



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC

MODEL NUMBER: SM-A500FU

FCC ID: A3LSMA500FU

REPORT NUMBER: 14U19260-E1, REVISION A

ISSUE DATE: DECEMBER 8, 2014

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Issue			
Rev.	Date	Revisions	Revised By
--	11/7/14	Initial issue	P. Zhang
A	12/8/14	Updated company address	P. Zhang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC
MODEL: SM-A500FU
SERIAL NUMBER: 1989213 (CONDUCTED); 1989211 (RADIATED)
DATE TESTED: NOVEMBER 3-7, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C 15.247	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.

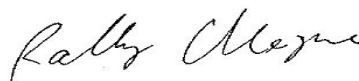
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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.

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2. TEST METHODOLOGY

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

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 26000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. GENERAL DESCRIPTION OF EUT

EUT DESCRIPTION	Phone with Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC			
MODEL NUMBER	SM-A500FU			
RADIO TYPE	BLUETOOTH			
MODULATION TYPE	GFSK, $\pi/4$ -DQPSK, 8DPSK			
OPERATING FREQUENCY	2402 ~ 2480 MHz			
NUMBER OF CHANNEL	79			
CHANNEL SPACING	1 MHz			
MAX OUTPUT POWER	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
	2402 - 2480	Basic GFSK	12.08	16.14
	2402 - 2480	Enhanced 8PSK	12.48	17.70
	Note: GFSK, $\pi/4$ -DQPSK, and 8DPSK average Power are all investigated, The GFSK & 8DPSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 8.6.			
ANTENNA TYPE	FPCB antenna			
ANTENNA GAIN	-4.08 dBi			

5.2. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203 an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

*The antennas of this device are permanently attached.

**The device Complies with the requirements of §15.203.

5.3. 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, and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.4. DESCRIPTION OF TEST SETUP

5.5. SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	EP-TA50EWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

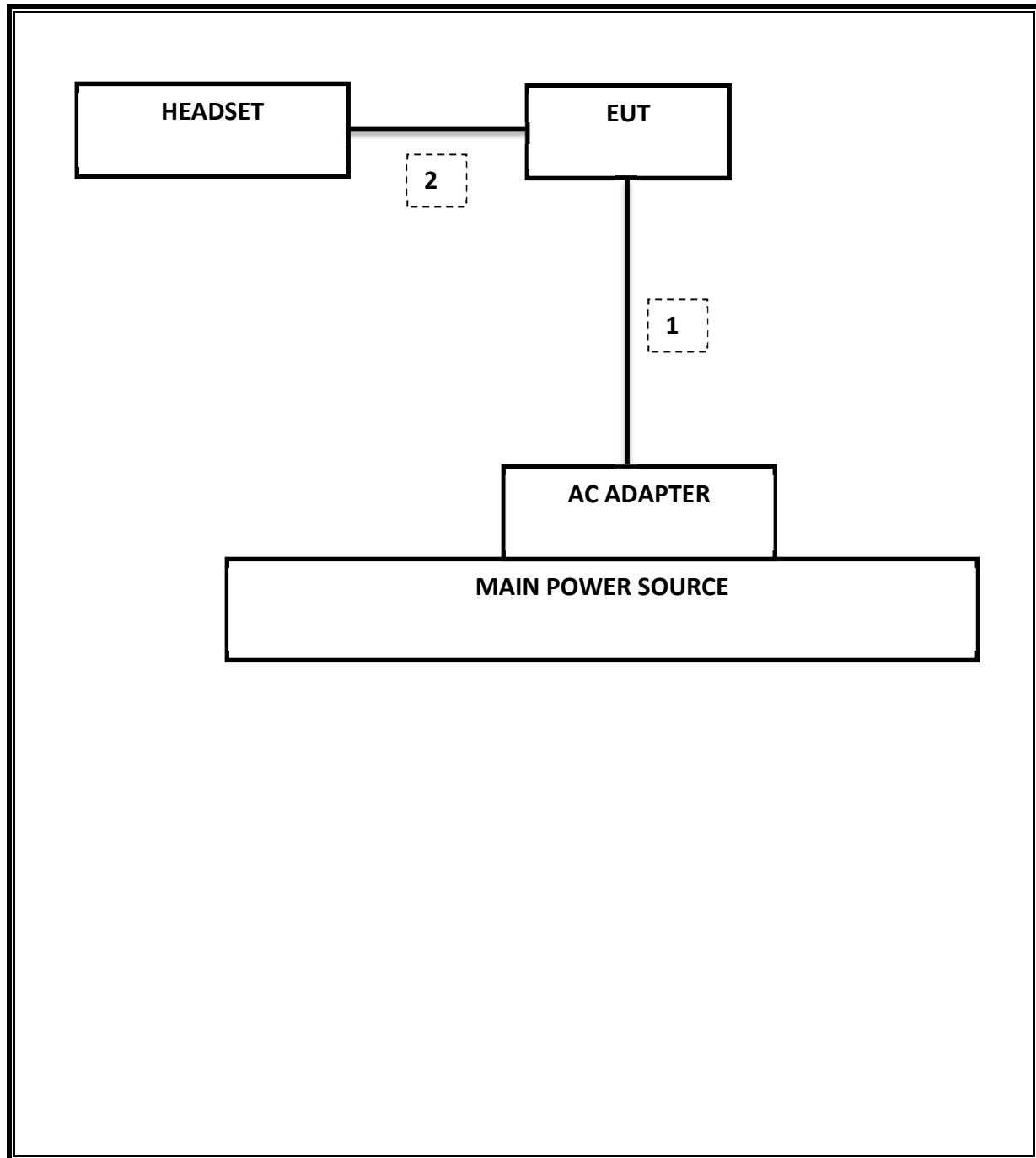
I/O CABLES

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

5.6. TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
EUT was set in the Key string menu mode to enable BT communications.

5.7. 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, 18GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/14
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	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/15
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/14
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/14
NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NIST USA.				

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass	1.2097 MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-39.66dbm
15.247 (b)(1)	RSS-210 A8.4	TX conducted output power	<21dBm		Pass	12.48dBm
15.247 (a)(1)	RSS-210 A8.1(b)	Hopping frequency separation	> 25KHz		Pass	1MHz
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79
15.247 (a)(1)(iii)	RSS-210 A8.1(d)	Avg Time of Occupancy	< 0.4sec		Pass	0.37479 s
15.207 (a)	RSS-GEN 7.2.2	AC Power Line conducted emissions	Section 10	Radiated	Pass	45.73dBuV/m
15.205, 15.209	RSS-210 Clause 2.6, RSS-210 Clause 6	Radiated Spurious Emission	< 54dBuV/m		Pass	42.05dBuV/m

Bluetooth Channels and Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	67	2468
7	2409	27	2429	47	2449	68	2469
8	2410	28	2430	48	2450	69	2470
9	2411	29	2431	49	2451	70	2471
10	2412	30	2432	50	2452	71	2472
11	2413	31	2433	51	2453	72	2473
12	2414	32	2434	52	2454	73	2474
13	2415	33	2435	53	2455	74	2475
14	2416	34	2436	54	2456	75	2476
15	2417	35	2437	55	2457	76	2477
16	2418	36	2438	56	2458	77	2478
17	2419	37	2439	57	2459	78	2479
18	2420	38	2440	58	2460	79	2480
19	2421	39	2441	59	2461		

8. ANTENNA PORT TEST RESULTS

8.1. 20 dB AND 99% BANDWIDTH

LIMIT

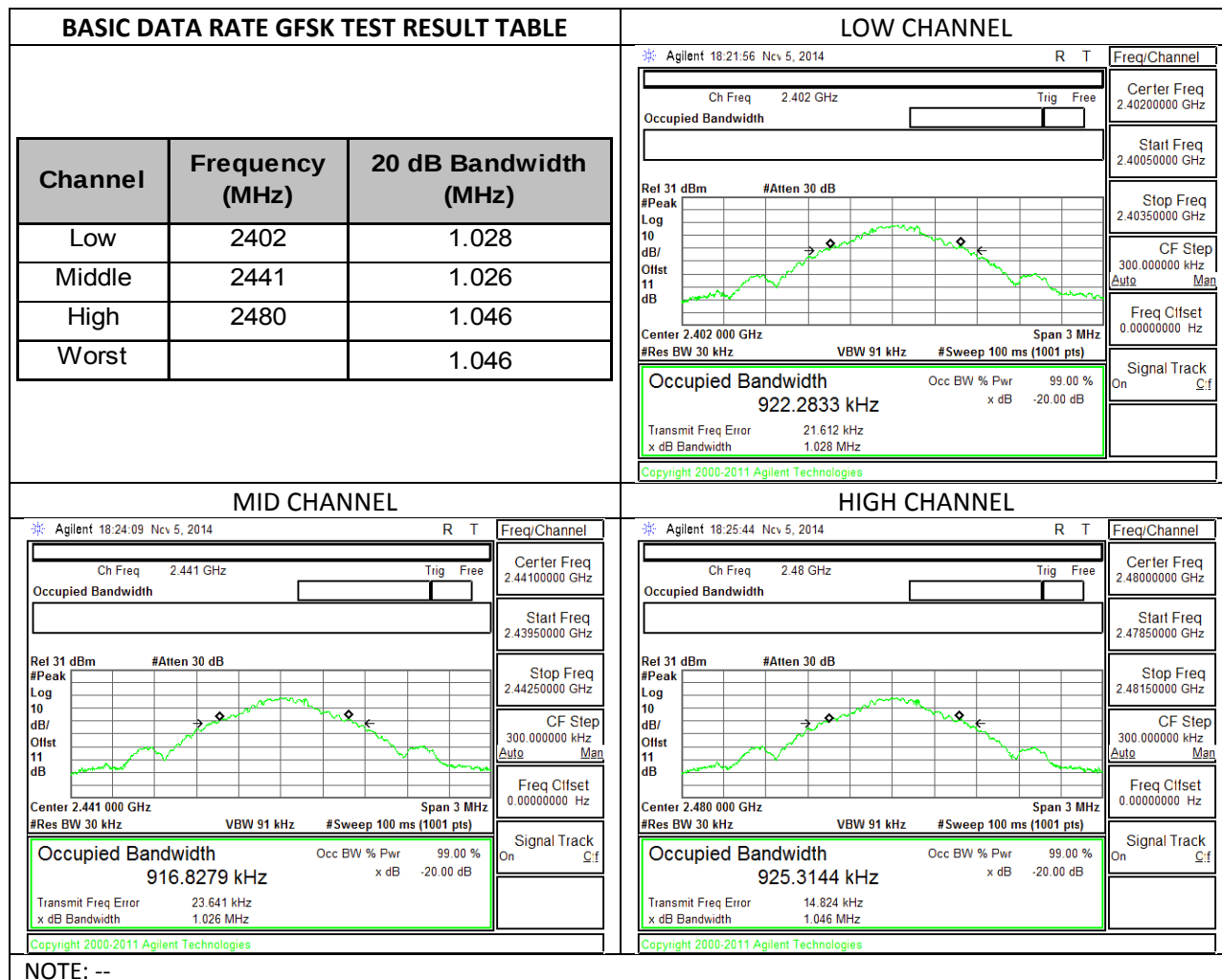
None; for reporting purposes only.

TEST PROCEDURE

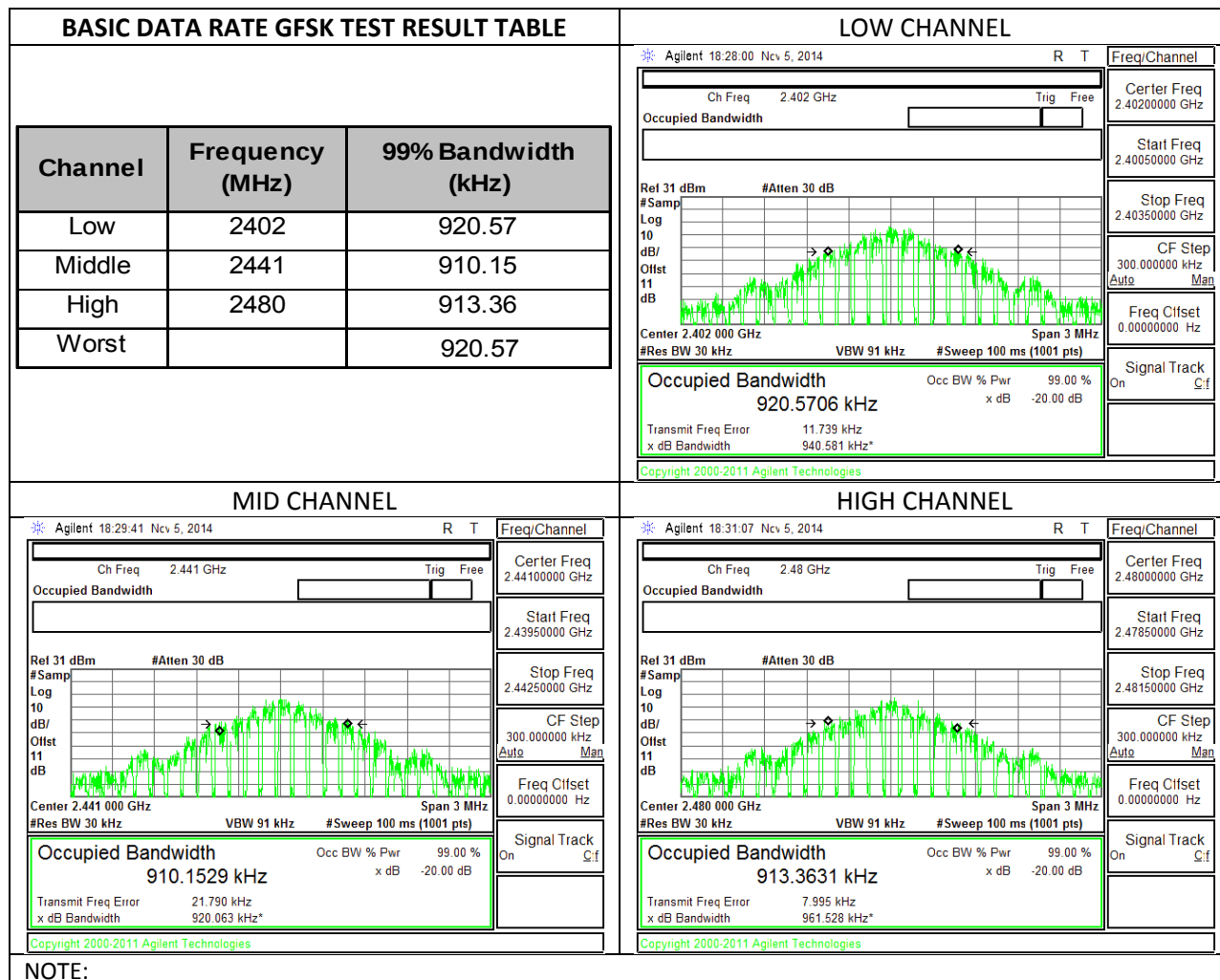
DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq$ 1% of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

