



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-G313MY

FCC ID: A3LSMG313MY

REPORT NUMBER: 14I18409-E4

ISSUE DATE: JULY 28, 2014

Prepared for

SAMSUNG ELECTRONICS CO., LTD.

416, MAETAN 3-DONG, YEONGTONG-GU

SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

Prepared by

UL VERIFICATION SERVICES INC.

47173 BENICIA STREET

FREMONT, CA 94538, U.S.A.

TEL: (510) 771-1000

FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/28/14	Initial Issue	P. Zhang

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
9.2. 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
9.3. 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	26
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
9.6.	<i>OUT-OF-BAND EMISSIONS</i>	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.	<i>LIMITS AND PROCEDURE</i>	54
10.2.	<i>TRANSMITTER ABOVE 1 GHz</i>	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	68
10.2.3.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND	81
10.3.	<i>WORST-CASE BELOW 1 GHz</i>	94
11.	AC POWER LINE CONDUCTED EMISSIONS	97
12.	SETUP PHOTOS	101

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL: SM-G313MY

SERIAL NUMBER: FL-206-A, FL-206-B, FL-206-C (Radiated), FL-206-D (Conducted)

DATE TESTED: JUNE 1-13, 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:



PENG ZHANG
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.



CHARLES VERGONIO
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
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 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☒ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

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/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n bar phone.

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	21.43	139.00
2412 - 2462	802.11g	23.07	202.77
2412 - 2462	802.11n HT20	21.88	154.17

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -1.6 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	ETA10U10BBB	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

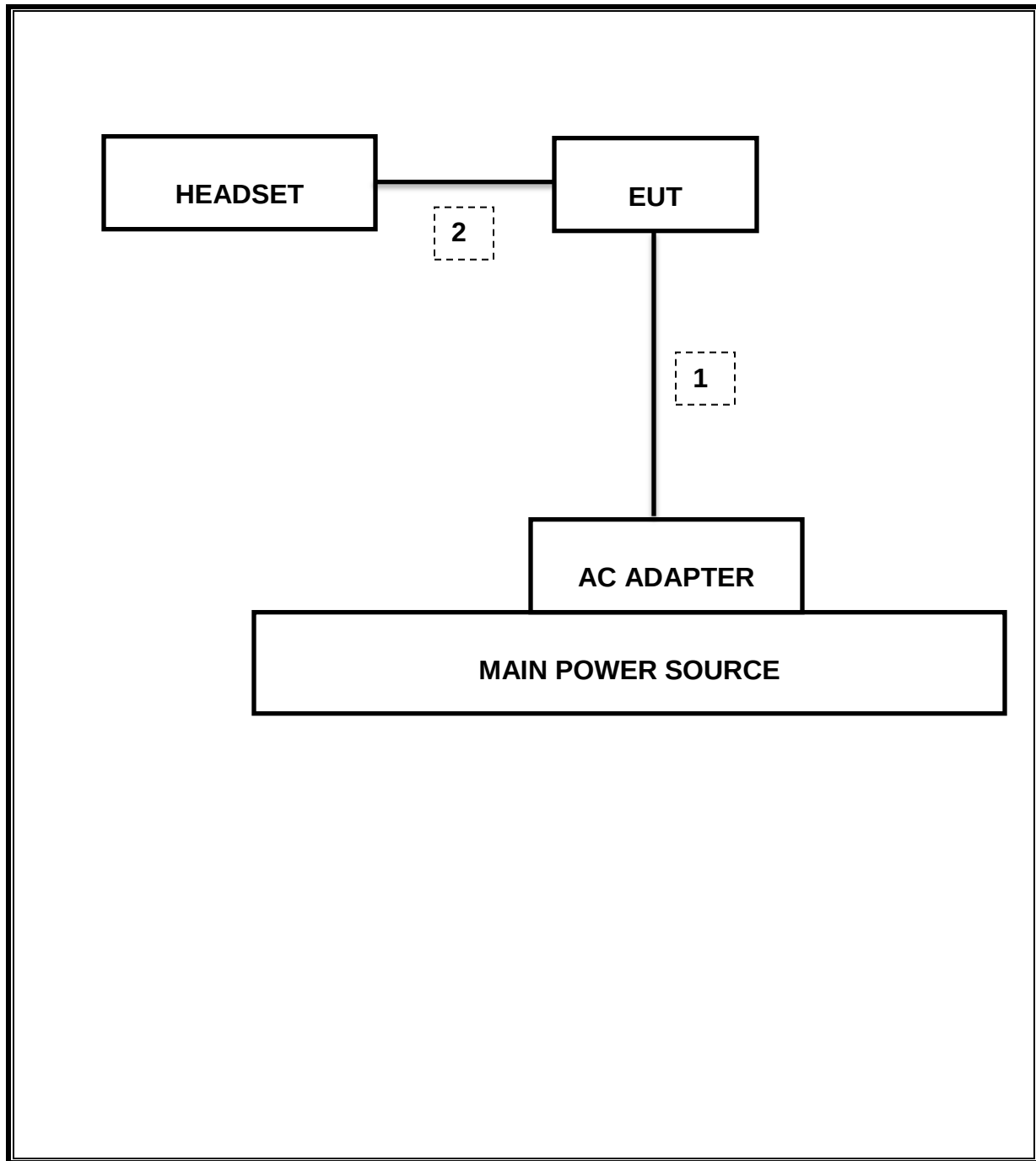
I/O CABLES

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 Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/14
Spectrum Analyzer, 9KHz-40GHz	HP	8564E	C00986	04/01/15
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	08/13/14
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/18/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14
Antenna, Horn, 1-18 GHz	ETS	3117	C01022	02/21/15
Antenna, Horn, 18- 26 GHz	ARA	MWH-1826/B	C00946	11/12/14
Antenna, Horn, 26-40 GHz	ARA	MWH-2640	C00891	06/28/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	T243	03/06/15
RF Preamplifier, 100KHz -> 1300MHz	HP	TBD	C00825	06/01/15
RF Preamplifier, 1GHz - 18GHz	Miteq	NSP4000-SP2	924343	03/23/15
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	F00351	06/27/14
AC Power Supply, 2,500VA 45-500Hz	Elgar-Ametek	CW2501M	F00013	CNR
RF Preamplifier, 1GHz - 40GHz	Miteq	NSP4000-SP2	C00990	08/20/14
Attenuator / Switch driver	HP	11713A	F00204	CNR
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	F00219	05/23/15
High Pass Filter 5GHz	Micro-Tronics	HPS17542	F00222	05/22/15
High Pass Filter 6GHz	Micro-Tronics	HPM17543	F00224	05/22/15

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.

Band edge emissions within Restricted Bands are measured using RMS with duty cycle factor offset method.

8. SUMMARY TABLE

The model FCC ID: A3LSMG313MY shares the same enclosure and circuit board as model FCC ID: A3LSMG313M. The WWAN/WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WWAN/WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units.

After confirming through preliminary radiated emissions that the performance of the A3LSMG313M WLAN remains representative of this model (FCC ID: A3LSMG313M) test data for FCC ID: A3LSMG313MY is being submitted for this application.

Radiated emissions were fully re-evaluated against FCC Part 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 WCDMA 1, 2, 5 changed to WCDMA 1, 2, 8 by changing W5 DPX to W8 DPX.

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	9.01MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-29.17dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	23.07dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-4.22dBm
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	30.38dBuV(AV)
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	53.78dBuV/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	9.01	0.5
Mid	2437	9.02	0.5
High	2462	9.02	0.5
Worst		9.01	

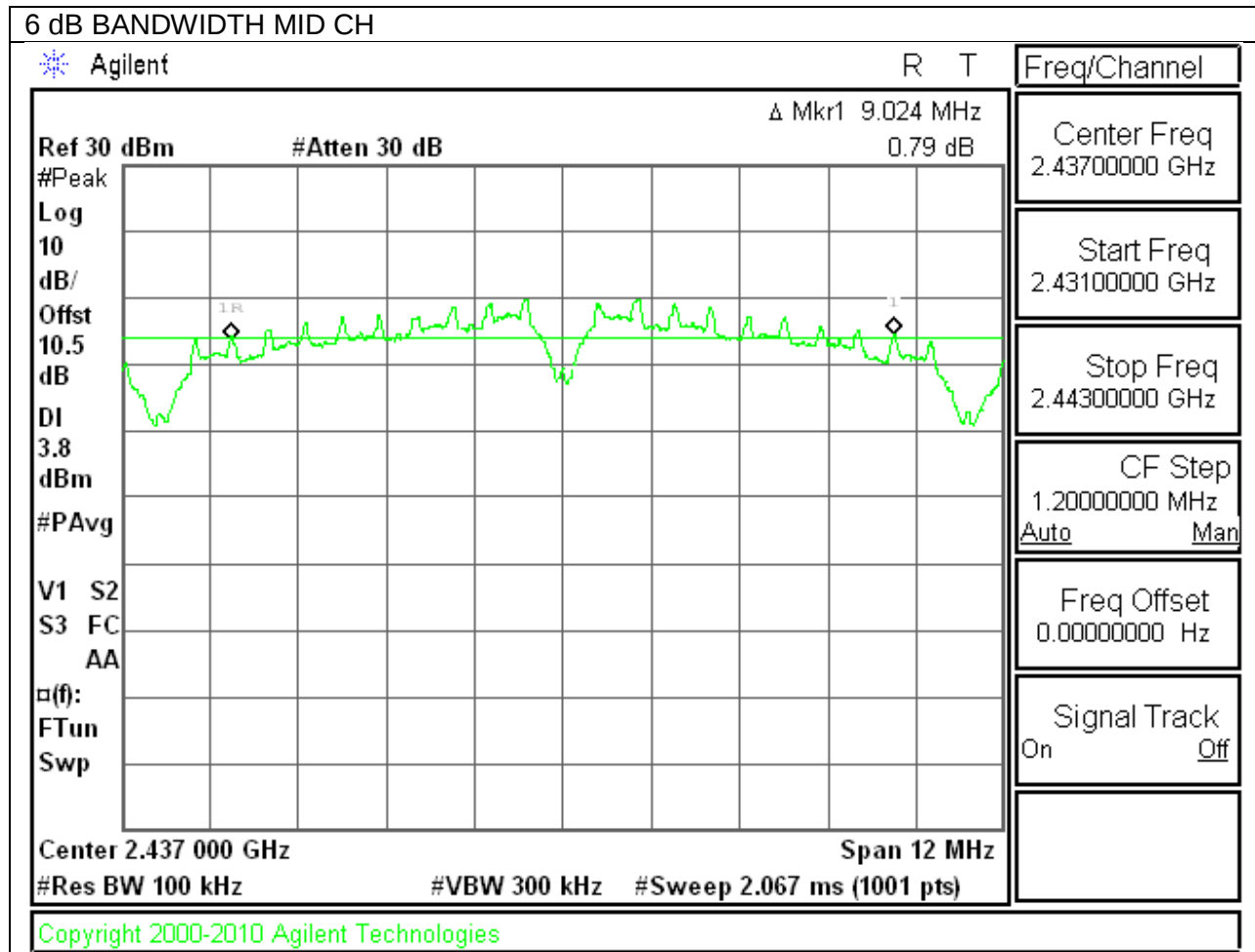
9.1.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.05	0.5
Mid	2437	15.18	0.5
High	2462	15.09	0.5
Worst		15.05	

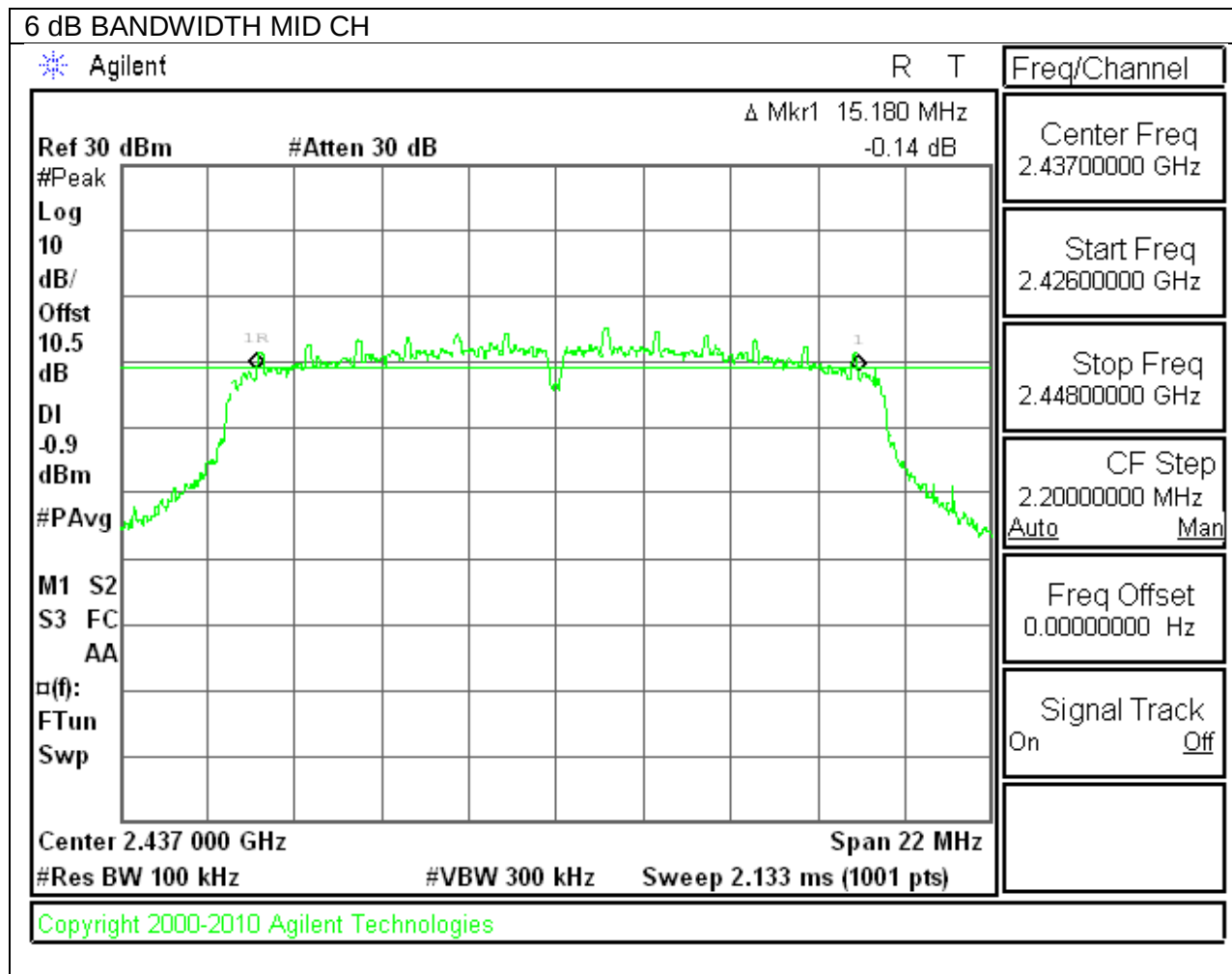
9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.15	0.5
Mid	2437	15.20	0.5
High	2462	15.20	0.5
Worst		15.15	

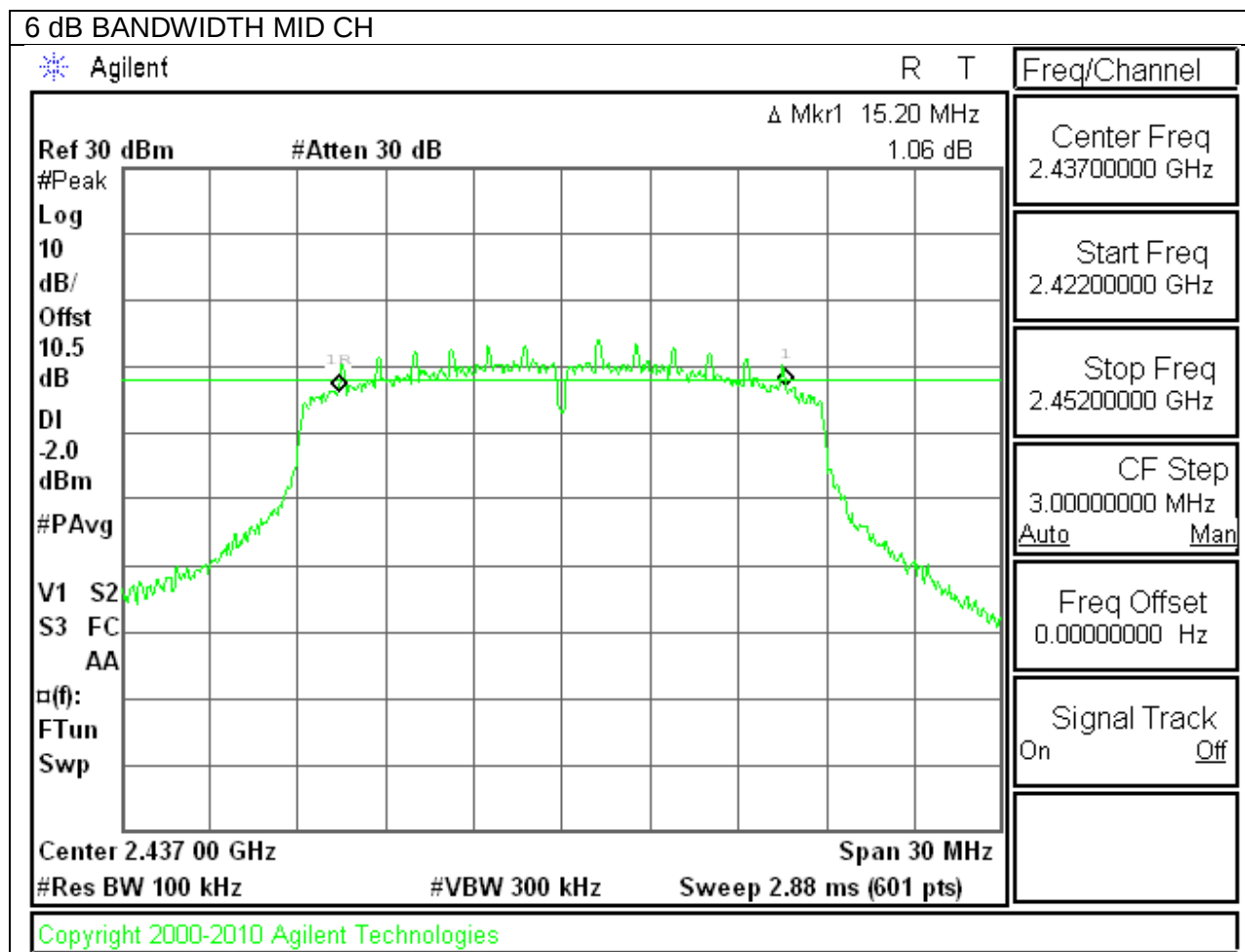
802.11b 6 dB BANDWIDTH



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	13.59
Mid	2437	13.94
High	2462	14.01
Worst		14.01

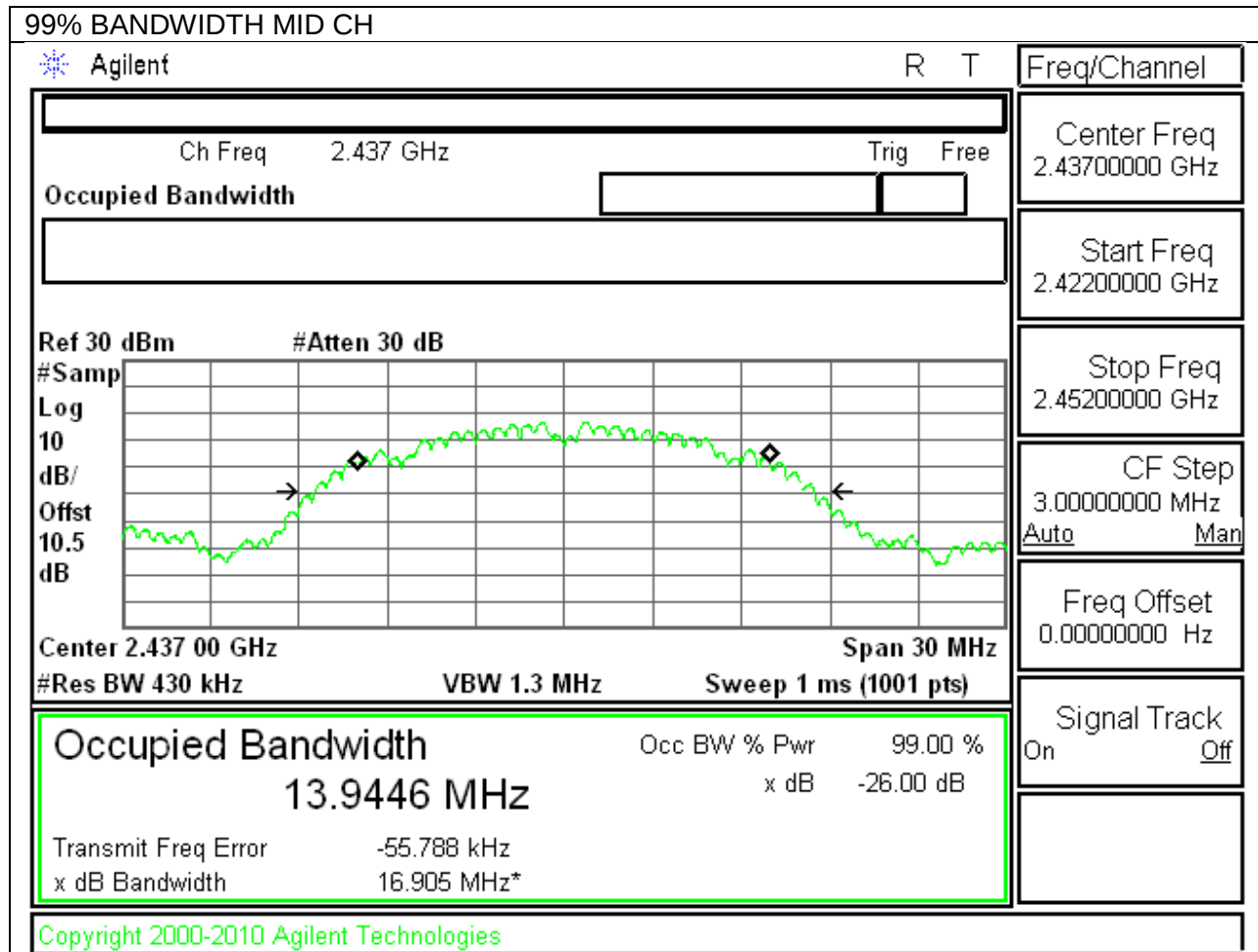
9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.55
Mid	2437	16.55
High	2462	16.47
Worst		16.55

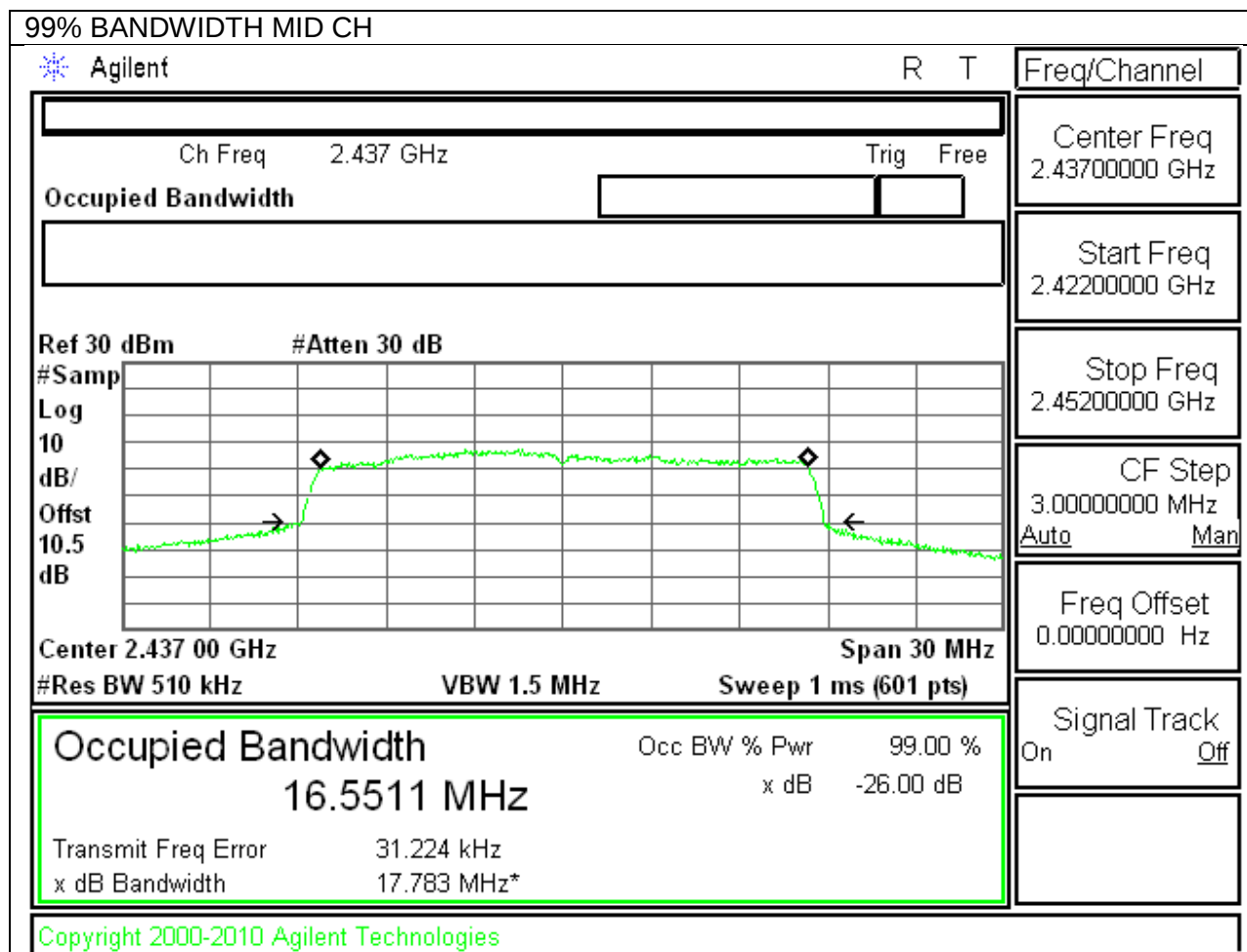
9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.32
Mid	2437	17.24
High	2462	17.29
Worst		17.32

