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

CERTIFICATION TEST REPORT

FOR

eTAG

MODEL NUMBER: eTag250W, eTag150W, eTag250WELT

FCC ID: W22-ETAG
IC: 9005A-ETAG

REPORT NUMBER: 14U19217-E1-REVISION A

ISSUE DATE: NOVEMBER 24, 2014

Prepared for
ALTIERRE INC.
1980 CONCOURSE DR.
SAN JOSE, CA 96131

Prepared by
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*Models differences are explained in the body of this report

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/24/14	Initial Issue	C.S.OOI
A	1/16/15	Updated FCC/IC ID to all capital letters	C.S.OOI

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ALTIERRE INC.
1980 CONCOURSE DR.
SAN JOSE, CA 96131

EUT DESCRIPTION: RFID eTAG

MODEL: eTag250W, eTag150W, etag250WELT

SERIAL NUMBER: eTag250W A (Radiated) eTag250W B (conducted)

DATE TESTED: NOVEMBER 05 to 07, 2014

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

*Models differences are explained in the body of this report

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:

CHOON SIAN OOI
Project Lead
UL Verification Services Inc.

Tested By:

JOSEPH GOMEZ
WiSE Engineer
UL Verification Services Inc.

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.

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

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

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an eTAG.

5.2. DESCRIPTION OF MODEL DIFFERENCES

Model eTag250W: Base model with transmitter

Model eTag150W: The RF layout is identical but is shifted slightly to the right on the small tag board and the large charge storage cap has been moved from the left side of the board to the right. The receiver antenna has been bent around the corner of the PCB, on the small tag however the transmitter antenna is identical. The overall size of the plastic housing for the small is 53x39.7x16.9mm

Model eTag250WELT: The RF layout and PCB size is identical to the eTag250W. This model uses batteries optimized for operation an cold temperatures. The display has been made with cold resistant material and the display crystals have been screened for temperature range.

5.3. 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	GFSK	-0.17	0.96

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of 0 dBi.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was ATD Utilities.

The test utility software used during testing was CC4 tag GUI.vi, rev. 1.0.0.86.

5.6. WORST-CASE CONFIGURATION AND MODE

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

Full testing was performed with the base model: eTag250W. Radiated test spot check was performed with model: eTag150W and model eTag250WELT.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	ThinkPad T Series	1S889202UL3A7996	N/A
AC Adapter	Lenovo	92P1156	11s92P1156Z1ZDX181E2P8	N/A
DC Power Supply	Kenwood	PA36-3A	PA36-3A	N/A
POE Power Injector	SMC	SMCPWR-INJ3	T17420031	N/A
Pocure Ethernet Switch	HP	(1400-8G) J907A	2460000084400A	N/A
AC Adapter	Delta Electronics	EADP-15DB	F2T0737105911	N/A
Access Point	Altierre	AAP400	0050C2C0C541	N/A
Tag Labeling Dock	Altierre	ATD100	ATD7777	N/A

I/O CABLES

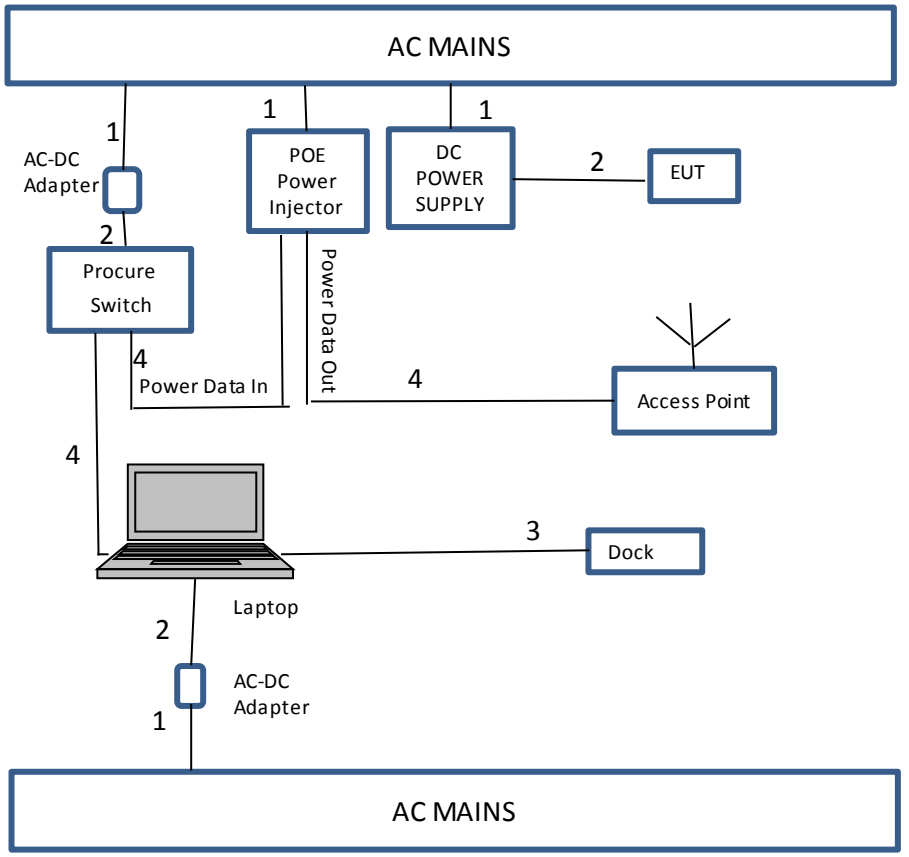
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC Power	4	US Type	Shielded	1m	Detachable
2	DC Power	3	Round	Shielded	1.9m	Non-detachable .
3	USB	1	USB	CM (shielded)	1.8m	N/A
4	Ethernet	3	RJ45	CAT5eUTP	1m	N/A
5	POE	1	RJ45	CAT5eUTP	1m	N/A

TEST SETUP

Radio of the EUT was set to operate before testing, as shown in setup diagram for test, test software was used to set the parameters of the radio of the device; and then EUT was removed from the dock. EUT was stand-alone during testing.

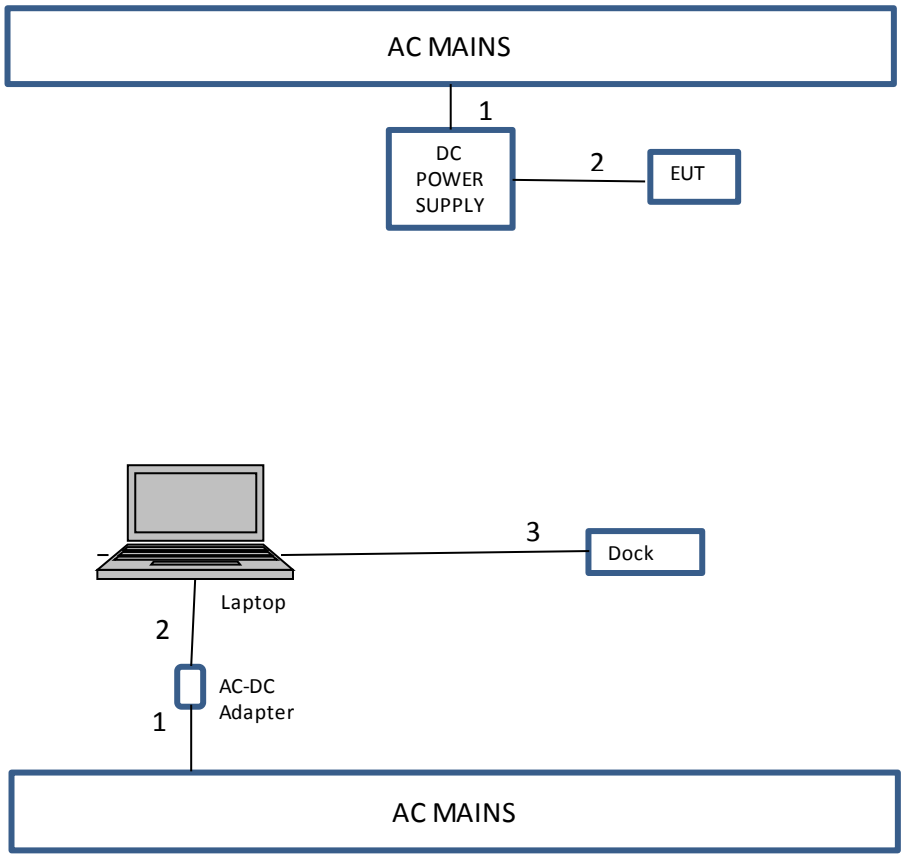
SETUP DIAGRAM FOR CONDUCTED TESTS

Radio of EUT was set to operate before testing, as below; then EUT was removed from the dock. EUT was stand-alone during testing.



SETUP DIAGRAM FOR RADIATED TESTS

Radio of EUT was set to operate before testing, as below; then EUT was removed from the dock. EUT was stand-alone during testing.



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**	**T No.**	**Cal Date**	**Cal Due**
PXA Spectrum Analyzer	Agilent	N9030A	908	09/05/14	09/05/15
PXA Spectrum Analyzer	Agilent	N9030A	817	03/21/14	03/21/15
Horn Antenna 1-18GHz	ETS	3117	136	02/28/14	02/28/15
Hybrid Antenna 30-1000MHz	Sunol Sciences	JB1	130	09/10/14	09/10/15
Preamp Below 1GHz	Sonoma	310	300	11/01/14	11/01/15
Preamp 1-18GHz	Miteq	AFS42-00101800-25S-42	492	08/19/14	08/19/15
3GHz High Pass Filter	Micro-Tronics	HPM17543	486	01/11/14	01/11/15
Spectrum Analyzer 9kHz-40GHz	HP	8564E	106	08/06/14	08/06/15
Horn Antenna 18-26GHz	ARA	MWH-1826	89	11/26/14	11/26/15
Preamp 1-26.5GHz	Agilent	8449B	404	03/25/14	03/25/15
PXA Spectrum Analyzer	Agilent	N9030A	339	12/10/13	12/10/14
Power Meter	Agilent	N1911A	379	10/03/14	10/03/15
Power Sensor	Agilent	E9323A	396	05/02/14	05/02/15
Thermo Chamber	Thermotron	SE 600-10-10	80	06/30/14	06/30/15

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

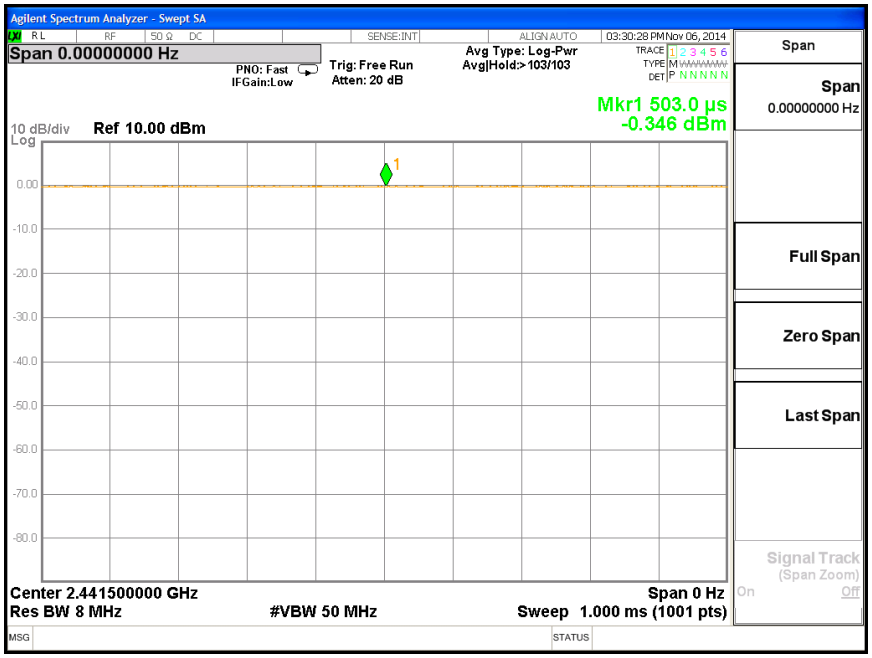
7.2. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4 GHz band (Hopping OFF)						
GFSK	0.503	0.503	1.000	100.00%	0.00	0.010

