



FCC CFR47 PART 15 SUBPART H

CERTIFICATION TEST REPORT

FOR

FIXED TV BAND DEVICE

MODEL NUMBER: ACRS 2.0

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/06/2013	Microsoft Kenya release	F. de Anda
A	09/27/2013	Final release	F. de Anda
B	02/21/2014	Updates to include alternate antenna data	F. de Anda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Adaptrum
25 E. Trimble Road
San Jose, CA 95131

EUT DESCRIPTION: Fixed TV Band Device

MODEL: ACRS 2.0

SERIAL NUMBER: Conducted Tests: A200A019
Radiated Tests: A200A019

DATE TESTED: JULY 16 to SEPTEMBER 05, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART H	Pass

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

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

Approved & Released For
UL Verification Services Inc. By:

Tested By:



FRACISCO DE ANDA
PROJECT LEAD
UL Verification Services Inc.



J. VANG
EMC ENGINEER
UL Verification Services Inc.

2. SCOPE

This report documents the results of RF and emissions tests. It does not include database test results.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15 Subpart H, KDB 416271 D01 v02, and ANSI C63.4-2009.

4. FACILITIES AND ACCREDITATION

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

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

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

5.3. MEASUREMENT UNCERTAINTY

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

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

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

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a TV Band Fixed Device with a tuning range from 473 Mhz to 695 Mhz.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power of 21.18 dBm (131 mW).

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio can be configured with the following antenna types, and highest gain for each type:

- Log Periodic (Flag) with 10.15 dBi
- DB2E with 11.8 dBi Gain
- PCB with 2.3 dBi Gain

6.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was C.1.0.1 firmware.

6.5. WORST-CASE CONFIGURATION AND MODE

Preliminary baseline tests were performed with the three antennas and at all data rates for all supported modulations.

The worst case radiated mode was determined to be the lowest data rate for QPSK.

6.6. MODIFICATIONS

The following modifications were made to meet FCC requirements.

Added ferrite beads on AC Mains Power Cable.

6.7. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	P16G	73JQLQ1	DoC
AC Adaptor	Dell	LA90PE1-00	OYP368-71615	N/A
POE Power	SL Power	ITE Power	PW183RA4800F01	N/A

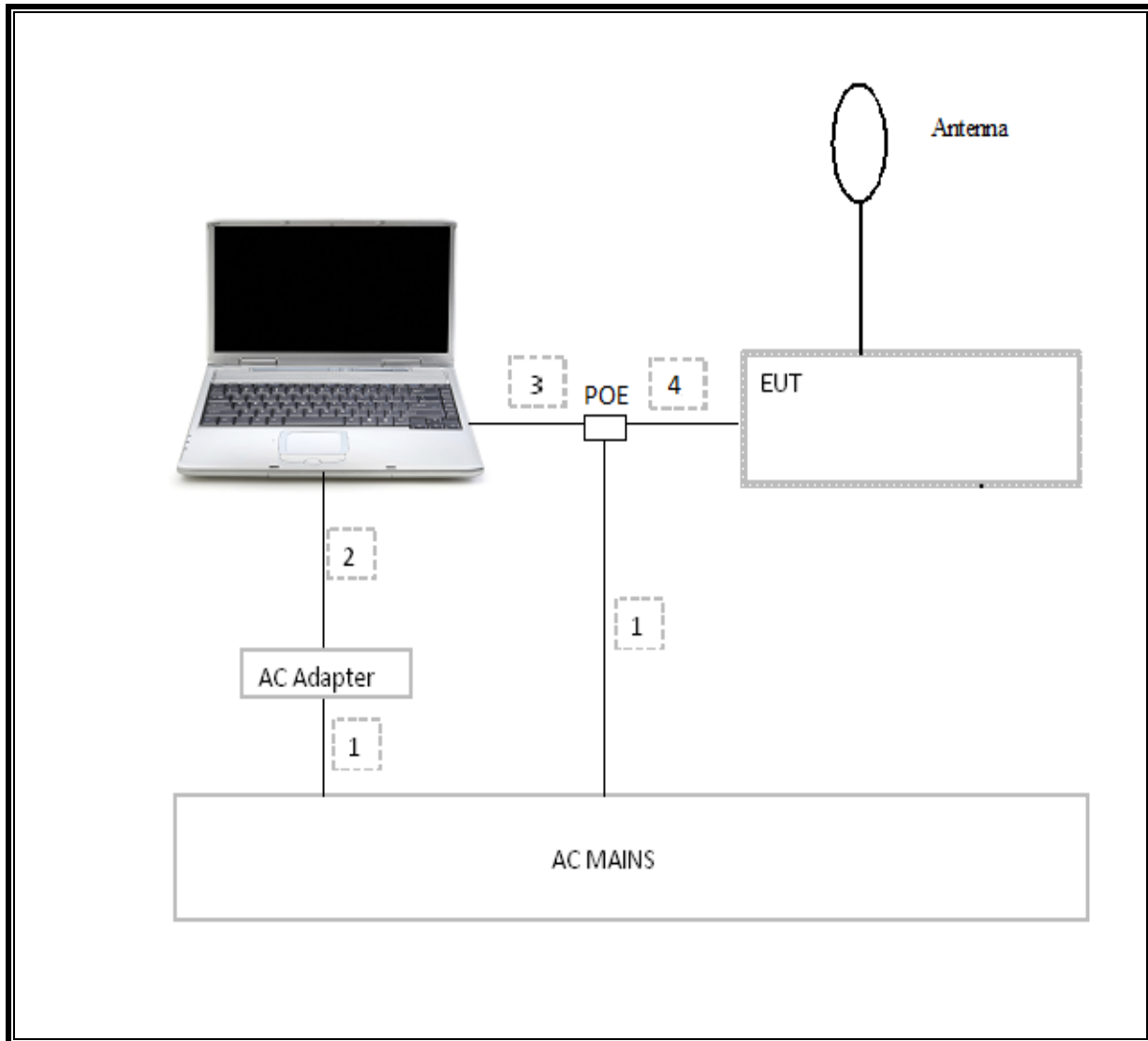
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	No. of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	2	US 115V	Un-shielded	1.5 m	
2	DC	1	DC	Un-shielded	1.5 m	
3	RJ45	1	Ethernet	Shielded	25 ft	
4	RJ45	1	Ethernet	Un-shielded	2 m	

TEST SETUP

The laptop is connected to the EUT via Ethernet to control the radio functions. Transmitter tests were made in a continuous transmission mode, with the device operating at the only source-based TDD duty cycle.

TEST SETUP DIAGRAM



7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	02/13/14
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	10/19/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	03/23/14
Notch Filter, 473 MHz	EWT	EWT-14-0337	T242	03/06/14
Notch Filter, 587 MHz	EWT	EWT-14-0338	T239	03/06/14
Notch Filter, 695 MHz	EWT	EWT-14-0339	T238	03/06/14
Bandpass Filter, 611 MHz	EWT	EWT-11-0780	780	03/06/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02686	CNR
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	05/07/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	04/10/14
EMI Test Receiver, 7 GHz	R & S	ESCI 7	1000741	08/08/13
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	C00626	01/14/14
Power Meter	Agilent / HP	E4416A	C00963	12/13/13
Power Sensor, 18 GHz	Agilent / HP	E9327A	C00964	12/13/13

8. APPLICABLE LIMITS AND TEST RESULTS

8.1. ANTENNA PORT TEST RESULTS (QPSK)

8.1.1. OUTPUT POWER

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 28 dBm in a 6 MHz band.

TEST PROCEDURE

KDB 416271 D01 v02

RESULTS

Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Delta (dB)
473	21.18	28.00	-6.82
587	20.55	28.00	-7.45
695	20.33	28.00	-7.67

8.1.2. POWER SPECTRAL DENSITY

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 10.6 dBm measured in a 100 kHz band.

TEST PROCEDURE

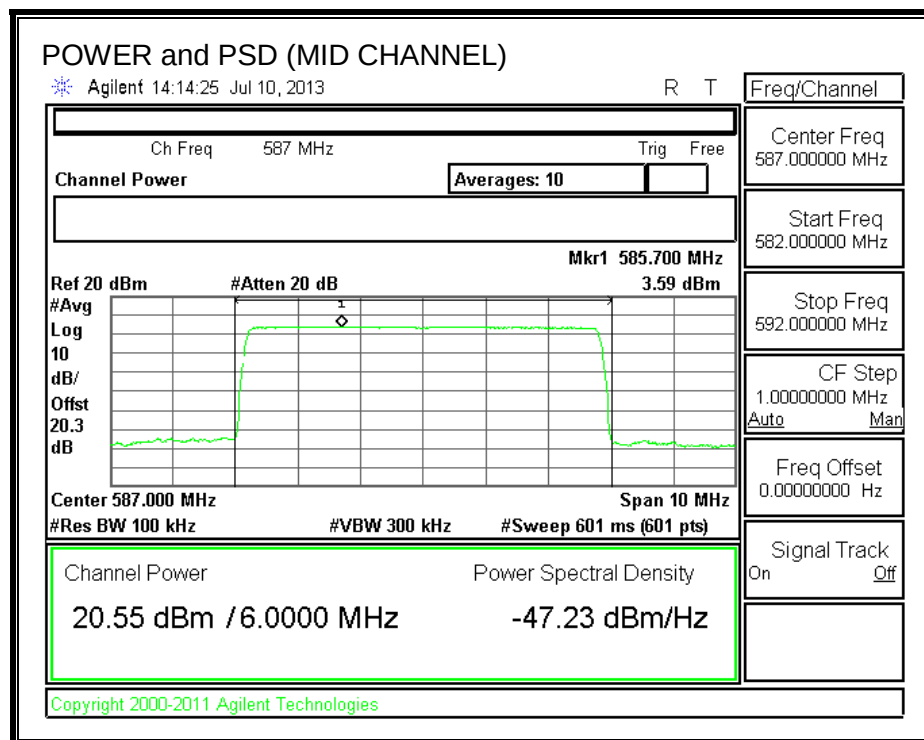
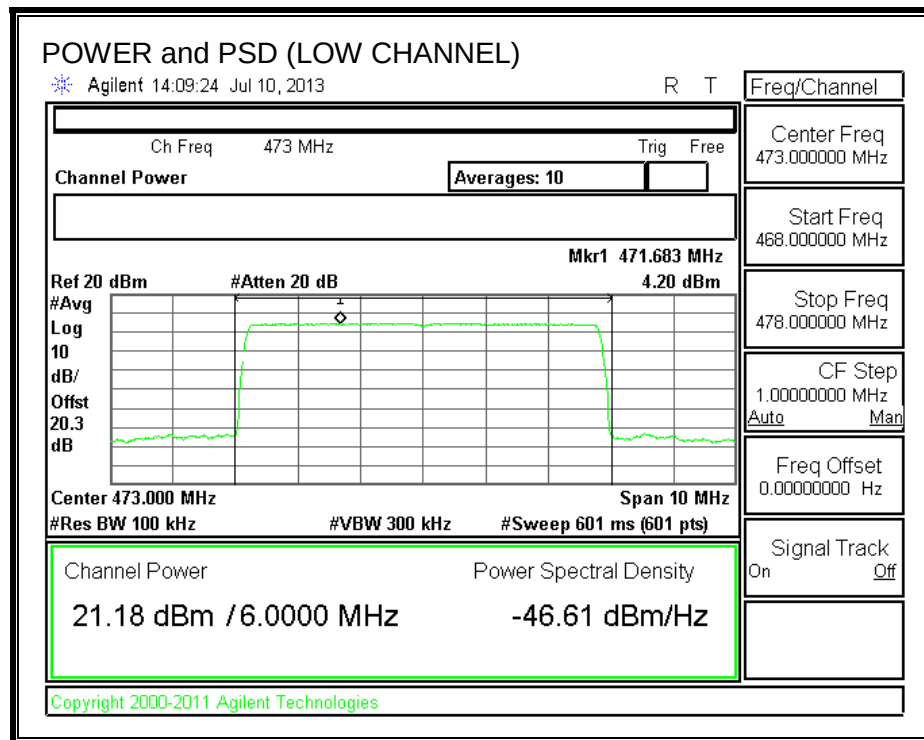
KDB 416271 D01 v02

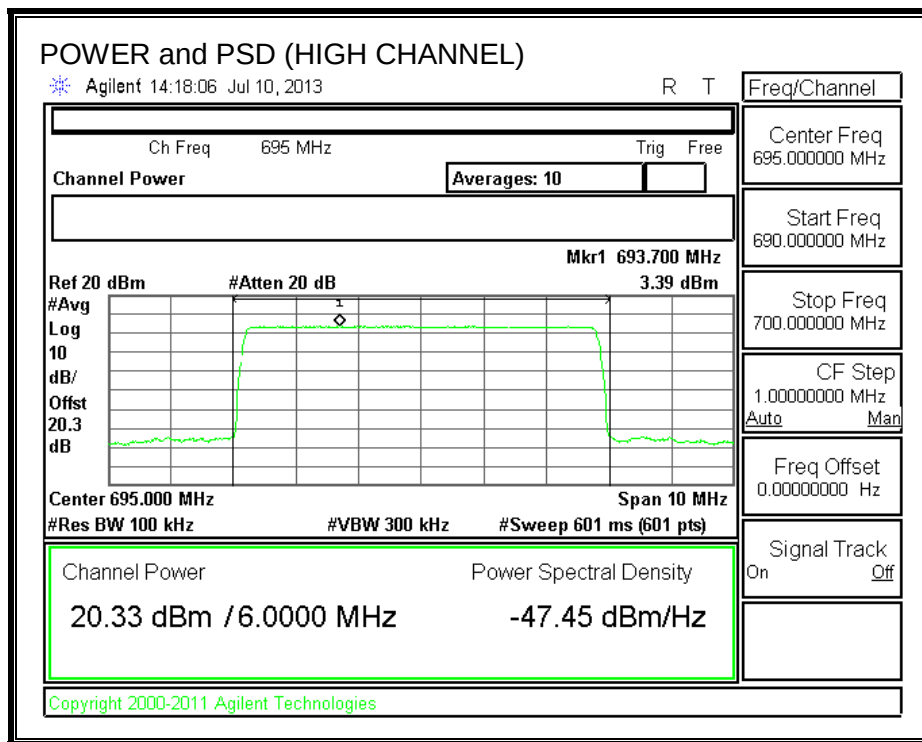
RESULTS

Frequency (MHz)	PSD (dBm/100 kHz)	PSD Limit (dBm/100 kHz)	Delta (dB)
473	4.20	10.60	-6.40
587	3.59	10.60	-7.01
695	3.39	10.60	-7.21

8.1.3. POWER / POWER SPECTRAL DENSITY PLOTS

PLOTS FOR POWER AND PSD





8.1.4. BANDEDGES

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

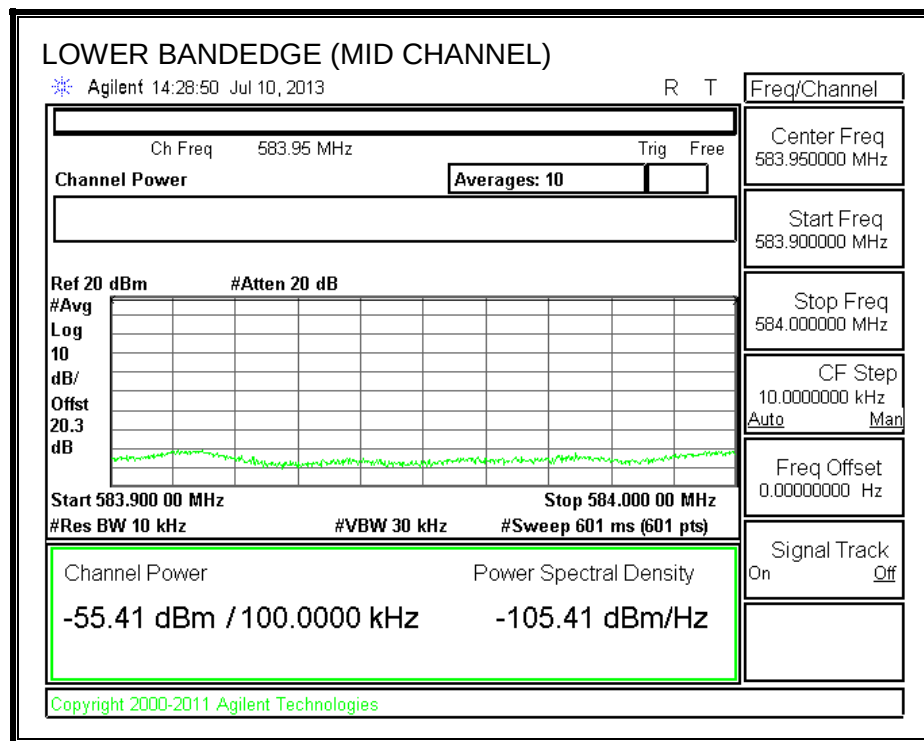
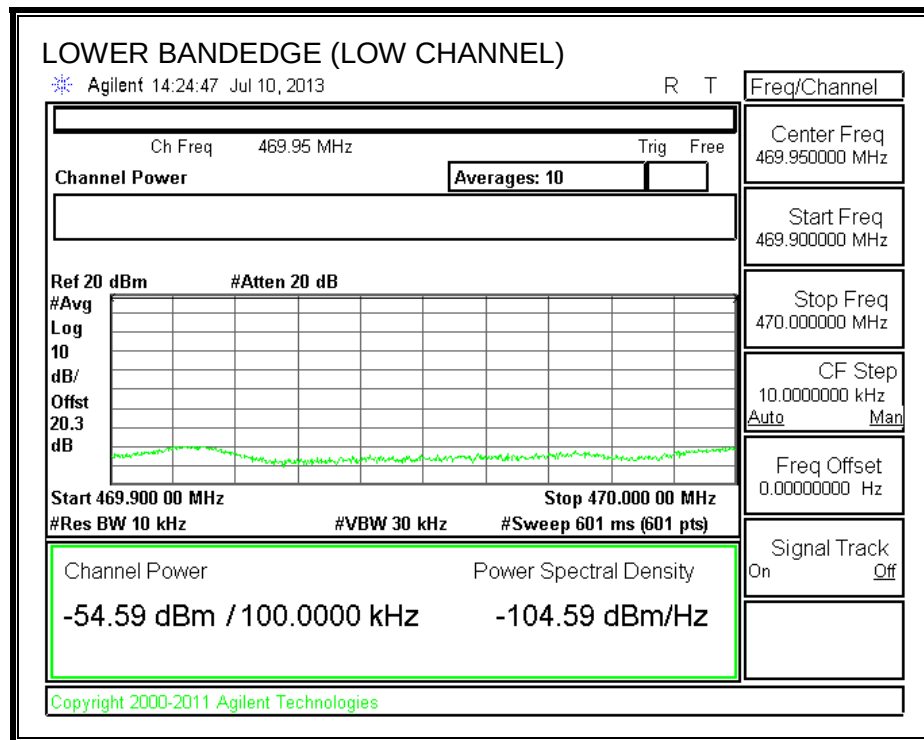
TEST PROCEDURE

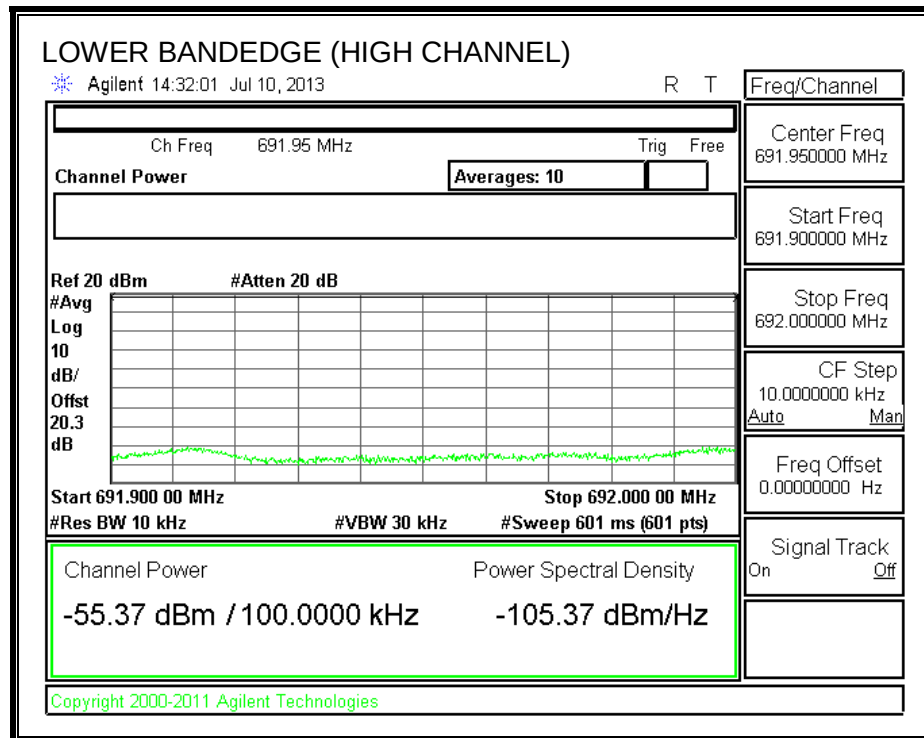
KDB 416271 D01 v02

RESULTS

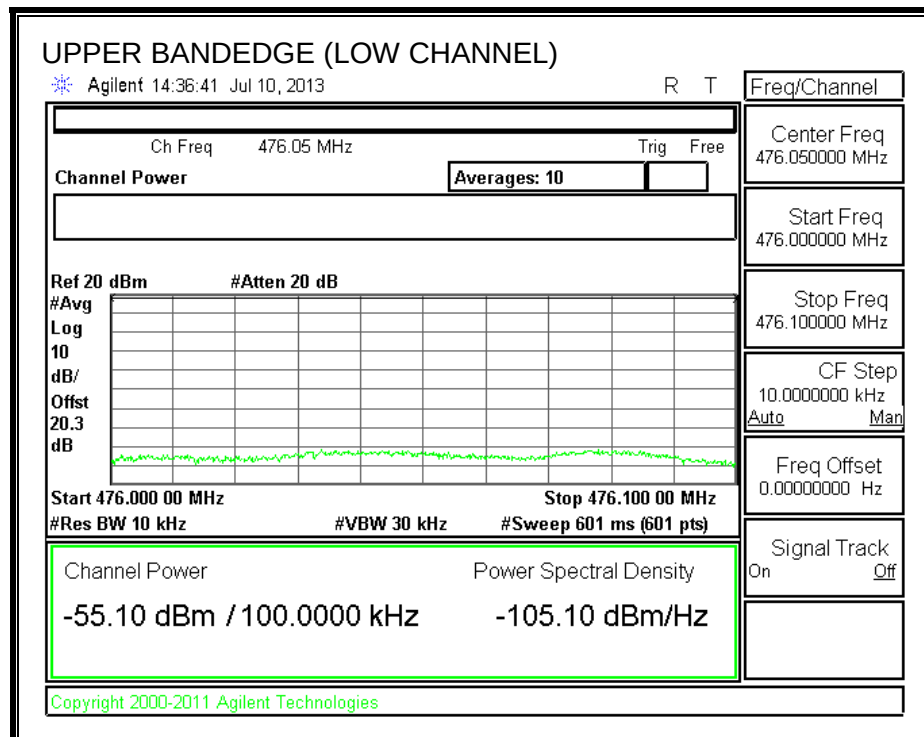
Frequency (MHz)	Bandedge Limit (dBm/100 kHz)	Lower Bandedge (dBm/100 kHz)	Lower Delta (dB)	Upper Bandedge (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-54.59	-11.79	-55.10	-12.30
587	-42.8	-55.41	-12.61	-57.18	-14.38
695	-42.8	-55.37	-12.57	-55.48	-12.68

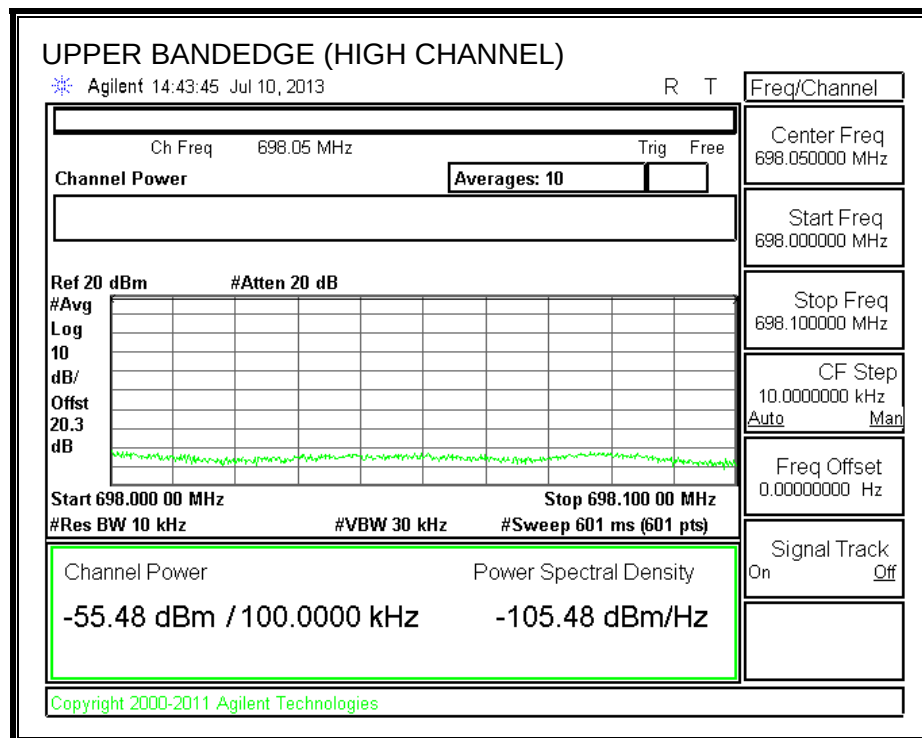
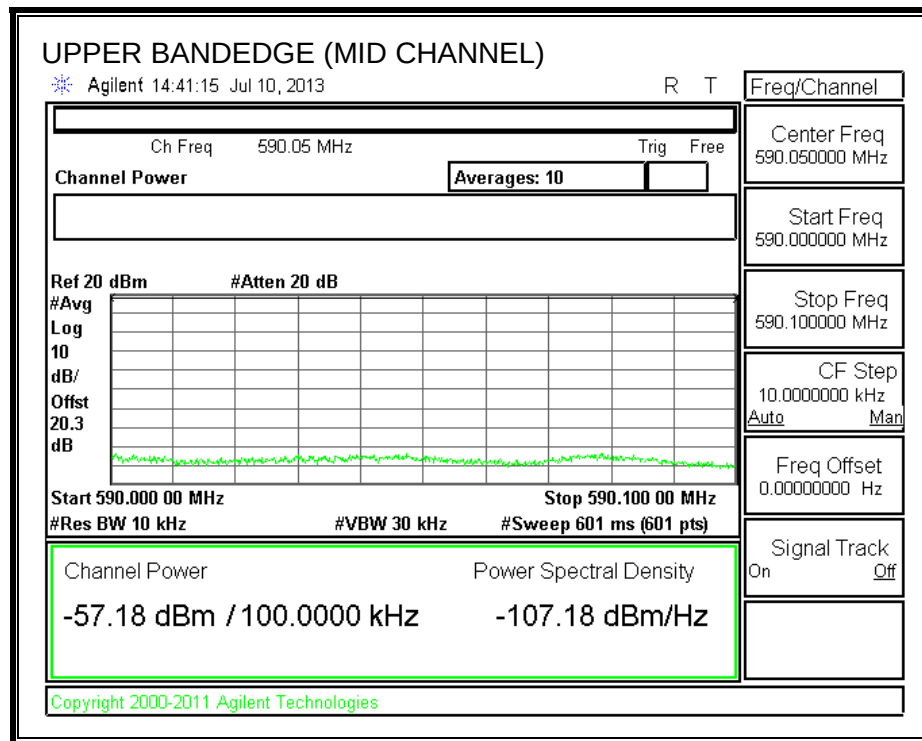
LOWER BANDEDGE





UPPER BANDEDGE





8.1.5. ADJACENT CHANNEL EMISSIONS

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

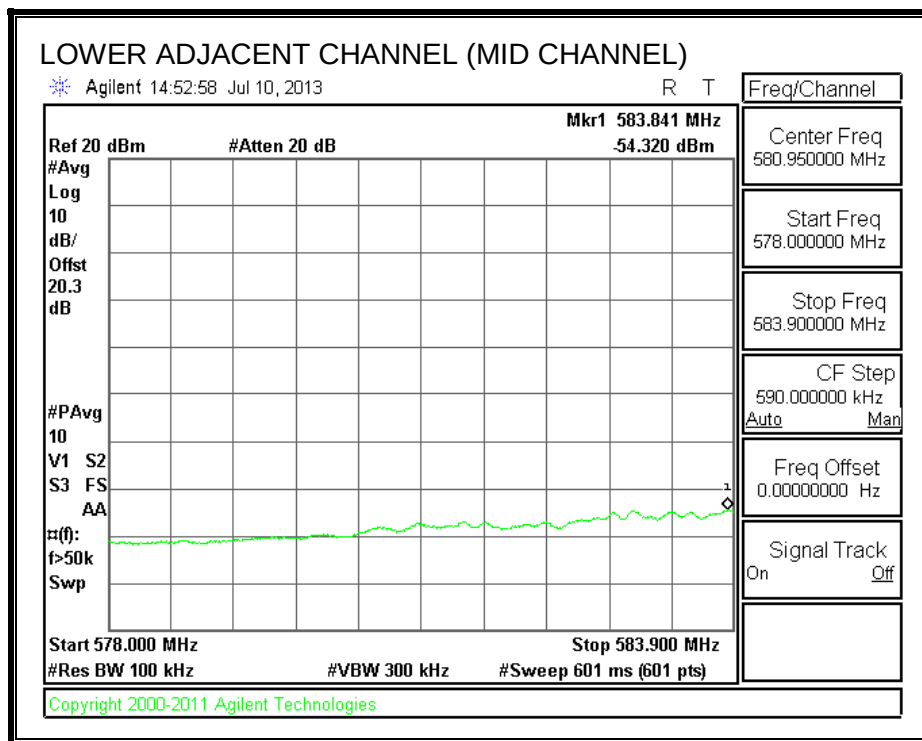
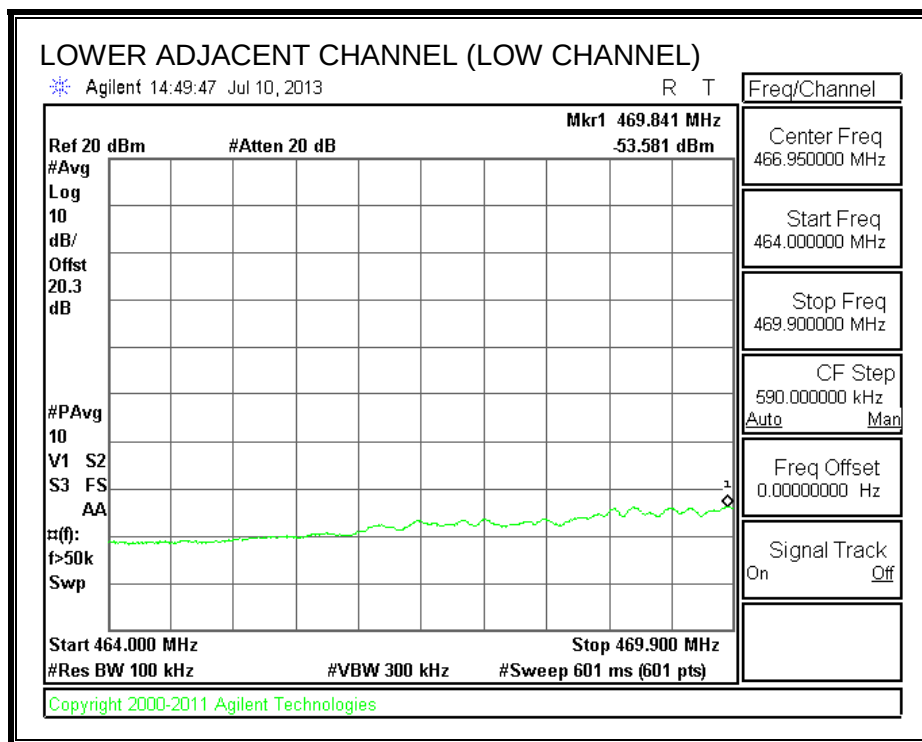
TEST PROCEDURE

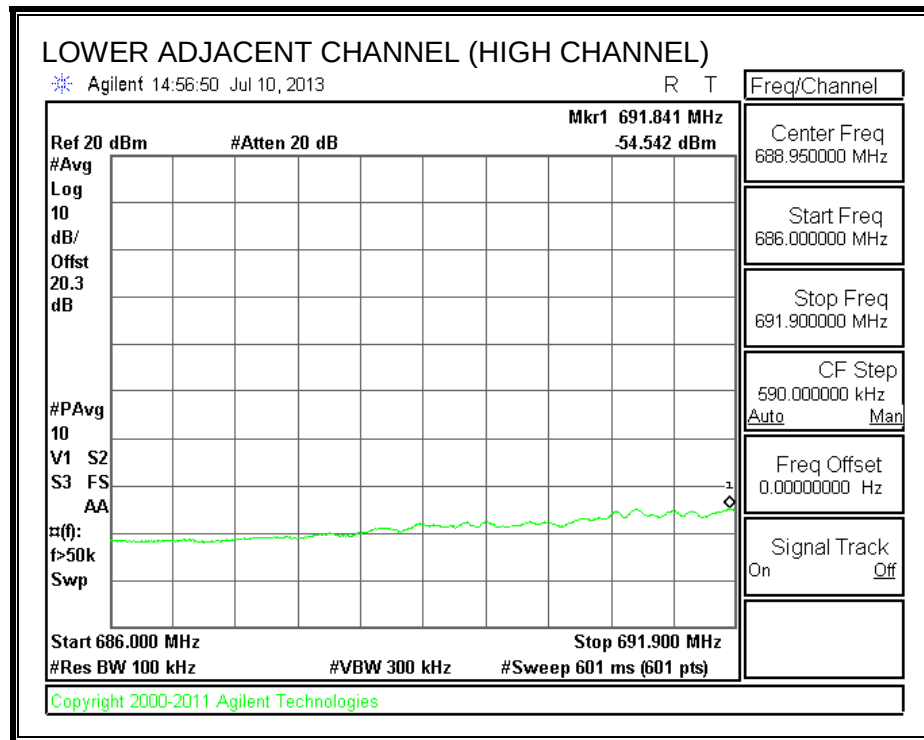
KDB 416271 D01 v02

RESULTS

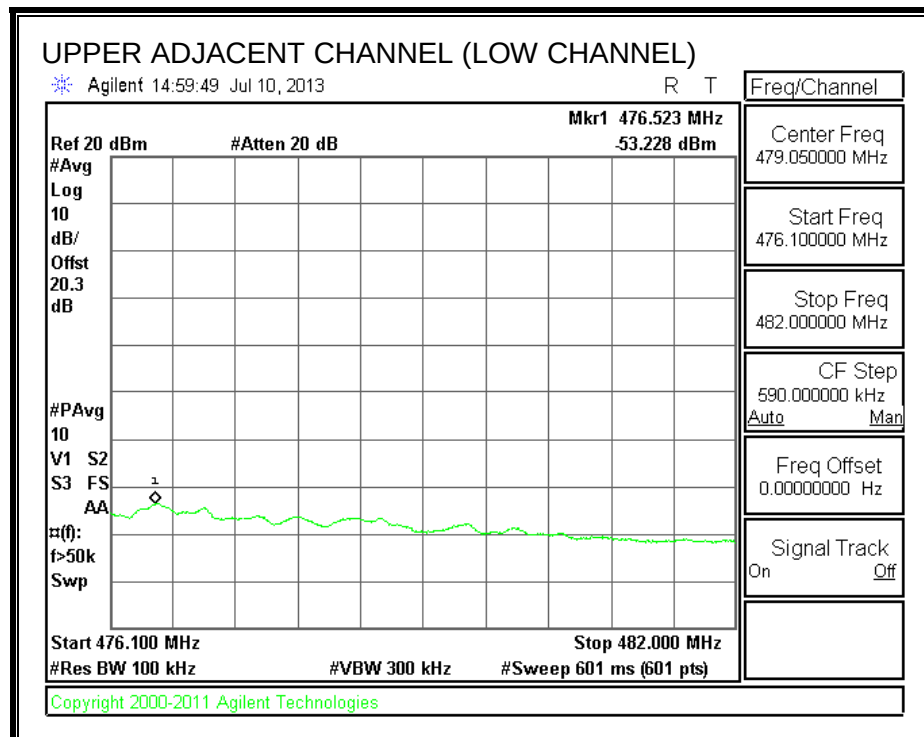
Frequency (MHz)	Emissions Limit (dBm/100 kHz)	Lower Adjacent Channel Emissions (dBm/100 kHz)	Lower Delta (dB)	Upper Adjacent Channel Emissions (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-53.58	-10.78	-53.23	-10.43
587	-42.8	-54.32	-11.52	-55.69	-12.89
695	-42.8	-54.54	-11.74	-54.20	-11.40

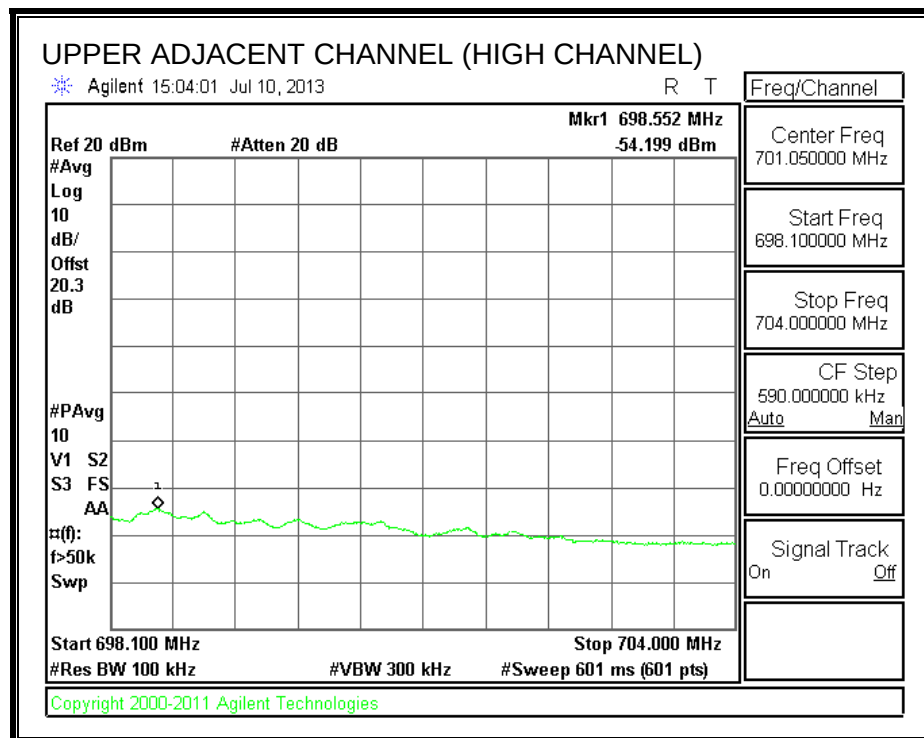
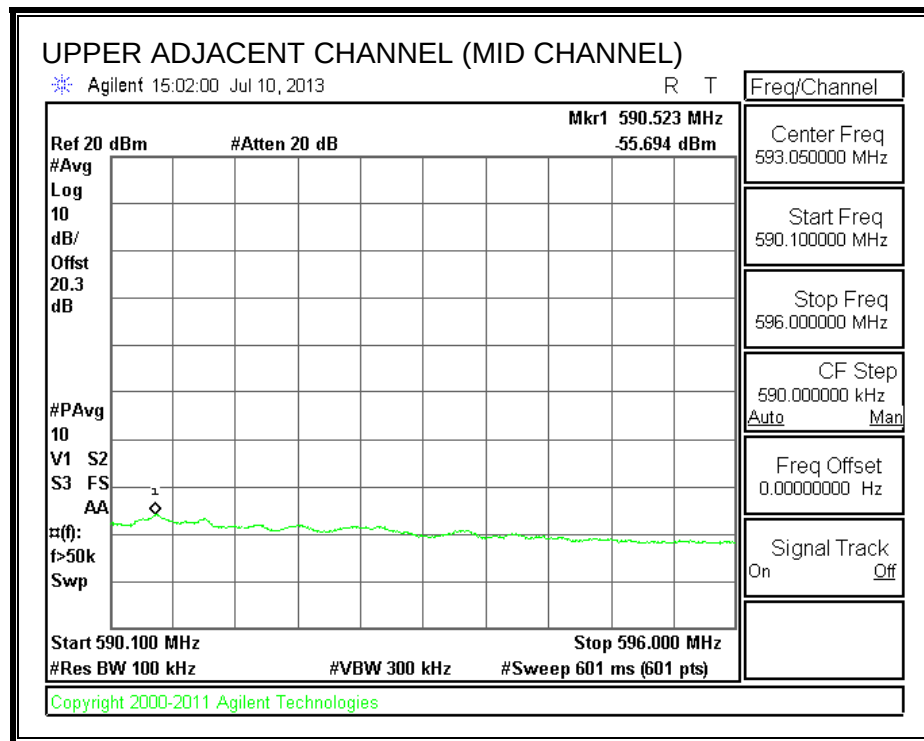
LOWER ADJACENT CHANNEL





UPPER ADJACENT CHANNEL





8.2. ANTENNA PORT TEST RESULTS (16QAM)

8.2.1. OUTPUT POWER

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 28 dBm in a 6 MHz band.

