



CERTIFICATION TEST REPORT

Report Number : R12368801-E1

Applicant : Husqvarna AB
EM-FHR
Huskvarna, SE-561 82 Sweden

Model : HQ-HH-001

FCC ID : ZAS-HQ-HH-001

IC : 23307-HQHH001

EUT Description : BLE Module

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date Of Issue:

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Prepared by:

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NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
1	2018-08-09	Initial Issue	Brian T. Kiewra
2	2020-02-04	Updated model name	Lariah Ijames
3	2020-02-10	Revised measurement methods in Section 6 to ANSI C63.10-2013 references.	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Husqvarna AB
EM-FHR
Huskvarna, SE-561 82 Sweden

EUT DESCRIPTION: BLE Module

MODEL: HQ-HH-001

SERIAL NUMBER: C1, C2

DATE TESTED: 2018-07-19 TO 2018-07-25

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Compliant
ISED RSS-247 Issue 2	Compliant
ISED RSS-GEN Issue 5	Compliant

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.

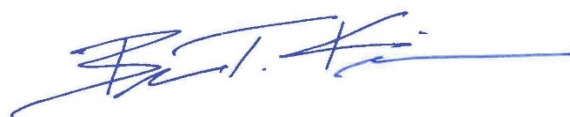
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this 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, or any agency of the U.S. government.

Approved & Released
For UL LLC By:



Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:



Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina, USA and 2800 Suite Perimeter Park Dr., Morrisville, North Carolina, USA. 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.

12 Laboratory Dr.		2800 Suite Perimeter Park Dr.	
☐	Chamber A (ISED:2180C-1)	☒	Chamber North (ISED:2180C-3)
☐	Chamber C (ISED:2180C-2)	☒	Chamber South (ISED:2180C-4)

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY	REQUIRED BY STANDARD
Occupied Channel Bandwidth	2.00%	±5 %
RF output power, conducted	1.3 dB	±1,5 dB
Power Spectral Density, conducted	2.47 dB	±3 dB
Unwanted Emissions, conducted	2.94 dB	±3 dB
All emissions, radiated	5.36 dB	±6 dB
Temperature	2.26 °C	±3 °C
Supply voltages	2.40%	±3 %
Time	3.39%	±5 %

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a BLE module.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	-0.06	0.99

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an ceramic chip antenna, with a maximum gain of 1 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was DTM software from “nRF52_SDK14”

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	1201.0002K50-132911-tU	None

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	9-pin	Unshielded	<1m	Provides DC power
2	Virtual COM	1	USB	Unshielded	<1m	Connection to CMW 500

TEST SETUP

The EUT is installed as a standalone device. CMW 500 used to configure device for test then disconnected during radiated scans.

SETUP DIAGRAMS

Please refer to R12368801-EP1 for setup diagrams

6. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10 Section 11.6

6 dB BW: ANSI C63.10 Subclause -11.8.1

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter – For Reference only)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Out-of-band emissions in non-restricted bands: ANSI C63.10-2013 Section 11.11 & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10-2013 Section 11.12.1 & 6.10.5

General Radiated Emissions: ANSI C63.10:2013 Sections 6.3 – 6.6

AC Line Conducted Emissions: ANSI C63.10:2013 Sections 6.2

7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2018-01-02	2019-01-02
30-1000 MHz					
AT0075	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-09-05	2018-09-30
1-18 GHz					
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2018-04-30	2019-04-30
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2018-05-20	2019-05-20
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2018-03-20	2019-03-20
Receiver & Software					
SA0026	Spectrum Analyzer	Agilent	N9030A	2018-03-20	2019-03-20
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024887	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
18-40 GHz					
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2017-10-10	2018-10-10
Gain-Loss Chains					
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-04-03	2019-04-03
Receiver & Software					
SA0027	Spectrum Analyzer	Agilent	N9030A	2018-04-04	2019-04-04
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

Test Equipment Used - Wireless Conducted Measurement Equipment (Morrisville Con-2)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0020	Spectrum Analyzer	Agilent Technologies	E4446A	2017-11-06	2018-11-06
PWM001	RF Power Meter	Keysight Technologies	N1912A	2018-05-30	2019-05-30
PWS007	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2018-05-30	2019-05-30
SN 161016511	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21
76022	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	N/A	N/A
T374 80579	Wideband Radio Communication Tester	Rhode & Schwarz	CMW500	2018-07-05	2019-07-05
MM0168	True RMS Multimeter	Agilent	U1232A	2017-08-25	2018-08-25

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

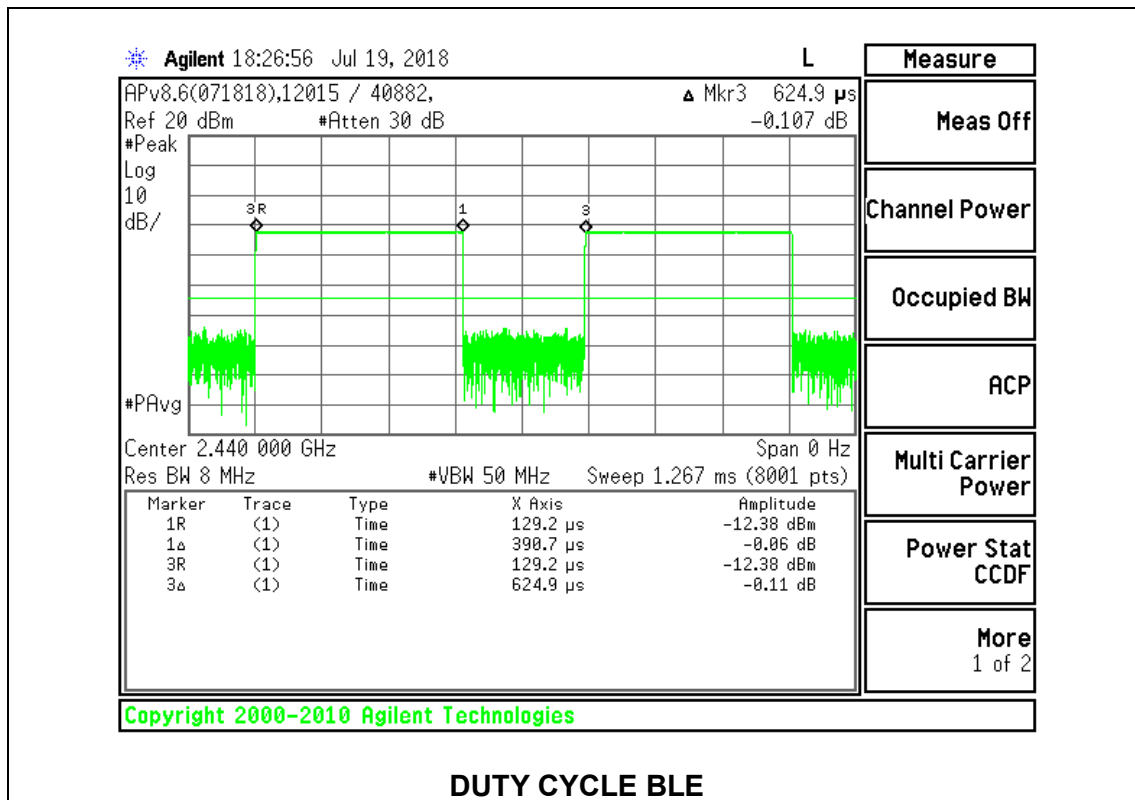
LIMITS

None; for reporting purposes only.

