



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n

MODEL NUMBER: SM-G3502T

FCC ID: A3LSMG3502T

REPORT NUMBER: 14I17207-4, Revision A

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Prepared for

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION.....	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	7
5.4. WORST-CASE CONFIGURATION AND MODE.....	8
5.5. DESCRIPTION OF TEST SETUP.....	9
6. TEST AND MEASUREMENT EQUIPMENT	11
7. MEASUREMENT METHODS.....	12
8. SUMMARY TABLE	13
9. ANTENNA PORT TEST RESULTS	14
9.1. 6 dB BANDWIDTH	14
9.1.1. 802.11b MODE IN THE 2.4 GHz BAND.....	15
9.1.2. 802.11g MODE IN THE 2.4 GHz BAND.....	15
9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	15
9.1.4. PLOTS.....	16
9.2. 99% BANDWIDTH.....	19
9.2.1. 802.11b MODE IN THE 2.4 GHz BAND.....	19
9.2.2. 802.11g MODE IN THE 2.4 GHz BAND.....	19
9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	19
9.2.1. PLOTS.....	20
9.3. AVERAGE POWER.....	23
9.3.1. 802.11b MODE IN THE 2.4 GHz BAND.....	24
9.3.2. 802.11g MODE IN THE 2.4 GHz BAND.....	24
9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	24
9.4. OUTPUT POWER	25
9.4.1. 802.11b MODE IN THE 2.4 GHz BAND.....	26
9.4.2. 802.11g MODE IN THE 2.4 GHz BAND.....	26
9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	27

9.4.1.	PLOTS.....	28
9.5.	PSD	31
9.5.1.	802.11b MODE IN THE 2.4 GHz BAND.....	31
9.5.2.	802.11g MODE IN THE 2.4 GHz BAND.....	31
9.5.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND	31
9.5.1.	PLOTS.....	32
9.6.	OUT-OF-BAND EMISSIONS.....	35
9.6.1.	802.11b MODE IN THE 2.4 GHz BAND.....	36
9.6.2.	802.11g MODE IN THE 2.4 GHz BAND.....	42
9.6.3.	802.11n MODE IN THE 2.4 GHz BAND.....	48
10.	RADIATED TEST RESULTS.....	54
10.1.	LIMITS AND PROCEDURE.....	54
10.2.	TRANSMITTER ABOVE 1 GHz.....	55
10.2.1.	TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND	55
10.2.2.	TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND	72
10.2.3.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND	89
10.3.	WORST-CASE BELOW 1 GHz	106
11.	AC POWER LINE CONDUCTED EMISSIONS	109
12.	SETUP PHOTOS	113

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

EUT DESCRIPTION: GSM/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n

MODEL: SM-G3502T

SERIAL NUMBER: FL-083-D (Conducted), FL-083-B, FL-083-C, FL-083-A (Radiated)

DATE TESTED: February 7- 26, 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 C63.4-2009.

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:

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

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

GSM/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n

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	18.92	77.98
2412 - 2462	802.11g	21.52	141.91
2412 - 2462	802.11n HT20	19.72	93.76

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 2.29 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-3502T	N/A	N/A
Earphone	Samsung	SM-3502T	N/A	N/A

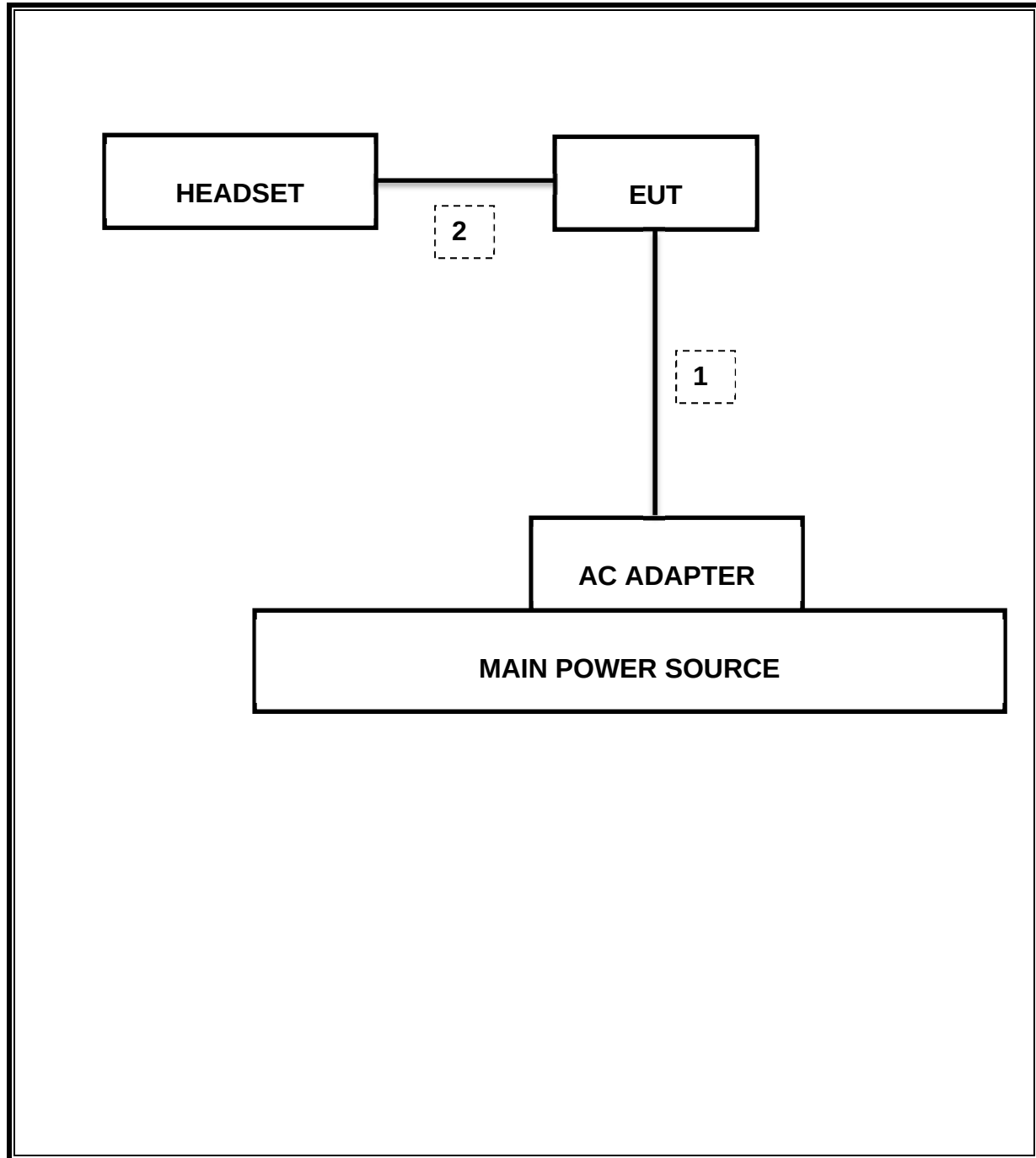
I/O CABLES

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	01/16/14	01/16/15
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	01/14/14	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/13	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/13	12/13/14

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.

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

For Band edge testing: 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.

8. SUMMARY TABLE

The model FCC ID: A3LSMG3502T shares the same enclosure and circuit board as mode FCC ID: A3LSMG350M. The WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units.

After confirming through preliminary radiated emissions that the performance of the A3LSMG350M WLAN remains representative of this model (FCC ID A3LSMG3502T) test data for FCC ID: A3LSMG350M is being submitted for this application.

Radiated emissions were fully re-evaluated against 15B requirements for digital devices and results indicated no significant differences between the two versions. Other differences between the two FCC IDs are in the WWAN antenna design, removal of SIM socket 2 and WWAN SAR and EMC has been fully retested for FCC ID: A3LSMG3502T.

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	8.00MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-28.53dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	21.52dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-5.89dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	50.36dBuV/m
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	53.255dBuV/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	8.00	0.5
Mid	2437	8.04	0.5
High	2462	8.04	0.5
Worst		8.00	

9.1.2. 802.11g MODE IN THE 2.4 GHz BAND

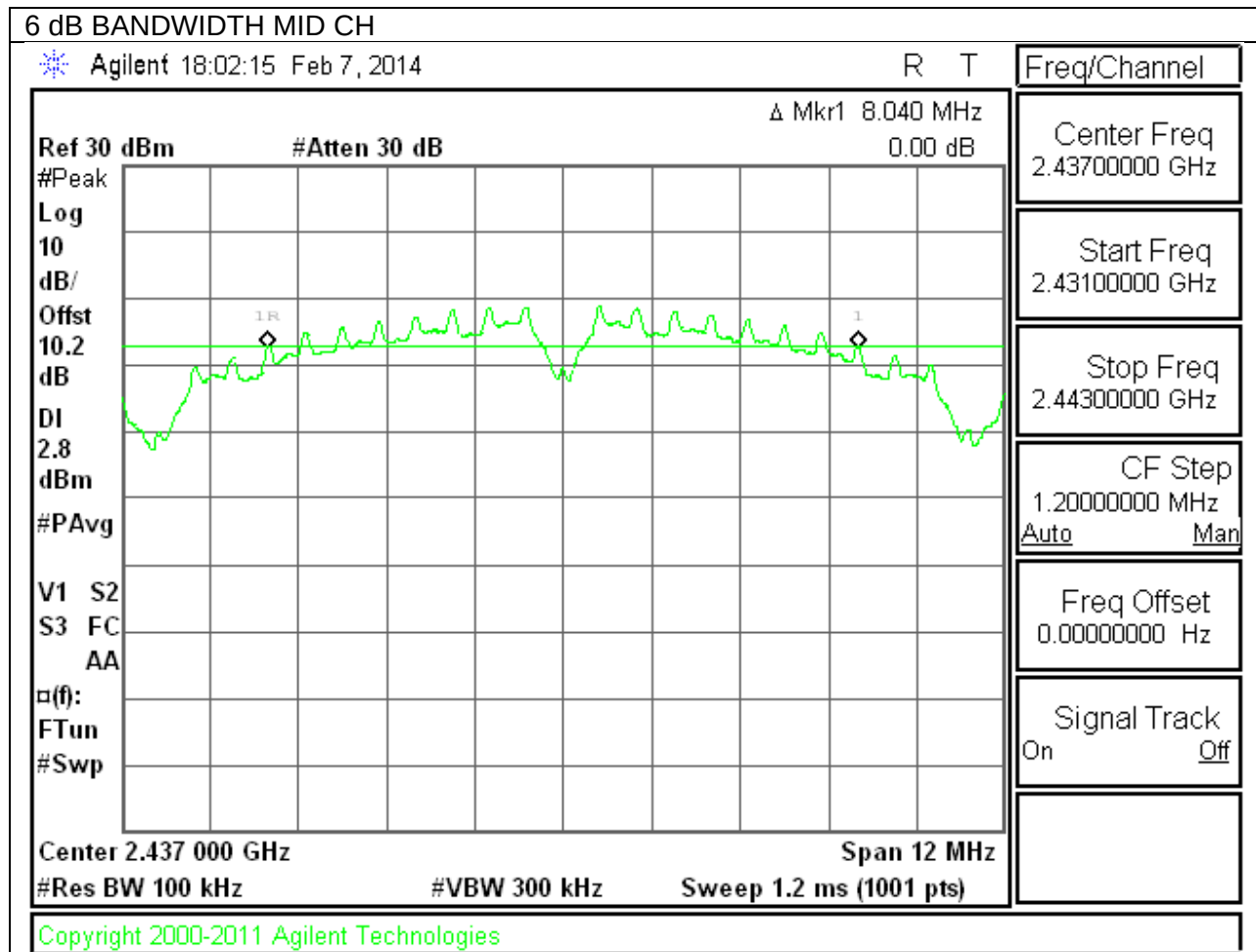
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.48	0.5
Mid	2437	16.42	0.5
High	2462	16.48	0.5
Worst		16.42	

9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

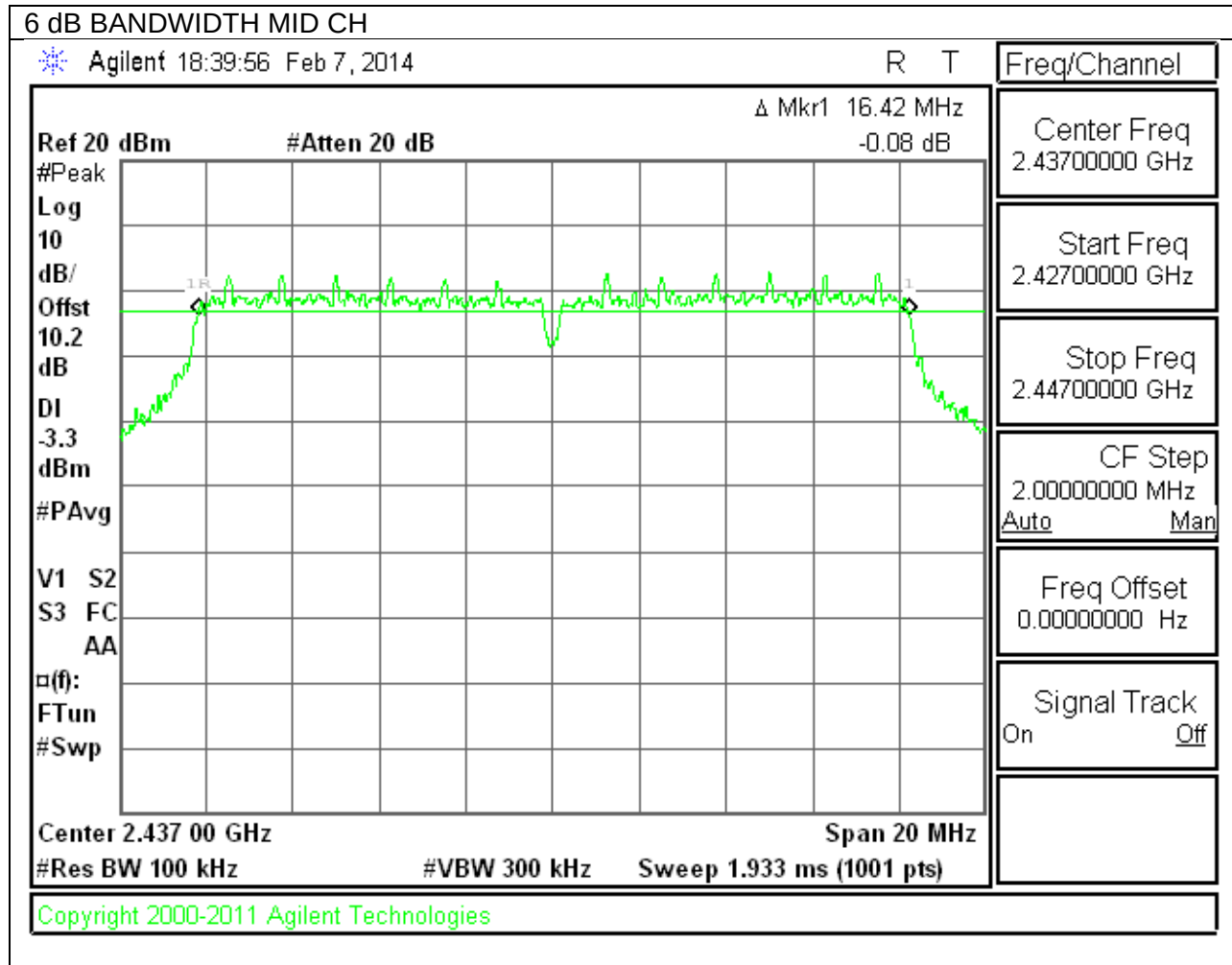
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.68	0.5
Mid	2437	17.65	0.5
High	2462	17.65	0.5
Worst		17.65	

9.1.4. PLOTS

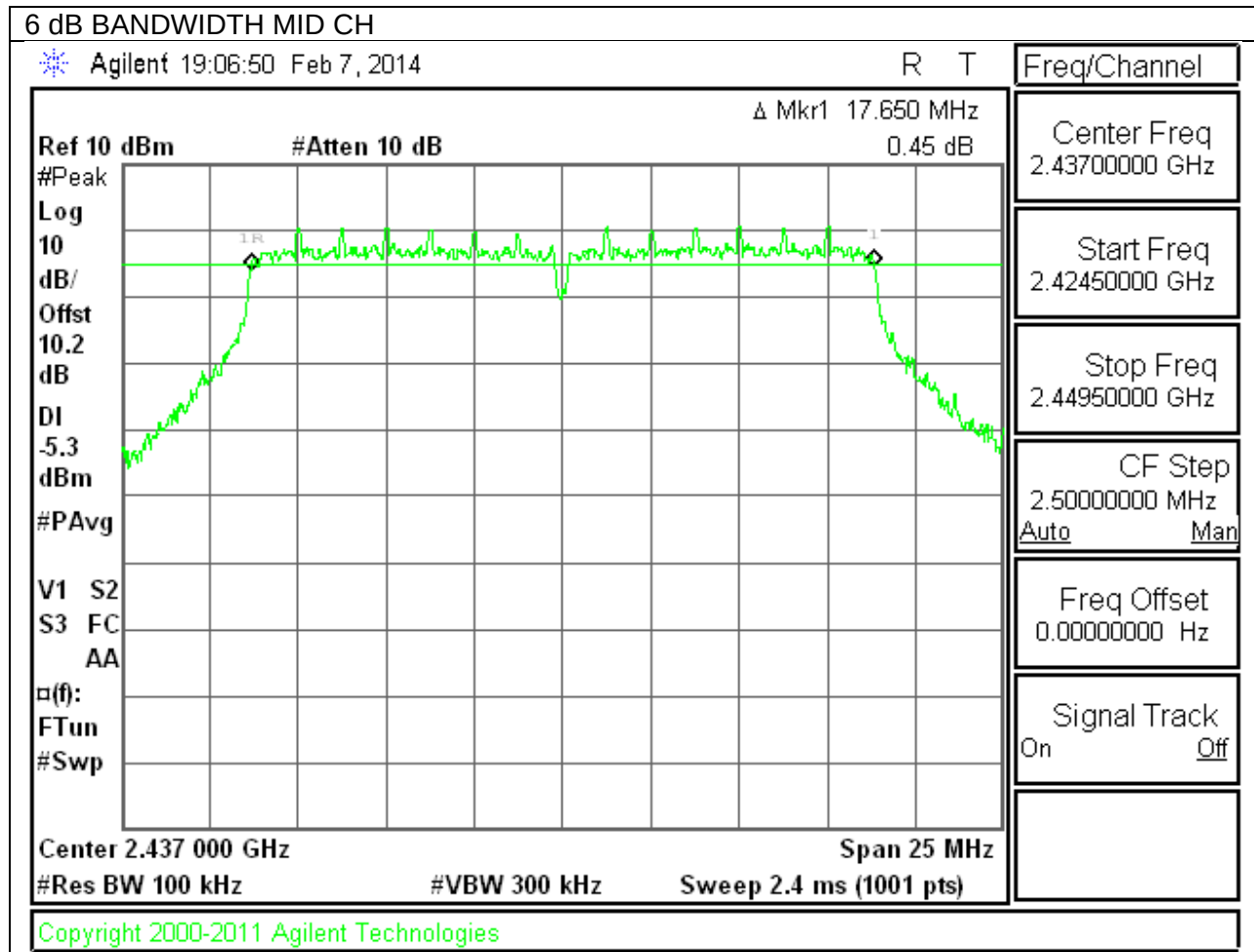
802.11b 6 dB BANDWIDTH



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	12.97
Mid	2437	12.74
High	2462	12.82
Worst		12.97

9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

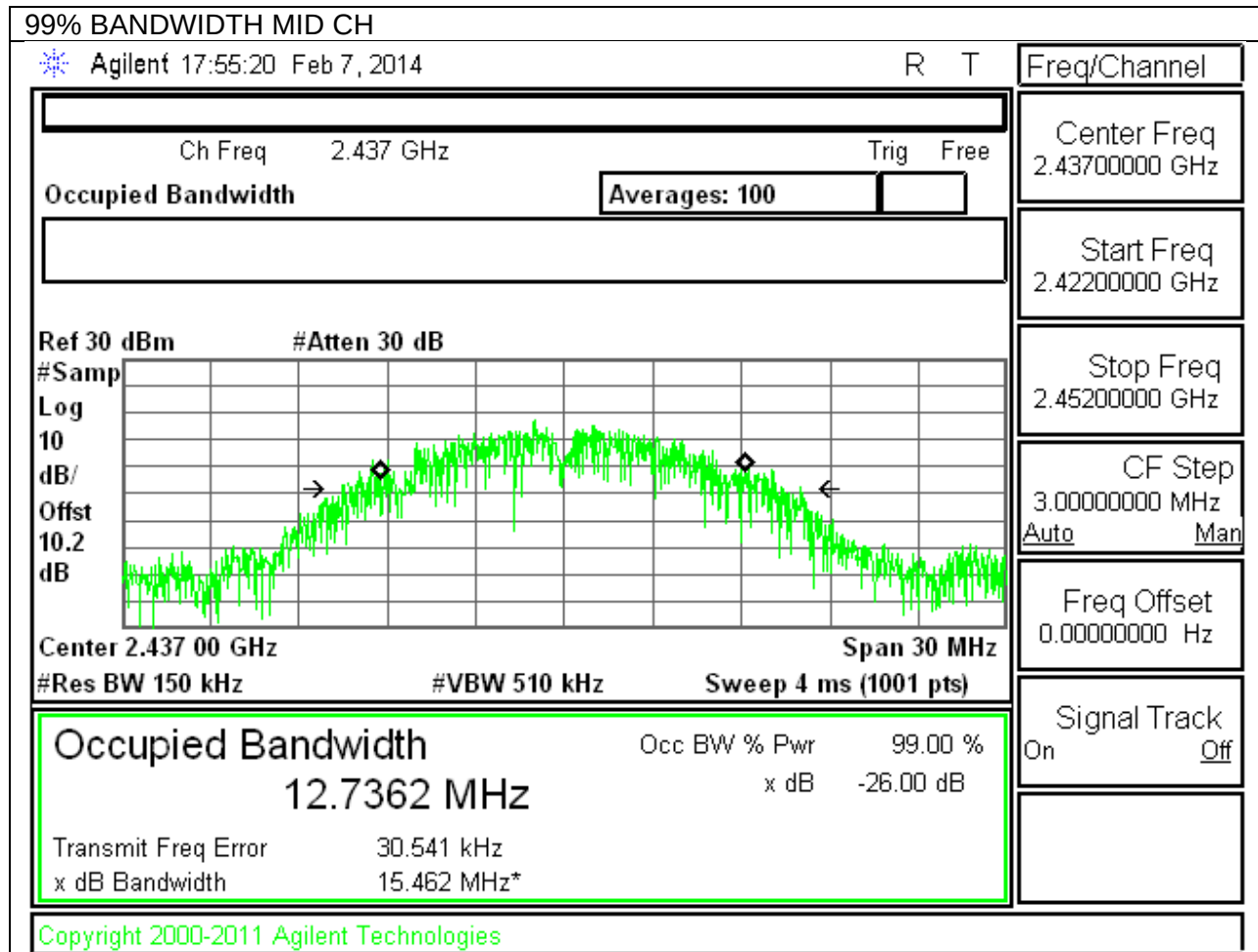
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.35
Mid	2437	16.69
High	2462	16.54
Worst		16.69

9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

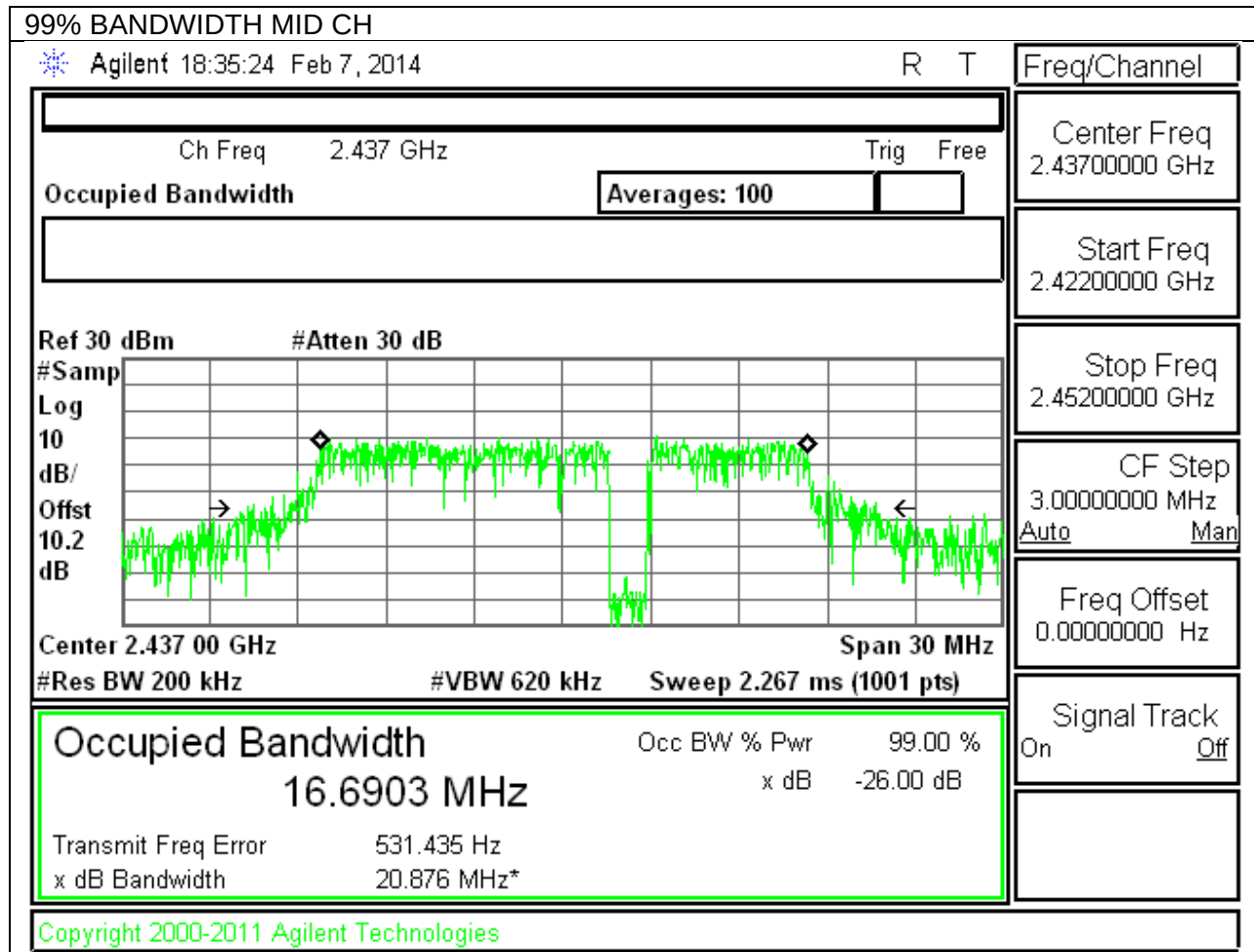
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.70
Mid	2437	17.69
High	2462	17.84
Worst		17.84

9.2.1. PLOTS

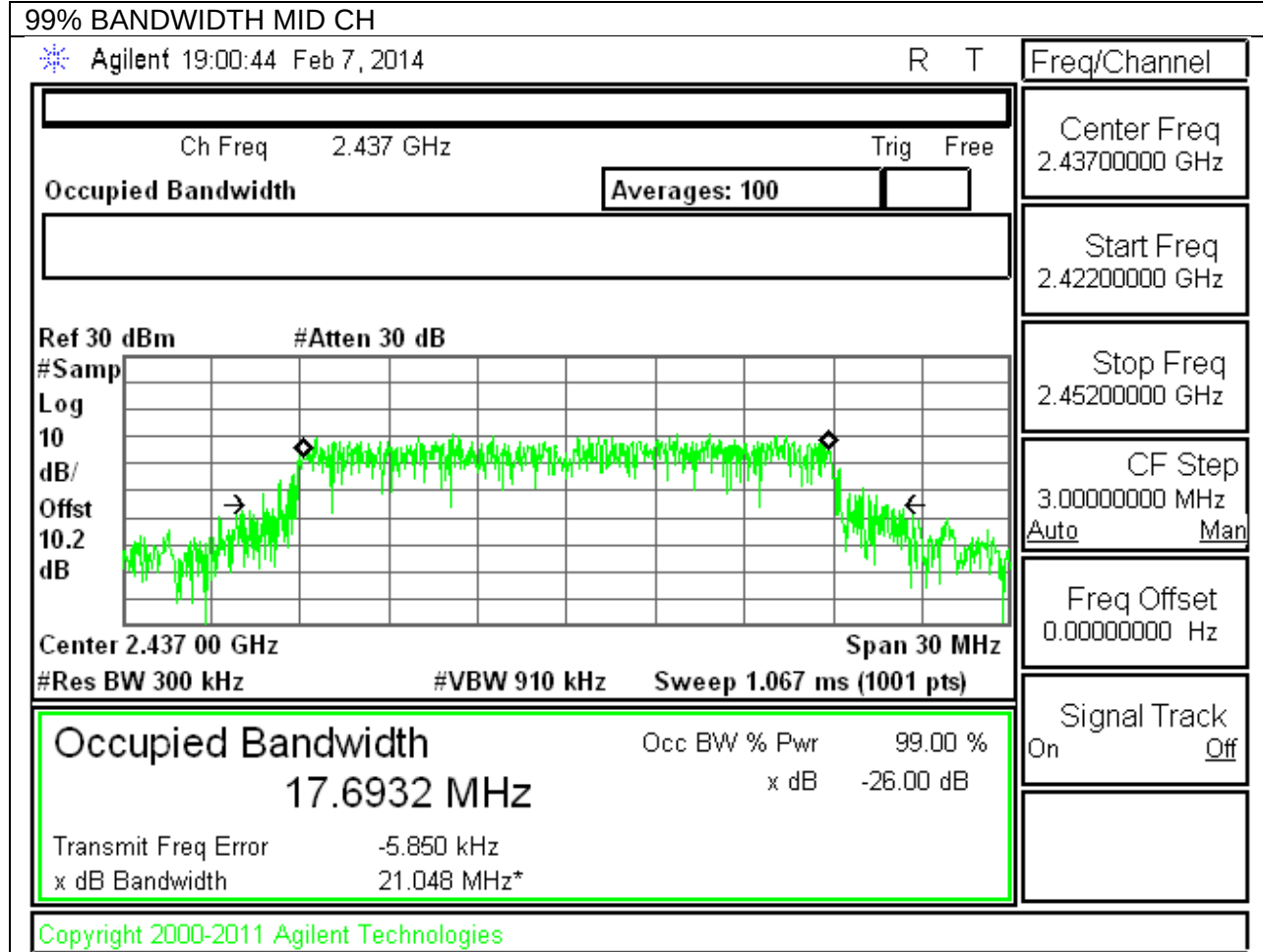
802.11b 99% BANDWIDTH



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 10.2 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	16.70
Mid	2437	17.00
High	2462	16.50
Worst		17.000

9.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	13.80
Mid	2437	14.00
High	2462	13.90
Worst		14.000

9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	11.70
Mid	2437	11.90
High	2462	11.90
Worst		11.900

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	2.29	30.00	30	36	30.00
Mid	2437	2.29	30.00	30	36	30.00
High	2462	2.29	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	18.89	18.89	30.00	-11.11
Mid	2437	18.92	18.92	30.00	-11.08
High	2462	18.44	18.44	30.00	-11.56
Worst			18.92		

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	2.29	30.00	30	36	30.00
Mid	2437	2.29	30.00	30	36	30.00
High	2462	2.29	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	21.52	21.52	30.00	-8.48
Mid	2437	21.52	21.52	30.00	-8.48
High	2462	21.47	21.47	30.00	-8.53
Worst			21.52		

9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

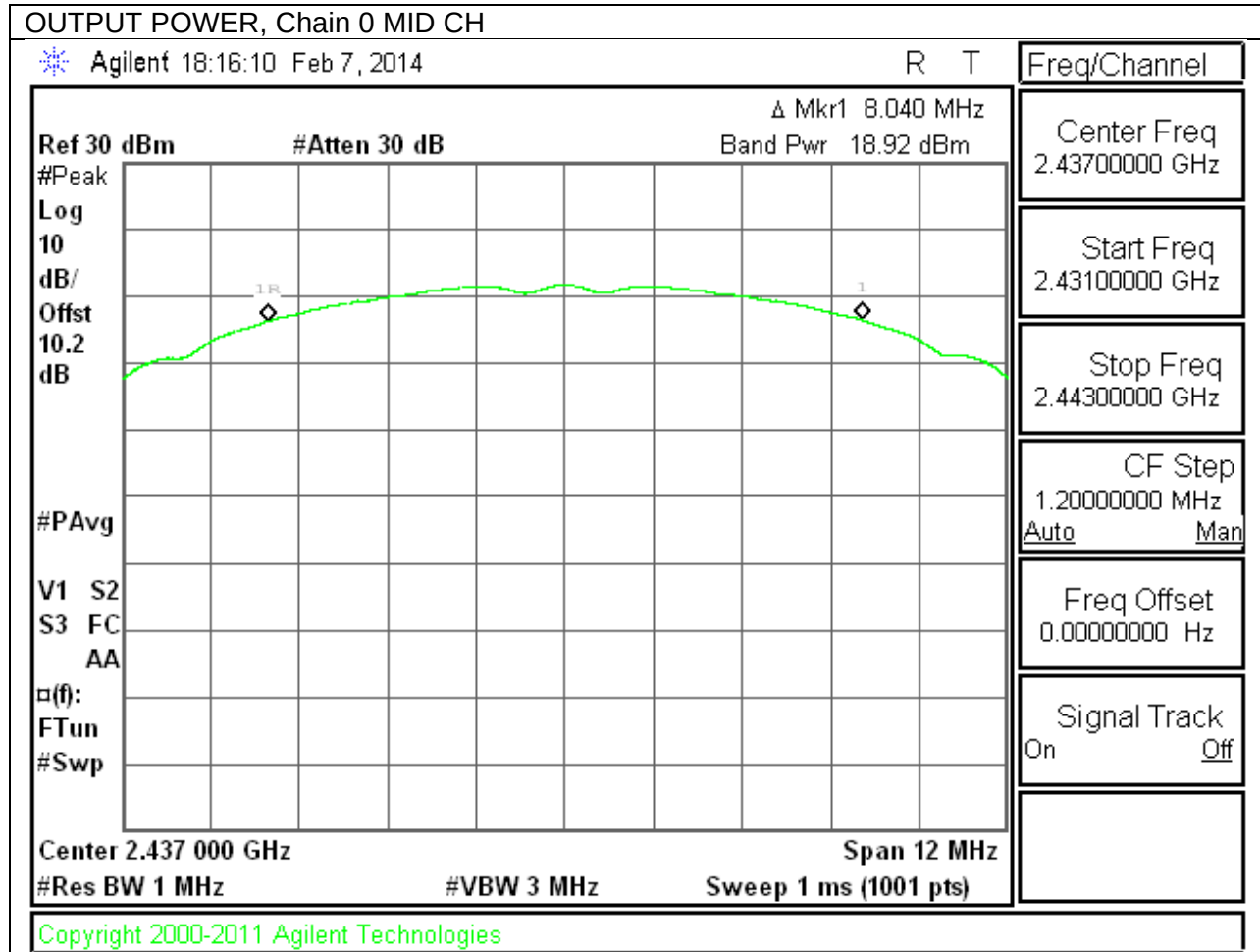
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	2.29	30.00	30	36	30.00
Mid	2437	2.29	30.00	30	36	30.00
High	2462	2.29	30.00	30	36	30.00