TEST PROCEDURE

KDB 416271 D01 v02

RESULTS

Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Delta (dB)
473	21.15	28.00	-6.85
587	20.55	28.00	-7.45
695	20.32	28.00	-7.68

8.2.2. POWER SPECTRAL DENSITY

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 10.6 dBm measured in a 100 kHz band.

TEST PROCEDURE

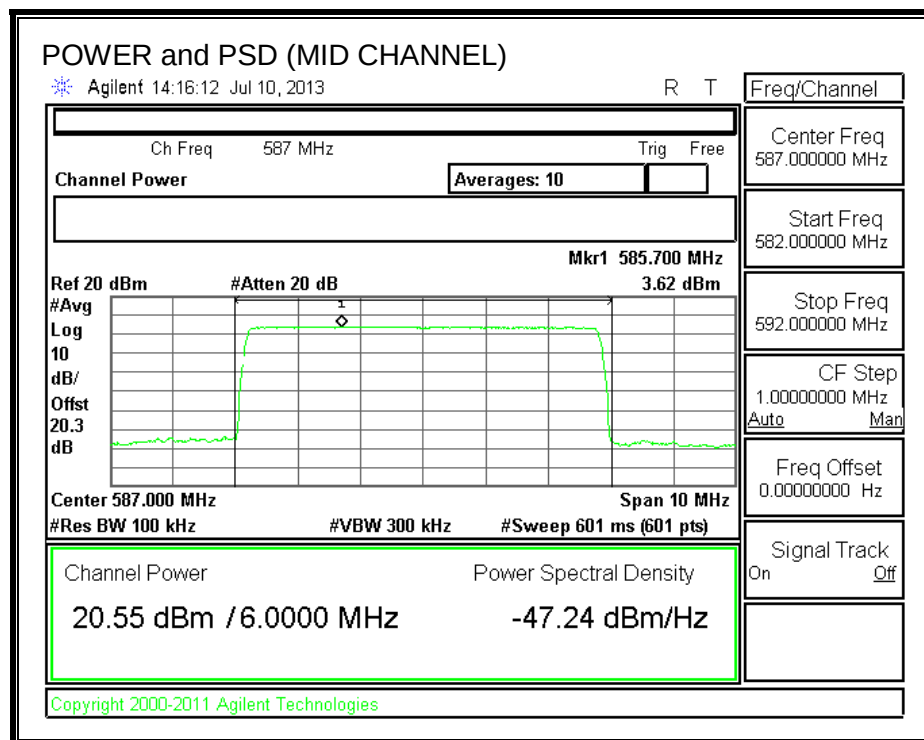
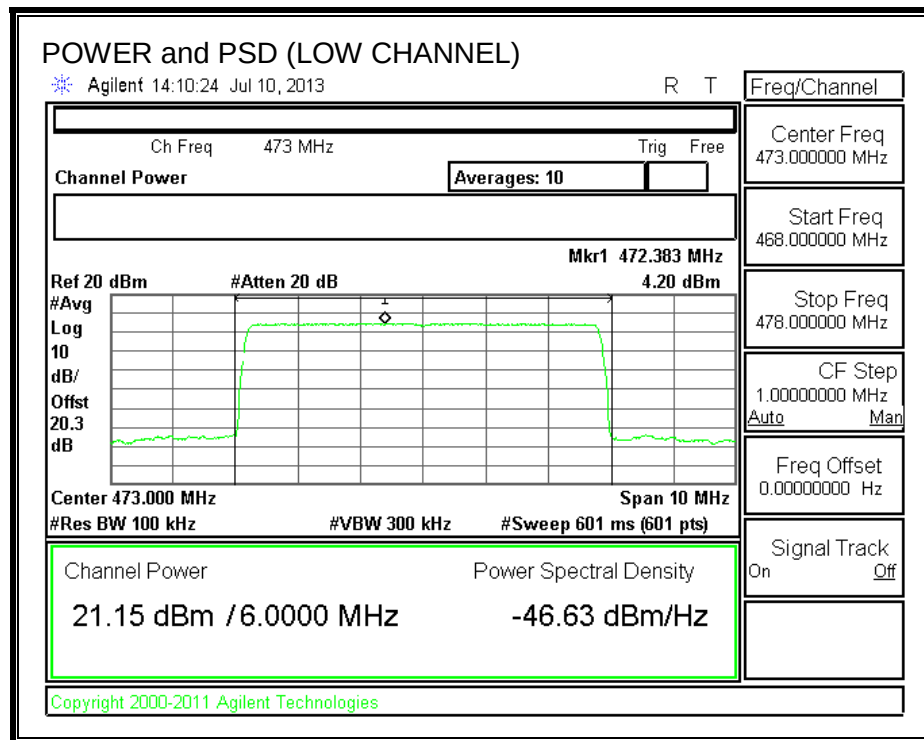
KDB 416271 D01 v02

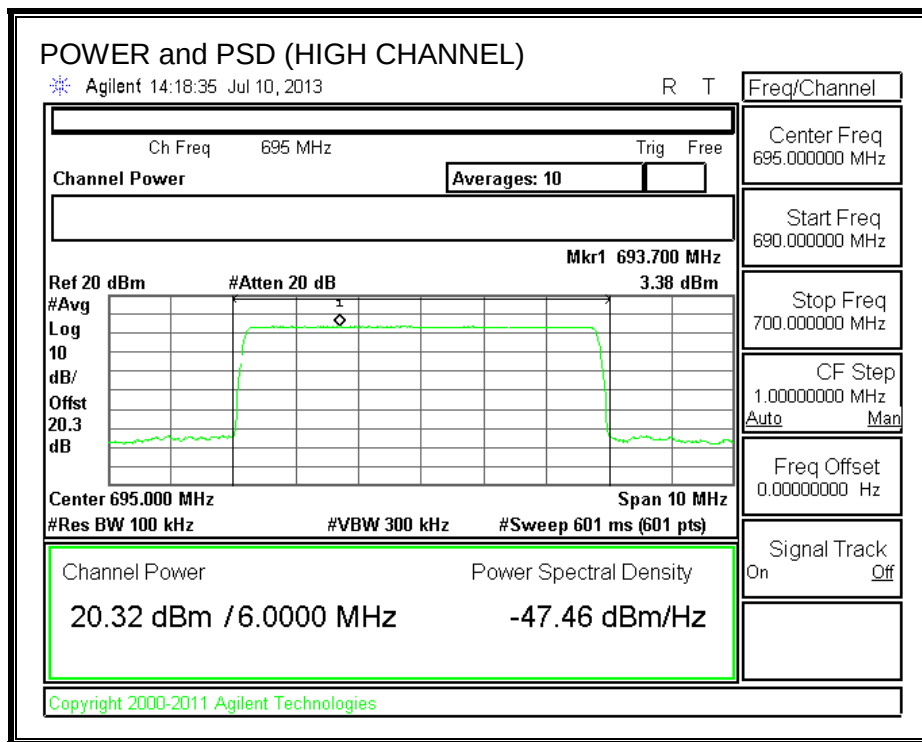
RESULTS

Frequency (MHz)	PSD (dBm/100 kHz)	PSD Limit (dBm/100 kHz)	Delta (dB)
473	4.20	10.60	-6.40
587	3.62	10.60	-6.98
695	3.38	10.60	-7.22

8.2.3. POWER / POWER SPECTRAL DENSITY PLOTS

PLOTS FOR POWER AND PSD





8.2.4. BANDEDGES

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

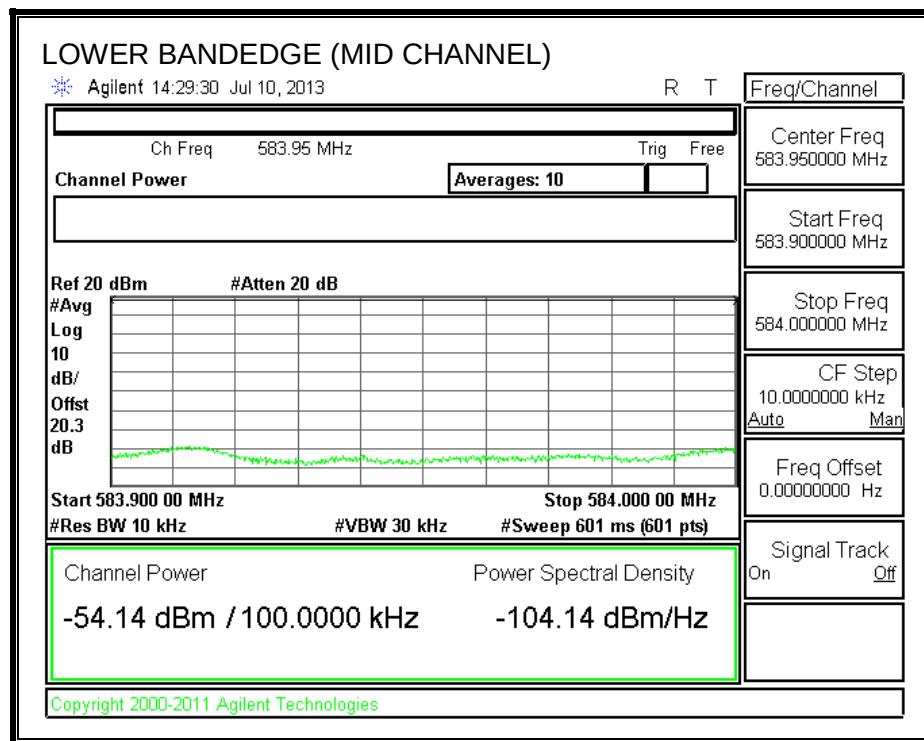
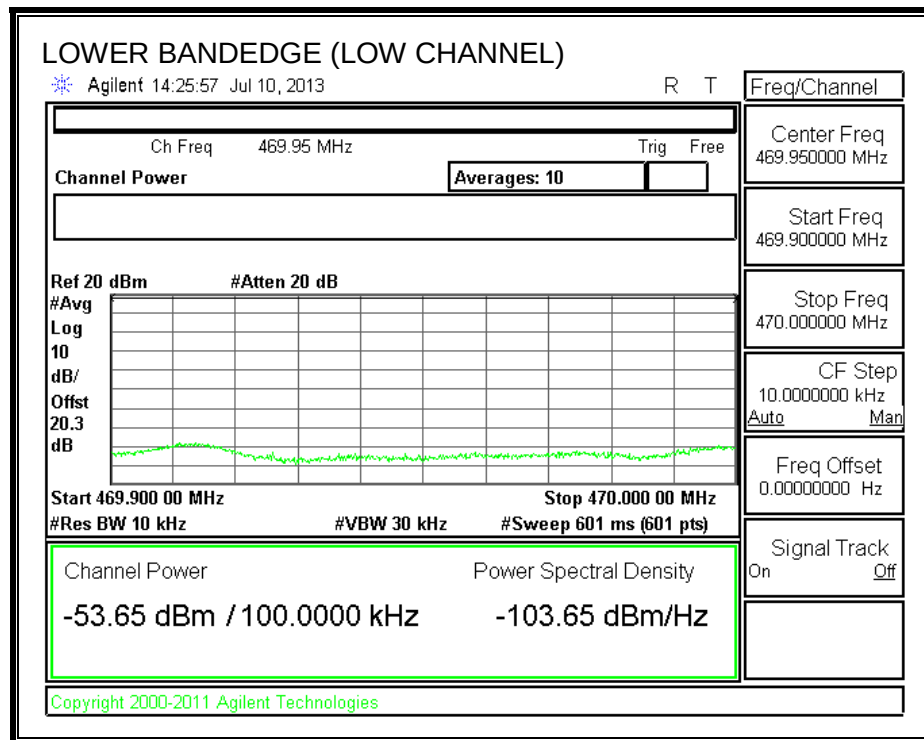
TEST PROCEDURE

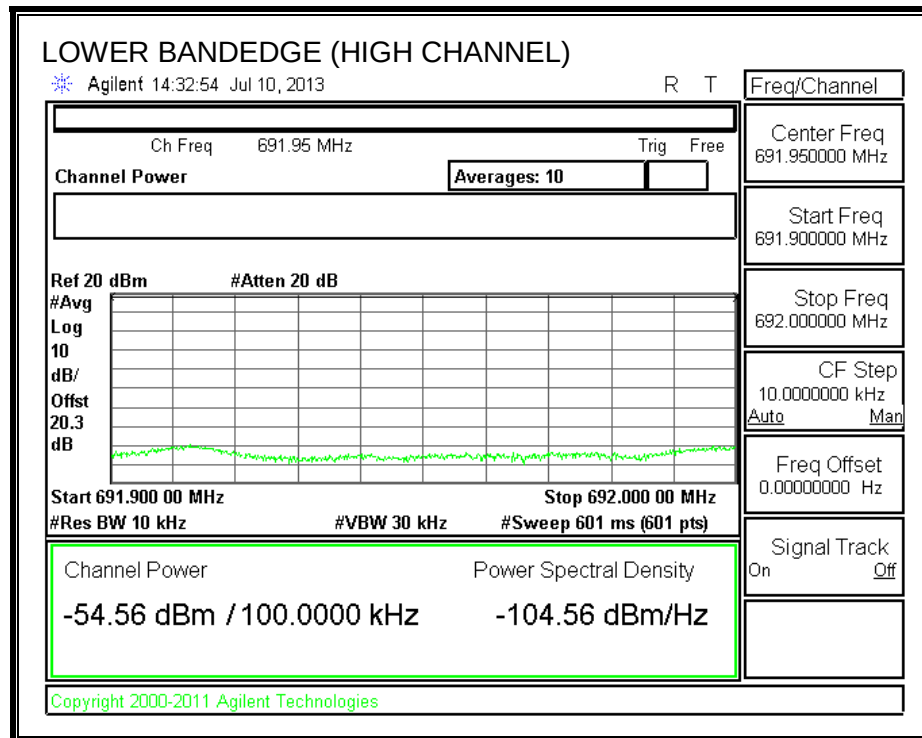
KDB 416271 D01 v02

RESULTS

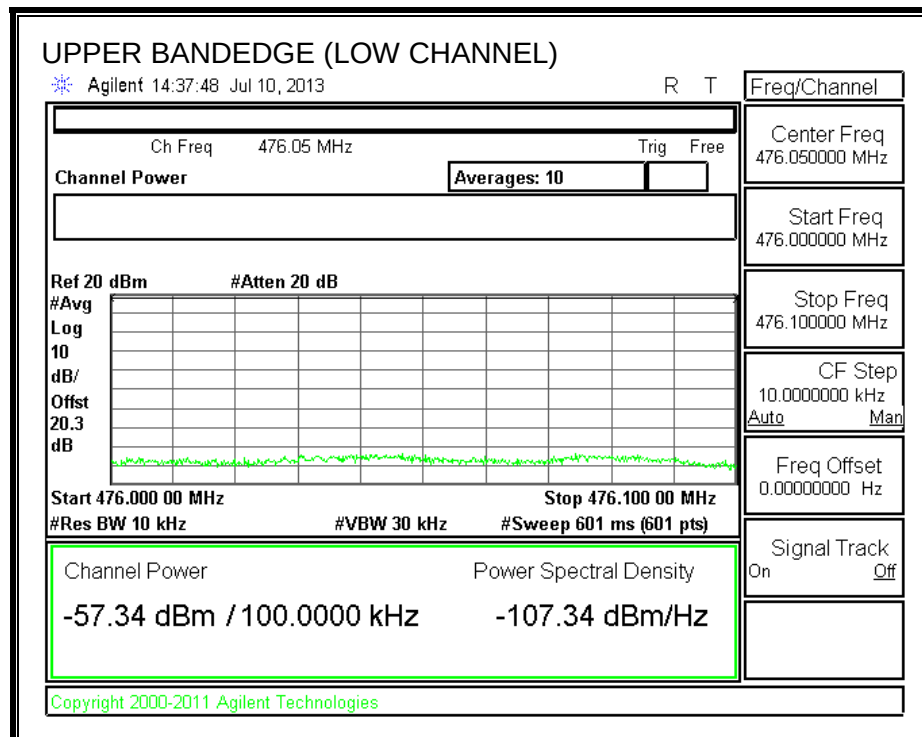
Frequency (MHz)	Bandedge Limit (dBm/100 kHz)	Lower Bandedge (dBm/100 kHz)	Lower Delta (dB)	Upper Bandedge (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-53.65	-10.85	-57.34	-14.54
587	-42.8	-54.14	-11.34	-55.84	-13.04
695	-42.8	-54.56	-11.76	-55.11	-12.31

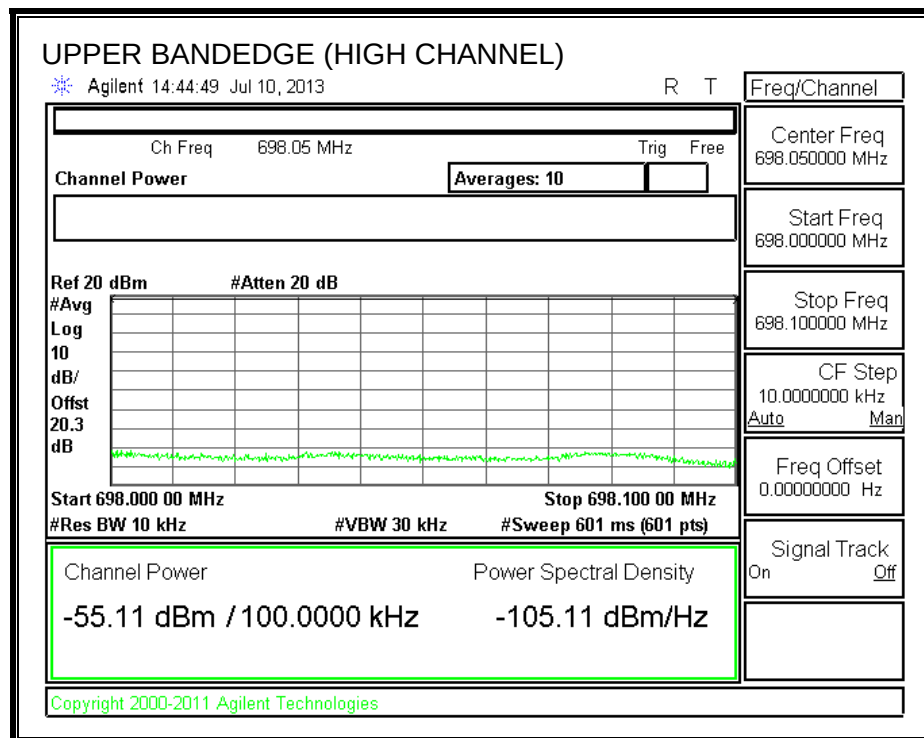
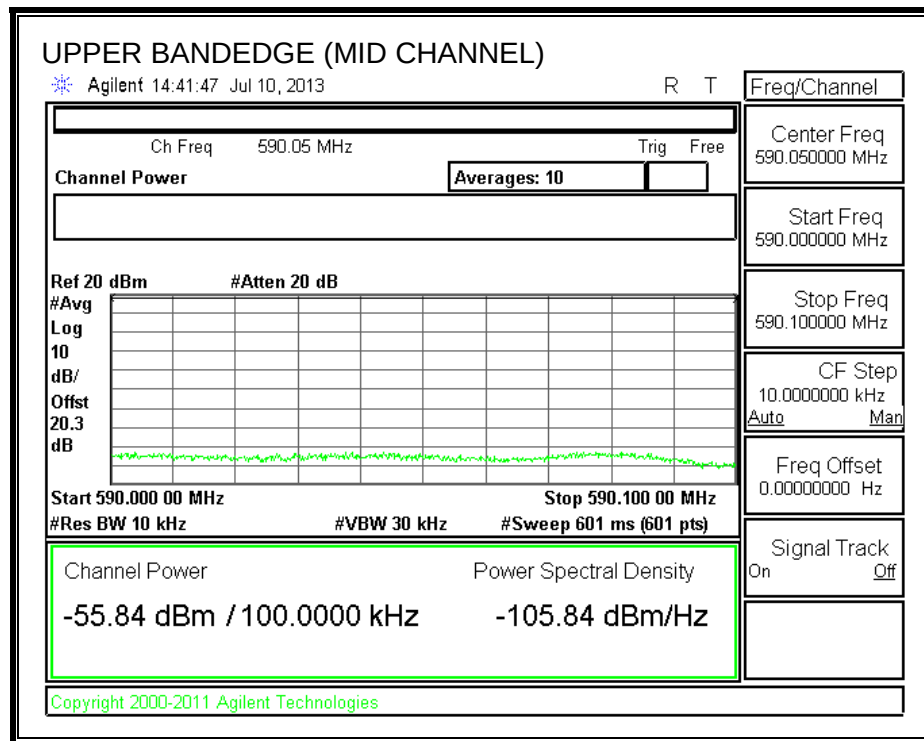
LOWER BANDEDGE





UPPER BANDEDGE





8.2.5. ADJACENT CHANNEL EMISSIONS

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

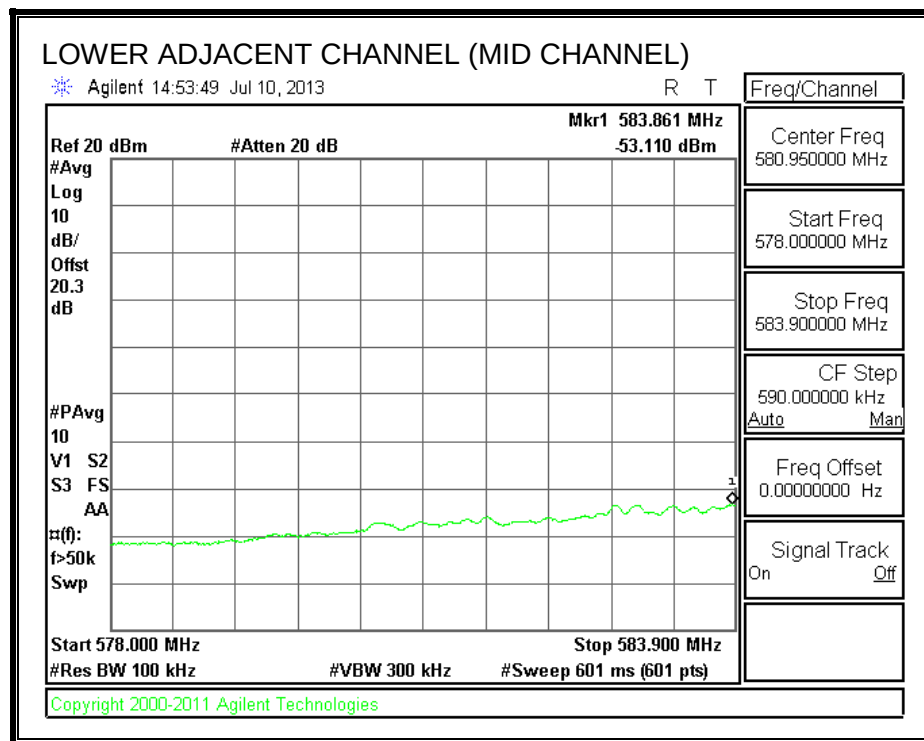
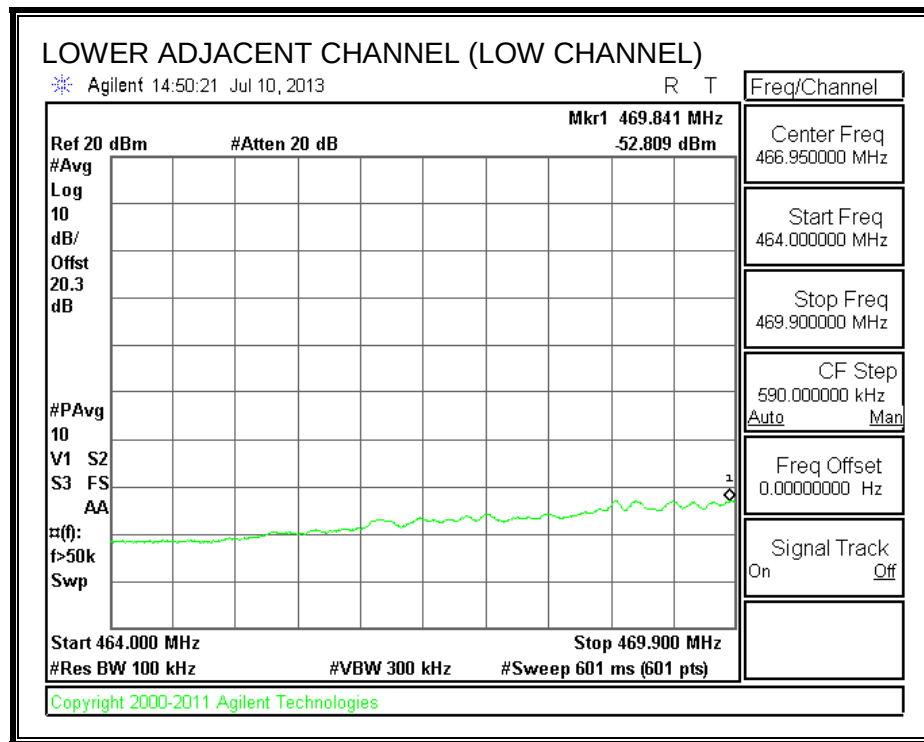
TEST PROCEDURE

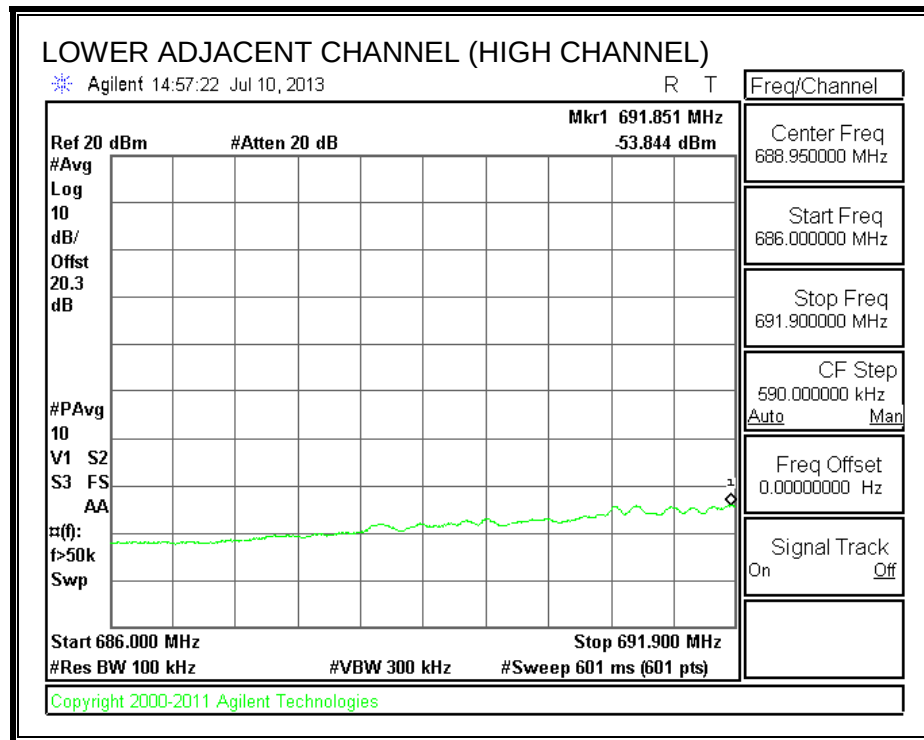
KDB 416271 D01 v02

RESULTS

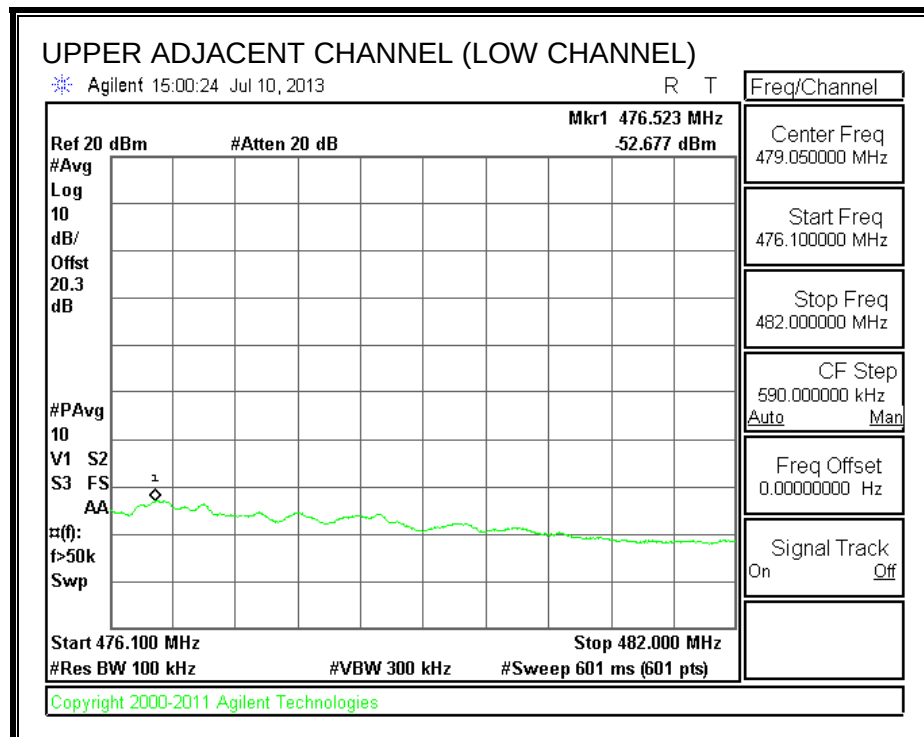
Frequency (MHz)	Emissions Limit (dBm/100 kHz)	Lower Adjacent Channel Emissions (dBm/100 kHz)	Lower Delta (dB)	Upper Adjacent Channel Emissions (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-52.81	-10.01	-52.68	-9.88
587	-42.8	-53.11	-10.31	-54.48	-11.68
695	-42.8	-53.84	-11.04	-53.88	-11.08

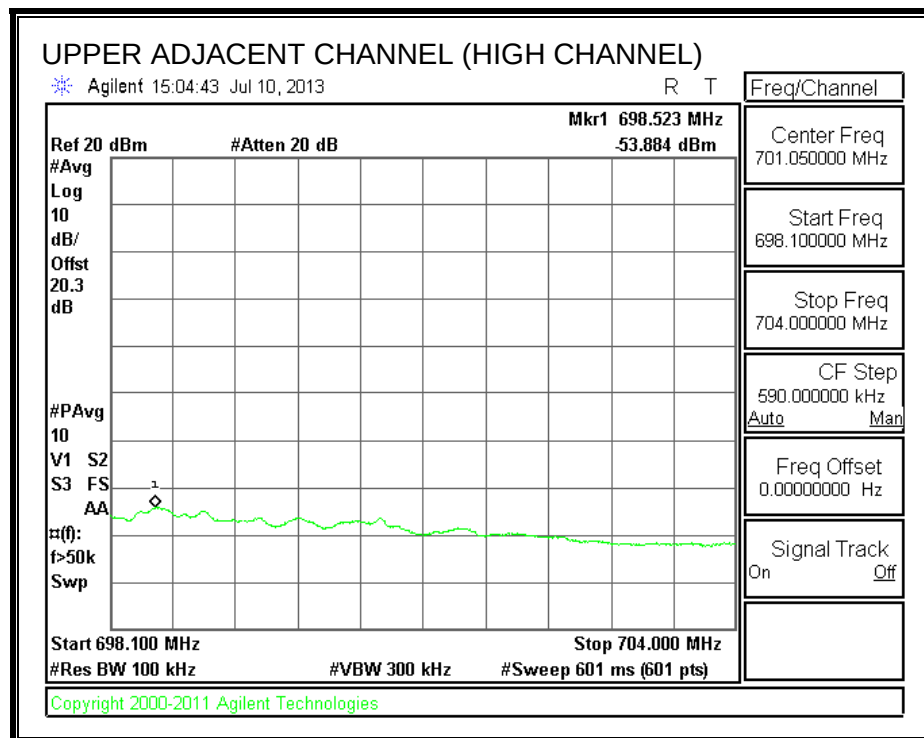
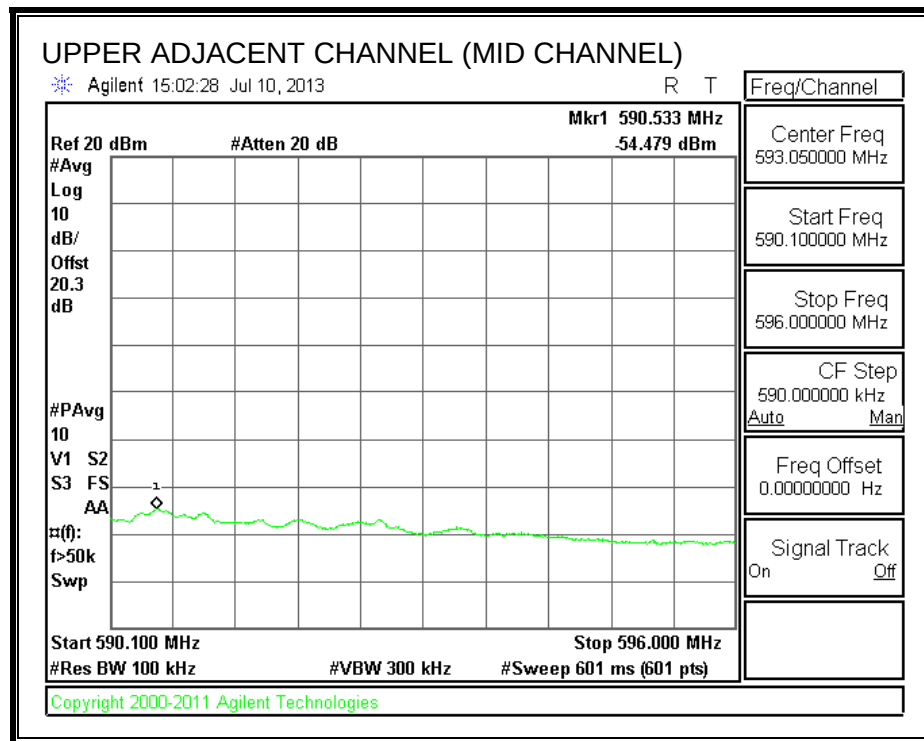
LOWER ADJACENT CHANNEL





UPPER ADJACENT CHANNEL





8.3. ANTENNA PORT TEST RESULTS (64QAM)

8.3.1. OUTPUT POWER

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 28 dBm in a 6 MHz band.

TEST PROCEDURE

KDB 416271 D01 v02

RESULTS

Frequency (MHz)	Output Power (dBm)	Power Limit (dBm)	Delta (dB)
473	20.15	28.00	-7.85
587	20.68	28.00	-7.32
695	20.33	28.00	-7.67

8.3.2. POWER SPECTRAL DENSITY

LIMITS

Fixed TVBD with 8 dBi Antenna Assembly Gain, Limit = 10.6 dBm measured in a 100 kHz band.

