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

CERTIFICATION TEST REPORT

FOR

CONTROLLER

MODEL NUMBER: M8936

FCC ID: AVHM8936
IC: 10329A-M8936

REPORT NUMBER: 10451636

ISSUE DATE: 2014-09-11

Prepared for
PARTECH INC
8383 SENECA TPKE
NEW HAVEN
CT, 13413, USA

Prepared by
UL LLC
1285 WALT WHITMAN RD.
MELVILLE, NY 11747, U.S.A.
TEL: (631) 271-6200
FAX: (877) 854-3577

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	9/11/14	Initial Issue	M. Antola

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PARTECH INC
8383 SENECA TPKE
NEW HARTFORD, CT, 13413, USA

EUT DESCRIPTION: MULTIFUNCTION TEMPERATURE PROBE

MODEL: M8936

SERIAL NUMBER: NON-SERIALIZED PRODUCTION UNIT

DATE TESTED: 8/13/14 – 8/14/14, 9/11/14

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8, Annex 2	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. All indications of Pass/Fail in this report are opinions expressed by UL LLC 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 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 LLC By:

BOB DELISI
PRINCIPAL ENGINEER
UL LLC

Tested By:

MICHAEL ANTOLA
PROJECT LEAD
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 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:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.3 dB
Radiated Disturbance, Below 30MHz	± 3.06 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld multifunction temperature probe that contains an RFID module operating at 13.56MHz and uses an ASK modulation scheme.

The device also contain a pre-approved Bluetooth modeule. This modeule is manufacturerd by Panasonci and the Model Number is PAN1326 (FCC ID: T7V1316, IC ID: 216Q-1316).

5.2. MAXIMUM OUTPUT POWER

The testing was performed at a 3-meter distance. The transmitter maximum E-field when, extrapolated to a 30-meter distance, is 26.96dBuV/m.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral PCB trace antenna, with a return loss of -2.25 dB.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was ver. R112.

5.5. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its fundamental and only operational frequency of 13.56MHz. Preliminary investigation of the EUT was made in all orientations. The EUT was tested in its worse-case configuration, which was seated in the charge cradle with the cradled powered by an AC source.

5.6. MODIFICATIONS

No modifications were made during testing.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	Partech	K8935	SA13C01270	N/A
AC Adapter	Elementech Intl Co., Ltd.	AU1050501u	J13100502R	N/A

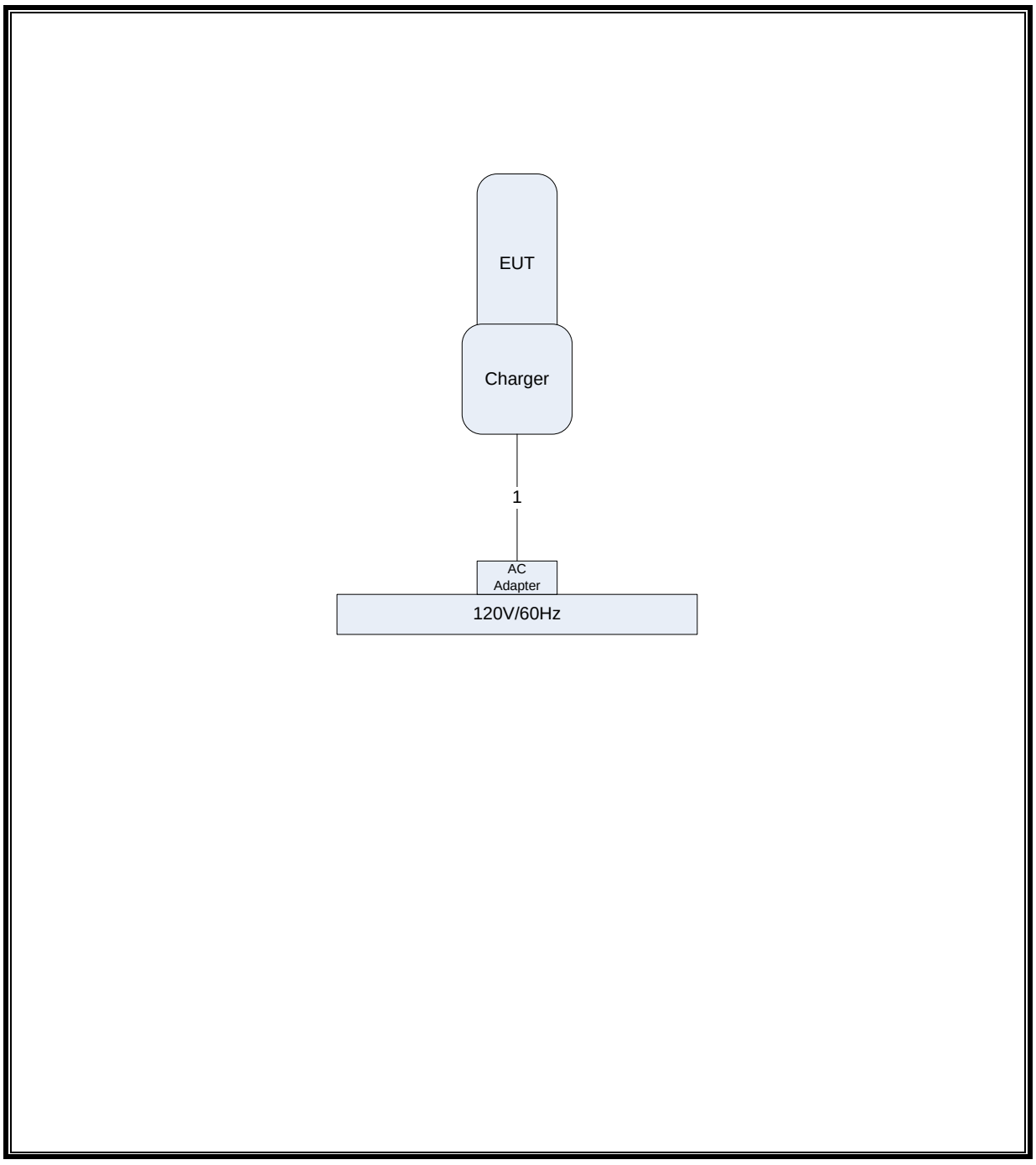
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Shielded	<3M	None

