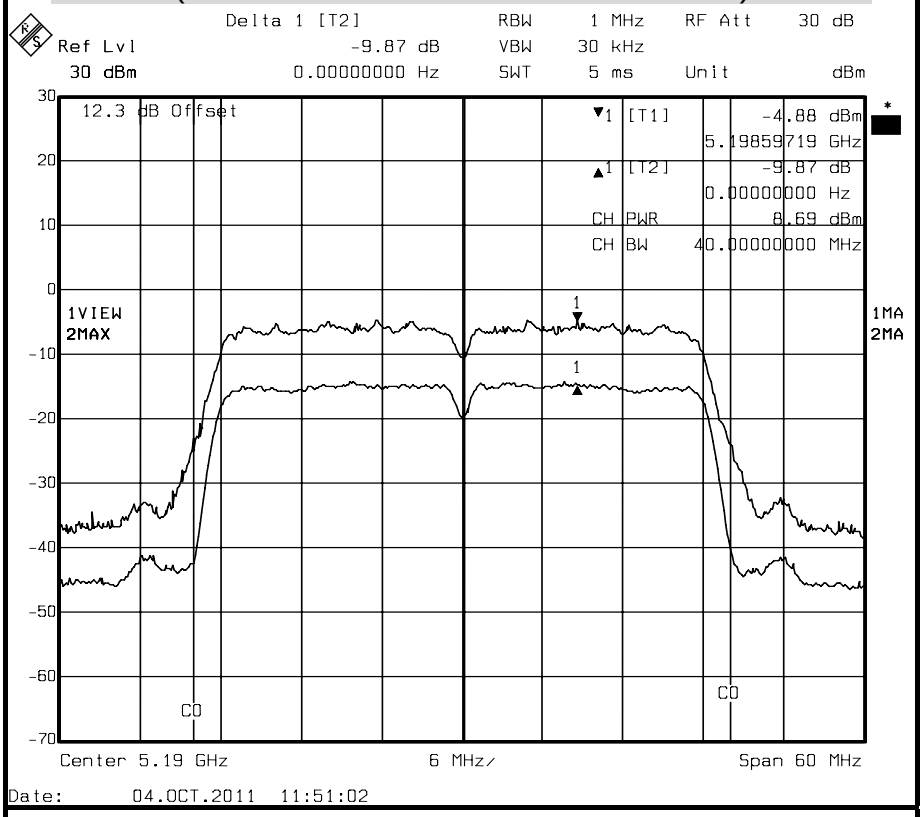
CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 0



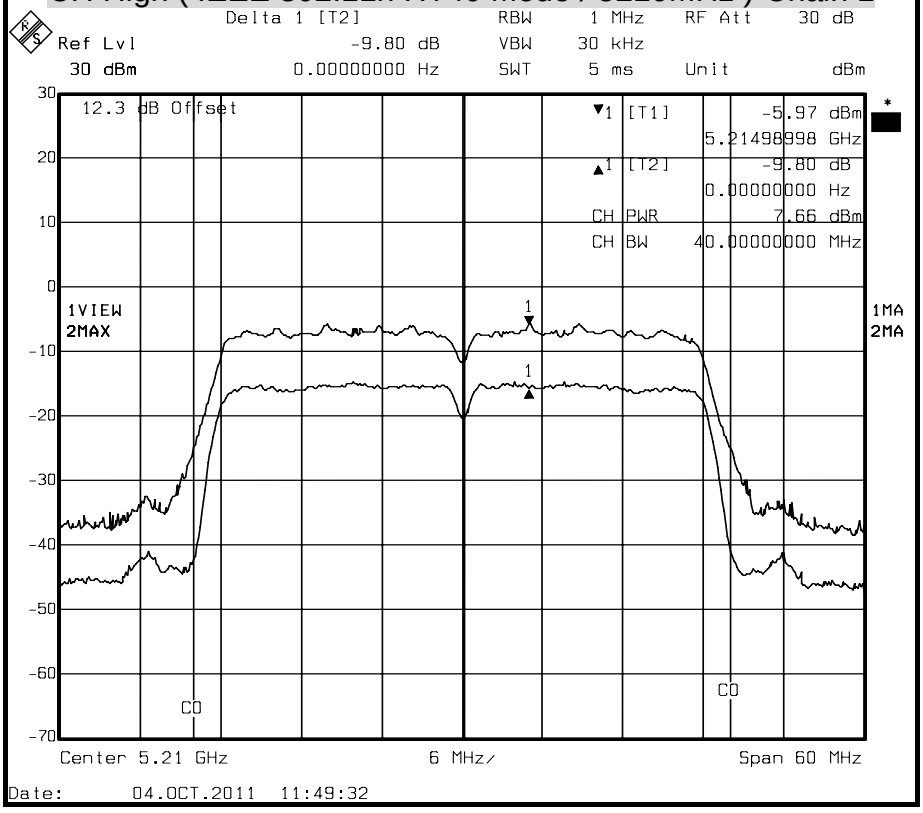
CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 0



CH Low (IEEE 802.11n HT40 Mode / 5190MHz)-Chain 1



CH High (IEEE 802.11n HT40 Mode / 5210MHz)-Chain 1



7.5 CONDUCTED SPURIOUS EMISSION

LIMITS

§ 15.407 (b),

(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.

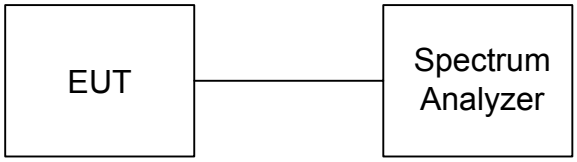
The provisions of § 15.205 apply to intentional radiators operating under this section.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation of measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1MHz. The video bandwidth is set to 1MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

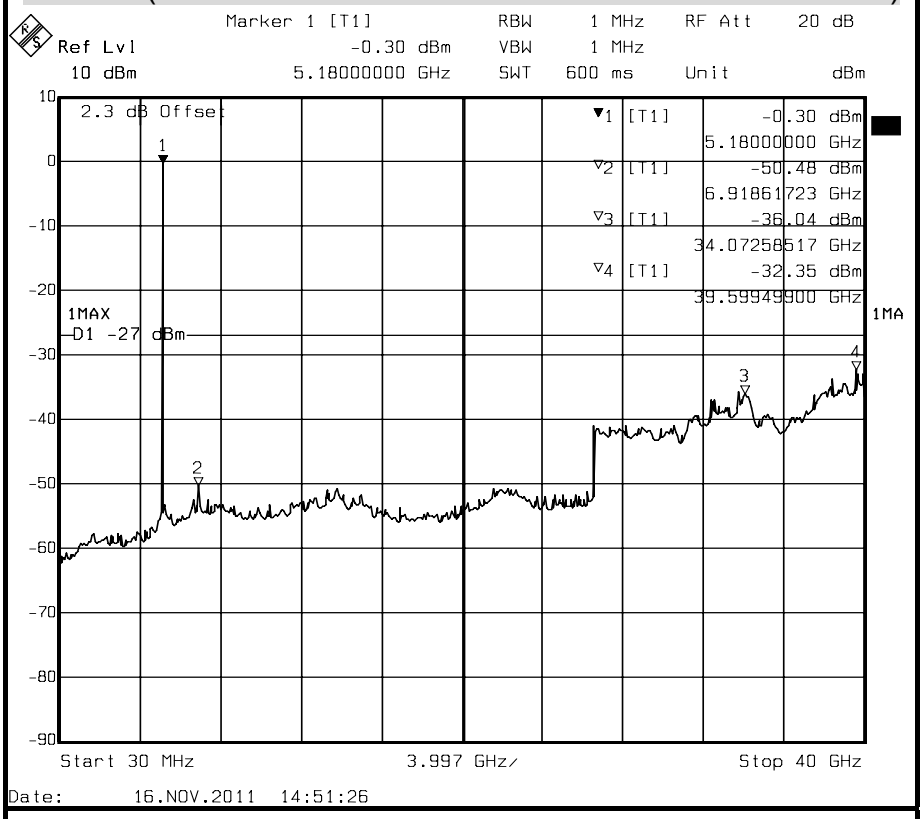
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

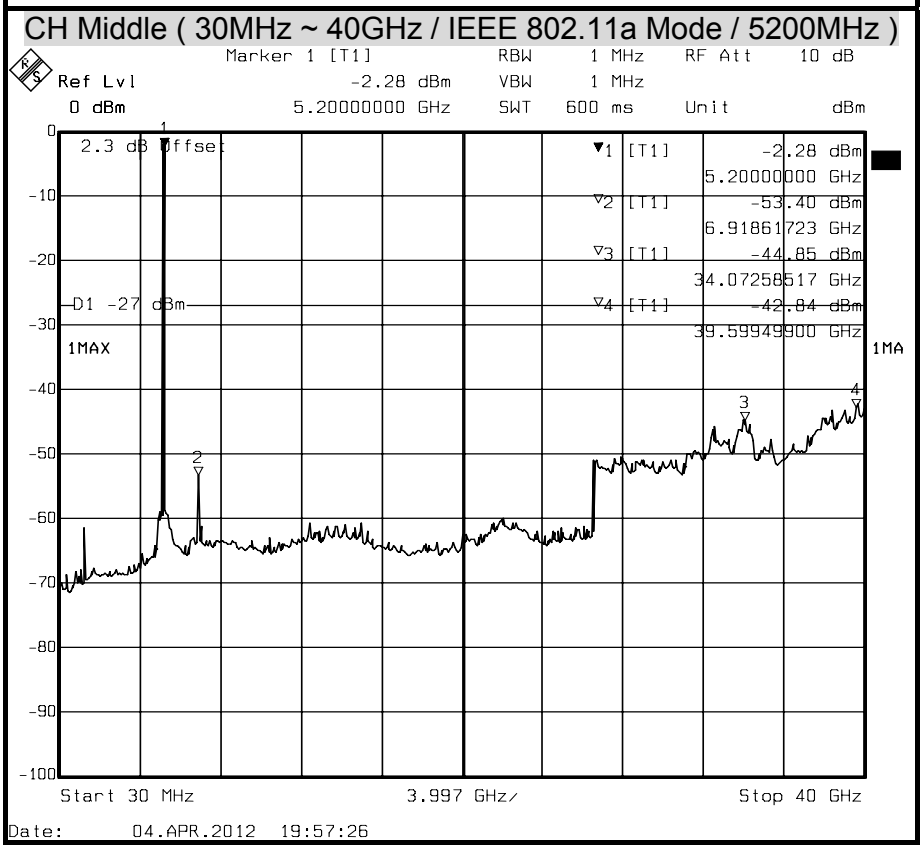
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

IEEE 802.11a Mode

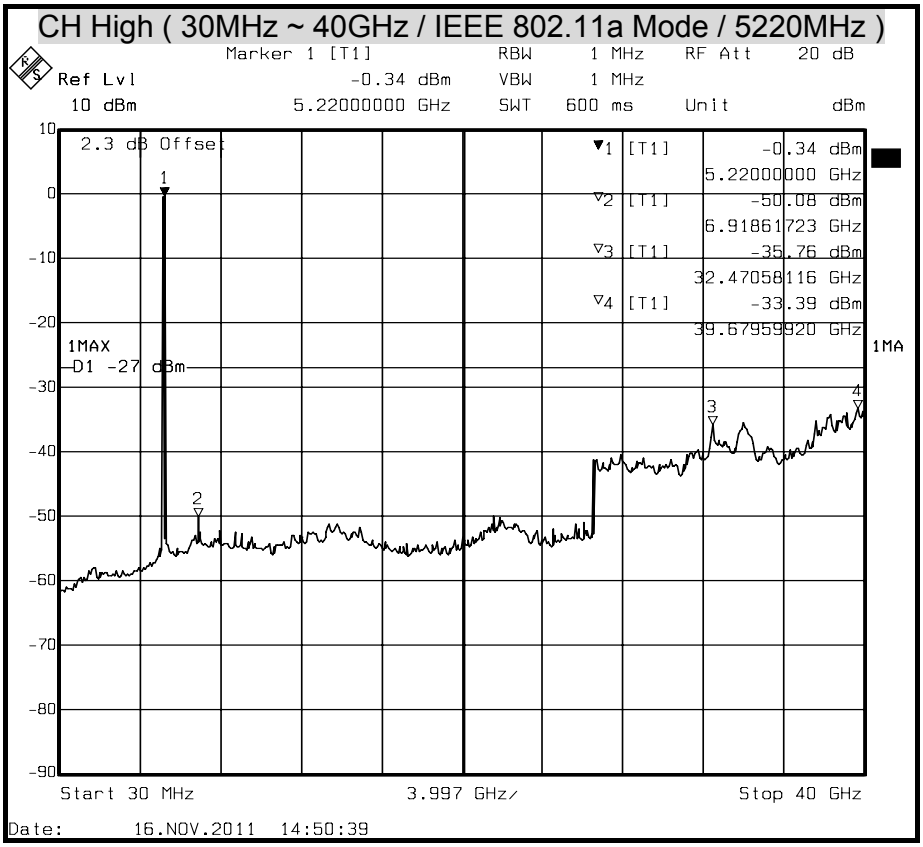
CH Low (30MHz ~ 40GHz / IEEE 802.11a Mode / 5180MHz)



CH Middle (30MHz ~ 40GHz / IEEE 802.11a Mode / 5200MHz)

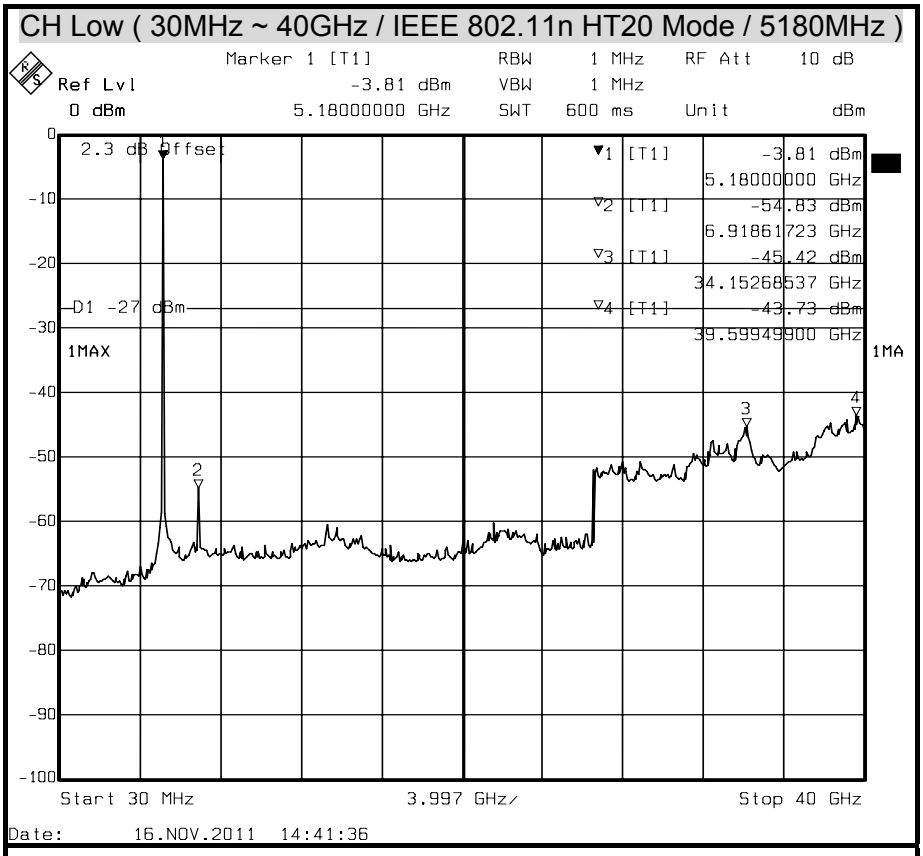


CH High (30MHz ~ 40GHz / IEEE 802.11a Mode / 5220MHz)