TEST PROCEDURE

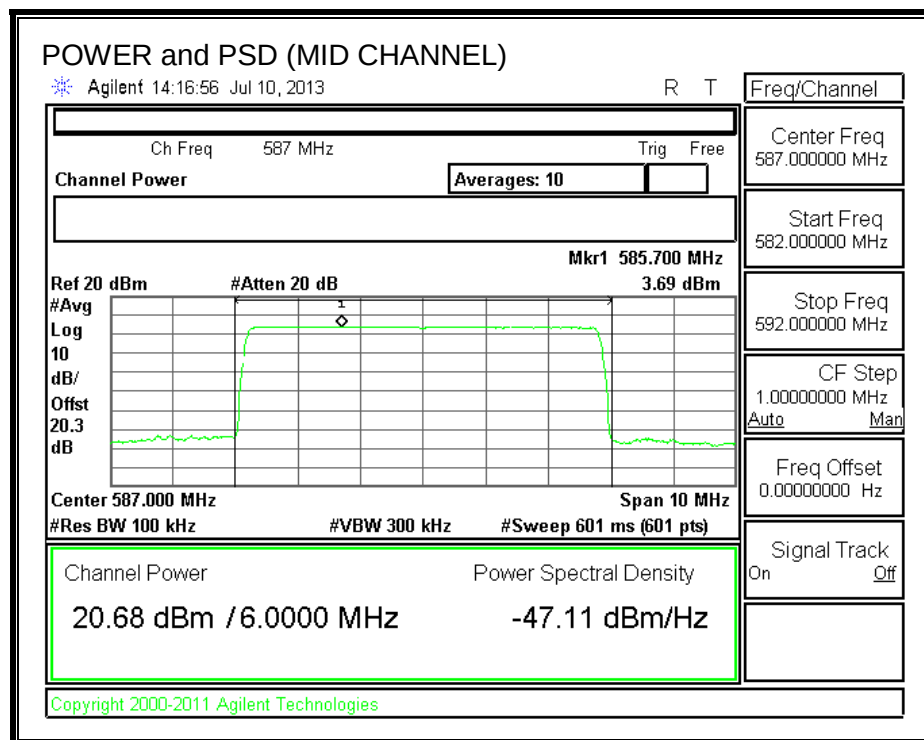
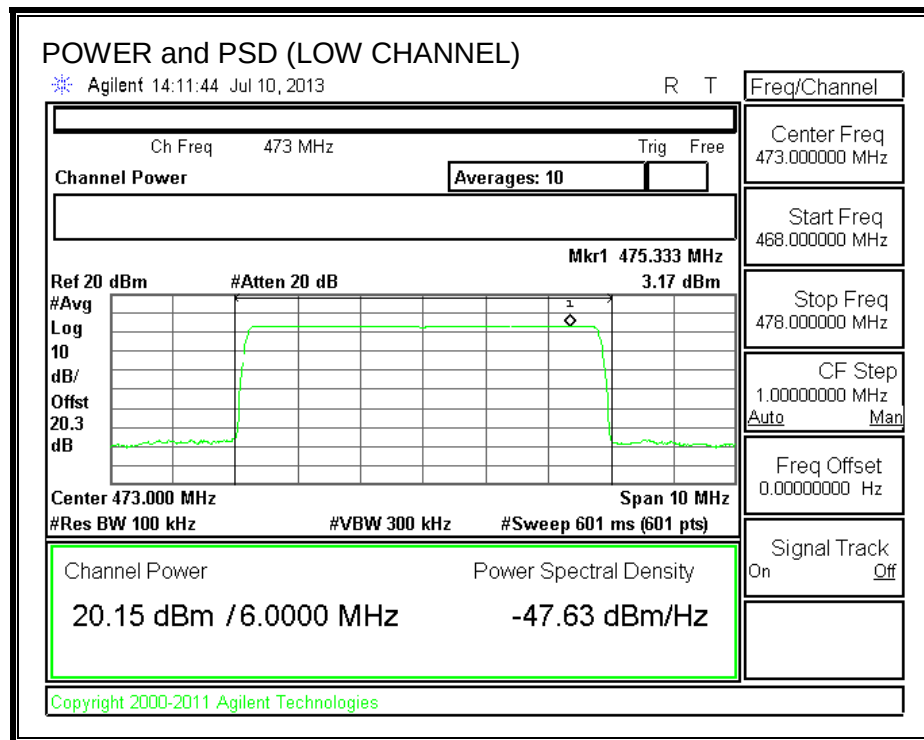
KDB 416271 D01 v02

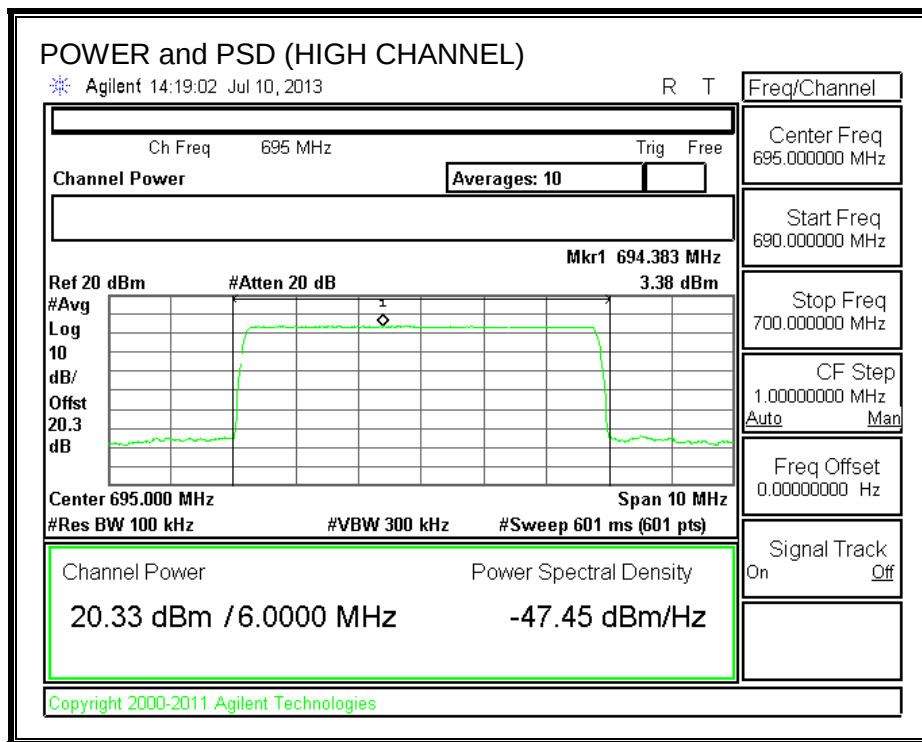
RESULTS

Frequency (MHz)	PSD (dBm/100 kHz)	PSD Limit (dBm/100 kHz)	Delta (dB)
473	3.17	10.60	-7.43
587	3.69	10.60	-6.91
695	3.38	10.60	-7.22

8.3.3. POWER / POWER SPECTRAL DENSITY PLOTS

PLOTS FOR POWER AND PSD





8.3.4. BANDEDGES

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

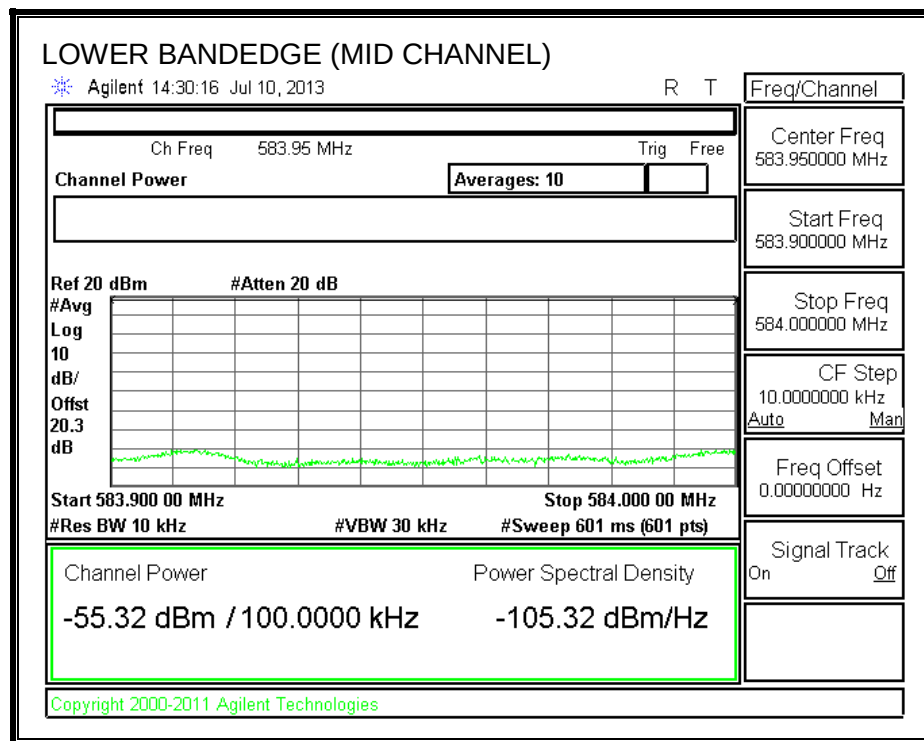
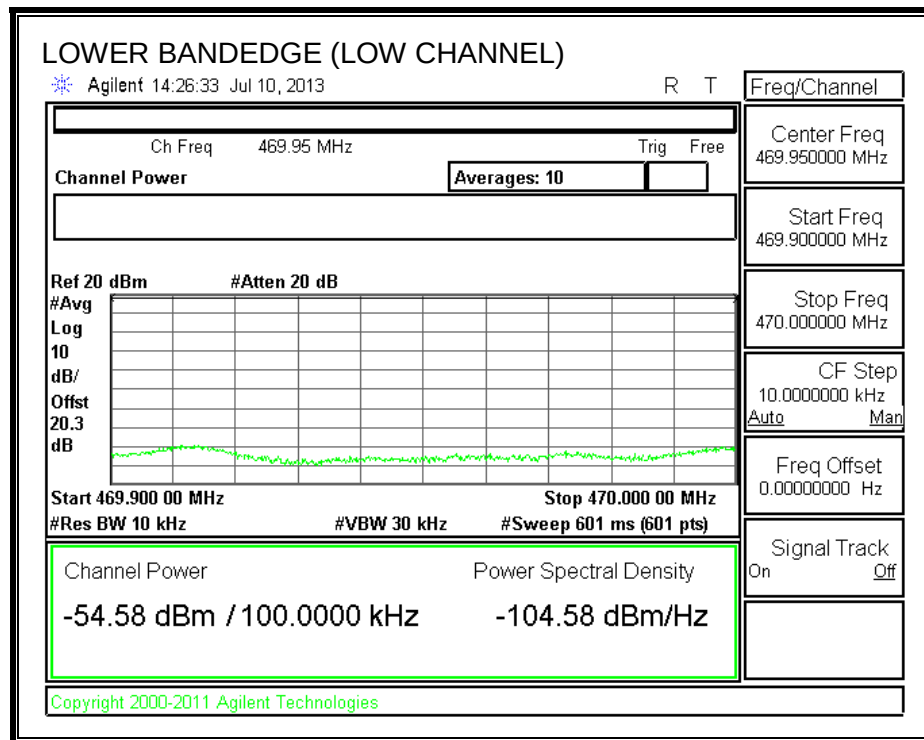
TEST PROCEDURE

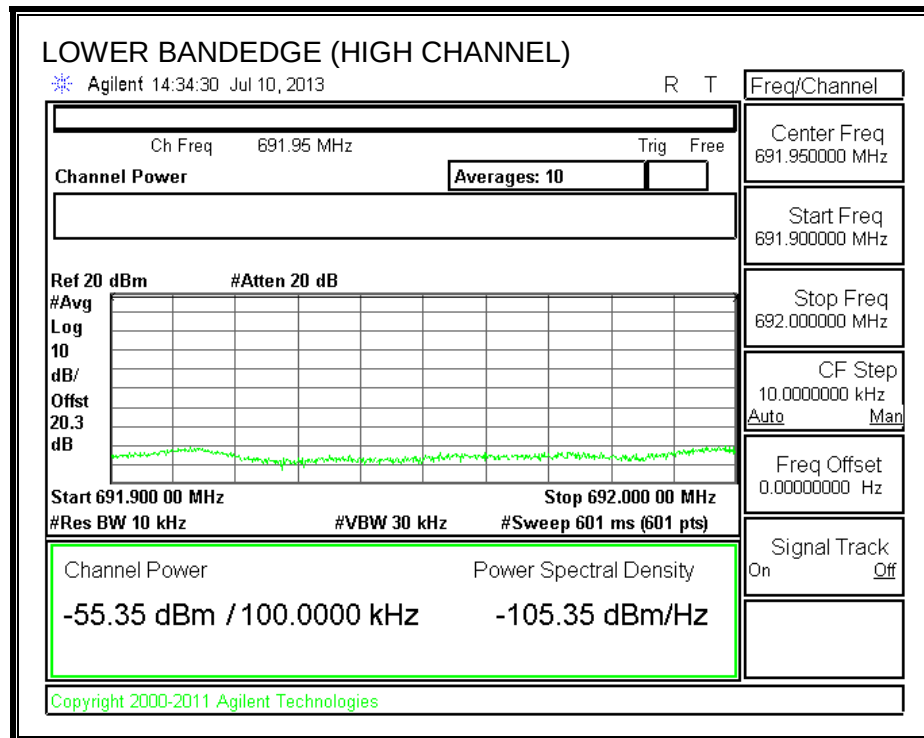
KDB 416271 D01 v02

RESULTS

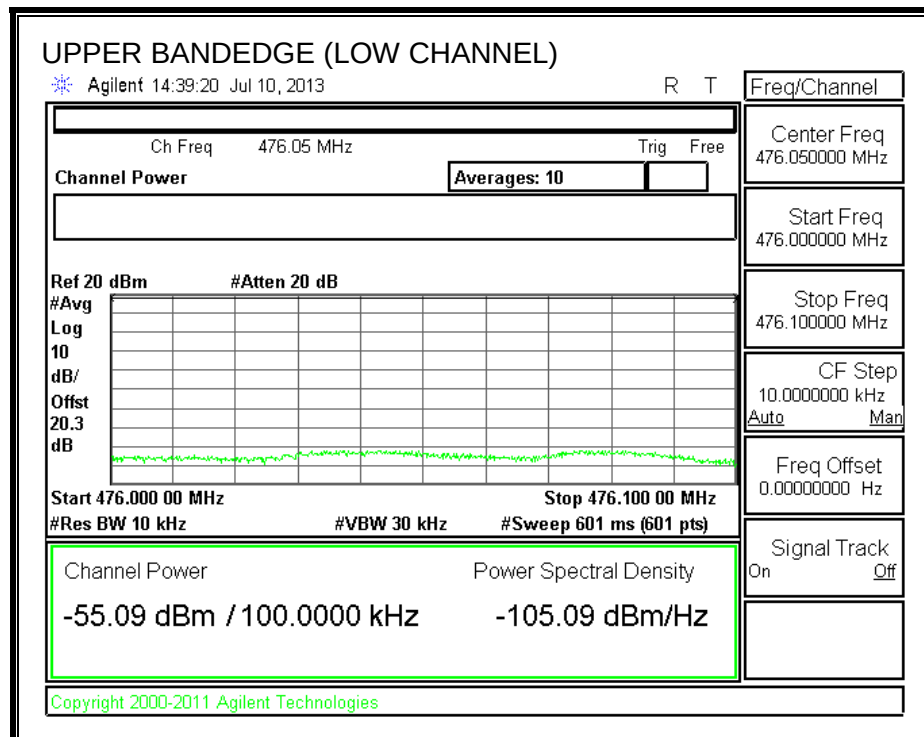
Frequency (MHz)	Bandedge Limit (dBm/100 kHz)	Lower Bandedge (dBm/100 kHz)	Lower Delta (dB)	Upper Bandedge (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-54.58	-11.78	-55.09	-12.29
587	-42.8	-55.32	-12.52	-57.19	-14.39
695	-42.8	-55.35	-12.55	-55.57	-12.77

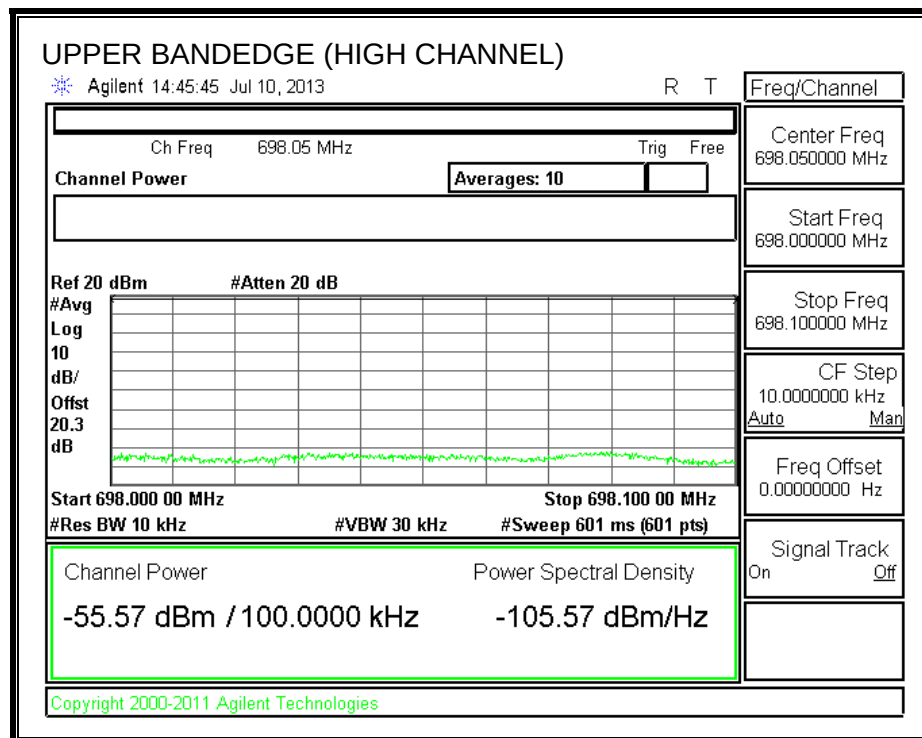
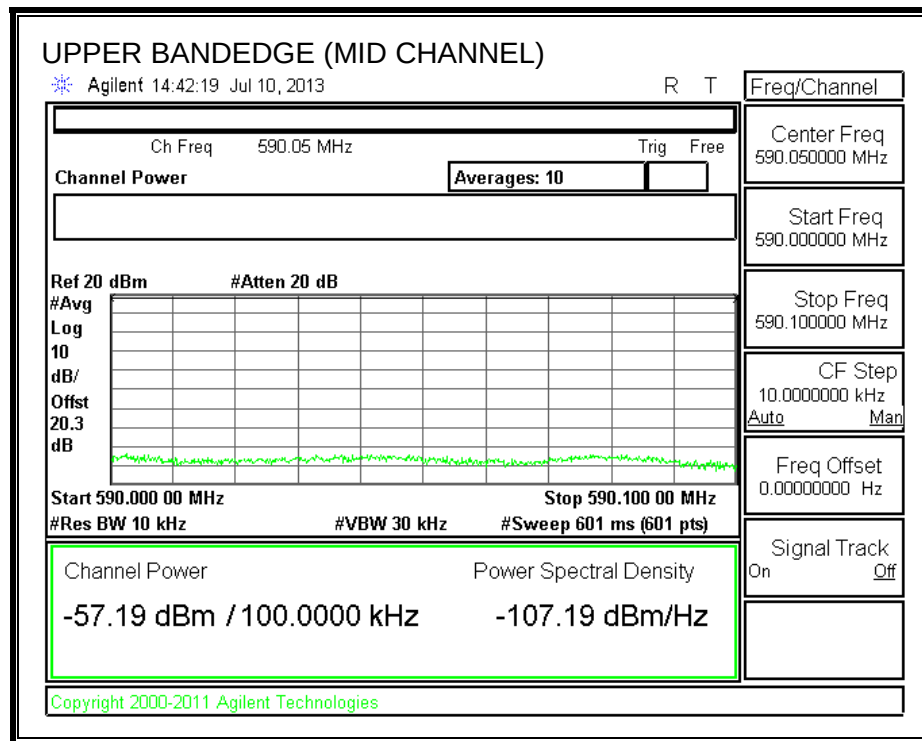
LOWER BANDEDGE





UPPER BANDEDGE





8.3.5. ADJACENT CHANNEL EMISSIONS

LIMITS

Fixed TVBD, Limit = -42.8 dBm/100 kHz

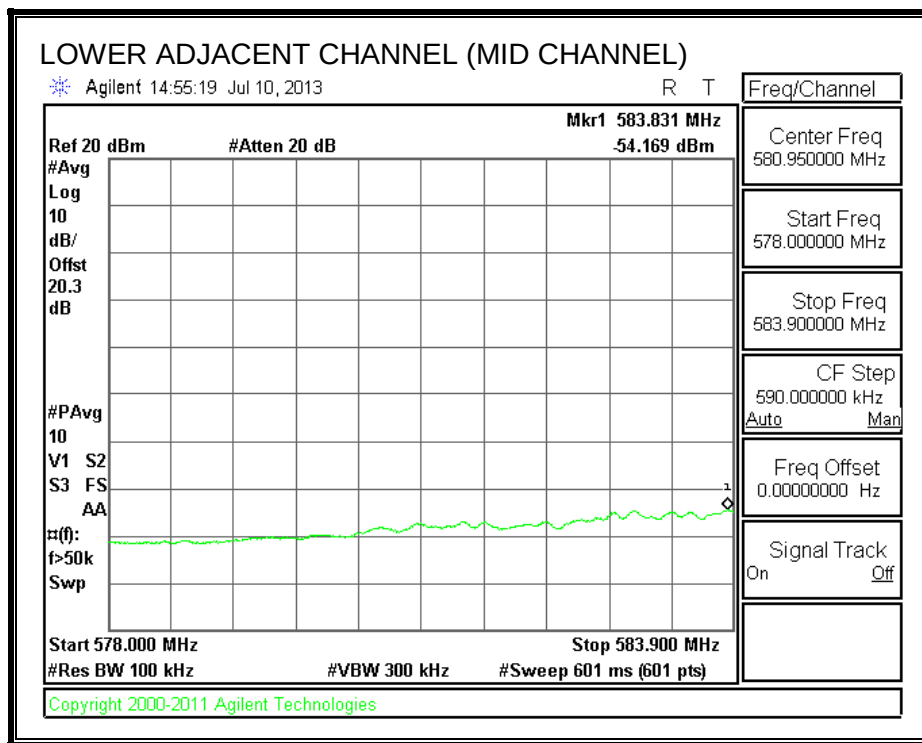
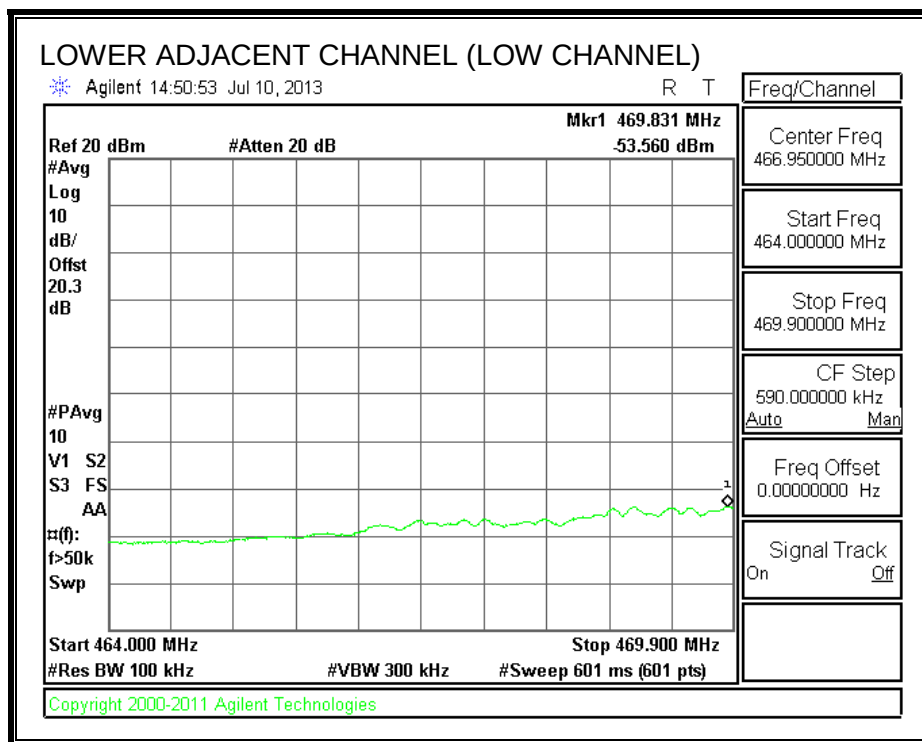
TEST PROCEDURE

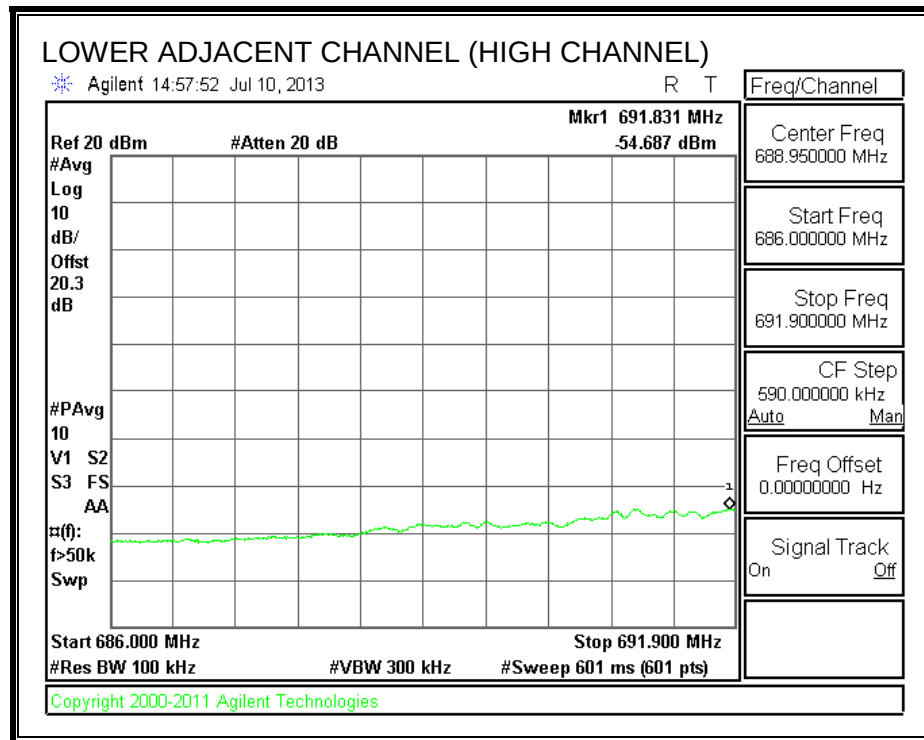
KDB 416271 D01 v02

RESULTS

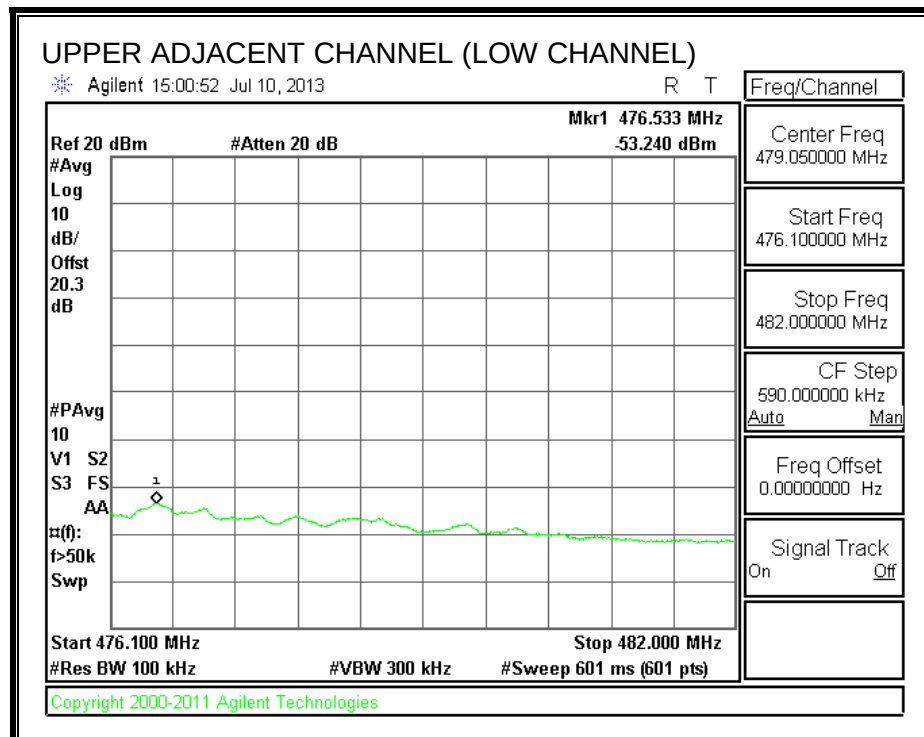
Frequency (MHz)	Emissions Limit (dBm/100 kHz)	Lower Adjacent Channel Emissions (dBm/100 kHz)	Lower Delta (dB)	Upper Adjacent Channel Emissions (dBm/100 kHz)	Upper Delta (dB)
473	-42.8	-53.56	-10.76	-53.24	-10.44
587	-42.8	-54.17	-11.37	-55.71	-12.91
695	-42.8	-54.69	-11.89	-54.24	-11.44

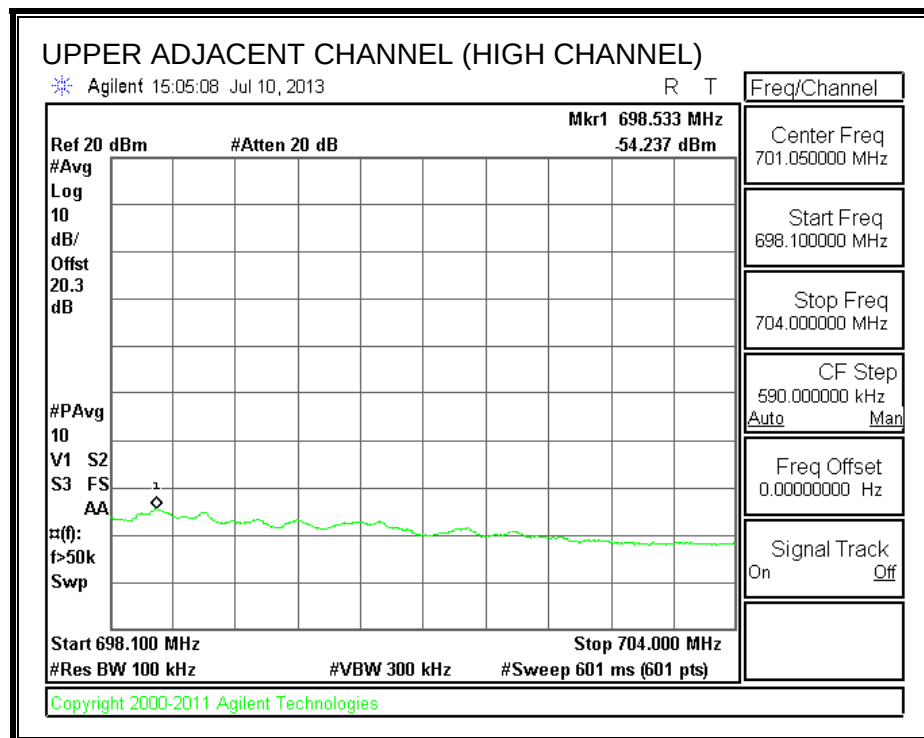
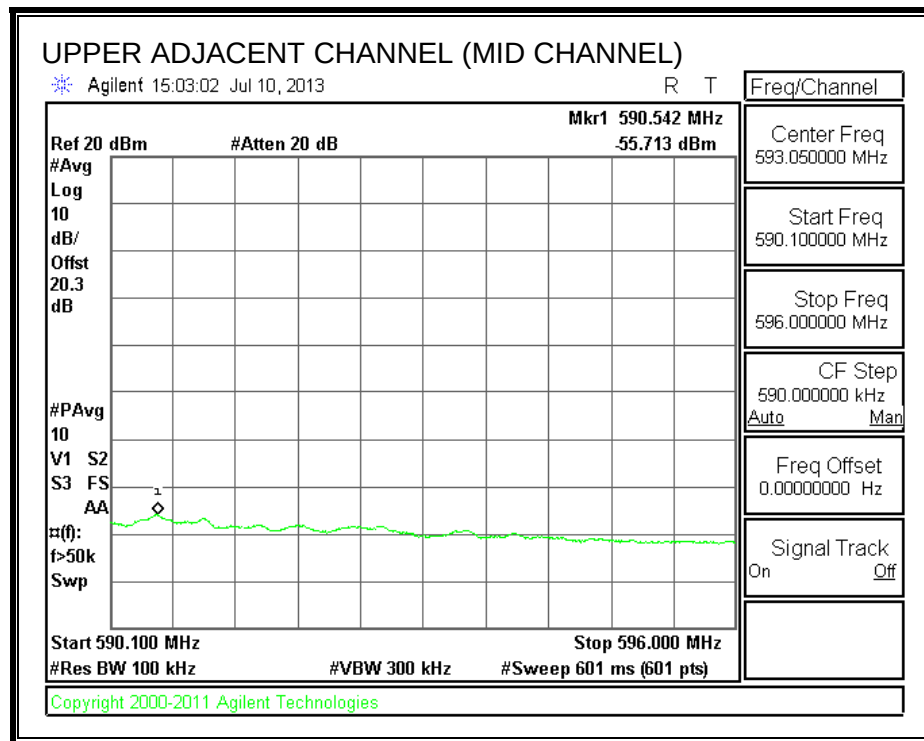
LOWER ADJACENT CHANNEL





UPPER ADJACENT CHANNEL





8.4. RADIATED EMISSIONS

LIMITS

FCC §15.709 (c) (3) At frequencies beyond the television channels immediately adjacent to the channel in which the TVBD is operating, the radiated emissions from TVBDs shall meet the requirements of §15.209.

Excluding Carrier Frequency +/- 9 MHz, the §15.209 limits are:

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

FCC §15.701 (c) (4) Emissions in the band 602–620 MHz must also comply with the following field strength limits at a distance of one meter.

Frequency (MHz)	Field strength dBuV/meter/120 kHz
602–607	$120-5[F(\text{MHz})-602]$
607–608	95
608–614	30
614–615	95
615–620	$120-5[620-F(\text{MHz})]$

TEST PROCEDURE

ANSI C63.4-2009.

The EUT is set to transmit in a continuous mode.

High-Q Cavity Notch filters are used to reduce the amplitude of the intentional transmitter and prevent overload of the system preamplifier.

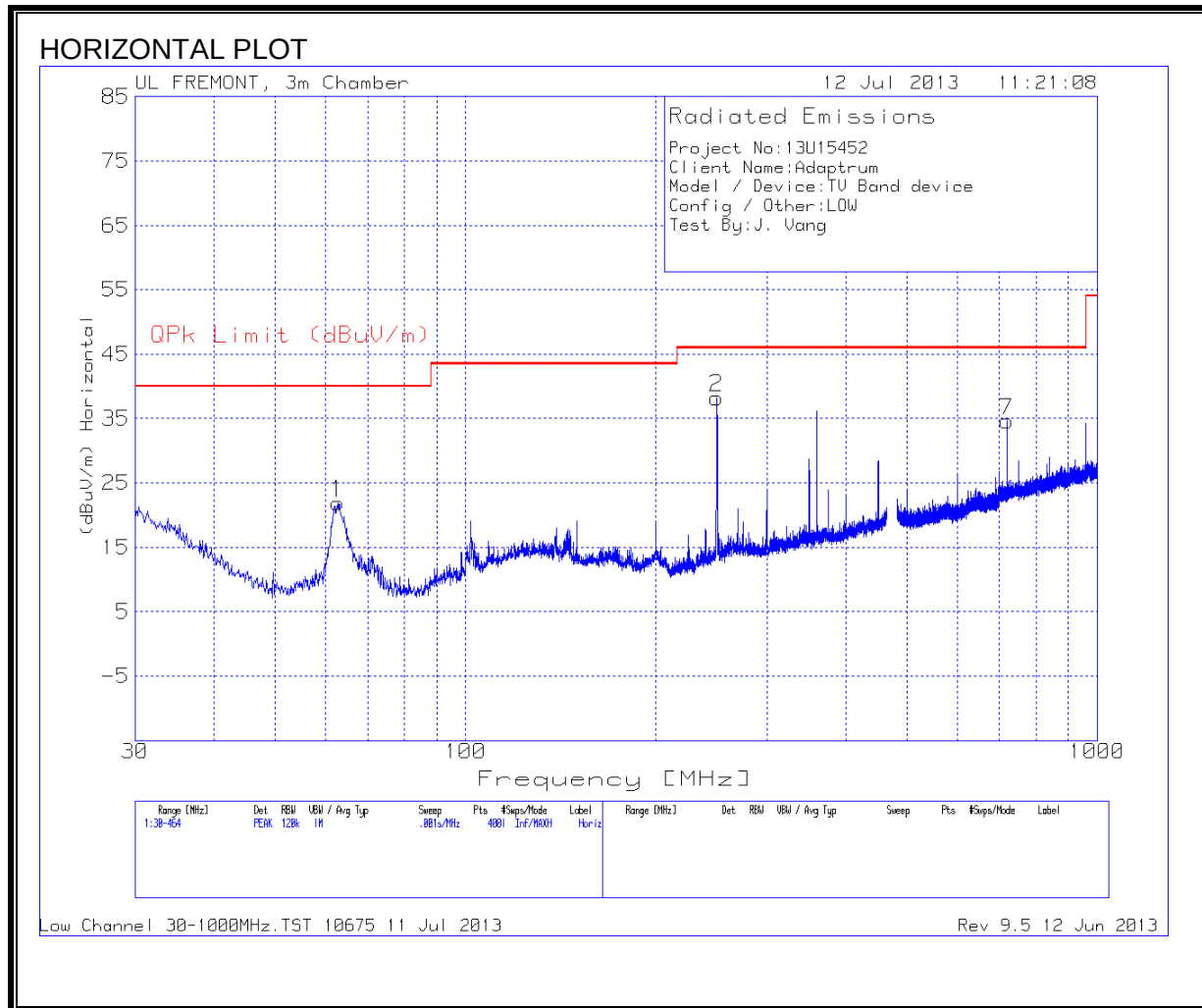
INSTRUMENTATION SETUP FOR 1-METER LIMITS FROM 602 TO 620 MHz

For the additional 602-620 MHz tests a High-Q Cavity band pass filter is used to reduce the amplitude of the intentional transmitter and prevent overload of the system preamplifier and the measurement distance is set to 1 meter.

