



Report Number: 12371351-E8V2  
Issue Date: 7/24/2018  
FCC ID: PY7-26828G  
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**

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## 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: 7/24/2018

Sample Serial Number: BH9300LFD4

Product Standards: FCC 47 CFR PART 15 SUBPART B

Date Test Item Received: 6/28/2018

Testing Start Date: 6/29/2018

Date Testing Complete: 7/5/2018

**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.

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**Report Revision History**

<b>Revision Date</b>	<b>Revision Version</b>	<b>Description</b>	<b>Revision Reviewed By</b>
7/6/18	V1	Initial Issue	
7/24/18	V2	Updated Section 3.1	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
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**1.2 Device Modifications Necessary for Compliance**

None
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**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:

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**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)

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

**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.

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

**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	$\pm 4.98$ 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	PY7-26828G	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	

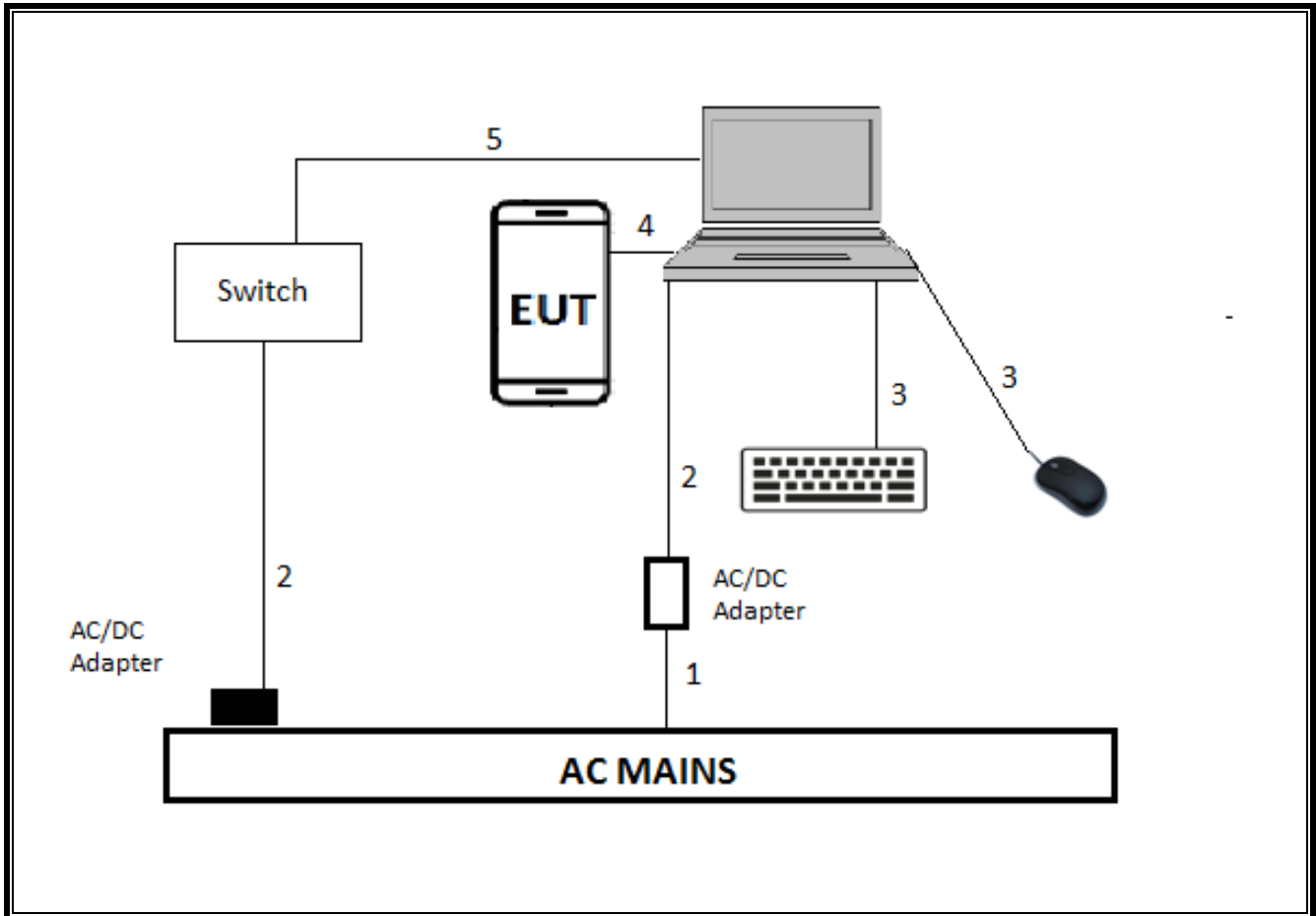
**3.1.5 Software and Firmware**

The software version installed in the EUT during testing was 0.299.

**3.2 Block Diagram:**

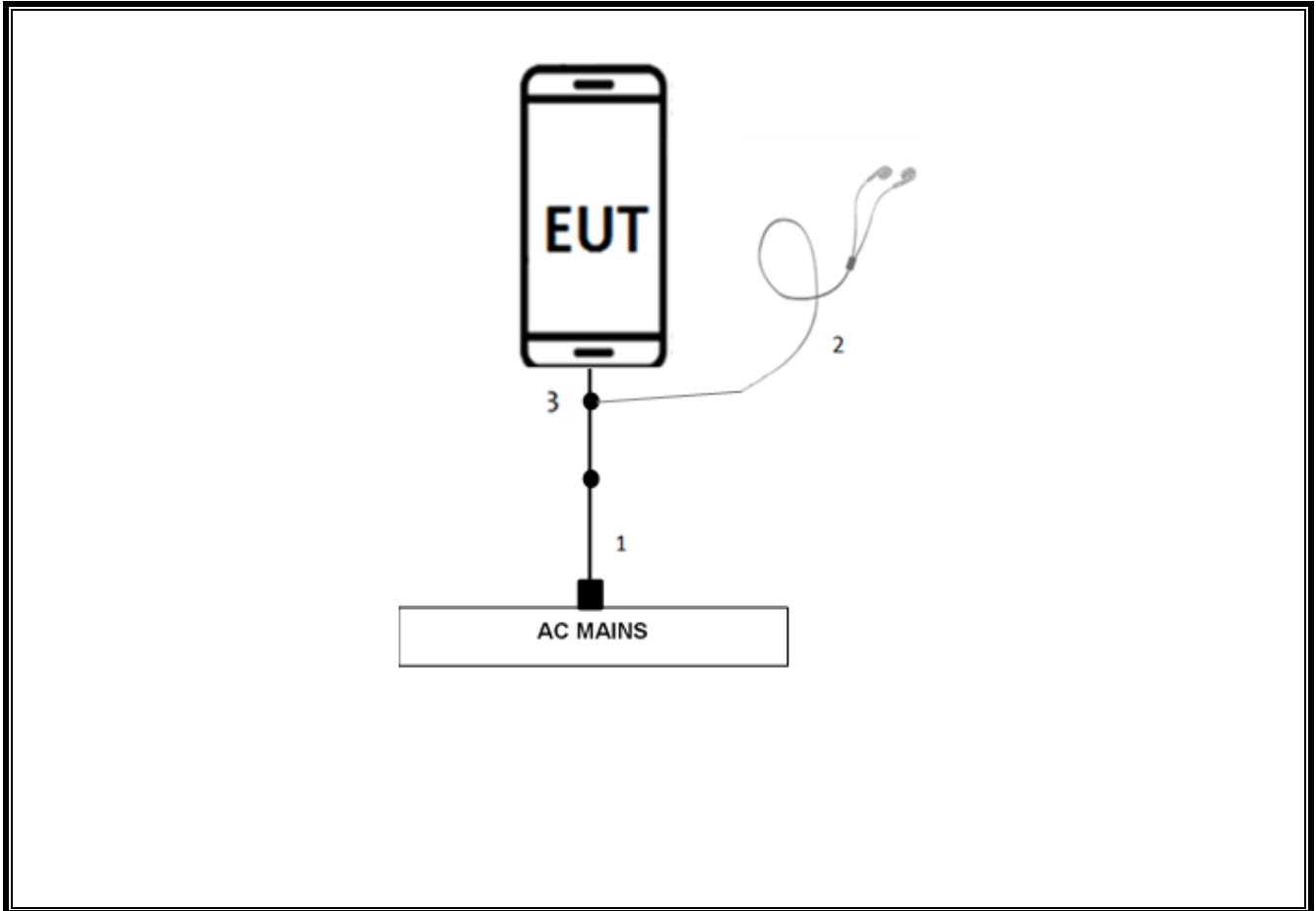
The diagram below illustrates the configuration of the equipment above.

**SYNC MODE:**



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

**CHARGING MODE:**



**3.3 EUT Configurations**

<b>Mode #</b>	<b>Description</b>
1	Sync Mode
2	Charging Mode

**3.4 EUT Operation Modes**

<b>Mode #</b>	<b>Description</b>
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.

