FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR
LEVITON MFG. CO. INC.
201 NORTH SERVICE ROAD
MELVILLE, NY 11747

EUT

Scene Capable Plug-In Appliance Module

MODEL NUMBERS: VRP15, DZPA1, DZPD3, VRP03, VRPA1, and VRPD3

FCC ID: QGH-VRP15
IC: 2473A- VRP15

REPORT NUMBER: 4786302492-2

ISSUE DATE: 2014-08-18

Prepared for
LEVITON MFG. CO. INC.
201 NORTH SERVICE ROAD
MELVILLE, NY 11747

Prepared by
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NVLAP LAB CODE 100255-0

Revision History

Rev.		Issue Date		Revisions		Revised By
--		2014-05-08		Initial Issue		Joseph Danisi
1		2014-07-30		Corrected limit, NAVLAP logo and site number		Joseph Danisi
2		2014-08-18		Revised 99% plot and procedure		Joseph Danisi

UL LLC FORM NO: CCSUP4701D
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UL LLC FORM NO: CCSUP4701D
1285 WALT WHITMAN RD, MELVILLE, NY 11747, USA TEL: (631) 271-6200 FAX: (877) 854-3577

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LEVITON MFG. CO. INC.
201 NORTH SERVICE ROAD
MELVILLE, NY 11747

EUT DESCRIPTION: Scene Capable Plug-In Appliance Module

MODEL: VRP15, DZPA1, DZPD3, VRP03, VRPA1, and VRPD3

SERIAL NUMBER: 206A10

DATE TESTED: 2014-02-17 to 2014-02-25

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 By:

Bob DeLisi
WiSE Principal Engineer
UL

Tested By:

Joseph Danisi
WiSE Project Lead
UL

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/1002550.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

Test	Uncertainty
Conducted Emissions (worst case 9kHz-30MHz)	2.0, k=2 (95%)
Radiated Emissions, 30-200MHz, Horizontal	3.6, k=2 (95%)
Radiated Emissions, 30-200MHz, Vertical	3.8, k=2 (95%)
Radiated Emissions, 200-1000MHz, Horizontal	2.8, k=2 (95%)
Radiated Emissions, 200-1000MHz, Vertical	3.7, k=2 (95%)
Radiated Emissions, 1-26GHz (worst case, Ground Plane)	5.7, k=2 (95%)

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

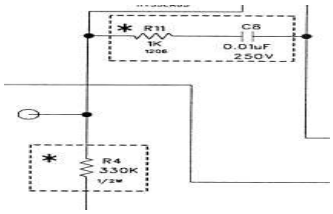
5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Leviton's ViziaRF +TM components are designed to communicate with each other via Radio Frequency (RF) to provide remote control of your lighting. Each module in Leviton's Vizia RF +TM component line is a Z-Wave enabled device. In a Z-Wave network, each device is designed to act as a router. These routers will re-transmit the RF signal from one device to another until the intended device is reached. This ensures that the signal is received by its intended device by routing the signal around obstacles and radio dead spots.

The Scene Capable Plug-in Appliance Module is compatible with any Z-Wave enabled network, regardless of the manufacturer and can also be used with other devices displaying the Z-Wave logo.

In addition based on the manufacturer Leviton the VRP15 will be the representative sample and it is there responsibility that the model numbers listed below perform as the one evaluated. The RF circuit is identical between each model DZPA1, DZPD3, VRP03, VRPA1, VRPD3, and VRP15 the only difference is as follows:



VRP15, VRPA1 and DZPA1 does not populate R4, R11 and C8

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output peak E-field as follows:

Frequency Range (MHz)	Mode	Output PK E-field Strength (dBuV/m)
908.4	Constant Packet	90.08

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna, permanently attached PCB.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Zensys revision 4.54 patch 2.

The test utility software used during testing was continuous emitting load and based on Zensys revision 4.54 patch 2.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case orientation was determined as the Y-Axis and configured and evaluated throughout tests. The duty cycle is >98% therefore all testing was performed with 100% duty cycle.

5.6 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Plug-In Appliance Module	**Leviton**	VRP15	Non serilaized	QGH-VRP15
Load	-	-	-	Incandescent light bulb

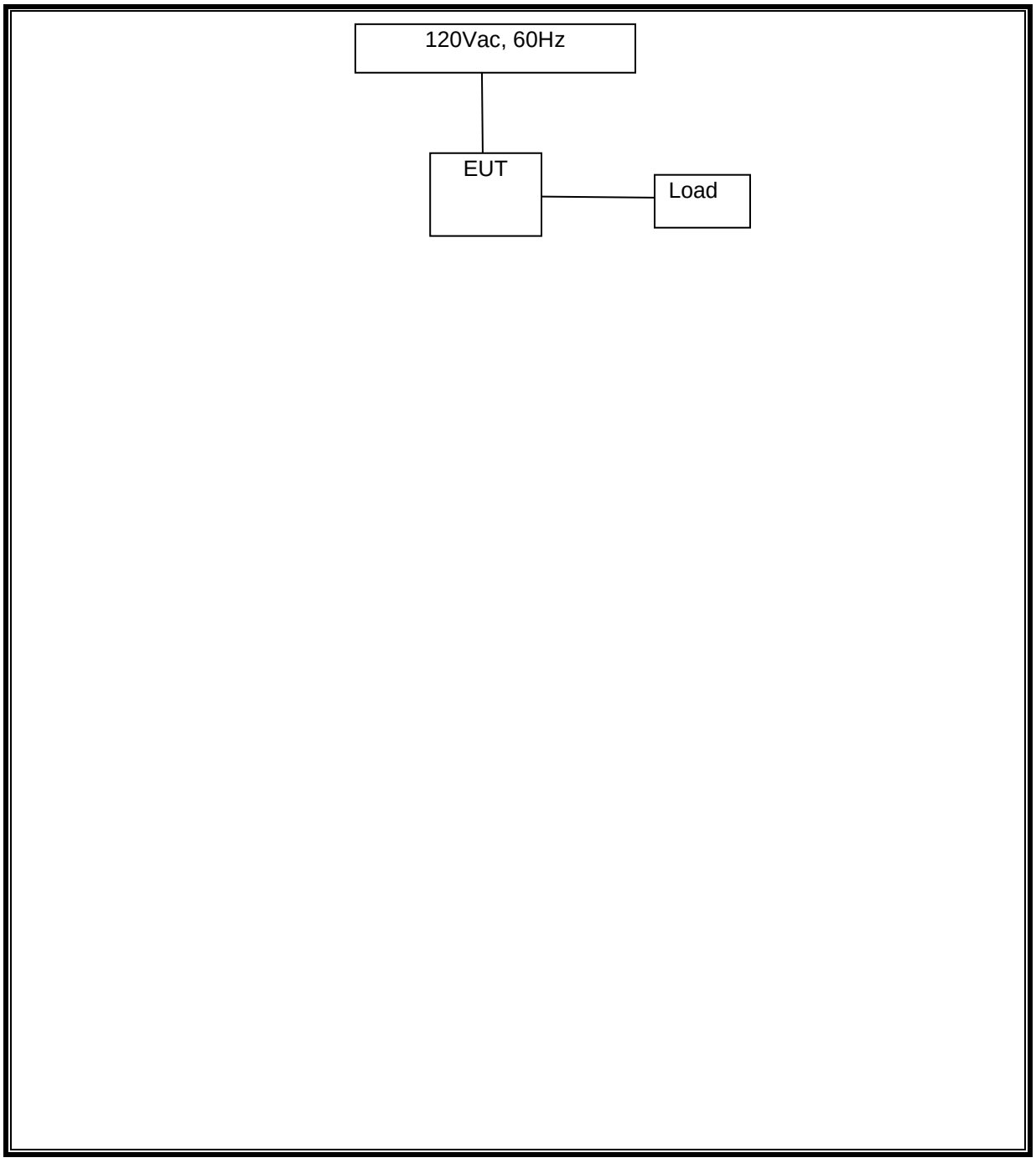
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	1	1	AC	Wire	1	None
2	2	1	Load	Wire	1.5	None

