



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM and WCDMA Phone with 2.4 GHz b/g/n and Bluetooth

MODEL NUMBER: SM-G3812B

FCC ID: A3LSMG3812B

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Samsung

EUT DESCRIPTION: GSM and WCDMA Phone with 2.4 GHz b/g/n and Bluetooth

MODEL: SM-G3812B

SERIAL NUMBER: FK-389-F

DATE TESTED: JANUARY 2-8, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 Verification Services Inc. By:

Tested By:



PHILIP KIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.



STEVEN TRAN
WiSE LAB TECHNICIAN
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, 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 Verification Services Inc. 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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 18000 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 a GSM and WCDMA Phone with 2.4 GHz b/g/n and Bluetooth.

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)
2412 - 2462	802.11b	17.18	52.24
2412 - 2462	802.11g	20.59	114.55
2412 - 2462	802.11n HT20	20.16	103.75

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 0.27 dBi.

5.4. 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:

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n HT20mode: MCS0

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

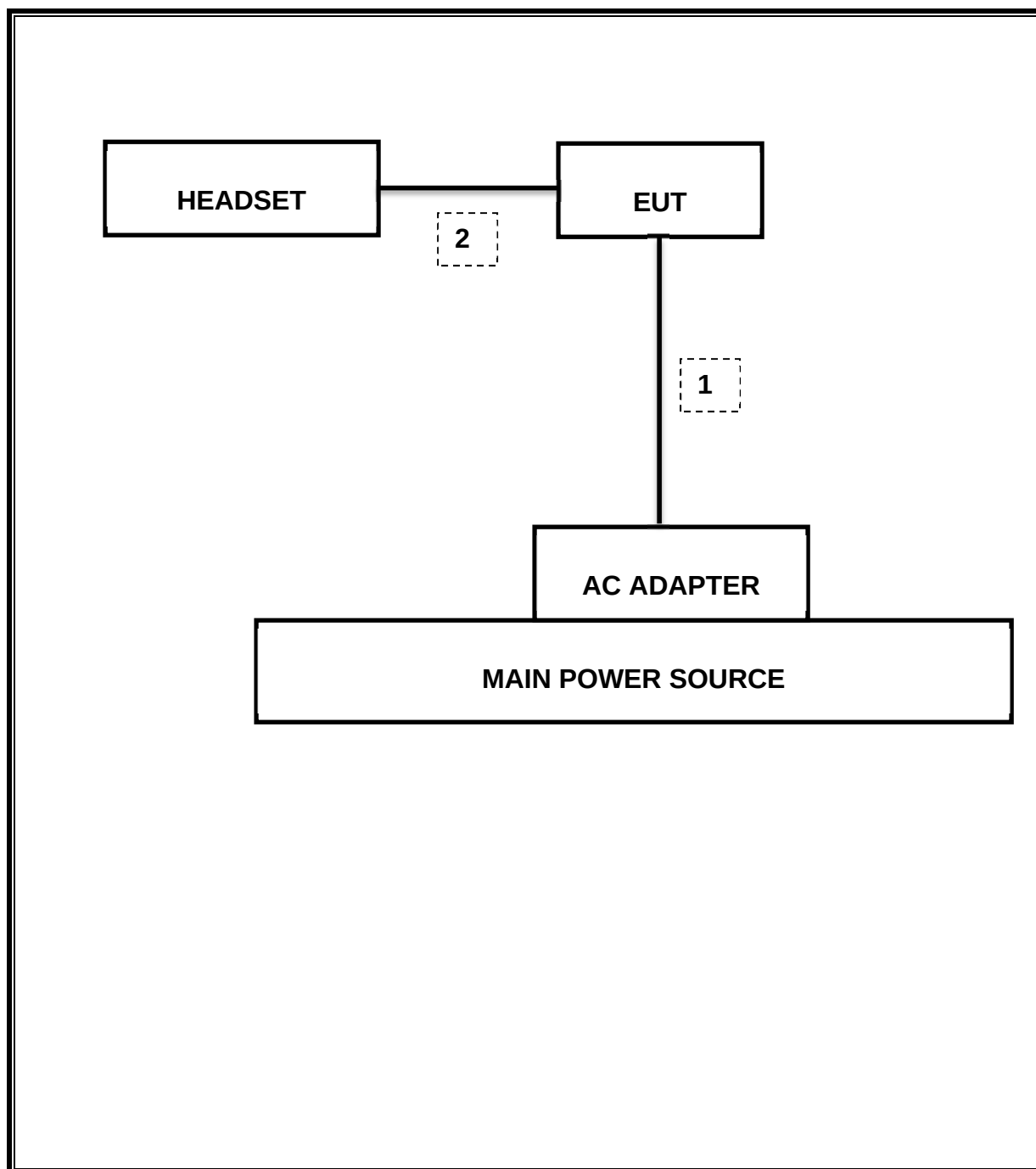
Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	SM-G3812B	FK-389-A	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1m	N/A

TEST SETUP

The EUT is a stand-alone unit 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
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01016	08/14/13	08/14/14
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/13	12/11/14
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/13	11/14/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/13	01/16/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/13	10/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/13	10/21/14
PXA SIGNAL ANALYZER	Agilent / HP	N9030A	N/A		05/09/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13	08/08/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/13	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/2013	12/13/2014

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r01:Measurement Procedure PK2 is used for power and PKPSD is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

8. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-210 A8.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	10.13 MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-33.36 dBc
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	20.59 dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-9.20 dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	28.68 dBuV(AV)
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 74dBuV/m		Pass	73.45 dBuV/m

9. ANTENNA PORT TEST RESULTS

9.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 DTS Meas Guidance v03r01: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

9.1.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.13	0.5
Mid	2437	10.13	0.5
High	2462	10.13	0.5
Worst		10.13	

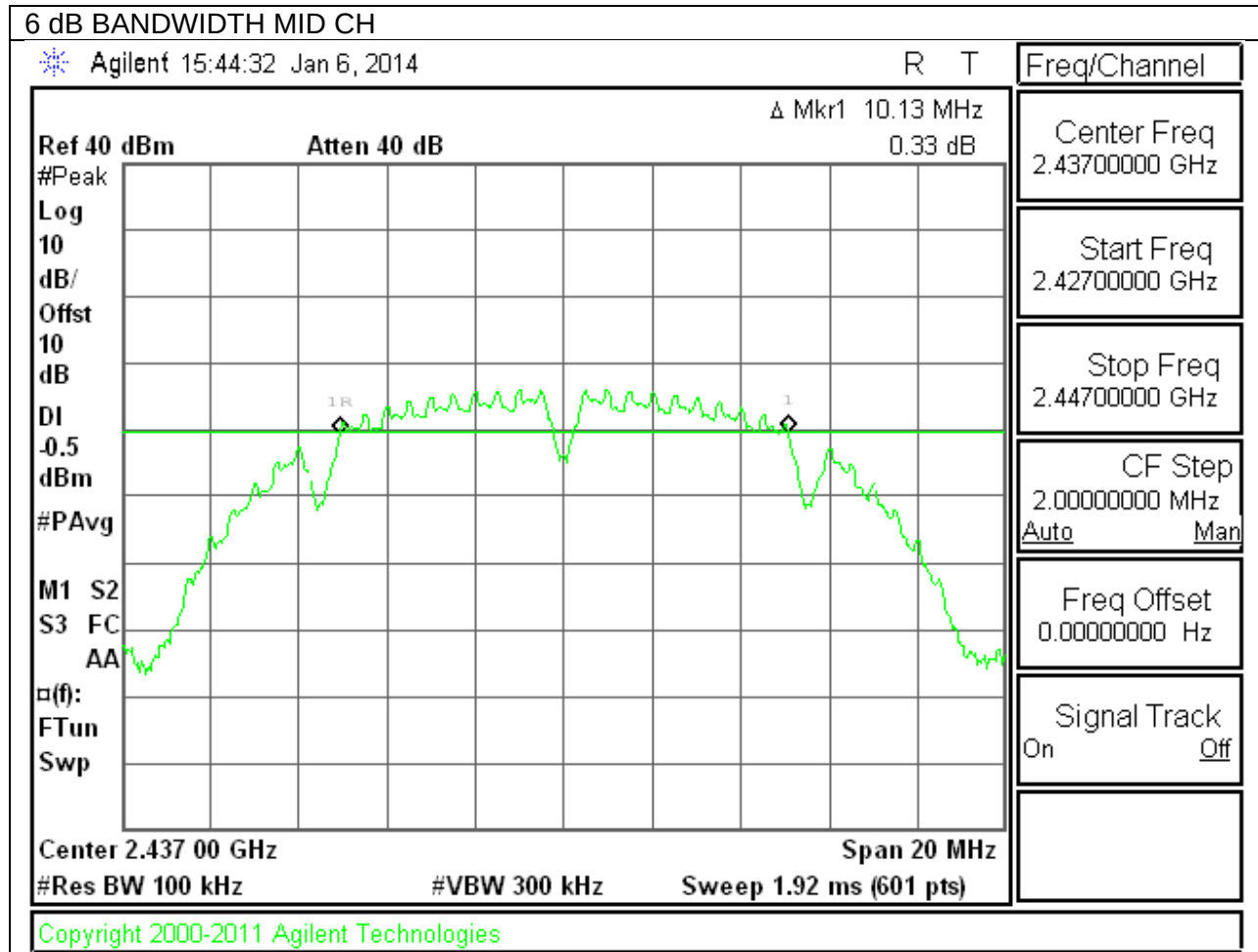
9.1.2. 802.11g MODE IN THE 2.4 GHz BAND

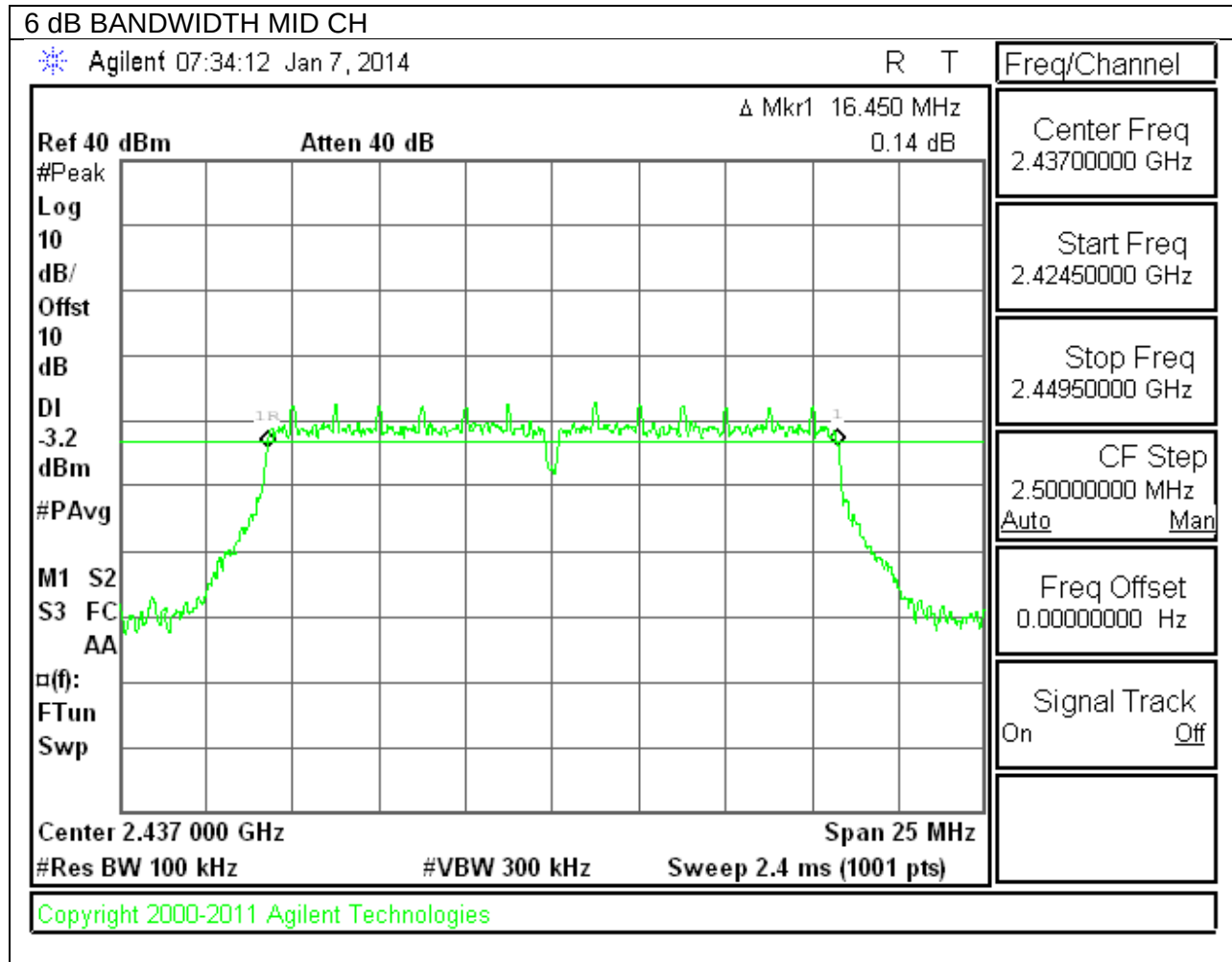
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.45	0.5
Mid	2437	16.45	0.5
High	2462	16.40	0.5
Worst		16.40	

9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

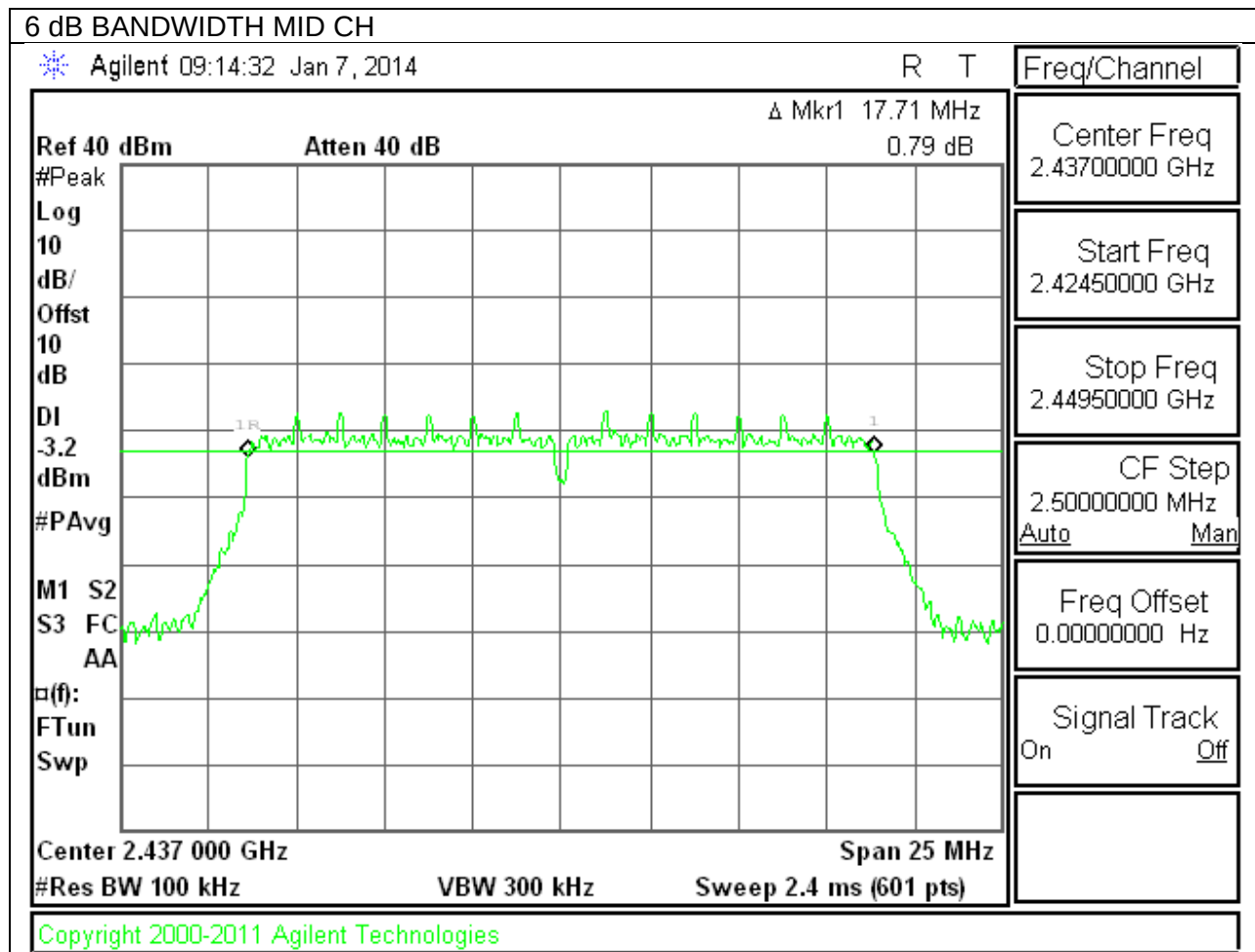
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.75	0.5
Mid	2437	17.71	0.5
High	2462	17.71	0.5
Worst		17.71	

802.11b 6 dB BANDWIDTH



802.11g 6 dB BANDWIDTH

802.11n 6 dB BANDWIDTH



9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

9.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.25
Mid	2437	13.26
High	2462	13.30
Worst		13.30

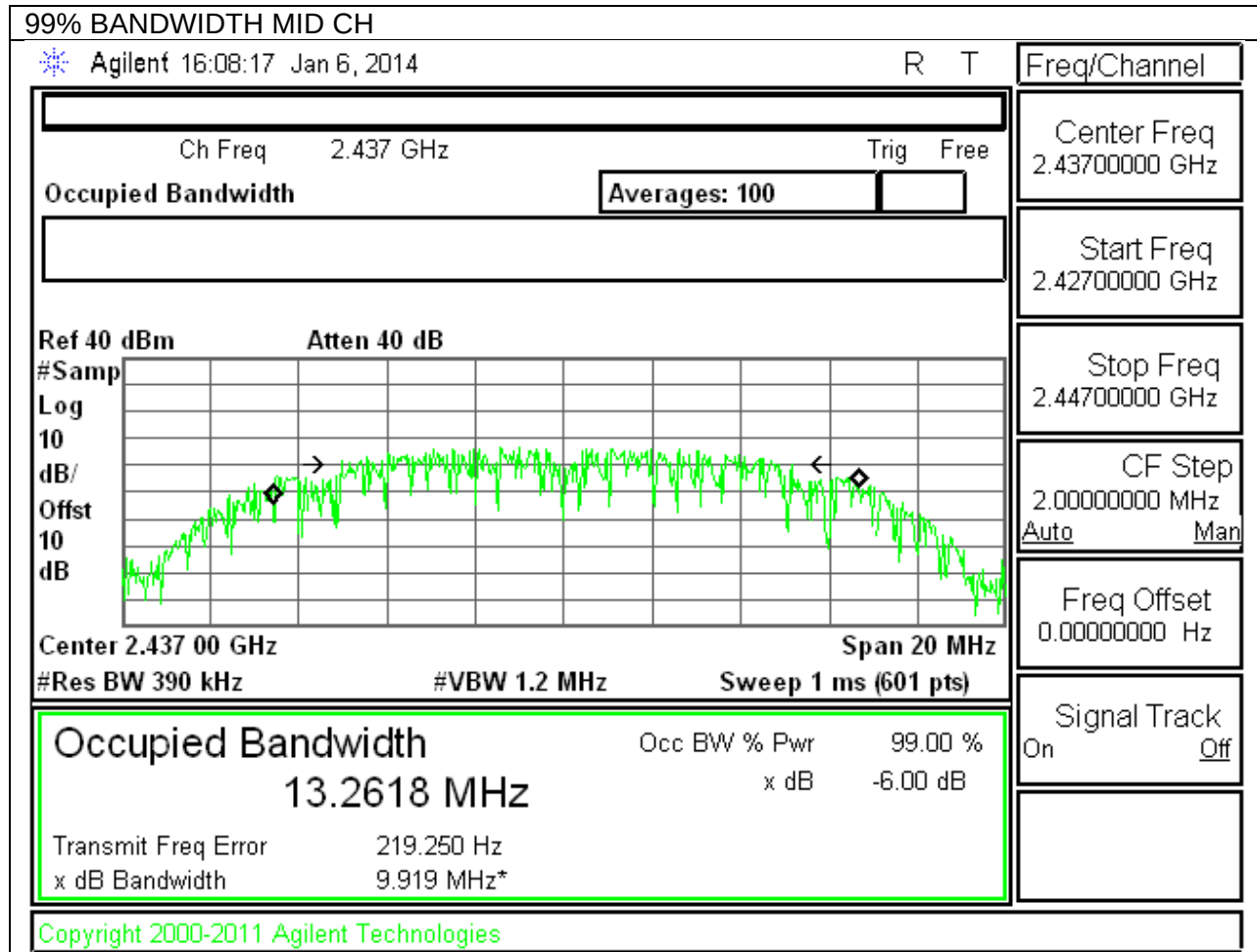
9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.57
Mid	2437	16.62
High	2462	16.30
Worst		16.62

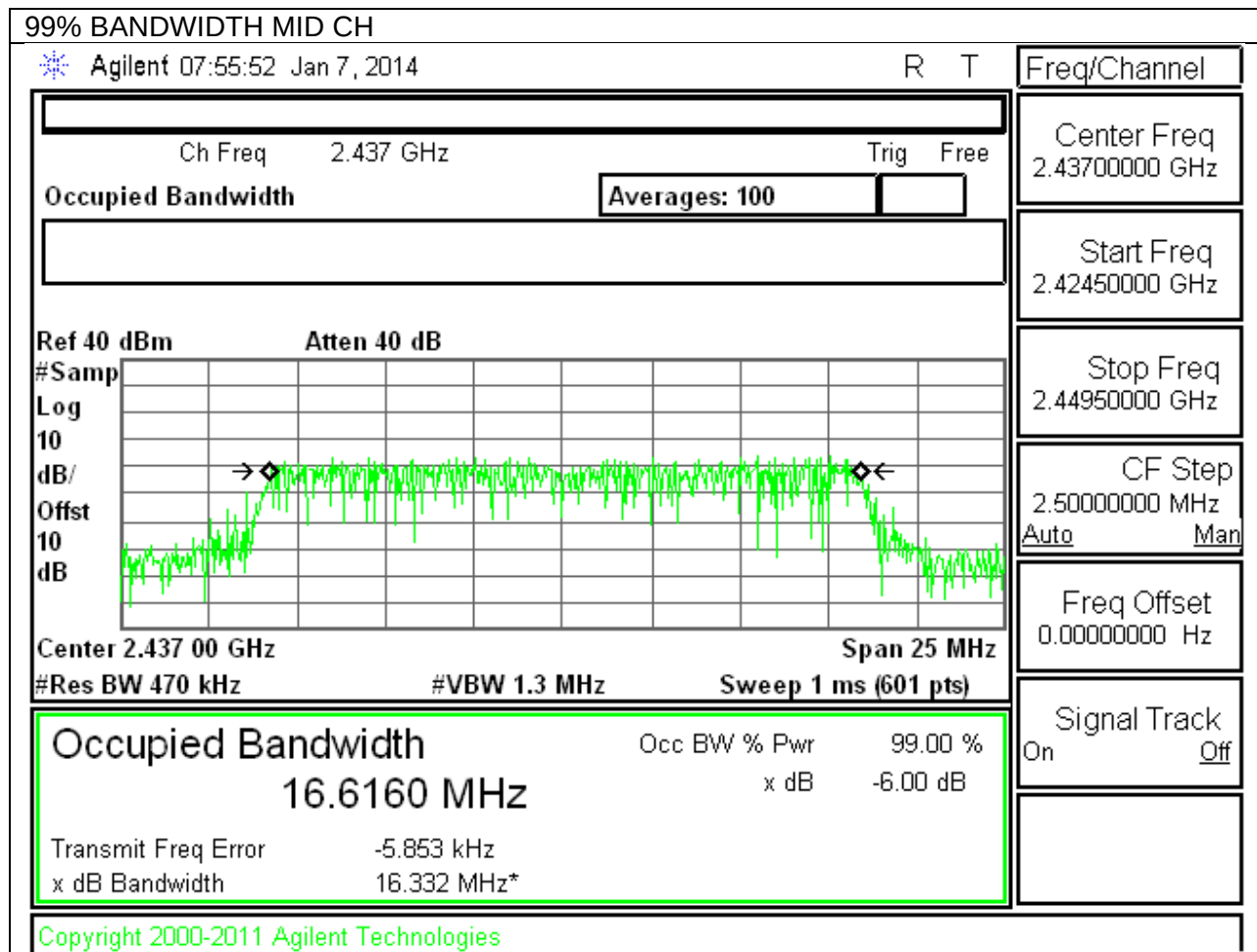
9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.66
Mid	2437	17.65
High	2462	17.86
Worst		17.86

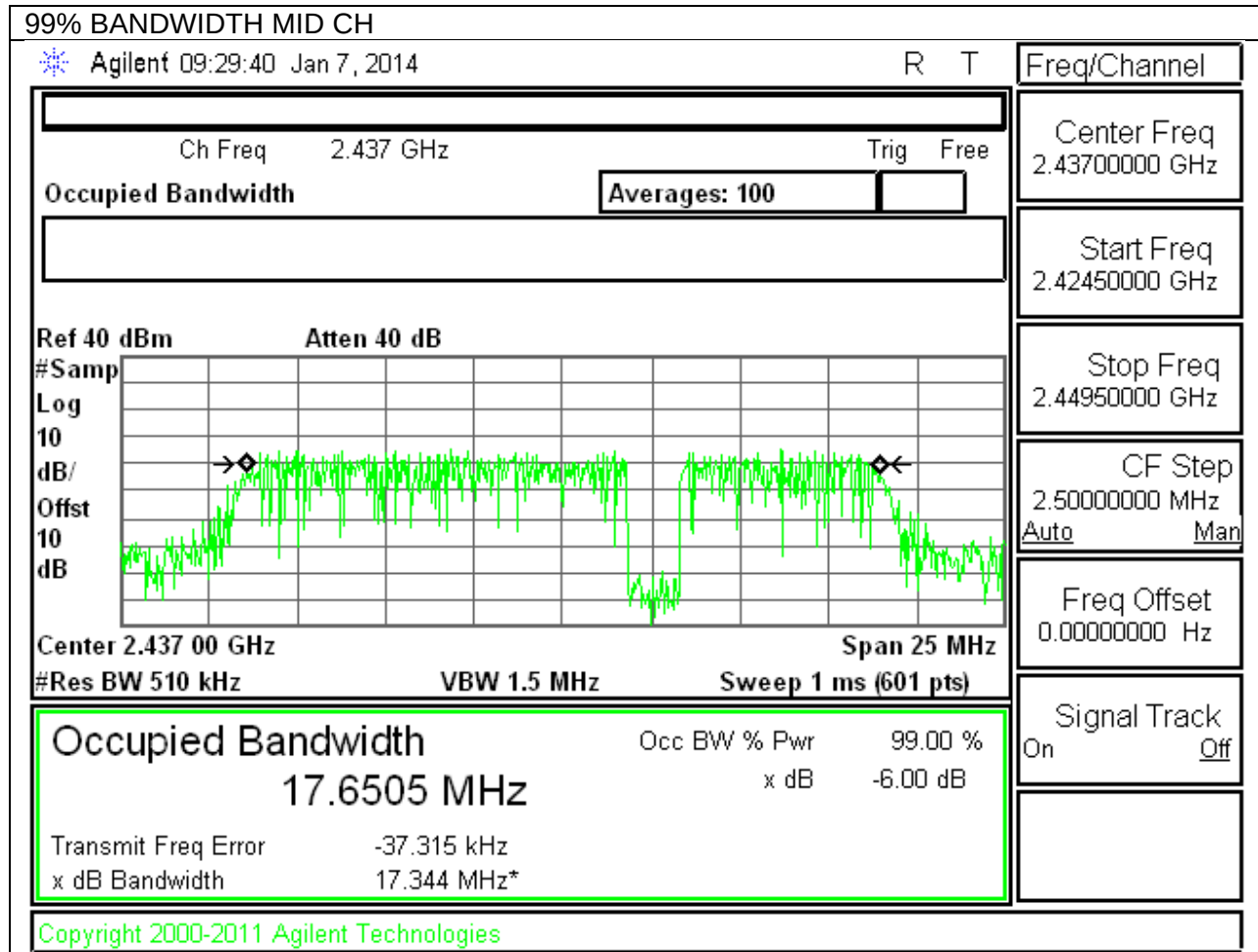
802.11b 99% BANDWIDTH



802.11g 99% BANDWIDTH



802.11n 99% BANDWIDTH



9.3. 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 0.2 dB (including 10 dB pad and 0.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

9.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	14.10
Mid	2437	14.50
High	2462	14.30
Worst		14.500

9.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	12.10
Mid	2437	12.50
High	2462	12.40
Worst		12.500

9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	12.10
Mid	2437	12.50
High	2462	12.40
Worst		12.500

9.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

9.4.1. 802.11b MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	0.27	30.00	30	36	30.00
Mid	2437	0.27	30.00	30	36	30.00
High	2462	0.27	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	16.71	16.71	30.00	-13.29
Mid	2437	16.73	16.73	30.00	-13.27
High	2462	17.18	17.18	30.00	-12.82
Worst			17.18		

9.4.2. 802.11g MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	0.27	30.00	30	36	30.00
Mid	2437	0.27	30.00	30	36	30.00
High	2462	0.27	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	19.32	19.32	30.00	-10.68
Mid	2437	19.50	19.50	30.00	-10.50
High	2462	20.59	20.59	30.00	-9.41
Worst			20.59		

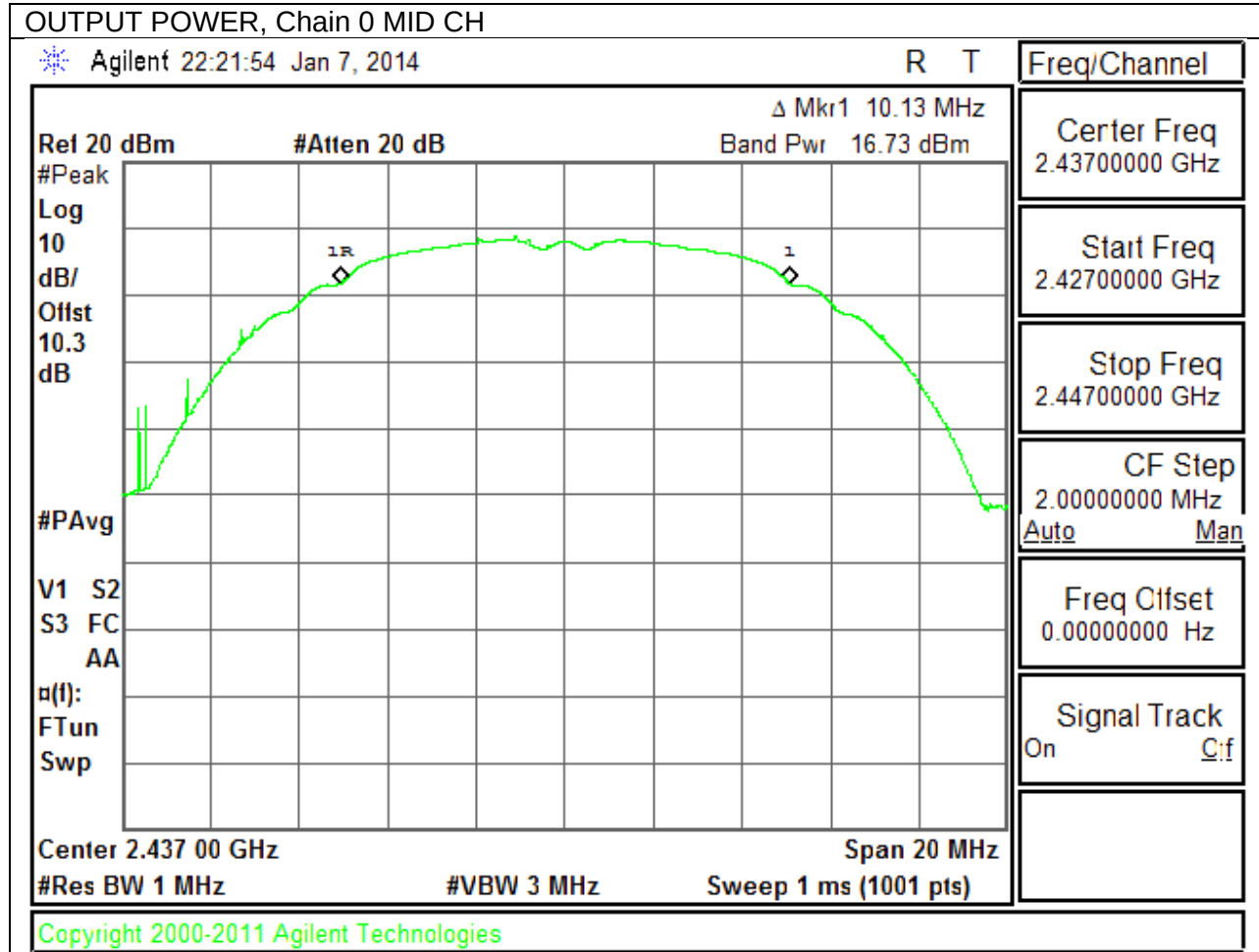
9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