**3.5 Rational for EUT Configuration**

<b>Mode #</b>	<b>Description</b>
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
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----- International -----

EMC Directive:	EMC - 2014/30/EU (OJ C 293 of 2014-04-12)
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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
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**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	45258 JL	
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains
<b>Limits - Class A</b>		
Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	79	66
0.5-30	73	60
<b>Limits - Class B</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		

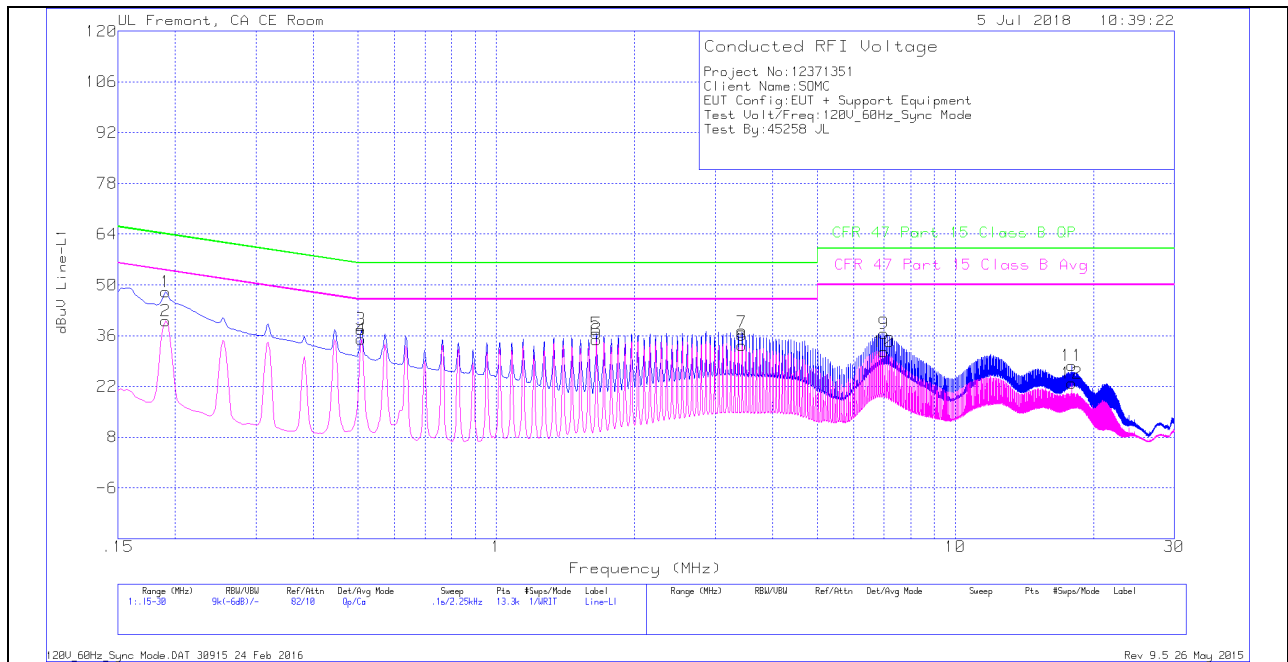
**Conducted Emissions Test Equipment**

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

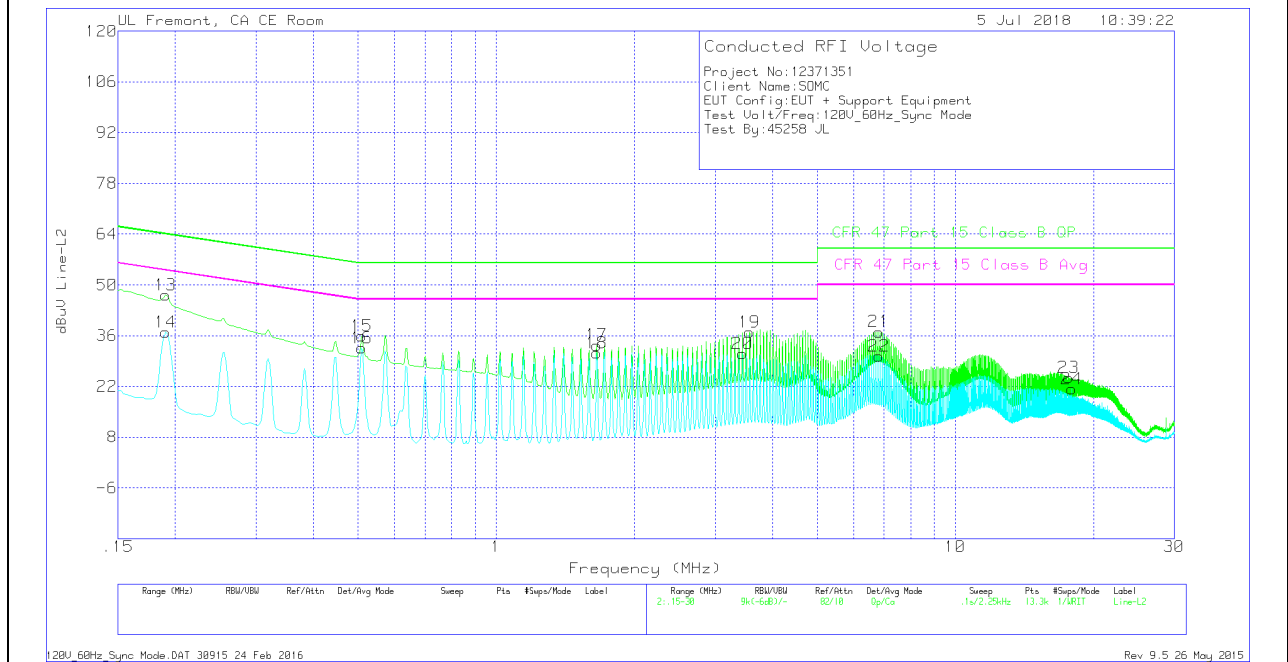


Results – 120 V, 60 Hz

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	.1905	37.94	Qp	0	0	10.1	48.04	64.01	-15.97	-	-
2	.1905	30.05	Ca	0	0	10.1	40.15	-	-	54.01	-13.86
3	.50775	27.64	Qp	0	0	10.1	37.74	56	-18.26	-	-
4	.50775	24.93	Ca	0	0	10.1	35.03	-	-	46	-10.97
5	1.653	26.48	Qp	0	.1	10.1	36.68	56	-19.32	-	-
6	1.653	24.62	Ca	0	.1	10.1	34.82	-	-	46	-11.18
7	3.43275	26.77	Qp	0	.1	10.1	36.97	56	-19.03	-	-
8	3.43275	23.1	Ca	0	.1	10.1	33.3	-	-	46	-12.7
9	6.9945	26.21	Qp	0	.2	10.2	36.61	60	-23.39	-	-
10	6.9945	21.19	Ca	0	.2	10.2	31.59	-	-	50	-18.41
11	17.93175	17.05	Qp	.1	.3	10.3	27.75	60	-32.25	-	-
12	17.93175	12.17	Ca	.1	.3	10.3	22.87	-	-	50	-27.13

Qp - Quasi-Peak detector

Ca - CISPR average detection

**Line-L2 .15 - 30MHz**

Trace Markers

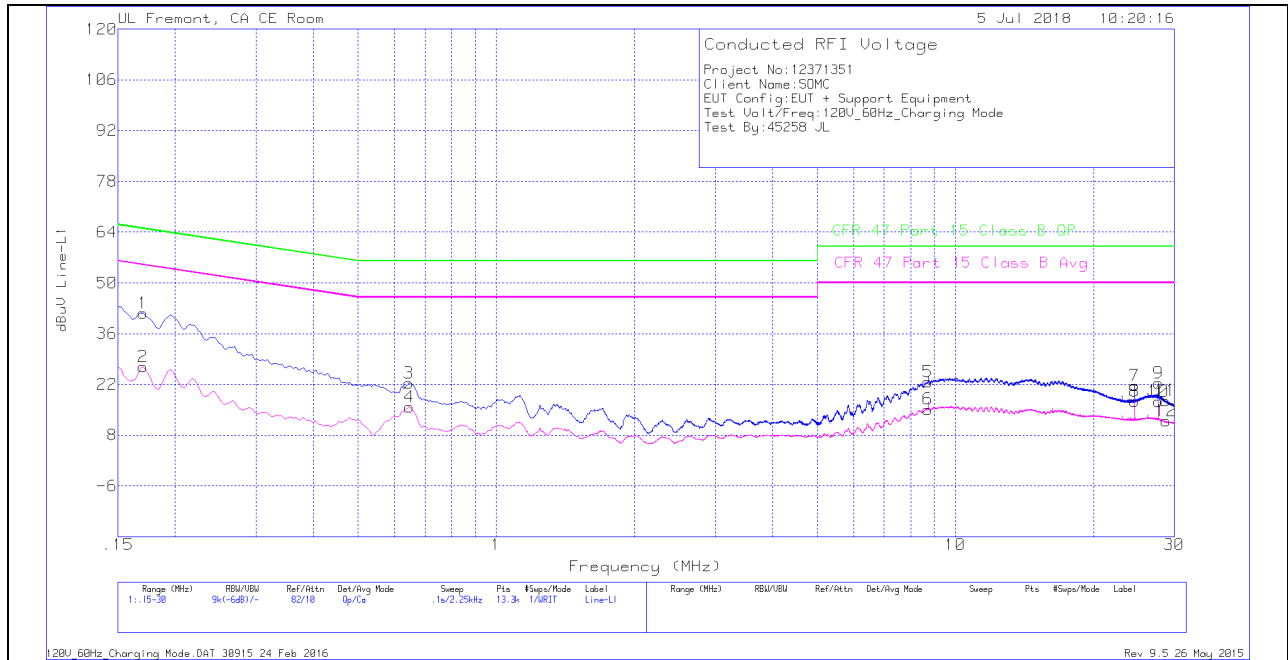
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.1905	37.06	Qp	0	0	10.1	47.16	64.01	-16.85	-	-
14	.1905	26.93	Ca	0	0	10.1	37.03	-	-	54.01	-16.98
15	.51	25.75	Qp	0	0	10.1	35.85	56	-20.15	-	-
16	.51	22.49	Ca	0	0	10.1	32.59	-	-	46	-13.41
17	1.65525	23.2	Qp	0	.1	10.1	33.4	56	-22.6	-	-
18	1.65525	21.08	Ca	0	.1	10.1	31.28	-	-	46	-14.72
19	3.5655	26.77	Qp	0	.1	10.1	36.97	56	-19.03	-	-
20	3.4395	20.78	Ca	0	.1	10.1	30.98	-	-	46	-15.02
21	6.8145	26.65	Qp	0	.2	10.2	37.05	60	-22.95	-	-
22	6.8145	19.91	Ca	0	.2	10.2	30.31	-	-	50	-19.69
23	17.6415	13.79	Qp	.1	.3	10.3	24.49	60	-35.51	-	-
24	17.93625	10.59	Ca	.1	.3	10.3	21.29	-	-	50	-28.71

