FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

802.11a/b/g/n NETWORK RADIO

MODEL NUMBER: 1525

FCC ID: C3K1525
IC: 3048-A1525

REPORT NUMBER: 13U14860-7, Revision A

ISSUE DATE: JUNE 13, 2013

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/18/13	Initial Issue	T. LEE
A	06/13/13	Changed antenna gain. Added a note to explain limits in radiated harmonics data above 1 GHz.	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corporation
One Microsoft Way
Redmond, WA 98052, U.S.A.

EUT DESCRIPTION: 802.11a/b/g/n Network Radio

MODEL: 1525

SERIAL NUMBER: 0050432165B0 (antenna-port sample)
0050432165BA (radiated and line-conducted sample)
1C3E842233F0 (DFS)

DATE TESTED: March 26 to April 4, 2013 (RF) and May 14,2013 (DFS)

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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:

TIM LEE
WiSE PROGRAM MANAGER
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n radio.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	12.02	15.92
5180 - 5240	802.11n HT20, CDD	12.9	19.50
5180 - 5240	802.11n HT20, STBC	14.8	30.20
5190 - 5230	802.11n HT40	14.64	29.11

List of test reduction and modes covering other modes:

5 GHz BAND

Frequency Range (MHz)	Tested Mode	Representive Mode
5180 - 5240	802.11a, CDD	N/A
5180 - 5240	802.11n HT20, CDD	802.11n HT20, STBC (Radiated Data Only)
5190 - 5230	802.11n HT20, STBC	None
5190 - 5230	802.11n HT40, CDD	802.11n HT40, STBC

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of 4.61 dBi for 2.4 Ghz band and 3.43 dBi for 5 GHz band.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 14.2.201.17.

The EUT driver software installed during testing was 2.0.0.13.

The test utility software used during testing was DutApiMimoBtFmBridgeEth.exe.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0

Radiated emissions for EUT with antenna was performed and passed; therefore, antenna port spurious was not performed.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

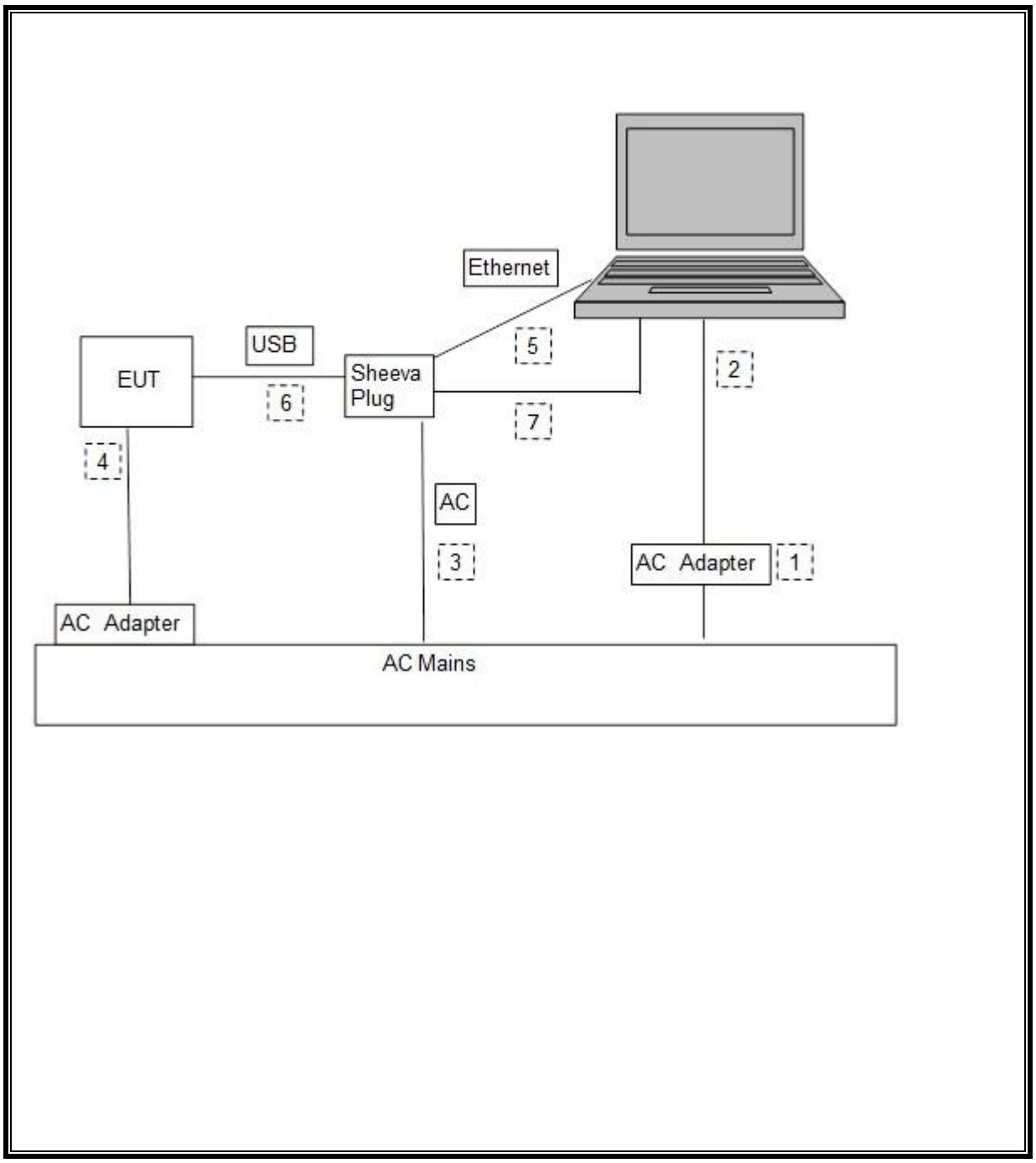
Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	DELL	Vostro 1000	DVT	DoC
AC-DC Adapter	DELL	LA65NS0-00	CN-ODF263-71615-6C4	DoC
Sheeva Plug	Globalscale	003-SP1001	1043-002835	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	USA 3P	Unshielded	1.8	None
2	DC	1	DC	Unshielded	1.8	None
3	AC	1	USA 2P	Unshielded	1.5	None
4	DC	1	DC	Unshielded	1.3	None
5	Ethernet	1	Ethernet	Unshielded	1	None
6	USB	1	USB	Unshielded	1.2	None
7	USB	1	USB	Unshielded	1.5	None

TEST SETUP

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**
Antenna, Horn, 18 GHz	ETS	3117	C01022	02/21/13	02/21/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/13	02/13/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/12	11/14/13
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/14/11	06/14/13
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	02/16/12	02/26/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/12	10/21/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/11	08/02/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/13	01/16/14
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02677		CNR
P-Series single channel Power Meter	Agilent / HP	N1911A	N/A	10/12/12	10/12/13
Peak / Average Power Sensor	Agilent / HP	E9323A	N/A	10/11/12	10/11/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/12	08/08/13
Reject Filter, 2.0-2.9 GHz	Micro-Tronics	BRM50702	N02684		CNR
Spectrum Analyzer	Agilent	N9030A	Pending	02/22/13	02/22/14
Peak and Average Power Sensor	Agilent	E9323A	N/A	04/03/13	04/03/14
Single Channel PK Power Meter	Agilent	N1911A	Pending	04/02/13	04/02/14

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

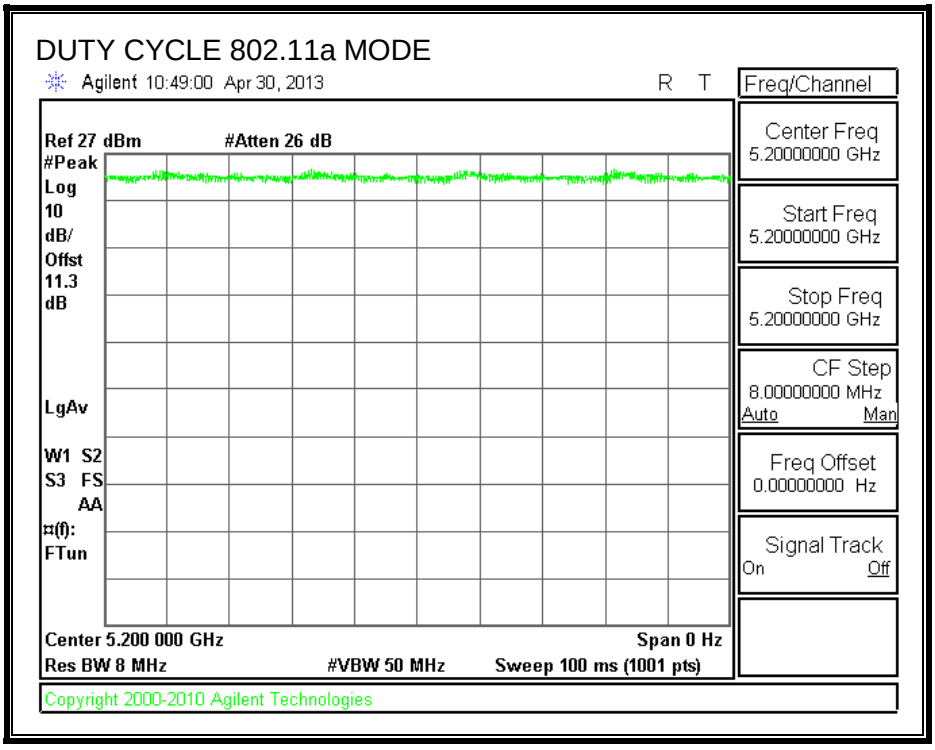
None; for reporting purposes only.

PROCEDURE

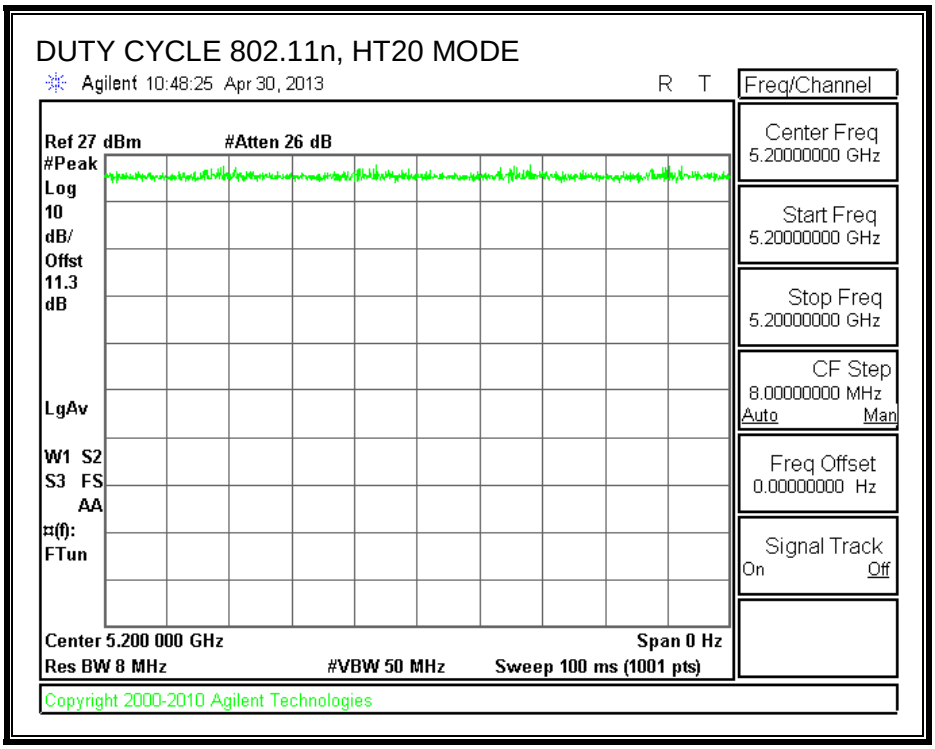
KDB 789033 Zero-Span Spectrum Analyzer Method.

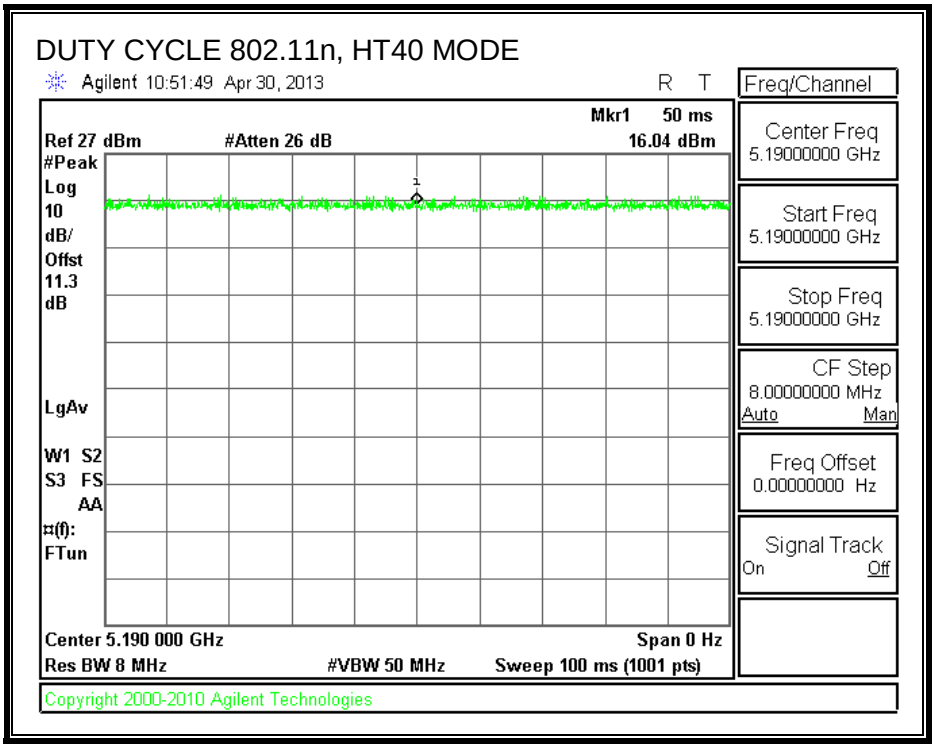
7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
802.11a 20 MHz	100.00	100	1.000	100.0%	0.00	0.010
802.11n HT20	100.00	100	1.000	100.0%	0.00	0.010
802.11n HT40	100.00	100	1.000	100.0%	0.00	0.010



DUTY CYCLE 802.11n, HT20 MODE





7.2. MEASUREMENT METHOD FOR POWER AND PPSD

The Duty Cycle is greater than or equal to 98% therefore KDB 789033 Method SA-1 is used.

7.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz

The Duty Cycle is greater than or equal to 98%, KDB 789033 Method AD with Power RMS Averaging is used.

8. ANTENNA PORT TEST RESULTS

8.1. TRANSMITTER ABOVE 1 GHz

8.2. 802.11a MODE IN THE 5.2 GHz BAND

8.2.1. **26 dB BANDWIDTH**

LIMITS

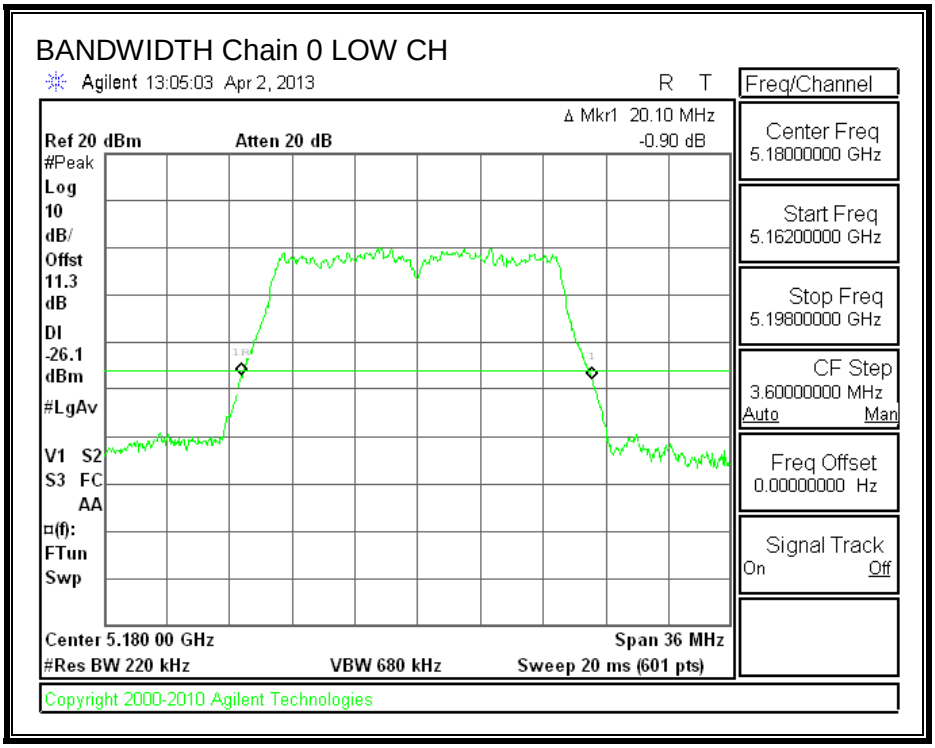
None; for reporting purposes only.

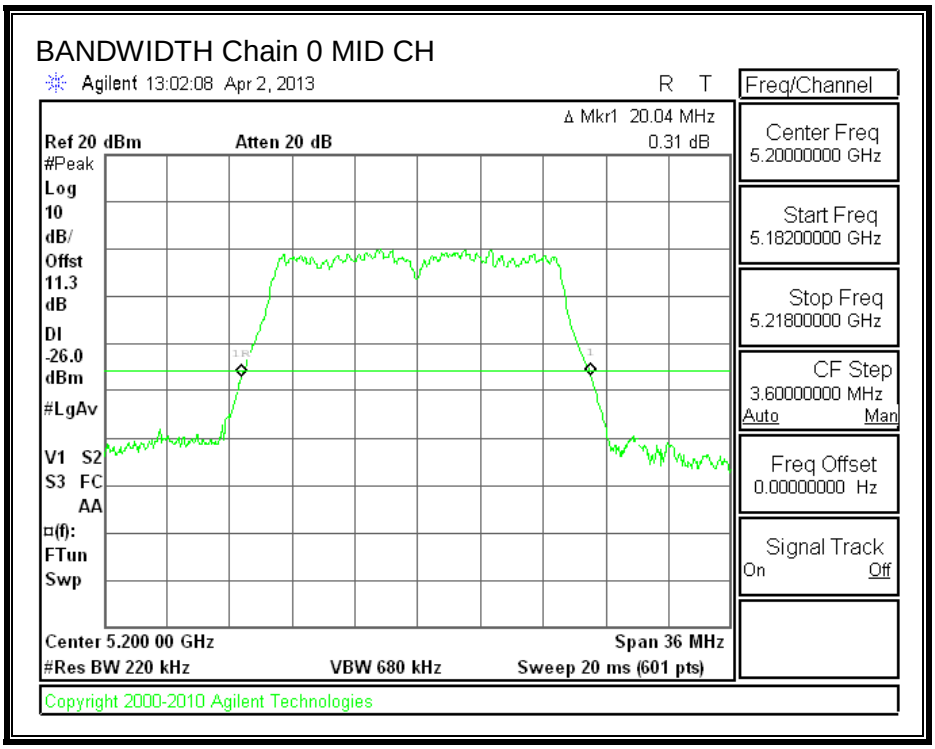
RESULTS

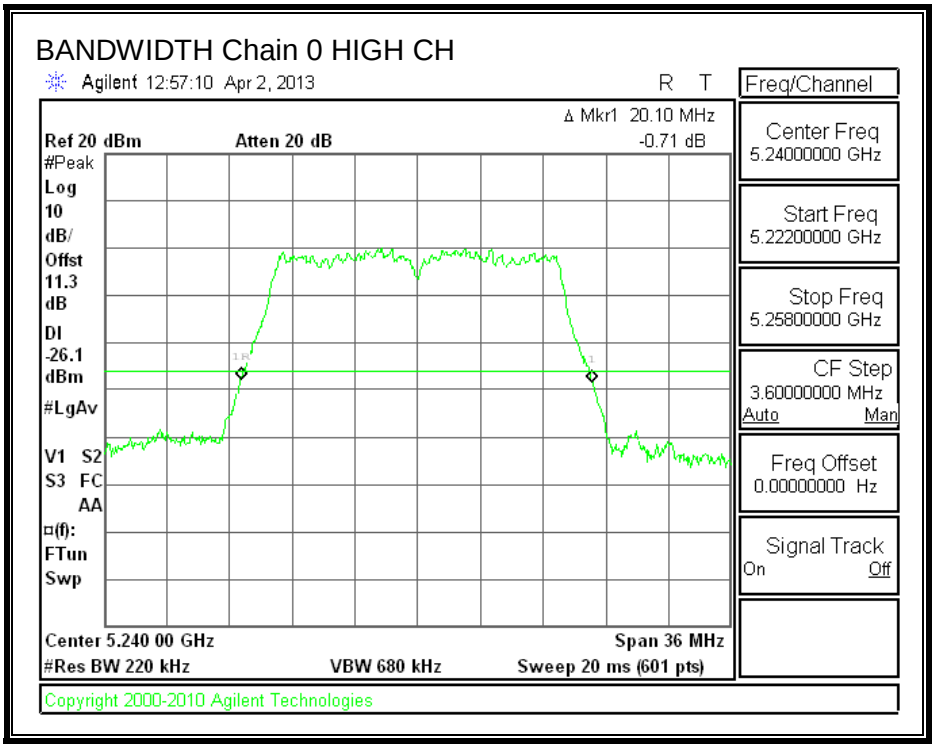
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	20.1	20.0
Mid	5200	20.0	20.0
High	5240	20.1	20.1

26 dB BANDWIDTH

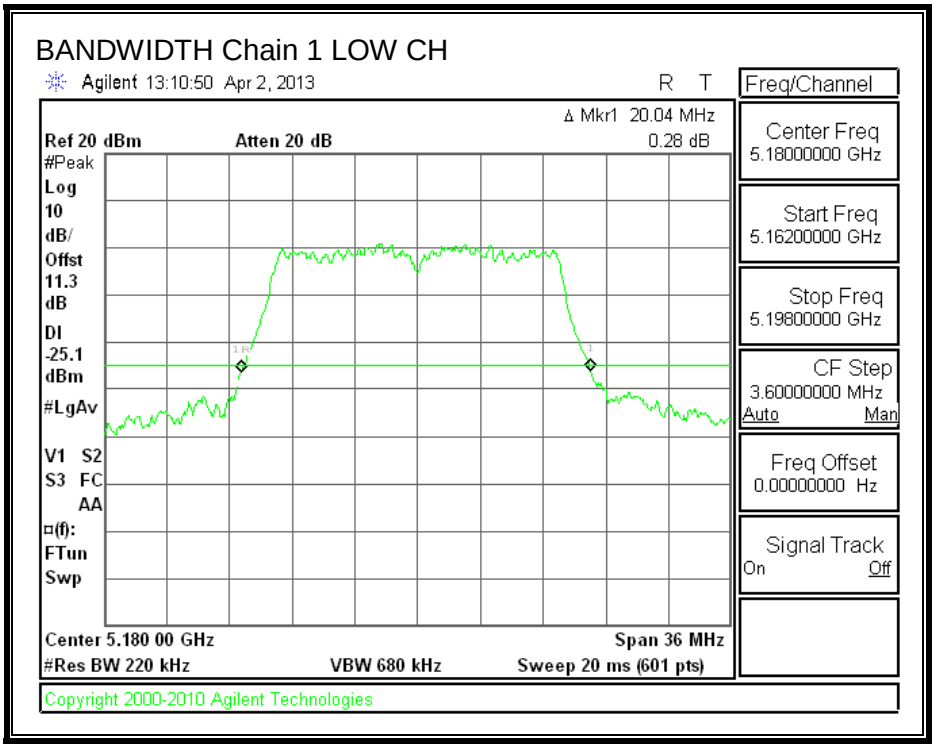
26 dB BANDWIDTH, Chain 0



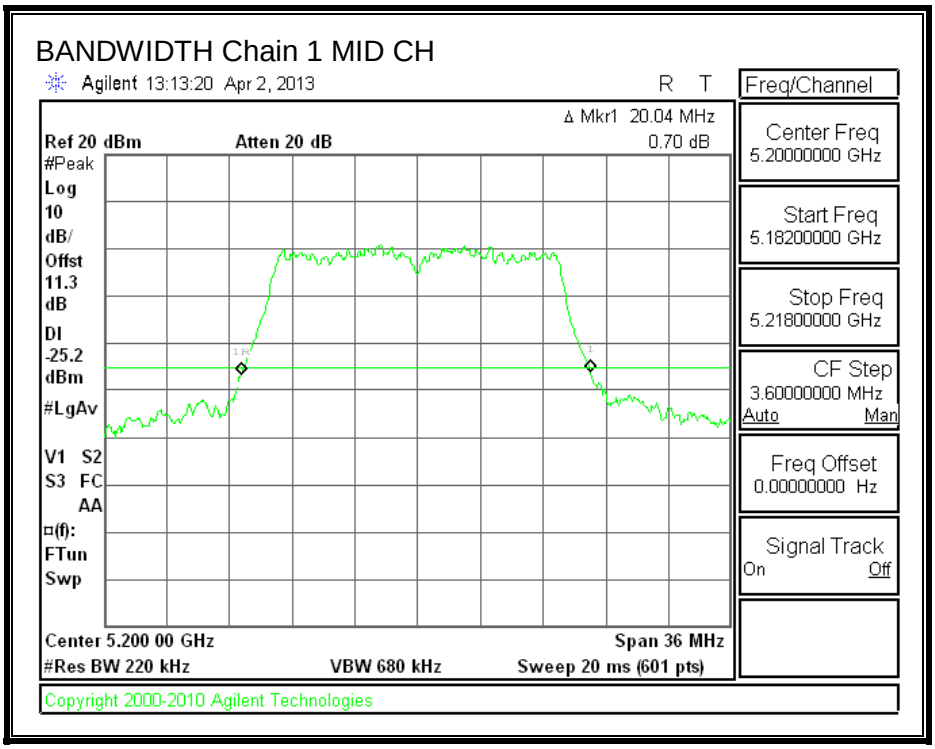




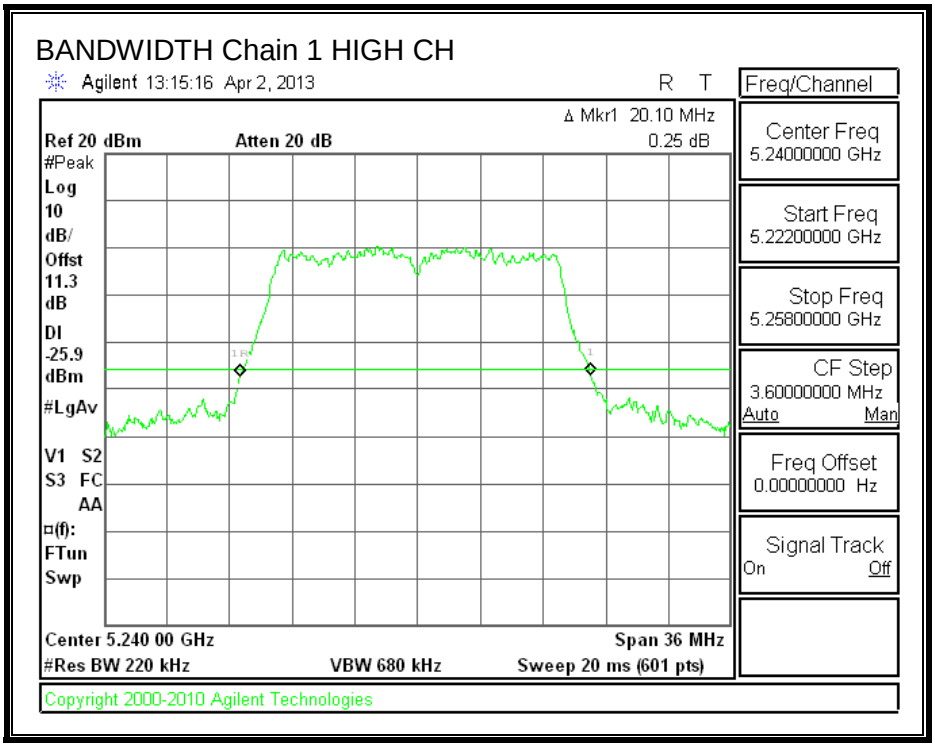
26 dB BANDWIDTH, Chain 1



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH



8.2.2. **99% BANDWIDTH**

LIMITS

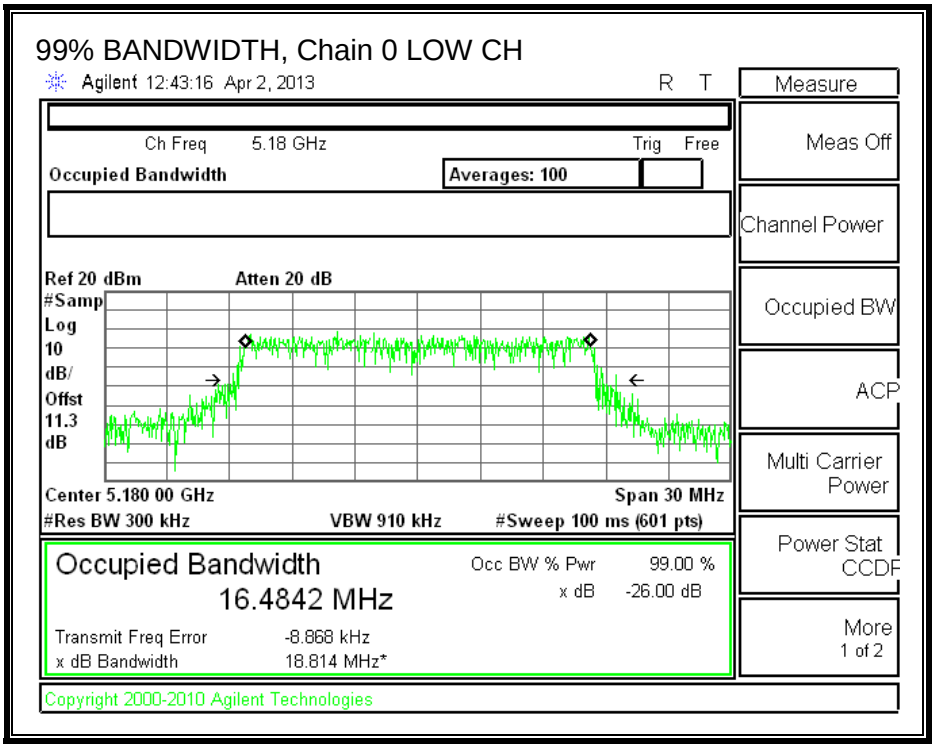
None; for reporting purposes only.

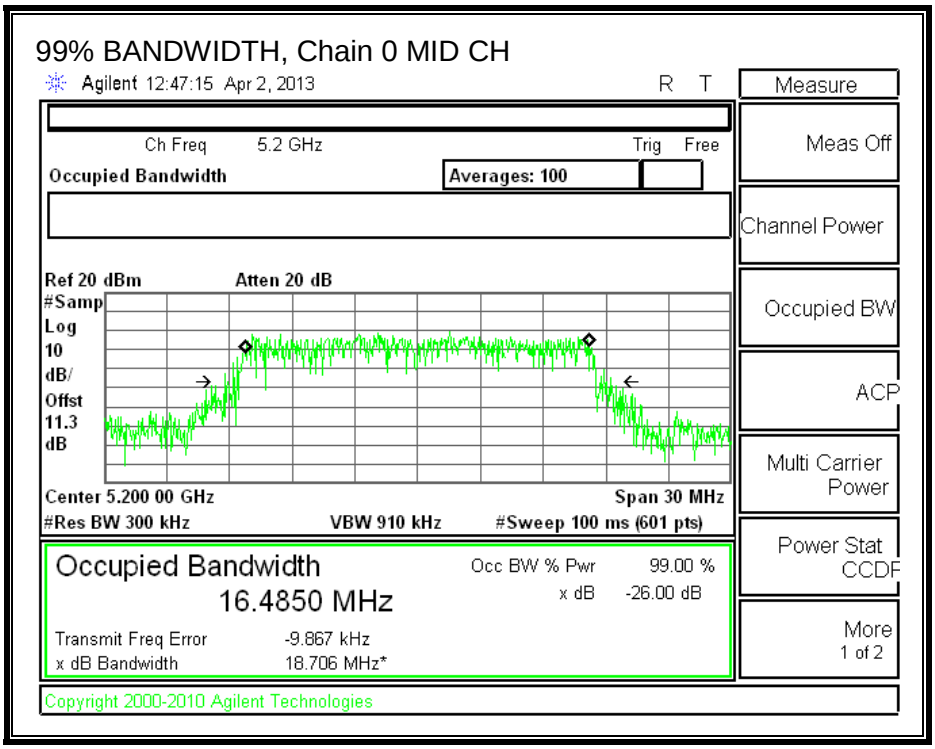
RESULTS

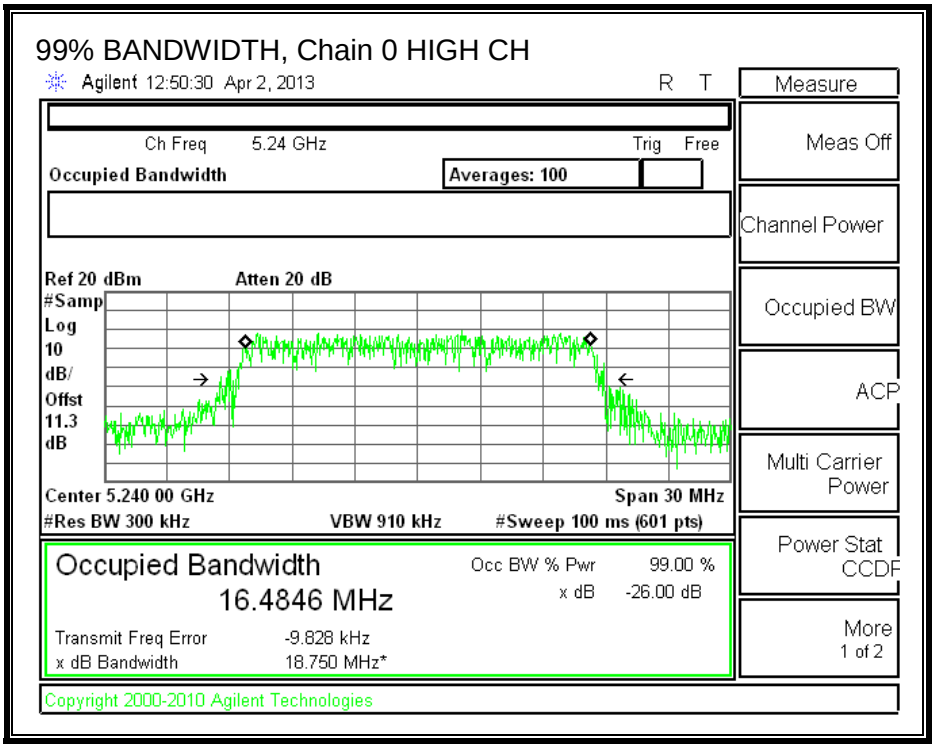
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	16.48	16.49
Mid	5200	16.49	16.50
High	5240	16.48	16.48

99% BANDWIDTH

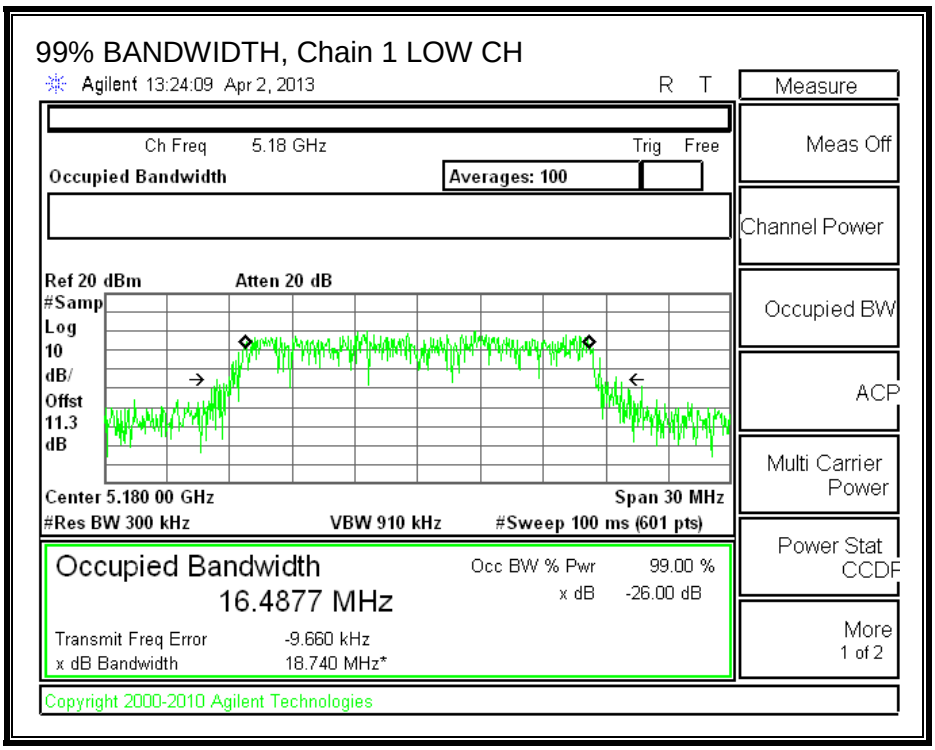
99% BANDWIDTH, Chain 0

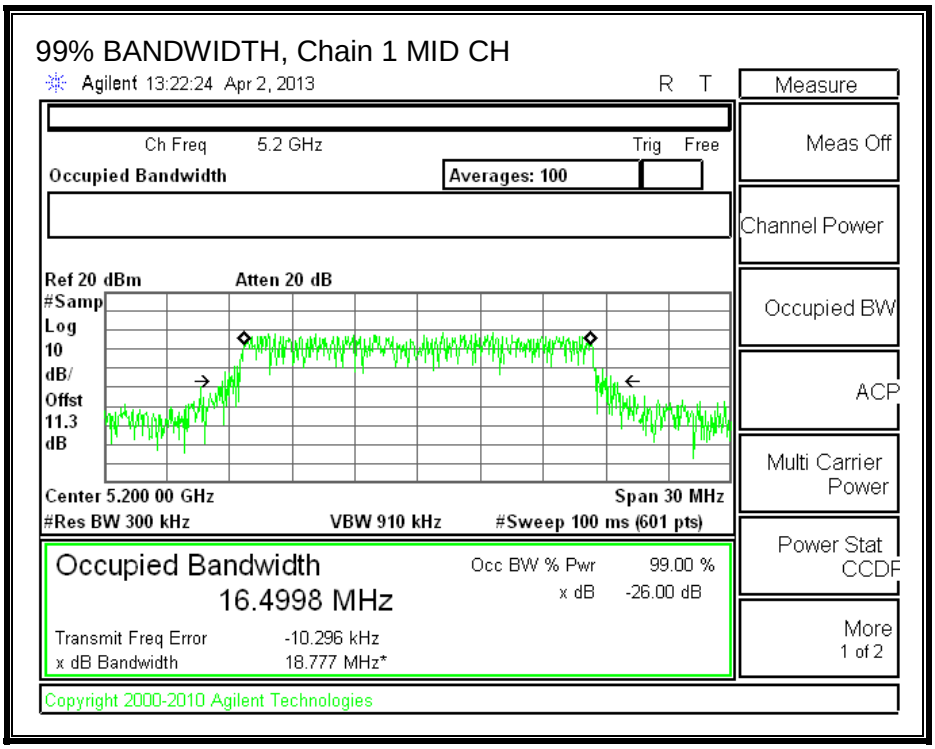


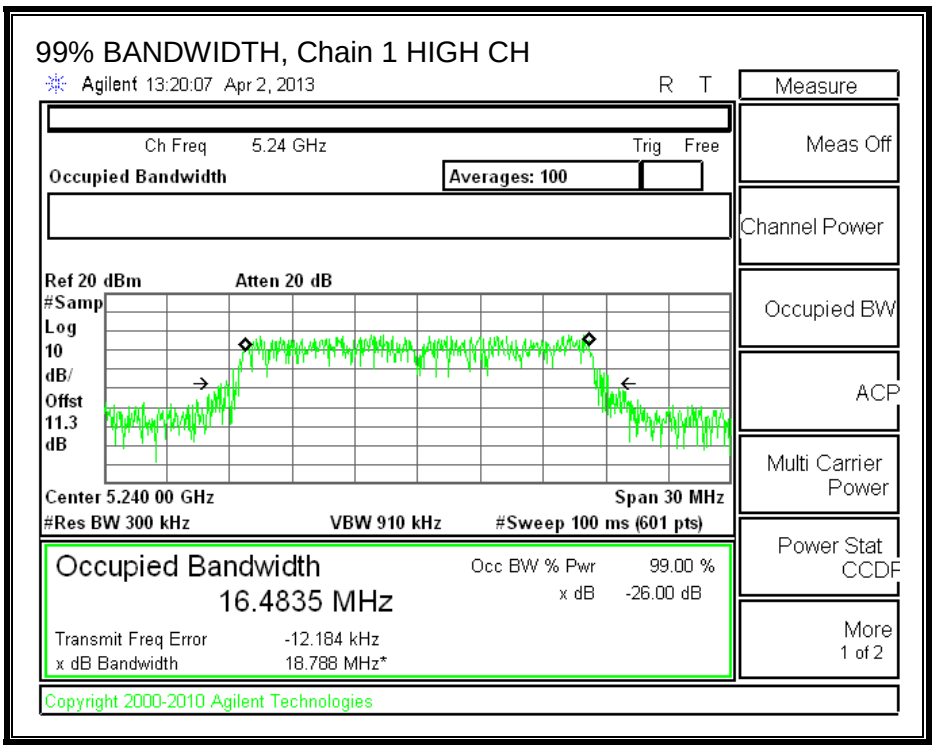




99% BANDWIDTH, Chain 1







8.2.3. **AVERAGE POWER**

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	8.20	8.70	11.47
Mid	5200	8.10	8.60	11.37
High	5240	8.00	8.10	11.06

