



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GT-C3592, GT-C3590~BT3.0 + HS+GSM 850/1900MHz Feature phone

MODEL NUMBER: GT-C3592/ GT-C3590

FCC ID: A3LGTC3592

REPORT NUMBER: 13I15211-02

ISSUE DATE: June 17, 2013

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
--	06/17/13	Initial Issue	P. Kim

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. SOFTWARE AND FIRMWARE.....	7
5.5. WORST-CASE CONFIGURATION AND MODE.....	8
5.6. DESCRIPTION OF TEST SETUP.....	9
6. TEST AND MEASUREMENT EQUIPMENT	12
7. ANTENNA PORT TEST RESULTS	13
7.1.1. 20 dB BANDWIDTH.....	13
7.1.2.....	16
7.1.3. NUMBER OF HOPPING CHANNELS.....	20
7.1.4. AVERAGE TIME OF OCCUPANCY	23
7.1.5. OUTPUT POWER	27
7.1.6. AVERAGE POWER	31
7.1.7. CONDUCTED SPURIOUS EMISSIONS.....	32
7.2. ENHANCED DATA RATE 8PSK MODULATION	37
7.2.1. 20 dB BANDWIDTH.....	37
7.2.2. HOPPING FREQUENCY SEPARATION	43
7.2.3. NUMBER OF HOPPING CHANNELS.....	45
7.2.4. AVERAGE TIME OF OCCUPANCY	48
7.2.5. OUTPUT POWER	52
7.2.6. AVERAGE POWER	55
7.2.7. CONDUCTED SPURIOUS EMISSIONS.....	56
8. RADIATED TEST RESULTS.....	61
8.1. LIMITS AND PROCEDURE	61
8.2. TRANSMITTER ABOVE 1 GHz	62
8.2.1. BASIC DATA RATE GFSK MODULATION	62
8.2.2. ENHANCED DATA RATE 8PSK MODULATION	75
8.3. WORST-CASE BELOW 1 GHz.....	88

9. AC POWER LINE CONDUCTED EMISSIONS.....	91
10. SETUP PHOTOS	95

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: GT-C3592~BT3.0 +basic rates +HS+GSM 850/1900MHz Folder phone

MODEL: GT-C3592

SERIAL NUMBER: 3598805006975301(Rad) / 35598805006978701 (Cond)

DATE TESTED: May 29, 2013 – June 3, 2013

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

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

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

Approved & Released For
UL Verification Services Inc. By:

Tested By:



PHILIP KIM
WISE PROGRAM MANAGER
UL VERIFICATION SERVICES



STEVEN TRAN
WISE LAB TECHNICIAN
UL VERIFICATION SERVICES

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

BAR PHONE WITH BLUETOOTH

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	7.35	5.43
2402 - 2480	Enhanced 8PSK	7.39	5.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -5.09 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was rev. C3592.001. The hardware version is REV0.1.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	ETA3U30EBE	RT1D125FS/5-E	N/A
Headset	Samsung	GH59-11129H	N/A	N/A

I/O CABLES (CONDUCTED SETUP)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	USB	Shielded	1.0	N/A

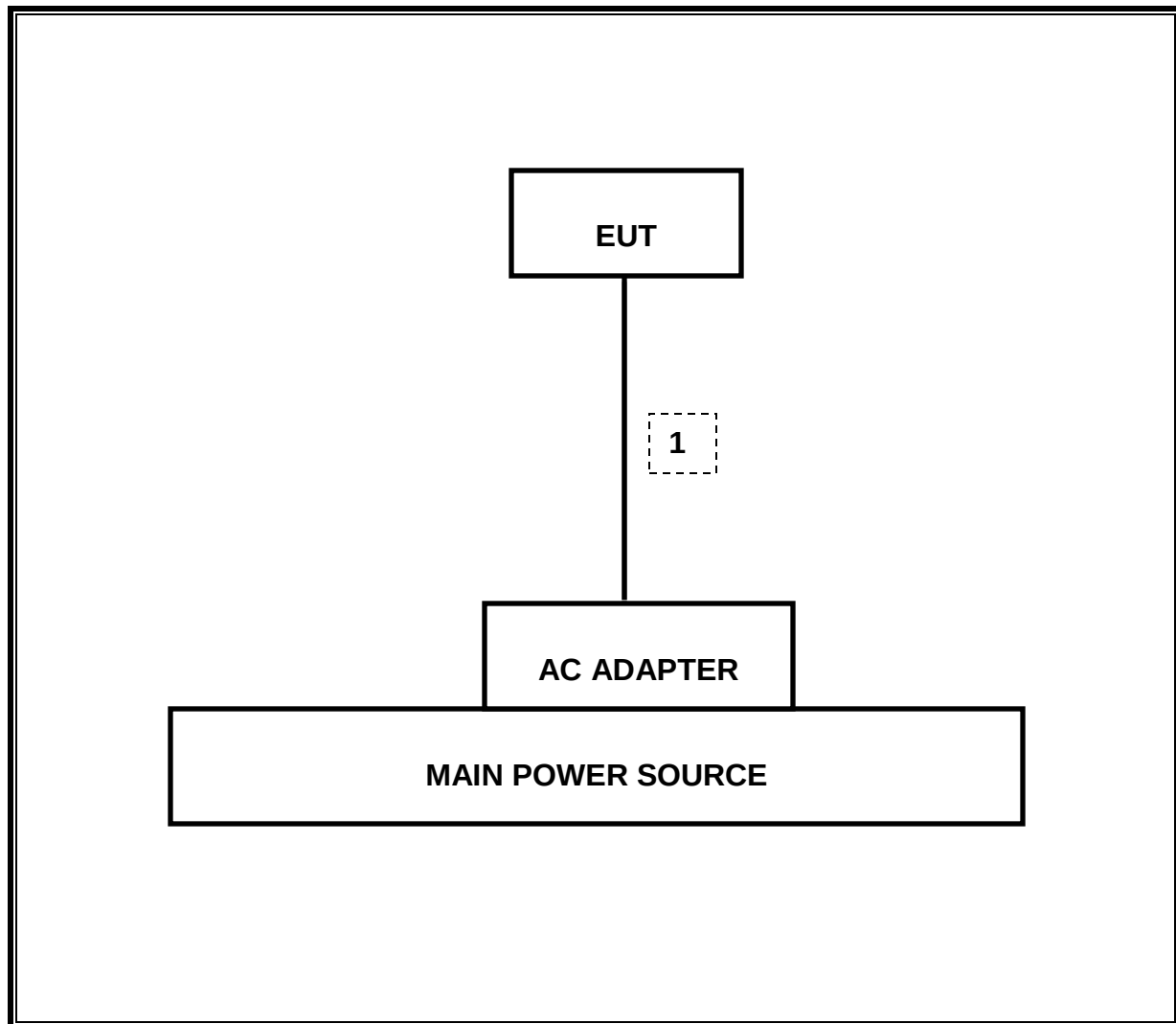
I/O CABLES (RADIATED SETUP)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	USB	Shielded	1.0	N/A
2	Audio	1	Headset	Un-Shielded	1.5	N/A

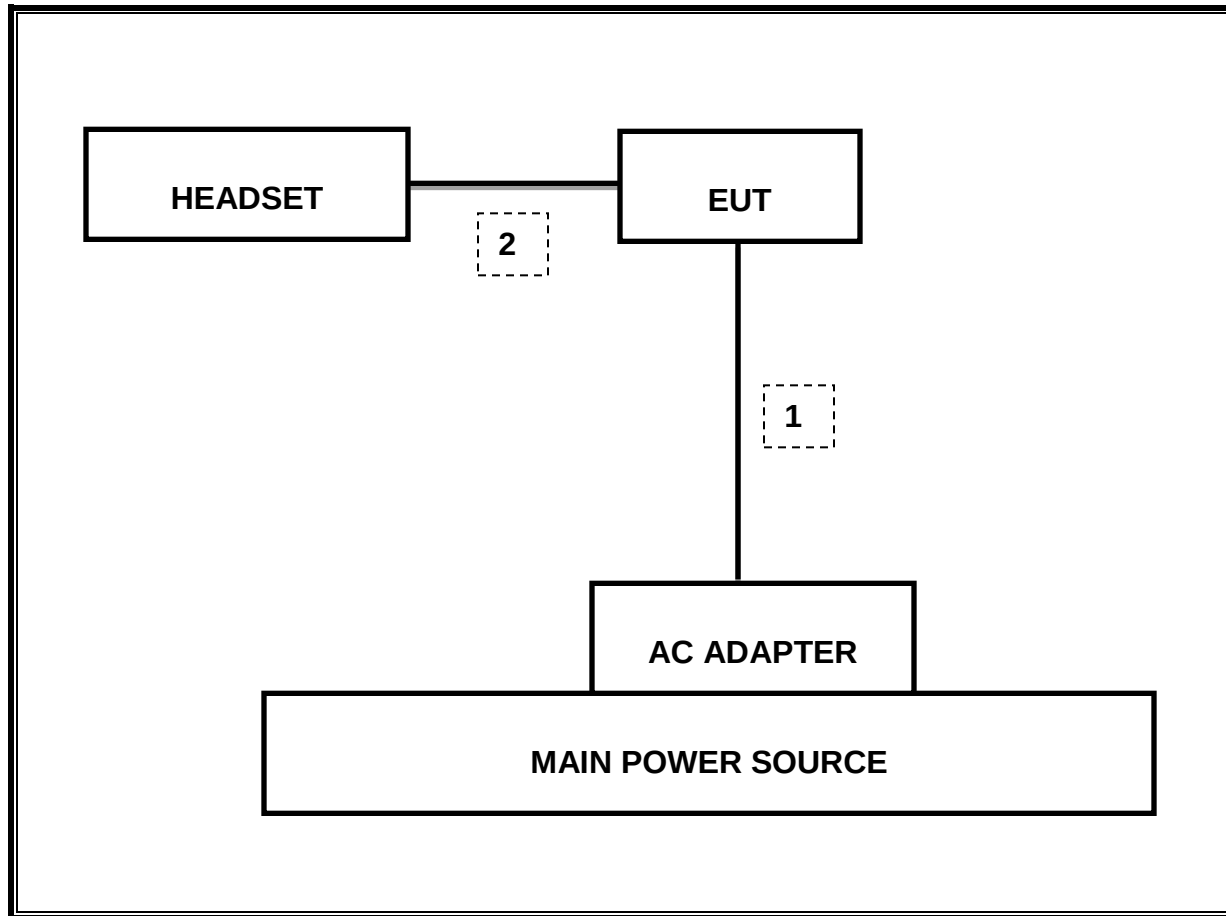
TEST SETUP

The EUT is with an AC adapter that was tested in the worst case orientation and configuration, where applicable, during the tests. Test software exercised the radio.

SETUP DIAGRAM FOR TESTS (CONDUCTED SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED SETUP)



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
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/28/14
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/13
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/13
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13
CBT Bluetooth Tester	R & S	CBT	None	04/11/14
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/13
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

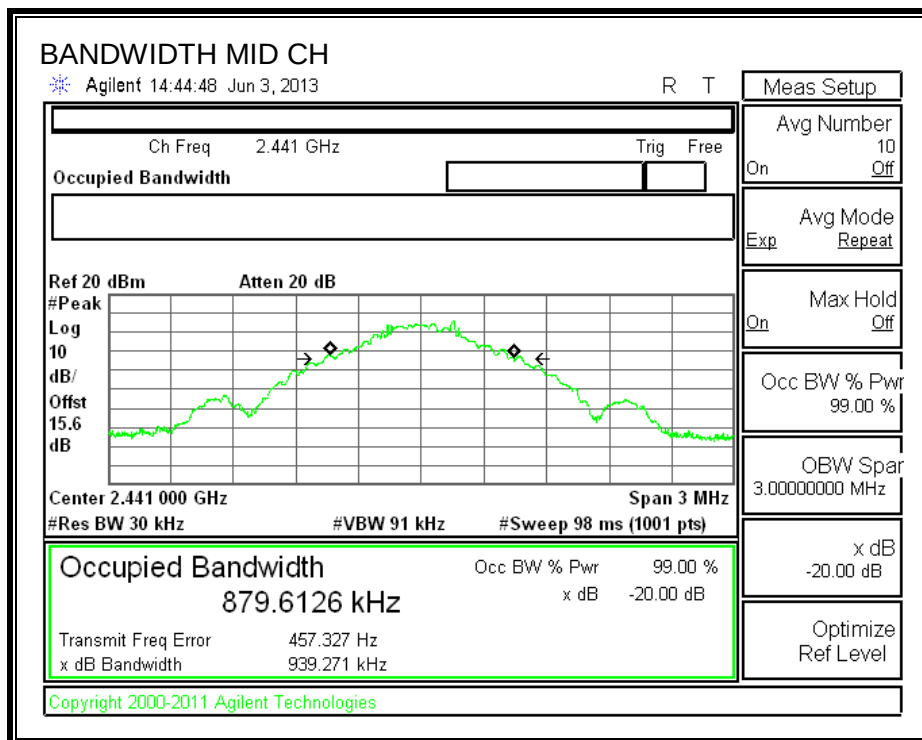
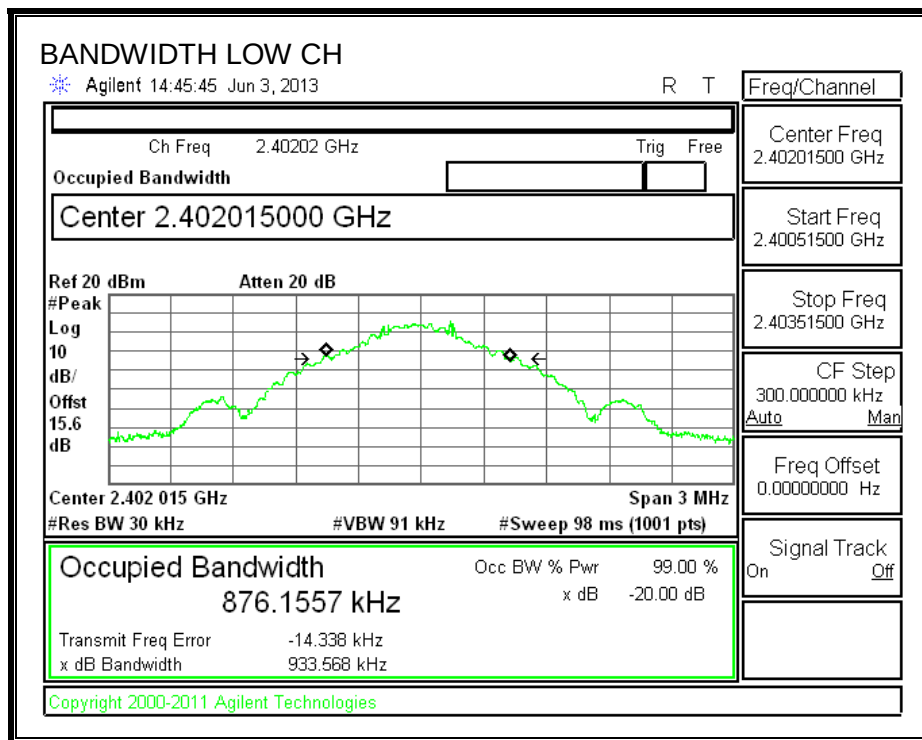
TEST PROCEDURE

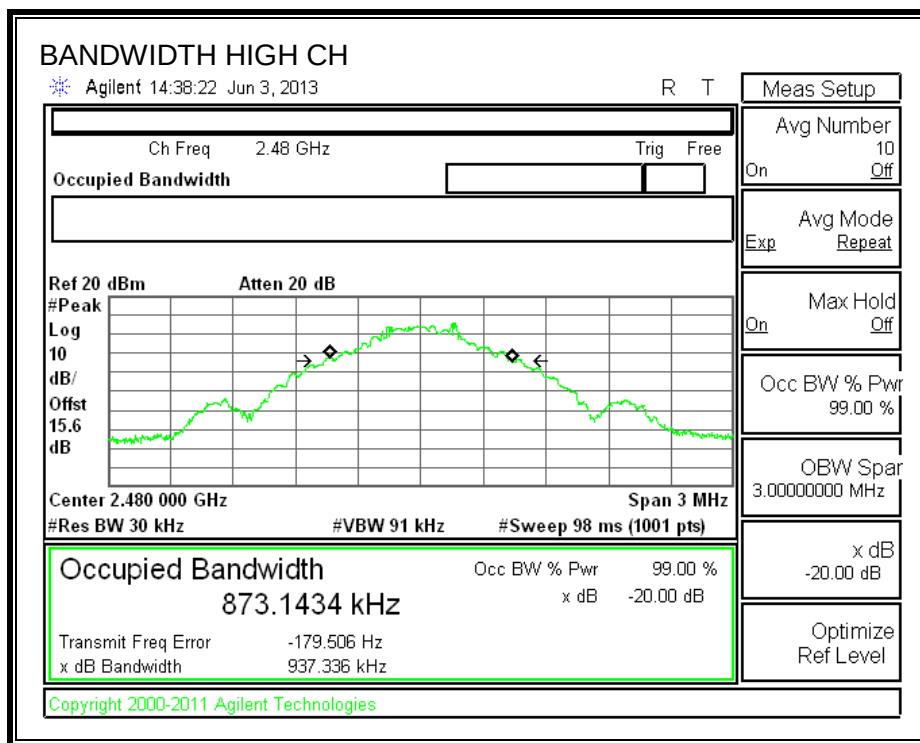
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

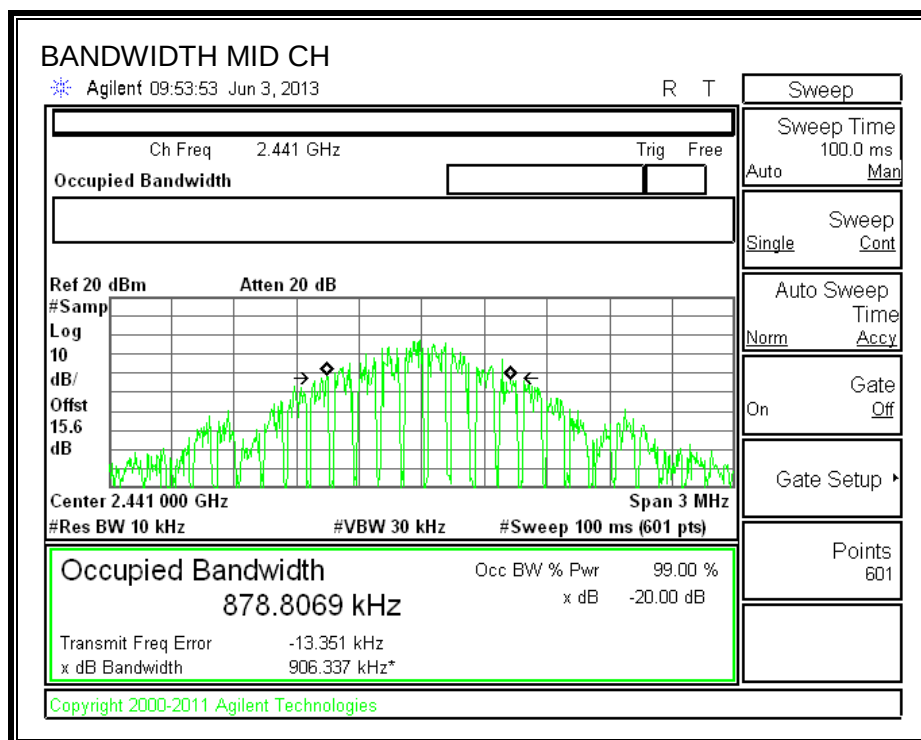
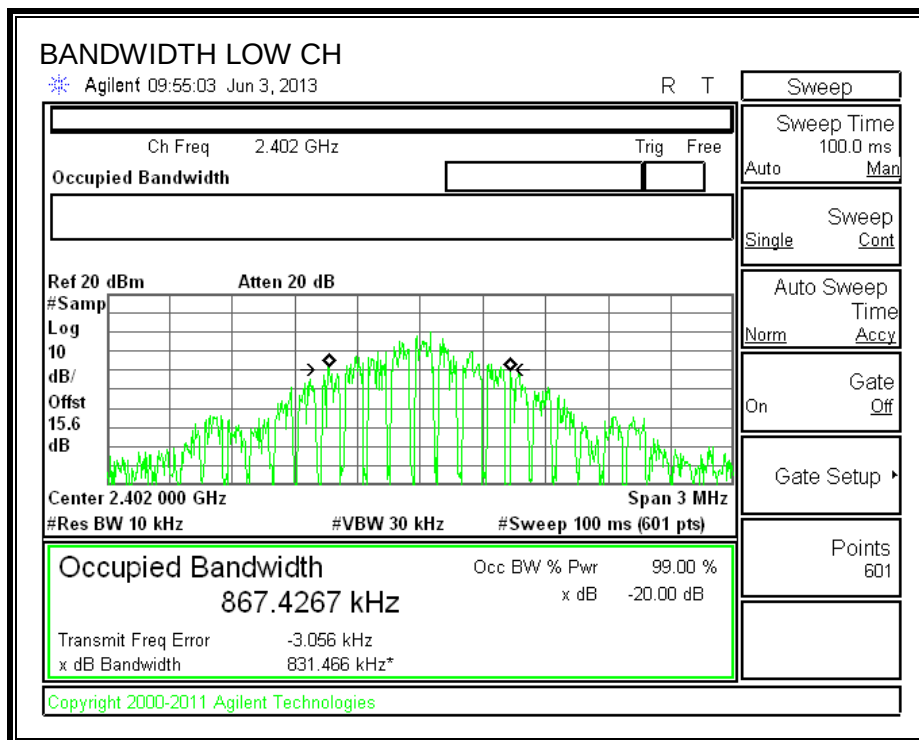
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	933.57	876.16
Middle	2441	939.27	879.61
High	2480	937.34	873.14

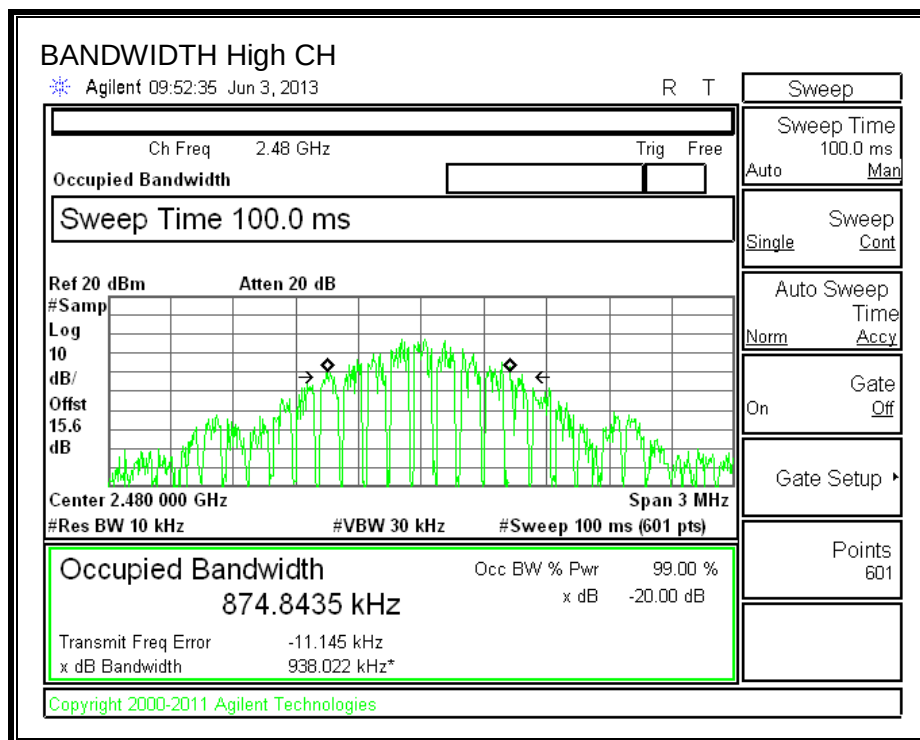
20 dB BANDWIDTH





7.1.2. 99% BANDWIDTH





7.1.3. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

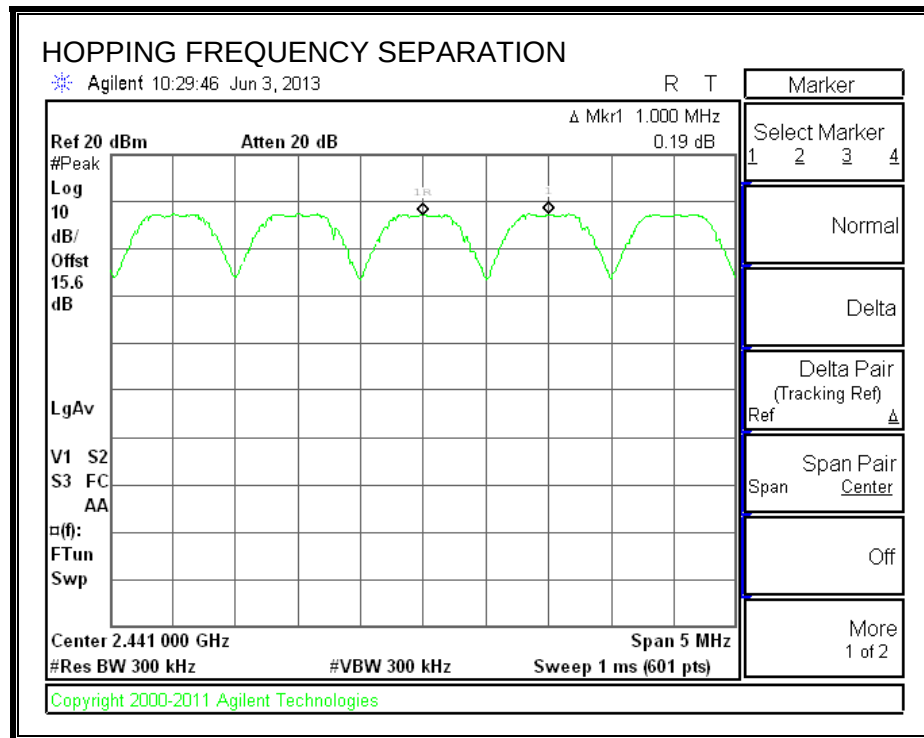
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.1.4. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

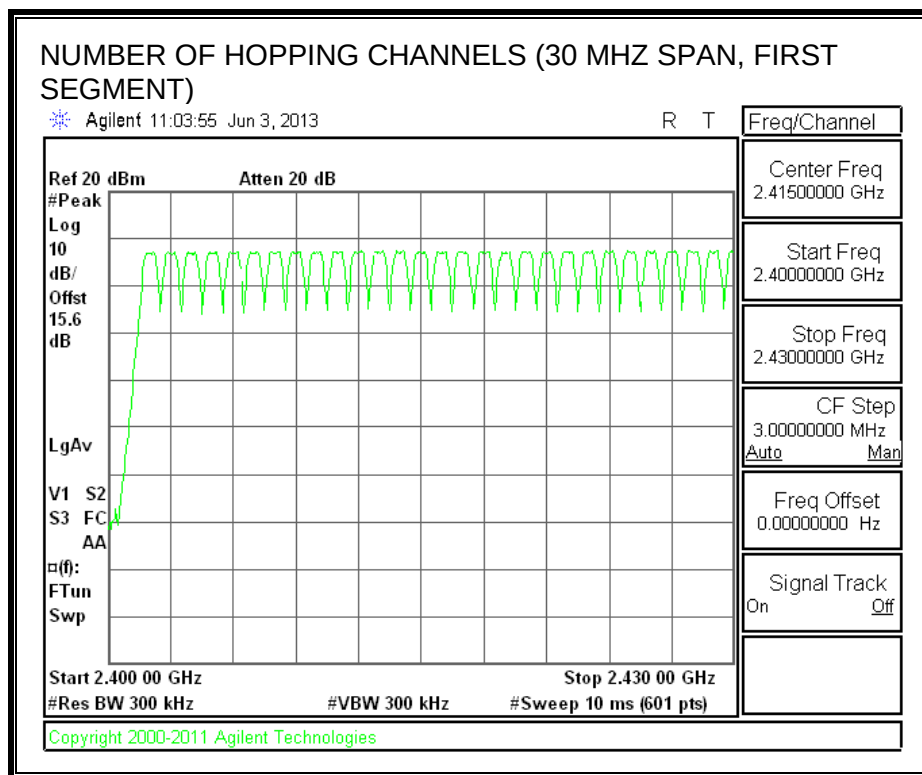
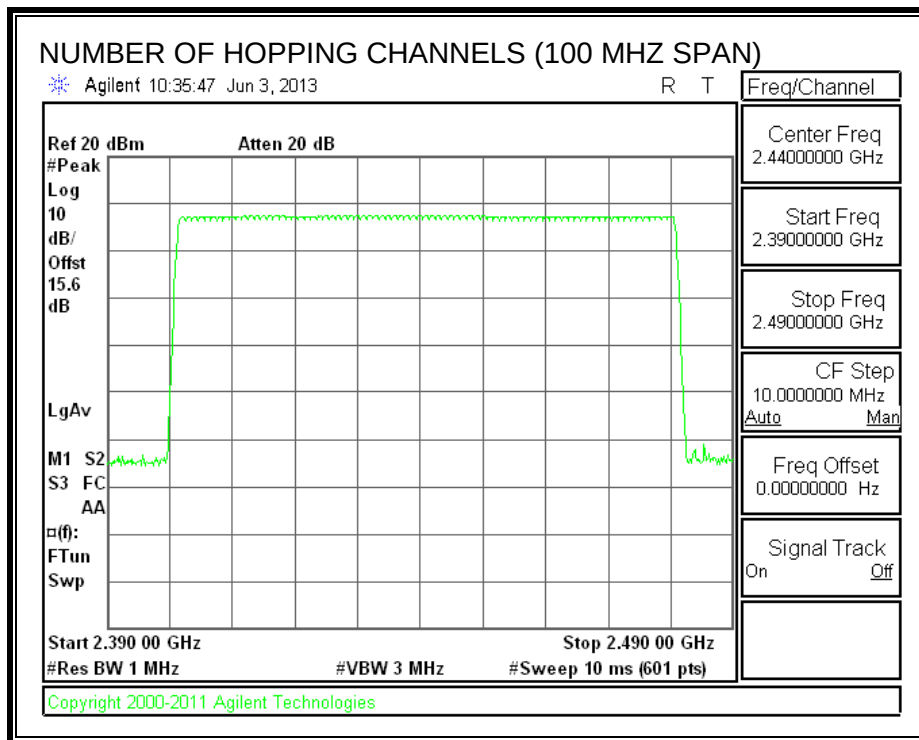
TEST PROCEDURE