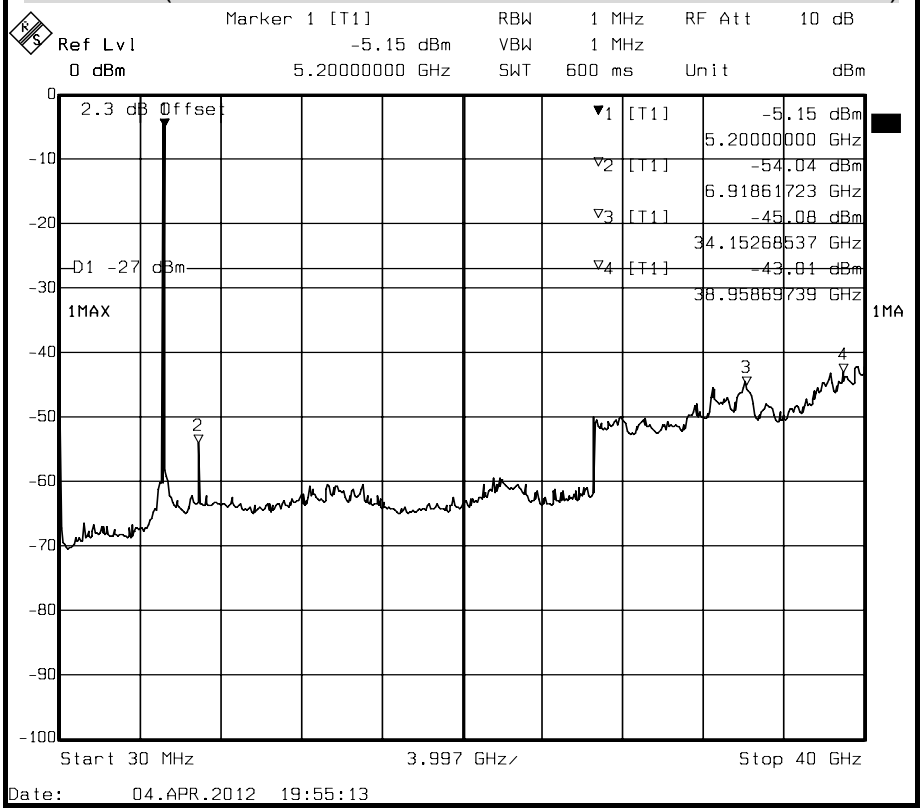


IEEE 802.11n HT20 Mode-Chain 0

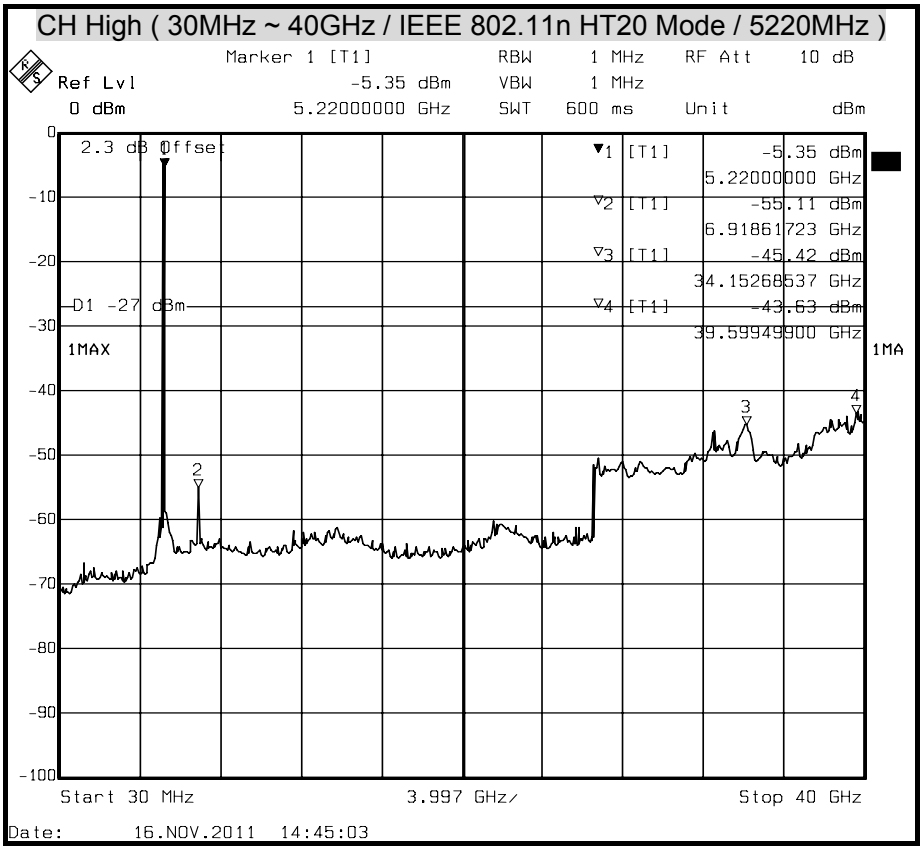
CH Low (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5180MHz)



CH Middle (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5200MHz)

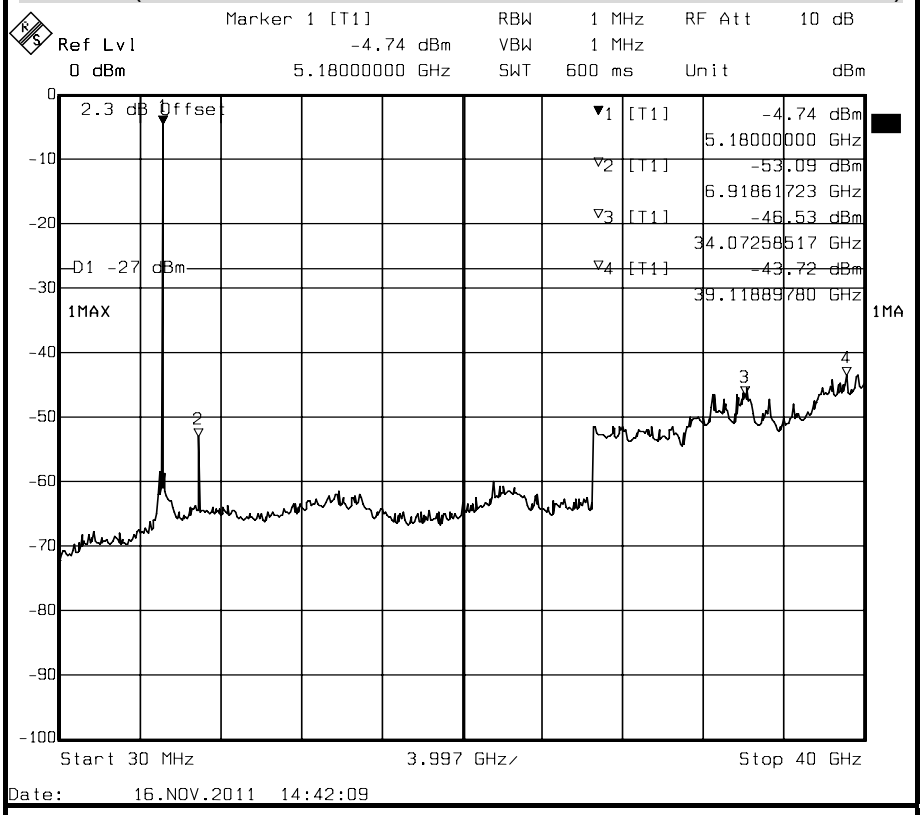


CH High (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5220MHz)

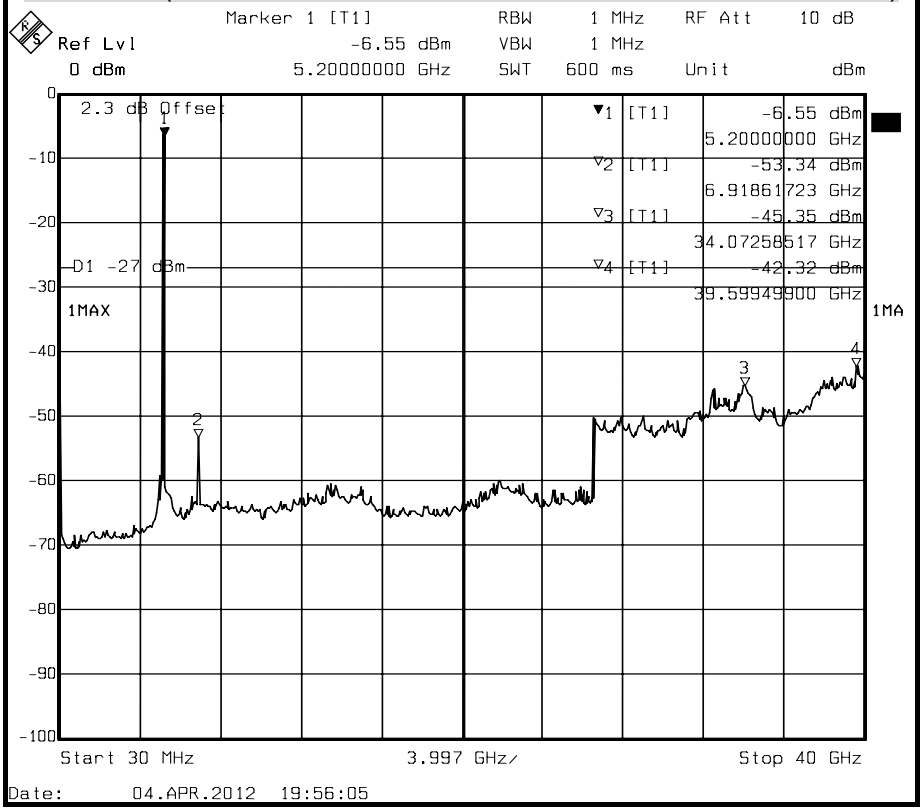


IEEE 802.11n HT20 Mode-Chain 1

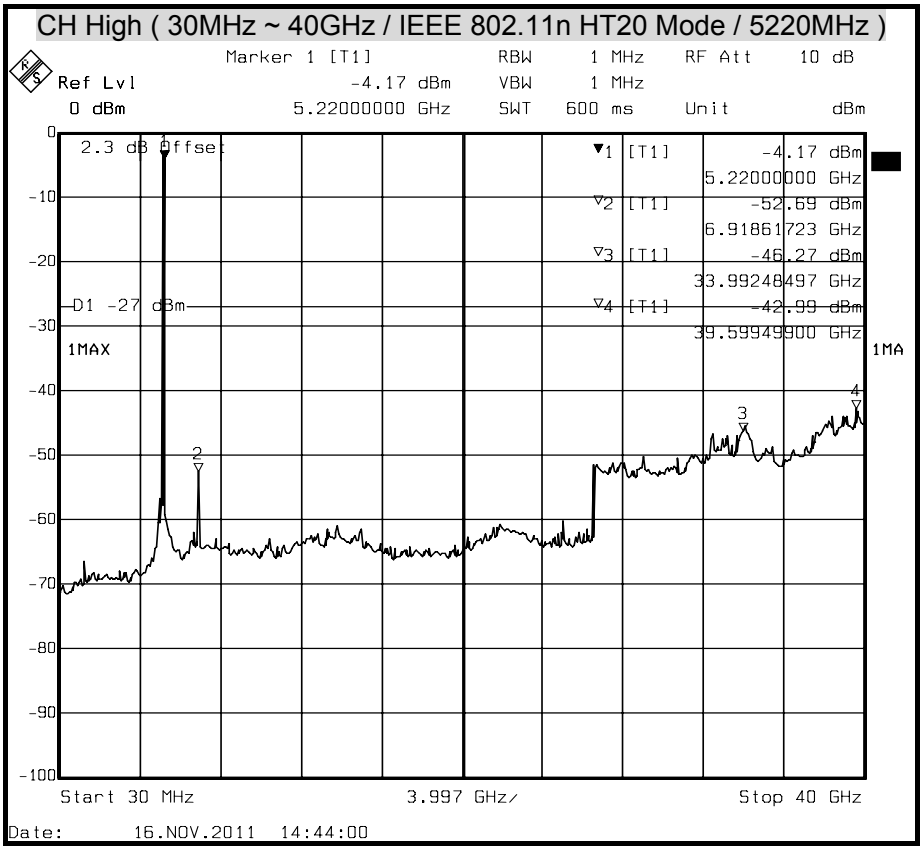
CH Low (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5180MHz)



CH Middle (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5200MHz)

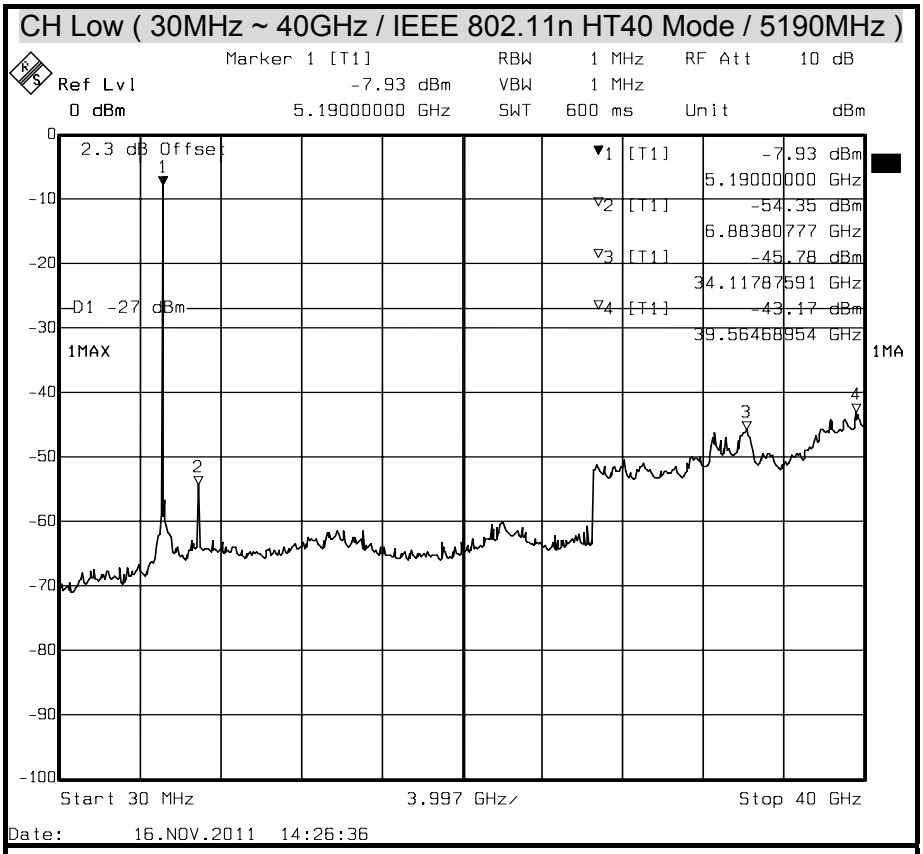


CH High (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5220MHz)

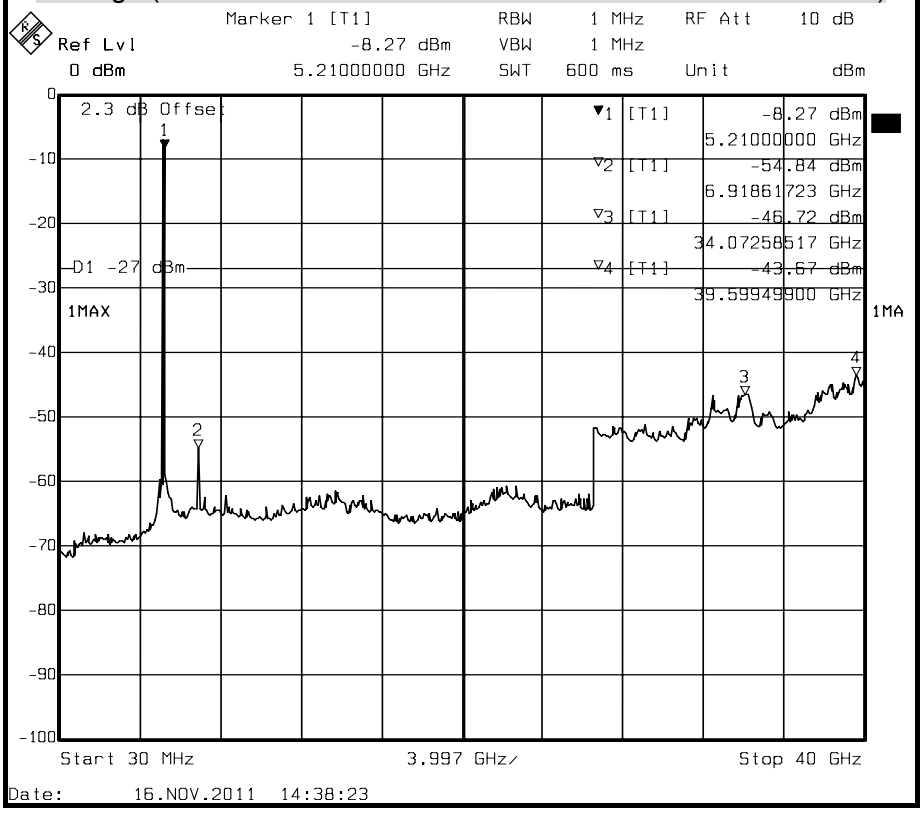


IEEE 802.11n HT40 Mode-Chain 0

CH Low (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5190MHz)

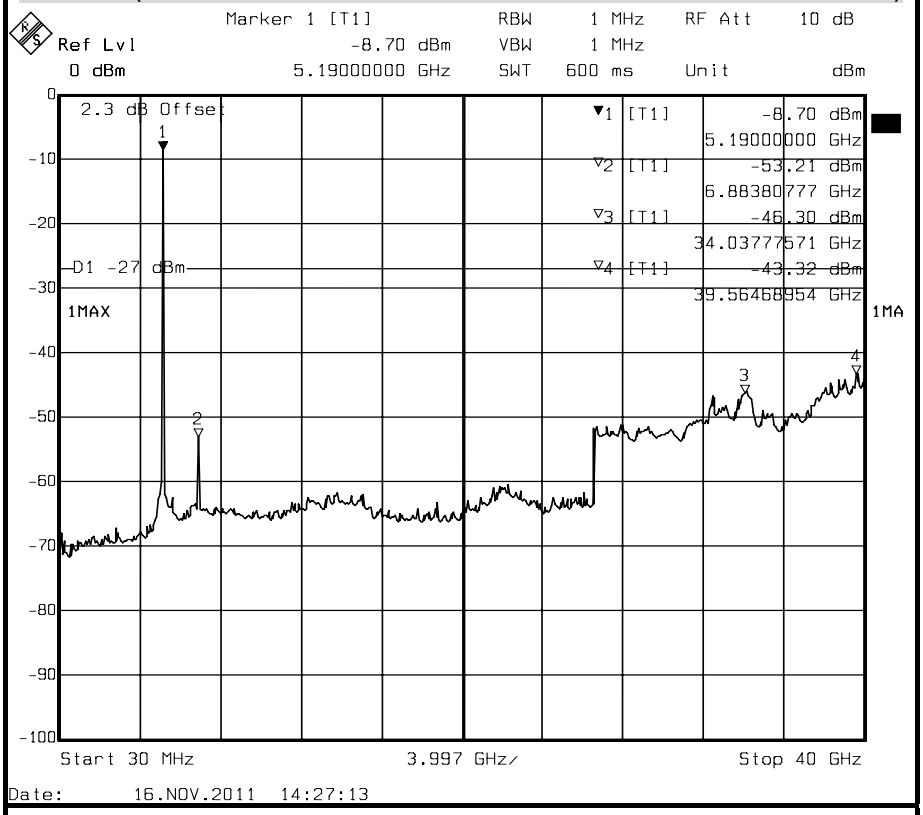


CH High (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5210MHz)