8.2.4. **OUTPUT POWER AND PPSD**

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

For output power, the two chains are considered uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.38	3.43	3.41

For PSD, the two chains are considered correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.38	3.43	6.42

OUTPUT POWER RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.00	16.5000	3.41
Mid	5200	20.00	16.5000	3.41
High	5240	20.10	16.5000	3.41

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)
Low	5180	17.00	22.17	18.76	17.00
Mid	5200	17.00	22.17	18.76	17.00
High	5240	17.00	22.17	18.76	17.00

Duty Cycle CF (dB)	0.00	

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	8.60	9.39	12.02	17.00	-4.98
Mid	5200	8.44	9.50	12.01	17.00	-4.99
High	5240	8.57	9.32	11.97	17.00	-5.03

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.00	16.5000	6.42
Mid	5200	20.00	16.5000	6.42
High	5240	20.10	16.5000	6.42

Limits

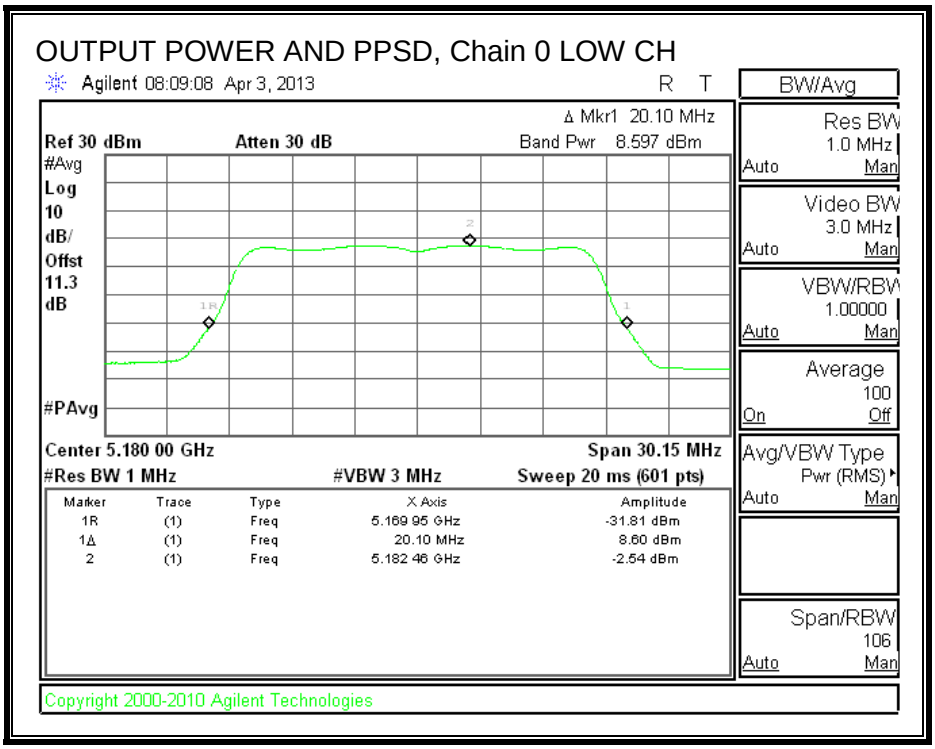
Channel	Frequency (MHz)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PSD Limit (dBm)
Low	5180	3.58	10.00	3.58
Mid	5200	3.58	10.00	3.58
High	5240	3.58	10.00	3.58

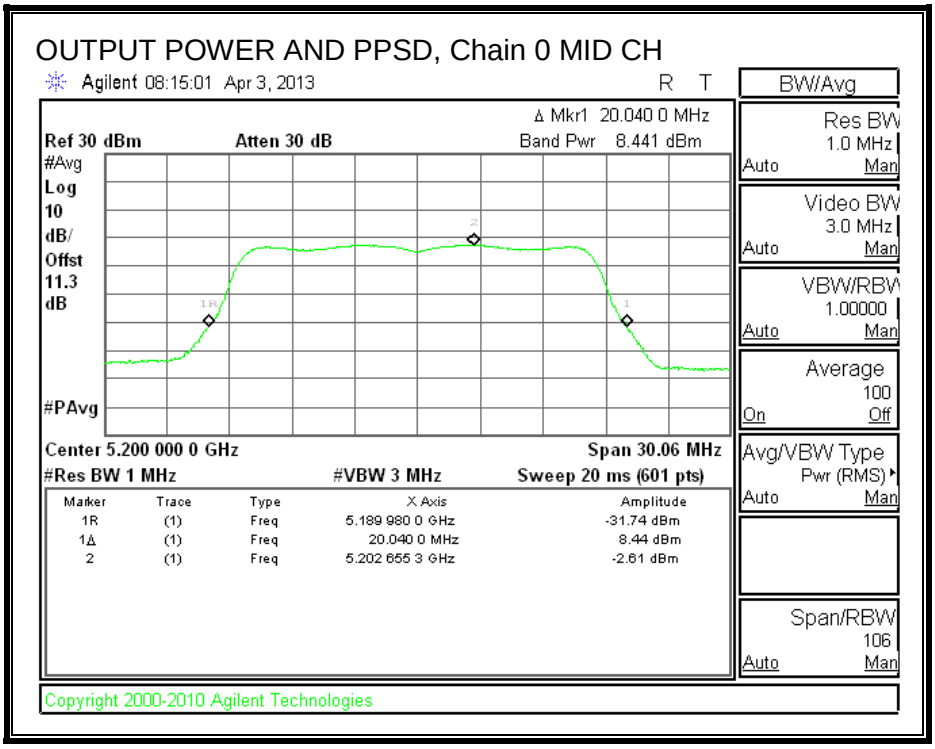
Duty Cycle CF (dB)	0.00	

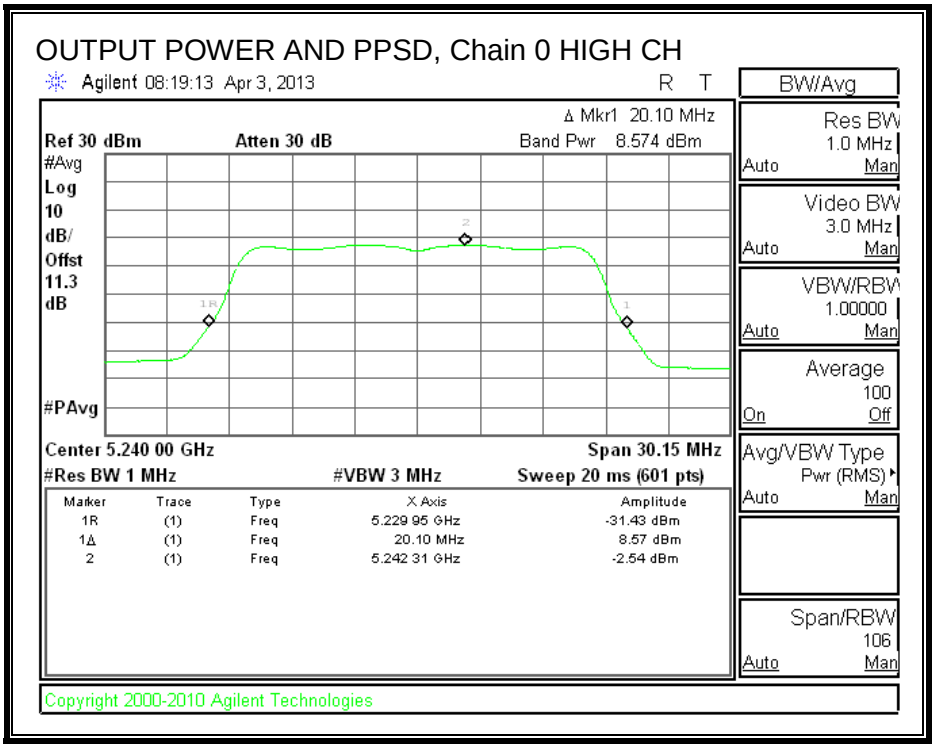
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	-2.54	-1.74	0.89	3.58	-2.69
Mid	5200	-2.61	-1.62	0.92	3.58	-2.66
High	5240	-2.54	-1.83	0.84	3.58	-2.74

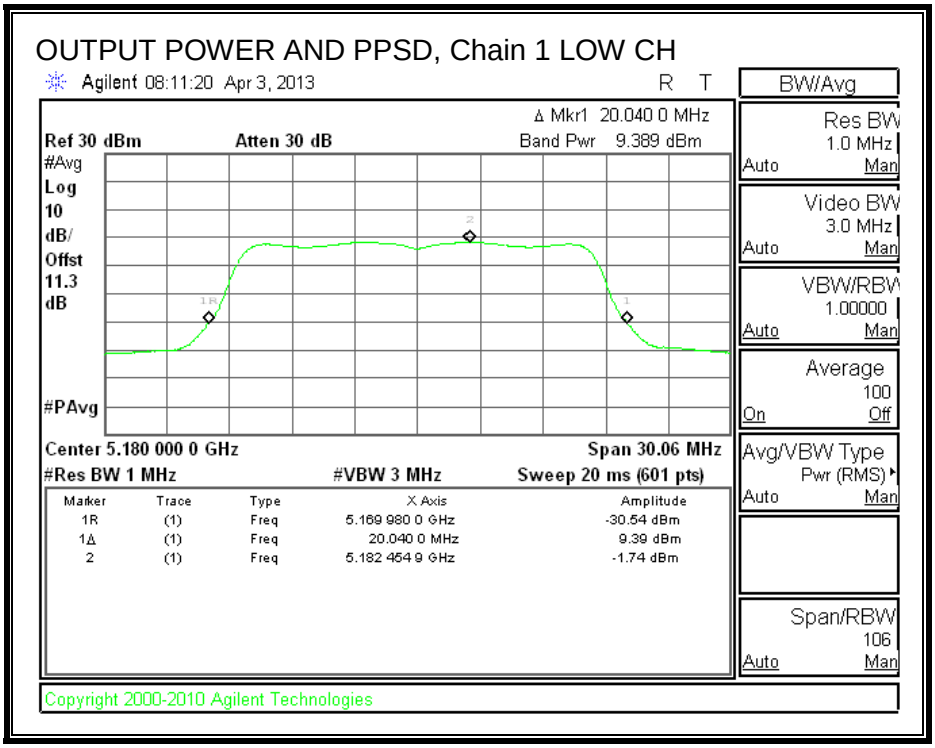
OUTPUT POWER AND PPSD, Chain 0

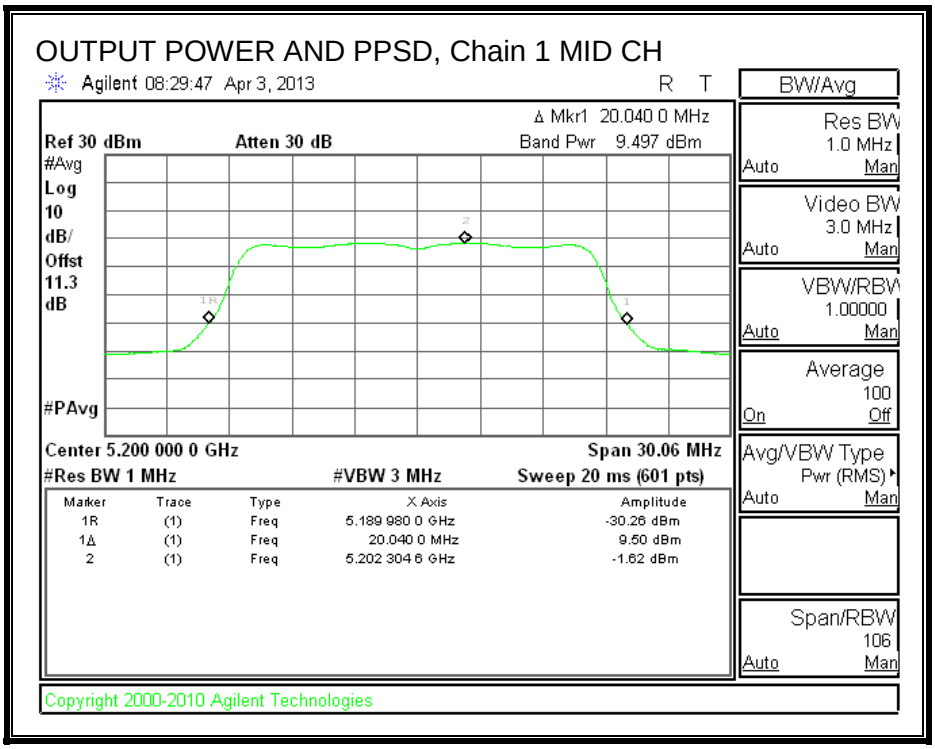


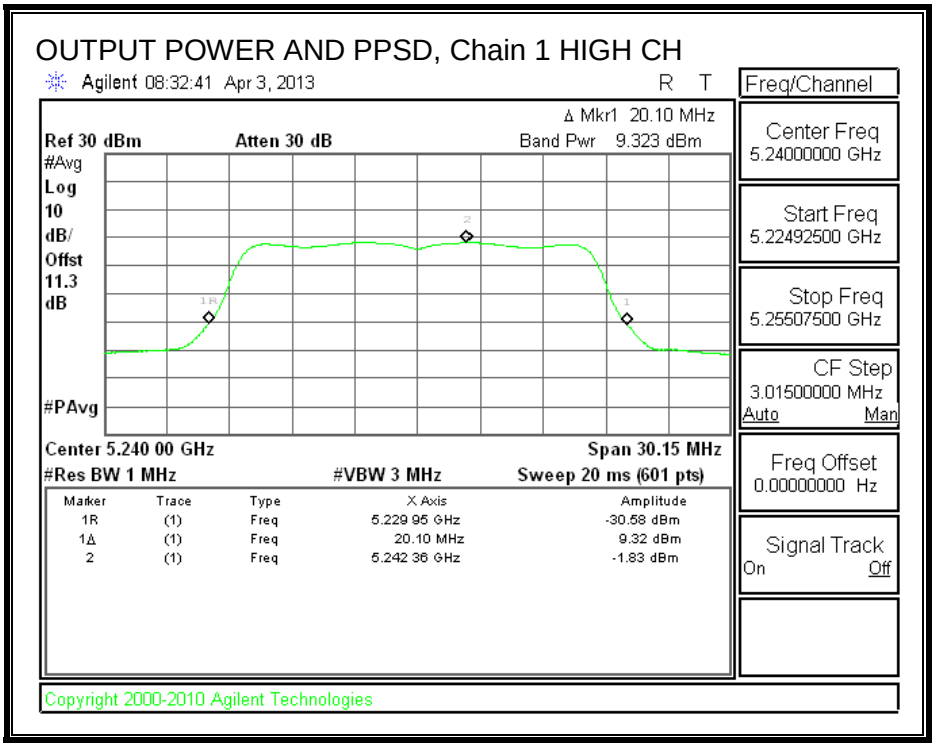




OUTPUT POWER AND PPSD, Chain 1







8.2.5. **PEAK EXCURSION**

LIMITS

FCC §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.

RESULTS

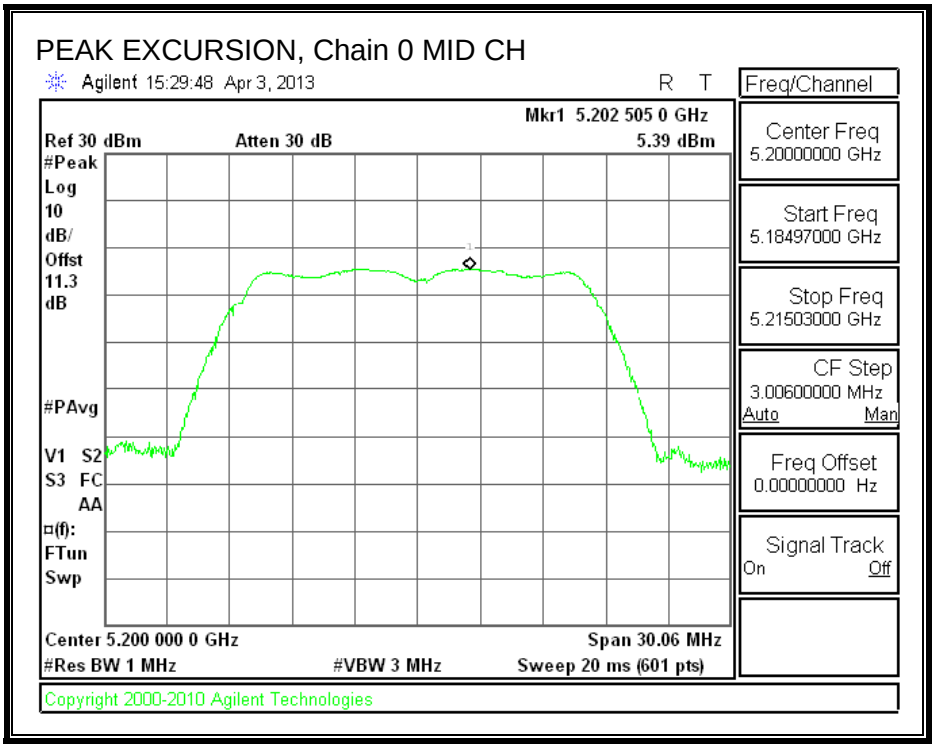
Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	5.39	-2.61	0.00	8.00	13	-5.00

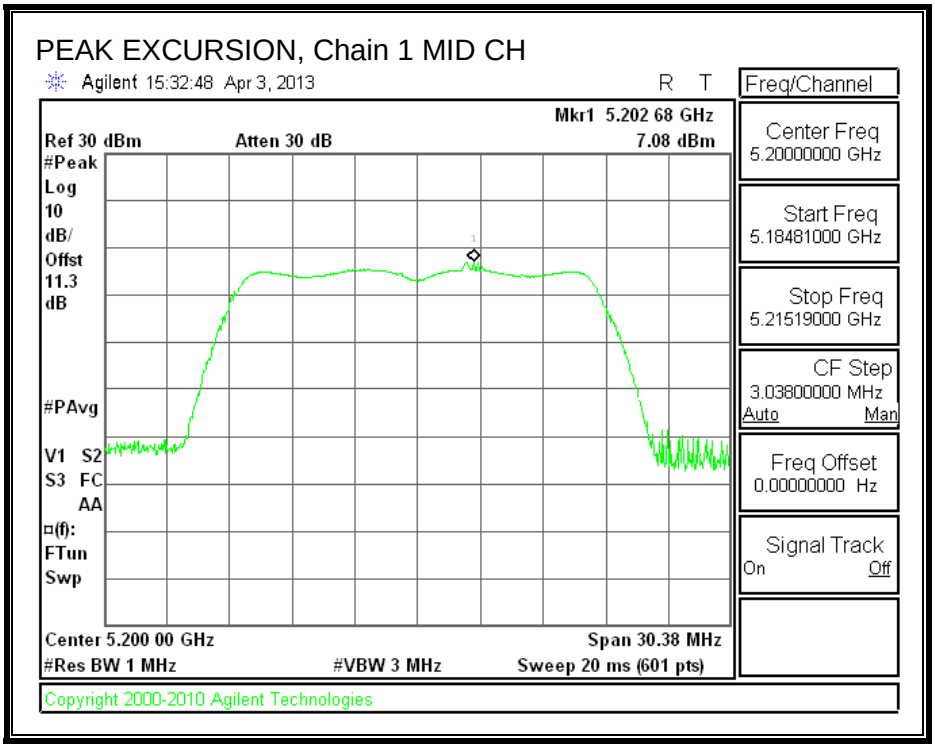
Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	6.07	-1.62	0.00	7.69	13	-5.31

PEAK EXCURSION, Chain 0



PEAK EXCURSION, Chain 1



8.3. 802.11n HT20, CDD MODE IN THE 5.2 GHz BAND

8.3.1. **26 dB BANDWIDTH**

LIMITS

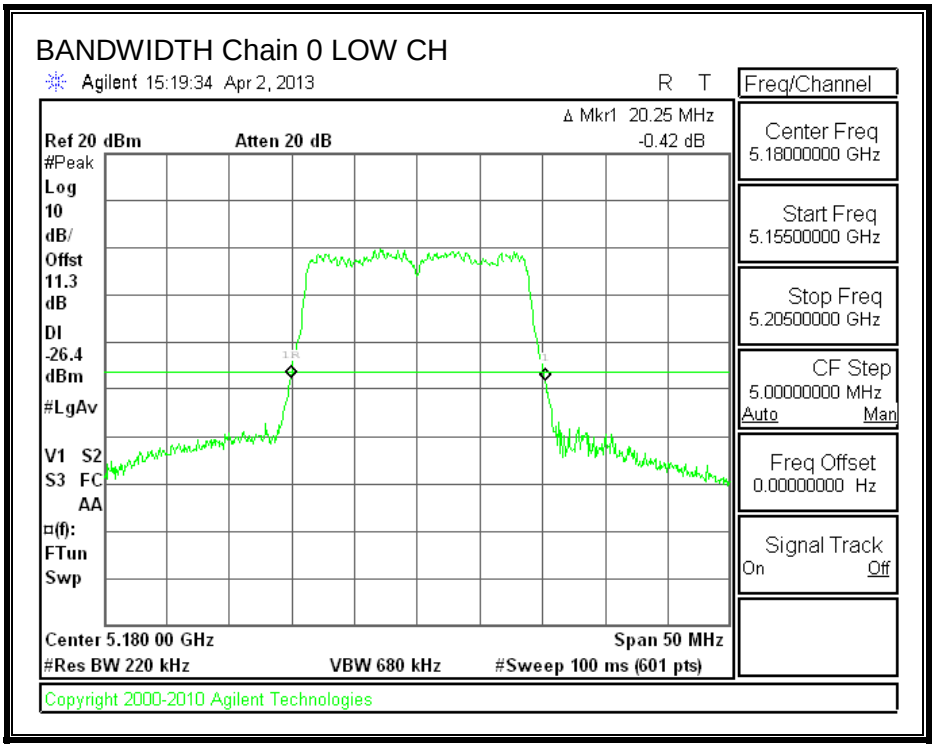
None; for reporting purposes only.

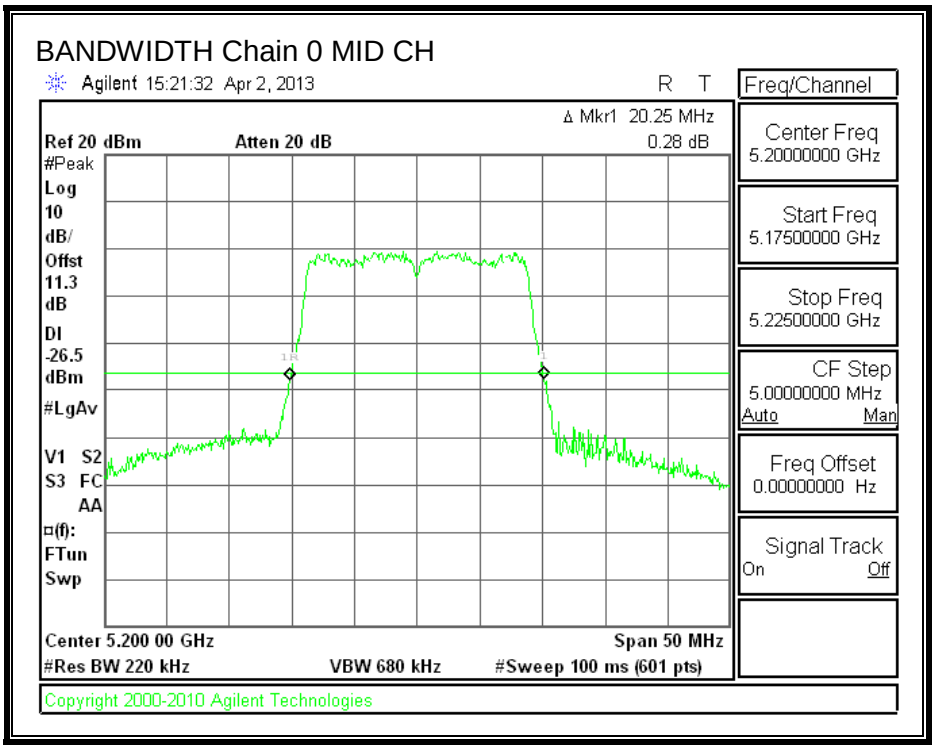
RESULTS

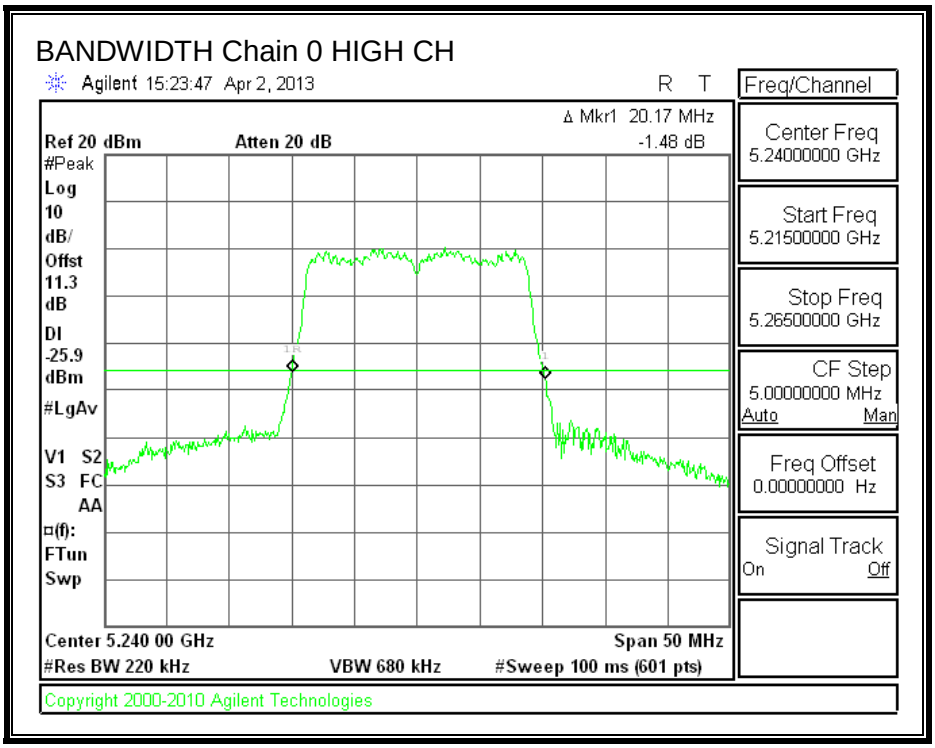
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	20.3	20.2
Mid	5200	20.3	20.4
High	5240	20.2	20.3

26 dB BANDWIDTH

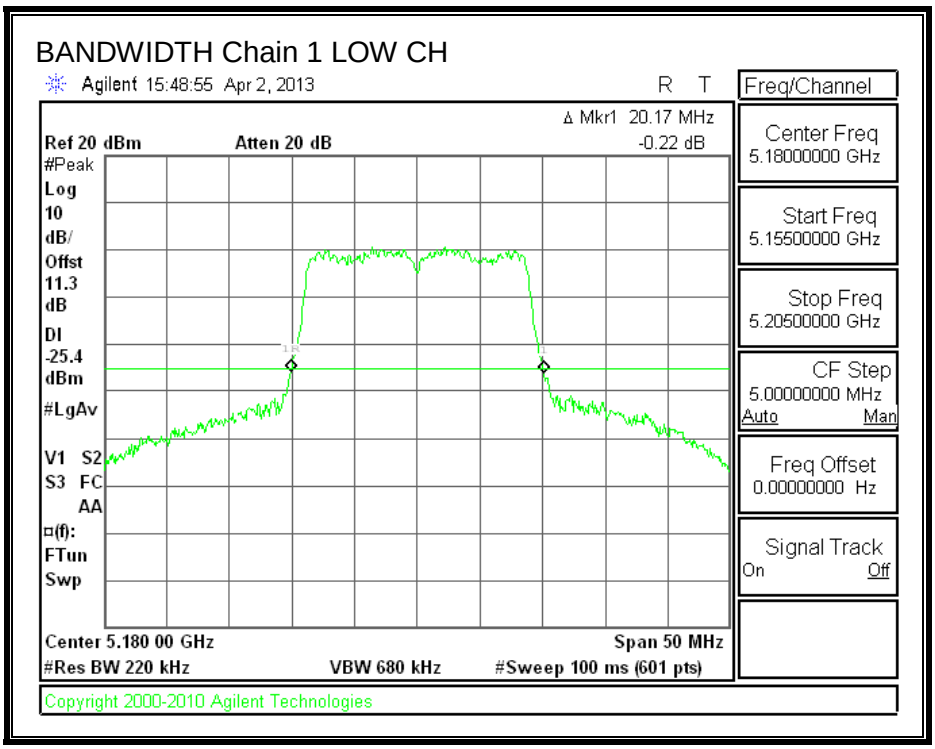
26 dB BANDWIDTH, Chain 0



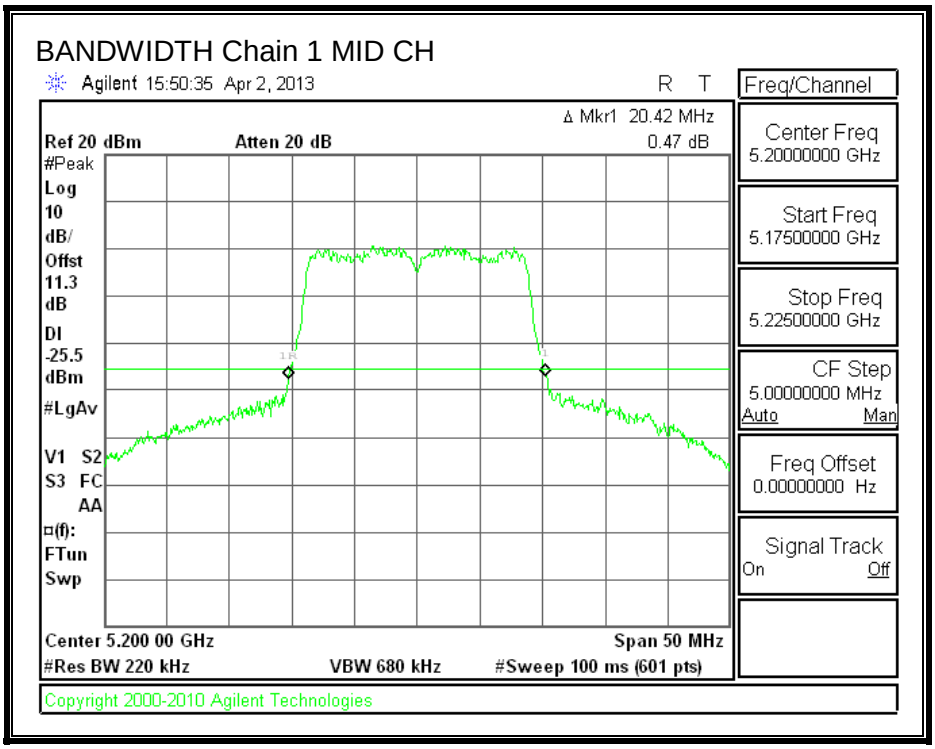




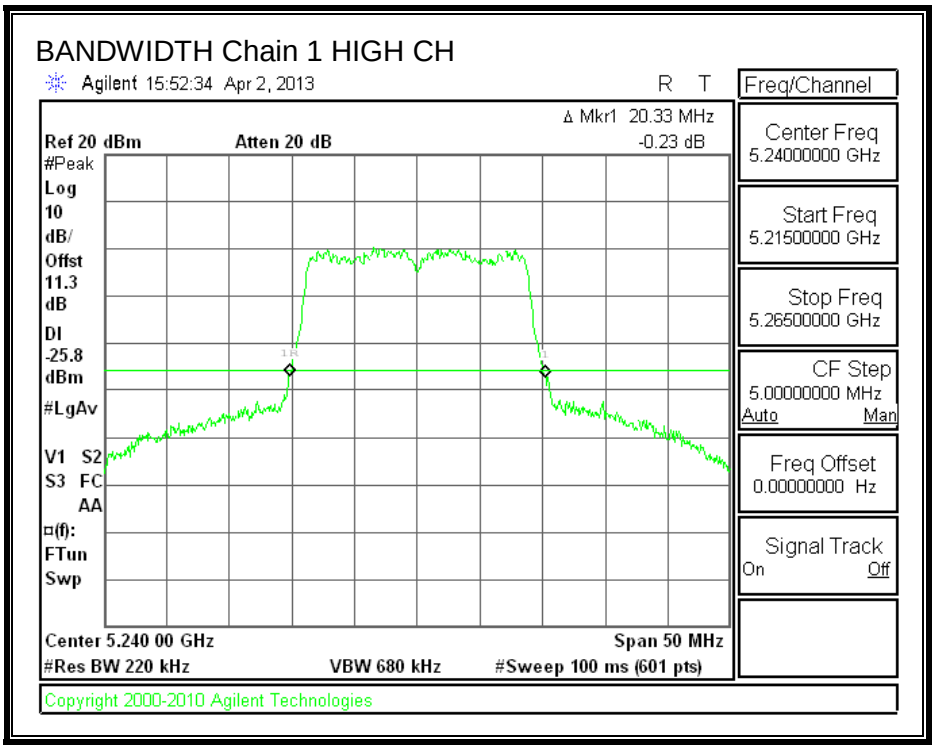
26 dB BANDWIDTH, Chain 1



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH



8.3.2. **99% BANDWIDTH**

LIMITS

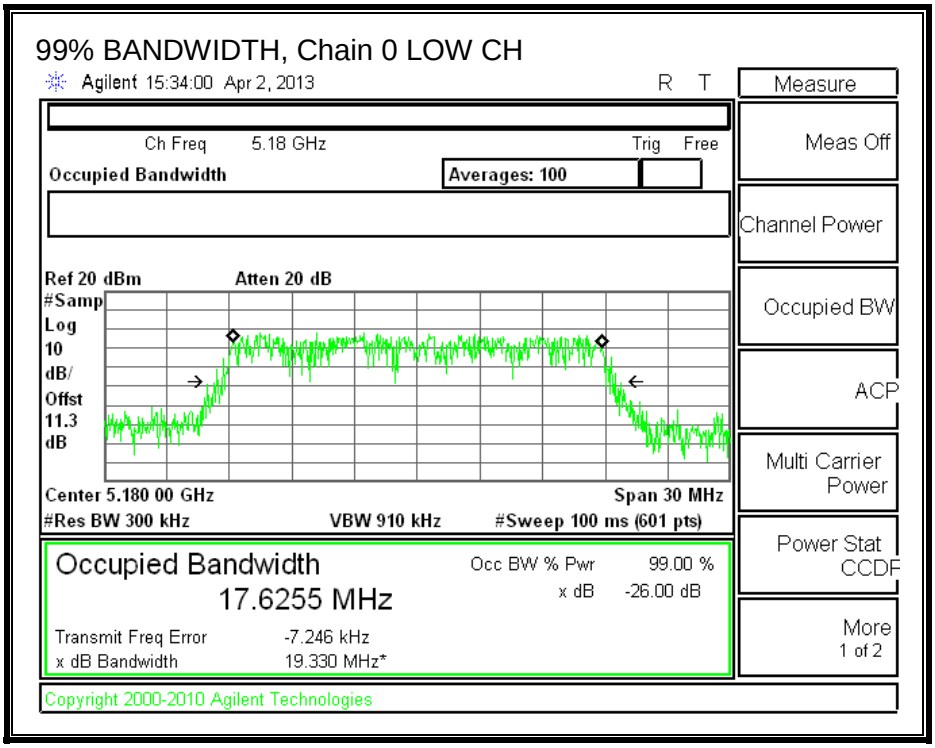
None; for reporting purposes only.