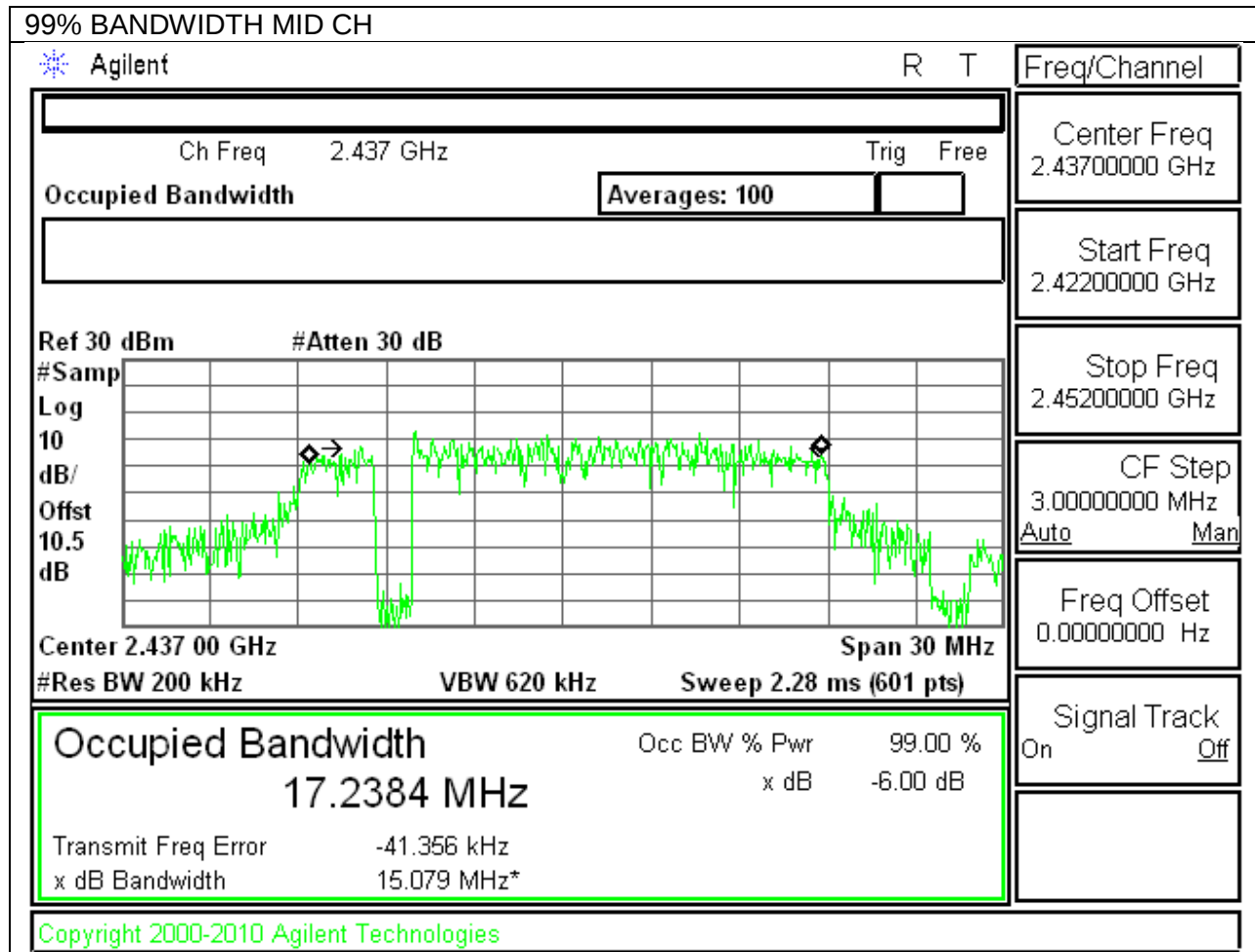
802.11b 99% BANDWIDTH



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	16.30
Mid	2437	16.50
High	2462	16.20
Worst		16.500

9.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	13.70
Mid	2437	13.70
High	2462	13.40
Worst		13.700

9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	12.50
Mid	2437	12.30
High	2462	12.10
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	-1.60	30.00	30	36	30.00
Mid	2437	-1.60	30.00	30	36	30.00
High	2462	-1.60	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	21.43	21.43	30.00	-8.57
Mid	2437	21.30	21.30	30.00	-8.70
High	2462	20.39	20.39	30.00	-9.61
Worst			21.43		

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	-1.60	30.00	30	36	30.00
Mid	2437	-1.60	30.00	30	36	30.00
High	2462	-1.60	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	23.07	23.07	30.00	-6.93
Mid	2437	23.00	23.00	30.00	-7.00
High	2462	22.75	22.75	30.00	-7.25
Worst			23.07		

9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

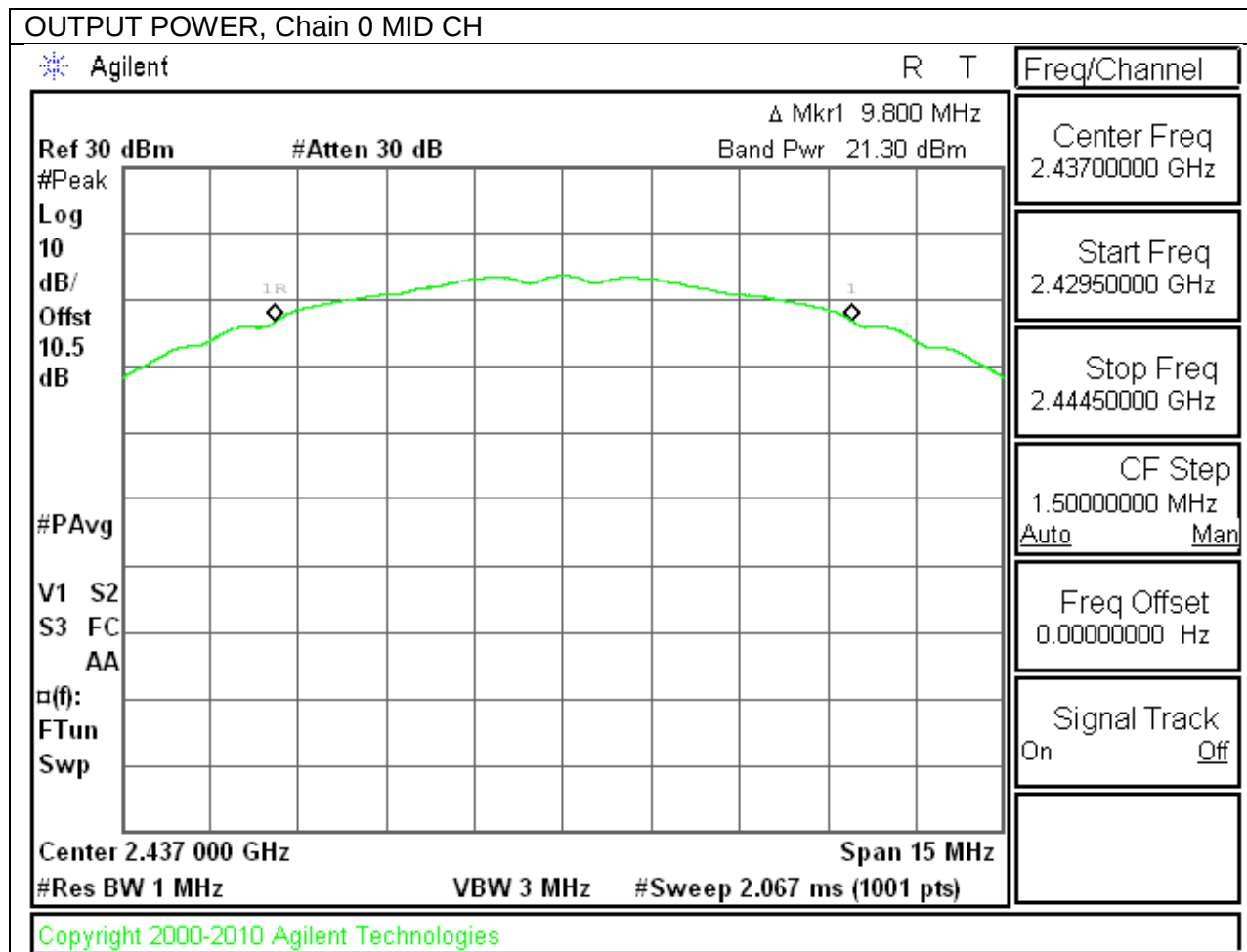
Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-1.60	30.00	30	36	30.00
Mid	2437	-1.60	30.00	30	36	30.00
High	2462	-1.60	30.00	30	36	30.00

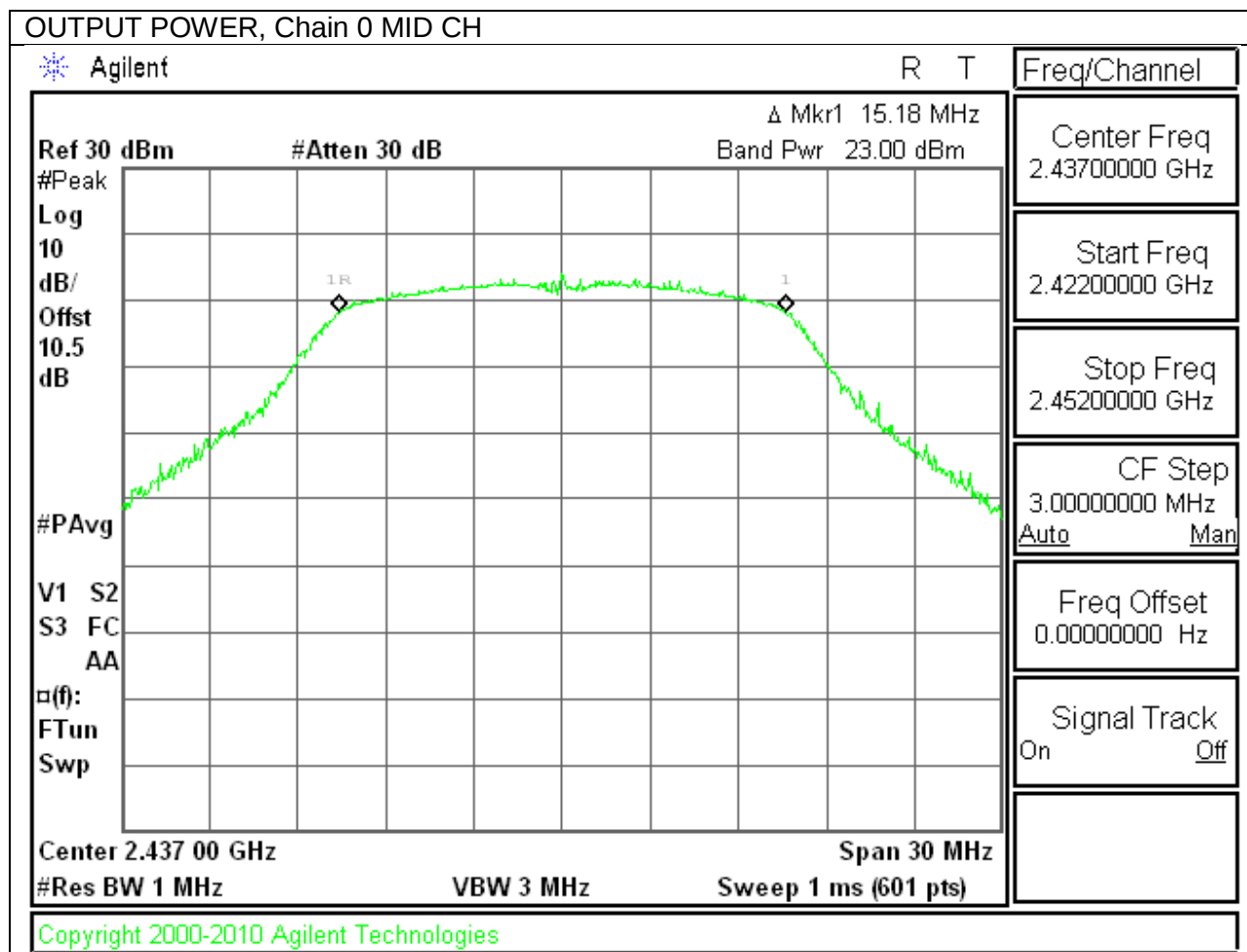
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	21.88	21.88	30.00	-8.12
Mid	2437	21.83	21.83	30.00	-8.17
High	2462	21.55	21.55	30.00	-8.45
Worst			21.88		

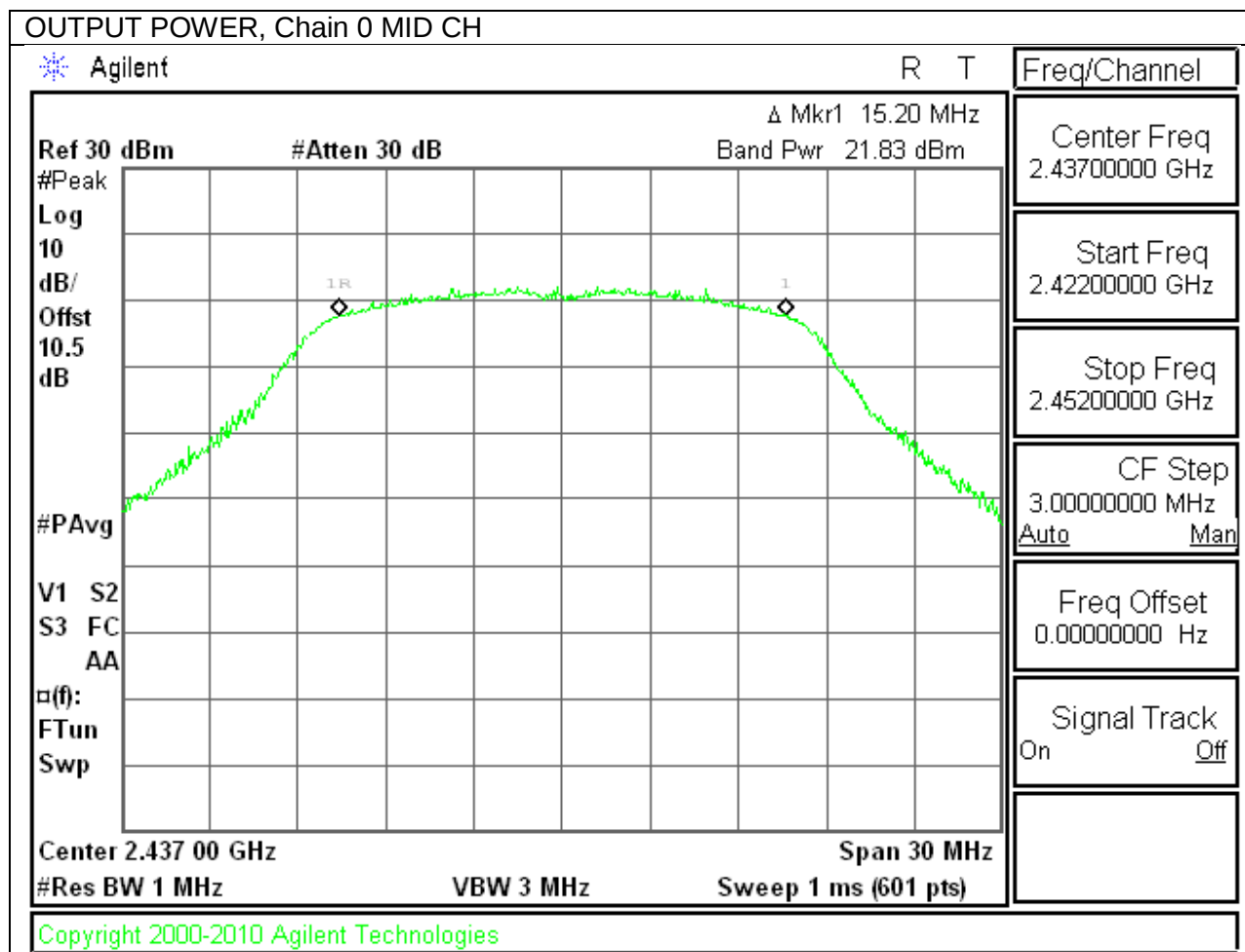
802.11b OUTPUT POWER, Chain 0



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	-4.22	8.0	-12.2
Mid	2437	-4.46	8.0	-12.5
High	2462	-5.02	8.0	-13.0

9.5.2. 802.11g MODE IN THE 2.4 GHz BAND

PSD Results

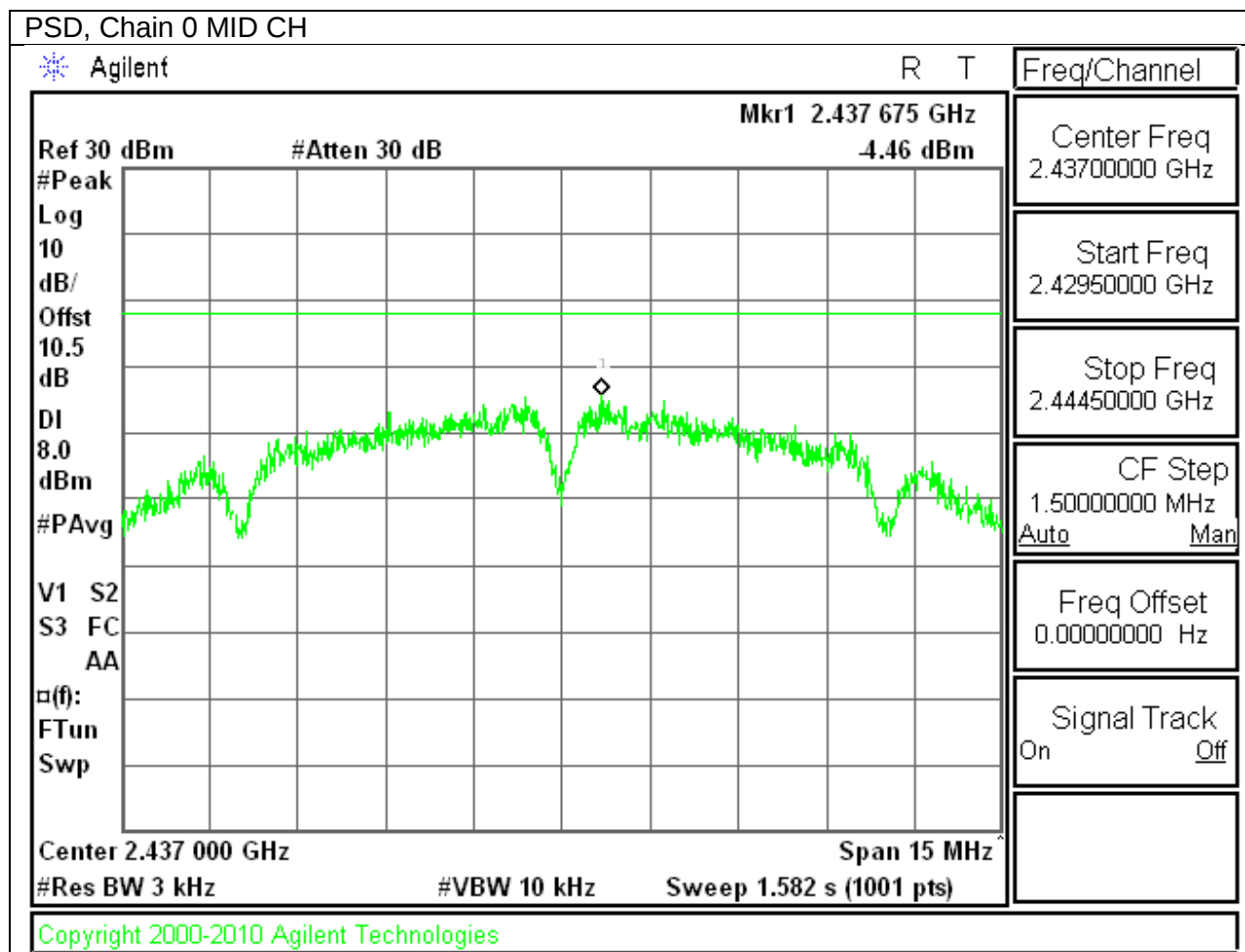
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.81	8.0	-18.8
Mid	2437	-10.22	8.0	-18.2
High	2462	-10.02	8.0	-18.0

9.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

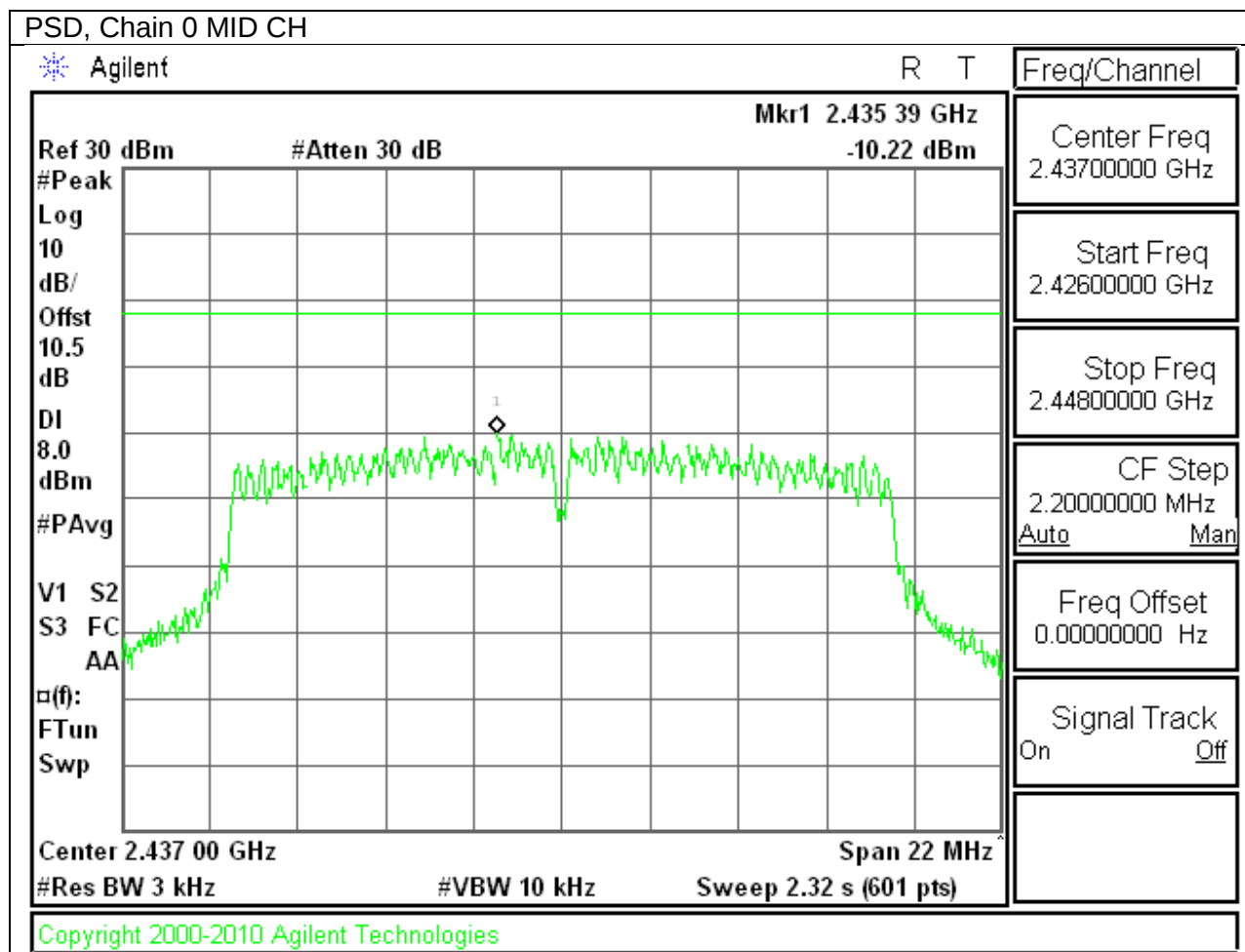
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.65	8.0	-18.7
Mid	2437	-9.84	8.0	-17.8
High	2462	-10.32	8.0	-18.3

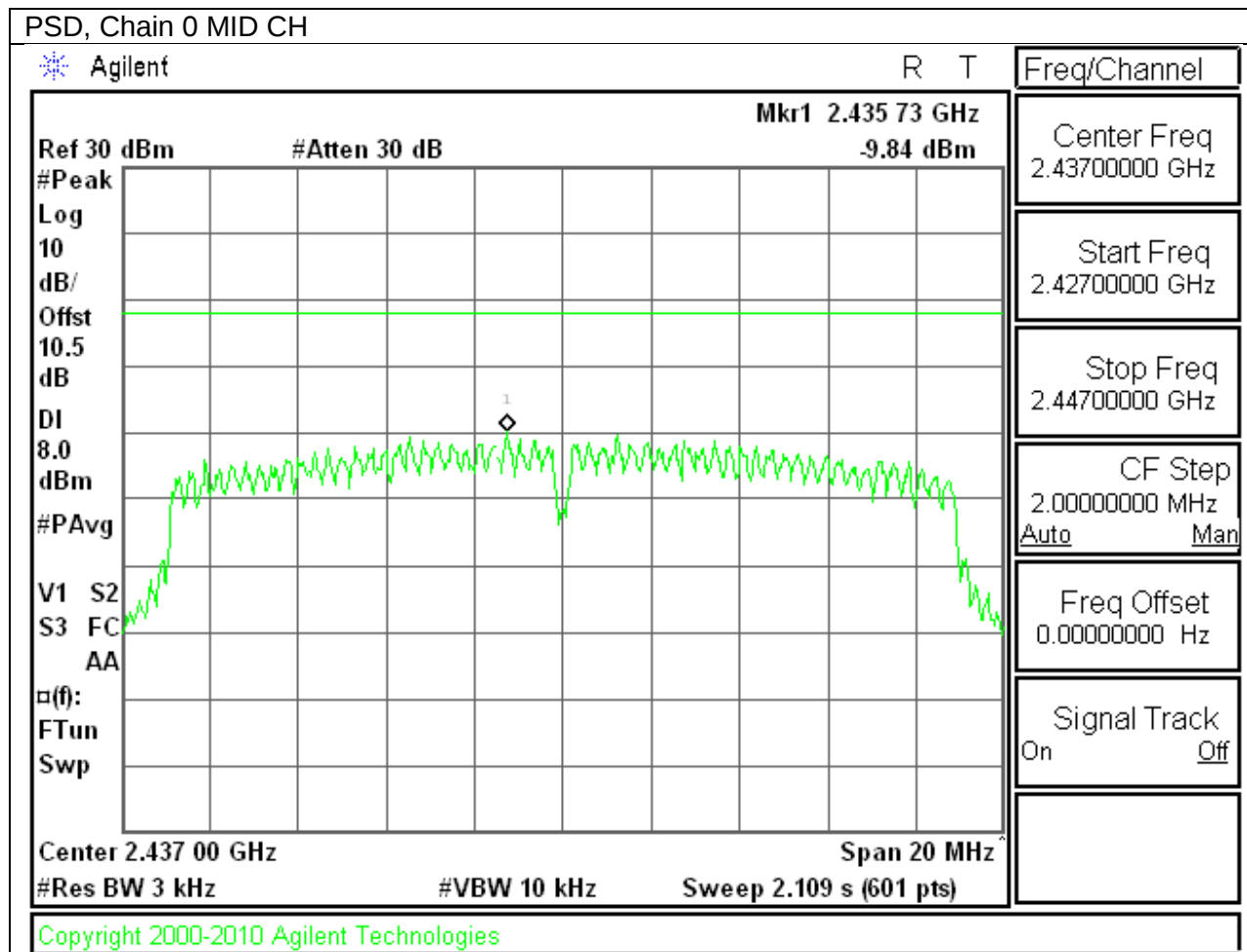
802.11b PSD, Chain 0



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.

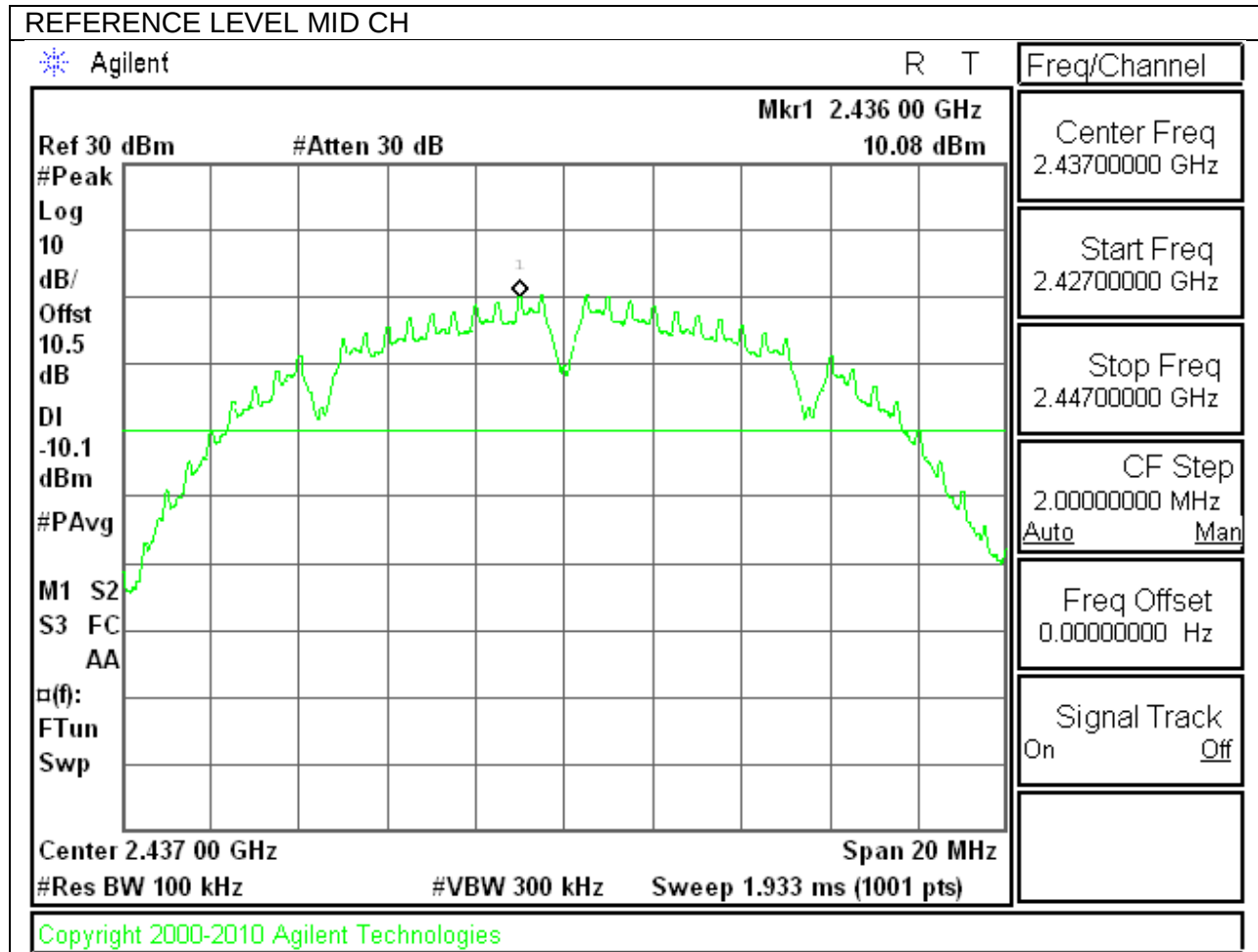
TEST PROCEDURE

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.

