FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

BAR PHONE WITH 802.11B/G/N WLAN AND BLUETOOTH

MODEL NUMBER: GT-S5312L

FCC ID: A3LGTS5312L

REPORT NUMBER: 13U14925- 4, Revision B

ISSUE DATE: MARCH 28, 2013

Prepared for

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

Prepared by

UL CCS
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
	04/16/13	Initial Issue	P. Kim
A	5/24/13	Removed “802.11a mode” under Page 9. Added notes explaining noise floor on harmonics plots.	P. Kim
B	5/28/13	Updated antenna gain information with correct values from customer.	P. Kim

This report shall not be reproduced except in full, without the written approval of UL CCS.

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 8

5.4. SOFTWARE AND FIRMWARE 8

5.5. WORST-CASE CONFIGURATION AND MODE 9

5.1. DESCRIPTION OF TEST SETUP 10

6. TEST AND MEASUREMENT EQUIPMENT 12

7. MEASUREMENT METHODS 13

7.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS 14

7.2. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS 14

7.2.1. ON TIME AND DUTY CYCLE RESULTS 14

7.2.2. MEASUREMENT METHOD FOR POWER AND PPSD 14

7.2.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz 15

7.2.4. DUTY CYCLE PLOTS 16

8. ANTENNA PORT TEST RESULTS 18

8.1. 802.11b MODE IN THE 2.4 GHz BAND 18

8.1.1. 6 dB BANDWIDTH 18

8.1.2. AVERAGE POWER 21

8.1.3. OUTPUT POWER 22

8.1.4. PSD 26

8.1.5. OUT-OF-BAND EMISSIONS 29

8.2. 802.11g MODE IN THE 2.4 GHz BAND 34

8.2.1. 6 dB BANDWIDTH 34

8.2.2. AVERAGE POWER 37

8.2.3. OUTPUT POWER 38

8.2.4. PSD 42

8.2.5. OUT-OF-BAND EMISSIONS 45

8.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND 50

This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3.1. 6 dB BANDWIDTH 50
8.3.2. AVERAGE POWER 53
8.3.3. OUTPUT POWER 54
8.3.4. PSD 58
8.3.5. OUT-OF-BAND EMISSIONS 61

9. RADIATED TEST RESULTS 66

9.1. LIMITS AND PROCEDURE 66

9.2. TRANSMITTER ABOVE 1 GHz 67
9.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND 67
9.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND 80
9.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND 87

9.3. WORST-CASE BELOW 1 GHz 113

10. AC POWER LINE CONDUCTED EMISSIONS 116

11. SETUP PHOTOS 120

This report shall not be reproduced except in full, without the written approval of UL CCS.

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:	BAR PHONE WITH WLAN, 802.11B/G/N AND BLUETOOTH
MODEL:	GT-S5312L
SERIAL NUMBER:	FK-065-C (EMISSION) AND FK-065-D (CONDUCTION)
DATE TESTED:	MARCH 13- 21, 2013.

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

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

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

Approved & Released For UL CCS By:

PHILIP KIM
WiSE PROJECT MANAGER
UL CCS

Tested By:

DANNY VU
EMC ENGINEER
UL CCS

This report shall not be reproduced except in full, without the written approval of UL CCS.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

This report shall not be reproduced except in full, without the written approval of UL CCS.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a bar-style cell phone featuring 802.11b/g/n WLAN, Bluetooth, GPS and 2.4 GHz mobile hotspot capability.

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	18.1	64.57
2412 - 2462	802.11g	21.96	157.04
2412 - 2462	802.11n HT20	20.66	116.41

This report shall not be reproduced except in full, without the written approval of UL CCS.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of -1.18 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was REV.5 and the software was S5312L.

This report shall not be reproduced except in full, without the written approval of UL CCS.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

This report shall not be reproduced except in full, without the written approval of UL CCS.

5.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung Electronics	GT-S5312B	FK-065-A	DoC
Headset	Samsung Electronics	GT-S5312L	FK-064-B	DoC

I/O CABLES

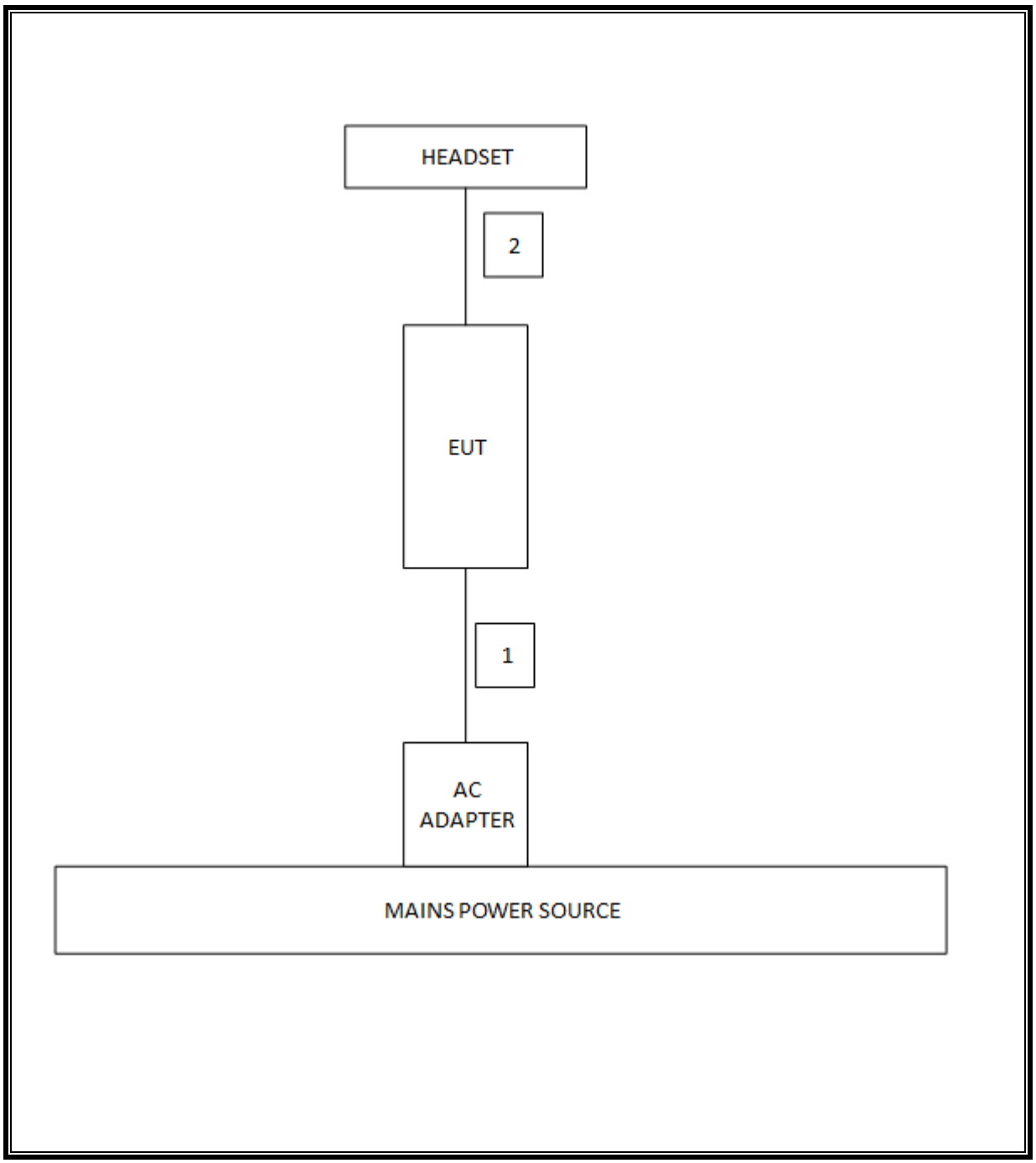
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	1.6m	N/A
2	Headset	1	Audio	Shielded	1.5m	N/A

TEST SETUP

The EUT is a stand-alone unit that was tested in the worst case orientation and configuration, where applicable, during the tests. Test software exercised the radio.

This report shall not be reproduced except in full, without the written approval of UL CCS.

SETUP DIAGRAM FOR TESTS



This report shall not be reproduced except in full, without the written approval of UL CCS.

6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Antenna, Horn, 18 GHz	EMCO	3115	C00872	09/20/12	09/20/13
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	07/28/12	07/28/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/12	10/21/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/21/12	10/21/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	02/21/13	02/21/14
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR	CNR
Bilog 30-2000MHz	Sunol	JB1	C01071	07/26/12	07/26/13
Power meter	HP	437B	T226	06/25/12	06/25/13
Power Sensor	HP	8481A	T233	06/26/12	06/26/13
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	01/14/13	01/14/14
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	03/07/12	03/07/14

This report shall not be reproduced except in full, without the written approval of UL CCS.

7. MEASUREMENT METHODS

KDB 558074 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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

7.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.2. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

7.2.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
802.11b	8.62	8.70	0.991	99.1%	0.00	0.010
802.11g	1.42	1.54	0.919	91.9%	0.36	0.706
802.11n HT20	1.33	1.44	0.924	92.4%	0.35	0.752

7.2.2. MEASUREMENT METHOD FOR POWER AND PPSD

The Duty Cycle is less than 98% and consistent therefore KDB 789033 Method SA-2 is used.

This report shall not be reproduced except in full, without the written approval of UL CCS.

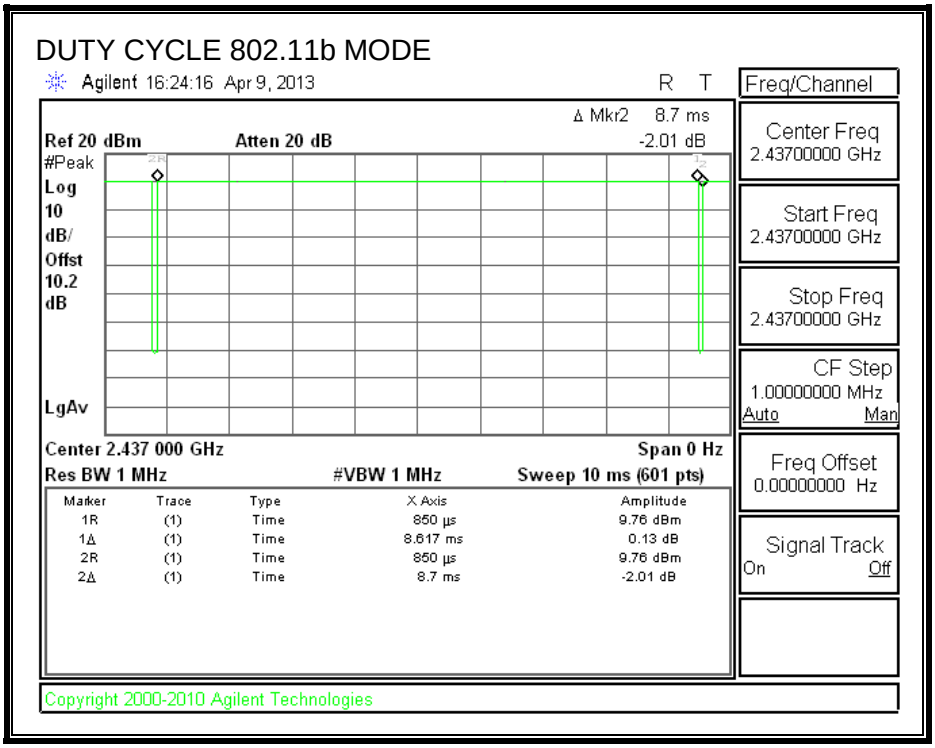
7.2.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz

The Duty Cycle is less than 98% and consistent, KDB 789033 Method AD with Power RMS Averaging and duty cycle correction is used.

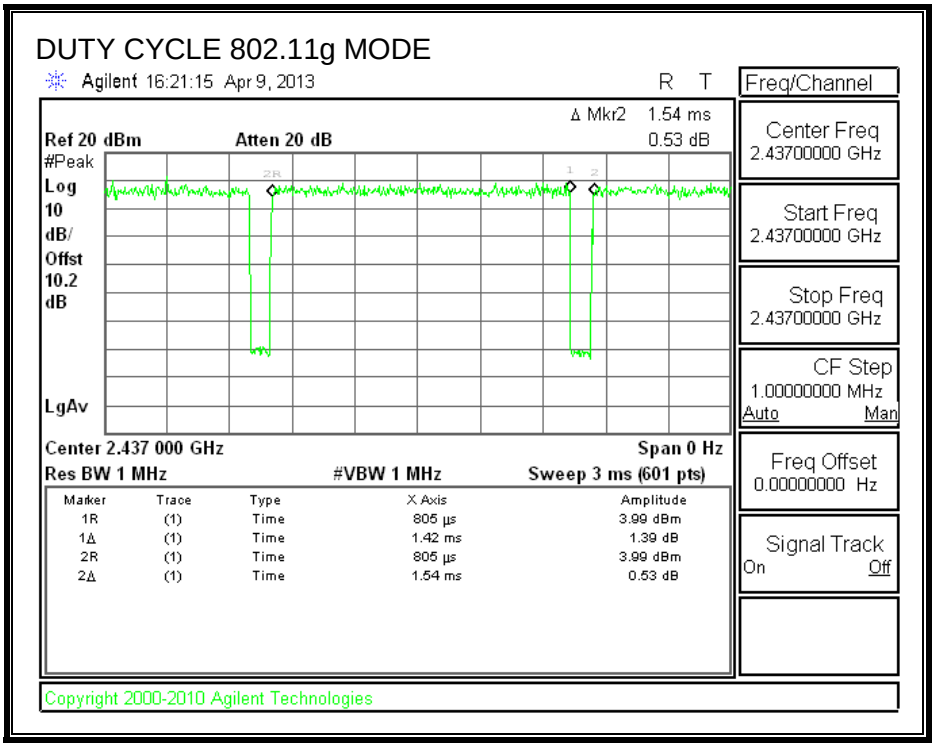
This report shall not be reproduced except in full, without the written approval of UL CCS.

7.2.4. DUTY CYCLE PLOTS

DUTY CYCLE 802.11b MODE

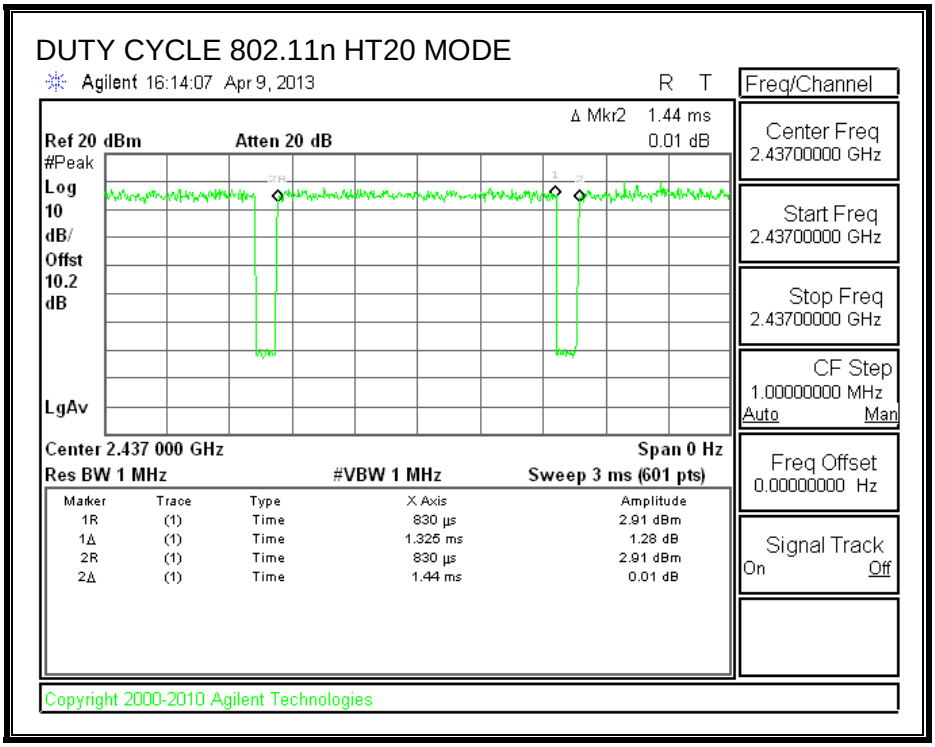


DUTY CYCLE 802.11g MODE



This report shall not be reproduced except in full, without the written approval of UL CCS.

DUTY CYCLE 802.11n HT20 MODE



This report shall not be reproduced except in full, without the written approval of UL CCS.

8. ANTENNA PORT TEST RESULTS

8.1. 802.11b MODE IN THE 2.4 GHz BAND

8.1.1. 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

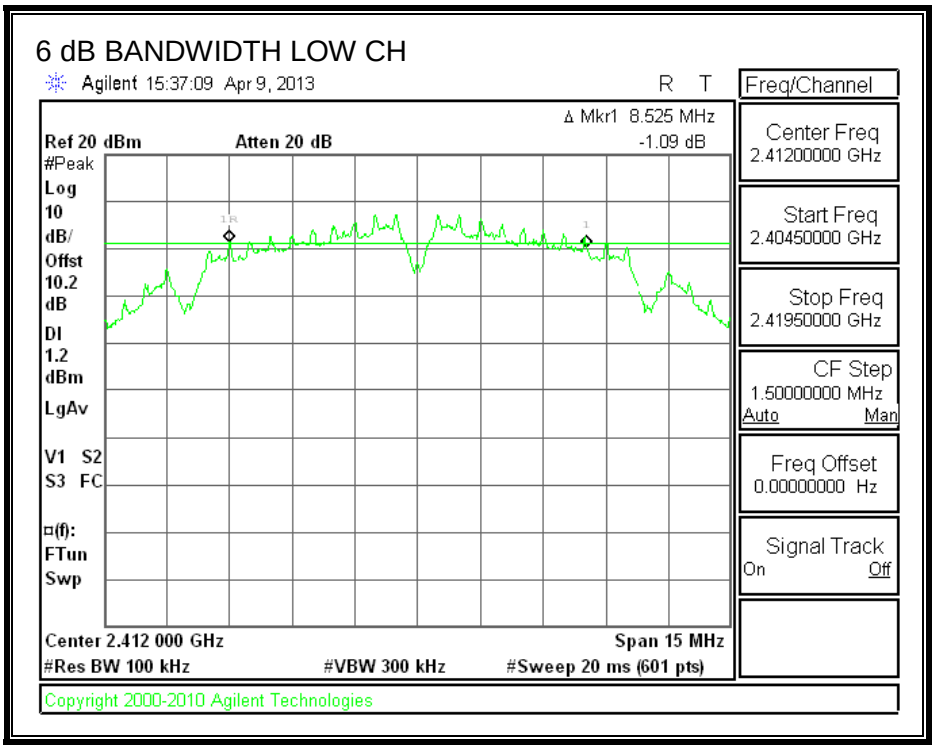
The transmitter output is connected to a spectrum analyzer with the RBW set between 1% and 5% of the EBW, the VBW >= 3 x RBW, peak detector and max hold.

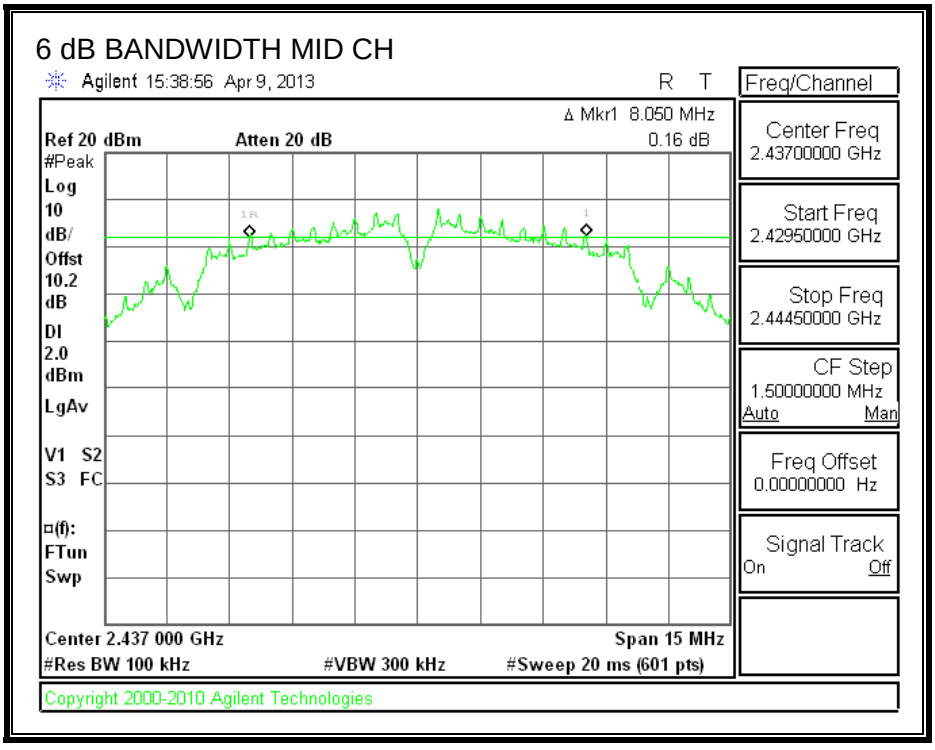
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.530	0.5
Mid	2437	8.050	0.5
High	2462	8.020	0.5

This report shall not be reproduced except in full, without the written approval of UL CCS.

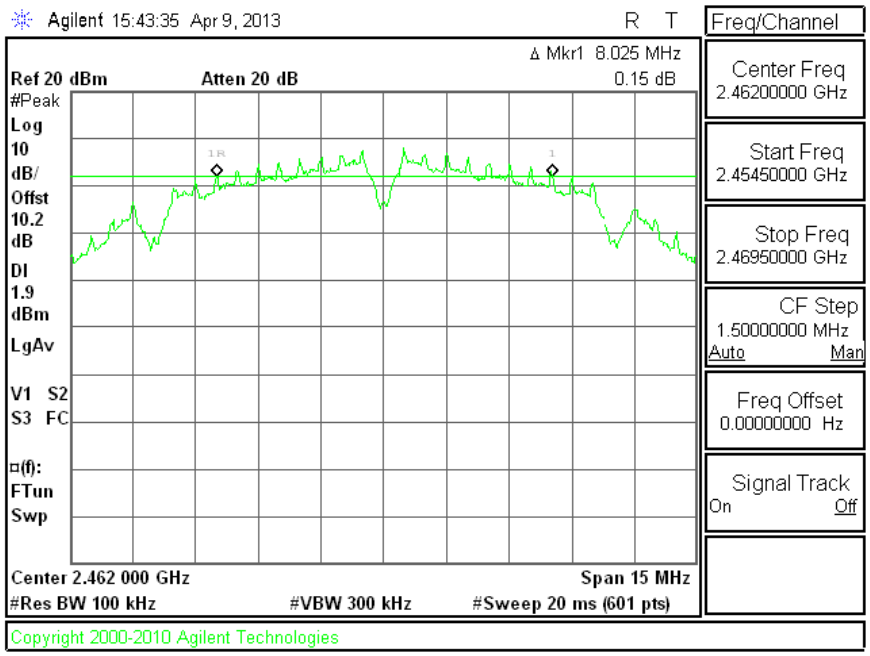
6 dB BANDWIDTH





This report shall not be reproduced except in full, without the written approval of UL CCS.

6 dB BANDWIDTH HIGH CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.1.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.7 dB (including 11 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	15.18
Mid	2437	15.40
High	2462	15.70

This report shall not be reproduced except in full, without the written approval of UL CCS.

8.1.3. 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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

RESULTS

Limits

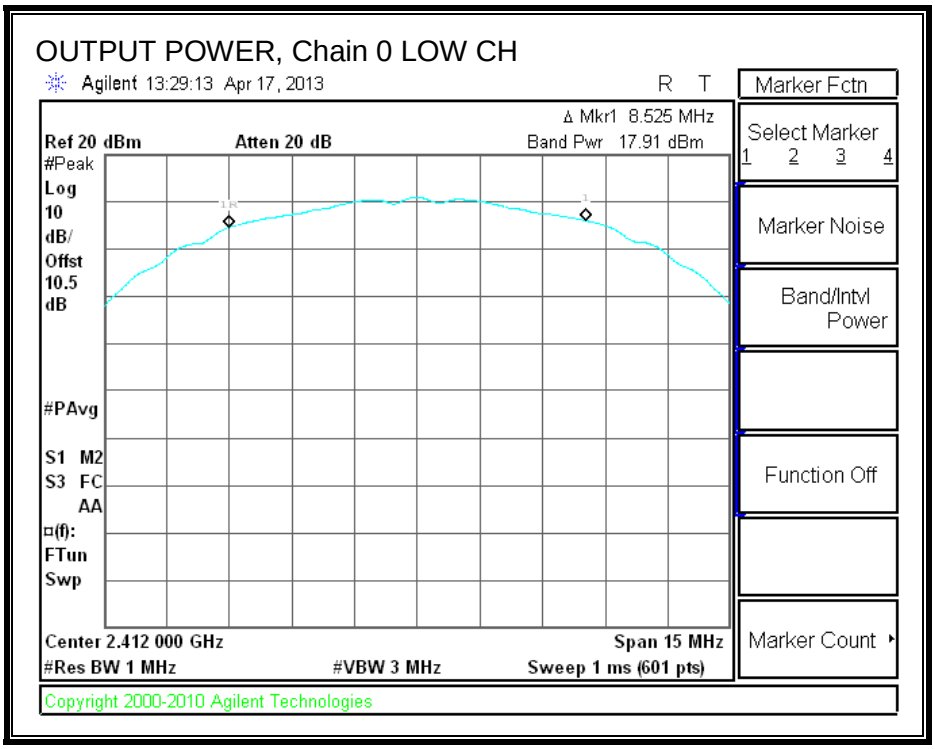
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-5.00	30.00	30	36	30.00
Mid	2437	-5.00	30.00	30	36	30.00
High	2462	-5.00	30.00	30	36	30.00

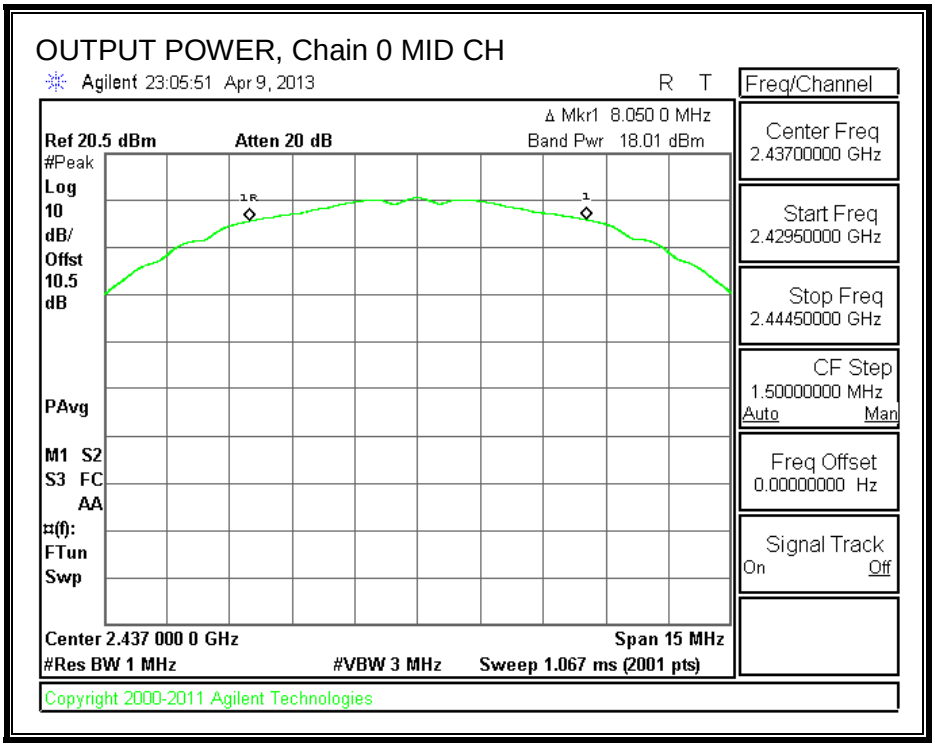
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	17.91	17.91	30.00	-12.09
Mid	2437	18.00	18.00	30.00	-12.00
High	2462	18.10	18.10	30.00	-11.90

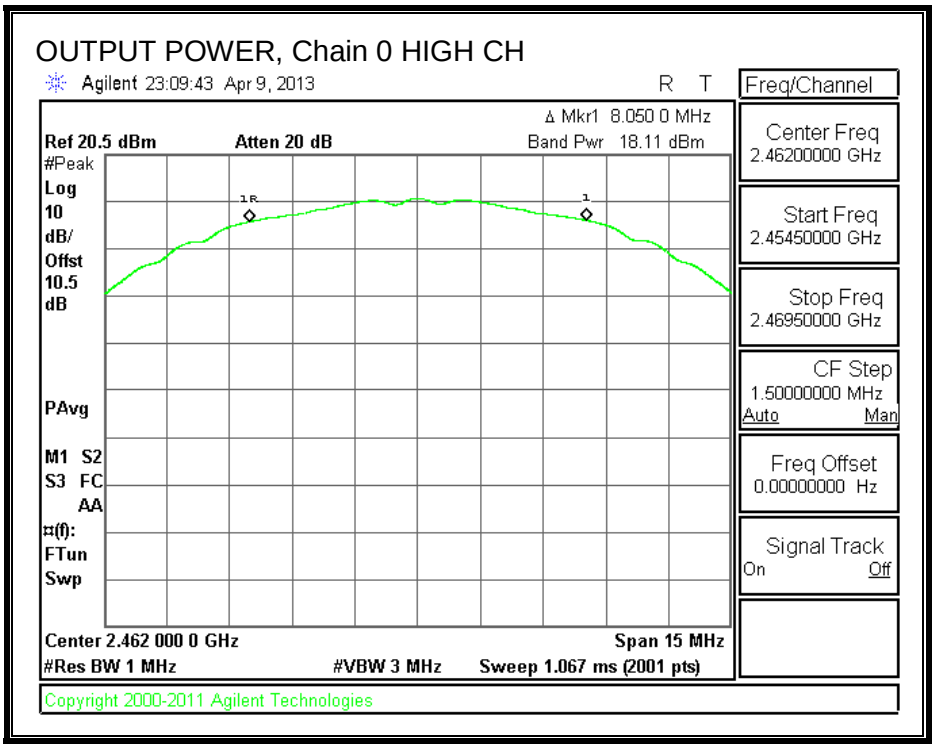
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUTPUT POWER, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.1.4. 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.

