Report Number:	12380932-E8V3
Issue Date:	8/10/2018
FCC ID:	PY7-12644J
EUT:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

Electromagnetic Compatibility Test Report

For

SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA
SHINAGAWA-KU, TOKYO, 140-0002, JAPAN

Copyright © 2012 UL LLC

UL LLC authorizes the above-named company to reproduce this Report provided it is reproduced in its entirety.

Test Report Details

Tests Performed By:	UL Verification Services 47173 Benicia Street, Fremont, CA 94538
Tests Performed For:	SONY MOBILE COMMUNICATIONS, INC. 4-12-3 HIGASHI-SHINAGAWA SHINAGAWA-KU, TOKYO, 140-0002, JAPAN
Issue Date:	8/10/2018
Sample Serial Number:	BH93000ZD8
Product Standards:	FCC 47 CFR PART 15 SUBPART B
Date Test Item Received:	7/13/2018
Testing Start Date:	7/14/2018
Date Testing Complete:	7/23/2018
Overall Results:	**Compliant**

UL LLC reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL LLC shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL LLC issued reports. 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.

*This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

Report Directory

1.0 Summary 5
1.1 Deviations from standard test methods 5
1.2 Device Modifications Necessary for Compliance 5
1.3 Applicable Standards 5
1.4 Summary of Tests 6
2.0 CALIBRATION AND UNCERTAINTY 7
2.1 Measuring Instrument Calibration 7
2.2 Sample Calculation 7
2.3 Measurement Uncertainty 7
3.0 GENERAL - Product Description 8
3.1 Equipment Description 8
4.0 APPLICABLE EMISSIONS LIMITS AND TEST RESULTS 13
4.1 Test Conditions and Results - MAINS TERMINAL - CONDUCTED EMISSIONS 14
4.1.1 SYNC MODE 16
4.1.2 CHARGING MODE 19
4.2 Test Conditions and Results - RADIATED EMISSIONS 22
4.2.1 SYNC MODE 24
4.2.2 CHARGING MODE 35
Appendix A 46
Facilities, Accreditations and Authorizations 46

Report Revision History

Revision Date	Revision Version	Description	Revised By	Revision Reviewed By
7/23/2018	V1	Initial Issue		
8/7/2018	V2	Updated Section 3.1	Kiya Kedida	
8/10/2018	V3	Updated Section 3.4	Kiya Kedida	

1.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL LLC in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

1.1 Deviations from standard test methods

None

1.2 Device Modifications Necessary for Compliance

None

1.3 Applicable Standards

Standard
FCC 47 CFR PART 15 SUBPART B

1.4 Summary of Tests

This product is considered Class B

Requirement – Test	Result (Compliant / Non-Compliant)
CONDUCTED EMISSIONS	Compliant
RADIATED EMISSIONS	Compliant

Reviewed By:

Kiya Kedida
Project Engineer
International EMC Services
Conformity Assessment Services

Approved & Released For
UL Verification Services Inc. By:

Dan Coronia
Operations Leader
International EMC Services
Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

2.0 CALIBRATION AND UNCERTAINTY

2.1 Measuring Instrument Calibration

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

2.2 Sample Calculation

RADIATED EMISSIONS
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

CONDUCTED EMISSIONS
Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

2.3 Measurement Uncertainty

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

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

PARAMETER	UNCERTAINTY	
	UL Verification Services	EMCE Engineering
Power Line Conducted Emission	3.65 dB	N/A
Radiated Emission, 30 to 1000 MHz	5.36 dB	± 4.98 dB
Radiated Emission, 1 to 6 GHz	4.32 dB	N/A

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

3.0 GENERAL - Product Description

3.1 Equipment Description

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC.

3.1.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	Phone	SONY	PY7-12644J	None
AE	AC Adapter	SONY	UCH20	None
AE	Earphone	SONY	N/A	None
AE	Audio & Charger Splitter	SONY	EC270	None
AE	Laptop	Lenovo	2349CW5	None
AE	AC Adapter	Lenovo	ADLX90NLT2A	None
AE	Mouse	Logitech	M-U0026	None
AE	Keyboard	Lenovo	KU-0225	None
AE	Switch	Netgear	FS105 v2	None
AE	Switch AC Adapter	Netgear	FA-0751000SUA	None

Note: **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)

3.1.2 Input/Output Ports:

SYNC MODE:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
1	AC Power	AC	N	N	AC Mains to AC/DC Adapter
2	DC Power	DC	N	N	AC/DC Adapter to Switch and Laptop
3	USB	I/O	N	N	Laptop to Keyboard and Mouse
4	USB	I/O	N	N	EUT to Laptop
5	Ethernet	TP	Y	N	Laptop to Switch

*Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

CHARGING MODE:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
1	USB	AC	N	N	EUT to AC/DC Adapter
2	Earphone	I/O	N	N	None
3	USB/HP Jack	I/O	N	N	Audio & Charging Cable

*Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

3.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description
5825	Highest Operating Frequency

3.1.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	100-240			50/60	Single	
1	120 Vac	-	-	60Hz	Single	

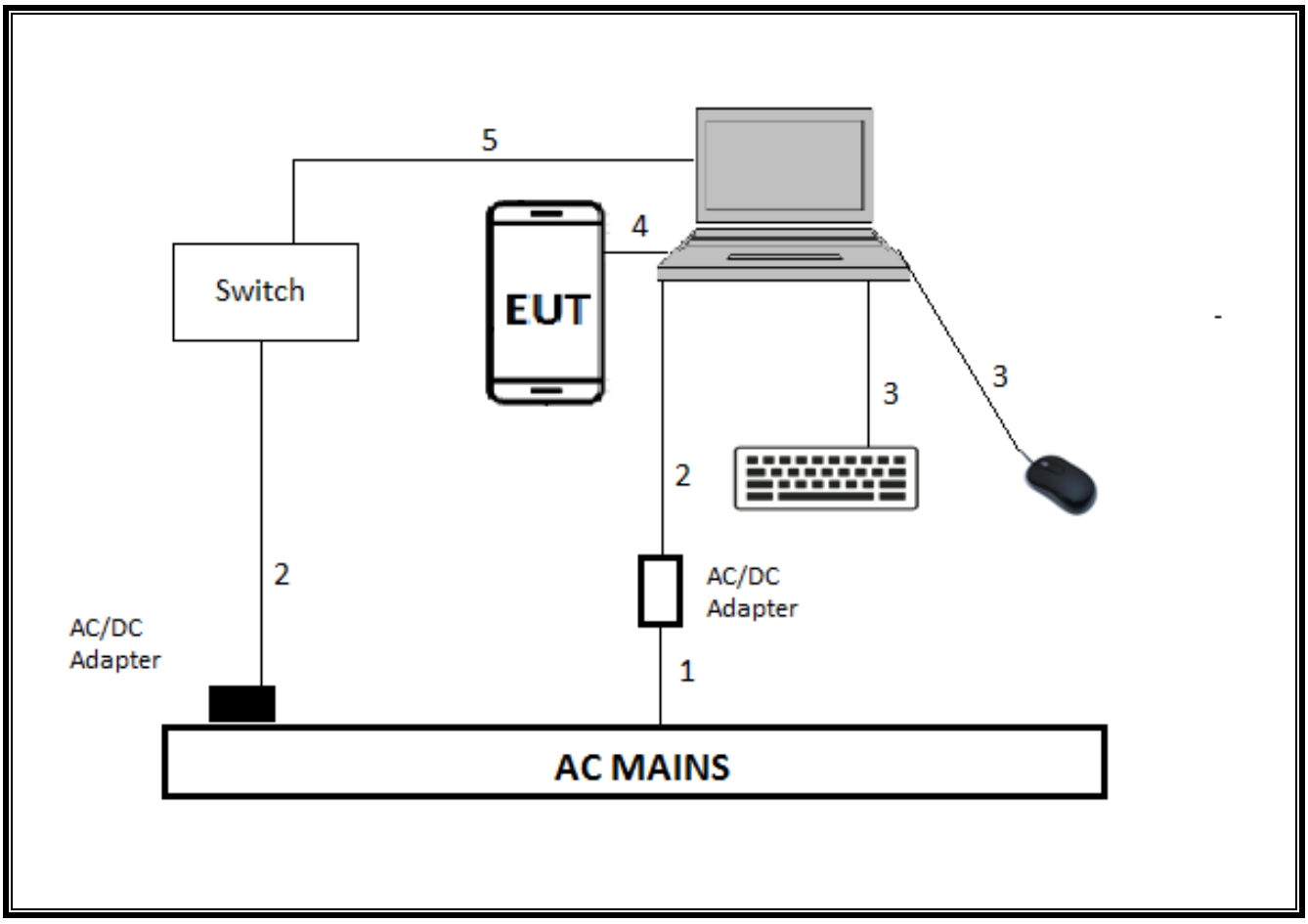
3.1.5 Software and Firmware

The software version installed in the EUT during testing was 2.20.