TEST SETUP

The EUT is installed in charger during testing. This is deemed worse-case with respect to the digital emissions.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

RADIATED EMISSIONS					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due
9kHz-1000MHz					
EMI Receiver	Rohde & Schwarz	ESCI7	75141	2014-01-29	2015-01-31
Active Loop Antenna	EMCO	6507	ME5A-288	2013-12-02	2014-12-02
Hybrid Antenna	Sunol	JB-1	84106	2014-02-19	2015-02-19
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
Multimeter	Fluke	87V	64386	2014-01-28	2015-01-31
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22

CONDUCTED EMISSIONS					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2014-04-09	2015-04-09
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	2014-03-24	2016-04-24
Multimeter	Fluke	87V	64386	2014-01-28	2015-01-31
Solid Room					
EMI Receiver	Rohde & Schwarz	ESR	85496	2014-05-23	2015-05-23
LISN	Solar	9252-50-R-24-BNC	47367	2014-01-28	2015-01-31
Switch Driver	HP	11713A	44403	N/A	N/A
RF Switch Box	UL	2	44400	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2014-03-24	2016-04-24
Multimeter	Fluke	87V	64386	2014-01-28	2015-01-31

BENCH TESTS					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 1					
Spectrum Analyzer	Agilent	N9030A	85671	2014-06-27	2015-06-27
Loop Antenna	EMCO	-	-	N/A	N/A
Thermal Chamber	Cincinatti Sub Zero	ZPH-8-3.5-SCT/AC	76023	2014-05-12	2015-05-12
Multimeter	Fluke	87V	64386	2014-01-28	2015-01-31
Variac	Staco Energy	3PN1520B	-	N/A	N/A

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225
IC RSS-210, Section 2.6 (Transmitter)
IC RSS-GEN, Section 6 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C64.10: 2013

The EUT is an intentional radiator incorporated into a digital device. The highest fundamental frequency generated or used in the device is 13.56MHz. The frequency range was investigated from 9 kHz to the 10th harmonic of the highest fundamental frequency, or 1000MHz, whichever is greater (1000MHz).

RESULTS

No non-compliance noted.

7.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

Frequency (MHz)	Meter Reading (dBuV)	Det	AF-5A288 [dB/m]	GL-3M [dB]	Distance Correction [dB]	Corrected Reading (dBuV/m)	FCC Pt15 SubC 15.225 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Loop Orientation
13.562	49.77	PK	16.7	.5	-40	26.97	84	-57.53	40	1
13.56	34.35	PK	16.7	0.5	-40	11.55	84	-72.45	52	2

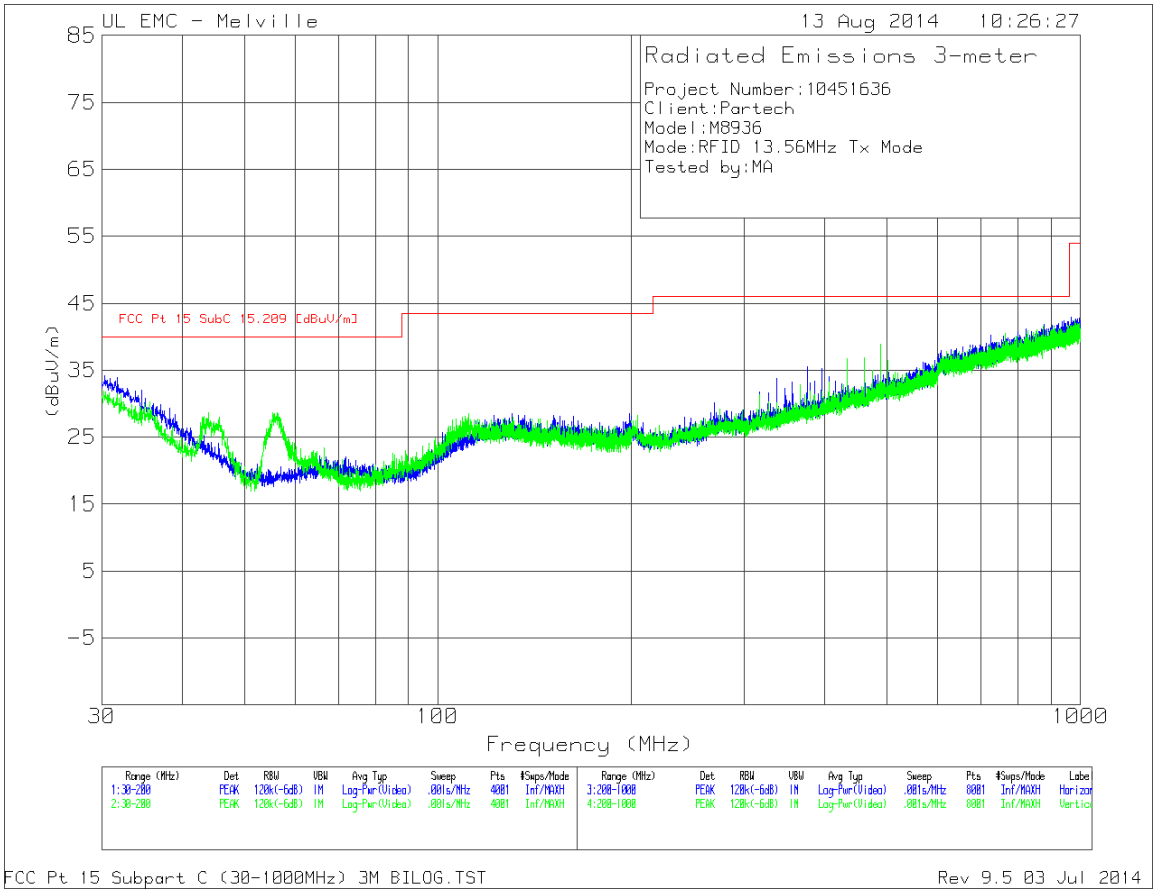
1 – Loop vertical, rotated about its axis

2 – Loop horizontal, pointed at the EUT

PK - Peak detector

NOTE: No additional emissions detected above the system noise floor.