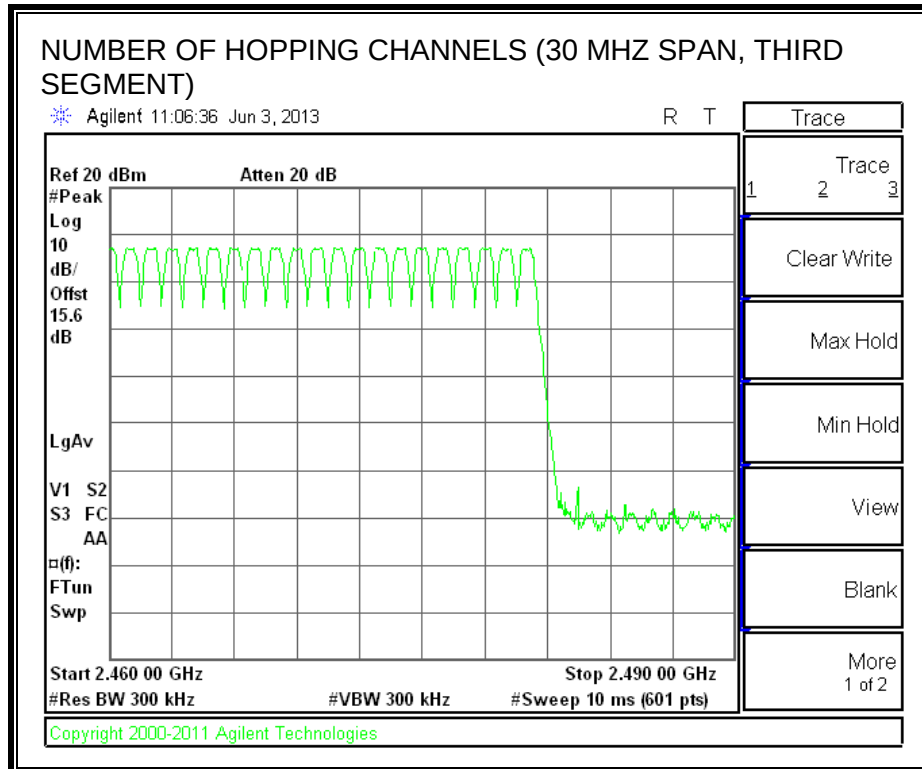
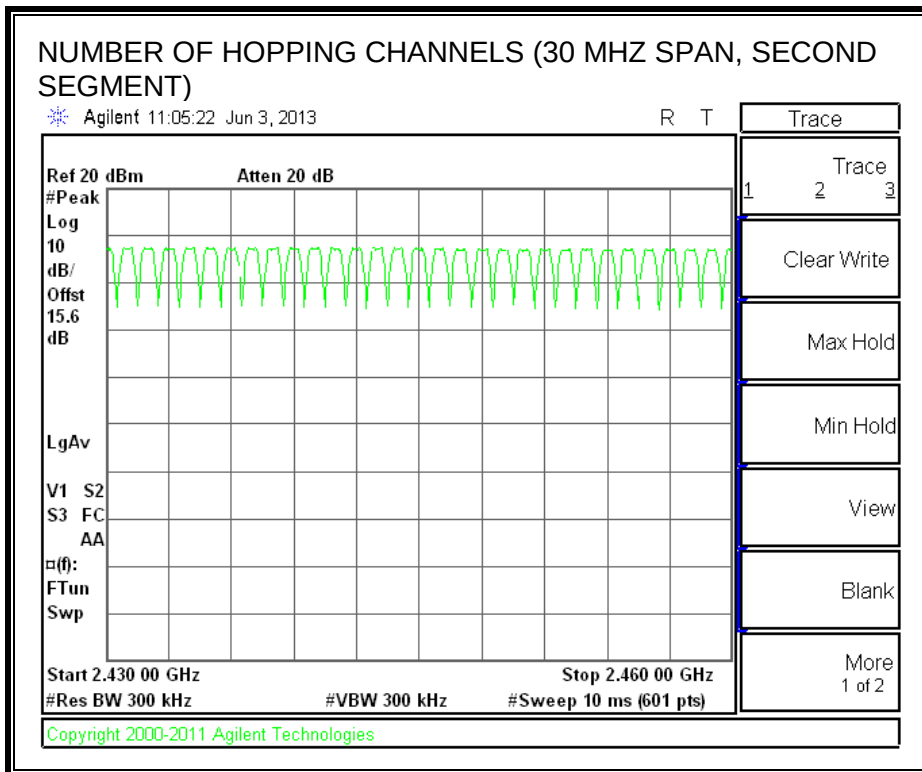
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





7.1.5. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

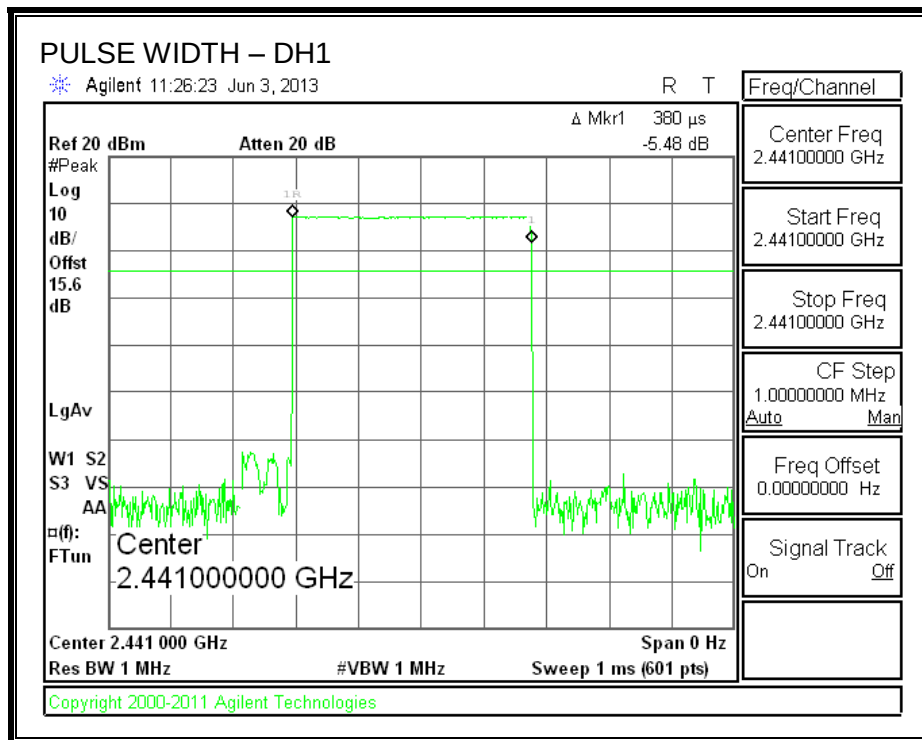
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{pulse width}$.

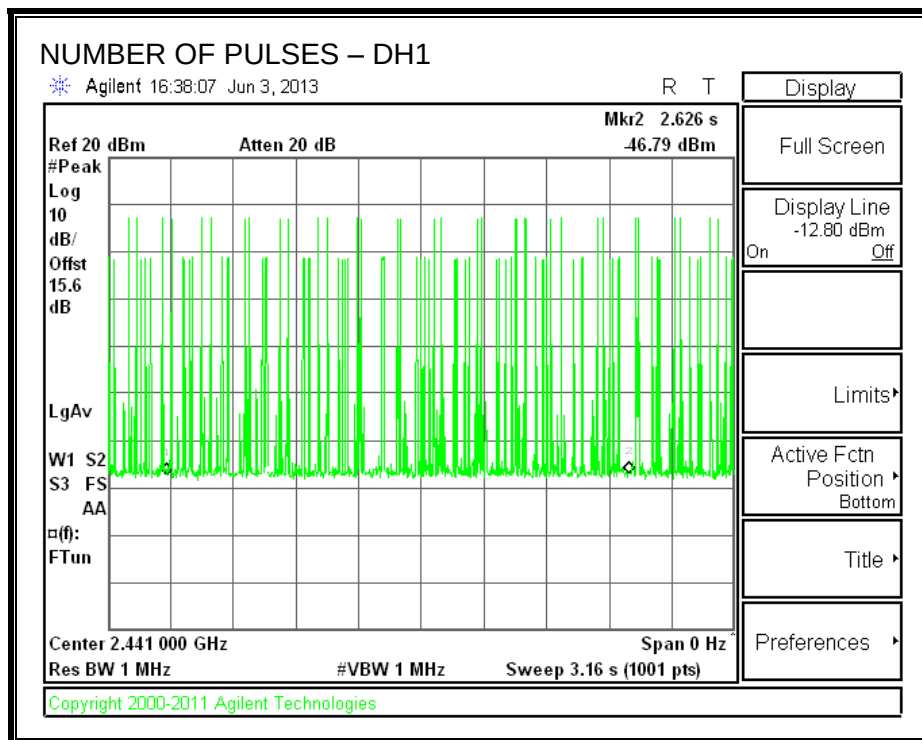
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.38	32	0.122	0.4	-0.278
DH3	1.64	14	0.230	0.4	-0.170
DH5	2.874	13	0.374	0.4	-0.026

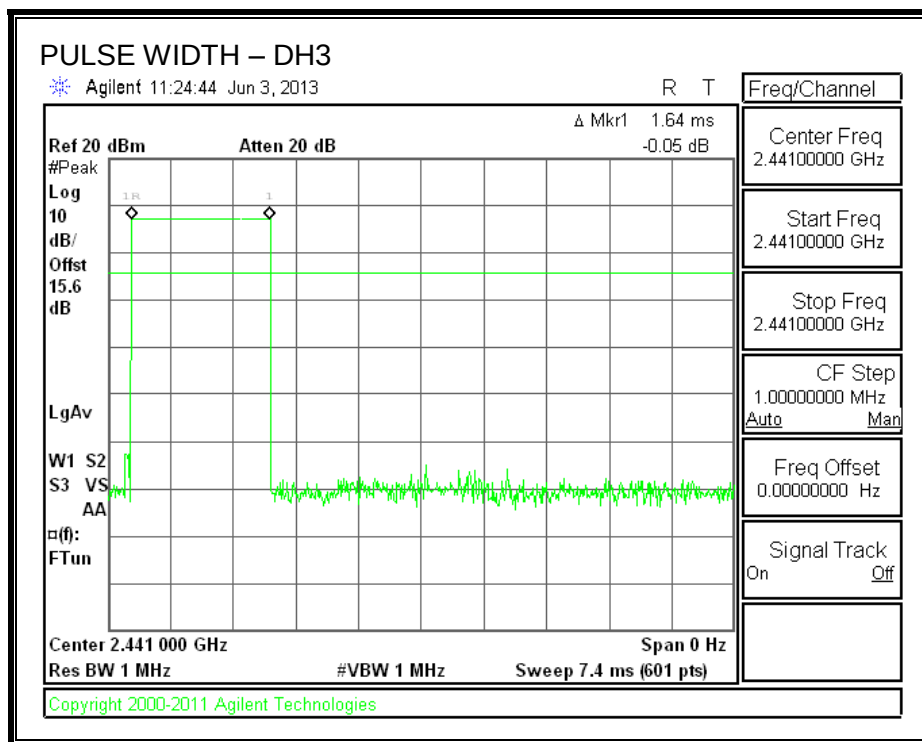
PULSE WIDTH - DH1



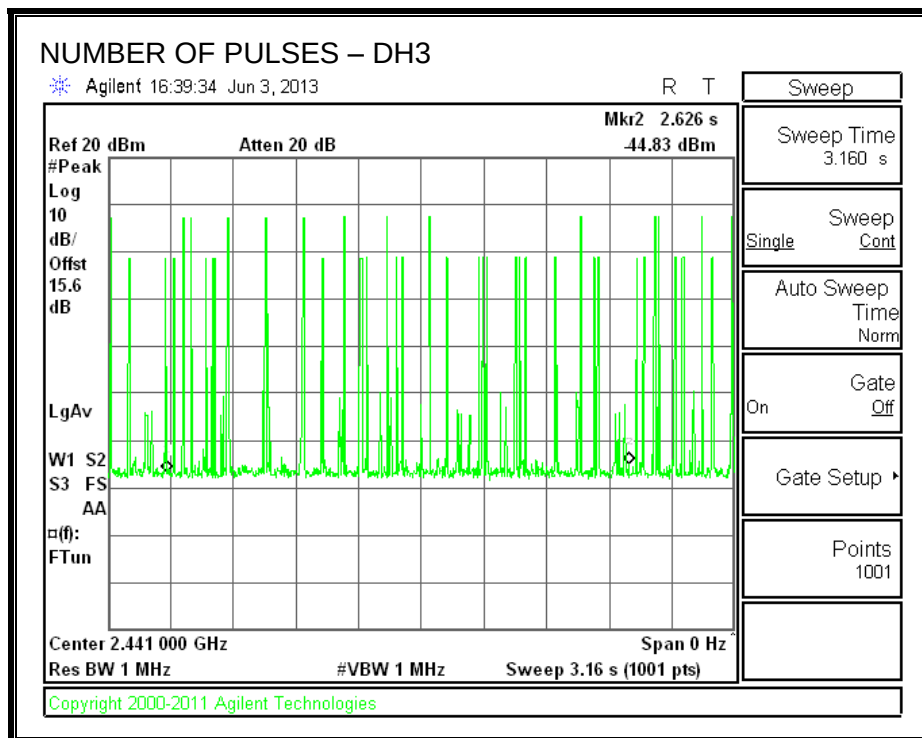
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



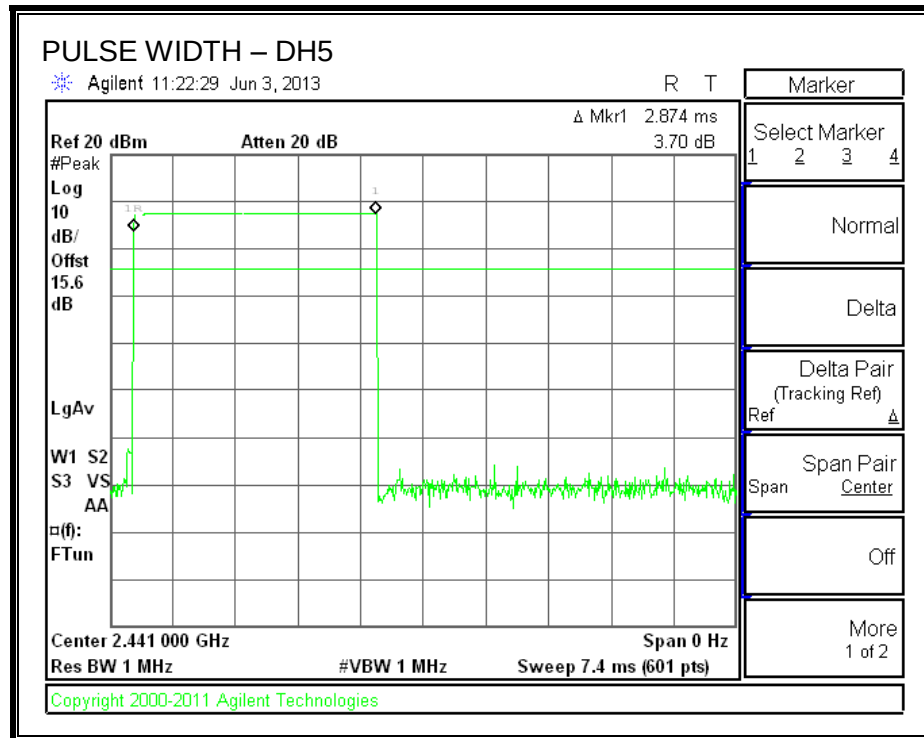
PULSE WIDTH – DH3



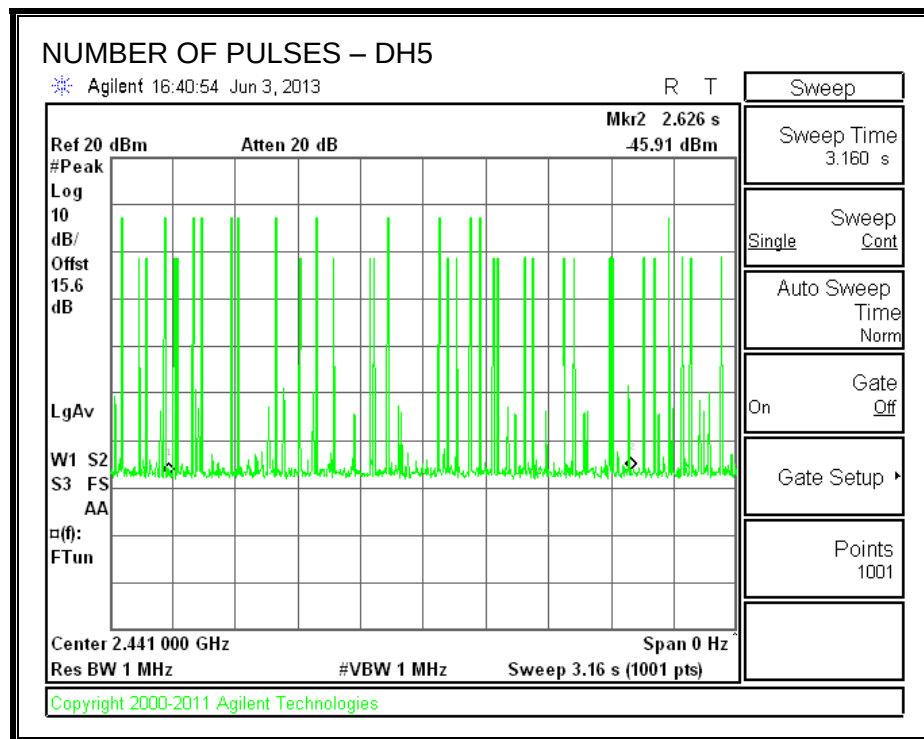
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.1.6. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

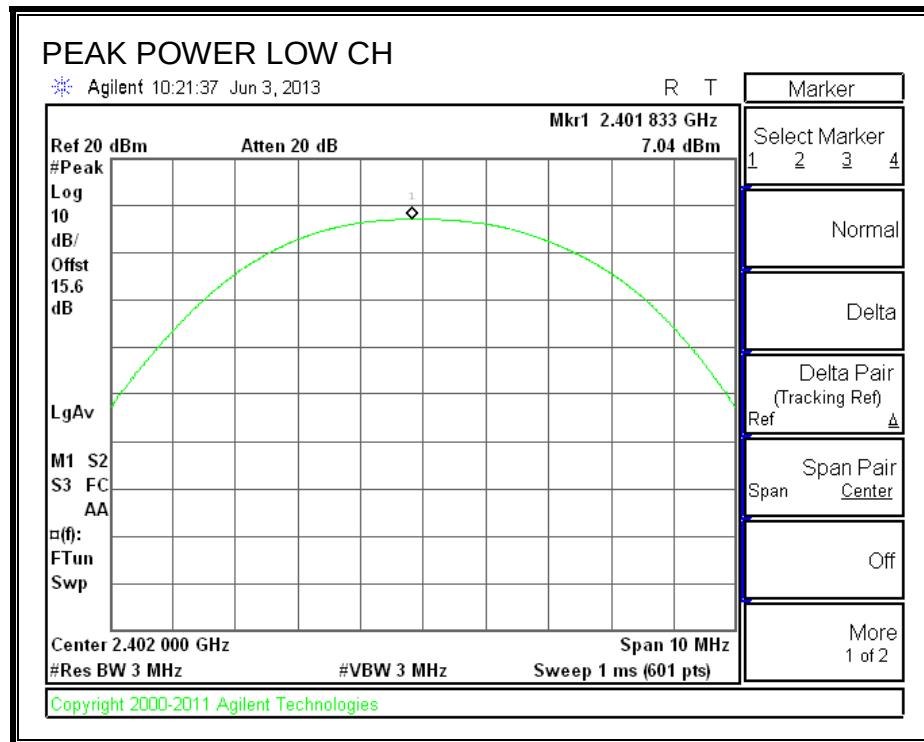
TEST PROCEDURE

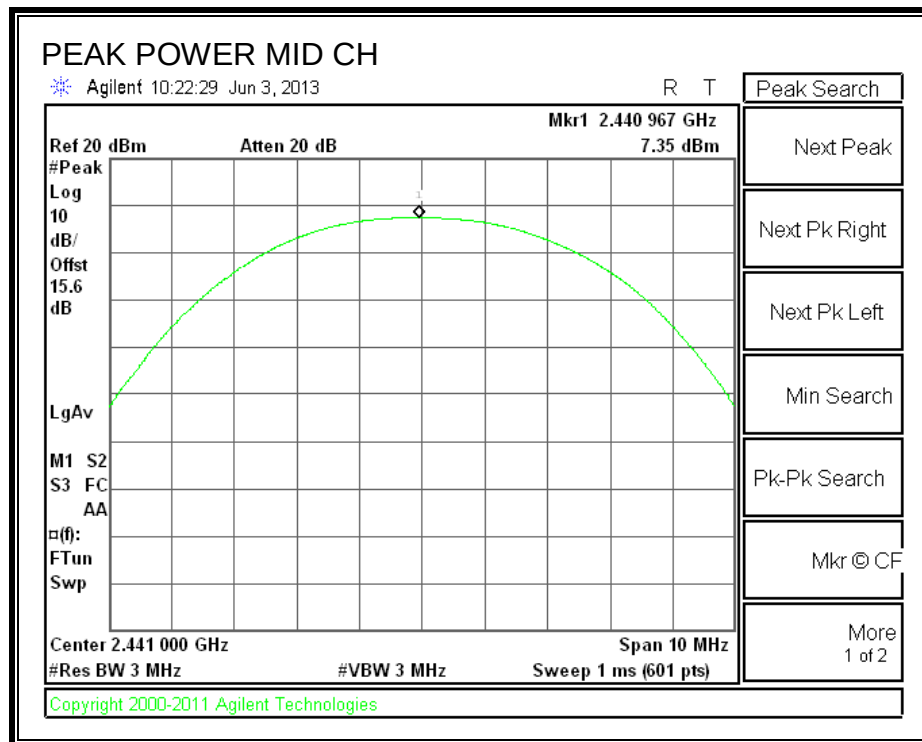
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

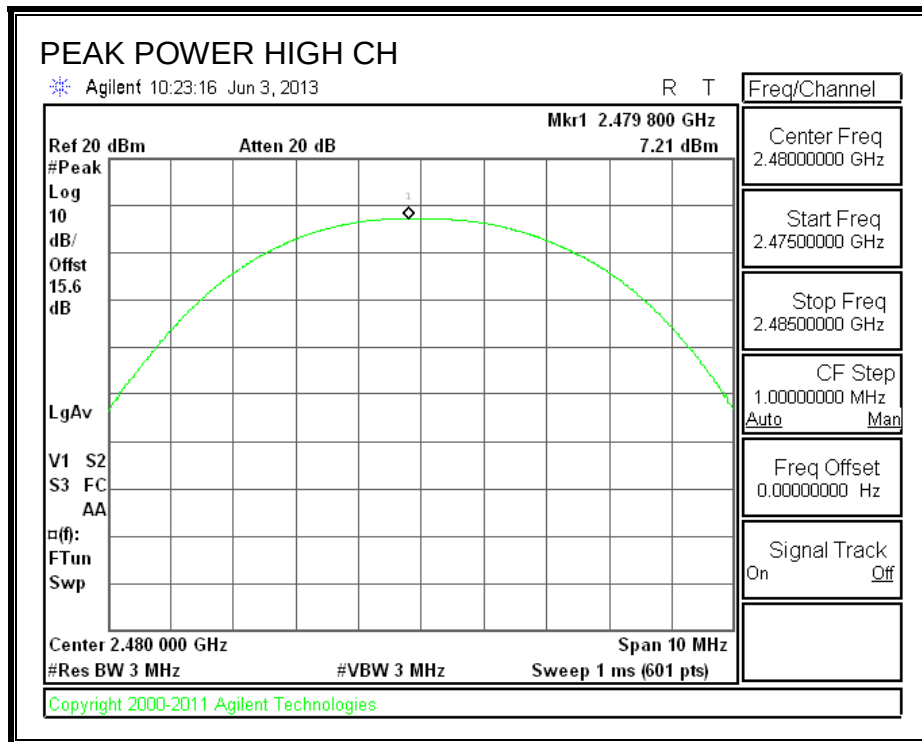
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.04	30	-22.96
Middle	2441	7.35	30	-22.65
High	2480	7.21	30	-22.79

OUTPUT POWER







7.1.7. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.85
Middle	2441	6.03
High	2480	5.94

7.1.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

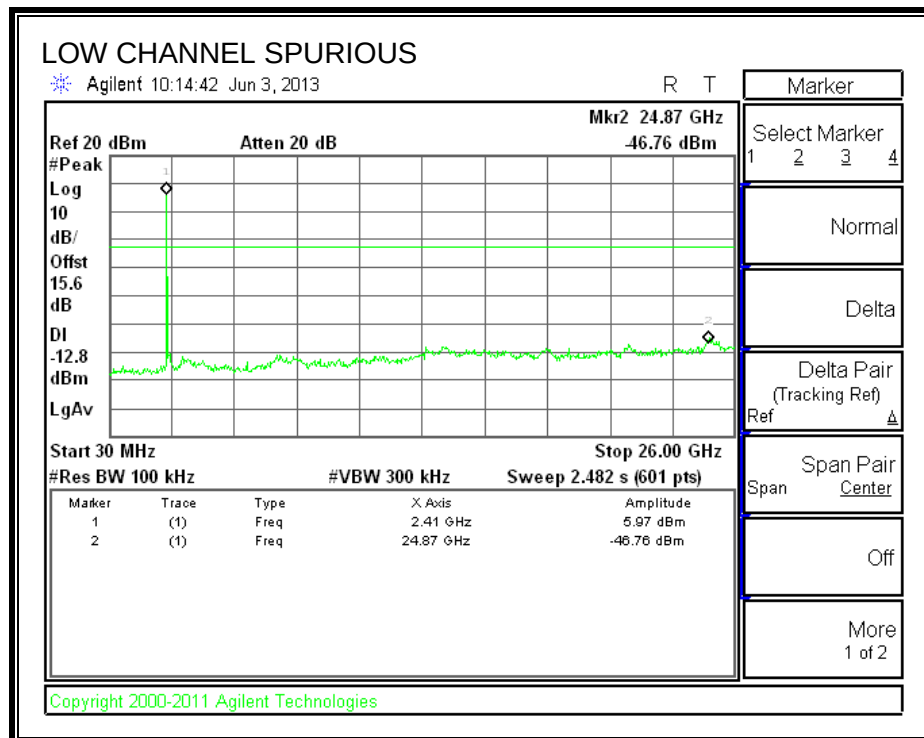
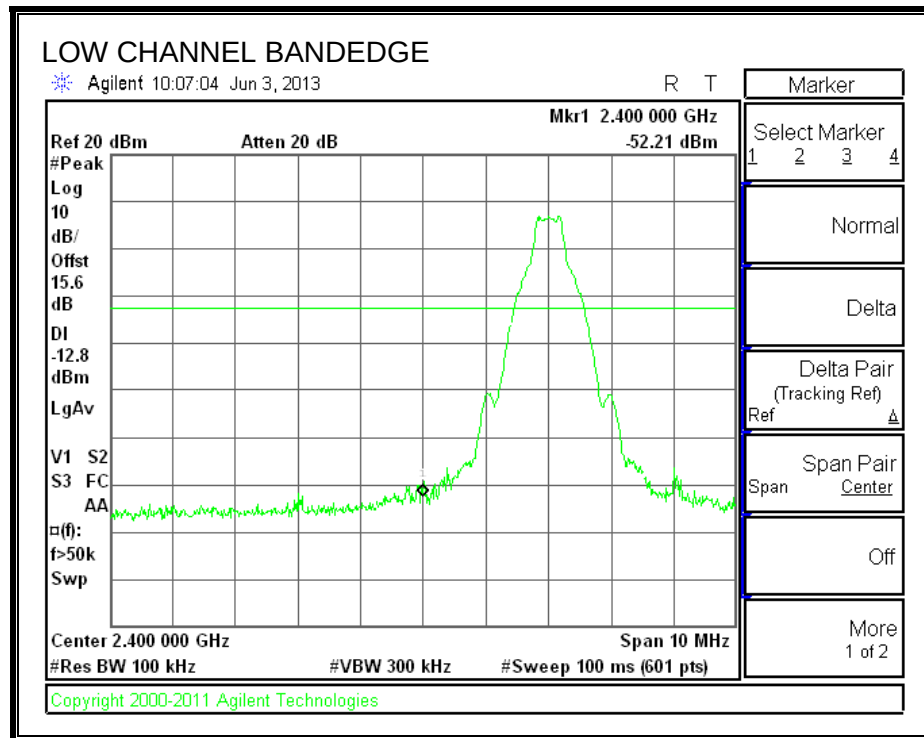
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