Qp - Quasi-Peak detector

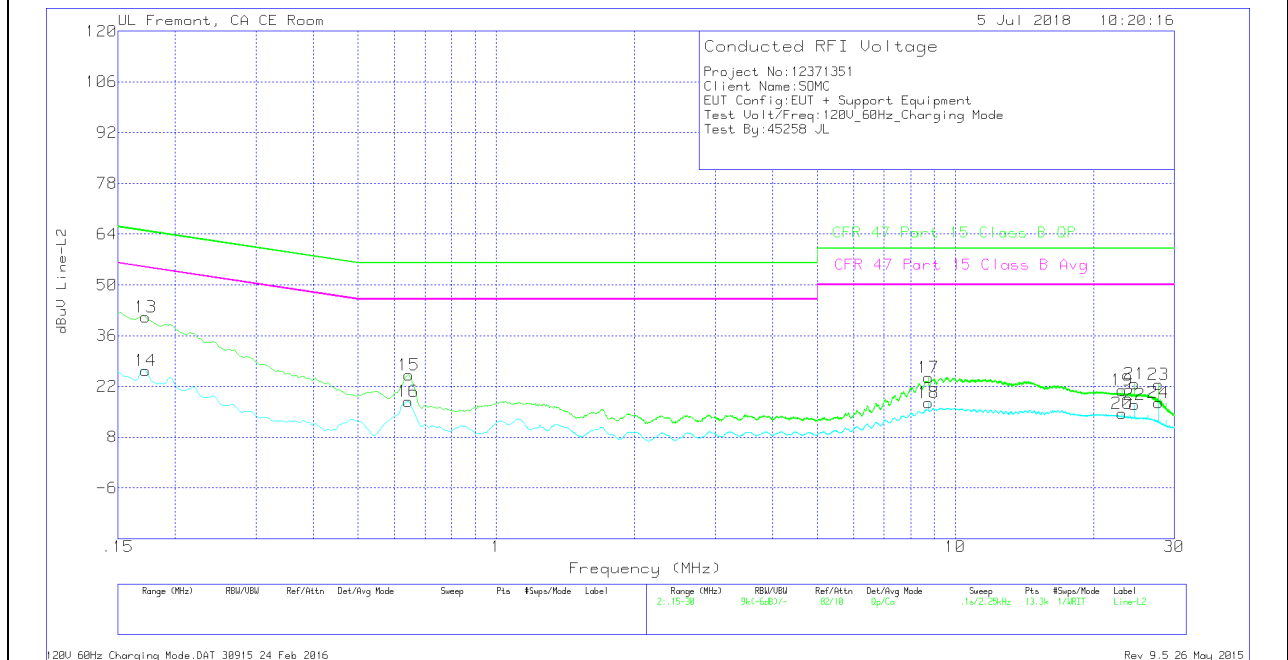
Ca - CISPR average detection

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	.17025	31.57	Qp	0	0	10.1	41.67	64.95	-23.28	-	-
2	.17025	16.84	Ca	0	0	10.1	26.94	-	-	54.95	-28.01
3	.645	12.22	Qp	0	0	10.1	22.32	56	-33.68	-	-
4	.64725	5.7	Ca	0	0	10.1	15.8	-	-	46	-30.2
5	8.727	12.29	Qp	0	.2	10.2	22.69	60	-37.31	-	-
6	8.70563	4.75	Ca	0	.2	10.2	15.15	-	-	50	-34.85
7	24.6165	10.8	Qp	.1	.3	10.5	21.7	60	-38.3	-	-
8	24.6165	6.44	Ca	.1	.3	10.5	17.34	-	-	50	-32.66
9	27.69225	11.37	Qp	.1	.4	10.5	22.37	60	-37.63	-	-
10	27.69225	6.26	Ca	.1	.4	10.5	17.26	-	-	50	-32.74
11	28.67775	6.58	Qp	.1	.4	10.5	17.58	60	-42.42	-	-
12	28.74975	.92	Ca	.1	.4	10.5	11.92	-	-	50	-38.08

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	.1725	31.02	Qp	0	0	10.1	41.12	64.84	-23.72	-	-
14	.1725	16.24	Ca	0	0	10.1	26.34	-	-	54.84	-28.5
15	.645	15.03	Qp	0	0	10.1	25.13	56	-30.87	-	-
16	.64387	7.73	Ca	0	0	10.1	17.83	-	-	46	-28.17
17	8.7495	13.99	Qp	0	.2	10.2	24.39	60	-35.61	-	-
18	8.7495	7.09	Ca	0	.2	10.2	17.49	-	-	50	-32.51
19	23.0775	10.09	Qp	.1	.3	10.4	20.89	60	-39.11	-	-
20	23.0775	3.78	Ca	.1	.3	10.4	14.58	-	-	50	-35.42
21	24.6165	11.85	Qp	.1	.3	10.5	22.75	60	-37.25	-	-
22	24.6165	6.1	Ca	.1	.3	10.5	17	-	-	50	-33
23	27.69225	11.52	Qp	.1	.4	10.5	22.52	60	-37.48	-	-
24	27.69225	6.45	Ca	.1	.4	10.5	17.45	-	-	50	-32.55

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	45258 JL / 43575 OS / 45256 JB	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 40 GHz	(3 meter/10 meter measurement distance)
<b>Limits - Class B</b>		
Frequency (MHz)	Limit (dBµV/m)	
<b>CISPR Limits for radiated disturbance of Class B ITE at measuring distance of 10 m</b>		
	Quasi-Peak	Average
30-230	30	NA
230-1000	37	NA
<b>FCC Limits for radiated disturbance of Class B ITE at measuring distance of 3 m</b>		
30-88	40	NA
88-216	43.5	NA
216-960	46	NA
Above 960	54	NA
	Peak	Average
Above 1 GHz	74	54
<b>CISPR Limits for radiated disturbance of Class B ITE at measuring distance of 3 m</b>		
	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		

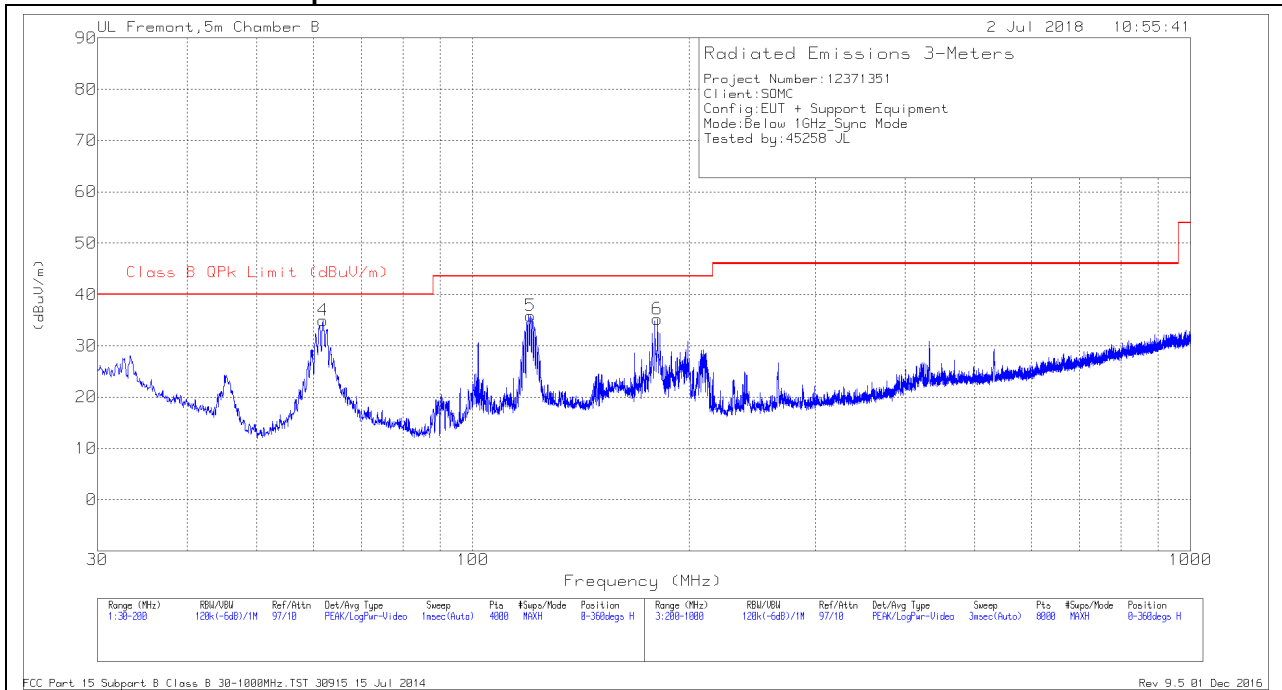
**Radiated Emissions Test Equipment**

<b>TEST EQUIPMENT LIST</b>				
Description	Manufacturer	Model	ID Num	Cal Due
Amplifier, 9KHz to 1GHz, 32dB	Sonoma Instrument	310	PRE0180089	06/21/2019
Amplifier, 9KHz to 1GHz, 32dB	Agilent (keysight) Technologies	8447D	T10	02/14/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB3	T477	07/07/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T4294	04/30/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/2019
Amplifier, 1-18GHz	MICRO-TRONICS	HPM17543	T485	04/03/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	05/11/2019
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
EMI Reciever	Rohde & Schwarz	ESR	T1436	02/21/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T24	03/06/2019
Thermometer - Digital	Control Company	14-650-118	PRE0177862	02/22/2019