PROCEDURE

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE	0.391	0.625	0.625	62.52%	2.04	2.560



8.2. 99% BANDWIDTH

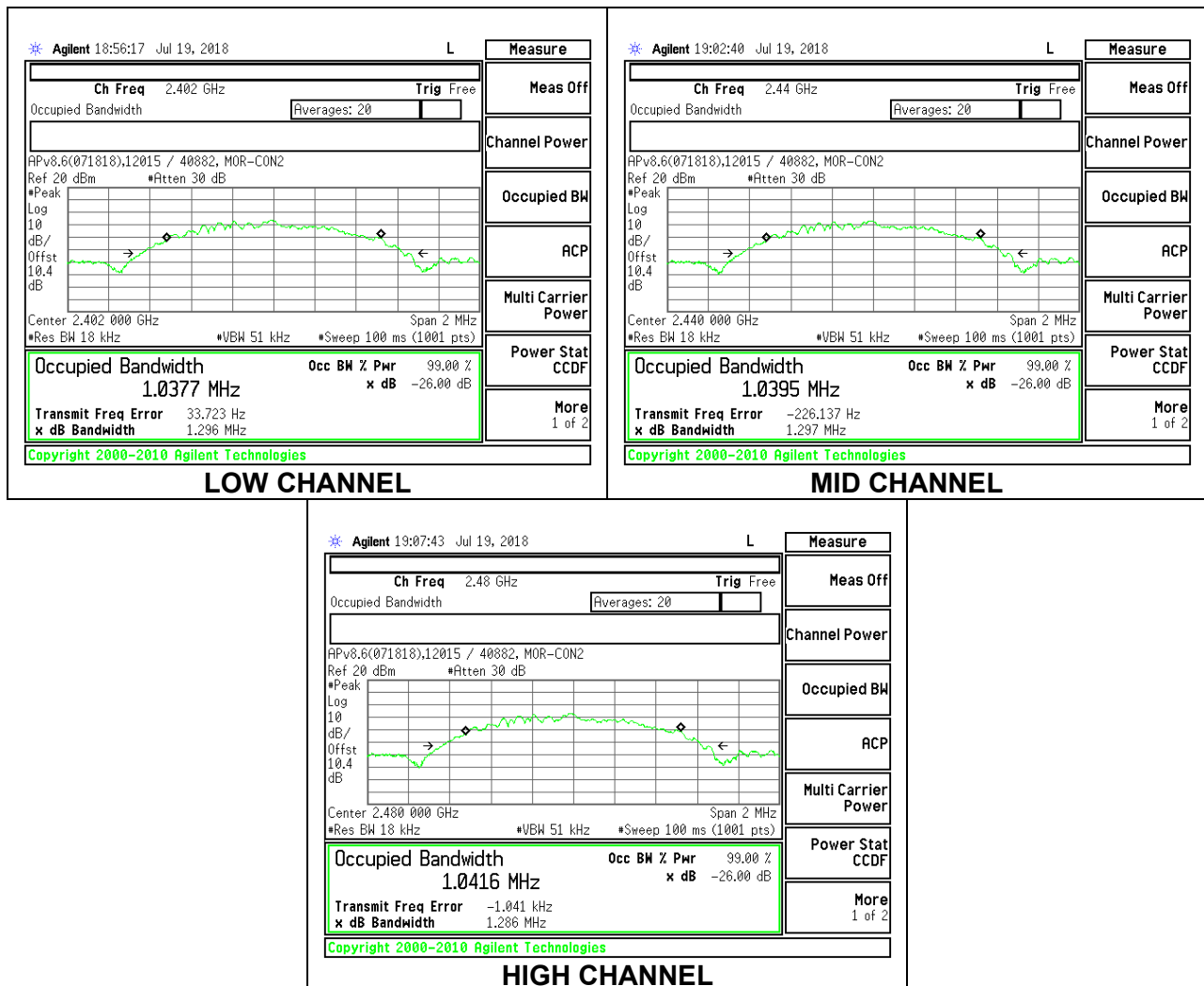
LIMITS

None; for reporting purposes only.

RESULTS

8.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0380
Middle	2440	1.0400
High	2480	1.0420



8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a)(2)

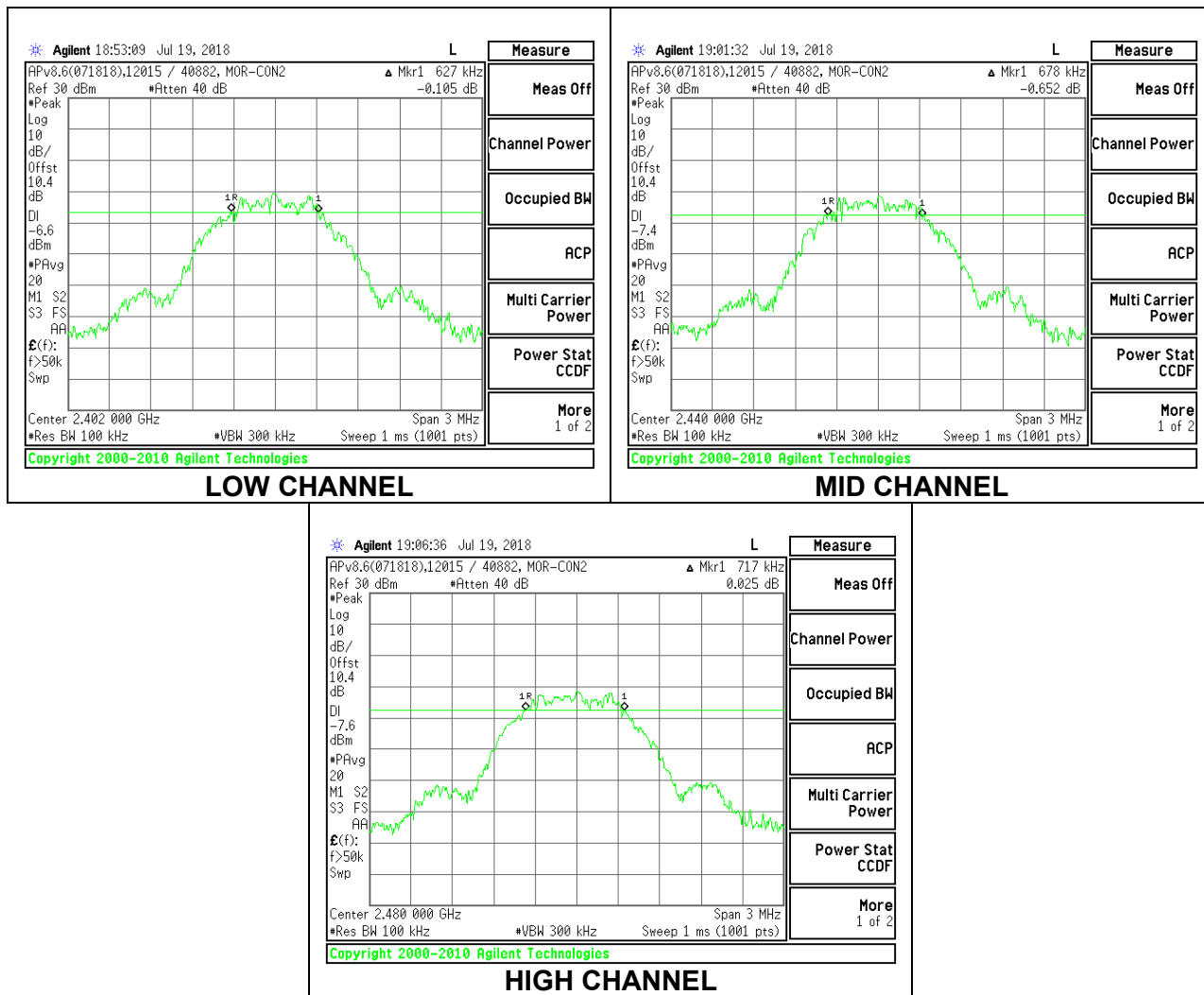
RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

8.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6270	0.5
Middle	2440	0.6780	0.5
High	2480	0.7170	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

IC RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.06	30	-30.060
Middle	2440	-0.29	30	-30.290
High	2480	-0.54	30	-30.540

TEST INFORMATION

Test Date: 2018-07-19

Project No: 12368801

Tested By: 12015 / 40882

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 10.44 dB (including 10 dB pad and 0.44 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-0.33
Middle	2440	-0.6
High	2480	-0.86

