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

For

Simultaneous Dual-Band Wireless N750 Media Router

Model: NBG5615

Data Applies To: EMG2626-R10A, Keenetic Ultra

Brand Name : ZyXEL

Issued for

ZyXEL Communications Corporation

No.6 Innovation Rd. II , Science-Based Industrial Park , Hsin-Chu , Taiwan

Issued by

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

Issued Date: April 23, 2013

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 12, 2013	Initial Issue	ALL	Sunny Chang
01	April 18, 2013	Update data	Page 8; 136	Sunny Chang
02	April 23, 2013	Update data	Page 136	Sunny Chang

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1. TEST REPORT CERTIFICATION

Applicant	：	ZyXEL Communications Corporation
Address	：	No.6 Innovation Rd. II , Science-Based Industrial Park , Hsin-Chu , Taiwan
Equipment Under Test	：	Simultaneous Dual-Band Wireless N750 Media Router
Model	：	NBG5615
Data Applies To	：	EMG2626-R10A, Keenetic Ultra
Trade Name	：	ZyXEL
Tested Date	：	December 17, 2012 ~ December 28, 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

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2. EUT DESCRIPTION

Product Name	Simultaneous Dual-Band Wireless N750 Media Router
Model Number	NBG5615
Data Applies To	EMG2626-R10A, Keenetic Ultra
Brand Name	ZyXEL
Identify Number	T121212N91
Received Date	December 12, 2012
Frequency Range	IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz, IEEE 802.11n HT40 : 5180MHz ~ 5220MHz,
Transmit Power	IEEE 802.11a : 5180MHz ~ 5240MHz : 13.75dBm IEEE 802.11n HT20 : 5180MHz ~ 5240MHz : 11.14dBm IEEE 802.11n HT40 : 5180MHz ~ 5220MHz : 11.14dBm
Channel Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40 : 20MHz
Channel Number	IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz : 4 Channels IEEE 802.11n HT40 : 5180MHz ~ 5220MHz : 3 Channels
Transmit Data Rate	IEEE 802.11a (5G) : 54, 48 ,36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 (5G) : 195 , 175.5 , 156 , 130 , 117 , 104 , 78 , 65 , 58.5 , 52 , 39 , 26 , 19.5 , 13 , 6.5 Mbps IEEE 802.11n HT40 (5G) : 450 , 405 , 364.5 , 324 , 300 , 270 , 243 , 216 , 162 , 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	**Antenna (3T3R)** Manufacture: WIESON TECHNOLOGIES CO., LTD. Type: Dipole antenna **Antenna 1:** Model: GY121HT467-009 Gain: 5G: 4dBi **Antenna 2: (2pcs)** Model: GY121HT467-010 Gain: 5G: 4dBi
Power Rating	12Vdc; 2A(Powered from Adapter)
Test Voltage	120Vac, 60Hz

Power Adapter :

No.	Manufacturer	Model No.	Power Input	Power Output
1	Powertron	PA1024-2I	100-240Vac, 50/60Hz, 0.6A	12Vdc, 2.0A

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Operation Frequency:
IEEE 802.11a, 802.11nHT20

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)			
CHANNEL	**MHz**	**CHANNEL**	**MHz**
36	5180	44	5220
40	5200	48	5240

IEEE 802.11nHT40

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

Remark :

1. *Client consigns only one model sample to test (Model Number: NBG5615).*
2. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
3. *For more details, please refer to the User's manual of the EUT.*
4. *This submittal(s) (test report) is intended for FCC ID: **I88NBG5615** filing to comply with Section 15.407, of the FCC Part 15, Subpart E Rules.*
5. *The listed models(EMG2626-R10A, Keenetic Ultra)are all the same of the original model(NBG5615), design, except for different models name and is just for the marketing purpose.*

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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 ~ 5240MHz

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	5240

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

IEEE 802.11n HT20 mode : 19.5Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT40 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 802.11n HT40 mode : 40.5Mbps 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.

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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 1109

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 TW1037

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

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6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Note Book	BenQ	Joybook R22E	DOC	Power cable, unshd, 1.6m

No.	Signal cable description	
A	DC Power	Unshielded, 1.5m, 1pcs
B	LAN Cable	Unshielded, 10m, 1pcs

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Printer	HP	C2164A	DOC	Printer cable, unshd, 1.6m
2	Notebook	Acer	AS 3830TG	DOC	Power cable, unshd, 1.6m
3	Notebook	TOSHIBA	Satellite L730	DOC	Power cable, unshd, 1.6m
4	HUB	BARRICAD	SMC7008BR	DOC	Power cable, unshd, 1.6m
5	Printer	HP	LASERJET-1320	CNBJJ70438	Printer cable, unshd, 1.6m

No.	Signal cable description	
A	Power	Unshielded, 1.4m, 1pcs.
B	USB	Shielded, 1.8m, 1pcs.
C	LAN	Unshielded, 10m, 1pcs.
D	LAN	Unshielded, 10m, 1pcs.
E	LAN	Unshielded, 2.0m, 3pcs.
F	USB	Shielded, 1.8m, 1pcs.

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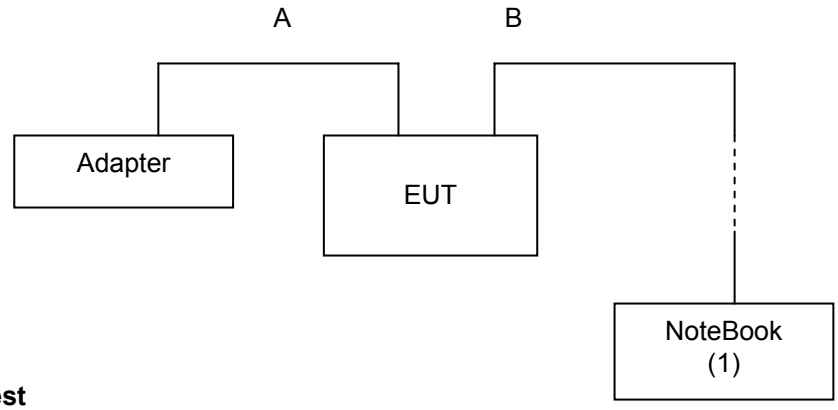
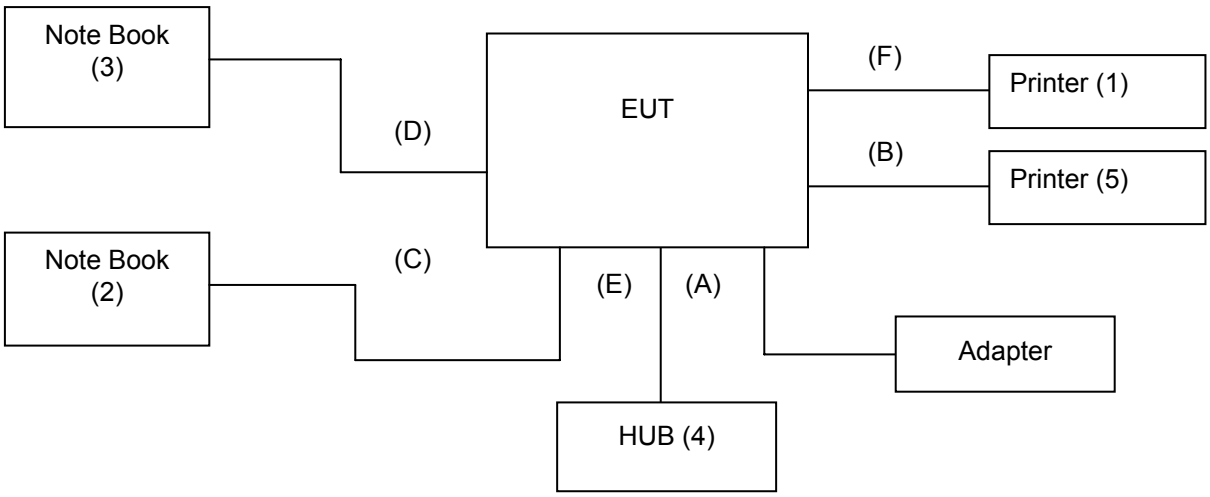
SETUP DIAGRAM FOR TESTS

For RF test



For EMI test



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EUT OPERATING CONDITION

Follow the steps:

1. PC IP :192.168.1.99
2. Run “MultiBootSrv_AMIT_P5.exe”
3. Use “ROM-D Configuration File” in “MultiBootSrv_AMIT_P5”
4. Choose file “Zyxel.log”
5. Use “Enable Engineer Debug Flag” in “MultiBootSrv_AMIT_P5”
6. Press "Start" button
7. EUT power ON
8. Telnet 192.168.1.1
   User:root
   Passwd:1234
9. Command for 5G RF test:
   ated -i rai0
   Command for 2.4G RF test:
   ated -i ra0
10. For 5G RF test:
    Run “RT3593 V1.0.2.4 AP QA Tools” in PC
    For 2.4G RF test:
    Run “RT5x9x V1.0.7.4 AP QA Tools” in PC

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RF Setup

1. Set up all computers like the setup diagram.
2. The “Ralink QA Test Program for “RT3593 QA_1.0.2.4” software was used for testing
   The EUT driver software installed in the host support equipment during testing was
   Ralink QA Test Program for “RT3593 QA_1.0.2.4” Drive

TX Mode:

- ⇨ **Tx Mode: OFDM、 HT MixMode** (Bandwidth: 20、40)
- ⇨ **Tx Data Rate: 6Mbps** (IEEE 802.11a mode ,chain 0 TX)
  19.5Mbps (IEEE 802.11n HT20 mode ,chain 0, chain 1, chain 2 TX)
  40.5Mbps (IEEE 802.11n HT40 mode, chain 0, chain 1, chain 2 TX)

Power control mode

Target Power:

IEEE 802.11a Lower Sub-Band Channel Low (5180MHz) = 09 **(Chain 0)**
IEEE 802.11a Lower Sub-Band Channel Middle (5200MHz) = 09 **(Chain 0)**
IEEE 802.11a Lower Sub-Band Channel High (5240MHz) = 0A **(Chain 0)**

Target Power:

IEEE 802.11n HT20 Lower Sub-Band Channel Low (5180MHz) = 00 **(Chain 0)**
IEEE 802.11 n HT20 Lower Sub-Band Channel Middle (5200MHz) = 00 **(Chain 0)**
IEEE 802.11n HT20 Lower Sub-Band Channel High (5240MHz) = 00 **(Chain 0)**
IEEE 802.11n HT20 Lower Sub-Band Channel Low (5180MHz) = 09 **(Chain 1)**
IEEE 802.11 n HT20 Lower Sub-Band Channel Middle (5200MHz) = 09 **(Chain 1)**
IEEE 802.11n HT20 Lower Sub-Band Channel High (5240MHz) = 07 **(Chain 1)**
IEEE 802.11n HT20 Lower Sub-Band Channel Low (5180MHz) = 04 **(Chain 2)**
IEEE 802.11 n HT20 Lower Sub-Band Channel Middle (5200MHz) = 03 **(Chain 2)**
IEEE 802.11n HT20 Lower Sub-Band Channel High (5240MHz) = 02 **(Chain 2)**

Target Power:

IEEE 802.11n HT40 Lower Sub-Band Channel Low (5180MHz) = 00 **(Chain 0)**
IEEE 802.11 n HT40 Lower Sub-Band Channel Middle (5200MHz) = 00 **(Chain 0)**
IEEE 802.11n HT40 Lower Sub-Band Channel High (5220MHz) = 00 **(Chain 0)**
IEEE 802.11n HT40 Lower Sub-Band Channel Low (5180MHz) = 09 **(Chain 1)**
IEEE 802.11 n HT40 Lower Sub-Band Channel Middle (5200MHz) = 09 **(Chain 1)**
IEEE 802.11n HT40 Lower Sub-Band Channel High (5220MHz) = 09 **(Chain 1)**
IEEE 802.11n HT40 Lower Sub-Band Channel Low (5180MHz) = 04 **(Chain 2)**
IEEE 802.11 n HT40 Lower Sub-Band Channel Middle (5200MHz) = 03 **(Chain 2)**
IEEE 802.11n HT40 Lower Sub-Band Channel High (5220MHz) = 03 **(Chain 2)**

RX Mode：

MAC Address: FFFFFFFFFFFF
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.

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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	FSU	200789	SEP. 29, 2013

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.

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TEST RESULTS

IEEE 802.11a Mode

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Pass / Fail
Low	5180	19.88	PASS
Middle	5200	19.98	PASS
High	5240	19.90	PASS

IEEE 802.11 n HT20 Mode

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
Low	5180	19.76	19.86	19.82	PASS
Middle	5200	19.92	19.84	19.88	PASS
High	5240	19.84	19.92	19.98	PASS

IEEE 802.11 n HT40 Mode

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
Low	5180	40.72	40.28	40.76	PASS
Middle	5200	40.60	40.28	40.48	PASS
High	5220	40.52	40.28	40.52	PASS

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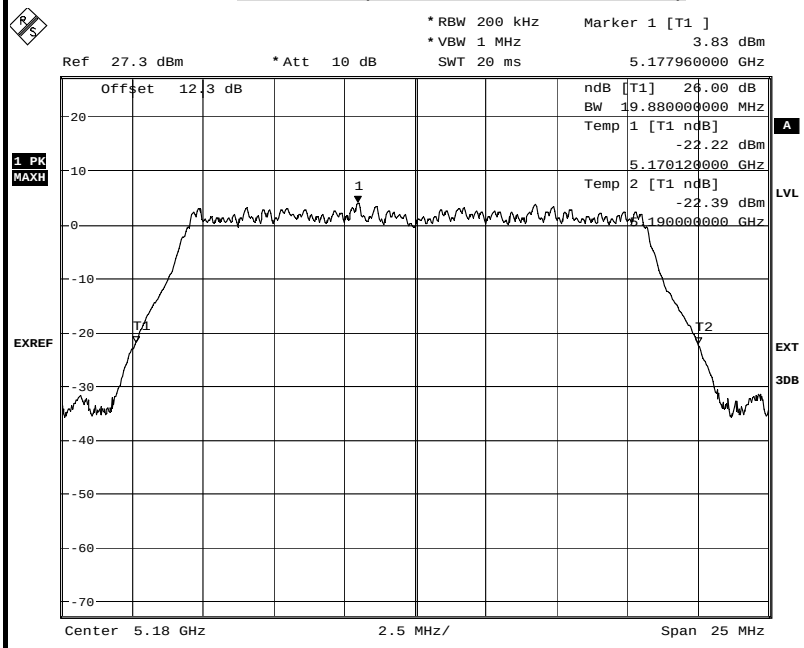
26dB BANDWIDTH

CH Low (IEEE 802.11a Mode)



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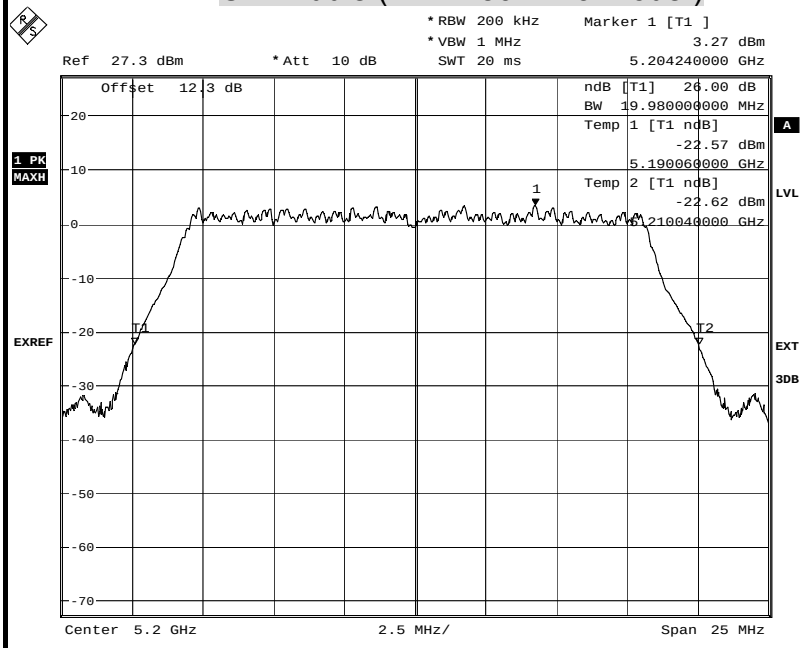

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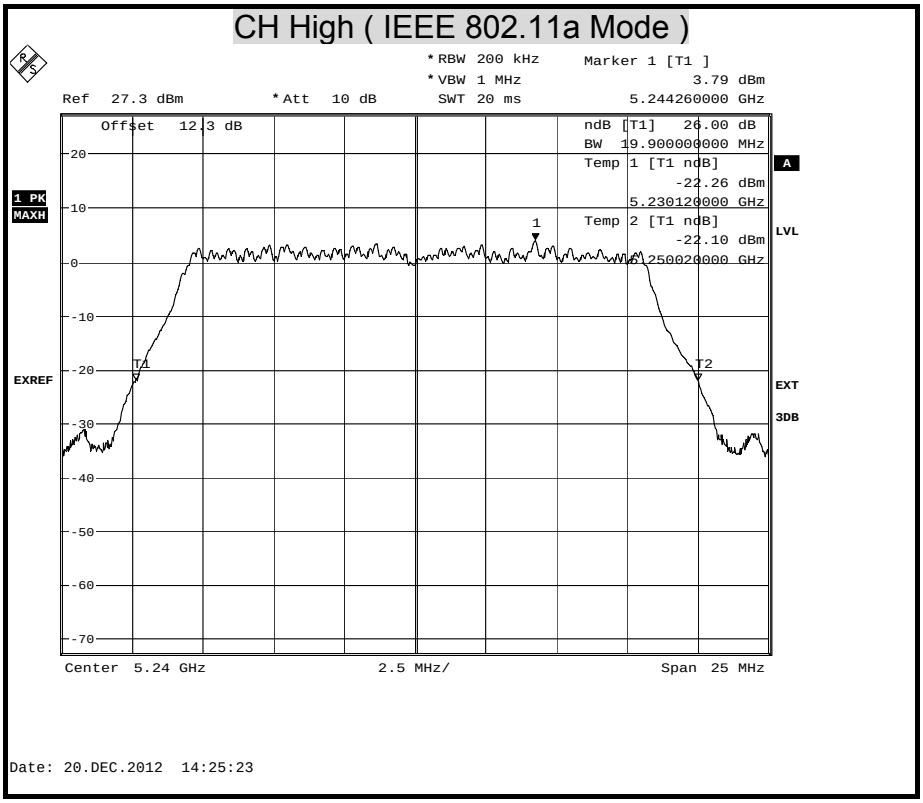
CH High (IEEE 802.11a Mode)



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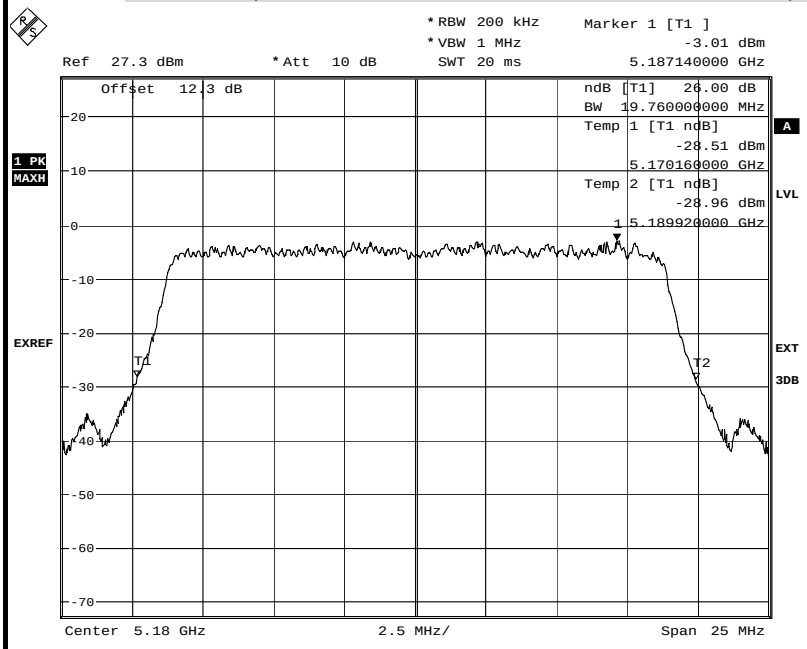
CH Low (IEEE 802.11n HT20 Mode / Chain 0)



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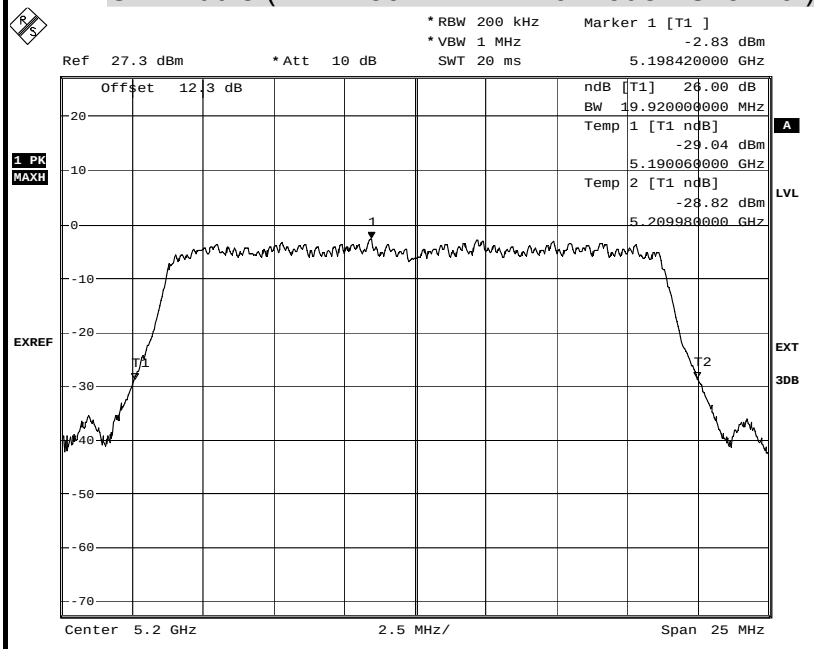

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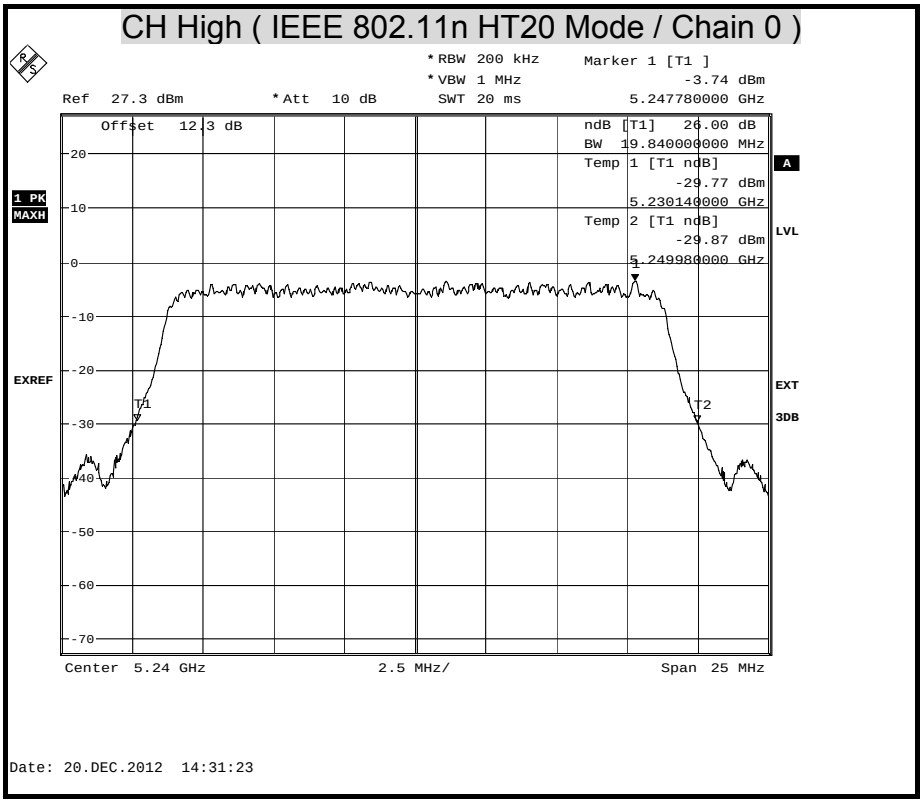
CH High (IEEE 802.11n HT20 Mode / Chain 0)



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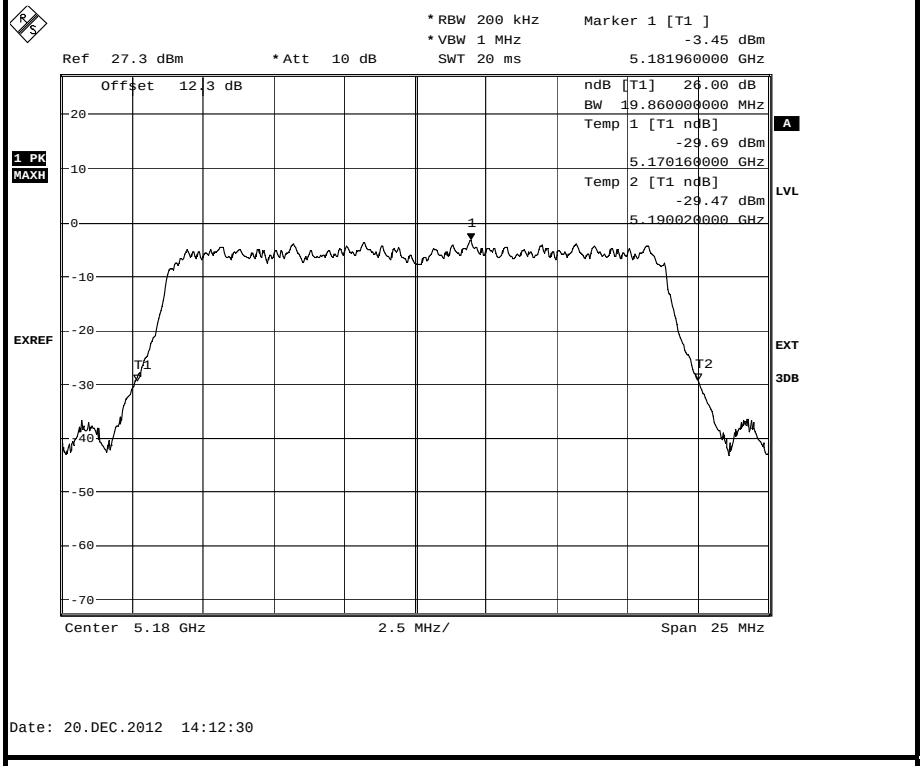

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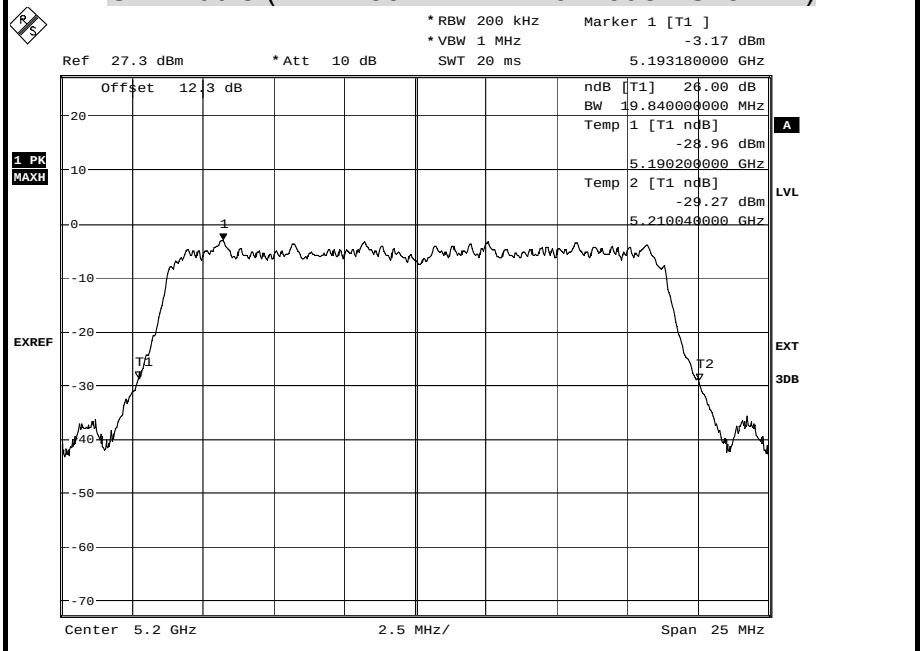

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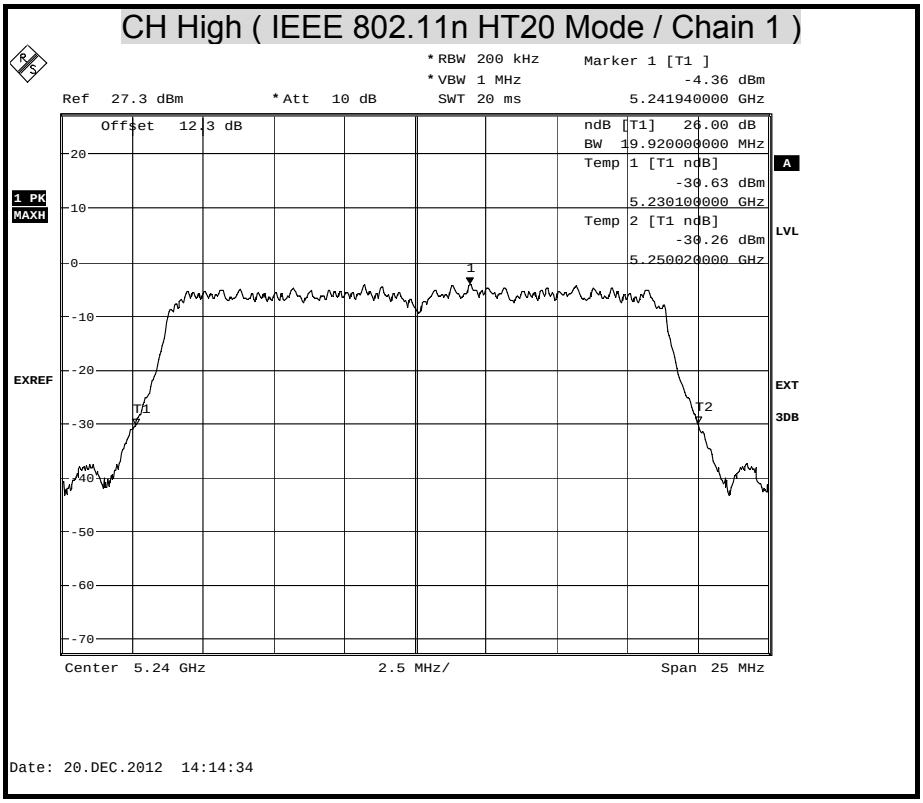
CH High (IEEE 802.11n HT20 Mode / Chain 1)