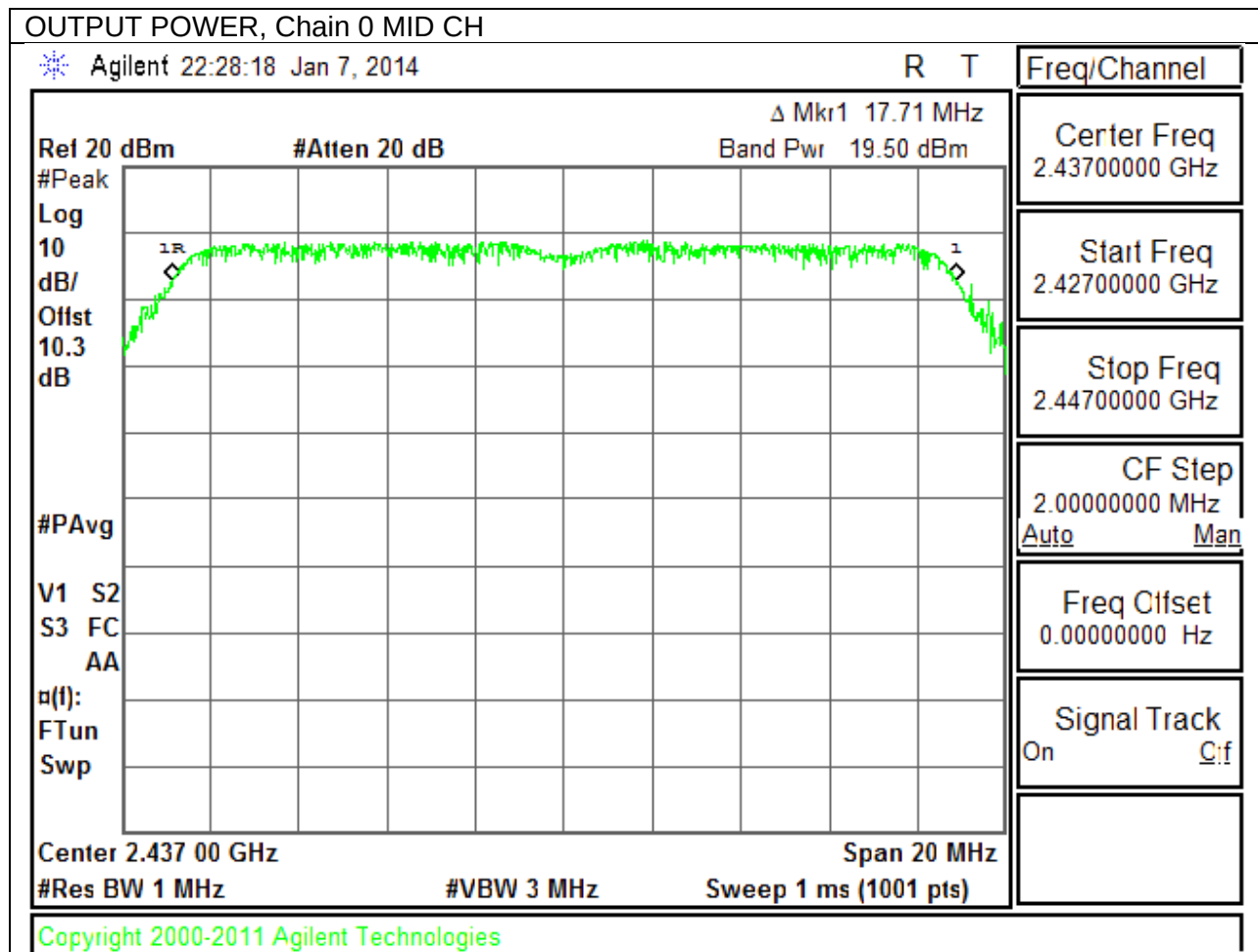
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	0.27	30.00	30	36	30.00
Mid	2437	0.27	30.00	30	36	30.00
High	2462	0.27	30.00	30	36	30.00

Results

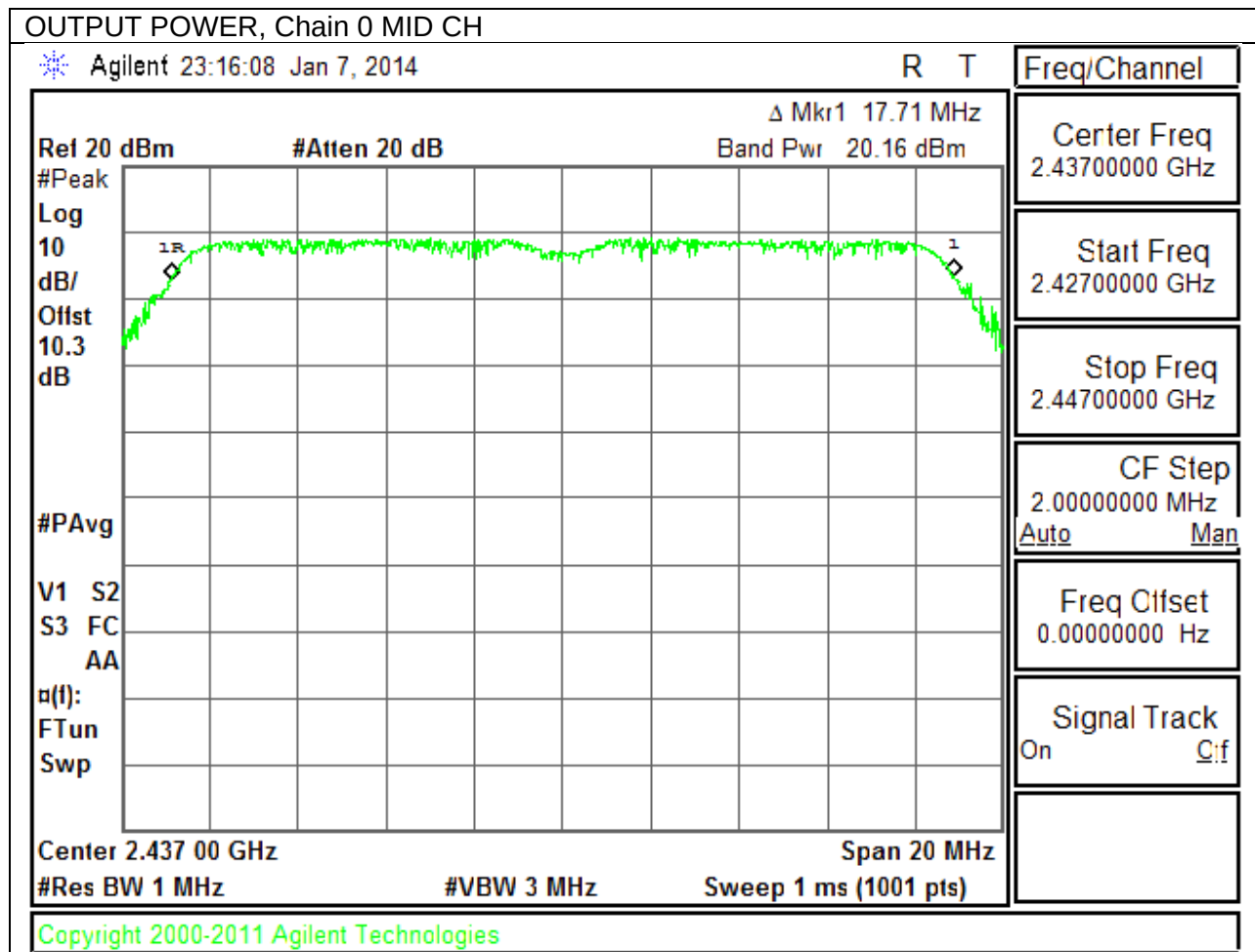
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	20.02	20.02	30.00	-9.98
Mid	2437	20.16	20.16	30.00	-9.84
High	2462	19.71	19.71	30.00	-10.29
Worst			20.16		

802.11b OUTPUT POWER, Chain 0

802.11g OUTPUT POWER, Chain 0



802.11n OUTPUT POWER, Chain 0



9.5. PSD

LIMITS

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

9.5.1. 802.11b MODE IN THE 2.4 GHz BAND

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.99	8.0	-18.0
Mid	2437	-9.20	8.0	-17.2
High	2462	-12.96	8.0	-21.0

9.5.2. 802.11g MODE IN THE 2.4 GHz BAND

PSD Results

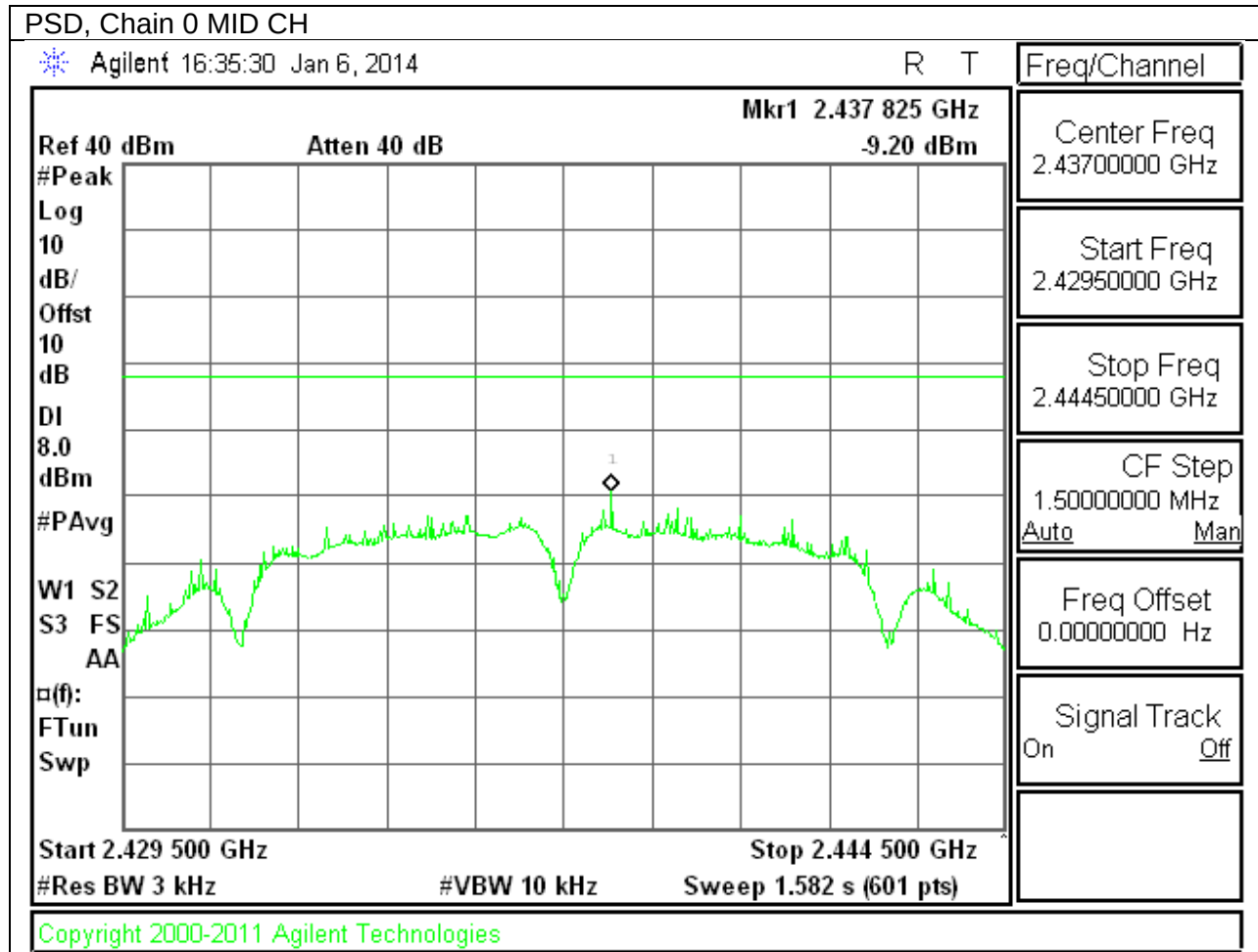
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14.41	8.0	-22.4
Mid	2437	-14.49	8.0	-22.5
High	2462	-16.17	8.0	-24.2

9.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

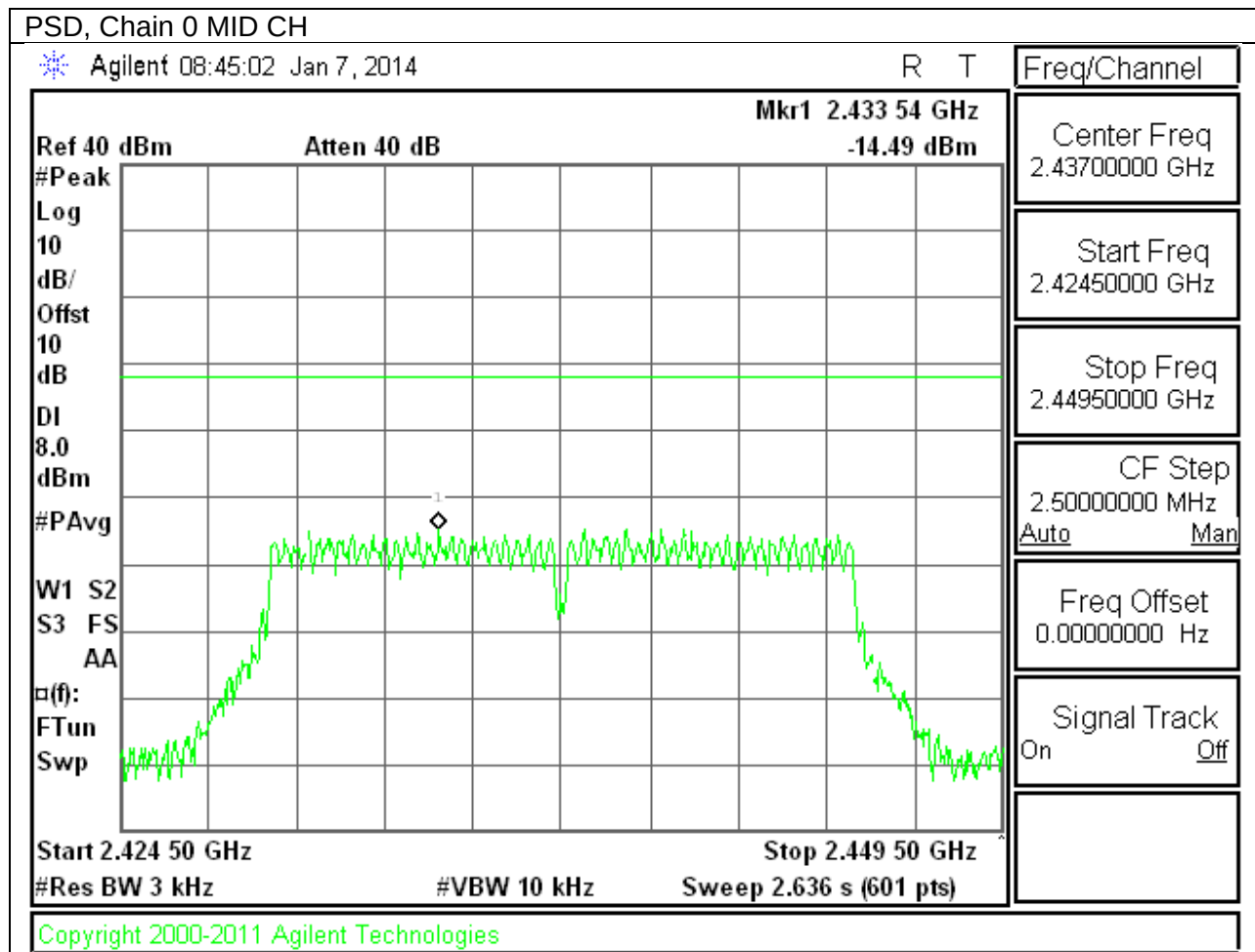
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.01	8.0	-18.0
Mid	2437	-9.69	8.0	-17.7
High	2462	-9.81	8.0	-17.8

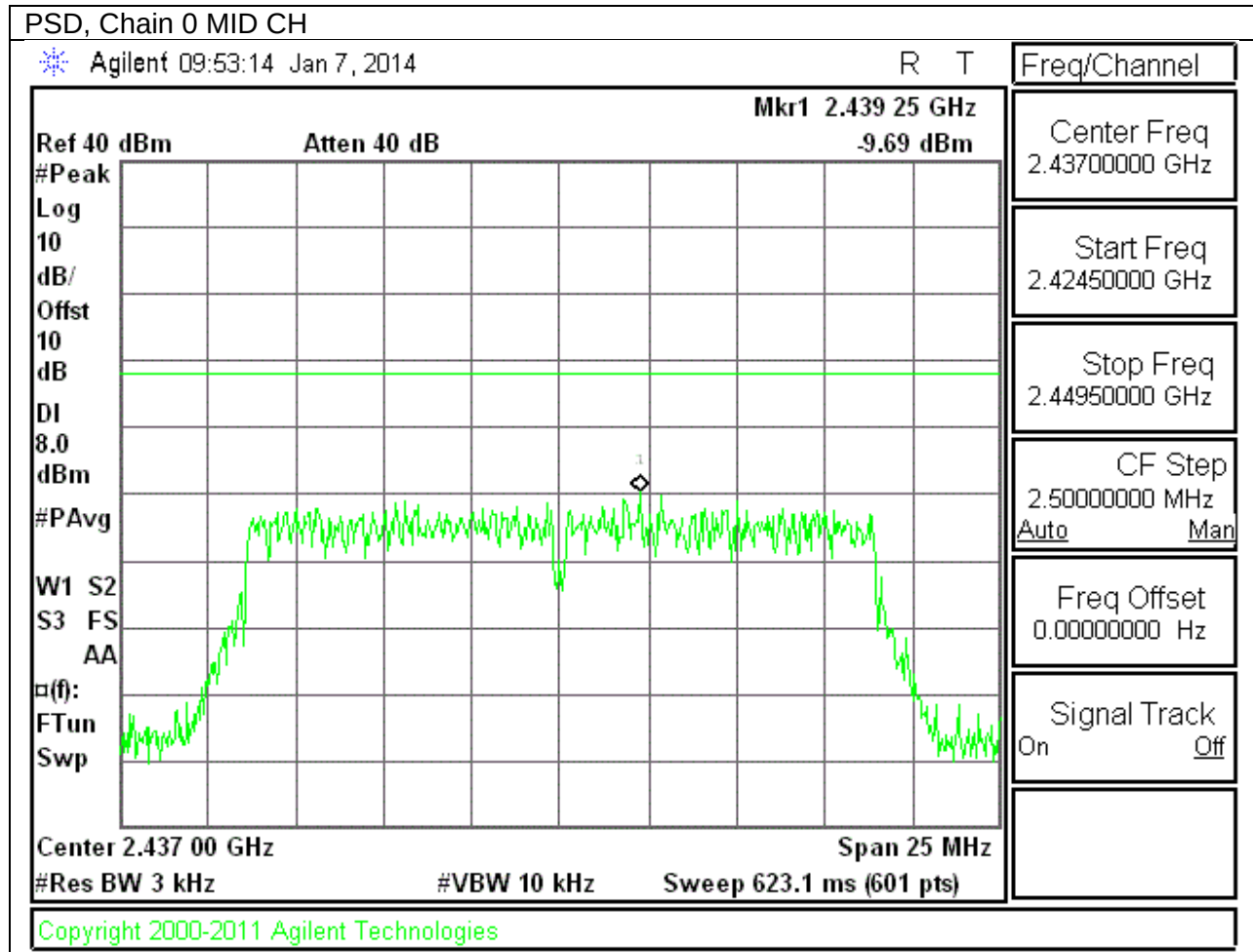
802.11b PSD, Chain 0



802.11g PSD, Chain 0



802.11n PSD, Chain 0



9.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

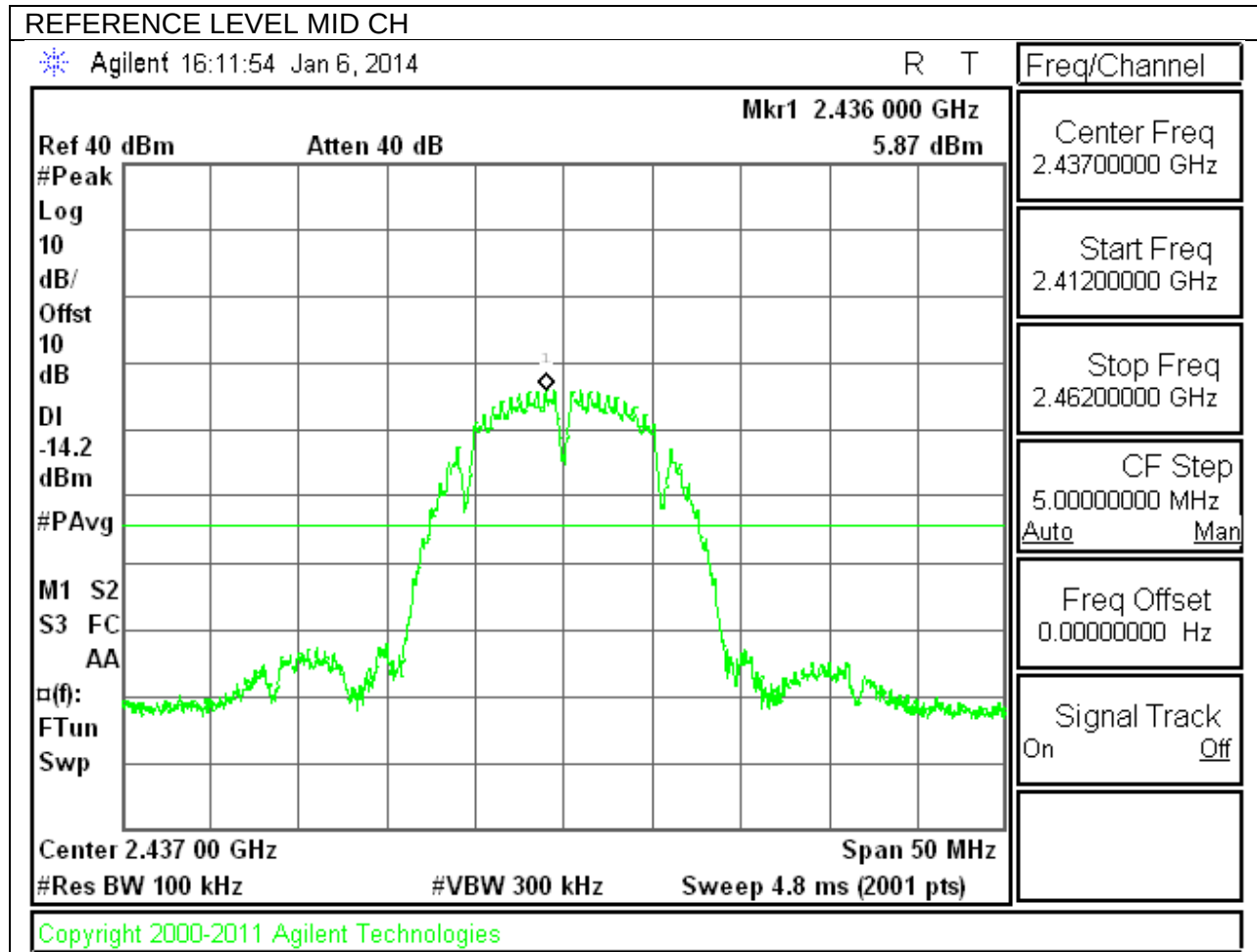
TEST PROCEDURE

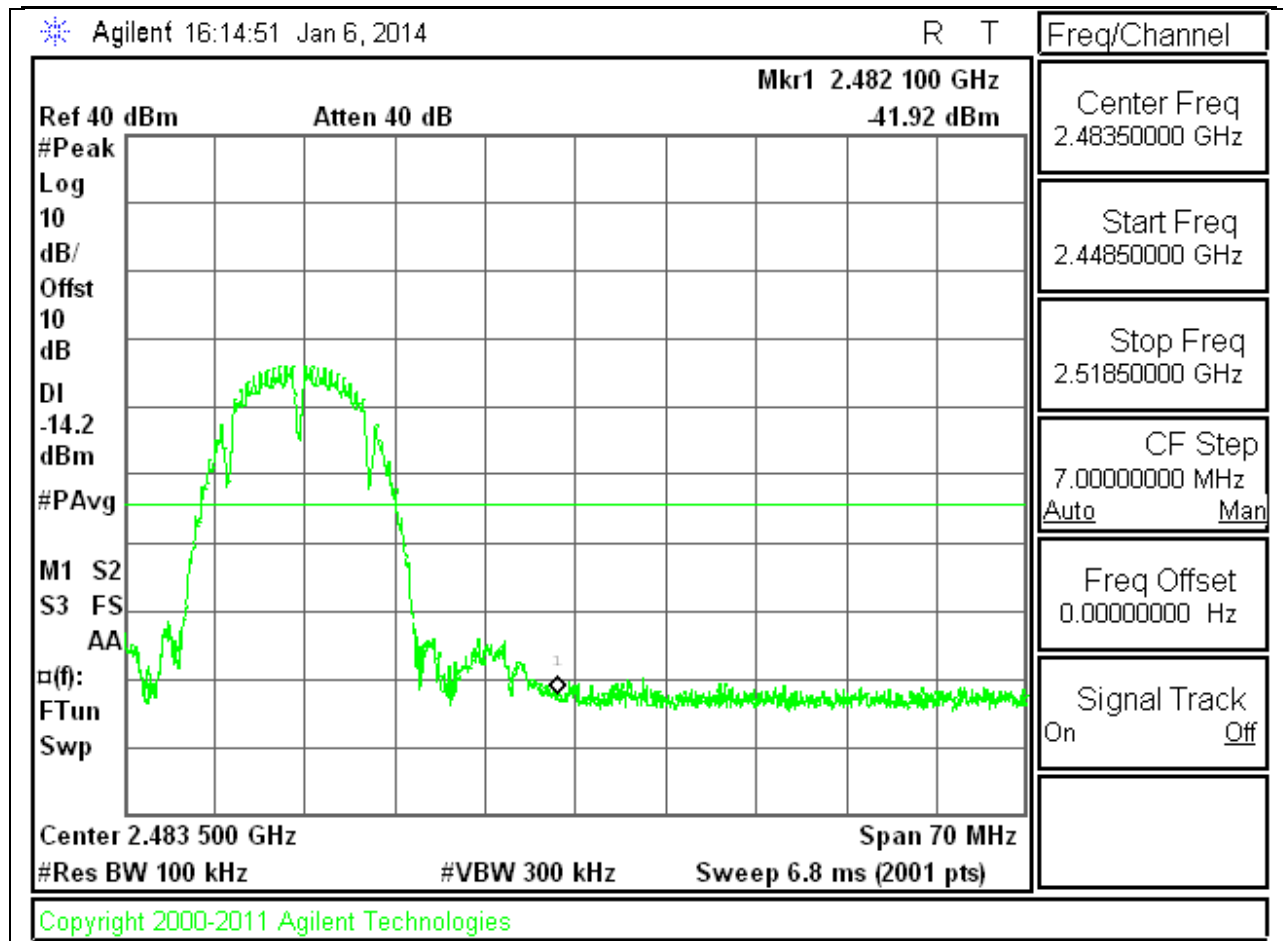
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

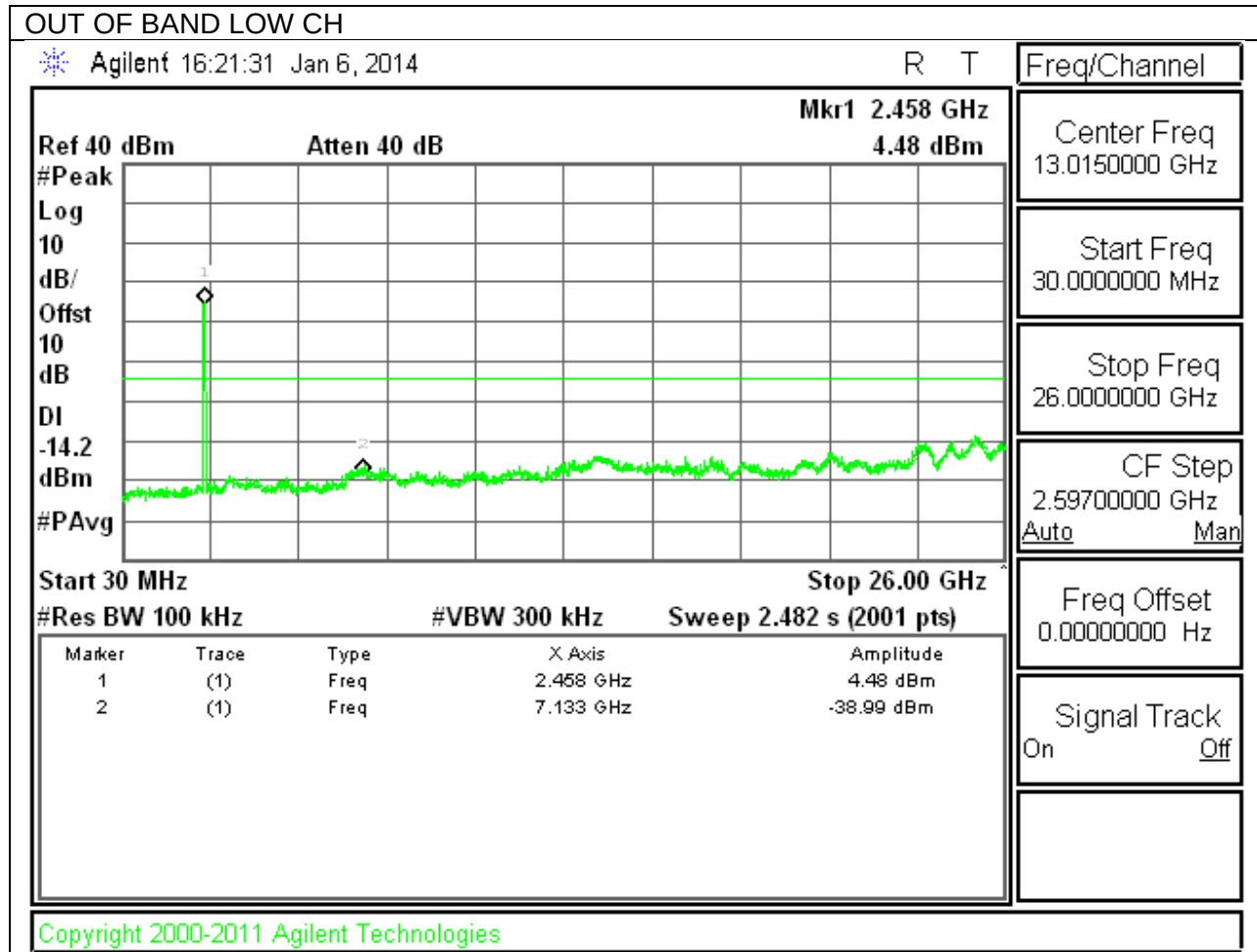
RESULTS

9.6.1. 802.11b MODE IN THE 2.4 GHz BAND

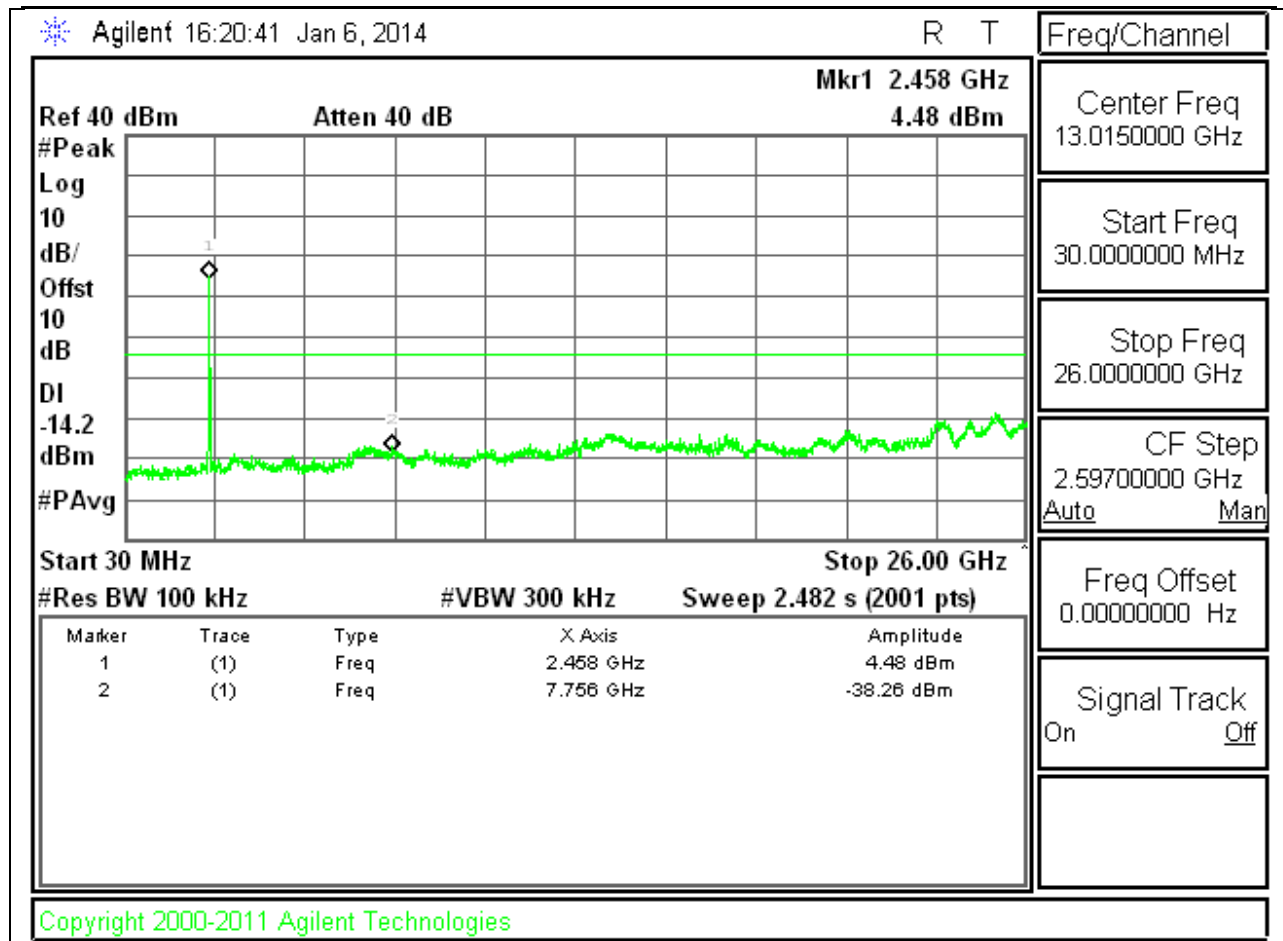
IN-BAND REFERENCE LEVEL





OUT-OF-BAND EMISSIONS

OUT OF BAND MID CH



OUT OF BAND HIGH CH

Agilent 16:19:22 Jan 6, 2014

R T

Freq/Channel

Ref 40 dBm

Atten 40 dB

Mkr1 2.458 GHz
4.48 dBm

#Peak

Log

10

dB/

Offst

10

dB

DI

-14.2

dBm

#PAvg

Start 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Stop 26.00 GHz
Sweep 2.482 s (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.458 GHz	4.48 dBm
2	(1)	Freq	7.717 GHz	-36.87 dBm