Results

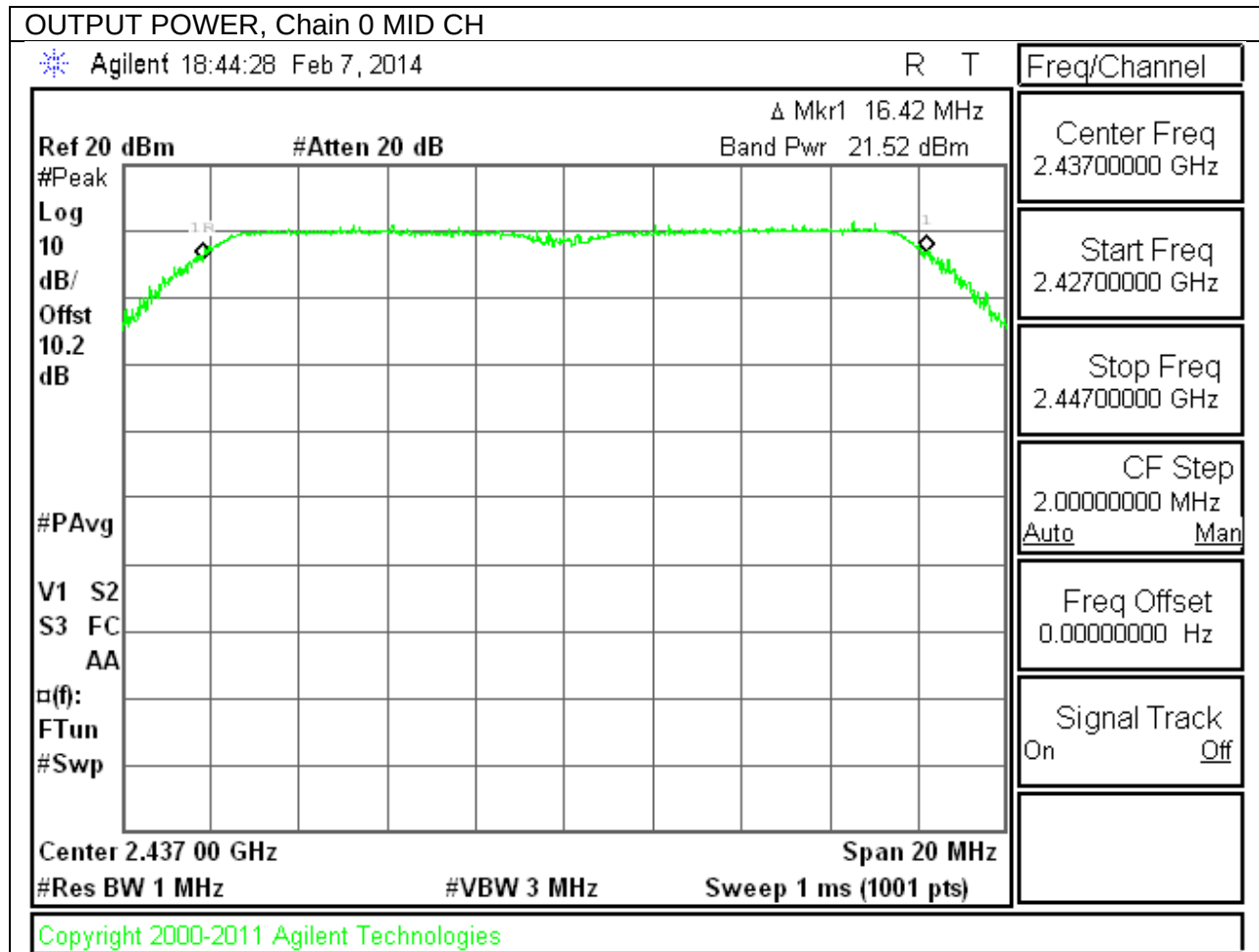
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	19.65	19.65	30.00	-10.35
Mid	2437	19.72	19.72	30.00	-10.28
High	2462	19.70	19.70	30.00	-10.30
Worst			19.72		

9.4.1. PLOTS

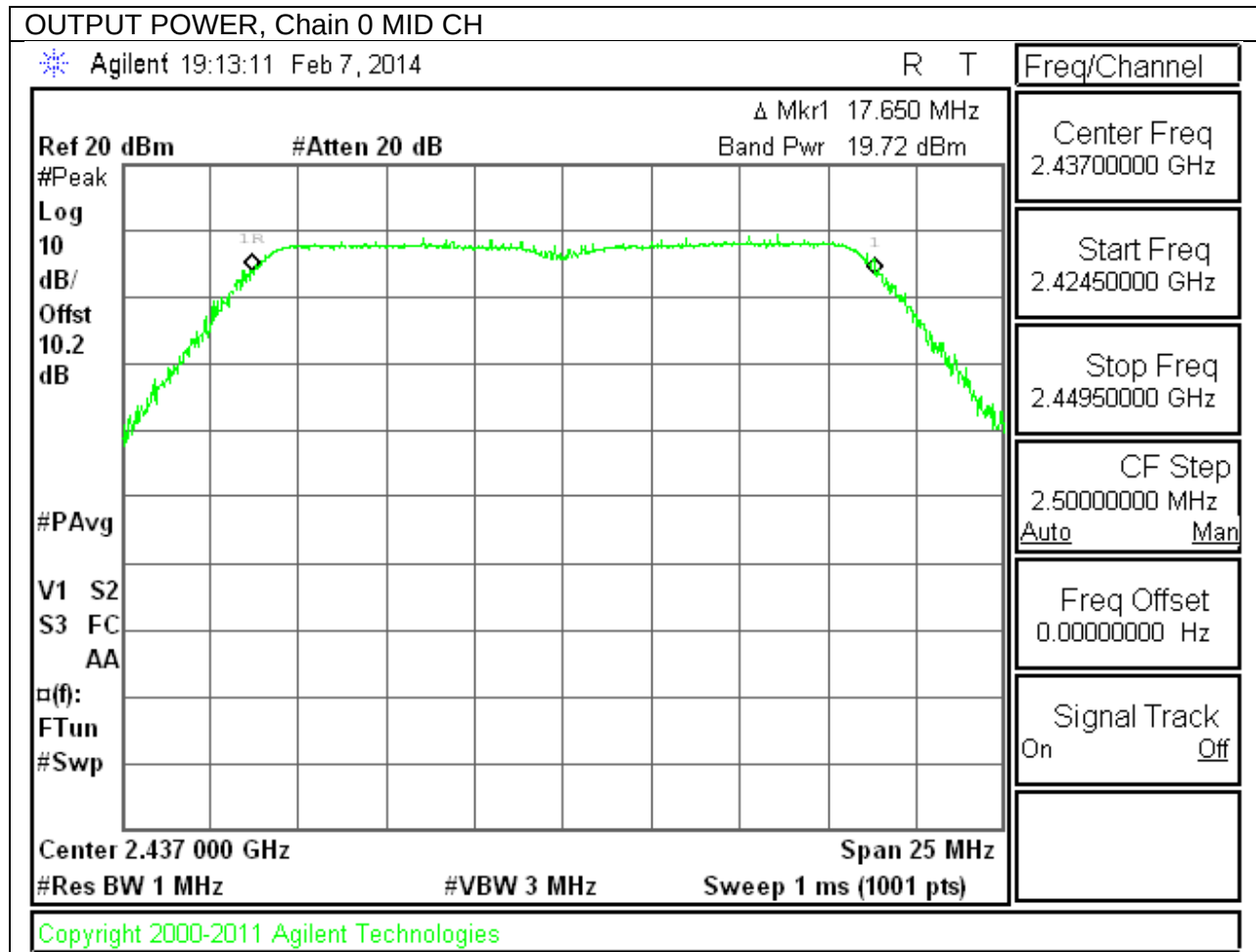
802.11b OUTPUT POWER, Chain 0



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	-6.09	8.0	-14.1
Mid	2437	-6.08	8.0	-14.1
High	2462	-5.89	8.0	-13.9

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	-11.23	8.0	-19.2
Mid	2437	-11.59	8.0	-19.6
High	2462	-11.00	8.0	-19.0

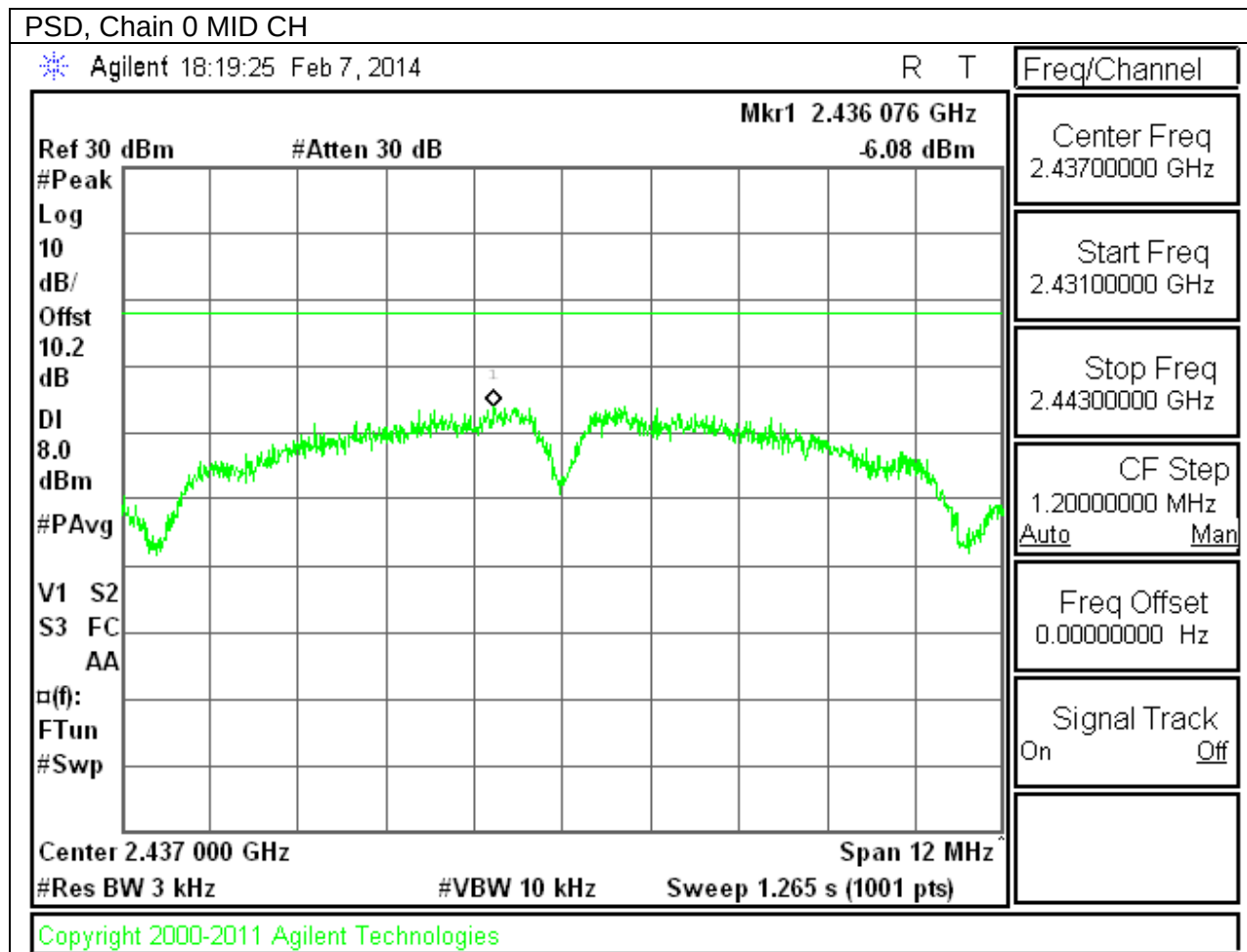
9.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

PSD Results

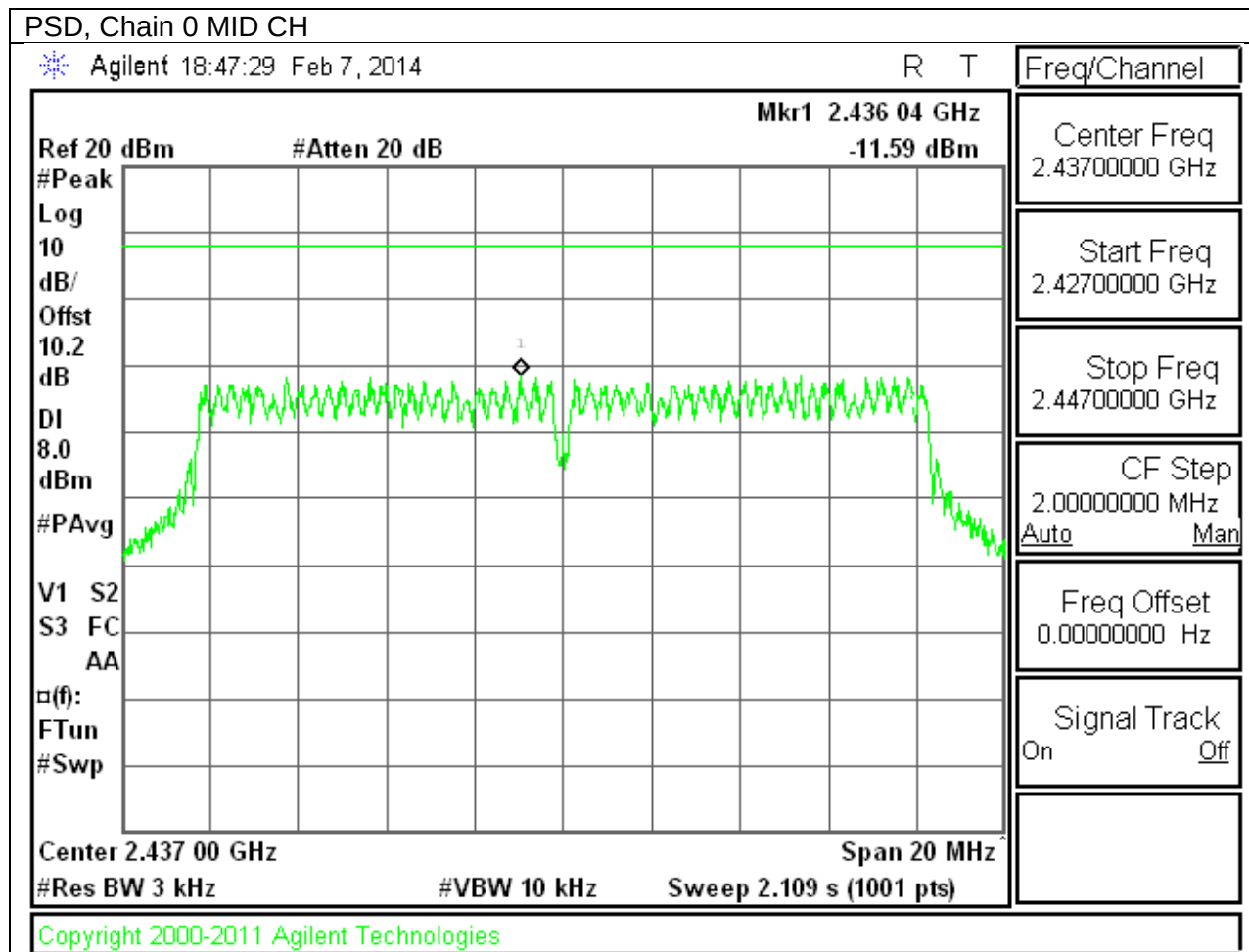
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.98	8.0	-22.0
Mid	2437	-12.64	8.0	-20.6
High	2462	-13.48	8.0	-21.5

9.5.1. PLOTS

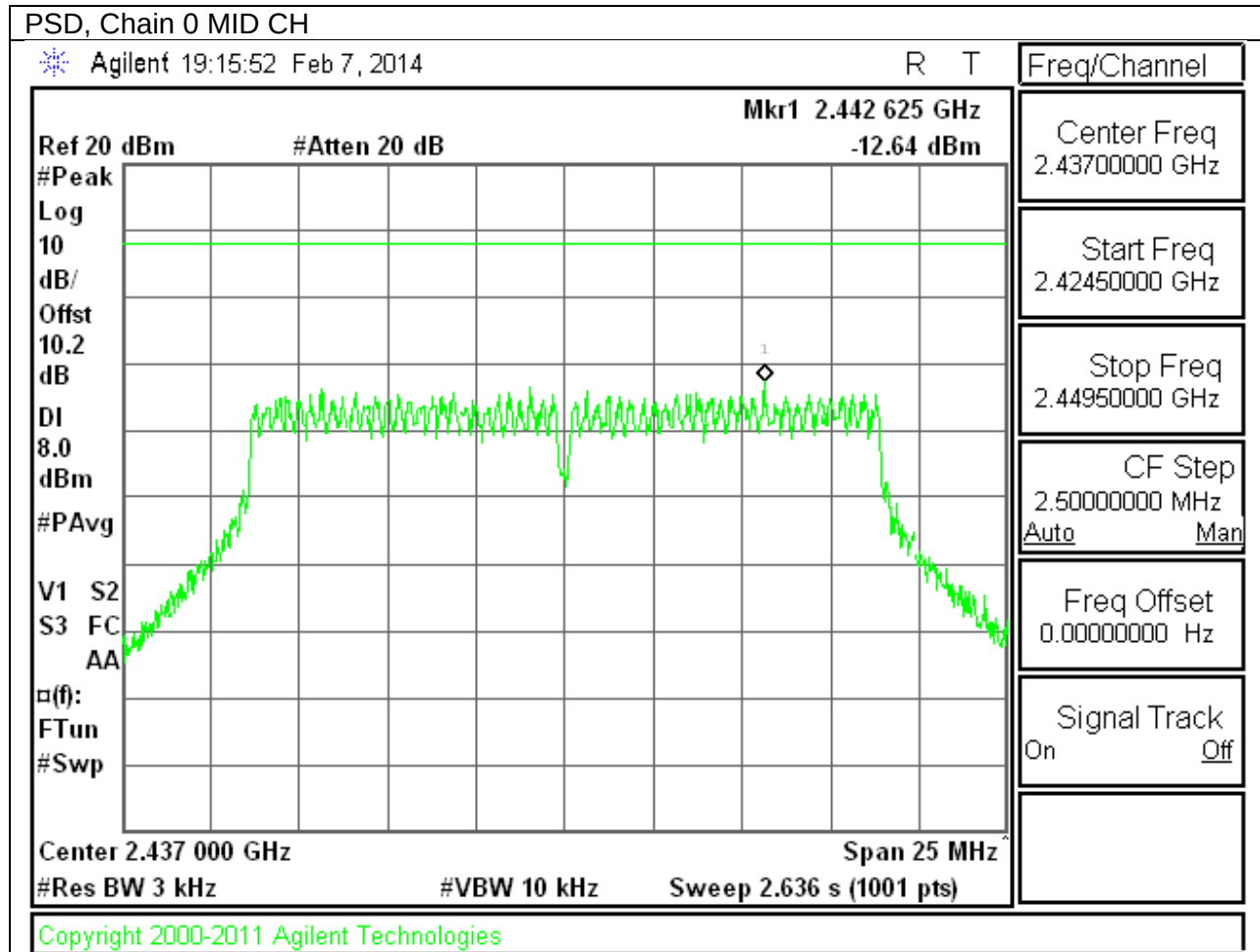
802.11b PSD, Chain 0



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.

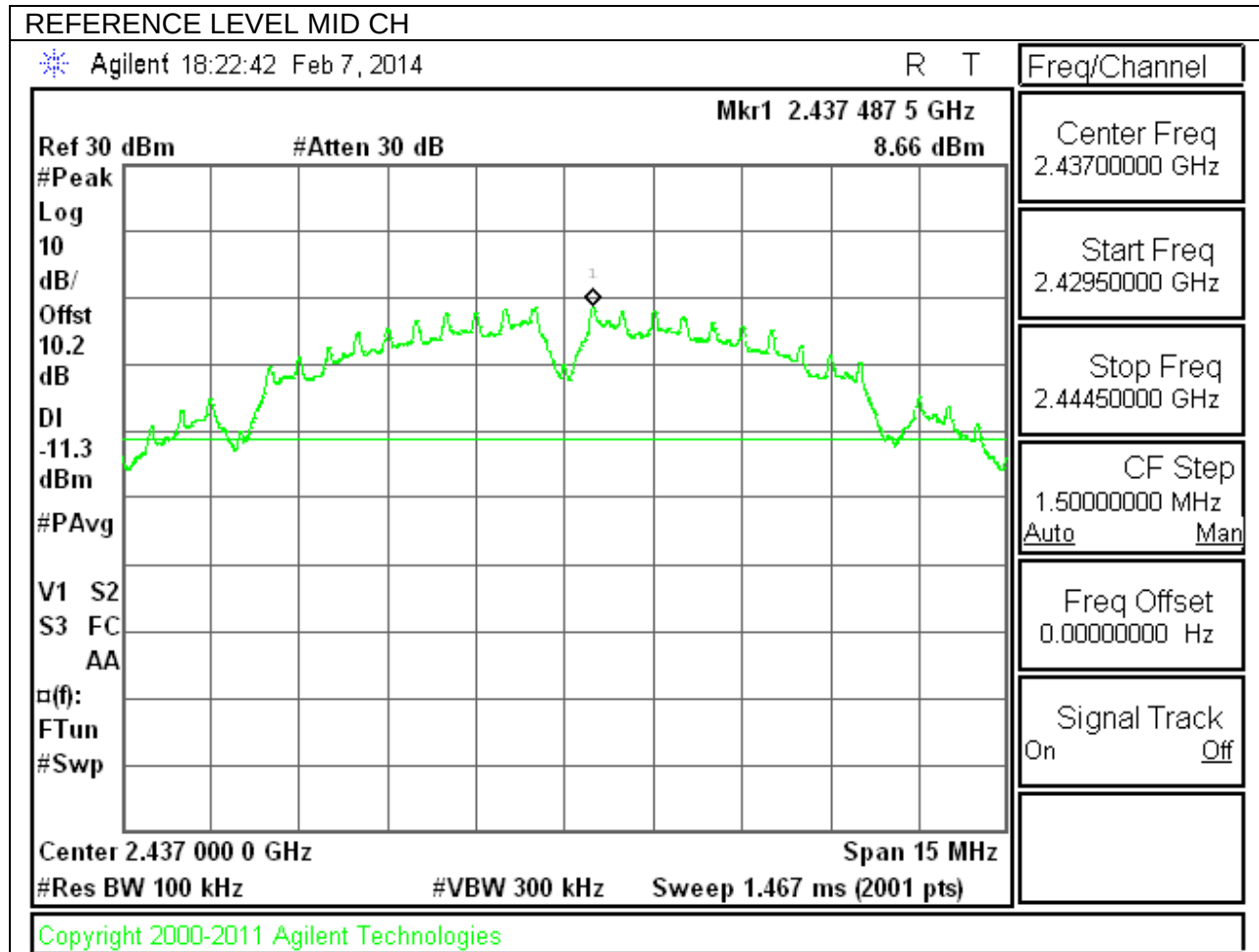
TEST PROCEDURE

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.