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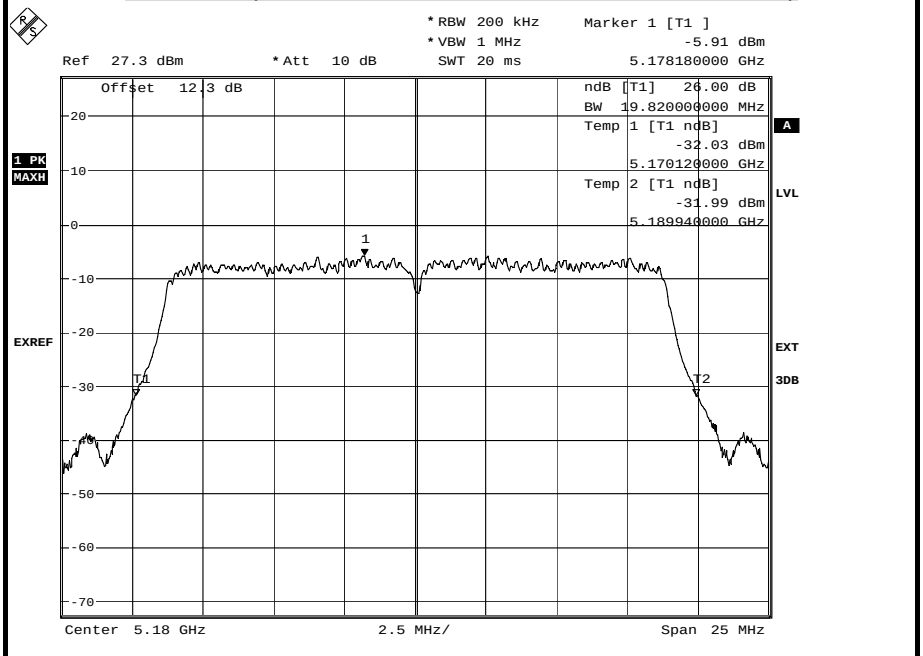

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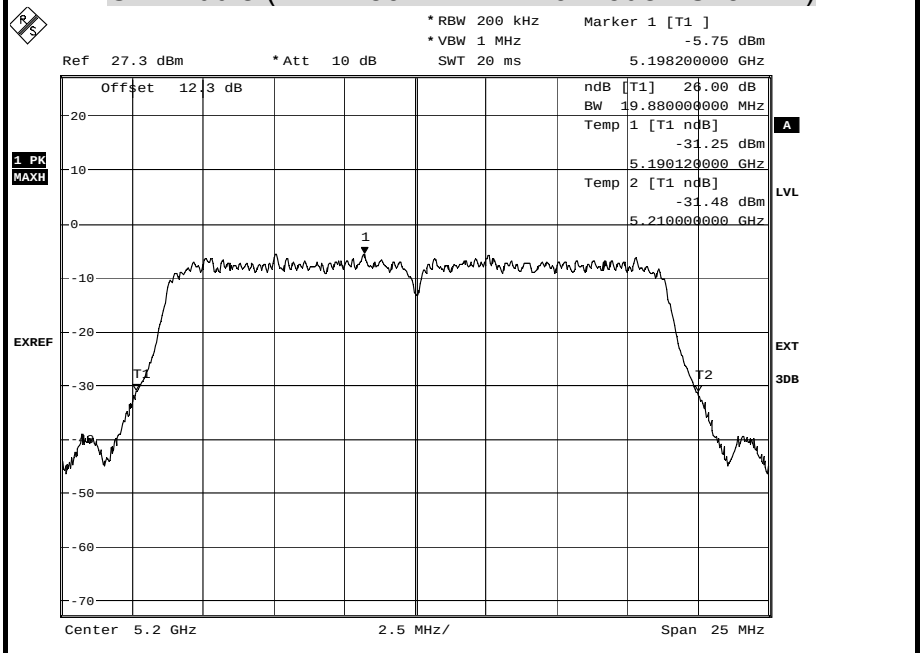

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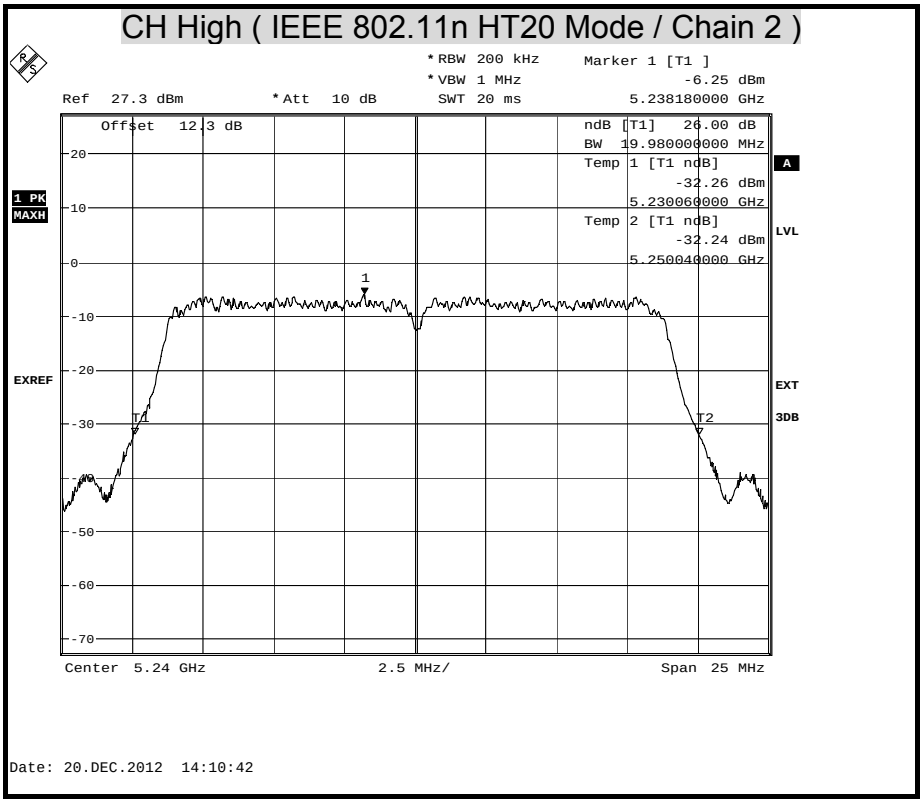

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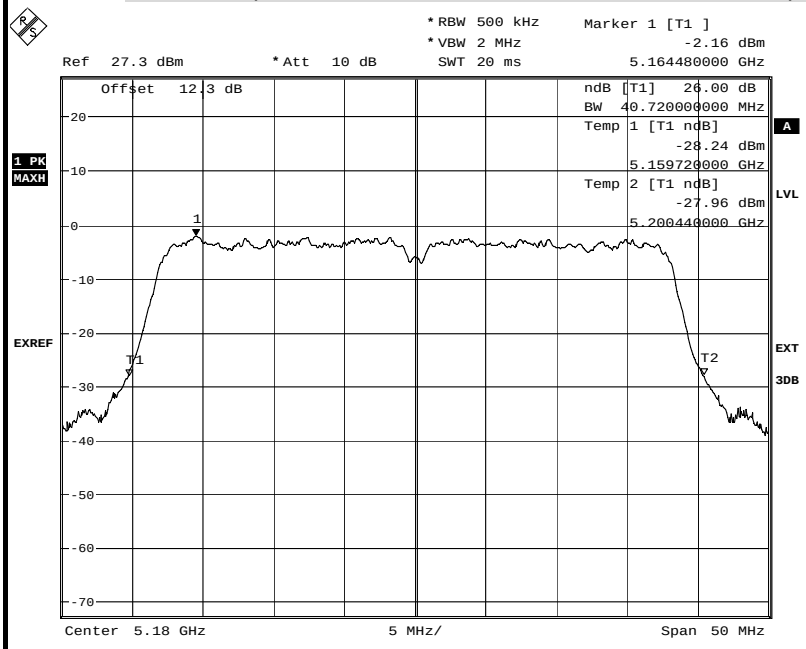
CH Low (IEEE 802.11n HT40 Mode / Chain 0)



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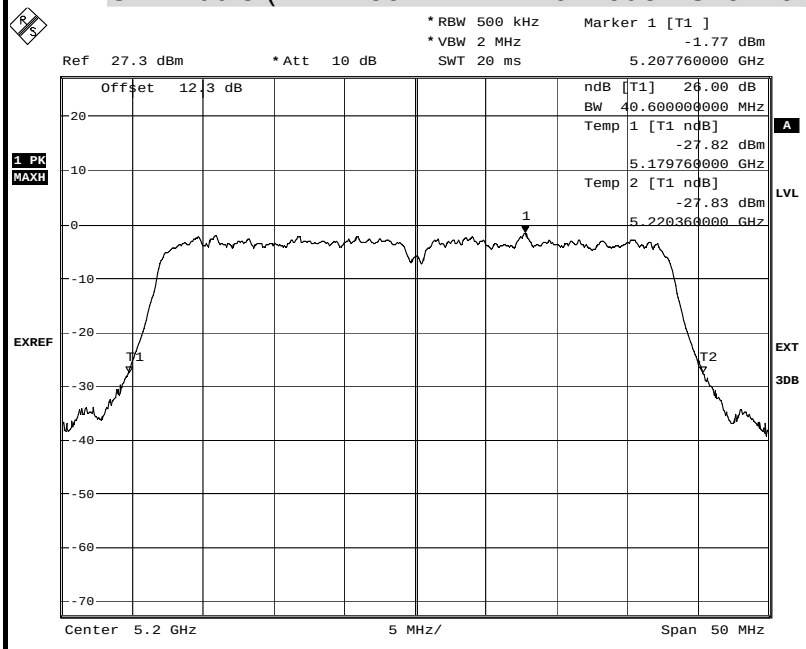

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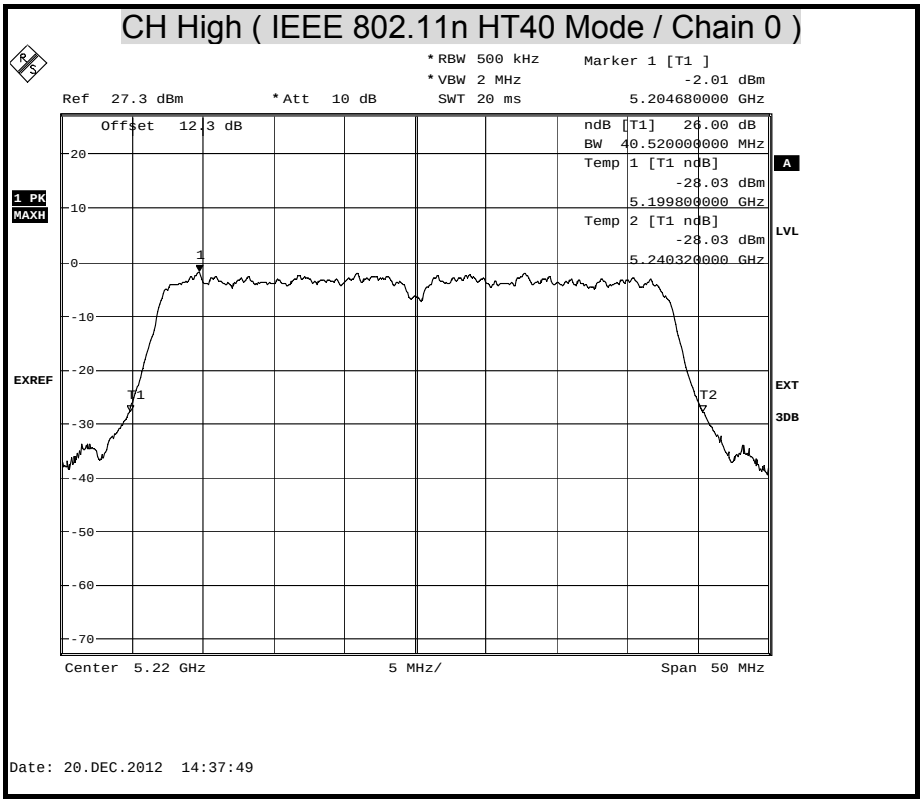

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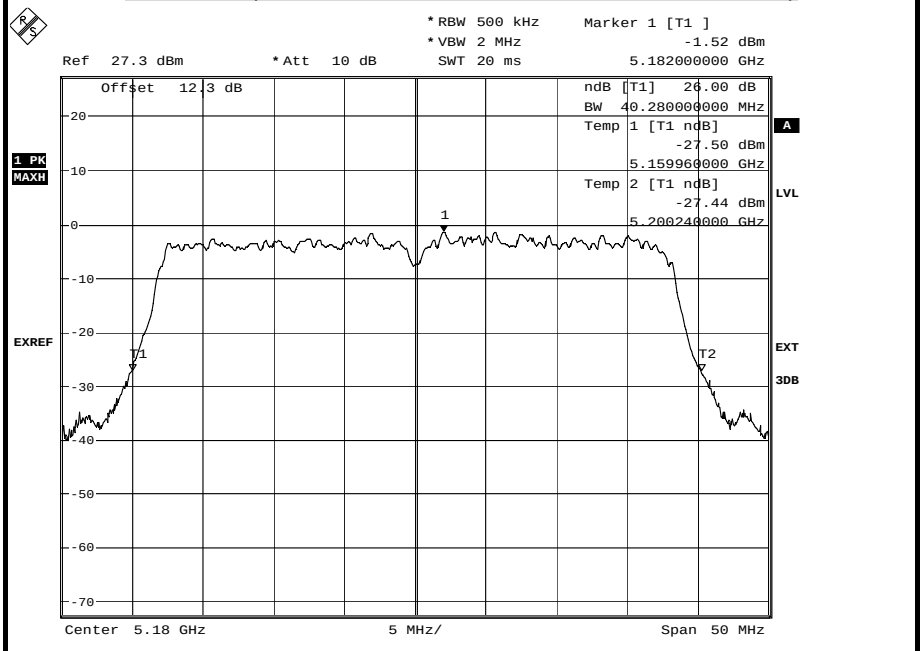

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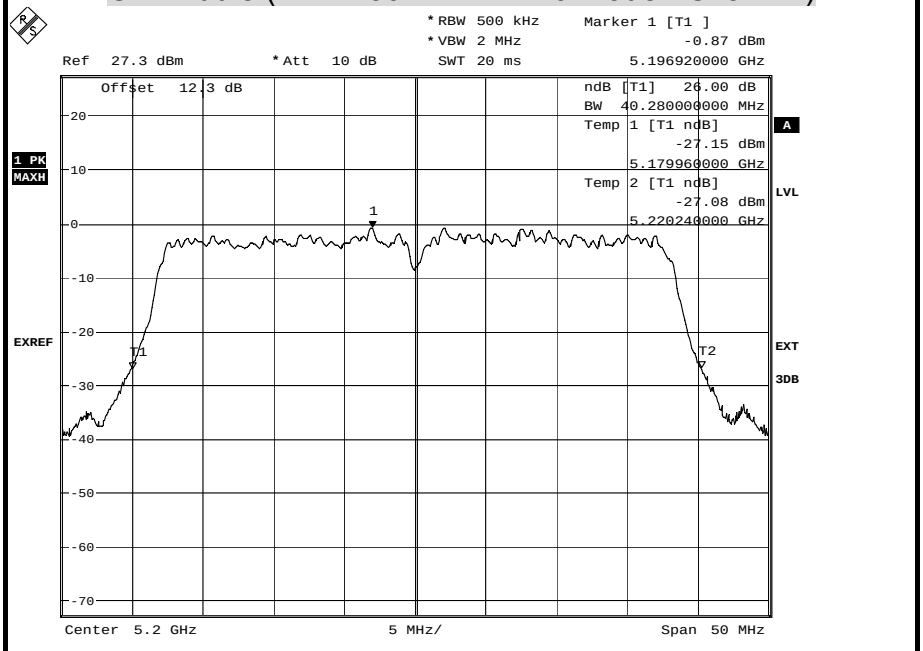
CH Middle (IEEE 802.11n HT40 Mode / Chain 1)



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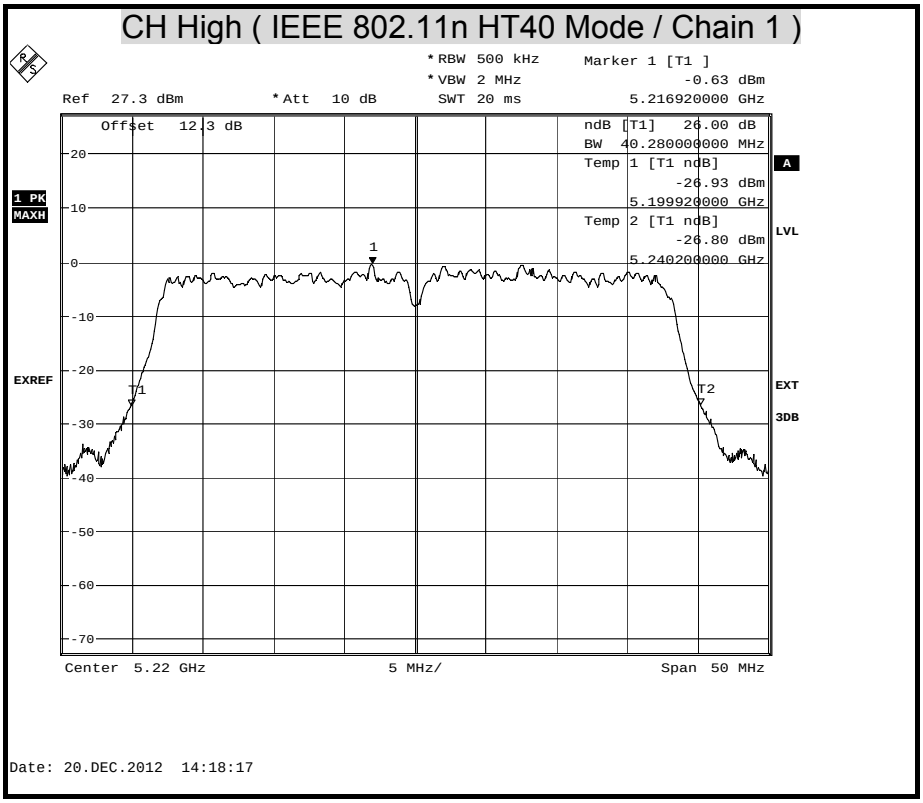
CH High (IEEE 802.11n HT40 Mode / Chain 1)



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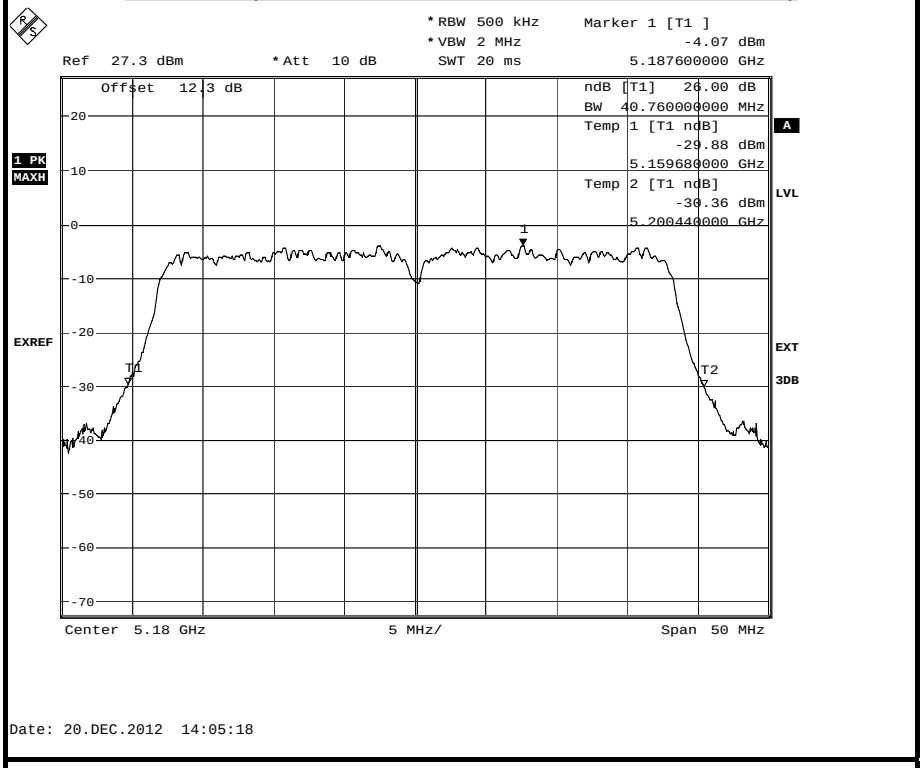
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



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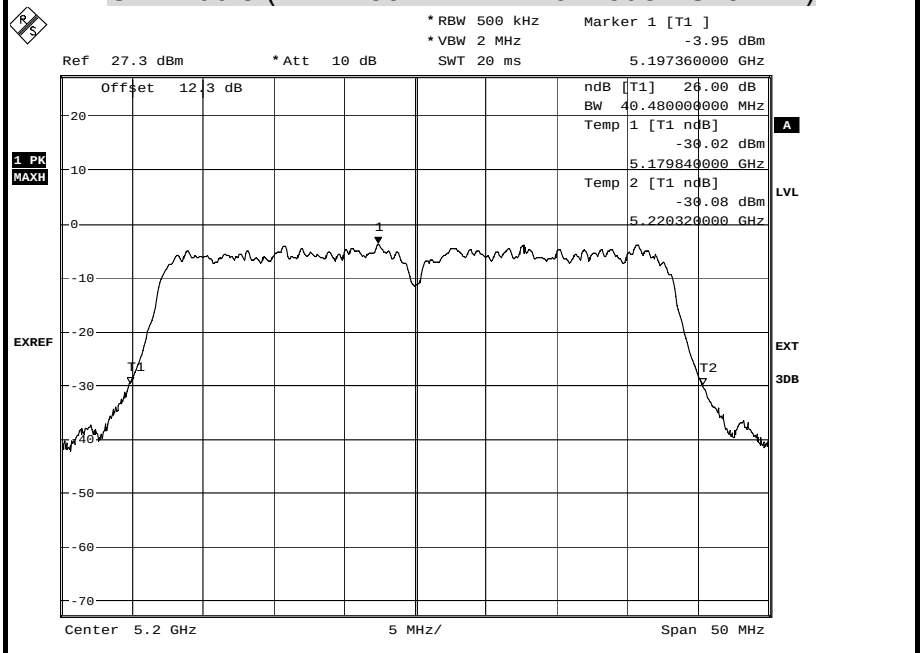

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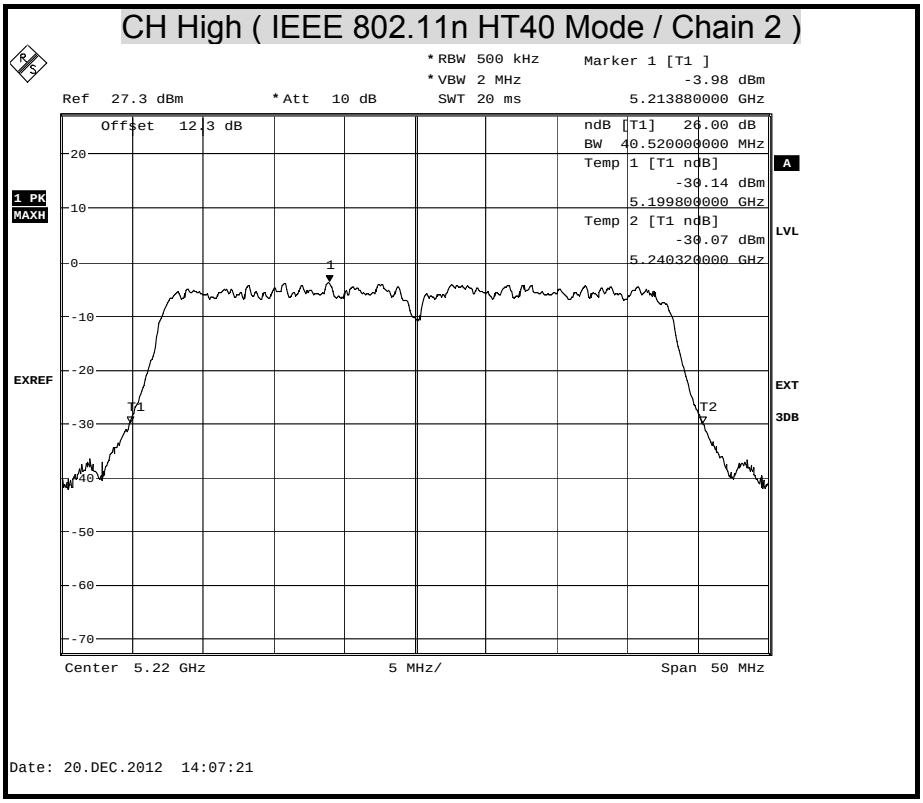
CH High (IEEE 802.11n HT40 Mode / Chain 2)



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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.

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The peak power shall not exceeded the limit as follows:

IEEE 802.11a mode

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	19.880	12.98	16.98	17.00
Middle	5200	19.980	13.01	17.01	17.00
High	5240	19.900	12.99	16.99	17.00

IEEE 802.11n HT20 mode

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	Chain 2			
Low	5180	19.760	19.860	19.820	12.98	16.98	17.00
Middle	5200	19.920	19.840	19.880	12.99	16.99	17.00
High	5240	19.840	19.920	19.980	13.01	17.01	17.00

IEEE 802.11n HT40 mode

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	Chain 2			
Low	5180	40.720	40.280	40.760	16.10	20.10	17.00
Middle	5200	40.600	40.280	40.480	16.09	20.09	17.00
High	5220	40.520	40.280	40.520	16.08	20.08	17.00

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TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013

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.

Setup RMS 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.

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TEST RESULTS

IEEE 802.11a Mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	5180	13.55	17.00	PASS
Middle	5200	13.41	17.00	PASS
High	5240	13.75	17.00	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

Channel	Channel Frequency (MHz)	Peak Power				Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Total		
Low	5180	7.61	6.67	3.93	11.10	14.23	PASS
Middle	5200	7.46	6.94	3.96	11.14	14.23	PASS
High	5240	6.99	6.51	4.16	10.82	14.23	PASS

Remark:

1. *At finial test to get the worst-case emission at 19.5Mbps.*
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

Channel	Channel Frequency (MHz)	Peak Power				Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Total		
Low	5180	7.53	6.39	4.25	11.03	14.23	PASS
Middle	5200	7.40	6.67	4.17	11.06	14.23	PASS
High	5220	7.14	7.02	4.45	11.14	14.23	PASS

Remark:

1. *At finial test to get the worst-case emission at 40.5Mbps.*
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.*

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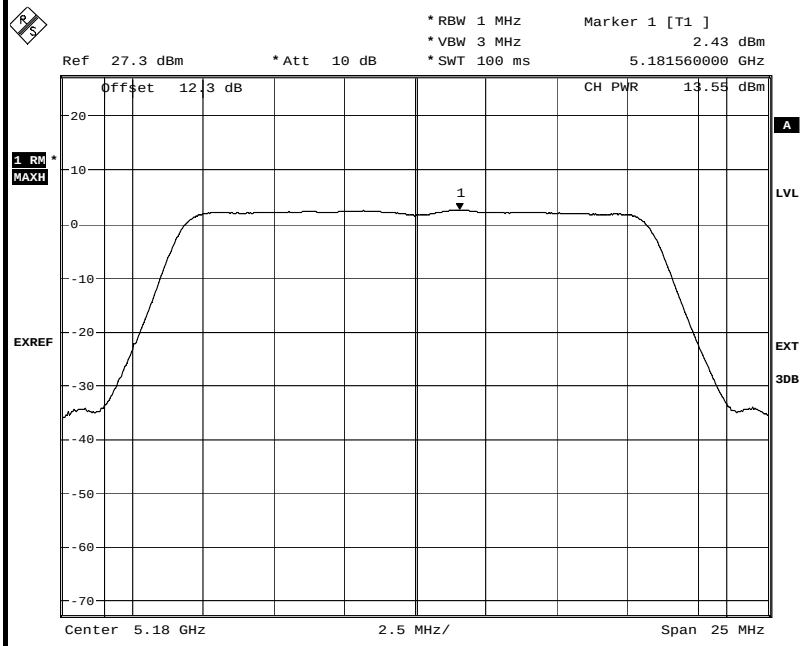
MAXIMUM CONDUCTED OUTPUT POWER

CH Low (IEEE 802.11a Mode)



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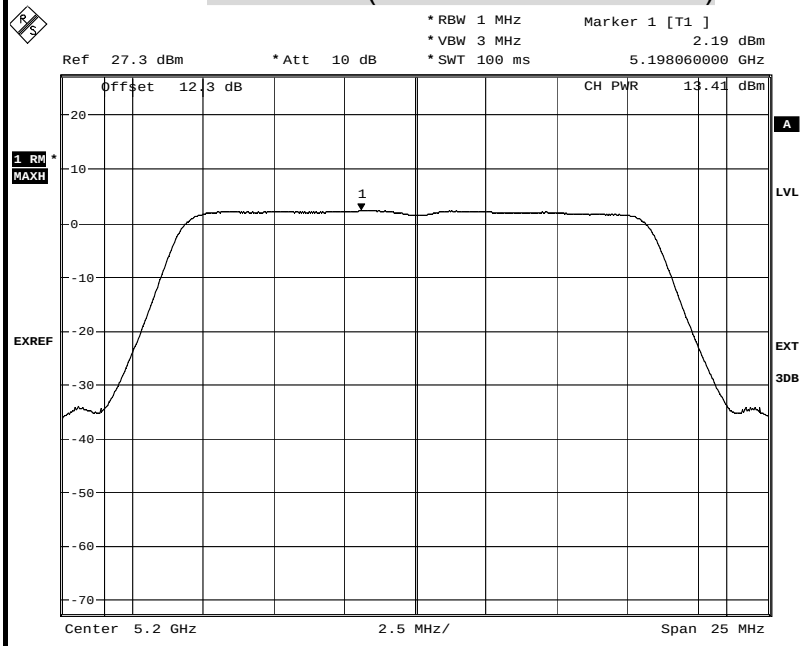

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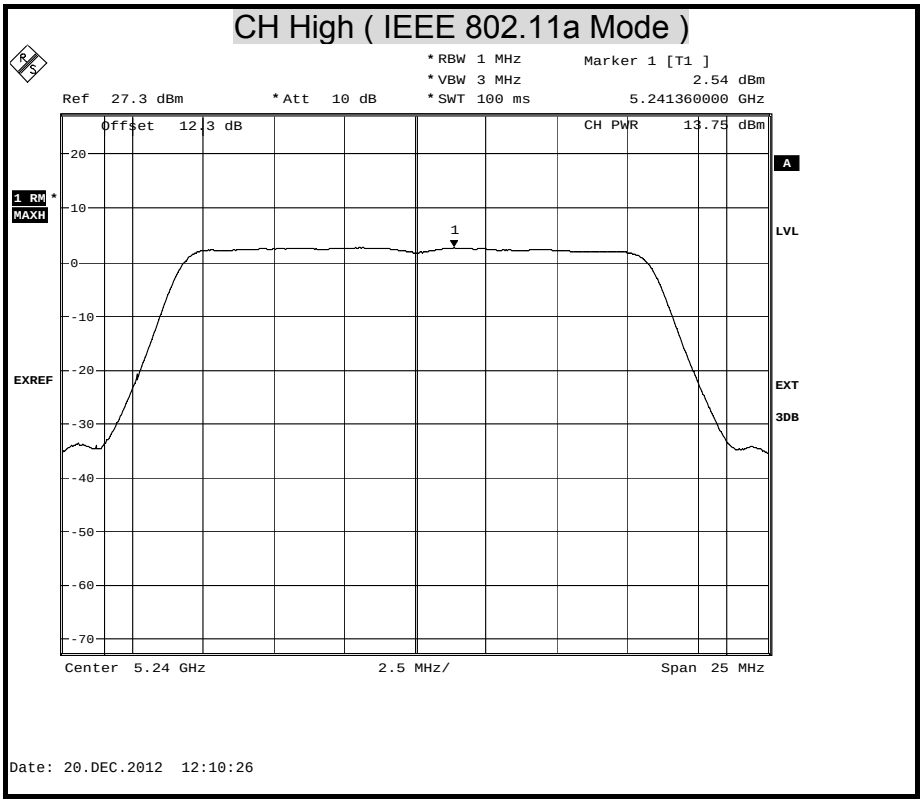
CH High (IEEE 802.11a Mode)