Center Freq
13.0150000 GHz

Start Freq
30.0000000 MHz

Stop Freq
26.0000000 GHz

CF Step
2.59700000 GHz
Auto Man

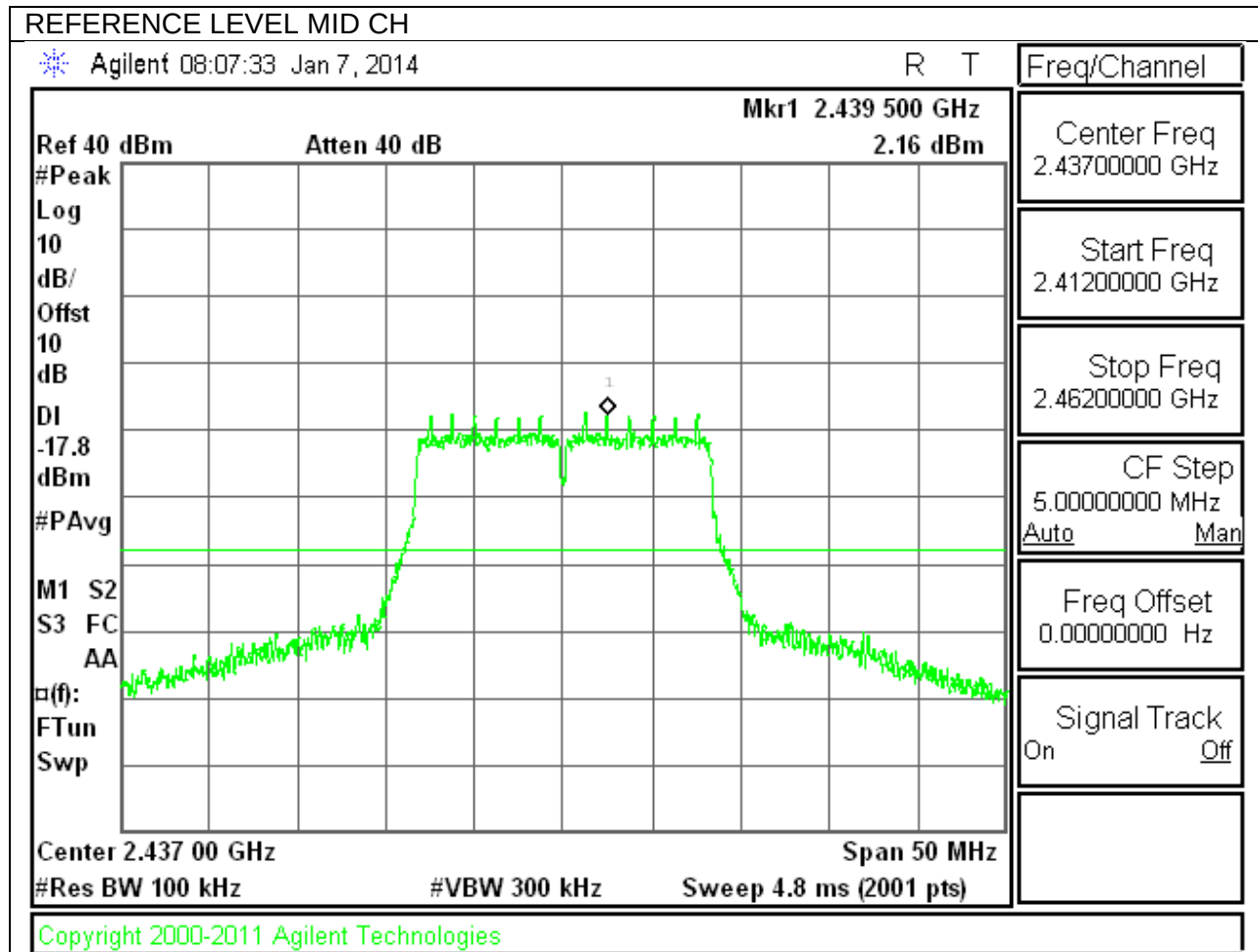
Freq Offset
0.00000000 Hz

Signal Track
On Off

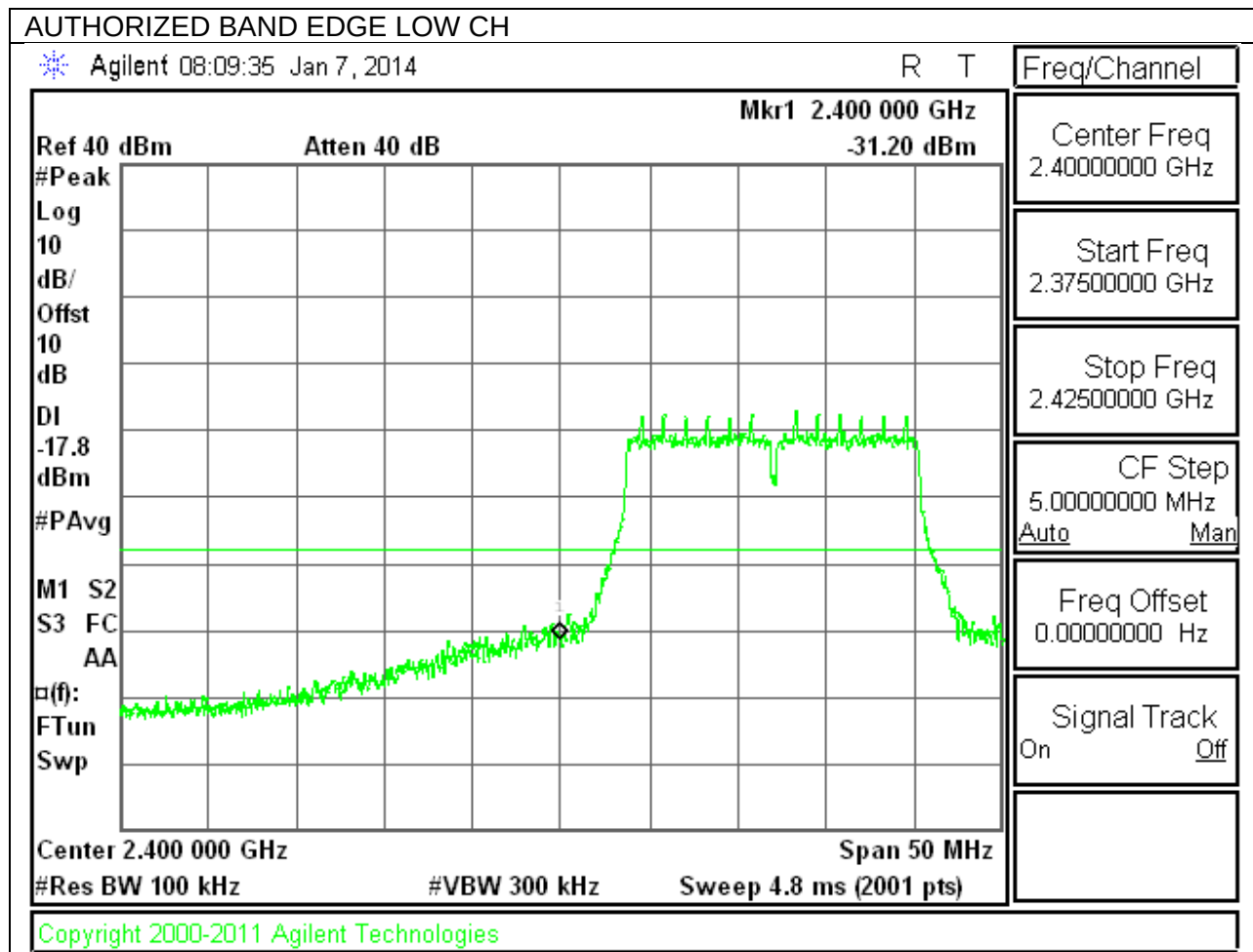
Copyright 2000-2011 Agilent Technologies

9.6.2. 802.11g MODE IN THE 2.4 GHz BAND

IN-BAND REFERENCE LEVEL

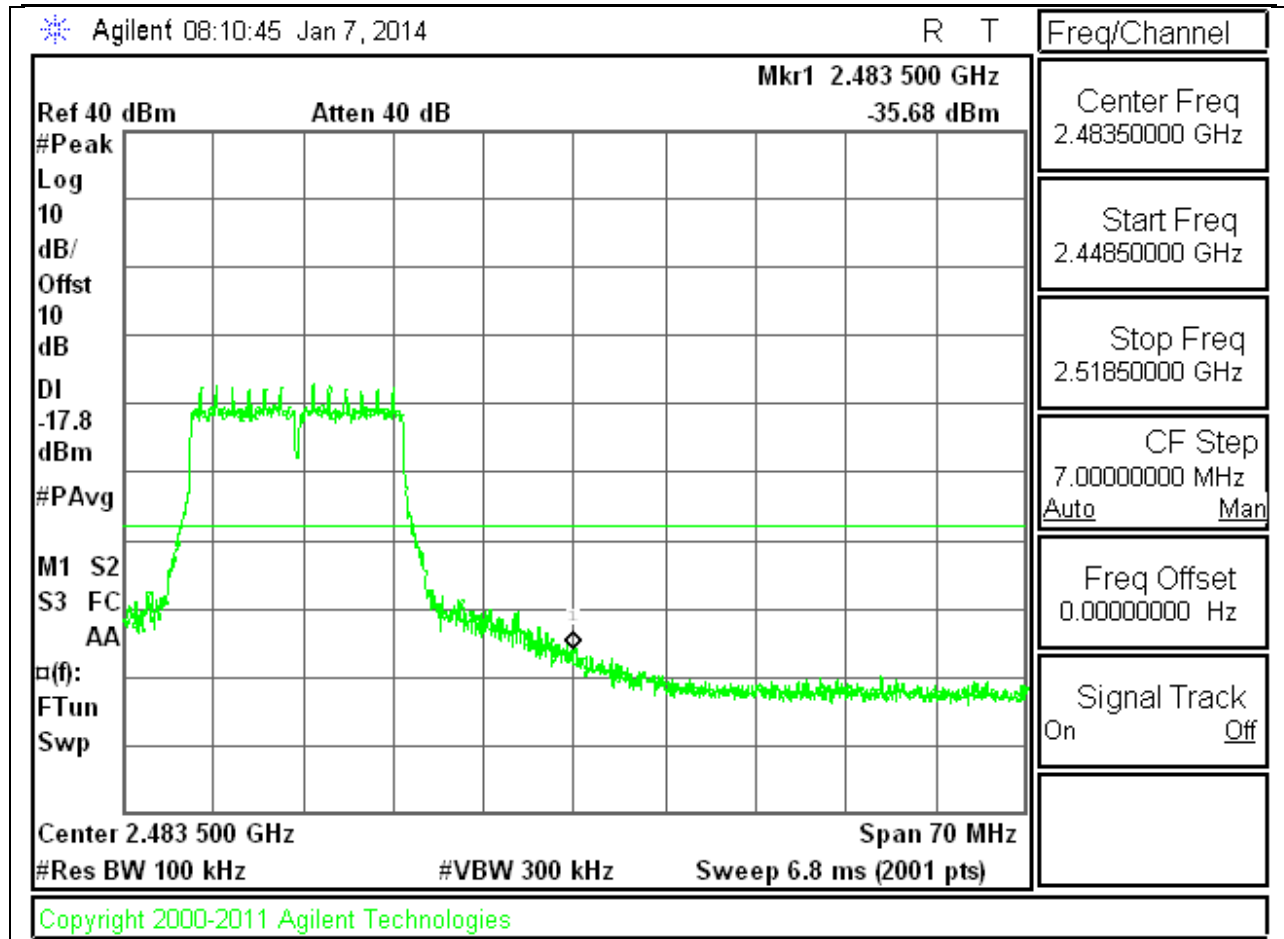


LOW CHANNEL BANDEDGE



HIGH CHANNEL BANDEDGE

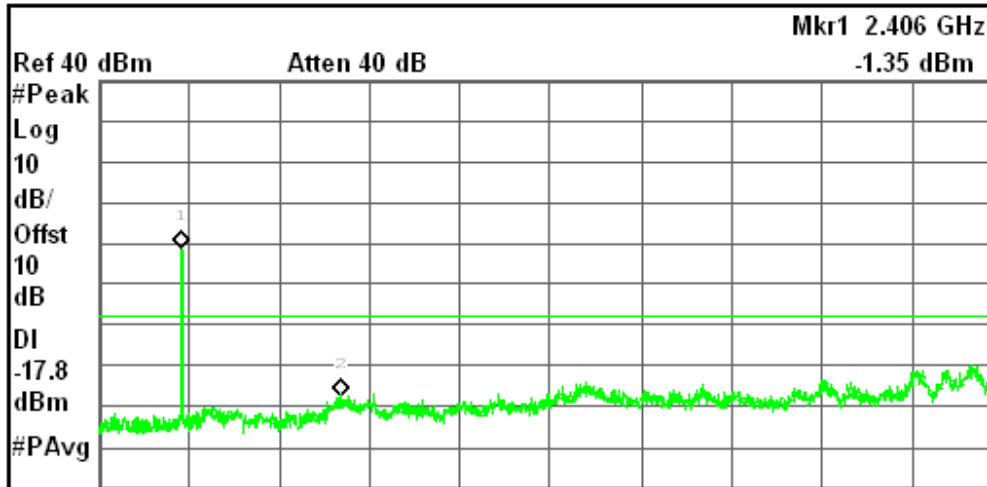
AUTHORIZED BAND EDGE HIGH CH



OUT-OF-BAND EMISSIONS**OUT OF BAND LOW CH**

* Agilent 08:16:37 Jan 7, 2014

R T



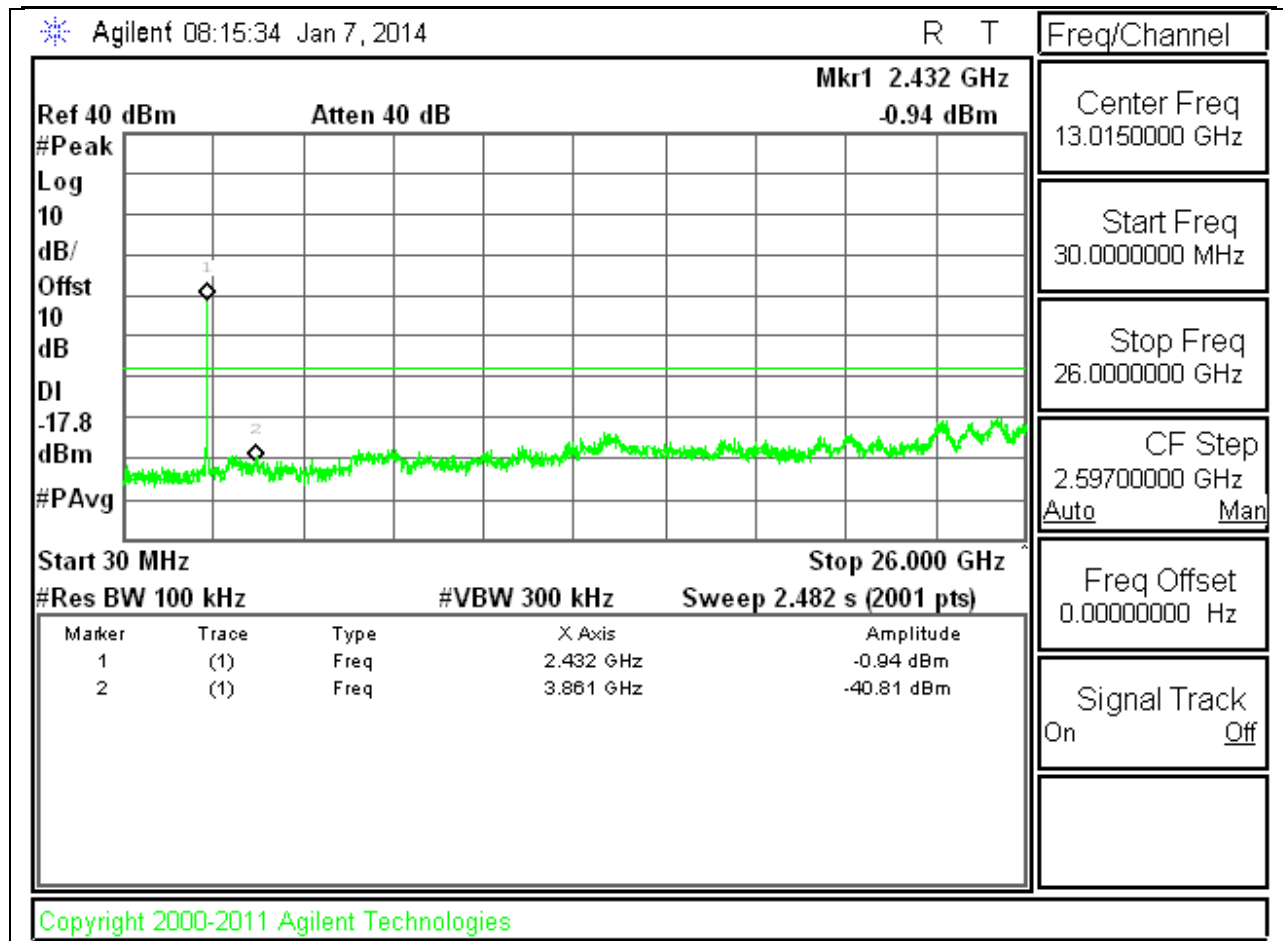
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.406 GHz	-1.35 dBm
2	(1)	Freq	6.977 GHz	-37.53 dBm

Freq/Channel

Center Freq
13.0150000 GHzStart Freq
30.0000000 MHzStop Freq
26.0000000 GHzCF Step
2.59700000 GHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

Copyright 2000-2011 Agilent Technologies

OUT OF BAND MID CH



OUT OF BAND HIGH CH

Agilent 08:14:25 Jan 7, 2014

R T

Freq/Channel

Ref 40 dBm

Atten 40 dB

Mkr1 2.458 GHz

-1.91 dBm

#Peak

Log

10

dB/

Offst

10

dB

DI

-17.8

dBm

#PAvg

Start 30 MHz

Stop 26.000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.482 s (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.458 GHz	-1.91 dBm
2	(1)	Freq	6.860 GHz	-36.50 dBm

Center Freq
13.0150000 GHz

Start Freq
30.0000000 MHz

Stop Freq
26.0000000 GHz

CF Step
2.59700000 GHz
Auto Man

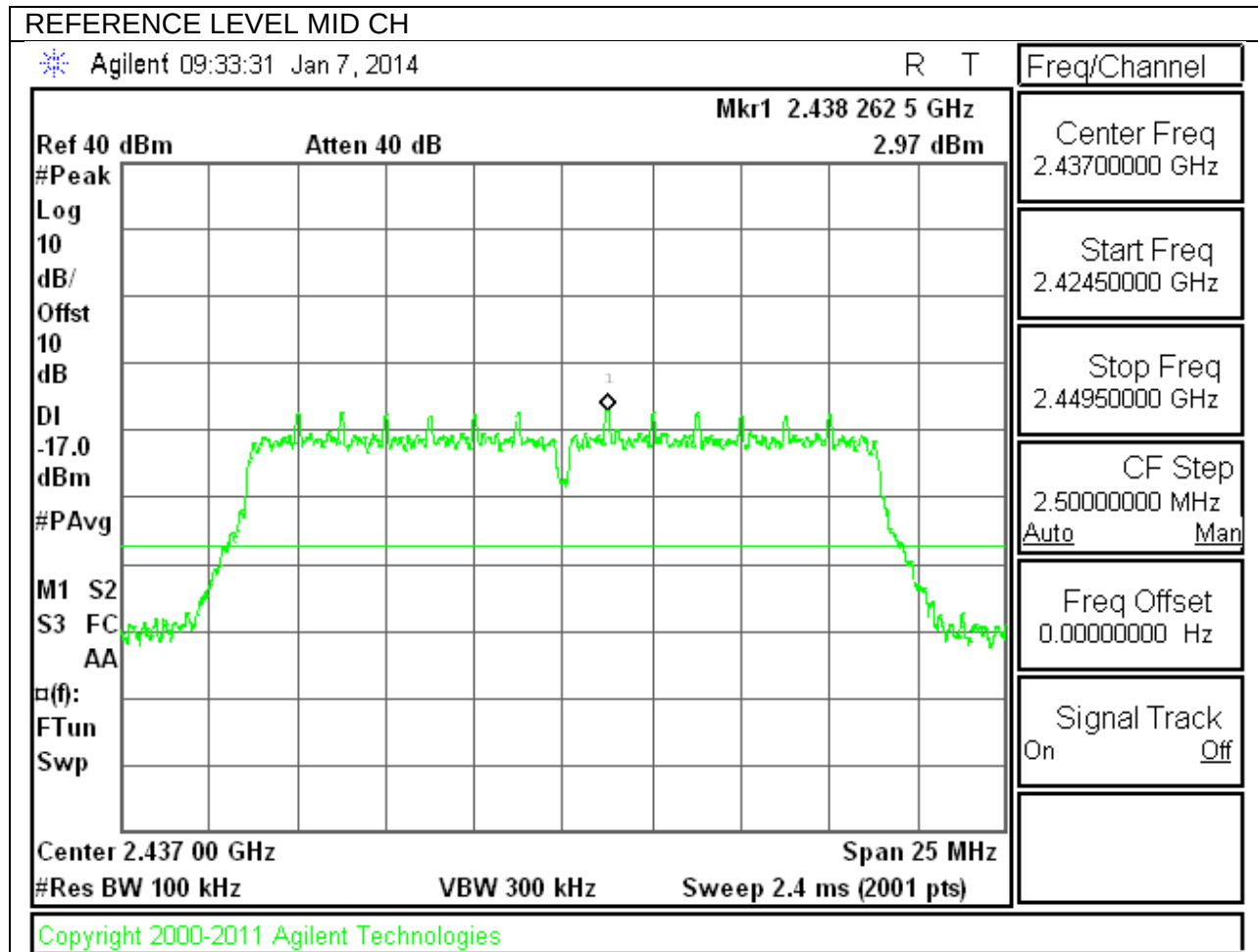
Freq Offset
0.00000000 Hz

Signal Track
On Off

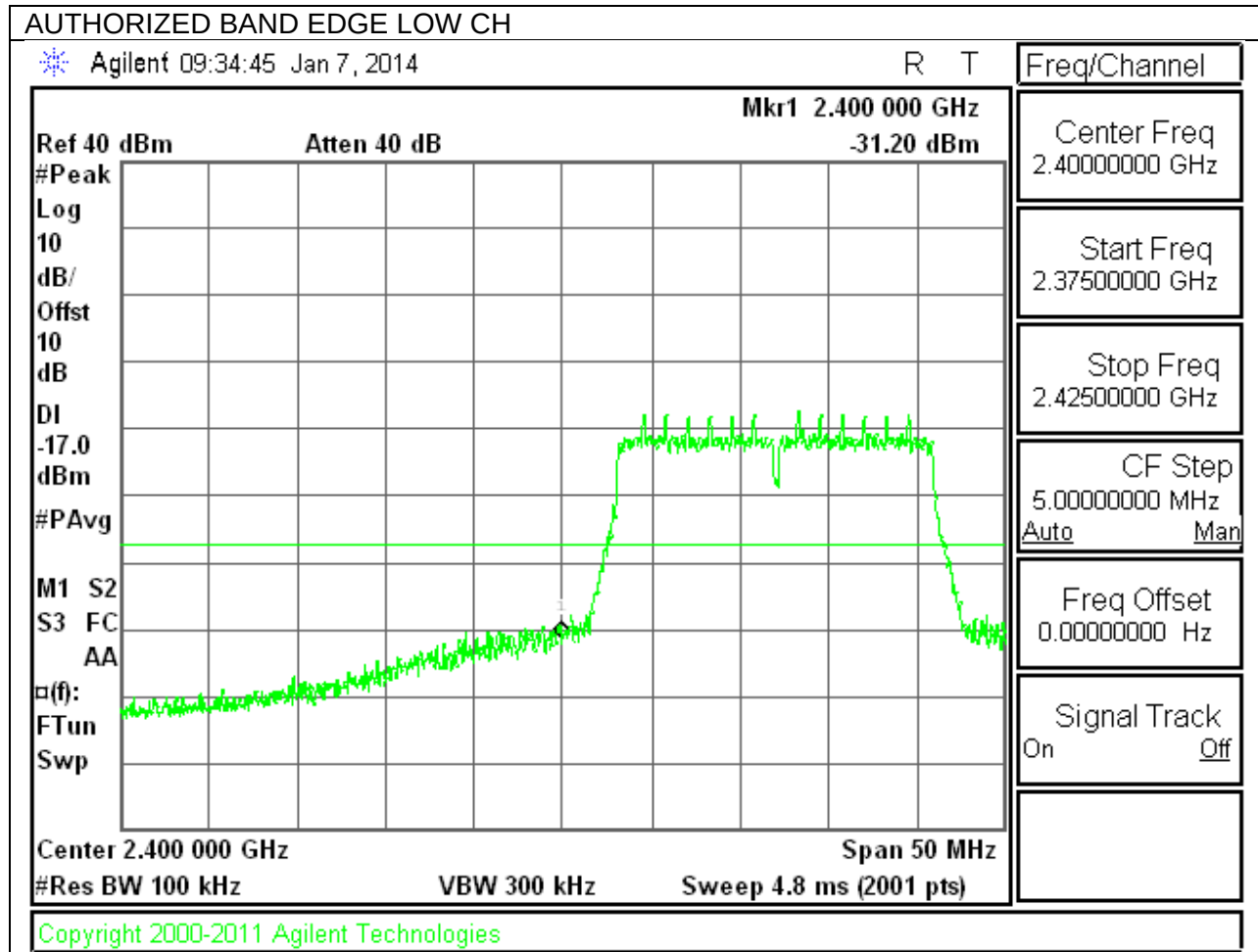
Copyright 2000-2011 Agilent Technologies

9.6.3. 802.11n MODE IN THE 2.4 GHz BAND

IN-BAND REFERENCE LEVEL

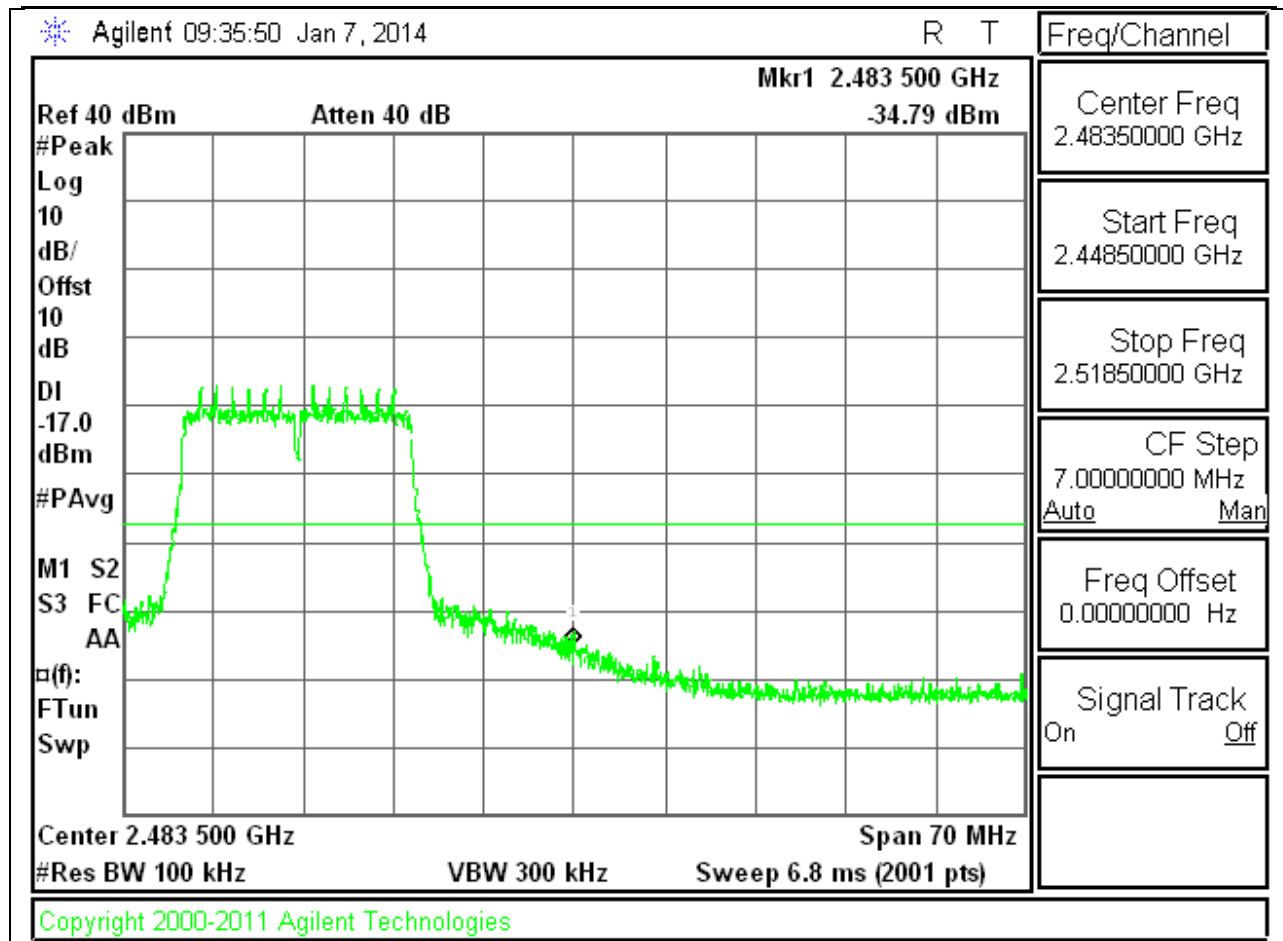


LOW CHANNEL BANDEDGE



HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH



OUT-OF-BAND EMISSIONS

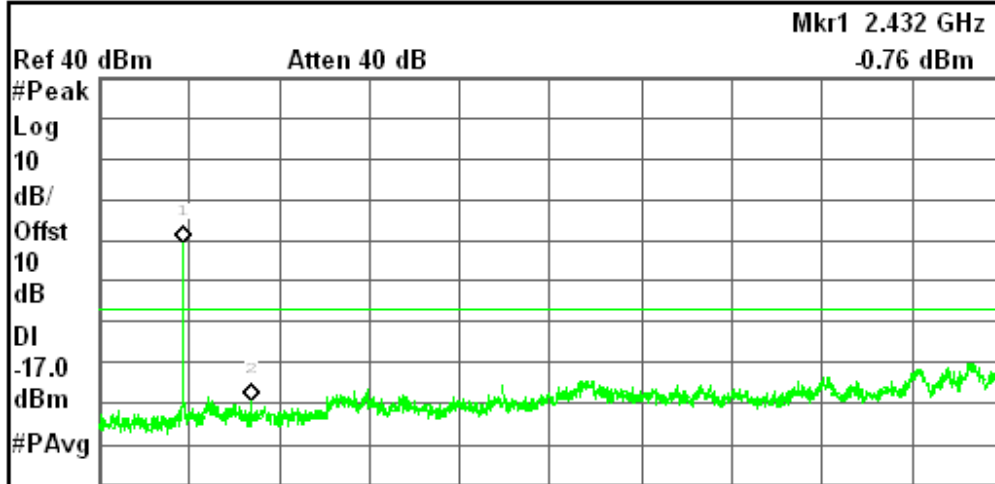
OUT OF BAND LOW CH

OUT OF BAND MID CH

Agilent 09:41:22 Jan 7, 2014

R T

Freq/Channel



Center Freq
13.0150000 GHz

Start Freq
30.0000000 MHz

Stop Freq
26.0000000 GHz

CF Step
2.59700000 GHz
Auto Man

Start 30 MHz Stop 26.000 GHz
#Res BW 100 kHz VBW 300 kHz Sweep 2.482 s (2001 pts)

Freq Offset
0.00000000 Hz

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.432 GHz	-0.76 dBm
2	(1)	Freq	4.419 GHz	-39.64 dBm

Signal Track
On Off

Copyright 2000-2011 Agilent Technologies

OUT OF BAND HIGH CH

Agilent 09:38:18 Jan 7, 2014

R T

Freq/Channel

Ref 40 dBm

Atten 40 dB

Mkr1 2.458 GHz

-1.14 dBm

#Peak

Log

10

dB/

Offst

10

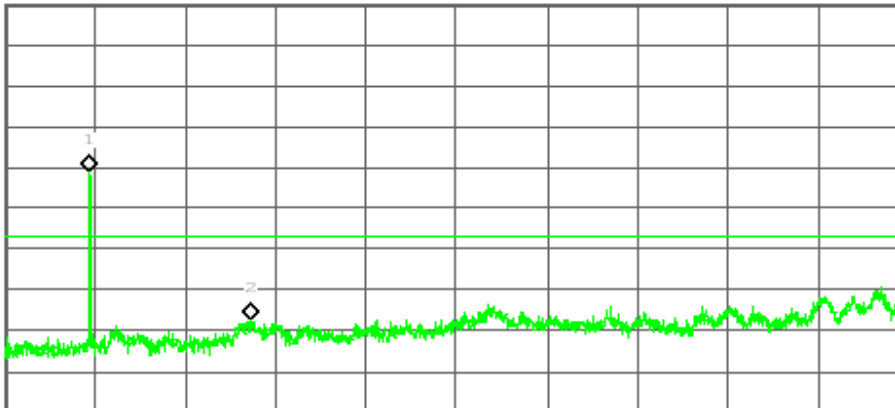
dB

DI

-17.0

dBm

#PAvg



Start 30 MHz

Stop 26.000 GHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 2.482 s (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.458 GHz	-1.14 dBm
2	(1)	Freq	7.107 GHz	-37.64 dBm

Center Freq
13.0150000 GHz

Start Freq
30.0000000 MHz

Stop Freq
26.0000000 GHz

CF Step
2.59700000 GHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

Copyright 2000-2011 Agilent Technologies

10. RADIATED TEST RESULTS

10.1. 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.