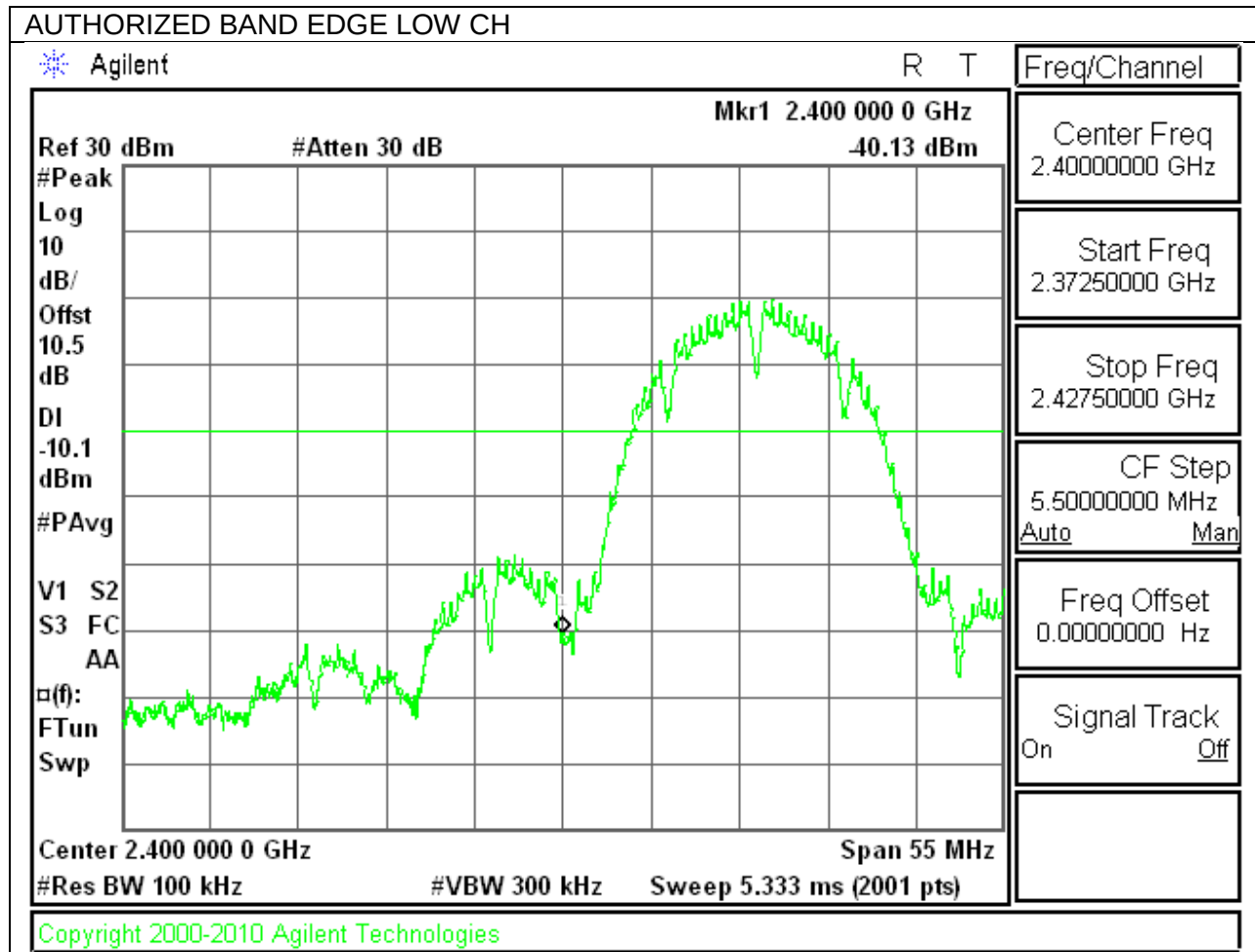
RESULTS

9.6.1. 802.11b MODE IN THE 2.4 GHz BAND

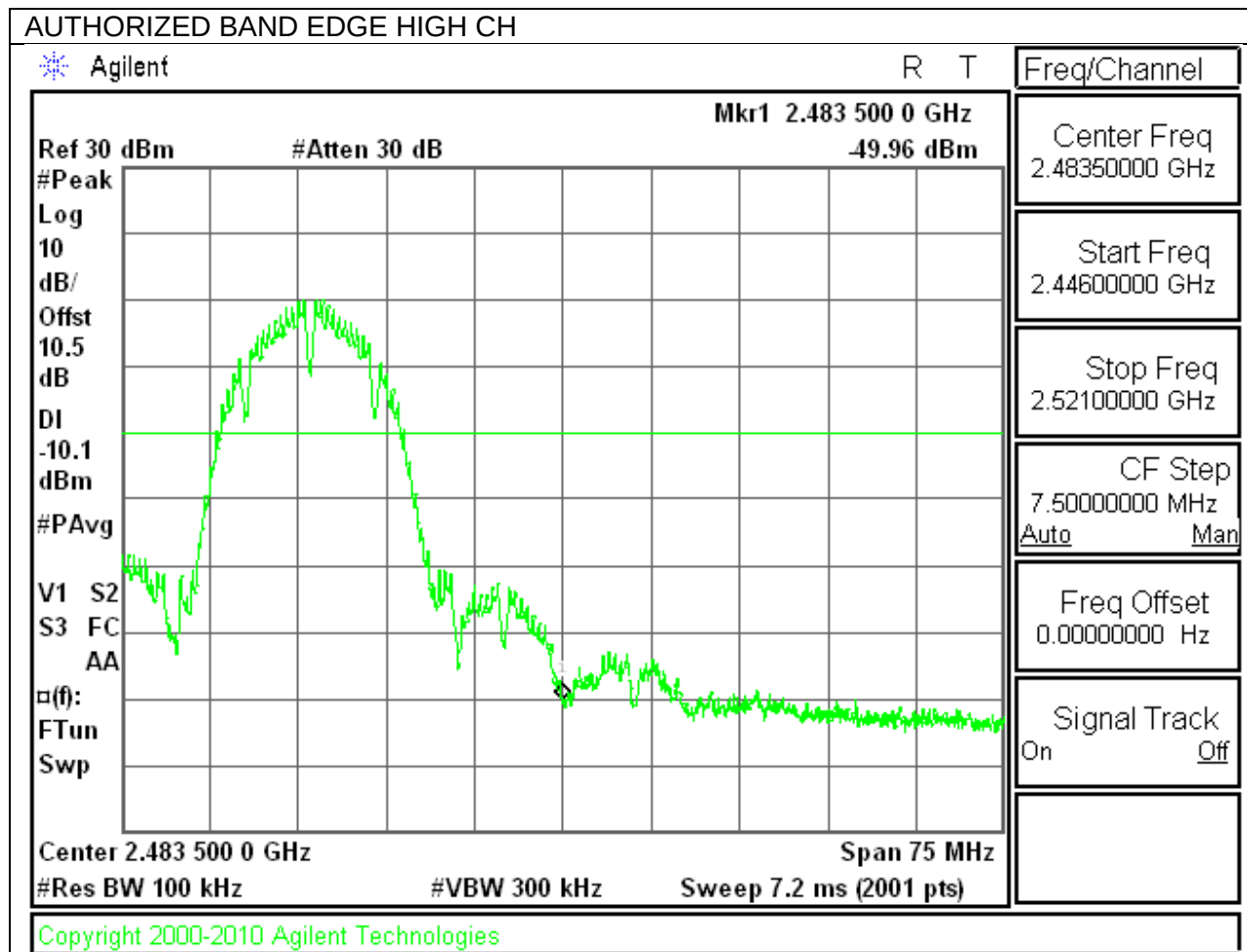
IN-BAND REFERENCE LEVEL



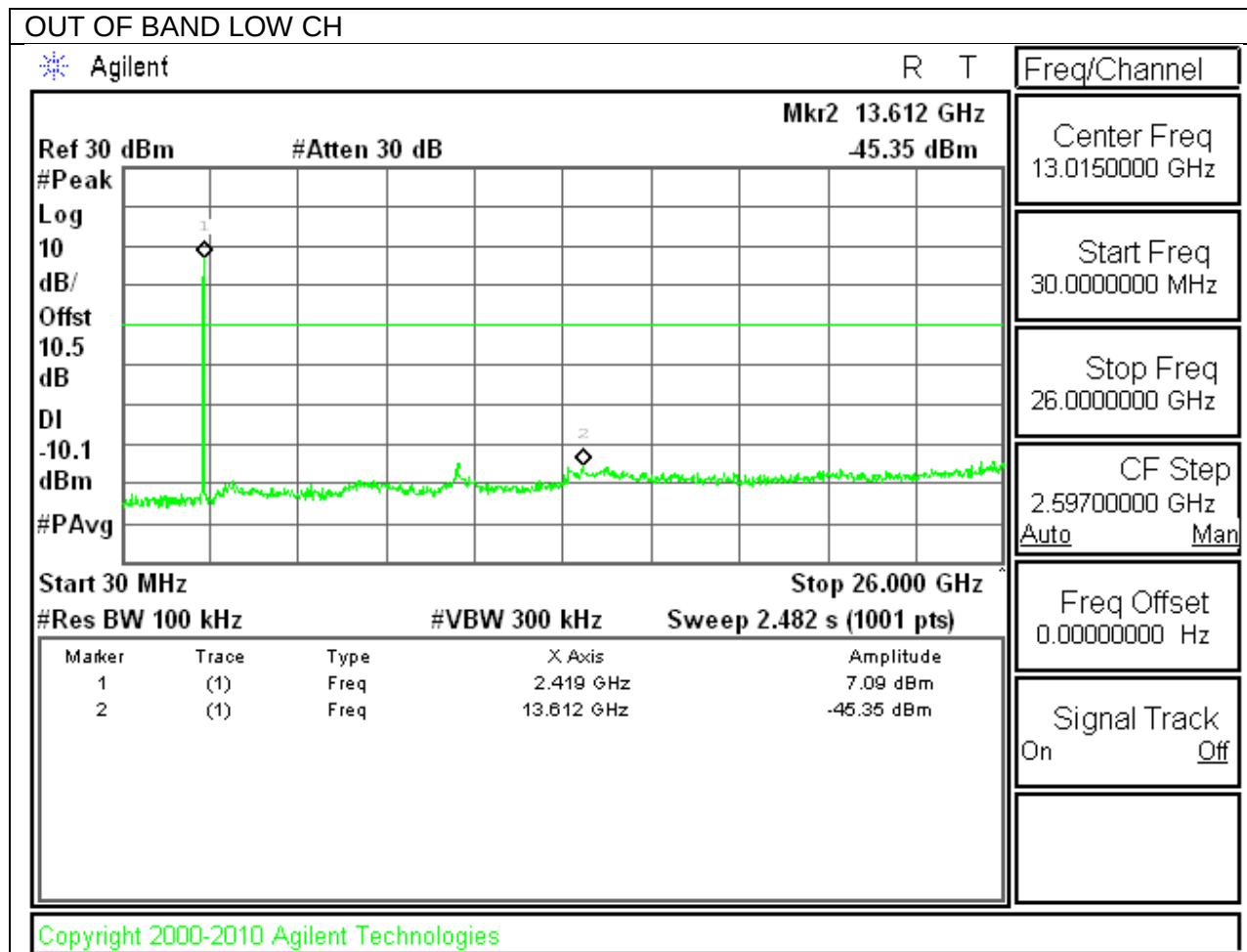
LOW CHANNEL BANDEDGE

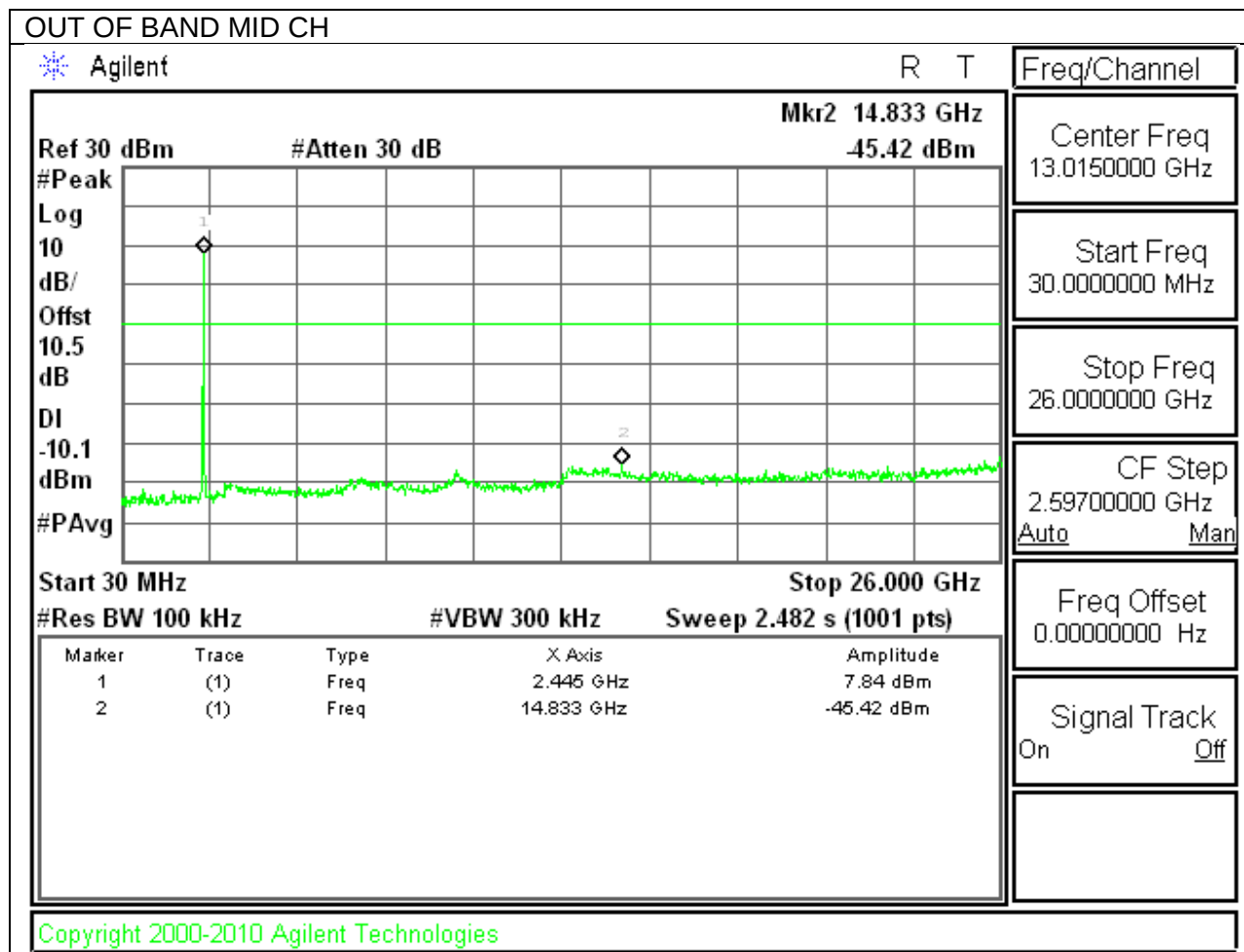


HIGH CHANNEL BANDEDGE

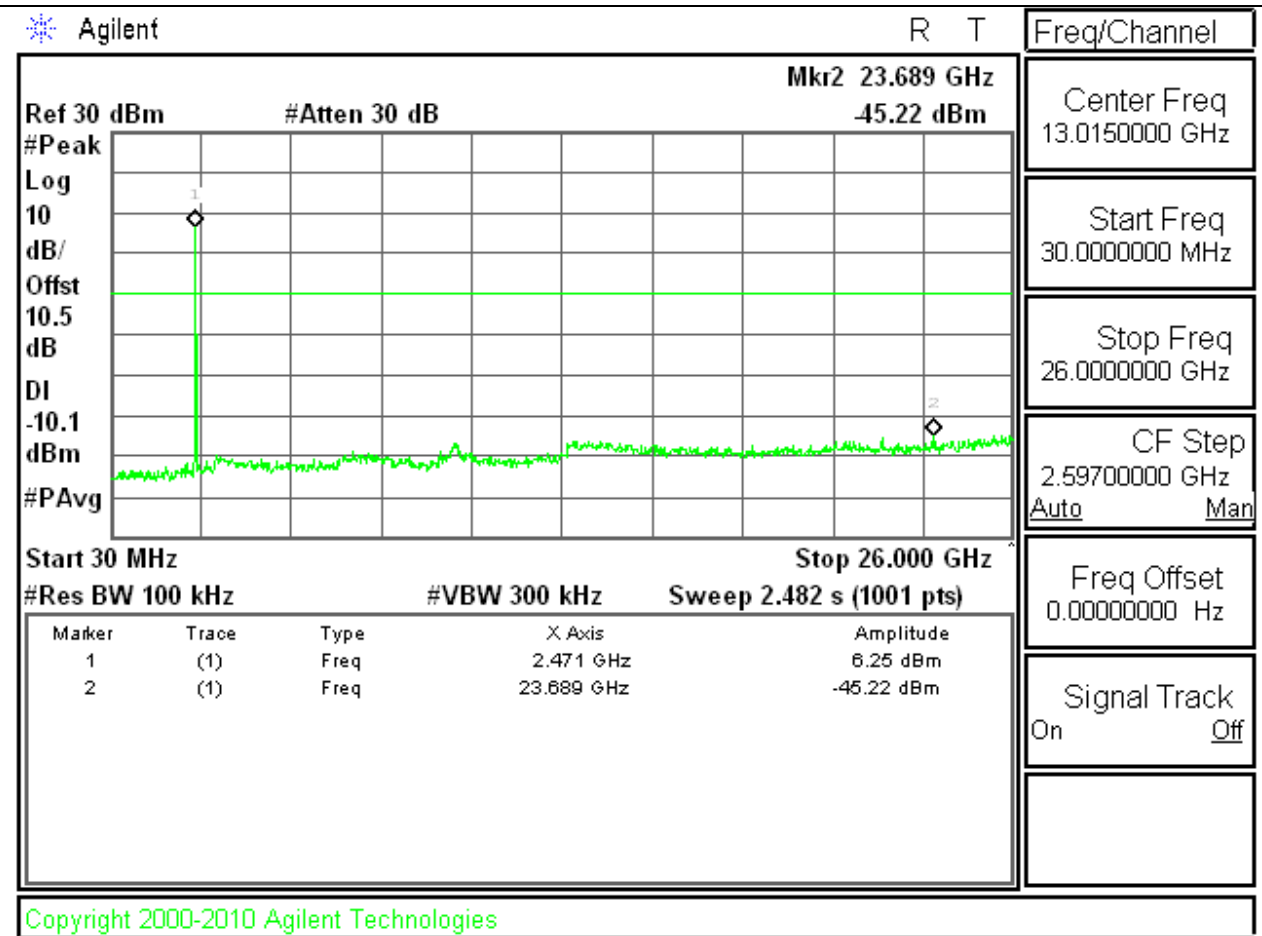


OUT-OF-BAND EMISSIONS



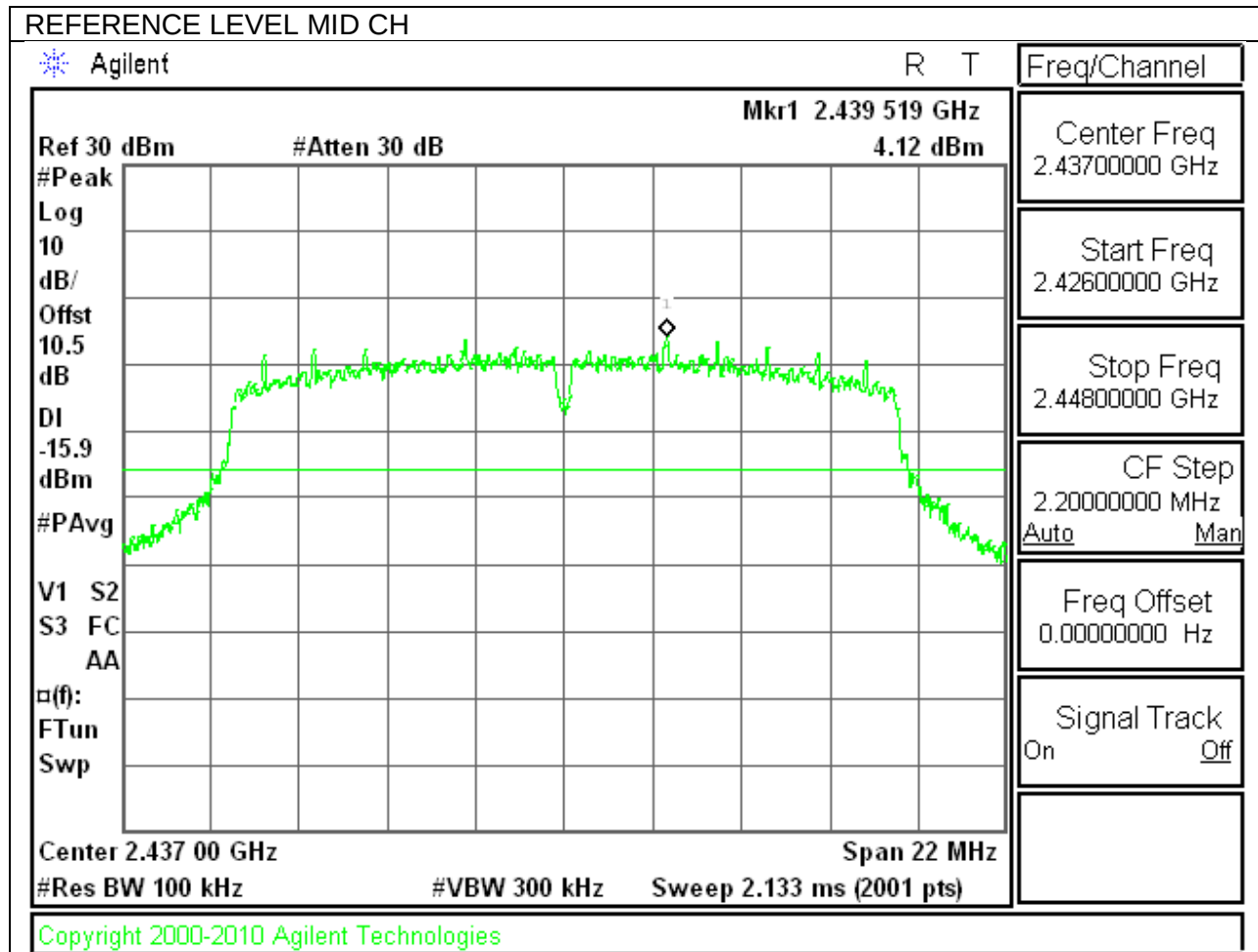


OUT OF BAND HIGH CH

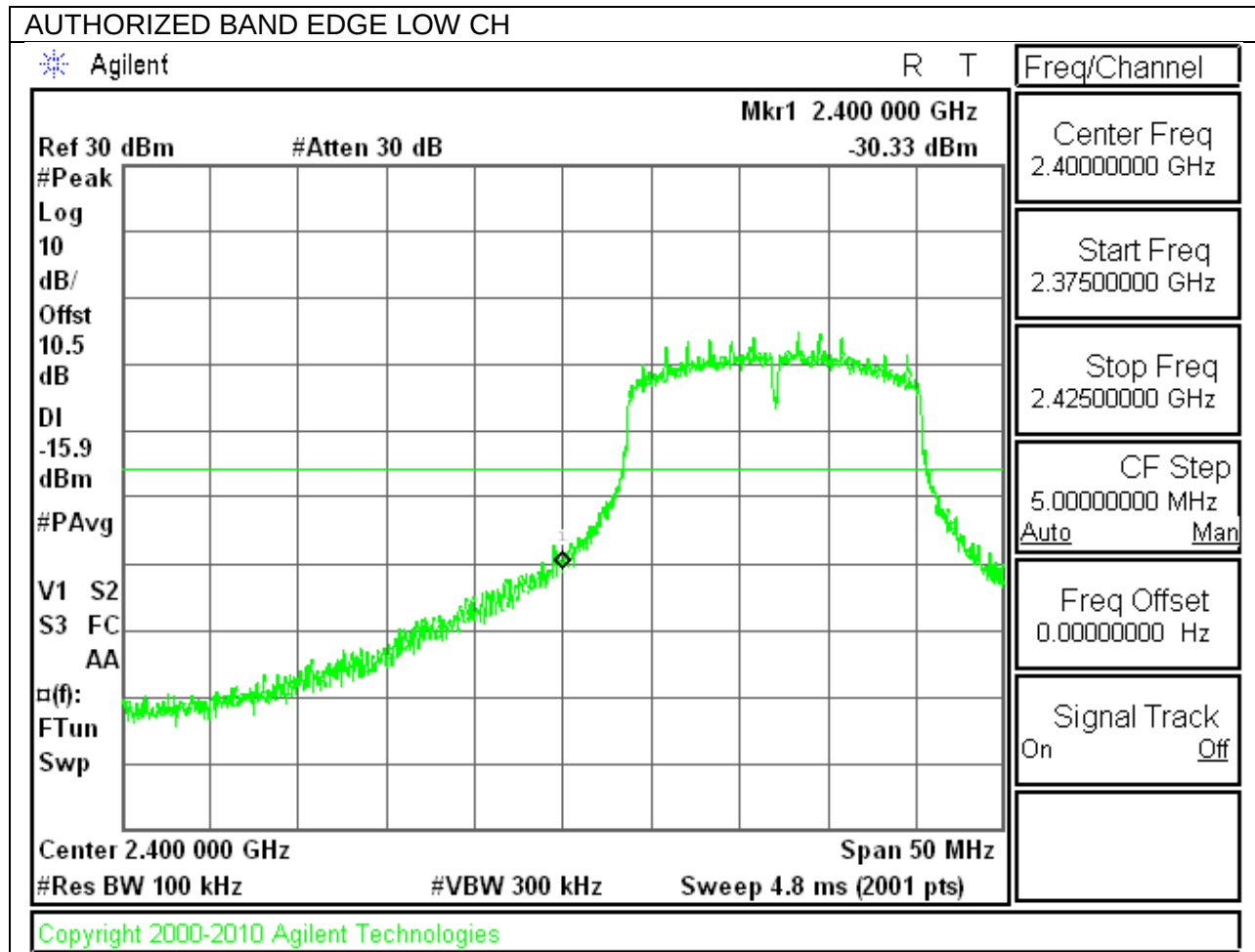


9.6.2. 802.11g MODE IN THE 2.4 GHz BAND

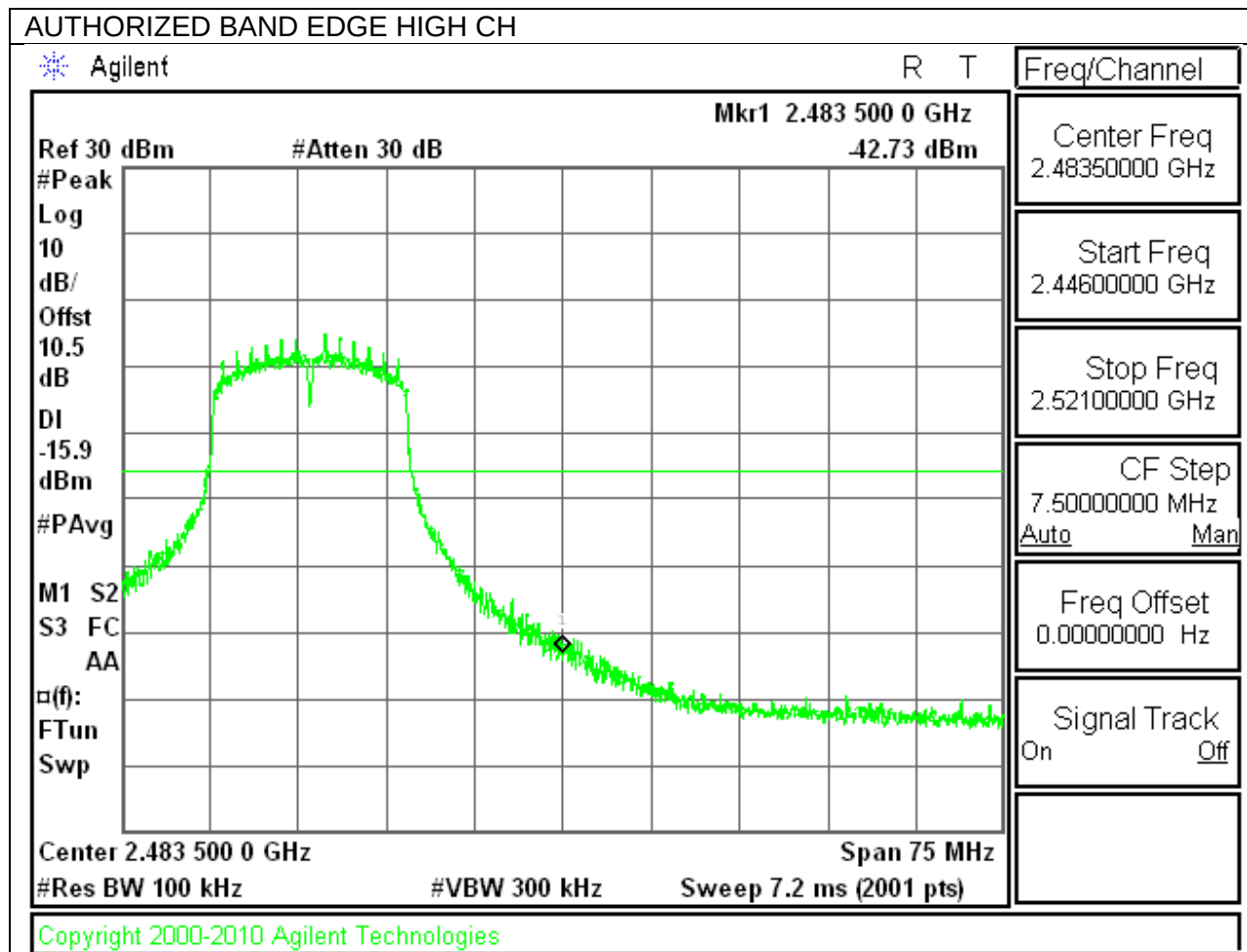
IN-BAND REFERENCE LEVEL



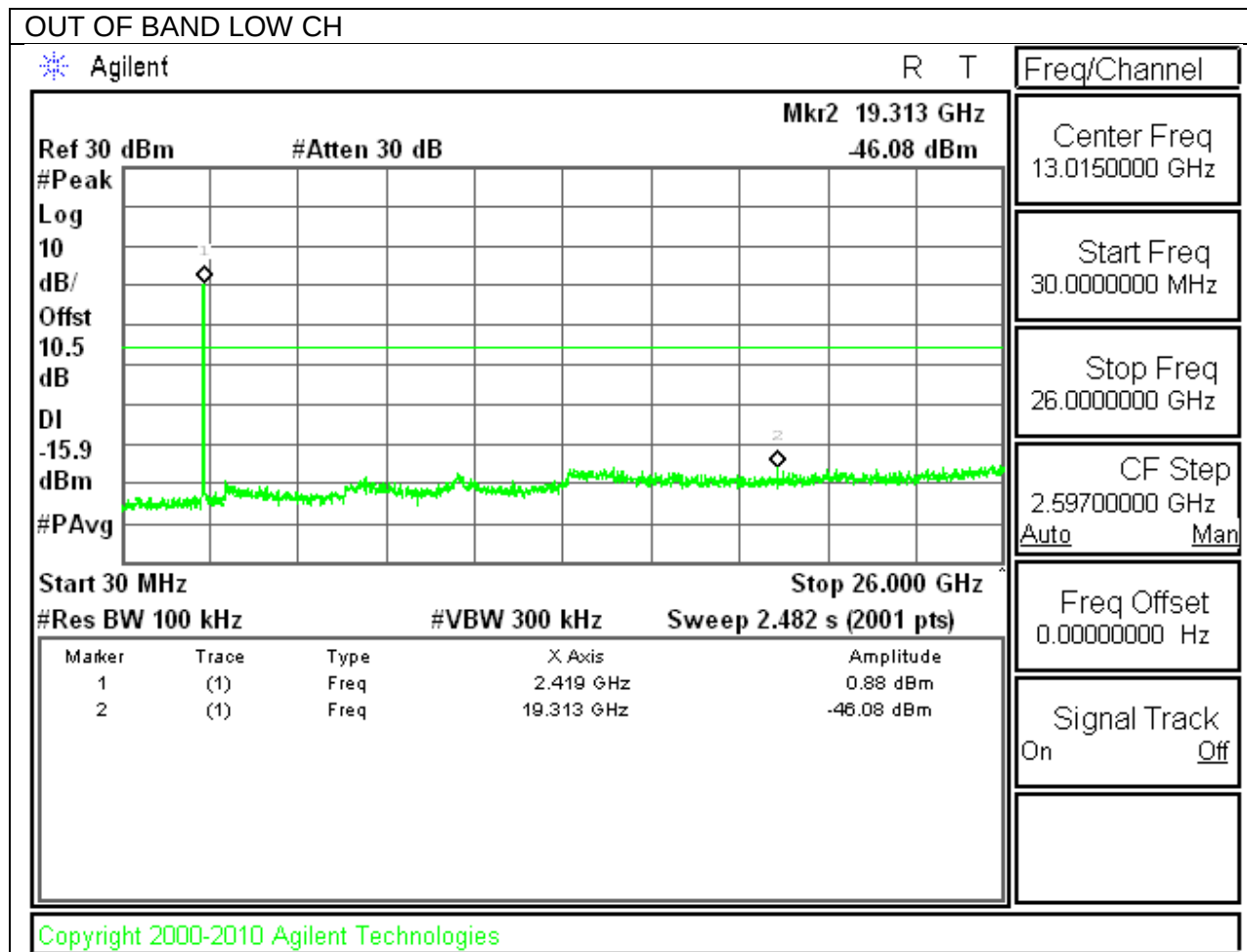
LOW CHANNEL BANDEDGE

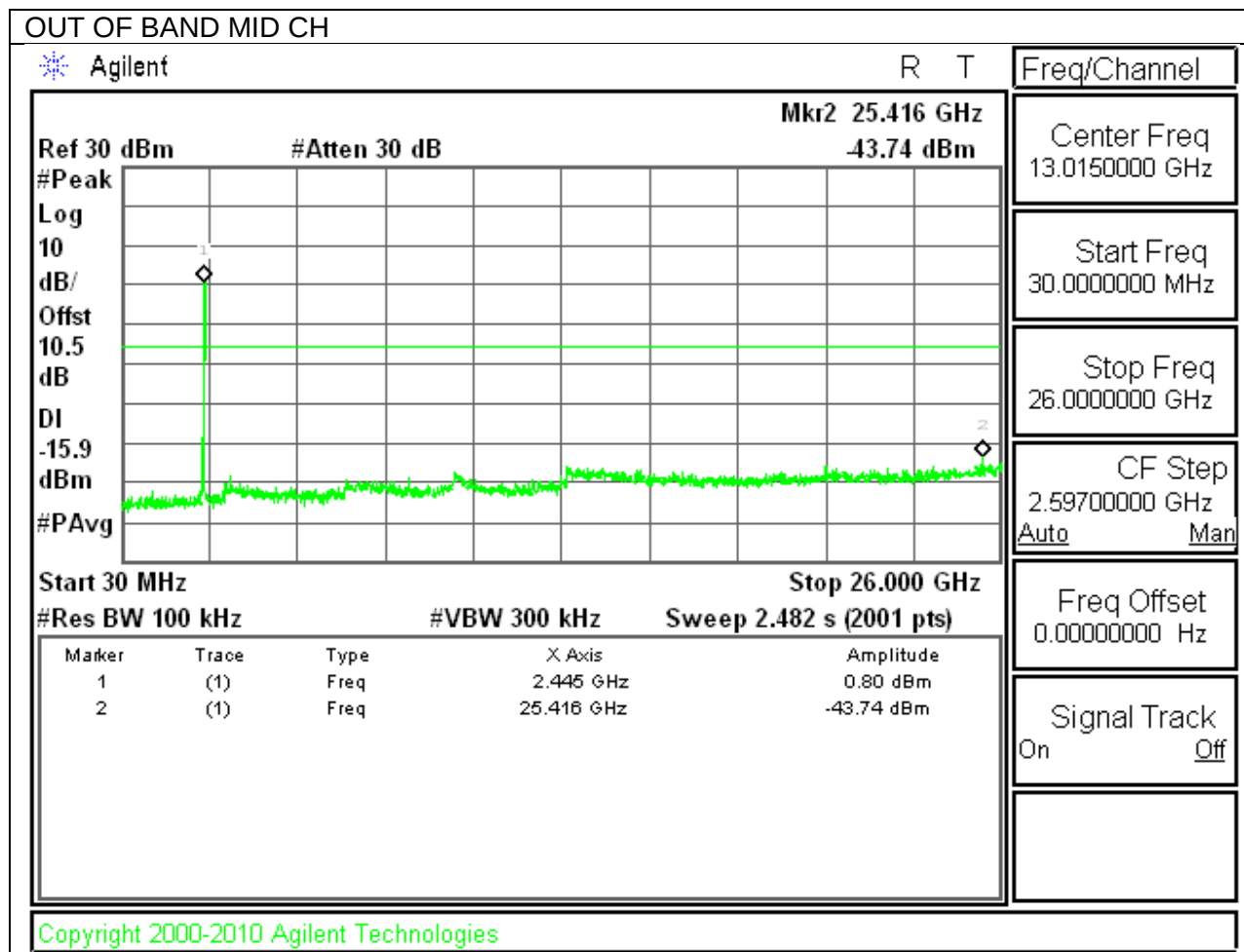


HIGH CHANNEL BANDEDGE

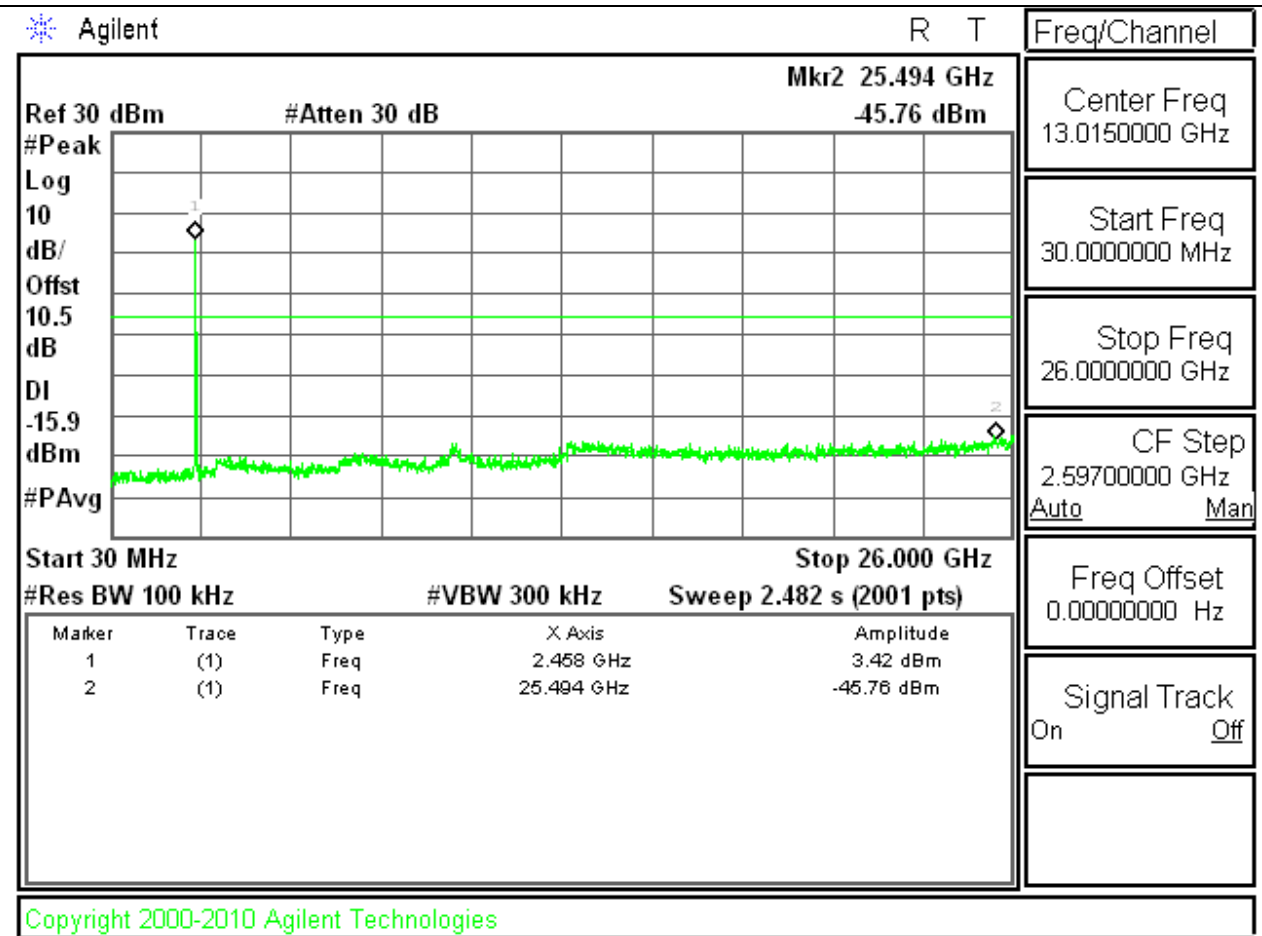


OUT-OF-BAND EMISSIONS



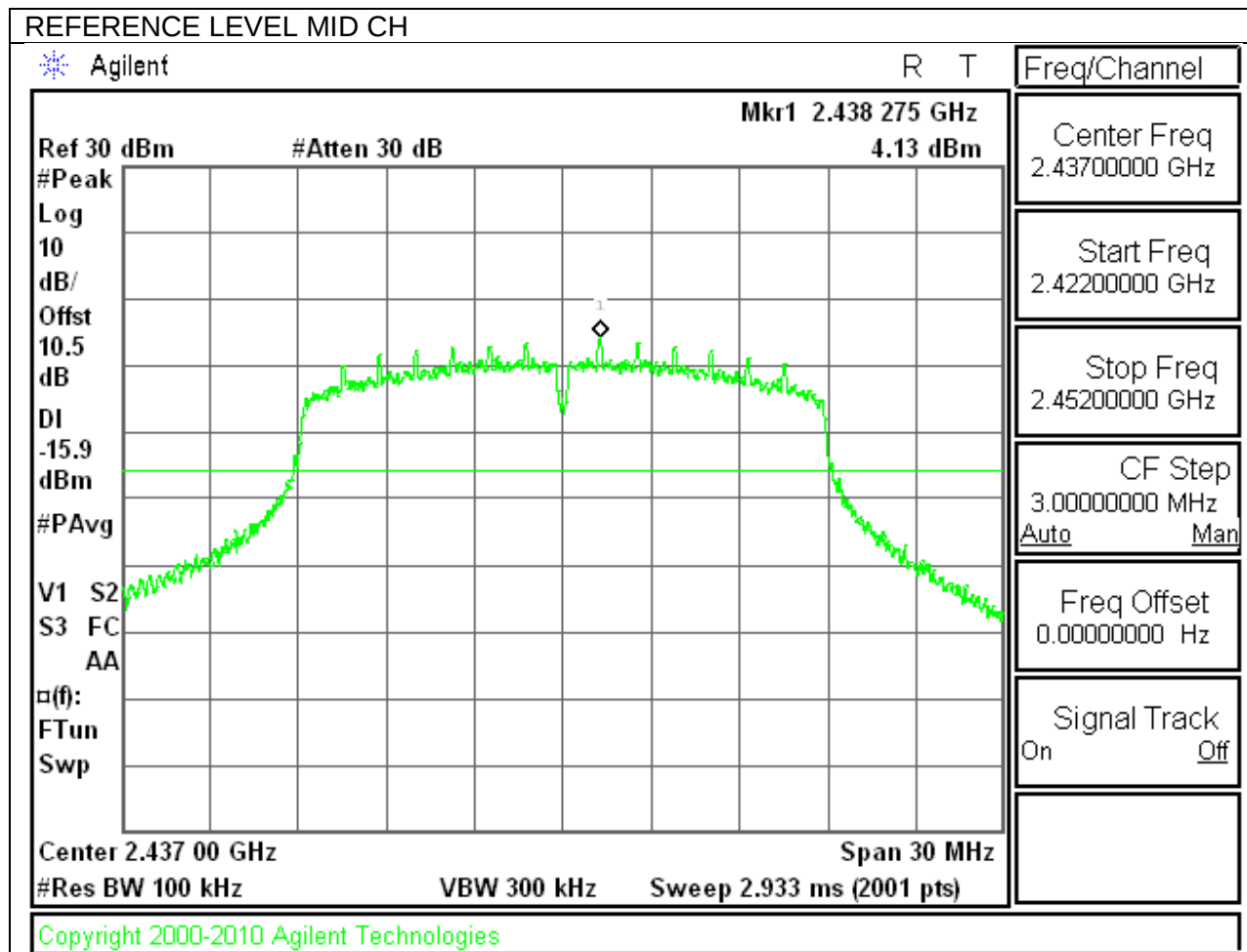


OUT OF BAND HIGH CH

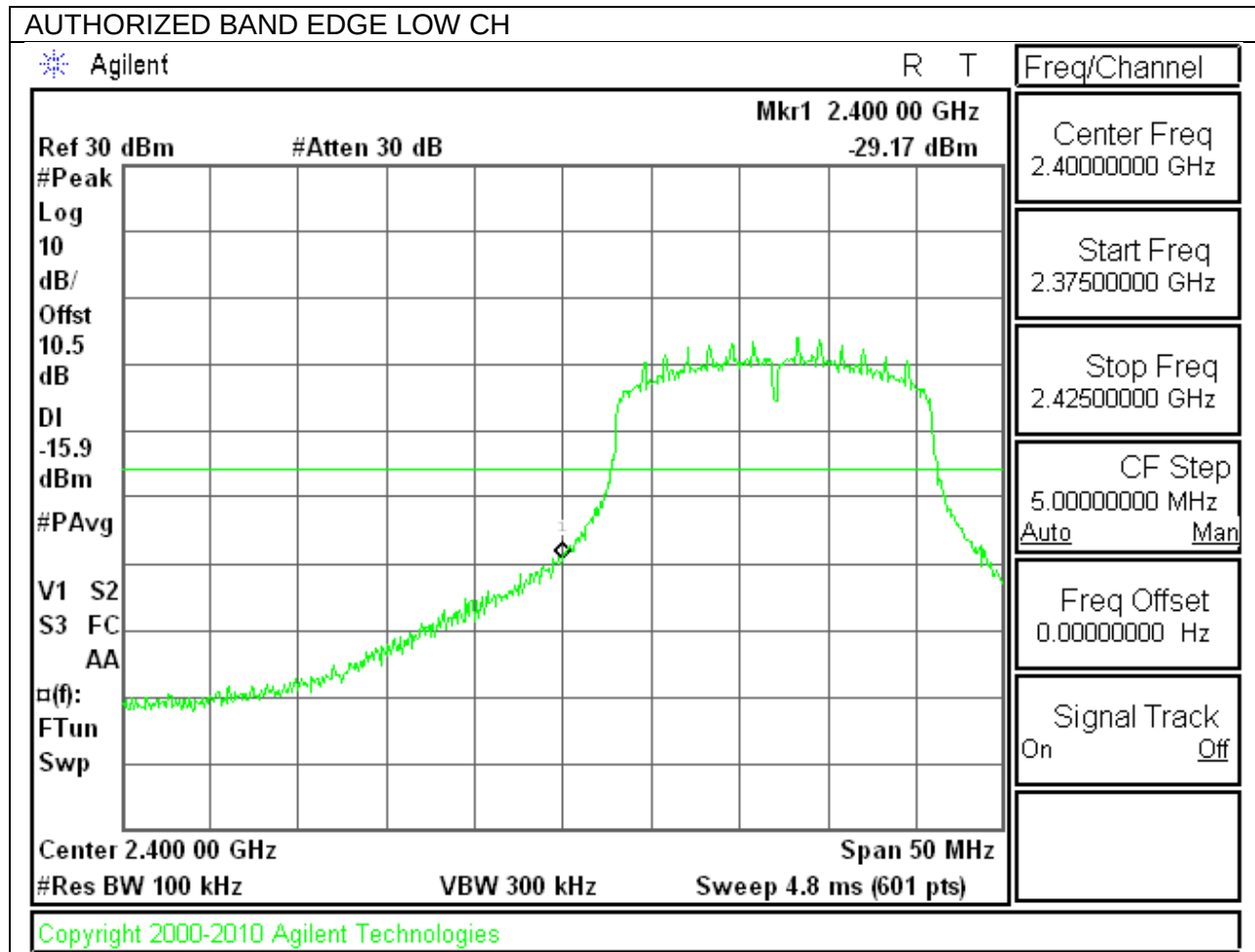


9.6.3. 802.11n MODE IN THE 2.4 GHz BAND

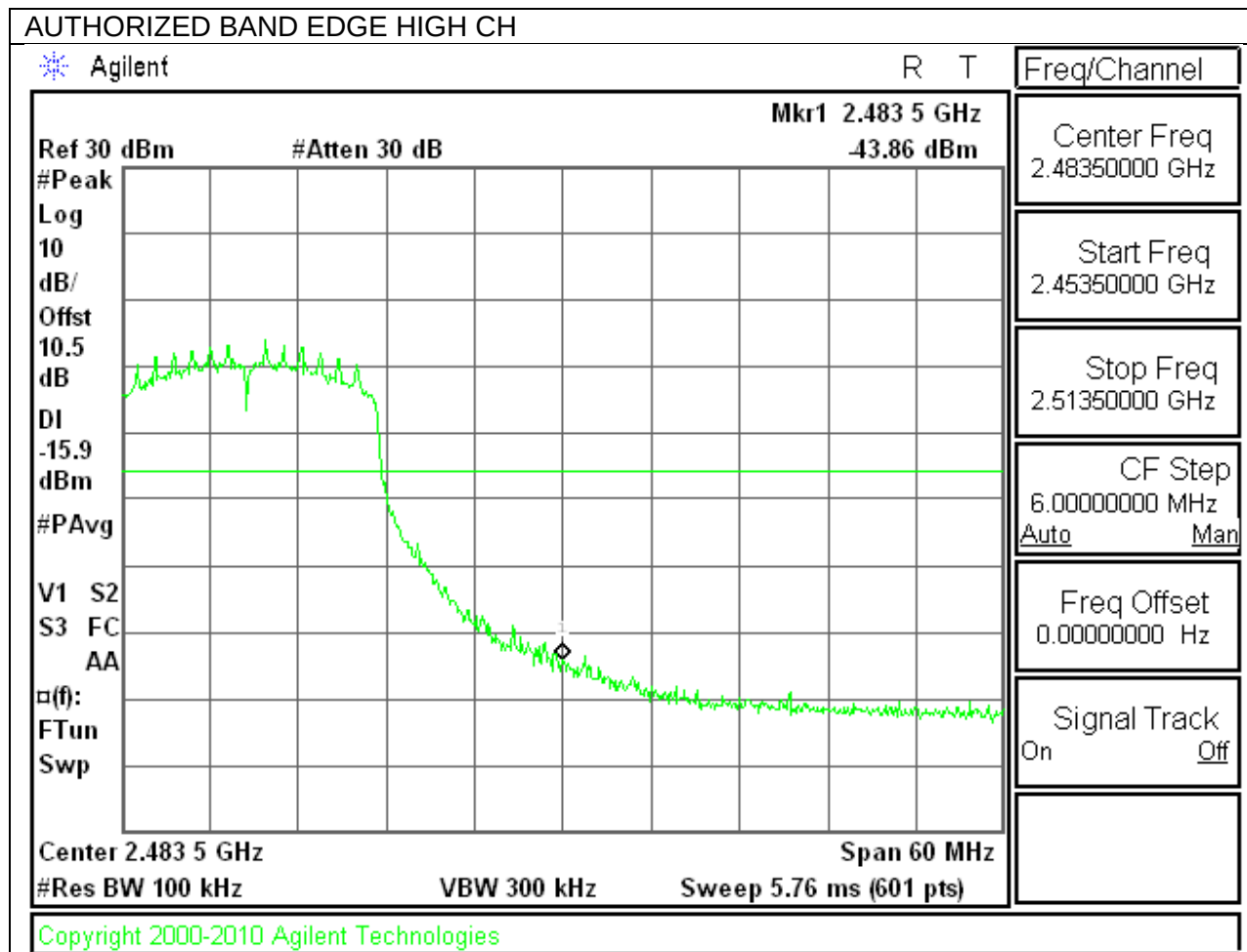
IN-BAND REFERENCE LEVEL



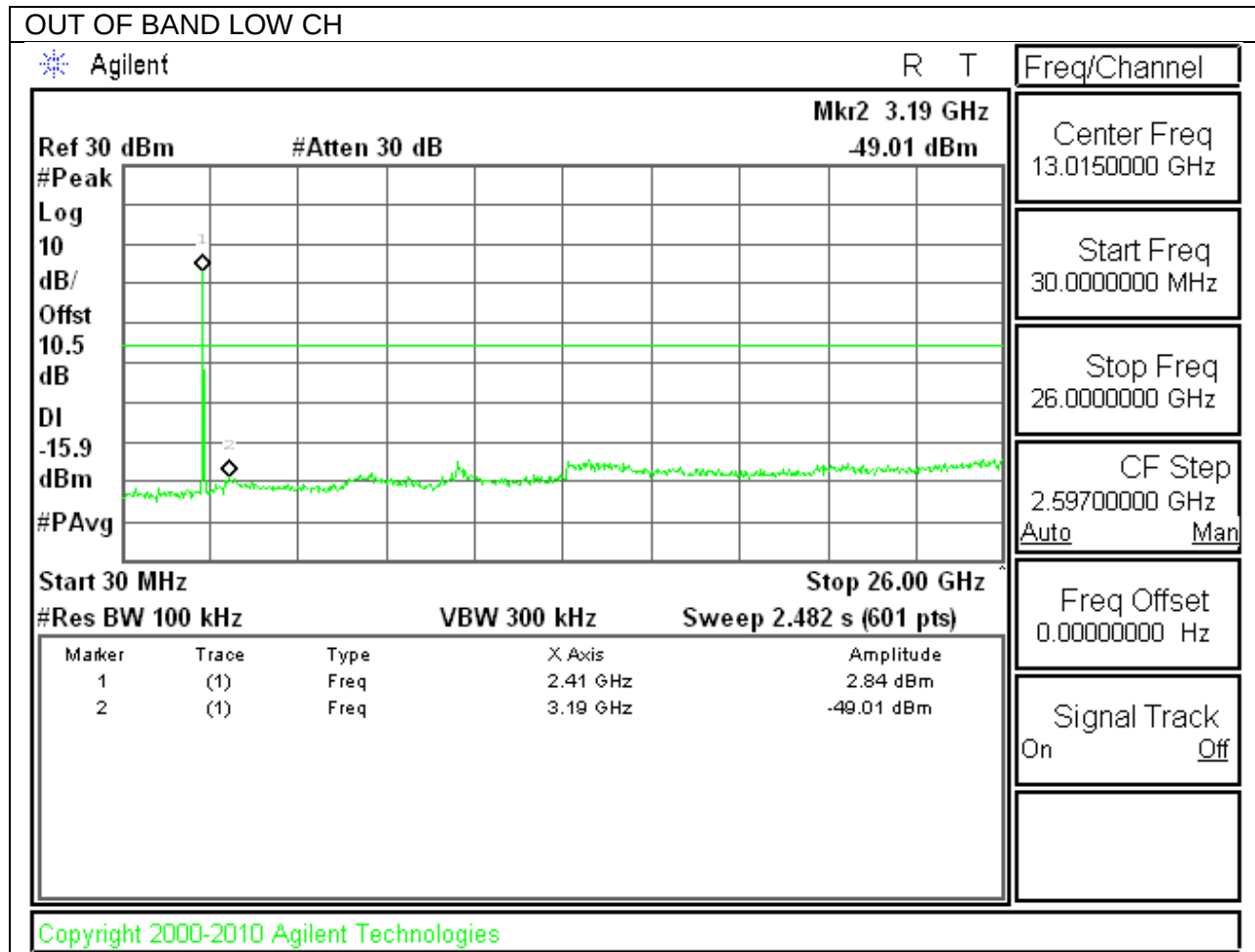
LOW CHANNEL BANDEDGE

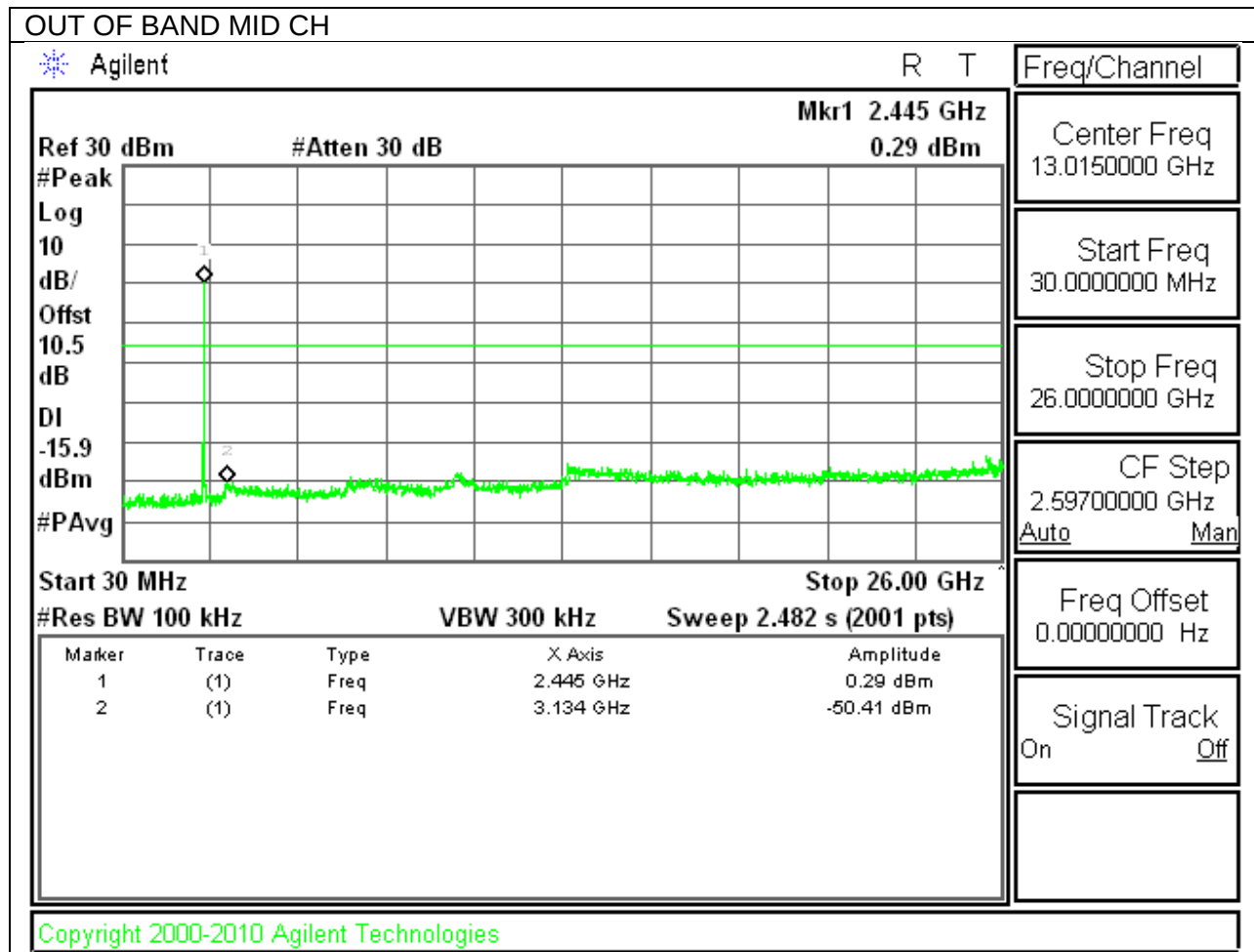


HIGH CHANNEL BANDEDGE

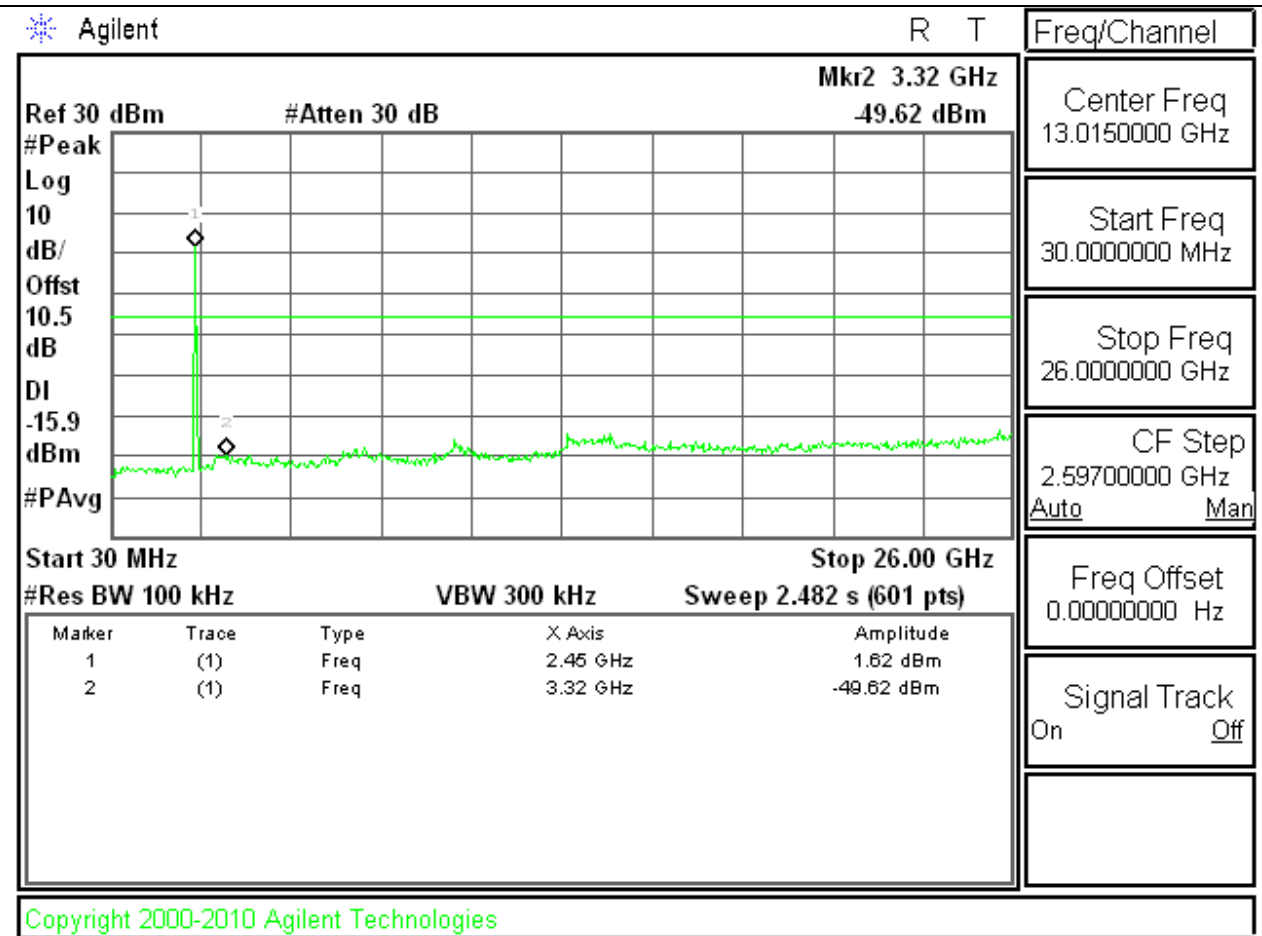


OUT-OF-BAND EMISSIONS