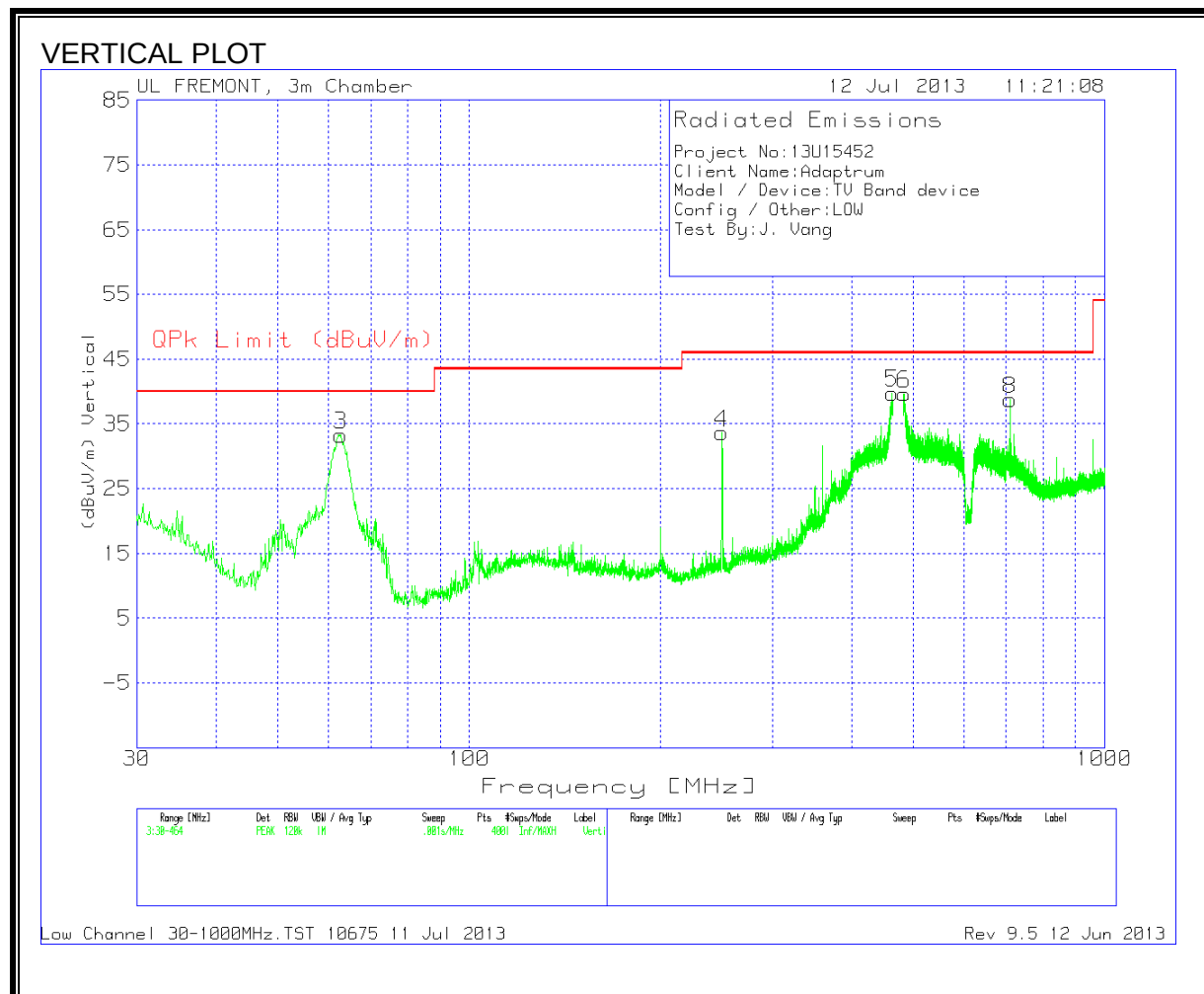
8.4.1. FLAG ANTENNA

8.4.1.1. RADIATED EMISSIONS BELOW 1 GHz (LOW CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T242 Fitr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	62.767	41.41	PK	7.4	-27.2	.3	21.91	40	-18.09	299	Horz
2	250.038	51.86	PK	11.5	-25.4	.3	38.26	46	-7.74	99	Horz
3	62.767	52.81	PK	7.4	-27.2	.3	33.31	40	-6.69	199	Vert
4	249.9295	47.23	PK	11.5	-25.4	.3	33.63	46	-12.37	199	Vert
5	463.349	47.35	PK	17.1	-25.8	1.1	39.75	46	-6.25	199	Vert
6	483.3625	47.26	PK	17.7	-25.9	.6	39.66	46	-6.34	199	Vert

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T237 HPF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
7	720.025	38.11	PK	20.4	-25	1.1	34.61	46	-11.39	99	Horz
8	710.05	42.35	PK	20.3	-25.1	1.2	38.75	46	-7.25	201	Vert

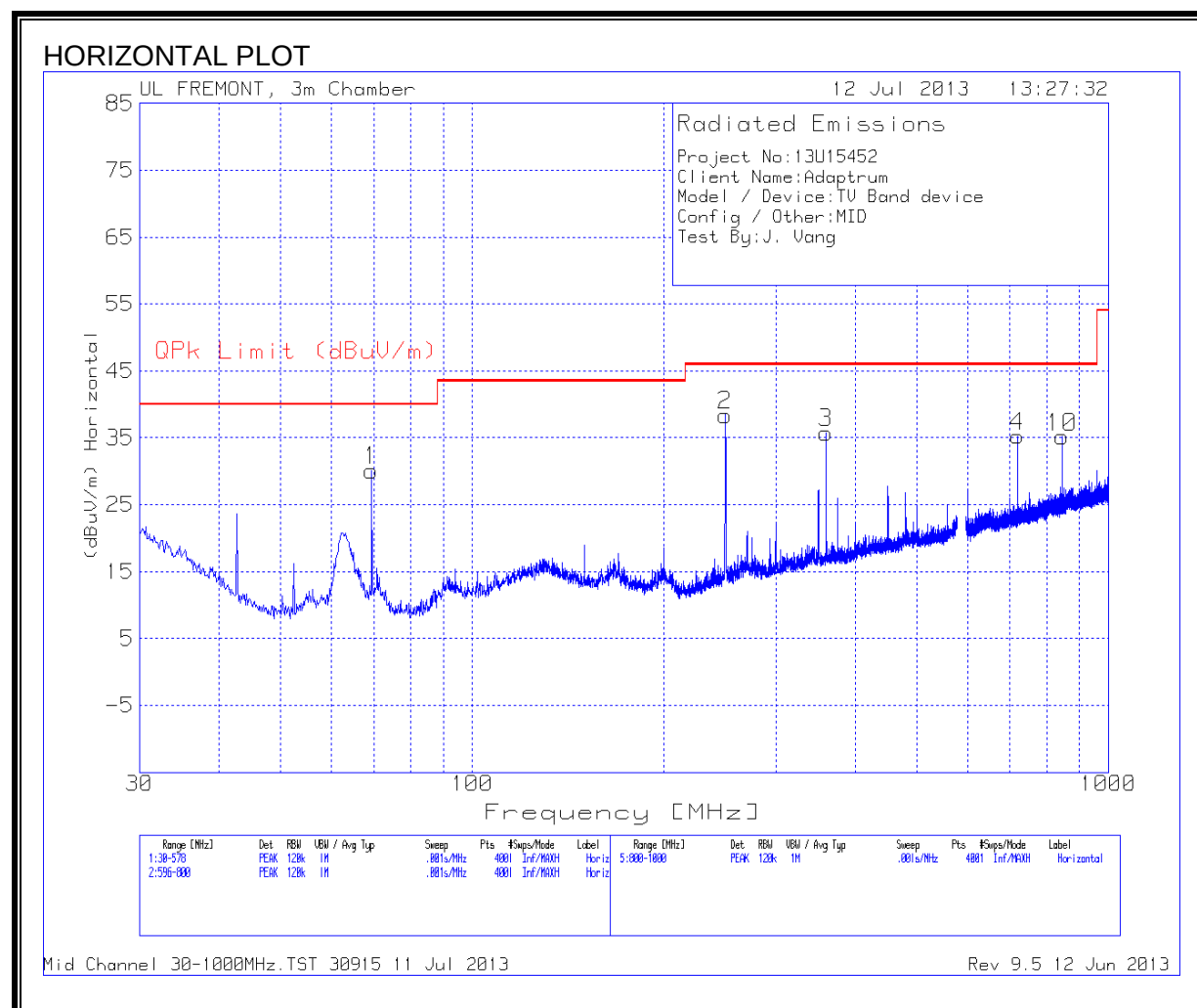
Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T242 Fitr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
65.664	51.69	QP	7.8	-27.1	.3	32.69	40	-7.31	53	126	Vert

PK - Peak detector

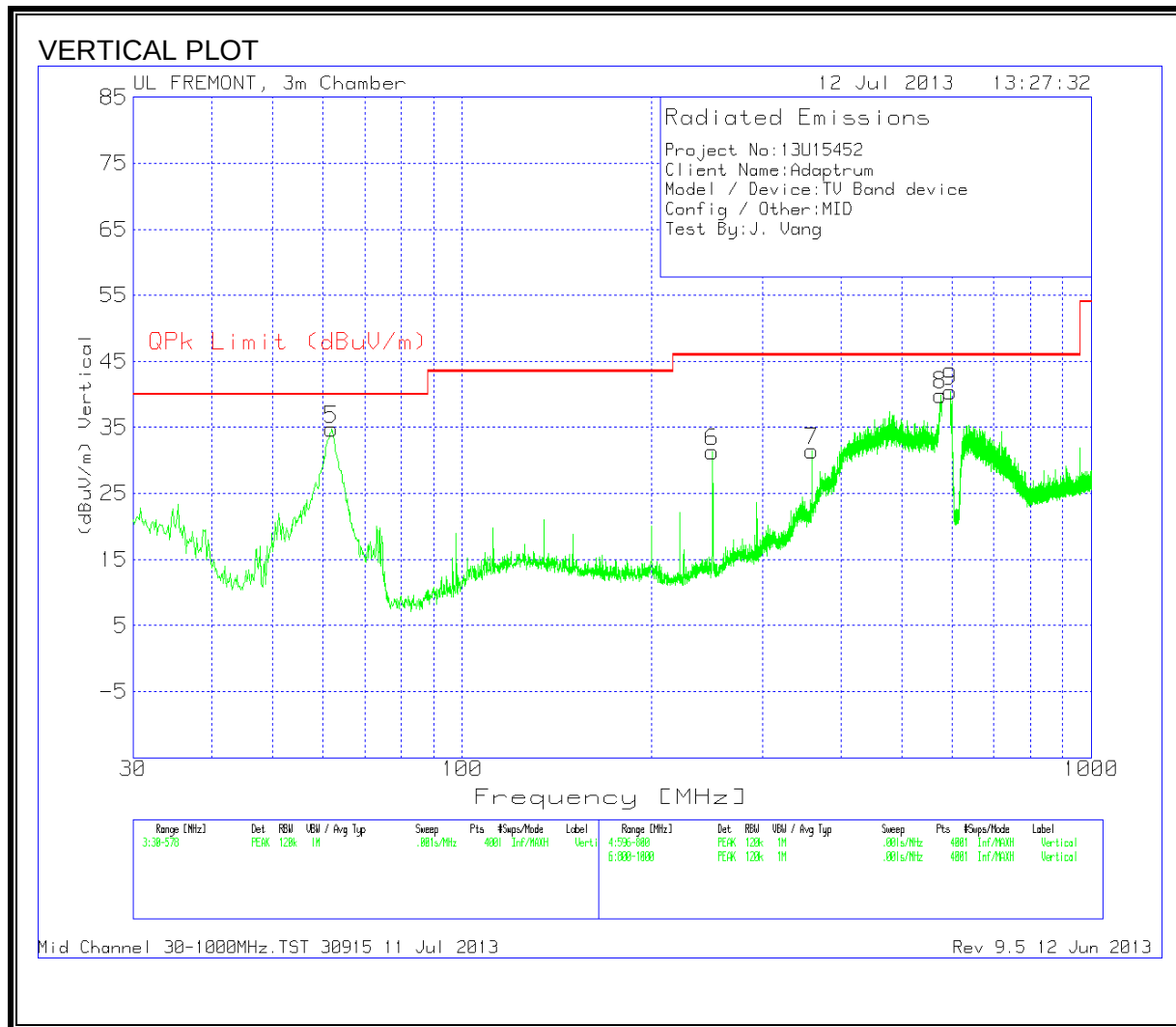
QP - Quasi-Peak detector

8.4.1.2. RADIATED EMISSIONS BELOW 1 GHz (MID CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

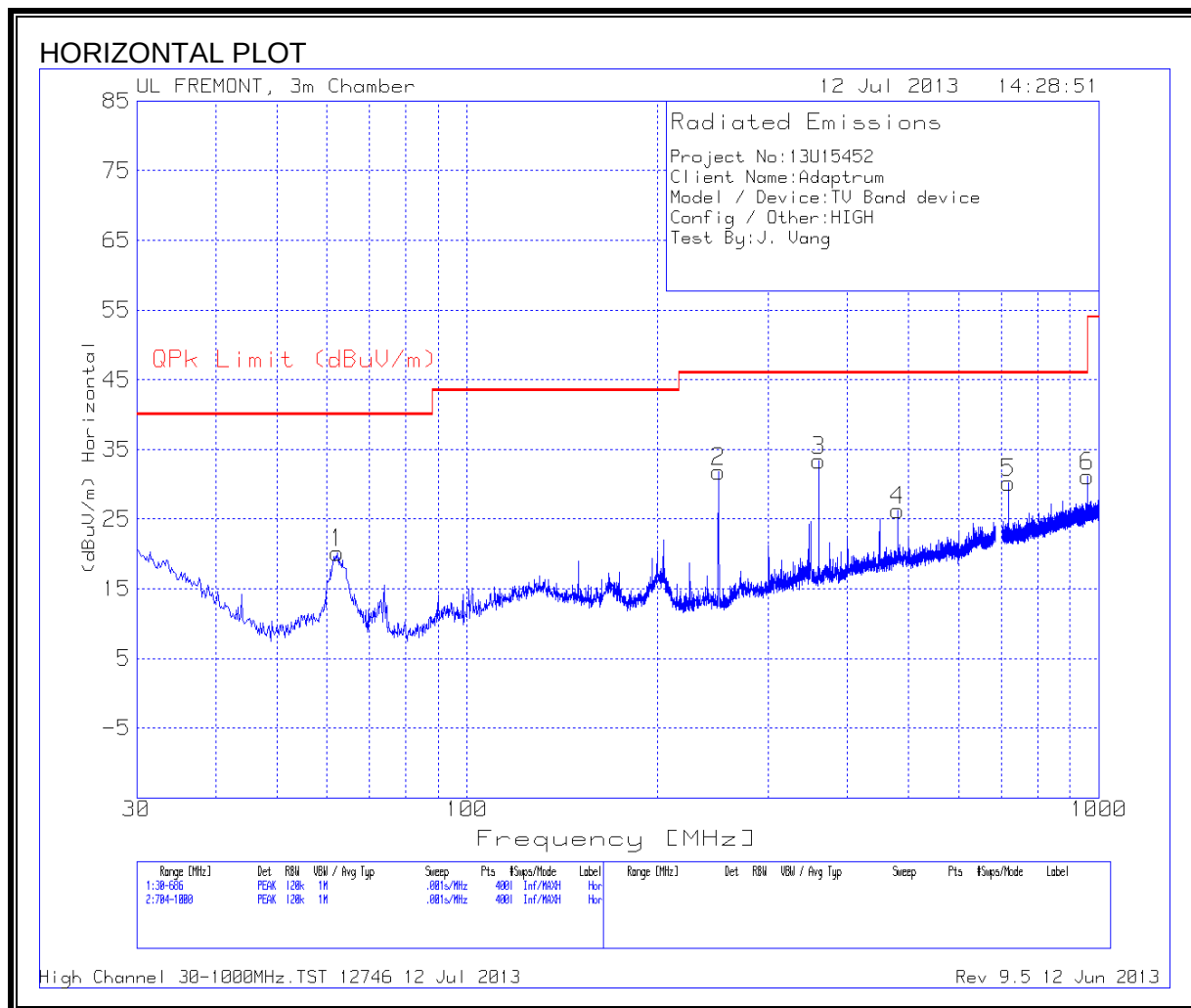
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T239 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	69.456	48.64	PK	8	-27.1	.6	30.14	40	-9.86	301	Horz
2	250.022	51.6	PK	11.5	-25.4	.7	38.4	46	-7.6	100	Horz
3	360.033	45.8	PK	14.7	-25.4	.7	35.8	46	-10.2	100	Horz
4	719.981	39.07	PK	20.4	-25	.8	35.27	46	-10.73	99	Horz
5	62.058	53.83	PK	7.4	-27.2	.7	34.73	40	-5.27	100	Vert
6	250.022	44.51	PK	11.5	-25.4	.7	31.31	46	-14.69	201	Vert
7	360.033	41.45	PK	14.7	-25.4	.7	31.45	46	-14.55	100	Vert
8	575.26	45.81	PK	18.6	-25.6	1.1	39.91	46	-6.09	201	Vert
9	597.122	46.27	PK	18.3	-25.6	1.5	40.47	46	-5.53	201	Vert

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T237 HPF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
10	845.8	36.65	PK	21.6	-24	.9	35.15	46	-10.85	100	Horz

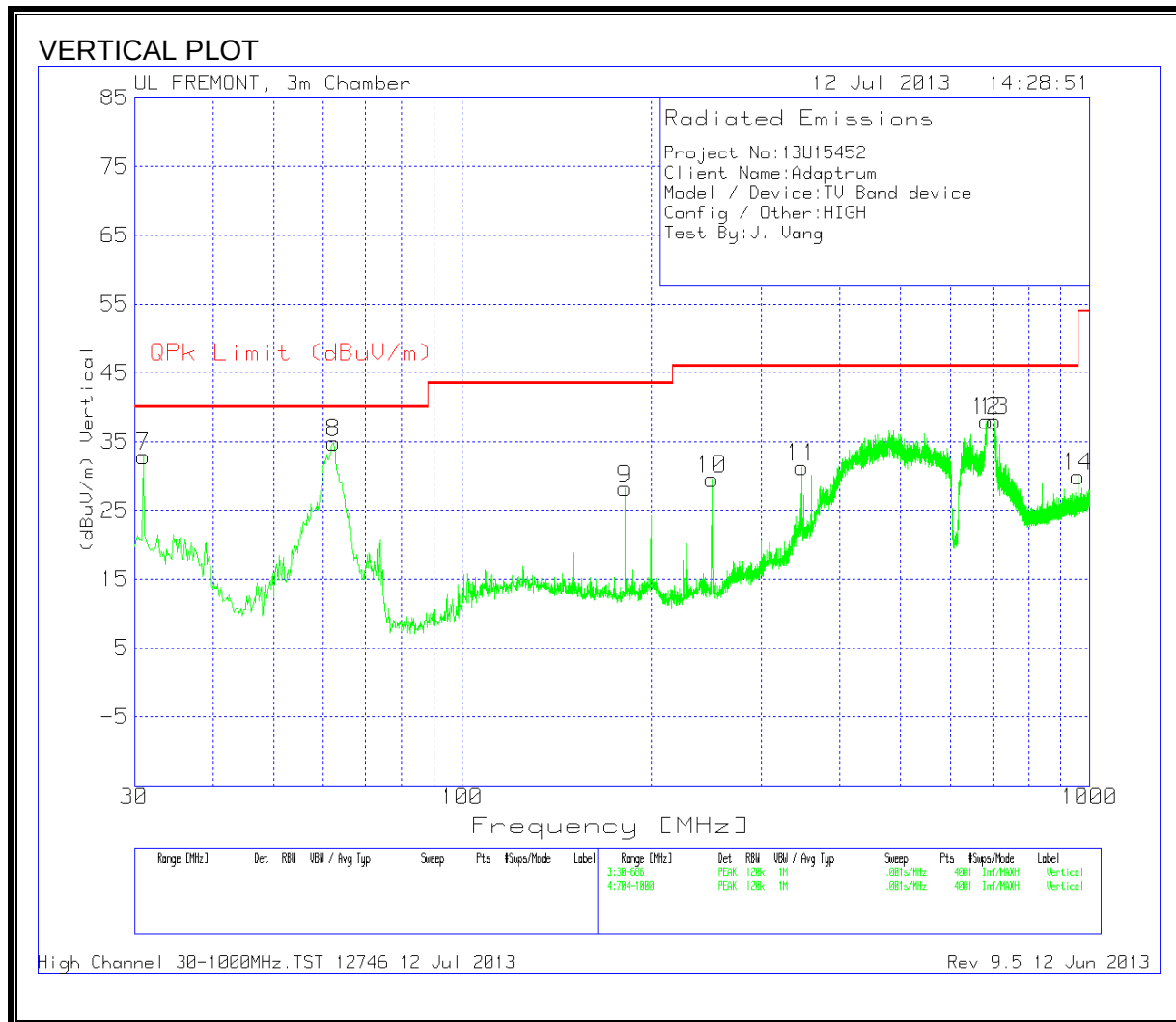
PK - Peak detector

8.4.1.3. RADIATED EMISSIONS BELOW 1 GHz (HIGH CHANNEL)

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



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



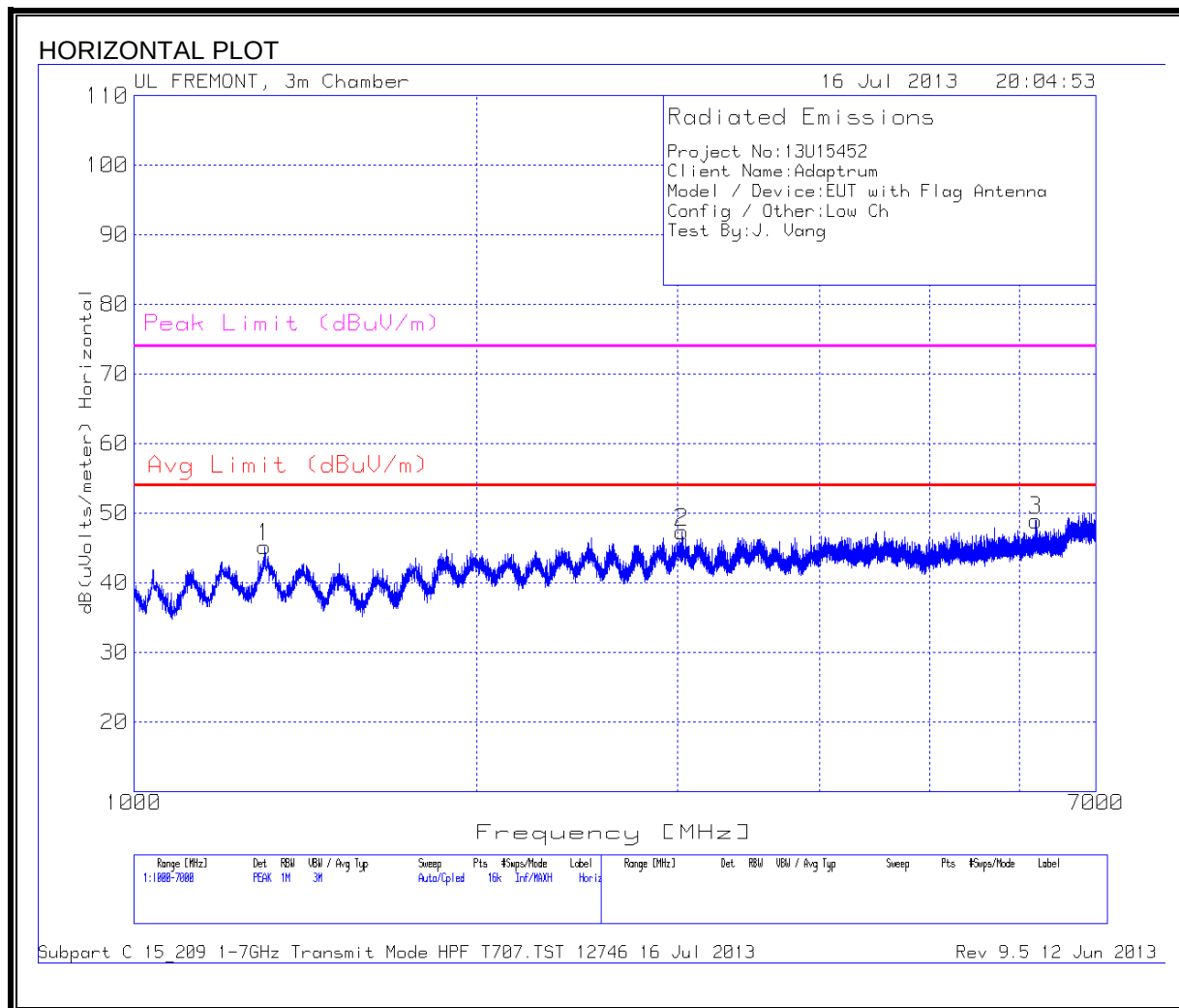
HORIZONTAL & VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T238 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	62.308	39.67	PK	7.4	-27.2	.3	20.17	40	-19.83	301	Horz
2	250.088	45.34	PK	11.5	-25.4	.3	31.74	46	-14.26	100	Horz
3	359.968	43.74	PK	14.7	-25.4	.3	33.34	46	-12.66	100	Horz
4	480.016	33.92	PK	17.8	-25.8	.3	26.22	46	-19.78	200	Horz
5	719.984	34.52	PK	20.4	-25	.3	30.22	46	-15.78	201	Horz
6	959.966	31.42	PK	22.7	-23.3	.3	31.12	46	-14.88	99	Horz
7	30.984	39.54	PK	20.5	-27.5	.3	32.84	40	-7.16	301	Vert
8	62.308	54.3	PK	7.4	-27.2	.3	34.8	40	-5.2	99	Vert
9	181.536	43.06	PK	10.9	-26.1	.3	28.16	43.5	-15.34	99	Vert
10	249.924	43.12	PK	11.5	-25.4	.3	29.52	46	-16.48	99	Vert
11	347.996	42.09	PK	14.2	-25.3	.3	31.29	46	-14.71	201	Vert
12	685.016	42.94	PK	19.9	-25.1	.3	38.04	46	-7.96	201	Vert
13	706.442	42.47	PK	20.2	-25	.3	37.97	46	-8.03	201	Vert
14	959.966	30.24	PK	22.7	-23.3	.3	29.94	46	-16.06	100	Vert

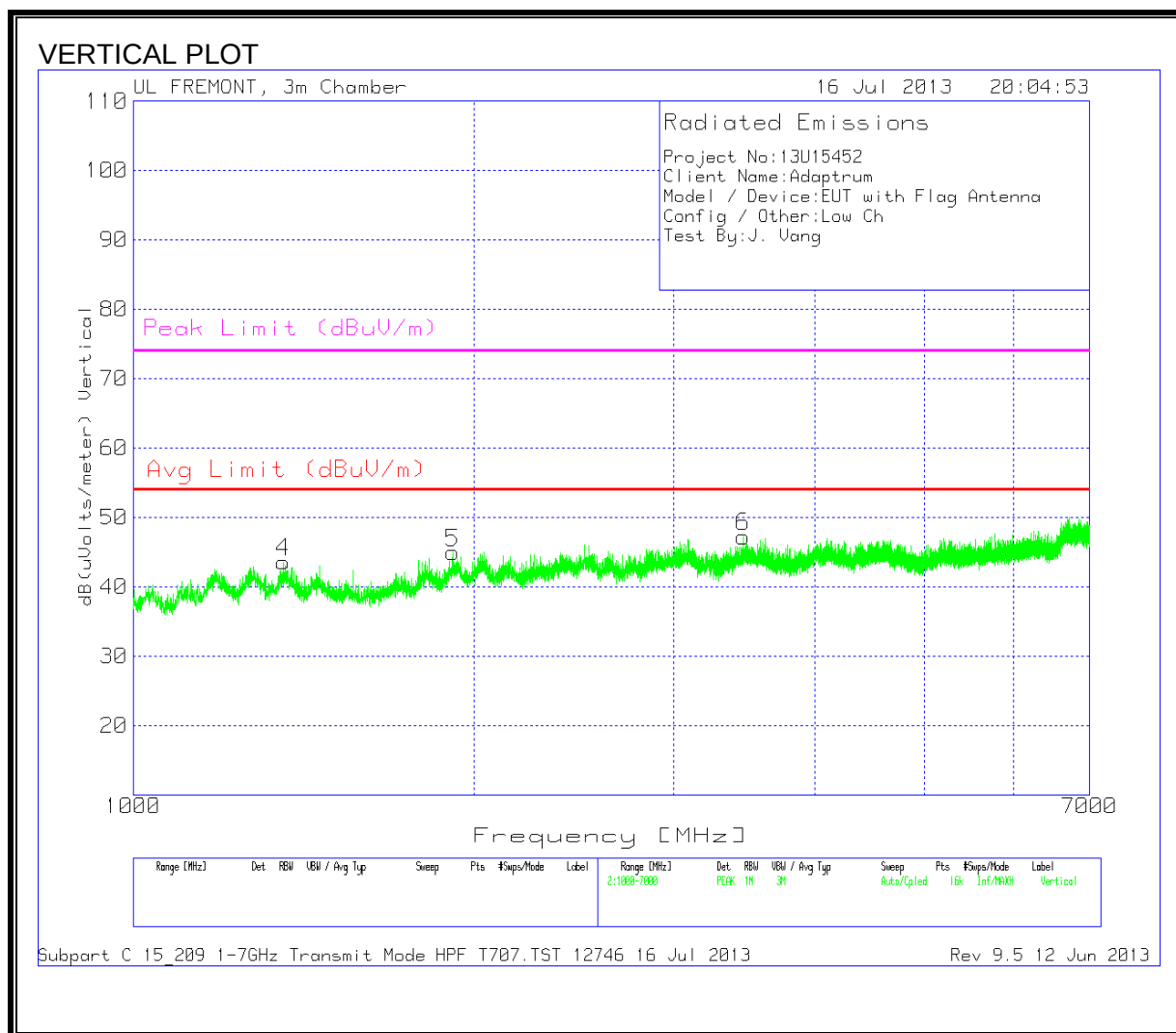
PK - Peak detector

8.4.1.4. TX SPURIOUS EMISSIONS ABOVE 1 GHz (LOW CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



LOW CH DATA

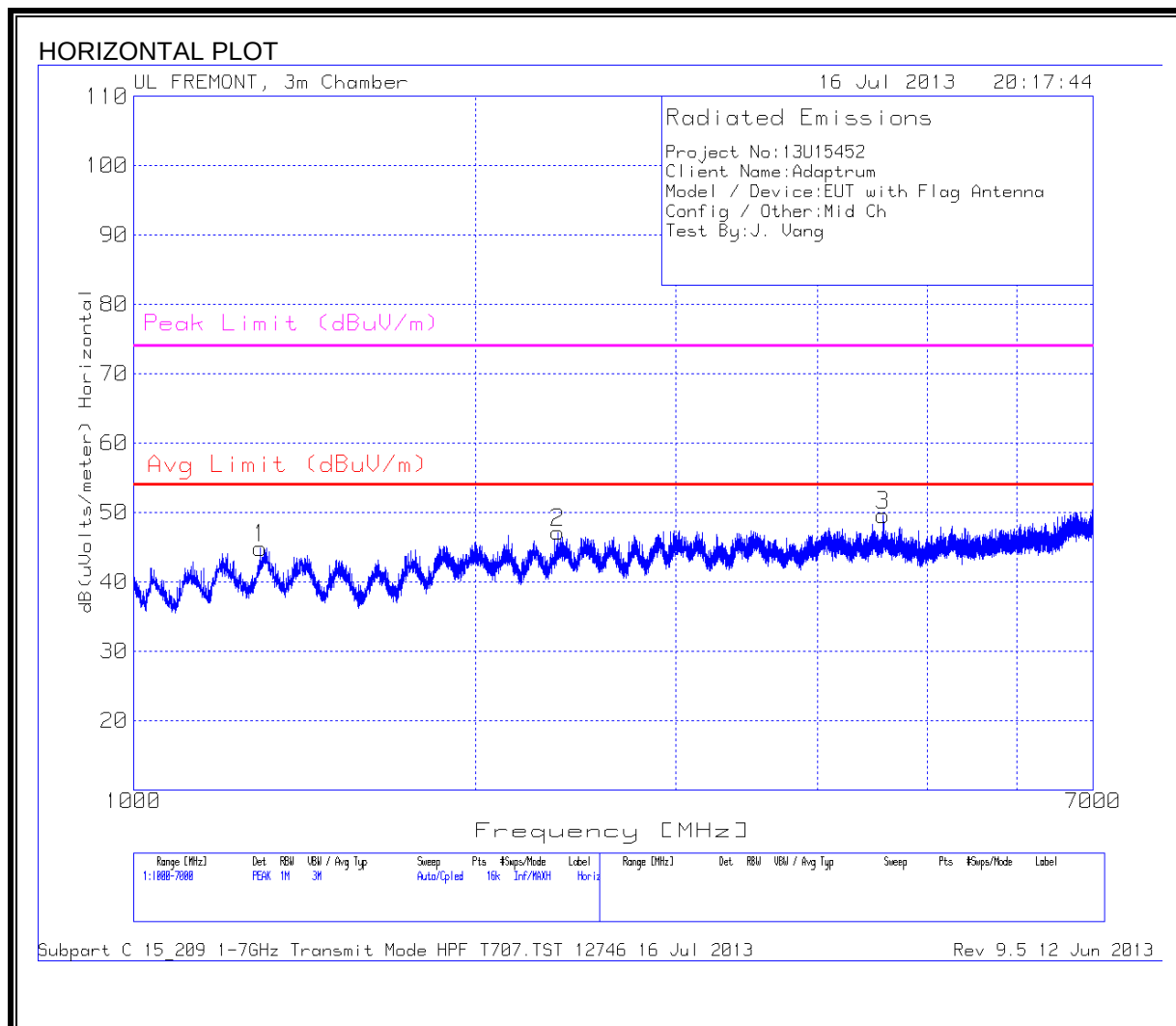
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts /meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.303	42.6	PK	30.2	-28	.4	45.2	53.97	-8.77	74	-28.8	99	Horz
2	3.027	37.53	PK	33	-23.6	.4	47.33	53.97	-6.64	74	-26.67	200	Horz
3	6.198	31.98	PK	35.3	-18.7	.4	48.98	-	-	68.2	-19.22	99	Horz
4	1.357	41.51	PK	29.6	-27.9	.4	43.61	53.97	-10.36	74	-30.39	99	Vert
5	1.916	39.26	PK	31.3	-26	.4	44.96	53.97	-9.01	74	-29.04	201	Vert
6	3.46	36.36	PK	33	-22.5	.4	47.26	53.97	-6.71	74	-26.74	201	Vert

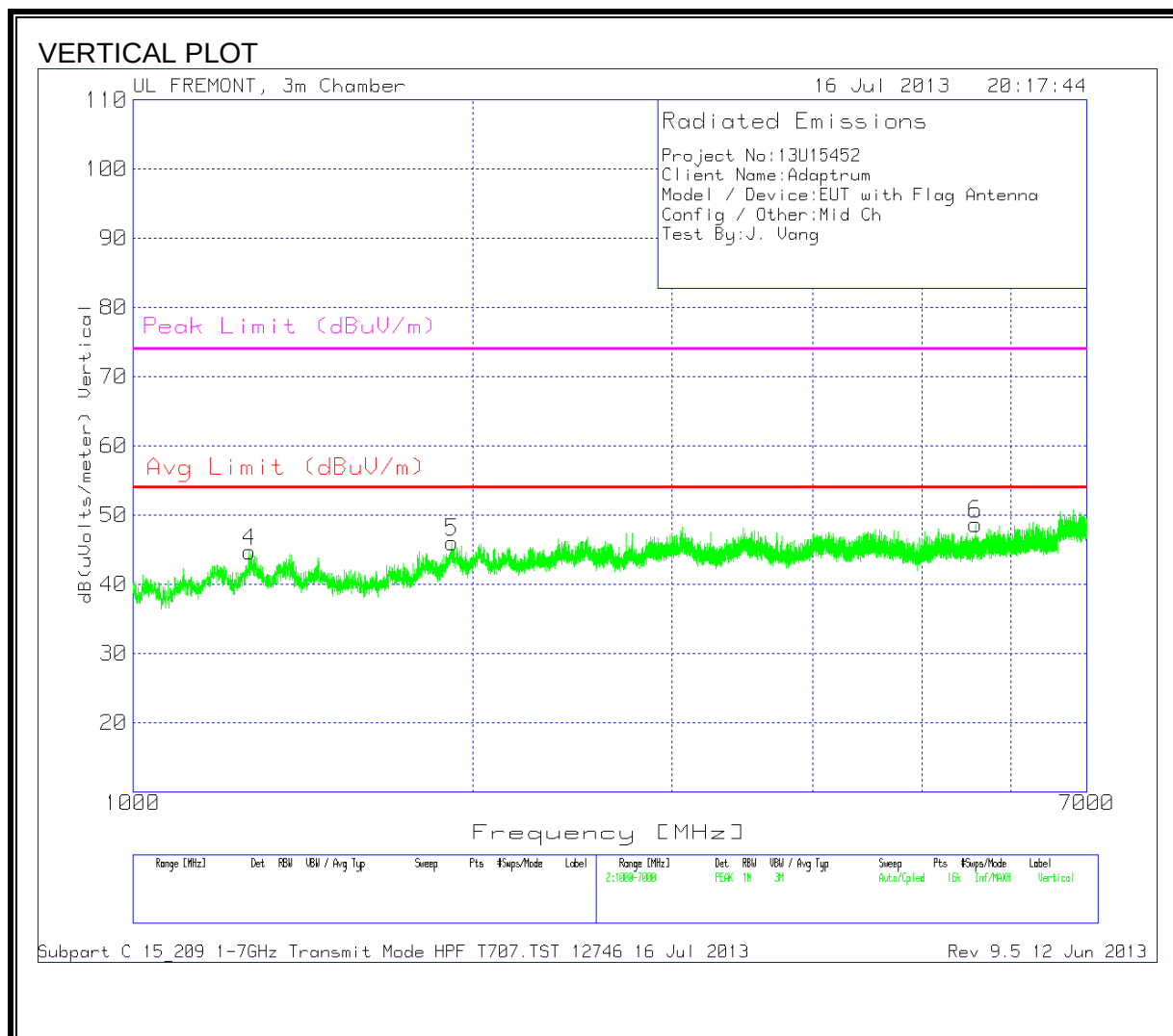
PK - Peak detector

8.4.1.5. TX SPURIOUS EMISSIONS ABOVE 1 GHz (MID CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



MID CH DATA

HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts /meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.293	42.38	PK	30.2	-28.1	.4	44.88	53.97	-9.09	74	-29.12	201	Horz
2	2.363	39.67	PK	32	-24.9	.4	47.17	53.97	-6.8	74	-26.83	201	Horz
3	4.568	35.92	PK	34	-20.7	.4	49.62	53.97	-4.35	74	-24.38	201	Horz
4	1.269	42.63	PK	29.9	-28.2	.4	44.73	53.97	-9.24	74	-29.27	100	Vert
5	1.918	40.38	PK	31.3	-26	.4	46.08	53.97	-7.89	74	-27.92	201	Vert
6	5.576	32.91	PK	34.8	-19.4	.4	48.71	-	-	68.2	-19.49	100	Vert