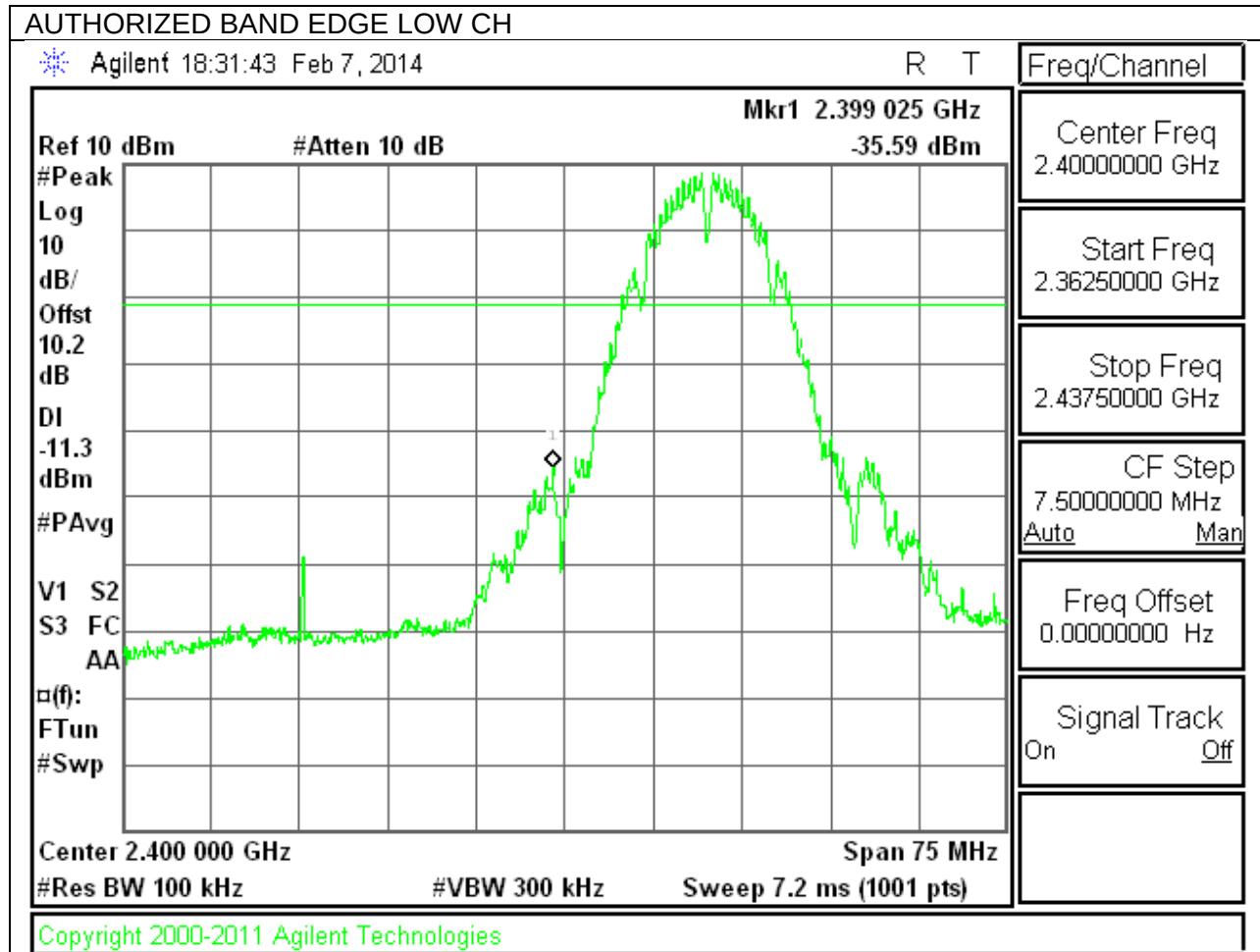
RESULTS

9.6.1. 802.11b MODE IN THE 2.4 GHz BAND

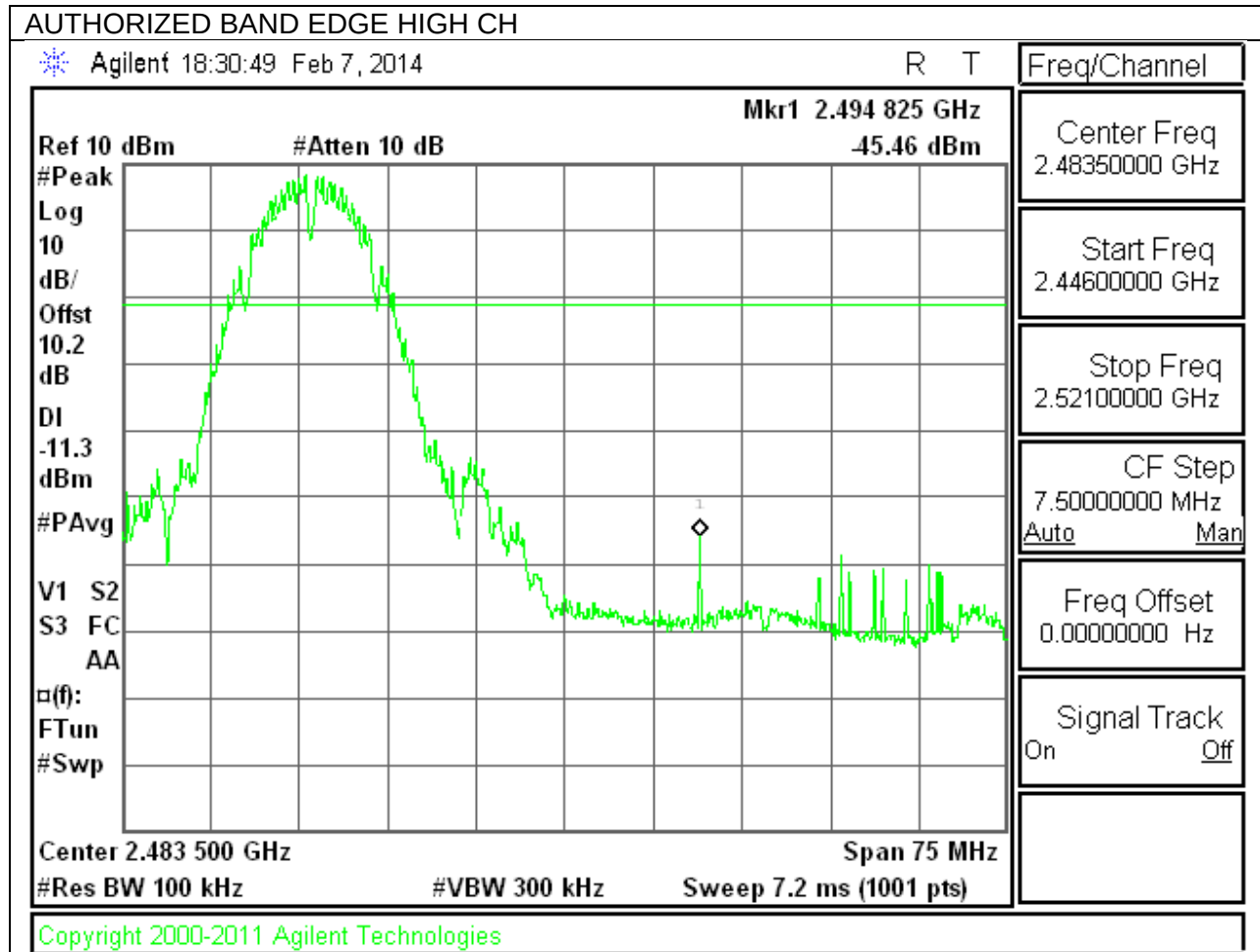
IN-BAND REFERENCE LEVEL



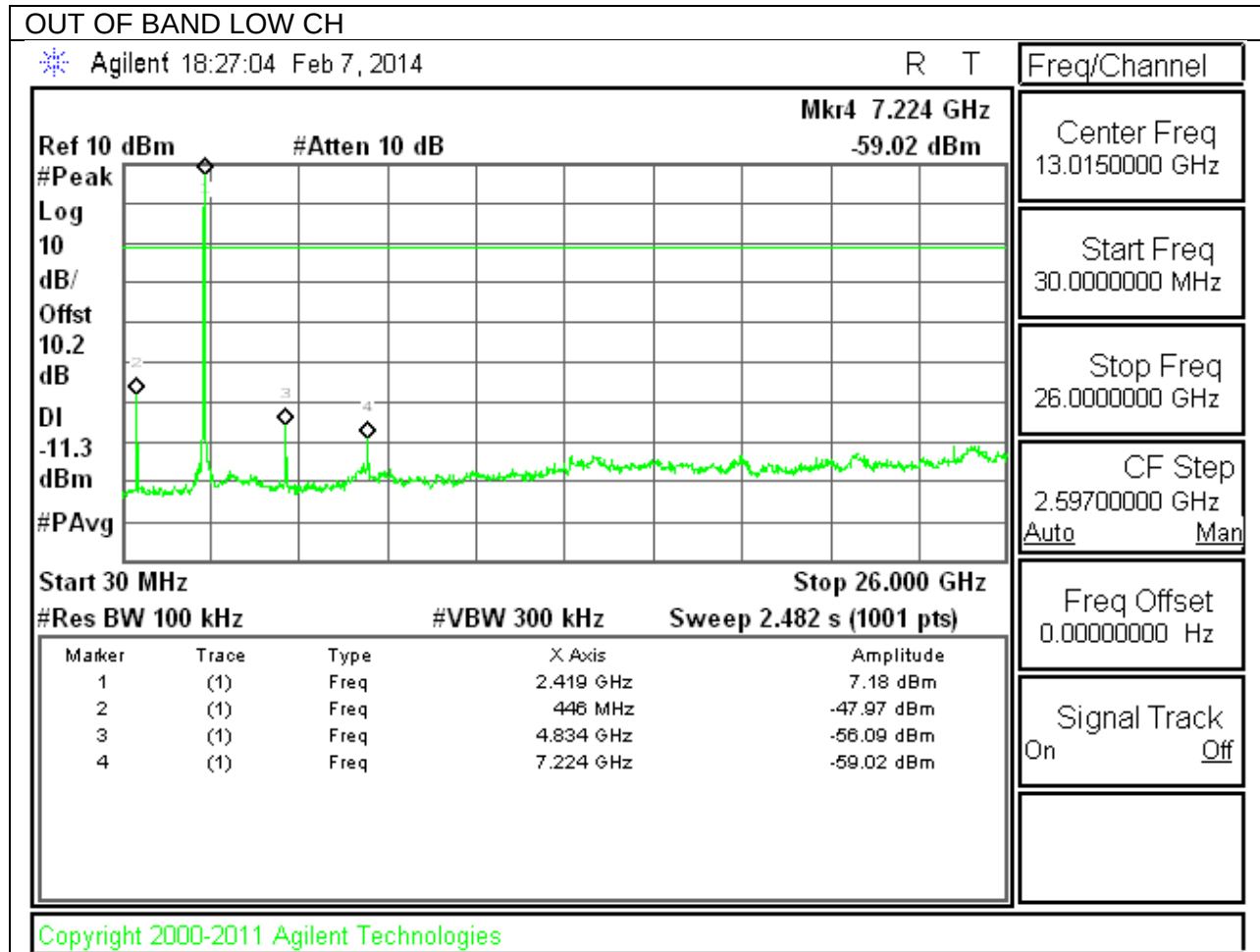
LOW CHANNEL BANDEDGE



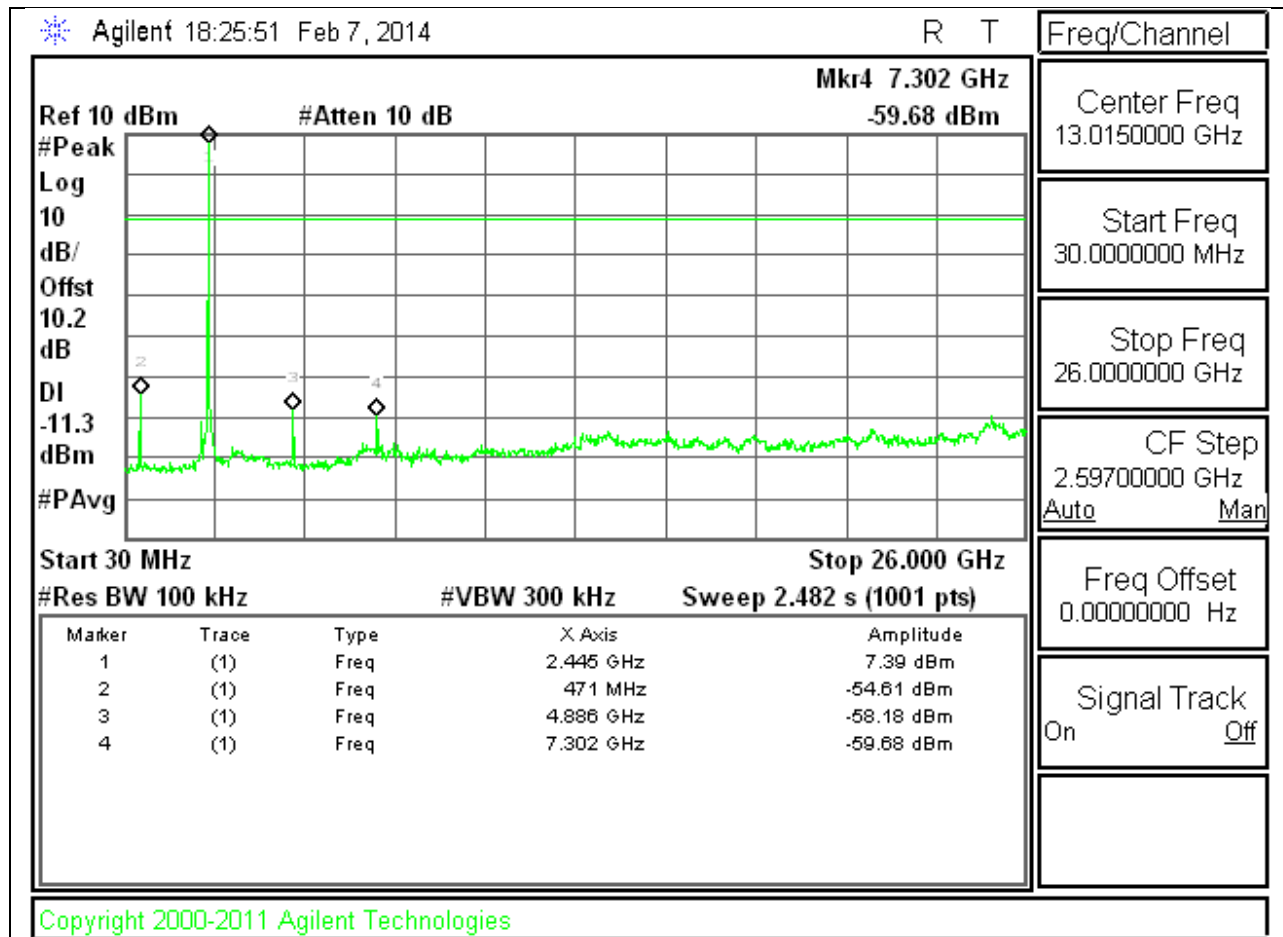
HIGH CHANNEL BANDEDGE

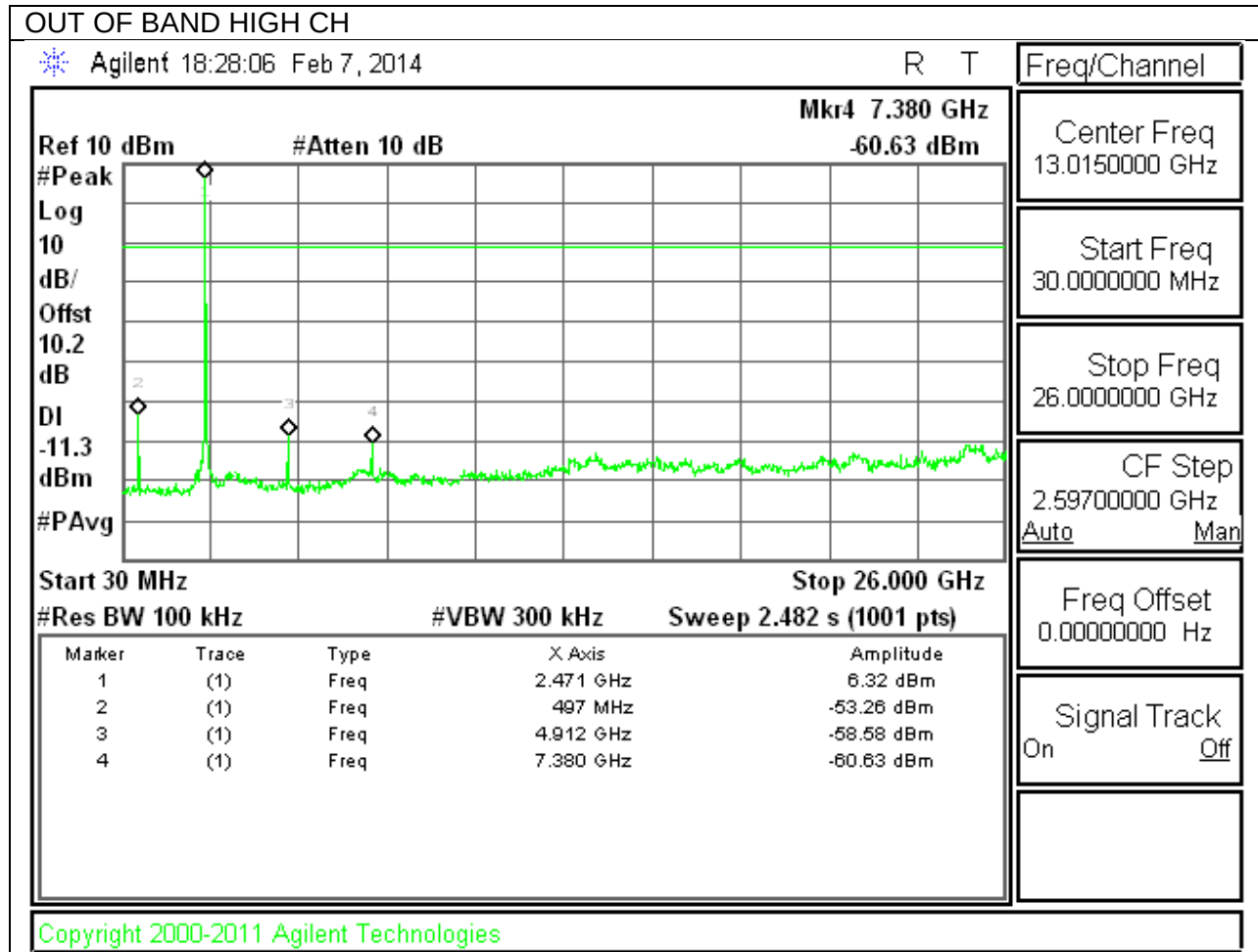


OUT-OF-BAND EMISSIONS



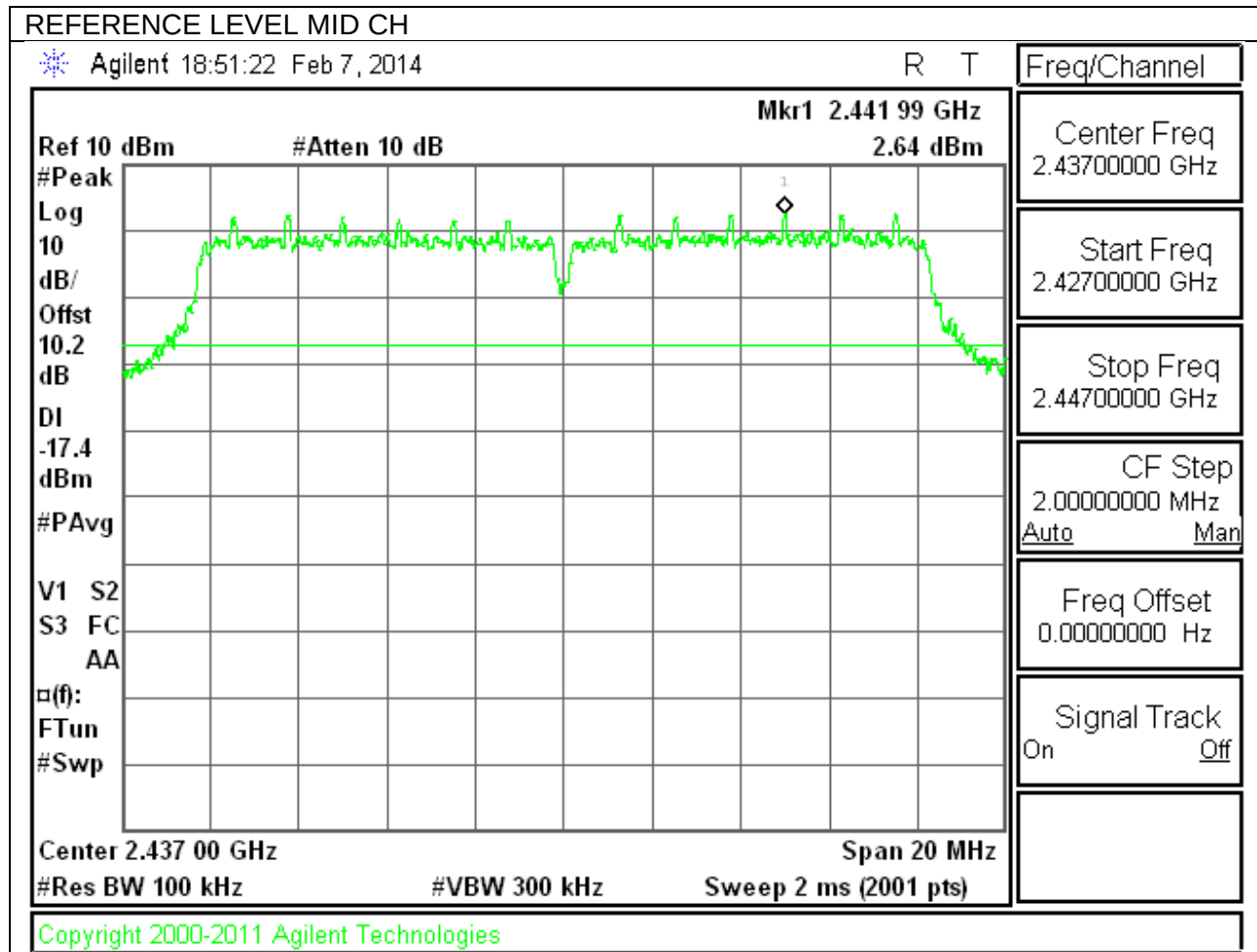
OUT OF BAND MID CH



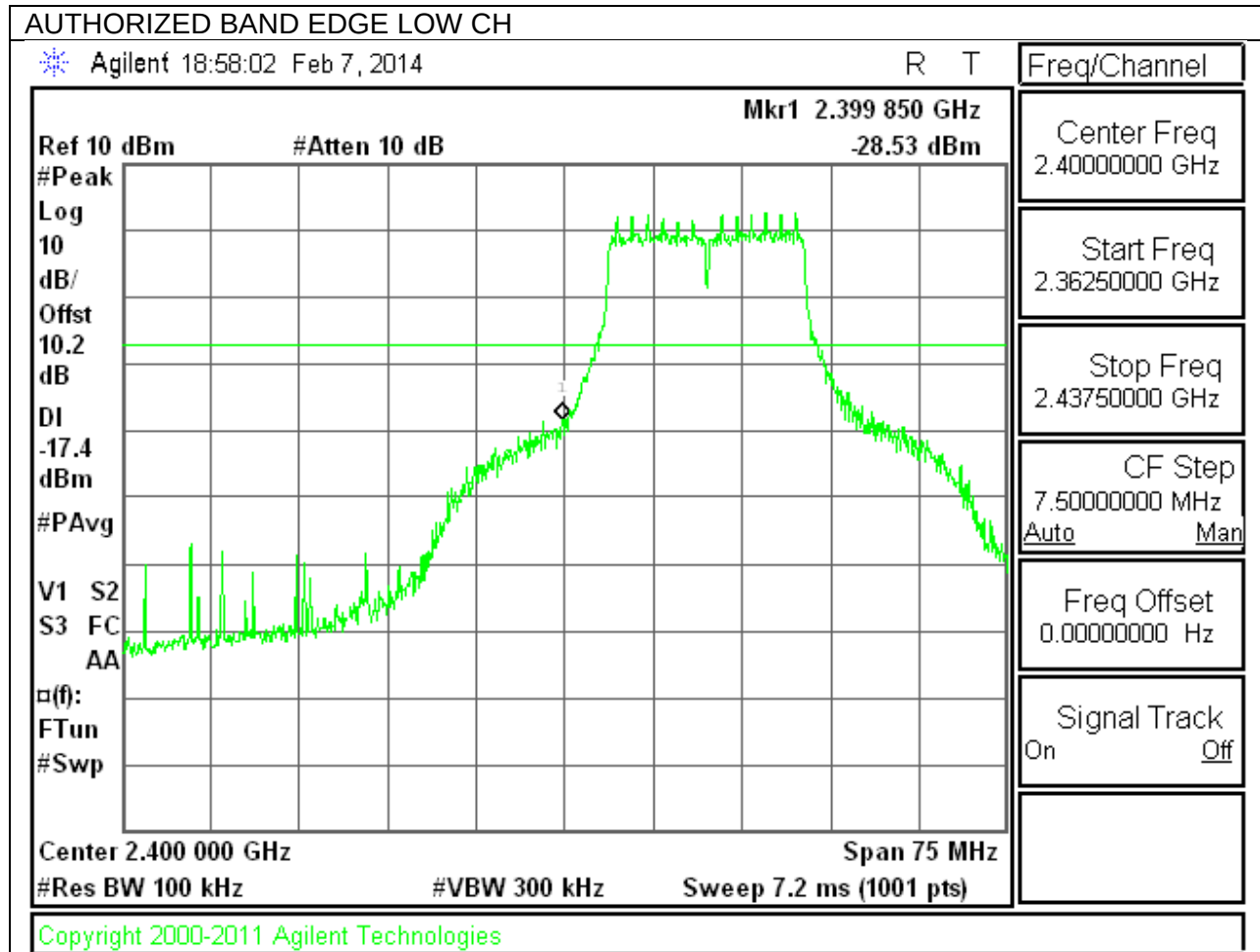


9.6.2. 802.11g MODE IN THE 2.4 GHz BAND

IN-BAND REFERENCE LEVEL

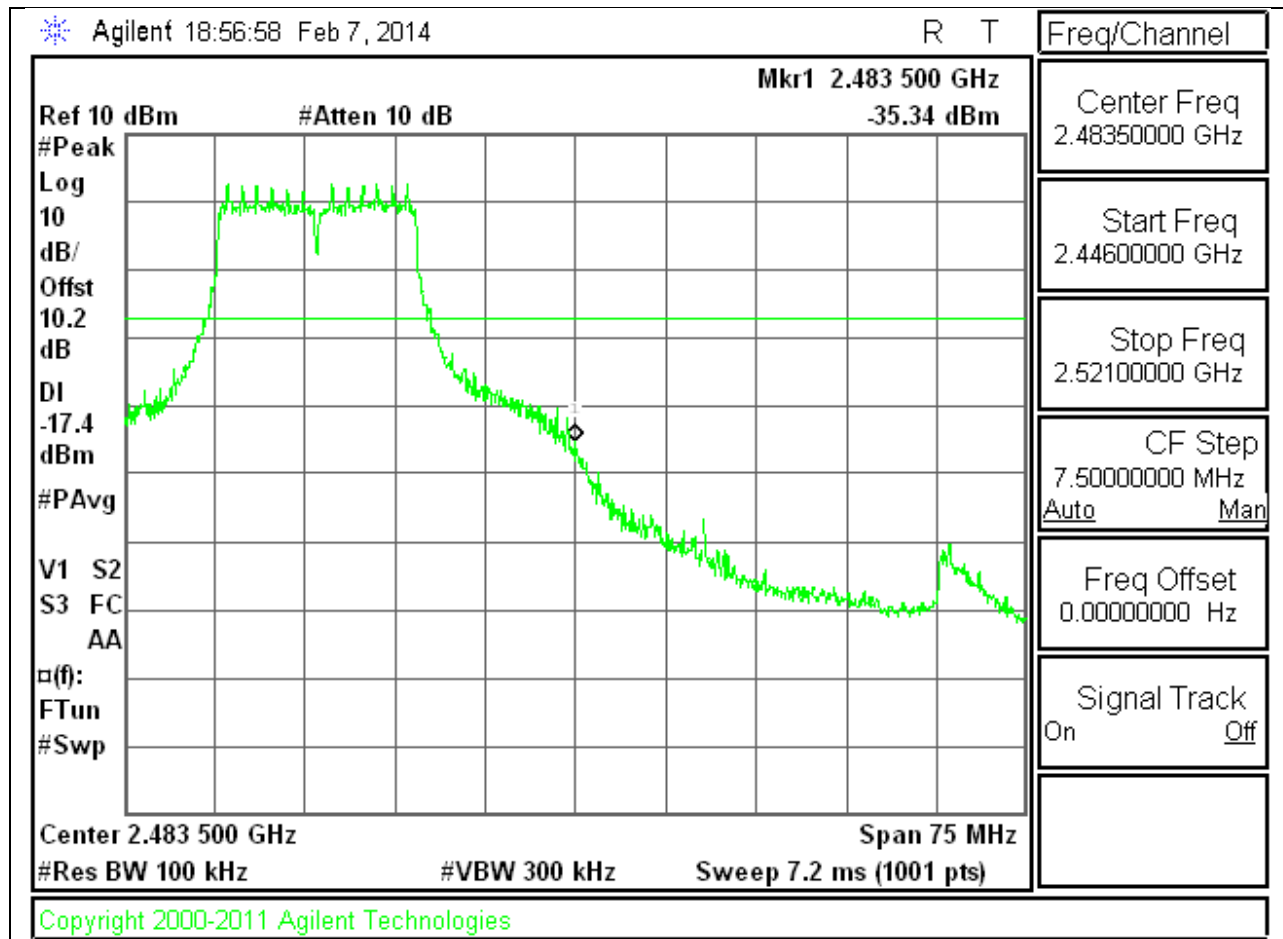


LOW CHANNEL BANDEDGE

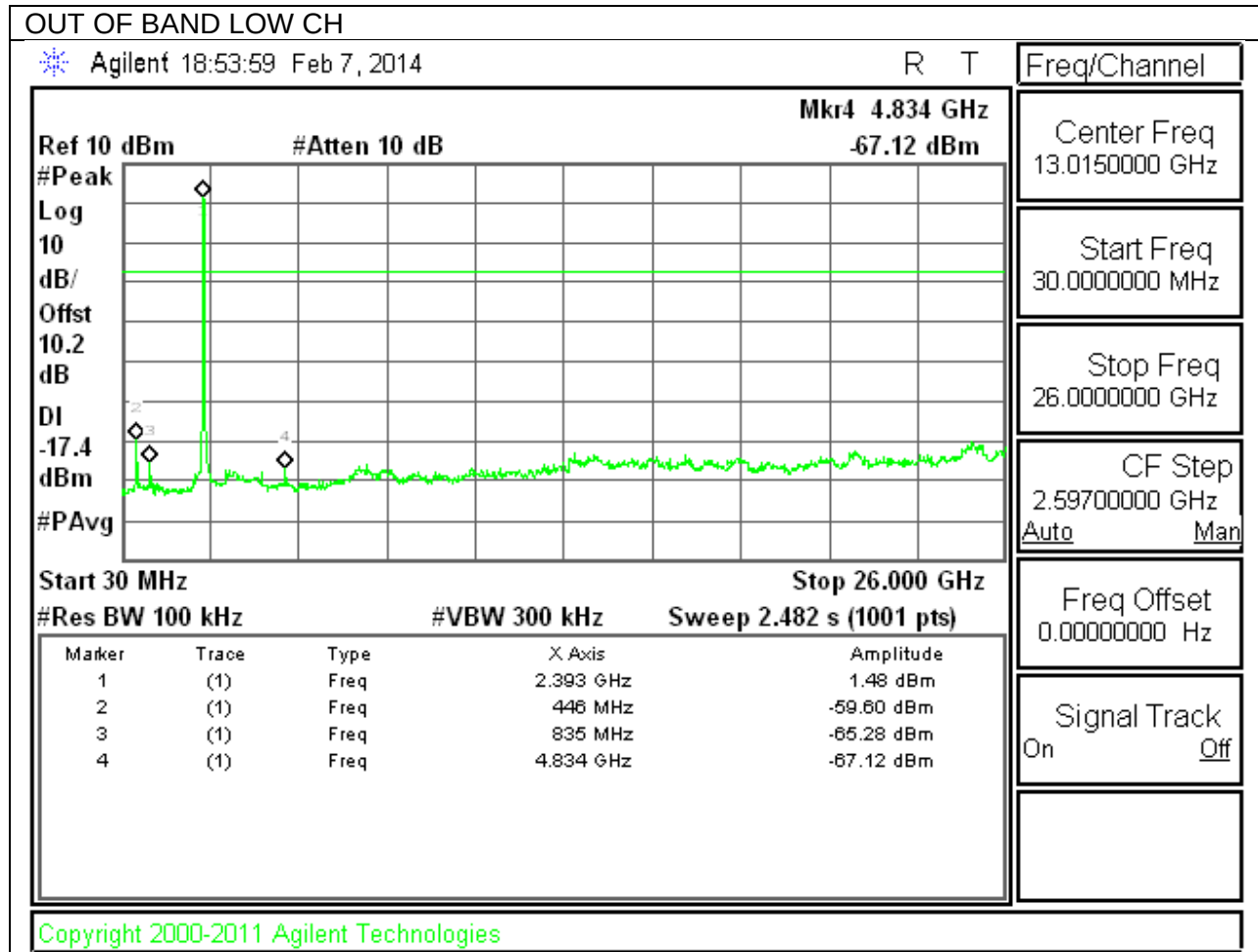


HIGH CHANNEL BANDEDGE

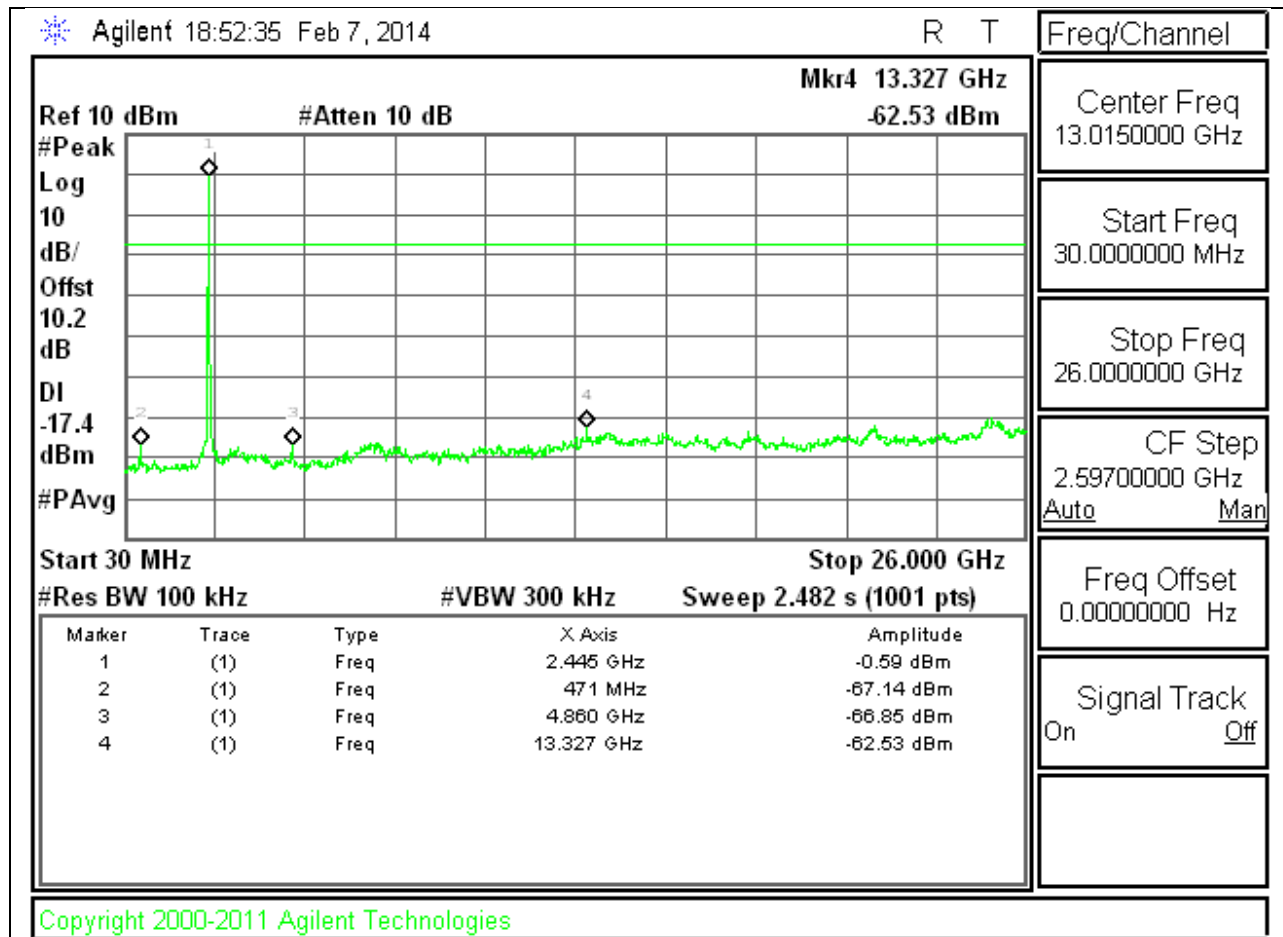
AUTHORIZED BAND EDGE HIGH CH

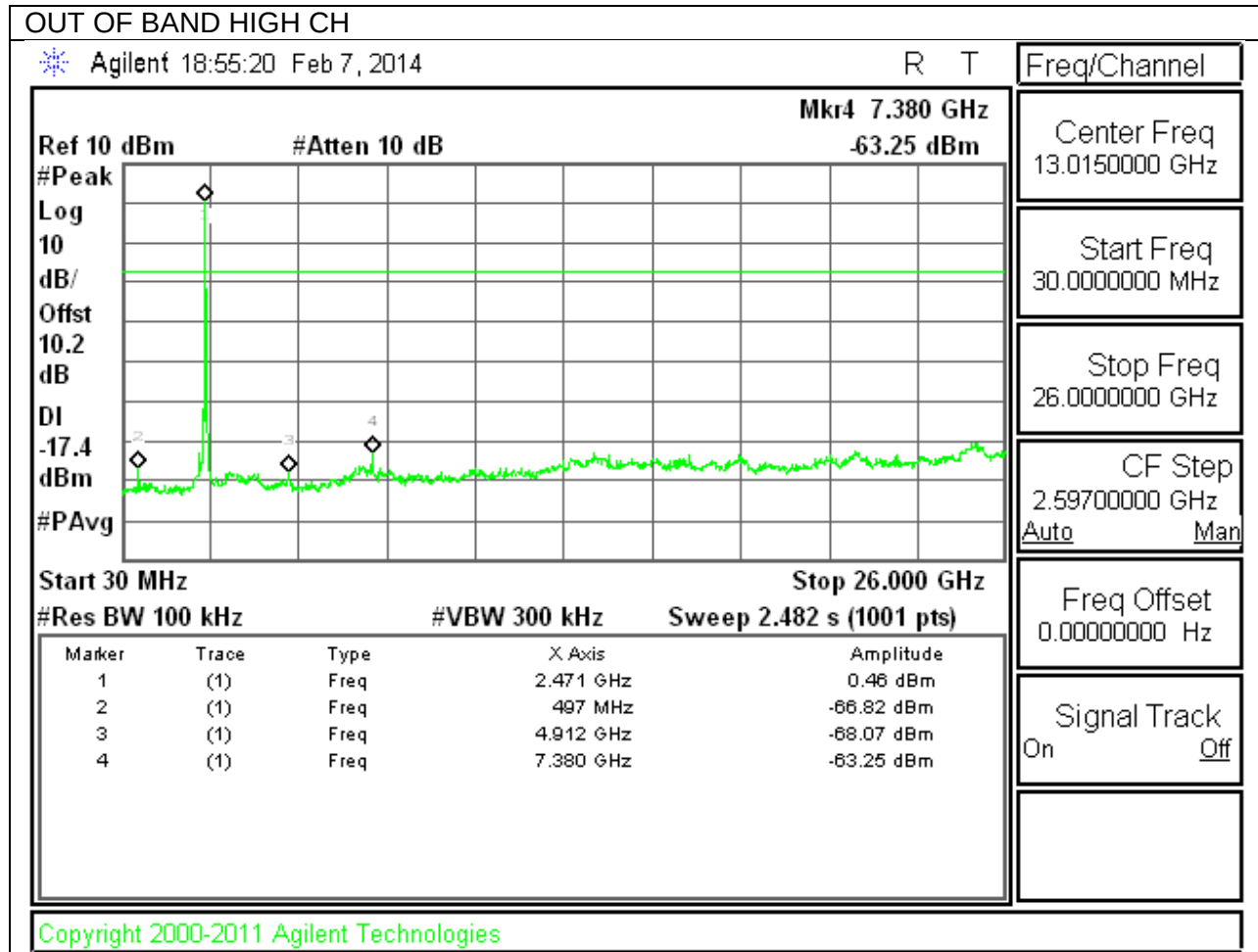


OUT-OF-BAND EMISSIONS



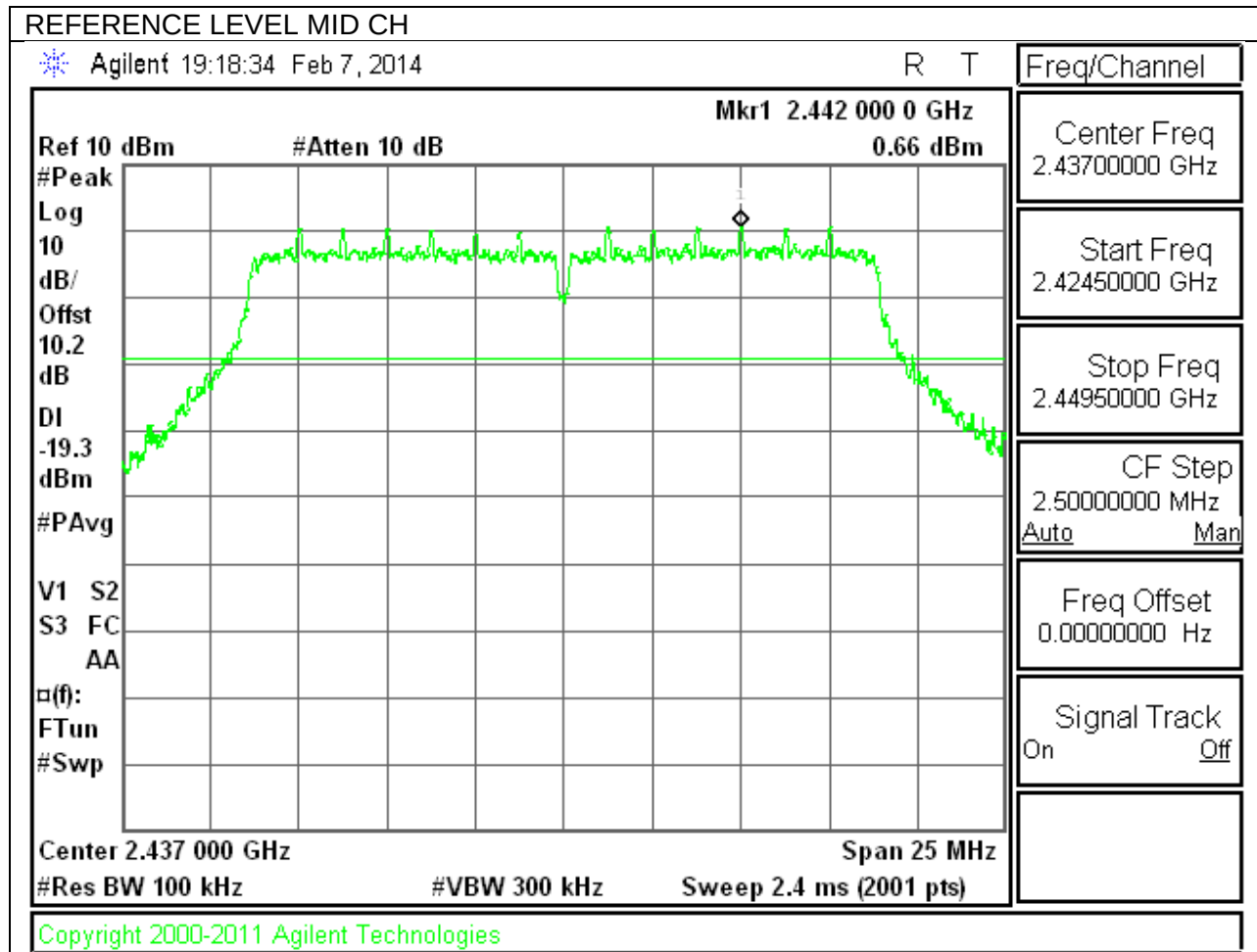