OUT OF BAND HIGH 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 = 0.1dB; G mode = 0.3dB; N mode = 0.32dB.

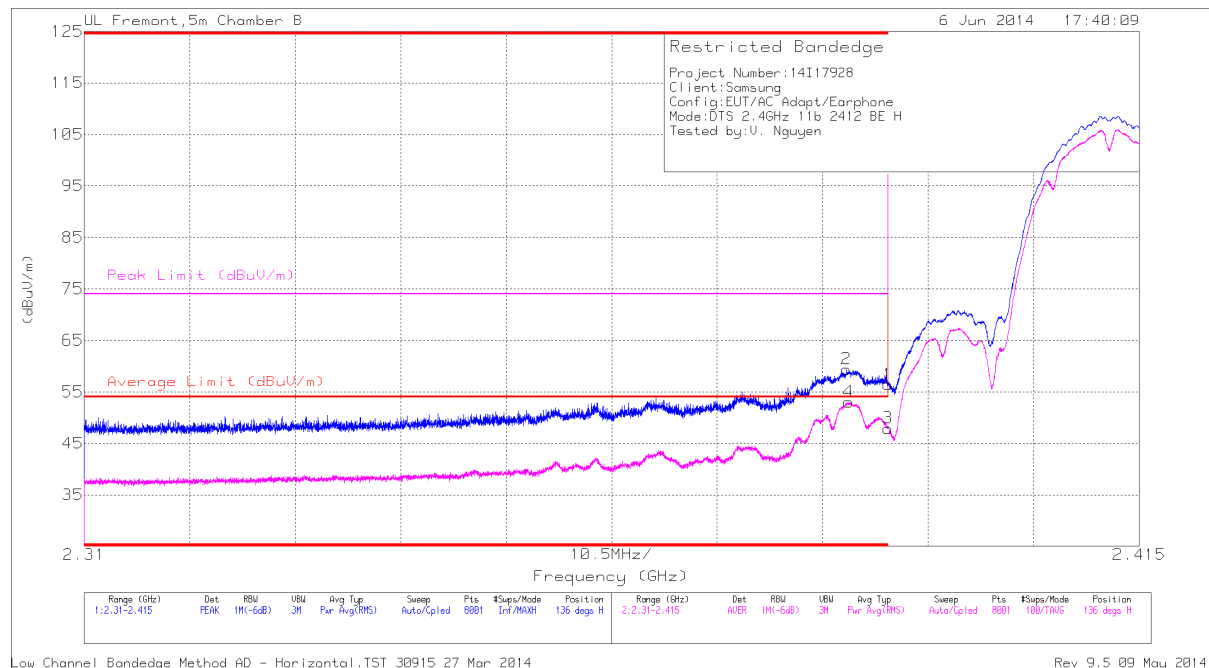
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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)

HORIZONTAL



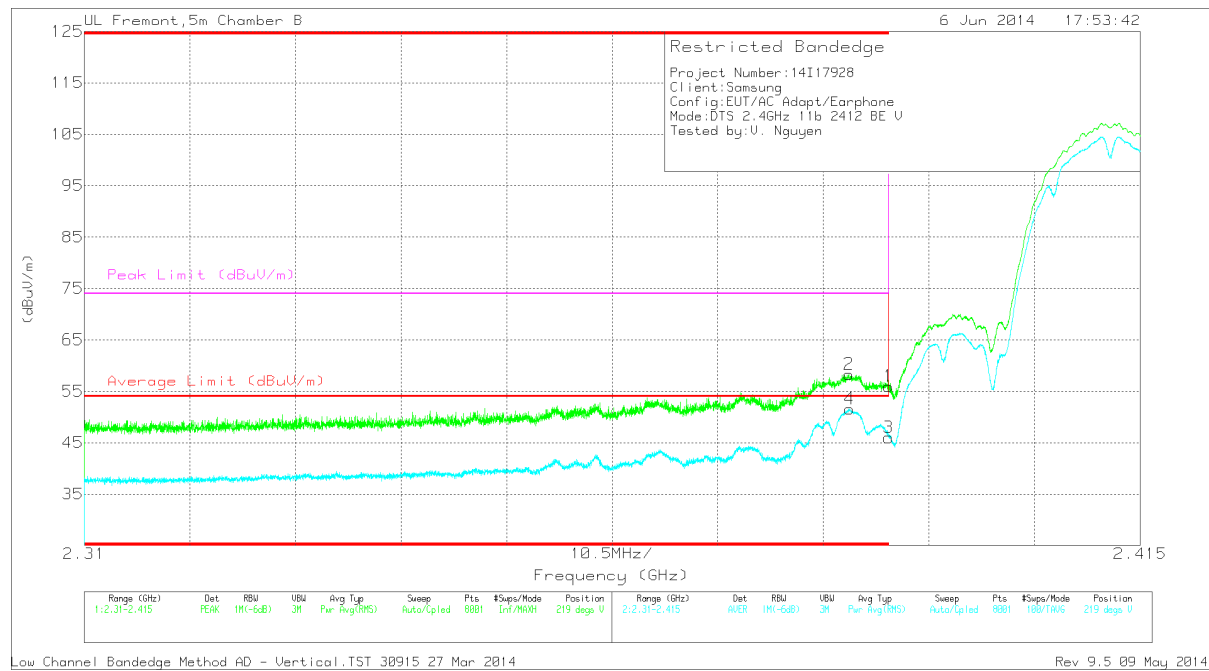
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.12	PK	32.1	-22.8	0	56.42	-	-	74	-17.58	136	284	H
2	* 2.386	50.22	PK	32.1	-22.9	0	59.42	-	-	74	-14.58	136	284	H
3	* 2.39	38.54	RMS	32.1	-22.8	.1	47.94	54	-6.06	-	-	136	284	H
4	* 2.386	43.74	RMS	32.1	-22.9	.1	53.04	54	-9.6	-	-	136	284	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.386	49.1	PK	32.1	-22.9	0	58.3	-	-	74	-15.7	219	291	V
4	* 2.386	42.27	RMS	32.1	-22.9	.1	51.57	54	-2.43	-	-	219	291	V
1	* 2.39	46.68	PK	32.1	-22.8	0	55.98	-	-	74	-18.02	219	291	V
3	* 2.39	36.6	RMS	32.1	-22.8	.1	46	54	-8	-	-	219	291	V

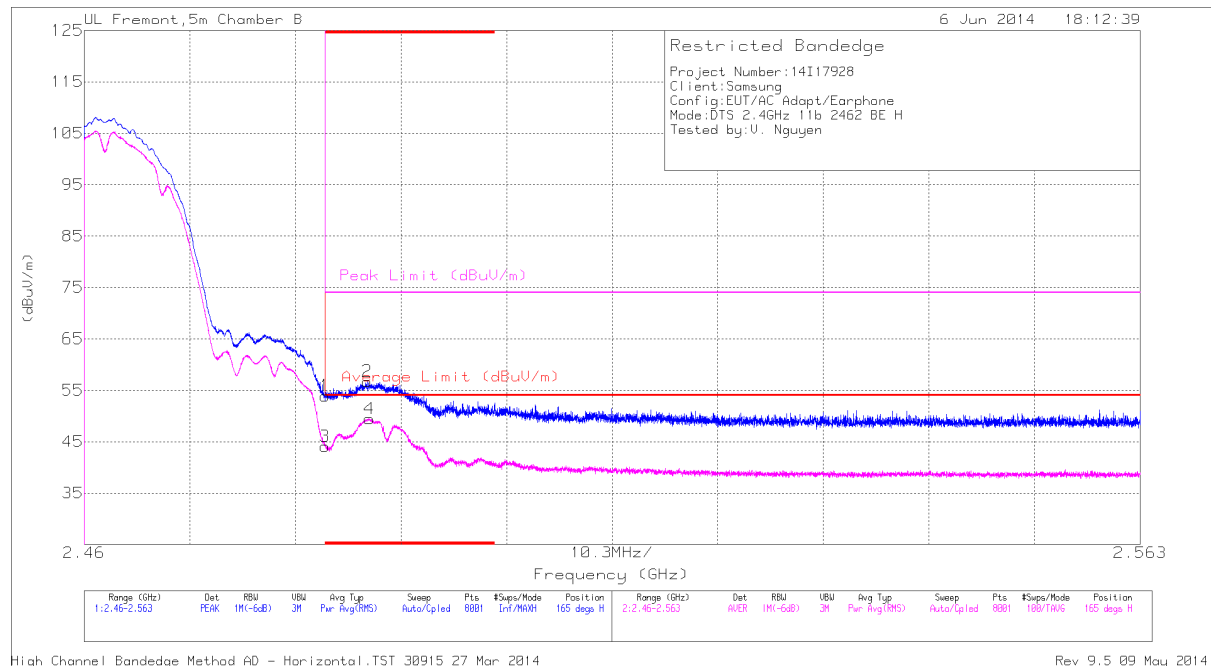
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL



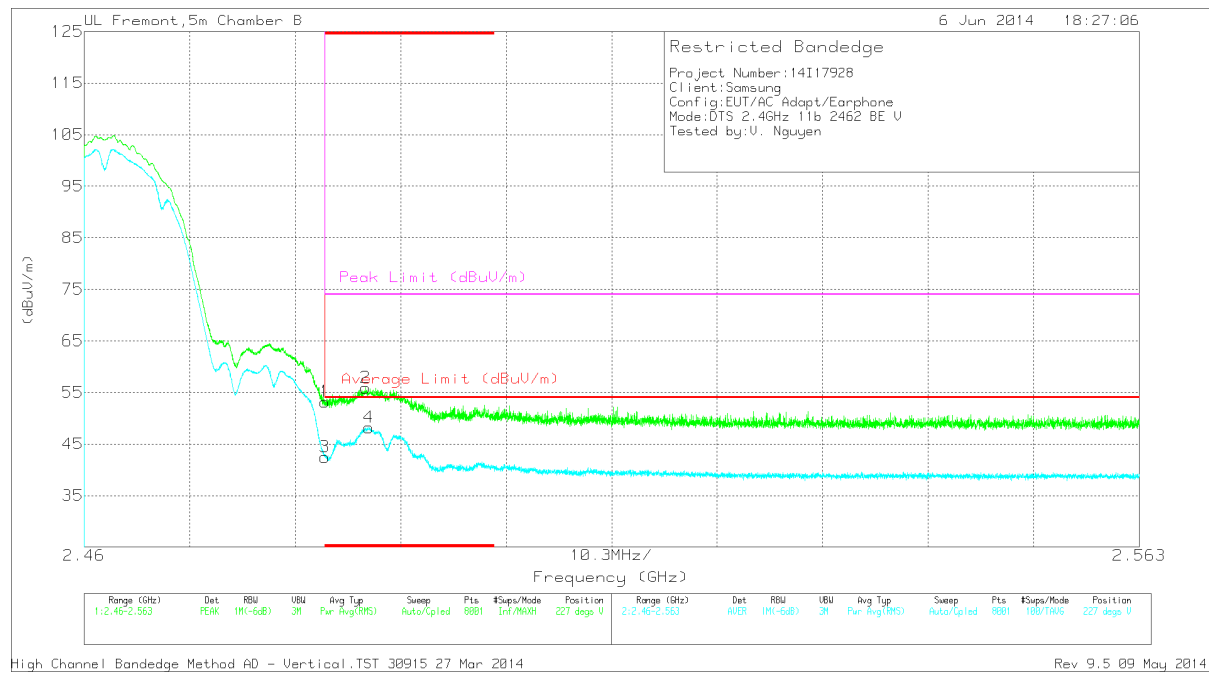
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	44.23	PK	32.4	-22.7	0	53.93	-	-	74	-20.07	165	227	H
3	* 2.484	34.27	RMS	32.4	-22.7	.1	44.07	54	-9.93	-	-	165	227	H
