



FCC CFR47 PART 90.103
CERTIFICATION TEST REPORT
FOR
GROUND RADAR

MODEL NUMBER: 001-10018266

FCC ID: QFS001-10018266

REPORT NUMBER: 10529421A

ISSUE DATE: November 3, 2014

Prepared for
Dynetics
1002 Explorer Boulevard
Huntsville, AL 35806

Prepared by
UL LLC
333 Pfingsten Road
Northbrook, IL 60062
TEL: (847) 272-8800



NVLAP LAB CODE 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY.....	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION.....	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY.....	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. SOFTWARE AND FIRMWARE.....	8
5.4. WORST-CASE CONFIGURATION AND MODE	8
5.5. DESCRIPTION OF TEST SETUP.....	9
6. TEST AND MEASUREMENT EQUIPMENT	11
7. RF POWER OUTPUT	12
8. CONDUCTED TEST RESULTS.....	16
8.1. OCCUPIED BANDWIDTH.....	16
8.2. BAND EDGE	20
8.3. OUT OF BAND EMISSIONS (Antenna Port and Radiated)	27
8.3.1. Antenna Port Out of Band Emissions.....	28
8.3.2. Radiated Enclosure Port Out of Band Emissions.....	46
9. FREQUENCY STABILITY	70

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Dynetics
1002 Explorer Boulevard
Huntsville, AL 35806-2806

EUT DESCRIPTION: Ground Radar

MODEL: 001-10018266

SERIAL NUMBER: 003-092014

DATE TESTED: August 2014 – October 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 90.103	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:



Michael Ferrer
WiSE ENGINEER
UL Verification Services Inc.

Tested By:



Bart Mucha
WiSE ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, 47 CFR Part 90.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1004140.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

Test	Range	Equipment	Uncertainty k=2
Conducted Emissions	150k-30MHz	LISN	2.29dB
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Radiated Emissions	26-40GHz	Horn	7.02dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wide band ground radar used to monitor a specific area.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output powers as follows:

Mode 1, Mode2, and Mode 3

	Mode 1 Peak power dBm	Mode 2 Peak Power dBm	Mode 3 Peak Power dBm
Low Channel	43.53	43.20	43.19
Middle Channel	43.93	44.03	43.95
High Channel	43.52	43.00	42.93

5.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 1.08

The EUT software installed during testing was 599

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT operates in three specific modes. Except for radiated spurious emissions all tests were conducted in all three modes. Radiated Spurious emissions was conducted in two modes (Mode 1 and Mode 3). The output power difference between modes was very small.

Center Frequency for 15.625 MHz Channels Mode 2 and Mode 3	Center Frequency for 31.25 MHz Channels Mode 1
3.1484375000E+09	3.1562500000E+09
3.1640625000E+09	3.1718750000E+09
3.1796875000E+09	3.1875000000E+09
3.1953125000E+09	3.2031250000E+09
3.2109375000E+09	3.2187500000E+09
3.2265625000E+09	3.2343750000E+09
3.2421875000E+09	
* green highlighted frequencies are the ones that were tested	

5.5. DESCRIPTION OF TEST SETUP

CONDUCTED and RADIATED TESTS SUPPORT EQUIPMENT

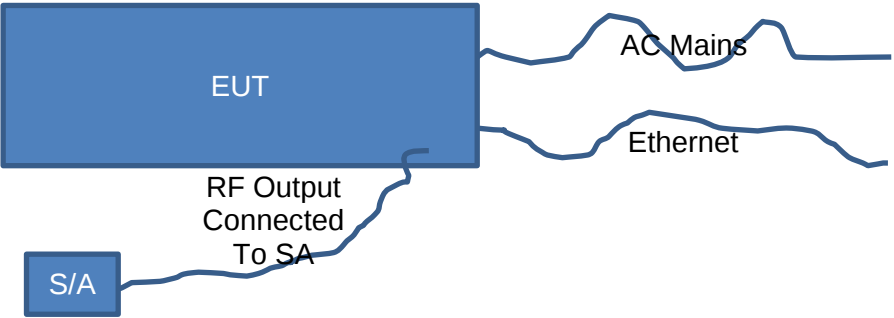
Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop Computer	Generic	Generic	N/A
EUT	Dynetics	001-10018266	003-092014

I/O CABLES

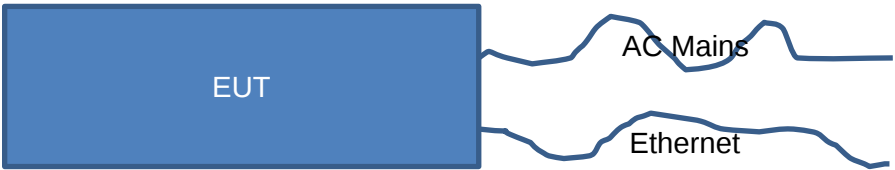
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC 3 Wire	16 AWG	50ft	Standard AC Power Cable
2	I/O	1	RJ-45	Cat 5	50ft	Standard Ethernet Cable

TEST SETUP

CONDUCTED SETUP



RADIATED SETUP



6. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20131227	20141231
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20131230	20141230
Bicon Antenna	Chase	VBA6106A	EMC4078	20140401	20150401
Log-P Antenna	Chase	UPA6109	EMC4313	20131003	20141003
Antenna Array	UL	BOMS	EMC4276	20130912	20141231
Spectrum Analyzer	Agilent	N9030A (PXA)	EMC4360	20131221	20141221
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	April 1, 2014	April 1, 2015
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	885551	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	Jan 15, 2014	Jan 16, 2015
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	Jan 15, 2014	Jan 16, 2015

7. RF POWER OUTPUT

REQUIREMENT

§2.1046 Measurements required: RF power output.

§90.205 Output Power.

(r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

TEST PROCEDURE

The transmitter output was connected to the input of Spectrum Analyzer via calibrated coaxial cable and attenuator.

The output power was measured with the spectrum analyzer at the low, middle and high channel for each mode.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW $\geq$ RBW. The RBW was set to largest available (8MHz). It is less then overall bandwidth of individual channel but is larger then bandwidth of individual pulse within a channel.
- Set a marker to point the corresponding peak value.

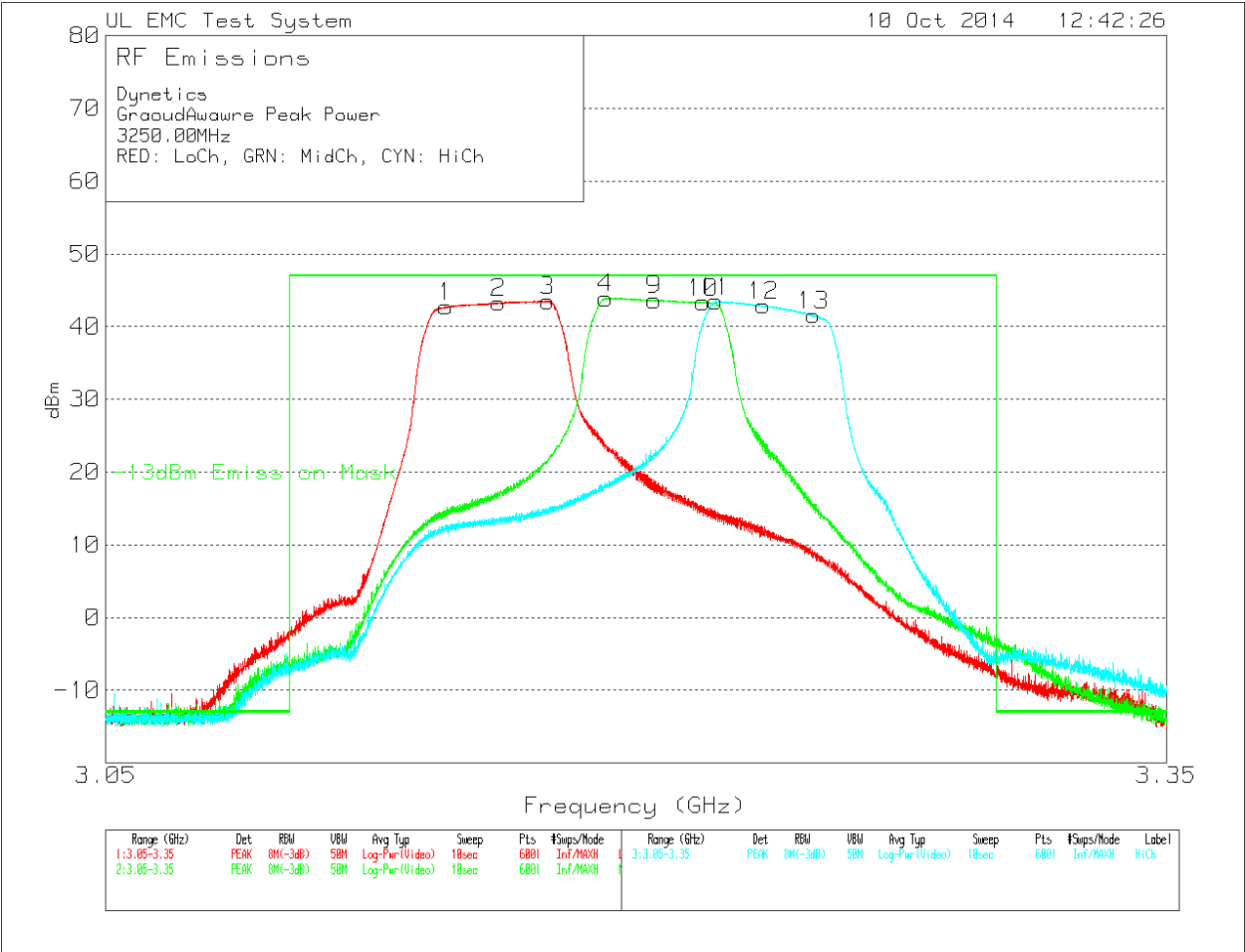
TABULAR RESULTS

	Mode 1 Peak power dBm	Mode 2 Peak Power dBm	Mode 3 Peak Power dBm
Low Channel	43.53	43.20	43.19
Middle Channel	43.93	44.03	43.95
High Channel	43.52	43.00	42.93

* The maximum power was derived from exported numeric trace data.

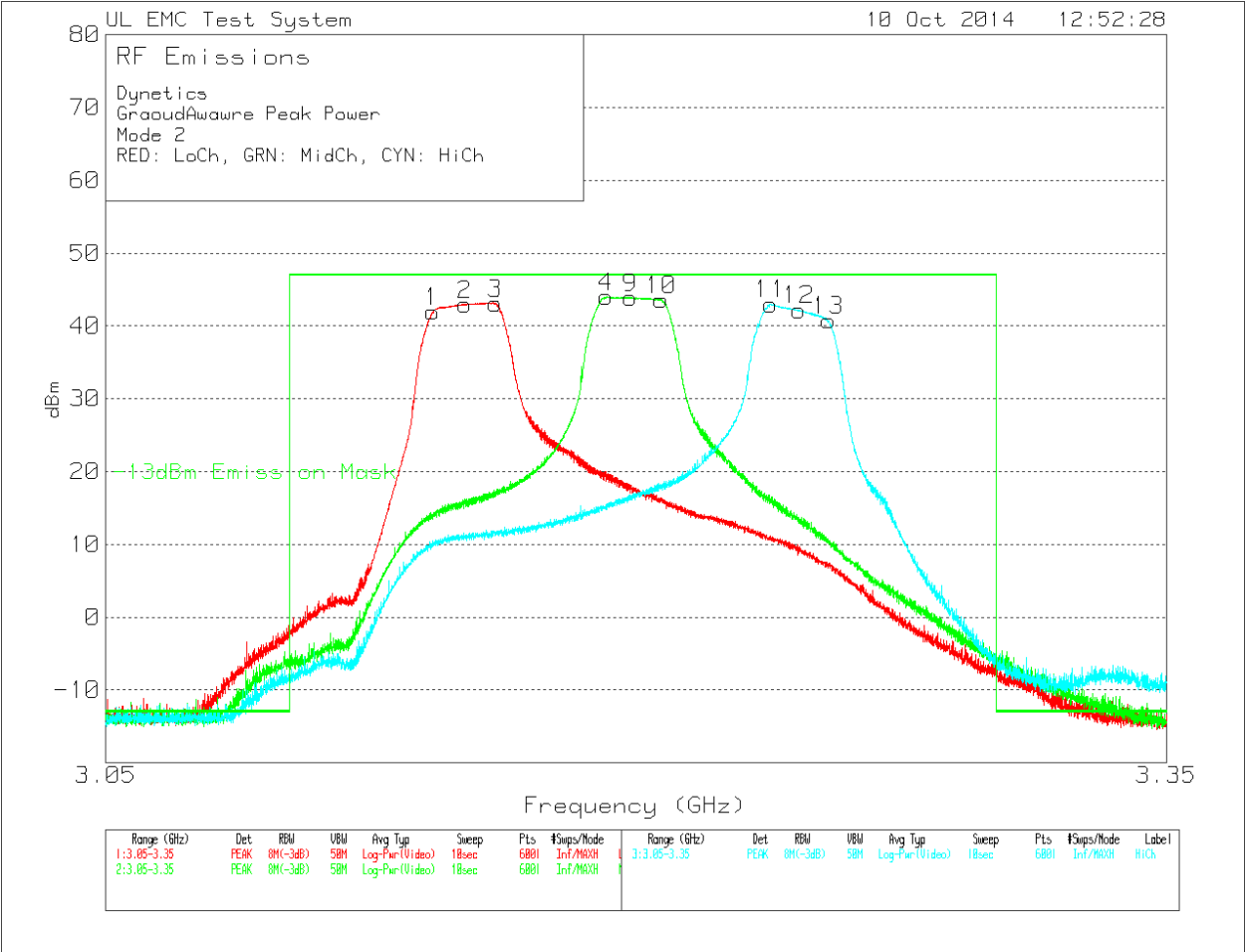
GRAPHICAL RESULTS

Mode 1 Peak Power

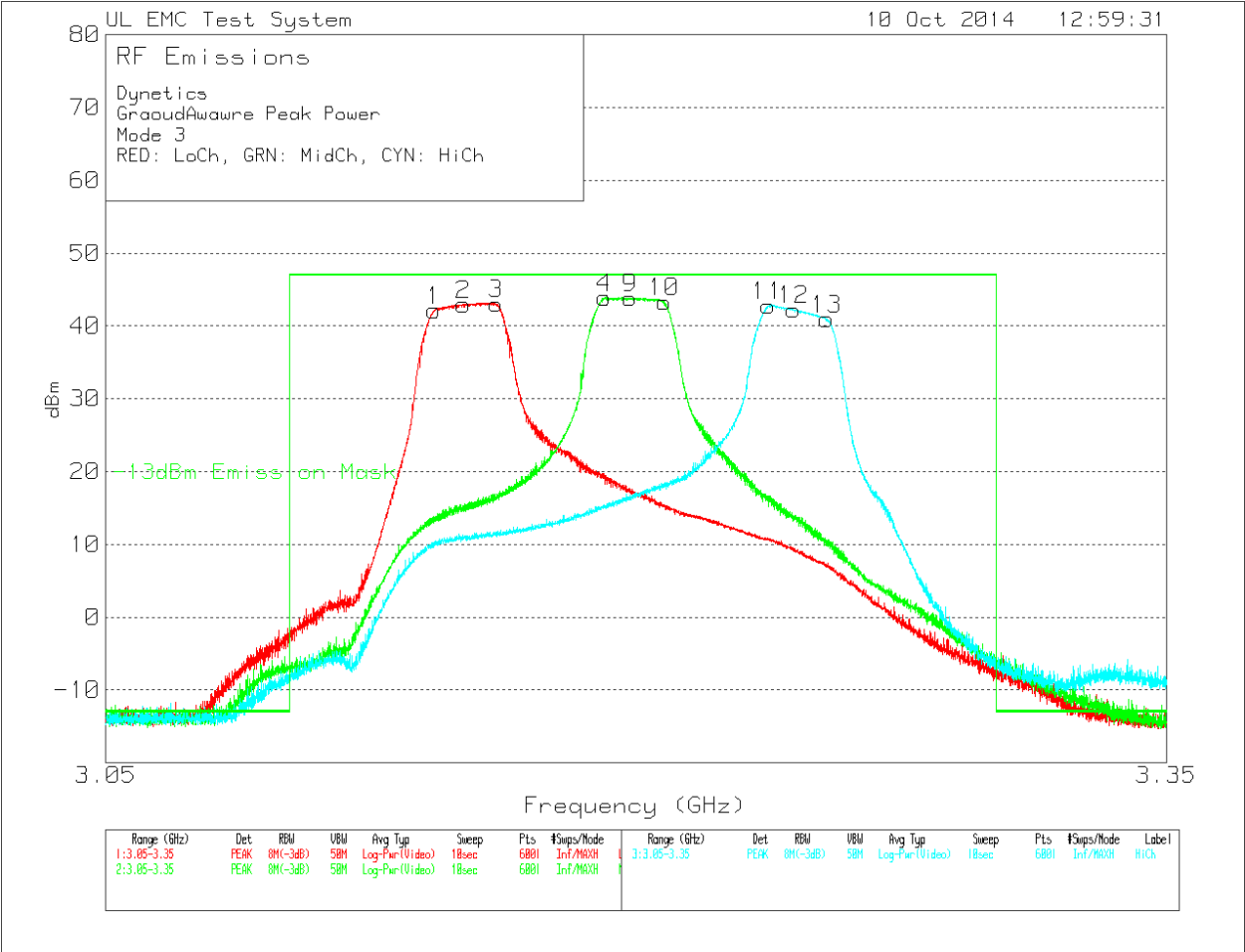


* Emission mask is not applicable for the output power measurement.

Mode 2 Peak Power



Mode 3 Peak Power



8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

§2.1049 Measurements required: Occupied bandwidth.

§90.207 Types of emissions.

(k) For radiolocation operations as may be authorized in accordance with subpart F, unless otherwise provided for any type of emission may be authorized upon a satisfactory showing of need.

§90.209 Bandwidth Limitation.

Above 2500 MHz:

²Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis. So no bandwidth limitation for certification of device, but could be a factor when licensing the device.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

MODES TESTED

TABULAR RESULTS

	Mode 1 99% Bandwidth MHz	Mode 2 99% Bandwidth MHz	Mode 2 99% Bandwidth MHz
Low Channel	33.239	17.295	17.053
Middle Channel	33.334	17.300	17.065
High Channel	33.239	17.377	17.089

GRAPHICAL RESULTS

Mode 1



Mode 2



Mode 3



8.2. BAND EDGE

RULE PART(S)

§2.1051 Measurements required: Spurious emissions at antenna terminals at the band edges.

§90.210 Emission Mask

Since there is no specific mask/bandwidth limitation we apply the standard -13dBm limit outside the allocated band.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. (-13dBm)

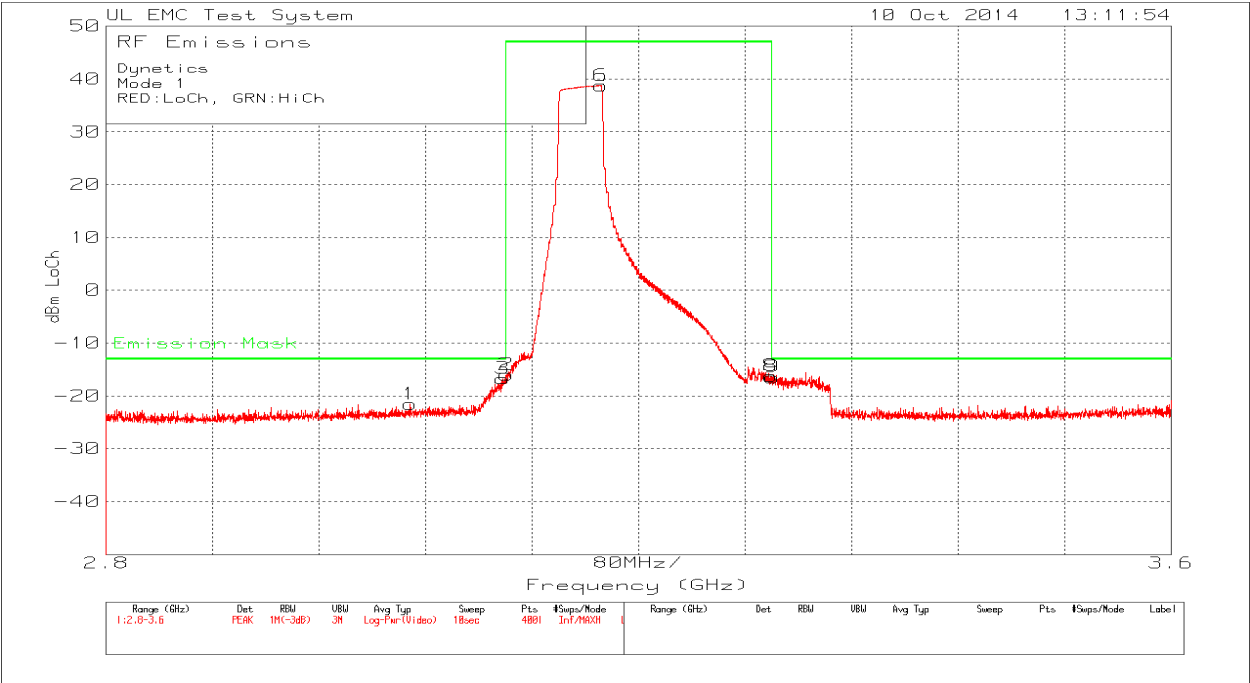
TEST PROCEDURE

The transmitter output was connected to the input of Spectrum Analyzer via calibrated coaxial cable and attenuator.

The output power was measured with the spectrum analyzer at the low, middle and high channel for each mode.

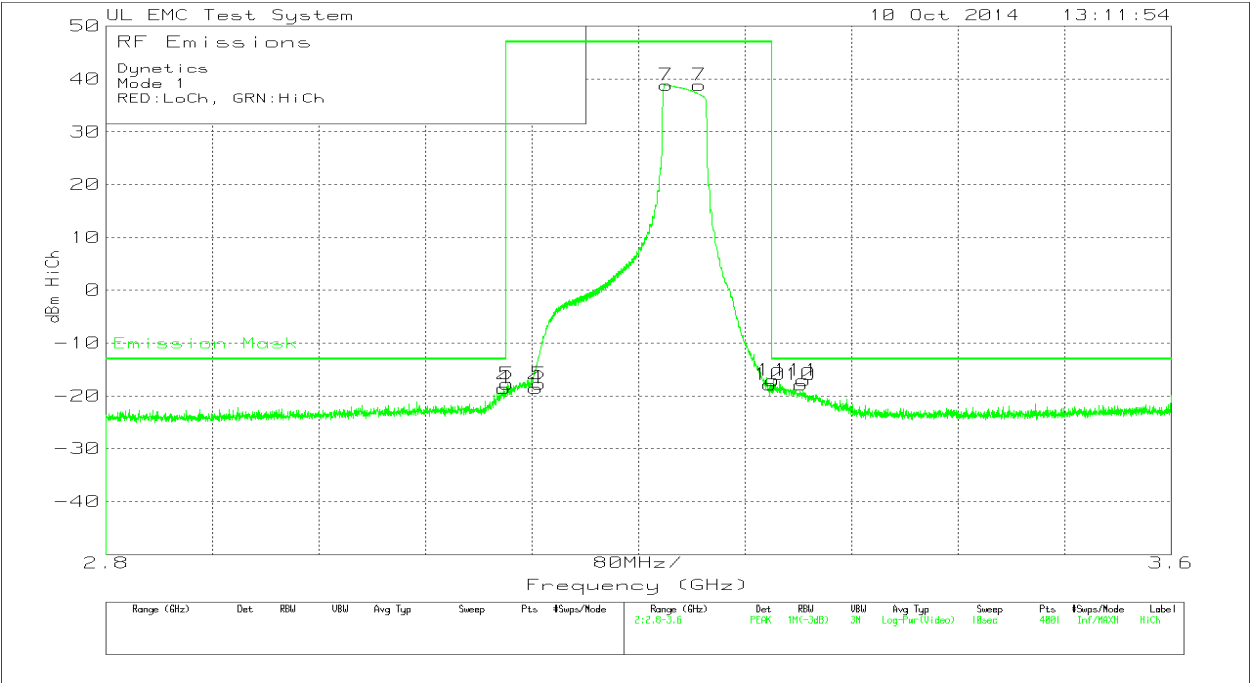
RESULTS

MODE 1, LOW CHANNEL



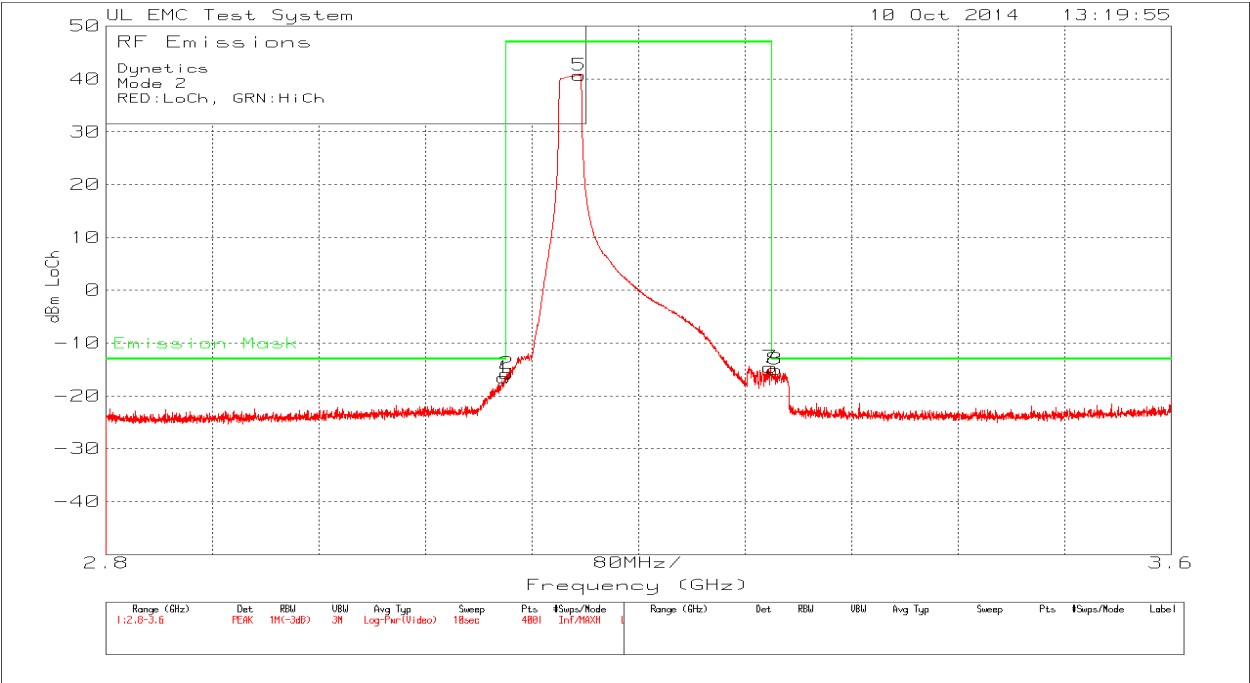
Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
1	3.0282	-52.65	PK	31.1	-21.55	-13	-8.55
2	3.1006	-47.16	PK	31.2	-15.96	47	-62.96
3	3.0978	-47.82	PK	31.1	-16.72	-13	-3.72
6	3.1717	7.58	PK	31.2	38.78	47	-8.22
8	3.2994	-47.42	PK	31.2	-16.22	47	-63.22
9	3.3004	-47.68	PK	31.2	-16.48	-13	-3.48

