FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

PORTABLE GAMING DEVICE

MODEL NUMBER: P2523

FCC ID: VOB-P2523
IC: 7361A-P2523

REPORT NUMBER: 14U19497-E1

ISSUE DATE: DECEMBER 13, 2014

Prepared for
NVIDIA
2701 SAN TOMAS EXPY
SANTA CLARA, CA 95050

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
--	12/13/14	Initial Issue	D. Coronia

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	NVIDIA
EUT DESCRIPTION:	Portable Gaming Device
MODEL:	P2523
SERIAL NUMBER:	P2523-E02-S0929
DATE TESTED:	NOVEMBER 21-DECEMBER 8, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 ISSUE 8	Pass
INDUSTRY CANADA RSS-GEN ISSUE 4	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:

DAN CORONIA
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL VERIFICATION SERVICES INC

Tested By:

STEVEN TRAN
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
UL VERIFICATION SERVICES INC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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 18000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Portable Gaming Device.

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	9.75	9.44
2402 - 2480	Enhanced 8PSK	8.67	7.36

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 8.6.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 3.36 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	NVIDIA	SPA011AU5W	R43001	N/A

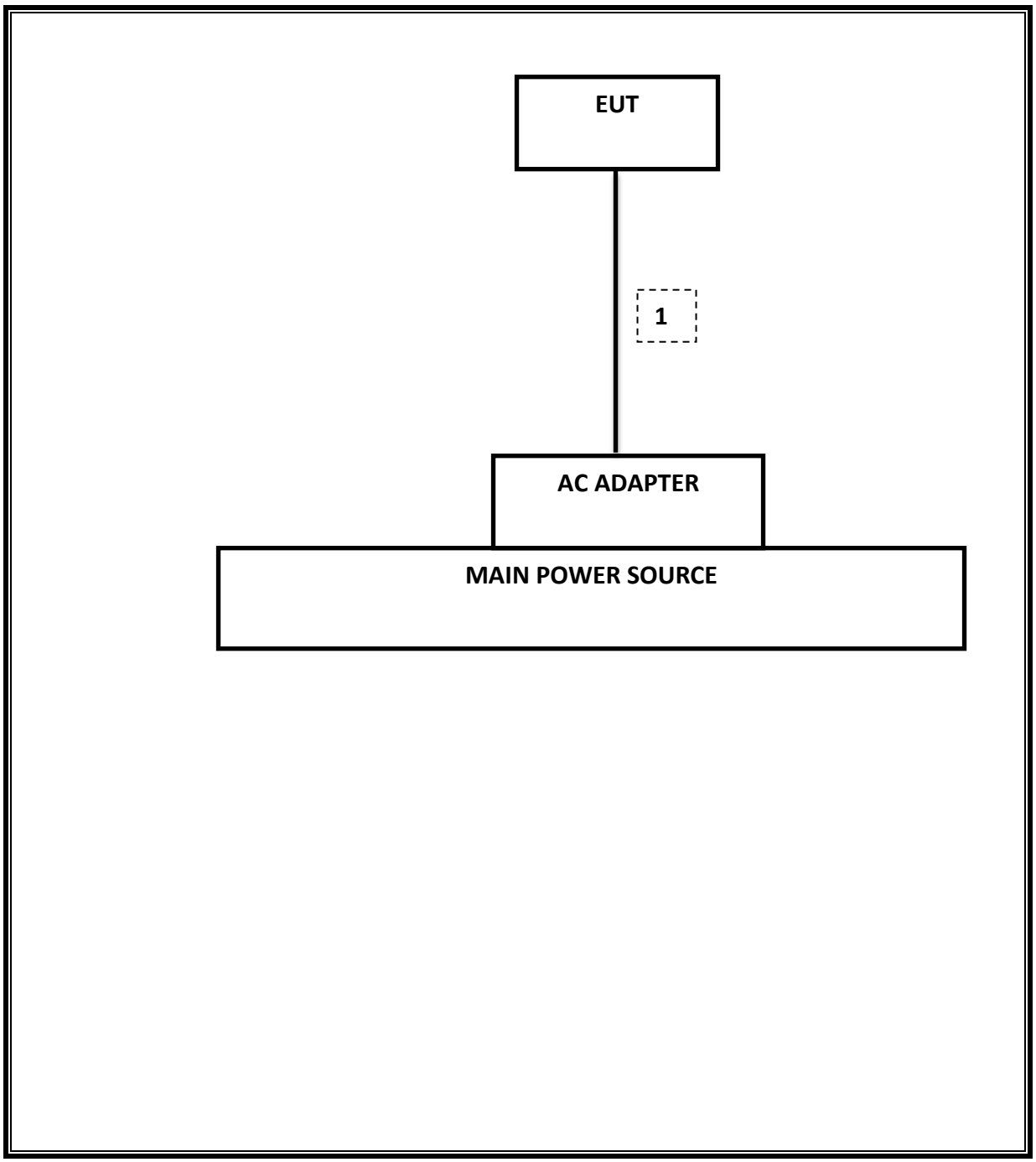
I/O CABLES

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

TEST SETUP

The EUT is continuously transmitting Bluetooth through the EUT's software.

5.6 SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/15
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	1013	01/15/15
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/15
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/14
CBT Bluetooth Tester	R & S	CBT	None	07/12/15
Peak Power Meter	Agilent / HP	E4416A	C00963	12/19/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/27/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	08/13/15
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/18/15

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS-GEN 6.6	Occupied Band width (99%)	N/A	Conducted	Pass	1.375 MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-43.37 dBm
15.247 (b)(1)	RSS-210 A8.4	TX conducted output power	<21dBm		Pass	9.75 dBm
15.247 (a)(1)	RSS-210 A8.1(b)	Hopping frequency separation	> 25KHz		Pass	1 MHz
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79 channels
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Avg Time of Occupancy	< 0.4sec		Pass	0.29 s
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass	51.63 dBuV (AV)
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	46.23 dBuV/m

8. ANTENNA PORT TEST RESULTS

8.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

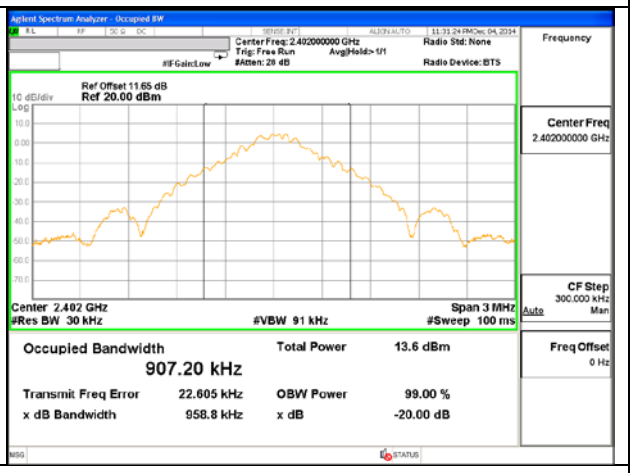
RESULTS

GFSK 20dB BANDWIDTH PLOTS AND TABLE

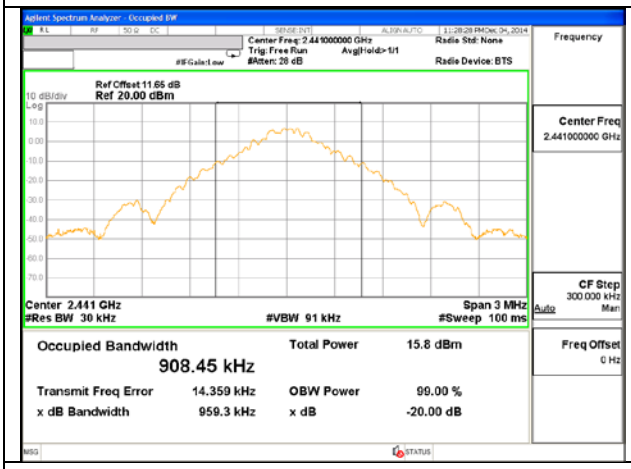
BASIC DATA RATE GFSK TEST RESULT TABLE

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	0.9588
Middle	2441	0.9593
High	2480	0.9591
Worst		0.9593

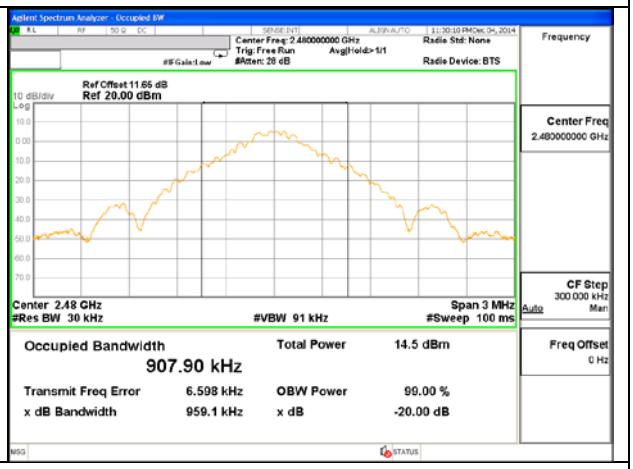
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



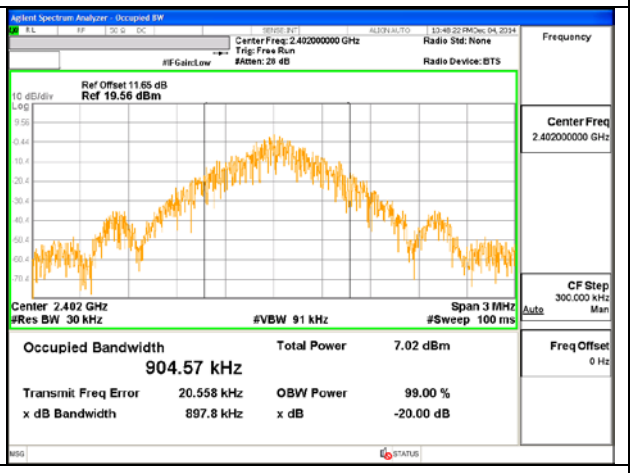
NOTE: --

GFSK 99% BANDWIDTH PLOTS AND TABLE

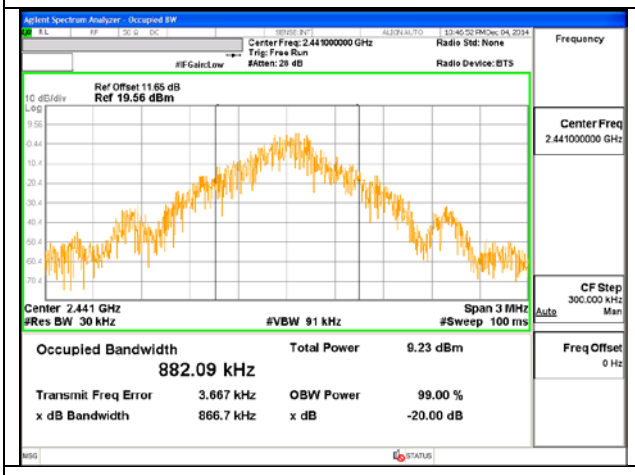
BASIC DATA RATE GFSK TEST RESULT TABLE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.9046
Middle	2441	0.8821
High	2480	0.9174
Worst		0.9174

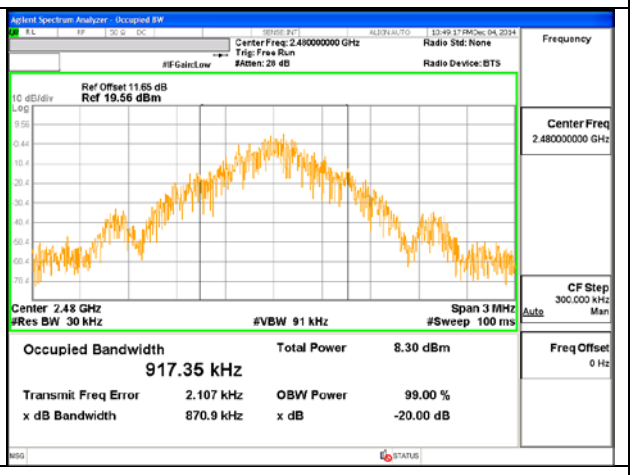
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



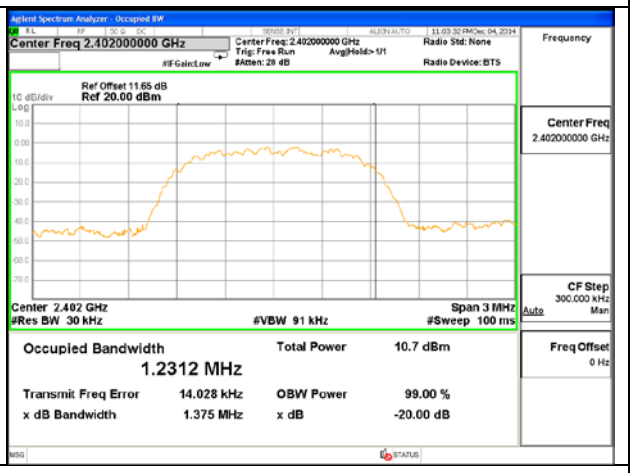
NOTE:

8DPSK 20dB BANDWIDTH PLOTS AND TABLE

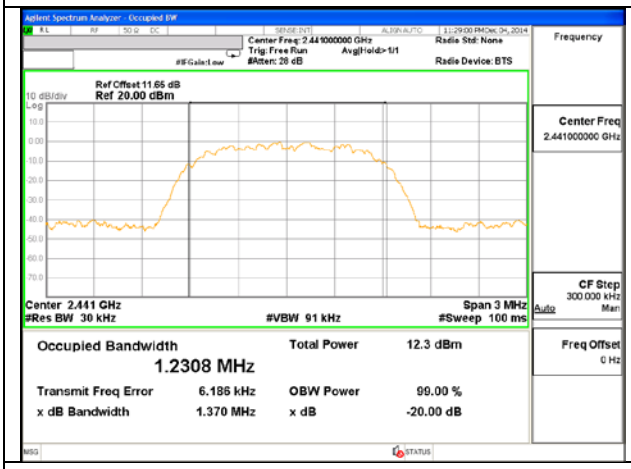
BASIC DATA RATE 8DPSK TEST RESULT TABLE

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	1.375
Middle	2441	1.370
High	2480	1.370
Worst		1.375

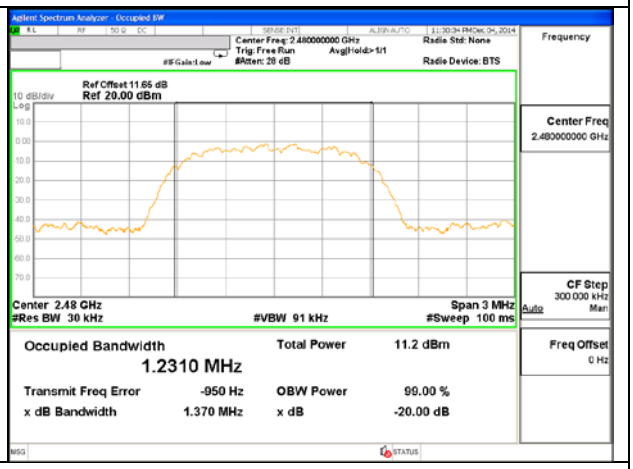
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



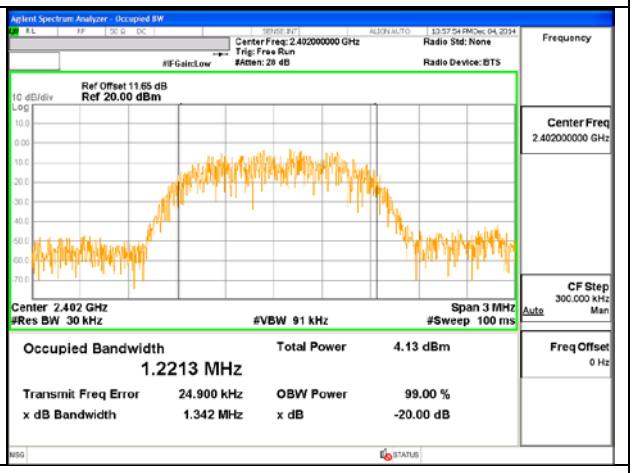
NOTE: --

8DPSK 99% BANDWIDTH PLOTS AND TABLE

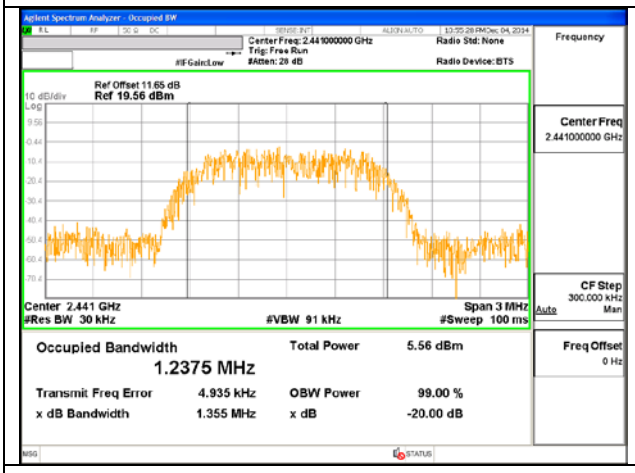
BASIC DATA RATE 8DPSK TEST RESULT TABLE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.342
Middle	2441	1.355
High	2480	1.337
Worst		1.355

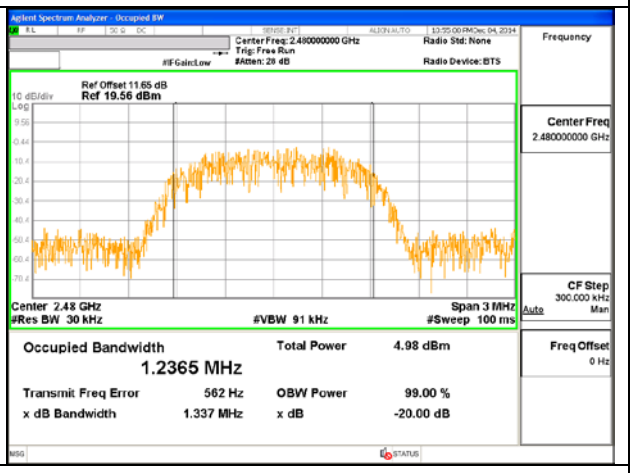
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



NOTE:

8.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

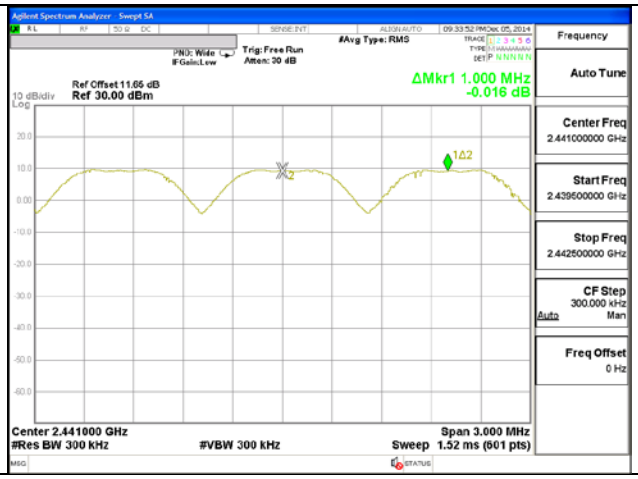
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION PLOT

NOTE: Hopping Frequency Separation is 1 MHz

8.3. 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.