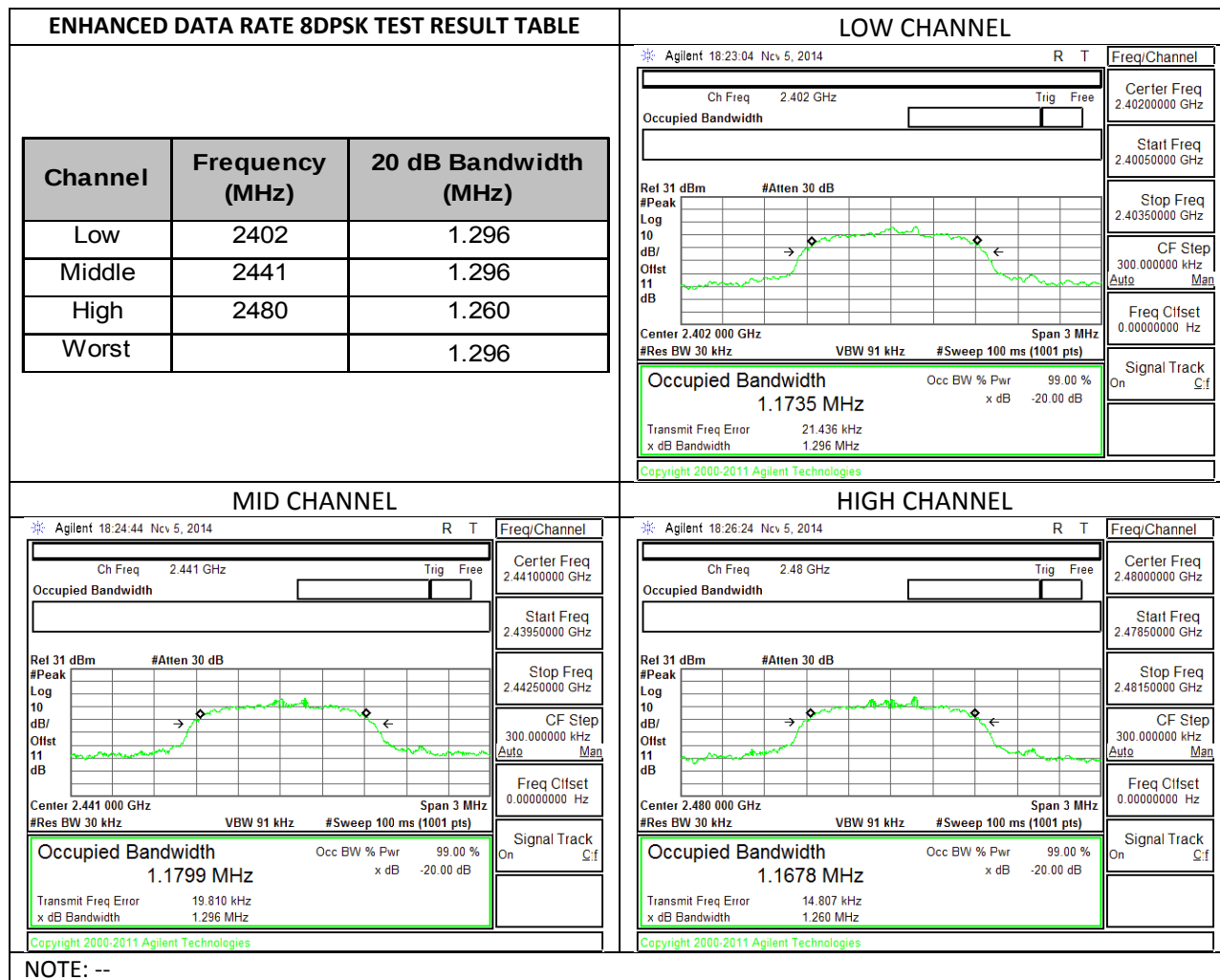
GFSK 20dB BANDWIDTH PLOTS AND TABLE



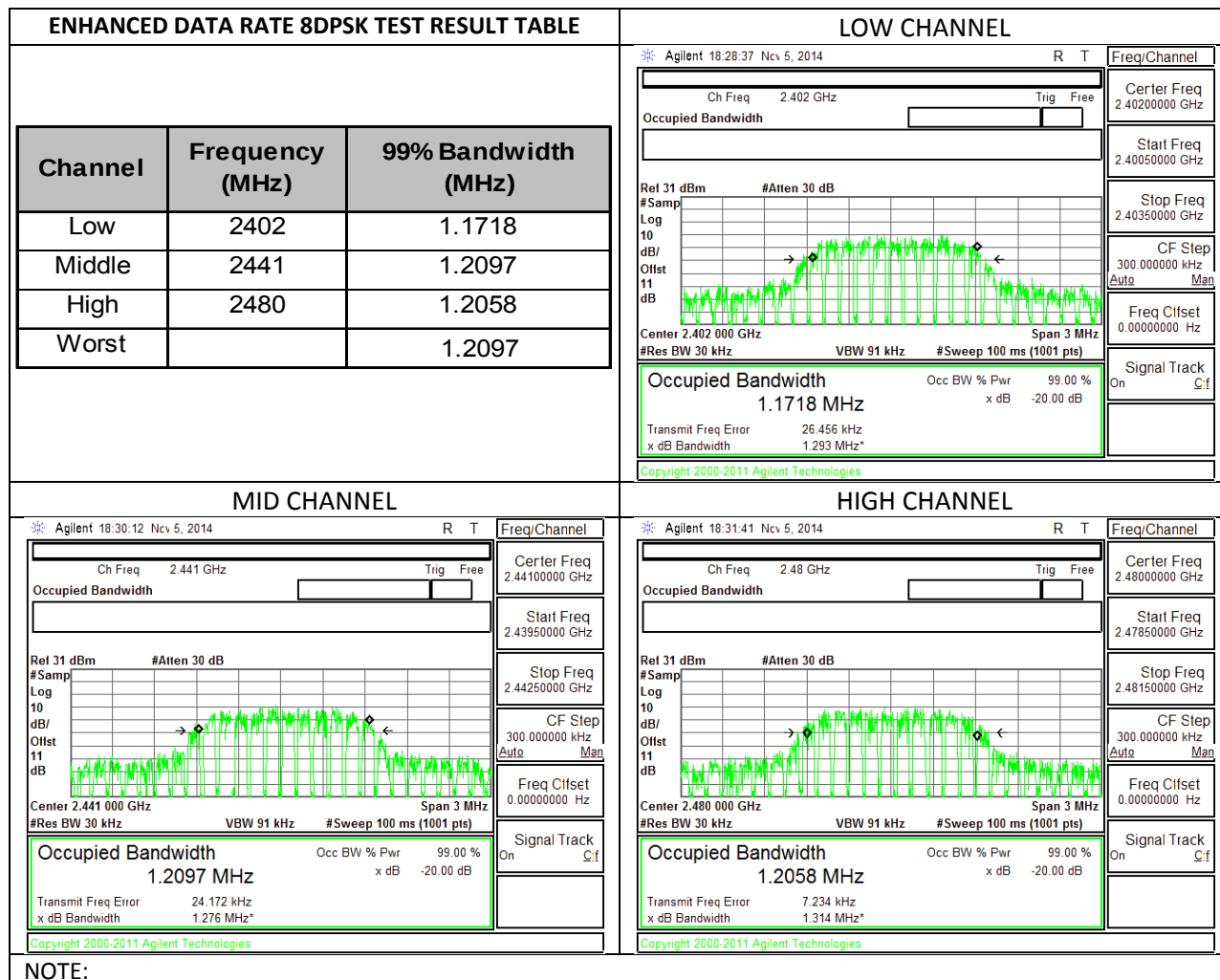
GFSK 99% BANDWIDTH PLOTS AND TABLE



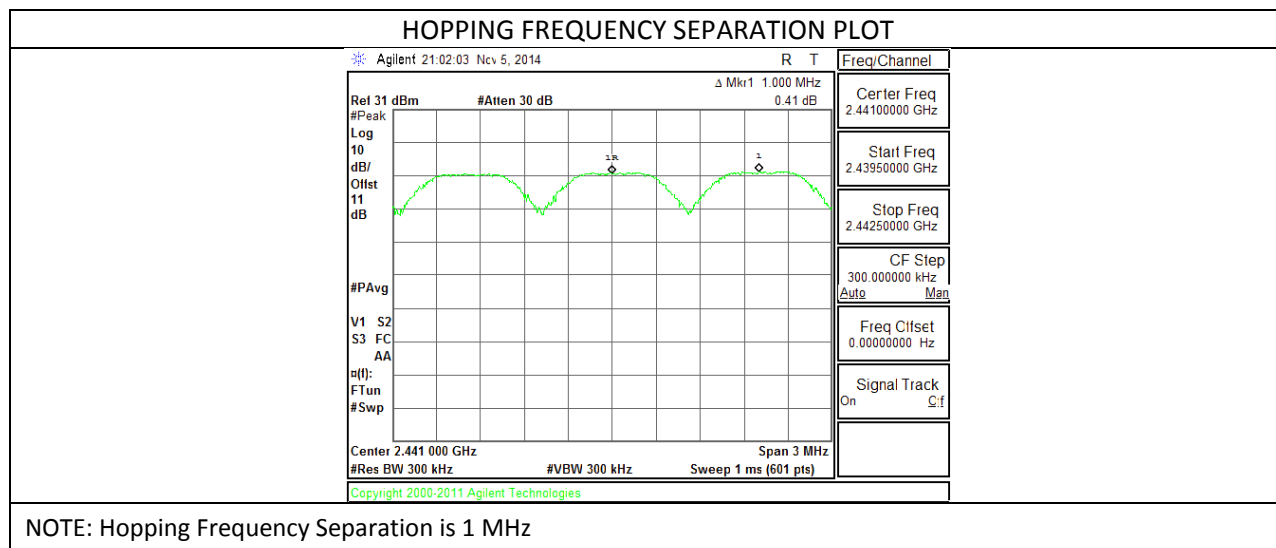
8DPSK 20dB BANDWIDTH PLOTS AND TABLE



8DPSK 99% BANDWIDTH PLOTS AND TABLE



NOTE:



8.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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

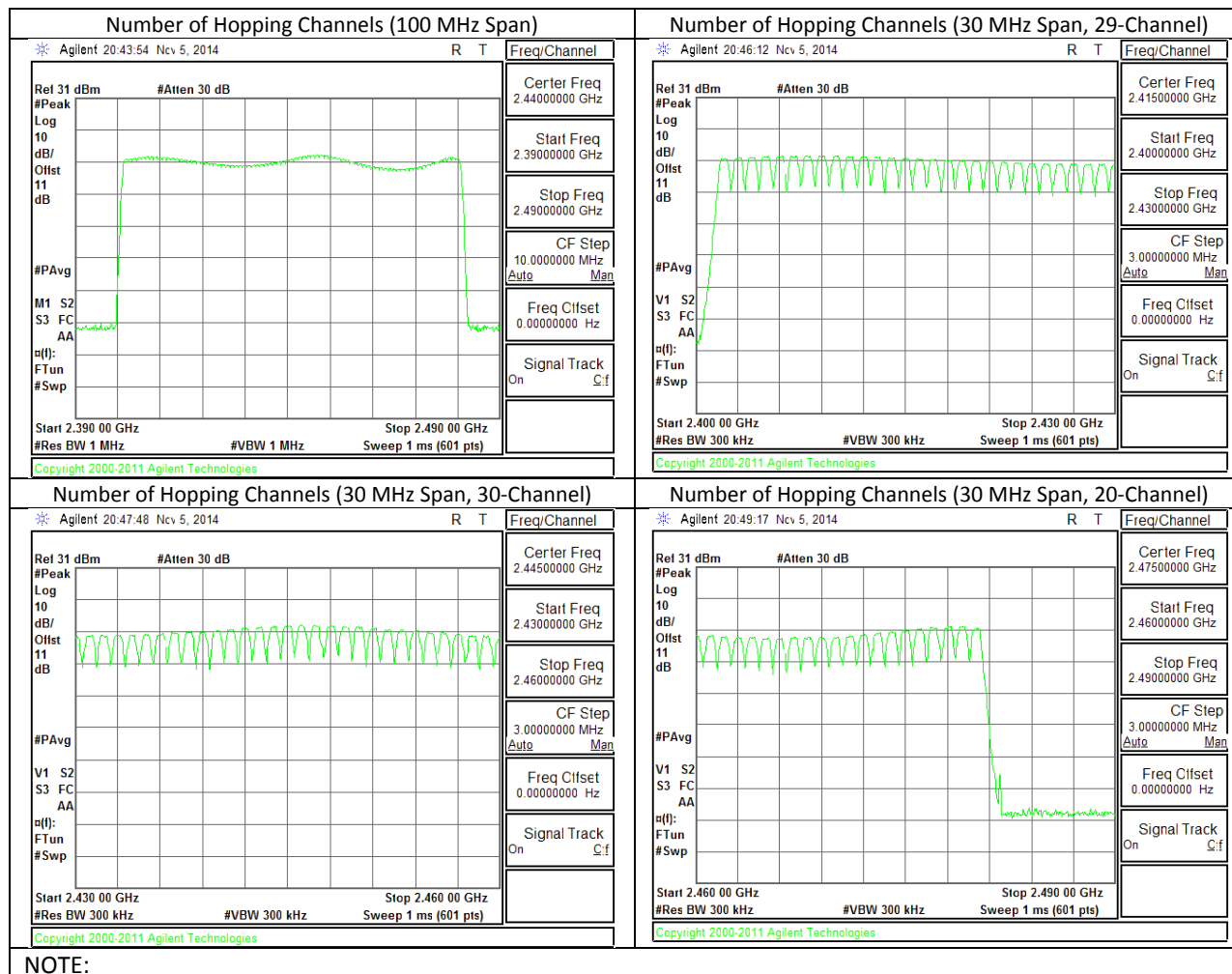
TEST PROCEDURE

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 PLOTS



8.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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.

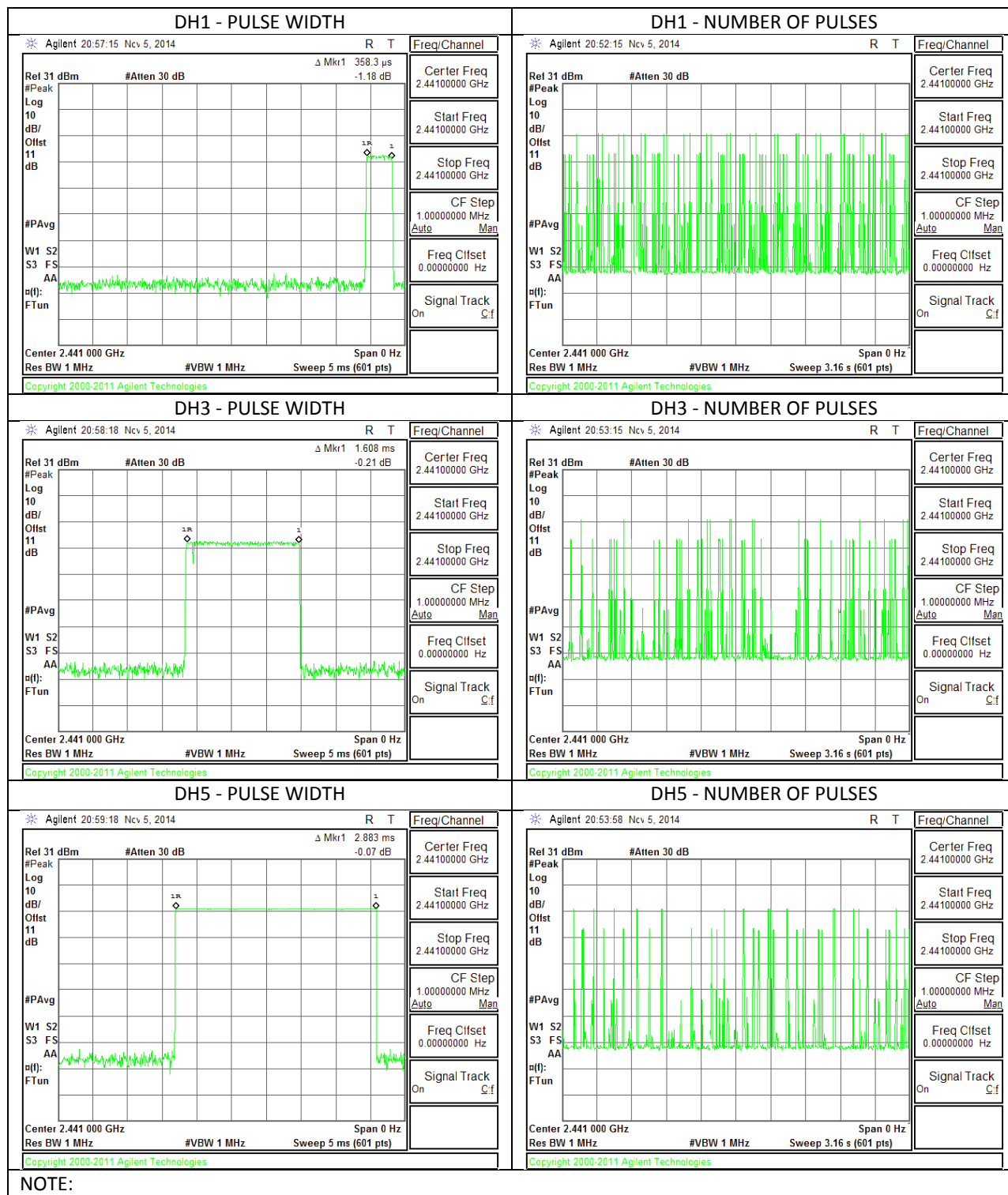
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