3.2 Block Diagram:

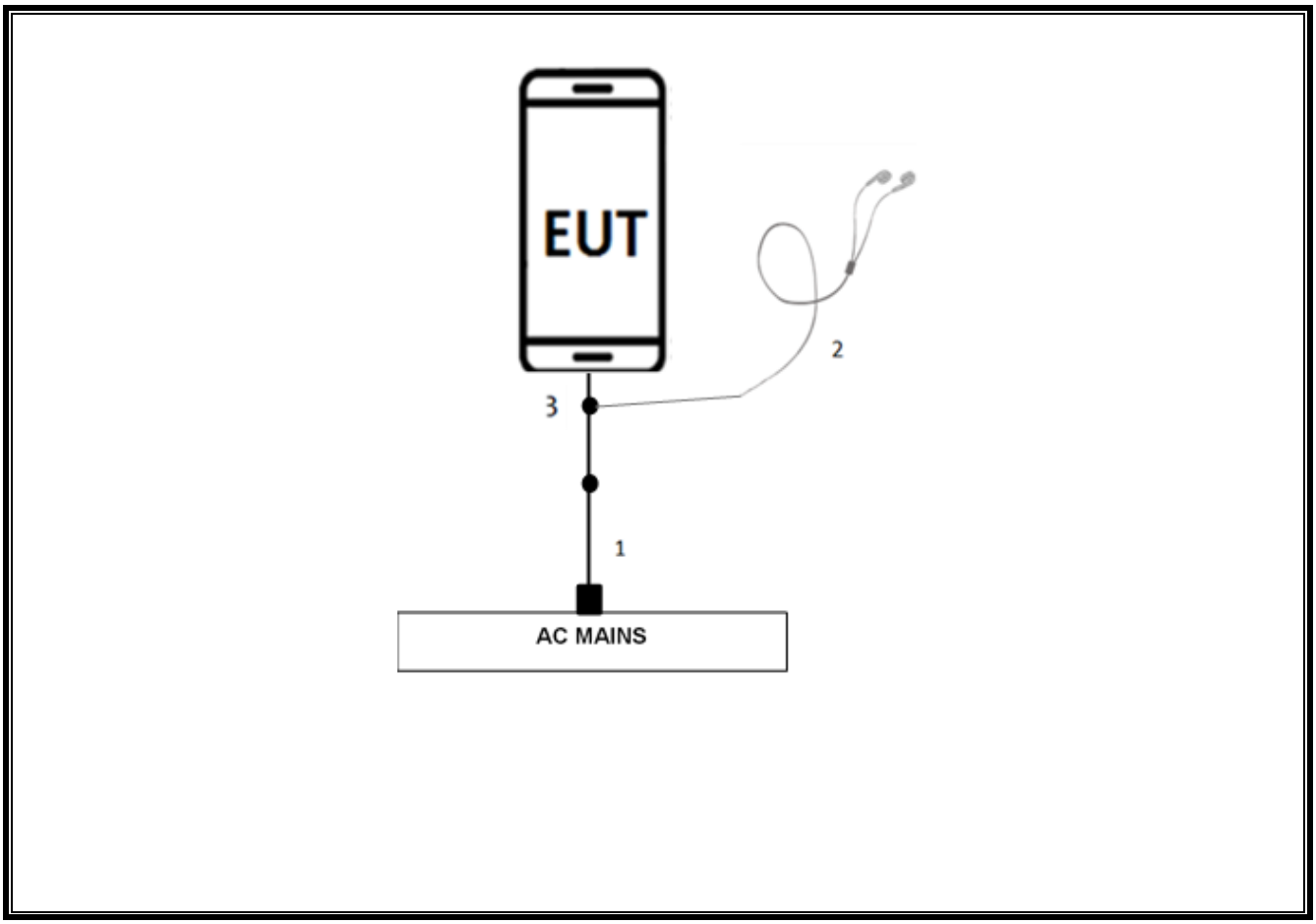
The diagram below illustrates the configuration of the equipment above.

SYNC MODE:



NOTE: Switch location is outside chamber (located in the control room).

CHARGING MODE:



3.3 EUT Configurations

Mode #	Description
1	Sync Mode
2	Charging Mode

3.4 EUT Operation Modes

Mode #	Description
1	Sync Mode – Data transfer; Sync video file from laptop to EUT and continued playing video during testing.
2	Charging Mode – Charging with supplied USB charger. EUT and its charger shall be on back edge of table, with charger connected to extension cord.

Note: The EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation with both Sync and Charging Modes.

3.5 Rational for EUT Configuration

Mode #	Description
1	The selected EUT configuration was chosen to maximize emissions

4.0 APPLICABLE EMISSIONS LIMITS AND TEST RESULTS

The emissions tests were performed according to following regulations:

---------- United States ----------

Code of Federal Regulations Title 47	Part 15, Subpart B, Radio Frequency Devices – Unintentional Radiators

---------- International ----------

EMC Directive:	EMC - 2014/30/EU (OJ C 293 of 2014-04-12)

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150

4.1 Test Conditions and Results - MAINS TERMINAL - CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.		
Standards		FCC Part 15 Subpart B	
Test Engineer		GE43578	
		Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range		150kHz to 30MHz	Mains

Limits - Class A

Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	79	66
0.5-30	73	60

Limits - Class B

Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Supplementary information: None

Conducted Emissions EUT Configuration Settings

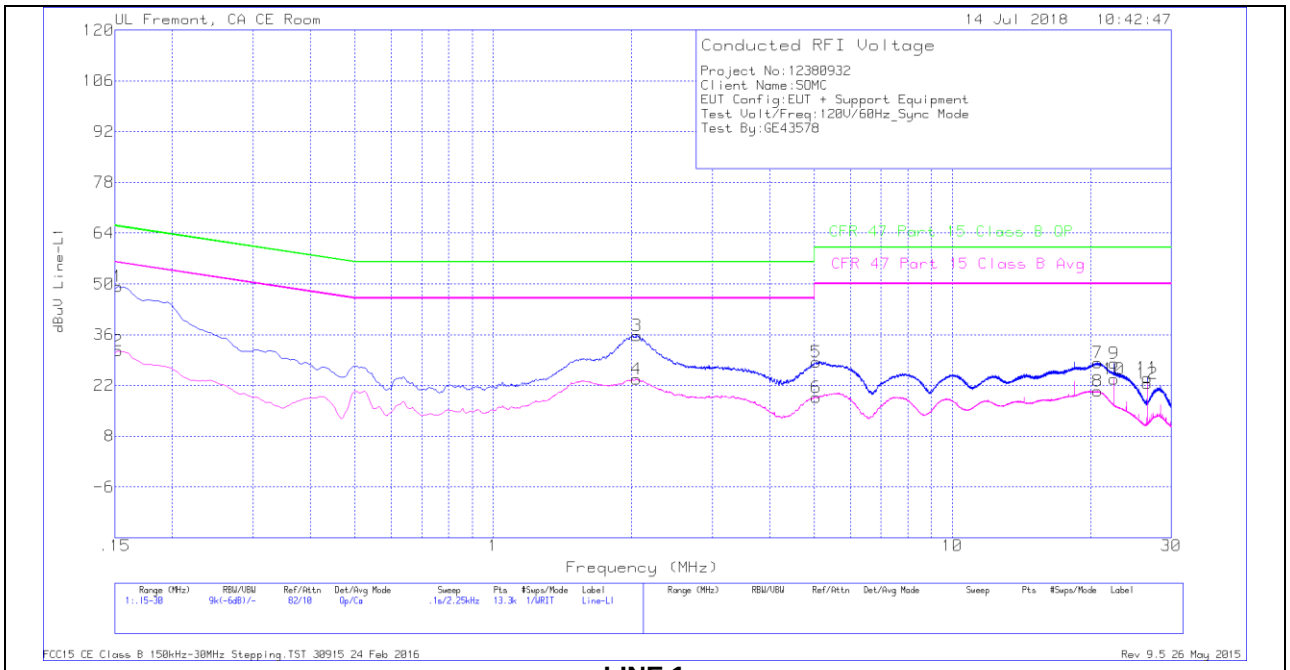
Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1,2	1,2
Supplementary information: None		

Conducted Emissions Test Equipment

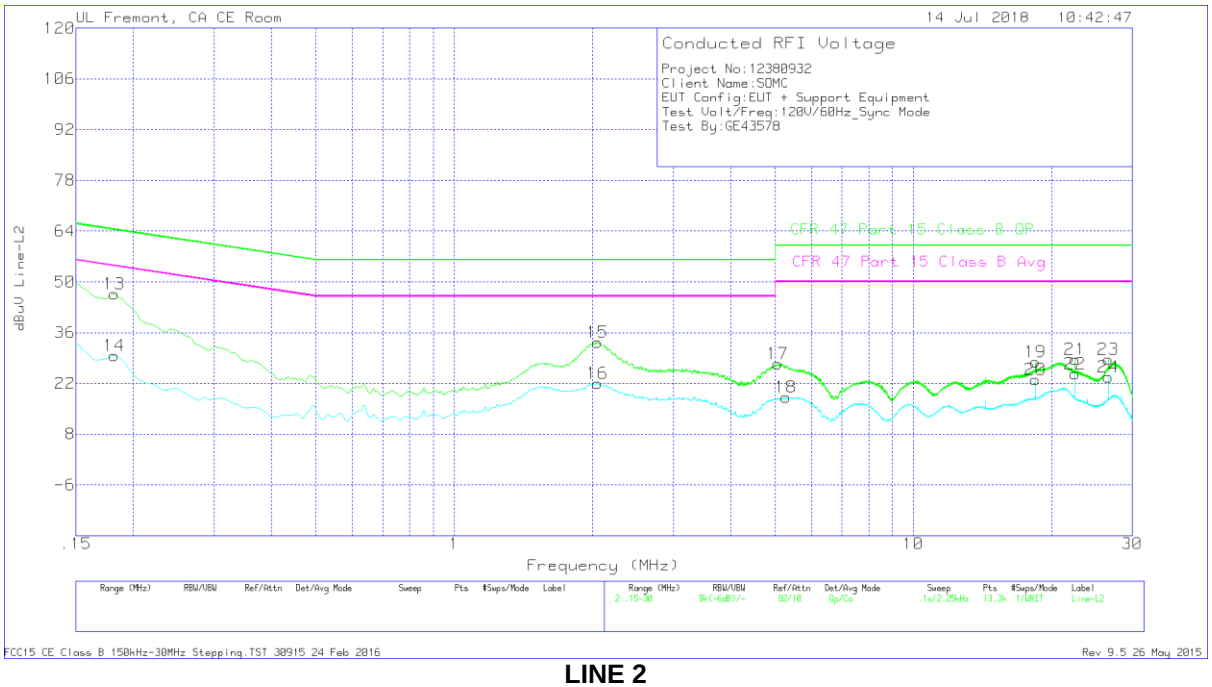
Test Equipment List					
Description	**Manufacturer**	**Model**	**Local ID (T No.)**	**Cal Date**	**Cal Due**
EMI Test Receiver	Rohde&Schwarz	ESR26	PRE0176493	2/21/2018	2/21/2019
Signal Condition Unit	Schaffner	CCN1000-1	133	7/25/2017	7/25/2018
AC Power source	Schaffner	NSG1007	134	7/25/2017	7/25/2018
L.I.S.N	FCC INC.	FCC LISN 50/250	1310	6/15/2018	6/15/2019
L.I.S.N	FCC INC.	FCC LISN 50/250	24	03/06/2018	03/06/2019
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	437	07/14/2017	07/14/2018