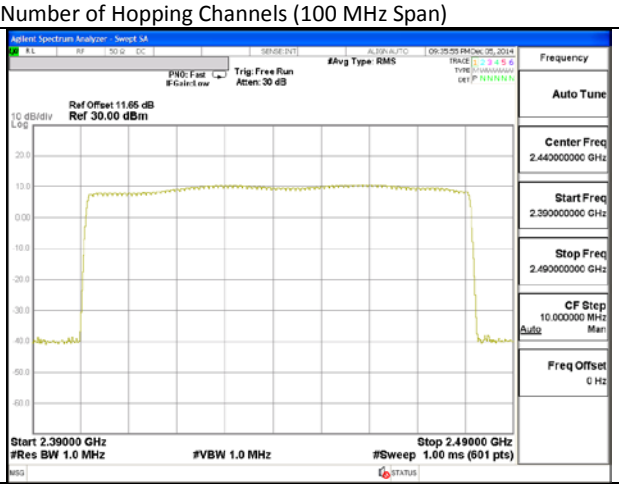
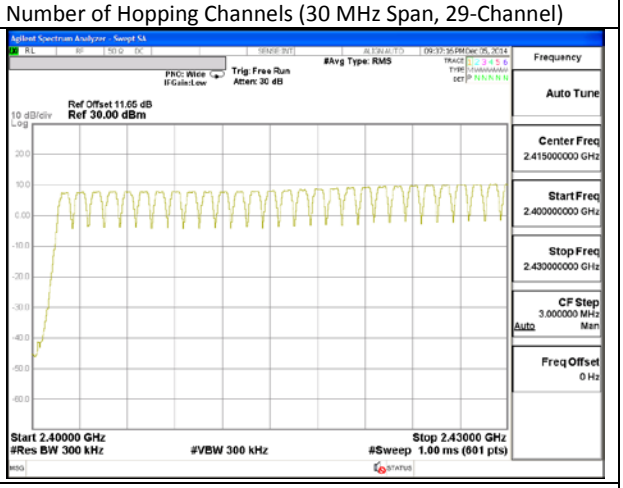
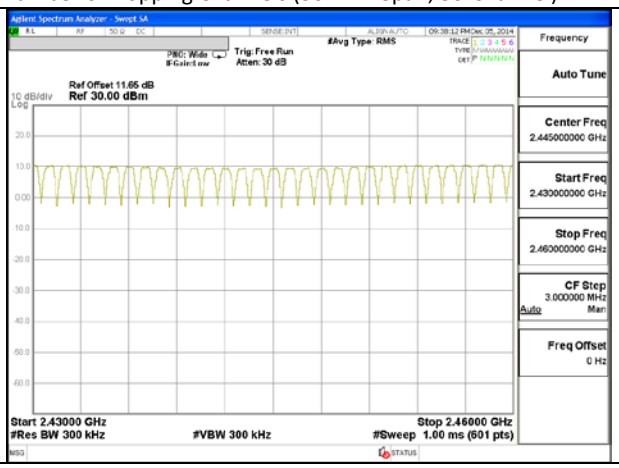
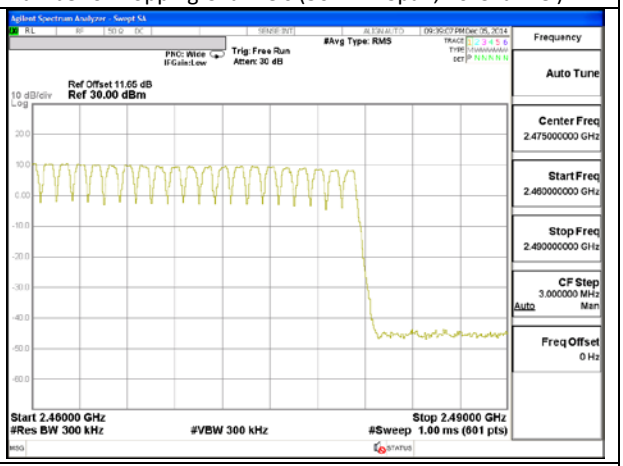
TEST PROCEDURE

DA 00-705: 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

Number of Hopping Channels (100 MHz Span)	Number of Hopping Channels (30 MHz Span, 29-Channel)
	
Number of Hopping Channels (30 MHz Span, 30-Channel)	Number of Hopping Channels (30 MHz Span, 20-Channel)
	
NOTE:	

8.4. 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 * (# of pulses in 3.16 s) * 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 * (# of pulses in 0.8 s) * pulse width.

RESULTS

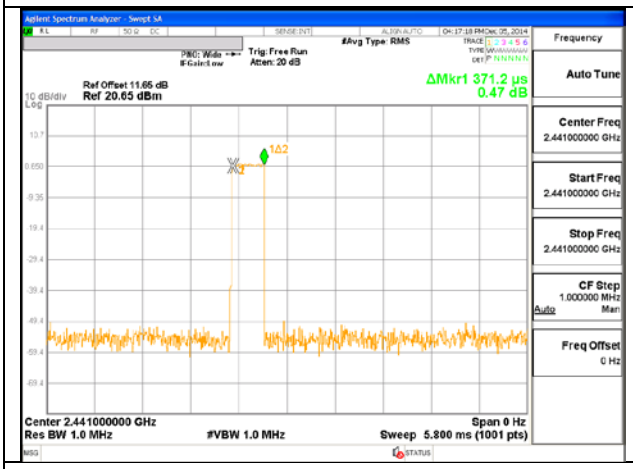
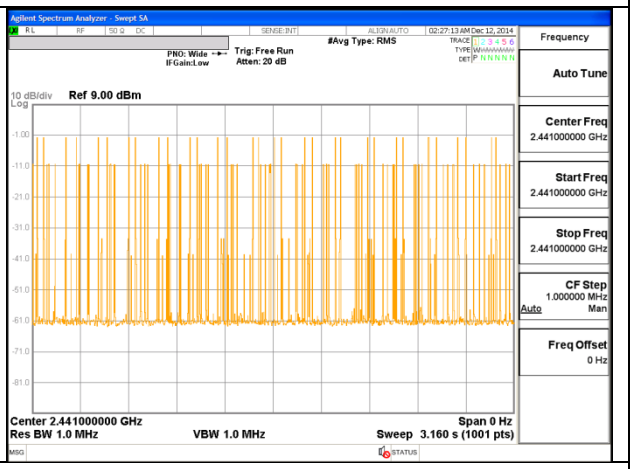
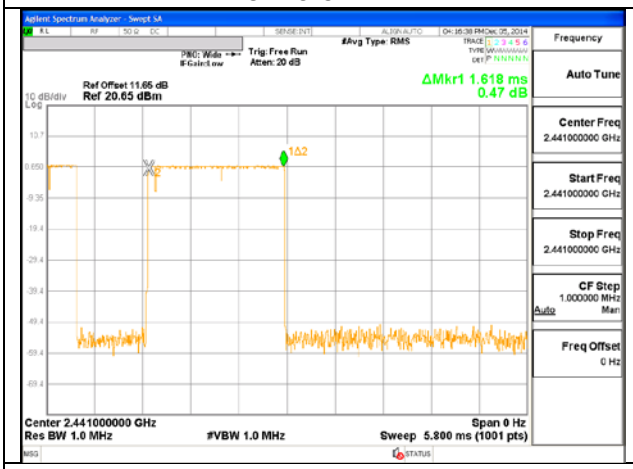
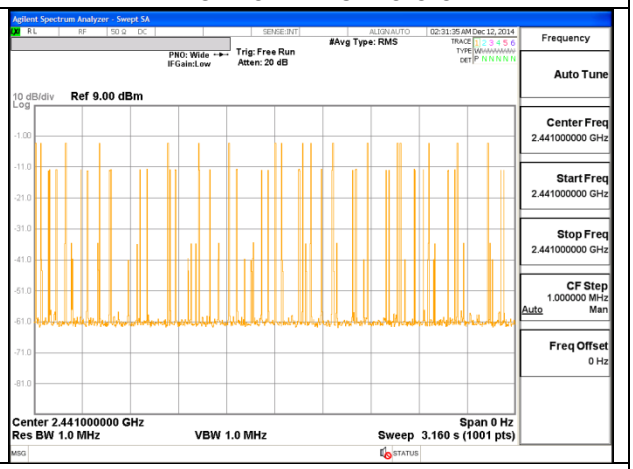
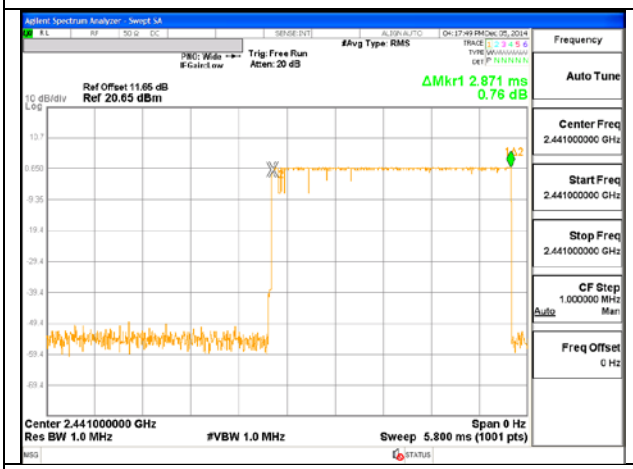
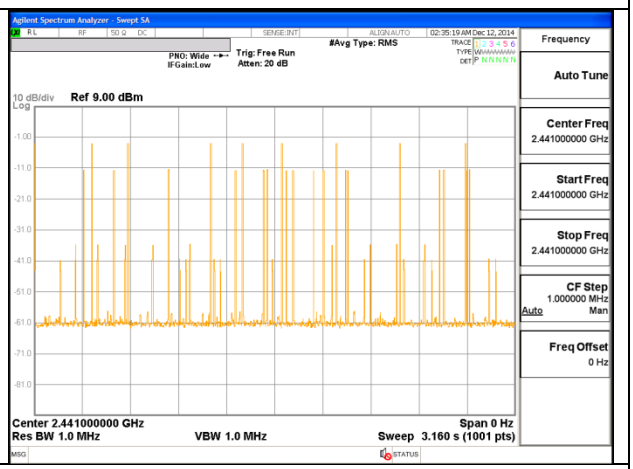
AVERAGE TIME OF OCCUPANCY

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	0.371	31	0.1151	0.4	-0.285
DH3	1.618	18	0.2912	0.4	-0.109
DH5	2.871	8	0.2297	0.4	-0.170

DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.371	7.75	0.02877	0.4	-0.3712
DH3	1.618	4.5	0.07281	0.4	-0.3272
DH5	2.871	2	0.05742	0.4	-0.3426

NOTE: --

PULSE WIDTH AND NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD PLOTS

DH1 - PULSE WIDTH	DH1 - NUMBER OF PULSES
	
DH3 - PULSE WIDTH	DH3 - NUMBER OF PULSES
	
DH5 - PULSE WIDTH	DH5 - NUMBER OF PULSES
	
NOTE:	

8.5. 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 21 dBm.

TEST PROCEDURE

DA 00-705: 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.

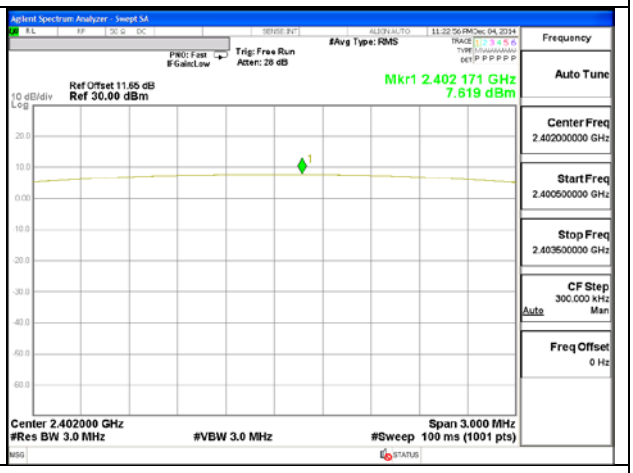
RESULTS

GFSK OUTPUT POWER PLOTS AND TABLE

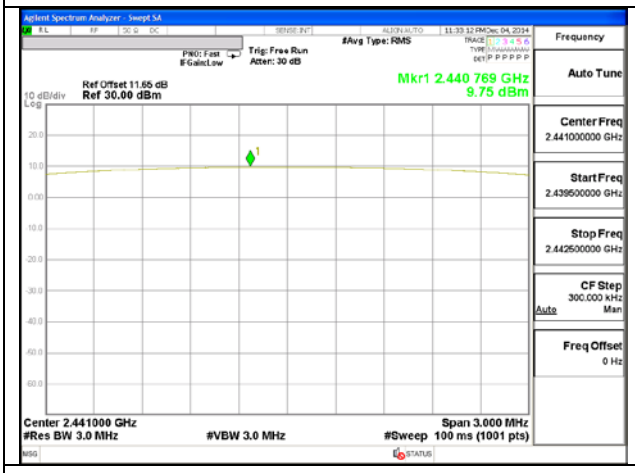
BASIC DATA RATE GFSK TEST RESULT TABLE

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.62	21	-13.38
Middle	2441	9.75	21	-11.25
High	2480	8.43	21	-12.57
Worst		9.75		-11.25

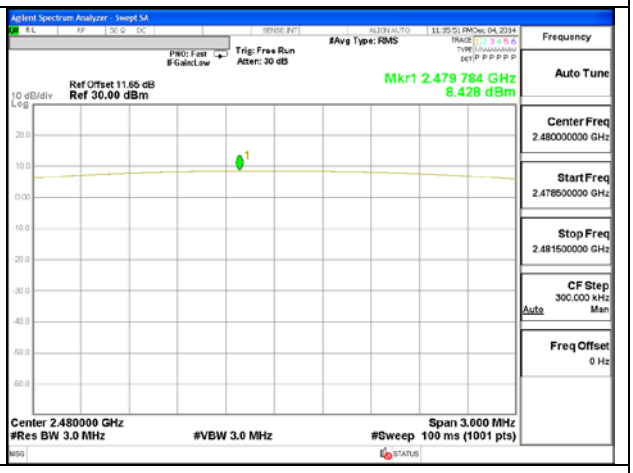
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



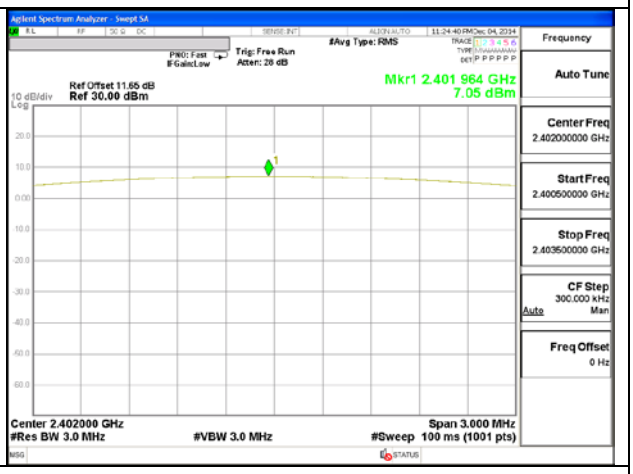
NOTE:

