CERTIFICATION TEST REPORT

Report Number. : 11988903-E3V2

Applicant	:	Mayfield Robotics 400 Convention Way Redwood City, CA 94063
Model	:	AHR-M8T
FCC ID	:	2AN44-AHR-M8T
EUT Description	:	General Consumer Home Robot
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
June 19, 2018

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

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	06/11/18	Initial Release	---
V2	06/19/18	Updated Section 1 Attestation Of Test Result, Date Tested; Updated Section 5.6 Setup Diagram For Radiated Tests and Setup Diagram For Line Conducted Test. Updated Section 6 Test And Measurement Equipment. Added Section 8.8.3 for worst-case co-location.	Q.Jason

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

TABLE OF CONTENTS

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Mayfield Robotics
400 Convention Way
Redwood City, CA 94063

EUT DESCRIPTION: General Consumer Home Robot

MODEL: AHR-M8T

SERIAL NUMBER: RADIATED: 17534007 (MF-001 Rev. A04)
CONDUCTED: 17450531 (MF-001 Rev. A04)

DATE TESTED: October 26, 2017 – June 19, 2018

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

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 the U.S. government.

Approved & Released For
UL Verification Services Inc By:

Francisco De Anda
Operations Leader
UL Verification Services Inc.

Prepared By:

Eric Yu
Test Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

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(ISED: 2324B-1)	☐ Chamber D(ISED: 22541-1)
☒ Chamber B(ISED: 2324B-2)	☒ Chamber E(ISED: 22541-2)
☐ Chamber C(ISED: 2324B-3)	☐ Chamber F(ISED: 22541-3)
	☐ Chamber G(ISED: 22541-4)
	☐ Chamber H(ISED: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at NVLAP Lab Search.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB

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

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a general consumer device

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum output power as follows:

		Average		Peak	
Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	GFSK	-2.15	0.61	-0.58	0.87
2402 - 2480	QPSK	-3.79	0.42	0.35	1.08
2402 - 2480	8PSK	-3.66	0.43	0.48	1.12

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes antenna, with a maximum gain of 3.1 dBi

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Windows 10

The test utility software used during testing was BlueSuite v2.6.4.1046

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The EUT cannot be used in different orientations. Therefore, all final radiated testing was performed with the EUT in typical standing orientation.

Worst-case data rates as provided by the client were:

GFSK mode: DH5
8PSK mode: 3-DH5

The height of the robot is at 0.51 meters and the highest point of the antennas is at 0.31 meters. Given the measurement antenna height range, 1 meter to 4 meters, and for above 1GHz testing, the boring sight mechanism and beamwidth of the antenna,testing on the floor would prevent capturing full emissions strength. Testing on the floor the antenna would not capture worst case emissions, therefore EUT was tested as table top equipment.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number
Laptop	Lenovo	X1 Carbon	R9-0JM36P
AC/DC Adapter	Lenovo	ADL170NDC2A	11S36200317ZZ40077C20J
DC Power Supply	BK Precesion	1550	238D15253
USB ethernet adapter	Cable Matters Inc.	202013	TS3G9FQ7
EUT AC Adapter	DYS	DYS902-190473W	NSN
Monitor	ODROID-VU	GH620A	YXD090TN02-40NMO1

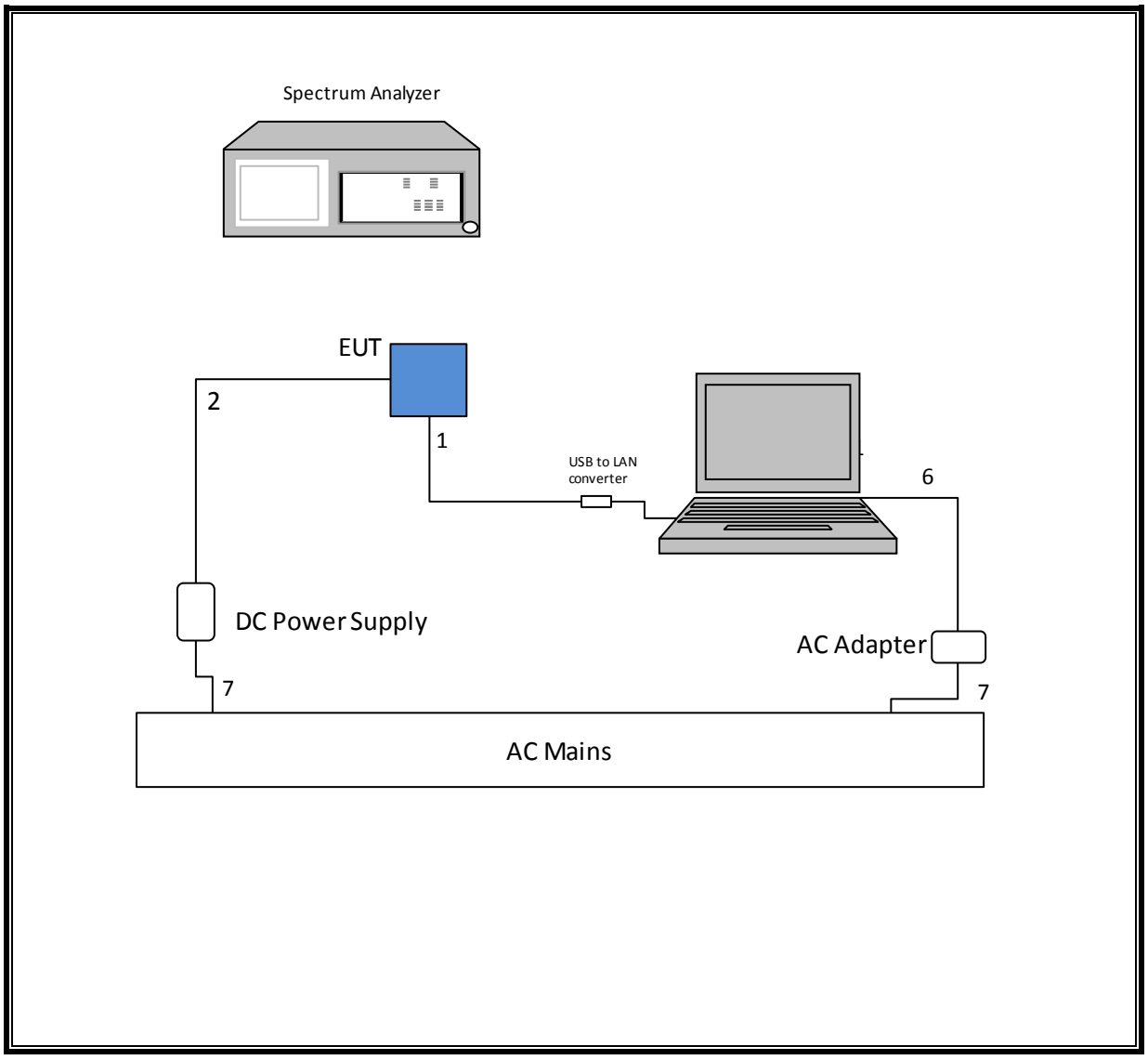
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Ethernet	1	RJ45	unshielded	2.1	
2	DC	1	Header	unshielded	1.85	To EUT from DC P/S
3	DC	1	barrel	unshielded	1.32	To EUT AC adapter
4	AC	1	2-prong	unshielded	1.22	
5	HDMI	1	HDMI	shielded	2.5	
6	DC	1	Barrle	shielded	1.5	To laptop
7	AC	2	3-prong	shielded	1	

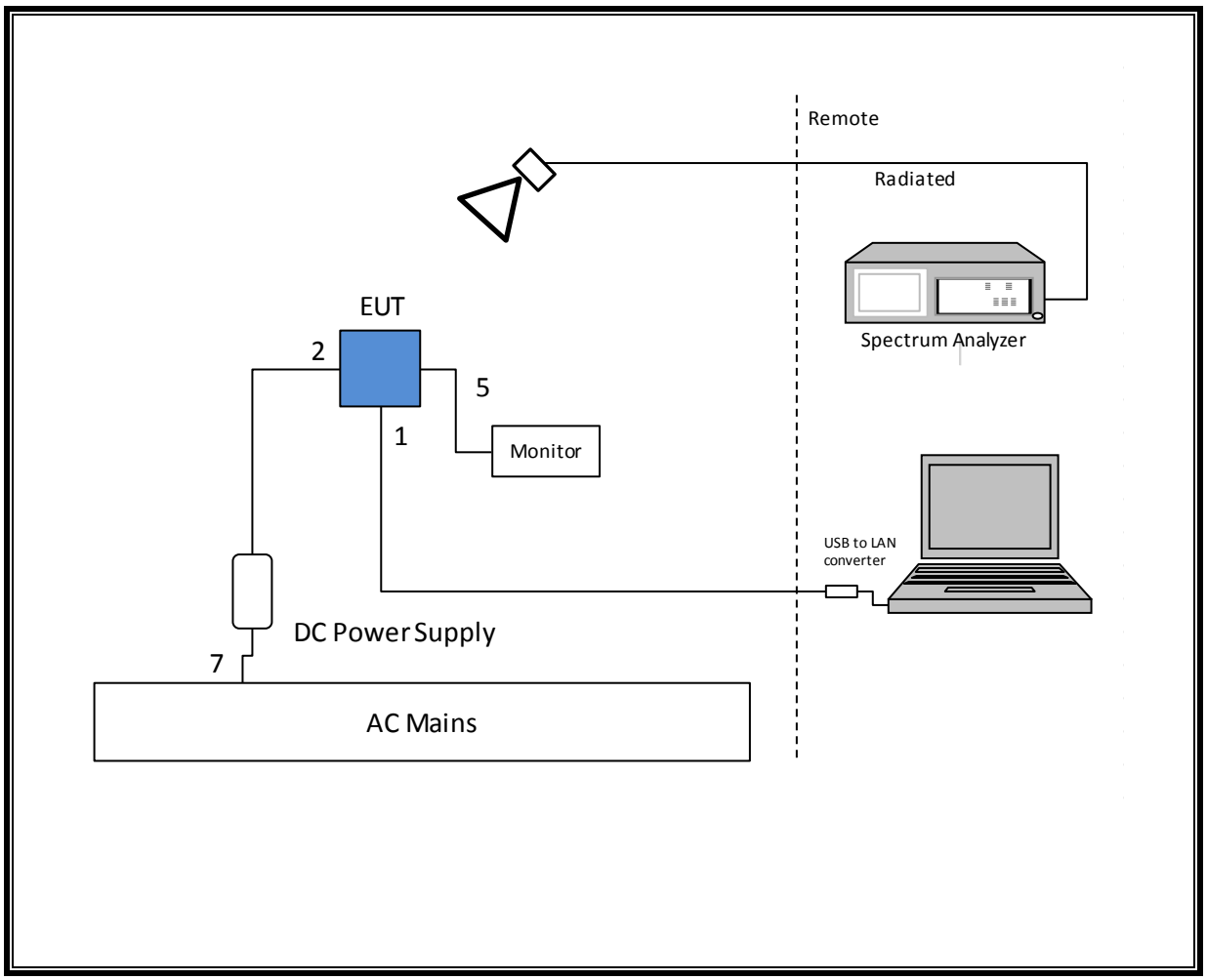
TEST SETUP

The EUT is connected to a test laptop. Test software exercises the radio.

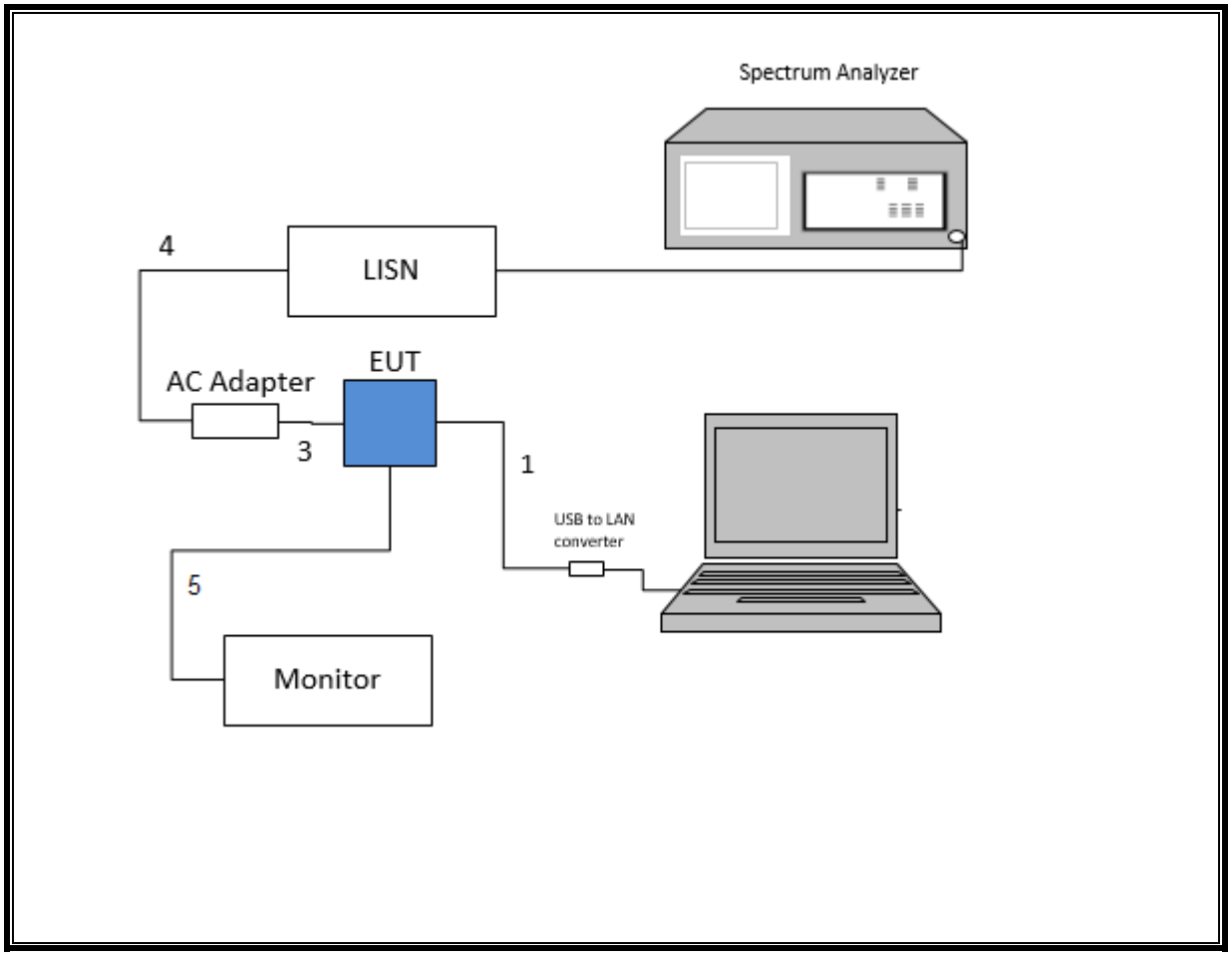
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR LINE CONDUCTED TEST



6. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Spectrum Analyzer	Keysight	E4446A	T146	07/17/18	07/17/17
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/18	04/11/17
Antenna, Biconolog, 30MHz – 1GHz	Sunol Sciences	JB1	T130	10/16/18	10/16/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T862	06/09/18	06/09/17
RF Preamplifier, 10kHz - 1GHz	Sonoma	310N	T300	11/18/18	11/17/17
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	06/24/18	06/24/17
RF Preamplifier, 1 - 8GHz	Miteq	AMF-4D-01000800-30-29P	T1573	06/24/18	06/24/17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	T486	06/24/18	06/24/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T863	06/09/18	06/09/17
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T493	02/15/18	02/15/17
RF Preamplifier, 1 - 8GHz	Miteq	AMF-4D-01000800-30-29P	T1156	02/15/18	02/15/17
Spectrum Analyzer	Keysight	N9030A	T907	01/23/18	01/23/17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	T485	02/15/18	02/15/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T712	01/30/18	01/30/17
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T931	06/21/18	06/21/17
Spectrum Analyzer	Keysight	N9030A	T905	01/11/18	01/11/17
Antenna, Horn, 18-26-GHz	ARA	MWH-1826	T89	01/04/18	01/04/17
Antenna, Active Loop 9KHz to 30MHz	COM-POWER	AL-130R	T1866	10/10/18	10/10/17
RF Preamplifier, 1-26GHz	Agilent	8449B	T404	07/23/18	07/23/17
Spectrum Analyzer, 40GHz	Keysight	N9030A	T1454	12/15/17	12/15/16
Spectrum Analyzer, 40GHz	Keysight	N9030A	T1450	02/05/19	02/05/18
Power Splitter	Weinschel	1594	T719	N/A	N/A
Power Meter	Keysight	N1911A	T1271	07/17/18	07/17/17
Power Sensor	Keysight	N1921A	T413	06/22/18	06/22/17
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/18	01/06/17
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/15/18	06/15/17

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016
Conducted Emissions Software	UL	UL EMC	Ver 9.5, May 26, 2015

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

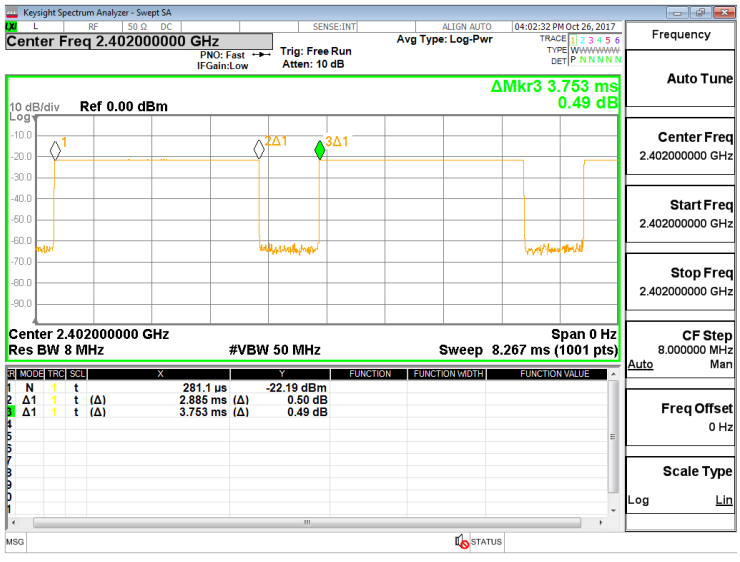
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

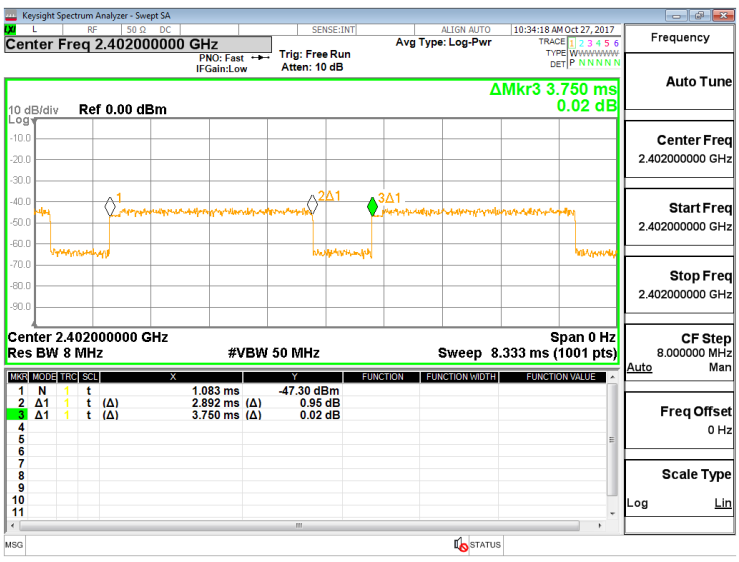
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Bluetooth GFSK	2.885	3.753	0.769	76.9%	1.14	0.347
Bluetooth 8PSK	2.892	3.750	0.771	77.1%	1.13	0.346

GFSK



8PSK



8.2. 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.