7.3. DUTY CYCLE PLOTS

HOPPING OFF

DUTY CYCLE GFSK MODE



7.4. BASIC DATA RATE GFSK MODULATION

7.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

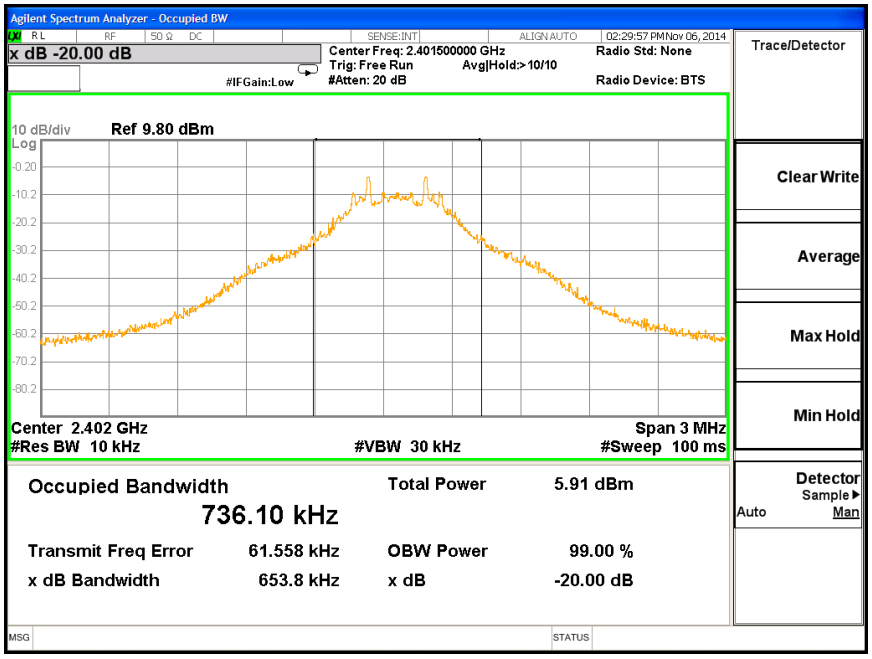
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

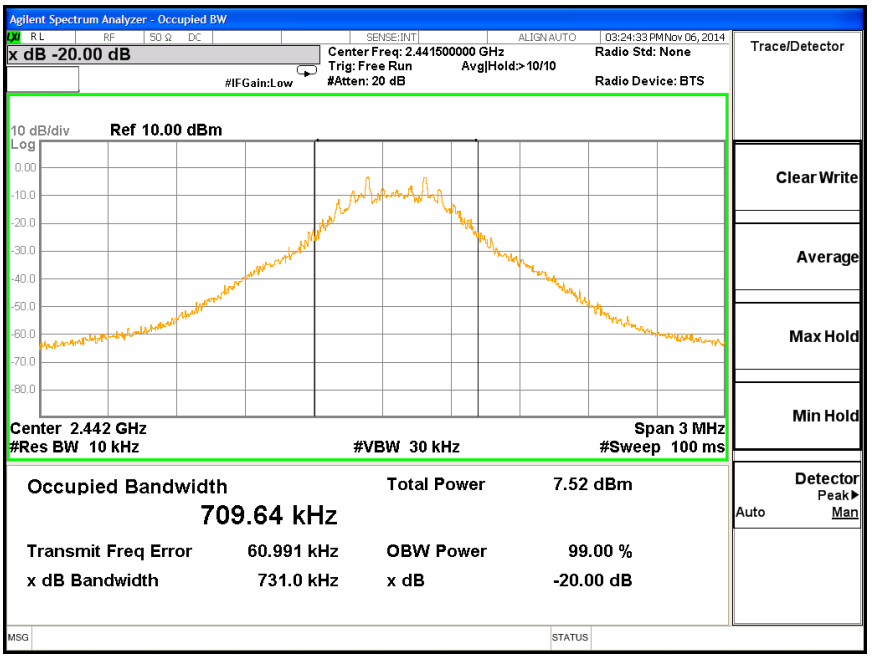
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2401.5	736.10	670.52
Middle	2441.5	709.64	563.24
High	2479.5	676.09	639.15

20 dB BANDWIDTH

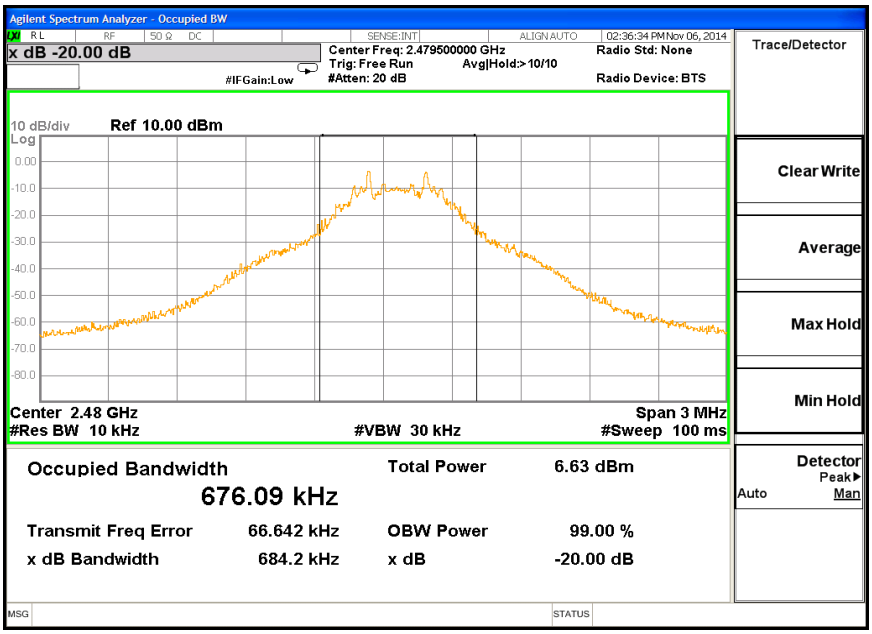
BANDWIDTH LOW CH



BANDWIDTH MID CH

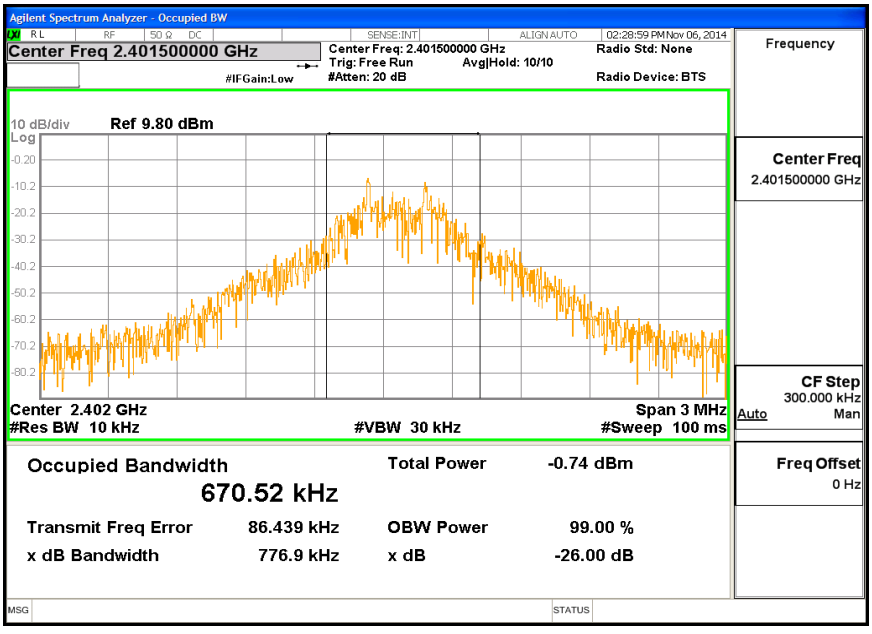


BANDWIDTH HIGH CH

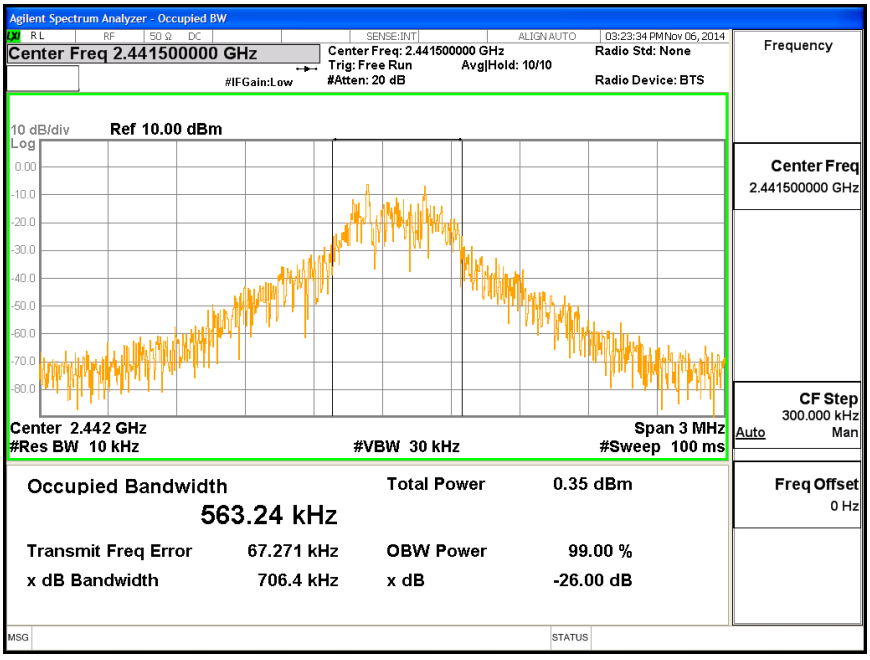


99% BANDWIDTH

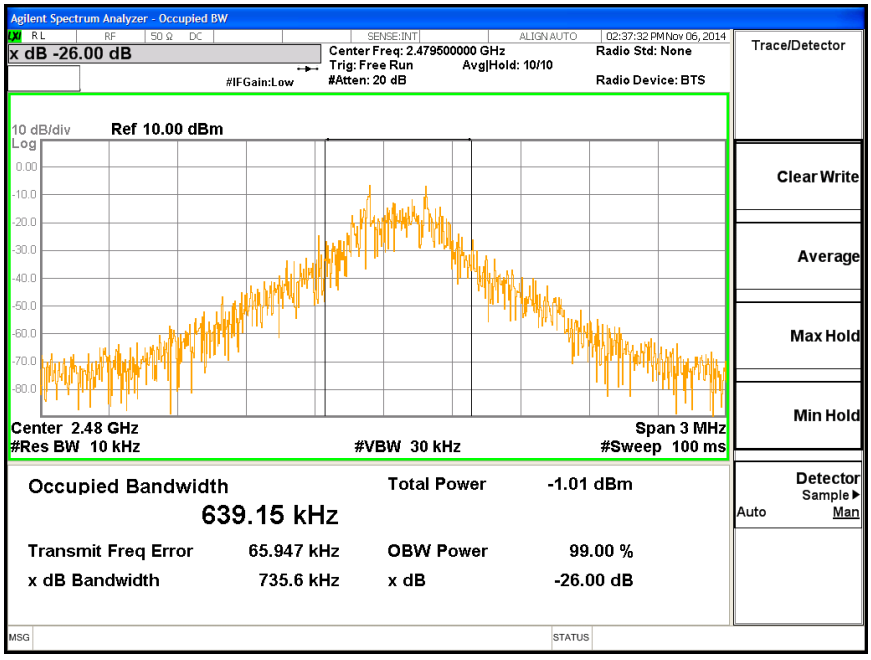
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.4.2. 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.