TEST SETUP

The EUT was tested as intended in a typically installation with the Plug-In Appliance Module attached to AC power with an incandescent Light to simulate a typically load condition.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2014-01-28	2015-01-31
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2014-01-28	2015-01-31
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13
Multimeter	Fluke	87V	44547	2014-01-29	2015-01-31

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESCI 7	75141	2014-01-29	2015-01-31
Bicon Antenna	Schaffner	VBA6106A	54	2013-04-03	2014-04-03
Log-P Antenna	Schaffner	UPA6109	44067	2013-07-09	2014-07-09
Bias Tee	Miteq	AM-1523-7687	44392	N/A	N/A
Bias Tee	Miteq	AM-1523-7687	44393	N/A	N/A
Preamp	Miteq	AM-3A-000110-7687	44391	N/A	N/A
Preamp	Miteq	AM-3A-000110-7687	44394	N/A	N/A
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-21	2014-12-21
Multimeter	Fluke	83III	ME5B-305	2014-01-28	2015-01-31
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E4446A	72823	2014-01-28	20145-01-31
Horn Antenna (1-2GHz)	ETS	3161-01 (26°)**	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
Horn Antenna (8-12 GHz)	ETS	3160-07 (26°)**	8933	2008-11-24	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-21	2014-12-21
Multimeter	Fluke	83III	ME5B-305	2014-01-28	2015-01-31

* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.

Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.

** - Number in parentheses denotes antenna beam width.

Bench Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 1					
Spectrum Analyzer	Agilent	E4446A	72823	2013-01-29	2014-01-31
Dipole Antenna	EMCO	3121C	3359	2014-01-10	2015-01-10
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4268	2012-03-13	2014-03-13
Multimeter	Fluke	83III	ME5B-305	2013-01-29	2014-01-31

7. TEST RESULTS

7.1. 20 dB AND 99% BW

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

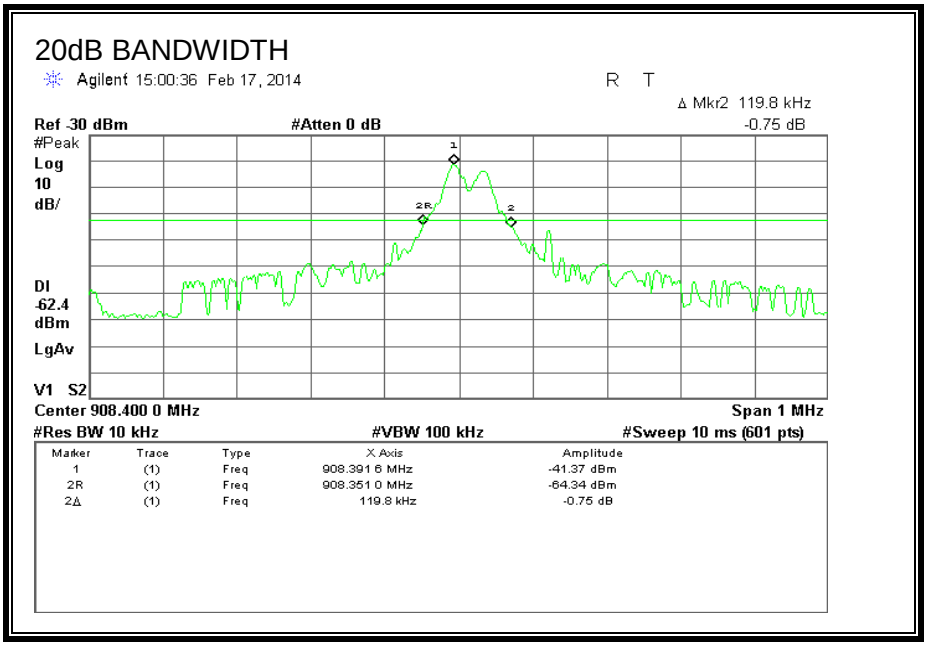
20dB Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
908.4	119.8	2271	-2151.2