8DPSK OUTPUT POWER PLOTS AND TABLE

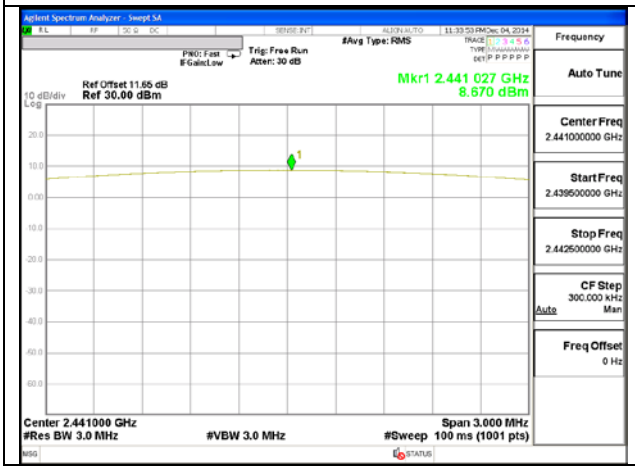
ENHANCED DATA RATE 8DPSK TEST RESULT TABLE

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.05	21	-13.95
Middle	2441	8.67	21	-12.33
High	2480	7.55	21	-13.45
Worst		8.67		-12.33

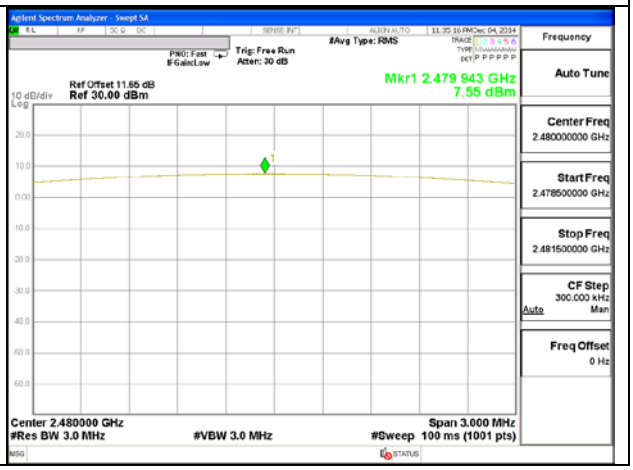
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

BASIC DATA RATE GFSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.61
Middle	2441	9.75
High	2480	8.43
Worst		9.75

ENHANCED DATA RATE 8DPSK

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.05
Middle	2441	8.67
High	2480	7.55
Worst		8.67

NOTE: --

8.7. 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.

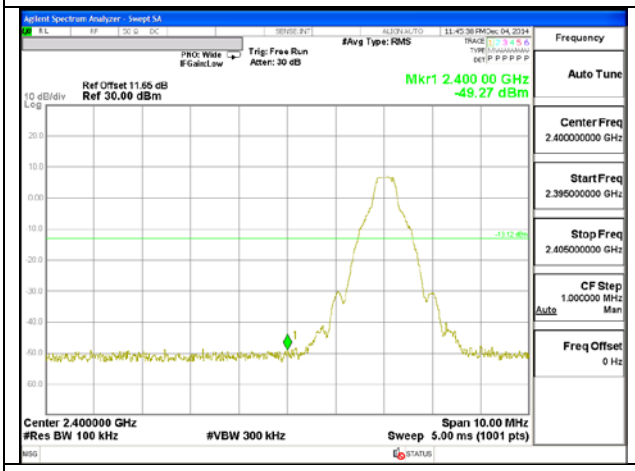
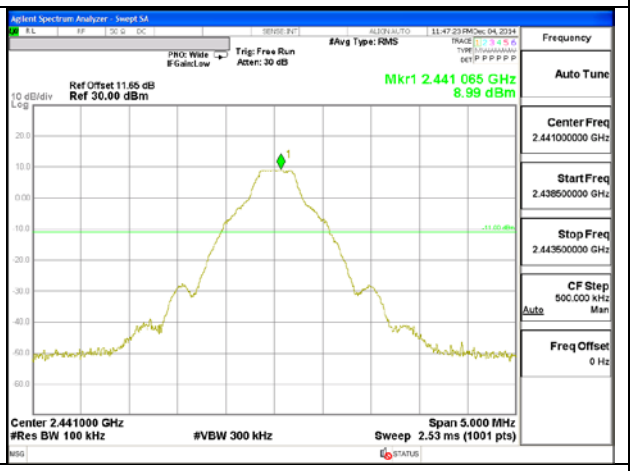
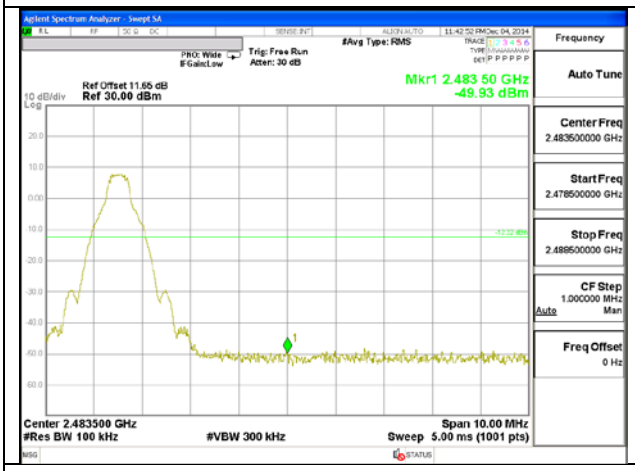
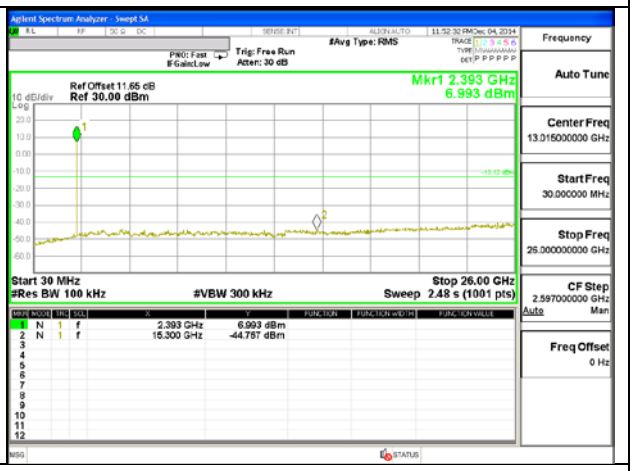
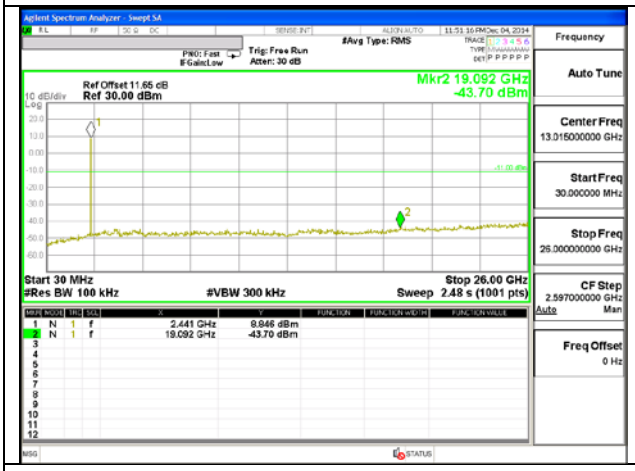
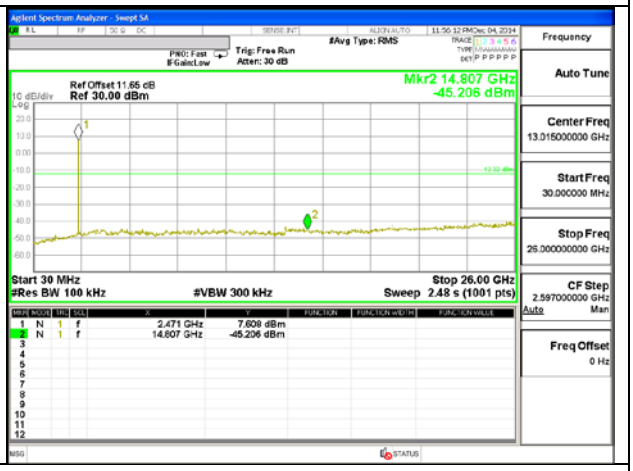
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

RESULTS

BASIC DATA RATE GFSK MODULATION NON-HOPPING MODE

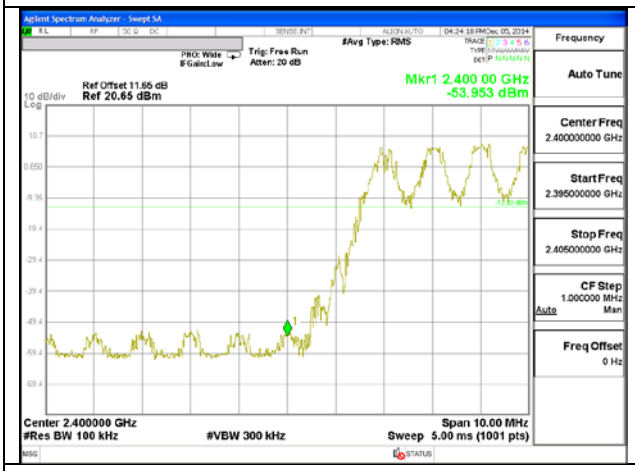
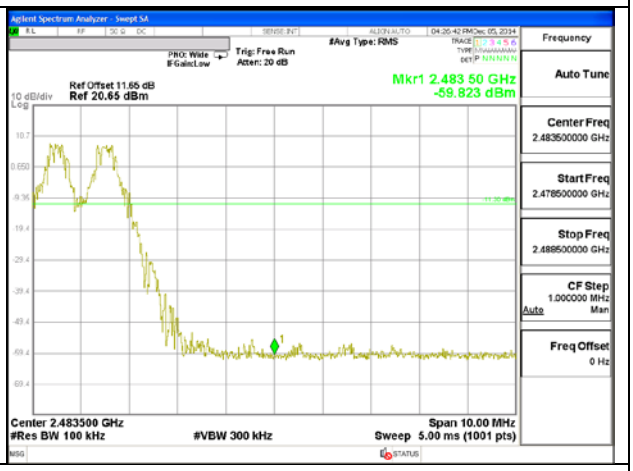
GFSK - BANDEDGE AND SPURIOUS EMISSIONS PLOTS

LOW CHANNEL BANDEDGE	MID CHANNEL REFERENCE
	
HIGH CHANNEL BANDEDGE	LOW CHANNEL SPURIOUS
	
MID CHANNEL SPURIOUS	HIGH CHANNEL SPURIOUS
	

NOTE:

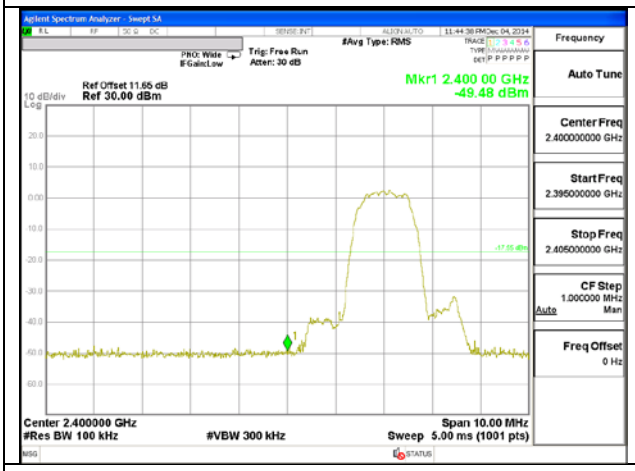
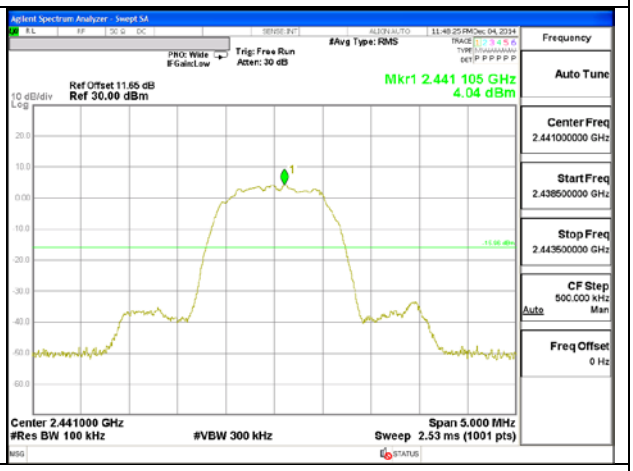
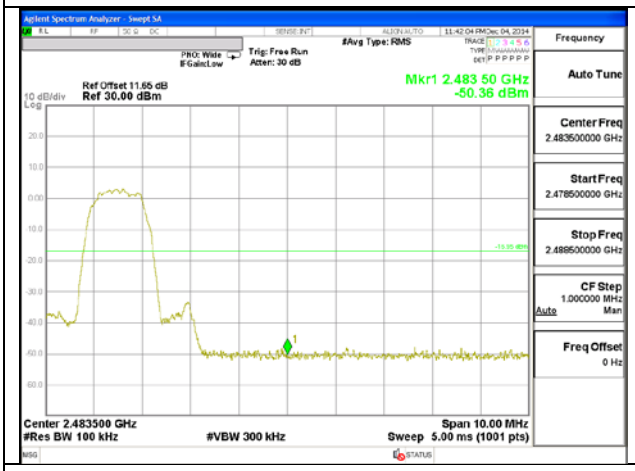
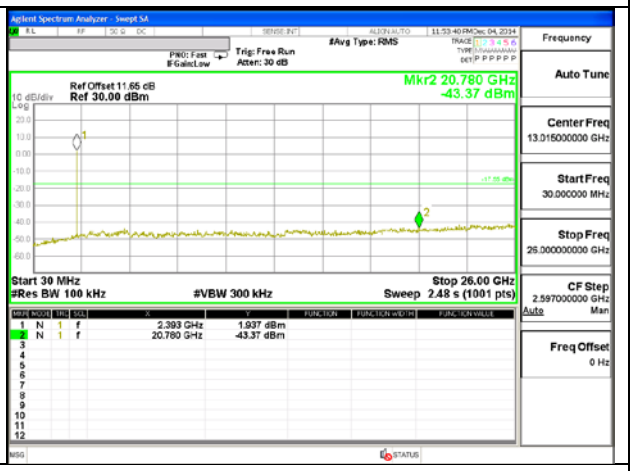
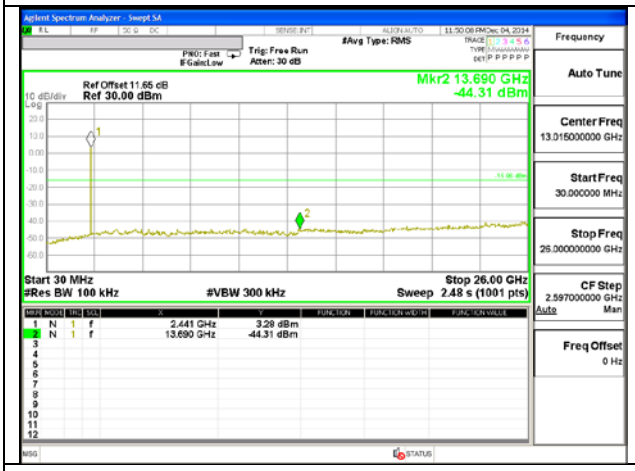
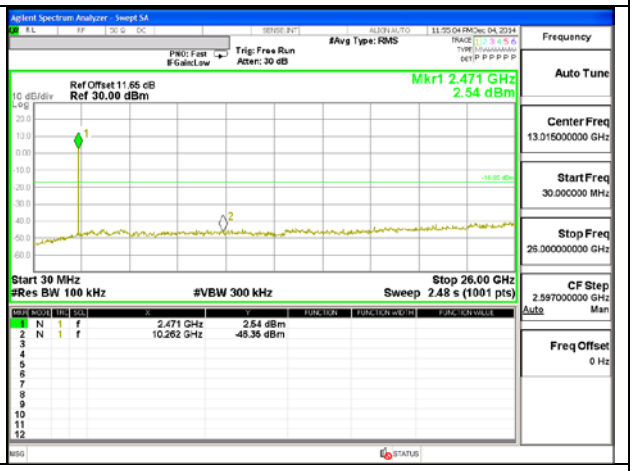
BASIC DATA RATE WITH GFSK HOPPING MODE

GFSK – BANDEDGE PLOTS

LOW CHANNEL BANDEDGE	HIGH CHANNEL BANDEDGE
	
NOTE:	

ENHANCED DATA RATE 8DPSK MODULATION NON-HOPPING MODE

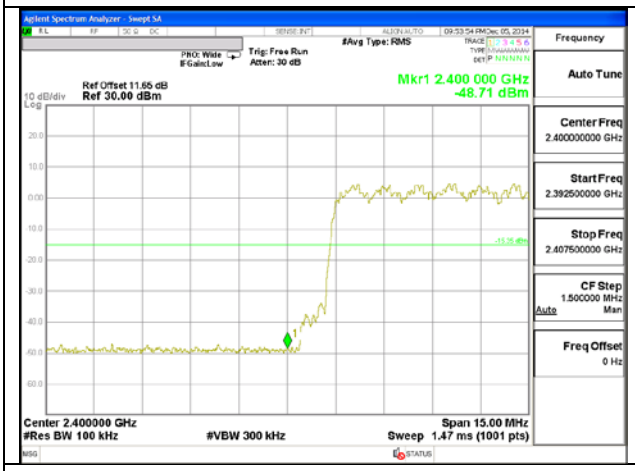
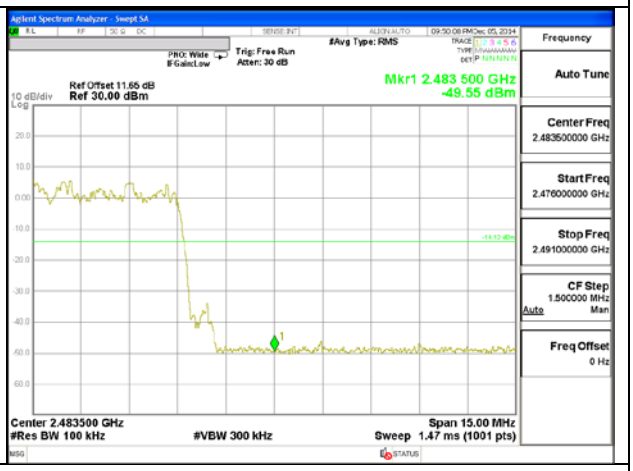
8DPSK - BANDEDGE AND SPURIOUS EMISSIONS PLOTS

LOW CHANNEL BANDEDGE	MID CHANNEL REFERENCE
	
HIGH CHANNEL BANDEDGE	LOW CHANNEL SPURIOUS
	
MID CHANNEL SPURIOUS	HIGH CHANNEL SPURIOUS
	

NOTE:

ENHANCED DATA RATE WITH 8DPSK HOPPING MODE

8DPSK – BANDEDGE PLOTS

LOW CHANNEL BANDEDGE	HIGH CHANNEL BANDEDGE
	
NOTE:	

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. 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 band edge 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 1/T (on time) for average measurement. GFSK = 1/T = 1 / 0.0038S = 260Hz.