TEST INFORMATION

Test Date: 2018-07-19

Project No: 12368801

Tested By: 12015 / 40882

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

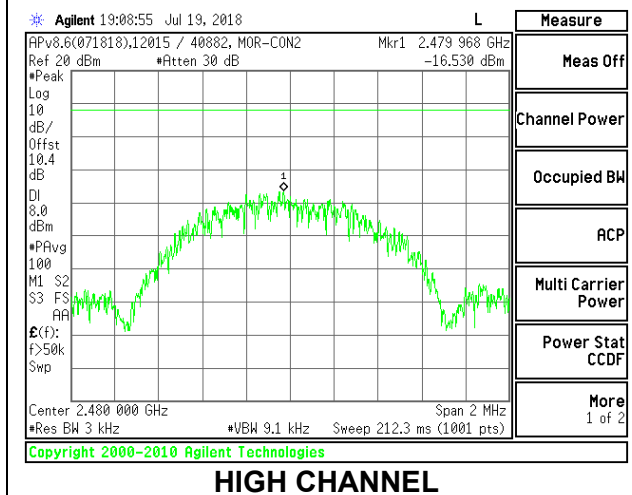
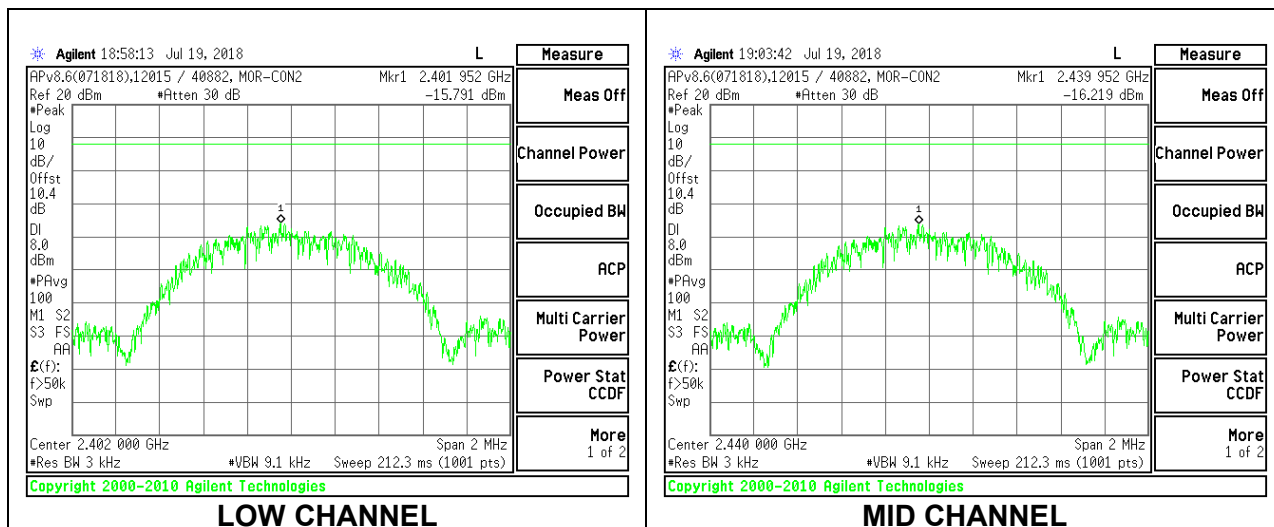
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

8.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-15.79	8	-23.79
Middle	2440	-16.22	8	-24.22
High	2480	-16.53	8	-24.53



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

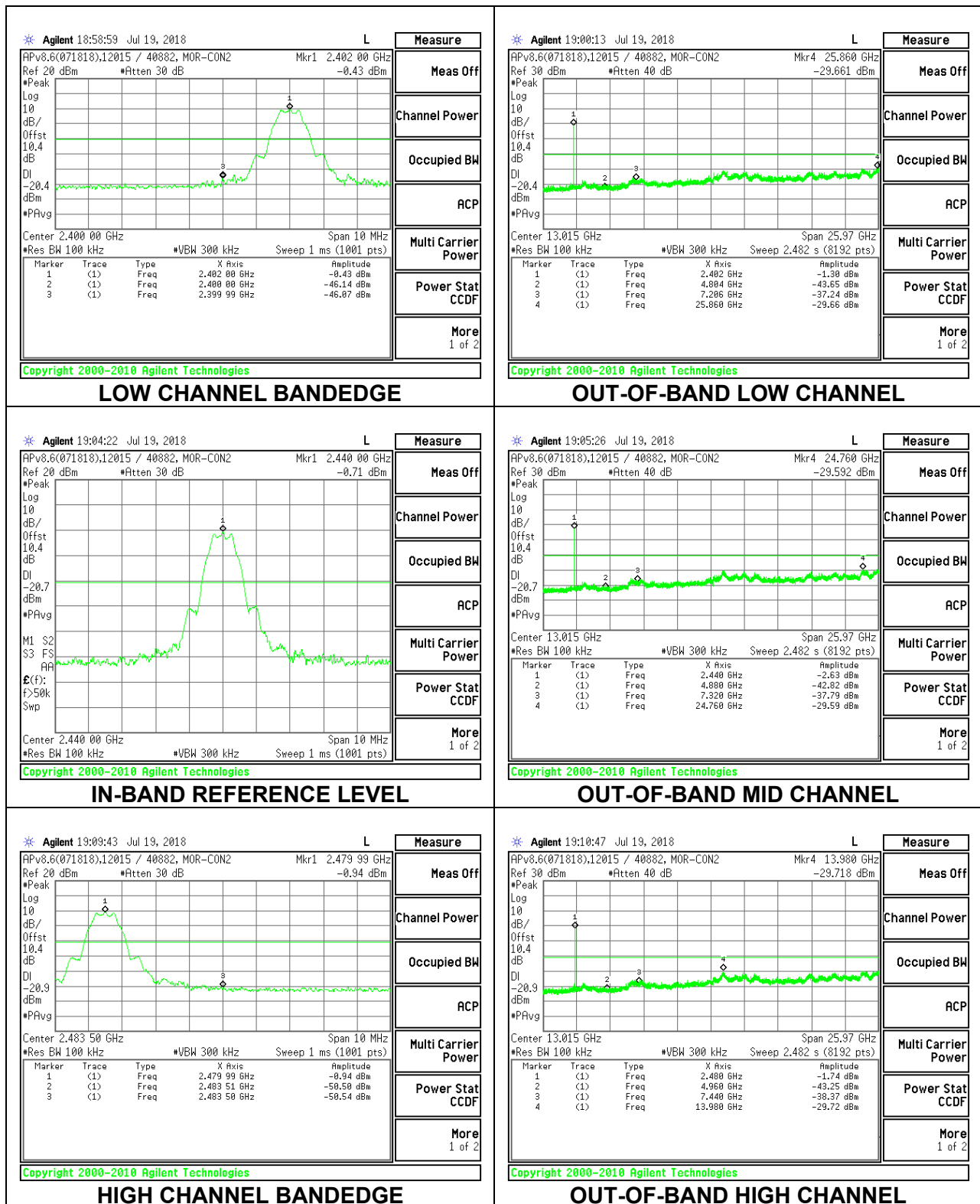
FCC §15.247 (d)

RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

8.7.1. BLE (1Mbps)



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was RMS.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power and PSD was tested.