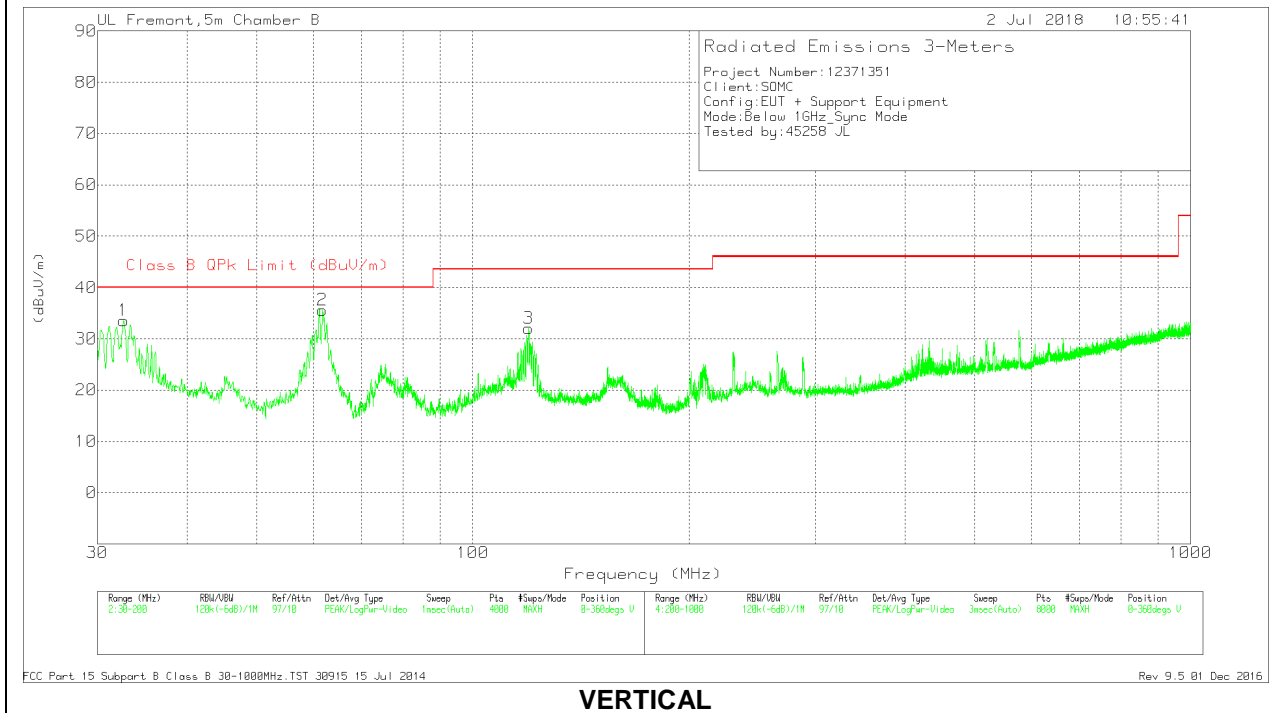
<b>Test Software List</b>			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018

**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 T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.6357	38.73	Pk	23.6	-28.8	33.53	40	-6.47	0-360	100	V
2	61.7557	52.11	Pk	11.9	-28.4	35.61	40	-4.39	0-360	100	V
	61.7826	43.95	Qp	11.9	-28.4	27.45	40	-12.55	189	106	V
4	61.8407	51.42	Pk	11.9	-28.4	34.92	40	-5.08	0-360	400	H
	61.28	43.97	Qp	11.8	-28.4	27.37	40	-12.63	255	352	H
3	119.6132	42.13	Pk	17.6	-27.7	32.03	43.52	-11.49	0-360	100	V
5	120.4209	45.9	Pk	17.6	-27.7	35.8	43.52	-7.72	0-360	200	H
6	180.744	47.16	Pk	15.1	-27.1	35.16	43.52	-8.36	0-360	200	H