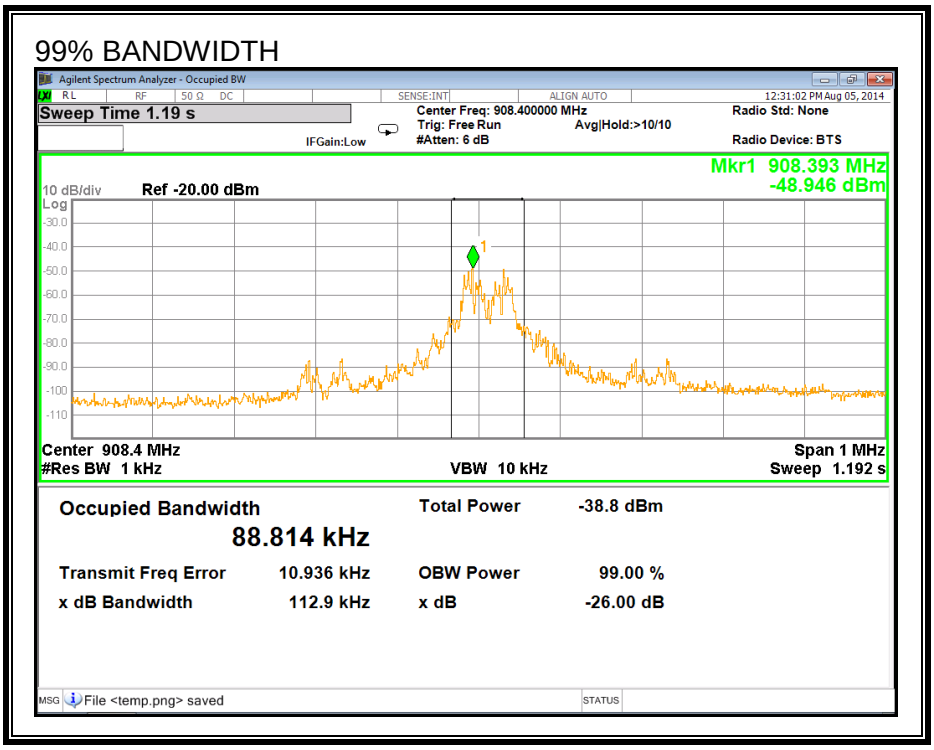
99% Bandwidth

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
908.4	88.81	2271	-2182.19

20dB BANDWIDTH



99% BANDWIDTH



7.2 RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4:2009

LIMIT

IC RSS-210, A2.9
FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

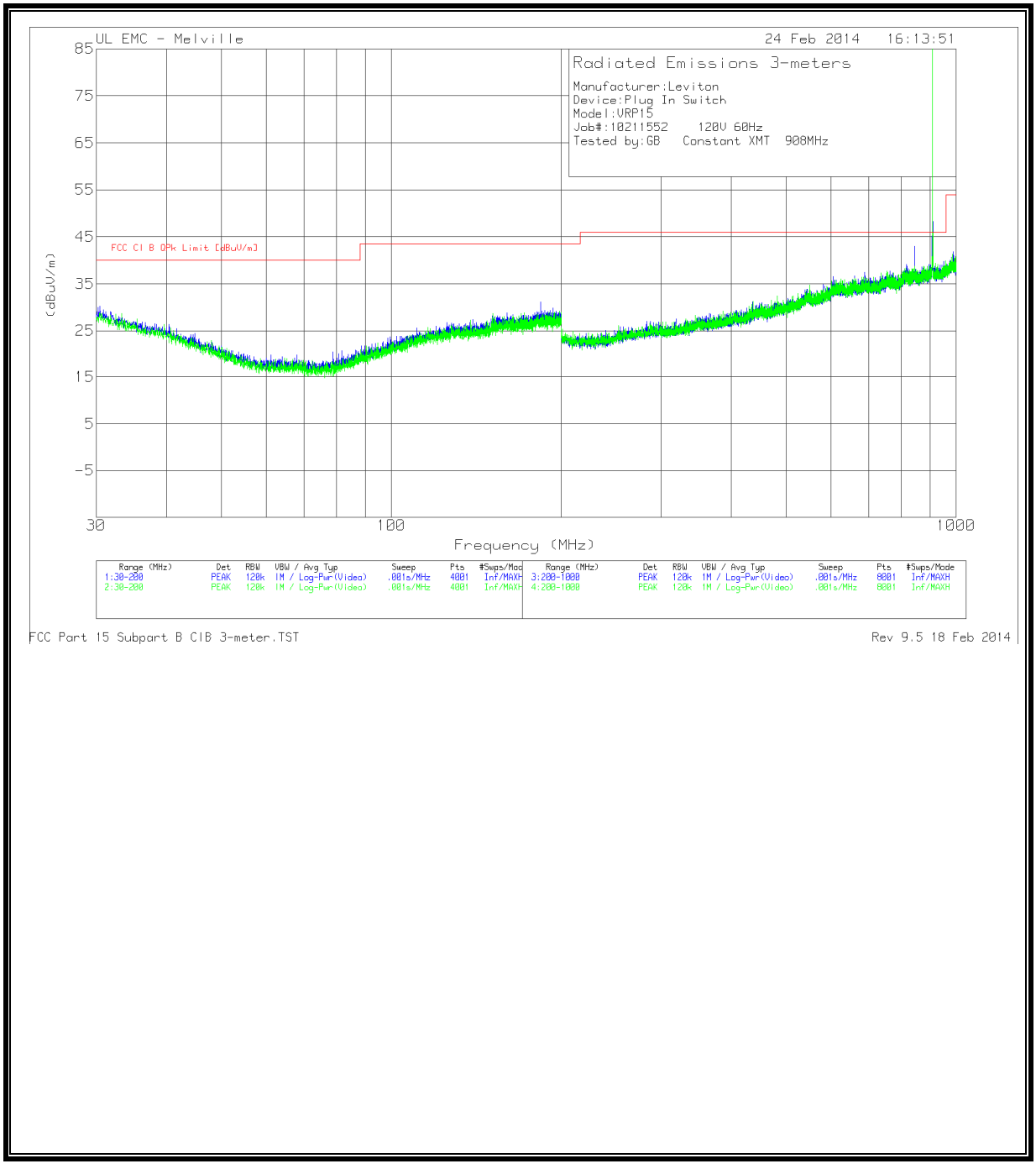
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

RESULTS

7.2.1 TX SPURIOUS EMISSION 30 TO 1000MHz (VERTICAL AND HORIZONTAL).



DATA

Radiated Emissions

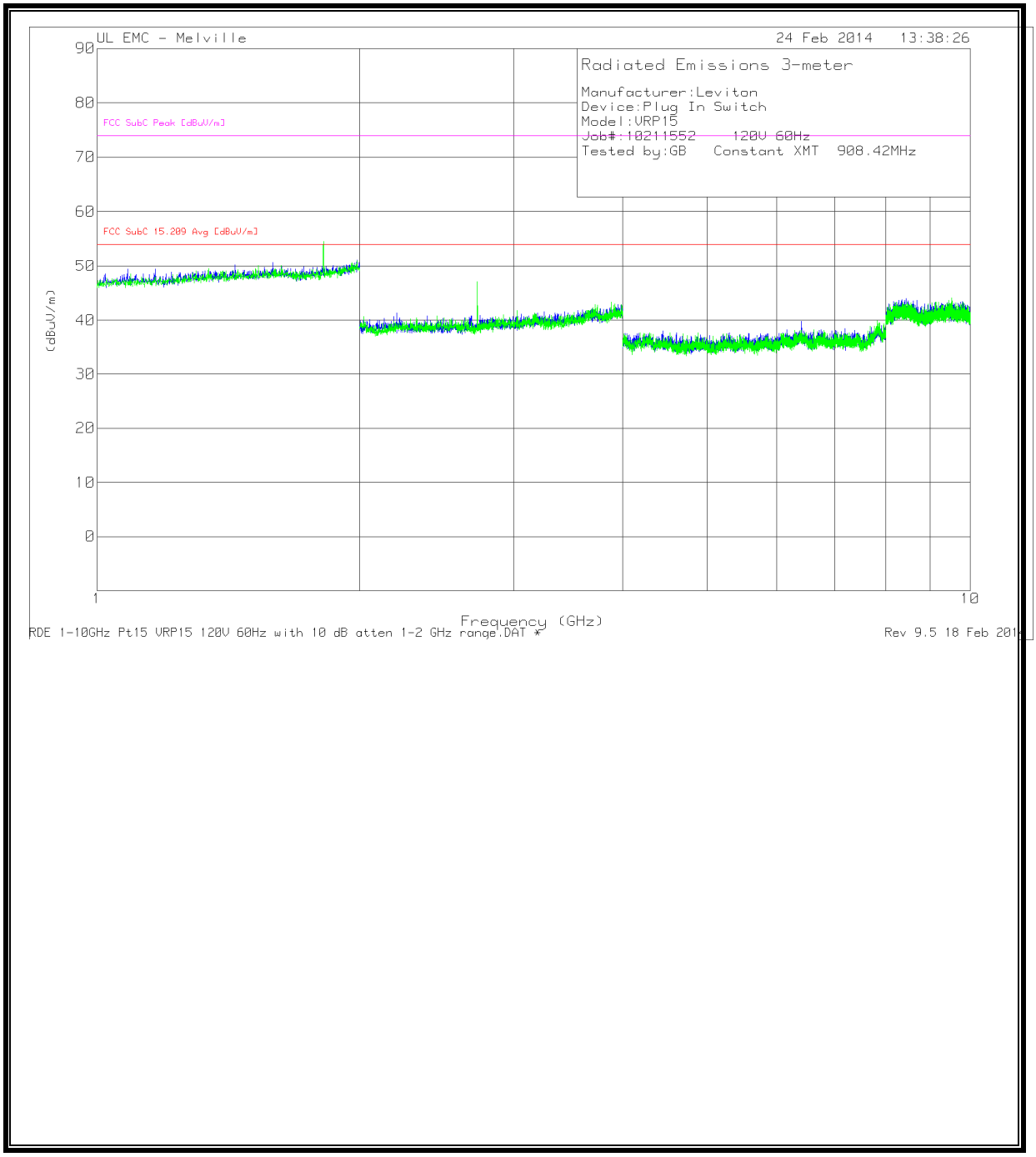
Frequency (MHz)	Meter Reading (dBuV)	Det	AF-67 [dB/m]	GL-3M [dB]	Corrected Reading (dBuV/m)	FCC Cl B QPk Limit [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
606.1	-1.37	QP	19.6	1.7	19.93	46	-26.07	116	264	H
845.7	-1.6	QP	22.6	2.1	23.1	46	-22.9	238	105	H
951.4	-1.55	QP	23.1	2.2	23.75	46	-22.25	346	398	H
990.7	-1.36	QP	24.2	2.2	25.04	54	-28.96	90	203	H
988.4	-1.41	QP	24.3	2.2	25.09	54	-28.91	174	389	H
606	-1.4	QP	19.6	1.7	19.9	46	-26.1	354	372	V

