EN 300 328 v1.7.1

TEST REPORT

FOR

802.11 gn 1x1 SISO NETWORKING DEVICE

MODEL NUMBER: UNIFI AP MINI

REPORT NUMBER: 11U14006-3

ISSUE DATE: FEBRUARY 7, 2012

Prepared for
UBIQUITI NETWORKS
91 E. TASMAN Drive, SUITE 150
SAN JOSE, CA 95134, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	2/07/2012	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: UBIQUITI NETWORKS
91E TASMAN DRIVE,
SAN JOSE 95134, U.S.A.

EUT DESCRIPTION: 802.11 gn 1X1 SISO NETWORKING DEVICE

MODEL: UniFi AP Mini

SERIAL NUMBER: 03055 for Emissions Unit and
03057 for Conducted Unit

DATE TESTED: August 26, 2011- October 15, 2011
January 25 – February 3, 2012

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
EN 300 328 v1.7.1	PASS

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:

STEVE AGUILAR
EMC TECHNICIAN
UL CCS

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented in EN 300 328 v1.7.1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency	3.5 x 10^(-8)
Total RF power, conducted	0.47 dB
RF power density, conducted	0.55 dB
Spurious emissions, conducted	2.94 dB
All emissions, radiated	5.64 dB
Temperature	0.9 deg C
Humidity	4.5 % RH
DC and low frequency voltages	0.45 %

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11gn SISO transceiver.

The radio module is manufactured by Ubiquiti Network.

5.2. MAXIMUM OUTPUT POWER

The highest conducted output power under normal environmental conditions in each mode is as follows:

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 – 2472	802.11g	16.36	43.3
2412 – 2472	802.11n HT20	16.94	49.4
2422 – 2462	802.11n HT40	16.56	45.3

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of 3 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Art2_Ver_2_54BIN_Mini.

The test utility software used during testing was Start_ Art “mytx_2g”

Firmware is AirOS v5.5

5.5. WORST-CASE CONFIGURATIONS

The following worst-case data rates, as provided by the client, were used for the testing purpose:
802.11g mode = 6 Mbps
802.11n 20MHz mode = MCS0
802.11n 40MHz mode = MCS0

The EUT has two positions, either wall mounted or ceiling mounted, the two positions were investigated and it was found that ceiling-mounted orientation is worst-case; therefore, final testing was performed with the EUT orientated as ceiling-mounted (flat on the table).

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	Vostro 1520	00144-365-878-185	N/A
AC/DC Adapter	Dell	HA65NS2-00	CN-0MN44-47890-965-D26H-A02	N/A
Carrire PoE	Ubiquiti	UBI-POE-24-1	1101-0009610	DoC

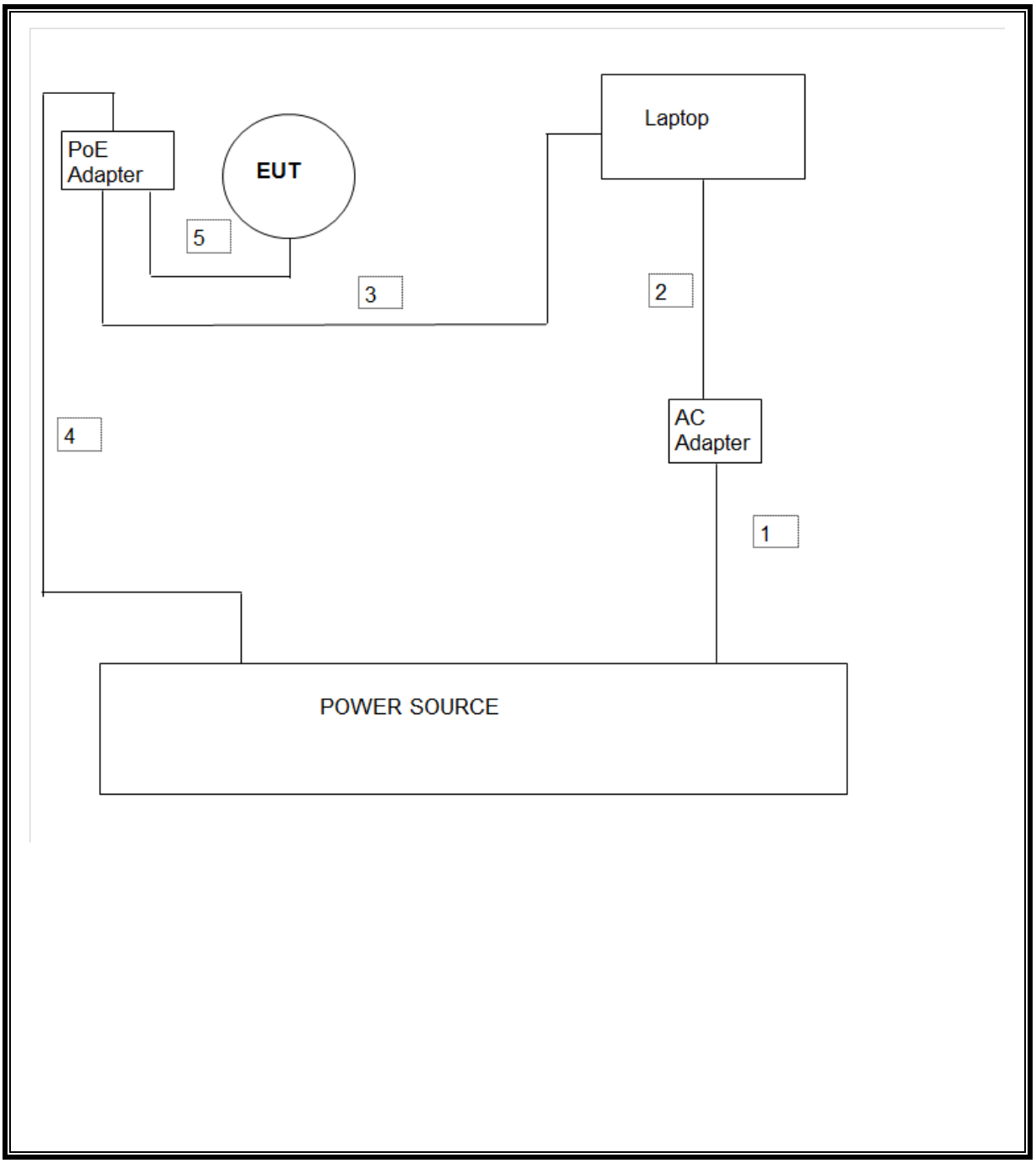
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	USA115VAC	Unshielded	0.8 m	N/A
2	DC	1	DC Plug	Unshielded	1 m	Ferrite at Laptop
3	WLAN	1	RJ45	Shielded	1.8 m	N/A
4	AC	1	USA115VAC	Unshielded	0.5 m	N/A
5	PoE	1	DC Plug	Shielded	1.8 m	N/A

TEST SETUP

The EUT is connected to a host laptop computer and powered by the PoE adapter during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	6/13/2011	7/12/2012
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01048	7/16/2011	7/16/2012
BiLog Antenna	ETS	3117	C01005	7/25/2011	7/25/2012
Antenna, Horn, 18 GHz	EMCO	3115	C00945	6/26/2011	6/26/2012
Power meter	Agilent	E4416A	PPM3	3/22/2011	3/22/2012
Power Sensor	Agilent	E9327A	T233	3/22/2011	3/22/2012
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	8/11/2011	8/11/2012
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	4/20/2011	4/20/2012

7. TEST RESULTS

7.1. NORMAL AND EXTREME CONDITIONS

LIMITS

None; For reporting purposes only.

RESULTS

Normal conditions are 25°C, 230 VAC.
The low temperature condition is 0 °C.
The high temperature condition is 35 °C.
The low voltage condition is 207 VAC.
The high voltage condition is 253 VAC.

7.2. DUTY CYCLE

LIMITS

None; for reporting purposes only.

RESULTS

Mode	Tx on (usec)	Tx on + Tx off (usec)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11g	1353	1413	95.75	0.19
802.11n HT20	1260	1323	95.24	0.21
802.11n HT40	628.3	678.9	92.55	0.34

7.3. EFFECIVE RADIATED POWER

LIMIT

ETSI EN 300 328 Clause 4.3.1.2

The equivalent isotropic radiated power (e.i.r.p.) shall be equal to or less than 100 mW (20 dBm) over normal and extreme conditions. This limit shall apply for any combination of power level and intended antenna assembly.

TEST PROCEDURE

ETSI EN 300 328 Clause 5.7.2

CALCULATIONS

Output Power = Measured Power + Test Cable Loss + Duty Cycle Factor

EIRP = Output Power + EUT Antenna Gain

RESULTS

7.3.1. 802.11g MODE

EUT Antenna Gain (dBi) =	3.0
Duty Cycle Factor (dB) =	0.19
Test Cable Loss (dB) =	7.4

Condition	Measured Power (dBm)	Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2412 MHz					
Normal	5.63	13.25	16.25	20	-3.75
Extreme T low, V low	4.88	12.5	15.50	20	-4.50
Extreme T low, V high	4.94	12.56	15.56	20	-4.44
Extreme T high V low	5.82	13.44	16.44	20	-3.56
Extreme T high, V high	5.87	13.49	16.49	20	-3.51
2442 MHz					
Normal	8.73	16.35	19.35	20	-0.65
Extreme T low, V low	8.35	15.97	18.97	20	-1.03
Extreme T low, V high	8.43	16.05	19.05	20	-0.95
Extreme T high V low	8.67	16.29	19.29	20	-0.71
Extreme T high, V high	8.69	16.31	19.31	20	-0.69
2472 MHz					
Normal	4.93	12.55	15.55	20	-4.45
Extreme T low, V low	5.28	12.9	15.90	20	-4.10
Extreme T low, V high	5.29	12.91	15.91	20	-4.09
Extreme T high V low	4.73	12.35	15.35	20	-4.65
Extreme T high, V high	4.75	12.37	15.37	20	-4.63

7.3.2. 802.11n HT20 MODE

EUT Antenna Gain (dBi) =	3.0
Duty Cycle Factor (dB) =	0.21
Test Cable Loss (dB) =	7.4

Condition	Measured Power (dBm)	Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2412 MHz					
Normal	5.49	13.13	16.13	20	-3.87
Extreme T low, V low	4.80	12.44	15.44	20	-4.56
Extreme T low, V high	4.80	12.44	15.44	20	-4.56
Extreme T high V low	5.55	13.19	16.19	20	-3.81
Extreme T high, V high	5.56	13.2	16.20	20	-3.80
2442 MHz					
Normal	9.30	16.94	19.94	20	-0.06
Extreme T low, V low	9.14	16.78	19.78	20	-0.22
Extreme T low, V high	9.14	16.78	19.78	20	-0.22
Extreme T high V low	9.22	16.86	19.86	20	-0.14
Extreme T high, V high	9.23	16.87	19.87	20	-0.13
2472 MHz					
Normal	4.21	11.85	14.85	20	-5.15
Extreme T low, V low	4.53	12.17	15.17	20	-4.83
Extreme T low, V high	4.51	12.15	15.15	20	-4.85
Extreme T high V low	4.05	11.69	14.69	20	-5.31
Extreme T high, V high	4.07	11.71	14.71	20	-5.29

7.3.3. 802.11n HT40 MODE

EUT Antenna Gain (dBi) =	3.0
Duty Cycle Factor (dB) =	0.34
Test Cable Loss (dB) =	7.4

Condition	Measured Power (dBm)	Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2422 MHz					
Normal	6.15	13.92	16.92	20	-3.08
Extreme T low, V low	5.71	13.48	16.48	20	-3.52
Extreme T low, V high	5.73	13.5	16.50	20	-3.50
Extreme T high V low	6.11	13.88	16.88	20	-3.12
Extreme T high, V high	6.13	13.9	16.90	20	-3.10
2442 MHz					
Normal	8.79	16.56	19.56	20	-0.44
Extreme T low, V low	8.75	16.52	19.52	20	-0.48
Extreme T low, V high	8.76	16.53	19.53	20	-0.47
Extreme T high V low	8.62	16.39	19.39	20	-0.61
Extreme T high, V high	8.62	16.39	19.39	20	-0.61
2462 MHz					
Normal	5.12	12.89	15.89	20	-4.11
Extreme T low, V low	5.40	13.17	16.17	20	-3.83
Extreme T low, V high	5.40	13.17	16.17	20	-3.83
Extreme T high V low	4.88	12.65	15.65	20	-4.35
Extreme T high, V high	4.89	12.66	15.66	20	-4.34

7.4. SPECTRAL POWER DENSITY

LIMIT

ETSI EN 300 328 Clause 4.3.2.2

For wide band modulations other then FHSS (e.g. DSSS, OFDM, etc.), the maximum e.i.r.p. spectral density is limited to 10 mW (10 dBm) per MHz.

TEST PROCEDURE

ETSI EN 300 328 Clause 5.7.3.1

CALCULATIONS

Power Density (dBm/MHz) EIRP =
Measured Power Density (dBm/MHz) + Duty Cycle Factor (dB) + EUT Antenna Gain (dBi)

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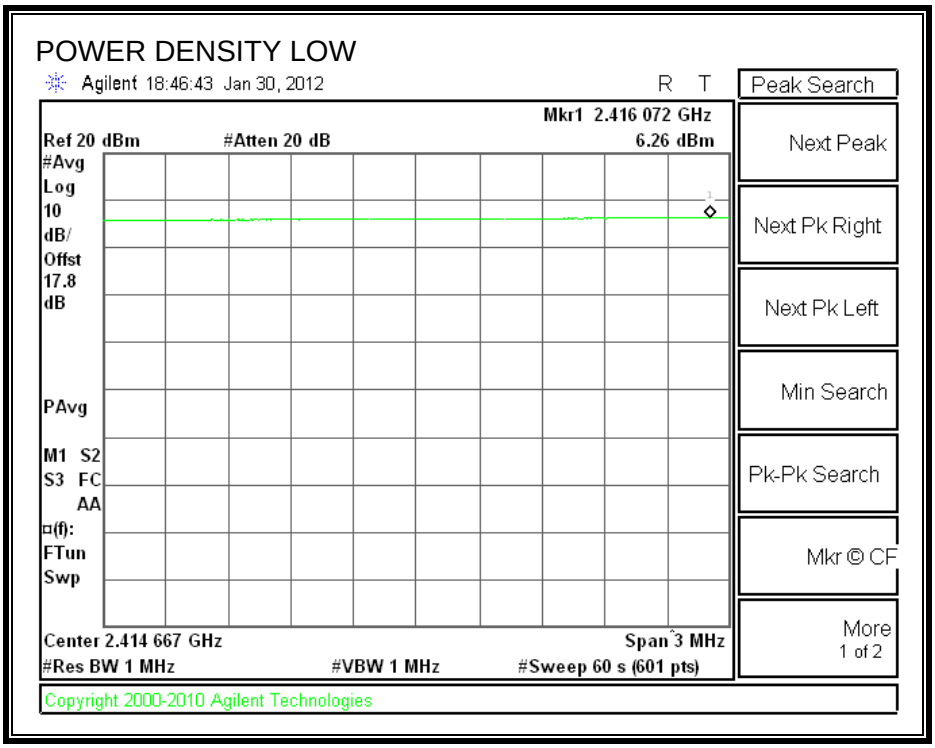
RESULTS