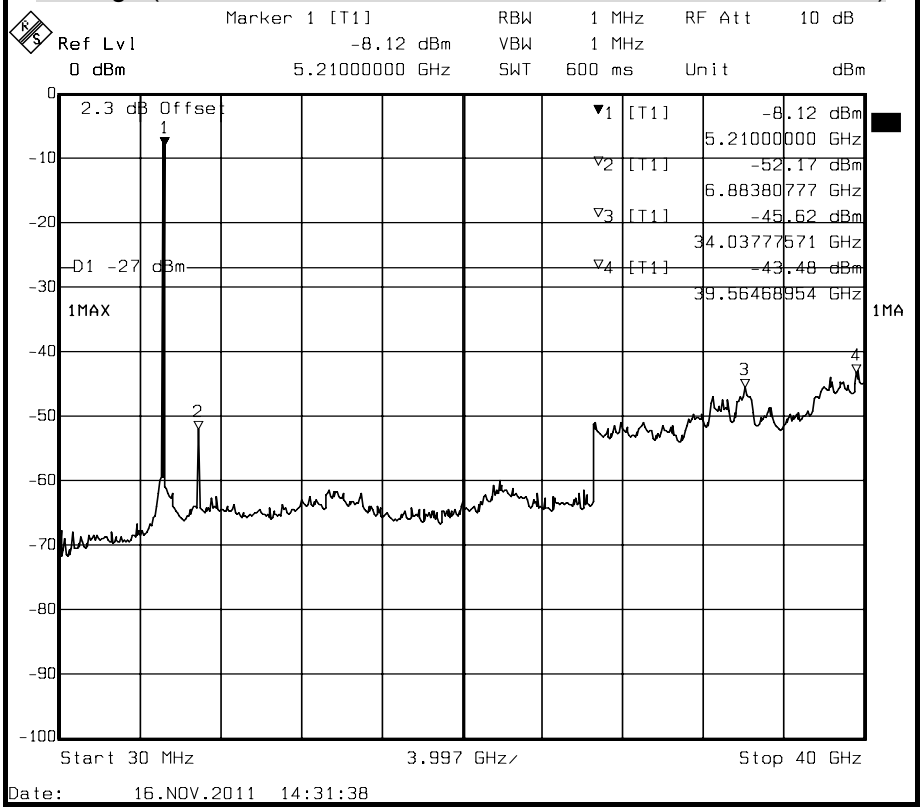


IEEE 802.11n HT40 Mode-Chain 1

CH Low (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5190MHz)

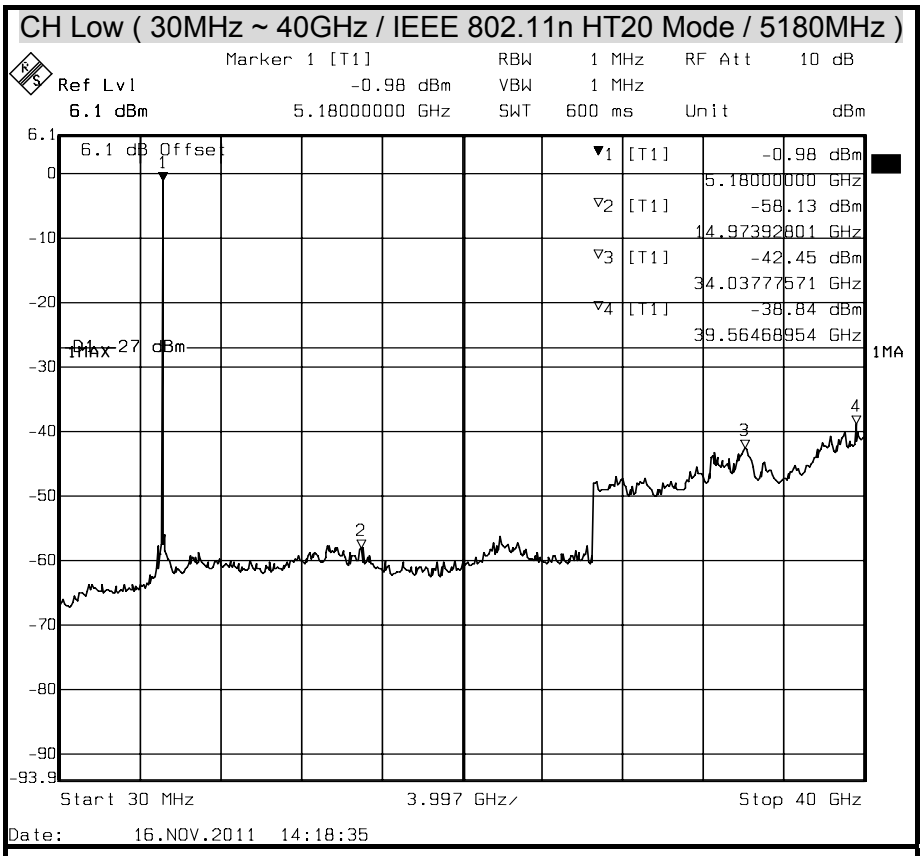


CH High (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5210MHz)

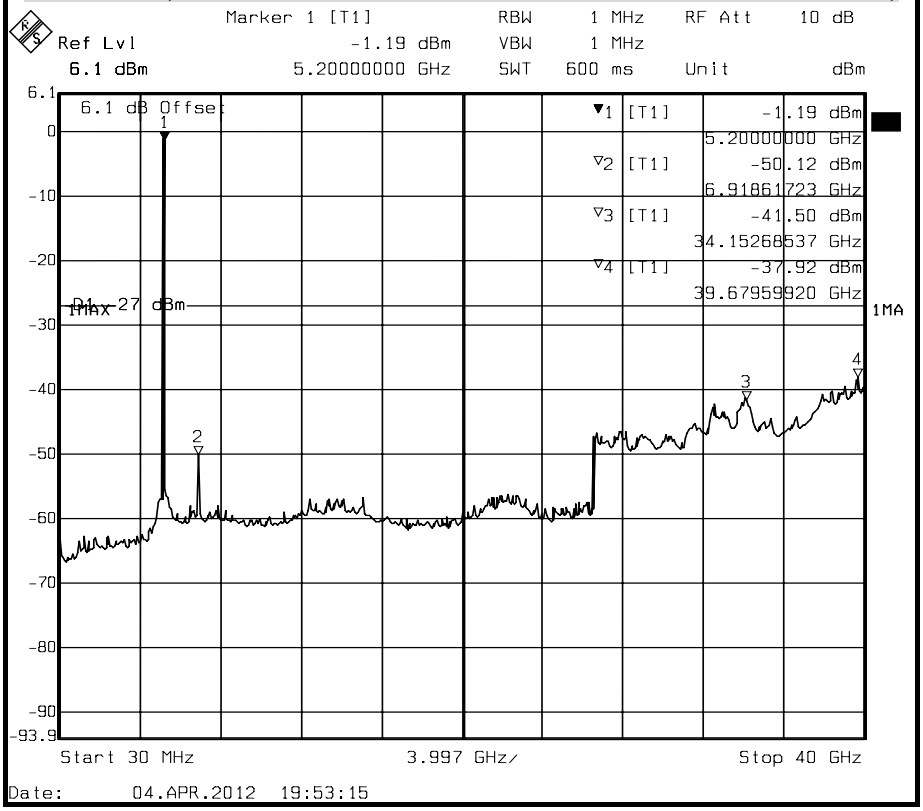


IEEE 802.11n HT20 Mode-Combined

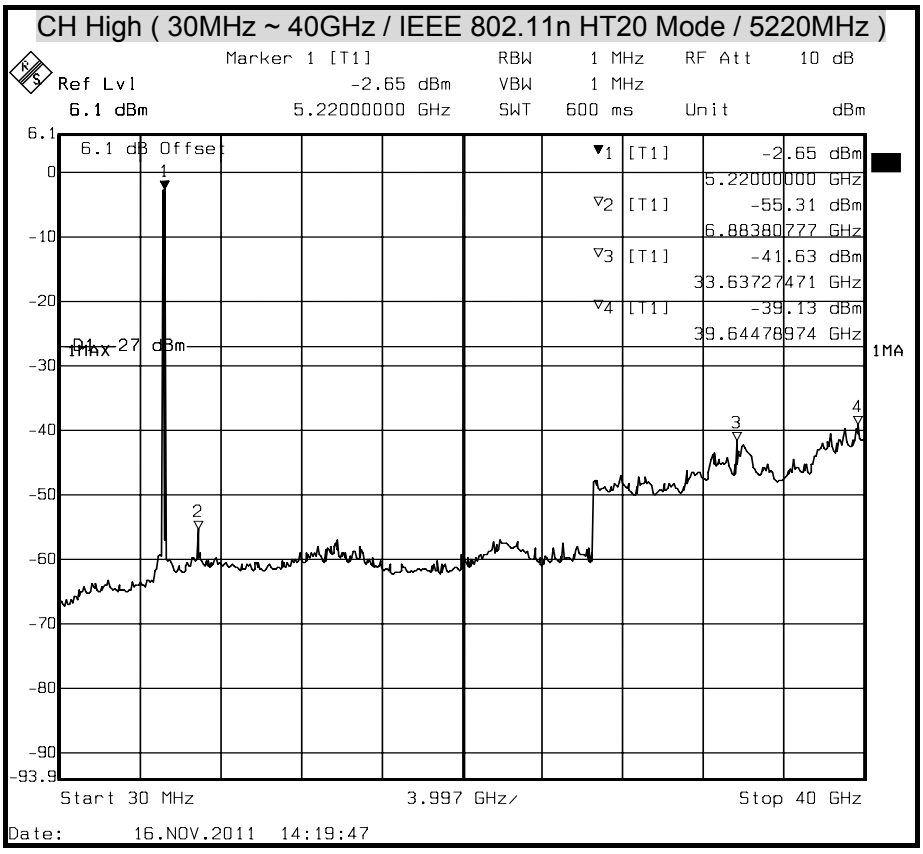
CH Low (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5180MHz)



CH Middle (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5200MHz)

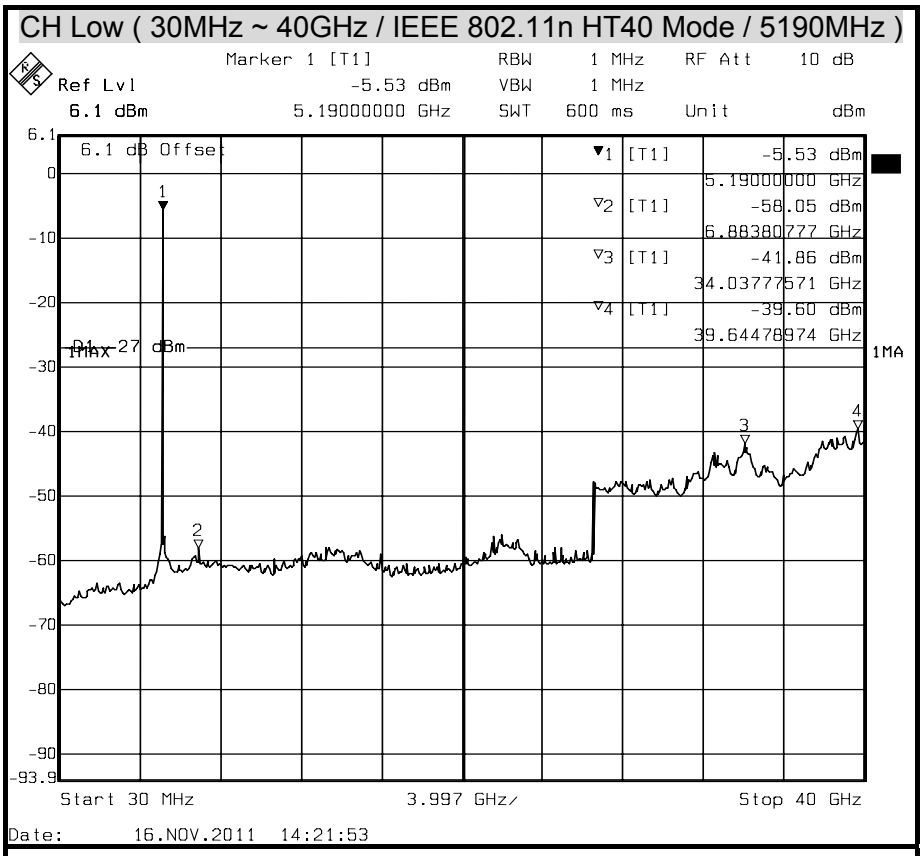


CH High (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode / 5220MHz)

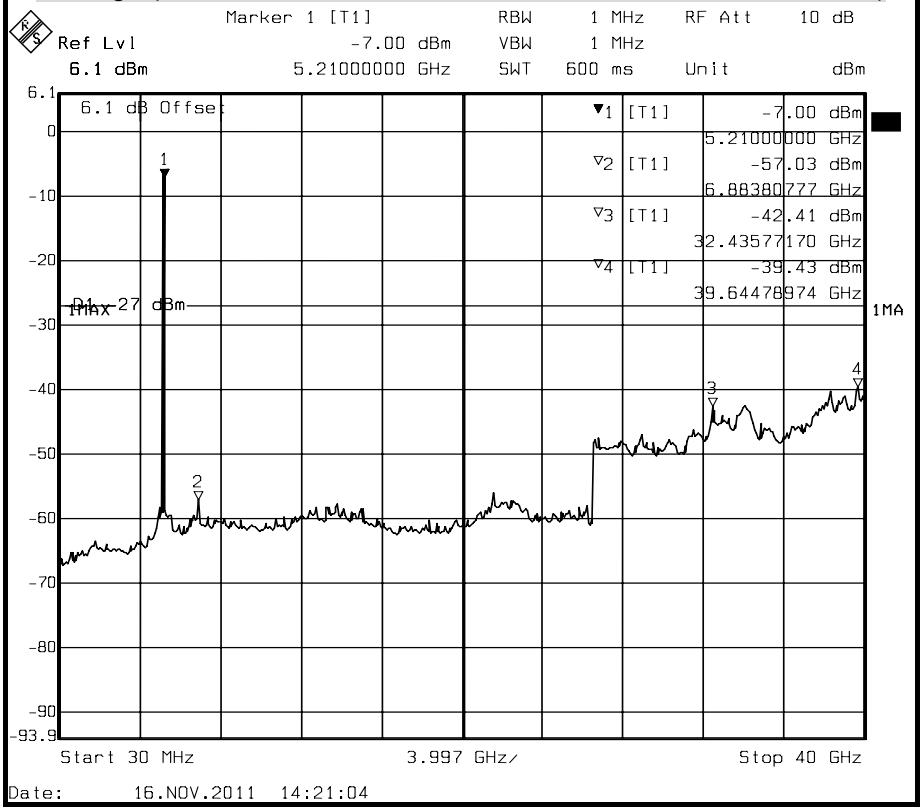


IEEE 802.11n HT40 Mode-Combined

CH Low (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5190MHz)



CH High (30MHz ~ 40GHz / IEEE 802.11n HT40 Mode / 5210MHz)



7.6 RADIATED EMISSION

LIMITS

(1) According to § 15.205 (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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

Remark:
1. [1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2. [2] Above 38.6

(2) According to § 15.205 (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 is 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.

(3) According to § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

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

Remark: ***Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

(4) According to § 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

he following test equipments are utilized in making the measurements contained in this report.

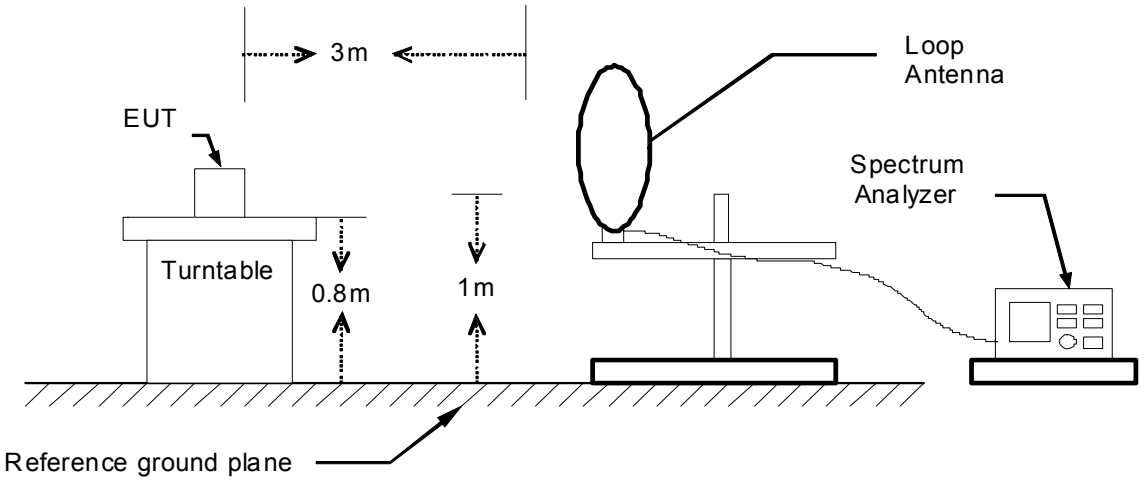
Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	NOV. 17, 2012
BI-LOG Antenna	Sunol	JB1	A070506-2	OCT. 03, 2012
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2012
Pre-Amplifier	HP	8447F	2944A03817	NOV. 23, 2012
EMI Receiver	R&S	ESVS10	833206/012	MAY 10, 2012
RF Cable	SUHNER	SUCOFLEX104PEA	20520/4PEA	NOV. 10, 2012
Horn Antenna	Com-Power	AH-118	071032	DEC. 27, 2012
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012
Pre-Amplifier	MITEQ	AFS44-00108650-42-10P-44	1205908	NOV. 23, 2012
3116 Double Ridge Antenna (40G)	ETS-LINDGREN	EMCO-003	00078	NOV. 14, 2012
Turn Table	Yo Chen	001	----------	N.C.R.
Antenna Tower	AR	TP1000A	309874	N.C.R.
Controller	CT	SC101	----------	N.C.R.
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180A	EC1204141	N.C.R
Power Meter	Anritsu	ML2487A	6K00003888	MAY 30, 2012
Power Sensor	Anritsu	MA2491A	33265	MAY 30.2012
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 09, 2012
Signal Generator	HP	8673C	2938A00663	SEP. 12, 2012
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R

Remark: *1. Each piece of equipment is scheduled for calibration once a year.*
2. N.C.R = No Calibration Request.