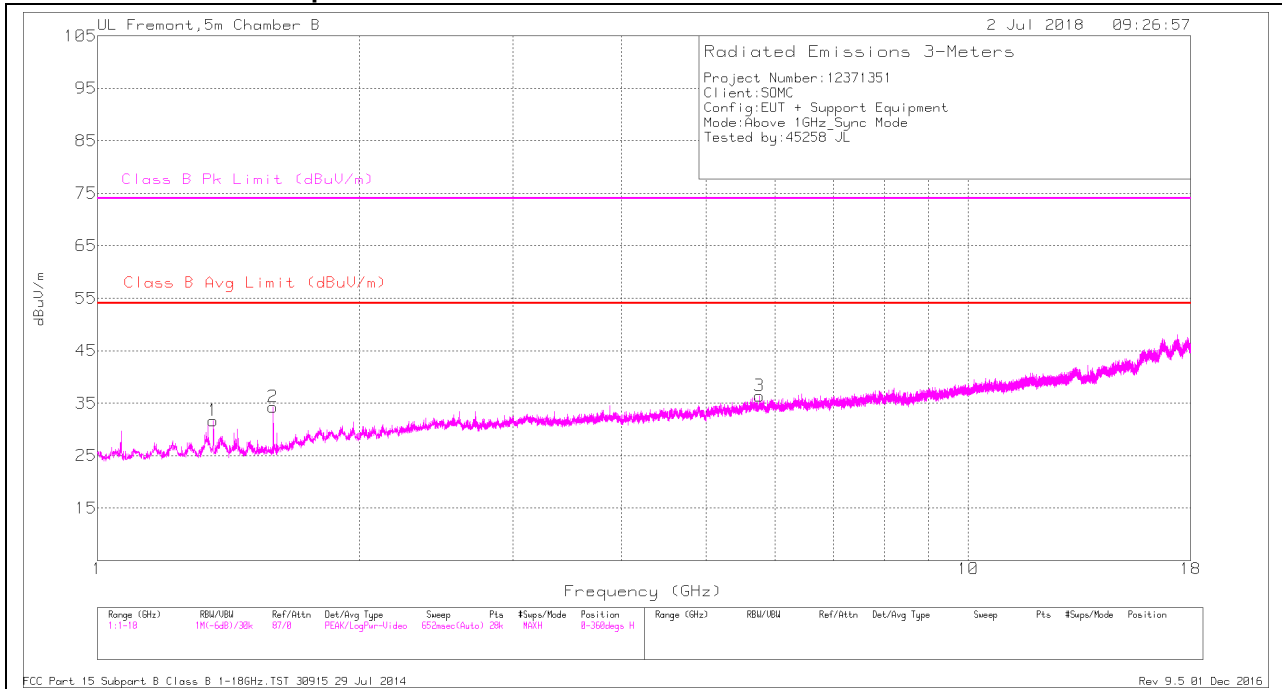
Pk - Peak detector

Qp - Quasi-Peak detector

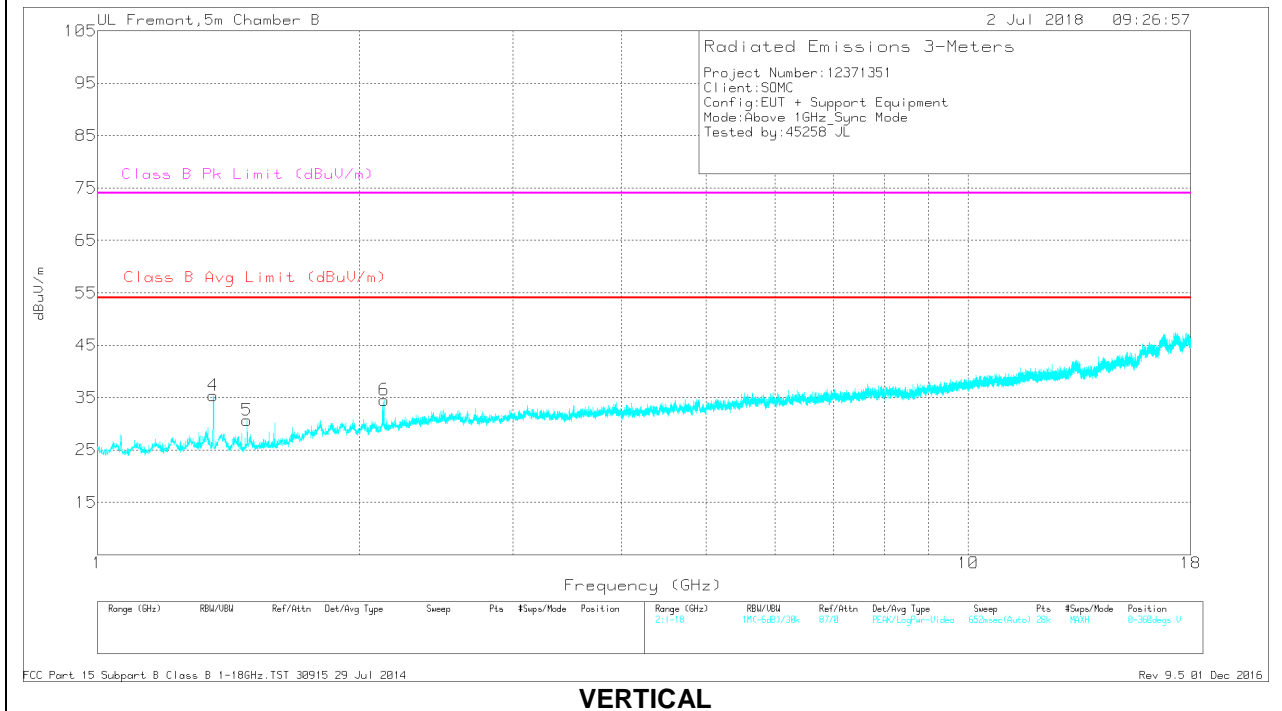


**RADIATED EMISSIONS 1000 TO 18,000 MHz – FCC**

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

Radiated Emissions

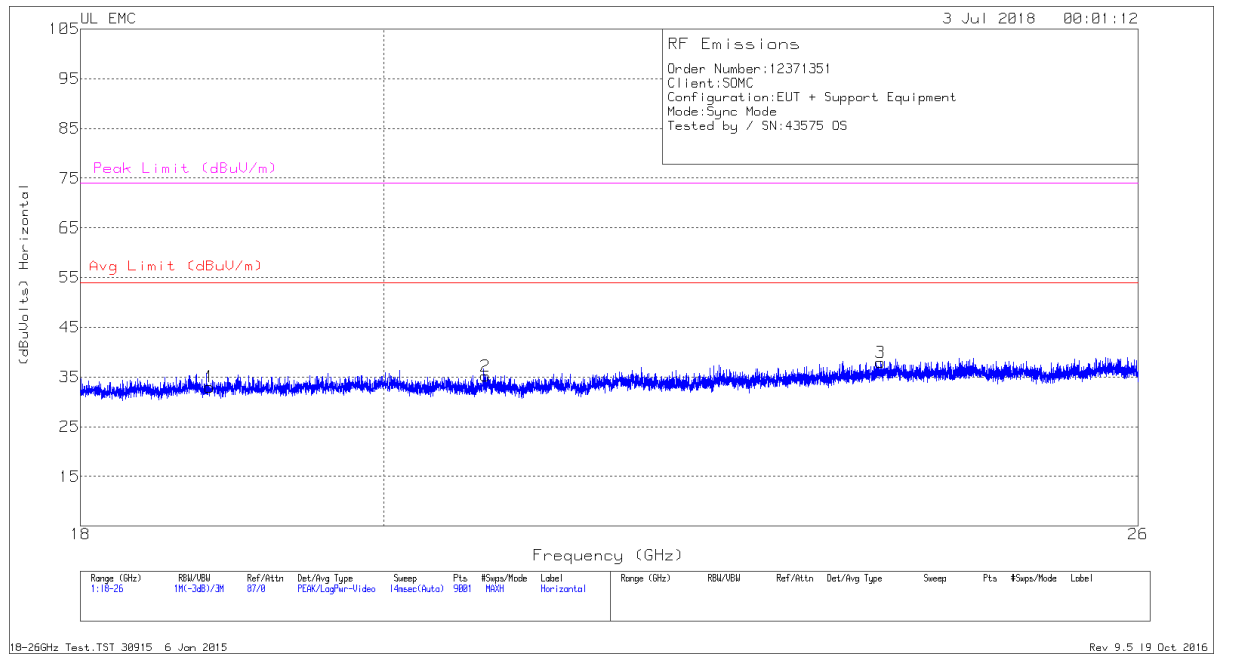
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.358	40.46	Pk	28.5	-34.3	34.66	-	-	74	-39.34	91	318	H
	1.357	27.46	Av	28.5	-34.3	21.66	54	-32.34	-	-	91	318	H
4	1.357	44.36	Pk	28.5	-34.3	38.56	-	-	74	-35.44	61	192	V
	1.358	27.82	Av	28.5	-34.3	22.02	54	-31.98	-	-	61	192	V
5	1.487	41.19	Pk	27.8	-34	34.99	-	-	74	-39.01	173	141	V
	1.485	28.16	Av	27.8	-34.1	21.86	54	-32.14	-	-	173	141	V
2	1.593	60.03	Pk	27.7	-34.3	53.43	-	-	74	-20.57	264	374	H
	1.593	28.3	Av	27.7	-34.3	21.7	54	-32.3	-	-	264	374	H
6	2.132	53.91	Pk	31.2	-33.6	51.51	-	-	74	-22.49	54	257	V
	2.132	28.43	Av	31.2	-33.6	26.03	54	-27.97	-	-	54	257	V
3	5.753	37.99	Pk	35.5	-30.6	42.89	-	-	74	-31.11	181	126	H
	5.751	25.29	Av	35.5	-30.6	30.19	54	-23.81	-	-	181	126	H