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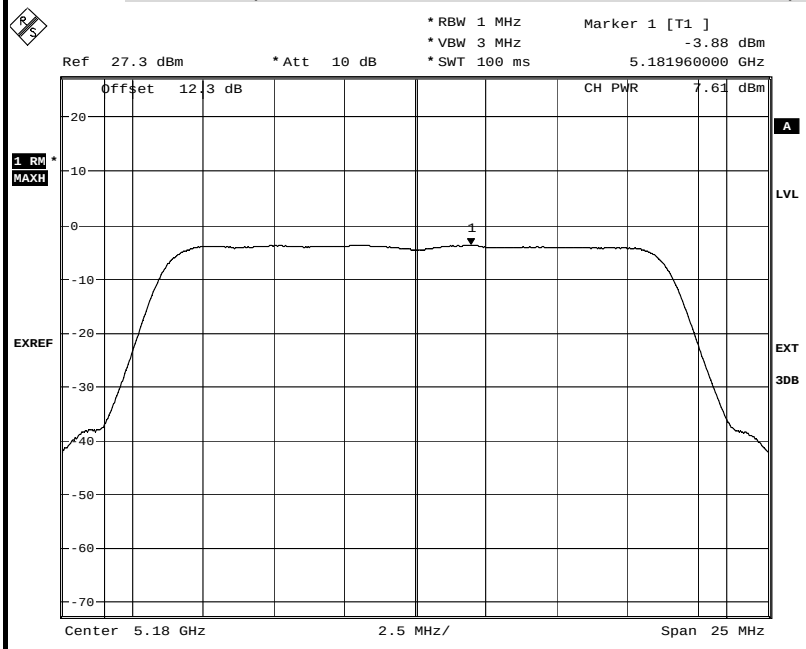
CH Low (IEEE 802.11n HT20 Mode / Chain 0)



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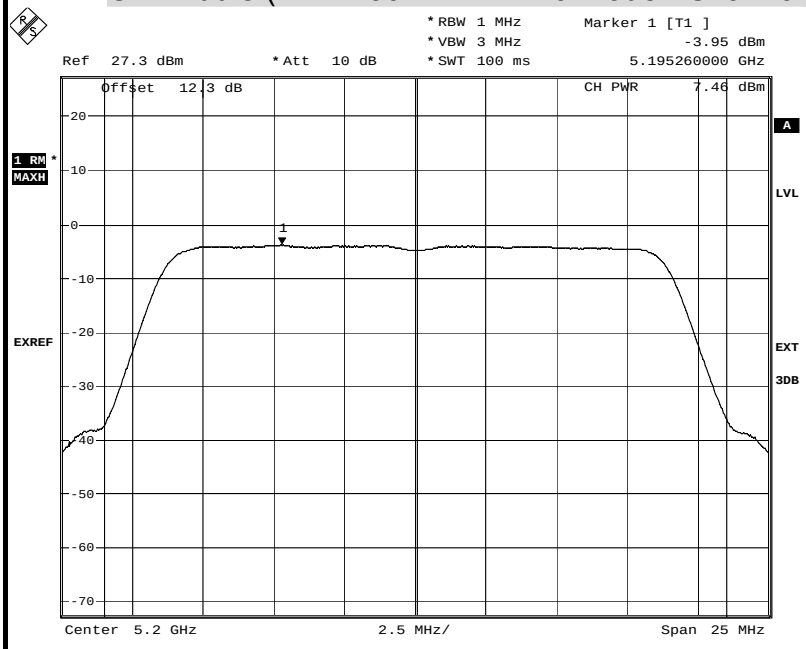

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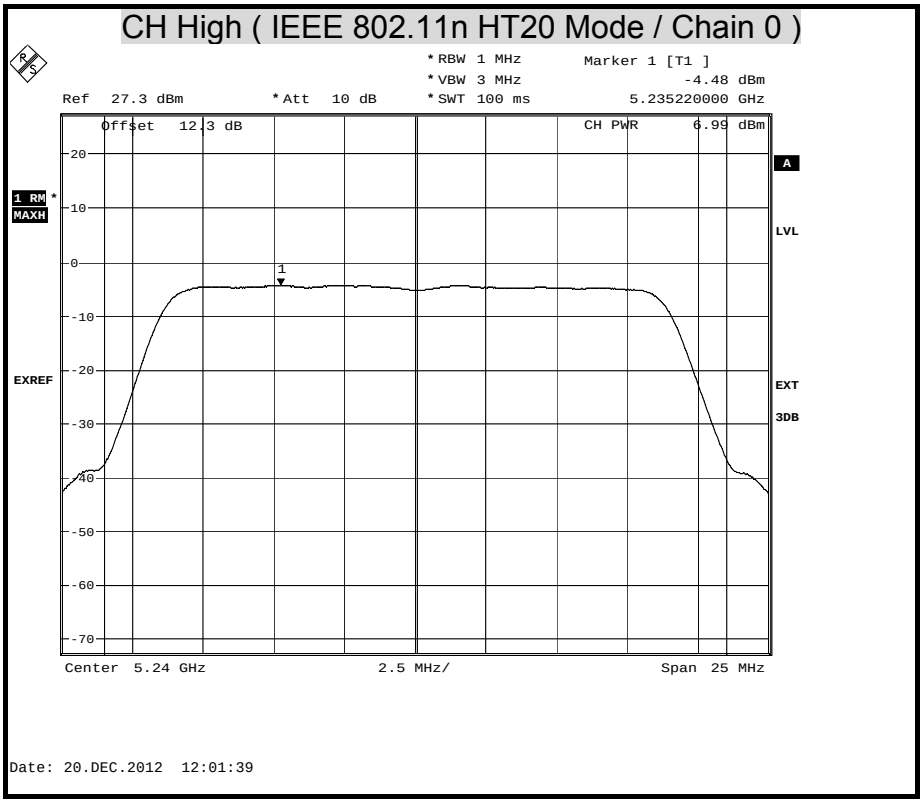

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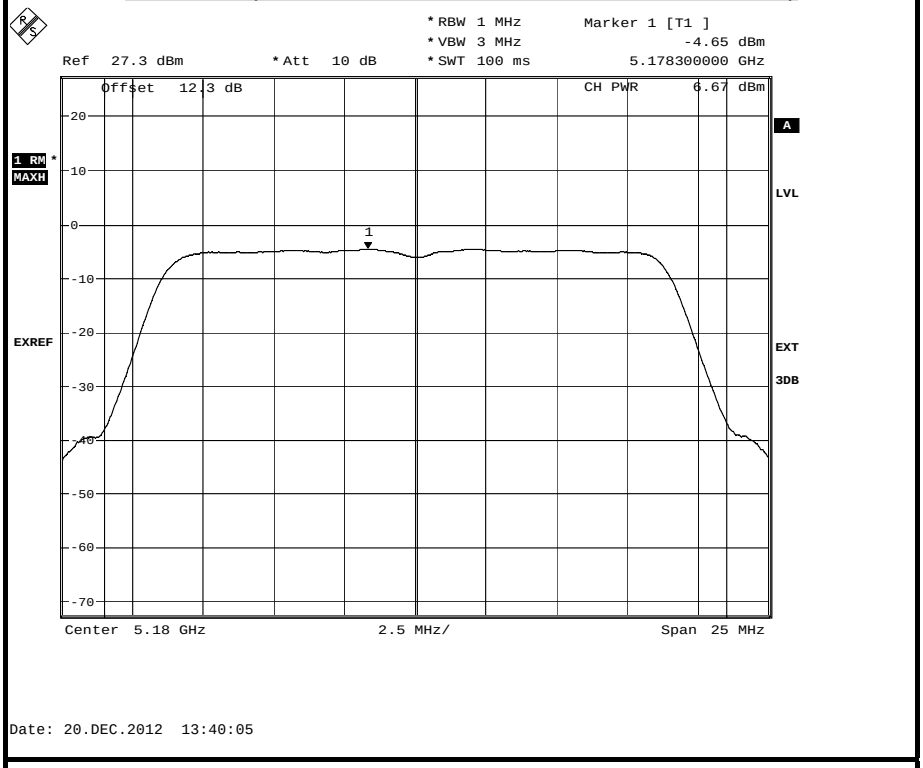
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



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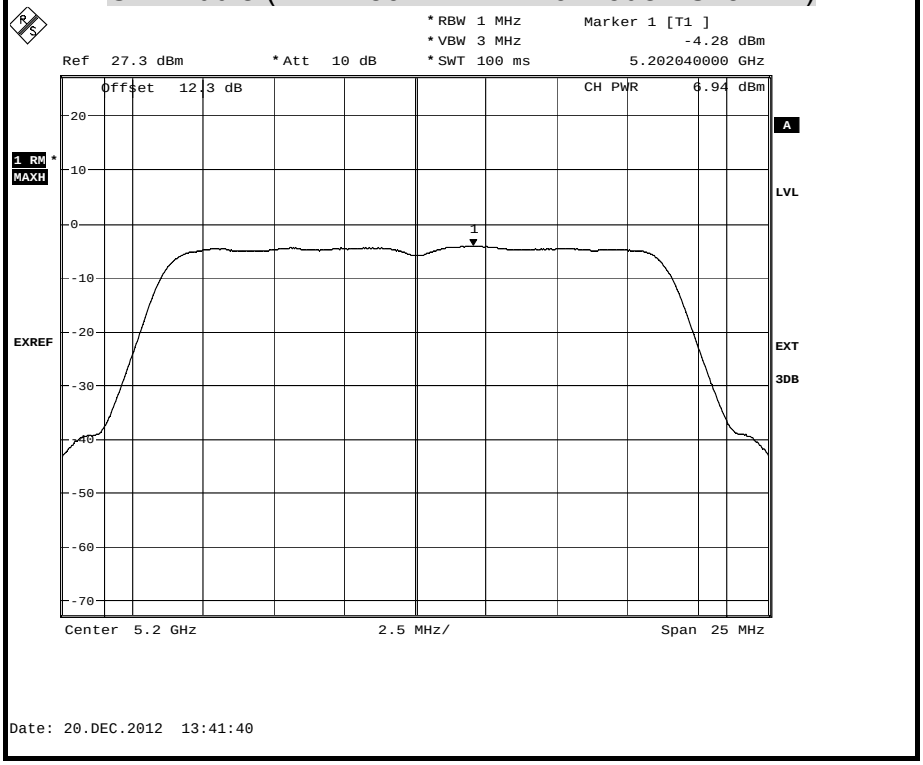

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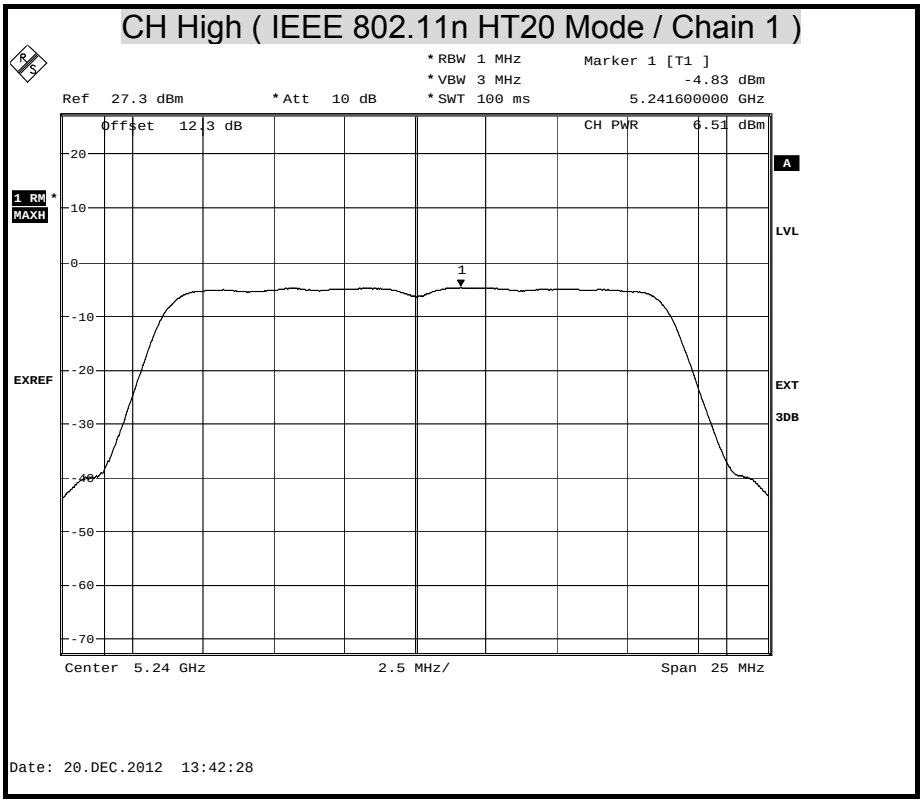
CH High (IEEE 802.11n HT20 Mode / Chain 1)



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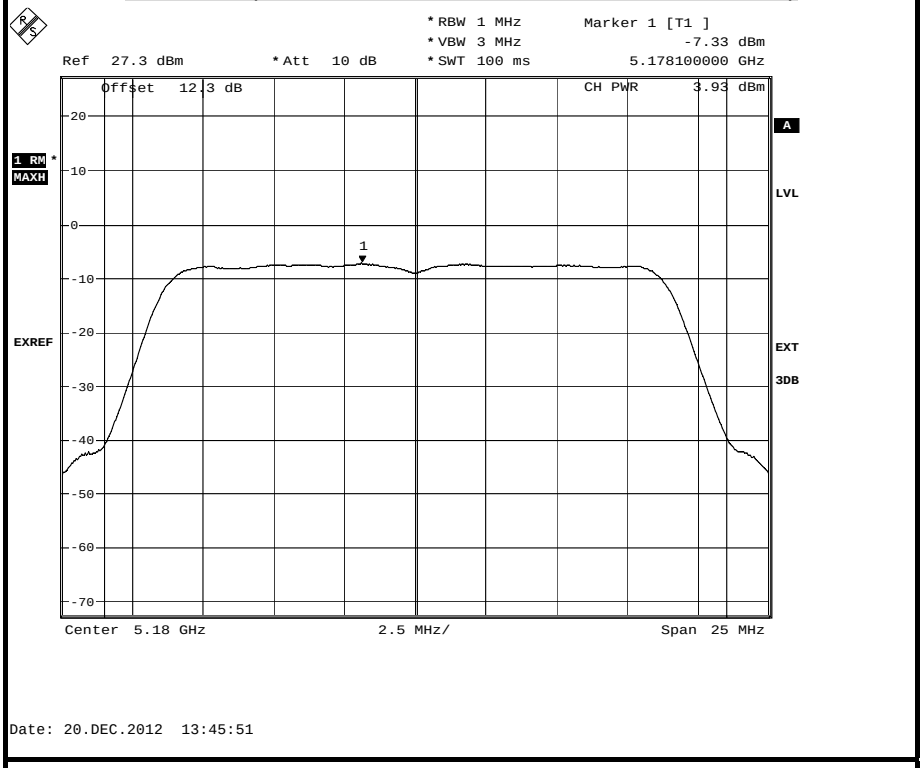

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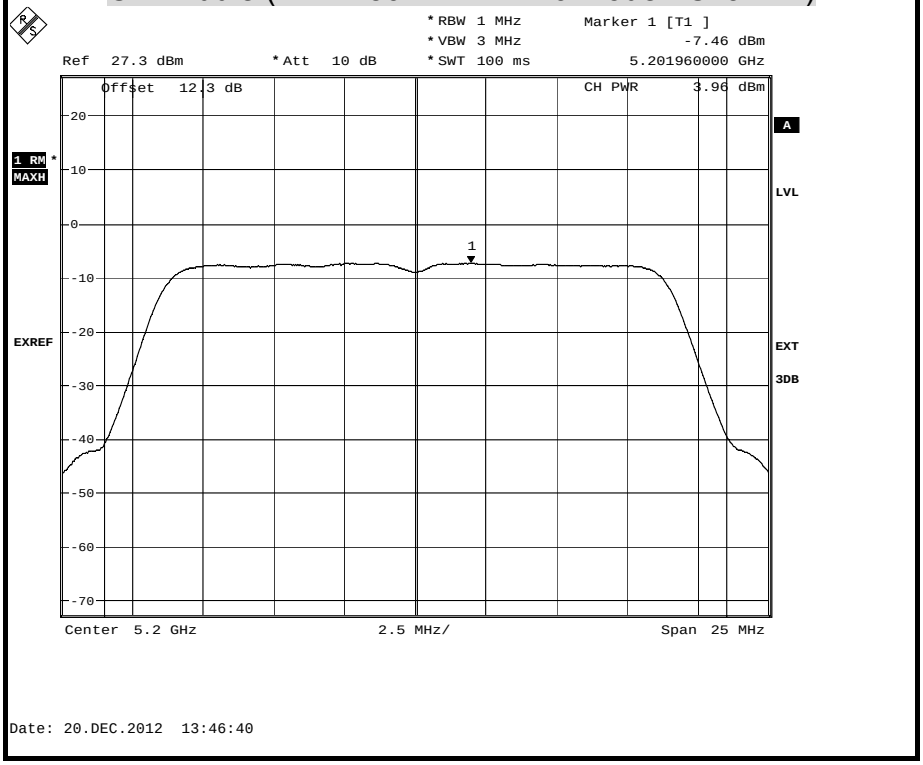

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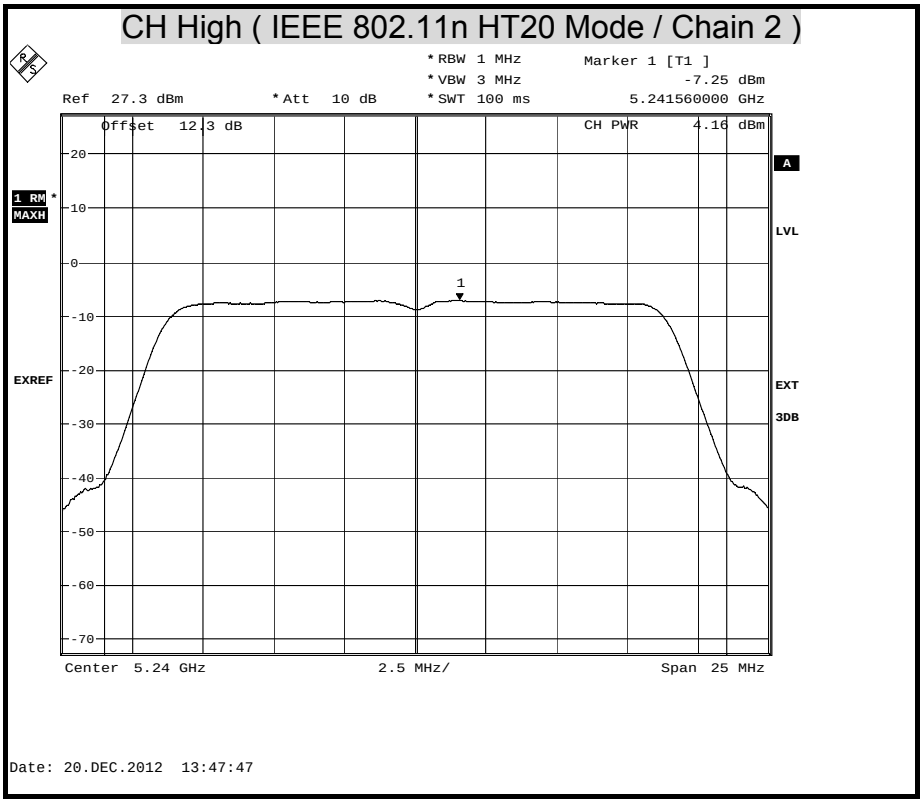

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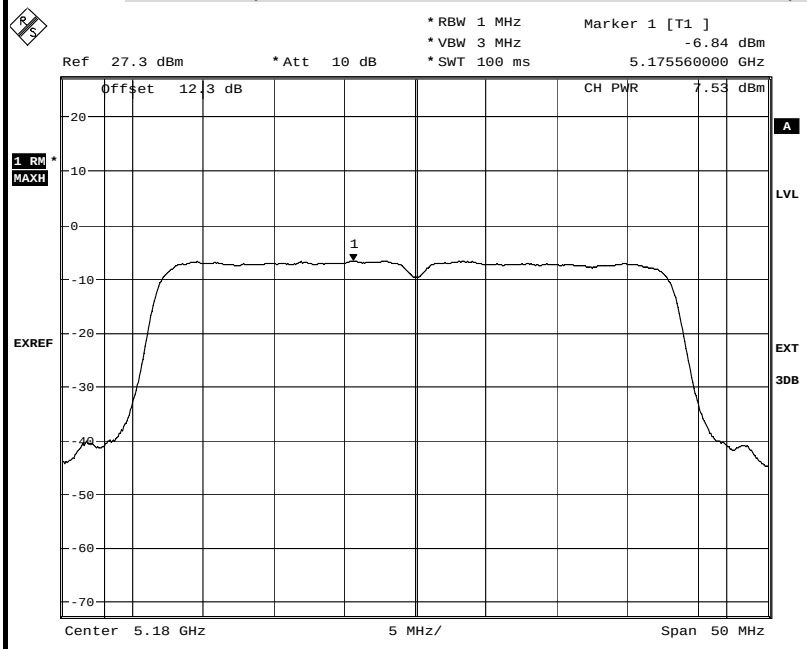

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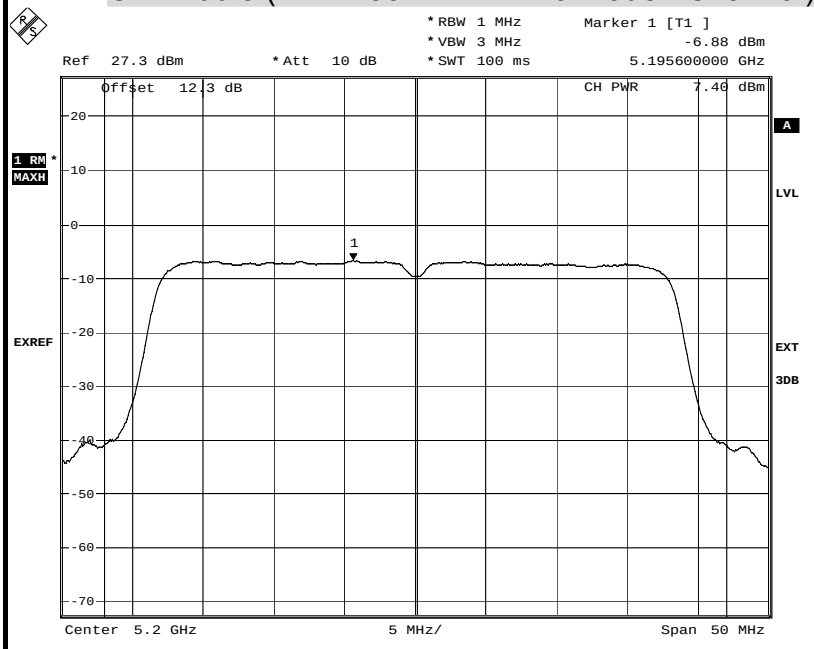

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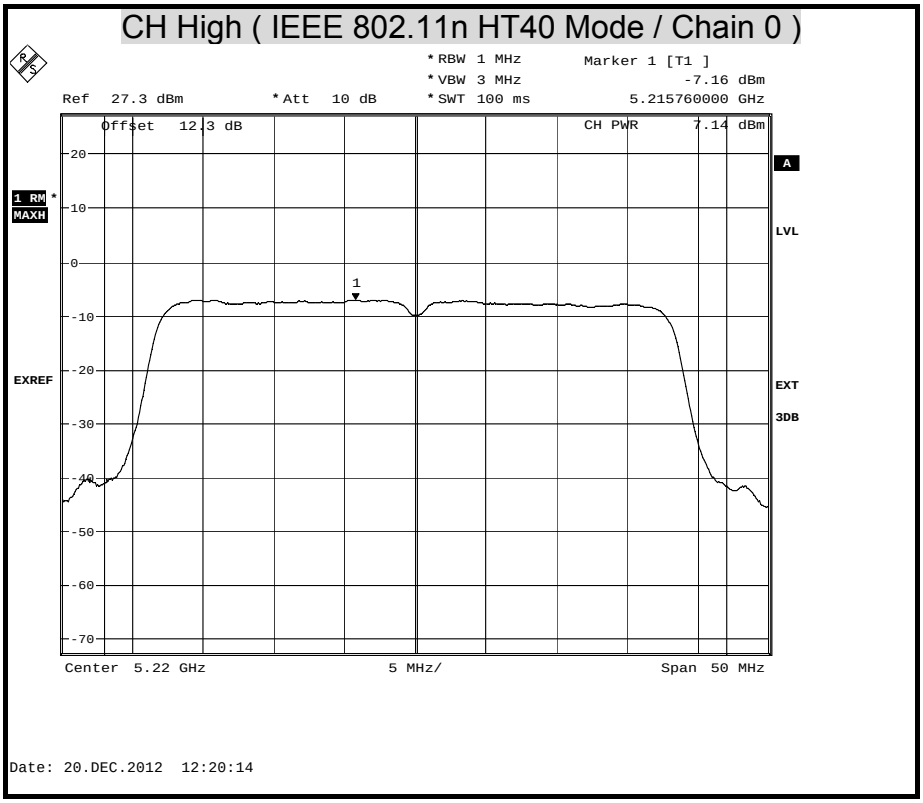

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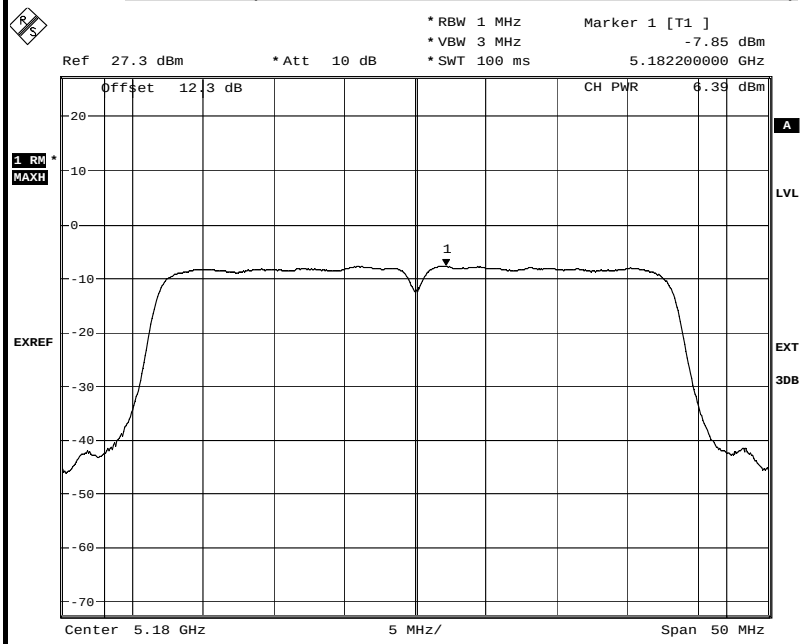

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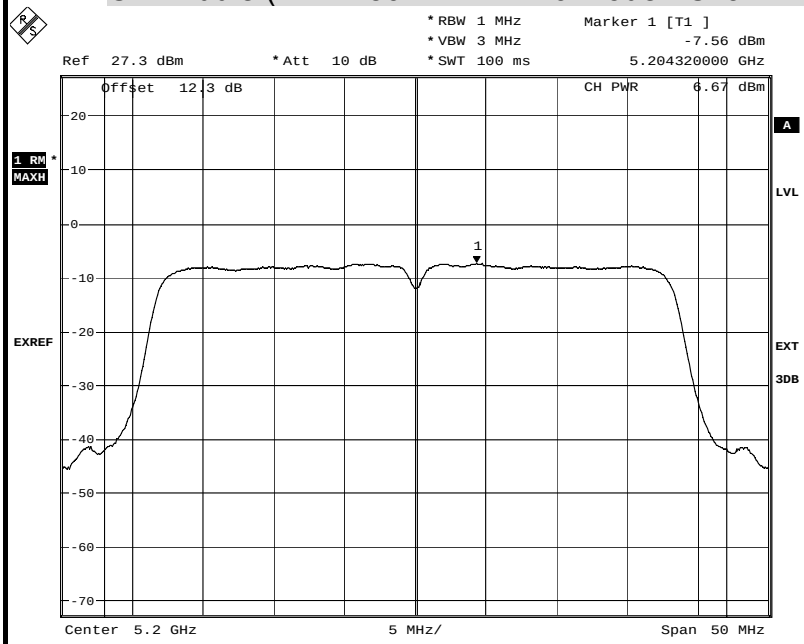

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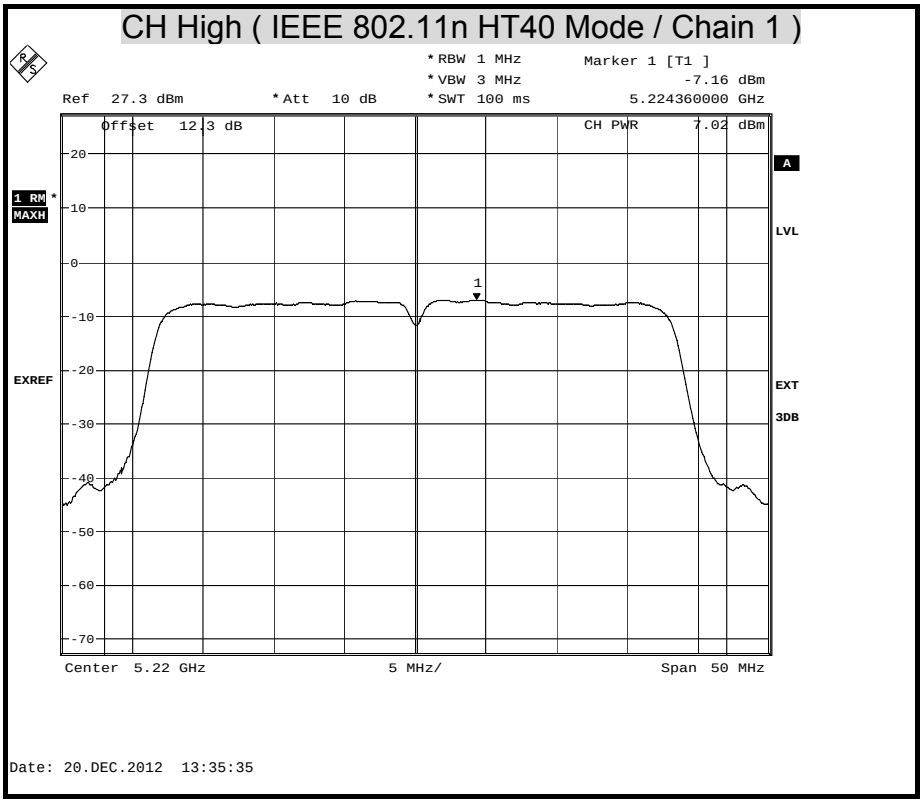
CH High (IEEE 802.11n HT40 Mode / Chain 1)



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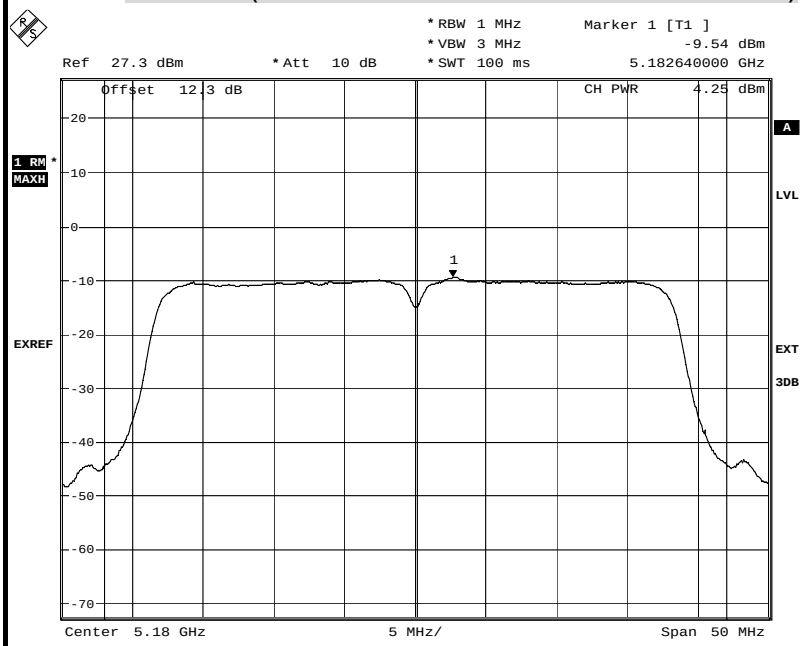
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



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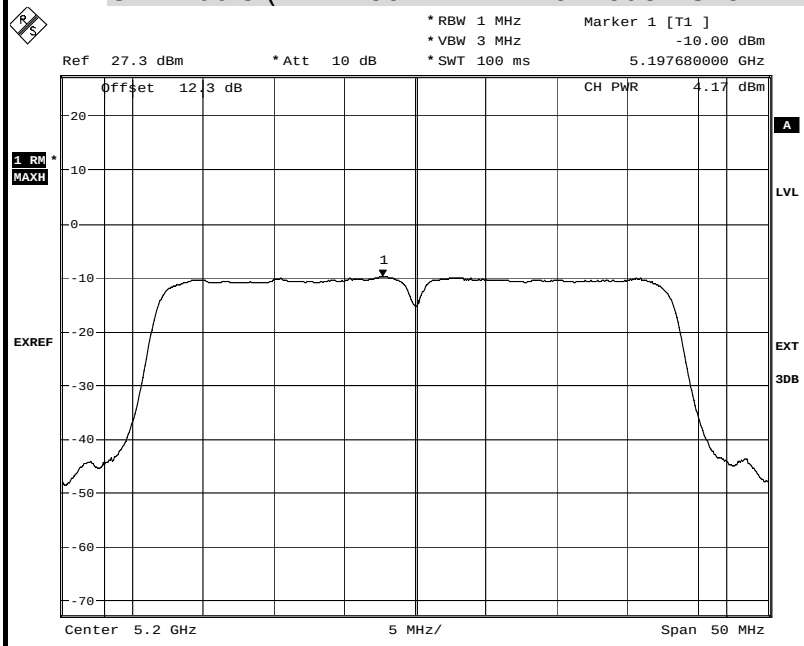

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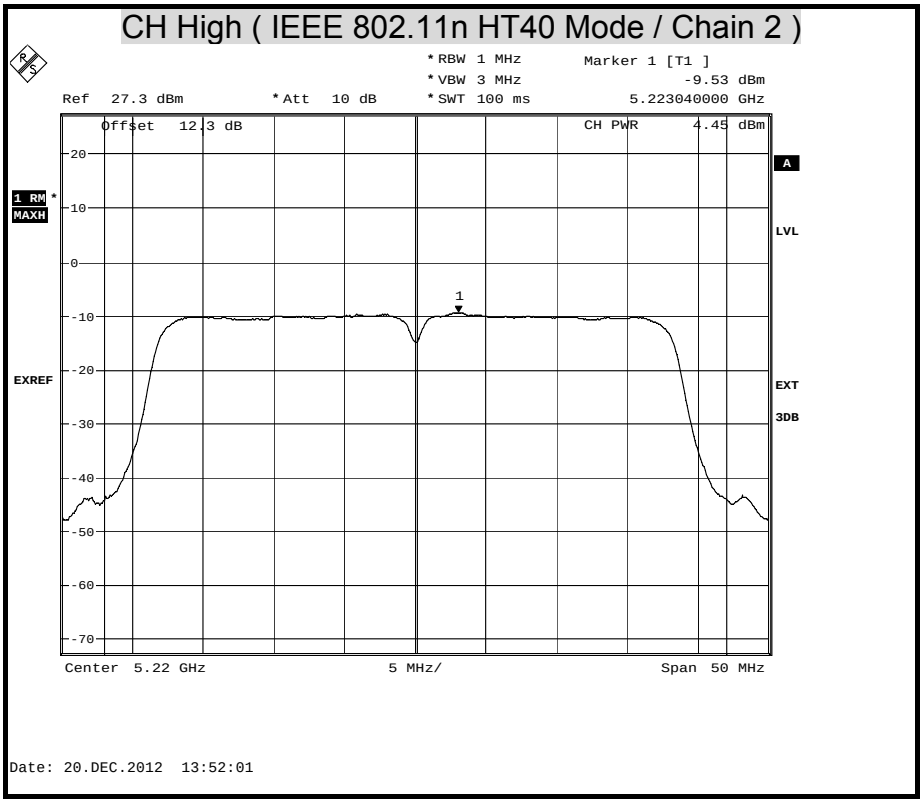
CH High (IEEE 802.11n HT40 Mode / Chain 2)



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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.