7.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz



Frequency (MHz)	Meter Reading (dBuV)	Det	AF-84106 [dB/m]	GL [dB]	Corrected Reading (dBuV/m)	FCC Pt 15 SubC 15.209 [dBuV/m]	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
31.7	12.34	PK	20.8	.8	33.94	40	-6.06	0-360	100	H
34.59	12.63	PK	18.6	.8	32.03	40	-7.97	0-360	250	H
35.6525	13.42	PK	16	.8	30.22	40	-9.78	0-360	100	V
43.8975	17.67	PK	10.1	.9	28.67	40	-11.33	0-360	100	V
56.1375	20.1	PK	7.4	1.1	28.6	40	-11.4	0-360	100	V
376.1	16.86	PK	15.7	2.9	35.46	46	-10.54	0-360	100	H
336.5	16.38	PK	14.6	2.8	33.78	46	-12.22	0-360	100	H
488.1	17.75	PK	17.7	3.4	38.85	46	-7.15	0-360	99	V
461	16.92	PK	16.8	3.2	36.92	46	-9.08	0-360	99	V
433.9	16.95	PK	16.6	3.2	36.75	46	-9.25	0-360	99	V

PK - Peak detector

8. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 7.2.2

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (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
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

ANSI C63.10: 2013

RESULTS

No non-compliance noted:

The EUT was tested with the antenna connected, then again with antenna removed and antenna port terminated since the fundamental emission was present on the conducted scans.

WORST EMISSIONS – WITH ANTENNA CONNECTED

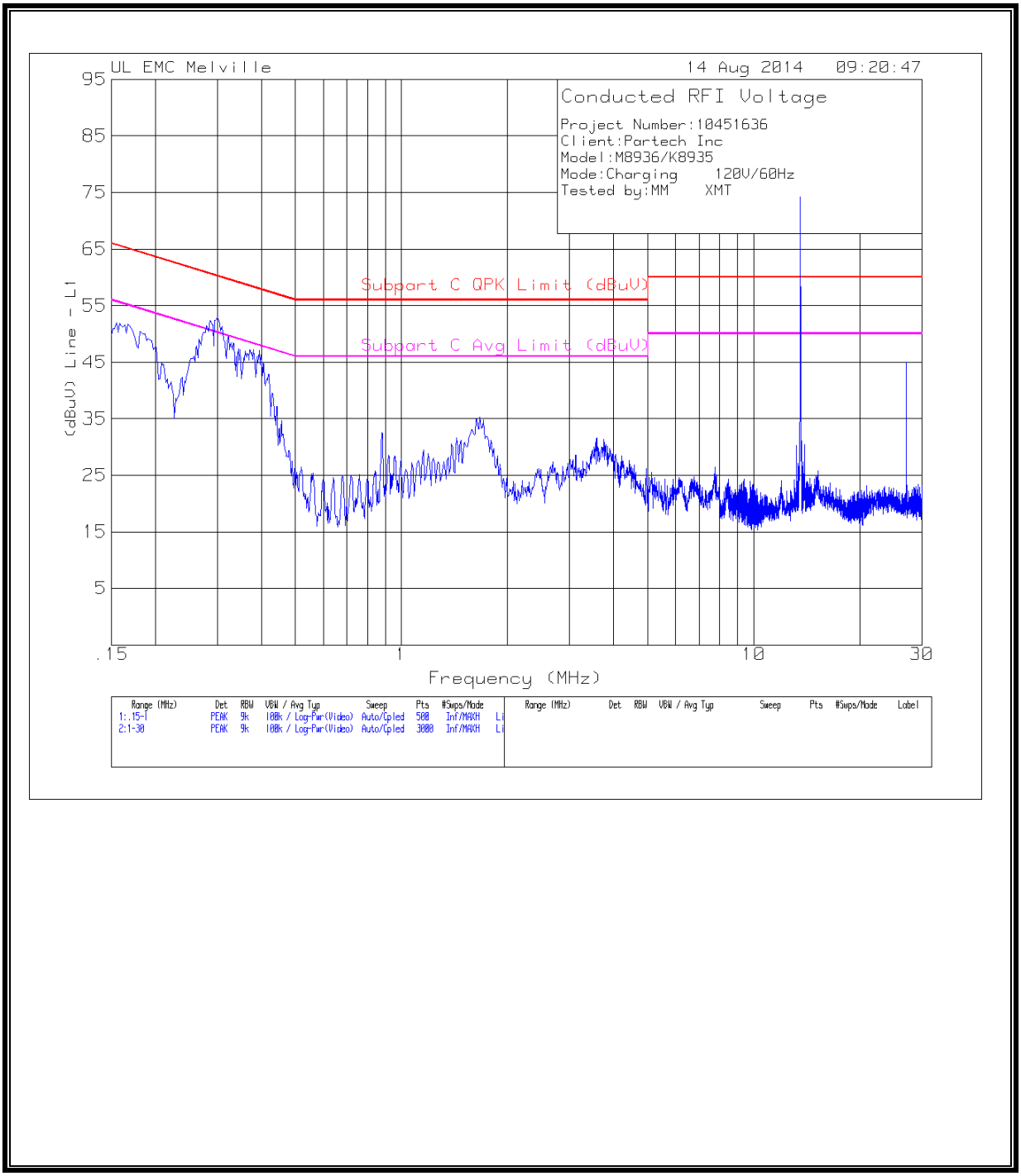
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.163753	16.16	CAV	10	26.16	-	-	55.27	-29.11
.27783	16.09	CAV	10	26.09	-	-	50.88	-24.79
.28716	14.61	CAV	10	24.61	-	-	50.61	-26
.317873	14.35	CAV	10	24.35	-	-	49.76	-25.41
.343743	8.41	CAV	10	18.41	-	-	49.11	-30.7
.378083	7.3	CAV	10	17.3	-	-	48.32	-31.02
13.5597	58.88	CAV	10.8	69.68	-	-	**50**	**19.68**
27.119125	20.19	CAV	11.8	31.99	-	-	50	-18.01
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)**
.175323	14.43	CAV	10	24.43	-	-	54.7	-30.27
.269303	11.08	CAV	10	21.08	-	-	51.14	-30.06
.290325	13.71	CAV	10	23.71	-	-	50.52	-26.81
.337788	8.41	CAV	10	18.41	-	-	49.26	-30.85
.379048	7.1	CAV	10	17.1	-	-	48.3	-31.2
13.559725	55.58	CAV	10.9	66.48	-	-	**50**	**16.48**
27.11955	15.8	CAV	11.9	27.7	-	-	50	-22.3