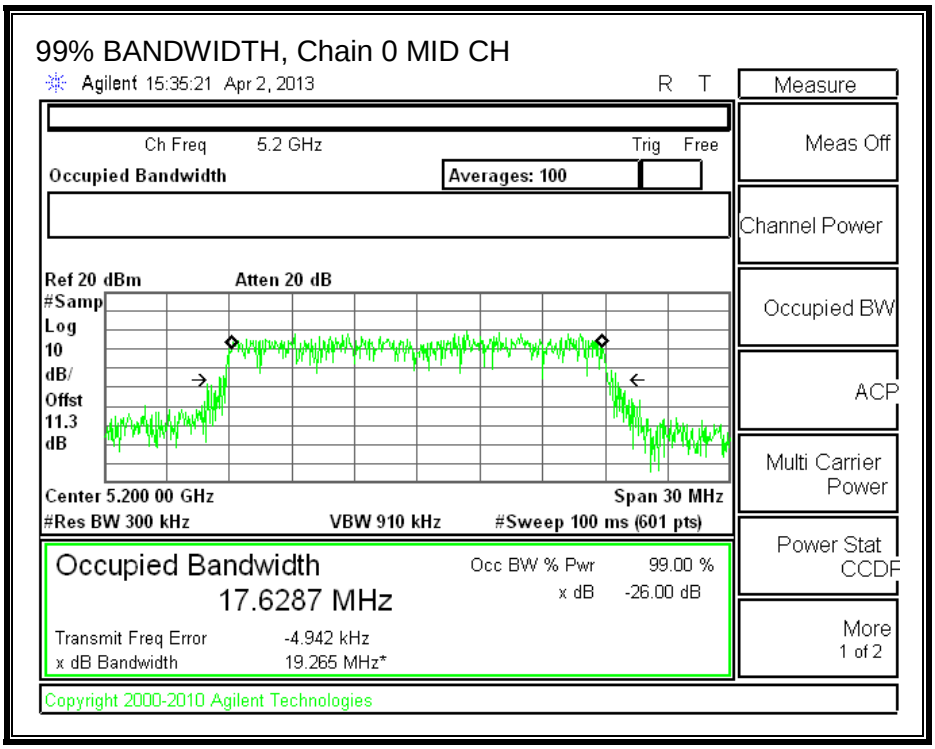
RESULTS

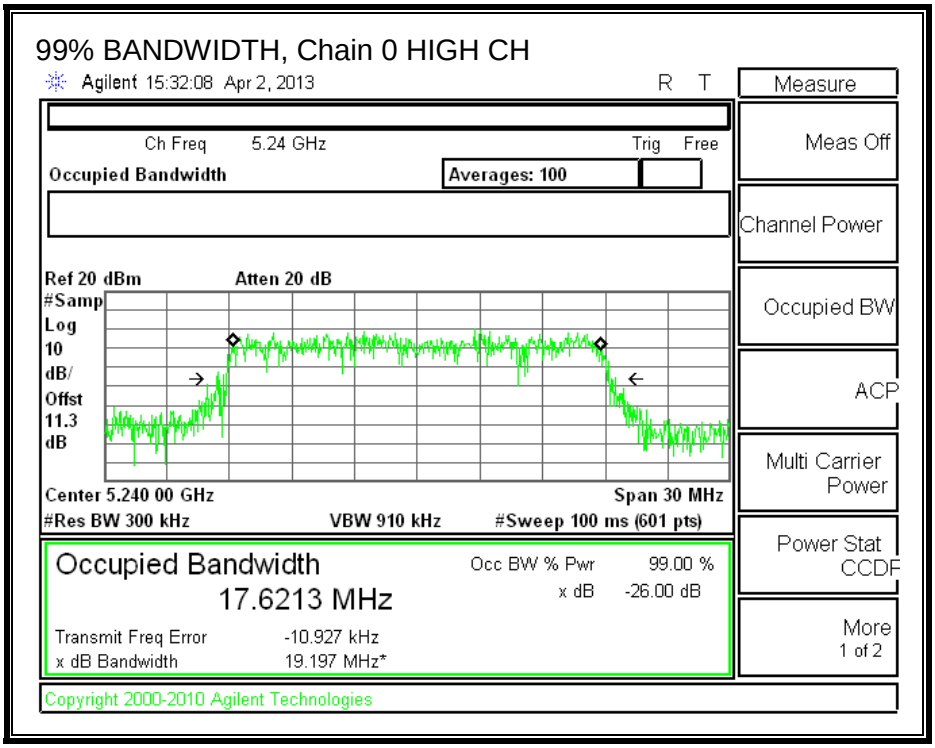
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	17.6	17.6
Mid	5200	17.6	17.6
High	5240	17.6	17.6

99% BANDWIDTH

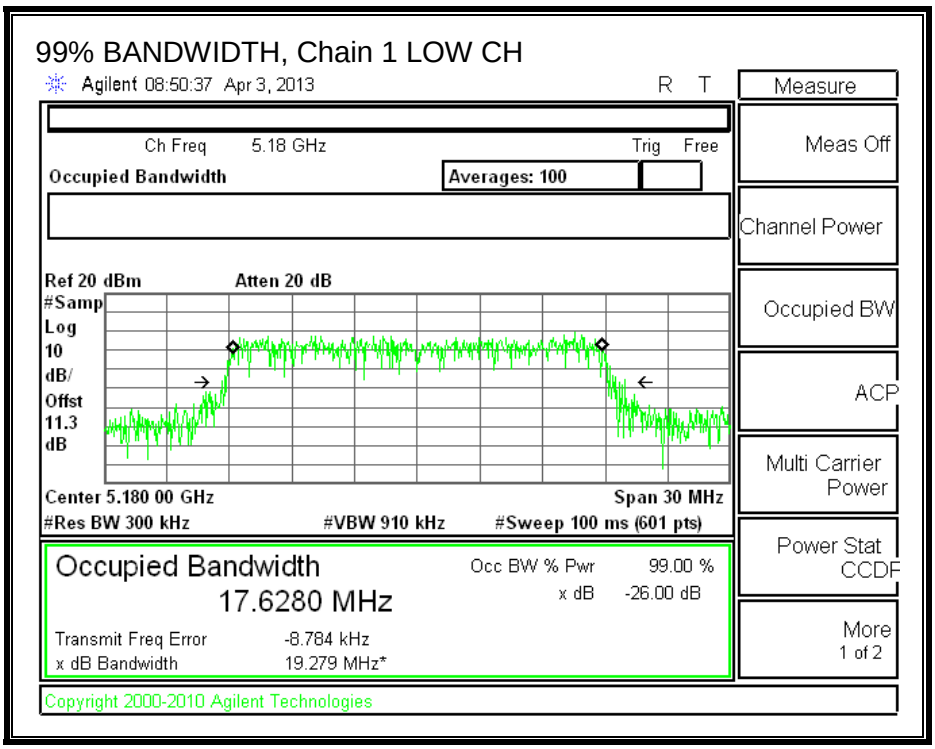
99% BANDWIDTH, Chain 0

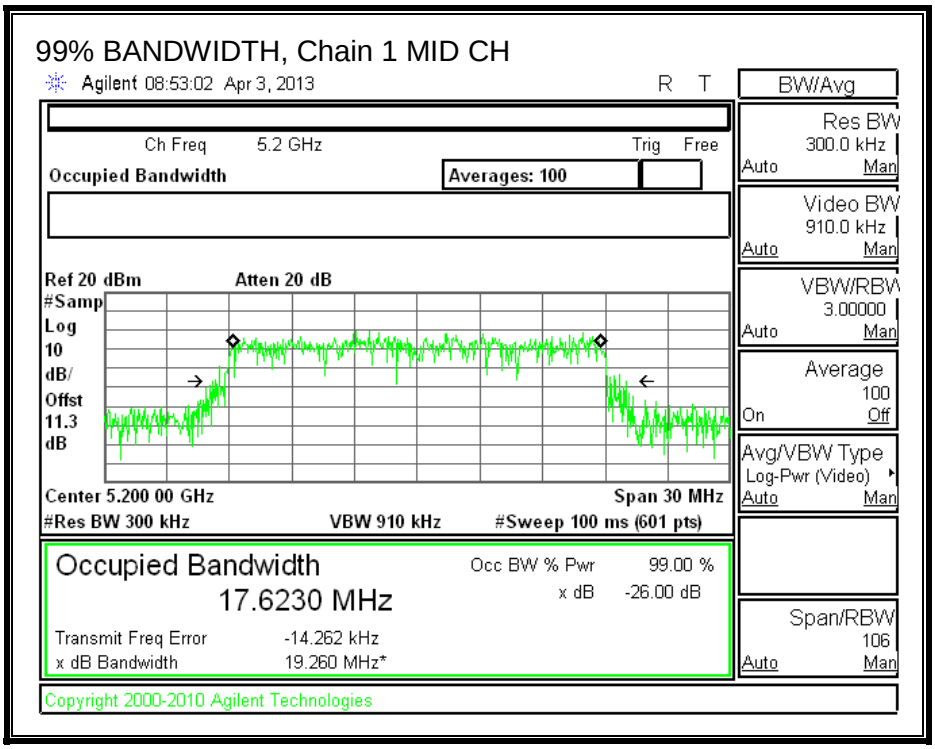


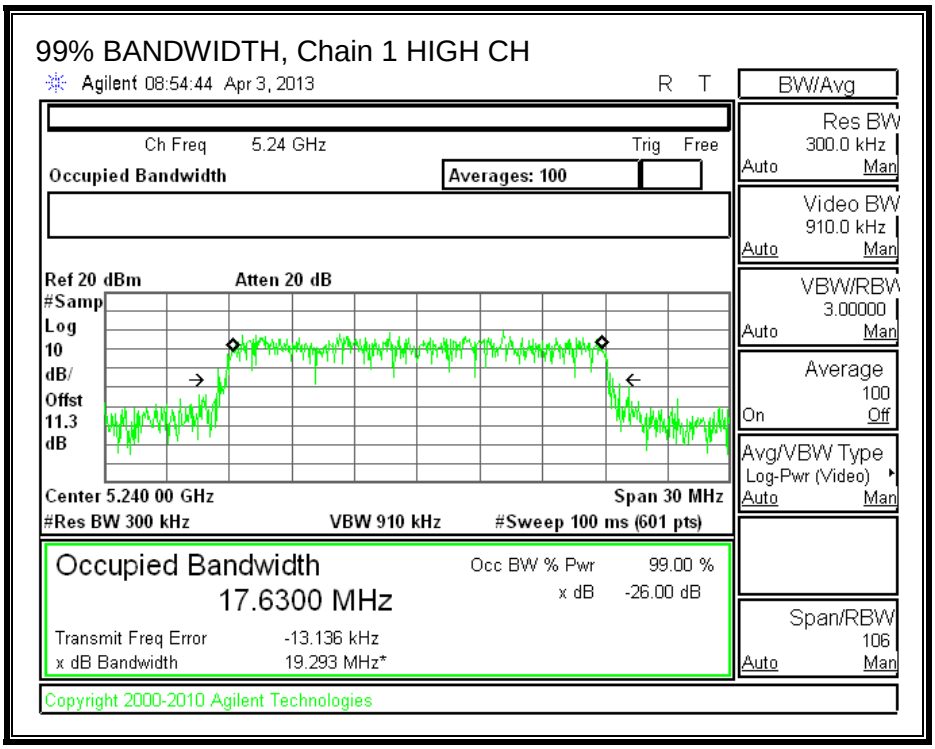




99% BANDWIDTH, Chain 1







8.3.3. **AVERAGE POWER**

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	8.35	9.06	11.73
Mid	5200	8.24	8.96	11.63
High	5240	8.01	8.30	11.17

8.3.4. **OUTPUT POWER AND PPSD**

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

For output power, the two chains are considered uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.38	3.43	3.41

For PSD, the two chains are considered correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.38	3.43	6.42

OUTPUT POWER RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.20	17.6000	3.41
Mid	5200	20.30	17.6000	3.41
High	5240	20.20	17.6000	3.41

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)
Low	5180	17.00	22.46	19.05	17.00
Mid	5200	17.00	22.46	19.05	17.00
High	5240	17.00	22.46	19.05	17.00

Duty Cycle CF (dB)	0.00	

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	8.99	9.98	12.52	17.00	-4.48
Mid	5200	9.91	9.86	12.90	17.00	-4.10
High	5240	9.19	9.50	12.36	17.00	-4.64

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.20	17.6000	6.42
Mid	5200	20.30	17.6000	6.42
High	5240	20.20	17.6000	6.42

Limits

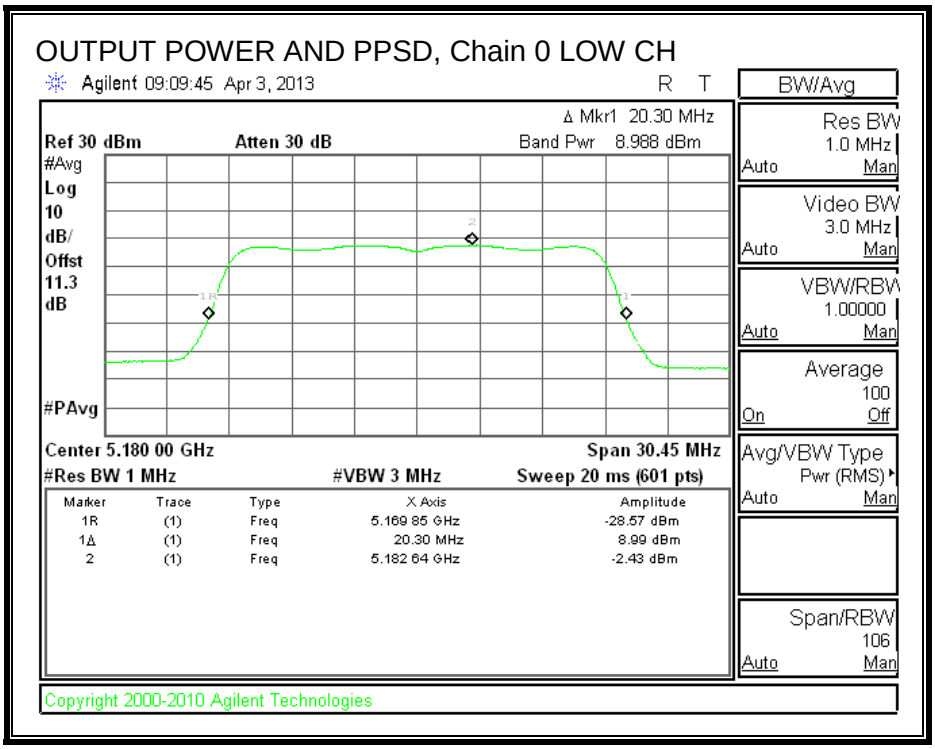
Channel	Frequency (MHz)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PSD Limit (dBm)
Low	5180	3.58	10.00	3.58
Mid	5200	3.58	10.00	3.58
High	5240	3.58	10.00	3.58

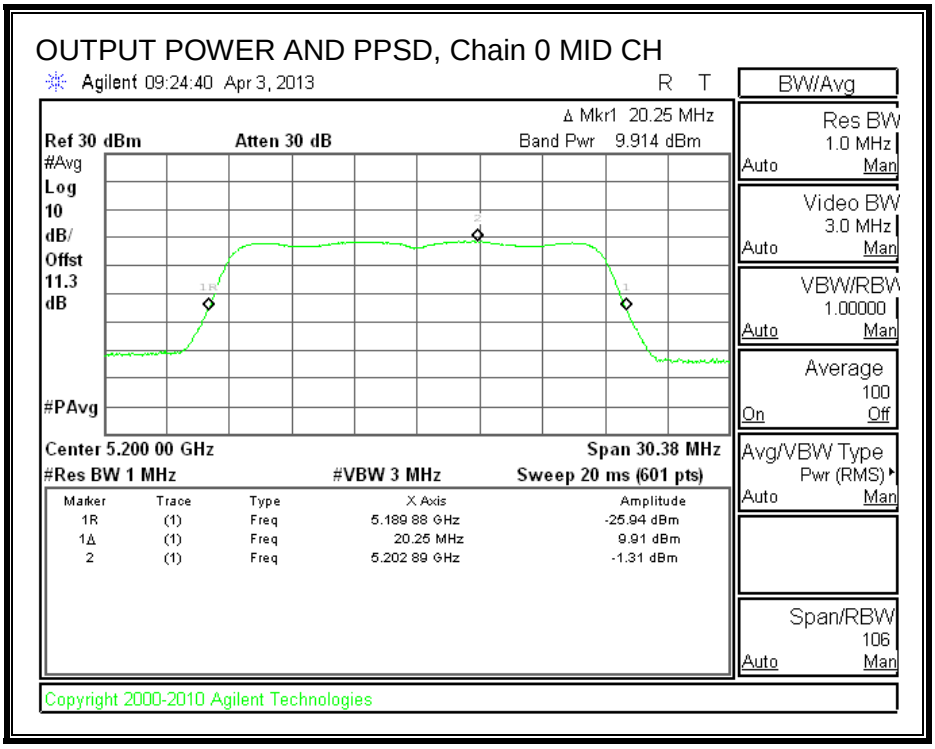
Duty Cycle CF (dB)	0.00	

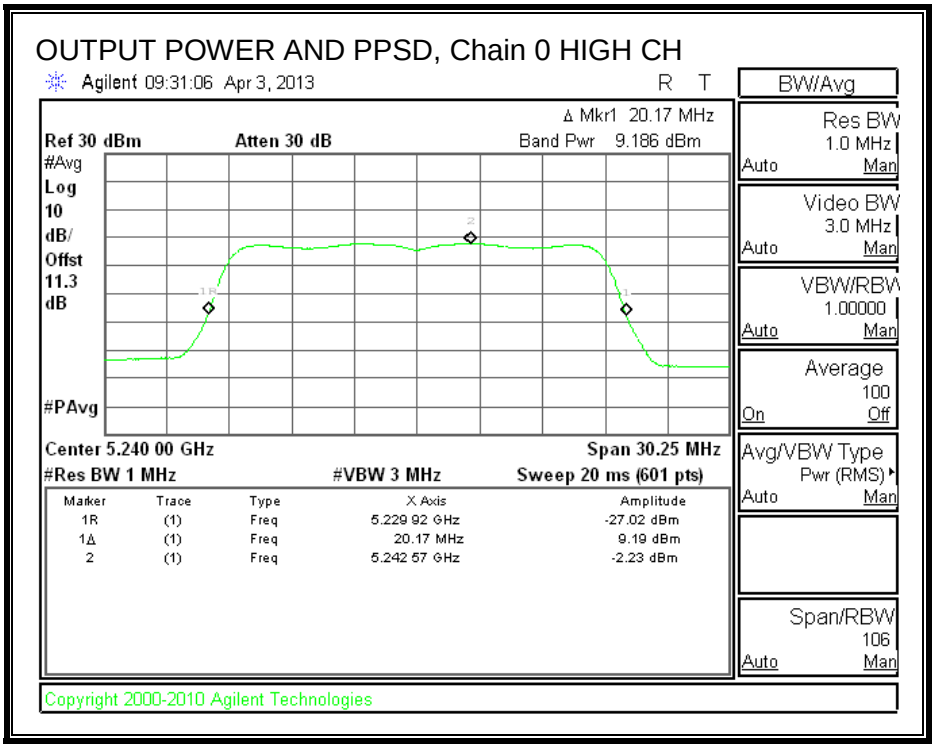
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	-1.46	-1.39	1.59	3.58	-1.99
Mid	5200	-1.31	-1.57	1.57	3.58	-2.01
High	5240	-2.23	-1.95	0.92	3.58	-2.66

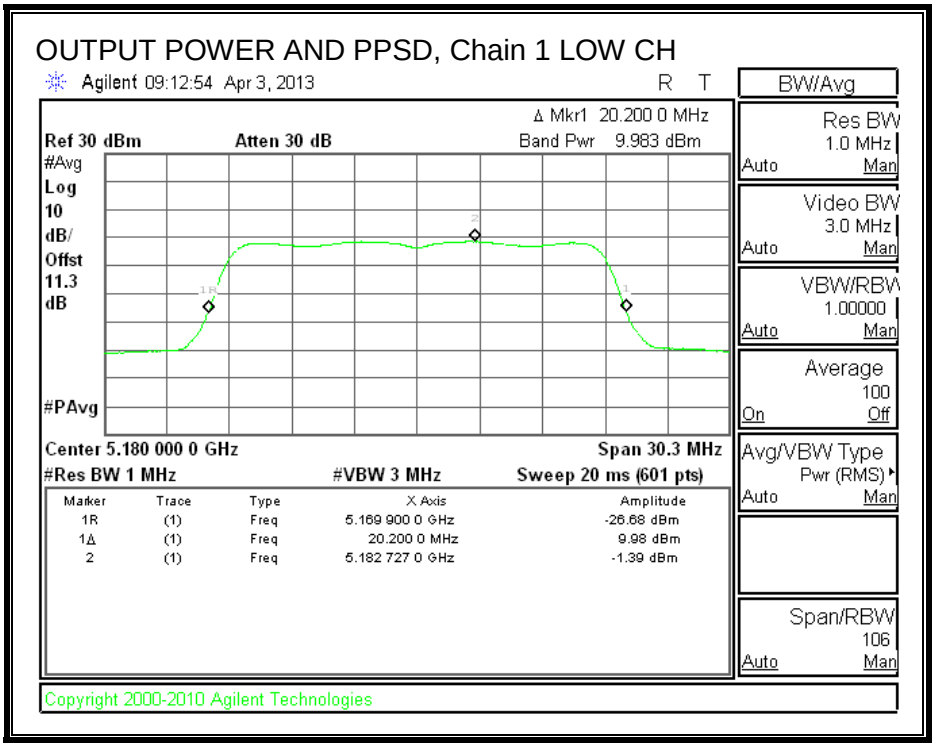
OUTPUT POWER AND PPSD, Chain 0

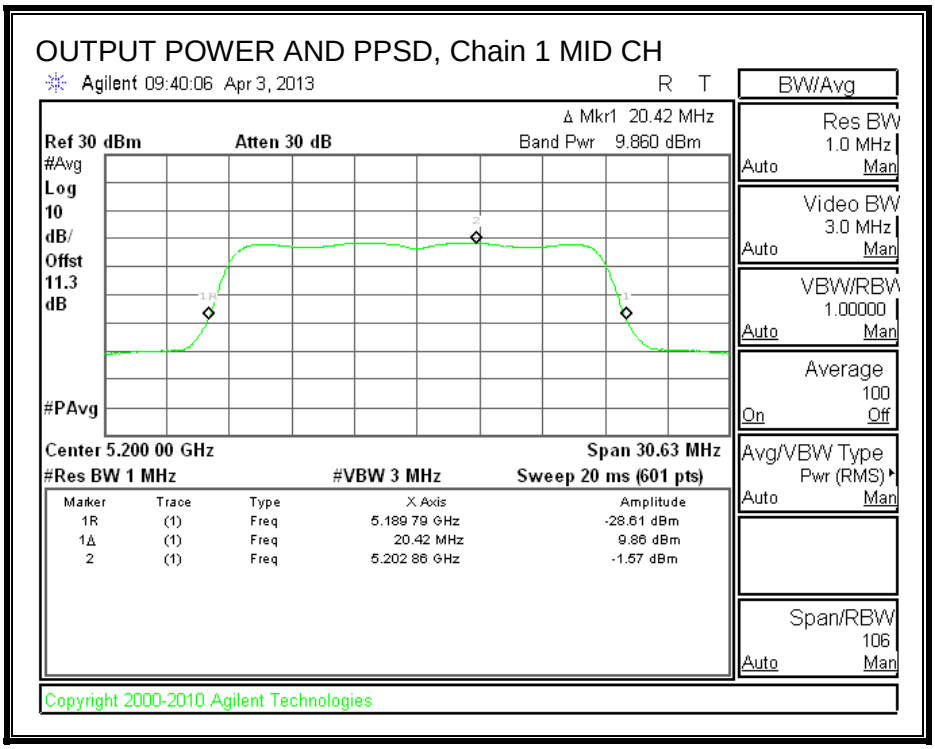


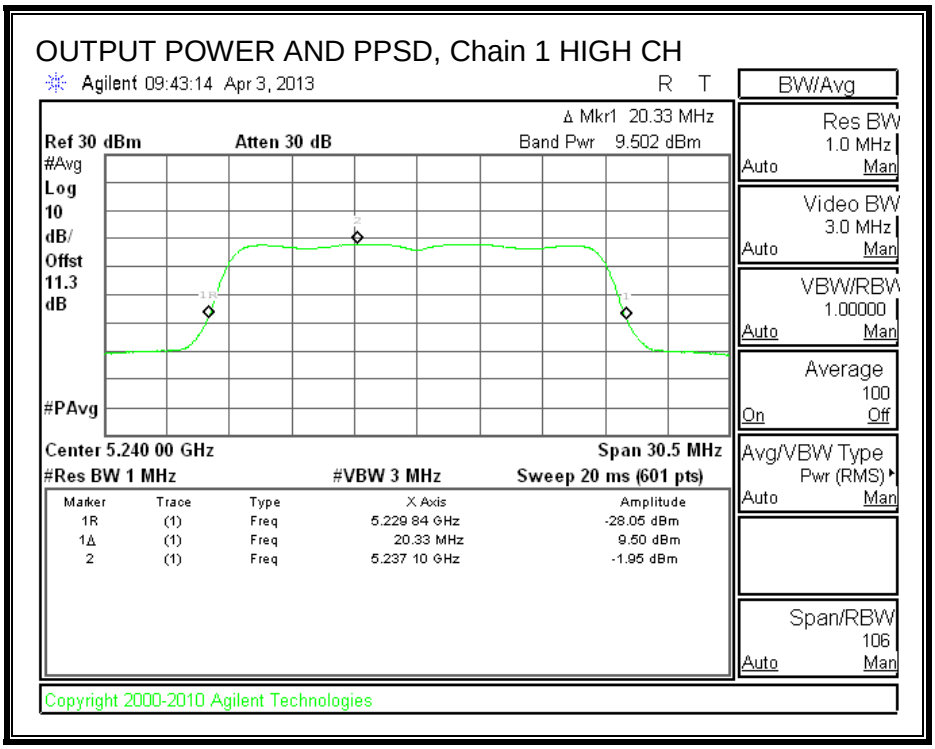




OUTPUT POWER AND PPSD, Chain 1







8.3.5. **PEAK EXCURSION**

LIMITS

FCC §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.

RESULTS

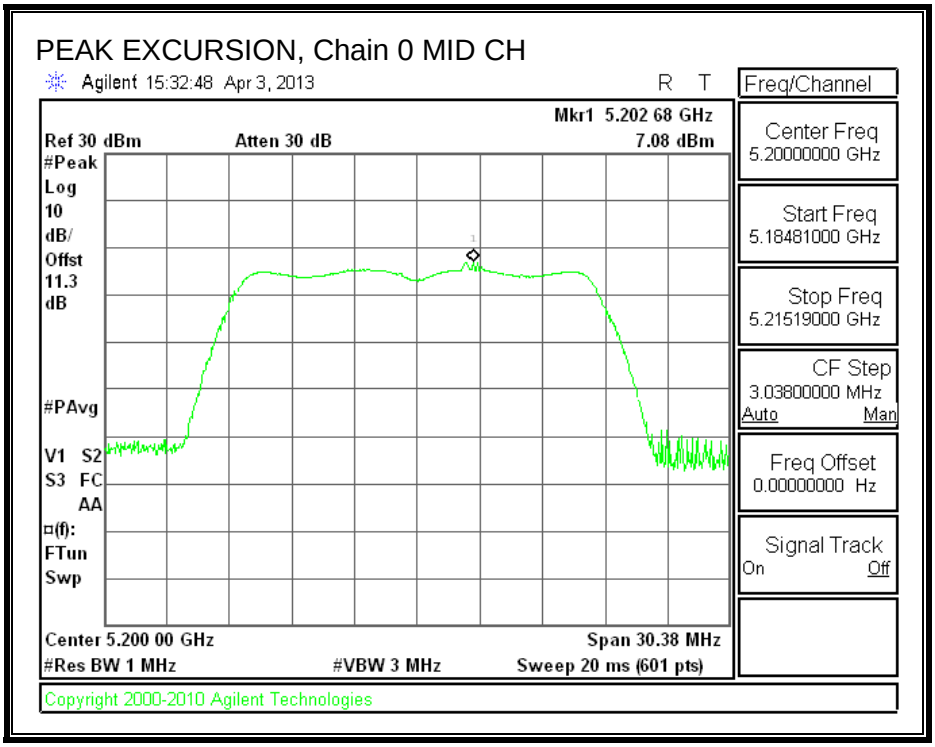
Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	7.08	-1.31	0.00	8.39	13	-4.61

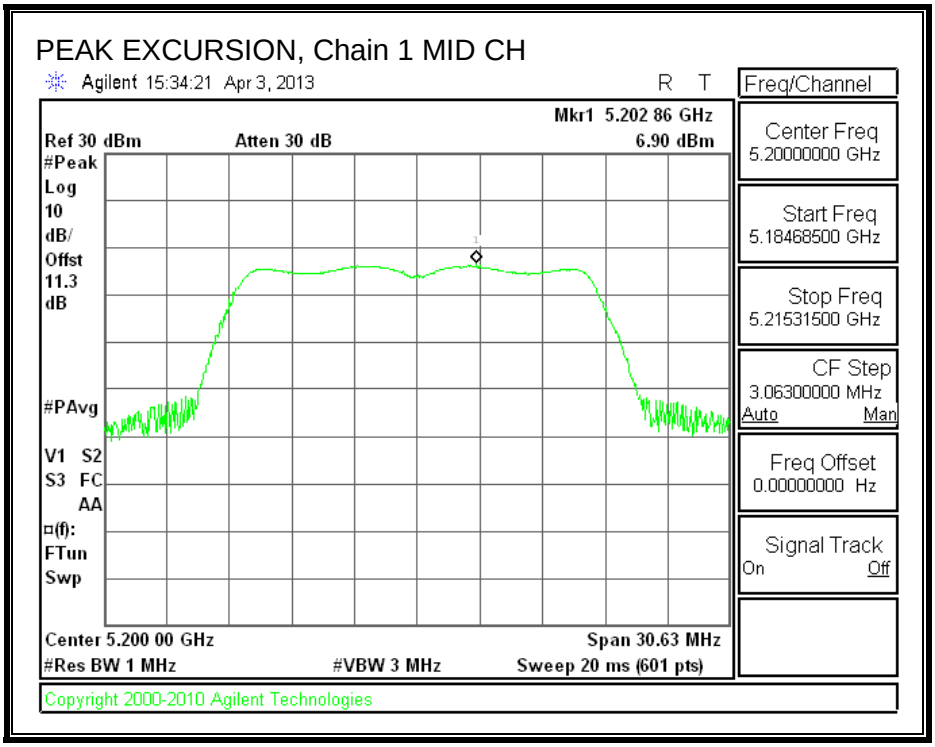
Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	6.90	-1.57	0.00	8.47	13	-4.53

PEAK EXCURSION, Chain 0



PEAK EXCURSION, Chain 1



8.4. 802.11n HT20, STBC MODE IN THE 5.2 GHz BAND

8.4.1. **26 dB BANDWIDTH**

LIMITS

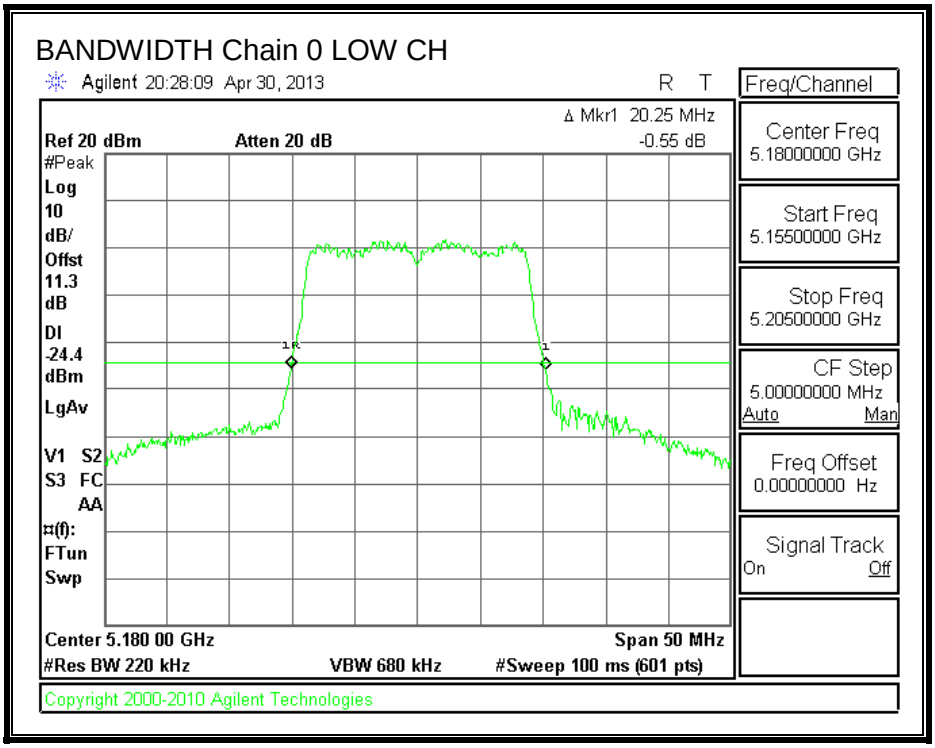
None; for reporting purposes only.

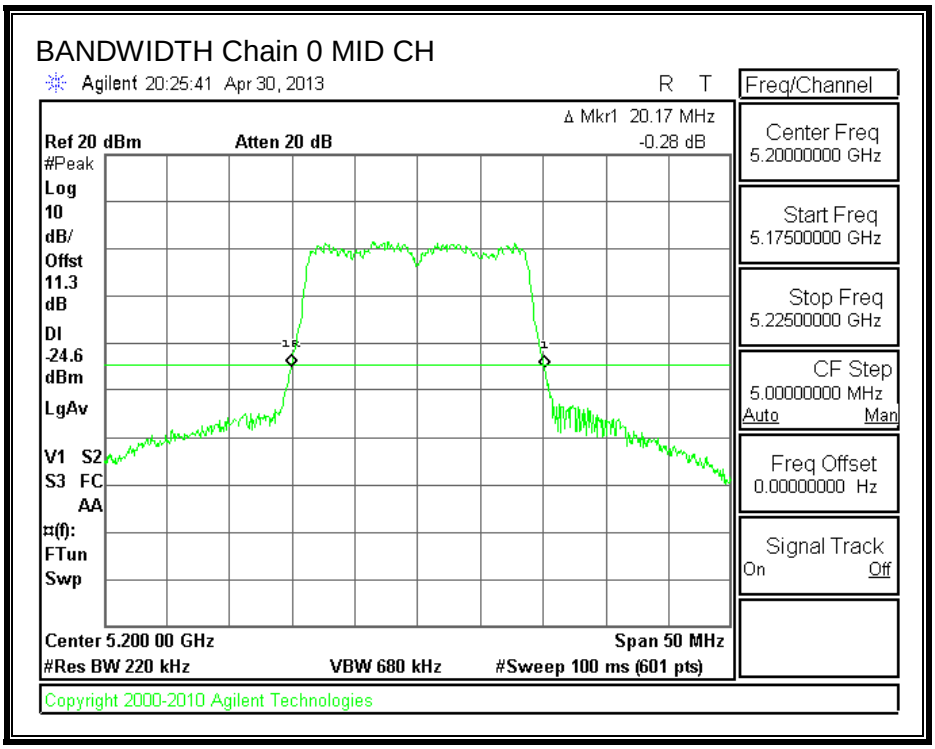
RESULTS

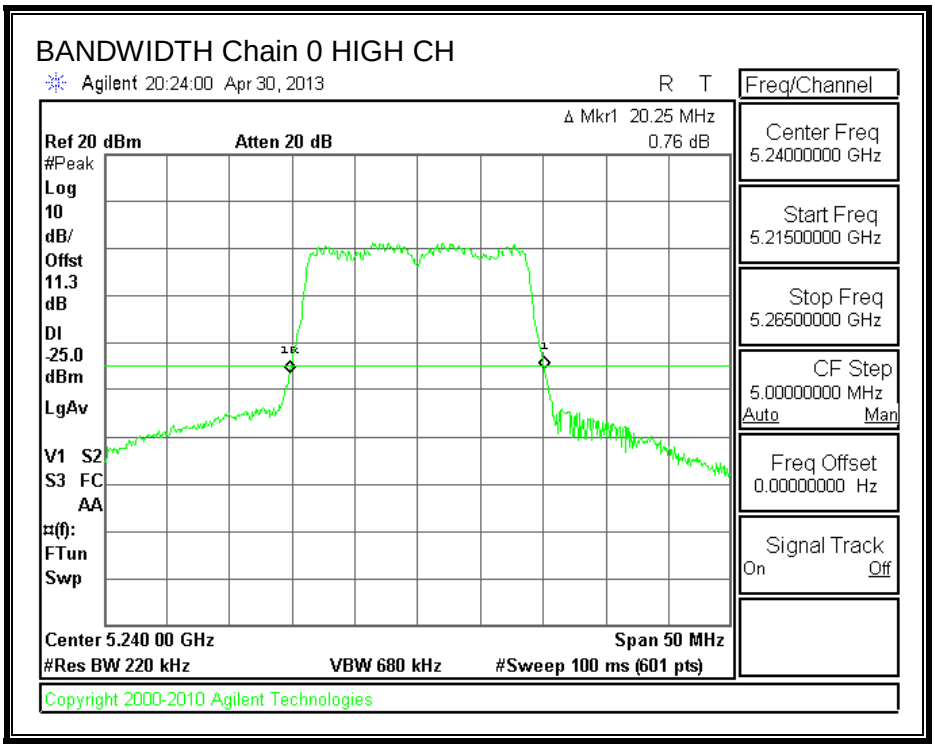
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	20.25	20.33
Mid	5200	20.17	20.17
High	5240	20.25	20.17