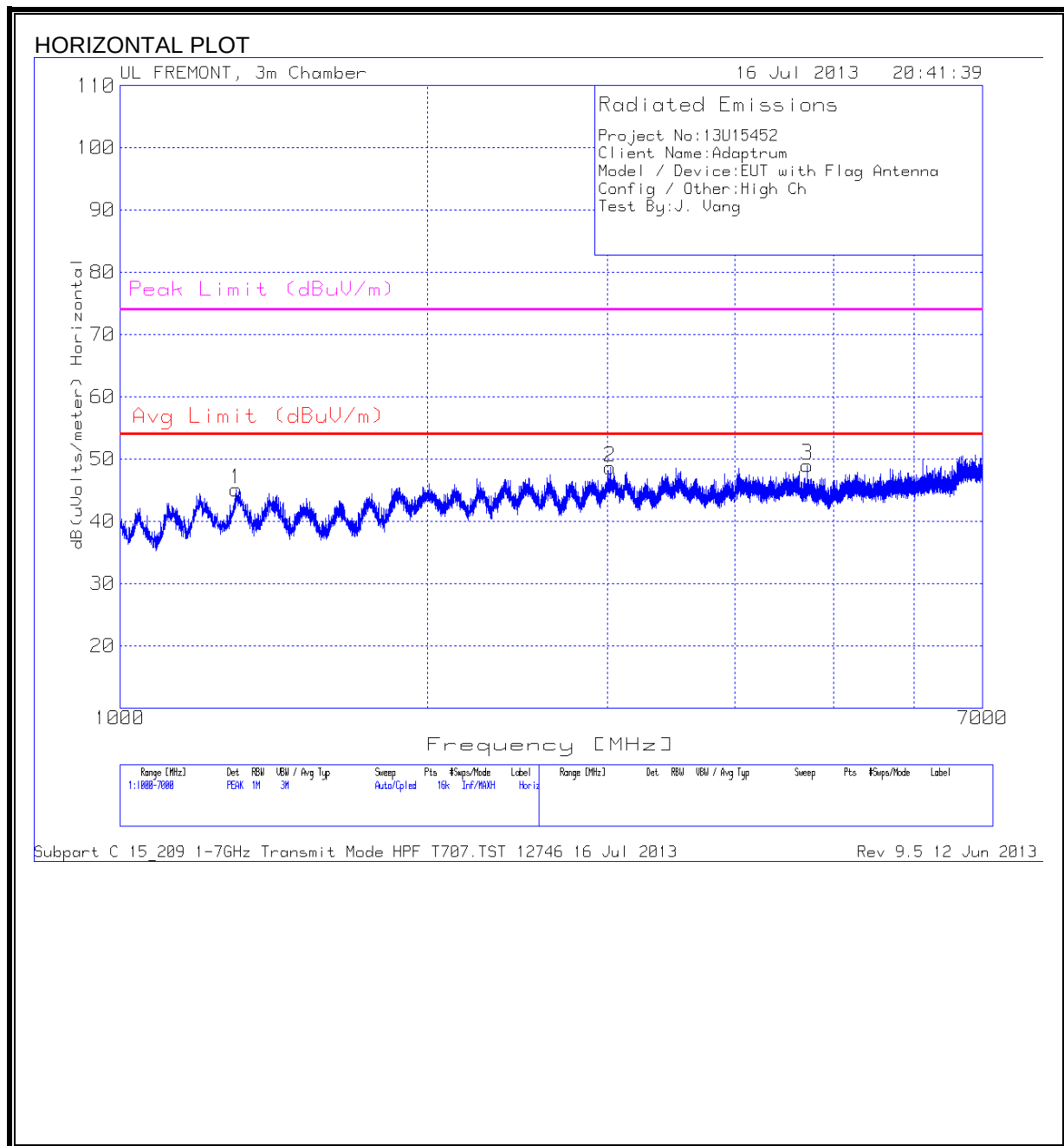
Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/ meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.574	22.12	Av	34	-20.6	.4	35.92	53.97	-18.05	-	-	272	273	Horz

PK - Peak detector

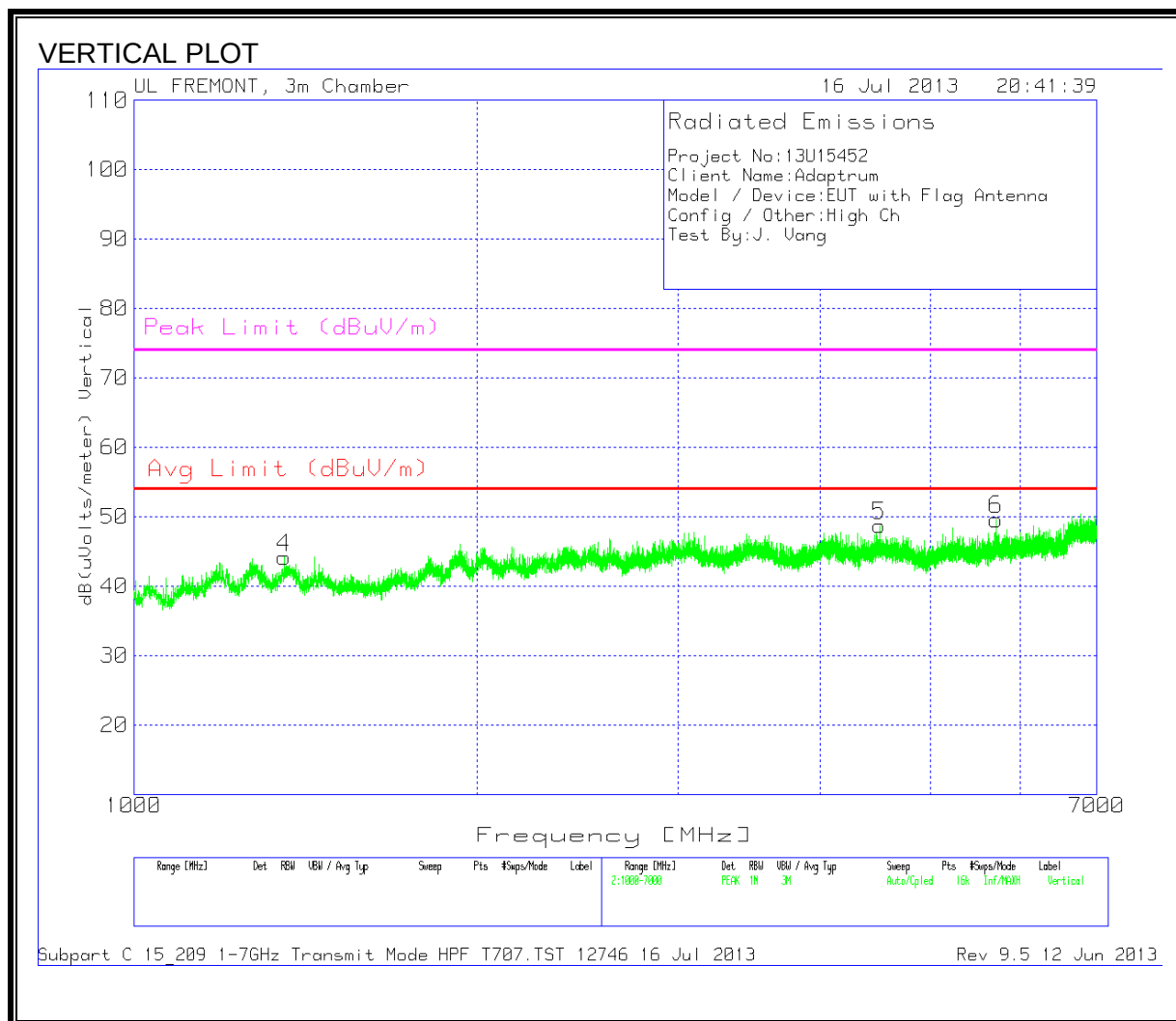
Av - average detection

8.4.1.6. TX SPURIOUS EMISSIONS ABOVE 1 GHz (HIGH CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



HIGH CH DATA

HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts /meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.3	42.51	PK	30.2	-28	.4	45.11	53.97	-8.86	74	-28.89	99	Horz
2	3.021	38.96	PK	33	-23.7	.4	48.66	-	-	68.2	-19.54	201	Horz
3	4.714	34.91	PK	34.1	-20.4	.4	49.01	53.97	-4.96	74	-24.99	99	Horz
4	1.355	42.06	PK	29.6	-27.9	.4	44.16	53.97	-9.81	74	-29.84	201	Vert
5	4.511	35.25	PK	33.9	-20.8	.4	48.75	53.97	-5.22	74	-25.25	100	Vert
6	5.713	33.62	PK	34.8	-19.2	.4	49.62	-	-	68.2	-18.58	201	Vert

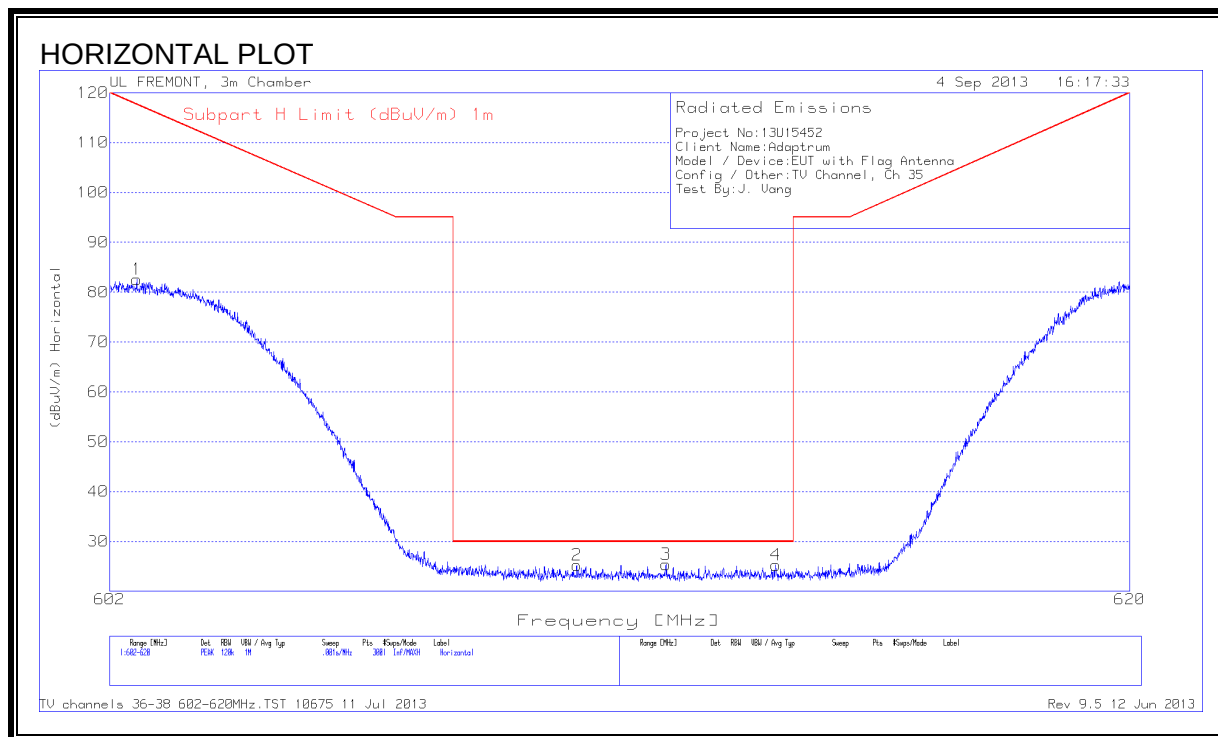
Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/ meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimu t (Degs)	Height (cm)	Polarity
4.714	21.71	Av	34.1	-20.4	.4	35.81	53.97	-18.16	-	-	346	243	Horz
4.515	20.18	Av	33.9	-20.7	.4	33.78	53.97	-20.19	-	-	102	298	Vert

PK - Peak detector

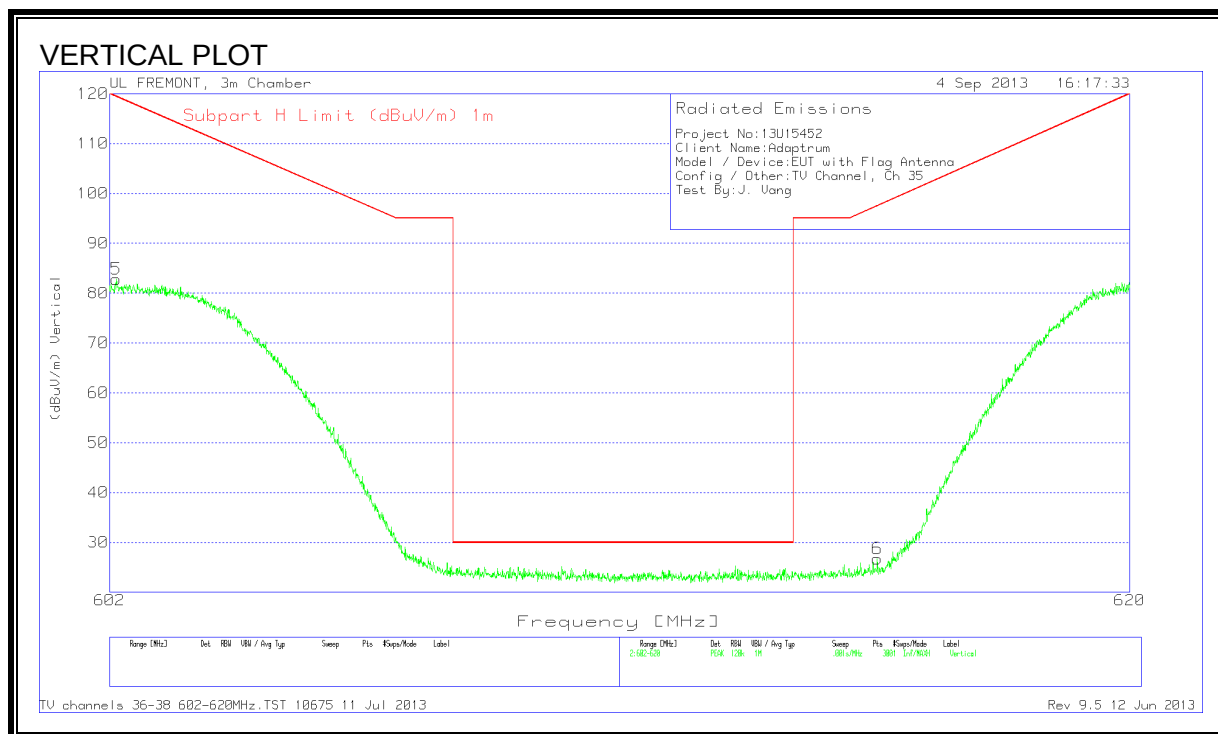
Av - average detection

8.4.1.7. RADIATED EMISSIONS 602 TO 620 MHz

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)



PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)

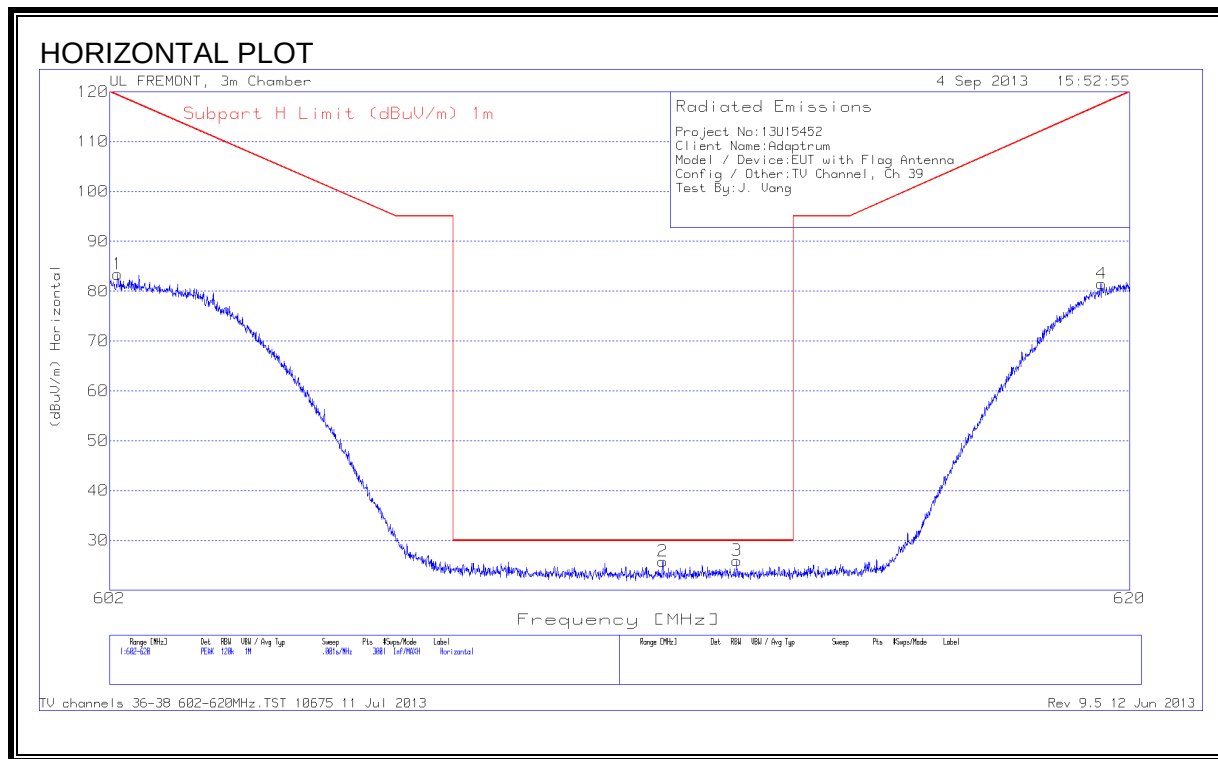


TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)

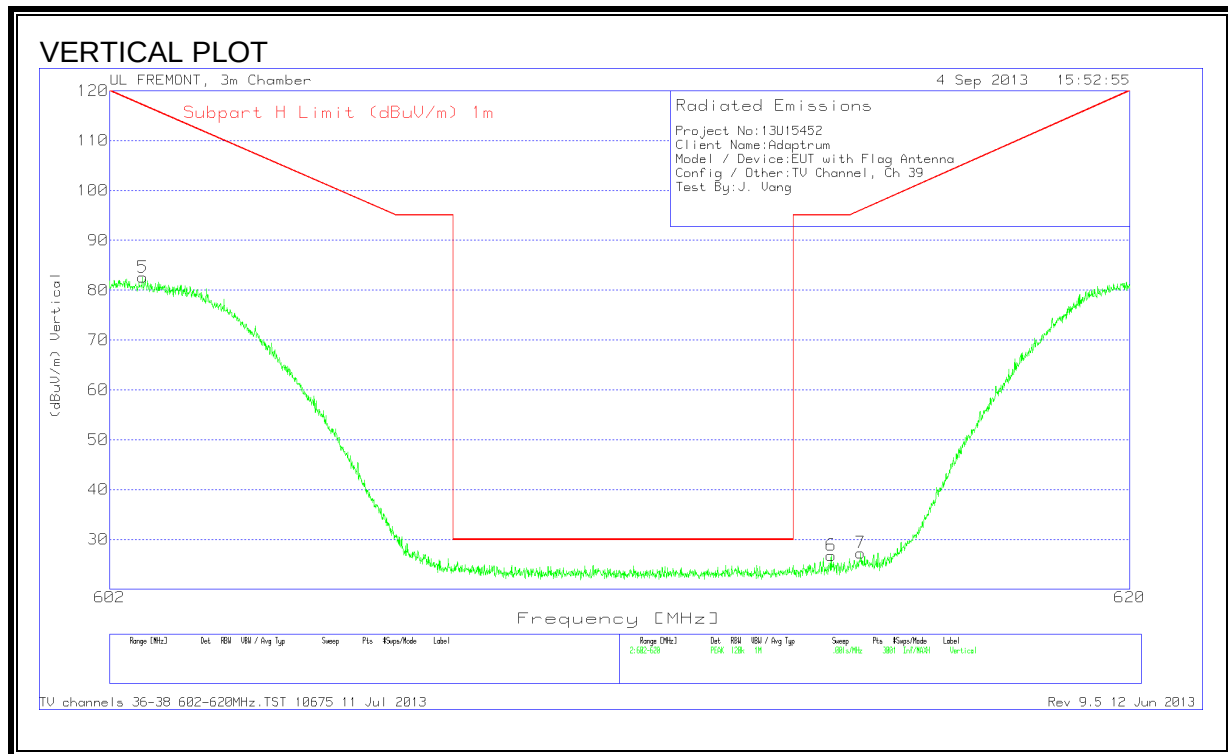
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	602.474	28.65	PK	18.4	-25.6	61.1	82.55	117.62	-35.07	400	Horz
2	610.178	29.33	PK	18.8	-25.5	2.6	25.23	30	-4.77	400	Horz
3	611.75	29.6	PK	18.8	-25.5	2.5	25.4	30	-4.6	100	Horz
4	613.694	29.28	PK	18.8	-25.5	2.7	25.28	30	-4.72	100	Horz
5	602.114	28.72	PK	18.4	-25.6	61.3	82.82	119.43	-36.61	199	Vert
6	615.494	29.55	PK	18.8	-25.5	3.9	26.75	97.48	-70.73	400	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
610.2438	23.24	QP	18.8	-25.5	2.6	19.14	30	-10.86	349	389	Horz
611.626	23.25	QP	18.8	-25.5	2.5	19.05	30	-10.95	48	381	Horz
613.3375	23.18	QP	18.8	-25.5	2.7	19.18	30	-10.82	90	135	Horz

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)



PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)



TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	602.138	29.33	PK	18.4	-25.6	61.3	83.43	119.31	-35.88	201	Horz
2	611.693	30.01	PK	18.8	-25.5	2.5	25.81	30	-4.19	301	Horz
3	613.004	30.03	PK	18.8	-25.5	2.6	25.93	30	-4.07	400	Horz
4	619.496	28.71	PK	19	-25.4	59.2	81.51	117.49	-35.98	201	Horz
5	602.576	28.69	PK	18.4	-25.5	61	82.59	117.11	-34.52	99	Vert
6	614.678	30.49	PK	18.8	-25.5	3	26.79	95	-68.21	199	Vert
7	615.2	30.5	PK	18.8	-25.5	3.5	27.3	96	-68.7	199	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
612.4064	23.31	QP	18.8	-25.5	2.6	19.21	30	-10.79	220	232	Horz
612.7465	23.25	QP	18.8	-25.5	2.6	19.15	30	-10.85	51	207	Horz

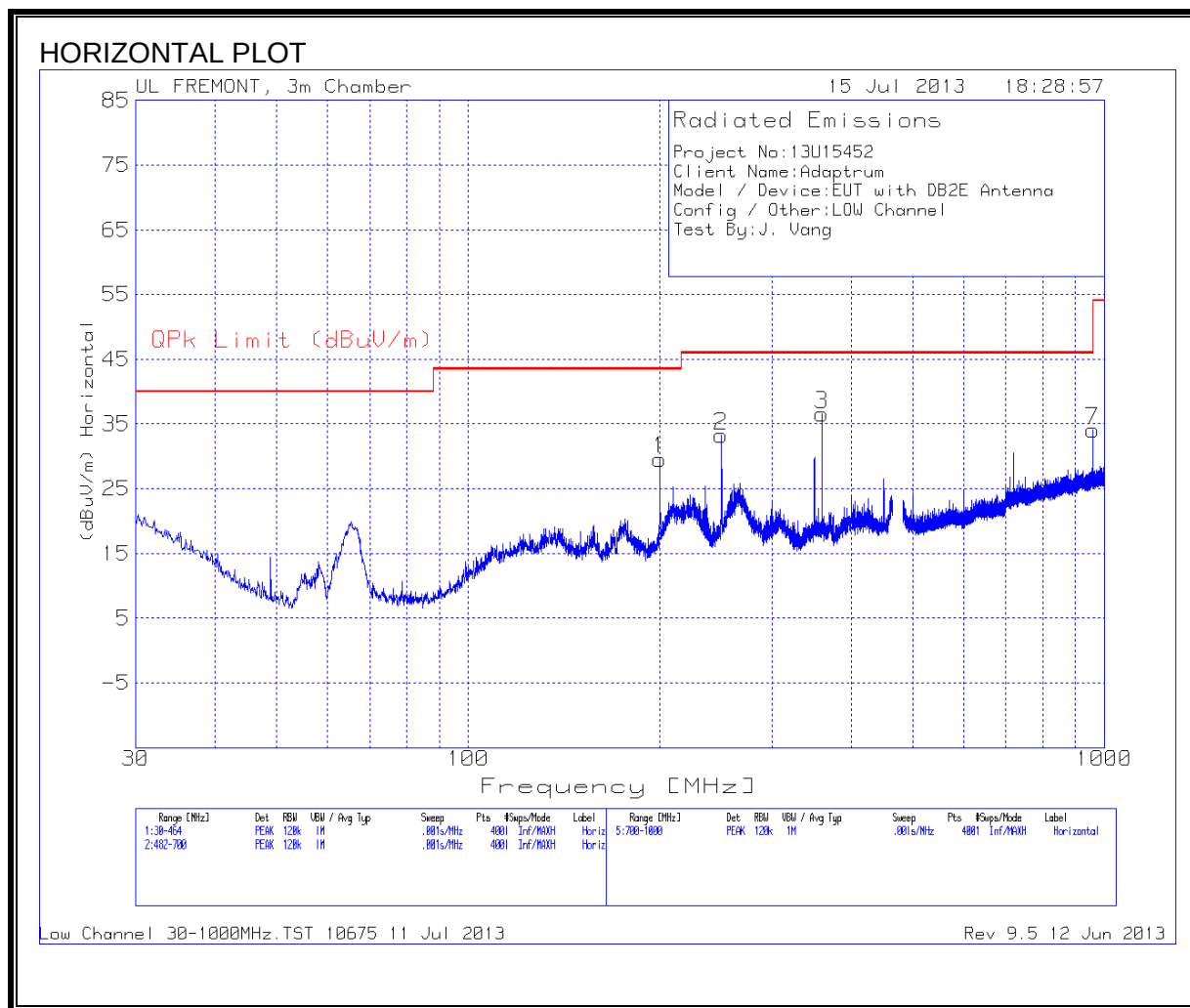
PK - Peak detector

QP - Quasi-Peak detector

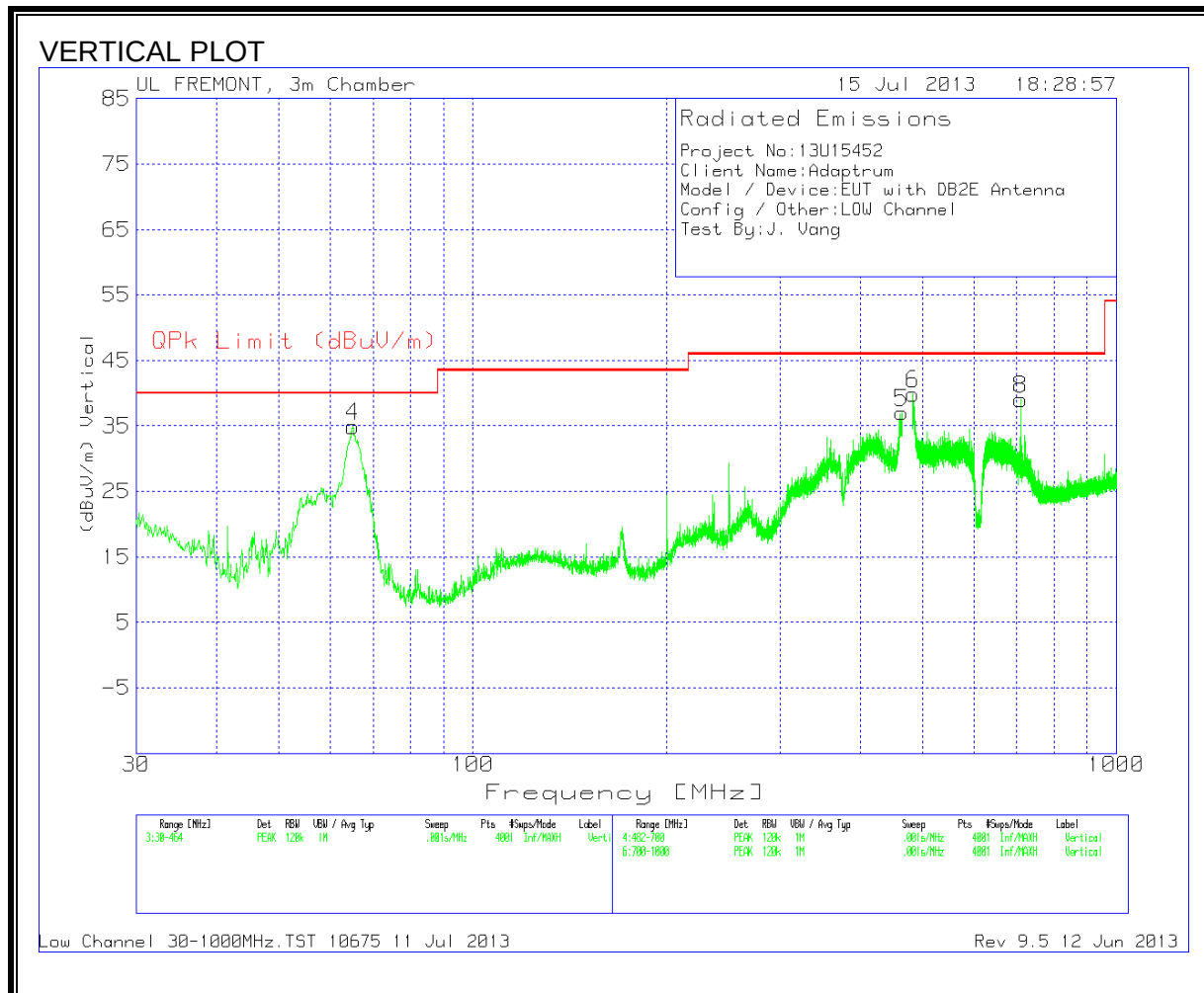
8.4.2. DB2E ANTENNA

8.4.2.1. RADIATED EMISSIONS BELOW 1 GHz (LOW CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

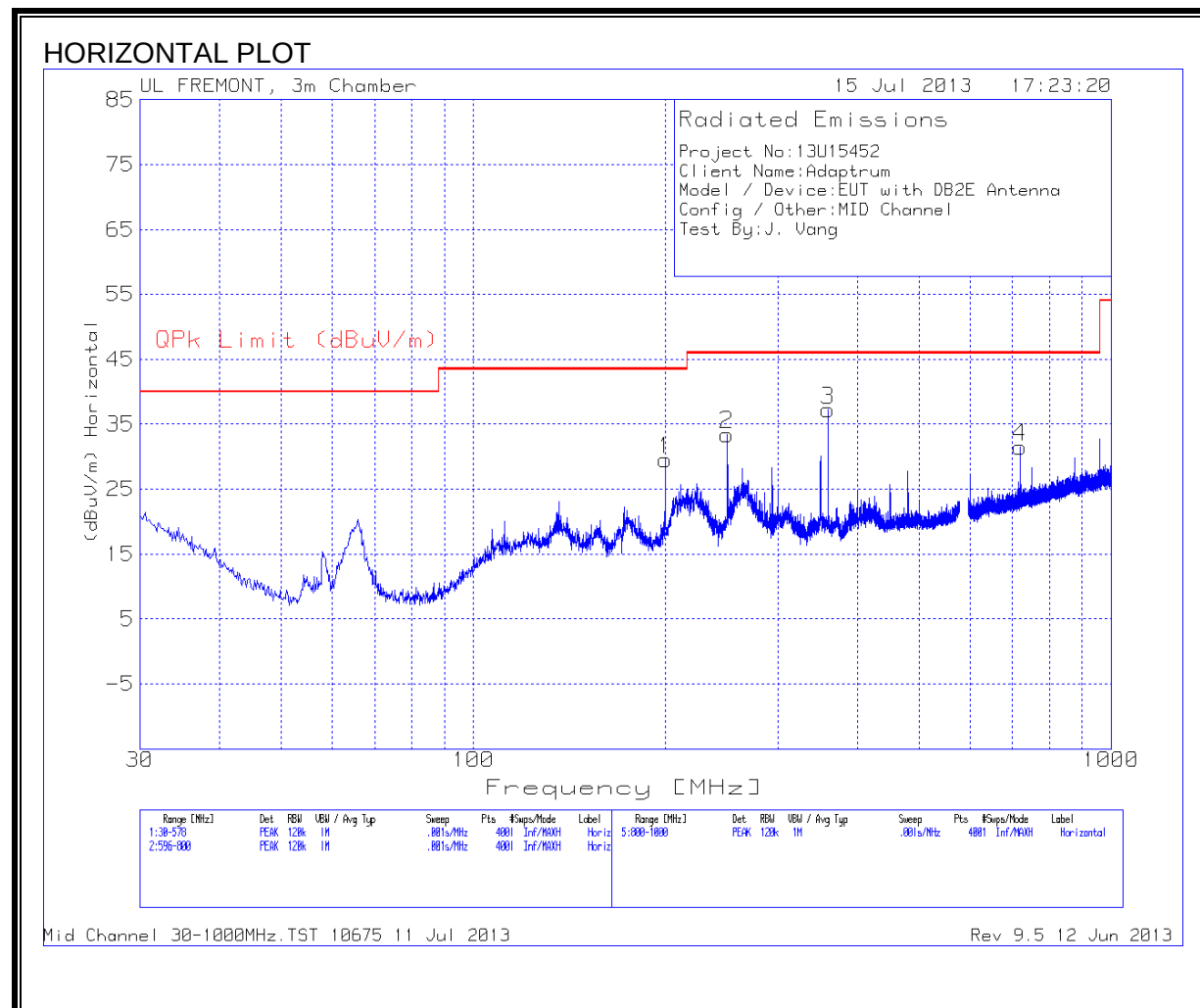
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T242 Fitr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	200.0195	42.91	PK	12.3	-25.9	.2	29.51	43.5	-13.99	200	Horz
2	249.9295	46.82	PK	11.5	-25.4	.3	33.22	46	-12.78	100	Horz
3	359.9485	46.93	PK	14.7	-25.4	.3	36.53	46	-9.47	100	Horz
4	65.154	54.16	PK	7.7	-27.2	.3	34.96	40	-5.04	199	Vert
5	464	44.66	PK	17.2	-25.9	1.1	37.06	46	-8.94	199	Vert
6	483.09	47.53	PK	17.7	-25.9	.6	39.93	46	-6.07	199	Vert

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T237 HPF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
7	959.95	33.86	PK	22.7	-23.3	.8	34.06	46	-11.94	100	Horz
8	709.975	42.66	PK	20.3	-25.1	1.2	39.06	46	-6.94	201	Vert

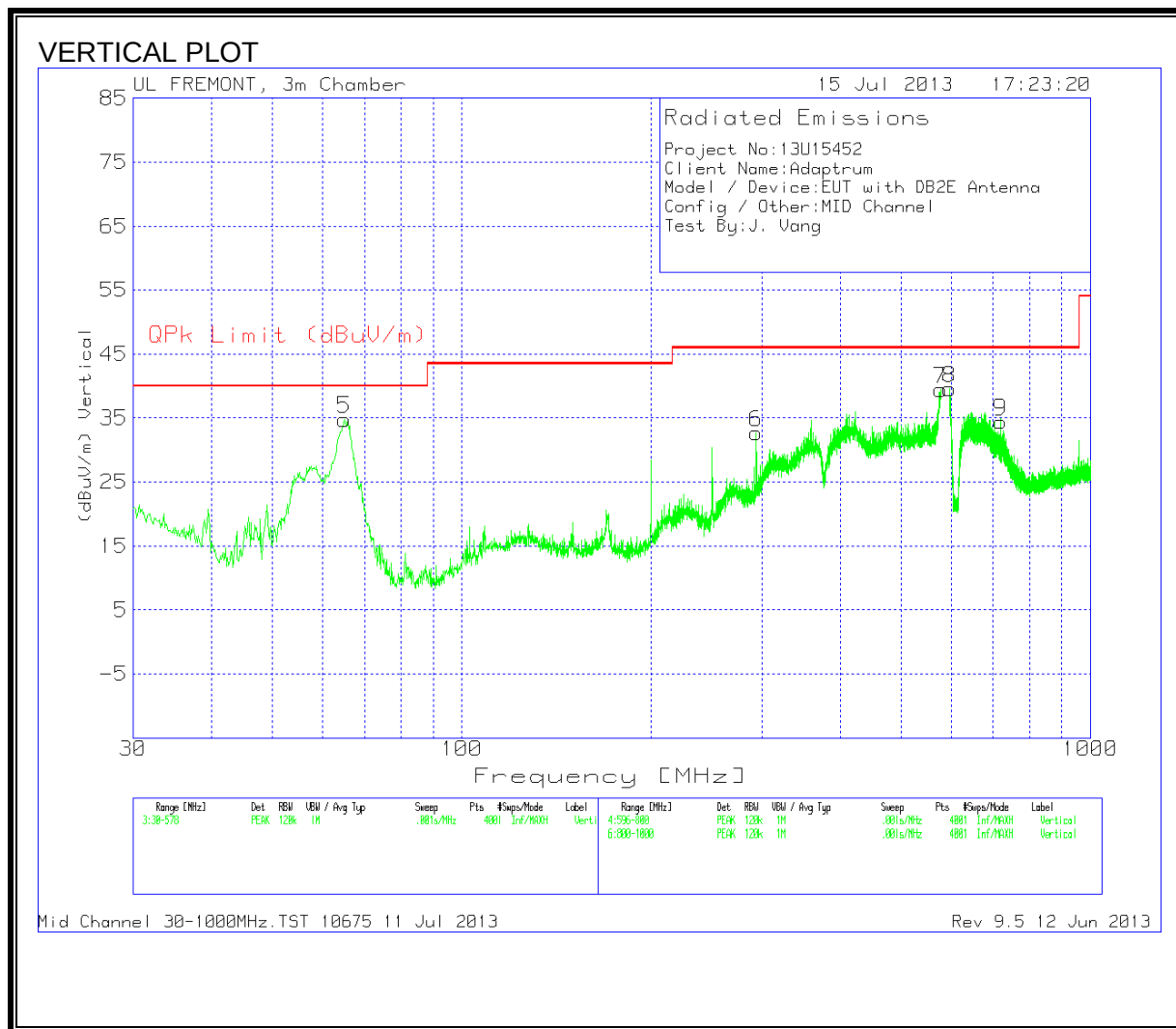
PK - Peak detector

8.4.2.2. RADIATED EMISSIONS BELOW 1 GHz (MID CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T239 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	200.017	42.51	PK	12.3	-25.9	.6	29.51	43.5	-13.99	201	Horz
2	250.022	46.66	PK	11.5	-25.4	.7	33.46	46	-12.54	99	Horz
3	360.033	47.22	PK	14.7	-25.4	.7	37.22	46	-8.78	99	Horz
4	719.981	35.32	PK	20.4	-25	.8	31.52	46	-14.48	100	Horz
5	65.072	53.6	PK	7.7	-27.2	.7	34.8	40	-5.2	100	Vert
6	293.999	44.02	PK	13.3	-25.2	.6	32.72	46	-13.28	100	Vert
7	577.863	44.74	PK	18.7	-25.6	1.6	39.44	46	-6.56	100	Vert
8	597.071	45.38	PK	18.3	-25.6	1.5	39.58	46	-6.42	100	Vert
9	720.032	38.23	PK	20.4	-25	.8	34.43	46	-11.57	100	Vert