CAV - CISPR average detection

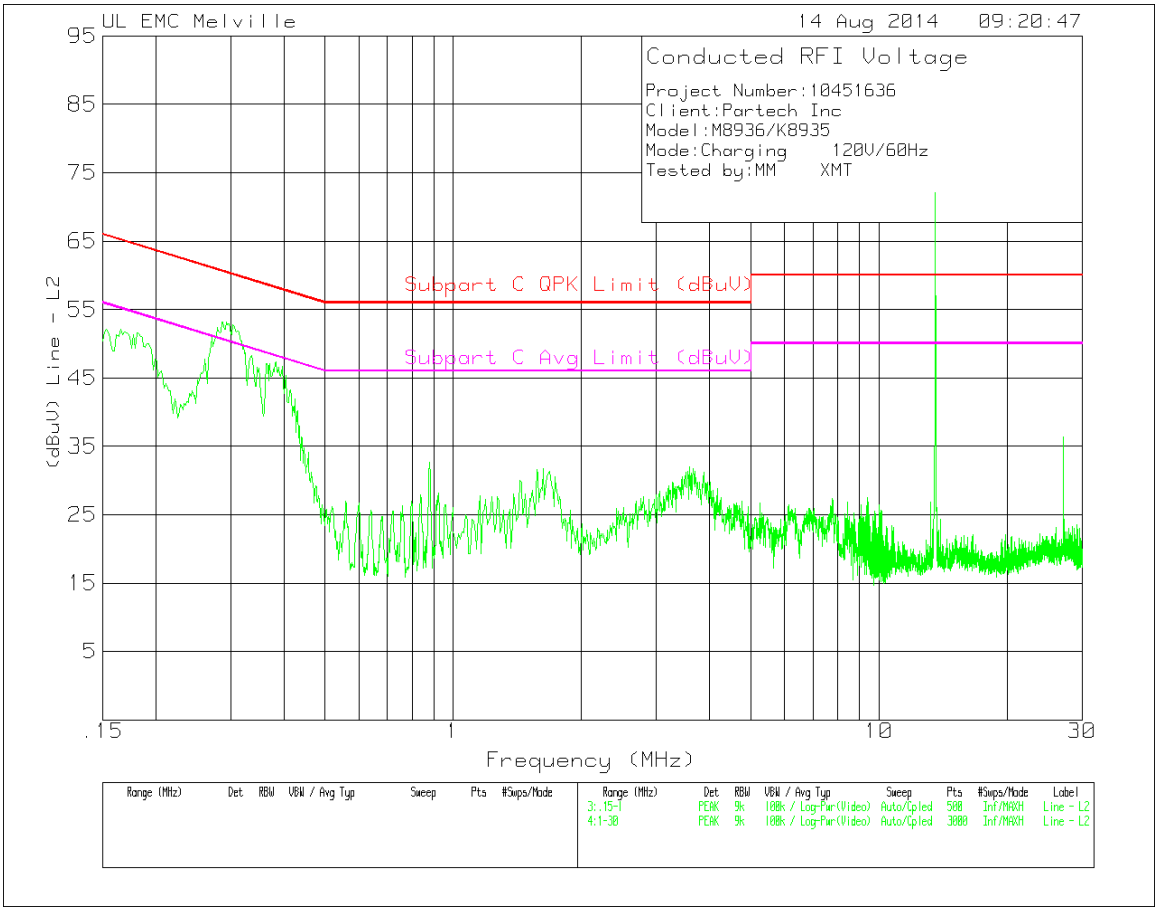
Frequency (MHz)	Meter Reading (dBuV)	Det	Line 1 G/L (dB)	Corrected Reading (dBuV)	Subpart C QPK Limit (dBuV)	Margin (dB)	Subpart C Avg Limit (dBuV)	Margin (dB)
.163753	33.67	QP	10	43.67	65.27	-21.6	-	-
.27783	33.13	QP	10	43.13	60.88	-17.75	-	-
.28716	34.83	QP	10	44.83	60.61	-15.78	-	-
.317873	31.37	QP	10	41.37	59.76	-18.39	-	-
.343743	27.65	QP	10	37.65	59.11	-21.46	-	-
.378083	27.69	QP	10	37.69	58.32	-20.63	-	-
13.5597	63.2	QP	10.8	74	**60**	**14**	-	-
27.119125	31.03	QP	11.8	42.83	60	-17.17	-	-
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)**
.175323	34.05	QP	10	44.05	64.7	-20.65	-	-
.269303	31.34	QP	10	41.34	61.14	-19.8	-	-
.290325	35.27	QP	10	45.27	60.52	-15.25	-	-
.337788	28.29	QP	10	38.29	59.26	-20.97	-	-
.379048	27.58	QP	10	37.58	58.3	-20.72	-	-
13.559725	59.68	QP	10.9	70.58	**60**	**10.58**	-	-
27.11955	23.92	QP	11.9	35.82	60	-24.18	-	-