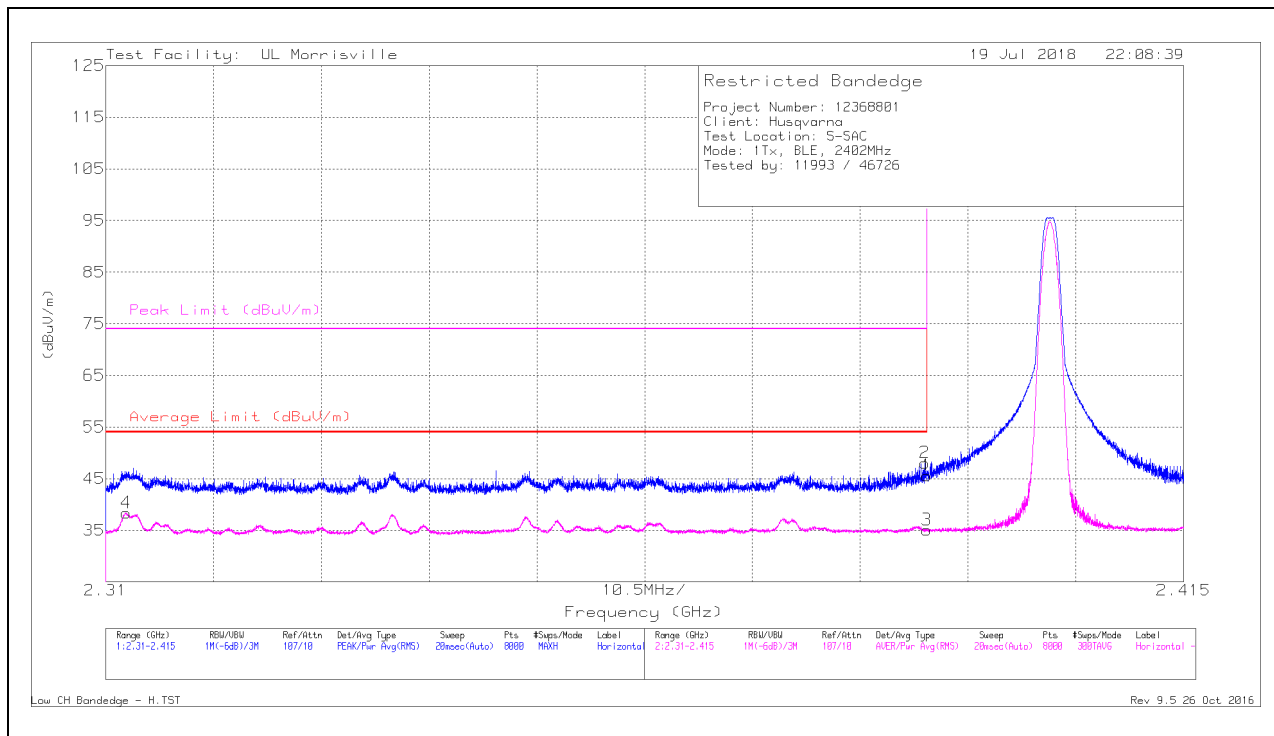
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.39	37.72	Pk	32	-24.1	0	45.62	-	-	74	-28.38	137	142	H
2	*** 2.39	40.17	Pk	32	-24.1	0	48.07	-	-	74	-25.93	137	142	H
3	*** 2.39	25.14	RMS	32	-24.1	2.04	35.08	54	-18.92	-	-	137	142	H
4	*** 2.312	28.44	RMS	31.7	-23.8	2.04	38.38	54	-15.62	-	-	137	142	H

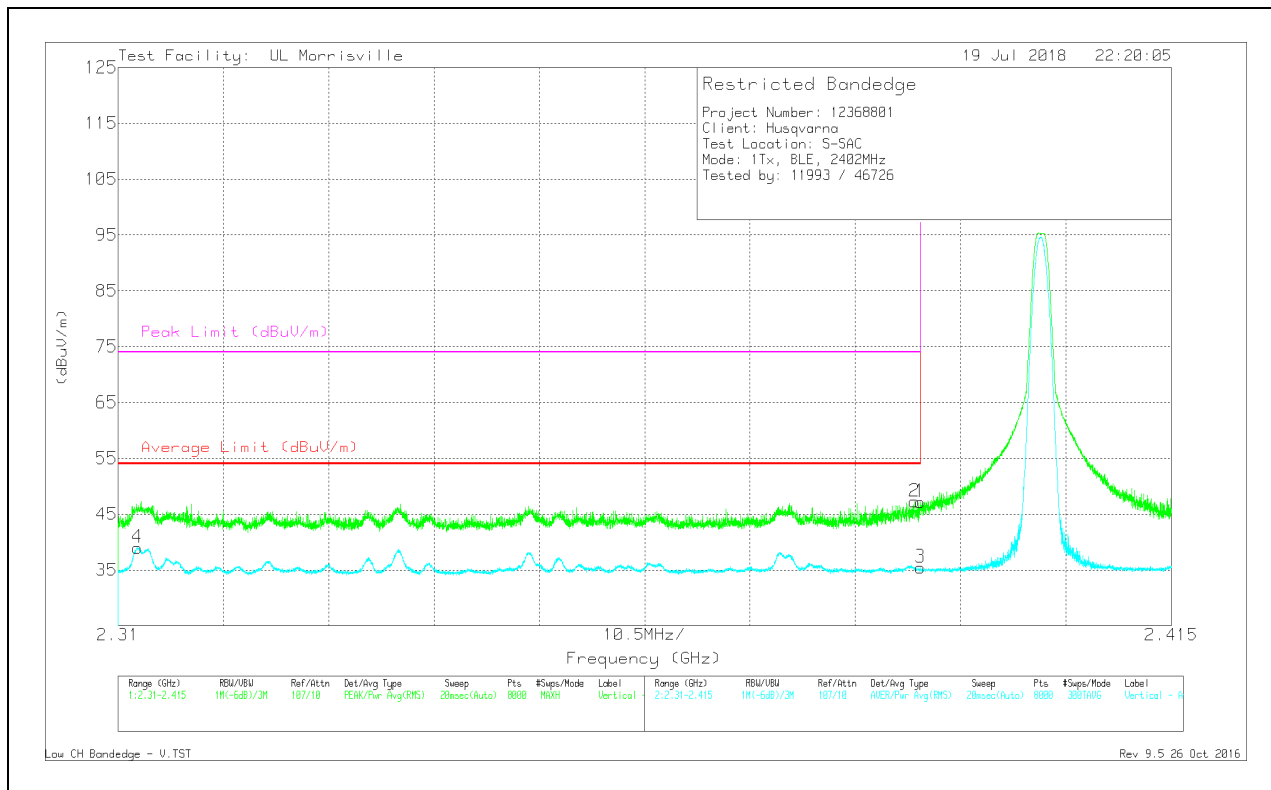
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	39.3	Pk	32	-24.1	0	47.2	-	-	74	-26.8	34	107	V
2	* ** 2.389	39.36	Pk	32	-24.1	0	47.26	-	-	74	-26.74	34	107	V
3	* ** 2.39	25.52	RMS	32	-24.1	2.04	35.46	54	-18.54	-	-	34	107	V
4	* ** 2.312	29.06	RMS	31.7	-23.8	2.04	39	54	-15	-	-	34	107	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