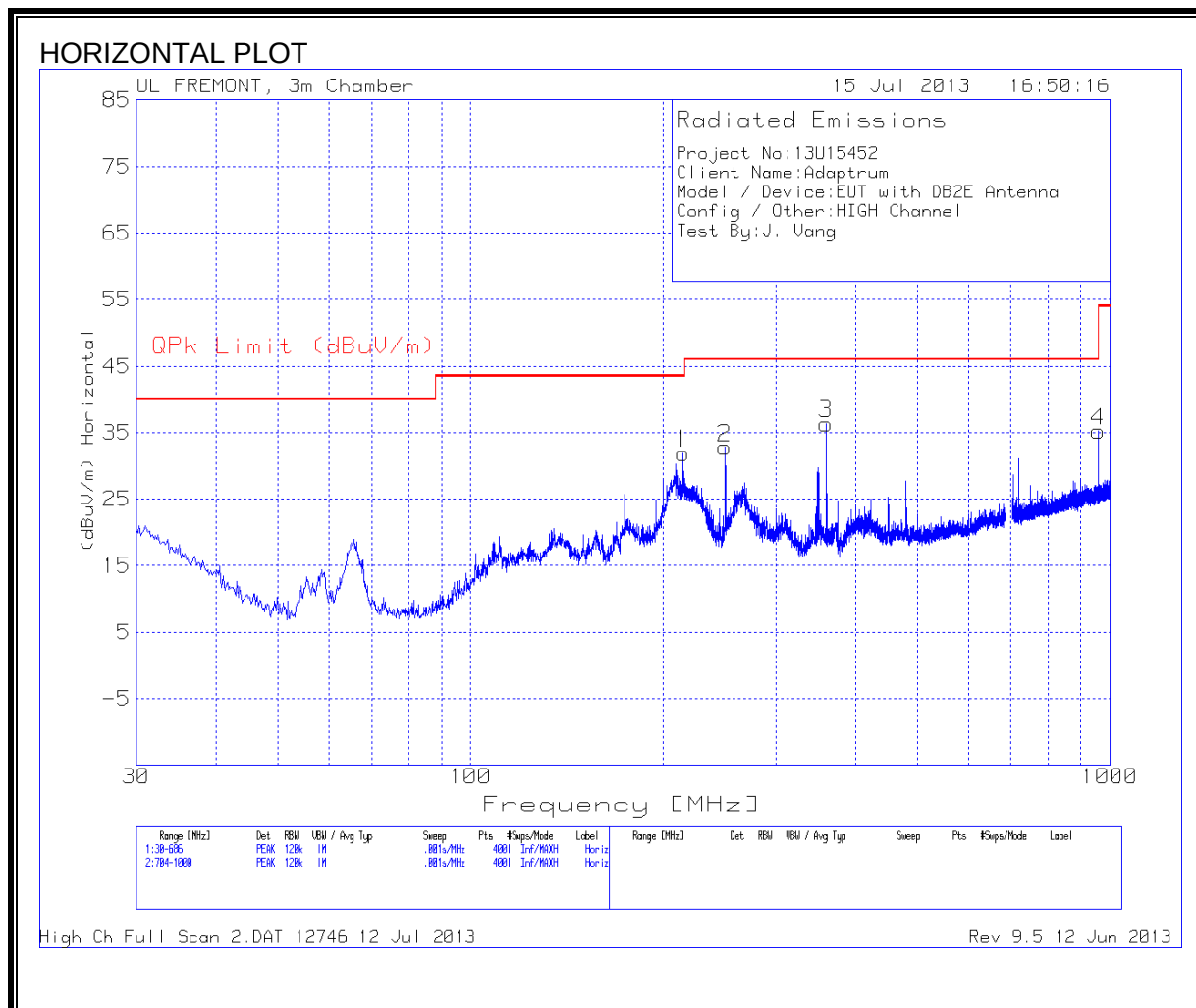
Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T239 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
65.0026	22.57	QP	7.7	-27.2	.7	3.77	40	-36.23	89	325	Vert

PK - Peak detector

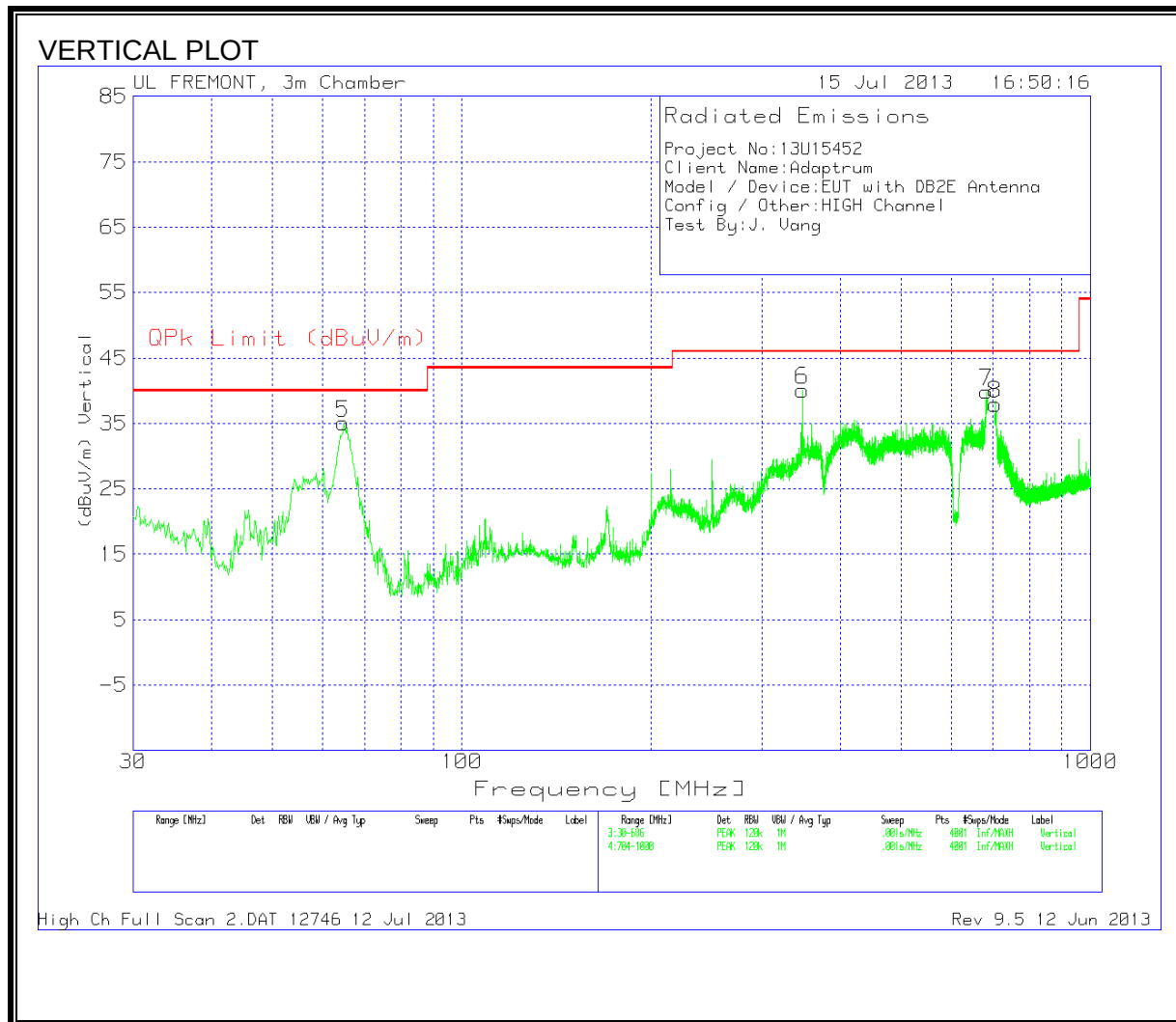
QP - Quasi-Peak detector

8.4.2.3. RADIATED EMISSIONS BELOW 1 GHz (HIGH CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T238 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	214.992	46.8	PK	10.5	-25.7	.3	31.9	43.5	-11.6	99	Horz
2	249.924	46.37	PK	11.5	-25.4	.3	32.77	46	-13.23	99	Horz
3	359.968	46.72	PK	14.7	-25.4	.3	36.32	46	-9.68	99	Horz
4	960.04	35.51	PK	22.7	-23.3	.3	35.21	54	-18.79	100	Horz
5	64.768	54.26	PK	7.7	-27.2	.3	35.06	40	-4.94	99	Vert
6	347.996	50.89	PK	14.2	-25.3	.3	40.09	46	-5.91	200	Vert
7	683.376	44.78	PK	19.9	-25.1	.3	39.88	46	-6.12	200	Vert
8	704.962	42.48	PK	20.2	-25	.3	37.98	46	-8.02	201	Vert

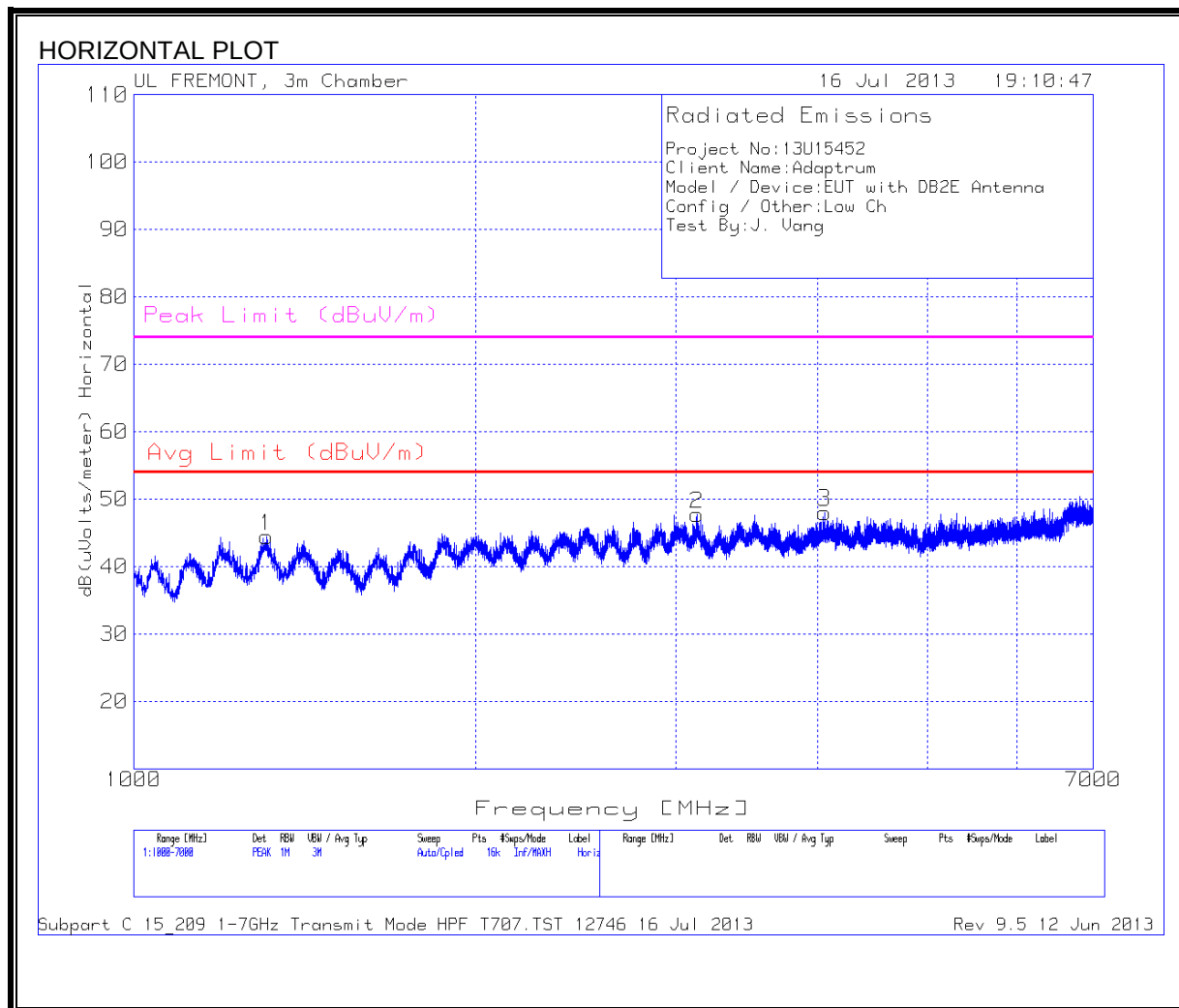
Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T238 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
64.7814	51.24	QP	7.7	-27.2	.3	32.04	40	-7.96	2	161	Vert

PK - Peak detector

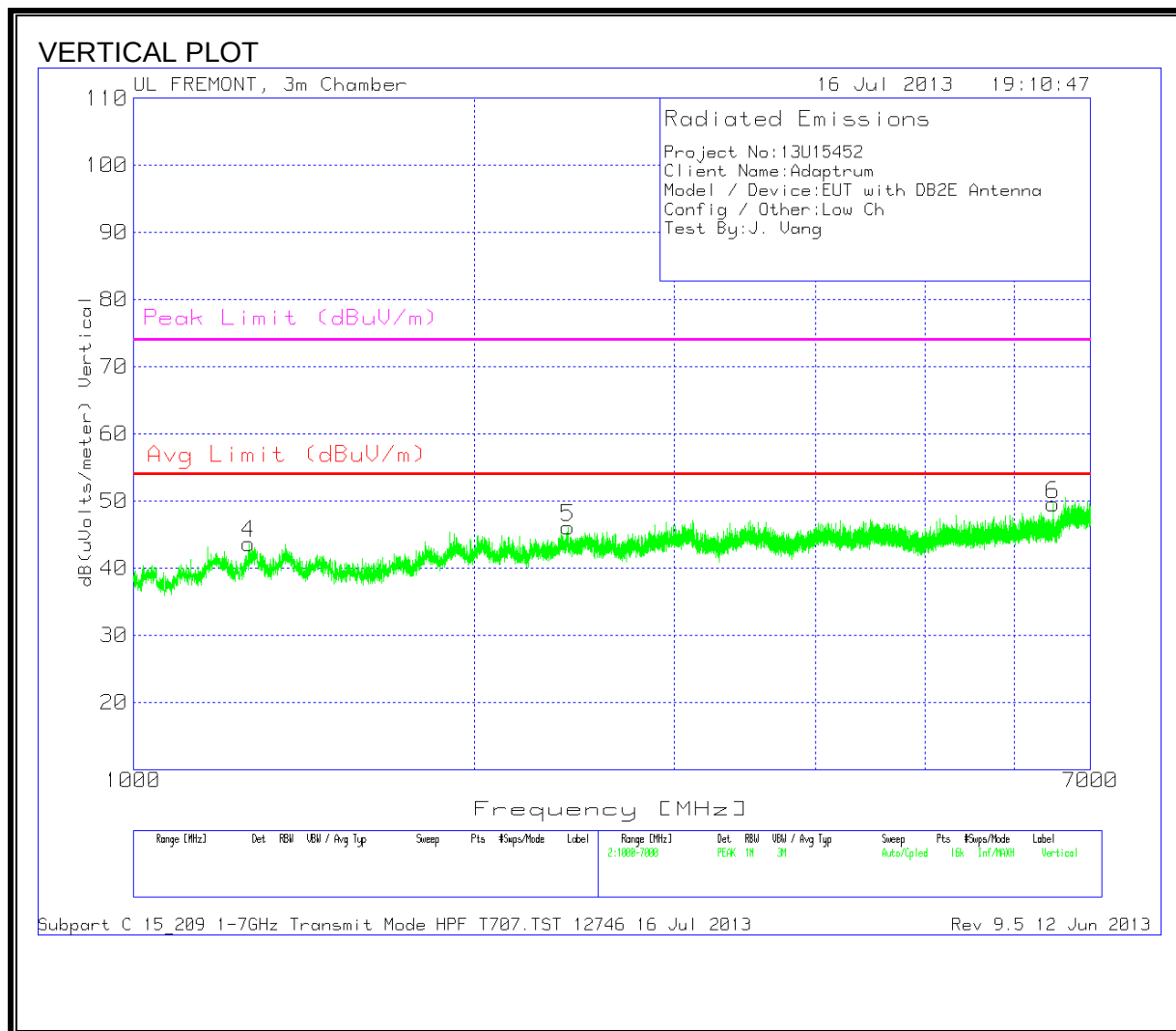
QP - Quasi-Peak detector

8.4.2.4. TX SPURIOUS EMISSIONS ABOVE 1 GHz (LOW CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



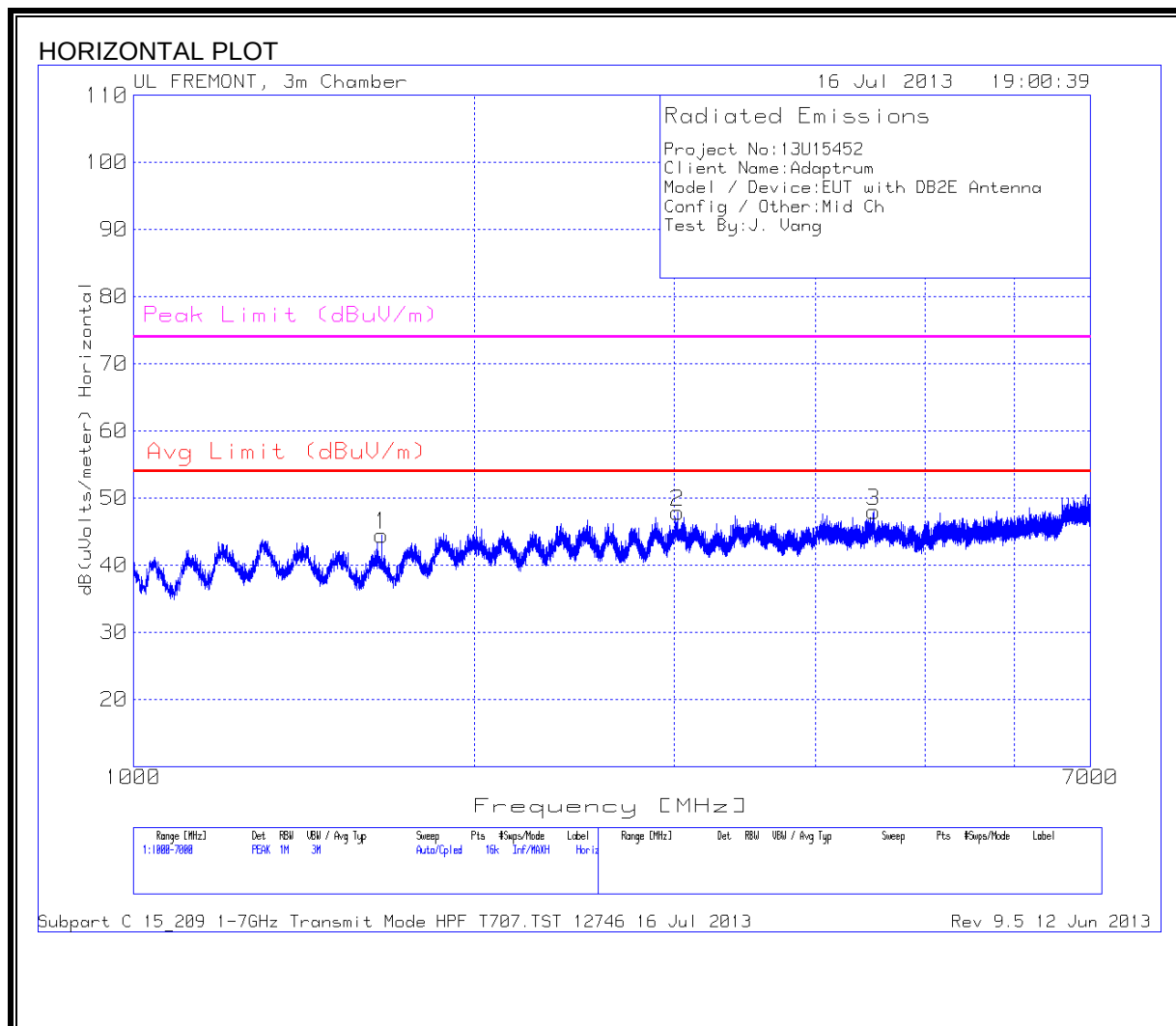
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1- 18GHz Loop no Pad 05-21- 2013	T707 1GHz HPF	Corrected Reading dB(uVolts /meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.31	41.97	PK	30.1	-28	.4	44.47	53.97	-9.5	74	-29.53	99	Horz
2	3.136	37.76	PK	33	-23.4	.4	47.76	53.97	-6.21	74	-26.24	99	Horz
3	4.059	35.75	PK	33.4	-21.5	.4	48.05	53.97	-5.92	74	-25.95	99	Horz
4	1.264	41.73	PK	29.9	-28.3	.4	43.73	53.97	-10.24	74	-30.27	201	Vert
5	2.421	38.33	PK	32.2	-24.8	.4	46.13	53.97	-7.84	74	-27.87	201	Vert
6	6.492	32.06	PK	35.5	-18.4	.4	49.56	-	-	68.2	-18.64	201	Vert

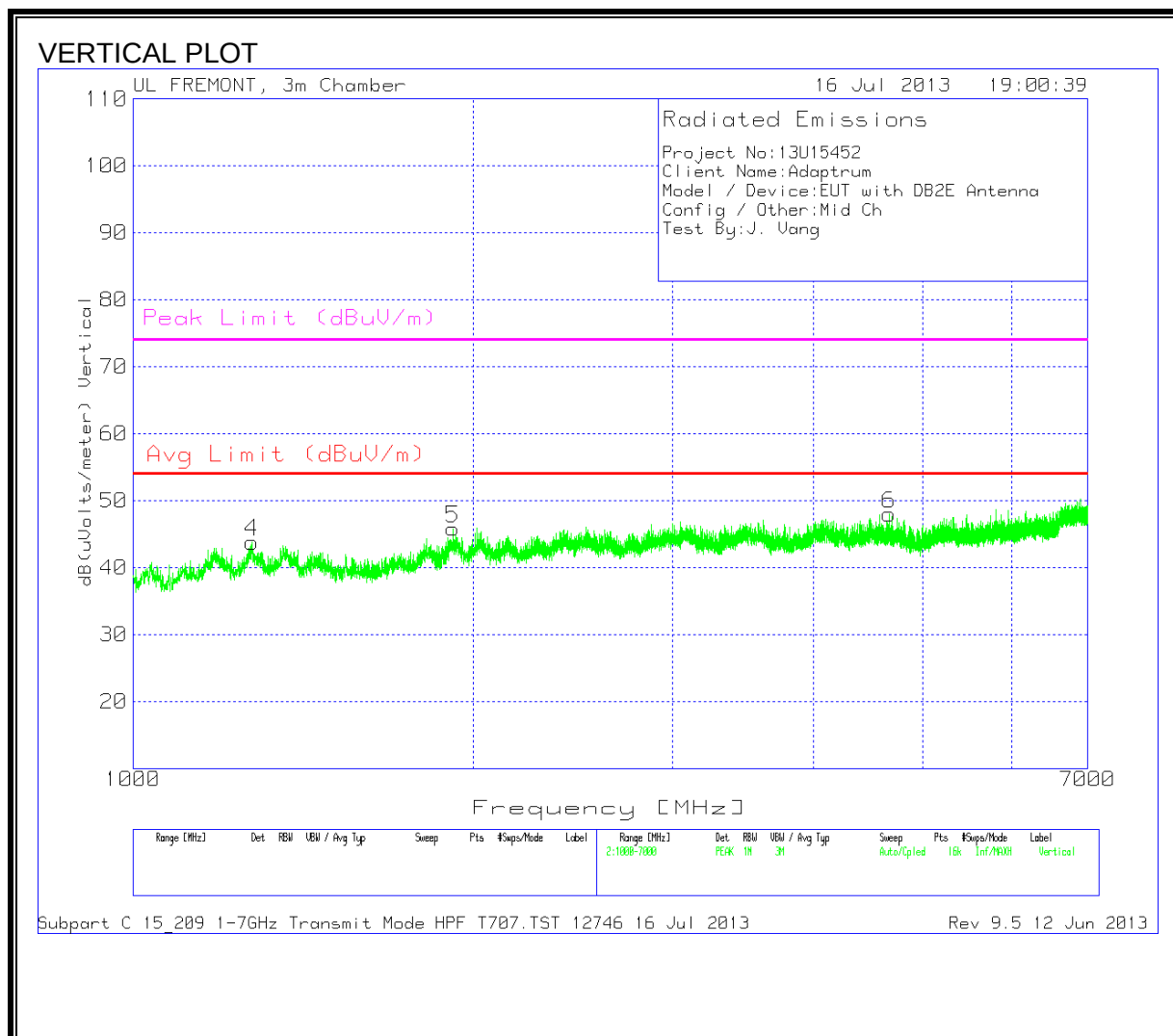
PK - Peak detector

8.4.2.5. TX SPURIOUS EMISSIONS ABOVE 1 GHz (MID CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



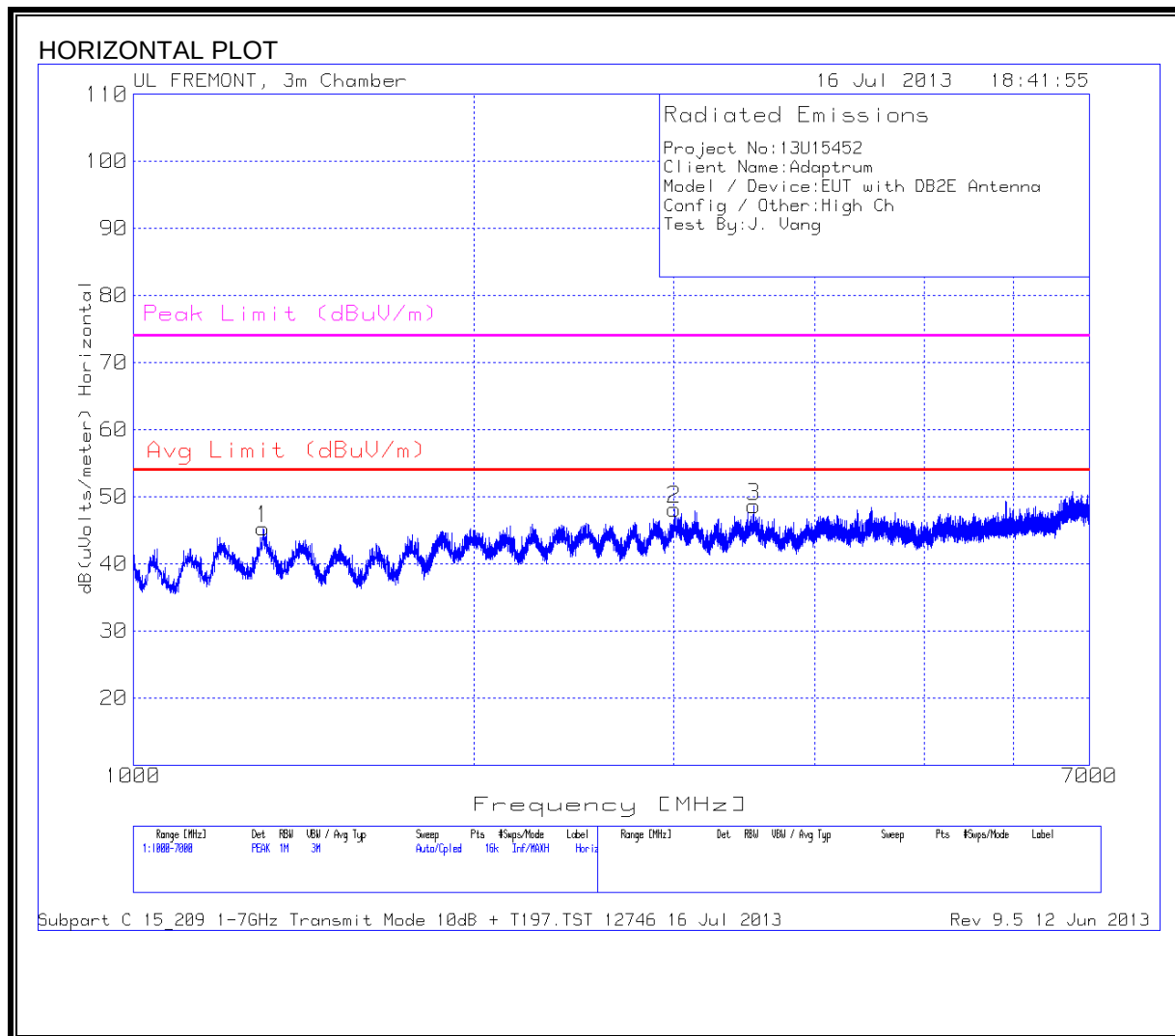
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1- 18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.656	42.42	PK	28.6	-26.9	.4	44.52	53.97	-9.45	74	-29.48	100	Horz
2	3.024	38.09	PK	33	-23.6	.4	47.89	53.97	-6.08	74	-26.11	100	Horz
3	4.505	34.5	PK	33.9	-20.8	.4	48	53.97	-5.97	74	-26	100	Horz
4	1.274	41.45	PK	30	-28	.4	43.85	53.97	-10.12	74	-30.15	201	Vert
5	1.921	40.26	PK	31.3	-26.1	.4	45.86	53.97	-8.11	74	-28.14	201	Vert
6	4.67	33.92	PK	34.1	-20.4	.4	48.02	53.97	-5.95	74	-25.98	100	Vert

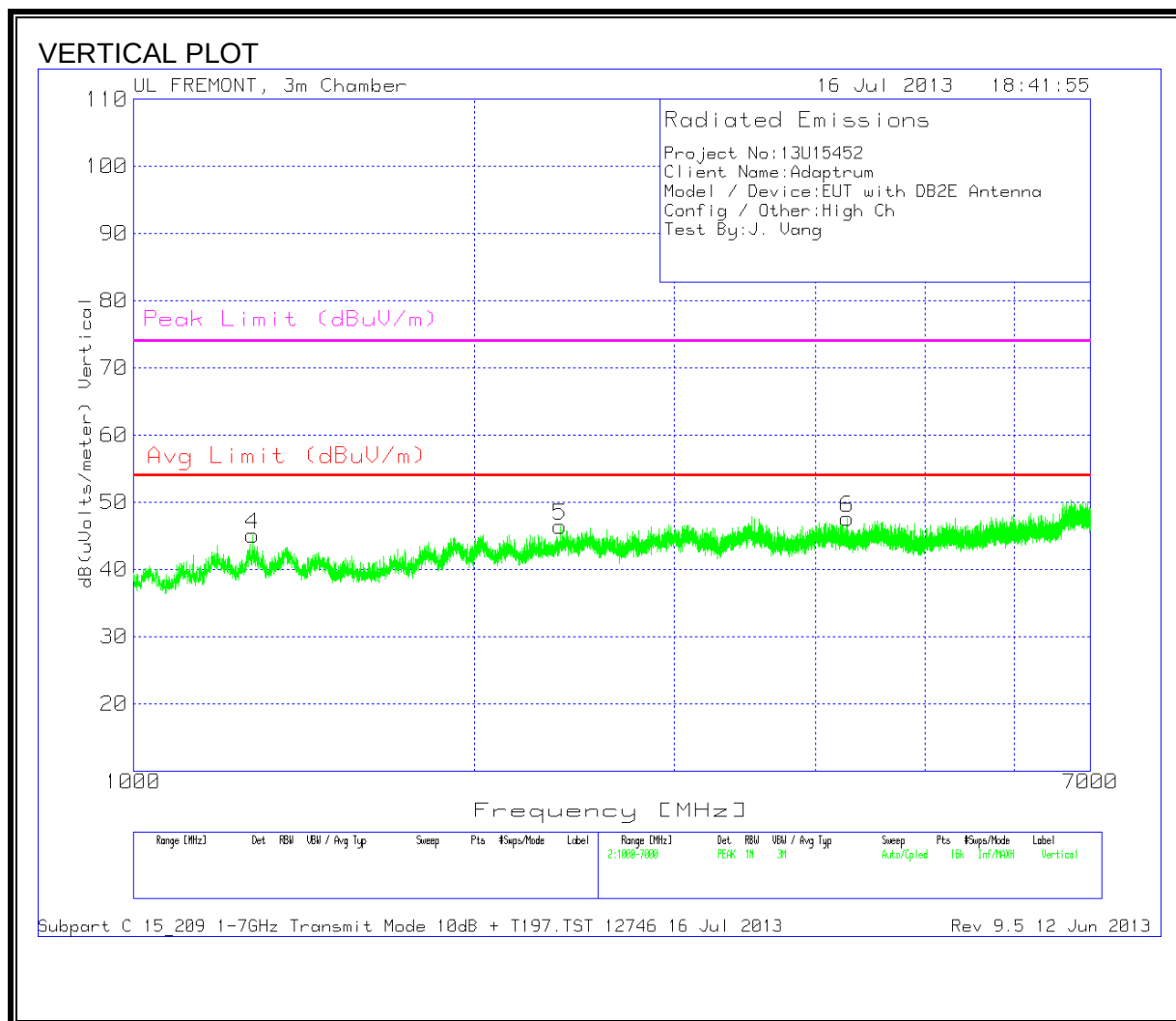
PK - Peak detector

8.4.2.6. TX SPURIOUS EMISSIONS ABOVE 1 GHz (HIGH CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



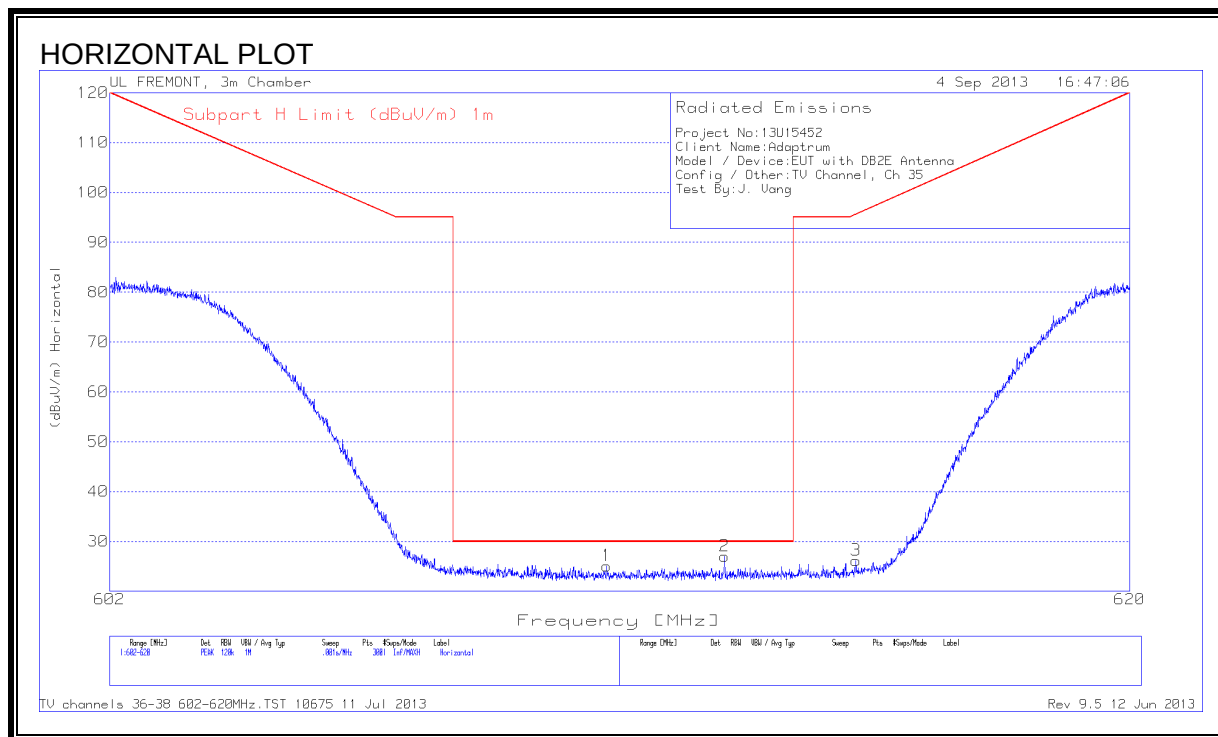
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.303	42.74	PK	30.2	-28	.4	45.34	53.97	-8.63	74	-28.66	100	Horz
2	3.007	38.4	PK	33	-23.6	.4	48.2	53.97	-5.77	74	-25.8	100	Horz
3	3.537	37.54	PK	33	-22.3	.4	48.64	53.97	-5.33	74	-25.36	201	Horz
4	1.275	42.74	PK	30	-28	.4	45.14	53.97	-8.83	74	-28.86	200	Vert
5	2.382	38.75	PK	32.1	-24.8	.4	46.45	53.97	-7.52	74	-27.55	99	Vert
6	4.271	34.72	PK	33.6	-21.1	.4	47.62	53.97	-6.35	74	-26.38	200	Vert

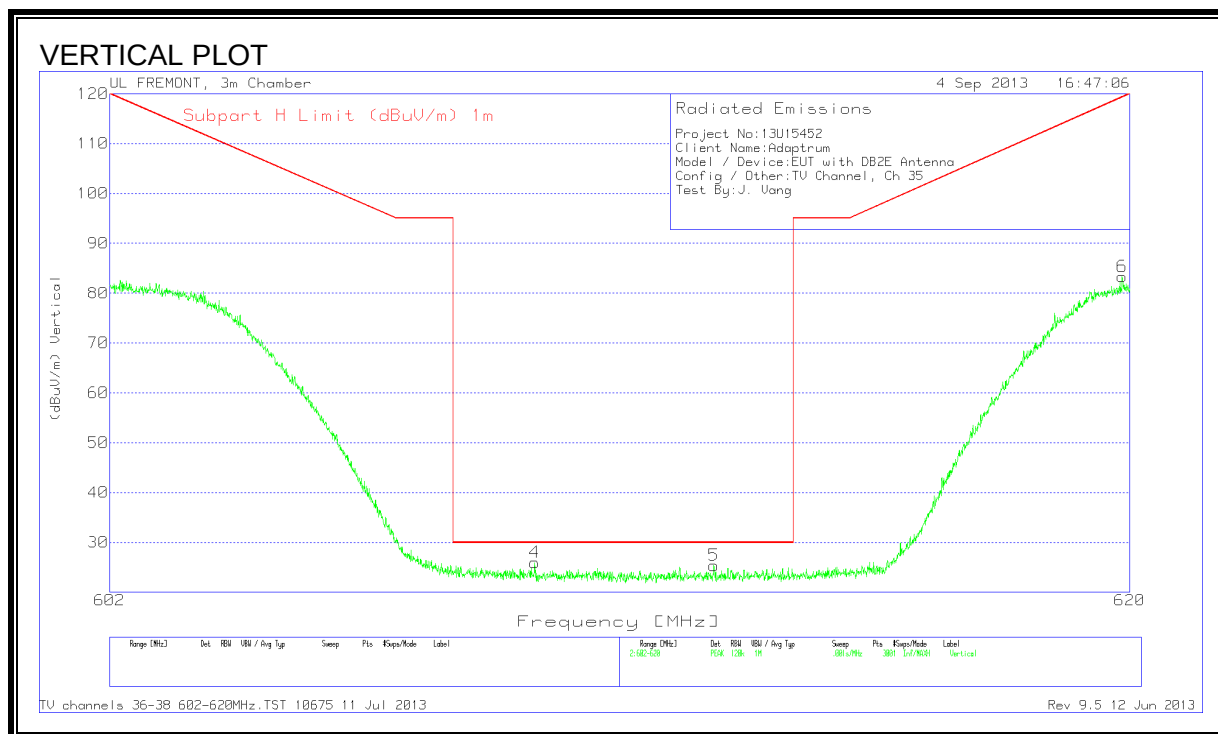
PK - Peak detector

8.4.2.7. RADIATED EMISSIONS 602 TO 620 MHz

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)



PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)



TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)