Pk - Peak detector

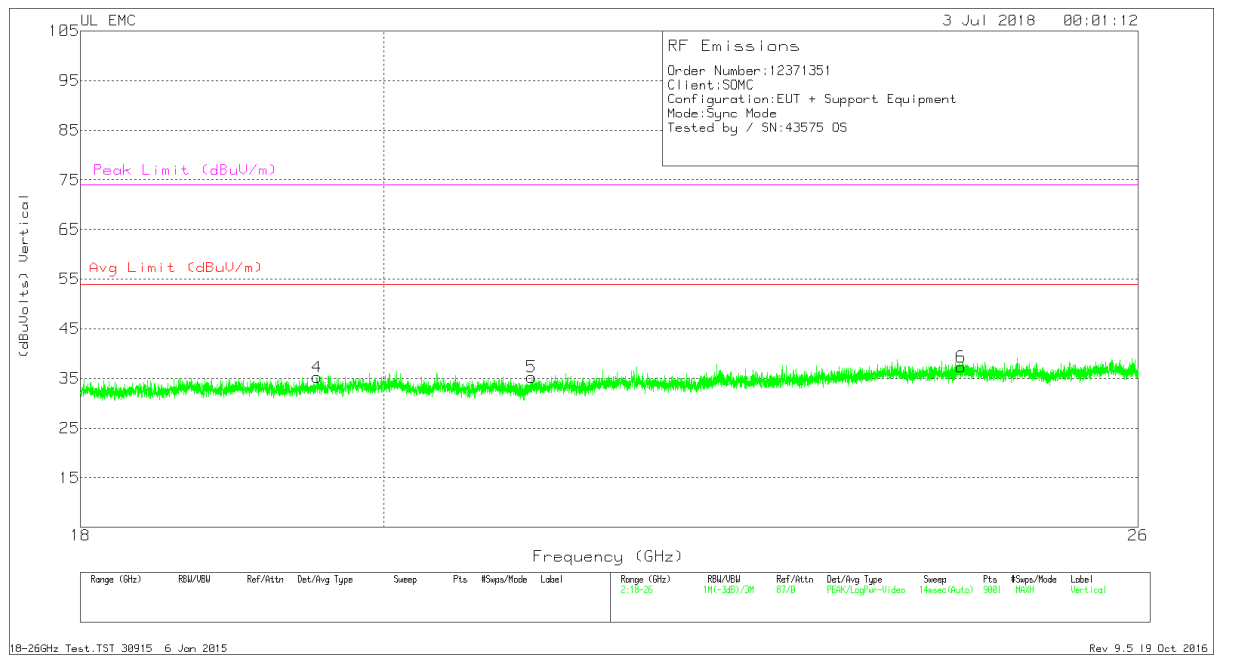
Av - Average detection

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

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

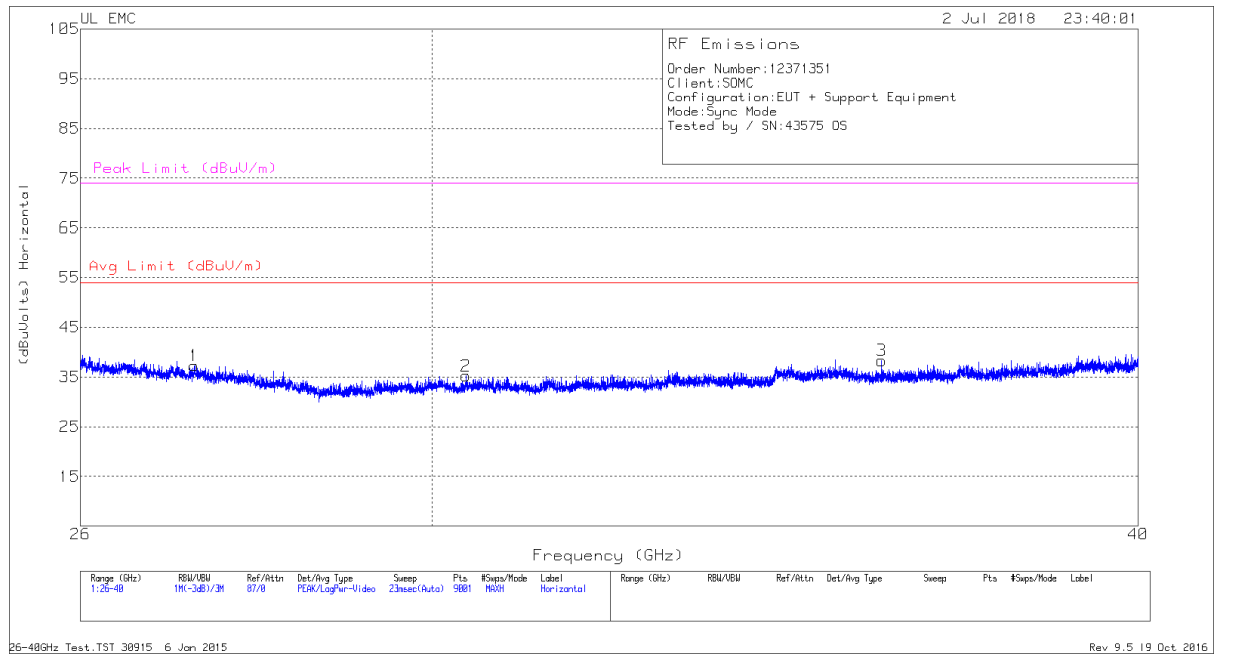
## Trace Markers

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	18.827	35.1	Pk	32.4	-25	-9.5	33	54	-21	74	-41
2	20.721	37.09	Pk	32.8	-25.2	-9.5	35.19	54	-18.81	74	-38.81
3	23.772	38.17	Pk	33.7	-24.4	-9.5	37.97	54	-16.03	74	-36.03
4	19.542	37.35	Pk	32.5	-25.1	-9.5	35.25	54	-18.75	74	-38.75
5	21.056	37.47	Pk	32.6	-25.3	-9.5	35.27	54	-18.73	74	-38.73
6	24.445	37.31	Pk	33.9	-24.4	-9.5	37.31	54	-16.69	74	-36.69

Pk - Peak detector

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

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

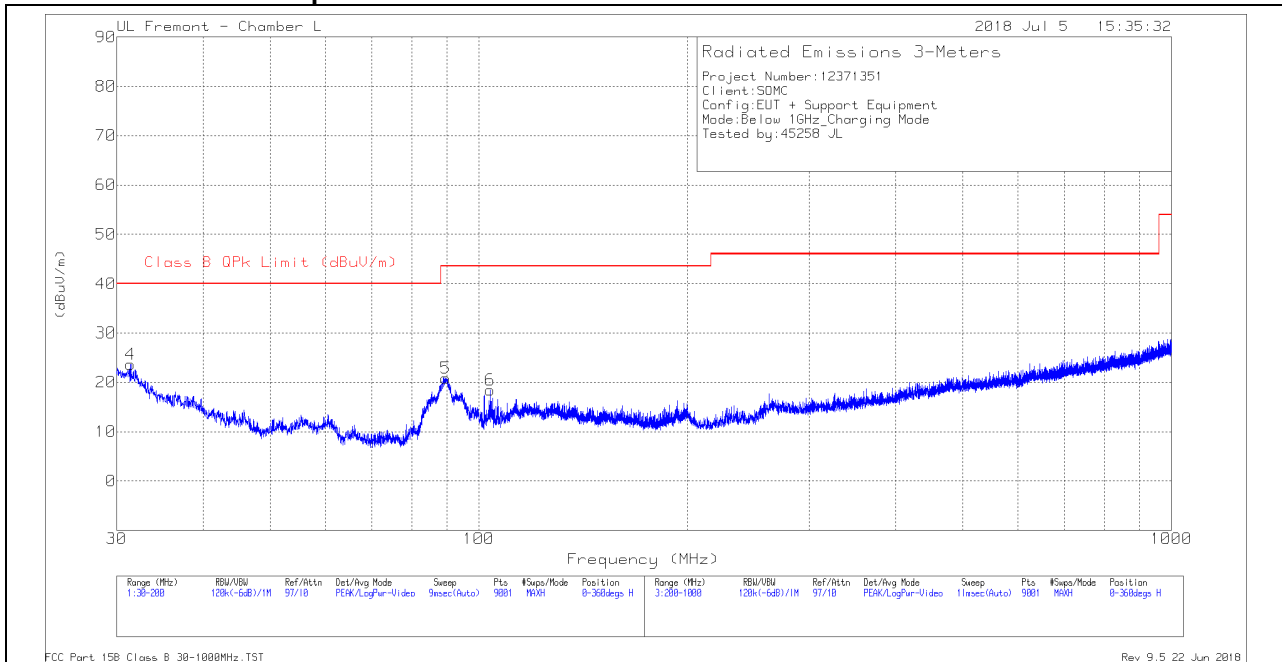
## Trace Markers

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	27.234	41.87	Pk	35.6	-30.7	-9.5	37.27	54	-16.73	74	-36.73
2	30.421	41.44	Pk	36	-32.7	-9.5	35.24	54	-18.76	74	-38.76
3	36.03	43.91	Pk	37.3	-33.4	-9.5	38.31	54	-15.69	74	-35.69
4	27.674	41.59	Pk	35.8	-31.2	-9.5	36.69	54	-17.31	74	-37.31
5	30.97	39.81	Pk	35.9	-32.7	-9.5	33.51	54	-20.49	74	-40.49
6	35.483	40.4	Pk	37.9	-33.3	-9.5	35.5	54	-18.5	74	-38.5