OUT OF BAND MID CH



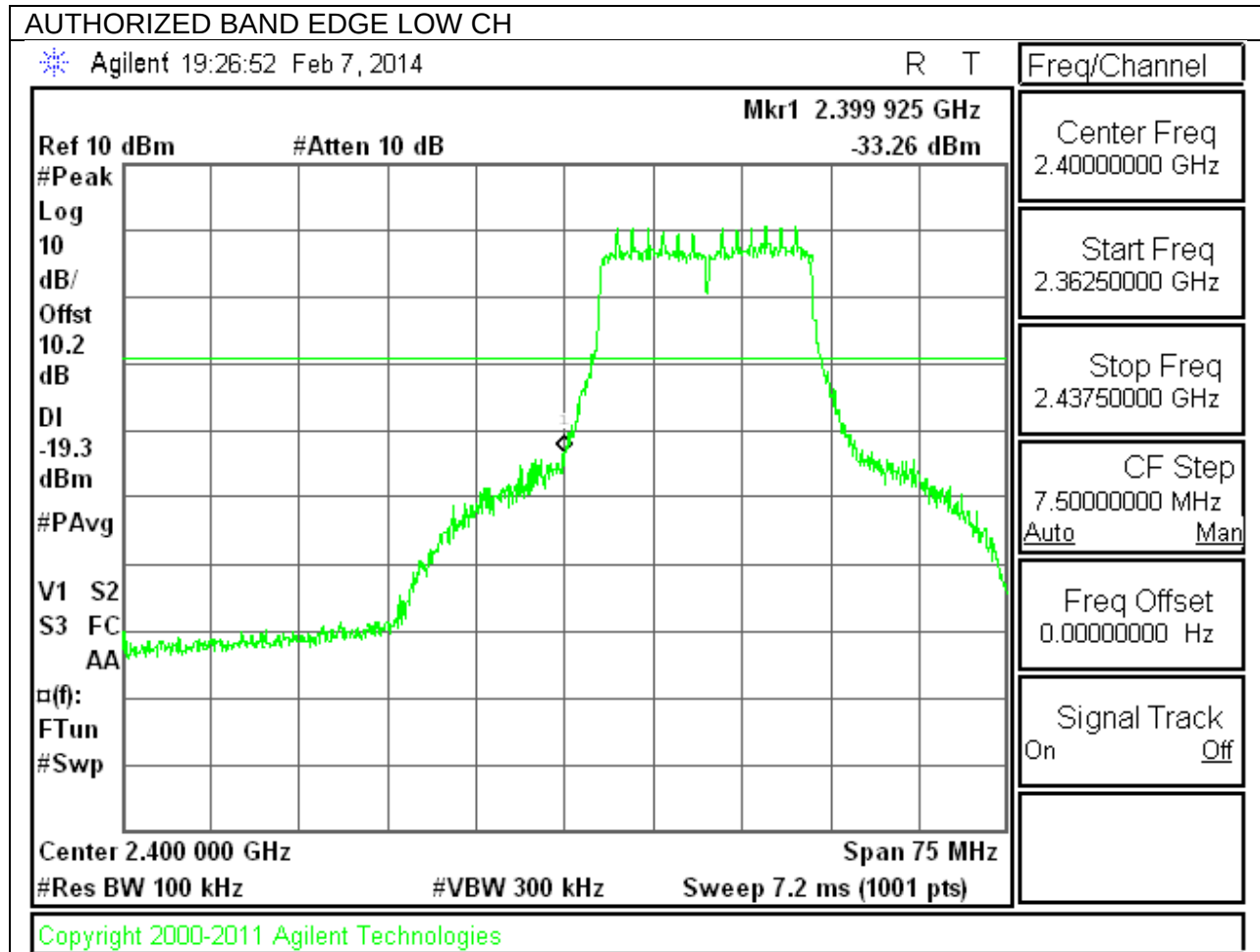


9.6.3. 802.11n MODE IN THE 2.4 GHz BAND

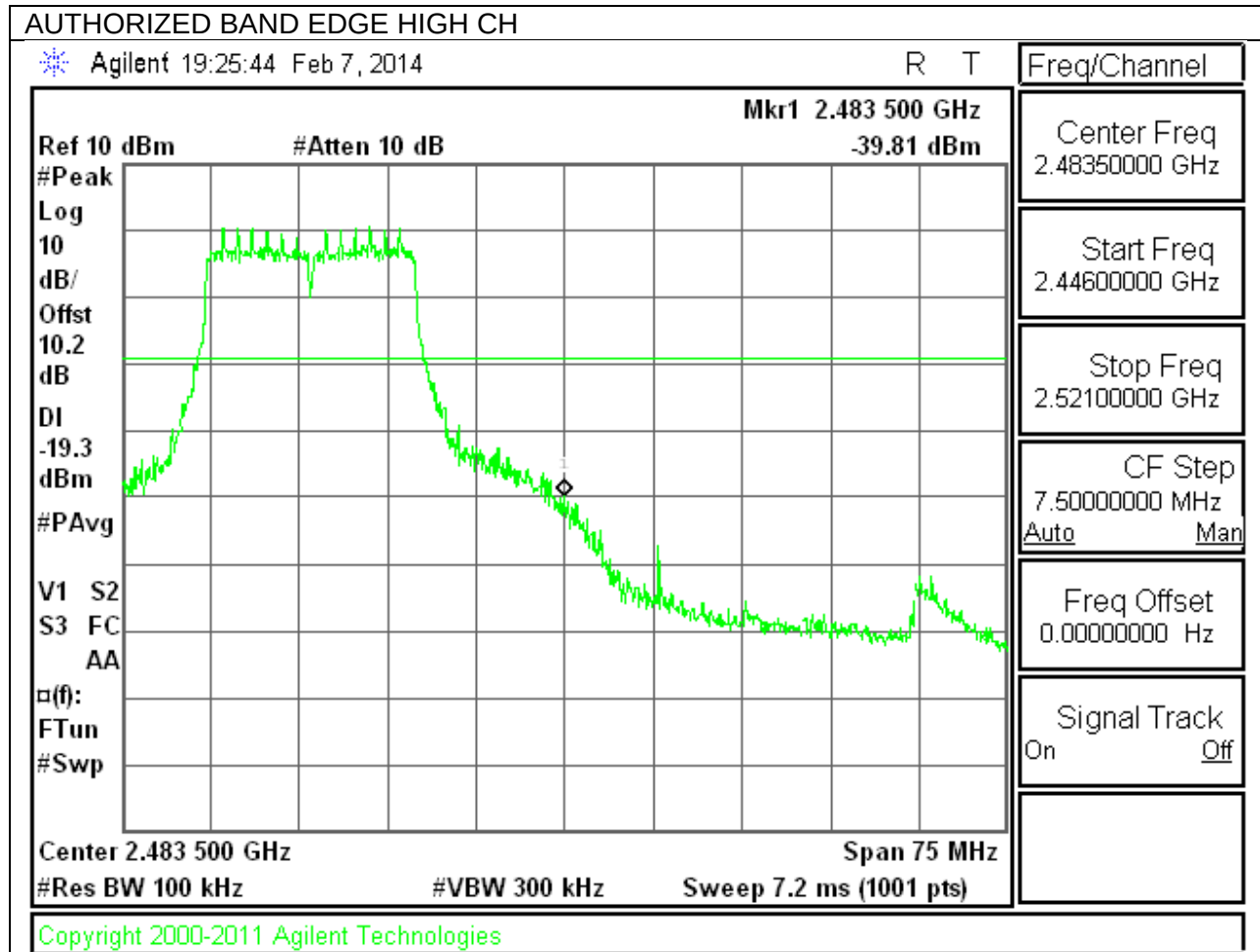
IN-BAND REFERENCE LEVEL



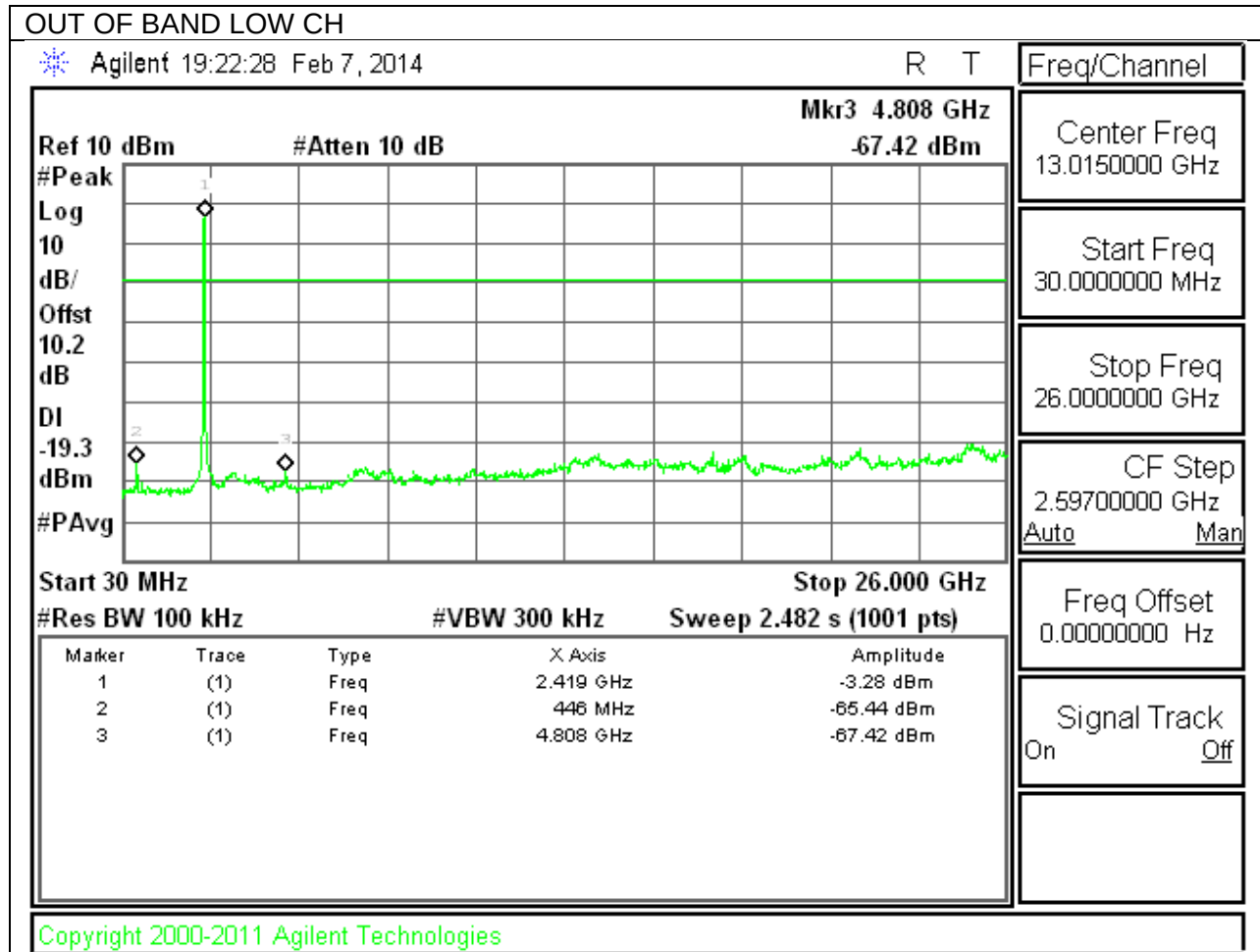
LOW CHANNEL BANDEDGE



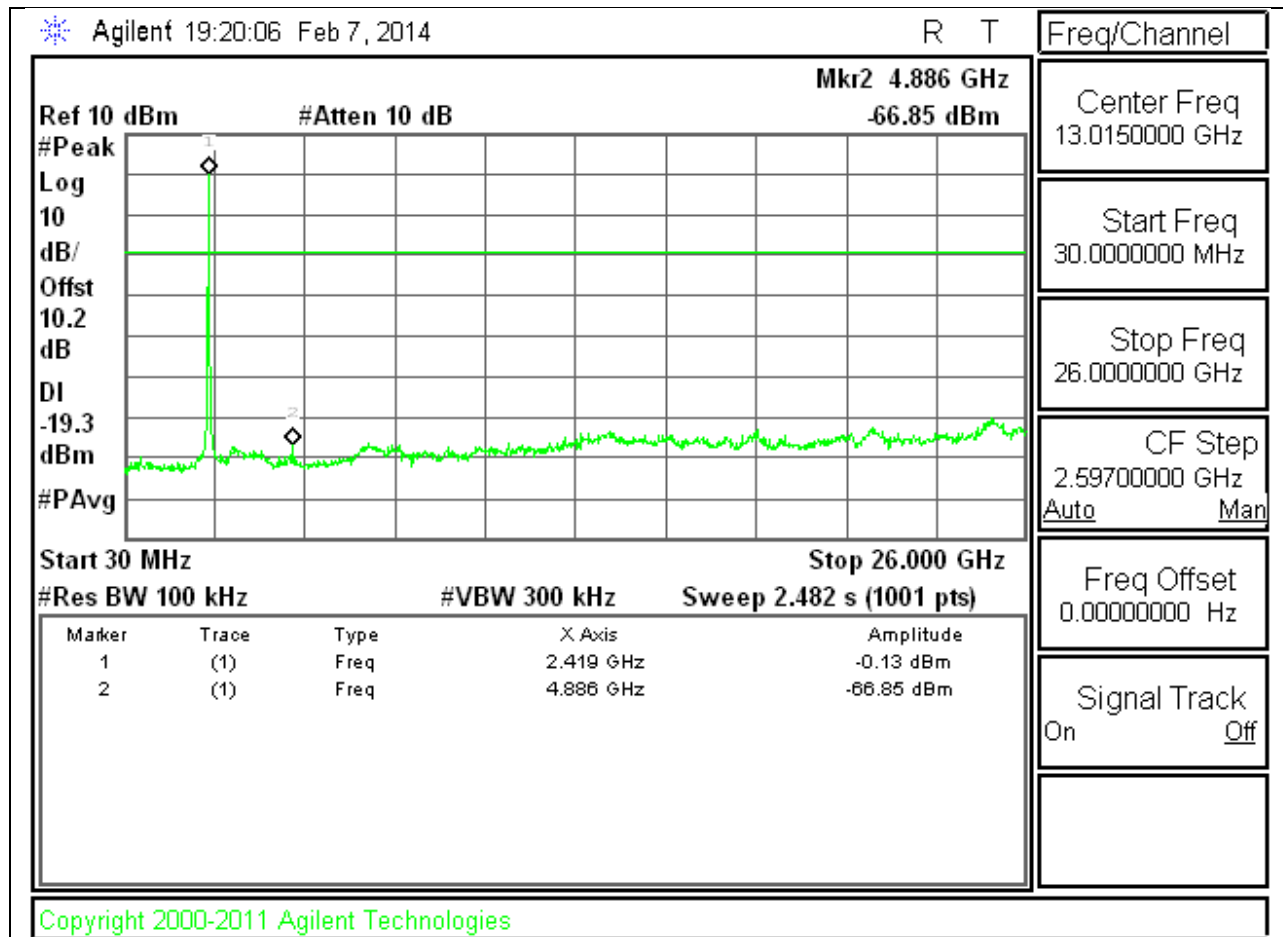
HIGH CHANNEL BANDEDGE

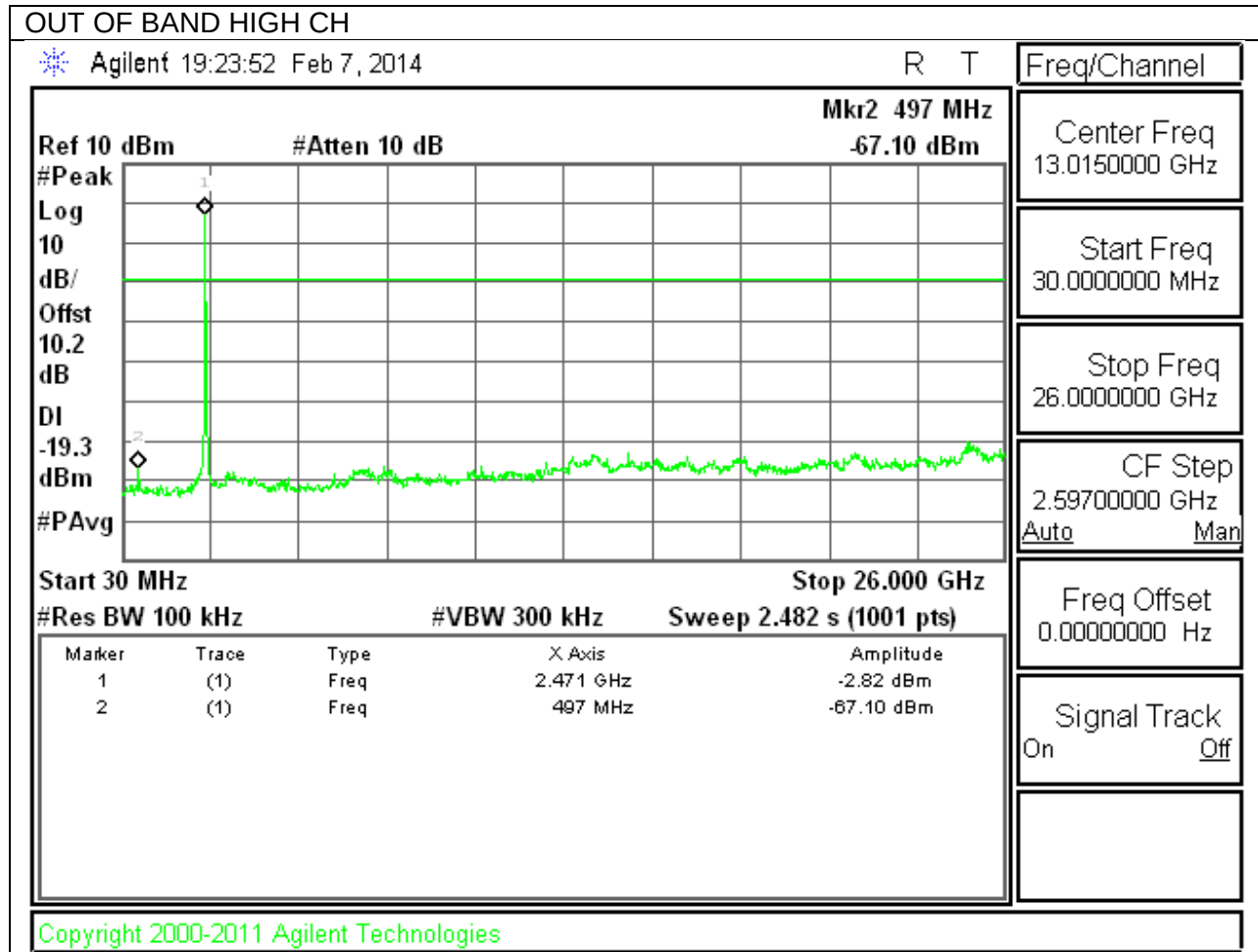


OUT-OF-BAND EMISSIONS



OUT OF BAND MID CH





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 = 0.3dB; N mode = 0.32dB.

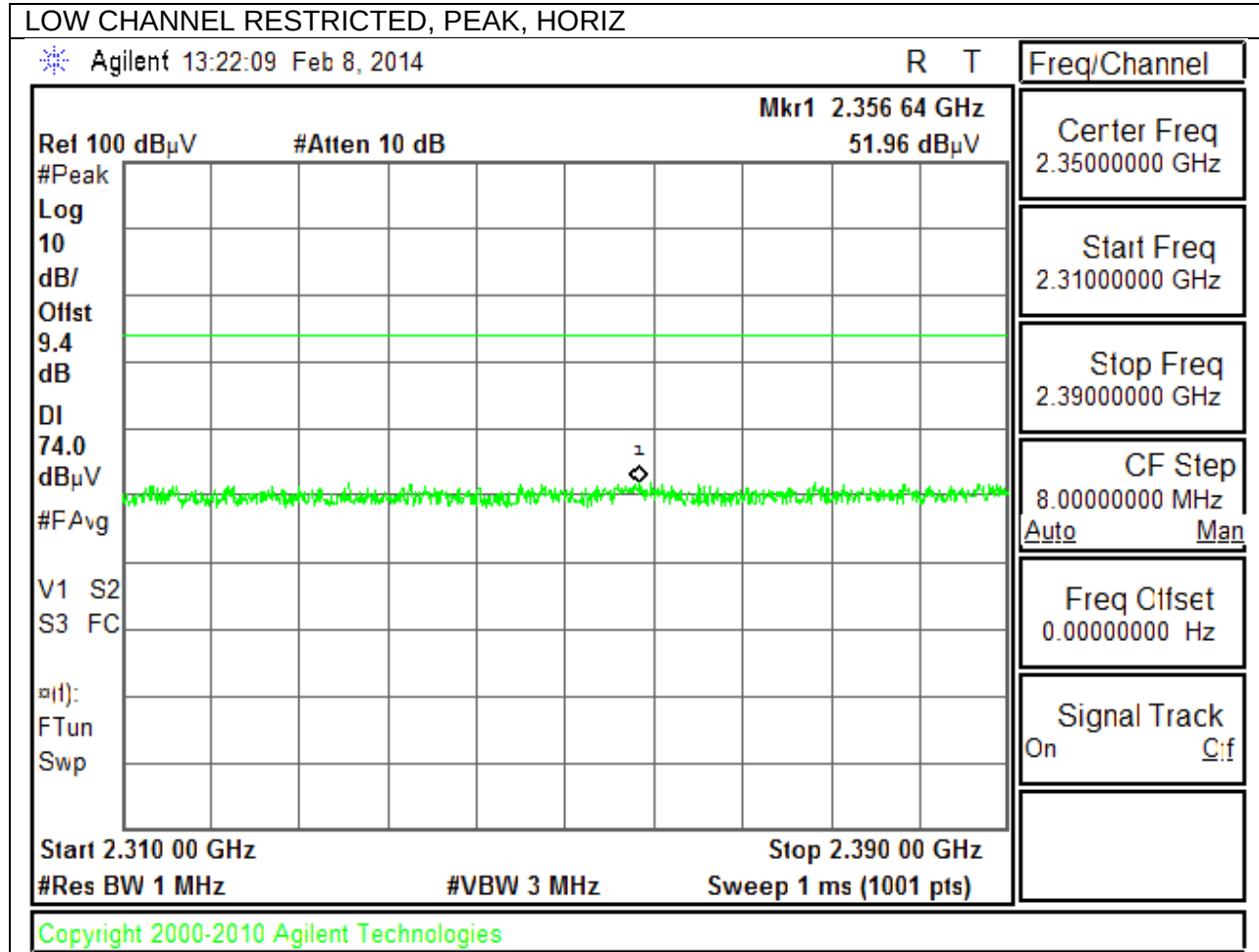
For spurious emission measurement traditional method of reduce VBW is followed.

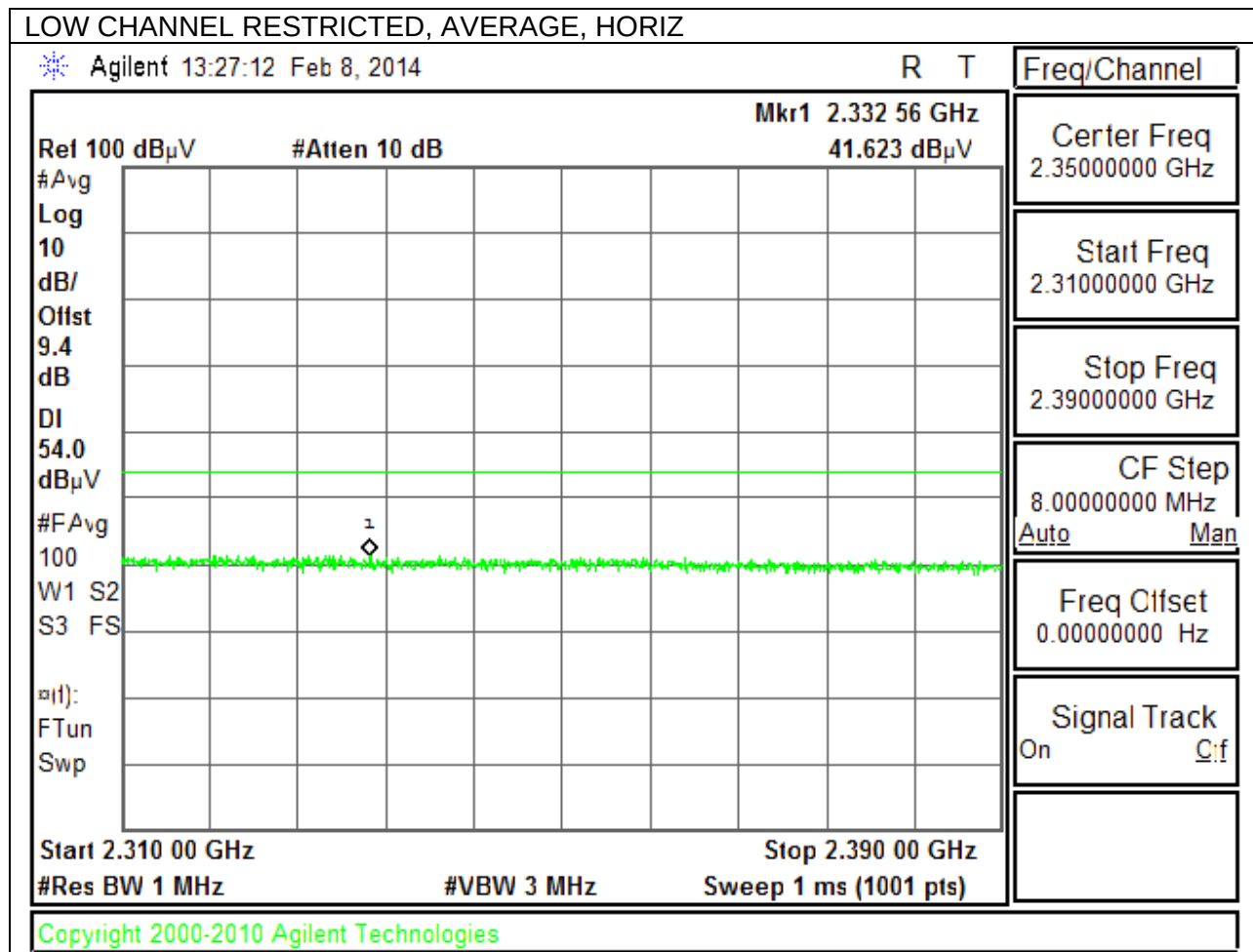
The spectrum from 1GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

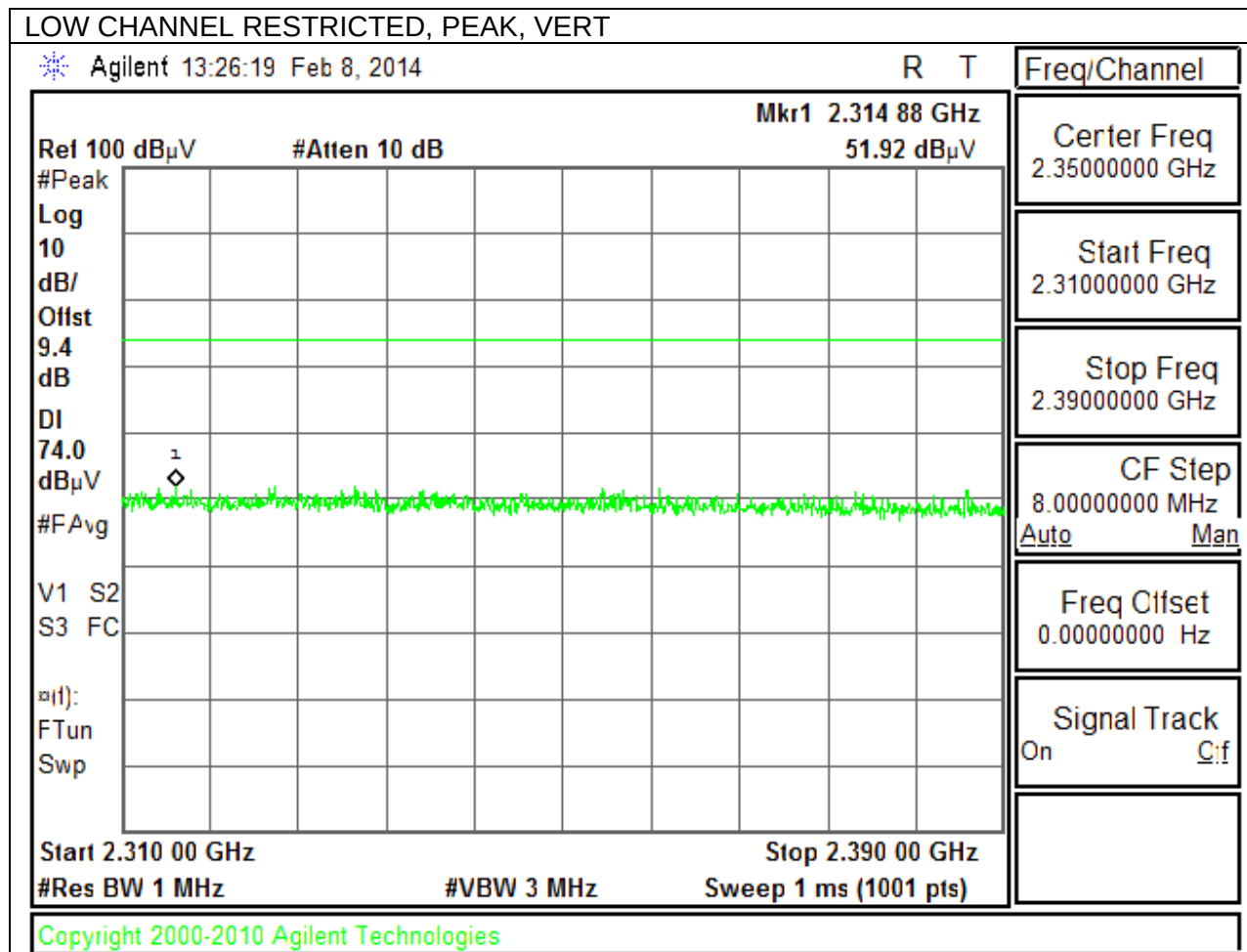
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