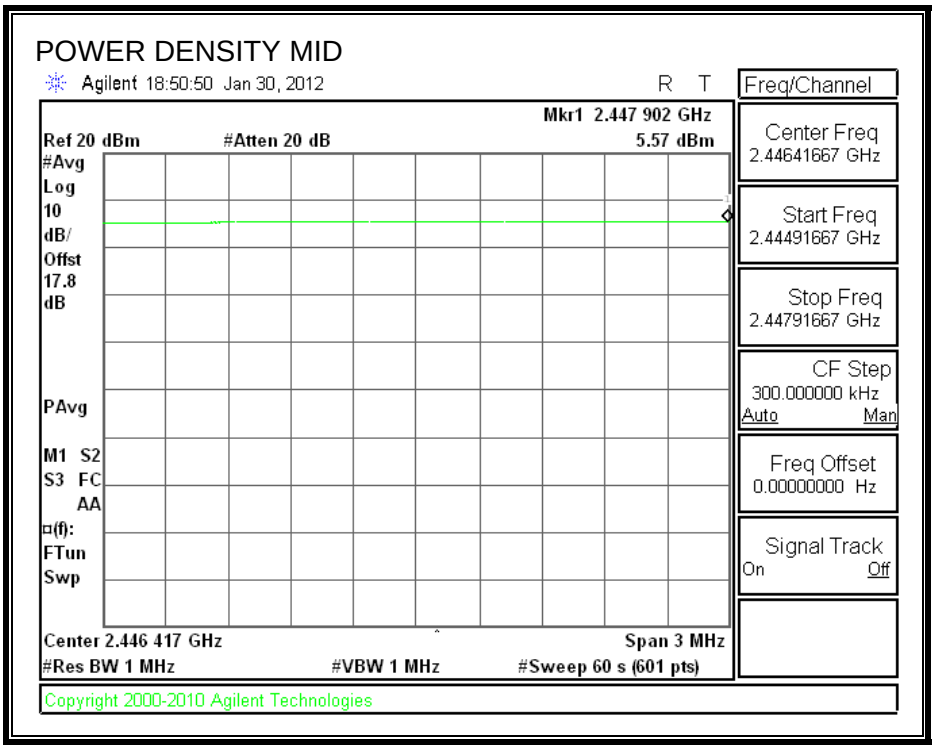
7.4.1. 802.11g MODE

EUT Antenna Gain (dBi) =	**3.0**
Duty Cycle Factor (dB) =	**0.19**

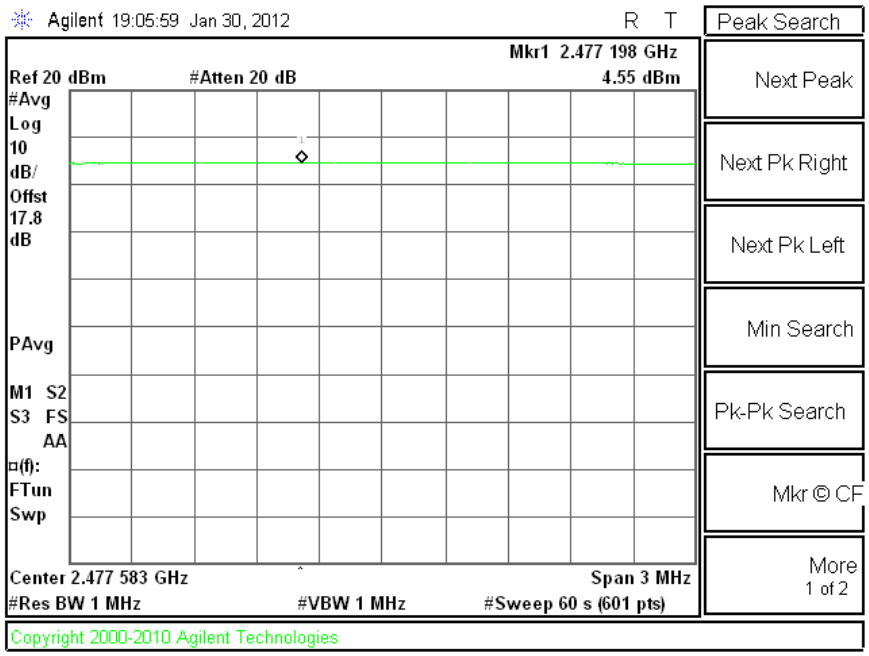
Frequency (MHz)	Measured Density (dBm/MHz)	Power Density (dBm/MHz) EIRP	Limit (dBm/MHz) EIRP	Margin (dB)
2412	6.26	9.45	10	-0.55
2442	5.57	8.76	10	-1.24
2472	4.55	7.74	10	-2.26

POWER DENSITY





POWER DENSITY HIGH

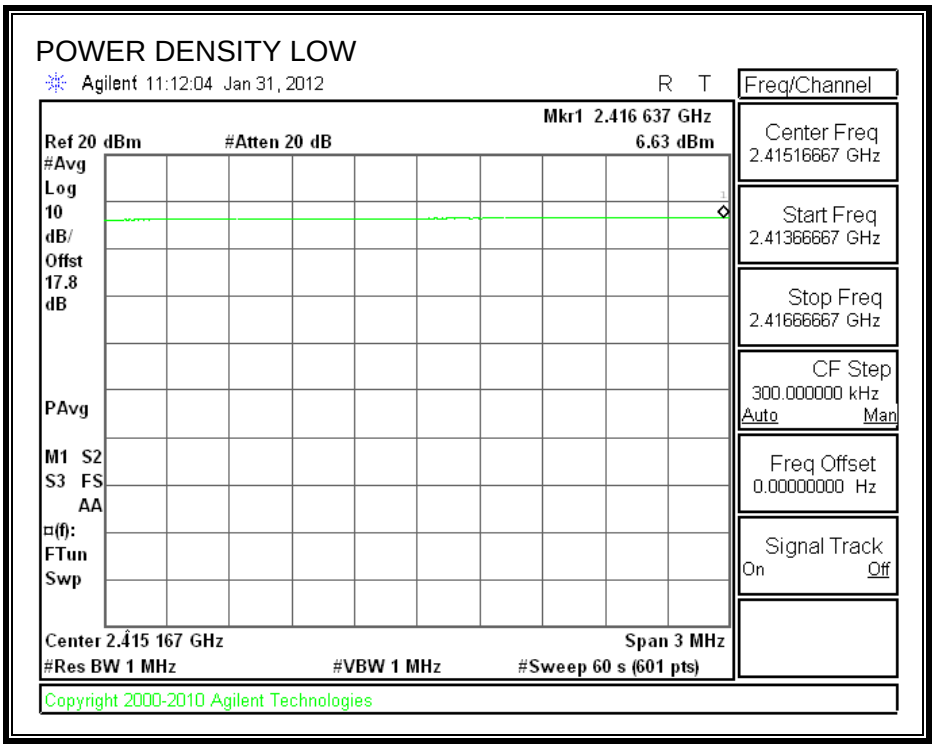


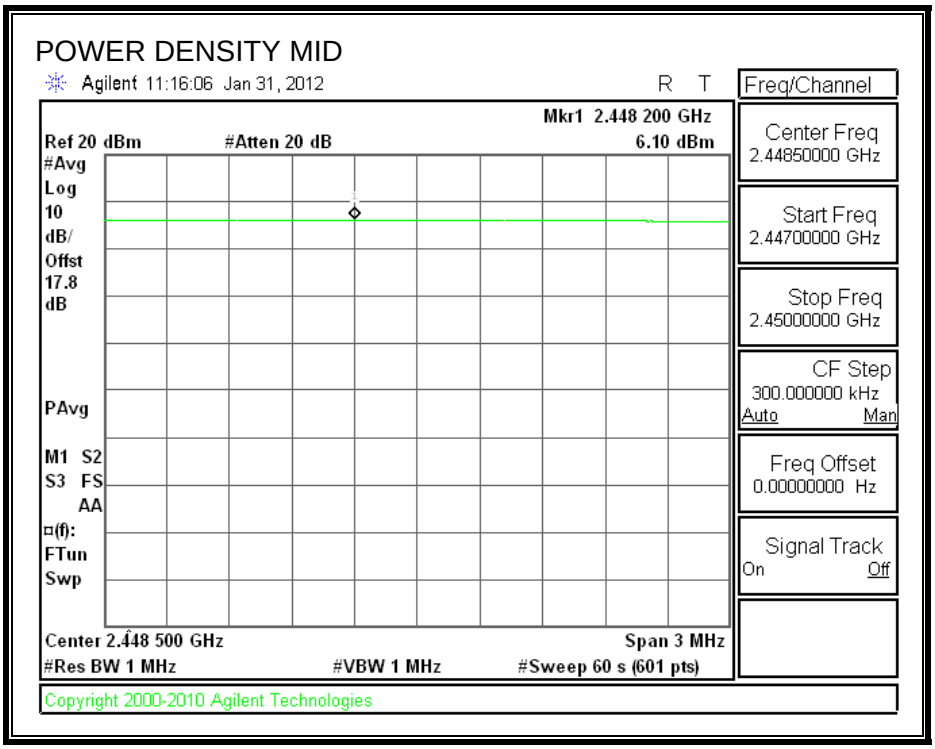
7.4.2. 802.11n HT20 MODE

EUT Antenna Gain (dBi) =	**3.0**
Duty Cycle Factor (dB) =	**0.21**

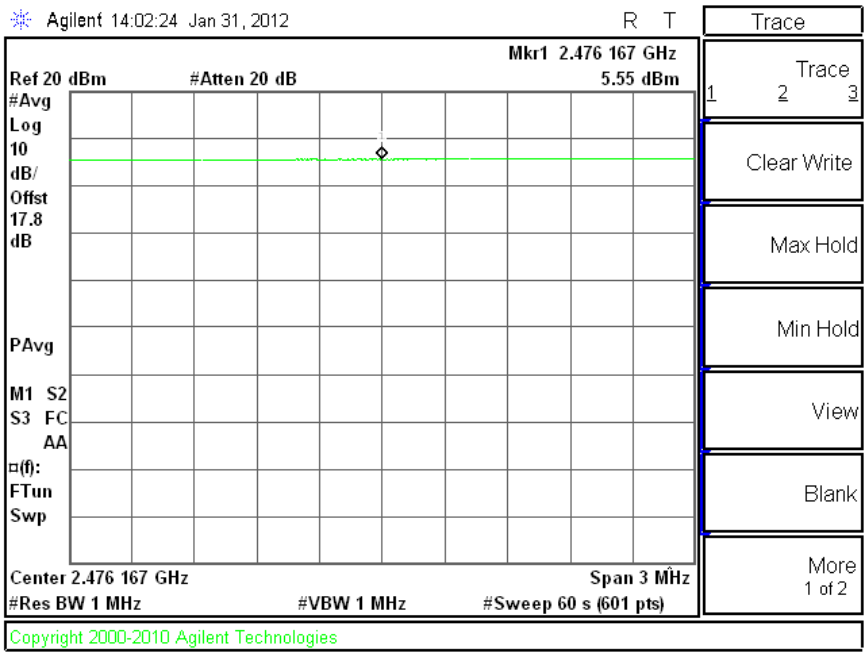
Frequency (MHz)	Measured Density (dBm/MHz)	Power Density (dBm/MHz) EIRP	Limit (dBm/MHz) EIRP	Margin (dB)
2412	6.63	9.84	10	-0.16
2442	6.10	9.31	10	-0.69
2472	5.55	8.76	10	-1.24

POWER DENSITY





POWER DENSITY HIGH

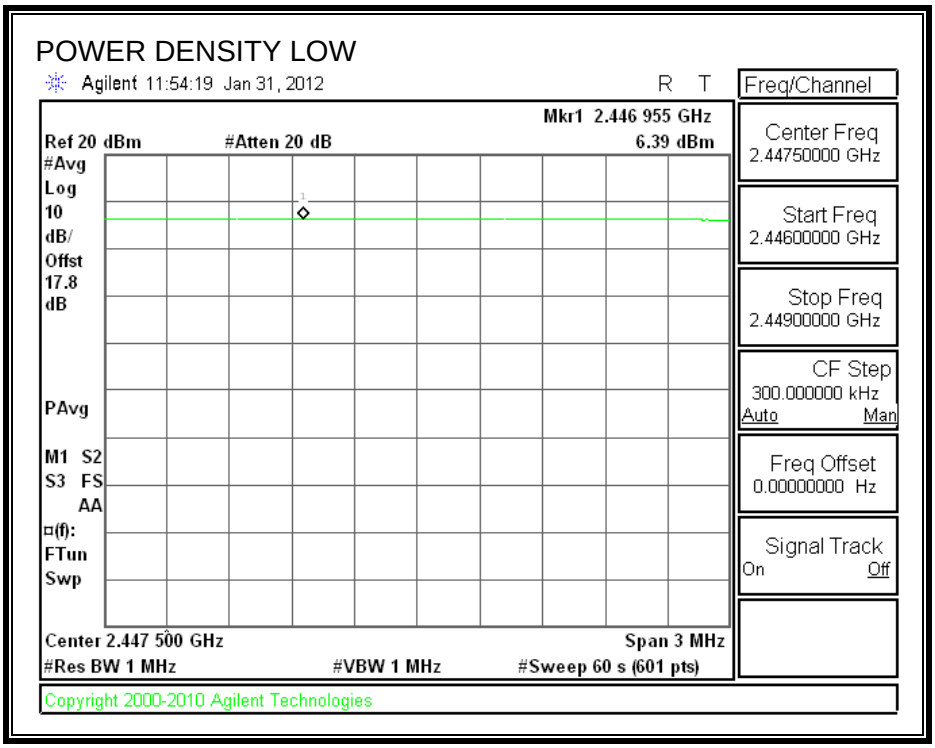


7.4.3. 802.11n HT40 MODE

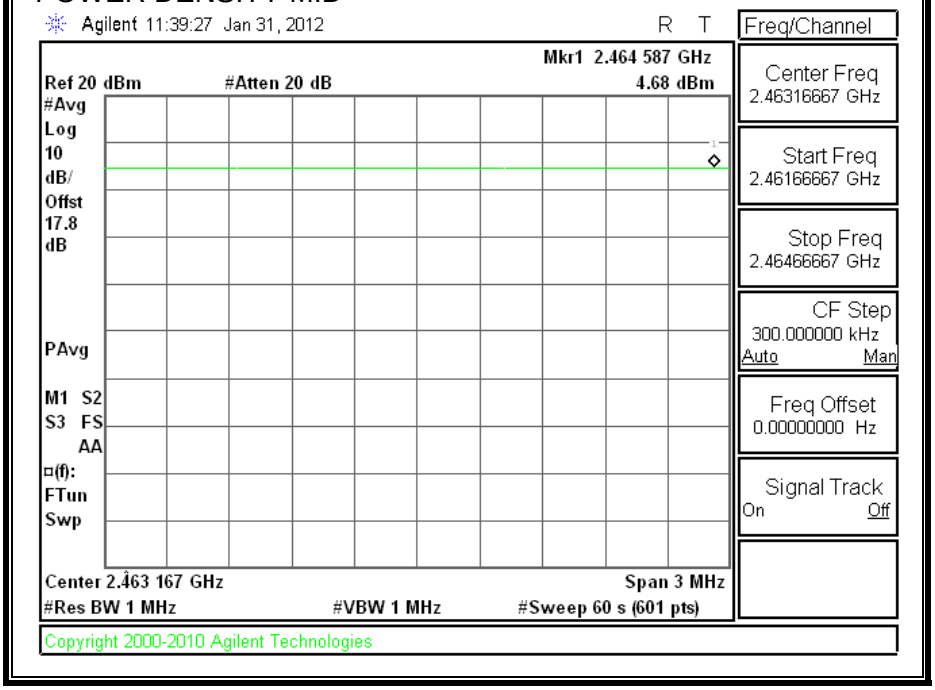
EUT Antenna Gain (dBi) =	**3.0**
Duty Cycle Factor (dB) =	**0.34**