MODE 1, HIGH CHANNEL



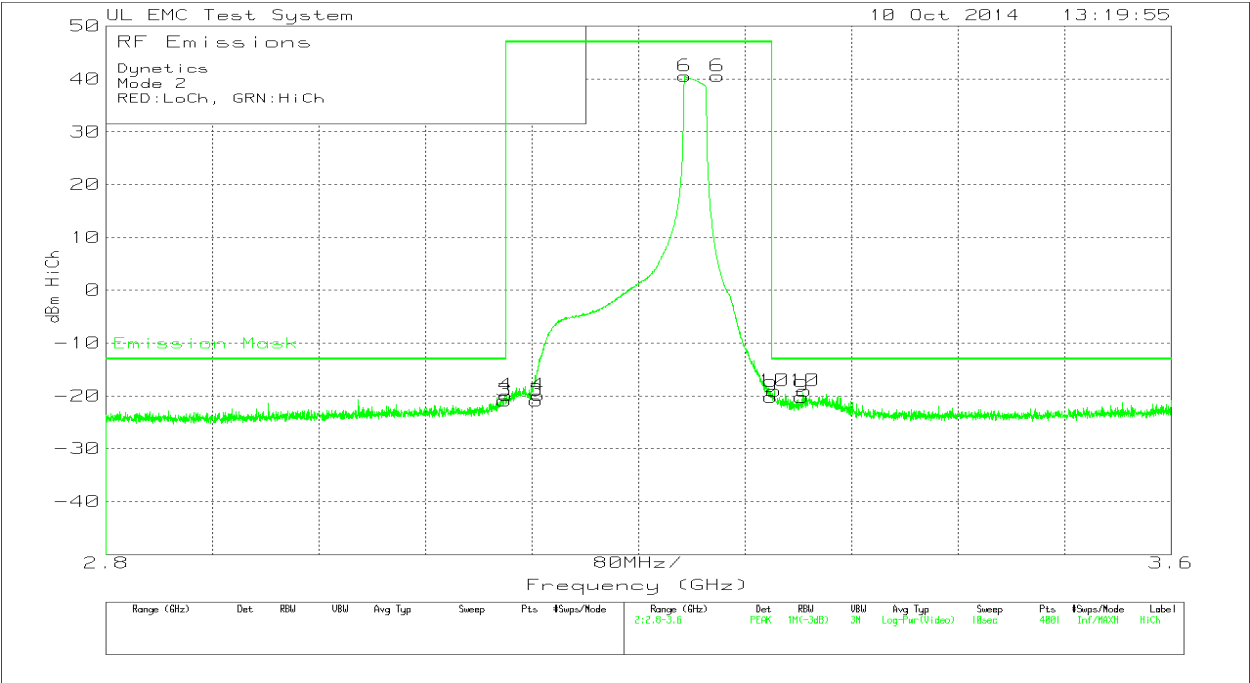
Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
4	3.0986	-49.63	PK	31.1	-18.53	-13	-5.53
5	3.1012	-48.9	PK	31.2	-17.7	47	-64.7
7	3.2206	7.65	PK	31.2	38.85	47	-8.15
10	3.2988	-49.06	PK	31.2	-17.86	47	-64.86
11	3.301	-48.24	PK	31.2	-17.04	-13	-4.04

MODE 2 LOW CHANNEL



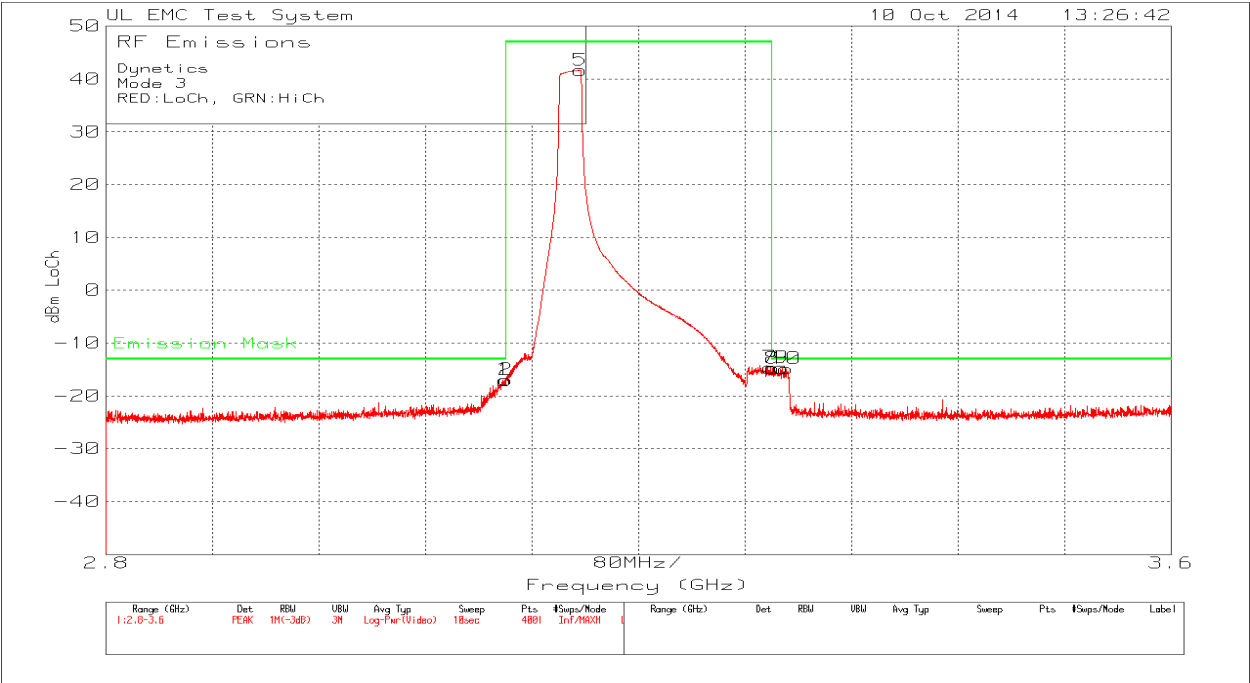
Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
1	3.099	-47.64	PK	31.1	-16.54	-13	-3.54
2	3.1008	-46.97	PK	31.2	-15.77	47	-62.77
5	3.1556	9.51	PK	31.2	40.71	47	-6.29
7	3.299	-45.75	PK	31.2	-14.55	47	-61.55
8	3.3026	-46.16	PK	31.2	-14.96	-13	-1.96

MODE 2 HIGH CHANNEL



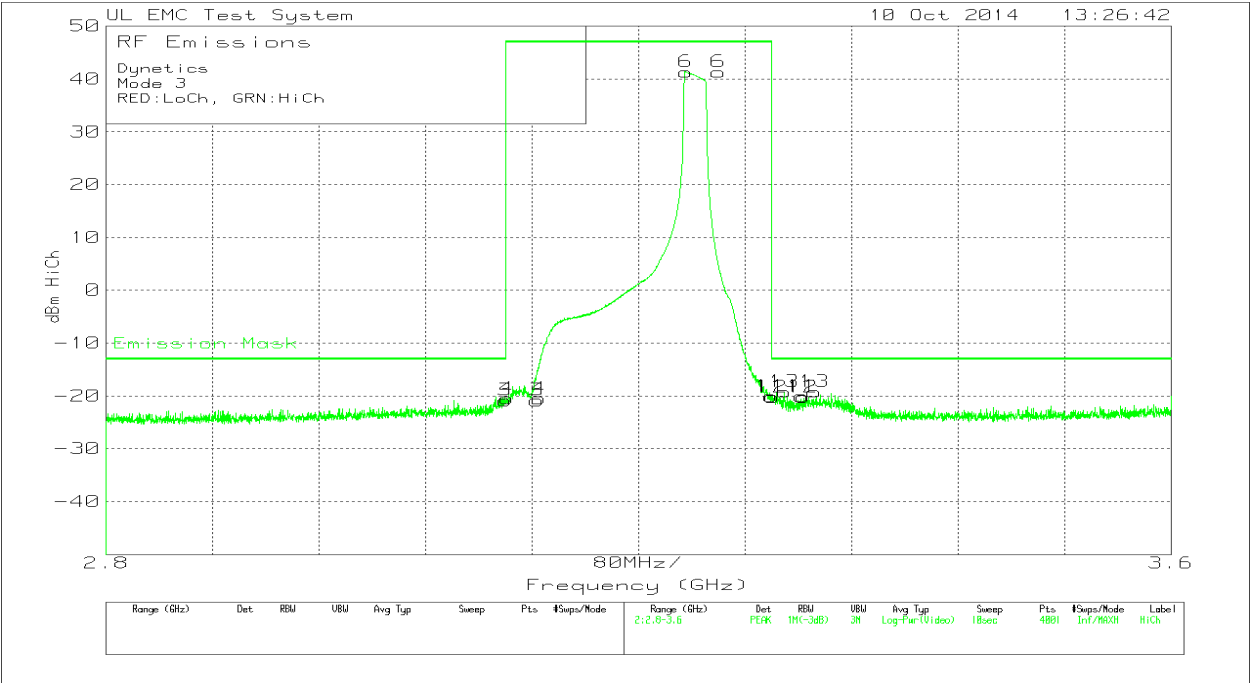
Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
3	3.0992	-51.99	PK	31.1	-20.89	-13	-7.89
4	3.1004	-51.09	PK	31.2	-19.89	47	-66.89
6	3.2347	9.34	PK	31.2	40.54	47	-6.46
9	3.2994	-51.38	PK	31.2	-20.18	47	-67.18
10	3.3018	-50.2	PK	31.2	-19	-13	-6

MODE 3 LOW CHANNEL



Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
1	3.0994	-48.11	PK	31.1	-17.01	-13	-4.01
2	3.1004	-48.15	PK	31.2	-16.95	47	-63.95
5	3.156	10.45	PK	31.2	41.65	47	-5.35
7	3.2988	-45.83	PK	31.2	-14.63	47	-61.63
8	3.3006	-45.97	PK	31.2	-14.77	-13	-1.77
9	3.3076	-45.84	PK	31.2	-14.64	-13	-1.64
10	3.3108	-46.04	PK	31.2	-14.84	-13	-1.84

MODE 3 HIGH CHANNEL



Marker No.	Test Frequency GHz	Meter Reading dBm	Detector	Path Factor dB	Level dBm	Emission Mask Limit dBm	Margin (dB)
3	3.0994	-51.94	PK	31.1	-20.84	-13	-7.84
4	3.101	-51.66	PK	31.2	-20.46	47	-67.46
6	3.2354	10.11	PK	31.2	41.31	47	-5.69
11	3.2994	-51.27	PK	31.2	-20.07	47	-67.07
12	3.3004	-51.43	PK	31.2	-20.23	-13	-7.23
13	3.3094	-50.44	PK	31.2	-19.24	-13	-6.24

8.3. OUT OF BAND EMISSIONS (Antenna Port and Radiated)

RULE PART(S)

§2.1051

§90.210 Emission Masks

Since there is no specific mask/bandwidth limitation we apply the standard -13dBm limit outside the allocated band.

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

For antenna port the RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

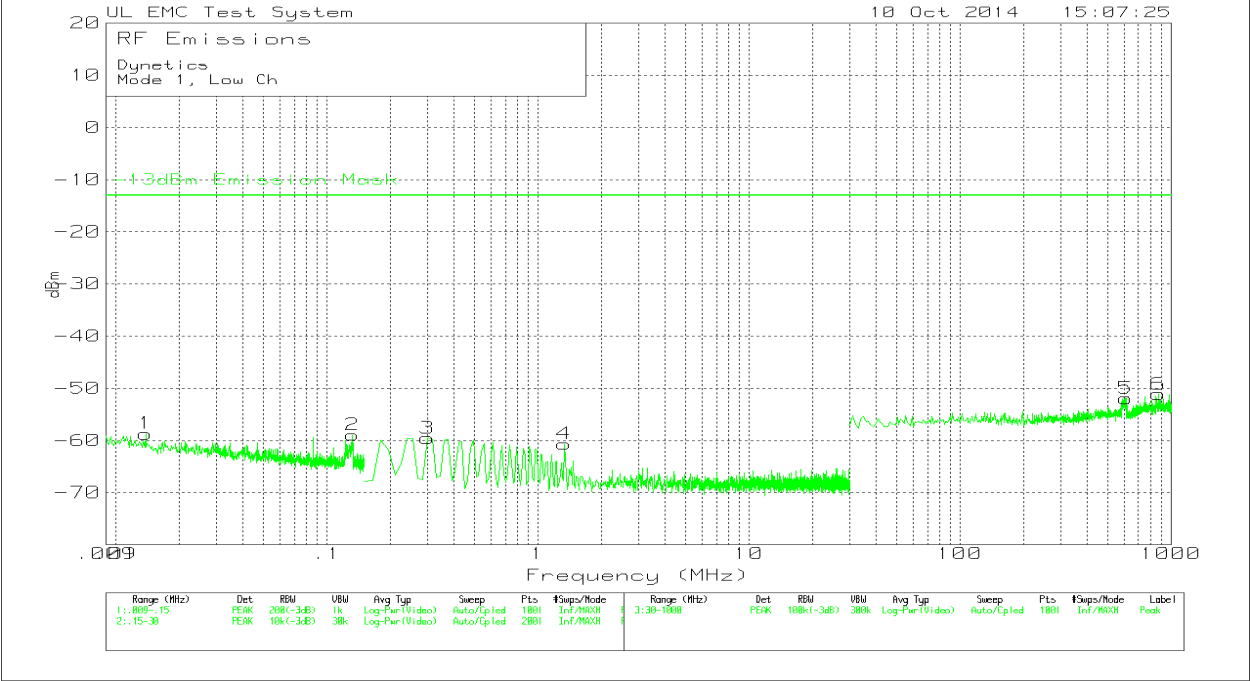
For radiated emissions the radio output was terminated with artificial antenna (50Ohm Load). The limit of -13dBm was converted to field strength limit using equation from FCC KDB publication "971168 D01 Power Meas License Digital System V02r01". Due to very minimal power difference (only few hundredths of a dB) only mode 1 and mode 3 Radiated testing was conducted.

$E(\text{dBuV/m}) = \text{EIRP}(\text{dBm}) - 20\log(D) + 104.8$, where D is the measurement distance in meters.

RESULTS

8.3.1. Antenna Port Out of Band Emissions

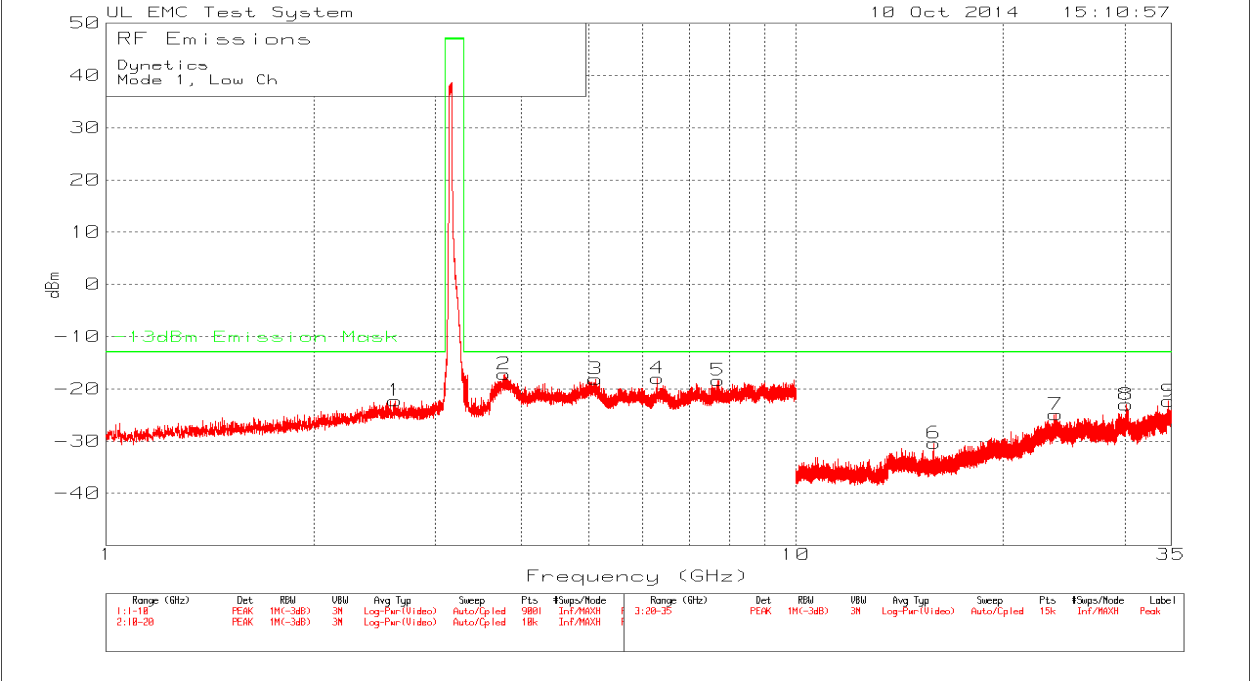
Mode 1, Low Channel, Below 1GHz, Graph



Mode 1, Low Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 1, Low Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.013794	-87.41	PK	28.7	-58.71	-13	-45.71
2	0.132234	-87.73	PK	28.8	-58.93	-13	-45.93
3	0.29925	-88.35	PK	28.8	-59.55	-13	-46.55
4	1.32908	-89.58	PK	28.9	-60.68	-13	-47.68
5	611.03	-81.84	PK	29.9	-51.94	-13	-38.94
6	871.96	-81.1	PK	30	-51.1	-13	-38.1
PK - Peak detector							

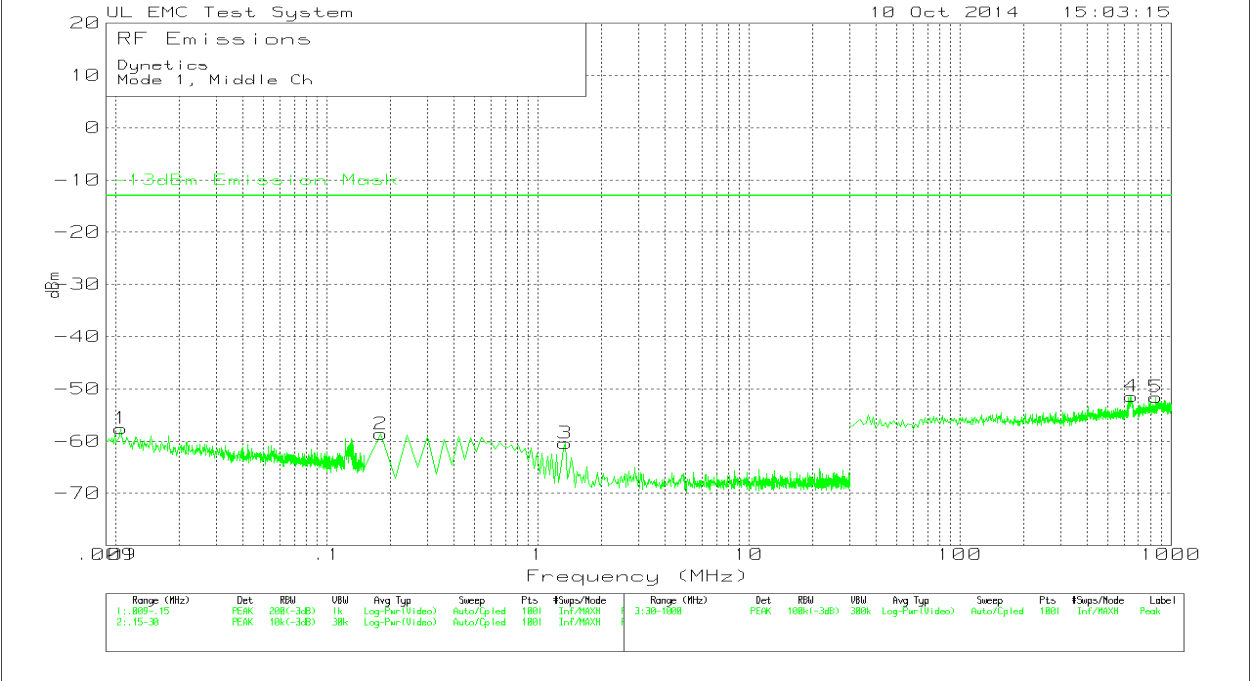
Mode 1, Low Channel, Above 1GHz, Graph



Mode 1, Low Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 1, Low Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	2.623	-53.26	PK	31	-22.26	-13	-9.26
2	3.777	-48.56	PK	31.4	-17.16	-13	-4.16
3	5.119	-49.94	PK	31.8	-18.14	-13	-5.14
4	6.298	-50.08	PK	32.1	-17.98	-13	-4.98
5	7.71	-50.88	PK	32.5	-18.38	-13	-5.38
6	15.859	-65	PK	34.6	-30.4	-13	-17.4
7	23.821	-62.29	PK	37.4	-24.89	-13	-11.89
8	30.14	-61.61	PK	38.6	-23.01	-13	-10.01
9	34.698	-60.23	PK	37.9	-22.33	-13	-9.33
PK - Peak detector							

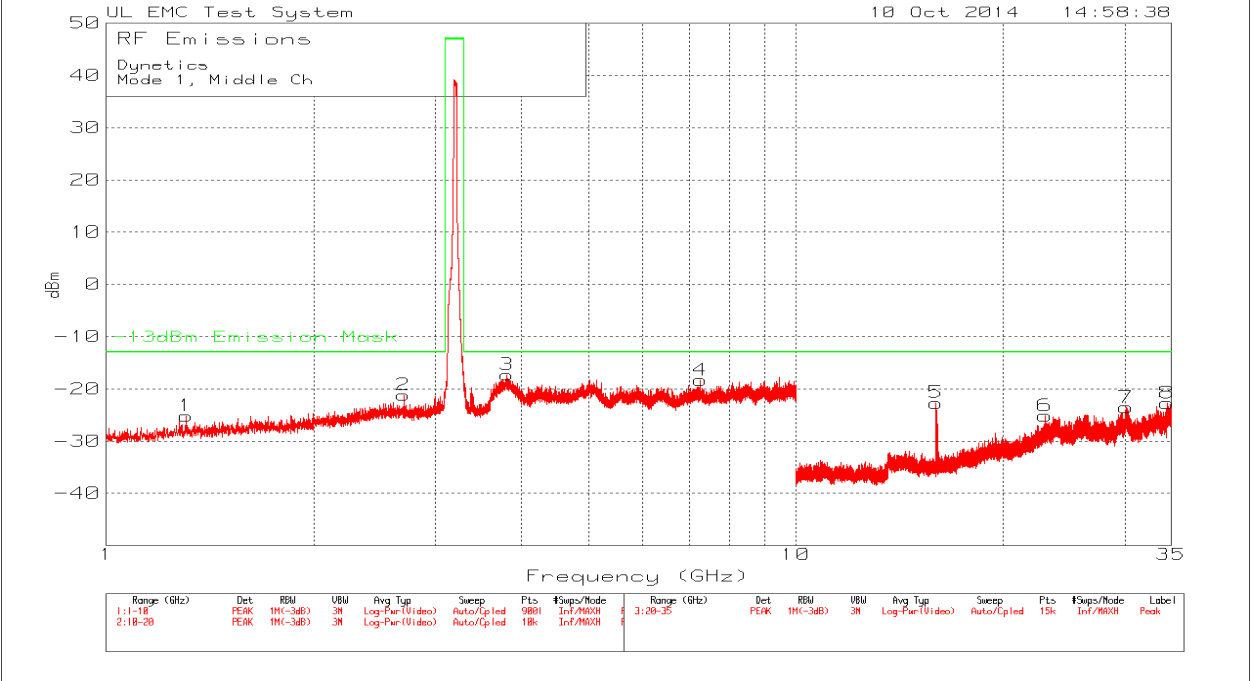
Mode 1, Middle Channel, Below 1GHz, Graph



Mode 1, Middle Channel, Below 1GHz, Tabular Data

	Dynetics						
	Mode 1, Middle Ch						
	Trace Markers						
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.010551	-86.28	PK	28.7	-57.58	-13	-44.58
2	0.17985	-87.42	PK	28.8	-58.62	-13	-45.62
3	1.344	-89.3	PK	28.9	-60.4	-13	-47.4
4	649.83	-81.35	PK	29.9	-51.45	-13	-38.45
5	847.71	-81.6	PK	30	-51.6	-13	-38.6
	PK - Peak detector						

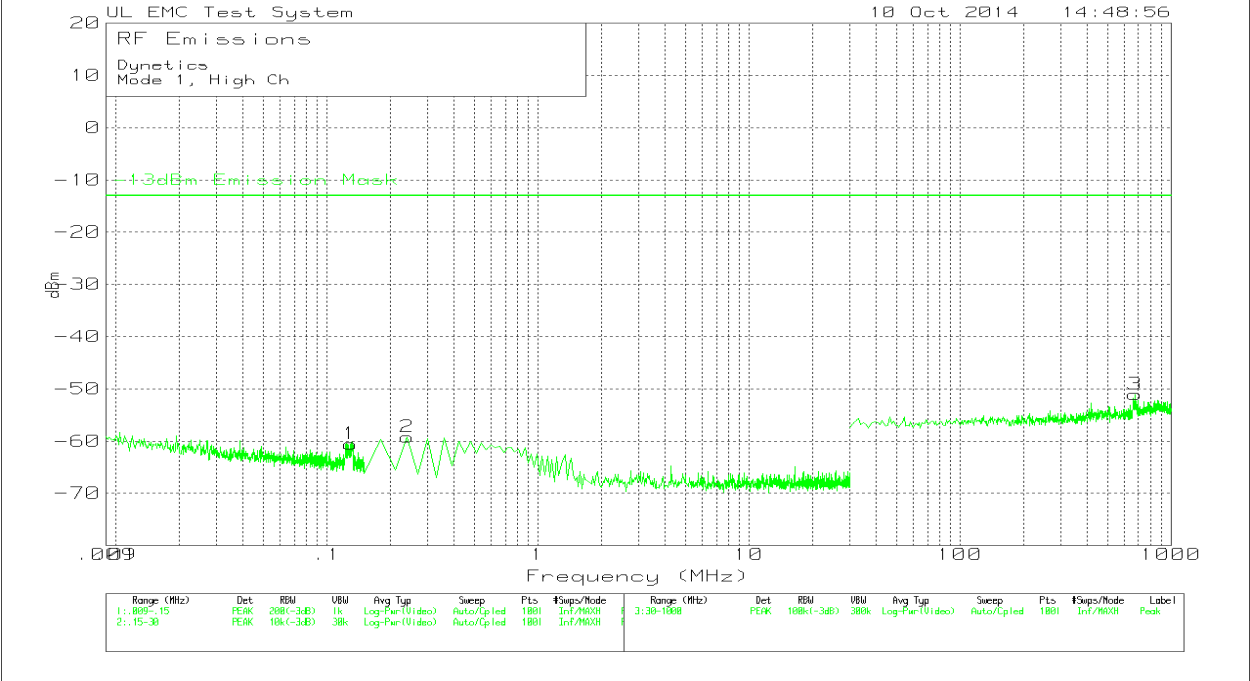
Mode 1, Middle Channel, Above 1GHz, Graph