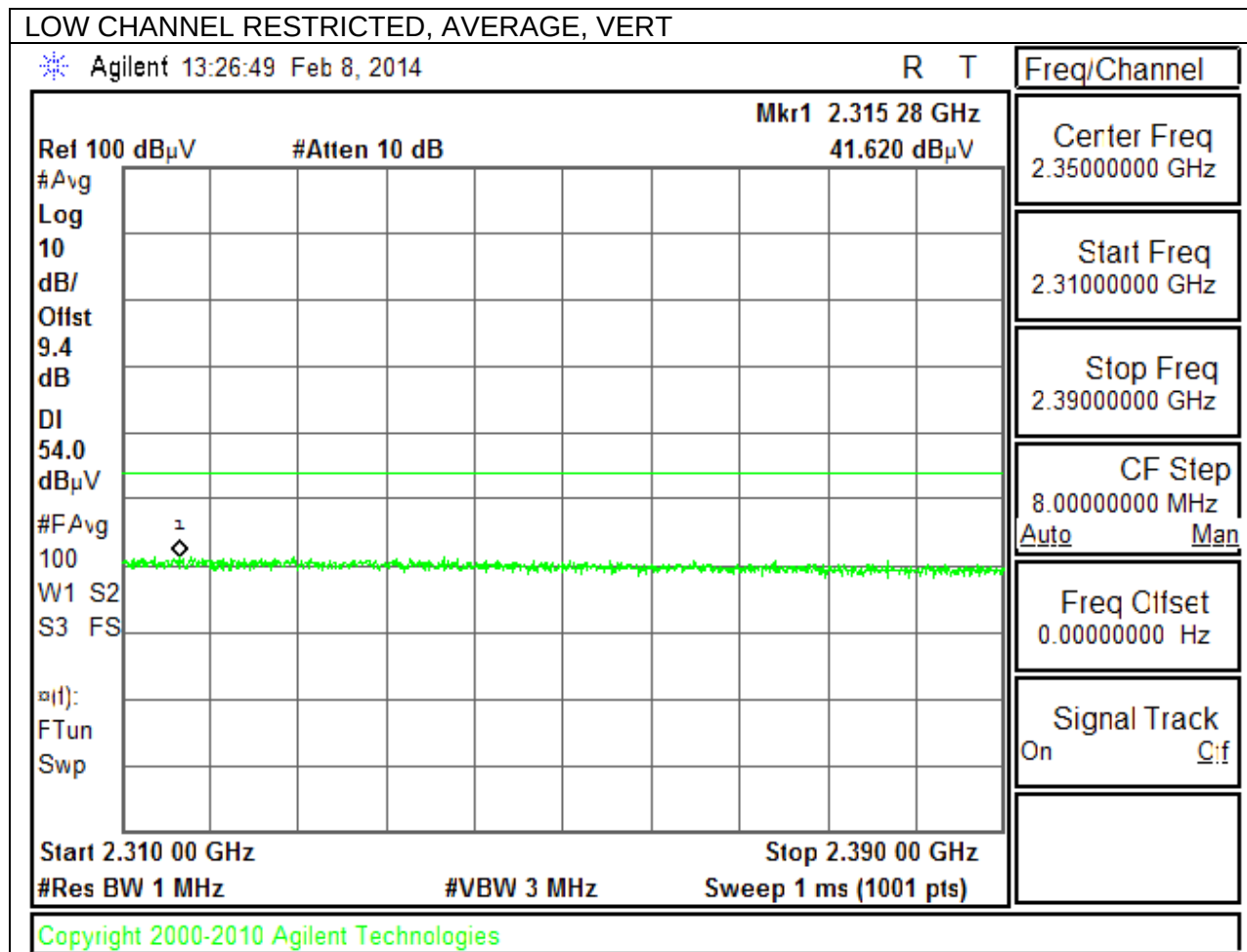
10.2. TRANSMITTER ABOVE 1 GHz

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

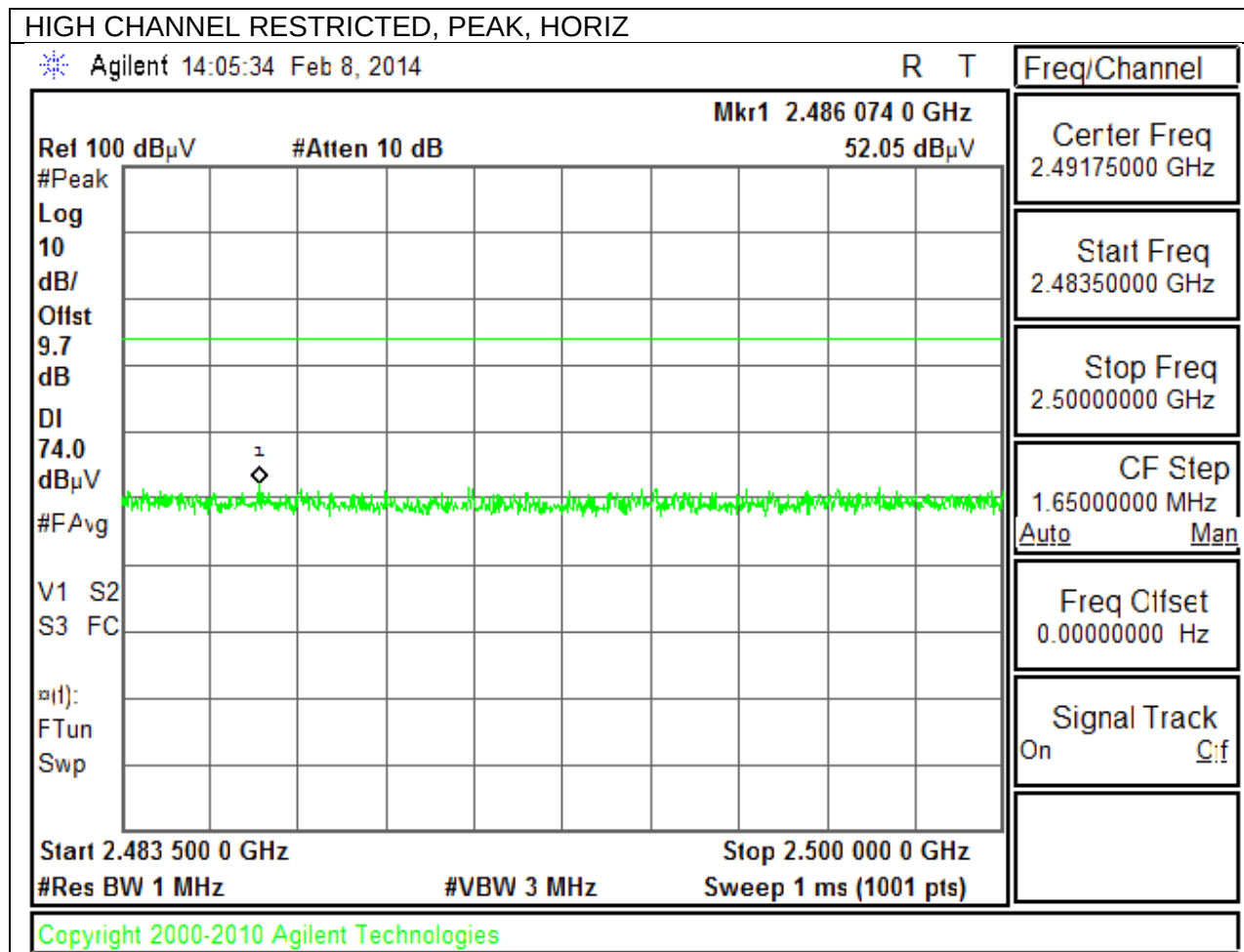


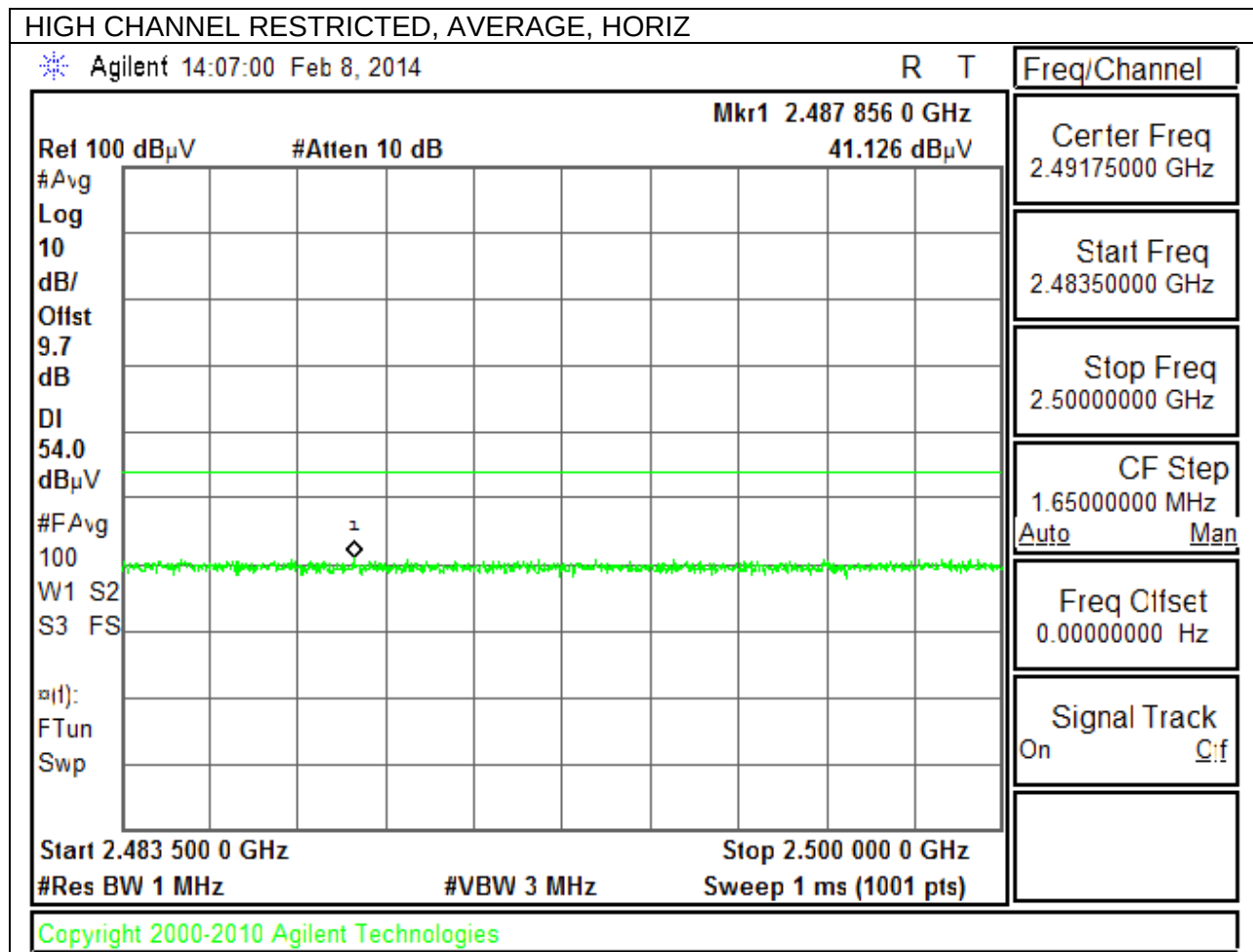


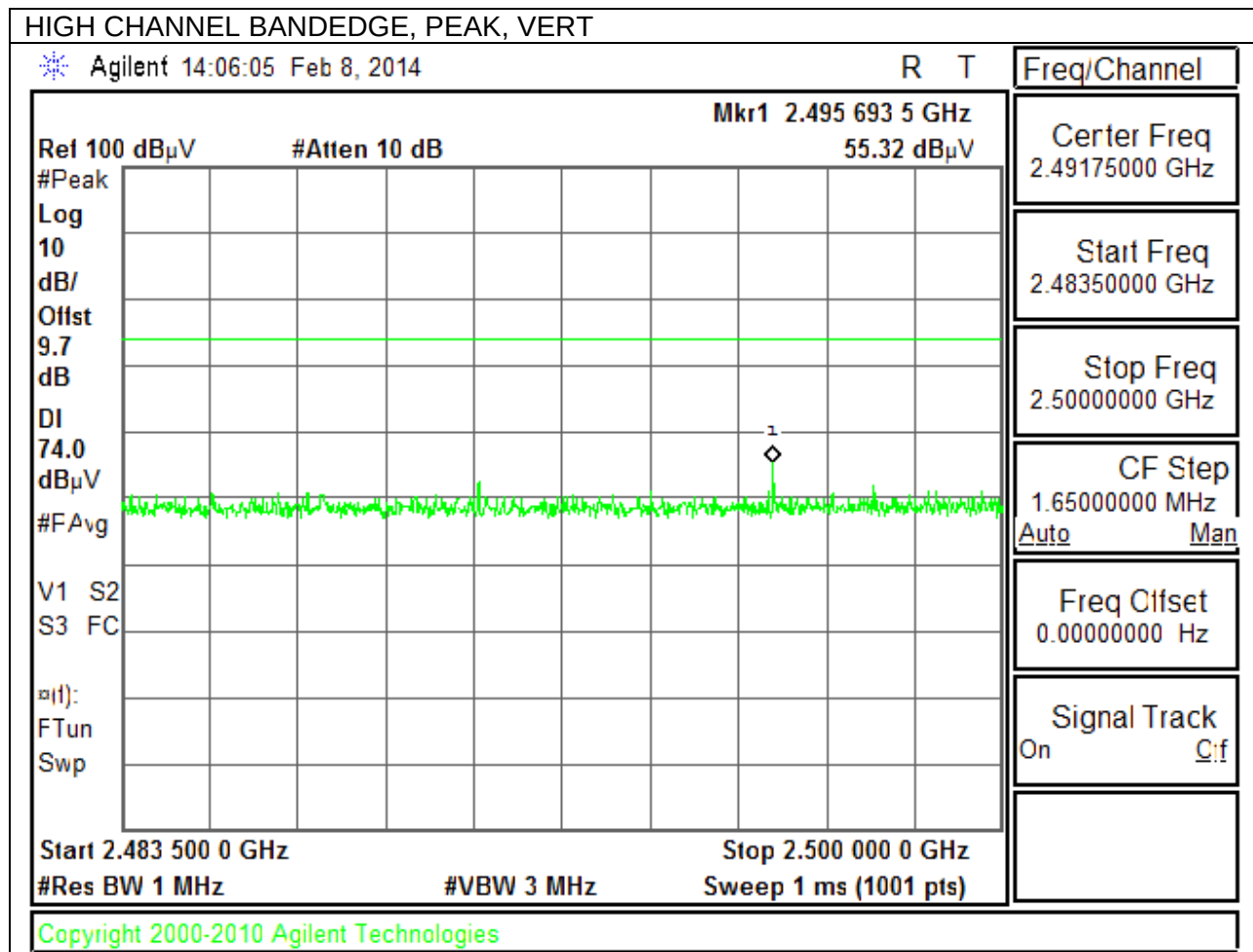


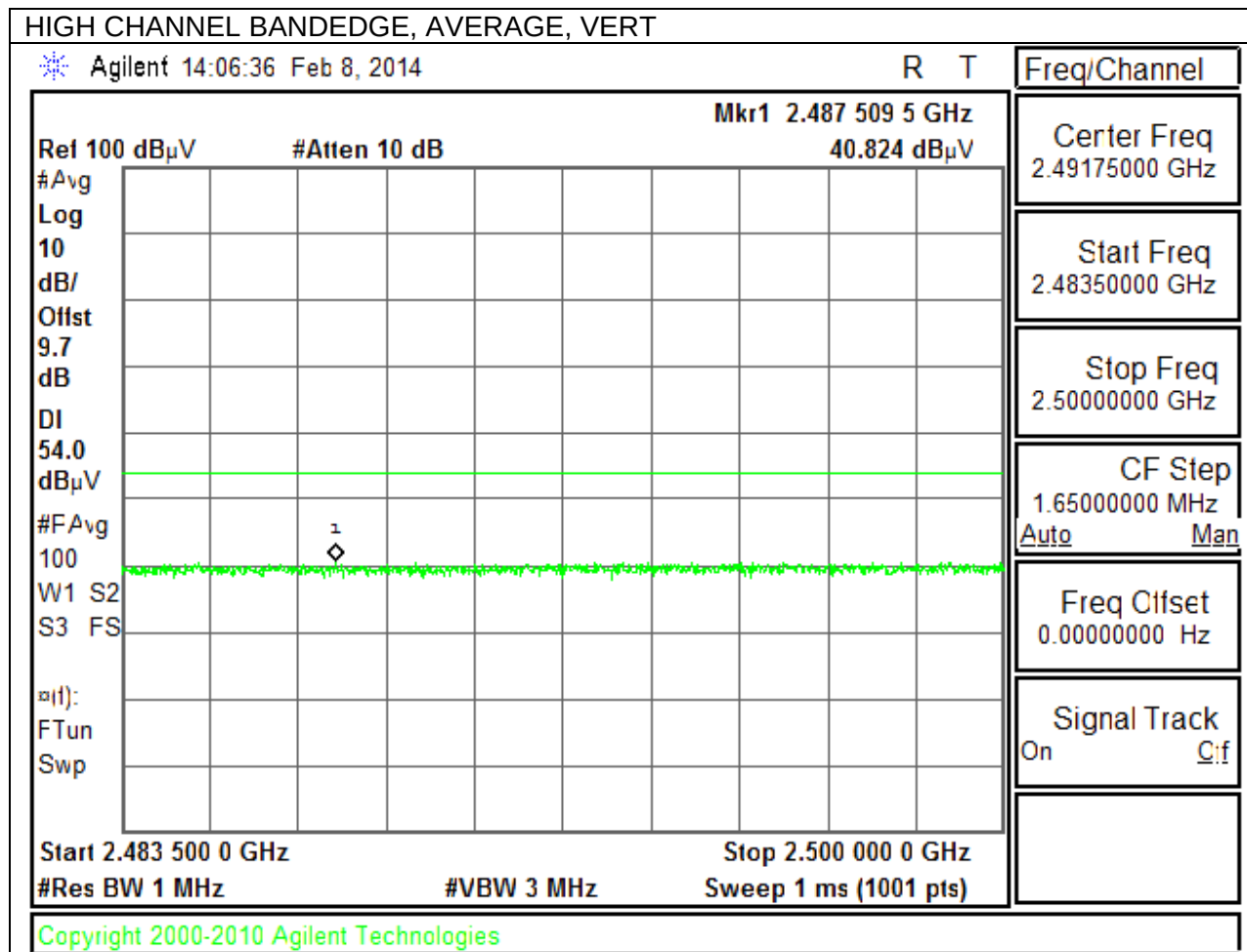


AUTHORIZED BANDEDGE (HIGH CHANNEL)



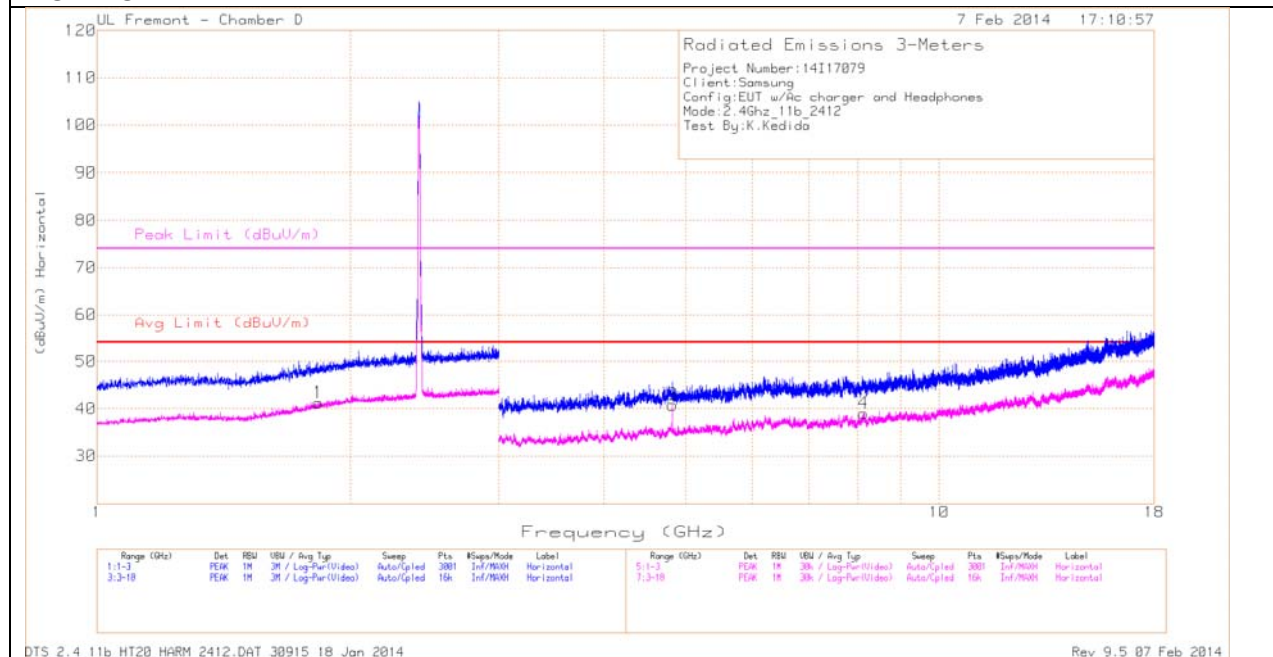






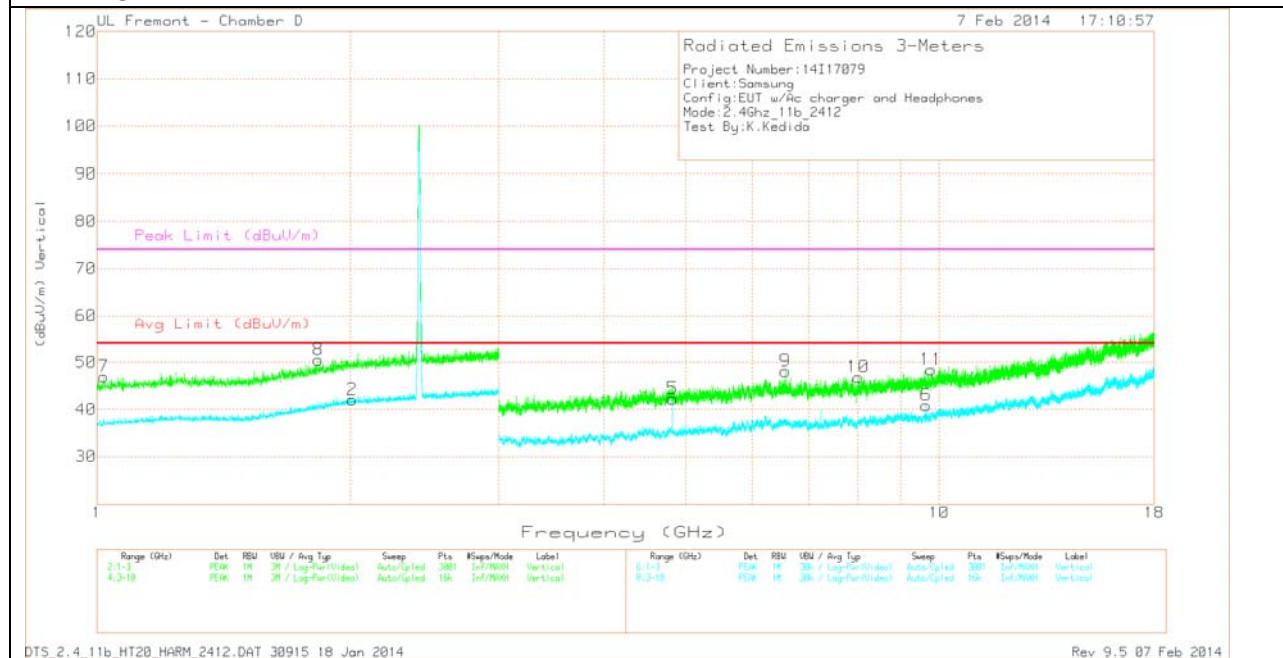
HARMONICS AND SPURIOUS EMISSIONS

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

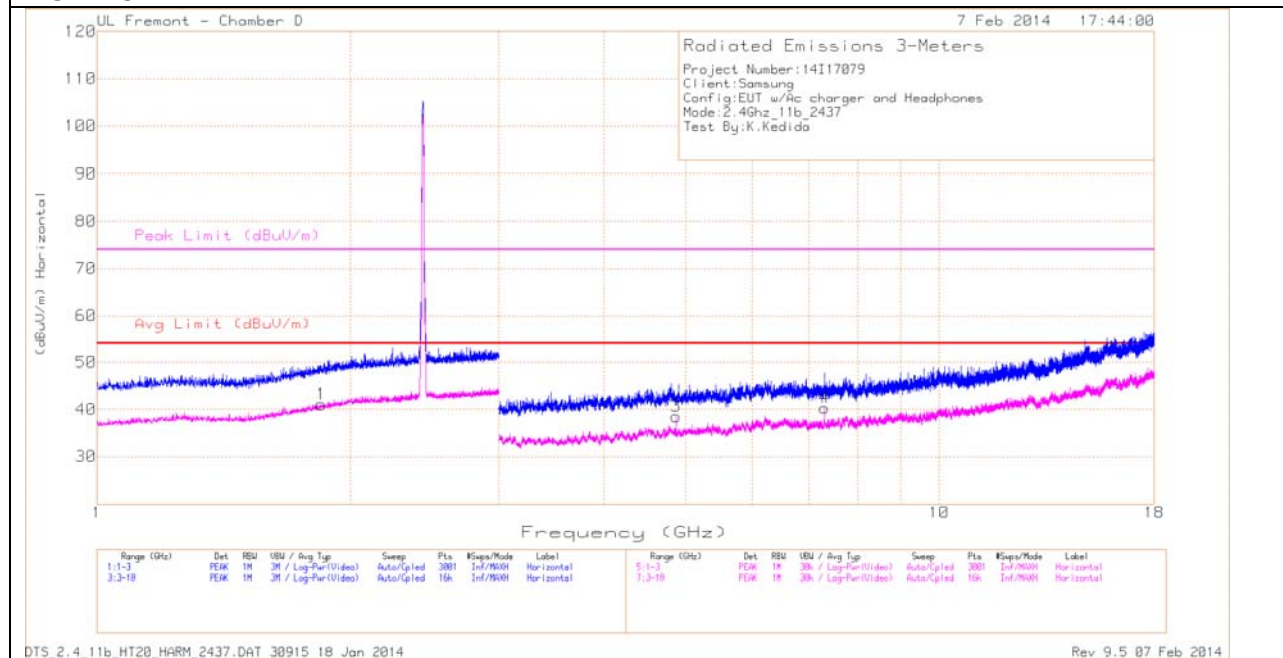


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA Trace Markers

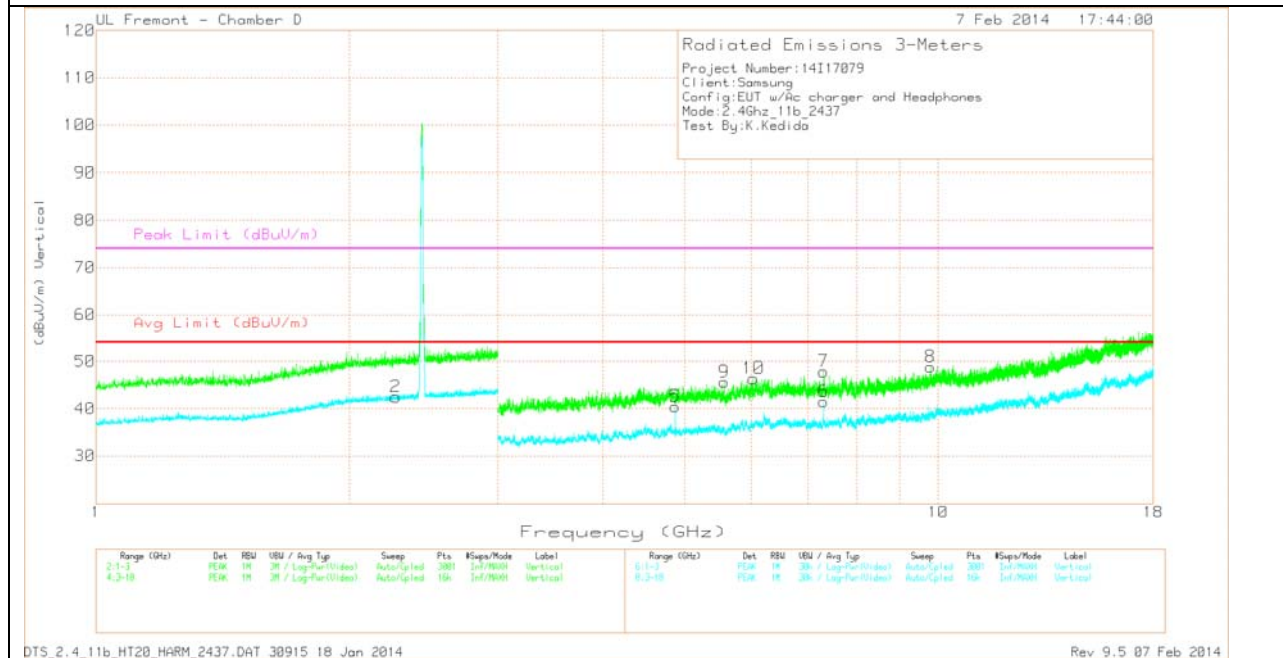
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 1.019	44.4	PK	27.5	-24.9	47	-	-	74	-27	0-360	99	V
3	* 4.824	35.41	Avq	34.7	-29.3	40.81	54	-13.19	-	-	0-360	202	H
4	* 8.134	29.18	Avq	36.1	-26.3	38.98	54	-15.02	-	-	0-360	99	H
5	* 4.824	36.85	Avq	34.7	-29.3	42.25	54	-11.75	-	-	0-360	202	V
1	1.831	34.36	Avq	30.6	-23.7	41.26	54	-12.74	-	-	0-360	202	H
8	1.832	43.51	PK	30.7	-23.7	50.51	-	-	74	-23.49	0-360	99	V
2	2.011	33.72	Avq	31.8	-23.5	42.02	54	-11.98	-	-	0-360	99	V
9	6.567	39.52	PK	35.9	-27.3	48.12	-	-	74	-25.88	0-360	202	V
10	8.015	37.57	PK	36.1	-26.8	46.87	-	-	74	-27.13	0-360	202	V
6	9.647	27.59	Avq	37.4	-24.1	40.89	54	-13.11	-	-	0-360	99	V
11	9.785	34.42	PK	37.5	-23.5	48.42	-	-	74	-25.58	0-360	202	V

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

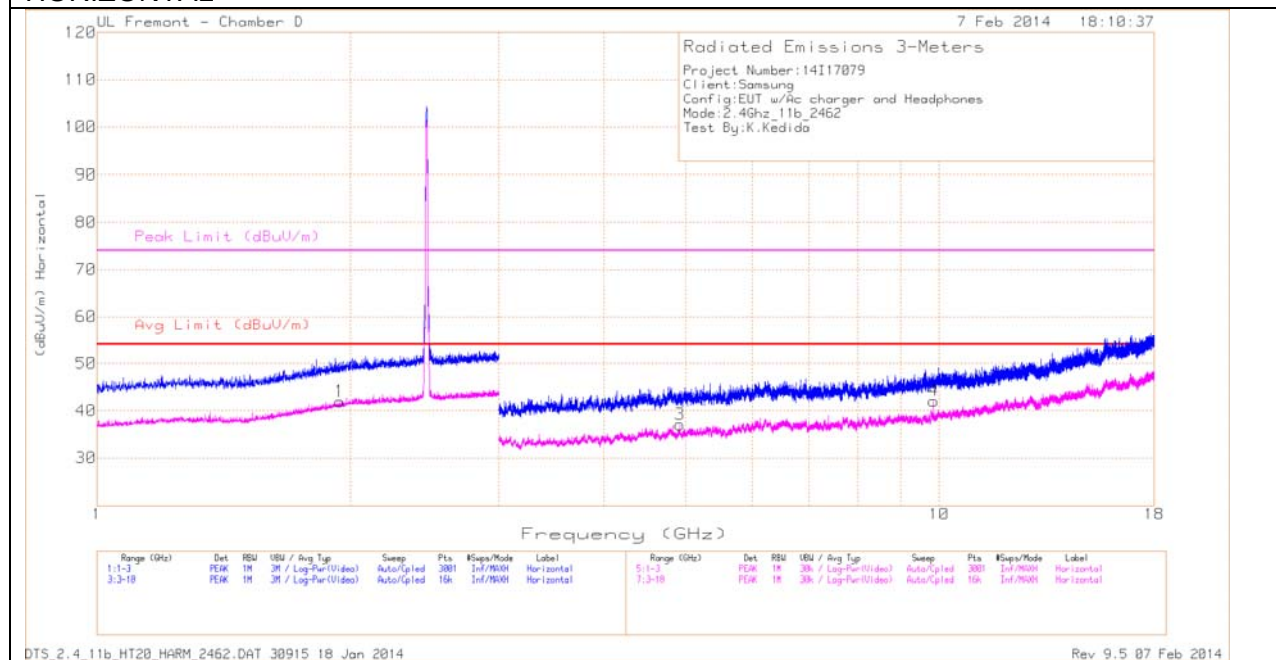


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA Trace Markers

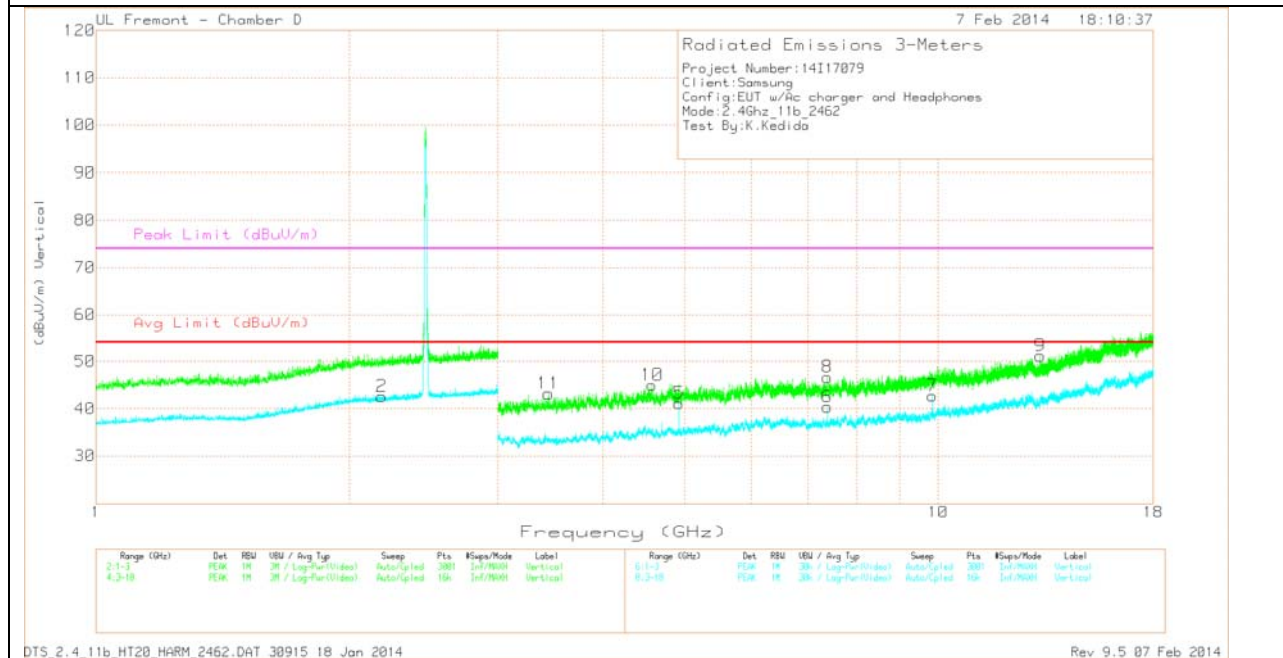
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 7.309	39.75	PK	35.8	-27.7	47.85	-	-	74	-26.15	0-360	99	V
2	* 2.269	33.5	Avq	32.1	-23.1	42.5	54	-11.5	-	-	0-360	202	V
3	* 4.874	34.45	Avq	34.7	-30.6	38.55	54	-15.45	-	-	0-360	202	H
4	* 7.308	32.25	Avq	35.8	-27.7	40.35	54	-13.65	-	-	0-360	202	H
5	* 4.874	36.32	Avq	34.7	-30.6	40.42	54	-13.58	-	-	0-360	202	V
6	* 7.31	33.4	Avq	35.8	-27.7	41.5	54	-12.5	-	-	0-360	99	V
1	1.846	33.84	Avq	30.8	-23.6	41.04	54	-12.96	-	-	0-360	99	H
9	5.572	40.11	PK	35	-29.5	45.61	-	-	74	-28.39	0-360	99	V
10	6.033	39.27	PK	35.9	-28.8	46.37	-	-	74	-27.63	0-360	99	V
8	9.789	34.79	PK	37.5	-23.5	48.79	-	-	74	-25.21	0-360	99	V

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

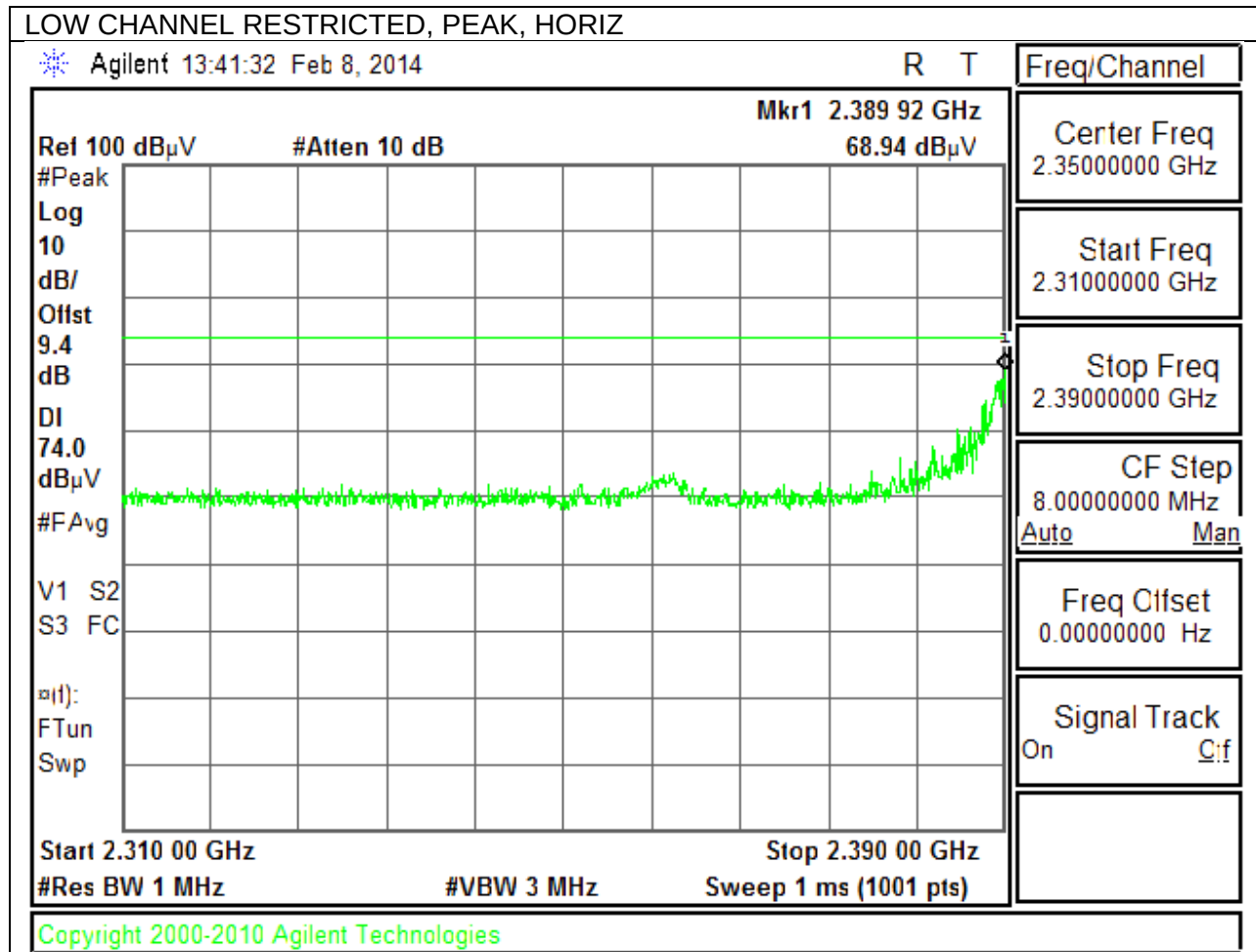


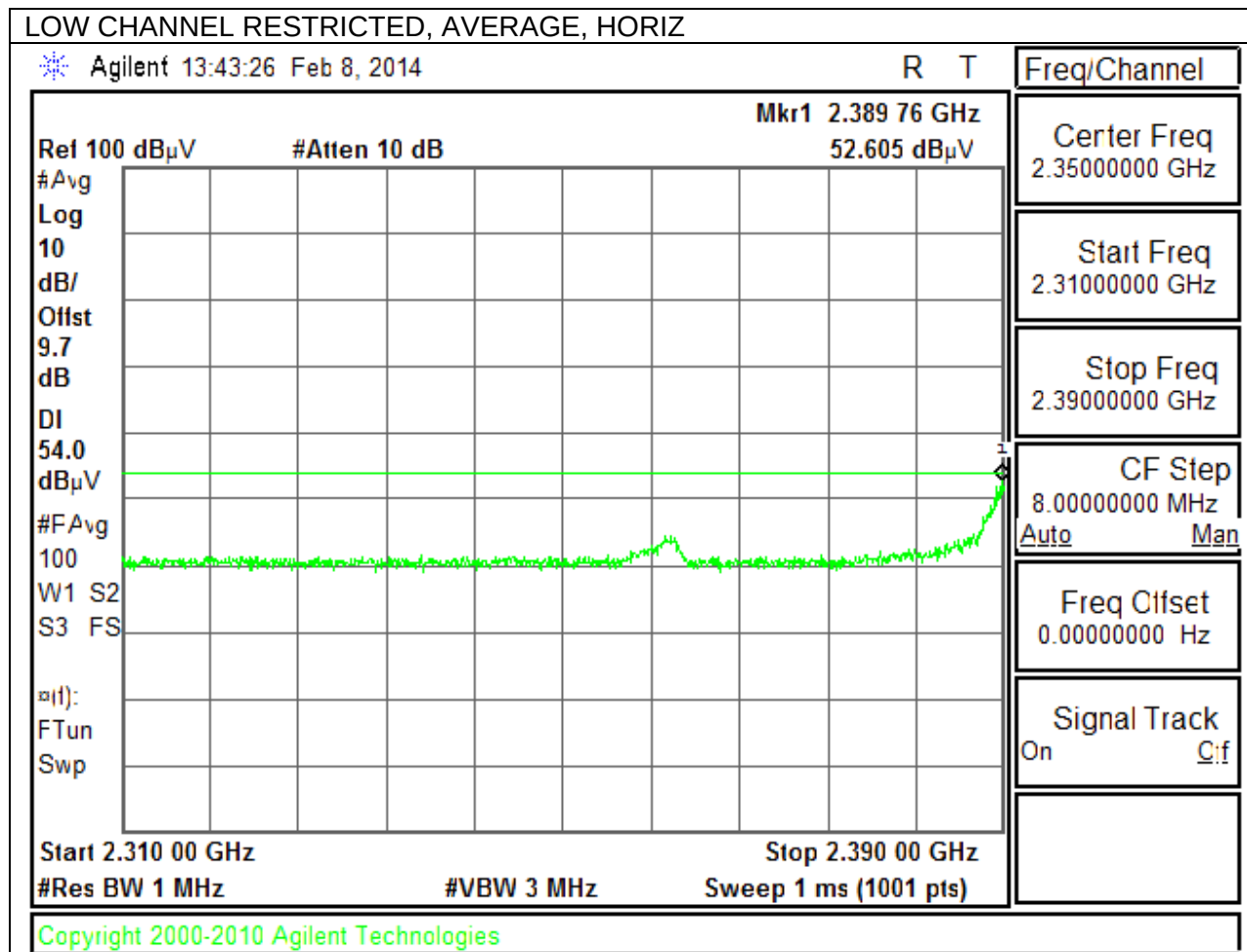
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