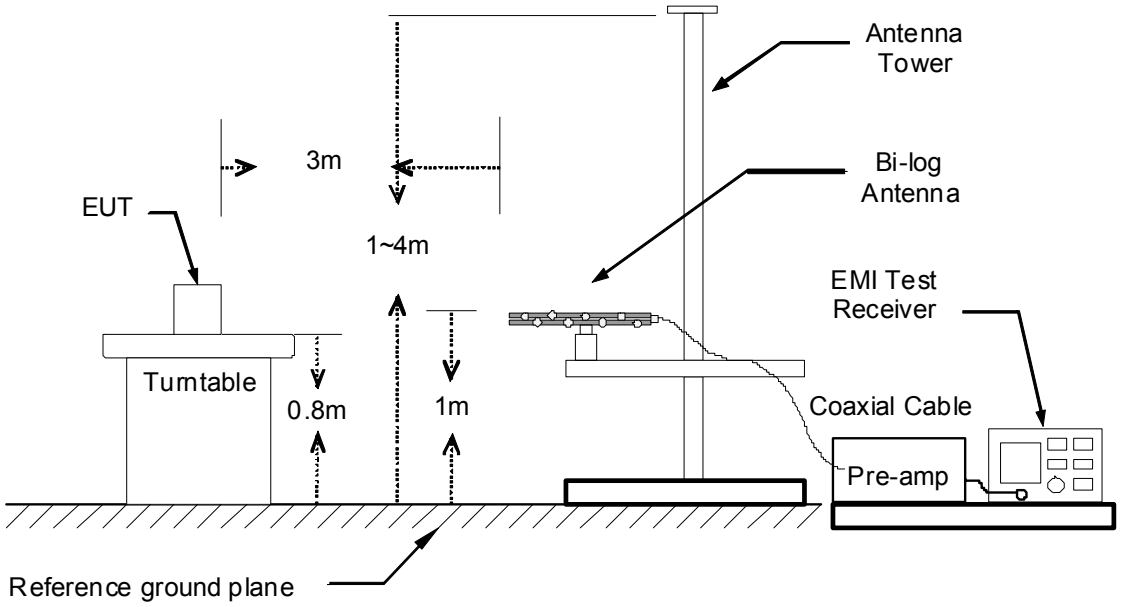
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

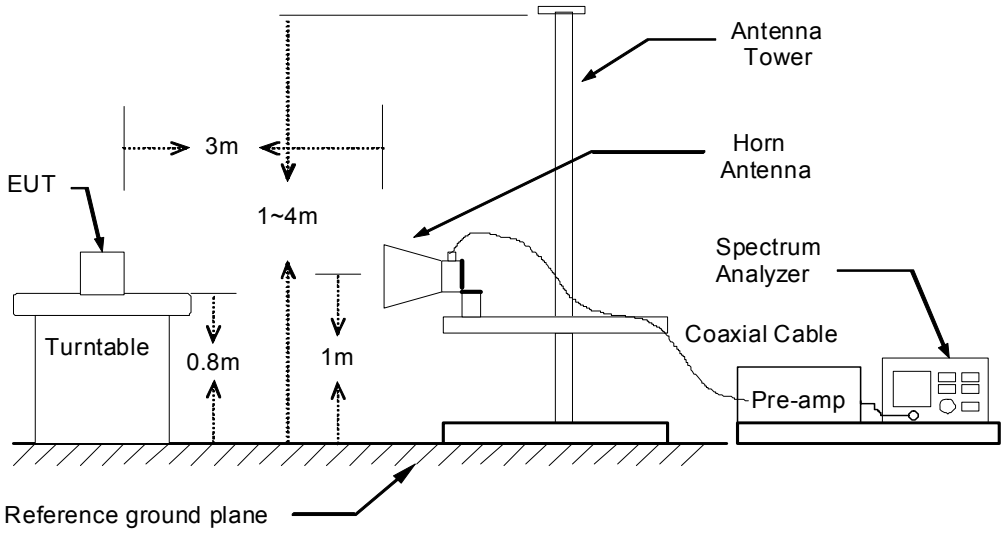
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Remark：

1. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.*
2. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.*
3. *The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.*

TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

Below 1 GHz (30MHz ~ 1GHz)

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	2012/10/04
Test Mode	Normal Operation	TEMP & Humidity	28.9°C, 52%

Horizontal

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Level	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
125.00	13.40	14.13	3.12	30.65	43.50	-12.86	QP
160.00	12.60	12.74	3.38	28.72	43.50	-14.78	QP
250.00	14.30	12.80	3.96	31.06	46.00	-14.94	QP
325.00	11.90	14.84	4.35	31.09	46.00	-14.92	QP
500.00	7.90	18.43	5.60	31.93	46.00	-14.07	QP
525.00	11.80	18.72	5.64	36.16	46.00	-9.84	QP
N/A	-----	-----	-----	-----	-----	-----	-----

Vertical

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Level	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dBμV/M)	(dB)	PK/QP
125.00	16.20	14.13	3.12	33.45	43.50	-10.06	QP
160.00	20.10	12.74	3.38	36.22	43.50	-7.28	QP
250.00	19.20	12.80	3.96	35.96	46.00	-10.04	QP
325.00	10.80	14.84	4.35	29.99	46.00	-16.02	QP
500.00	11.90	18.43	5.60	35.93	46.00	-10.07	QP
525.00	16.20	18.72	5.64	40.56	46.00	-5.44	QP
N/A	-----	-----	-----	-----	-----	-----	-----

REMARK: Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

Above 1 GHz

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11a TX / CH Low / 5180MHz	TEMP & Humidity	28.1°C, 54%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	57.46	25.65	1.83	39.58	0.74	46.10	74.00	-27.90	P
1250.00	52.11	25.65	1.83	39.58	0.74	40.75	54.00	-13.25	A
10360.00	53.19	39.24	6.04	37.28	0.54	61.73	74.00	-12.27	P
10360.00	40.13	39.24	6.04	37.28	0.54	48.67	54.00	-5.33	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	56.78	25.65	1.83	39.58	0.74	45.42	74.00	-28.58	P
1250.00	51.20	25.65	1.83	39.58	0.74	39.84	54.00	-14.16	A
10360.00	54.29	39.24	6.04	37.28	0.54	62.83	74.00	-11.17	P
10360.00	40.66	39.24	6.04	37.28	0.54	49.20	54.00	-4.80	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Apr. 04, 2012
Test Mode	IEEE 802.11a TX / CH Middle / 5200MHz	TEMP & Humidity	28.1°C, 54%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1249.98	57.63	25.65	1.83	39.58	0.74	46.27	74.00	-27.73	P
1249.98	52.71	25.65	1.83	39.58	0.74	41.35	54.00	-12.65	A
10400.04	53.66	39.26	6.07	37.23	0.56	62.32	74.00	-11.68	P
10400.04	40.28	39.26	6.07	37.23	0.56	48.94	54.00	-5.06	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.02	55.72	25.65	1.83	39.58	0.74	44.36	74.00	-29.64	P
1250.02	50.24	25.65	1.83	39.58	0.74	38.88	54.00	-15.12	A
10399.99	54.36	39.26	6.07	37.23	0.56	63.02	74.00	-10.98	P
10399.99	40.21	39.26	6.07	37.23	0.56	48.87	54.00	-5.13	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11a TX / CH High / 5220MHz	TEMP & Humidity	28.1°C, 54%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1249.99	56.24	25.65	1.83	39.58	0.74	44.88	74.00	-29.12	P
1249.99	51.79	25.65	1.83	39.58	0.74	40.43	54.00	-13.57	A
10440.00	52.36	39.28	6.10	37.17	0.58	61.14	74.00	-12.86	P
10440.00	40.10	39.28	6.10	37.17	0.58	48.88	54.00	-5.12	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	53.19	25.65	1.83	39.58	0.74	41.83	74.00	-32.17	P
1250.00	49.25	25.65	1.83	39.58	0.74	37.89	54.00	-16.11	A
10439.99	54.73	39.28	6.10	37.17	0.58	63.51	74.00	-10.49	P
10439.99	39.76	39.28	6.10	37.17	0.58	48.54	54.00	-5.46	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11n HT20 TX / CH Low / 5180MHz	TEMP & Humidity	25°C, 62%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.01	57.12	25.65	1.83	39.58	0.74	45.76	74.00	-28.24	P
1250.01	52.00	25.65	1.83	39.58	0.74	40.64	54.00	-13.36	A
10359.99	54.93	39.24	6.04	37.28	0.54	63.47	74.00	-10.53	P
10359.99	40.68	39.24	6.04	37.28	0.54	49.22	54.00	-4.78	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	54.19	25.65	1.83	39.58	0.74	42.83	74.00	-31.17	P
1250.00	49.37	25.65	1.83	39.58	0.74	38.01	54.00	-15.99	A
10359.98	54.24	39.24	6.04	37.28	0.54	62.78	74.00	-11.22	P
10359.98	40.23	39.24	6.04	37.28	0.54	48.77	54.00	-5.23	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Apr. 04, 2012
Test Mode	IEEE 802.11n HT20 TX / CH Middle / 5200MHz	TEMP & Humidity	25°C, 62%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	60.25	25.65	1.83	39.58	0.74	48.89	74.00	-25.11	P
1250.00	54.33	25.65	1.83	39.58	0.74	42.97	54.00	-11.03	A
10399.97	51.03	39.26	6.07	37.23	0.56	59.69	74.00	-14.31	P
10399.97	39.46	39.26	6.07	37.23	0.56	48.12	54.00	-5.88	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	55.91	25.65	1.83	39.58	0.74	44.55	74.00	-29.45	P
1250.00	49.60	25.65	1.83	39.58	0.74	38.24	54.00	-15.76	A
10399.99	53.20	39.26	6.07	37.23	0.56	61.86	74.00	-12.14	P
10399.99	40.39	39.26	6.07	37.23	0.56	49.05	54.00	-4.95	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11n HT20 TX / CH High / 5220MHz	TEMP & Humidity	25°C, 62%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	59.64	25.65	1.83	39.58	0.74	48.28	74.00	-25.72	P
1250.00	53.38	25.65	1.83	39.58	0.74	42.02	54.00	-11.98	A
10439.99	52.16	39.28	6.10	37.17	0.58	60.94	74.00	-13.06	P
10439.99	40.16	39.28	6.10	37.17	0.58	48.94	54.00	-5.06	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	54.13	25.65	1.83	39.58	0.74	42.77	74.00	-31.23	P
1250.00	49.22	25.65	1.83	39.58	0.74	37.86	54.00	-16.14	A
10439.99	54.47	39.28	6.10	37.17	0.58	63.25	74.00	-10.75	P
10439.99	40.36	39.28	6.10	37.17	0.58	49.14	54.00	-4.86	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11n HT40 TX / CH Low / 5189MHz	TEMP & Humidity	25°C, 62%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	58.46	25.65	1.83	39.58	0.74	47.10	74.00	-26.90	P
1250.00	52.69	25.65	1.83	39.58	0.74	41.33	54.00	-12.67	A
10380.01	52.13	39.25	6.05	37.26	0.55	60.73	74.00	-13.27	P
10380.01	39.85	39.25	6.05	37.26	0.55	48.45	54.00	-5.55	A

Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.01	54.59	25.65	1.83	39.58	0.74	43.23	74.00	-30.77	P
1250.01	49.62	25.65	1.83	39.58	0.74	38.26	54.00	-15.74	A
10380.00	54.03	39.25	6.05	37.26	0.55	62.63	74.00	-11.37	P
10380.00	40.11	39.25	6.05	37.26	0.55	48.71	54.00	-5.29	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	11n Dual-Band USB Dongle	Test By	John Chen
Model	WU318d	Test Date	Nov. 17, 2011
Test Mode	IEEE 802.11n HT40 TX / CH High / 5210MHz	TEMP & Humidity	25°C, 62%

Measurement Distance at 3m Horizontal polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	56.19	25.65	1.83	39.58	0.74	44.83	74.00	-29.17	P
1250.00	50.67	25.65	1.83	39.58	0.74	39.31	54.00	-14.69	A
10419.99	54.13	39.27	6.08	37.20	0.57	62.85	74.00	-11.15	P
10419.99	40.25	39.27	6.08	37.20	0.57	48.97	54.00	-5.03	A

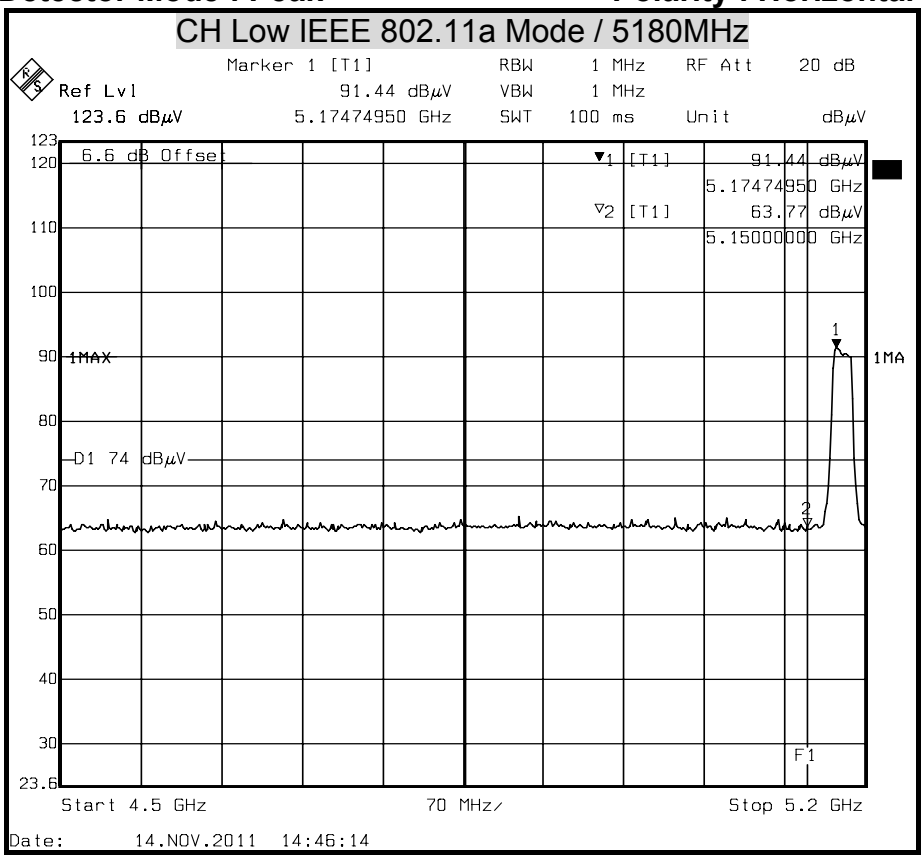
Measurement Distance at 3m Vertical polarity									
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
1250.00	55.31	25.65	1.83	39.58	0.74	43.95	74.00	-30.05	P
1250.00	49.98	25.65	1.83	39.58	0.74	38.62	54.00	-15.38	A
10419.99	54.13	39.27	6.08	37.20	0.57	62.85	74.00	-11.15	P
10419.99	40.46	39.27	6.08	37.20	0.57	49.18	54.00	-4.82	A

REMARK:

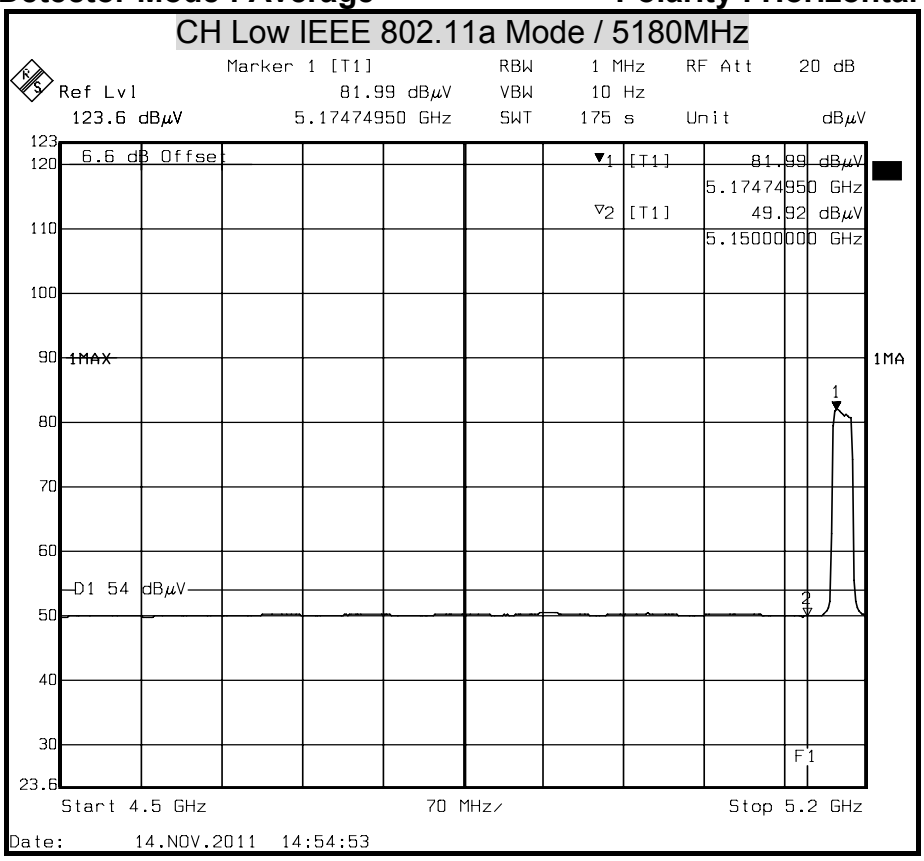
1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Restricted Band Edges

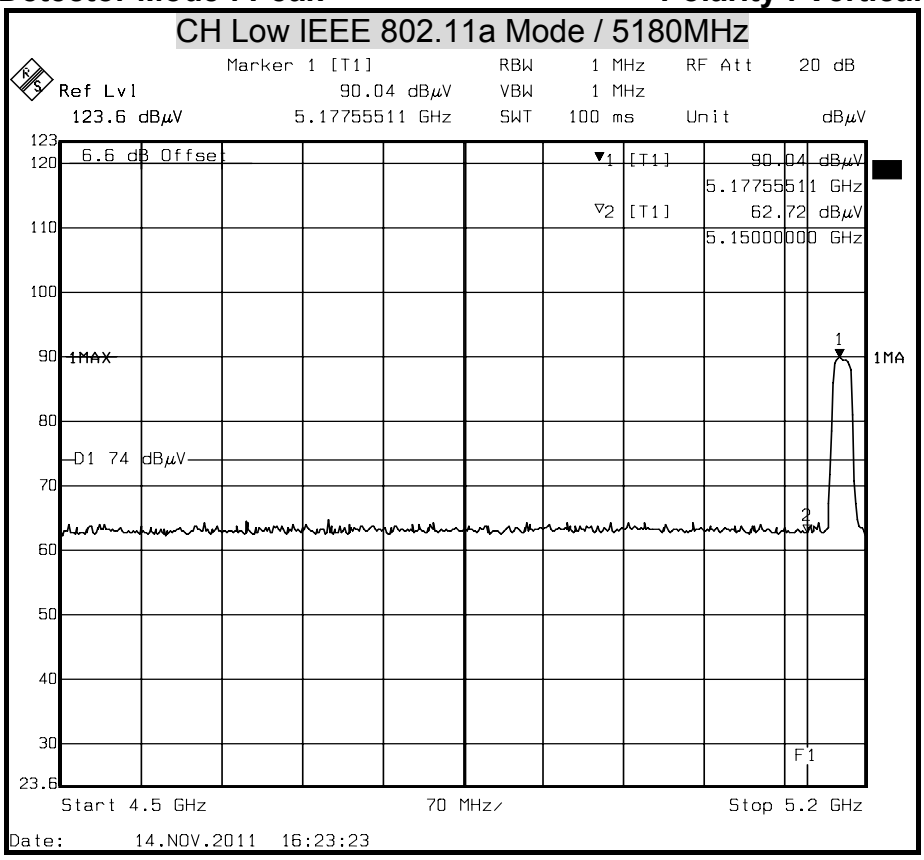
Detector Mode : Peak **Polarity : Horizontal**