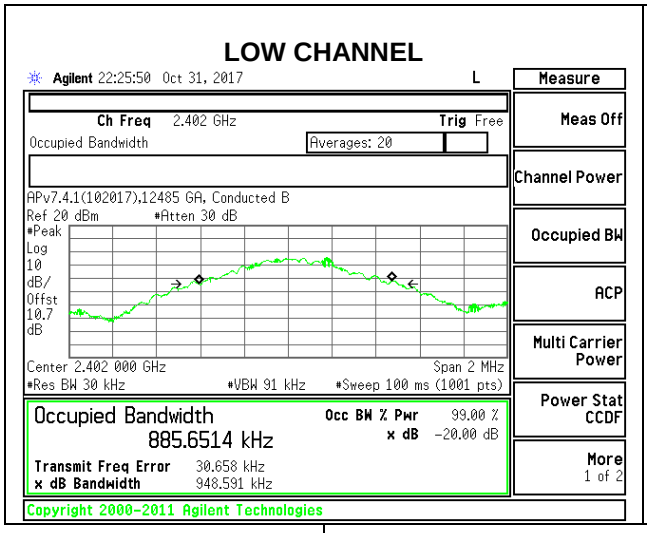
RESULTS

8.2.1. BASIC DATA RATE GFSK MODULATION

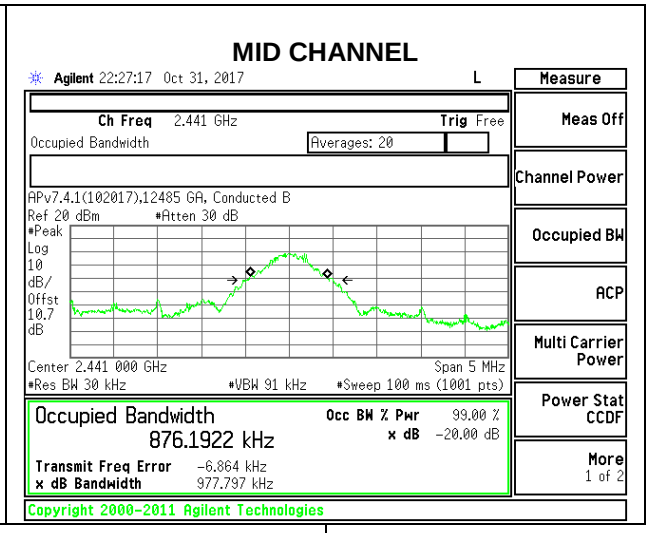
20dB and 99% BANDWIDTH

Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	948.6	885.65
Mid	2441	977.8	876.19
High	2480	1011.0	873.95

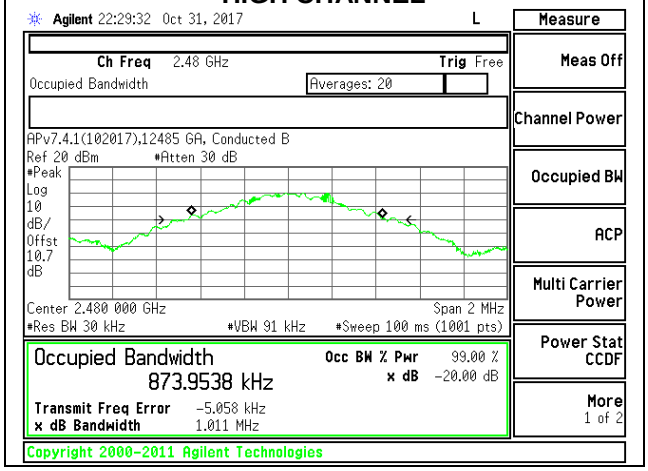
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

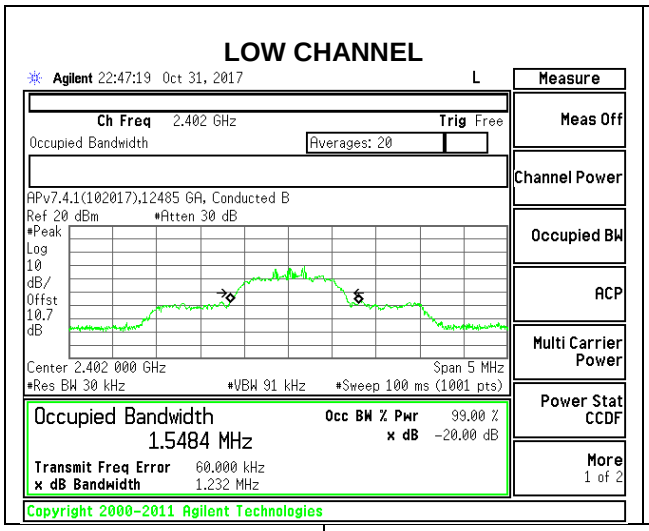


8.2.2. ENHANCED DATA RATE 8PSK MODULATION

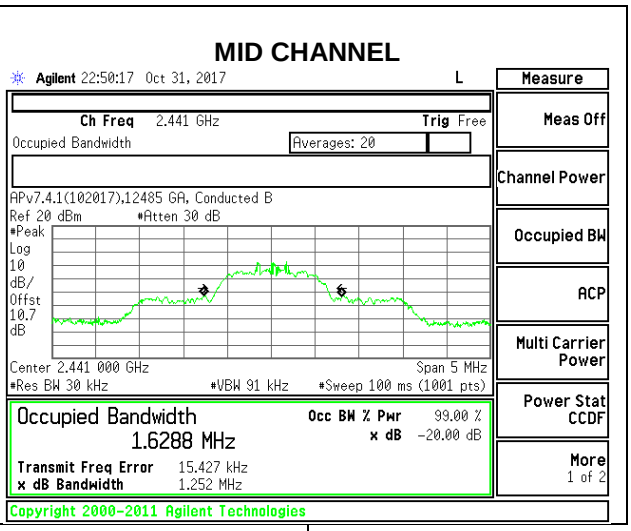
20dB and 99% BANDWIDTH

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.232	1.548
Mid	2441	1.252	1.629
High	2480	1.249	1.656

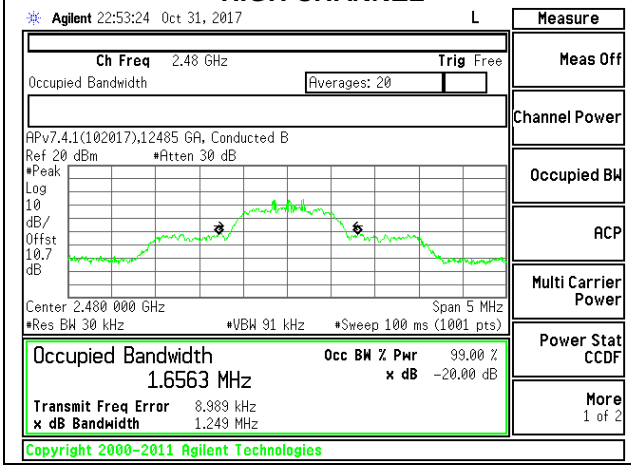
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.3. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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.

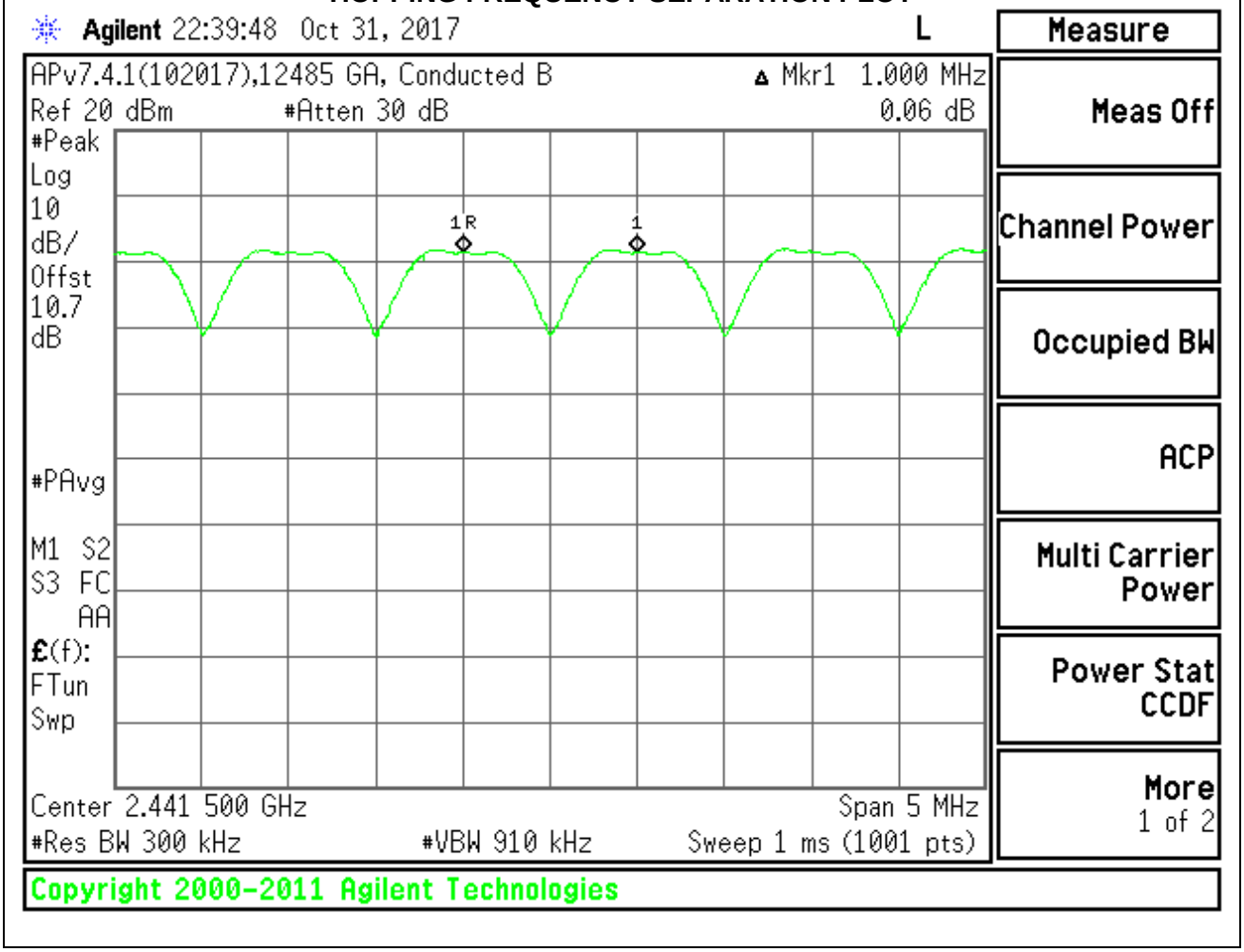
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS

8.3.1. BASIC DATA RATE GFSK MODULATION

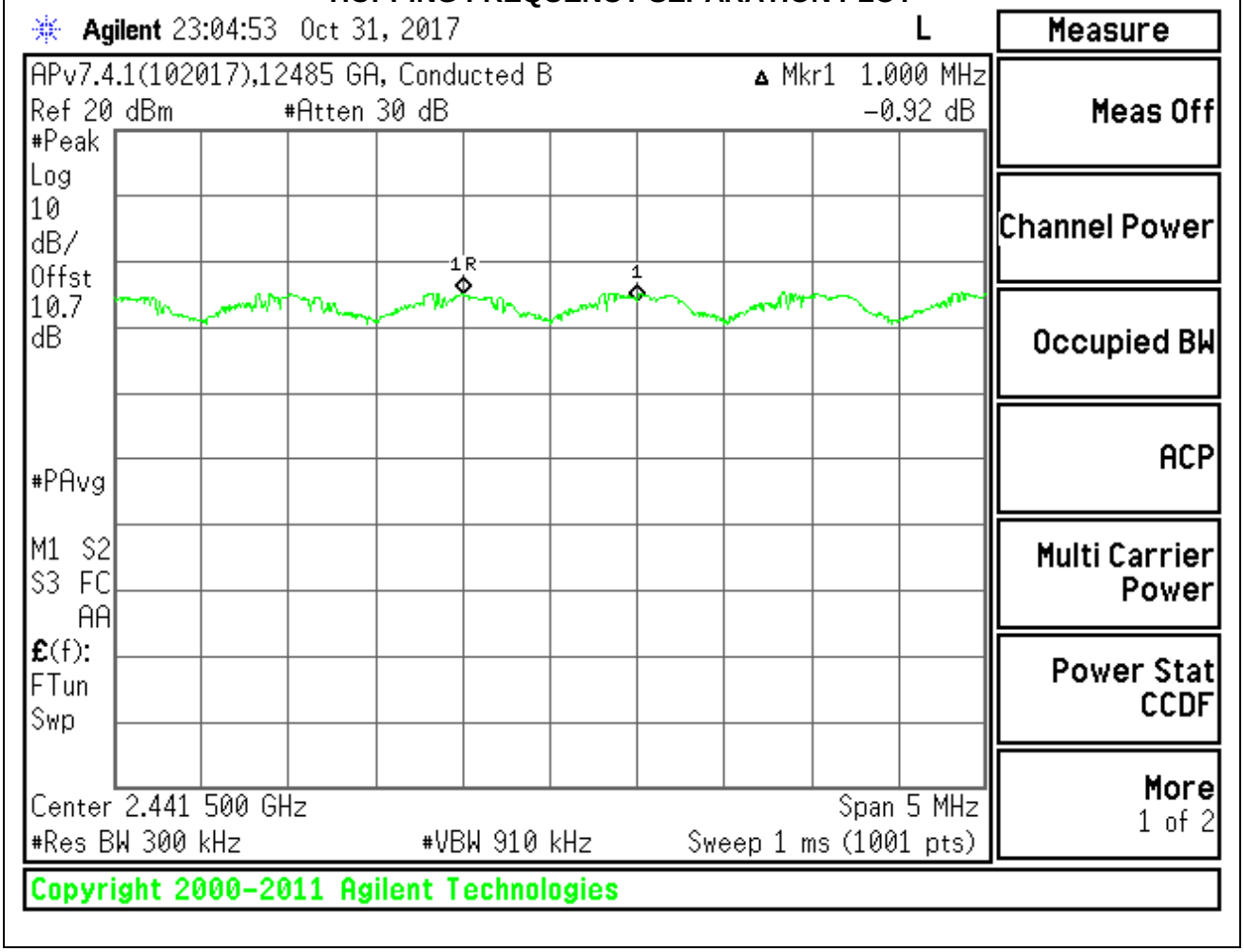
HOPPING FREQUENCY SEPARATION PLOT



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8.3.2. ENHANCED DATA RATE 8PSK MODULATION

HOPPING FREQUENCY SEPARATION PLOT



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

8.4. NUMBER OF HOPPING CHANNELS

LIMITS

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

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

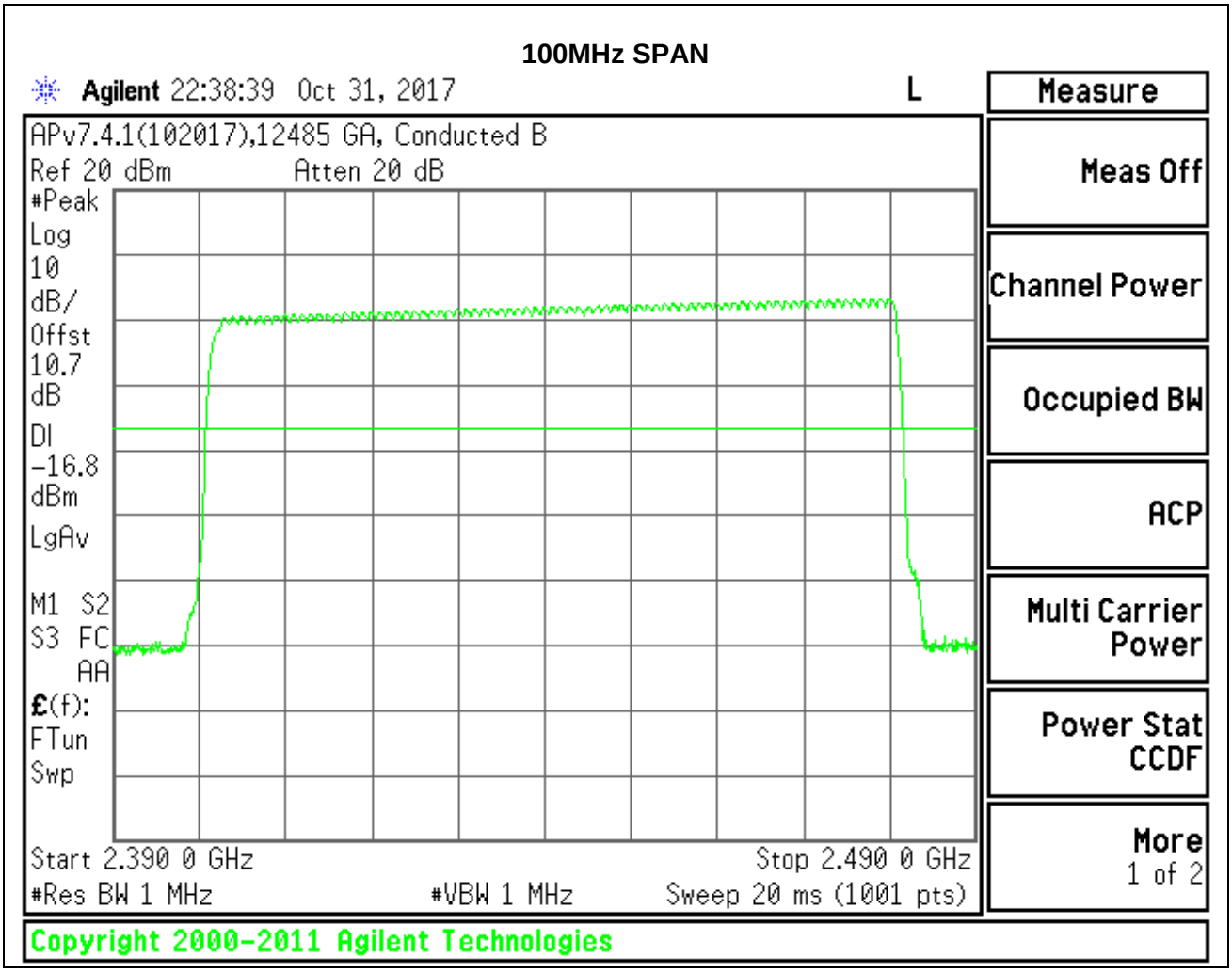
Normal Mode: 79 Channels observed.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

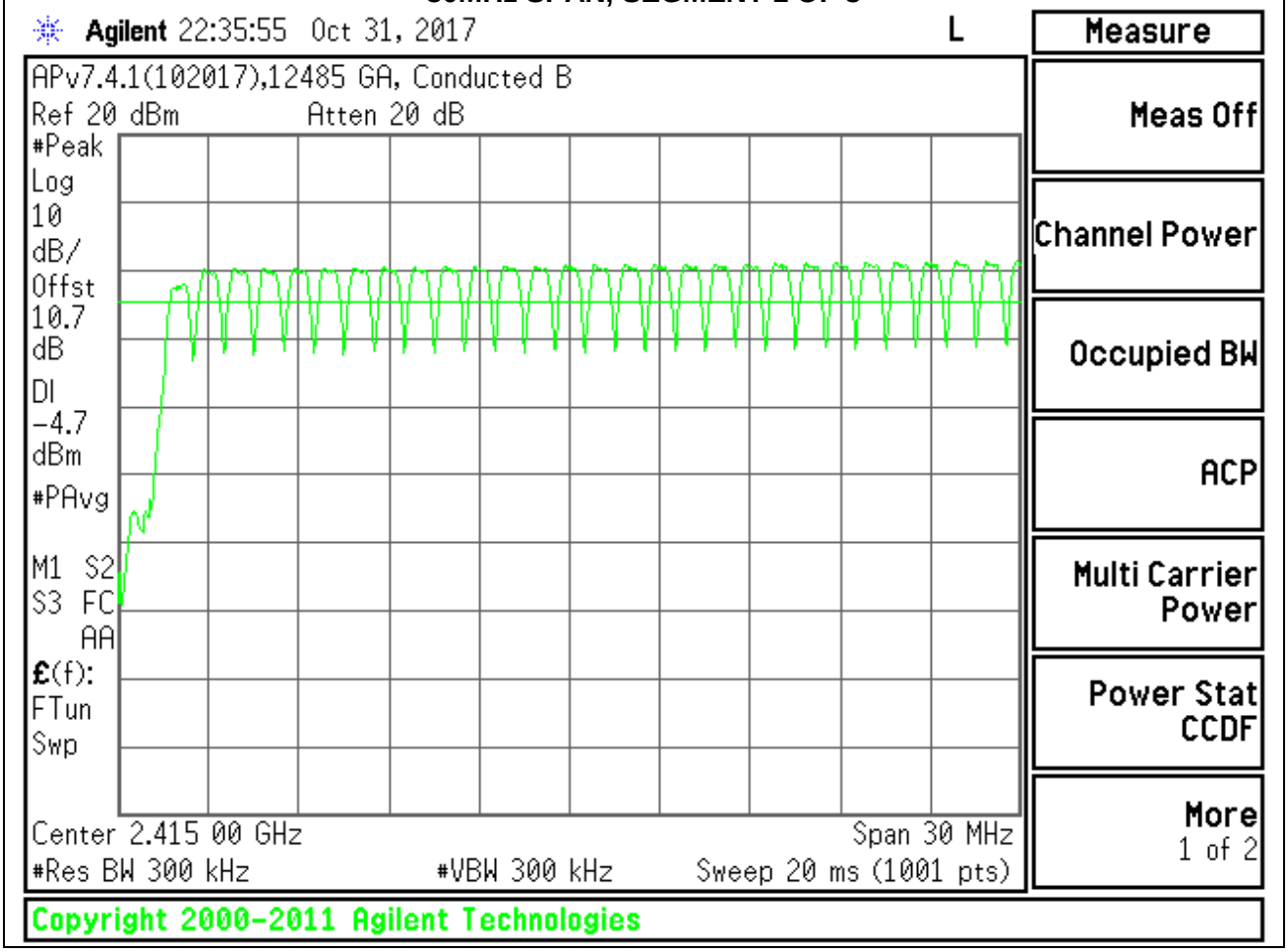
8.4.1. BASIC DATA RATE GFSK MODULATION

NUMBER OF HOPPING CHANNELS

100MHz SPAN

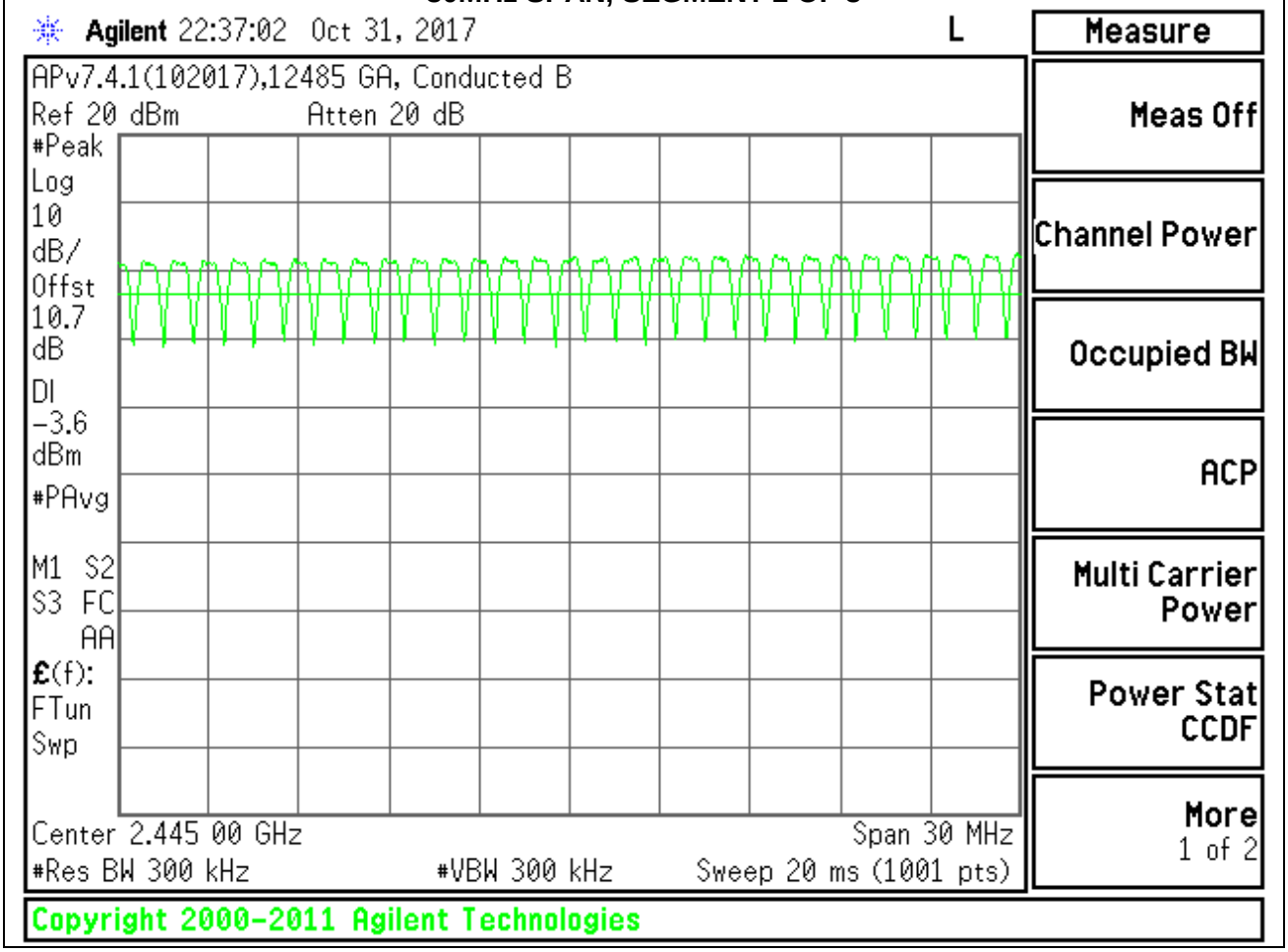


30MHz SPAN, SEGMENT 1 OF 3



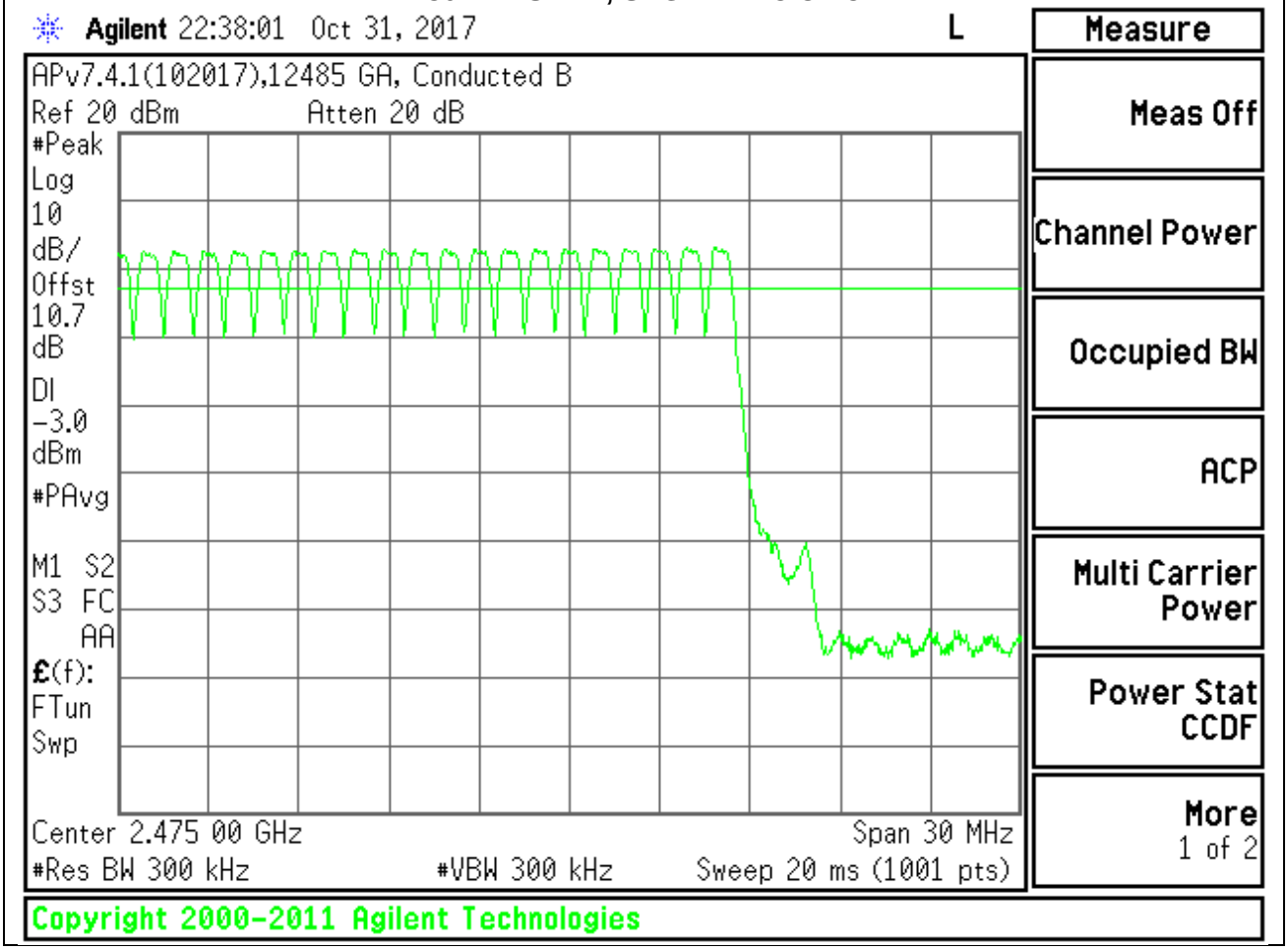
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