Frequency (MHz)	Measured Density (dBm/MHz)	Power Density (dBm/MHz) EIRP	Limit (dBm/MHz) EIRP	Margin (dB)
2422	6.39	9.73	10	-0.27
2442	4.68	8.02	10	-1.98
2462	2.47	5.81	10	-4.19

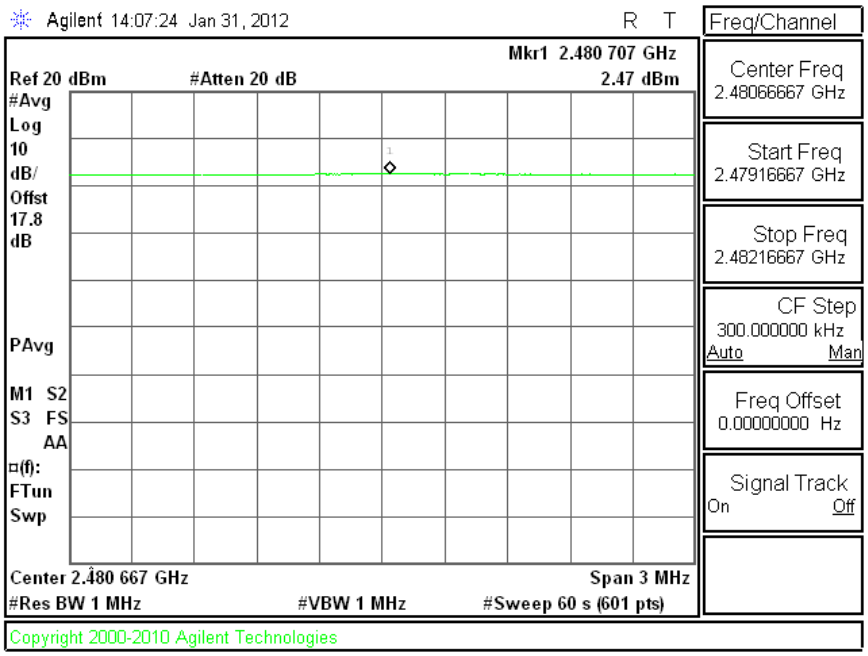
POWER DENSITY



POWER DENSITY MID



POWER DENSITY HIGH



7.5. FREQUENCY RANGE

LIMIT

ETSI EN 300 328 Clause 4.3.3.2

For all equipment the frequency range shall lie within the band 2,4 GHz to 2,4835 GHz (f_L > 2,4 GHz and f_H < 2,4835 GHz), over Normal and Extreme conditions.

TEST PROCEDURE

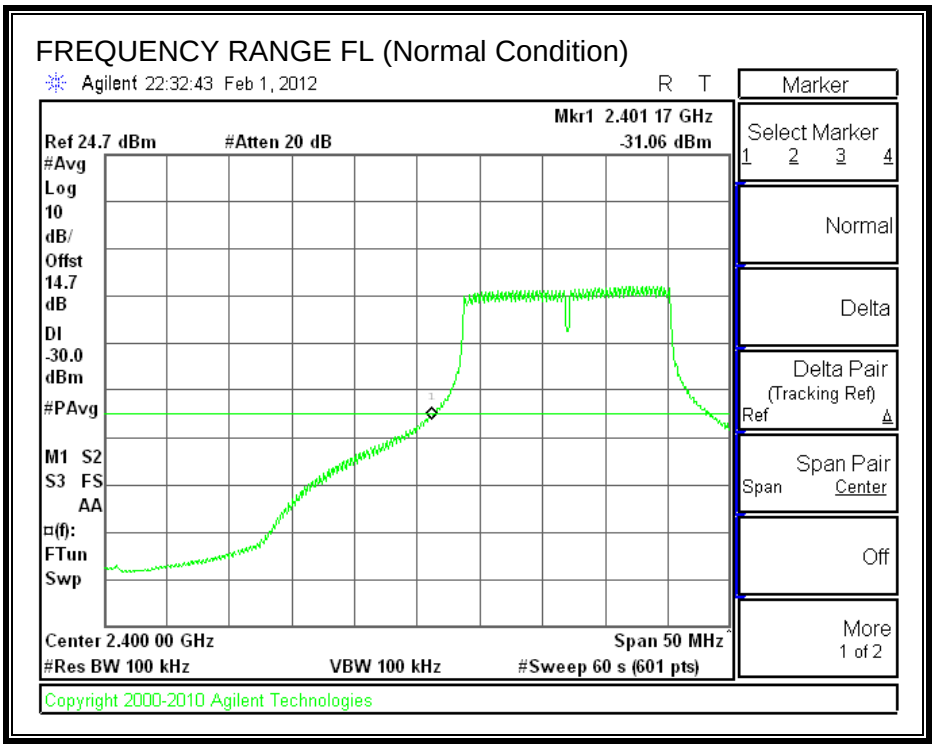
ETSI EN 300 328 Clause 5.7.4.1

REF LEVEL OFFSET = EUT Antenna Gain + Test Cable Loss + Attenuator + Duty Cycle Factor

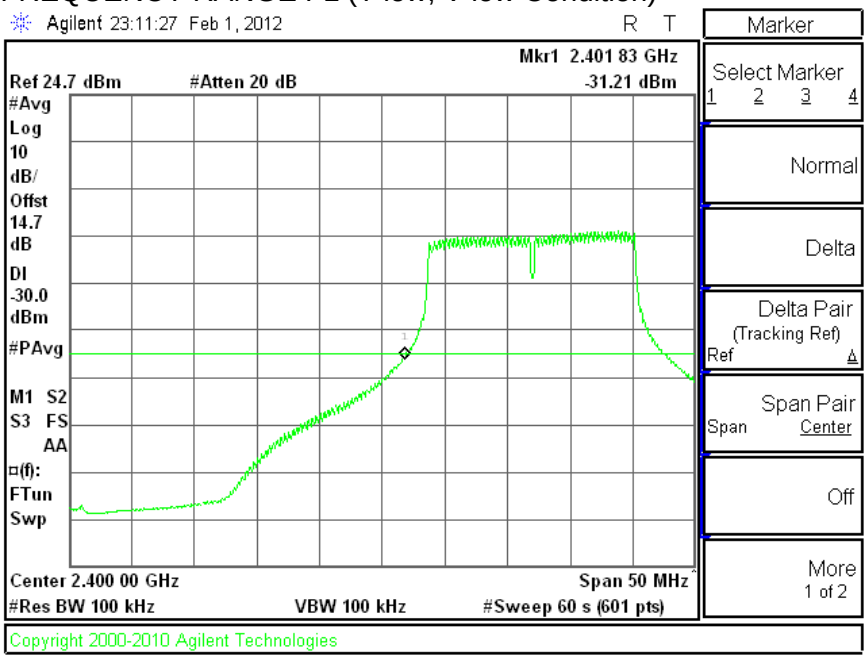
7.5.1. 802.11g MODE

Limit	2400 Minimum	2483.5 Maximum
Condition	F low (MHz)	F high (MHz)
Normal	2401.17	2482.50
Extreme T low, V low	2401.83	2483.42
Extreme T low, V high	2431.83	2483.33
Extreme T high V low	2401.08	2482.75
Extreme T high, V high	2401.17	2482.50

FREQUENCY RANGE F LOW



FREQUENCY RANGE FL (T low, V low Condition)



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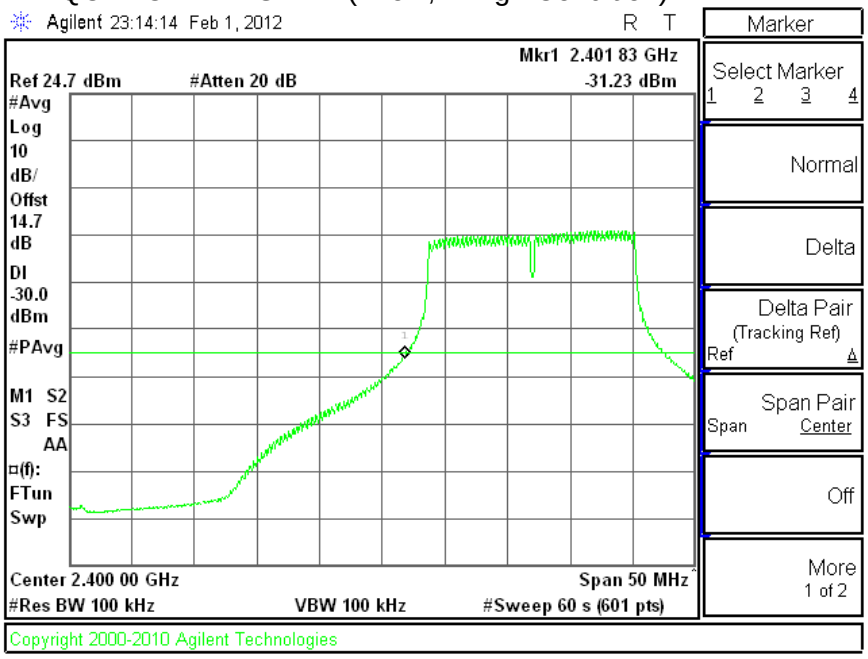
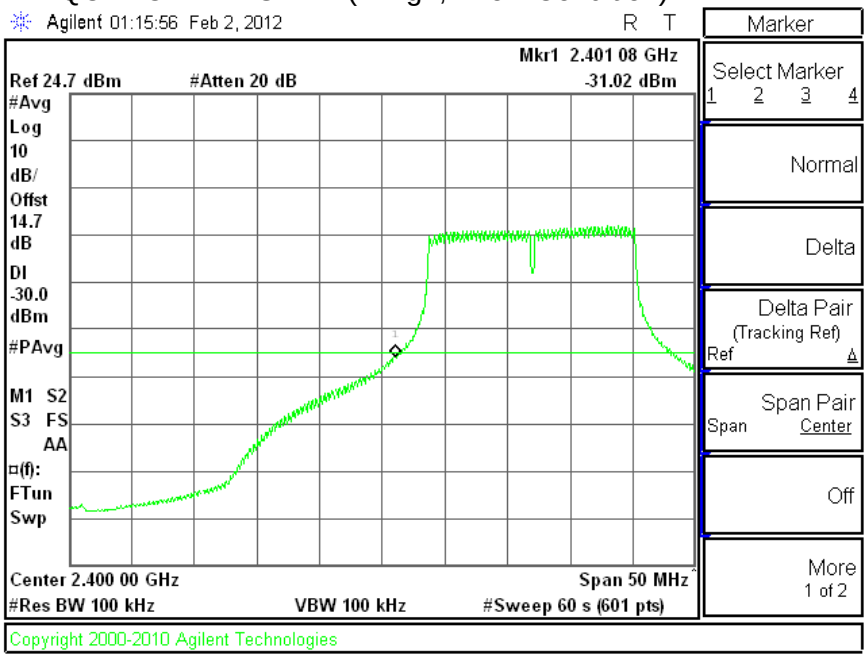


FREQUENCY RANGE FL (T high, V low Condition)



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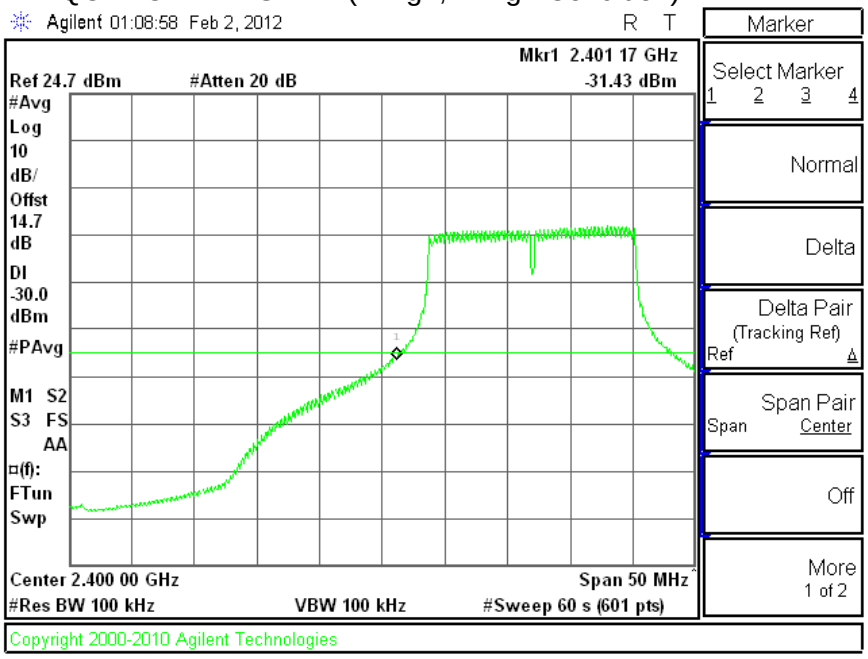
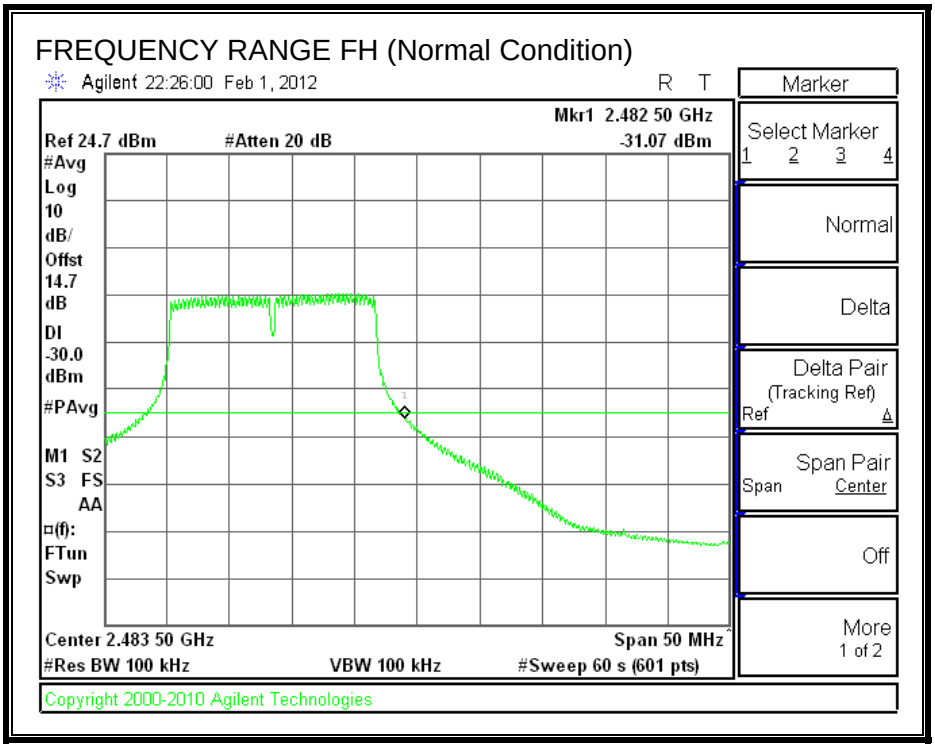