2	* 2.488	47	PK	32.4	-22.7	0	56.7	-	-	74	-17.3	165	227	H
4	* 2.488	39.66	RMS	32.4	-22.7	.1	49.46	54	-4.54	-	-	165	227	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



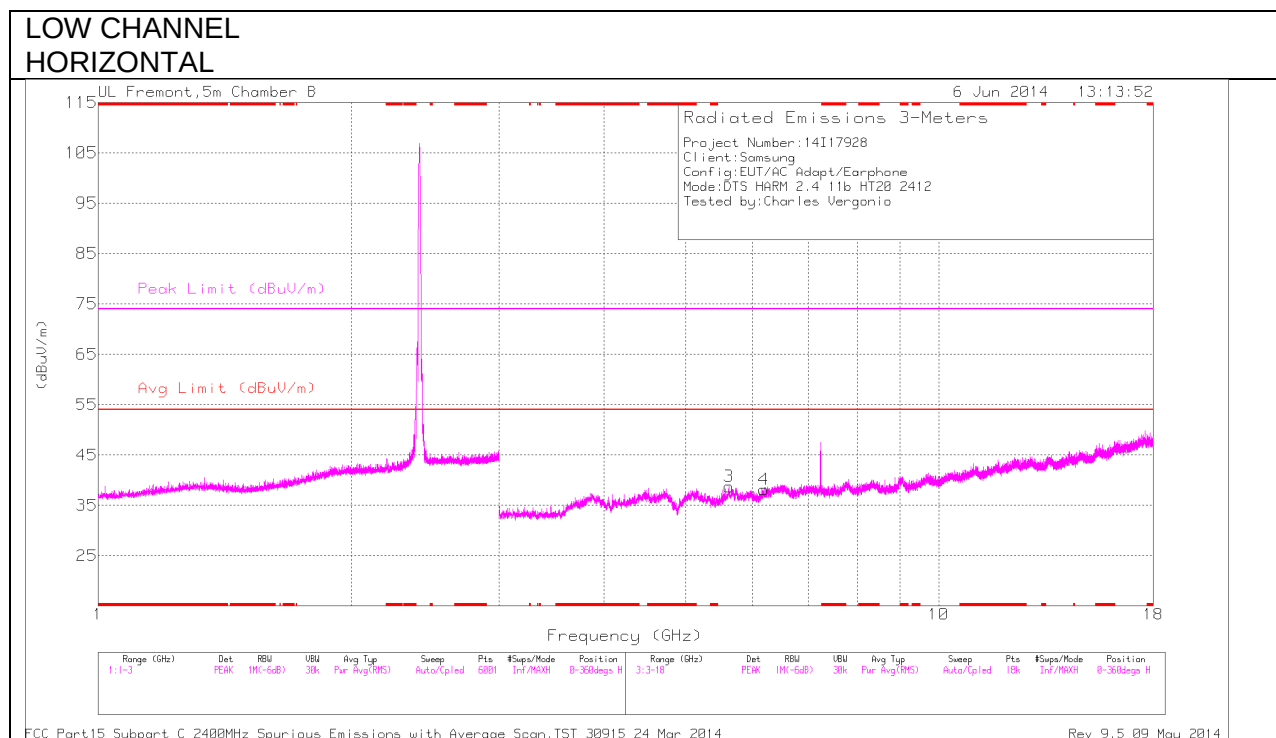
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.5	PK	32.4	-22.7	0	53.2	-	-	74	-20.8	227	336	V
3	* 2.484	32.66	RMS	32.4	-22.7	.1	42.46	54	-11.54	-	-	227	336	V
2	* 2.487	46.21	PK	32.4	-22.7	0	55.91	-	-	74	-18.09	227	336	V
4	* 2.488	38.4	RMS	32.4	-22.7	.1	48.2	54	-5.8	-	-	227	336	V

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

PK - Peak detector

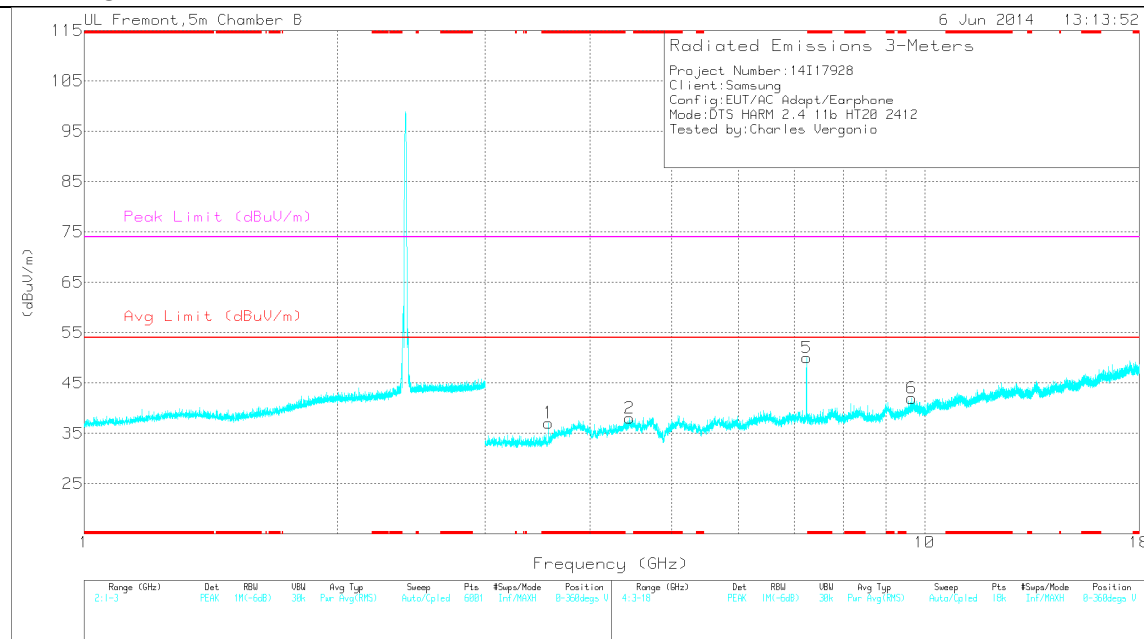
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS



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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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

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
1	* 3.567	35.27	PK	33	-31.2	37.07	-	-	74	-36.93	0-360	101	V
2	4.457	33.31	PK	33.9	-29.2	38.01	-	-	-	-	0-360	201	V
3	5.63	33.33	PK	34.5	-29.1	38.73	-	-	-	-	0-360	201	H
4	6.196	31.25	PK	35.4	-28.5	38.15	-	-	-	-	0-360	101	H
5	7.236	41.71	PK	35.6	-27.3	50.01	-	-	-	-	0-360	201	V
6	9.647	28.88	PK	36.8	-23.7	41.98	-	-	-	-	0-360	201	V