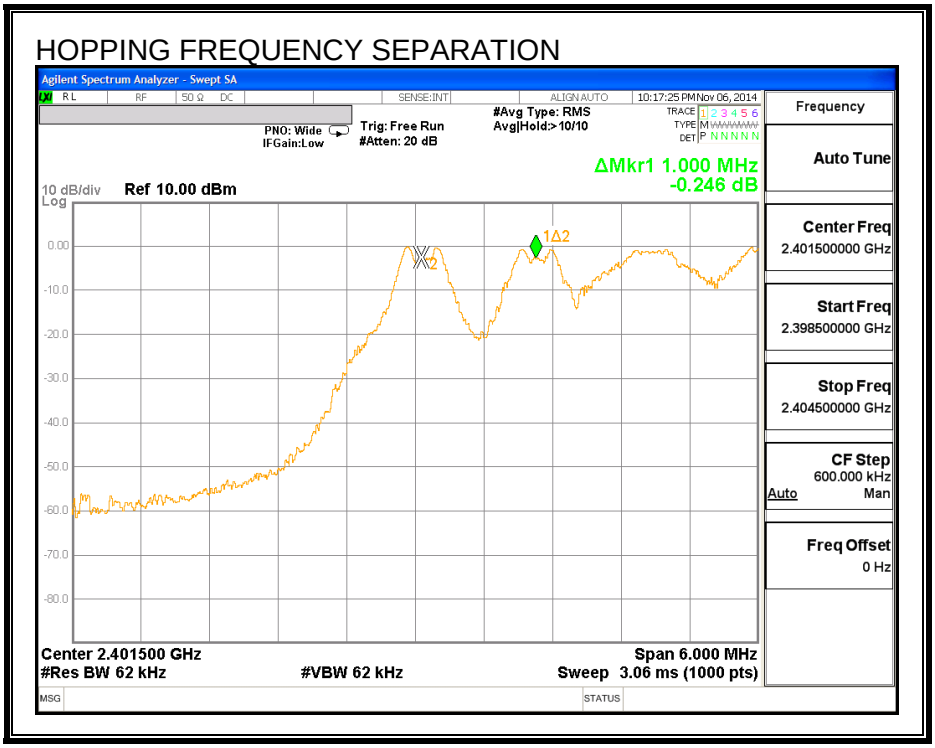
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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



7.4.3. 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

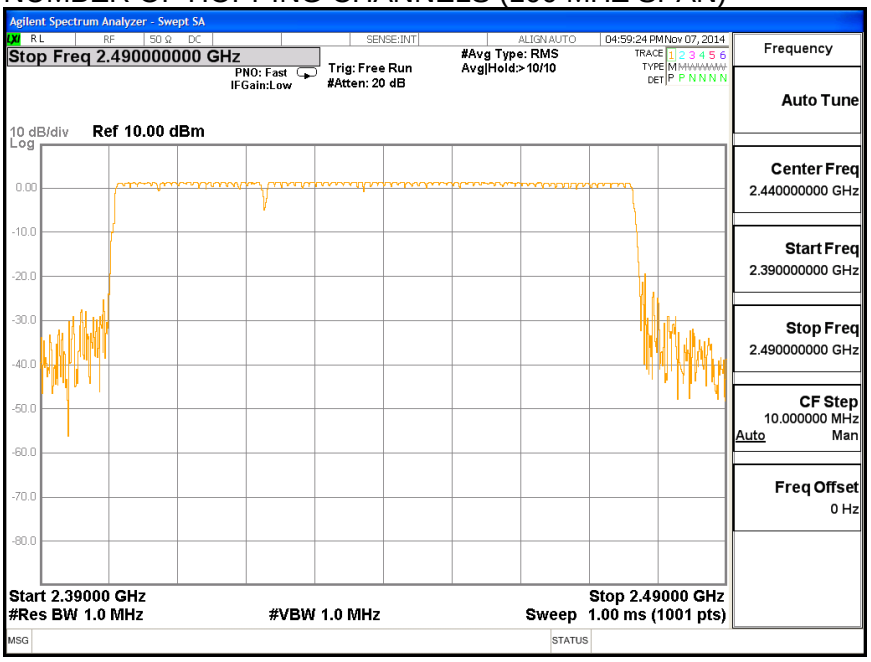
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

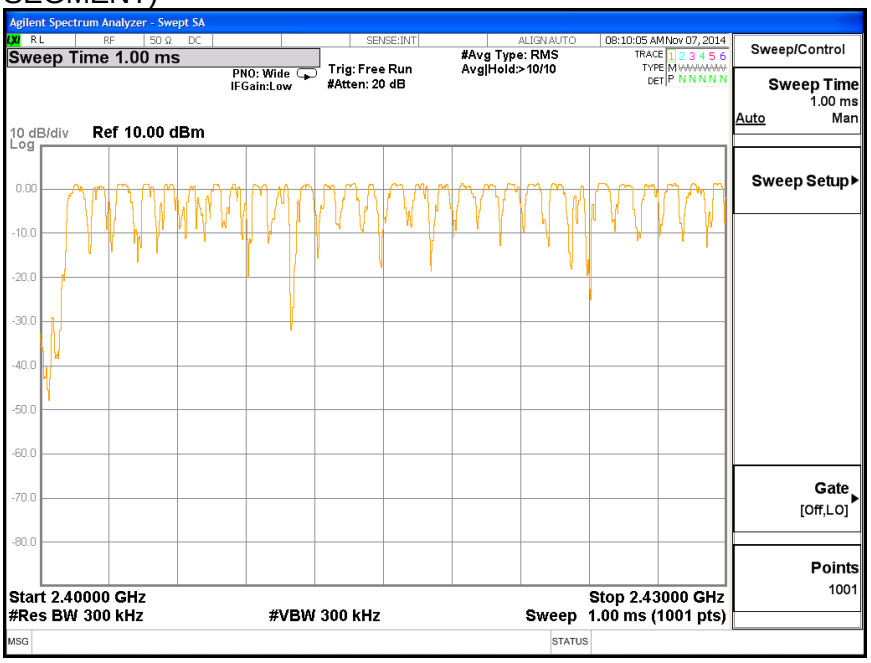
Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS

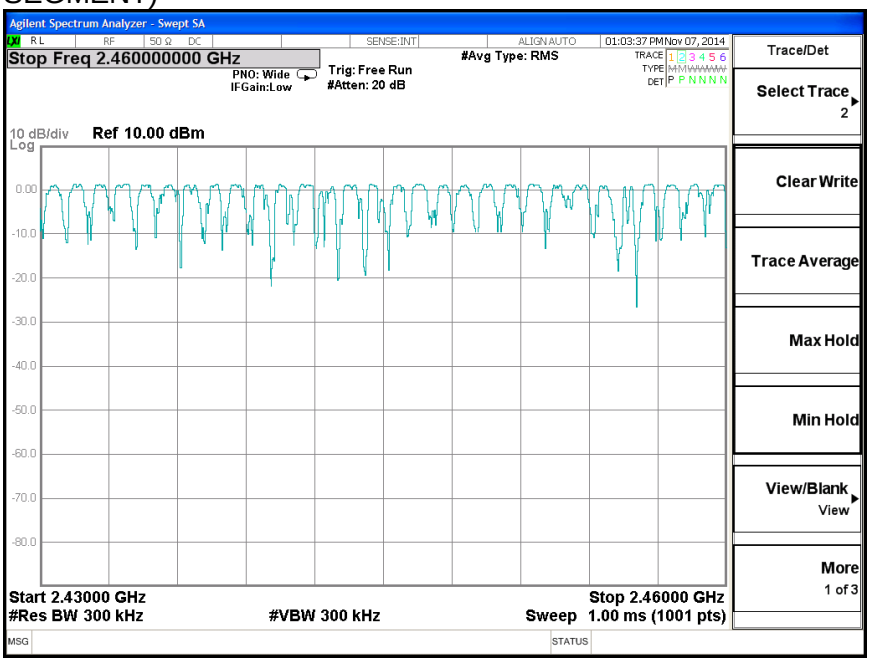
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



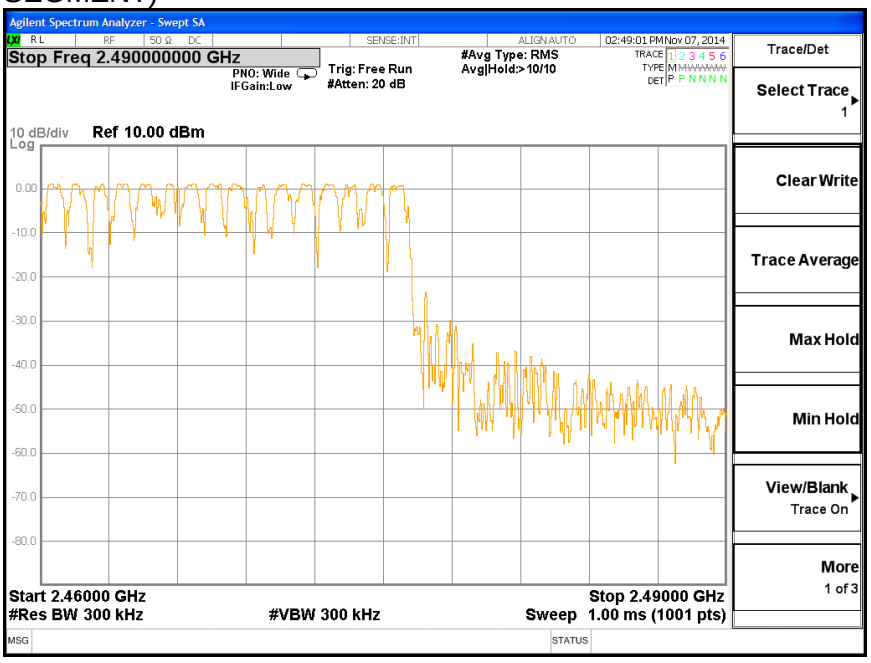
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.4.4. 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.

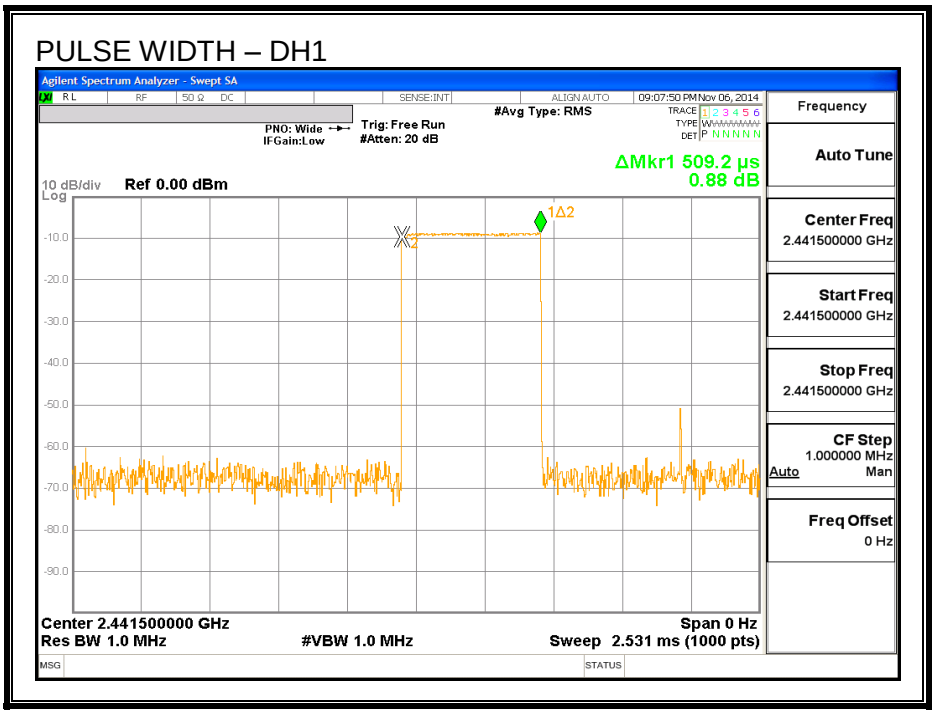
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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.

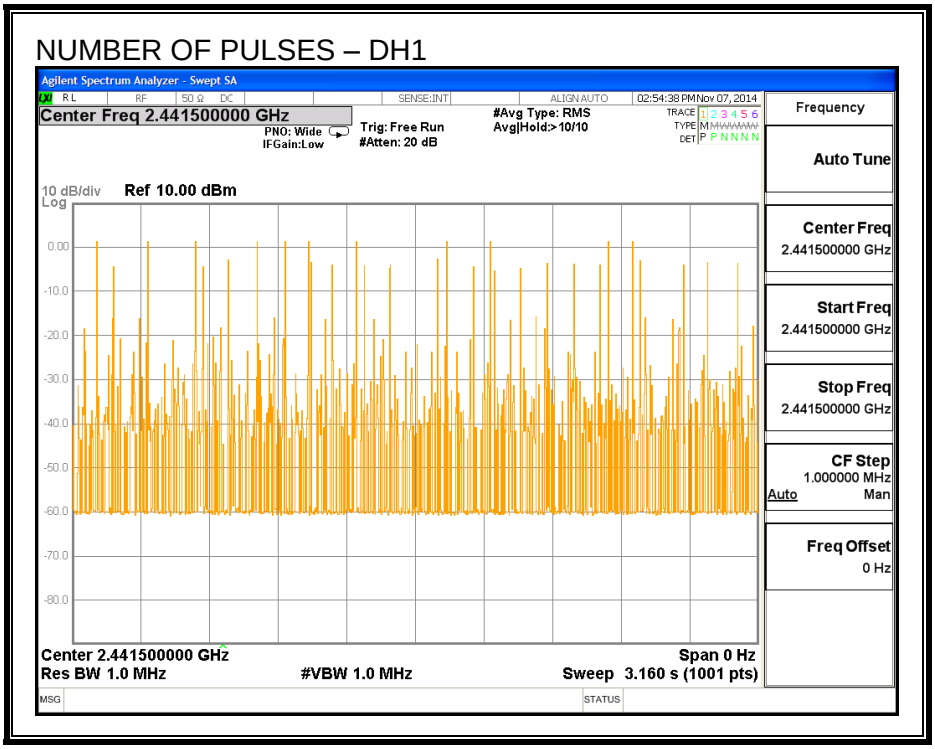
RESULTS

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	0.5092	29	0.148	0.4	-0.252
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.5092	7.25	0.037	0.4	-0.363