Results – 120 V, 60 Hz

Conducted Emissions Graph



LINE 1



LINE 2

Conducted Emissions Data Points

Line-L1 .15 - 30MHz

Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	39.1	Qp	.1	0	10.1	49.3	65.88	-16.58	-	-
2	.15225	21.44	Ca	.1	0	10.1	31.64	-	-	55.88	-24.24
3	2.05463	25.57	Qp	0	.1	10.1	35.77	56	-20.23	-	-
4	2.0535	13.5	Ca	0	.1	10.1	23.7	-	-	46	-22.3
5	5.05725	18.22	Qp	0	.1	10.1	28.42	60	-31.58	-	-
6	5.0595	8.5	Ca	0	.1	10.1	18.7	-	-	50	-31.3
7	20.724	17.5	Qp	.1	.3	10.4	28.3	60	-31.7	-	-
8	20.72625	9.58	Ca	.1	.3	10.4	20.38	-	-	50	-29.62
9	22.5285	17.34	Qp	.1	.3	10.4	28.14	60	-31.86	-	-
10	22.5285	12.96	Ca	.1	.3	10.4	23.76	-	-	50	-26.24
11	26.6235	13.17	Qp	.1	.3	10.5	24.07	60	-35.93	-	-
12	26.6235	11.57	Ca	.1	.3	10.5	22.47	-	-	50	-27.53

Qp - Quasi-Peak detector
Ca - CISPR average detection

Line-L2 .15 - 30MHz

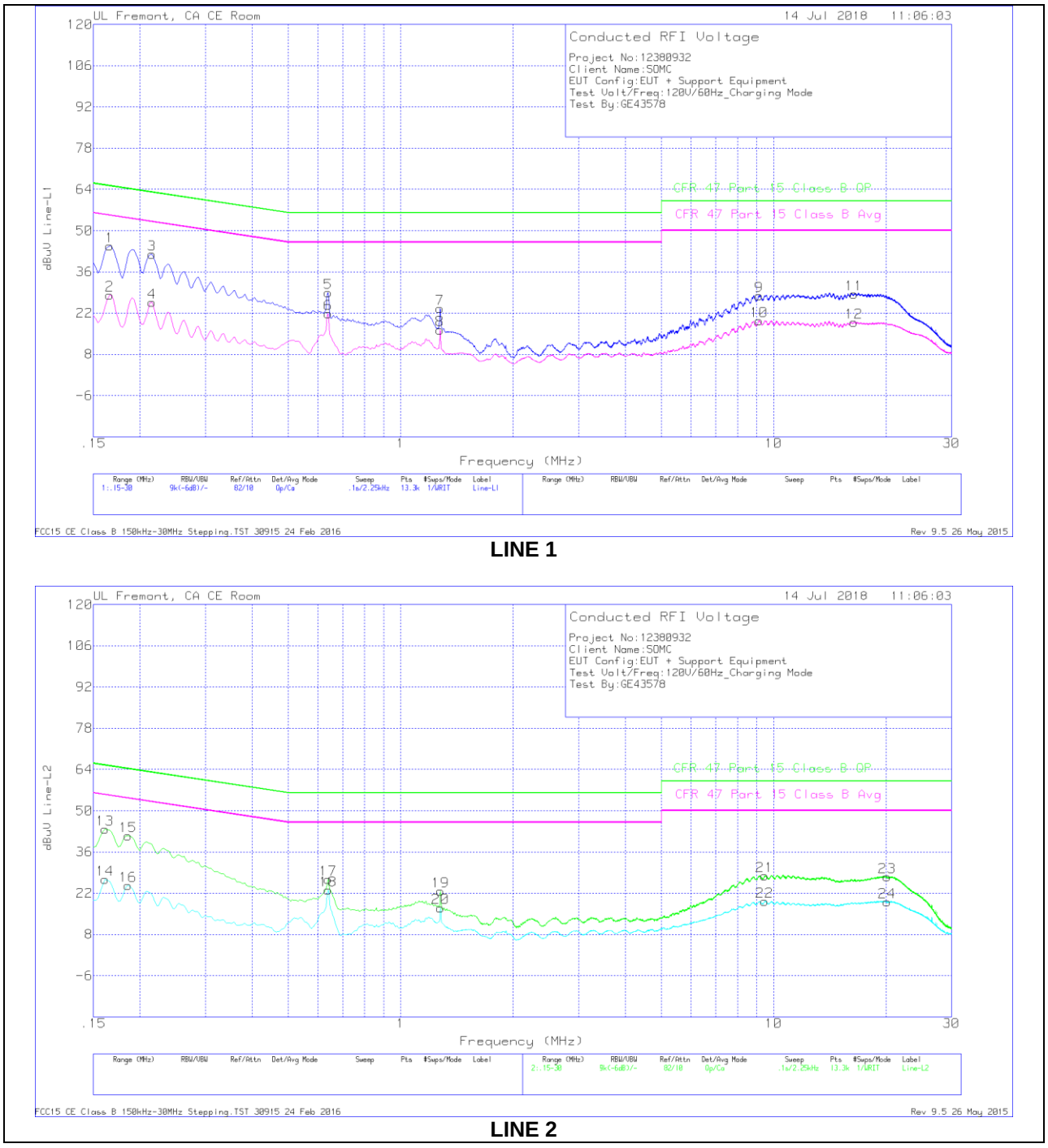
Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.1815	36.57	Qp	0	0	10.1	46.67	64.42	-17.75	-	-
14	.1815	19.6	Ca	0	0	10.1	29.7	-	-	54.42	-24.72
15	2.0535	23.19	Qp	0	.1	10.1	33.39	56	-22.61	-	-
16	2.05013	11.81	Ca	0	.1	10.1	22.01	-	-	46	-23.99
17	5.0685	17.27	Qp	0	.1	10.1	27.47	60	-32.53	-	-
18	5.28788	7.91	Ca	0	.1	10.1	18.11	-	-	50	-31.89
19	18.43125	17.2	Qp	.1	.3	10.3	27.9	60	-32.1	-	-
20	18.43125	12.41	Ca	.1	.3	10.3	23.11	-	-	50	-26.89
21	22.5285	17.84	Qp	.1	.3	10.4	28.64	60	-31.36	-	-
22	22.5285	13.86	Ca	.1	.3	10.4	24.66	-	-	50	-25.34
23	26.6235	17.76	Qp	.1	.3	10.5	28.66	60	-31.34	-	-
24	26.6235	12.89	Ca	.1	.3	10.5	23.79	-	-	50	-26.21

Qp - Quasi-Peak detector
Ca - CISPR average detection

Results – 120 V, 60 Hz

Conducted Emissions Graph



LINE 1

LINE 2

Conducted Emissions Data Points

Line-L1 .15 - 30MHz

Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.16575	34.53	Qp	.1	0	10.1	44.73	65.17	-20.44	-	-
2	.16575	17.98	Ca	.1	0	10.1	28.18	-	-	55.17	-26.99
3	.21525	31.97	Qp	0	0	10.1	42.07	63	-20.93	-	-
4	.21525	15.56	Ca	0	0	10.1	25.66	-	-	53	-27.34
5	.63825	18.87	Qp	0	0	10.1	28.97	56	-27.03	-	-
6	.63825	11.67	Ca	0	0	10.1	21.77	-	-	46	-24.23
7	1.275	13.33	Qp	0	.1	10.1	23.53	56	-32.47	-	-
8	1.275	6.16	Ca	0	.1	10.1	16.36	-	-	46	-29.64
9	9.1275	17.48	Qp	0	.2	10.2	27.88	60	-32.12	-	-
10	9.1275	8.93	Ca	0	.2	10.2	19.33	-	-	50	-30.67
11	16.43325	17.67	Qp	.1	.3	10.3	28.37	60	-31.63	-	-
12	16.422	8.23	Ca	.1	.3	10.3	18.93	-	-	50	-31.07

Qp - Quasi-Peak detector
Ca - CISPR average detection

Line-L2 .15 - 30MHz

Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.16125	33.57	Qp	.1	0	10.1	43.77	65.4	-21.63	-	-
14	.16125	16.43	Ca	.1	0	10.1	26.63	-	-	55.4	-28.77
15	.186	31.44	Qp	0	0	10.1	41.54	64.21	-22.67	-	-
16	.186	14.48	Ca	0	0	10.1	24.58	-	-	54.21	-29.63
17	.63825	16.58	Qp	0	0	10.1	26.68	56	-29.32	-	-
18	.63825	13.01	Ca	0	0	10.1	23.11	-	-	46	-22.89
19	1.27725	12.44	Qp	0	.1	10.1	22.64	56	-33.36	-	-
20	1.27725	6.86	Ca	0	.1	10.1	17.06	-	-	46	-28.94
21	9.4695	17.54	Qp	0	.2	10.2	27.94	60	-32.06	-	-
22	9.46613	8.8	Ca	0	.2	10.2	19.2	-	-	50	-30.8
23	20.148	16.86	Qp	.1	.3	10.3	27.56	60	-32.44	-	-
24	20.15138	8.31	Ca	.1	.3	10.3	19.01	-	-	50	-30.99