QP- Quasi Peak

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-67 [dB/m]	GL-3M [dB]	Corrected Reading (dBuV/m)	FCC Part 15 Subpart C 15.249 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
908.3844	64.98	PK	22.9	2.2	90.08	94	-3.92	212	165	H
908.3926	61.92	PK	22.9	2.2	87.02	94	-6.98	39	168	V

PK - Peak detector

7.2.2 HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF-51442 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.817	65.49	PK	21.1	-34.2	52.39	-	-	74	-21.61	0-360	100	H
1.817	67.57	PK	21.1	-34.2	54.47	-	-	74	-19.53	0-360	100	V

PK - Peak detector

Frequency (GHz)	Meter Reading (dBuV)	Det	AF-48107 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.725	65.49	PK	21.7	-42.18	45.01	-	-	74	-28.99	0-360	100	H
2.725	68.07	PK	21.2	-42.18	47.09	-	-	74	-26.91	0-360	100	V

PK - Peak detector

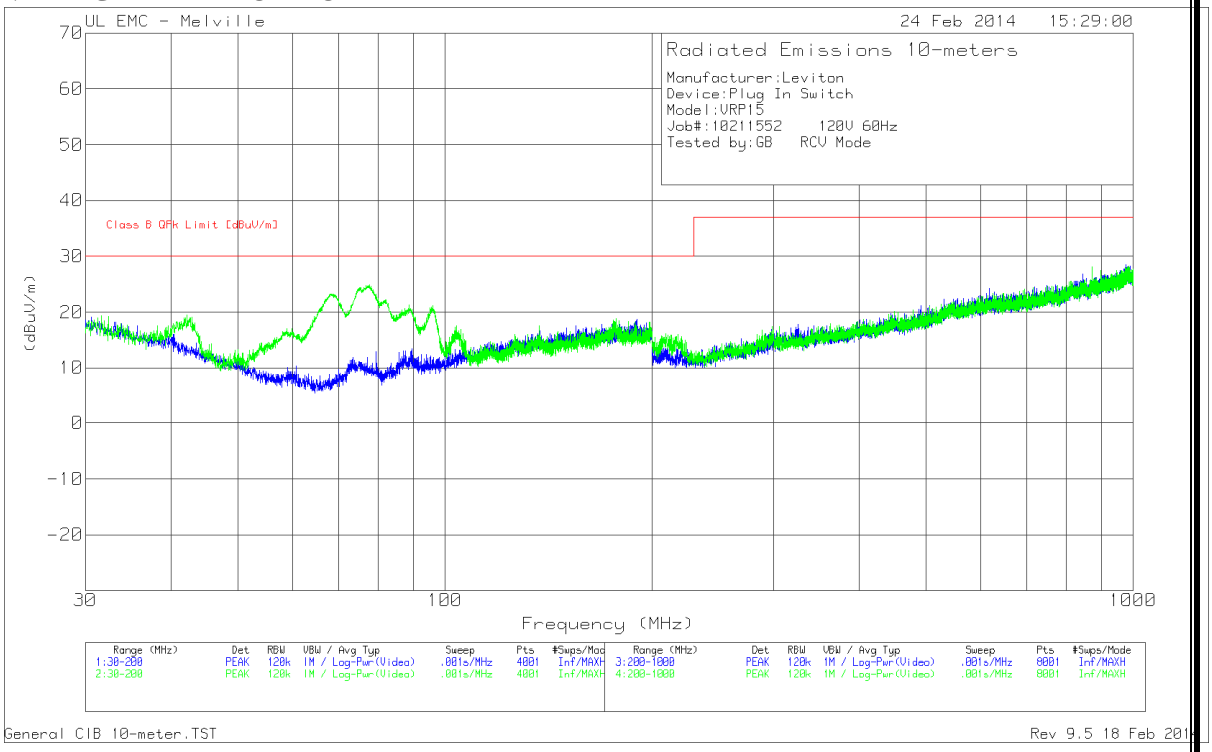
Frequency (GHz)	Meter Reading (dBuV)	Det	AF-51442 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.817	62.33	Av	21.1	-34.16	49.27	54	-4.73	-	-	102	254	V
1.817	57.18	Av	21.1	-34.18	44.1	54	-9.9	-	-	202	294	H

Frequency (GHz)	Meter Reading (dBuV)	Det	AF-48107 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.725	63.67	Av	21.7	-42.18	43.19	54	-10.81	-	-	162	258	H
2.725	63.92	Av	21.7	-42.18	43.44	54	-10.56	-	-	352	376	V