QP - Quasi-Peak detector

LINE 1 RESULTS – WITH ANTENNA CONNECTED



LINE 2 RESULTS – WITH ANTENNA CONNECTED

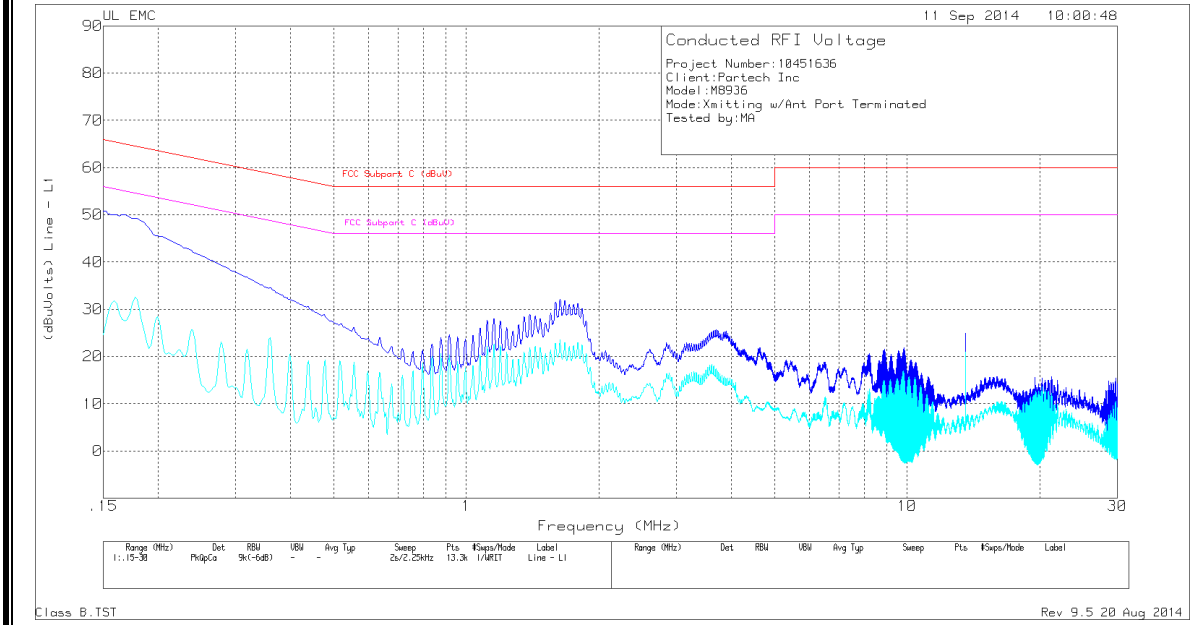


WORST EMISSIONS – WITH ANTENNA PORT TERMINATED

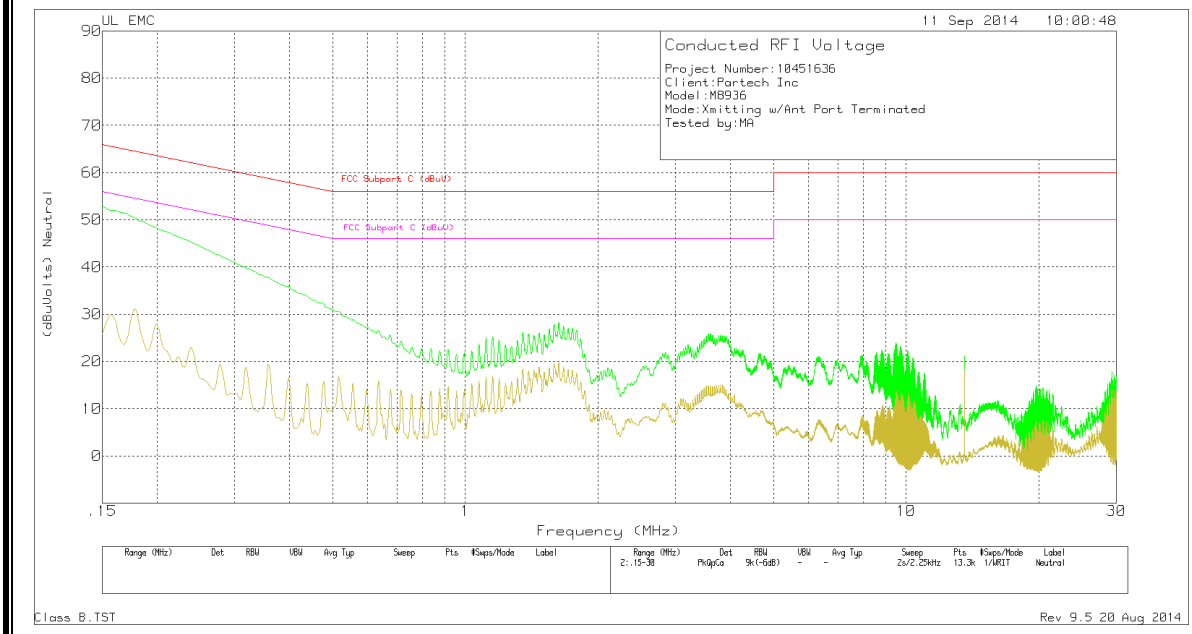
Frequency (MHz)	Meter Reading (dBuV)	Det	K1SWTL (dB)	Corrected Reading (dBuVolts)	FCC Subpart C QPk (dBuV)	QP Margin (dB)	FCC Subpart C Avg (dBuV)	Av(CISPR)Margin (dB)
.15225	17.29	Ca	10	27.29	-	-	55.88	-28.59
.18825	13.13	Ca	10	23.13	-	-	54.11	-30.98
.28275	9.46	Ca	10	19.46	-	-	50.73	-31.27
1.671	12.78	Ca	10.1	22.88	-	-	46	-23.12
13.56	10.62	Ca	10.3	20.92	-	-	50	-29.08
27.1185	-5.06	Ca	10.5	5.44	-	-	50	-44.56
.15225	40.78	Qp	10	50.78	65.88	-15.1	-	-
.18825	37.78	Qp	10	47.78	64.11	-16.33	-	-
.28275	28.94	Qp	10	38.94	60.73	-21.79	-	-
1.671	21.7	Qp	10.1	31.8	56	-24.2	-	-
13.56	14.65	Qp	10.3	24.95	60	-35.05	-	-
27.1185	-.02	Qp	10.5	10.48	60	-49.52	-	-
Frequency (MHz)	**Meter Reading (dBuV)**	**Det**	**K2SWTL (dB)**	**Corrected Reading (dBuVolts)**	**FCC Subpart C QPk (dBuV)**	**QP Margin (dB)**	**FCC Subpart C Avg (dBuV)**	**Av(CISPR)Margin (dB)**
.16125	18.23	Ca	10	28.23	-	-	55.4	-27.17
.27375	6.47	Ca	10	16.47	-	-	51	-34.53
1.6305	9.66	Ca	10.1	19.76	-	-	46	-26.24
3.75	3.56	Ca	10.1	13.66	-	-	46	-32.34
13.56	7.96	Ca	10.3	18.26	-	-	50	-31.74
26.36925	-6.61	Ca	10.5	3.89	-	-	50	-46.11
.16125	42.01	Qp	10	52.01	65.4	-13.39	-	-
.27375	32.6	Qp	10	42.6	61	-18.4	-	-
1.6305	18.17	Qp	10.1	28.27	56	-27.73	-	-
3.75	14.41	Qp	10.1	24.51	56	-31.49	-	-
13.56	10.93	Qp	10.3	21.23	60	-38.77	-	-
26.36925	-1.77	Qp	10.5	8.73	60	-51.27	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 1 RESULTS – WITH ANTENNA PORT TERMINATED