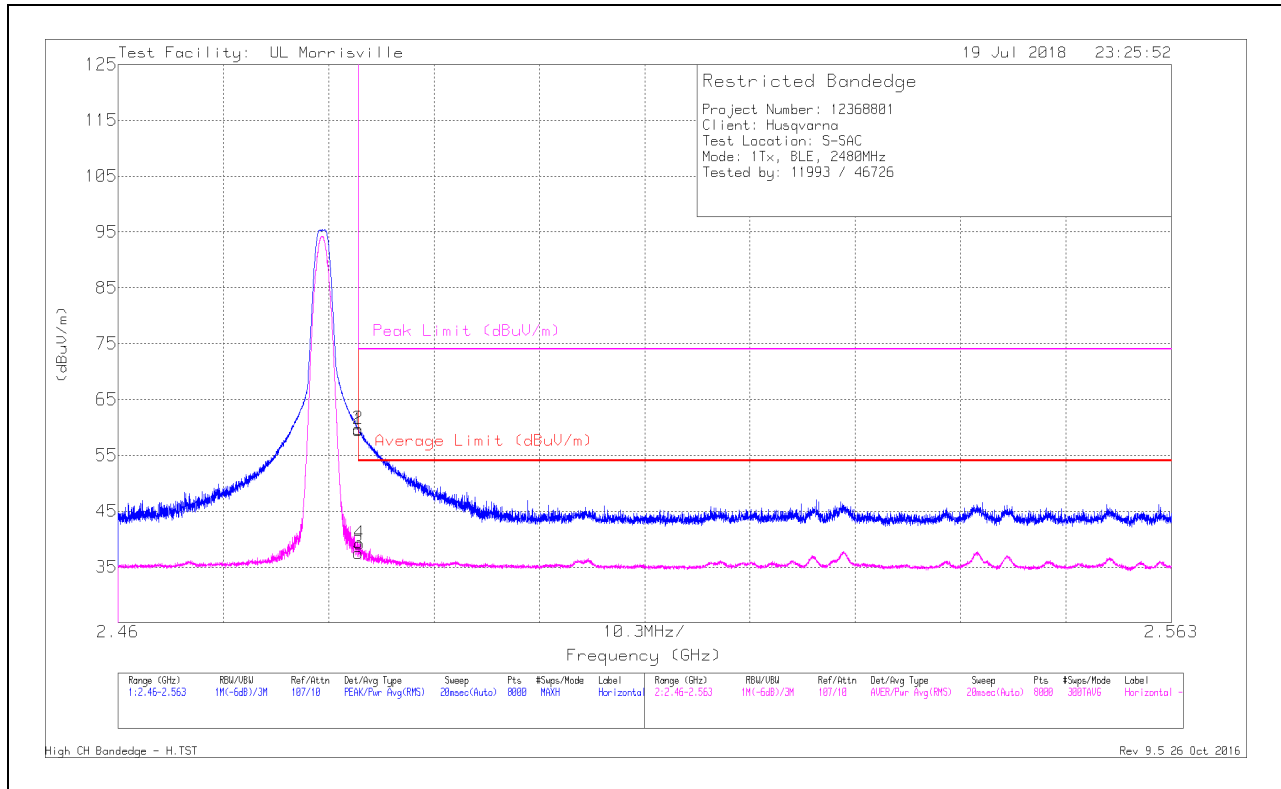
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	51.69	Pk	32.4	-24.6	0	59.49	-	-	74	-14.51	149	111	H
2	* ** 2.484	51.91	Pk	32.4	-24.6	0	59.71	-	-	74	-14.29	149	111	H
3	* ** 2.484	27.64	RMS	32.4	-24.6	2.04	37.48	54	-16.52	-	-	149	111	H
4	* ** 2.484	29.38	RMS	32.4	-24.6	2.04	39.22	54	-14.78	-	-	149	111	H

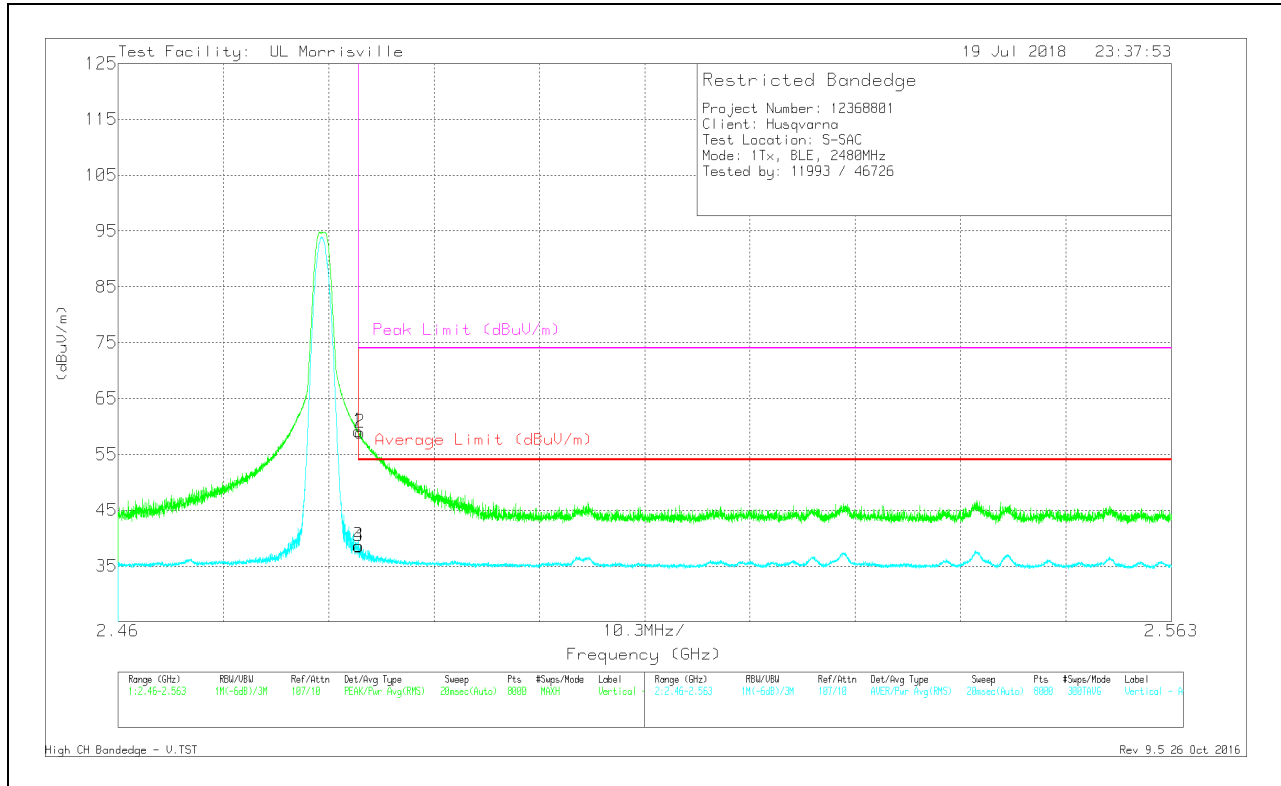
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	51.35	Pk	32.4	-24.6	0	59.15	-	-	74	-14.85	57	115	V
2	* ** 2.484	51.13	Pk	32.4	-24.6	0	58.93	-	-	74	-15.07	57	115	V
3	* ** 2.484	28.79	RMS	32.4	-24.6	2.04	38.63	54	-15.37	-	-	57	115	V
4	* ** 2.484	28.71	RMS	32.4	-24.6	2.04	38.55	54	-15.45	-	-	57	115	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