Mode 1, Middle Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 1, Middle Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	1.305	-55.6	PK	30.4	-25.2	-13	-12.2
2	2.698	-52.2	PK	31	-21.2	-13	-8.2
3	3.81	-48.7	PK	31.4	-17.3	-13	-4.3
4	7.272	-50.73	PK	32.4	-18.33	-13	-5.33
5	15.973	-57.4	PK	34.7	-22.7	-13	-9.7
6	22.987	-63.21	PK	38.1	-25.11	-13	-12.11
7	30.131	-62.05	PK	38.5	-23.55	-13	-10.55
8	34.537	-60.61	PK	37.9	-22.71	-13	-9.71
PK - Peak detector							

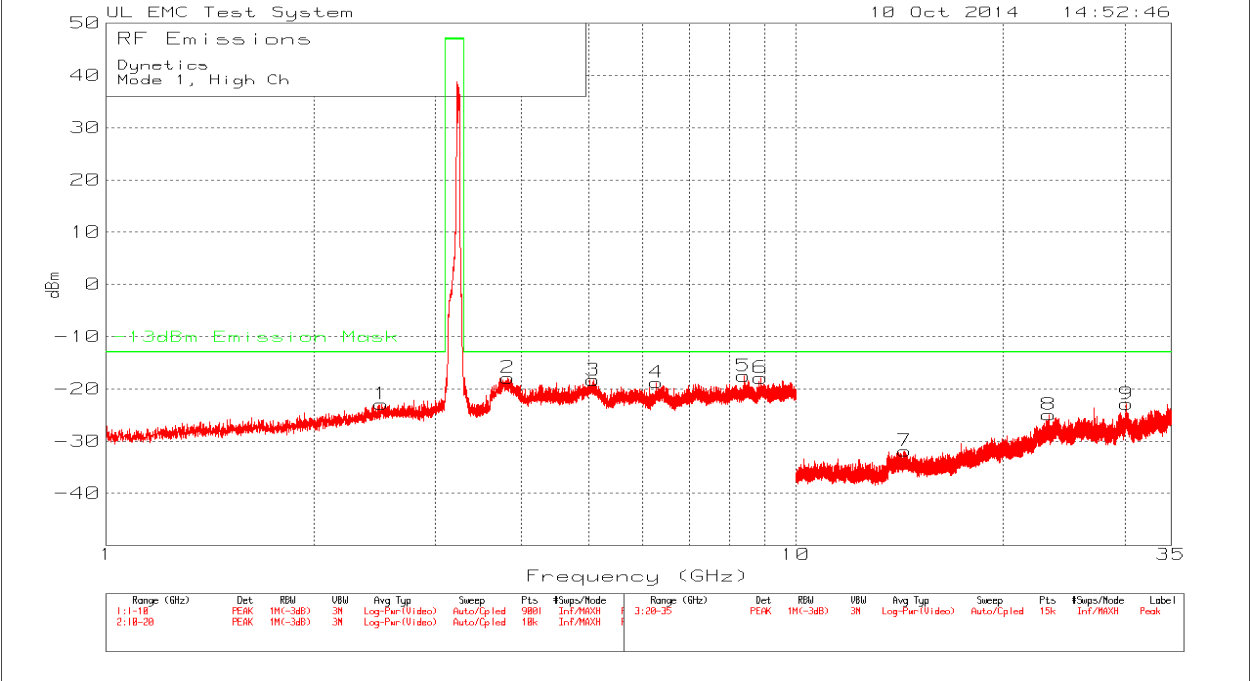
Mode 1, High Channel, Below 1GHz, Graph



Mode 1, High Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 1, High Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.129132	-89.37	PK	28.8	-60.57	-13	-47.57
2	0.23955	-88	PK	28.8	-59.2	-13	-46.2
3	673.11	-80.94	PK	29.9	-51.04	-13	-38.04
PK - Peak detector							

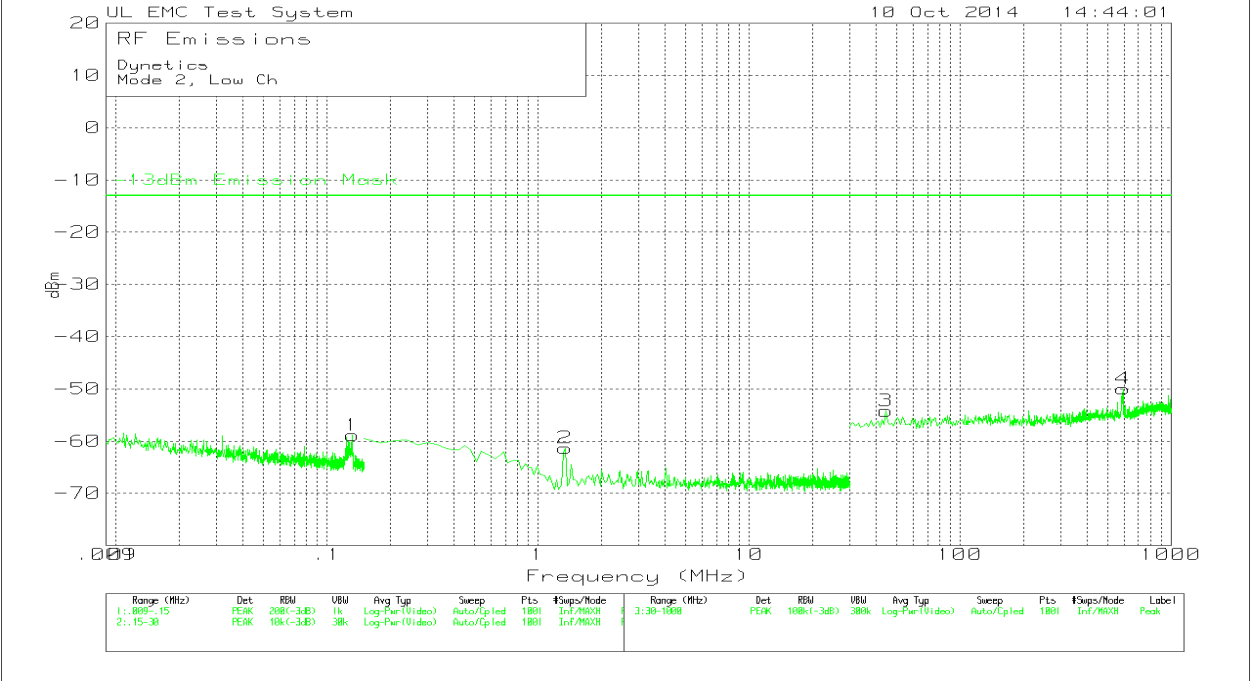
Mode 1, High Channel, Above 1GHz, Graph



Mode 1, High Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 1, High Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	2.506	-53.92	PK	31	-22.92	-13	-9.92
2	3.824	-49.28	PK	31.4	-17.88	-13	-4.88
3	5.083	-50.1	PK	31.8	-18.3	-13	-5.3
4	6.28	-50.88	PK	32.1	-18.78	-13	-5.78
5	8.402	-50.2	PK	32.7	-17.5	-13	-4.5
6	8.891	-50.79	PK	32.9	-17.89	-13	-4.89
7	14.382	-66.27	PK	34.4	-31.87	-13	-18.87
8	23.28	-63.26	PK	38.3	-24.96	-13	-11.96
9	30.17	-61.27	PK	38.4	-22.87	-13	-9.87
PK - Peak detector							

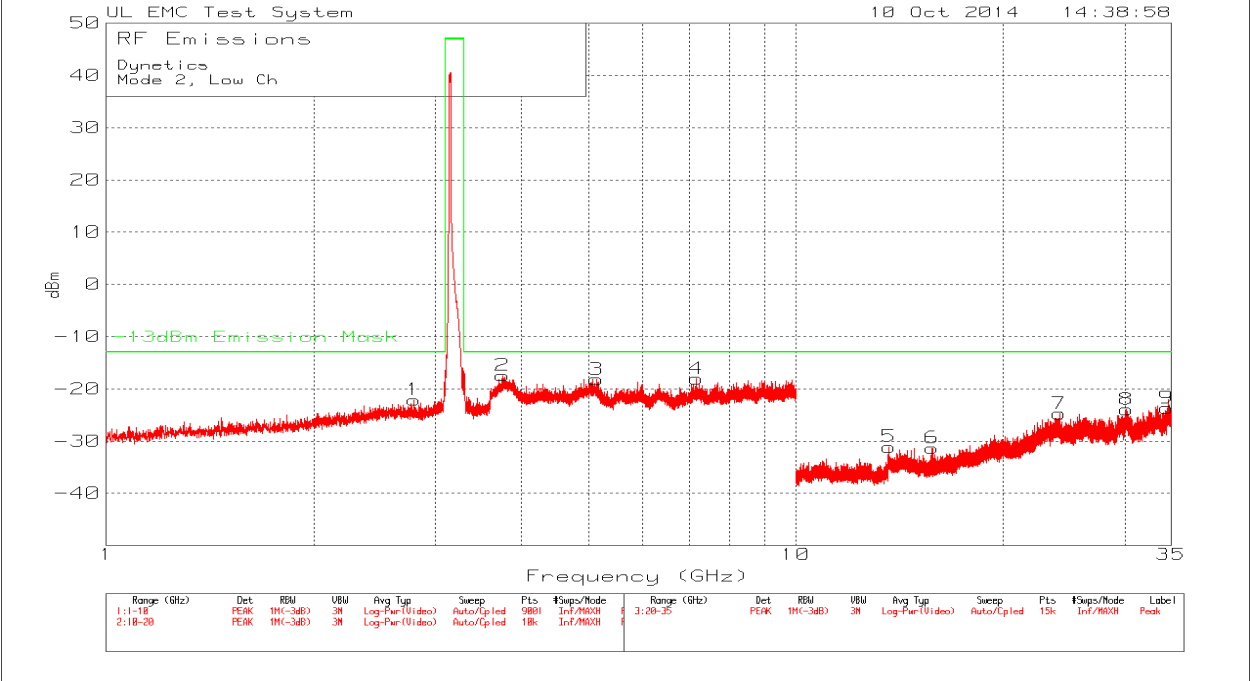
Mode 2, Low Channel, Below 1GHz, Graph



Mode 2, Low Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 2, Low Ch							
Trace Markers							
Marker	Test	Meter		Path	Level	-13dBm	
No.	Frequency (MHz)	Reading (dBm)	Detector	Factor dB	dBm	Limit	Margin (dB)
1	0.132093	-87.67	PK	28.8	-58.87	-13	-45.87
2	1.344	-90.24	PK	28.9	-61.34	-13	-48.34
3	44.55	-83.41	PK	29.2	-54.21	-13	-41.21
4	593.57	-79.8	PK	29.8	-50	-13	-37
PK - Peak detector							

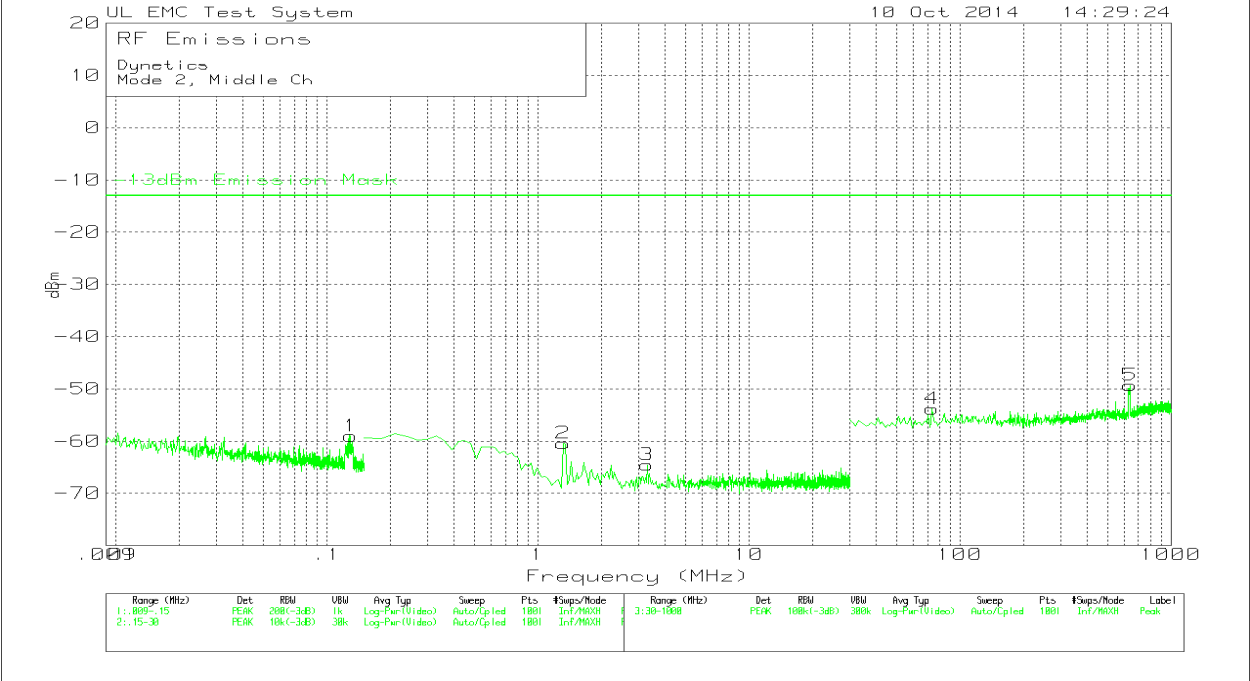
Mode 2, Low Channel, Below 1GHz, Graph



Mode 2, Low Channel, Below 1GHz, Tabular Data

	Dynetics							
	Mode 2, Low Ch							
	Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)	
1	2.793	-53.1	PK	31	-22.1	-13	-9.1	
2	3.753	-48.84	PK	31.4	-17.44	-13	-4.44	
3	5.137	-49.98	PK	31.8	-18.18	-13	-5.18	
4	7.18	-50.45	PK	32.4	-18.05	-13	-5.05	
5	13.654	-65.22	PK	34.1	-31.12	-13	-18.12	
6	15.766	-66.02	PK	34.7	-31.32	-13	-18.32	
7	24.11	-62.02	PK	37.3	-24.72	-13	-11.72	
8	30.165	-62.44	PK	38.5	-23.94	-13	-10.94	
9	34.525	-61.54	PK	37.9	-23.64	-13	-10.64	
PK - Peak detector								

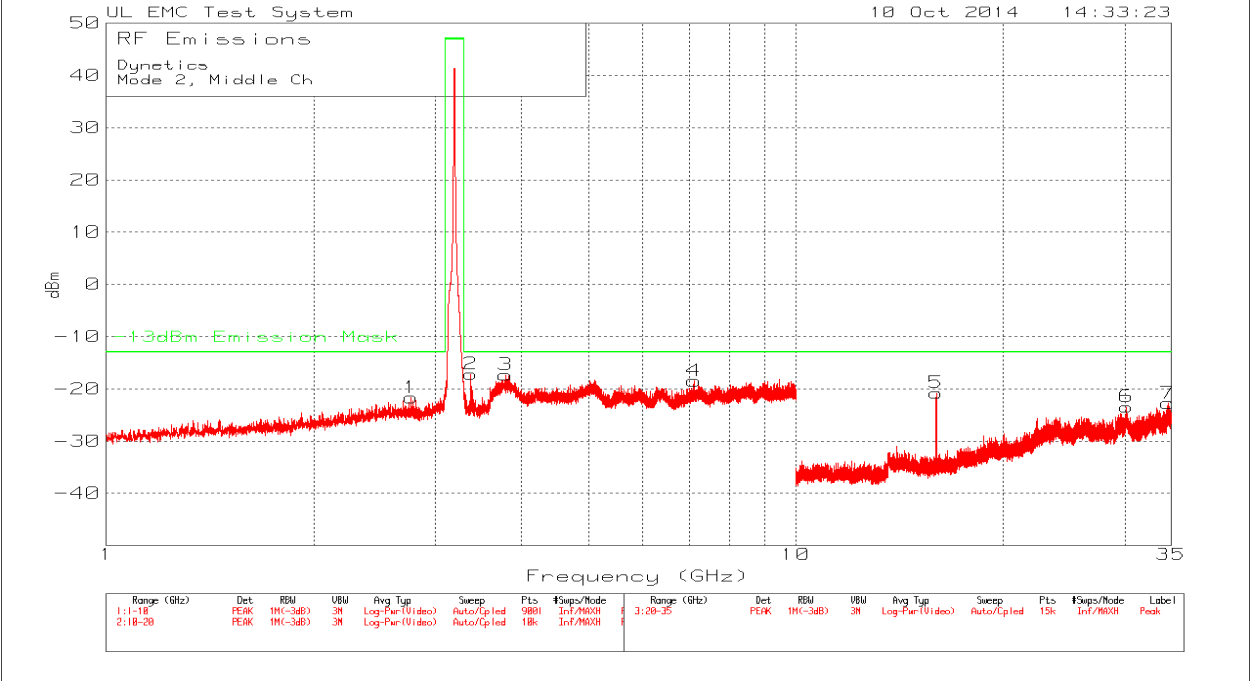
Mode 2, Middle Channel, Below 1GHz, Graph



Mode 2, Middle Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 2, Middle Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.129414	-87.83	PK	28.8	-59.03	-13	-46.03
2	1.31415	-89.33	PK	28.9	-60.43	-13	-47.43
3	3.28425	-93.55	PK	29	-64.55	-13	-51.55
4	73.65	-83.02	PK	29.2	-53.82	-13	-40.82
5	638.19	-79.2	PK	29.9	-49.3	-13	-36.3
PK - Peak detector							

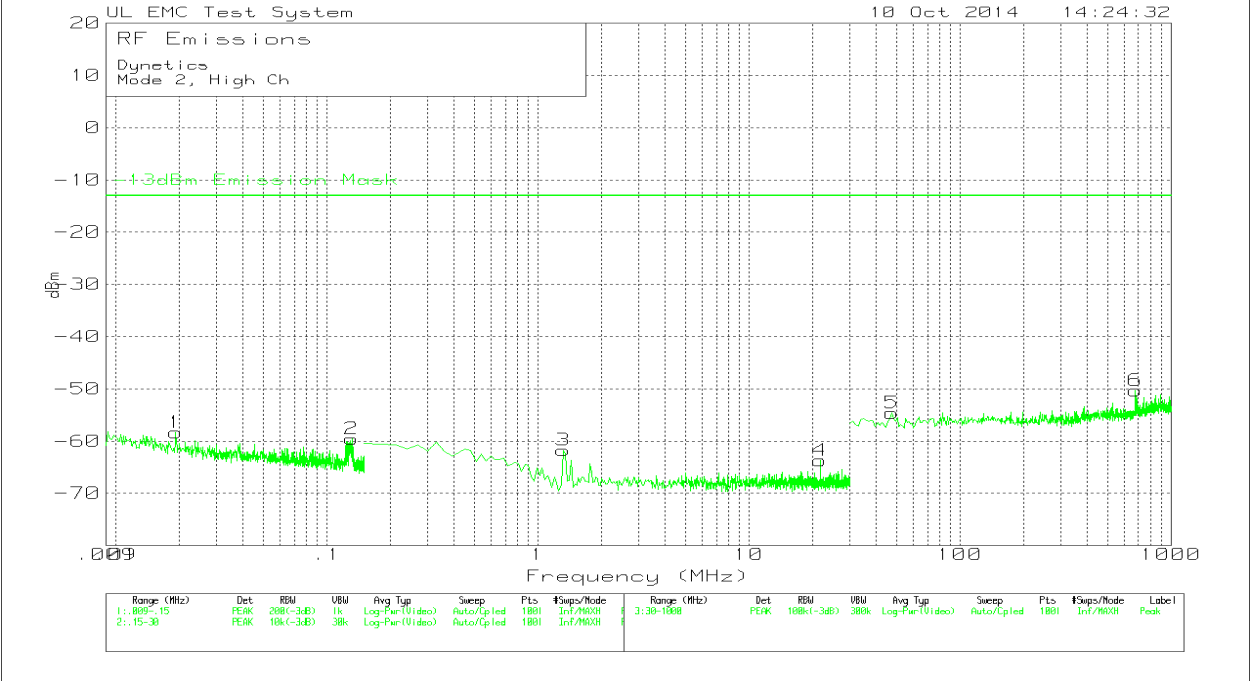
Mode 2, Middle Channel, Above 1GHz, Graph



Mode 2, Middle Channel, Above 1GHz, Tabular Data

	Dynetics						
	Mode 2, Middle Ch						
	Trace Markers						
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	2.766	-52.67	PK	31	-21.67	-13	-8.67
2	3.378	-48.45	PK	31.3	-17.15	-13	-4.15
3	3.791	-48.74	PK	31.4	-17.34	-13	-4.34
4	7.121	-50.83	PK	32.4	-18.43	-13	-5.43
5	15.981	-55.5	PK	34.7	-20.8	-13	-7.8
6	30.156	-62.04	PK	38.6	-23.44	-13	-10.44
7	34.64	-60.74	PK	38	-22.74	-13	-9.74
	PK - Peak detector						

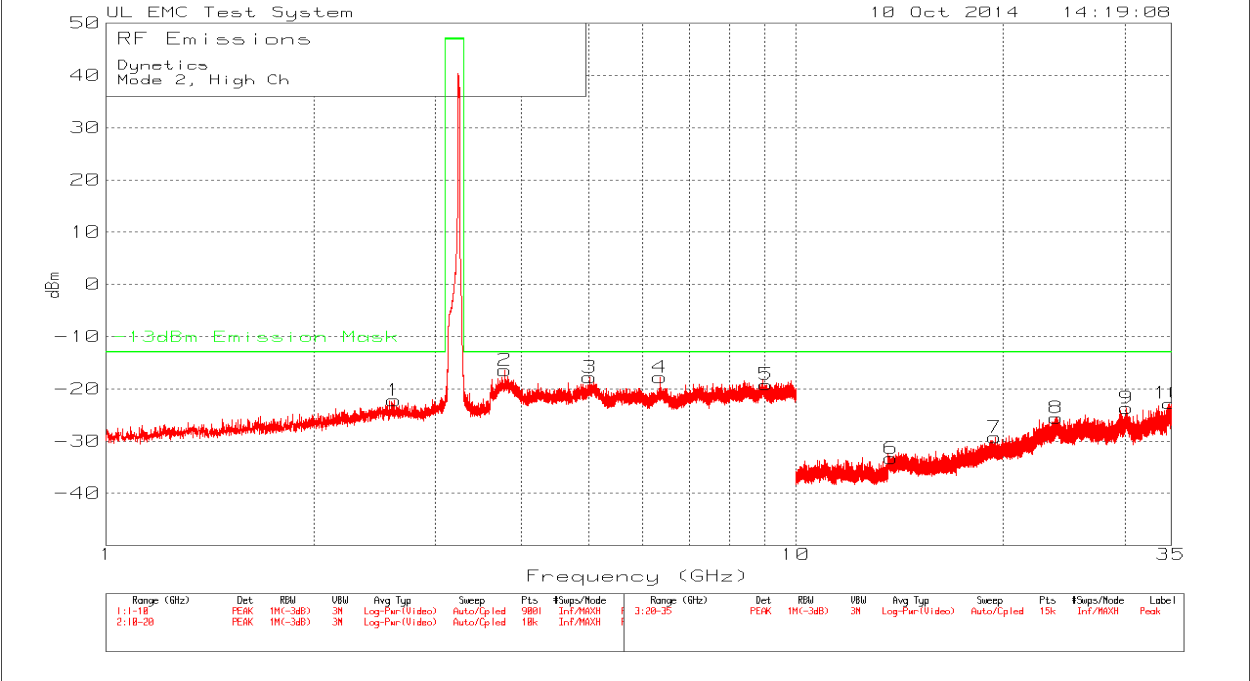
Mode 2, High Channel, Below 1GHz, Graph



Mode 2, High Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 2, High Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.019152	-87.06	PK	28.7	-58.36	-13	-45.36
2	0.131106	-88.38	PK	28.8	-59.58	-13	-46.58
3	1.31415	-90.64	PK	28.9	-61.74	-13	-48.74
4	21.7017	-92.8	PK	29.1	-63.7	-13	-50.7
5	47.46	-83.79	PK	29.2	-54.59	-13	-41.59
6	676.99	-80.22	PK	29.9	-50.32	-13	-37.32
PK - Peak detector							