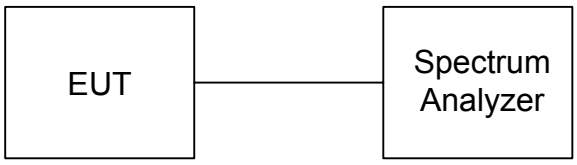
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013

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.

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TEST RESULTS

IEEE 802.11a Mode

Channel	Channel Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	2.43	4.00	-1.57	PASS
Middle	5200	2.19		-1.81	PASS
High	5240	2.54		-1.46	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

Channel	Channel Frequency (MHz)	PPSD (dBm)				Limit (dBm)	Margin (dB)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Tatol			
Low	5180	-3.88	-4.65	-7.33	-0.28	1.23	-1.51	PASS
Middle	5200	-3.95	-4.28	-7.46	-0.20		-1.43	PASS
High	5240	-4.48	-4.83	-7.25	-0.59		-1.82	PASS

Remark:

1. At finial test to get the worst-case emission at 19.5Mbps
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

Channel	Channel Frequency (MHz)	PPSD (dBm)				Limit (dBm)	Margin (dB)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Tatol			
Low	5180	-6.84	-7.85	-9.54	-3.17	1.23	-4.40	PASS
Middle	5200	-6.88	-7.56	-10.00	-3.18		-4.41	PASS
High	5220	-7.16	-7.16	-9.53	-3.04		-4.27	PASS

Remark:

1. At finial test to get the worst-case emission at 40.5Mbps
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.

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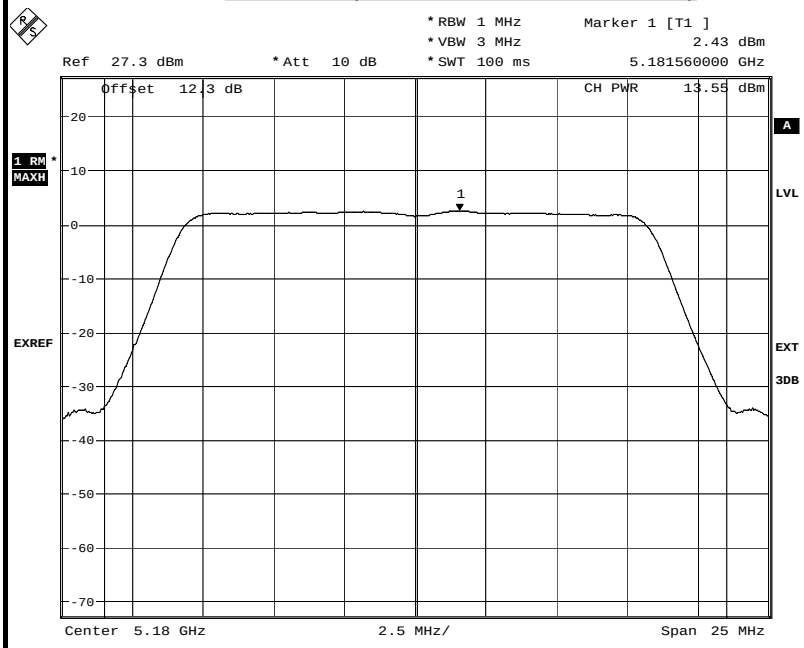
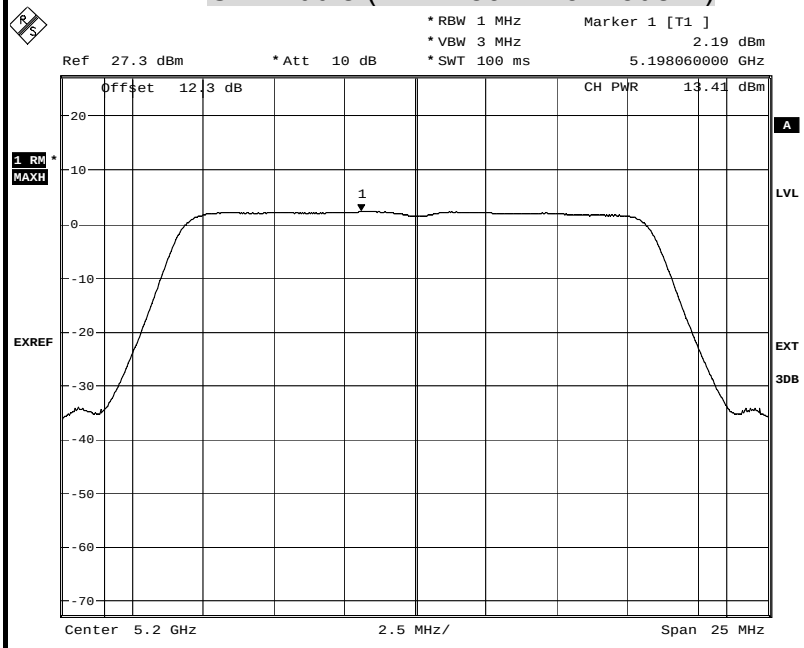
PEAK POWER SPECTRAL DENSITY

CH Low (IEEE 802.11a Mode)



CH Middle (IEEE 802.11a Mode)



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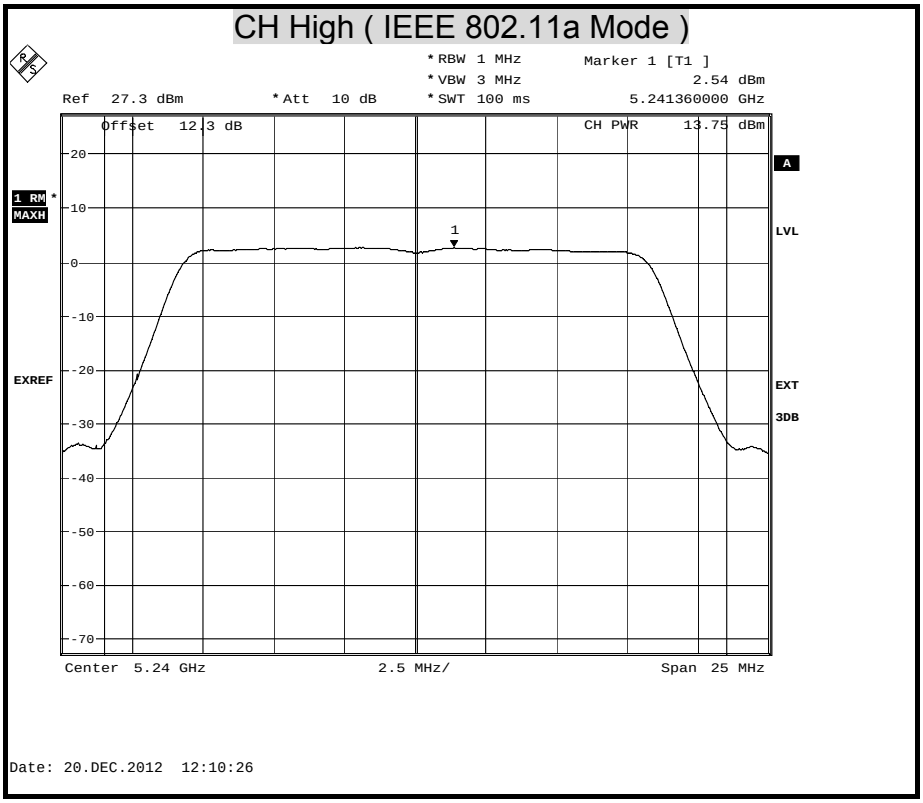
CH High (IEEE 802.11a Mode)



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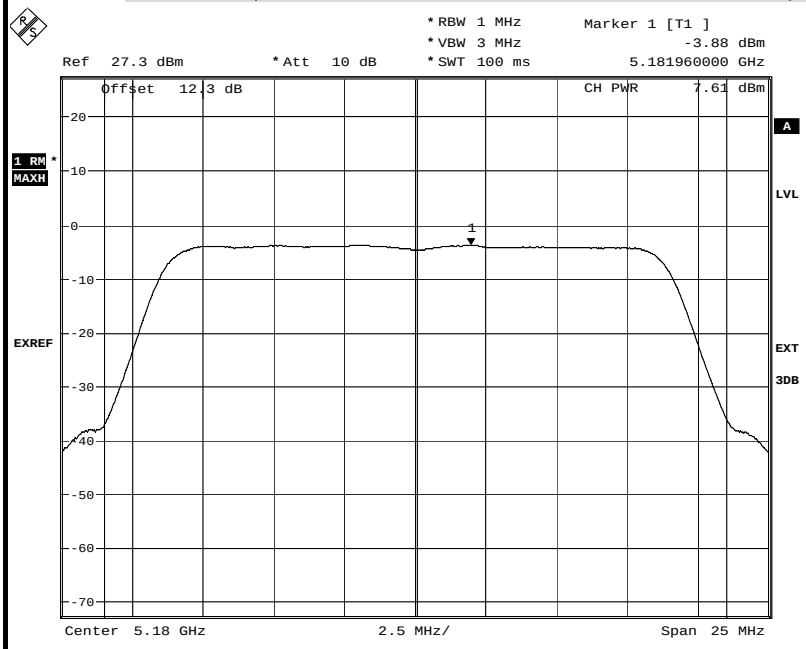
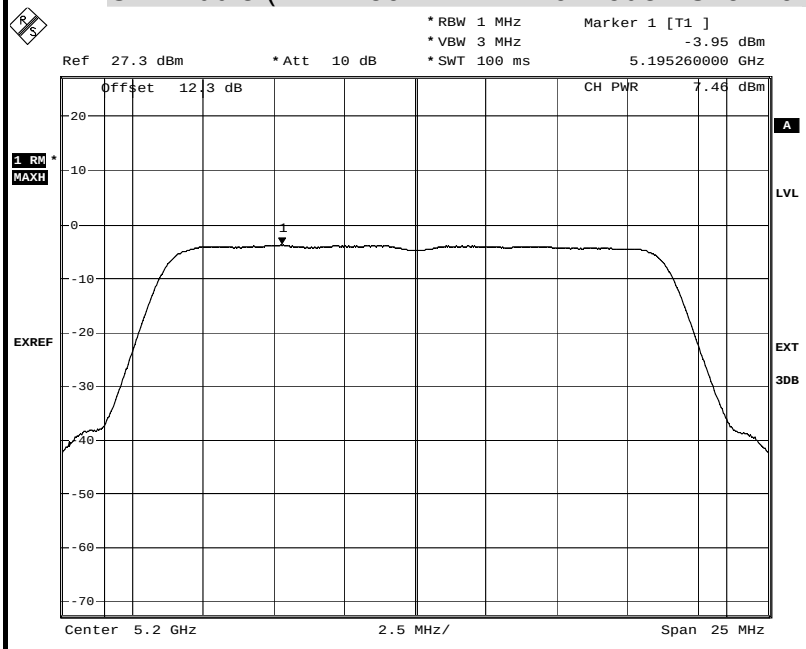
CH Low (IEEE 802.11n HT20 Mode / Chain 0)



Date: 20.DEC.2012 11:55:57

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



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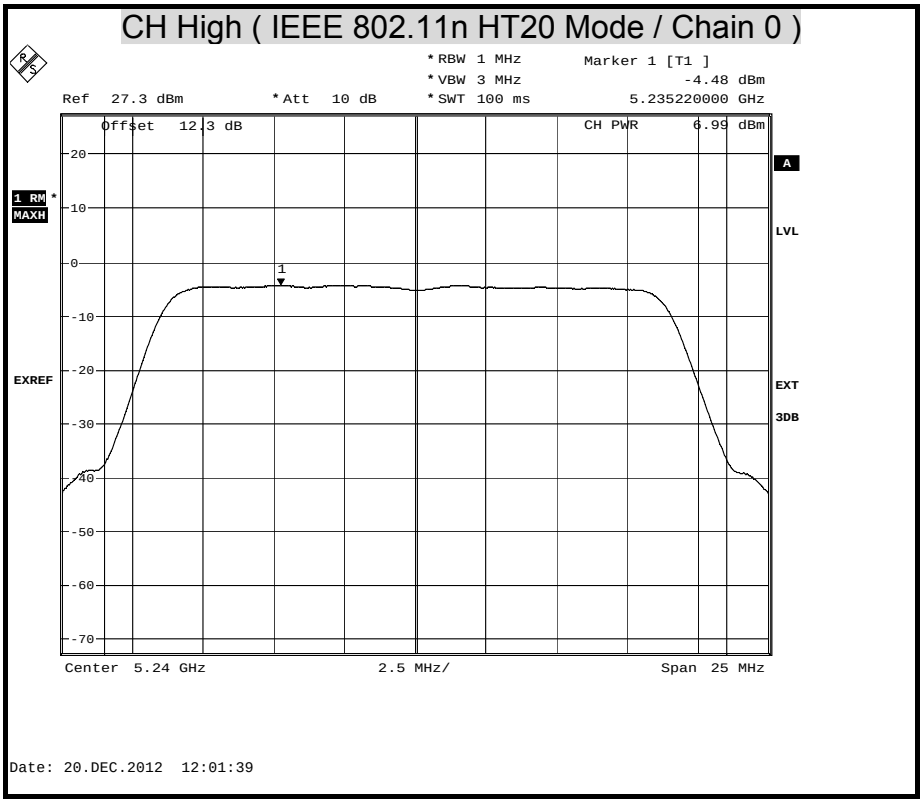
CH High (IEEE 802.11n HT20 Mode / Chain 0)



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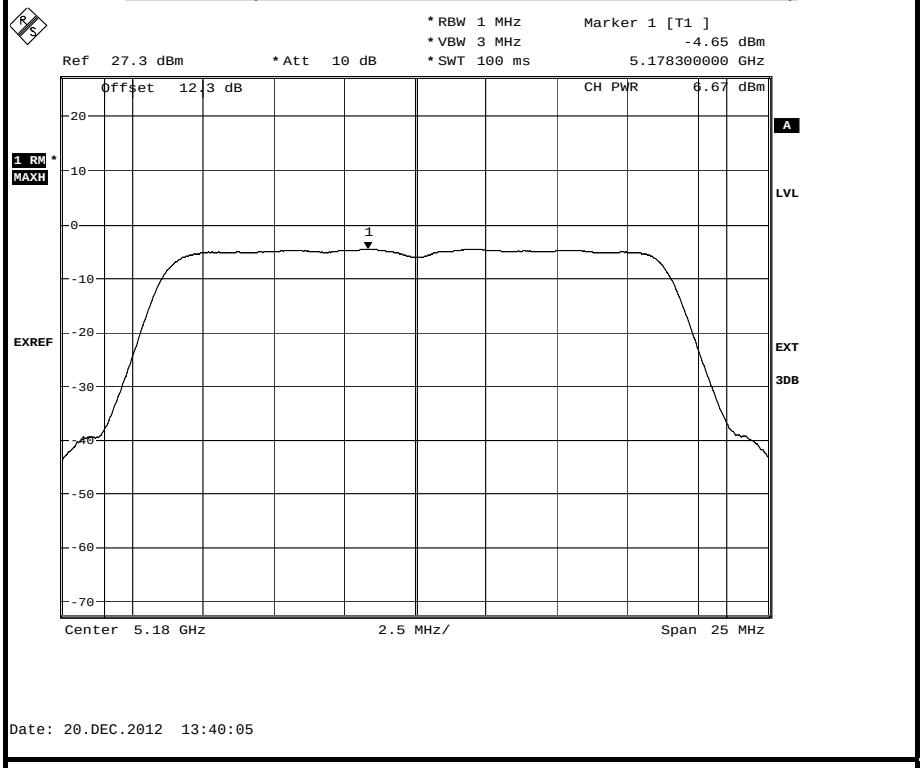
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



Date: 20.DEC.2012 13:40:05

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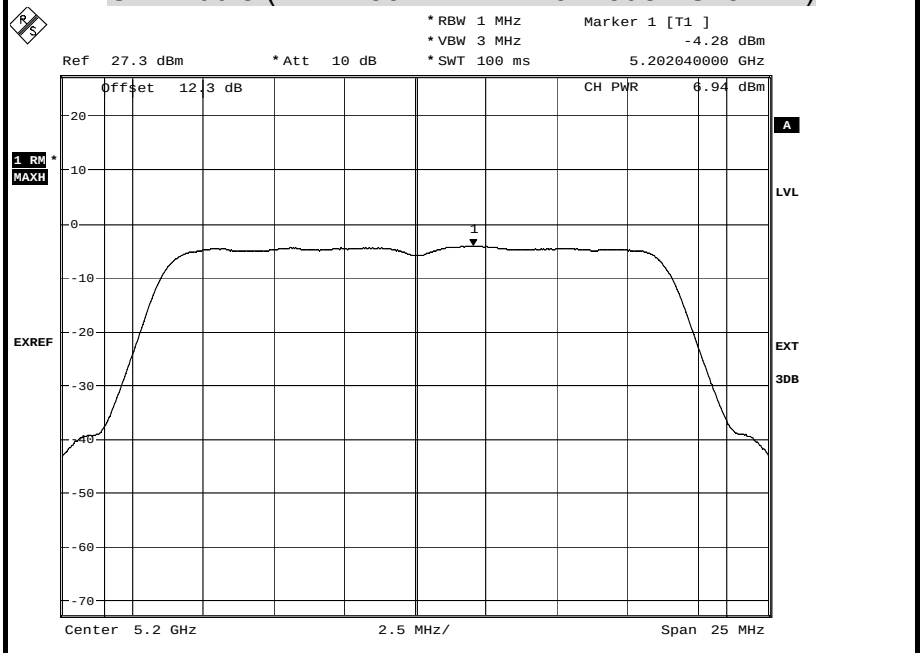

Date: 20.DEC.2012 13:41:40

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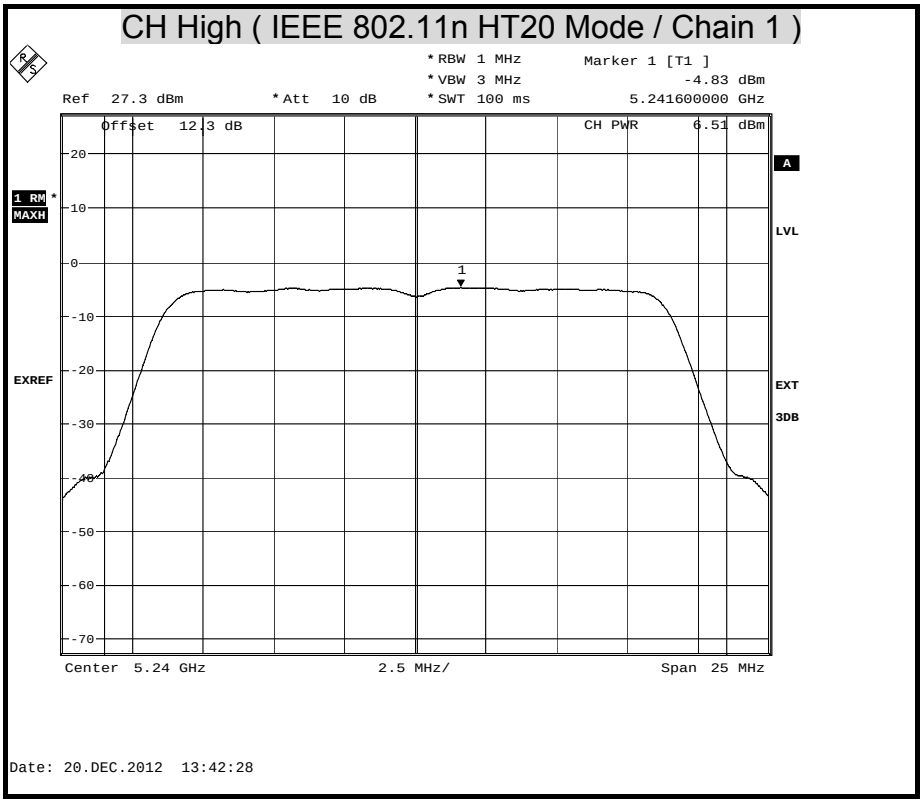
CH High (IEEE 802.11n HT20 Mode / Chain 1)



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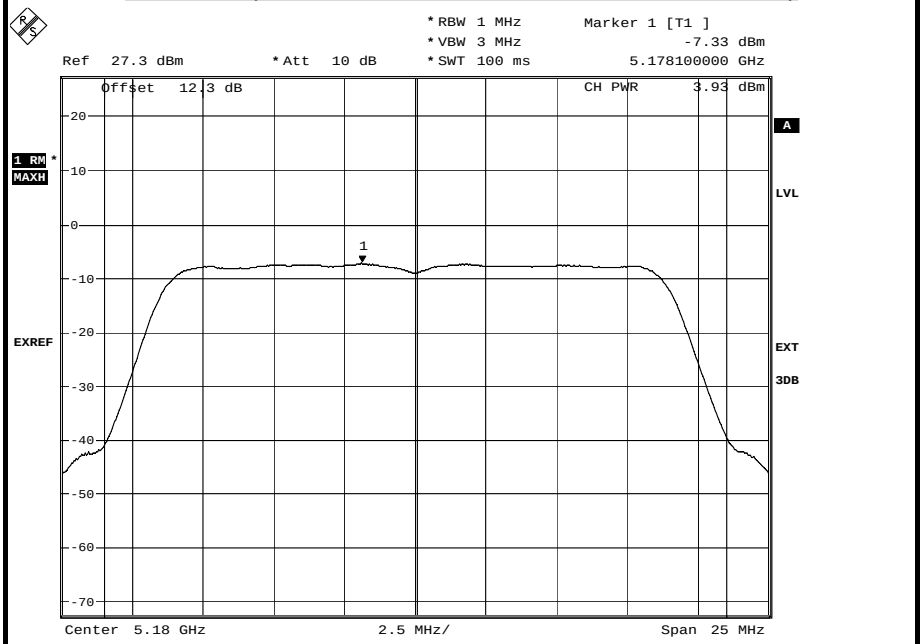
CH Low (IEEE 802.11n HT20 Mode / Chain 2)



Date: 20.DEC.2012 13:45:51

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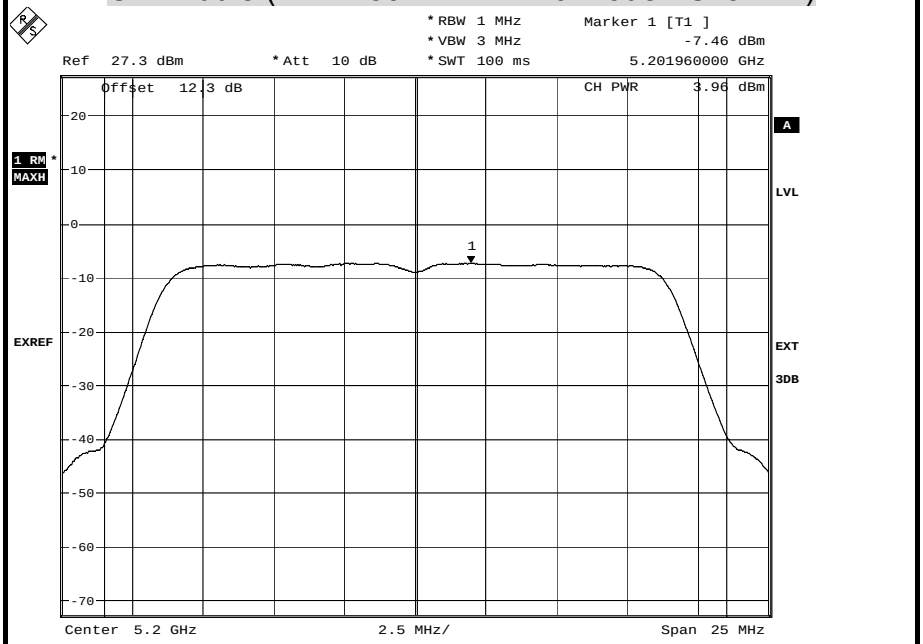

Date: 20.DEC.2012 13:46:40

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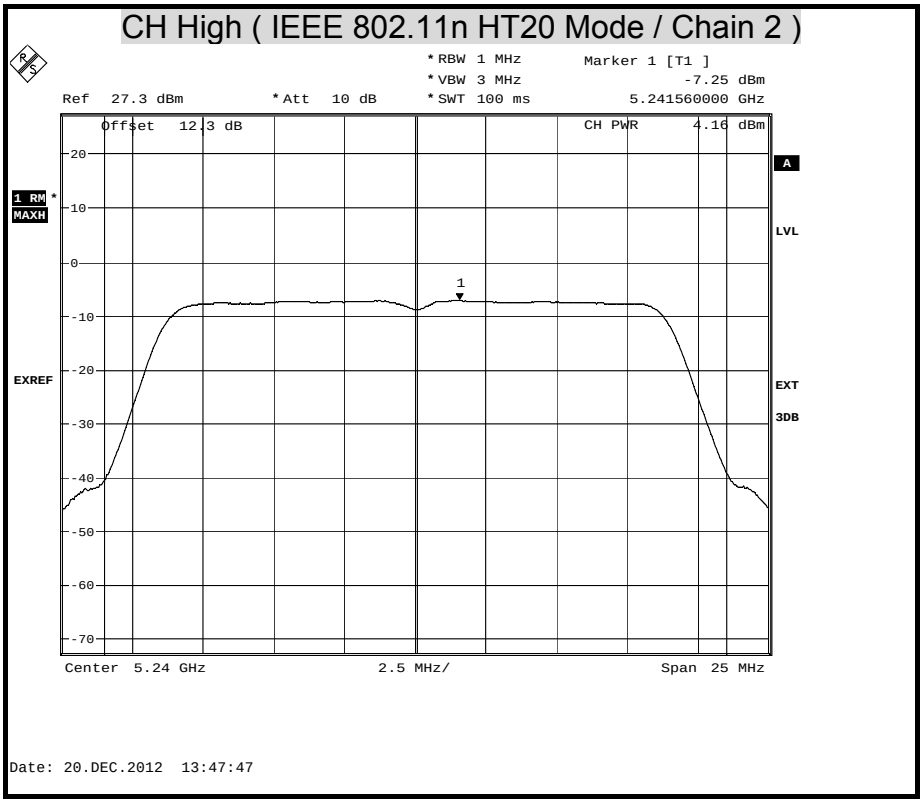

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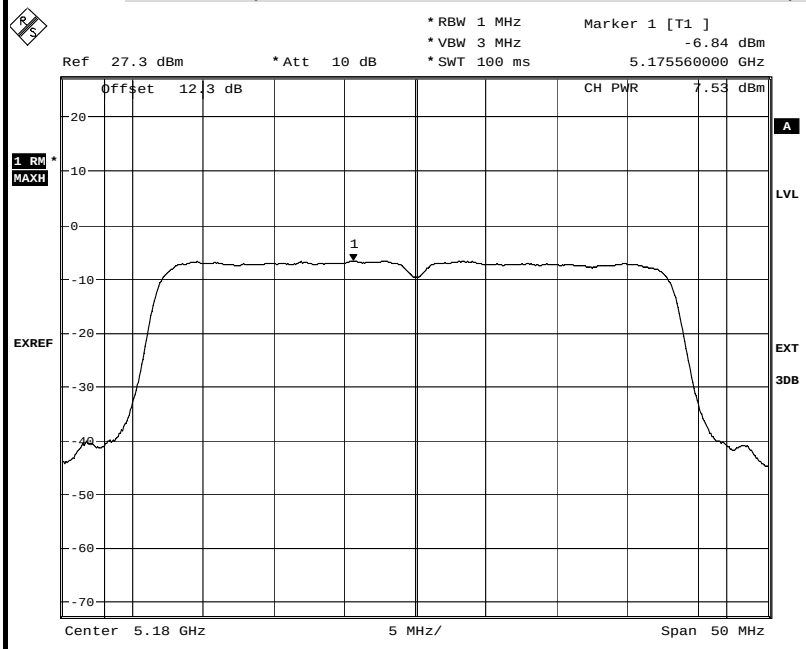
CH Low (IEEE 802.11n HT40 Mode / Chain 0)