Qp - Quasi-Peak detector
Ca - CISPR average detection

4.2 Test Conditions and Results - RADIATED EMISSIONS

Test Description	Measurements were made in a 3-meter/10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter/10-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Standards	FCC Part 15 Subpart B		
Test Engineer	GE43578 and 45258 JL		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 40 GHz	(3 meter/10 meter measurement distance)	
Limits - Class B			
Frequency (MHz)	Limit (dBµV/m)		
CISPR Limits for radiated disturbance of Class B ITE at measuring distance of 10 m			
	Quasi-Peak	Average	
30-230	30	NA	
230-1000	37	NA	
FCC Limits for radiated disturbance of Class B ITE at measuring distance of 3 m			
30-88	40	NA	
88-216	43.5	NA	
216-960	46	NA	
Above 960	54	NA	
	Peak	Average	
Above 1 GHz	74	54	
CISPR Limits for radiated disturbance of Class B ITE at measuring distance of 3 m			
	Peak	Average	
1000-3000	70	50	
3000-6000	74	54	
Supplementary information: None			

Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1,2	1,2
Supplementary information: None		

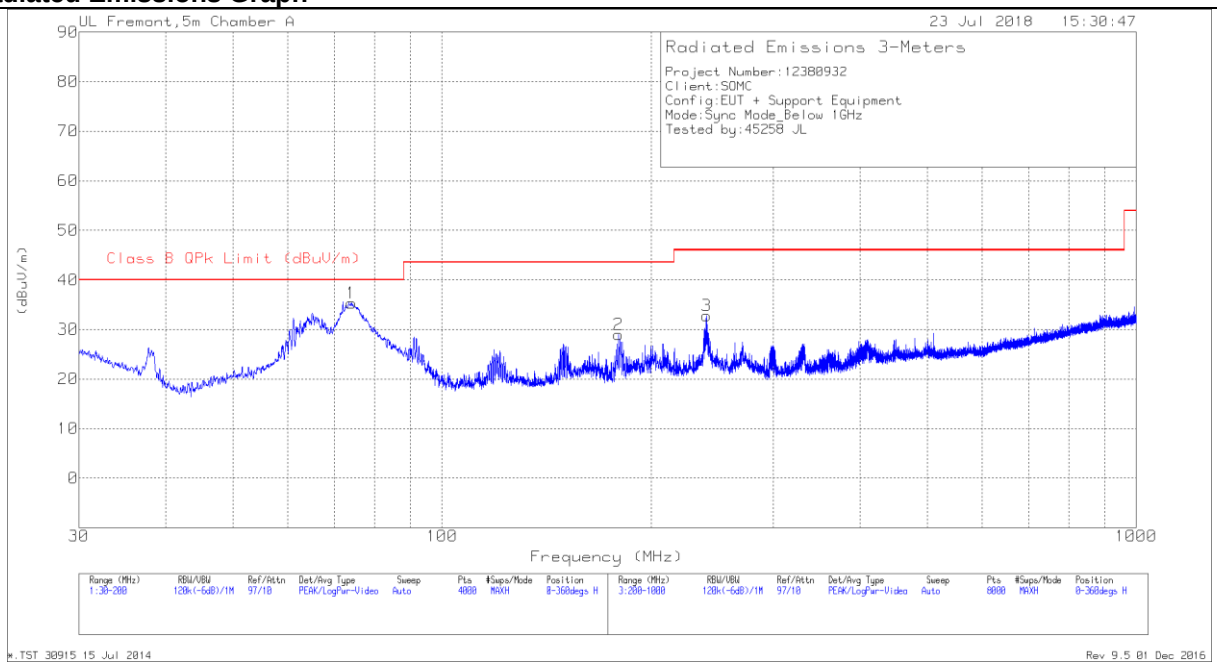
Radiated Emissions Test Equipment

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
Amplifier, 9KHz to 1GHz, 32dB	Agilent (keysight) Technologies	8447D	T10	02/14/2019
Amplifier, 9KHz to 1GHz, 32dB	Agilent (keysight) Technologies	8447D	T15	08/14/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T130	10/16/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	05/24/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T146	07/18/2018
18 - 26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T89	01/18/2019
26.5 - 40 GHz Horn Antenna	ARA	MWH-2640/B	T90	08/25/2018
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019
Pre-Amp, 26-40GHz	MITEQ	NSTTA2640-35-HG	T1864	03/09/2019
Thermometer - Digital	Control Company	14-650-118	PRE0177862	02/22/2019

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018

RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Radiated Emissions Graph



HORIZONTAL

VERTICAL

Radiated Emissions Data Points

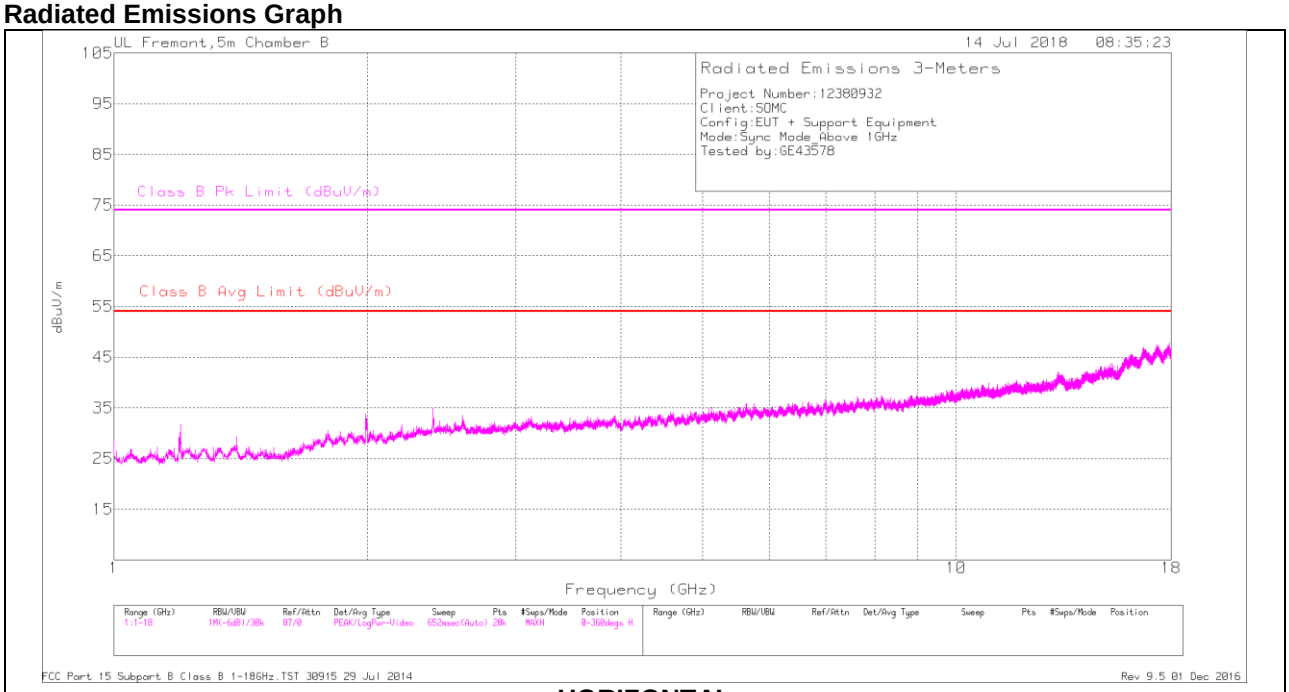
Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	73.4037	50.82	Pk	12	-26.7	36.12	40	-3.88	0-360	100	V
	73.4743	45.82	Qp	12	-26.7	31.12	40	-8.88	141	105	V
1	74.0839	50.04	Pk	12	-26.7	35.34	40	-4.66	0-360	400	H
	73.8482	45.88	Qp	12	-26.7	31.18	40	-8.82	84	238	H
5	119.5707	38.58	Pk	17.8	-26.2	30.18	43.52	-13.34	0-360	100	V
2	179.6812	39.28	Pk	15.2	-25.5	28.98	43.52	-14.54	0-360	200	H
3	240.4053	42.17	Pk	15.5	-24.9	32.77	46.02	-13.25	0-360	200	H
6	505.5397	34.05	Pk	21.7	-25.3	30.45	46.02	-15.57	0-360	101	V

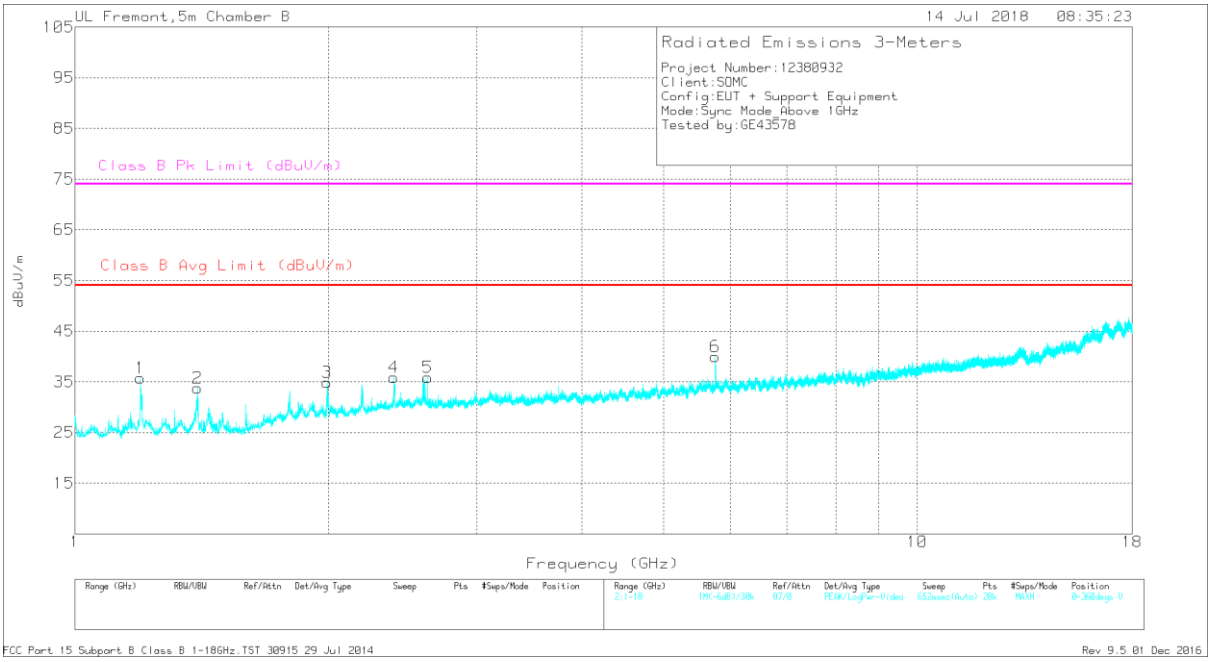
Pk - Peak detector
Qp - Quasi-Peak detector