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	0.358	34	0.122	0.4	-0.278	
DH3	1.608	14	0.225	0.4	-0.175	
DH5	2.883	13	0.375	0.4	-0.025	
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	0.358	8.50	0.030	0.4	-0.370	
DH3	1.608	3.50	0.056	0.4	-0.344	
DH5	2.883	3.25	0.094	0.4	-0.306	

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



8.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

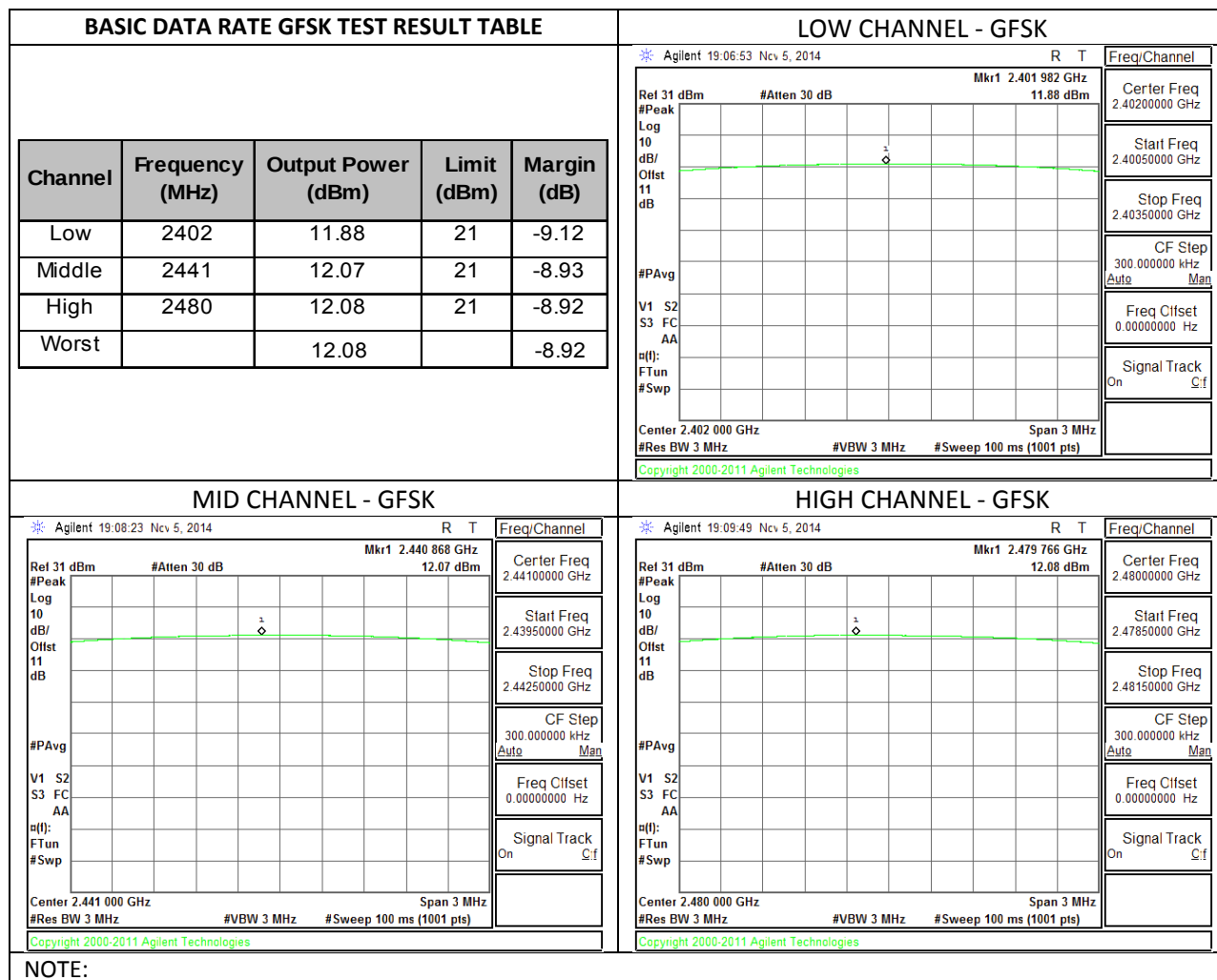
The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

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.

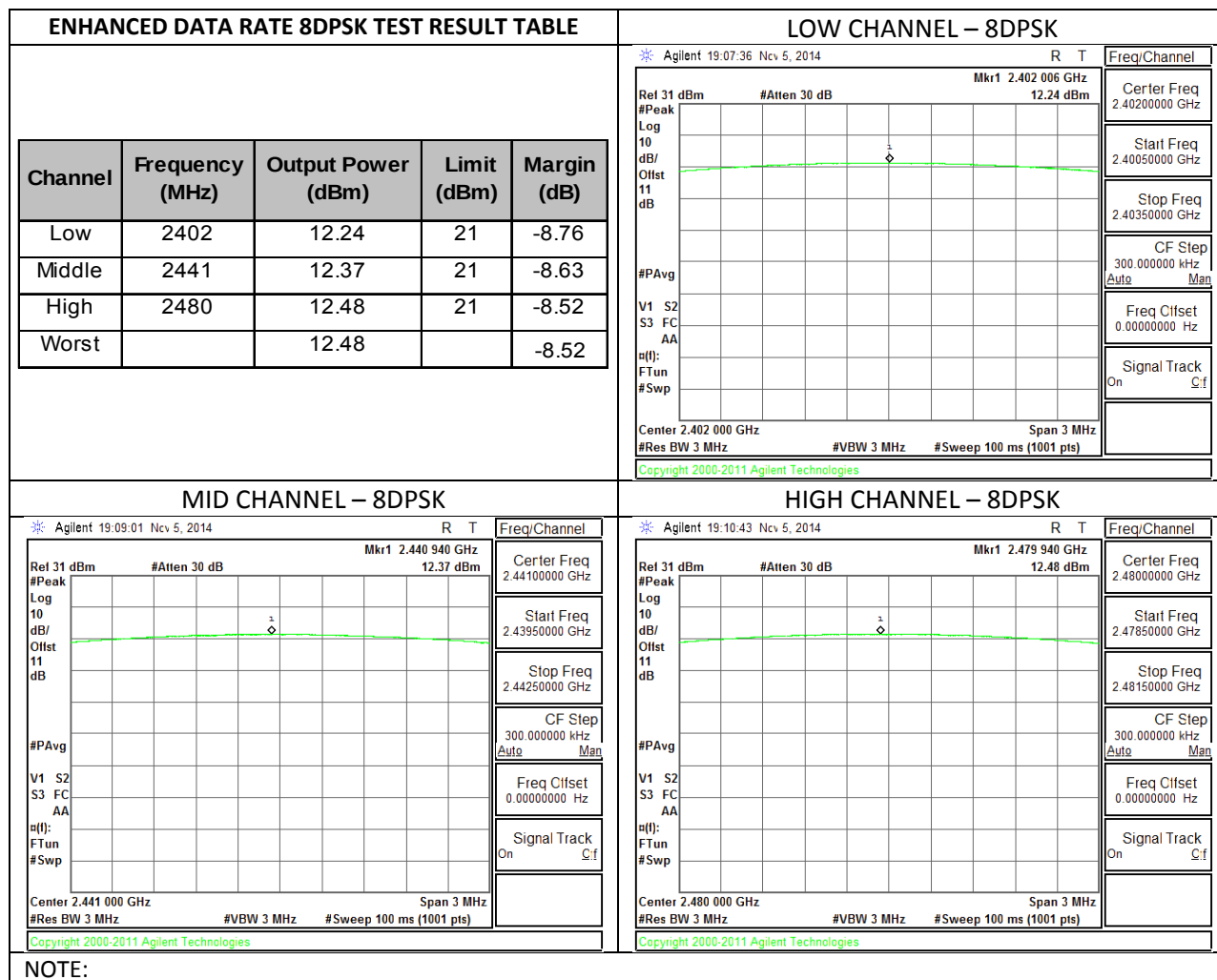
RESULTS

GFSK OUTPUT POWER PLOTS AND TABLE



NOTE:

8DPSK OUTPUT POWER PLOTS AND TABLE



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	10.47
Middle	2441	10.72
High	2480	10.23
Worst		10.72

ENHANCED DATA RATE 8DPSK		
Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.03
Middle	2441	6.31
High	2480	6.17
Worst		6.31

NOTE: --

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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.

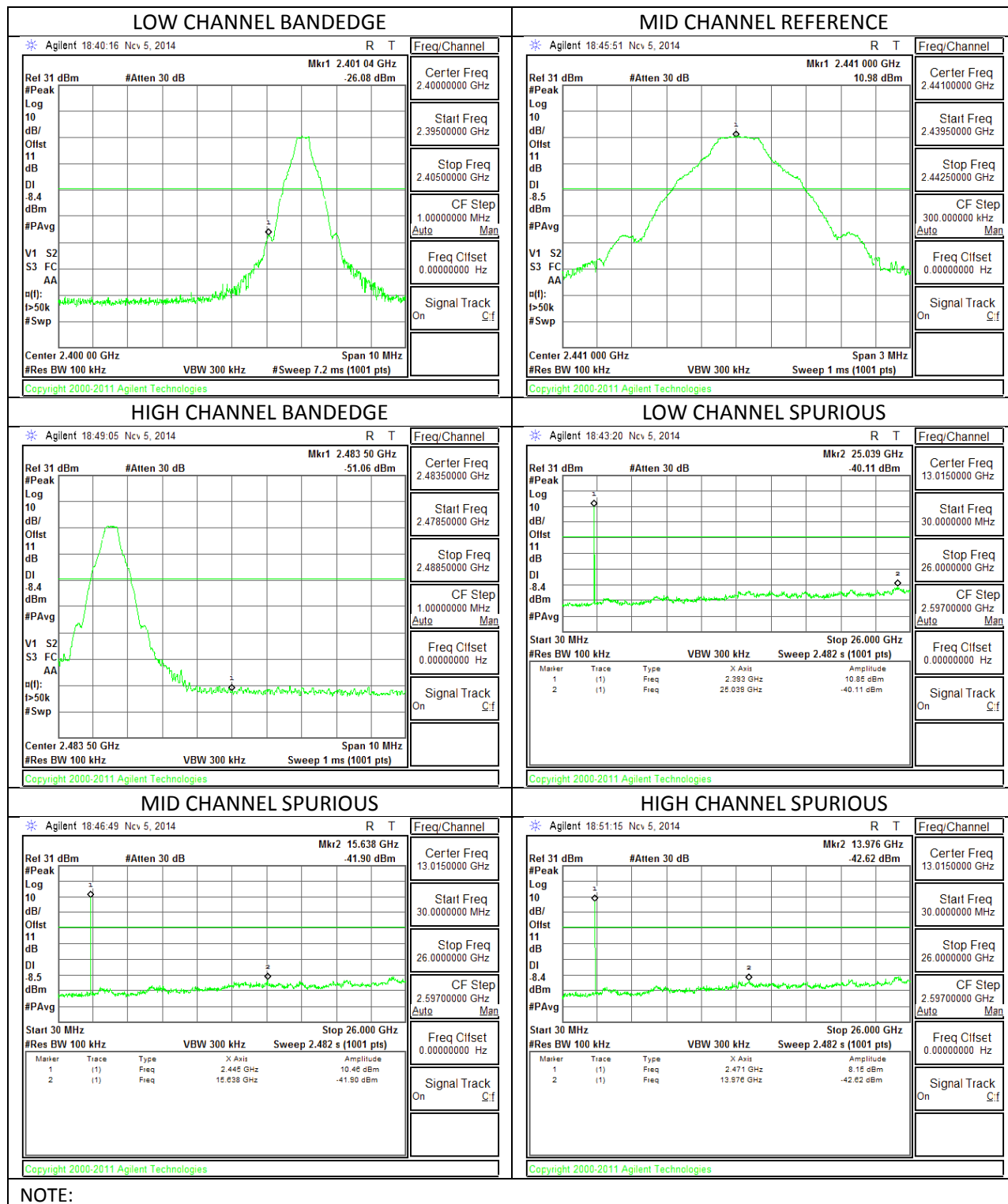
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

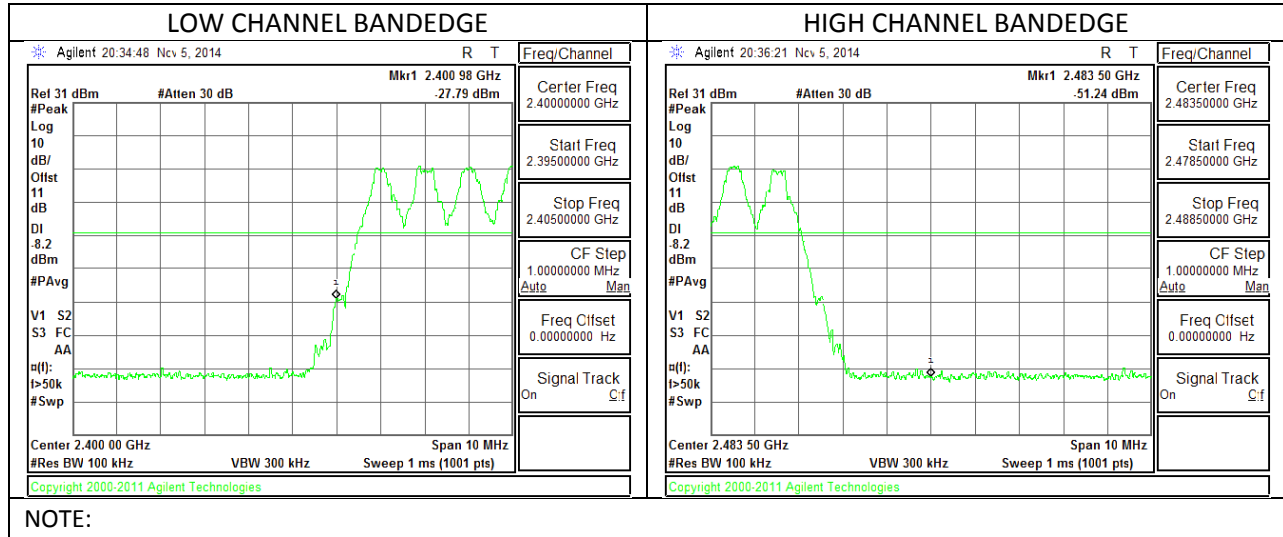
GFSK - BANDEDGE AND SPURIOUS EMISSIONS PLOTS