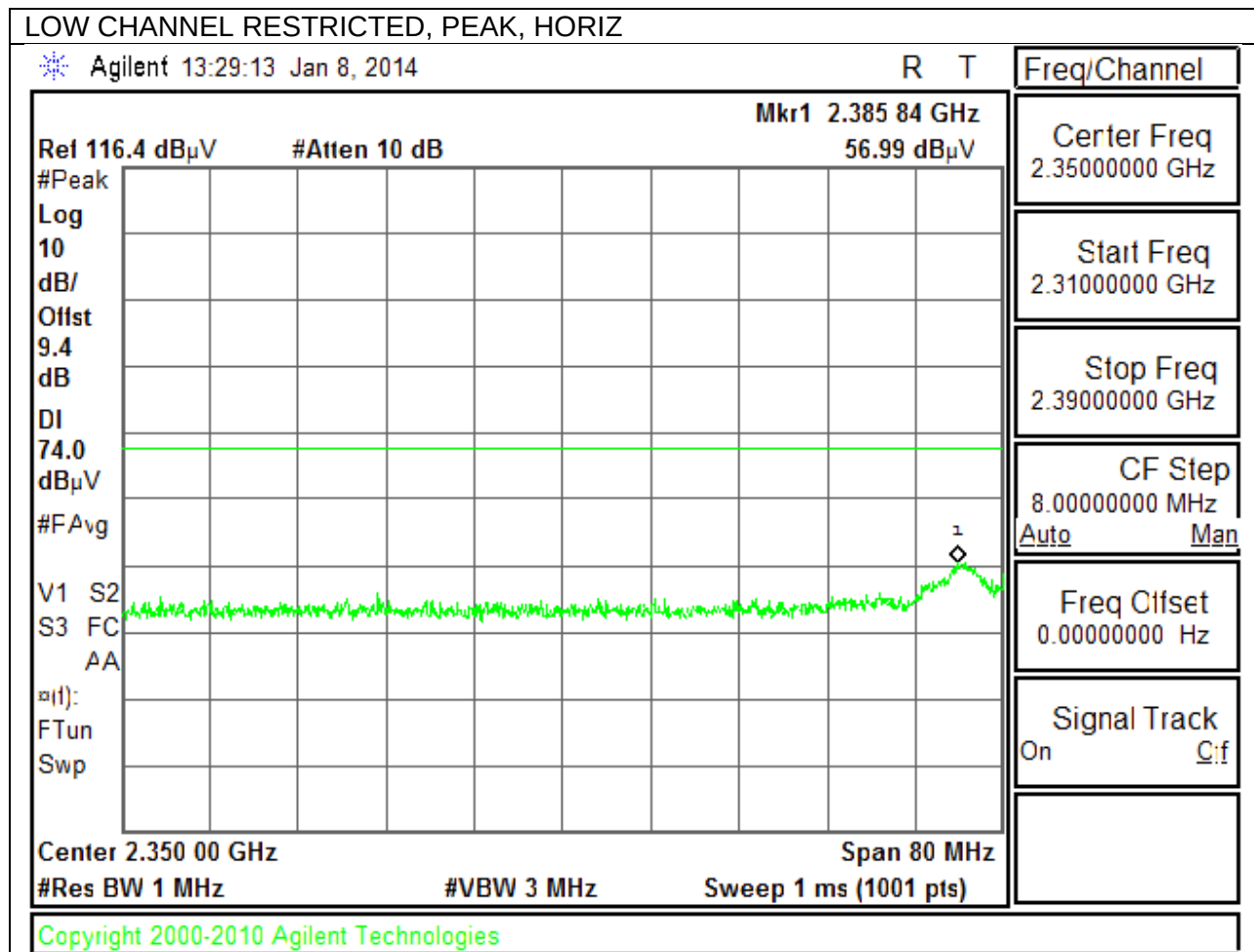
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor= $10\log(1/x)$ For this sample B mode = 0dB (duty cycle >98%); G mode = 0.2dB; N mode = 0.2dB.

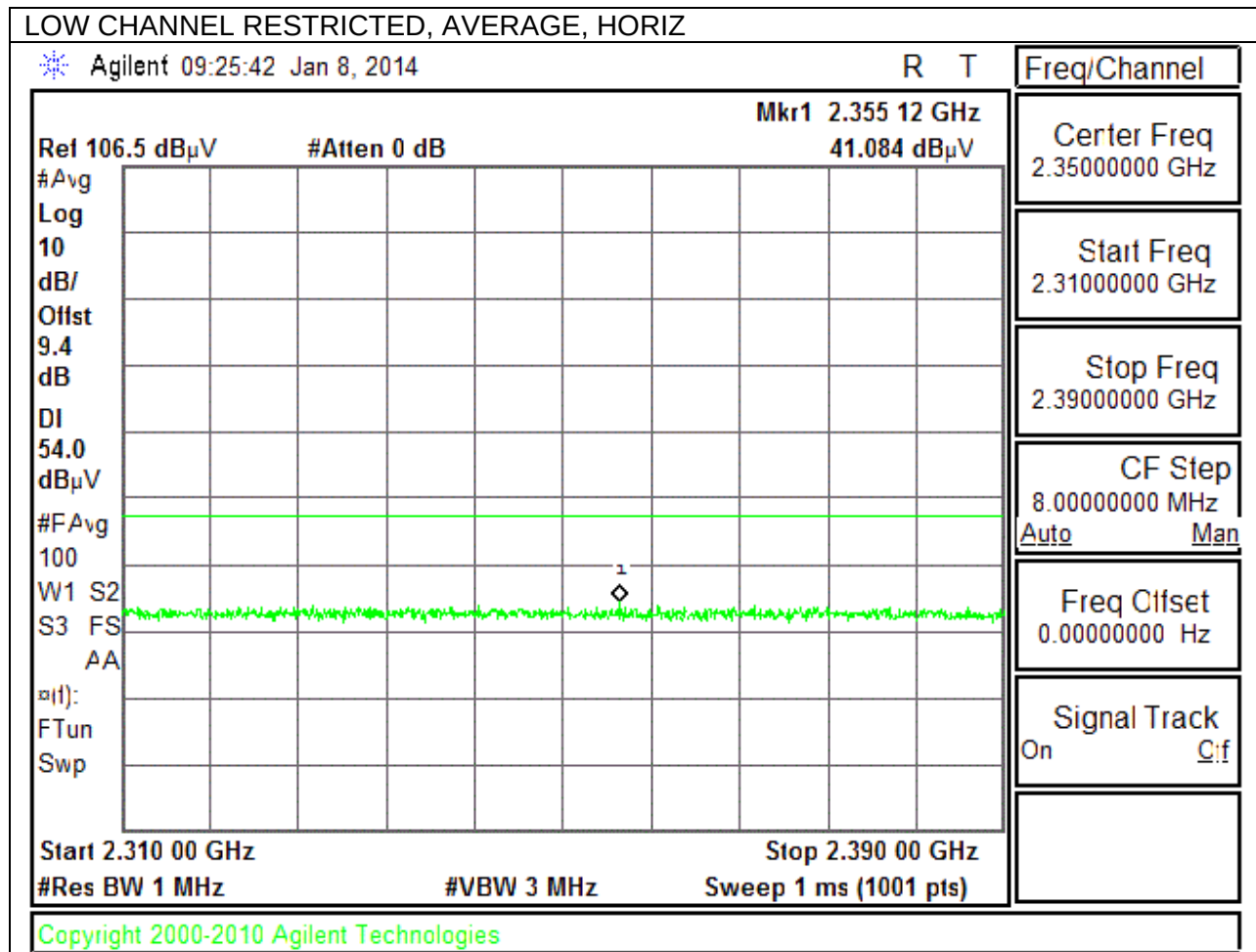
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

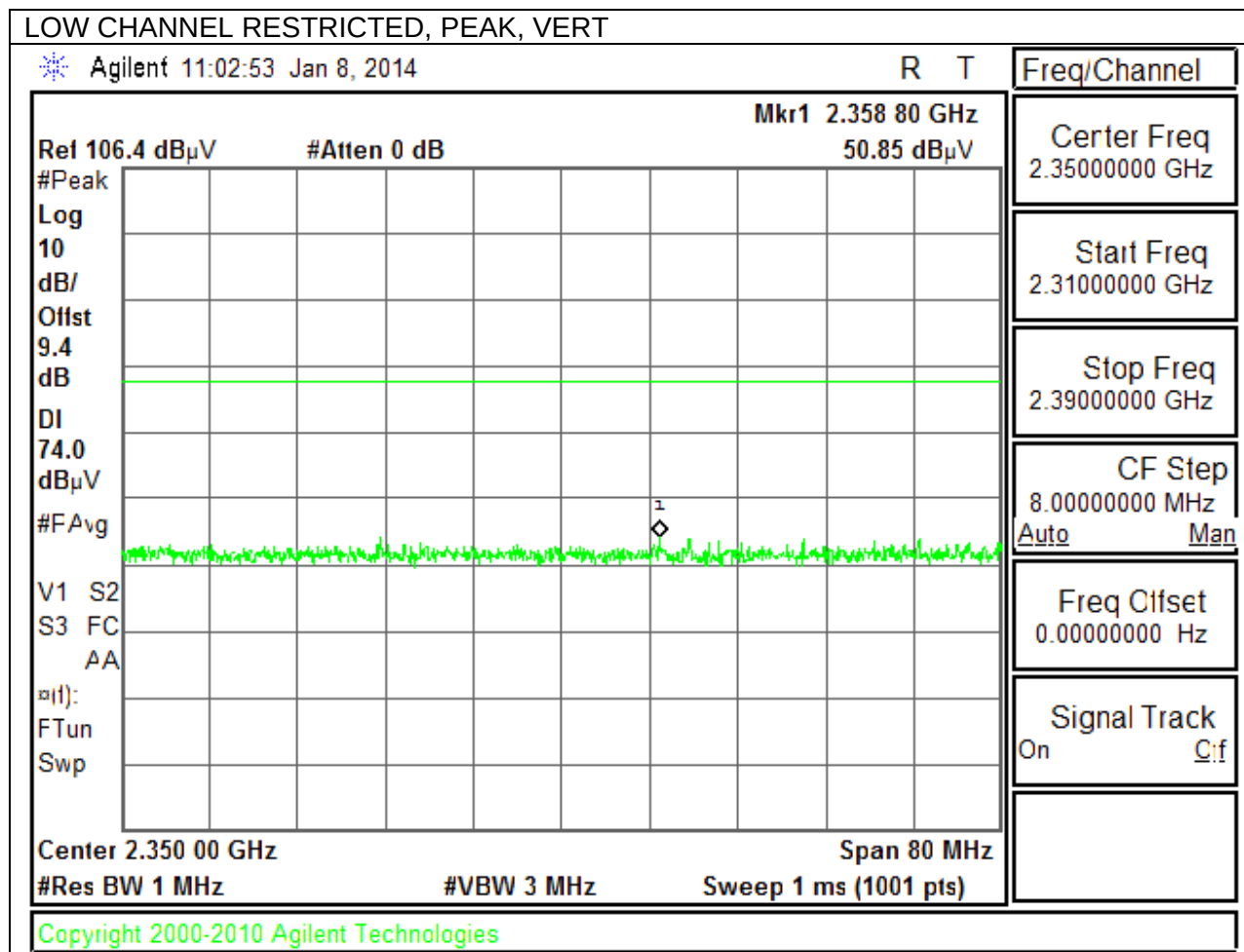
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

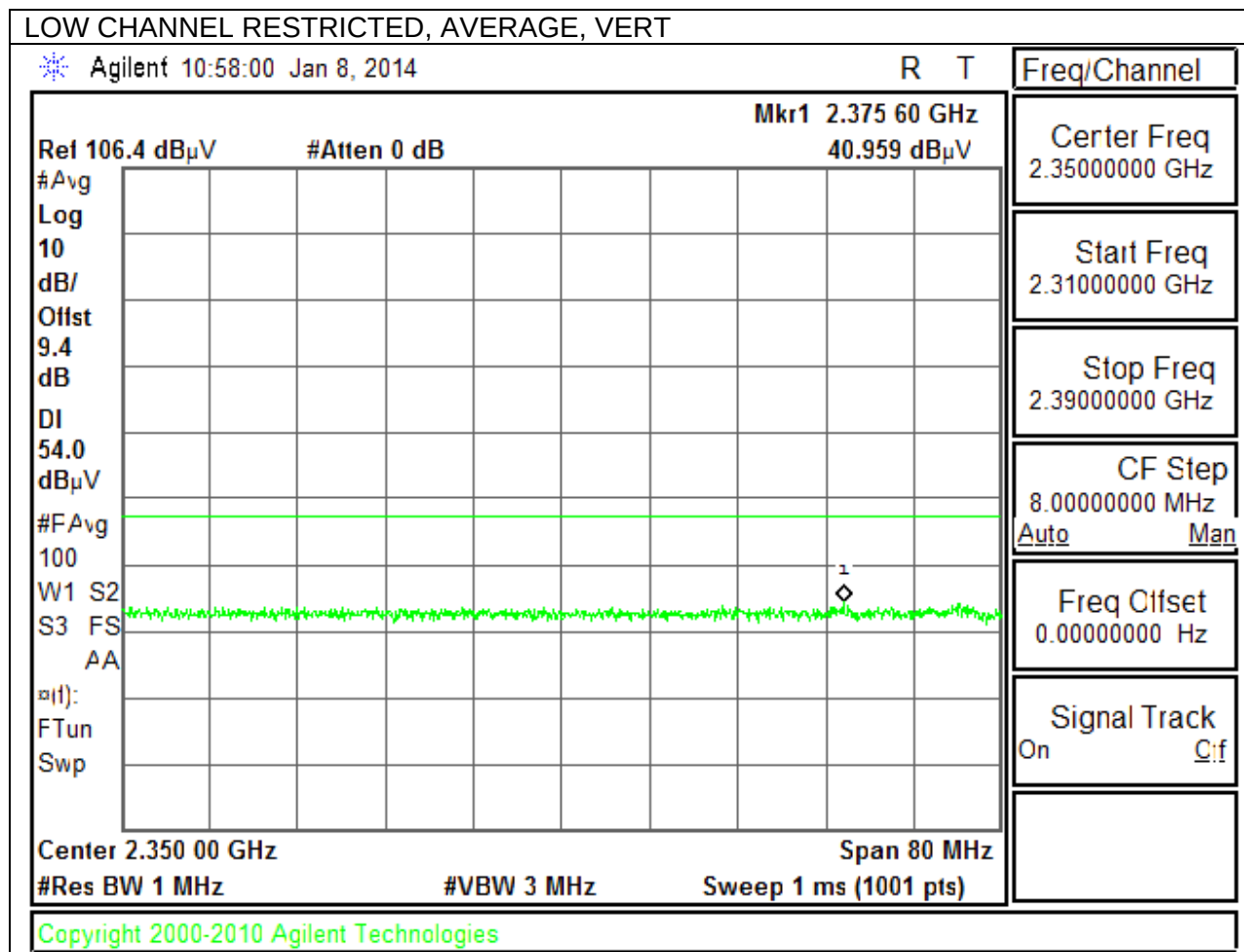
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

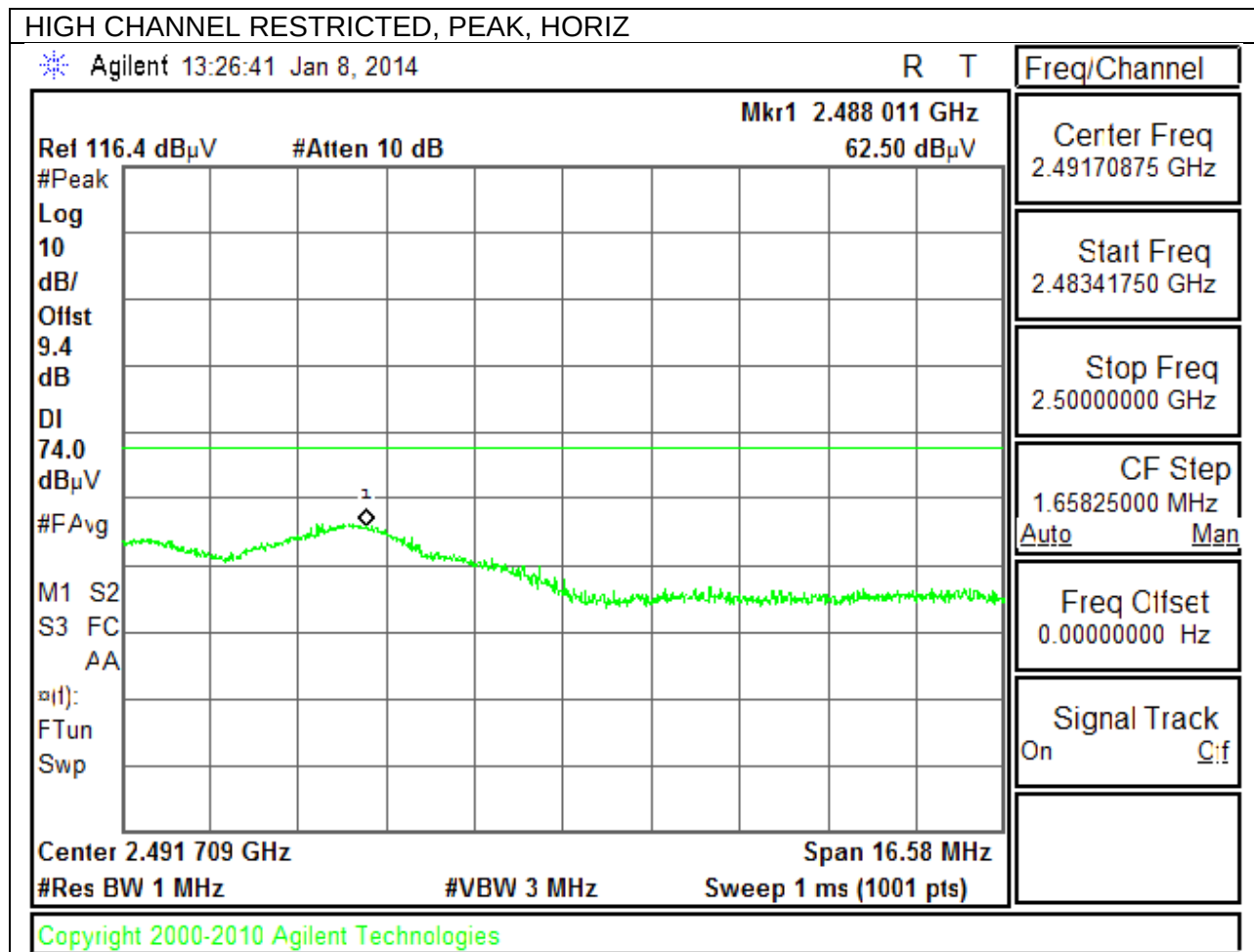


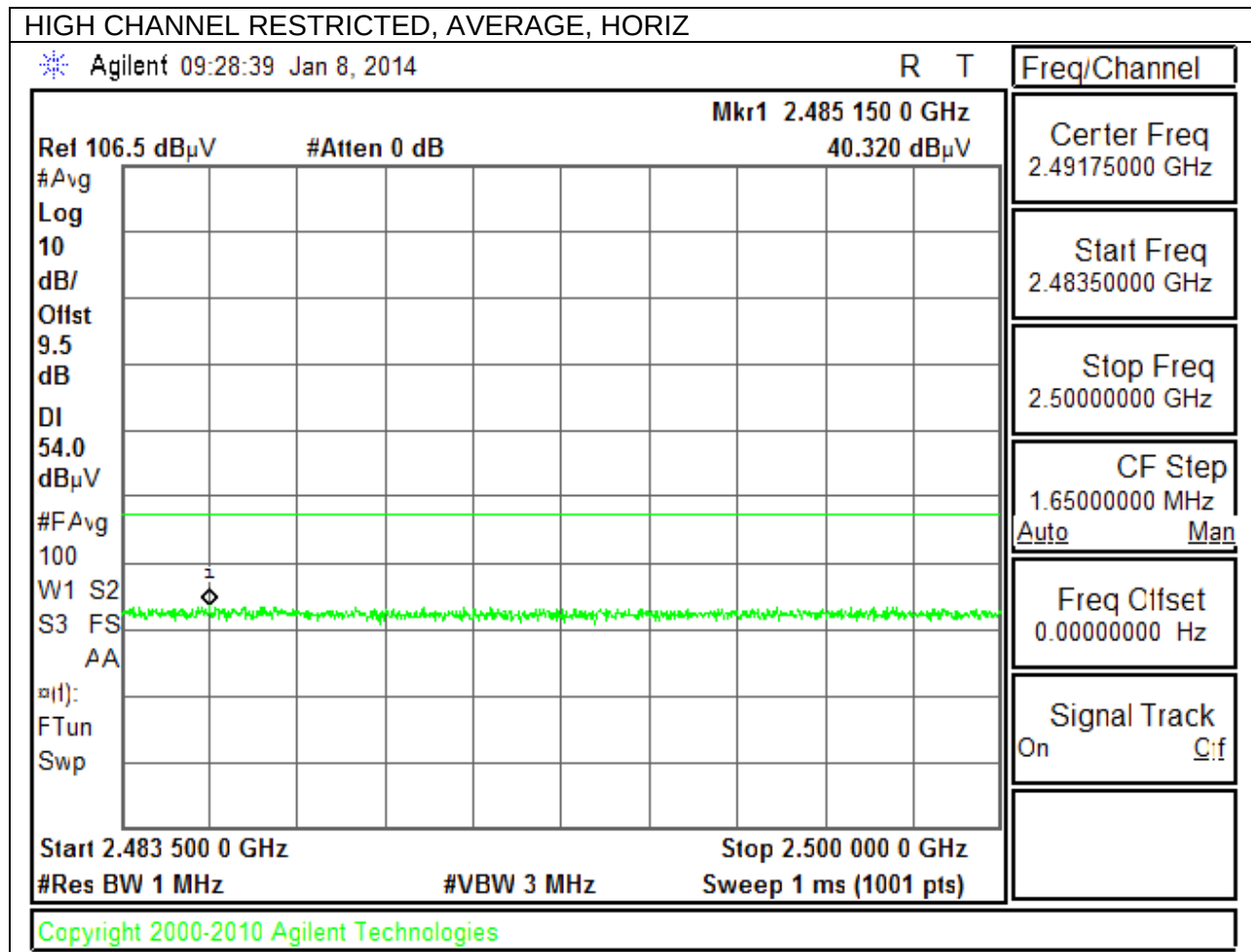


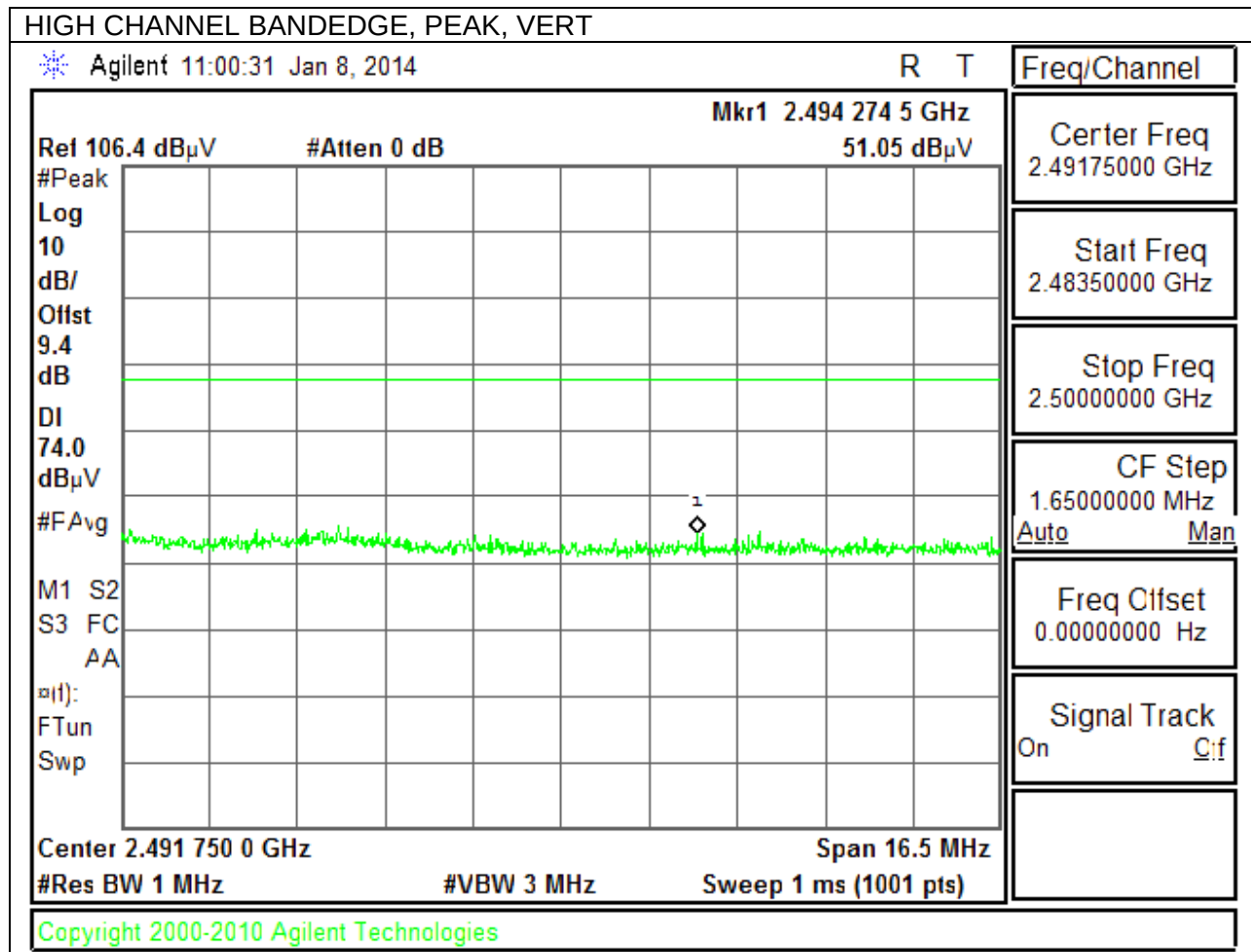


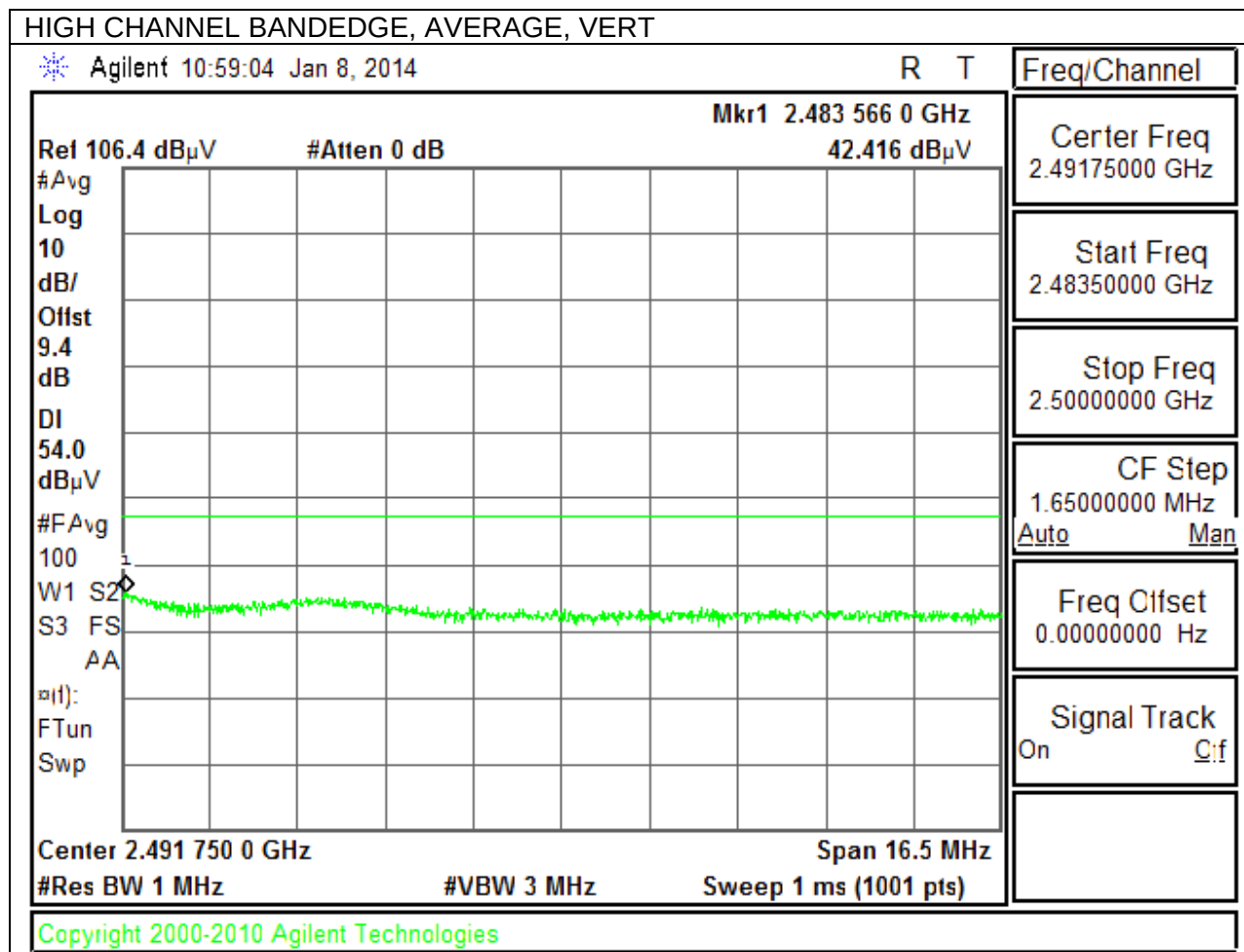


AUTHORIZED BANDEDGE (HIGH CHANNEL)