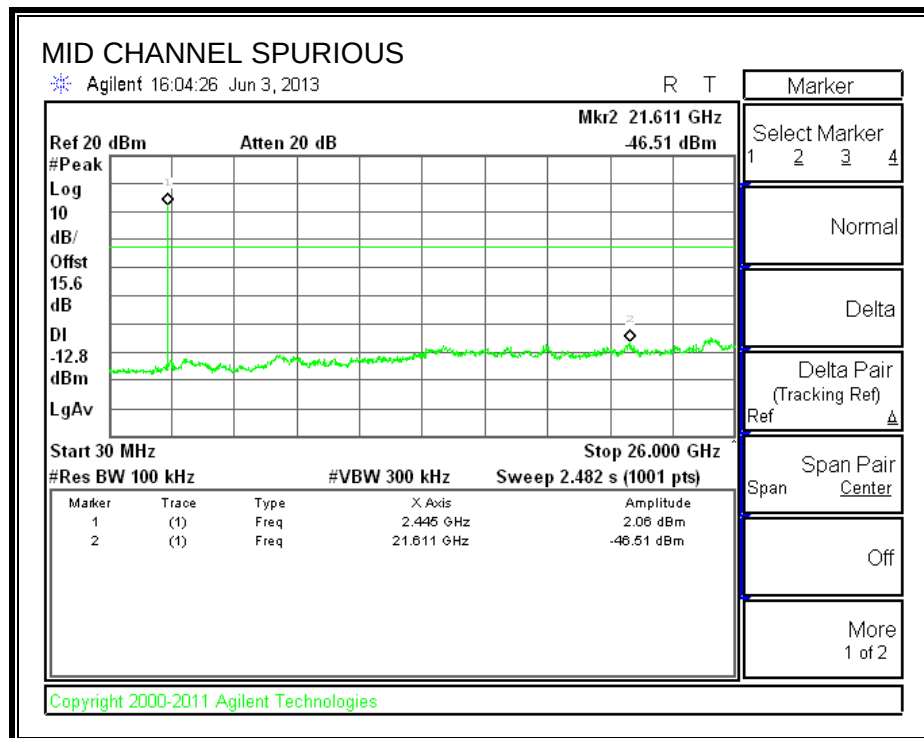
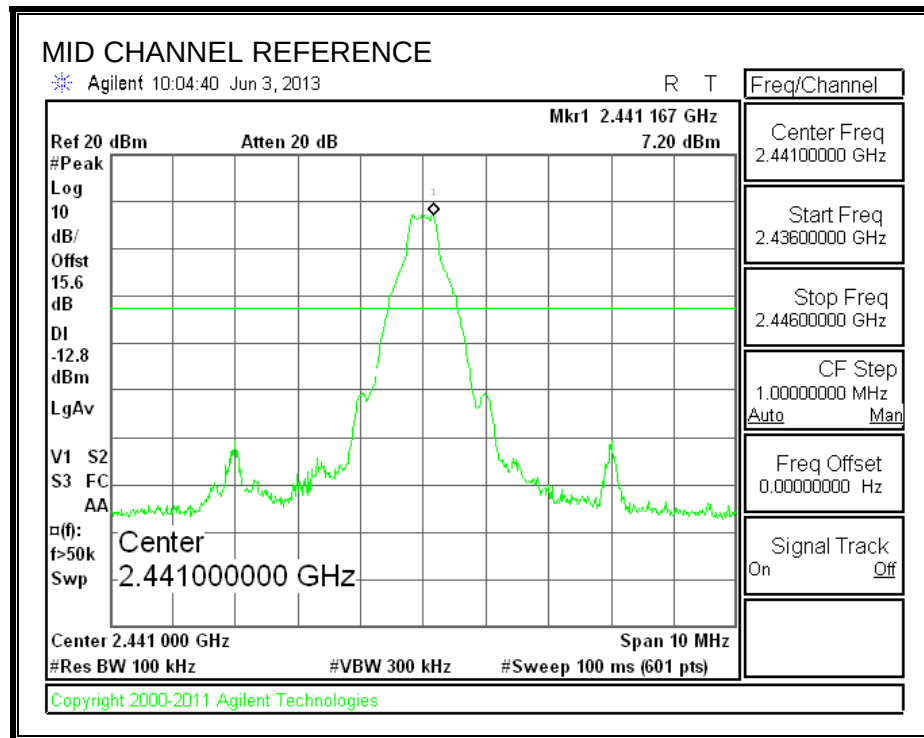
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

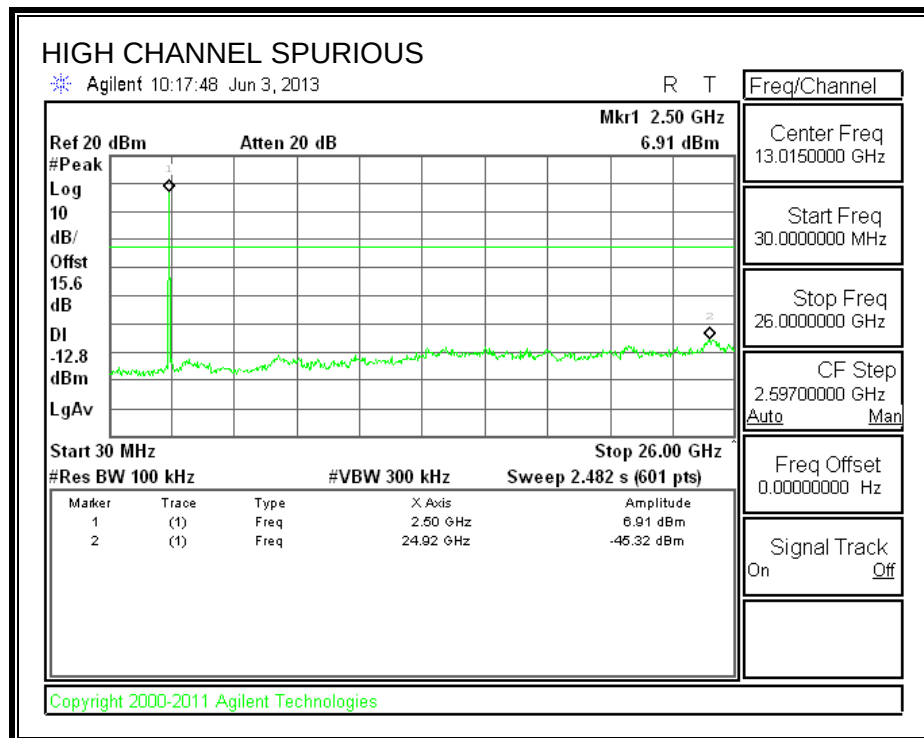
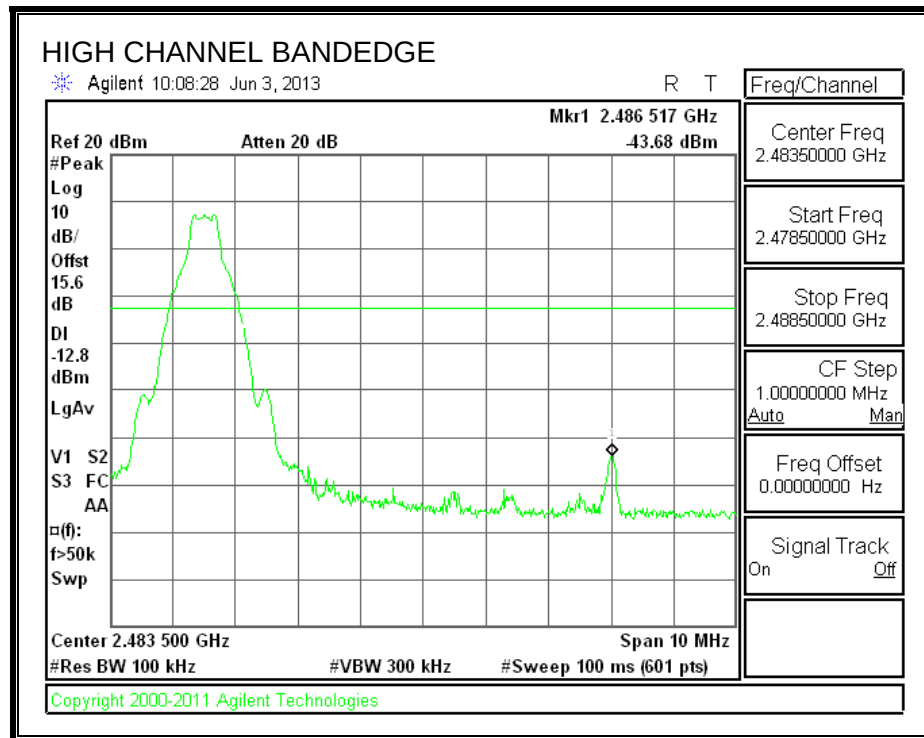
SPURIOUS EMISSIONS, LOW CHANNEL



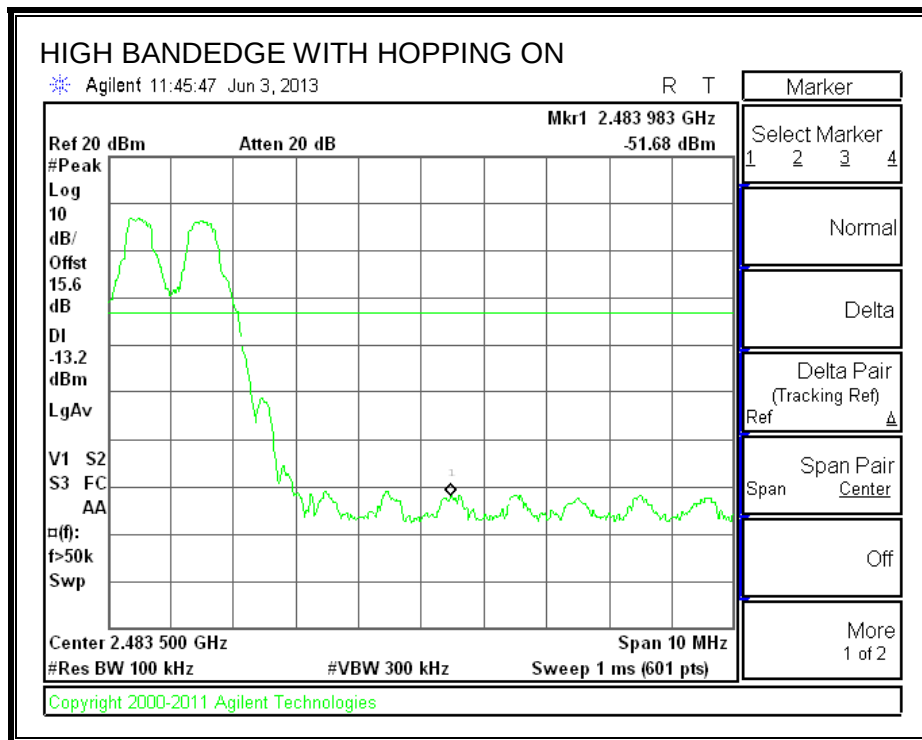
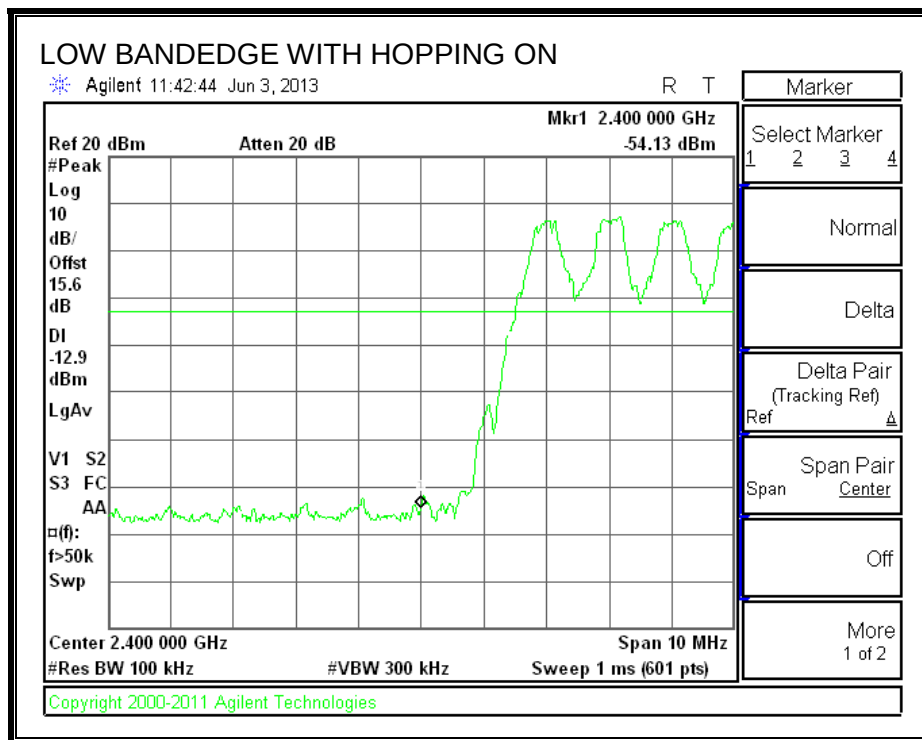
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

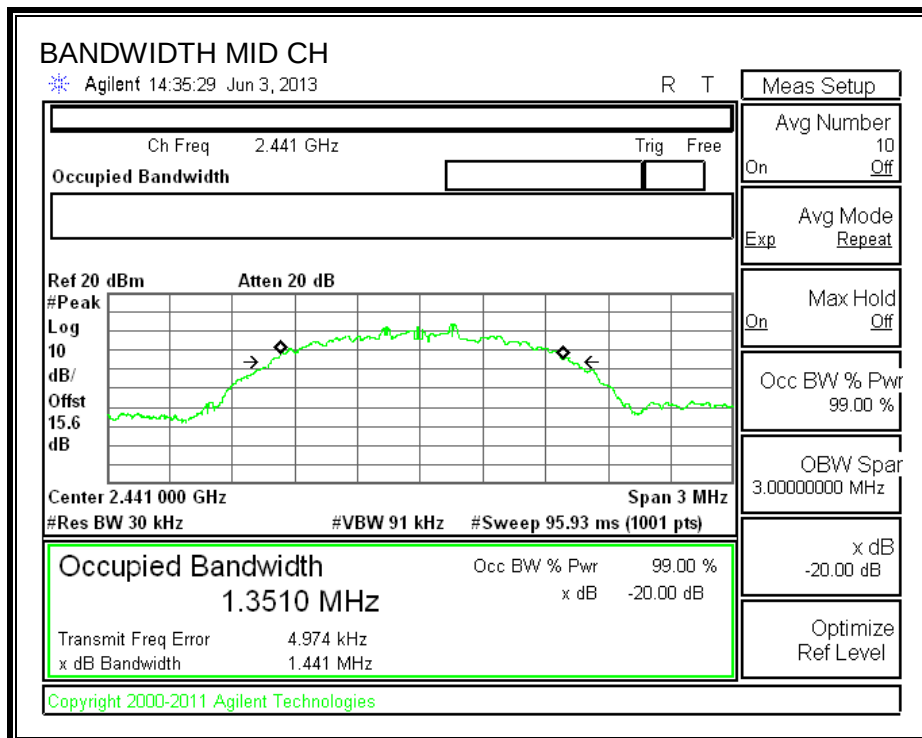
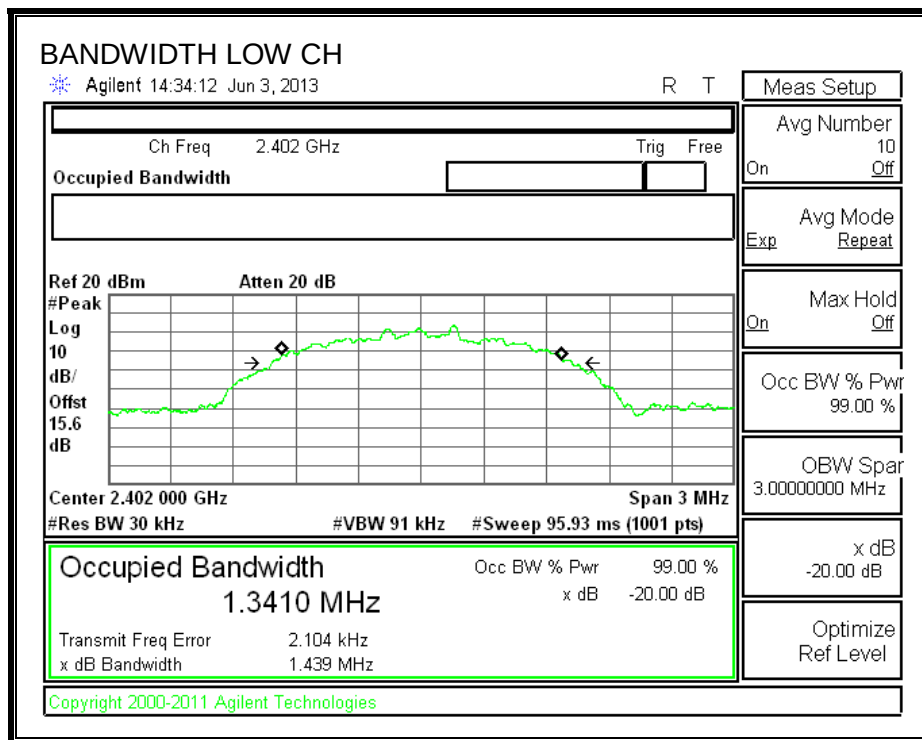
TEST PROCEDURE

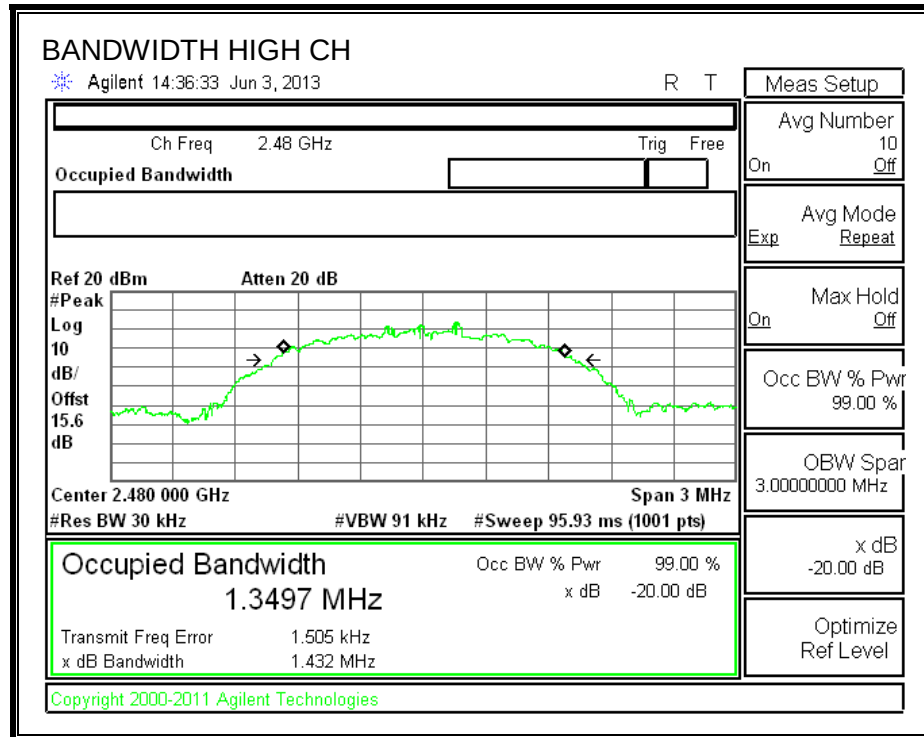
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

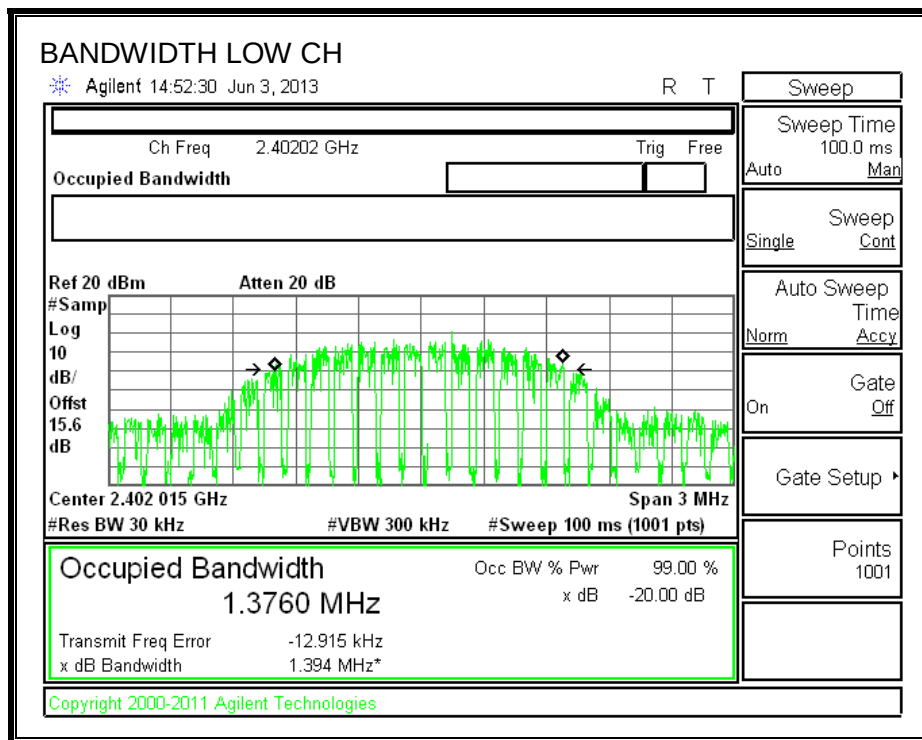
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.439	1.376
Middle	2441	1.441	1.3667
High	2480	1.432	1.3663

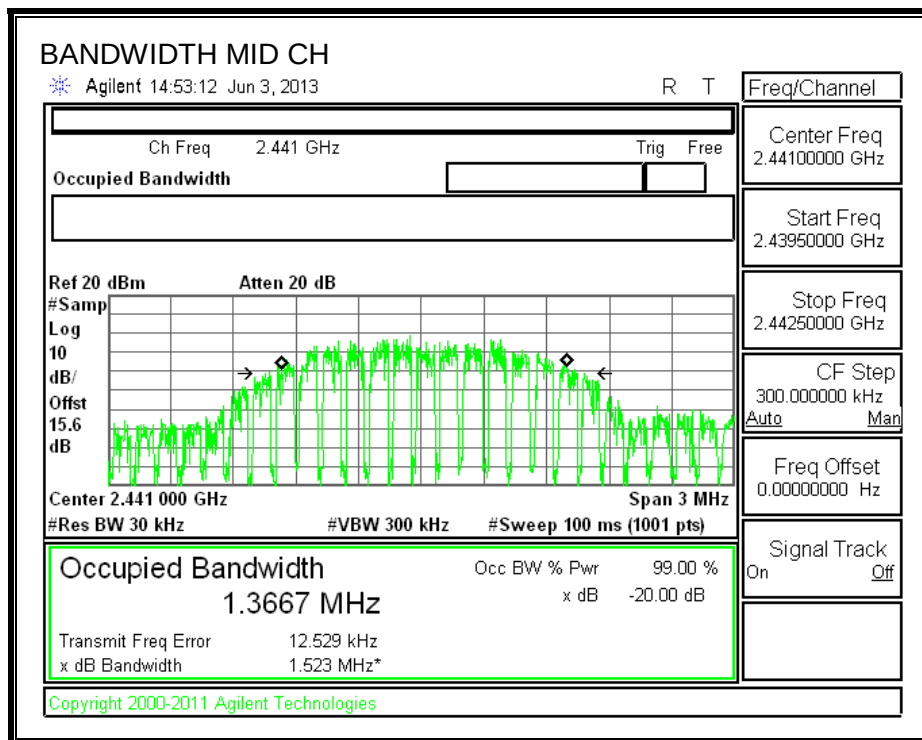
20 dB BANDWIDTH

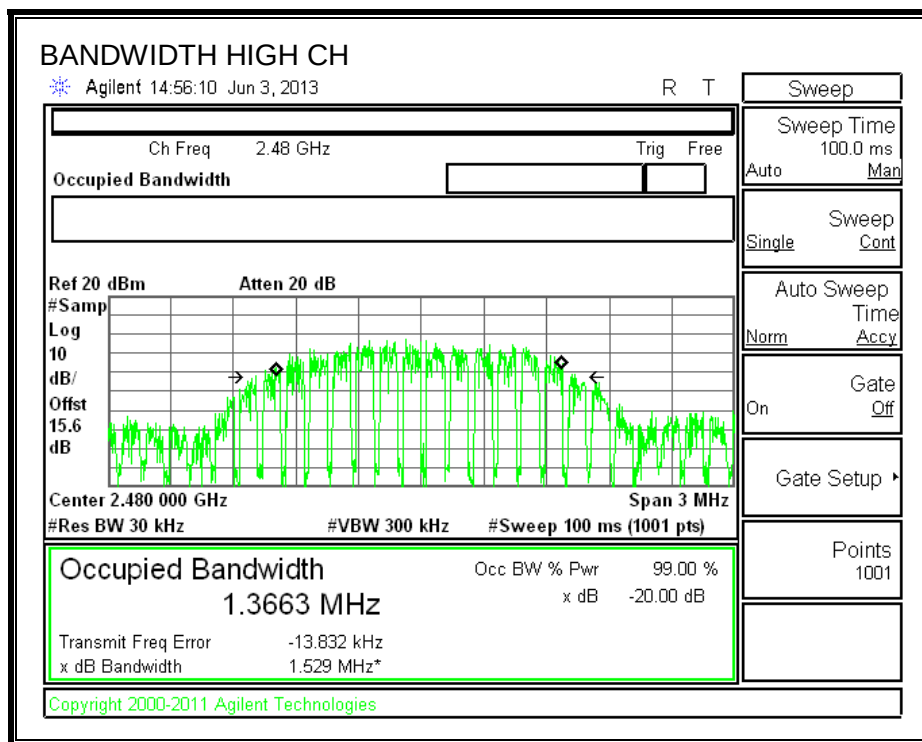




99% BANDWIDTH







7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

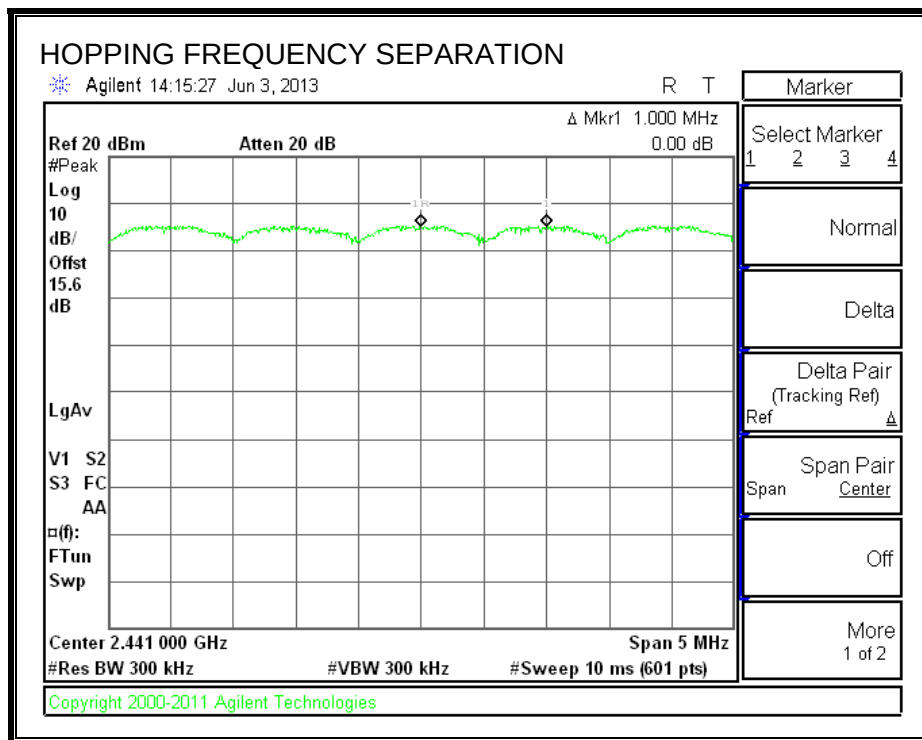
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