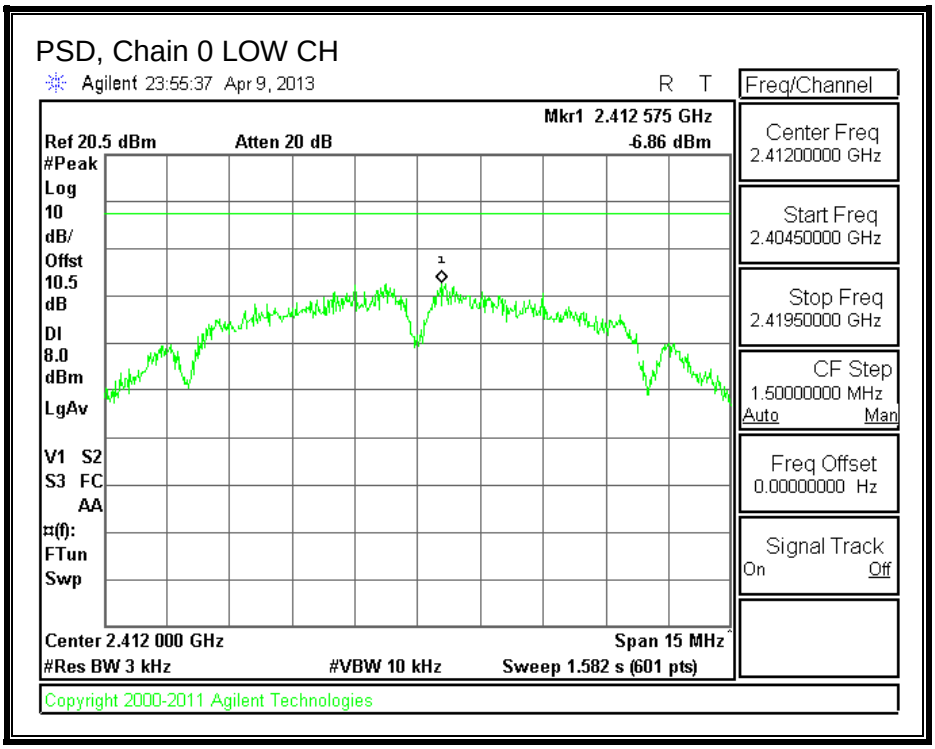
RESULTS

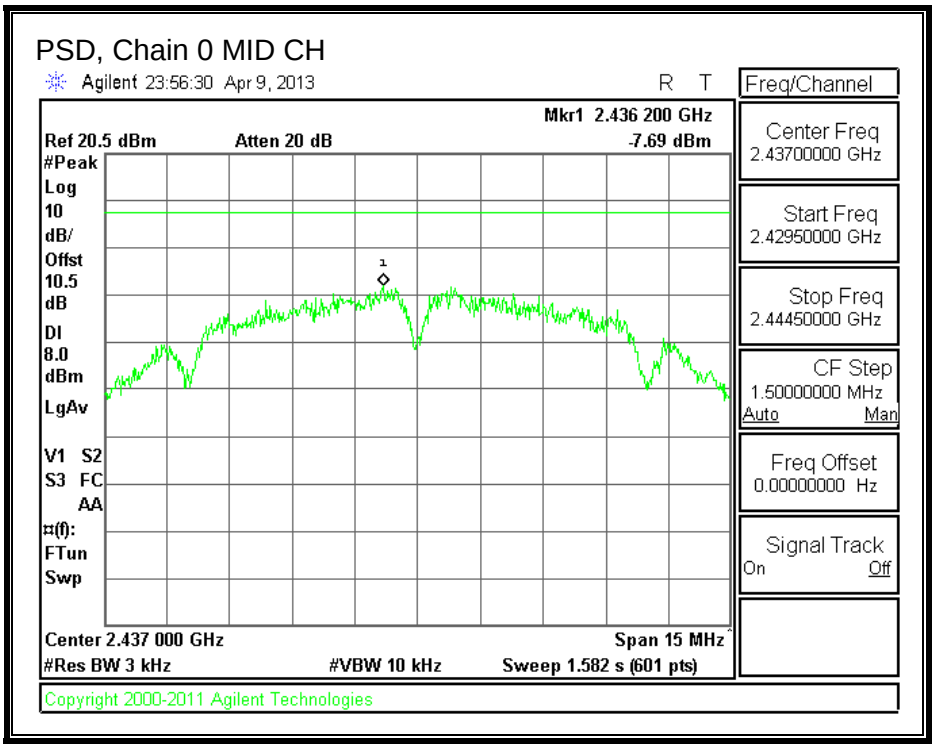
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.86	8.0	-14.9
Mid	2437	-7.69	8.0	-15.7
High	2462	-6.43	8.0	-14.4

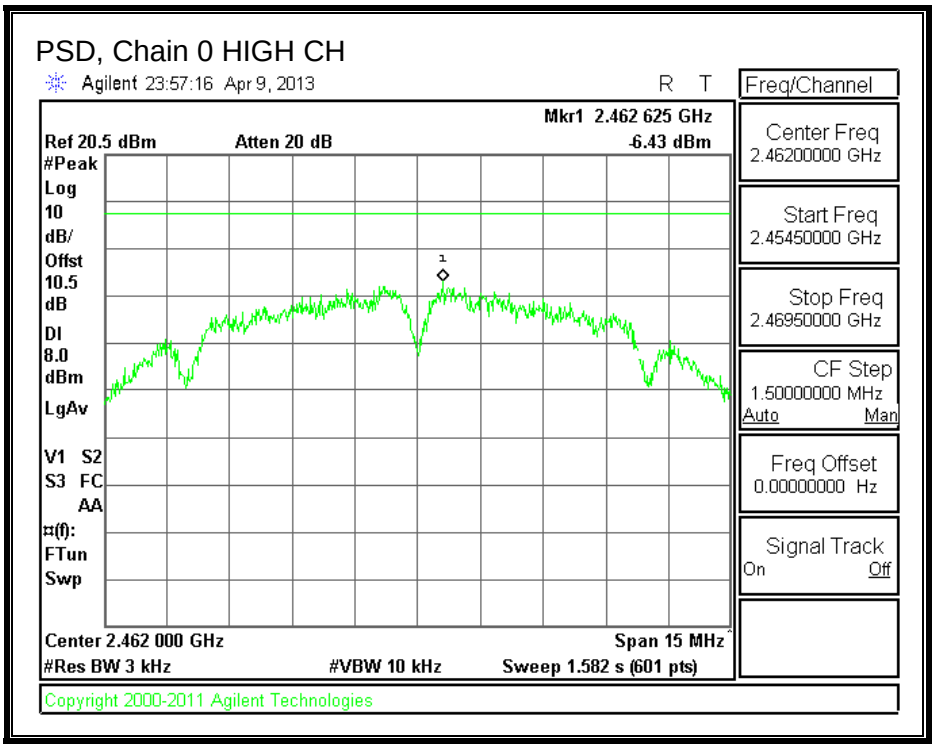
This report shall not be reproduced except in full, without the written approval of UL CCS.

PSD, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.1.5. 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.

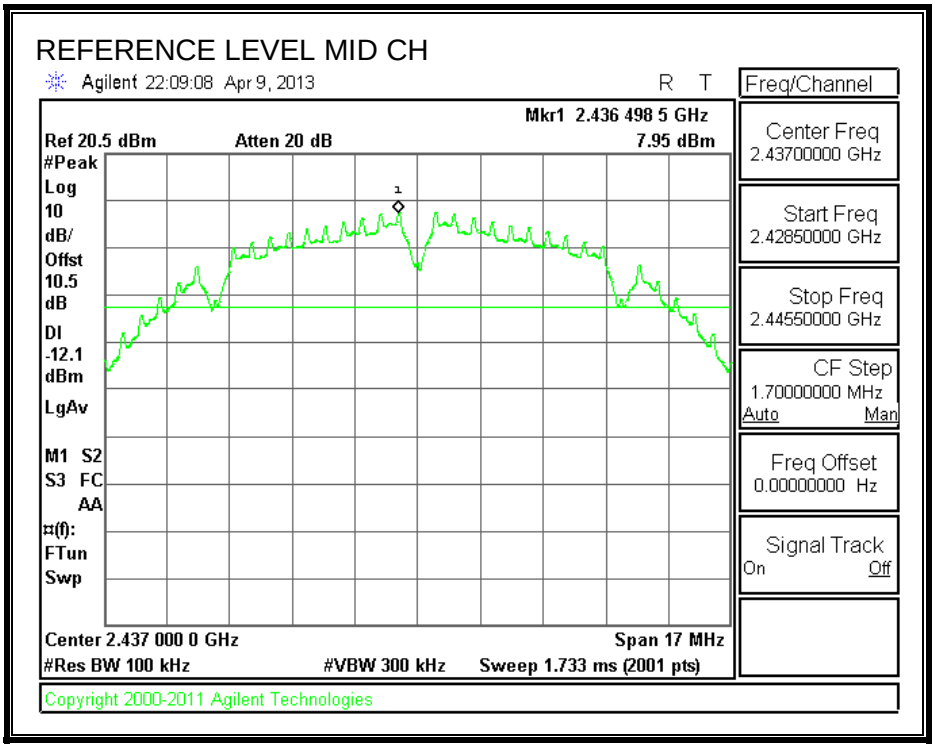
TEST PROCEDURE

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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

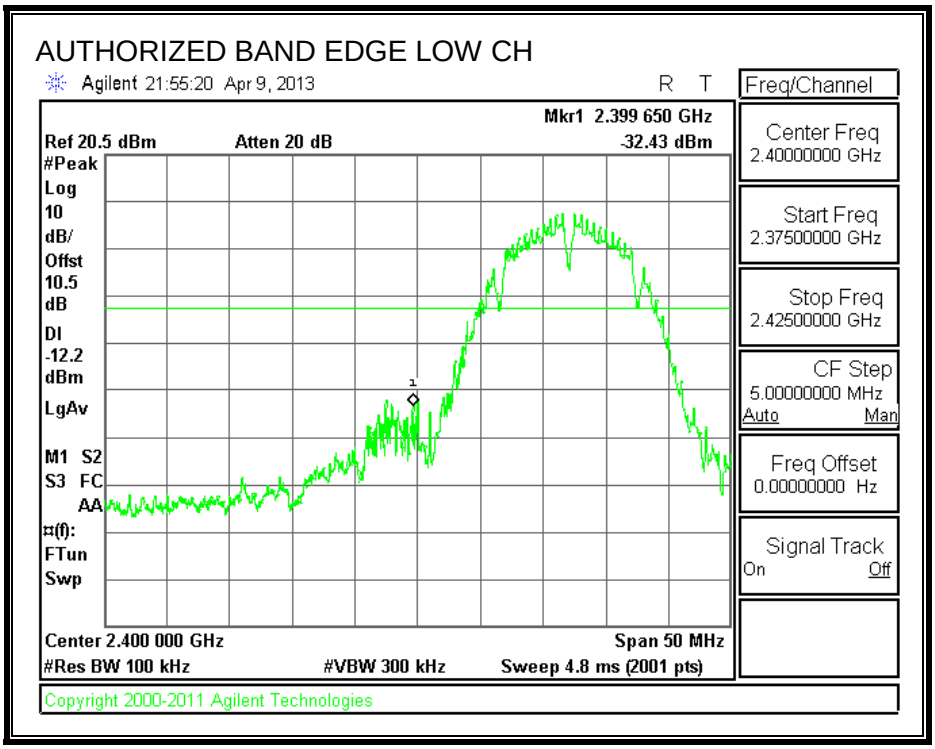
RESULTS

IN-BAND REFERENCE LEVEL

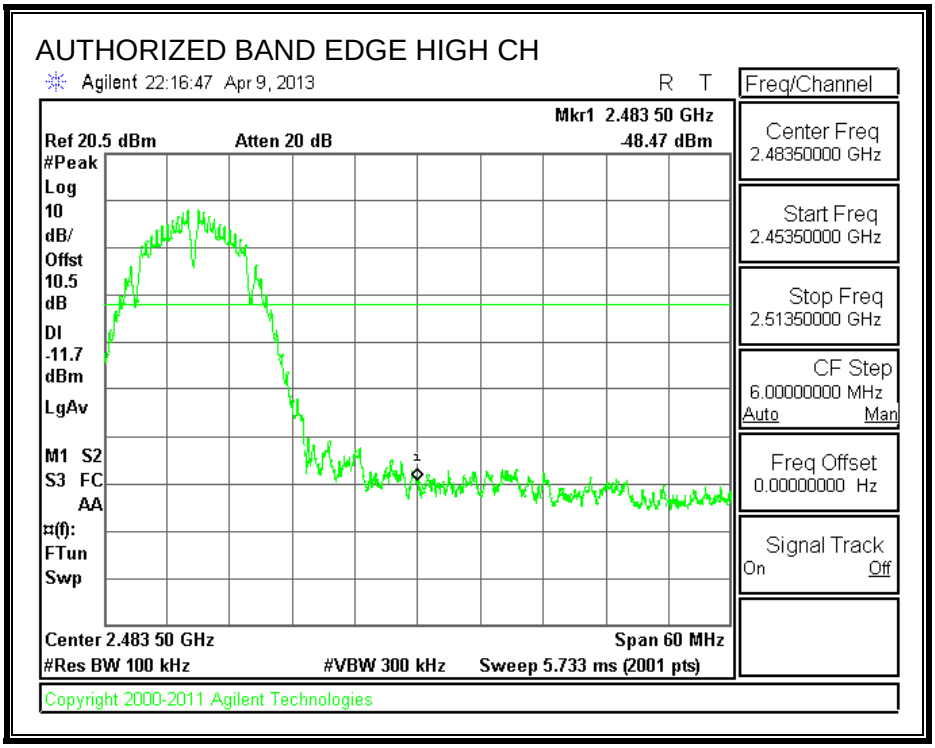


This report shall not be reproduced except in full, without the written approval of UL CCS.

LOW CHANNEL BANDEDGE



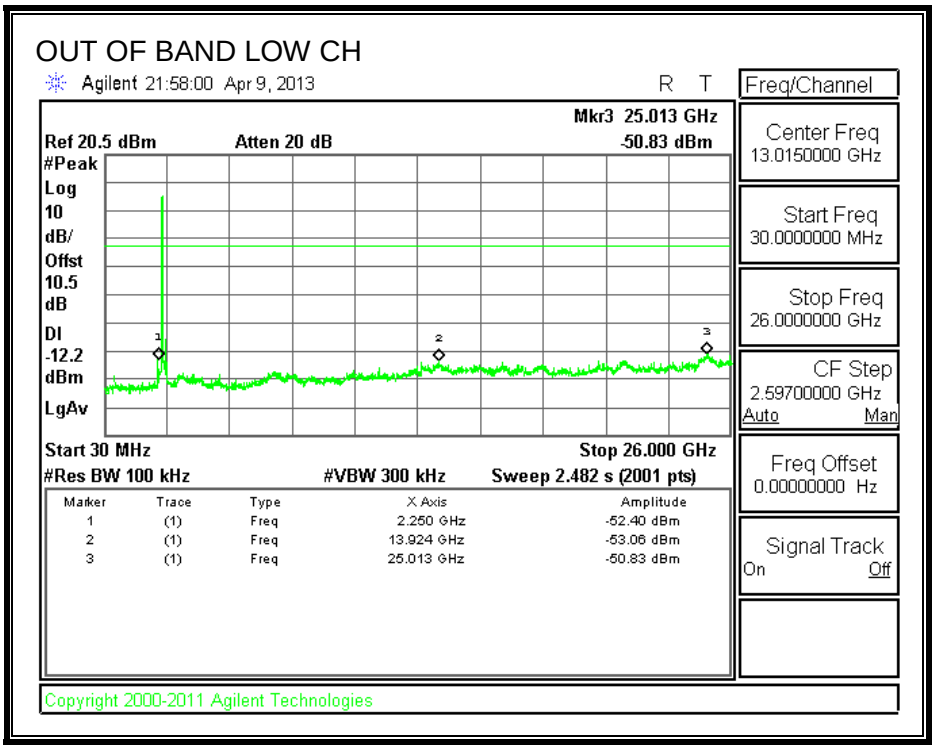
HIGH CHANNEL BANDEDGE



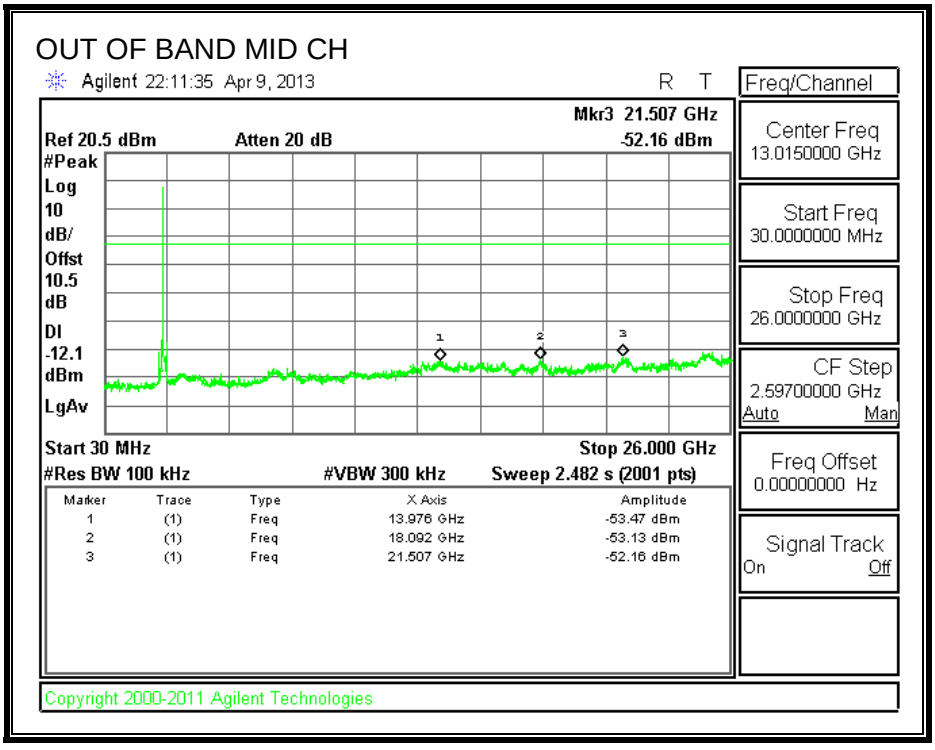
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT-OF-BAND EMISSIONS

OUT OF BAND LOW CH

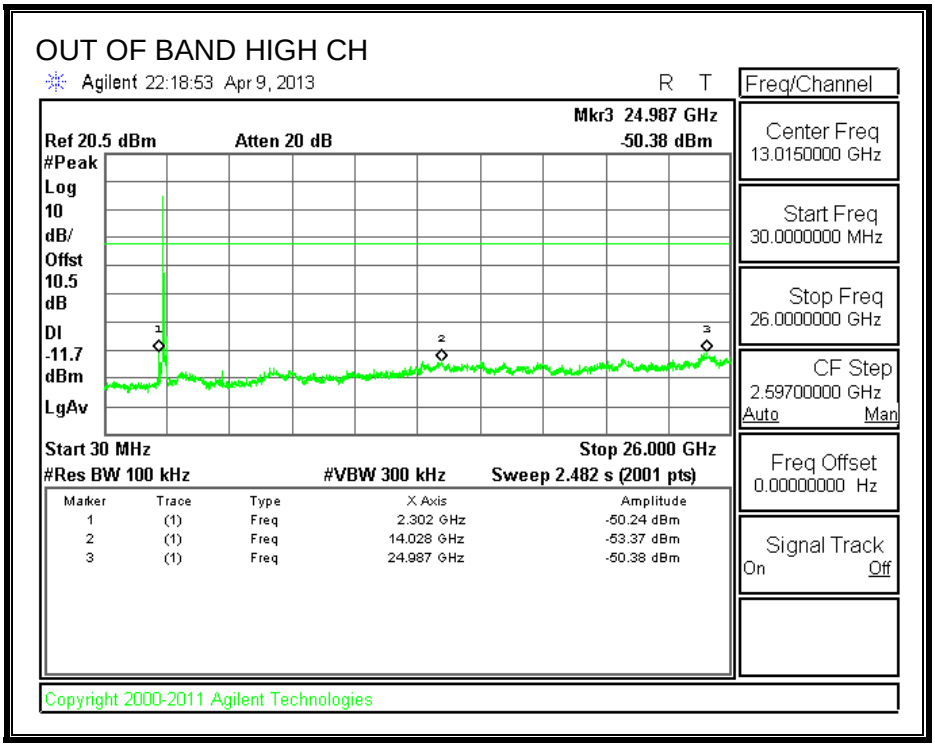


OUT OF BAND MID CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT OF BAND HIGH CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.2. 802.11g MODE IN THE 2.4 GHz BAND

8.2.1. 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

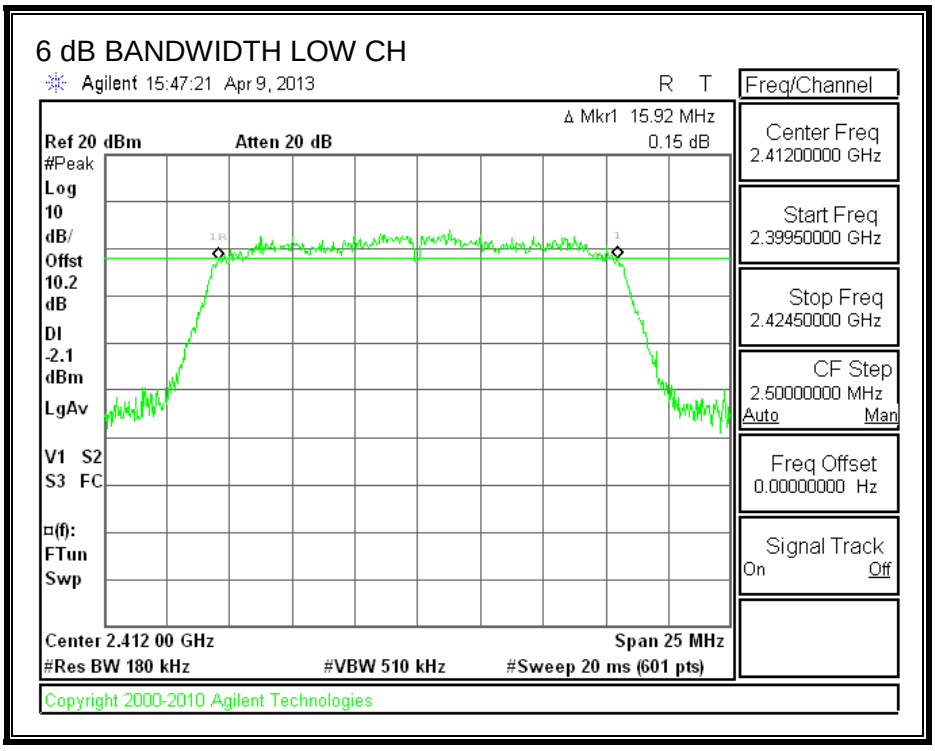
The transmitter output is connected to a spectrum analyzer with the RBW set between 1% and 5% of the EBW, the VBW >= 3 x RBW, peak detector and max hold.

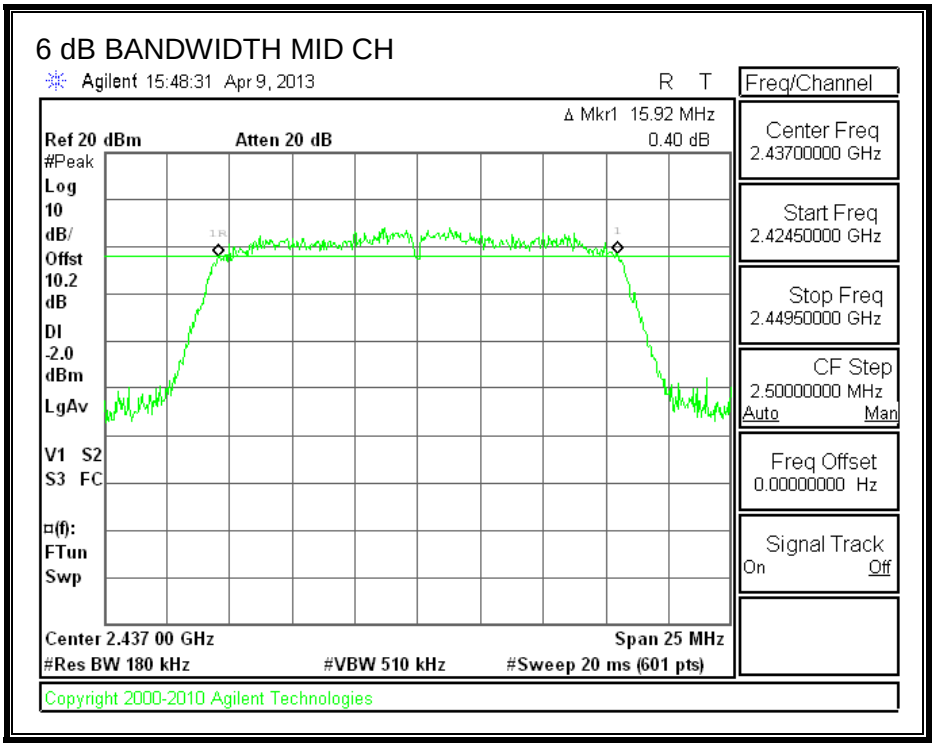
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.920	0.5
Mid	2437	15.920	0.5
High	2462	15.920	0.5

This report shall not be reproduced except in full, without the written approval of UL CCS.

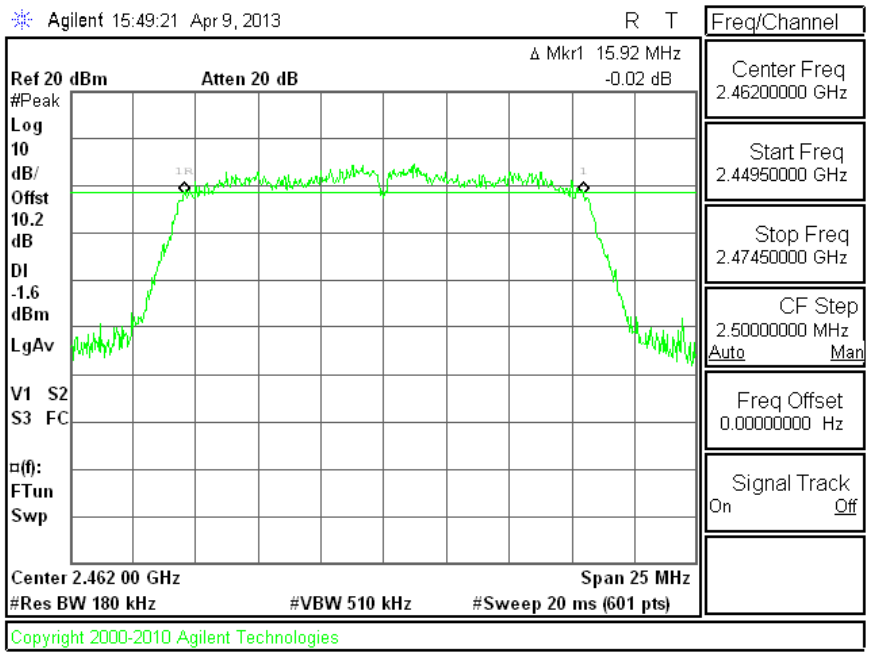
6 dB BANDWIDTH





This report shall not be reproduced except in full, without the written approval of UL CCS.

6 dB BANDWIDTH HIGH CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.2.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.7 dB (including 11 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.62
Mid	2437	12.97
High	2462	13.14

This report shall not be reproduced except in full, without the written approval of UL CCS.

8.2.3. 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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

RESULTS

Limits

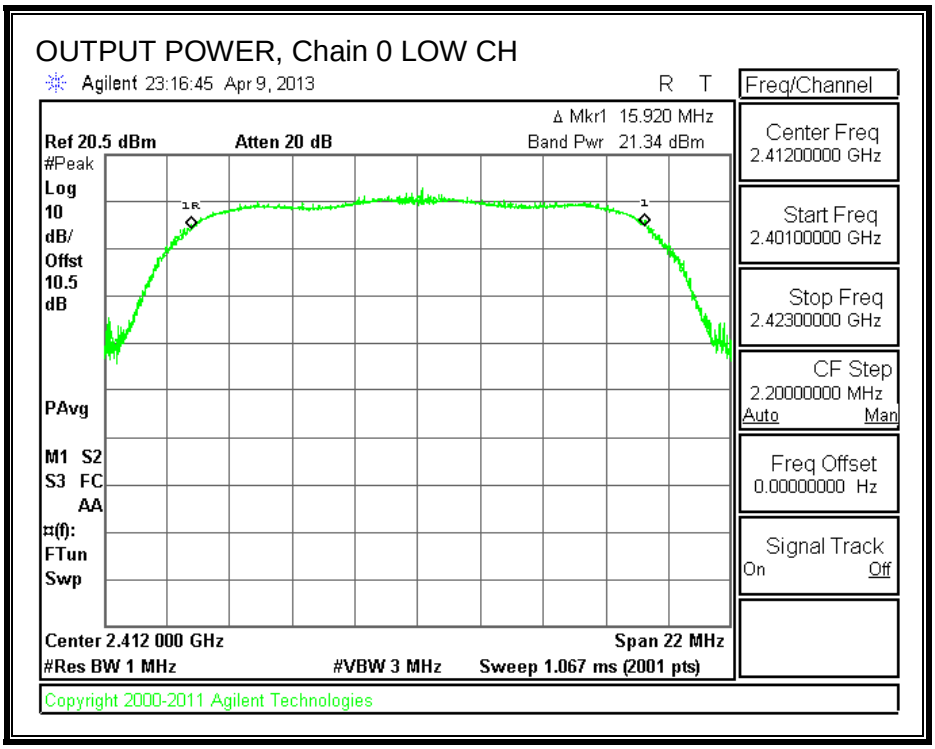
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-5.00	30.00	30	36	30.00
Mid	2437	-5.00	30.00	30	36	30.00
High	2462	-5.00	30.00	30	36	30.00

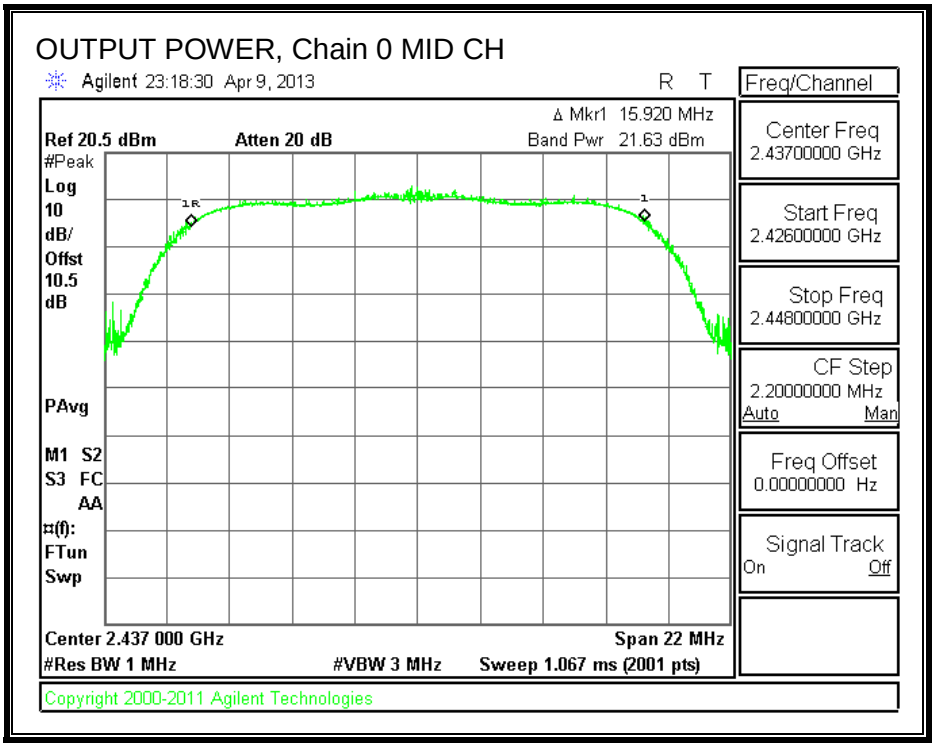
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	21.34	21.34	30.00	-8.66
Mid	2437	21.63	21.63	30.00	-8.37
High	2462	21.96	21.96	30.00	-8.04

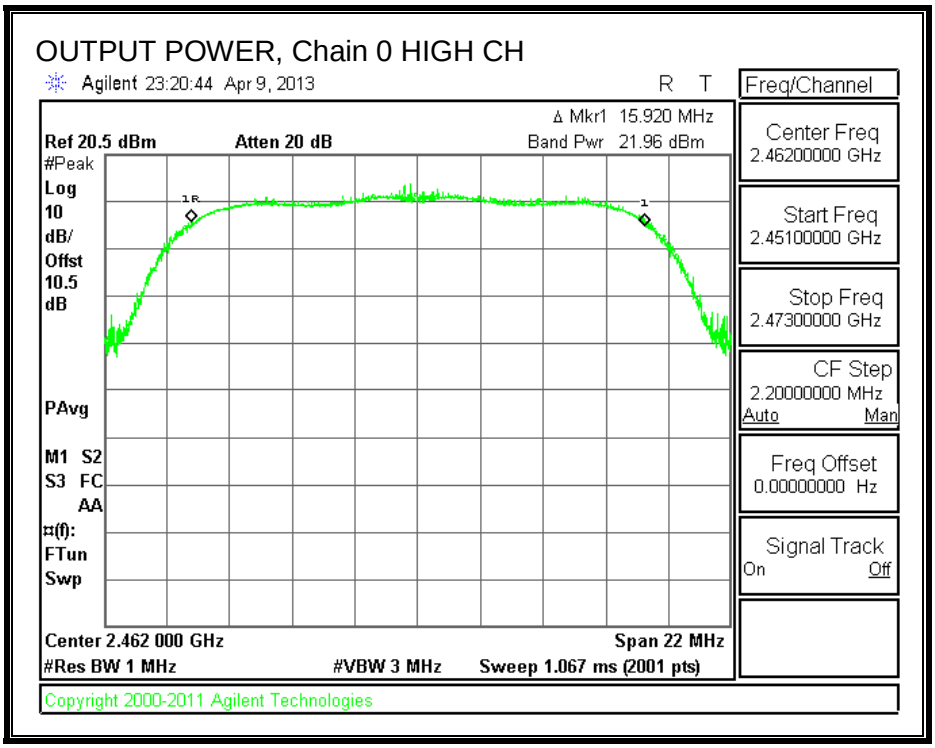
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUTPUT POWER, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.2.4. 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.