The spectrum from 1GHzHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

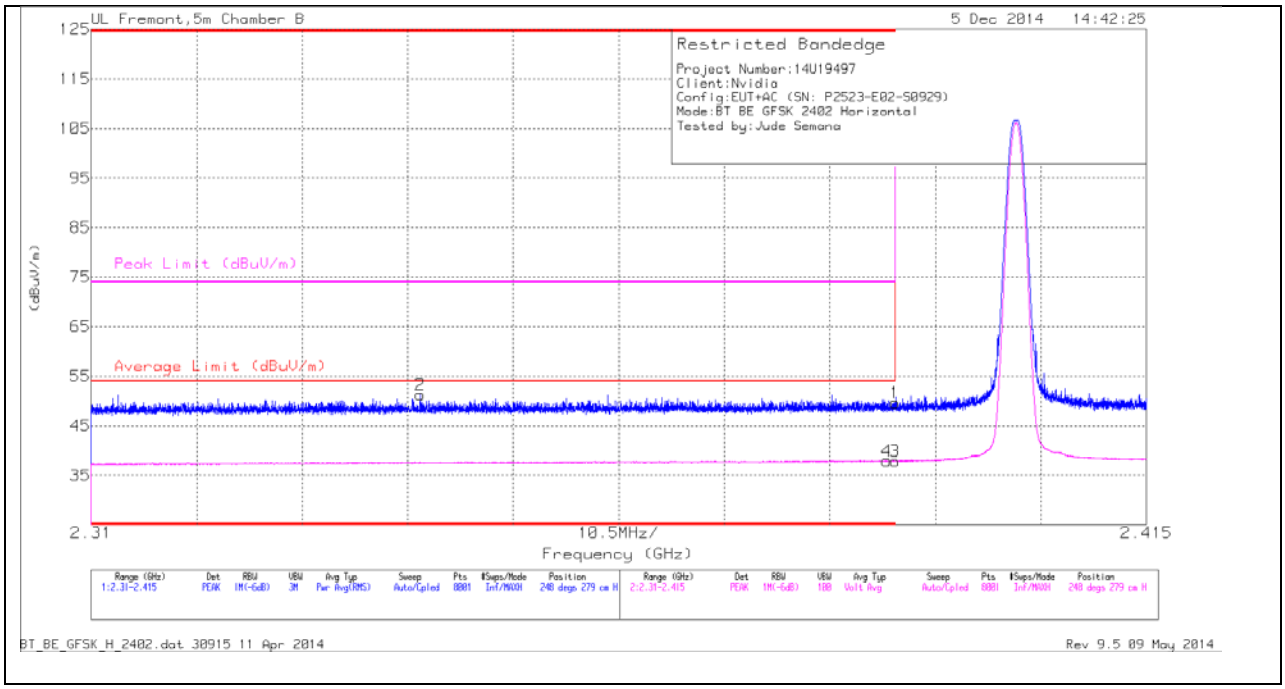
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

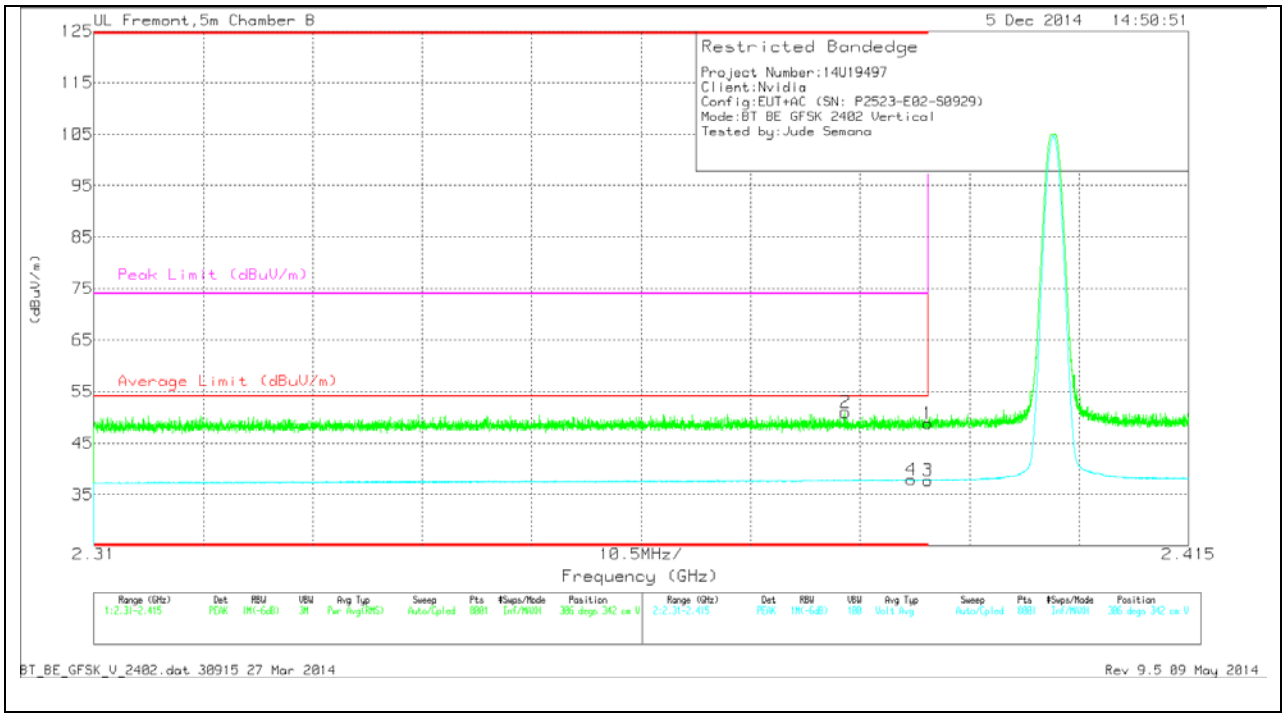
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.26	PK	32.1	-22.7	49.66	-	-	74	-24.34	248	279	H
2	* 2.343	42.18	PK	31.9	-22.8	51.28	-	-	74	-22.72	248	279	H
3	* 2.39	28.45	VB1T	32.1	-22.7	37.85	54	-16.15	-	-	248	279	H
4	* 2.389	28.52	VB1T	32.1	-22.7	37.92	54	-16.08	-	-	248	279	H

VERTICAL PEAK AND AVERAGE PLOT

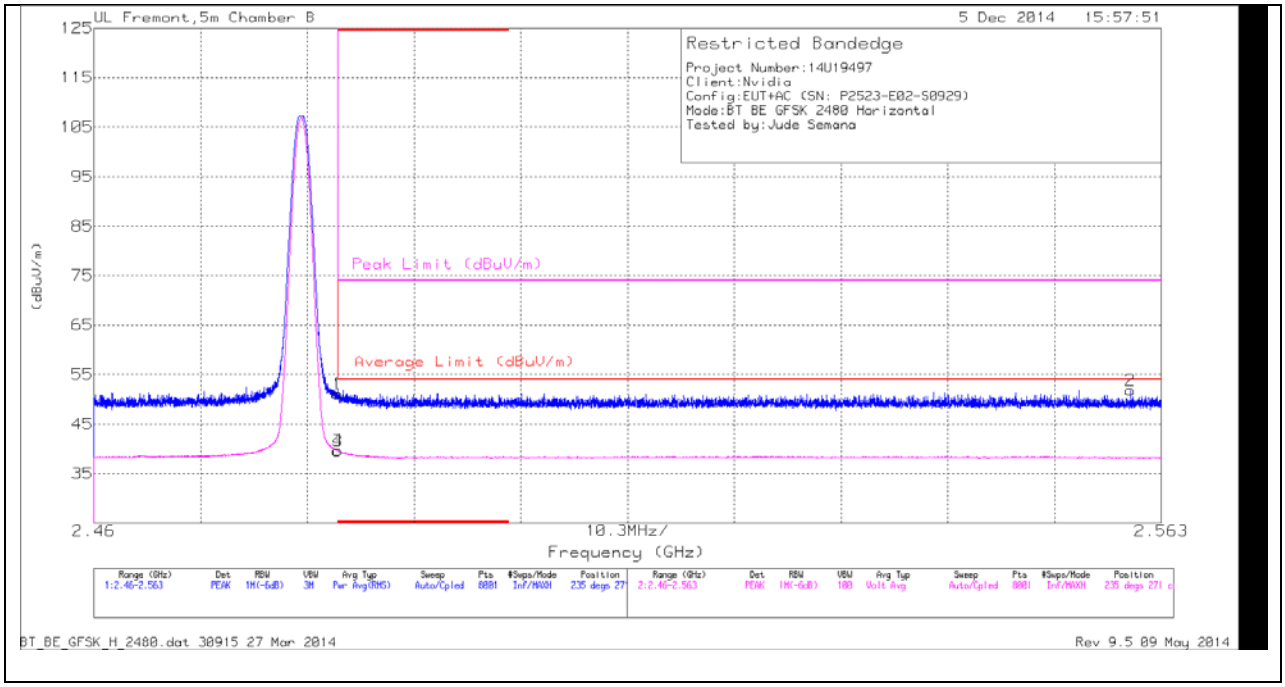


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.382	41.59	PK	32.1	-22.7	50.99	-	-	74	-23.01	306	342	V
4	* 2.388	28.47	VB1T	32.1	-22.7	37.87	54	-16.13	-	-	306	342	V
1	* 2.39	39.45	PK	32.1	-22.7	48.85	-	-	74	-25.15	306	342	V
3	* 2.39	28.35	VB1T	32.1	-22.7	37.75	54	-16.25	-	-	306	342	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

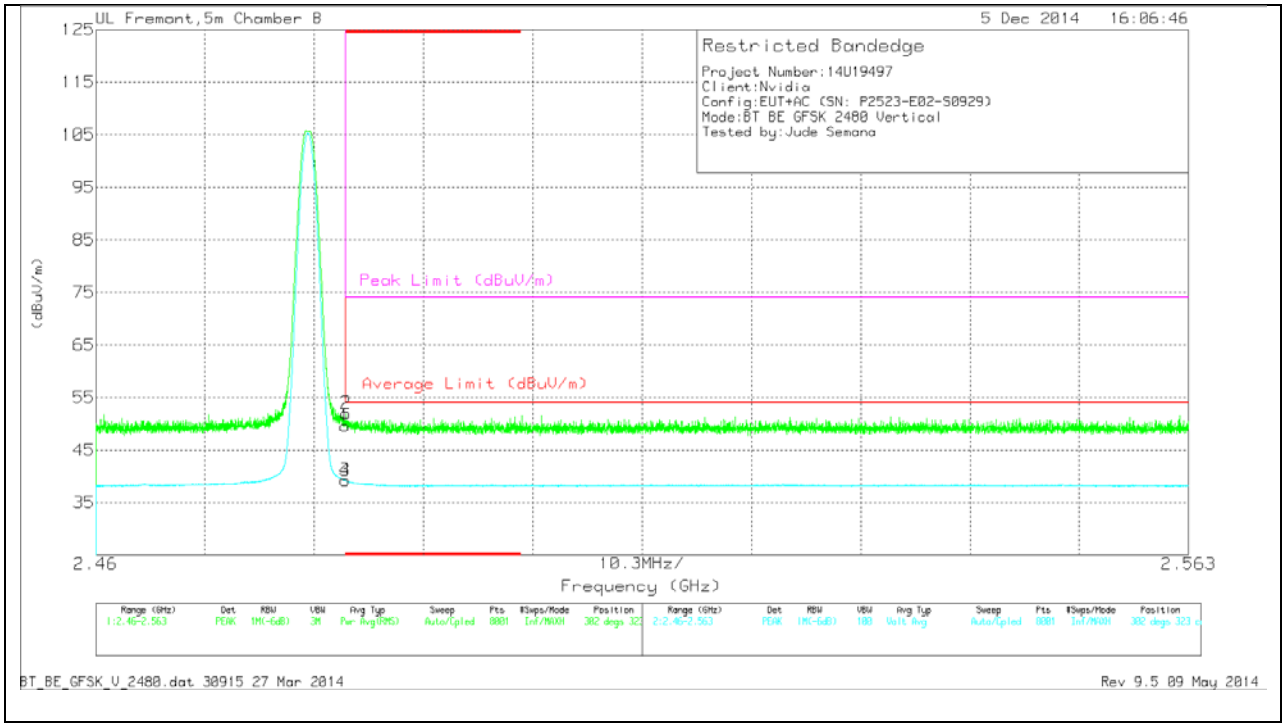
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.3	PK	32.4	-22.6	51.1	-	-	74	-22.9	235	271	H
3	* 2.484	29.77	VB1T	32.4	-22.6	39.57	54	-14.43	-	-	235	271	H
4	* 2.484	29.86	VB1T	32.4	-22.6	39.66	54	-14.34	-	-	235	271	H
2	2.56	41.92	PK	32.5	-22.6	51.82	-	-	74	-22.18	235	271	H

VERTICAL PEAK AND AVERAGE PLOT

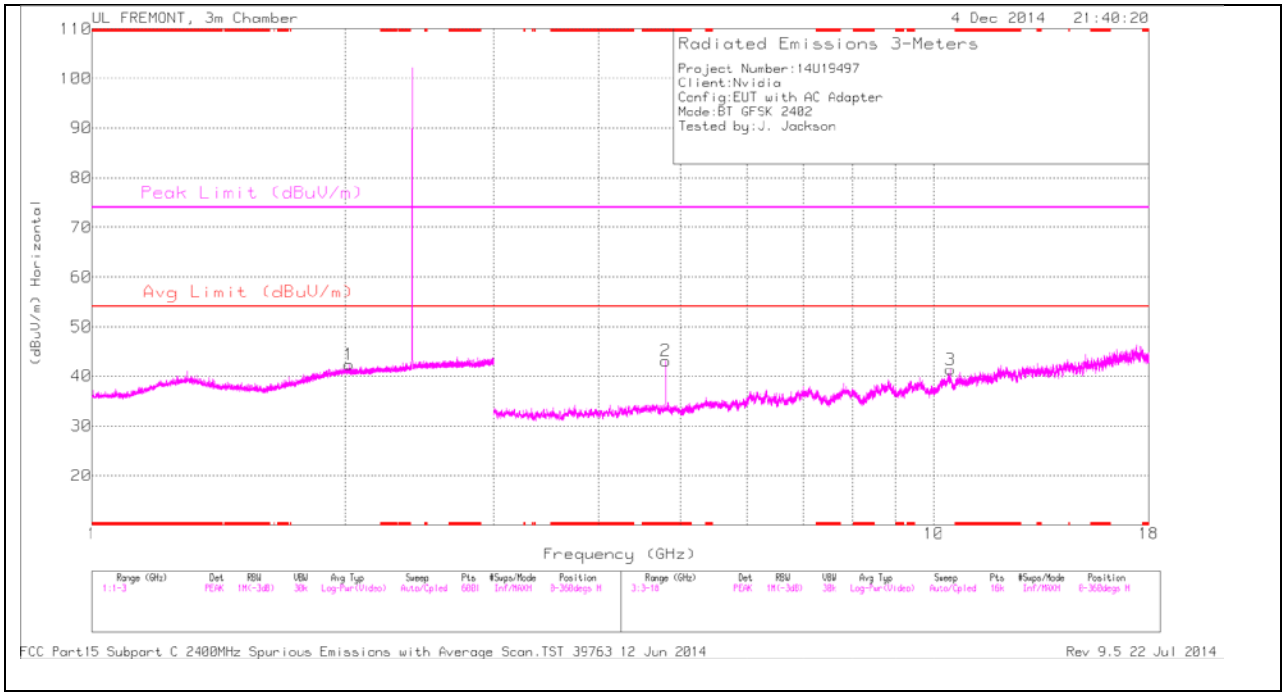


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.78	PK	32.4	-22.6	49.58	-	-	74	-24.42	302	323	V
2	* 2.484	42.18	PK	32.4	-22.6	51.98	-	-	74	-22.02	302	323	V
3	* 2.484	29.43	VB1T	32.4	-22.6	39.23	54	-14.77	-	-	302	323	V
4	* 2.484	29.43	VB1T	32.4	-22.6	39.23	54	-14.77	-	-	302	323	V