RADIATED EMISSIONS 1000 TO 18,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

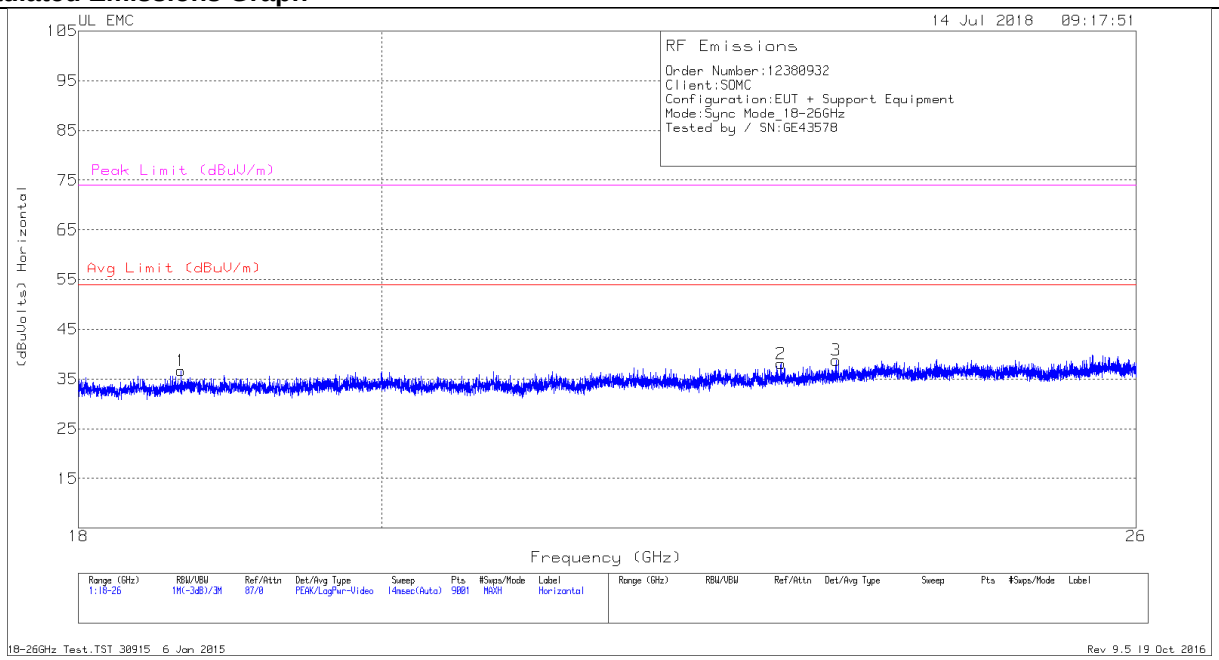
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.197	48.61	Pk	28.2	-34.7	42.11	-	-	74	-31.89	256	125	V
	1.197	28.42	Av	28.2	-34.7	21.92	54	-32.08	-	-	256	125	V
2	1.397	52.53	Pk	28.5	-34.3	46.73	-	-	74	-27.27	28	238	V
	1.397	30.68	Av	28.5	-34.3	24.88	54	-29.12	-	-	28	238	V
3	1.991	46.41	Pk	30.9	-33.7	43.61	-	-	74	-30.39	298	116	V
	1.991	27.54	Av	30.9	-33.7	24.74	54	-29.26	-	-	298	116	V
4	2.392	47.47	Pk	32.4	-33.1	46.77	-	-	74	-27.23	236	105	V
	2.392	27.53	Av	32.4	-33.1	26.83	54	-27.17	-	-	236	105	V
5	2.623	44.19	Pk	32.6	-33	43.79	-	-	74	-30.21	19	250	V
	2.623	27	Av	32.6	-33	26.6	54	-27.4	-	-	19	250	V
6	5.76	41.87	Pk	35.5	-30.3	47.07	-	-	74	-26.93	323	187	V
	5.76	34.89	Av	35.5	-30.3	40.09	54	-13.91	-	-	323	187	V

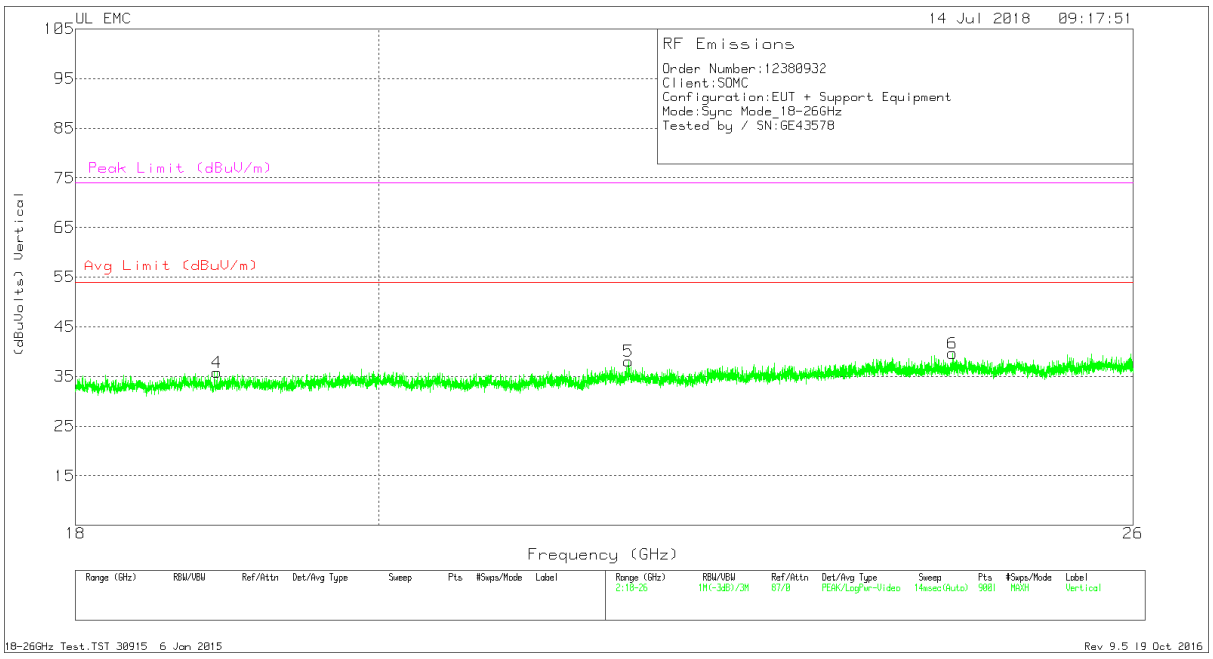
Pk - Peak detector
Av - Average detection

RADIATED EMISSIONS 18,000 TO 26,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

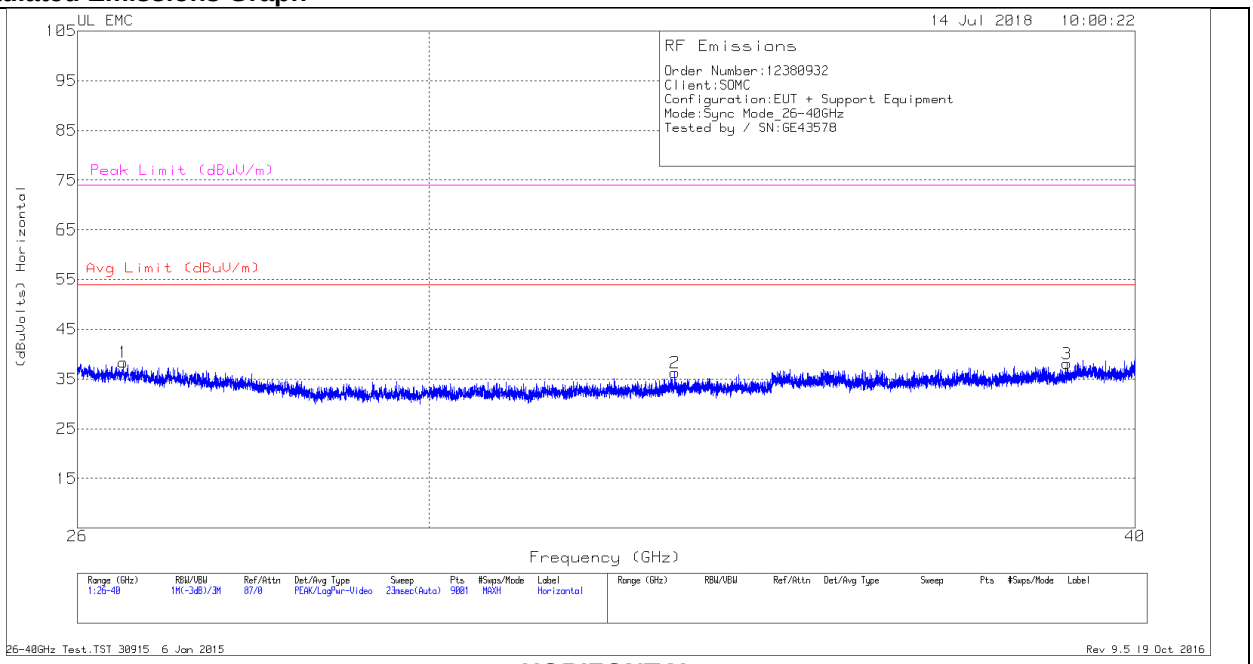
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.653	38.6	Pk	32.5	-24.9	-9.5	36.7	54	-17.3	74	-37.3
2	22.98	39.1	Pk	33.5	-25	-9.5	38.1	54	-15.9	74	-35.9
3	23.423	39.36	Pk	33.3	-24.4	-9.5	38.76	54	-15.24	74	-35.24
4	18.907	38.44	Pk	32.3	-25.4	-9.5	35.84	54	-18.16	74	-38.16
5	21.814	38.62	Pk	33.3	-24.4	-9.5	38.02	54	-15.98	74	-35.98
6	24.417	39.46	Pk	33.8	-24.1	-9.5	39.66	54	-14.34	74	-34.34