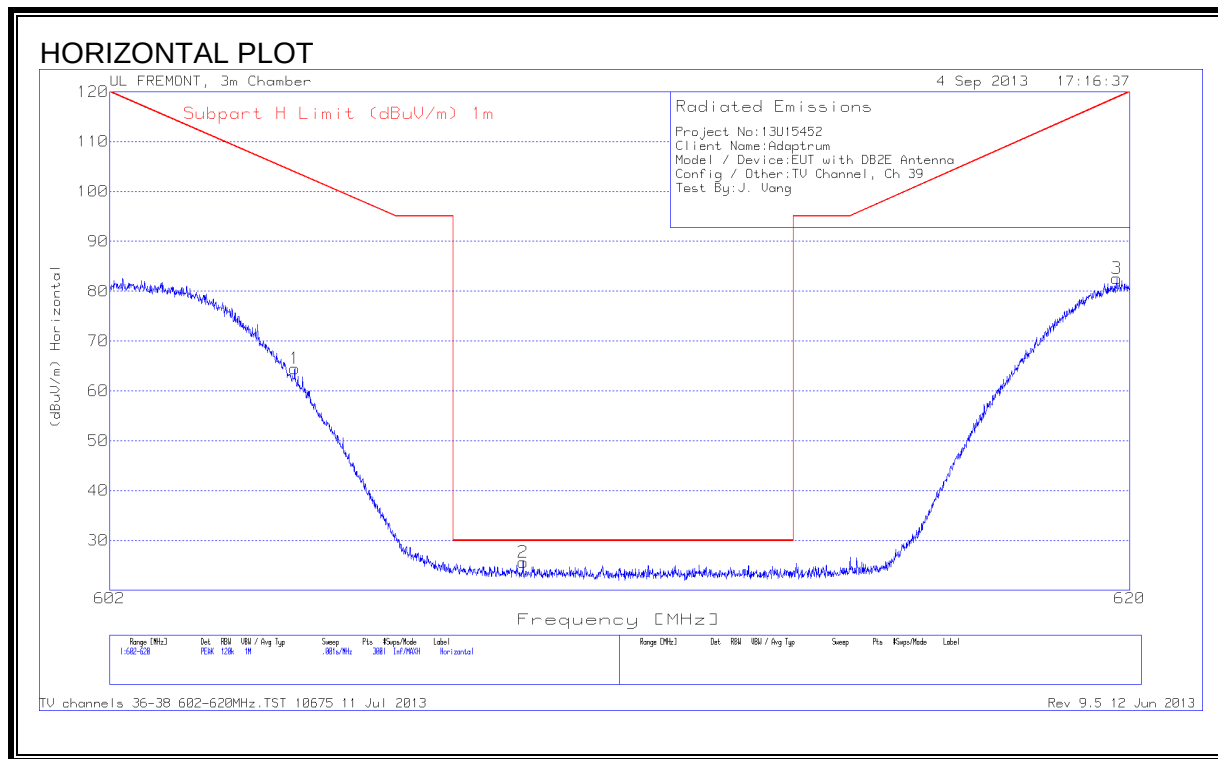
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	610.706	29.3	PK	18.8	-25.5	2.5	25.1	30	-4.9	400	Horz
2	612.788	31.14	PK	18.8	-25.5	2.6	27.04	30	-2.96	100	Horz
3	615.116	29.57	PK	18.8	-25.5	3.3	26.17	95.58	-69.41	300	Horz
4	609.434	29.97	PK	18.8	-25.5	2.7	25.97	30	-4.03	100	Vert
5	612.596	29.49	PK	18.8	-25.5	2.6	25.39	30	-4.61	100	Vert
6	619.862	29.43	PK	19	-25.4	60.3	83.33	119.31	-35.98	100	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
610.9788	23.39	QP	18.8	-25.5	2.5	19.19	30	-10.81	45	393	Horz
612.788	23.53	QP	18.8	-25.5	2.6	19.43	30	-10.57	40	100	Horz
609.5005	23.28	QP	18.8	-25.5	2.7	19.28	30	-10.72	159	186	Vert
612.4737	23.33	QP	18.8	-25.5	2.6	19.23	30	-10.77	227	175	Vert

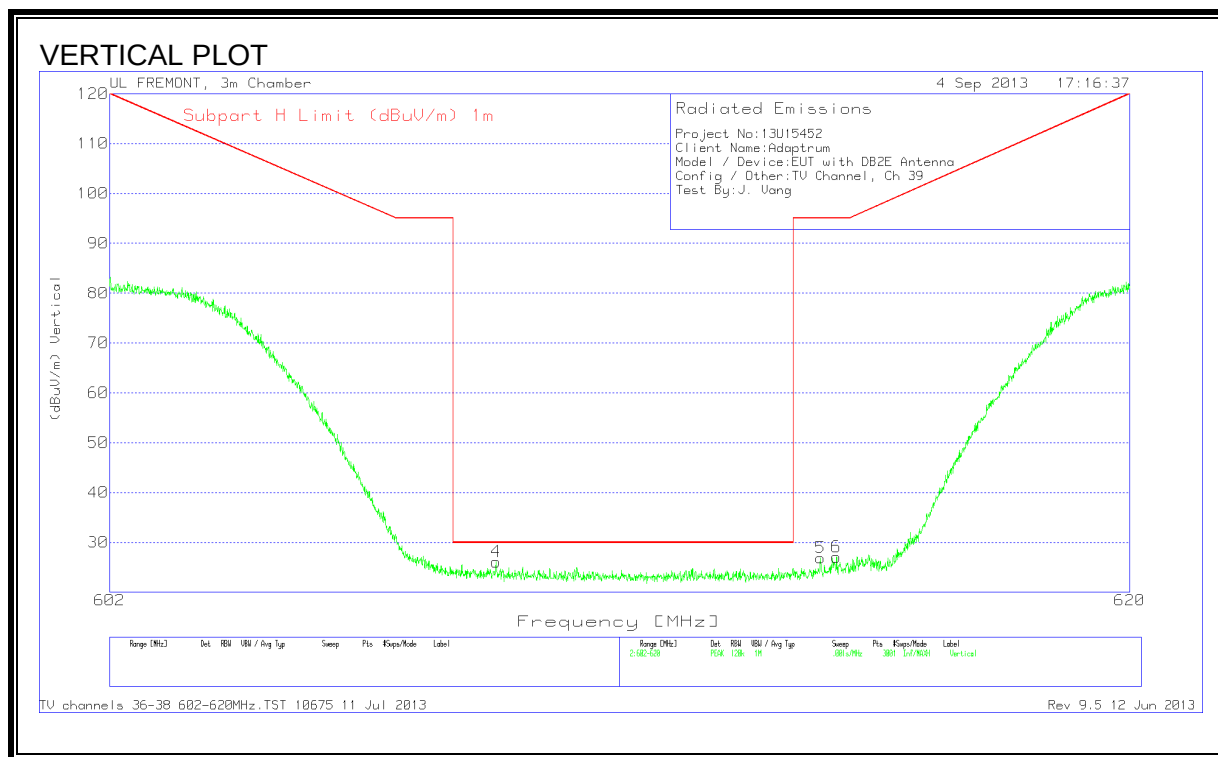
PK - Peak detector

QP - Quasi-Peak detector

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)



PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)



TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	605.228	29.19	PK	18.5	-25.5	42.3	64.49	103.84	-39.35	100	Horz
2	609.23	29.51	PK	18.8	-25.5	2.8	25.61	30	-4.39	100	Horz
3	619.766	28.97	PK	19	-25.4	60	82.57	118.83	-36.26	201	Horz
4	608.756	29.94	PK	18.7	-25.5	3	26.14	30	-3.86	100	Vert
5	614.486	30.7	PK	18.8	-25.5	2.9	26.9	95	-68.1	199	Vert
6	614.768	30.82	PK	18.8	-25.5	3	27.12	95	-67.88	199	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
609.0149	23.25	QP	18.7	-25.5	2.8	19.25	30	-10.75	130	213	Horz
609.0996	23.19	QP	18.7	-25.5	2.8	19.19	30	-10.81	91	389	Vert

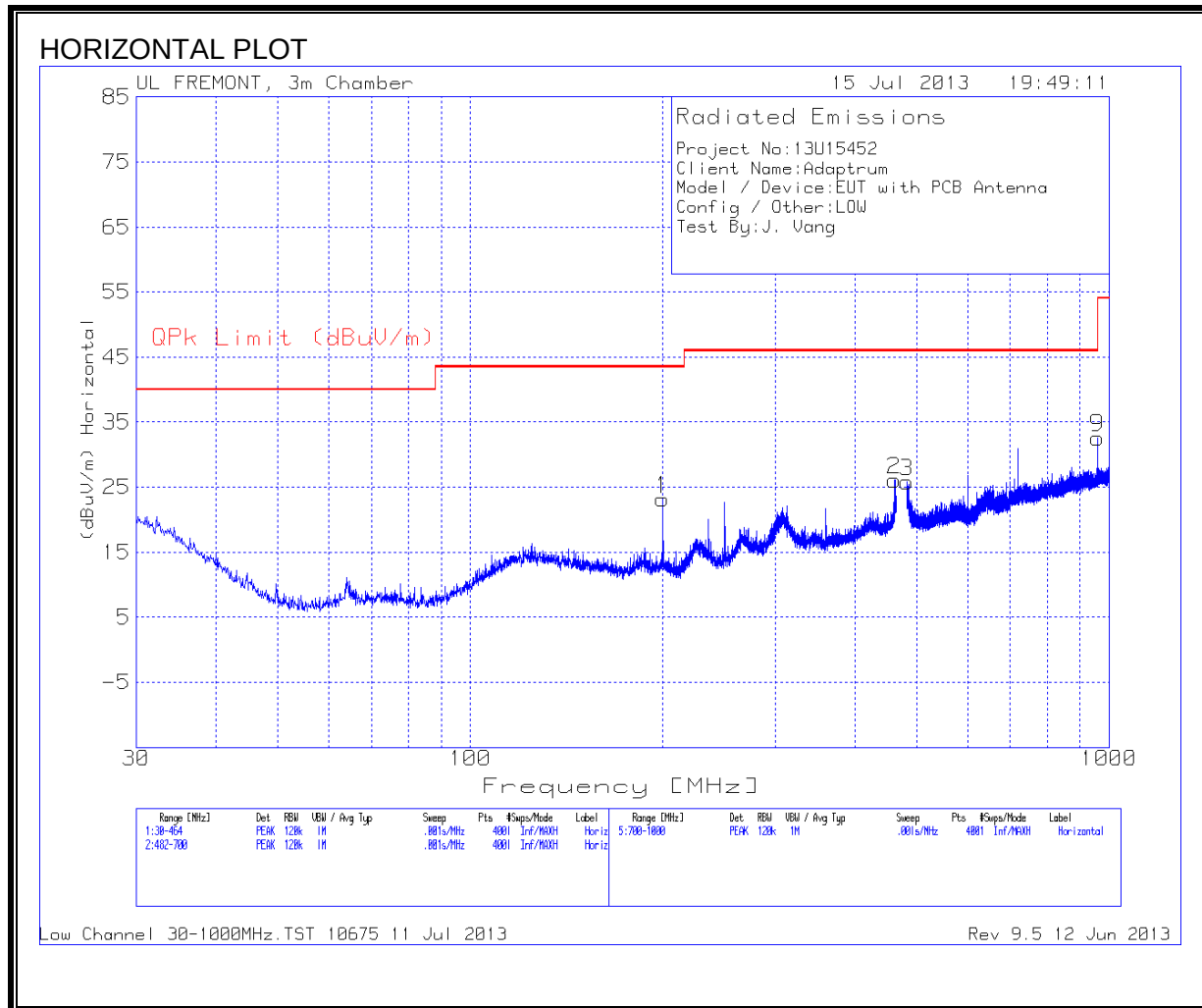
PK - Peak detector

QP - Quasi-Peak detector

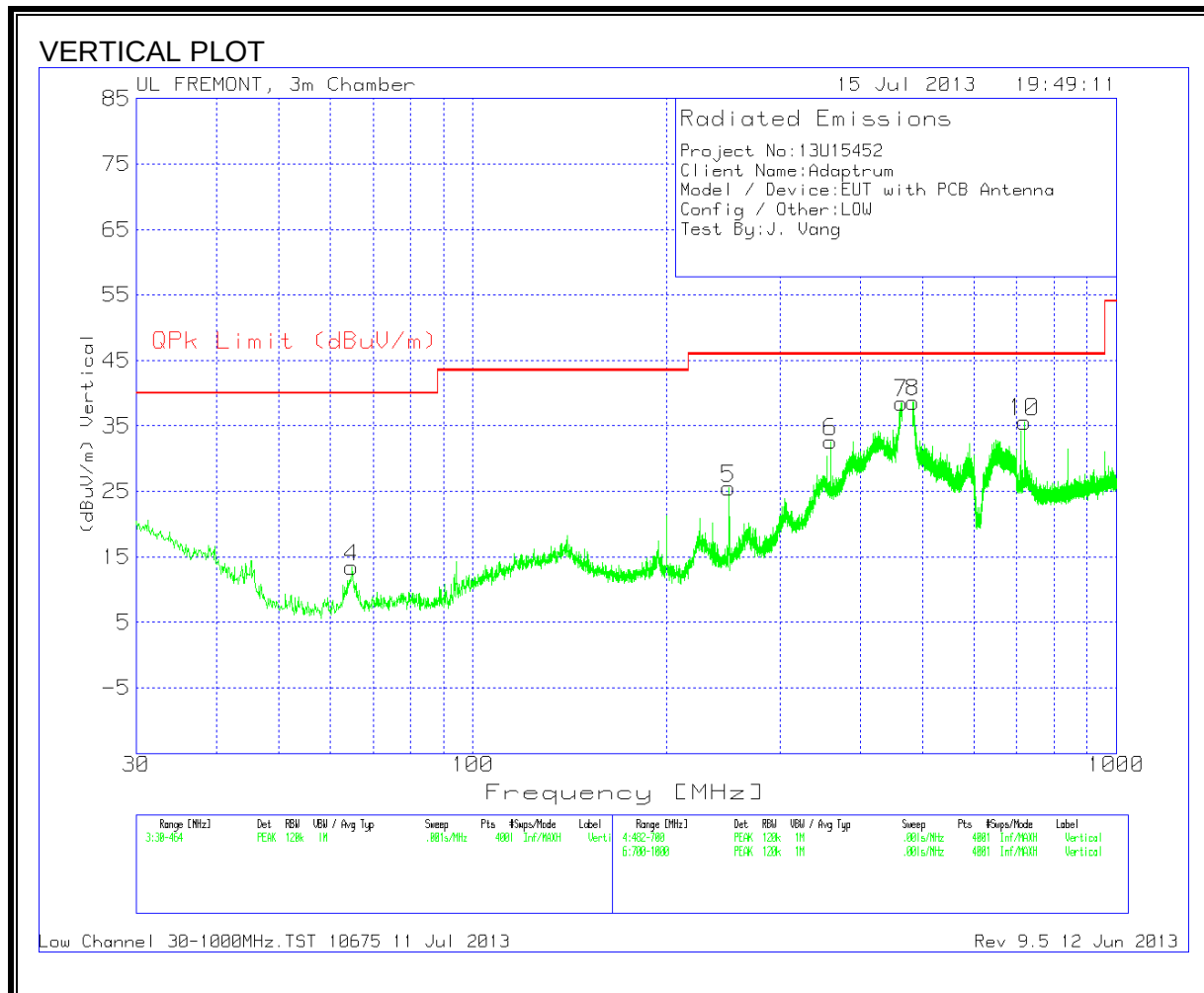
8.4.3. PCB ANTENNA

8.4.3.1. RADIATED EMISSIONS BELOW 1 GHz (LOW CHANNEL)

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



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



HORIZONTAL & VERTICAL DATA

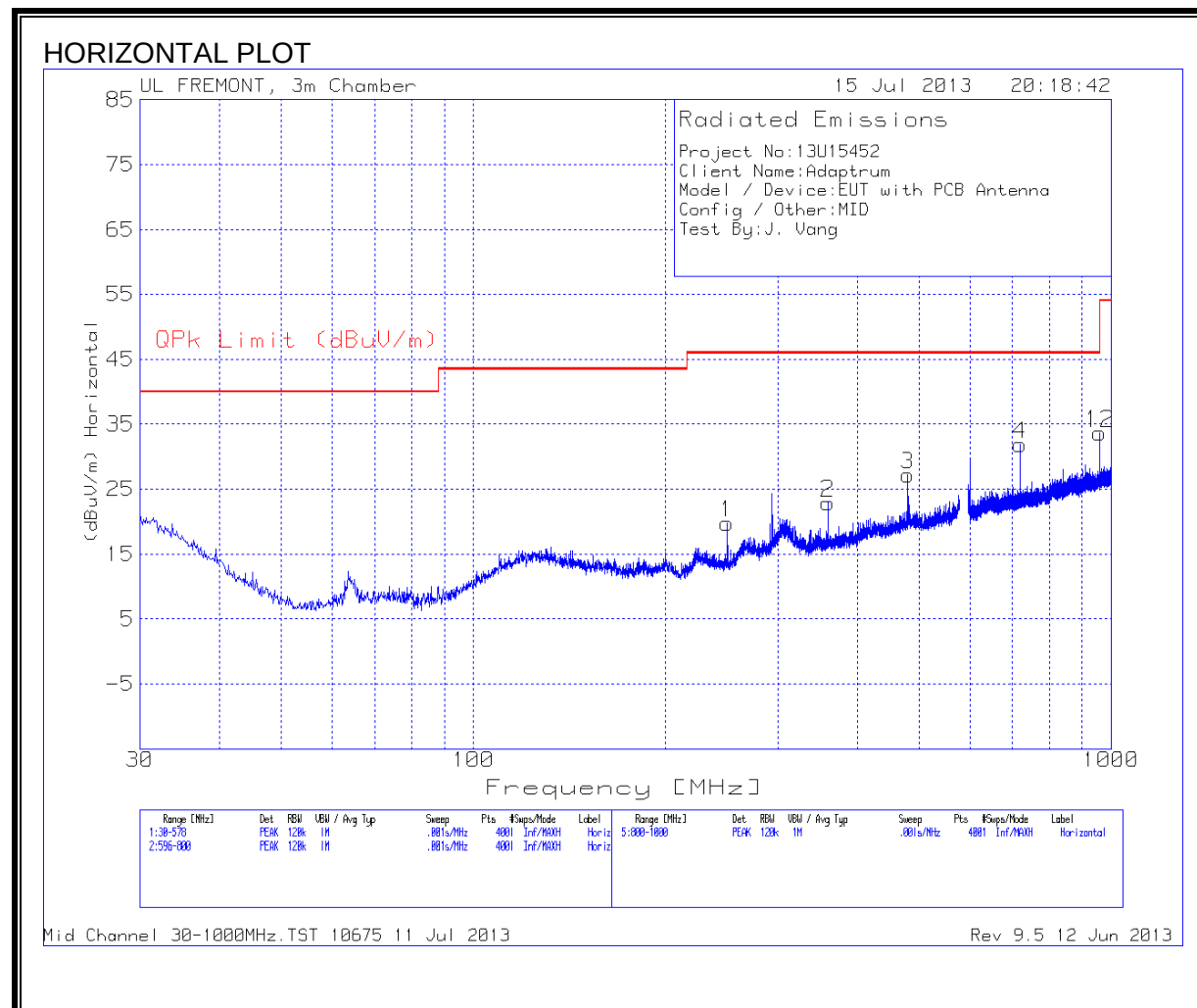
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T242 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	199.911	36.56	PK	12.3	-25.9	.2	23.16	43.5	-20.34	301	Horz
2	461.613	33.8	PK	17.1	-25.8	1	26.1	46	-19.9	201	Horz
3	482.218	33.21	PK	17.8	-25.9	.7	25.81	46	-20.19	299	Horz
4	64.937	32.61	PK	7.7	-27.2	.3	13.41	40	-26.59	300	Vert
5	250.038	39.11	PK	11.5	-25.4	.3	25.51	46	-20.49	100	Vert
6	360.057	43.05	PK	14.7	-25.4	.3	32.65	46	-13.35	100	Vert
7	463.2405	46.11	PK	17.1	-25.8	1.1	38.51	46	-7.49	100	Vert
8	483.09	46.24	PK	17.7	-25.9	.6	38.64	46	-7.36	99	Vert

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T237 HPF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
9	959.95	32.43	PK	22.7	-23.3	.8	32.63	46	-13.37	201	Horz
10	720.025	39.16	PK	20.4	-25	1.1	35.66	46	-10.34	100	Vert

PK - Peak detector

8.4.3.2. RADIATED EMISSIONS BELOW 1 GHz (MID CHANNEL)

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



HORIZONTAL & VERTICAL DATA

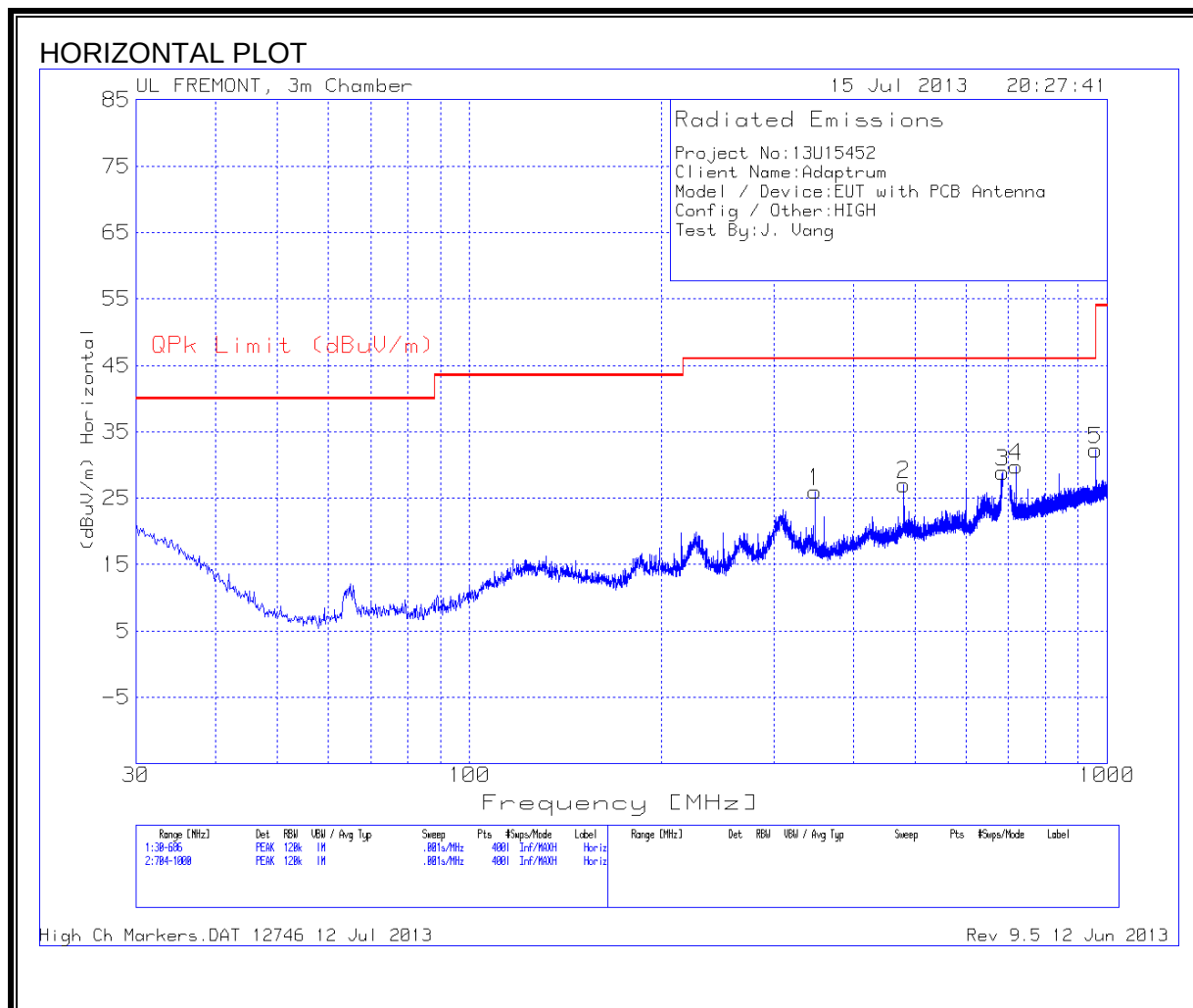
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T239 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	249.885	32.96	PK	11.5	-25.4	.7	19.76	46	-26.24	100	Horz
2	360.033	32.88	PK	14.7	-25.4	.7	22.88	46	-23.12	200	Horz
3	480.045	34.48	PK	17.8	-25.8	.7	27.18	46	-18.82	200	Horz
4	719.981	35.67	PK	20.4	-25	.8	31.87	46	-14.13	299	Horz
5	64.25	34.8	PK	7.6	-27.2	.6	15.8	40	-24.2	99	Vert
6	250.022	38.62	PK	11.5	-25.4	.7	25.42	46	-20.58	99	Vert
7	360.033	42.88	PK	14.7	-25.4	.7	32.88	46	-13.12	99	Vert
8	480.045	44.15	PK	17.8	-25.8	.7	36.85	46	-9.15	99	Vert
9	577.178	38.15	PK	18.6	-25.6	1.5	32.65	46	-13.35	99	Vert
10	597.071	40.05	PK	18.3	-25.6	1.5	34.25	46	-11.75	100	Vert
11	719.981	41.77	PK	20.4	-25	.8	37.97	46	-8.03	100	Vert

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T237 HPF (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
12	960	33.54	PK	22.7	-23.4	.8	33.64	46	-12.36	100	Horz
13	840	33.62	PK	21.7	-24.1	.8	32.02	46	-13.98	100	Vert

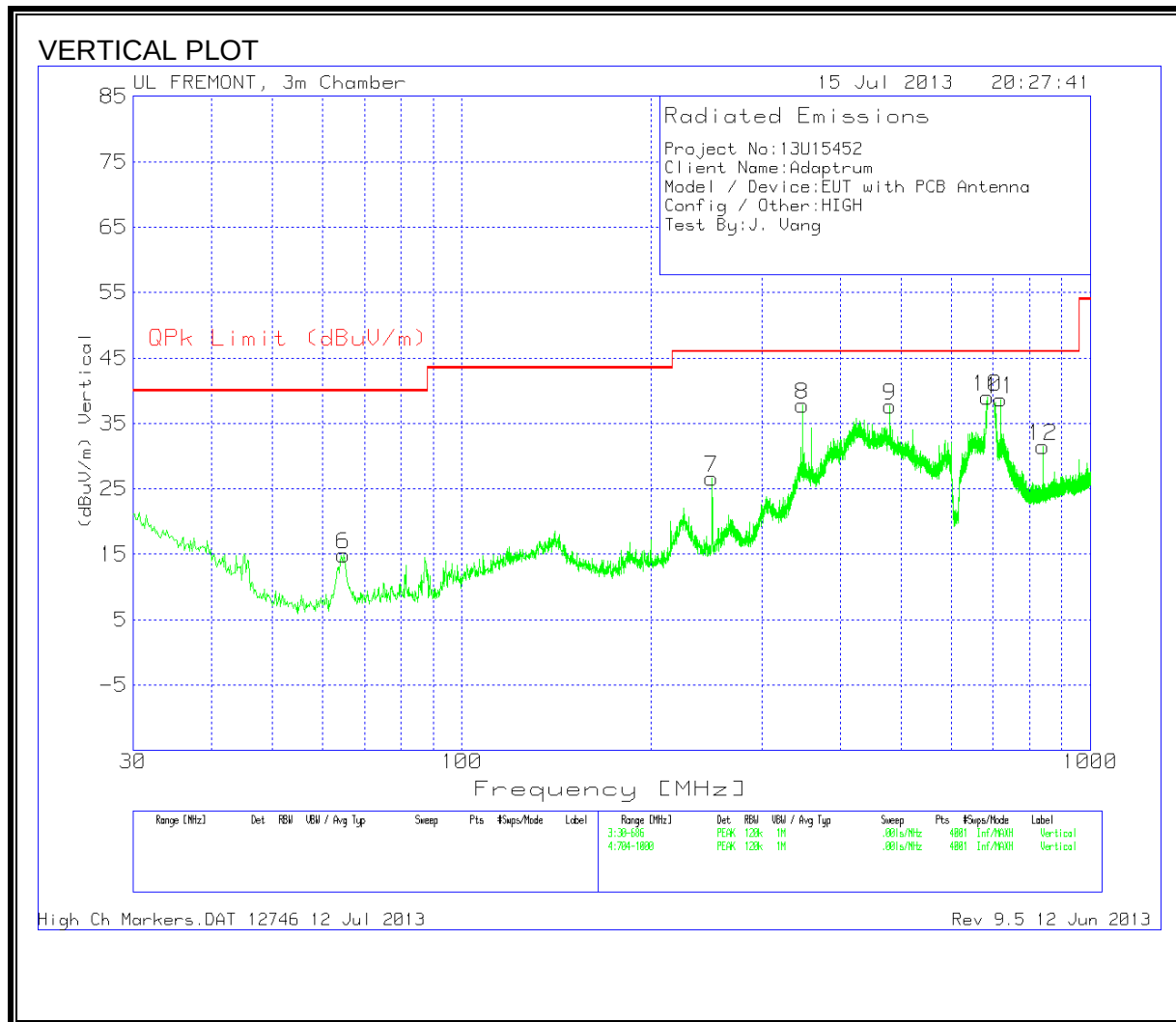
PK - Peak detector

8.4.3.3. RADIATED EMISSIONS BELOW 1 GHz (HIGH CHANNEL)

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



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



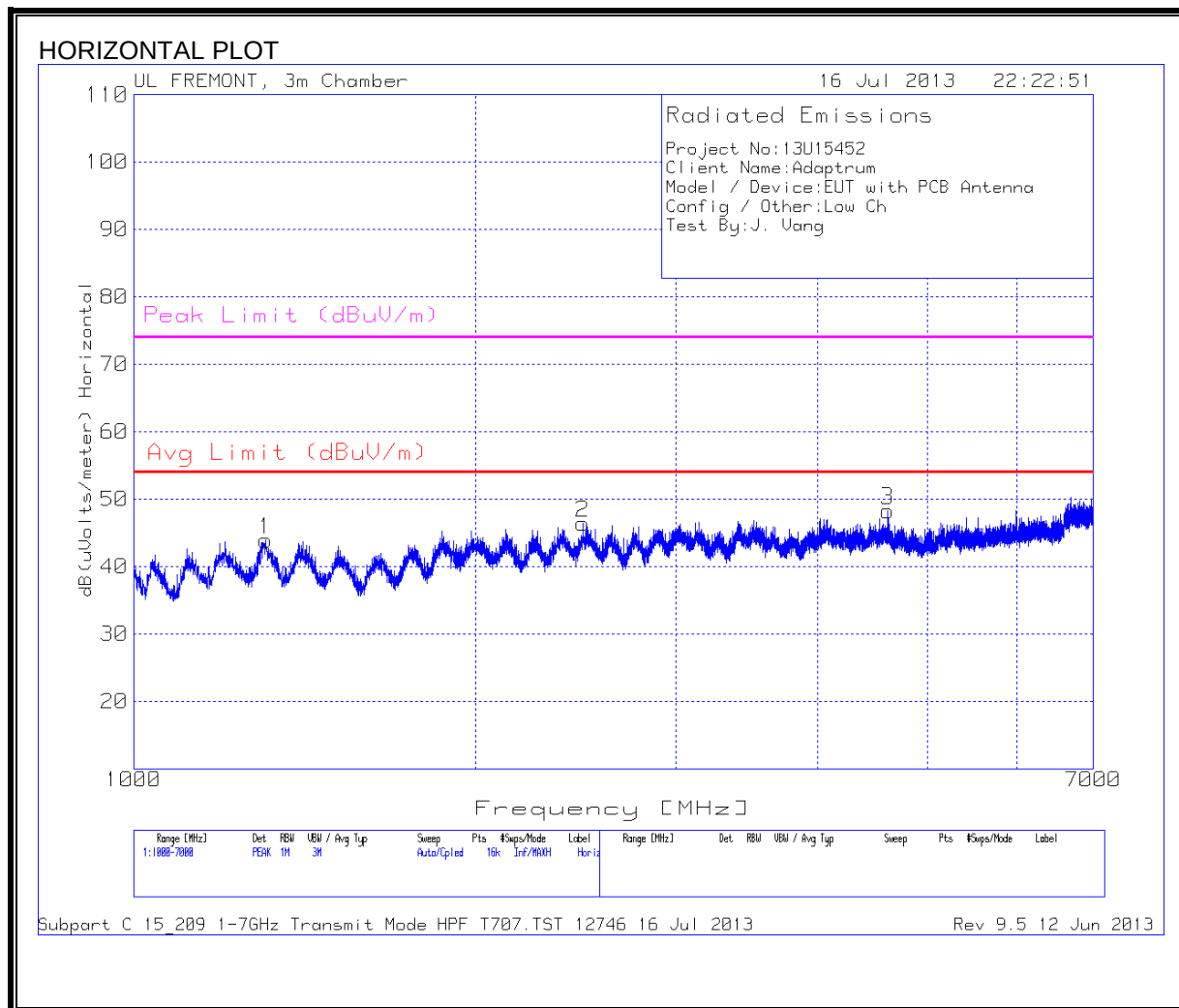
HORIZONTAL & VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T238 Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	347.996	36.82	PK	14.2	-25.3	.3	26.02	46	-19.98	201	Horz
2	480.016	34.77	PK	17.8	-25.8	.3	27.07	46	-18.93	201	Horz
3	685.18	33.8	PK	19.9	-25.1	.3	28.9	46	-17.1	99	Horz
4	719.984	34.08	PK	20.4	-25	.3	29.78	46	-16.22	300	Horz
5	959.966	32.58	PK	22.7	-23.3	.3	32.28	46	-13.72	201	Horz
6	64.932	34.11	PK	7.7	-27.2	.3	14.91	40	-25.09	99	Vert
7	250.088	40.22	PK	11.5	-25.4	.3	26.62	46	-19.38	99	Vert
8	347.996	48.56	PK	14.2	-25.3	.3	37.76	46	-8.24	99	Vert
9	480.016	45.34	PK	17.8	-25.8	.3	37.64	46	-8.36	99	Vert
10	686	43.88	PK	19.9	-25.1	.3	38.98	46	-7.02	99	Vert
11	719.984	42.97	PK	20.4	-25	.3	38.67	46	-7.33	100	Vert
12	840.012	33.56	PK	21.7	-24.1	.3	31.46	46	-14.54	100	Vert

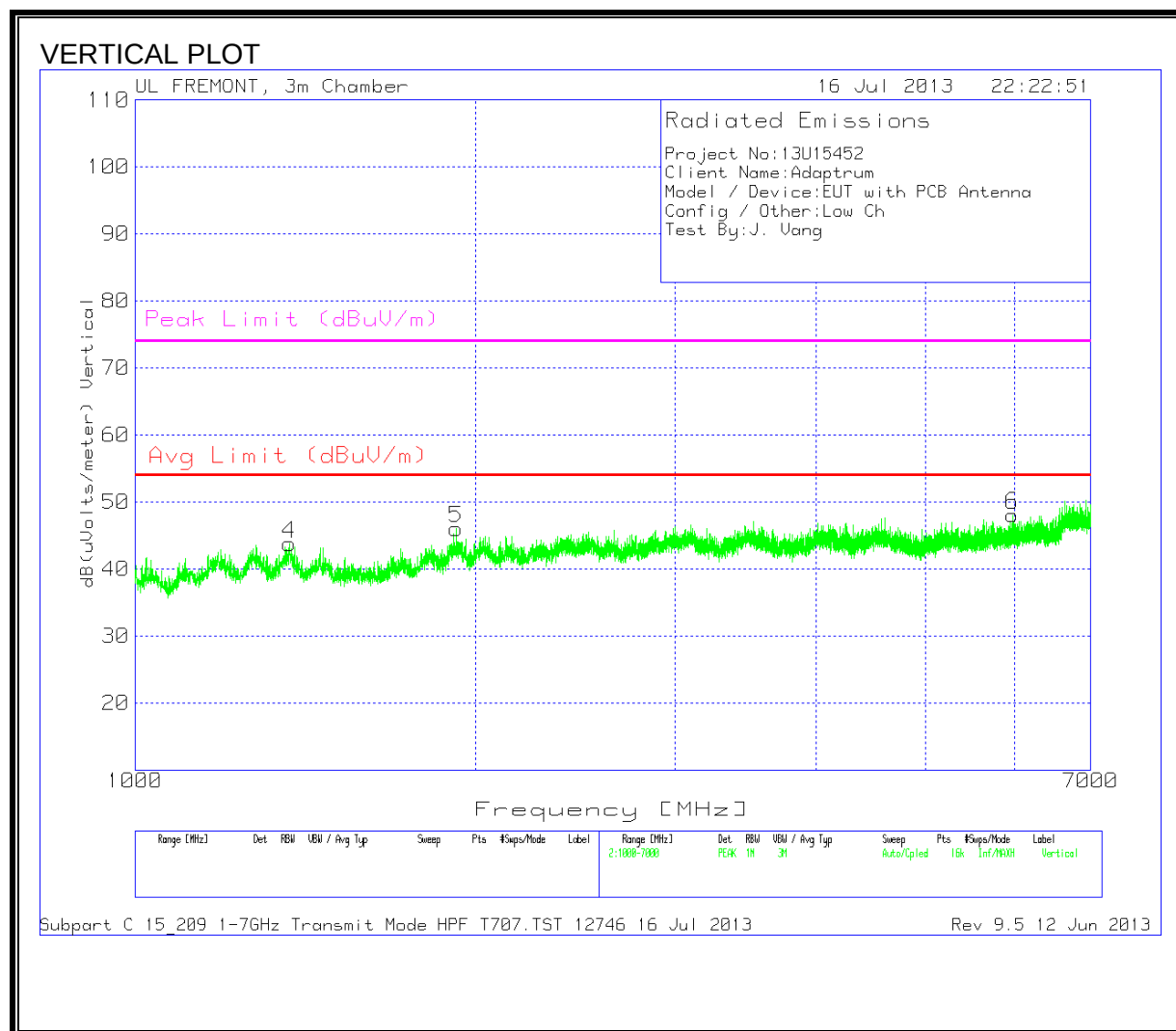
PK - Peak detector

8.4.3.4. TX SPURIOUS EMISSIONS ABOVE 1 GHz (LOW CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1- 18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.306	41.33	PK	30.2	-28	.4	43.93	53.97	-10.04	74	-30.07	200	Horz
2	2.488	38.53	PK	32.3	-24.8	.4	46.43	53.97	-7.54	74	-27.57	200	Horz
3	4.616	34.44	PK	34	-20.5	.4	48.34	53.97	-5.63	74	-25.66	100	Horz
4	1.37	41.77	PK	29.4	-27.8	.4	43.77	53.97	-10.2	74	-30.23	100	Vert
5	1.923	40.46	PK	31.3	-26.1	.4	46.06	53.97	-7.91	74	-27.94	201	Vert
6	5.97	31.6	PK	35.2	-19.1	.4	48.1	53.97	-5.87	74	-25.9	201	Vert