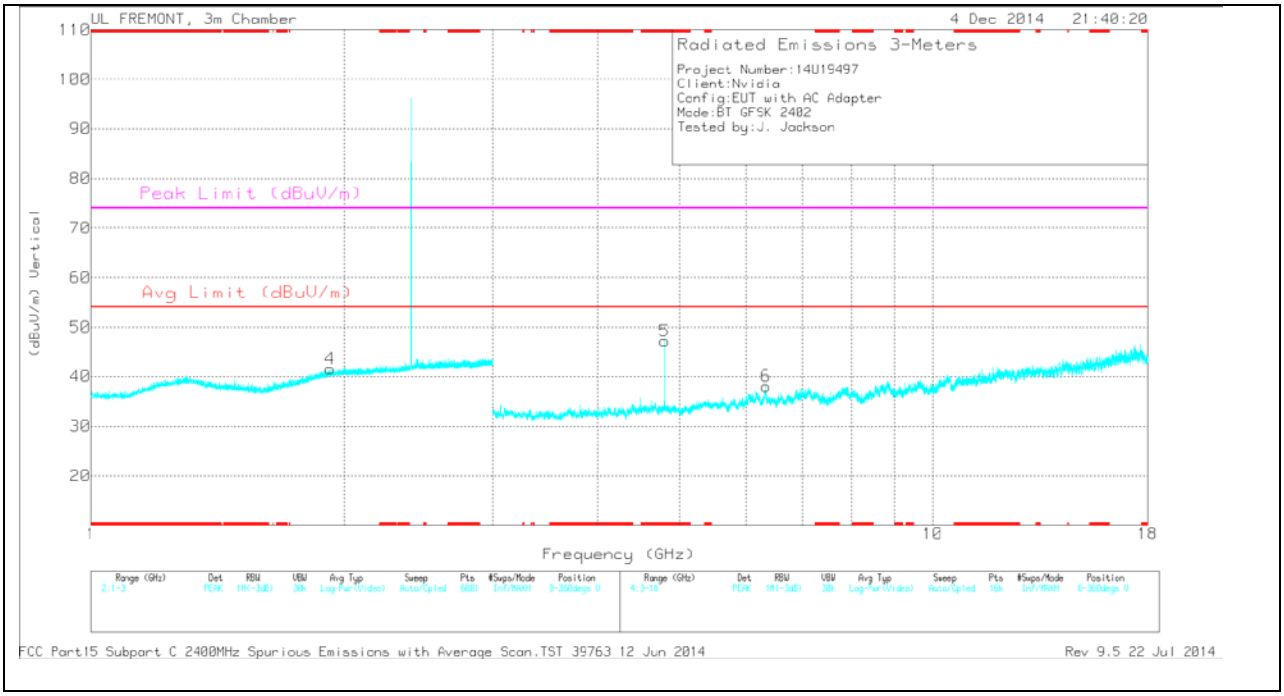
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



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

LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.805	39.29	PK	34.1	-30.3	43.09	-	-	74	-30.91	0-360	200	H
5	* 4.804	43.37	PK	34.1	-30.3	47.17	-	-	74	-26.83	0-360	200	V
4	1.92	33.63	PK	31.3	-23.3	41.63	-	-	-	-	0-360	200	V
1	2.02	34	PK	31.6	-23.2	42.4	-	-	-	-	0-360	100	H
6	6.334	31.75	PK	35.4	-29.1	38.05	-	-	-	-	0-360	200	V
3	10.461	29.15	PK	37.4	-25.2	41.35	-	-	-	-	0-360	200	H

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	44.97	PK3	34.1	-30.3	48.77	-	-	74	-25.23	114	178	H
* 4.804	38.33	VB1T	34.1	-30.3	42.13	54	-11.87	-	-	114	178	H
* 4.804	47.34	PK3	34.1	-30.3	51.14	-	-	74	-22.86	132	214	V
* 4.804	42.43	VB1T	34.1	-30.3	46.23	54	-7.77	-	-	132	214	V

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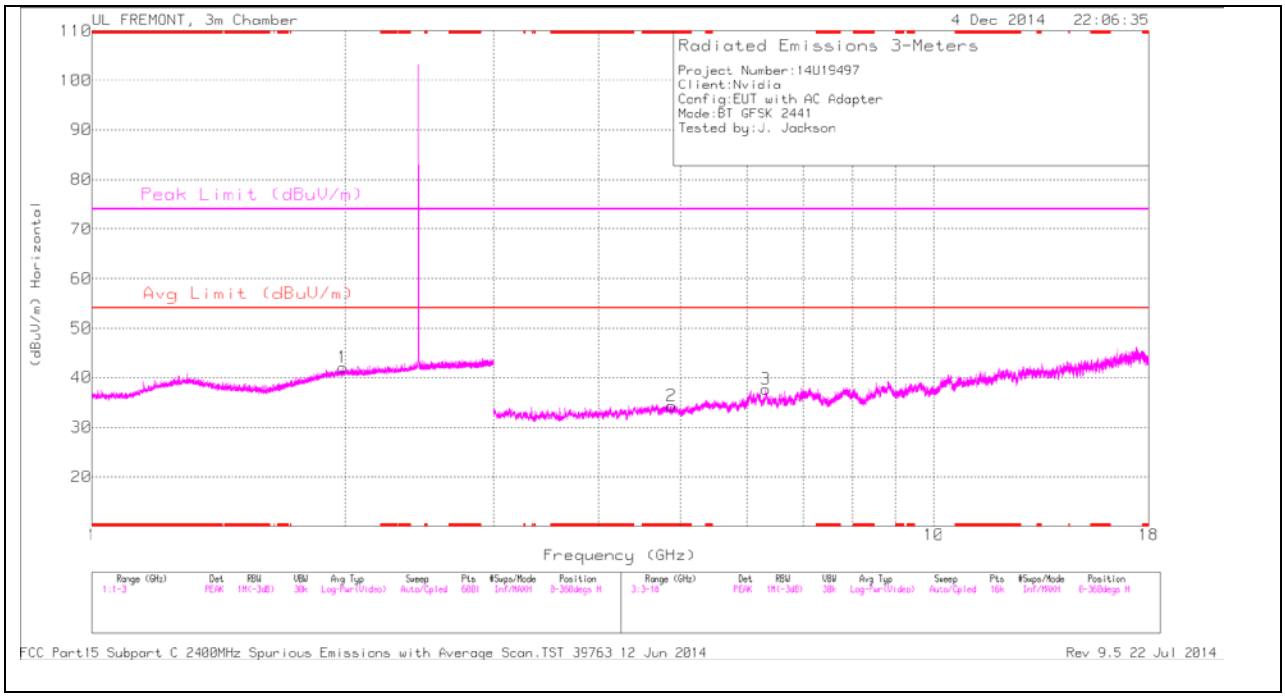
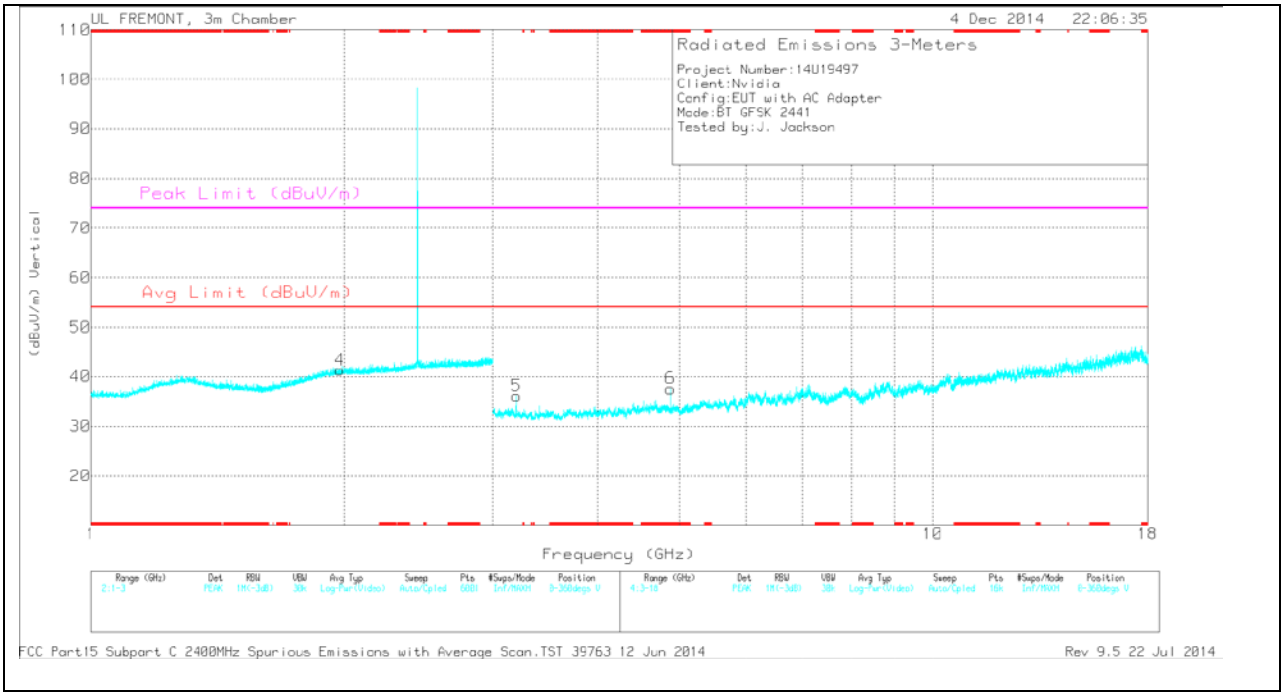
MID CHANNEL HORIZONTAL



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

MID CHANNEL VERTICAL



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

MID CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.882	30.49	PK	34	-30.1	34.39	-	-	74	-39.61	0-360	200	H
6	* 4.881	33.82	PK	34	-30.2	37.62	-	-	74	-36.38	0-360	200	V
4	1.974	33.03	PK	31.5	-23.2	41.33	-	-	-	-	0-360	200	V
1	1.986	33.86	PK	31.5	-23.2	42.16	-	-	-	-	0-360	100	H
5	3.2	34.41	PK	32.9	-31.2	36.11	-	-	-	-	0-360	200	V
3	6.314	31.8	PK	35.4	-29.5	37.7	-	-	-	-	0-360	200	H

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	40.85	PK3	34	-30.1	44.75	-	-	74	-29.25	0	200	H
* 4.882	29.54	VB1T	34	-30.1	33.44	54	-20.56	-	-	0	200	H
* 4.882	42.62	PK3	34	-30.1	46.52	-	-	74	-27.48	144	149	V
* 4.882	34.1	VB1T	34	-30.1	38	54	-16	-	-	144	149	V

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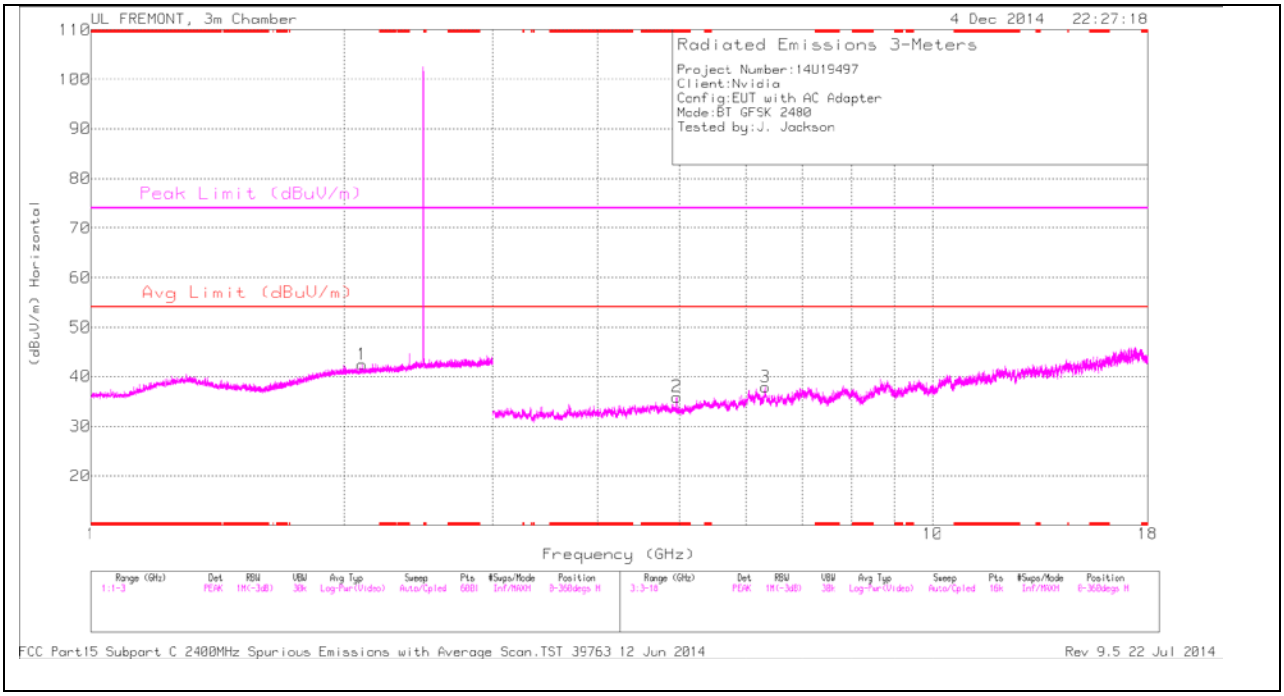
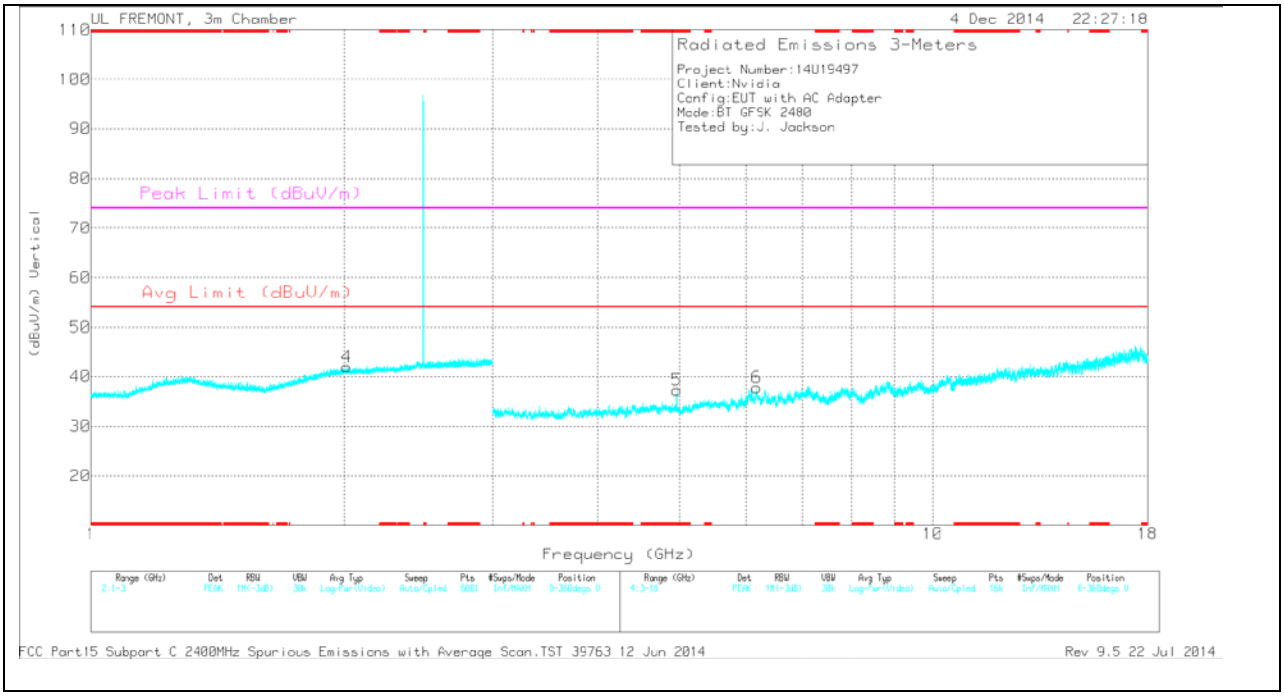
HIGH CHANNEL HORIZONTAL