PULSE WIDTH - DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



7.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-210 Clause A8.4 (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

TEST PROCEDURE

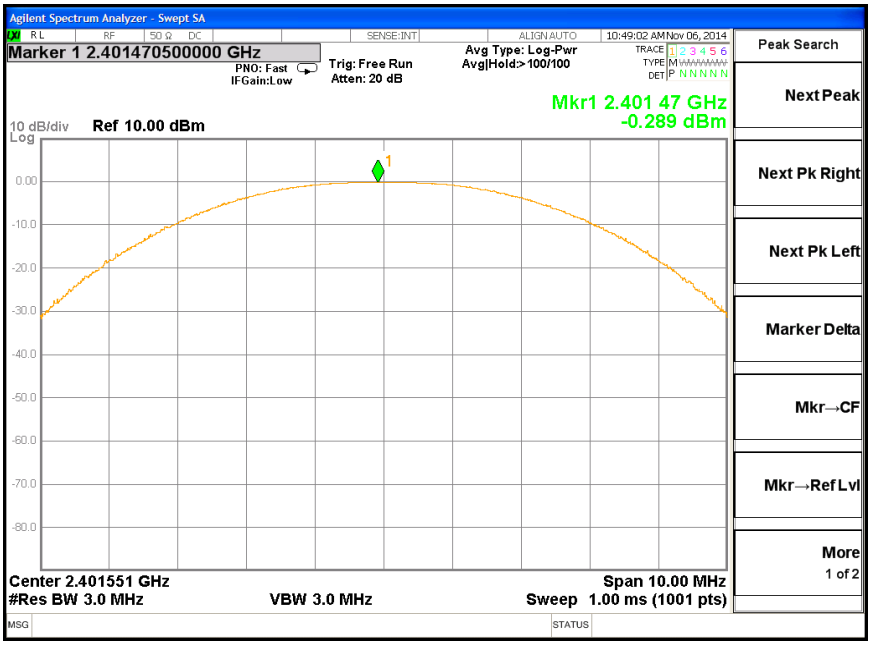
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

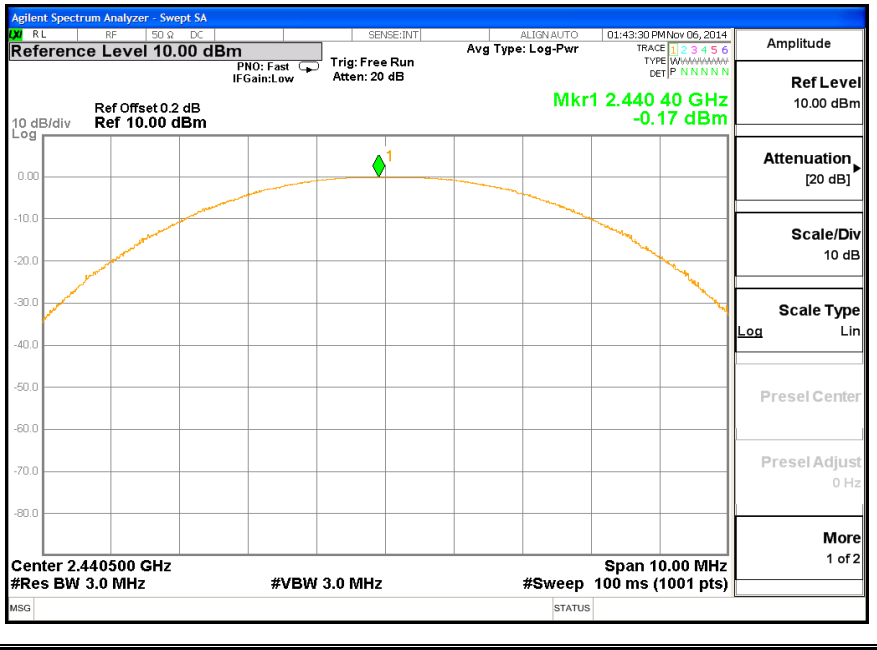
Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dBm)	Margin (dB)
Low	2401.5	-0.289	0.00	21	-21.29
Middle	2441.5	-0.170	0.00	21	-21.17
High	2479.5	-0.617	0.00	21	-21.62

OUTPUT POWER

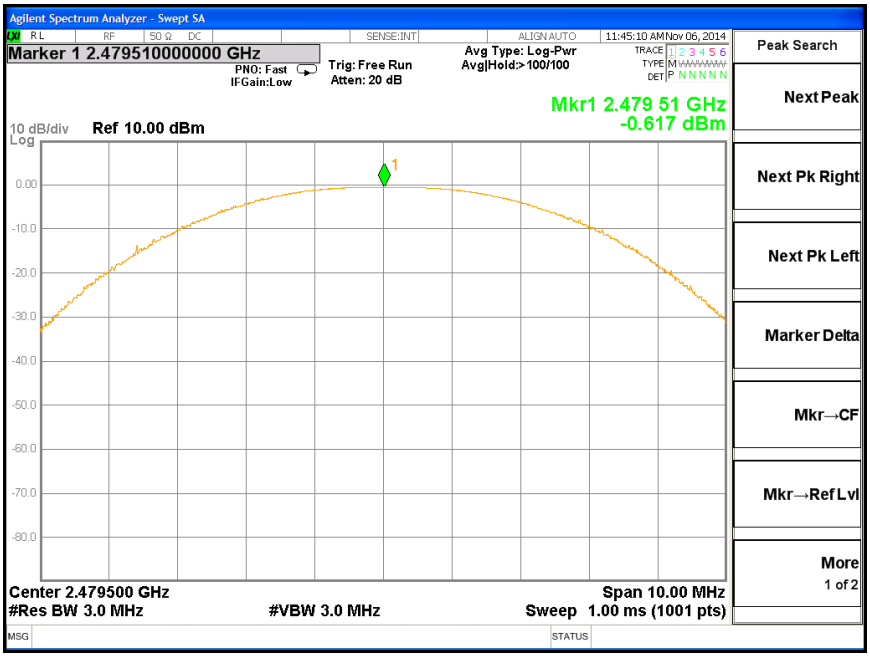
PEAK POWER LOW CH



PEAK POWER MID CH



PEAK POWER HIGH CH



7.4.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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.

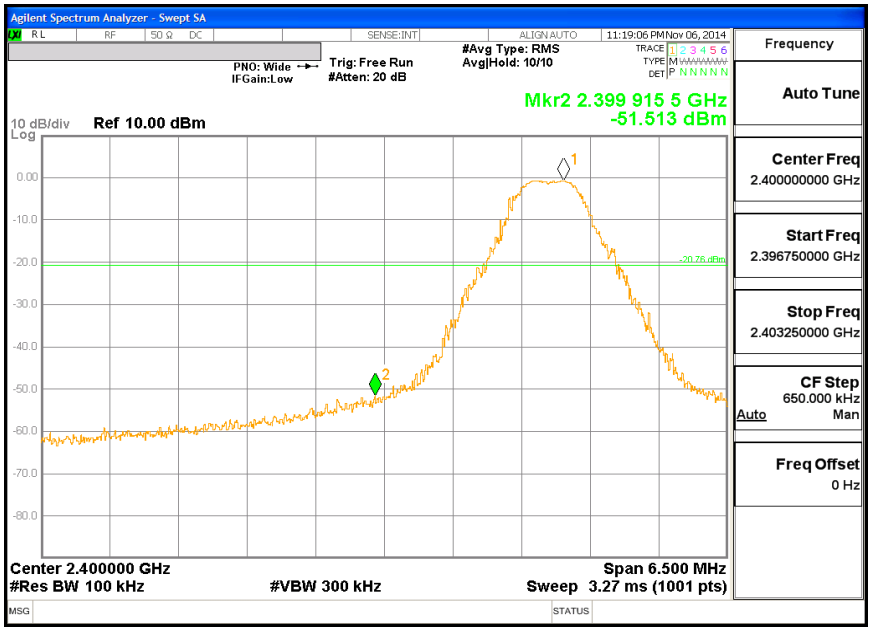
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

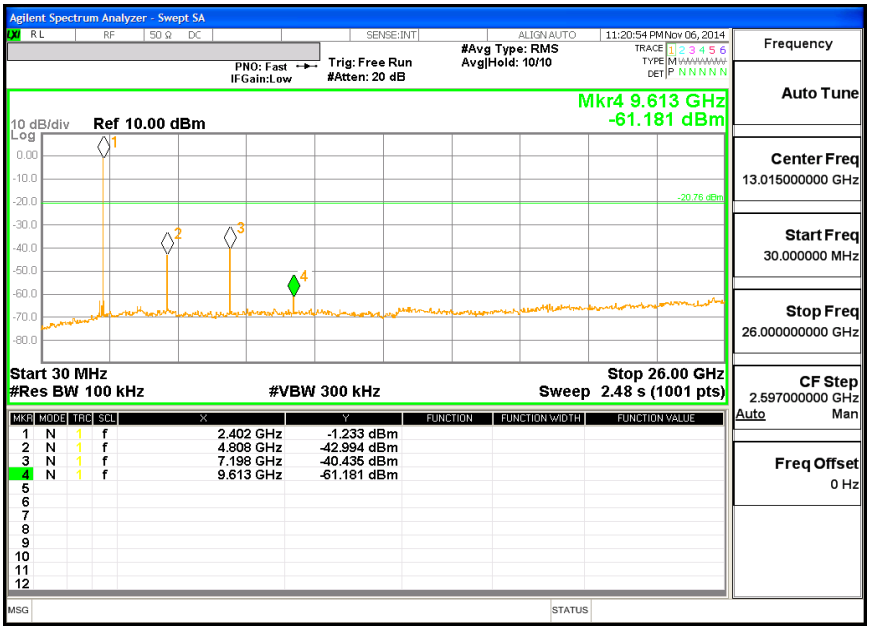
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE

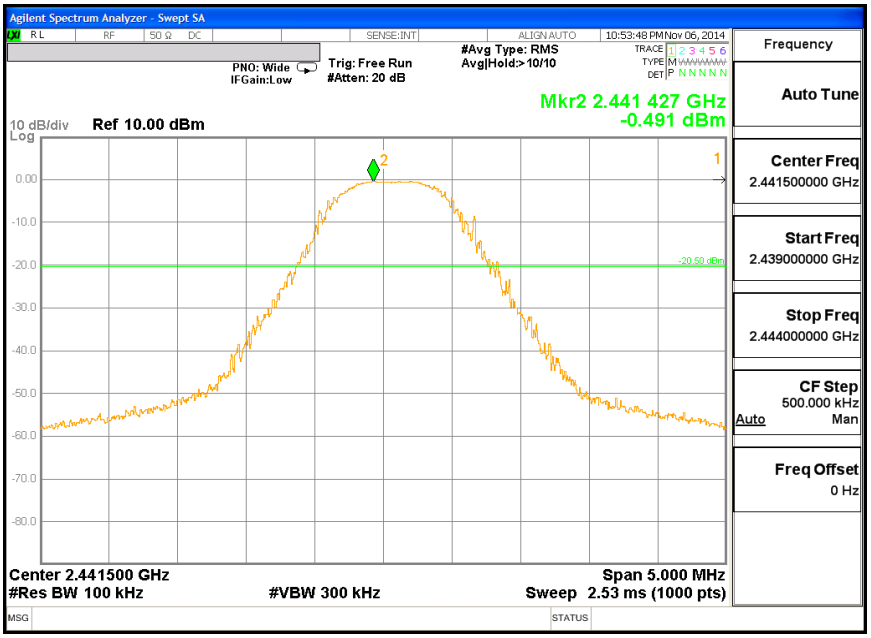


LOW CHANNEL SPURIOUS

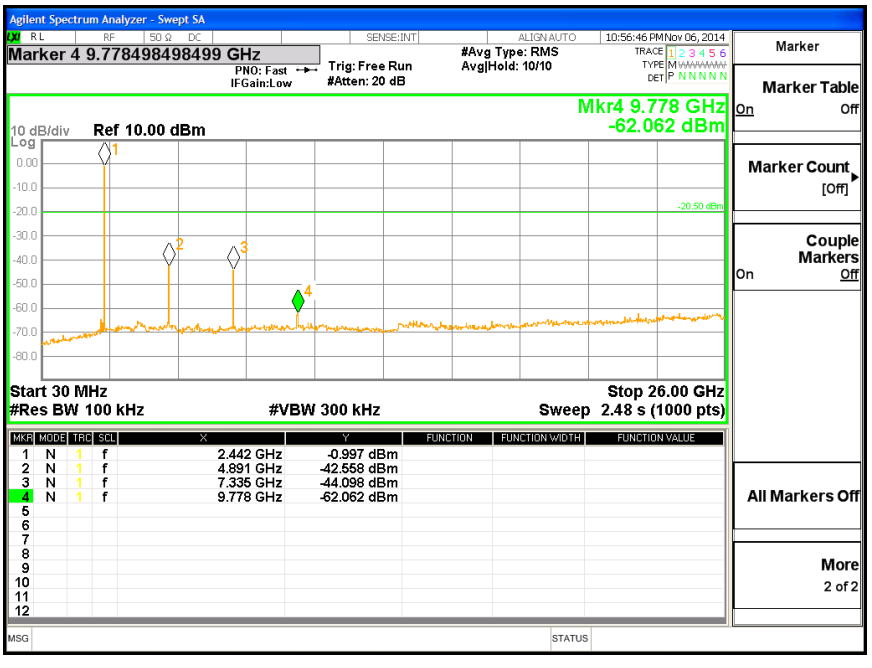


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

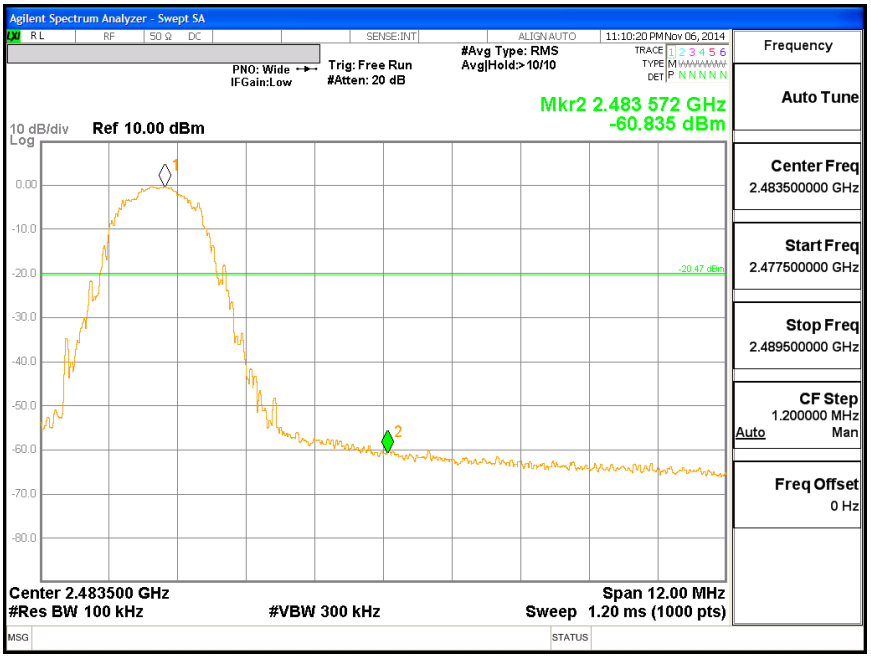


MID CHANNEL SPURIOUS

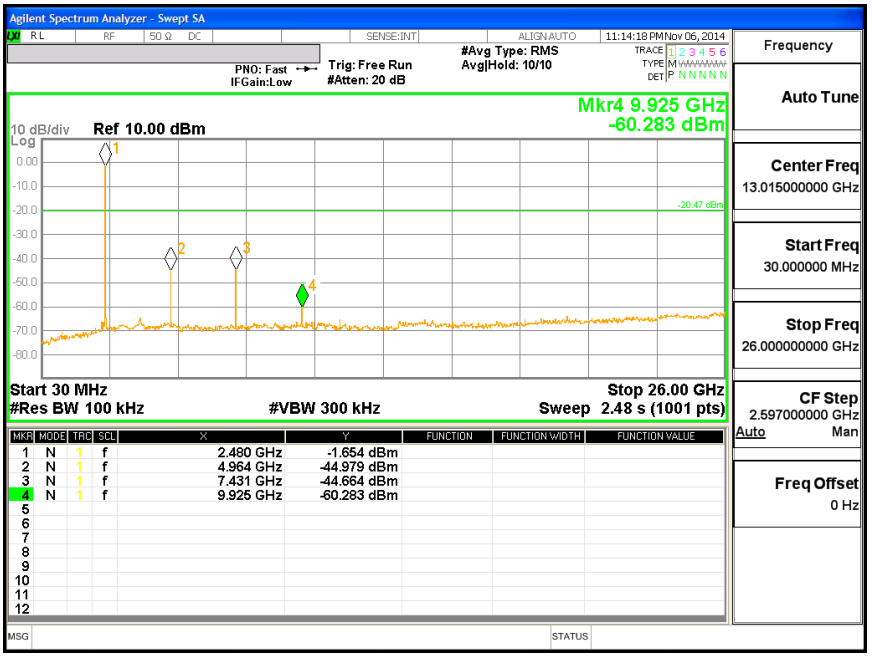


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE

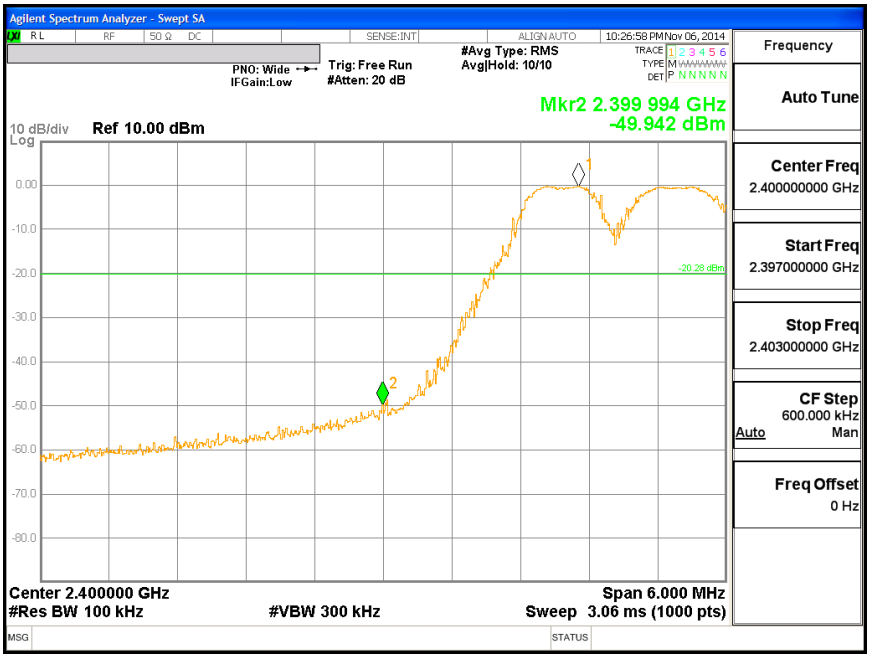


HIGH CHANNEL SPURIOUS

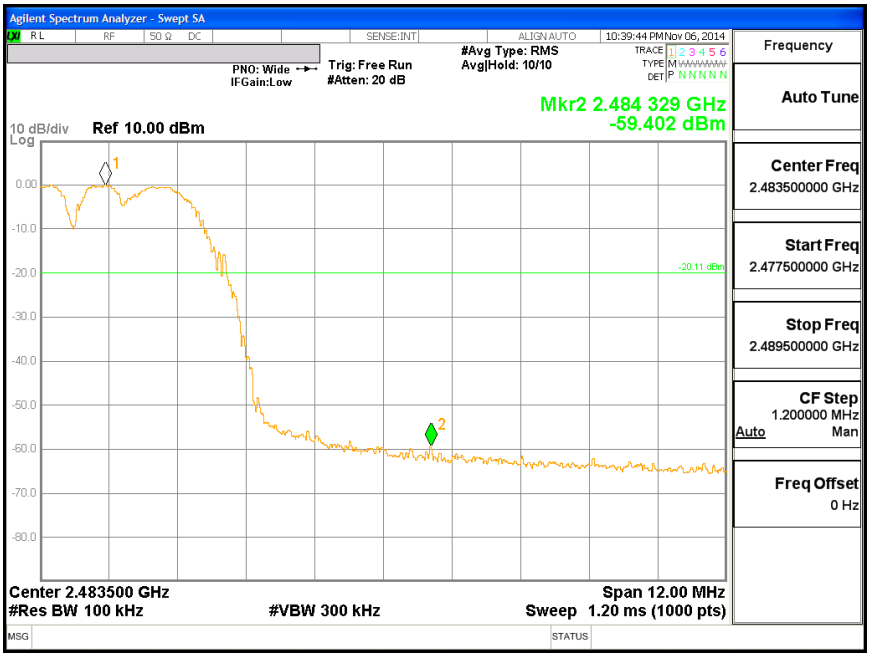


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE 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)

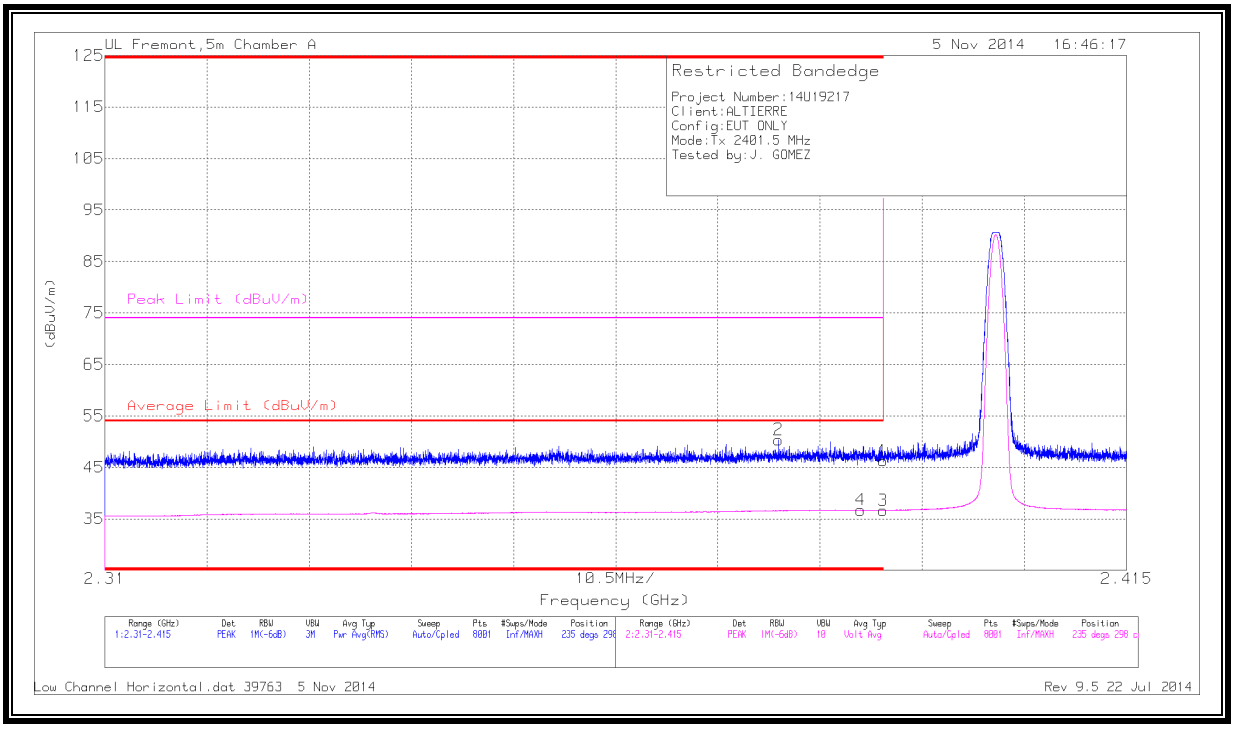
IC RSS-GEN Clause 6 (Receiver)