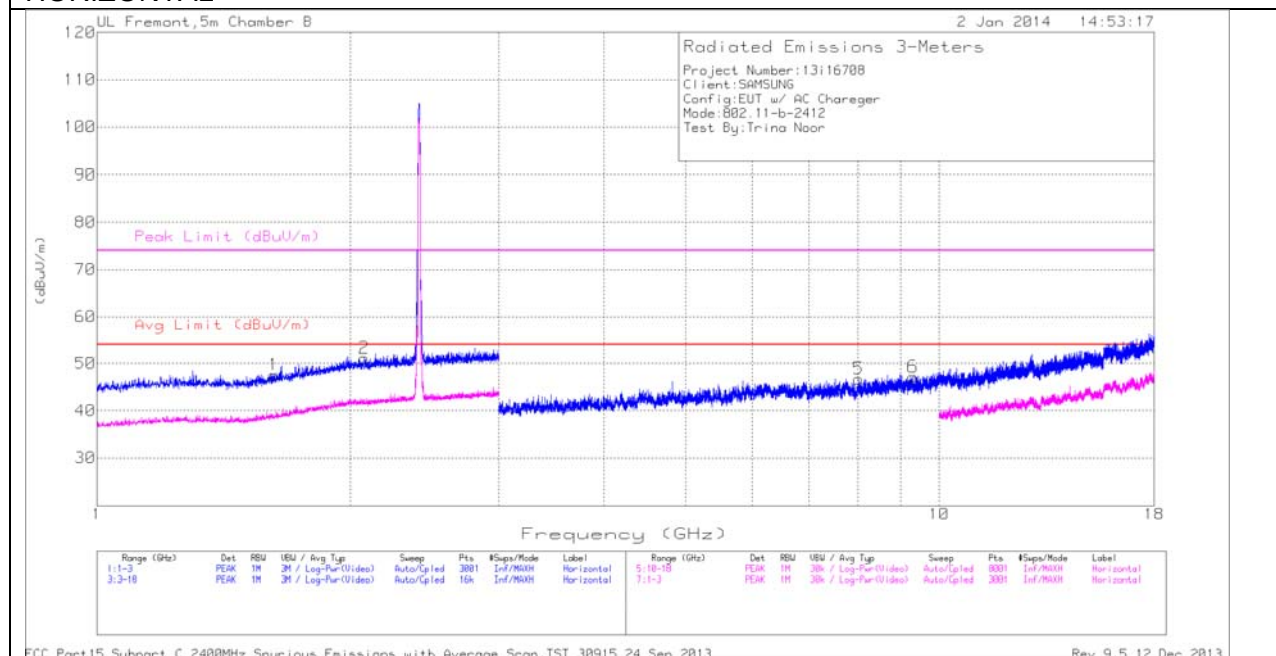






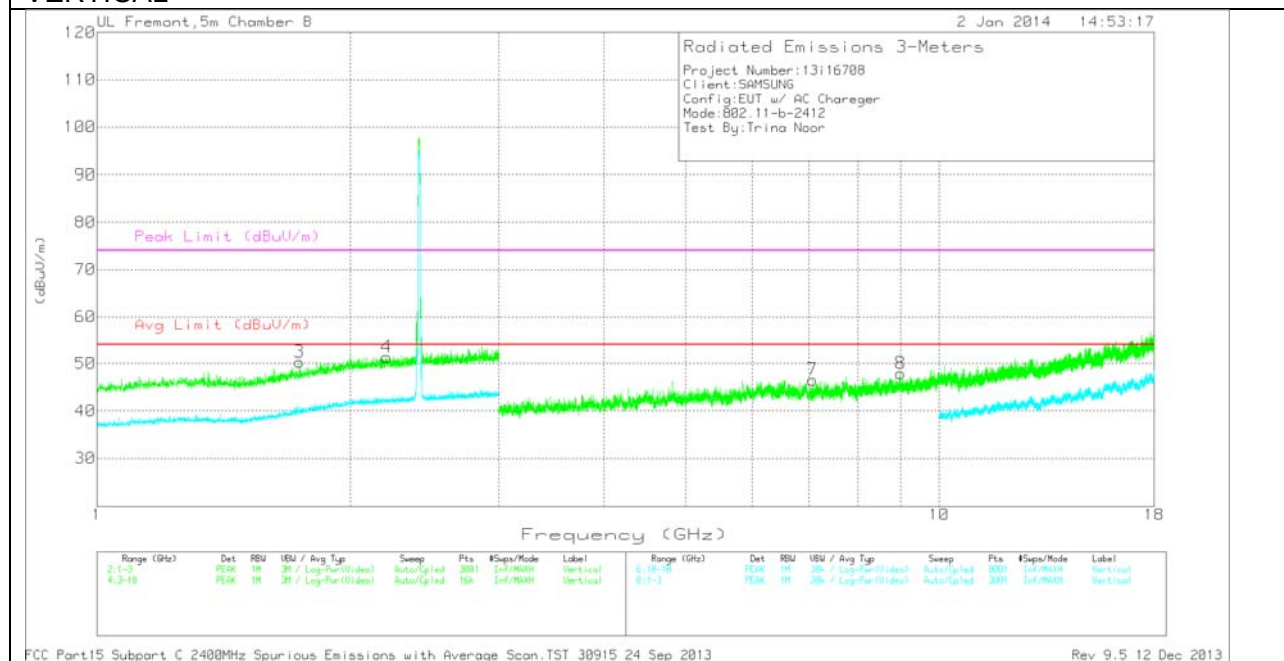
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

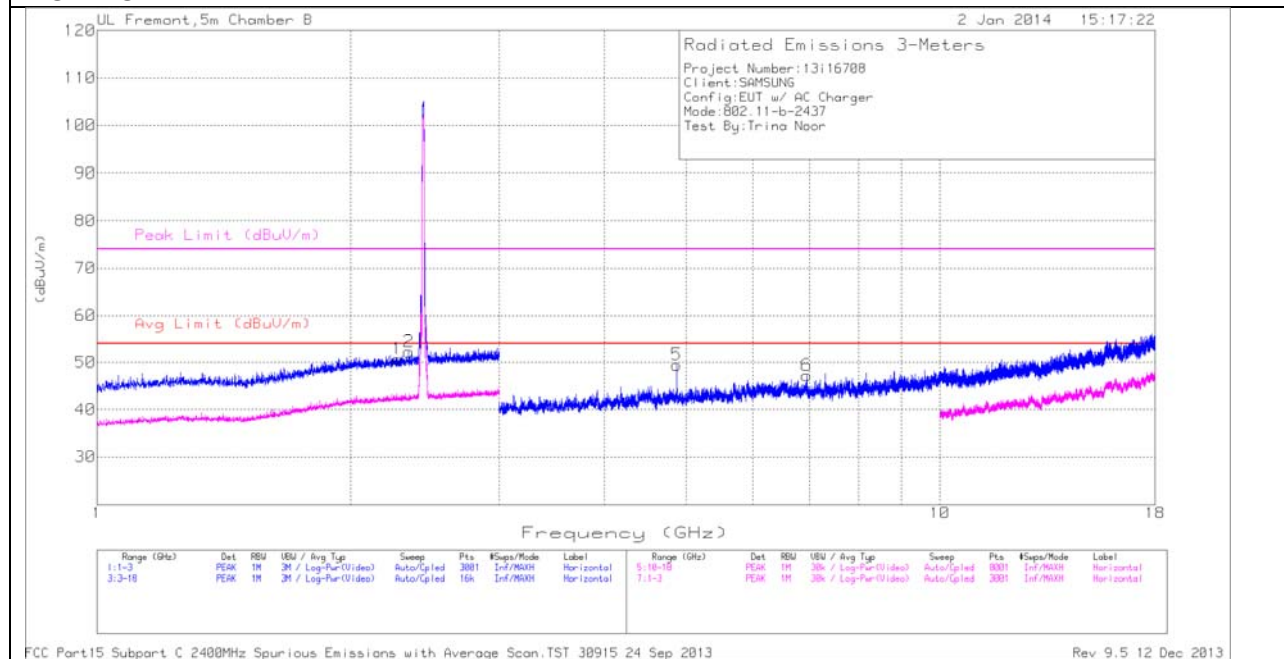
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.622	42.42	PK	29.1	-24	47.52	53.97	-6.45	74	-26.48	0-360	99	H
3	1.739	44.09	PK	30	-23.8	50.29	53.97	-3.68	74	-23.71	0-360	99	V
2	2.077	42.59	PK	31.9	-23.4	51.09	53.97	-2.88	74	-22.91	0-360	201	H
4	2.207	42.52	PK	32	-23.2	51.32	53.97	-2.65	74	-22.68	0-360	202	V
7	7.075	38.32	PK	35.9	-27.7	46.52	53.97	-7.45	74	-27.48	0-360	99	V
5	8.018	37.4	PK	36.1	-26.8	46.7	53.97	-7.27	74	-27.3	0-360	202	H
8	9	35.96	PK	36.8	-24.9	47.86	53.97	-6.11	74	-26.14	0-360	99	V
6	9.305	34.8	PK	37	-24.7	47.1	53.97	-6.87	74	-26.9	0-360	99	H

PK - Peak detector

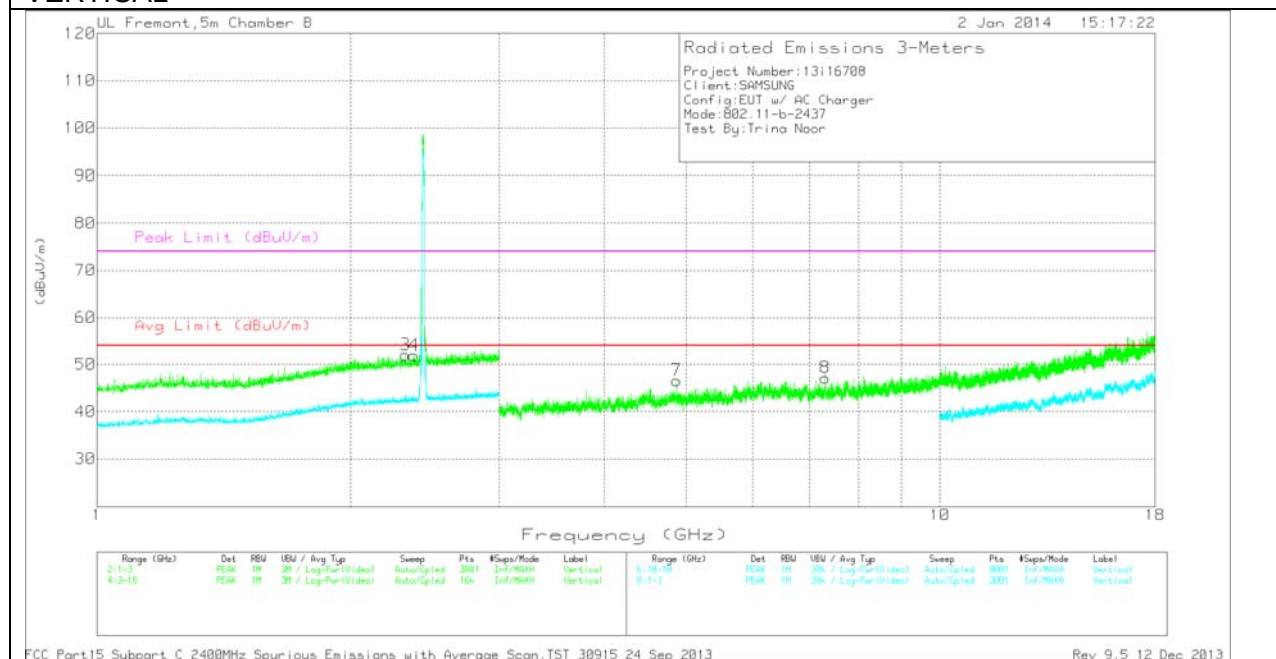
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 12 Dec 2013

MID CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

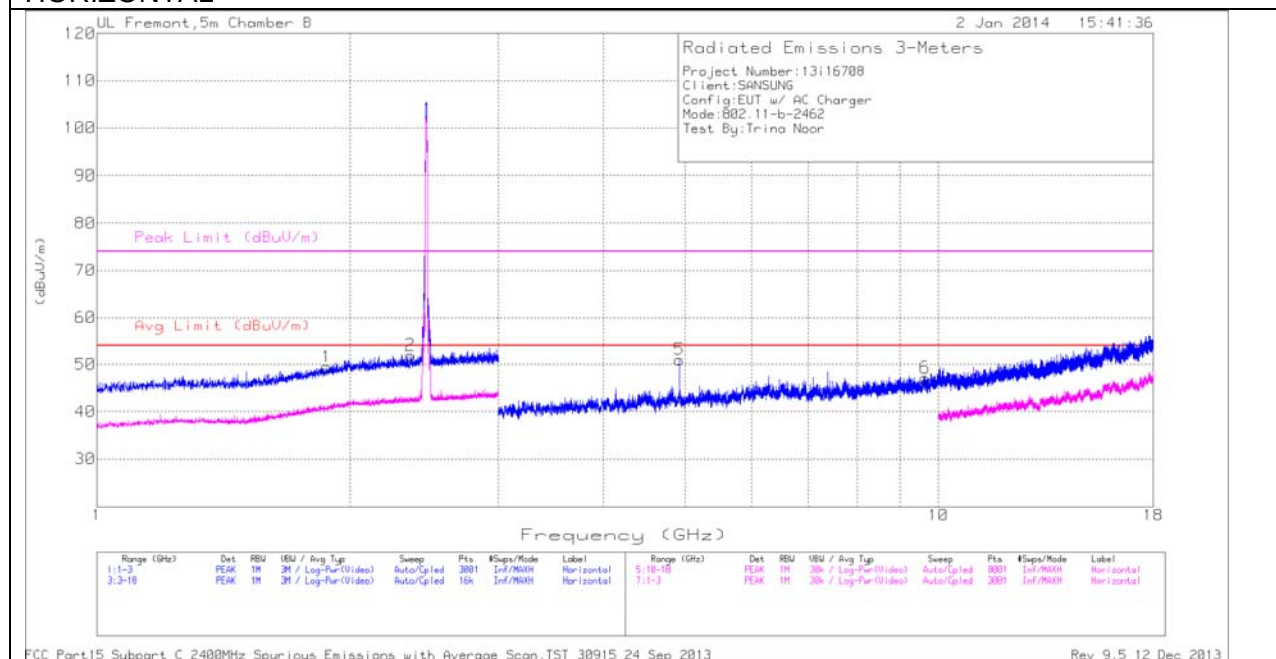
MID CHANNEL DATA
Trace Markers

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Ampl/Cbl/ Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.271	41.72	PK	32.1	-23.1	50.72	53.97	-3.25	74	-23.28	0-360	202	H
3	2.321	42.76	PK	32.2	-23	51.96	53.97	-2.01	74	-22.04	0-360	202	V
2	2.343	43.01	PK	32.2	-23	52.21	53.97	-1.76	74	-21.79	0-360	202	H
4	2.377	42.45	PK	32.3	-22.9	51.85	53.97	-2.12	74	-22.15	0-360	99	V
5	4.874	45.35	PK	34.7	-30.6	49.45	53.97	-4.52	74	-24.55	0-360	201	H
7	4.874	42.44	PK	34.7	-30.6	46.54	53.97	-7.43	74	-27.46	0-360	202	V
6	6.95	39.21	PK	35.9	-27.9	47.21	53.97	-6.76	74	-26.79	0-360	99	H
8	7.312	39.04	PK	35.8	-27.7	47.14	53.97	-6.83	74	-26.86	0-360	99	V

PK - Peak detector

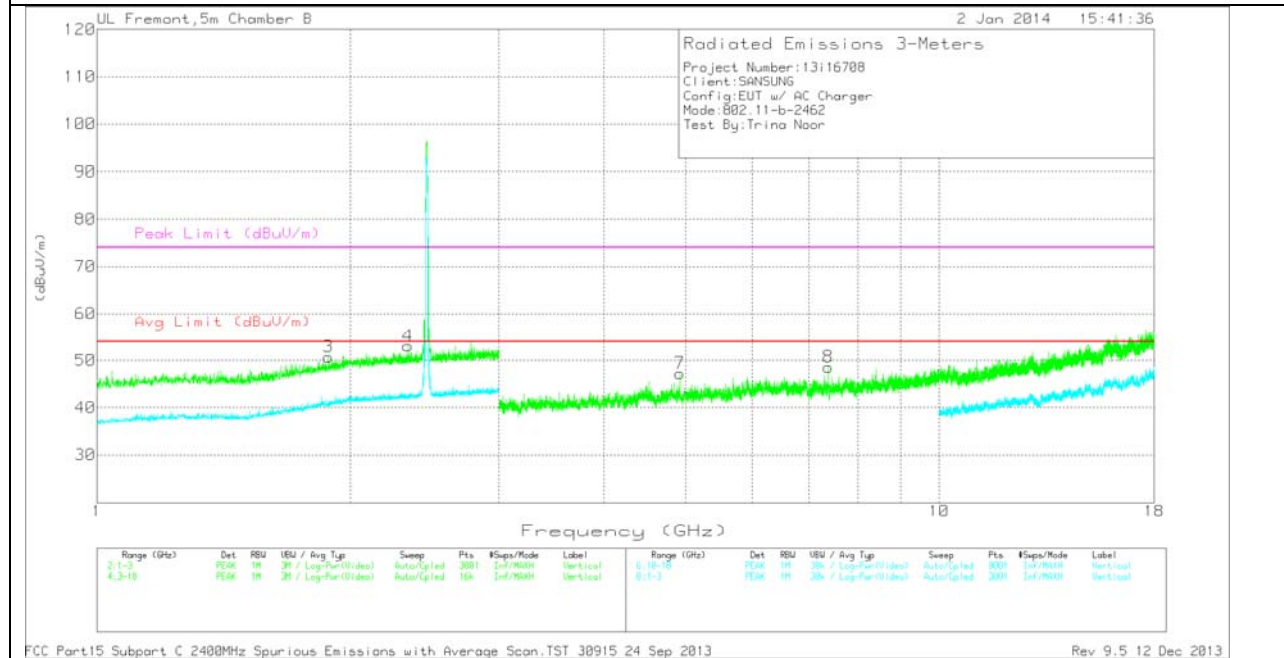
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep
2013 Rev 9.5 12 Dec 2013

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

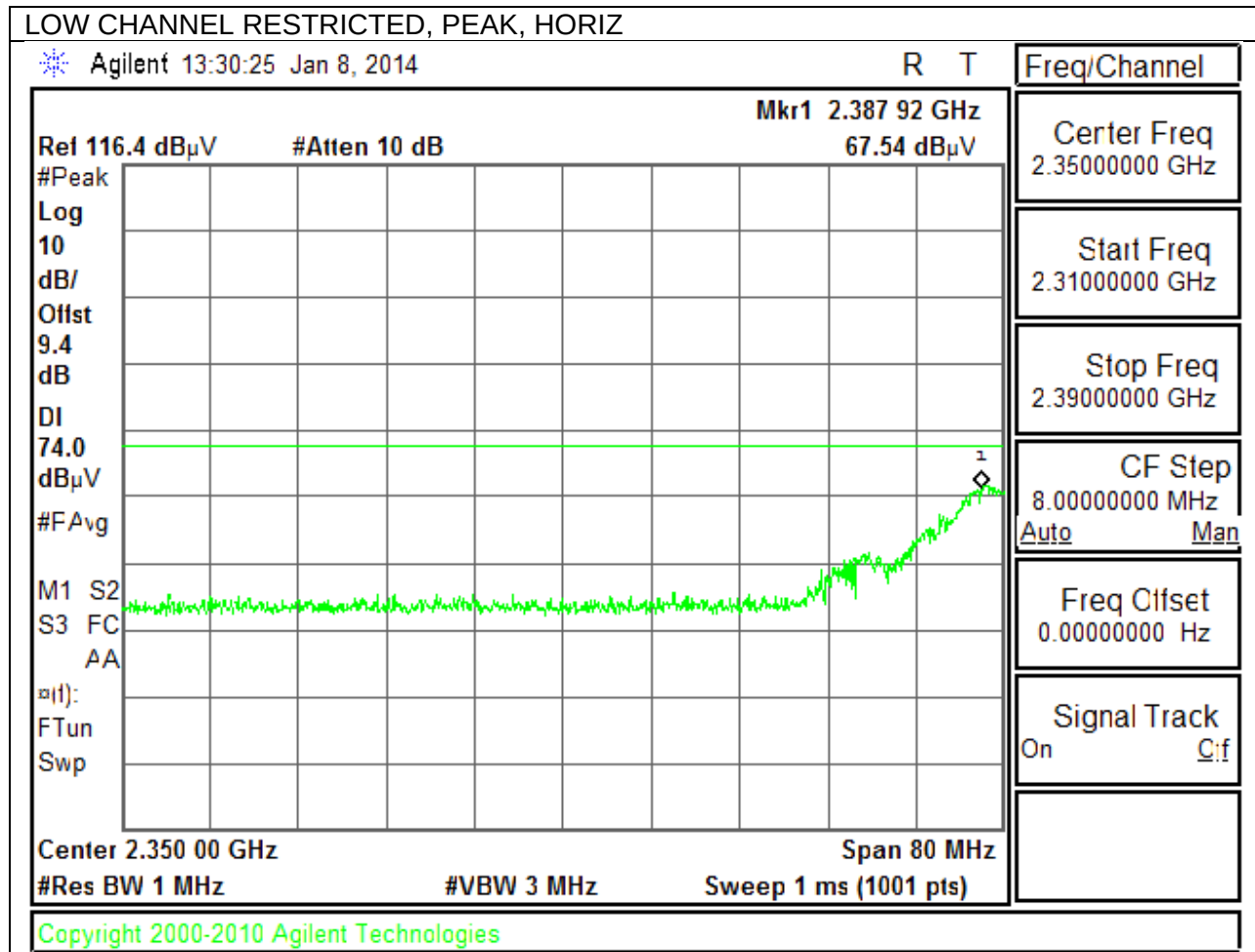
Trace Markers

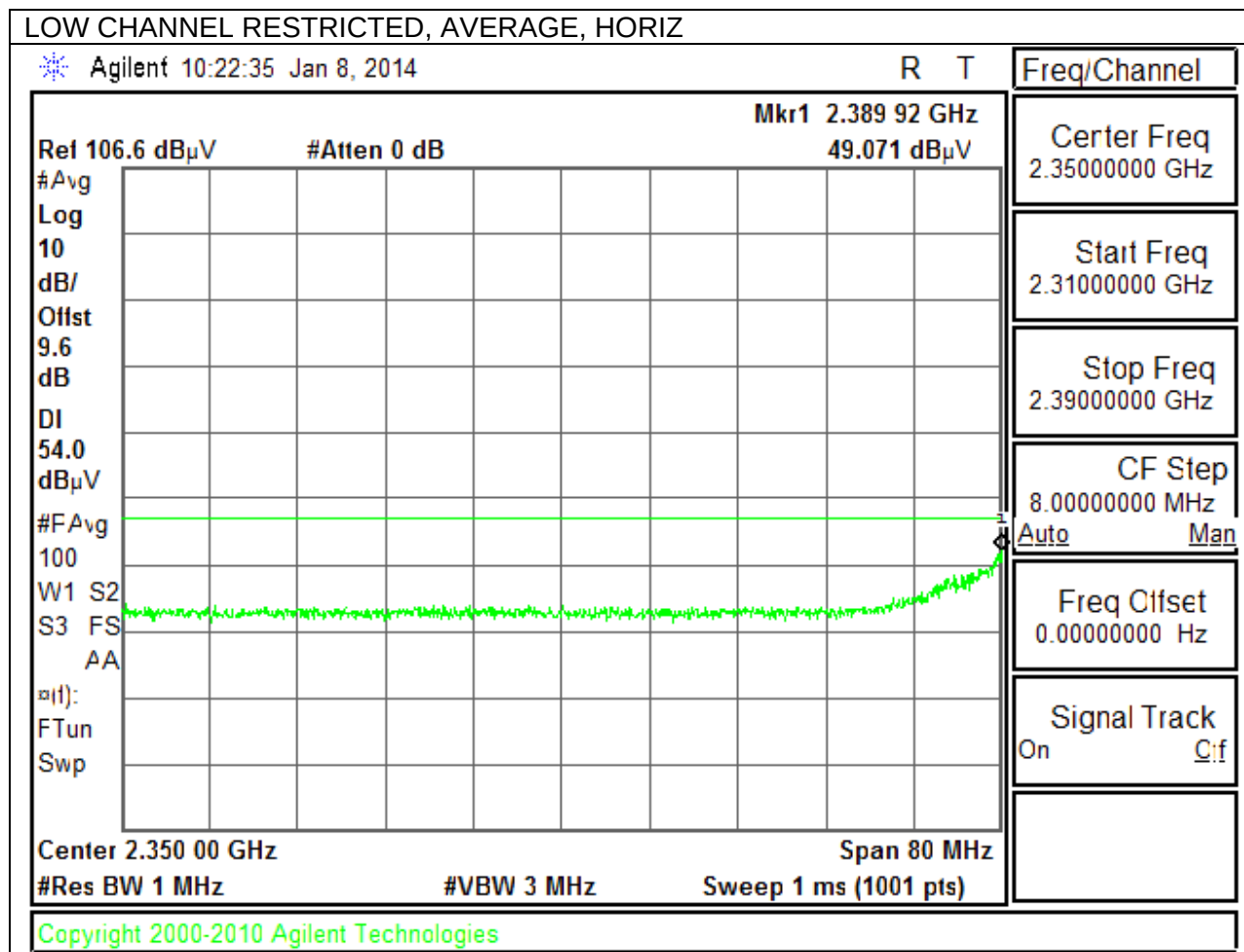
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Ampl/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.875	42.21	PK	30.9	-23.7	49.41	53.97	-4.56	74	-24.59	0-360	201	H
3	1.883	43.32	PK	31	-23.6	50.72	53.97	-3.25	74	-23.28	0-360	99	V
4	2.341	43.95	PK	32.2	-23.1	53.05	53.97	-.92	74	-20.95	0-360	99	V
2	2.359	42.47	PK	32.3	-22.9	51.87	53.97	-2.1	74	-22.13	0-360	201	H
7	4.924	43.32	PK	34.6	-30.7	47.22	53.97	-6.75	74	-26.78	0-360	99	V
5	4.925	47.09	PK	34.6	-30.7	50.99	53.97	-2.98	74	-23.01	0-360	202	H
8	7.387	40.03	PK	35.9	-27.4	48.53	53.97	-5.44	74	-25.47	0-360	99	V
6	9.642	34	PK	37.4	-24.3	47.1	53.97	-6.87	74	-26.9	0-360	202	H

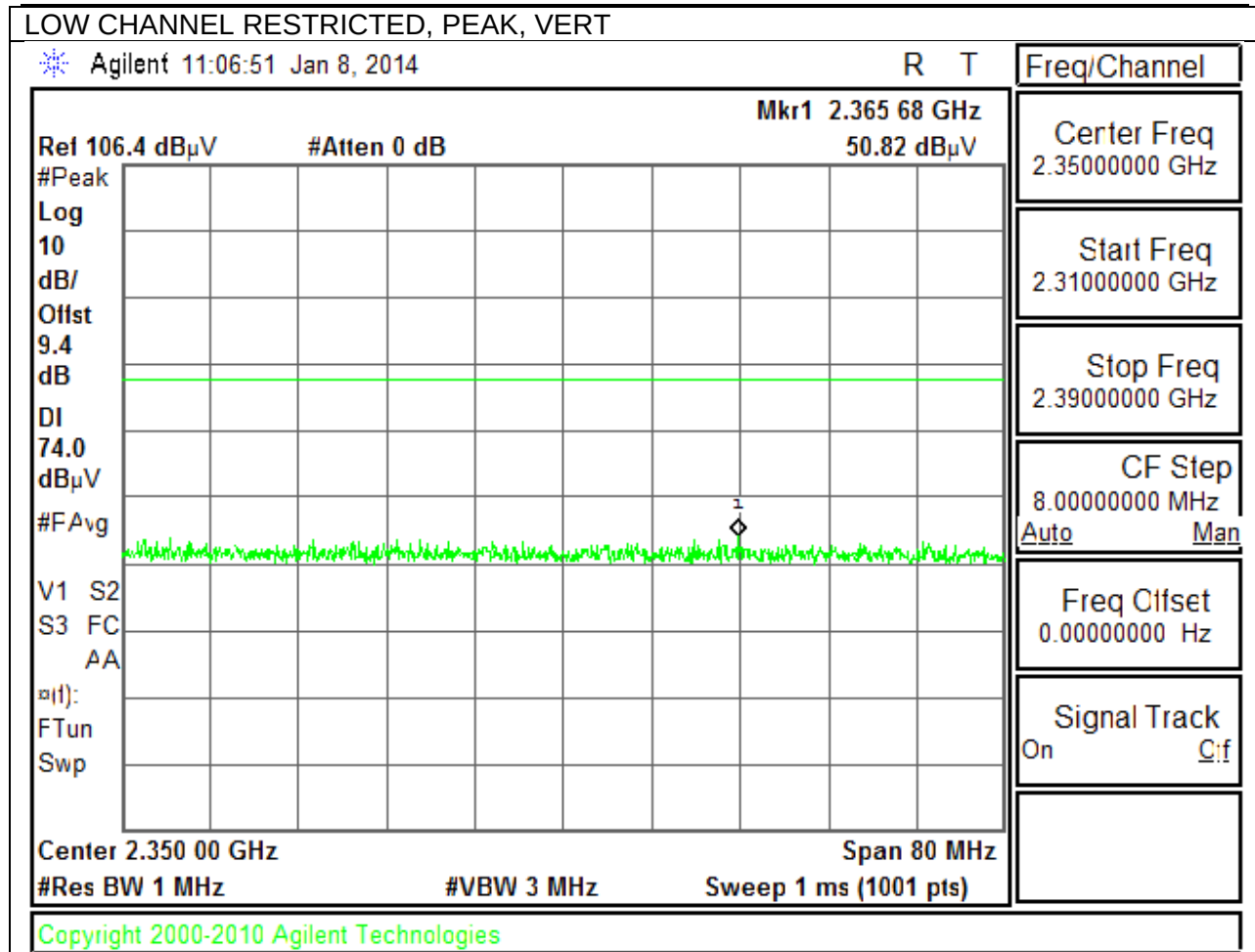
PK - Peak detector

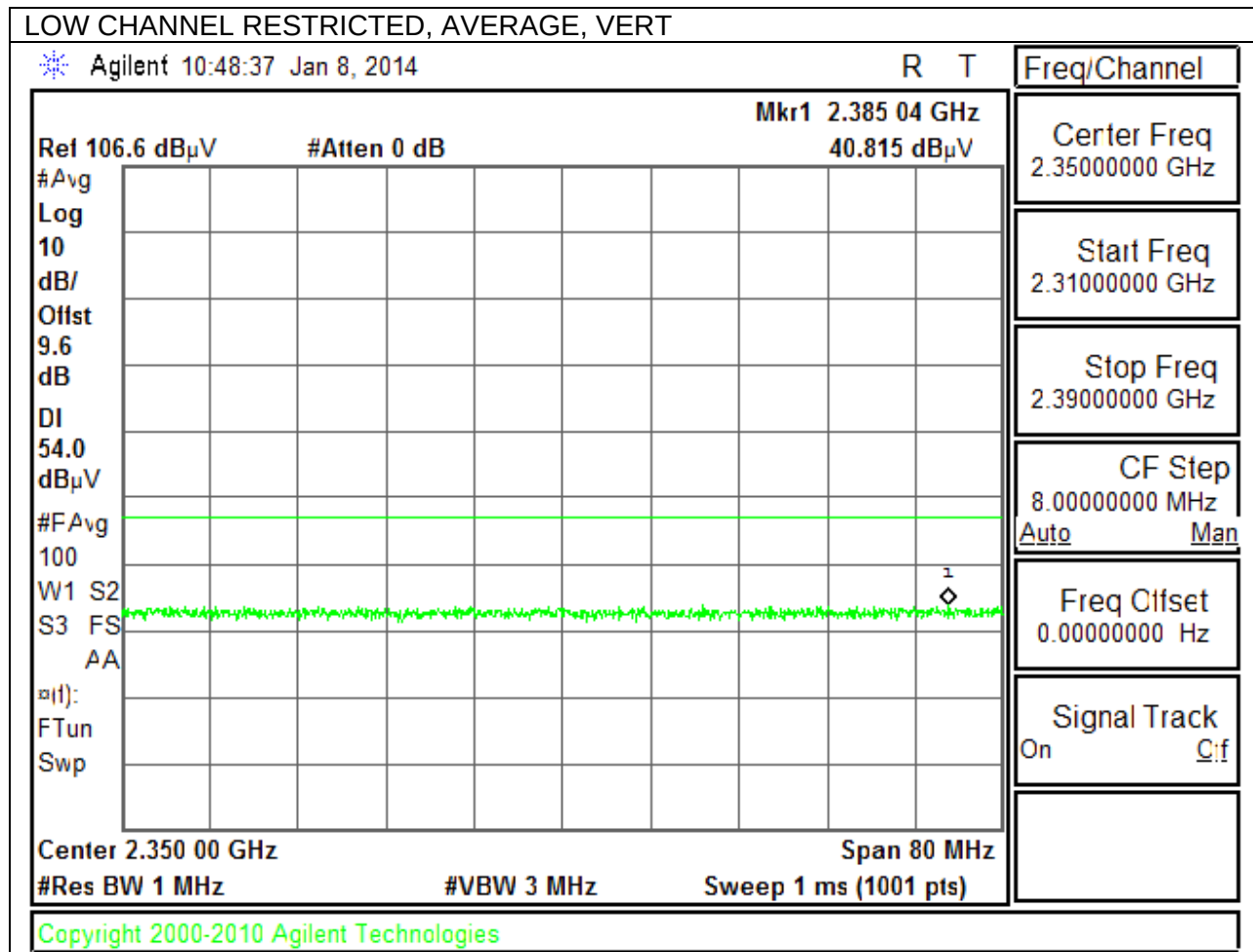
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 12 Dec 2013