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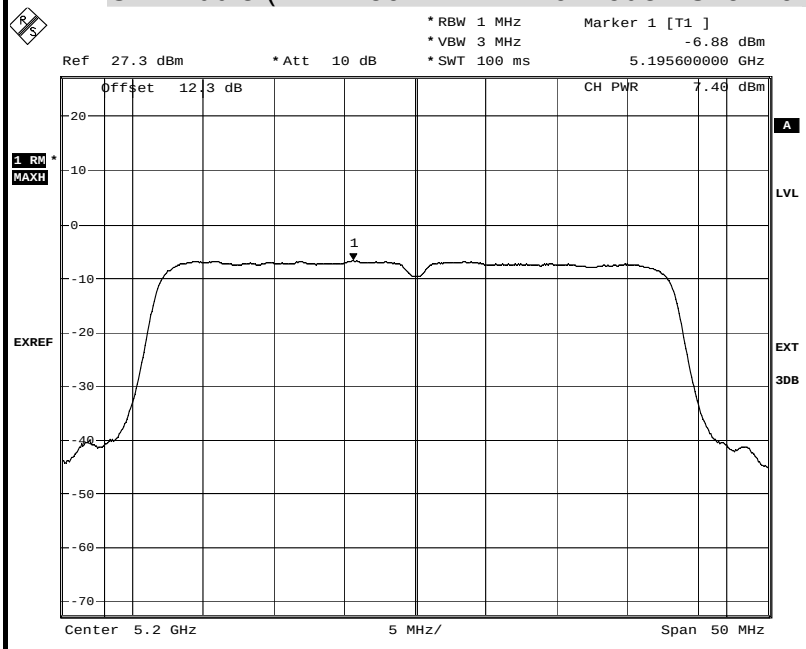

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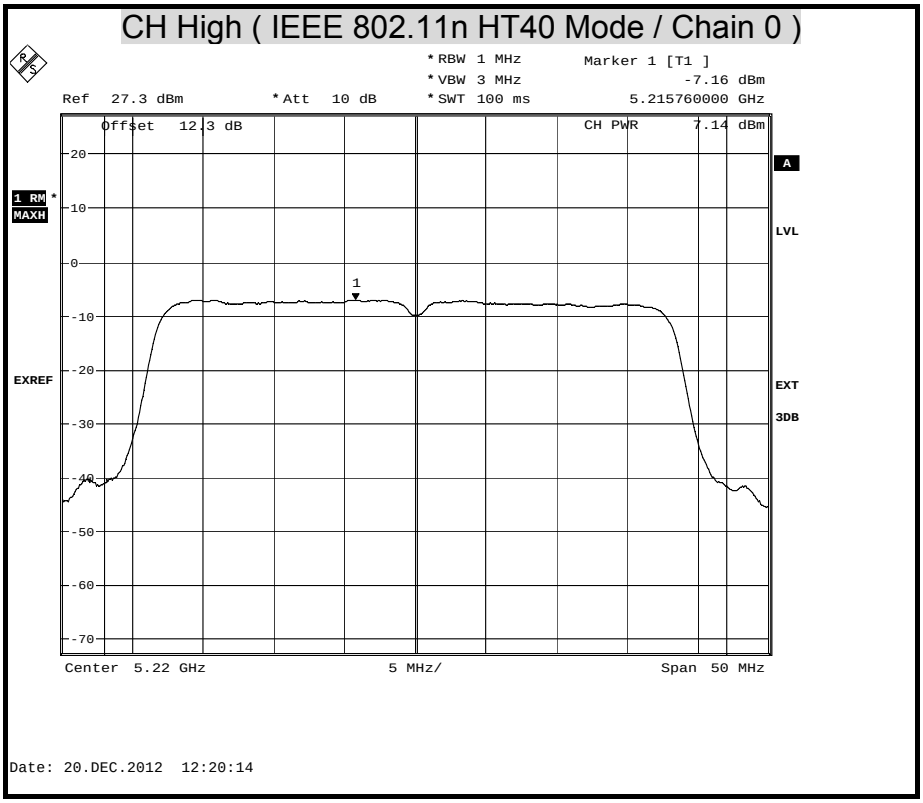

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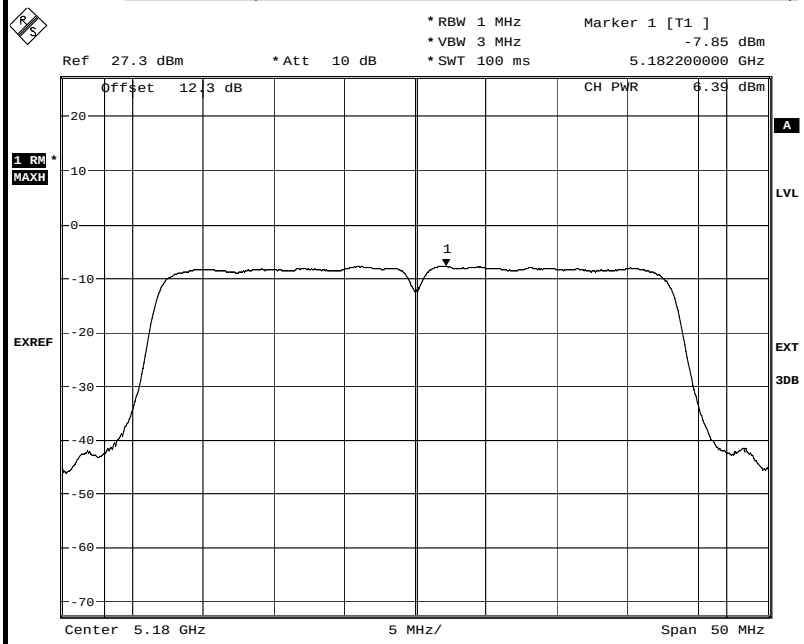
CH Low (IEEE 802.11n HT40 Mode / Chain 1)



Date: 20.DEC.2012 13:43:50

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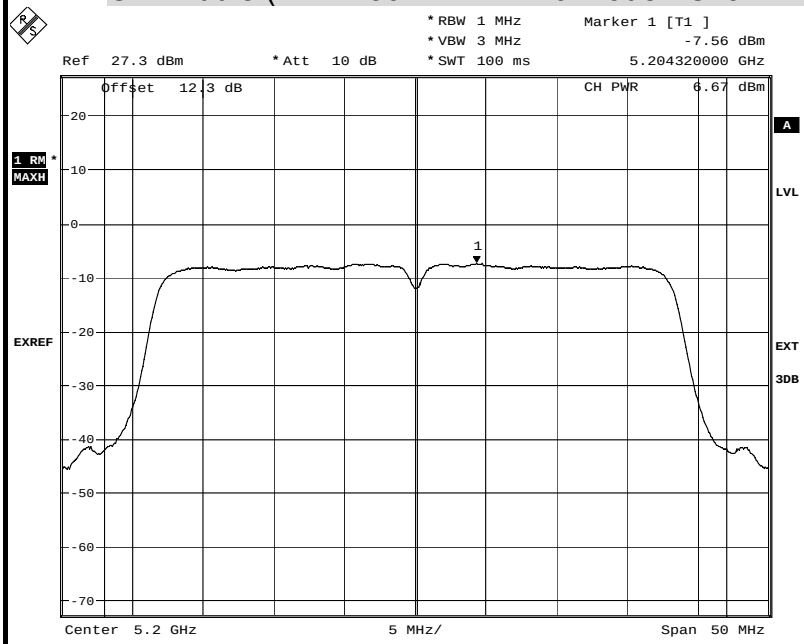

Date: 20.DEC.2012 13:34:33

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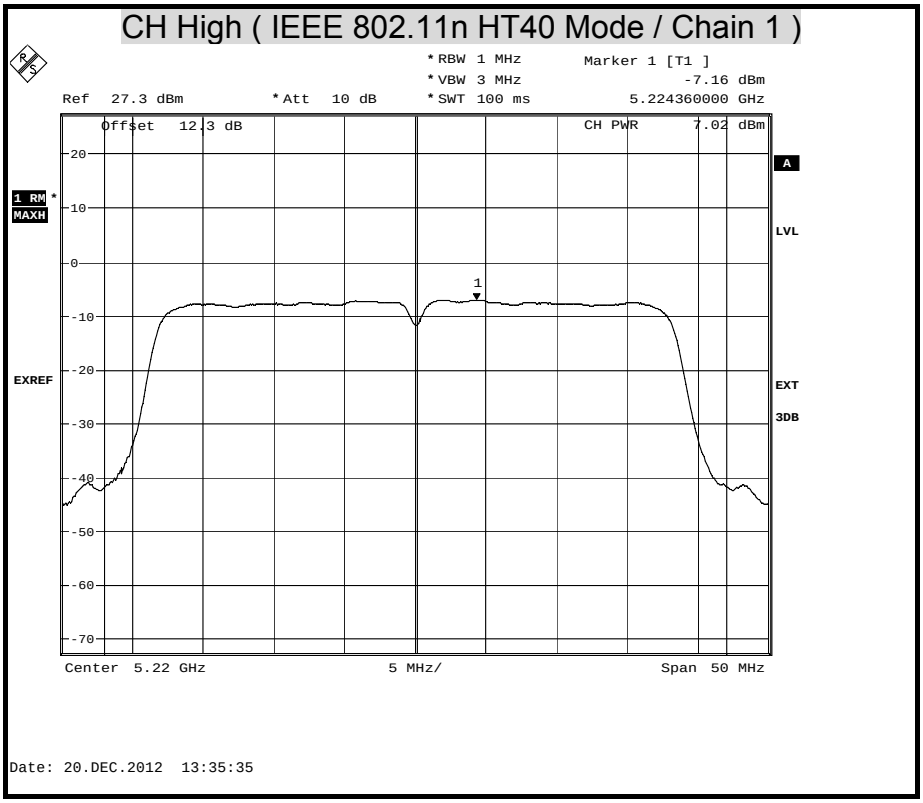

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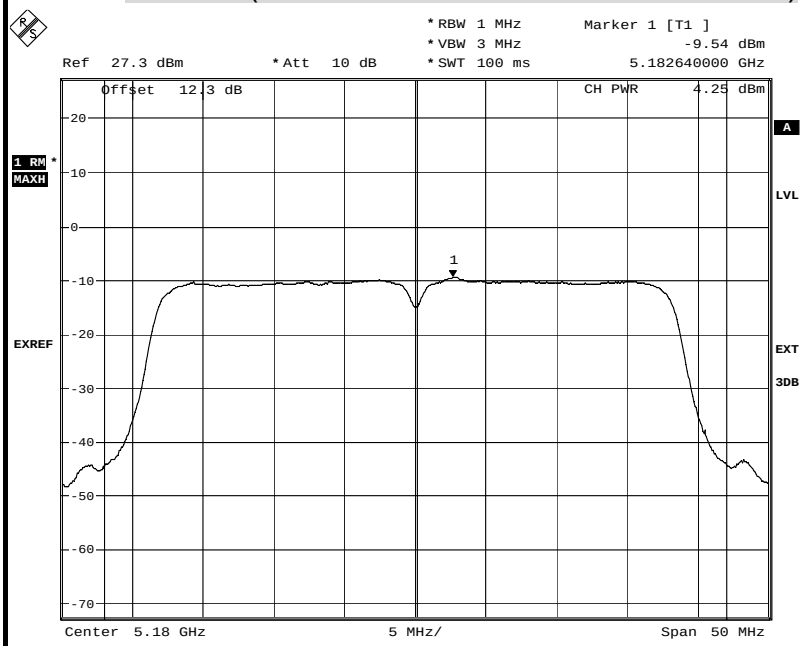
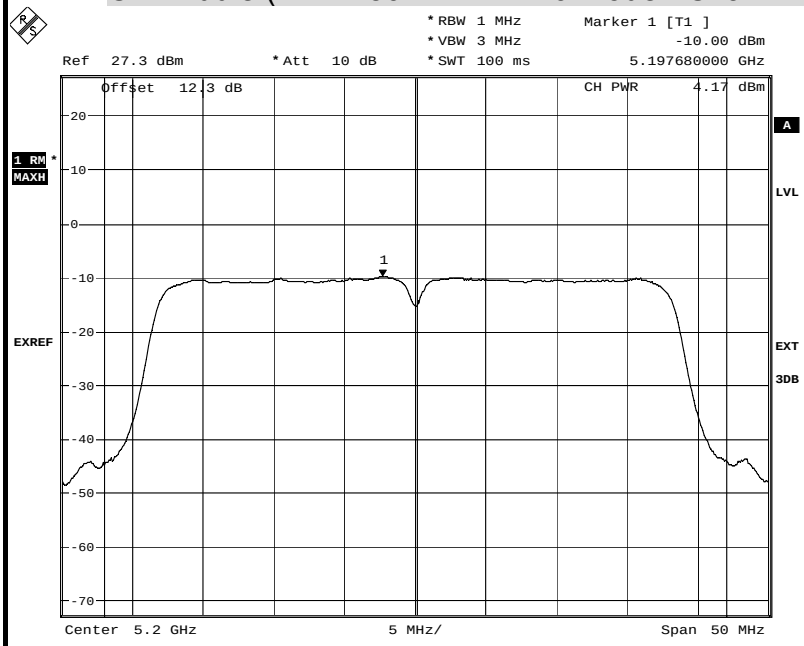


Date: 20.DEC.2012 13:49:12

CH Middle (IEEE 802.11n HT40 Mode / Chain 2)



Date: 20.DEC.2012 13:50:19

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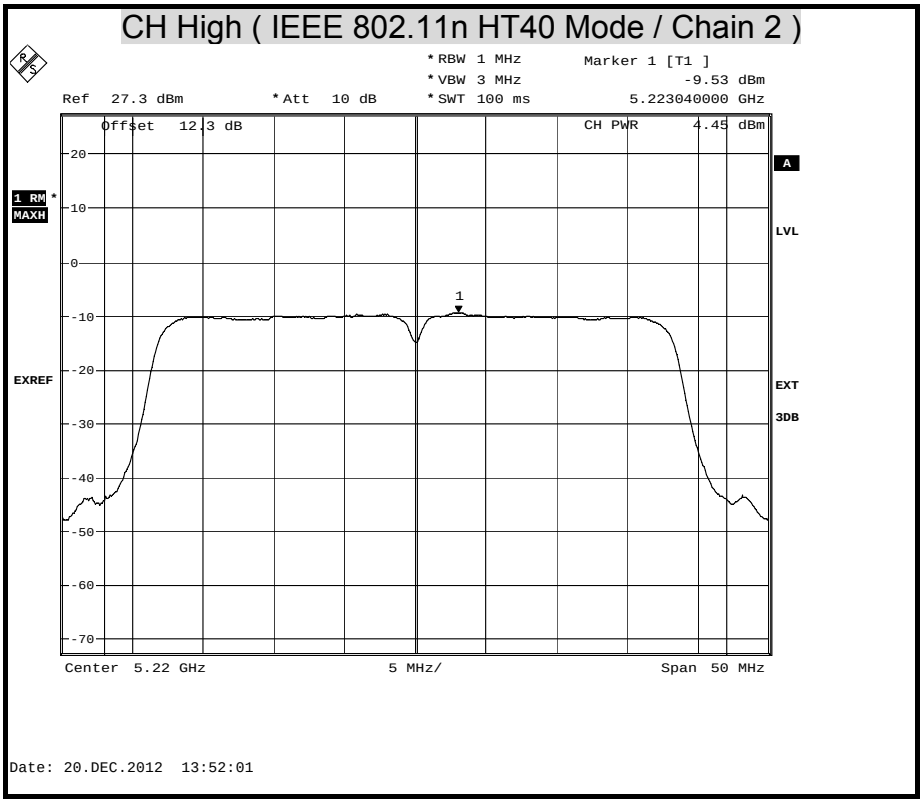
CH High (IEEE 802.11n HT40 Mode / Chain 2)



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7.4 PEAK EXCURSION

LIMITS

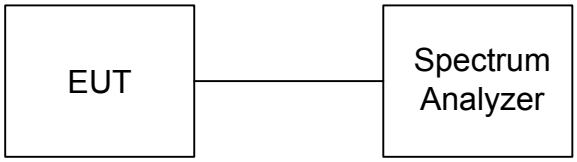
§ 15.407 (a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2013

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 = 3MHz, Span > 26dB Bandwidth, Setup RMS detector and power average mode, to scan 100 times with average.
4. Delta Mark trace A Maximum frequency and trace B same frequency.
5. Repeat the above procedure until measurements for all frequencies were complete.

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TEST RESULTS

IEEE 802.11a Mode

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	8.28	13.00	-4.72	PASS
Middle	5200	8.25		-4.75	PASS
High	5240	8.21		-4.79	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.

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IEEE 802.11n HT20 Mode / Chain 0

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	8.40	13.00	-4.60	PASS
Middle	5200	8.36		-4.64	PASS
High	5240	8.53		-4.47	PASS

Remark:

1. At finial test to get the worst-case emission at 19.5Mbps.
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 / Chain 1

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.26	13.00	-3.74	PASS
Middle	5200	9.40		-3.60	PASS
High	5240	9.15		-3.85	PASS

Remark:

1. At finial test to get the worst-case emission at 19.5Mbps.
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 / Chain 2

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.07	13.00	-3.93	PASS
Middle	5200	9.59		-3.41	PASS
High	5240	9.32		-3.68	PASS

Remark:

1. At finial test to get the worst-case emission at 19.5Mbps.
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.

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IEEE 802.11n HT40 Mode / Chain 0

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	8.45	13.00	-4.55	PASS
Middle	5200	8.40		-4.60	PASS
High	5220	8.49		-4.51	PASS

Remark:

1. At finial test to get the worst-case emission at 40.5Mbps.

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 / Chain 1

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.08	13.00	-3.92	PASS
Middle	5200	9.19		-3.81	PASS
High	5220	9.13		-3.87	PASS

Remark:

1. At finial test to get the worst-case emission at 40.5Mbps.

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 / Chain 2

Channel	Channel Frequency (MHz)	Peak Excursion (dB)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	5180	9.35	13.00	-3.65	PASS
Middle	5200	8.55		-4.45	PASS
High	5220	9.38		-3.62	PASS

Remark:

1. At finial test to get the worst-case emission at 40.5Mbps.

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.

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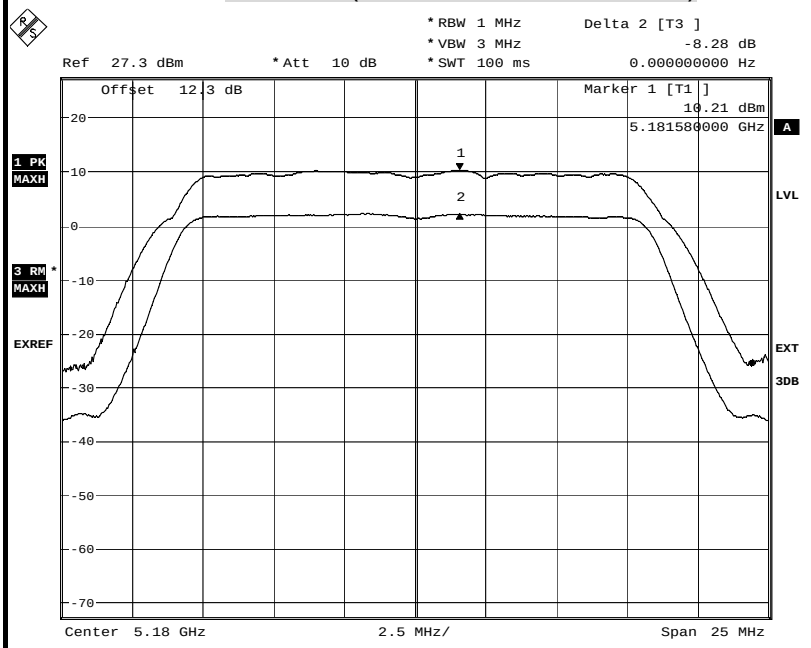
PEAK EXCURSION

CH Low (IEEE 802.11a Mode)



Date: 20.DEC.2012 22:49:27

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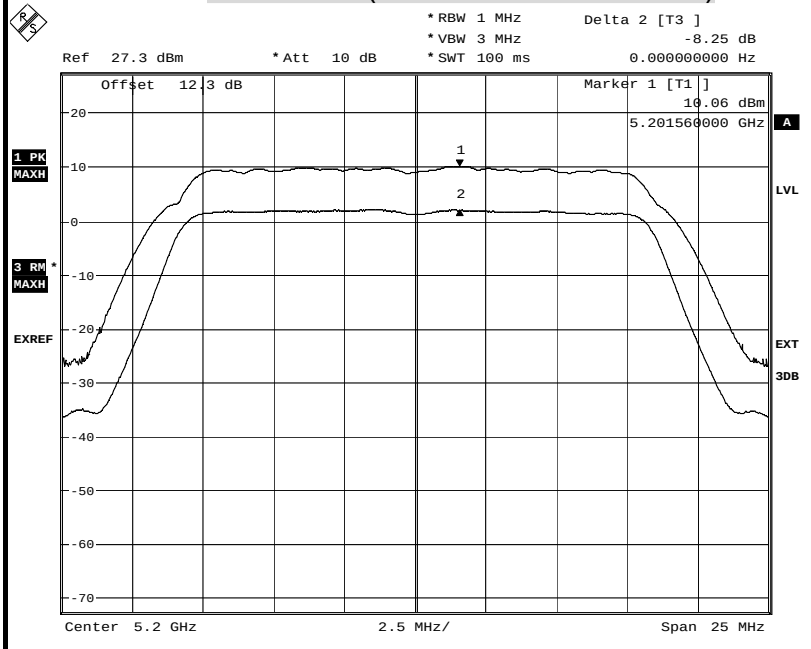

Date: 20.DEC.2012 22:51:12

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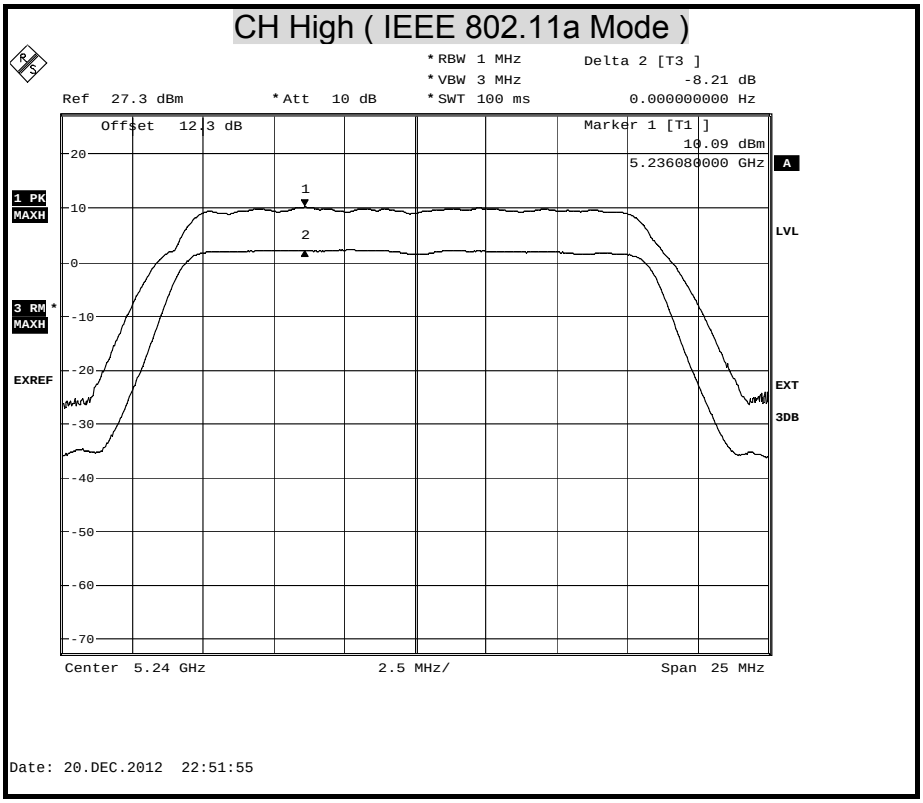
CH High (IEEE 802.11a Mode)



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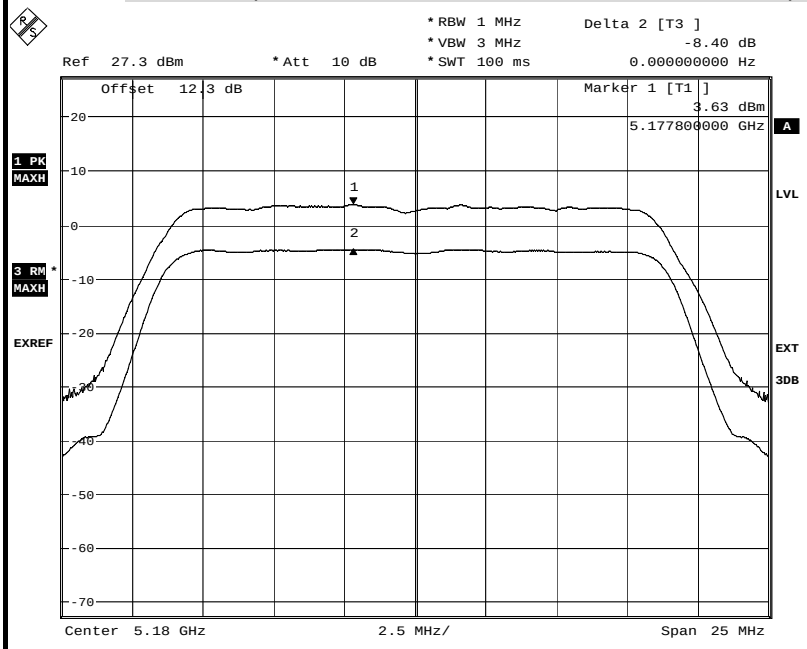
CH Low (IEEE 802.11n HT20 Mode / Chain 0)



Date: 20.DEC.2012 22:41:34

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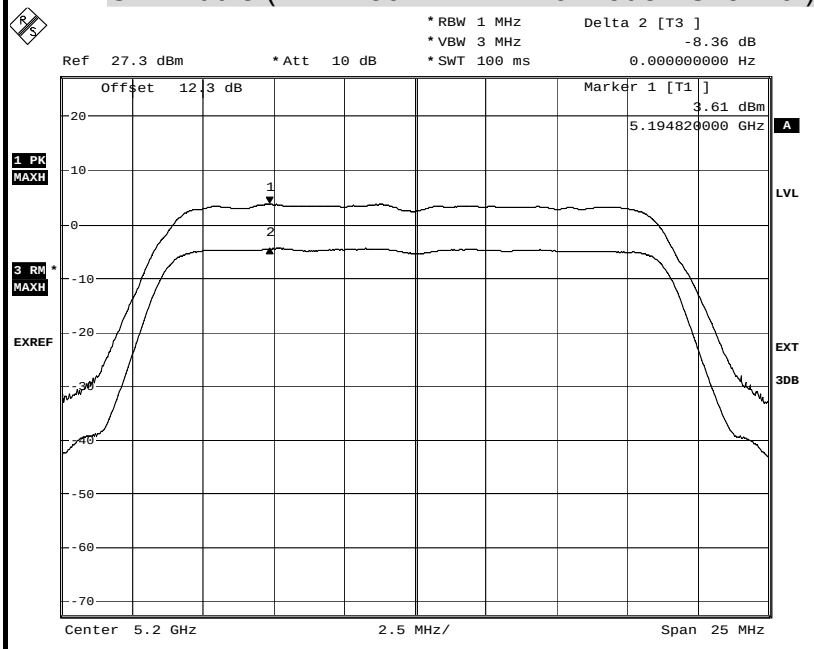

Date: 20.DEC.2012 22:42:46

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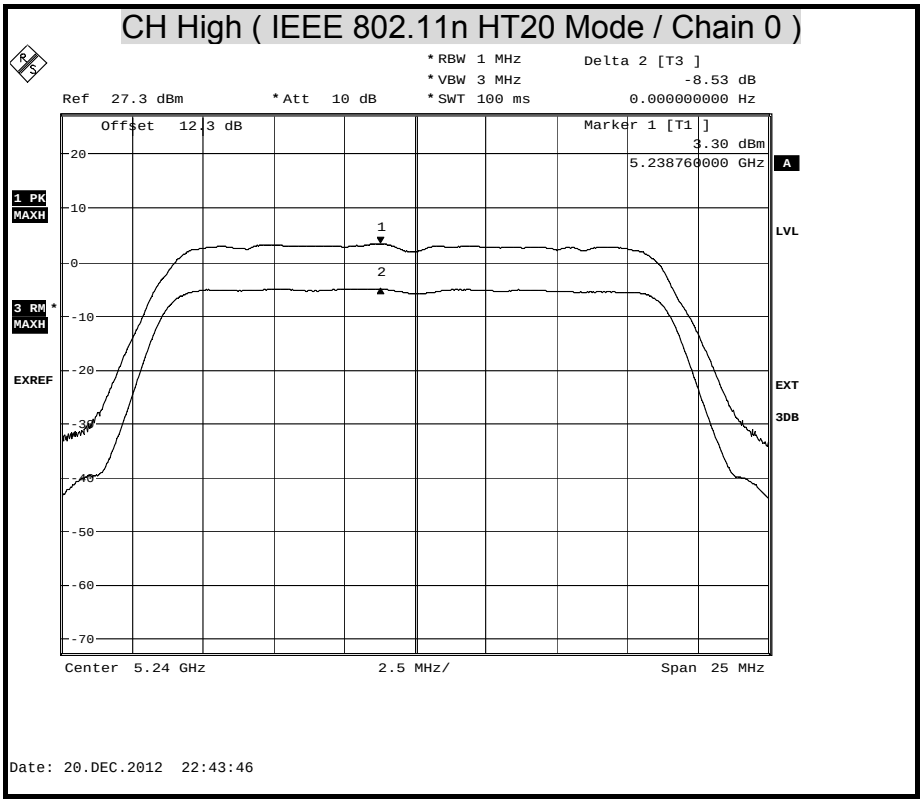
CH High (IEEE 802.11n HT20 Mode / Chain 0)



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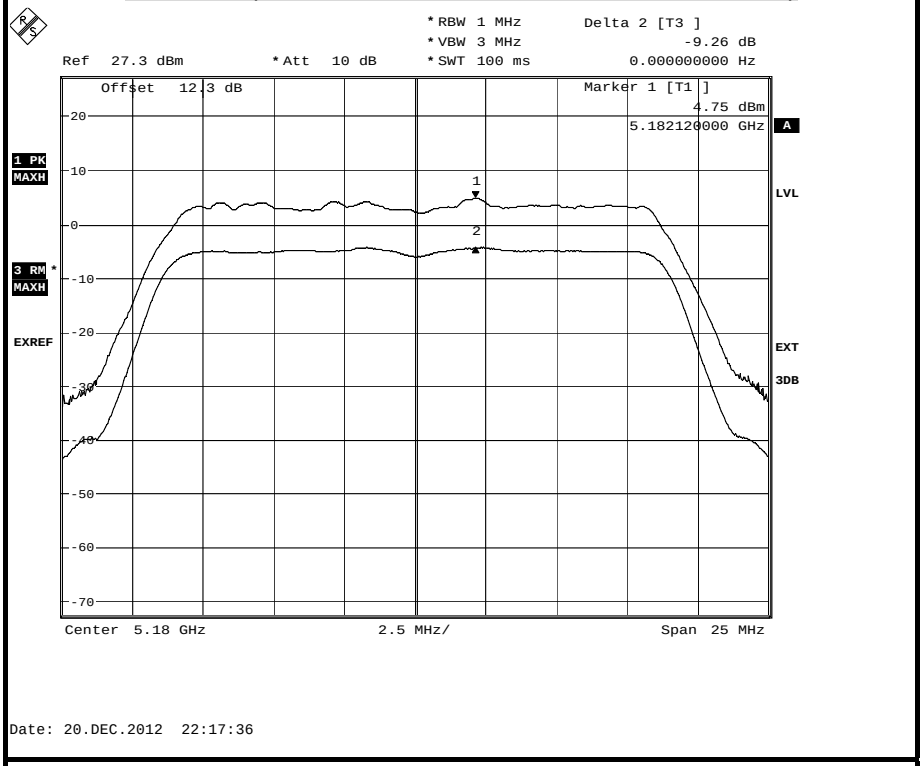
CH Low (IEEE 802.11n HT20 Mode / Chain 1)