30MHz SPAN, SEGMENT 2 OF 3



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

30MHz SPAN, SEGMENT 3 OF 3

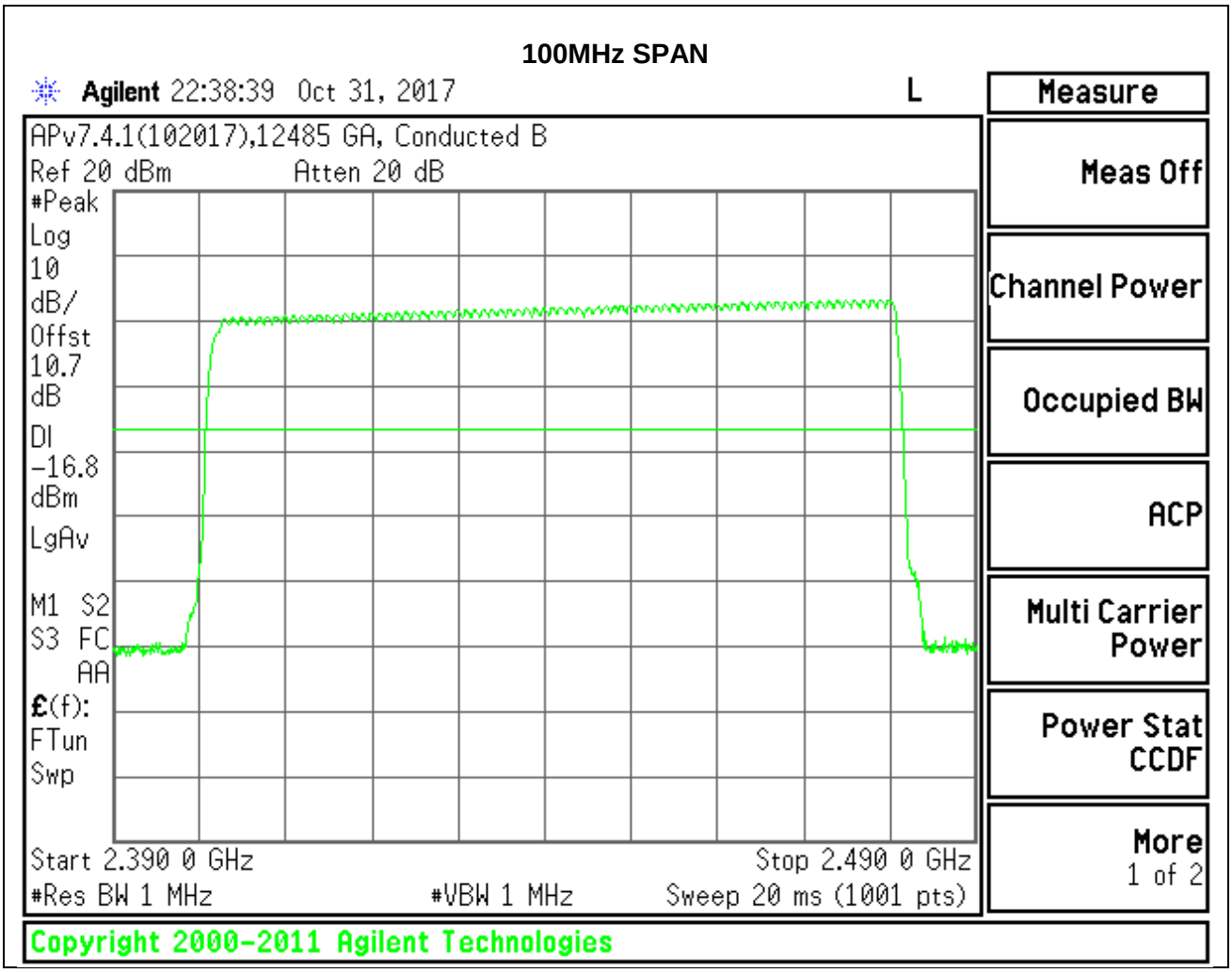


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

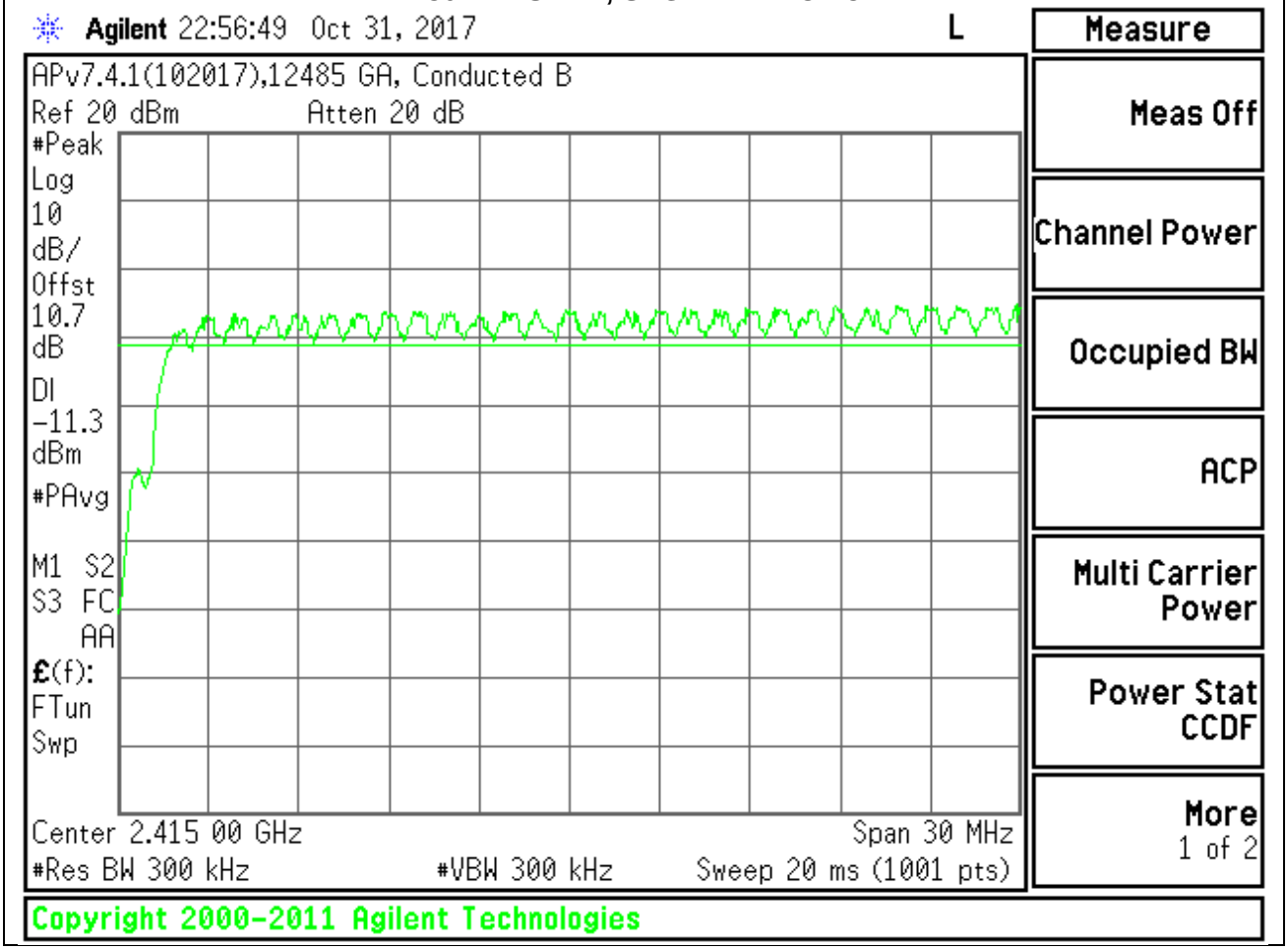
8.4.2. ENHANCED DATA RATE 8PSK MODULATION

NUMBER OF HOPPING CHANNELS

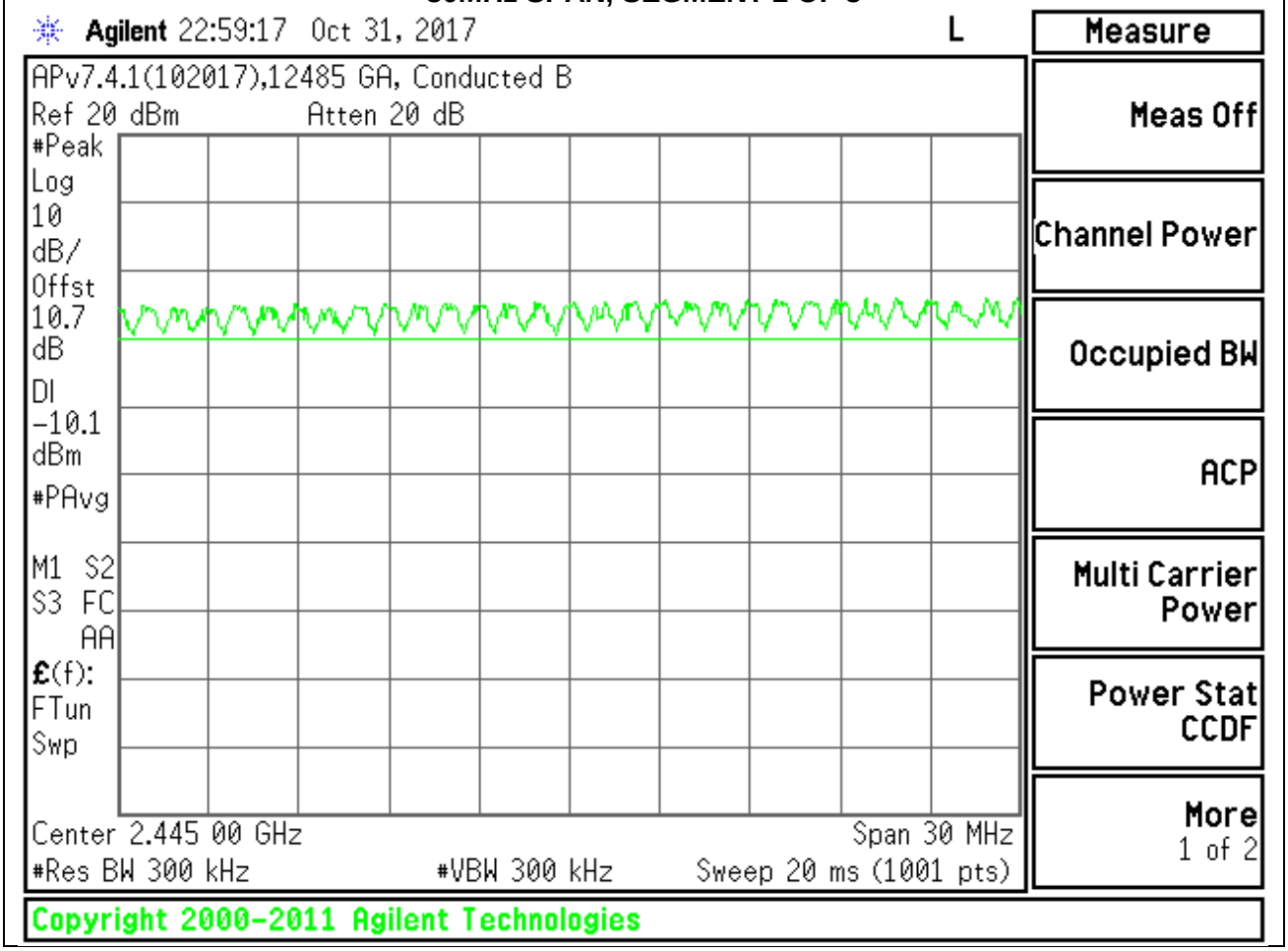
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

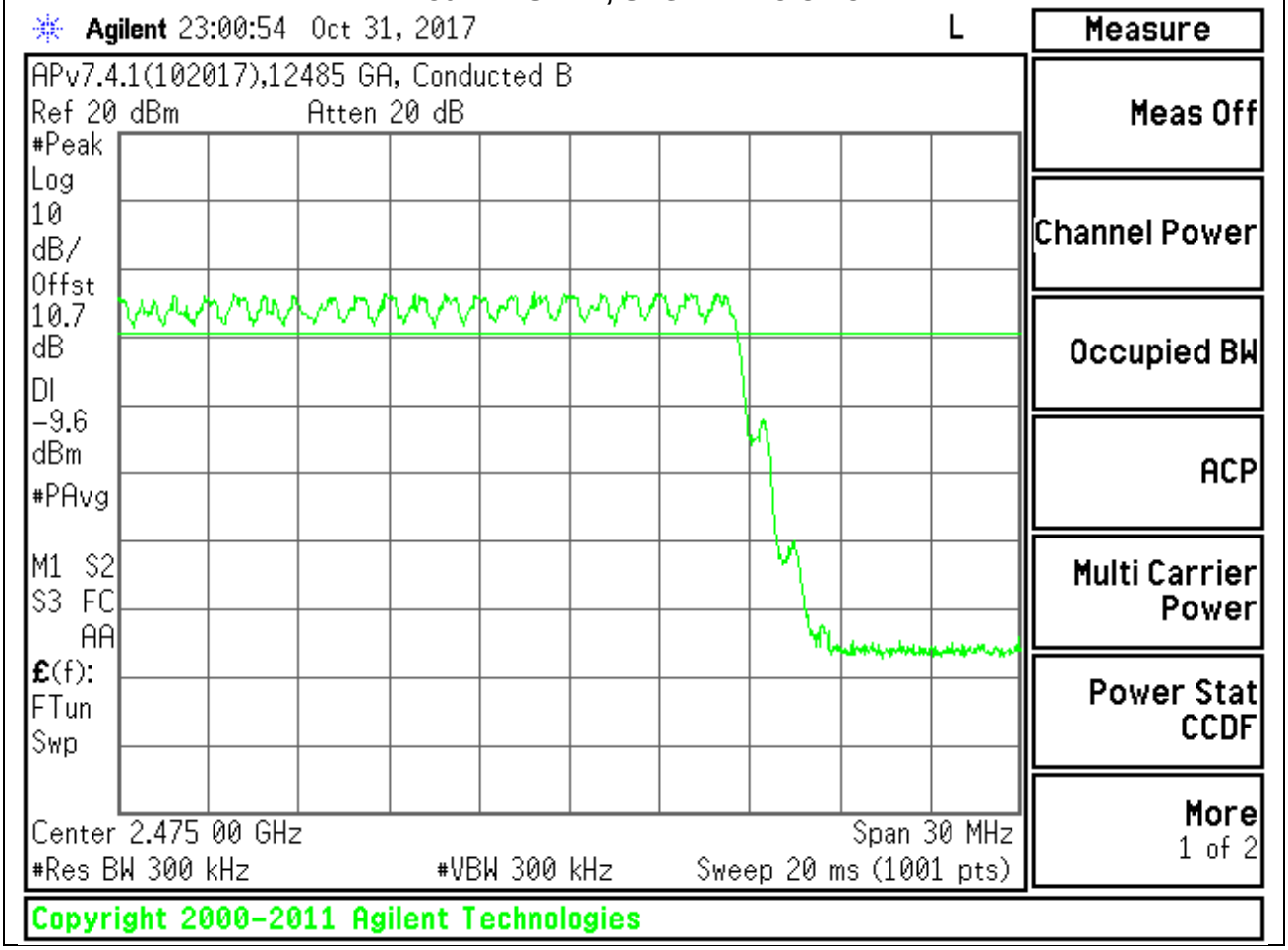


30MHz SPAN, SEGMENT 2 OF 3



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

30MHz SPAN, SEGMENT 3 OF 3



8.5. 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 * (# 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.

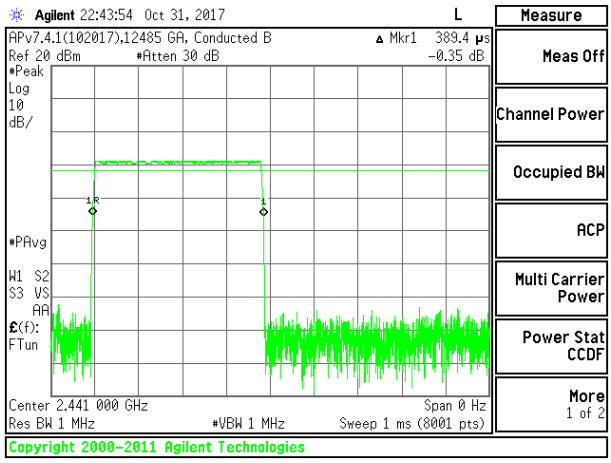
RESULTS

8.5.1. BASIC DATA RATE GFSK MODULATION

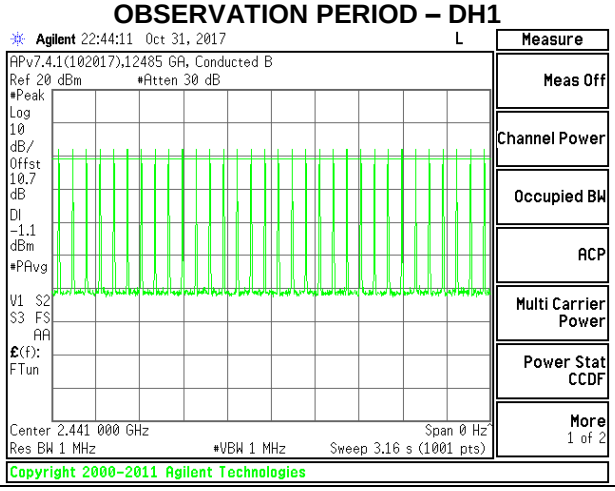
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.3894	32	0.1246	0.4	-0.2754
DH3	1.645	16	0.2632	0.4	-0.1368
DH5	2.893	11	0.3182	0.4	-0.0818
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.3894	8	0.03115	0.4	-0.3688
DH3	1.645	4	0.06580	0.4	-0.3342
DH5	2.893	2.75	0.07956	0.4	-0.3204

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

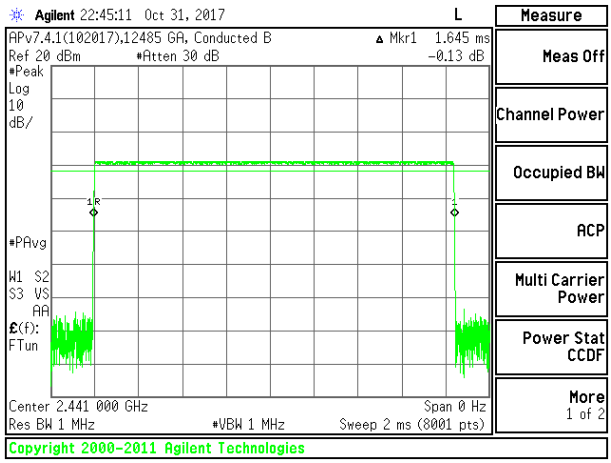
PULSE WIDTH – DH1



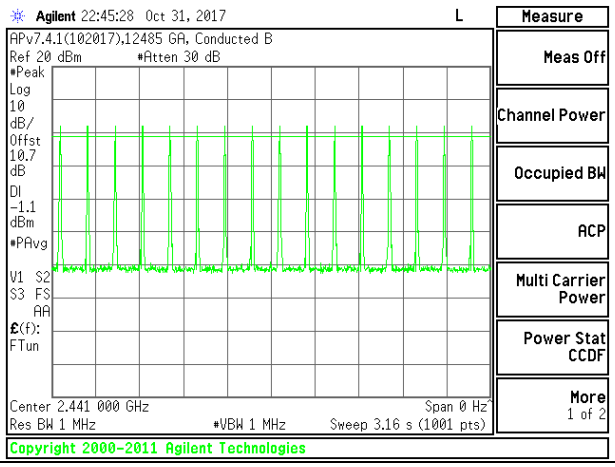
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