FREQUENCY RANGE F HIGH



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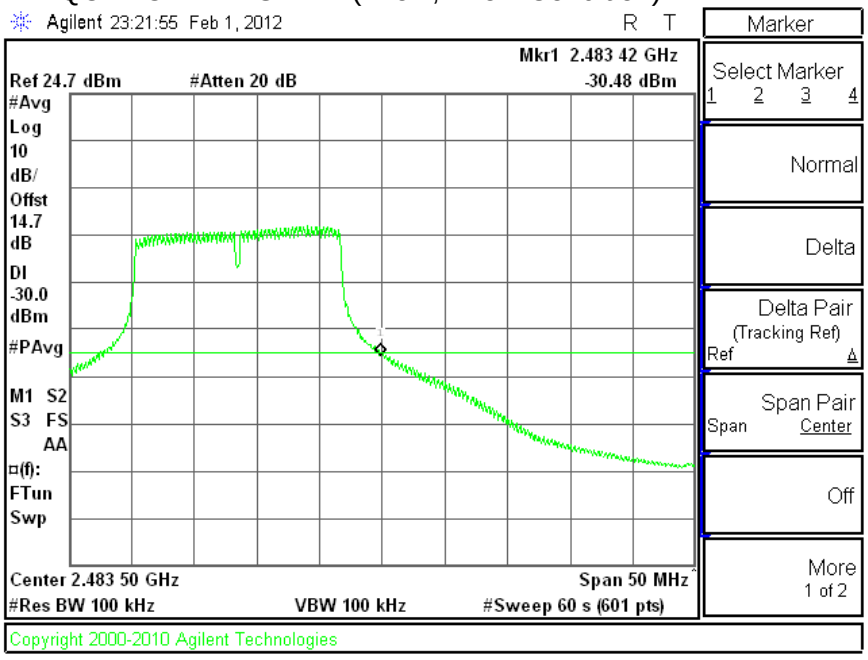
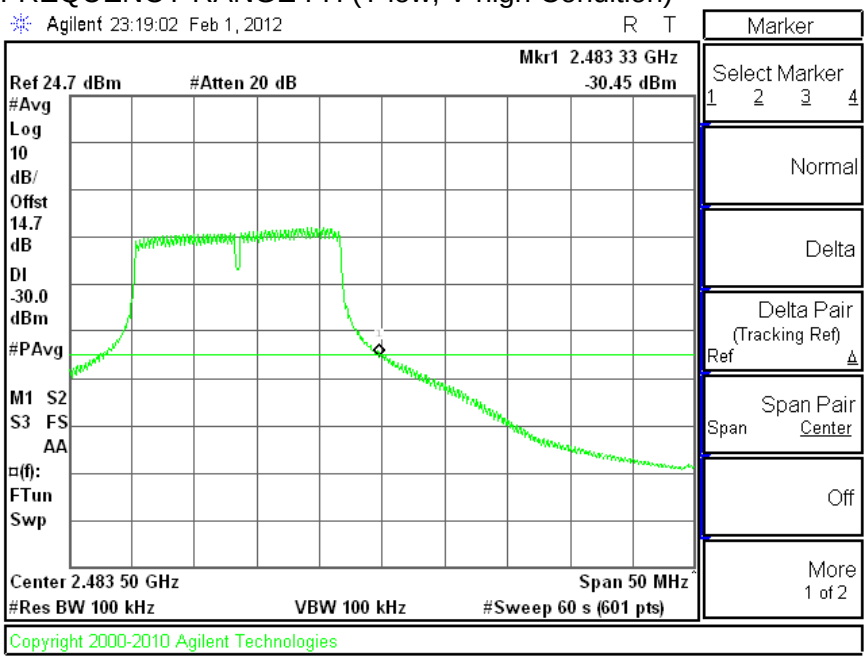
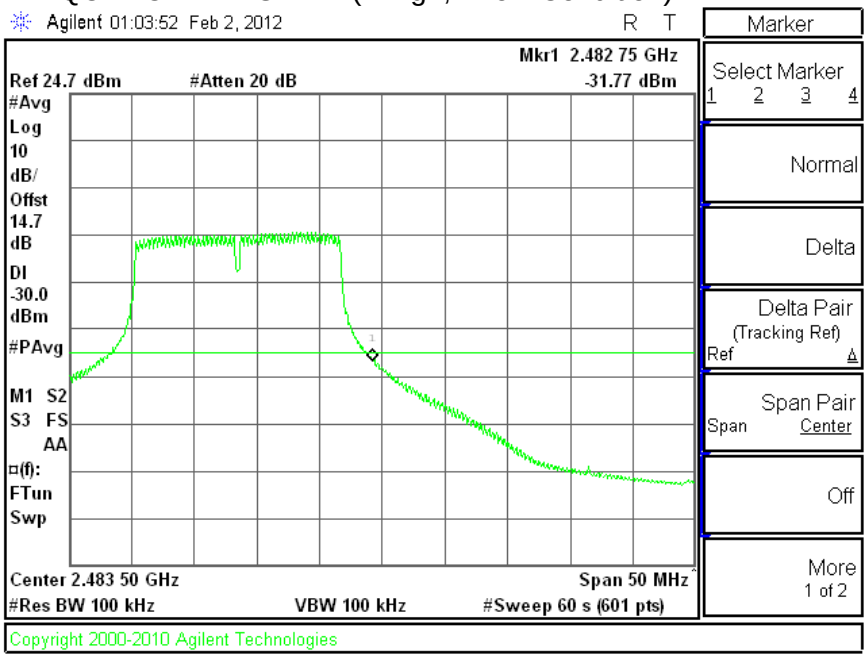


FREQUENCY RANGE FH (T low, V high Condition)



FREQUENCY RANGE FH (T high, V low Condition)



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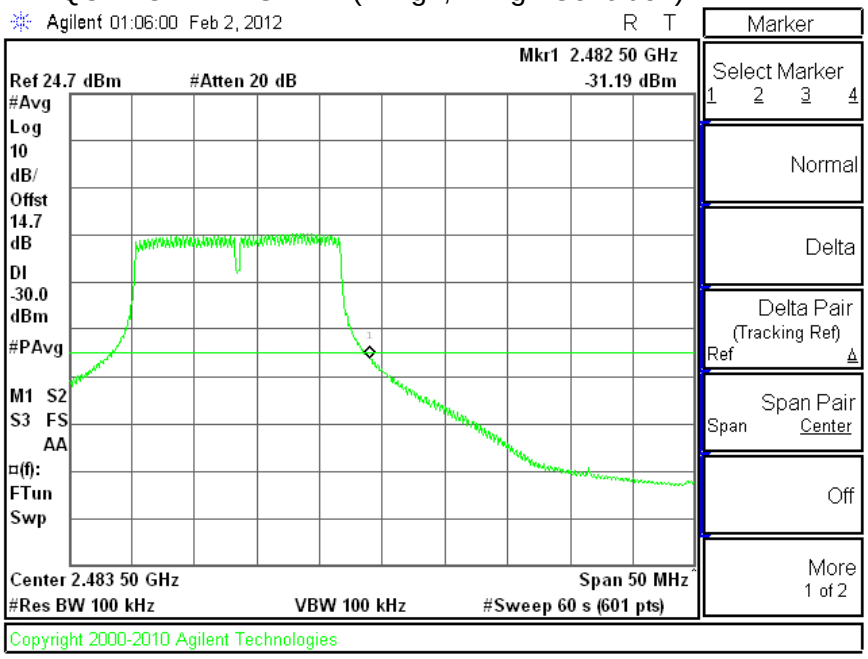
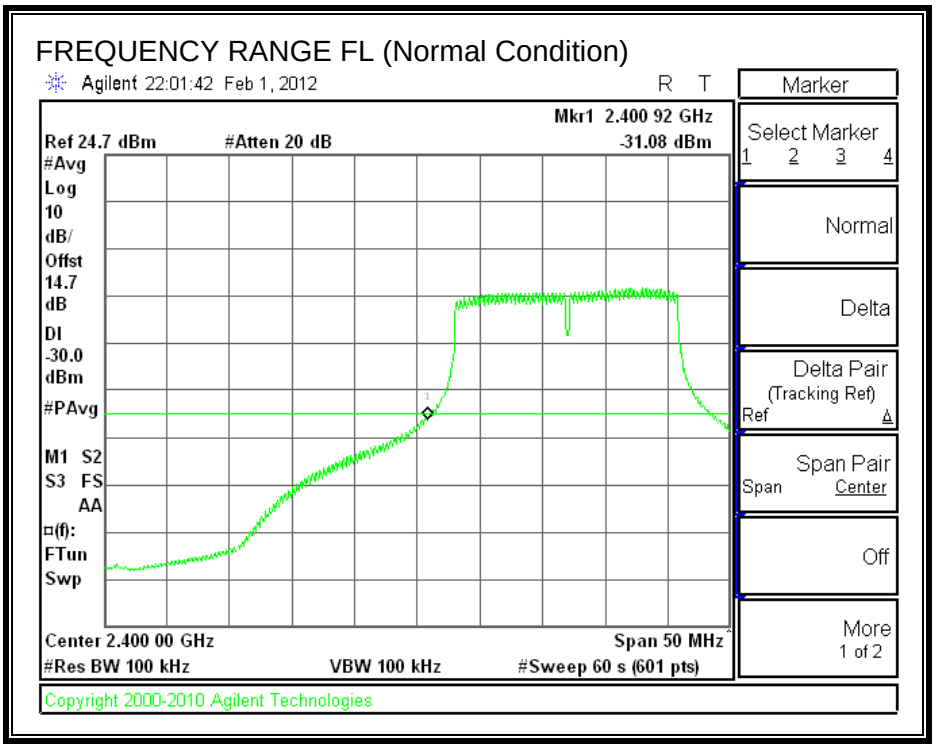


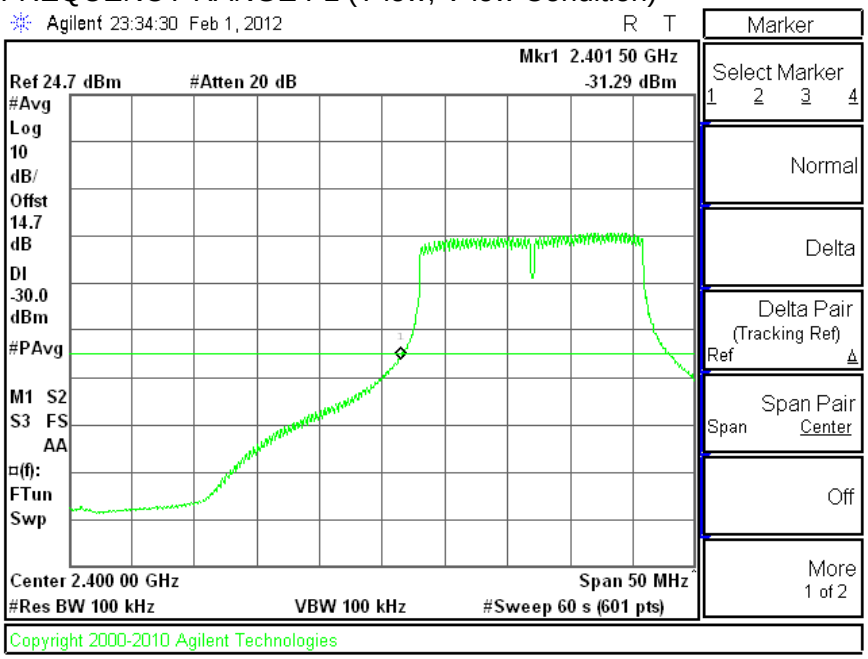
7.5.2. 802.11n HT20 MODE

Limit	2400 Minimum	2483.5 Maximum
Condition	F low (MHz)	F high (MHz)
Normal	2400.92	2482.67
Extreme T low, V low	2401.50	2483.33
Extreme T low, V high	2401.50	2483.42
Extreme T high V low	2400.92	2482.42
Extreme T high, V high	2400.92	2482.42

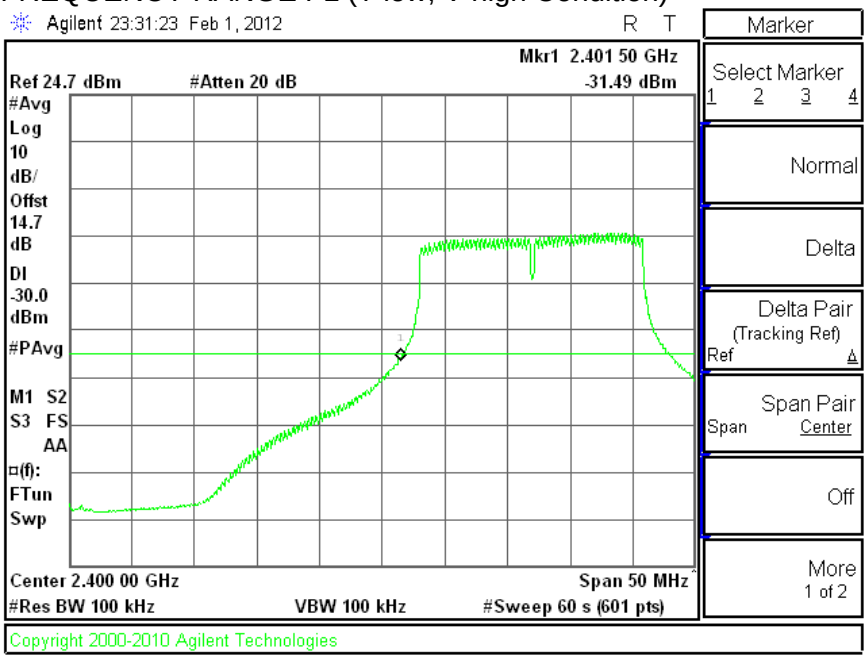
FREQUENCY RANGE F LOW



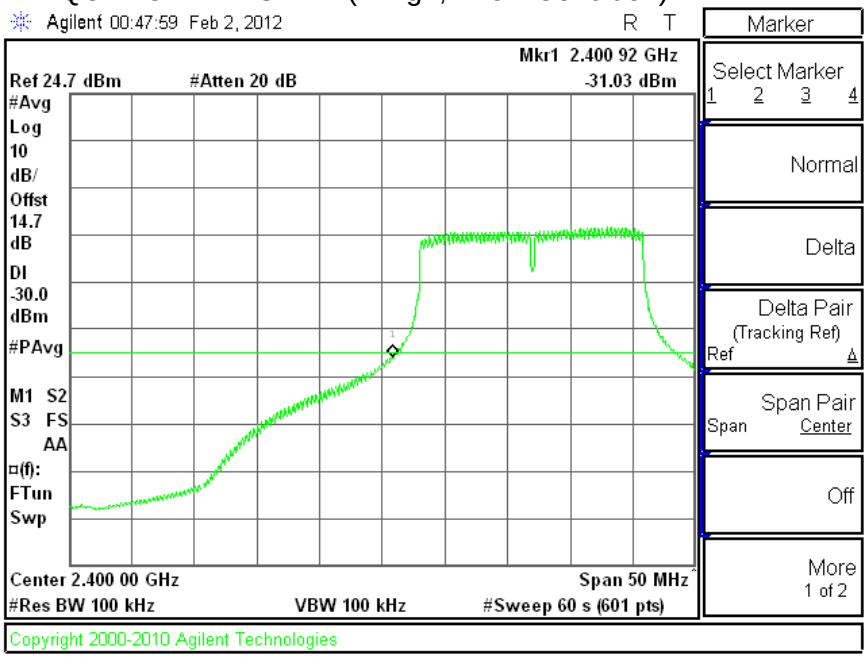
FREQUENCY RANGE FL (T low, V low Condition)