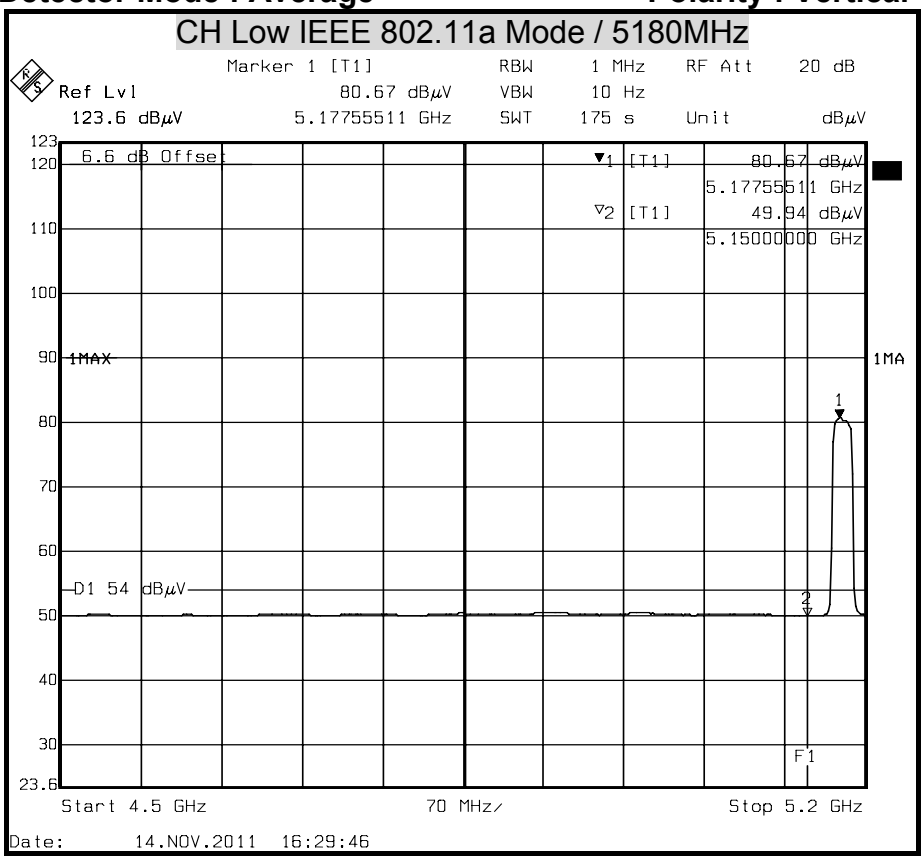
Detector Mode : Average **Polarity : Horizontal**



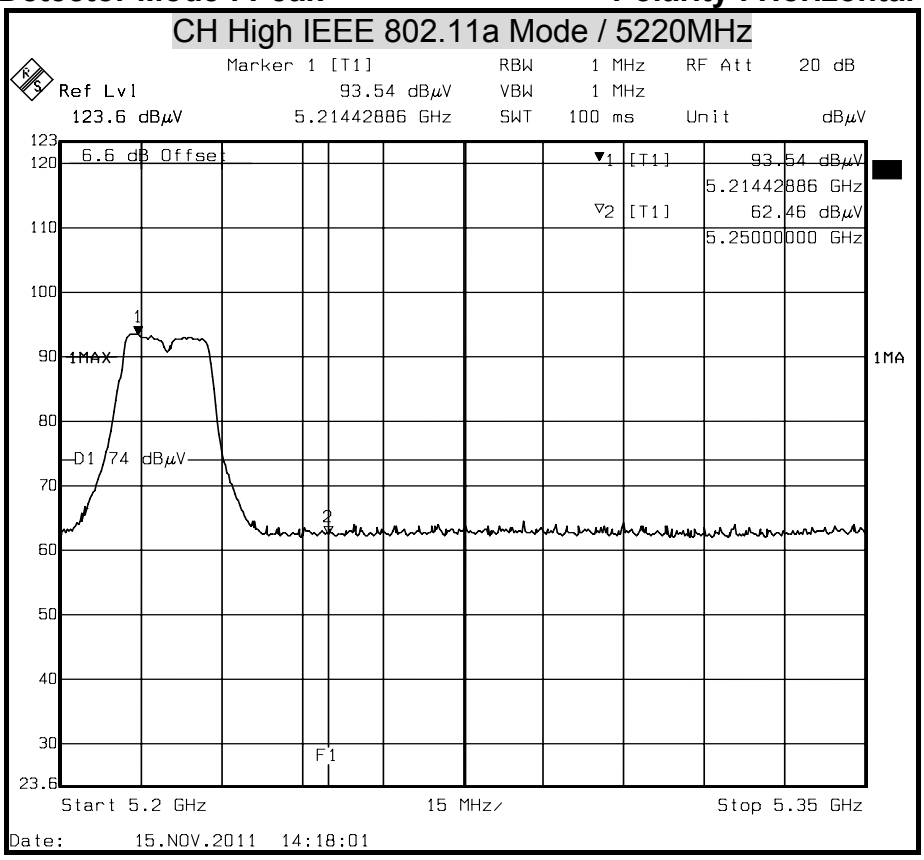
Detector Mode : Peak **Polarity : Vertical**



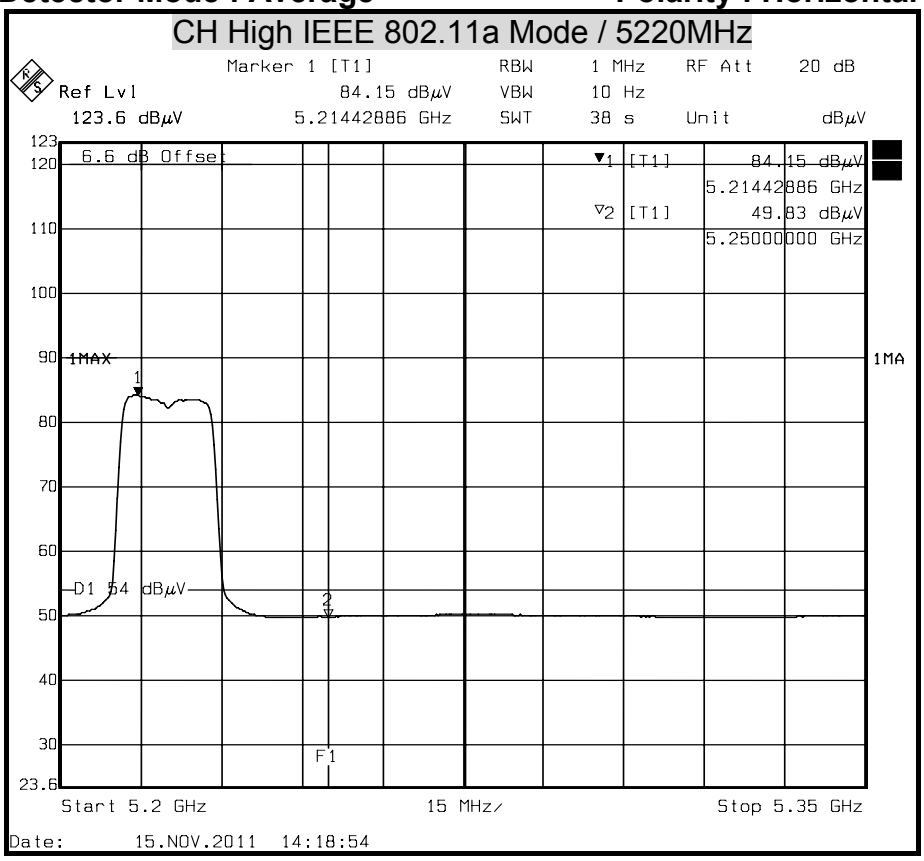
Detector Mode : Average **Polarity : Vertical**



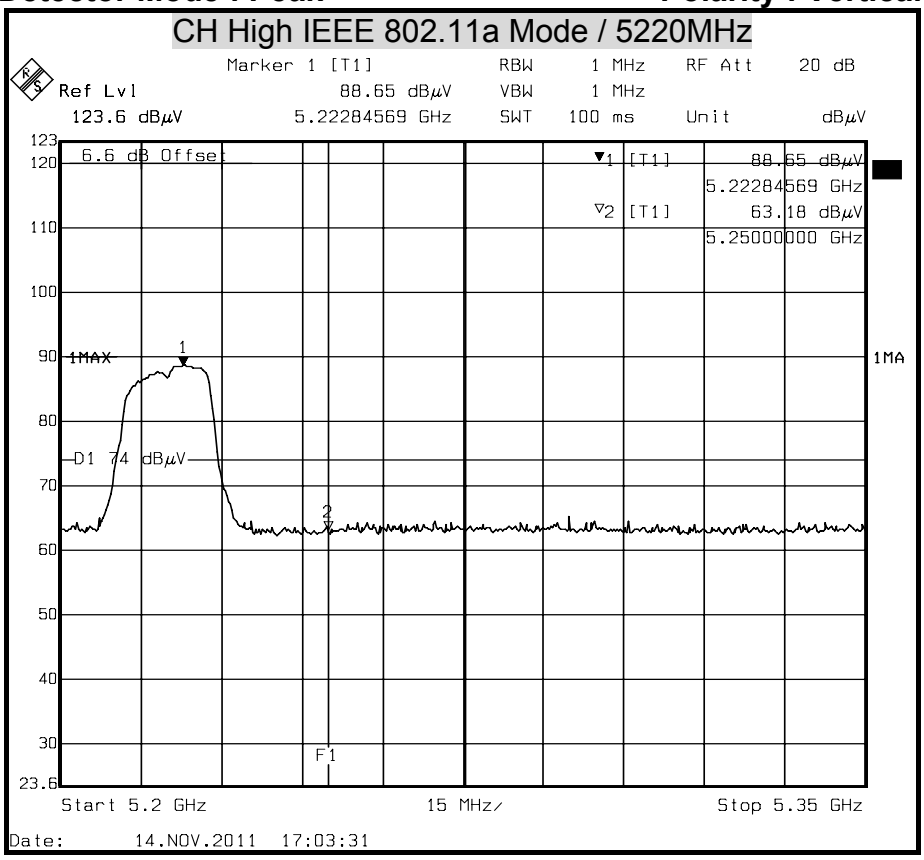
Detector Mode : Peak **Polarity : Horizontal**



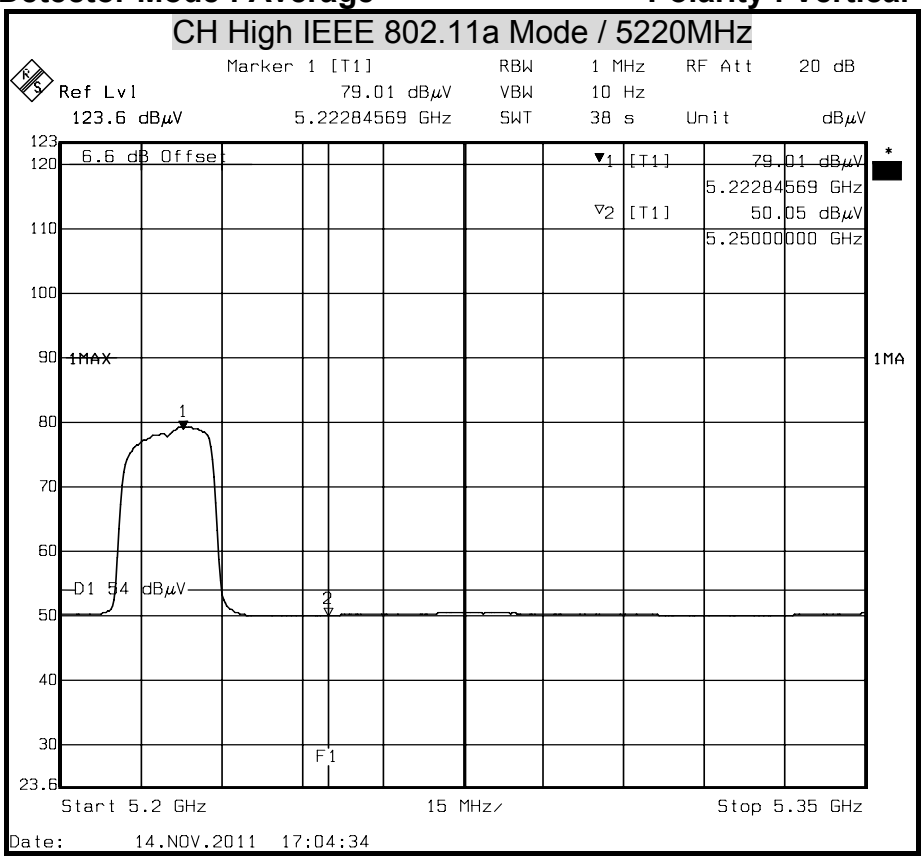
Detector Mode : Average **Polarity : Horizontal**



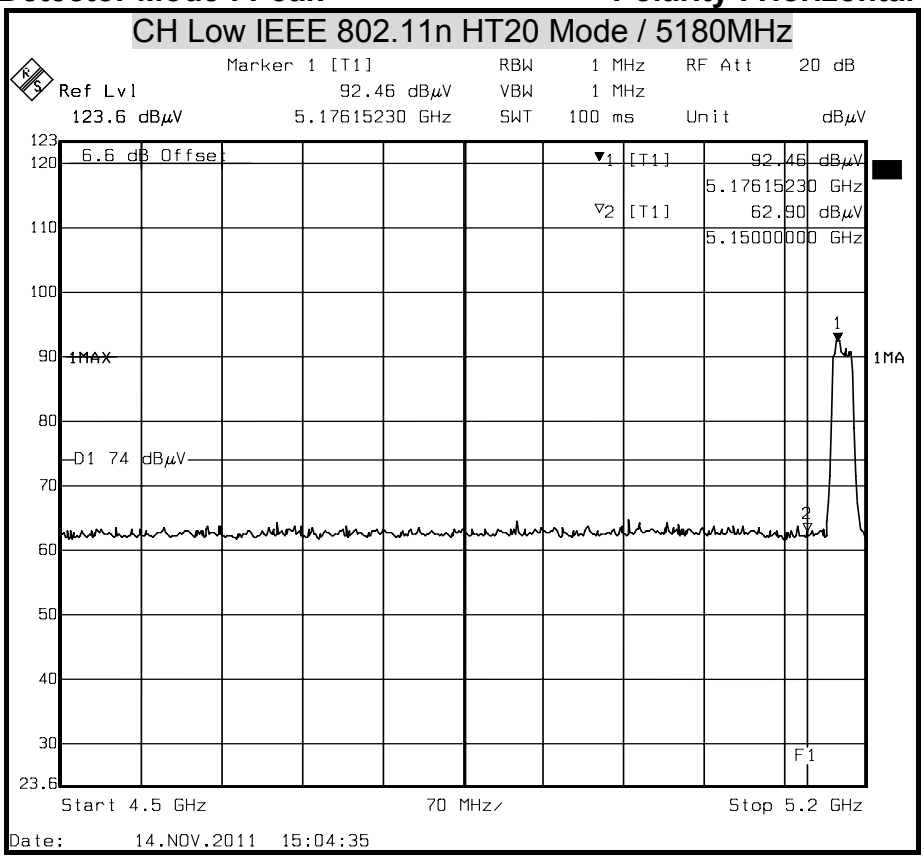
Detector Mode : Peak **Polarity : Vertical**



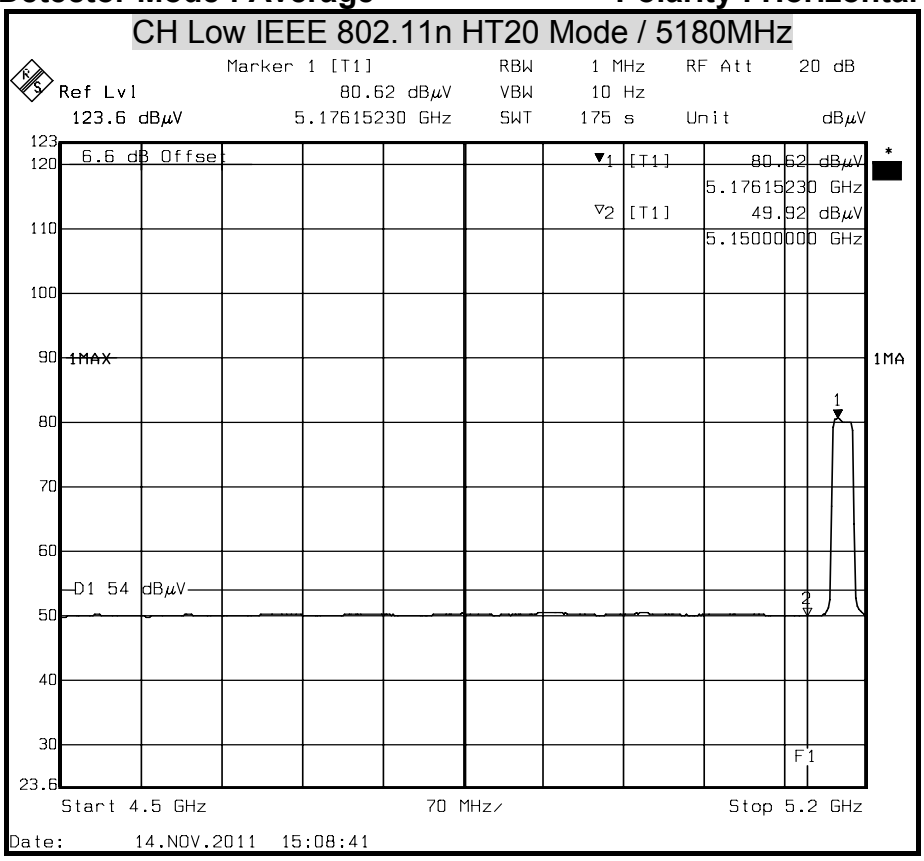
Detector Mode : Average **Polarity : Vertical**