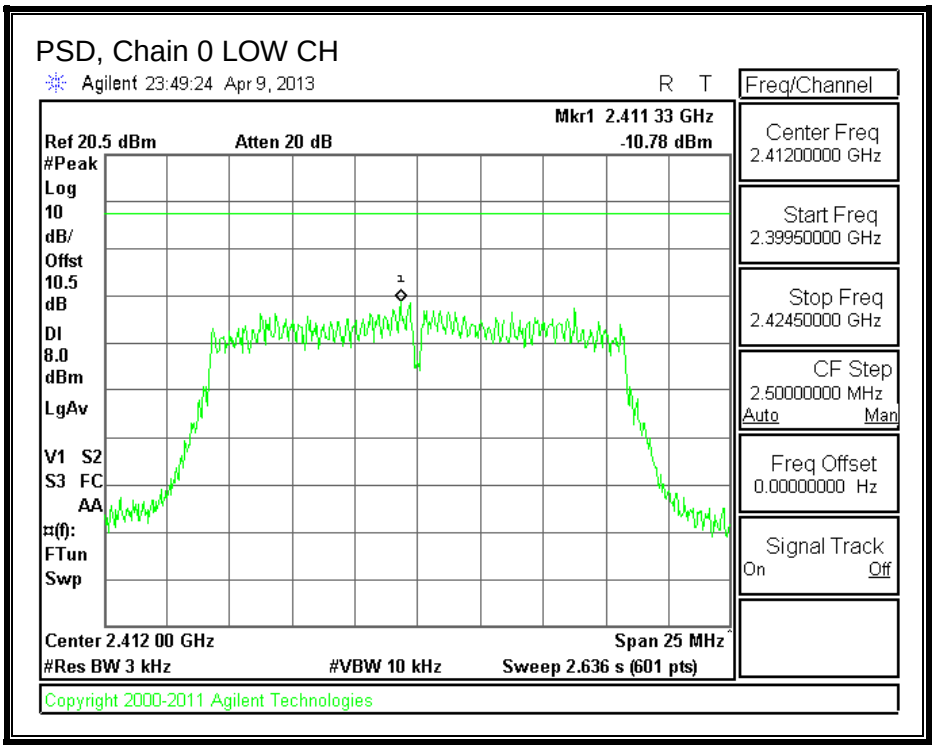
RESULTS

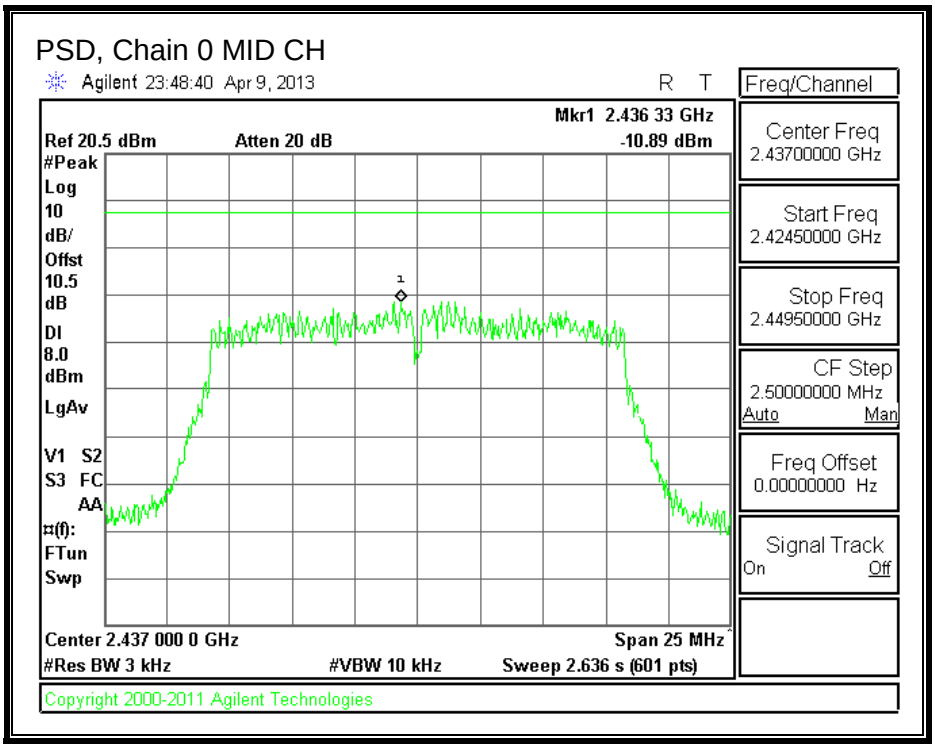
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-10.78	8.0	-18.8
Mid	2437	-10.89	8.0	-18.9
High	2462	-10.28	8.0	-18.3

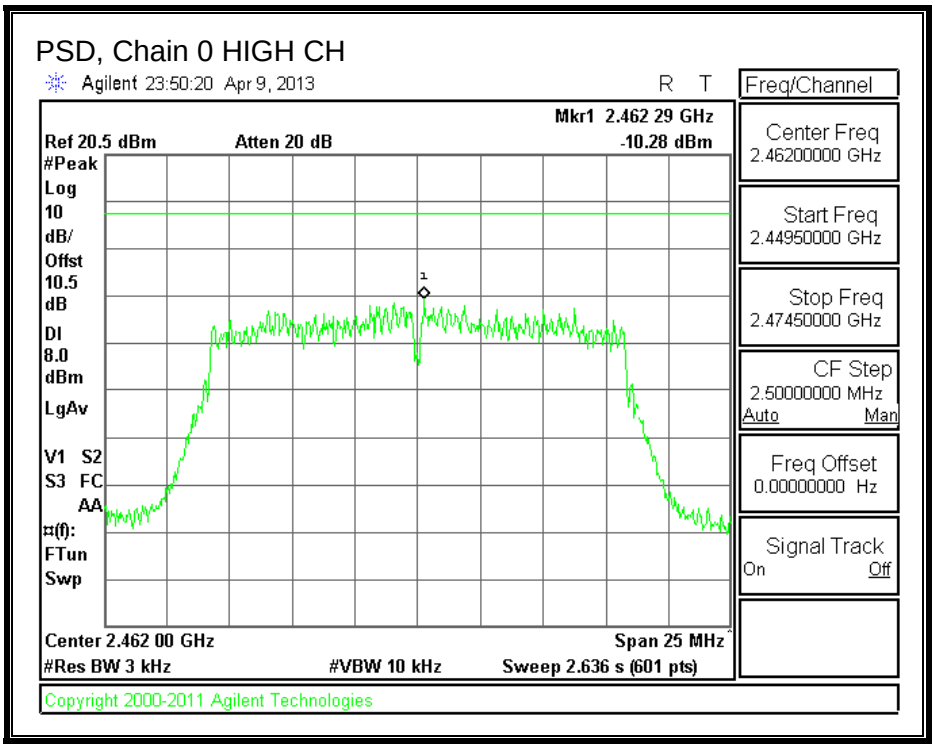
This report shall not be reproduced except in full, without the written approval of UL CCS.

PSD, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.2.5. 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.

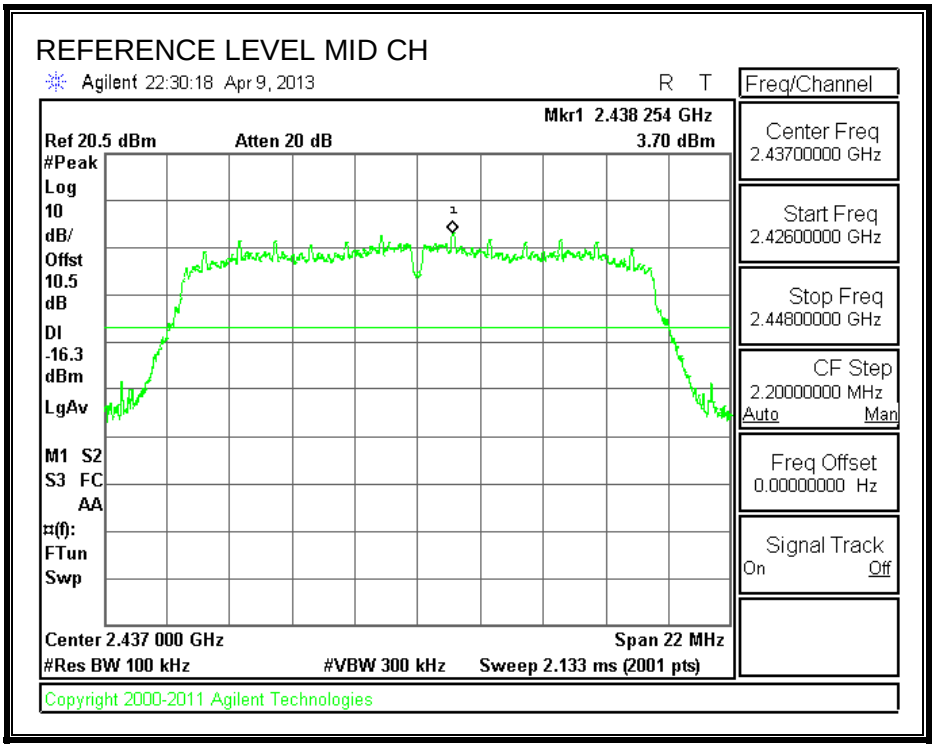
TEST PROCEDURE

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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

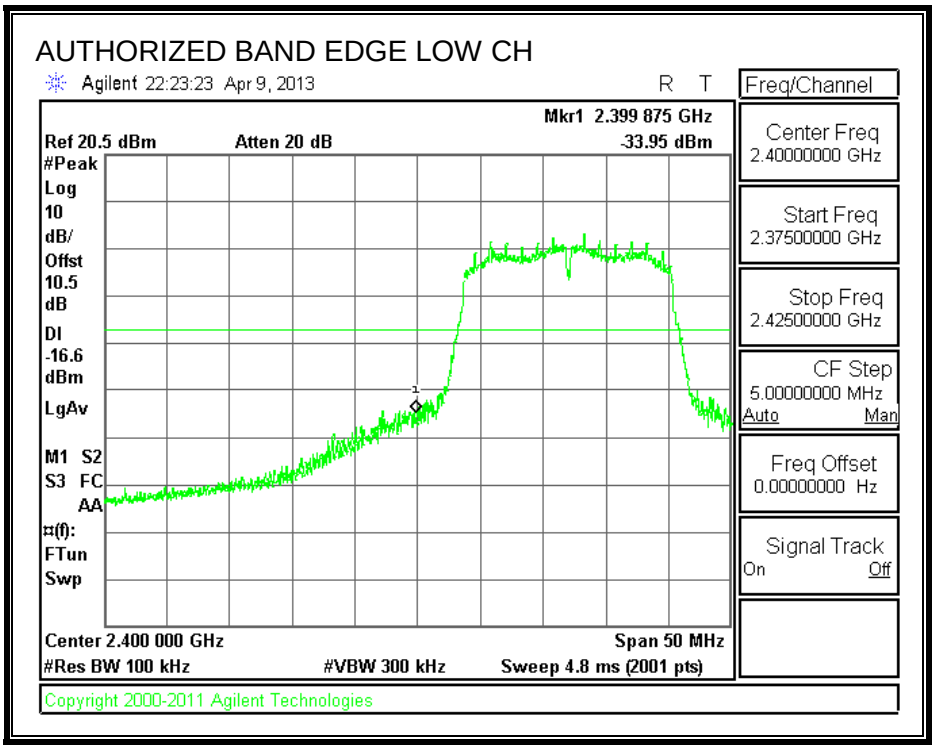
RESULTS

IN-BAND REFERENCE LEVEL

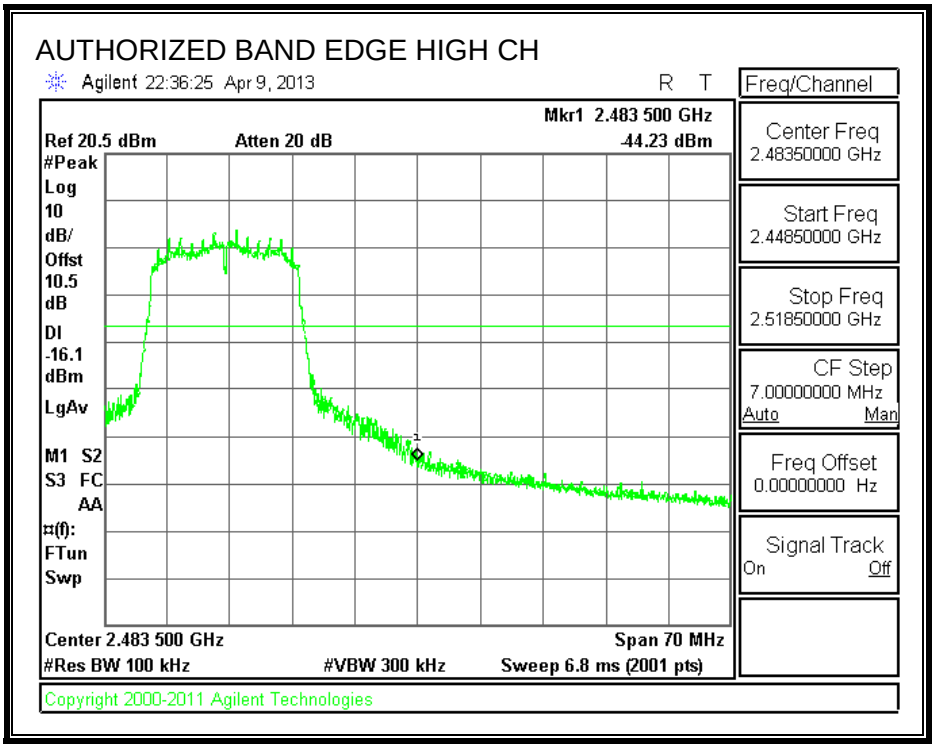


This report shall not be reproduced except in full, without the written approval of UL CCS.

LOW CHANNEL BANDEDGE



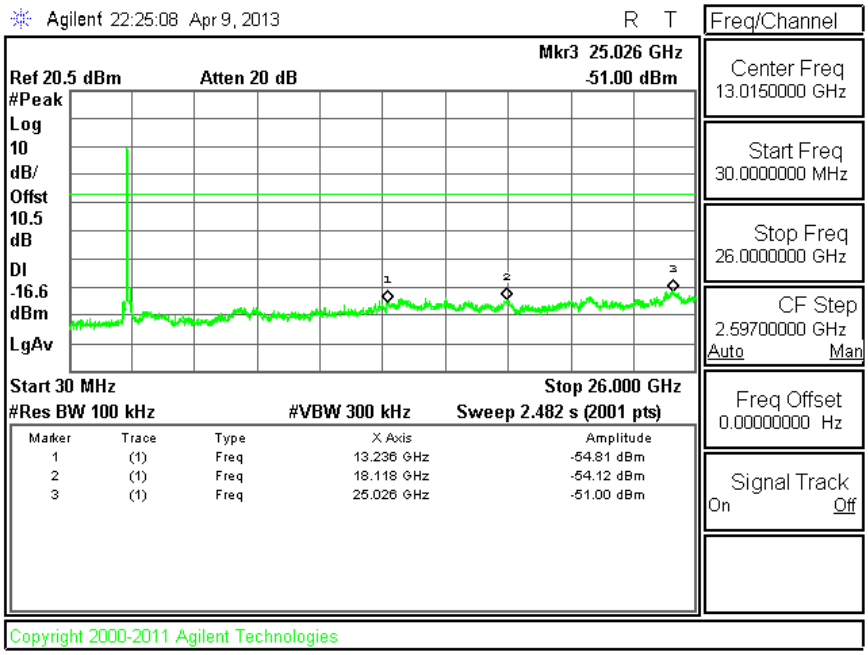
HIGH CHANNEL BANDEDGE



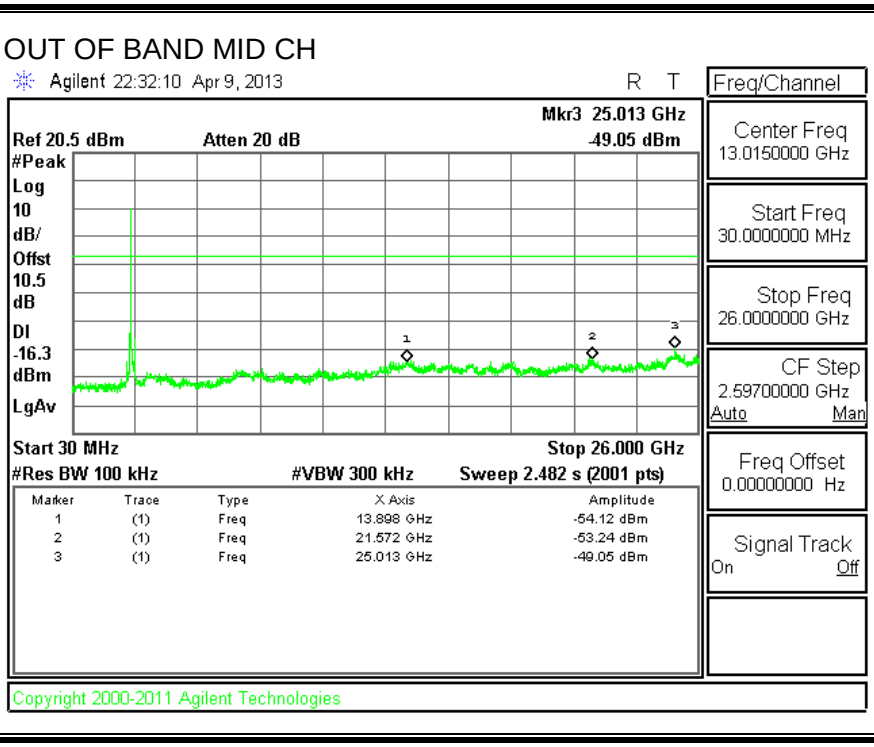
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT-OF-BAND EMISSIONS

OUT OF BAND LOW CH

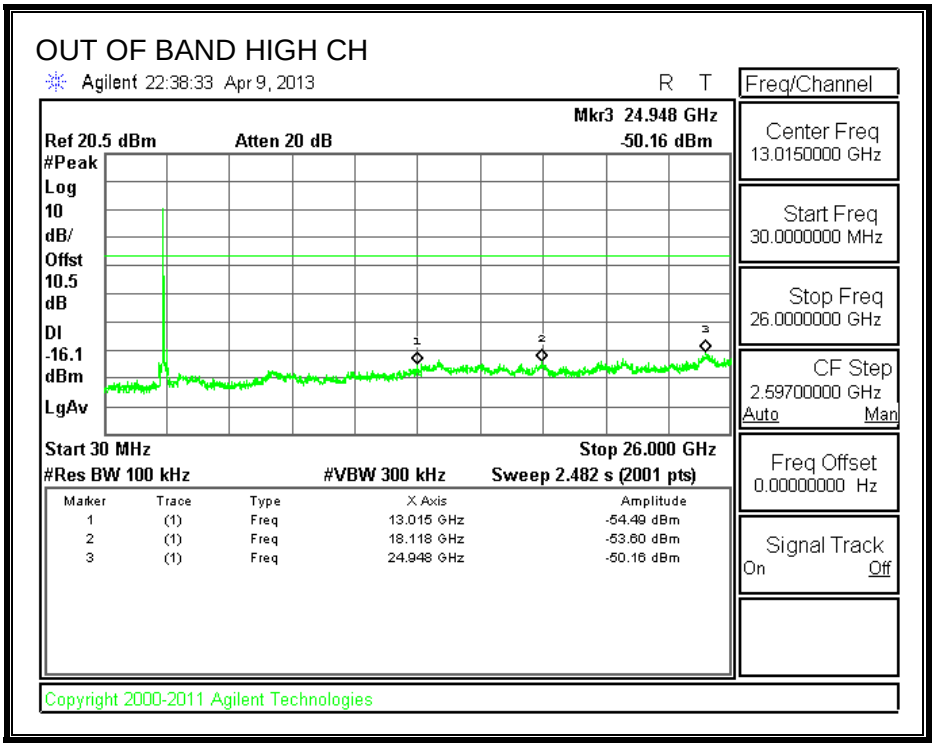


OUT OF BAND MID CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT OF BAND HIGH CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

8.3.1. 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

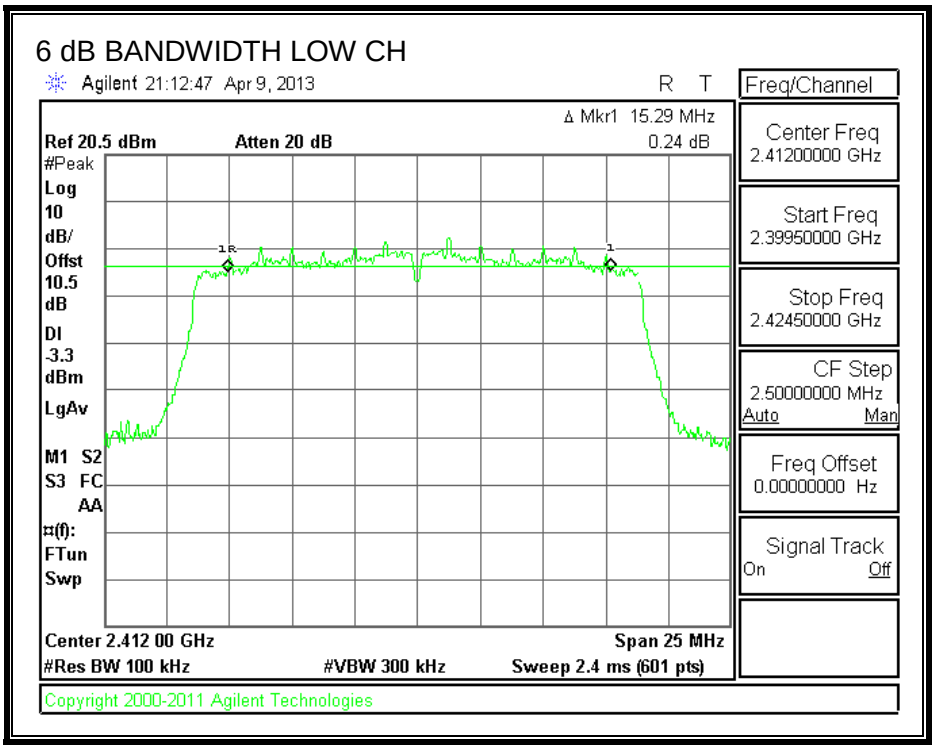
The transmitter output is connected to a spectrum analyzer with the RBW set between 1% and 5% of the EBW, the VBW >= 3 x RBW, peak detector and max hold.

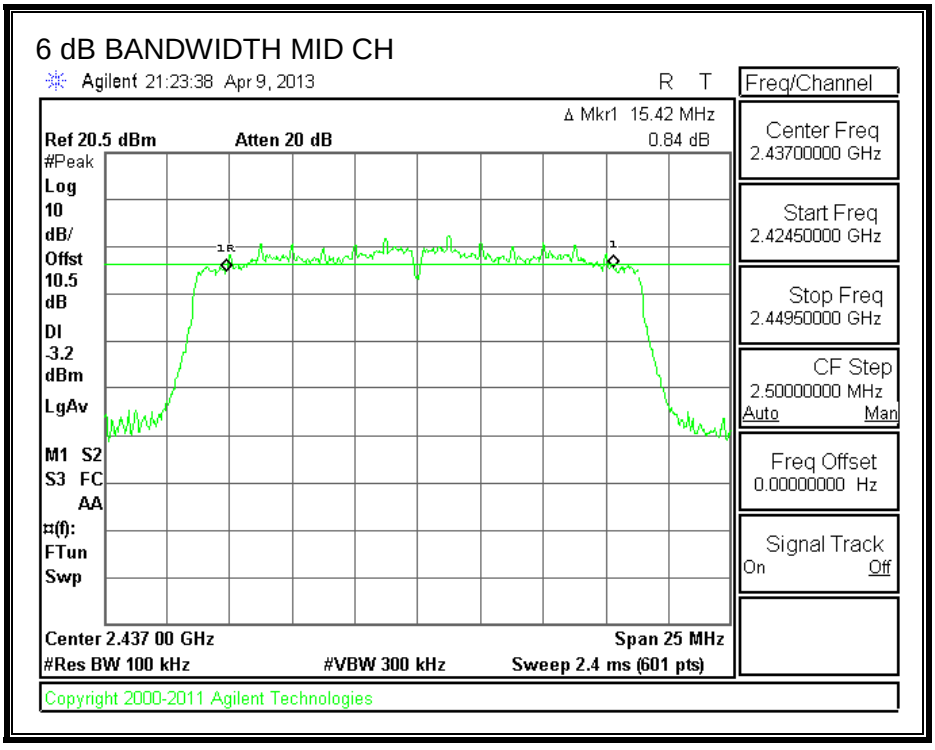
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.290	0.5
Mid	2437	15.420	0.5
High	2462	15.210	0.5

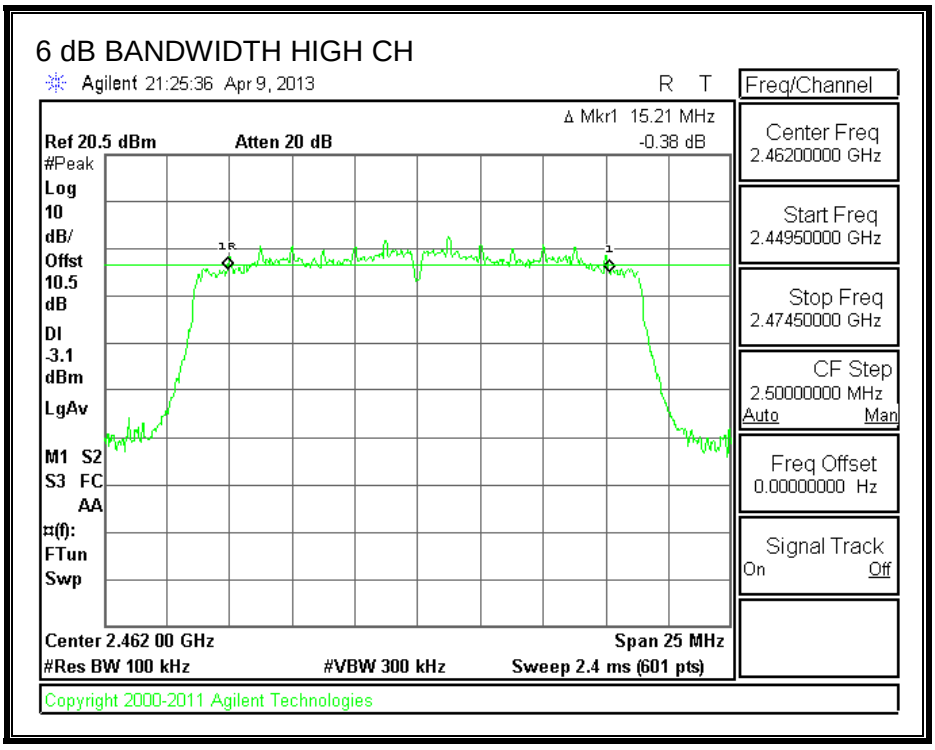
This report shall not be reproduced except in full, without the written approval of UL CCS.

6 dB BANDWIDTH





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3.2. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.7 dB (including 11 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	2412	11.42
Mid	2437	11.69
High	2462	11.87

This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3.3. 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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

RESULTS

Limits

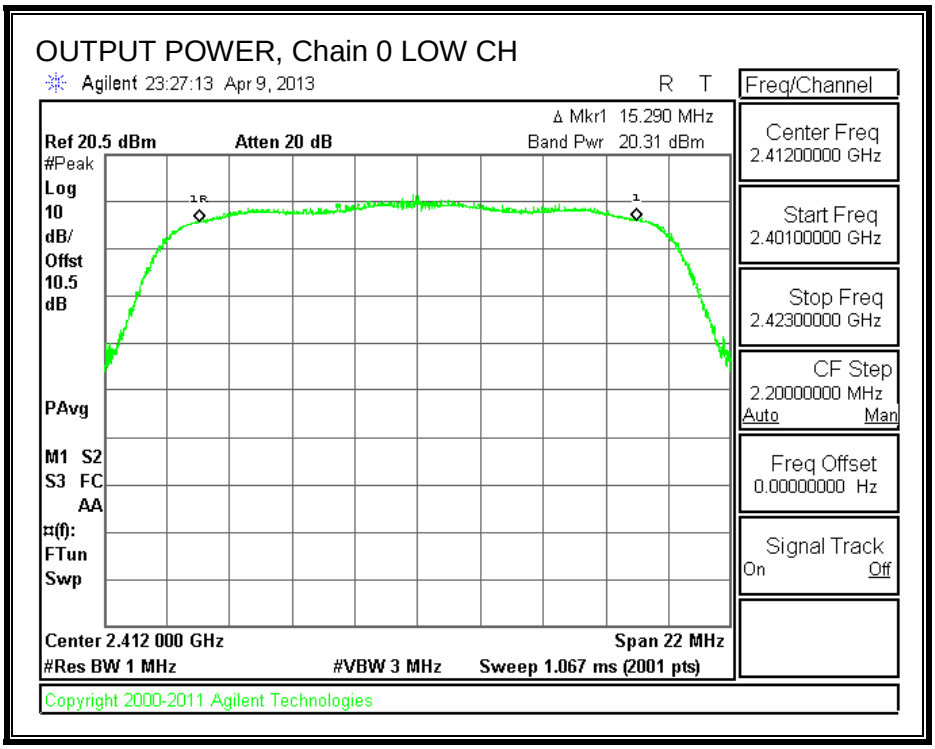
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	-5.00	30.00	30	36	30.00
Mid	2437	-5.00	30.00	30	36	30.00
High	2462	-5.00	30.00	30	36	30.00

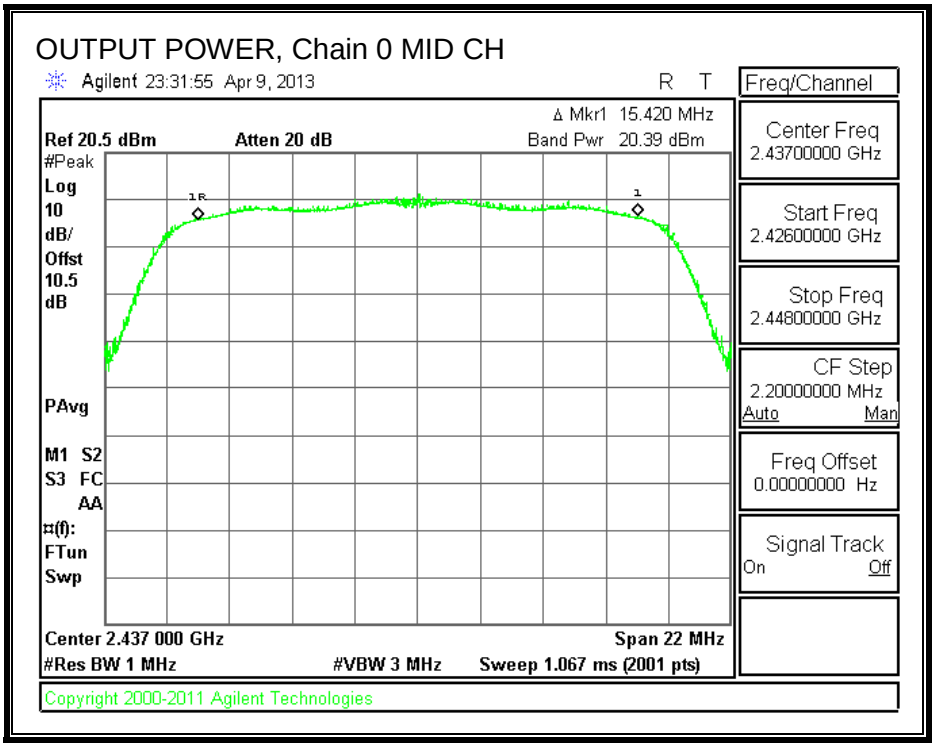
Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	20.31	20.31	30.00	-9.69
Mid	2437	20.39	20.39	30.00	-9.61
High	2462	20.66	20.66	30.00	-9.34

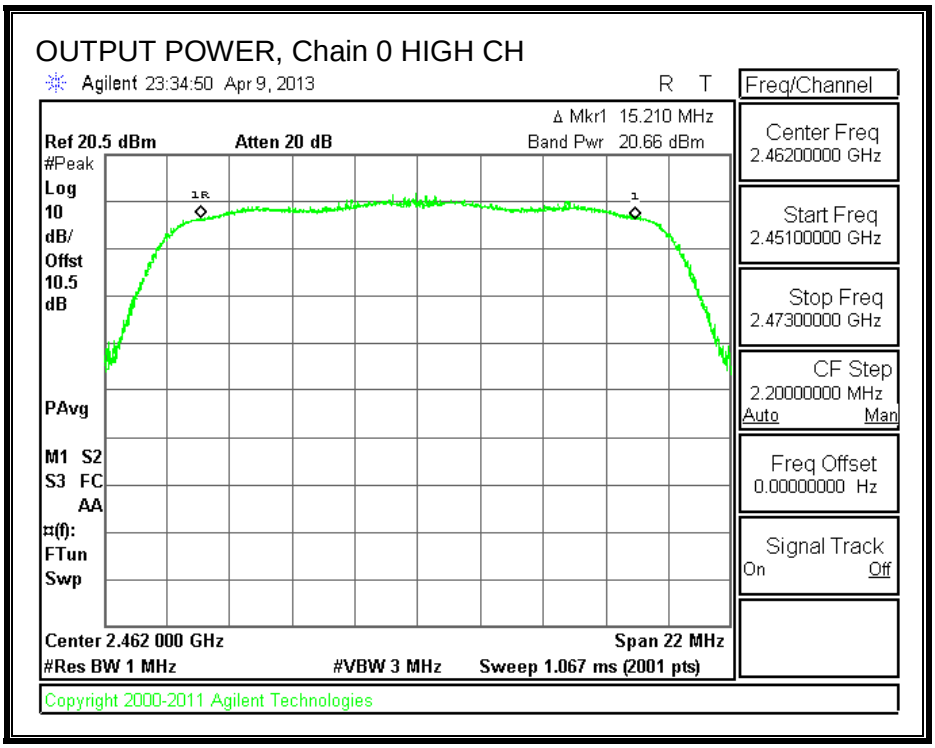
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUTPUT POWER, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3.4. 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.