26 dB BANDWIDTH

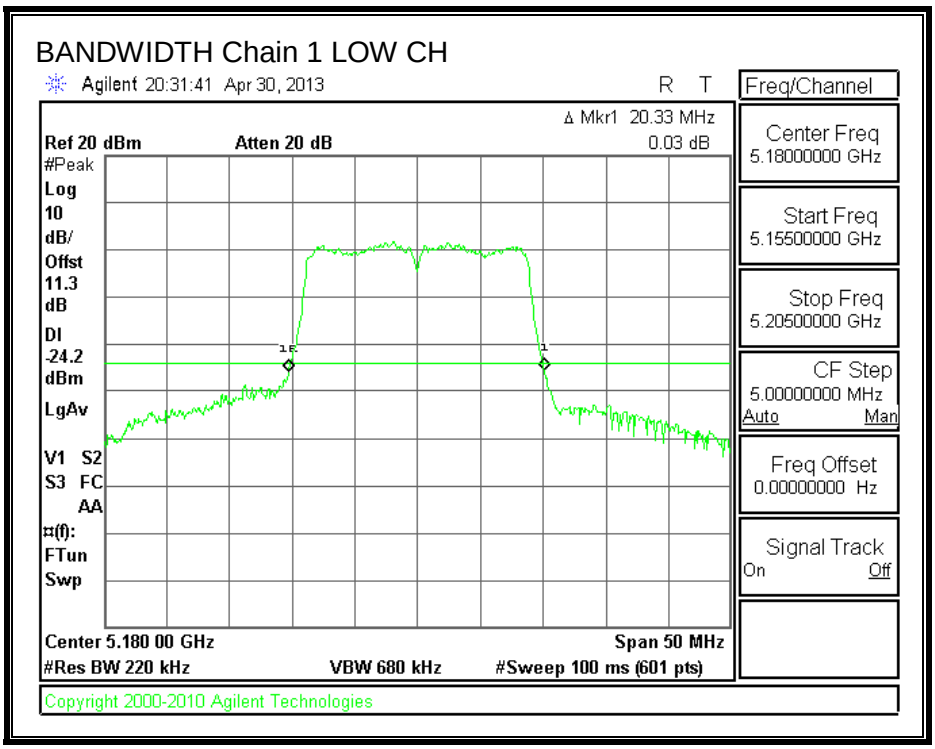
26 dB BANDWIDTH, Chain 0



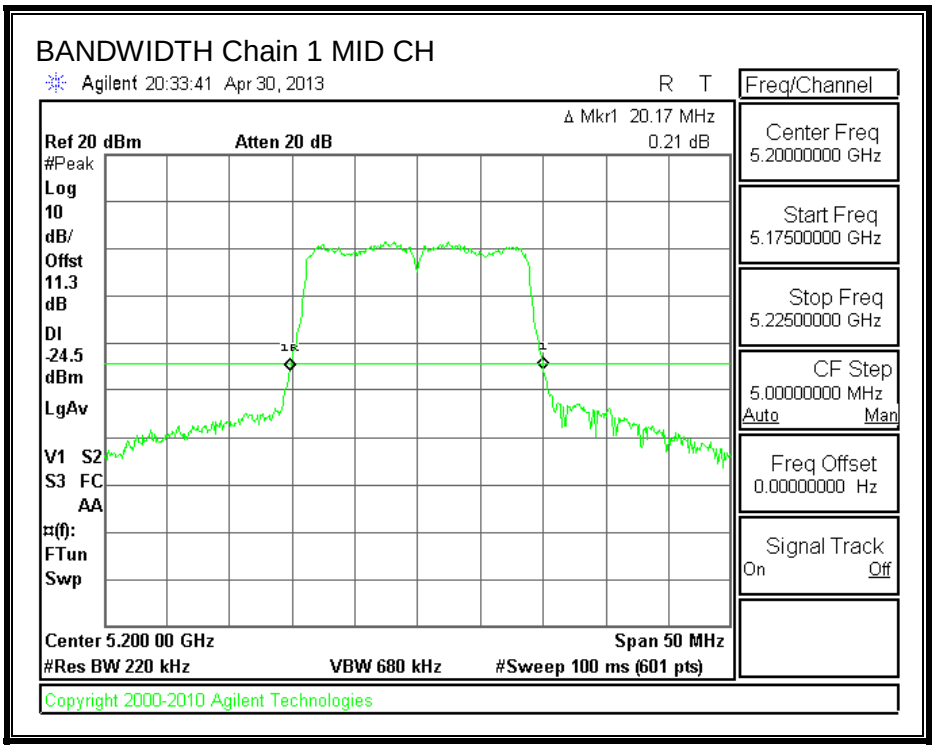




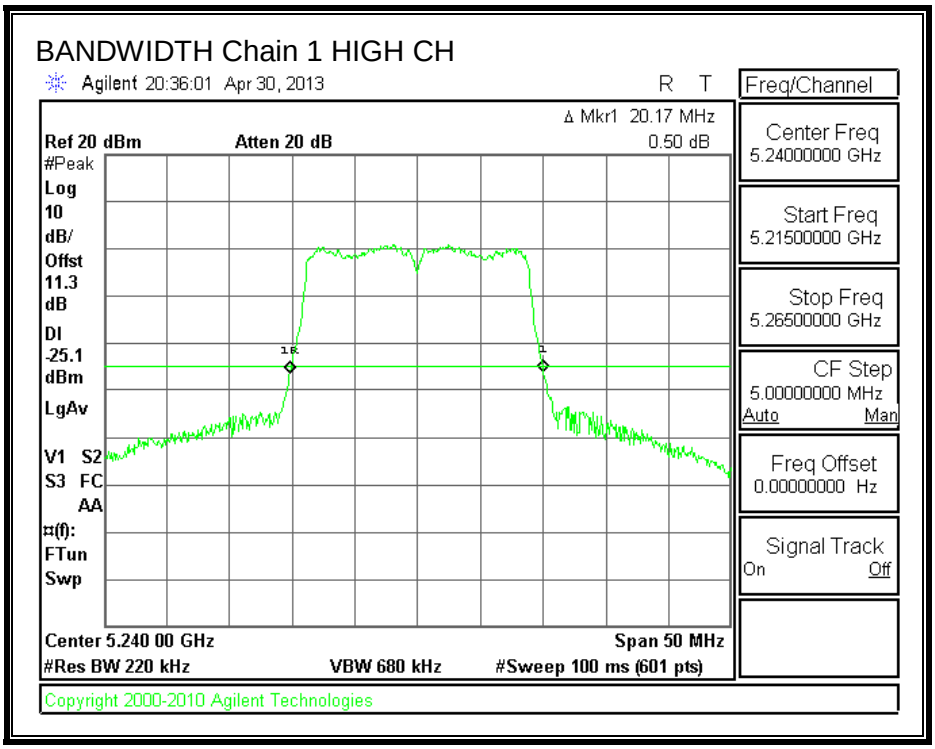
26 dB BANDWIDTH, Chain 1



BANDWIDTH Chain 1 MID CH



BANDWIDTH Chain 1 HIGH CH



8.4.2. **99% BANDWIDTH**

LIMITS

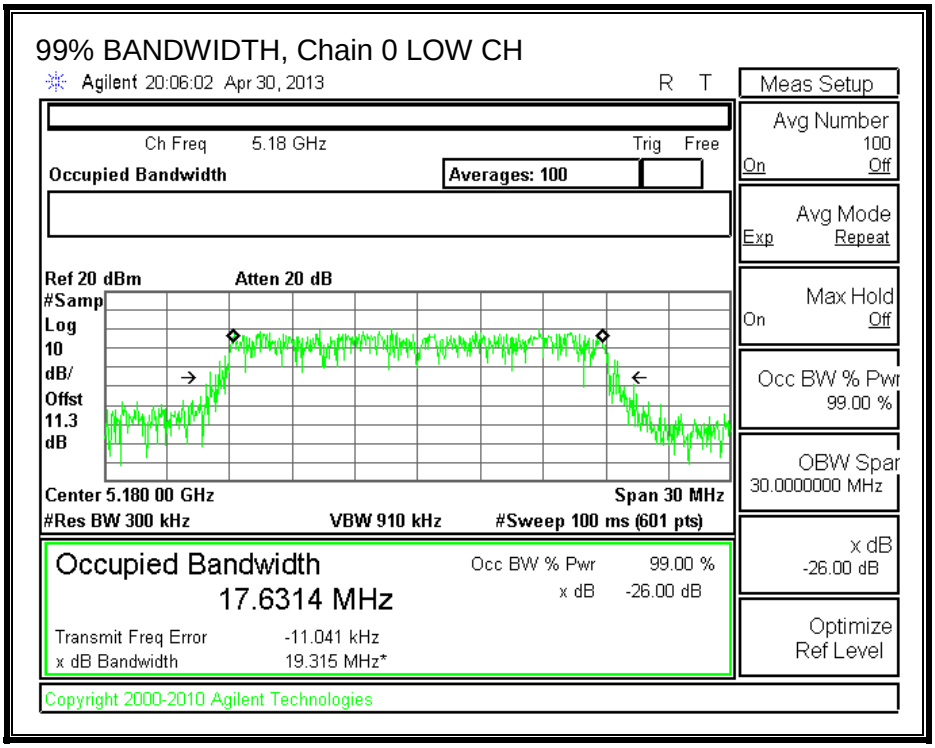
None; for reporting purposes only.

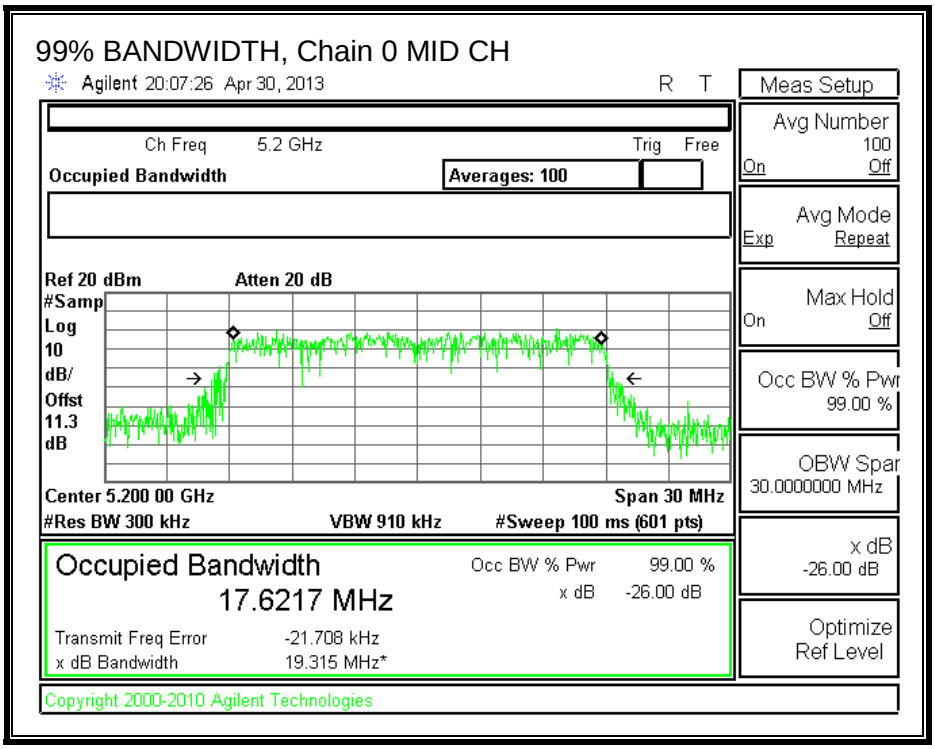
RESULTS

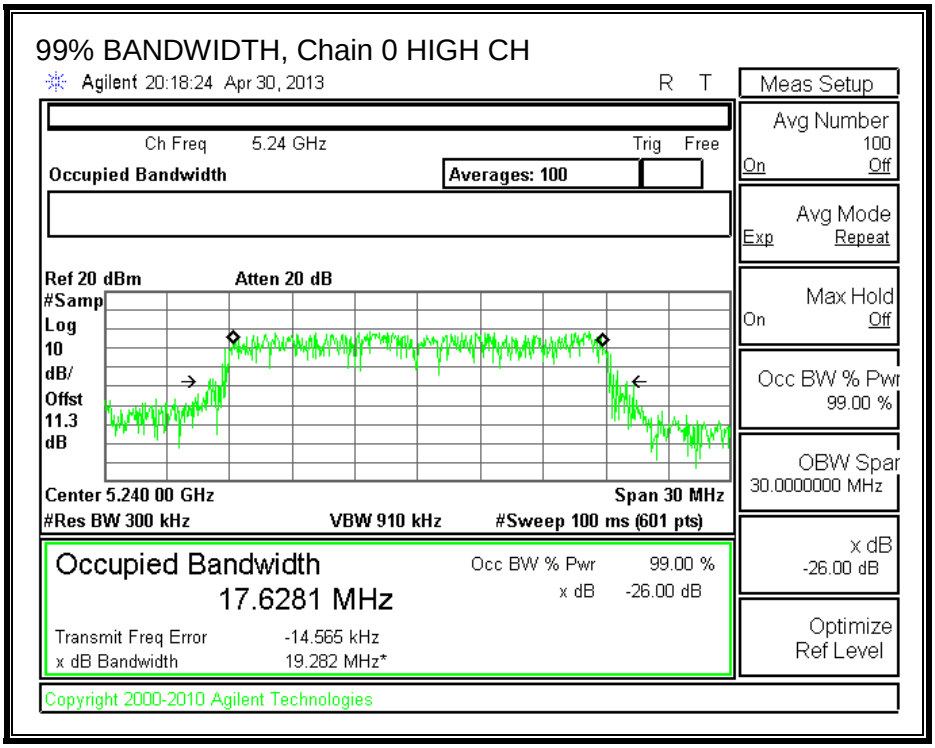
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	17.6314	17.6201
Mid	5200	17.6217	17.6203
High	5240	17.6281	17.6191

99% BANDWIDTH

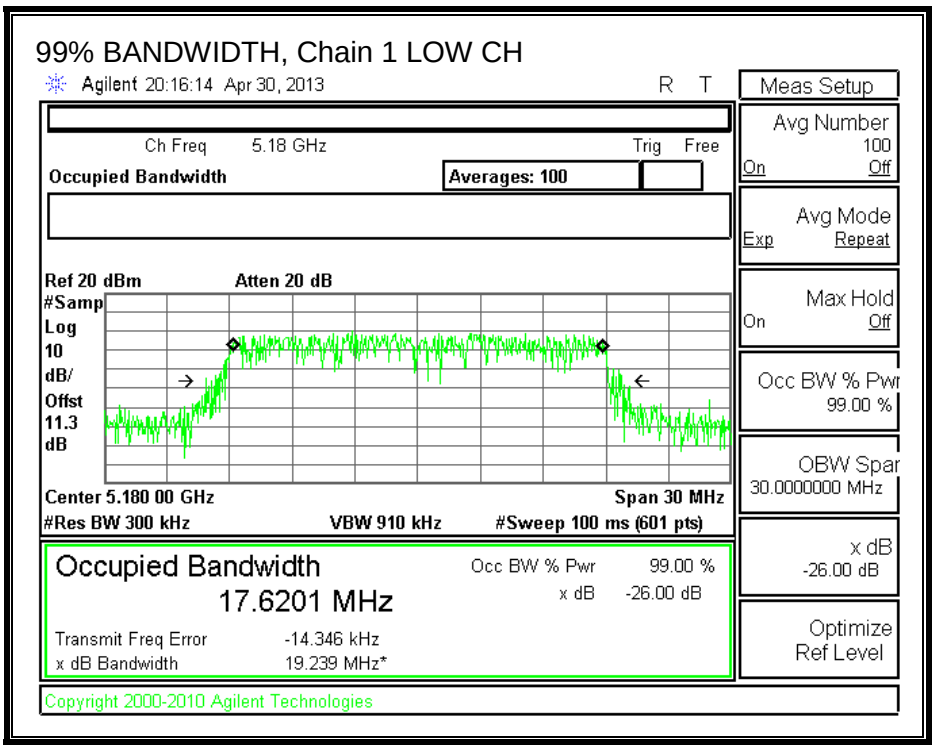
99% BANDWIDTH, Chain 0

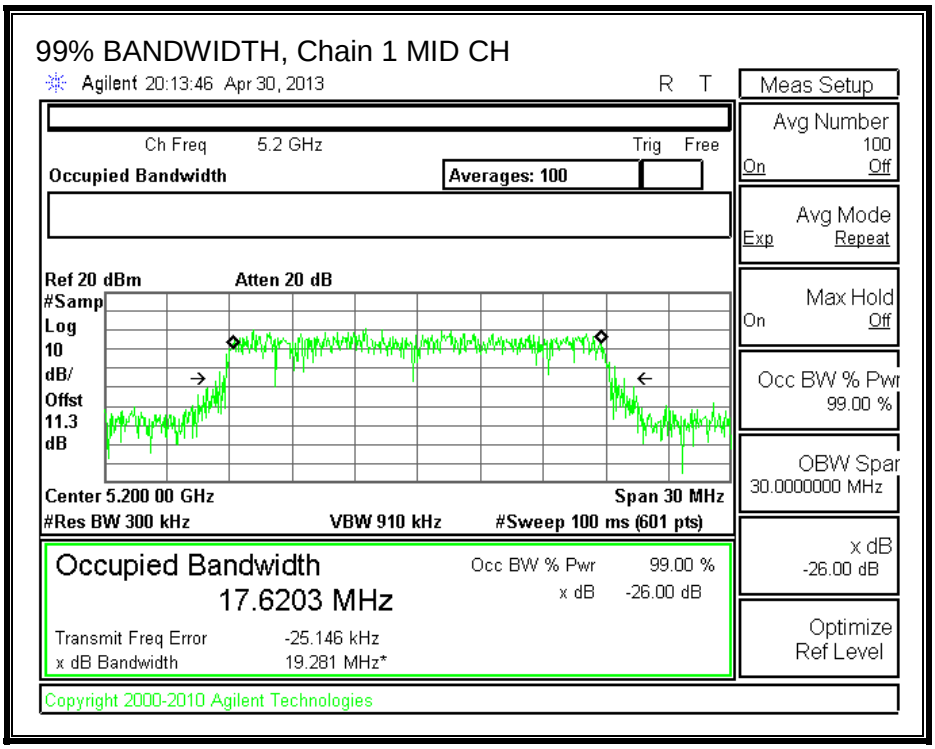


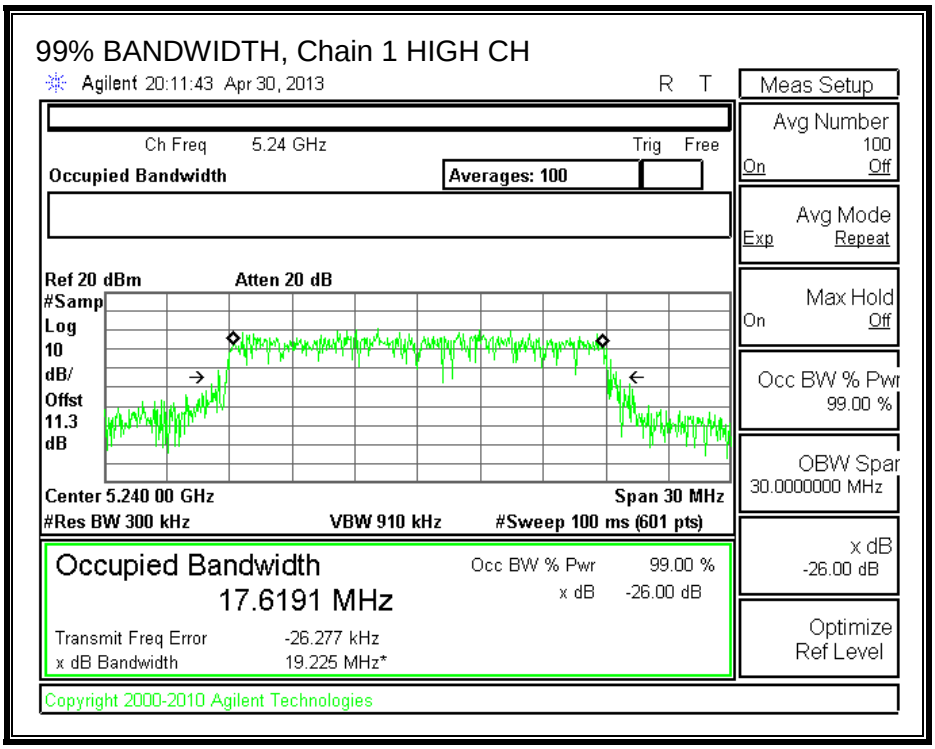




99% BANDWIDTH, Chain 1







8.4.3. **AVERAGE POWER**

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	10.94	11.12	14.04
Mid	5200	10.82	10.94	13.89
High	5240	10.56	10.45	13.52

8.4.4. **OUTPUT POWER AND PPSD**

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

For output power and PSD, the two chains are considered uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.38	3.43	3.41

For PSD, the two chains are considered correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.38	3.43	6.42

OUTPUT POWER RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.25	17.6201	3.41
Mid	5200	20.17	17.6203	3.41
High	5240	20.17	17.6191	3.41

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)
Low	5180	17.00	22.46	19.05	17.00
Mid	5200	17.00	22.46	19.05	17.00
High	5240	17.00	22.46	19.05	17.00

Duty Cycle CF (dB)	0.00	

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	11.70	11.88	14.80	17.00	-2.20
Mid	5200	11.59	11.72	14.66	17.00	-2.34
High	5240	11.25	11.20	14.23	17.00	-2.77

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	20.17	17.6201	6.42
Mid	5200	20.17	17.6203	6.42
High	5240	20.17	17.6191	6.42

Limits

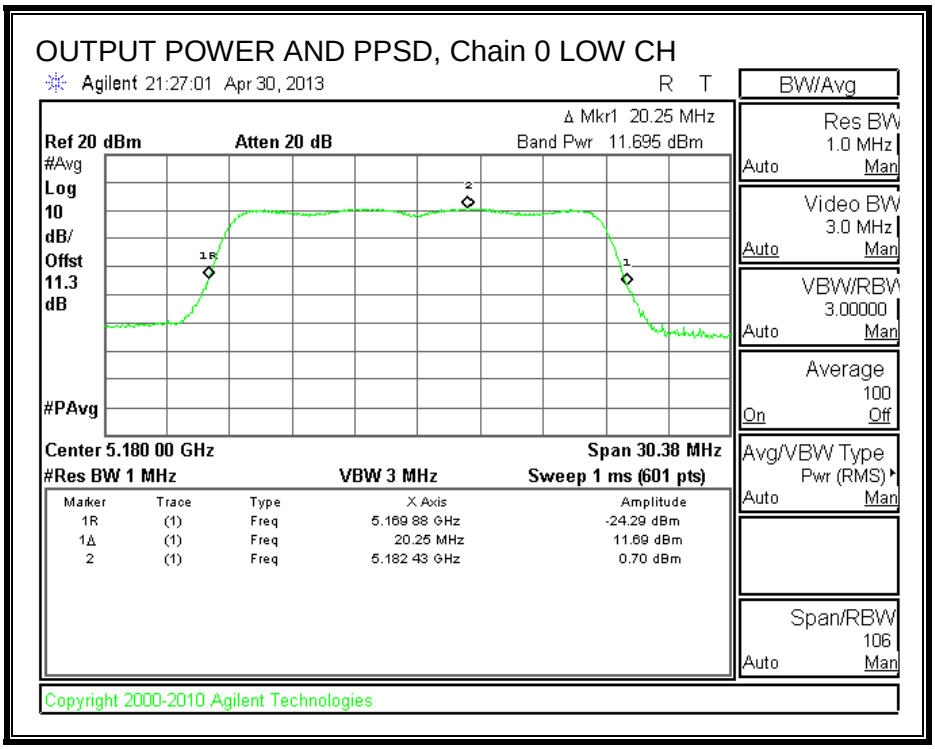
Channel	Frequency (MHz)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PSD Limit (dBm)
Low	5180	3.58	10.00	3.58
Mid	5200	3.58	10.00	3.58
High	5240	3.58	10.00	3.58

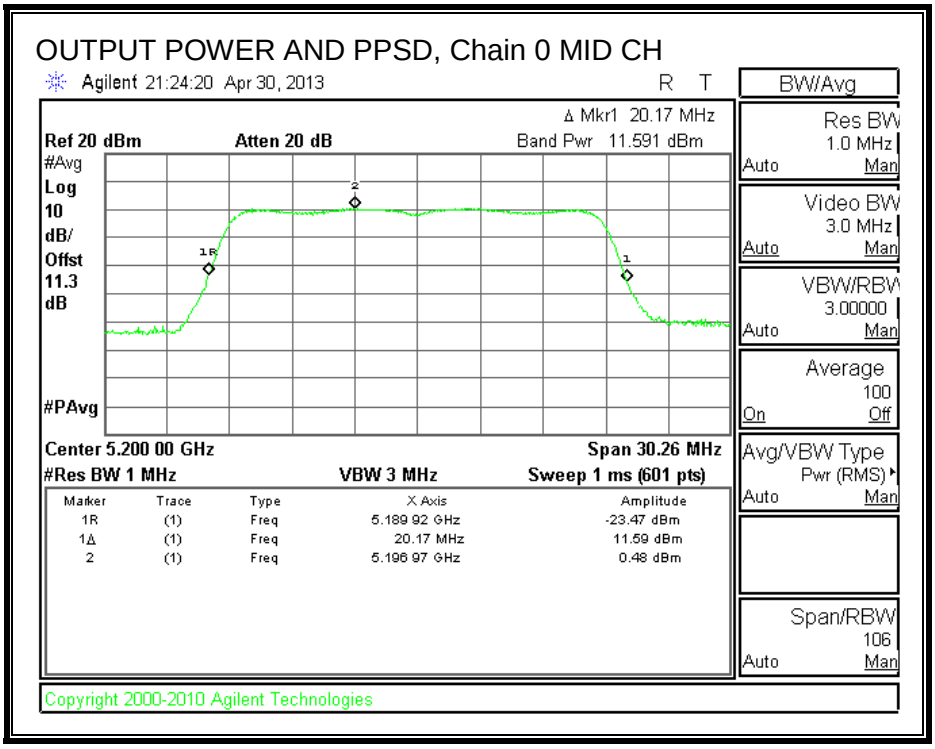
Duty Cycle CF (dB)	0.00	

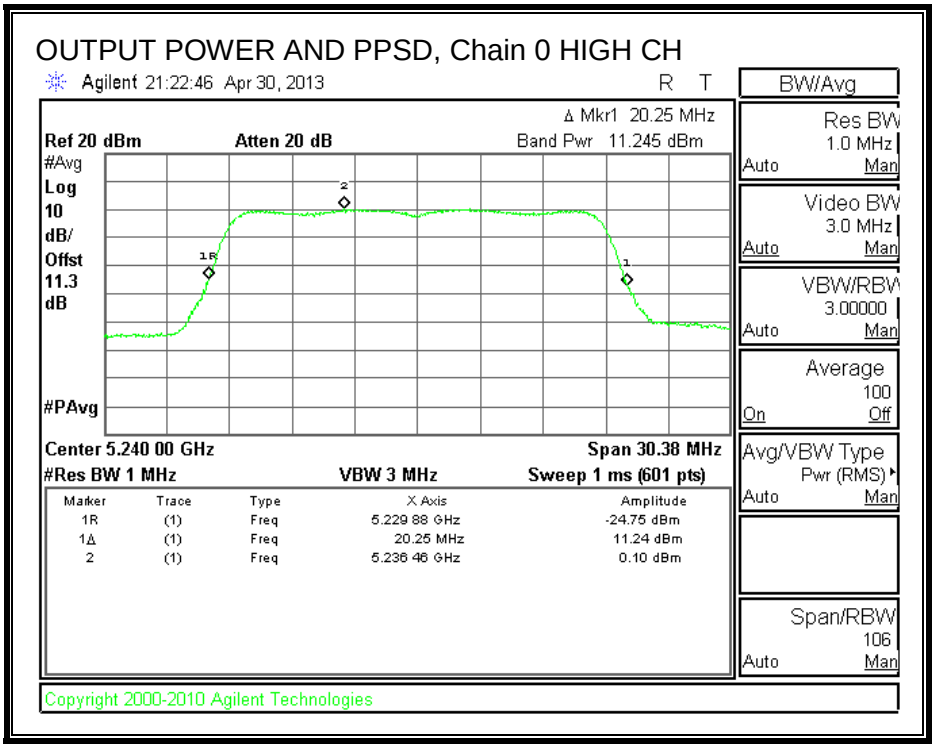
PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	0.70	0.62	3.67	3.58	0.09
Mid	5200	0.48	0.61	3.56	3.58	-0.02
High	5240	0.10	0.14	3.13	3.58	-0.45

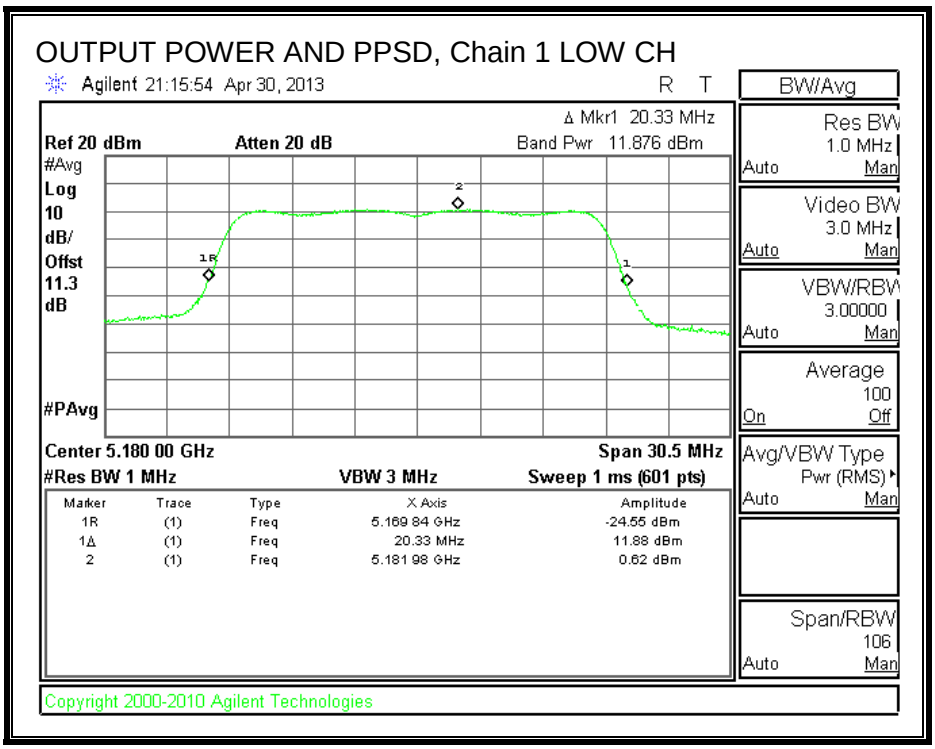
OUTPUT POWER AND PPSD, Chain 0

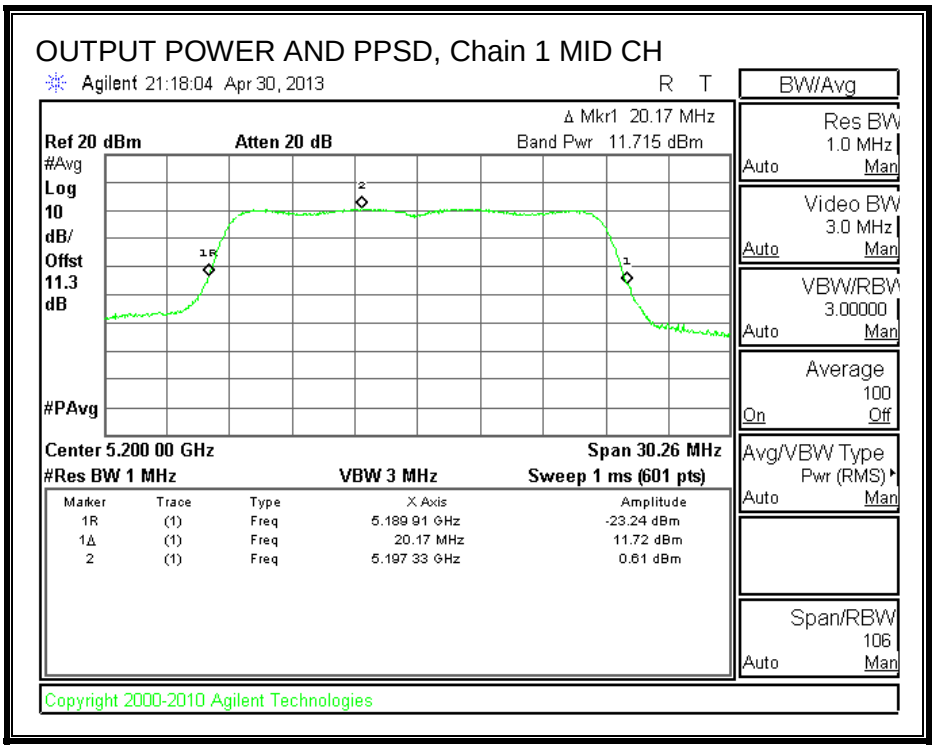


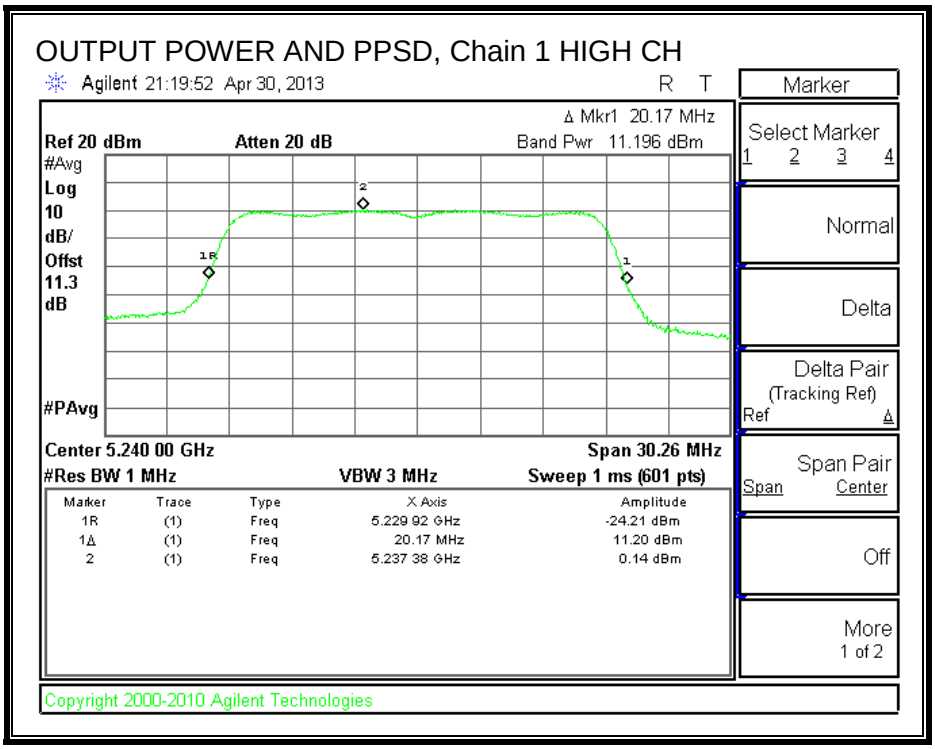




OUTPUT POWER AND PPSD, Chain 1







8.4.5. **PEAK EXCURSION**

LIMITS

FCC §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.

RESULTS

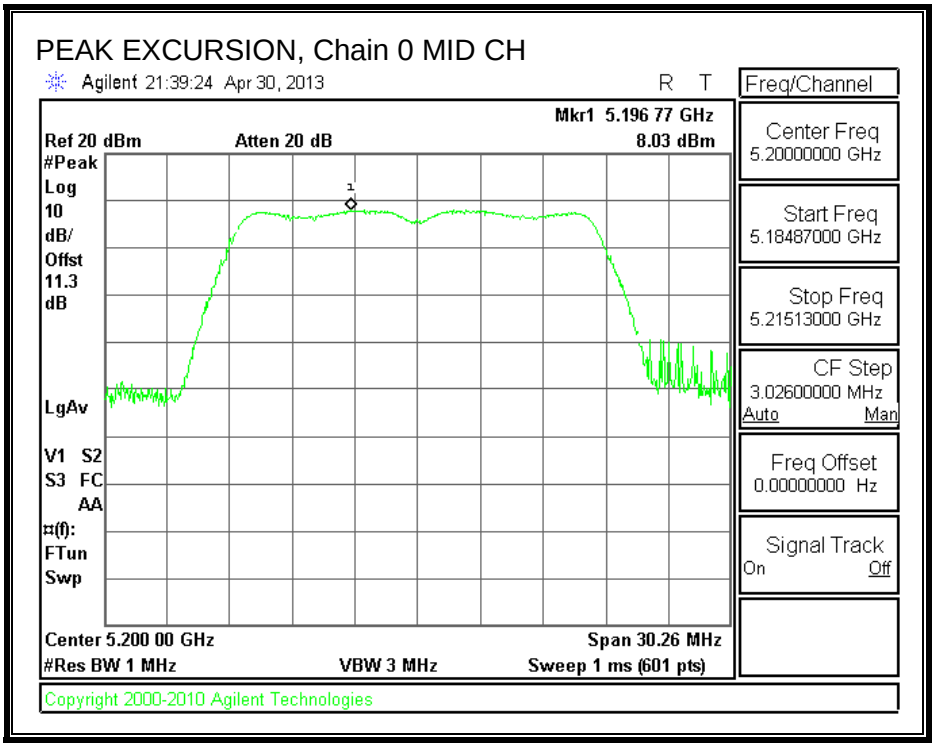
Chain 0

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	8.03	0.48	0.00	7.55	13	-5.45

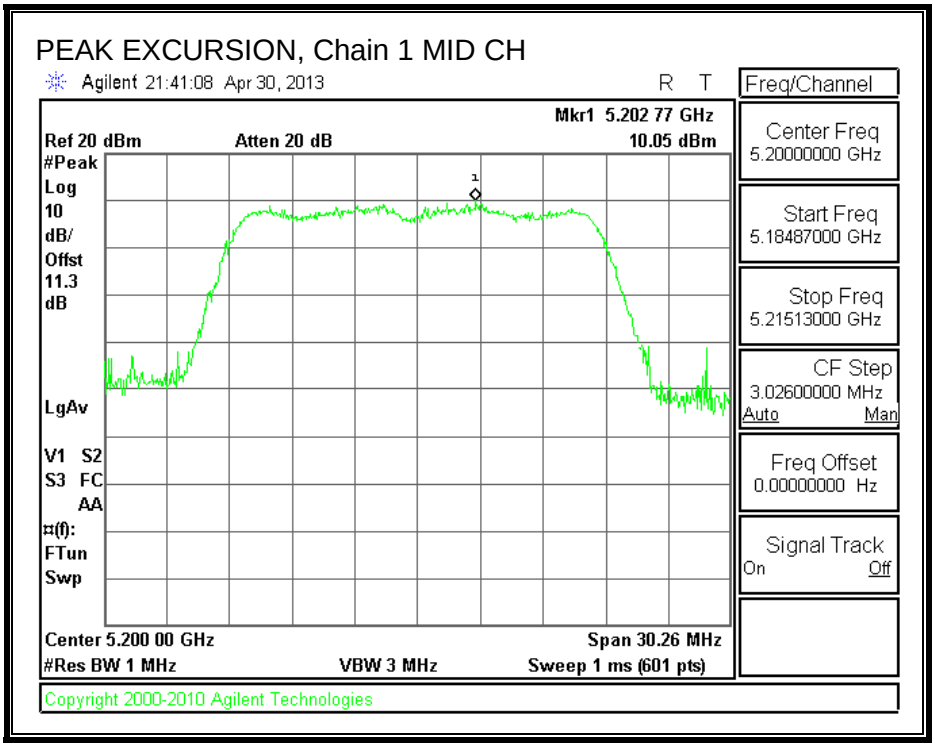
Chain 1

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	10.05	0.61	0.00	9.44	13	-3.56

PEAK EXCURSION, Chain 0



PEAK EXCURSION, Chain 1



8.5. 802.11n HT40, MODE IN THE 5.2 GHz BAND

8.5.1. **26 dB BANDWIDTH**

LIMITS

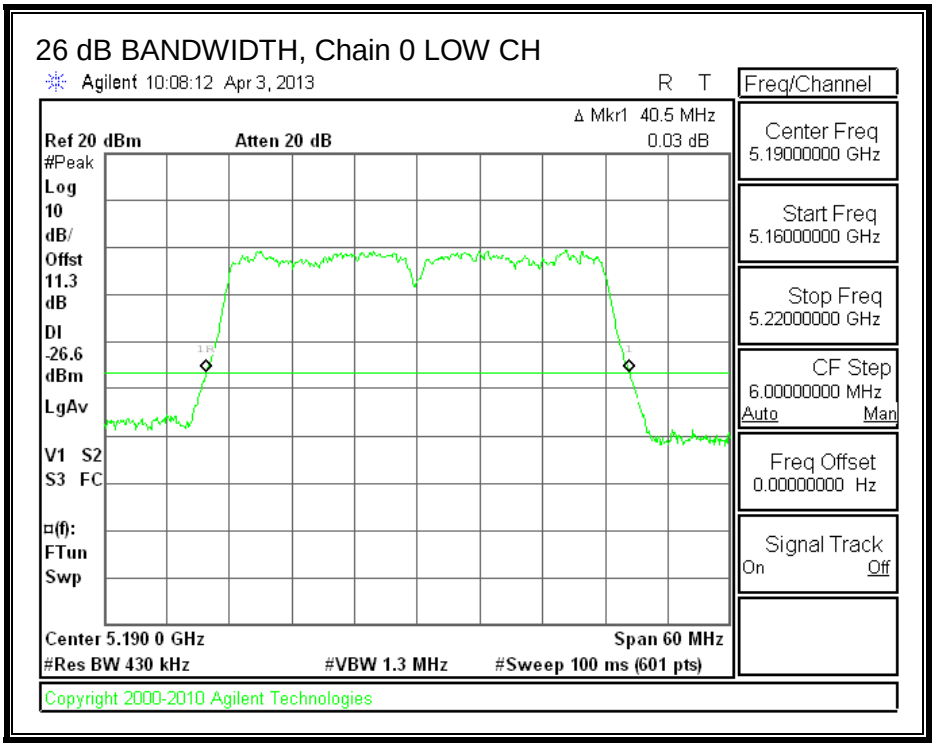
None; for reporting purposes only.