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

8.1. TRANSMITTER ABOVE 1 GHz

8.1.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



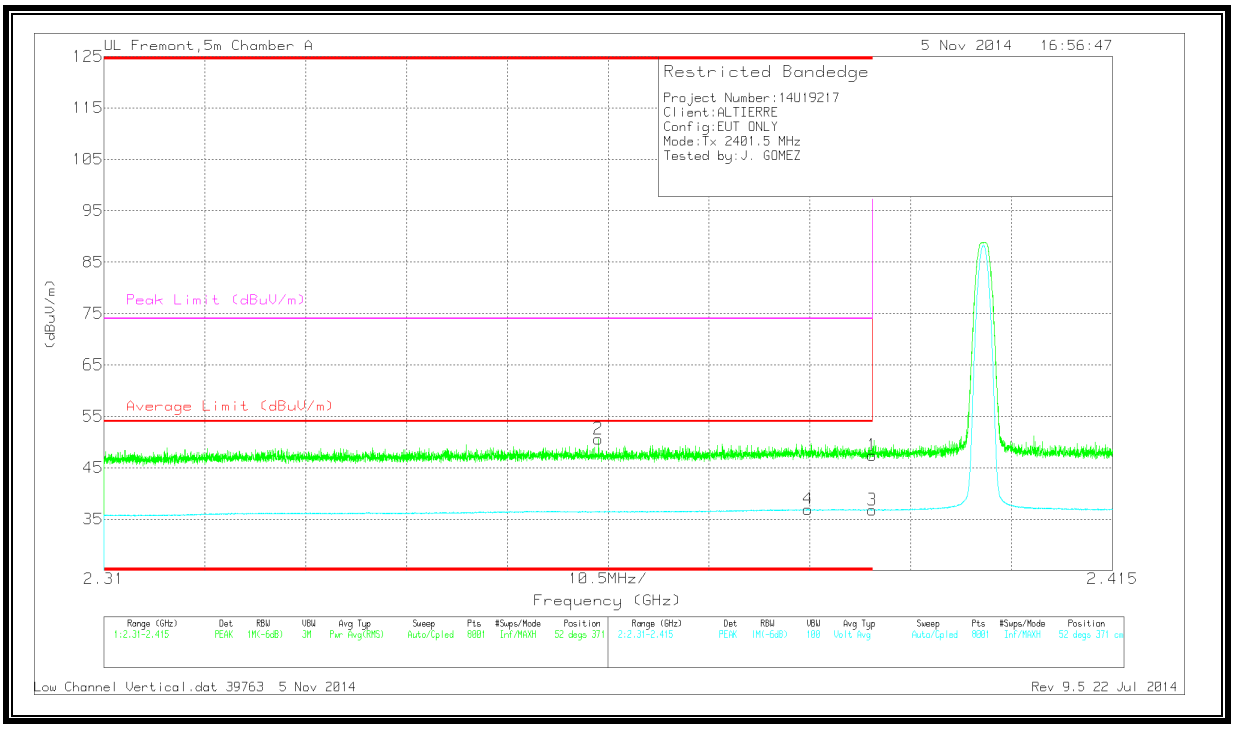
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.18	PK	32.2	-24.1	46.28	-	-	74	-27.72	235	298	H
2	* 2.379	42.26	PK	32.1	-24	50.36	-	-	74	-23.64	235	298	H
3	* 2.39	28.55	VB1T	32.2	-24.1	36.65	54	-17.35	-	-	235	298	H
4	* 2.388	28.52	VB1T	32.2	-24	36.72	54	-17.28	-	-	235	298	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)



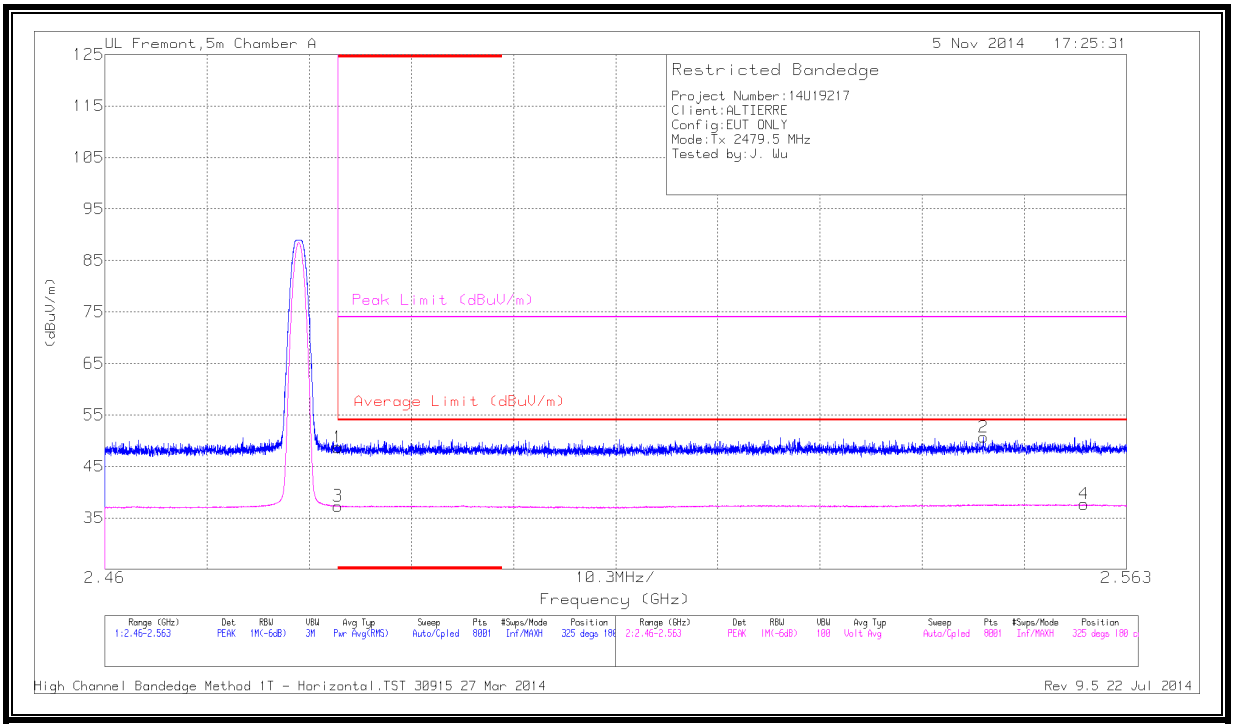
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.34	PK	32.2	-24.1	47.44	-	-	74	-26.56	52	371	V
2	* 2.361	42.71	PK	32	-24.1	50.61	-	-	74	-23.39	52	371	V
3	* 2.39	28.68	VB1T	32.2	-24.1	36.78	54	-17.22	-	-	52	371	V
4	* 2.383	28.75	VB1T	32.2	-24	36.95	54	-17.05	-	-	52	371	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

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



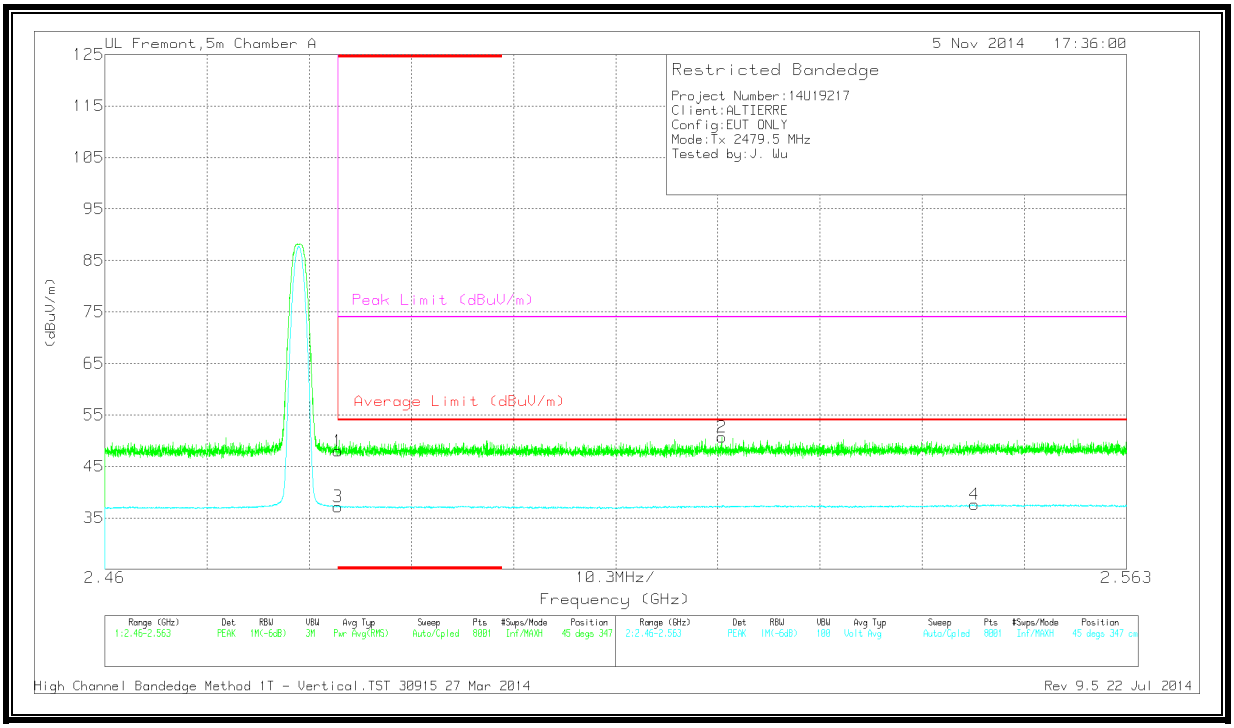
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.2	PK	32.7	-24.2	48.7	-	-	74	-25.3	325	180	H
3	* 2.484	28.79	VB1T	32.7	-24.2	37.29	54	-16.71	-	-	325	180	H
2	2.549	41.67	PK	32.9	-23.9	50.67	-	-	74	-23.33	325	180	H
4	2.559	28.59	VB1T	32.9	-23.8	37.69	54	-16.31	-	-	325	180	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 (HIGH CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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	39.5	PK	32.7	-24.2	48	-	-	74	-26	45	347	V
3	* 2.484	28.66	VB1T	32.7	-24.2	37.16	54	-16.84	-	-	45	347	V
2	2.522	41.88	PK	32.9	-24.1	50.68	-	-	74	-23.32	45	347	V
4	2.548	28.5	VB1T	32.9	-23.8	37.6	54	-16.4	-	-	45	347	V

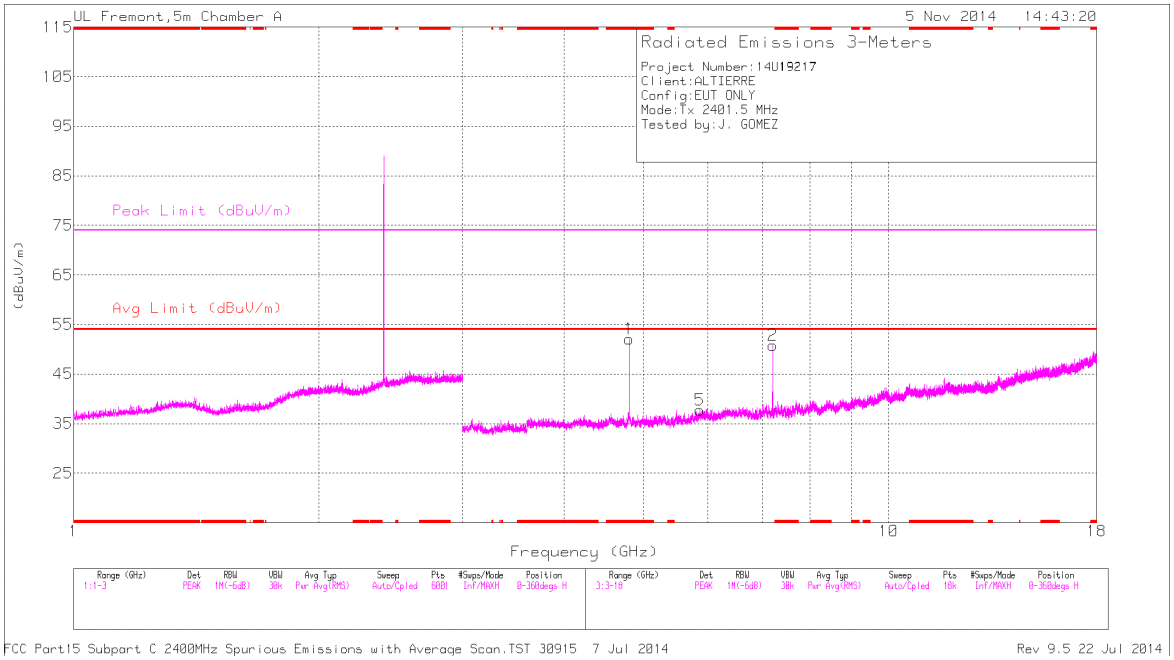
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