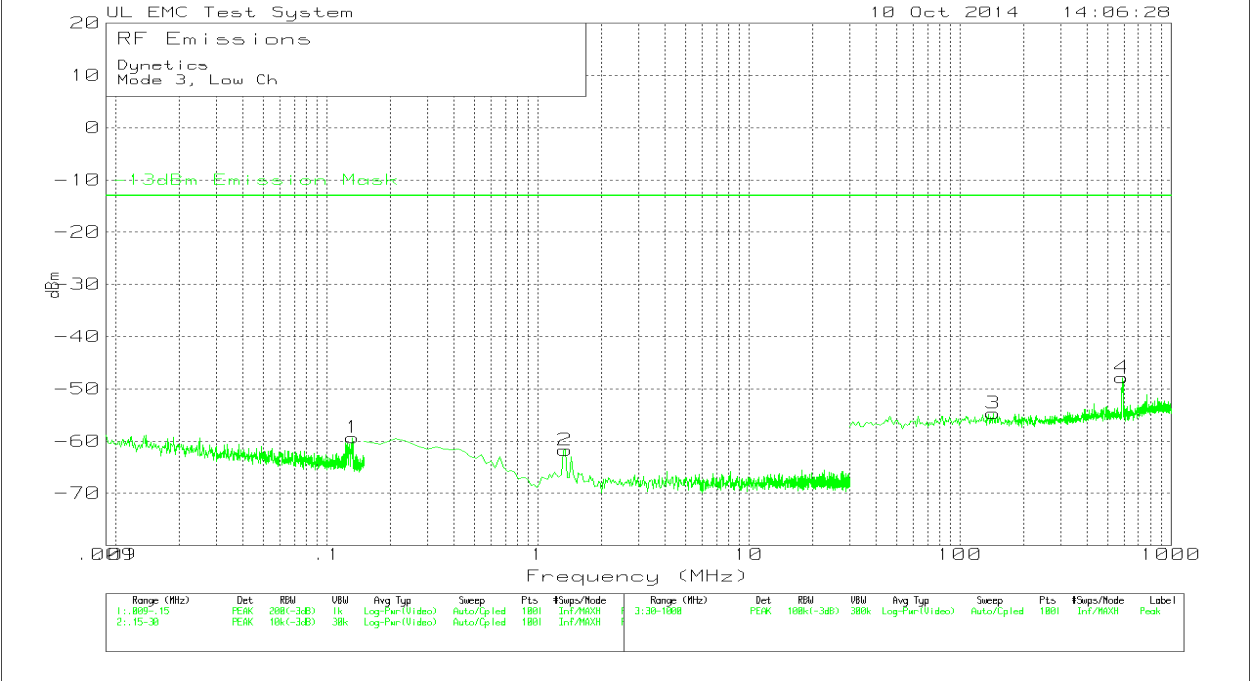
Mode 2, High Channel, Above 1GHz, Graph



Mode 2, High Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 2, High Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	2.615	-53.2	PK	31	-22.2	-13	-9.2
2	3.782	-47.83	PK	31.4	-16.43	-13	-3.43
3	5.021	-49.56	PK	31.8	-17.76	-13	-4.76
4	6.348	-49.89	PK	32.1	-17.79	-13	-4.79
5	9.053	-52.06	PK	32.9	-19.16	-13	-6.16
6	13.749	-67.5	PK	34.2	-33.3	-13	-20.3
7	19.439	-65.09	PK	35.8	-29.29	-13	-16.29
8	23.839	-62.97	PK	37.4	-25.57	-13	-12.57
9	30.174	-62.07	PK	38.4	-23.67	-13	-10.67
10	34.809	-61.02	PK	38.2	-22.82	-13	-9.82
PK - Peak detector							

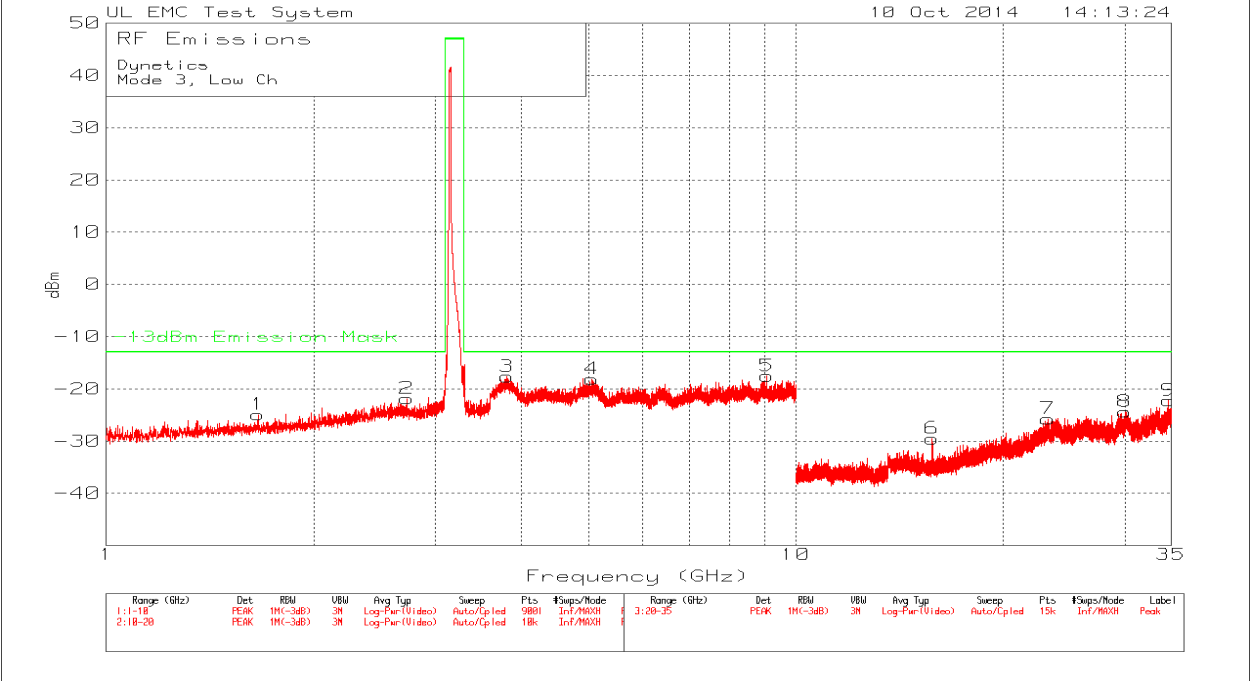
Mode 3, Low Channel, Below 1GHz, Graph



Mode 3, Low Channel, Below 1GHz, Tabular Data

Dynamics							
Mode 3, Low Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.132234	-88.13	PK	28.8	-59.33	-13	-46.33
2	1.344	-90.61	PK	28.9	-61.71	-13	-48.71
3	143.49	-84.05	PK	29.4	-54.65	-13	-41.65
4	585.81	-77.66	PK	29.8	-47.86	-13	-34.86
PK - Peak detector							

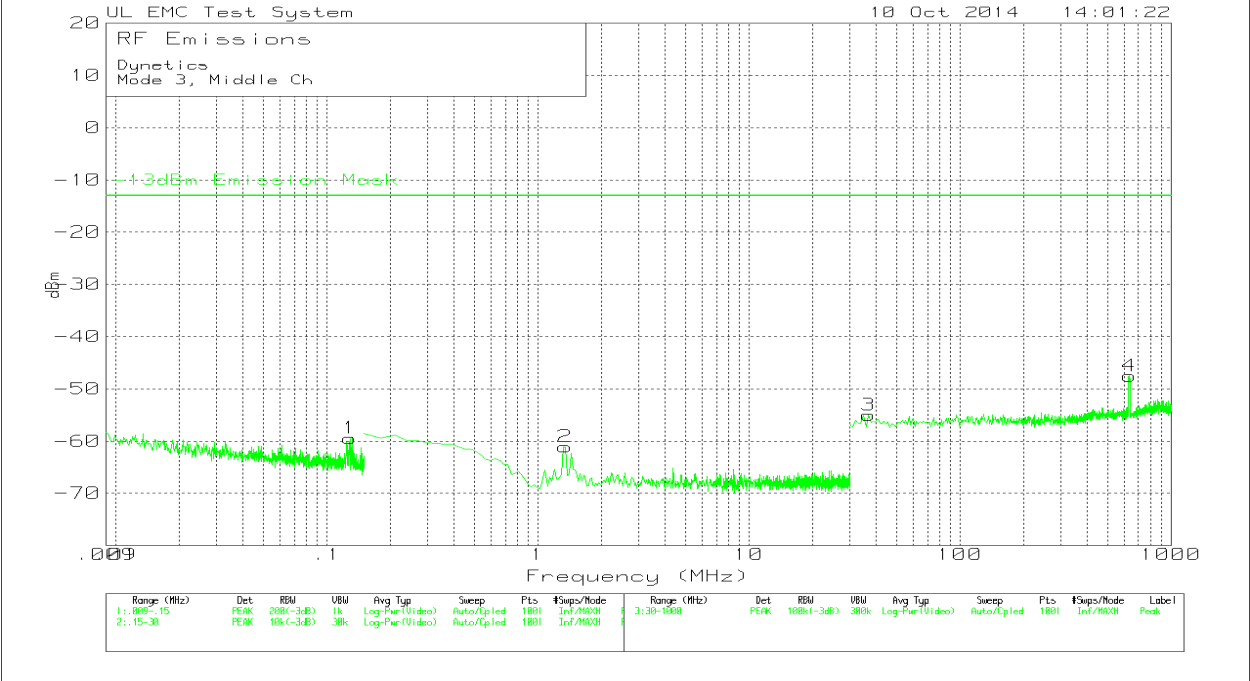
Mode 3, Low Channel, Above 1GHz, Graph



Mode 3, Low Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 3, Low Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	1.659	-55.52	PK	30.6	-24.9	-13	-11.92
2	2.728	-52.84	PK	31	-21.8	-13	-8.84
3	3.809	-49.06	PK	31.4	-17.7	-13	-4.66
4	5.057	-49.94	PK	31.8	-18.1	-13	-5.14
5	9.074	-50.42	PK	32.9	-17.5	-13	-4.52
6	15.765	-64.22	PK	34.7	-29.5	-13	-16.52
7	23.196	-64.06	PK	38.3	-25.8	-13	-12.76
8	30	-62.37	PK	38	-24.4	-13	-11.37
9	34.701	-60.12	PK	37.9	-22.2	-13	-9.22
PK - Peak detector							

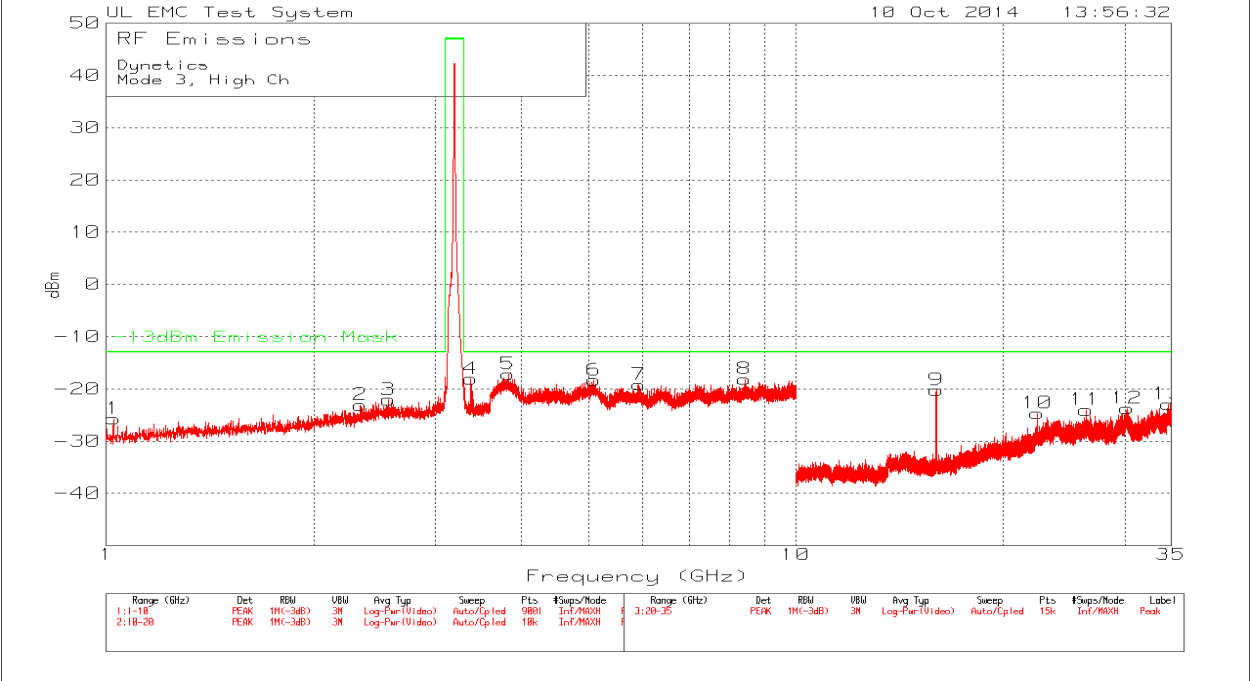
Mode 3, Middle Channel, Below 1GHz, Graph



Mode 3, Middle Channel, Below 1GHz, Tabular Data

Dynetics							
Mode 3, Middle Ch							
Trace Markers							
Marker No.	Test Frequency (MHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	0.128286	-88.29	PK	28.8	-59.49	-13	-46.49
2	1.344	-89.98	PK	28.9	-61.08	-13	-48.08
3	36.79	-84.13	PK	29.1	-55.03	-13	-42.03
4	635.28	-77.31	PK	29.8	-47.51	-13	-34.51
PK - Peak detector							

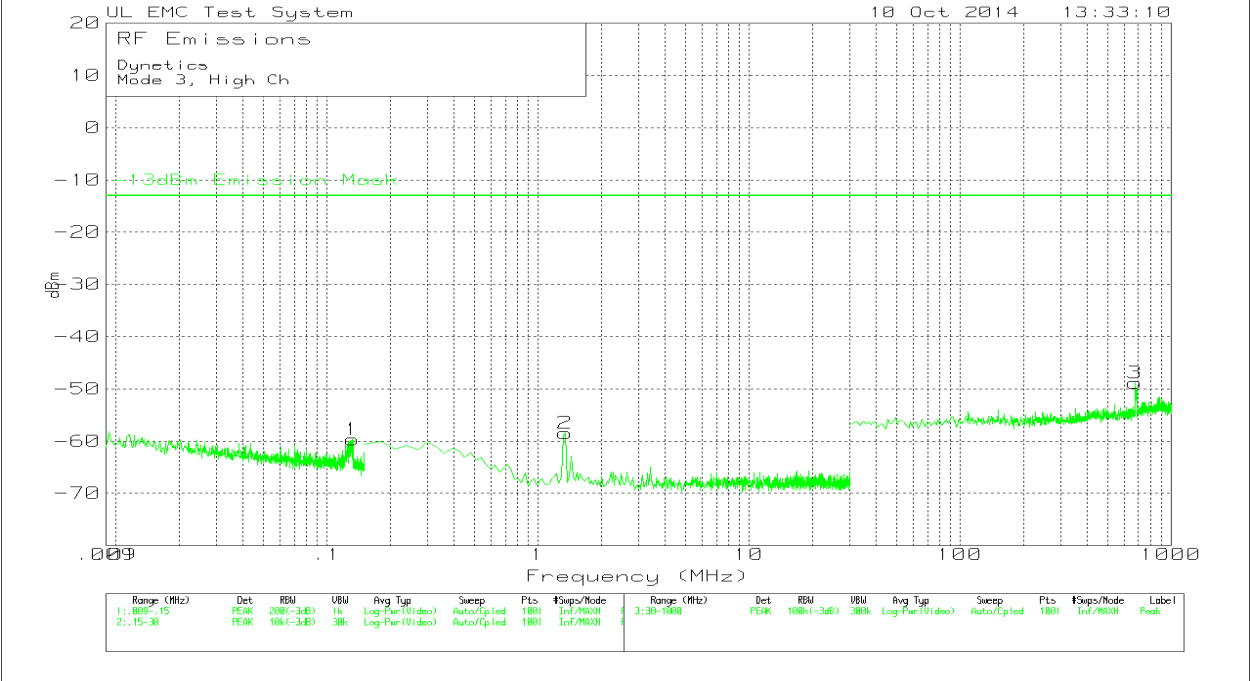
Mode 3, Middle Channel, Above 1GHz, Graph



Mode 3, Middle Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 3, High Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	1.024	-55.91	PK	30.2	-25.71	-13	-12.71
2	2.334	-53.99	PK	30.9	-23.09	-13	-10.09
3	2.565	-52.97	PK	30.9	-22.07	-13	-9.07
4	3.376	-49.35	PK	31.3	-18.05	-13	-5.05
5	3.826	-48.59	PK	31.4	-17.19	-13	-4.19
6	5.094	-50.1	PK	31.8	-18.3	-13	-5.3
7	5.919	-51.17	PK	32	-19.17	-13	-6.17
8	8.426	-50.83	PK	32.7	-18.13	-13	-5.13
9	15.993	-54.91	PK	34.7	-20.21	-13	-7.21
10	22.395	-61.85	PK	37.2	-24.65	-13	-11.65
11	26.339	-61.04	PK	37	-24.04	-13	-11.04
12	30.222	-62	PK	38.3	-23.7	-13	-10.7
13	34.665	-61.3	PK	38.4	-22.9	-13	-9.9
PK - Peak detector							

Mode 3, High Channel, Below 1GHz, Graph



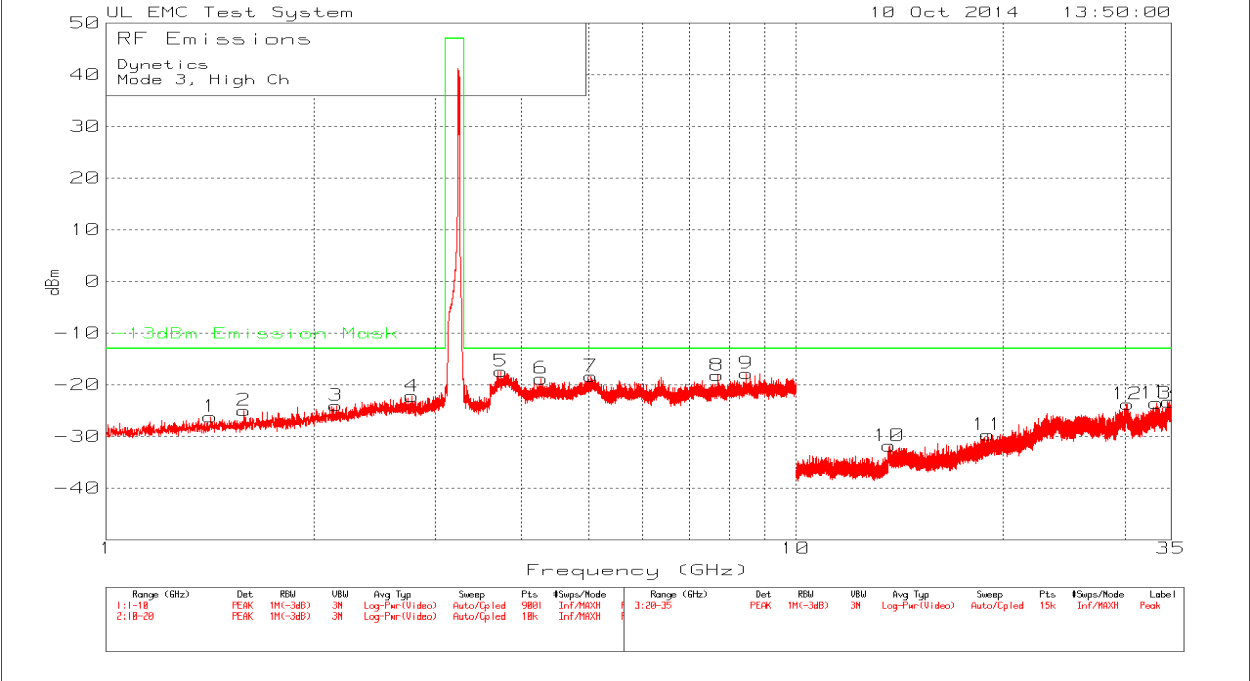
Mode 3, High Channel, Below 1GHz, Tabular Data

Dynetics
Mode 3, High Ch

Trace Markers										
No.	Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5
Frequency		Reading	Factor	Factor	Reading					
(MHz)			(dB)	(dB)						
=====1 .13209										
-88.49dBm PK		28.8	0	-59.69	-13	-	-	-	-	-
					Margin (dB)	-46.69	-	-	-	-
2 1.344		-87.36dBm PK	28.9	0	-58.46	-13	-	-	-	-
					Margin (dB)	-45.46	-	-	-	-
3 673.11		-78.77dBm PK	29.9	0	-48.87	-13	-	-	-	-
					Margin (dB)	-35.87	-	-	-	-

LIMIT 1: -13dBm Emission Mask
PK - Peak detector

Mode 3, High Channel, Above 1GHz, Graph

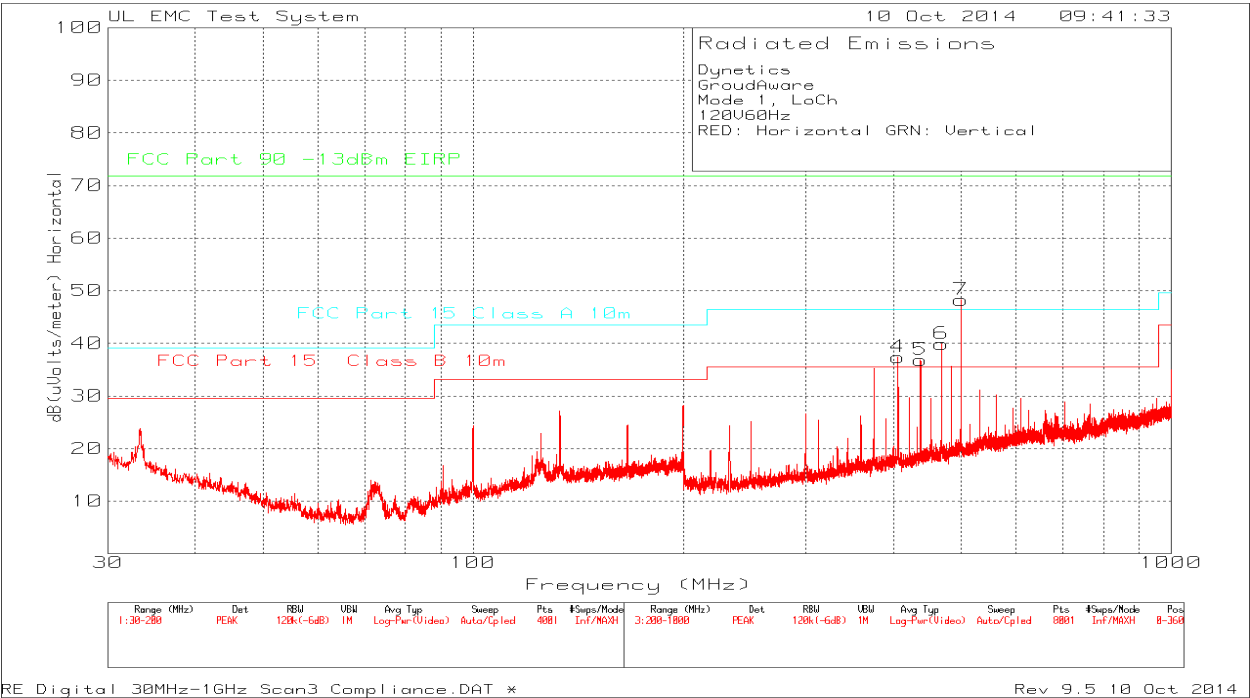
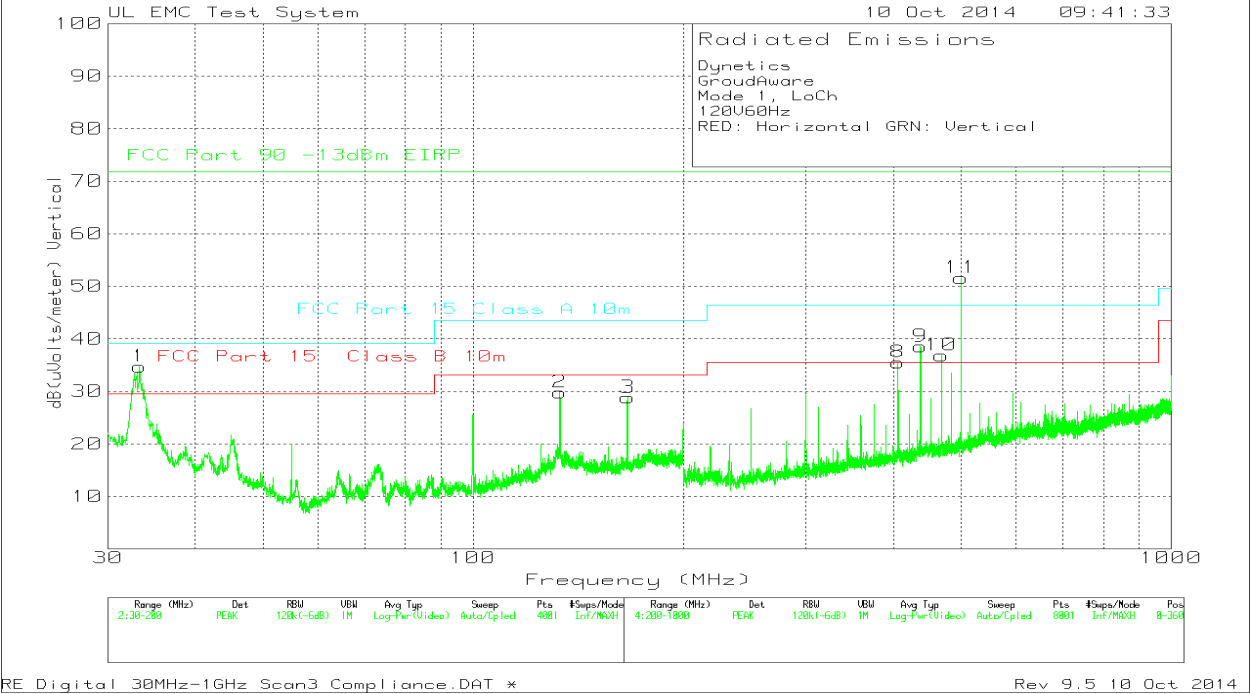


Mode 3, High Channel, Above 1GHz, Tabular Data

Dynetics							
Mode 3, High Ch							
Trace Markers							
Marker No.	Test Frequency (GHz)	Meter Reading (dBm)	Detector	Path Factor dB	Level dBm	-13dBm Limit	Margin (dB)
1	1.415	-56.67	PK	30.5	-26.2	-13	-13.17
2	1.584	-55.59	PK	30.6	-25	-13	-11.99
3	2.154	-54.8	PK	30.8	-24	-13	-11
4	2.774	-53.21	PK	31	-22.2	-13	-9.21
5	3.734	-48.79	PK	31.4	-17.4	-13	-4.39
6	4.271	-50.28	PK	31.5	-18.8	-13	-5.78
7	5.043	-50.14	PK	31.8	-18.3	-13	-5.34
8	7.692	-50.67	PK	32.5	-18.2	-13	-5.17
9	8.475	-50.49	PK	32.7	-17.8	-13	-4.79
10	13.663	-65.87	PK	34.1	-31.8	-13	-18.77
11	18.985	-65.26	PK	35.6	-29.7	-13	-16.66
12	30.254	-62.14	PK	38.4	-23.7	-13	-10.74
13	33.315	-61.15	PK	37.6	-23.6	-13	-10.55
14	34.763	-61.07	PK	37.8	-23.3	-13	-10.27
PK - Peak detector							

8.3.2. Radiated Enclosure Port Out of Band Emissions

Mode 1, Low Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 1, Low Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 1, LoCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