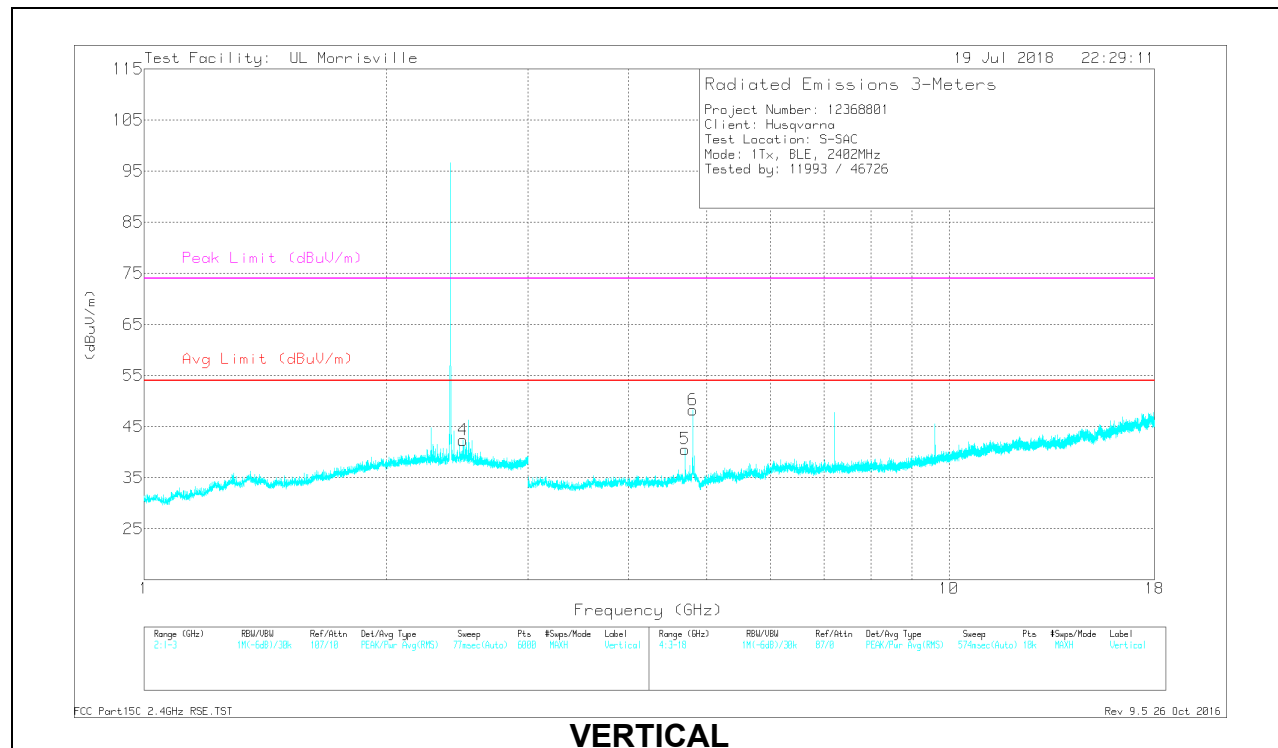
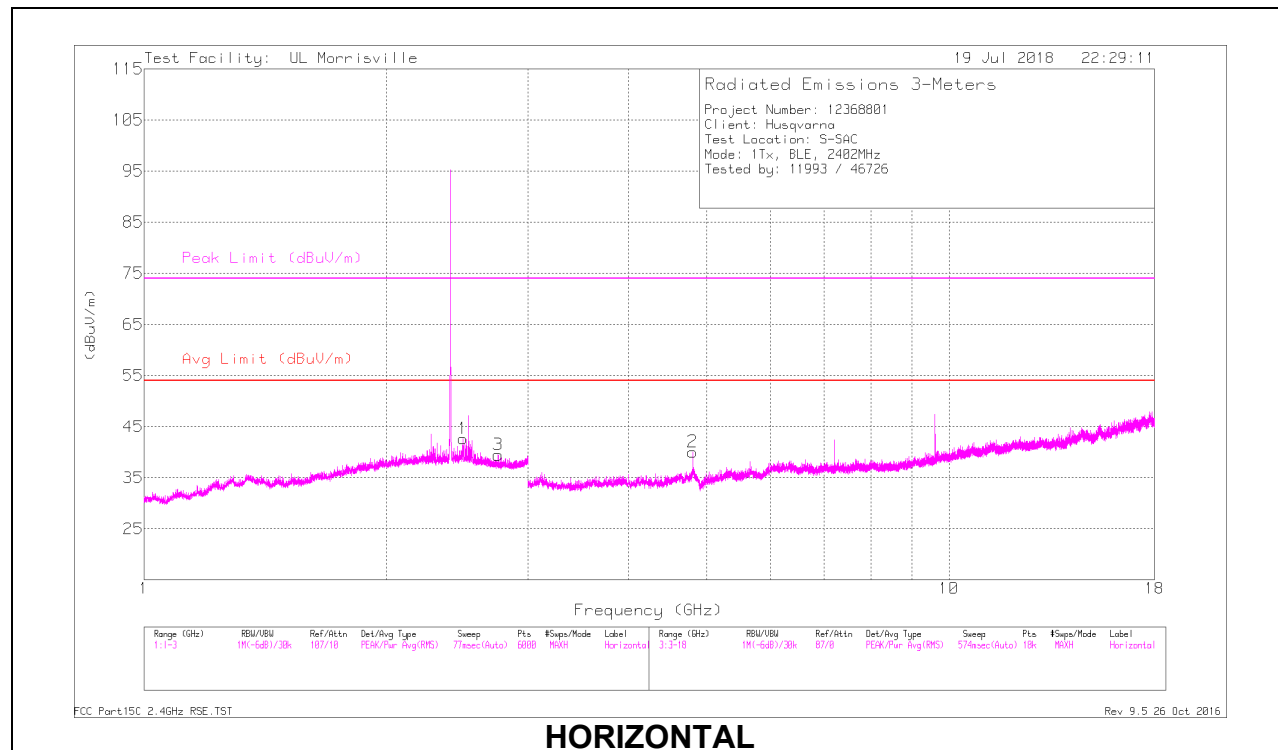
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.492	40.68	PK2	32.4	-24.7	0	48.38	-	-	74	-25.62	133	105	H
	* ** 2.491	31.05	MAv1	32.4	-24.7	2.04	40.79	54	-13.21	-	-	133	105	H
3	* ** 2.751	37.66	PK2	32.2	-26	0	43.86	-	-	74	-30.14	237	182	H
	* ** 2.752	25.88	MAv1	32.2	-26	2.04	34.12	54	-19.88	-	-	237	182	H
2	* ** 4.804	42.79	PK2	34	-31.2	0	45.59	-	-	74	-28.41	315	127	H
	* ** 4.804	33.16	MAv1	34	-31.2	2.04	38	54	-16	-	-	315	127	H
4	* ** 2.492	41.1	PK2	32.4	-24.7	0	48.8	-	-	74	-25.2	65	143	V
	* ** 2.492	31.52	MAv1	32.4	-24.7	2.04	41.26	54	-12.74	-	-	65	143	V
5	* ** 4.703	46.18	PK2	33.9	-31.8	0	48.28	-	-	74	-25.72	124	159	V
	* ** 4.702	29.65	MAv1	33.9	-31.8	2.04	33.79	54	-20.21	-	-	124	159	V
6	* ** 4.804	47.6	PK2	34	-31.2	0	50.4	-	-	74	-23.6	124	142	V
	* ** 4.804	41.26	MAv1	34	-31.2	2.04	46.1	54	-7.9	-	-	124	142	V