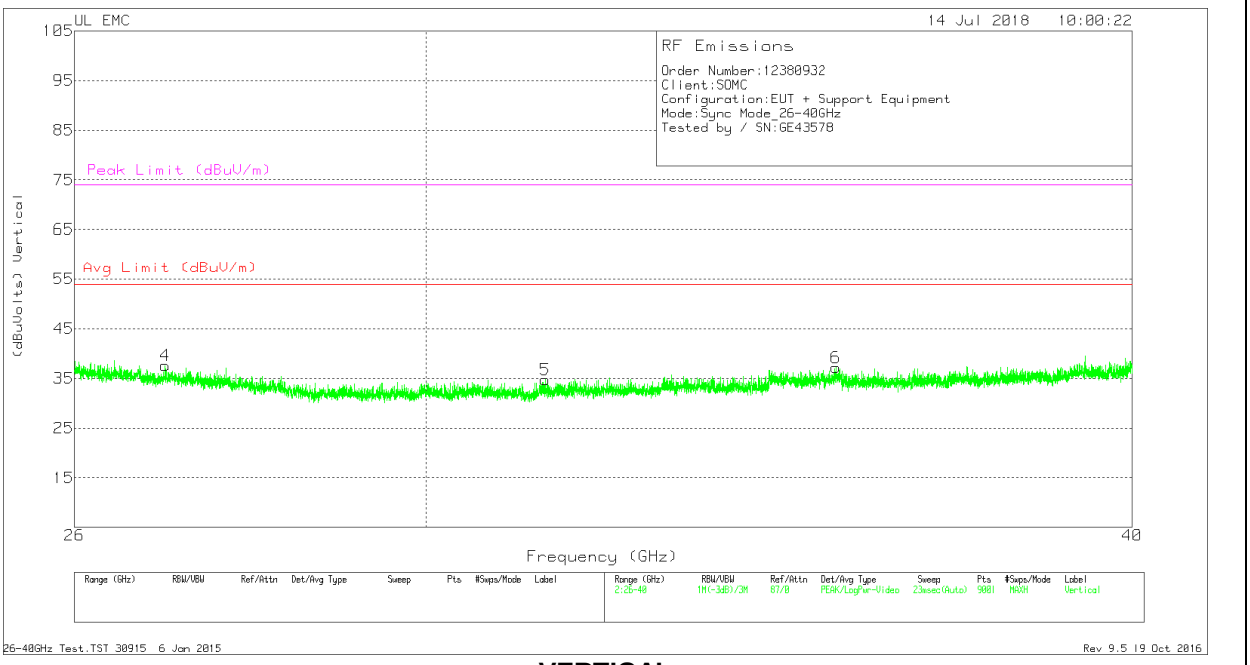
Pk - Peak detector

RADIATED EMISSIONS 26,000 TO 40,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

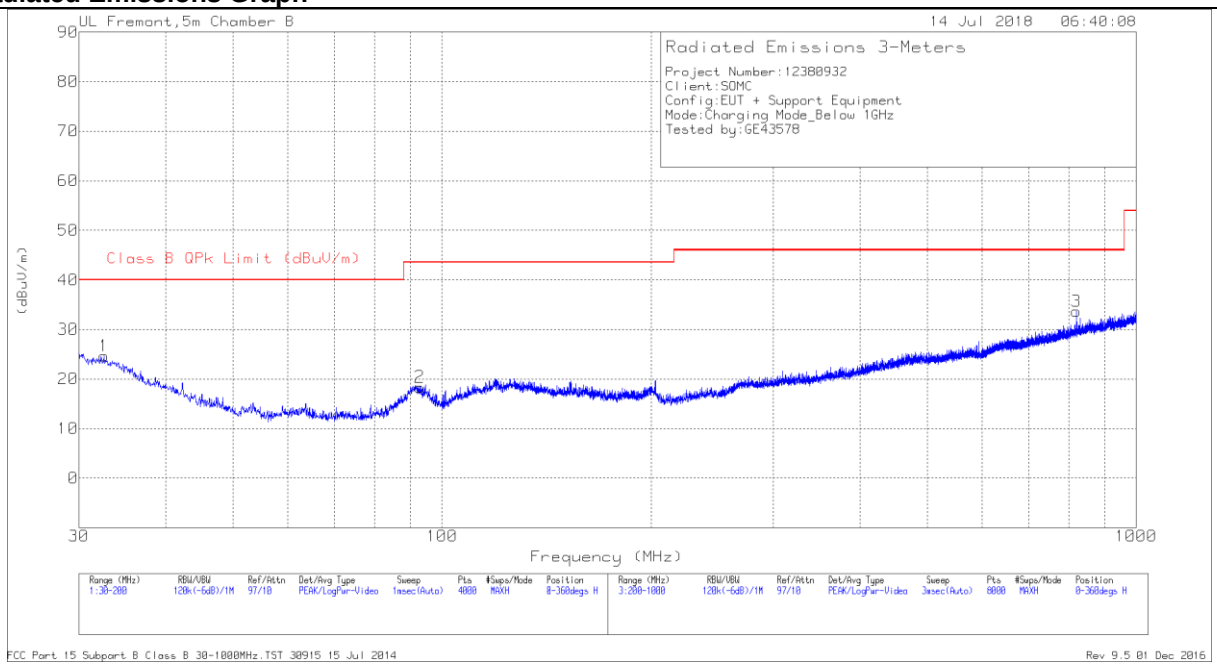
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	26.49	42.97	Pk	35.5	-30.6	-9.5	38.37	54	-15.63	74	-35.63
2	33.16	41.57	Pk	36.8	-32.6	-9.5	36.27	54	-17.73	74	-37.73
3	38.902	42.48	Pk	37	-31.9	-9.5	38.08	54	-15.92	74	-35.92
4	26.977	42.2	Pk	35.5	-30.6	-9.5	37.6	54	-16.4	74	-36.4
5	31.496	41.07	Pk	36.2	-33	-9.5	34.77	54	-19.23	74	-39.23
6	35.45	42.28	Pk	37.9	-33.5	-9.5	37.18	54	-16.82	74	-36.82