Av - Average

7.2.3 RX SPURIOUS EMISSIONS BELOW 1GHz (WORST-CASE CONFIGURATION)

VERTICAL AND HORIZONTAL DATA



DATA

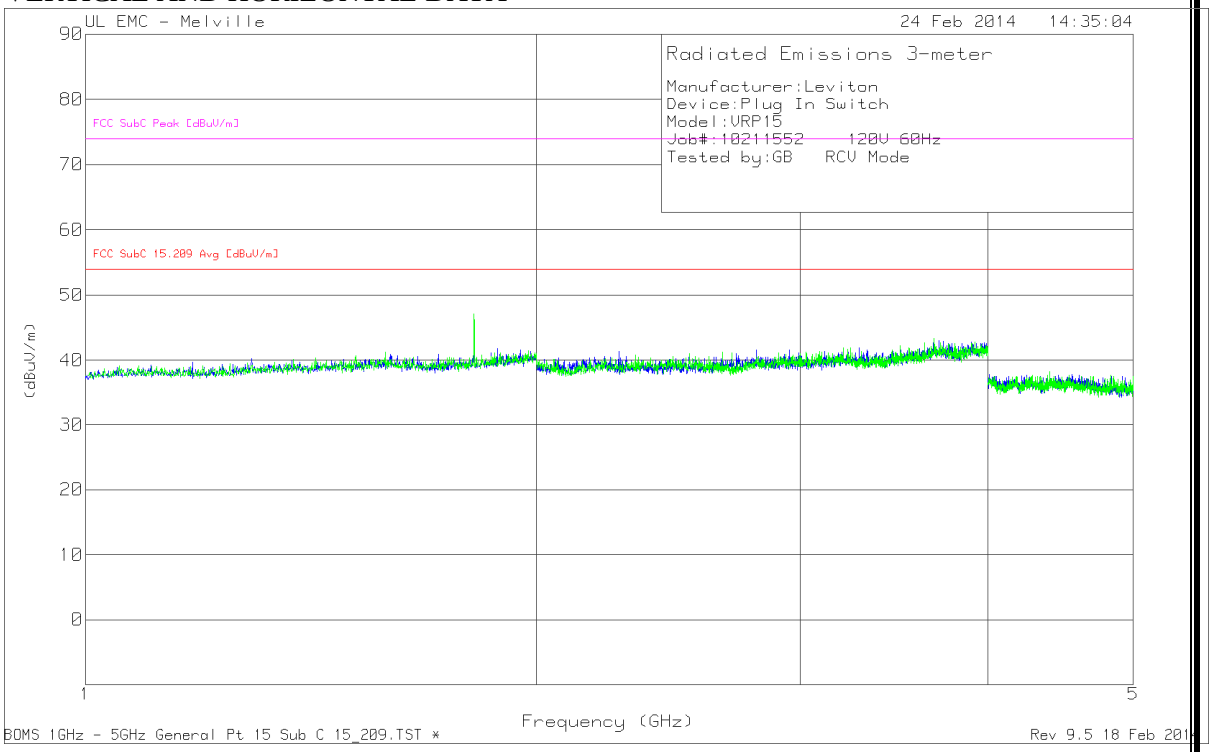
Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-41 [dB/m]	GL-A [dB]	Corrected Reading (dBuV/m)	Class B QPk Limit [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
41.6013	32.94	QP	13.5	-32.7	13.74	30	-16.26	43	177	V
68.4191	47.28	QP	6	-32.7	20.58	30	-9.42	193	279	V
77.4163	47.75	QP	7.1	-32.6	22.25	30	-7.75	120	297	V
82	44.59	QP	8.1	-32.6	20.09	30	-9.91	212	206	V
88.56	39.51	QP	9.2	-32.5	16.21	30	-13.79	249	375	V
95.96	39.94	QP	10.3	-32.5	17.74	30	-12.26	294	190	V

PK - Peak detector

7.2.4 RX SPURIOUS EMISSIONS ABOVE 1GHz (WORST-CASE CONFIGURATION)

VERTICAL AND HORIZONTAL DATA



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF-51442 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.291	64.15	PK	20.4	-44.25	40.3	54	-13.7	74	-33.7	0-360	200	H
1.585	64.21	PK	21.1	-44.03	41.28	54	-12.72	74	-32.72	0-360	99	V
1.817	69.77	PK	21.1	-43.71	47.16	54	-6.84	74	-26.84	0-360	99	V

PK - Peak detector

Frequency (GHz)	Meter Reading (dBuV)	Det	AF-48107 [dB/m]	Gain/Loss (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.27	63.09	PK	21.2	-42.89	41.4	54	-12.6	74	-32.6	0-360	200	H
2.804	62.1	PK	21.8	-42.27	41.63	54	-12.37	74	-32.37	0-360	200	H
3.283	61.41	PK	22.1	-41.56	41.95	54	-12.05	74	-32.05	0-360	200	H

PK - Peak detector

7 AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)
IC RSS-GEN, Section 7.2.2

Frequency of emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
* Decreases with the logarithm of the frequency.		

TEST PROCEDURE

ANSI C63.4

RESULTS

No non-compliance noted:

6 WORST EMISSIONS

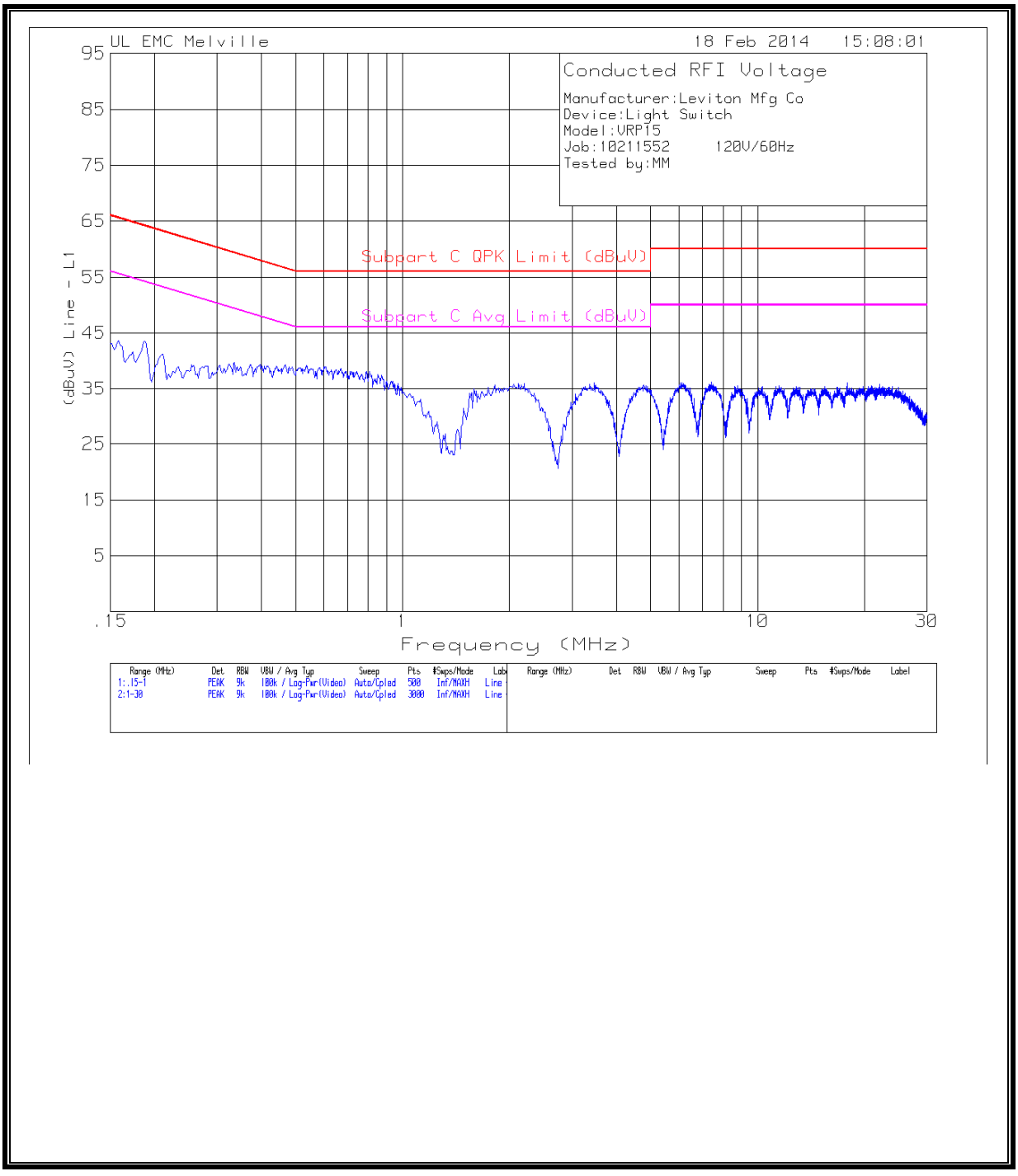
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.18748	33.46	PK	10	43.46	64.15	-20.69	54.15	-10.69
.37996	28.13	PK	10	38.13	58.28	-20.15	48.28	-10.15
2.12171	25.84	PK	10.1	35.94	56	-20.06	46	-10.06
3.4078	25.21	PK	10.1	35.31	56	-20.69	46	-10.69
7.4885	25.43	PK	10.4	35.83	60	-24.17	50	-14.17
17.72891	23.28	PK	10.9	34.18	60	-25.82	50	-15.82