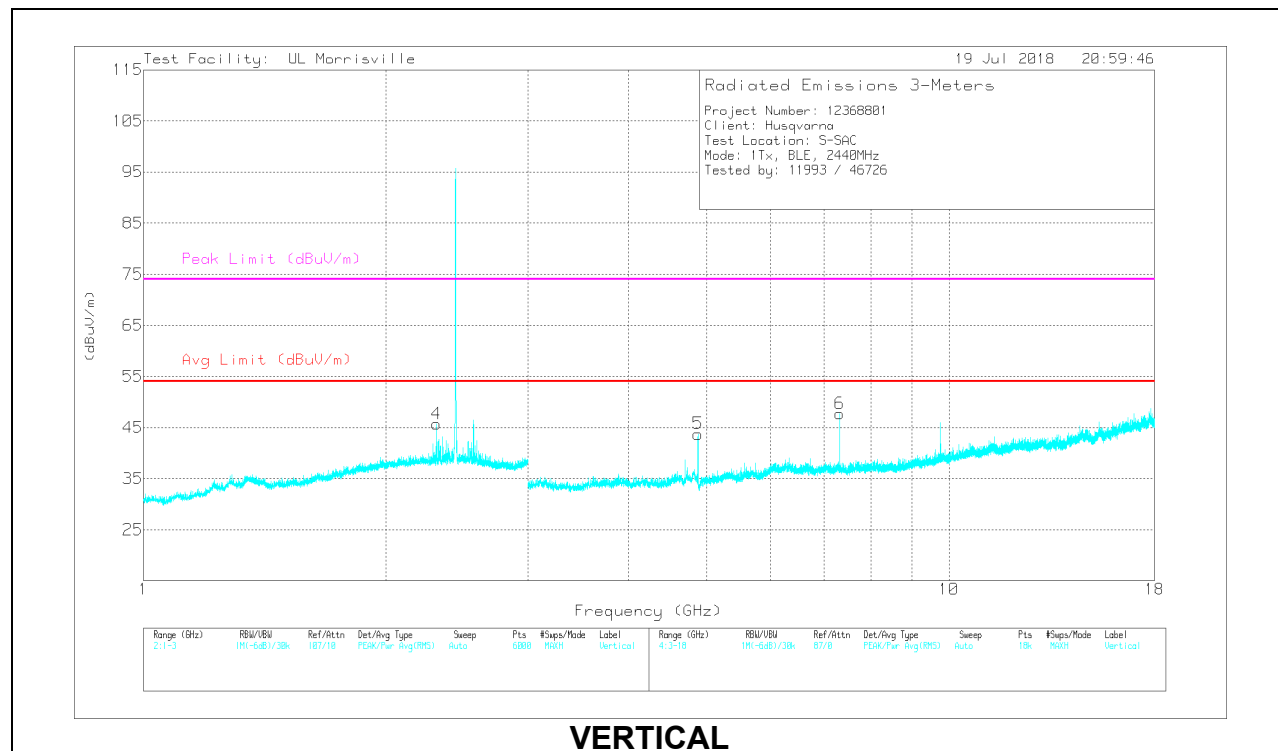
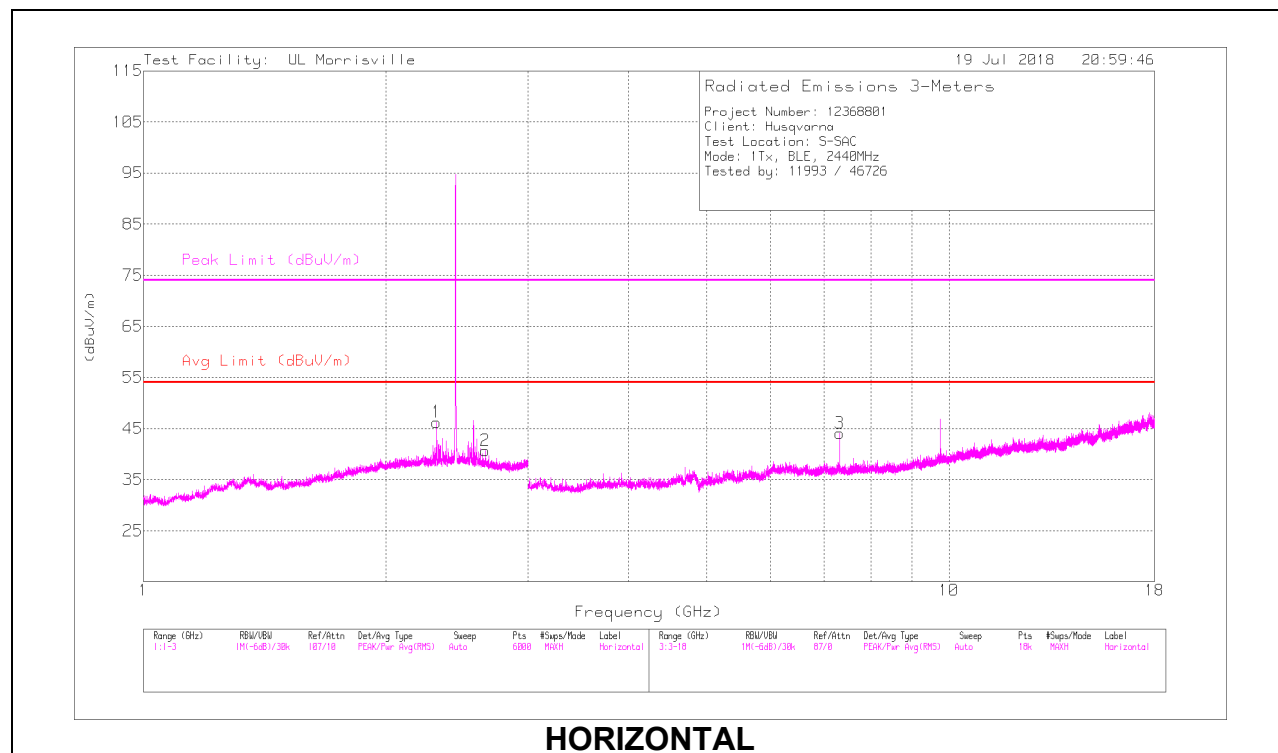
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

MAv1 - Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.312	42.27	PK2	31.7	-23.8	0	50.17	-	-	74	-23.83	116	104	H
	* ** 2.312	34.65	MAv1	31.7	-23.8	2.04	44.59	54	-9.41	-	-	116	104	H
2	* ** 2.658	39.3	PK2	32.3	-25.6	0	46	-	-	74	-28	296	161	H
	* ** 2.658	28.83	MAv1	32.3	-25.6	2.04	37.57	54	-16.43	-	-	296	161	H
3	* ** 7.321	41.89	PK2	35.5	-27.6	0	49.79	-	-	74	-24.21	313	262	H
	* ** 7.319	33.05	MAv1	35.5	-27.6	2.04	42.99	54	-11.01	-	-	313	262	H
4	* ** 2.312	42.43	PK2	31.7	-23.8	0	50.33	-	-	74	-23.67	10	138	V
	* ** 2.312	34.59	MAv1	31.7	-23.8	2.04	44.53	54	-9.47	-	-	10	138	V
5	* ** 4.88	45.67	PK2	34	-30.9	0	48.77	-	-	74	-25.23	123	232	V
	* ** 4.88	39.42	MAv1	34	-30.9	2.04	44.56	54	-9.44	-	-	123	232	V
6	* ** 7.321	43.9	PK2	35.5	-27.6	0	51.8	-	-	74	-22.2	276	123	V
	* ** 7.319	35.49	MAv1	35.5	-27.6	2.04	45.43	54	-8.57	-	-	276	123	V