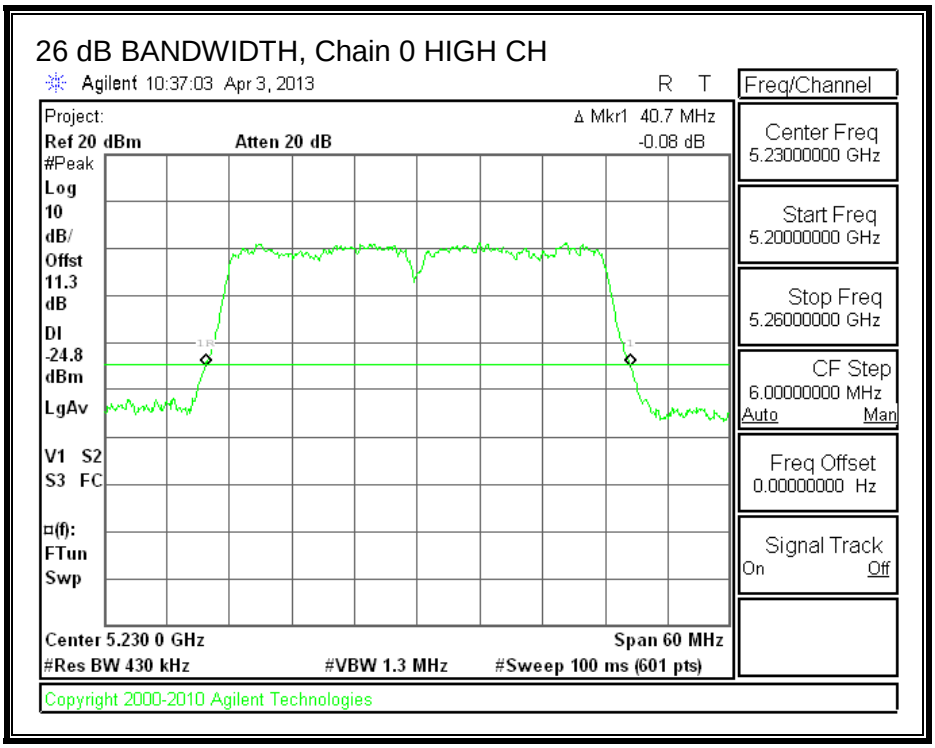
RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5190	40.5	40.7
High	5230	40.7	40.9

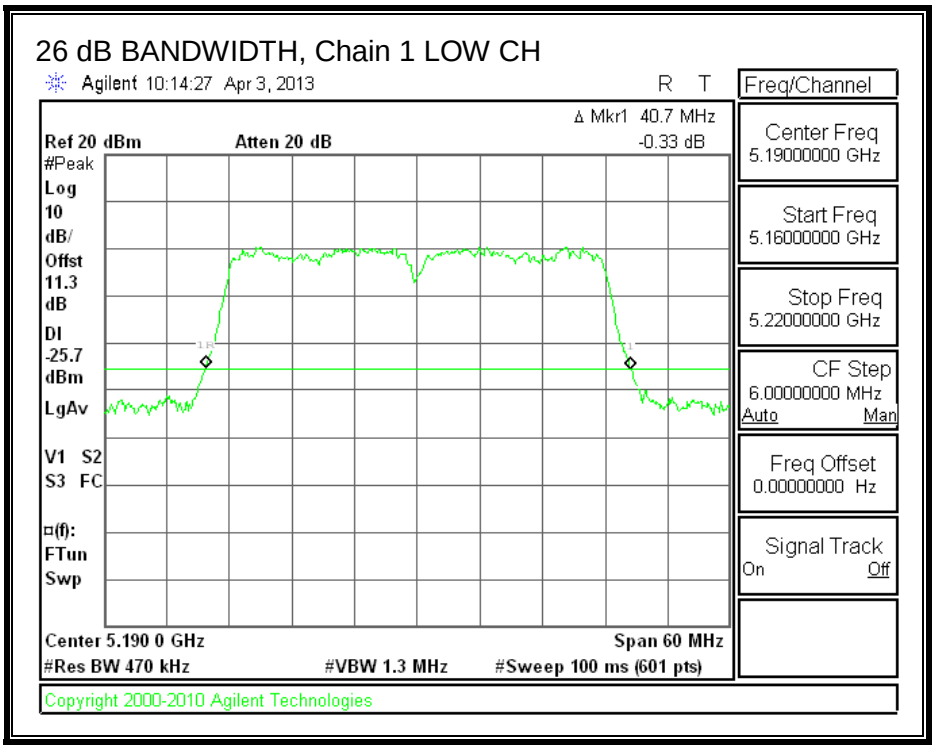
26 dB BANDWIDTH

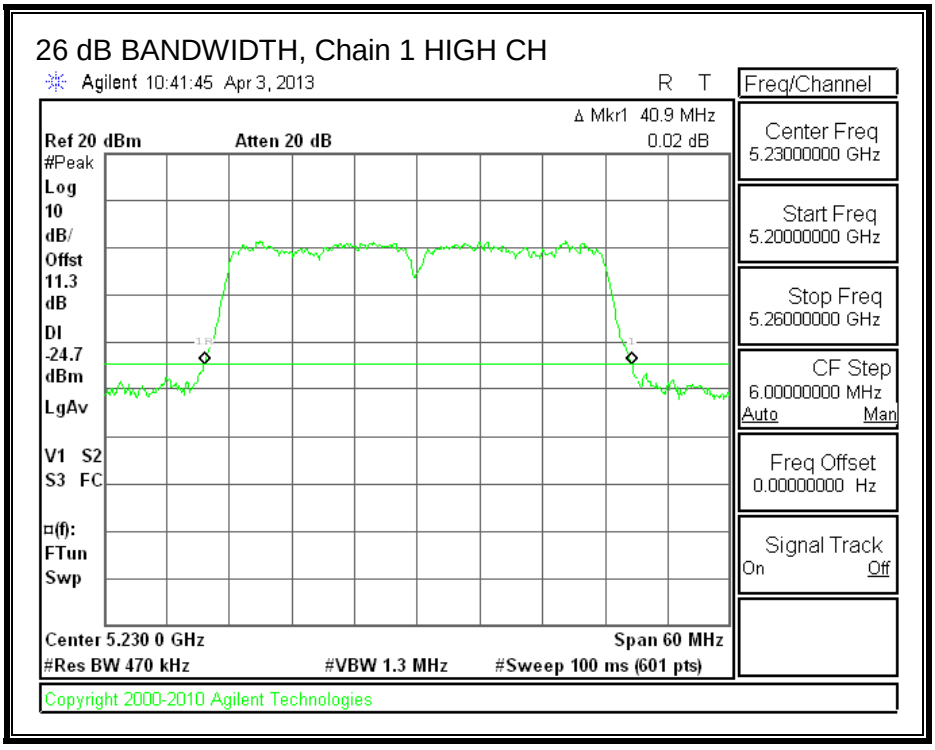
26 dB BANDWIDTH, Chain 0





26 dB BANDWIDTH, Chain 1





8.5.2. **99% BANDWIDTH**

LIMITS

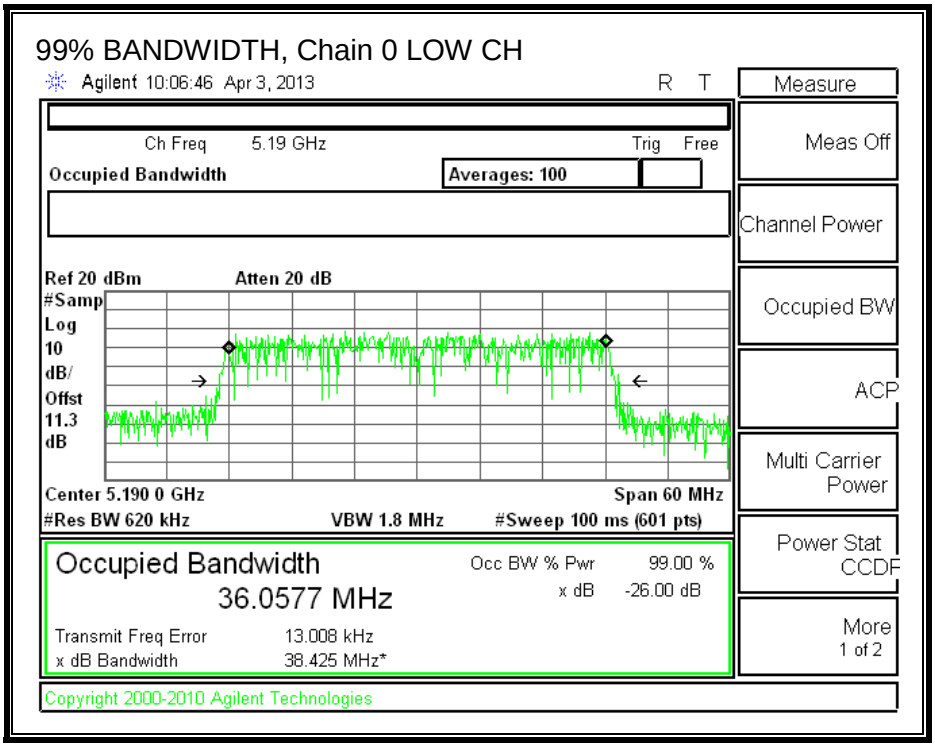
None; for reporting purposes only.

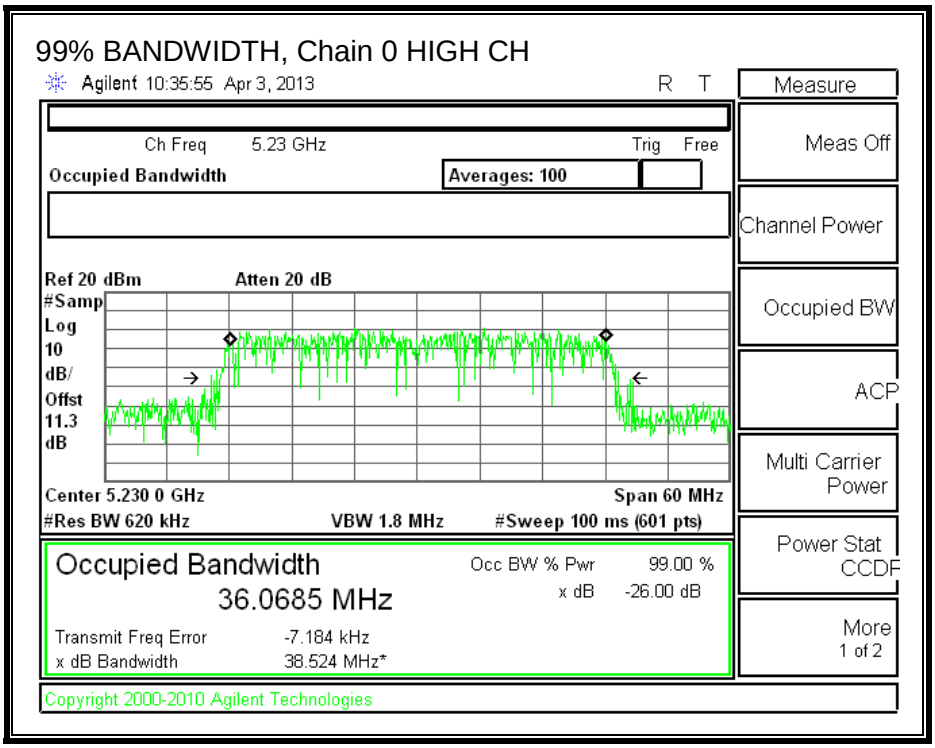
RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	36.1	36.0
High	5230	36.1	36.1

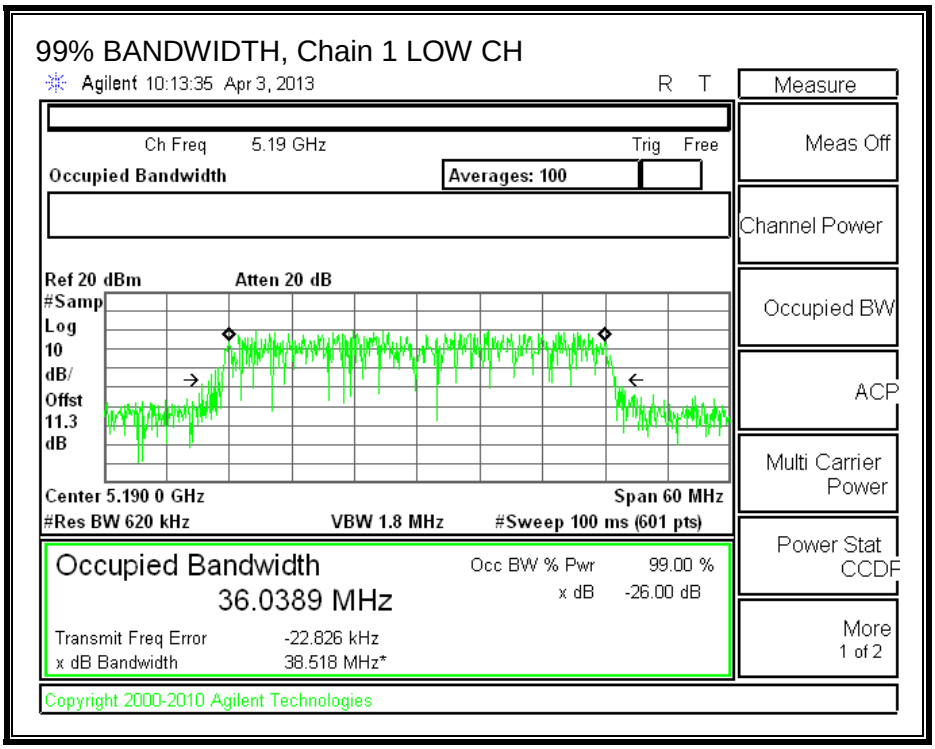
99% BANDWIDTH

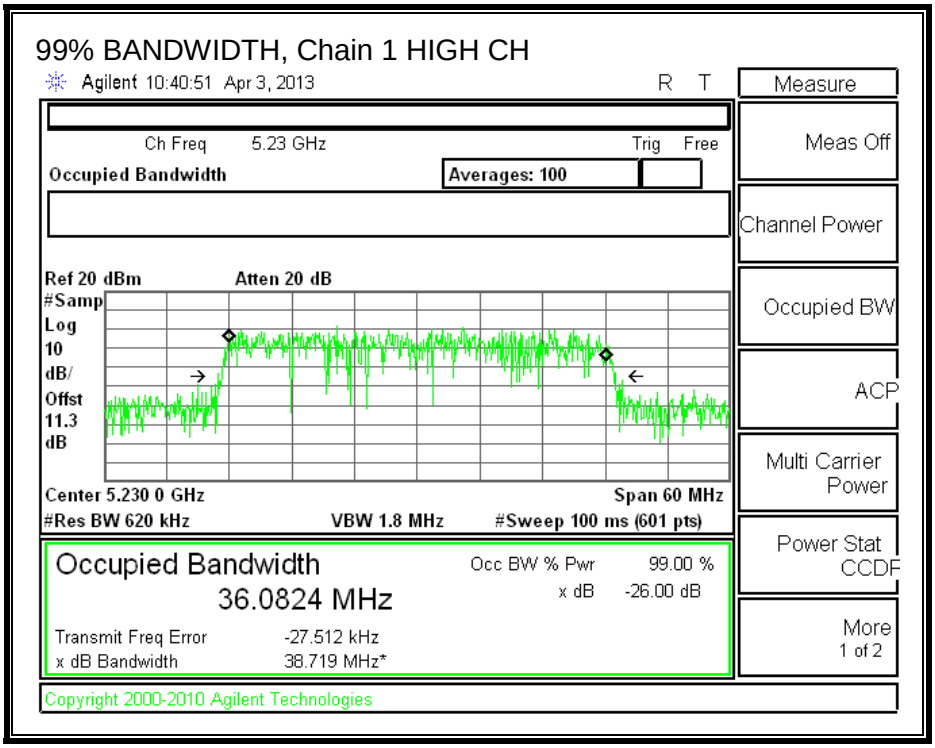
99% BANDWIDTH, Chain 0





99% BANDWIDTH, Chain 1





8.5.3. **AVERAGE POWER**

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5190	10.22	10.38	13.31
High	5230	10.01	9.98	13.01

8.5.4. **OUTPUT POWER AND PPSD**

LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

DIRECTIONAL ANTENNA GAIN

For output power, the two chains are considered uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
3.38	3.43	3.41

For PSD, the two chains are considered correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
3.38	3.43	6.42

RESULTS

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5190	40.5	36.0	3.41
High	5230	40.7	36.1	3.41

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5190	17.00	23.00	19.59	17.00	4.00	10.00	4.00
High	5230	17.00	23.00	19.59	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD

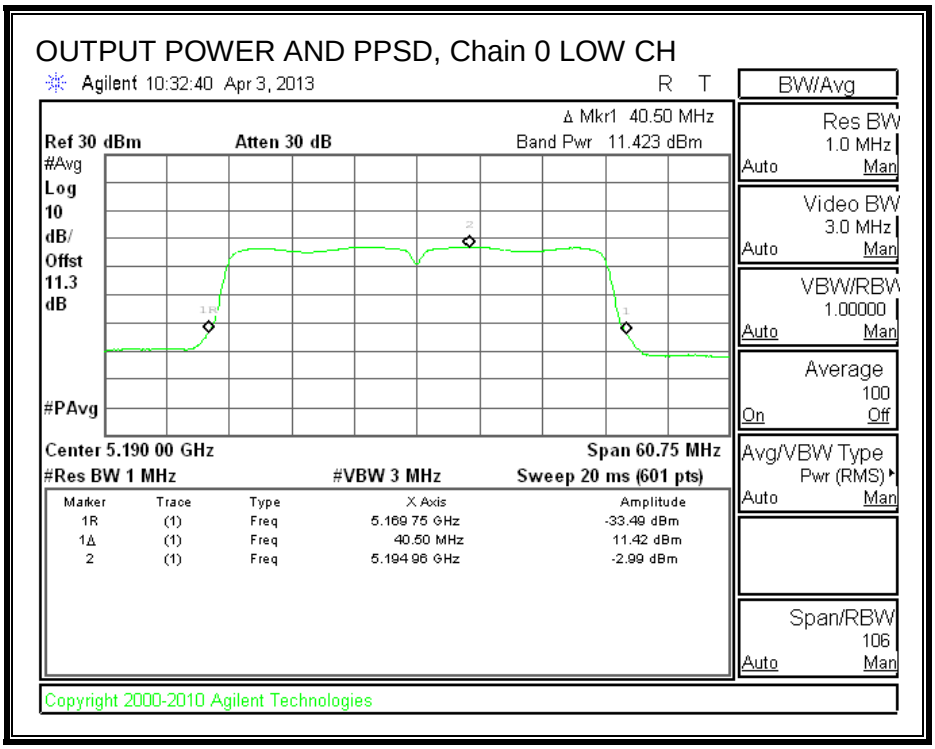
Output Power Results

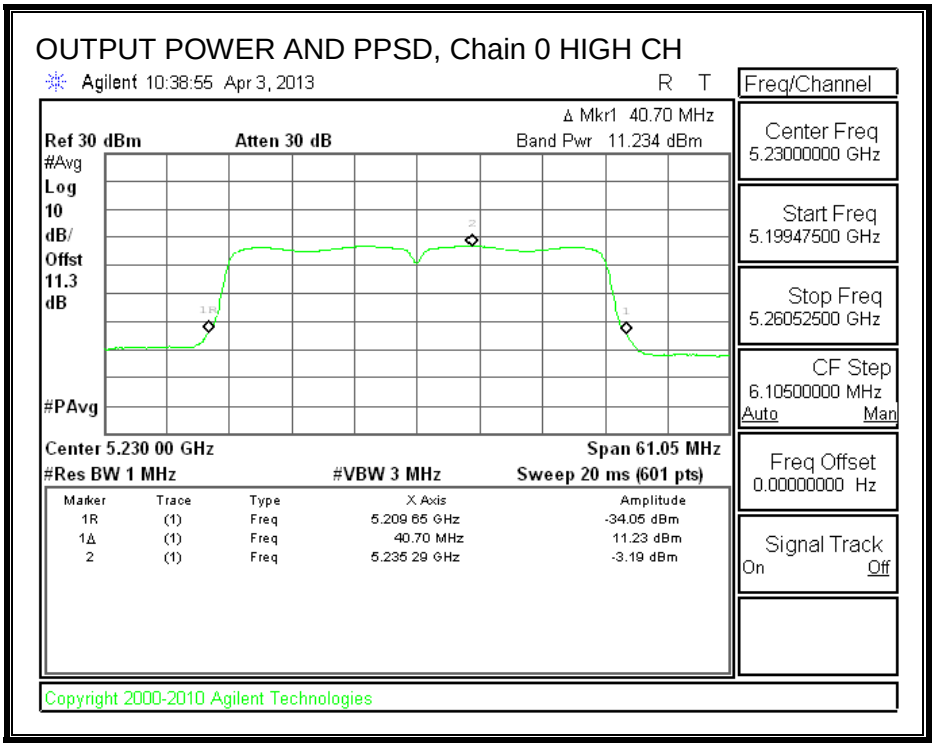
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	11.42	11.82	14.64	17.00	-2.36
High	5230	11.23	11.12	14.19	17.00	-2.81

PPSD Results

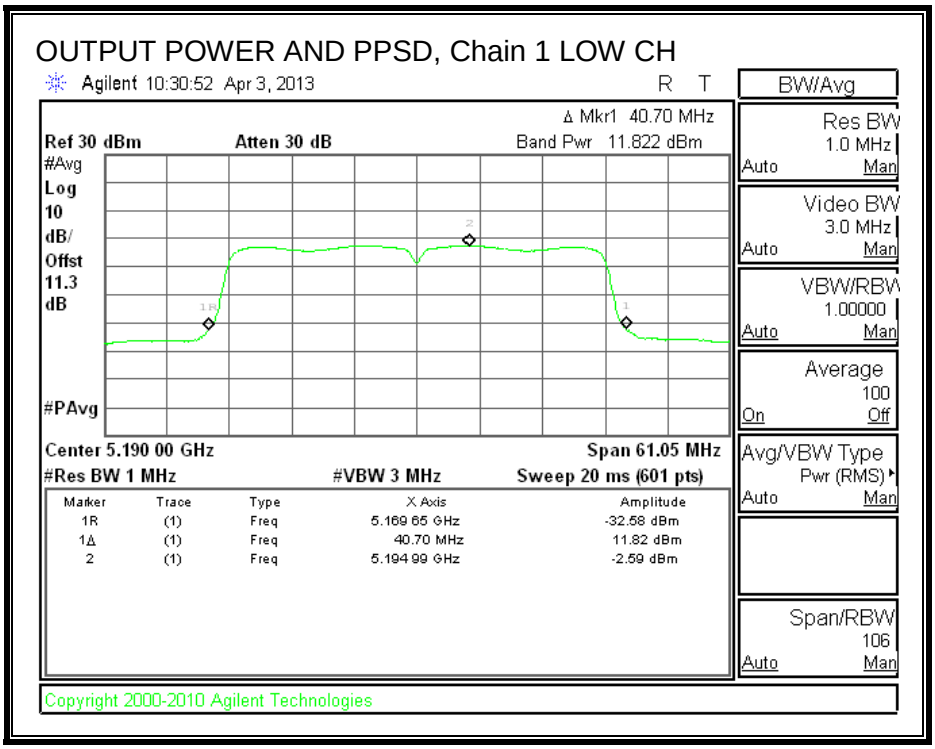
Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5190	-2.99	-2.59	0.22	4.00	-3.78
High	5230	-3.19	-3.32	-0.24	4.00	-4.24

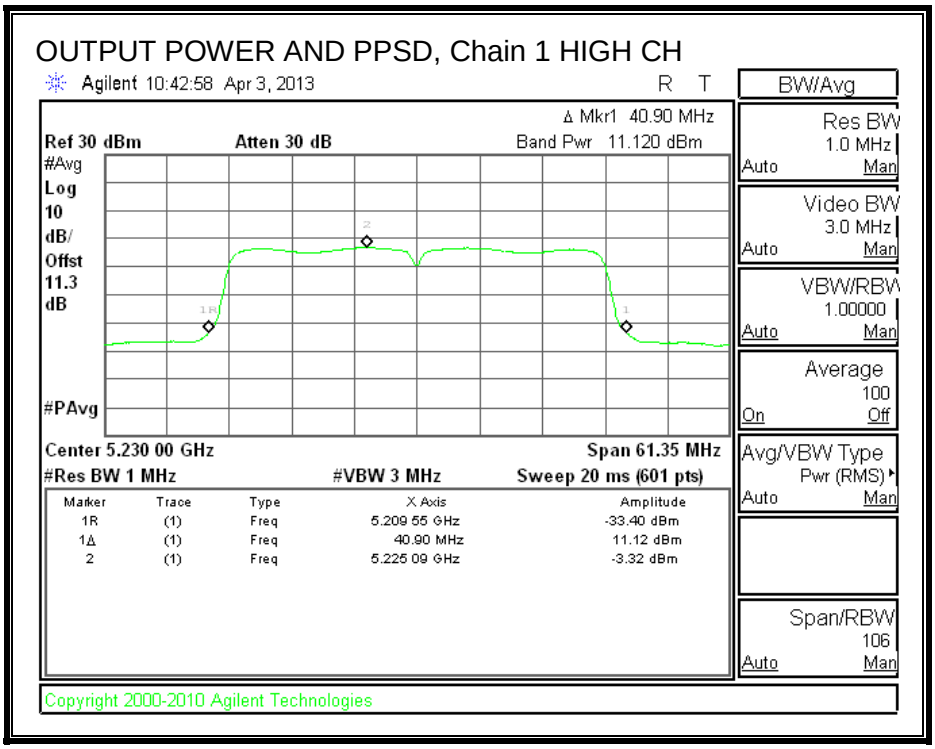
OUTPUT POWER AND PPSD, Chain 0





OUTPUT POWER AND PPSD, Chain 1





8.5.5. **PEAK EXCURSION**

LIMITS

FCC §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.

RESULTS

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

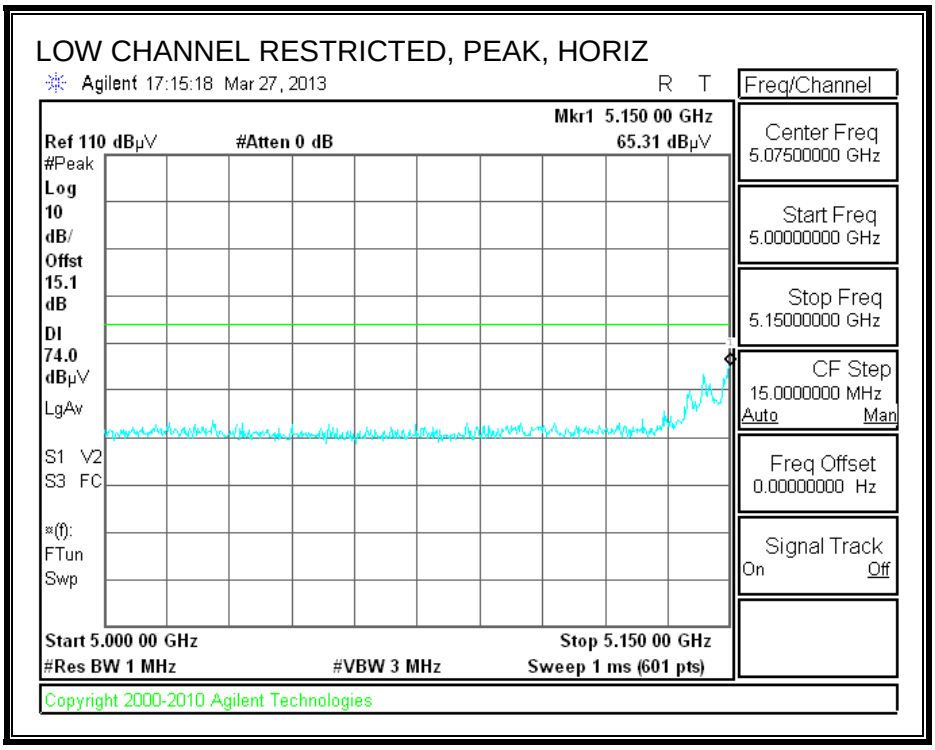
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

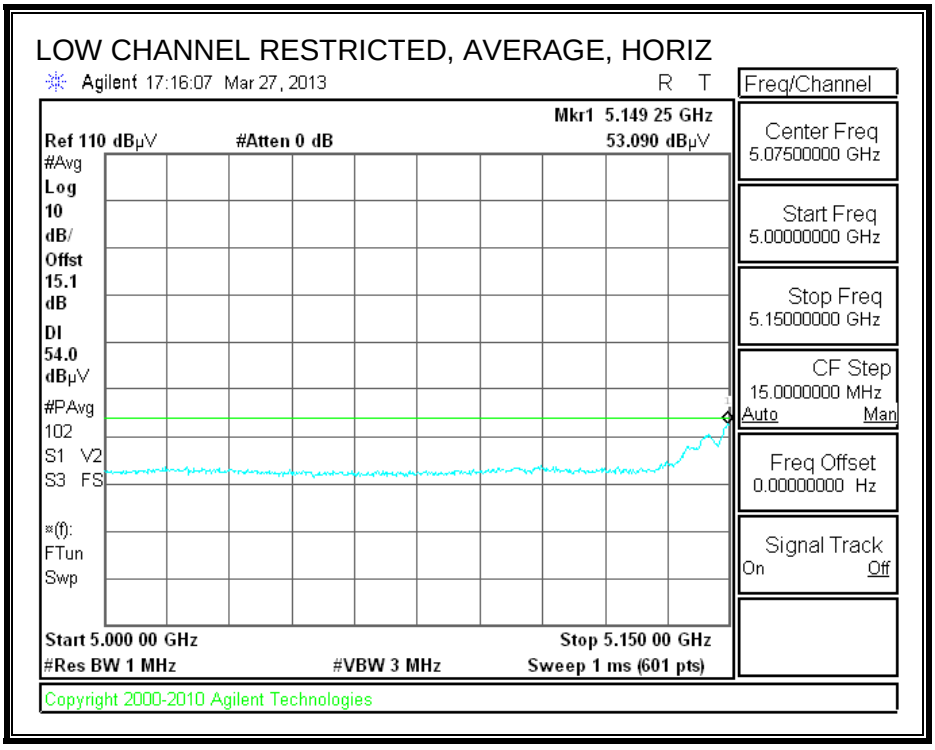
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

9.2. TRANSMITTER ABOVE 1 GHz

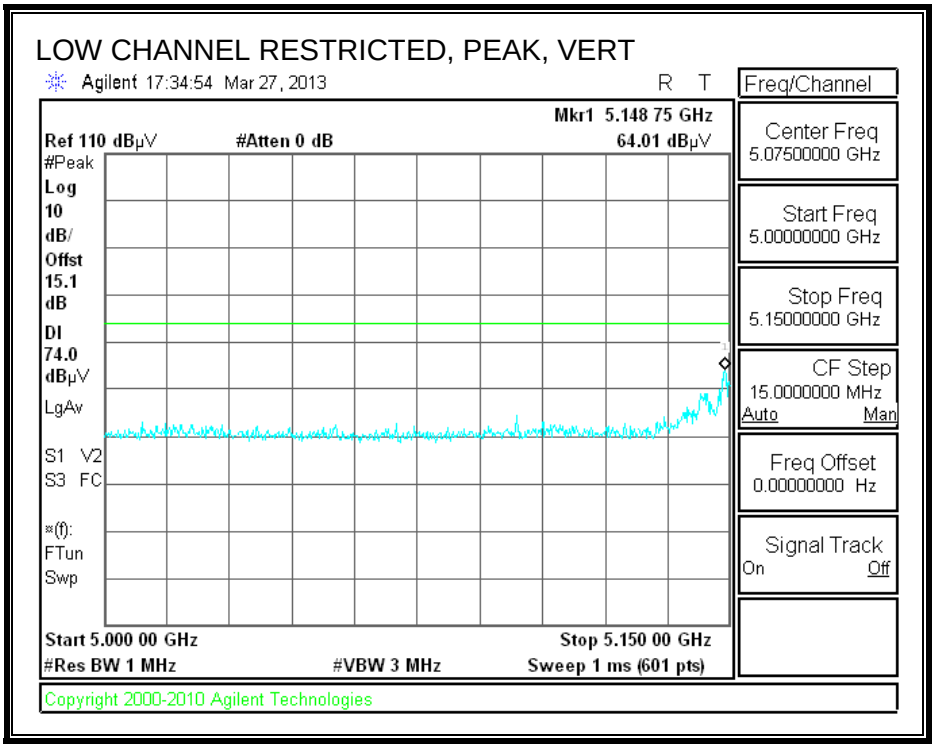
9.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

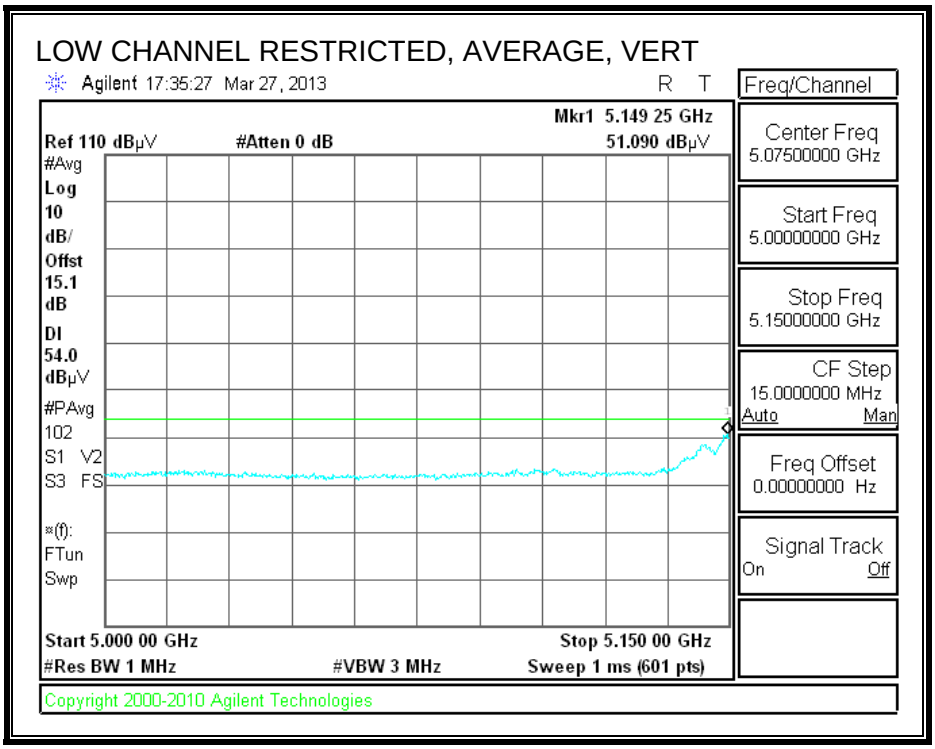




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CH

Project :13U14860

Model / Config:1525

Mode:TX 5.2GHz 11a low ch

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m]	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1188.730	50.64	PK1	28.30	-35.70	3.40	0.00	46.64	-	-	74.0	-27.4	287	Horz	Y	
	1188.540	35.36	AD1	28.30	-35.70	3.40	0.00	31.36	54.0	-22.6	-	-	287	Horz	Y	
	2275.710	40.86	PK1	32.10	-35.00	4.50	0.00	42.46	-	-	74.0	-31.5	275	Horz	Y	
	2278.890	30.32	AD1	32.10	-35.00	4.50	0.00	31.92	54.0	-22.1	-	-	275	Horz	Y	
3	2400.230	40.50	PK1	32.30	-35.00	4.60	0.10	42.50	-	-	74.0	-31.5	260	Horz	N	
	2397.120	30.20	AD1	32.30	-35.00	4.60	0.10	32.20	54.0	-21.8	-	-	260	Horz	N	
2	2777.811	47.09	PK	32.80	-35.10	5.00	0.00	49.79	54.0	-4.2	74.0	-24.2	100	Horz	Y	
9	2975.712	39.98	PK	33.10	-35.20	5.20	0.00	43.08	54.0	-10.9	74.0	-30.9	100	Horz	N	
10	5179.010	52.17	PK	34.80	-34.90	7.30	0.90	60.27	-	-	-	-	100	Horz	N	(Fundamental)
4	1193.840	50.75	PK1	28.30	-35.70	3.40	0.00	46.75	-	-	74.0	-27.3	273	Vert	Y	
	1197.220	36.67	AD1	28.30	-35.70	3.40	0.00	32.67	54.0	-21.3	-	-	273	Vert	Y	
5	1422.189	51.32	PK	28.30	-35.30	3.60	0.00	47.92	54.0	-6.1	74.0	-26.1	200	Vert	Y	
6	2126.950	41.60	PK1	32.00	-35.00	4.30	0.00	42.90	-	-	74.0	-31.1	290	Vert	N	
	2131.210	30.80	AD1	32.00	-35.00	4.30	0.00	32.10	54.0	-21.9	-	-	290	Vert	N	
7	2390.660	41.14	PK1	32.30	-35.00	4.60	0.10	43.14	-	-	74.0	-30.9	269	Vert	N	
	2386.080	30.52	AD1	32.30	-35.00	4.60	0.10	32.52	54.0	-21.5	-	-	269	Vert	Y	
8	2785.970	44.62	PK1	32.80	-35.10	5.00	0.00	47.32	-	-	74.0	-26.7	200	Vert	Y	
	2781.650	32.16	AD1	32.80	-35.10	5.00	0.00	34.86	54.0	-19.1	-	-	200	Vert	Y	
11	5188.906	48.57	PK	34.80	-34.90	7.40	0.90	56.77	-	-	-	-	200	Vert	N	(Fundamental)

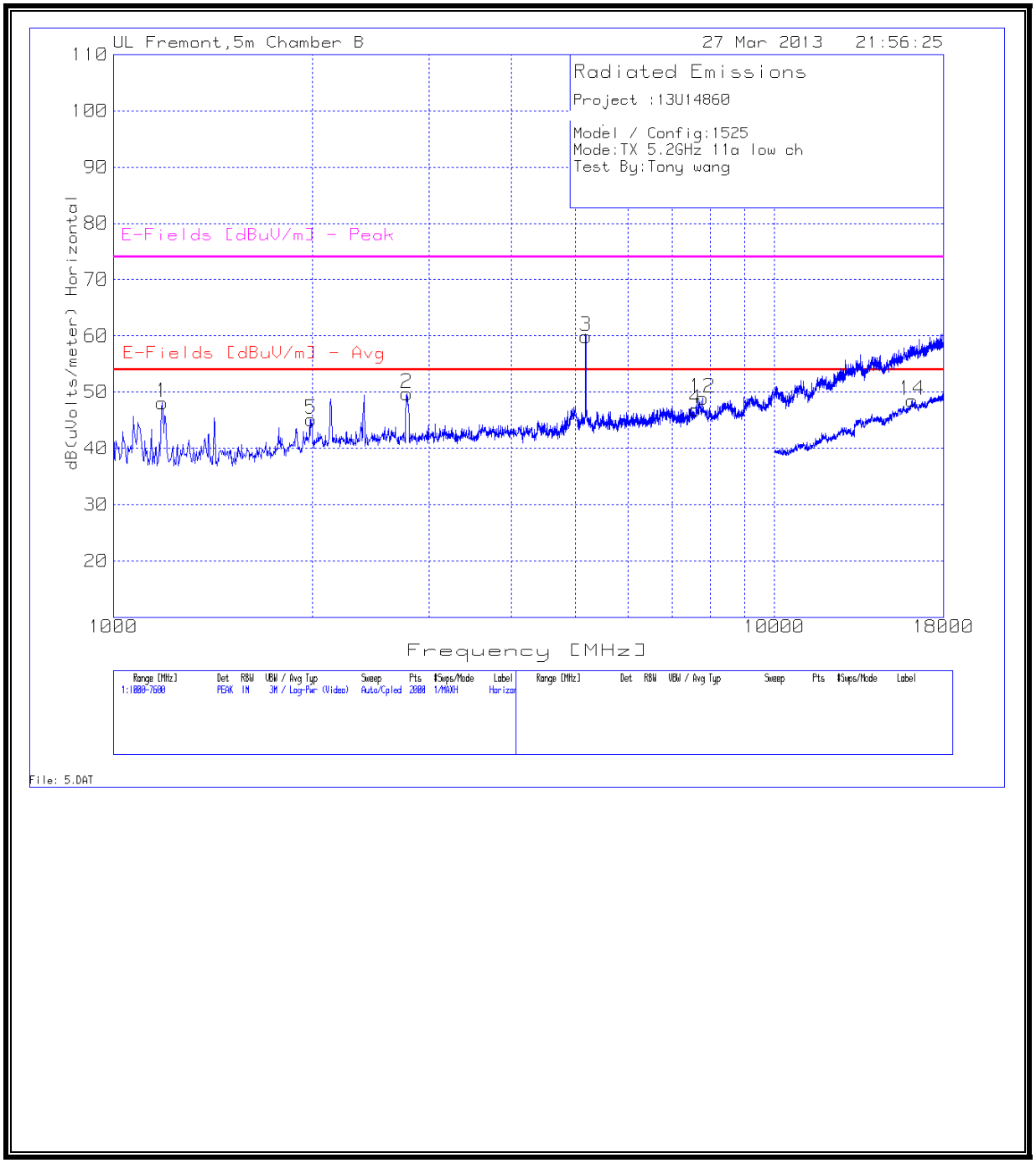
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