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

HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.96	32.97	PK	34	-31	35.97	-	-	74	-38.03	0-360	200	H
5	* 4.96	34.34	PK	34	-31	37.34	-	-	74	-36.66	0-360	200	V
4	2.013	33.62	PK	31.6	-23.2	42.02	-	-	-	-	0-360	200	V
1	2.099	33.99	PK	31.5	-23	42.49	-	-	-	-	0-360	100	H
6	6.177	32.57	PK	35.3	-30.1	37.77	-	-	-	-	0-360	200	V
3	6.327	31.67	PK	35.4	-29.1	37.97	-	-	-	-	0-360	100	H

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.959	41.78	PK3	34	-31	44.78	-	-	74	-29.22	133	296	H
* 4.96	31.31	VB1T	34	-31	34.31	54	-19.69	-	-	133	296	H
* 4.96	42.82	PK3	34	-31	45.82	-	-	74	-28.18	160	186	V
* 4.96	34.35	VB1T	34	-31	37.35	54	-16.65	-	-	160	186	V

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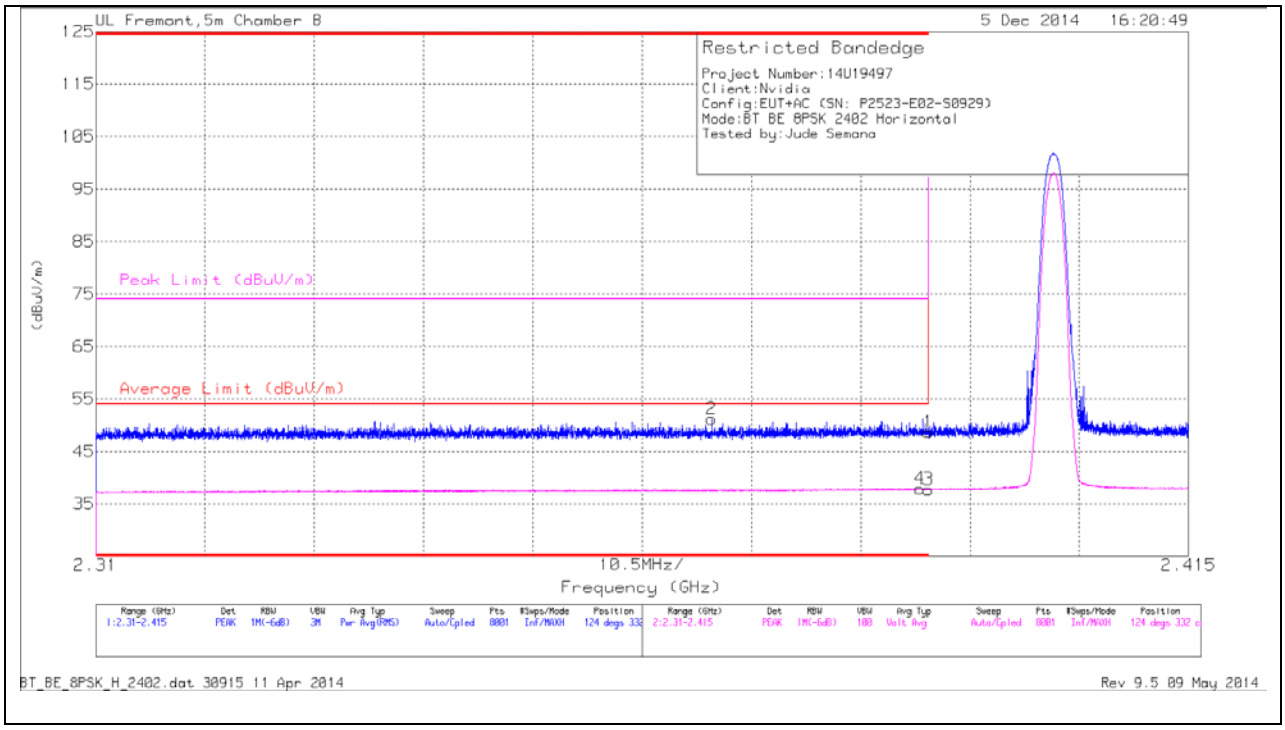
9.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

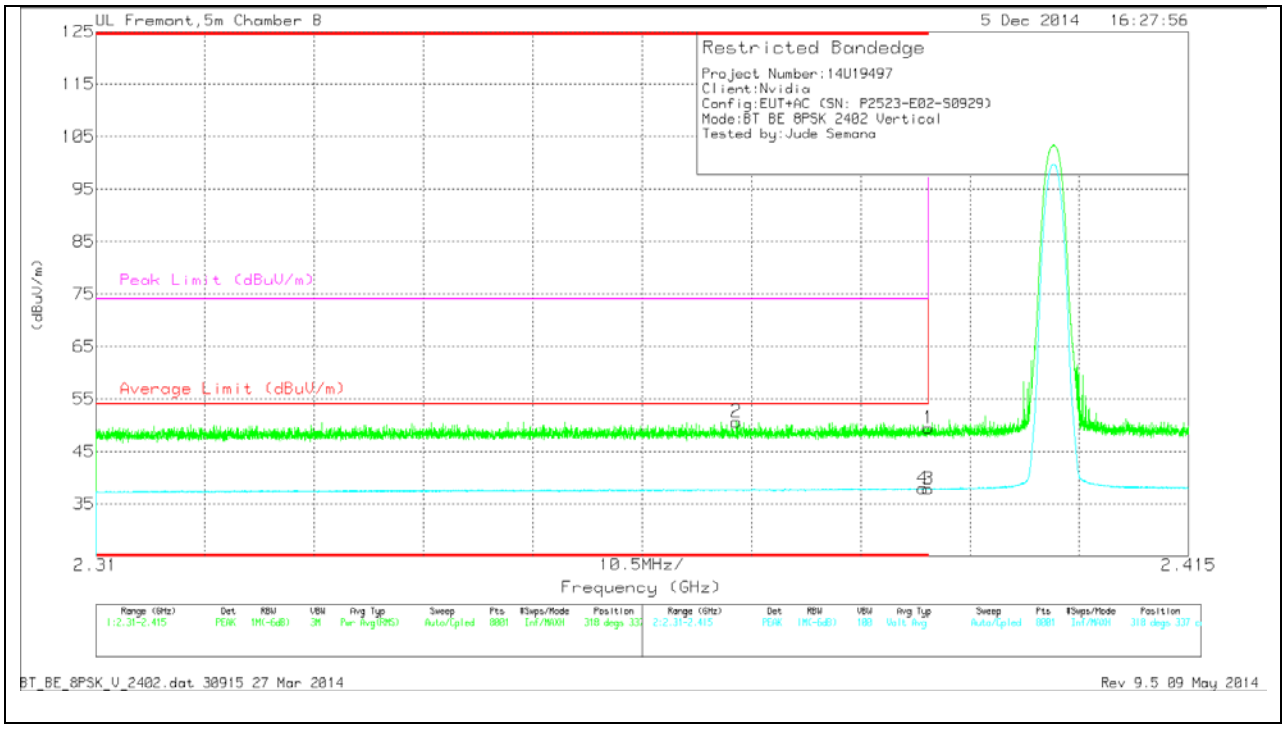
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.369	41.99	PK	32	-22.8	51.19	-	-	74	-22.81	124	332	H
4	* 2.389	28.48	VB1T	32.1	-22.7	37.88	54	-16.12	-	-	124	332	H
1	* 2.39	39.29	PK	32.1	-22.7	48.69	-	-	74	-25.31	124	332	H
3	* 2.39	28.33	VB1T	32.1	-22.7	37.73	54	-16.27	-	-	124	332	H

VERTICAL PEAK AND AVERAGE PLOT

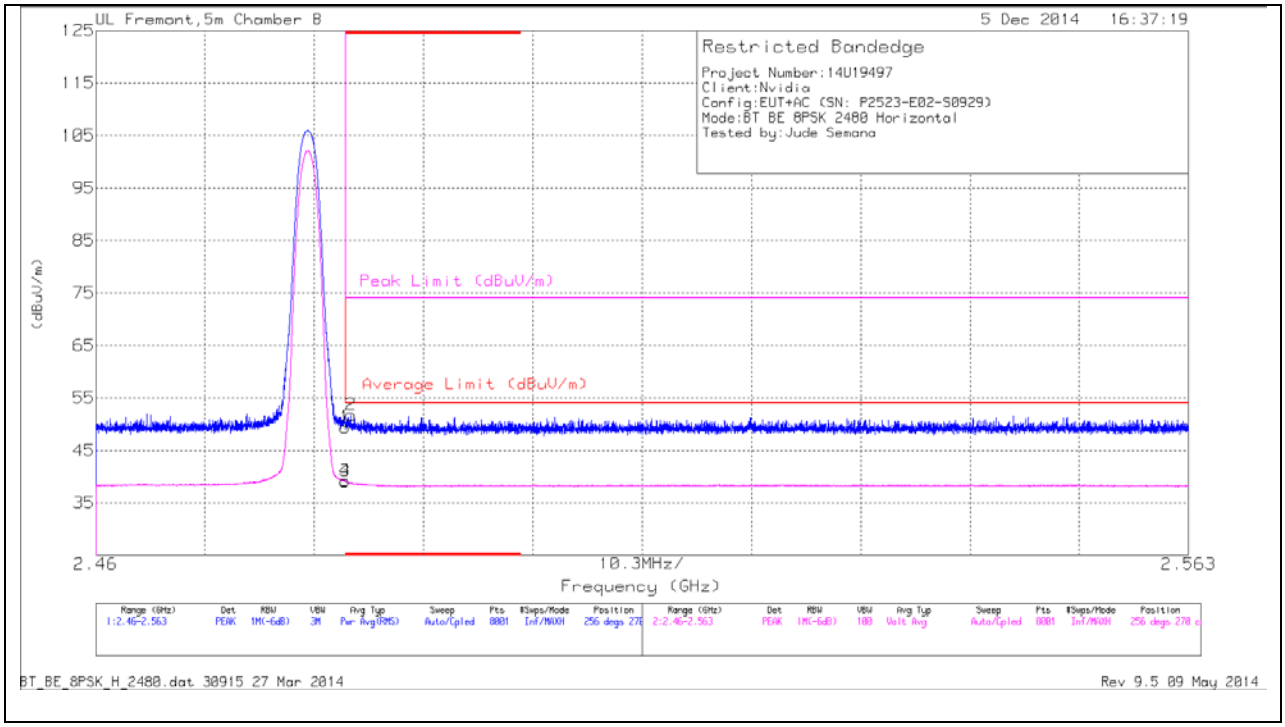


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.372	41.47	PK	32	-22.8	50.67	-	-	74	-23.33	318	337	V
4	* 2.389	28.53	VB1T	32.1	-22.7	37.93	54	-16.07	-	-	318	337	V
1	* 2.39	40.09	PK	32.1	-22.7	49.49	-	-	74	-24.51	318	337	V
3	* 2.39	28.46	VB1T	32.1	-22.7	37.86	54	-16.14	-	-	318	337	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

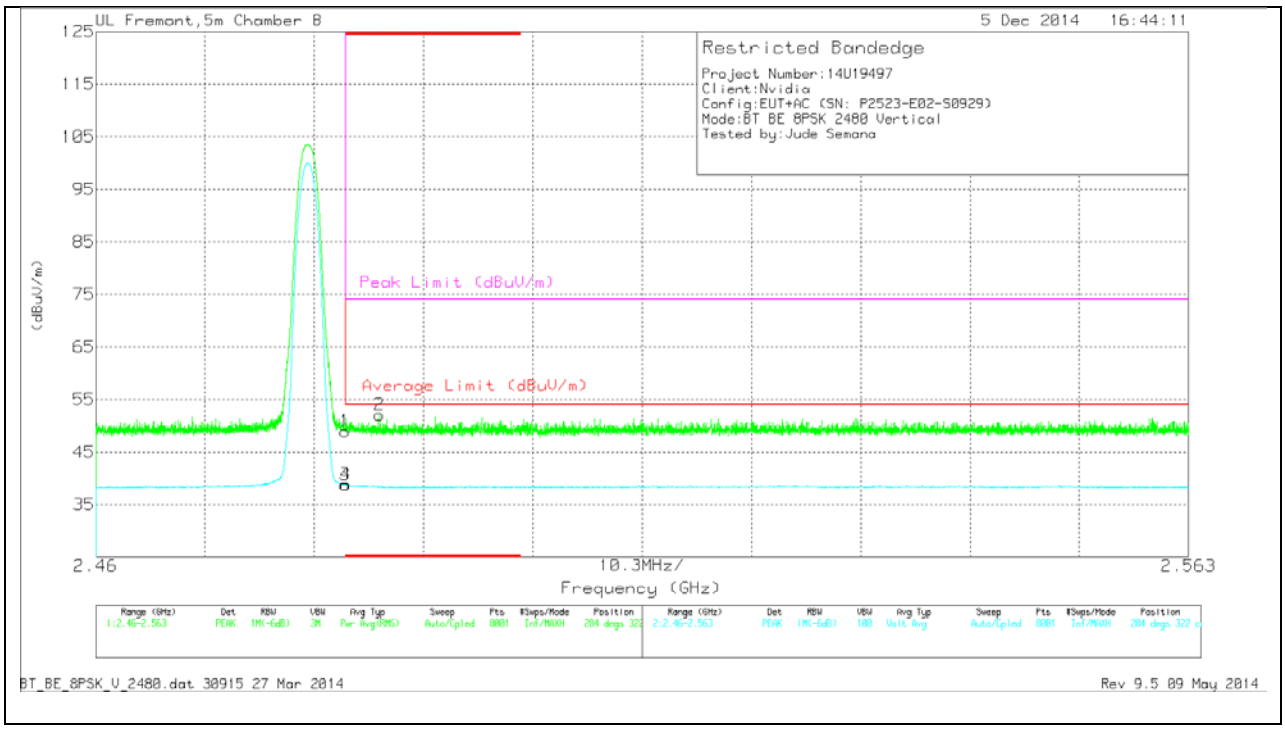
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.6	PK	32.4	-22.6	49.4	-	-	74	-24.6	256	270	H
2	* 2.484	41.96	PK	32.4	-22.6	51.76	-	-	74	-22.24	256	270	H
3	* 2.484	29.35	VB1T	32.4	-22.6	39.15	54	-14.85	-	-	256	270	H
4	* 2.484	29.4	VB1T	32.4	-22.6	39.2	54	-14.8	-	-	256	270	H

VERTICAL PEAK AND AVERAGE PLOT

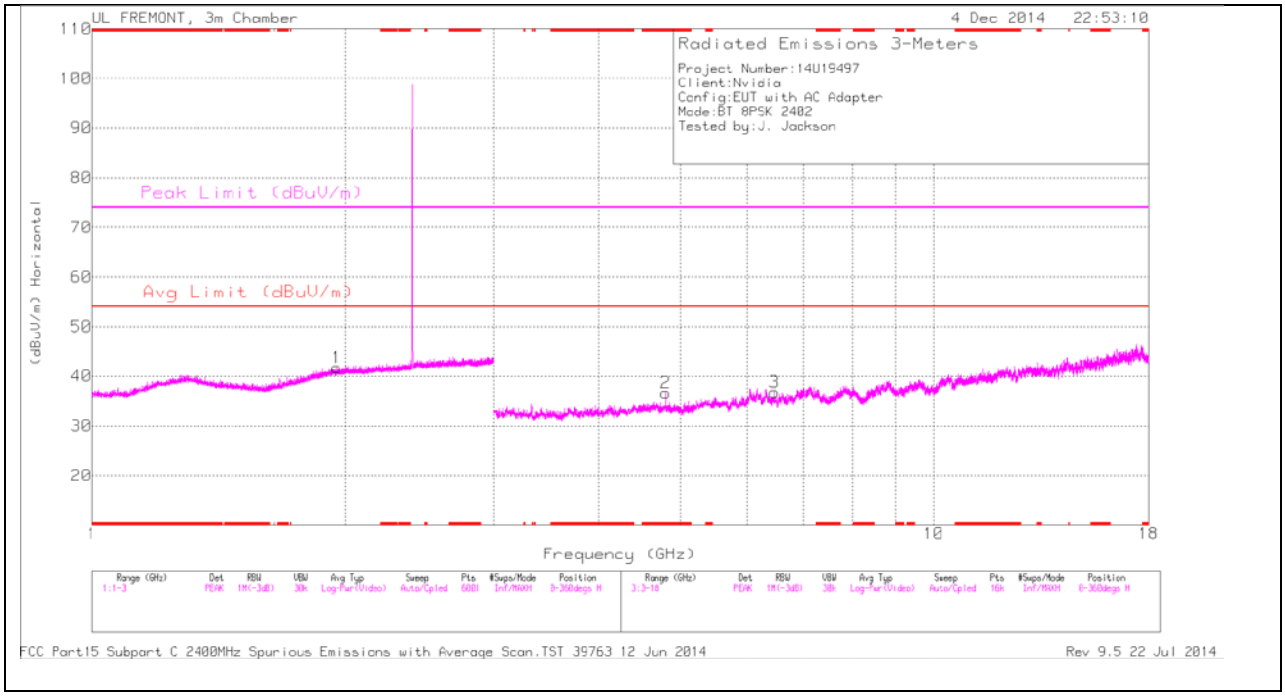


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.13	PK	32.4	-22.6	48.93	-	-	74	-25.07	284	322	V
3	* 2.484	29	VB1T	32.4	-22.6	38.8	54	-15.2	-	-	284	322	V
4	* 2.484	29.03	VB1T	32.4	-22.6	38.83	54	-15.17	-	-	284	322	V
2	* 2.487	42.24	PK	32.4	-22.6	52.04	-	-	74	-21.96	284	322	V