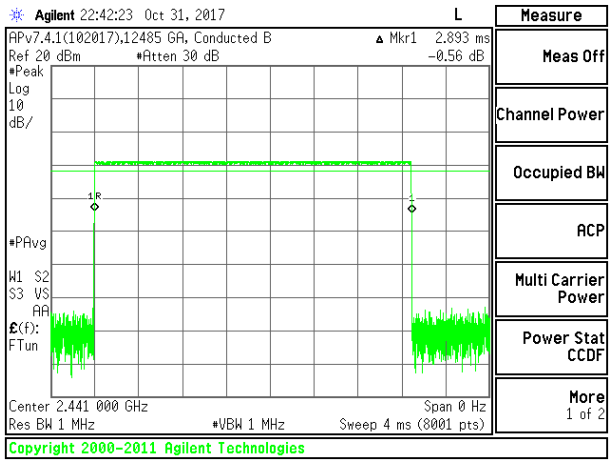
PULSE WIDTH – DH3



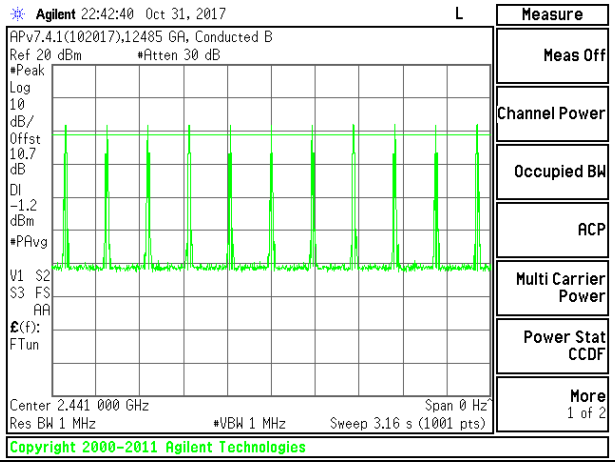
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



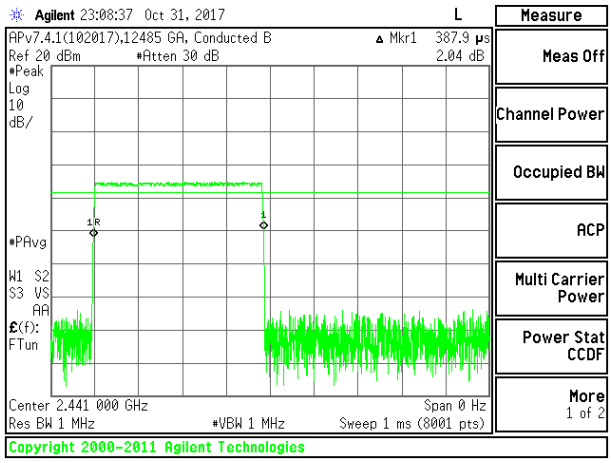
8.5.2. ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3-DH1	0.3879	32	0.124128	0.4	-0.27587
3-DH3	1.65	16	0.264	0.4	-0.136
3-DH5	2.901	11	0.31911	0.4	-0.08089

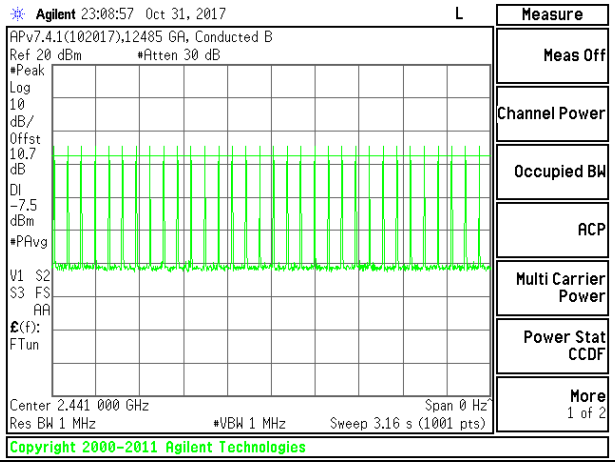
Note: for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate in section 7.5.1 demonstrates compliance with channel occupancy when AFH is employed.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

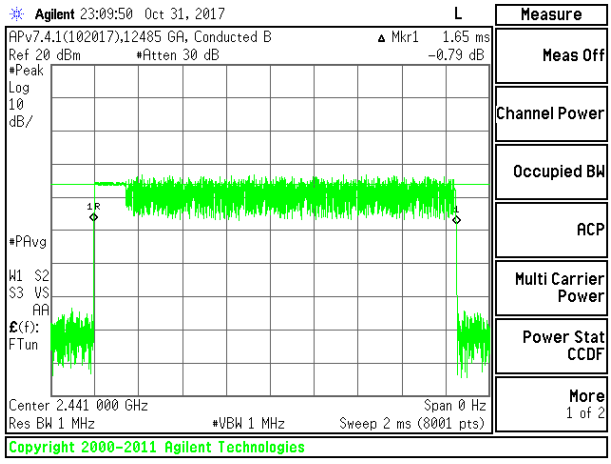
PULSE WIDTH – DH1



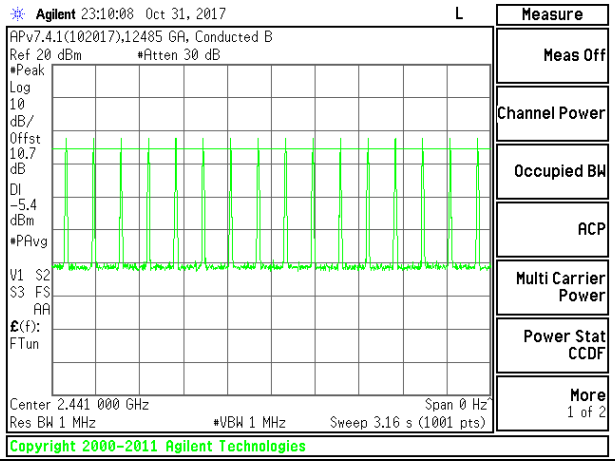
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



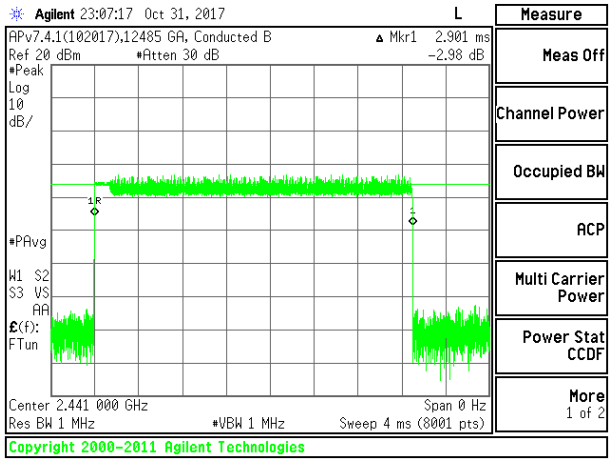
PULSE WIDTH – DH3



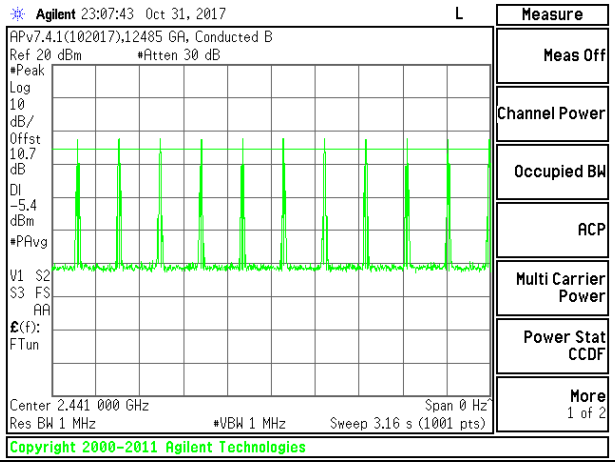
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.6. OUTPUT POWER

LIMITS

§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.

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

TEST PROCEDURE

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 a gated peak reading of power.

TEST ENGINEER:	43573	**Date:**	11/20/17

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

RESULTS

8.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-3.72	30	-33.72
Middle	2441	-1.72	30	-31.72
High	2480	-0.58	30	-30.58

8.6.2. ENHANCED DATA RATE DQPSK MODULATION

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-2.8	30	-32.8
Middle	2441	0.35	30	-29.65
High	2480	-5.22	30	-35.22

8.6.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-2.33	30	-32.33
Middle	2441	0.48	30	-29.52
High	2480	-5.05	30	-35.05

8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

TEST ENGINEER:	43573	**Date:**	11/20/17

8.7.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-5.66
Middle	2441	-3.46
High	2480	-2.15

8.7.2. ENHANCED DATA RATE DQPSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-6.91
Middle	2441	-3.79
High	2480	-10.79

8.7.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-6.75
Middle	2441	-3.66
High	2480	-10.23

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

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)).

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.

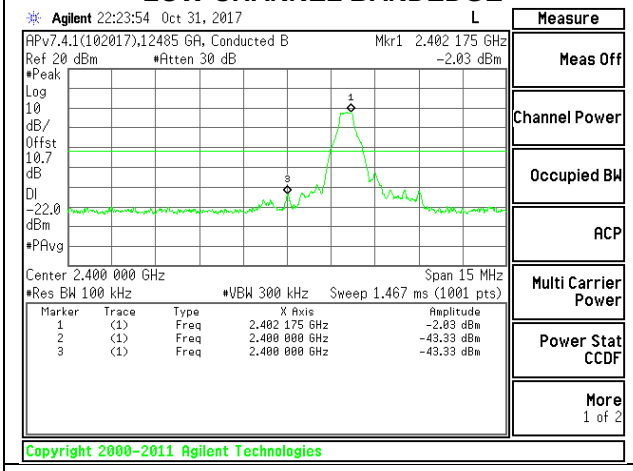
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

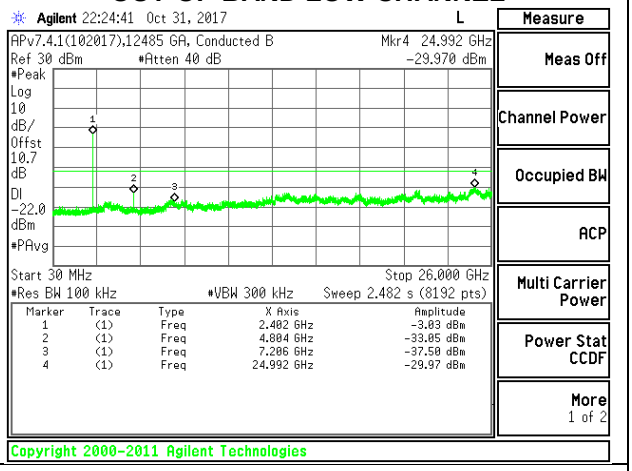
8.8.1. BASIC DATA RATE GFSK MODULATION

SPURIOUS EMISSIONS, NON HOPPING

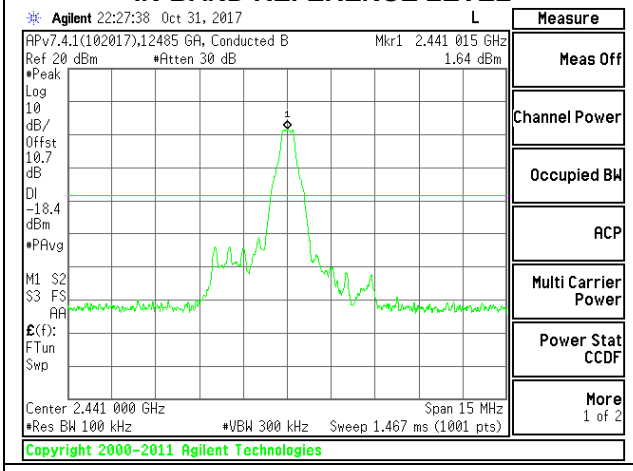
LOW CHANNEL BANDEDGE



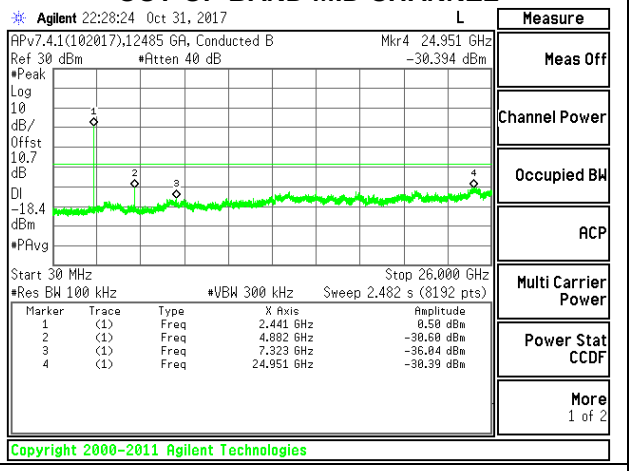
OUT-OF-BAND LOW CHANNEL



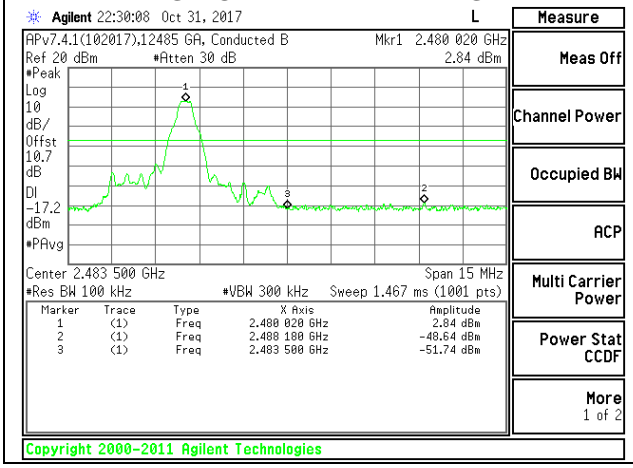
IN-BAND REFERENCE LEVEL



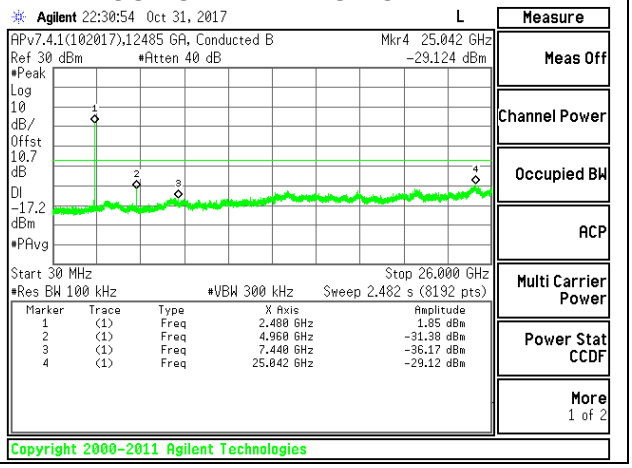
OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE

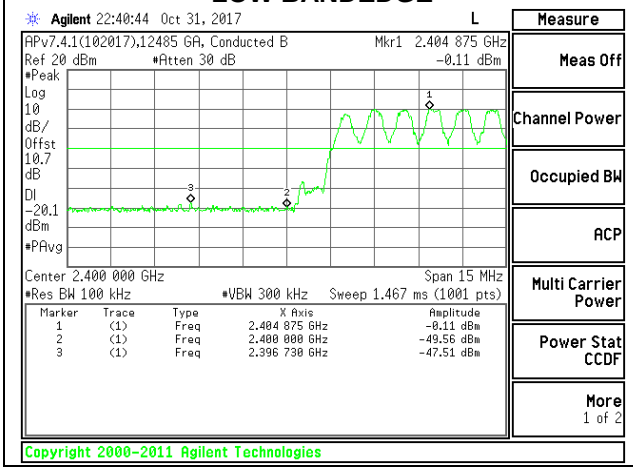


OUT-OF-BAND HIGH CHANNEL

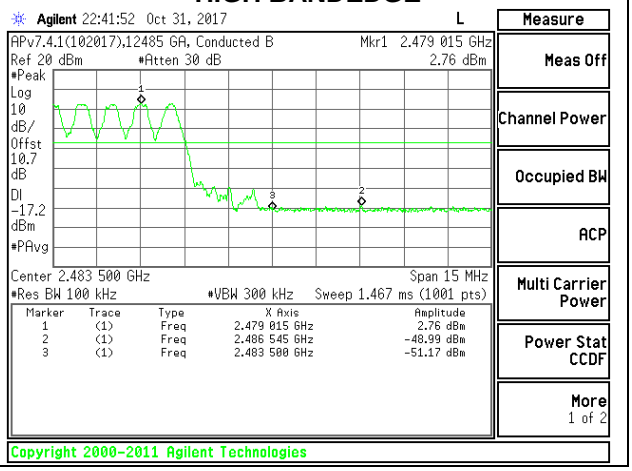


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE



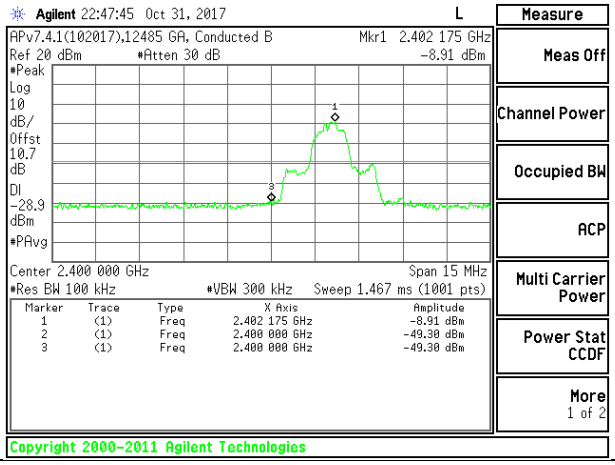
HIGH BANDEDGE



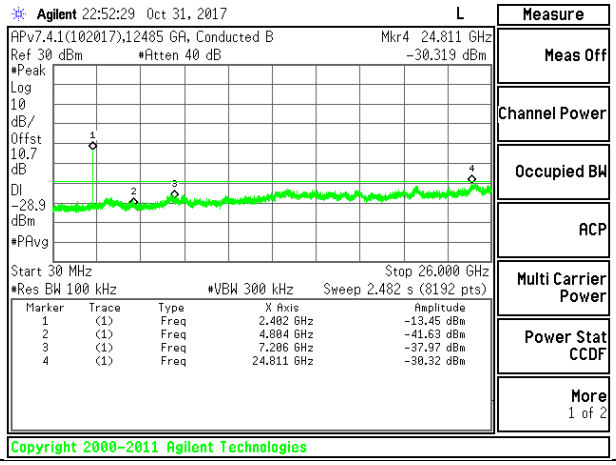
8.8.2. ENHANCED DATA RATE 8PSK MODULATION

SPURIOUS EMISSIONS, NON HOPPING

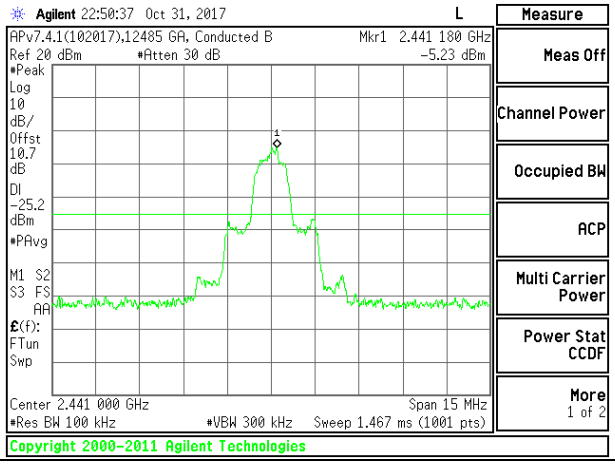
LOW CHANNEL BANDEDGE



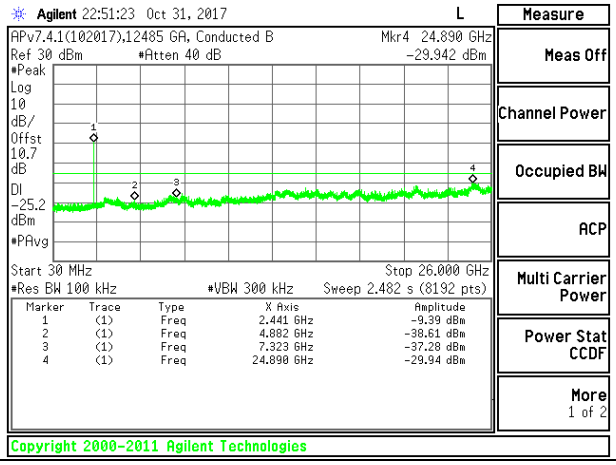
OUT-OF-BAND LOW CHANNEL



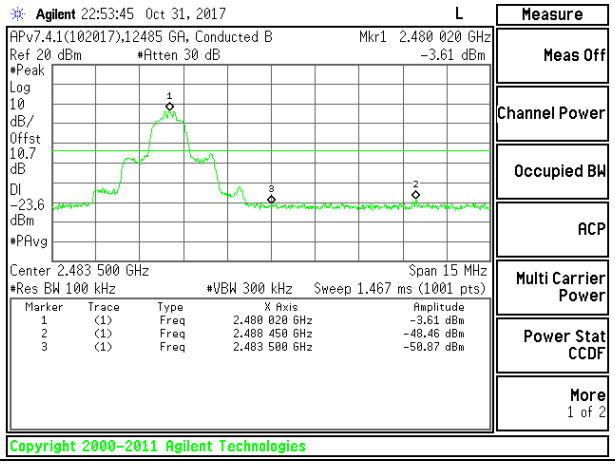
IN-BAND REFERENCE LEVEL



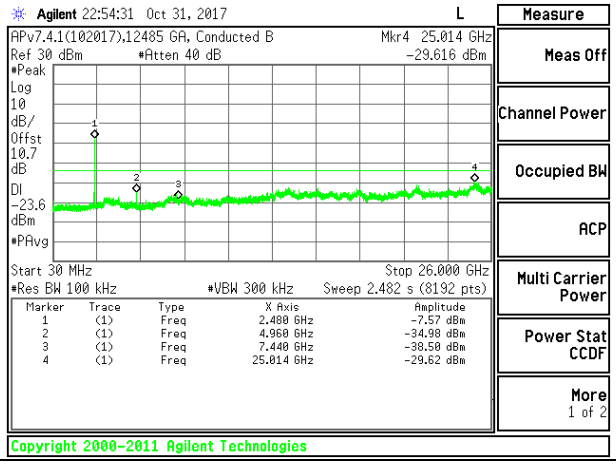
OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE

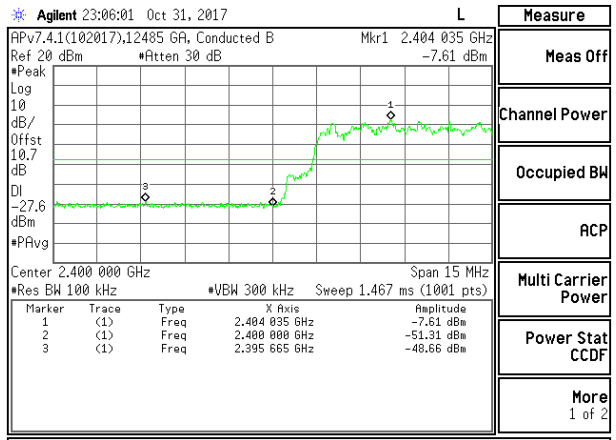


OUT-OF-BAND HIGH CHANNEL

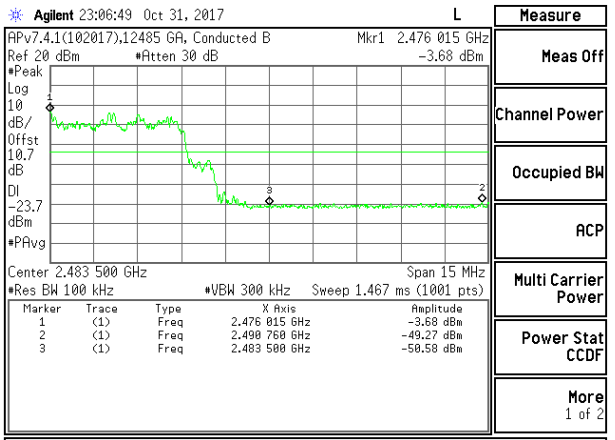


SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE



HIGH BANDEDGE

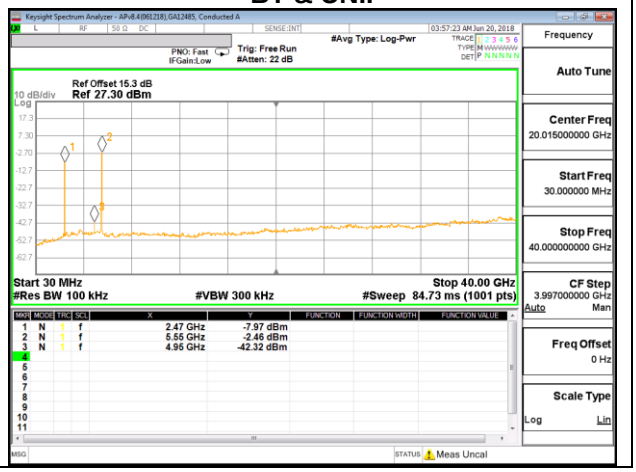


8.8.3. WORST-CASE CO-LOCATION

SPURIOUS EMISSION FOR CO-LOCATION (BT & WLAN)

BT & DTS

BT & UNII



Note: For BT & DTS, markers 1, 2 are the BT and DTS fundamental signals. For BT & UNII, markers 1, 2 are the BT and UNII fundamental signals.