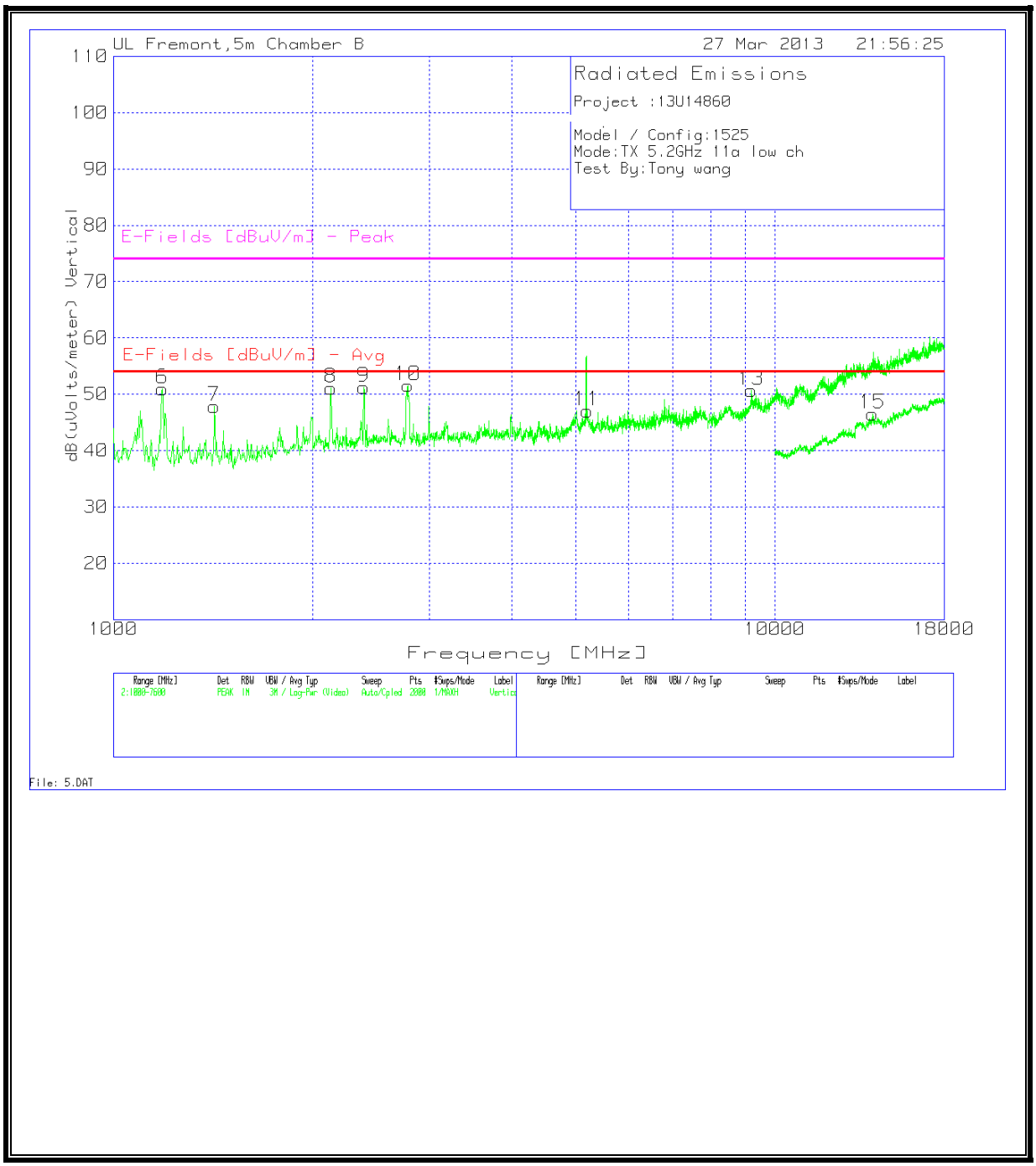
HARMONICS AND SPURIOUS EMISSIONS

LOW CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

LOW CH Vertical



HARMONICS AND SPURIOUS EMISSIONS

MID CH

Project :13U14860

Model / Config:1525

Mode:TX 5.2GHz 11a Mid ch

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m]	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1095.652	52.14	PK	27.90	-35.90	3.30	0.00	47.44	54.0	-6.5	74.0	-26.6	200	Horz	Y	
2	1184.708	51.87	PK	28.30	-35.70	3.40	0.00	47.87	54.0	-6.1	74.0	-26.1	200	Horz	Y	
3	2395.200	41.80	PK1	32.30	-35.00	4.60	0.10	43.80	-	-	74.0	-30.2	120	Horz	N	
	2392.360	30.49	AD1	32.30	-35.00	4.60	0.10	32.49	54.0	-21.5	-	-	120	Horz	N	
4	2773.200	47.71	PK1	32.80	-35.10	5.00	0.00	50.41	-	-	74.0	-23.6	120	Horz	Y	
	2772.430	35.08	AD1	32.80	-35.10	5.00	0.00	37.78	54.0	-16.2	-	-	120	Horz	Y	
12	5192.204	50.33	PK	34.80	-34.90	7.40	0.90	58.53	-	-	-	-	100	Horz		(Fundamental)
5	1188.700	54.11	PK1	28.30	-35.70	3.40	0.00	50.11	-	-	74.0	-23.9	209	Vert	Y	
	1189.590	40.80	AD1	28.30	-35.70	3.40	0.00	36.80	54.0	-17.2	-	-	209	Vert	Y	
6	1418.891	50.74	PK	28.30	-35.30	3.60	0.00	47.34	54.0	-6.6	74.0	-26.7	200	Vert	Y	
7	1775.112	47.14	PK	30.30	-35.10	4.00	0.00	46.34	54.0	-7.6	74.0	-27.7	100	Vert	N	
8	2121.120	41.23	PK1	31.90	-35.00	4.30	0.00	42.43	-	-	74.0	-31.6	383	Vert	N	
	2124.700	31.34	AD1	31.90	-35.00	4.30	0.00	32.54	54.0	-21.4	-	-	383	Vert	N	
9	2390.220	40.71	PK1	32.30	-35.00	4.60	0.10	42.71	-	-	74.0	-31.3	383	Vert	N	
	2393.640	30.25	AD1	32.30	-35.00	4.60	0.10	32.25	54.0	-21.7	-	-	383	Vert	N	
10	2771.270	45.14	PK1	32.80	-35.10	5.00	0.00	47.84	-	-	74.0	-26.2	293	Vert	Y	
	2775.150	32.95	AD1	32.80	-35.10	5.00	0.00	35.65	54.0	-18.3	-	-	293	Vert	Y	
11	3592.504	43.73	PK	33.40	-35.00	5.80	0.00	47.93	54.0	-6.0	74.0	-26.1	100	Vert	N	
13	5195.502	48.50	PK	34.80	-34.90	7.40	0.90	56.70	-	-	-	-	200	Vert	N	(Fundamental)

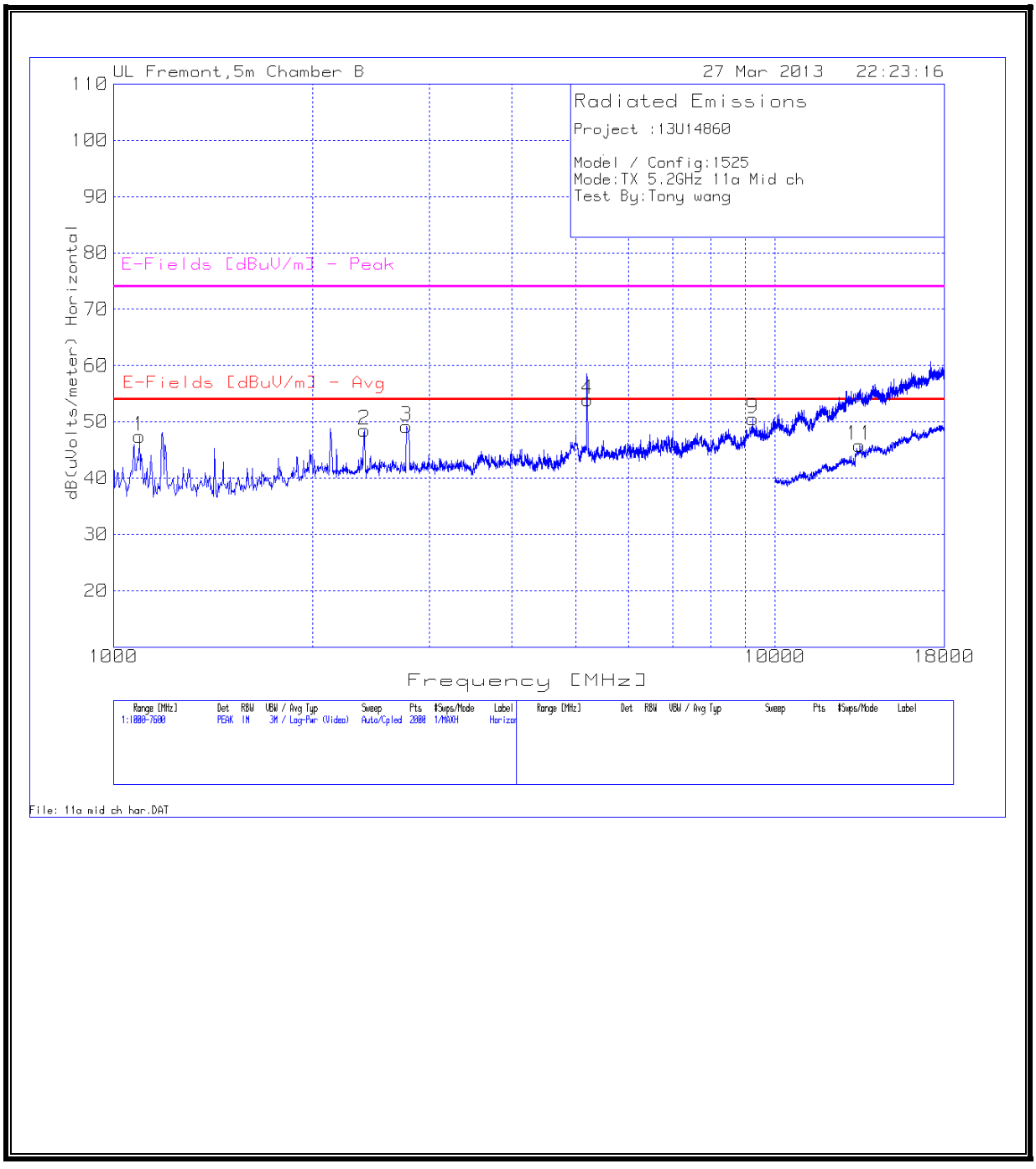
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

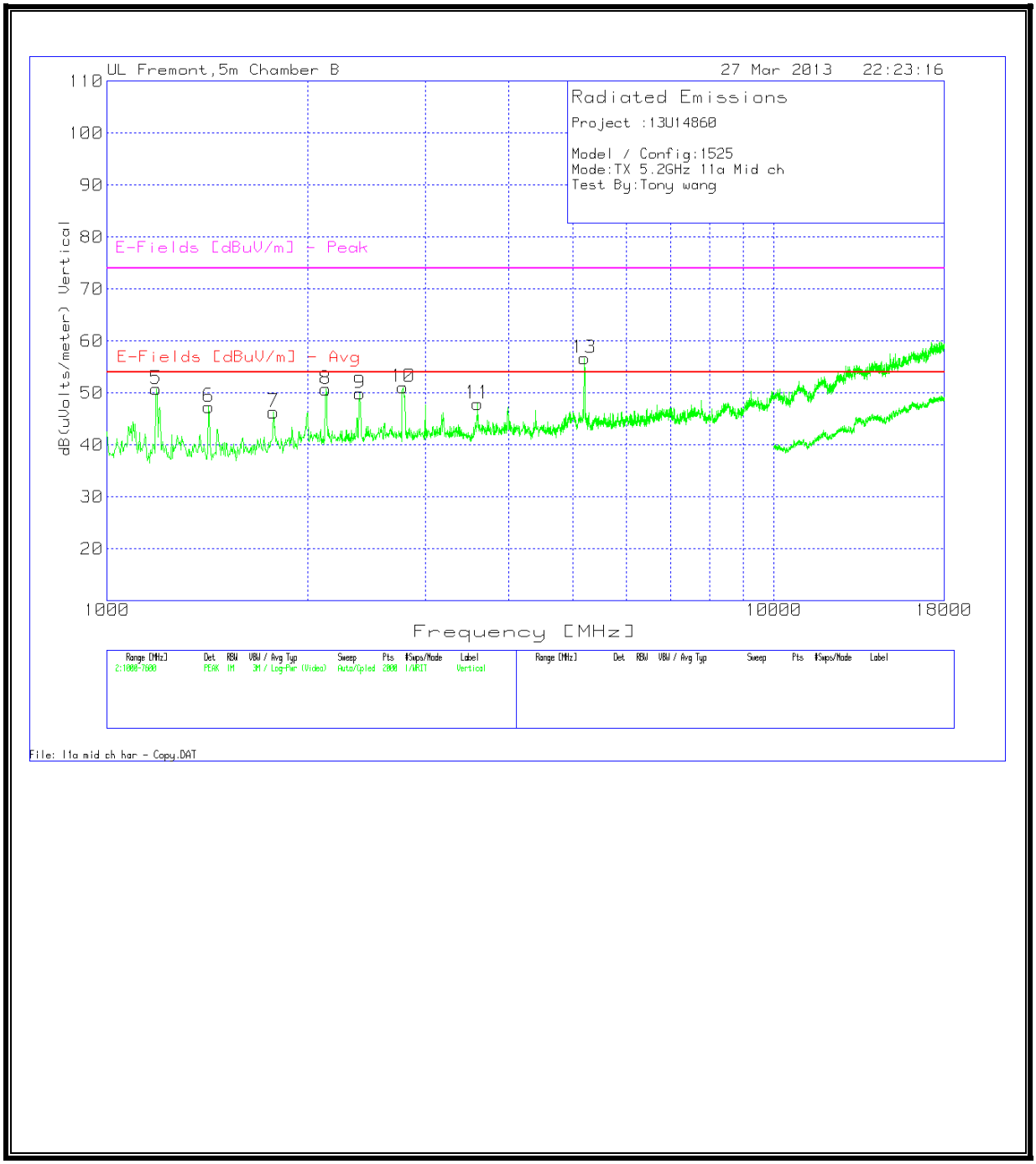
HARMONICS AND SPURIOUS EMISSIONS

MID CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

MID CH Vertical



HARMONICS AND SPURIOUS EMISSIONS

HIGH CH

Project :13U14860

Model / Config:1525

Mode:TX 5.2GHz 11a High ch

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m]	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1084.570	53.62	PK1	27.80	-35.90	3.20	0.00	48.72	54.0	-5.3	74.0	-25.3	200	Horz	Y	
	1085.360	44.53	AD1	27.80	-35.90	3.20	0.00	39.63	54.0	-14.3	74.0	-34.4	200	Horz	Y	
2	1188.730	50.64	PK1	28.30	-35.70	3.40	0.00	46.64	54.0	-7.3	74.0	-27.4	287	Horz	Y	
	1187.540	35.36	AD1	28.30	-35.70	3.40	0.00	31.36	54.0	-22.6	74.0	-42.6	287	Horz	Y	
3	1422.189	49.76	PK	28.30	-35.30	3.60	0.00	46.36	54.0	-7.6	74.0	-27.6	200	Horz	Y	
4	1893.853	46.02	PK	31.10	-35.00	4.10	0.00	46.22	54.0	-7.8	74.0	-27.8	200	Horz	N	
5	2131.560	47.86	PK1	32.00	-35.00	4.30	0.00	49.16	54.0	-4.8	74.0	-24.8	275	Horz	N	
	2129.480	38.32	AD1	32.00	-35.00	4.30	0.00	39.62	54.0	-14.4	74.0	-34.4	275	Horz	N	
13	5244.978	47.51	PK	34.90	-34.90	7.40	0.90	55.81	-	-	-	-	200	Horz	N	(Fundamental)
6	1098.951	50.31	PK	27.90	-35.80	3.30	0.00	45.71	54.0	-8.3	74.0	-28.3	200	Vert	Y	
7	1186.150	52.74	PK1	28.30	-35.70	3.40	0.00	48.74	54.0	-5.2	74.0	-25.4	200	Vert	Y	
	1185.270	37.46	AD1	28.30	-35.70	3.40	0.00	33.46	54.0	-20.5	74.0	-40.5	200	Vert	Y	
8	1193.840	50.75	PK1	28.30	-35.70	3.40	0.00	46.75	54.0	-7.2	74.0	-27.3	273	Vert	Y	
	1197.220	36.67	AD1	28.30	-35.70	3.40	0.00	32.67	54.0	-21.3	74.0	-41.3	273	Vert	Y	
9	1996.102	45.35	PK	31.80	-35.00	4.20	0.00	46.35	54.0	-7.6	74.0	-27.7	100	Vert	N	
10	2126.950	41.60	PK1	32.00	-35.00	4.30	0.00	42.90	54.0	-11.1	74.0	-31.1	290	Vert	N	
	2131.210	30.80	AD1	32.00	-35.00	4.30	0.00	32.10	54.0	-21.9	74.0	-41.9	290	Vert	N	
11	2390.660	41.14	PK1	32.30	-35.00	4.60	0.10	43.14	54.0	-10.8	74.0	-30.9	269	Vert	N	
	2386.080	30.52	AD1	32.30	-35.00	4.60	0.10	32.52	54.0	-21.5	74.0	-41.5	269	Vert	Y	
12	2785.970	44.62	PK1	32.80	-35.10	5.00	0.00	47.32	54.0	-6.7	74.0	-26.7	200	Vert	Y	
	2781.650	32.16	AD1	32.80	-35.10	5.00	0.00	34.86	54.0	-19.1	74.0	-39.1	200	Vert	Y	
14	5238.381	49.32	PK	34.90	-34.90	7.40	0.90	57.62	-	-	-	-	200	Vert	N	(Fundamental)

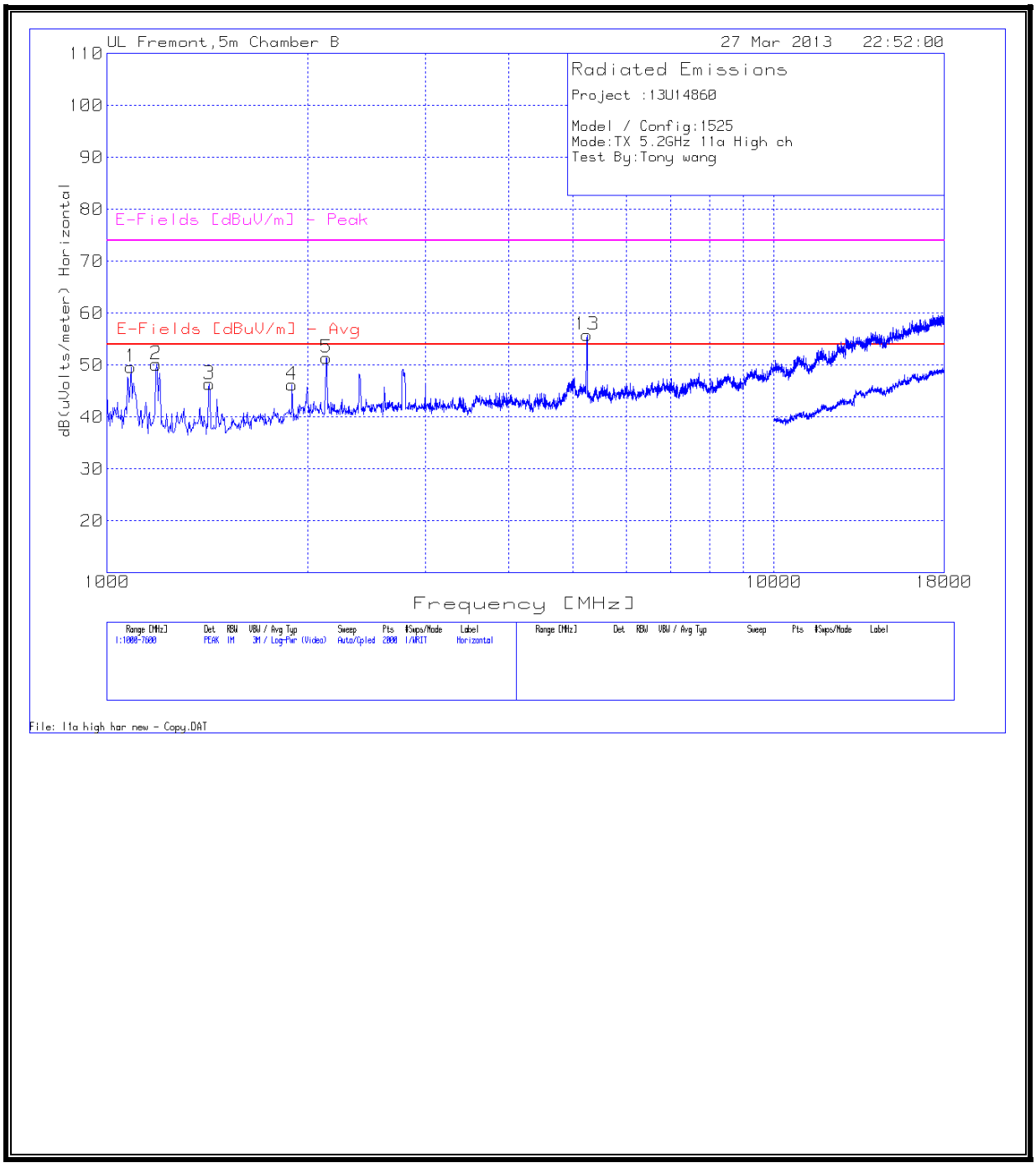
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

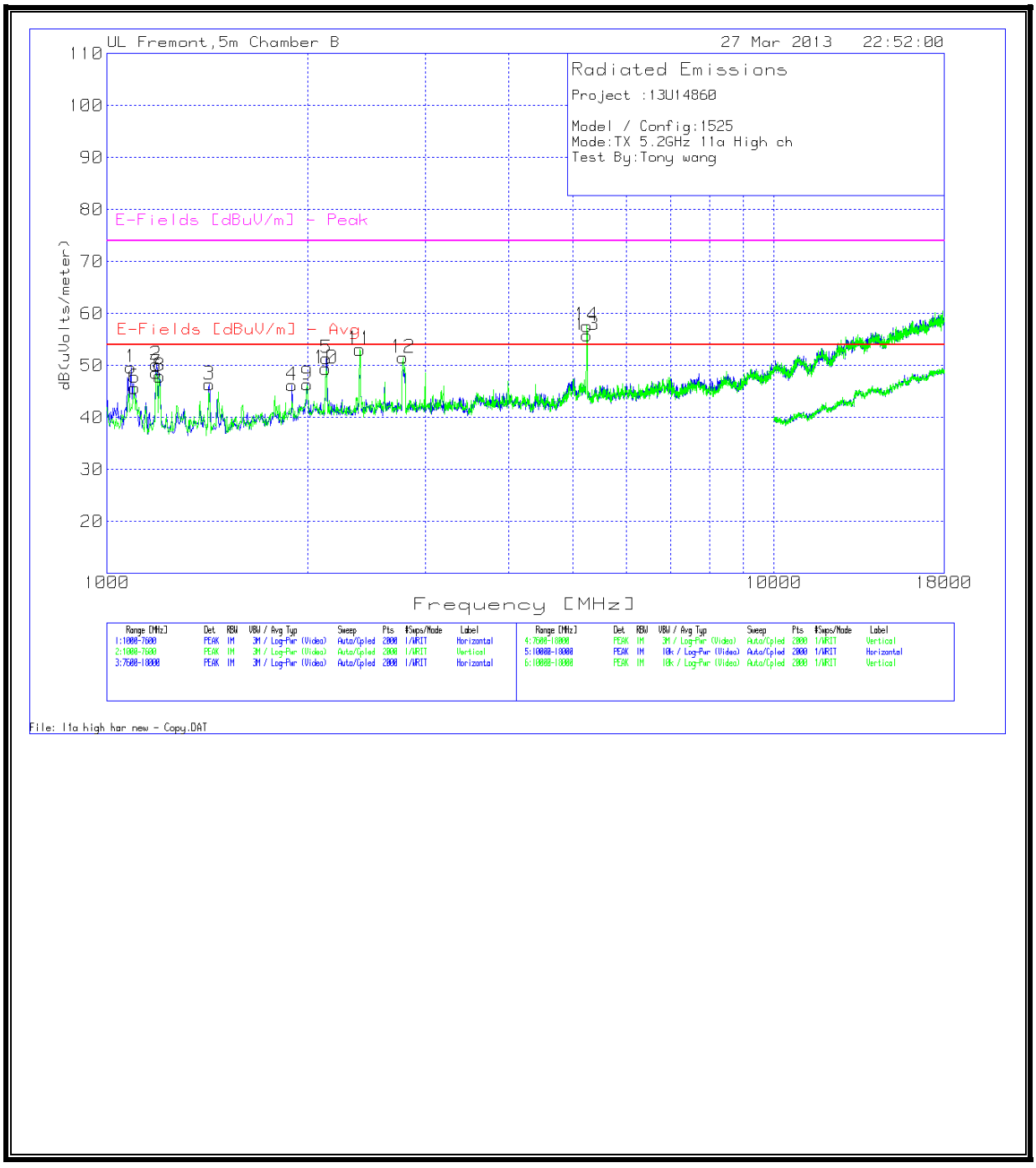
HARMONICS AND SPURIOUS EMISSIONS

HIGH CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

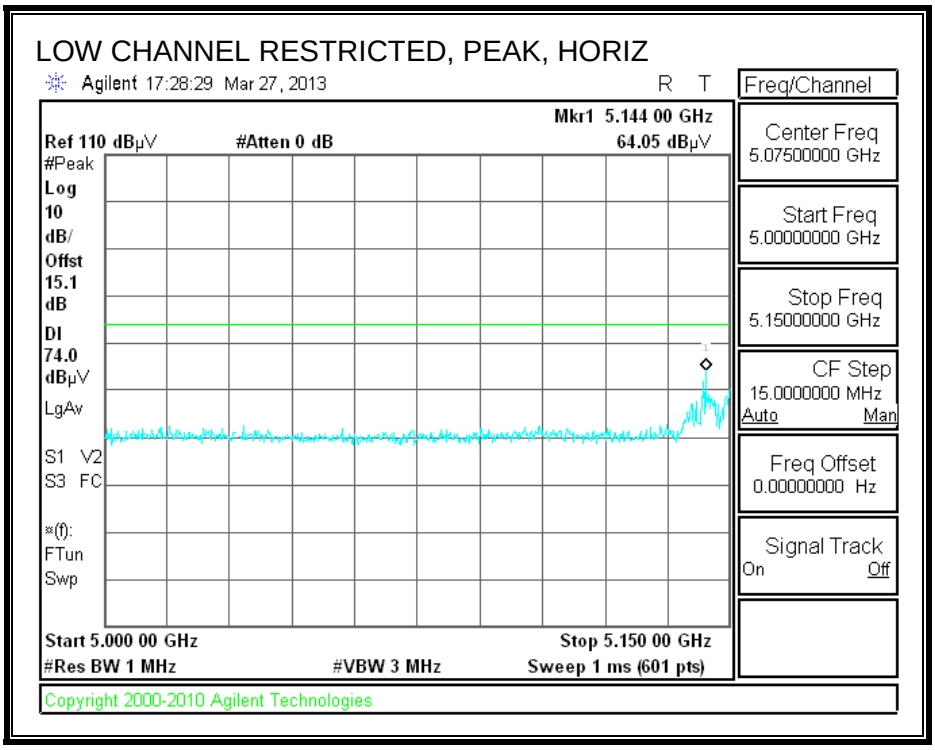
HIGH CH Vertical



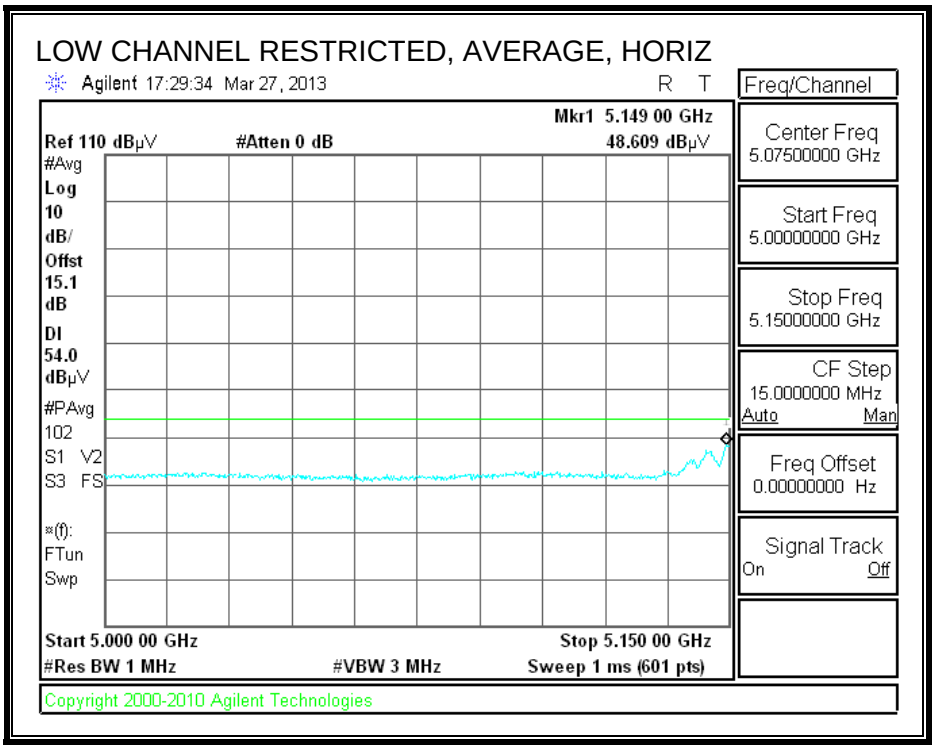
9.2.2. **TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND**

All radiated tests for 802.11n, HT20 was conducted with CDD mode at the elevated power of the STBC mode (12 dBm). This configuration is considered representative of both modes.

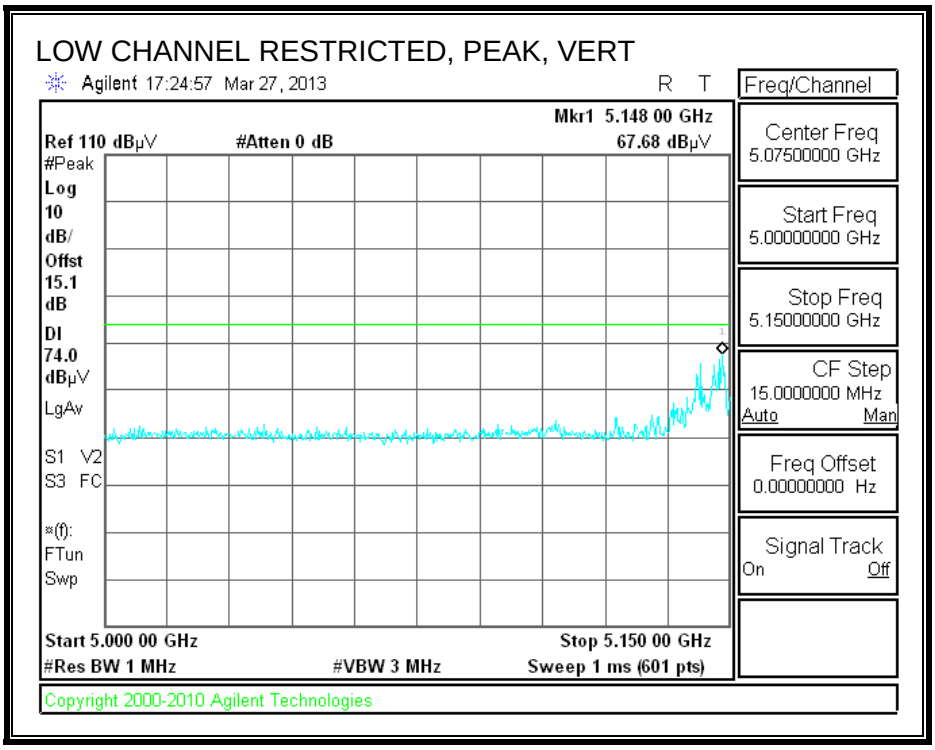
RESTRICTED BANDEDGE (LOW CHANNEL)

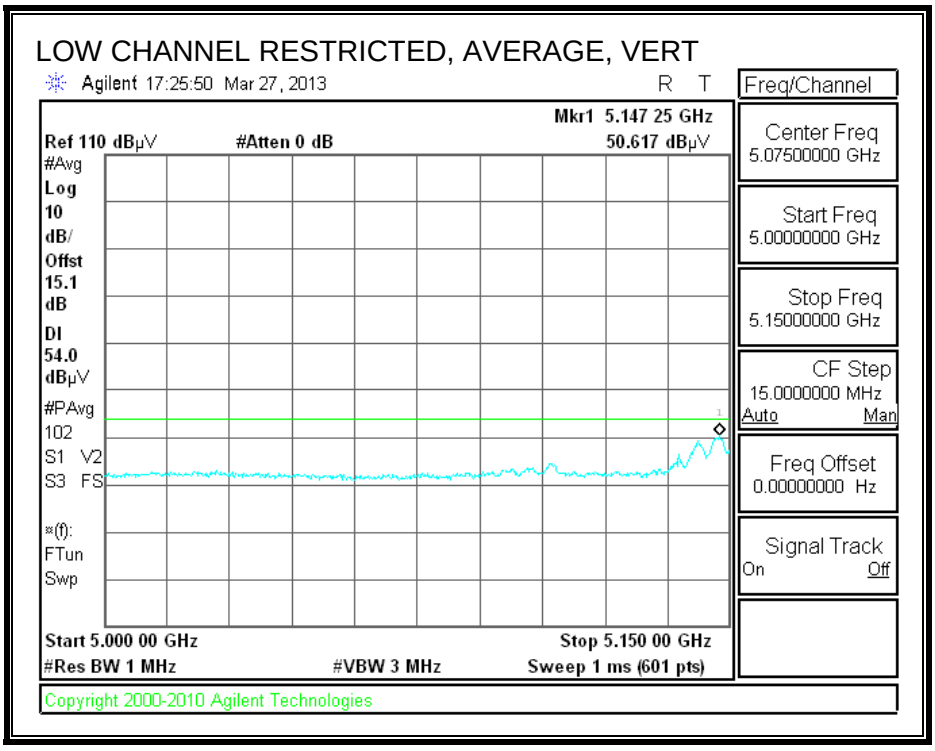


LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



LOW CHANNEL RESTRICTED, PEAK, VERT





HARMONICS AND SPURIOUS EMISSIONS

LOW CH

Project :13U14860

Model / Config:1525

Mode:TX 5.2GHz 11n20MHz Low ch

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m]	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1098.951	50.87	PK	27.90	-35.80	3.30	0.00	46.27	54.0	-7.7	74.0	-27.7	100	Horz	Y	
2	1197.901	50.48	PK	28.30	-35.70	3.40	0.00	46.48	54.0	-7.5	74.0	-27.5	200	Horz	Y	
3	1422.189	47.70	PK	28.30	-35.30	3.60	0.00	44.30	54.0	-9.7	74.0	-29.7	100	Horz	Y	
4	2128.036	49.66	PK	32.00	-35.00	4.30	0.00	50.96	54.0	-3.0	74.0	-23.0	200	Horz	N	
5	2442.230	48.50	PK1	32.40	-35.00	4.70	0.10	50.70	-	-	74.0	-23.3	260	Horz	N	
	2445.760	37.20	AD1	32.40	-35.00	4.70	0.10	39.40	54.0	-14.6	-	-	260	Horz	N	
6	2785.970	44.62	PK1	32.80	-35.10	5.00	0.00	47.32	-	-	74.0	-26.7	200	Horz	Y	
	2781.650	32.16	AD1	32.80	-35.10	5.00	0.00	34.86	54.0	-19.1	-	-	200	Horz	Y	
12	5179.010	49.75	PK	34.80	-34.90	7.30	0.90	57.85	-	-	-	-	100	Horz	N	(Fundamental)
7	1188.700	44.11	PK1	28.30	-35.70	3.40	0.00	40.11	-	-	74.0	-33.9	296	Vert	Y	
	1189.590	33.80	AD1	28.30	-35.70	3.40	0.00	29.80	54.0	-24.2	-	-	296	Vert	Y	
8	1422.189	50.39	PK	28.30	-35.30	3.60	0.00	46.99	54.0	-7.0	74.0	-27.0	200	Vert	Y	
9	2132.200	41.42	PK1	32.00	-35.00	4.30	0.00	42.72	-	-	74.0	-31.3	366	Vert	N	
	2127.410	30.85	AD1	32.00	-35.00	4.30	0.00	32.15	54.0	-21.8	-	-	366	Vert	N	
10	2388.290	40.75	PK1	32.30	-35.00	4.60	0.10	42.75	-	-	74.0	-31.3	366	Vert	Y	
	2389.770	30.32	AD1	32.30	-35.00	4.60	0.10	32.32	54.0	-21.7	-	-	366	Vert	Y	
	2399.900	42.31	PK1	32.30	-35.00	4.60	0.10	44.31	-	-	74.0	-29.7	125	Vert	N	
	2399.820	31.69	AD1	32.30	-35.00	4.60	0.10	33.69	54.0	-20.3	-	-	125	Vert	N	
11	2784.150	49.11	PK1	32.80	-35.10	5.00	0.00	51.81	-	-	74.0	-22.2	129	Vert	Y	
	2788.710	36.69	AD1	32.80	-35.10	5.00	0.10	39.49	54.0	-14.5	-	-	129	Vert	Y	
13	5188.906	47.75	PK	34.80	-34.90	7.40	0.90	55.95	-	-	-	-	200	Vert	N	(Fundamental)