NOTE:

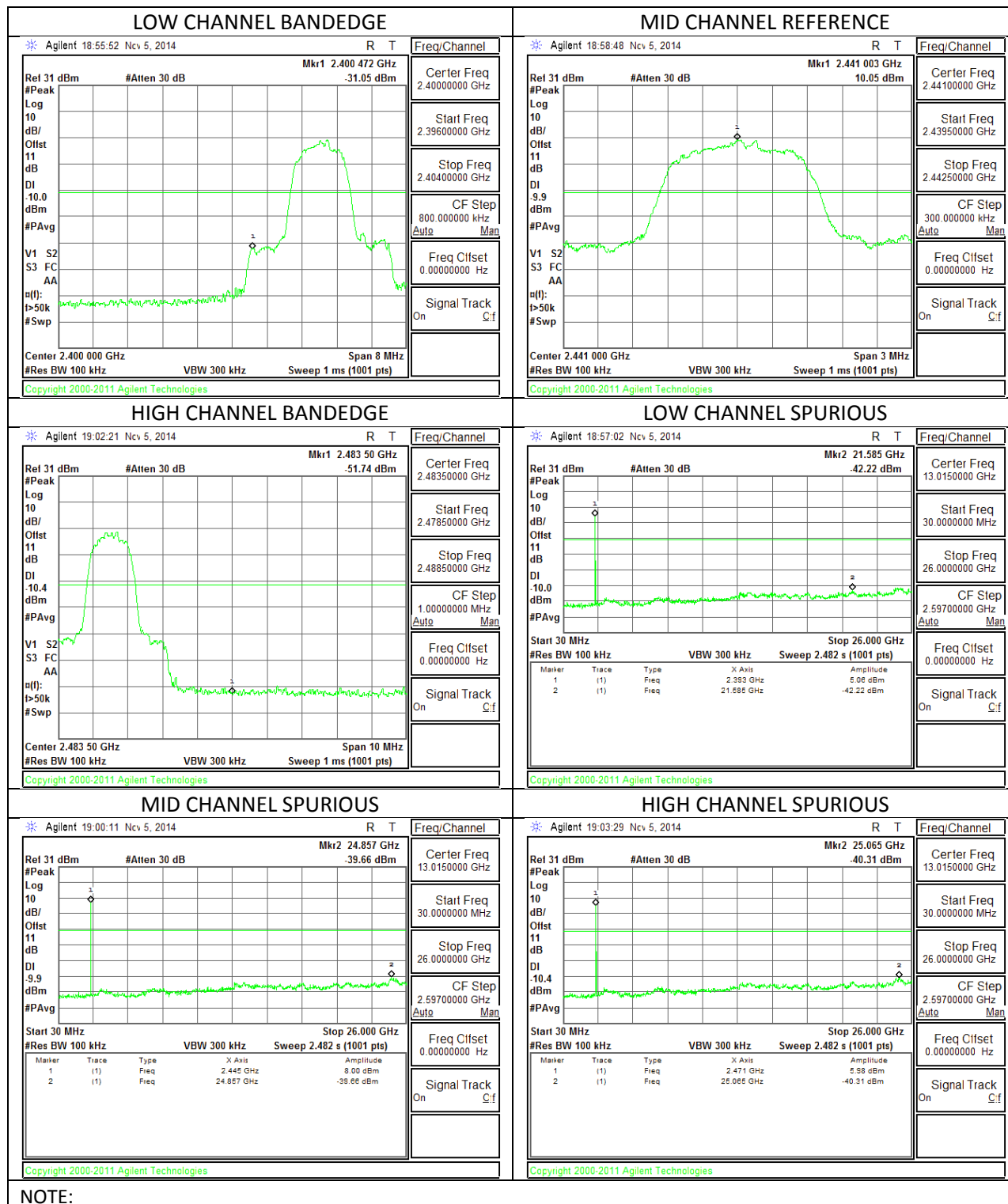
BASIC DATA RATE WITH GFSK HOPPING MODE

GFSK – BANDEDGE PLOTS



ENHANCED DATA RATE 8DPSK MODULATION NON-HOPPING MODE

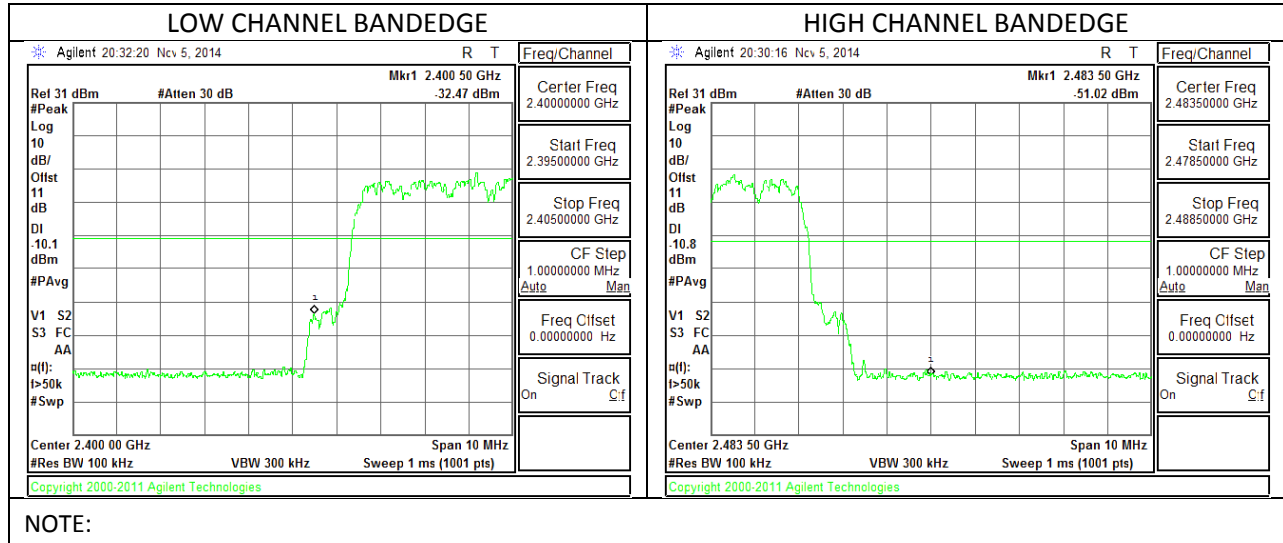
8DPSK - BANDEDGE AND SPURIOUS EMISSIONS PLOTS



NOTE:

ENHANCED DATA RATE WITH 8DPSK HOPPING MODE

8DPSK – BANDEDGE PLOTS



9. RADIATED TEST RESULTS

LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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.

$GFSK = 1/T = 1 / 2.88ms = 350Hz$.

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.

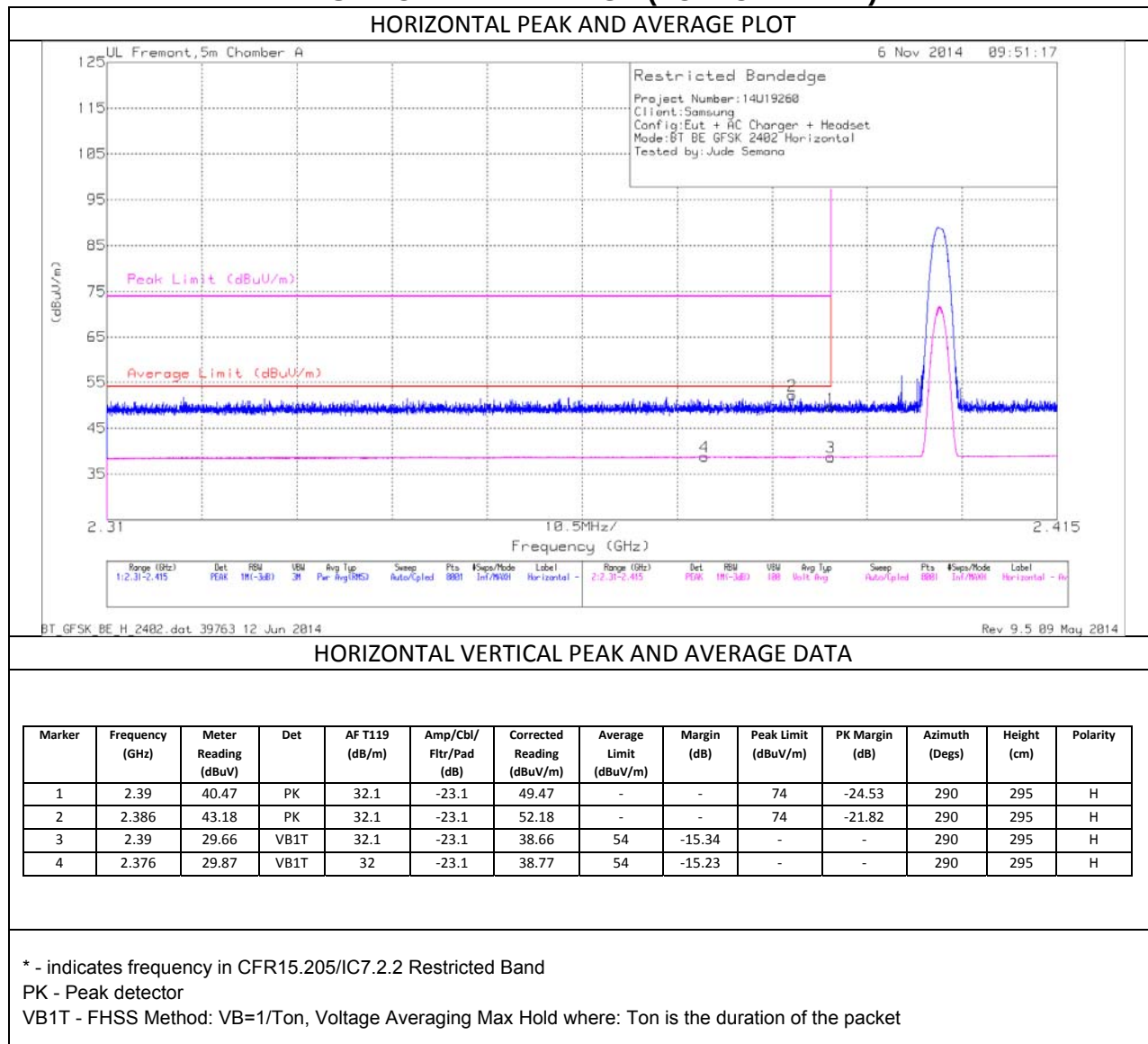
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

9.1. TRANSMITTER ABOVE 1 GHz

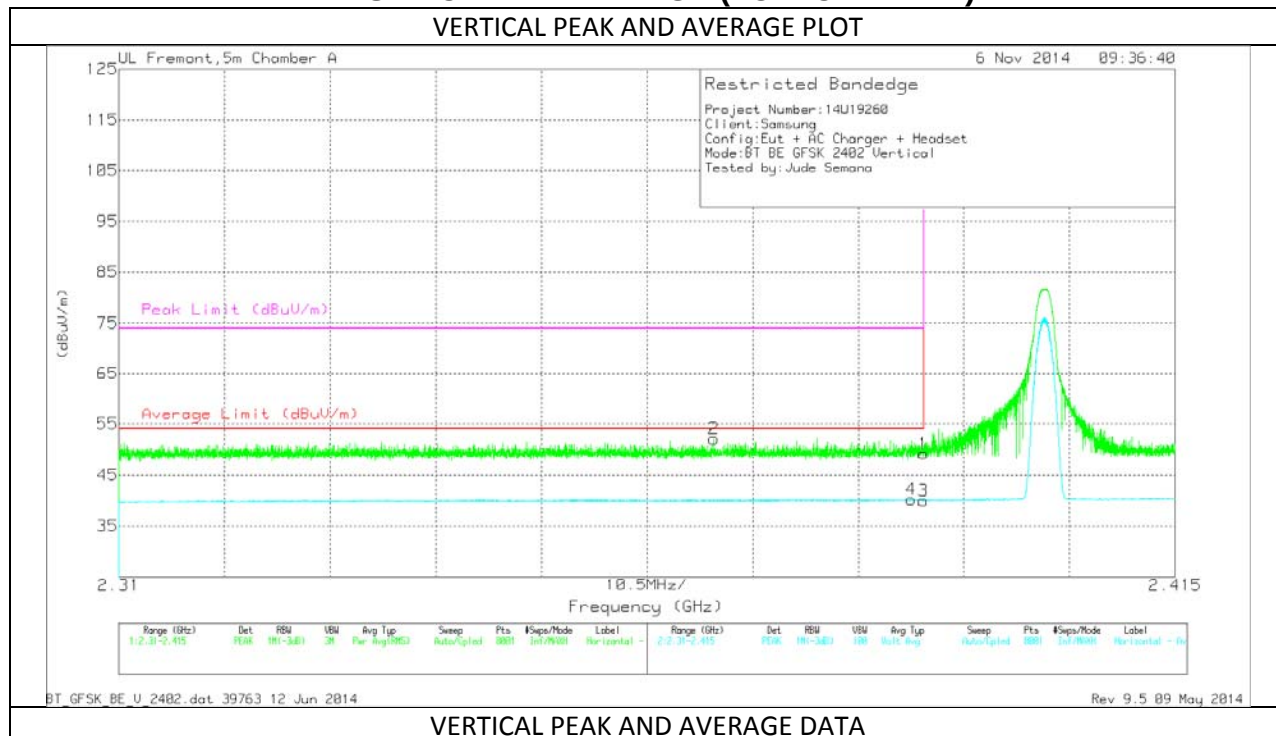
BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)



RESTRICTED BANDEDGE (LOW CHANNEL)

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F ltr/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	40.15	PK	32.1	-23.1	49.15	-	-	74	-24.85	205	372	V
2	2.369	43.19	PK	32	-23.1	52.09	-	-	74	-21.91	205	372	V
3	2.39	30.95	VB1T	32.1	-23.1	41.25	54	-12.75	-	-	205	372	V
4	2.389	31.15	VB1T	32.1	-23.1	41.45	54	-12.55	-	-	205	372	V