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

9. RADIATED TEST RESULTS

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
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
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 for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T (360Hz) video bandwidth with peak detector for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

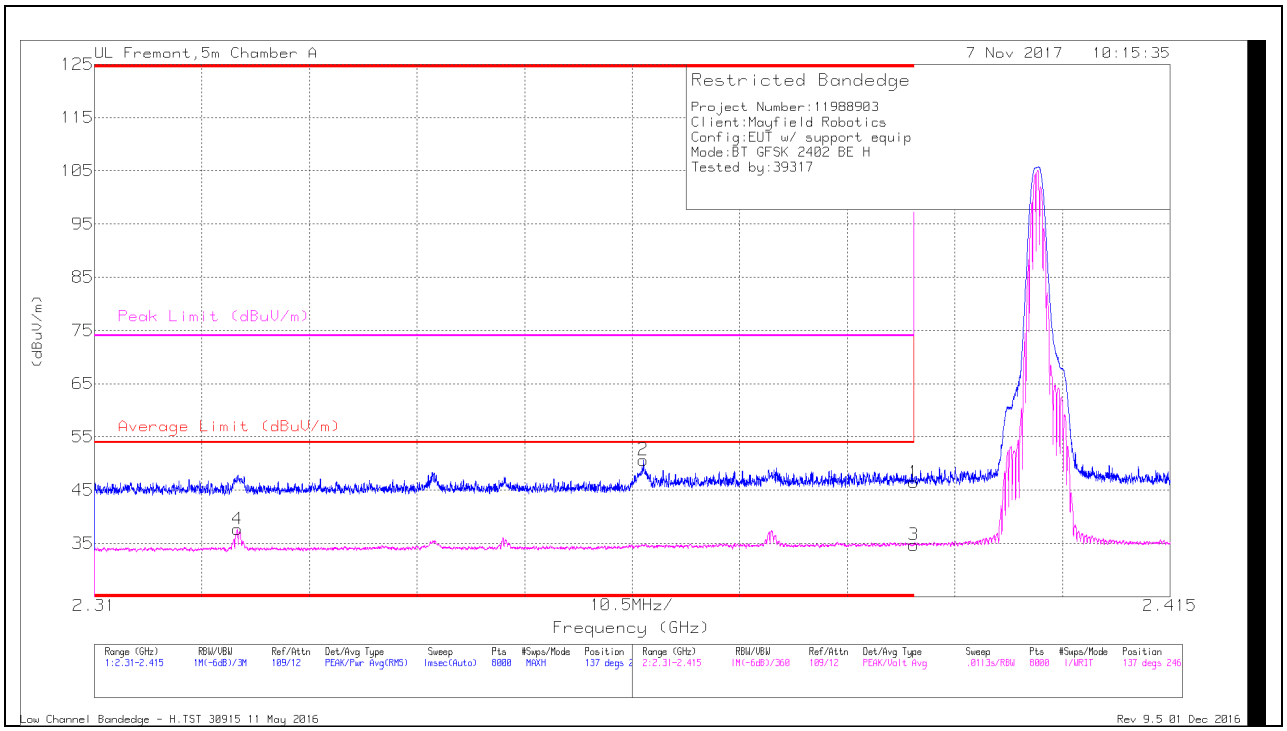
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULTS

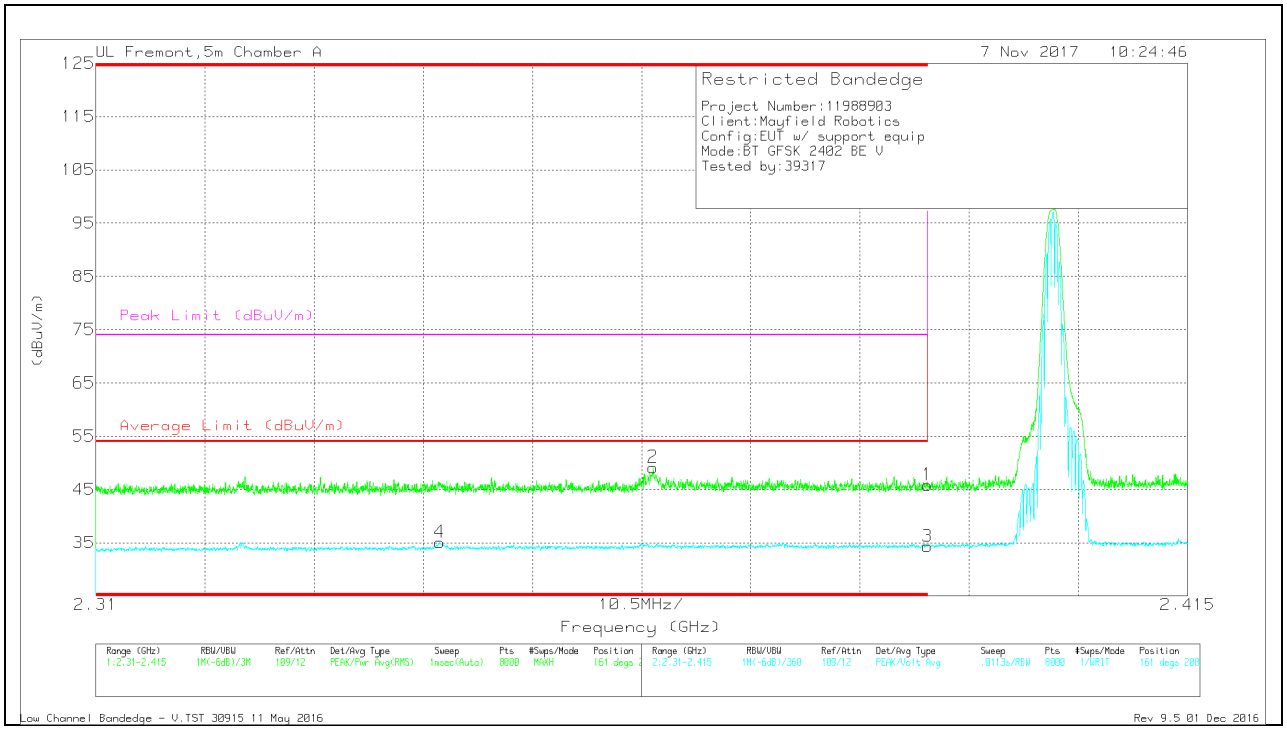


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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
4	* 2.324	29.34	VA1T	31.6	-23.3	37.64	54	-16.36	-	-	137	246	H
2	* 2.364	42.28	Pk	31.6	-23.2	50.68	-	-	74	-23.32	137	246	H
1	* 2.39	37.88	Pk	31.8	-23.2	46.48	-	-	74	-27.52	137	246	H
3	* 2.39	26.09	VA1T	31.8	-23.2	34.69	54	-19.31	-	-	137	246	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULTS



Trace Markers

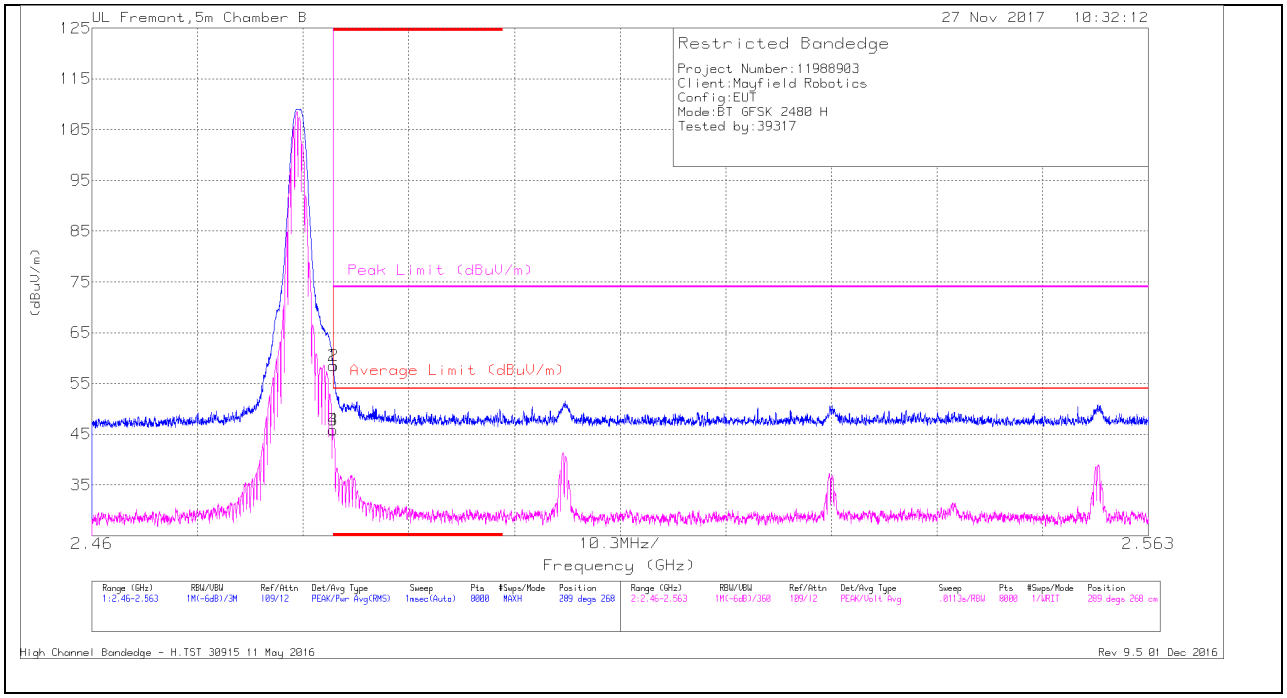
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.343	26.68	VA1T	31.6	-23.2	35.08	54	-18.92	-	-	161	208	V
2	* 2.364	40.74	Pk	31.6	-23.2	49.14	-	-	74	-24.86	161	208	V
1	* 2.39	37.25	Pk	31.8	-23.2	45.85	-	-	74	-28.15	161	208	V
3	* 2.39	25.69	VA1T	31.8	-23.2	34.29	54	-19.71	-	-	161	208	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

AUTHORIZED BANDEDGE (HIGH CHANNEL)

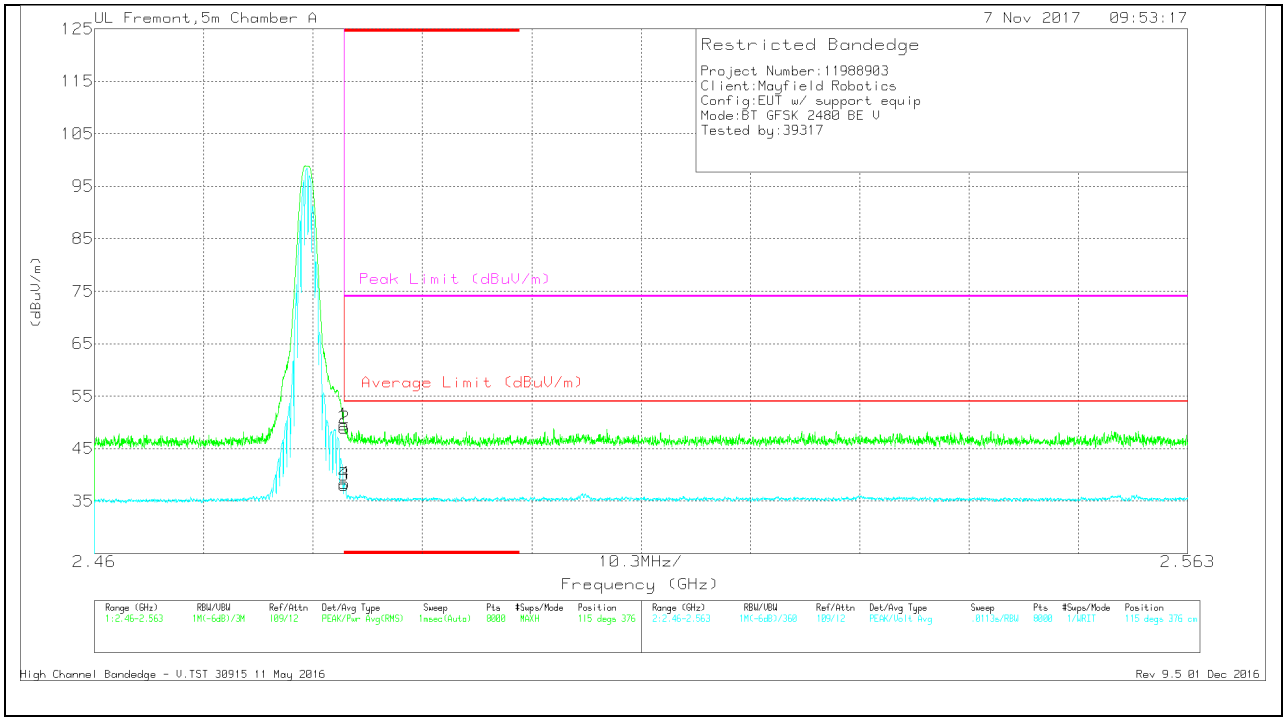
HORIZONTAL RESULTS



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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	46.93	Pk	32.5	-20.9	58.53	-	-	74	-15.47	289	268	H
2	* 2.484	46.91	Pk	32.5	-20.9	58.51	-	-	74	-15.49	289	268	H
3	* 2.484	34.23	VA1T	32.5	-20.9	45.83	54	-8.17	-	-	289	268	H
4	* 2.484	34.28	VA1T	32.5	-20.9	45.88	54	-8.12	-	-	289	268	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULTS



Trace Markers

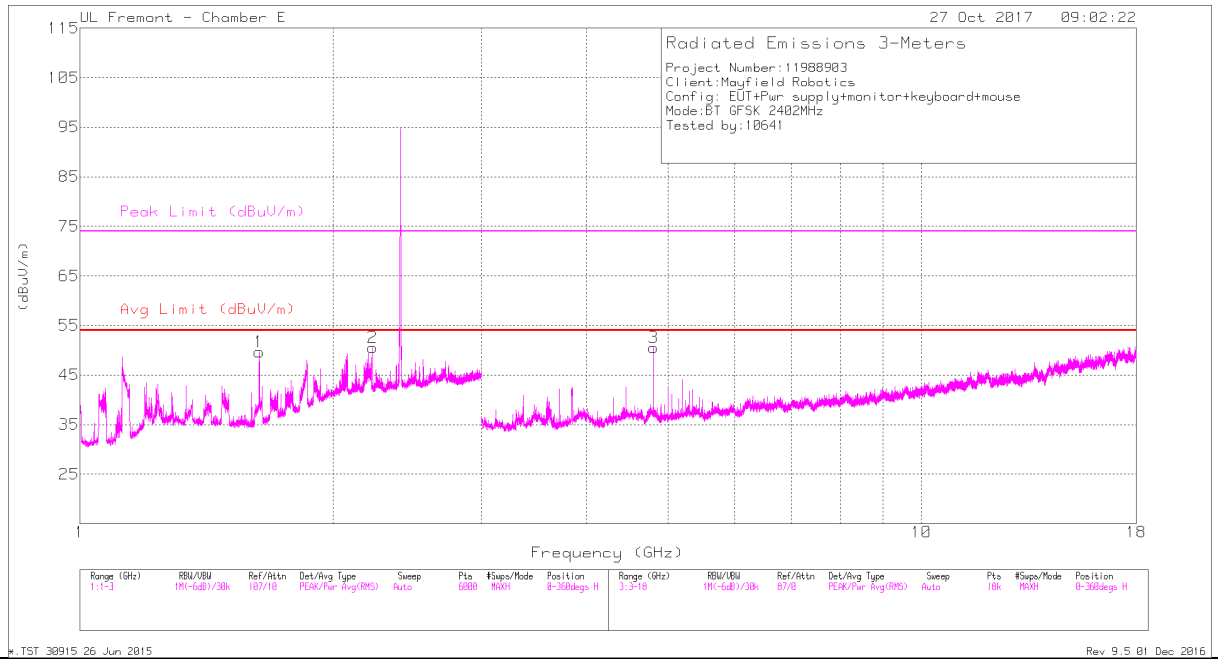
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.33	Pk	32.3	-23.1	49.53	-	-	74	-24.47	115	376	V
2	* 2.484	39.76	Pk	32.3	-23.1	48.96	-	-	74	-25.04	115	376	V
3	* 2.484	28.86	VA1T	32.3	-23.1	38.06	54	-15.94	-	-	115	376	V
4	* 2.484	29.14	VA1T	32.3	-23.1	38.34	54	-15.66	-	-	115	376	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

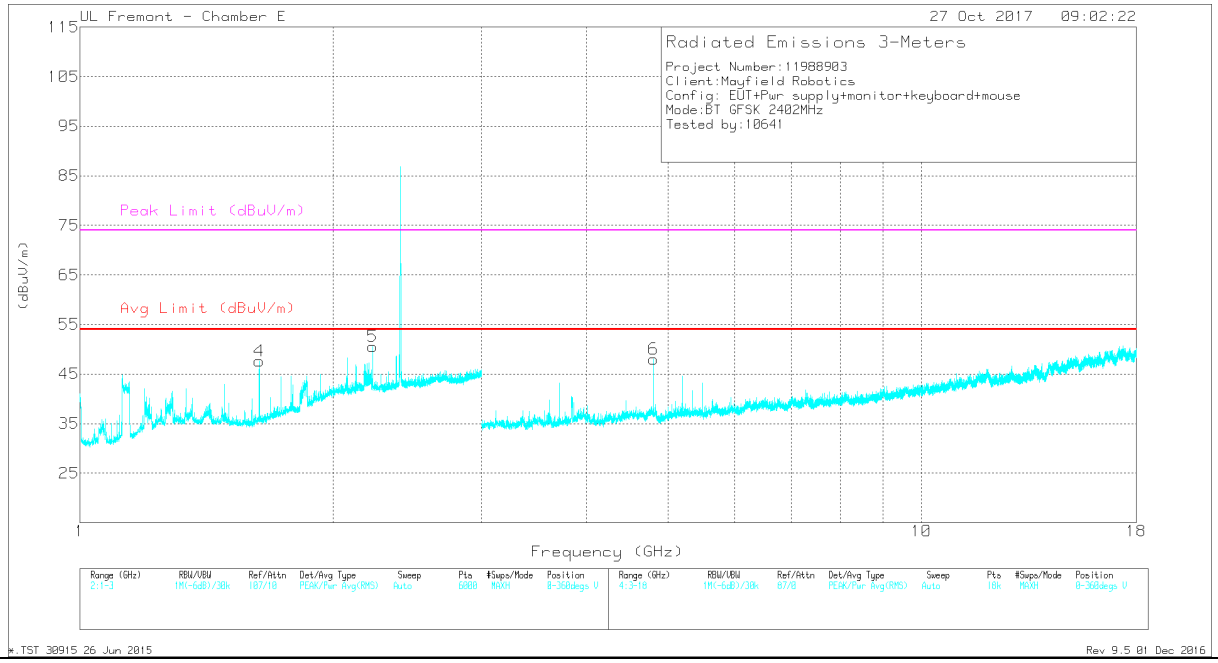
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

HORIZONTAL



VERTICAL



LOW CHANNEL DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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	* 2.228	41.19	PKFH	32	-19.4	53.79	-	-	74	-20.21	189	198	H
	* 2.228	33.69	VA1T	32	-19.4	46.29	54	-7.71	-	-	189	198	H
5	* 2.227	42.46	PKFH	32	-19.4	55.06	-	-	74	-18.94	187	226	V
	* 2.228	33.03	VA1T	32	-19.4	45.63	54	-8.37	-	-	187	226	V
3	* 4.804	49.13	PKFH	34.4	-29.1	54.43	-	-	74	-19.57	266	177	H
	* 4.804	44.81	VA1T	34.4	-29.1	50.11	54	-3.89	-	-	266	177	H
6	* 4.804	47.36	PKFH	34.4	-29.1	52.66	-	-	74	-21.34	143	117	V
	* 4.804	42.75	VA1T	34.4	-29.1	48.05	54	-5.95	-	-	143	117	V
1	1.634	44.38	PKFH	27.5	-20.6	51.28	-	-	-	-	204	122	H
4	1.634	42.63	PKFH	27.5	-20.6	49.53	-	-	-	-	161	221	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