**10.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND
RESTRICTED BANDEDGE (LOW CHANNEL)**

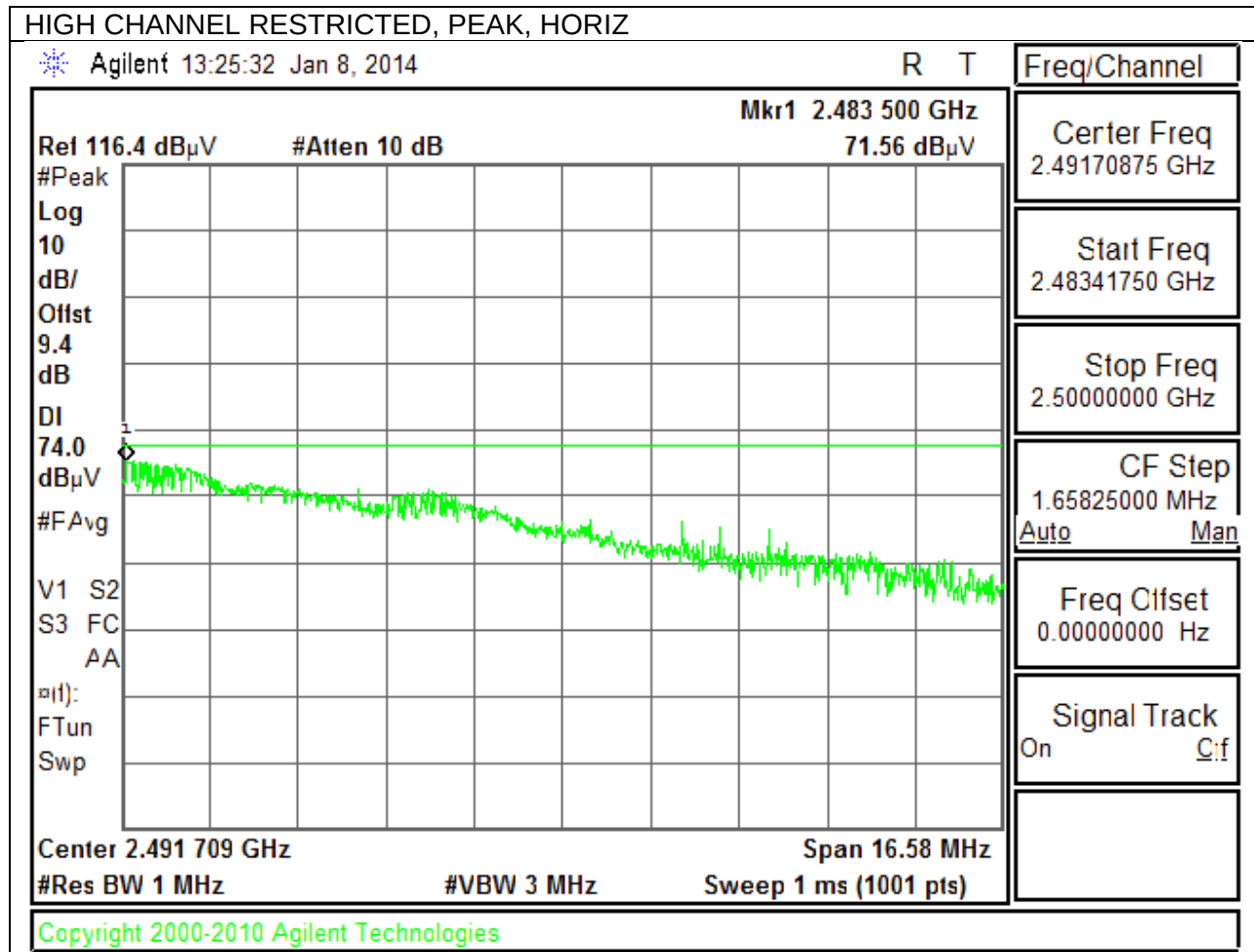


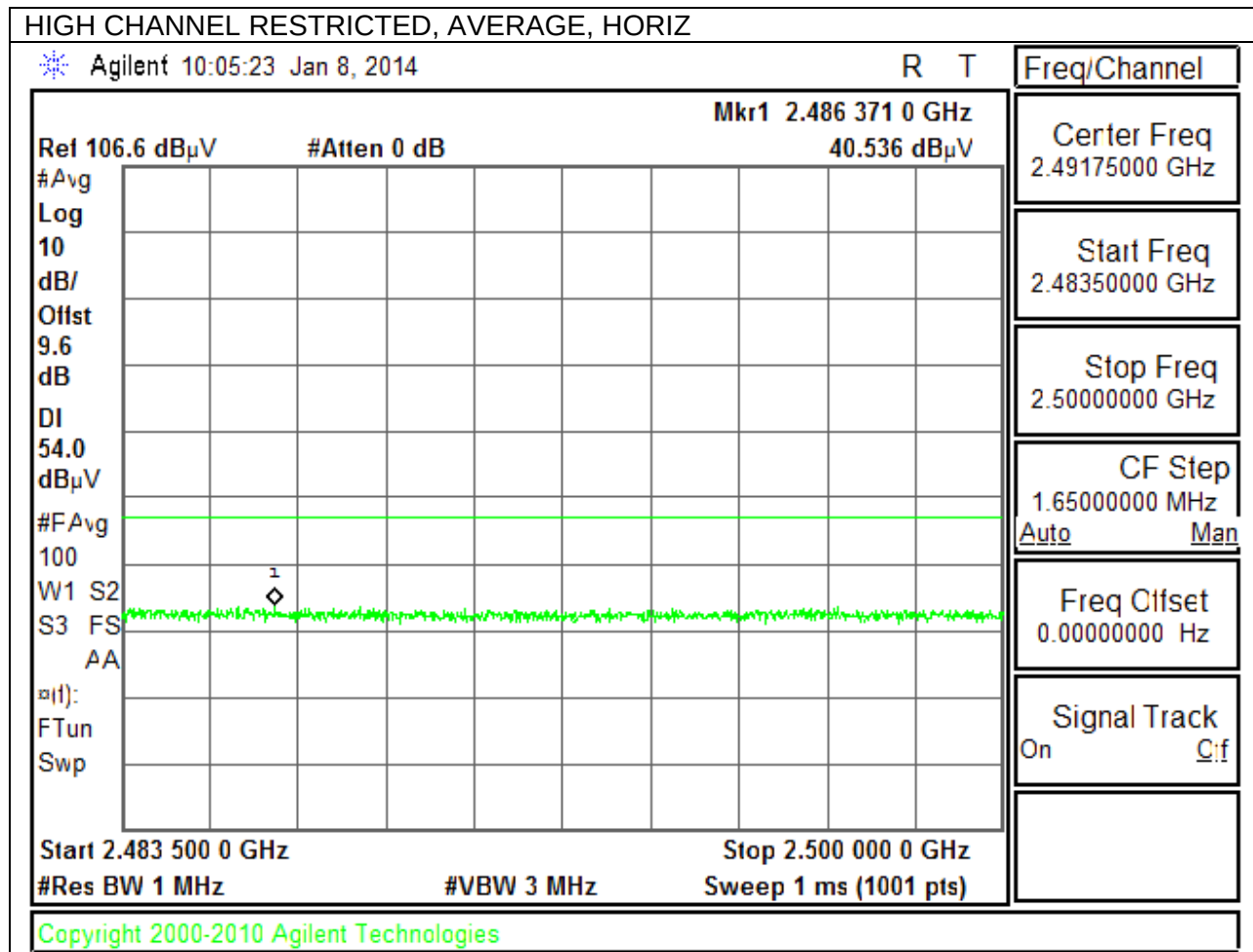


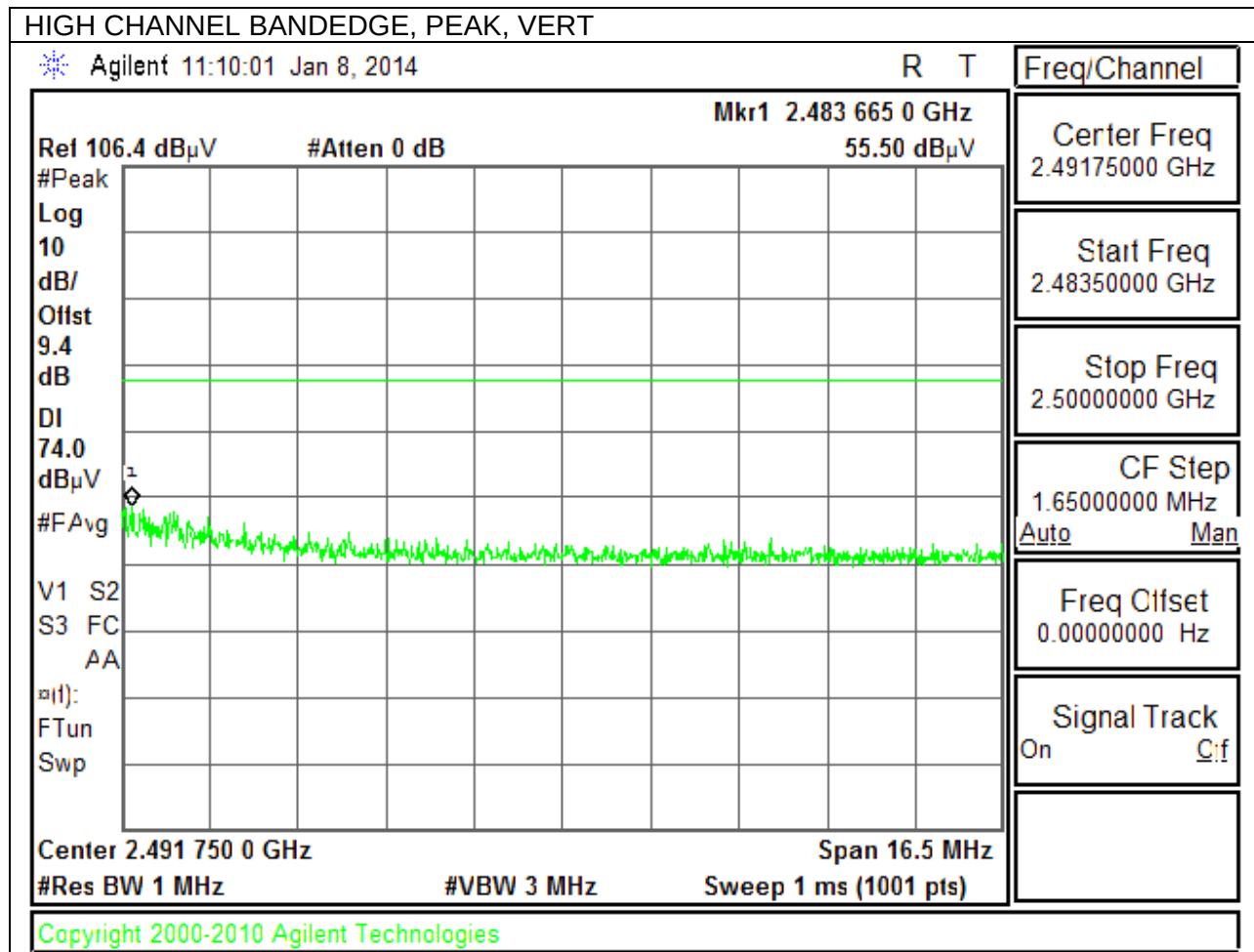


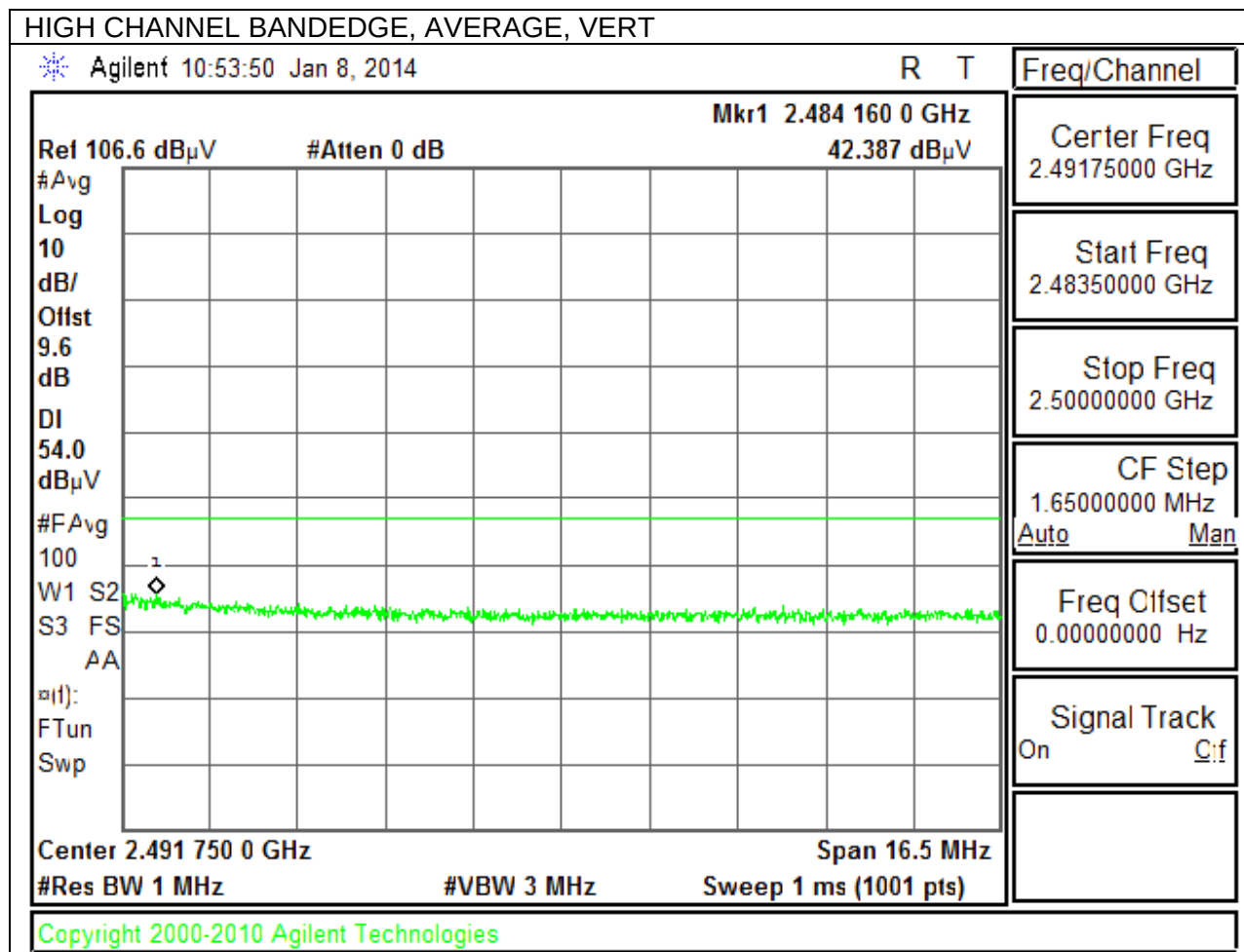


AUTHORIZED BANDEDGE (HIGH CHANNEL)



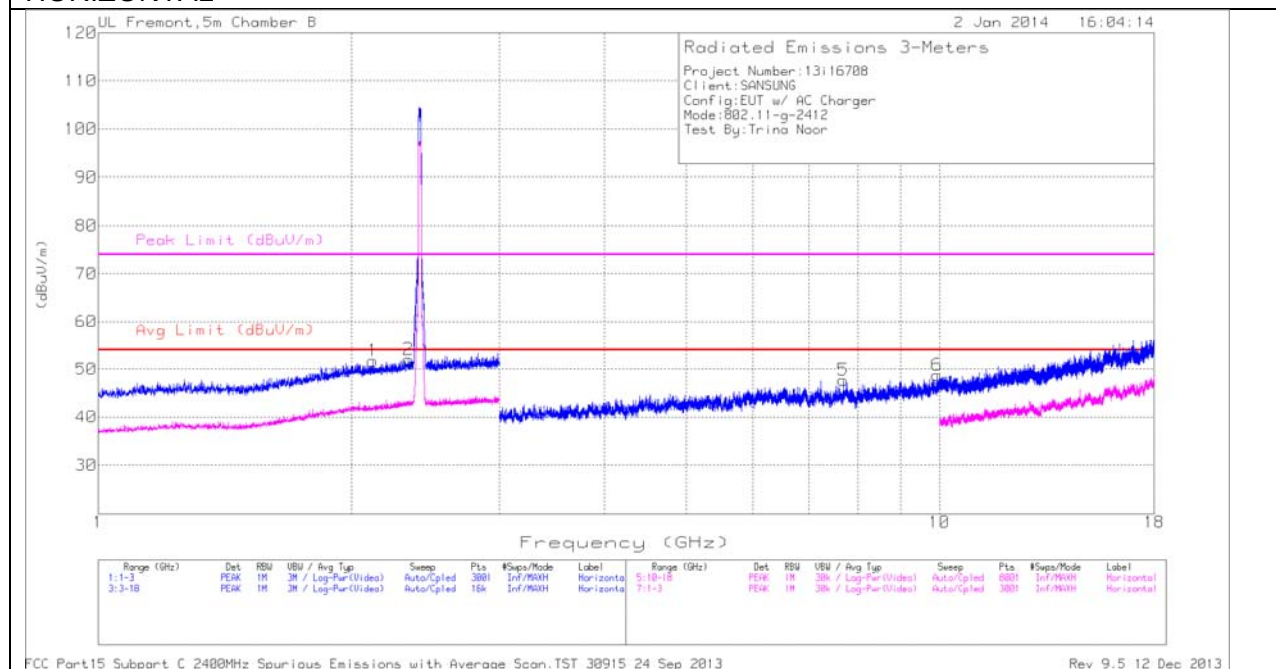






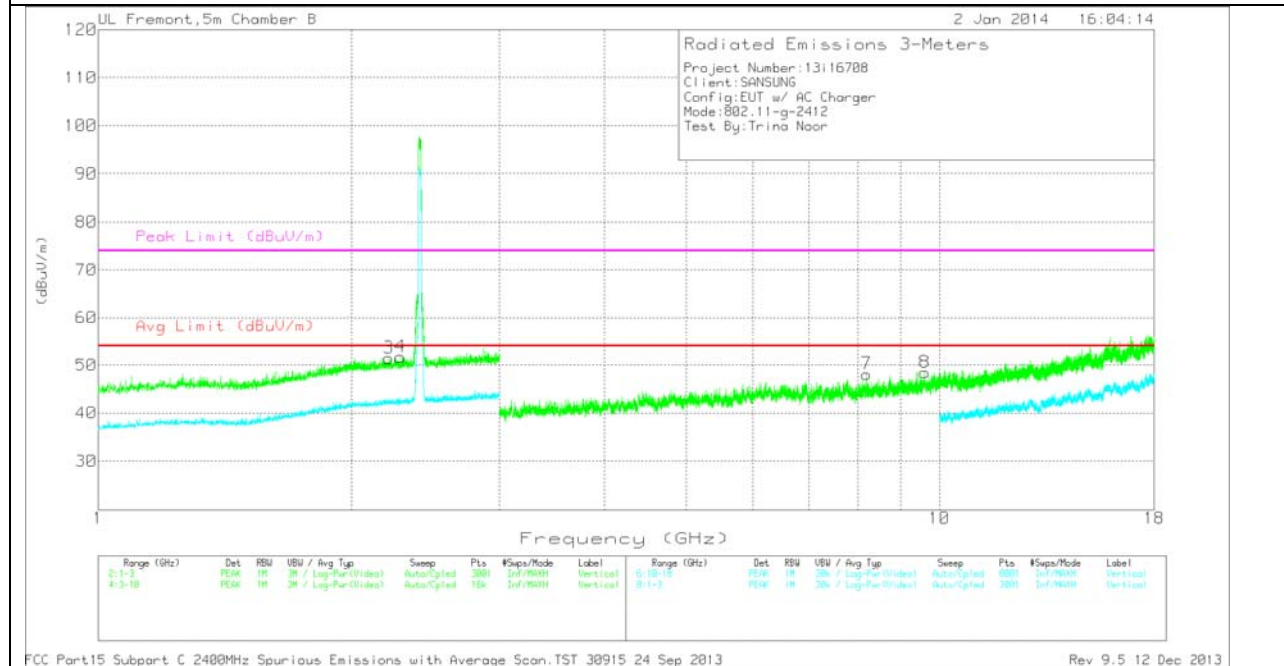
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

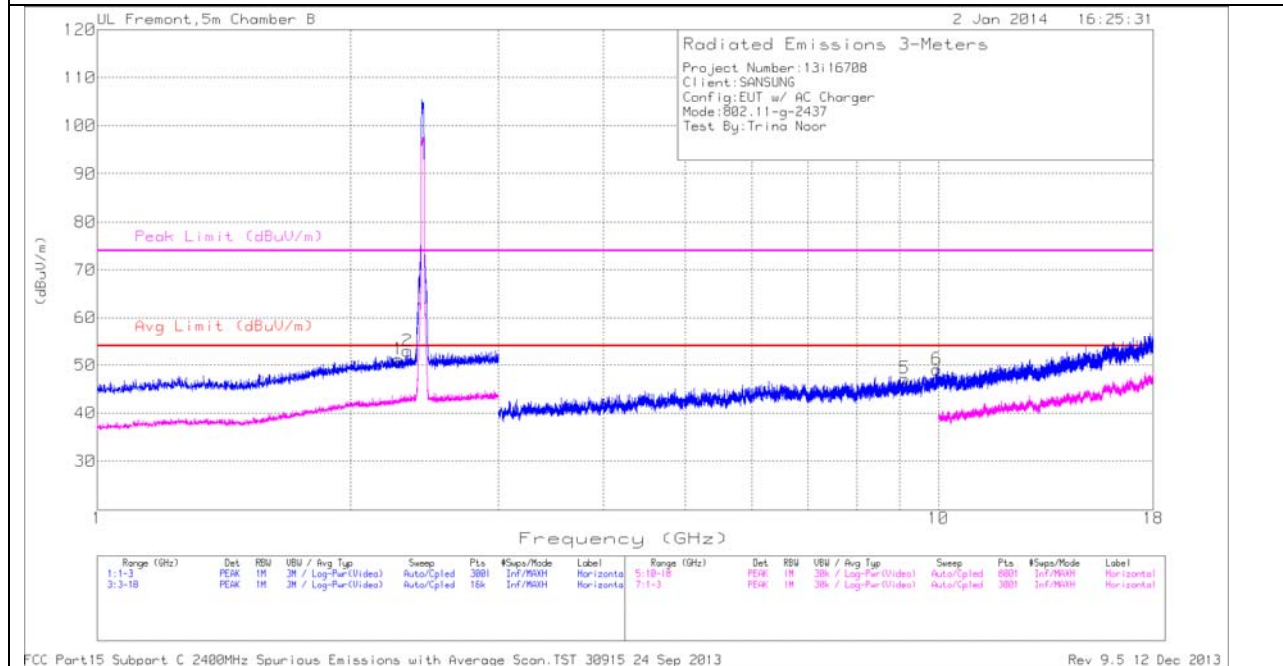
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.121	43.09	PK	31.9	-23.3	51.69	53.97	-2.28	74	-22.31	0-360	202	H
3	2.215	42.55	PK	32.1	-23.2	51.45	53.97	-2.52	74	-22.55	0-360	202	V
4	2.289	42.6	PK	32.2	-23.1	51.7	53.97	-2.27	74	-22.3	0-360	202	V
2	2.338	42.83	PK	32.2	-23.1	51.93	53.97	-2.04	74	-22.07	0-360	202	H
5	7.685	38.28	PK	36.1	-26.7	47.68	53.97	-6.29	74	-26.32	0-360	99	H
7	8.194	39.1	PK	36.1	-27.1	48.1	53.97	-5.87	74	-25.9	0-360	99	V
8	9.606	35.26	PK	37.3	-24.1	48.46	53.97	-5.51	74	-25.54	0-360	99	V
6	9.936	34.92	PK	37.7	-23.9	48.72	53.97	-5.25	74	-25.28	0-360	202	H

PK - Peak detector

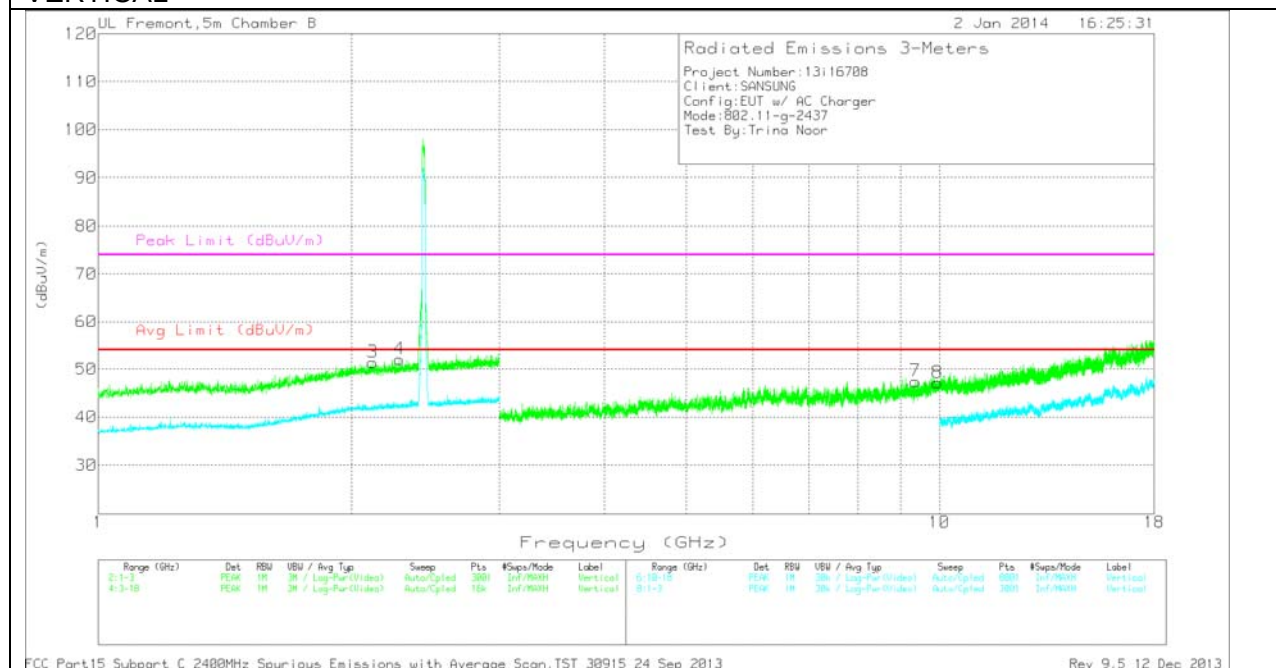
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 12 Dec 2013

MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

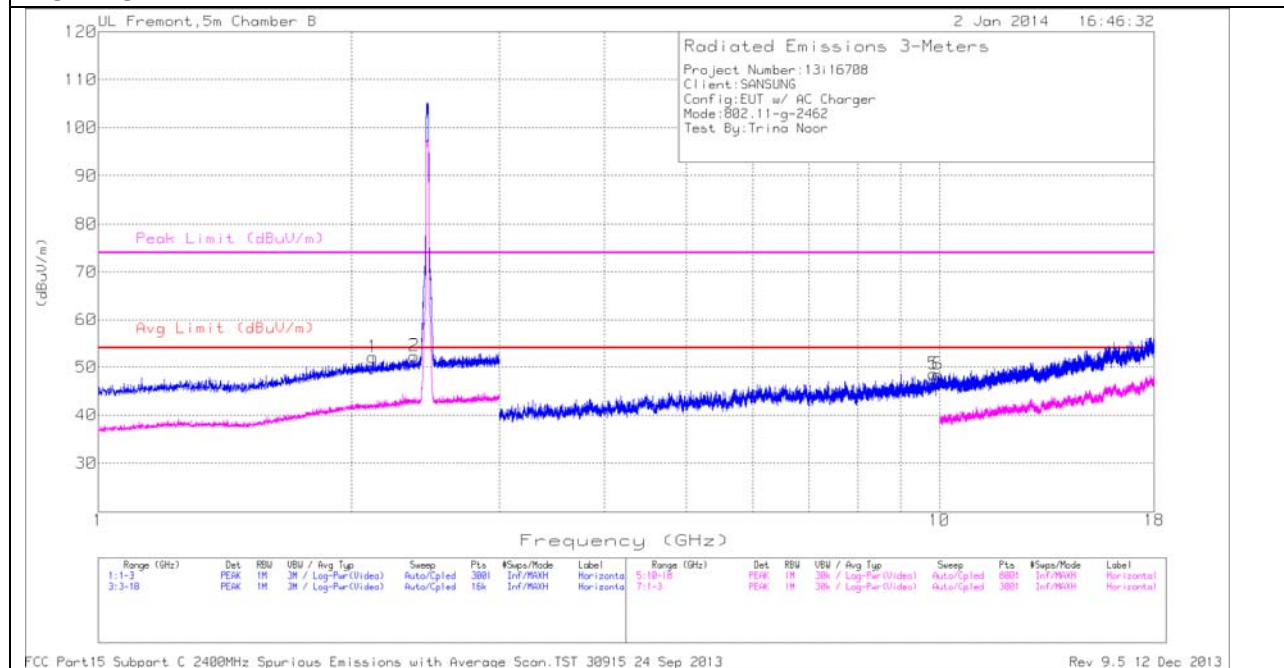
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	2.121	42.76	PK	31.9	-23.3	51.36	53.97	-2.61	74	-22.64	0-360	99	V
1	2.282	42.08	PK	32.2	-23.1	51.18	53.97	-2.79	74	-22.82	0-360	99	H
4	2.282	42.93	PK	32.2	-23.1	52.03	53.97	-1.94	74	-21.97	0-360	99	V
2	2.338	43.89	PK	32.2	-23.1	52.99	53.97	-0.98	74	-21.01	0-360	201	H
5	9.121	35.4	PK	36.8	-25	47.2	53.97	-6.77	74	-26.8	0-360	99	H
7	9.362	35.24	PK	37	-24.8	47.44	53.97	-6.53	74	-26.56	0-360	99	V
8	9.947	33.35	PK	37.7	-23.9	47.15	53.97	-6.82	74	-26.85	0-360	99	V
6	9.959	35.3	PK	37.8	-24	49.1	53.97	-4.87	74	-24.9	0-360	99	H