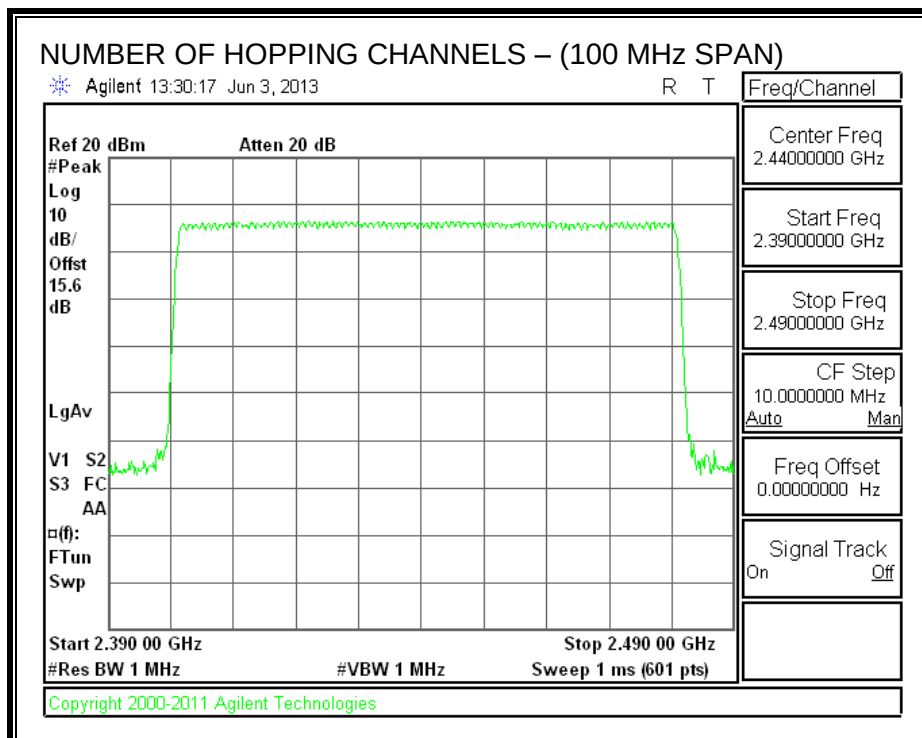
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

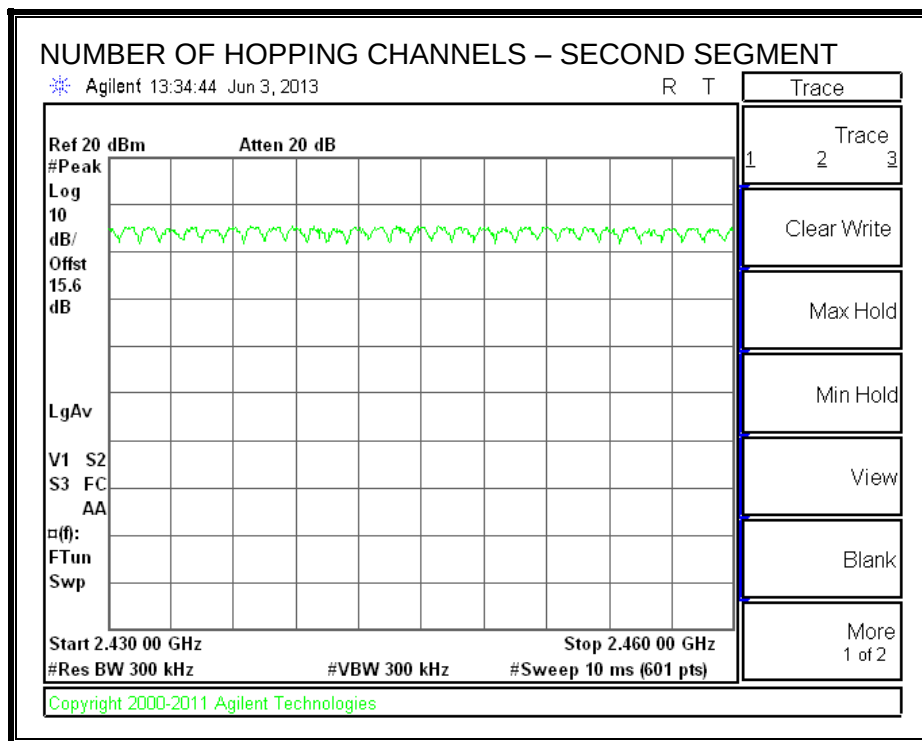
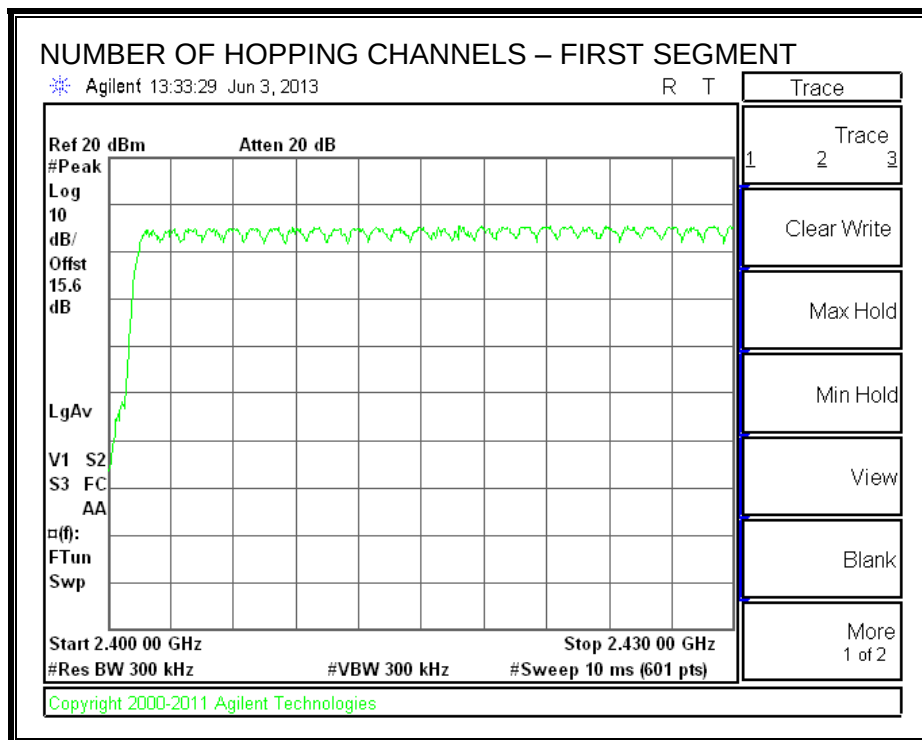
TEST PROCEDURE

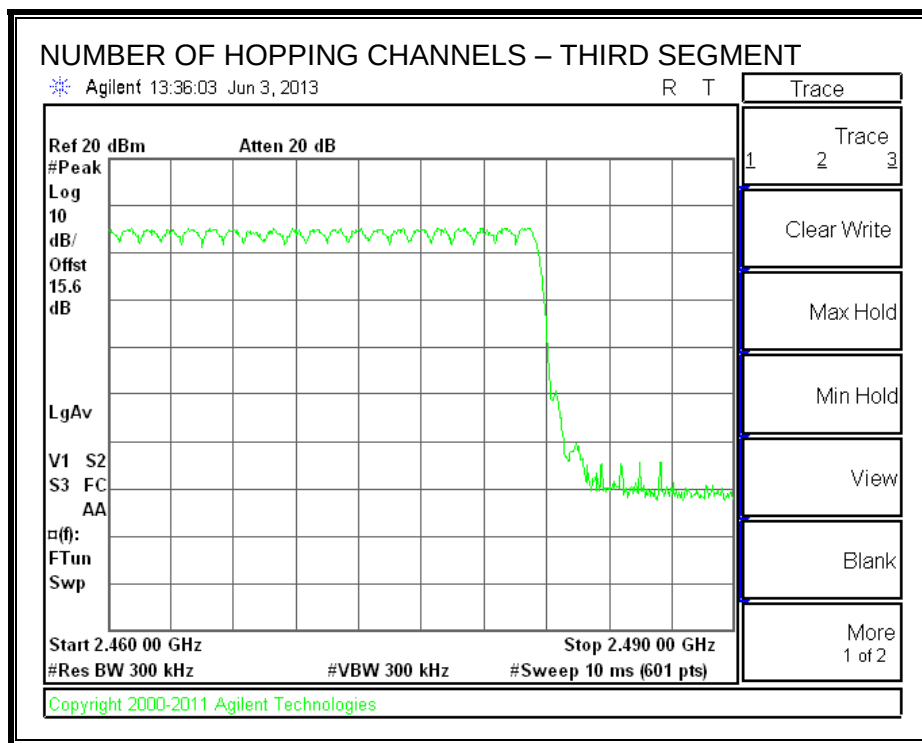
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.







7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

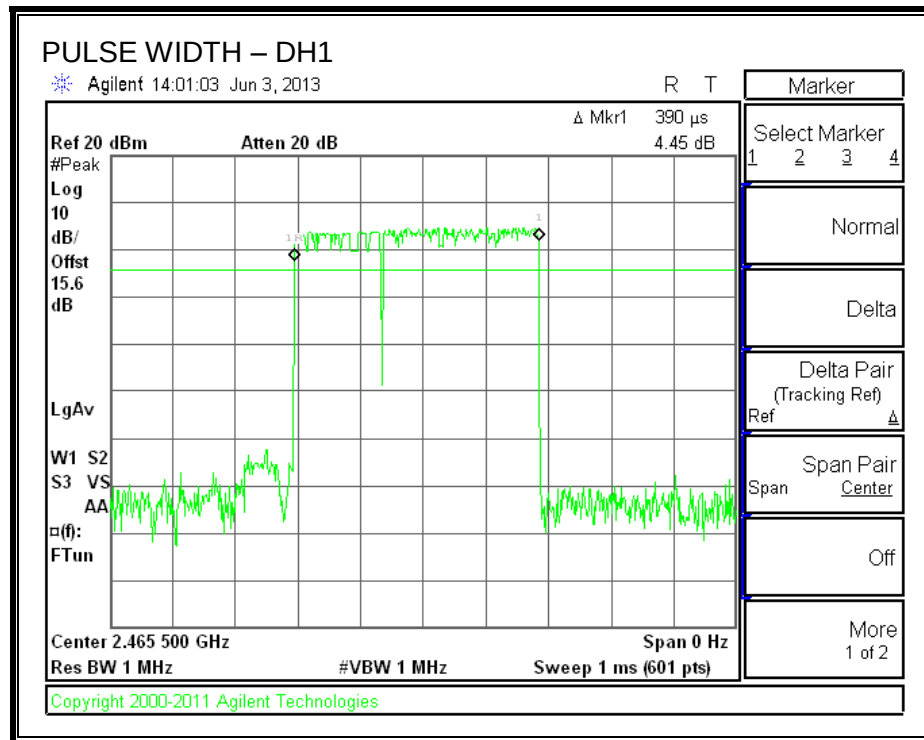
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

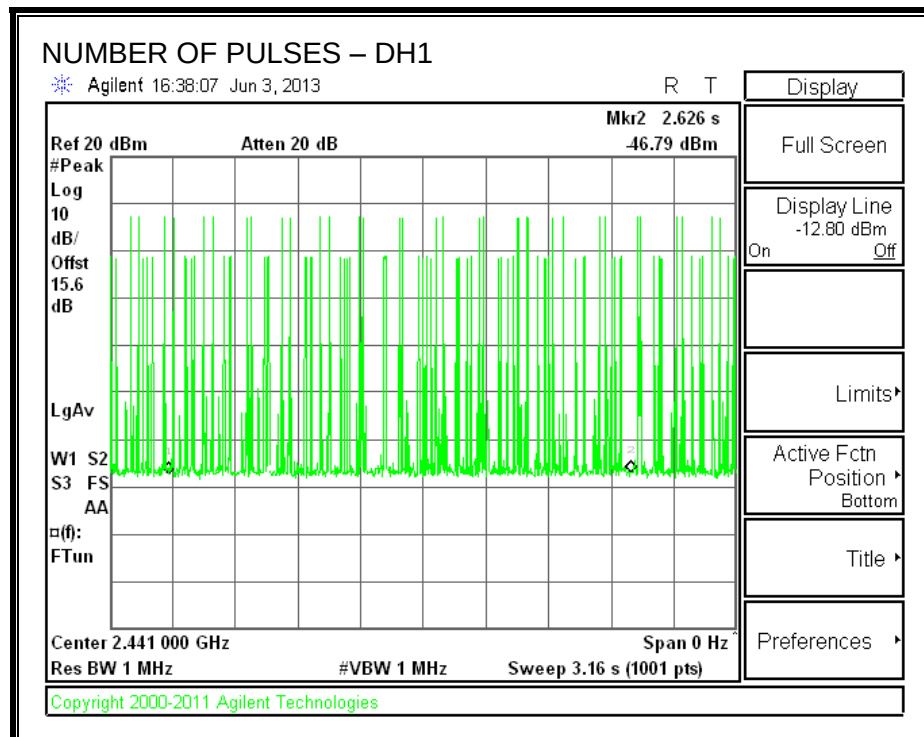
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK (EDR) Mode					
DH1	0.39	32	0.125	0.4	-0.275
DH3	1.642	15	0.246	0.4	-0.154
DH5	2.883	12	0.346	0.4	-0.054

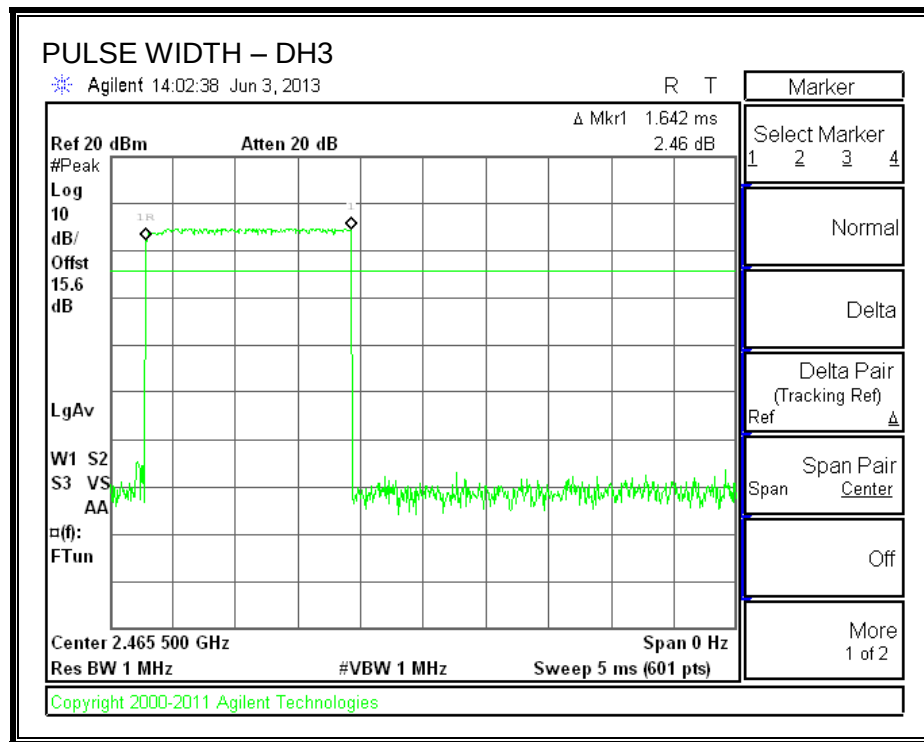
PULSE WIDTH - DH1



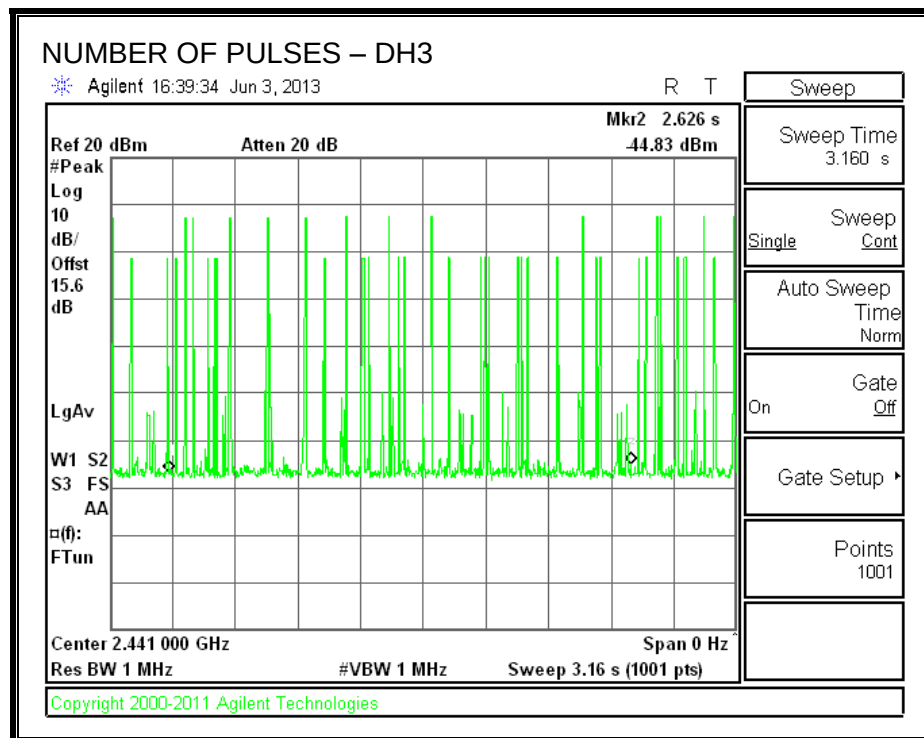
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



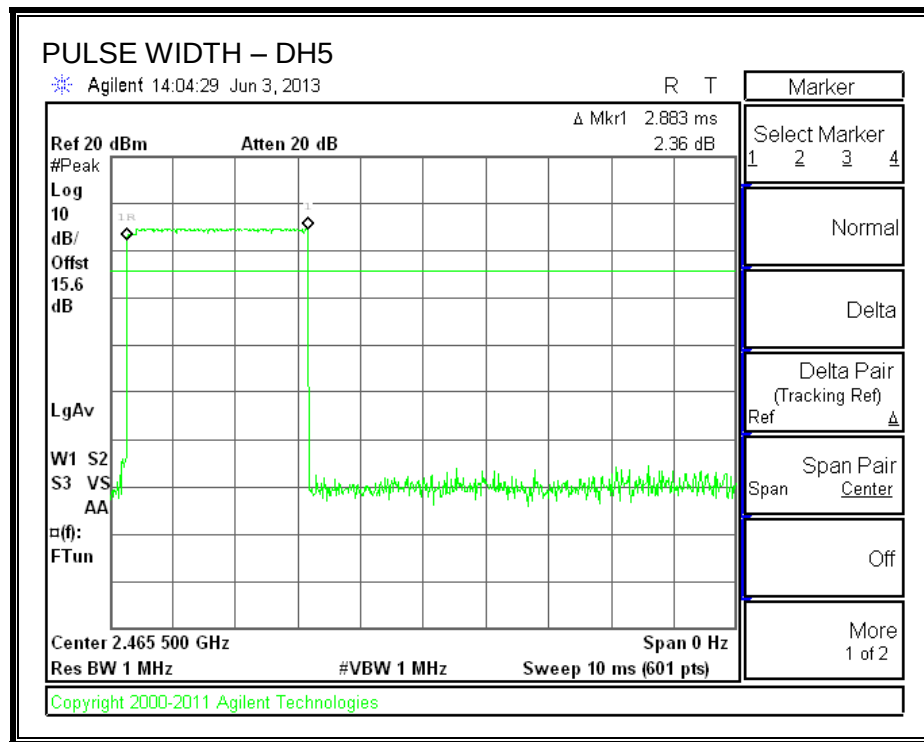
PULSE WIDTH – DH3



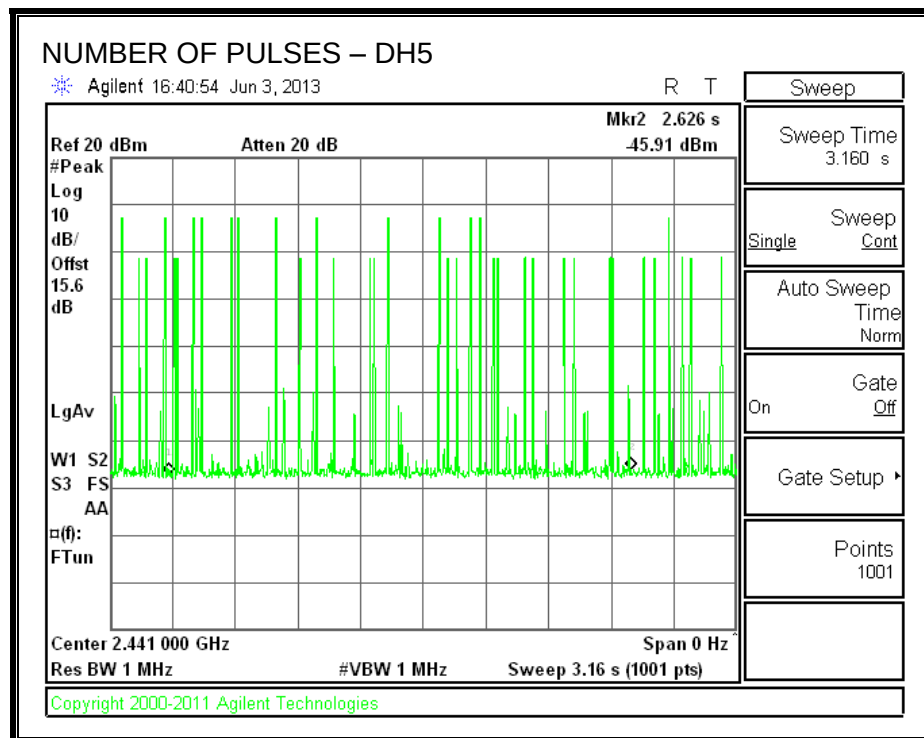
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

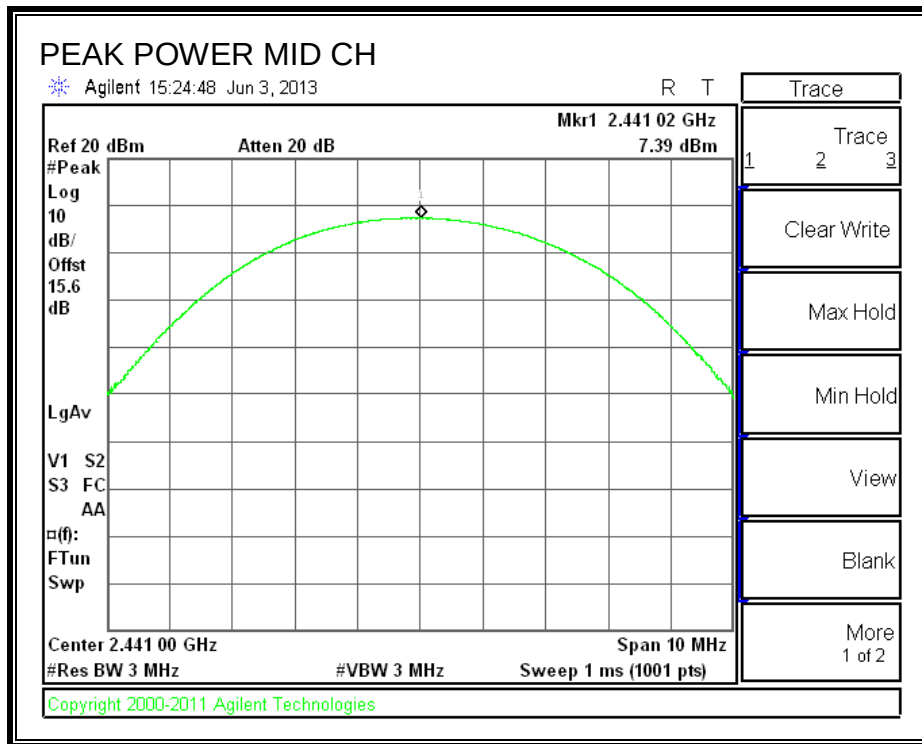
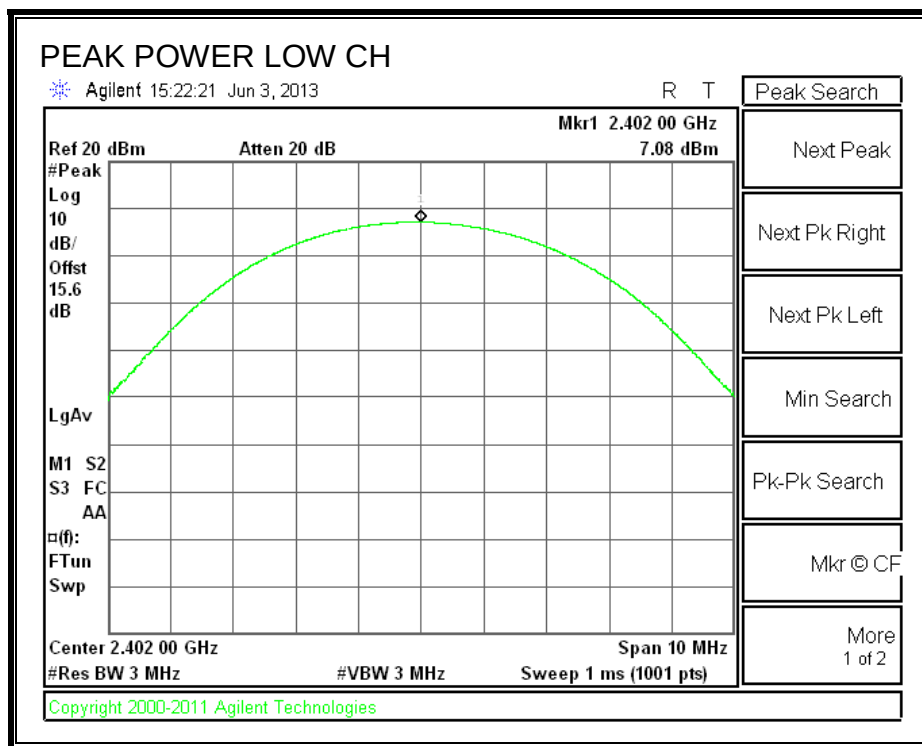
TEST PROCEDURE