Test No.	Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2	3	4	5	6
=1	33.2725	48.41dBuV Pk	16.4	-30.1	34.71	71.8	-	39.08	29.55	-	
-											
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-37.09	-	-4.37	5.16	-	-
2	133.0625	45.43dBuV Pk	14.1	-29.7	29.83	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.97	-	-13.69	-3.24	-	-
3	166.595	43.02dBuV Pk	15.2	-29.4	28.82	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.98	-	-14.7	-4.25	-	-
4	406.3	46.98dBuV Pk	15.8	-25.4	37.38	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-34.42	-	-9.06	1.81	-	-
5	437.5	45.66dBuV Pk	16.6	-25.4	36.86	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-34.94	-	-9.58	1.29	-	-
6	468.8	48.21dBuV Pk	16.9	-25.2	39.91	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-31.89	-	-6.53	4.34	-	-
7	500.1	55.77dBuV Pk	17.6	-25.1	48.27	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-23.53	-	1.83	12.7	-	-
8	406.3	45.11dBuV Pk	15.8	-25.4	35.51	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-36.29	-	-10.93	-1.06	-	-
9	437.5	47.34dBuV Pk	16.6	-25.4	38.54	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-33.26	-	-7.9	2.97	-	-
10	468.8	45.16dBuV Pk	16.9	-25.2	36.86	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-34.94	-	-9.58	1.29	-	-
11	500.1	59.08dBuV Pk	17.6	-25.1	51.58	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-20.22	-	5.14	16.01	-	-

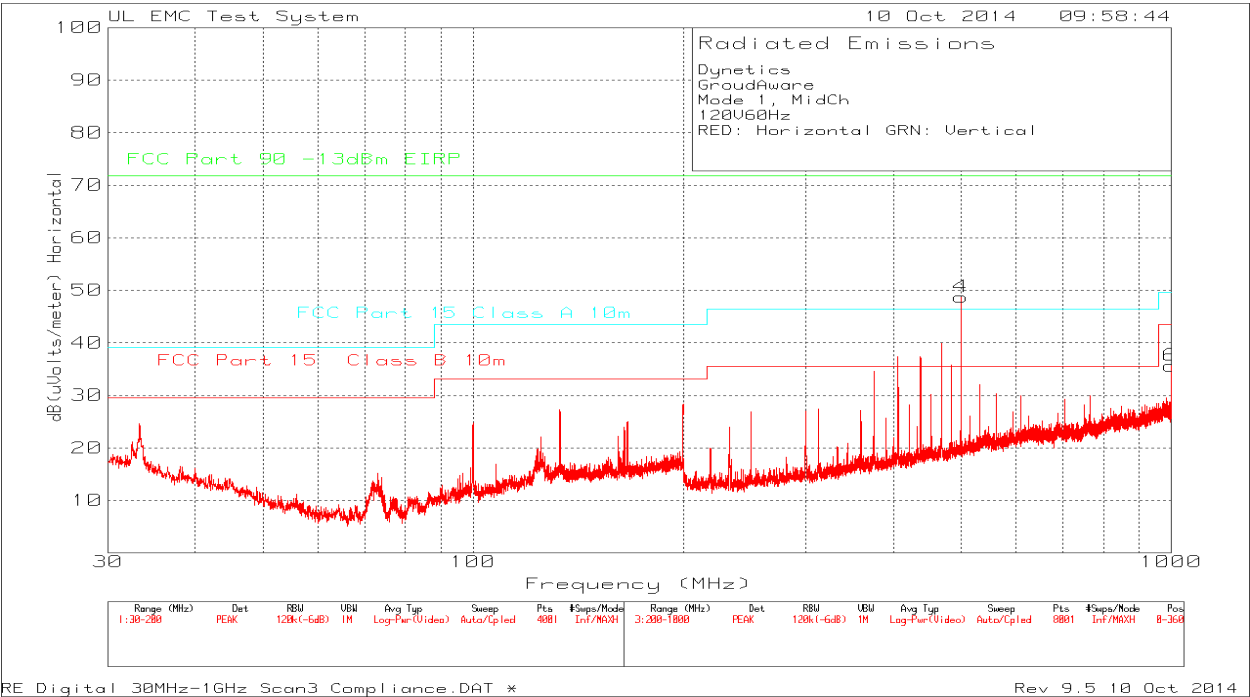
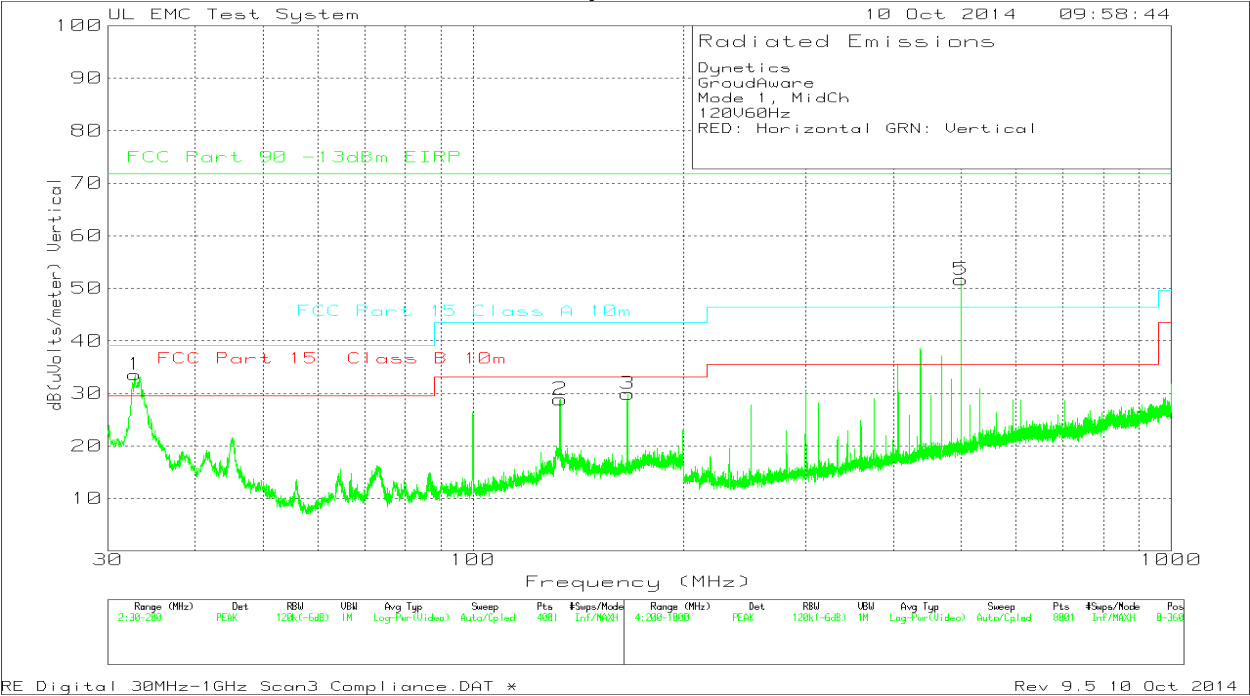
LIMIT 1: FCC Part 90 -13dBm EIRP

LIMIT 3: FCC Part 15 Class A 10m
LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 1, Middle Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 1, Middle Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 1, MidCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

Test No.	Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB (uVolts/meter)	2	3	4	5	6
=1	32.7625	47.08dBuV Pk	16.6	-30.1	33.58	71.8	-	39.08	29.55	-	
-											
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-38.22	-	-5.5	4.03	-	-
2	133.3175	44.34dBuV Pk	14.2	-29.7	28.84	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.96	-	-14.68	-4.23	-	-
3	166.6375	44.13dBuV Pk	15.2	-29.4	29.93	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.87	-	-13.59	-3.14	-	-
4	500.1	56.24dBuV Pk	17.6	-25.1	48.74	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-23.06	-	2.3	13.17	-	-
6	1000	35.23dBuV Pk	23.9	-23.5	35.63	71.8	-	49.54	43.52	-	-
		Azimuth:0-360	Height:99	Horz	Margin (dB)	-36.17	-	-13.91	-7.89	-	-
5	500.1	59.14dBuV Pk	17.6	-25.1	51.64	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-20.16	-	5.2	16.07	-	-

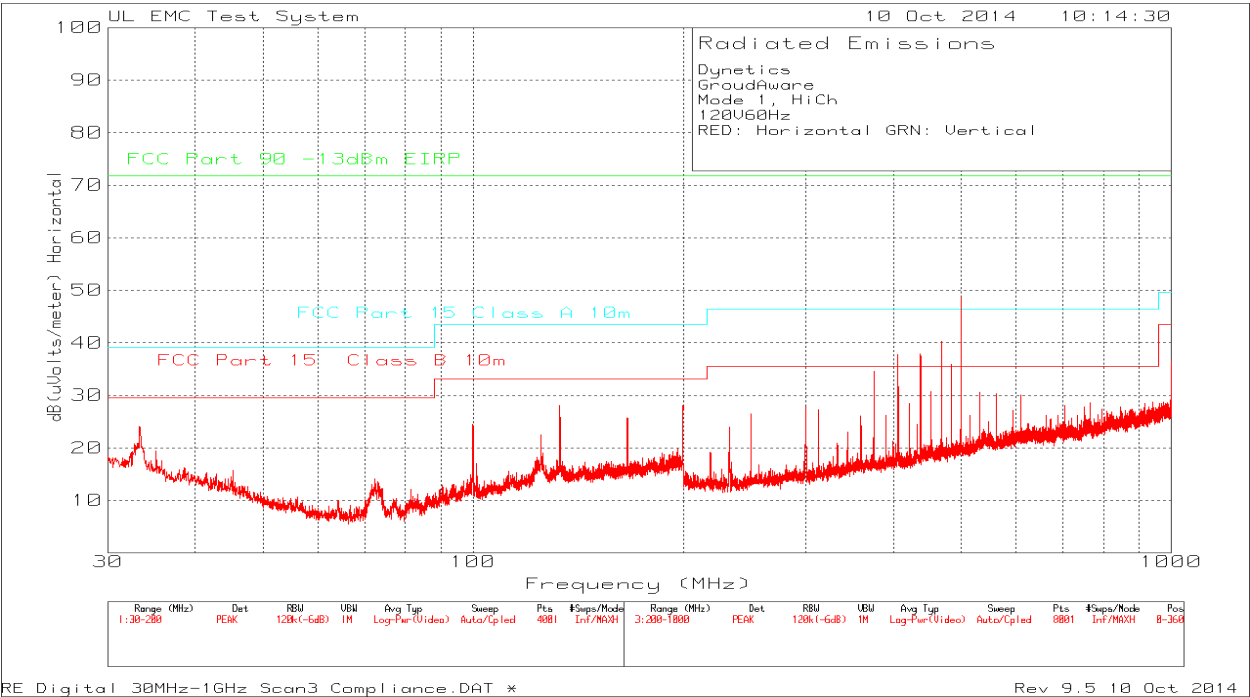
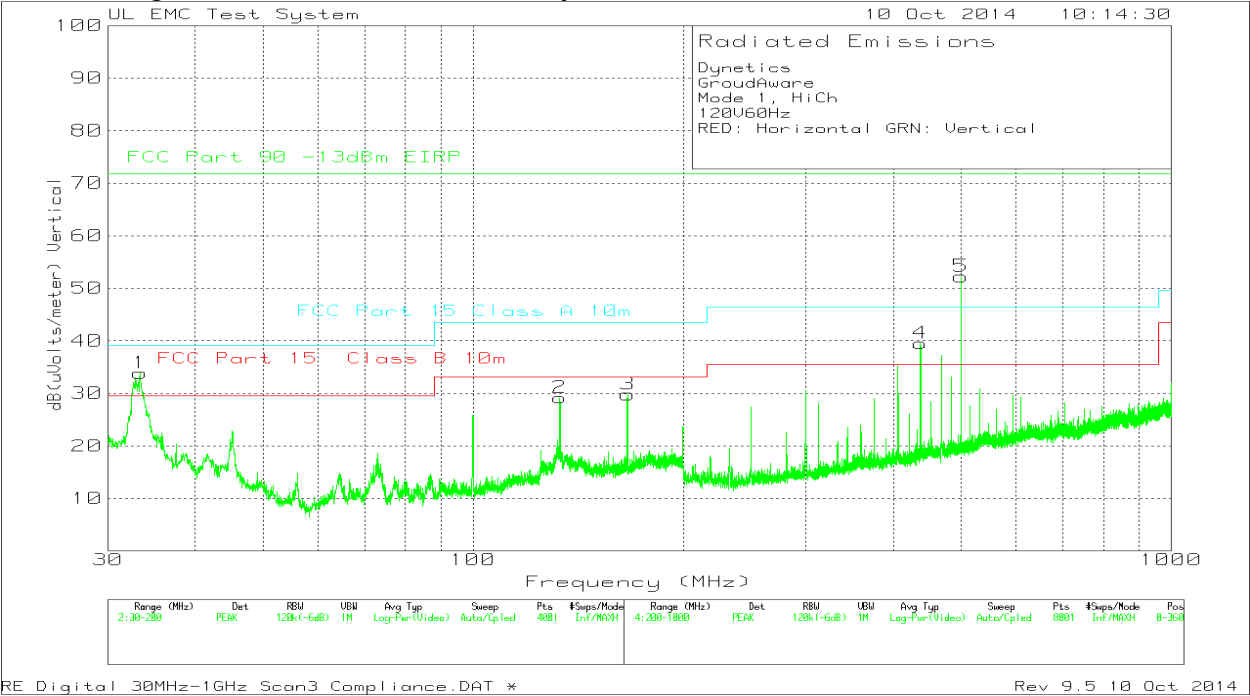
LIMIT 1: FCC Part 90 -13dBm EIRP

LIMIT 3: FCC Part 15 Class A 10m
LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 1, High Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 1, High Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 1, HiCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

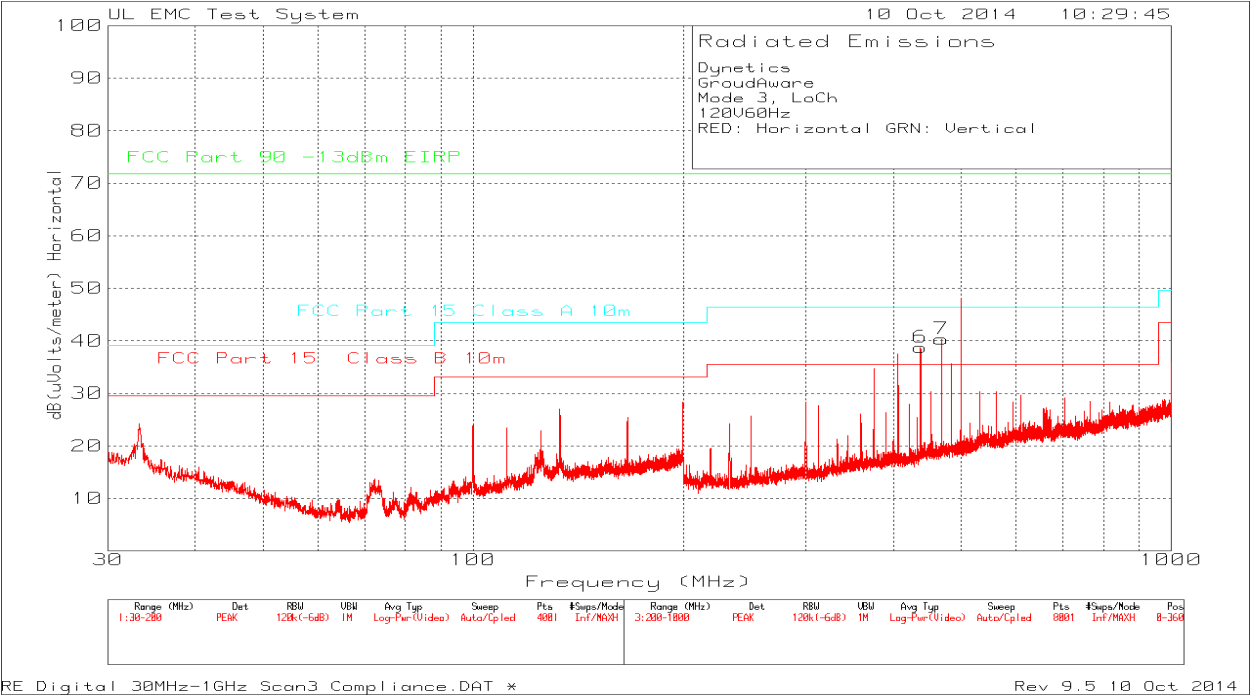
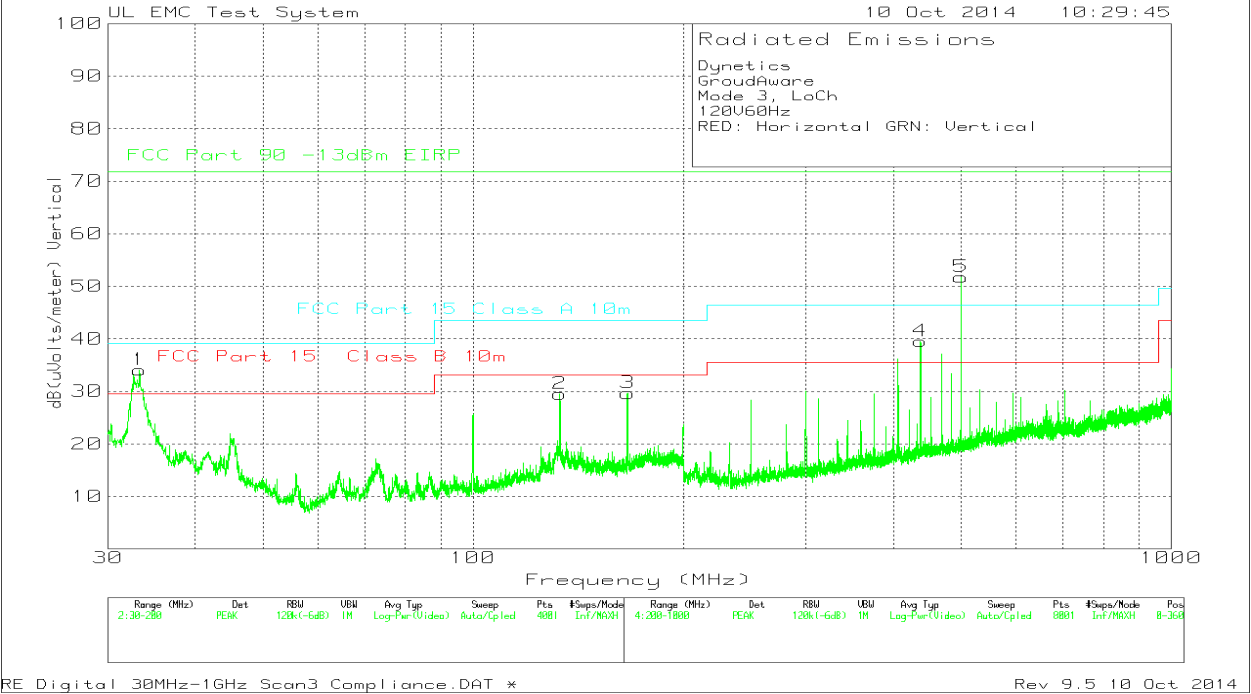
Test No. Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit:1	2	3	4	5	6
=====										
=1 33.315	47.56dBuV Pk	16.4	-30.1	33.86	71.8	-	39.08	29.55	-	
-										
	Azimuth:0-360	Height:249	Vert	Margin (dB)	-37.94	-	-5.22	4.31	-	-
2 133.0625	44.79dBuV Pk	14.1	-29.7	29.19	71.8	-	43.52	33.07	-	-
	Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.61	-	-14.33	-3.88	-	-
3 166.6375	43.99dBuV Pk	15.2	-29.4	29.79	71.8	-	43.52	33.07	-	-
	Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.01	-	-13.73	-3.28	-	-
4 437.5	48.34dBuV Pk	16.6	-25.4	39.54	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:299	Vert	Margin (dB)	-32.26	-	-6.9	3.97	-	-
5 500.1	59.71dBuV Pk	17.6	-25.1	52.21	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:299	Vert	Margin (dB)	-19.59	-	5.77	16.64	-	-

LIMIT 1: FCC Part 90 -13dBm EIRP
LIMIT 3: FCC Part 15 Class A 10m
LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 3, Low Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 3, Low Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 3, LoCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2	3	4	5	6
=====											
=											
1	33.2725	47.79dBuV Pk	16.4	-30.1	34.09	71.8	-	39.08	29.55	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-37.71	-	-4.99	4.54	-	-
2	133.0625	45.15dBuV Pk	14.1	-29.7	29.55	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.25	-	-13.97	-3.52	-	-
3	166.6375	43.89dBuV Pk	15.2	-29.4	29.69	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-42.11	-	-13.83	-3.38	-	-
6	437.5	47.55dBuV Pk	16.6	-25.4	38.75	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-33.05	-	-7.69	3.18	-	-
7	468.8	48.63dBuV Pk	16.9	-25.2	40.33	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-31.47	-	-6.11	4.76	-	-
4	437.5	48.36dBuV Pk	16.6	-25.4	39.56	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-32.24	-	-6.88	3.99	-	-
5	500.1	59.26dBuV Pk	17.6	-25.1	51.76	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-20.04	-	5.32	16.19	-	-

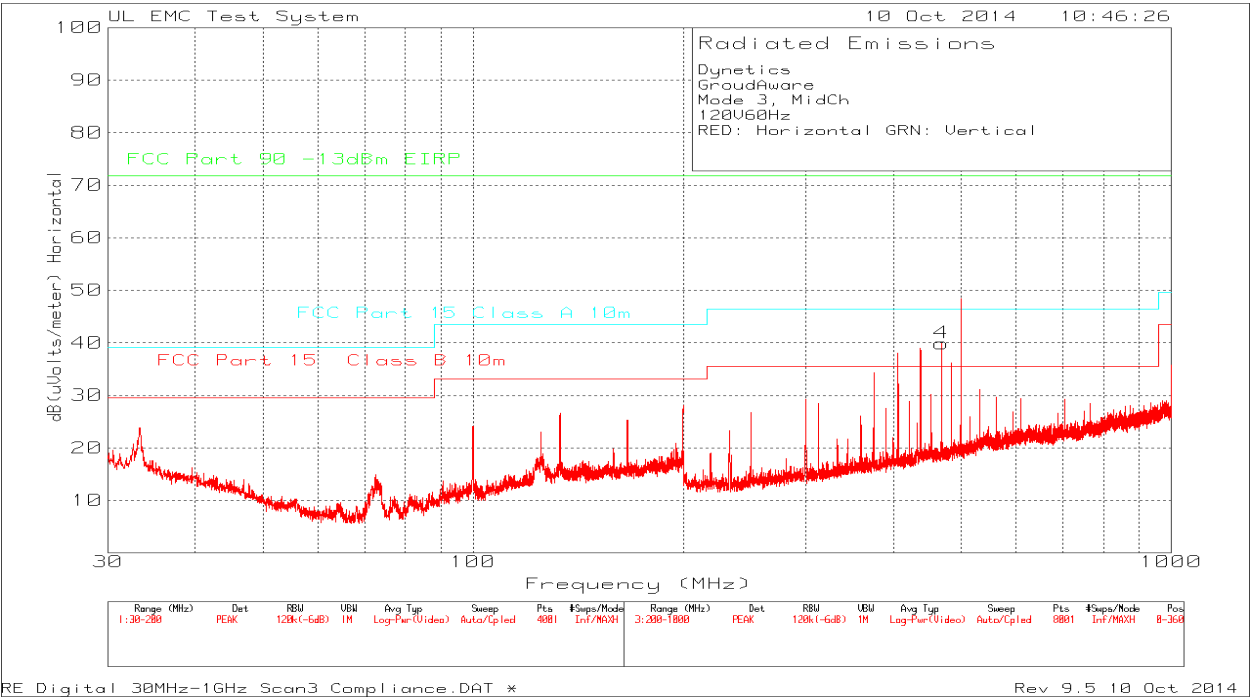
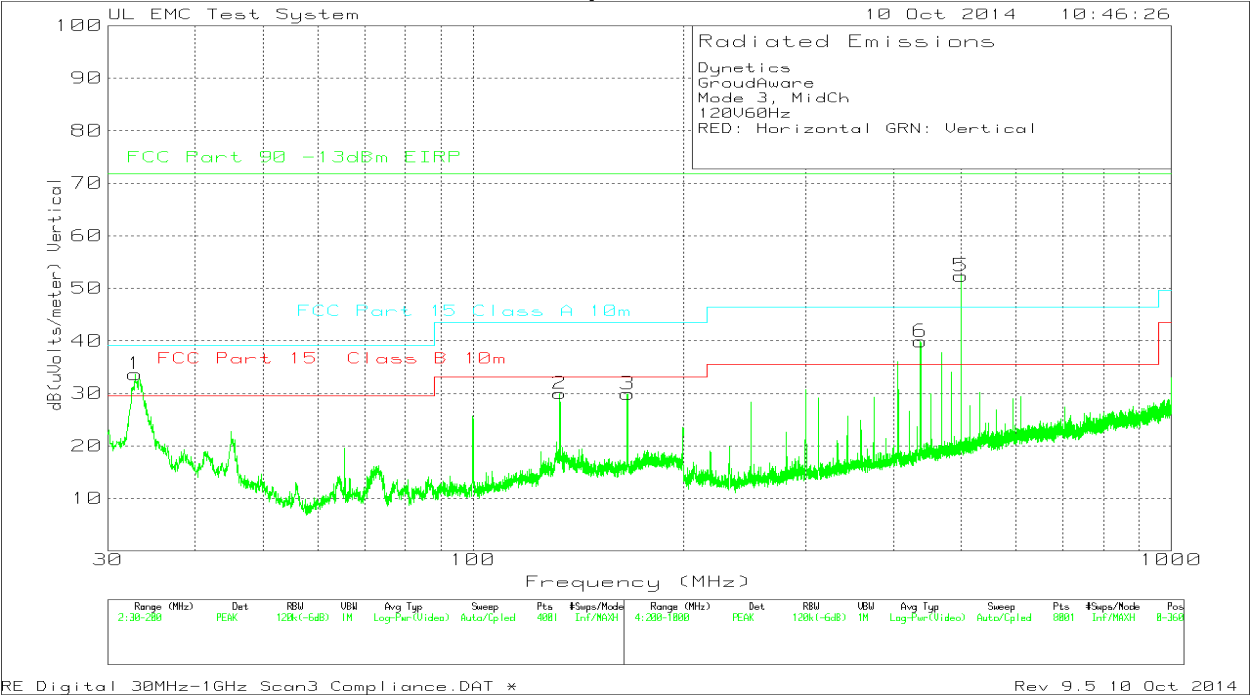
LIMIT 1: FCC Part 90 -13dBm EIRP

LIMIT 3: FCC Part 15 Class A 10m
LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 3, Middle Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 3, Middle Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 3, MidCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB (uVolts/meter)	2	3	4	5	6
=====											
=											
1	32.805	47.14dBuV Pk	16.6	-30.1	33.64	71.8	-	39.08	29.55	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-38.16	-	-5.44	4.09	-	-
2	133.0625	45.59dBuV Pk	14.1	-29.7	29.99	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.81	-	-13.53	-3.08	-	-
3	166.6375	44.1dBuV Pk	15.2	-29.4	29.9	71.8	-	43.52	33.07	-	-
		Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.9	-	-13.62	-3.17	-	-
4	468.8	48.22dBuV Pk	16.9	-25.2	39.92	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:200	Horz	Margin (dB)	-31.88	-	-6.52	4.35	-	-
5	500.1	59.84dBuV Pk	17.6	-25.1	52.34	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-19.46	-	5.9	16.77	-	-
6	437.5	48.67dBuV Pk	16.6	-25.4	39.87	71.8	-	46.44	35.57	-	-
		Azimuth:0-360	Height:299	Vert	Margin (dB)	-31.93	-	-6.57	4.3	-	-