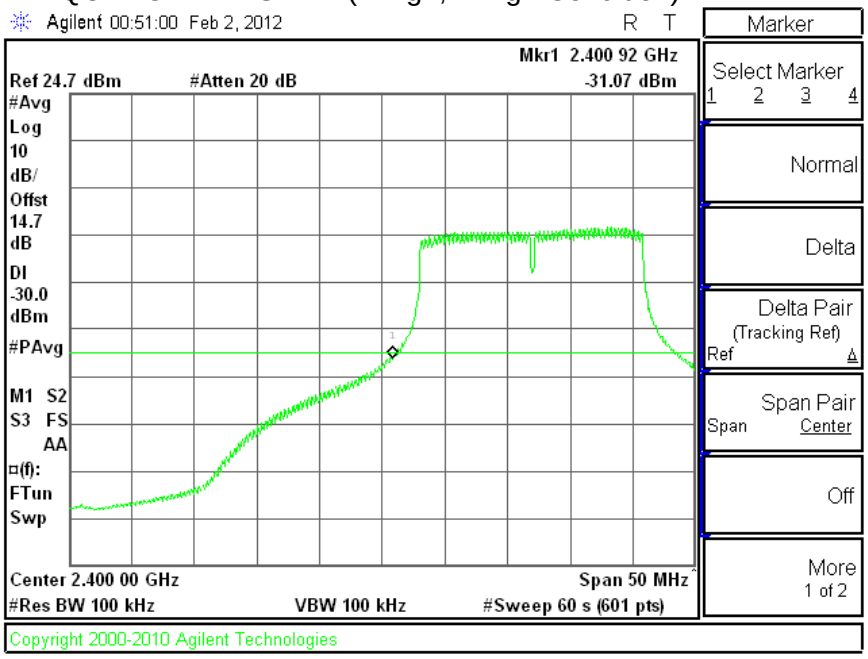
FREQUENCY RANGE FL (T low, V high Condition)



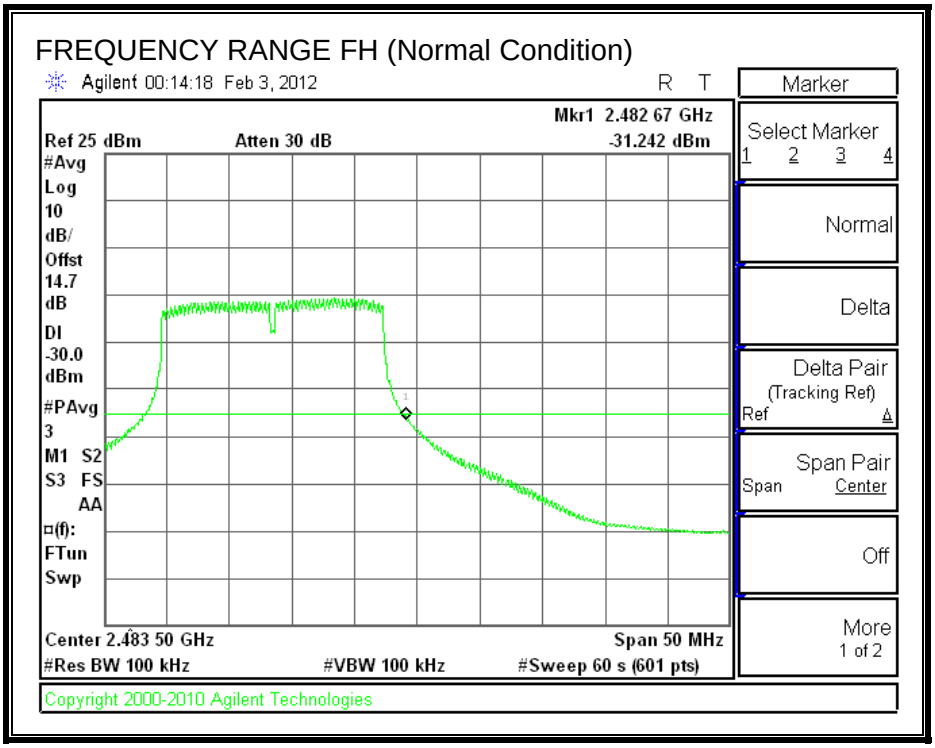
FREQUENCY RANGE FL (T high, V low Condition)



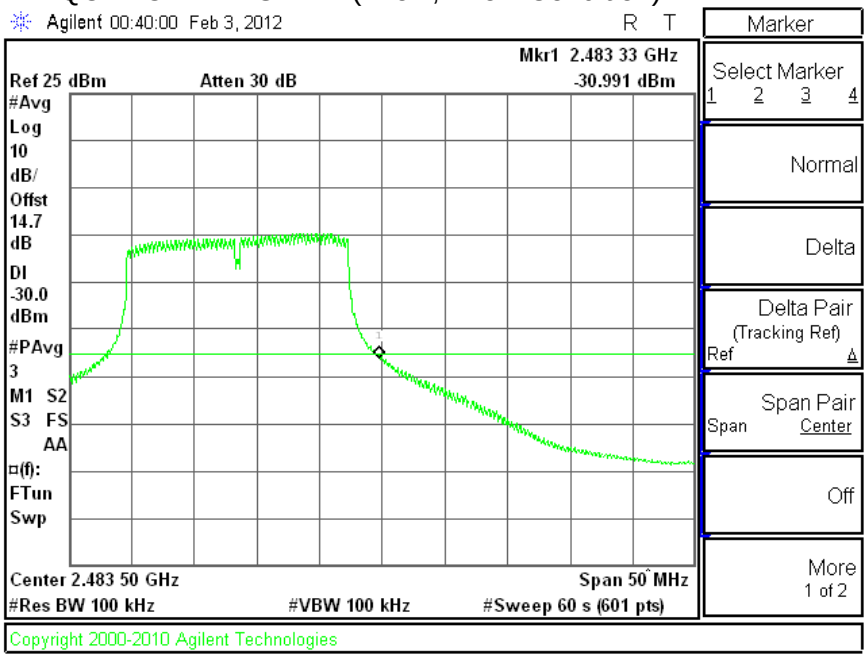
FREQUENCY RANGE FL (T high, V high Condition)



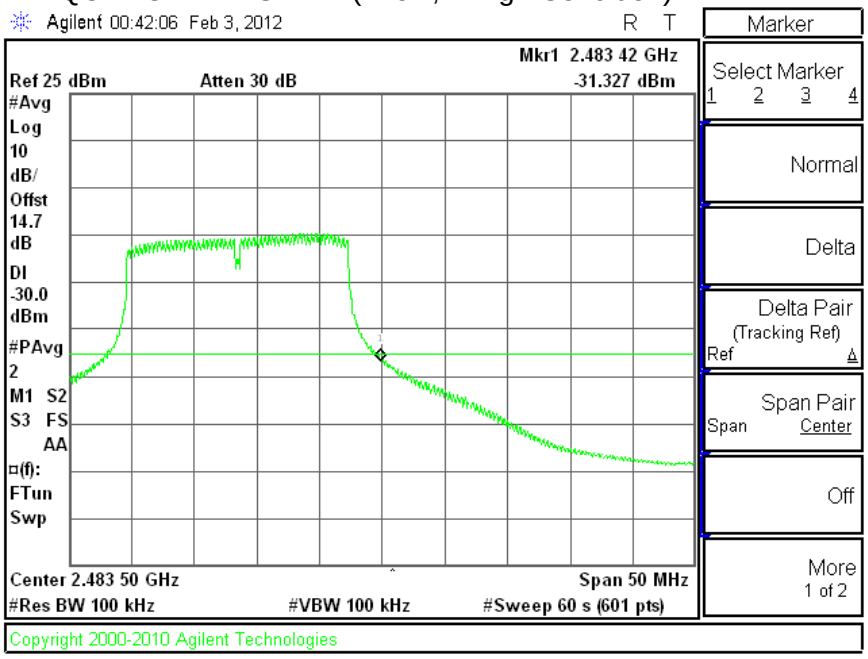
FREQUENCY RANGE F HIGH



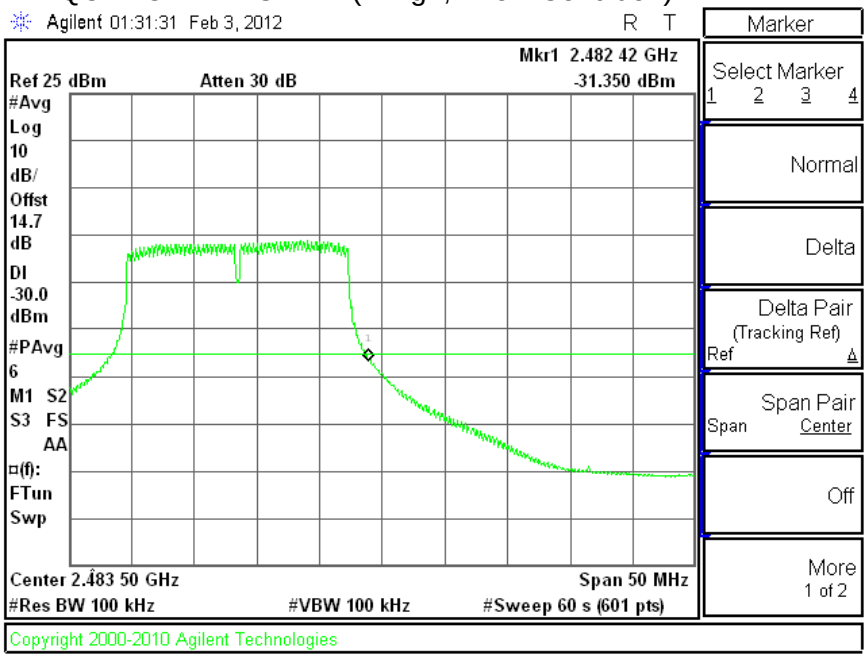
FREQUENCY RANGE FH (T low, V low Condition)



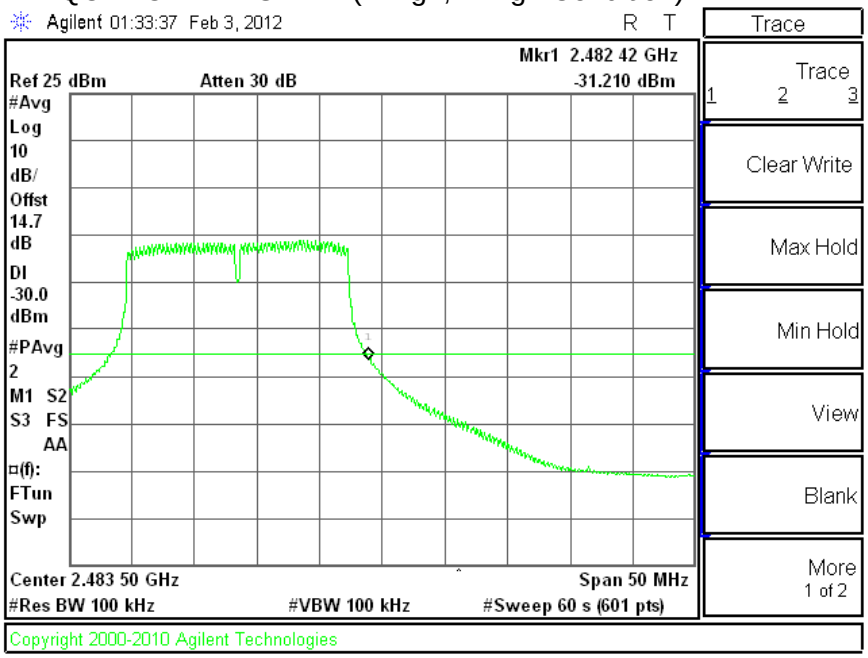
FREQUENCY RANGE FH (T low, V high Condition)



FREQUENCY RANGE FH (T high, V low Condition)



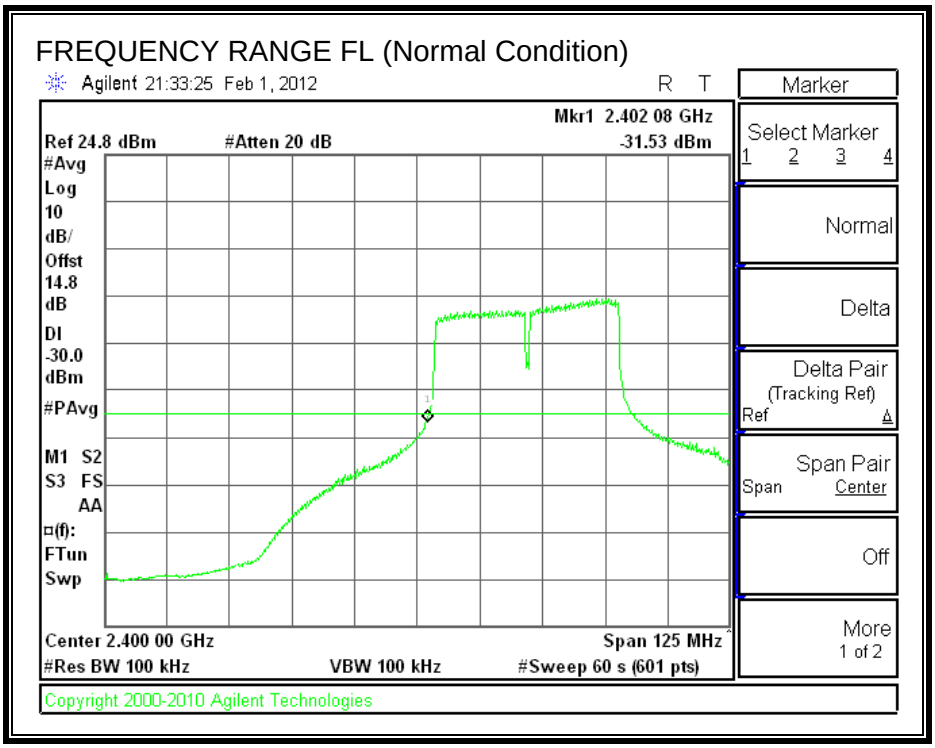
FREQUENCY RANGE FH (T high, V high Condition)