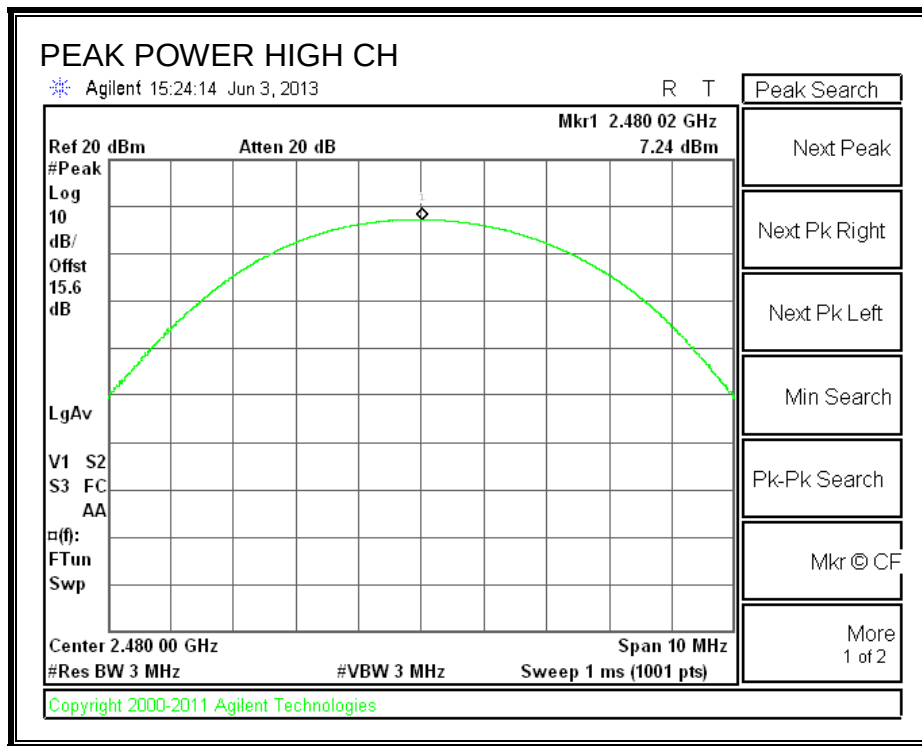
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.08	30	-22.92
Middle	2441	7.39	30	-22.61
High	2480	7.24	30	-22.76

OUTPUT POWER





7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and .7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	3.90
Middle	2441	4.16
High	2480	3.97

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

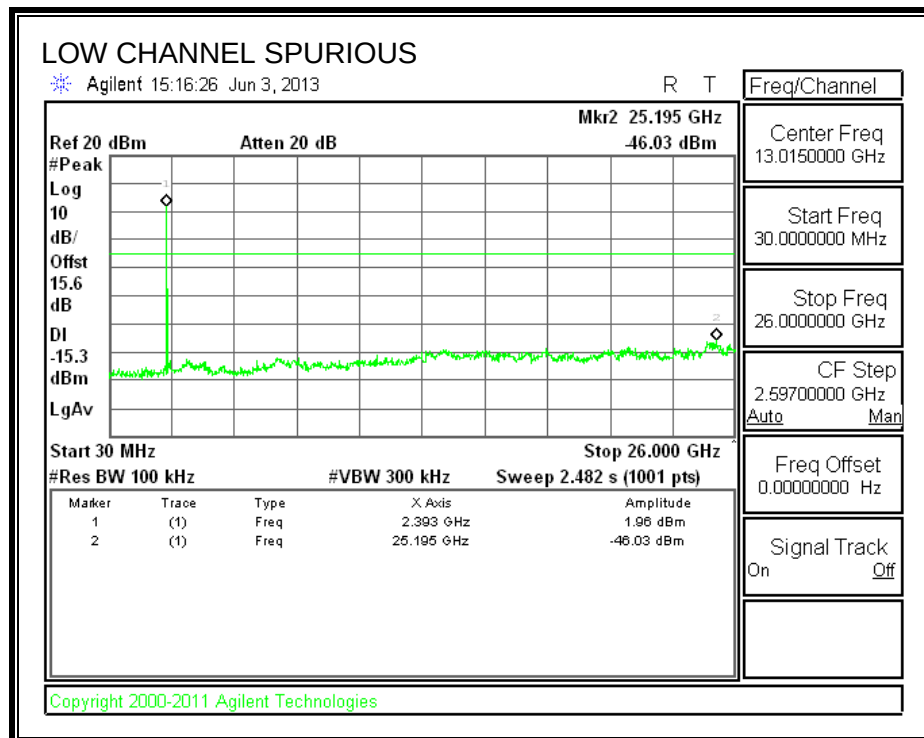
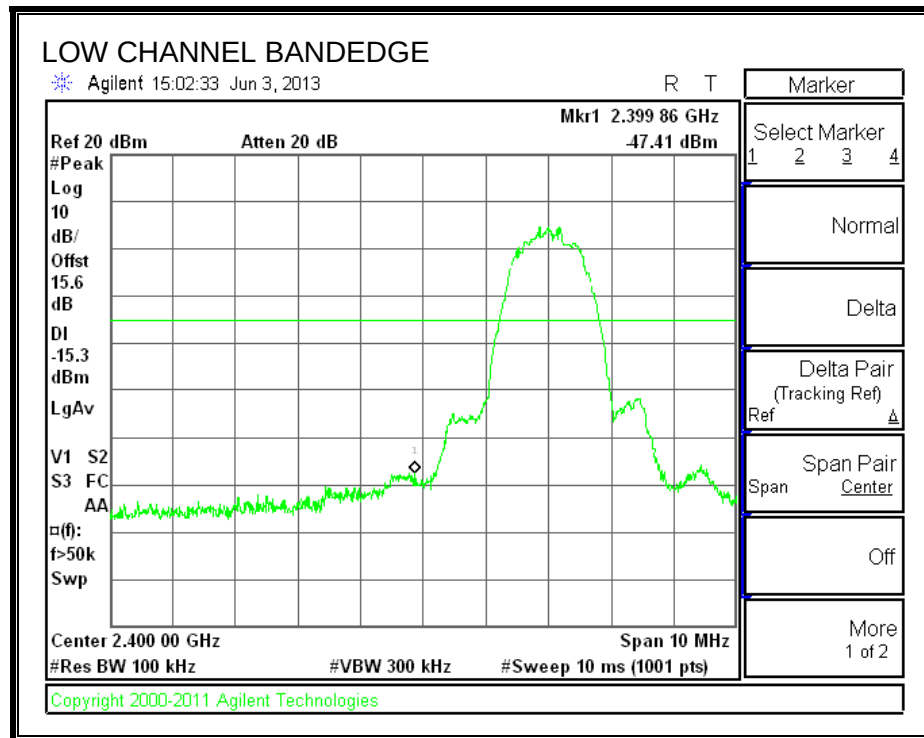
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

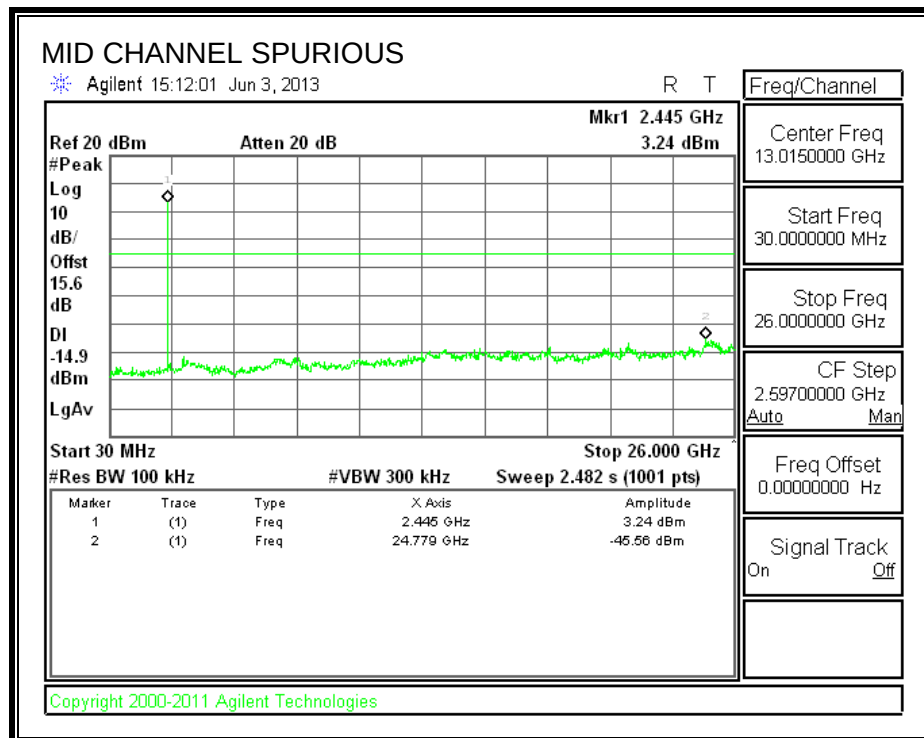
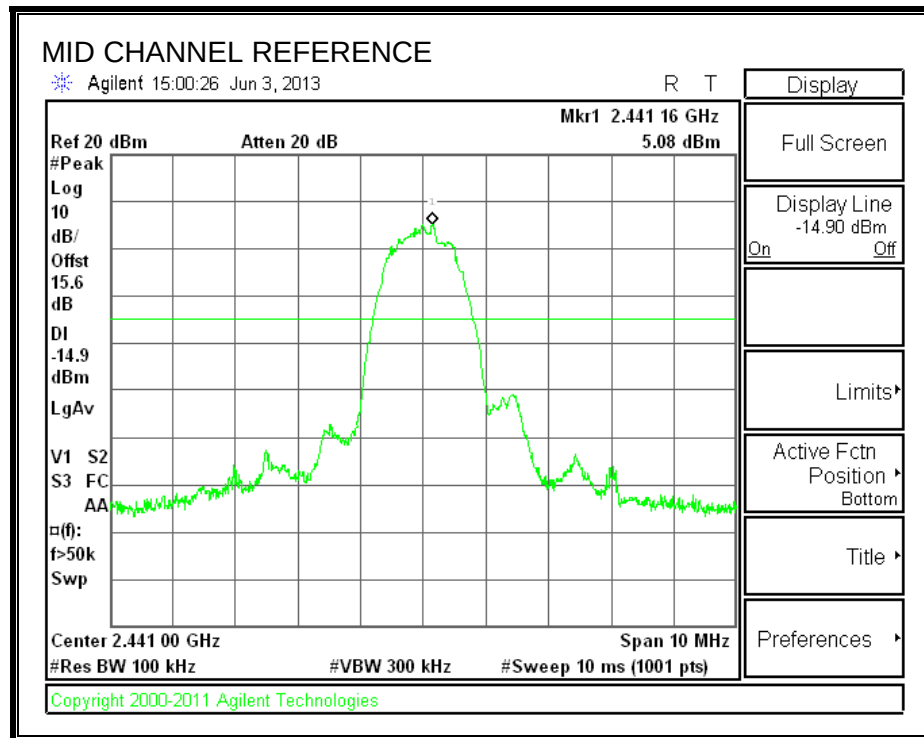
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

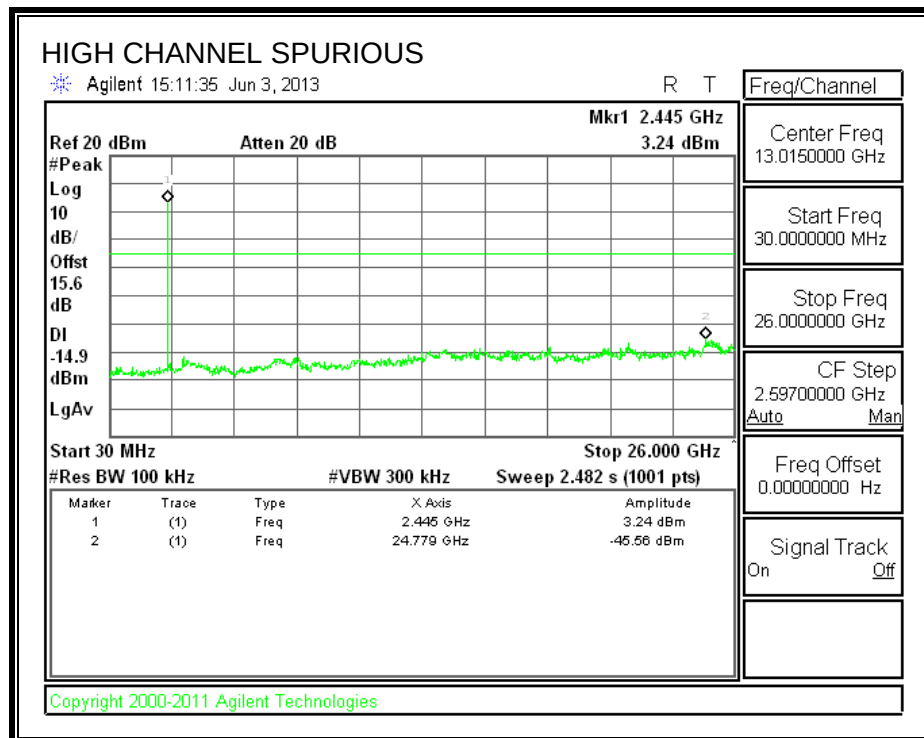
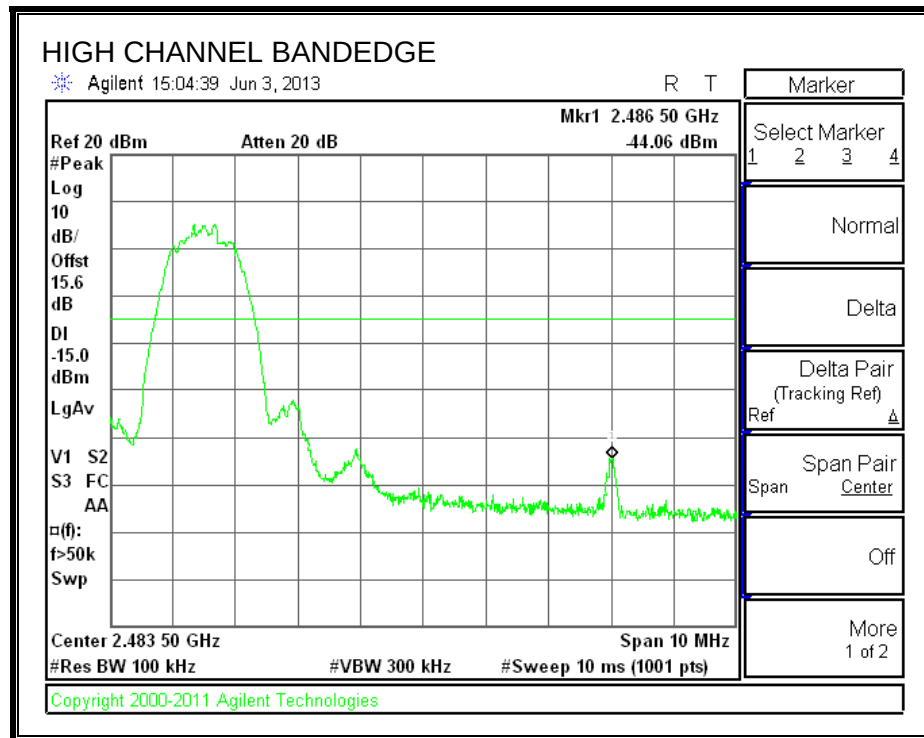
SPURIOUS EMISSIONS, LOW CHANNEL



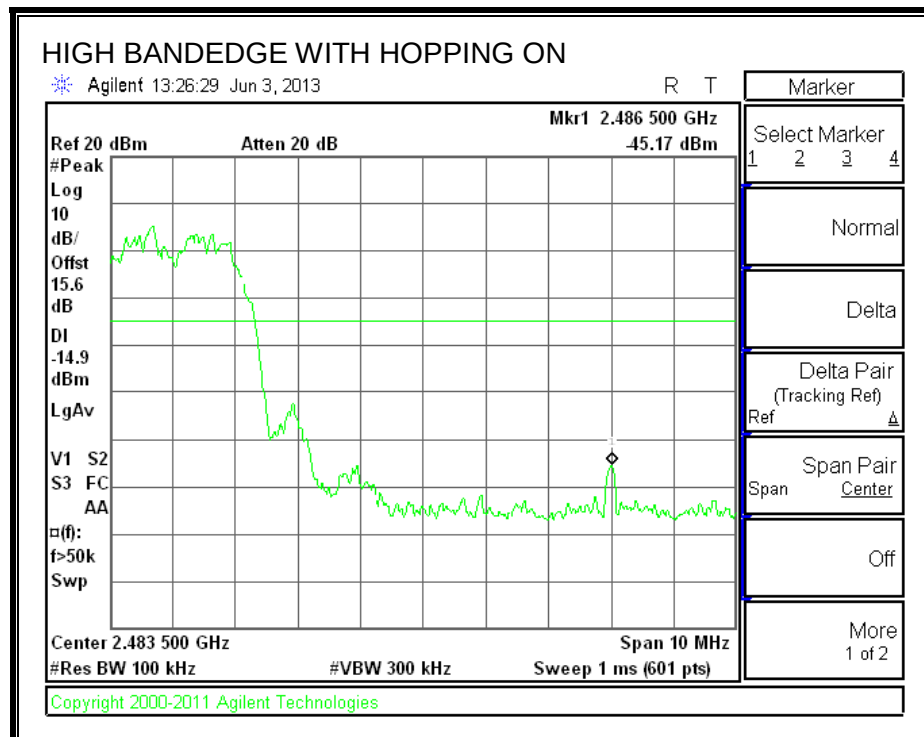
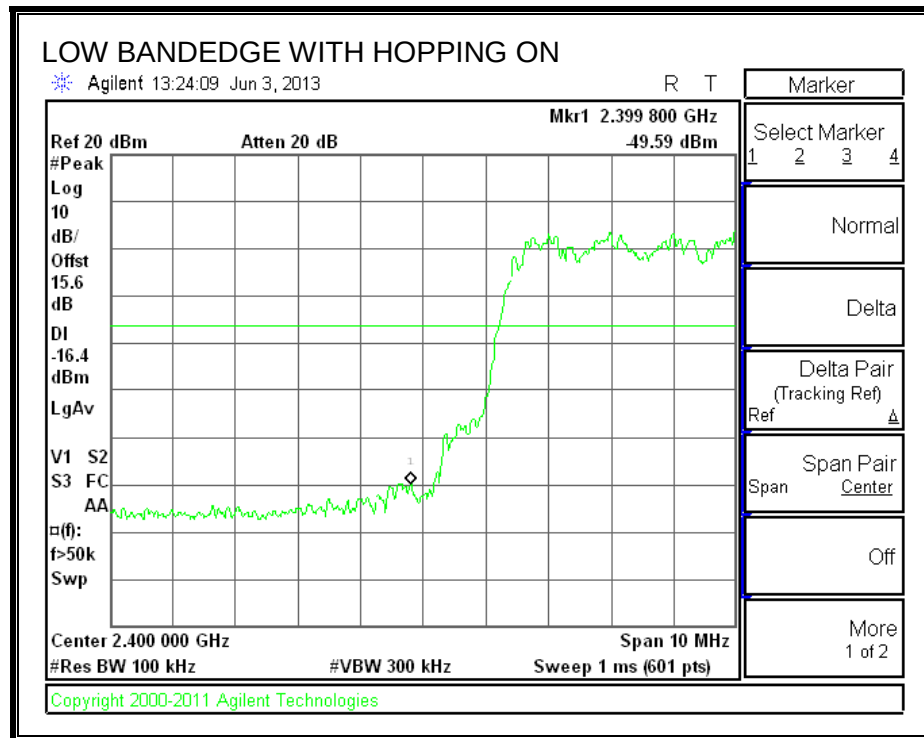
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. 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. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

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, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

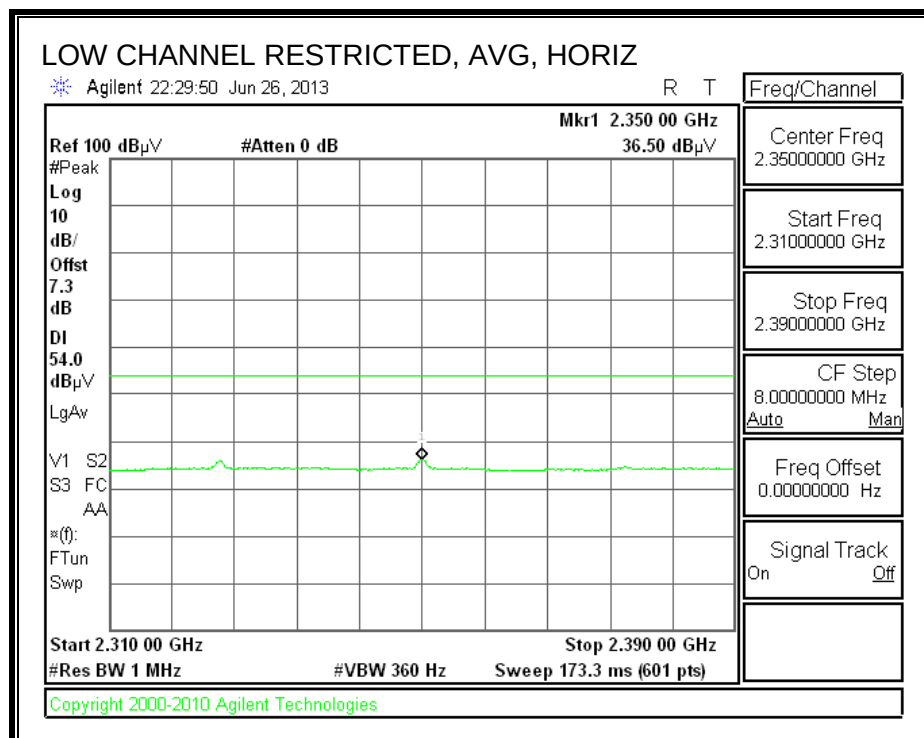
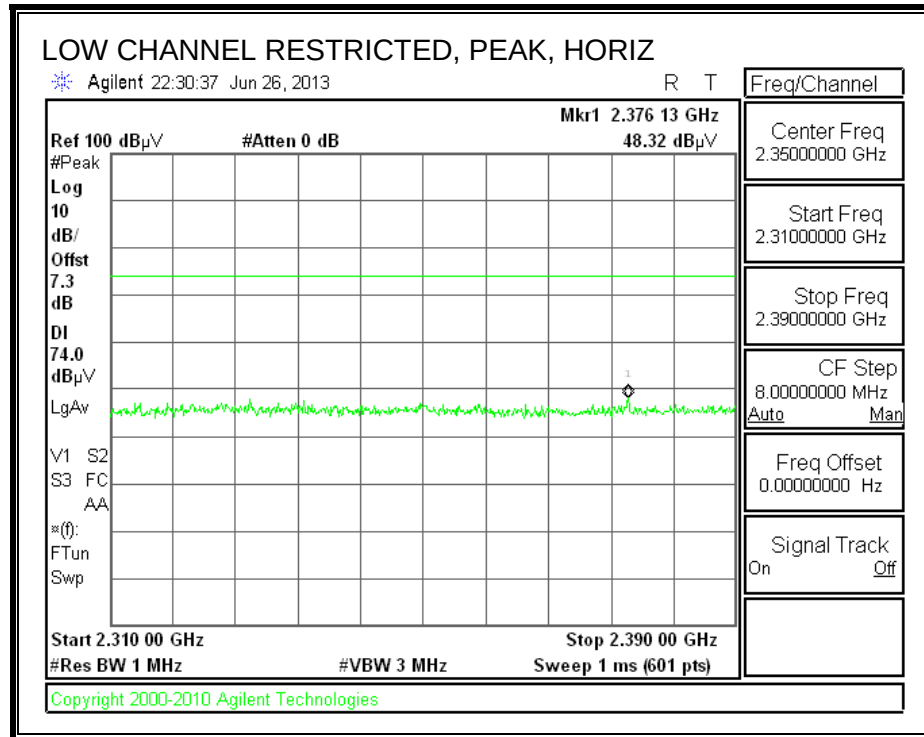
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

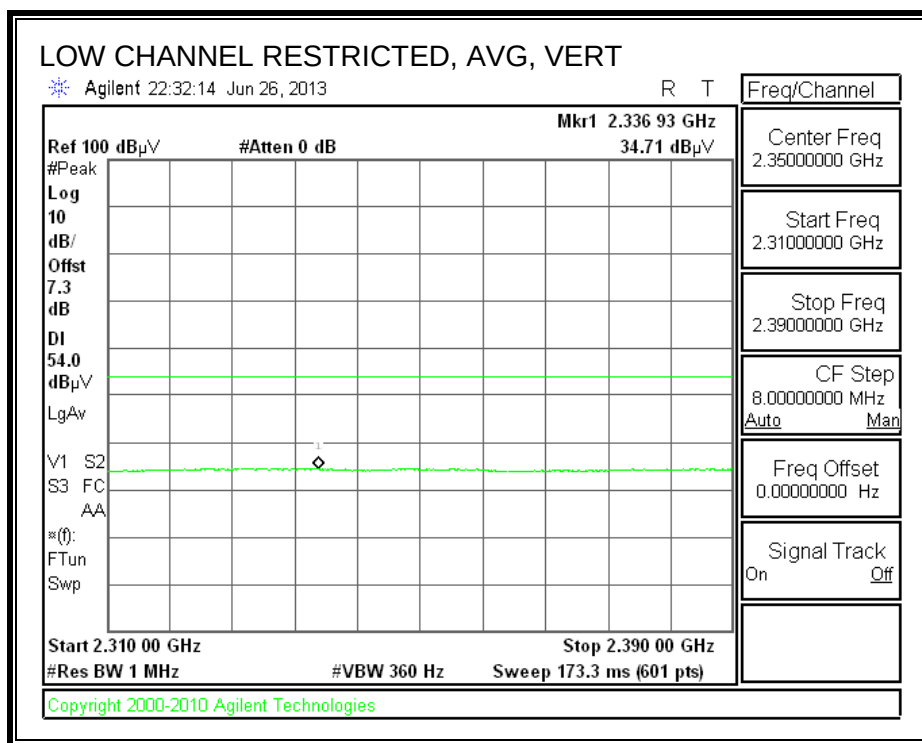
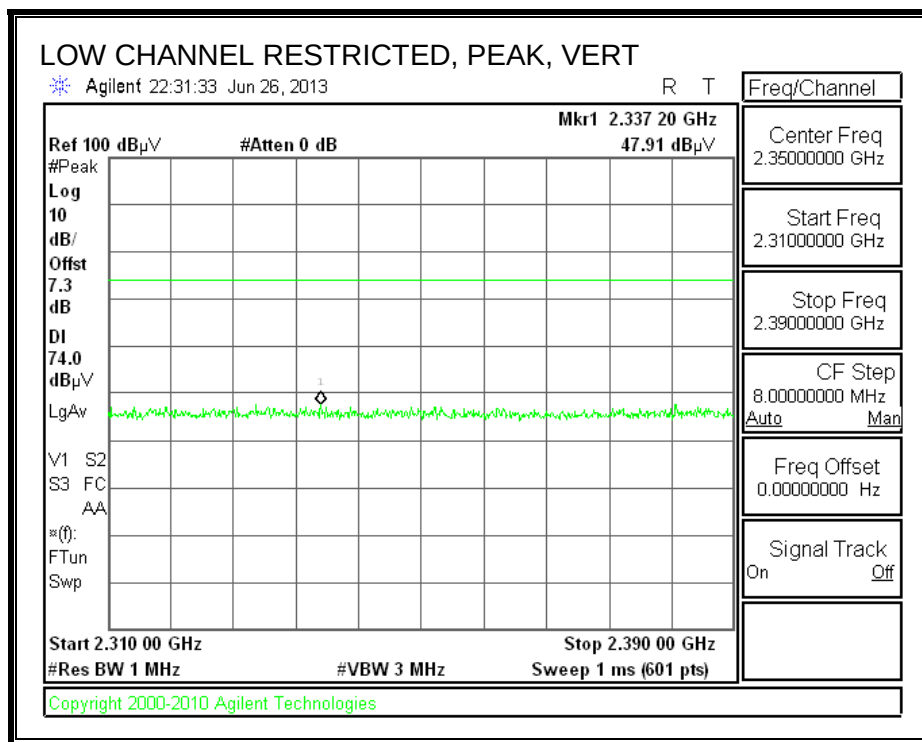
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