LINE 2 RESULTS – WITH ANTENNA PORT TERMINATED



9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC **Limit: ± 100 ppm = 135.596 kHz**				
Power Supply (Vac)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
115.00	50	13.5598893	-0.246	± 100
115.00	40	13.5596919	-0.101	± 100
115.00	30	13.5598670	-0.230	± 100
115.00	***20***	***13.5595554***	***0.000***	***± 100***
115.00	10	13.5596671	-0.082	± 100
115.00	0	13.5597107	-0.115	± 100
115.00	-10	13.5596979	-0.105	± 100
115.00	-20	13.5597576	-0.149	± 100
97.15	20	13.5597228	-0.123	± 100
132.25	20	13.5597423	-0.138	± 100

10. 20dB OBW & 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

20dB Bandwidth: The RBW is set to 10 KHz. The VBW is set to 100 KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

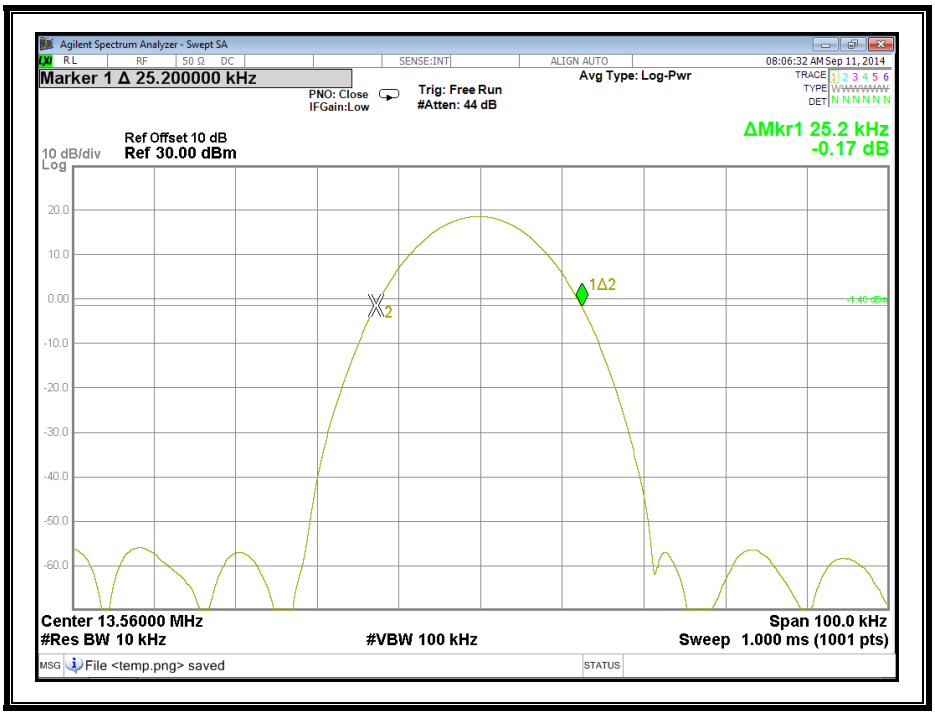
99% Bandwidth: The RBW is set to 10 KHz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

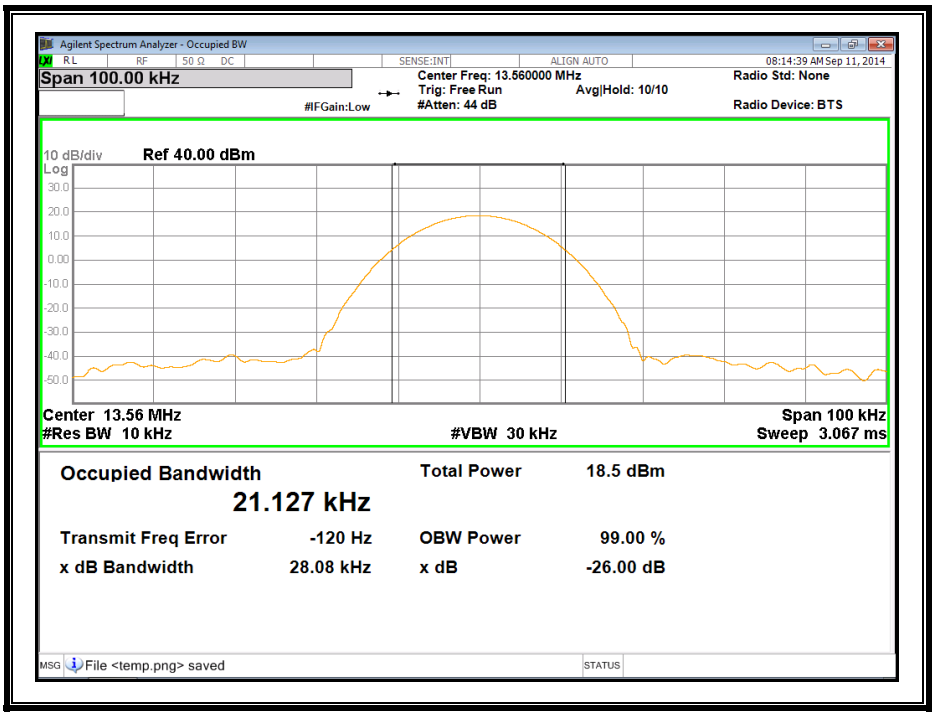
Frequency (kHz)	20dB Bandwidth (KHz)
13.56	25.2