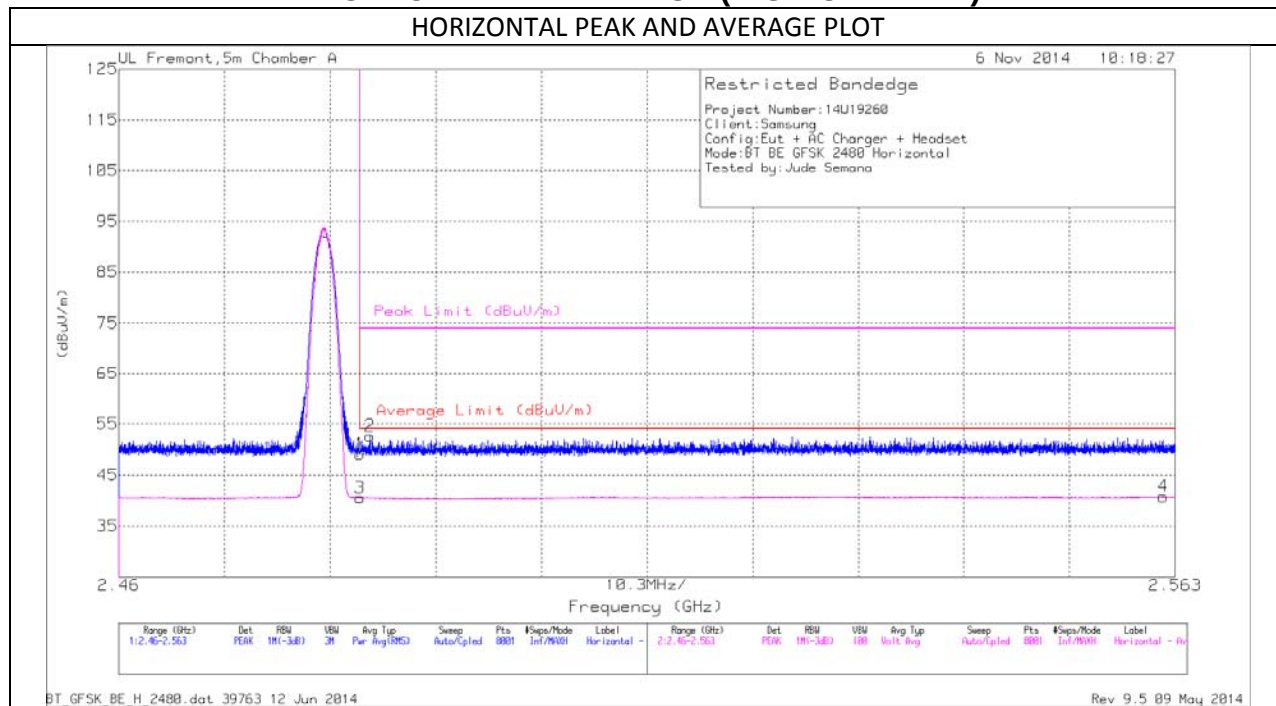
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F ltr/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	39.55	PK	32.3	-22.8	49.05	-	-	74	-24.95	45	252	H
2	2.485	43.12	PK	32.3	-22.8	52.62	-	-	74	-21.38	45	252	H
3	2.484	31.01	VB1T	32.3	-22.8	41.81	54	-12.19	-	-	45	252	H
4	2.562	31.05	VB1T	32.4	-22.7	42.05	54	-11.95	-	-	45	252	H

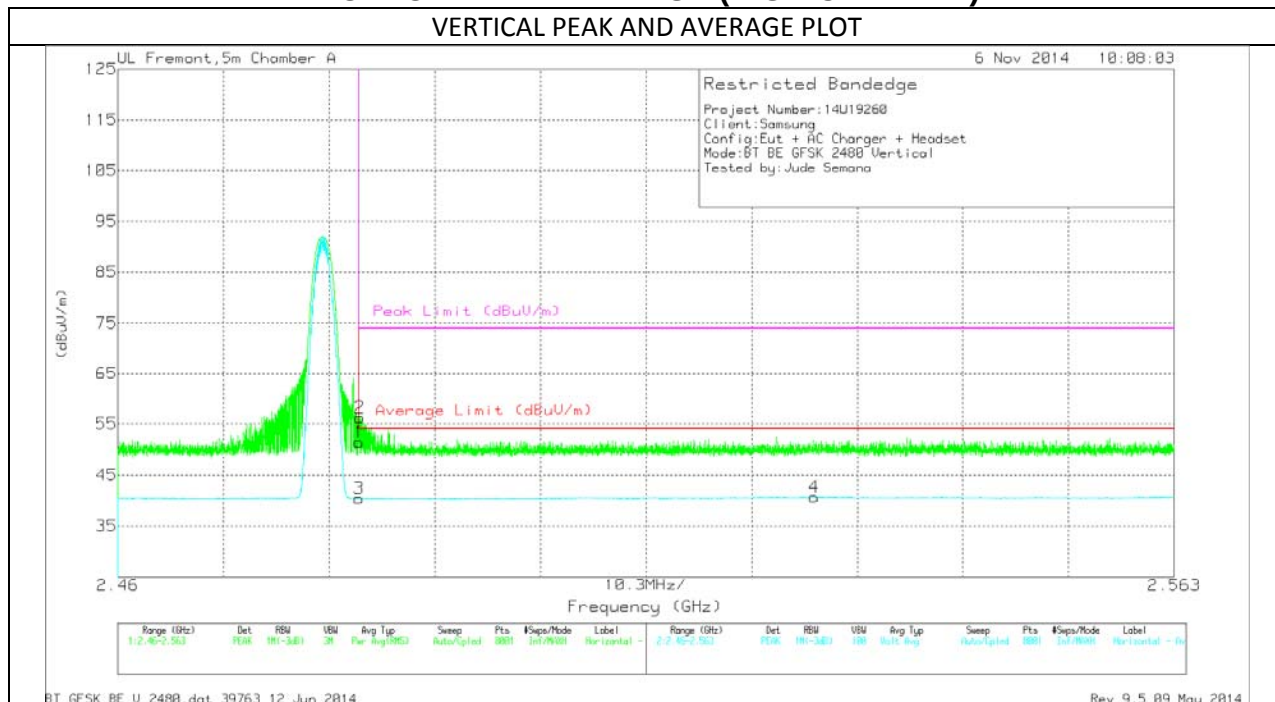
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F ltr/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	41.91	PK	32.3	-22.8	51.41	-	-	74	-22.59	12	192	V
2	2.484	46.71	PK	32.3	-22.8	56.21	-	-	74	-17.79	12	192	V
3	2.484	30.88	VB1T	32.3	-22.8	41.68	54	-12.32	-	-	12	192	V
4	2.528	30.96	VB1T	32.4	-22.7	41.96	54	-12.04	-	-	12	192	V

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

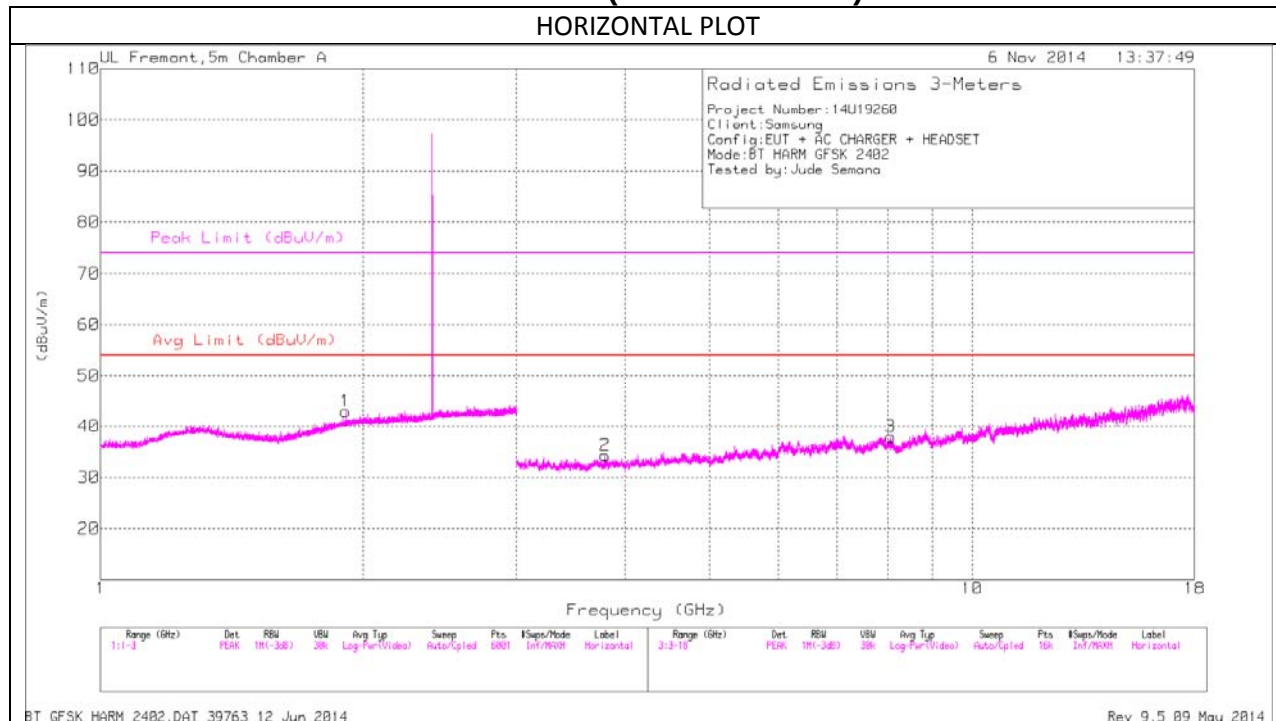
PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

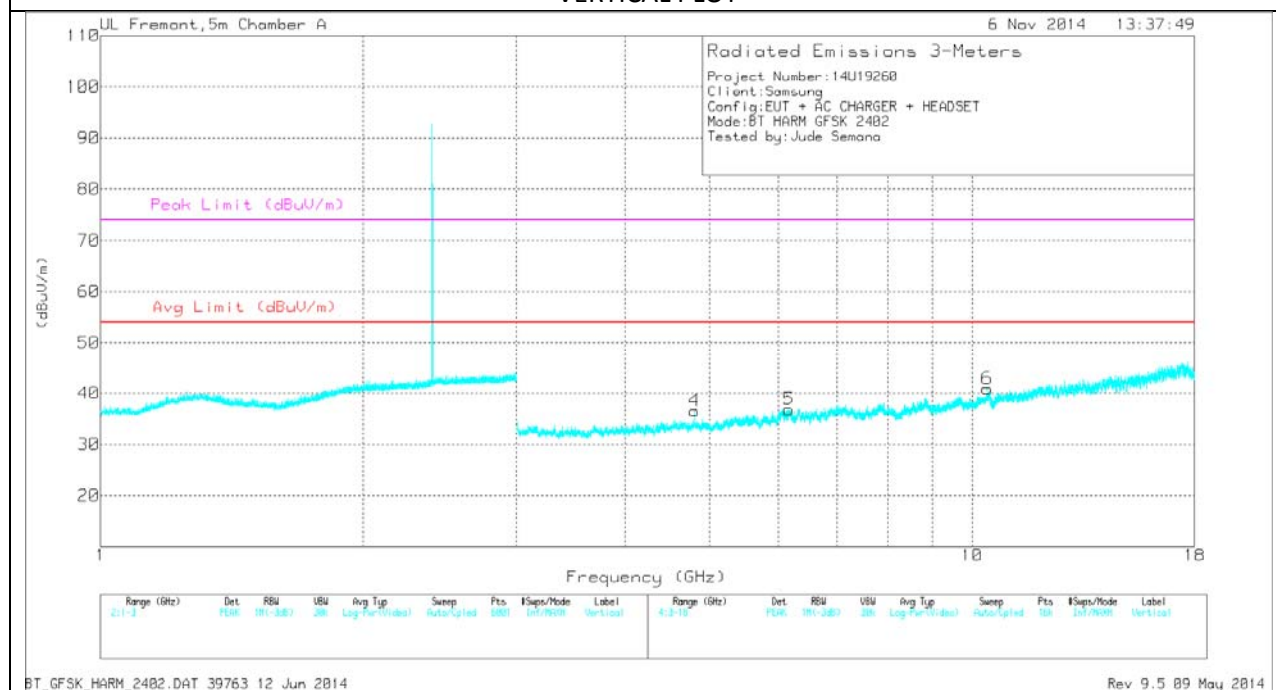
HARMONICS AND SPURIOUS EMISSIONS

SPURIOUS (LOW CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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

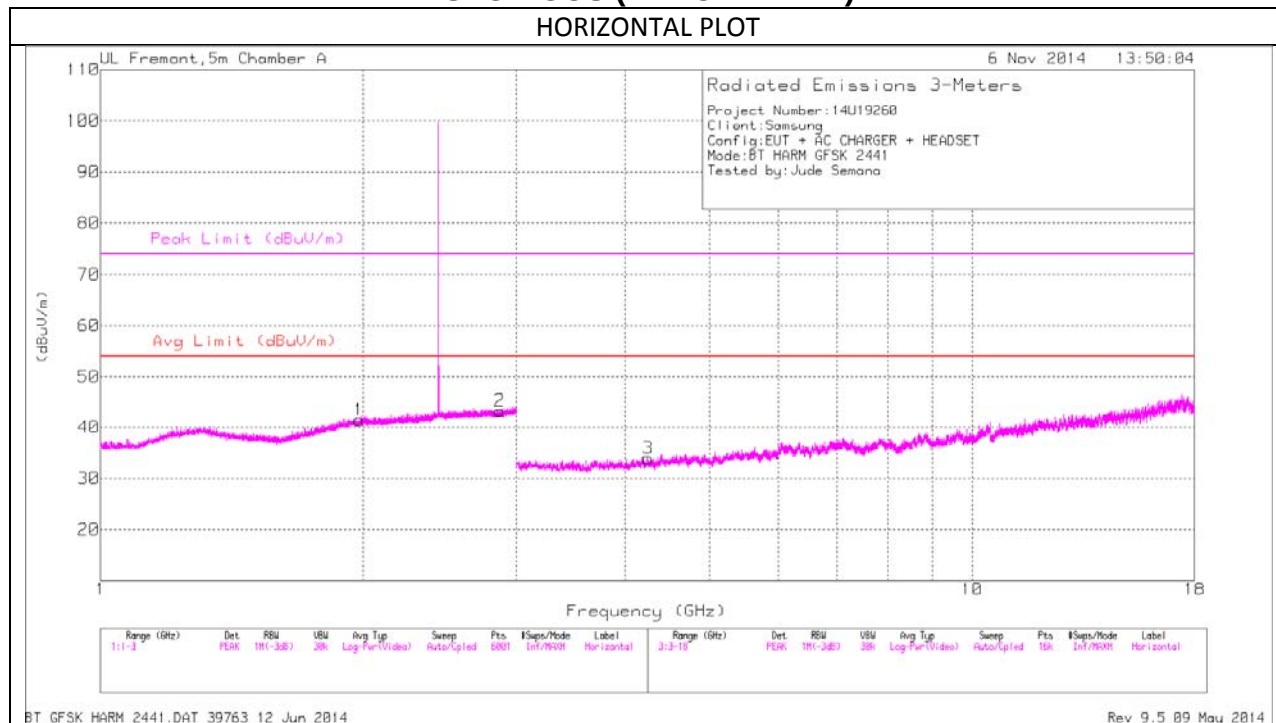
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.911	34.78	PK	31.3	-23.2	42.88	-	-	-	-	0-360	100	H
2	3.793	32.07	PK	33.2	-31	34.27	-	-	74	-39.73	0-360	200	H
3	8.072	30.01	PK	35.7	-27.8	37.91	-	-	74	-36.09	0-360	100	H
4	4.804	32.76	PK	34.1	-30.3	36.56	-	-	74	-37.44	0-360	200	V
5	6.162	31.34	PK	35.3	-29.8	36.84	-	-	-	-	0-360	200	V
6	10.409	28.46	PK	37.4	-25	40.86	-	-	-	-	0-360	200	V