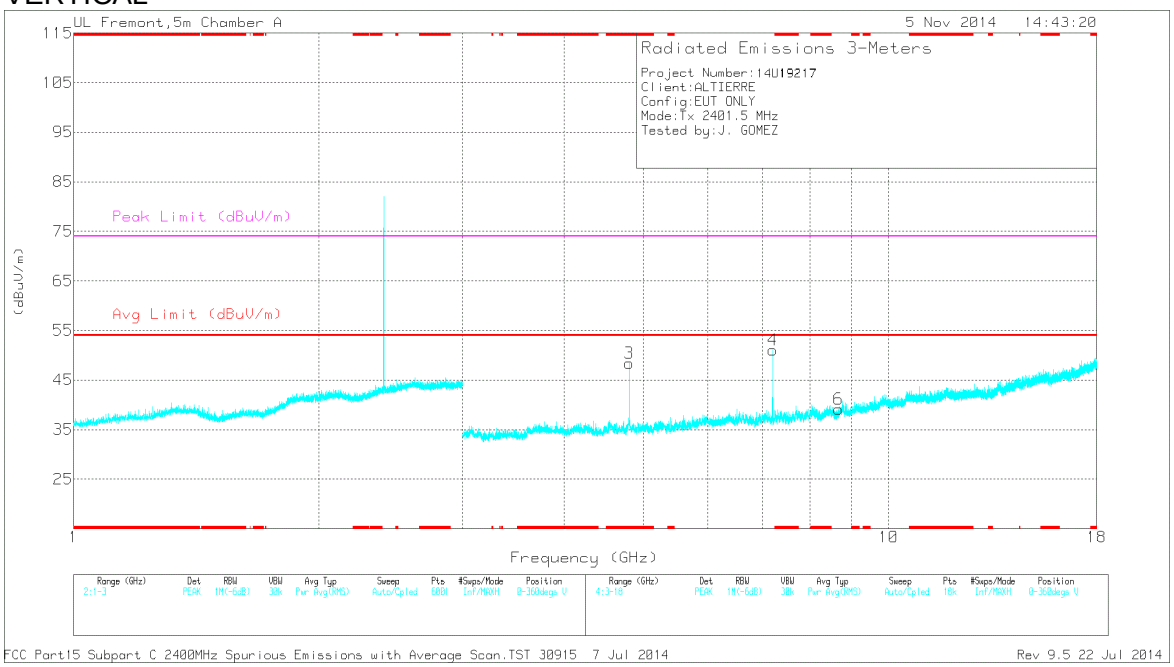
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HORIZONTAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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	* 4.803	50.32	PK3	34	-29.2	55.12	-	-	74	-18.88	213	225	H
	* 4.803	46.18	VB10	34	-29.2	50.98	54	-3.02	-	-	213	225	H
3	* 4.803	47.29	PK3	34	-29.2	52.09	-	-	74	-21.91	351	285	V
	* 4.803	42.56	VB10	34	-29.2	47.36	54	-6.64	-	-	351	285	V
5	5.862	31.16	PK	34.9	-28.3	37.76	-	-	-	-	0-360	201	H
2	7.205	42.71	PK	35.2	-27.1	50.81	-	-	-	-	0-360	201	H
4	7.205	42.97	PK	35.2	-27.1	51.07	-	-	-	-	0-360	201	V
6	8.681	28.65	PK	35.8	-25.3	39.15	-	-	-	-	0-360	100	V

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

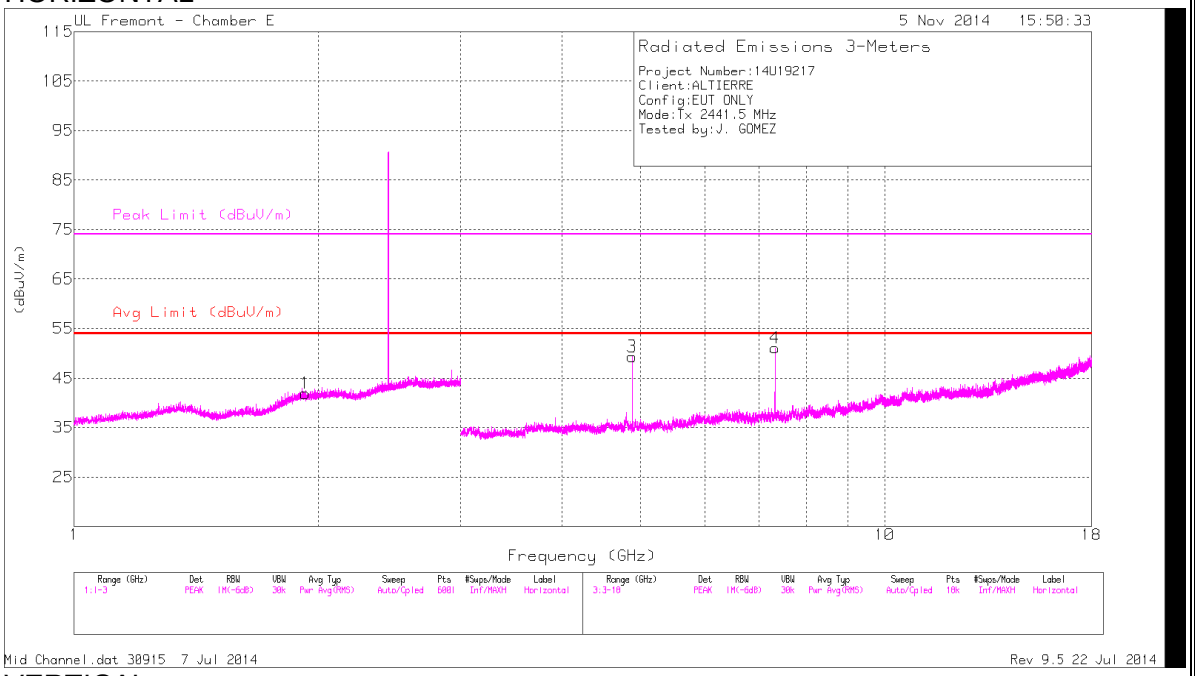
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

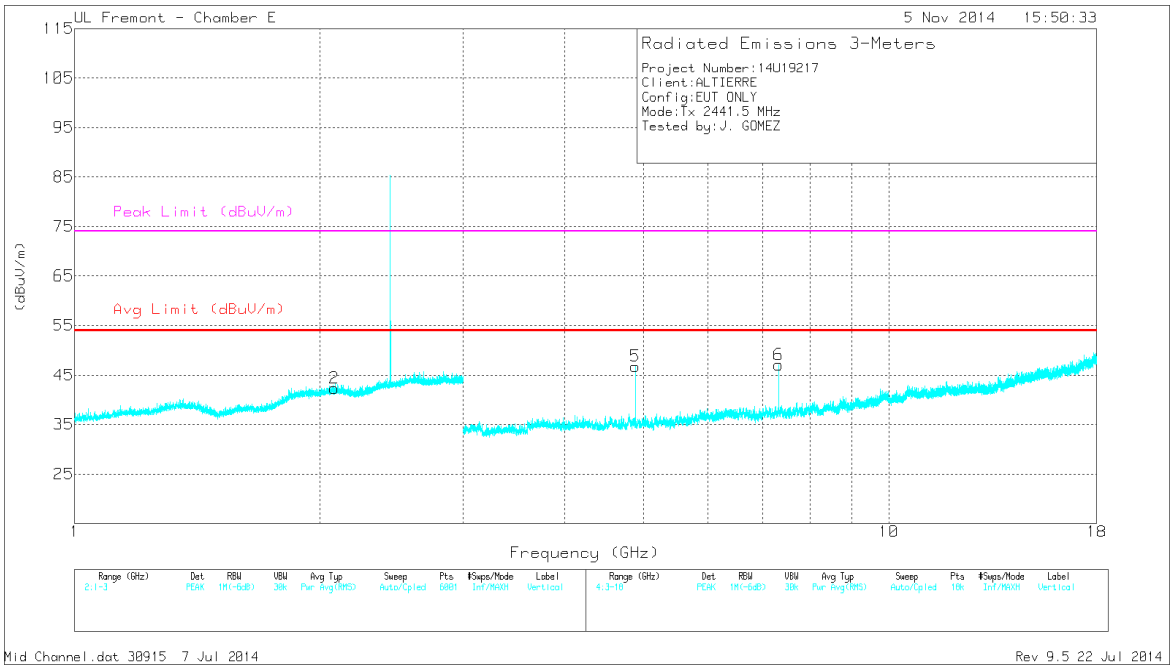
-Compliance for emissions in non-restricted bands shown in conducted out of band testing

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HORIZONTAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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
3	* 4.883	46.92	PK3	34	-28.7	52.22	-	-	74	-21.78	200	275	H
	* 4.883	43.4	VB10	34	-28.7	48.7	54	-5.3	-	-	200	275	H
4	* 7.325	45.76	PK3	35.2	-26	54.96	-	-	74	-19.04	272	102	H
	* 7.325	40.98	VB10	35.2	-26	50.18	54	-3.82	-	-	272	102	H
5	* 4.883	44.93	PK3	34	-28.7	50.23	-	-	74	-23.77	322	202	V
	* 4.883	39.63	VB10	34	-28.7	44.93	54	-9.07	-	-	322	202	V
6	* 7.324	45.47	PK3	35.2	-26	54.67	-	-	74	-19.33	188	390	V
	* 7.325	40.13	VB10	35.2	-26	49.33	54	-4.67	-	-	188	390	V
1	1.928	35.48	PK	31.8	-25.4	41.88	-	-	-	-	0-360	201	H
2	2.085	35.15	PK	31.8	-24.6	42.35	-	-	-	-	0-360	201	V

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

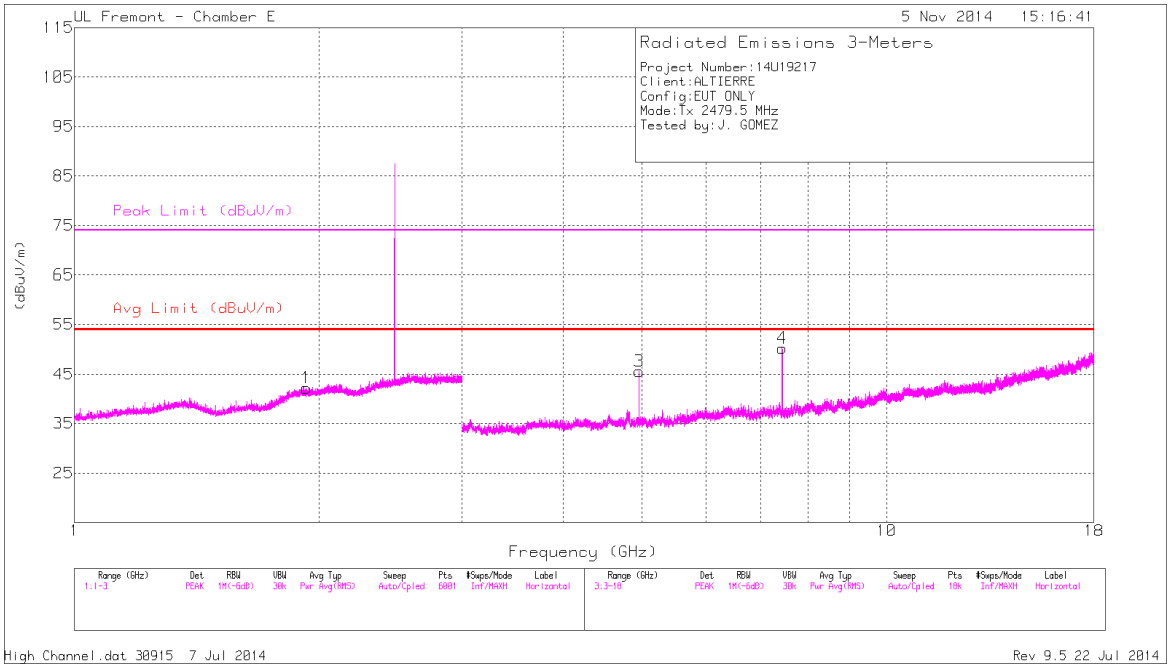
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