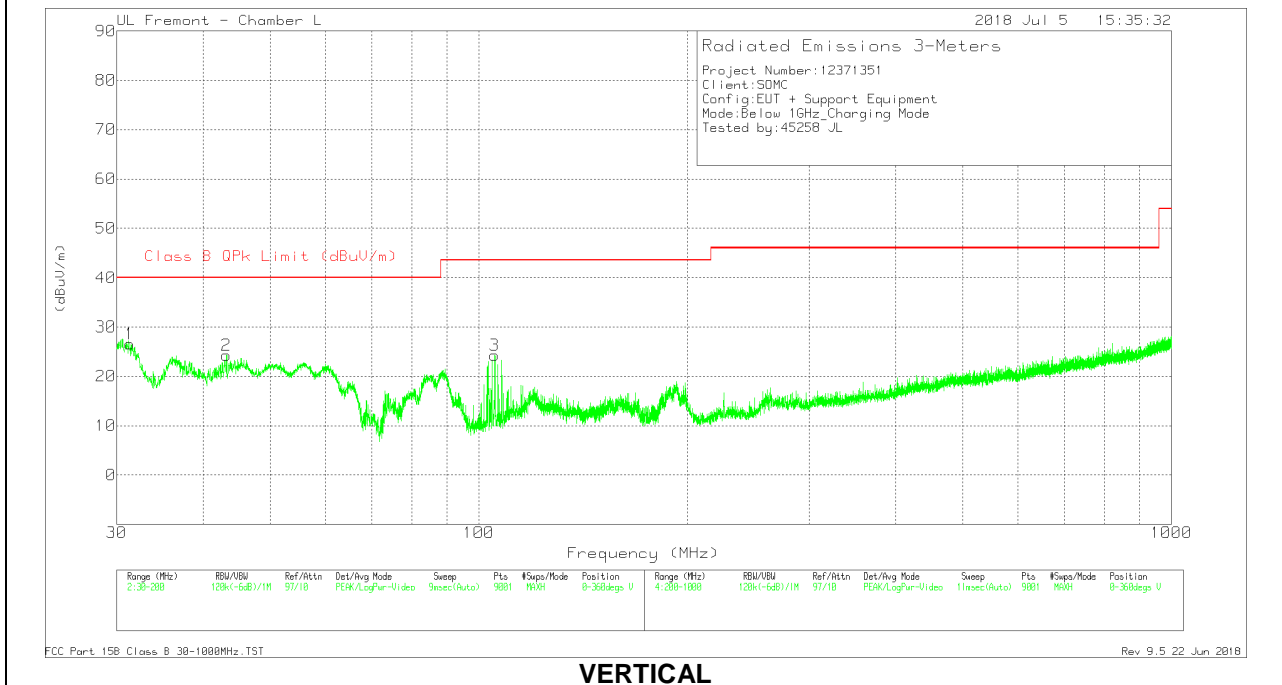
Pk - Peak detector

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

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

## Trace Markers

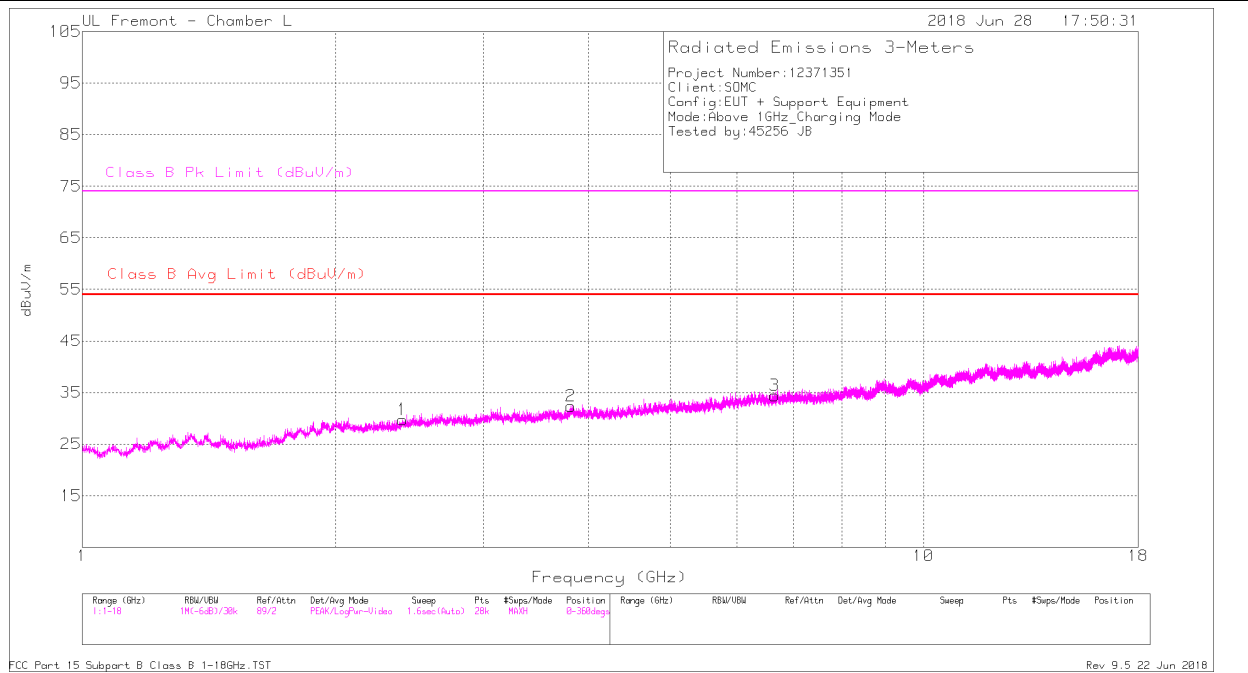
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.4167	30.04	Pk	25.1	-31.5	23.64	40	-16.36	0-360	299	H
5	89.5759	39.91	Pk	12	-31	20.91	43.52	-22.61	0-360	299	H
6	103.8371	33.67	Pk	15.7	-30.9	18.47	43.52	-25.05	0-360	299	H
1	31.3033	32.92	Pk	25.2	-31.5	26.62	40	-13.38	0-360	100	V
2	43.2223	39.58	Pk	16.1	-31.4	24.28	40	-15.72	0-360	100	V
3	105.4616	39.13	Pk	16.1	-30.9	24.33	43.52	-19.19	0-360	100	V

Pk - Peak detector

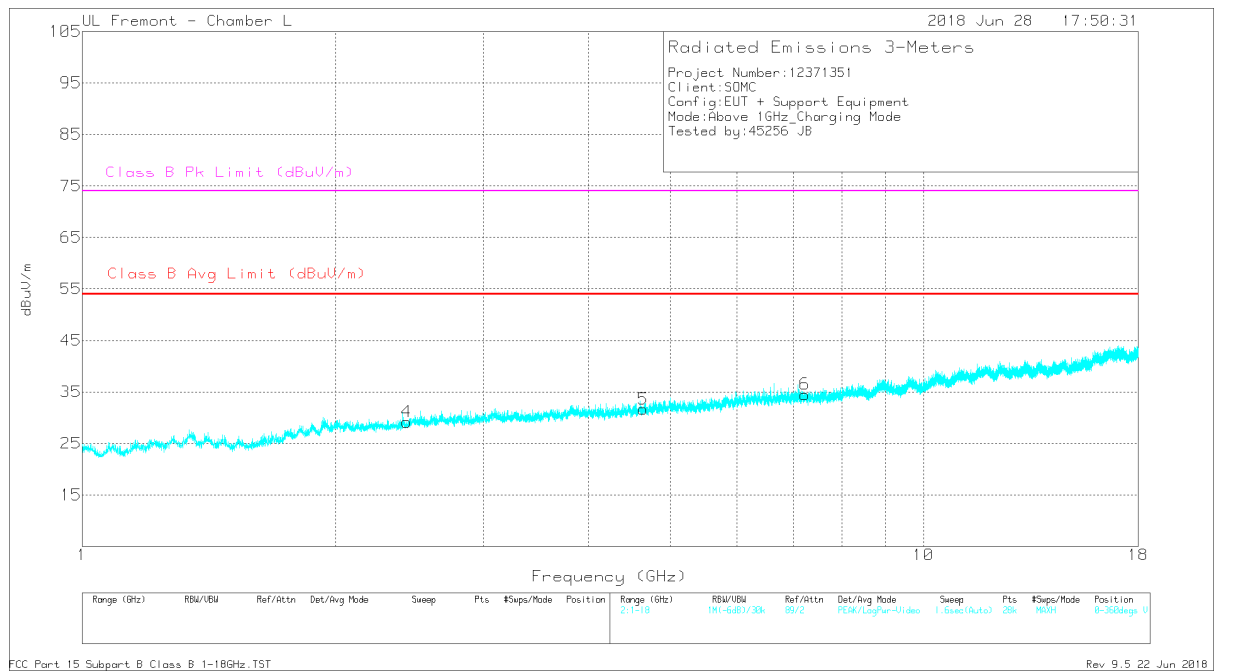


**RADIATED EMISSIONS 1000 TO 18,000 MHz – FCC**

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

Radiated Emissions

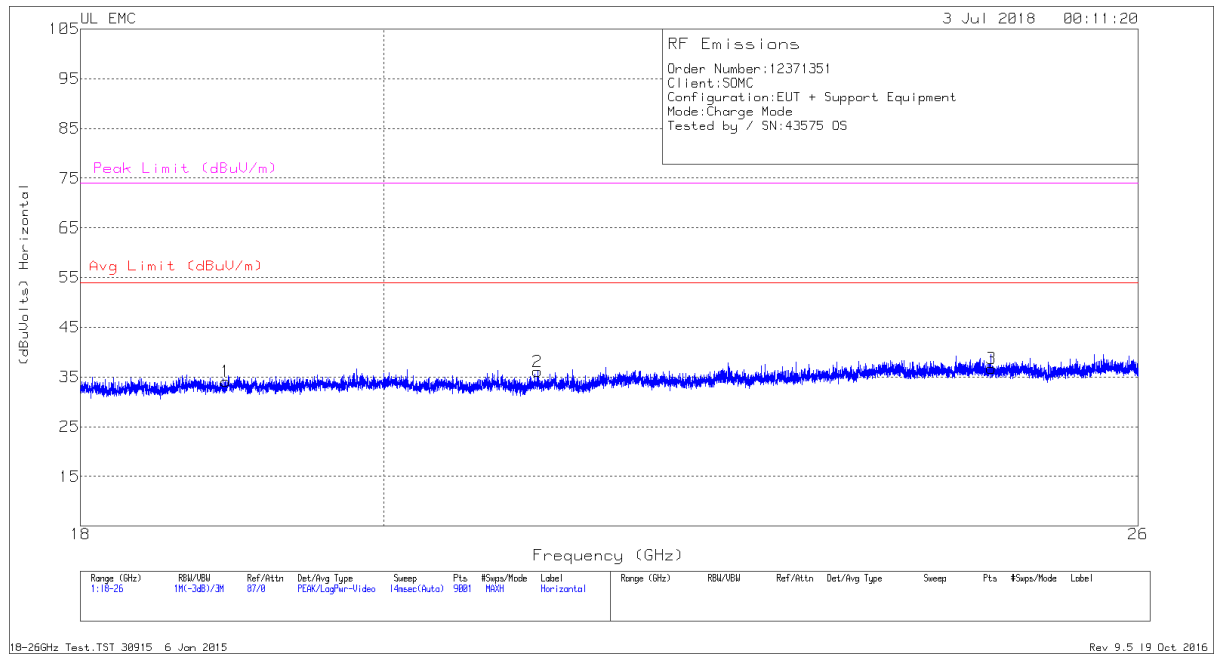
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.403	28.14	Pk	31.9	-32.8	27.24	-	-	74	-46.76	136	134	H
	2.403	17.56	Av	31.9	-32.8	16.66	54	-37.34	-	-	136	134	H
2	3.811	27.18	Pk	33.7	-30.8	30.08	-	-	74	-43.92	128	346	H
	3.811	16.43	Av	33.7	-30.8	19.33	54	-34.67	-	-	128	346	H
3	6.653	23.13	Pk	35.6	-26.7	32.03	-	-	74	-41.97	13	101	H
	6.653	12.98	Av	35.6	-26.7	21.88	54	-32.12	-	-	13	101	H
4	2.431	27.72	Pk	32.1	-32.8	27.02	-	-	74	-46.98	323	314	V
	2.431	17.67	Av	32.1	-32.8	16.97	54	-37.03	-	-	323	314	V
5	4.641	26.02	Pk	34	-29.8	30.22	-	-	74	-43.78	344	168	V
	4.641	15.27	Av	34	-29.8	19.47	54	-34.53	-	-	344	168	V
6	7.223	22.71	Pk	35.7	-26.2	32.21	-	-	74	-41.79	154	136	V
	7.223	12.28	Av	35.7	-26.2	21.78	54	-32.22	-	-	154	136	V