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

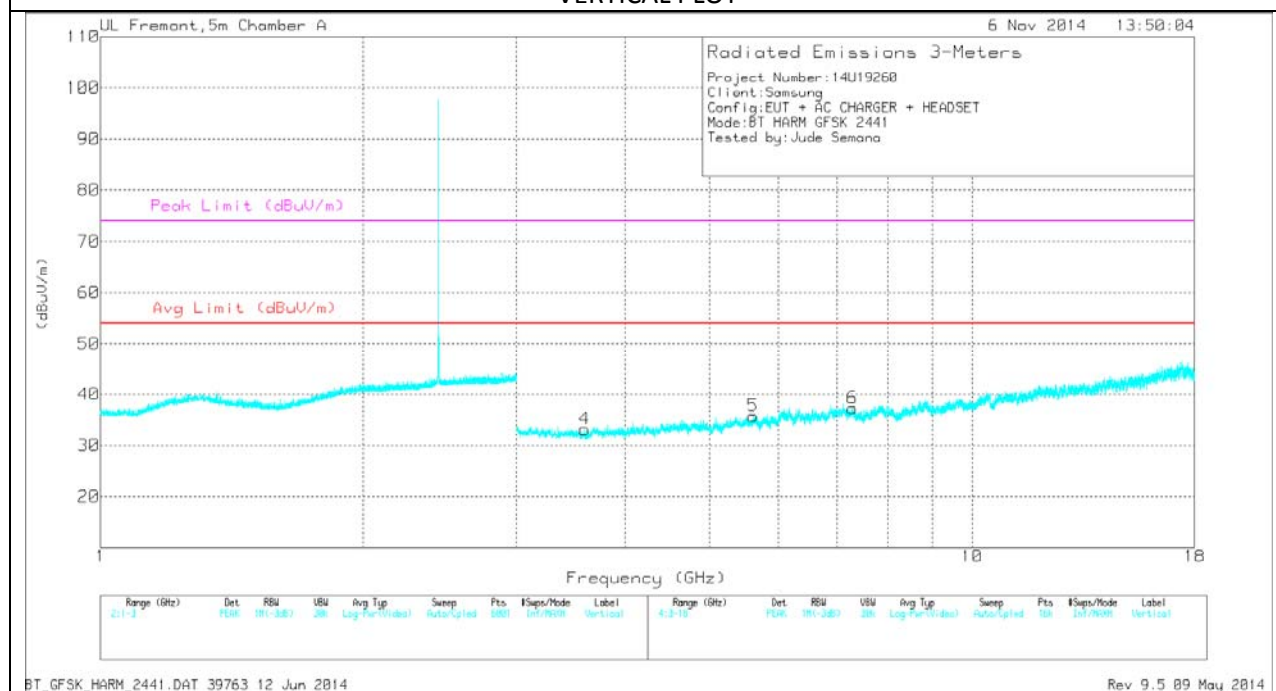
PK - Peak detector

SPURIOUS (MID CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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

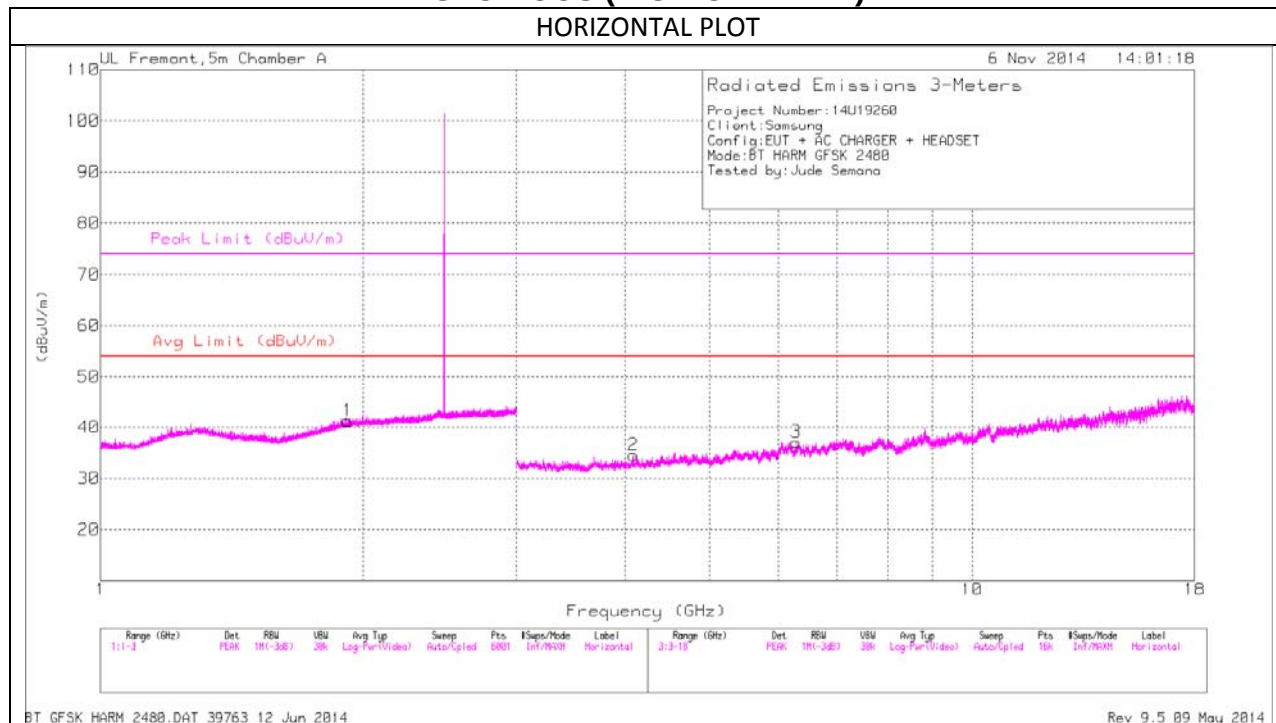
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.981	33.06	PK	31.5	-23.2	41.36	-	-	-	-	0-360	100	H
2	2.873	33.16	PK	32.7	-22.7	43.16	-	-	74	-30.84	0-360	100	H
3	4.248	31.7	PK	33.5	-31.3	33.9	-	-	74	-40.1	0-360	200	H
4	3.593	31.86	PK	33	-31.7	33.16	-	-	74	-40.84	0-360	200	V
5	5.609	30.21	PK	34.7	-29.2	35.71	-	-	-	-	0-360	100	V
6	7.293	30.55	PK	35.6	-28.9	37.25	-	-	74	-36.75	0-360	100	V

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

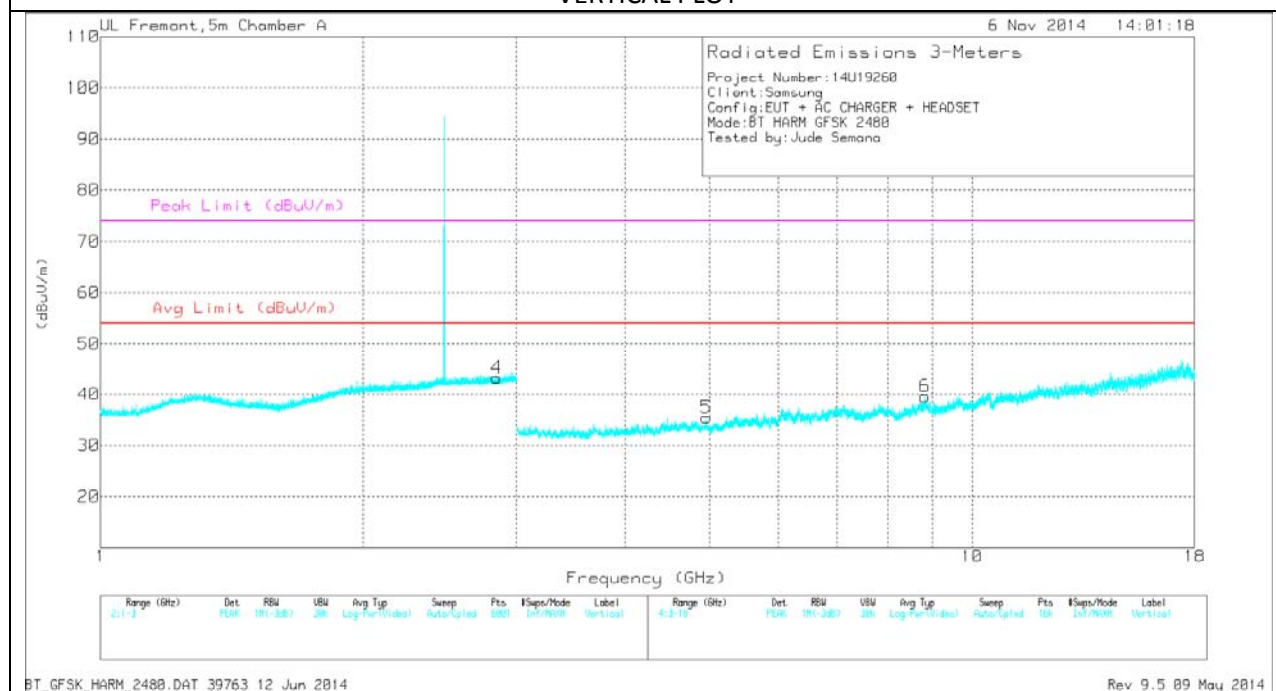
PK - Peak detector

SPURIOUS (HIGH CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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/Fitter/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	1.921	33.12	PK	31.3	-23.2	41.22	-	-	-	-	0-360	100	H
4	2.849	33.15	PK	32.7	-22.7	43.15	-	-	74	-30.85	0-360	200	V
2	4.087	32.54	PK	33.5	-31.5	34.54	-	-	74	-39.46	0-360	200	H
3	6.287	31.75	PK	35.3	-30	37.05	-	-	-	-	0-360	100	H
5	4.959	32.39	PK	34	-31	35.39	-	-	74	-38.61	0-360	200	V
6	8.828	30.06	PK	36	-26.5	39.56	-	-	-	-	0-360	200	V

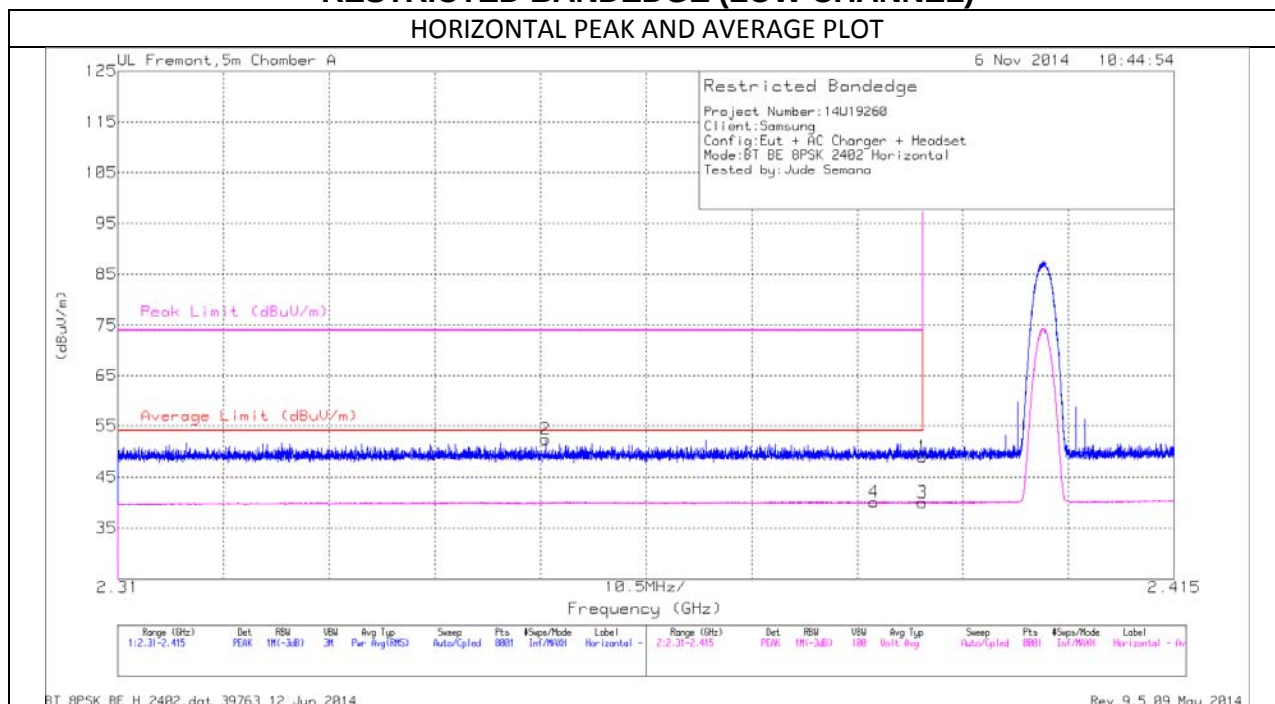
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

ENHANCED DATA RATE 8DPSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL VERTICAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cbl/F Itr/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	39.94	PK	32.1	-23.1	48.94	-	-	74	-25.06	216	232	H
2	2.353	43.49	PK	32	-23.1	52.39	-	-	74	-21.61	216	232	H
3	2.39	30.97	VB1T	32.1	-23.1	41.27	54	-12.73	-	-	216	232	H
4	2.385	31.07	VB1T	32.1	-23.1	41.37	54	-12.63	-	-	216	232	H

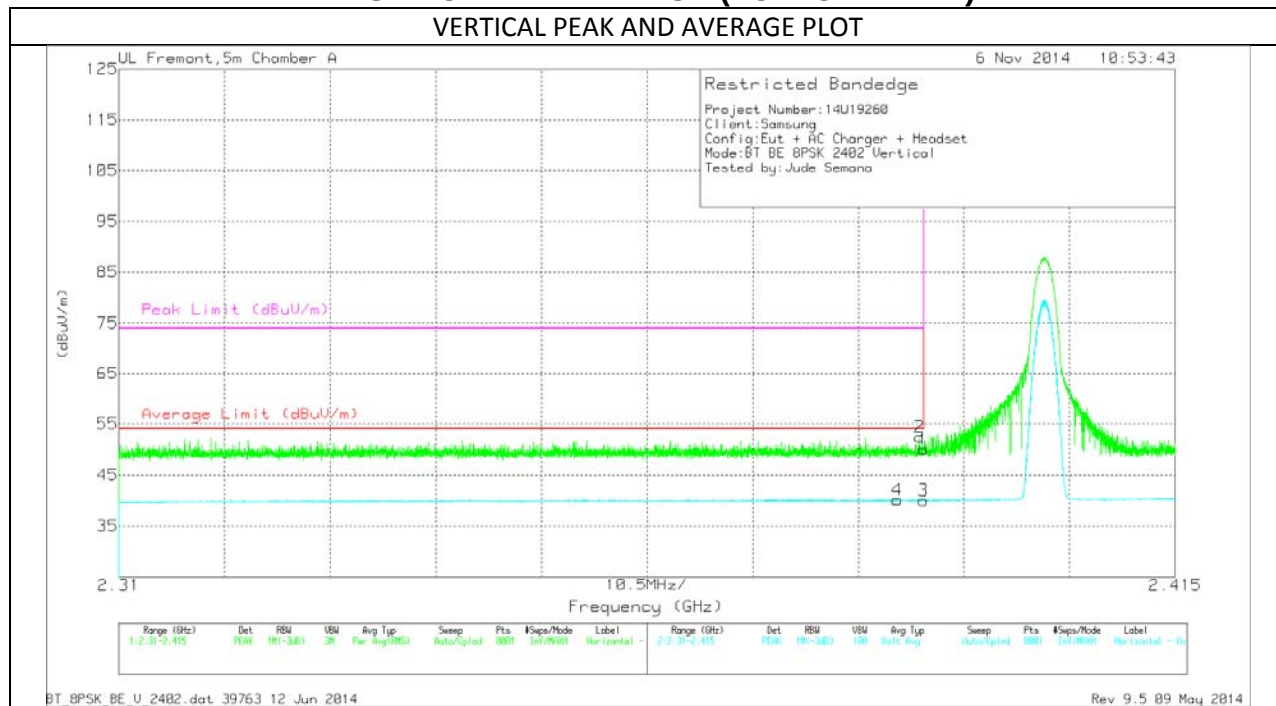
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (LOW CHANNEL)

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F ltr/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	41.08	PK	32.1	-23.1	50.08	-	-	74	-23.92	163	145	V
2	2.39	43.44	PK	32.1	-23.1	52.44	-	-	74	-21.56	163	145	V
3	2.39	30.98	VB1T	32.1	-23.1	41.28	54	-12.72	-	-	163	145	V
4	2.387	31.1	VB1T	32.1	-23.1	41.4	54	-12.6	-	-	163	145	V