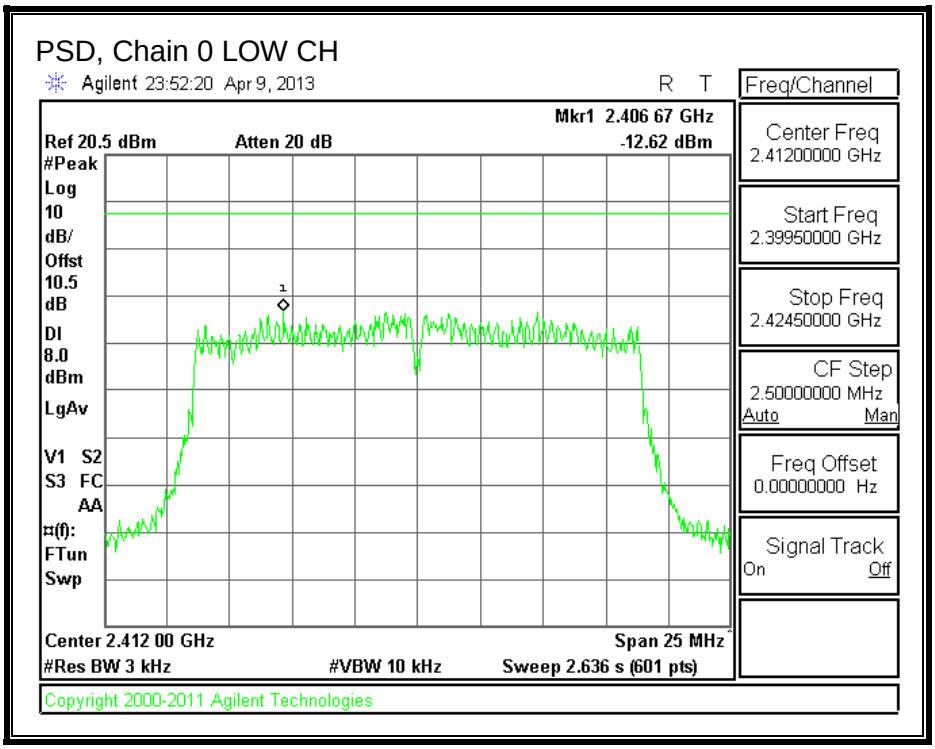
RESULTS

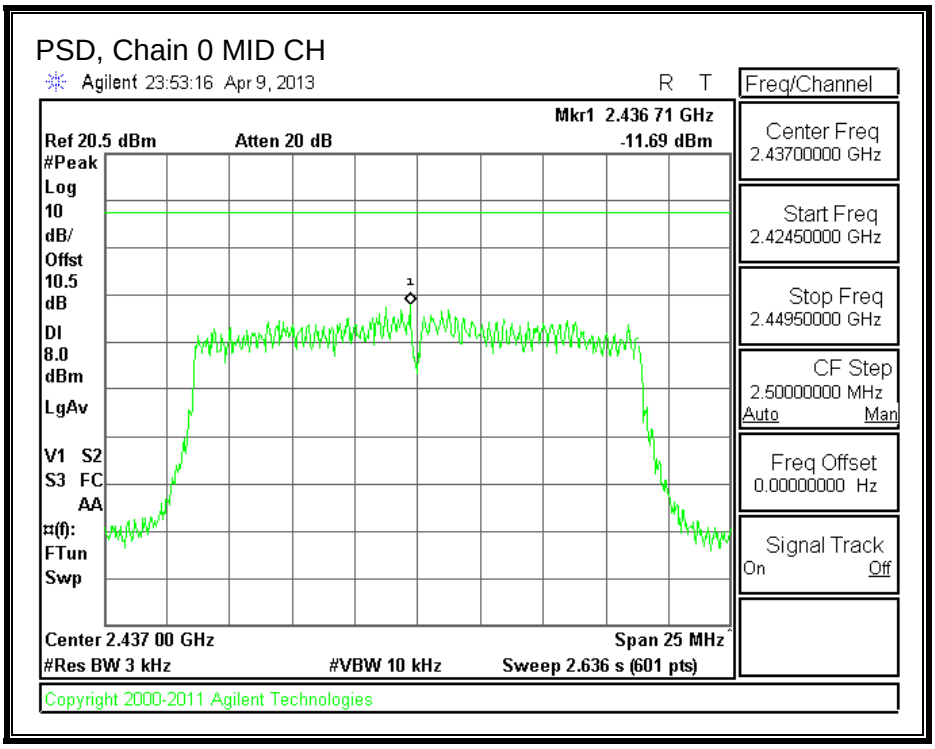
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.62	8.0	-20.6
Mid	2437	-11.69	8.0	-19.7
High	2462	-12.08	8.0	-20.1

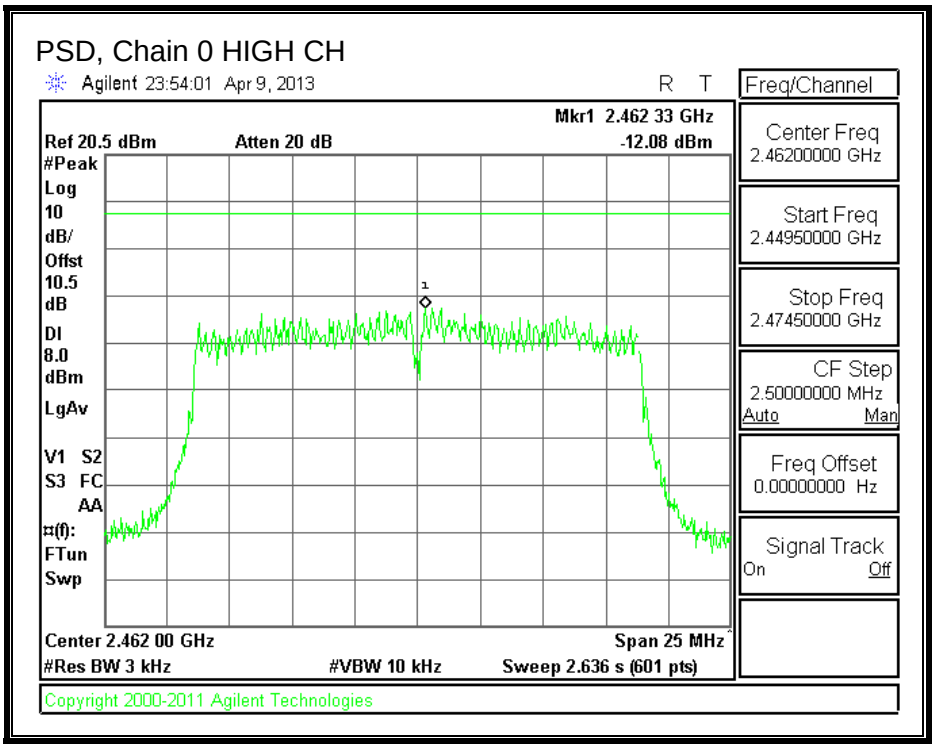
This report shall not be reproduced except in full, without the written approval of UL CCS.

PSD, Chain 0





This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

8.3.5. 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.

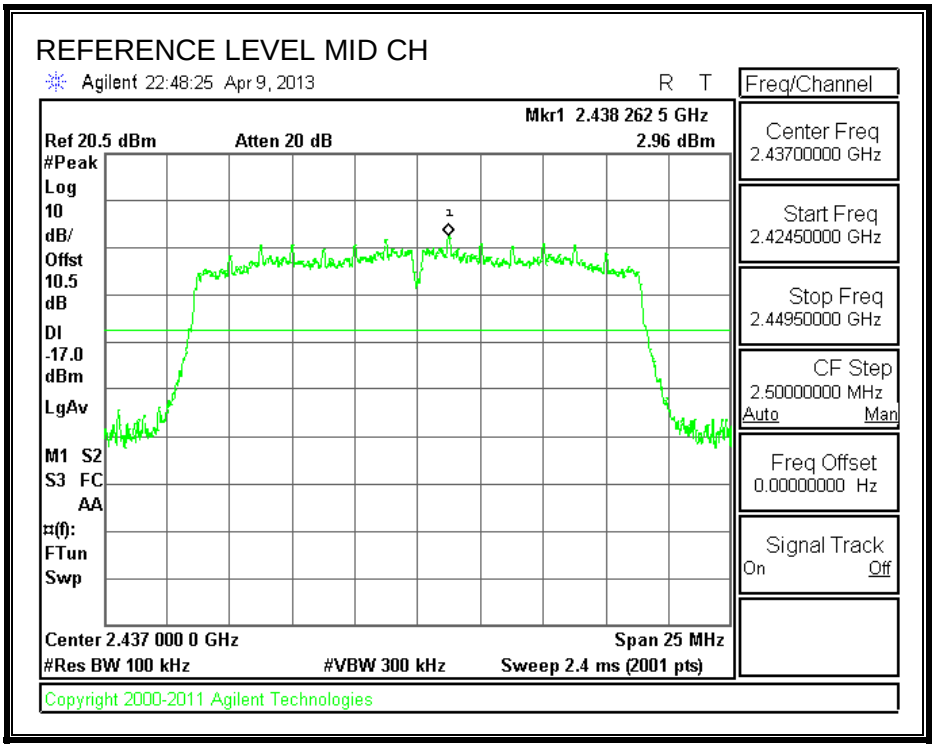
TEST PROCEDURE

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.

This report shall not be reproduced except in full, without the written approval of UL CCS.

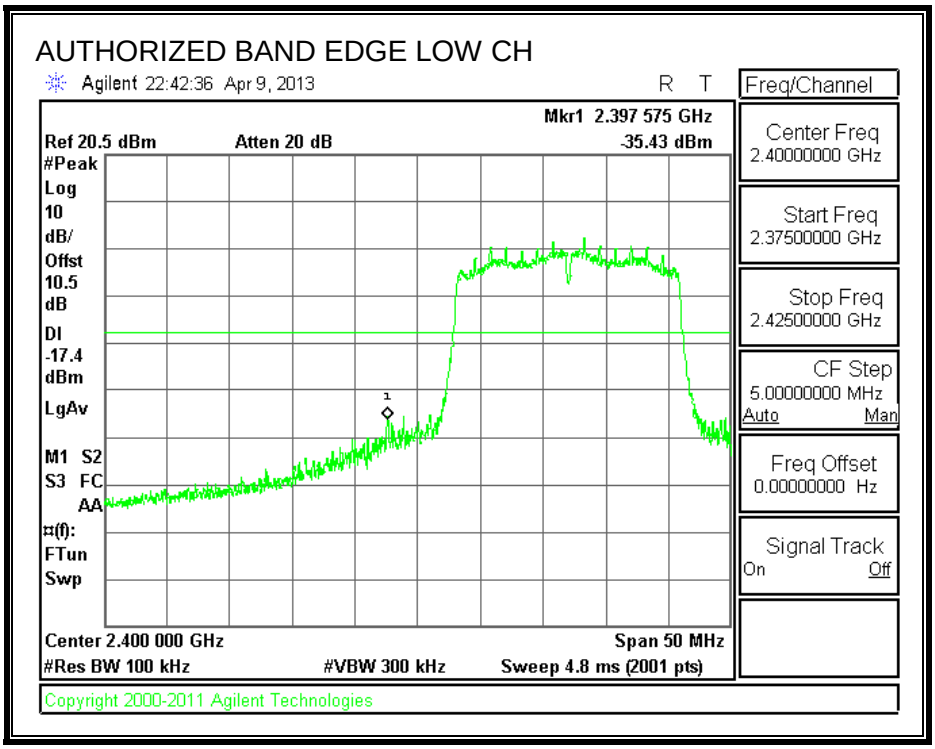
RESULTS

IN-BAND REFERENCE LEVEL

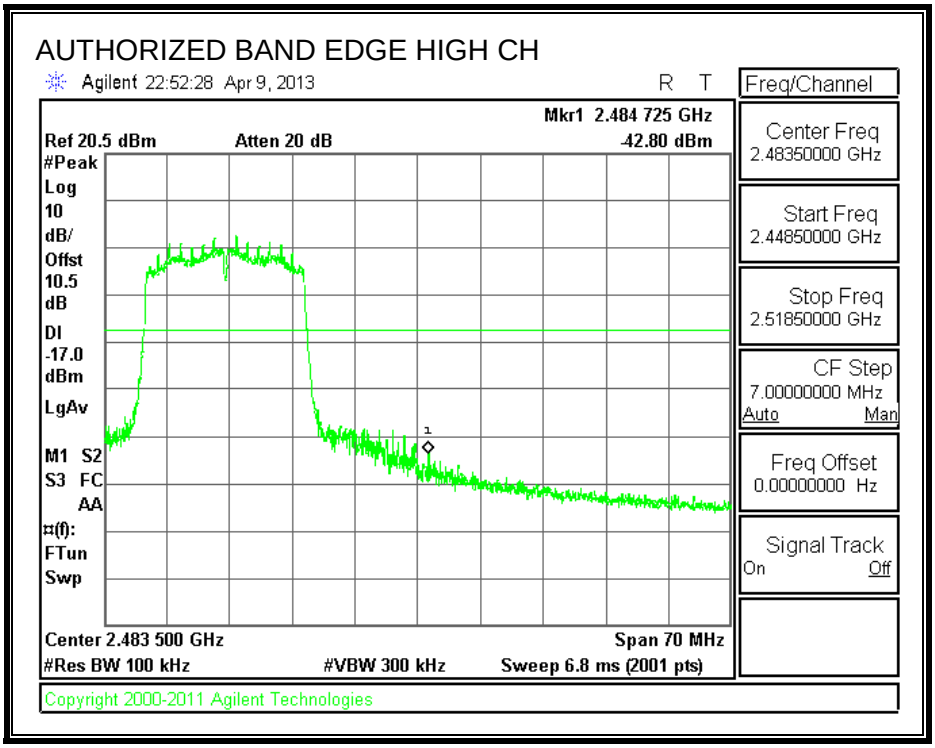


This report shall not be reproduced except in full, without the written approval of UL CCS.

LOW CHANNEL BANDEDGE



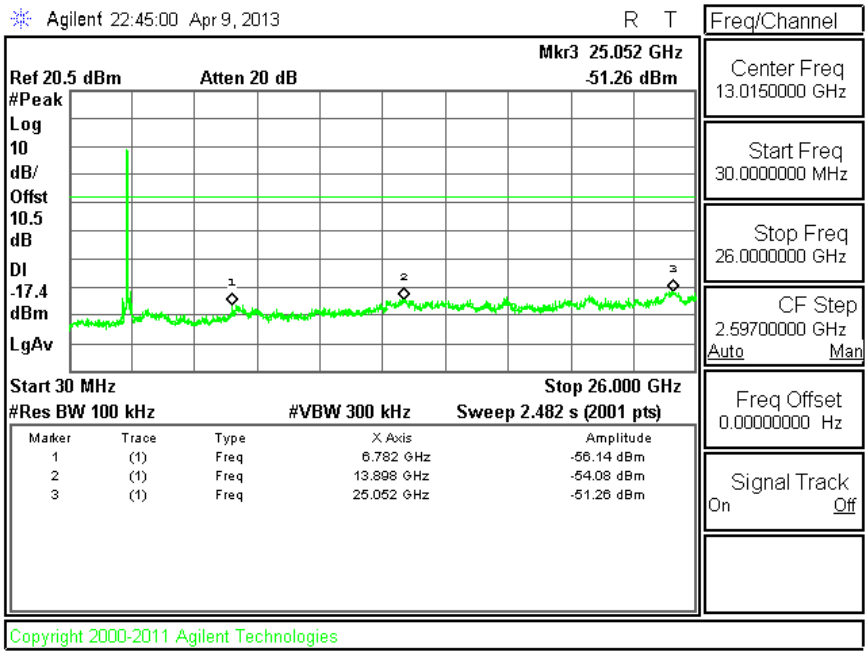
HIGH CHANNEL BANDEDGE



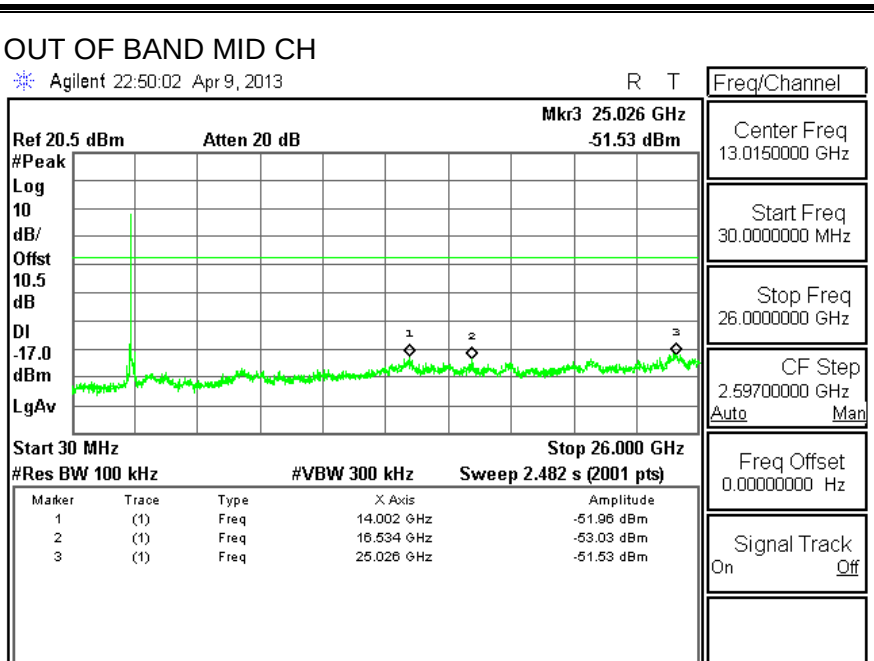
This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT-OF-BAND EMISSIONS

OUT OF BAND LOW CH

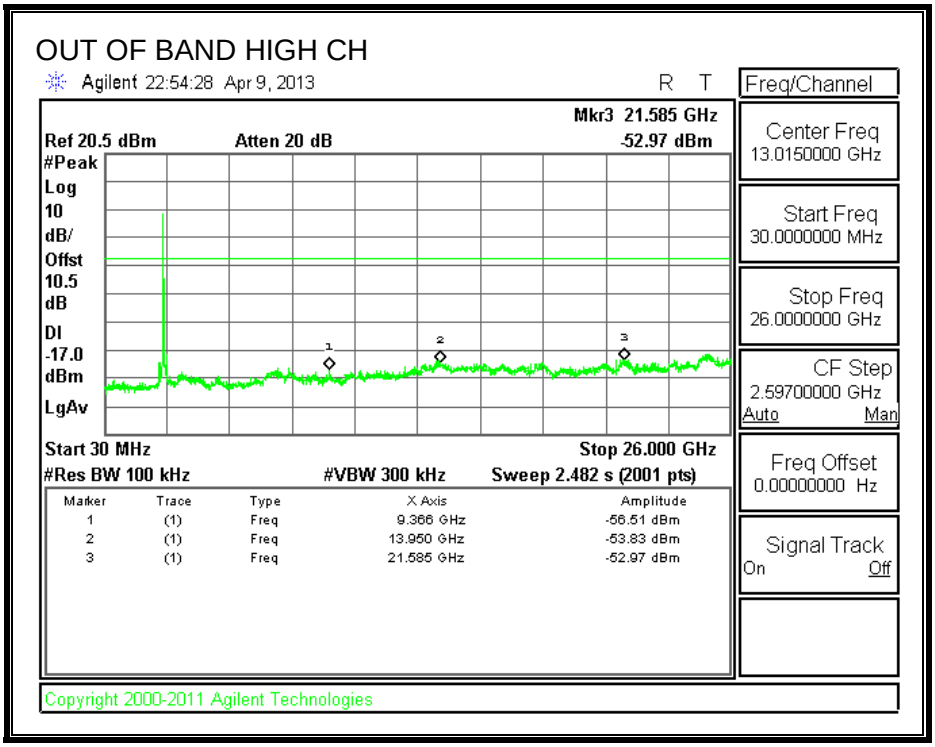


OUT OF BAND MID CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

OUT OF BAND HIGH CH



This report shall not be reproduced except in full, without the written approval of UL CCS.

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

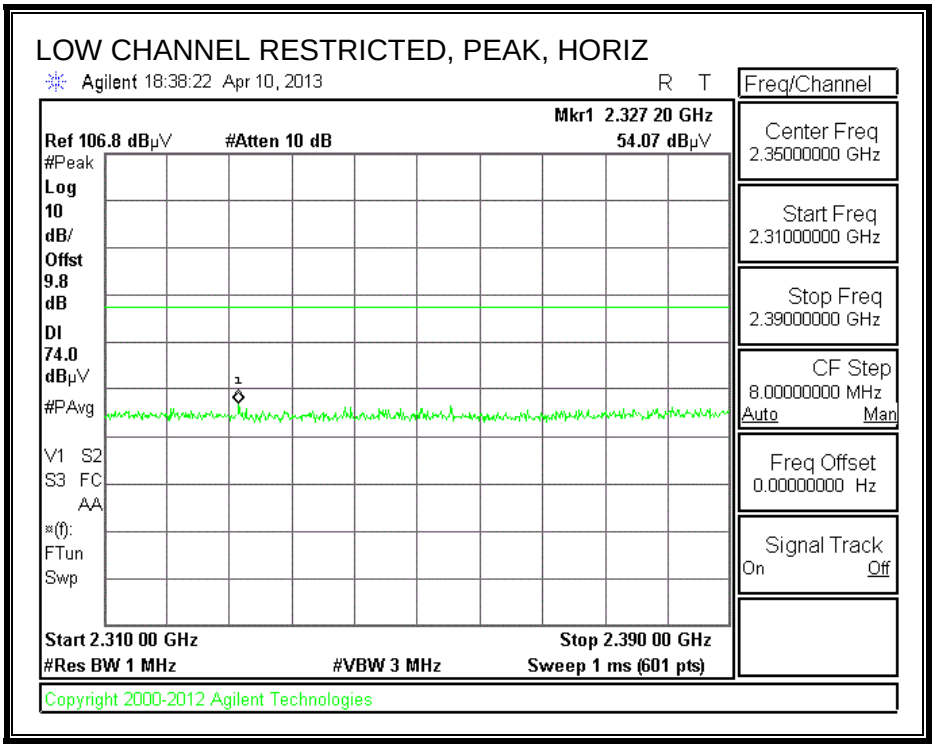
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

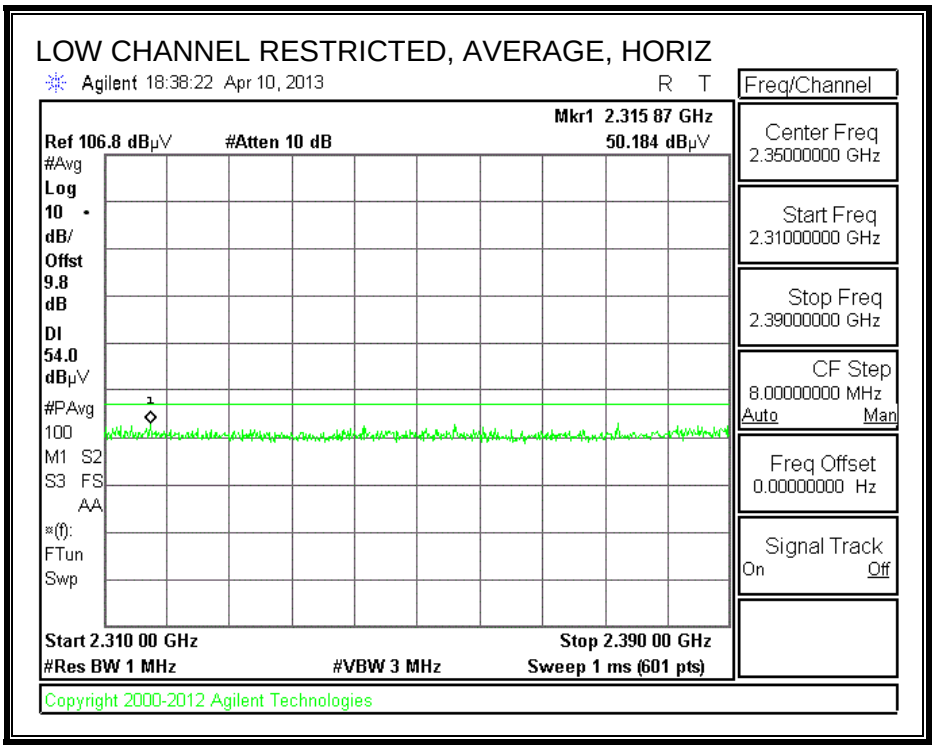
This report shall not be reproduced except in full, without the written approval of UL CCS.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

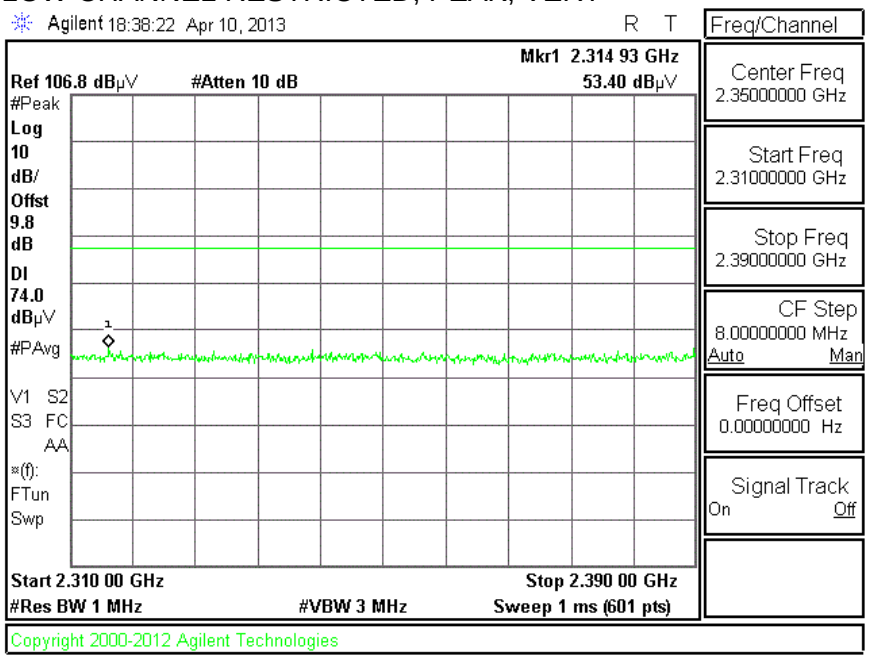
RESTRICTED BANDEDGE (LOW CHANNEL)



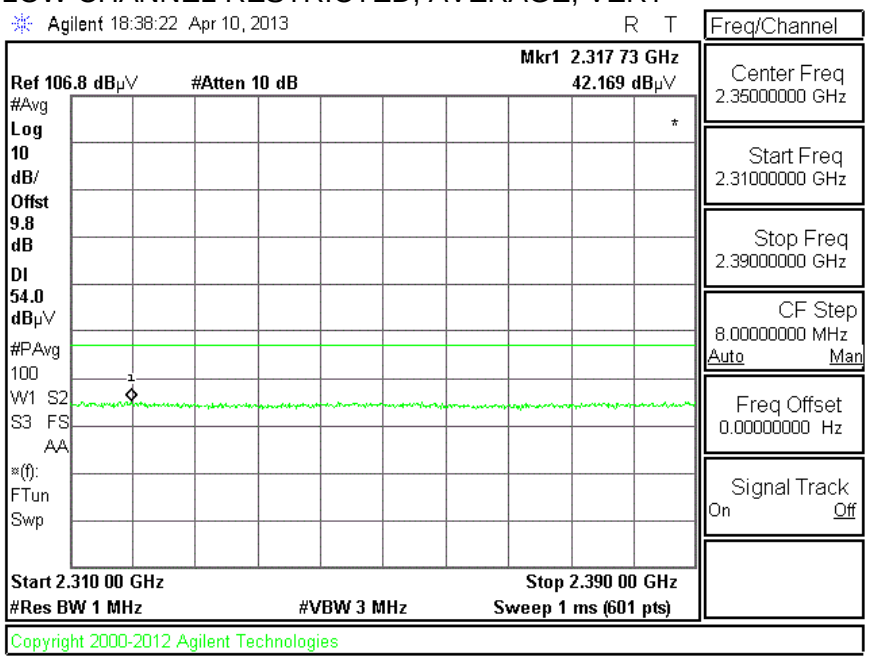


This report shall not be reproduced except in full, without the written approval of UL CCS.

LOW CHANNEL RESTRICTED, PEAK, VERT

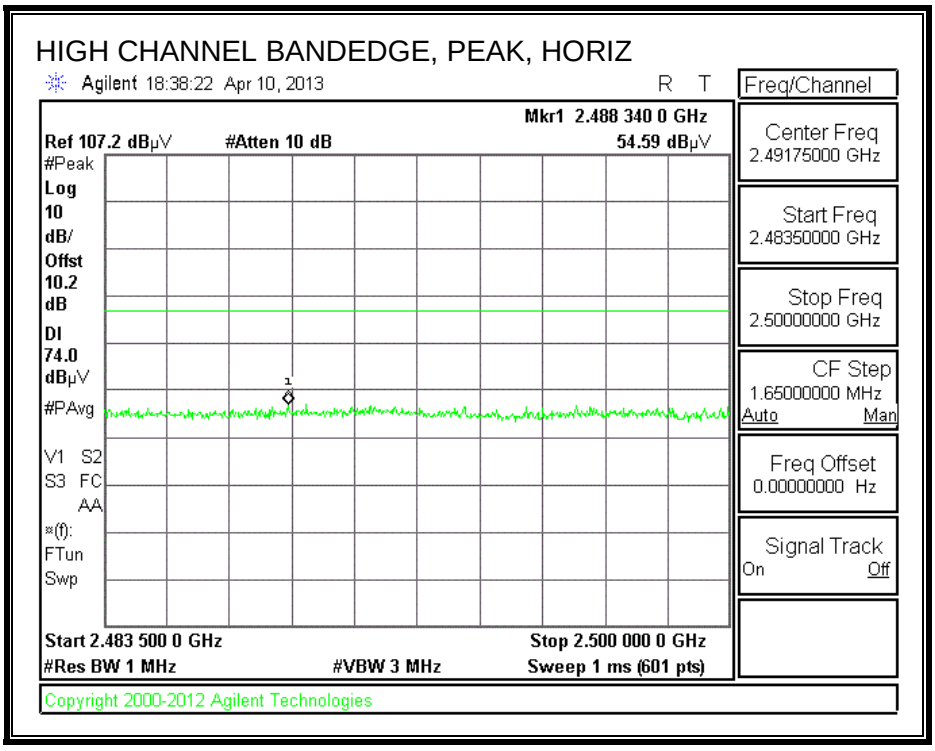


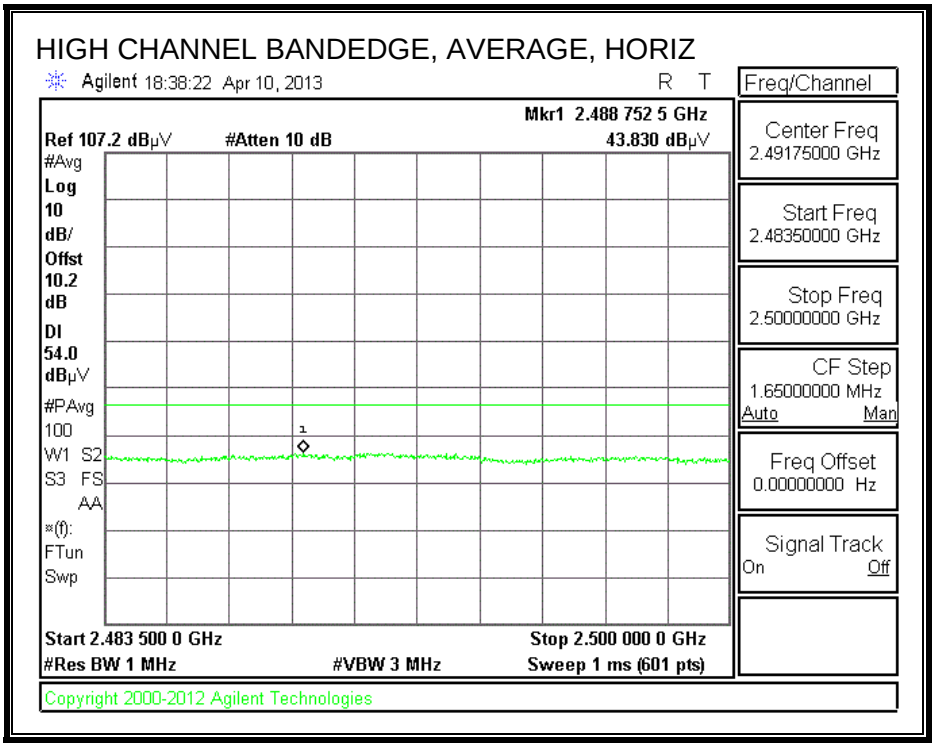
LOW CHANNEL RESTRICTED, AVERAGE, VERT



This report shall not be reproduced except in full, without the written approval of UL CCS.