LIMIT 1: FCC Part 90 -13dBm EIRP

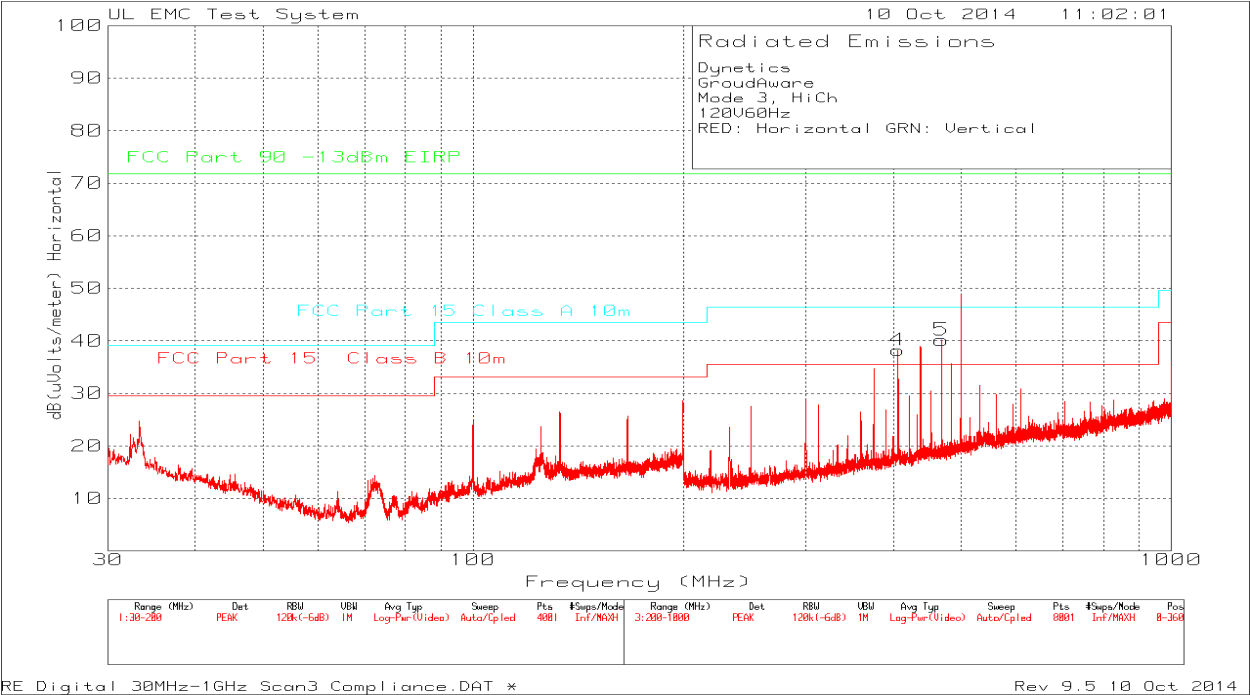
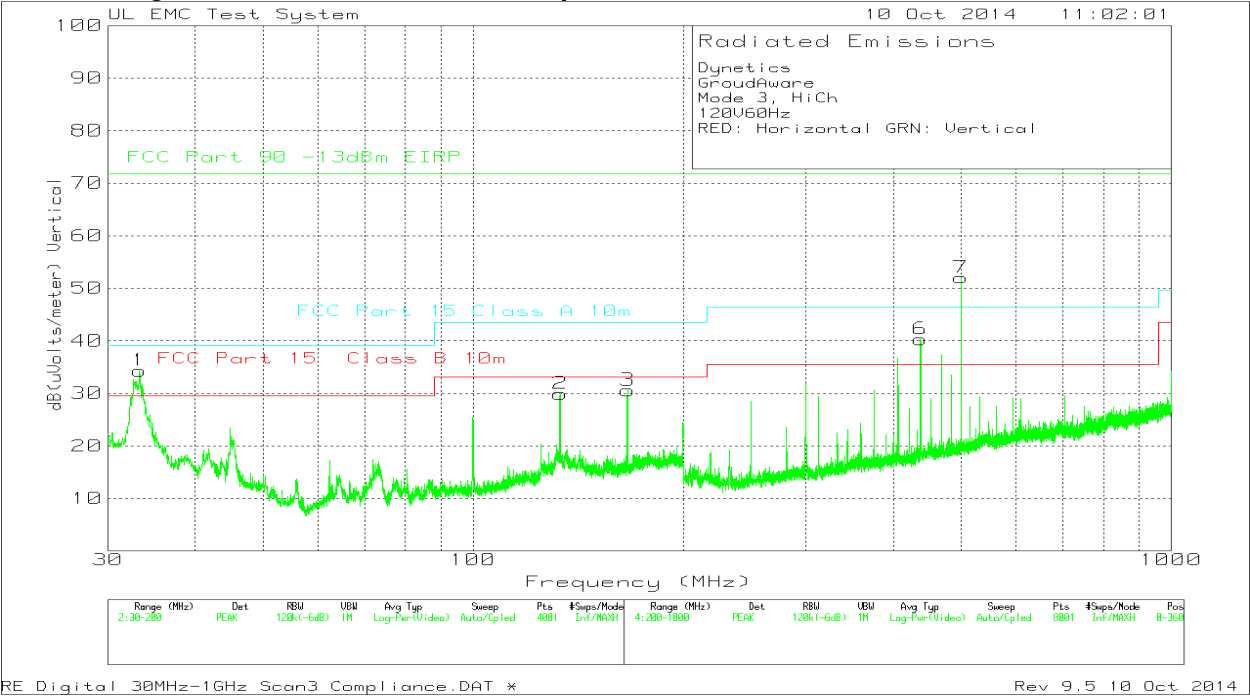
LIMIT 3: FCC Part 15 Class A 10m

LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 3, High Channel, Below 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 3, High Channel, Below 1GHz, Tabular Data

Dynetics
GroudAware
Mode 3, HiCh
120V60Hz
RED: Horizontal GRN: Vertical

Trace Markers

Test No. Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit:1	2	3	4	5	6
=====										
1 33.2725	48.02dBuV Pk	16.4	-30.1	34.32	71.8	-	39.08	29.55	-	-
	Azimuth:0-360	Height:99	Vert	Margin (dB)	-37.48	-	-4.76	4.77	-	-
2 133.275	45.46dBuV Pk	14.2	-29.7	29.96	71.8	-	43.52	33.07	-	-
	Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.84	-	-13.56	-3.11	-	-
3 166.595	44.77dBuV Pk	15.2	-29.4	30.57	71.8	-	43.52	33.07	-	-
	Azimuth:0-360	Height:99	Vert	Margin (dB)	-41.23	-	-12.95	-2.5	-	-
4 406.3	47.83dBuV Pk	15.8	-25.4	38.23	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:200	Horz	Margin (dB)	-33.57	-	-8.21	2.66	-	-
5 468.8	48.43dBuV Pk	16.9	-25.2	40.13	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:99	Horz	Margin (dB)	-31.67	-	-6.31	4.56	-	-
6 437.5	49.09dBuV Pk	16.6	-25.4	40.29	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:299	Vert	Margin (dB)	-31.51	-	-6.15	4.72	-	-
7 500.1	59.54dBuV Pk	17.6	-25.1	52.04	71.8	-	46.44	35.57	-	-
	Azimuth:0-360	Height:299	Vert	Margin (dB)	-19.76	-	5.6	16.47	-	-

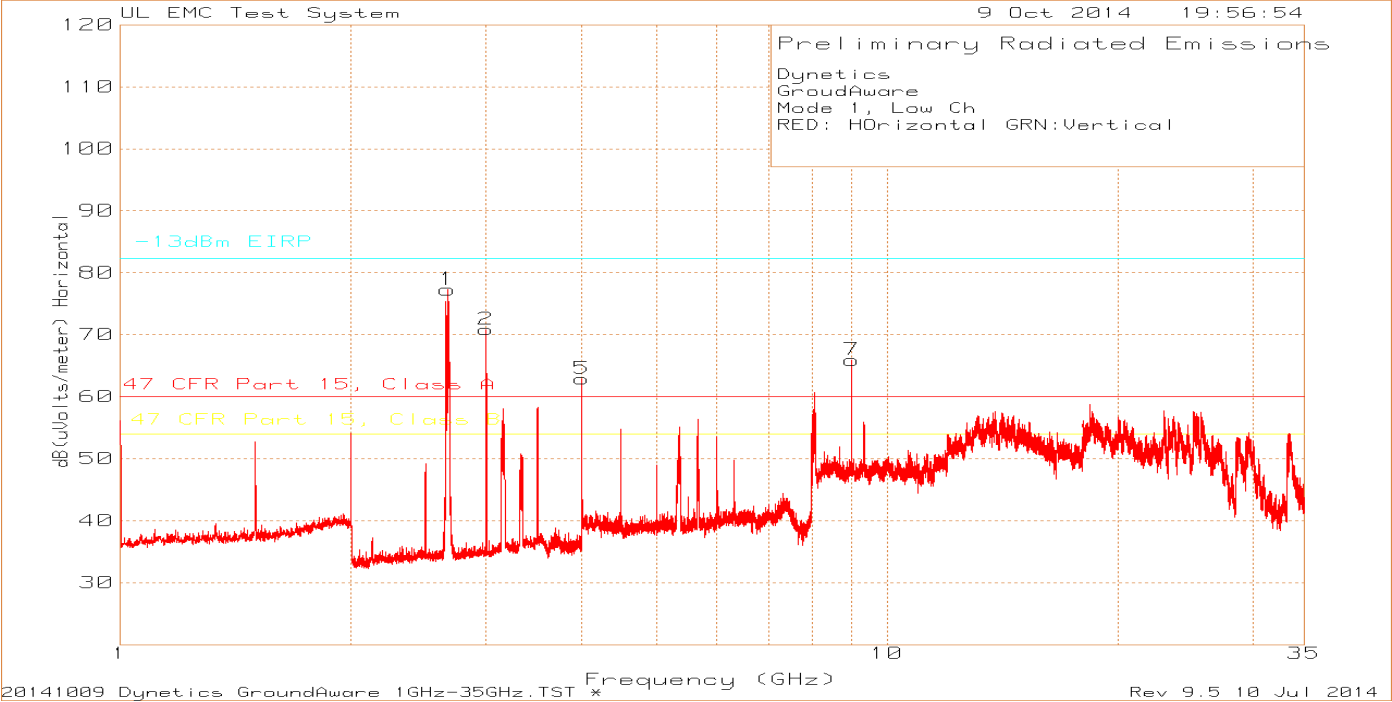
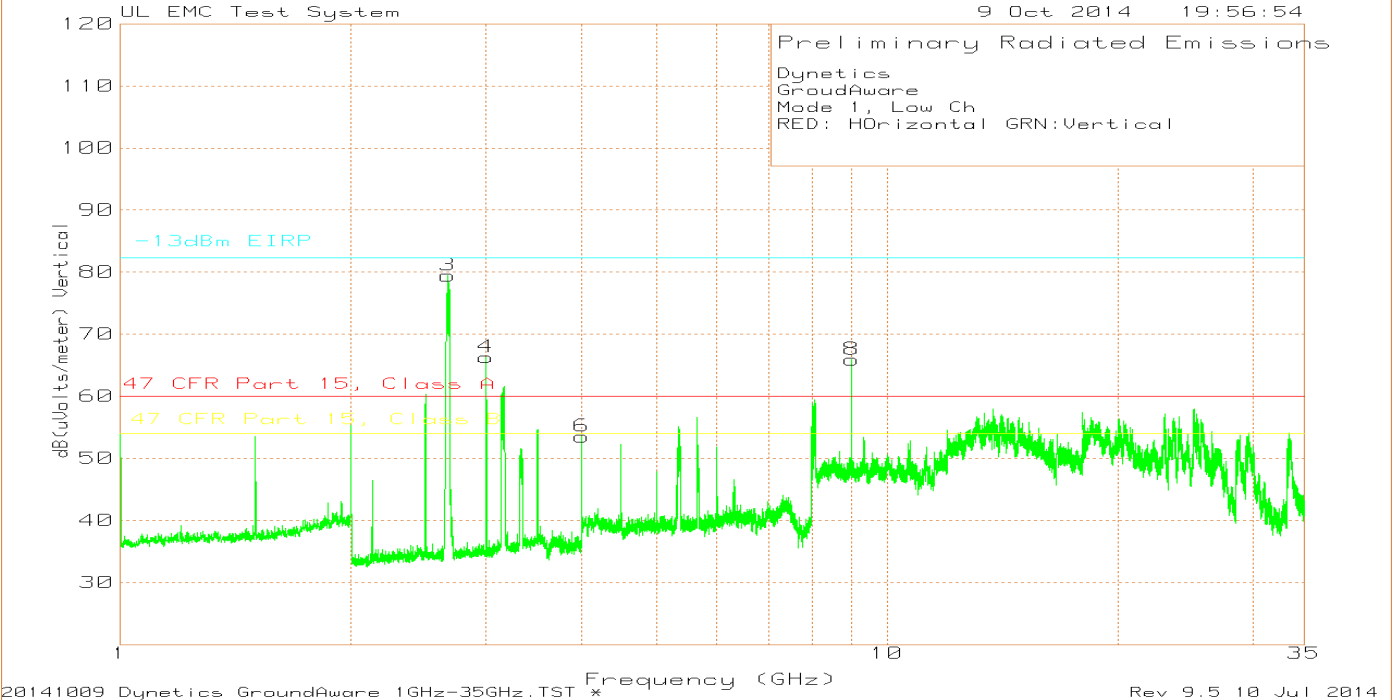
LIMIT 1: FCC Part 90 -13dBm EIRP

LIMIT 3: FCC Part 15 Class A 10m
LIMIT 4: FCC Part 15 Class B 10m

Pk - Peak detector

* There are two sources for the 500MHz emissions. The one shown it data above is used as LO for the transmitter only. The second source detailed is the DoC report is used as digital source and as shown in the DoC report is under the class A limits.

Mode 1, Low Channel, Above 1GHz, Graph

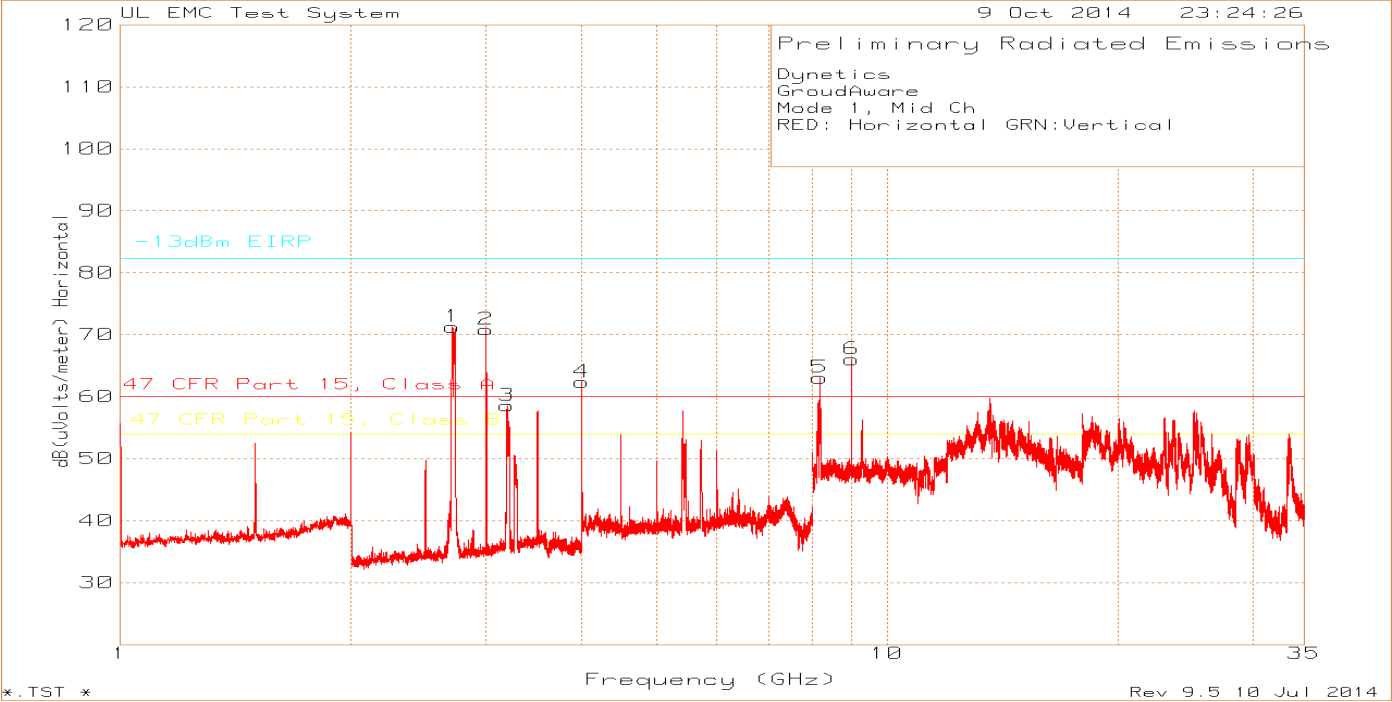
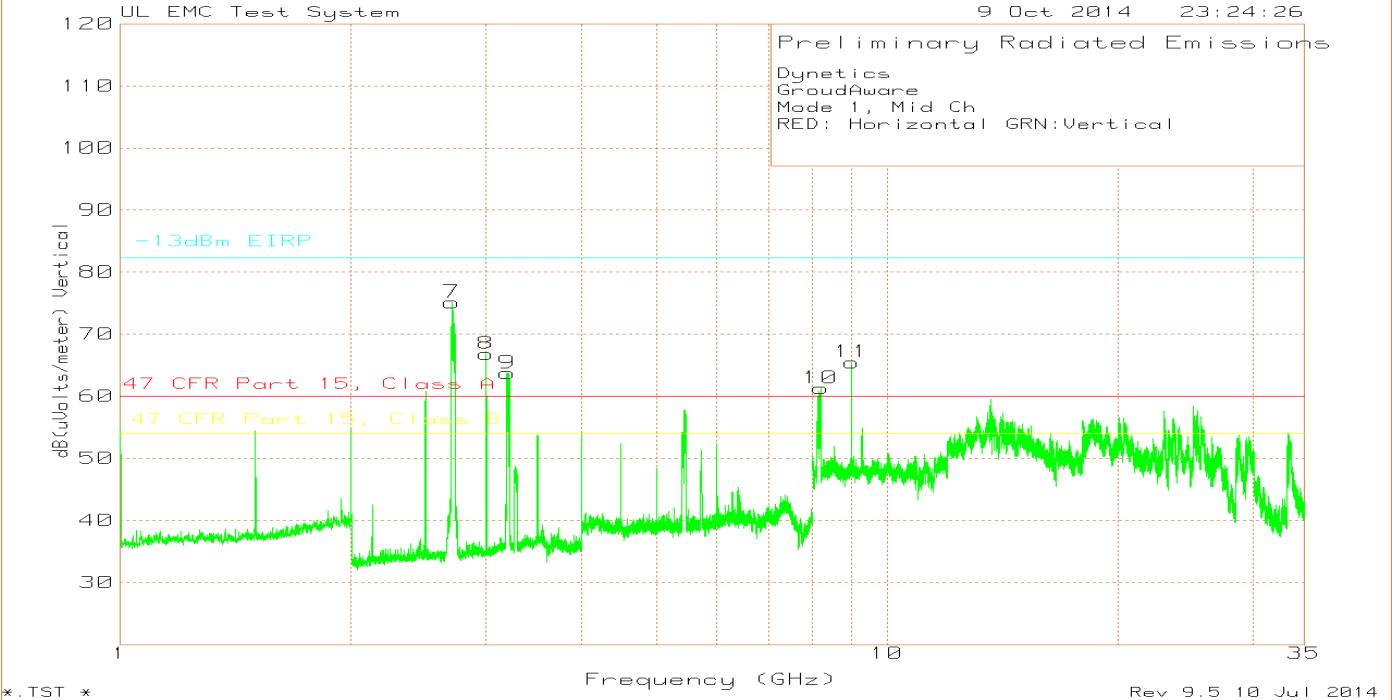


* Only the -13dBm Limit is applicable

Mode 1, Low Channel, Above 1GHz, Tabular Data

Dynetics											
GroudAware											
Mode 1, Low Ch											
RED: Horizontal GRN:Vertical											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.671	105.9	PK	22.2	-50.83	77.27	82.26	-4.99	0-360	99	H
2	3	98.48	PK	22.5	-50.13	70.85	82.26	-11.41	0-360	99	H
5	4.001	85.58	PK	28.5	-51.19	62.89	82.26	-19.37	0-360	99	H
7	9.001	77.99	PK	36.1	-48.15	65.94	82.26	-16.32	0-360	150	H
3	2.675	108.06	PK	22.2	-50.79	79.47	82.26	-2.79	0-360	150	V
4	3	93.92	PK	22.5	-50.13	66.29	82.26	-15.97	0-360	99	V
6	4.001	76.2	PK	28.5	-51.19	53.51	82.26	-28.75	0-360	99	V
8	9.001	77.94	PK	36.1	-48.15	65.89	82.26	-16.37	0-360	150	V
PK - Peak detector											
Radiated Emission Data											
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.6668	106.01	PK	22.2	-50.87	77.34	82.26	-4.92	174	101	H
	2.6732	106.21	PK	22.2	-50.81	77.6	82.26	-4.66	227	155	V
	2.673	106.83	PK	22.2	-50.81	78.22	82.26	-4.04	186	136	V
PK - Peak detector											

Mode 1, Middle Channel, Above 1GHz, Graph

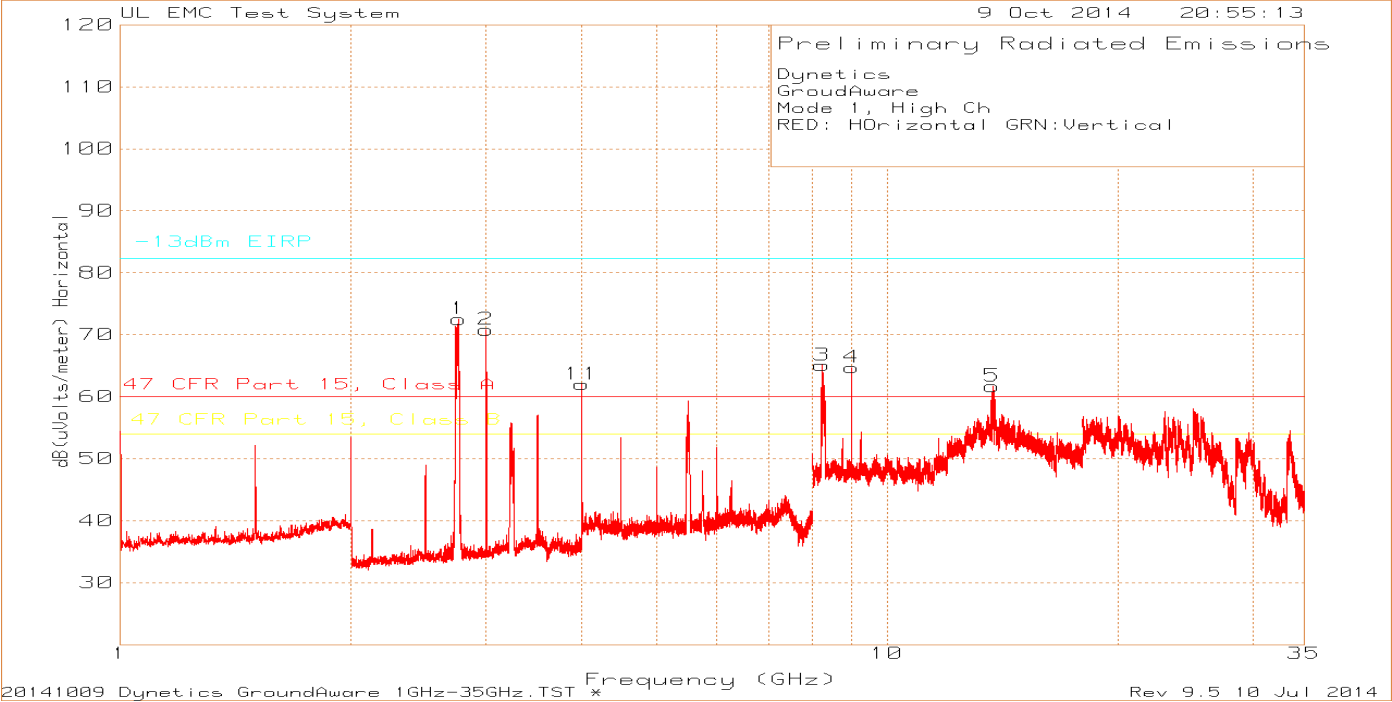
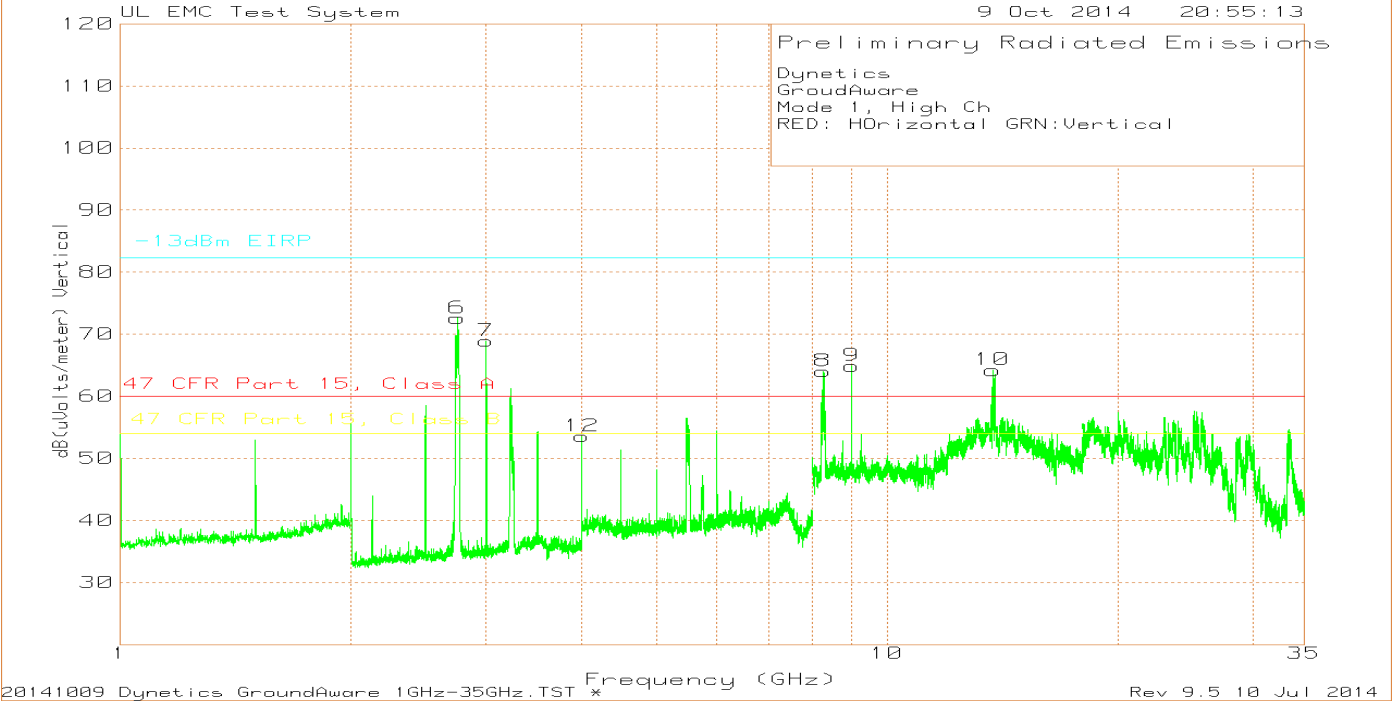