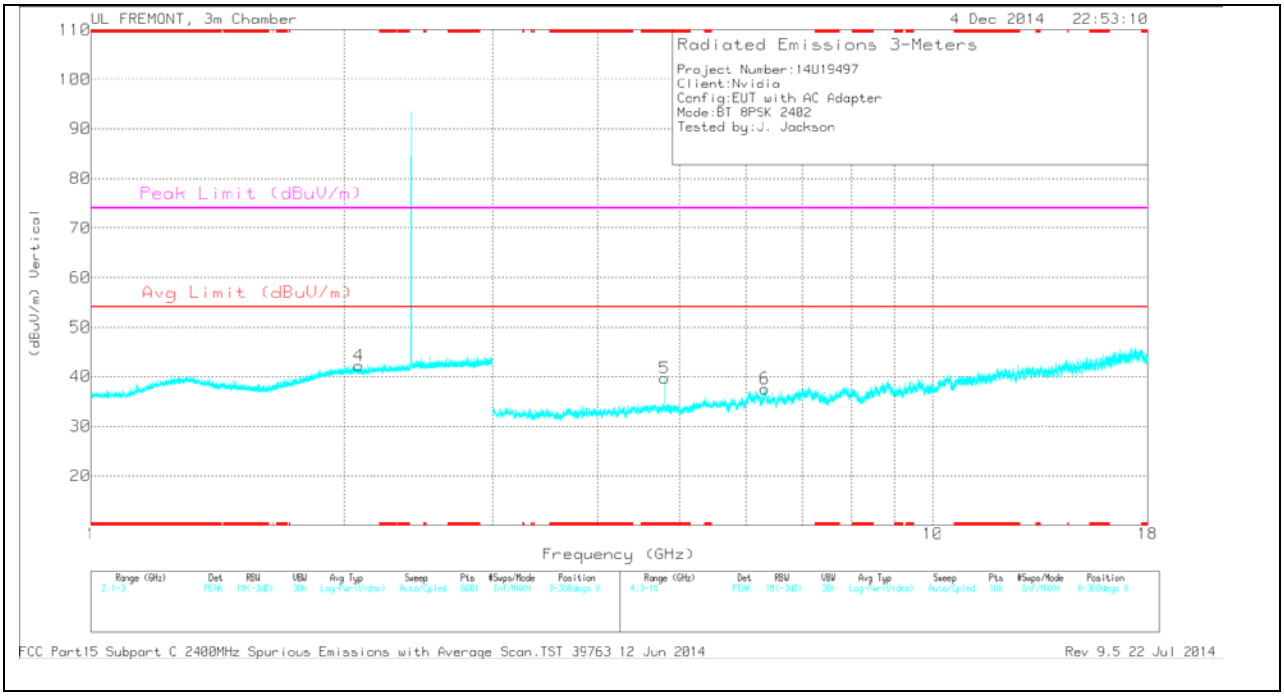
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



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

LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.805	32.92	PK	34.1	-30.3	36.72	-	-	74	-37.28	0-360	200	H
5	* 4.805	35.86	PK	34.1	-30.3	39.66	-	-	74	-34.34	0-360	200	V
1	1.953	33.55	PK	31.4	-23.2	41.75	-	-	-	-	0-360	200	H
4	2.081	33.73	PK	31.5	-23	42.23	-	-	-	-	0-360	100	V
6	6.311	31.79	PK	35.4	-29.6	37.59	-	-	-	-	0-360	200	V
3	6.47	31.5	PK	35.5	-30.2	36.8	-	-	-	-	0-360	200	H

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	43.52	PK3	34.1	-30.3	47.32	-	-	74	-26.68	283	353	H
* 4.804	33.53	VB1T	34.1	-30.3	37.33	54	-16.67	-	-	283	353	H
* 4.804	45.4	PK3	34.1	-30.3	49.2	-	-	74	-24.8	141	152	V
* 4.804	36.25	VB1T	34.1	-30.3	40.05	54	-13.95	-	-	141	152	V

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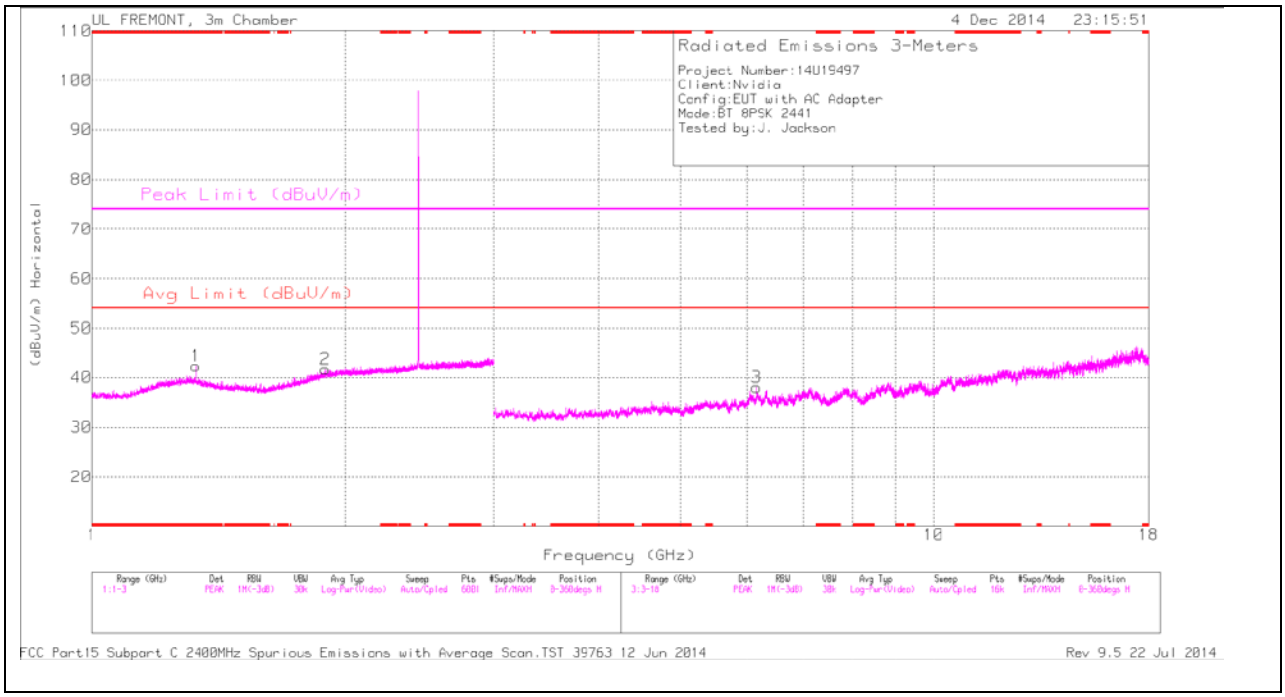
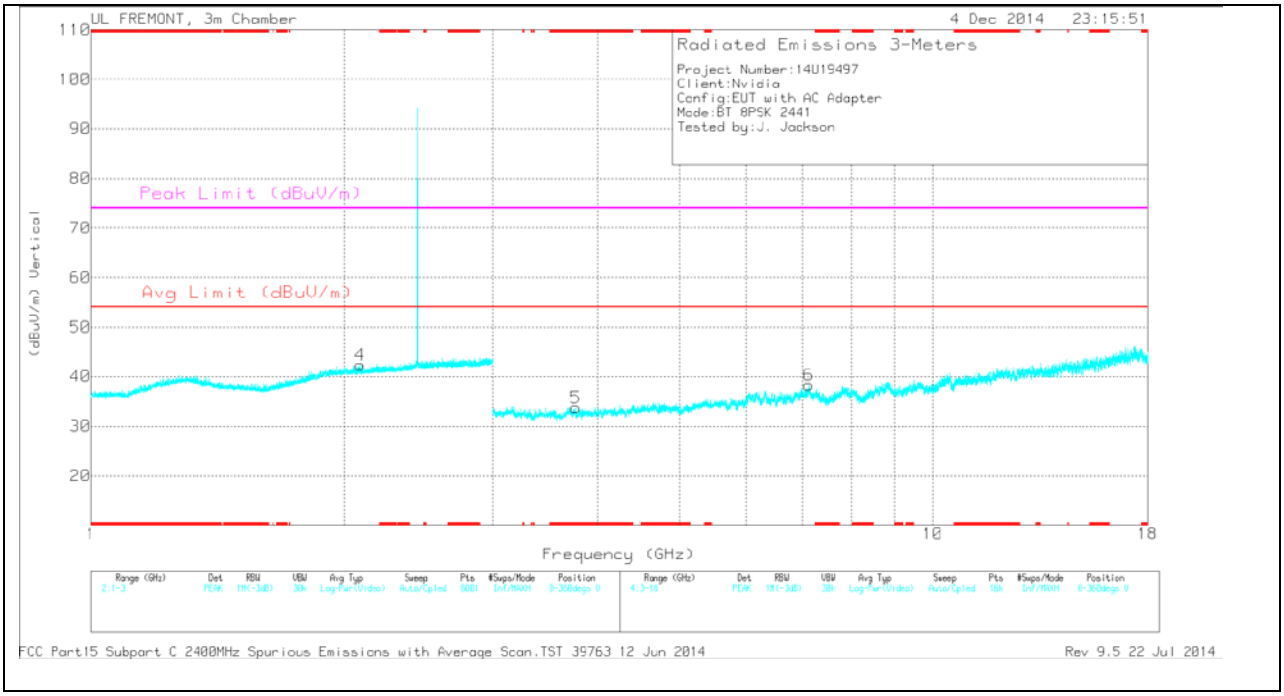
MID CHANNEL HORIZONTAL



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

MID CHANNEL VERTICAL



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

MID CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.328	36.31	PK	29.9	-23.8	42.41	-	-	74	-31.59	0-360	100	H
5	* 3.761	31.81	PK	33.2	-31.3	33.71	-	-	74	-40.29	0-360	100	V
2	1.891	33.95	PK	31.1	-23.3	41.75	-	-	-	-	0-360	200	H
4	2.087	34.01	PK	31.5	-23.1	42.41	-	-	-	-	0-360	200	V
3	6.156	32.43	PK	35.3	-29.7	38.03	-	-	-	-	0-360	100	H
6	7.117	30.67	PK	35.6	-28	38.27	-	-	-	-	0-360	100	V

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.327	43.02	PK3	29.9	-23.8	49.12	-	-	74	-24.88	235	100	H
* 1.329	30.58	VB1T	29.9	-23.8	36.68	54	-17.32	-	-	235	100	H
* 3.76	40.47	PK3	33.2	-31.3	42.37	-	-	74	-31.63	235	100	V
* 3.759	28.12	VB1T	33.2	-31.3	30.02	54	-23.98	-	-	235	100	V

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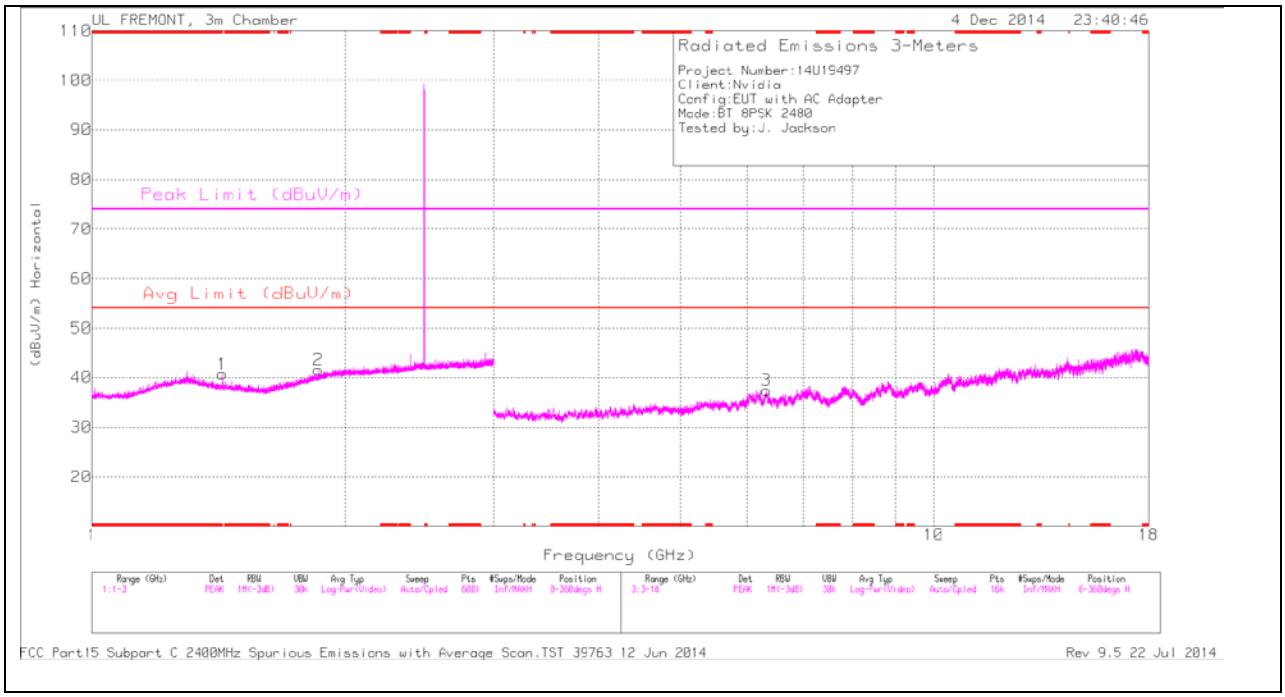
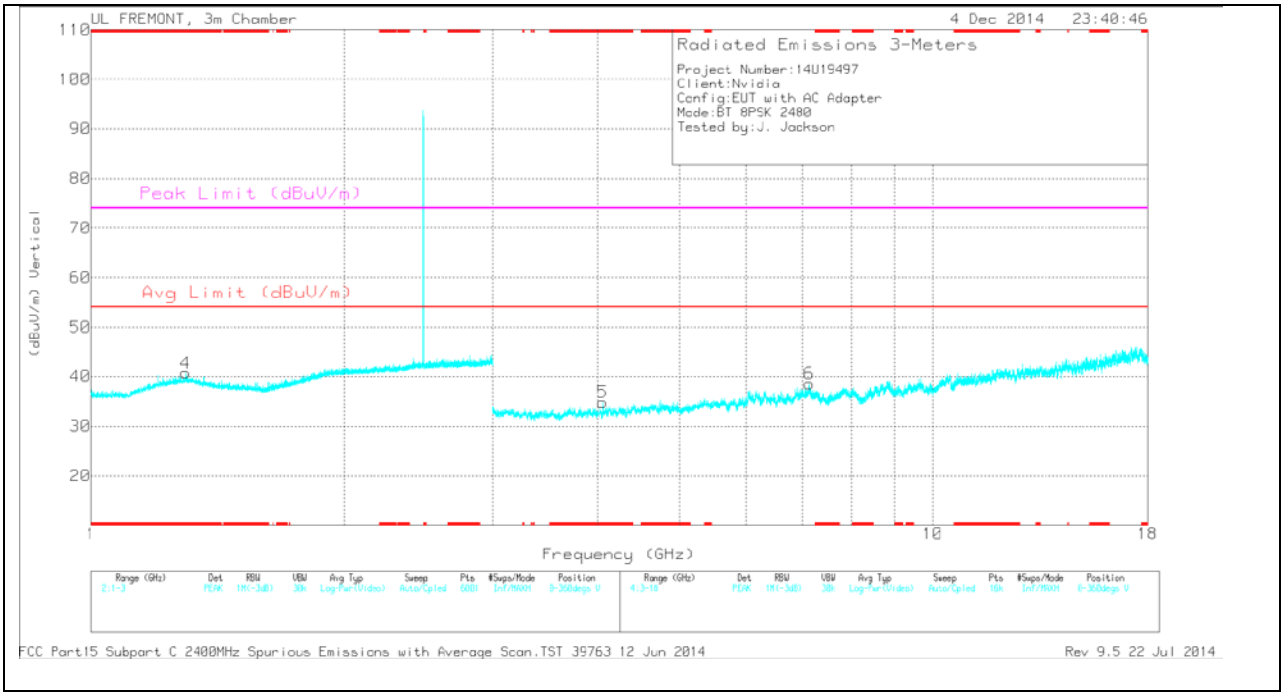
HIGH CHANNEL HORIZONTAL