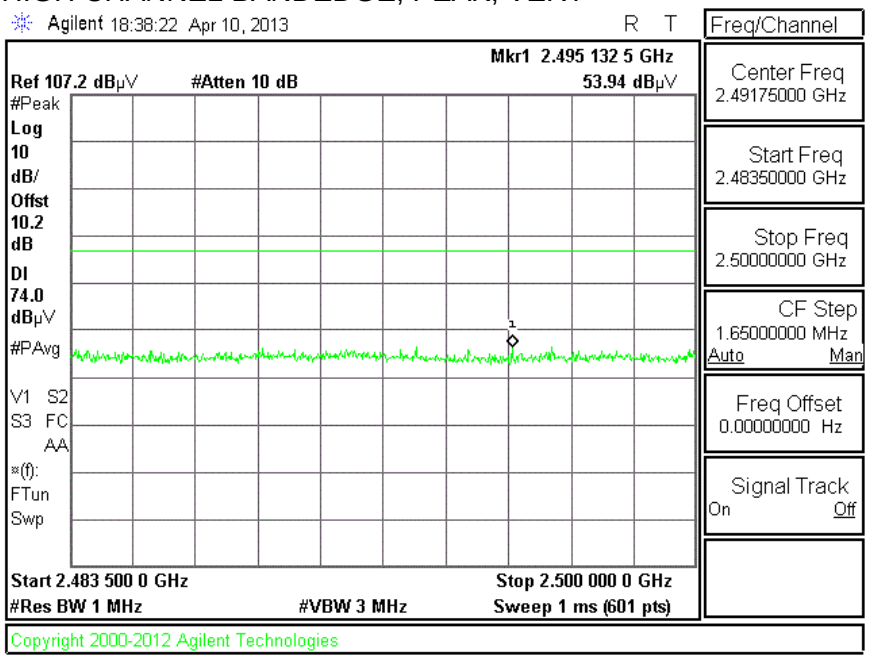
AUTHORIZED BANDEDGE (HIGH CHANNEL)



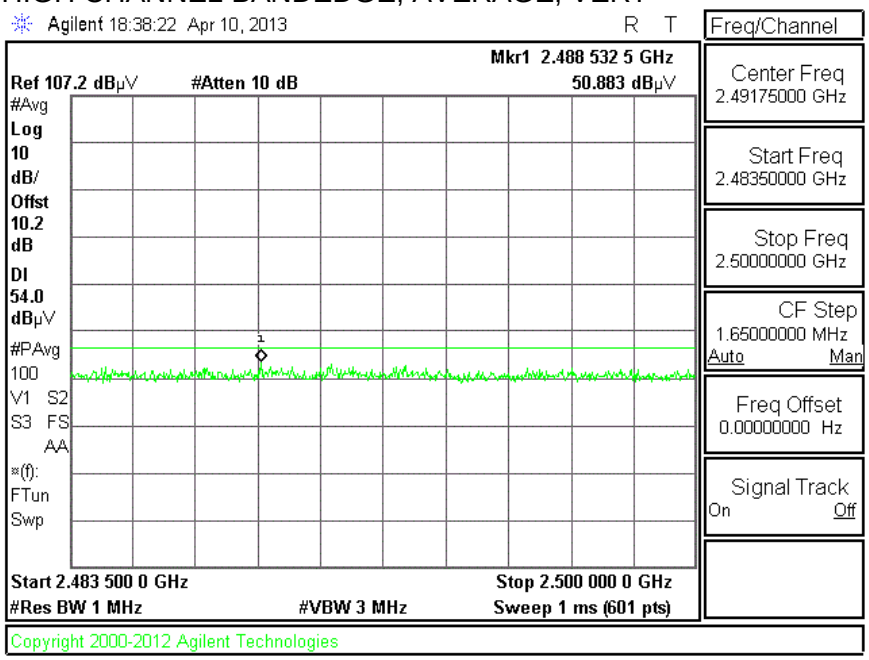


This report shall not be reproduced except in full, without the written approval of UL CCS.

HIGH CHANNEL BANDEDGE, PEAK, VERT



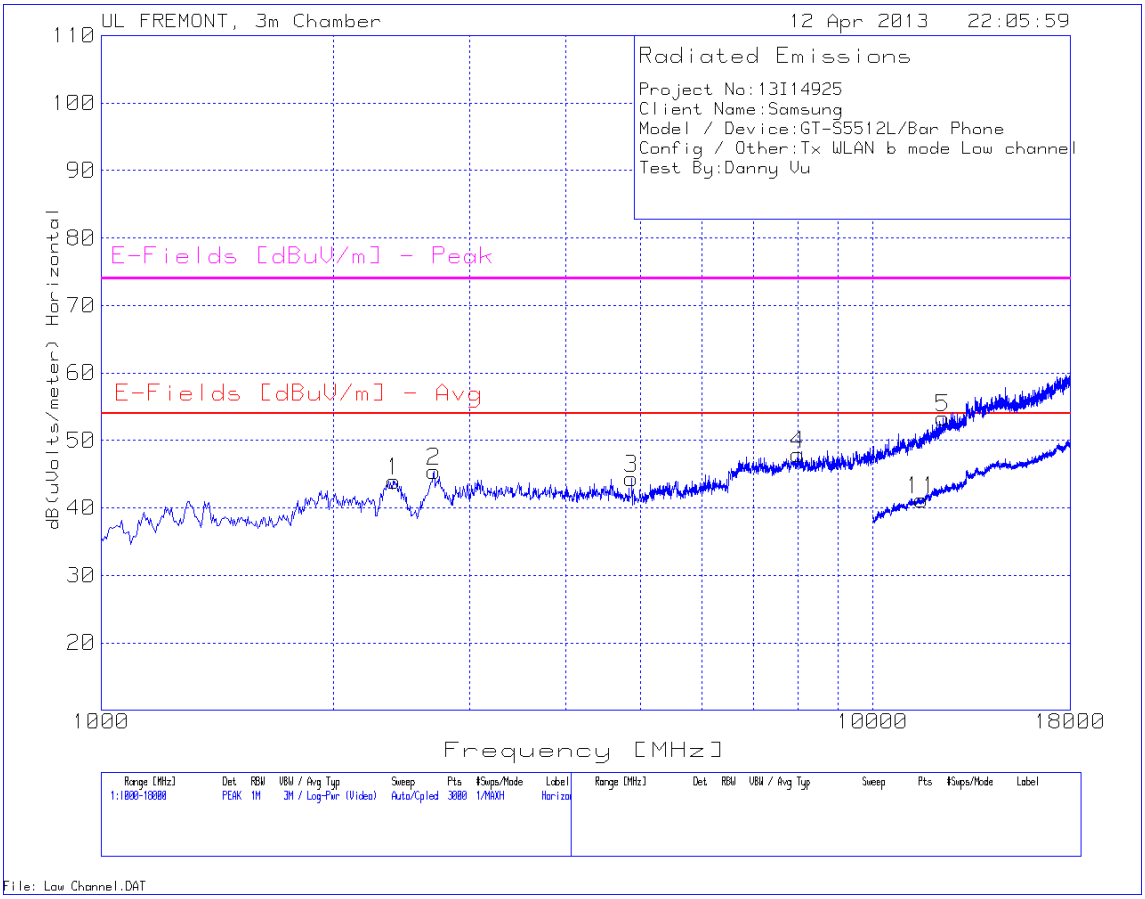
HIGH CHANNEL BANDEDGE, AVERAGE, VERT



This report shall not be reproduced except in full, without the written approval of UL CCS.

HARMONICS AND SPURIOUS EMISSIONS

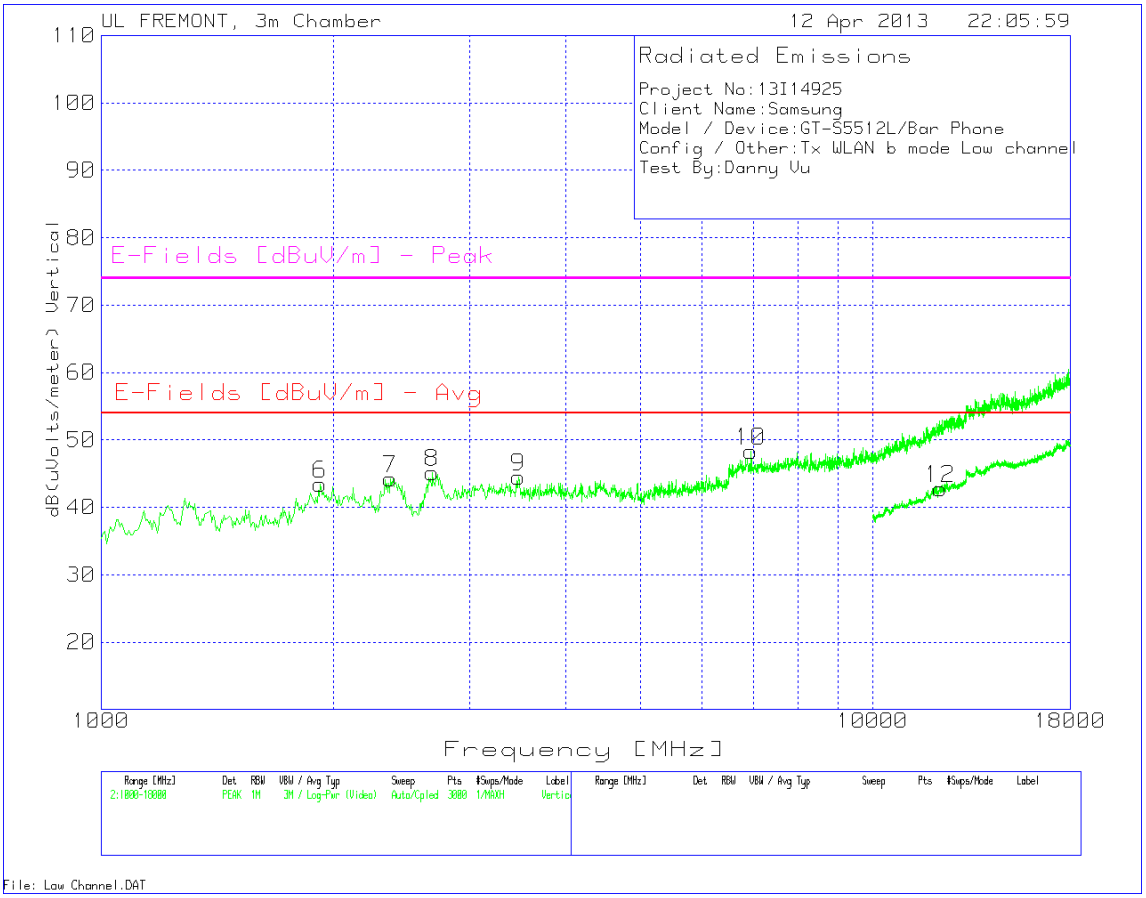
Low Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel

Project No:13I14925
Client Name:Samsung
Model / Device:GT-S5512L/Bar Phone
Config / Other:Tx WLAN b mode Low channel
Test By:Danny Vu

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
1	2393.071	40.73	PK	32.1	-29.7	0.9	44.03	54	-9.97	74	-29.97
2	2698.867	40.94	PK	32.6	-29	0.9	45.44	54	-8.56	74	-28.56
3	4867.755	35.35	PK	34	-25.2	0.2	44.35	54	-9.65	74	-29.65
4	8004.997	34.38	PK	35.7	-22.4	0.3	47.98	54	-6.02	74	-26.02
5	12325.783	32.43	PK	39	-18.6	0.5	53.33	54	-0.67	74	-20.67

Vertical 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
6	1923.051	42.05	PK	31.3	-30.8	0.9	43.45	54	-10.55	74	-30.55
7	2370.42	41.04	PK	32	-29.7	0.9	44.24	54	-9.76	74	-29.76
8	2687.542	40.64	PK	32.6	-29	0.9	45.14	54	-8.86	74	-28.86
9	3474.684	38.47	PK	33	-27.3	0.4	44.57	54	-9.43	74	-29.43
10	6951.699	35.63	PK	35.6	-23.2	0.3	48.33	54	-5.67	74	-25.67

Horizontal 10000 - 18000MHz

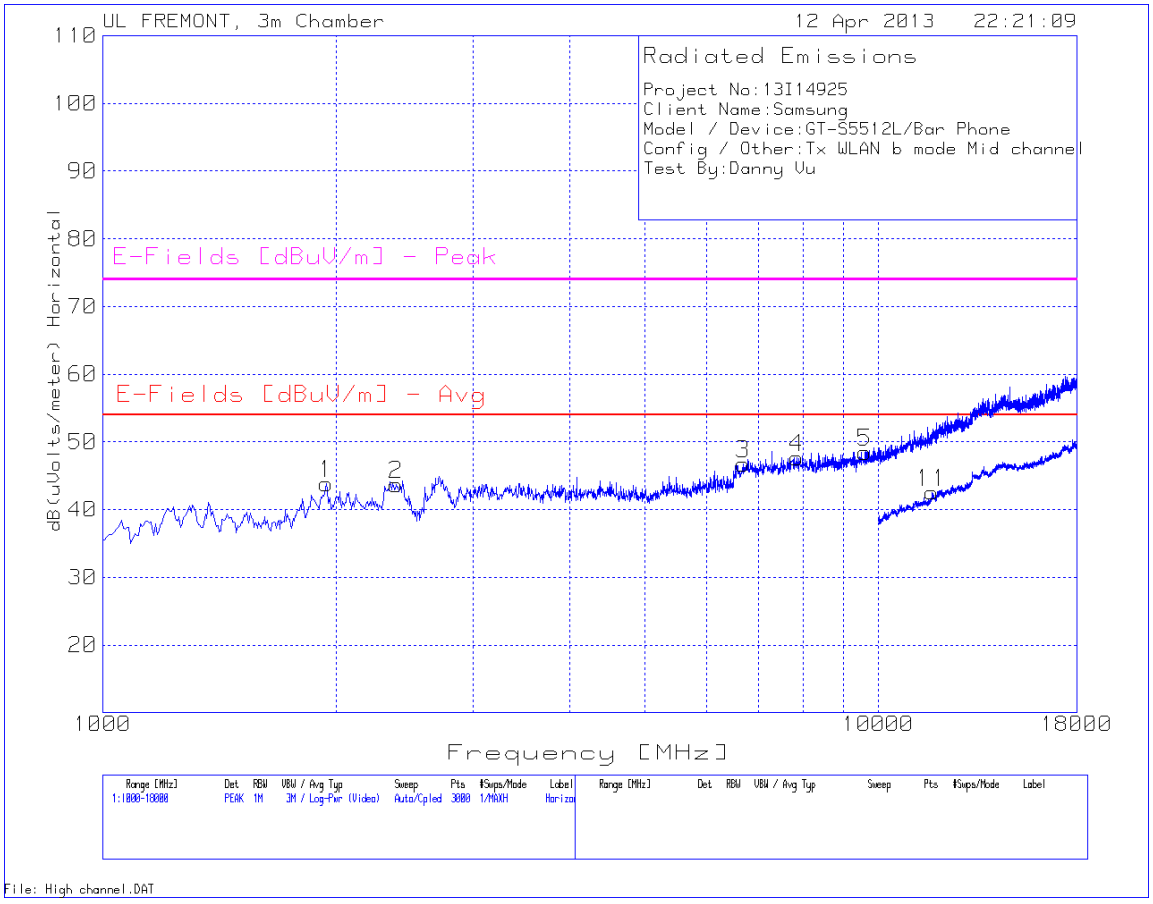
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
11	11559.22	21.46	PK	38.4	-19.3	0.7	41.26	54	-12.74	74	-32.74

Vertical 10000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
12	12210.895	21.81	PK	39.1	-18.8	0.7	42.81	54	-11.19	74	-31.19

This report shall not be reproduced except in full, without the written approval of UL CCS.

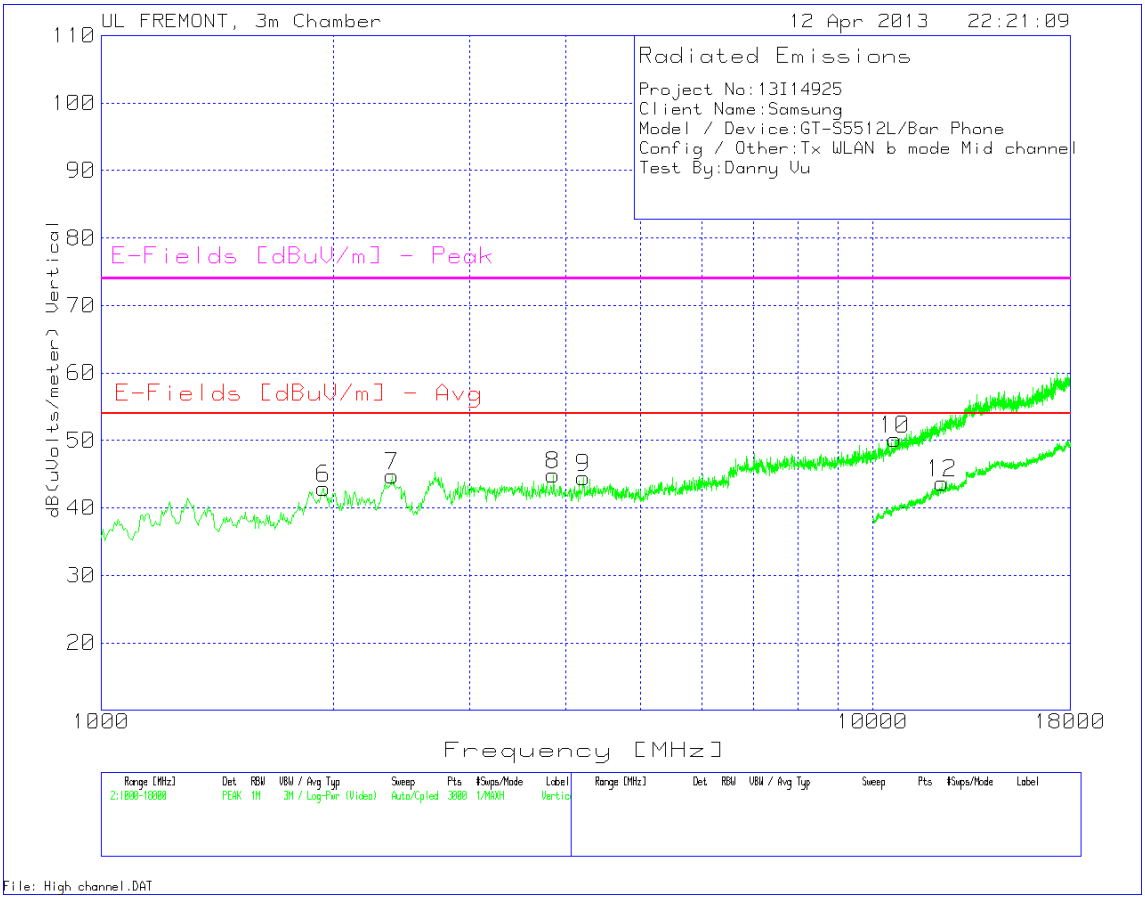
Mid Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel

Project No:13I14925
Client Name:Samsung
Model / Device:GT-S5512L/Bar Phone
Config / Other:Tx WLAN b mode Mid channel
Test By:Danny Vu

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
1	1940.04	42.36	PK	31.4	-30.8	0.9	43.86	54	-10.14	74	-30.14
2	2387.408	40.45	PK	32.1	-29.7	0.9	43.75	54	-10.25	74	-30.25
3	6696.869	34.22	PK	35.6	-23.4	0.3	46.72	54	-7.28	74	-27.28
4	7852.099	34.12	PK	35.8	-22.6	0.3	47.62	54	-6.38	74	-26.38
5	9601.932	33.02	PK	36.7	-21.8	0.6	48.52	54	-5.48	74	-25.48

Vertical 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
6	1940.04	41.45	PK	31.4	-30.8	0.9	42.95	54	-11.05	74	-31.05
7	2381.746	41.52	PK	32.1	-29.7	0.9	44.82	54	-9.18	74	-29.18
8	3854.097	37.9	PK	33.2	-26.5	0.3	44.9	54	-9.1	74	-29.1
9	4216.522	36.62	PK	33.5	-25.9	0.3	44.52	54	-9.48	74	-29.48
10	10683.544	32.13	PK	37.8	-20.3	0.6	50.23	54	-3.77	74	-23.77

Horizontal 10000 - 18000MHz

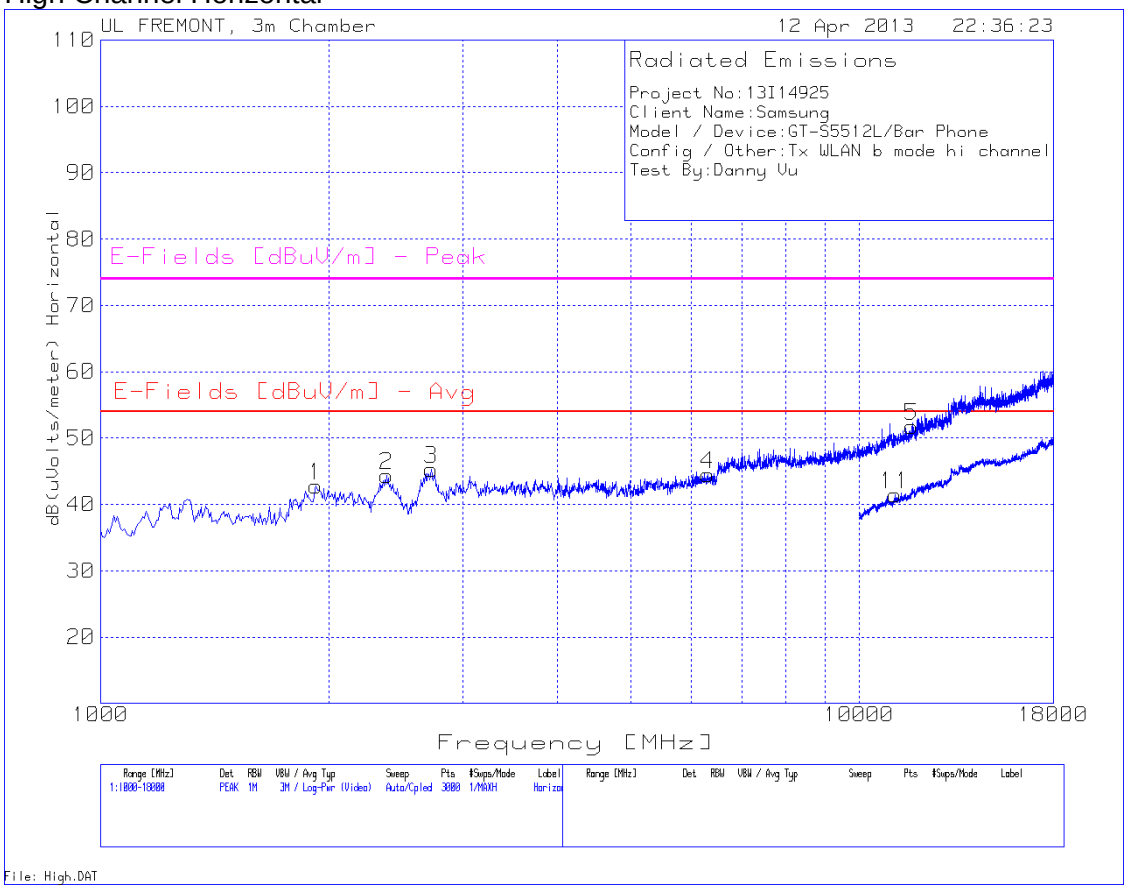
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
11	11727.136	22.49	PK	38.7	-19.2	0.6	42.59	54	-11.41	74	-31.41

Vertical 10000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
12	12294.853	22.9	PK	39	-18.6	0.4	43.7	54	-10.3	74	-30.3

This report shall not be reproduced except in full, without the written approval of UL CCS.

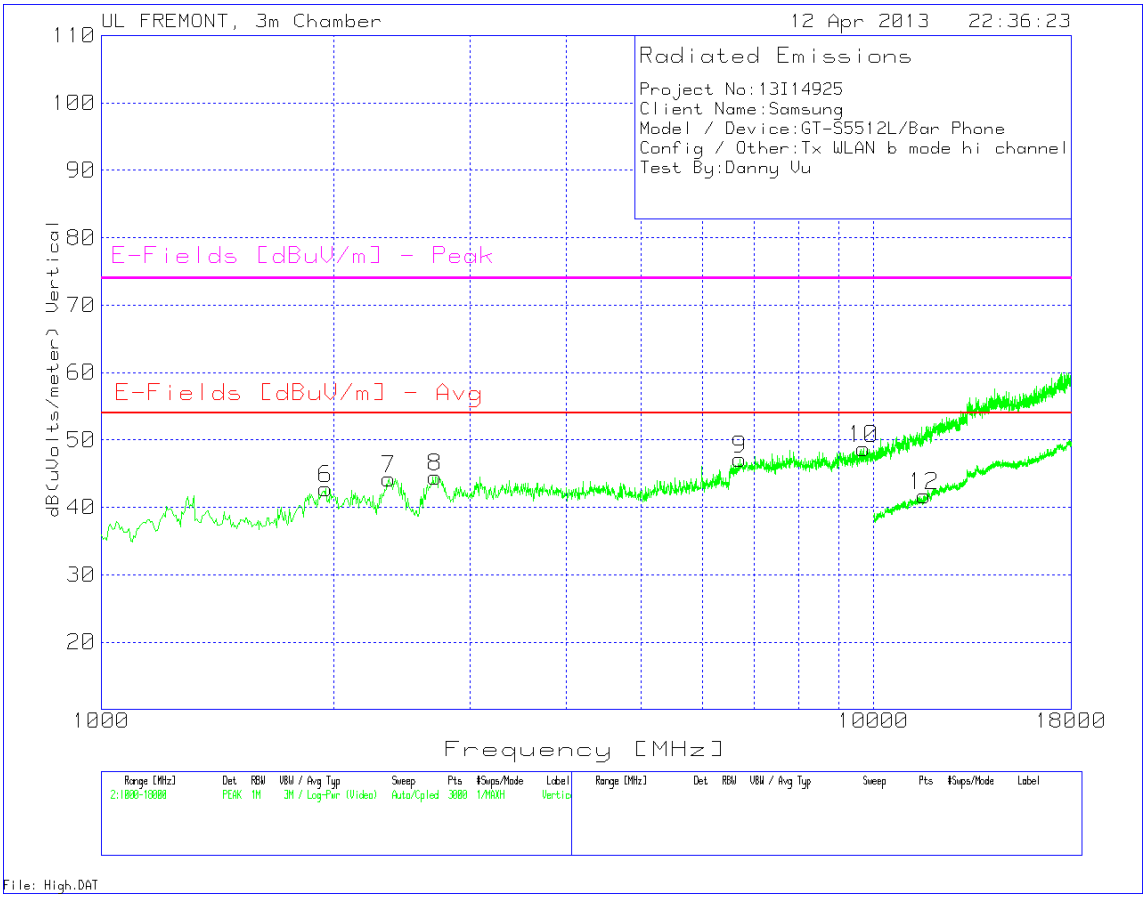
High Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel

Project No:13I14925
Client Name:Samsung
Model / Device:GT-S5512L/Bar Phone
Config / Other:Tx WLAN b mode hi channel
Test By:Danny Vu

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
1	1923.051	41.41	PK	31.3	-30.8	0.9	42.81	54	-11.19	74	-31.19
2	2381.746	41.03	PK	32.1	-29.7	0.9	44.33	54	-9.67	74	-29.67
3	2727.182	40.75	PK	32.6	-29	0.9	45.25	54	-8.75	74	-28.75
4	6306.129	32.56	PK	35.4	-23.7	0.2	44.46	54	-9.54	74	-29.54
5	11708.528	31.75	PK	38.7	-19.2	0.5	51.75	54	-2.25	74	-22.25

Vertical 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
6	1951.366	41.32	PK	31.4	-30.8	0.9	42.82	54	-11.18	74	-31.18
7	2359.094	41.08	PK	32	-29.7	0.9	44.28	54	-9.72	74	-29.72
8	2710.193	39.99	PK	32.6	-29	0.9	44.49	54	-9.51	74	-29.51
9	6708.195	34.68	PK	35.6	-23.4	0.3	47.18	54	-6.82	74	-26.82
10	9709.527	33.1	PK	36.9	-21.7	0.4	48.7	54	-5.3	74	-25.3

Horizontal 10000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
11	11155.422	22.43	PK	37.9	-19.6	0.7	41.43	54	-12.57	74	-32.57

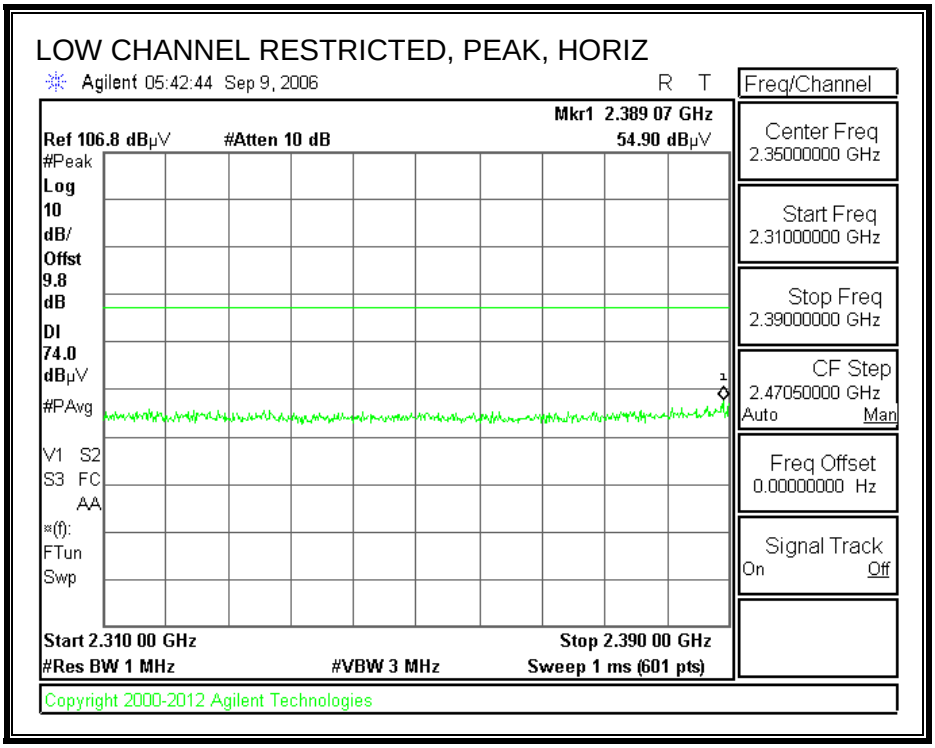
Vertical 10000 - 18000MHz

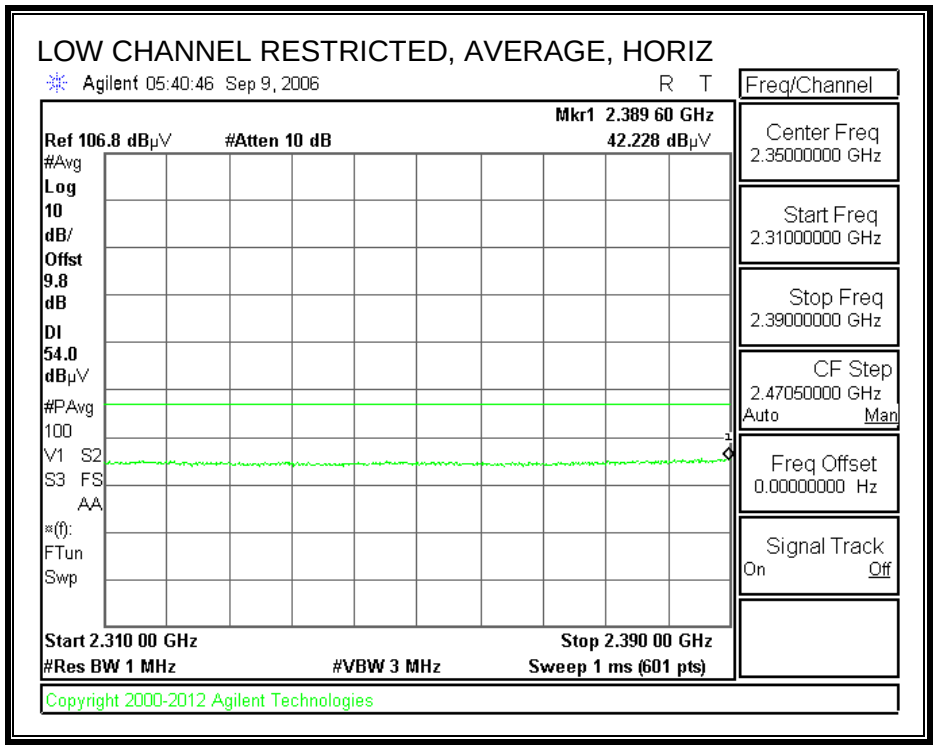
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)
12	11631.184	21.88	PK	38.5	-19.3	0.7	41.78	54	-12.22	74	-32.22

This report shall not be reproduced except in full, without the written approval of UL CCS.