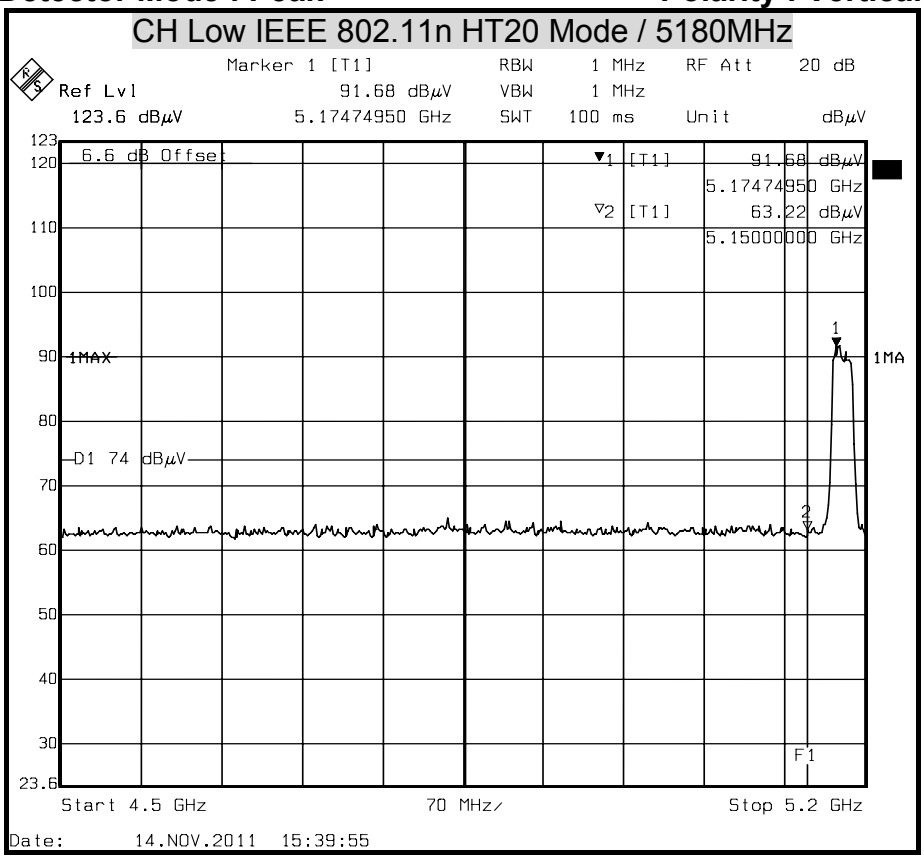
Detector Mode : Peak **Polarity : Horizontal**



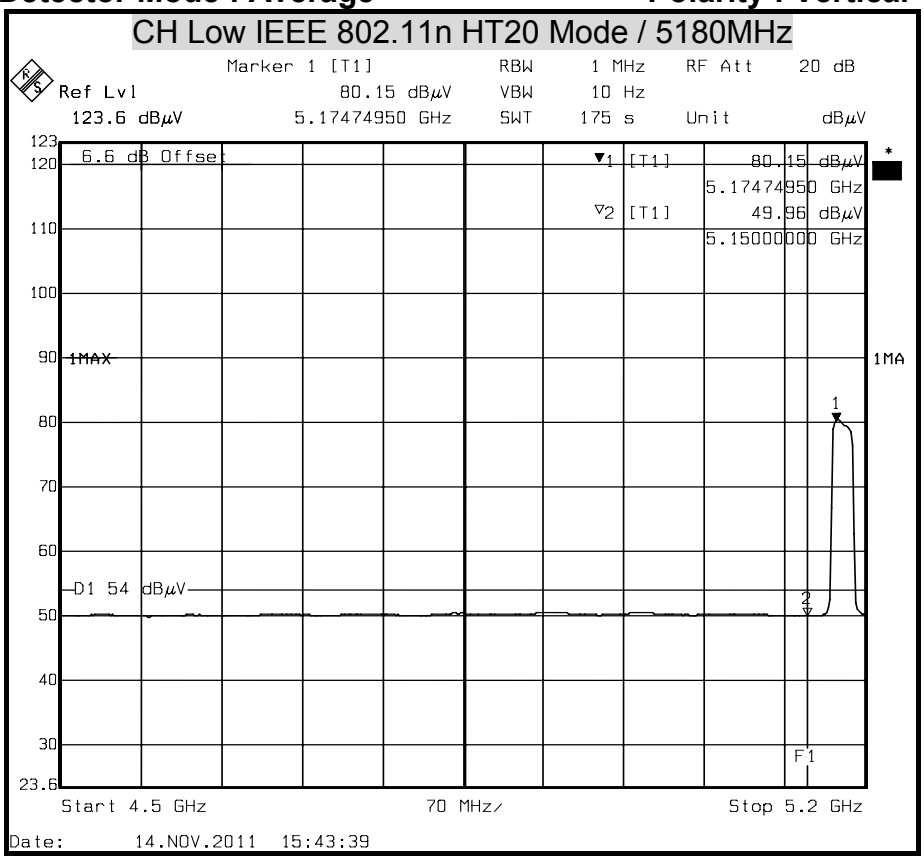
Detector Mode : Average **Polarity : Horizontal**



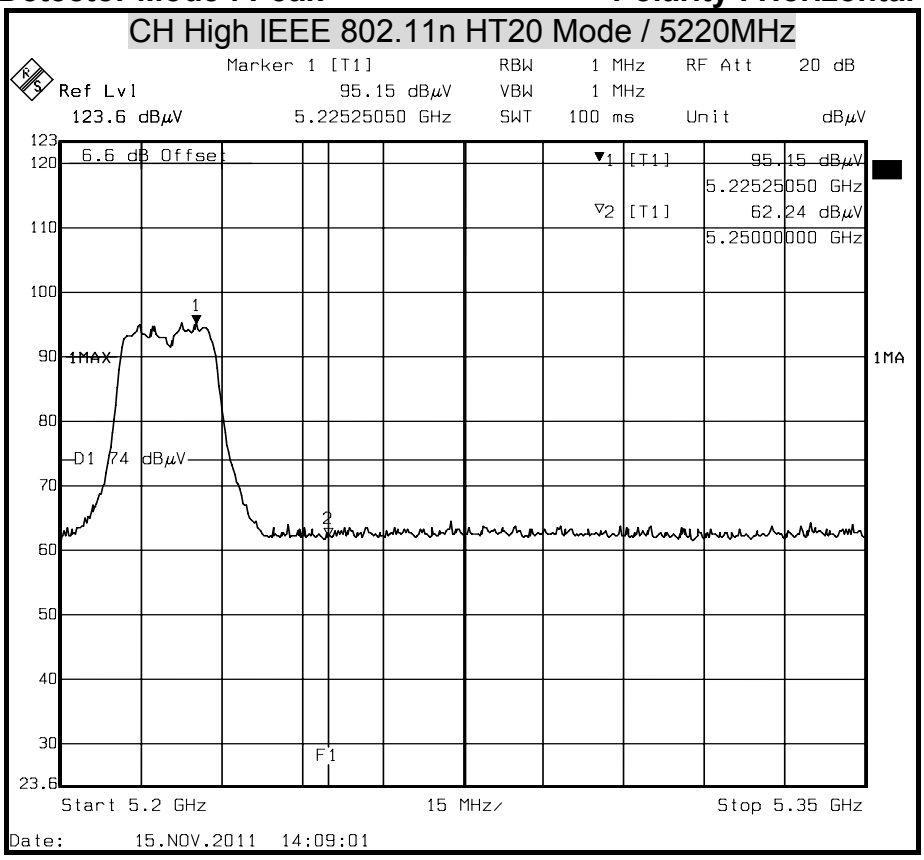
Detector Mode : Peak **Polarity : Vertical**



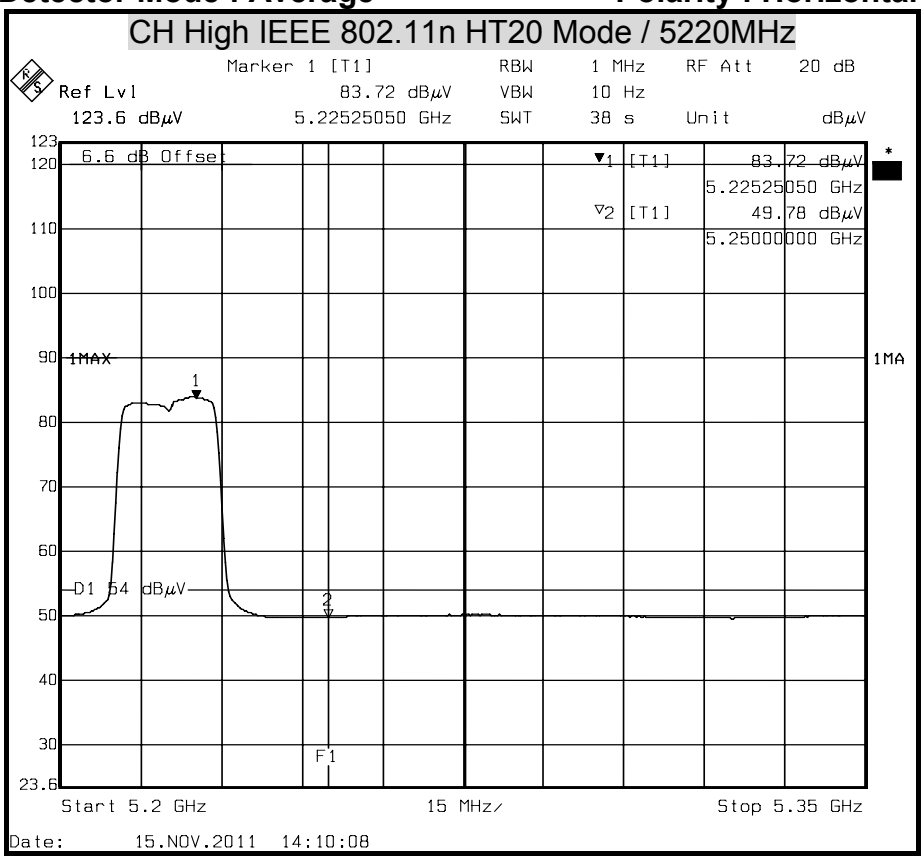
Detector Mode : Average **Polarity : Vertical**



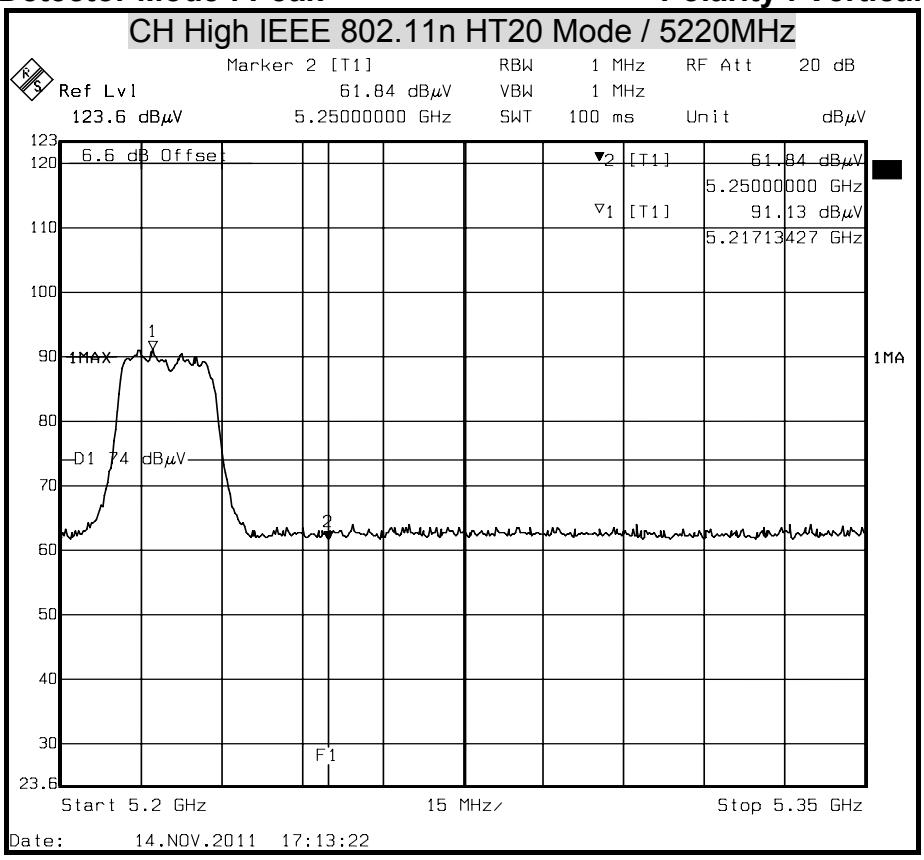
Detector Mode : Peak **Polarity : Horizontal**



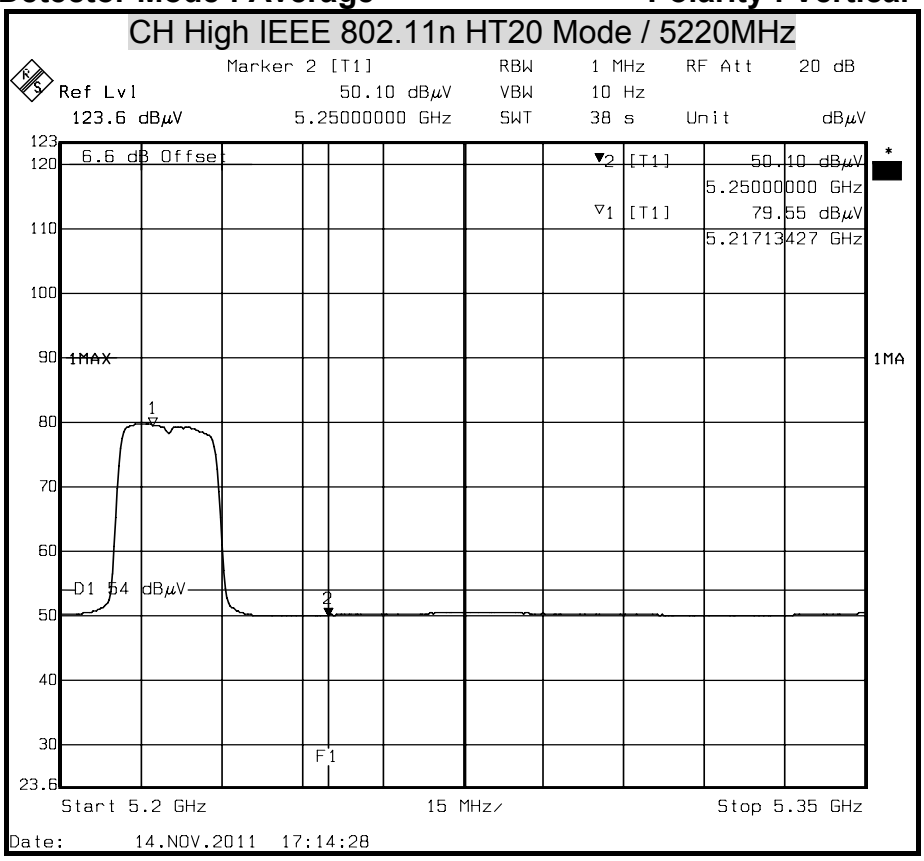
Detector Mode : Average **Polarity : Horizontal**



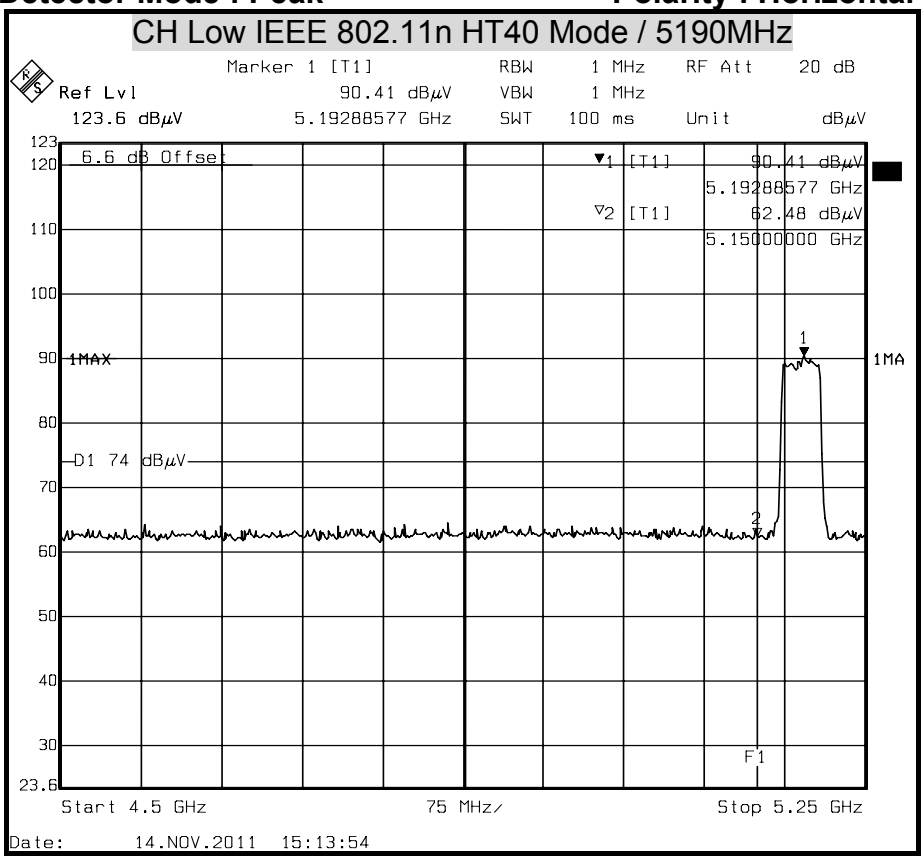
Detector Mode : Peak **Polarity : Vertical**