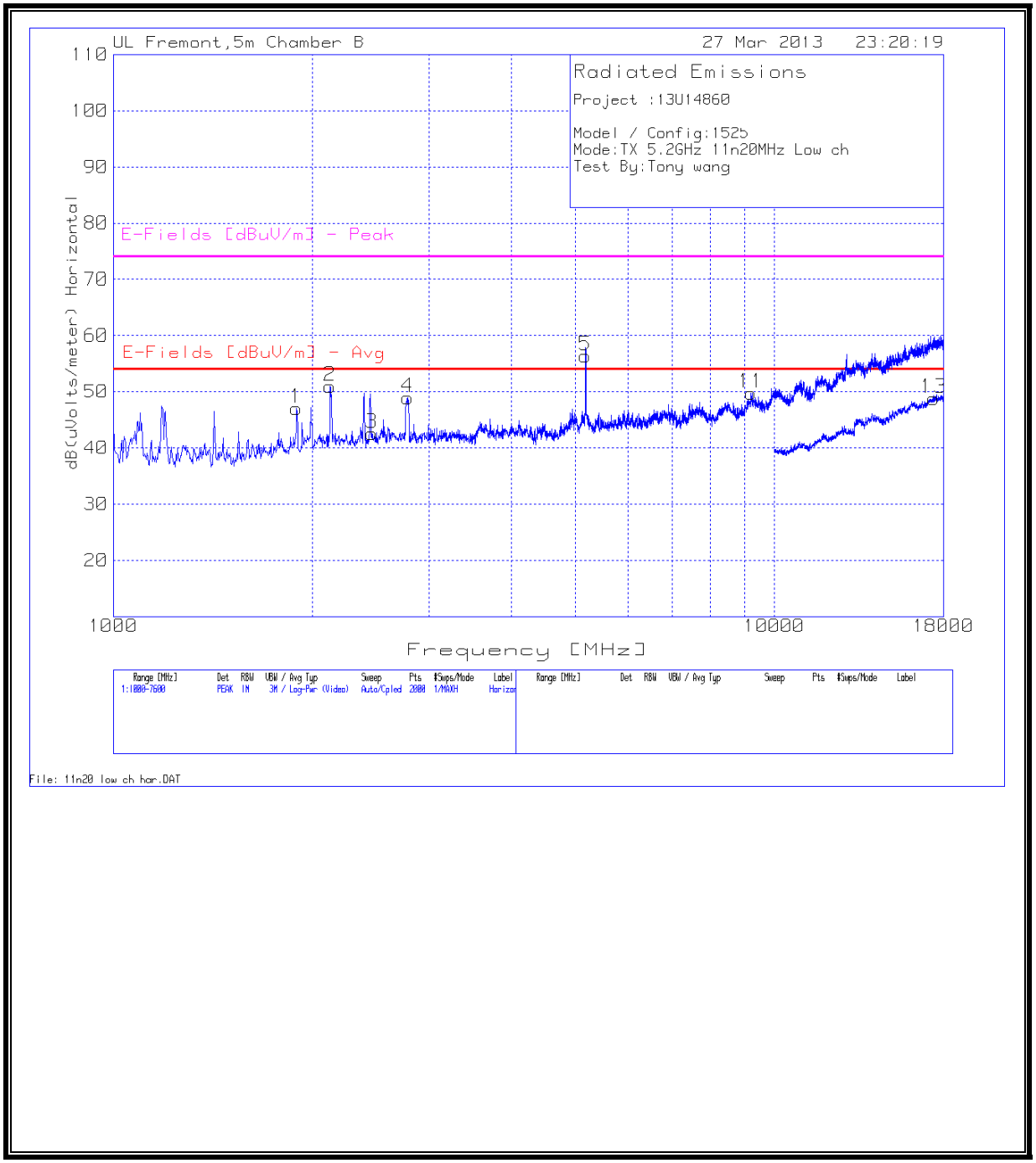
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

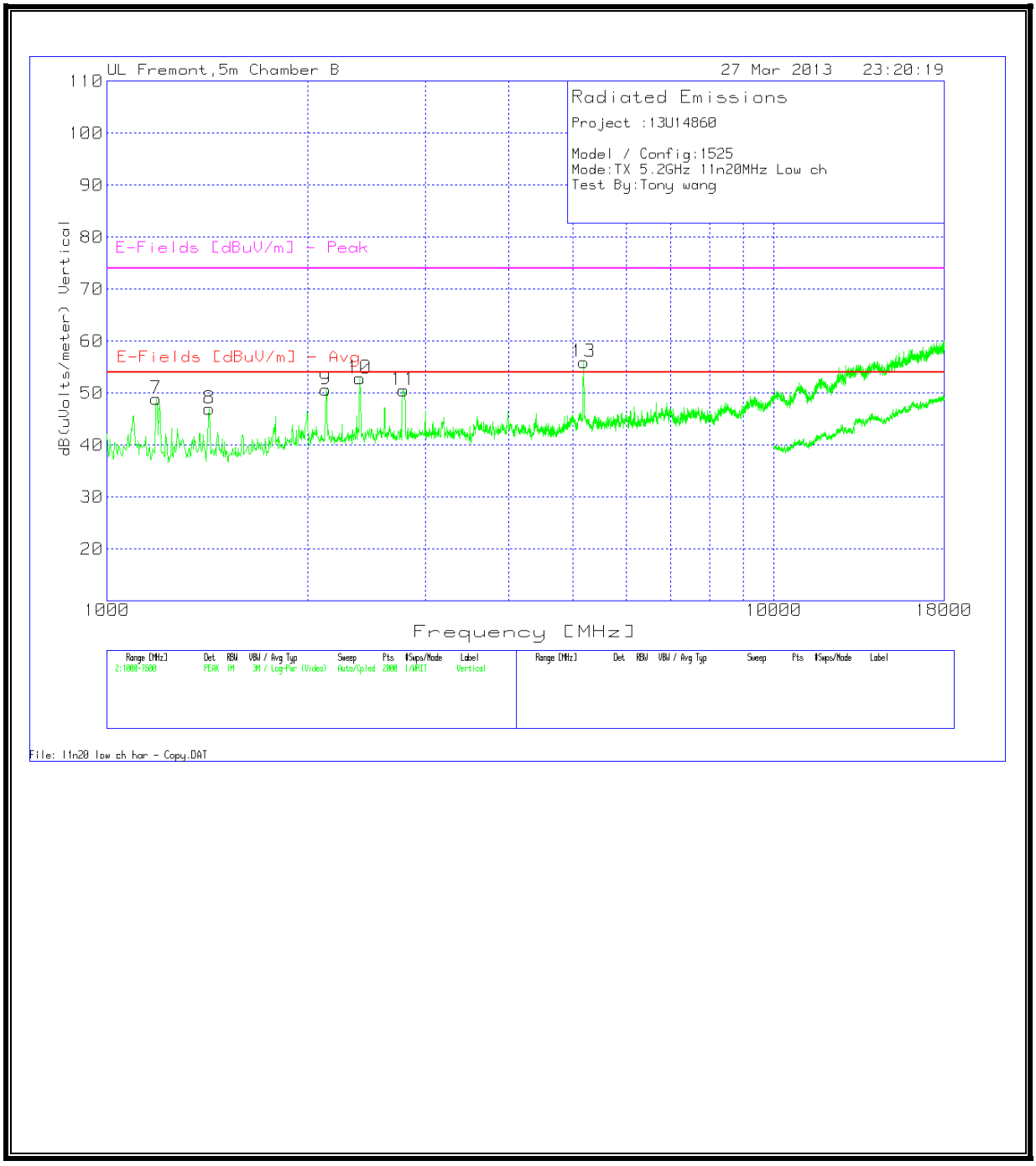
HARMONICS AND SPURIOUS EMISSIONS

LOW CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

LOW CH Vertical



HARMONICS AND SPURIOUS EMISSIONS

MID CH

Project :13U14860

Model / Config:1525

Mode:TX 5.2GHz 11n20MHz Mid ch

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1089.055	51.87	PK	27.80	-35.90	3.30	0.00	47.07	54.0	-6.9	74.0	-26.9	200	Horz	Y	
2	1184.708	51.85	PK	28.30	-35.70	3.40	0.00	47.85	54.0	-6.1	74.0	-26.2	200	Horz	Y	
3	1422.189	48.51	PK	28.30	-35.30	3.60	0.00	45.11	54.0	-8.9	74.0	-28.9	200	Horz	Y	
4	2131.334	46.54	PK	32.00	-35.00	4.30	0.00	47.84	54.0	-6.1	74.0	-26.2	100	Horz	N	
5	2783.450	45.62	PK1	32.80	-35.10	5.00	0.00	48.32	-	-	74.0	-25.7	215	Horz	Y	
	2785.370	34.16	AD1	32.80	-35.10	5.00	0.00	36.86	54.0	-17.1	-	-	215	Horz	Y	
14	5195.502	49.12	PK	34.80	-34.90	7.40	0.90	57.32	-	-	-	-	100	Horz	N	(Fundamental)
6	5723.238	36.99	PK	35.20	-34.90	7.70	0.10	45.09	54.0	-8.9	74.0	-28.9	100	Horz	N	
7	1095.652	50.62	PK	27.90	-35.90	3.30	0.00	45.92	54.0	-8.1	74.0	-28.1	200	Vert	Y	
8	1188.700	44.11	PK1	28.30	-35.70	3.40	0.00	40.11	-	-	74.0	-33.9	296	Vert	Y	
	1189.590	33.80	AD1	28.30	-35.70	3.40	0.00	29.80	54.0	-24.2	-	-	296	Vert	Y	
9	1418.891	48.97	PK	28.30	-35.30	3.60	0.00	45.57	54.0	-8.4	74.0	-28.4	200	Vert	Y	
10	1996.102	46.08	PK	31.80	-35.00	4.20	0.00	47.08	54.0	-6.9	74.0	-26.9	100	Vert	N	
11	2132.200	41.42	PK1	32.00	-35.00	4.30	0.00	42.72	-	-	74.0	-31.3	366	Vert	N	
	2127.410	30.85	AD1	32.00	-35.00	4.30	0.00	32.15	54.0	-21.8	-	-	366	Vert	N	
	2388.290	40.75	PK1	32.30	-35.00	4.60	0.10	42.75	-	-	74.0	-31.3	366	Vert	Y	
	2389.770	30.32	AD1	32.30	-35.00	4.60	0.10	32.32	54.0	-21.7	-	-	366	Vert	Y	
12	2399.900	42.31	PK1	32.30	-35.00	4.60	0.10	44.31	-	-	74.0	-29.7	125	Vert	N	
	2399.820	31.69	AD1	32.30	-35.00	4.60	0.10	33.69	54.0	-20.3	-	-	125	Vert	N	
13	2784.150	49.11	PK1	32.80	-35.10	5.00	0.00	51.81	-	-	74.0	-22.2	129	Vert	Y	
	2788.710	36.69	AD1	32.80	-35.10	5.00	0.10	39.49	54.0	-14.5	-	-	129	Vert	Y	
15	5195.502	47.45	PK	34.80	-34.90	7.40	0.90	55.65	-	-	-	-	200	Vert	N	(Fundamental)

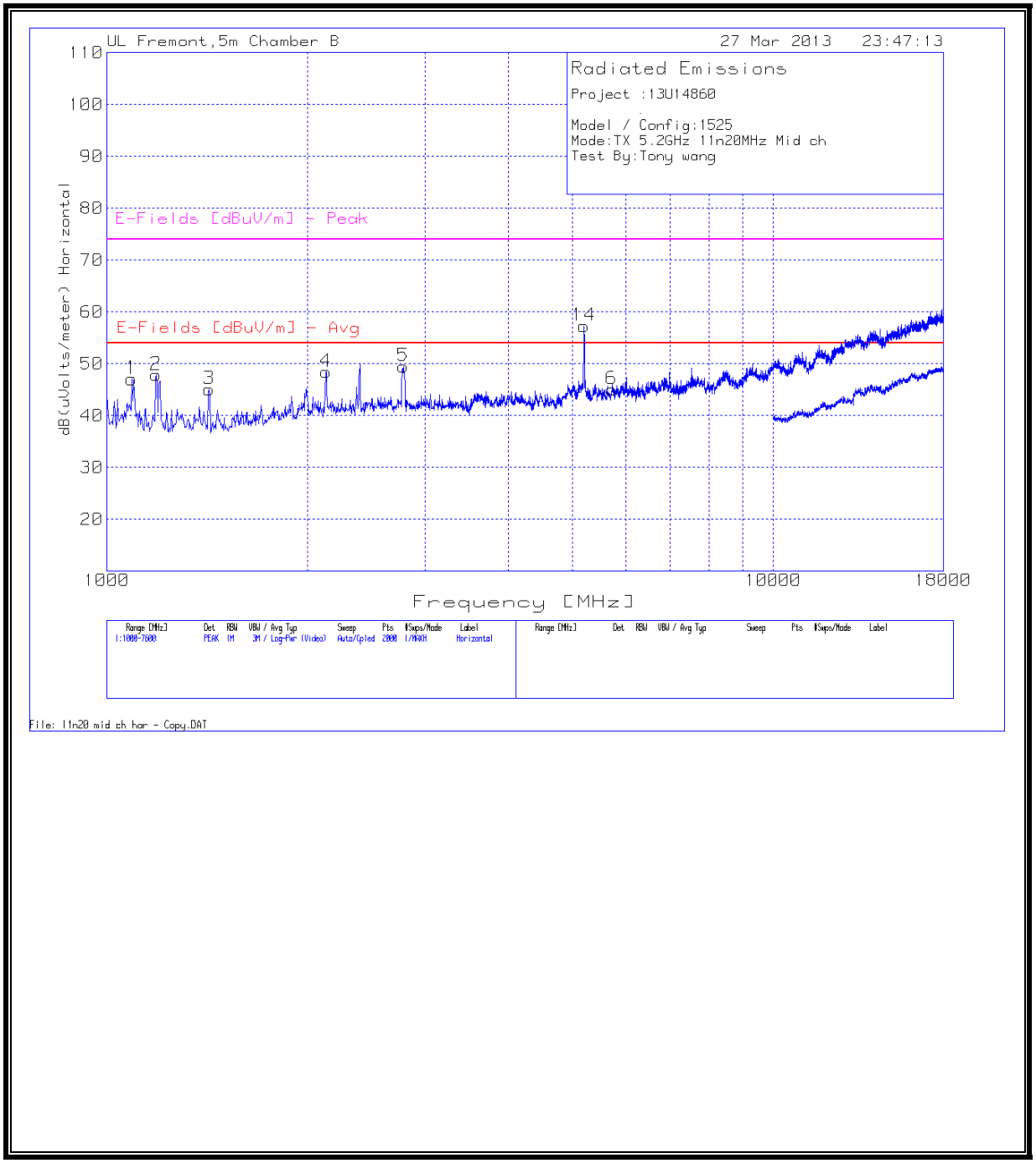
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

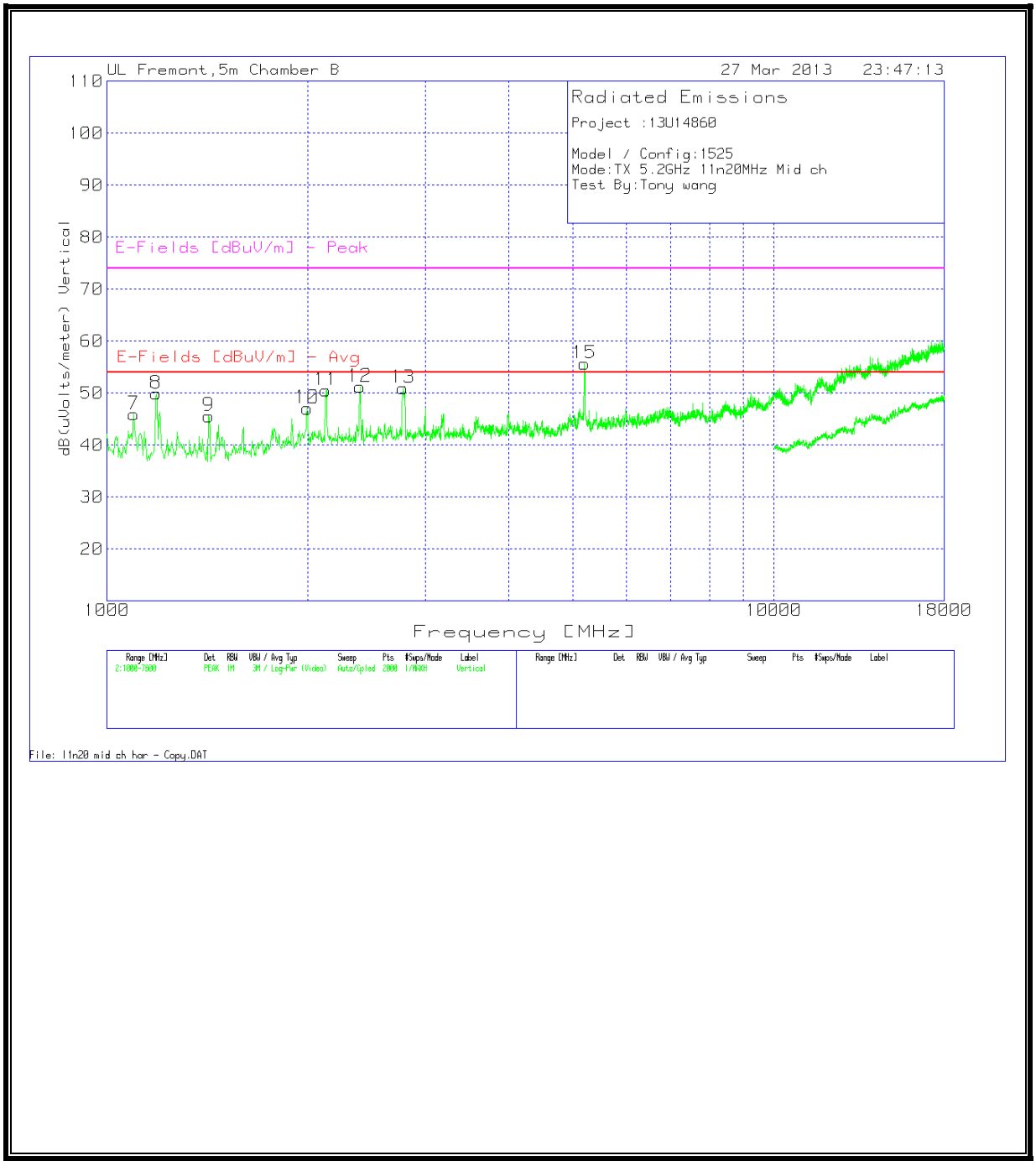
HARMONICS AND SPURIOUS EMISSIONS

MID CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

MID CH Vertical



HARMONICS AND SPURIOUS EMISSIONS

HIGH CH

Project :13U14860

Model / Config:1525

Mode:Tx 5.2GHz 11n20 high ch set14

Test By:Tony Wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1197.901	48.41	PK	28.30	-35.70	3.40	0.00	44.41	54.0	-9.6	74.0	-29.6	200	Horz	Y	
2	1992.804	45.14	PK	31.80	-35.00	4.20	0.00	46.14	54.0	-7.8	74.0	-27.9	200	Horz	N	
3	2784.150	49.11	PK1	32.80	-35.10	5.00	0.00	51.81	-	-	74.0	-22.2	129	Horz	Y	
	2788.710	36.69	AD1	32.80	-35.10	5.00	0.10	39.49	54.0	-14.5	-	-	129	Horz	Y	
4	4120.240	38.19	PK	34.00	-34.80	6.40	0.10	43.89	54.0	-10.1	74.0	-30.1	200	Horz	Y	
12	5238.381	42.72	PK	34.90	-34.90	7.40	0.90	51.02	-	-	-	-	200	Horz	N	(Fundamental)
5	5841.979	37.63	PK	35.50	-34.90	7.80	0.10	46.13	54.0	-7.8	74.0	-27.9	100	Horz	N	
6	1197.901	51.24	PK	28.30	-35.70	3.40	0.00	47.24	54.0	-6.7	74.0	-26.8	100	Vert	Y	
7	1376.012	49.29	PK	28.40	-35.40	3.60	0.00	45.89	54.0	-8.1	74.0	-28.1	100	Vert	Y	
8	1597.001	48.02	PK	28.90	-35.20	3.80	0.00	45.52	54.0	-8.5	74.0	-28.5	100	Vert	Y	
9	1997.900	50.37	PK1	31.80	-35.00	4.20	0.00	51.37	-	-	74.0	-22.6	115	Vert	N	
	1996.600	37.41	AD1	31.80	-35.00	4.20	0.00	40.41	54.0	-15.6	-	-	115	Vert	N	
10	2783.110	50.54	PK1	32.80	-35.10	5.00	0.00	53.24	-	-	74.0	-20.8	131	Vert	Y	
	2778.980	37.86	AD1	32.80	-35.10	5.00	0.00	40.56	54.0	-13.4	-	-	131	Vert	Y	
13	5241.679	47.23	PK	34.90	-34.90	7.40	0.90	55.53	-	-	-	-	200	Vert	N	(Fundamental)
11	5515.442	37.19	PK	34.90	-34.90	7.60	0.70	45.49	54.0	-8.5	74.0	-28.5	200	Vert	N	

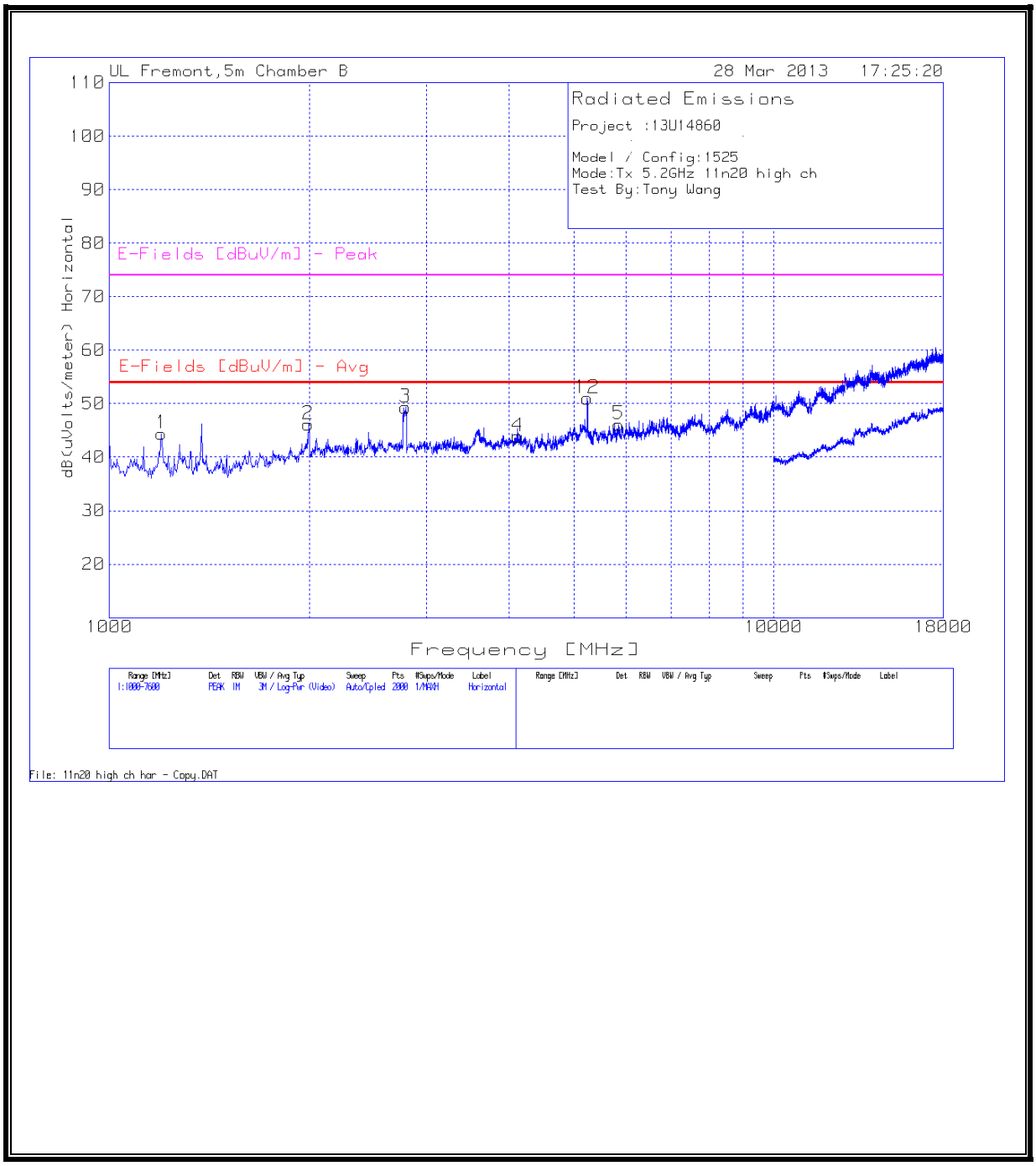
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

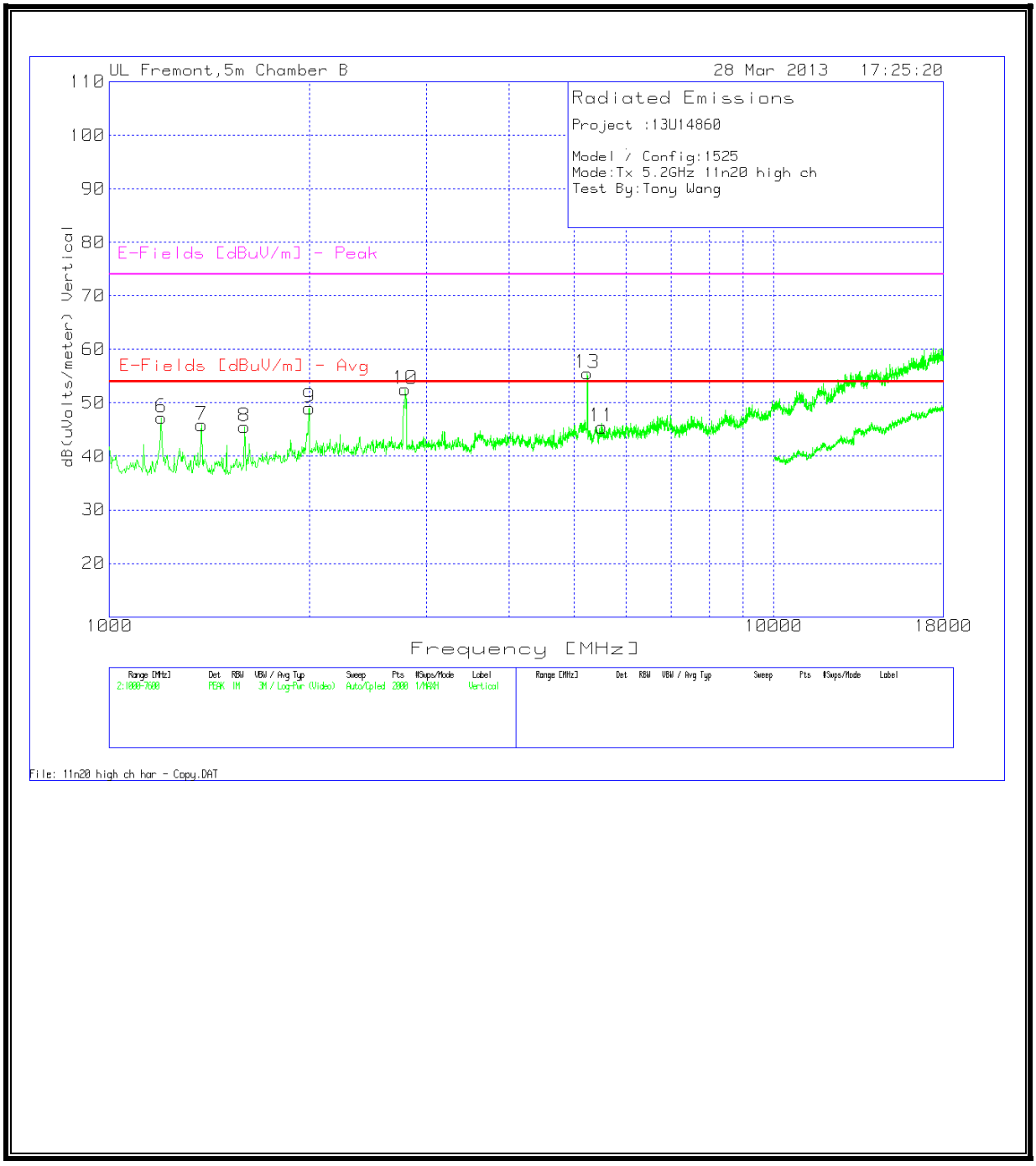
HARMONICS AND SPURIOUS EMISSIONS

HIGH CH Horizontal



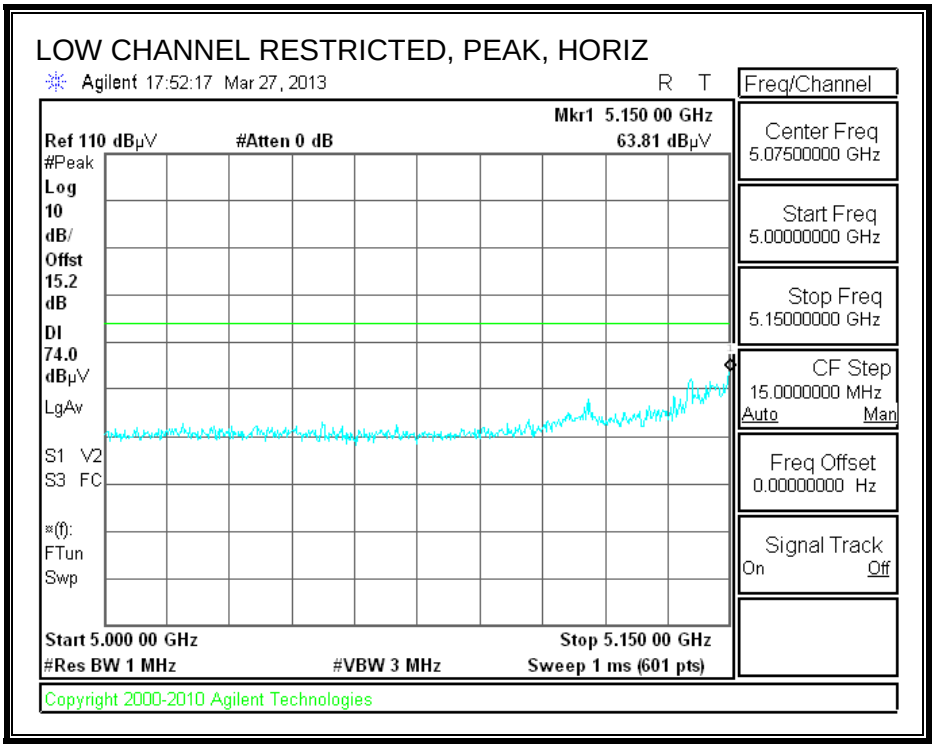
HARMONICS AND SPURIOUS EMISSIONS

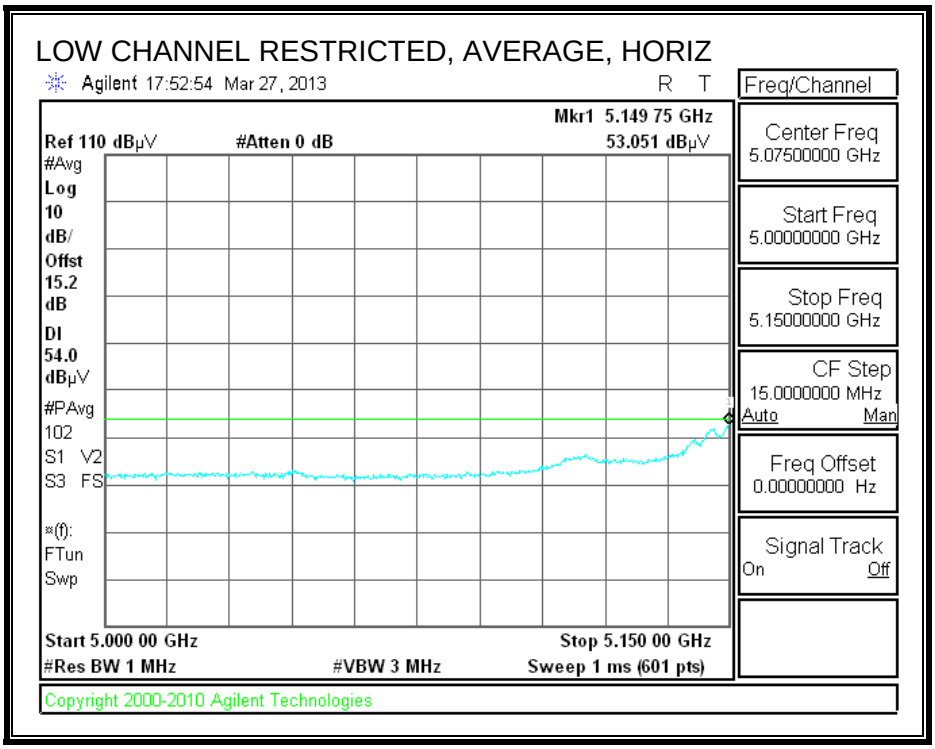
HIGH CH Vertical



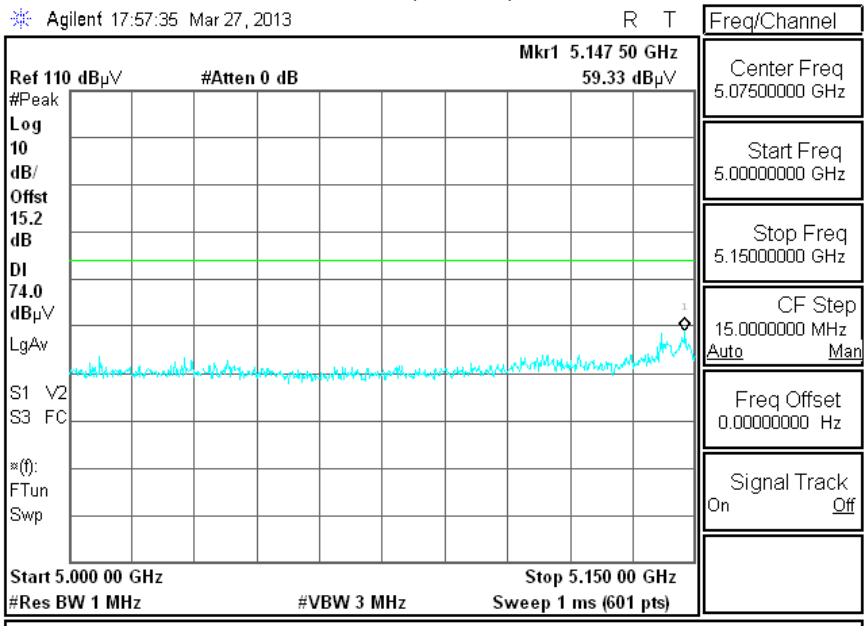
9.2.3. **TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND**

RESTRICTED BANDEDGE (LOW CHANNEL)

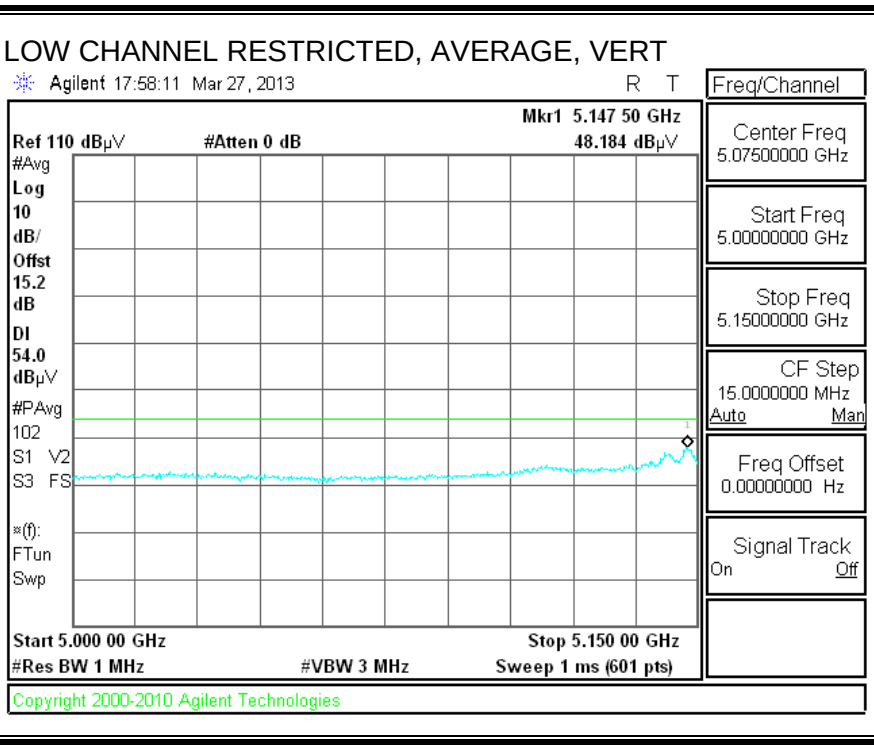




LOW CHANNEL RESTRICTED, PEAK, VERT



LOW CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CH

Project :13U14860

Model / Config:1525

Mode:Tx 11n40 5.2g low ch set12

Test By:Tony Wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1194.603	50.94	PK	28.30	-35.70	3.40	0.00	46.94	54.0	-7.0	74.0	-27.1	200	Horz	Y	
2	1999.400	46.12	PK	31.80	-35.00	4.20	0.00	47.12	54.0	-6.9	74.0	-26.9	200	Horz	N	
3	2773.200	47.71	PK1	32.80	-35.10	5.00	0.00	50.41	54.0	-3.6	74.0	-23.6	120	Horz	Y	
	2772.430	35.08	AD1	32.80	-35.10	5.00	0.00	37.78	54.0	-16.2	74.0	-36.2	120	Horz	Y	
4	3585.907	41.19	PK	33.40	-35.00	5.80	0.00	45.39	54.0	-8.6	74.0	-28.6	200	Horz	N	
11	5185.607	45.19	PK	34.80	-34.90	7.40	0.90	53.39	-	-	-	-	100	Horz	N	(Fundamental)
5	6580.810	37.48	PK	35.90	-35.00	8.40	0.00	46.78	54.0	-7.2	74.0	-27.2	100	Horz	N	
6	1193.840	50.75	PK1	28.30	-35.70	3.40	0.00	46.75	54.0	-7.2	74.0	-27.3	273	Vert	Y	
	1197.220	36.67	AD1	28.30	-35.70	3.40	0.00	32.67	54.0	-21.3	74.0	-41.3	273	Vert	Y	
7	1593.703	48.71	PK	28.90	-35.20	3.80	0.00	46.21	54.0	-7.8	74.0	-27.8	100	Vert	Y	
8	1997.900	55.37	PK1	31.80	-35.00	4.20	0.00	56.37	54.0	2.4	74.0	-17.6	115	Vert	N	
	1996.600	39.41	AD1	31.80	-35.00	4.20	0.00	40.41	54.0	-13.6	74.0	-35.6	115	Vert	N	
9	2784.150	49.11	PK1	32.80	-35.10	5.00	0.00	51.81	54.0	-2.2	74.0	-22.2	129	Vert	Y	
	2788.710	36.69	AD1	32.80	-35.10	5.00	0.10	39.49	54.0	-14.5	74.0	-34.5	129	Vert	Y	
10	4384.108	39.35	PK	34.30	-34.90	6.60	0.10	45.45	54.0	-8.5	74.0	-28.6	100	Vert	Y	
12	5185.607	44.49	PK	34.80	-34.90	7.40	0.90	52.69	-	-	-	-	200	Vert	N	(Fundamental)