PK - Peak detector

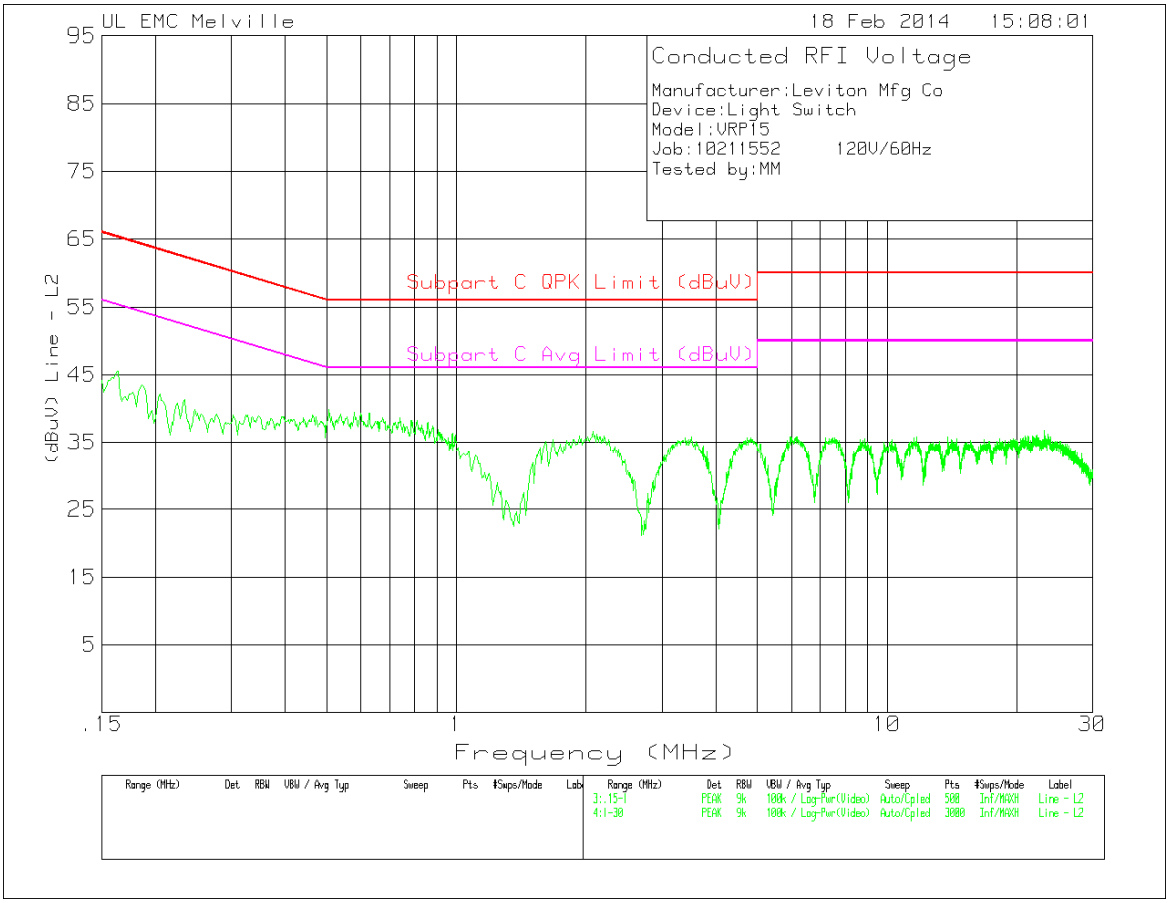
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 2 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.16363	35.57	PK	10	45.57	65.28	-19.71	55.28	-9.71
.23176	30.95	PK	10	40.95	62.39	-21.44	52.39	-11.44
.83136	27.47	PK	10.1	37.57	56	-18.43	46	-8.43
4.7906	25.28	PK	10.2	35.48	56	-20.52	46	-10.52
11.78193	23.85	PK	10.9	34.75	60	-25.25	50	-15.25
23.52117	23.59	PK	11.5	35.09	60	-24.91	50	-14.91