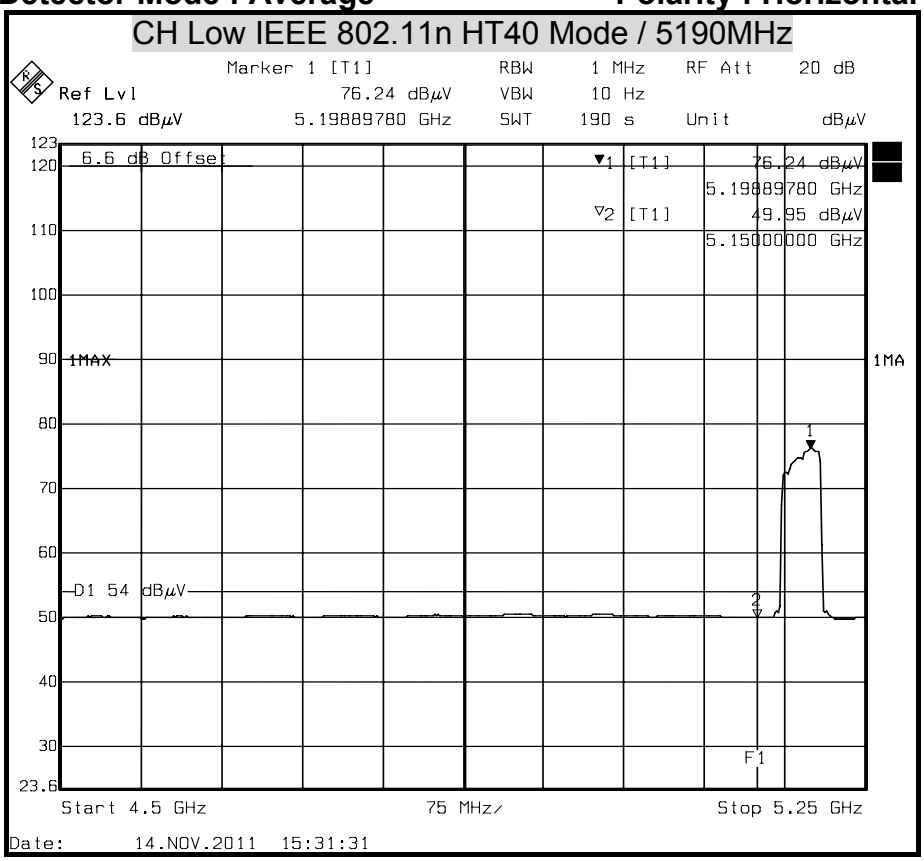
Detector Mode : Average **Polarity : Vertical**



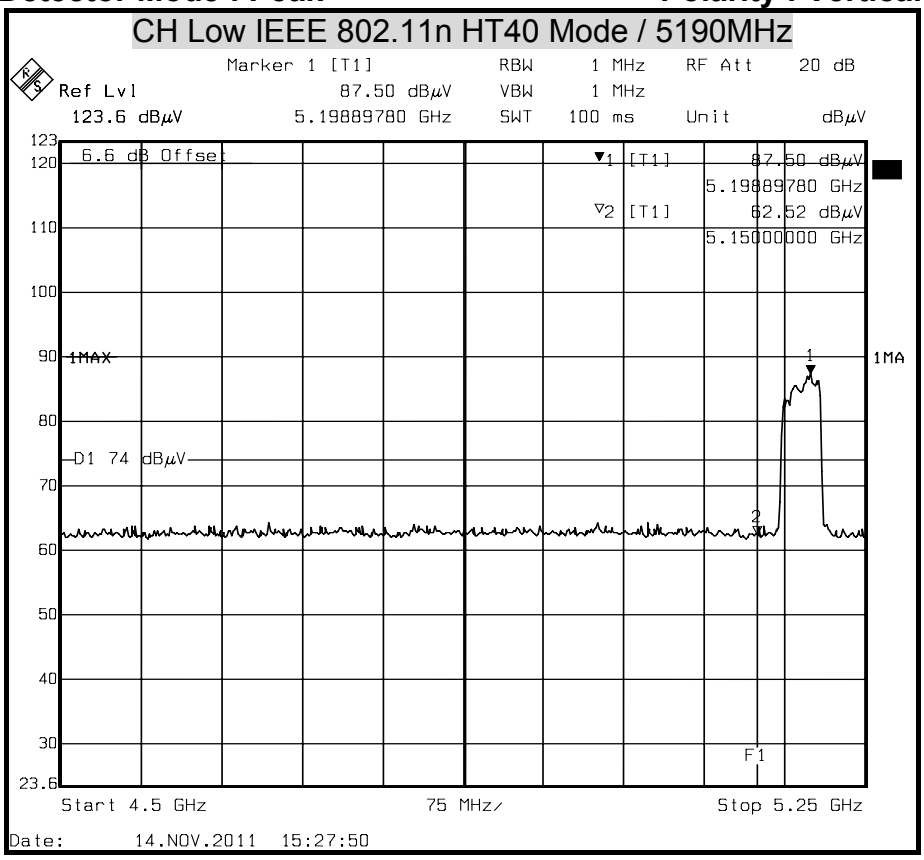
Detector Mode : Peak **Polarity : Horizontal**



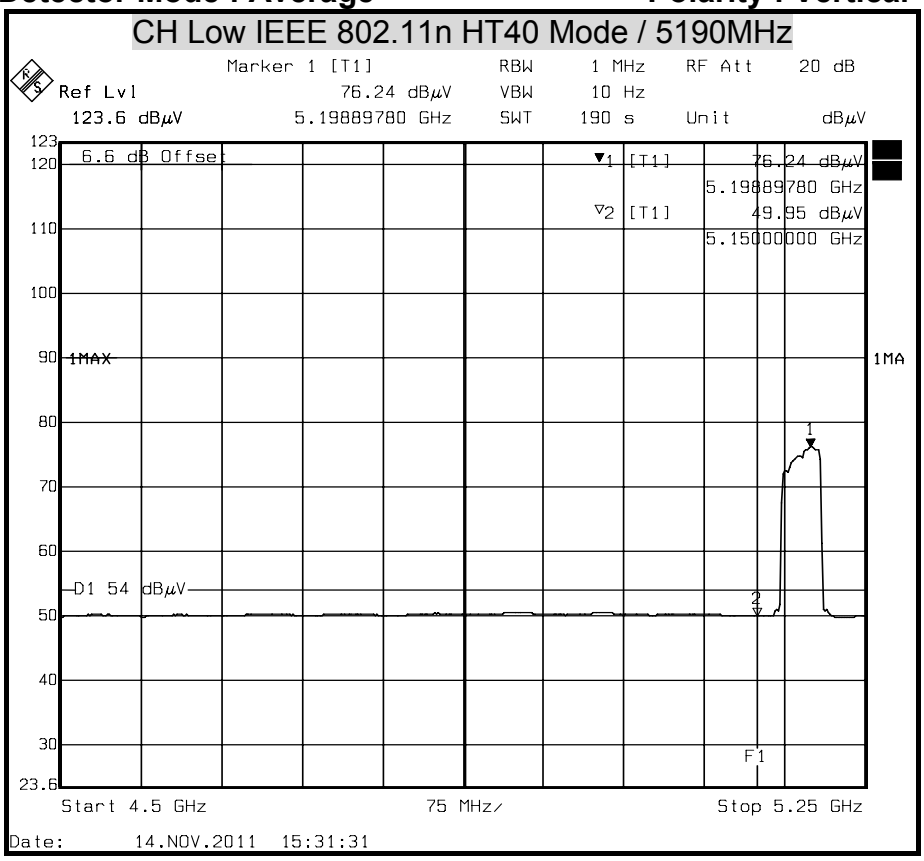
Detector Mode : Average **Polarity : Horizontal**



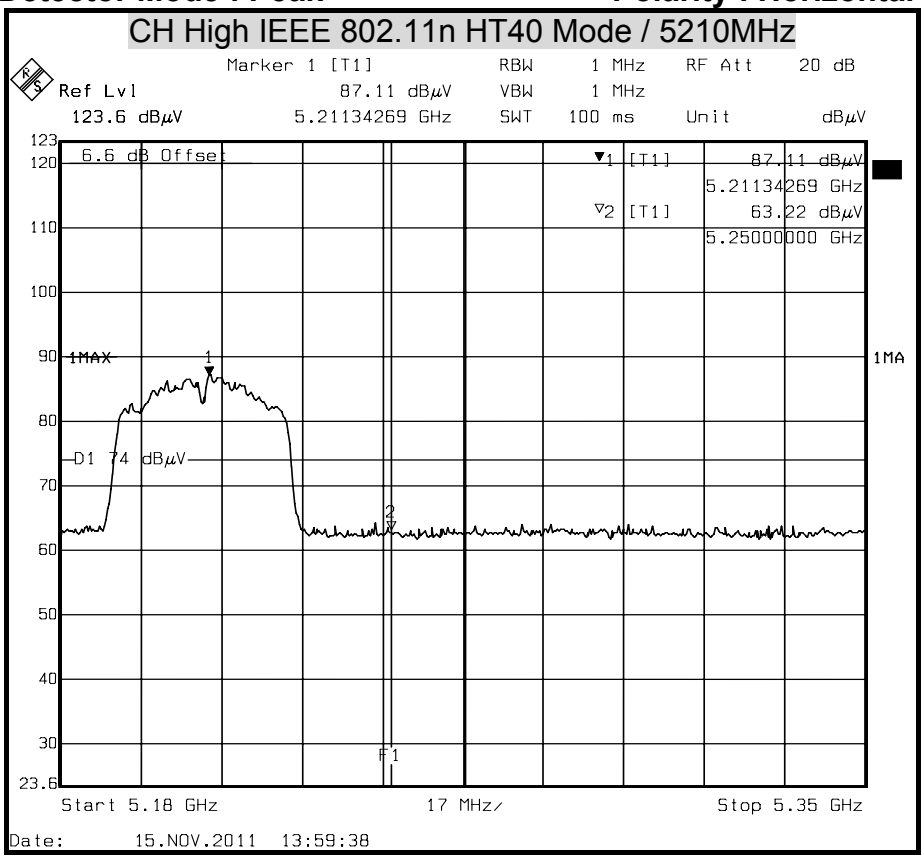
Detector Mode : Peak **Polarity : Vertical**



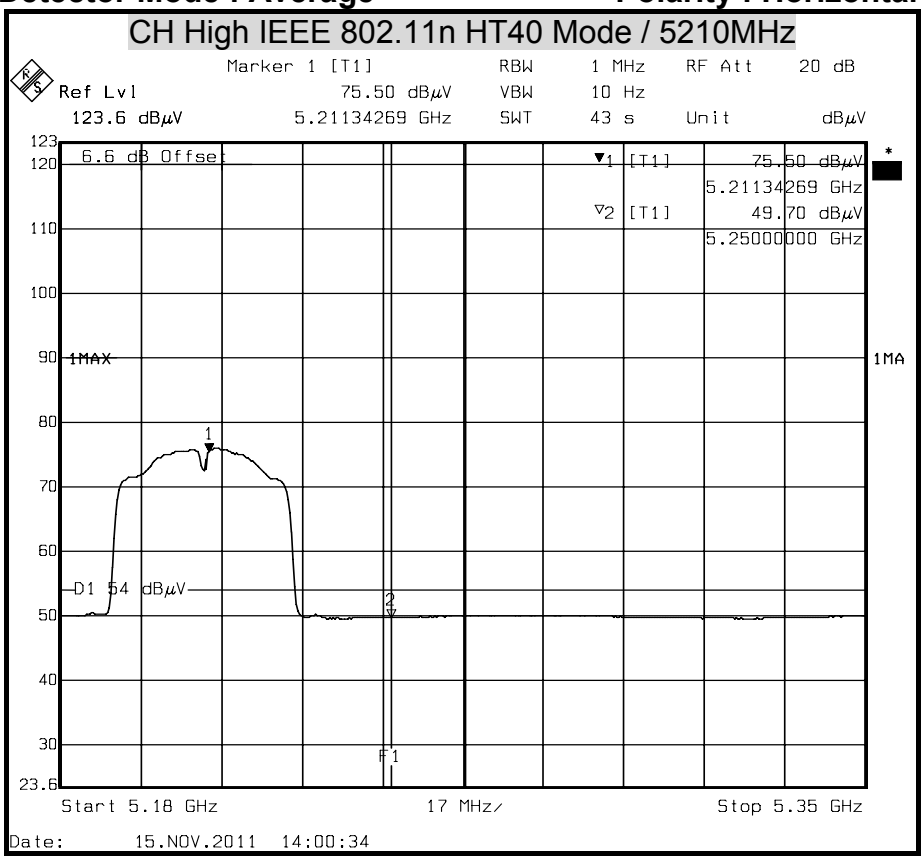
Detector Mode : Average **Polarity : Vertical**



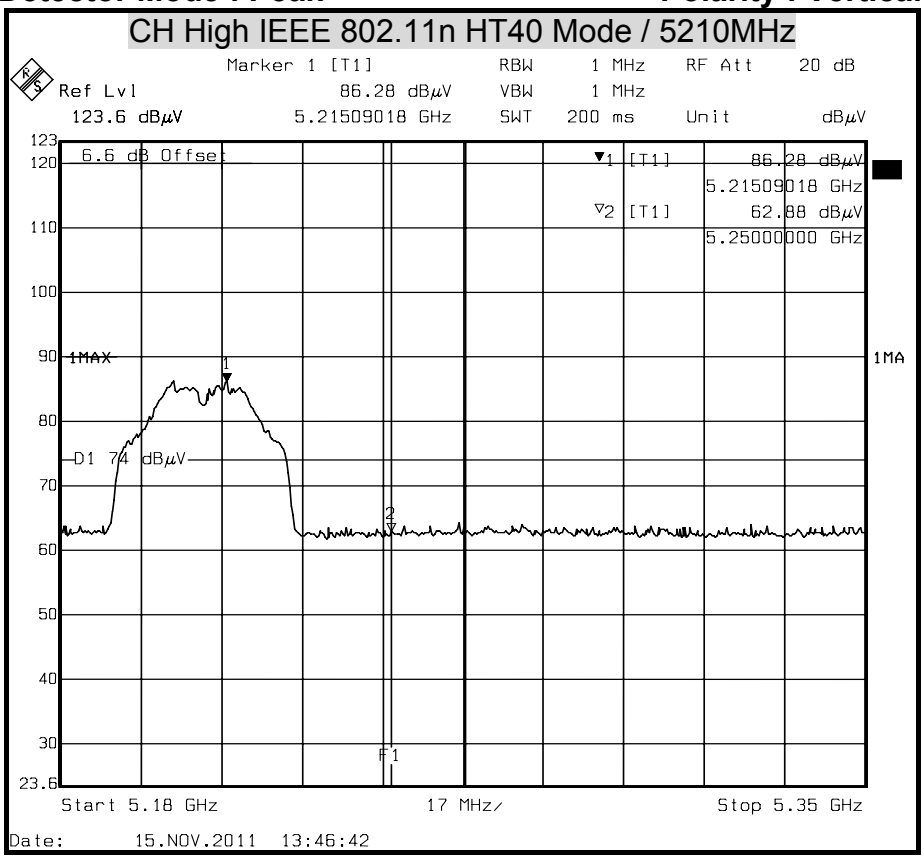
Detector Mode : Peak **Polarity : Horizontal**



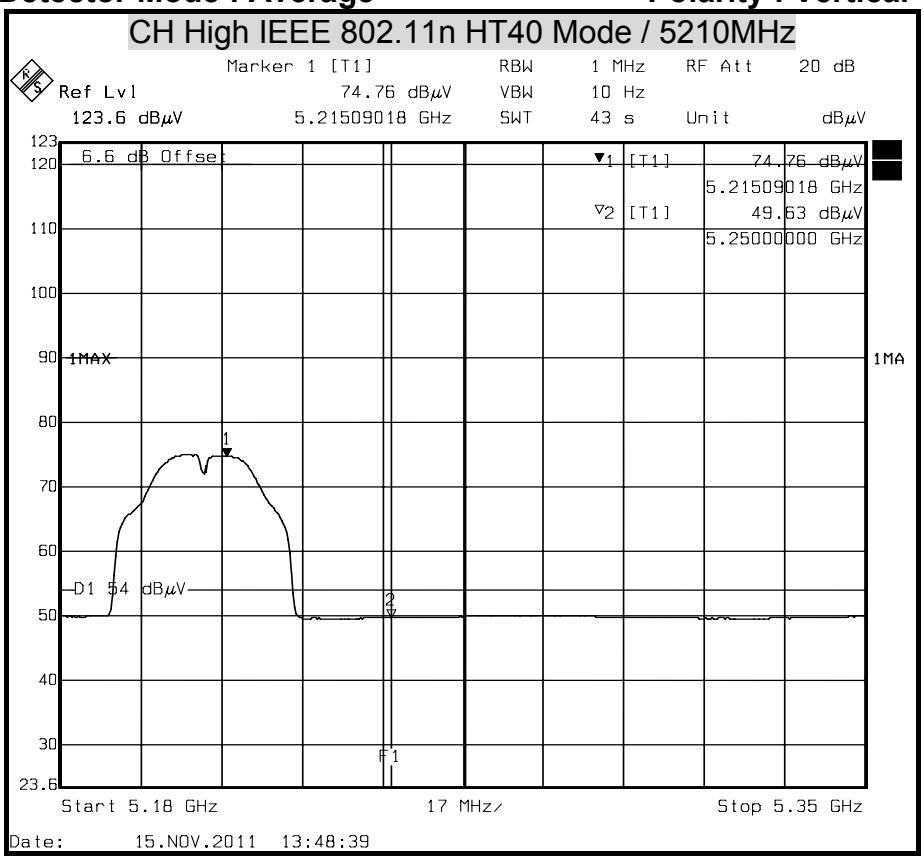
Detector Mode : Average **Polarity : Horizontal**