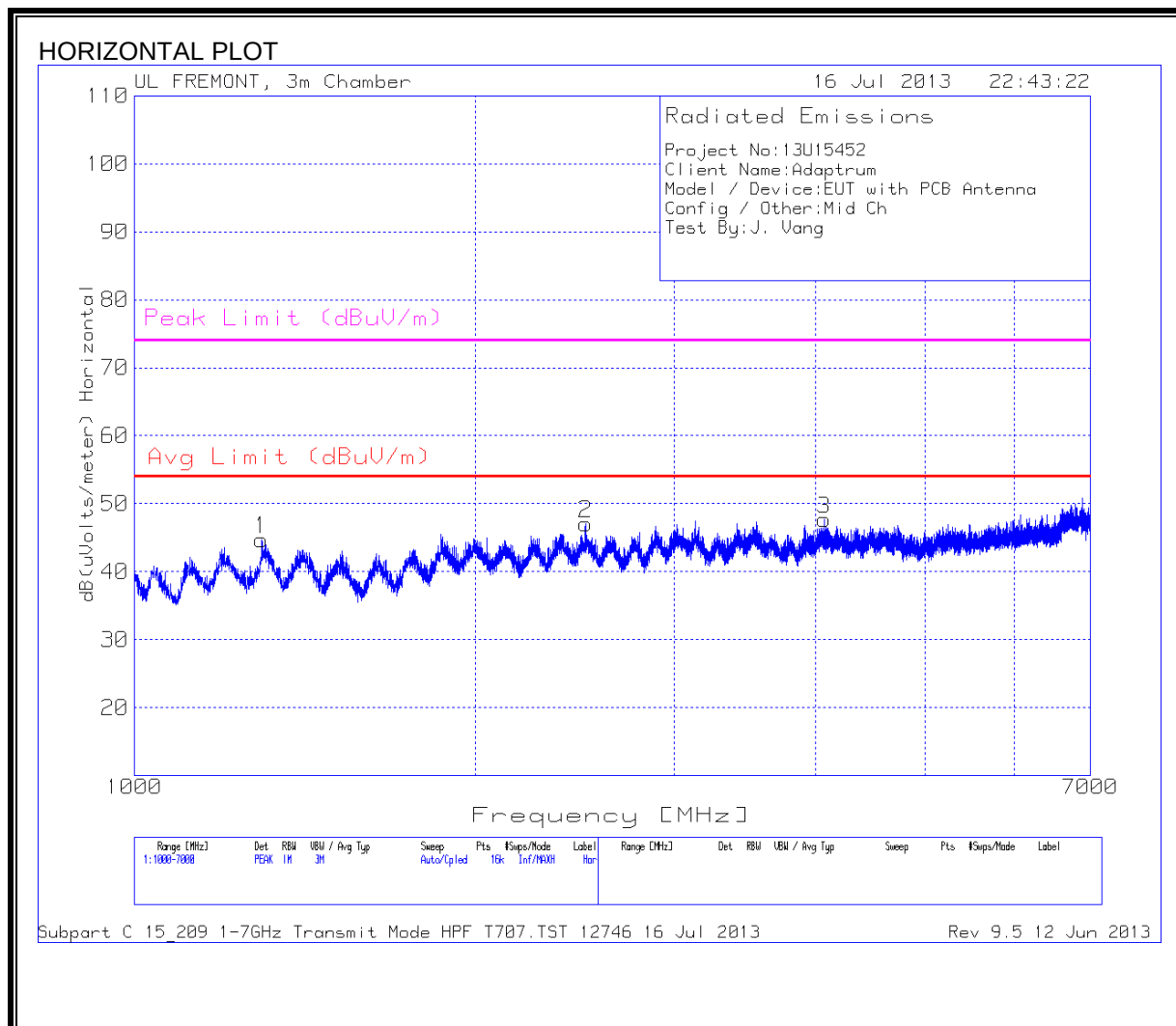
Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1-18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.61	21.6	Av	34	-20.5	.4	35.5	53.97	-18.47	-	-	169	262	Horz

PK - Peak detector

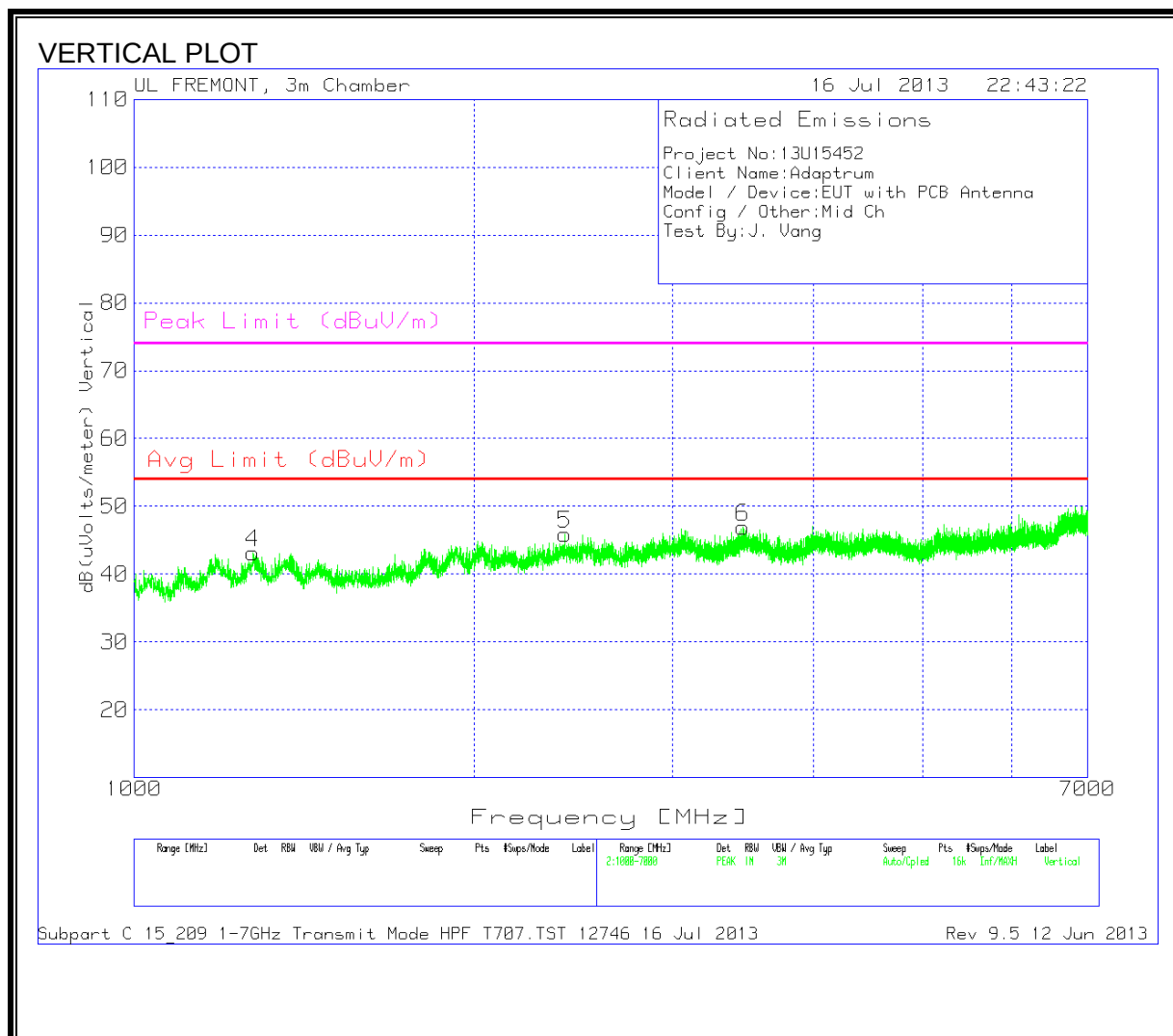
Av - Average detection

8.4.3.5. TX SPURIOUS EMISSIONS ABOVE 1 GHz (MID CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



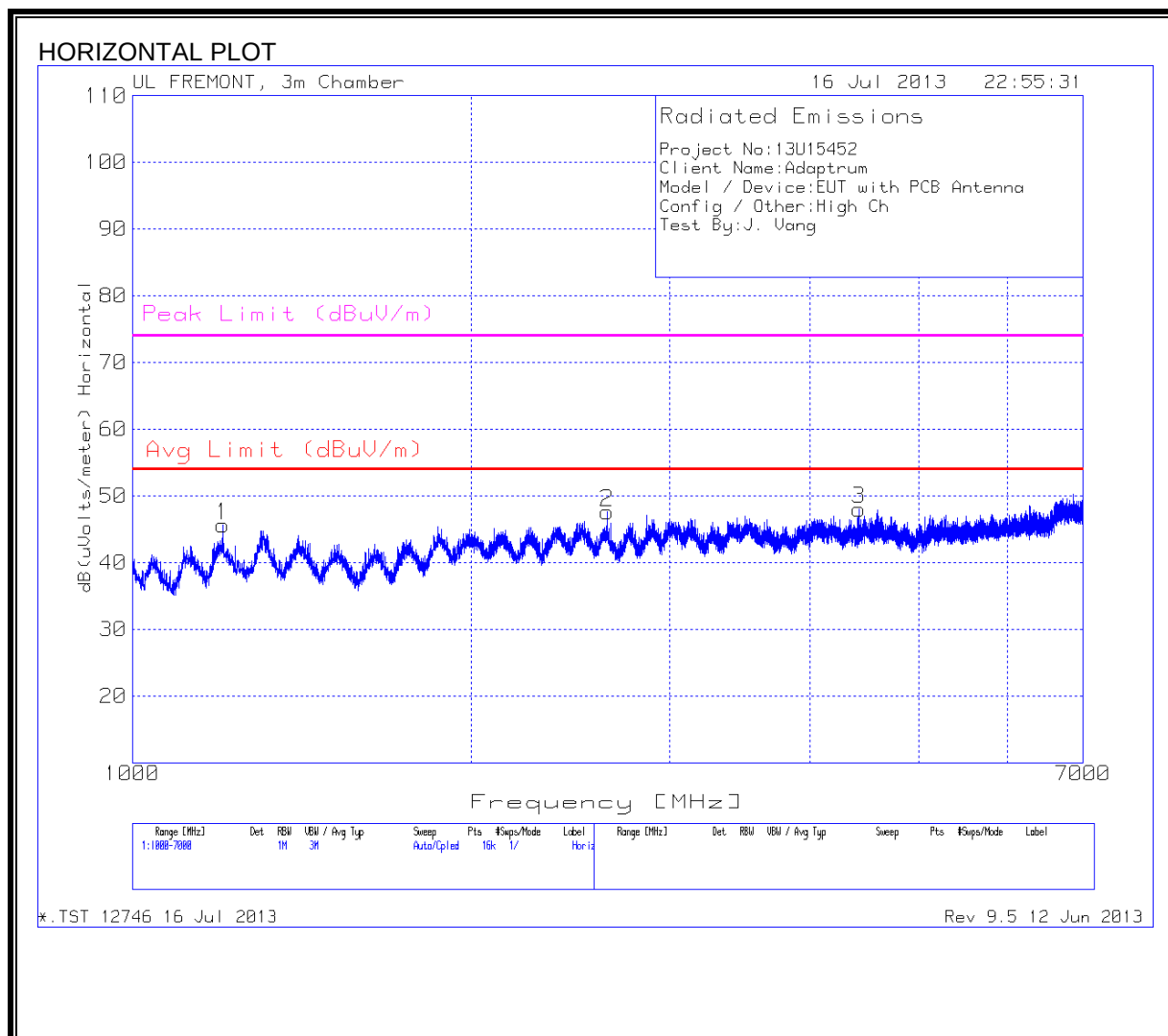
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1- 18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.296	42.21	PK	30.2	-28.1	.4	44.71	53.97	-9.26	74	-29.29	100	Horz
2	2.504	39	PK	32.3	-24.6	.4	47.1	53.97	-6.87	74	-26.9	100	Horz
3	4.074	35.06	PK	33.5	-21.3	.4	47.66	53.97	-6.31	74	-26.34	100	Horz
4	1.275	40.82	PK	30	-28	.4	43.22	53.97	-10.75	74	-30.78	100	Vert
5	2.407	38.26	PK	32.1	-24.9	.4	45.86	53.97	-8.11	74	-28.14	201	Vert
6	3.465	36.17	PK	33	-22.6	.4	46.97	53.97	-7	74	-27.03	201	Vert

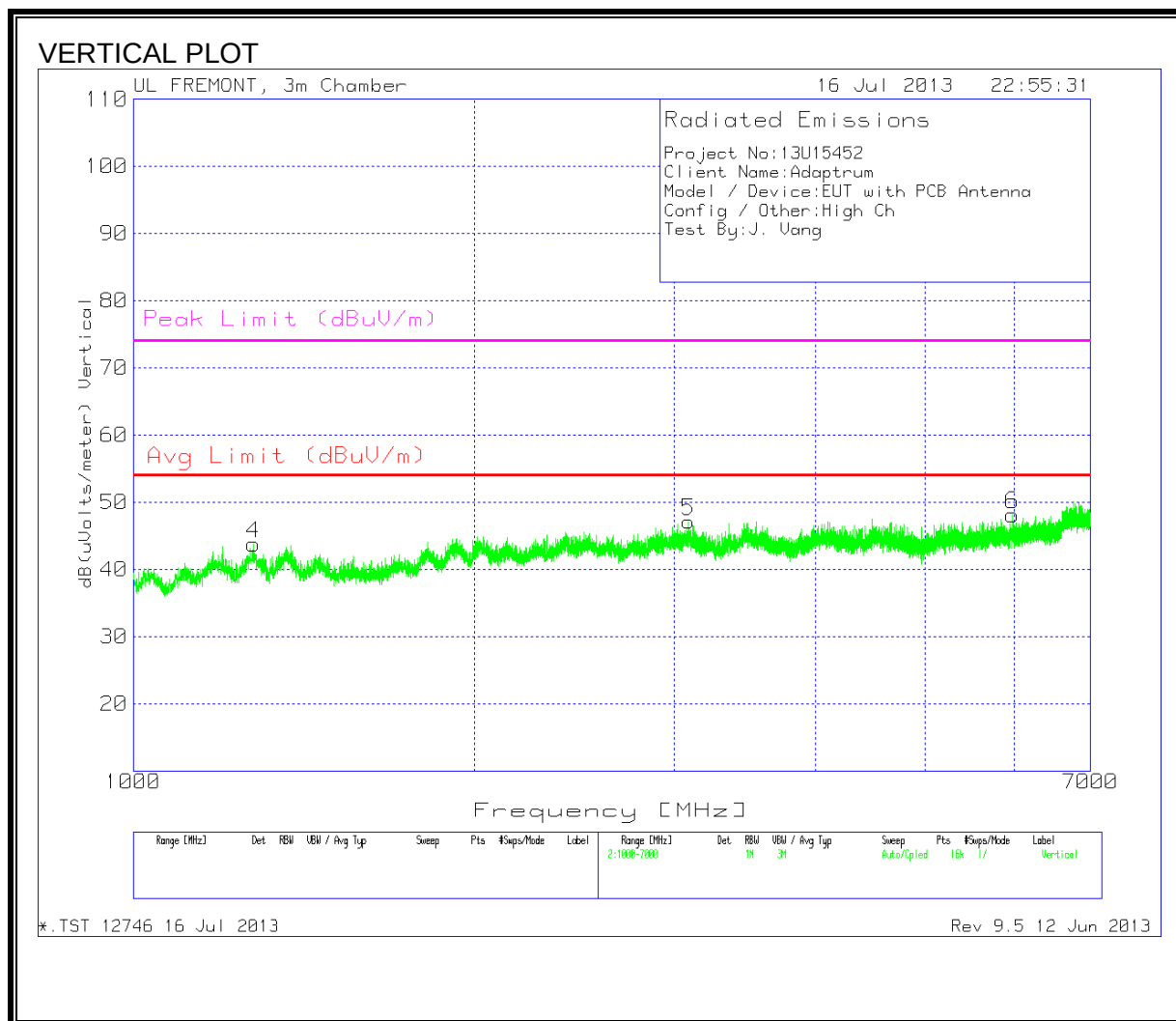
PK - Peak detector

8.4.3.6. TX SPURIOUS EMISSIONS ABOVE 1 GHz (HIGH CH)

SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 1000 TO 7000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



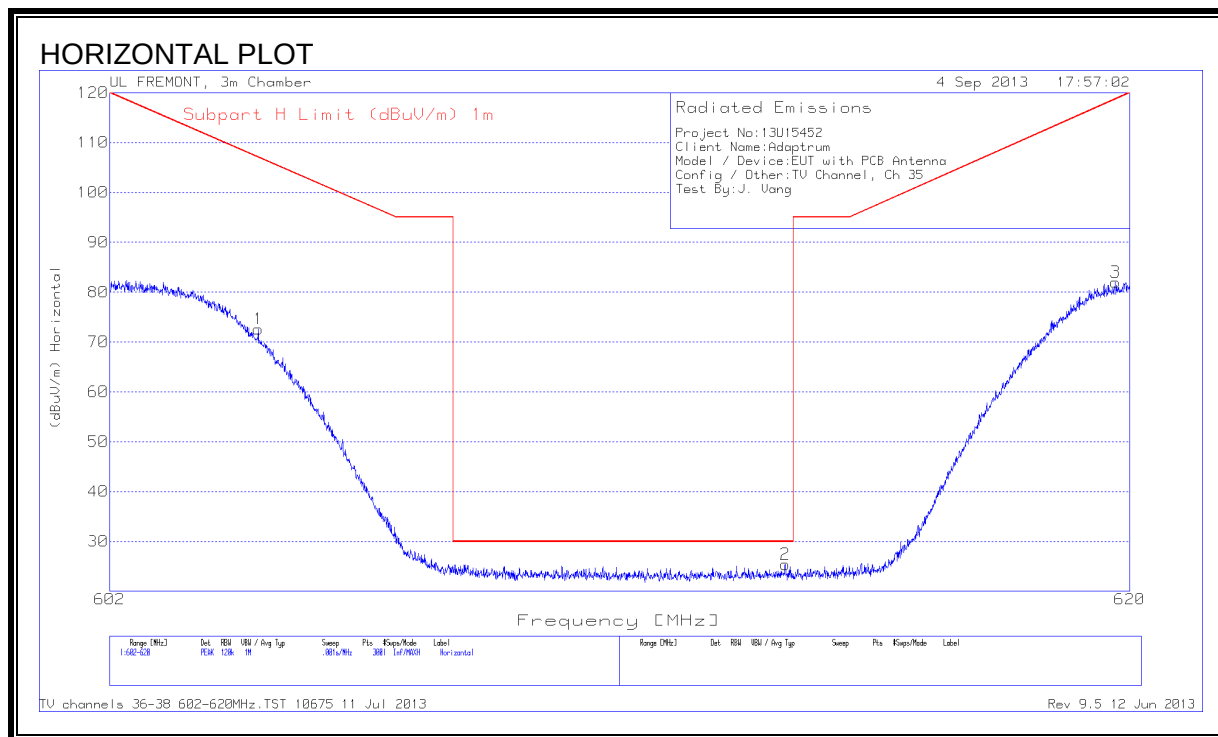
HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	1- 18GHz Loop no Pad 05- 21-2013	T707 1GHz HPF	Corrected Reading dB(uVolts/meter)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.204	44.41	PK	29.3	-28.5	.4	45.61	53.97	-8.36	74	-28.39	99	Horz
2	2.644	38.89	PK	32.6	-24.3	.4	47.59	53.97	-6.38	74	-26.41	200	Horz
3	4.425	34.83	PK	33.7	-20.9	.4	48.03	53.97	-5.94	74	-25.97	200	Horz
4	1.276	41.4	PK	30	-28	.4	43.8	53.97	-10.17	74	-30.2	100	Vert
5	3.092	36.97	PK	33.1	-23.3	.4	47.17	53.97	-6.8	74	-26.83	201	Vert
6	5.973	31.68	PK	35.2	-19.1	.4	48.18	-	-	68.2	-20.02	201	Vert

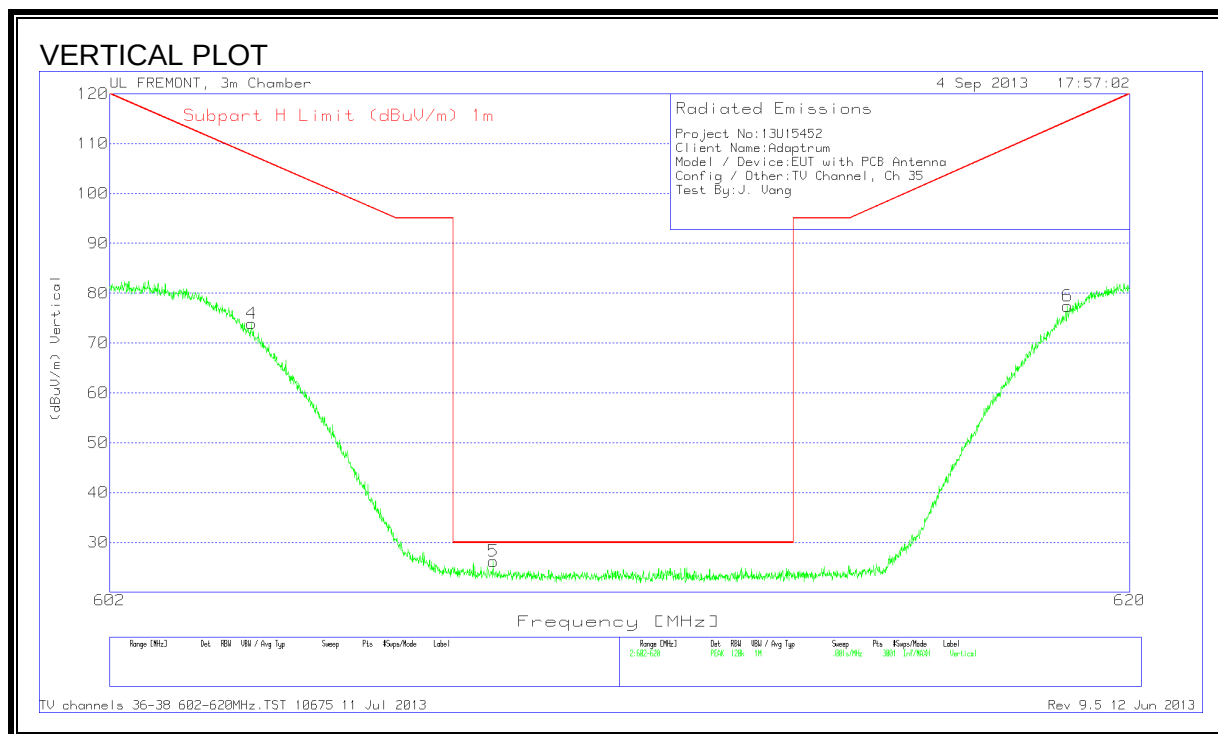
PK - Peak detector

8.4.3.7. RADIATED EMISSIONS 602 TO 620 MHz

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)



PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)



TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 35 - 599MHz)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	604.592	29.09	PK	18.5	-25.5	50.5	72.59	107.01	-34.42	100	Horz
2	613.862	29.31	PK	18.8	-25.5	2.8	25.41	30	-4.59	100	Horz
3	619.742	28.49	PK	19	-25.4	59.9	81.99	118.71	-36.72	400	Horz
4	604.472	29.13	PK	18.5	-25.5	51.8	73.93	107.61	-33.68	400	Vert
5	608.708	30.01	PK	18.7	-25.5	3	26.21	30	-3.79	400	Vert
6	618.884	28.93	PK	19	-25.4	54.9	77.43	114.44	-37.01	201	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
612.6912	23.38	QP	18.8	-25.5	2.6	19.28	30	-10.72	111	140	Horz
607.8793	23.39	QP	18.7	-25.5	3.7	20.29	30	-9.71	252	100	Vert

PK - Peak detector

QP - Quasi-Peak detector

HORIZONTAL PLOT

UL FREMONT, 3m Chamber 4 Sep 2013 18:20:33

Subpart H Limit (dBuV/m) 1m

Radiated Emissions
Project No:13U15452
Client Name:Adaptrum
Model / Device:EUT with PCB Antenna
Config / Other:TU Channel, Ch 39
Test By:J. Vang

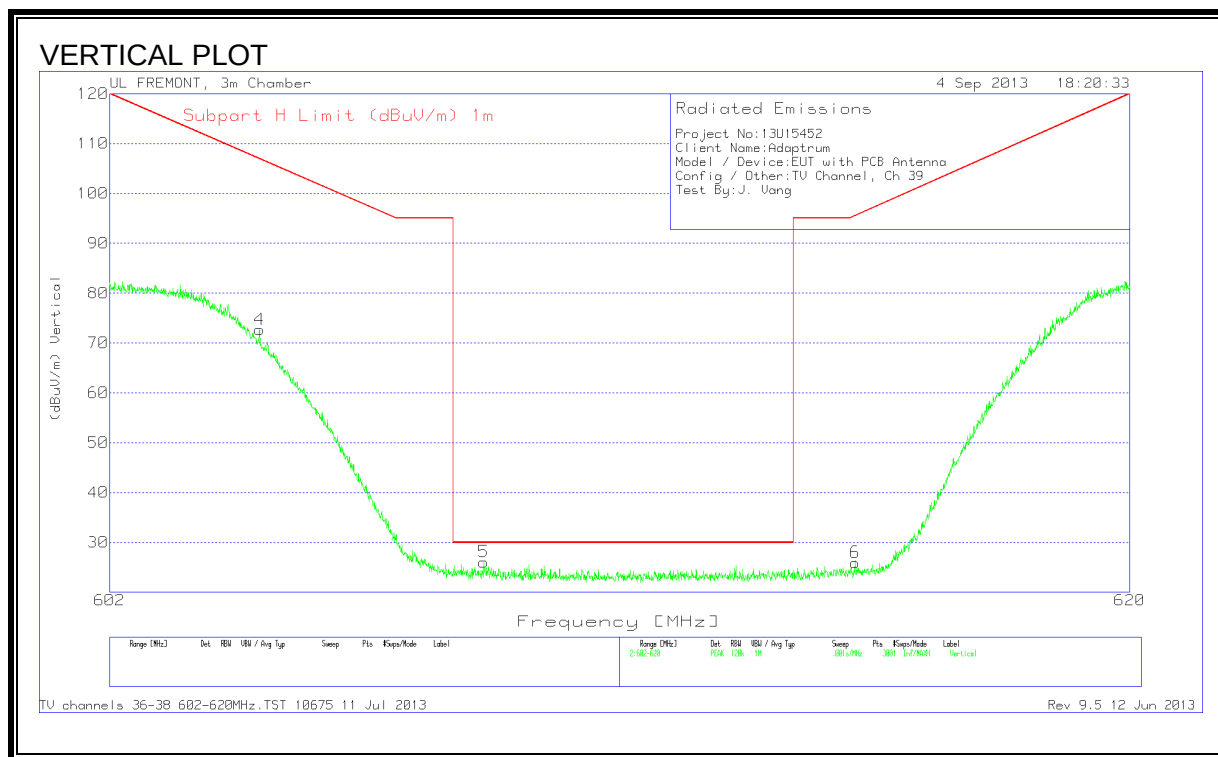
(dBuV/m) Horizontal

Frequency [MHz]

Range [MHz] Det. RES. VBW / Avg Type Sweep Pts KSpw/Mode Label
1:602-620 PEA 120k 1H 1000 3000 1 of 10000 Horizontal

TV channels 36-38 602-620MHz.TST 10675 11 Jul 2013 Rev 9.5 12 Jun 2013

PLOT OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)



TABULAR LISTING OF SPURIOUS EMISSIONS 602 TO 620 MHz (CHANNEL 39 - 623MHz)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Height (cm)	Polarity
1	605.498	29.48	PK	18.5	-25.5	38.1	60.58	102.49	-41.91	300	Horz
2	607.838	29.58	PK	18.7	-25.5	3.8	26.58	95	-68.42	201	Horz
3	613.028	30.7	PK	18.8	-25.5	2.6	26.6	30	-3.4	300	Horz
4	604.61	29.41	PK	18.5	-25.5	50.3	72.71	106.92	-34.21	299	Vert
5	608.54	29.68	PK	18.7	-25.5	3.2	26.08	30	-3.92	400	Vert
6	615.104	29.35	PK	18.8	-25.5	3.3	25.95	95.52	-69.57	99	Vert

Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	T240 Fltr (dB)	Corrected Reading (dBuV/m)	Subpart H Limit (dBuV/m) 1m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
612.8133	23.53	QP	18.8	-25.5	2.6	19.43	30	-10.57	240	103	Horz
607.6335	23.37	QP	18.7	-25.5	4.5	21.07	30	-8.93	134	109	Vert

PK - Peak detector

QP - Quasi-Peak detector

8.5. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

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

TEST PROCEDURE

ANSI C63.4-2009.

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

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

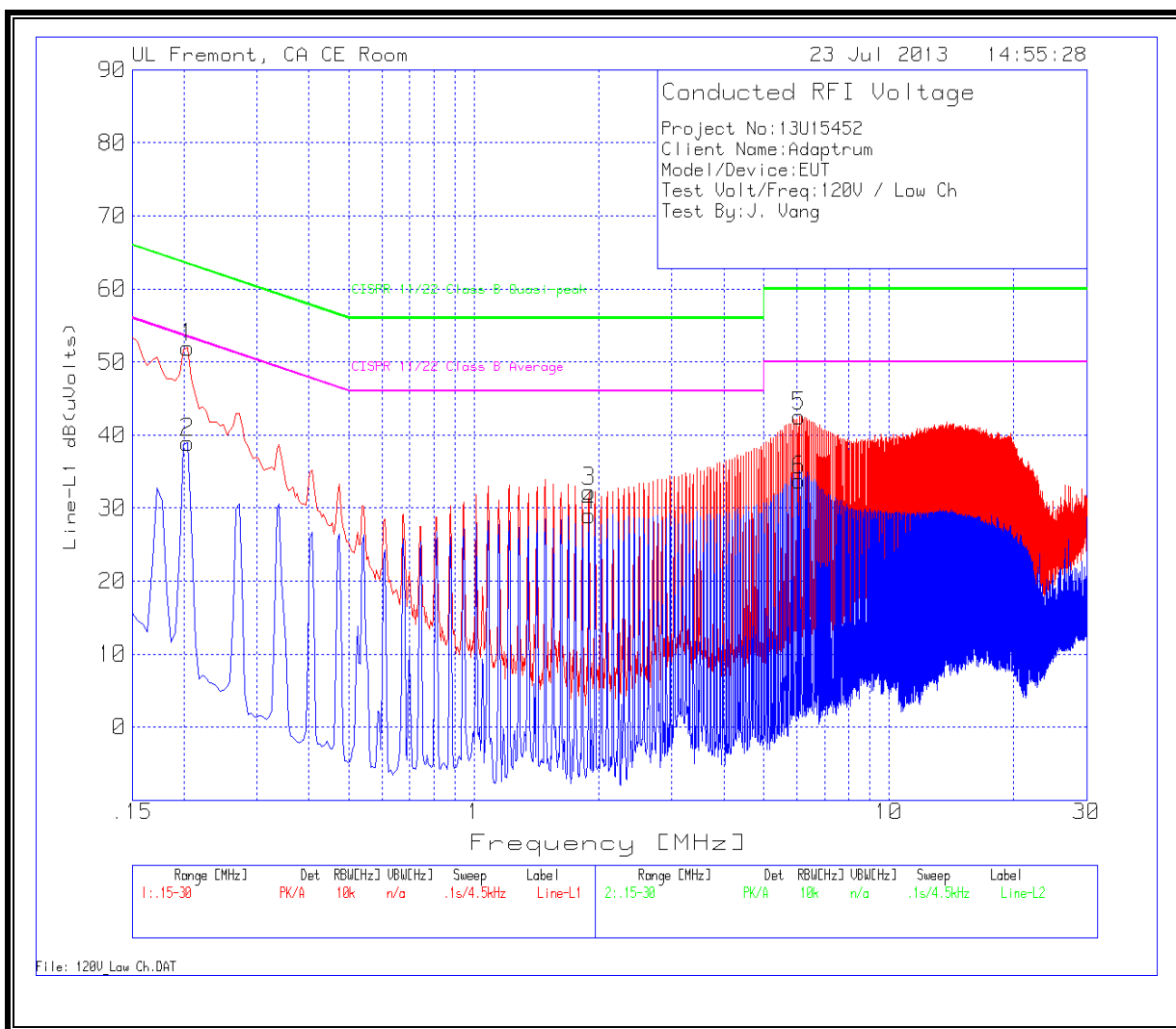
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.204	51.81	PK	.1	0	51.91	63.4	-11.49	-	-
2	.204	38.85	Av	.1	0	38.95	-	-	53.4	-14.45
3	1.8915	32.04	PK	.1	.1	32.24	56	-23.76	-	-
4	1.8915	28.86	Av	.1	.1	29.06	-	-	46	-16.94
5	6.0765	42.31	PK	.1	.1	42.51	60	-17.49	-	-
6	6.0765	33.54	Av	.1	.1	33.74	-	-	50	-16.26

PK - Peak detector

Av - average detection

LINE 1 RESULTS



6 WORST EMISSIONS

Line-L2 .15 - 30MHz

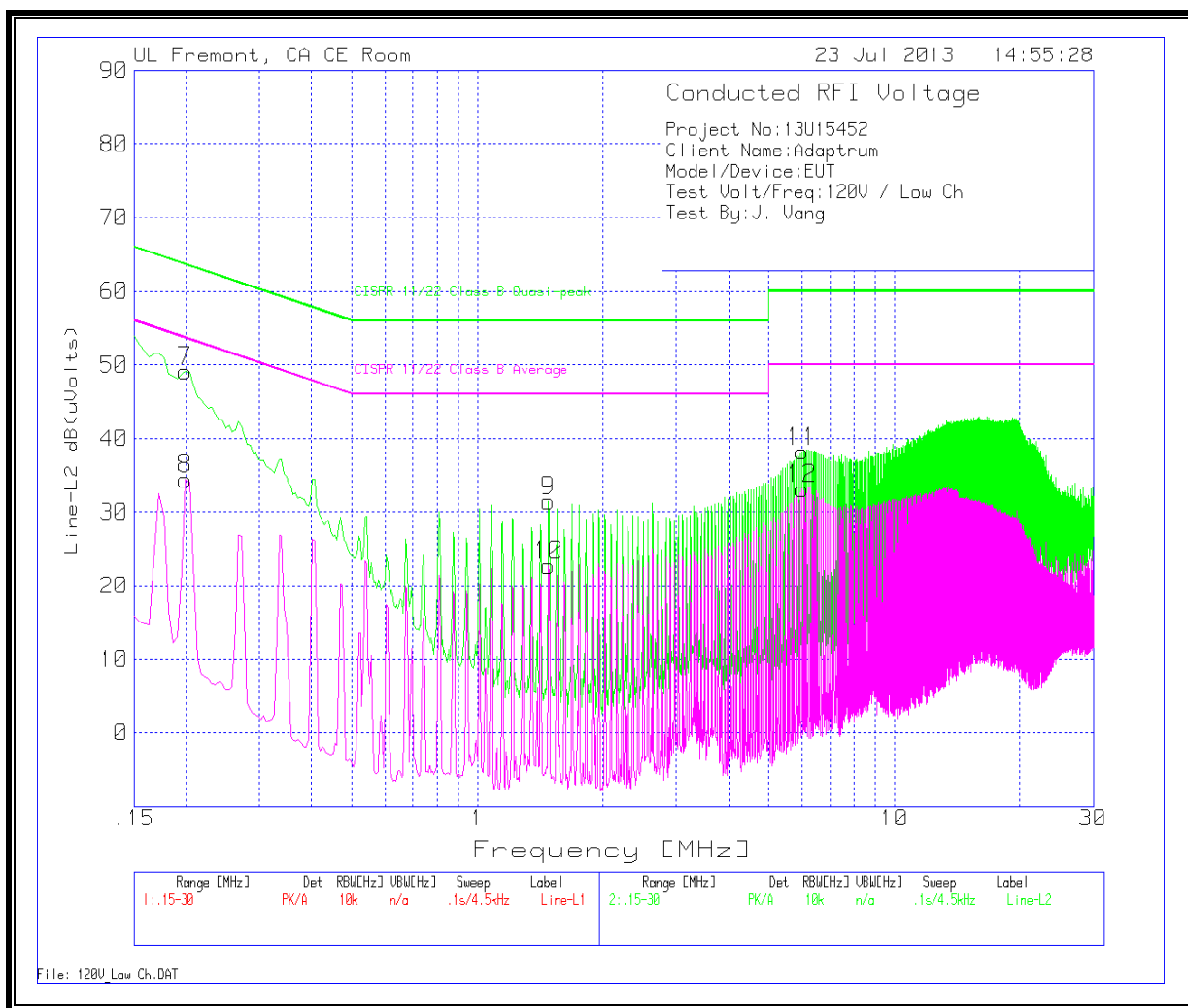
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
7	.1995	49.04	PK	.1	0	49.14	63.6	-14.46	-	-
8	.1995	34.28	Av	.1	0	34.38	-	-	53.6	-19.22
9	1.482	31.29	PK	.1	.1	31.49	56	-24.51	-	-
10	1.482	22.47	Av	.1	.1	22.67	-	-	46	-23.33
11	6.0045	38.03	PK	.1	.1	38.23	60	-21.77	-	-
12	6.0045	32.96	Av	.1	.1	33.16	-	-	50	-16.84

PK - Peak detector

Av - average detection

LINE 2 RESULTS



9. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * D^2)$$

where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

where

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power in mW

S = Power density in mW/cm²

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of $S = f/1500$ mW/cm², where f is the operating frequency in MHz.

MEASUREMENT NOTES

The conducted output power was measured with the device operating at the only source-based TDD duty cycle, therefore no duty cycle correction is applied to the RF Exposure calculations.

RESULTS FOR FIXED OPERATION

In accordance with §15.709 (d), the minimum separation distance for a Fixed TVBD is 40 cm.

RF Exposure for Maximum Output Power and highest antenna assembly gain (DB2E,11.8).

Frequency (MHz)	Mode	Separation Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Duty Cycle (%)	Power Density (mW/cm^2)	FCC Limit (mW/cm^2)
473.0	QPSK	40	21.18	11.80	32.98	1986	100	0.099	0.315
581.0	QPSK	40	20.55	11.80	32.35	1718	100	0.085	0.387
695.0	QPSK	40	20.33	11.80	32.13	1633	100	0.081	0.463
473.0	16QAM	40	21.15	11.80	32.95	1972	100	0.098	0.315
581.0	16QAM	40	20.55	11.80	32.35	1718	100	0.085	0.387
695.0	16QAM	40	20.32	11.80	32.12	1629	100	0.081	0.463
473.0	64QAM	40	20.15	11.80	31.95	1567	100	0.078	0.315
581.0	64QAM	40	20.68	11.80	32.48	1770	100	0.088	0.387
695.0	64QAM	40	20.33	11.80	32.13	1633	100	0.081	0.463