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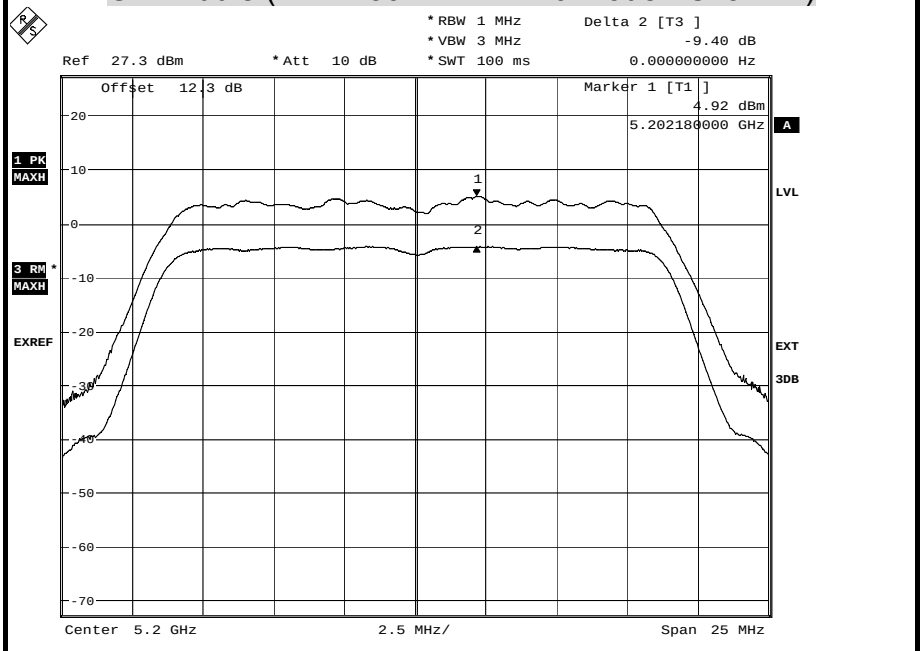

Date: 20.DEC.2012 22:18:31

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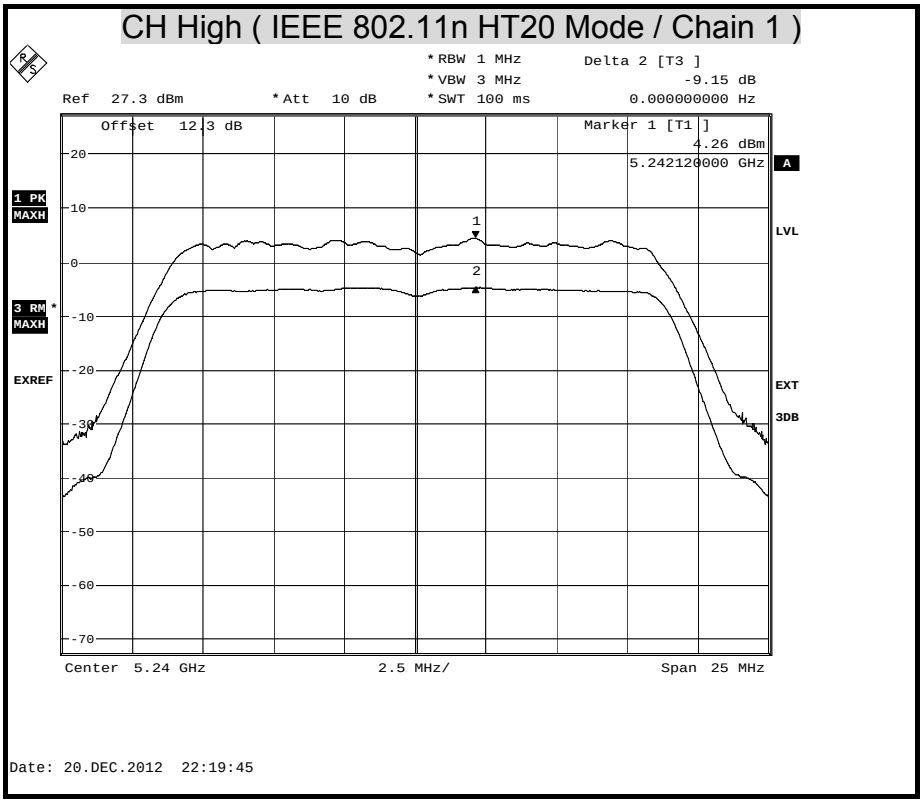

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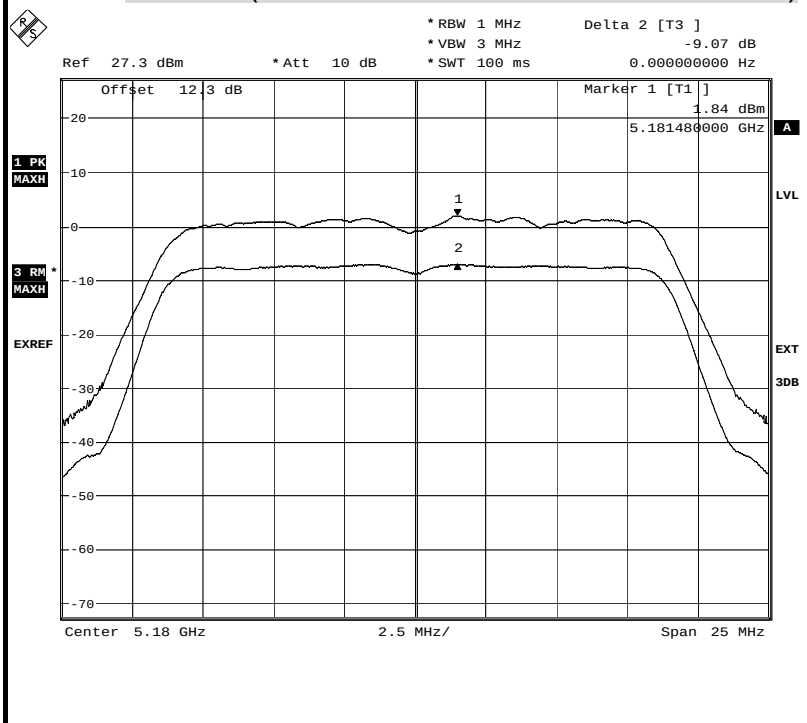
CH Low (IEEE 802.11n HT20 Mode / Chain 2)



Date: 20.DEC.2012 22:32:32

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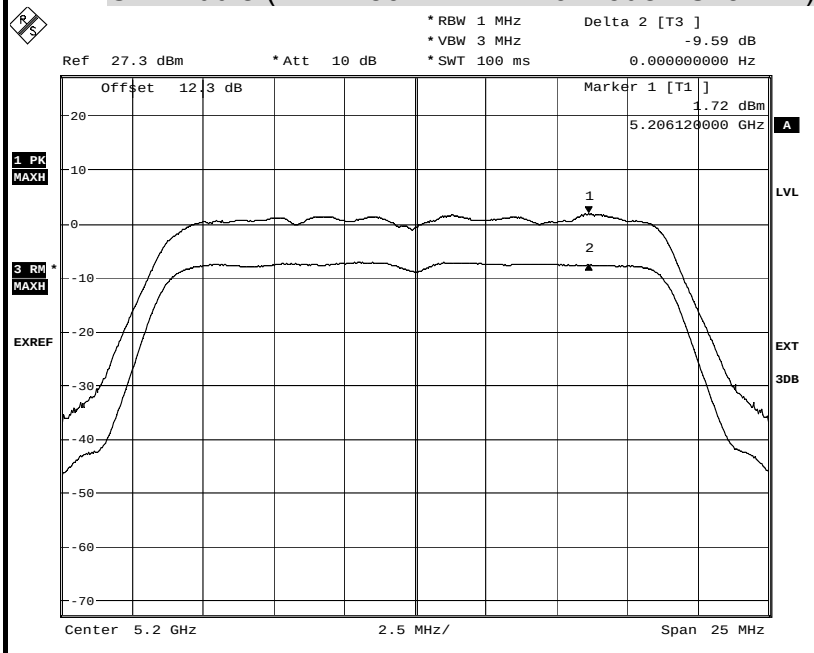

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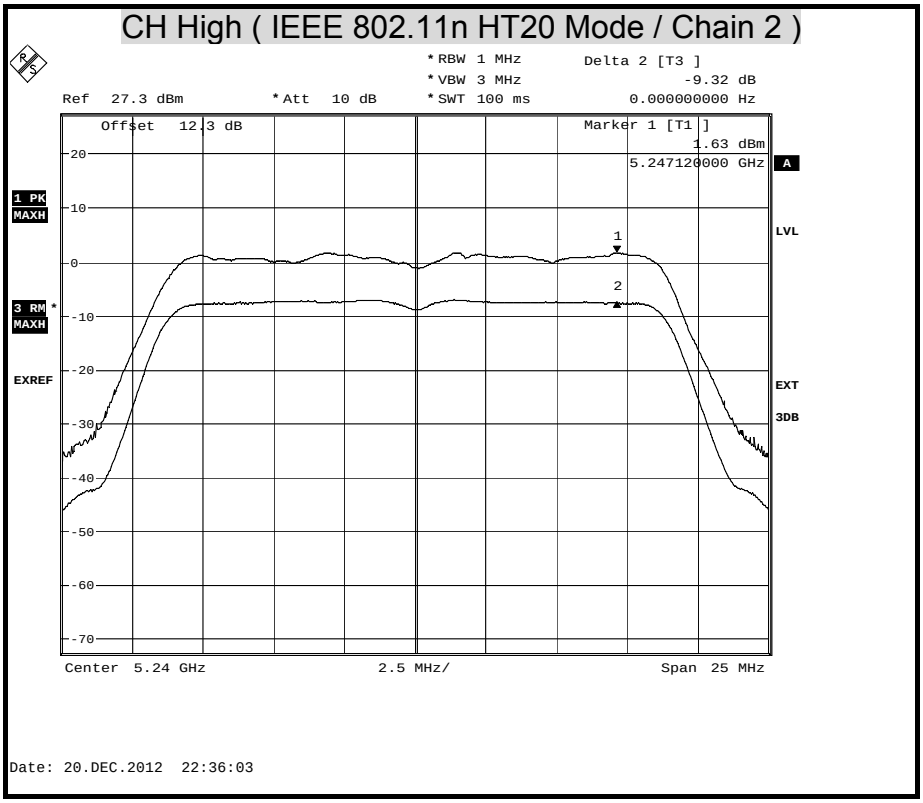

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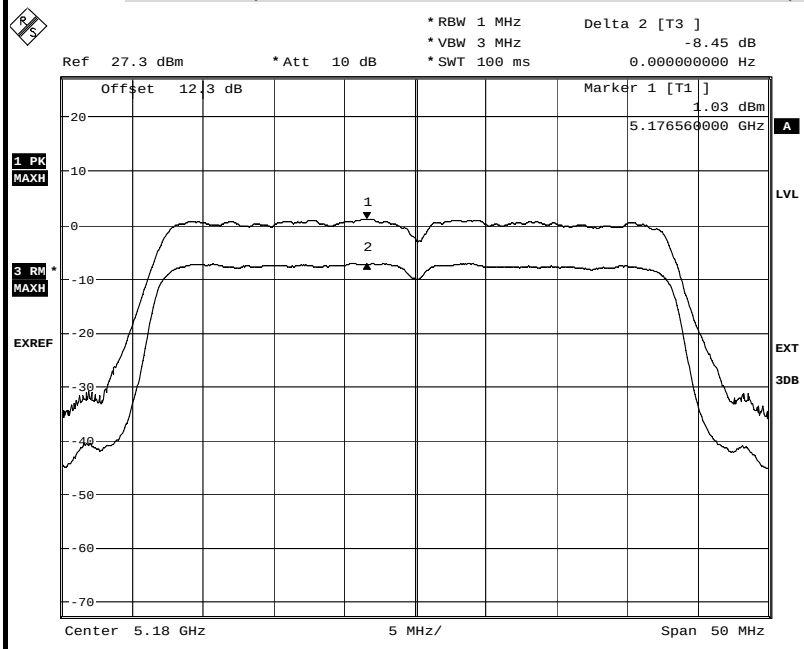

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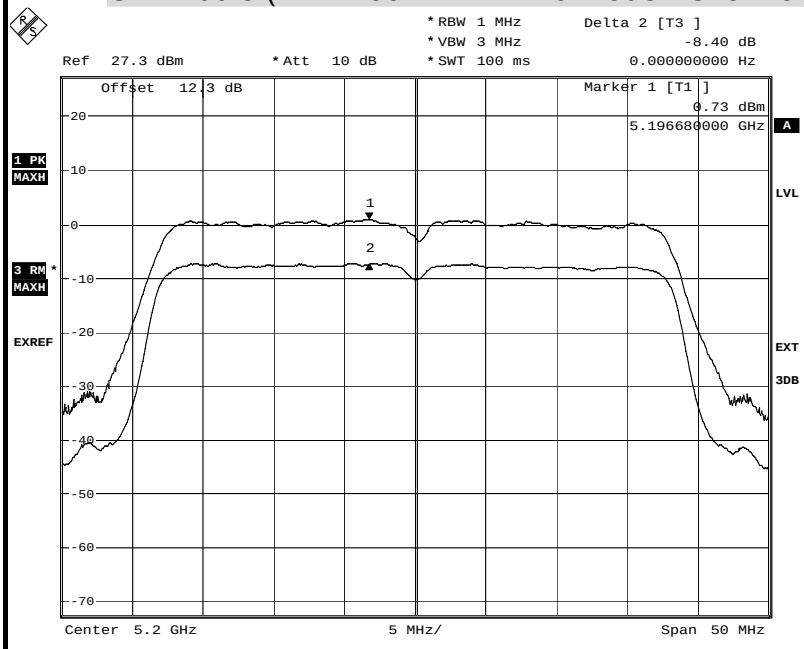

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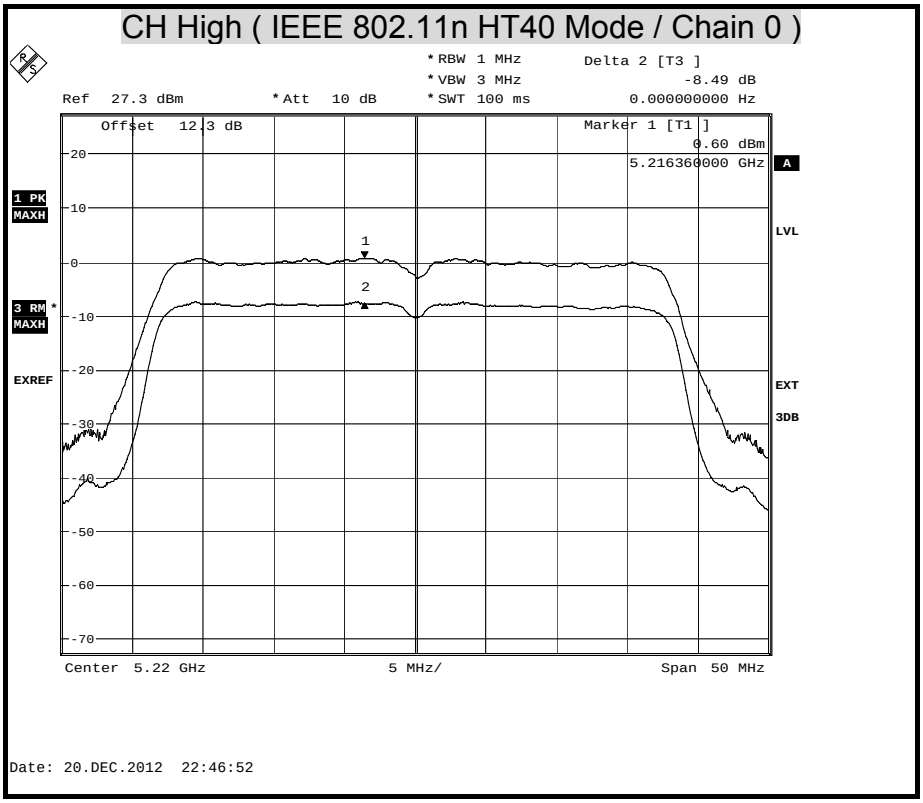

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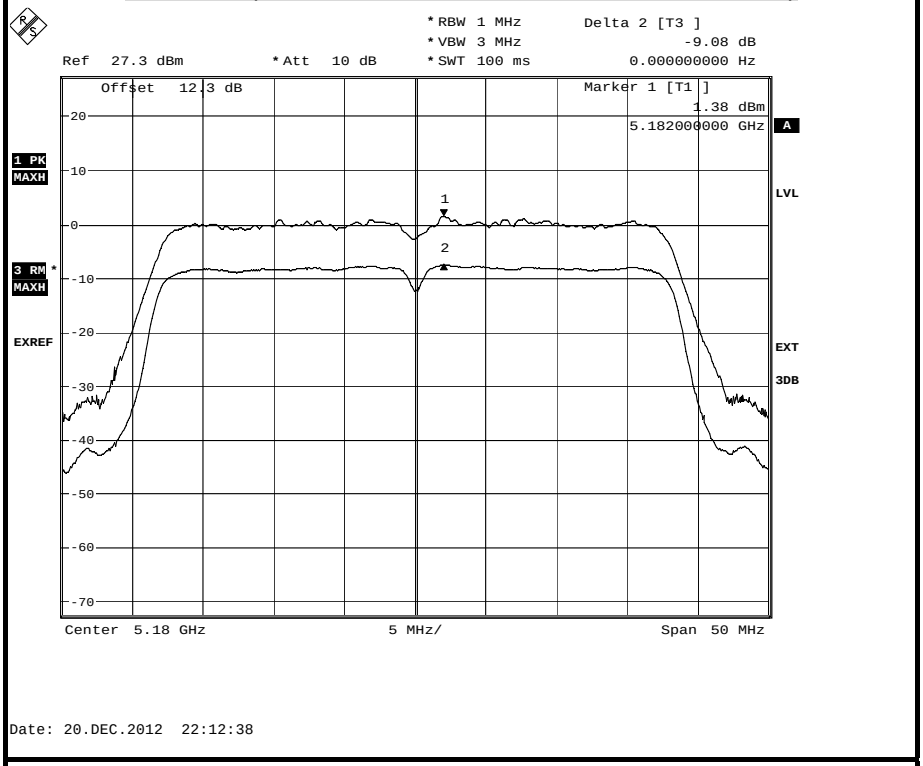
CH Low (IEEE 802.11n HT40 Mode / Chain 1)



Date: 20.DEC.2012 22:12:38

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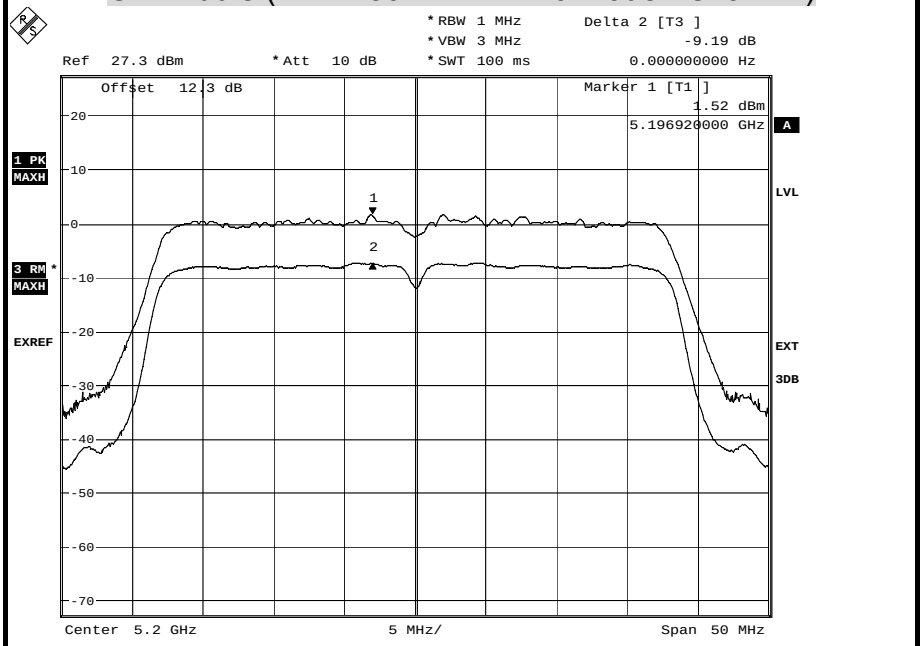

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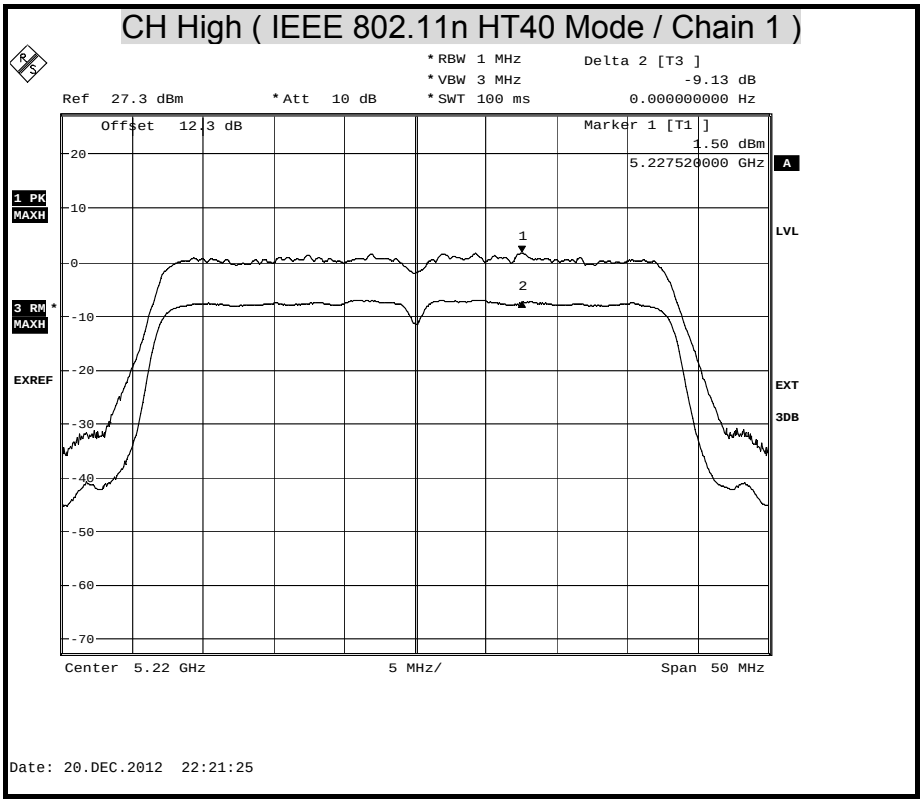

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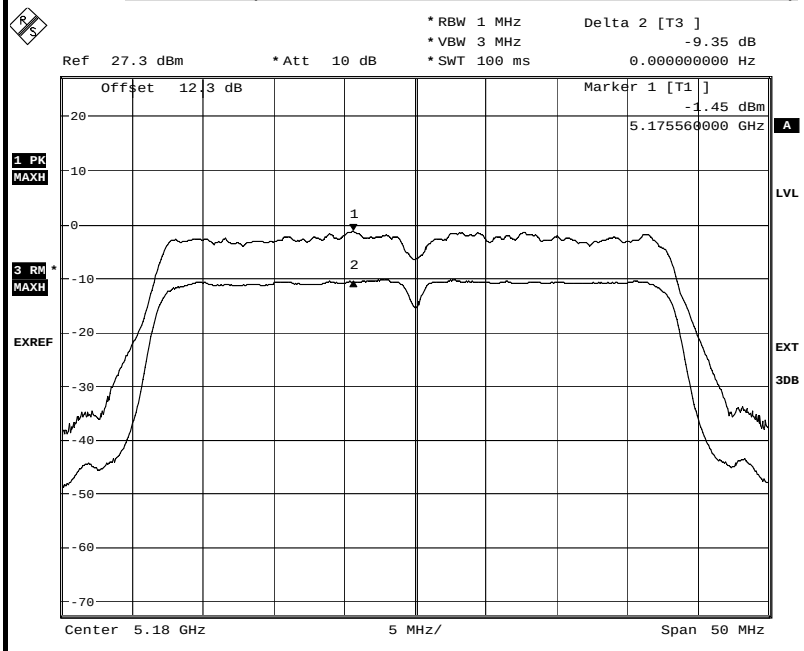
CH Low (IEEE 802.11n HT40 Mode / Chain 2)



Date: 20.DEC.2012 22:29:14

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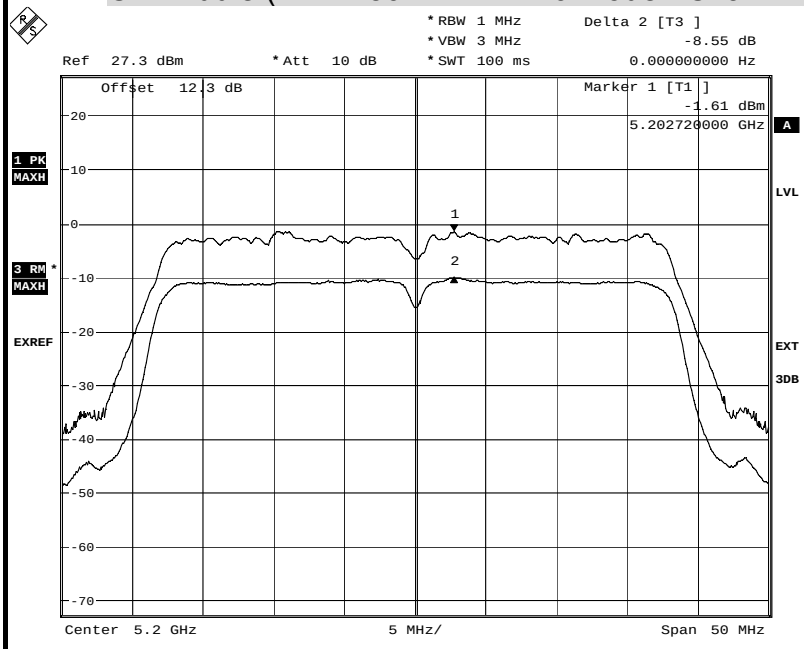

Date: 20.DEC.2012 22:27:01

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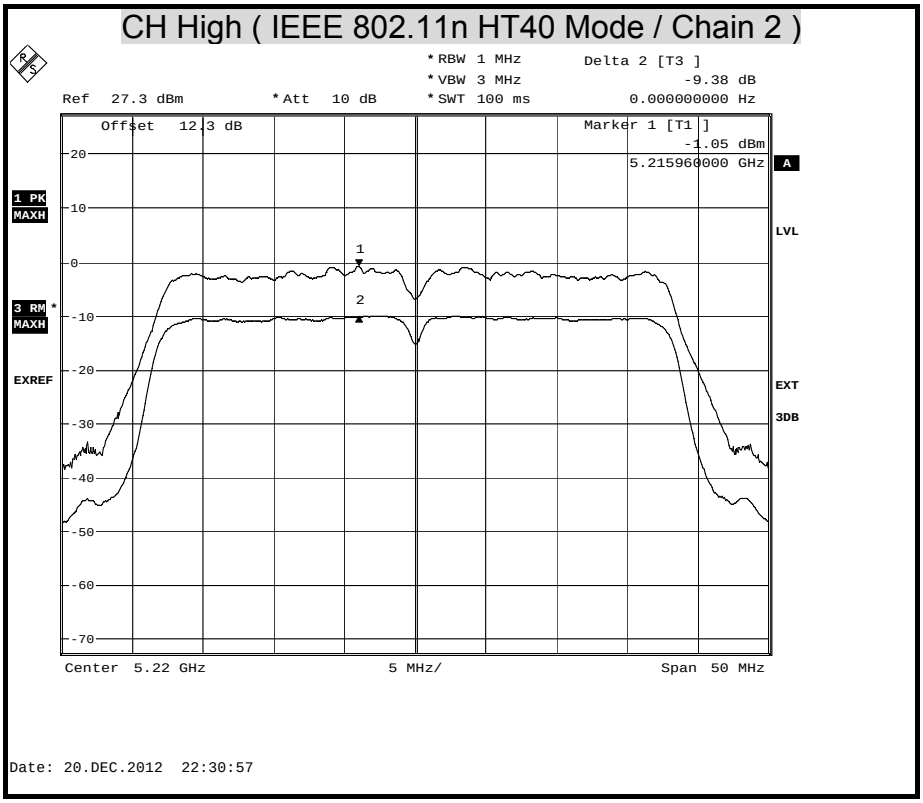

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7.5 CONDUCTED SPURIOUS EMISSION

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.

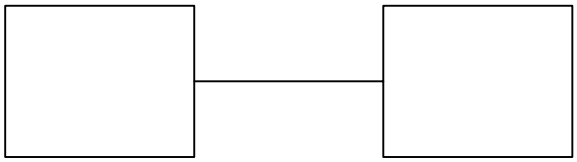
The provisions of § 15.205 apply to intentional radiators operating under this section.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2013

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.