Detector Mode : Peak **Polarity : Vertical**



Detector Mode : Average **Polarity : Vertical**



7.7 CONDUCTED EMISSION

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

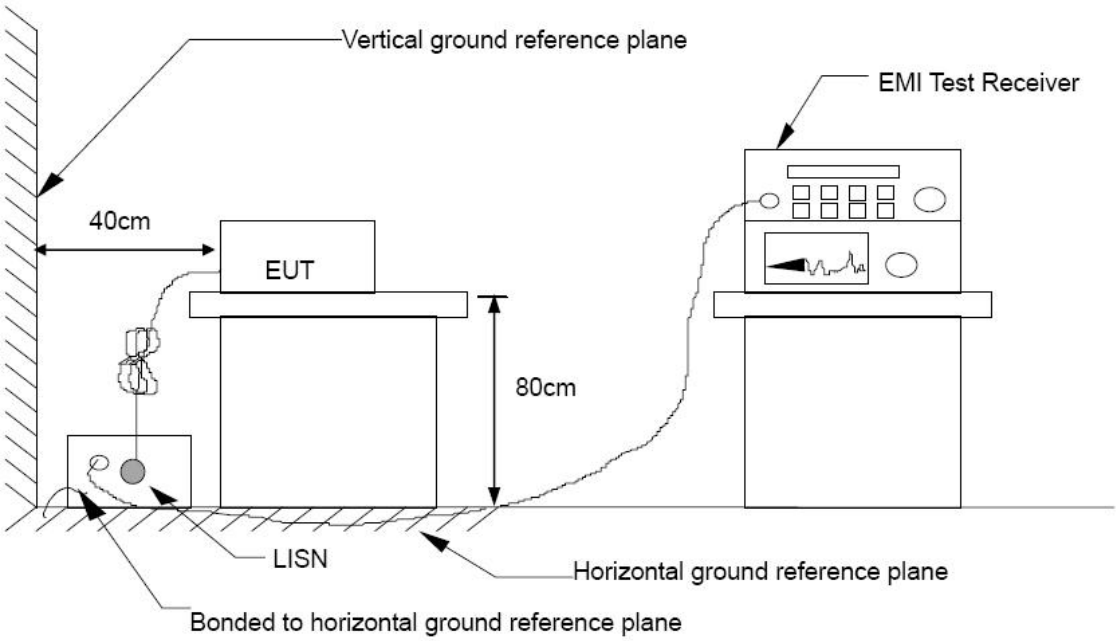
Frequency Range (MHz)	Conducted Limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5.00	56	46
5.00 - 30.0	60	50

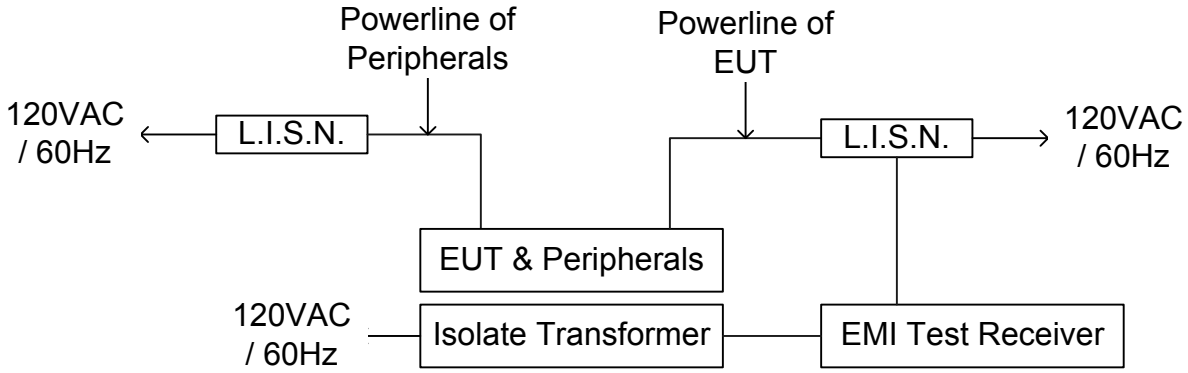
TEST EQUIPMENT

Conducted Emission room #1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK	NNLK 8130	8130124	SEP. 25, 2012
	Rohde & Schwarz	ESH 3-Z5	840062/021	AUG. 02, 2012
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 03, 2012
BNC COAXIAL CABLE	CCS	BNC50	11	OCT. 30, 2012
Test S/W	e-3 (5.04211c) R&S (2.27)			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP





TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2003.

The test procedure is performed in a 4m × 3m × 2.4m (L×W×H) shielded room.

The EUT along with its peripherals were placed on a 1.0m (W) × 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

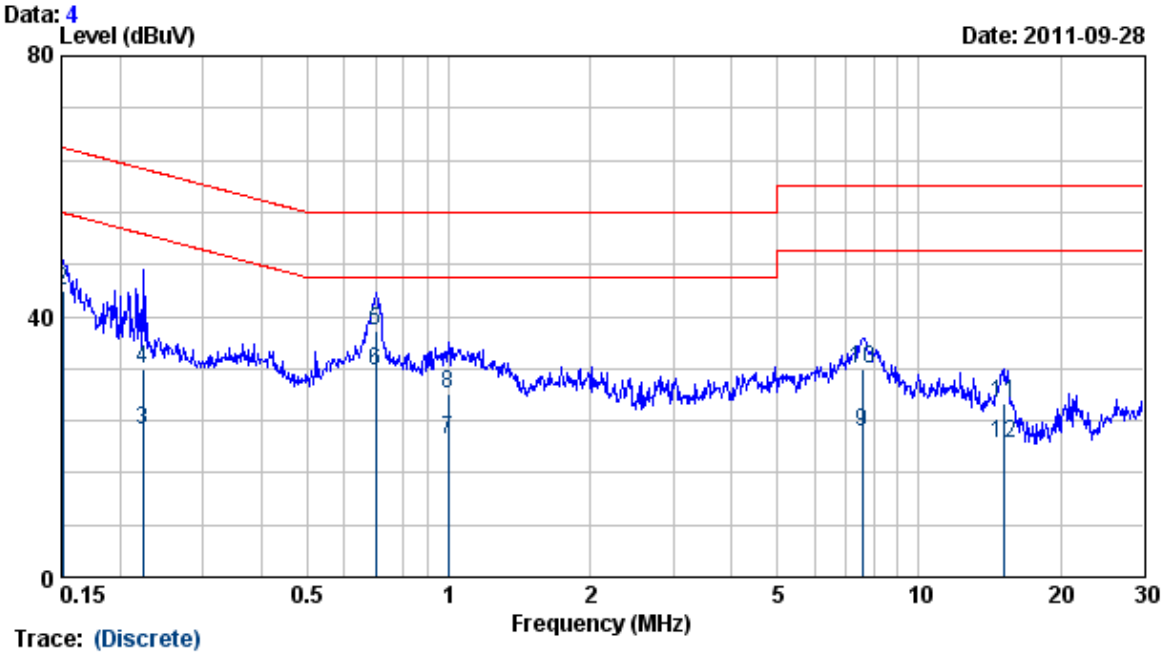
The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.

The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN is 0.8 m. Where a mains flexible cord was provided by the manufacturer shall be 1 m long, or if in excess of 1 m, the excess cable was folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

TEST RESULTS

Product Name	11n Dual-Band USB Dongle	Test By	Shiang Su
Model	WU318d	Test Date	SEP. 28, 2011
Test Mode	TX Mode	Temp. & Humidity	24.5°C, 56%

LINE



Trace: (Discrete)

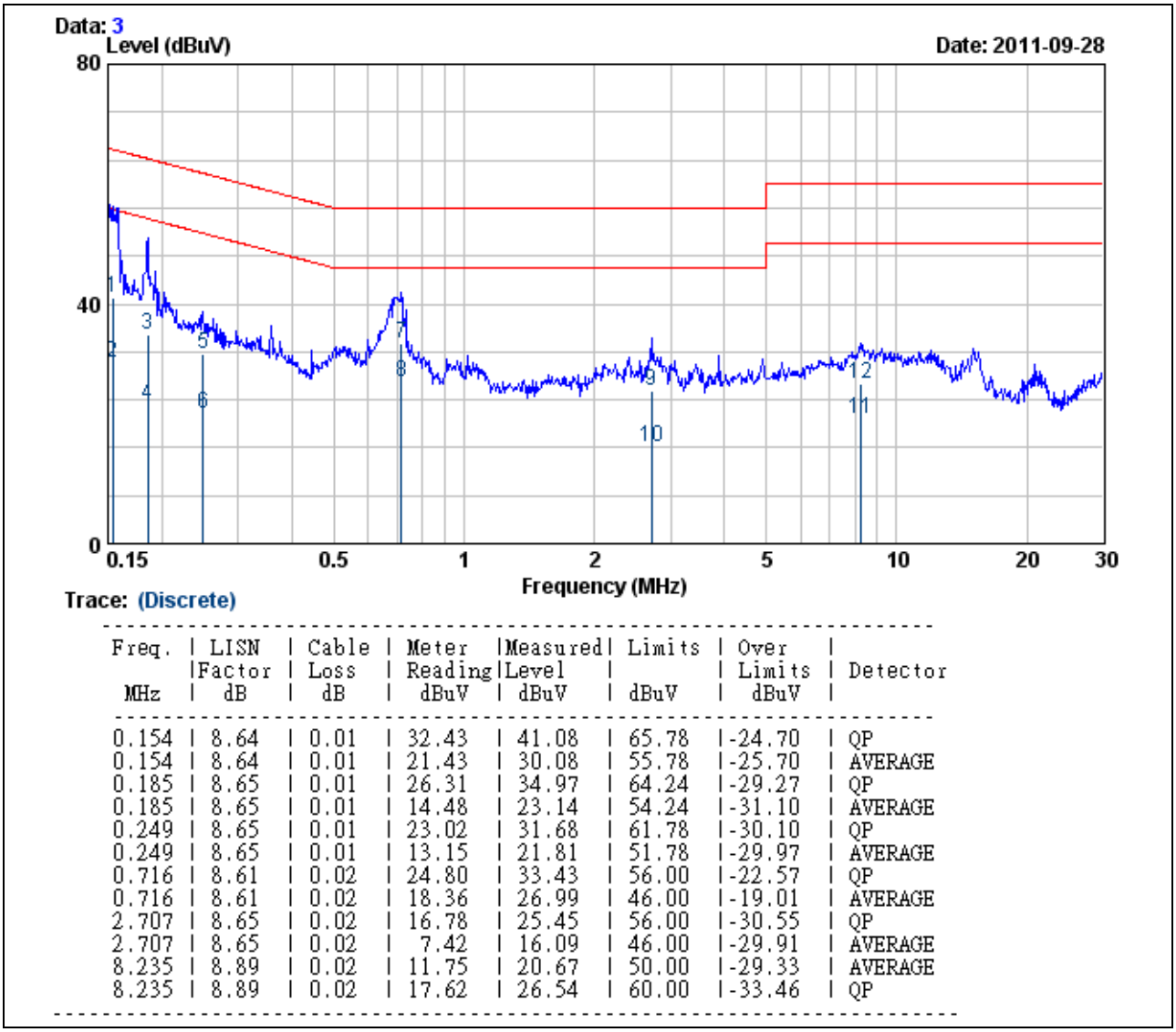
Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.151	8.64	0.01	20.61	29.26	55.96	-26.70	AVERAGE
0.151	8.64	0.01	35.16	43.81	65.96	-22.15	QP
0.223	8.65	0.01	13.87	22.53	52.70	-30.17	AVERAGE
0.223	8.65	0.01	23.17	31.83	62.70	-30.87	QP
0.701	8.61	0.02	29.24	37.87	56.00	-18.13	QP
0.701	8.61	0.02	23.10	31.73	46.00	-14.27	AVERAGE
1.000	8.62	0.02	12.45	21.09	46.00	-24.91	AVERAGE
1.000	8.62	0.02	19.44	28.08	56.00	-27.92	QP
7.566	8.88	0.02	13.24	22.13	50.00	-27.87	AVERAGE
7.566	8.88	0.02	23.15	32.04	60.00	-27.96	QP
15.146	8.81	0.13	17.63	26.57	60.00	-33.43	QP
15.146	8.81	0.13	11.65	20.59	50.00	-29.41	AVERAGE

Remark:

1. Correction Factor = Insertion loss + Cable loss
2. Emission level = Reading Value + Correction factor
3. Margin value = Emission level – Limit value

Product Name	11n Dual-Band USB Dongle	Test By	Shiang Su
Model	WU318d	Test Date	SEP. 28, 2011
Test Mode	TX Mode	Temp. & Humidity	24.5°C, 56%

NEUTRAL



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.154	8.64	0.01	32.43	41.08	65.78	-24.70	QP
0.154	8.64	0.01	21.43	30.08	55.78	-25.70	AVERAGE
0.185	8.65	0.01	26.31	34.97	64.24	-29.27	QP
0.185	8.65	0.01	14.48	23.14	54.24	-31.10	AVERAGE
0.249	8.65	0.01	23.02	31.68	61.78	-30.10	QP
0.249	8.65	0.01	13.15	21.81	51.78	-29.97	AVERAGE
0.716	8.61	0.02	24.80	33.43	56.00	-22.57	QP
0.716	8.61	0.02	18.36	26.99	46.00	-19.01	AVERAGE
2.707	8.65	0.02	16.78	25.45	56.00	-30.55	QP
2.707	8.65	0.02	7.42	16.09	46.00	-29.91	AVERAGE
8.235	8.89	0.02	11.75	20.67	50.00	-29.33	AVERAGE
8.235	8.89	0.02	17.62	26.54	60.00	-33.46	QP

Remark:

1. Correction Factor = Insertion loss + Cable loss
2. Emission level = Reading Value + Correction factor
3. Margin value = Emission level – Limit value

7.8 FREQUENCY STABILITY

LIMITS

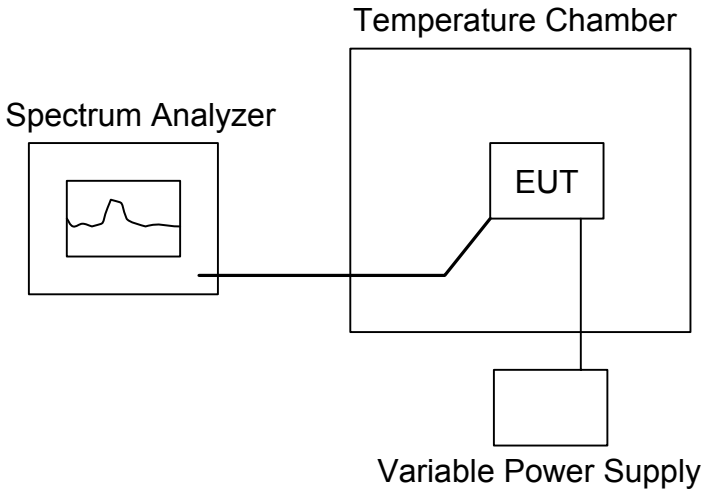
§ 15.407 (g) manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2012
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 09, 2012

Remark: *Each piece of equipment is scheduled for calibration once a year*

TEST SETUP



TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

TEST RESULTS

IEEE 802.11a mode

CH Low / 5180MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5179.942698	5150-5250	PASS
40		5179.939380	5150~5250	
30		5179.938680	5150~5250	
20		5179.938560	5150~5250	
10		5179.938790	5150~5250	
0		5179.938560	5150~5250	
-10		5179.940090	5150~5250	
-20		5179.939970	5150~5250	

CH Low / 5180MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5179.94	5150~5250	PASS
	110	5179.94	5150~5250	
	121	5179.94	5150~5250	

IEEE 802.11a mode

CH High / 5220MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5219.938940	5150~5250	PASS
40		5219.938880	5150~5250	
30		5219.938820	5150~5250	
20		5219.938940	5150~5250	
10		5219.938940	5150~5250	
0		5219.938880	5150~5250	
-10		5219.938880	5150~5250	
-20		5219.939000	5150~5250	

CH High / 5220MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5219.94	5150~5250	PASS
	110	5219.94	5150~5250	
	121	5219.94	5150~5250	

IEEE 802.11n HT20 mode

CH Low / 5180MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5179.962660	5150~5250	PASS
40		5179.962660	5150~5250	
30		5179.959370	5150~5250	
20		5179.963600	5150~5250	
10		5179.956790	5150~5250	
0		5179.963600	5150~5250	
-10		5179.961490	5150~5250	
-20		5179.961490	5150~5250	

CH Low / 5180MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5179.96	5150~5250	PASS
	110	5179.96	5150~5250	
	121	5179.96	5150~5250	

IEEE 802.11n HT20 mode

CH High / 5220MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5219.957490	5150~5250	PASS
40		5219.957960	5150~5250	
30		5219.957610	5150~5250	
20		5219.955850	5150~5250	
10		5219.995749	5150~5250	
0		5219.957960	5150~5250	
-10		5219.995749	5150~5250	
-20		5219.995749	5150~5250	

CH High / 5220MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5219.96	5150~5250	PASS
	110	5219.96	5150~5250	
	121	5219.96	5150~5250	

IEEE 802.11n HT40 mode

CH Low / 5190MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5189.960720	5150~5250	PASS
40		5189.960080	5150~5250	
30		5189.960550	5150~5250	
20		5189.960080	5150~5250	
10		5189.960370	5150~5250	
0		5189.959200	5150~5250	
-10		5189.959610	5150~5250	
-20		5189.960080	5150~5250	

CH Low / 5190MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5189.96	5150~5250	PASS
	110	5189.96	5150~5250	
	121	5189.96	5150~5250	

IEEE 802.11n HT40 mode

CH High / 5210MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	110	5209.958900	5150~5250	PASS
40		5209.958900	5150~5250	
30		5209.959140	5150~5250	
20		5209.956960	5150~5250	
10		5209.951420	5150~5250	
0		5209.951420	5150~5250	
-10		5209.955440	5150~5250	
-20		5209.955440	5150~5250	

CH High / 5210MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	99	5209.96	5150~5250	PASS
	110	5209.96	5150~5250	
	121	5209.96	5150~5250	

APPENDIX I MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate theenvironment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

CALCULATIONS

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm2

LIMIT

Power Density Limit, S=1.0mW/cm^2

TEST RESULTS

※Since the EUT is classed portable device, and the maximum peak power is 13.25 dBm (<13.6dBm), the MPE evaluation is not required and no SAR consideration applied.