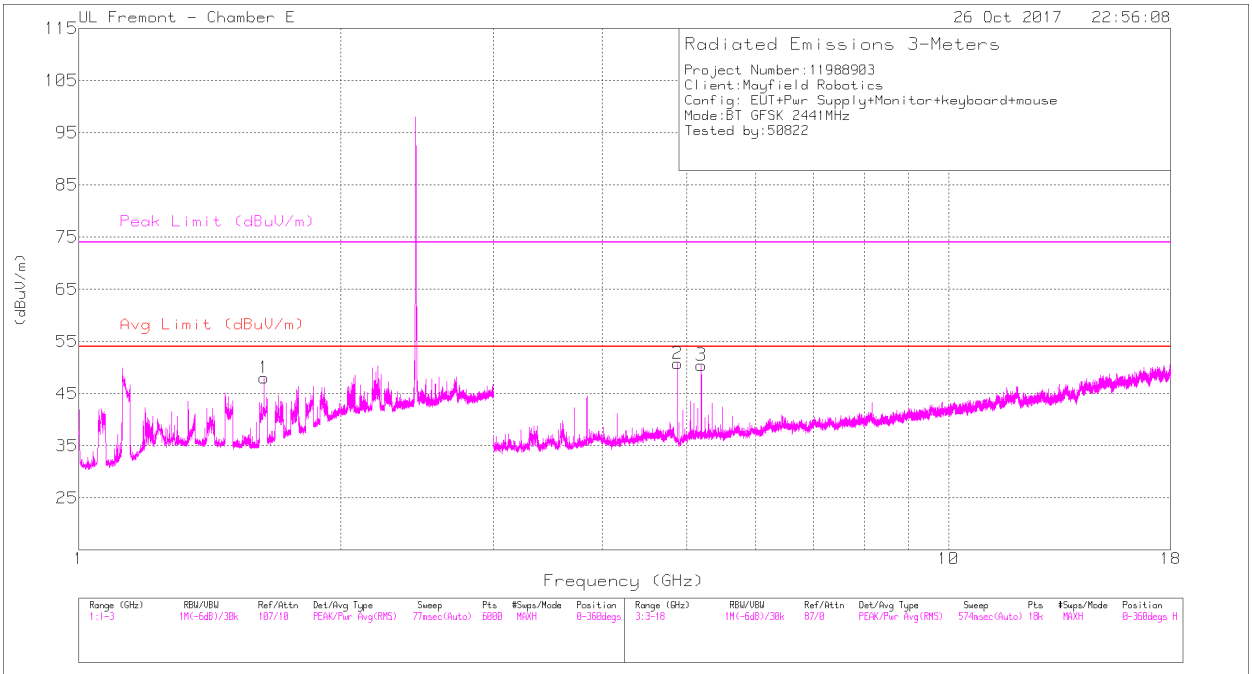
PKFH - FHSS: RB=1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

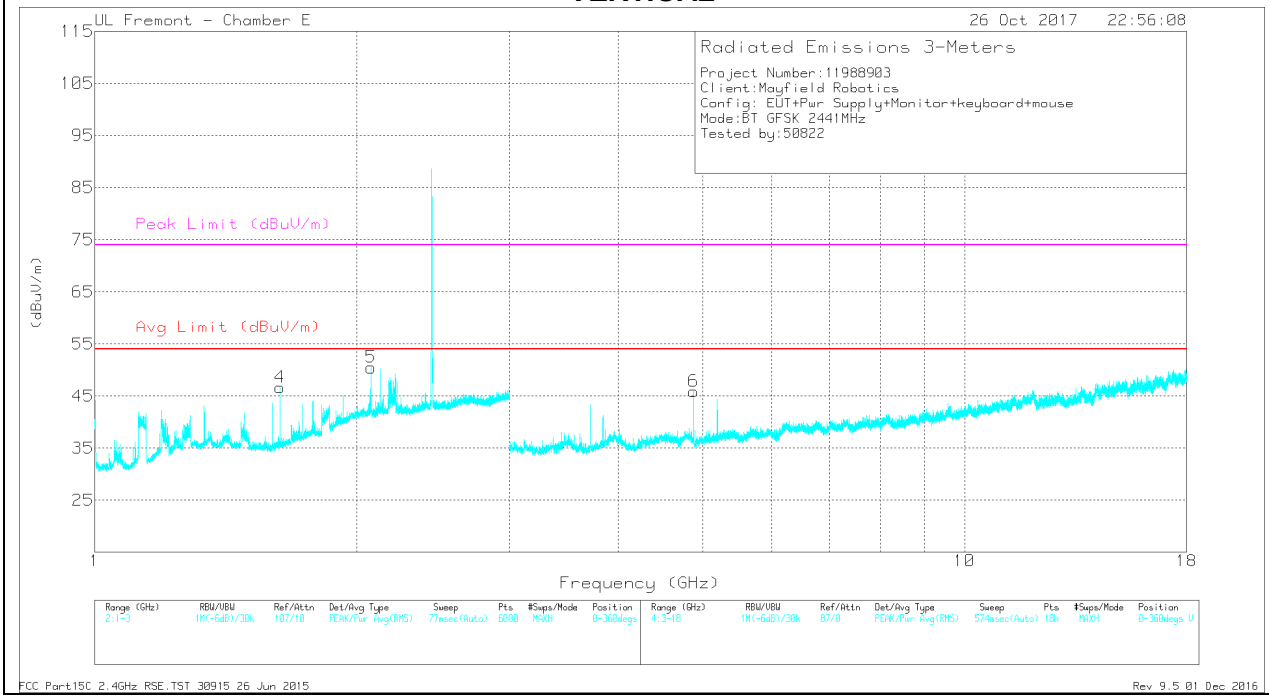
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

MID CHANNEL RESULTS

HORIZONTAL



VERTICAL



MID CHANNEL DATA

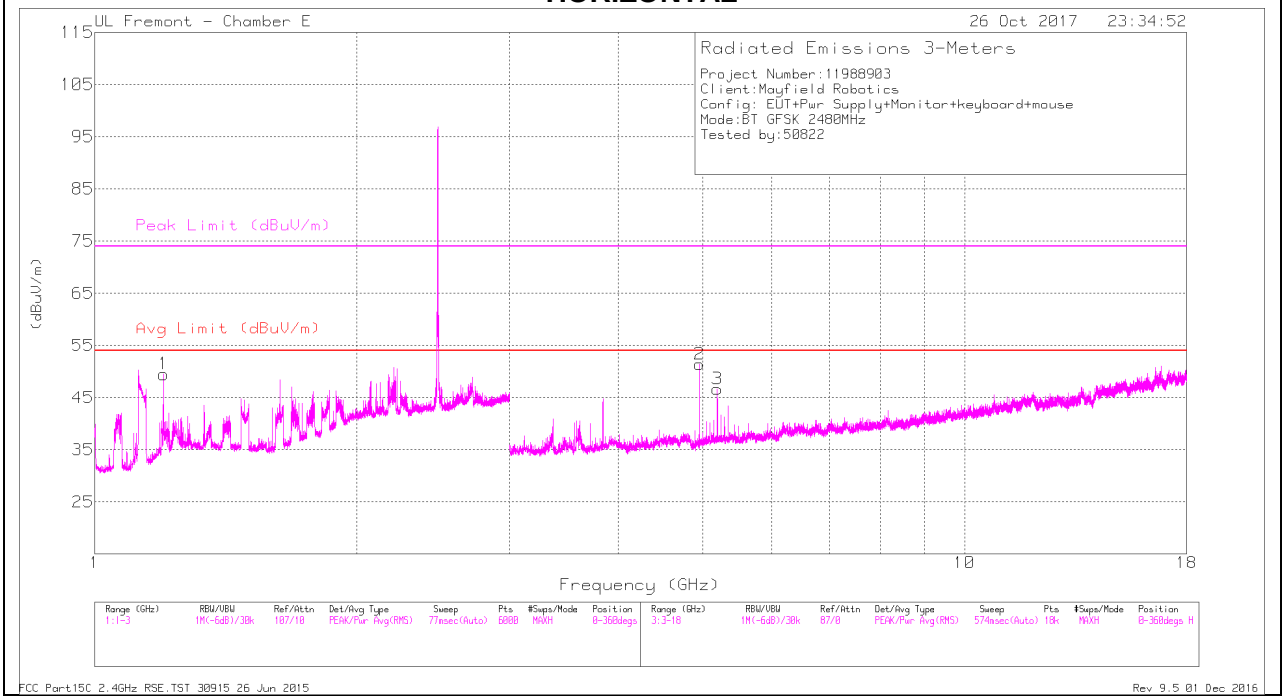
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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	48.87	PKFH	34.5	-29.5	53.87	-	-	74	-20.13	126	234	H
	* 4.882	44.84	VA1T	34.5	-29.4	49.94	54	-4.06	-	-	126	234	H
6	* 4.882	45.17	PKFH	34.5	-29.4	50.27	-	-	74	-23.73	63	101	V
	* 4.882	39.63	VA1T	34.5	-29.4	44.73	54	-9.27	-	-	63	101	V
1	1.633	42.66	PKFH	27.5	-20.6	49.56	-	-	-	-	192	101	V
4	1.634	43.67	PKFH	27.5	-20.6	50.57	-	-	-	-	167	187	H
5	2.079	39.17	PKFH	32.1	-20	51.27	-	-	-	-	187	101	V
6	5.198	44.68	PKFH	34.8	-29.7	49.78	-	-	-	-	14	110	H

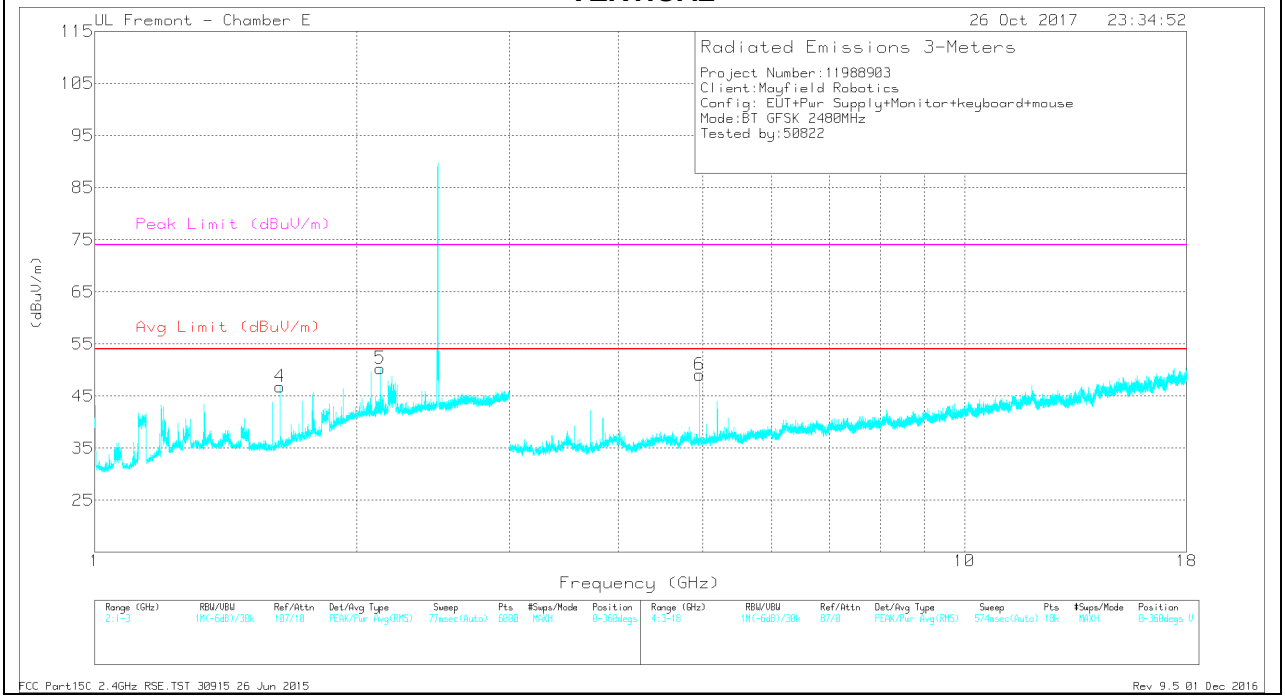
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL RESULTS

HORIZONTAL



VERTICAL



HIGH CHANNEL DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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	* 1.2	49.51	PKFH	28	-22.1	55.41	-	-	74	-18.59	227	101	H
	* 1.2	25.33	VA1T	28	-22.1	31.23	54	-22.77	-	-	227	101	H
2	* 4.96	50.08	PKFH	34.5	-29.8	54.78	-	-	74	-19.22	178	203	H
	* 4.96	45.85	VA1T	34.5	-29.8	50.55	54	-3.45	-	-	178	203	H
6	* 4.96	47.78	PKFH	34.5	-29.8	52.48	-	-	74	-21.52	53	180	V
	* 4.96	43.65	VA1T	34.5	-29.8	48.35	54	-5.65	-	-	53	180	V
4	1.633	41.37	PKFH	27.5	-20.6	48.27	-	-	-	-	208	101	V
5	2.129	39.59	PKFH	32.1	-19.7	51.99	-	-	-	-	188	135	V
3	5.198	44.2	PKFH	34.8	-29.7	49.3	-	-	-	-	355	102	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH - FHSS: RB=1MHz VB=3 x RB, Peak

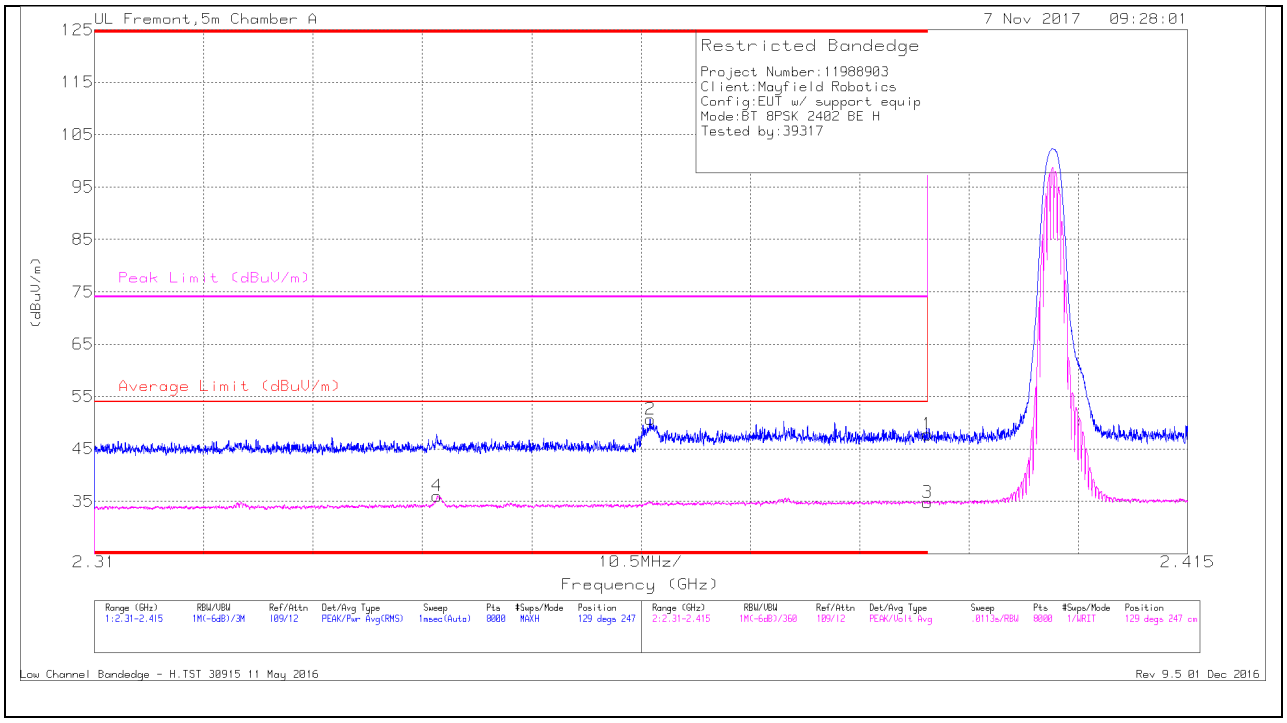
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

9.1.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULTS

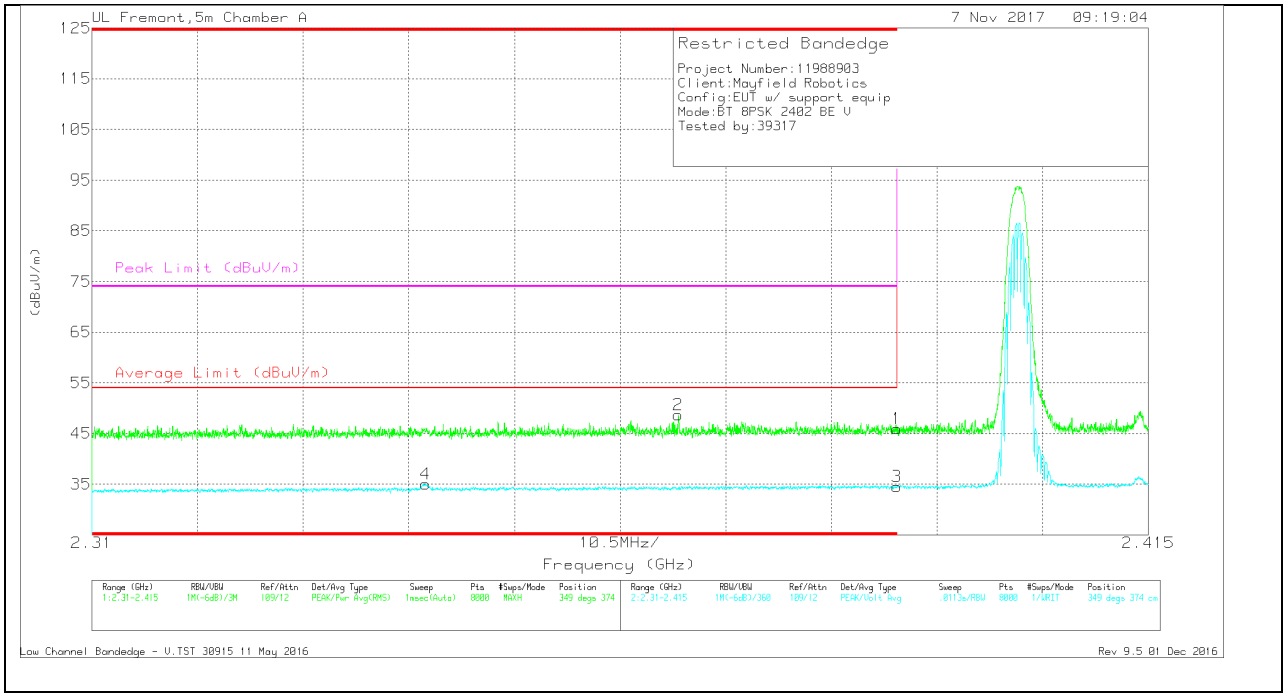


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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
4	* 2.343	27.65	VA1T	31.6	-23.2	36.05	54	-17.95	-	-	129	247	H
2	* 2.363	42.28	Pk	31.6	-23.2	50.68	-	-	74	-23.32	129	247	H
1	* 2.39	39.15	Pk	31.8	-23.2	47.75	-	-	74	-26.25	129	247	H
3	* 2.39	26.22	VA1T	31.8	-23.2	34.82	54	-19.18	-	-	129	247	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULTS



Trace Markers

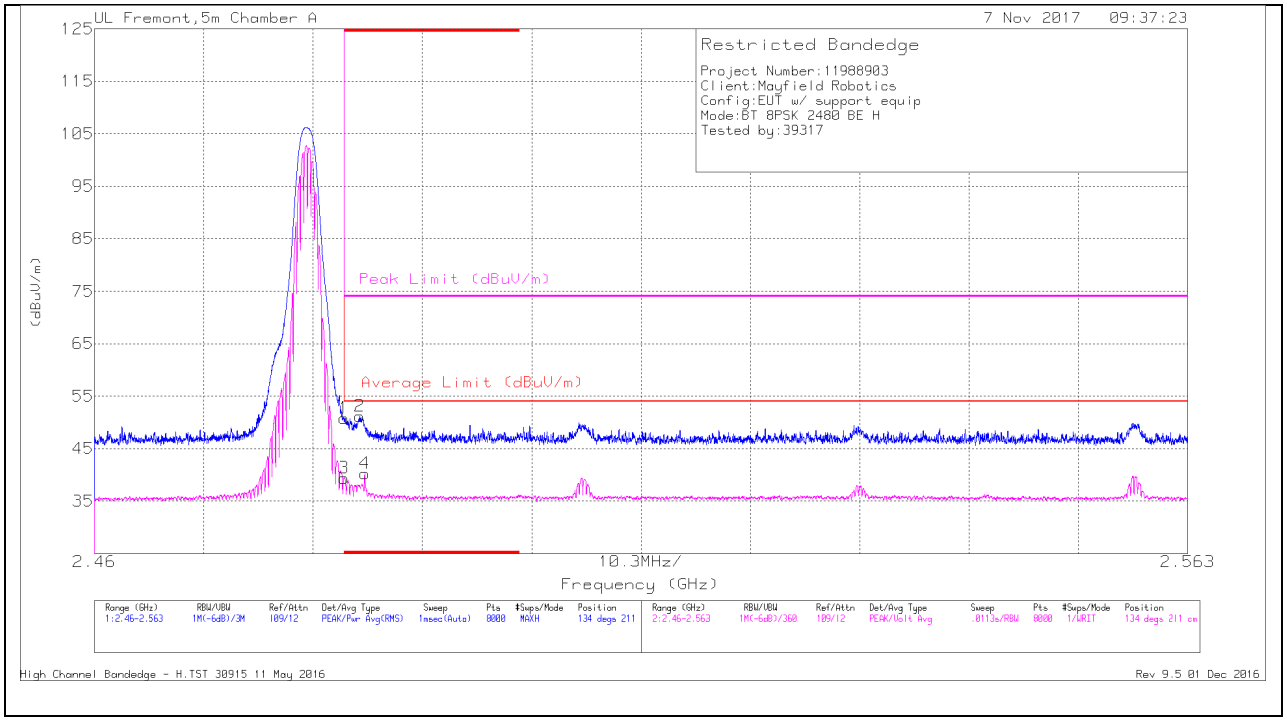
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.34	Pk	31.8	-23.2	45.94	-	-	74	-28.06	349	374	V
2	* 2.368	40.21	Pk	31.7	-23.2	48.71	-	-	74	-25.29	349	374	V
3	* 2.39	25.91	VA1T	31.8	-23.2	34.51	54	-19.49	-	-	349	374	V
4	* 2.343	26.67	VA1T	31.6	-23.2	35.07	54	-18.93	-	-	349	374	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULTS

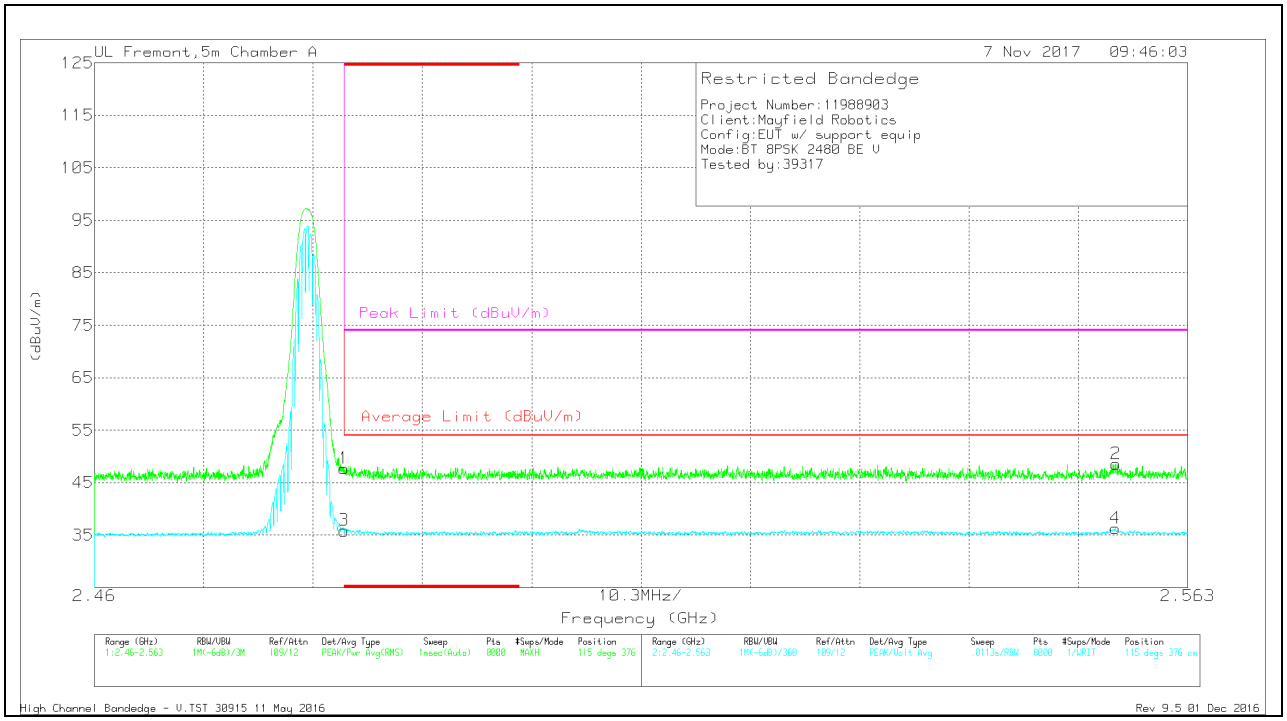


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (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	41.62	Pk	32.3	-23.1	50.82	-	-	74	-23.18	134	211	H
3	* 2.484	30.15	VA1T	32.3	-23.1	39.35	54	-14.65	-	-	134	211	H
2	* 2.485	41.99	Pk	32.3	-23.1	51.19	-	-	74	-22.81	134	211	H
4	* 2.485	31.09	VA1T	32.3	-23.1	40.29	54	-13.71	-	-	134	211	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULTS



Trace Markers

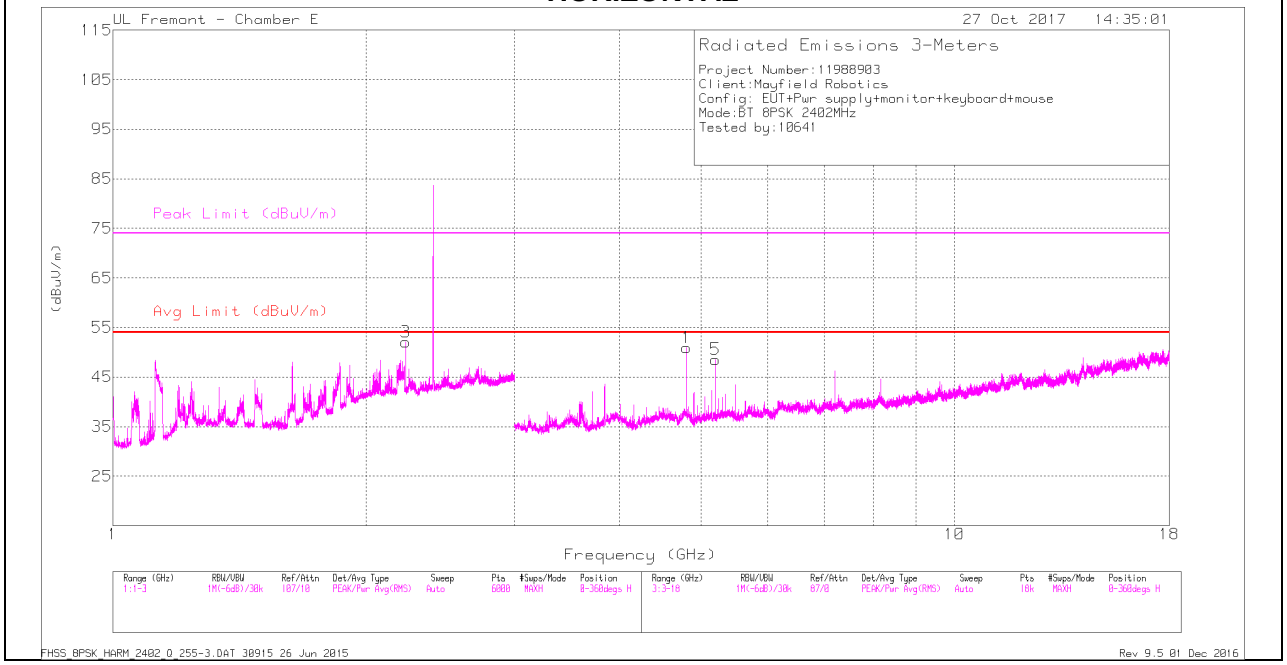
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.54	Pk	32.3	-23.1	47.74	-	-	74	-26.26	115	376	V
3	* 2.484	26.63	VA1T	32.3	-23.1	35.83	54	-18.17	-	-	115	376	V
2	2.556	39.3	Pk	32.3	-23	48.6	-	-	74	-25.4	115	376	V
4	2.556	26.91	VA1T	32.3	-23	36.21	54	-17.79	-	-	115	376	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

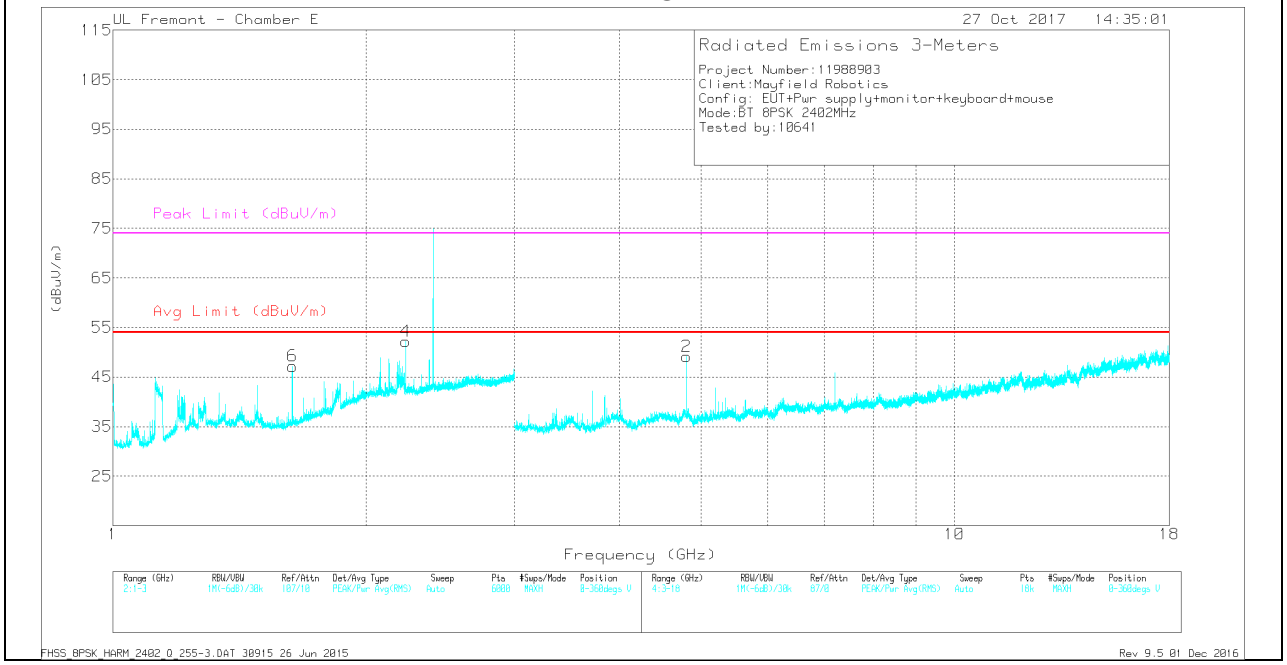
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

HORIZONTAL



VERTICAL



LOW CHANNEL DATA

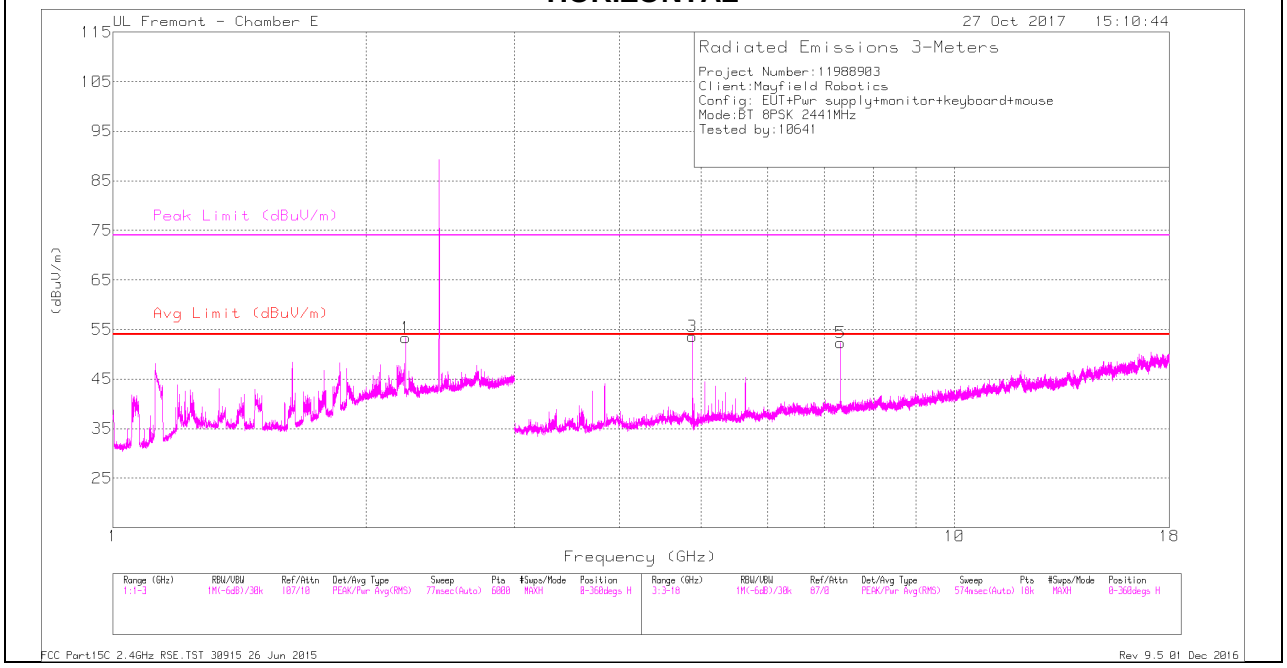
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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	* 2.228	41.6	PKFH	32	-19.4	54.2	-	-	74	-19.8	159	202	H
	* 2.228	32.98	VA1T	32	-19.4	45.58	54	-8.42	-	-	159	202	H
4	* 2.227	41.6	PKFH	32	-19.4	54.2	-	-	74	-19.8	169	151	V
	* 2.228	35.73	VA1T	32	-19.4	48.33	54	-5.67	-	-	169	151	V
1	* 4.804	52.4	PKFH	34.4	-29.1	57.7	-	-	74	-16.3	227	244	H
	* 4.804	45.1	VA1T	34.4	-29.1	50.4	54	-3.6	-	-	227	244	H
2	* 4.804	47.59	PKFH	34.4	-29.1	52.89	-	-	74	-21.11	219	133	V
	* 4.804	40.32	VA1T	34.4	-29.1	45.62	54	-8.38	-	-	219	133	V
6	1.633	41.28	PKFH	27.5	-20.6	48.18	-	-	-	-	198	250	V
5	5.198	41.49	PKFH	34.8	-29.7	46.59	-	-	-	-	183	130	H

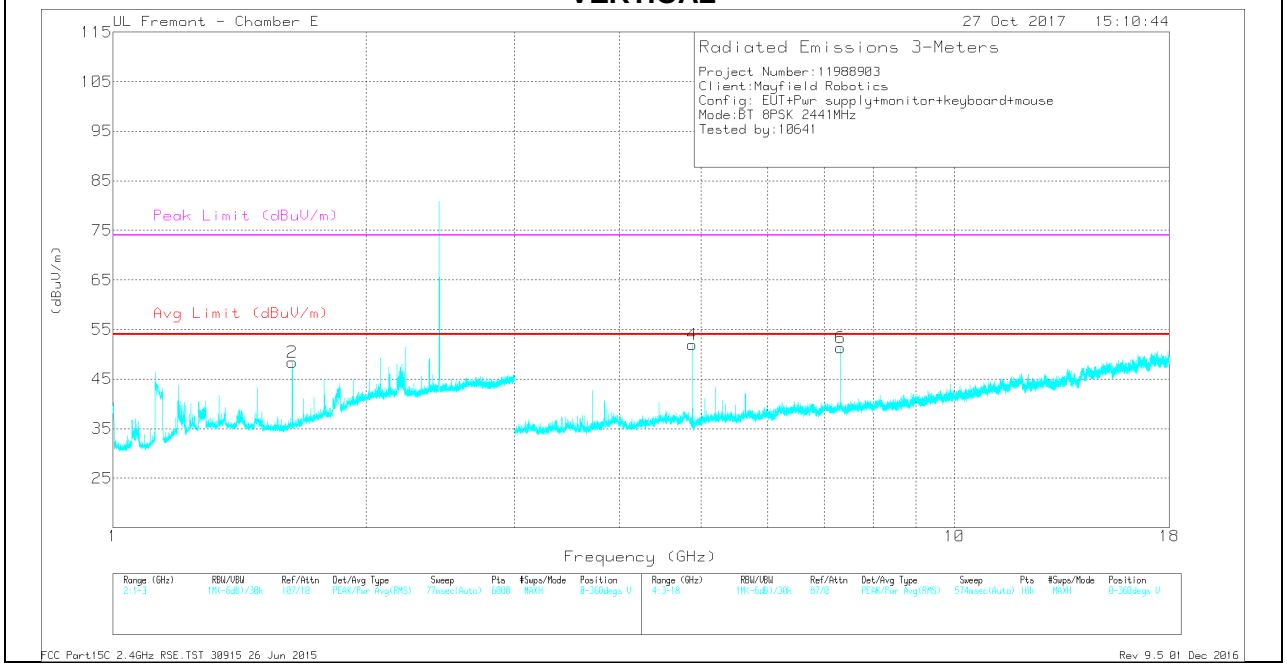
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL RESULTS

HORIZONTAL



VERTICAL



MID CHANNEL DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (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	* 4.882	51.57	PKFH	34.5	-29.4	56.67	-	-	74	-17.33	51	191	H
	* 4.882	44.35	VA1T	34.5	-29.4	49.45	54	-4.55	-	-	51	191	H
5	* 7.323	47.09	PKFH	36	-25.6	57.49	-	-	74	-16.51	9	178	H
	* 7.323	39.14	VA1T	36	-25.6	49.54	54	-4.46	-	-	9	178	H
4	* 4.882	52.72	PKFH	34.5	-29.4	57.82	-	-	74	-16.18	141	204	V
	* 4.882	44.94	VA1T	34.5	-29.4	50.04	54	-3.96	-	-	141	204	V
6	* 7.323	47.45	PKFH	36	-25.6	57.85	-	-	74	-16.15	355	288	V
	* 7.323	39.28	VA1T	36	-25.6	49.68	54	-4.32	-	-	355	288	V

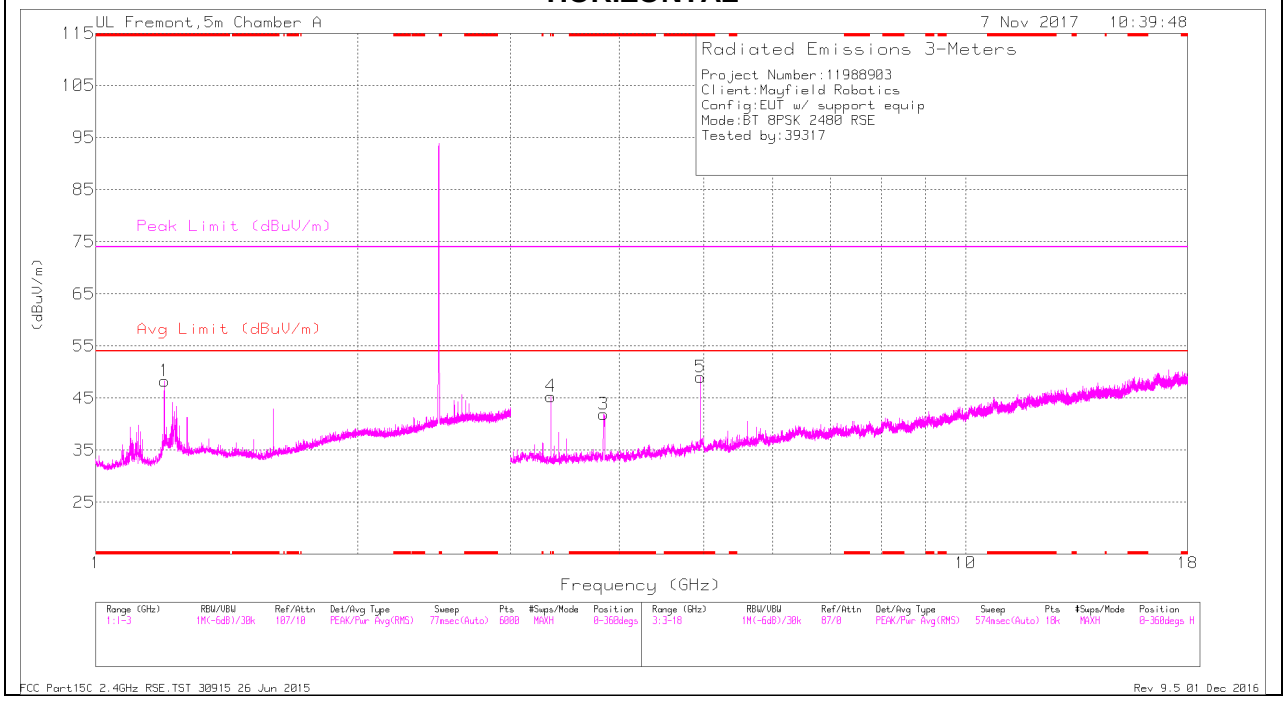
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH - FHSS: RB=1MHz VB=3 x RB, Peak

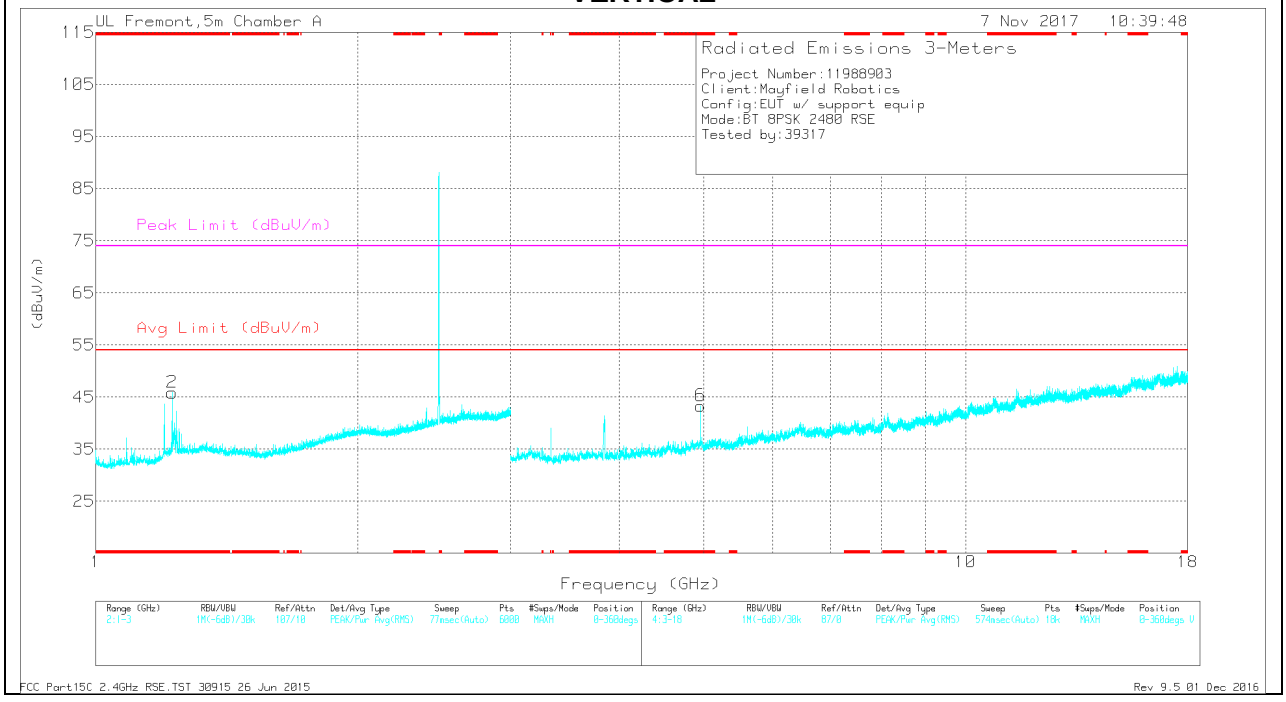
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL RESULTS

HORIZONTAL



VERTICAL



HIGH CHANNEL DATA

Radiated Emissions

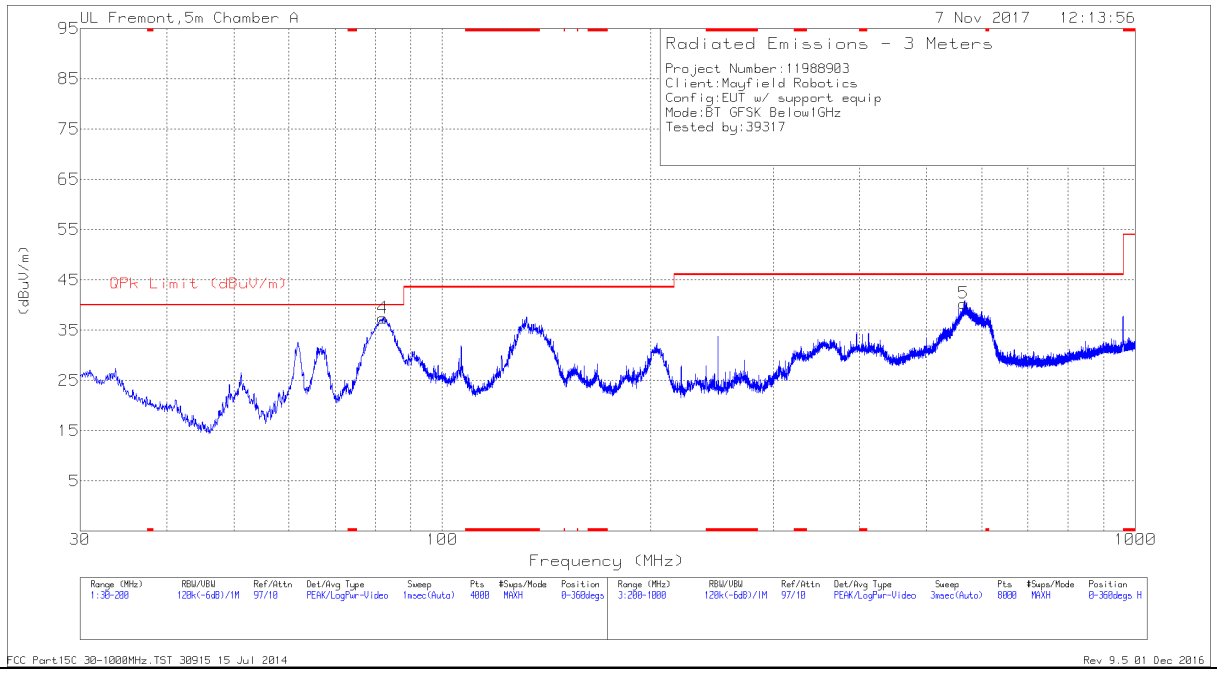
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.201	46.38	PKFH	28.2	-23.6	50.98	-	-	74	-23.02	238	251	H
	* 1.199	25.6	VA1T	28.2	-23.6	30.2	54	-23.8	-	-	238	251	H
2	* 1.225	35.81	PKFH	28.7	-23.6	40.91	-	-	74	-33.09	7	133	V
	* 1.226	24.96	VA1T	28.7	-23.6	30.06	54	-23.94	-	-	7	133	V
3	* 3.834	46.05	PKFH	33	-29.5	49.55	-	-	74	-24.45	92	228	H
	* 3.834	29.74	VA1T	33	-29.5	33.24	54	-20.76	-	-	92	228	H
5	* 4.96	45.71	PKFH	34.2	-27.9	52.01	-	-	74	-21.99	95	234	H
	* 4.96	39.15	VA1T	34.2	-27.9	45.45	54	-8.55	-	-	95	234	H
4	* 3.337	45.14	PKFH	32.7	-30.1	47.74	-	-	74	-26.26	119	191	H
	* 3.337	40.11	VA1T	32.7	-30.1	42.71	54	-11.29	-	-	119	191	H
6	* 4.96	41.88	PKFH	34.2	-27.9	48.18	-	-	74	-25.82	20	152	V
	* 4.96	34.13	VA1T	34.2	-27.9	40.43	54	-13.57	-	-	20	152	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