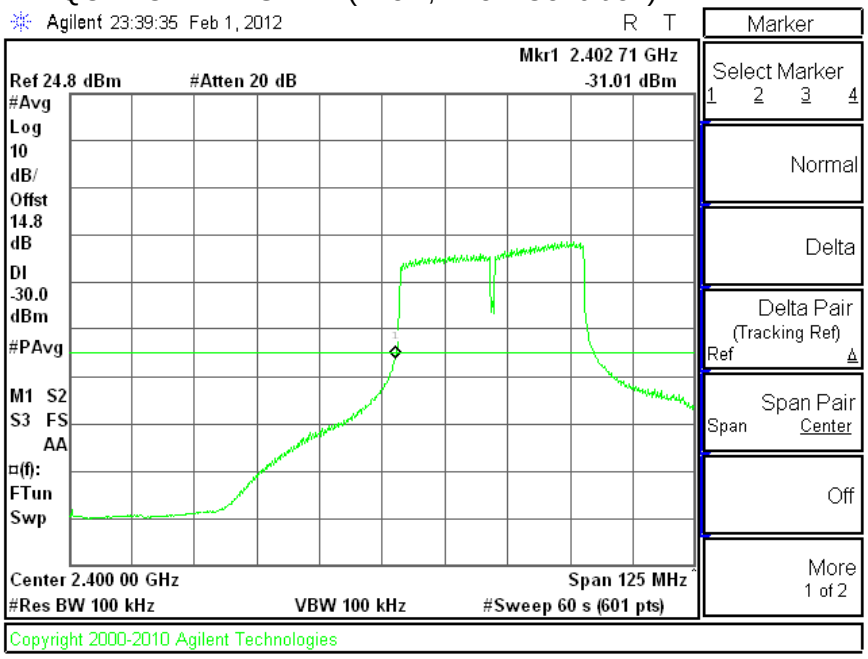
7.5.3. 802.11n HT40 MODE

Limit	2400 Minimum	2483.5 Maximum
Condition	F low (MHz)	F high (MHz)
Normal	2402.08	2482.33
Extreme T low, V low	2402.71	2483.29
Extreme T low, V high	2402.71	2483.29
Extreme T high V low	2402.08	2482.25
Extreme T high, V high	2402.71	2482.25

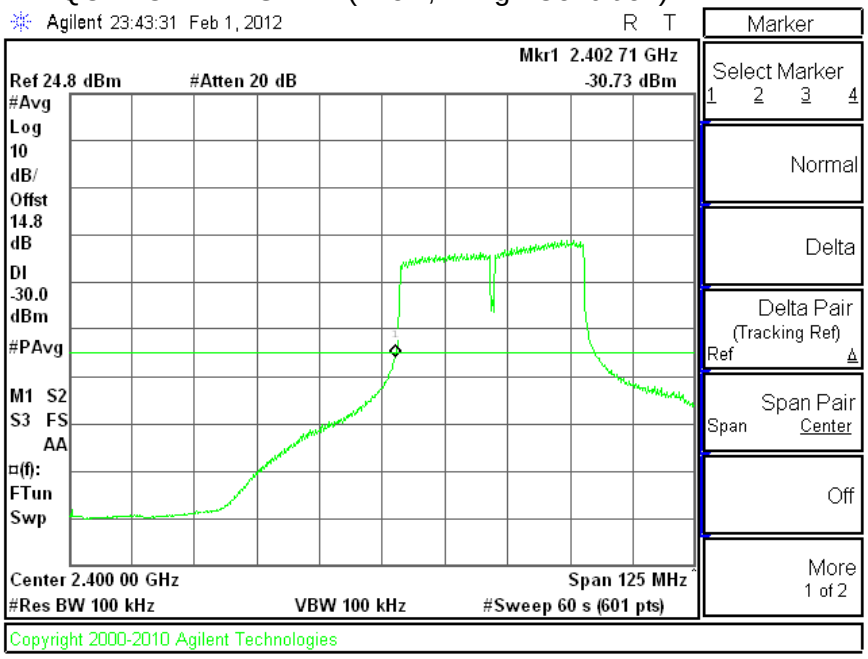
FREQUENCY RANGE F LOW



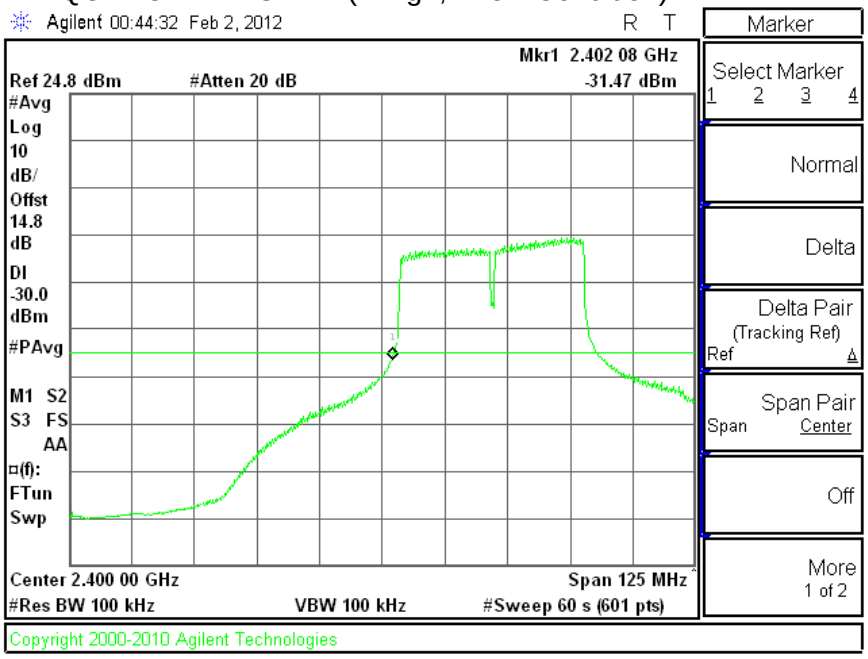
FREQUENCY RANGE FL (T low, V low Condition)



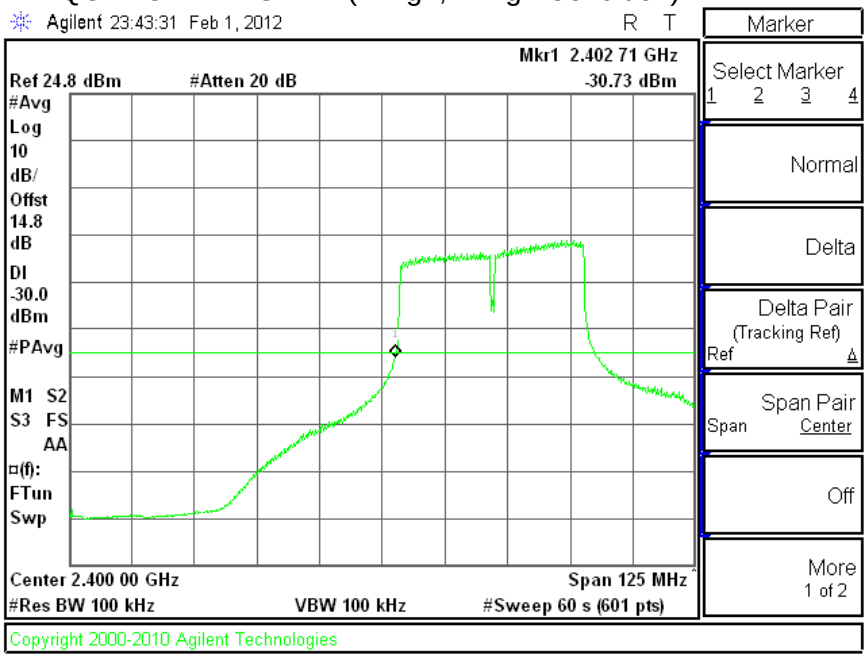
FREQUENCY RANGE FL (T low, V high Condition)



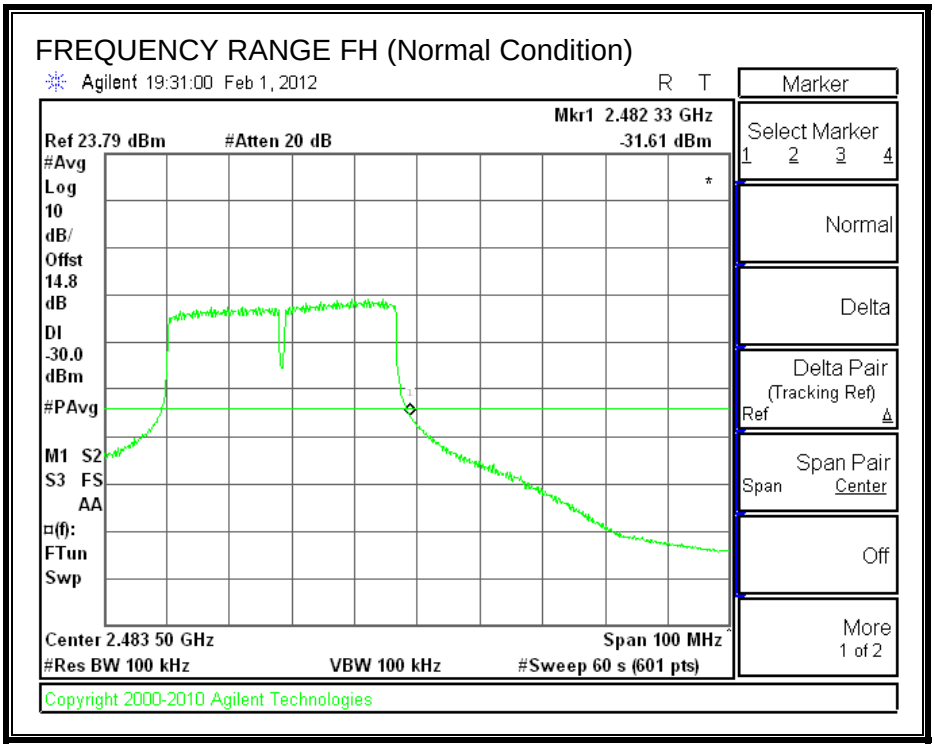
FREQUENCY RANGE FL (T high, V low Condition)



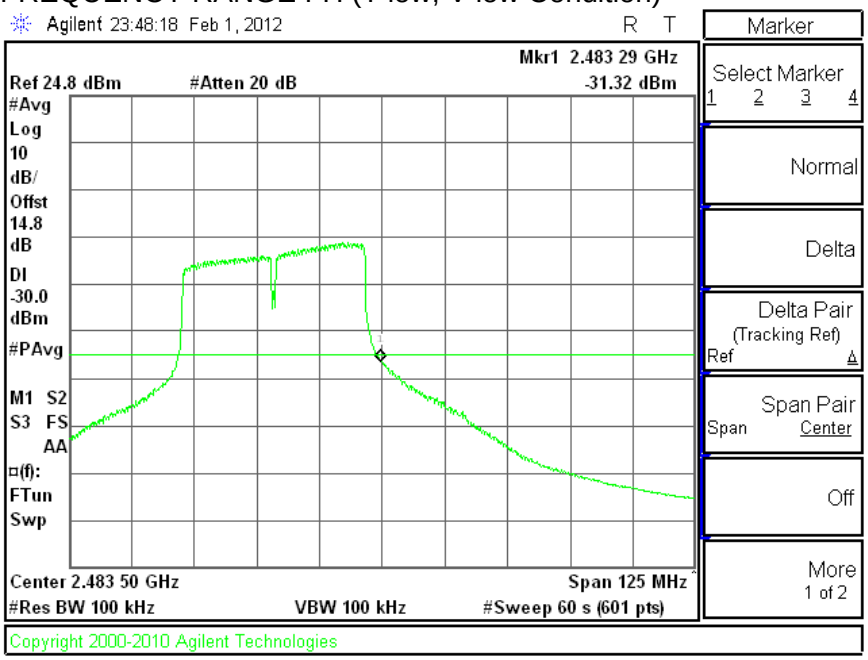
FREQUENCY RANGE FL (T high, V high Condition)



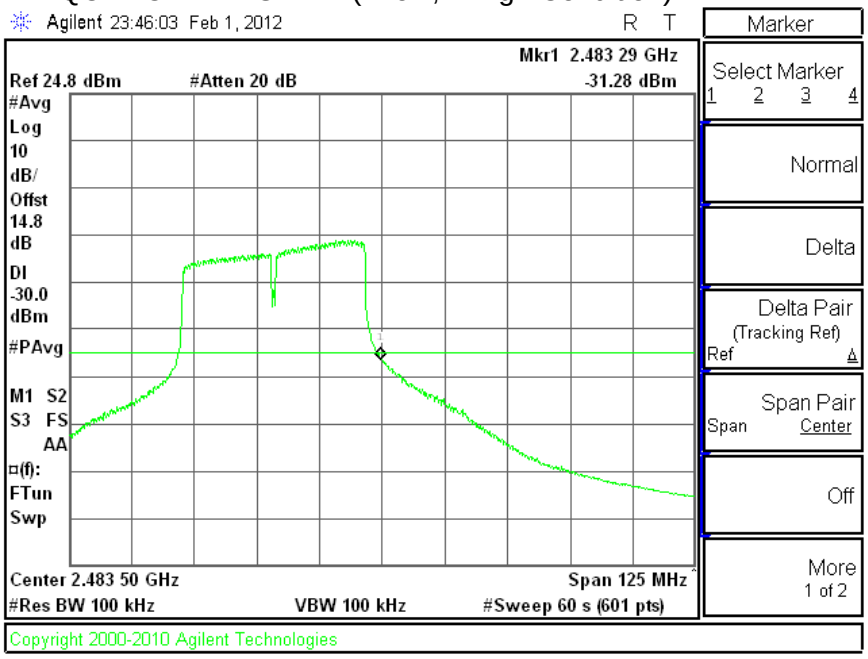
FREQUENCY RANGE F HIGH



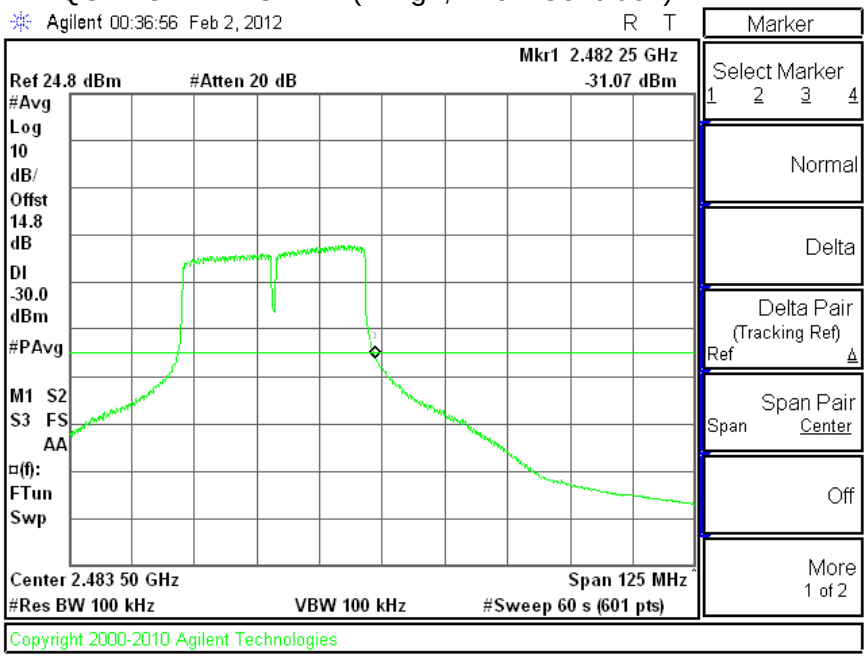
FREQUENCY RANGE FH (T low, V low Condition)