Frequency (kHz)	99% Bandwidth (KHz)
13.56	21.127

20dB BANDWIDTH



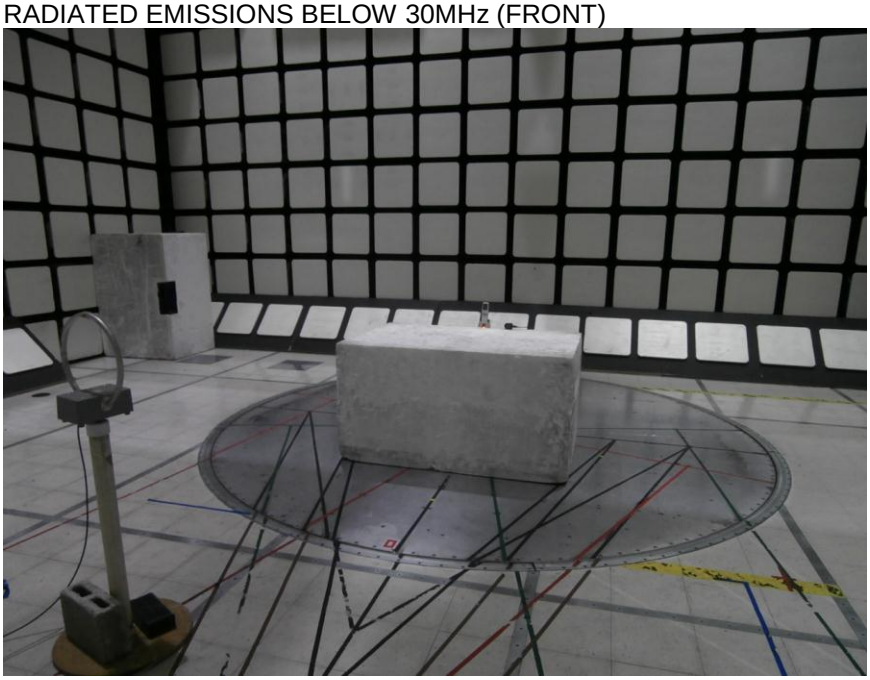
99% BANDWIDTH



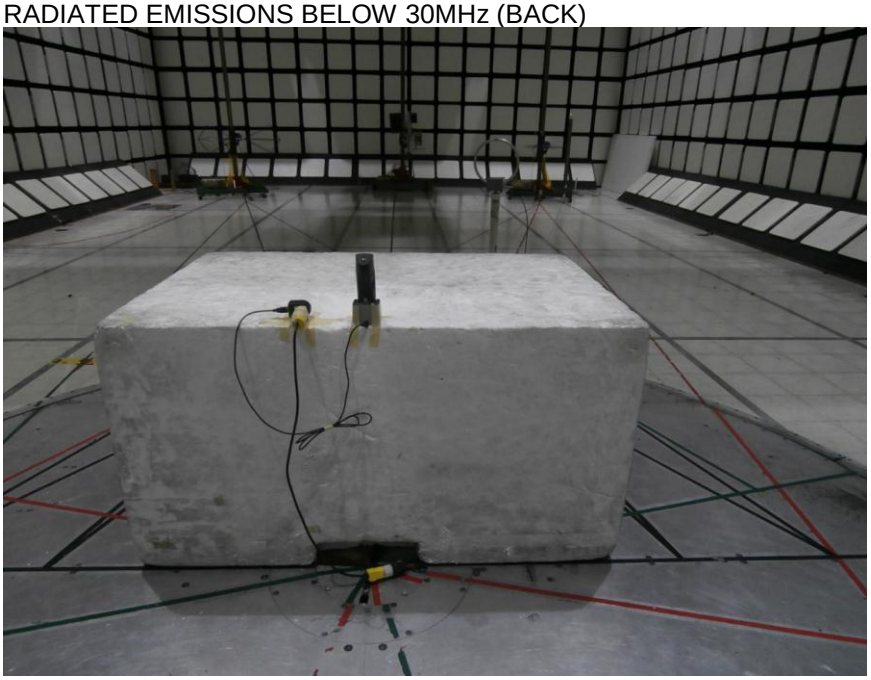
11. SETUP PHOTOS

RADIATED EMISSION BELOW 30 MHz

RADIATED EMISSIONS BELOW 30MHz (FRONT)

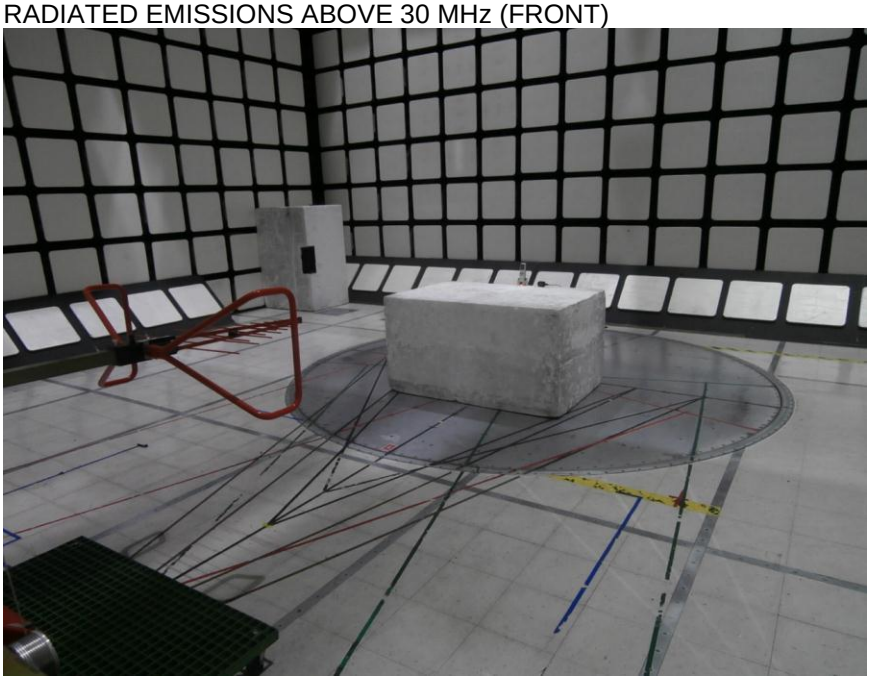


RADIATED EMISSIONS BELOW 30MHz (BACK)