PK - Peak detector

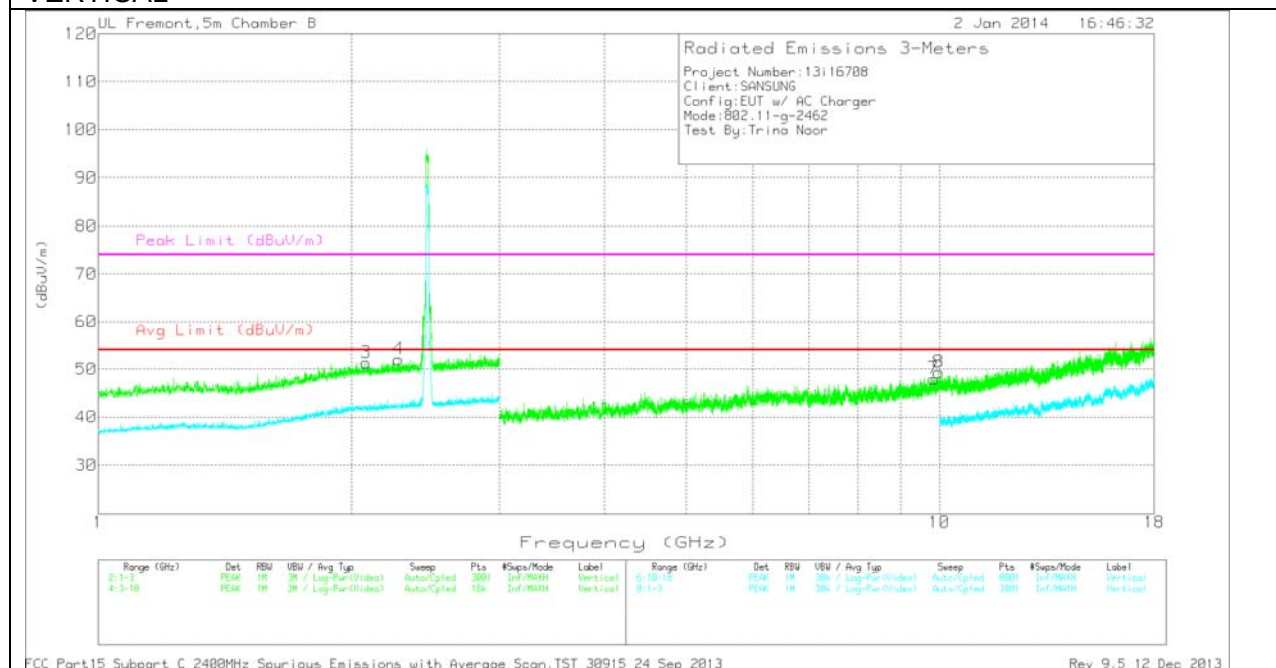
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 12 Dec 2013

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

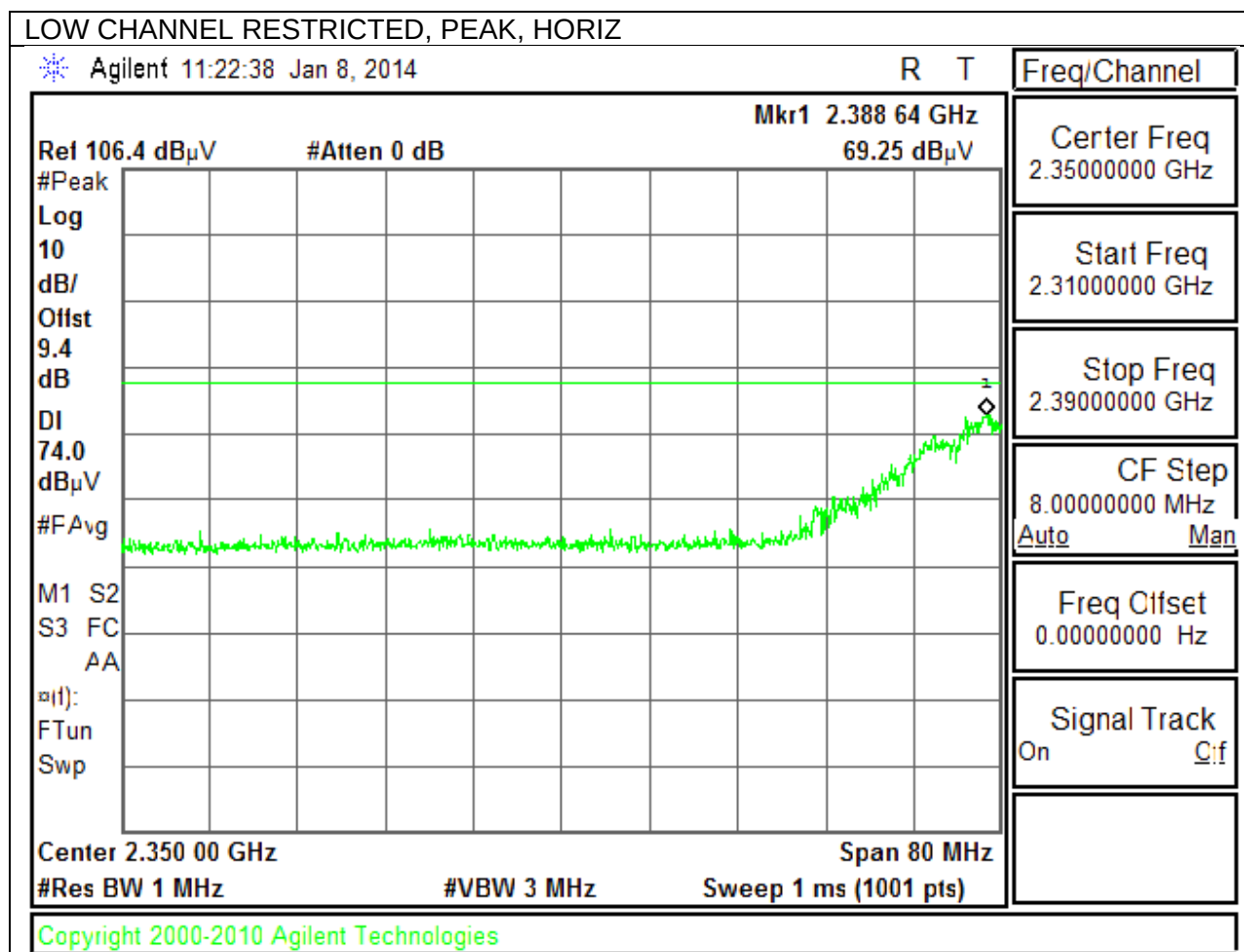
HIGH CHANNEL DATA
Trace Markers

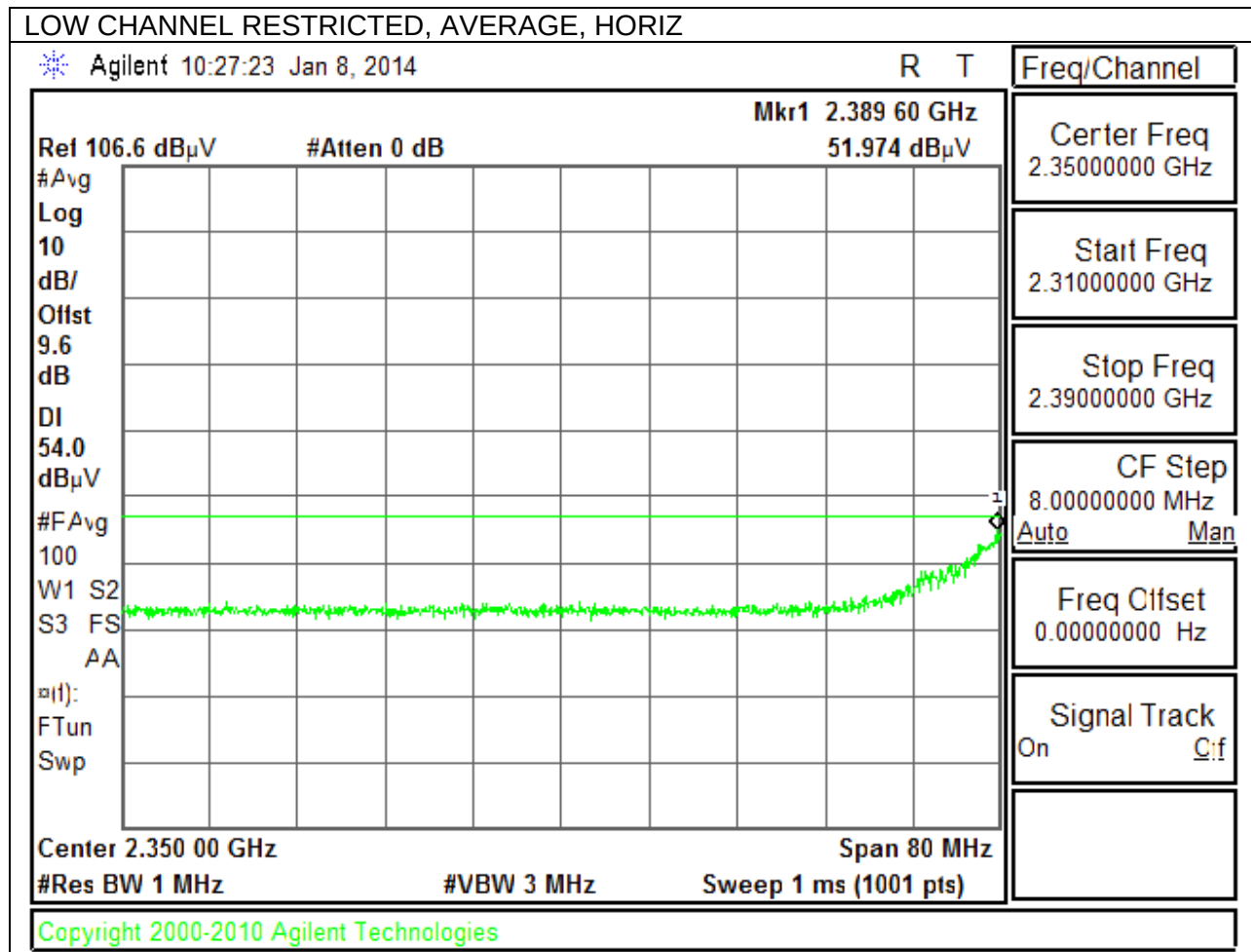
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	2.082	42.82	PK	31.9	-23.4	51.32	53.97	-2.65	74	-22.68	0-360	99	V
1	2.121	43.47	PK	31.9	-23.3	52.07	53.97	-1.9	74	-21.93	0-360	99	H
4	2.275	43.02	PK	32.1	-23.1	52.02	53.97	-1.95	74	-21.98	0-360	99	V
2	2.376	42.9	PK	32.3	-22.9	52.3	53.97	-1.67	74	-21.7	0-360	202	H
5	9.839	35.08	PK	37.6	-24.1	48.58	53.97	-5.39	74	-25.42	0-360	99	H
7	9.844	34.46	PK	37.6	-24.1	47.96	53.97	-6.01	74	-26.04	0-360	202	V
6	9.96	34.68	PK	37.8	-24	48.48	53.97	-5.49	74	-25.52	0-360	202	H
8	9.978	35.54	PK	37.8	-24	49.34	53.97	-4.63	74	-24.66	0-360	99	V

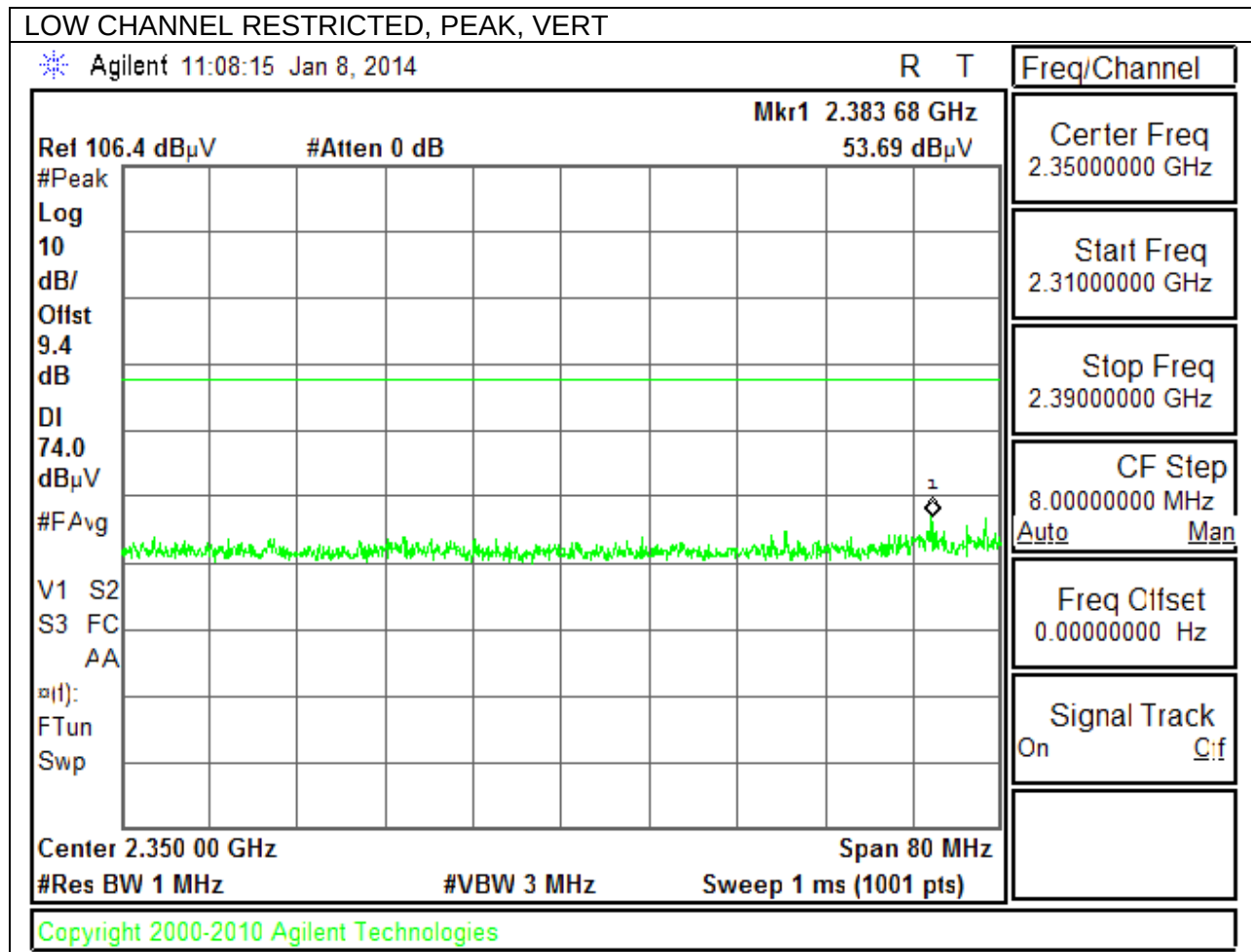
PK - Peak detector

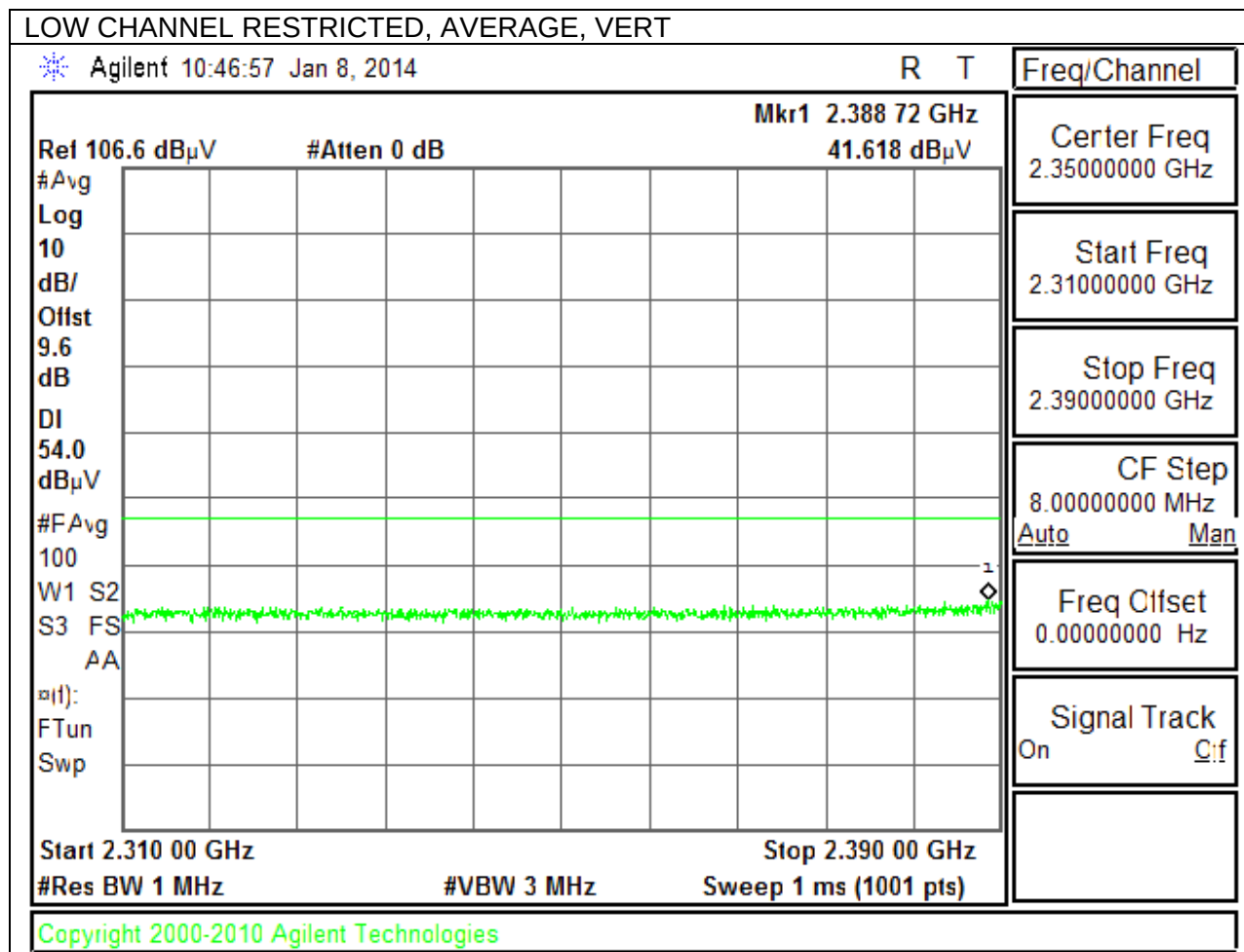
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep
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**10.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND
RESTRICTED BANDEDGE (LOW CHANNEL)**

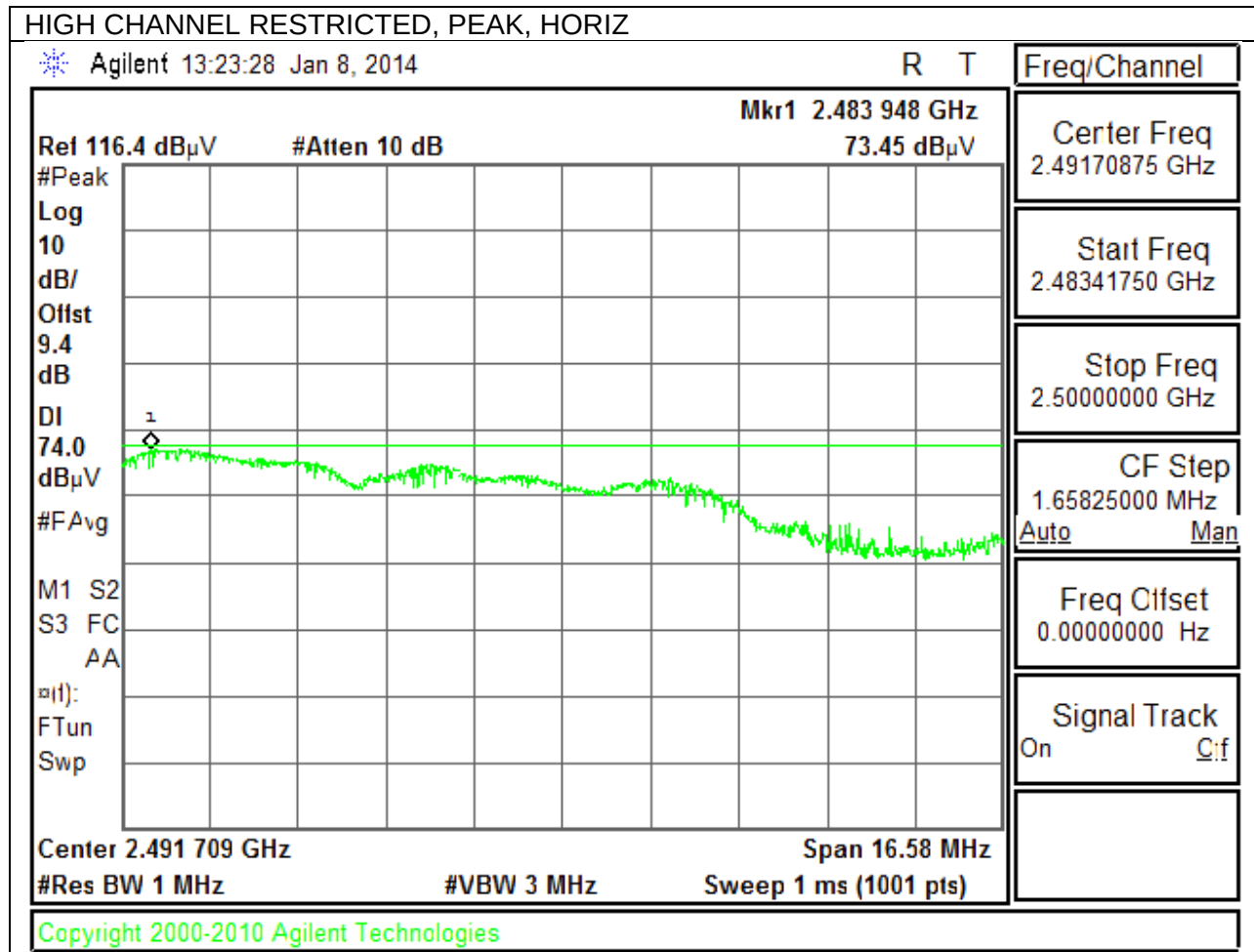


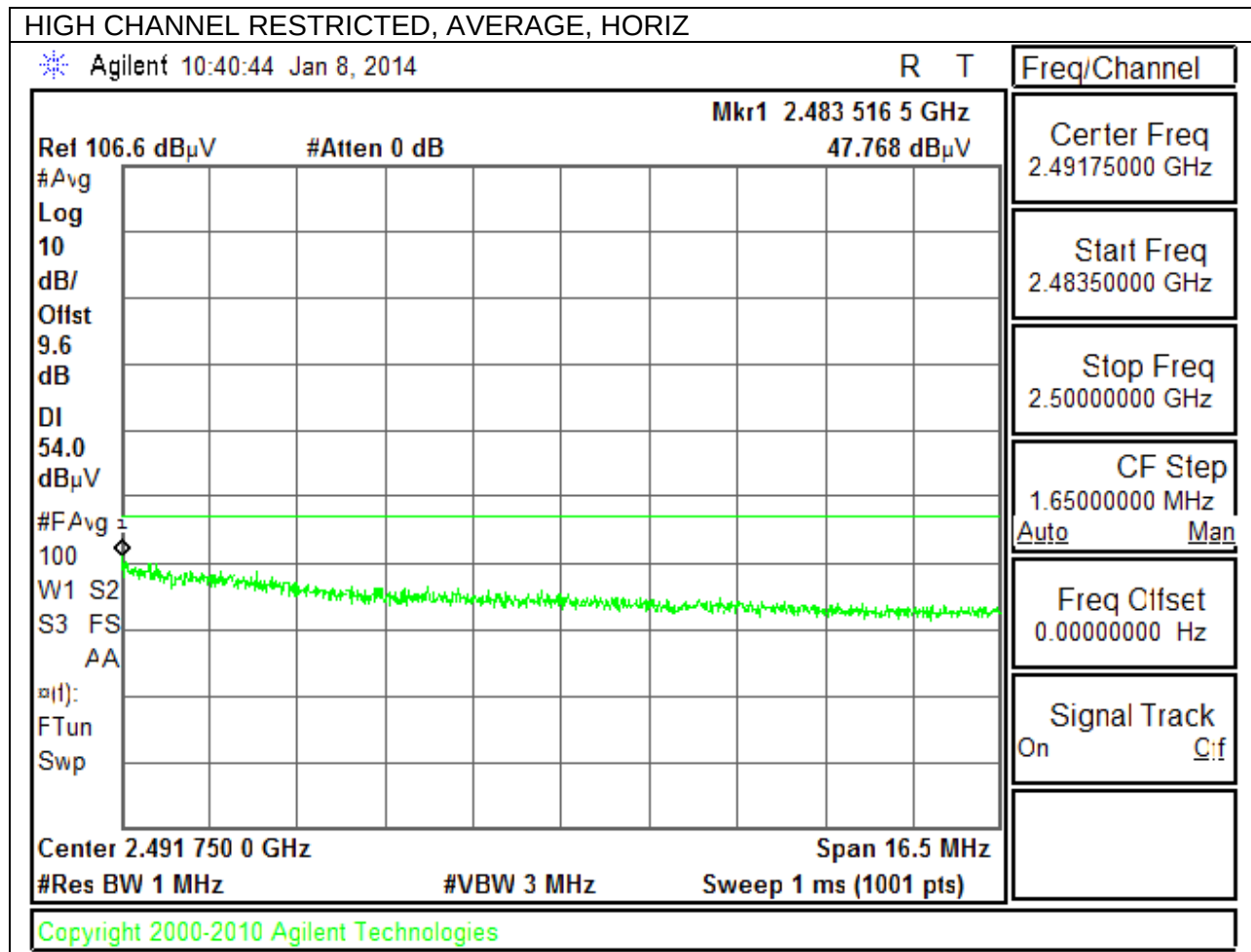


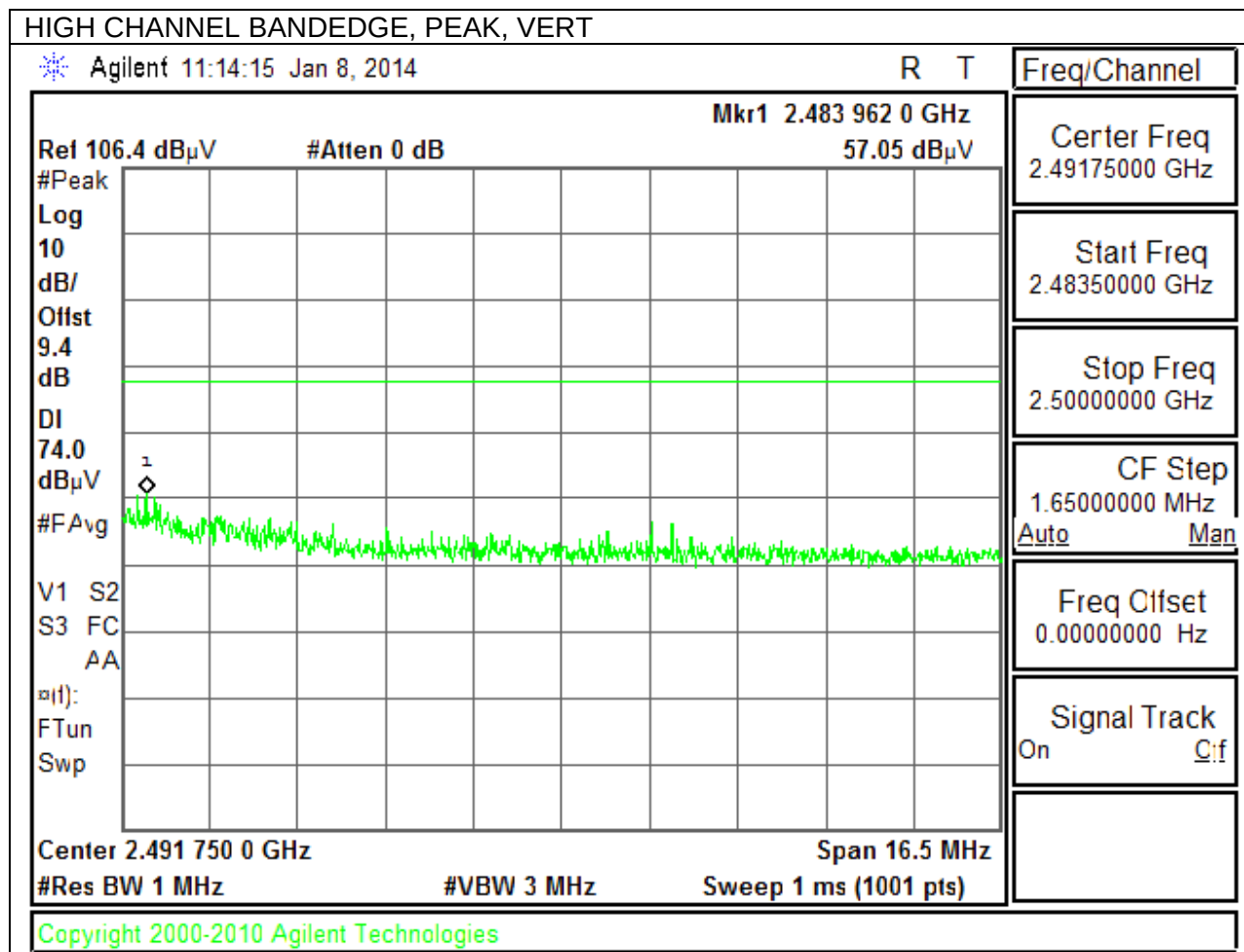


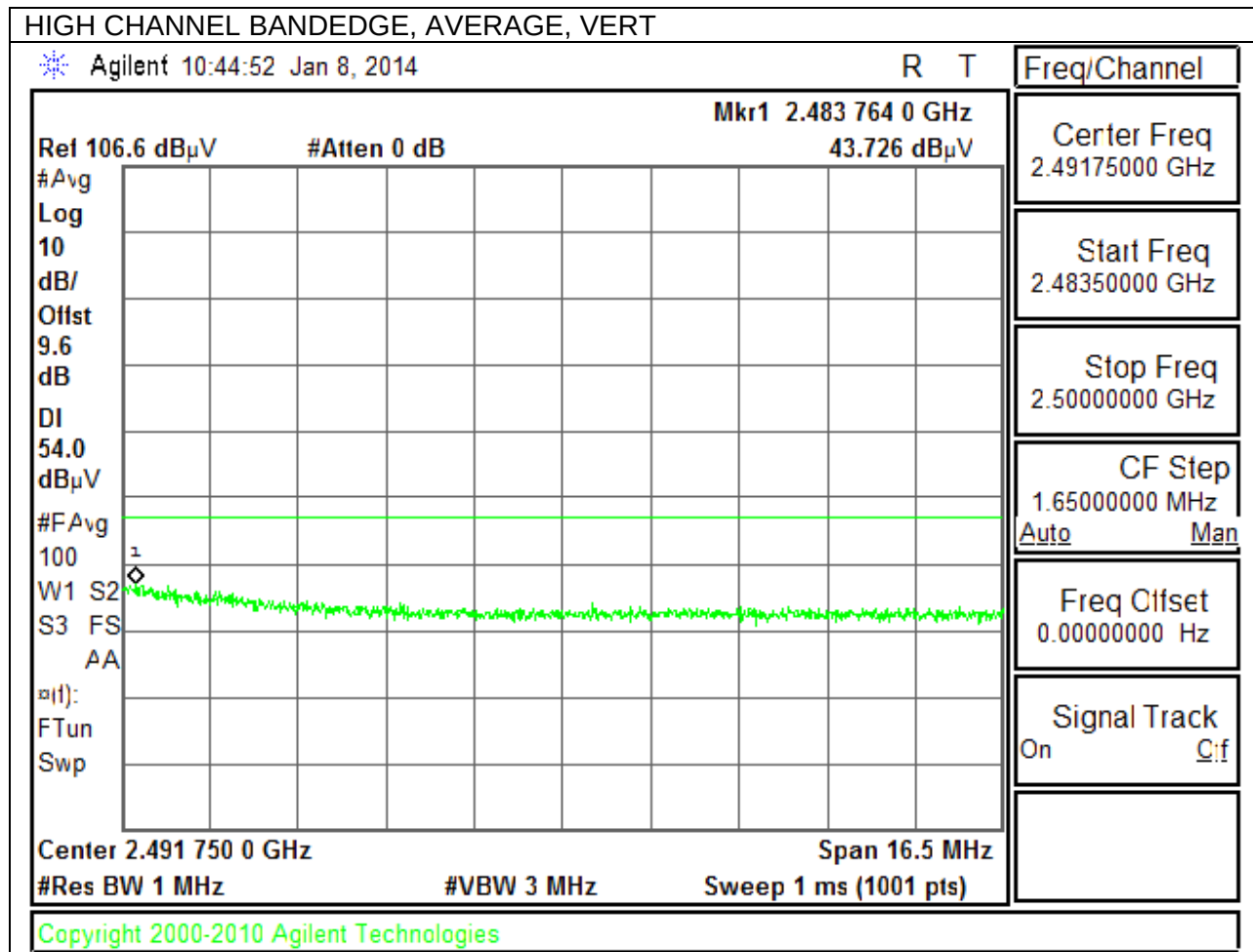


AUTHORIZED BANDEDGE (HIGH CHANNEL)