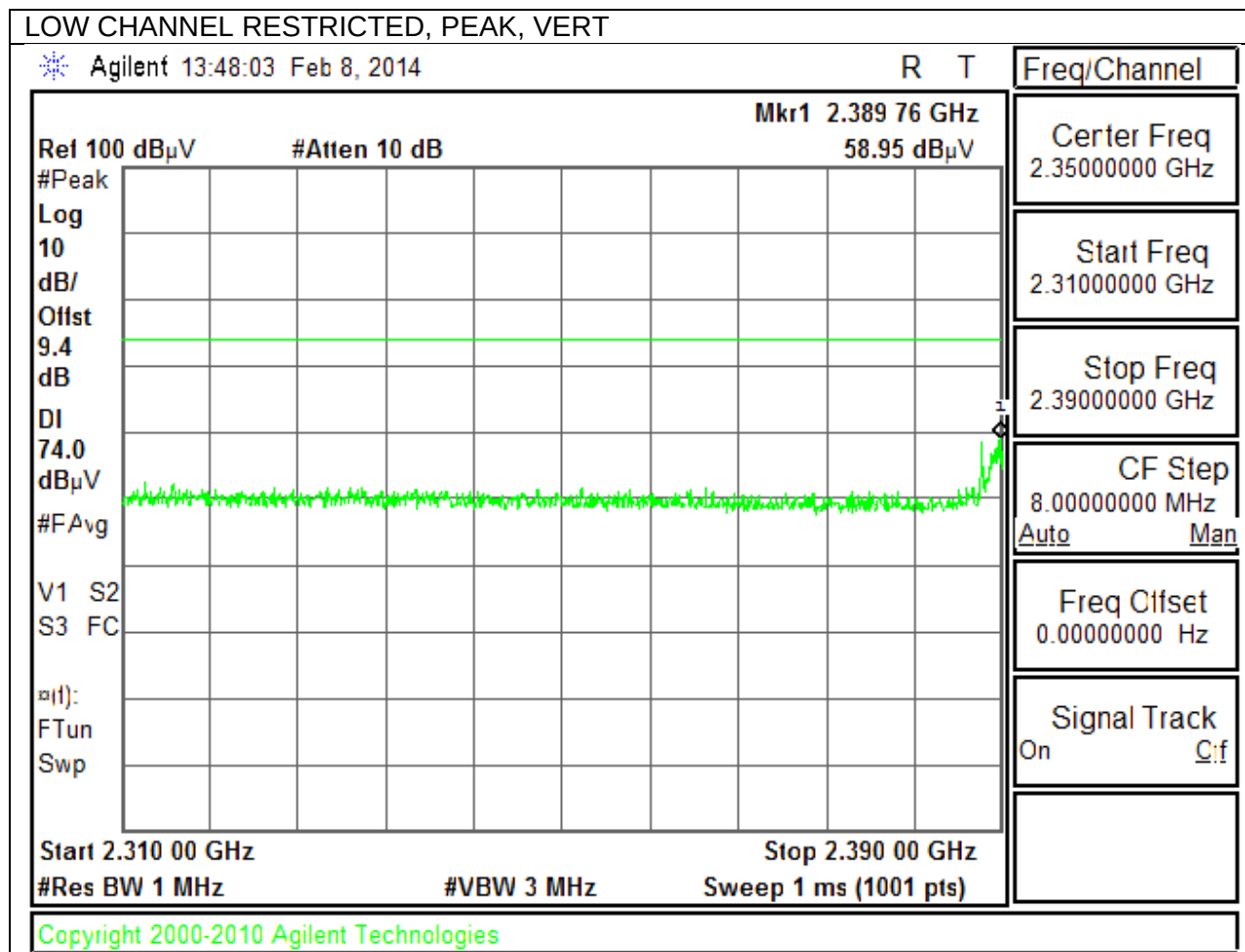
HIGH CHANNEL DATA Trace Markers

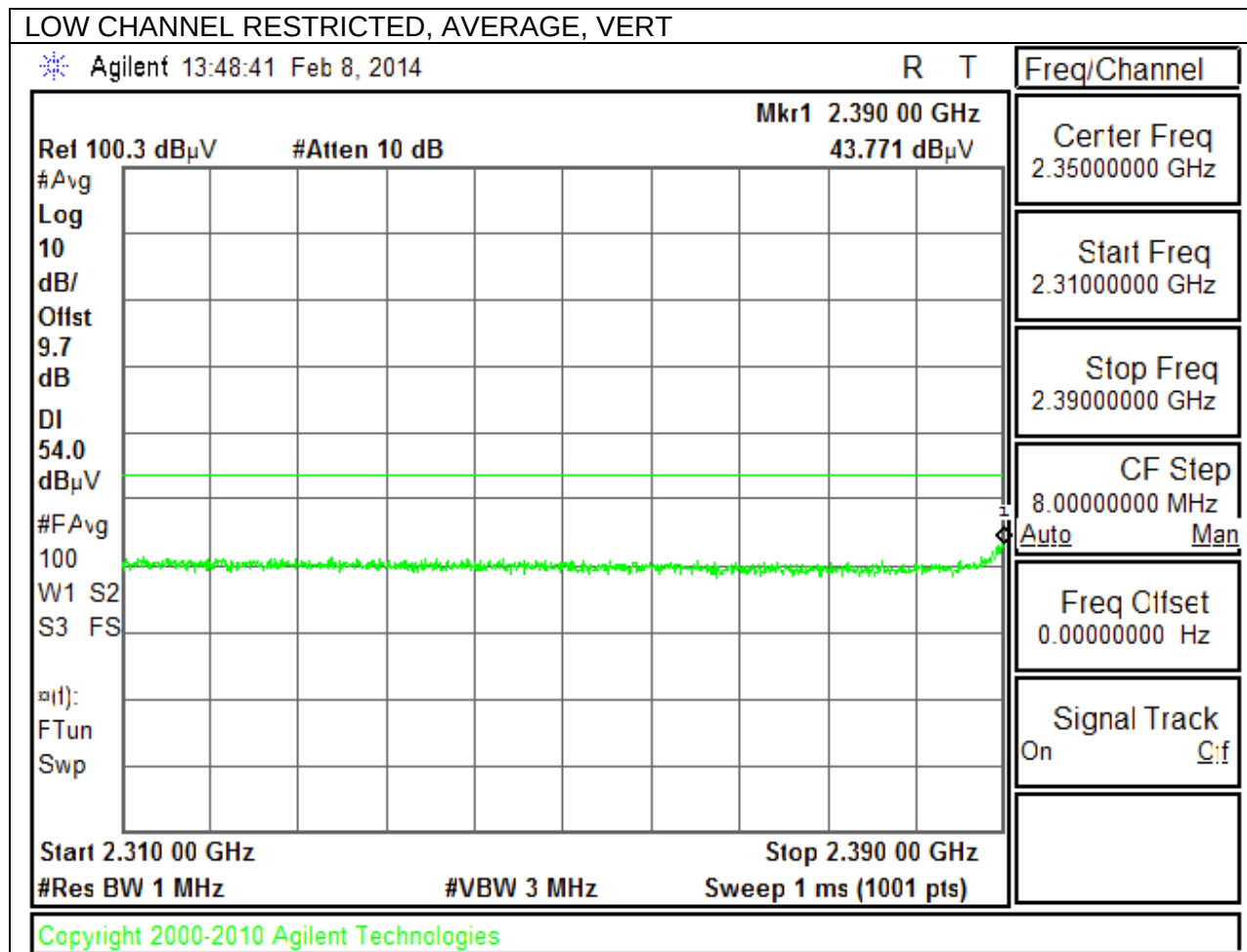
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
8	* 7.386	38.15	PK	35.9	-27.4	46.65	-	-	74	-27.35	0-360	202	V
10	* 4.573	41.05	PK	34.6	-30.7	44.95	-	-	74	-29.05	0-360	202	V
3	* 4.924	33.15	Avq	34.6	-30.7	37.05	54	-16.95	-	-	0-360	202	H
5	* 4.924	37.23	Avq	34.6	-30.7	41.13	54	-12.87	-	-	0-360	202	V
6	* 7.384	31.88	Avq	35.9	-27.4	40.38	54	-13.62	-	-	0-360	99	V
1	1.942	34.09	Avq	31.4	-23.6	41.89	54	-12.11	-	-	0-360	202	H
2	2.185	33.78	Avq	32	-23.2	42.58	54	-11.42	-	-	0-360	202	V
11	3.445	41.09	PK	33.2	-31.1	43.19	-	-	74	-30.81	0-360	99	V
7	9.847	29.19	Avq	37.6	-24.1	42.69	54	-11.31	-	-	0-360	99	V
4	9.848	28.57	Avq	37.6	-24.1	42.07	54	-11.93	-	-	0-360	202	H
9	13.216	34.37	PK	39.1	-22.3	51.17	-	-	74	-22.83	0-360	202	V

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

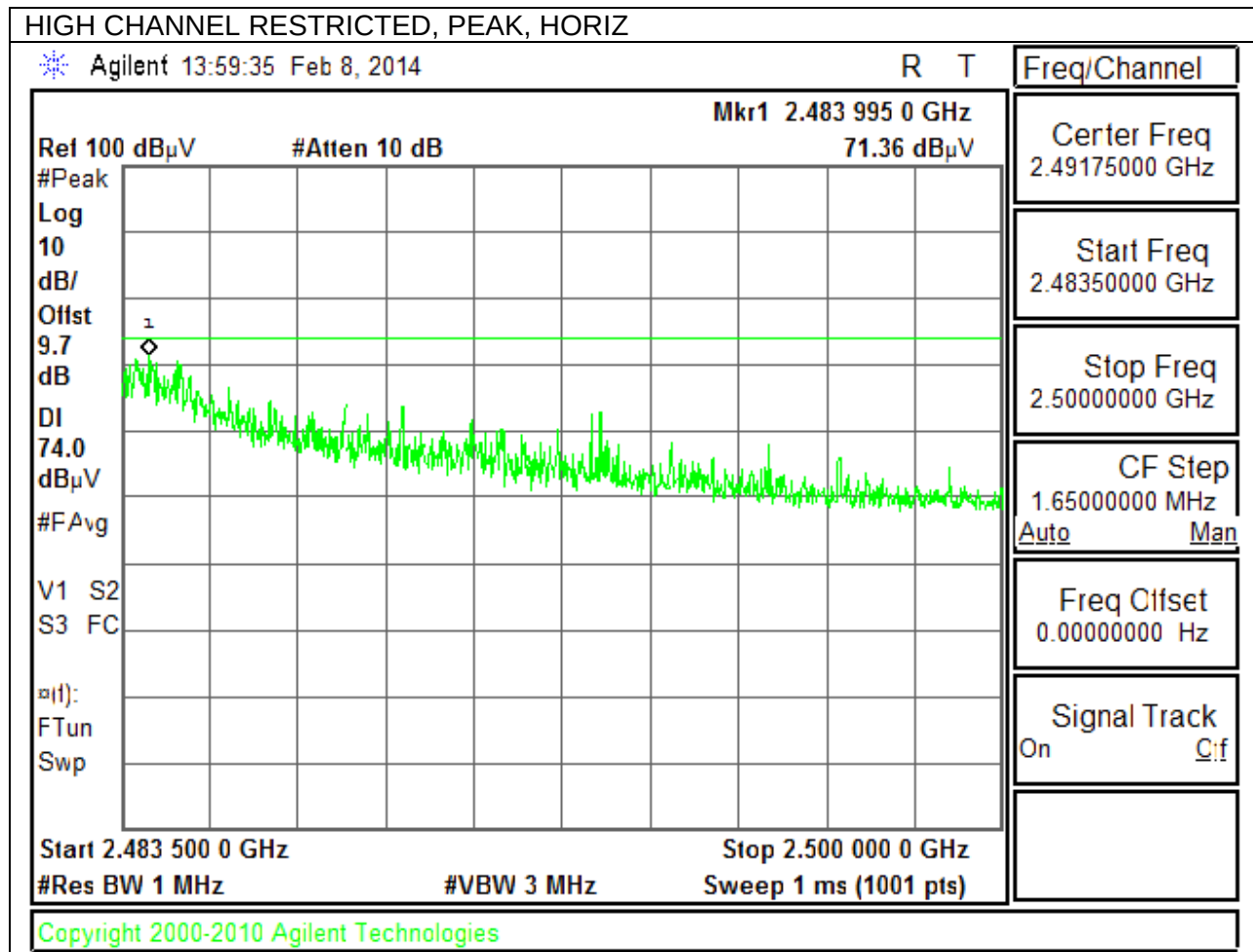


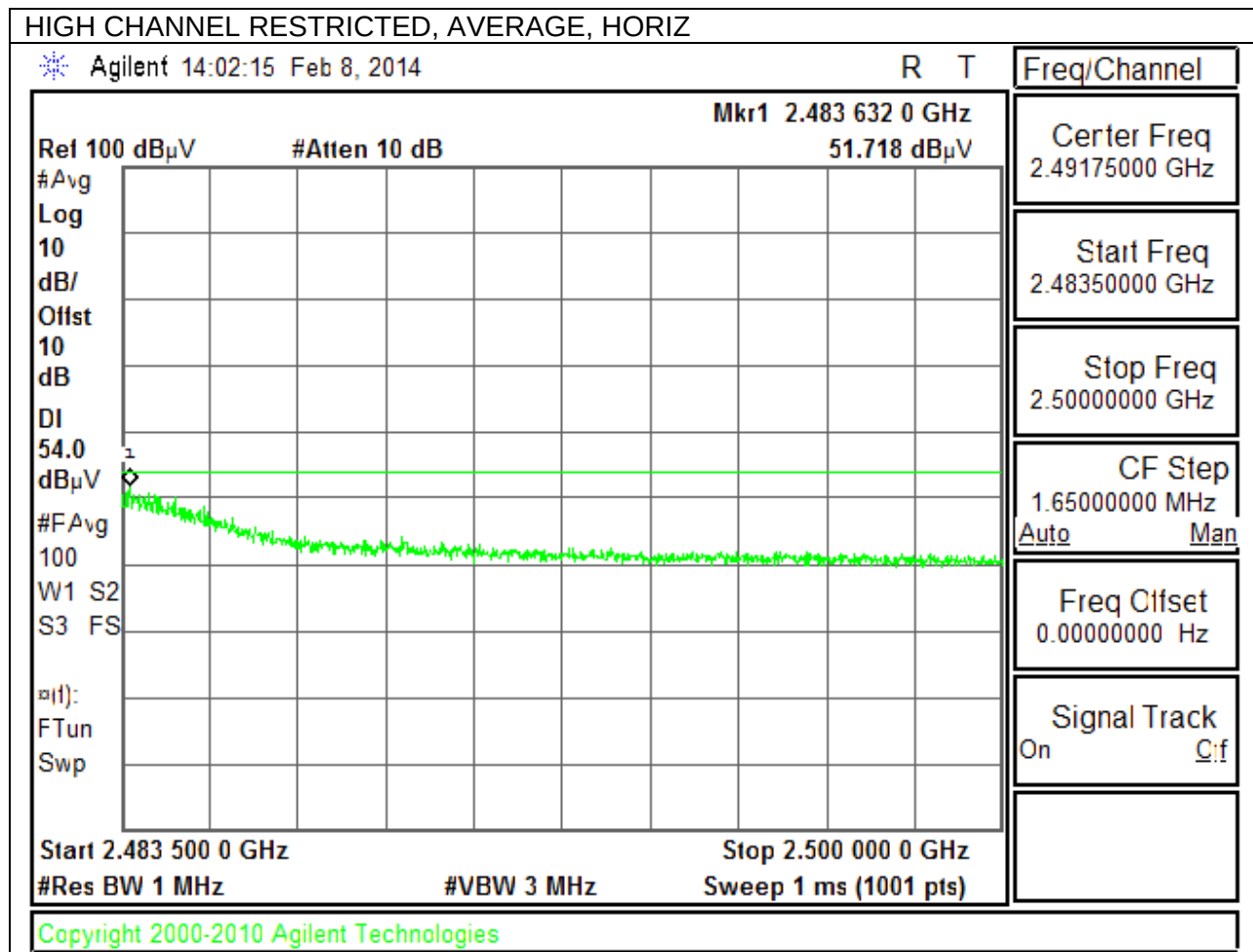


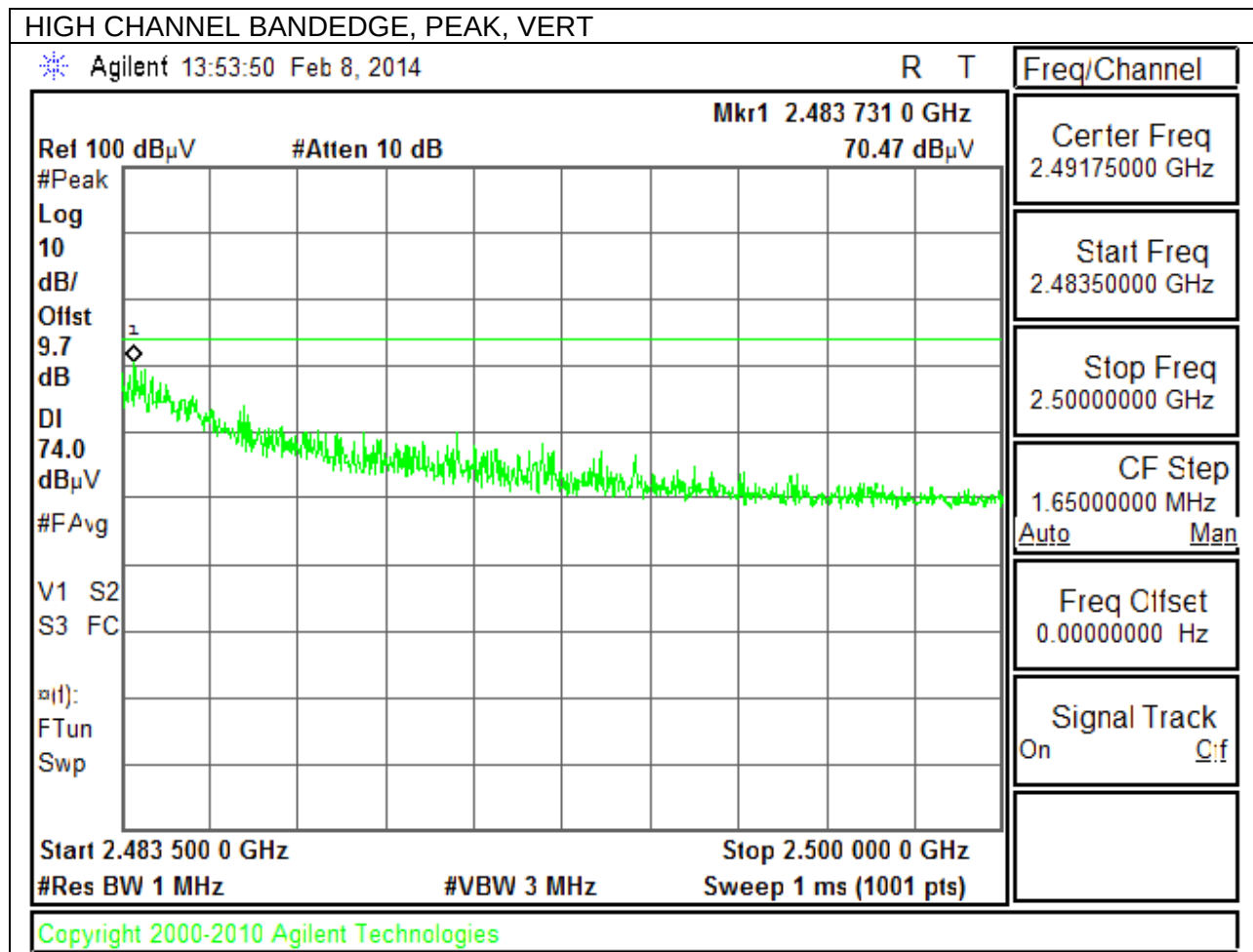


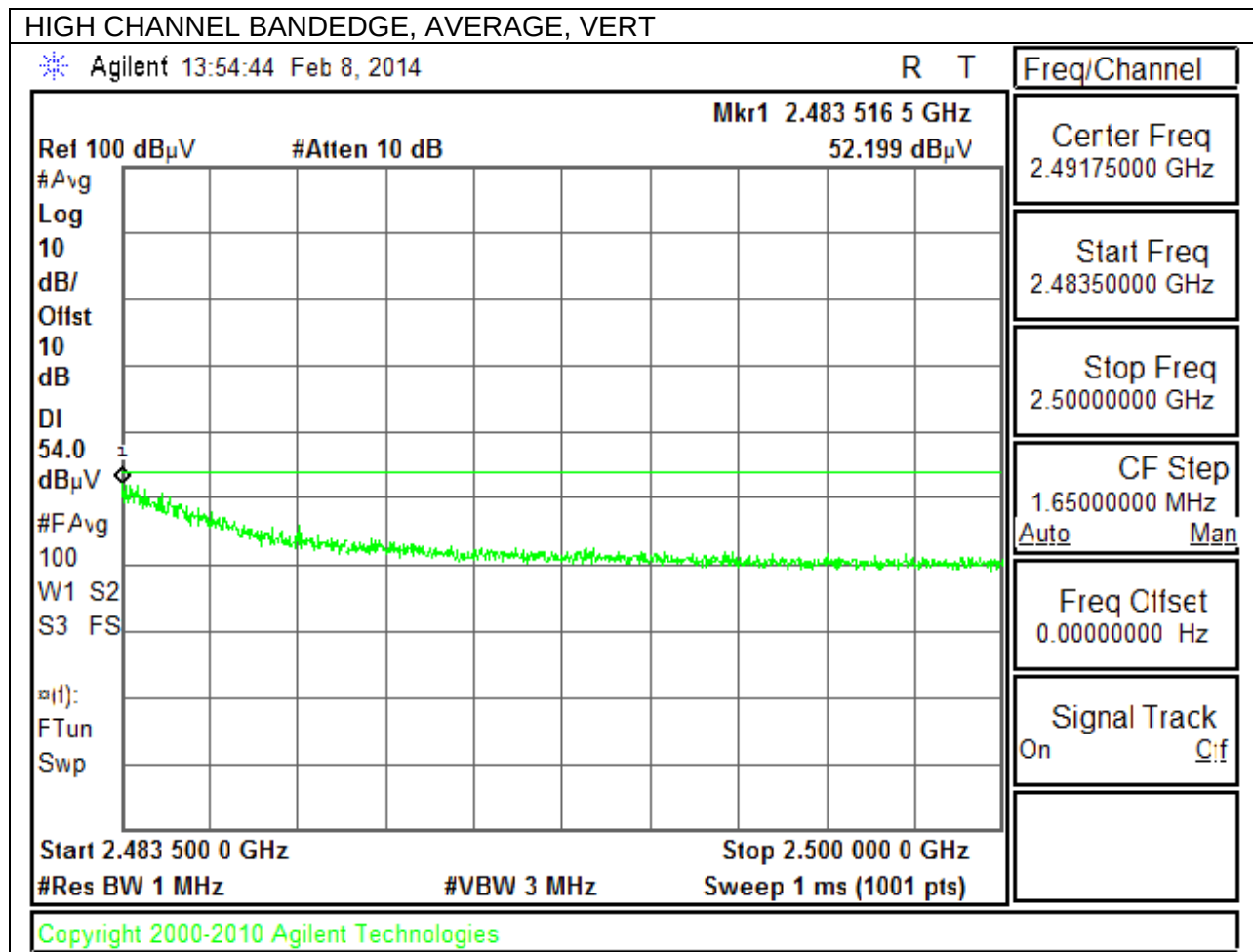


AUTHORIZED BANDEDGE (HIGH CHANNEL)



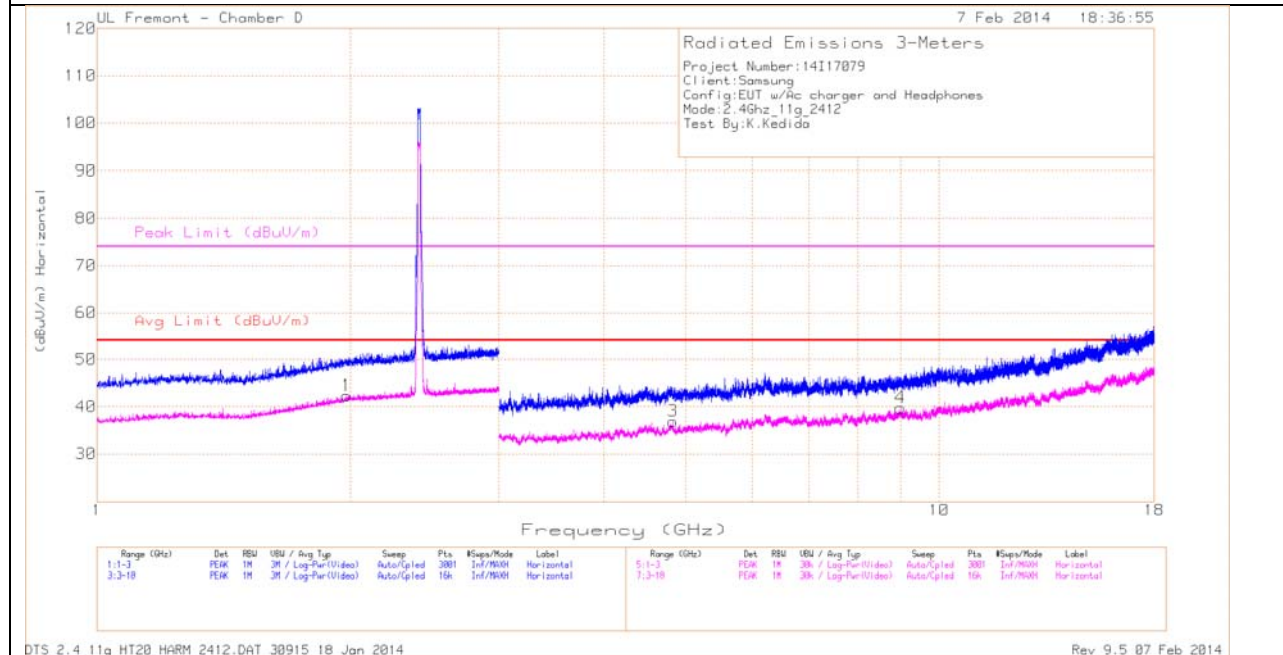






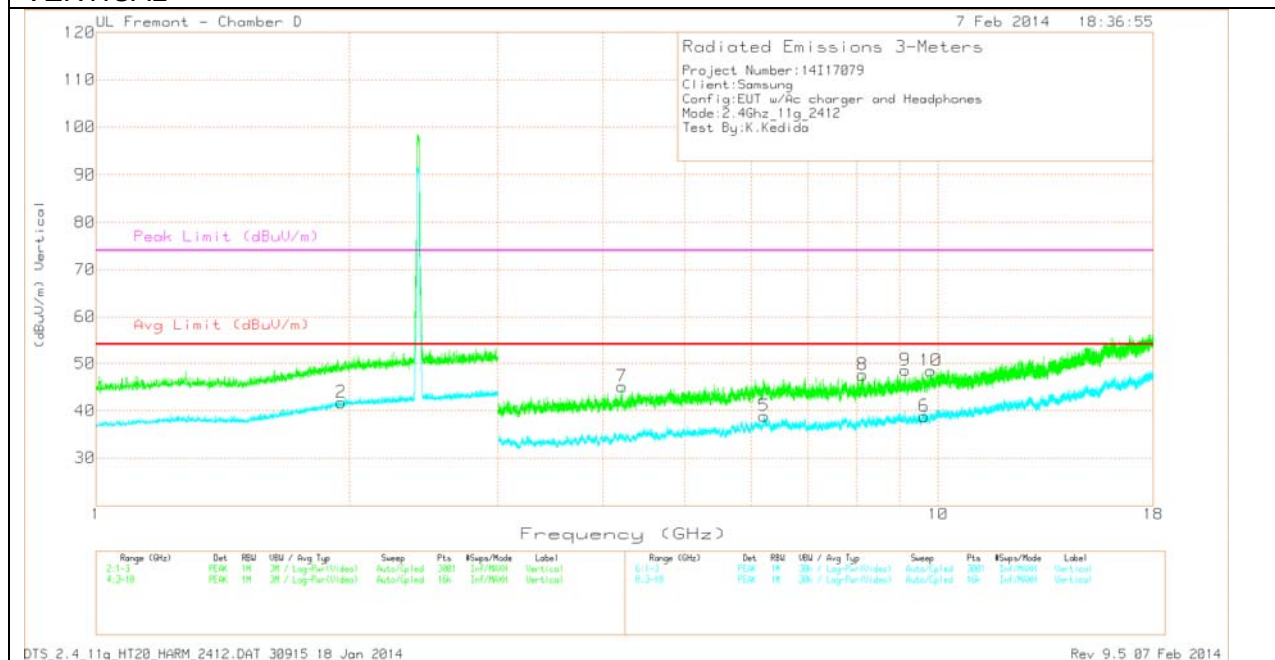
HARMONICS AND SPURIOUS EMISSIONS

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



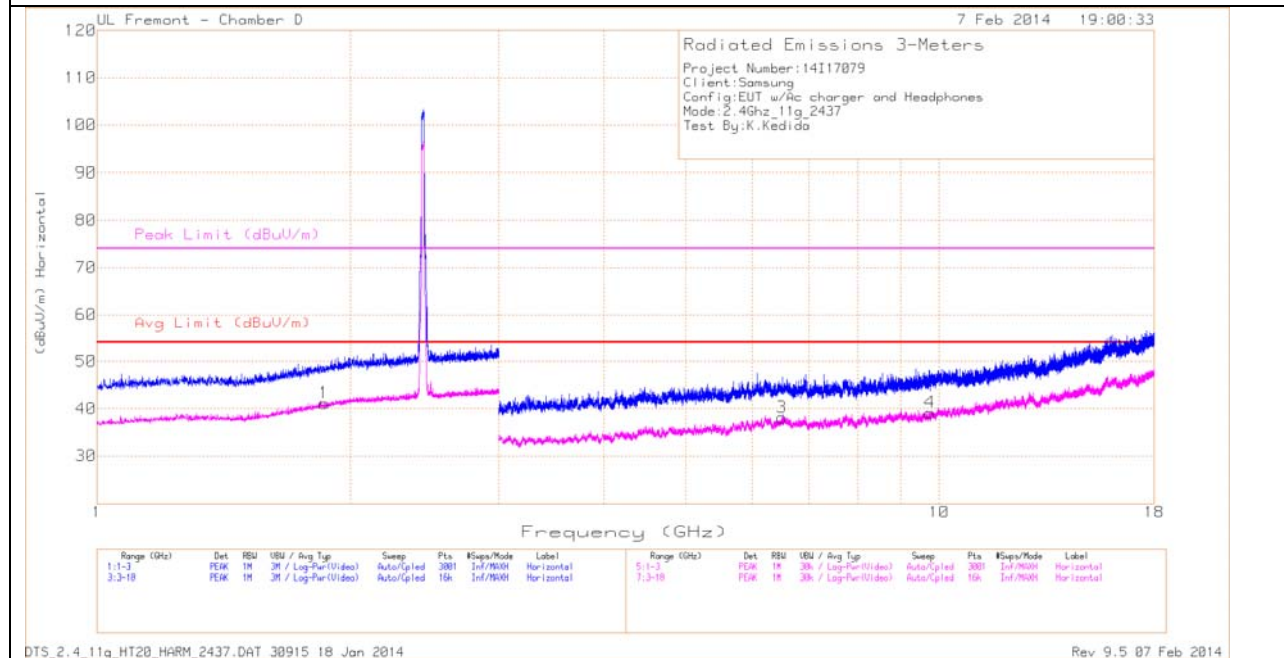
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