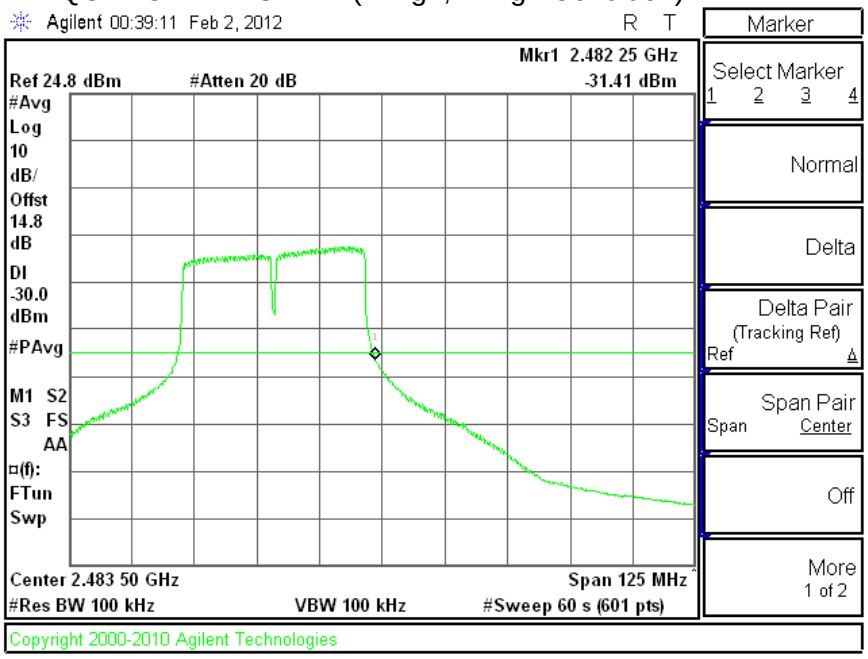
FREQUENCY RANGE FH (T low, V high Condition)



FREQUENCY RANGE FH (T high, V low Condition)



FREQUENCY RANGE FH (T high, V high Condition)



7.6. TRANSMITTER SPURIOUS EMISSIONS

LIMIT

ETSI EN 300 328 Clause 4.3.6.2

Table 2: Transmitter Limits for Narrowband Spurious Emissions

Frequency Range	Limit when operating	Limit when in standby
30 MHz to 1.0 GHz	-36 dBm	-57 dBm
1.0 GHz to 12.75 GHz	-30 dBm	-47 dBm
1.8 GHz to 1.9 GHz 5.15 GHz to 5.3 GHz	-47 dBm	-47 dBm

Table 3: Transmitter Limits for Wideband Spurious Emissions

Frequency Range	Limit when operating	Limit when in standby
30 MHz to 1.0 GHz	-86 dBm/Hz	-107 dBm/Hz
1.0 GHz to 12.75 GHz	-80 dBm/Hz	-97 dBm/Hz
1.8 GHz to 1.9 GHz 5.15 GHz to 5.3 GHz	-97 dBm/Hz	-97 dBm/Hz

TEST PROCEDURE

ETSI EN 300 328 Clause 5.7.5

TEST PROTOCOL

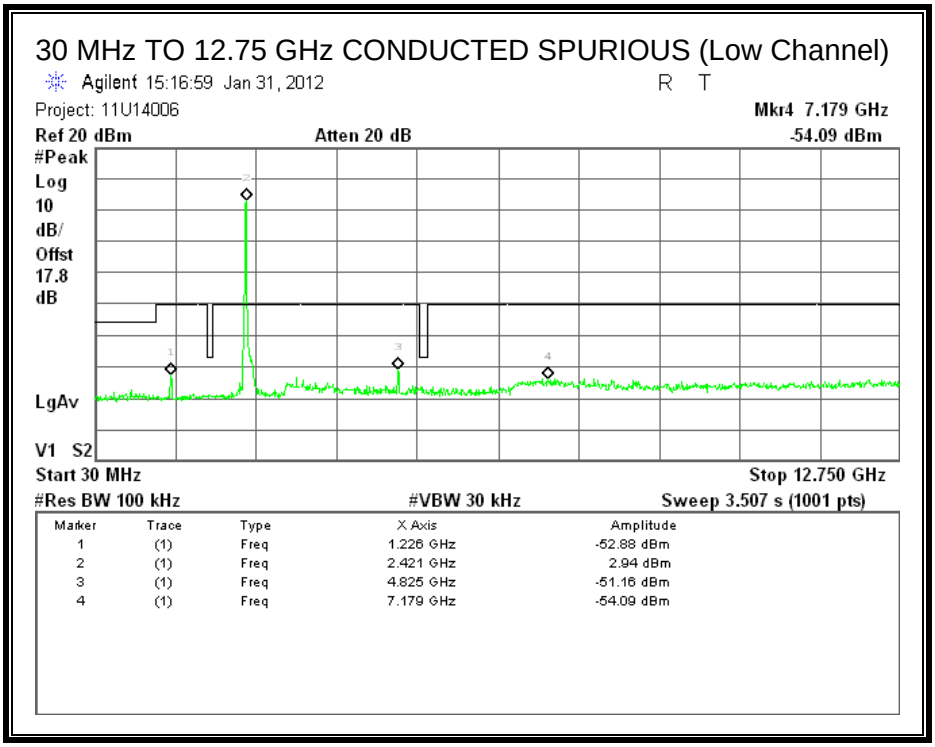
EN 300 328 Clause 5.7.5

The levels of spurious emissions are measured as their power in a specified load (conducted spurious emissions); and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation).

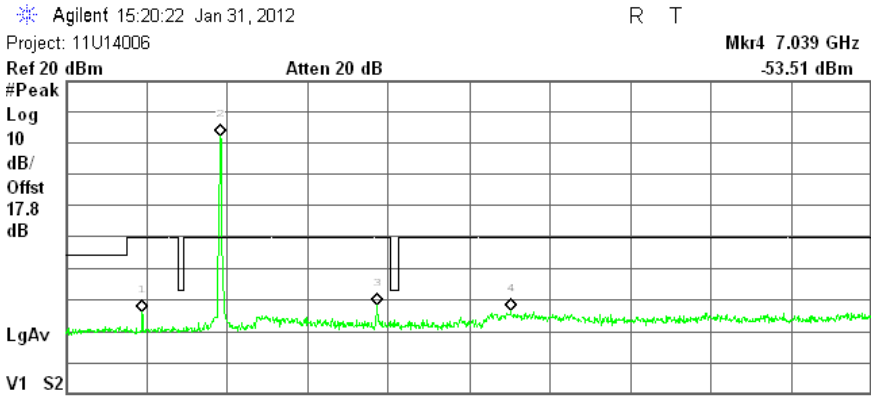
RESULTS

7.6.1. 802.11g MODE

CONDUCTED SPURIOUS EMISSIONS



30 MHz TO 12.75 GHz CONDUCTED SPURIOUS (High Channel)



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.226 GHz	-54.22 dBm
2	(1)	Freq	2.472 GHz	2.16 dBm
3	(1)	Freq	4.953 GHz	-52.02 dBm
4	(1)	Freq	7.039 GHz	-53.51 dBm

RADIATED SPURIOUS EMISSIONS BELOW 1 GHz

Compliance Certification Services
30 - 1000MHz Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-26-2012
Test Engineer: Oliver Su
Configuration: Tx continuously
Mode: 802.11g Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T64 8447D		ETSI 300 328 Tx

f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2412MHz										
94.70	-48.8	H	3.0	17.1	28.3		-60.0	-36.0	-24.0	
377.46	-59.0	H	3.0	22.0	28.0		-65.0	-36.0	-29.0	
600.00	-57.6	H	3.0	27.9	27.5		-57.1	-36.0	-21.1	
94.70	-46.0	V	3.0	19.6	28.3		-54.7	-36.0	-18.7	
104.40	-43.7	V	3.0	22.4	28.3		-49.6	-36.0	-13.6	
600.70	-59.0	V	3.0	30.1	27.5		-56.4	-36.0	-20.4	
High Channel - 2472MHz										
94.70	-46.9	H	3.0	17.1	28.3		-58.1	-36.0	-22.1	
162.60	-57.8	H	3.0	21.9	28.2		-64.2	-36.0	-28.2	
600.70	-57.5	H	3.0	27.9	27.5		-57.1	-36.0	-21.1	
94.70	-46.7	V	3.0	19.6	28.3		-55.4	-36.0	-19.4	
102.80	-44.7	V	3.0	22.0	28.3		-51.0	-36.0	-15.0	
600.70	-59.9	V	3.0	30.1	27.5		-57.3	-36.0	-21.3	

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RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-25-2012
Test Engineer: Dennis Huang
Configuration: Tx
Mode: 802.11g Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T34 8449B	Filter 1	ETSI 300 328 Tx

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2412MHz										
4.82	-52.9	H	3.0	48.4	34.8	1.0	-38.3	-30.0	-8.3	
7.24	-78.7	H	3.0	52.8	34.9	1.0	-59.8	-30.0	-29.8	
4.82	-53.9	V	3.0	47.9	34.8	1.0	-39.8	-30.0	-9.8	
7.24	-76.6	V	3.0	51.1	34.9	1.0	-59.4	-30.0	-29.4	
High Channel - 2472MHz										
4.94	-55.7	H	3.0	48.8	34.8	1.0	-40.7	-30.0	-10.7	
7.42	-66.8	H	3.0	53.0	34.9	1.0	-47.7	-30.0	-17.7	
4.94	-55.2	V	3.0	48.2	34.8	1.0	-40.8	-30.0	-10.8	
7.42	-69.0	V	3.0	51.3	34.9	1.0	-51.6	-30.0	-21.6	

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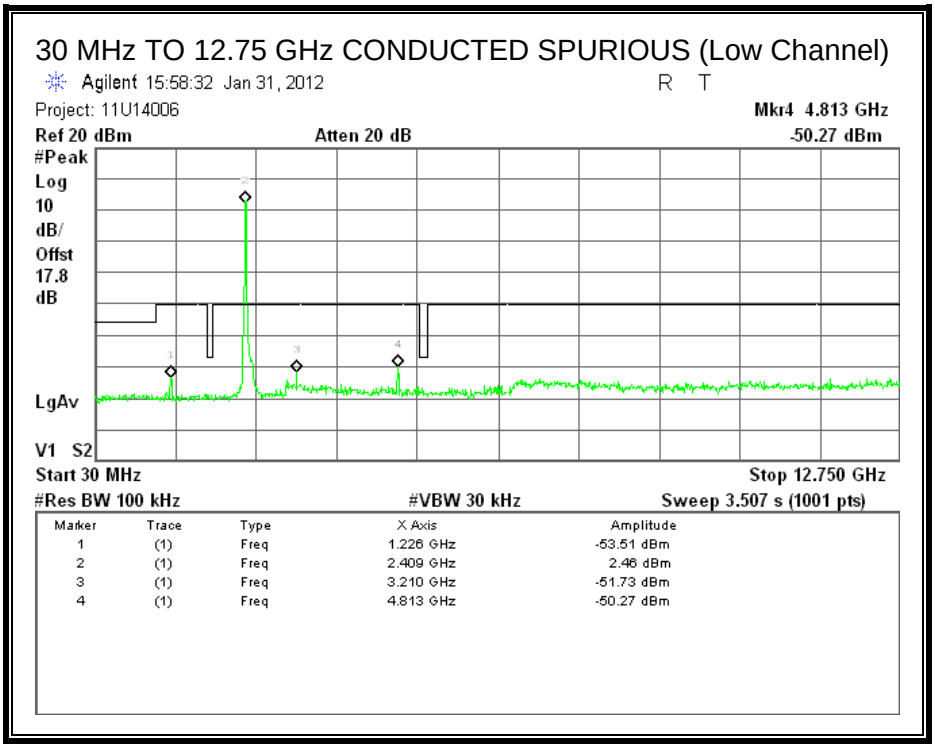
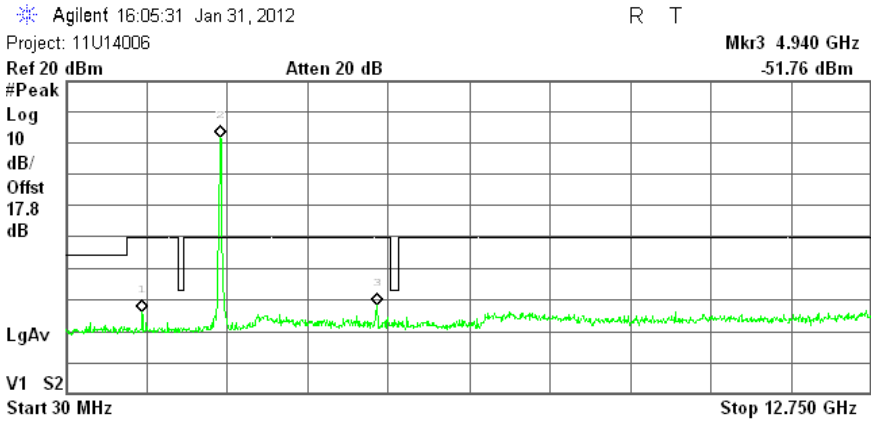
7.6.2. 802.11n HT20 MODE

CONDUCTED SPURIOUS EMISSIONS



30 MHz TO 12.75 GHz CONDUCTED SPURIOUS (High Channel)



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.226 GHz	-53.99 dBm
2	(1)	Freq	2.472 GHz	2.03 dBm
3	(1)	Freq	4.940 GHz	-51.76 dBm

RADIATED SPURIOUS EMISSIONS BELOW 1 GHz

Compliance Certification Services
30 - 1000MHz Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-26-2012
Test Engineer: Oliver Su
Configuration: Tx continuously
Mode: 802.11n HT20 Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T64 8447D		ETSI 300 328 Tx

f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2412MHz										
94.70	-47.0	H	3.0	17.1	28.3		-58.3	-36.0	-22.3	
162.60	-58.4	H	3.0	21.9	28.2		-64.8	-36.0	-28.8	
600.00	-57.9	H	3.0	27.9	27.5		-57.4	-36.0	-21.4	
65.60	-47.5	V	3.0	29.8	28.4		-46.0	-36.0	-10.0	
104.40	-44.8	V	3.0	22.4	28.3		-50.7	-36.0	-14.7	
400.20	-59.4	V	3.0	25.5	28.0		-61.9	-36.0	-25.9	
High Channel - 2472MHz										
94.70	-48.4	H	3.0	17.1	28.3		-59.6	-36.0	-23.6	
162.60	-57.4	H	3.0	21.9	28.2		-63.8	-36.0	-27.8	
600.00	-57.4	H	3.0	27.9	27.5		-57.0	-36.0	-21.0	
67.20	-48.4	V	3.0	30.0	28.3		-46.8	-36.0	-10.8	
102.80	-44.7	V	3.0	22.0	28.3		-51.0	-36.0	-15.0	
600.00	-60.2	V	3.0	30.1	27.5		-57.6	-36.0	-21.6	

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RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-25-2012
Test Engineer: Dennis Huang
Configuration: Tx
Mode: 802.11n HT20 Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T34 8449B	Filter 1	ETSI 300 328 Tx

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2412MHz										
4.82	-52.7	H	3.0	48.4	34.8	1.0	-38.0	-30.0	-8.0	
7.24	-79.2	H	3.0	52.8	34.9	1.0	-60.3	-30.0	-30.3	
4.82	-55.6	V	3.0	47.9	34.8	1.0	-41.5	-30.0	-11.5	
7.24	-77.8	V	3.0	51.1	34.9	1.0	-60.5	-30.0	-30.5	
High Channel - 2472MHz										
4.94	-55.5	H	3.0	48.8	34.8	1.0	-40.5	-30.0	-10.5	
7.42	-67.5	H	3.0	53.0	34.9	1.0	-48.4	-30.0	-18.4	
4.94	-55.1	V	3.0	48.2	34.8	1.0	-40.7	-30.0	-10.7	
7.42	-69.2	V	3.0	51.3	34.9	1.0	-51.8	-30.0	-21.8	