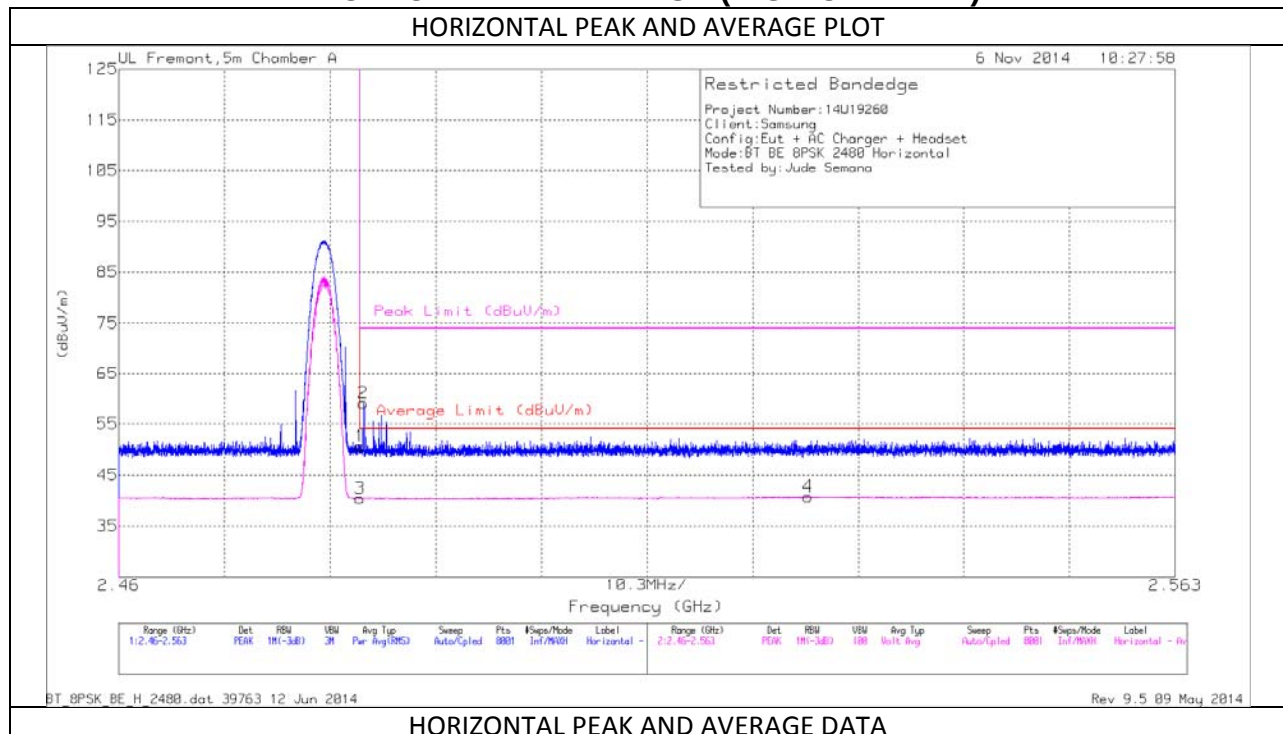
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F Itr/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	41.14	PK	32.3	-22.8	50.64	-	-	74	-23.36	254	355	H
2	2.484	49.58	PK	32.3	-22.8	59.08	-	-	74	-14.92	254	355	H
3	2.484	30.89	VB1T	32.3	-22.8	41.69	54	-12.31	-	-	254	355	H
4	2.527	31.02	VB1T	32.4	-22.7	42.02	54	-11.98	-	-	254	355	H

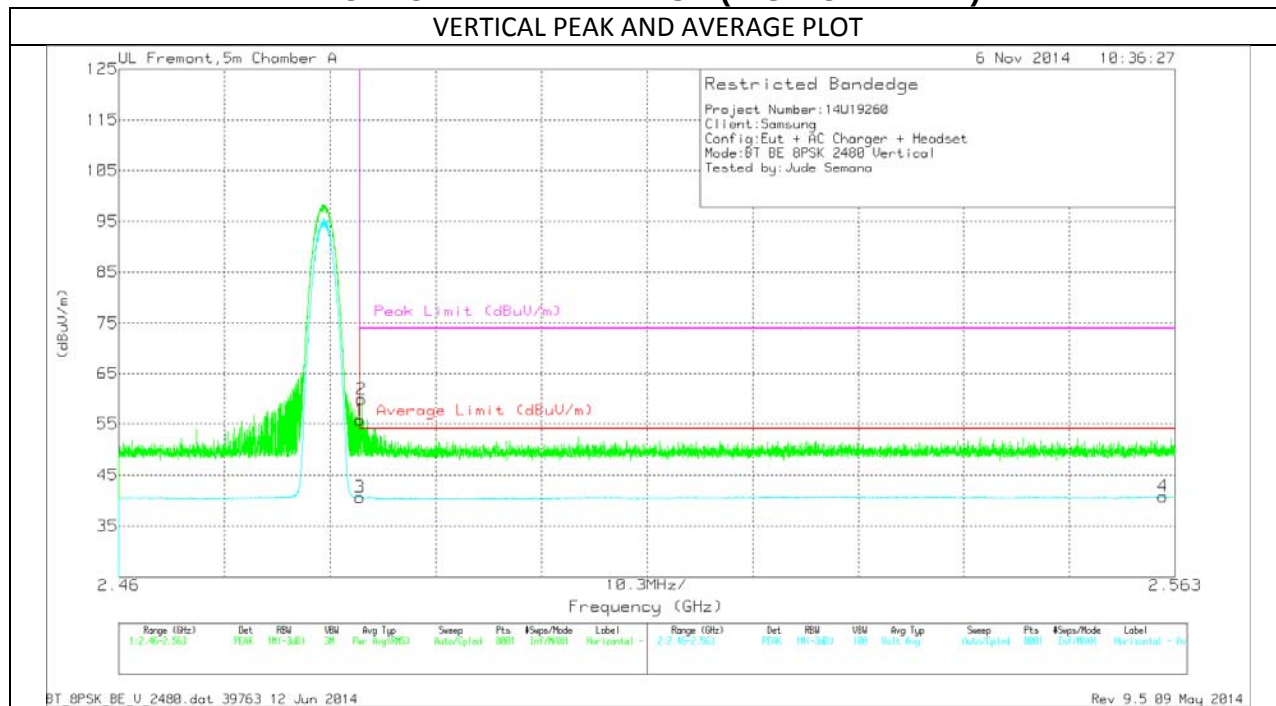
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

AUTHORIZED BANDEDGE (HIGH CHANNEL)

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL PEAK AND AVERAGE DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cbl/Ftr/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	46.25	PK	32.3	-22.8	55.75	-	-	74	-18.25	157	298	V
2	2.484	50.37	PK	32.3	-22.8	59.87	-	-	74	-14.13	157	298	V
3	2.484	31.1	VB1T	32.3	-22.8	41.9	54	-12.1	-	-	157	298	V
4	2.562	31.04	VB1T	32.4	-22.7	42.04	54	-11.96	-	-	157	298	V

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

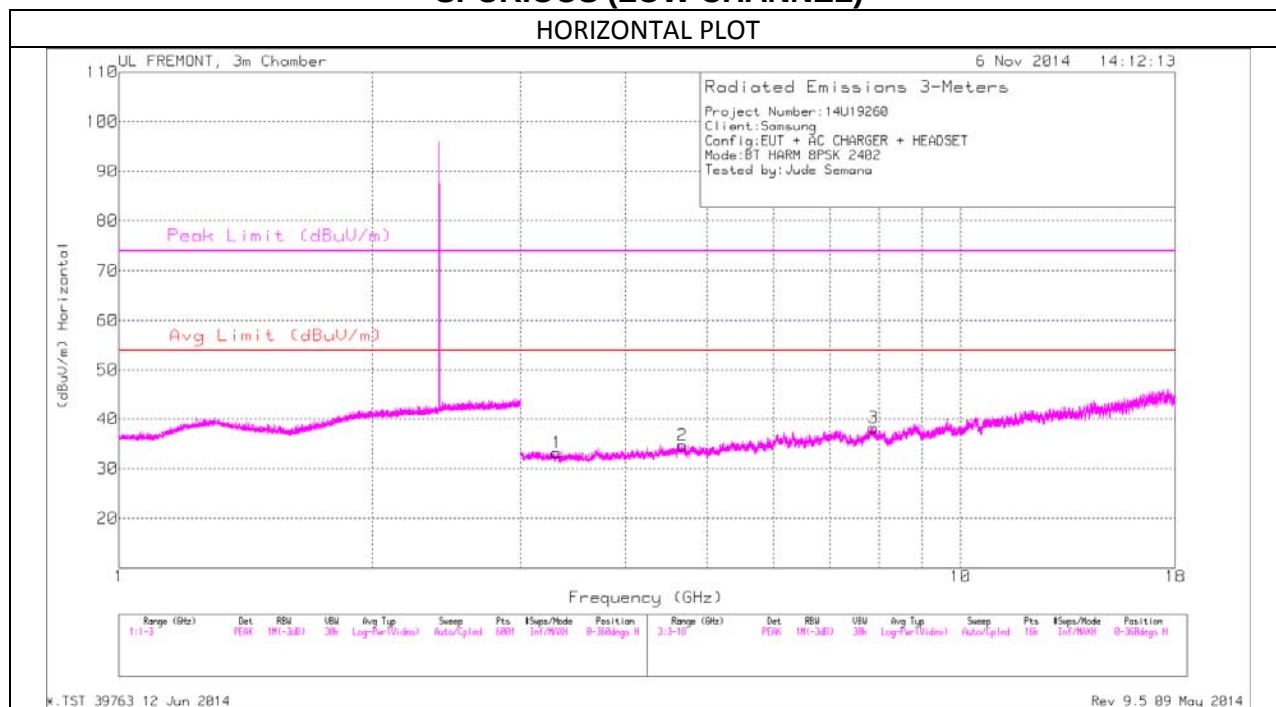
PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

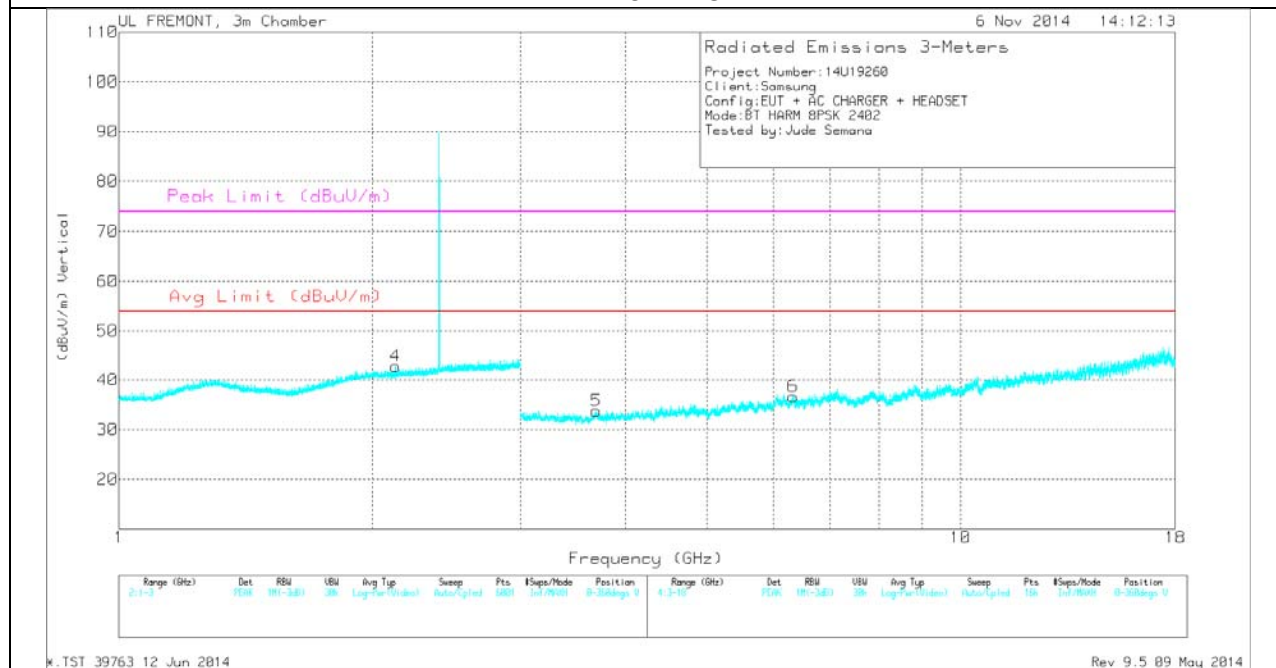
HARMONICS AND SPURIOUS EMISSIONS

SPURIOUS (LOW CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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

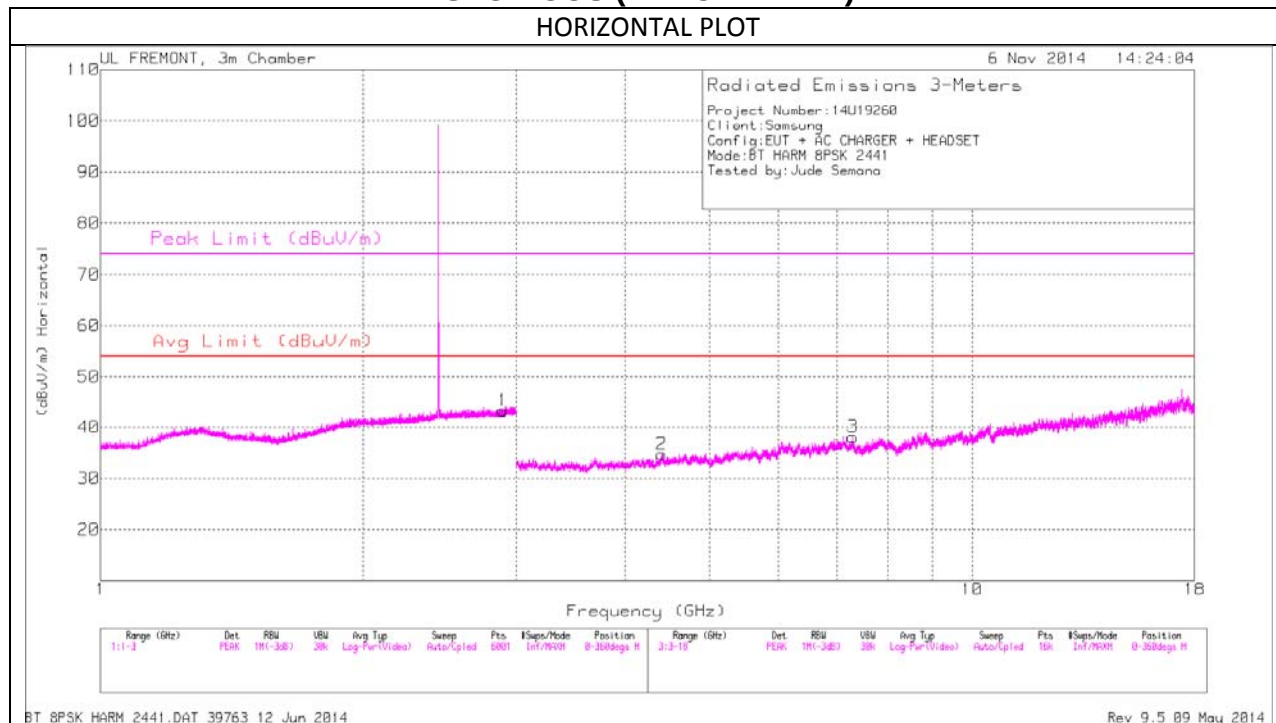
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	2.132	34.28	PK	31.6	-23.1	42.78	-	-	-	-	0-360	100	V
1	3.315	31.71	PK	32.9	-31.4	33.21	-	-	-	-	0-360	200	H
5	3.693	31.38	PK	33.2	-30.8	33.78	-	-	74	-40.22	0-360	200	V
2	4.672	31.26	PK	34.1	-30.7	34.66	-	-	74	-39.34	0-360	100	H
6	6.328	30.29	PK	35.4	-29	36.69	-	-	-	-	0-360	200	V
3	7.89	29.86	PK	35.8	-27.4	38.26	-	-	-	-	0-360	200	H