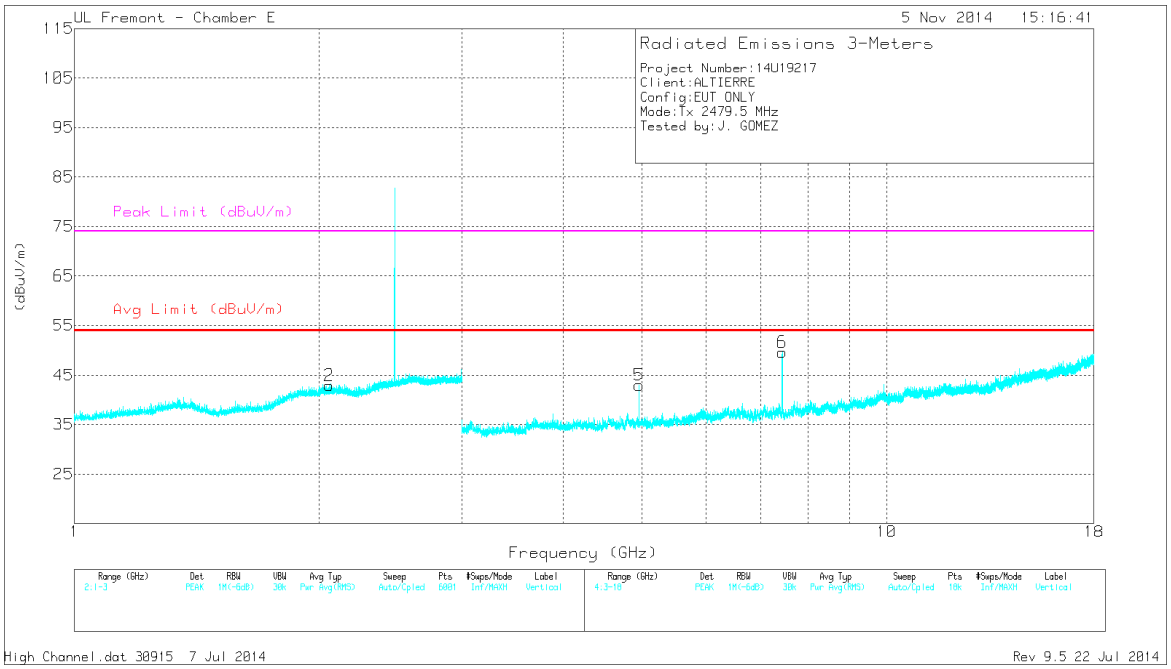
-Compliance for emissions in non-restricted bands shown in conducted out of band testing

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HORIZONTAL



VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (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
3	* 4.959	46.31	PK3	33.9	-28.9	51.31	-	-	74	-22.69	215	268	H
	* 4.959	42.17	VB10	33.9	-29	47.07	54	-6.93	-	-	215	268	H
4	* 7.439	43.85	PK3	35.3	-25.6	53.55	-	-	74	-20.45	283	216	H
	* 7.439	38.42	VB10	35.3	-25.6	48.12	54	-5.88	-	-	283	216	H
5	* 4.959	44.4	PK3	33.9	-28.9	49.4	-	-	74	-24.6	339	363	V
	* 4.959	37.52	VB10	33.9	-29	42.42	54	-11.58	-	-	339	363	V
6	* 7.439	43.58	PK3	35.3	-25.6	53.28	-	-	74	-20.72	294	114	V
	* 7.439	37.81	VB10	35.3	-25.6	47.51	54	-6.49	-	-	294	114	V
1	1.93	35.78	PK	31.8	-25.4	42.18	-	-	-	-	0-360	201	H
2	2.06	35.88	PK	31.9	-24.9	42.88	-	-	-	-	0-360	201	V

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

PK3 - FHSS Method: Maximum Peak

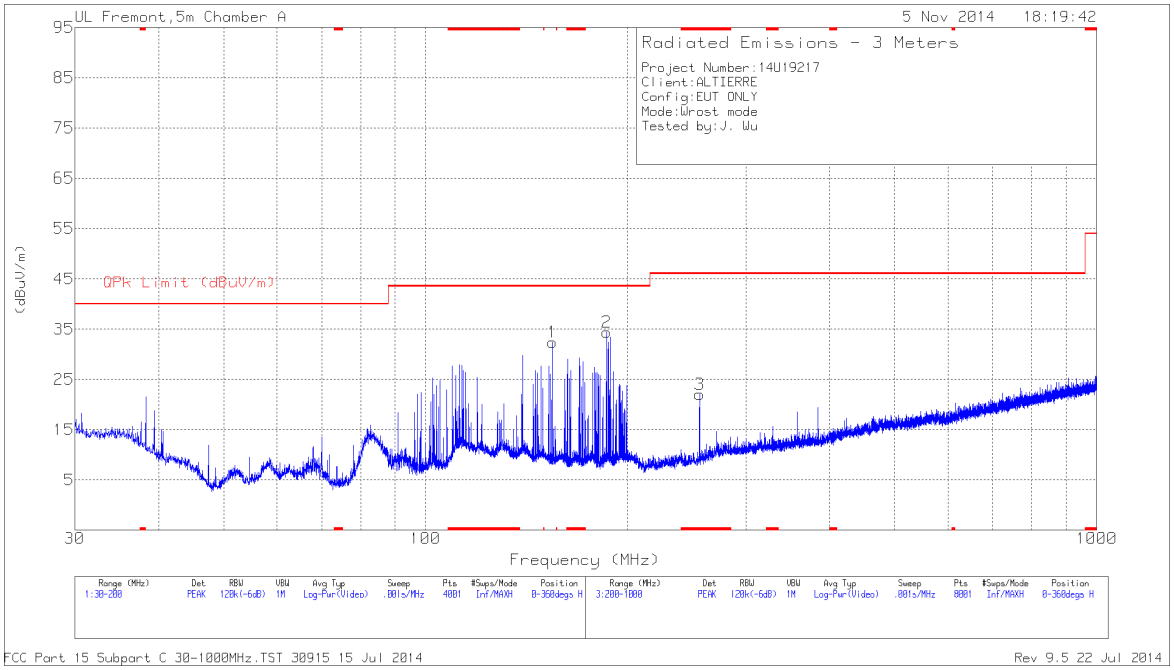
VB10Hz - FHSS Method: 10Hz Video Bandwidth

-Compliance for emissions in non-restricted bands shown in conducted out of band testing

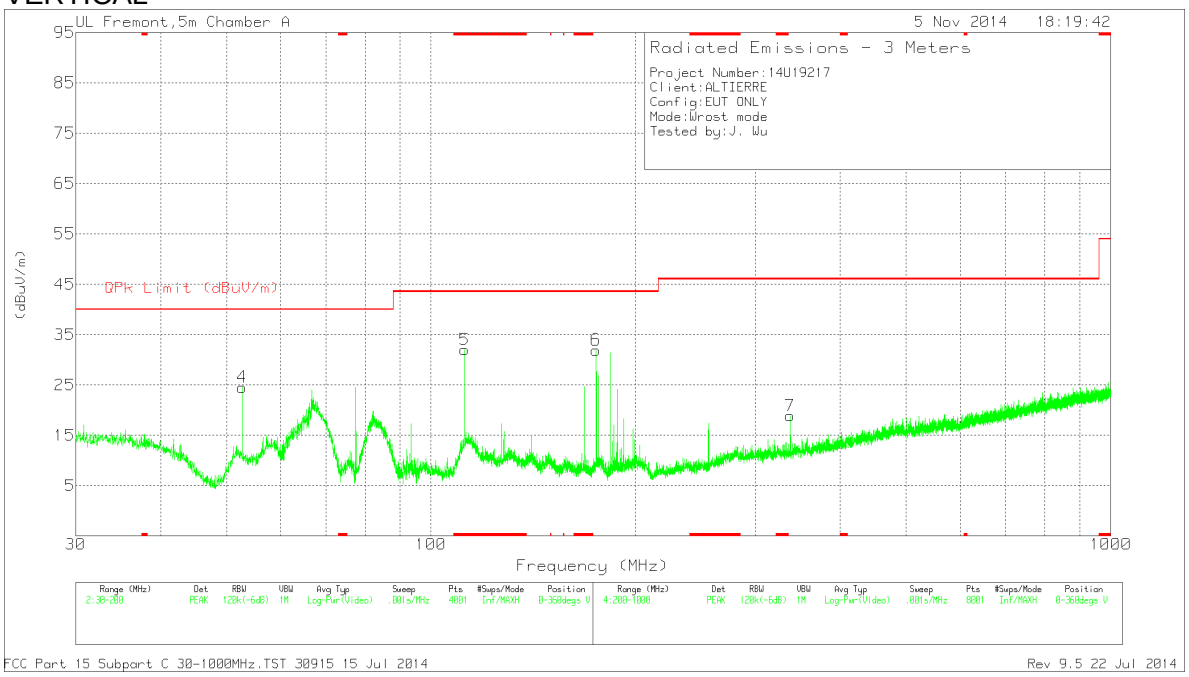
8.2. WORST-CASE BELOW 1 GHz

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

HORIZONTAL



VERTICAL



DATA

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	* 112.11	49.52	PK	12.9	-30.4	32.02	43.52	-11.5	0-360	101	V
3	* 256	39.73	PK	11.7	-29.4	22.03	46.02	-23.99	0-360	101	H
4	52.7375	48.06	PK	7.3	-30.8	24.56	40	-15.44	0-360	101	V
1	154.6525	50.07	PK	12.3	-30	32.37	43.52	-11.15	0-360	200	H
6	174.925	50.45	PK	11.6	-30.1	31.95	43.52	-11.57	0-360	101	V
2	186.1025	52.9	PK	11.4	-29.9	34.4	43.52	-9.12	0-360	200	H
7	337.8	34.21	PK	13.9	-29.2	18.91	46.02	-27.11	0-360	101	V

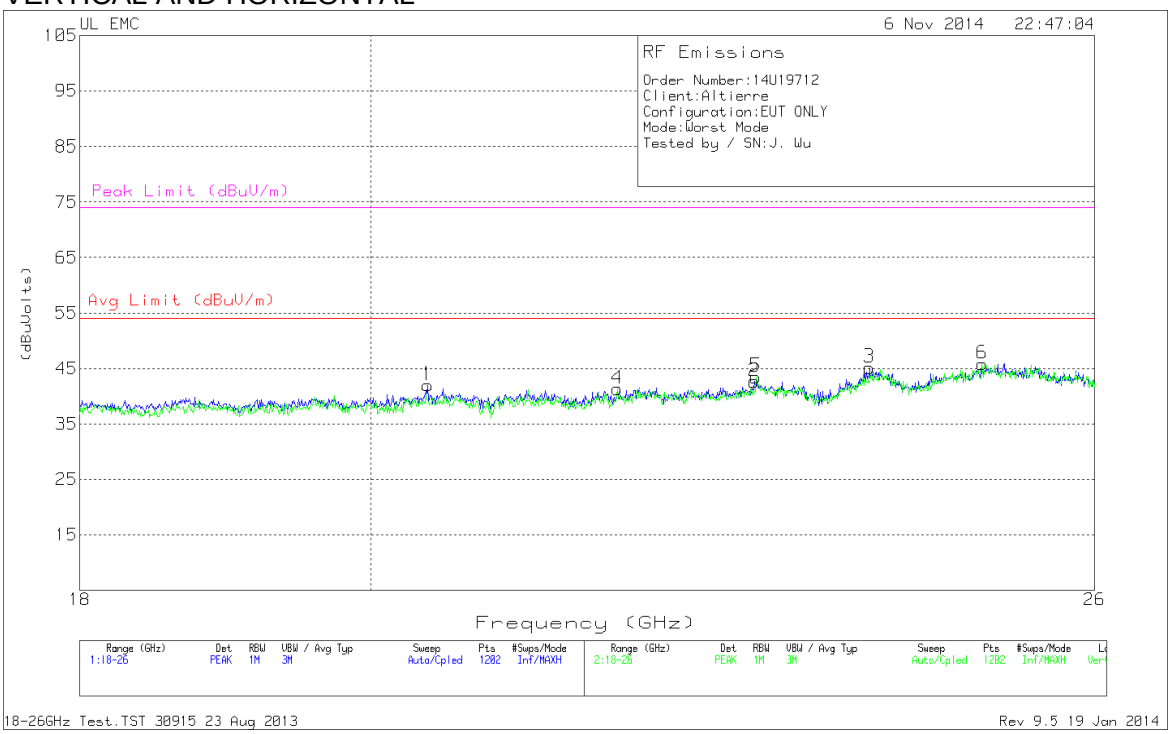
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

8.3. WORST CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION)

VERTICAL AND HORIZONTAL



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T89 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.418	42.5	PK	32.8	-23.8	-9.5	42	54	-12	74	-32
2	22.983	41.77	PK	33.6	-23.2	-9.5	42.67	54	-11.33	74	-31.33
3	23.962	43.77	PK	33.6	-22.7	-9.5	45.17	54	-8.83	74	-28.83
4	21.87	41.23	PK	33.3	-23.7	-9.5	41.33	54	-12.67	74	-32.67
5	22.996	42.6	PK	33.6	-23.2	-9.5	43.5	54	-10.5	74	-30.5
6	24.961	44.13	PK	34	-22.8	-9.5	45.83	54	-8.17	74	-28.17

PK - Peak detector