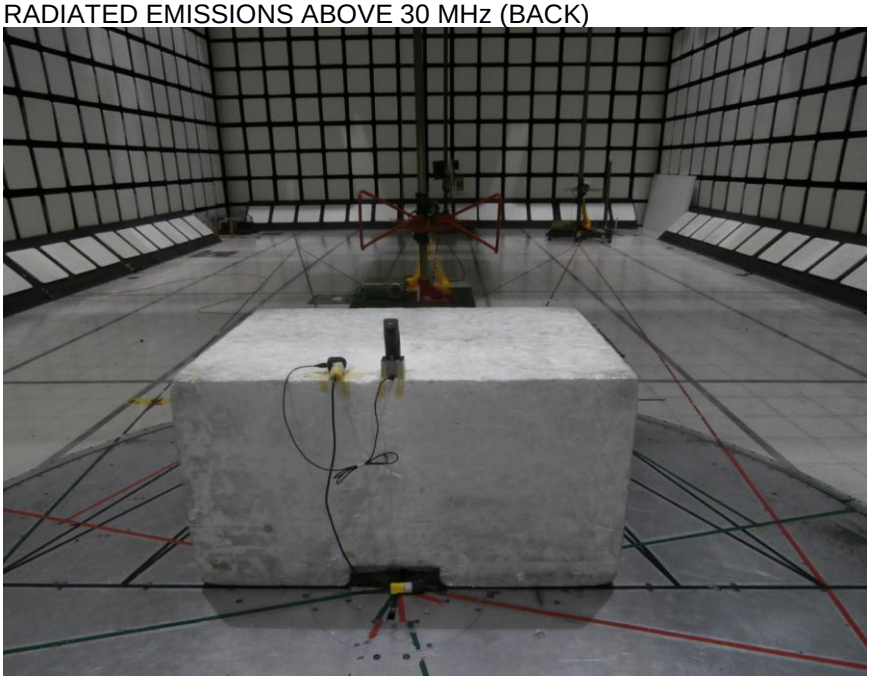


RADIATED EMISSION ABOVE 30 MHz

RADIATED EMISSIONS ABOVE 30 MHz (FRONT)

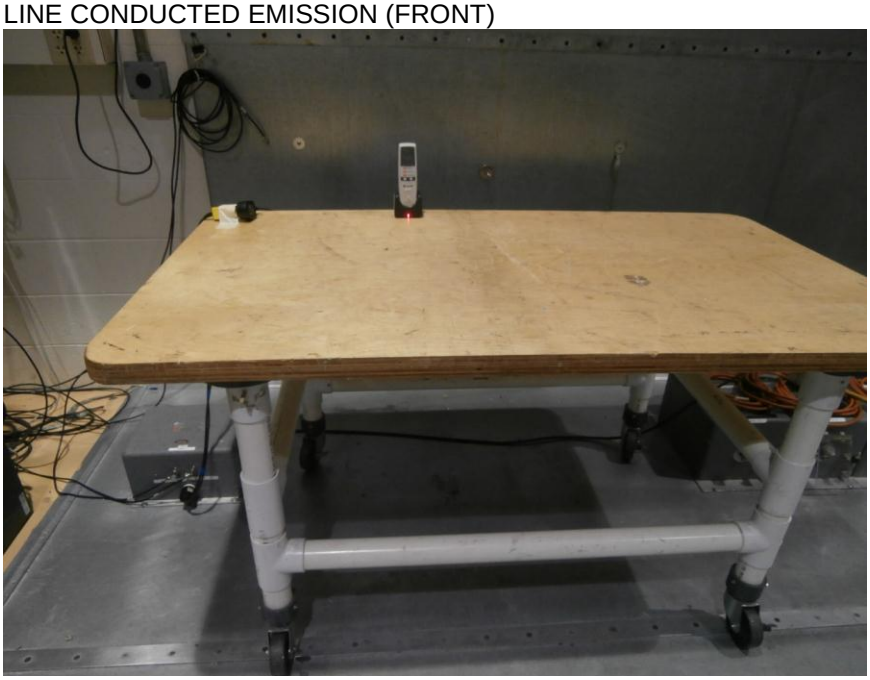


RADIATED EMISSIONS ABOVE 30 MHz (BACK)



AC MAINS LINE CONDUCTED EMISSION

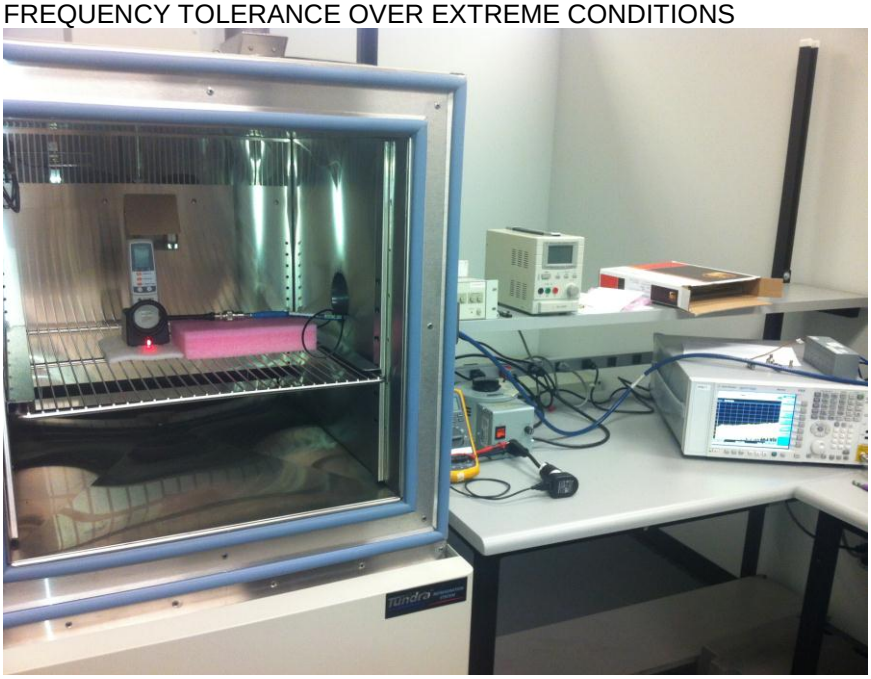
LINE CONDUCTED EMISSION (FRONT)



LINE CONDUCTED EMISSION (BACK)

FREQUENCY TOLERANCE OVER EXTREME CONDITIONS

FREQUENCY TOLERANCE OVER EXTREME CONDITIONS



END OF REPORT