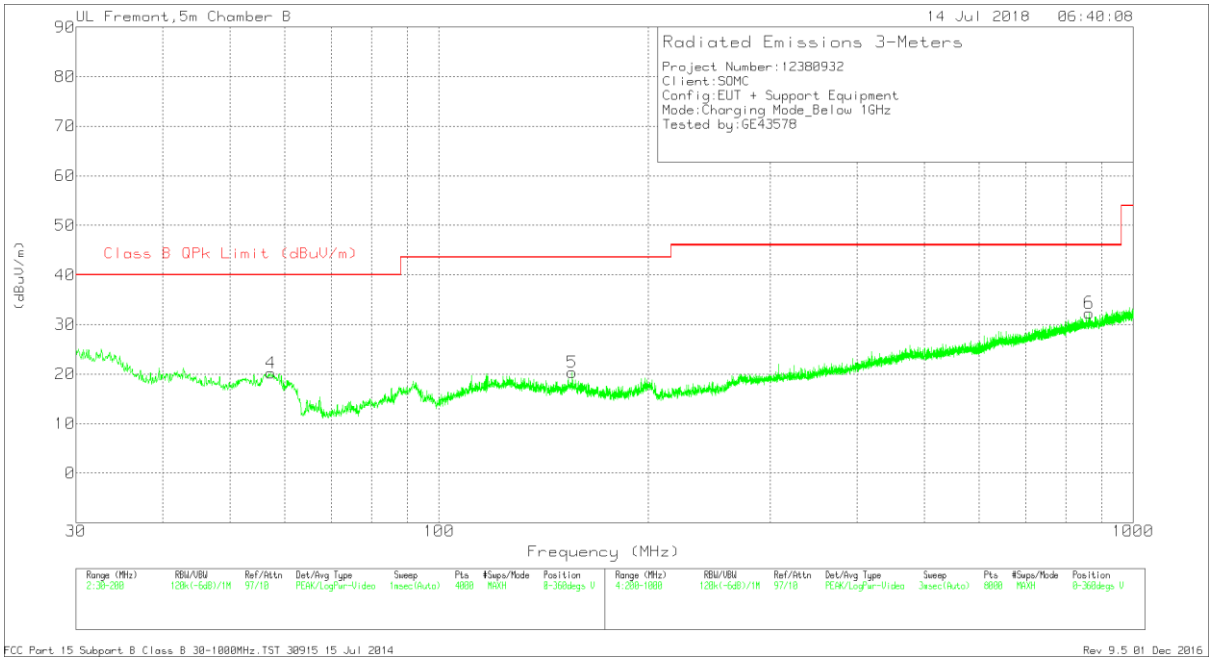
Pk - Peak detector

RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

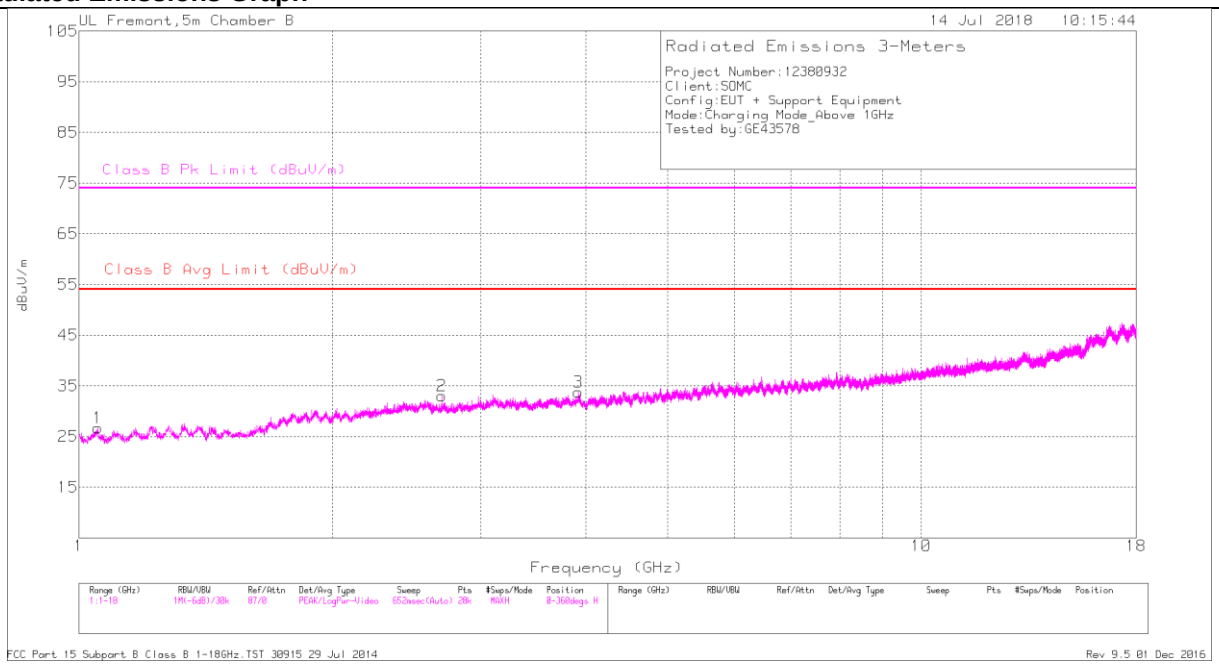
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.5932	30.22	Pk	23.3	-28.8	24.72	40	-15.28	0-360	300	H
4	57.2496	37.35	Pk	11.3	-28.4	20.25	40	-19.75	0-360	100	V
2	92.9163	34.08	Pk	12.3	-28	18.38	43.52	-25.14	0-360	300	H
5	155.4925	31.31	Pk	16.3	-27.3	20.31	43.52	-23.21	0-360	100	V
3	819.8806	31.98	Pk	25.8	-24.1	33.68	46.02	-12.34	0-360	100	H
6	863.9863	30.04	Pk	26.1	-23.8	32.34	46.02	-13.68	0-360	300	V

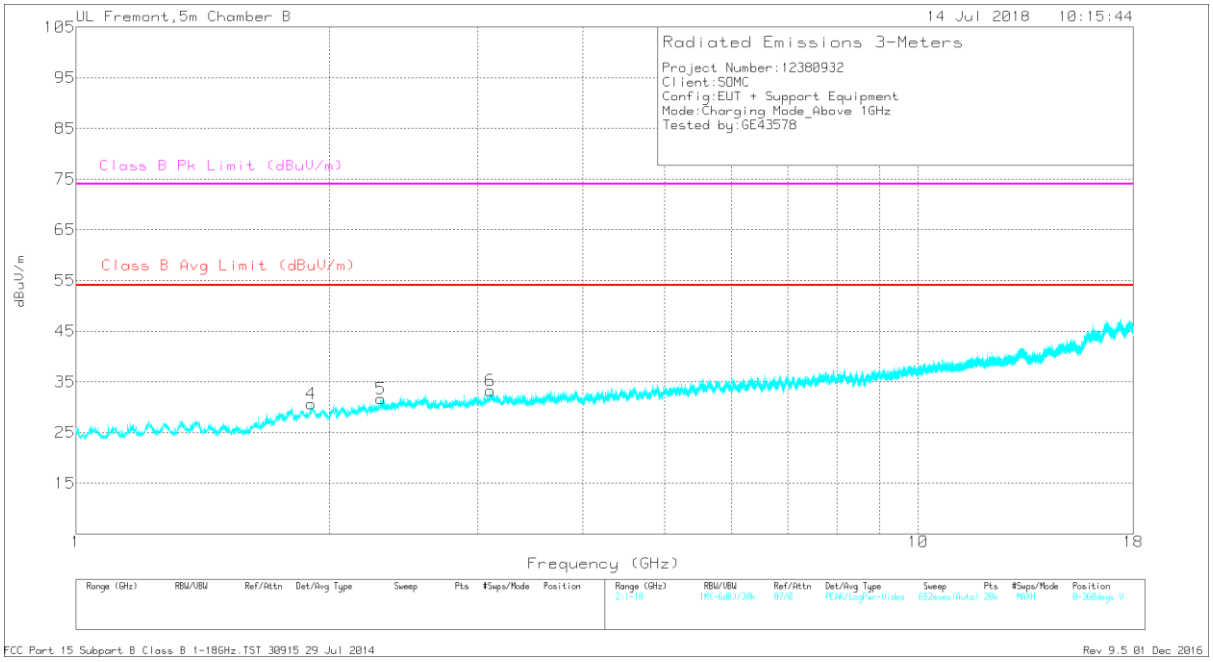
Pk - Peak detector

RADIATED EMISSIONS 1000 TO 18,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

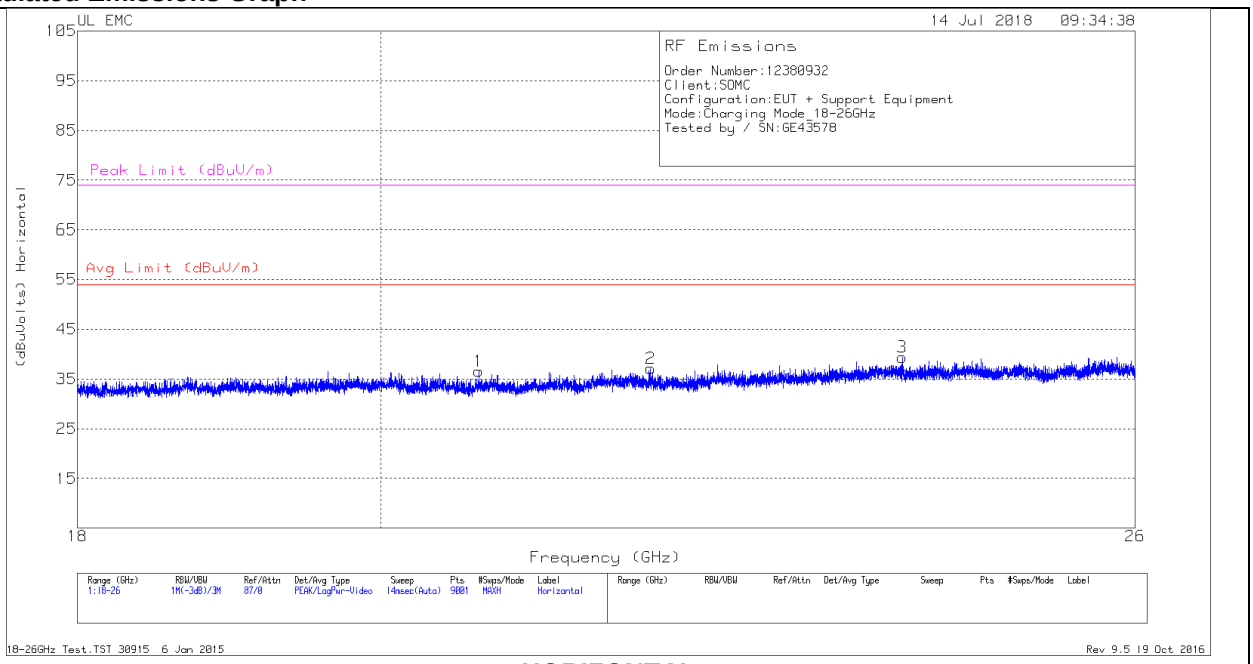
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.053	41.89	Pk	27.4	-34.9	34.39	-	-	74	-39.61	79	101	H
	1.053	28.87	Av	27.4	-34.9	21.37	54	-32.63	-	-	79	101	H
4	1.903	41.32	Pk	31.1	-33.5	38.92	-	-	74	-35.08	265	199	V
	1.903	27.92	Av	31.1	-33.5	25.52	54	-28.48	-	-	265	199	V
5	2.303	40.98	Pk	32	-33	39.98	-	-	74	-34.02	201	104	V
	2.303	27.23	Av	32	-33	26.23	54	-27.77	-	-	201	104	V
2	2.697	40.02	Pk	32.3	-32.6	39.72	-	-	74	-34.28	45	199	H
	2.697	26.96	Av	32.3	-32.6	26.66	54	-27.34	-	-	45	199	H
6	3.106	39.77	Pk	33.3	-31.8	41.27	-	-	74	-32.73	324	199	V
	3.106	26.53	Av	33.3	-31.8	28.03	54	-25.97	-	-	324	199	V
3	3.914	38.62	Pk	33.4	-31.2	40.82	-	-	74	-33.18	133	104	H
	3.914	25.64	Av	33.4	-31.2	27.84	54	-26.16	-	-	133	104	H