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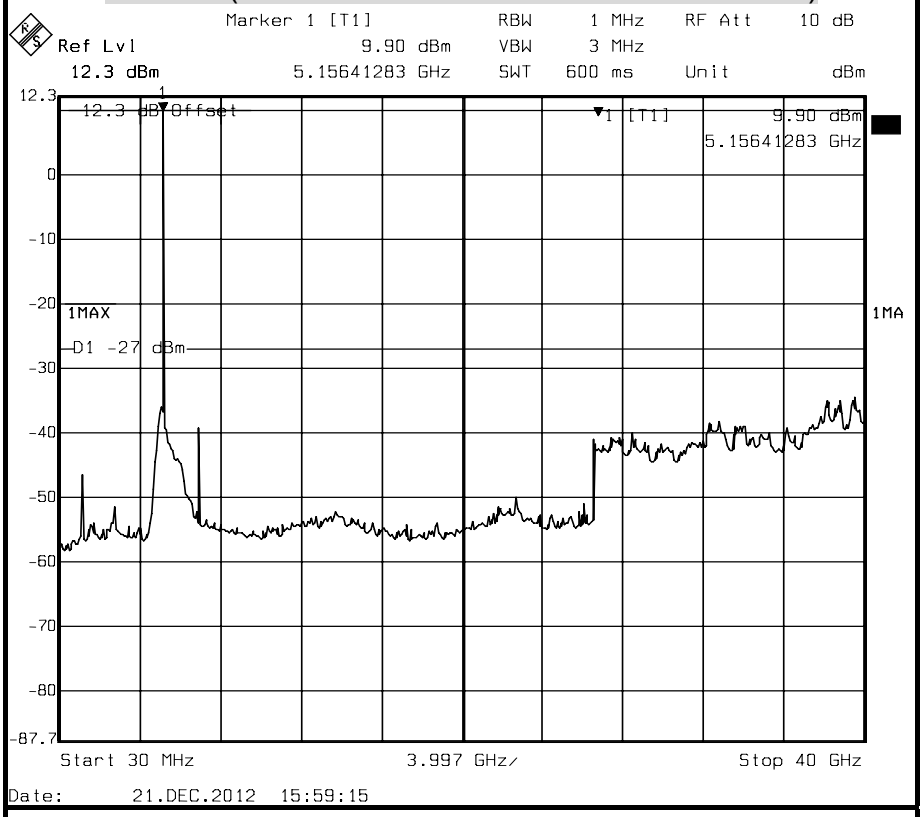
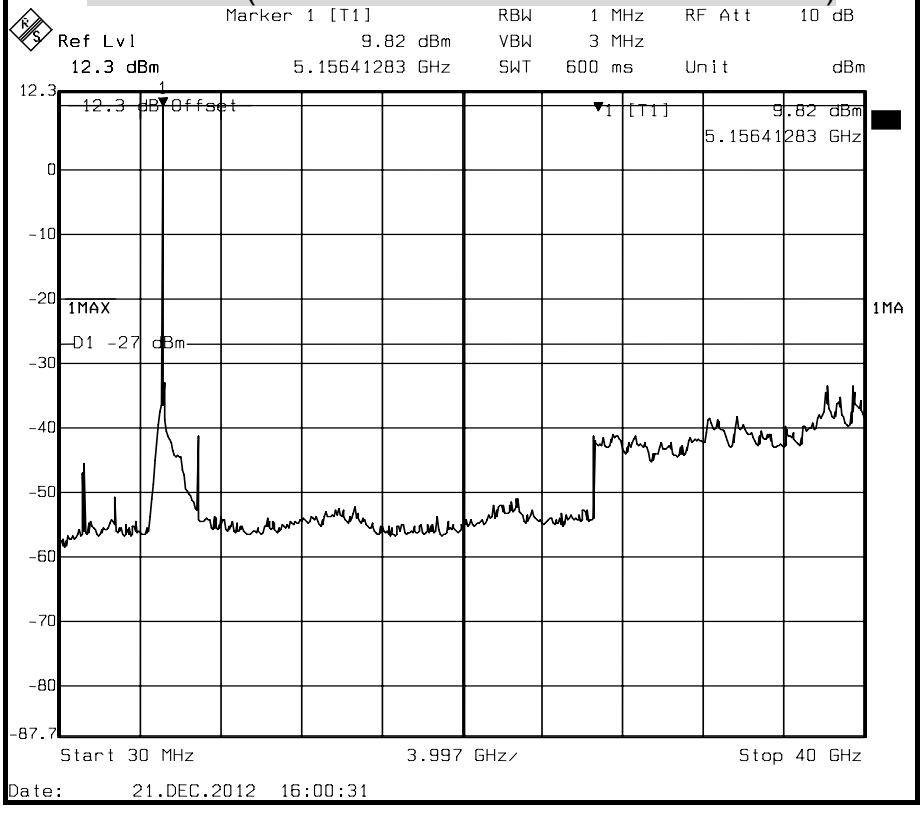
TEST RESULTS

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(802.11a MODE)

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



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



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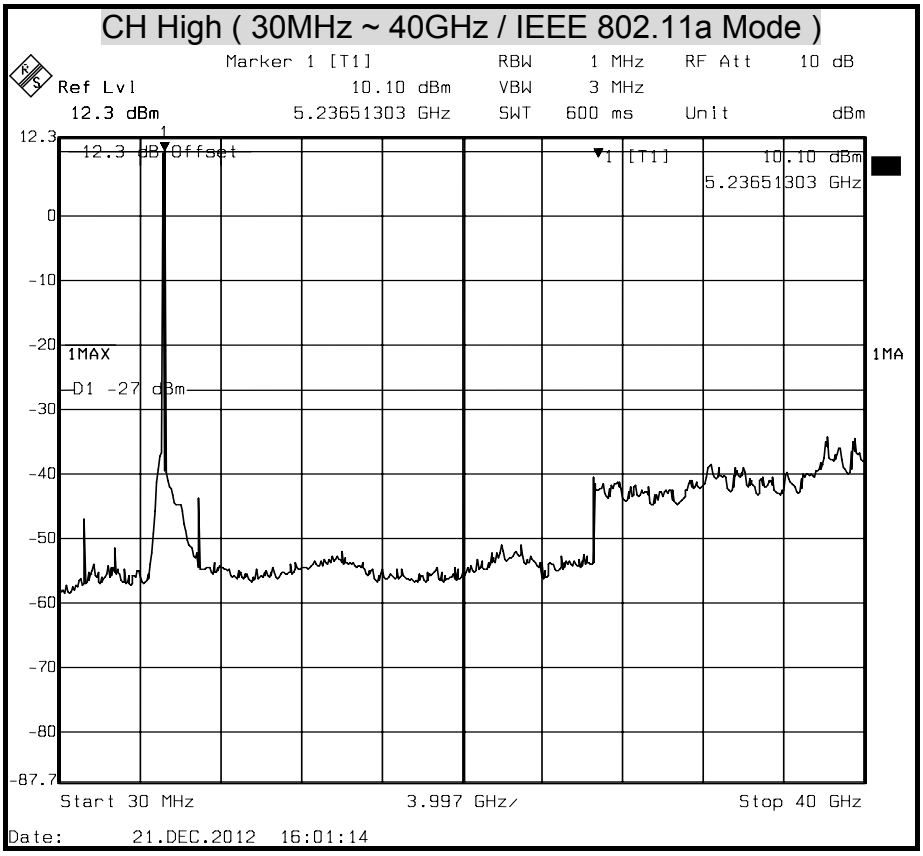
CH High (30MHz ~ 40GHz / IEEE 802.11a Mode)



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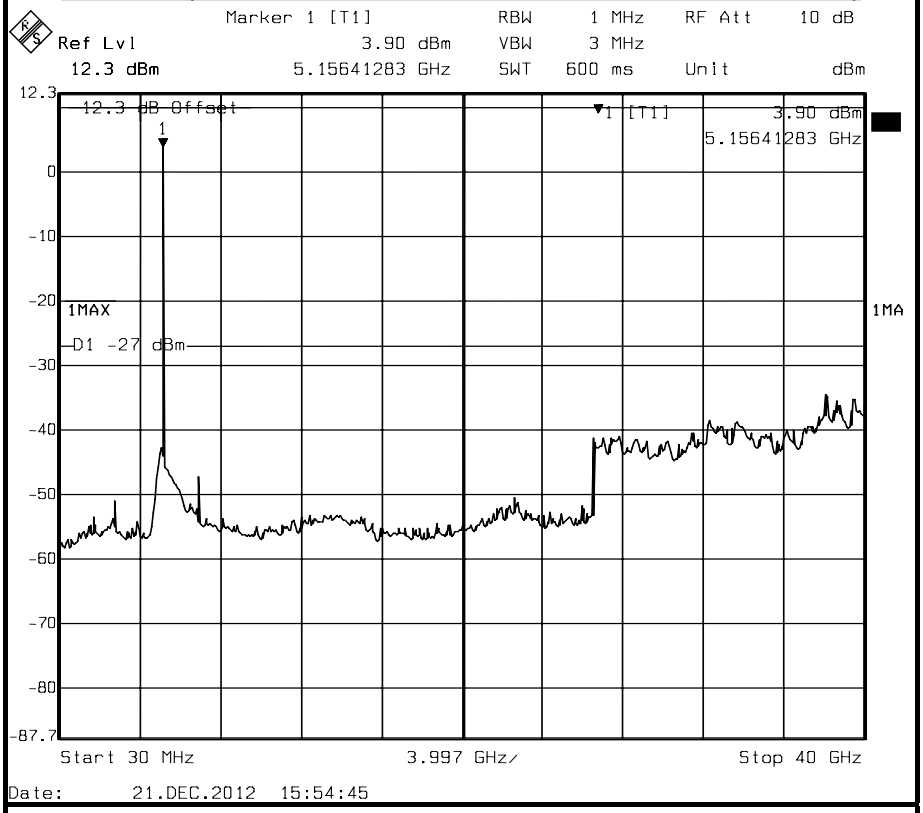
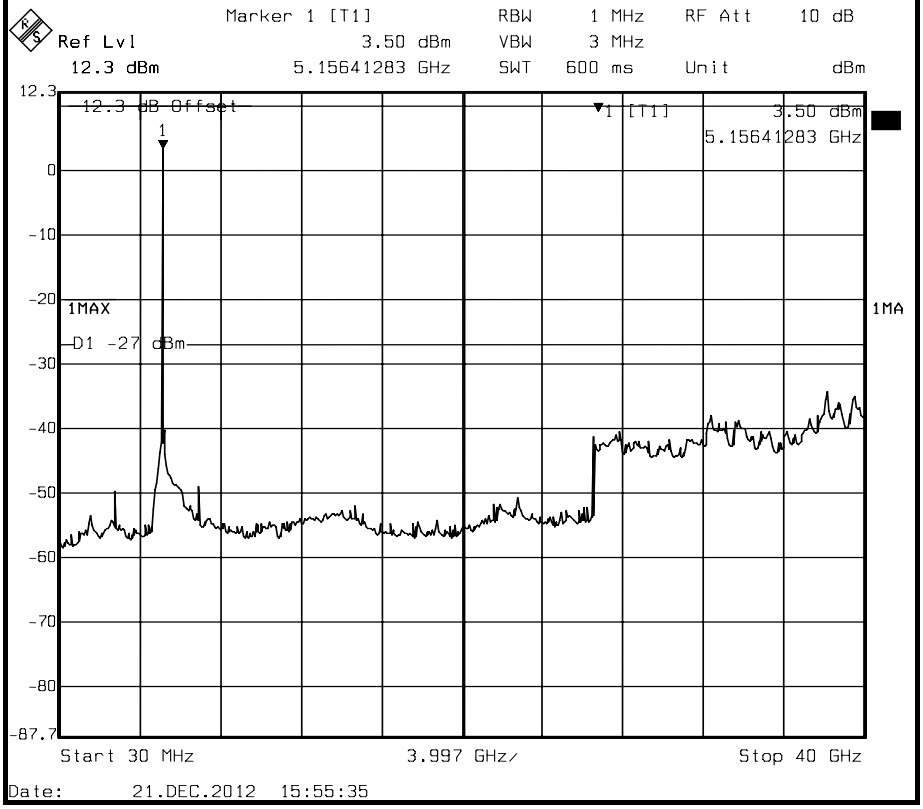
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT20 Mode / Chain 0)

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



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



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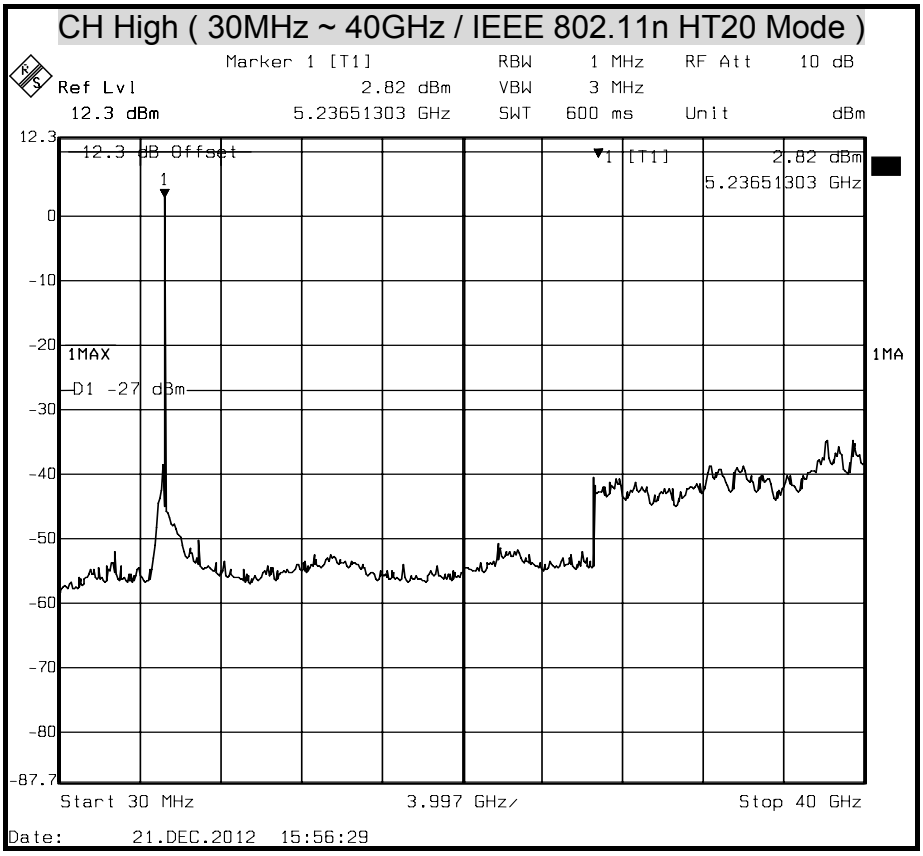

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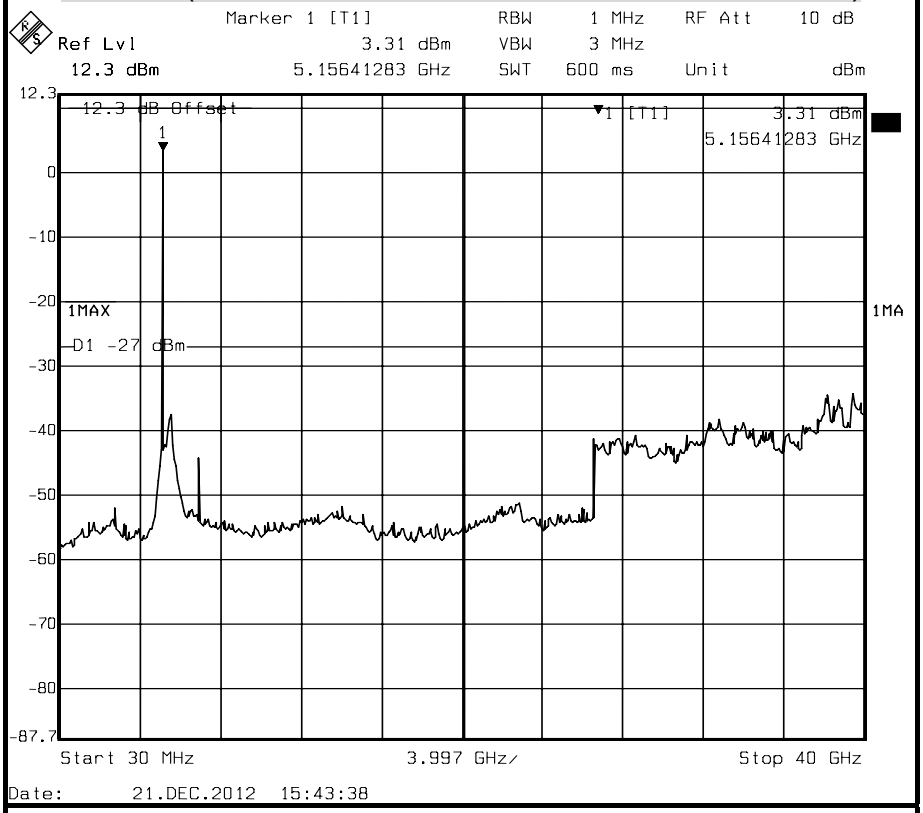
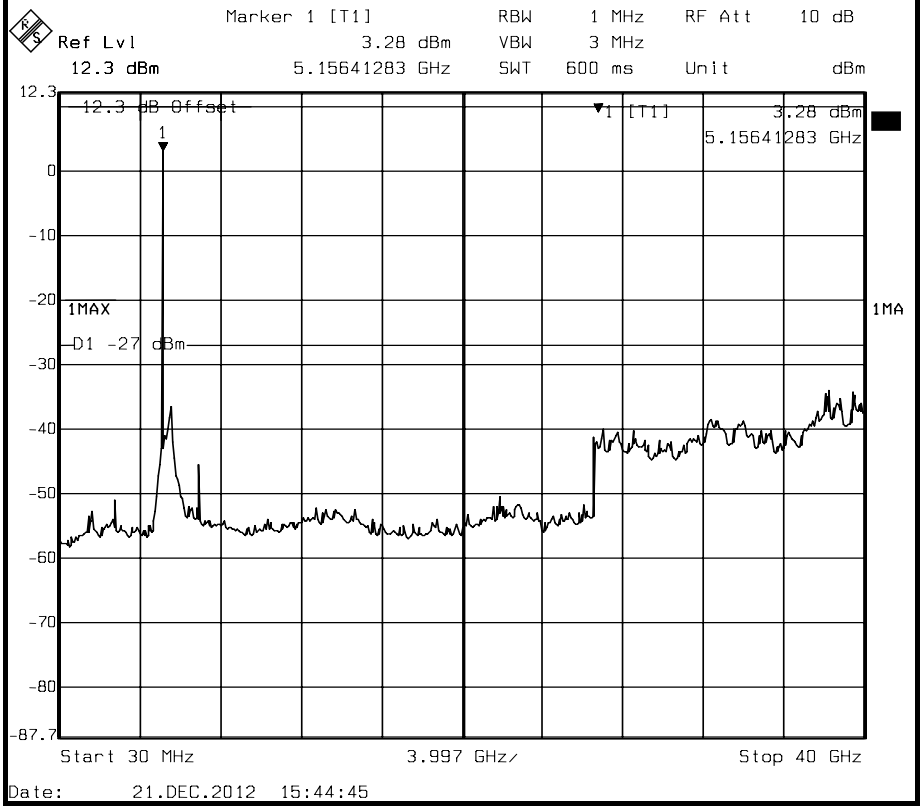
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT20 Mode / Chain 1)

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



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



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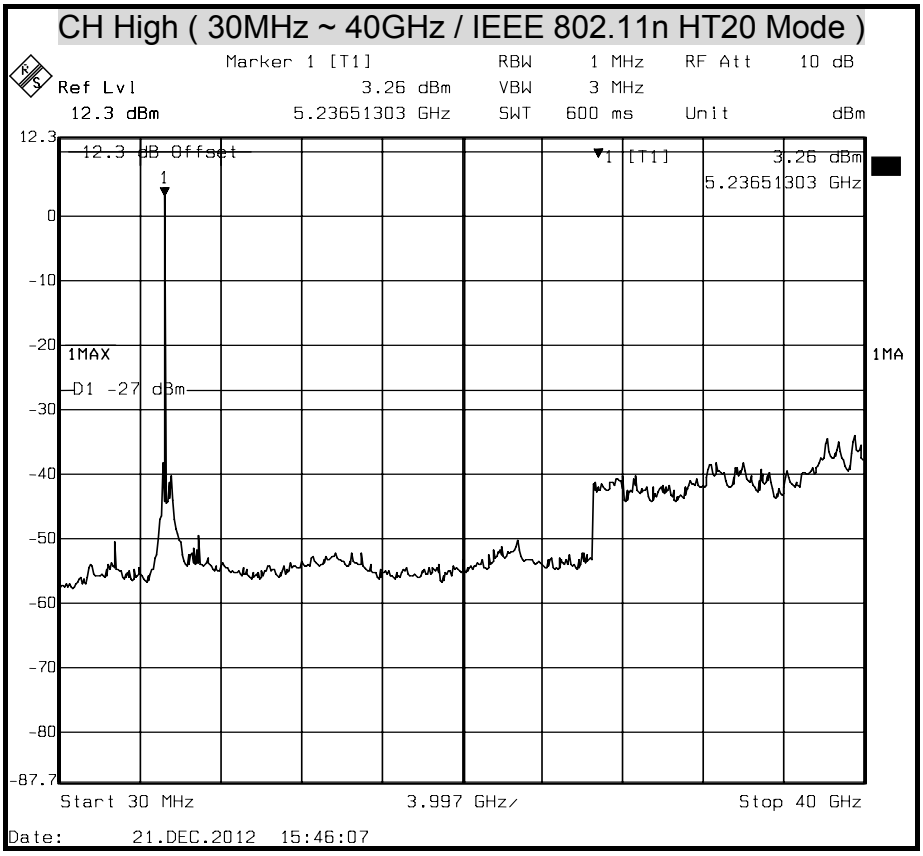
CH High (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode)



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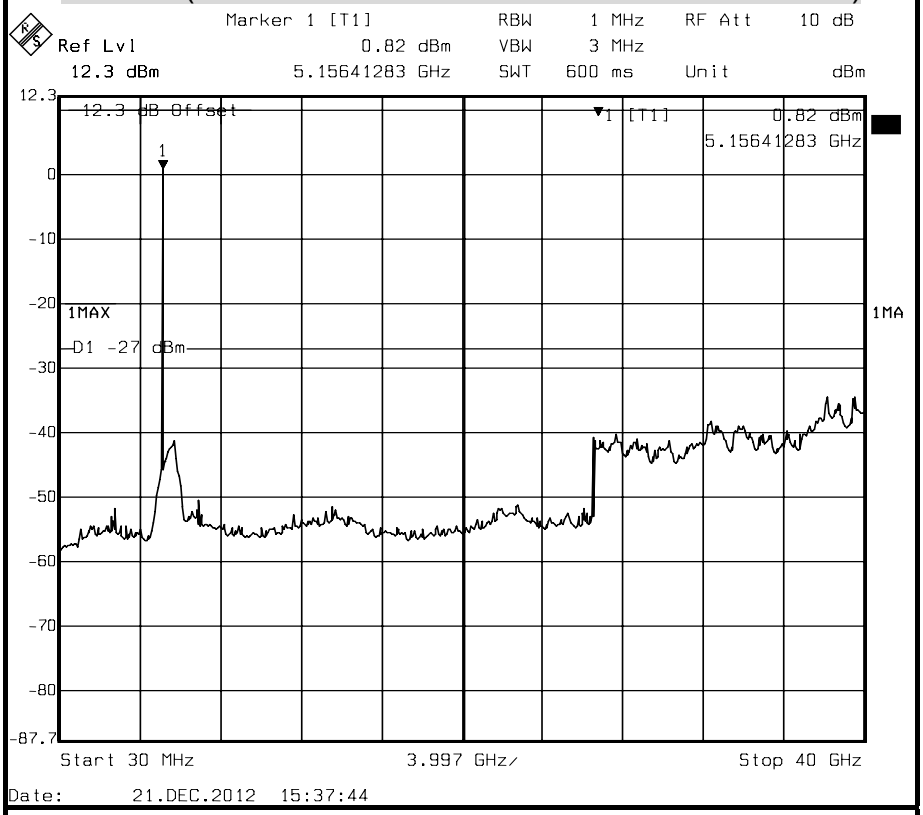
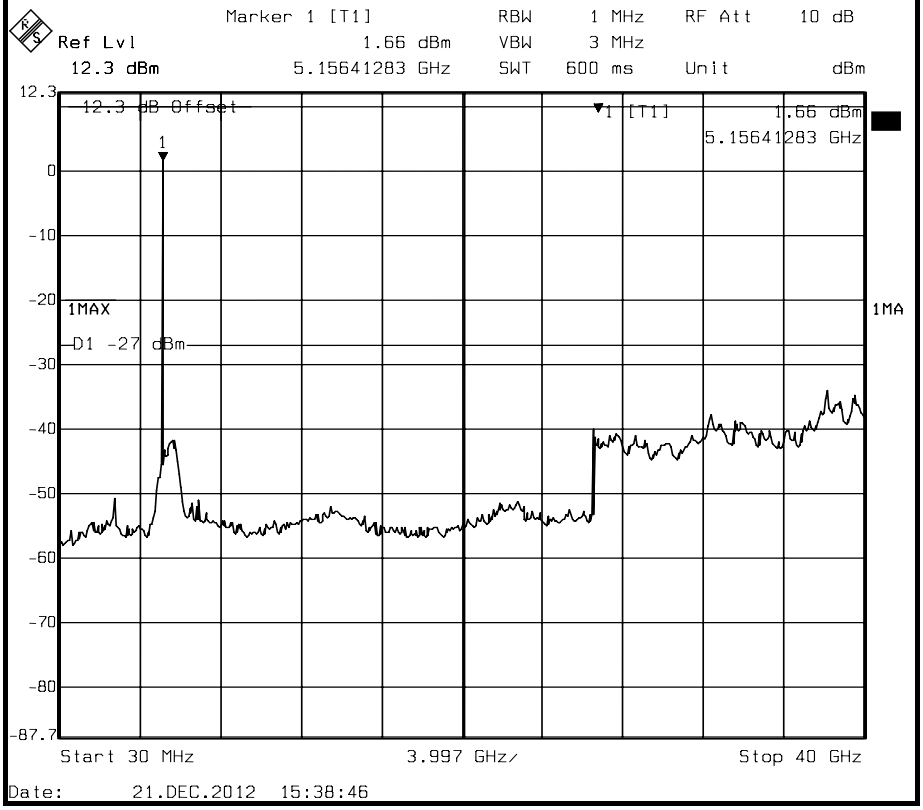
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT20 Mode / Chain 2)

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



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



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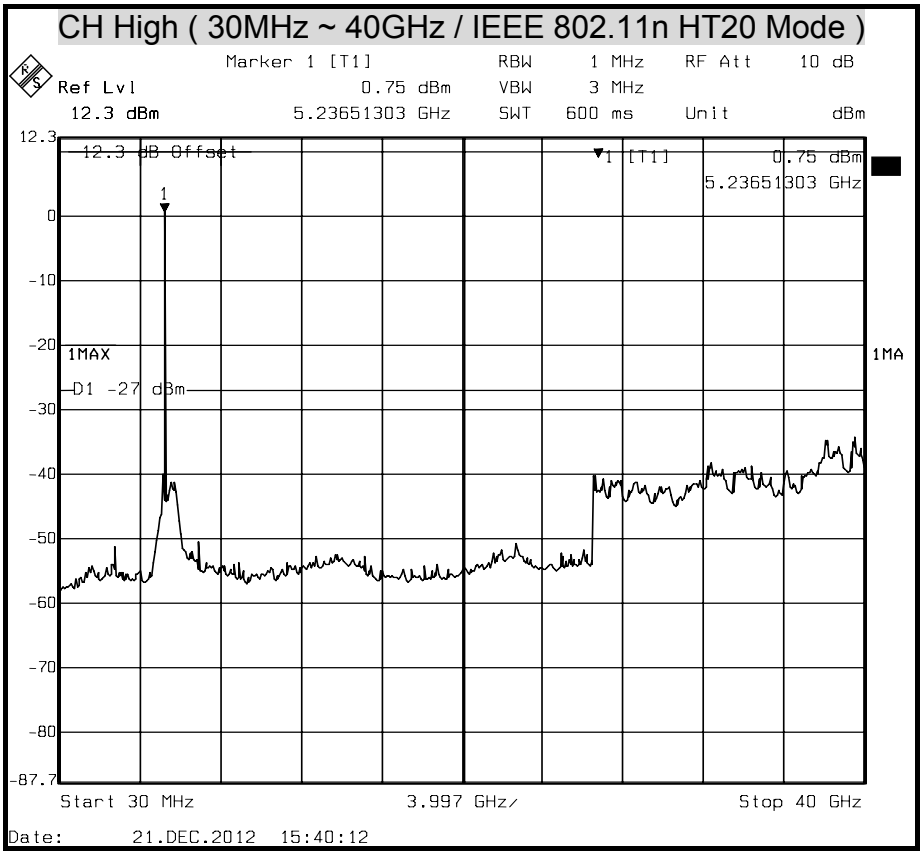
CH High (30MHz ~ 40GHz / IEEE 802.11n HT20 Mode)



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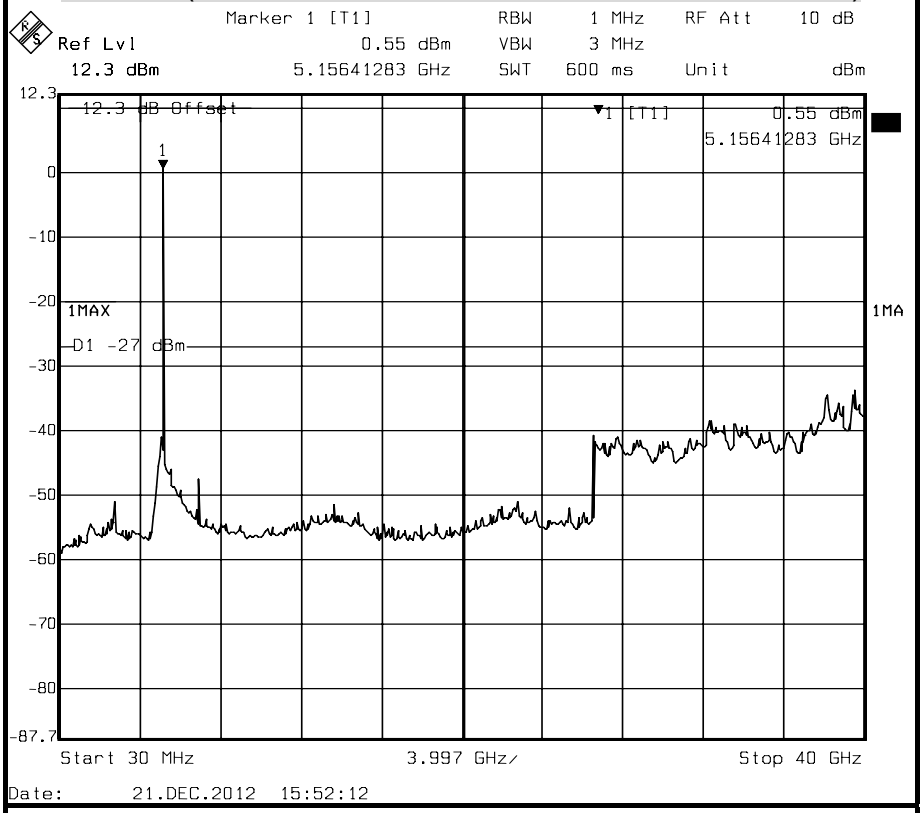
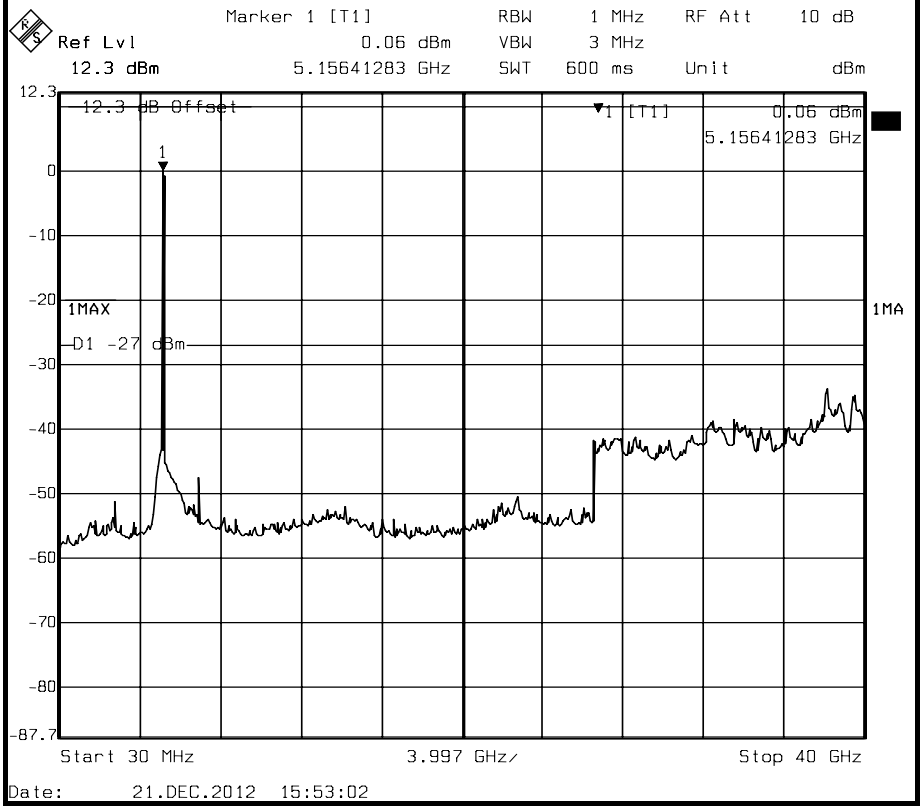
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT40 Mode / Chain 0)