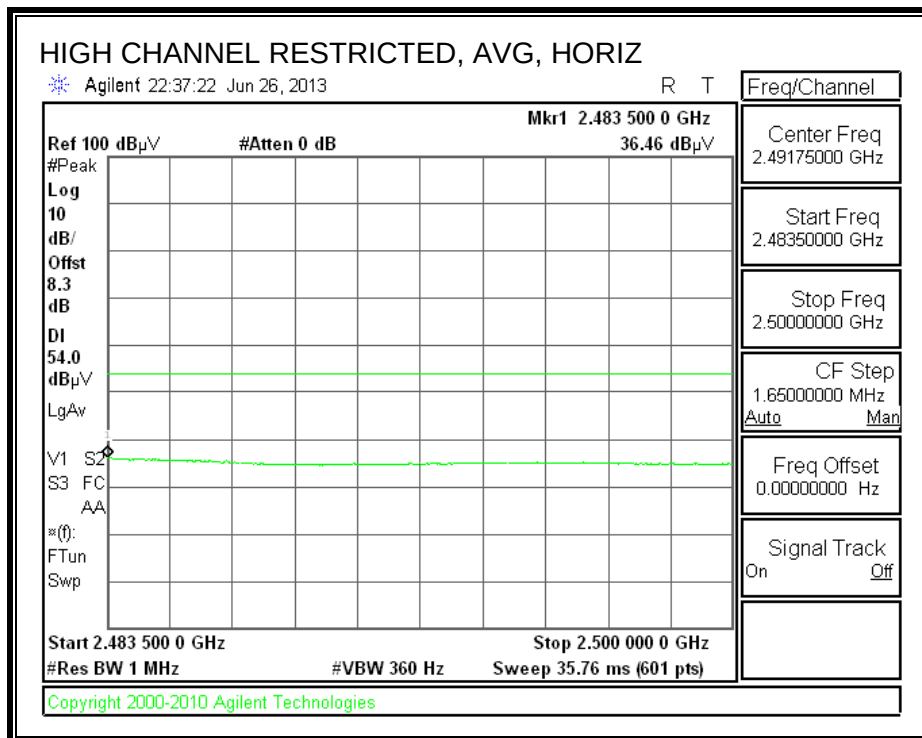
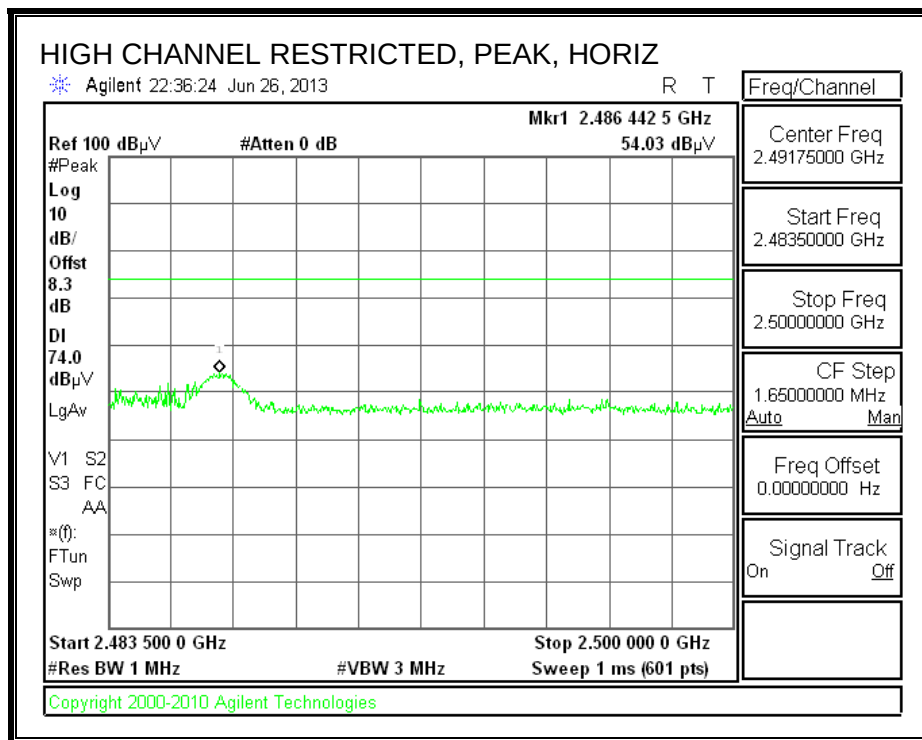
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



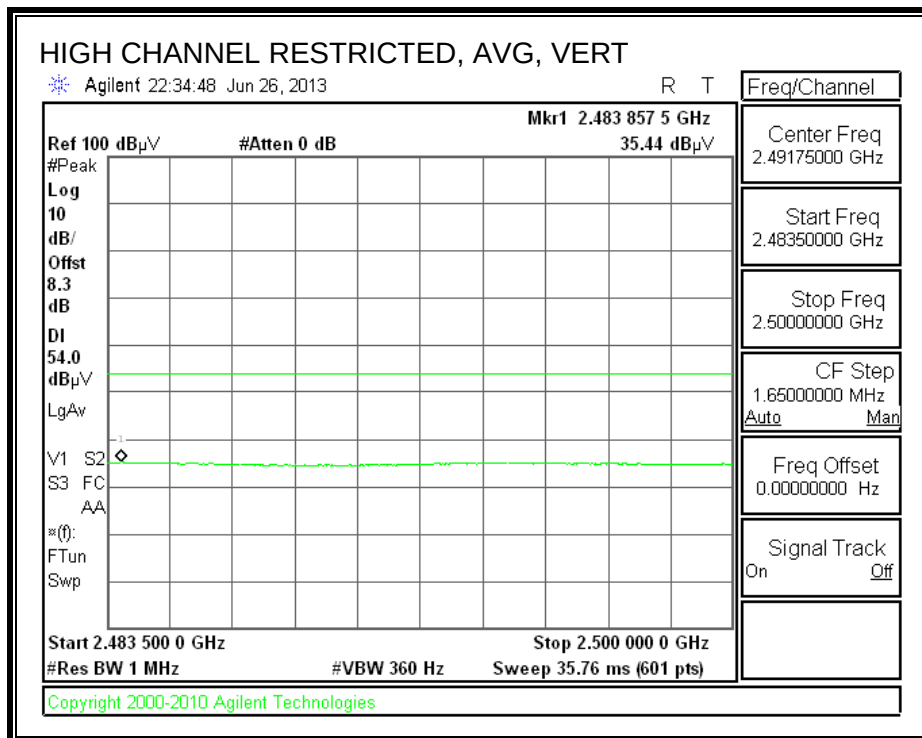
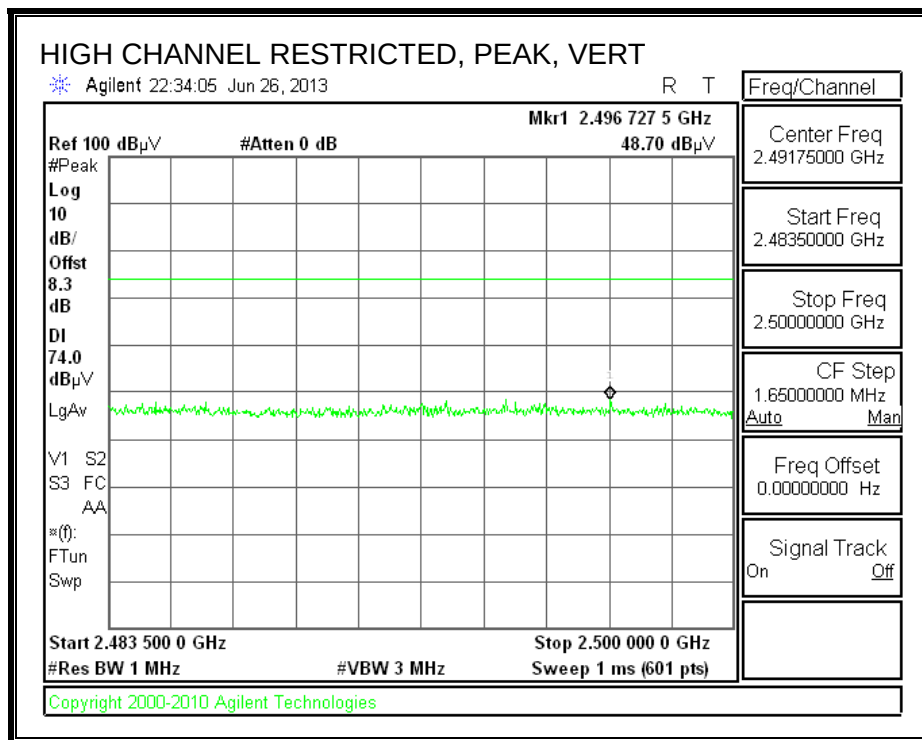
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



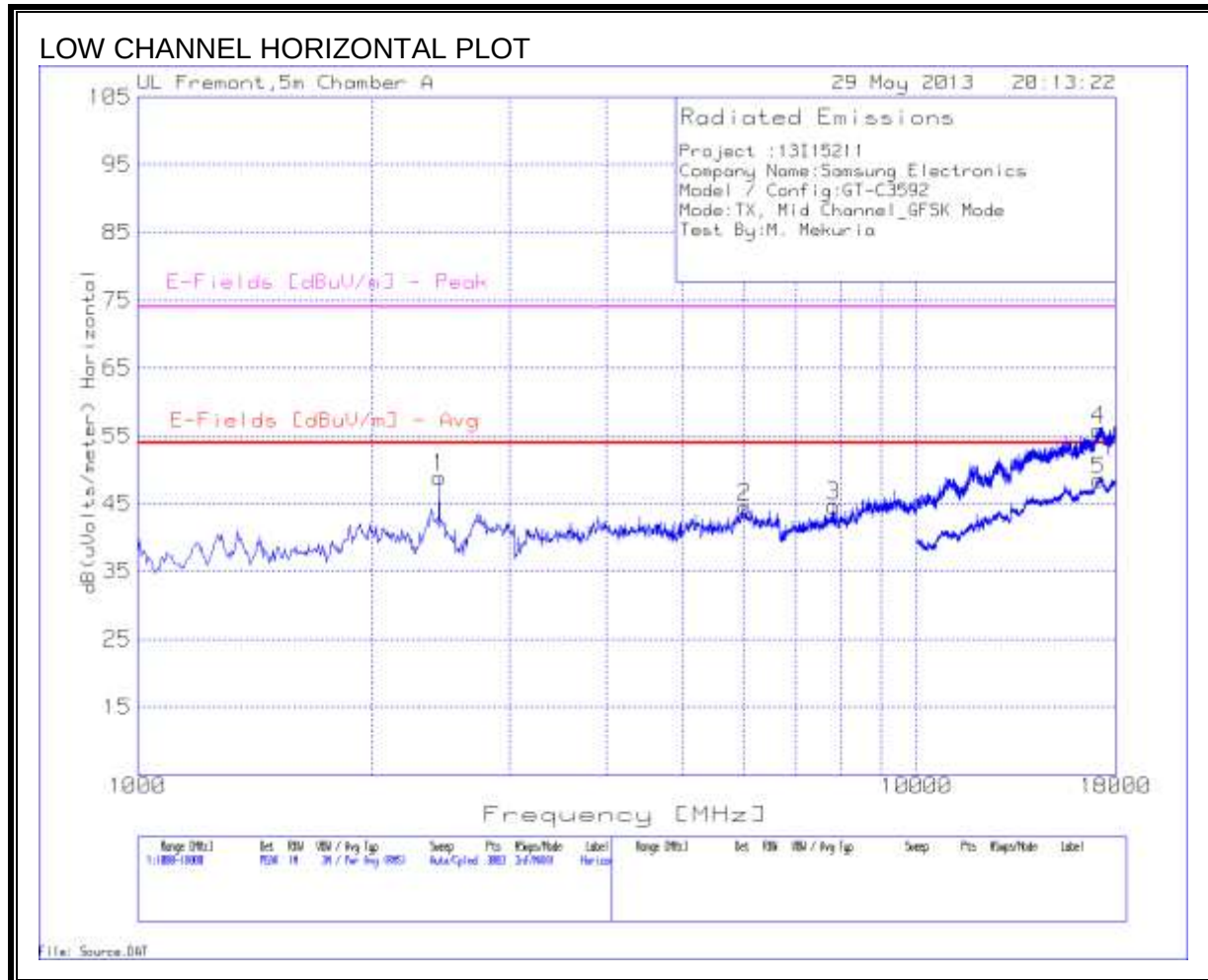
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



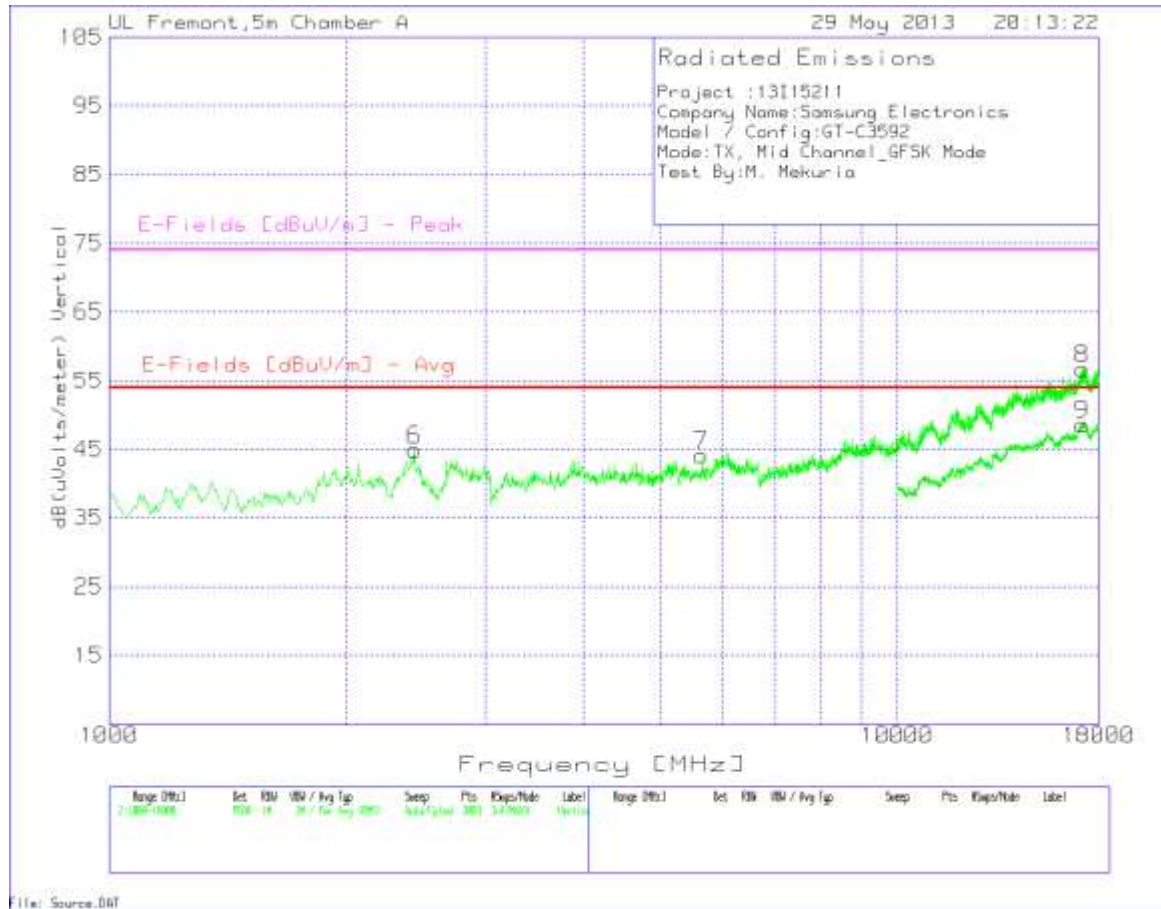
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL VERTICAL PLOT



LOW CHANNEL DATA

Project :13I15211
Company Name:Samsung Electronics
Model / Config:GT-C3592
Mode:TX, Low Channel_GFSK Mode
Test By:M. Mekuria

Horizontal 1000 - 18000MHz

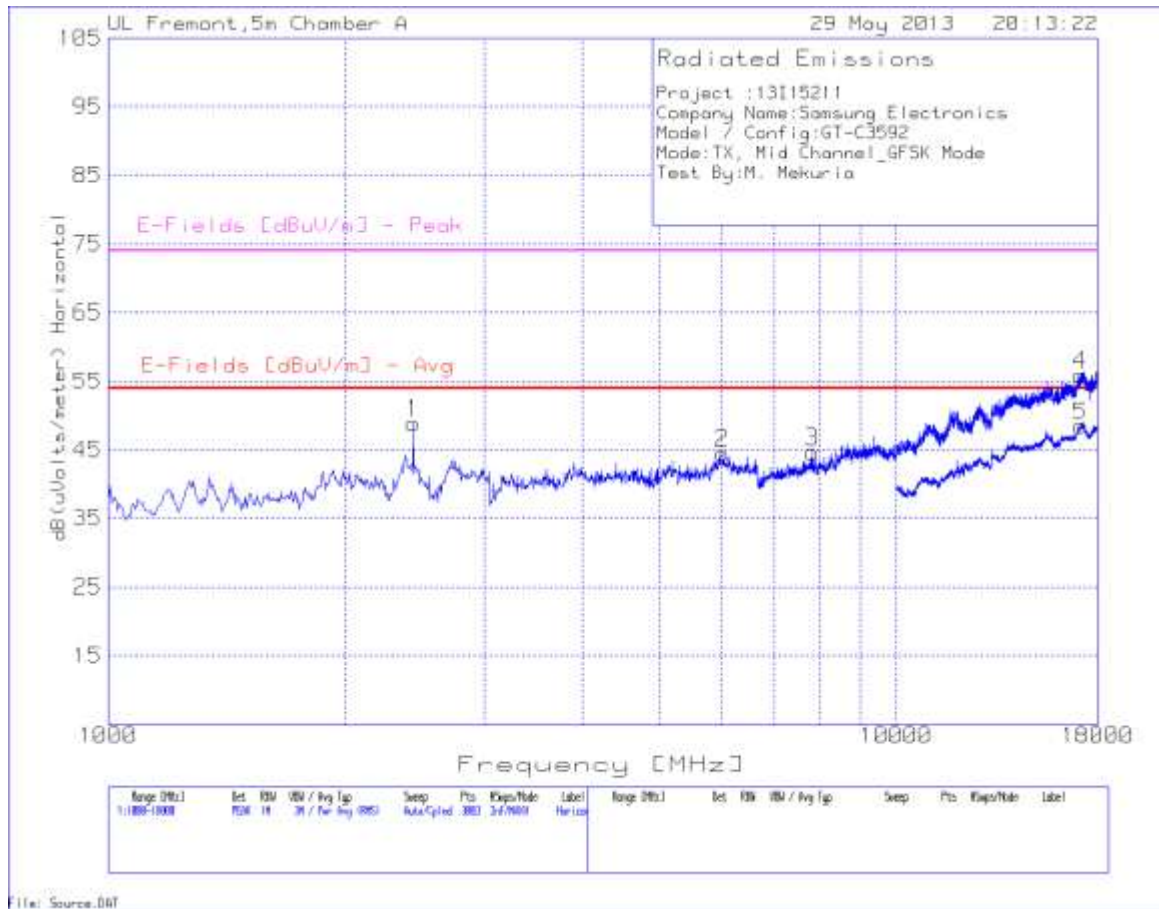
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(μVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2298.734	49.36	PK	32.1	-36.9	6.4	0.9	49.86	53.97	-4.11	74	-24.14	200	Horz
2	6645.903	36.81	PK	35.5	-35.6	8.2	0.3	45.21	53.97	-8.76	74	-28.79	200	Horz
3	17088.274	35.18	PK	40.9	-34.2	14	0.4	56.28	53.97	2.31	74	-17.72	200	Horz
4	17088.274	27.02	PK	40.9	-34.2	14	0.5	48.22	53.97	-5.75	74	-25.76	100	Horz

Vertical 1000 - 18000MHz

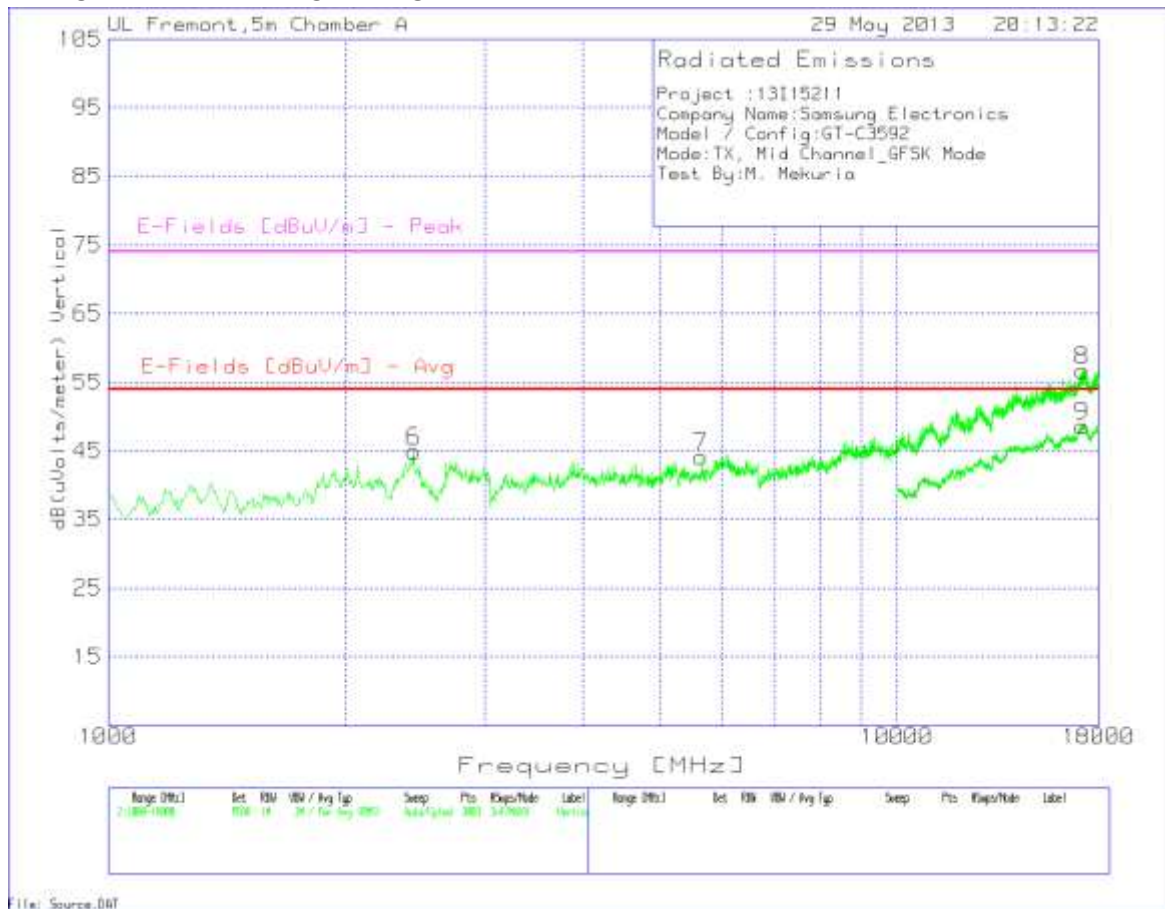
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(μVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
5	2298.734	43.99	PK	32.1	-36.9	6.4	0.9	46.49	53.97	-7.48	74	-27.51	200	Vert
6	6600.6	36.37	PK	35.5	-35.6	8.2	0.2	44.67	53.97	-9.3	74	-29.33	100	Vert
7	17252.498	35.55	PK	41	-34.3	14.1	0.5	56.85	53.97	2.88	74	-17.15	100	Vert
8	17252.498	27.84	PK	41	-34.3	14.1	0.6	48.24	53.97	-4.73	74	-24.76	200	Vert

PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



MID CHANNEL DATA

Project :1315211

Company Name:Samsung Electronics

Model / Config:GT-C3592

Mode:TX, Mid Channel_GFSK Mode

Test By:M. Mekuria

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2438.374	48.08	PK	32.3	-36.9	4.5	0.9	48.88	53.97	-5.09	74	-25.12	101	Horz
2	6017.322	37.03	PK	35.2	-35.6	7.7	0.2	44.53	53.97	-9.44	74	-29.47	200	Horz
3	7823.784	35.81	PK	35.5	-35.9	9	0.2	44.61	53.97	-9.36	74	-29.39	200	Horz
4	17127.915	34.74	PK	40.9	-34.2	14	0.5	55.94	53.97	1.97	74	-18.06	200	Horz
5	17128.436	27.23	PK	40.9	-34.2	14	0.5	48.43	53.97	-5.54	74	-25.57	100	Horz

Vertical 1000 - 18000MHz

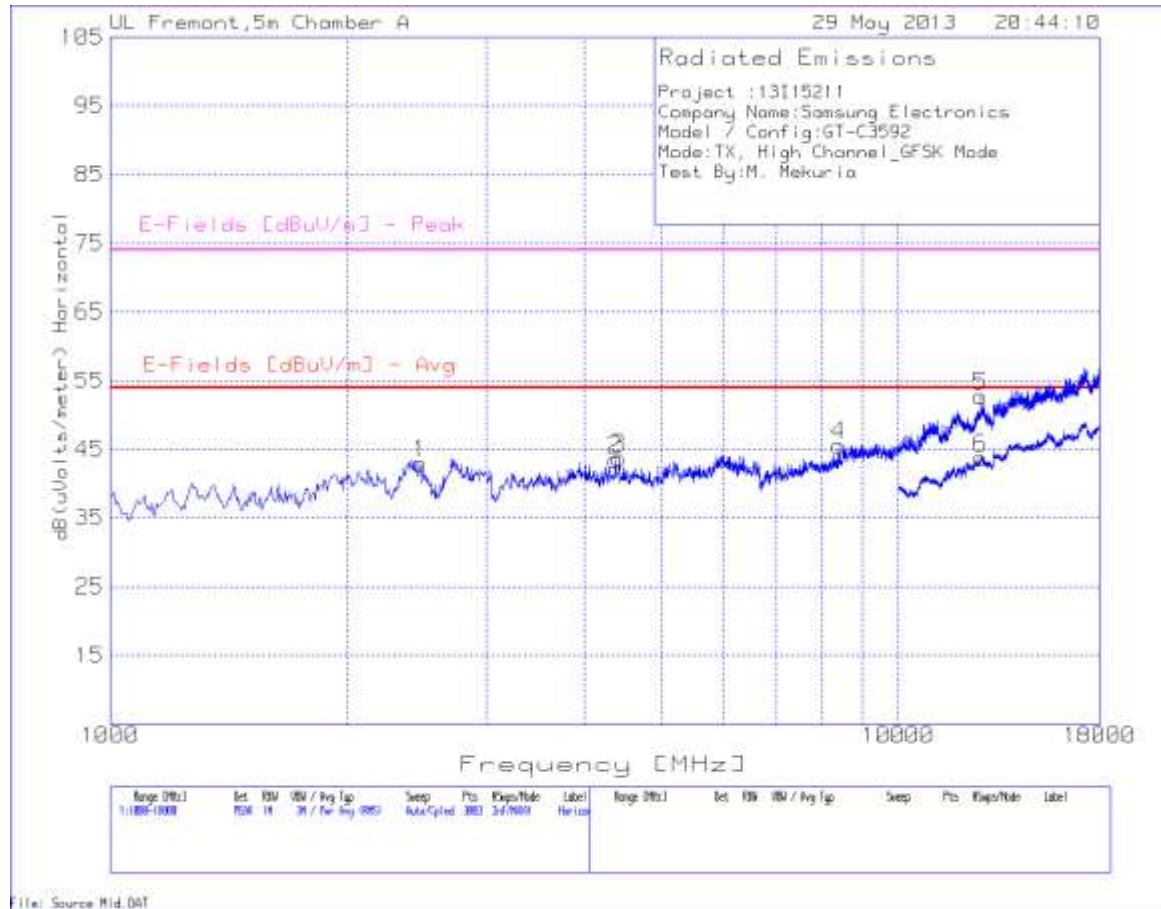
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
6	2438.374	44.1	PK	32.3	-36.9	4.5	0.9	44.9	53.97	-9.07	74	-29.1	200	Vert
7	5649.234	37.52	PK	34.5	-35.5	7.4	0.2	44.12	53.97	-9.85	74	-29.88	200	Vert
8	17156.229	35.51	PK	40.9	-34.2	14.1	0.4	56.71	53.97	2.74	74	-17.29	200	Vert
9	17160.42	27.37	PK	40.9	-34.2	14.1	0.4	48.57	53.97	-5.4	74	-25.43	100	Vert