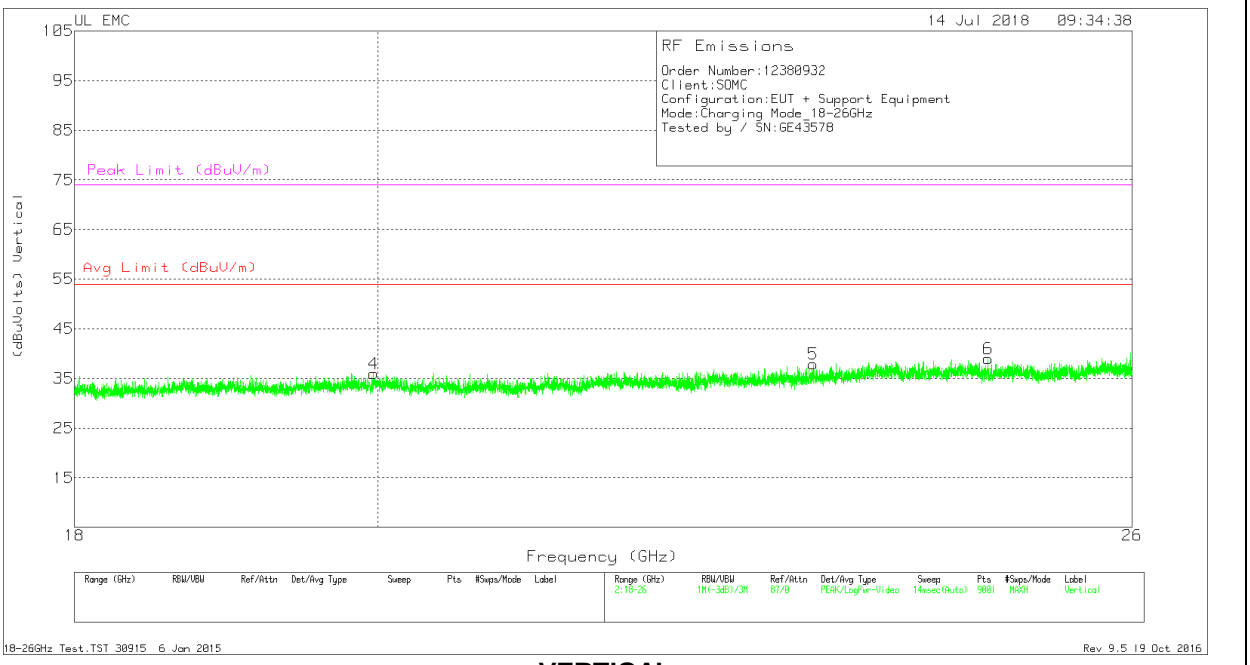
Pk - Peak detection
Av - Average detection

RADIATED EMISSIONS 18,000 TO 26,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

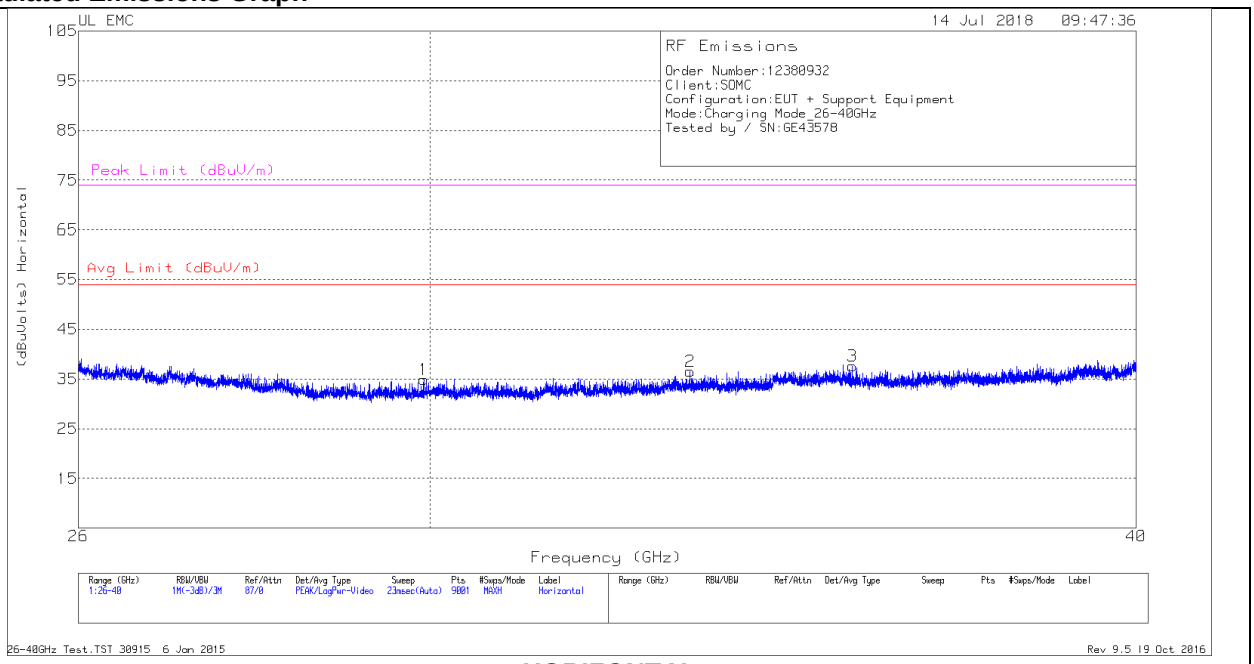
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.694	38.47	Pk	32.8	-25.2	-9.5	36.57	54	-17.43	74	-37.43
2	21.968	38.62	Pk	33.2	-25.2	-9.5	37.12	54	-16.88	74	-36.88
3	23.976	39.76	Pk	33.3	-24.2	-9.5	39.36	54	-14.64	74	-34.64
4	19.972	37.55	Pk	33	-25.1	-9.5	35.95	54	-18.05	74	-38.05
5	23.269	38.58	Pk	33.5	-24.7	-9.5	37.88	54	-16.12	74	-36.12
6	24.728	39.26	Pk	33.8	-24.6	-9.5	38.96	54	-15.04	74	-35.04

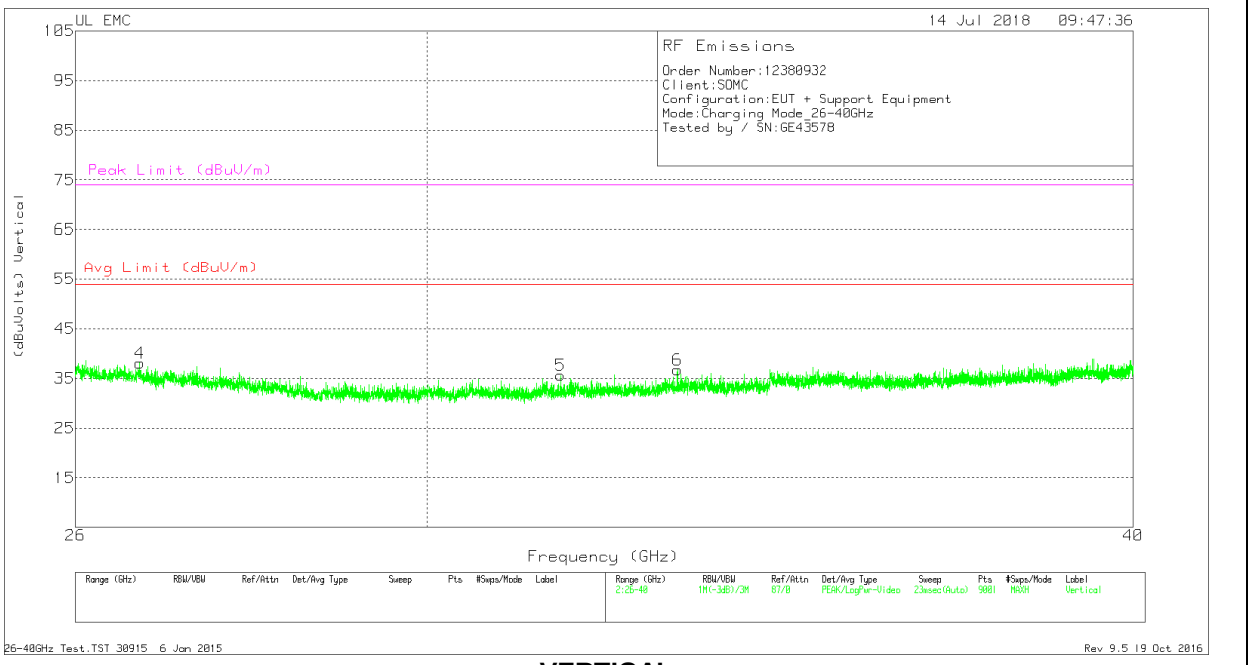
Pk - Peak detector

RADIATED EMISSIONS 26,000 TO 40,000 MHz – FCC

Radiated Emissions Graph



HORIZONTAL



VERTICAL

Radiated Emissions Data Points

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	29.925	41.01	Pk	36	-32.6	-9.5	34.91	54	-19.09	74	-39.09
2	33.353	41.85	Pk	37	-32.8	-9.5	36.55	54	-17.45	74	-37.45
3	35.634	43	Pk	37.5	-33.4	-9.5	37.6	54	-16.4	74	-36.4
4	26.688	42.51	Pk	35.3	-30.2	-9.5	38.11	54	-15.89	74	-35.89
5	31.678	41.74	Pk	36.3	-32.9	-9.5	35.64	54	-18.36	74	-38.36
6	33.222	42.02	Pk	36.9	-32.7	-9.5	36.72	54	-17.28	74	-37.28

Pk - Peak detector

Appendix A

Facilities, Accreditations and Authorizations

NVLAP Lab code: 200065-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/standards/scopes/1004140.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91044).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2180

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: Radiated Emissions R-621, Conducted Emissions C-642.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).
NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
☒ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☐ Chamber K (ISED: 2324A-1)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☐ Chamber L (ISED: 2324A-3)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	
	☐ Chamber G (ISED:22541-4)	
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

The UL Verification Services Inc. VCCI laboratory facility registration number is A-0043.

END OF REPORT