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

PK - Peak detector

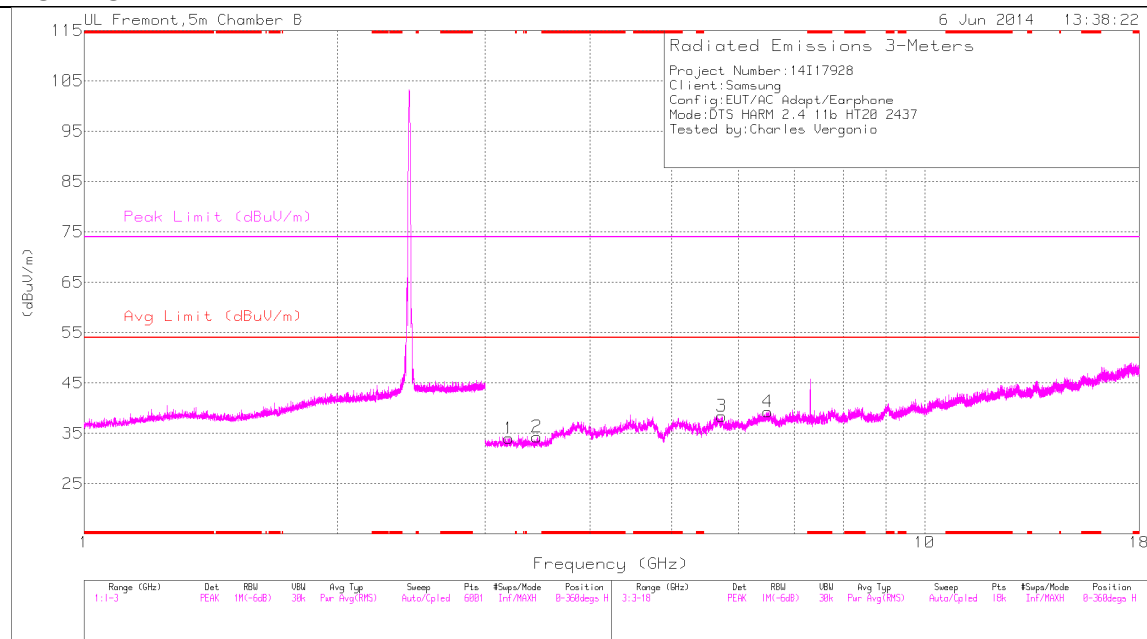
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Factor	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.567	41.18	PK2	33	-31.2		42.98	-	-	74	-31.02	46	278	V
* 3.568	28.86	MAV1	33	-31.2	0.1	30.66	54	-23.34	-	-	46	278	V
7.235	48.87	PK2	35.6	-27.2		57.27	-	-	-	-	142	177	V
7.235	43.71	MAV1	35.6	-27.2	0.1	52.11	-	-	-	-	142	177	V

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

PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL HORIZONTAL

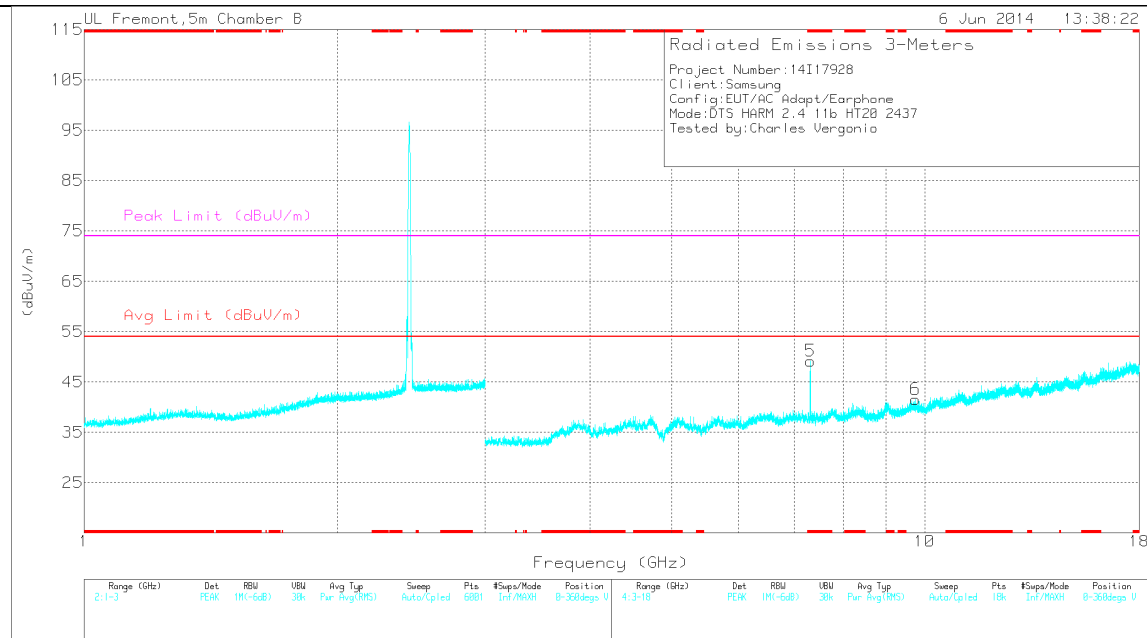


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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

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
5	* 7.311	41.67	PK	35.6	-28.1	49.17	-	-	74	-24.83	0-360	201	V
1	3.2	32.31	PK	32.8	-31.1	34.01	-	-	-	-	0-360	100	H
2	3.457	32.53	PK	32.8	-31	34.33	-	-	-	-	0-360	100	H
3	5.734	33.26	PK	34.6	-29.4	38.46	-	-	-	-	0-360	201	H
4	6.506	32.12	PK	35.7	-28.5	39.32	-	-	-	-	0-360	201	H
6	9.748	28.57	PK	36.9	-23.9	41.57	-	-	-	-	0-360	201	V

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

PK - Peak detector

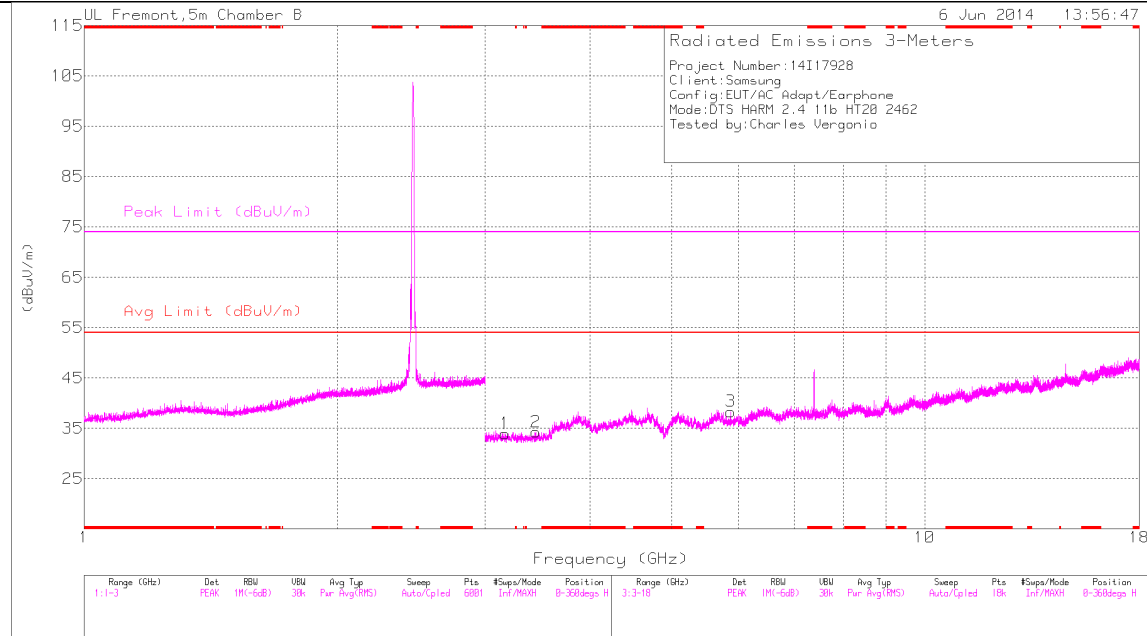
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC factor	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.312	47.48	PK2	35.6	-28.1		54.98	-	-	74	-19.02	160	268	V
* 7.312	41.75	MAV1	35.6	-28.1	0.1	49.25	54	-4.75	-	-	160	268	V

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

PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL HORIZONTAL

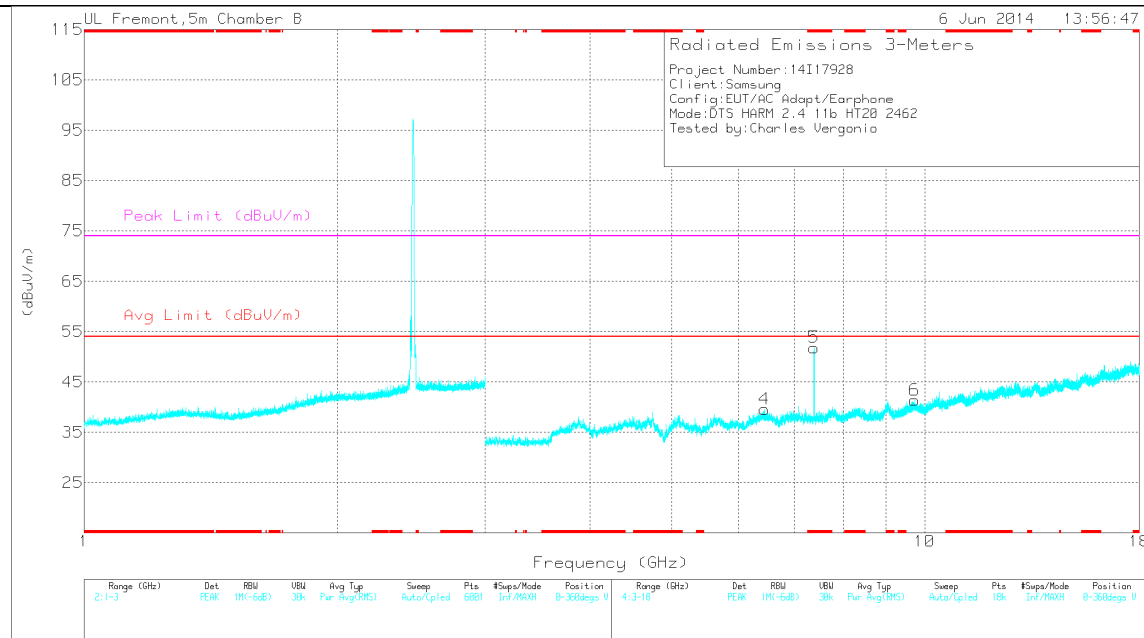


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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	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
5	* 7.386	43.63	PK	35.6	-27.4	51.83	-	-	74	-22.17	0-360	201	V
1	3.167	32.26	PK	32.8	-31.1	33.96	-	-	-	-	0-360	201	H
2	3.447	32.37	PK	32.8	-30.9	34.27	-	-	-	-	0-360	201	H
3	5.879	32.34	PK	34.9	-28.9	38.34	-	-	-	-	0-360	101	H
4	6.447	33.1	PK	35.6	-29.1	39.6	-	-	-	-	0-360	201	V
6	9.727	28	PK	36.9	-23.5	41.4	-	-	-	-	0-360	101	V

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

PK - Peak detector

Radiated Emissions

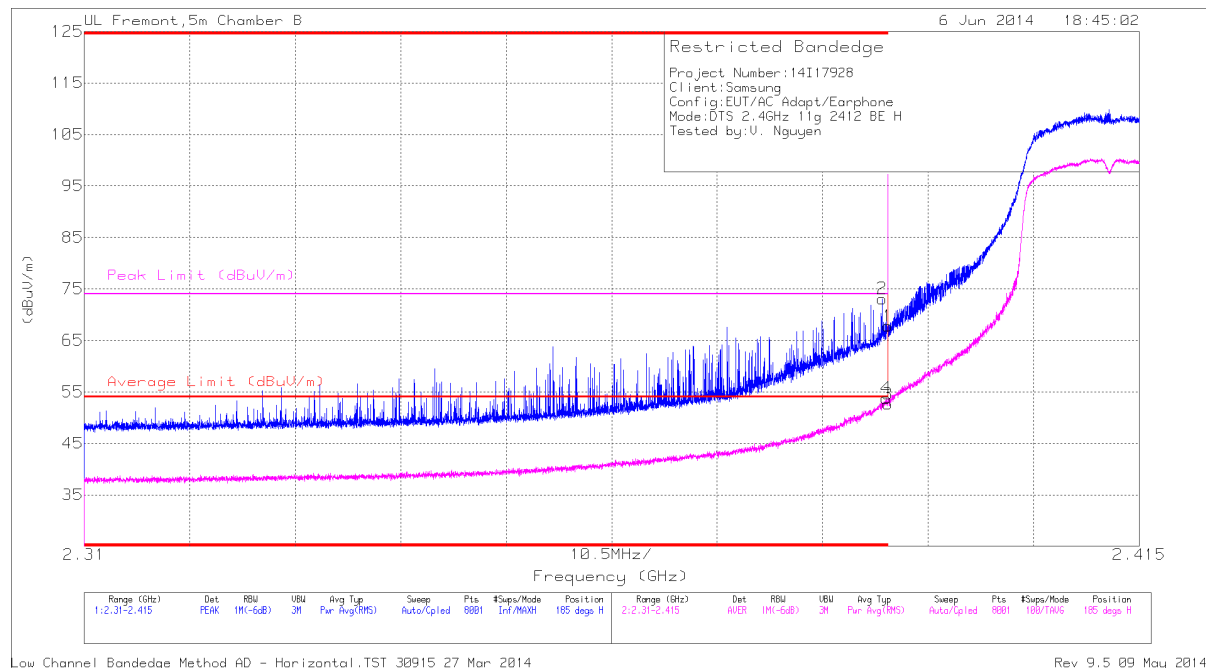
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC factor	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.386	50.05	PK2	35.6	-27.4		58.25	-	-	74	-15.75	307	248	V
* 7.385	44.73	MAV1	35.6	-27.4	0.1	52.93	54	-1.07	-	-	307	248	V

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

PK2 - KDB558074 Method: Maximum Peak

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

HORIZONTAL



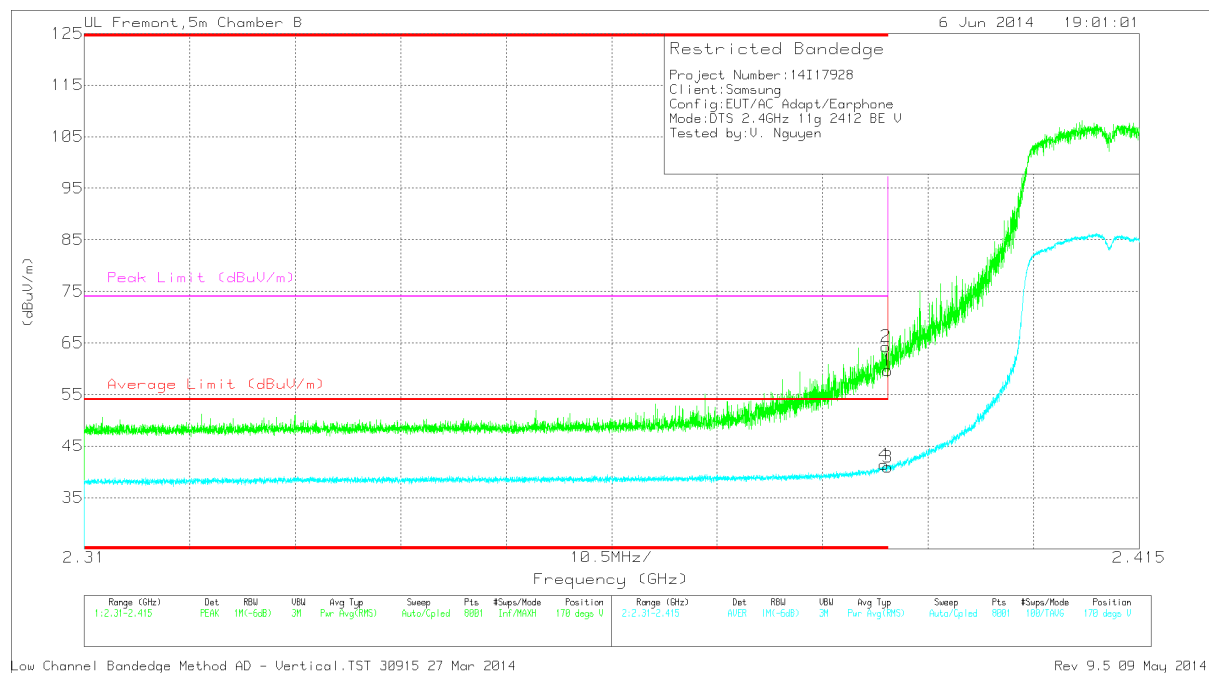
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	63.79	PK	32.1	-22.8	0	73.09	-	-	74	-91	185	282	H
1	* 2.39	58.51	PK	32.1	-22.8	0	67.81	-	-	74	-6.19	185	282	H
3	* 2.39	43.03	RMS	32.1	-22.8	.3	52.63	54	-1.37	-	-	185	282	H
4	* 2.39	44.18	RMS	32.1	-22.8	.3	53.78	54	-22	-	-	185	282	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	50.38	PK	32.1	-22.8	0	59.68	-	-	74	-14.32	170	287	V
2	* 2.39	54.99	PK	32.1	-22.8	0	64.29	-	-	74	-9.71	170	287	V
3	* 2.39	31.29	RMS	32.1	-22.8	.3	40.89	54	-13.11	-	-	170	287	V
4	* 2.39	31.78	RMS	32.1	-22.8	.3	41.38	54	-12.62	-	-	170	287	V

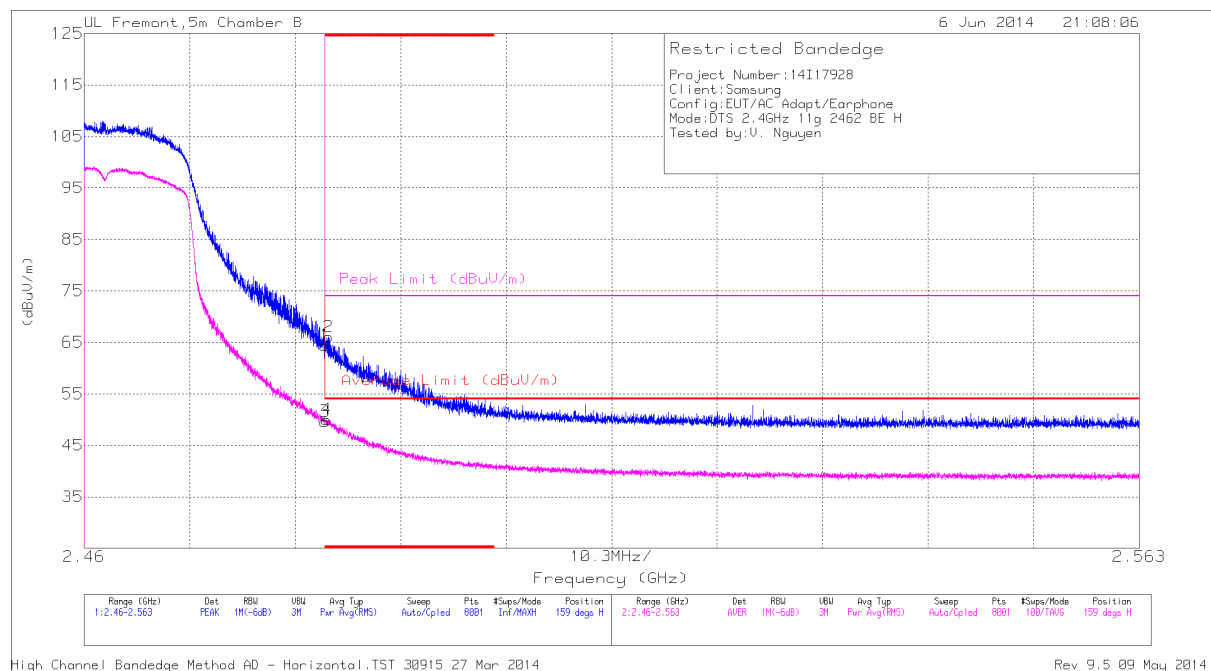
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL



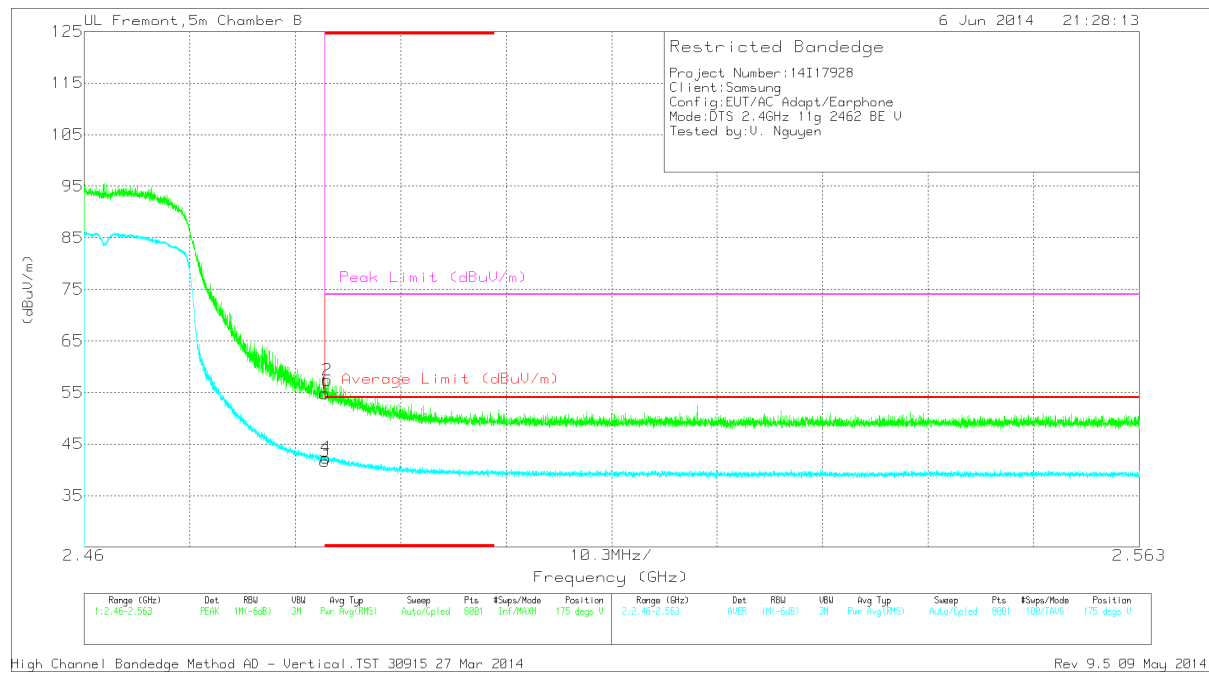
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	54.74	PK	32.4	-22.7	0	64.44	-	-	74	-9.56	159	179	H
2	* 2.484	56.37	PK	32.4	-22.7	0	66.07	-	-	74	-7.93	159	179	H
3	* 2.484	39.64	RMS	32.4	-22.7	.3	49.64	54	-4.36	-	-	159	179	H
4	* 2.484	40.02	RMS	32.4	-22.7	.3	50.02	54	-3.98	-	-	159	179	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



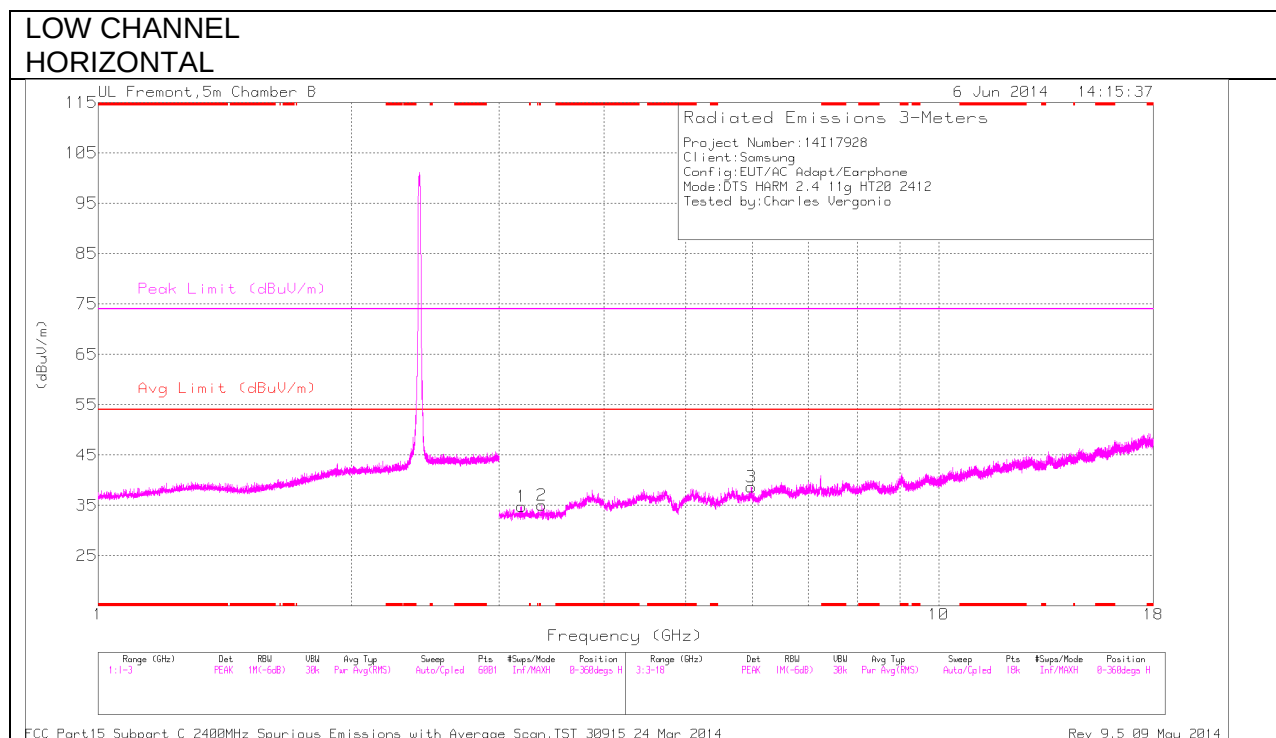
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.1	PK	32.4	-22.7	0	54.8	-	-	74	-19.2	175	178	V
2	* 2.484	47.67	PK	32.4	-22.7	0	57.37	-	-	74	-16.63	175	178	V
3	* 2.484	31.97	RMS	32.4	-22.7	.3	41.97	54	-12.03	-	-	175	178	V
4	* 2.484	32.62	RMS	32.4	-22.7	.3	42.62	54	-11.38	-	-	175	178	V

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

PK - Peak detector

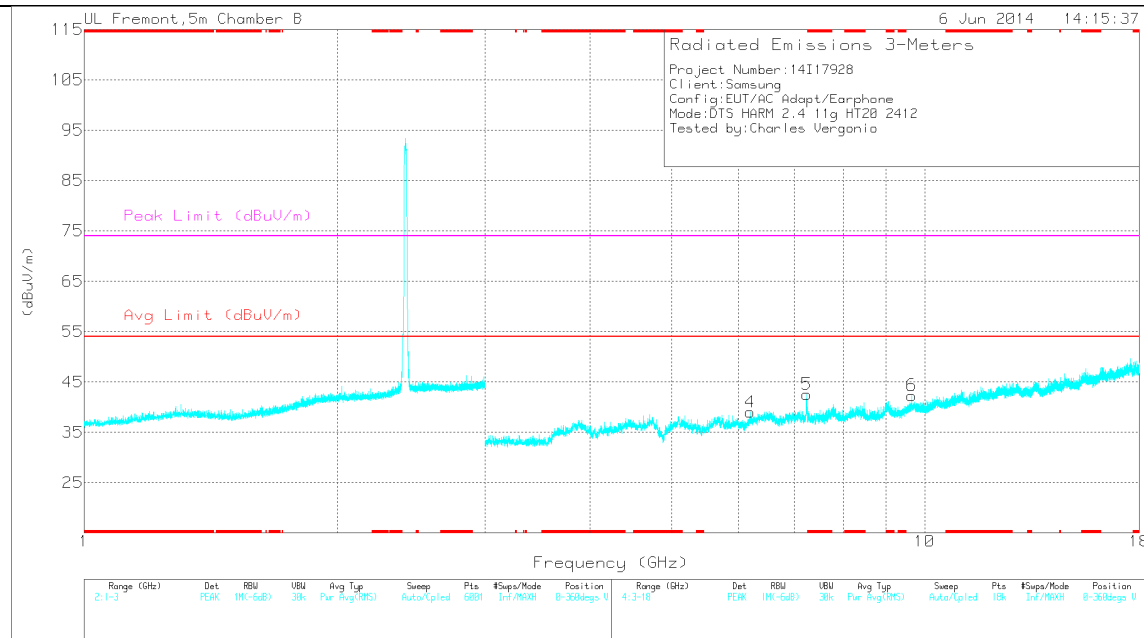
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS



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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.189	33.17	PK	32.8	-31.2	0	34.77	-	-	-	-	0-360	201	H
2	3.372	33.6	PK	32.8	-31.4	0	35	-	-	-	-	0-360	201	H
3	5.986	31.95	PK	35.2	-28.5	0	38.65	-	-	-	-	0-360	100	H
4	6.204	32.13	PK	35.4	-28.5	0	39.03	-	-	-	-	0-360	200	V
5	7.236	34.26	PK	35.6	-27.3	0	42.56	-	-	-	-	0-360	100	V
6	9.648	29.23	PK	36.8	-23.7	0	42.33	-	-	-	-	0-360	200	V

PK - Peak detector

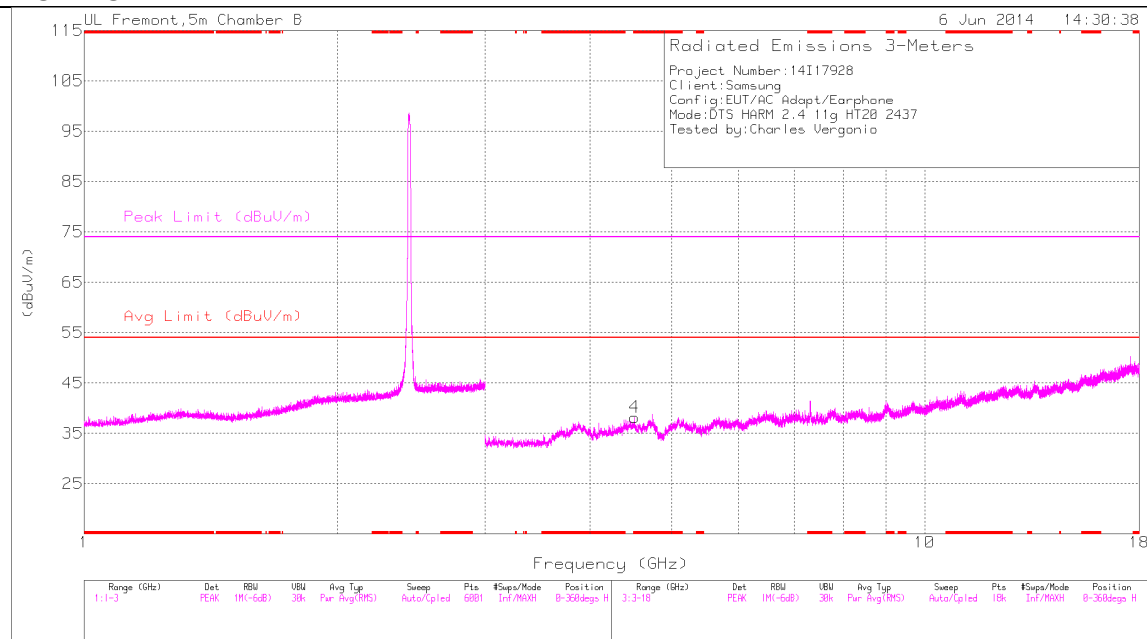
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.236	43.03	PK2	35.6	-27.3	0	51.33	-	-	-	-	360	100	V
7.236	30.84	MAV1	35.6	-27.3	.3	39.44	-	-	-	-	360	100	V

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL

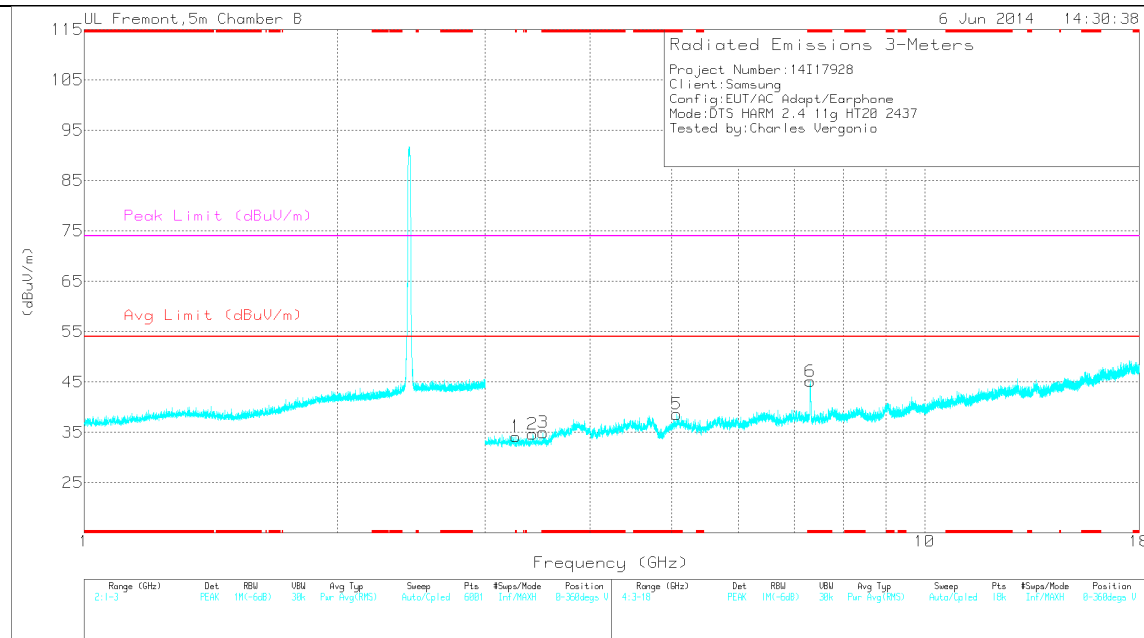


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4.517	33.8	PK	34	-29.6	0	38.2	-	-	74	-35.8	0-360	200	H
1	* 3.263	32.58	PK	32.8	-31.2	0	34.18	-	-	74	-39.82	0-360	201	V
3	* 3.517	33.38	PK	32.9	-31.3	0	34.98	-	-	74	-39.02	0-360	101	V
5	* 5.067	33.01	PK	34.2	-28.6	0	38.61	-	-	74	-35.39	0-360	201	V
6	* 7.311	37.63	PK	35.6	-28.1	0	45.13	-	-	74	-28.87	0-360	201	V
2	3.416	33.07	PK	32.8	-31.2	0	34.67	-	-	-	-	0-360	201	V

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

PK - Peak detector

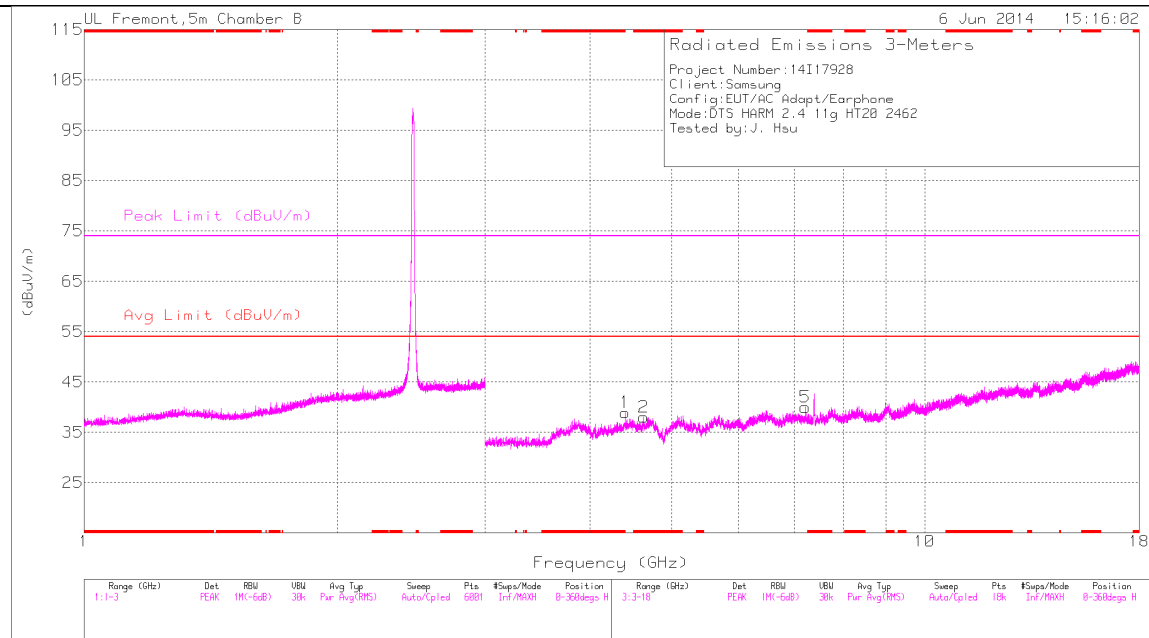
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.517	40.93	PK2	34	-29.6	0	45.33	-	-	74	-28.67	1	202	H
* 4.519	30.07	MAV1	34	-29.6	.3	34.77	54	-19.23	-	-	1	202	H
* 3.264	40.53	PK2	32.8	-31.2	0	42.13	-	-	74	-31.87	1	202	V
* 3.261	29.49	MAV1	32.8	-31.2	.3	31.39	54	-22.61	-	-	1	202	V
* 3.516	40.83	PK2	32.9	-31.3	0	42.43	-	-	74	-31.57	1	101	V
* 3.515	29.57	MAV1	32.9	-31.3	.3	31.47	54	-22.53	-	-	1	101	V
* 5.069	40.02	PK2	34.2	-28.6	0	45.62	-	-	74	-28.38	1	202	V
* 5.066	28.88	MAV1	34.2	-28.6	.3	34.78	54	-19.22	-	-	1	202	V
* 7.312	48.76	PK2	35.6	-28.1	0	56.26	-	-	74	-17.74	116	268	V
* 7.312	34.51	MAV1	35.6	-28.1	.3	42.31	54	-11.69	-	-	116	268	V
3.416	41.68	PK2	32.8	-31.2	0	43.28	-	-	-	-	1	202	V
3.417	29.65	MAV1	32.8	-31.2	.3	31.55	-	-	-	-	1	202	V

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

PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL HORIZONTAL

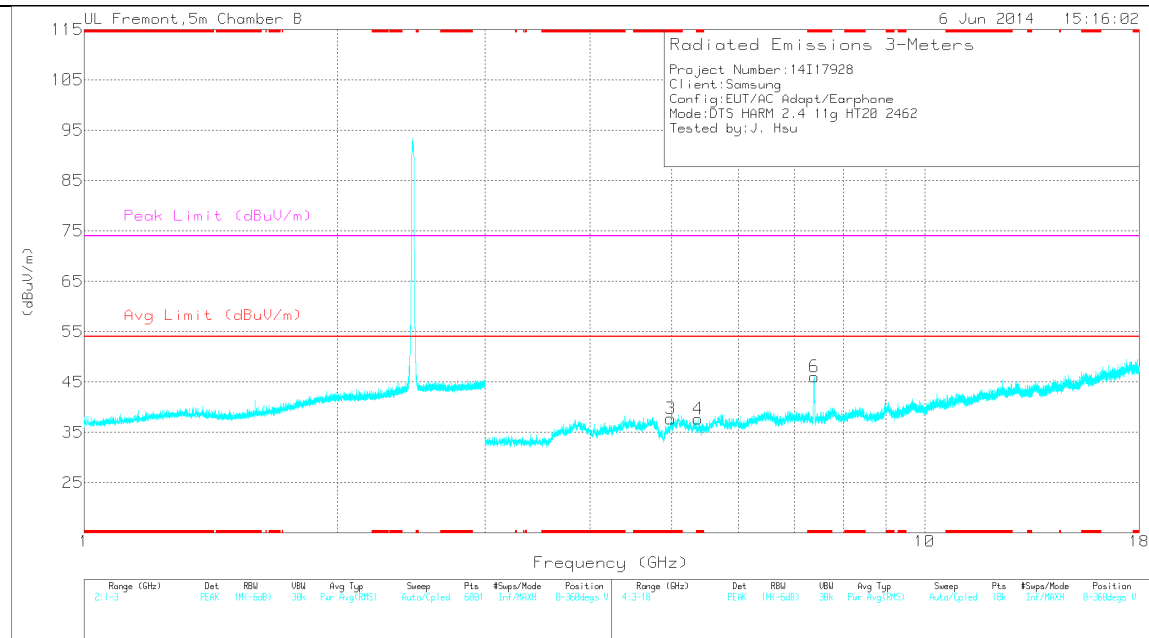


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.632	34.62	PK	34.2	-30.8	0	38.02	-	-	74	-35.98	0-360	100	H
3	* 4.988	33.33	PK	34.2	-29.8	0	37.73	-	-	74	-36.27	0-360	100	V
4	* 5.375	31.99	PK	34.5	-28.8	0	37.69	-	-	74	-36.31	0-360	100	V
6	* 7.387	37.74	PK	35.6	-27.3	0	46.04	-	-	74	-27.96	0-360	201	V
1	4.403	34.95	PK	33.8	-29.8	0	38.95	-	-	-	-	0-360	201	H
5	7.21	31.38	PK	35.5	-26.9	0	39.98	-	-	-	-	0-360	201	H

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

PK - Peak detector

Radiated Emissions

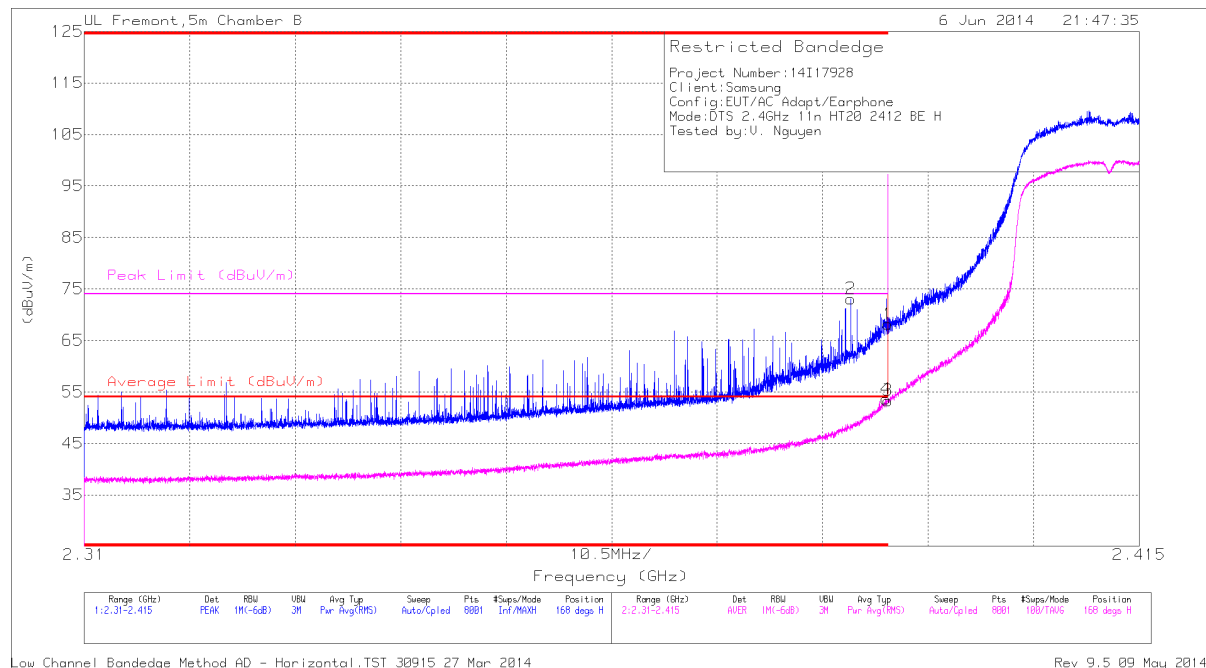
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.388	50.53	PK2	35.6	-27.3	0	58.83	-	-	74	-15.17	296	233	V
* 7.386	35.75	MAV1	35.6	-27.4	.3	44.25	54	-9.75	-	-	296	233	V

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

PK2 - KDB558074 Method: Maximum Peak

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

HORIZONTAL



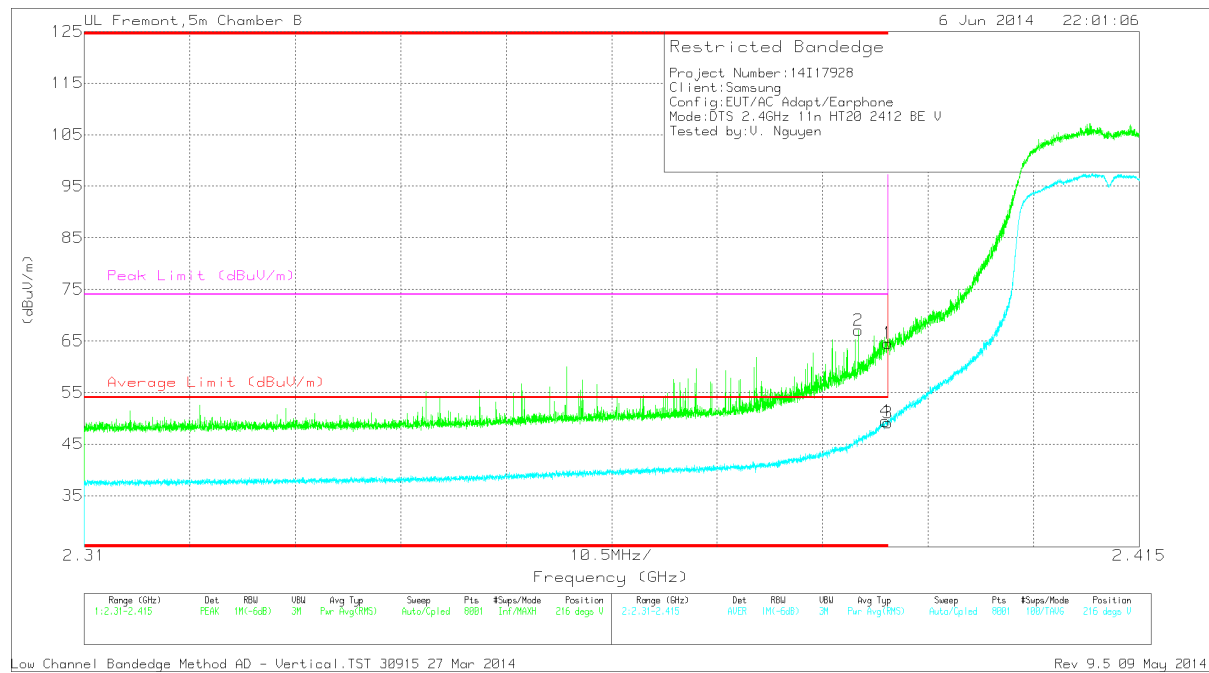
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.386	63.87	PK	32.1	-22.9	0	73.07	-	-	74	-93	168	287	H
1	* 2.39	58.84	PK	32.1	-22.8	0	68.14	-	-	74	-5.86	168	287	H
3	* 2.39	43.72	RMS	32.1	-22.8	.32	53.32	54	-68	-	-	168	287	H
4	* 2.39	44.03	RMS	32.1	-22.8	.32	53.63	54	-37	-	-	168	287	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC factor	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.387	57.77	PK	32.1	-22.8		67.07	-	-	74	-6.93	216	351	V
1	* 2.39	55.25	PK	32.1	-22.8		64.55	-	-	74	-9.45	216	351	V
3	* 2.39	39.79	RMS	32.1	-22.8	0.32	49.09	54	-4.91	-	-	216	351	V
4	* 2.39	40.12	RMS	32.1	-22.8	0.32	49.42	54	-4.58	-	-	216	351	V

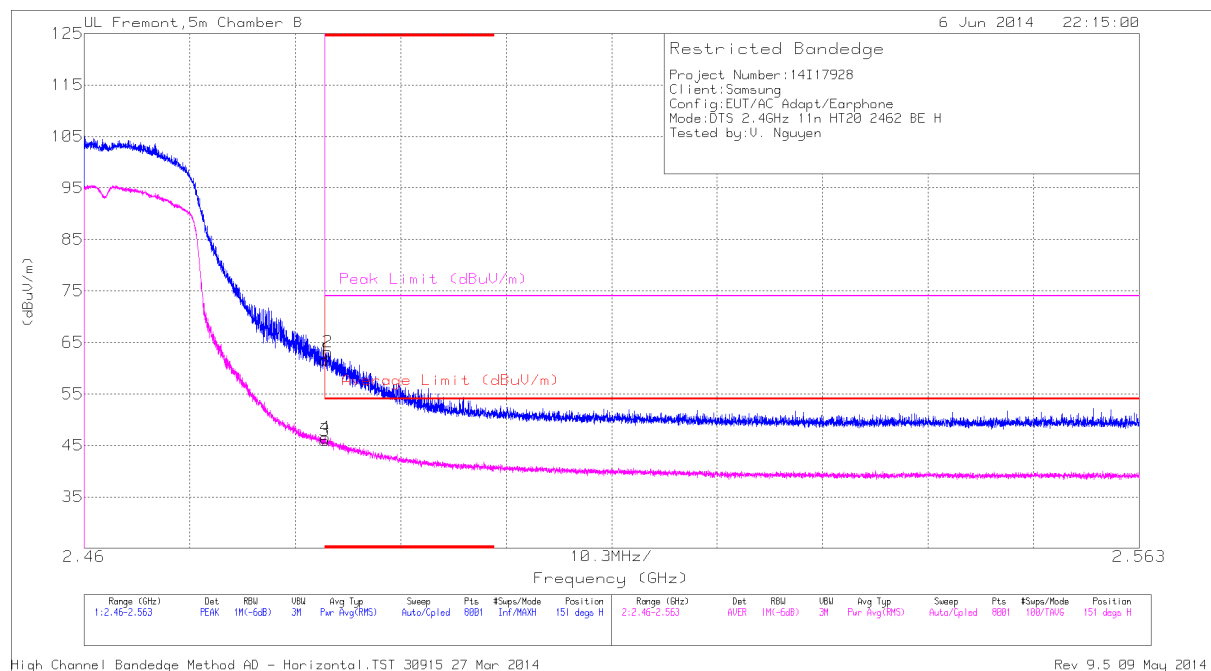
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL



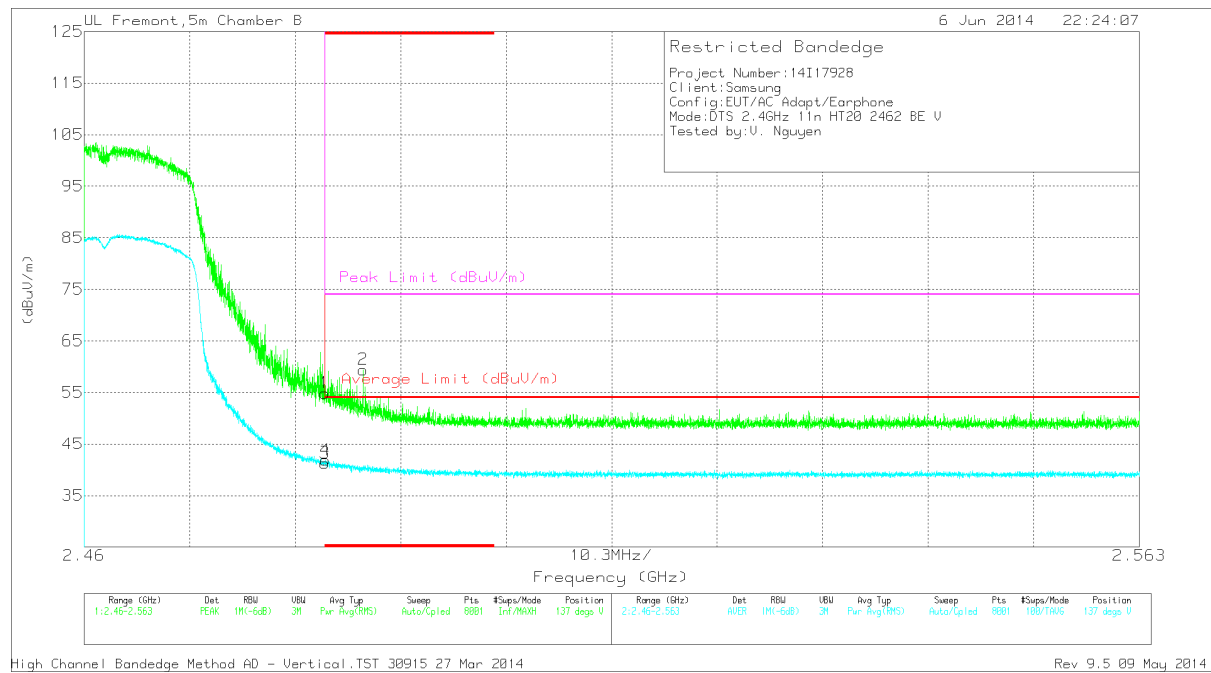
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	51.89	PK	32.4	-22.7	0	61.59	-	-	74	-12.41	151	273	H
2	* 2.484	53.42	PK	32.4	-22.7	0	63.12	-	-	74	-10.88	151	273	H
3	* 2.484	35.95	RMS	32.4	-22.7	.32	45.95	54	-8.05	-	-	151	273	H
4	* 2.484	36.49	RMS	32.4	-22.7	.32	46.49	54	-7.51	-	-	151	273	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL



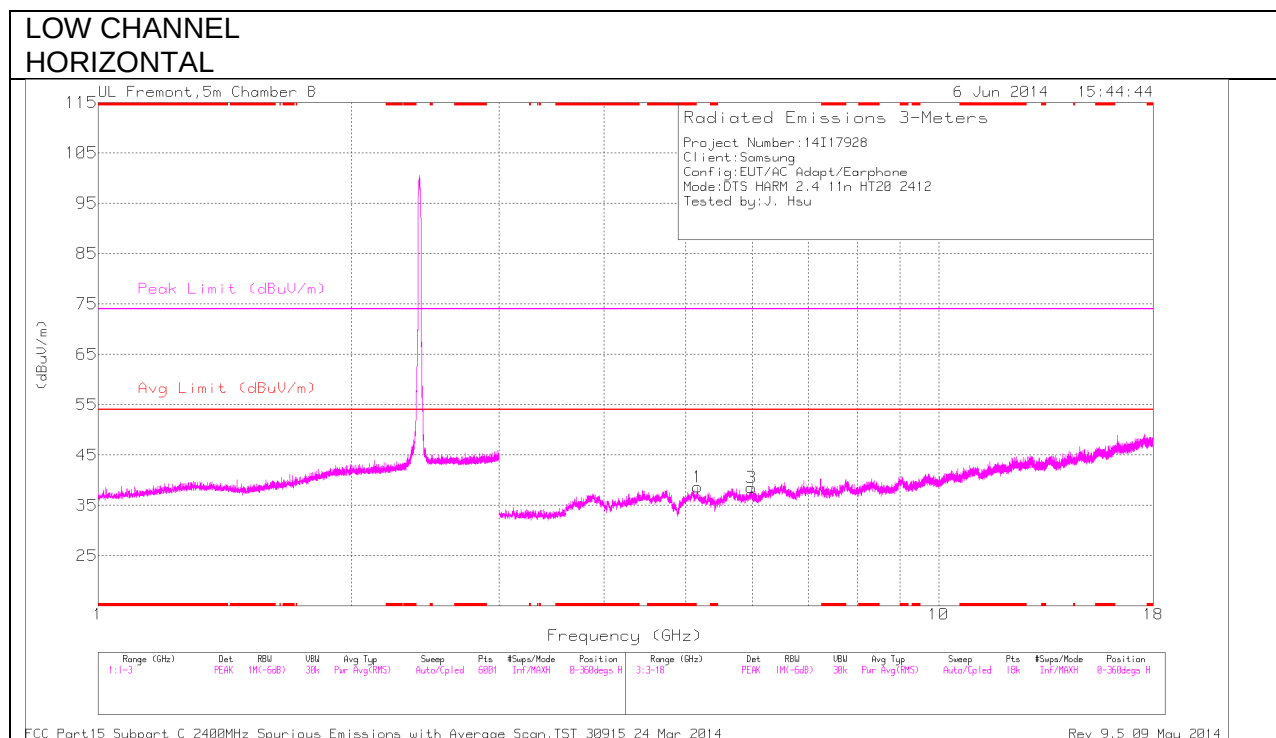
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.21	PK	32.4	-22.7	0	54.91	-	-	74	-19.09	137	273	V
3	* 2.484	31.32	RMS	32.4	-22.7	.32	41.32	54	-12.68	-	-	137	273	V
4	* 2.484	31.9	RMS	32.4	-22.7	.32	41.9	54	-12.1	-	-	137	273	V
2	* 2.487	49.73	PK	32.4	-22.7	0	59.43	-	-	74	-14.57	137	273	V