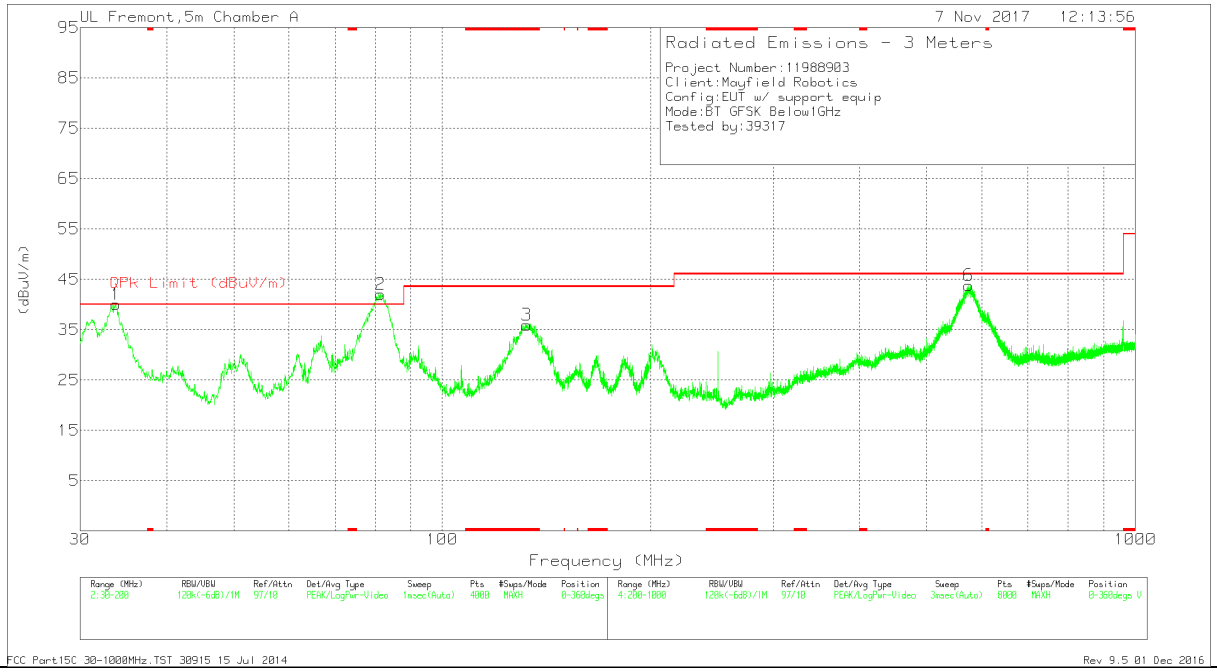
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

9.2. WORST-CASE BELOW 1 GHz

HORIZONTAL



VERTICAL



Below 1GHz DATA

Radiated Emissions

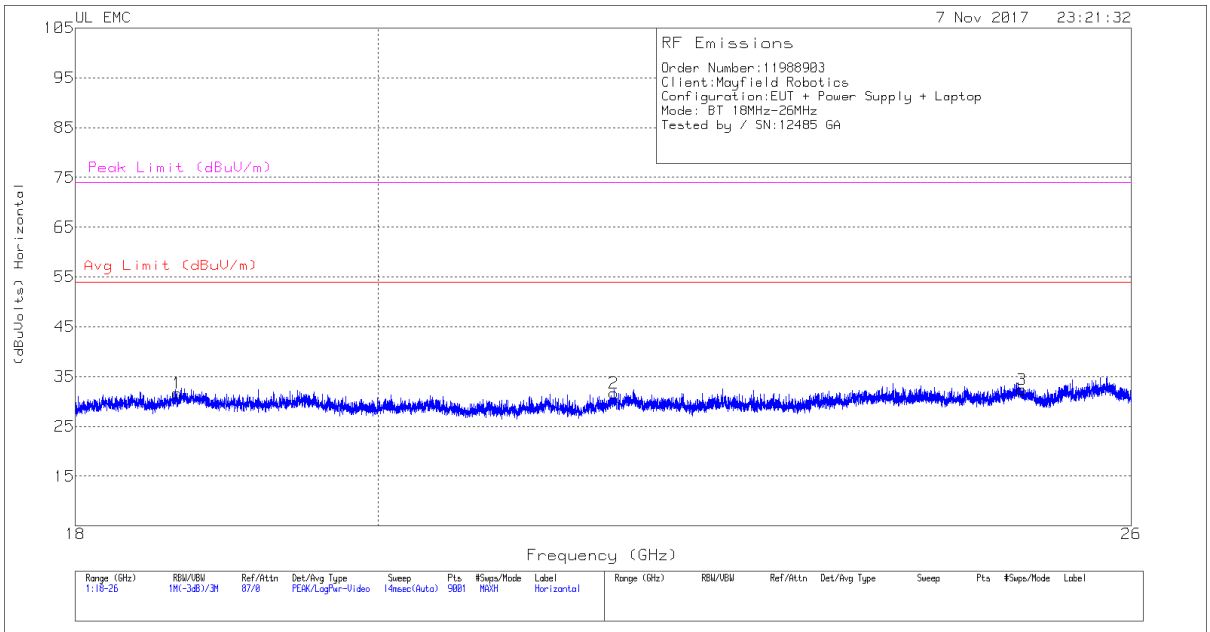
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 132.324	36.92	Qp	17.8	-26	28.72	43.52	-14.8	121	100	V
1	33.7835	38.8	Qp	22.5	-27.2	34.1	40	-5.9	146	111	V
2	81.4808	52.42	Qp	11.4	-26.6	37.22	40	-2.78	121	142	V
4	82.0335	49.35	Qp	11.4	-26.6	34.15	40	-5.85	119	242	H
5	565.2475	39.24	Qp	22.5	-25.1	36.64	46.02	-9.38	158	187	H
6	575.3488	42.53	Qp	22.7	-25.1	40.13	46.02	-5.89	274	114	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Qp - Quasi-Peak detector

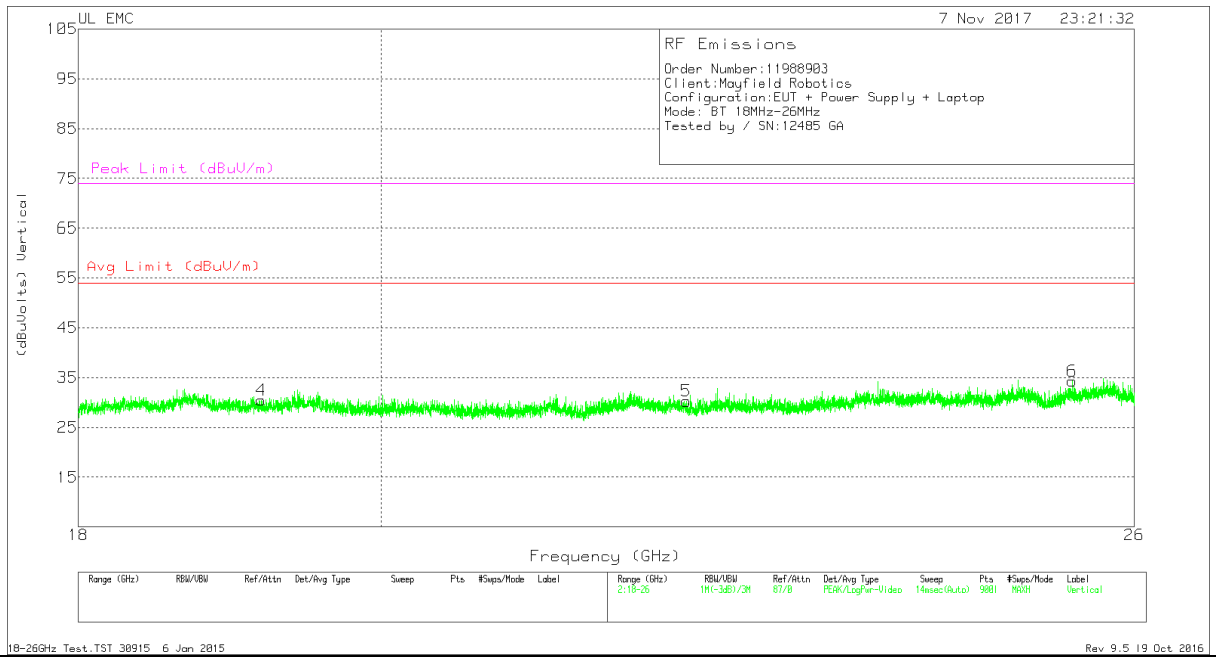
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

9.3. WORST-CASE 18-26GHz

HORIZONTAL



VERTICAL



18-26GHz DATA

Trace Markers

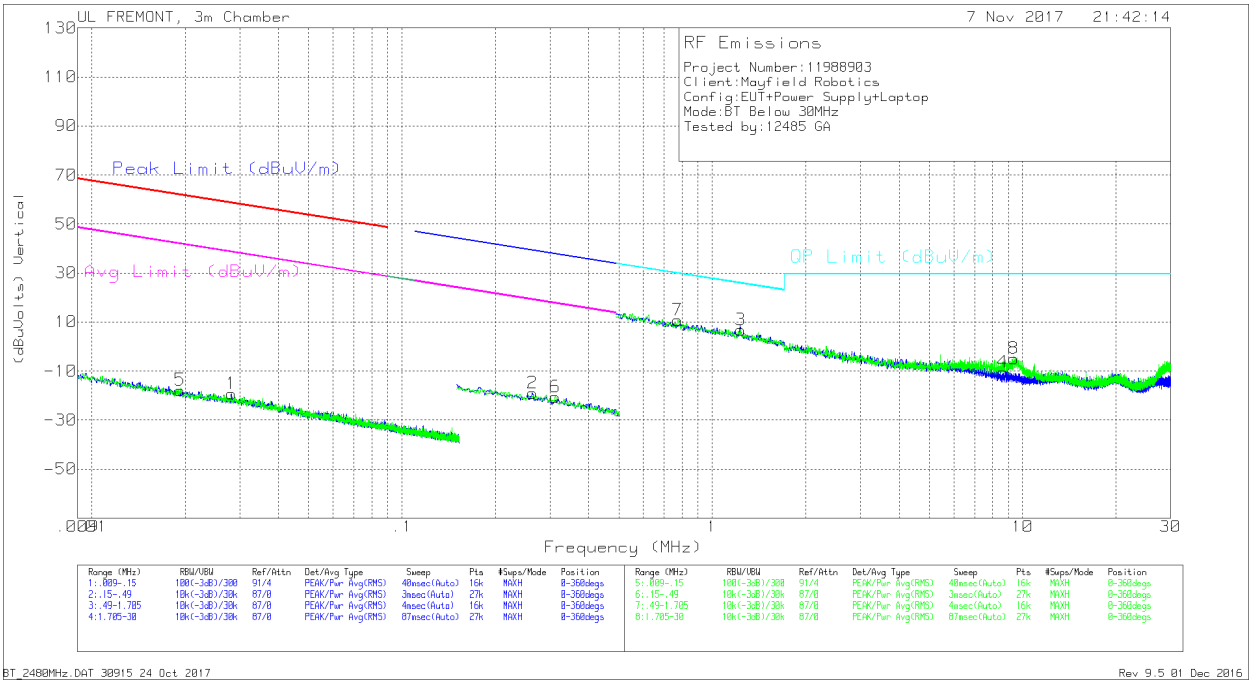
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.65	33.65	Pk	32.5	-25	-9.5	31.65	54	-22.35	74	-42.35
2	21.713	32.59	Pk	33.3	-24.7	-9.5	31.69	54	-22.31	74	-42.31
3	25.028	32.46	Pk	34.1	-24.7	-9.5	32.36	54	-21.64	74	-41.64
4	19.183	32.33	Pk	32.3	-24.7	-9.5	30.43	54	-23.57	74	-43.57
5	22.245	31.85	Pk	32.7	-24.8	-9.5	30.25	54	-23.75	74	-43.75
6	25.444	34.42	Pk	33.8	-24.4	-9.5	34.32	54	-19.68	74	-39.68

Pk - Peak detector

9.4. WORST-CASE BELOW 30 MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL AND VERTICAL PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.01928	45.97	Pk	14.8	1.4	-80	-17.83	61.88	-79.71	41.88	-59.71	-	-	-	-	0-360
1	.02817	43.87	Pk	15.4	1.4	-80	-19.33	58.59	-77.92	38.59	-57.92	-	-	-	-	0-360
2	.26311	45.74	Pk	13.8	1.5	-80	-18.96	-	-	-	-	39.21	-58.17	19.21	-38.17	0-360
6	.31147	44.17	Pk	13.8	1.5	-80	-20.53	-	-	-	-	37.74	-58.27	17.74	-38.27	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
7	.7747	35.14	Pk	14	1.5	-40	10.64	29.83	-19.19	0-360
3	1.23351	30.96	Pk	14.3	1.5	-40	6.76	25.8	-19.04	0-360
4	8.64695	13.55	Pk	14.4	1.5	-40	-10.55	29.5	-40.05	0-360
8	9.37741	18.98	Pk	14.5	1.5	-40	-5.02	29.5	-34.52	0-360

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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 C63.10.

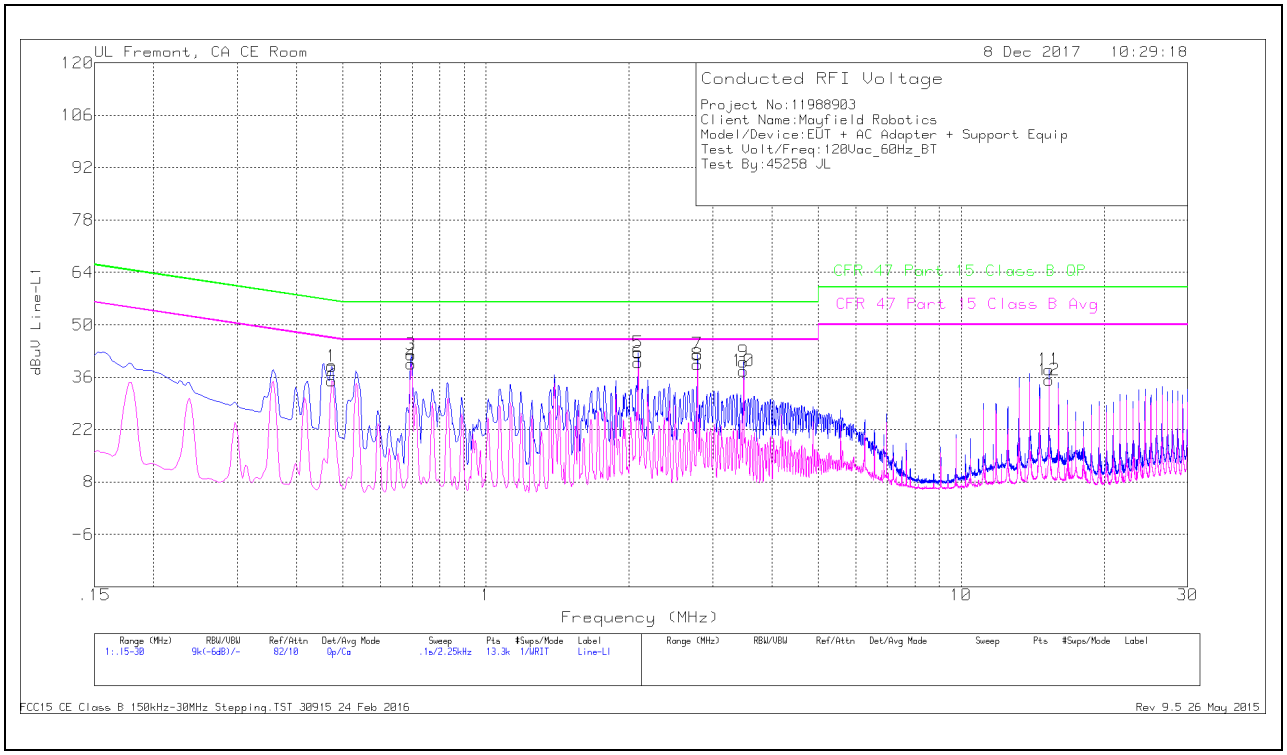
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

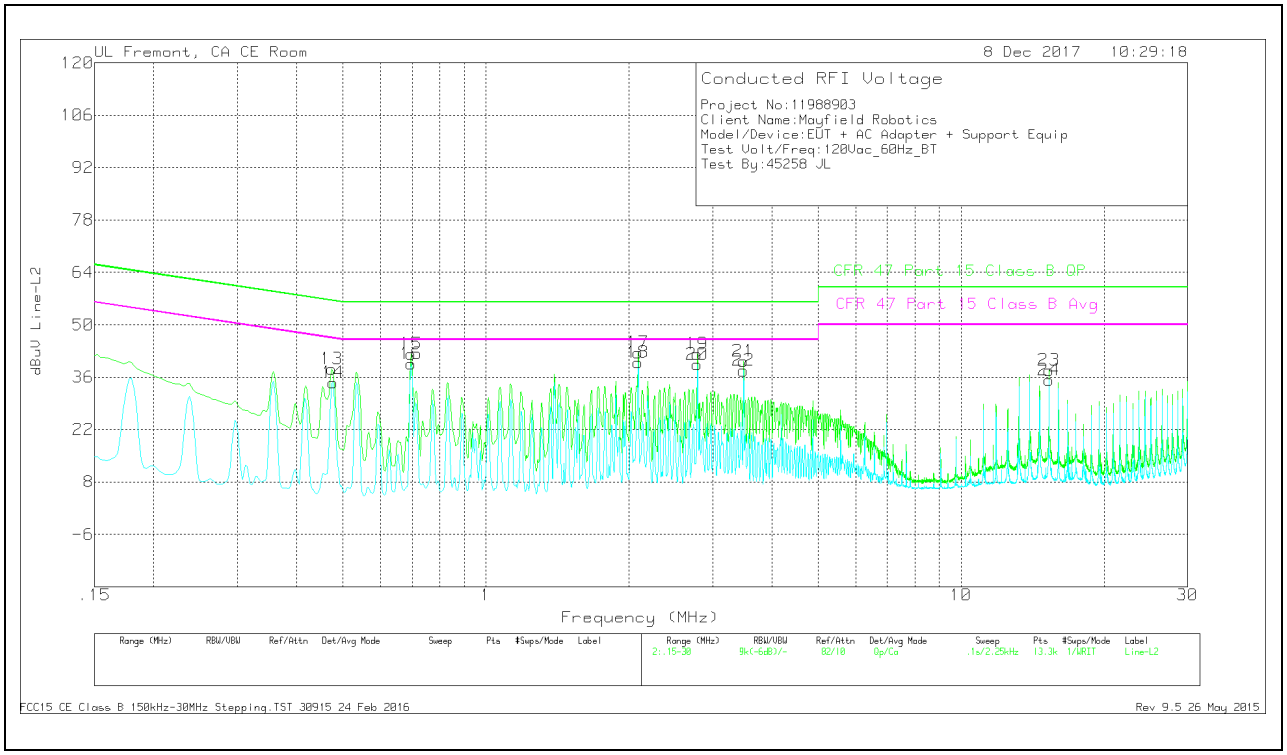
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.474	28.76	Qp	0	0	10.1	38.86	56.44	-17.58	-	-
2	.474	24.95	Ca	0	0	10.1	35.05	-	-	46.44	-11.39
3	.69675	31.98	Qp	0	0	10.1	42.08	56	-13.92	-	-
4	.69675	29.47	Ca	0	0	10.1	39.57	-	-	46	-6.43
5	2.09175	32.36	Qp	0	.1	10.1	42.56	56	-13.44	-	-
6	2.09175	29.65	Ca	0	.1	10.1	39.85	-	-	46	-6.15
7	2.78925	31.89	Qp	0	.1	10.1	42.09	56	-13.91	-	-
8	2.78925	29.25	Ca	0	.1	10.1	39.45	-	-	46	-6.55
9	3.4845	29.83	Qp	0	.1	10.2	40.13	56	-15.87	-	-
10	3.4845	27.42	Ca	0	.1	10.2	37.72	-	-	46	-8.28
11	15.333	27.36	Qp	0	.3	10.3	37.96	60	-22.04	-	-
12	15.33525	24.61	Ca	0	.3	10.3	35.21	-	-	50	-14.79

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.474	28	Qp	0	0	10.1	38.1	56.44	-18.34	-	-
14	.47625	24.47	Ca	0	0	10.1	34.57	-	-	46.4	-11.83
15	.69675	32.03	Qp	0	0	10.1	42.13	56	-13.87	-	-
16	.69675	29.52	Ca	0	0	10.1	39.62	-	-	46	-6.38
17	2.09175	32.36	Qp	0	.1	10.1	42.56	56	-13.44	-	-
18	2.09175	29.67	Ca	0	.1	10.1	39.87	-	-	46	-6.13
19	2.787	31.91	Qp	0	.1	10.1	42.11	56	-13.89	-	-
20	2.787	29.25	Ca	0	.1	10.1	39.45	-	-	46	-6.55
21	3.4845	29.97	Qp	0	.1	10.2	40.27	56	-15.73	-	-
22	3.4845	27.45	Ca	0	.1	10.2	37.75	-	-	46	-8.25
23	15.333	27.26	Qp	0	.3	10.3	37.86	60	-22.14	-	-
24	15.33525	24.64	Ca	0	.3	10.3	35.24	-	-	50	-14.76

Qp - Quasi-Peak detector

Ca - CISPR average detection