PK- Peak detector

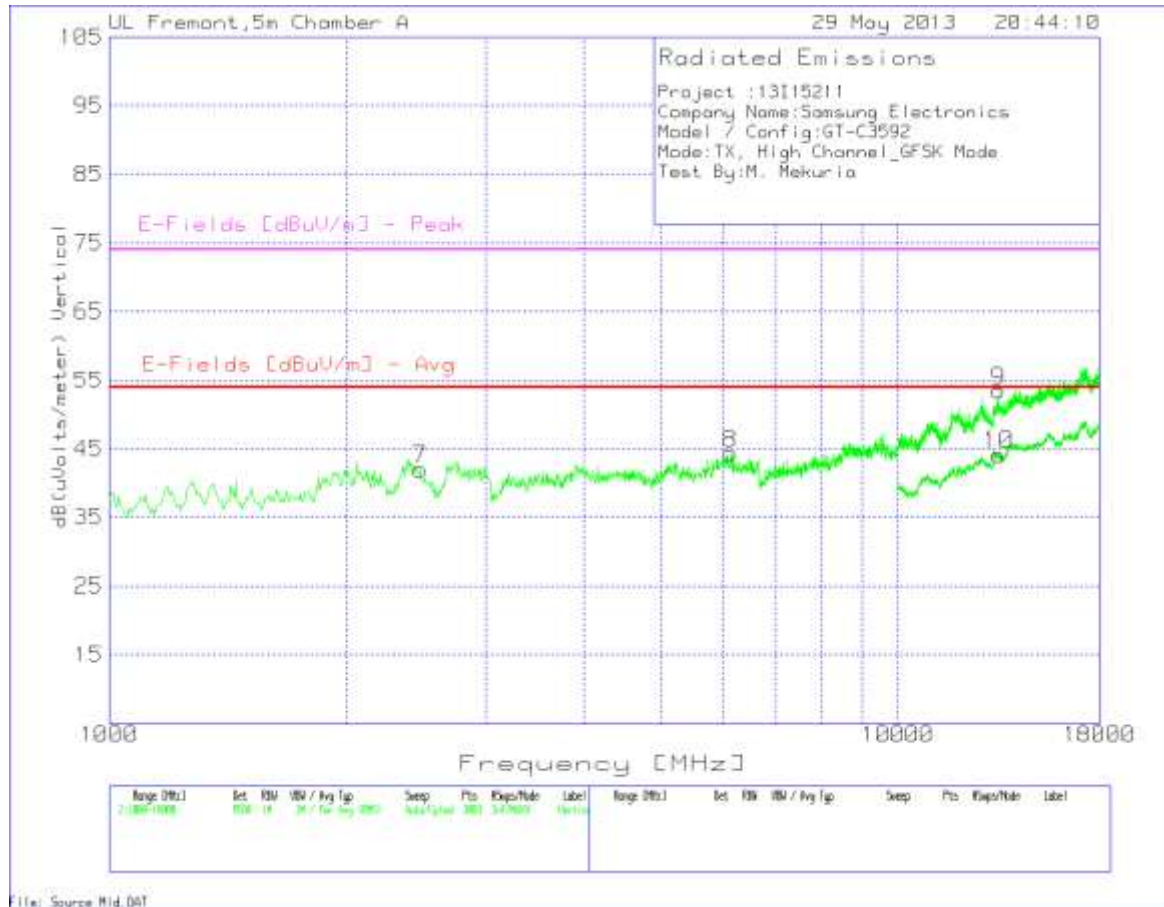
QP- Quasi-Peak detector

Av- Average detector

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



HIGH CHANNEL DATA

Project :13I15211
Company Name:Samsung Electronics
Model / Config:GT-C3592
Mode:TX, High Channel _GFSK Mode
Test By:M, Mekuria

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2472.352	41.86	PK	32.5	-36.8	4.5	0.9	42.96	53.97	-11.01	74	-31.04	101	Horz
2	4375.083	39.21	PK	33.6	-35.9	6.4	0.2	43.51	53.97	-10.46	74	-30.49	200	Horz
3	4426.049	39.28	PK	33.7	-35.8	6.4	0.2	43.78	53.97	-10.19	74	-30.22	101	Horz
4	8412.725	36.17	PK	35.7	-36	9.4	0.3	45.57	53.97	-8.4	74	-28.43	200	Horz
5	12733.511	35.77	PK	39.2	-34.6	11.8	0.5	52.67	53.97	-1.3	74	-21.33	200	Horz
6	12730.635	26.97	PK	39.2	-34.6	11.8	0.4	43.77	53.97	-10.2	74	-30.23	100	Horz

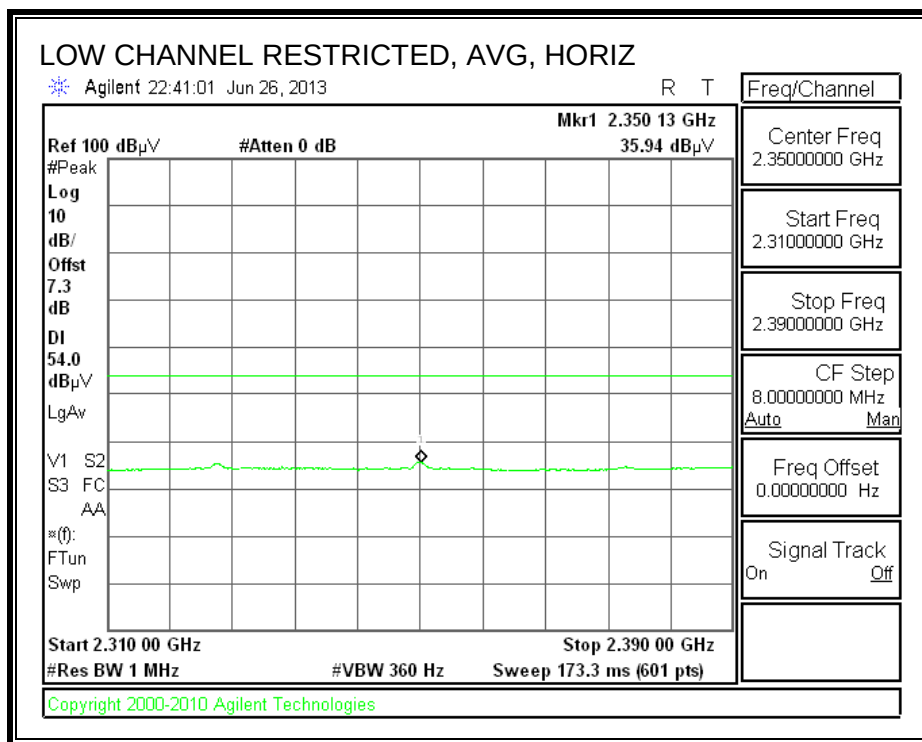
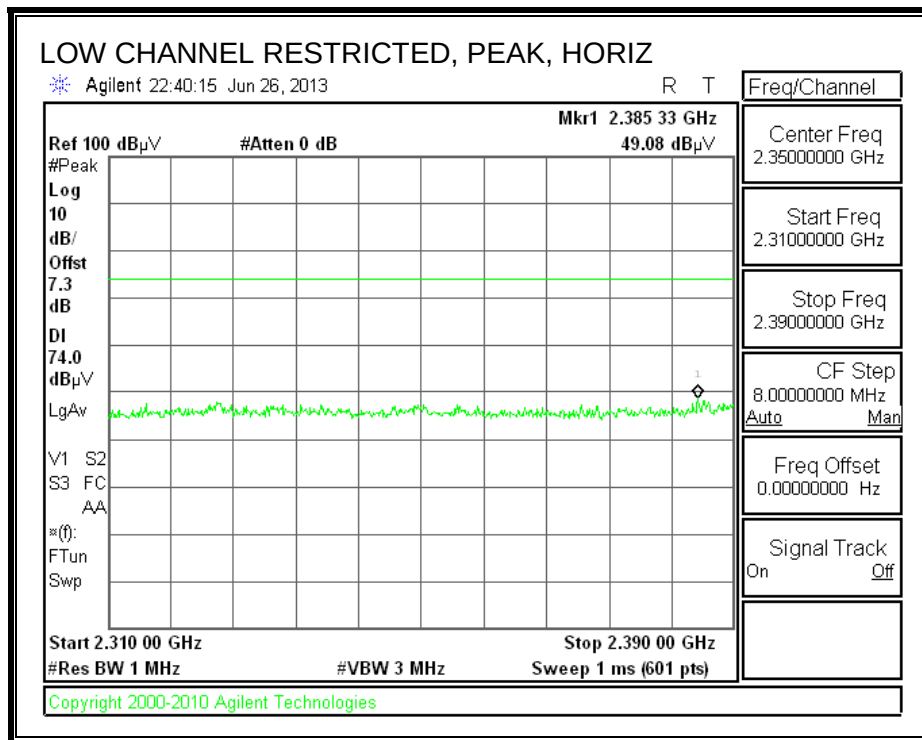
Vertical 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
7	2478.015	40.86	PK	32.5	-36.8	4.5	0.9	41.96	53.97	-12.01	74	-32.04	200	Vert
8	6136.243	36.62	PK	33.3	-35.6	7.8	0.2	44.32	53.97	-9.65	74	-29.68	200	Vert
9	13407.395	35.75	PK	39.1	-34	12.2	0.4	53.45	53.97	-0.52	74	-20.55	100	Vert
10	13410.295	26.46	PK	39.1	-34	12.2	0.4	44.16	53.97	-9.81	74	-29.84	100	Vert

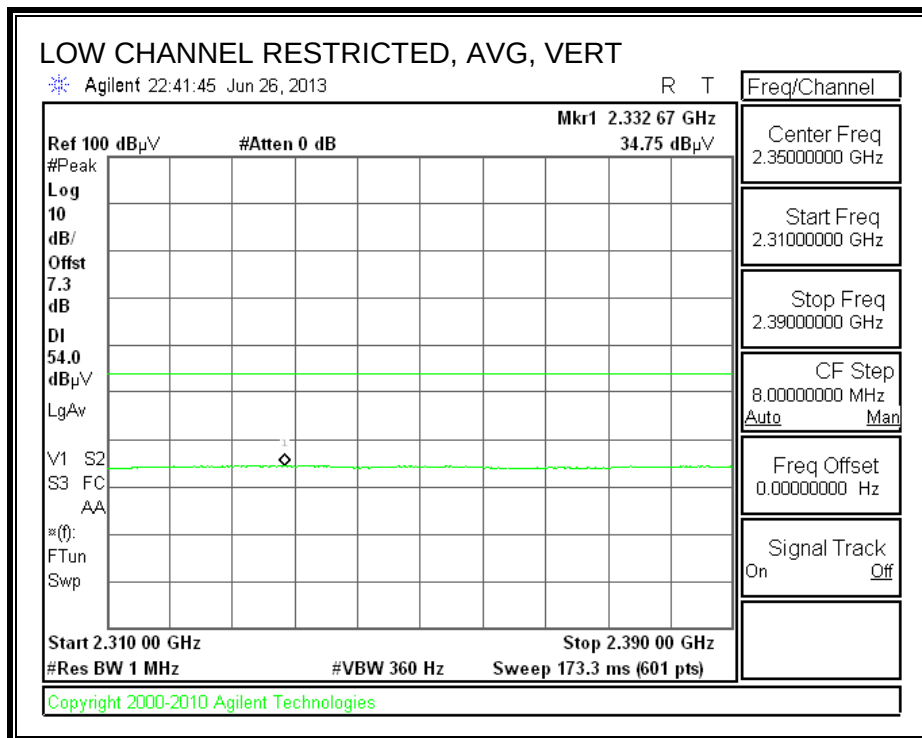
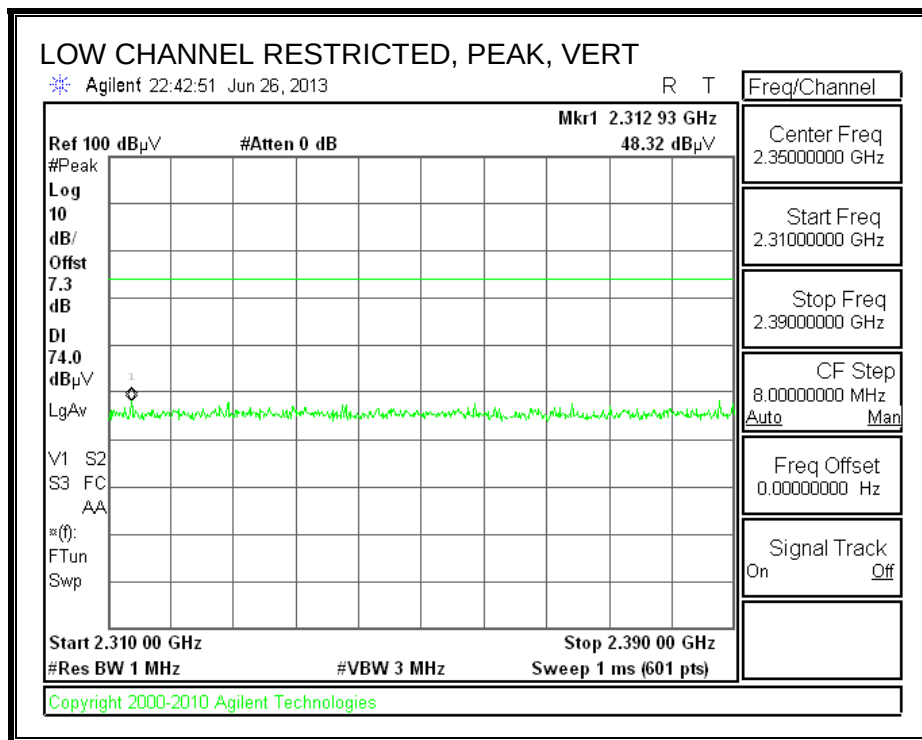
PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

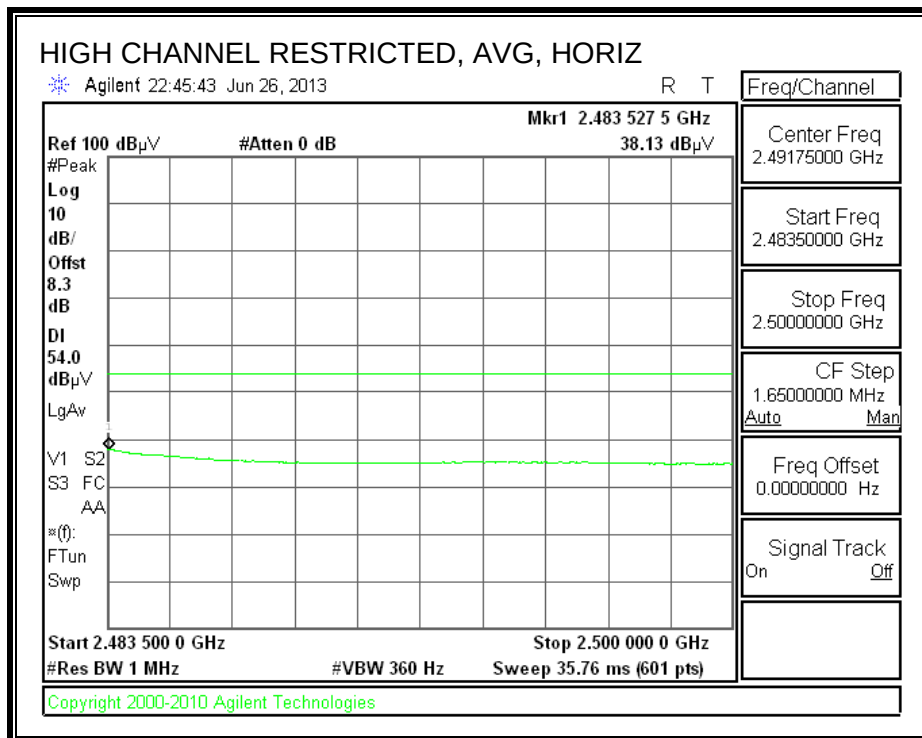
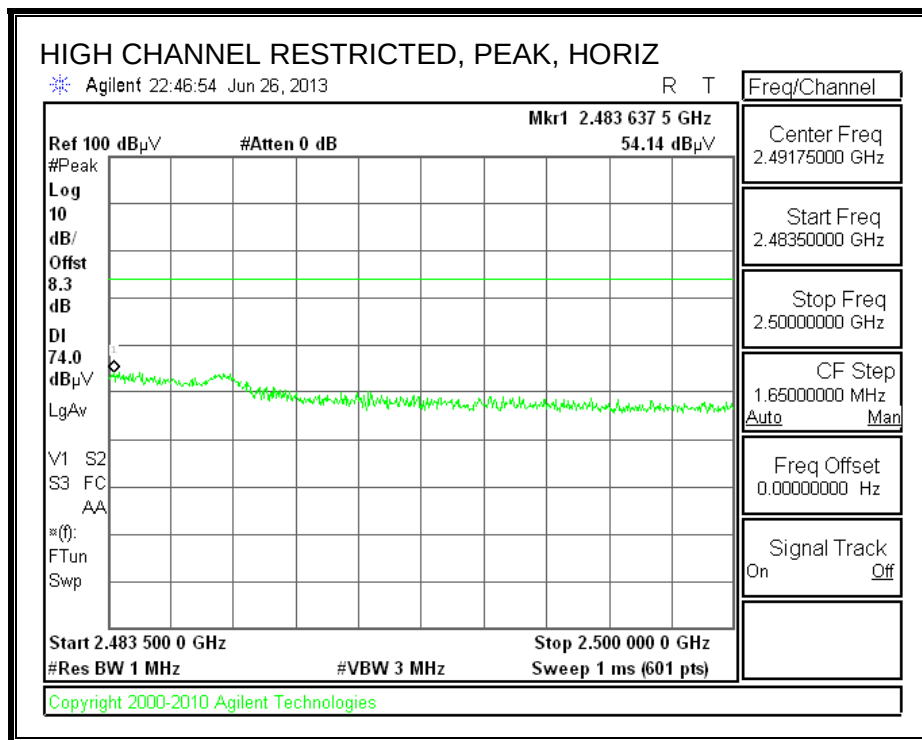
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



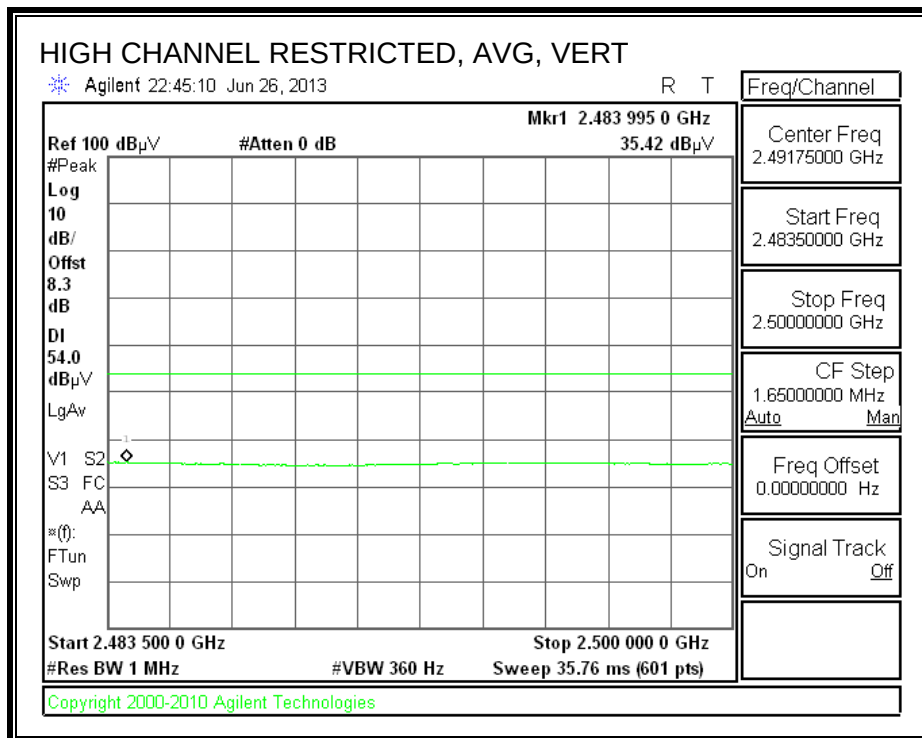
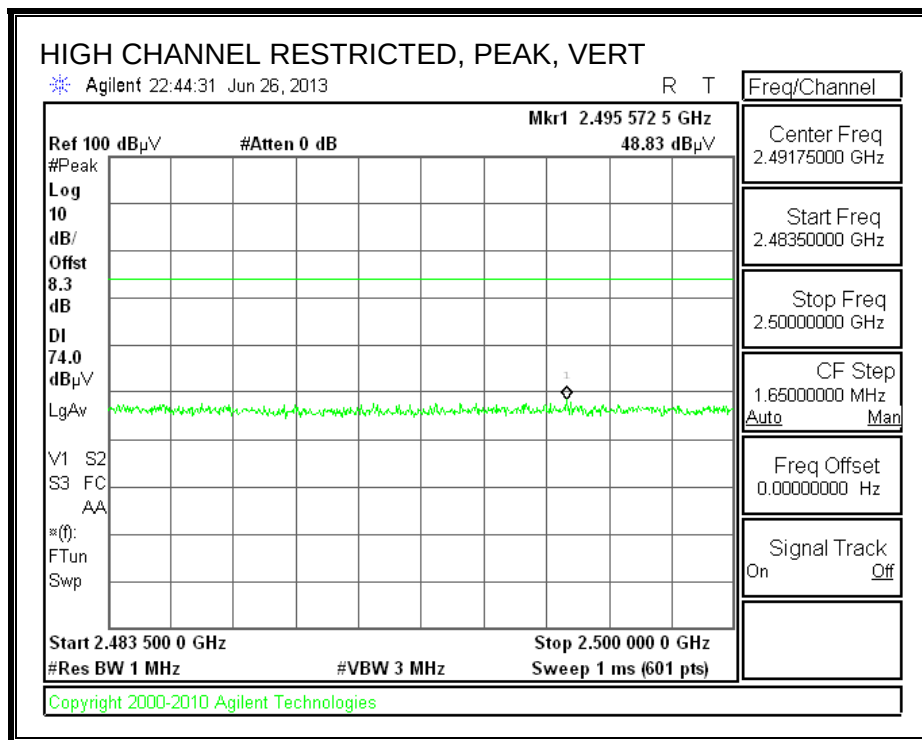
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



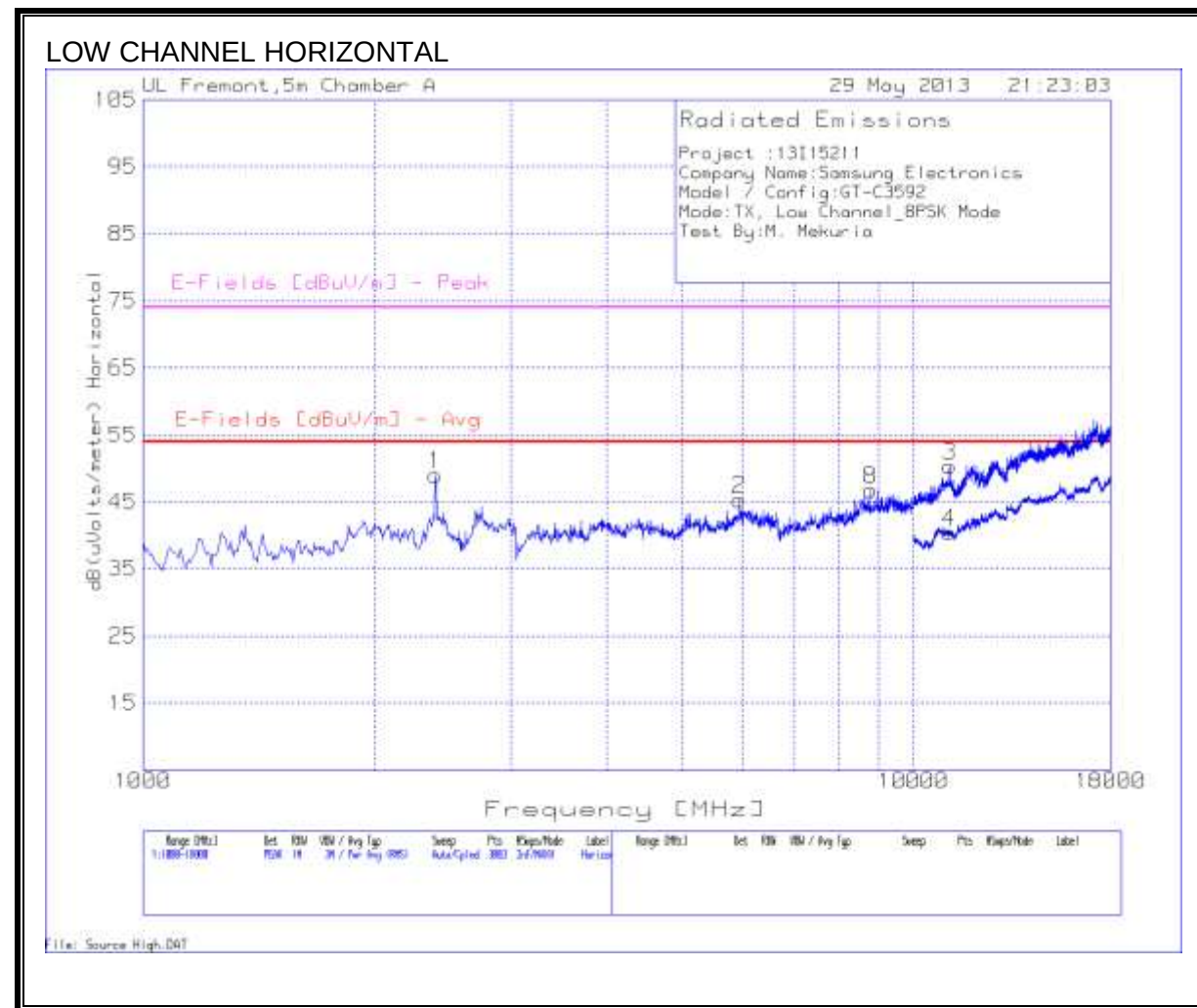
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



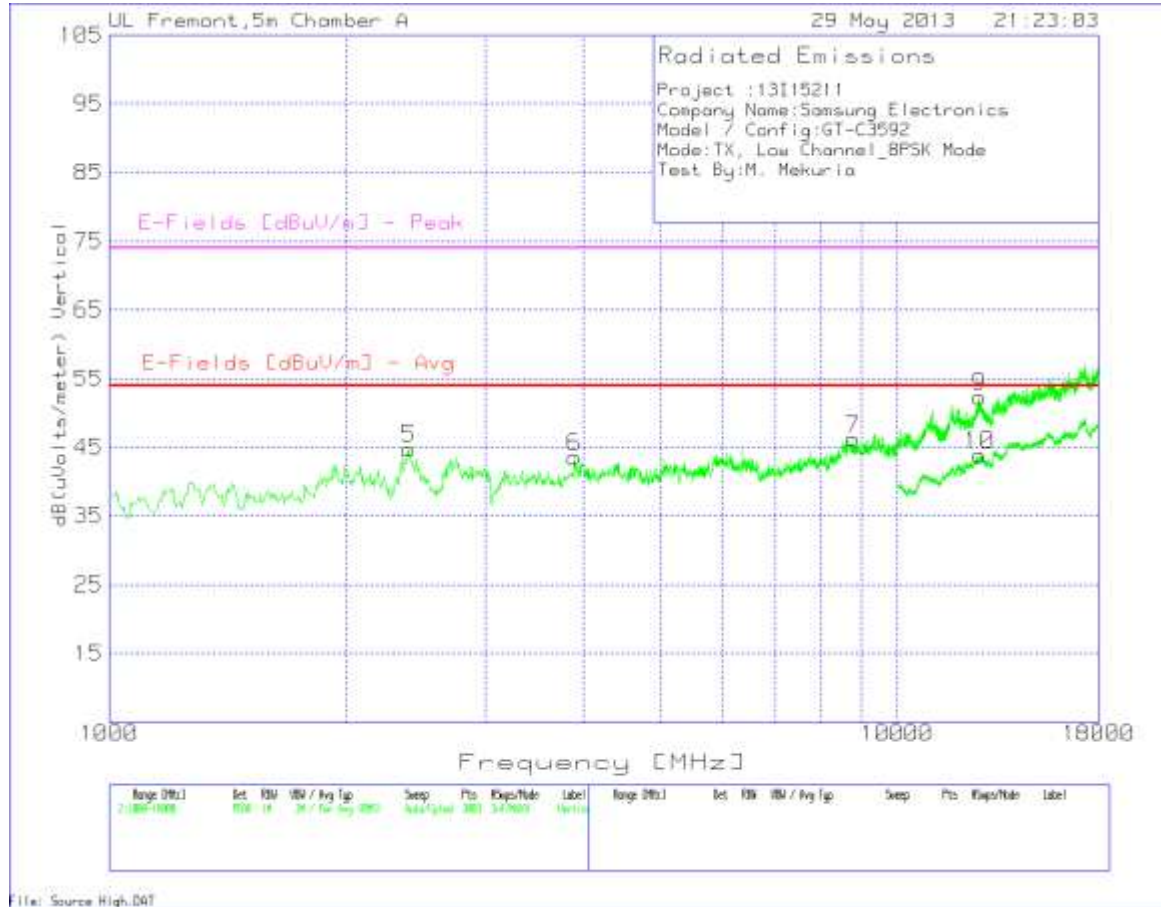
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS