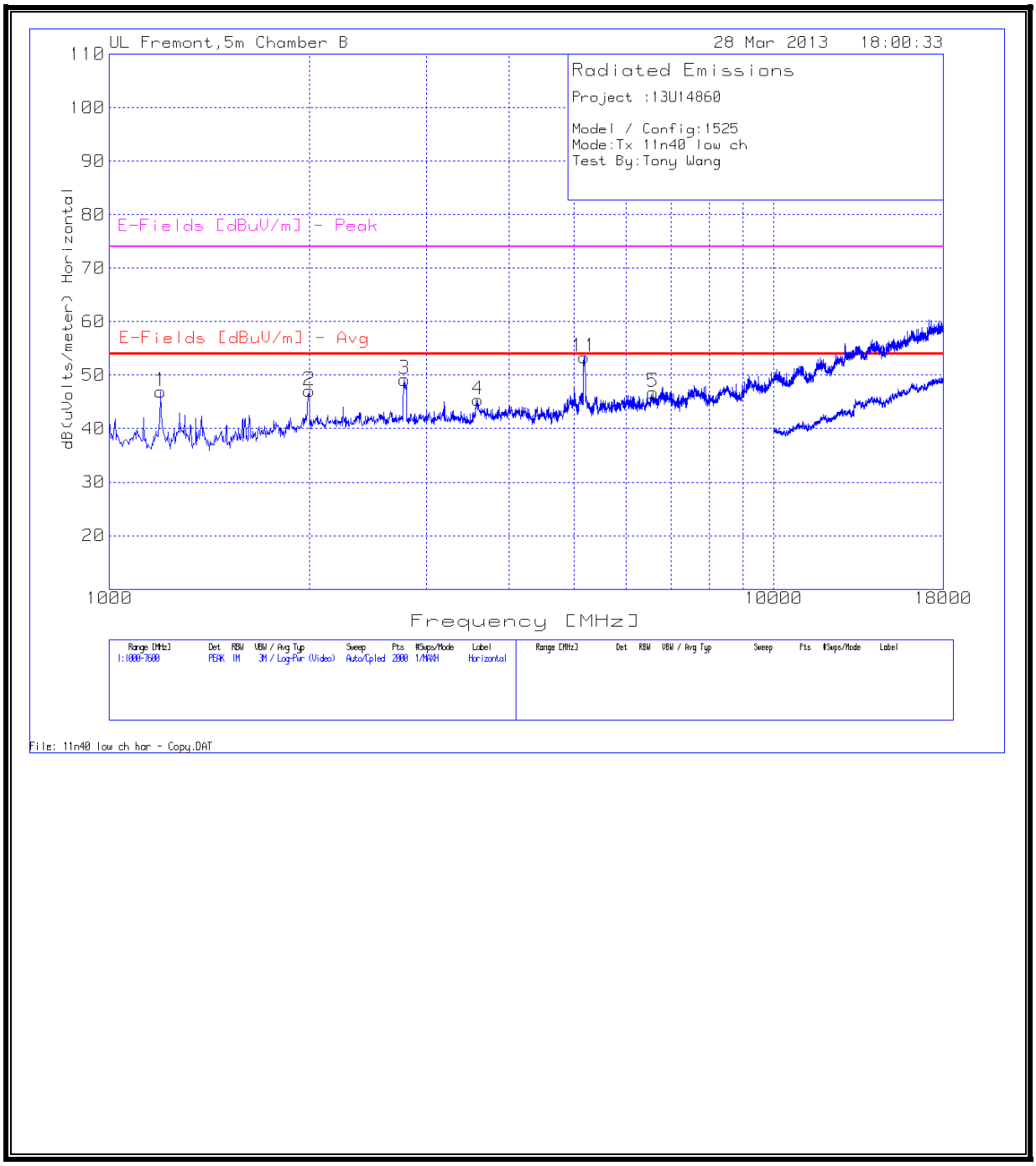
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

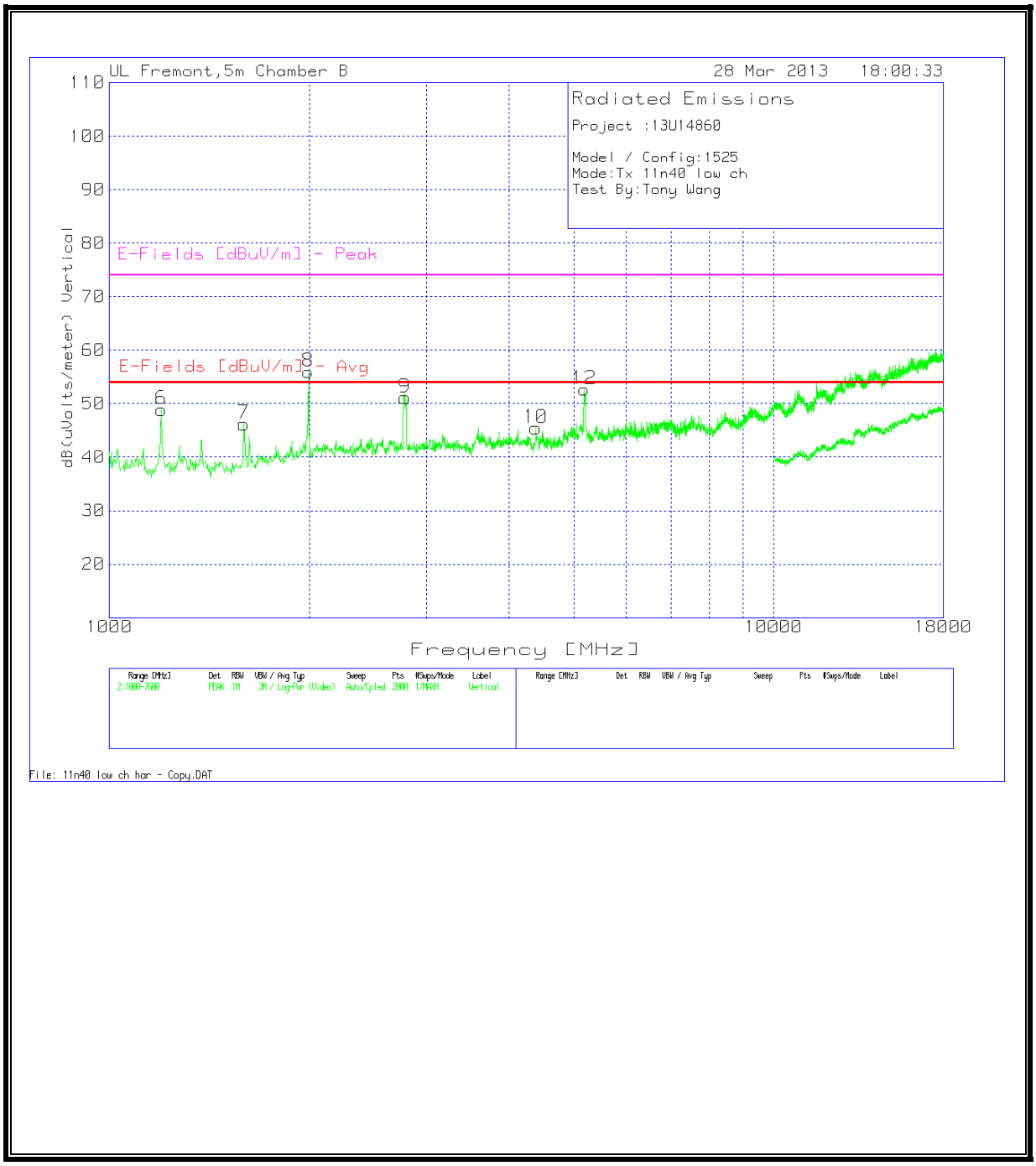
HARMONICS AND SPURIOUS EMISSIONS

LOW CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

LOW CH Vertical



HARMONICS AND SPURIOUS EMISSIONS

HIGH CH

Project :13U14860

Model / Config:1525

Mode:Tx 5.2GHz 11n40 high ch set12

Test By:Tony wang

Marker No.	Test Frequency [MHz]	Meter Reading [dBuV]	Detector Type	T345 Antenna Factor [dB/m]	T145 Preamp [dB]	Cable Factor [dB]	BRF [dB]	Field Strength [dBuV/m]	FCC Part 15C 15.209 Avg Limit [dBuV/m]	Margin [dB]	FCC Part 15C Peak Limit [dBuV/m]	Margin [dB]	Height [cm]	Polarity	Restricted Band?	
1	1194.740	55.67	PK1	28.30	-35.70	3.40	0.00	51.67	54.0	-2.3	74.0	-22.3	138	Vert	Y	
	1196.400	39.97	AD1	28.30	-35.70	3.40	0.00	35.97	54.0	-18.0	74.0	-38.0	138	Vert	Y	
2	1994.260	53.80	PK1	31.80	-35.00	4.20	0.00	54.80	54.0	0.8	74.0	-19.2	148	Vert	N	
	1995.790	37.42	AD1	31.80	-35.00	4.20	0.00	38.42	54.0	-15.6	74.0	-35.6	148	Vert	N	
3	2797.260	50.46	PK1	32.90	-35.10	5.00	0.10	53.36	54.0	-0.6	74.0	-20.6	135	Vert	Y	
	2796.430	38.33	AD1	32.90	-35.10	5.00	0.10	41.23	54.0	-12.7	74.0	-32.8	135	Vert	Y	
4	3595.802	40.71	PK	33.40	-35.00	5.80	0.00	44.91	54.0	-9.1	74.0	-29.1	200	Horz	N	
12	5215.292	41.79	PK	34.90	-34.90	7.40	0.90	50.09	54.0	-3.9	74.0	-23.9	100	Horz	N	(Fundamental)
5	5584.708	36.48	PK	35.00	-34.90	7.60	0.30	44.48	54.0	-9.5	74.0	-29.5	100	Horz	N	
6	1197.901	53.04	PK	28.30	-35.70	3.40	0.00	49.04	54.0	-4.9	74.0	-25.0	100	Vert	Y	
7	1626.687	46.84	PK	29.20	-35.20	3.80	0.00	44.64	54.0	-9.3	74.0	-29.4	100	Vert	N	
8	1992.804	53.01	PK	31.80	-35.00	4.20	0.00	54.01	54.0	0.0	74.0	-20.0	100	Vert	N	
9	2783.400	46.23	PK1	32.80	-35.10	5.00	0.00	48.93	54.0	-5.0	74.0	-25.1	259	Horz	Y	
	2779.990	34.61	AD1	32.80	-35.10	5.00	0.00	37.31	54.0	-16.7	74.0	36.7	259	Horz	Y	
10	4433.583	37.39	PK	34.40	-34.90	6.70	0.10	43.69	54.0	-10.3	74.0	-30.3	100	Vert	N	
13	5248.276	42.71	PK	34.90	-34.90	7.40	0.90	51.01	54.0	-3.0	74.0	-23.0	200	Vert	N	(Fundamental)
11	5729.835	37.39	PK	35.20	-34.90	7.80	0.10	45.59	54.0	-8.4	74.0	-28.4	100	Vert	N	

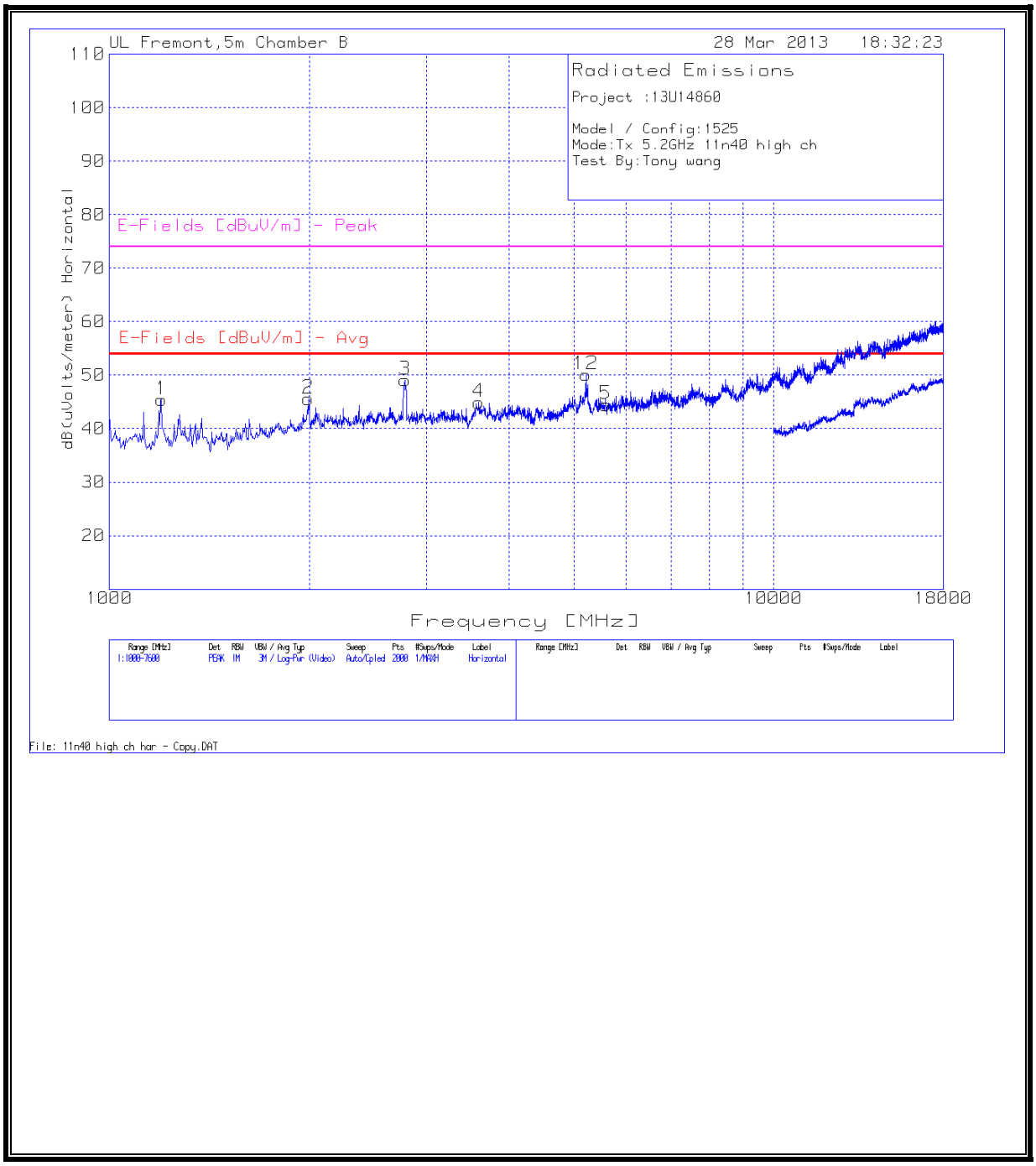
Notes:

1) The PK limit of 74 dBuV/m and the AVG limit of 54 dBuV/m only apply in restricted bands, outside restricted bands the limit is 68.3dBuV/m (-27dBm/MHz eirp). The plots and discrete measurements all show peak emissions are below 54dBuV/m from 1- 10 GHz, above 10 GHz emissions exceed the 54dBuV/m but are below 68dBuV/m.

2) There was no signal from EUT above the system noise floor up to 40 GHz.

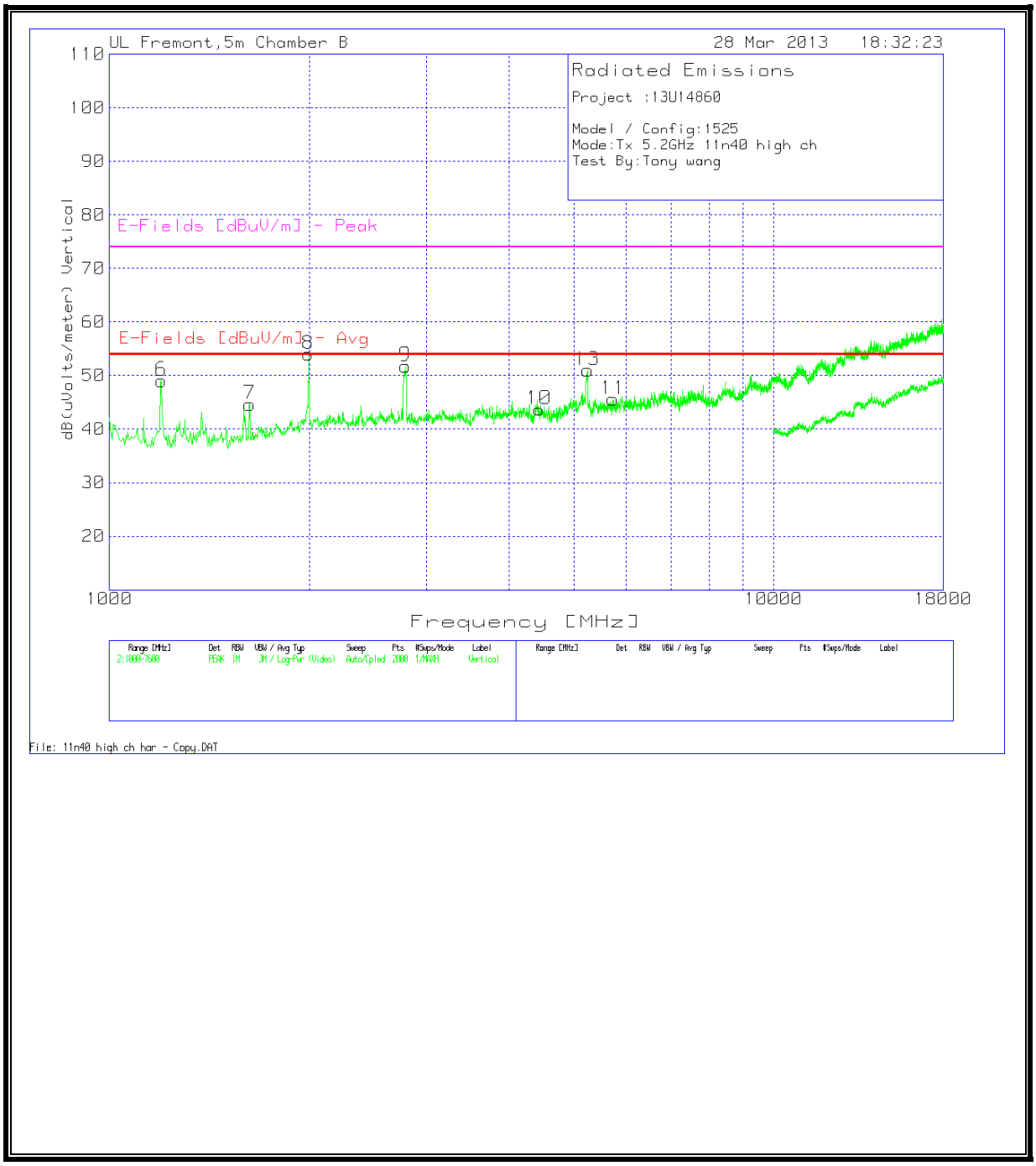
HARMONICS AND SPURIOUS EMISSIONS

HIGH CH Horizontal



HARMONICS AND SPURIOUS EMISSIONS

HIGH CH Vertical



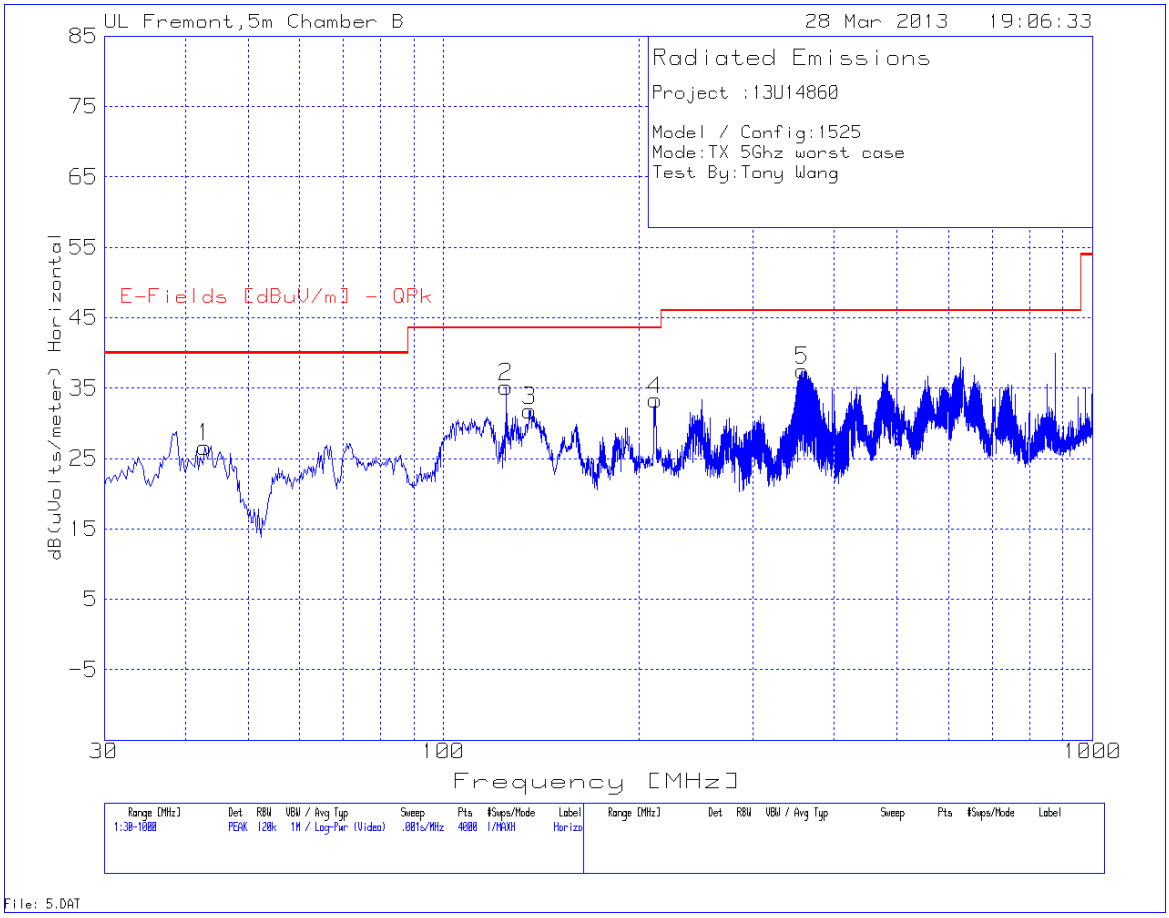
9.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL AND VERTICAL DATA

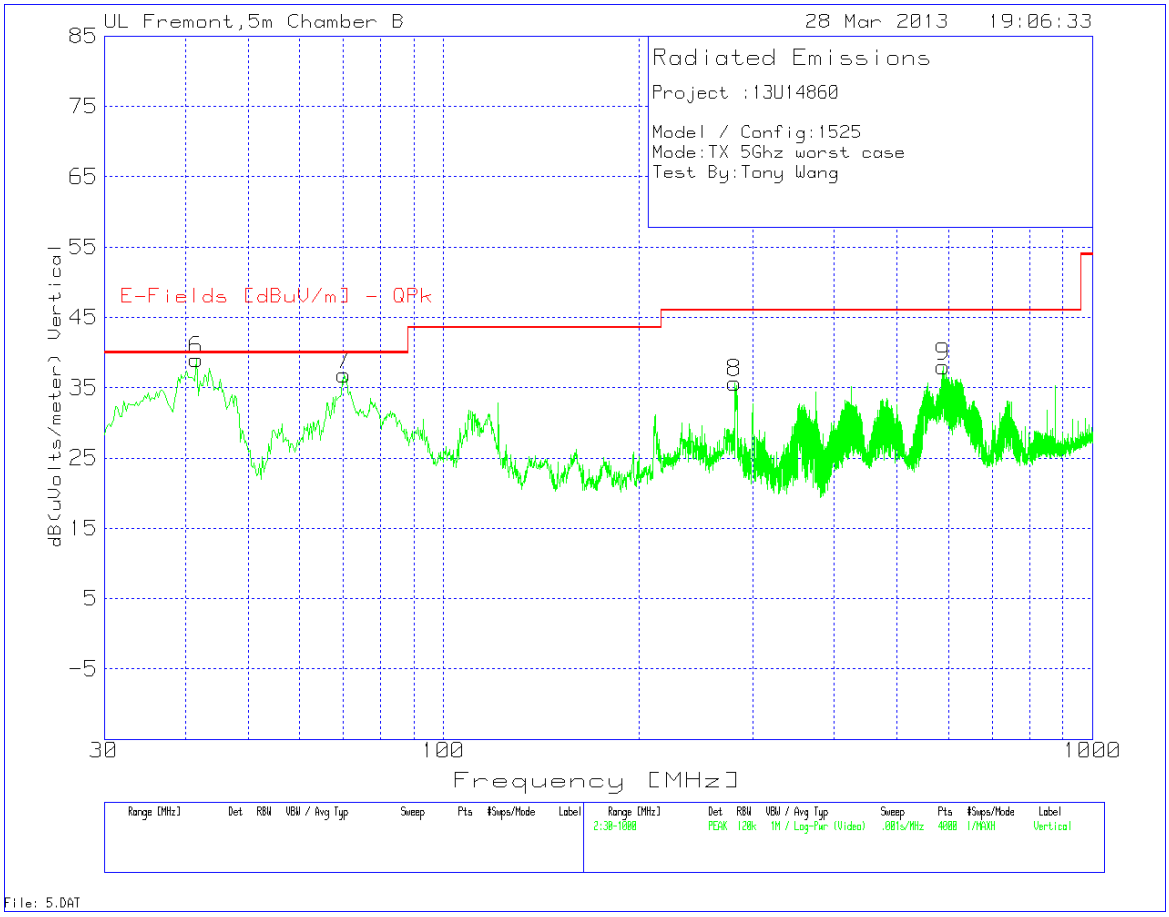
Project :13U14860											
Model / Config:1525											
Mode:TX 5Ghz worst case											
Test By:Tony Wang											
Marker No.	**Test Frequency [MHz]**	**Meter Reading [dBuV]**	**Detector Type**	**T243 Antenna Factor [dB/m]**	**T10 Preamp/Cable Gain/loss [dB]**	**Field Strength [dBuV/m]**	**FCC 15.209 QP Limit [dBuV/m]**	**Margin [dB]**	**Height [cm]**	**Polarity**	**Restricted Band?**
1	124.989	49.02	PK	14.10	-28.00	35.1	43.5	-8.4	200	Horz	Y
2	249.783	48.79	PK	11.50	-26.90	33.4	46.0	-12.6	200	Horz	Y
3	357.372	49.32	PK	14.50	-26.30	37.5	46.0	-8.5	100	Horz	N
4	473.200	43.57	PK	17.40	-26.40	34.6	46.0	-11.5	200	Horz	N
5	619.318	43.27	PK	19.10	-26.00	36.4	46.0	-9.7	100	Horz	N
6	41.056	52.17	QP	12.70	-29.00	35.9	40.0	-4.1	101	Vert	N
7	42.931	53.14	QP	11.30	-28.90	35.5	40.0	-4.5	101	Vert	N
8	70.374	54.61	QP	7.90	-28.70	33.8	40.0	-6.2	101	Vert	N
9	281.284	48.90	PK	13.40	-26.60	35.7	46.0	-10.3	200	Vert	Y
10	424.979	45.27	PK	16.40	-26.50	35.2	46.0	-10.9	200	Vert	N

HORIZONTAL PLOT



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

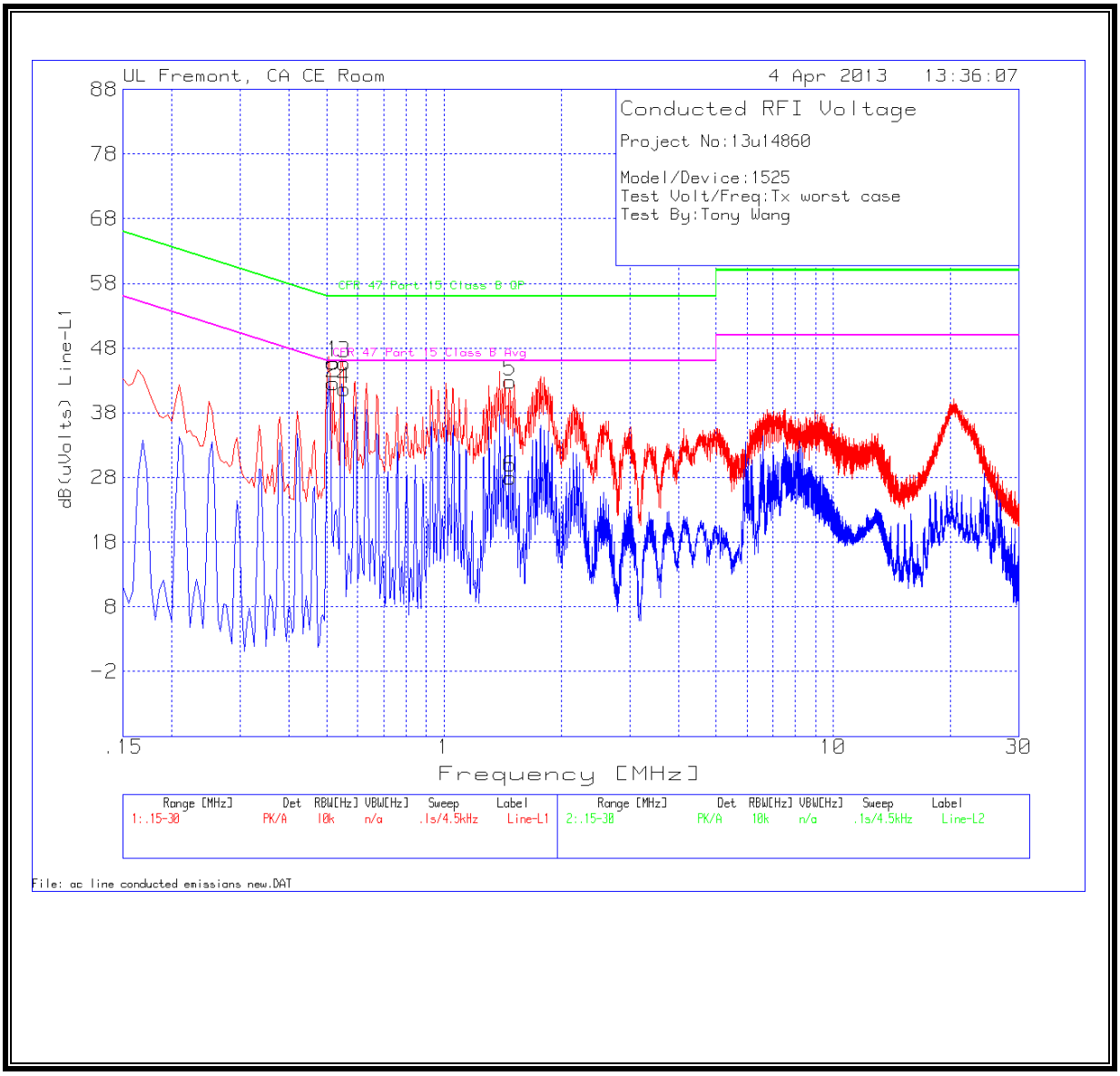
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

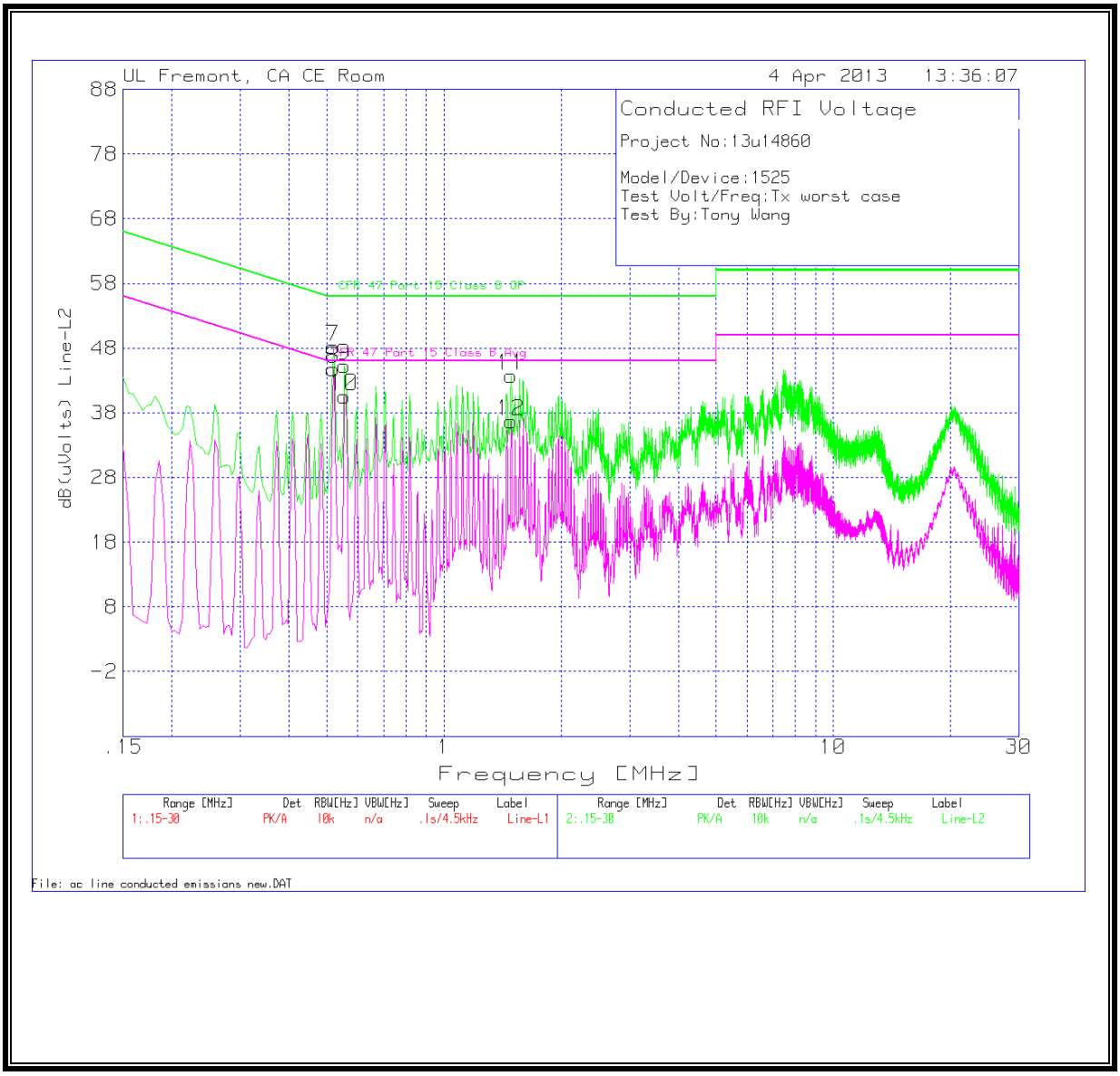
6 WORST EMISSIONS

Project No:13u14860										
Model/Device:1525										
Test Volt/Freq:Tx worst case										
Test By:Tony Wang										
Conductor	**Test Frequency [MHz]**	**Meter Reading [dBuV]**	**Detector Type**	**T24 Voltage Correction Factor [dB]**	**Cables 1&3 Loss [dB]**	**RF Line Voltage [dBuV]**	**CFR 47 Part 15 Class B QP [dBuV]**	**Margin [dB]**	**CFR 47 Part 15 Class B Avg [dBuV]**	**Margin [dB]**
Line L1	0.519	45.67	PK	0.10	0.00	45.77	56.0	-10.2	-	-
Line L1	0.519	42.44	Av	0.10	0.00	42.54	-	-	46.0	-3.5
Line L1	0.555	45.53	PK	0.10	0.00	45.63	56.0	-10.4	-	-
Line L1	0.555	41.56	Av	0.10	0.00	41.66	-	-	46.0	-4.3
Line L1	1.478	42.59	PK	0.10	0.10	42.79	56.0	-13.2	-	-
Line L1	1.478	27.78	Av	0.10	0.10	27.98	-	-	46.0	-18.0
Line L2	0.519	48.10	PK	0.10	0.00	48.20	56.0	-7.8	-	-
Line L2	0.519	44.72	Av	0.10	0.00	44.82	-	-	46.0	-1.2
Line L2	0.555	45.21	PK	0.10	0.00	45.31	56.0	-10.7	-	-
Line L2	0.555	40.50	Av	0.10	0.00	40.60	-	-	46.0	-5.4
Line L2	1.487	43.51	PK	0.10	0.10	43.71	56.0	-12.3	-	-
Line L2	1.487	36.55	Av	0.10	0.10	36.75	-	-	46.0	-9.3

LINE 1 RESULTS



LINE 2 RESULTS



11. MAXIMUM PERMISSIBLE RF EXPOSURE

11.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

11.2. IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

11.3. EQUATIONS

POWER DENSITY

Power density is given by:

S = EIRP / (4 * Pi * D^2)

Where

S = Power density in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power in mW
D = Separation distance in cm

Power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by 10.

DISTANCE

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

Where

D = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power in mW
S = Power density in mW/cm^2

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) * EIRP

Where

DC = Duty Cycle in %, as applicable
EIRP = Equivalent Isotropic Radiated Power in W

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

Total EIRP = (EIRP1) + (EIRP2) + ... + (EIRPn)

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as
(Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

11.4. LIMITS AND IC EXEMPTION

VARIABLE LIMITS

For mobile radio equipment operating in the cellular phone band, the lowest power density limit is calculated using the lowest frequency:

824 MHz / 1500 = 0.55 mW/cm^2 (FCC)
824 MHz / 150 = 5.5 W/m^2 (IC).

FIXED LIMITS

For operation in the PCS band, the 2.4 GHz band and the 5 GHz bands:

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2
From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

INDUSTRY CANADA EXEMPTION

RSS-102 Clause 2.5.2 RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 2.5 W;
- at or above 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 5 W.

11.5. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Calculation for the Network Radio

Multiple chain or colocated transmitters									
Band	**Mode**	**Chain for MIMO**	**Separatio Distance (cm)**	**Output Power (dBm)**	**Antenna Gain (dBi)**	**Duty Cycle (%)**	**EIRP (mW)**	**FCC Power Density (mW/cm^2)**	**IC Density (W/m^2)**
5 GHz	WLAN	1		16.50	3.38	100.0	97.3		
5 GHz	WLAN	2		16.50	3.43	100.0	98.4		
Combined			20				440.9	0.088	0.88

Worst Case calculation of both Radios

Multiple chain or colocated transmitters									
Band	**Mode**	**Chain for MIMO**	**Separatio Distance (cm)**	**Output Power (dBm)**	**Antenna Gain (dBi)**	**Duty Cycle (%)**	**EIRP (mW)**	**FCC Power Density (mW/cm^2)**	**IC Density (W/m^2)**
5 GHz	Accessory WLAN	1		11.50	3.14	100.0	29.1		
2.4 GHz	Network WLAN	2		17.50	3.38	100.0	122.5		
2.4 GHz	Network WLAN	3		17.50	4.61	100.0	162.6		
Combined			20				331.2	0.066	0.66

Note: antenna gains in the tables above are worst-case gains for individual chains

The device operates above 1.5 GHz with a maximum EIRP less than or equal to 5 Watts as a mobile device with a minimum separation distance of 20 cm, therefore it is exempt from routine RF Exposure Evaluation under RSS-102.