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

PK - Peak detector

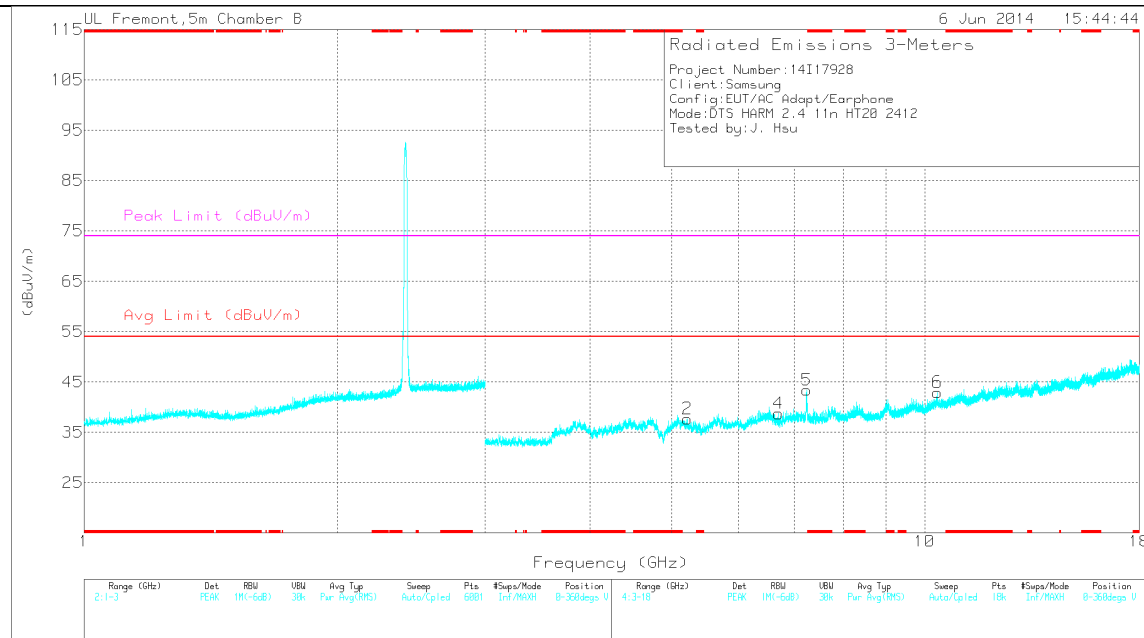
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS



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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.169	34.54	PK	34.3	-30.2	0	38.64	-	-	-	-	0-360	201	H
2	5.221	33.89	PK	34.4	-30.6	0	37.69	-	-	-	-	0-360	201	V
3	5.987	31.8	PK	35.2	-28.5	0	38.5	-	-	-	-	0-360	201	H
4	6.703	31.94	PK	35.7	-28.9	0	38.74	-	-	-	-	0-360	101	V
5	7.236	35.11	PK	35.6	-27.3	0	43.41	-	-	-	-	0-360	201	V
6	10.361	28.55	PK	37.2	-22.8	0	42.95	-	-	-	-	0-360	201	V

PK - Peak detector

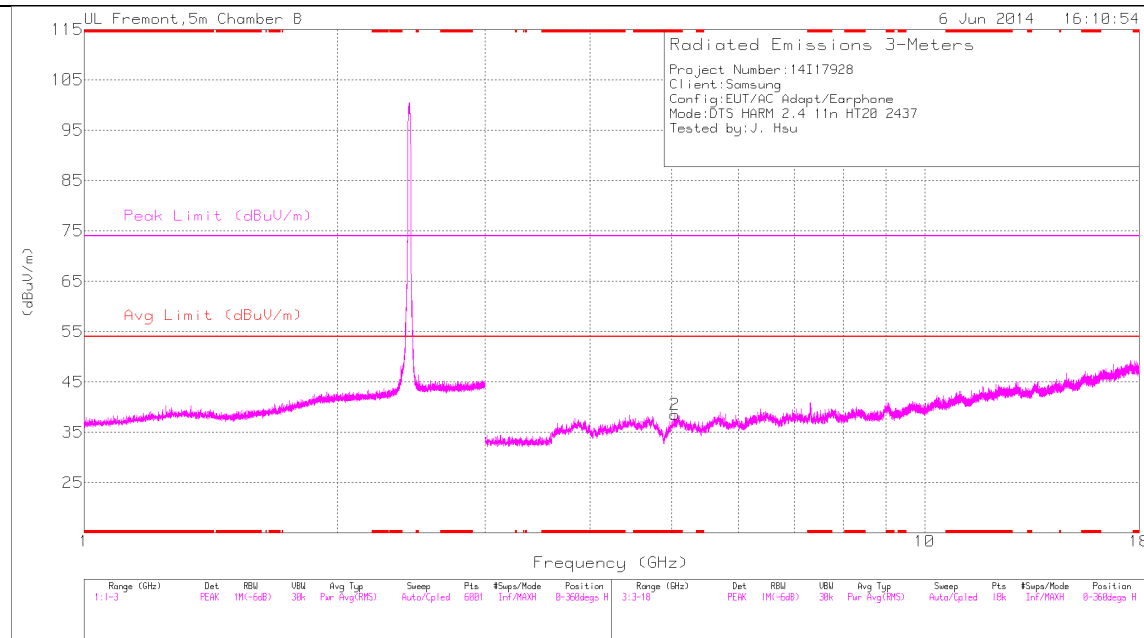
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.234	47.29	PK2	35.6	-27.2	0	55.69	-	-	-	-	127	334	V
7.236	32.88	MAV1	35.6	-27.3	.4	41.58	-	-	-	-	127	334	V

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL
HORIZONTAL

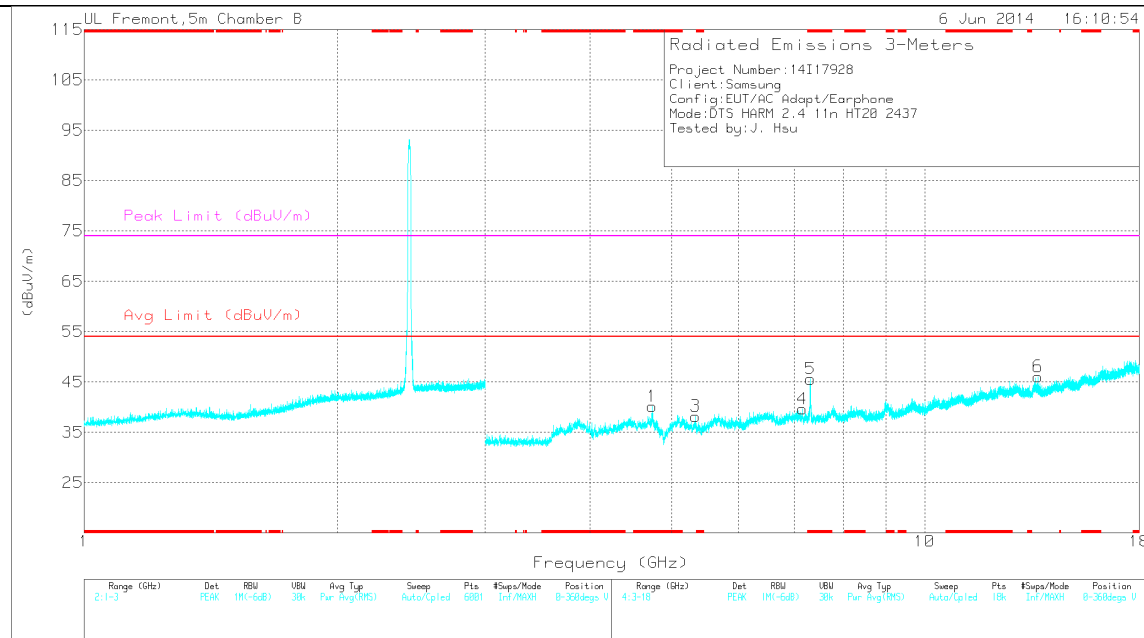


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 5.043	33.32	PK	34.2	-29	0	38.52	-	-	74	-35.48	0-360	201	H
1	* 4.744	35.26	PK	34.2	-29.3	0	40.16	-	-	74	-33.84	0-360	201	V
5	* 7.312	38.1	PK	35.6	-28.1	0	45.6	-	-	74	-28.4	0-360	201	V
3	5.338	32.41	PK	34.5	-28.7	0	38.21	-	-	-	-	0-360	201	V
4	7.156	31.03	PK	35.6	-27	0	39.63	-	-	-	-	0-360	101	V
6	13.636	28.26	PK	38.7	-20.9	0	46.06	-	-	-	-	0-360	101	V

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

PK - Peak detector

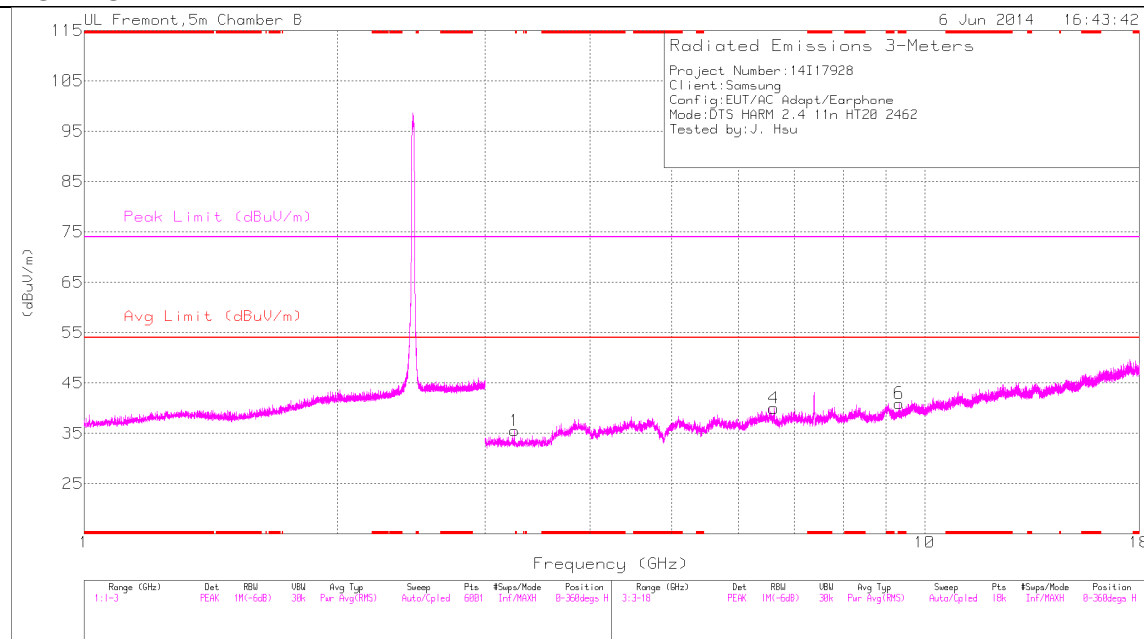
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.743	42.29	PK2	34.2	-29.3	0	47.19	-	-	74	-26.81	1	202	V
* 4.744	30.42	MAV1	34.2	-29.3	.4	35.72	54	-18.28	-	-	1	202	V
* 7.311	47.62	PK2	35.6	-28.1	0	55.12	-	-	74	-18.88	151	203	V
* 7.311	33.9	MAV1	35.6	-28.1	.4	41.8	54	-12.2	-	-	151	203	V
13.634	23.71	MAV1	38.8	-20.9	.4	42.01	-	-	-	-	151	102	V
13.636	34.53	PK2	38.7	-20.9	0	52.33	-	-	-	-	151	102	V

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

PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL HORIZONTAL

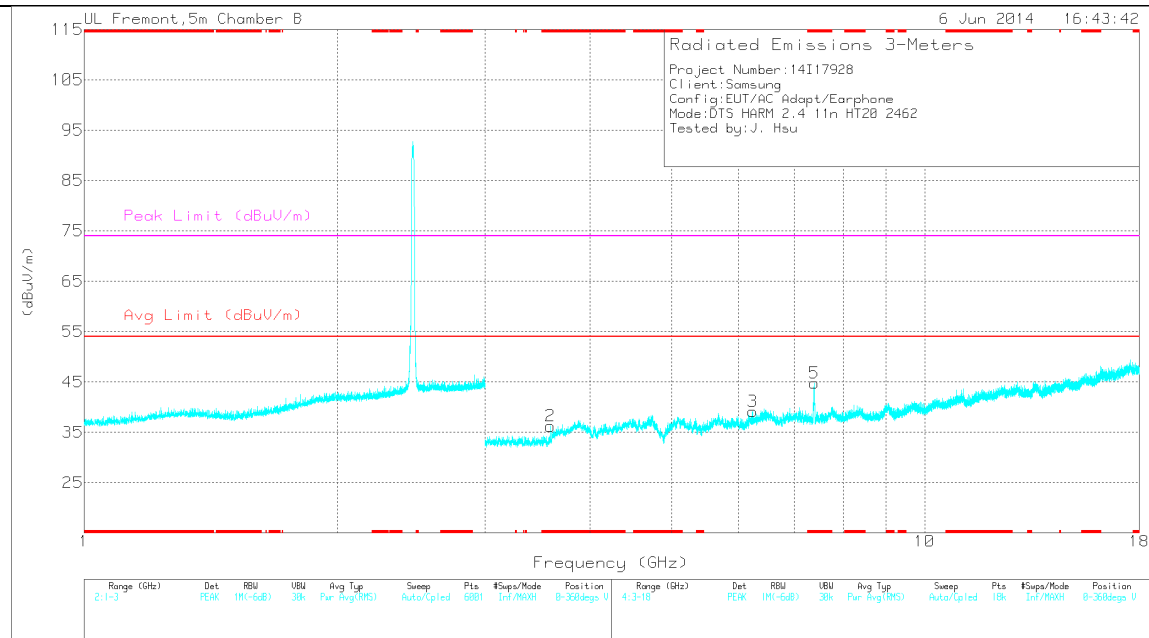


FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 24 Mar 2014

Rev 9.5 09 May 2014

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	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 9.326	29.04	PK	36.4	-24.5	0	40.94	-	-	74	-33.06	0-360	101	H
2	* 3.585	34.24	PK	33.1	-31.1	0	36.24	-	-	74	-37.76	0-360	101	V
5	* 7.392	36.37	PK	35.6	-27.2	0	44.77	-	-	74	-29.23	0-360	201	V
1	3.252	34.01	PK	32.8	-31.3	0	35.51	-	-	-	-	0-360	101	H
3	6.246	32.16	PK	35.4	-28.4	0	39.16	-	-	-	-	0-360	101	V
4	6.615	32.18	PK	35.7	-27.9	0	39.98	-	-	-	-	0-360	101	H

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

PK - Peak detector

Radiated Emissions

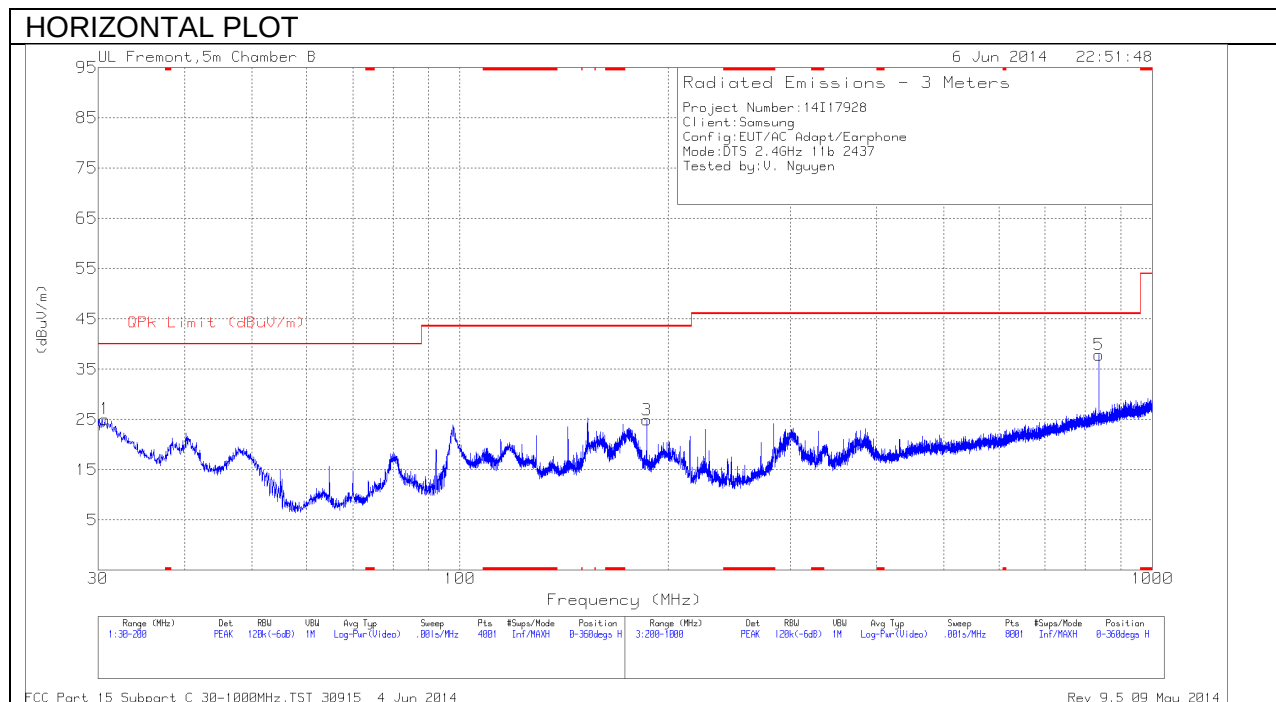
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.392	48.44	PK2	35.6	-27.2	0	56.84	-	-	74	-17.16	135	210	V
* 7.391	34.09	MAV1	35.6	-27.2	.4	42.89	54	-11.11	-	-	135	210	V

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

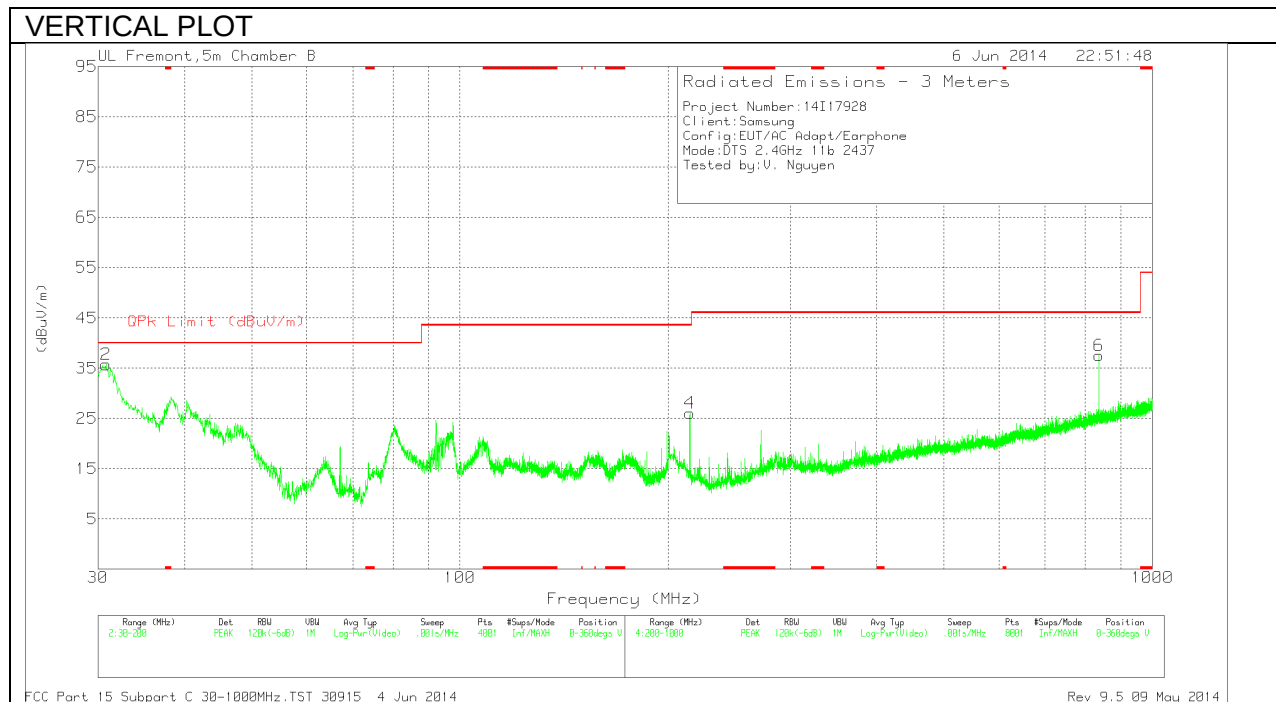
PK2 - KDB558074 Method: Maximum Peak

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

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.68	32.99	PK	20.9	-28.8	0	25.09	40	-14.91	0-360	200	H
2	30.8075	43.72	PK	20.8	-28.8	0	35.72	40	-4.28	0-360	101	V
3	186.145	40.97	PK	10.9	-27	0	24.87	43.52	-18.65	0-360	100	H
4	214.8	42.27	PK	10.6	-26.8	0	26.07	43.52	-17.45	0-360	200	V
5	836.6	39.64	PK	21.7	-23.5	0	37.84	46.02	-8.18	0-360	200	H
6	836.7	39.29	PK	21.7	-23.5	0	37.49	46.02	-8.53	0-360	200	V

PK - Peak detector

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

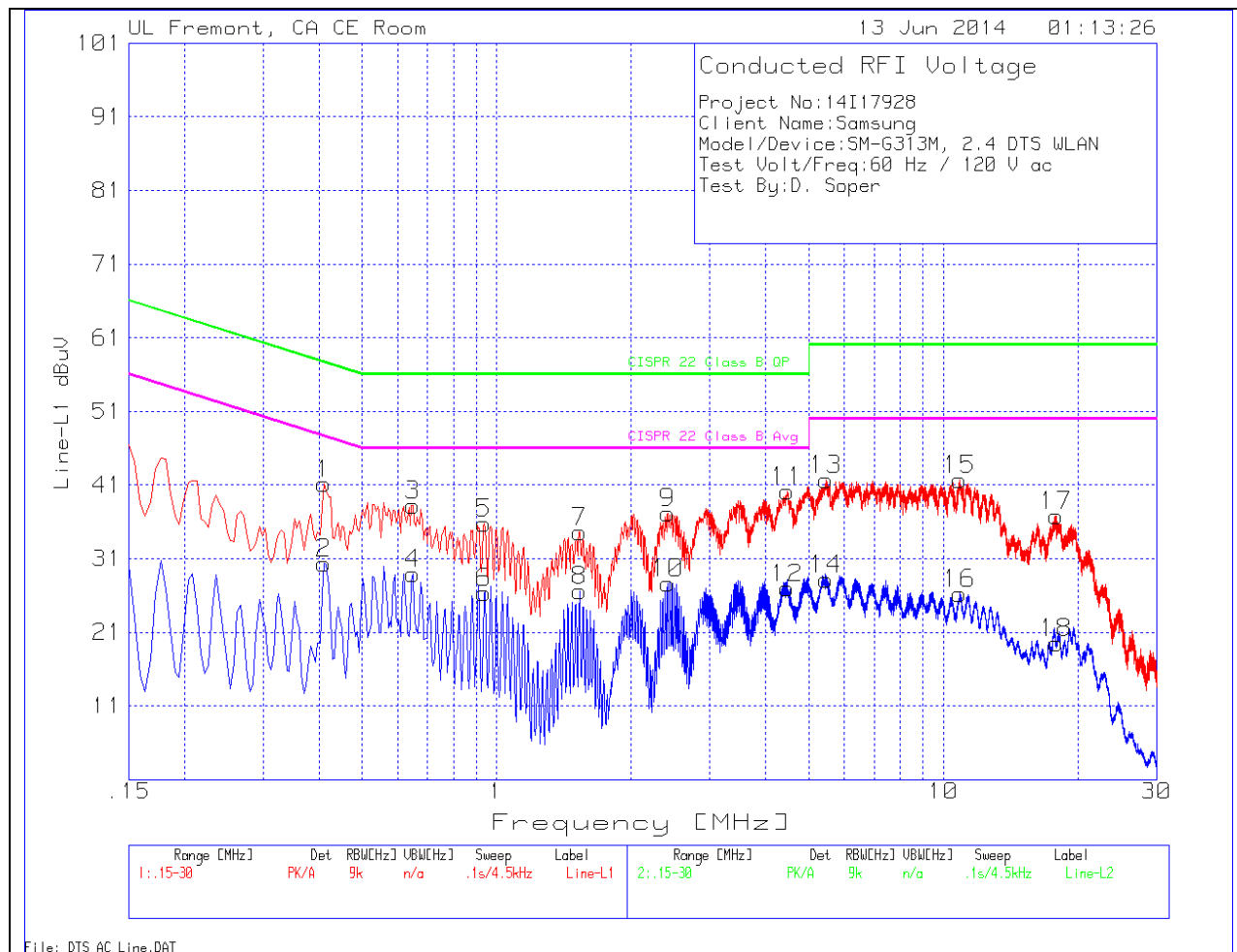
Line-L1 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.411	40.72	PK	.4	0	41.12	57.6	-16.48	-	-
2	.411	29.98	Av	.4	0	30.38	-	-	47.6	-17.22
3	.6495	37.96	PK	.3	0	38.26	56	-17.74	-	-
4	.6495	28.65	Av	.3	0	28.95	-	-	46	-17.05
5	.9375	35.43	PK	.3	0	35.73	56	-20.27	-	-
6	.9375	26.1	Av	.3	0	26.4	-	-	46	-19.6
7	1.5315	34.34	PK	.2	.1	34.64	56	-21.36	-	-
8	1.5315	26.33	Av	.2	.1	26.63	-	-	46	-19.37
9	2.4135	36.86	PK	.2	.1	37.16	56	-18.84	-	-
10	2.4135	27.39	Av	.2	.1	27.69	-	-	46	-18.31
11	4.479	39.8	PK	.2	.1	40.1	56	-15.9	-	-
12	4.479	26.64	Av	.2	.1	26.94	-	-	46	-19.06
13	5.469	41.36	PK	.2	.1	41.66	60	-18.34	-	-
14	5.469	27.85	Av	.2	.1	28.15	-	-	50	-21.85
15	10.869	41.27	PK	.2	.2	41.67	60	-18.33	-	-
16	10.869	25.86	Av	.2	.2	26.26	-	-	50	-23.74
17	17.8665	36.24	PK	.3	.2	36.74	60	-23.26	-	-
18	17.8665	19	Av	.3	.2	19.5	-	-	50	-30.5

Line-L2 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
19	.213	39.26	PK	.9	0	40.16	63.1	-22.94	-	-
20	.213	24.09	Av	.9	0	24.99	-	-	53.1	-28.11
21	.573	34.87	PK	.3	0	35.17	56	-20.83	-	-
22	.573	19.01	Av	.3	0	19.31	-	-	46	-26.69
23	.9015	29.64	PK	.3	0	29.94	56	-26.06	-	-
24	.9015	17.51	Av	.3	0	17.81	-	-	46	-28.19
25	1.5315	28.03	PK	.2	.1	28.33	56	-27.67	-	-
26	1.5315	20.19	Av	.2	.1	20.49	-	-	46	-25.51
27	2.9085	30.55	PK	.2	.1	30.85	56	-25.15	-	-
28	2.9085	19.02	Av	.2	.1	19.32	-	-	46	-26.68
29	7.296	34.56	PK	.2	.1	34.86	60	-25.14	-	-
30	7.296	19.85	Av	.2	.1	20.15	-	-	50	-29.85
31	10.1895	34.7	PK	.2	.2	35.1	60	-24.9	-	-
32	10.1895	17.63	Av	.2	.2	18.03	-	-	50	-31.97
33	11.6655	34.4	PK	.2	.2	34.8	60	-25.2	-	-
34	11.6655	16.34	Av	.2	.2	16.74	-	-	50	-33.26
35	14.946	27.57	PK	.3	.2	28.07	60	-31.93	-	-
36	14.946	9.86	Av	.3	.2	10.36	-	-	50	-39.64
37	17.97	29.3	PK	.3	.2	29.8	60	-30.2	-	-
38	17.97	14.24	Av	.3	.2	14.74	-	-	50	-35.26

LINE 1 RESULTS



LINE 2 RESULTS