Pk - Peak detection

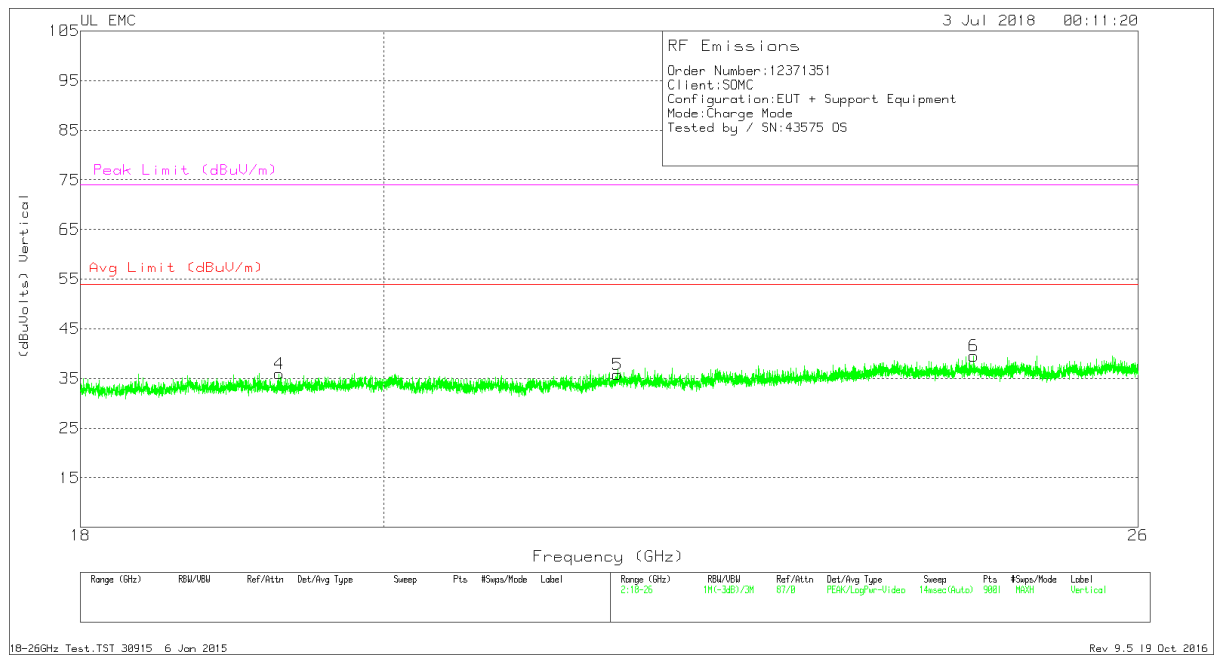
Av - Average detection

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

**Radiated Emissions Graph**



**HORIZONTAL**



**VERTICAL**

**Radiated Emissions Data Points**

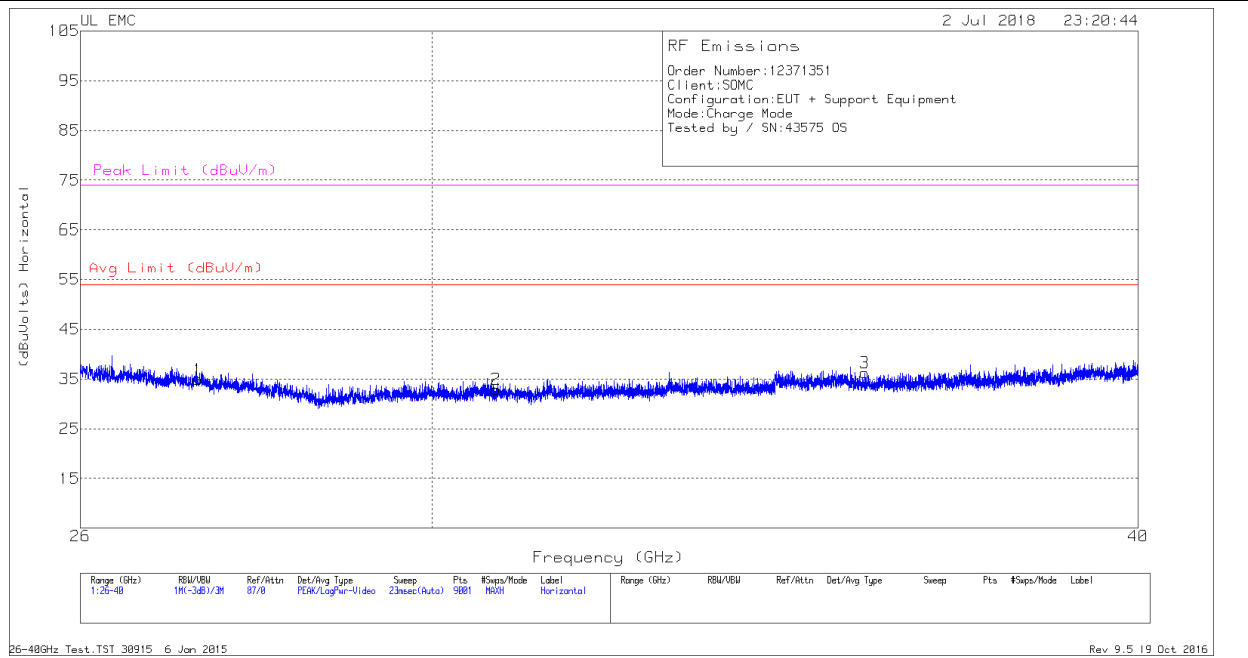
## Trace Markers

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	18.932	36.6	Pk	32.3	-25.3	-9.5	34.1	54	-19.9	74	-39.9
2	21.1	38.01	Pk	32.7	-25.1	-9.5	36.11	54	-17.89	74	-37.89
3	24.708	37.04	Pk	33.8	-24.6	-9.5	36.74	54	-17.26	74	-37.26
4	19.287	37.82	Pk	32.3	-24.7	-9.5	35.92	54	-18.08	74	-38.08
5	21.693	36.6	Pk	33.3	-24.6	-9.5	35.8	54	-18.2	74	-38.2
6	24.554	39.02	Pk	33.9	-23.9	-9.5	39.52	54	-14.48	74	-34.48

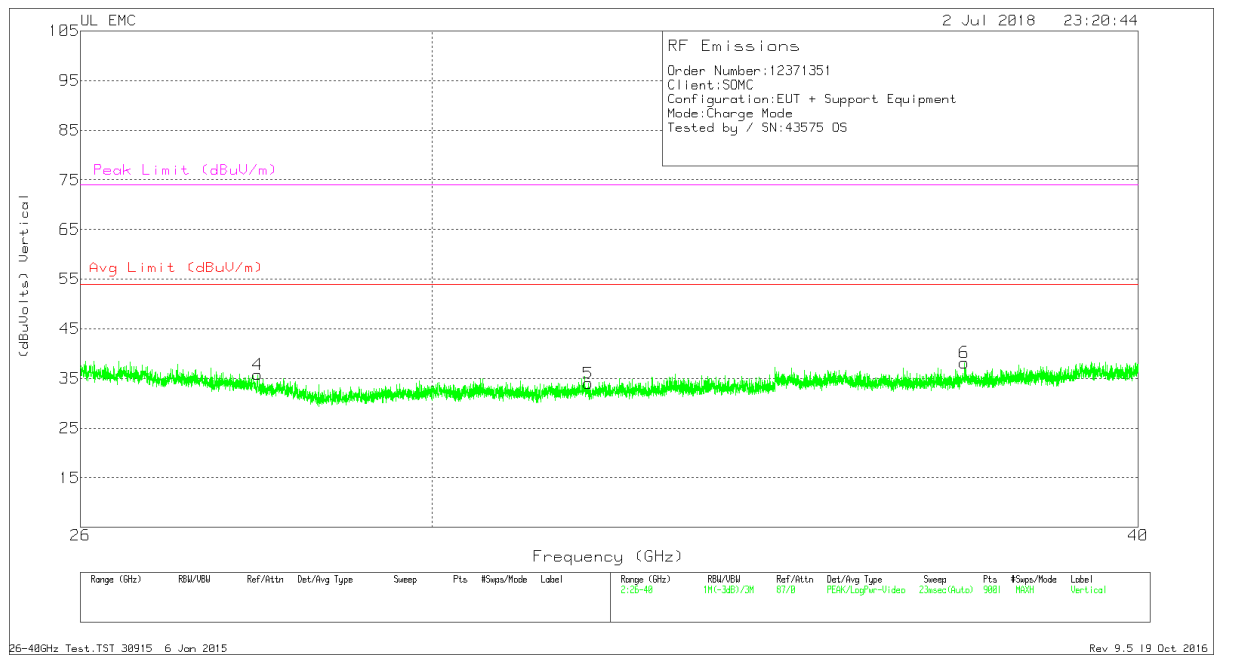
Pk - Peak detector

**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	27.274	40.04	Pk	35.6	-31.2	-9.5	34.94	54	-19.06	74	-39.06
2	30.794	39.03	Pk	36.1	-32.7	-9.5	32.93	54	-21.07	74	-41.07
3	35.784	41.91	Pk	37.2	-33.4	-9.5	36.21	54	-17.79	74	-37.79
4	27.946	41.04	Pk	35.8	-31.6	-9.5	35.74	54	-18.26	74	-38.26
5	31.973	40.23	Pk	36.2	-32.9	-9.5	34.03	54	-19.97	74	-39.97
6	37.265	43.16	Pk	37.3	-32.8	-9.5	38.16	54	-15.84	74	-35.84

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.

<b>47173 Benicia Street</b>	<b>47266 Benicia Street</b>	<b>47658 Kato Rd.</b>
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input type="checkbox"/> Chamber K (ISED: 2324A-1)
<input checked="" type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input checked="" type="checkbox"/> Chamber L (ISED: 2324A-3)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	
	<input type="checkbox"/> Chamber G (ISED:22541-4)	
	<input type="checkbox"/> 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 TEST REPORT**