9.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

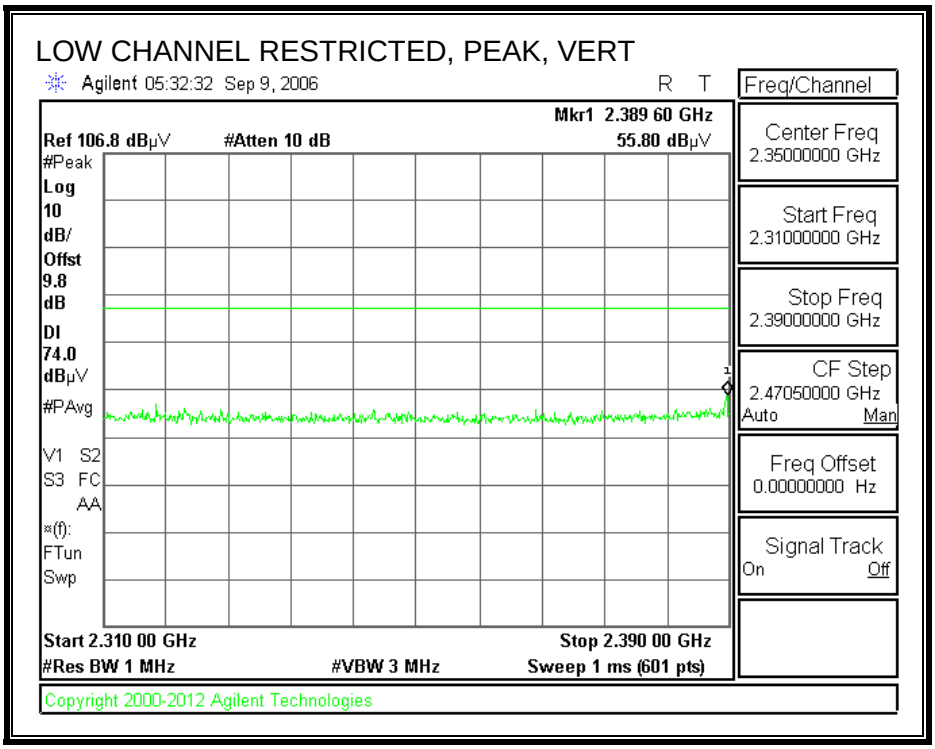
RESTRICTED BANDEDGE (LOW CHANNEL)



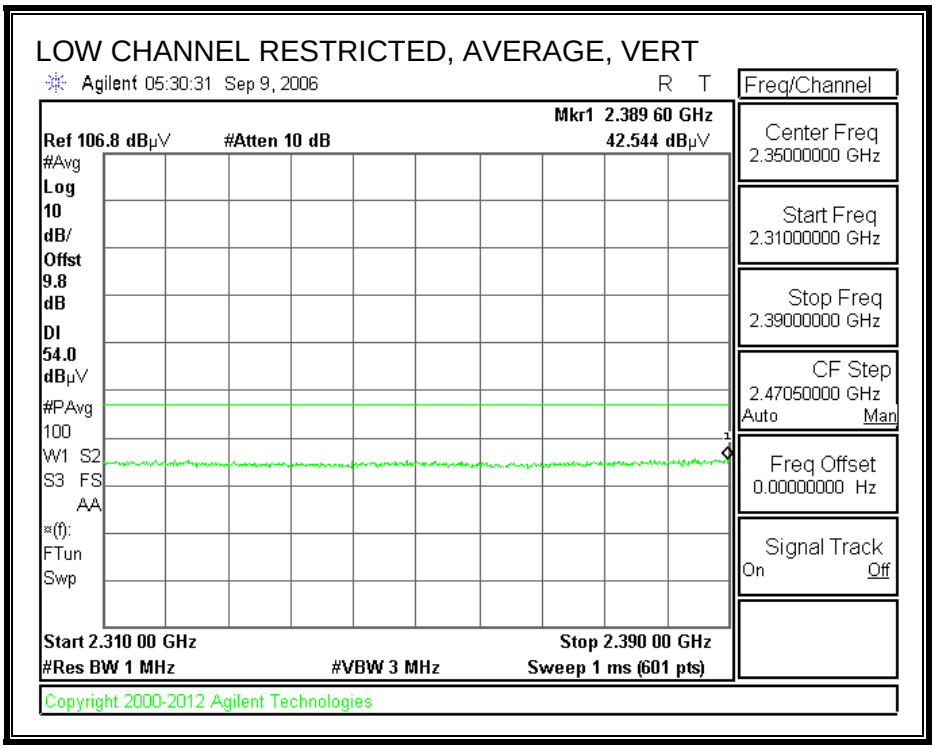


Actual Average = Measured Average + Correction Factor
= 43.375 dBuV + 0.95
= 44.325 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.



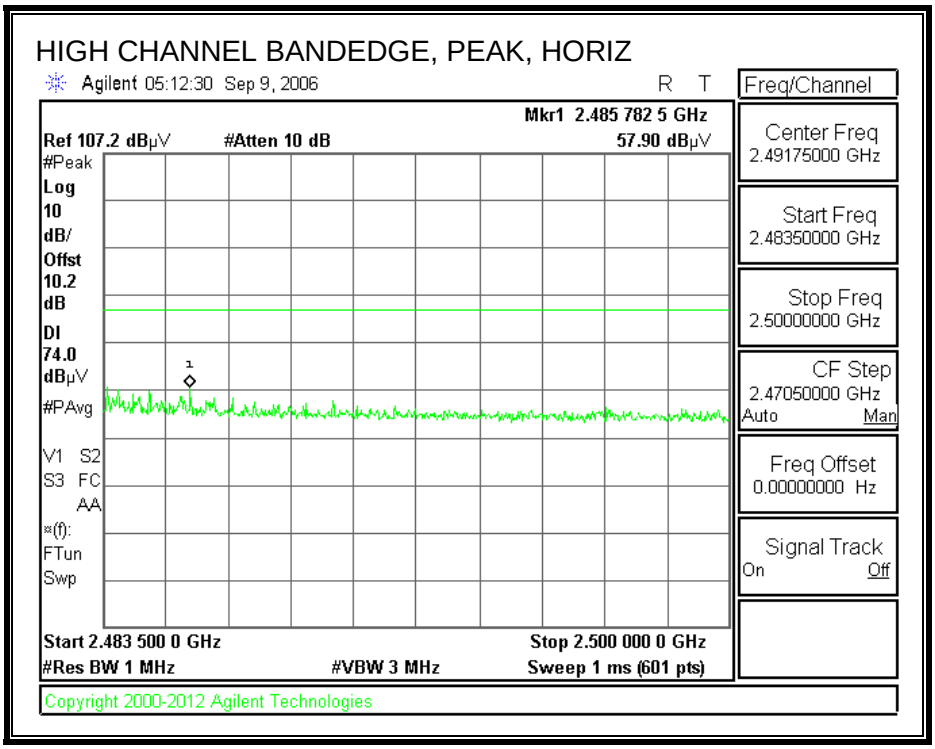
This report shall not be reproduced except in full, without the written approval of UL CCS.



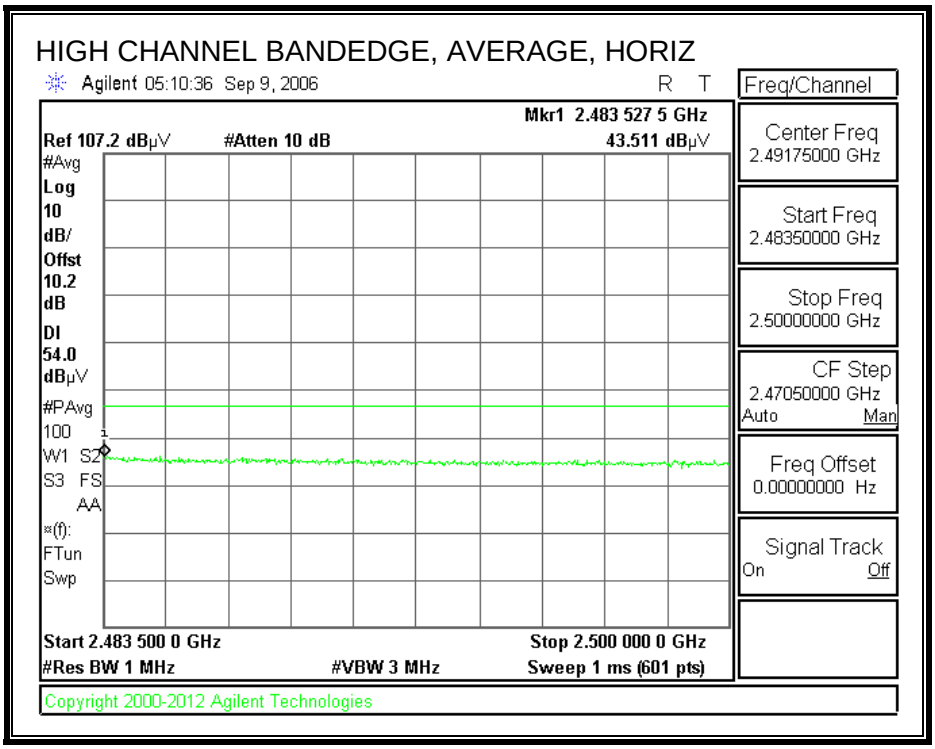
Actual Average = Measured Average + Correction Factor
= 40.812 dBuV + 0.95
= 41.762 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.

AUTHORIZED BANDEDGE (HIGH CHANNEL)

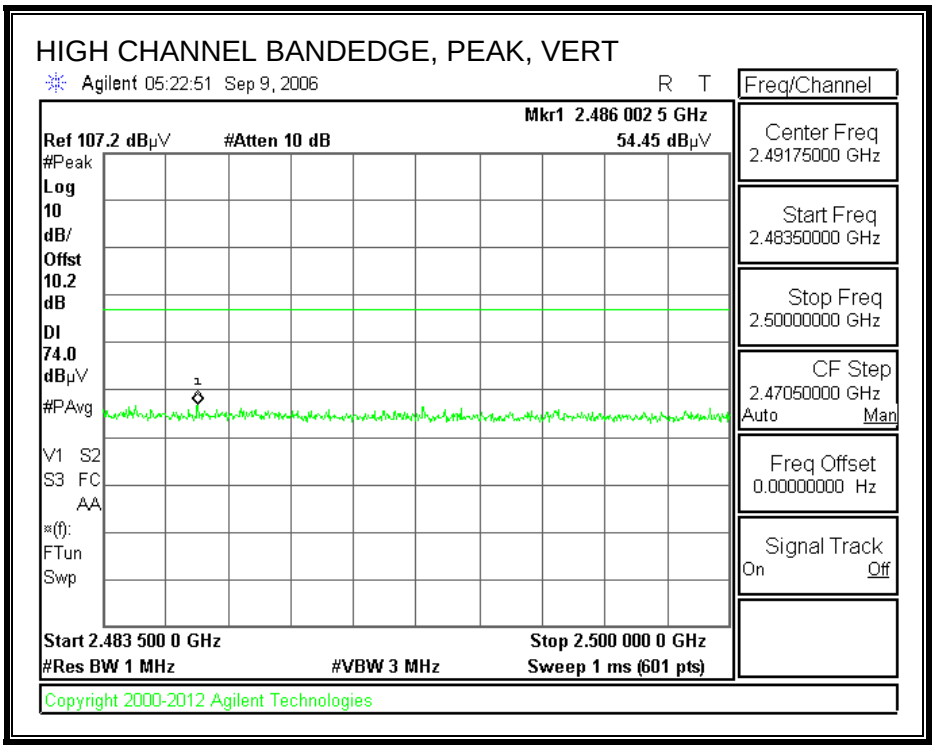


This report shall not be reproduced except in full, without the written approval of UL CCS.

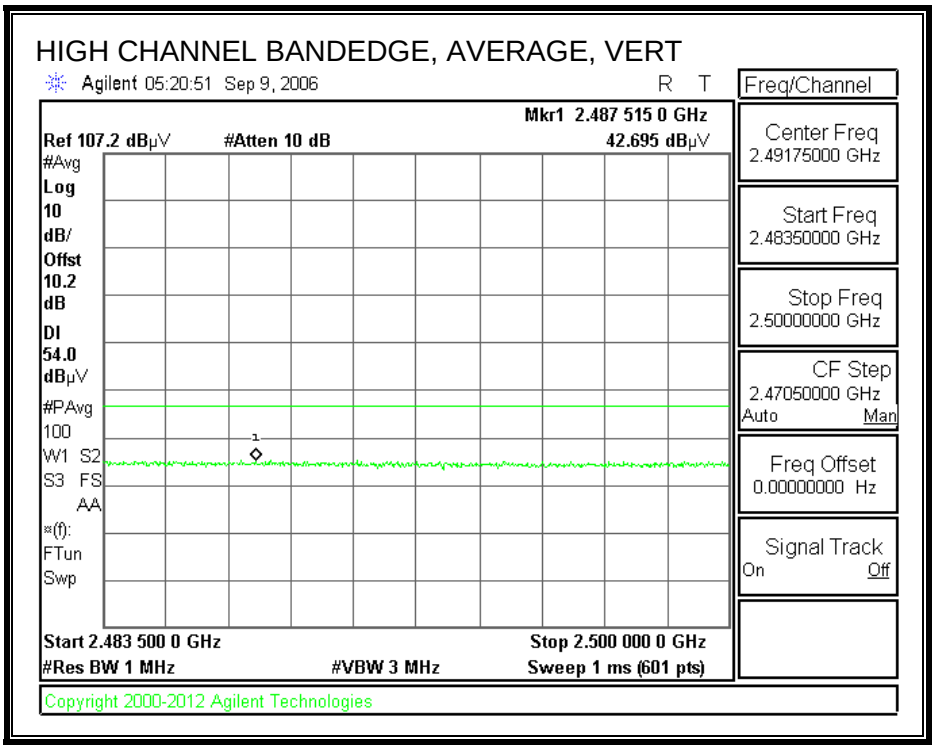


Actual Average = Measured Average + Correction Factor
= 40.688 dBuV + 0.95
= 41.638 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

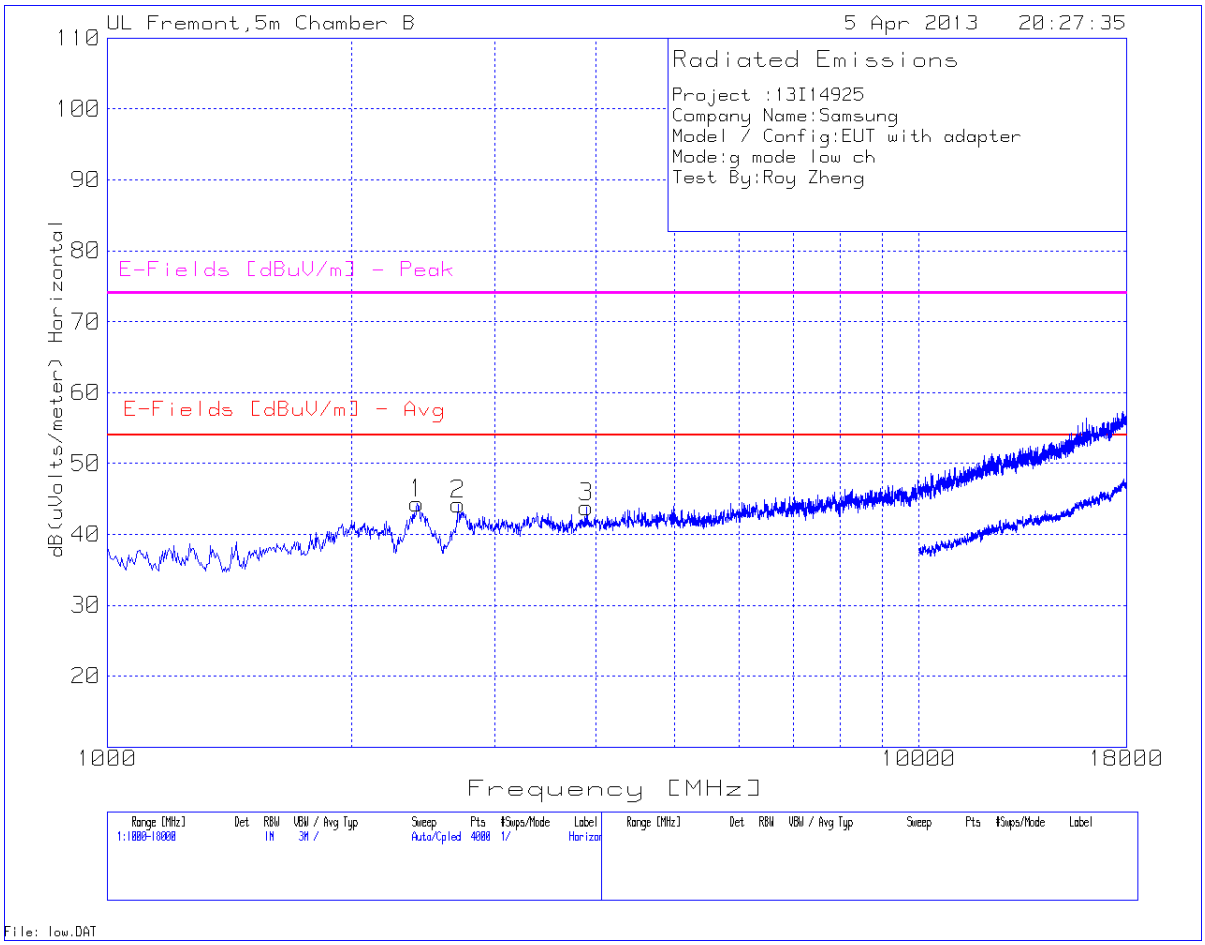


Actual Average = Measured Average + Correction Factor
= 41.496 dBuV + 0.95
= 42.446 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.

HARMONICS AND SPURIOUS EMISSIONS

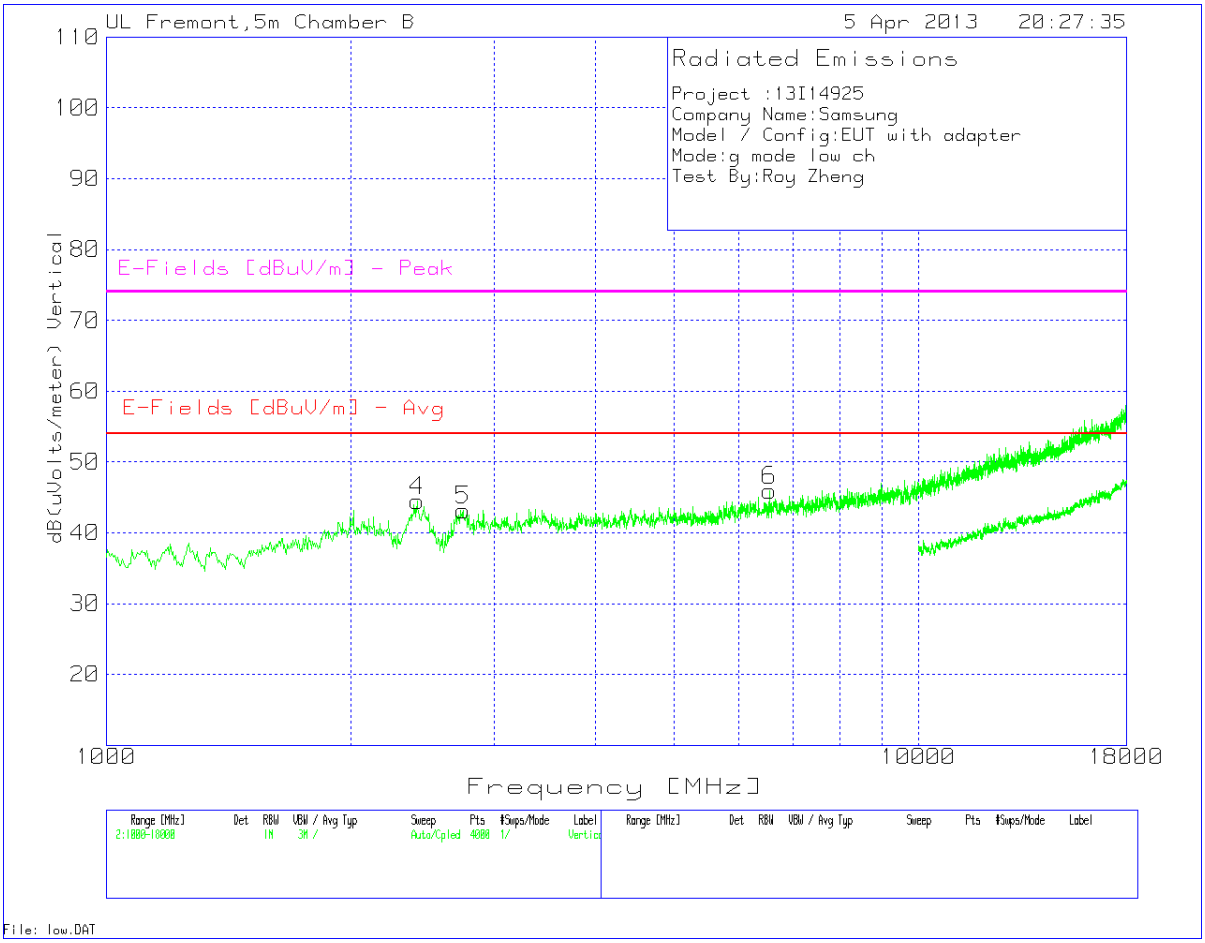
Low Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:g mode low ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

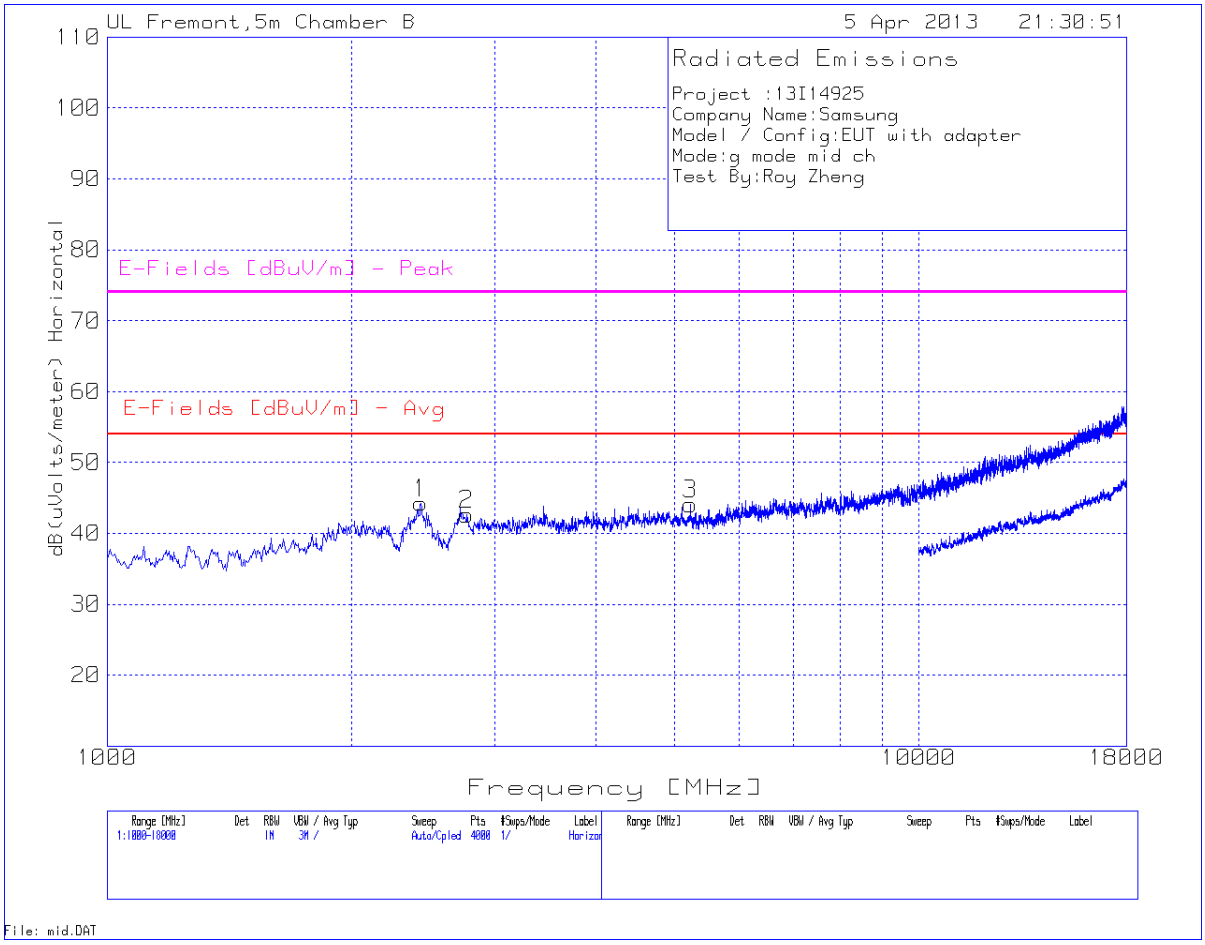
Marker No.	Frequency (MHz)	Meter Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
1	2409.943	41.44	PK	32.4	-35	4.6	0.9	44.34	74	54	-29.66	-9.66
2	2707.22	40.86	PK	32.7	-35.1	4.9	0.9	44.26	74	54	-29.74	-9.74
3	3896.328	38.39	PK	33.9	-34.9	6.1	0.3	43.79	74	54	-30.21	-10.21

Vertical 1000 - 18000MHz

Marker No.	Frequency (MHz)	Meter Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolts /meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
4	2414.189	41.55	PK	32.4	-35	4.6	0.9	44.45	74	54	-29.55	-9.55
5	2749.688	39.55	PK	32.8	-35.1	5	0.9	43.15	74	54	-30.85	-10.85
6	6546.34	36.52	PK	35.9	-35	8.3	0.2	45.92	74	54	-28.08	-8.08

This report shall not be reproduced except in full, without the written approval of UL CCS.

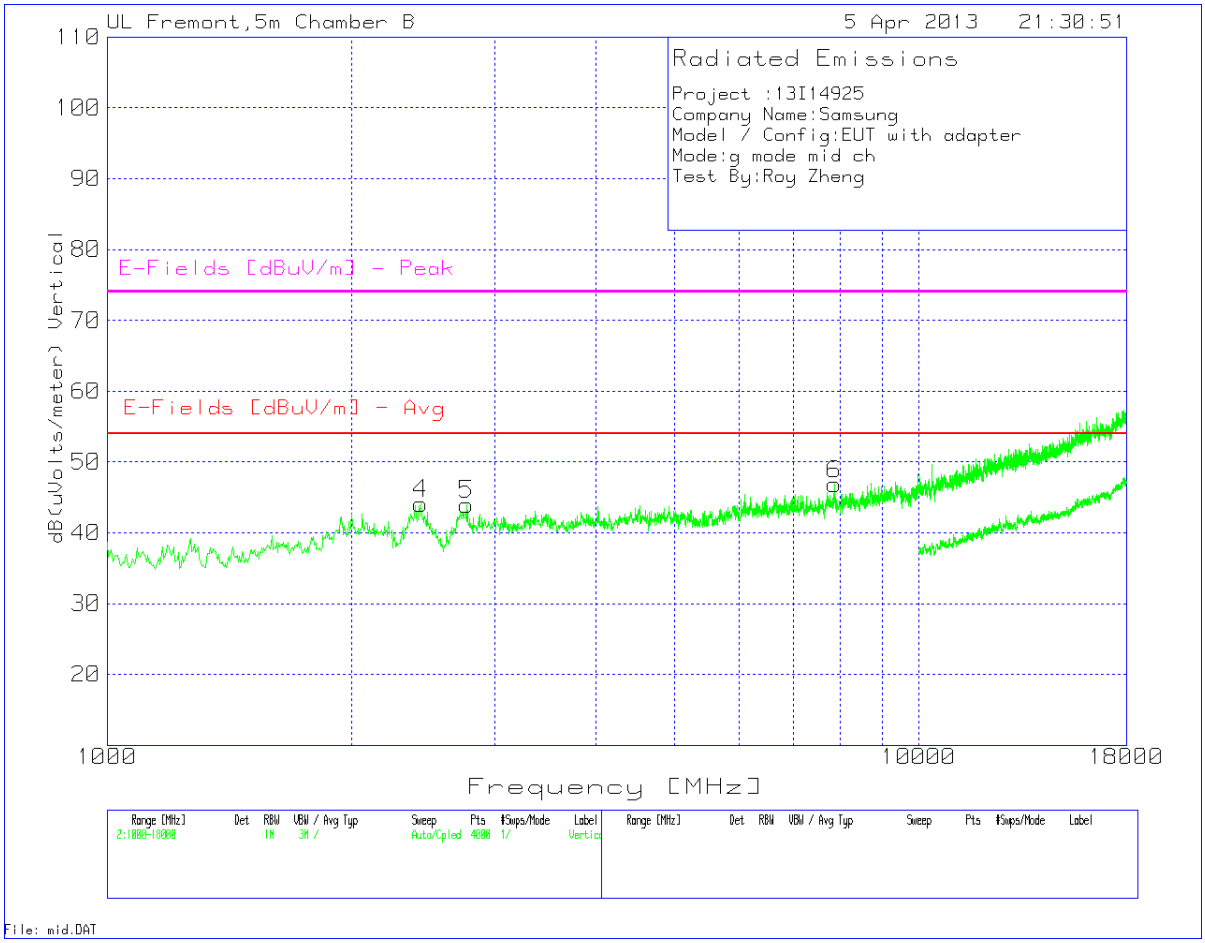
Mid Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:g mode mid ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

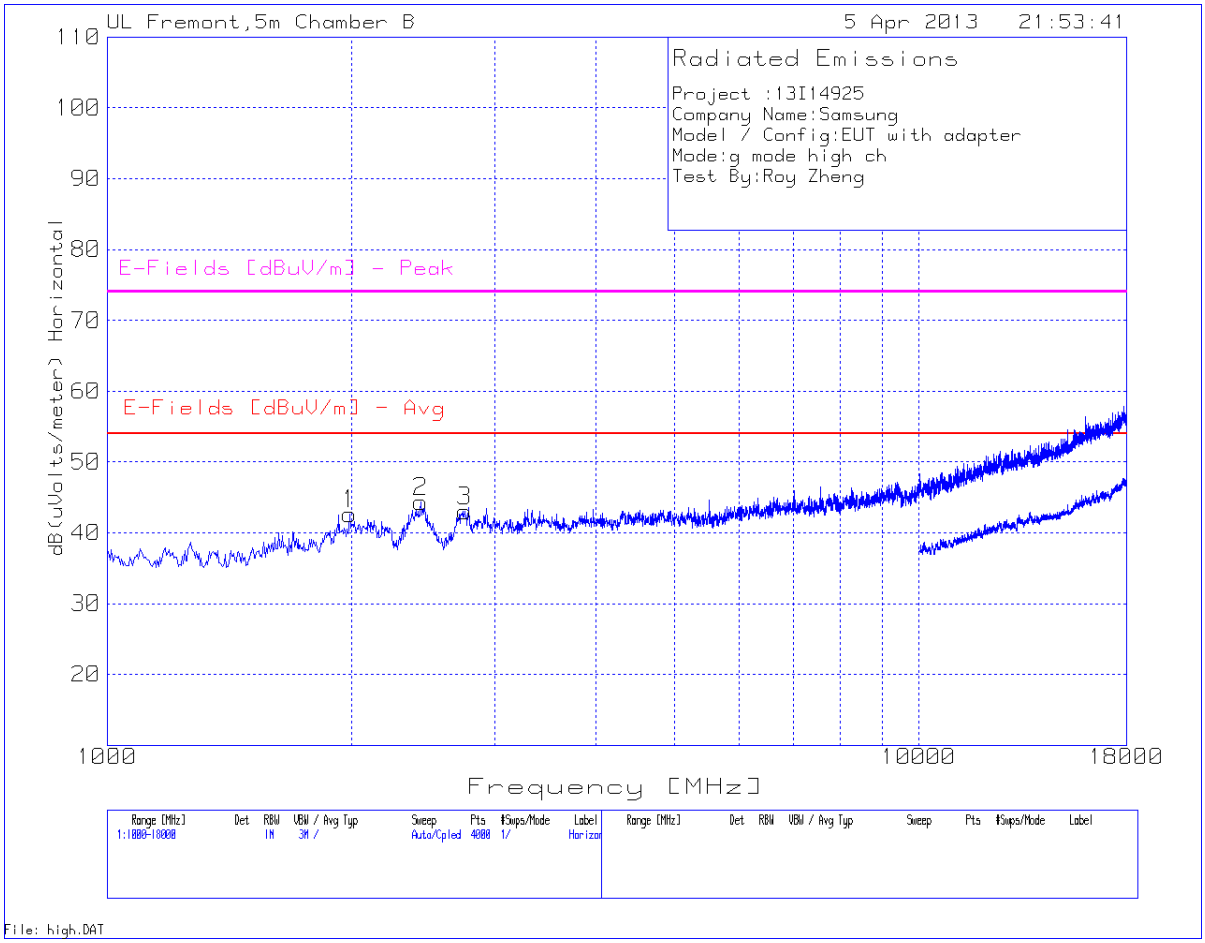
Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolts/meter)	[dBuV/m] - Peak	[dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
1	2435.423	41.29	PK	32.4	-35	4.7	0.9	44.29	74	54	-29.71	-9.71
2	2775.169	39	PK	32.8	-35.1	5	0.9	42.6	74	54	-31.4	-11.4
3	5229.828	36.48	PK	34.9	-34.9	7.4	0.2	44.08	74	54	-29.92	-9.92

Vertical 1000 - 18000MHz

Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolts/meter)	[dBuV/m] - Peak		Peak Margin (dB)	Avg Margin (dB)
4	2435.423	41.06	PK	32.4	-35	4.7	0.9	44.06	74	54	-29.94	-9.94
5	2775.169	40.4	PK	32.8	-35.1	5	0.9	44	74	54	-30	-10
6	7867.1	36.21	PK	36.2	-35.1	9.2	0.3	46.81	74	54	-27.19	-7.19

This report shall not be reproduced except in full, without the written approval of UL CCS.