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

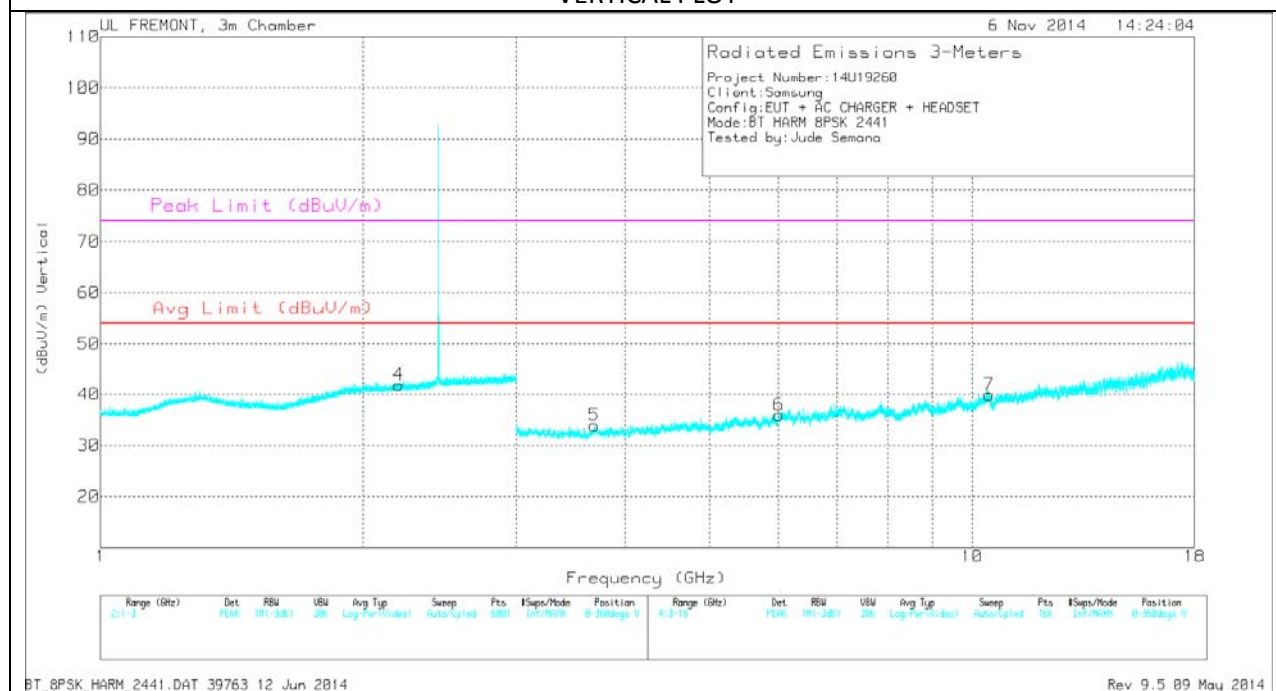
PK - Peak detector

SPURIOUS (MID CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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

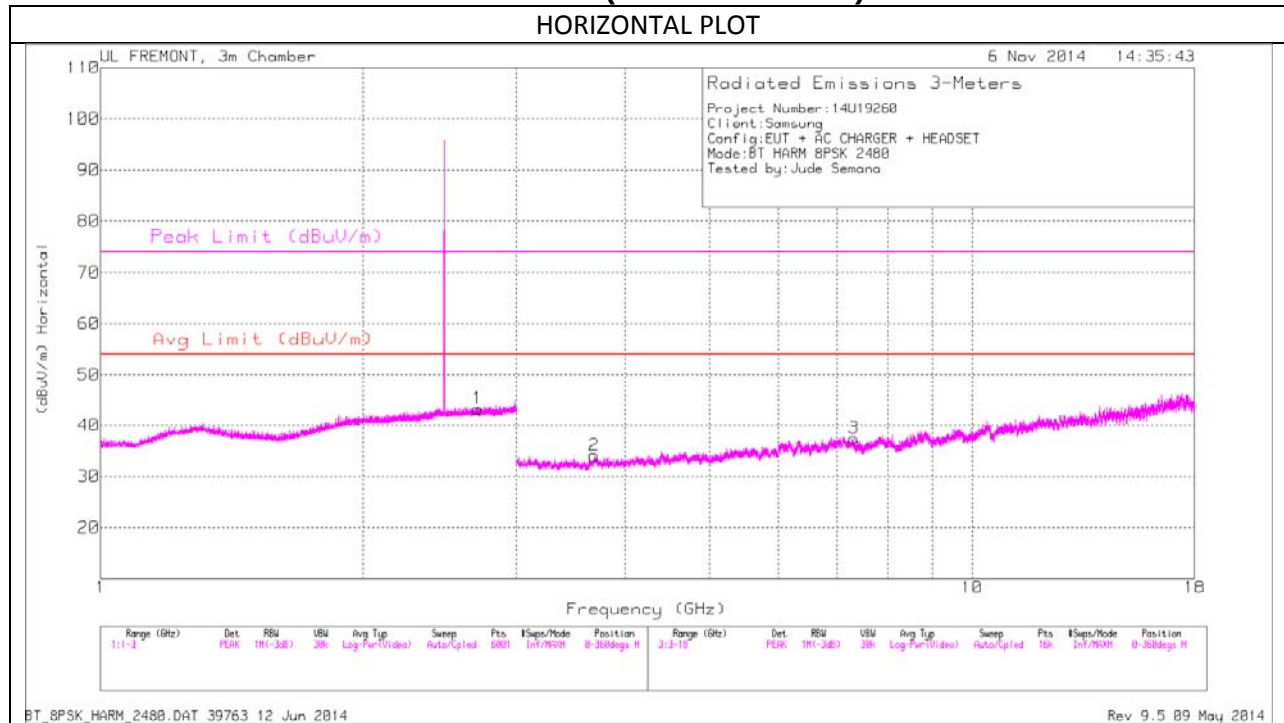
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	2.199	33	PK	31.7	-22.9	41.8	-	-	-	-	0-360	100	V
1	2.897	33.21	PK	32.7	-22.7	43.21	-	-	74	-30.79	0-360	200	H
5	3.686	31.39	PK	33.2	-30.7	33.89	-	-	74	-40.11	0-360	200	V
2	4.405	31.22	PK	33.7	-30.2	34.72	-	-	-	-	0-360	200	H
6	6.004	30.9	PK	35.3	-30.3	35.9	-	-	-	-	0-360	100	V
3	7.296	31.29	PK	35.6	-28.8	38.09	-	-	74	-35.91	0-360	200	H
7	10.465	27.35	PK	37.5	-25	39.85	-	-	-	-	0-360	100	V

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

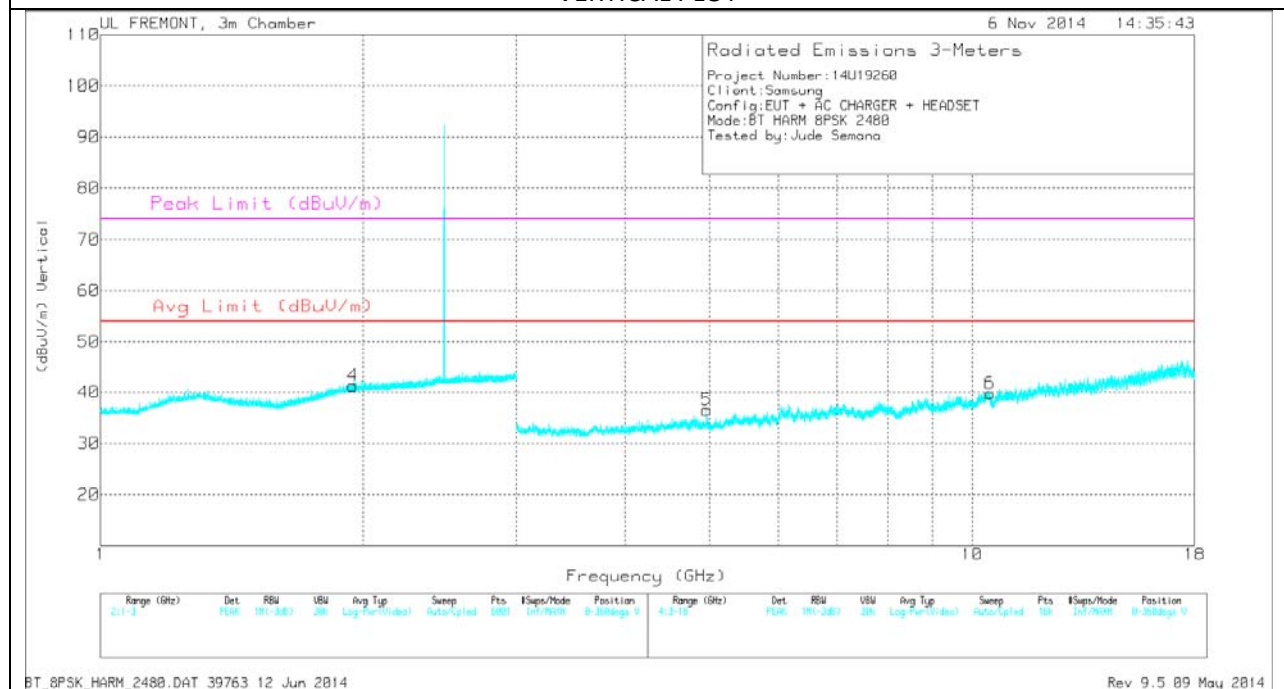
PK - Peak detector

SPURIOUS (HIGH CHANNEL)

HORIZONTAL PLOT



VERTICAL PLOT



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

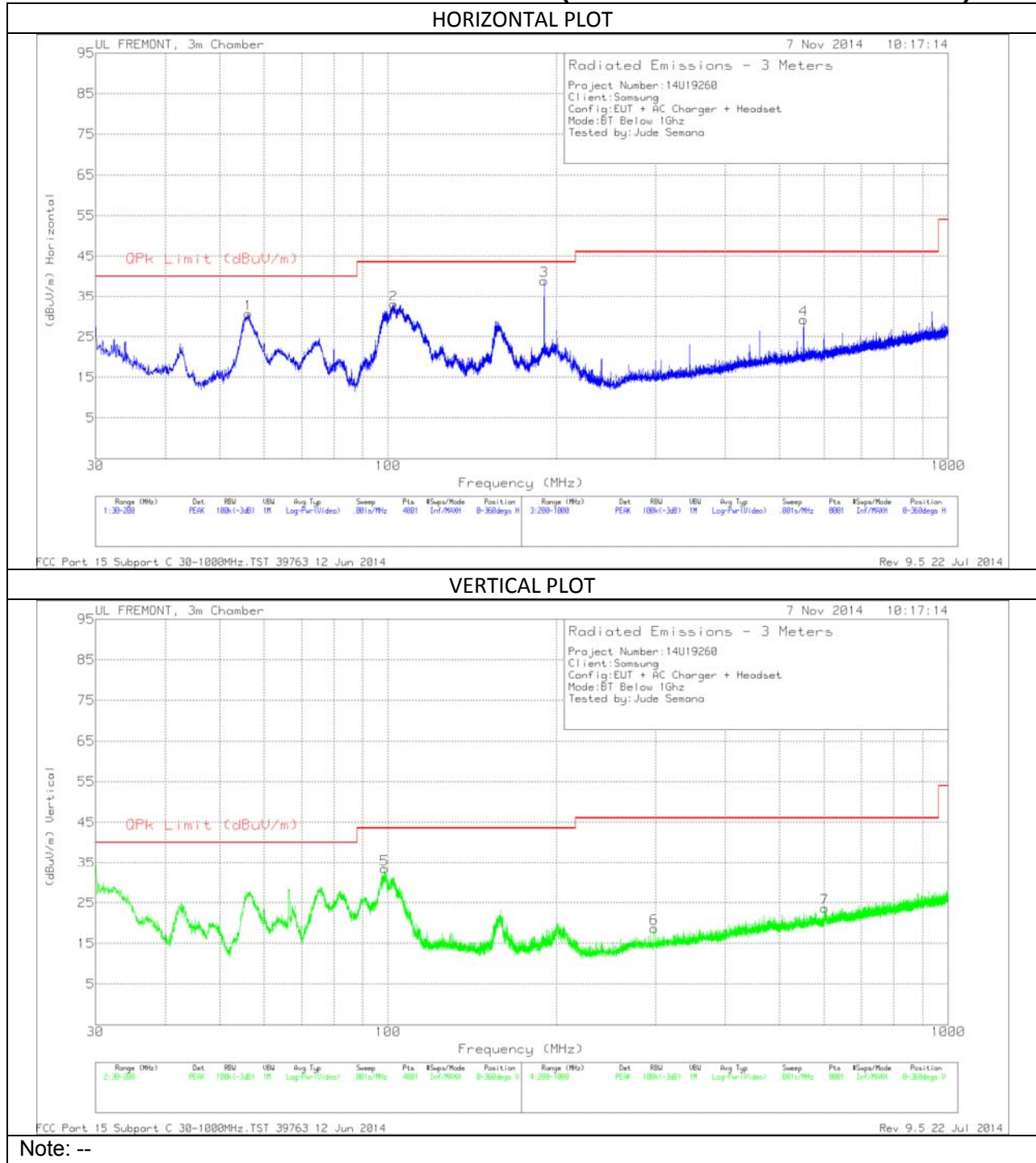
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.948	33.11	PK	31.4	-23.3	41.21	-	-	-	-	0-360	200	V
1	2.71	33.38	PK	32.6	-22.8	43.18	-	-	74	-30.82	0-360	100	H
2	3.685	31.55	PK	33.2	-30.7	34.05	-	-	74	-39.95	0-360	200	H
5	4.96	33.52	PK	34	-31	36.52	-	-	74	-37.48	0-360	200	V
3	7.321	30.27	PK	35.6	-28.4	37.47	-	-	74	-36.53	0-360	200	H
6	10.479	27.48	PK	37.5	-25.2	39.78	-	-	-	-	0-360	100	V

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

PK - Peak detector

9.2. TRANSMITTER BELOW 1 GHz

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



BELOW 1 GHz TABLE

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	56.3075	51.04	PK	6.8	-27.2	30.64	40	-9.36	0-360	400	H
5	98.5525	50.72	PK	9.5	-26.8	33.42	43.52	-10.1	0-360	100	V
2	102.2075	49.33	PK	10.5	-26.8	33.03	43.52	-10.49	0-360	200	H
3	189.885	53.85	PK	11	-25.9	38.95	43.52	-4.57	0-360	200	H
6	298.3	30.61	PK	13.3	-25.2	18.71	46.02	-27.31	0-360	200	V
4	552	36.9	PK	18.1	-25.8	29.2	46.02	-16.82	0-360	200	H
7	602.3	30.92	PK	18.4	-25.6	23.72	46.02	-22.3	0-360	100	V

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

PK - Peak detector

Note: --

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS AND PROCEDURE

LIMITS

FCC §15.207 (a)

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4-2009.

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

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

RESULTS

6 WORST EMISSIONS