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

HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

TRACE MARKERS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 1.295	34.3	PK	30.2	-23.8	40.7	-	-	74	-33.3	0-360	200	V
5	* 4.056	32.63	PK	33.4	-31.2	34.83	-	-	74	-39.17	0-360	200	V
1	1.428	35.56	PK	28.9	-23.7	40.76	-	-	-	-	0-360	100	H
2	1.857	34.07	PK	30.8	-23.3	41.57	-	-	-	-	0-360	200	H
3	6.327	31.15	PK	35.4	-29.1	37.45	-	-	-	-	0-360	200	H
6	7.131	31.03	PK	35.6	-28	38.63	-	-	-	-	0-360	100	V

PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.295	43.1	PK3	30.2	-23.8	49.5	-	-	74	-24.5	0	200	V
* 1.296	30.67	VB1T	30.2	-23.8	37.07	54	-16.93	-	-	0	200	V
* 4.055	40.84	PK3	33.4	-31.2	43.04	-	-	74	-30.96	0	200	V
* 4.057	28.37	VB1T	33.4	-31.3	30.47	54	-23.53	-	-	0	200	V

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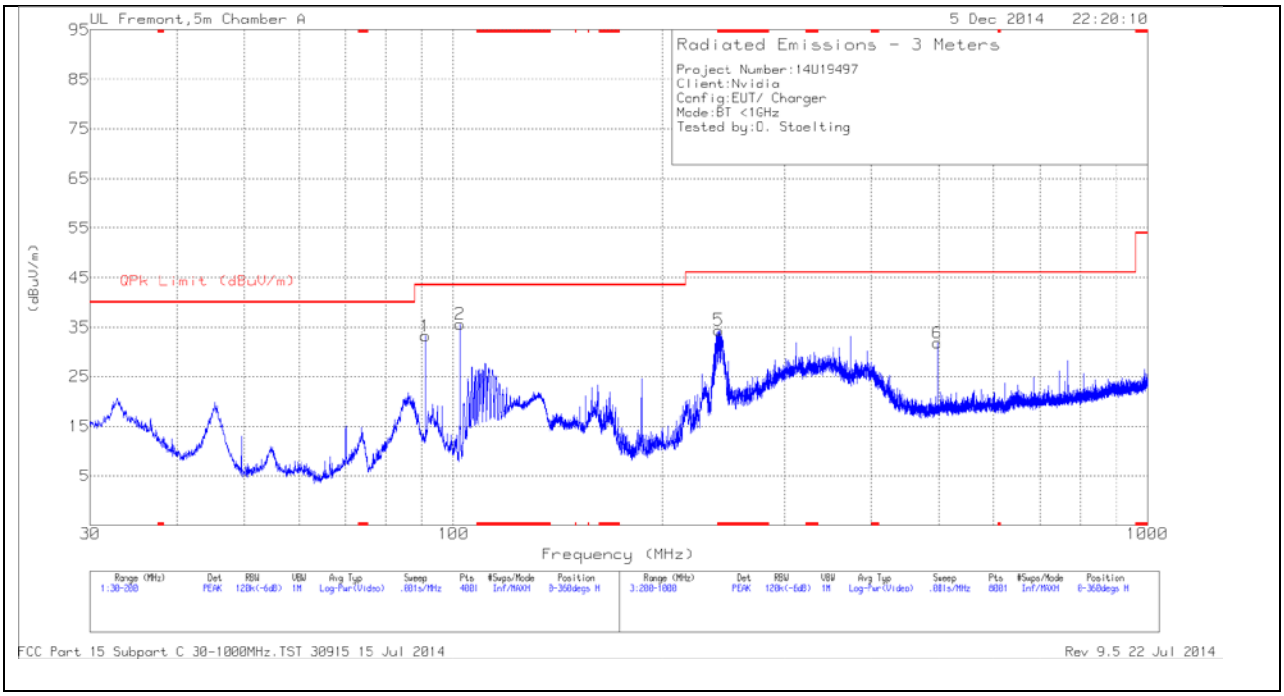
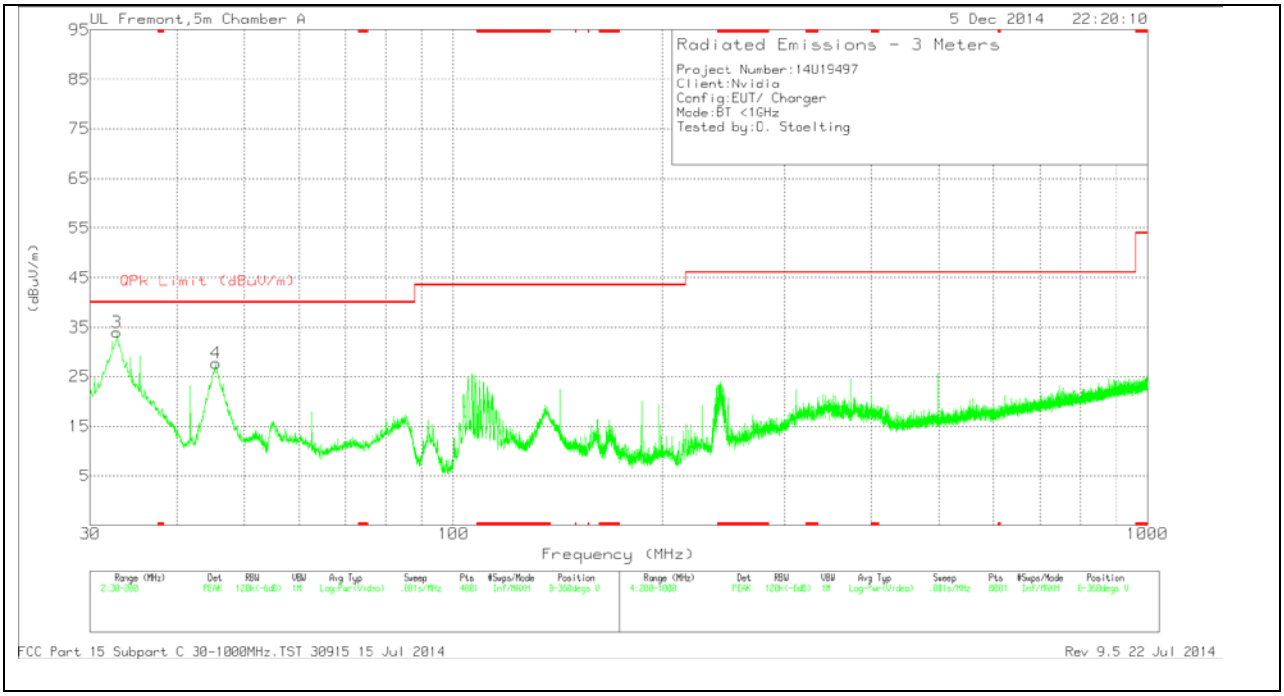
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* 241.1	52.62	PK	11.5	-29.7	34.42	46.02	-11.6	0-360	200	H
3	32.7625	45.94	PK	19.2	-31.2	33.94	40	-6.06	0-360	101	V
4	45.5125	48.61	PK	10.3	-31.1	27.81	40	-12.19	0-360	101	V
1	91.2	55.93	PK	7.9	-30.6	33.23	43.52	-10.29	0-360	300	H
2	102.25	55.69	PK	10.4	-30.5	35.59	43.52	-7.93	0-360	300	H
6	498	43.01	PK	17.6	-28.8	31.81	46.02	-14.21	0-360	200	H

PK - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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.

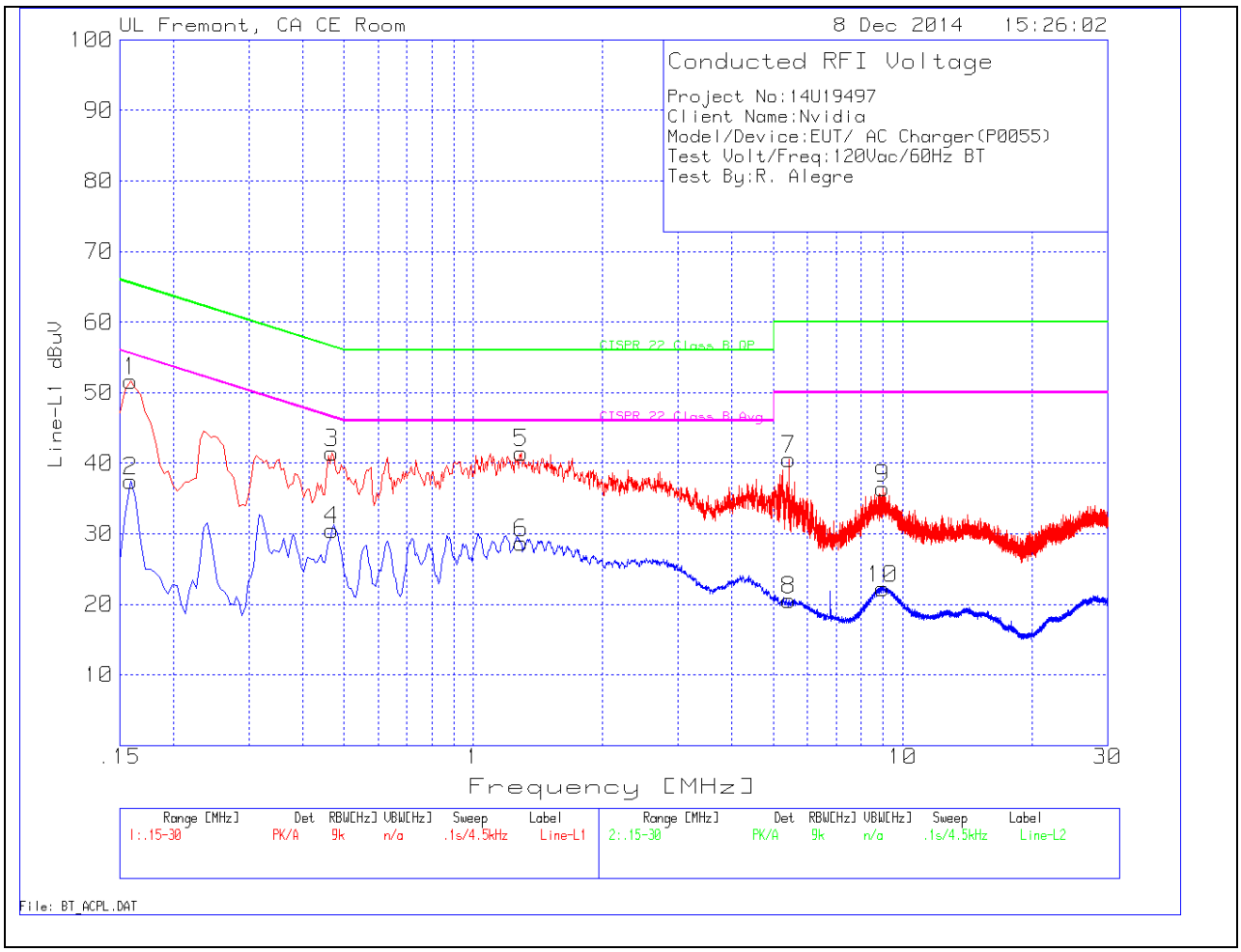
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



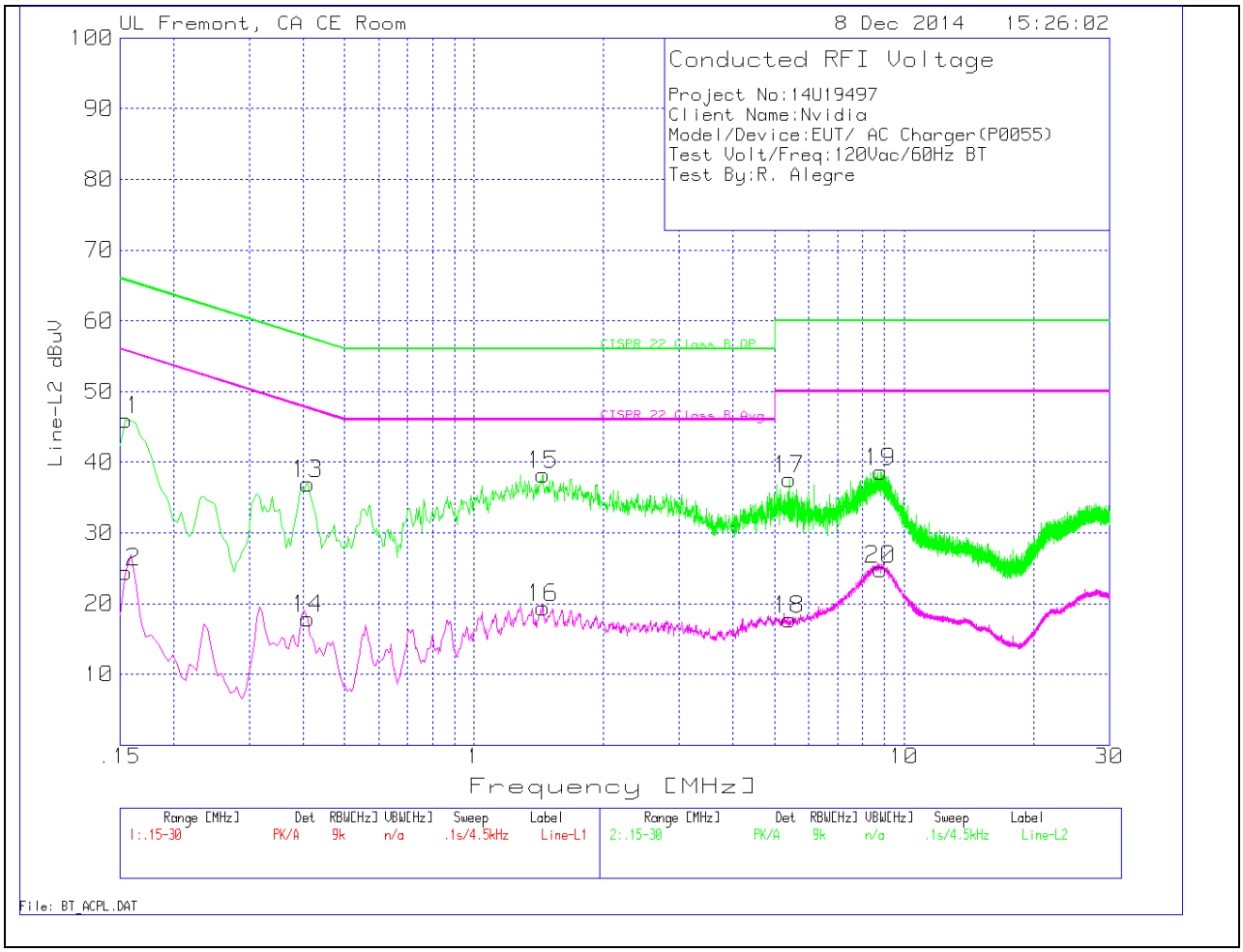
LINE 1 RESULTS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.159	50.33	PK	1.3	0	51.63	65.5	-13.87	-	-
2	.159	36.21	Av	1.3	0	37.51	-	-	55.5	-17.99
3	.4695	41.01	PK	.4	0	41.41	56.5	-15.09	-	-
4	.4695	30.06	Av	.4	0	30.46	-	-	46.5	-16.04
5	1.293	41.13	PK	.2	.1	41.43	56	-14.57	-	-
6	1.293	28.36	Av	.2	.1	28.66	-	-	46	-17.34
7	5.424	40.24	PK	.2	.1	40.54	60	-19.46	-	-
8	5.424	20.32	Av	.2	.1	20.62	-	-	50	-29.38
9	8.979	36.1	PK	.2	.1	36.4	60	-23.6	-	-
10	8.979	21.9	Av	.2	.1	22.2	-	-	50	-27.8

LINE 2 PLOT



LINE 2 RESULTS

Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
11	.1545	44.62	PK	1.4	0	46.02	65.8	-19.78	-	-
12	.1545	23.04	Av	1.4	0	24.44	-	-	55.8	-31.36
13	.411	36.52	PK	.4	0	36.92	57.6	-20.68	-	-
14	.411	17.5	Av	.4	0	17.9	-	-	47.6	-29.7
15	1.446	38	PK	.2	.1	38.3	56	-17.7	-	-
16	1.446	19.17	Av	.2	.1	19.47	-	-	46	-26.53
17	5.415	37.32	PK	.2	.1	37.62	60	-22.38	-	-
18	5.415	17.5	Av	.2	.1	17.8	-	-	50	-32.2
19	8.826	38.28	PK	.2	.1	38.58	60	-21.42	-	-
20	8.826	24.49	Av	.2	.1	24.79	-	-	50	-25.21

PK - Peak detector

Av - average detection