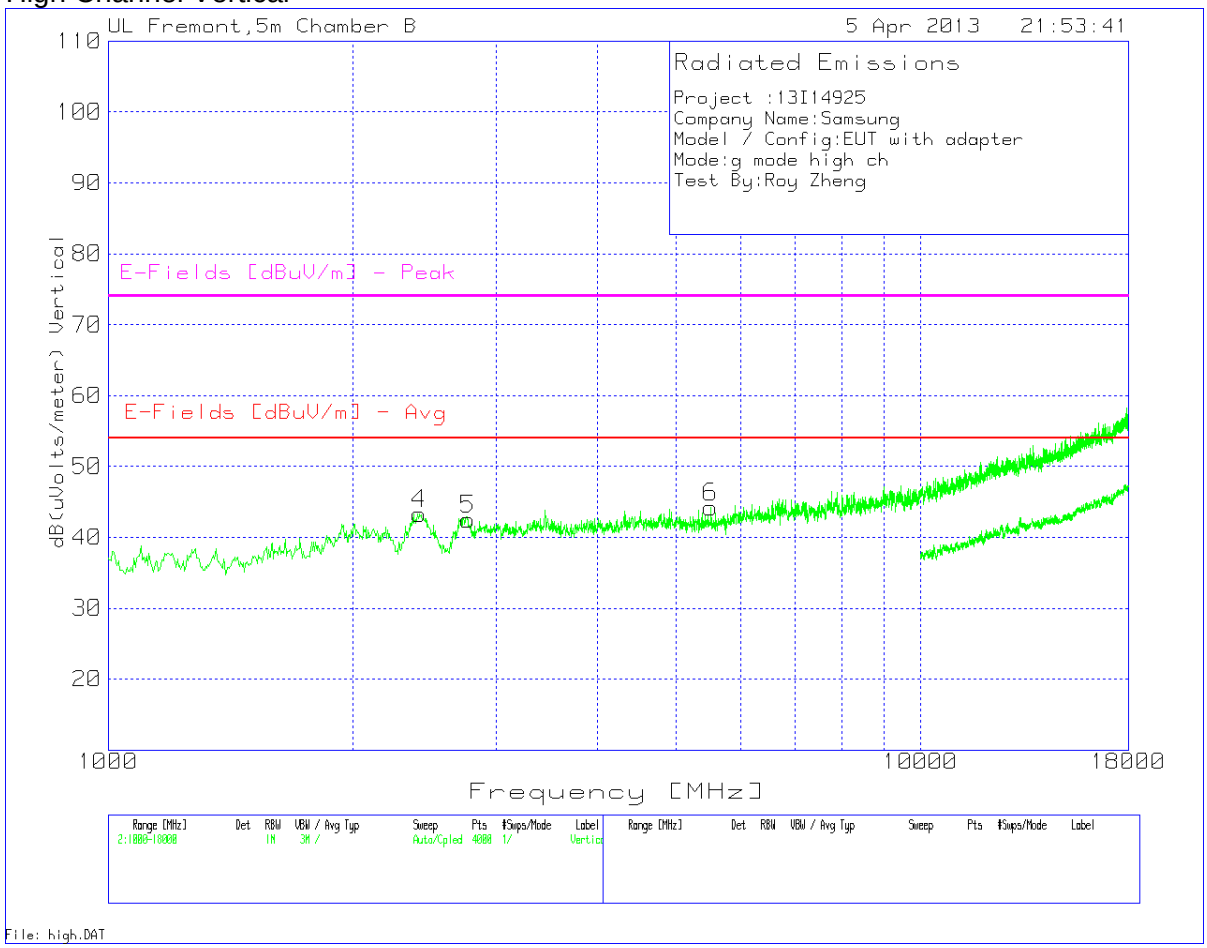
High Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:g mode low ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolt s/meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
1	2409.943	41.44	PK	32.4	-35	4.6	0.9	44.34	74	54	-29.66	-9.66
2	2707.22	40.86	PK	32.7	-35.1	4.9	0.9	44.26	74	54	-29.74	-9.74
3	3896.328	38.39	PK	33.9	-34.9	6.1	0.3	43.79	74	54	-30.21	-10.21

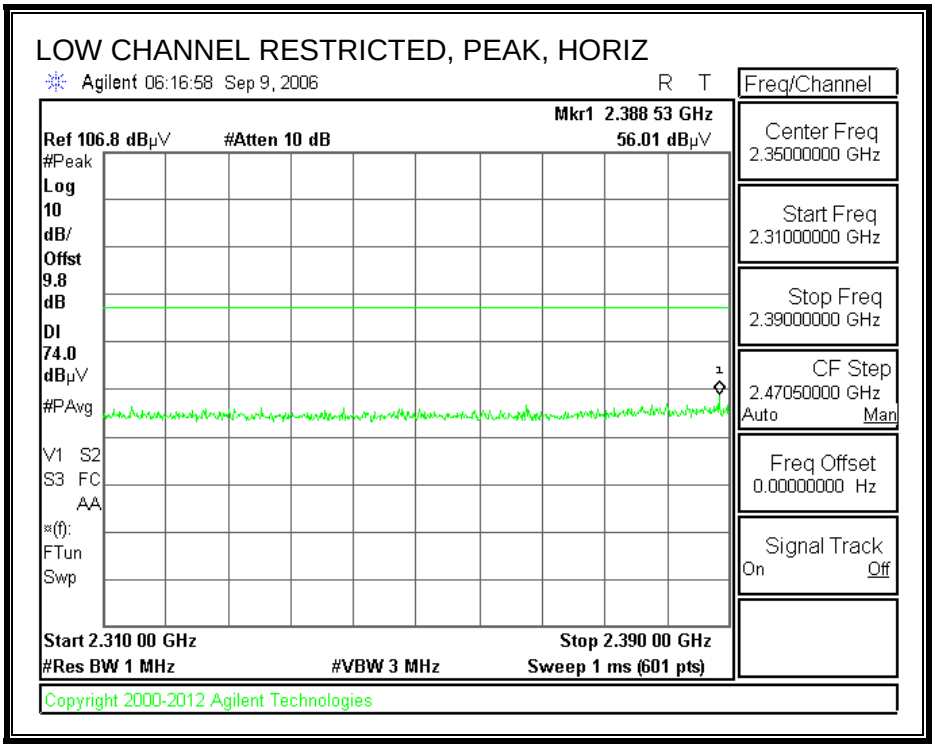
Vertical 1000 - 18000MHz

Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolt s/meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
4	2414.189	41.55	PK	32.4	-35	4.6	0.9	44.45	74	54	-29.55	-9.55
5	2749.688	39.55	PK	32.8	-35.1	5	0.9	43.15	74	54	-30.85	-10.85
6	6546.34	36.52	PK	35.9	-35	8.3	0.2	45.92	74	54	-28.08	-8.08

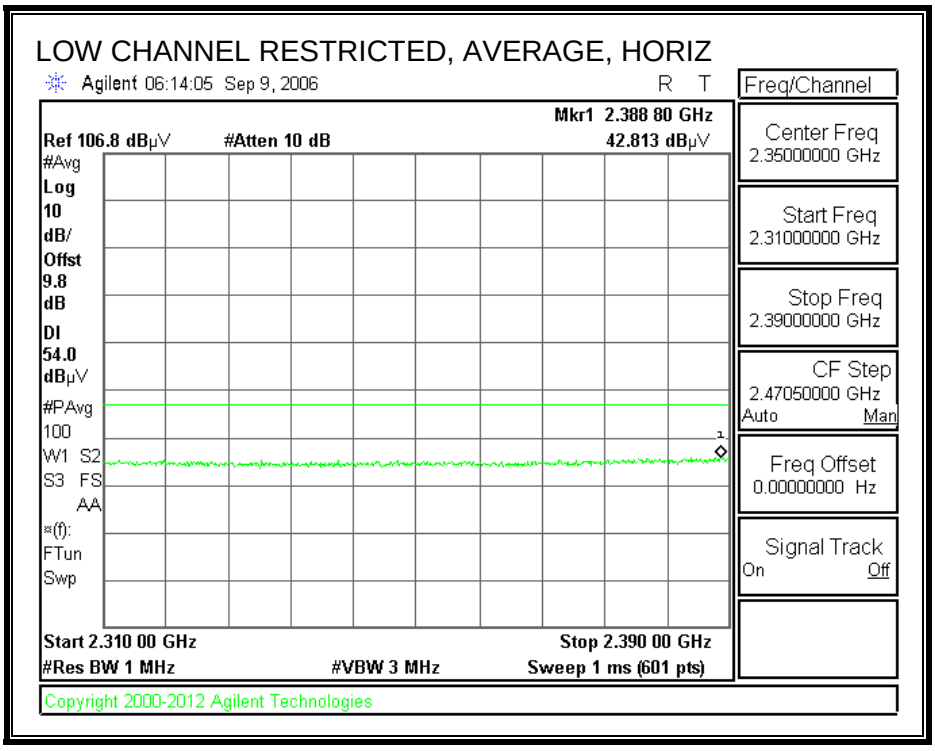
This report shall not be reproduced except in full, without the written approval of UL CCS.

9.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

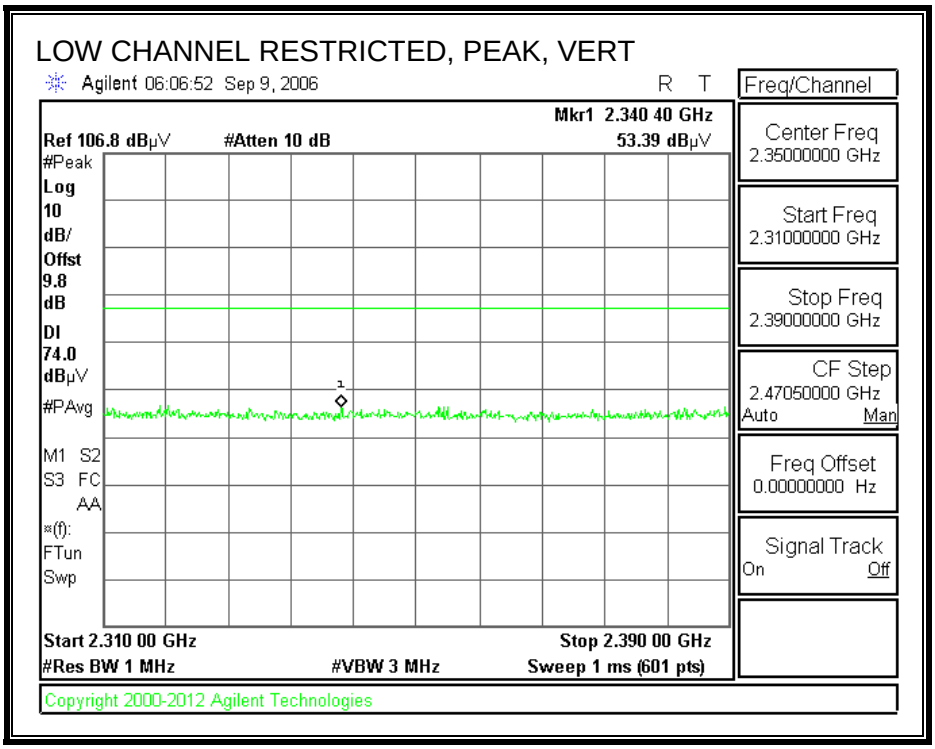


This report shall not be reproduced except in full, without the written approval of UL CCS.

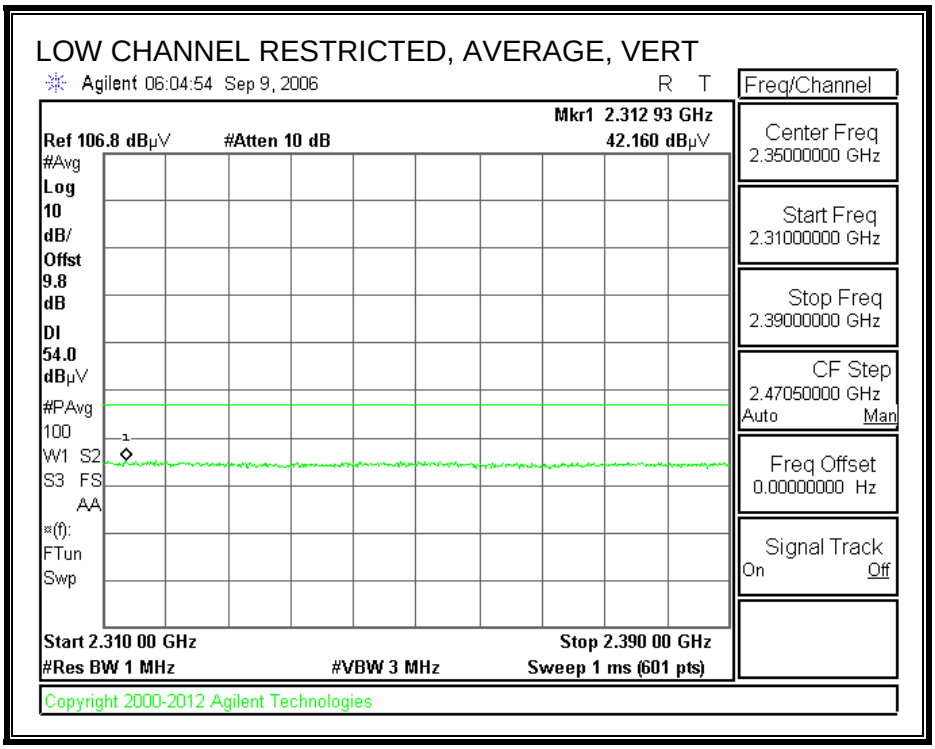


Actual Average = Measured Average + Correction Factor
= 42.777 dBuV + 1.58
= 44.357 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.



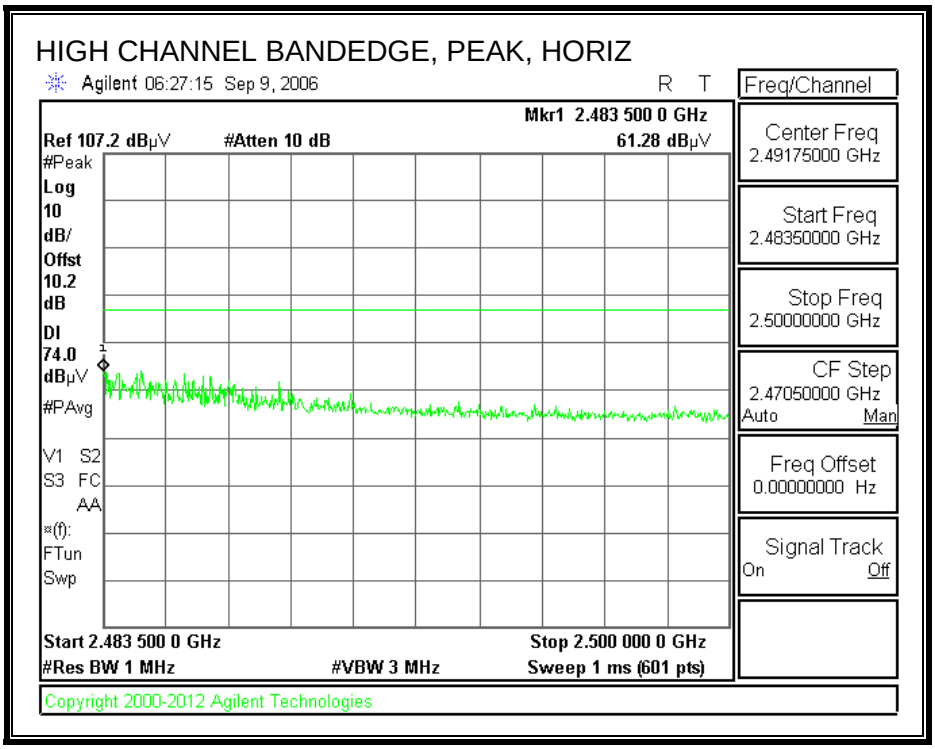
This report shall not be reproduced except in full, without the written approval of UL CCS.



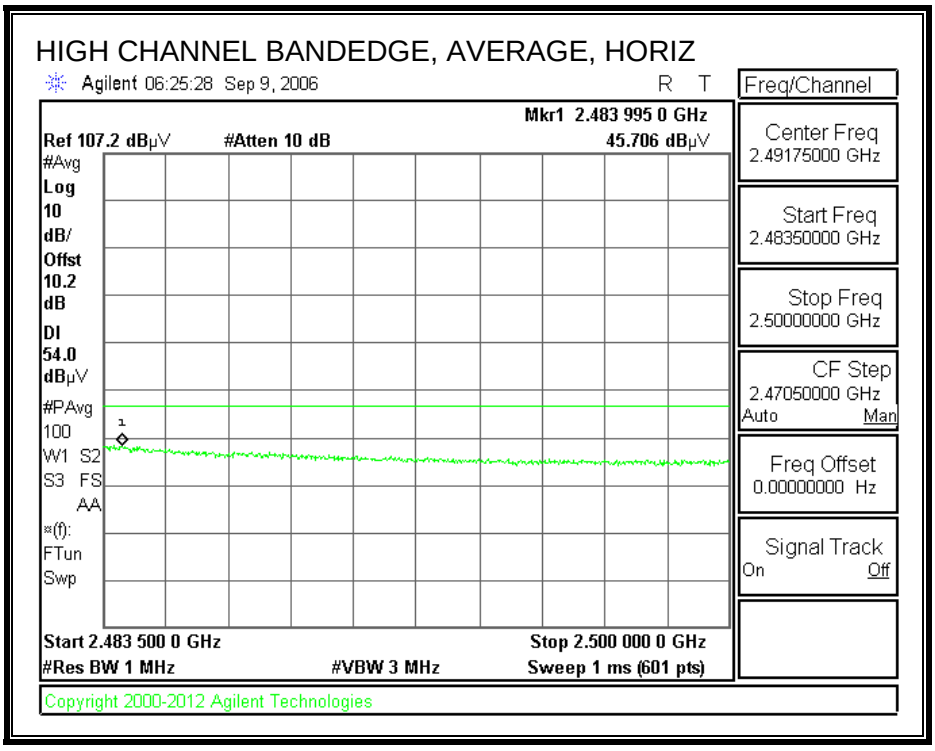
Actual Average = Measured Average + Correction Factor
= 41.481 dBuV + 1.58
= 43.061 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.

AUTHORIZED BANDEDGE (HIGH CHANNEL)

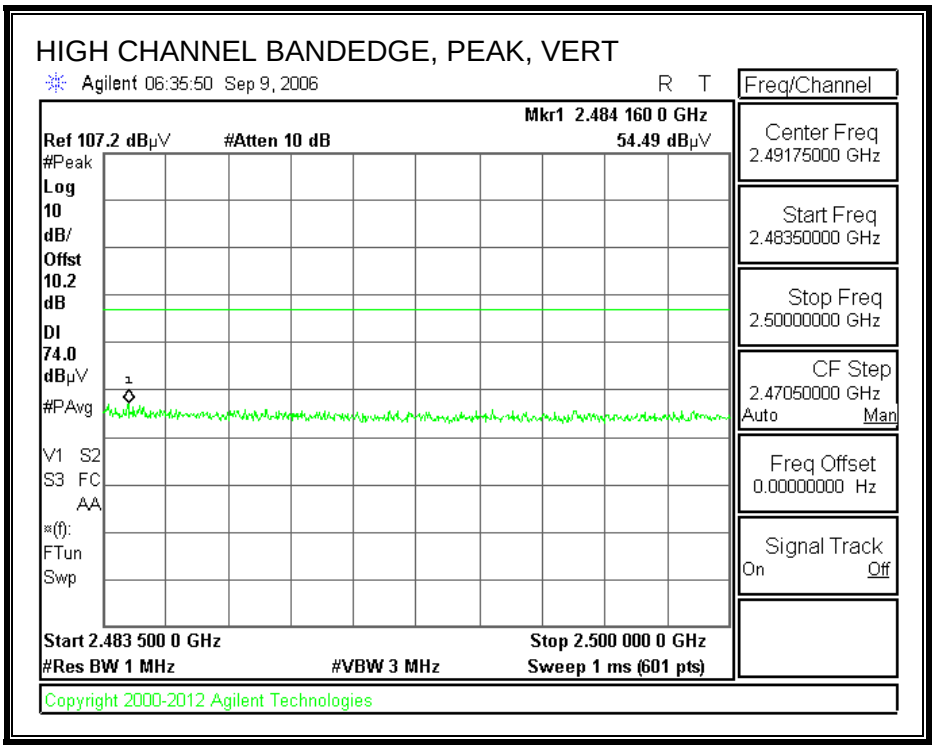


This report shall not be reproduced except in full, without the written approval of UL CCS.

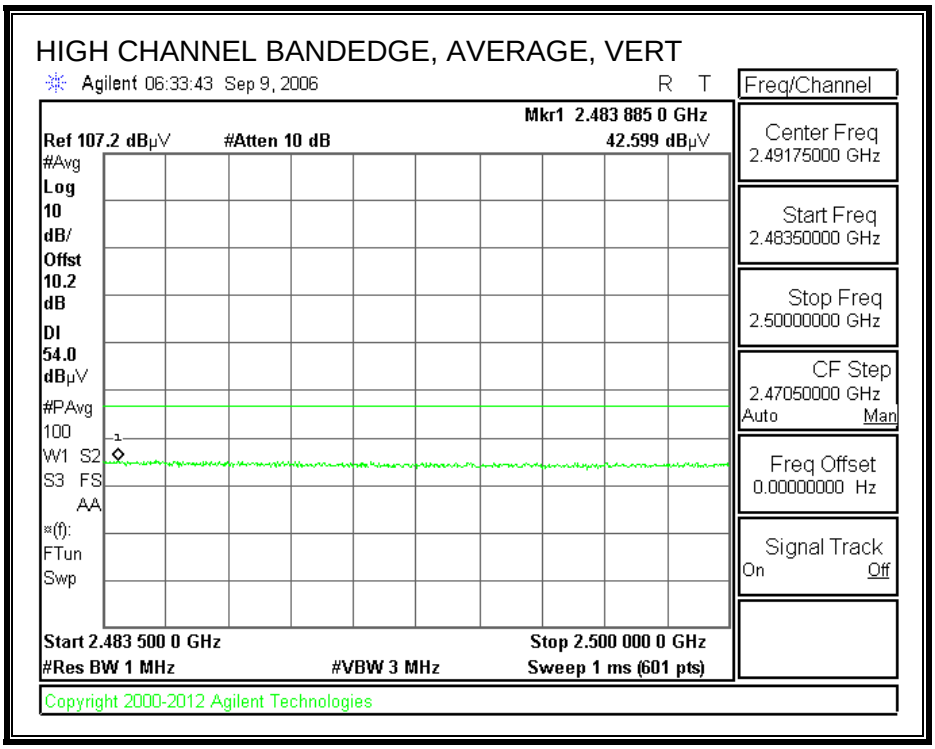


Actual Average = Measured Average + Correction Factor
= 43.069 dBuV + 1.58
= 44.649 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.



This report shall not be reproduced except in full, without the written approval of UL CCS.

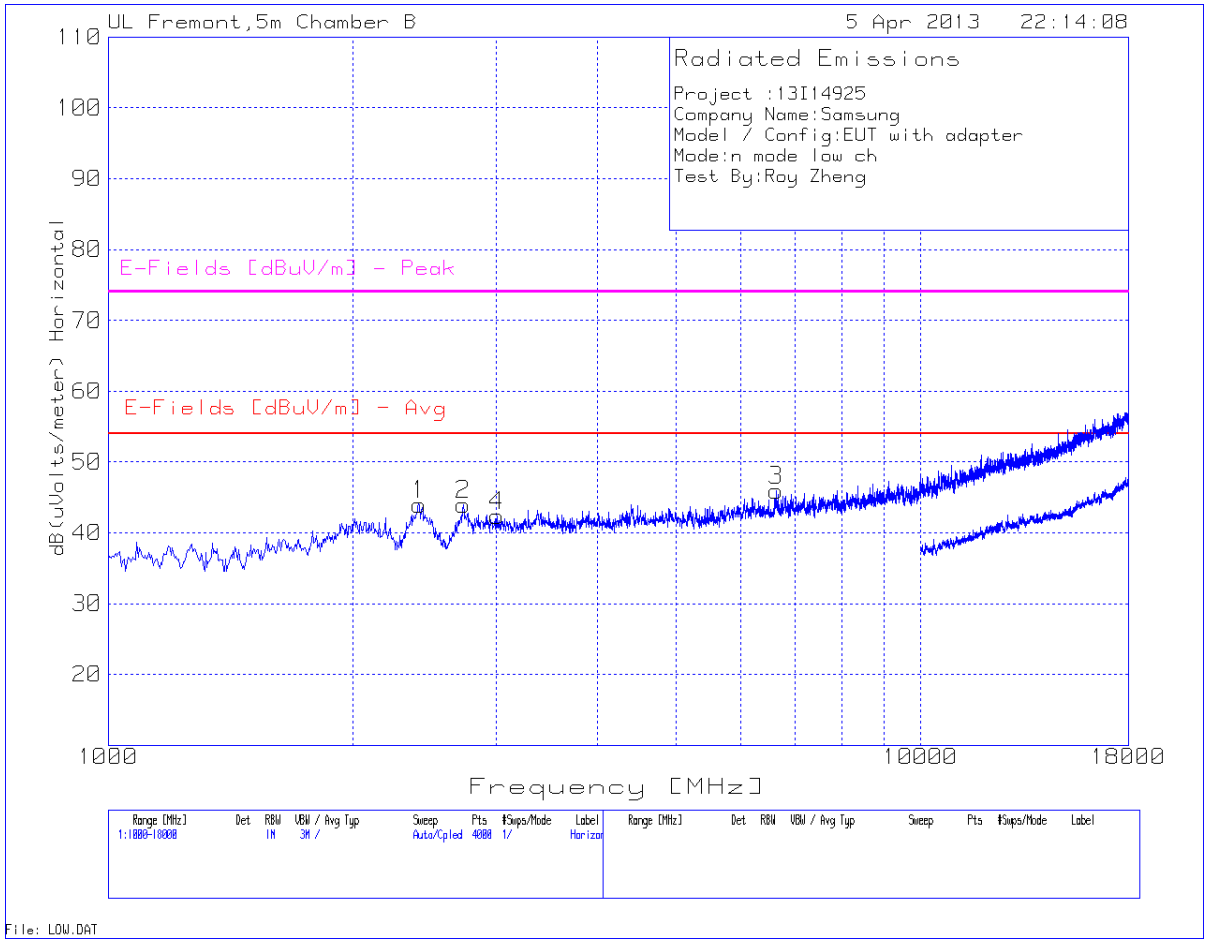


Actual Average = Measured Average + Correction Factor
= 41.169 dBuV + 1.58
= 42.749 dBuV

This report shall not be reproduced except in full, without the written approval of UL CCS.

HARMONICS AND SPURIOUS EMISSIONS

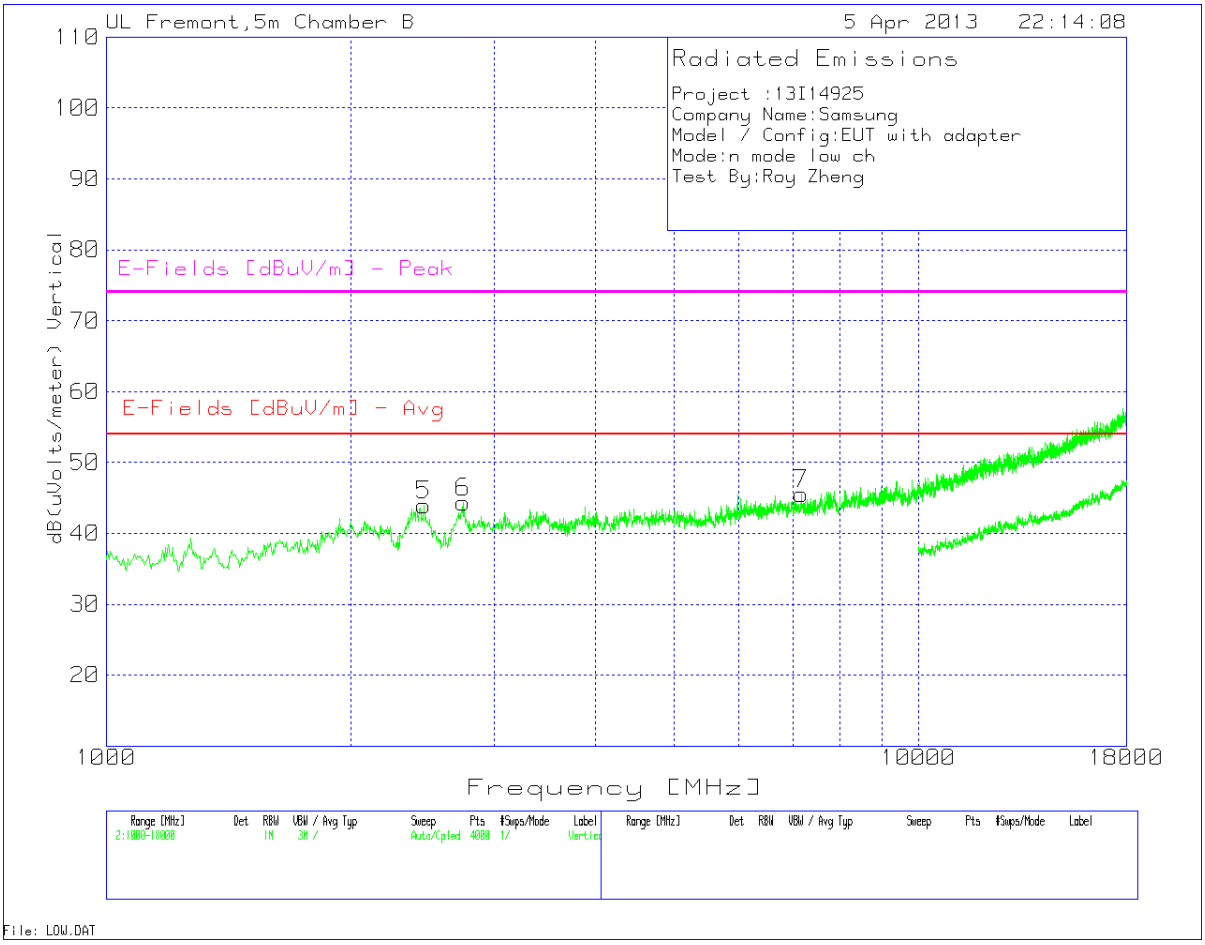
Low Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Low Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:n mode low ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

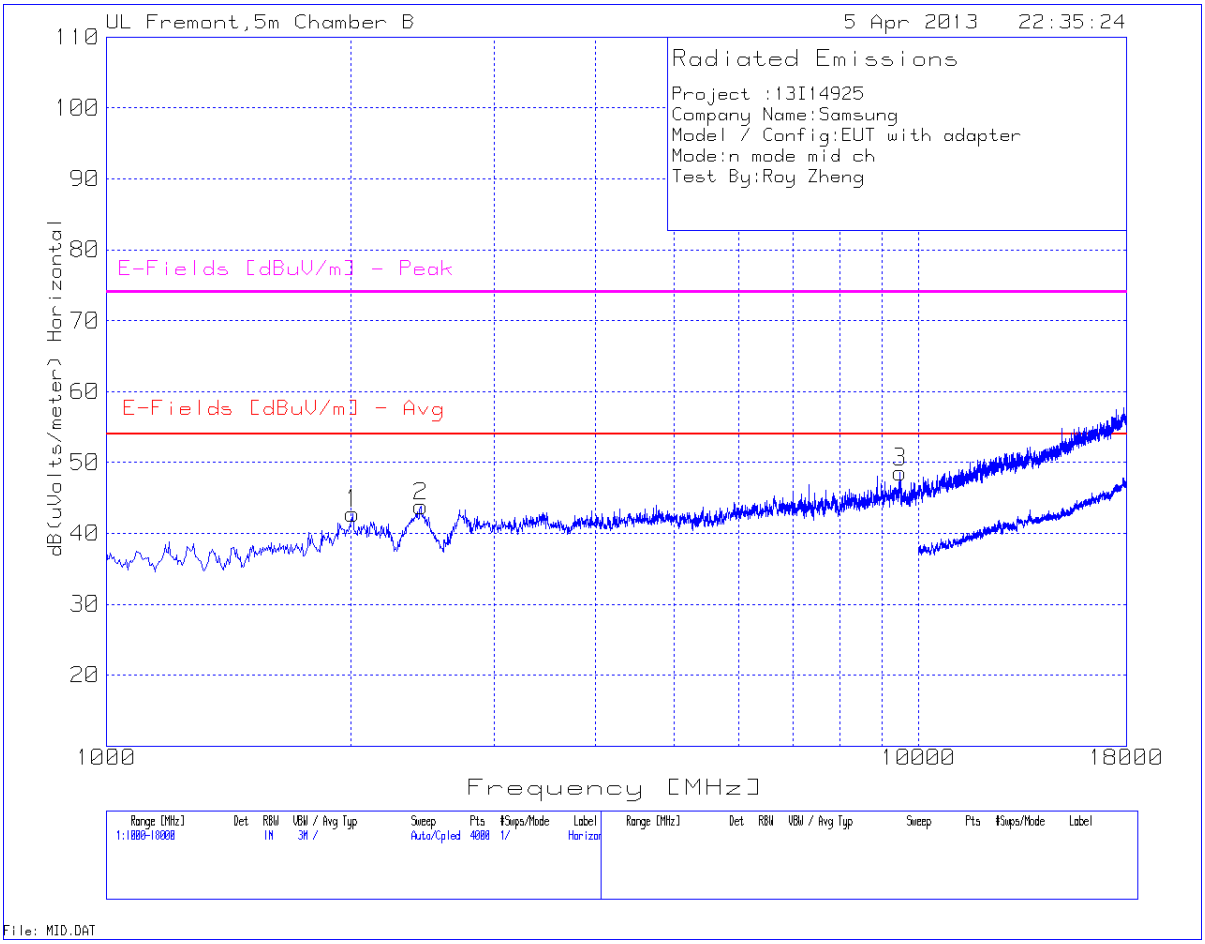
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolt s/meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin	Avg Margin
1	2418.436	41.11	PK	32.4	-35	4.6	0.9	44.01	74	54	-29.99	-9.99
2	2736.947	40.38	PK	32.8	-35.1	5	0.9	43.98	74	54	-30.02	-10.02
3	6635.523	36.46	PK	35.8	-35	8.4	0.3	45.96	74	54	-28.04	-8.04
4	3012.99	38.34	PK	33.1	-35.2	5.3	0.8	42.34	74	54	-31.66	-11.66

Vertical 1000 - 18000MHz

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolt s/meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Peak Margin	Avg Margin
5	2460.904	40.98	PK	32.4	-35	4.7	0.9	43.98	74	54	-30.02	-10.02
6	2749.688	40.79	PK	32.8	-35.1	5	0.9	44.39	74	54	-29.61	-9.61
7	7174.869	35.69	PK	35.8	-35	8.8	0.3	45.59	74	54	-28.41	-8.41

This report shall not be reproduced except in full, without the written approval of UL CCS.