PK - Peak detector

LINE 1 RESULTS



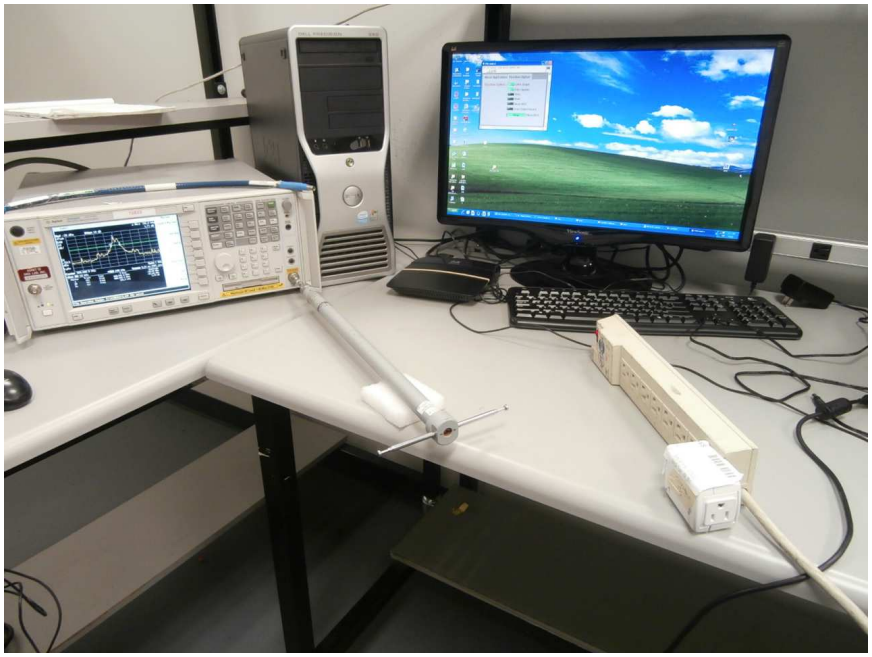
LINE 2 RESULTS



8 SETUP PHOTOS

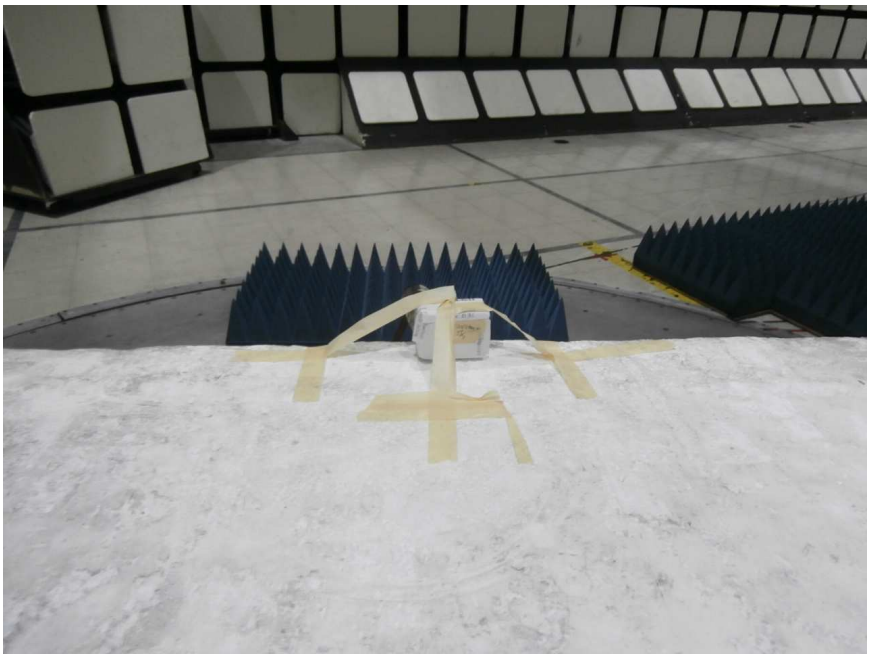
ANTENNA PORT MEASUREMENT SETUP

ANTENNA PORT PHOTO

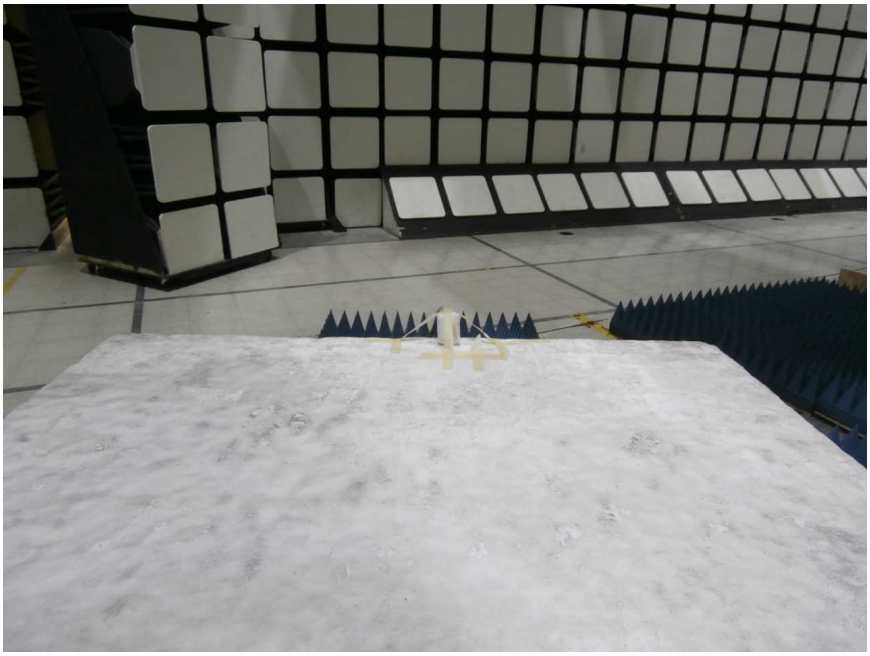


RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

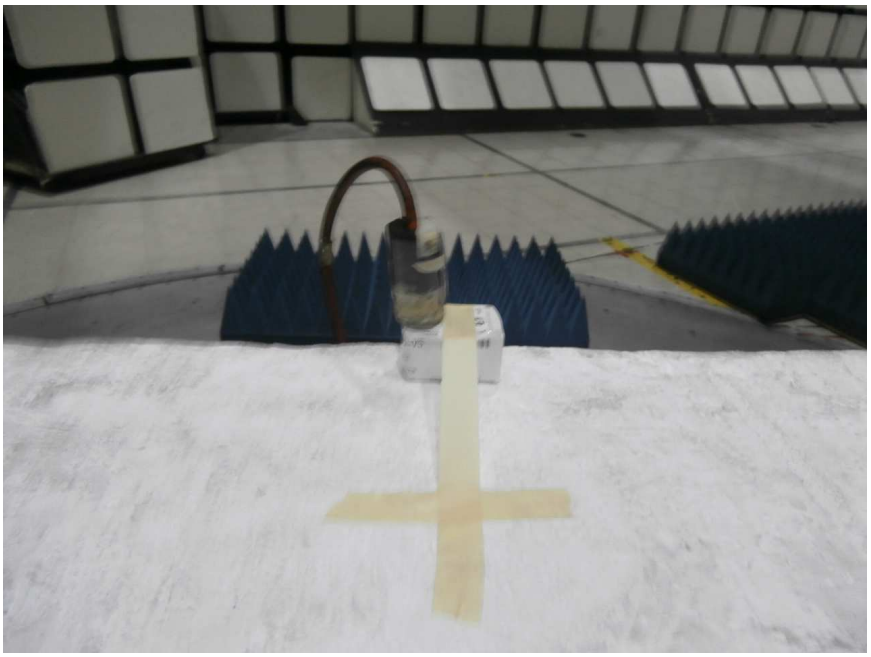
X-AXIS FRONT PHOTO



Y-AXIS FRONT PHOTO

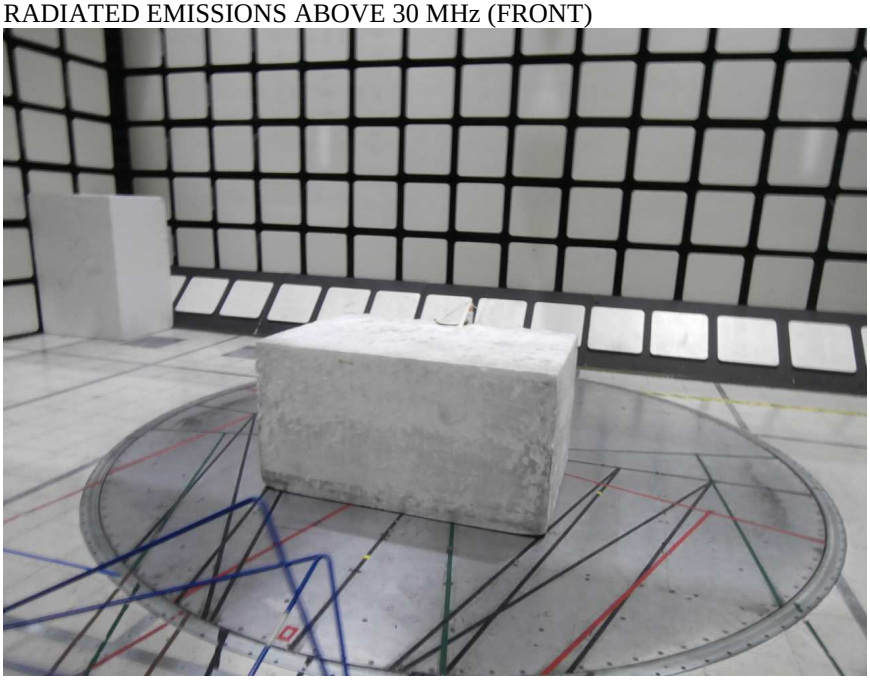


Z-AXIS FRONT PHOTO

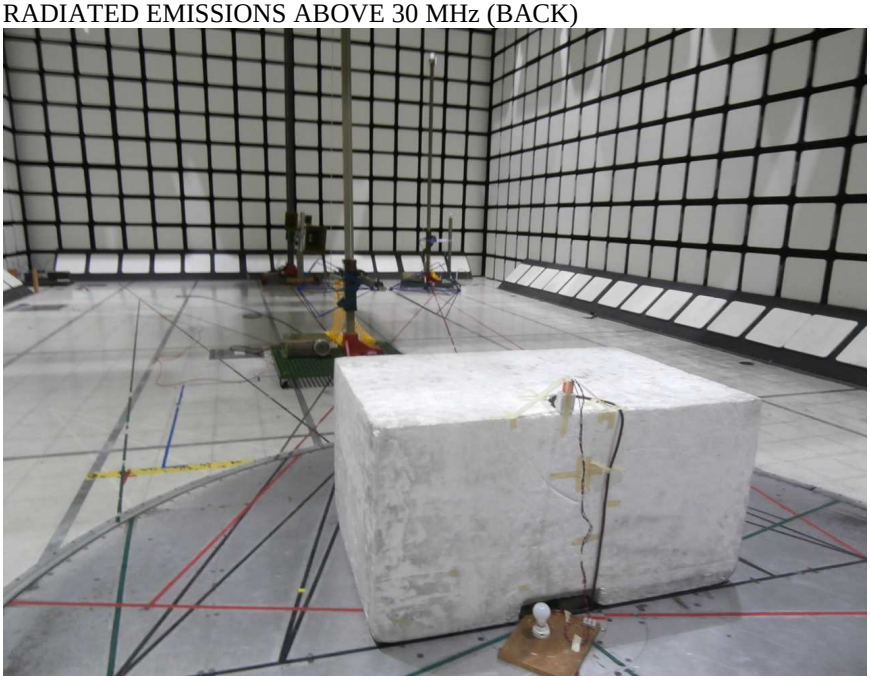