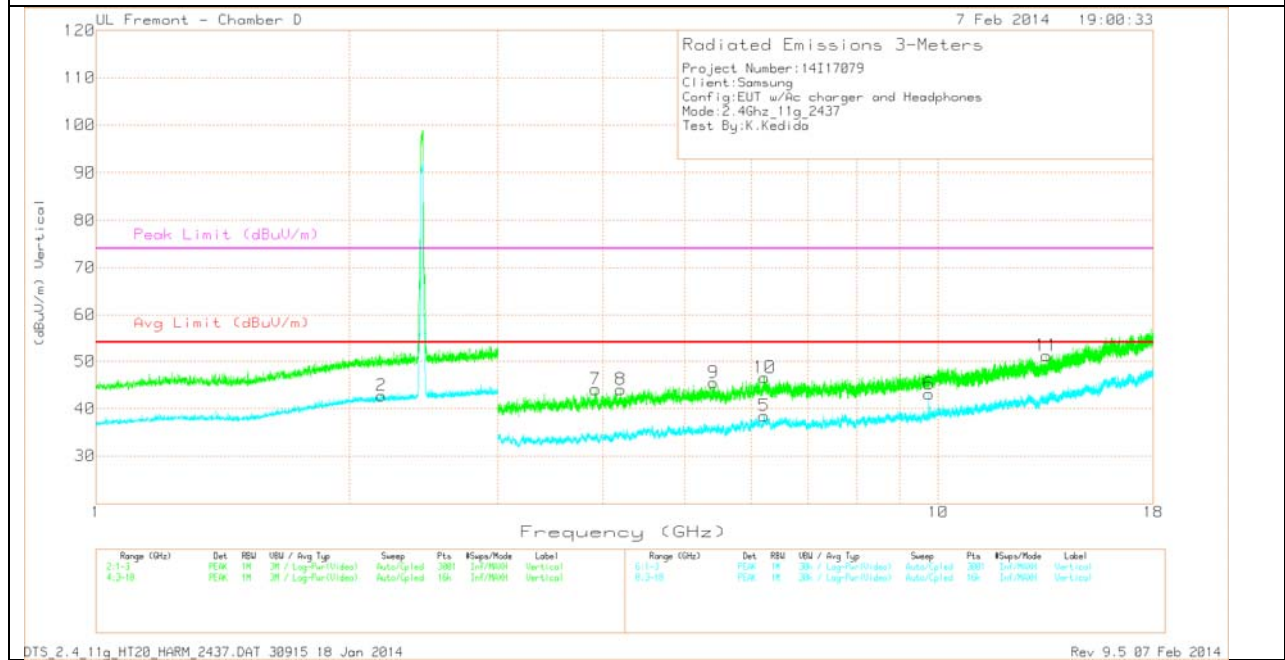
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 4.213	41.15	PK	34.1	-30.1	45.15	-	-	74	-28.85	0-360	202	V
8	* 8.133	37.78	PK	36.1	-26.3	47.58	-	-	74	-26.42	0-360	99	V
9	* 9.143	36.73	PK	36.9	-25.1	48.53	-	-	74	-25.47	0-360	202	V
3	* 4.831	31.69	Avg	34.7	-29.5	36.89	54	-17.11	-	-	0-360	99	H
2	1.955	33.84	Avg	31.5	-23.6	41.74	54	-12.26	-	-	0-360	202	V
1	1.979	34.09	Avg	31.7	-23.5	42.29	54	-11.71	-	-	0-360	202	H
5	6.212	30.68	Avg	36	-27.8	38.88	54	-15.12	-	-	0-360	202	V
4	8.996	27.95	Avg	36.8	-25	39.75	54	-14.25	-	-	0-360	99	H
6	9.628	25.72	Avg	37.4	-24.3	38.82	54	-15.18	-	-	0-360	99	V
10	9.797	34.66	PK	37.6	-23.8	48.46	-	-	74	-25.54	0-360	202	V

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



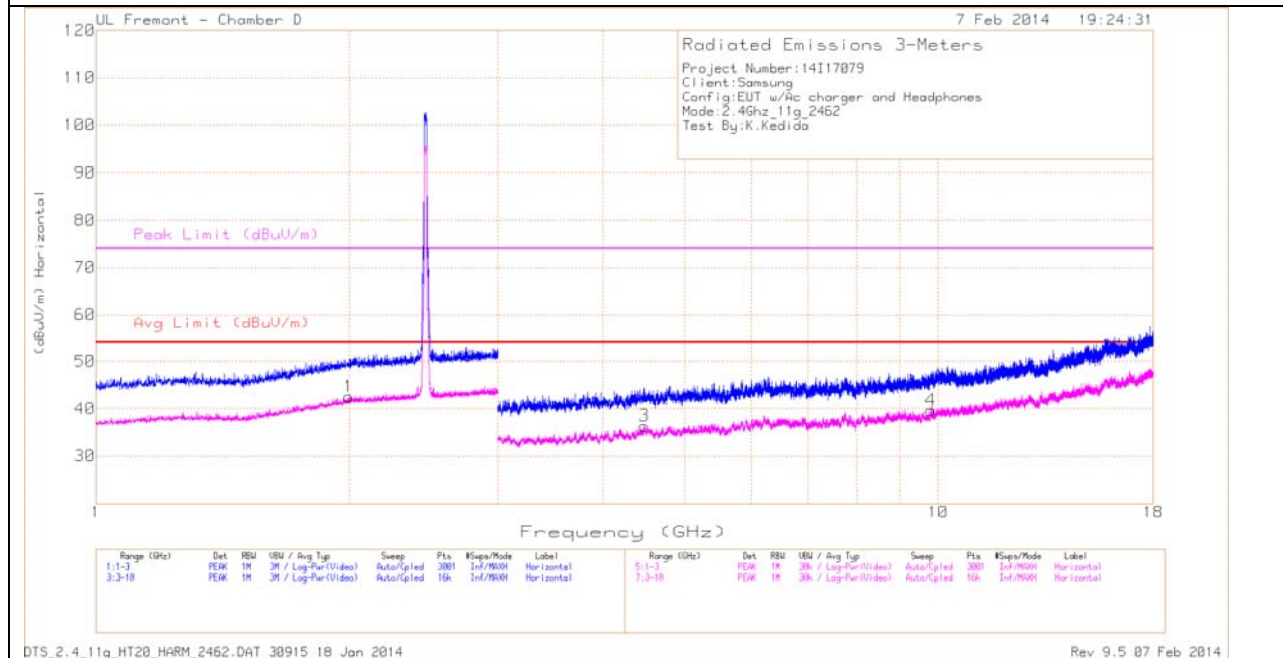
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

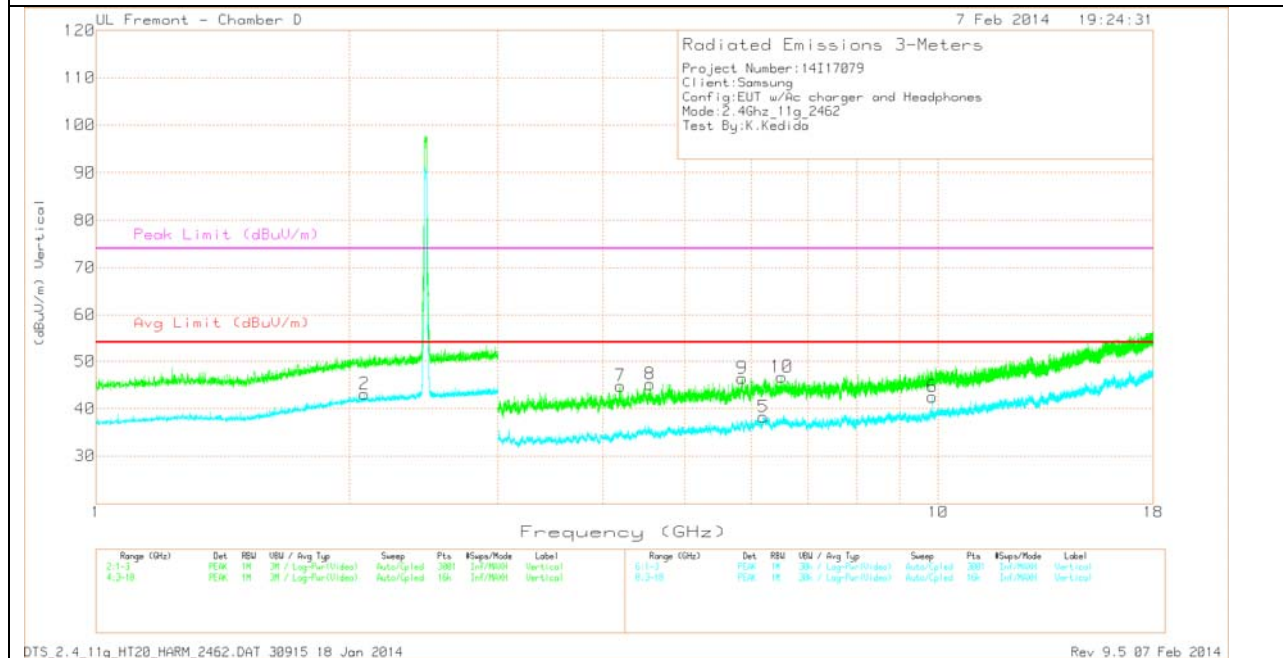
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 3.92	40.7	PK	33.9	-30.5	44.1	-	-	74	-29.9	0-360	202	V
8	* 4.197	39.85	PK	34.1	-29.9	44.05	-	-	74	-29.95	0-360	202	V
9	* 5.412	39.68	PK	34.9	-29.1	45.48	-	-	74	-28.52	0-360	202	V
1	1.861	33.94	Avg	30.9	-23.7	41.14	54	-12.86	-	-	0-360	202	H
2	2.183	33.95	Avg	32	-23.2	42.75	54	-11.25	-	-	0-360	202	V
5	6.214	30.29	Avg	36	-27.8	38.49	54	-15.51	-	-	0-360	99	V
10	6.221	38.34	PK	36	-27.8	46.54	-	-	74	-27.46	0-360	202	V
3	6.506	30.02	Avg	35.9	-27.8	38.12	54	-15.88	-	-	0-360	202	H
4	9.748	25.87	Avg	37.5	-24.2	39.17	54	-14.83	-	-	0-360	202	H
6	9.748	29.78	Avg	37.5	-24.2	43.08	54	-10.92	-	-	0-360	99	V
11	13.442	34.11	PK	39.1	-22	51.21	-	-	74	-22.79	0-360	202	V

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

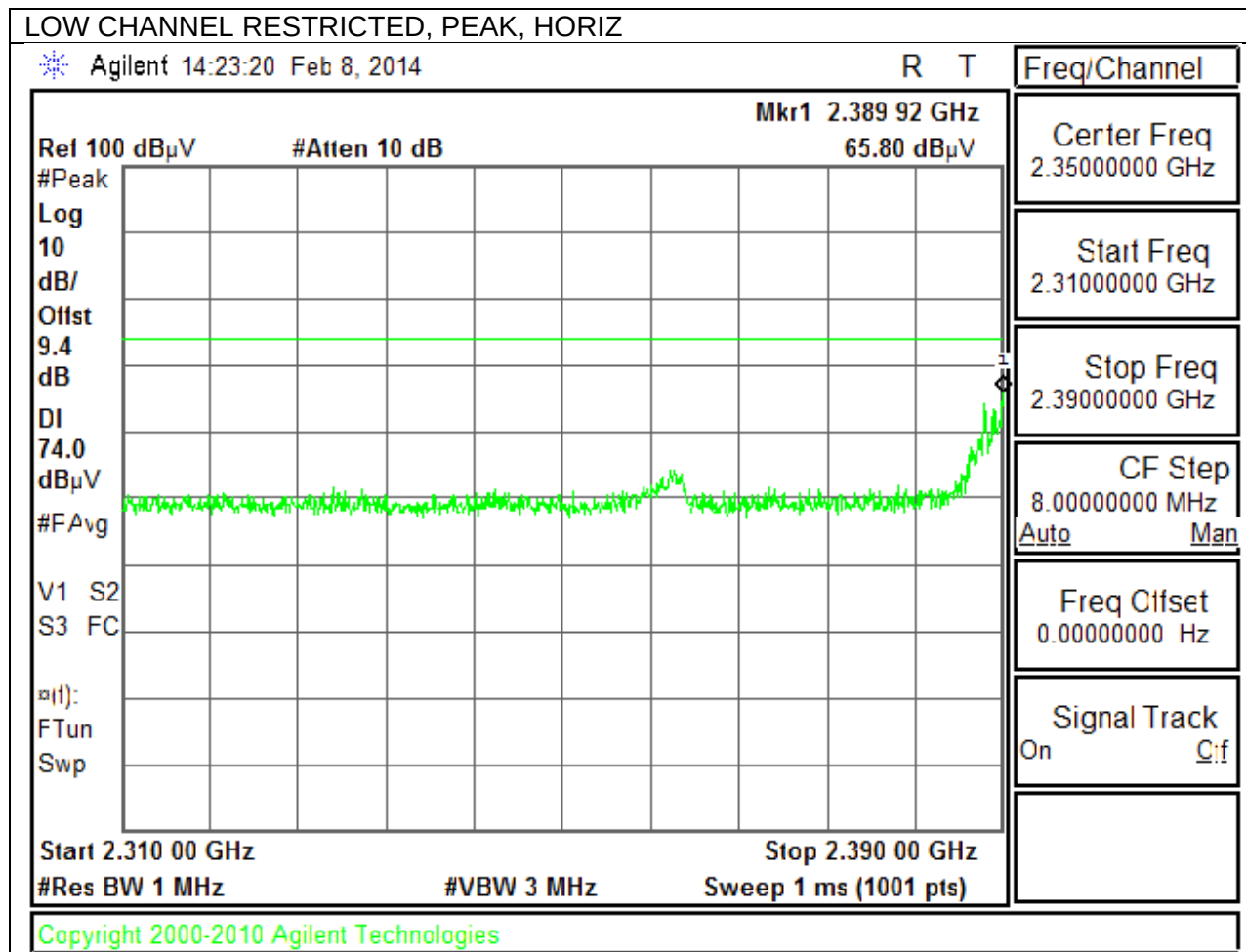


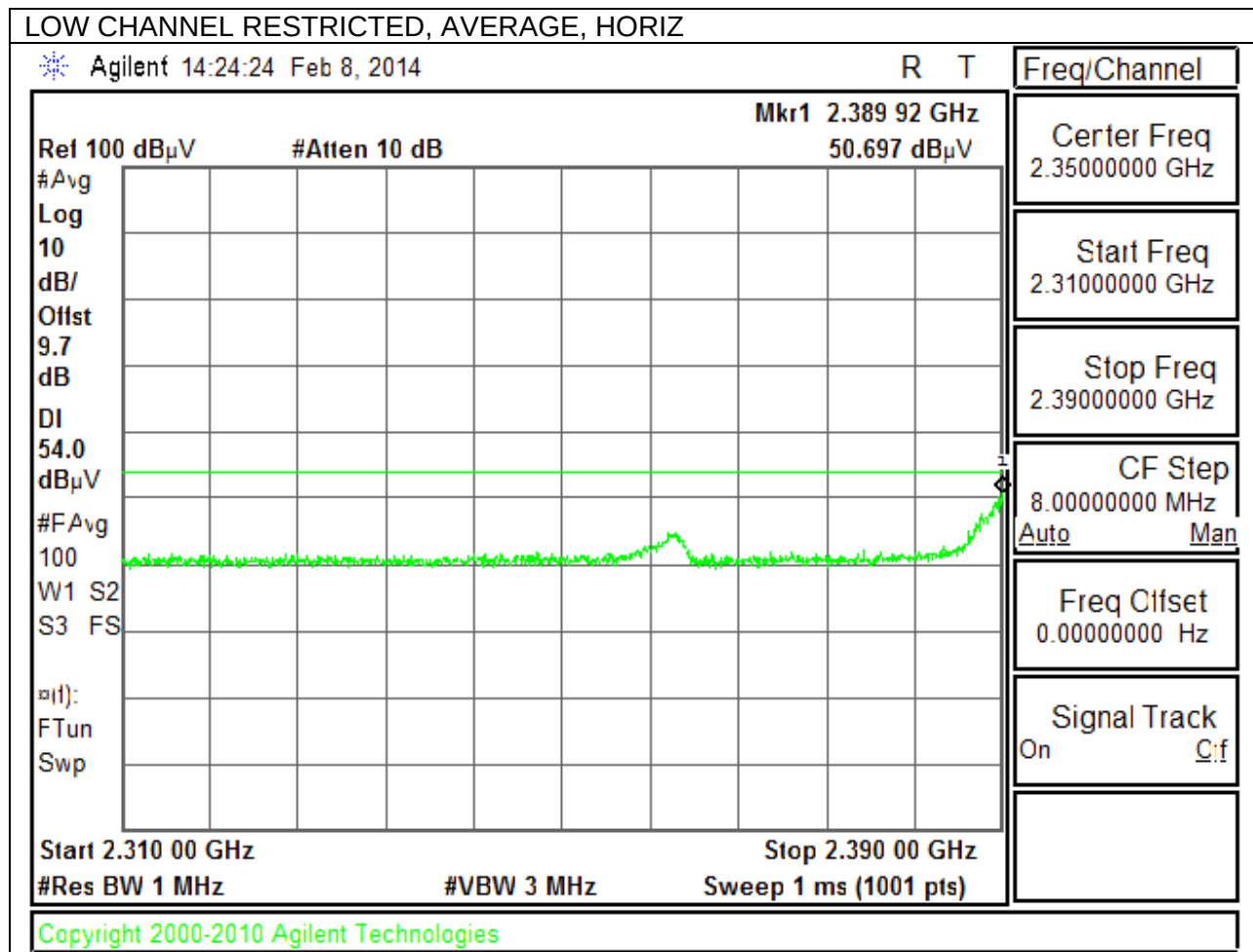
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

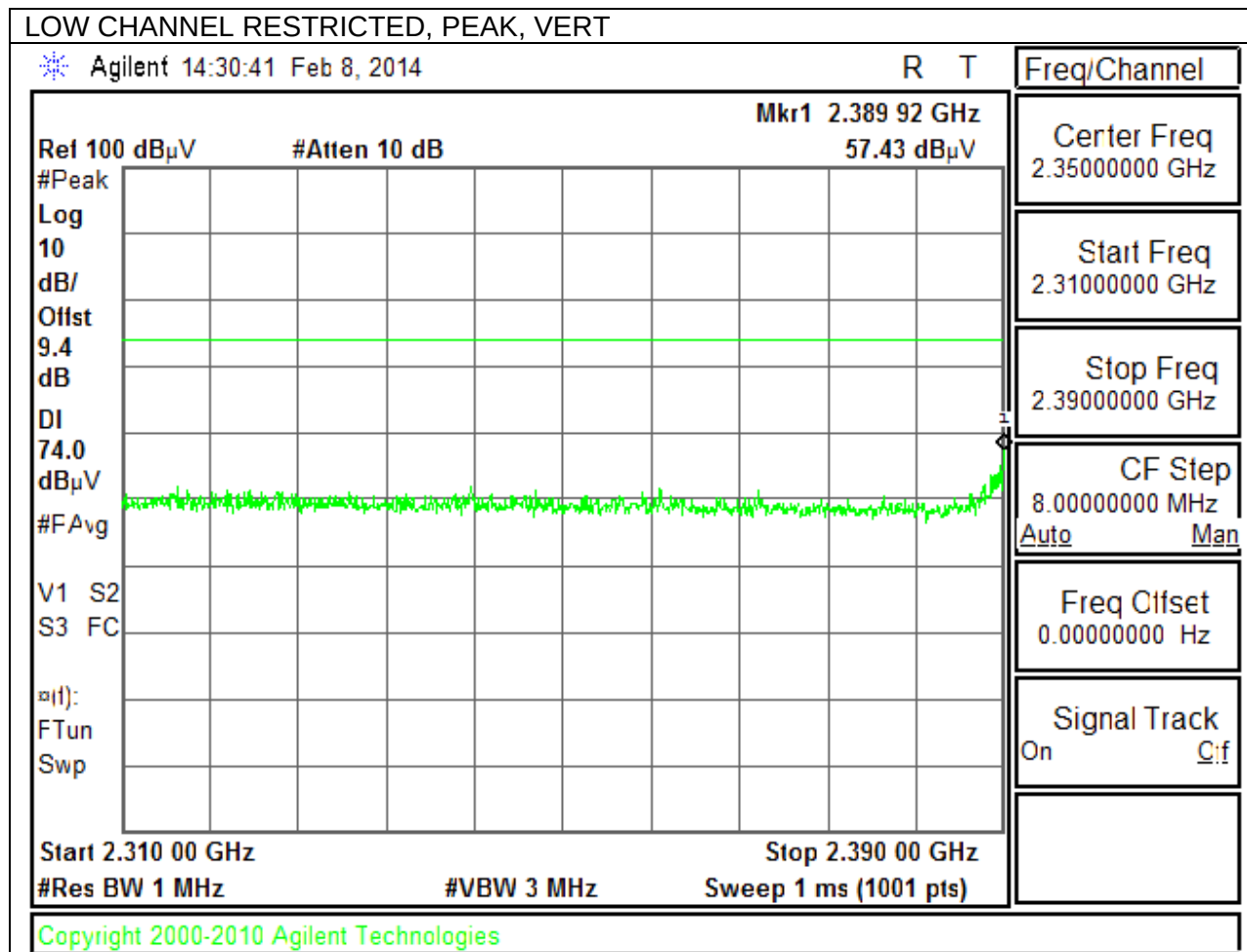
HIGH CHANNEL DATA

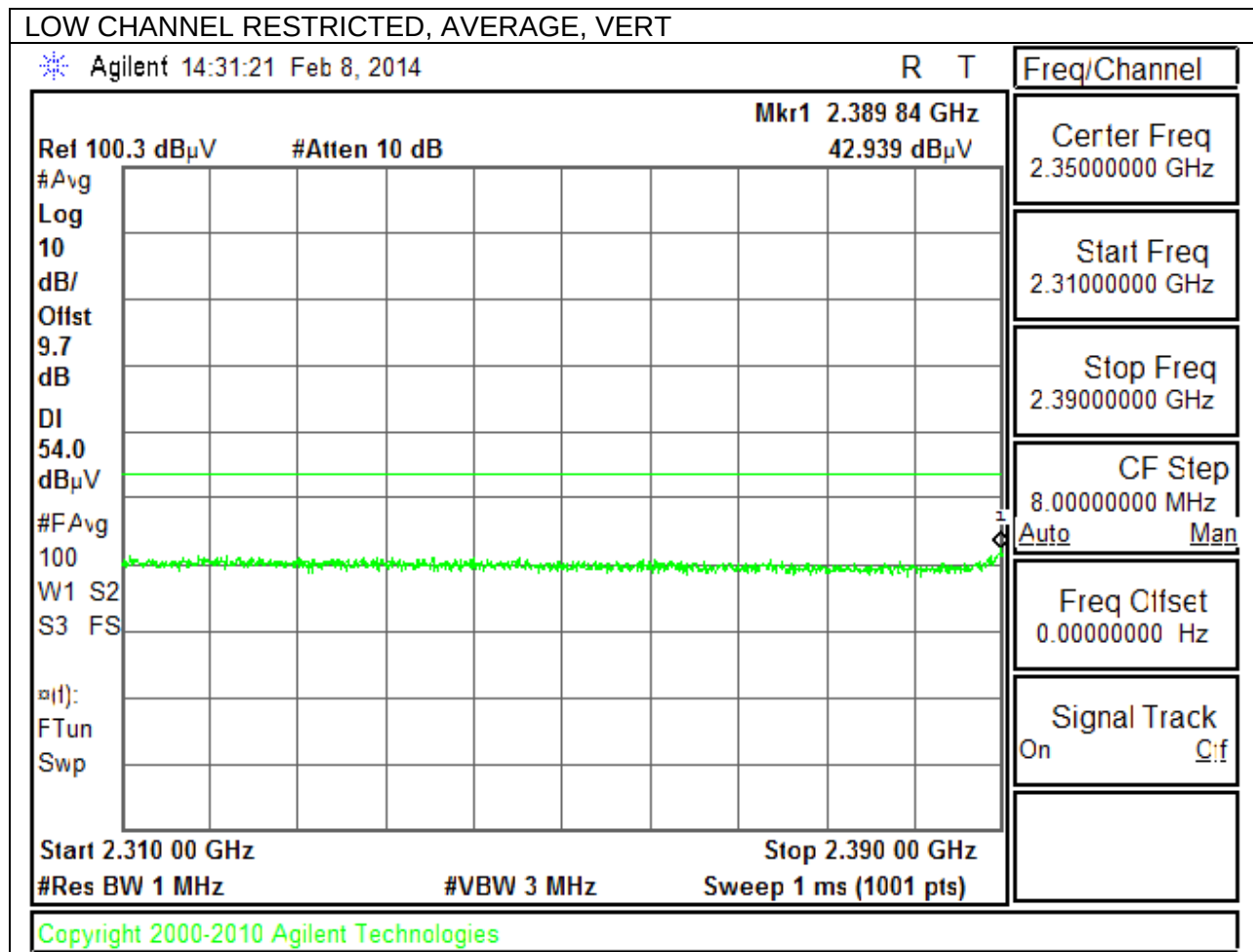
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 4.196	40.47	PK	34.1	-29.8	44.77	-	-	74	-29.23	0-360	99	V
8	* 4.547	40.97	PK	34.5	-30.3	45.17	-	-	74	-28.83	0-360	99	V
1	1.996	34.2	Avg	31.8	-23.5	42.5	54	-11.5	-	-	0-360	201	H
2	2.084	34.58	Avg	31.9	-23.4	43.08	54	-10.92	-	-	0-360	99	V
3	4.479	30.95	Avg	34.5	-29.1	36.35	54	-17.65	-	-	0-360	99	H
9	5.852	40.12	PK	35.5	-29.2	46.42	-	-	74	-27.58	0-360	99	V
5	6.201	30.25	Avg	36	-28	38.25	54	-15.75	-	-	0-360	202	V
10	6.519	38.28	PK	35.9	-27.5	46.68	-	-	74	-27.32	0-360	99	V
4	9.802	26.03	Avg	37.6	-24	39.63	54	-14.37	-	-	0-360	99	H
6	9.847	29.03	Avg	37.6	-24.1	42.53	54	-11.47	-	-	0-360	99	V

10.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

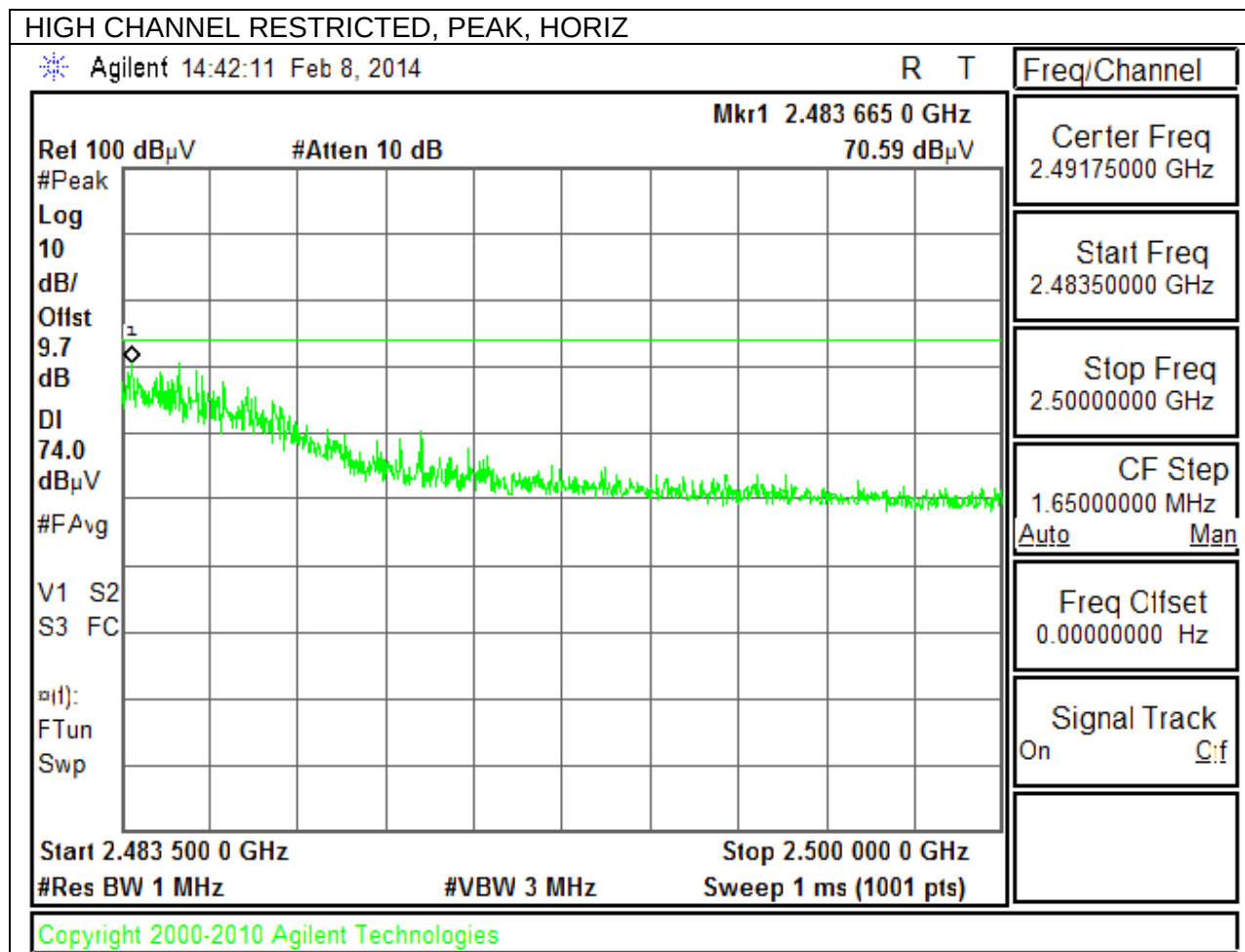


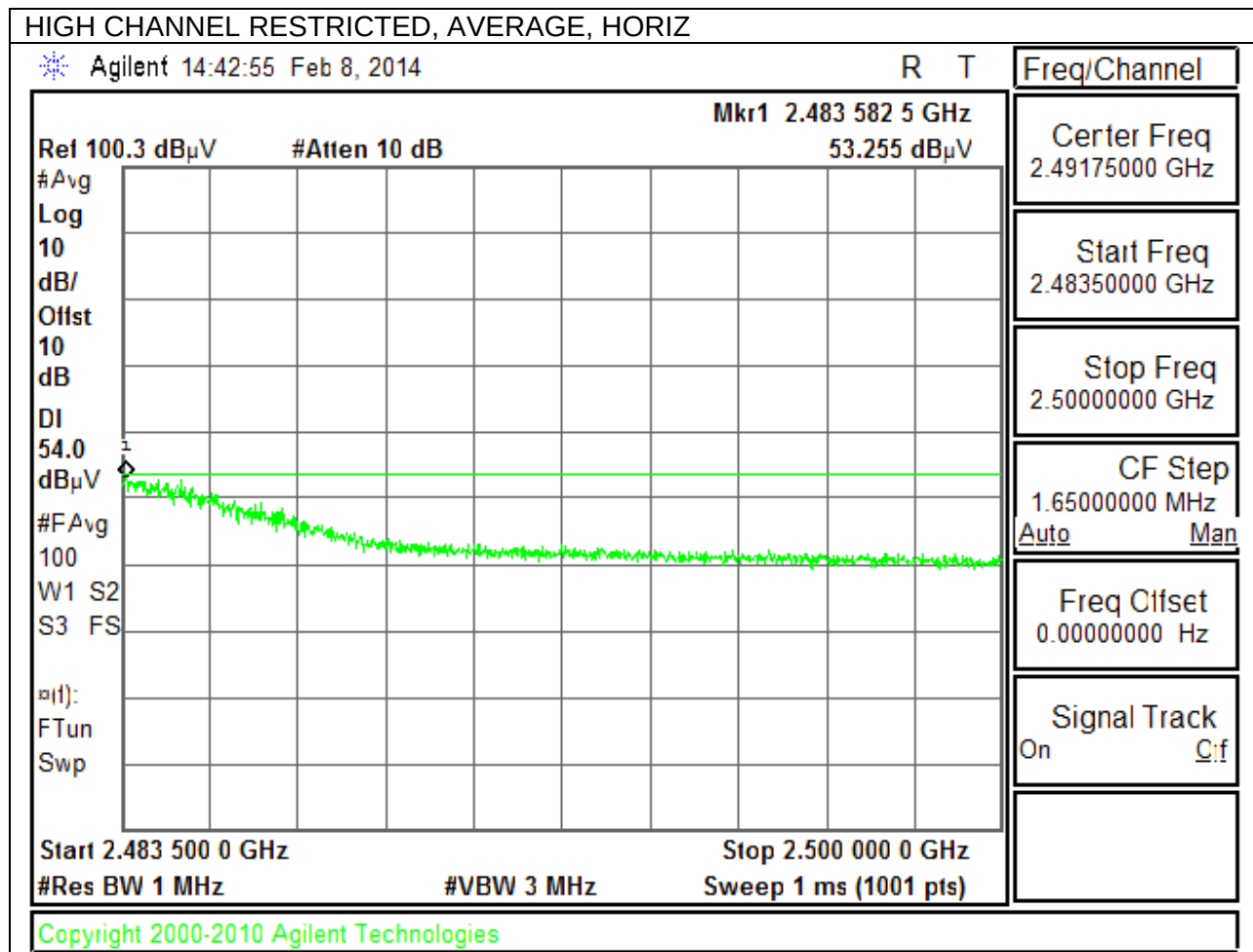


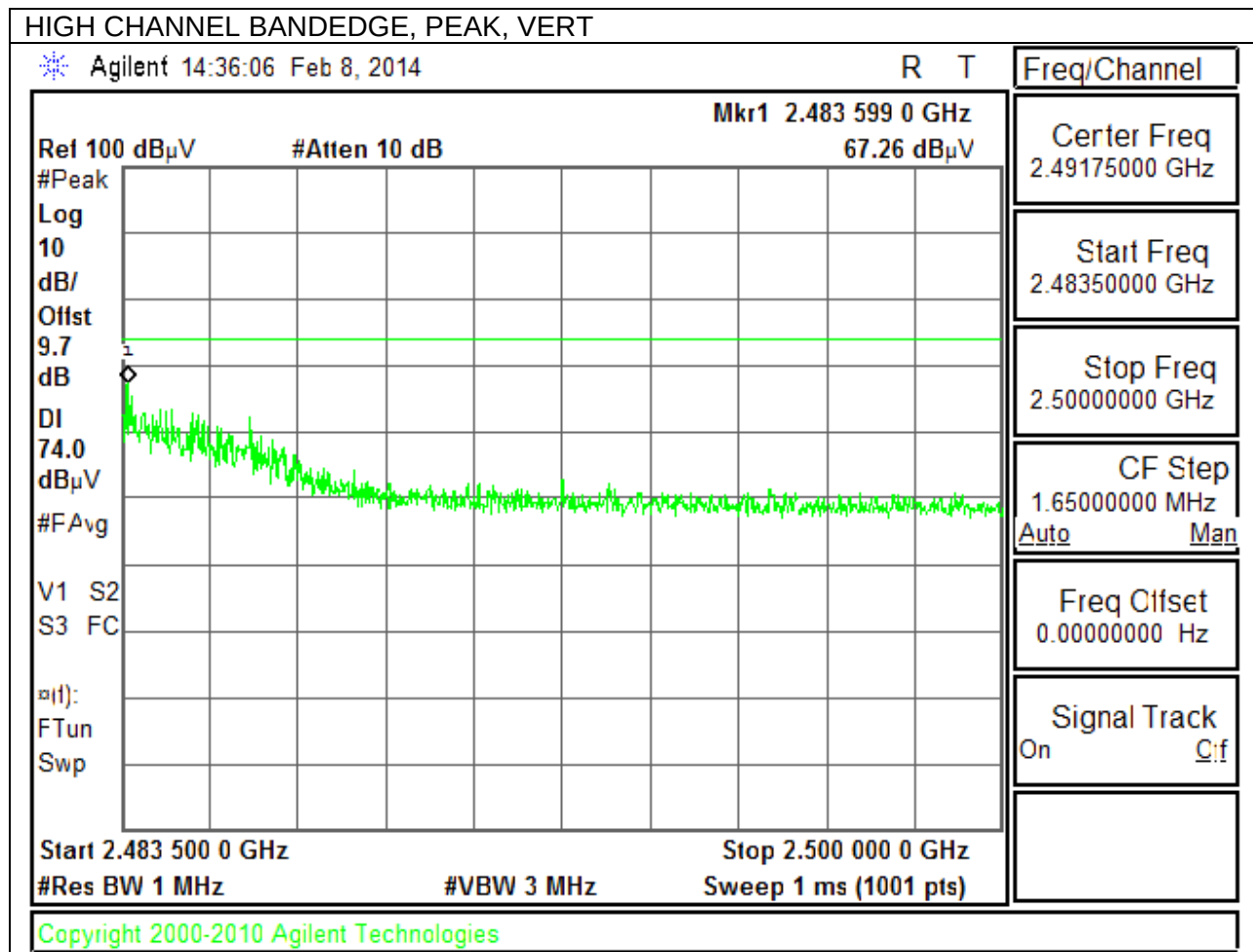


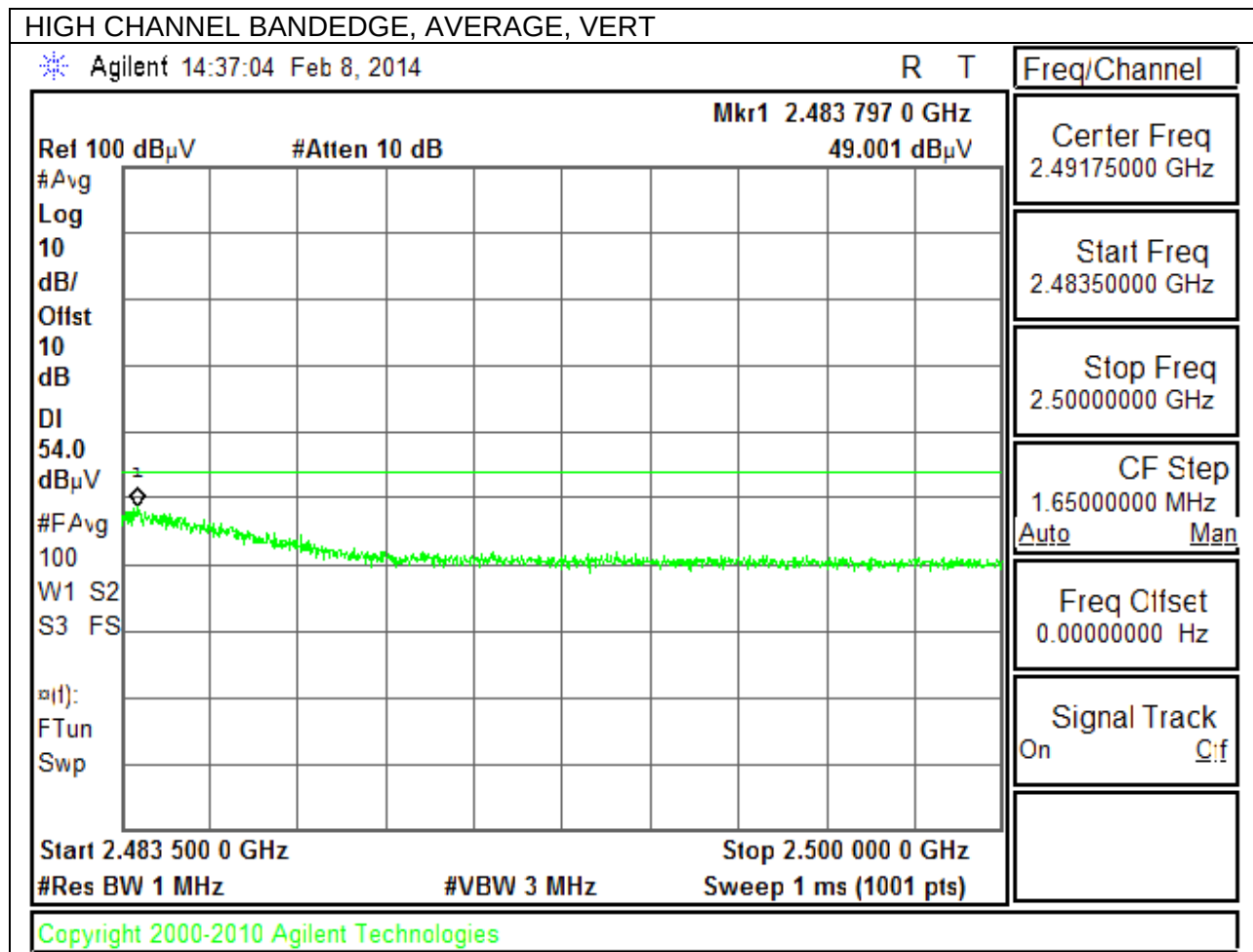


AUTHORIZED BANDEDGE (HIGH CHANNEL)