* Only the -13dBm Limit is applicable

Mode 1, Middle Channel, Above 1GHz, Tabular Data

Dynamics											
GroudAware											
Mode 1, Mid Ch											
RED: Horizontal GRN:Vertical											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.712	99.88	PK	22.1	-50.69	71.29	82.26	-10.97	0-360	99	H
2	3	98.47	PK	22.5	-50.13	70.84	82.26	-11.42	0-360	99	H
3	3.195	85.75	PK	23.2	-50.37	58.58	82.26	-23.68	0-360	99	H
4	4.001	85.04	PK	28.5	-51.19	62.35	82.26	-19.91	0-360	99	H
5	8.176	75.07	PK	36.3	-48.3	63.07	82.26	-19.19	0-360	150	H
6	9.001	78.09	PK	36.1	-48.15	66.04	82.26	-16.22	0-360	150	H
7	2.707	103.69	PK	22.1	-50.69	75.1	82.26	-7.16	0-360	150	V
8	3	94.46	PK	22.5	-50.13	66.83	82.26	-15.43	0-360	150	V
9	3.198	90.89	PK	23.2	-50.37	63.72	82.26	-18.54	0-360	99	V
10	8.194	72.76	PK	36.3	-47.77	61.29	82.26	-20.97	0-360	150	V
11	9.001	77.5	PK	36.1	-48.15	65.45	82.26	-16.81	0-360	99	V
PK - Peak detector											

Mode 1, High Channel, Above 1GHz, Graph

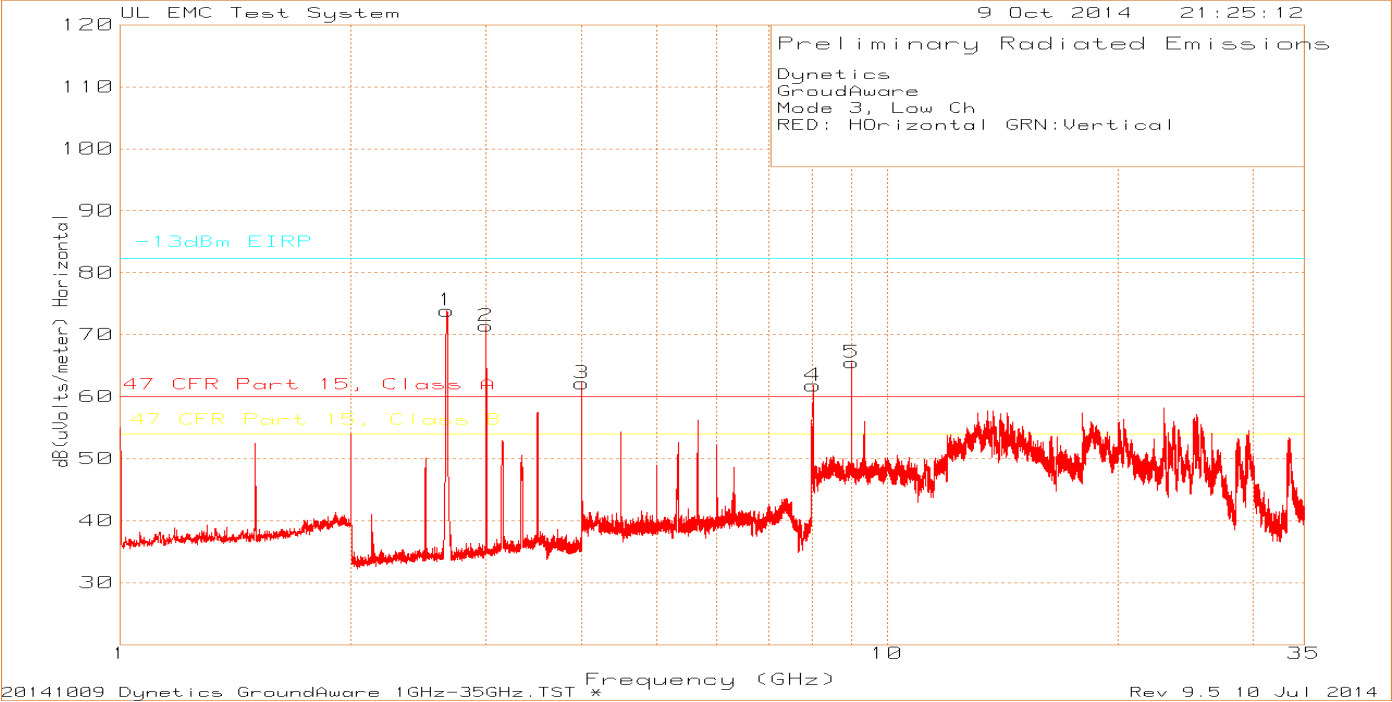
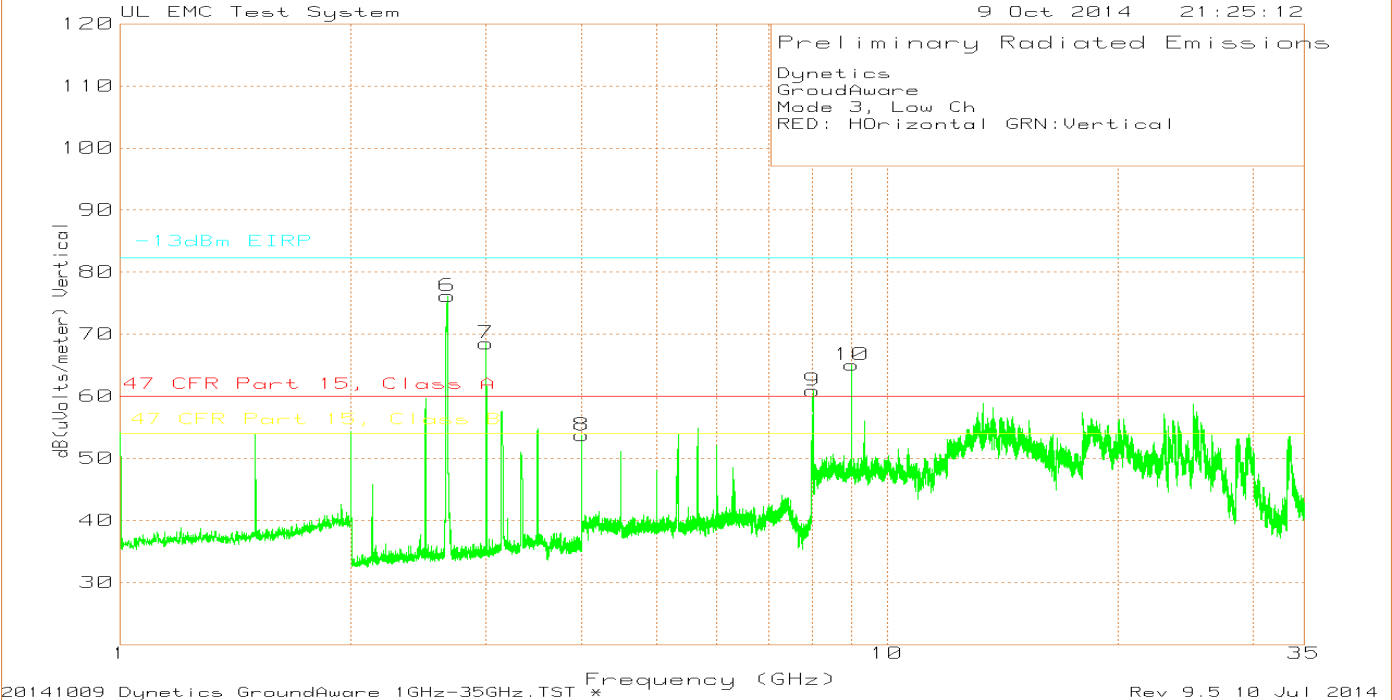


* Only the -13dBm Limit is applicable

Mode 1, High Channel, Above 1GHz, Tabular Data

Dynetics											
GroudAware											
Mode 1, High Ch											
RED: HOrizontal GRN:Vertical											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.765	100.9	PK	22.2	-50.58	72.52	82.26	-9.74	0-360	99	H
2	3	98.43	PK	22.5	-50.13	70.8	82.26	-11.46	0-360	99	H
11	4.001	84.69	PK	28.5	-51.19	62	82.26	-20.26	0-360	99	H
3	8.233	75.66	PK	36.4	-46.99	65.07	82.26	-17.19	0-360	99	H
4	9.001	76.76	PK	36.1	-48.15	64.71	82.26	-17.55	0-360	150	H
5	13.729	61.32	PK	39.8	-39.45	61.67	82.26	-20.59	0-360	150	H
6	2.754	101.02	PK	22.2	-50.64	72.58	82.26	-9.68	0-360	150	V
7	3	96.55	PK	22.5	-50.13	68.92	82.26	-13.34	0-360	150	V
12	4.001	76.25	PK	28.5	-51.19	53.56	82.26	-28.7	0-360	99	V
8	8.259	74.94	PK	36.4	-47.3	64.04	82.26	-18.22	0-360	150	V
9	9.001	76.94	PK	36.1	-48.15	64.89	82.26	-17.37	0-360	99	V
10	13.74	63.33	PK	39.8	-38.92	64.21	82.26	-18.05	0-360	99	V
PK - Peak detector											

Mode 3, Low Channel, Above 1GHz, Graph

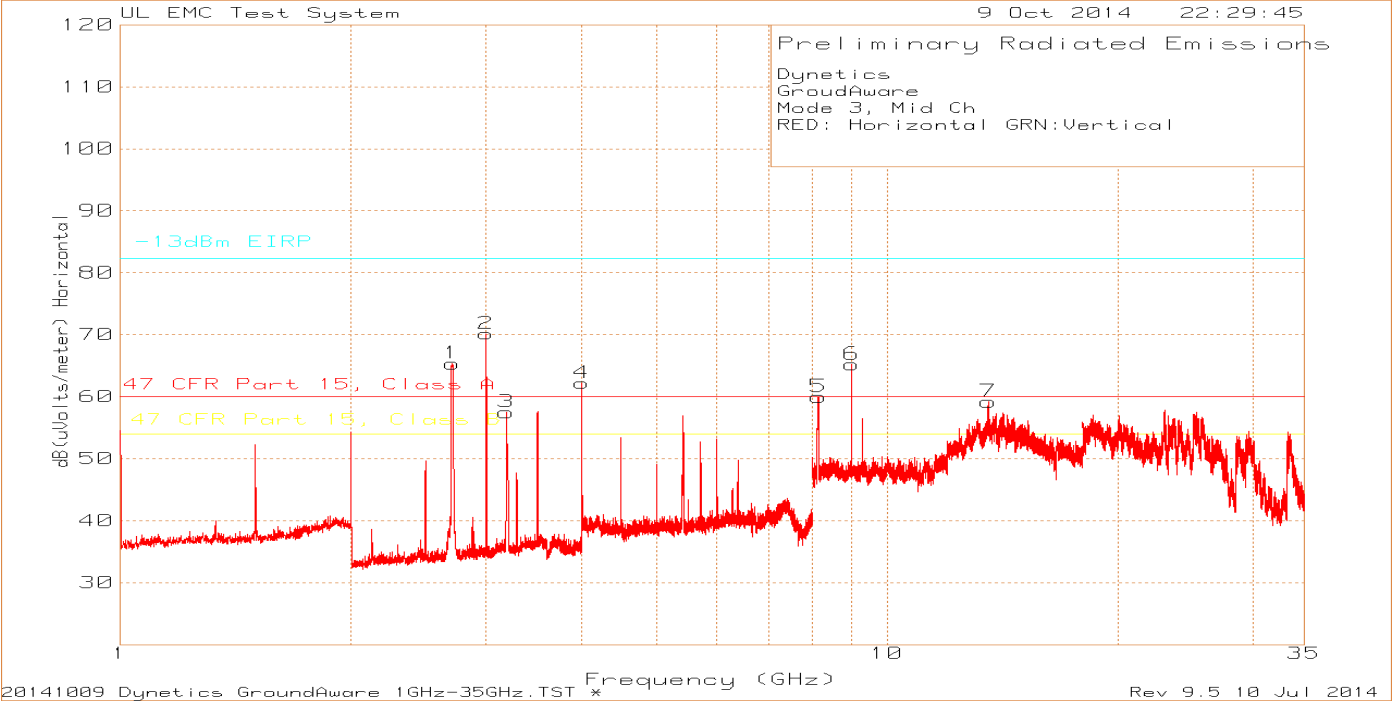
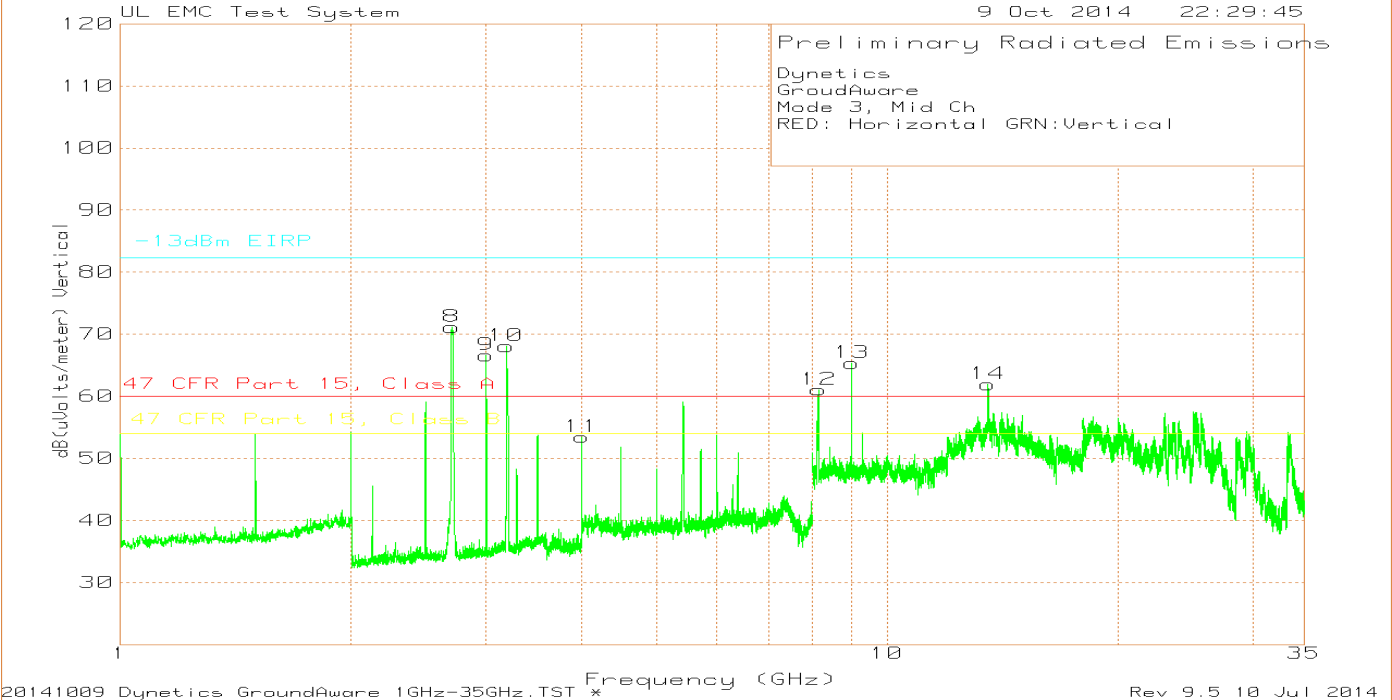


* Only the -13dBm Limit is applicable

Mode 3, Low Channel, Above 1GHz, Tabular Data

Dynetics											
GroudAware											
Mode 3, Low Ch											
RED: HOrizontal GRN:Vertical											
Trace Markers											
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.667	102.54	PK	22.2	-50.87	73.87	82.26	-8.39	0-360	99	H
2	3	99.06	PK	22.5	-50.13	71.43	82.26	-10.83	0-360	99	H
3	4.001	84.86	PK	28.5	-51.19	62.17	82.26	-20.09	0-360	99	H
4	8.011	72.58	PK	36.1	-46.88	61.8	82.26	-20.46	0-360	150	H
5	9.001	77.57	PK	36.1	-48.15	65.52	82.26	-16.74	0-360	150	H
6	2.672	104.78	PK	22.2	-50.82	76.16	82.26	-6.1	0-360	99	V
7	3	96.16	PK	22.5	-50.13	68.53	82.26	-13.73	0-360	150	V
8	4.001	76.4	PK	28.5	-51.19	53.71	82.26	-28.55	0-360	99	V
9	8.005	71.68	PK	36.1	-46.88	60.9	82.26	-21.36	0-360	99	V
10	9.001	77.1	PK	36.1	-48.15	65.05	82.26	-17.21	0-360	99	V
PK - Peak detector											
Radiated Emission Data											
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.6669	105.94	PK	22.2	-50.87	77.27	82.26	-4.99	174	100	H
	2.6718	106.5	PK	22.2	-50.82	77.88	82.26	-4.38	138	100	V
Notes:											
1 - Mode 1 Lo Ch											
PK - Peak detector											

Mode 3, Middle Channel, Above 1GHz, Graph

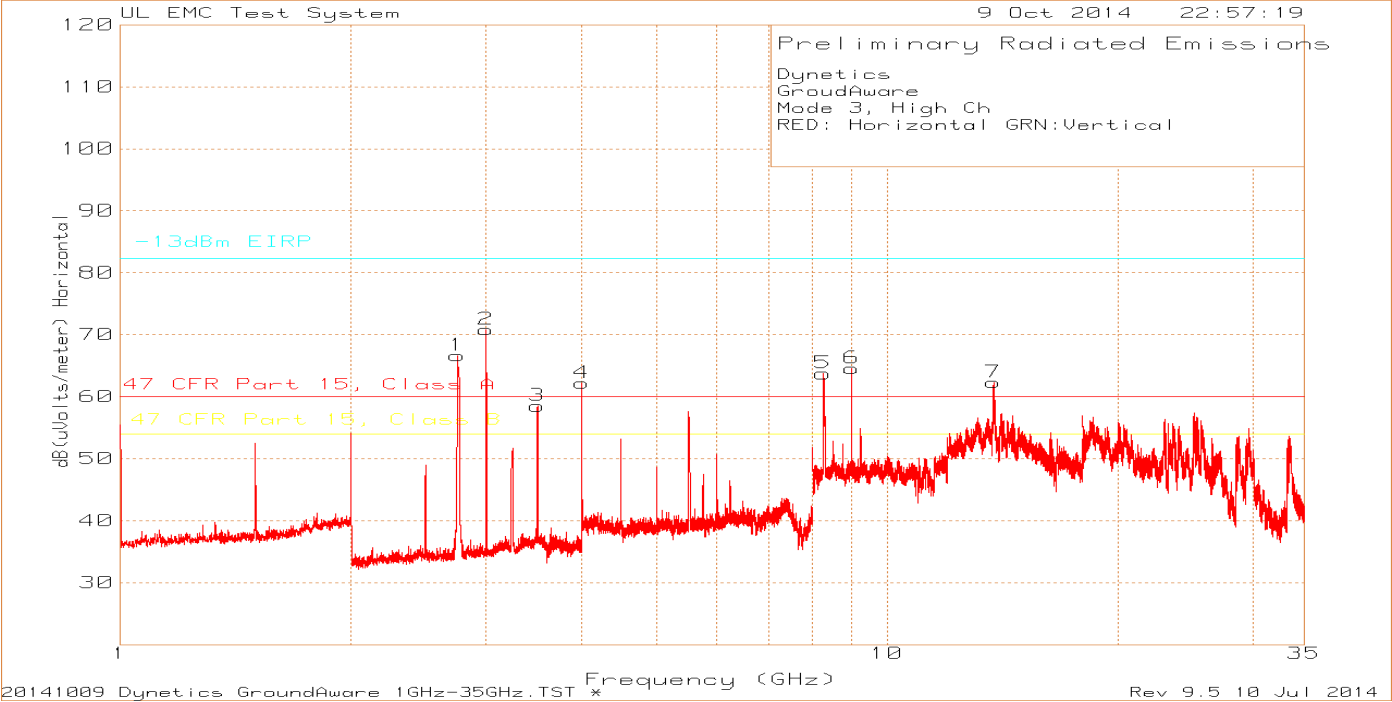
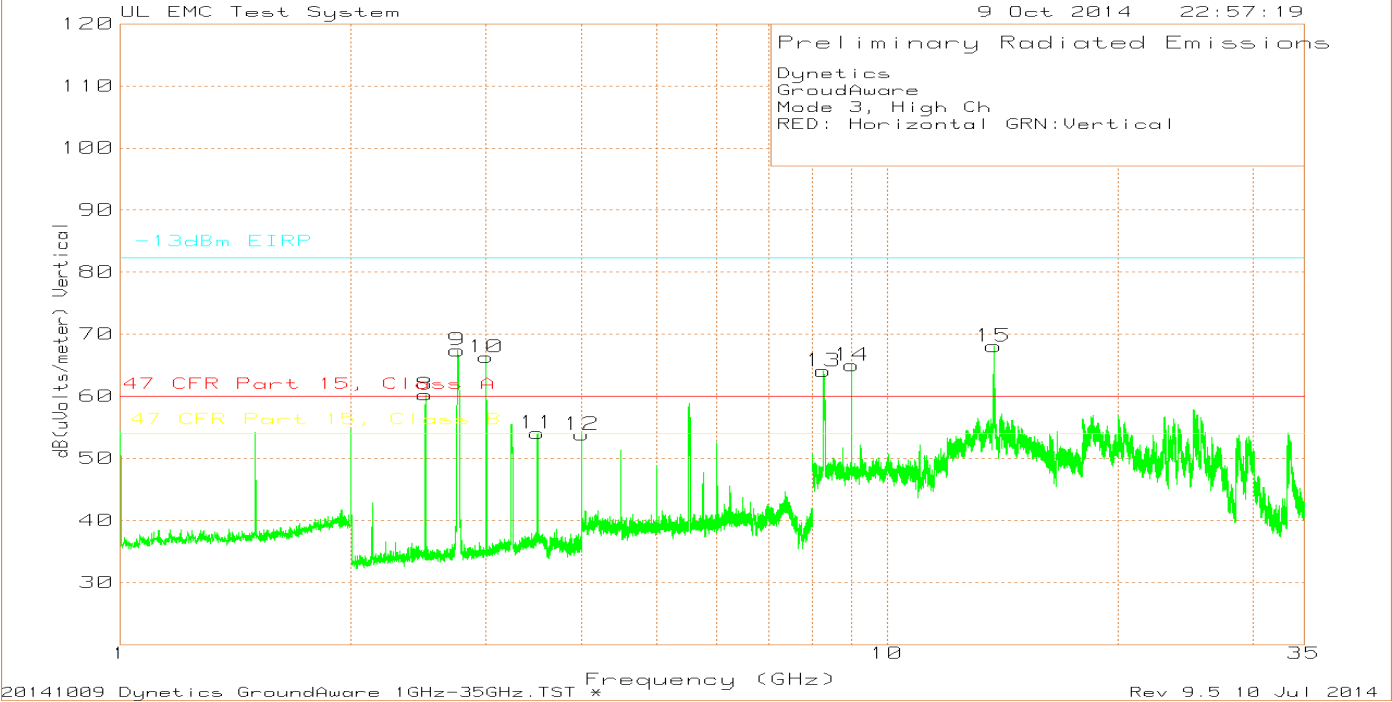


* Only the -13dBm Limit is applicable

Mode 3, Middle Channel, Above 1GHz, Tabular Data

Dy netics												
GroudAware												
Mode 3, Mid Ch												
RED: Horizontal GRN:Vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
1	2.7105	93.94	PK	22.1	-50.7	65.34	82.26	-16.92	0-360	99	H	
2	3	97.81	PK	22.5	-50.13	70.18	82.26	-12.08	0-360	99	H	
3	3.188	84.77	PK	23.1	-50.37	57.5	82.26	-24.76	0-360	99	H	
4	4.001	84.91	PK	28.5	-51.19	62.22	82.26	-20.04	0-360	99	H	
5	8.143	72.3	PK	36.3	-48.62	59.98	82.26	-22.28	0-360	99	H	
6	9.001	77.25	PK	36.1	-48.15	65.2	82.26	-17.06	0-360	150	H	
7	13.566	58.75	PK	39.8	-39.34	59.21	82.26	-23.05	0-360	99	H	
8	2.709	99.75	PK	22.1	-50.69	71.16	82.26	-11.1	0-360	99	V	
9	3	94.23	PK	22.5	-50.13	66.6	82.26	-15.66	0-360	150	V	
10	3.188	95.36	PK	23.1	-50.37	68.09	82.26	-14.17	0-360	99	V	
11	4.001	76.15	PK	28.5	-51.19	53.46	82.26	-28.8	0-360	99	V	
12	8.15	73.33	PK	36.3	-48.57	61.06	82.26	-21.2	0-360	99	V	
13	9.001	77.42	PK	36.1	-48.15	65.37	82.26	-16.89	0-360	150	V	
14	13.542	61.31	PK	39.8	-39.18	61.93	82.26	-20.33	0-360	99	V	
PK - Peak detector												

Mode 3, High Channel, Above 1GHz, Graph



* Only the -13dBm Limit is applicable

Mode 3, High Channel, Above 1GHz, Tabular Data

Dynetics												
GroudAware												
Mode 3, High Ch												
RED: Horizontal GRN:Vertical												
Trace Markers												
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	-13dBm EIRP	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	
1	2.751	95.11	PK	22.2	-50.65	66.66	82.26	-15.6	0-360	99	H	
2	3	98.47	PK	22.5	-50.13	70.84	82.26	-11.42	0-360	99	H	
3	3.501	84.43	PK	23.5	-49.41	58.52	82.26	-23.74	0-360	99	H	
4	4.001	84.91	PK	28.5	-51.19	62.22	82.26	-20.04	0-360	99	H	
5	8.253	74.56	PK	36.4	-47.19	63.77	82.26	-18.49	0-360	99	H	
6	9.001	76.63	PK	36.1	-48.15	64.58	82.26	-17.68	0-360	99	H	
7	13.774	61.09	PK	39.9	-38.66	62.33	82.26	-19.93	0-360	99	H	
8	2.5	89.25	PK	22.1	-51.09	60.26	82.26	-22	0-360	150	V	
9	2.754	95.83	PK	22.2	-50.64	67.39	82.26	-14.87	0-360	150	V	
10	3	93.94	PK	22.5	-50.13	66.31	82.26	-15.95	0-360	150	V	
11	3.501	79.97	PK	23.5	-49.41	54.06	82.26	-28.2	0-360	99	V	
12	4.001	76.5	PK	28.5	-51.19	53.81	82.26	-28.45	0-360	99	V	
13	8.263	75.05	PK	36.4	-47.39	64.06	82.26	-18.2	0-360	150	V	
14	9.001	77.04	PK	36.1	-48.15	64.99	82.26	-17.27	0-360	99	V	
15	13.779	66.64	PK	39.9	-38.49	68.05	82.26	-14.21	0-360	99	V	
PK - Peak detector												

9. FREQUENCY STABILITY

RULE PART(S)

§2.1055

§90.213 Frequency stability

Above 2450 MHz ¹⁰

¹⁰Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.