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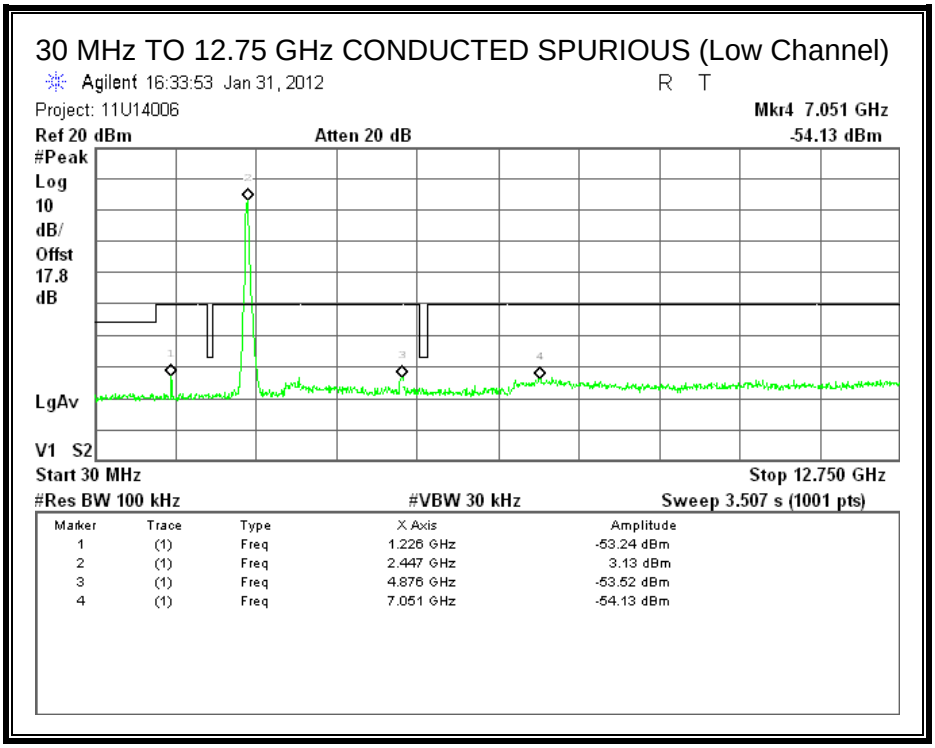
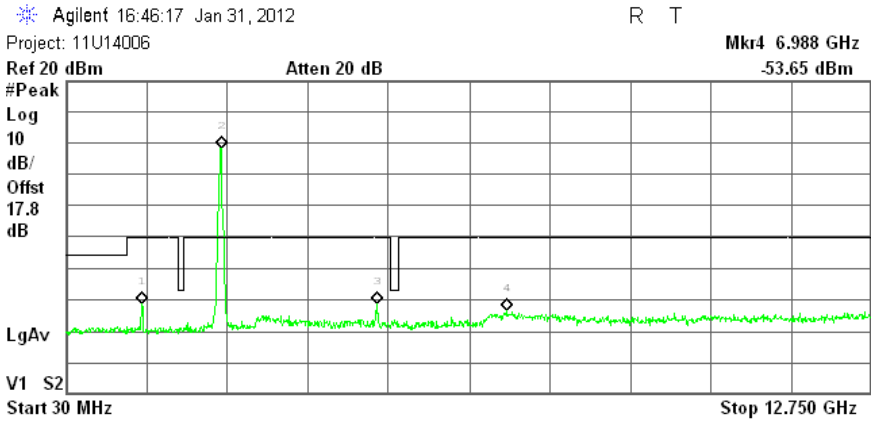
7.6.3. 802.11n HT40 MODE

CONDUCTED SPURIOUS EMISSIONS



30 MHz TO 12.75 GHz CONDUCTED SPURIOUS (High Channel)



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.226 GHz	-51.27 dBm
2	(1)	Freq	2.485 GHz	-1.44 dBm
3	(1)	Freq	4.940 GHz	-51.32 dBm
4	(1)	Freq	6.988 GHz	-53.65 dBm

RADIATED SPURIOUS EMISSIONS BELOW 1 GHz

Compliance Certification Services
30 - 1000MHz Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-26-2012
Test Engineer: Oliver Su
Configuration: Tx continuously
Mode: 802.11n HT40 Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T64 8447D		ETSI 300 328 Tx

f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2422MHz										
102.80	-48.2	H	3.0	18.0	28.3		-58.5	-36.0	-22.5	
162.60	-58.5	H	3.0	21.9	28.2		-64.9	-36.0	-28.9	
600.70	-57.7	H	3.0	27.9	27.5		-57.2	-36.0	-21.2	
67.20	-48.4	V	3.0	30.0	28.3		-46.8	-36.0	-10.8	
102.80	-43.7	V	3.0	22.0	28.3		-50.0	-36.0	-14.0	
379.20	-57.5	V	3.0	24.8	28.0		-60.7	-36.0	-24.7	
High Channel - 2462MHz										
68.60	-58.6	H	3.0	29.4	28.3		-57.6	-36.0	-21.6	
102.80	-47.6	H	3.0	18.0	28.3		-57.9	-36.0	-21.9	
600.70	-57.6	H	3.0	27.9	27.5		-57.1	-36.0	-21.1	
67.20	-50.7	V	3.0	30.0	28.3		-49.0	-36.0	-13.0	
102.80	-46.1	V	3.0	22.0	28.3		-52.4	-36.0	-16.4	
380.80	-60.0	V	3.0	24.8	28.0		-63.1	-36.0	-27.1	

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RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-25-2012
Test Engineer: Dennis Huang
Configuration: Tx
Mode: 802.11n HT40 Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T34 8449B	Filter 1	ETSI 300 328 Tx

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel - 2422MHz										
4.84	-56.5	H	3.0	48.5	34.8	1.0	-41.8	-30.0	-11.8	
7.27	-80.6	H	3.0	52.8	34.9	1.0	-61.7	-30.0	-31.7	
4.84	-57.6	V	3.0	47.9	34.8	1.0	-43.5	-30.0	-13.5	
7.27	-76.9	V	3.0	51.1	34.9	1.0	-59.6	-30.0	-29.6	
High Channel - 2462MHz										
4.92	-55.7	H	3.0	48.7	34.8	1.0	-40.8	-30.0	-10.8	
7.39	-71.1	H	3.0	52.9	34.9	1.0	-52.0	-30.0	-22.0	
4.92	-55.8	V	3.0	48.1	34.8	1.0	-41.5	-30.0	-11.5	
7.39	-72.0	V	3.0	51.3	34.9	1.0	-54.6	-30.0	-24.6	

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STANDBY MODE

The standby mode is identical to the receive mode. See Receiver Spurious Emissions results.

7.7. RECEIVER SPURIOUS EMISSIONS

LIMIT

ETSI EN 300 328 Clause 4.3.7.2

Table 4: Narrowband Spurious Emissions Limits for Receivers

Frequency Range	Limit
30 MHz to 1.0 GHz	-57 dBm
1.0 GHz to 12.75 GHz	-47 dBm

Table 5: Wideband Spurious Emissions Limits for Receivers

Frequency Range	Limit
30 MHz to 1.0 GHz	-107 dBm/Hz
1.0 GHz to 12.75 GHz	-97 dBm/Hz

TEST PROCEDURE

EN 300 328 Clause 5.7.6

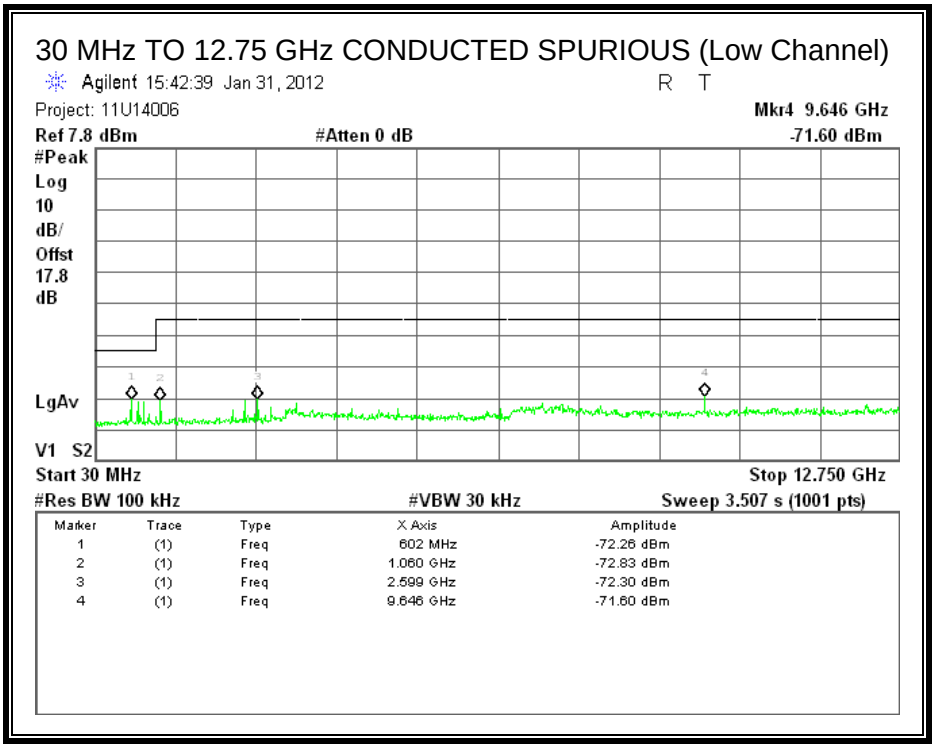
TEST PROTOCOL

EN 300 328 Clause 5.7.6

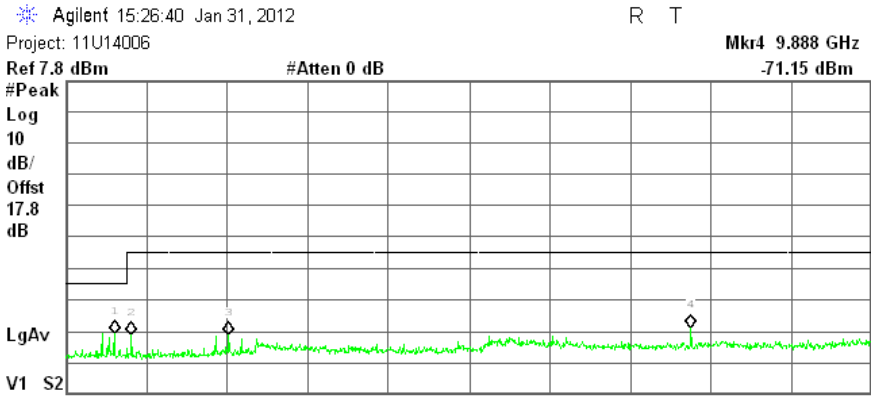
The levels of spurious emissions are measured as their power in a specified load (conducted spurious emissions); and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation).

RESULTS

CONDUCTED SPURIOUS EMISSIONS



30 MHz TO 12.75 GHz CONDUCTED SPURIOUS (High Channel)



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	793 MHz	-72.57 dBm
2	(1)	Freq	1.060 GHz	-73.29 dBm
3	(1)	Freq	2.599 GHz	-73.32 dBm
4	(1)	Freq	9.888 GHz	-71.15 dBm

RADIATED SPURIOUS EMISSIONS BELOW 1 GHz

Compliance Certification Services
30 - 1000MHz Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-25-2012
Test Engineer: Dennis Huang
Configuration: Rx/StandBy Mode
Mode: Rx/StandBy

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T10 8447D		ETSI 300 328 Rx

f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
94.70	-46.6	H	3.0	17.2	29.5		-59.0	-57.0	-2.0	
238.60	-57.5	H	3.0	18.9	29.0		-67.6	-57.0	-10.6	
600.00	-60.9	H	3.0	27.7	29.6		-62.8	-57.0	-5.8	
95.37	-49.7	V	3.0	19.7	29.5		-59.5	-57.0	-2.5	
138.30	-55.8	V	3.0	24.4	29.4		-60.8	-57.0	-3.8	
600.00	-66.7	V	3.0	29.6	29.6		-66.8	-57.0	-9.8	

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RADIATED SPURIOUS EMISSIONS ABOVE 1 GHz

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Ubiquiti Networks
Project #: 11U14006
Date: 1-25-2012
Test Engineer: Dennis Huang
Configuration: Rx/Stand By
Mode: Rx/Stand By Mode

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T34 8449B	Filter 1	ETSI 300 328 Rx

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.40	-55.2	H	3.0	35.0	37.8	1.0	-57.0	-47.0	-10.0	
1.80	-65.4	H	3.0	38.7	37.1	1.0	-62.9	-47.0	-15.9	
2.20	-61.1	H	3.0	40.2	36.6	1.0	-56.5	-47.0	-9.5	
1.40	-58.0	V	3.0	34.0	37.8	1.0	-60.8	-47.0	-13.8	
1.80	-65.7	V	3.0	38.8	37.1	1.0	-63.0	-47.0	-16.0	
2.20	-64.0	V	3.0	41.4	36.6	1.0	-58.2	-47.0	-11.2	

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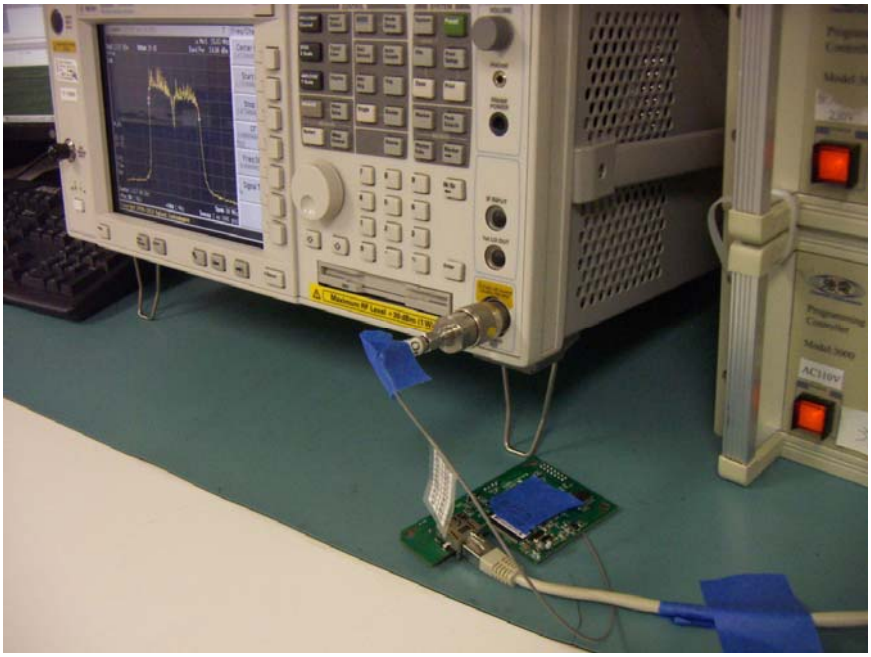
8. SETUP PHOTOS

RF CONDUCTED MEASUREMENT AT ANTENNA PORT

ANTENNA PORT CONDUCTED PHOTO



ENVIRONMENTAL CHAMBER SETUP

ENVIRONMENTAL CHAMBER PHOTO

RADIATED SPURIOUS EMISSIONS

RADIATED SPURIOUS FRONT PHOTO

RADIATED SPURIOUS BACK PHOTO

END OF REPORT