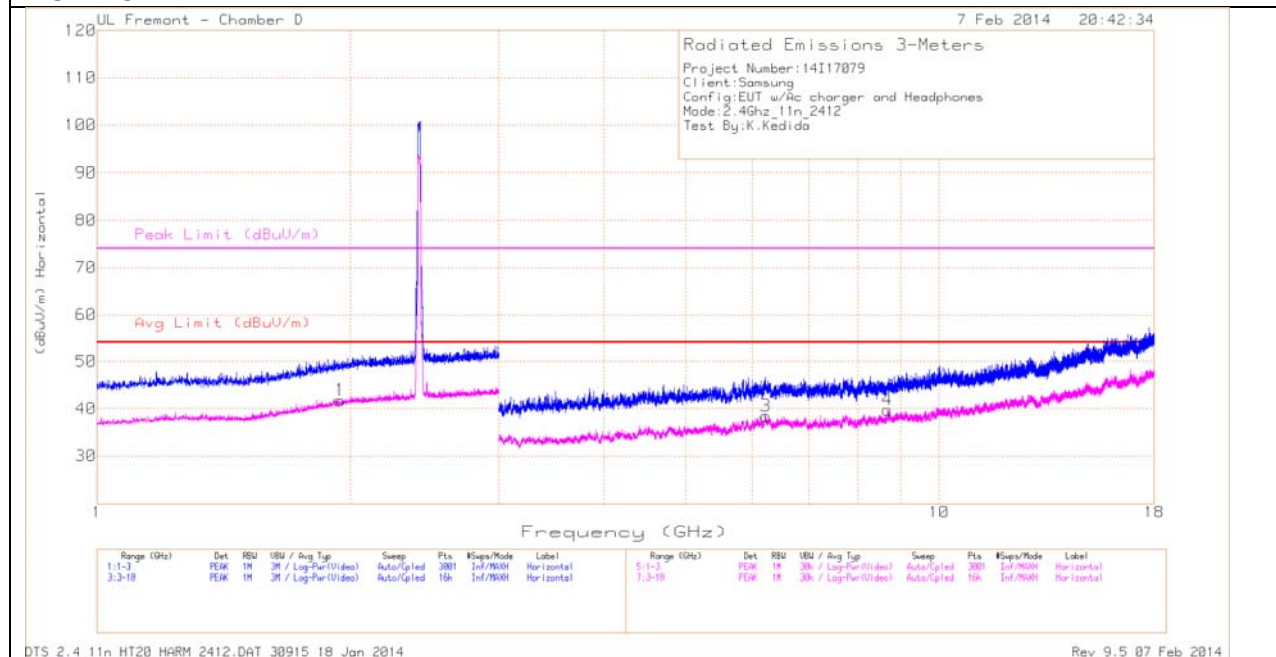






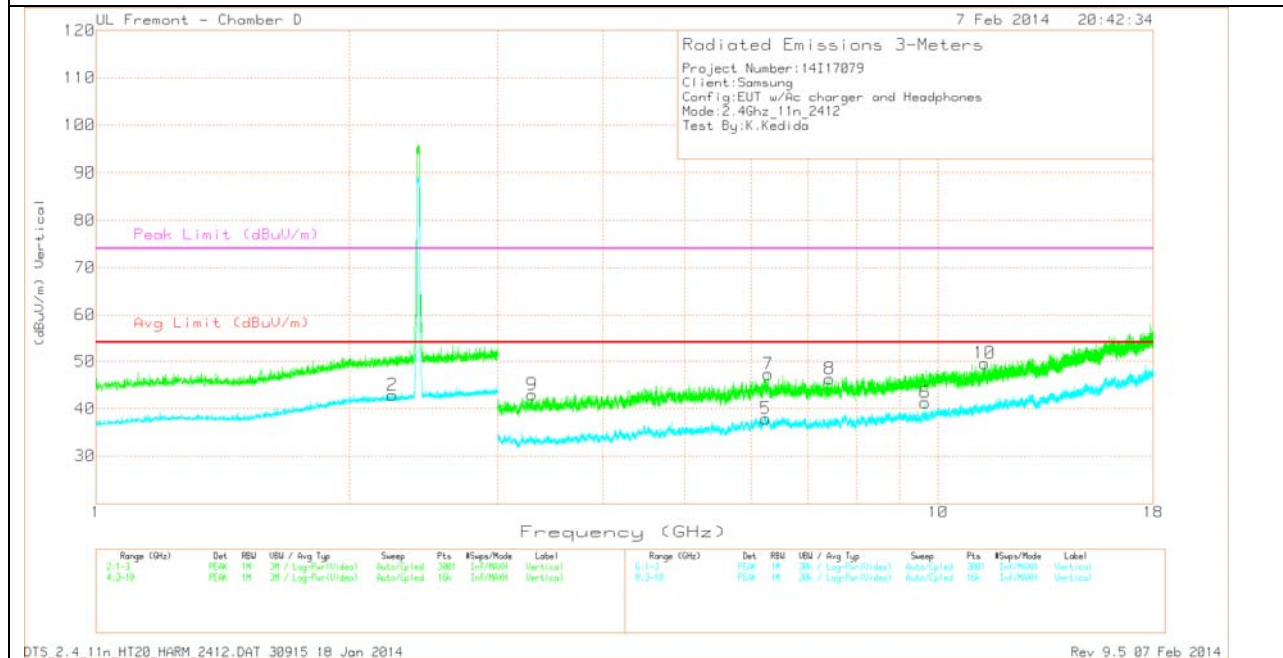
HARMONICS AND SPURIOUS EMISSIONS

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

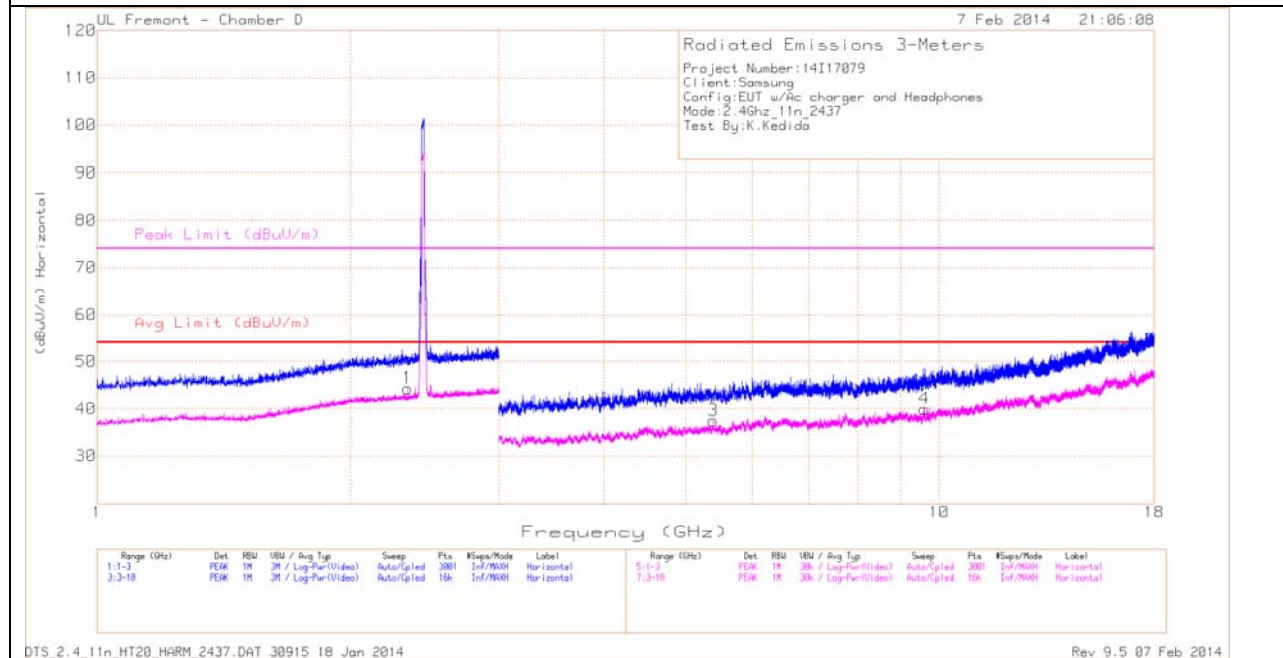


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA Trace Markers

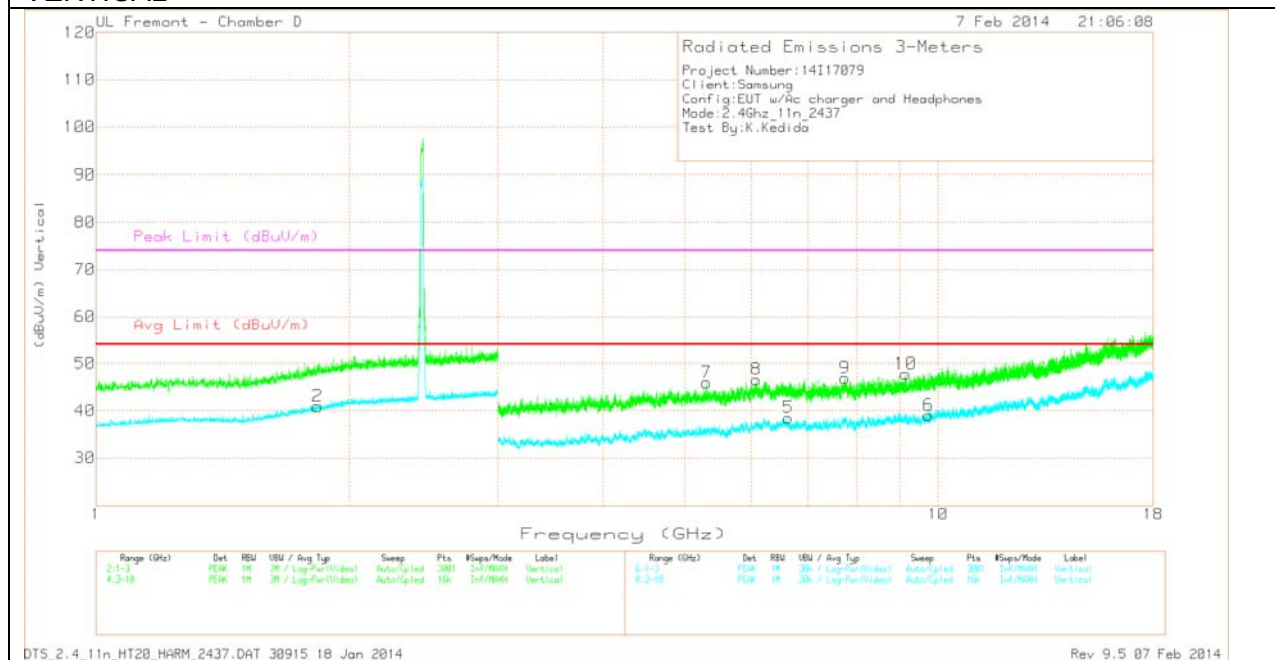
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
8	* 7.433	37.09	PK	35.9	-26.7	46.29	-	-	74	-27.71	0-360	202	V
10	* 11.351	33.57	PK	38.6	-22.6	49.57	-	-	74	-24.43	0-360	202	V
2	* 2.249	33.82	Avq	32.1	-23.1	42.82	54	-11.18	-	-	0-360	99	V
1	1.945	33.94	Avq	31.4	-23.6	41.74	54	-12.26	-	-	0-360	99	H
9	3.295	40.75	PK	33.3	-31.1	42.95	-	-	74	-31.05	0-360	202	V
3	6.223	30.19	Avq	36	-27.8	38.39	54	-15.61	-	-	0-360	99	H
5	6.24	29.96	Avq	36	-28.1	37.86	54	-16.14	-	-	0-360	202	V
7	6.284	39.29	PK	36	-28	47.29	-	-	74	-26.71	0-360	99	V
4	8.686	29.05	Avq	36.3	-25.6	39.75	54	-14.25	-	-	0-360	202	H
6	9.647	28	Avq	37.4	-24.1	41.3	54	-12.7	-	-	0-360	202	V

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



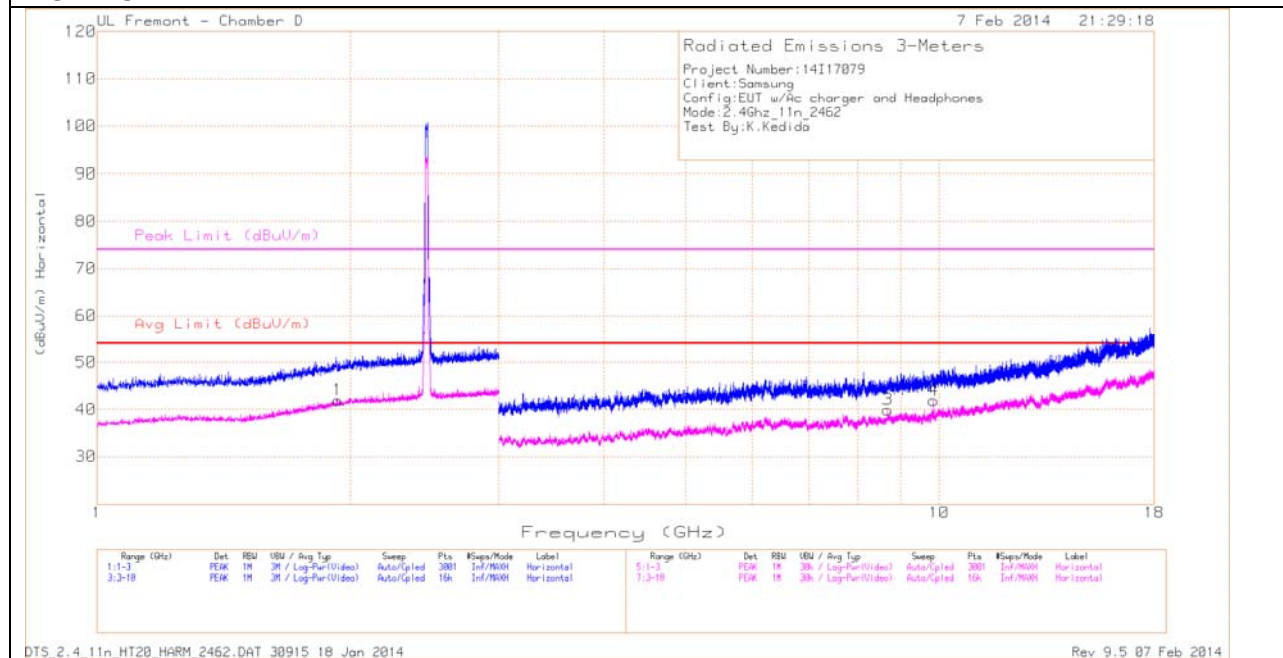
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

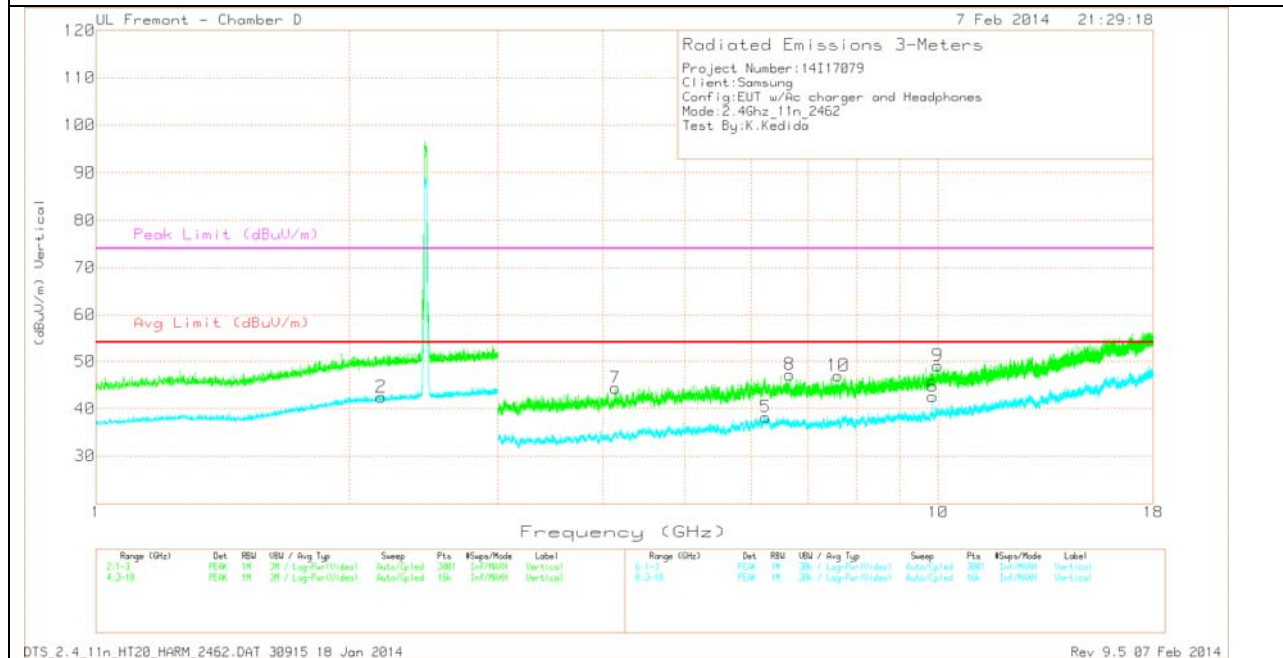
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
10	* 9.148	36.17	PK	36.9	-25.3	47.77	-	-	74	-26.23	0-360	202	V
1	* 2.338	35.16	Avq	32.2	-23.1	44.26	54	-9.74	-	-	0-360	99	H
3	* 5.39	31.06	Avq	34.9	-28.5	37.46	54	-16.54	-	-	0-360	99	H
2	1.833	33.91	Avq	30.7	-23.7	40.91	54	-13.09	-	-	0-360	99	V
7	5.312	39.75	PK	34.9	-28.7	45.95	-	-	74	-28.05	0-360	99	V
8	6.081	39.8	PK	35.9	-29.1	46.6	-	-	74	-27.4	0-360	202	V
5	6.641	31.29	Avq	35.8	-28.6	38.49	54	-15.51	-	-	0-360	202	V
9	7.751	36.68	PK	36.2	-26	46.88	-	-	74	-27.12	0-360	99	V
4	9.6	26.85	Avq	37.3	-24.2	39.95	54	-14.05	-	-	0-360	202	H
6	9.737	25.49	Avq	37.5	-24	38.99	54	-15.01	-	-	0-360	202	V

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.

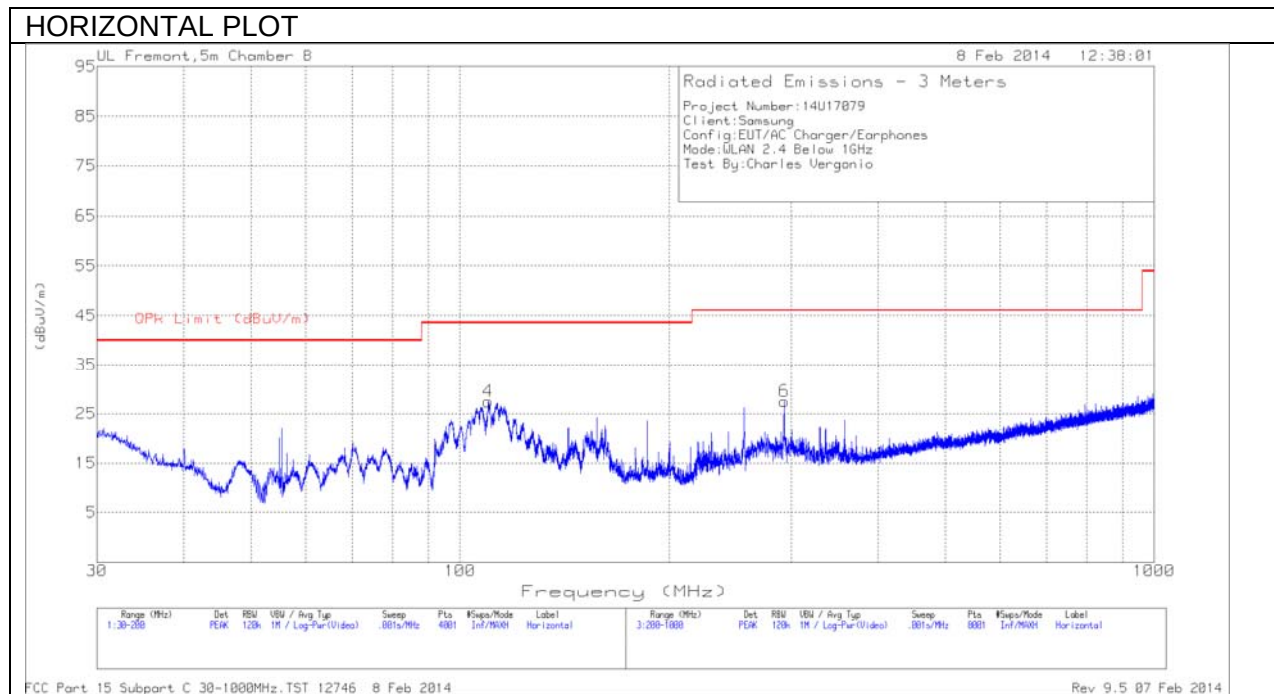
HIGH CHANNEL DATA

Trace Markers

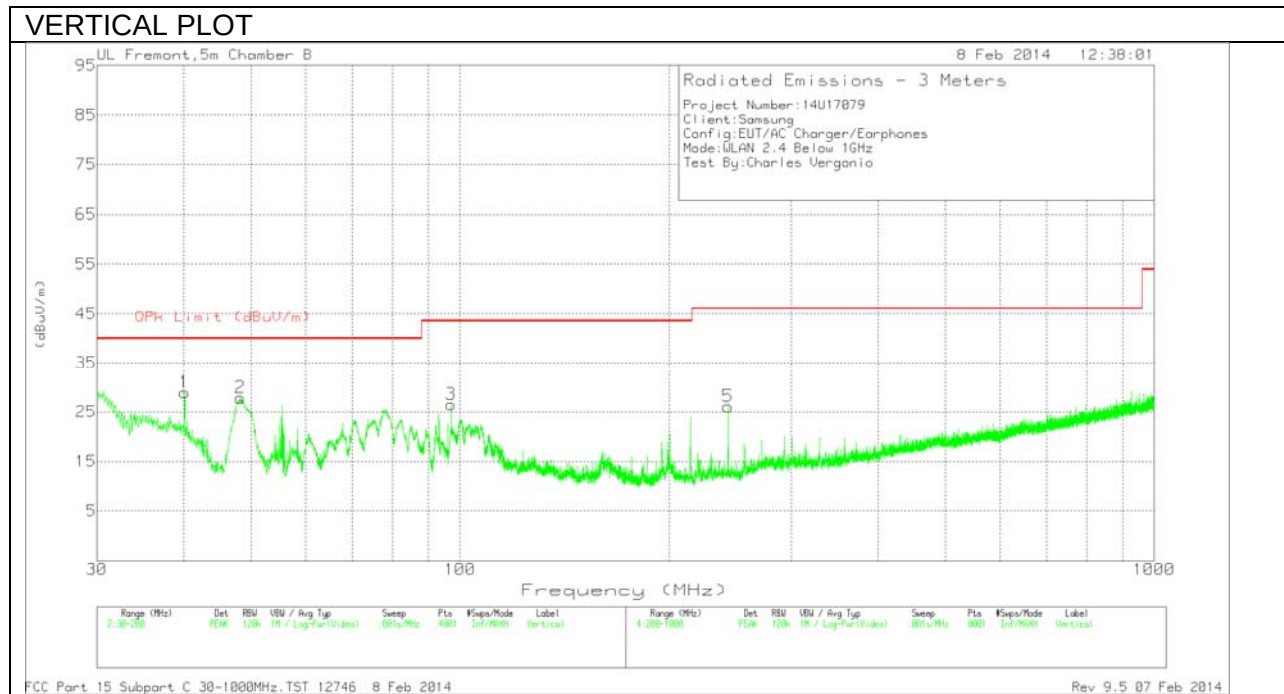
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 4.139	40.06	PK	34	-29.7	44.36	-	-	74	-29.64	0-360	202	V
10	* 7.608	38.27	PK	36.1	-27.4	46.97	-	-	74	-27.03	0-360	99	V
1	1.931	34.26	Avg	31.3	-23.6	41.96	54	-12.04	-	-	0-360	99	H
2	2.181	33.65	Avg	32	-23.2	42.45	54	-11.55	-	-	0-360	99	V
5	6.239	30.34	Avg	36	-28.1	38.24	54	-15.76	-	-	0-360	99	V
8	6.659	40.17	PK	35.8	-28.8	47.17	-	-	74	-26.83	0-360	202	V
3	8.687	29.25	Avg	36.3	-25.6	39.95	54	-14.05	-	-	0-360	99	H
4	9.848	28.42	Avg	37.6	-24.1	41.92	54	-12.08	-	-	0-360	201	H
6	9.848	29.11	Avg	37.6	-24.1	42.61	54	-11.39	-	-	0-360	99	V
9	9.989	35.39	PK	37.8	-24.1	49.09	-	-	74	-24.91	0-360	202	V

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	Frequenc y (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Correcte d Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 109.815	42.98	PK	12.5	-28	27.48	43.52	-16.04	0-360	300	H
5	* 243.4	40.96	PK	11.6	-26.5	26.06	46.02	-19.96	0-360	200	V
1	40.115	44.25	PK	13.4	-28.7	28.95	40	-11.05	0-360	100	V
2	48.275	48.15	PK	8.4	-28.7	27.85	40	-12.15	0-360	100	V
3	97.1075	45.51	PK	9.1	-28.1	26.51	43.52	-17.01	0-360	100	V
6	293.1	40.32	PK	13.3	-26.1	27.52	46.02	-18.5	0-360	101	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 12746 8 Feb 2014

Rev 9.5 07 Feb 2014

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

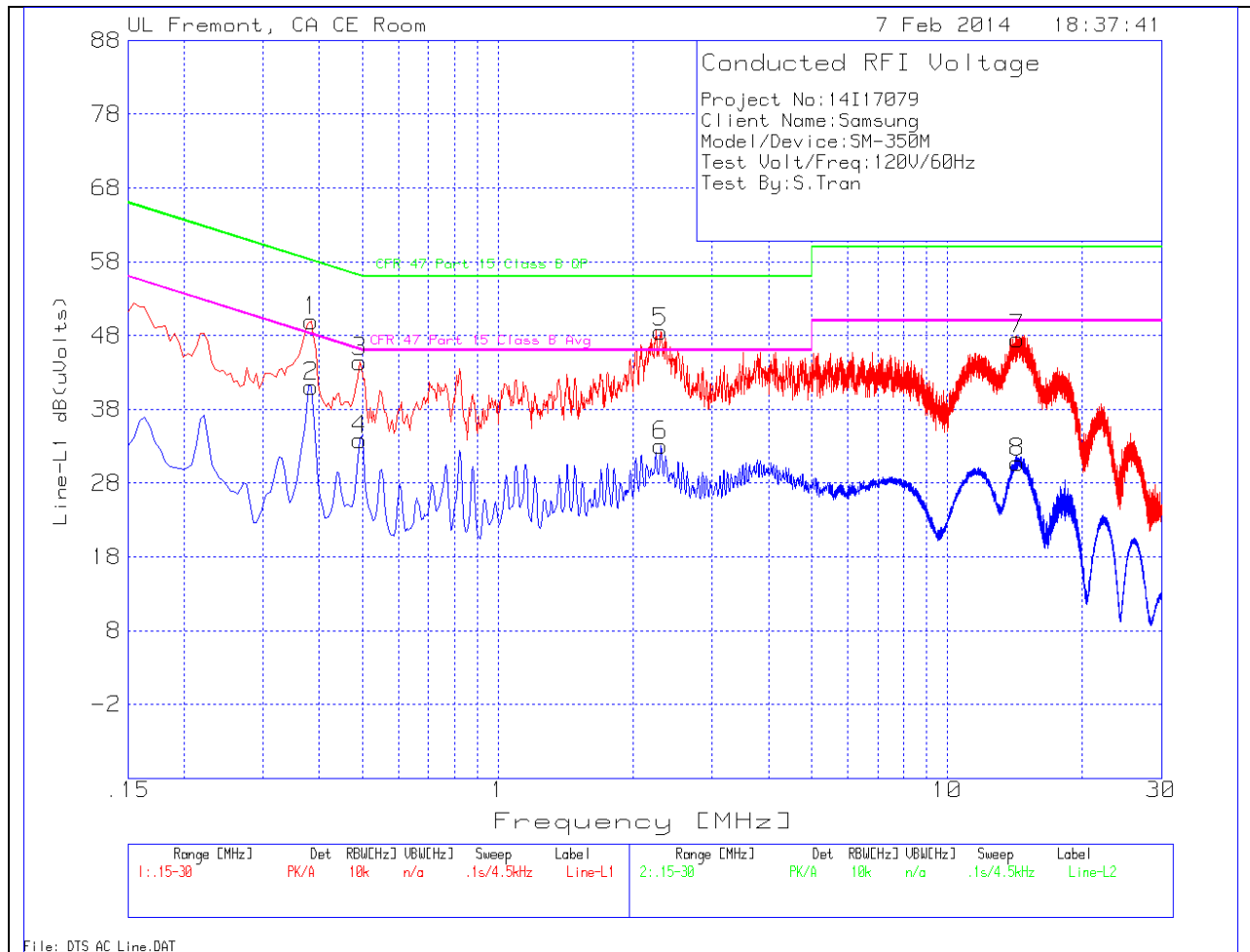
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
1	.384	49.52	PK	.4	0	49.92	58.2	-8.28	-	-
2	.384	40.71	Av	.4	0	41.11	-	-	48.2	-7.09
3	.492	44.02	PK	.4	0	44.42	56.1	-11.68	-	-
4	.492	33.42	Av	.4	0	33.82	-	-	46.1	-12.28
5	2.3055	48.18	PK	.2	.1	48.48	56	-7.52	-	-
6	2.3055	32.82	Av	.2	.1	33.12	-	-	46	-12.88
7	14.343	47.08	PK	.2	.2	47.48	60	-12.52	-	-
8	14.343	30.33	Av	.2	.2	30.73	-	-	50	-19.27

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)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
9	.384	49.86	PK	.5	0	50.36	58.2	-7.84	-	-
10	.384	38.39	Av	.5	0	38.89	-	-	48.2	-9.31
11	.4965	44.88	PK	.4	0	45.28	56.1	-10.82	-	-
12	.4965	32.25	Av	.4	0	32.65	-	-	46.1	-13.45
13	2.2335	44.99	PK	.2	.1	45.29	56	-10.71	-	-
14	2.2335	28.9	Av	.2	.1	29.2	-	-	46	-16.8
15	14.487	46.39	PK	.3	.2	46.89	60	-13.11	-	-
16	14.487	30.82	Av	.3	.2	31.32	-	-	50	-18.68

LINE 1 RESULTS



LINE 2 RESULTS