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



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



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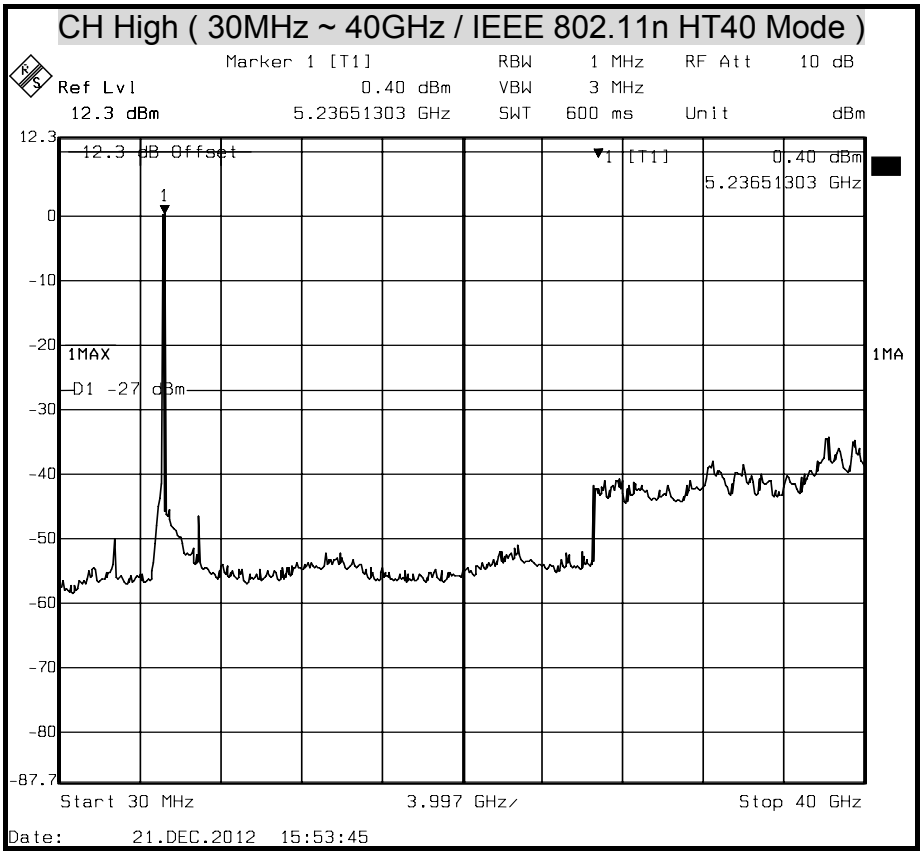

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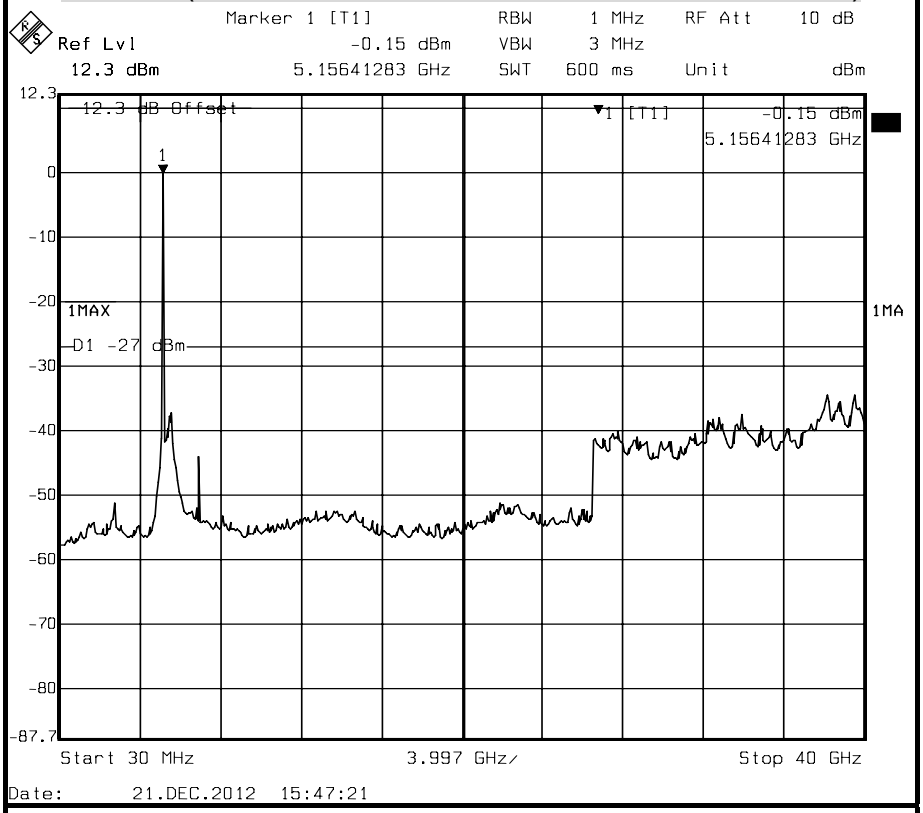
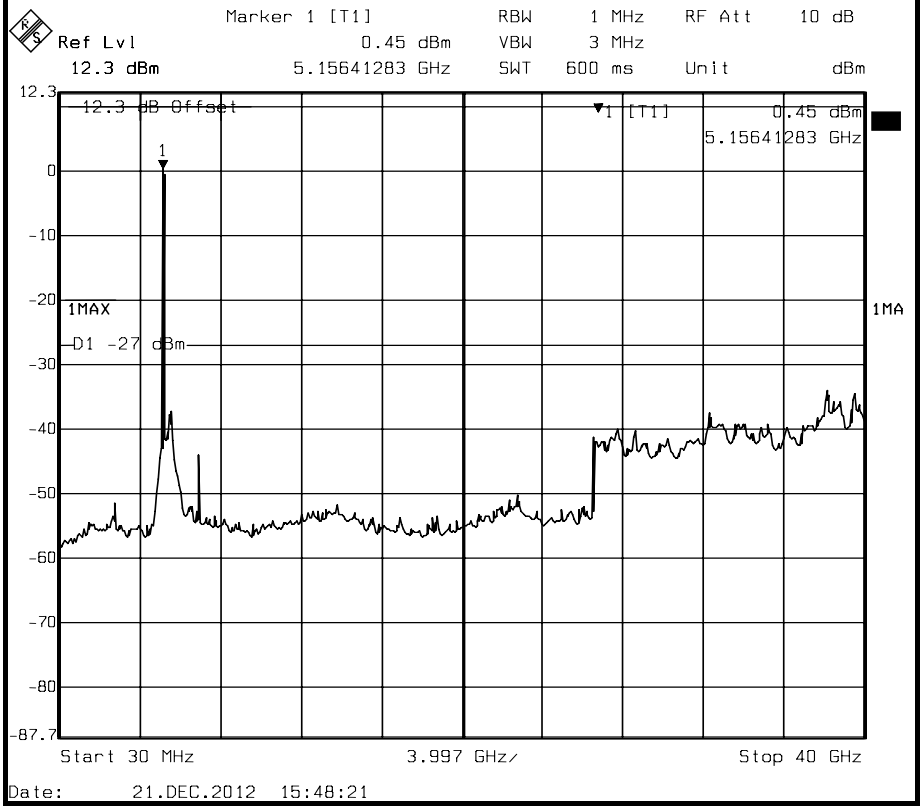
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT40 Mode / Chain 1)

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



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



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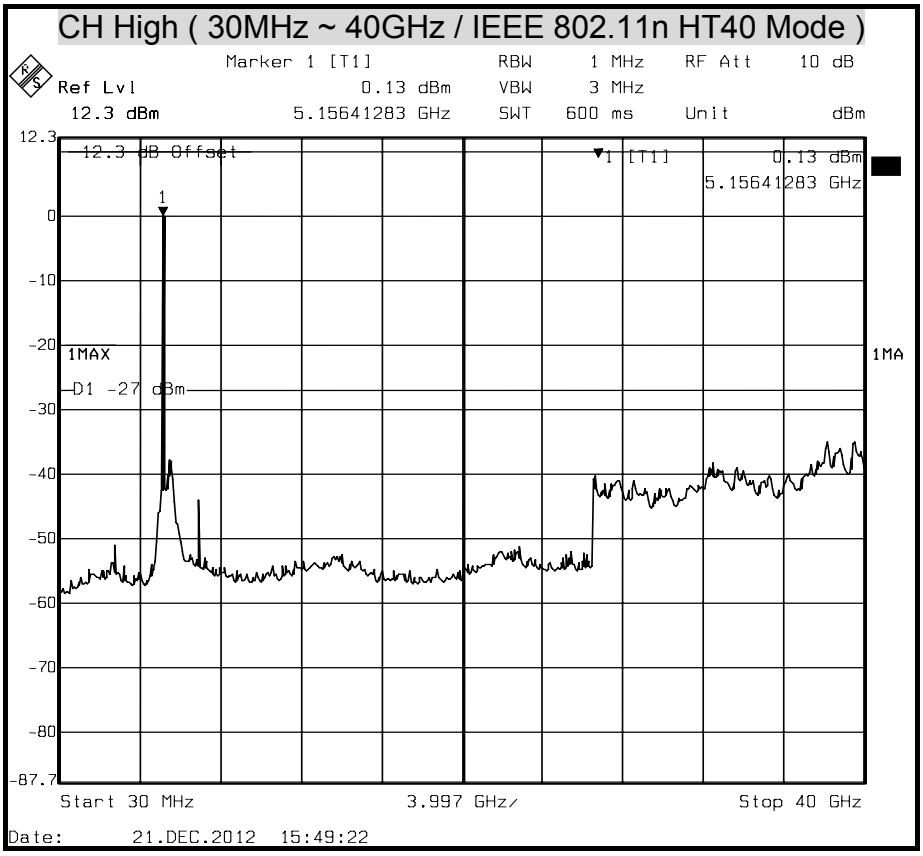

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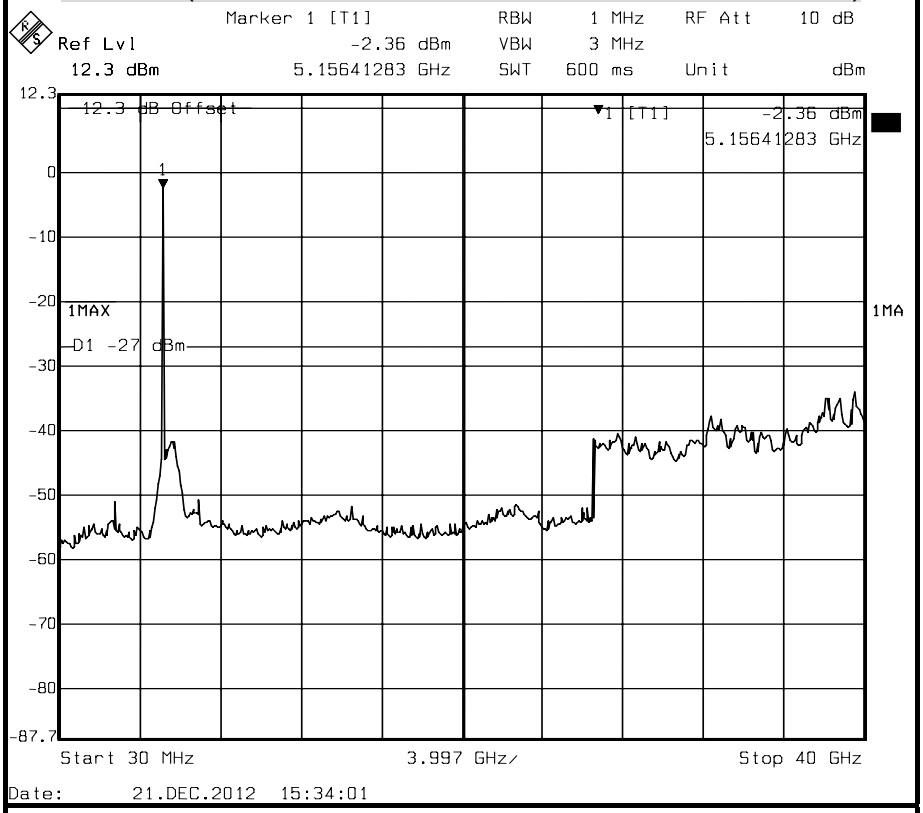
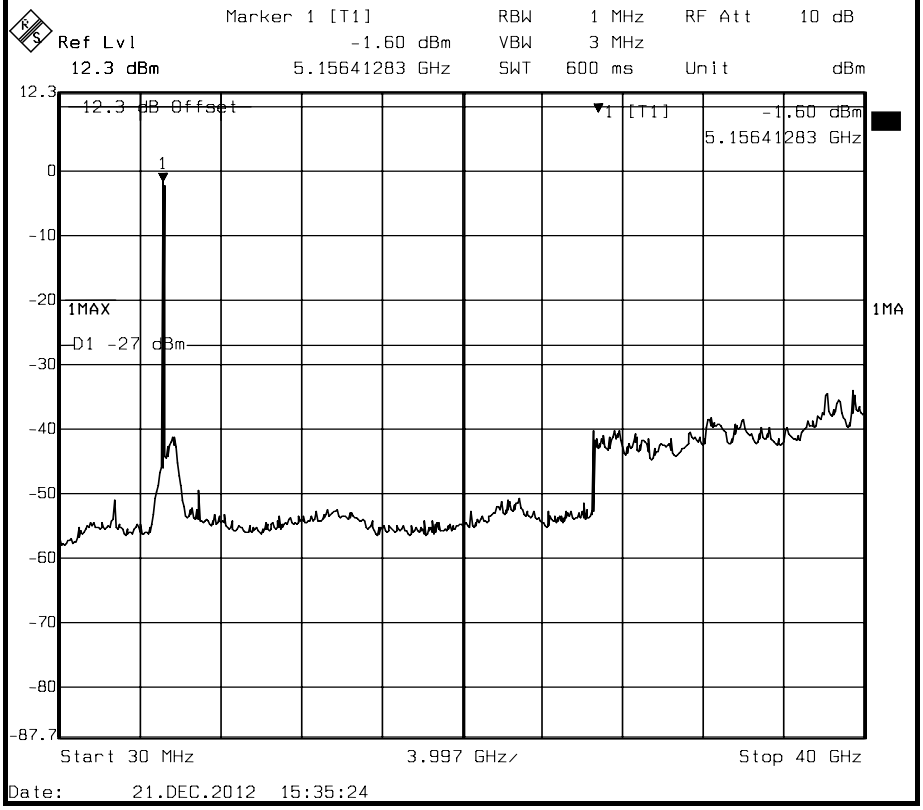
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT
(IEEE 802.11n HT40 Mode / Chain 2)

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



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



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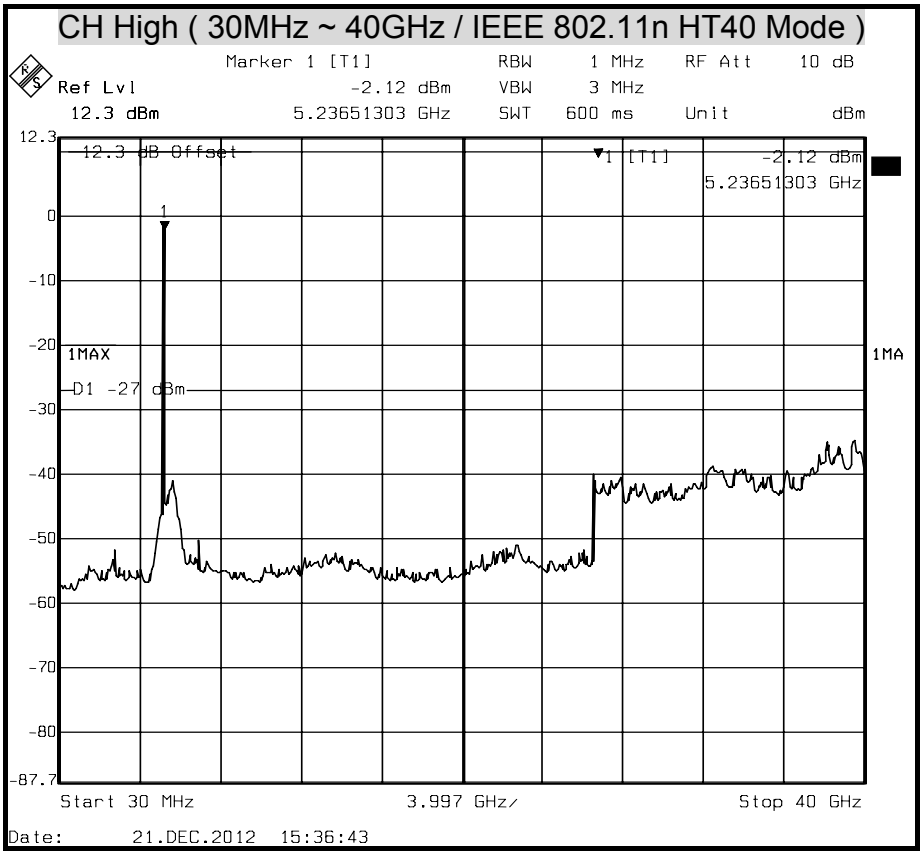

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7.6 RADIATED EMISSION

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.

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(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.

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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. 15, 2013
BI-LOG Antenna	Sunol	JB1	A070506-2	SEP. 26, 2013
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2013
Pre-Amplifier	HP	8447F	NCR	NCR
EMI Receiver	R&S	ESVS10	833206/012	JUN. 26, 2013
Horn Antenna	Com-Power	AH-118	071032	DEC. 05, 2013
Spectrum Analyzer	R&S	FSEK 30	835253/002	SEP. 29, 2013
Spectrum Analyzer	R&S	FSU	200789	SEP. 29, 2013
3116 Double Ridge Antenna (40G)	ETS-LINDGREN	EMCO-003	00078	NOV. 14, 2013
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. 20, 2013
Power Sensor	Anritsu	MA2491A	33265	MAY. 20, 2013
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 08, 2013
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.

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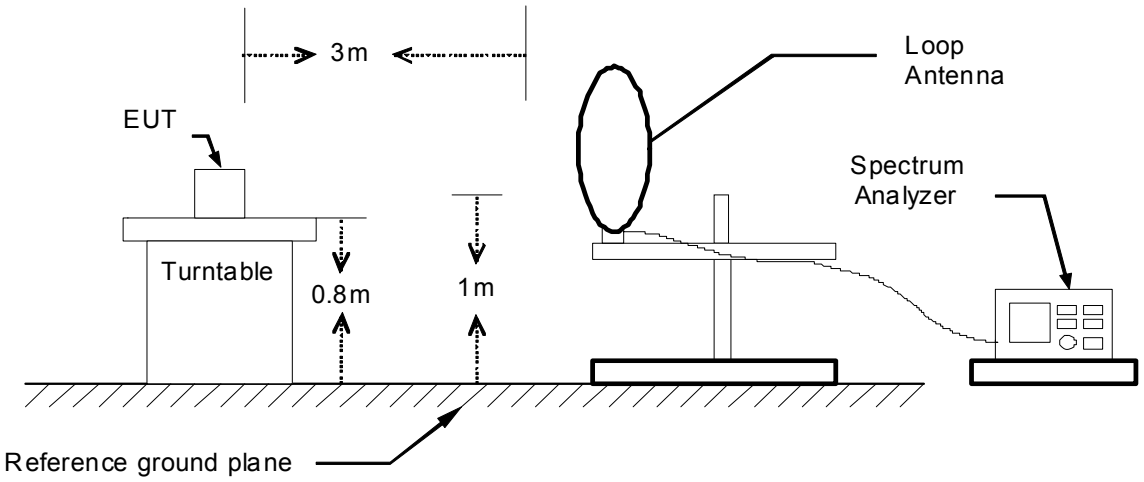
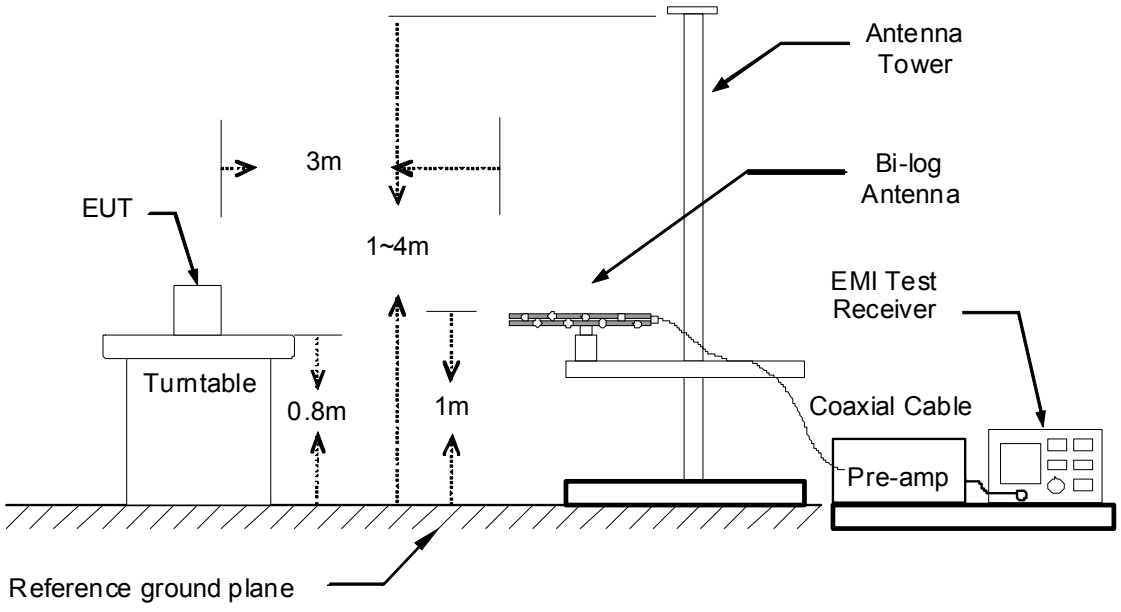
TEST SETUP

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

9kHz ~ 30MHz



30MHz ~ 1GHz



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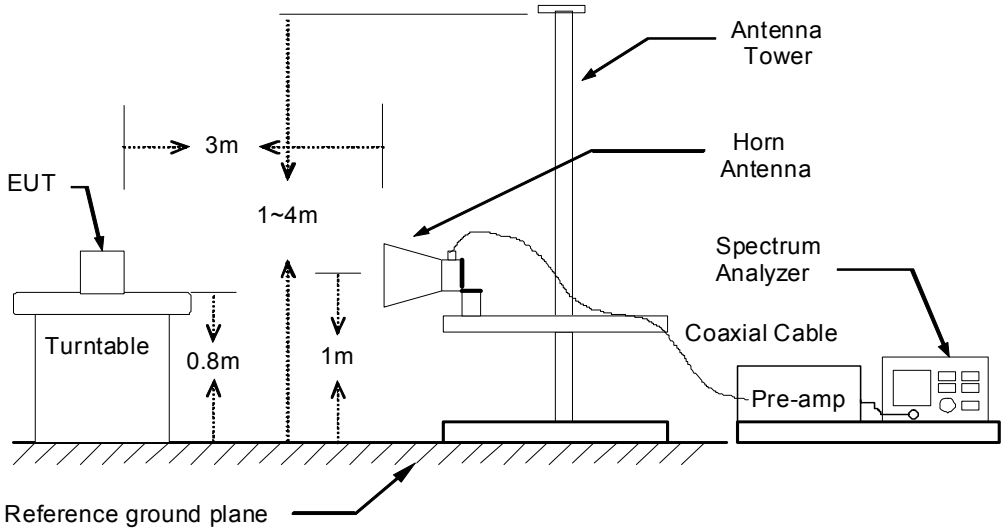
The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



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.

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TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

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

Below 1 GHz (30MHz ~ 1GHz)

Model	NBG5615	Test By	John Chen
Test Mode	Normal Operation	Test Date	2013/01/02
TEMP & Humidity	25°C, 55%		

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
250.04	24.15	12.80	3.96	40.91	46.00	-5.09	QP
374.99	20.88	15.98	4.63	41.49	46.00	-4.51	QP
500.00	15.36	18.43	5.60	39.39	46.00	-6.61	QP
625.00	13.28	19.89	5.76	38.93	46.00	-7.07	QP
750.00	12.27	21.58	5.81	39.66	46.00	-6.34	QP
875.00	11.63	22.93	6.06	40.62	46.00	-5.38	QP

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
124.99	19.64	14.13	3.12	36.89	43.50	-6.61	QP
250.04	25.71	12.80	3.96	42.47	46.00	-3.53	QP
374.98	18.24	15.98	4.63	38.85	46.00	-7.15	QP
625.00	14.28	19.89	5.76	39.93	46.00	-6.07	QP
750.00	11.90	21.58	5.81	39.29	46.00	-6.71	QP
875.00	8.77	22.93	6.06	37.76	46.00	-8.24	QP

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

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Above 1 GHz

Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11a TX / CH Low		

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	57.03	25.65	1.83	39.58	0.74	45.67	74.00	-28.33	P
1250.01	51.26	25.65	1.83	39.58	0.74	39.90	54.00	-14.10	A
10360.17	50.62	39.24	6.04	37.28	0.54	59.16	74.00	-14.84	P
10360.17	40.78	39.24	6.04	37.28	0.54	49.32	54.00	-4.68	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)

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11a TX / CH Middle		

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)
1250.03	55.72	25.65	1.83	39.58	0.74	44.36	74.00	-29.64	P
1250.03	49.26	25.65	1.83	39.58	0.74	37.90	54.00	-16.10	A
10400.67	51.35	39.26	6.07	37.23	0.56	60.01	74.00	-13.99	P
10400.67	40.88	39.26	6.07	37.23	0.56	49.54	54.00	-4.46	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	57.93	25.65	1.83	39.58	0.74	46.57	74.00	-27.43	P
1250.00	52.48	25.65	1.83	39.58	0.74	41.12	54.00	-12.88	A
10399.70	52.67	39.26	6.07	37.23	0.56	61.33	74.00	-12.67	P
10399.70	41.06	39.26	6.07	37.23	0.56	49.72	54.00	-4.28	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11a TX / CH High		

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	55.73	25.65	1.83	39.58	0.74	44.37	74.00	-29.63	P
1250.00	49.35	25.65	1.83	39.58	0.74	37.99	54.00	-16.01	A
10480.24	50.72	39.29	6.13	37.12	0.59	59.61	74.00	-14.39	P
10480.24	40.60	39.29	6.13	37.12	0.59	49.49	54.00	-4.51	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)
1249.97	58.07	25.65	1.83	39.58	0.74	46.71	74.00	-27.29	P
1249.97	52.94	25.65	1.83	39.58	0.74	41.58	54.00	-12.42	A
10480.33	51.36	39.29	6.13	37.12	0.59	60.25	74.00	-13.75	P
10480.33	40.83	39.29	6.13	37.12	0.59	49.72	54.00	-4.28	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT20 TX / CH Low		

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)
1249.97	56.16	25.65	1.83	39.58	0.74	44.80	74.00	-29.20	P
1249.97	50.36	25.65	1.83	39.58	0.74	39.00	54.00	-15.00	A
10360.44	50.39	39.24	6.04	37.28	0.54	58.94	74.00	-15.06	P
10360.44	40.24	39.24	6.04	37.28	0.54	48.79	54.00	-5.21	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	57.62	25.65	1.83	39.58	0.74	46.26	74.00	-27.74	P
1250.00	52.33	25.65	1.83	39.58	0.74	40.97	54.00	-13.03	A
10360.24	50.93	39.24	6.04	37.28	0.54	59.47	74.00	-14.53	P
10360.24	40.57	39.24	6.04	37.28	0.54	49.11	54.00	-4.89	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT20 TX / CH Middle		

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	55.72	25.65	1.83	39.58	0.74	44.36	74.00	-29.64	P
1250.00	49.16	25.65	1.83	39.58	0.74	37.80	54.00	-16.20	A
10400.33	49.63	39.26	6.07	37.23	0.56	58.29	74.00	-15.71	P
10400.33	39.51	39.26	6.07	37.23	0.56	48.17	54.00	-5.83	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	57.14	25.65	1.83	39.58	0.74	45.78	74.00	-28.22	P
1250.02	52.39	25.65	1.83	39.58	0.74	41.03	54.00	-12.97	A
10400.17	50.36	39.26	6.07	37.23	0.56	59.02	74.00	-14.98	P
10400.17	39.58	39.26	6.07	37.23	0.56	48.24	54.00	-5.76	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT20 TX / CH High		

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	55.72	25.65	1.83	39.58	0.74	44.36	74.00	-29.64	P
1250.01	49.95	25.65	1.83	39.58	0.74	38.59	54.00	-15.41	A
10480.09	50.88	39.29	6.13	37.12	0.59	59.77	74.00	-14.23	P
10480.09	40.36	39.29	6.13	37.12	0.59	49.25	54.00	-4.75	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	58.93	25.65	1.83	39.58	0.74	47.57	74.00	-26.43	P
1250.01	53.14	25.65	1.83	39.58	0.74	41.78	54.00	-12.22	A
10480.34	51.50	39.29	6.13	37.12	0.59	60.39	74.00	-13.61	P
10480.34	40.60	39.29	6.13	37.12	0.59	49.49	54.00	-4.51	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT40 TX / CH Low		

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)
1250.03	55.73	25.65	1.83	39.58	0.74	44.37	74.00	-29.63	P
1250.03	50.20	25.65	1.83	39.58	0.74	38.84	54.00	-15.16	A
10360.07	50.12	39.24	6.04	37.28	0.54	58.66	74.00	-15.34	P
10360.07	39.63	39.24	6.04	37.28	0.54	48.17	54.00	-5.83	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	57.24	25.65	1.83	39.58	0.74	45.88	74.00	-28.12	P
1250.02	52.70	25.65	1.83	39.58	0.74	41.34	54.00	-12.66	A
10360.19	51.36	39.24	6.04	37.28	0.54	59.90	74.00	-14.10	P
10360.19	40.35	39.24	6.04	37.28	0.54	48.89	54.00	-5.11	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT40 TX / CH Middle		

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	55.43	25.65	1.83	39.58	0.74	44.07	74.00	-29.93	P
1250.00	49.93	25.65	1.83	39.58	0.74	38.57	54.00	-15.43	A
10400.36	50.16	39.26	6.07	37.23	0.56	58.82	74.00	-15.18	P
10400.36	39.52	39.26	6.07	37.23	0.56	48.18	54.00	-5.82	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)
1249.98	57.92	25.65	1.83	39.58	0.74	46.56	74.00	-27.44	P
1249.98	52.37	25.65	1.83	39.58	0.74	41.01	54.00	-12.99	A
10400.55	51.24	39.26	6.07	37.23	0.56	59.90	74.00	-14.10	P
10400.55	40.88	39.26	6.07	37.23	0.56	49.54	54.00	-4.46	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.*

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Model	NBG5615	Test By	John Chen
TEMP & Humidity	23.1°C, 47%	Test Date	2012/12/28
Test Mode	IEEE 802.11n HT40 TX / CH High		

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)
1250.02	56.90	25.65	1.83	39.58	0.74	45.54	74.00	-28.46	P
1250.02	51.26	25.65	1.83	39.58	0.74	39.90	54.00	-14.10	A
10440.27	50.04	39.28	6.10	37.17	0.58	58.82	74.00	-15.18	P
10440.27	38.94	39.28	6.10	37.17	0.58	47.72	54.00	-6.28	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	58.42	25.65	1.83	39.58	0.74	47.06	74.00	-26.94	P
1250.00	53.10	25.65	1.83	39.58	0.74	41.74	54.00	-12.26	A
10439.81	51.23	39.28	6.10	37.17	0.58	60.01	74.00	-13.99	P
10439.81	40.76	39.28	6.10	37.17	0.58	49.54	54.00	-4.46	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.*

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