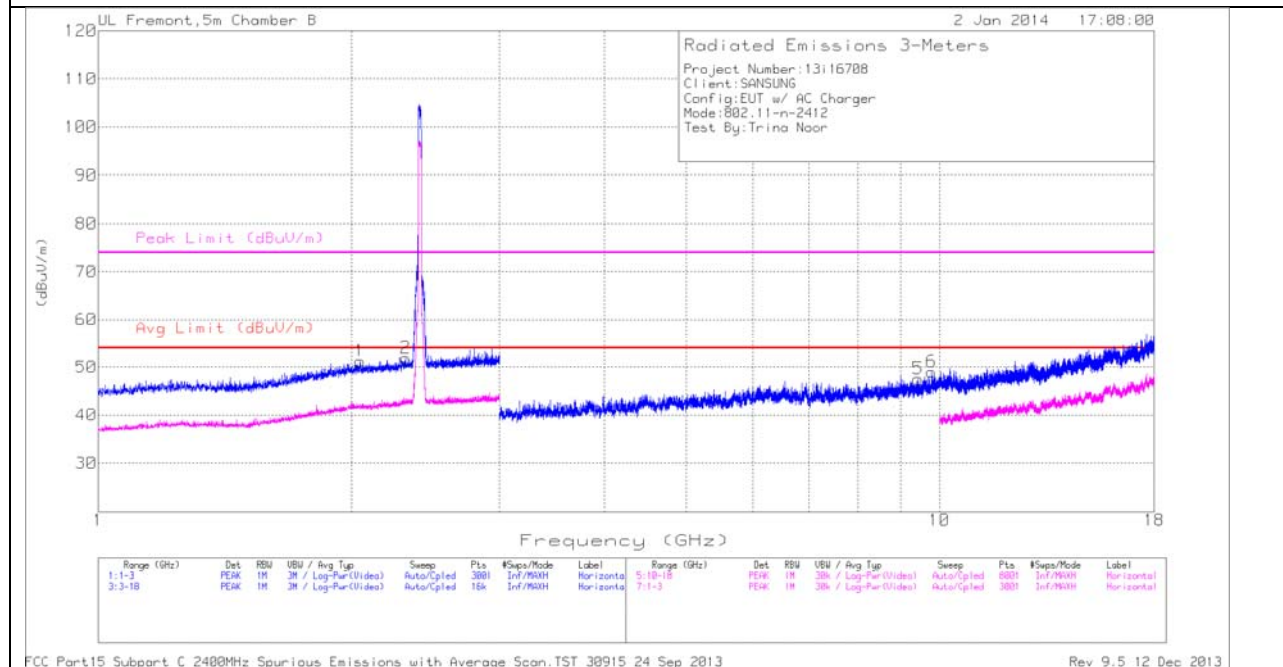






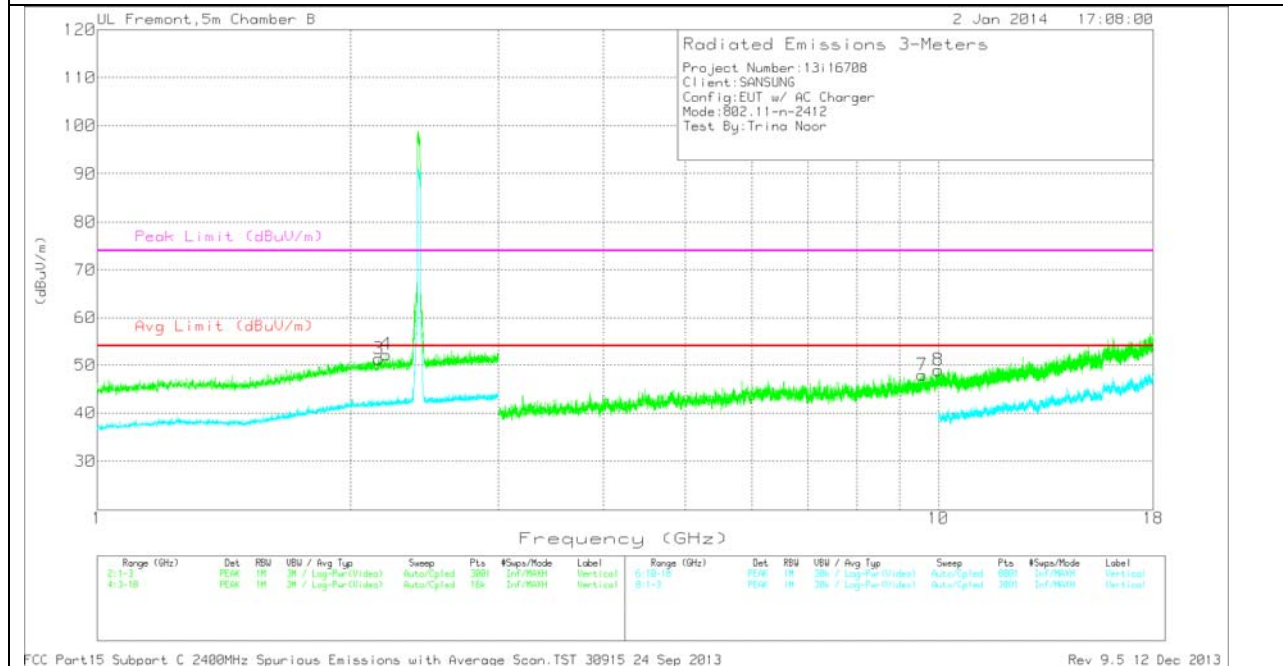
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

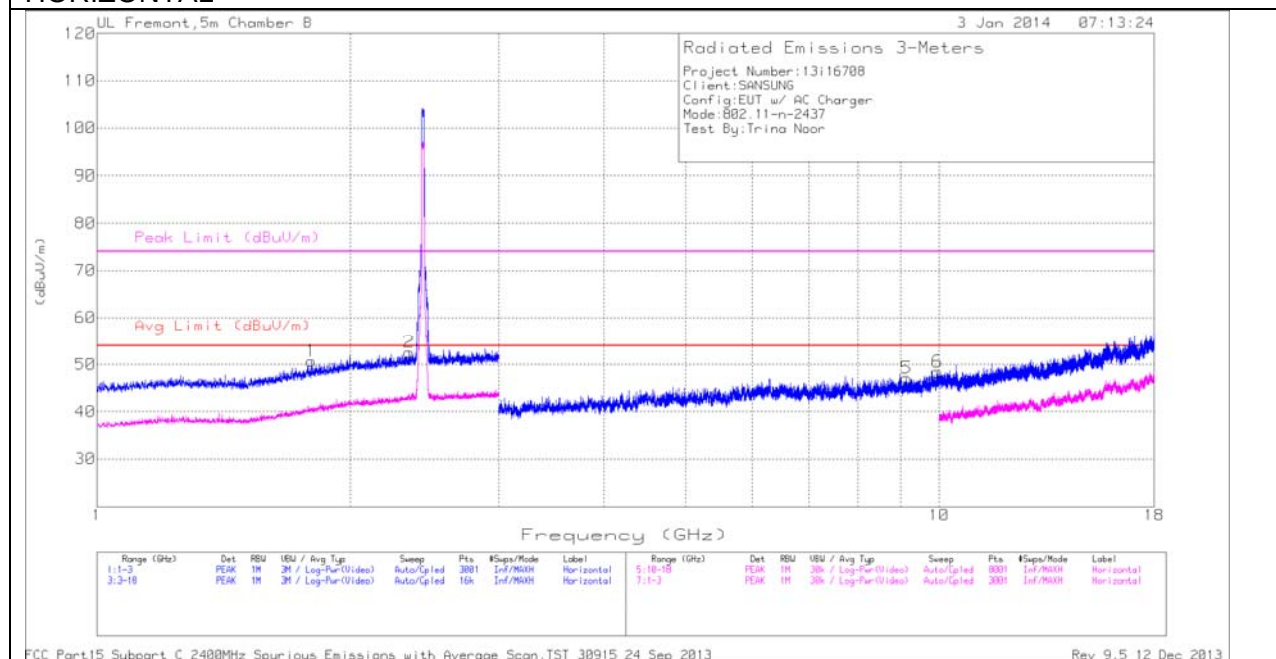
LOW CHANNEL DATA
Trace Markers

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.048	42.82	PK	31.9	-23.5	51.22	53.97	-2.75	74	-22.78	0-360	99	H
3	2.161	42.47	PK	32	-23.2	51.27	53.97	-2.7	74	-22.73	0-360	99	V
4	2.207	43.35	PK	32	-23.2	52.15	53.97	-1.82	74	-21.85	0-360	202	V
2	2.321	42.63	PK	32.2	-23	51.83	53.97	-2.14	74	-22.17	0-360	202	H
5	9.436	35.09	PK	37.1	-24.7	47.49	53.97	-6.48	74	-26.51	0-360	201	H
7	9.565	34.73	PK	37.3	-24.1	47.93	53.97	-6.04	74	-26.07	0-360	99	V
6	9.788	34.99	PK	37.5	-23.5	48.99	53.97	-4.98	74	-25.01	0-360	99	H
8	9.994	35.27	PK	37.8	-24.1	48.97	53.97	-5	74	-25.03	0-360	99	V

PK - Peak detector

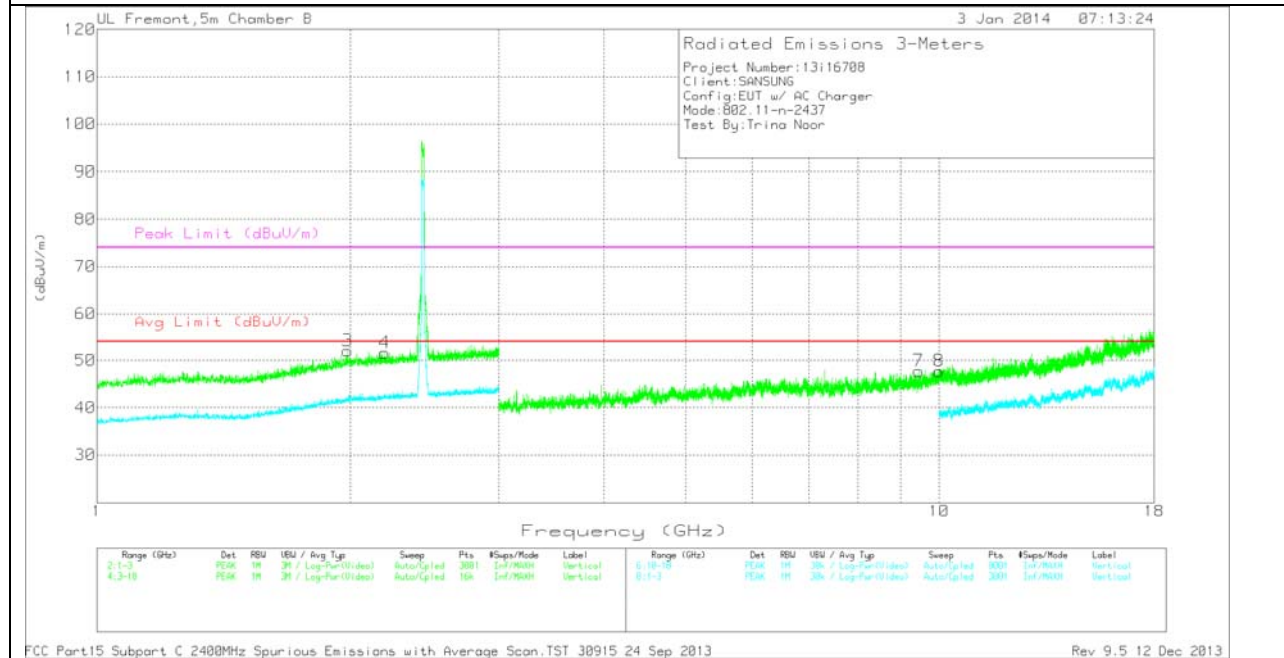
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep
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MID CHANNEL
HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL
VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

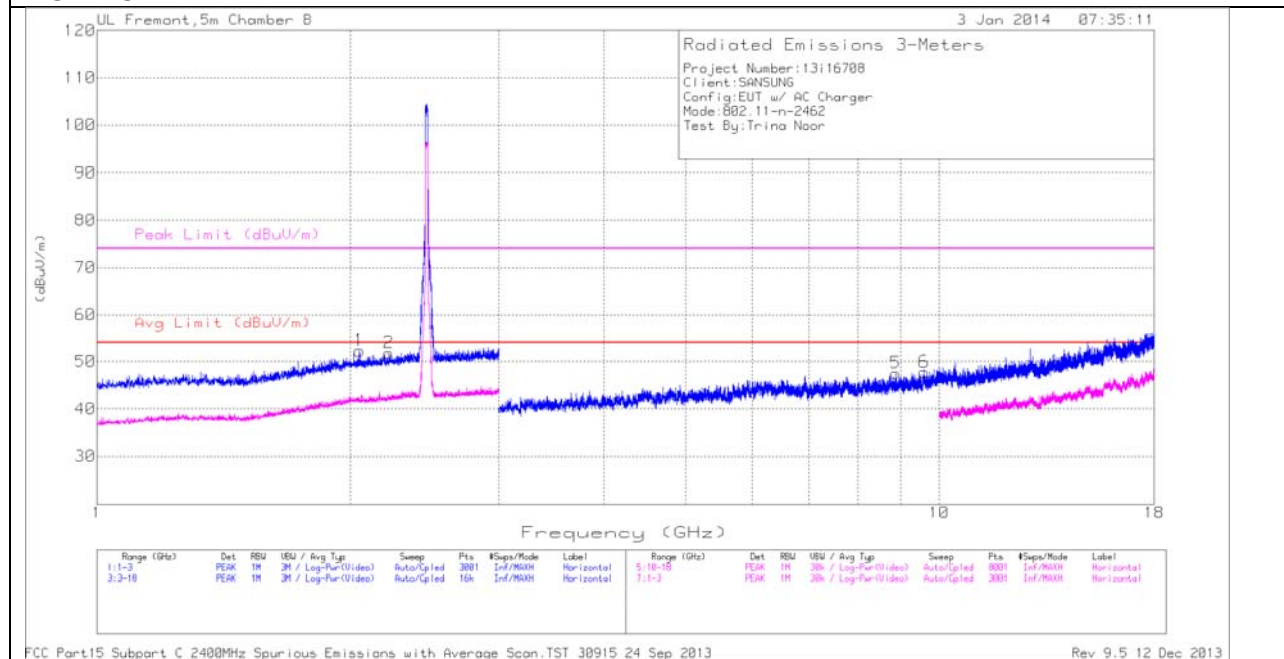
Trace Markers

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.798	43.98	PK	30.4	-23.7	50.68	53.97	-3.29	74	-23.32	0-360	201	H
3	1.984	43.82	PK	31.7	-23.5	52.02	53.97	-1.95	74	-21.98	0-360	99	V
4	2.196	42.75	PK	32	-23.2	51.55	53.97	-2.42	74	-22.45	0-360	202	V
2	2.347	43.27	PK	32.3	-23	52.57	53.97	-1.4	74	-21.43	0-360	201	H
5	9.147	35.33	PK	36.9	-25.2	47.03	53.97	-6.94	74	-26.97	0-360	201	H
7	9.453	35.32	PK	37.1	-24.7	47.72	53.97	-6.25	74	-26.28	0-360	202	V
6	9.952	34.57	PK	37.7	-23.9	48.37	53.97	-5.6	74	-25.63	0-360	99	H
8	9.995	34	PK	37.8	-24.1	47.7	53.97	-6.27	74	-26.3	0-360	99	V

PK - Peak detector

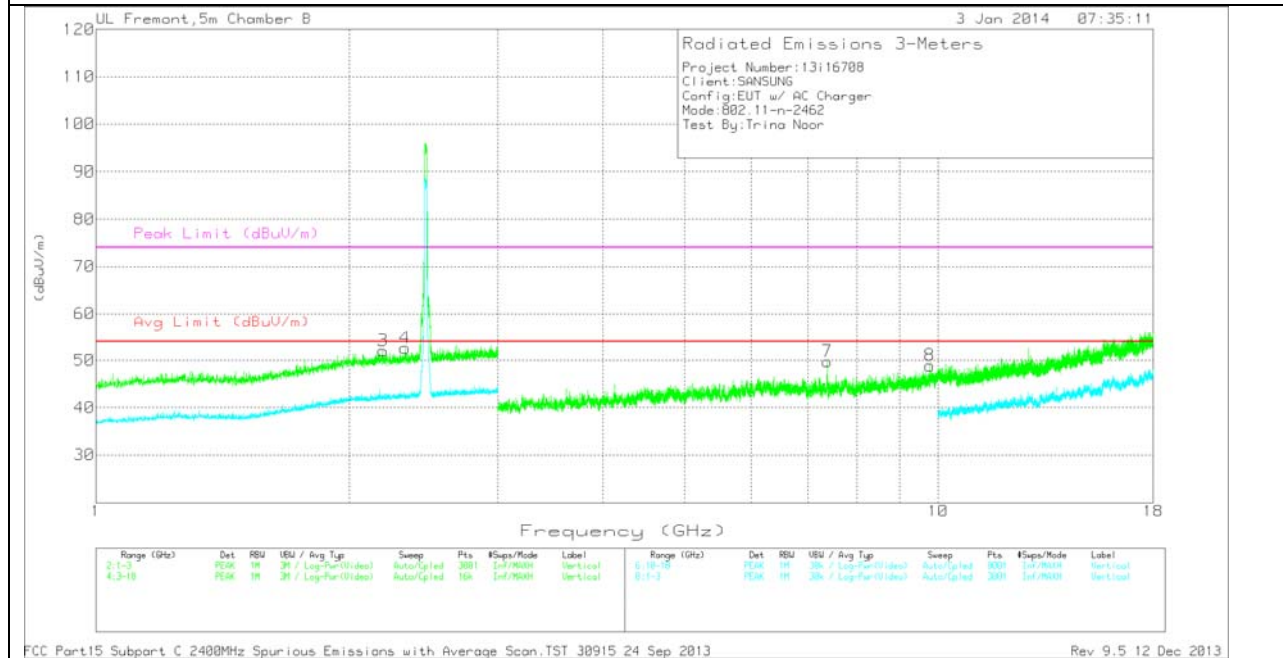
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep
2013 Rev 9.5 12 Dec 2013

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Trace Markers

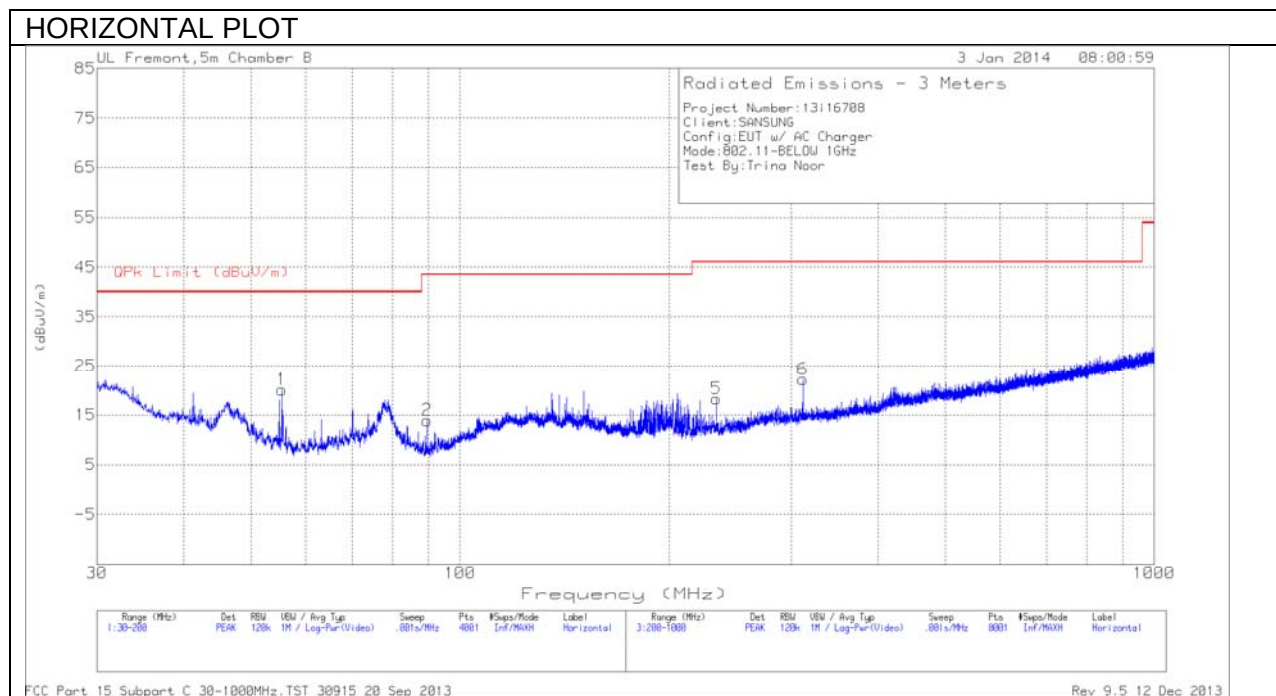
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Ampl/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.049	43.84	PK	31.9	-23.5	52.24	53.97	-1.73	74	-21.76	0-360	99	H
3	2.191	43.23	PK	32	-23.2	52.03	53.97	-1.94	74	-21.97	0-360	99	V
2	2.221	42.79	PK	32.1	-23.1	51.79	53.97	-2.18	74	-22.21	0-360	201	H
4	2.329	43.52	PK	32.2	-23.1	52.62	53.97	-1.35	74	-21.38	0-360	99	V
7	7.383	41.33	PK	35.9	-27.5	49.73	53.97	-4.24	74	-24.27	0-360	202	V
5	8.879	36.83	PK	36.6	-25.9	47.53	53.97	-6.44	74	-26.47	0-360	99	H
6	9.597	34.61	PK	37.3	-24.2	47.71	53.97	-6.26	74	-26.29	0-360	202	H
8	9.778	35.09	PK	37.5	-23.7	48.89	53.97	-5.08	74	-25.11	0-360	202	V

PK - Peak detector

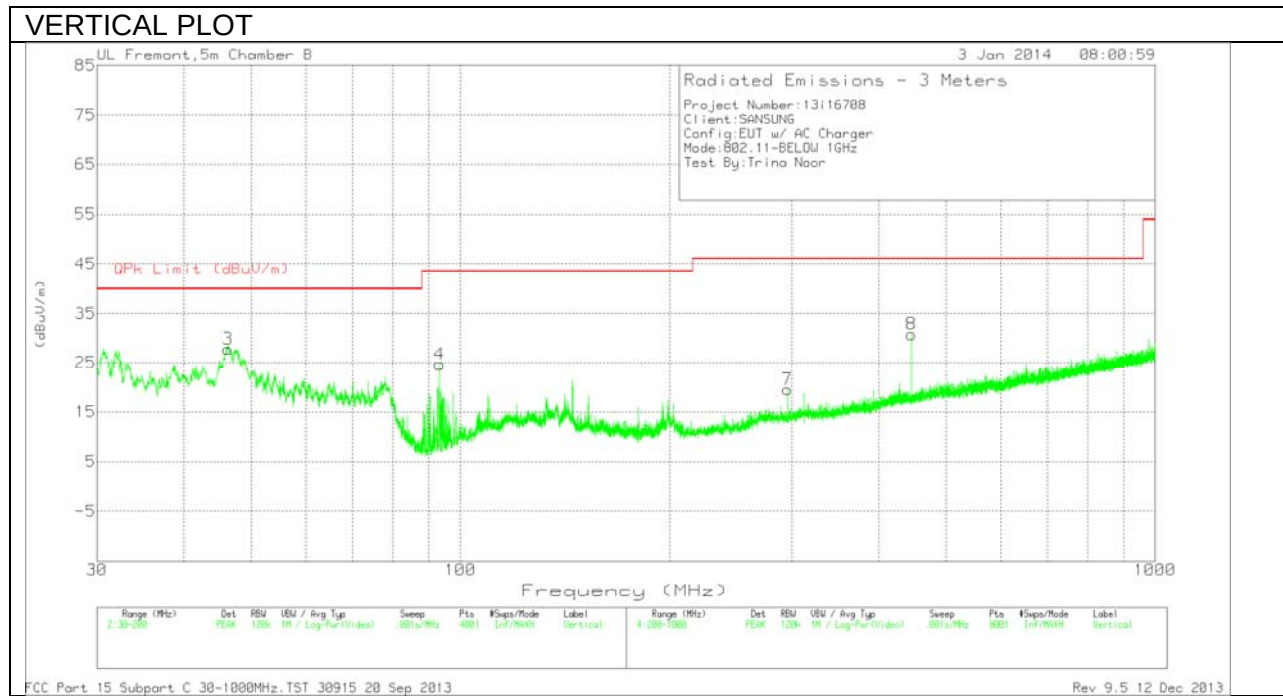
FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Sep 2013 Rev 9.5 12 Dec 2013

10.3. WORST-CASE BELOW 1 GHz

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



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



Below 1G Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	46.2775	47.2	PK	9.3	-28.7	27.8	40	-12.2	0-360	101	V
1	55.415	41.93	PK	6.8	-28.6	20.13	40	-19.87	0-360	200	H
2	89.6275	34.6	PK	7.5	-28.2	13.9	43.52	-29.62	0-360	200	H
4	93.3675	44.58	PK	8.2	-28.1	24.68	43.52	-18.84	0-360	101	V
5	234	33.68	PK	11.2	-26.6	18.28	46.02	-27.74	0-360	101	H
7	295.7	32.33	PK	13.3	-26.1	19.53	46.02	-26.49	0-360	101	V
6	312	34.56	PK	13.7	-26	22.26	46.02	-23.76	0-360	101	H
8	445.8	40.19	PK	16.6	-26	30.79	46.02	-15.23	0-360	200	V

PK - Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 20 Sep 2013 Rev 9.5 12 Dec 2013

11. 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 2009.

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

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.15	48.07	PK	.1	0	48.17	66	-17.83	-	-
2	.15	28.58	Av	.1	0	28.68	-	-	56	-27.32
3	.7755	41.42	PK	.1	0	41.52	56	-14.48	-	-
4	.7755	24.46	Av	.1	0	24.56	-	-	46	-21.44
5	2.1615	39.84	PK	.1	.1	40.04	56	-15.96	-	-
6	2.1615	23.41	Av	.1	.1	23.61	-	-	46	-22.39
7	5.3205	36.96	PK	.1	.1	37.16	60	-22.84	-	-
8	5.3205	19.67	Av	.1	.1	19.87	-	-	50	-30.13
9	22.9065	30.75	PK	.4	.2	31.35	60	-28.65	-	-
10	22.9065	13.66	Av	.4	.2	14.26	-	-	50	-35.74

Line-L2 .15 - 30MHz

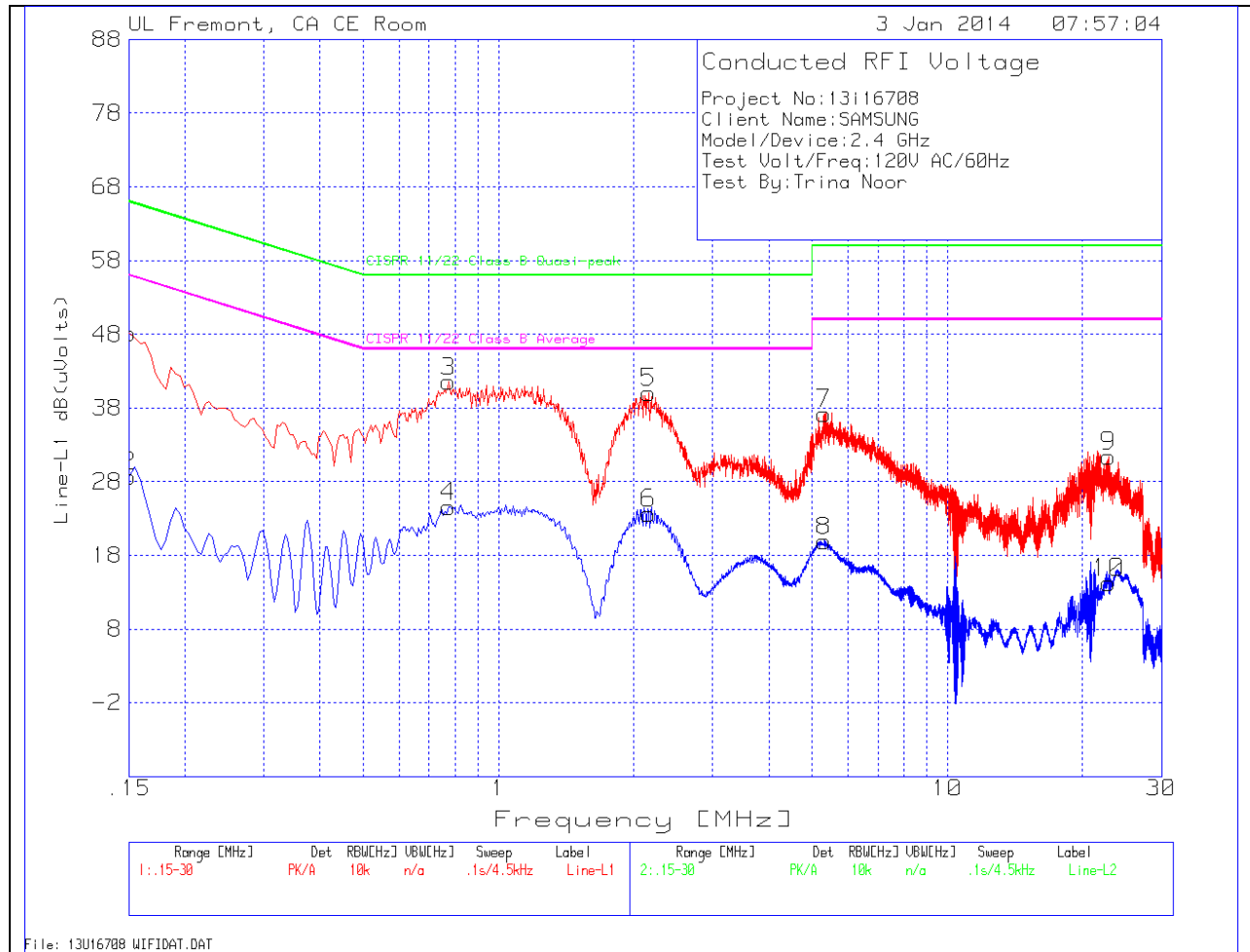
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
11	.1545	36.9	PK	.1	0	37	65.8	-28.8	-	-
12	.1545	14.84	Av	.1	0	14.94	-	-	55.8	-40.86
13	.852	36.32	PK	.1	0	36.42	56	-19.58	-	-
14	.852	20.42	Av	.1	0	20.52	-	-	46	-25.48
15	5.01	32.08	PK	.1	.1	32.28	60	-27.72	-	-
16	5.01	15.06	Av	.1	.1	15.26	-	-	50	-34.74
17	25.2285	36.93	PK	.5	.3	37.73	60	-22.27	-	-
18	25.2285	15.59	Av	.5	.3	16.39	-	-	50	-33.61

PK - Peak detector

Av - average detection

LINE 1 RESULTS



LINE 2 RESULTS