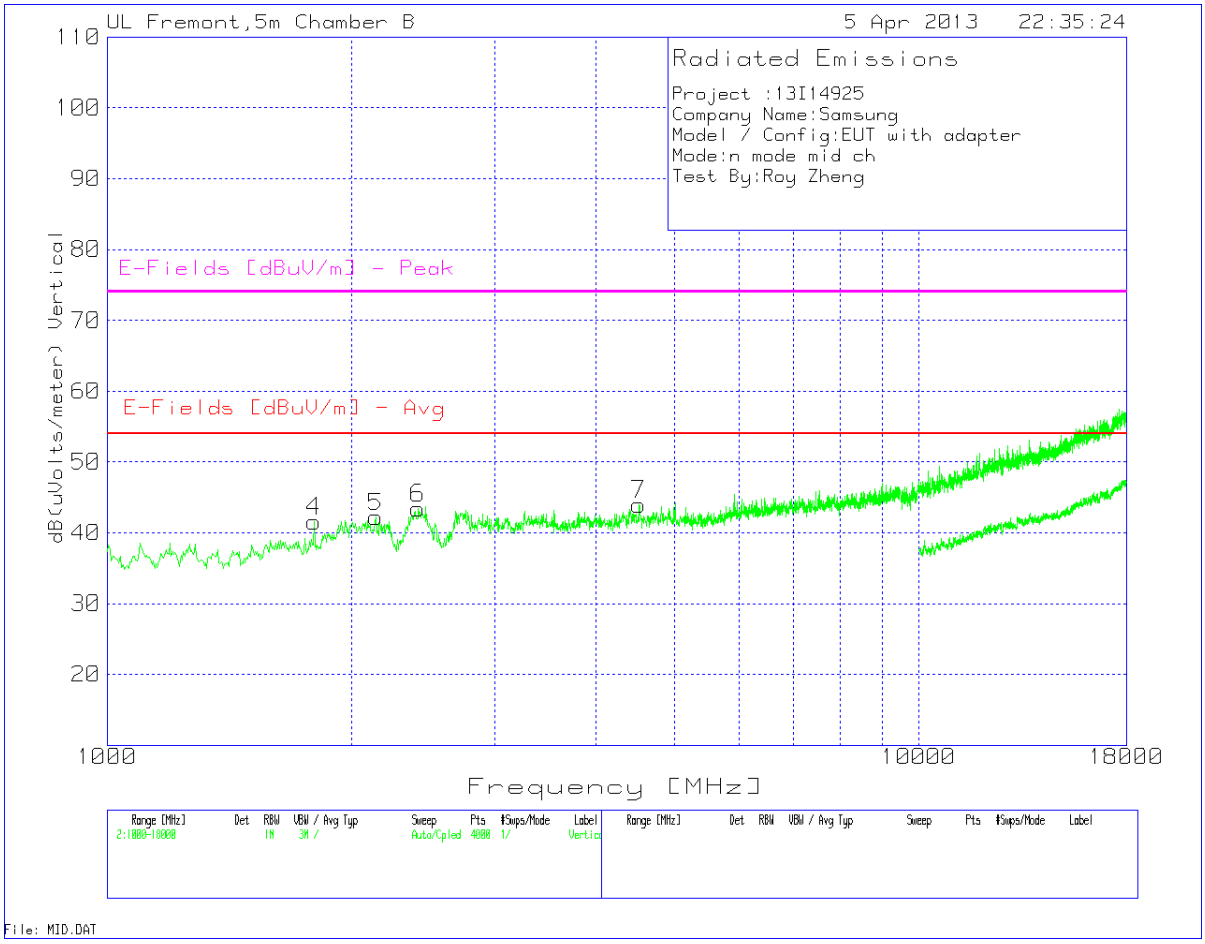
Mid Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

Mid Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:n mode mid ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

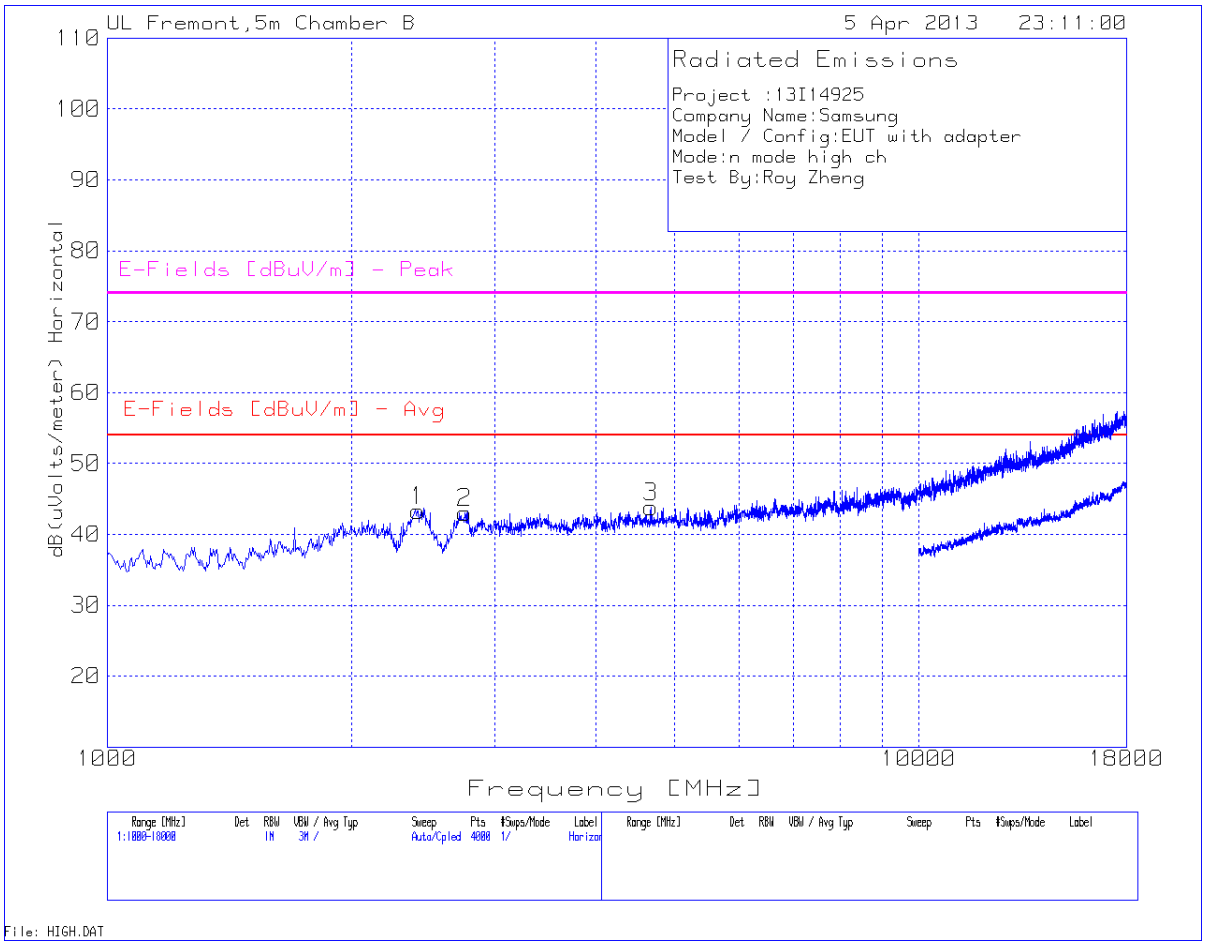
Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolt s/meter)	[dBuV/m] - Peak	[dBuV/m] - Avg	Peak Margin (dB)	Avg Margin (dB)
1	2010.742	40.87	PK	31.8	-35	4.2	0.9	42.77	74	54	-31.23	-11.23
2	2439.67	40.77	PK	32.4	-35	4.7	0.9	43.77	74	54	-30.23	-10.23
3	9489.383	35.86	PK	37.2	-35.1	10.2	0.4	48.56	74	54	-25.44	-5.44

Vertical 1000 - 18000MHz

Marker No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolt s/meter)	[dBuV/m] - Peak	[dBuV/m] - Peak	Peak Margin (dB)	Avg Margin (dB)
4	1798.401	41.64	PK	30.4	-35.1	4	0.7	41.64	74	54	-32.36	-12.36
5	2142.393	39.88	PK	32	-35	4.4	0.9	42.18	74	54	-31.82	-11.82
6	2418.436	40.55	PK	32.4	-35	4.6	0.9	43.45	74	54	-30.55	-10.55
7	4524.856	37.4	PK	34.5	-34.9	6.8	0.2	44	74	54	-30	-10

This report shall not be reproduced except in full, without the written approval of UL CCS.

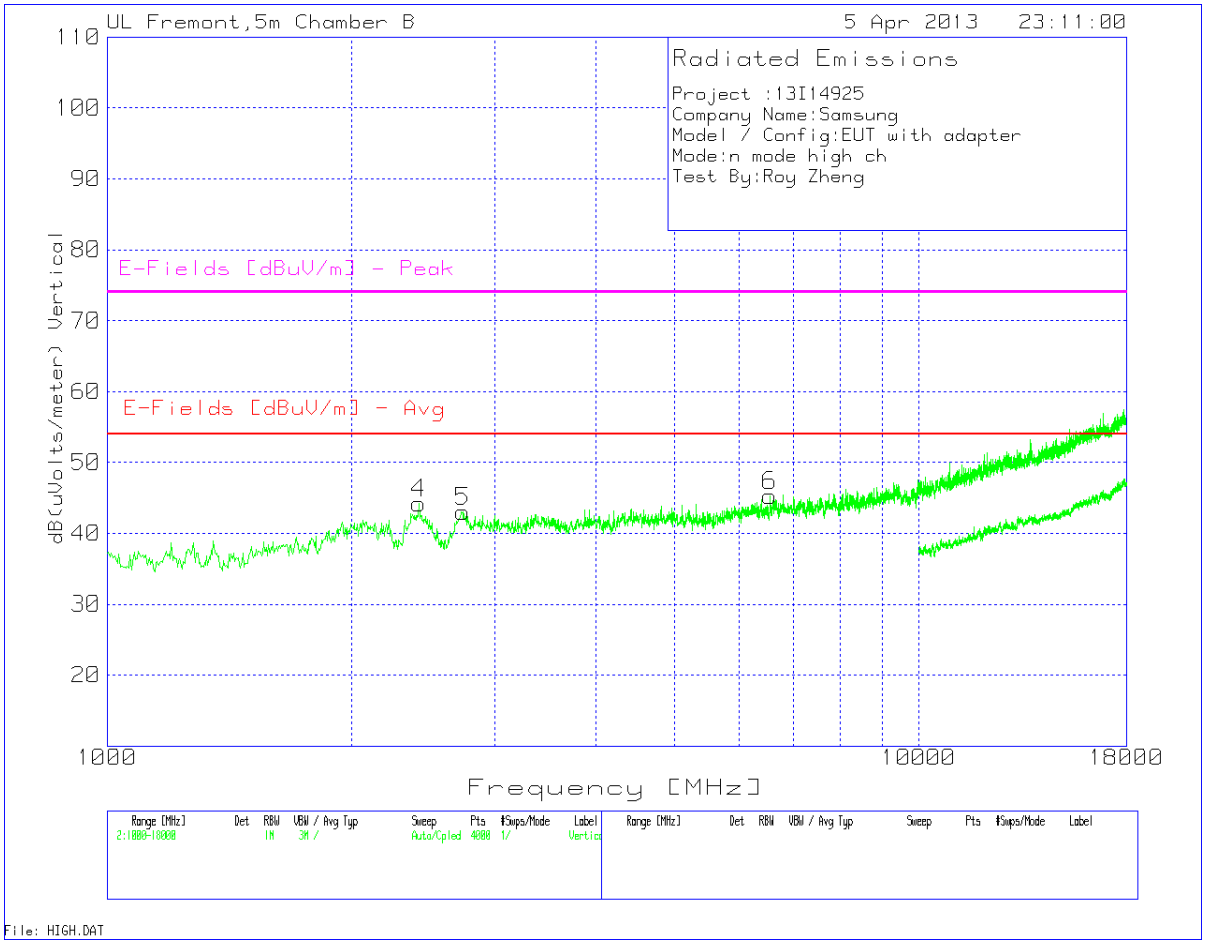
High Channel Horizontal



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel Vertical



Note: Spurious measurement from 1 ~ 18GHz was re-measured in average mode as shown in second line below the first full scan to ensure that device is passing average spec.

This report shall not be reproduced except in full, without the written approval of UL CCS.

High Channel

Project :13I14925
Company Name:Samsung
Model / Config:EUT with adapter
Mode:n mode high ch
Test By:Roy Zheng

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading (dBuV)	Detector	T345 Ant Factor	T145 Preamp	Cable Factor	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Margin (dB)-Peak	Margin (dB)-Avg
1	2418.436	40.43	PK	32.4	-35	4.6	0.9	43.33	74	54	-30.67	-10.67
2	2758.181	39.49	PK	32.8	-35.1	5	0.9	43.09	74	54	-30.91	-10.91
3	4677.742	36.9	PK	34.6	-34.9	6.9	0.3	43.8	74	54	-30.2	-10.2

Vertical 1000 - 18000MHz

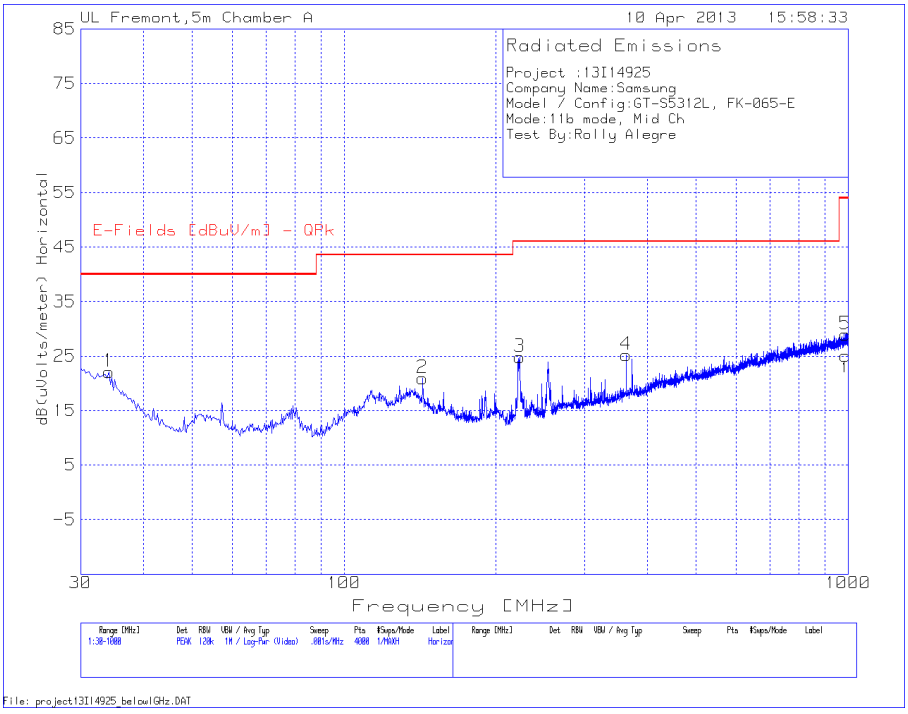
Marker No.	Frequency (MHz)	Meter Reading (dBuV)	Detector	Factor [dB/m]	Preamp Gain [dB]	Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Peak	E-Fields [dBuV/m] - Avg	Margin (dB)-Peak	Margin (dB)-Avg
4	2422.683	41.19	PK	32.4	-35	4.7	0.9	44.19	74	54	-29.81	-9.81
5	2741.194	39.46	PK	32.8	-35.1	5	0.9	43.06	74	54	-30.94	-10.94
6	6554.834	35.7	PK	35.9	-35	8.4	0.3	45.3	74	54	-28.7	-8.7

This report shall not be reproduced except in full, without the written approval of UL CCS.

9.3. WORST-CASE BELOW 1 GHz

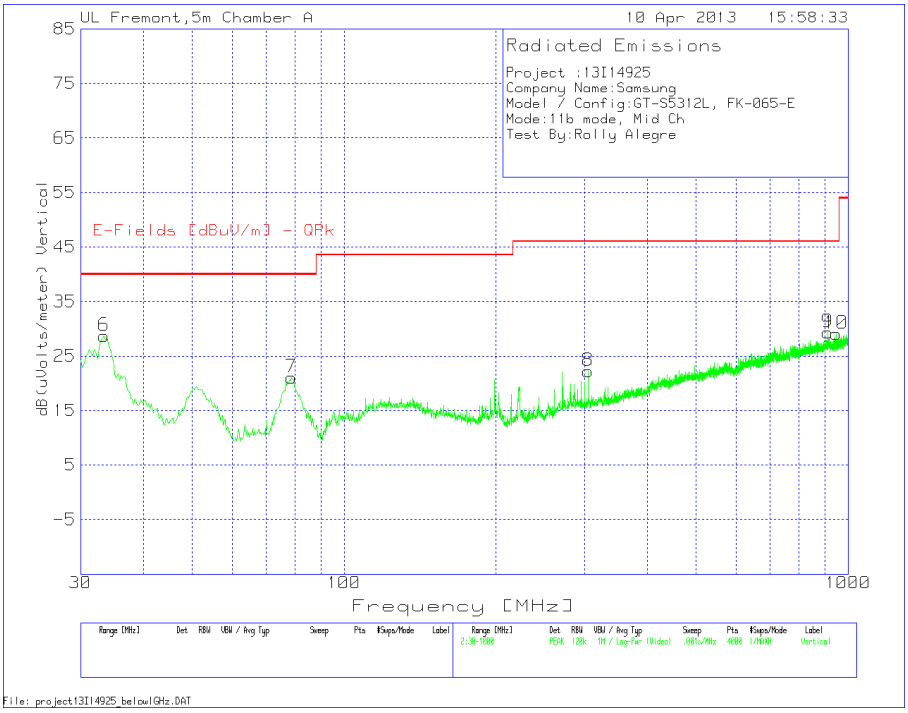
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



This report shall not be reproduced except in full, without the written approval of UL CCS.

VERTICAL PLOT



This report shall not be reproduced except in full, without the written approval of UL CCS.

HORIZONTAL AND VERTICAL DATA

Project :13I14925
Company Name:Samsung
Model / Config:GT-S5312L, FK-065-E
Mode:11b mode, Mid Ch
Test By:Rolly Alegre

Horizontal 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T185 Antenna Factor dB/m	T64 preamp/ cable loss [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - QPk	Margin (dB)	Height [cm]	Polarity
1	34.1194	31.57	PK	18.1	-27.6	22.07	40	-17.93	300	Horz
2	143.1626	34.79	PK	12.8	-26.7	20.89	43.52	-22.63	100	Horz
3	222.8853	40.06	PK	10.8	-26	24.86	46.02	-21.16	100	Horz
4	363.1876	35.83	PK	14.8	-25.4	25.23	46.02	-20.79	100	Horz
5	987.8841	28.61	PK	23	-22.7	28.91	53.97	-25.06	300	Horz

Vertical 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T185 Antenna Factor dB/m	T64 preamp/ cable loss [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - QPk	Margin (dB)	Height [cm]	Polarity
6	33.3925	37.67	PK	18.6	-27.6	28.67	40	-11.33	200	Vert
7	78.706	40.41	PK	7.8	-27.2	21.01	40	-18.99	200	Vert
8	305.0312	34.54	PK	13.5	-25.8	22.24	46.02	-23.78	200	Vert
9	910.3422	29.92	PK	22.4	-23	29.32	46.02	-16.7	200	Vert
10	948.3862	29.05	PK	22.6	-22.6	29.05	46.02	-16.97	200	Vert

This report shall not be reproduced except in full, without the written approval of UL CCS.

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

This report shall not be reproduced except in full, without the written approval of UL CCS.

RESULTS

6 WORST EMISSIONS

Project No:13I14925
Client Name:Samsung
Model/Device:S5312 EUT/AC Adapter/Headset
Test Volt/Freq:115VAC 60Hz
Test By:Angela Wang

Line-L1 .15 - 30MHz

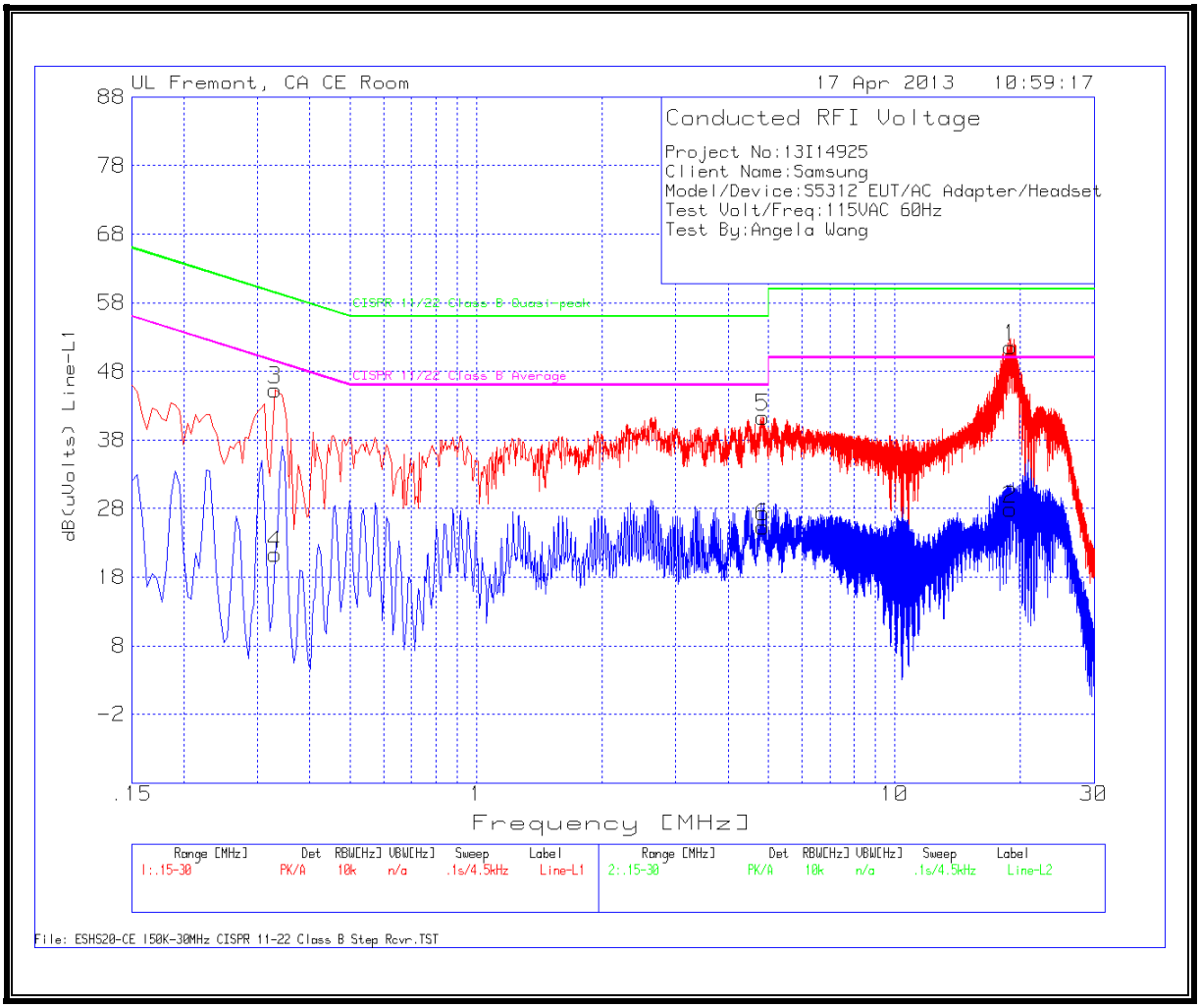
Test Frequency	Meter Reading (dBuV)	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin (dB)	CISPR 11/22 Class B Average	Margin (dB)
18.9285	51.17	PK	0.2	0.2	51.57	60	-8.43	-	-
18.9285	27.53	Av	0.2	0.2	27.93	-	-	50	-22.07
0.33	45.26	PK	0.1	0	45.36	59.5	-14.14	-	-
0.33	21.28	Av	0.1	0	21.38	-	-	49.5	-28.12
4.8525	41.17	PK	0.1	0.1	41.37	56	-14.63	-	-
4.8525	25.14	Av	0.1	0.1	25.34	-	-	46	-20.66

Line-L2 .15 - 30MHz

Test Frequency	Meter Reading (dBuV)	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin (dB)	CISPR 11/22 Class B Average	Margin (dB)
18.807	44.45	PK	0.3	0.2	44.95	60	-15.05	-	-
18.807	24.71	Av	0.3	0.2	25.21	-	-	50	-24.79
0.33	43.12	PK	0.1	0	43.22	59.5	-16.28	-	-
0.33	30.86	Av	0.1	0	30.96	-	-	49.5	-18.54
4.8705	34.94	PK	0.1	0.1	35.14	56	-20.86	-	-
4.8705	20.4	Av	0.1	0.1	20.6	-	-	46	-25.4

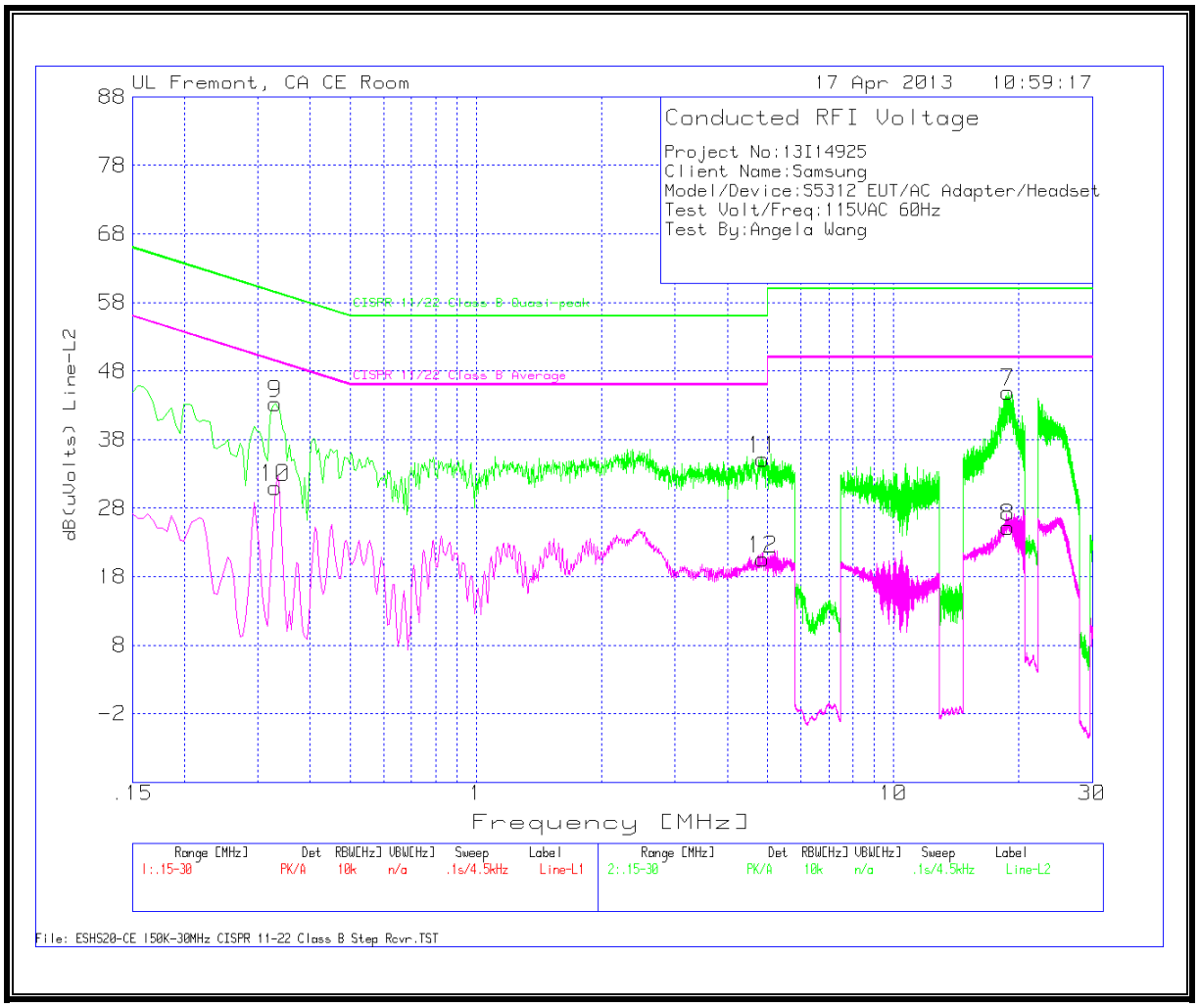
This report shall not be reproduced except in full, without the written approval of UL CCS.

LINE 1 RESULTS



This report shall not be reproduced except in full, without the written approval of UL CCS.

LINE 2 RESULTS



This report shall not be reproduced except in full, without the written approval of UL CCS.