RADIATED EMISSION ABOVE 30 MHz

RADIATED EMISSIONS ABOVE 30 MHz (FRONT)

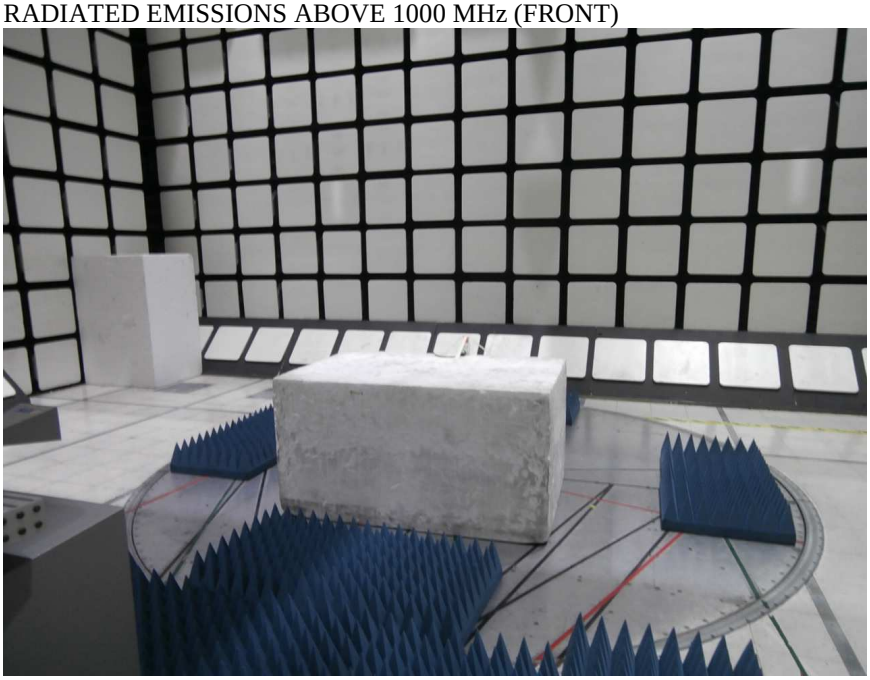


RADIATED EMISSIONS ABOVE 30 MHz (BACK)

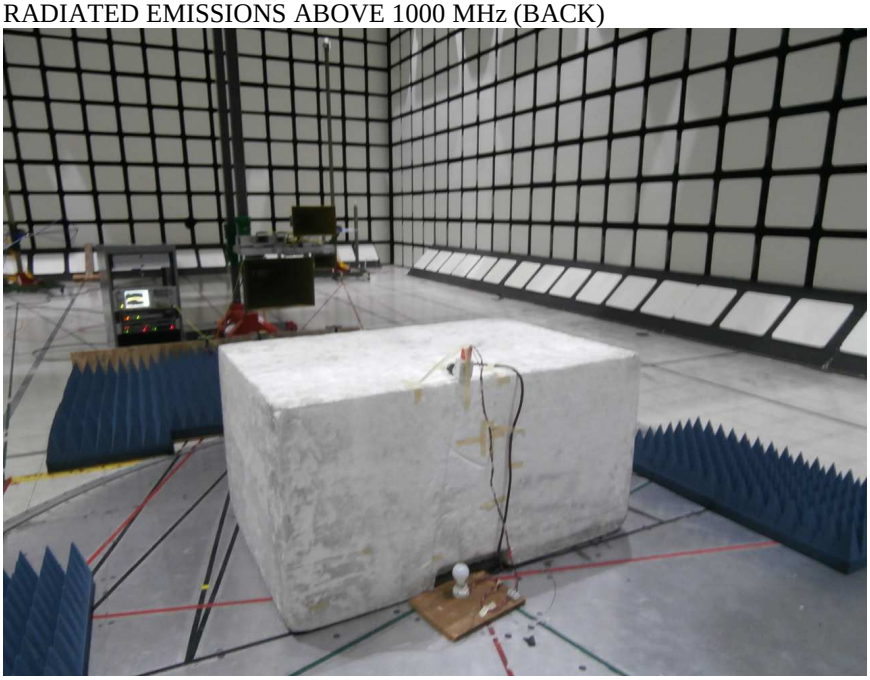


RADIATED EMISSION ABOVE 1000MHz

RADIATED EMISSIONS ABOVE 1000 MHz (FRONT)



RADIATED EMISSIONS ABOVE 1000 MHz (BACK)



AC MAINS LINE CONDUCTED EMISSION

LINE CONDUCTED EMISSION (FRONT)

LINE CONDUCTED EMISSION (BACK)

END OF REPORT

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