LIMITS

Device must remain operating in between 3100MHz to 3300MHz.

TEST PROCEDURE

Use spectrum analyzer to measure -6dBc points

- Temp. = -30° to +50°C
- Voltage = Normal, 120VAC, Low, 102VAC and High, 138VAC.

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 25°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by changed to either +30°C or +20°C degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C and -30°C is reached in 10° steps.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

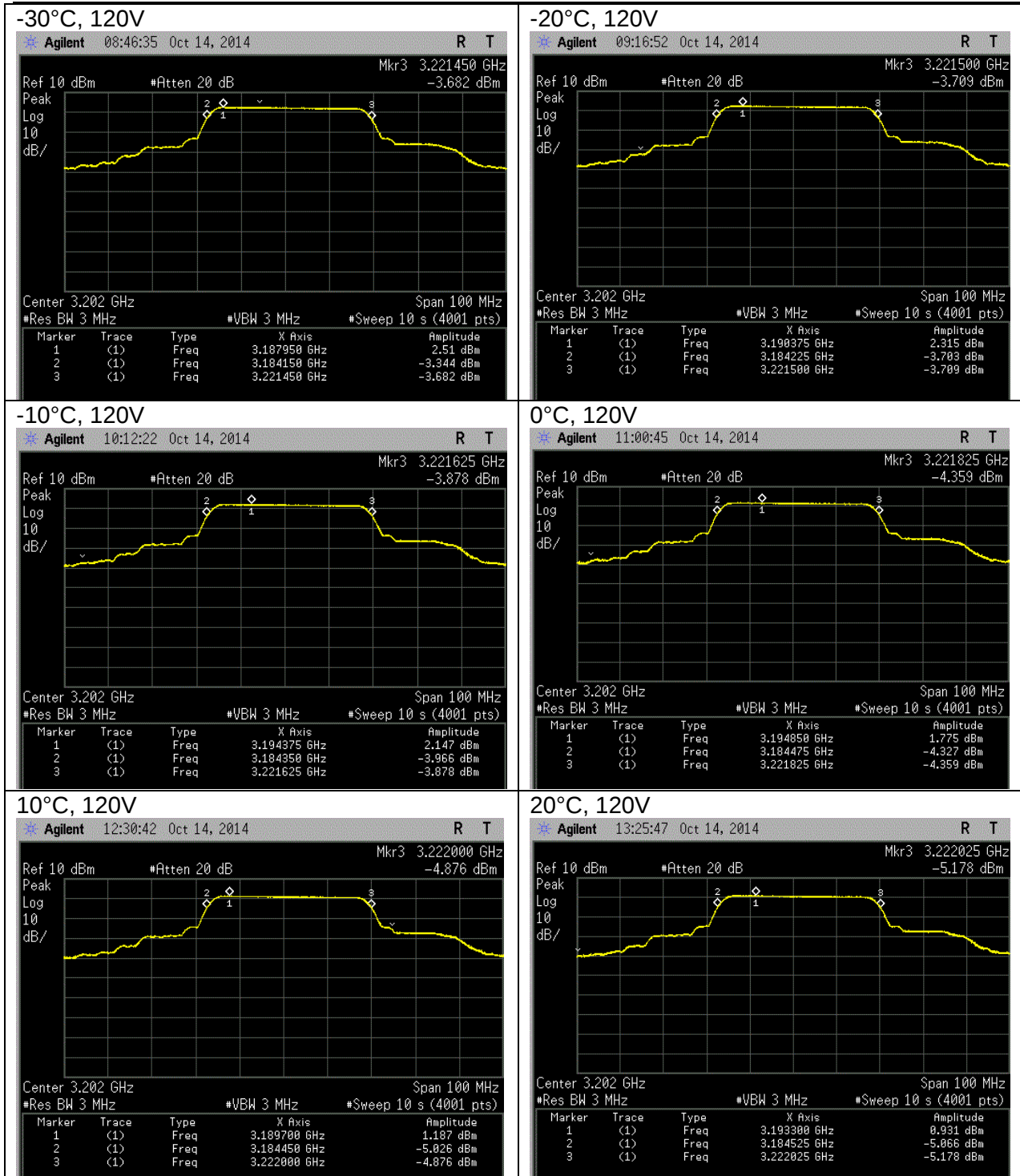
RESULTS

* Based on the band edge measurements and the frequency error data the device will operate in between the frequency range of 3100MHz - 3300MHz under all temperature and voltage variations.

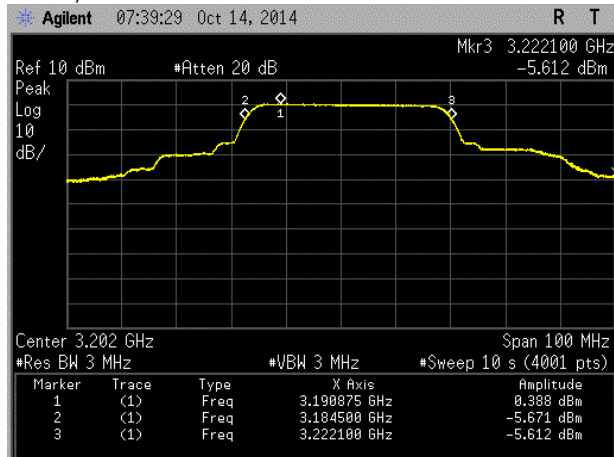
See the following pages for data.

Programmed Frequency: 3.203125GHz					
Temp °C	Freq. GHz - 6dBc Low Side	Freq. GHz - 6dBc Upper Side	Freq. GHz Center $F_L + ((F_U - F_L)/2)$	Freq Error GHz	PPM Error from Nominal
-30	3.184200	3.221575	3.202888	-0.000237	-74.15
-20	3.184225	3.221500	3.202863	-0.000262	-81.95
-10	3.184350	3.221625	3.202988	-0.000138	-42.93
0	3.184475	3.221825	3.203150	0.000025	7.80
10	3.184450	3.222000	3.203225	0.000100	31.22
20	3.184525	3.222025	3.203275	0.000150	46.83
Nominal / 25	3.184525	3.222000	3.203263	0.000138	42.93
30	3.184500	3.222075	3.203288	0.000163	50.73
40	3.184525	3.222150	3.203338	0.000212	66.34
50	3.184500	3.222075	3.203288	0.000163	50.73
Voltage @ 25°C	Freq. GHz - 6dBc Low Side	Freq. GHz - 6dBc Upper Side	Center Freq $F_L + ((F_U - F_L)/2)$	Freq Error GHz	PPM Error from Nominal
102	3.1845	3.2221	3.2033	0.000175	54.63
Nominal / 120	3.184525	3.222	3.2032625	0.000138	42.93
138	3.184475	3.2222	3.2033375	0.000212	66.34

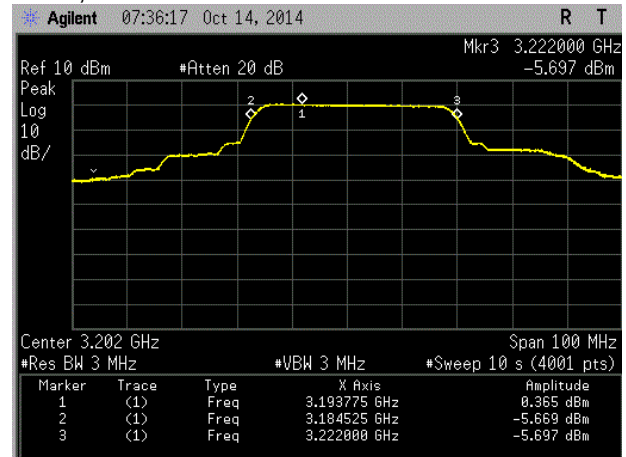
	Low Channel Worst Case F_L GHz	Low Channel Worst Case F_H GHz	High Channel Worst Case F_L GHz	High Channel Worst Case F_H GHz
Mode 1	3.106	3.2698	3.1238	3.288
Mode 2	3.108	3.2668	3.125	3.2864
Mode 3	3.108	3.2672	3.125	3.2826
Min Freq GHz	3.106			
Max Freq GHz	3.288			
Min Freq + Maximum Negative Deviation			3.105738	GHz
Max Freq + Maximum Positive Deviation			3.288213	GHz



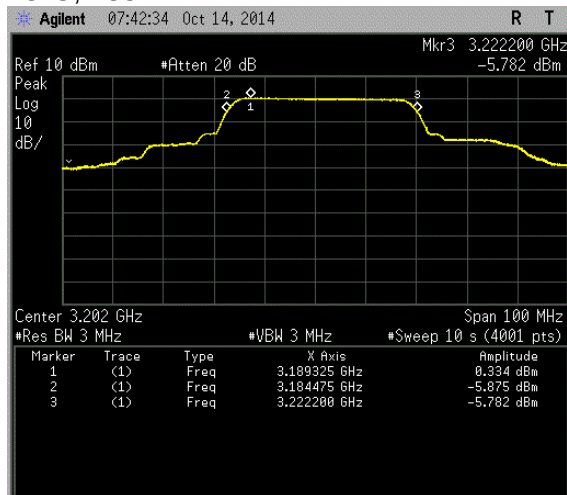
25°C, 102V



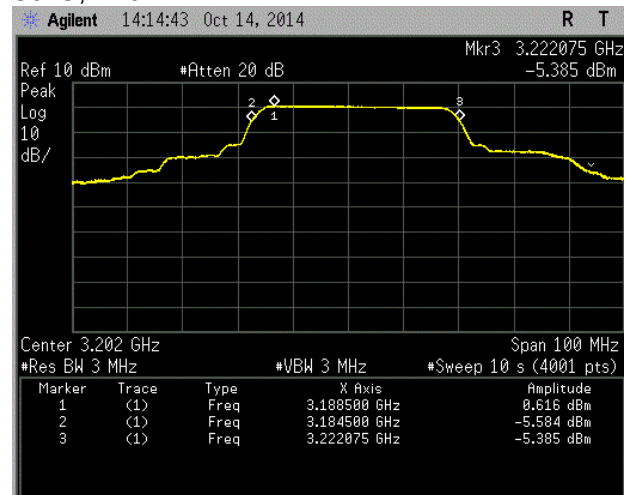
25°C, 120V



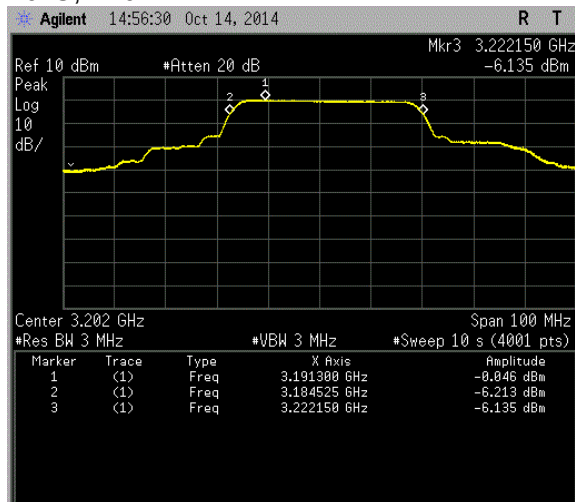
25°C, 138V



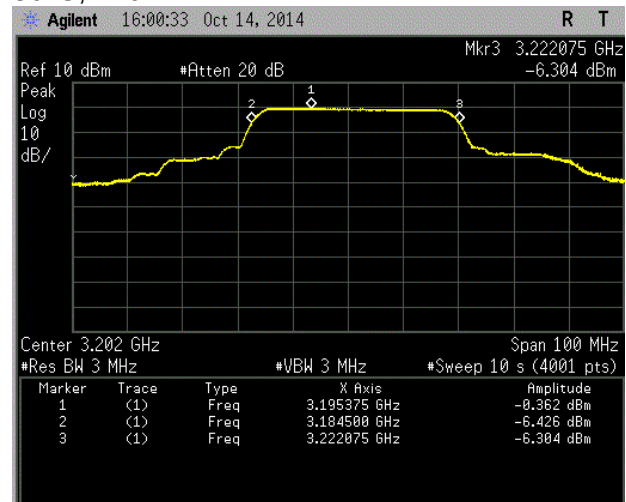
30°C, 120V



40°C, 120V



50°C, 120V



10. AC POWER 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

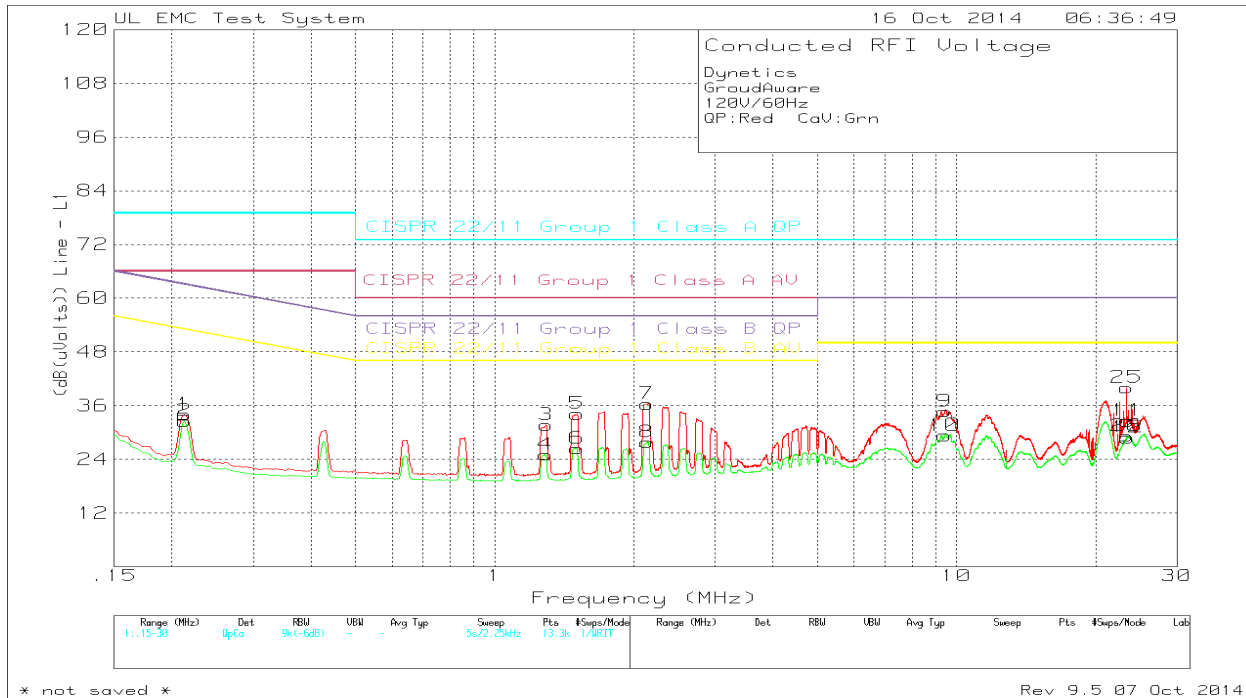
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Quasi-Peak and CISPR Average detection is used unless otherwise noted.

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

RESULTS

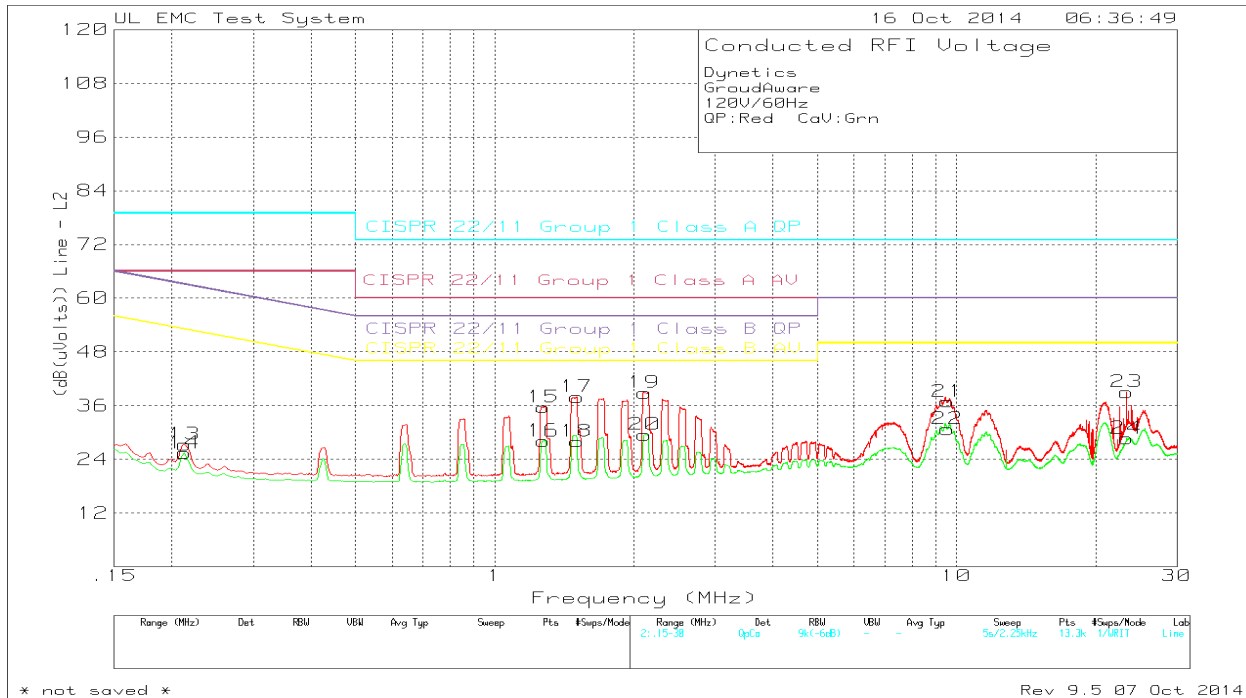
LINE 1 RESULTS



Test No.	Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit:1	2	3	4	5	6
Line 1											
1	.213	22.39dBuV Qp	.1	11.5	33.99	79	66	63.09	53.09	-	-
					Margin (dB)	-45.01	-32.01	-29.1	-19.1	-	-
2	.213	21.05dBuV Ca	.1	11.5	32.65	79	66	63.09	53.09	-	-
					Margin (dB)	-46.35	-33.35	-30.44	-20.44	-	-
3	1.293	20.97dBuV Qp	.1	10.6	31.67	73	60	56	46	-	-
					Margin (dB)	-41.33	-28.33	-24.33	-14.33	-	-
4	1.29075	14.36dBuV Ca	.1	10.6	25.06	73	60	56	46	-	-
					Margin (dB)	-47.94	-34.94	-30.94	-20.94	-	-
5	1.509	23.51dBuV Qp	.1	10.6	34.21	73	60	56	46	-	-
					Margin (dB)	-38.79	-25.79	-21.79	-11.79	-	-
6	1.50563	15.75dBuV Ca	.1	10.6	26.45	73	60	56	46	-	-
					Margin (dB)	-46.55	-33.55	-29.55	-19.55	-	-
7	2.1345	25.66dBuV Qp	.1	10.6	36.36	73	60	56	46	-	-
					Margin (dB)	-36.64	-23.64	-19.64	-9.64	-	-
8	2.1345	17.12dBuV Ca	.1	10.6	27.82	73	60	56	46	-	-
					Margin (dB)	-45.18	-32.18	-28.18	-18.18	-	-
9	9.42	23.62dBuV Qp	.1	11	34.72	73	60	60	50	-	-
					Margin (dB)	-38.28	-25.28	-25.28	-15.28	-	-
10	9.42	18.22dBuV Ca	.1	11	29.32	73	60	60	50	-	-
					Margin (dB)	-43.68	-30.68	-30.68	-20.68	-	-
11	23.42063	20.71dBuV Qp	.3	11.6	32.61	73	60	60	50	-	-
					Margin (dB)	-40.39	-27.39	-27.39	-17.39	-	-
12	23.42175	16.97dBuV Ca	.3	11.6	28.87	73	60	60	50	-	-
					Margin (dB)	-44.13	-31.13	-31.13	-21.13	-	-
25	23.32725	28.13dBuV Qp	.3	11.6	40.03	73	60	60	50	-	-
					Margin (dB)	-32.97	-19.97	-19.97	-9.97	-	-
26	23.32725	17.34dBuV Ca	.3	11.6	29.24	73	60	60	50	-	-
					Margin (dB)	-43.76	-30.76	-30.76	-20.76	-	-

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV
Qp - Quasi-Peak detector
Ca - CISPR Average detection

LINE 2 RESULTS



Test No.	Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit:1	2	3	4	5	6
Line 2											
13	.213	15.71dBuV Qp	.1	11.5	27.31	79	66	63.09	53.09	-	-
					Margin (dB)	-51.69	-38.69	-35.78	-25.78	-	-
14	.213	13.82dBuV Ca	.1	11.5	25.42	79	66	63.09	53.09	-	-
					Margin (dB)	-53.58	-40.58	-37.67	-27.67	-	-
15	1.275	24.92dBuV Qp	.1	10.6	35.62	73	60	56	46	-	-
					Margin (dB)	-37.38	-24.38	-20.38	-10.38	-	-
16	1.275	17.37dBuV Ca	.1	10.6	28.07	73	60	56	46	-	-
					Margin (dB)	-44.93	-31.93	-27.93	-17.93	-	-
17	1.50675	27.23dBuV Qp	.1	10.6	37.93	73	60	56	46	-	-
					Margin (dB)	-35.07	-22.07	-18.07	-8.07	-	-
18	1.50675	17.31dBuV Ca	.1	10.6	28.01	73	60	56	46	-	-
					Margin (dB)	-44.99	-31.99	-27.99	-17.99	-	-
19	2.1075	28.17dBuV Qp	.1	10.6	38.87	73	60	56	46	-	-
					Margin (dB)	-34.13	-21.13	-17.13	-7.13	-	-
20	2.112	18.79dBuV Ca	.1	10.6	29.49	73	60	56	46	-	-
					Margin (dB)	-43.51	-30.51	-26.51	-16.51	-	-
21	9.55725	25.8dBuV Qp	.1	11	36.9	73	60	60	50	-	-
					Margin (dB)	-36.1	-23.1	-23.1	-13.1	-	-
22	9.555	19.65dBuV Ca	.1	11	30.75	73	60	60	50	-	-
					Margin (dB)	-42.25	-29.25	-29.25	-19.25	-	-
23	23.32725	27.03dBuV Qp	.4	11.6	39.03	73	60	60	50	-	-
					Margin (dB)	-33.97	-20.97	-20.97	-10.97	-	-
24	23.32725	16.68dBuV Ca	.4	11.6	28.68	73	60	60	50	-	-
					Margin (dB)	-44.32	-31.32	-31.32	-21.32	-	-

LIMIT 1: CISPR 22/11 Group 1 Class A QP
LIMIT 2: CISPR 22/11 Group 1 Class A AV
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

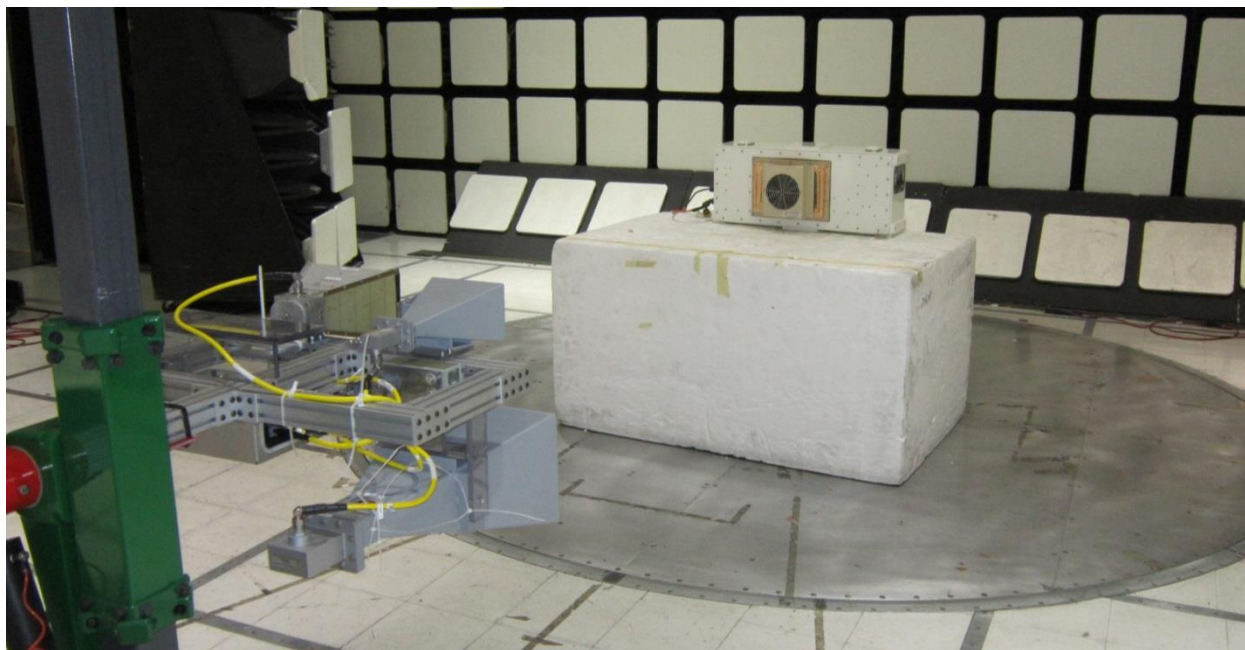
Qp - Quasi-Peak detector
Ca - CISPR Average detection

11. Test Setup Photos

Antenna Port Measurement



Radiated Measurements



Line Conducted Emissions