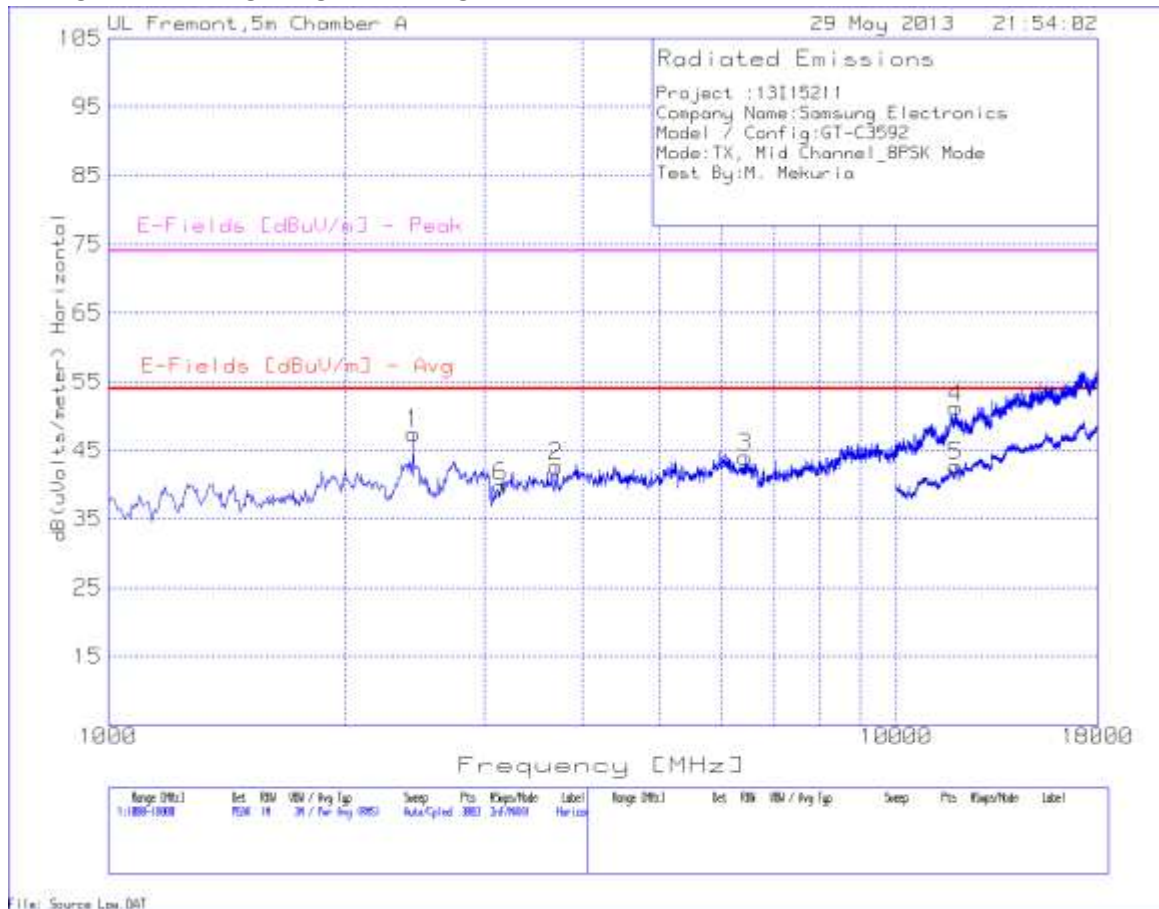
LOW CHANNEL VERTICAL PLOT



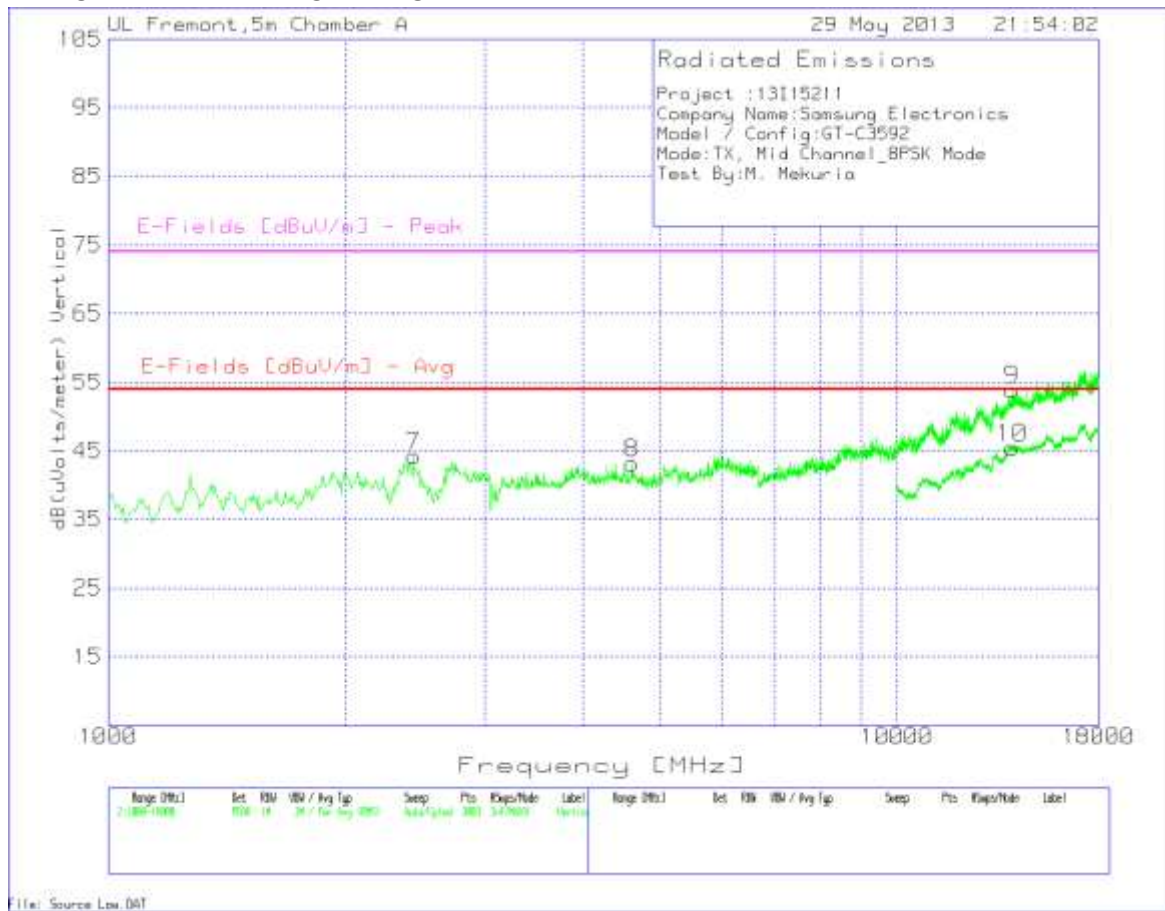
LOW CHANNEL DATA

Project :13I15211														
Company Name:Samsung Electronics														
Model / Config:GT-C3592														
Mode:TX, Low Channel_BPSK Mode														
Test By:M. Mekuria														
Horizontal 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2398.734	48.49	PK	32.1	-36.9	4.4	0.9	48.99	53.97	-4.98	74	-25.01	101	Horz
2	5943.704	37.91	PK	35.1	-35.6	7.7	0.2	45.31	53.97	-8.66	74	-28.69	101	Horz
3	11130.913	36.45	PK	37.8	-35.6	11	0.7	50.35	53.97	-3.62	74	-23.65	200	Horz
4	11127.436	26.49	PK	37.8	-35.6	11	0.7	40.39	53.97	-13.58	74	-33.61	100	Horz
8	8797.801	36.75	PK	35.8	-36	9.7	0.5	46.75	53.97	-7.22	74	-27.25	200	Horz
Vertical 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
5	2404.397	44.32	PK	32.1	-36.9	4.4	0.9	44.82	53.97	-9.15	74	-29.18	200	Vert
6	3893.738	39.65	PK	33.7	-36	6	0.3	43.65	53.97	-10.32	74	-30.35	100	Vert
7	8792.139	36.18	PK	35.8	-36	9.7	0.5	46.18	53.97	-7.79	74	-27.82	200	Vert
9	12710.859	35.54	PK	39.2	-34.6	11.8	0.4	52.34	53.97	-1.63	74	-21.66	100	Vert
10	12710.645	27.1	PK	39.2	-34.6	11.8	0.4	43.9	53.97	-10.07	74	-30.1	200	Vert
PK - Peak detector														
QP - Quasi-Peak detector														
Av - Average detector														

MID CHANNEL HORIZONTAL PLOT



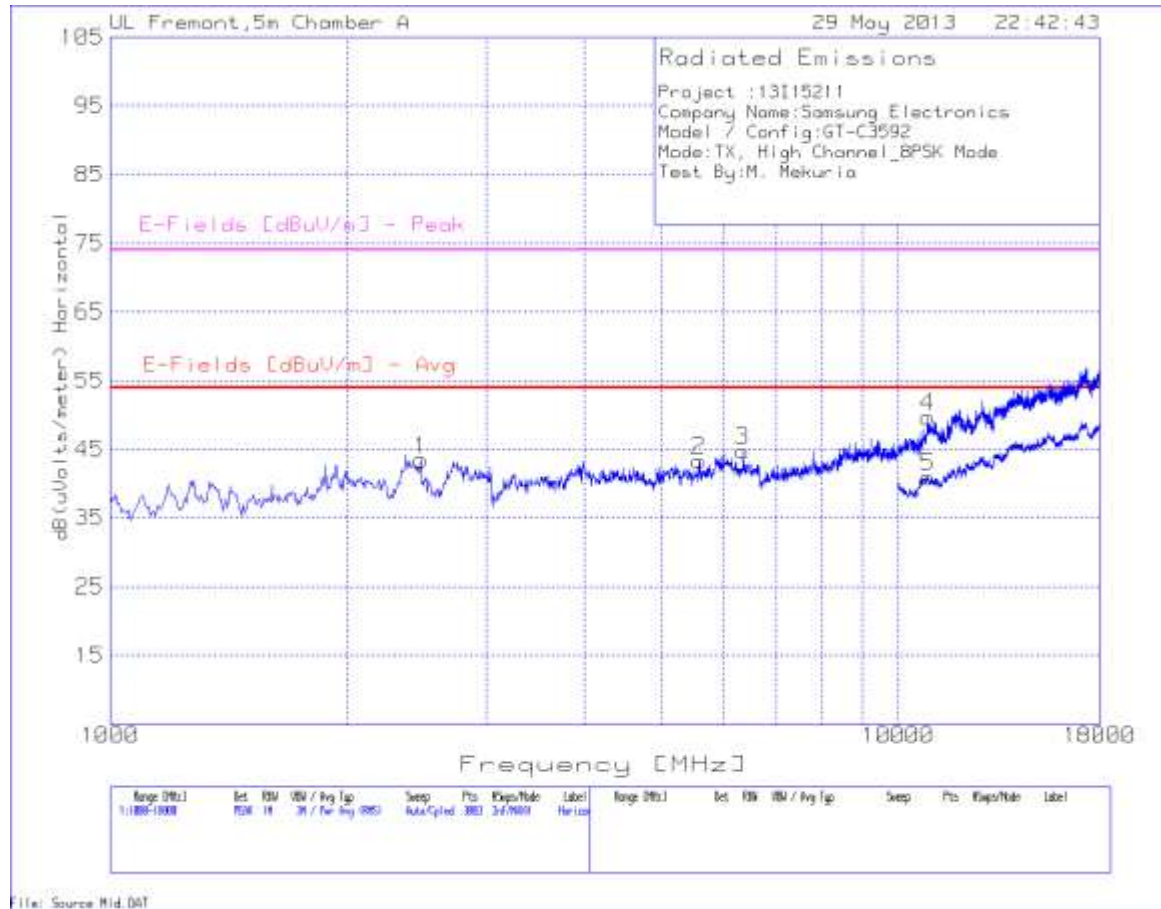
MID CHANNEL VERTICAL PLOT



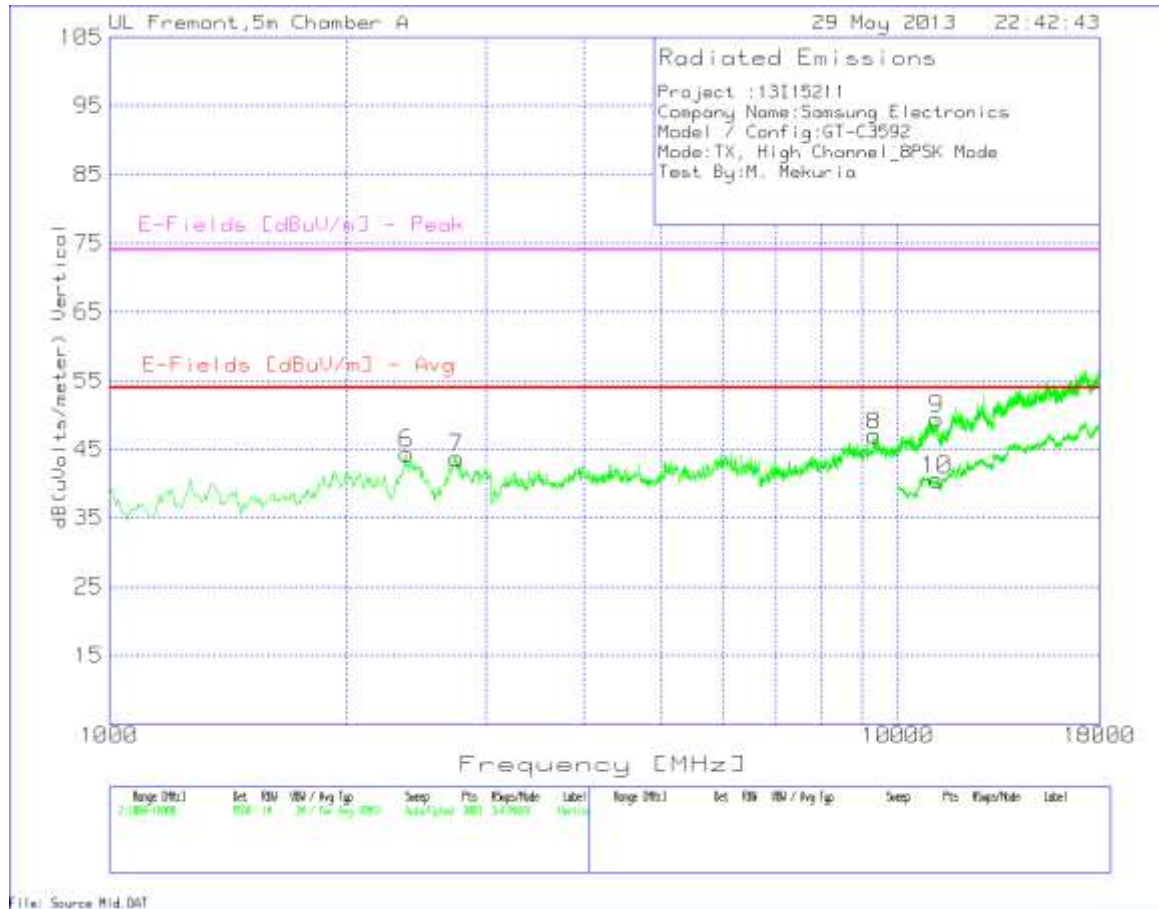
MID CHANNEL DATA

Project :13I15211														
Company Name:Samsung Electronics														
Model / Config:GT-C3592														
Mode:TX, Mid Channel_8PSK Mode														
Test By:M. Mekuria														
Horizontal 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2438.374	46.65	PK	32.3	-36.9	4.5	0.9	47.45	53.97	-6.52	74	-26.55	101	Horz
2	3706.862	39.47	PK	33.3	-36.2	5.8	0.3	42.67	53.97	-11.3	74	-31.33	101	Horz
3	6430.713	35.85	PK	35.5	-35.6	8	0.3	44.05	53.97	-9.92	74	-29.95	101	Horz
4	11906.729	36.1	PK	38.7	-35.7	11.4	0.7	51.2	53.97	-2.77	74	-22.8	200	Horz
5	11899.05	27.73	PK	38.7	-35.7	11.4	0.6	42.73	53.97	-11.24	74	-31.27	100	Horz
6	3146.236	37.38	PK	33.2	-36.6	5.2	0.6	39.78	53.97	-14.19	74	-34.22	200	Horz
Vertical 1000 - 18000MHz														
Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
7	2438.374	43.4	PK	32.3	-36.9	4.5	0.9	44.2	53.97	-9.77	74	-29.8	200	Vert
8	4612.925	38.2	PK	33.9	-35.8	6.6	0.3	43.2	53.97	-10.77	74	-30.8	100	Vert
9	13996.336	35.66	PK	39.1	-33.8	12.5	0.4	53.86	53.97	-0.11	74	-20.14	100	Vert
10	13998.001	27.22	PK	39.1	-33.8	12.5	0.4	45.42	53.97	-8.55	74	-28.58	100	Vert
PK - Peak detector														
QP - Quasi-Peak detector														
Av - Average detector														

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



HIGH CHANNEL DATA

Project :13I15211

Company Name:Samsung Electronics

Model / Config:GT-C3592

Mode:TX, High Channel_8PSK Mode

Test By:M. Mekuria

Horizontal 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
1	2478.015	42.3	PK	32.5	-36.8	4.5	0.9	43.4	53.97	-10.57	74	-30.6	200	Horz
2	5581.279	36.79	PK	34.4	-35.5	7.4	0.2	43.29	53.97	-10.68	74	-30.71	101	Horz
3	6351.432	36.7	PK	35.5	-35.6	8	0.2	44.8	53.97	-9.17	74	-29.2	101	Horz
4	10898.734	35.99	PK	37.9	-35.7	10.9	0.6	49.69	53.97	-4.28	74	-24.31	200	Horz
5	10899.55	27.25	PK	37.9	-35.7	10.9	0.6	40.95	53.97	-13.02	74	-33.05	200	Horz

Vertical 1000 - 18000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T136 Ant Factor [dB/m]	T144 Preamp Gain [dB]	Cable Factor [dB]	T160 BRF [dB]	dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height [cm]	Polarity
6	2381.746	44.02	PK	32	-36.9	4.4	0.9	44.42	53.97	-9.55	74	-29.58	200	Vert
7	2755.496	42.18	PK	32.6	-36.8	4.8	0.9	43.68	53.97	-10.29	74	-30.32	200	Vert
8	9318.787	36.47	PK	36.3	-36.2	10	0.4	46.97	53.97	-7	74	-27.03	200	Vert
9	11198.867	35.41	PK	37.9	-35.6	11	0.7	49.41	53.97	-4.56	74	-24.59	100	Vert
10	11203.398	26.56	PK	37.9	-35.6	11	0.7	40.56	53.97	-13.41	74	-33.44	100	Vert

PK - Peak detector

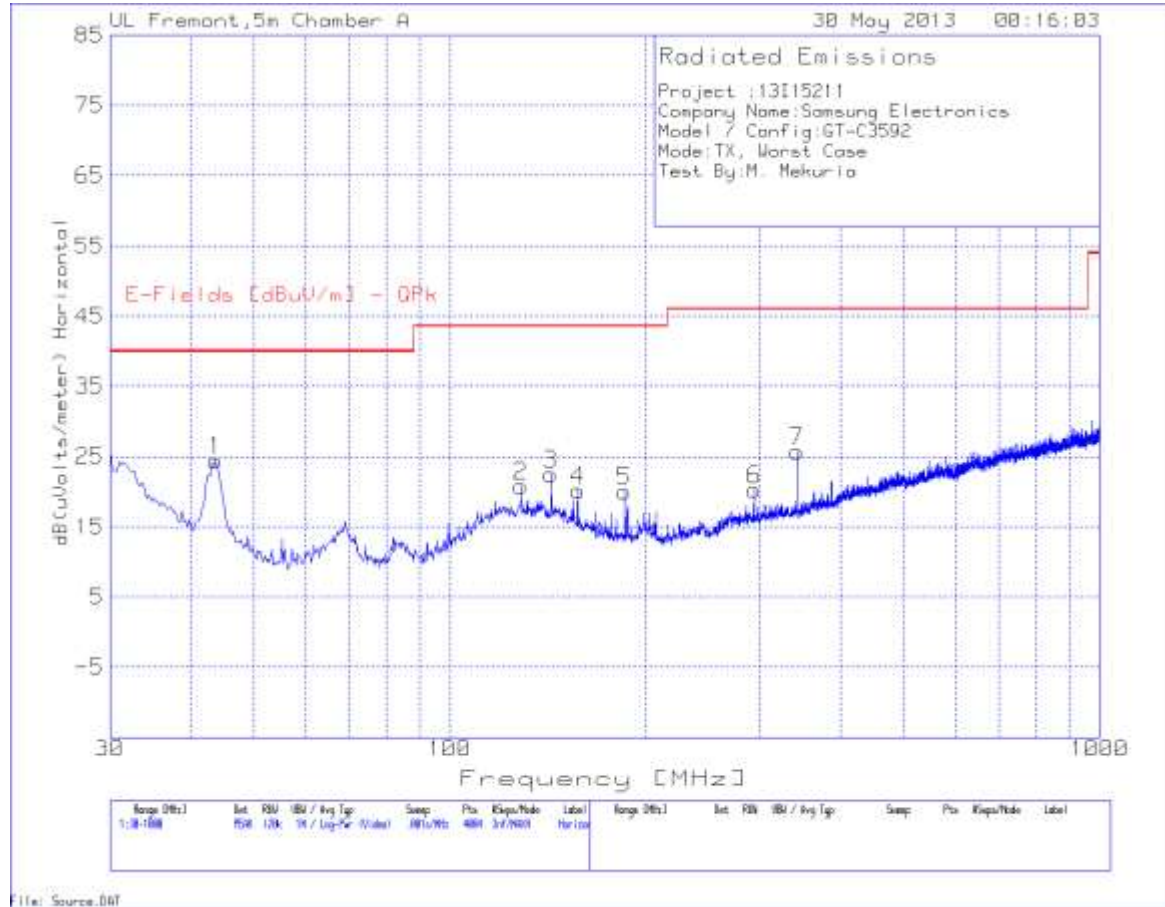
QP - Quasi-Peak detector

Av - Average detector

8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



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



HORIZONTAL AND VERTICAL DATA

Project :13I15211

Company Name:Samsung Electronics

Model / Config:GT-C3592

Mode:TX, Worst Case

Test By:M. Mekuria

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	43.5698	40.96	PK	11	-27.5	24.46	40	-15.54	300	Horz
2	128.8659	33.51	PK	14.1	-26.8	20.81	43.52	-22.71	200	Horz
3	143.1626	36.34	PK	12.8	-26.7	22.44	43.52	-21.08	200	Horz
4	157.4594	34.57	PK	12.2	-26.6	20.17	43.52	-23.35	100	Horz
5	186.053	35.47	PK	10.9	-26.3	20.07	43.52	-23.45	100	Horz
6	294.1269	32.84	PK	13.3	-25.9	20.24	46.02	-25.78	100	Horz
7	342.5906	37.14	PK	14.1	-25.5	25.74	46.02	-20.28	100	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
8	40.662	34.44	PK	13.1	-27.5	20.04	40	-19.96	200	Vert
9	70.7095	37.33	PK	8.1	-27.2	18.23	40	-21.77	200	Vert
10	198.8958	33.93	PK	12.1	-26.2	19.83	43.52	-23.69	200	Vert
11	312.0585	34.28	PK	13.6	-25.7	22.18	46.02	-23.84	200	Vert
12	342.5906	35.18	PK	14.1	-25.5	23.78	46.02	-22.24	200	Vert

PK - Peak detector

QP - Quasi-Peak detector

Av - Average detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

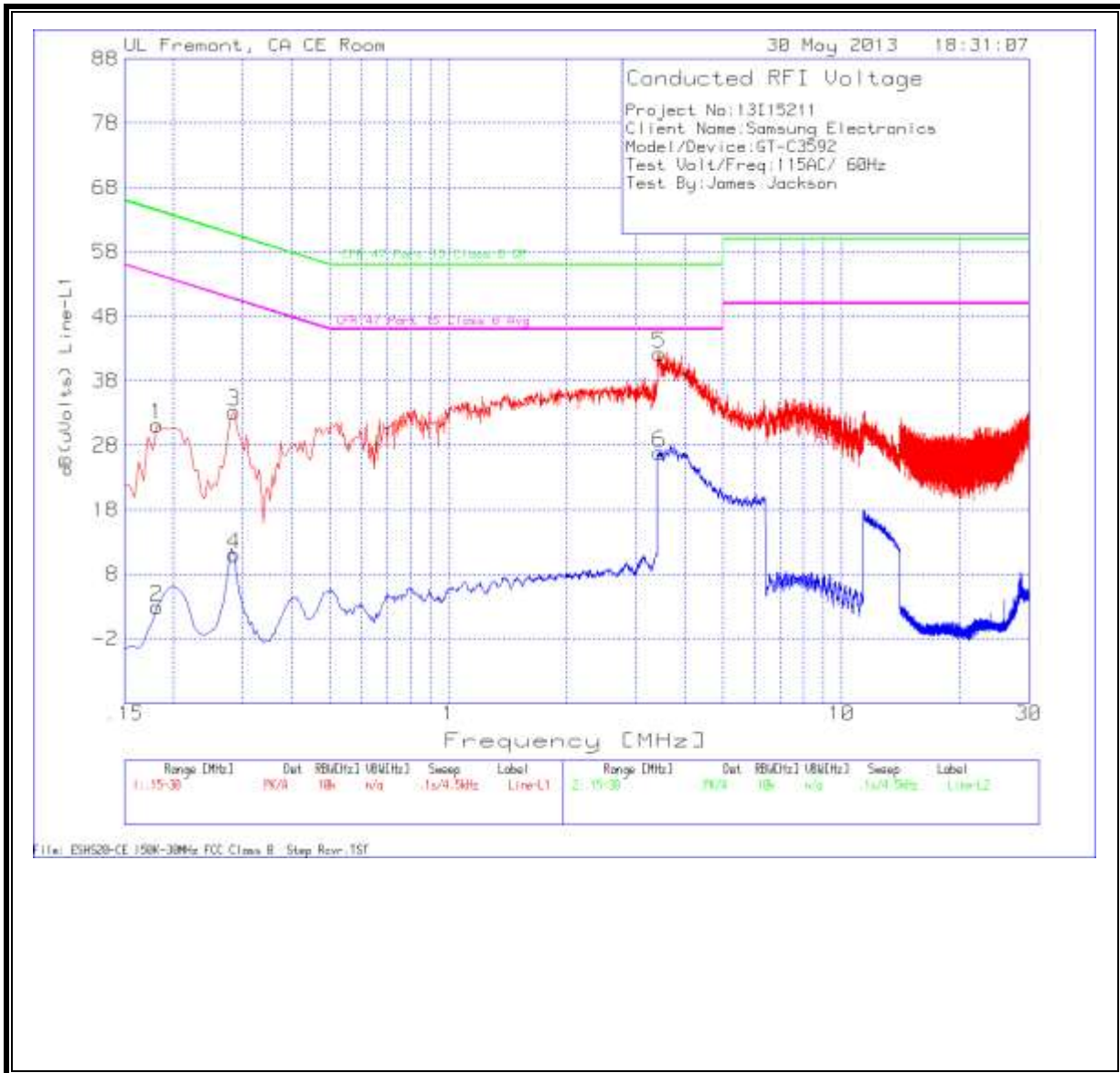
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

Project No:13I15211									
Client Name:Samsung Electronics									
Model/Device:GT-C3592									
Test Volt/Freq:115AC/ 60Hz									
Test By:James Jackson									
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.1815	31.02	PK	0.1	0	31.12	64.4	-33.28	-	-
0.1815	2.76	Av	0.1	0	2.86	-	-	54.4	-51.54
0.285	33.15	PK	0.1	0	33.25	60.7	-27.45	-	-
0.285	10.97	Av	0.1	0	11.07	-	-	50.7	-39.63
3.459	42.02	PK	0.1	0.1	42.22	56	-13.78	-	-
3.459	26.73	Av	0.1	0.1	26.93	-	-	46	-19.07
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L2.TXT (dB)	LC Cables 2&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.213	31.98	PK	0.1	0	32.08	63.1	-31.02	-	-
0.213	5.7	Av	0.1	0	5.8	-	-	53.1	-47.3
0.2805	34.27	PK	0.1	0	34.37	60.8	-26.43	-	-
0.2805	11.41	Av	0.1	0	11.51	-	-	50.8	-39.29
1.9905	38.11	PK	0.1	0.1	38.31	56	-17.69	-	-
1.9905	7.27	Av	0.1	0.1	7.47	-	-	46	-38.53
E									
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

LINE 1 RESULTS



LINE 2 RESULTS