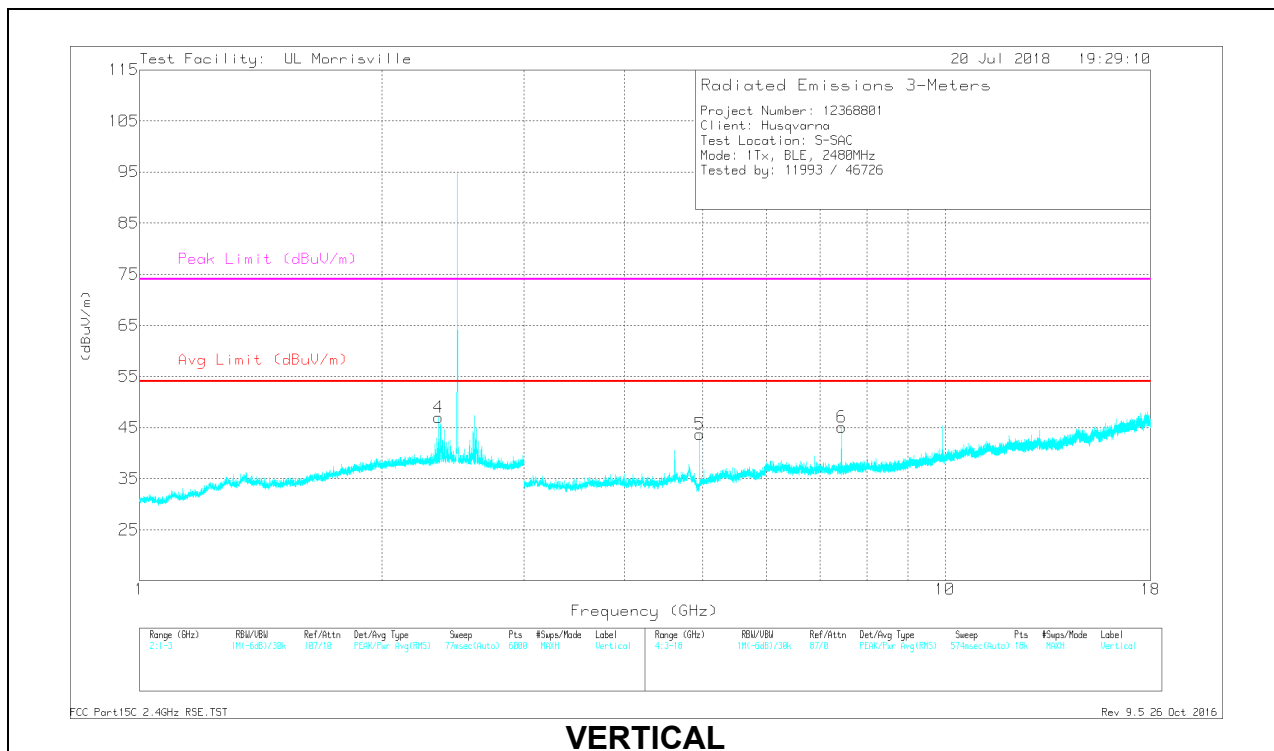
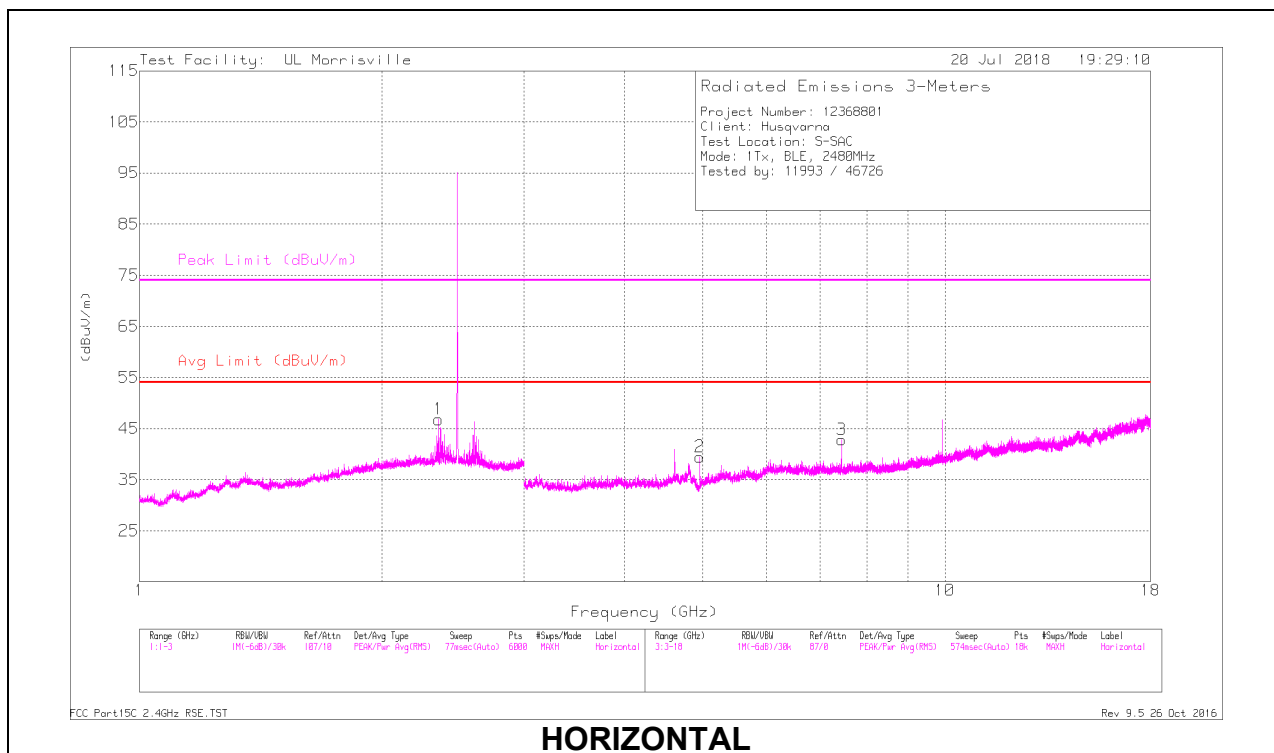
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

MAv1 - Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.352	44.04	PK2	31.7	-24	0	51.74	-	-	74	-22.26	127	103	H
	* ** 2.352	37.06	MAV1	31.7	-24	2.04	46.8	54	-7.2	-	-	127	103	H
2	* ** 4.96	42.51	PK2	34	-31.1	0	45.41	-	-	74	-28.59	87	252	H
	* ** 4.96	34.87	MAV1	34	-31.1	2.04	39.81	54	-14.19	-	-	87	252	H
3	* ** 7.441	41.7	PK2	35.5	-27.9	0	49.3	-	-	74	-24.7	336	303	H
	* ** 7.439	32.35	MAV1	35.5	-27.9	2.04	41.99	54	-12.01	-	-	336	303	H
4	* ** 2.352	43.76	PK2	31.7	-24	0	51.46	-	-	74	-22.54	47	109	V
	* ** 2.352	37.36	MAV1	31.7	-24	2.04	47.1	54	-6.9	-	-	47	109	V
5	* ** 4.96	45.68	PK2	34	-31.1	0	48.58	-	-	74	-25.42	121	108	V
	* ** 4.96	38.89	MAV1	34	-31.1	2.04	43.83	54	-10.17	-	-	121	108	V
6	* ** 7.441	43.42	PK2	35.5	-27.9	0	51.02	-	-	74	-22.98	287	109	V
	* ** 7.439	34.37	MAV1	35.5	-27.9	2.04	44.01	54	-9.99	-	-	287	109	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

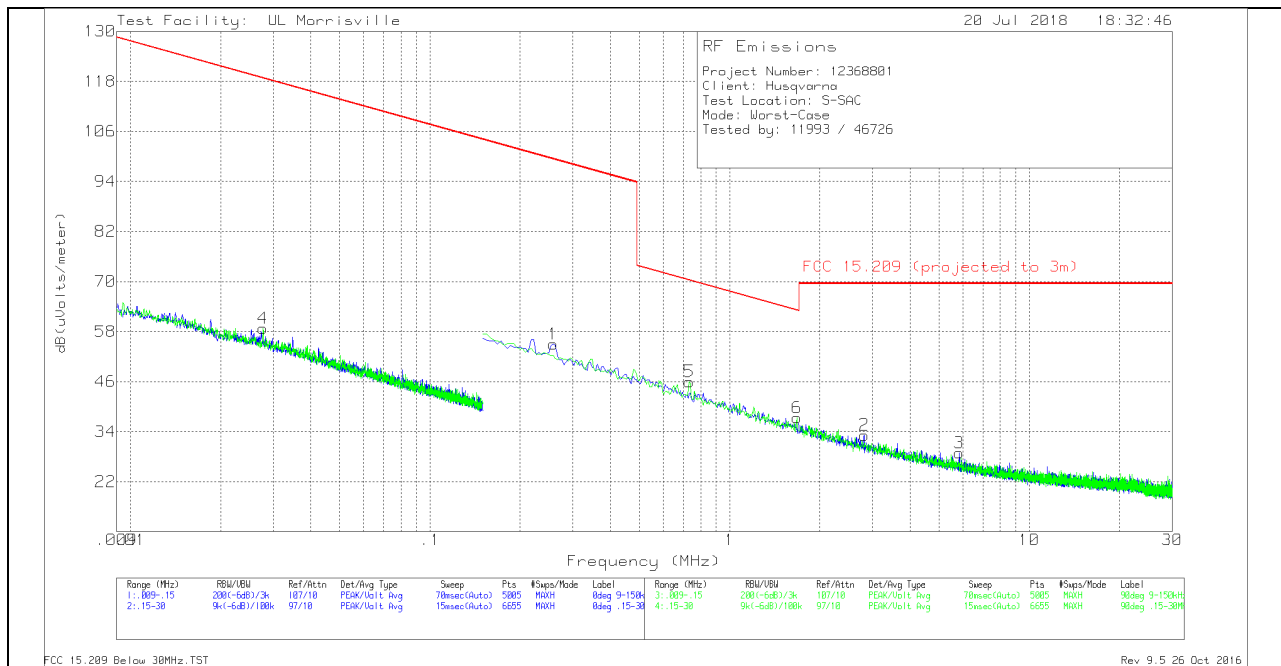
MAV1 - Maximum RMS Average

9.3. WORST CASE BELOW 1 GHz

SPURIOUS EMISSIONS 0.009 TO 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were $40 \cdot \log(\text{specification distance} / \text{test distance})$.

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

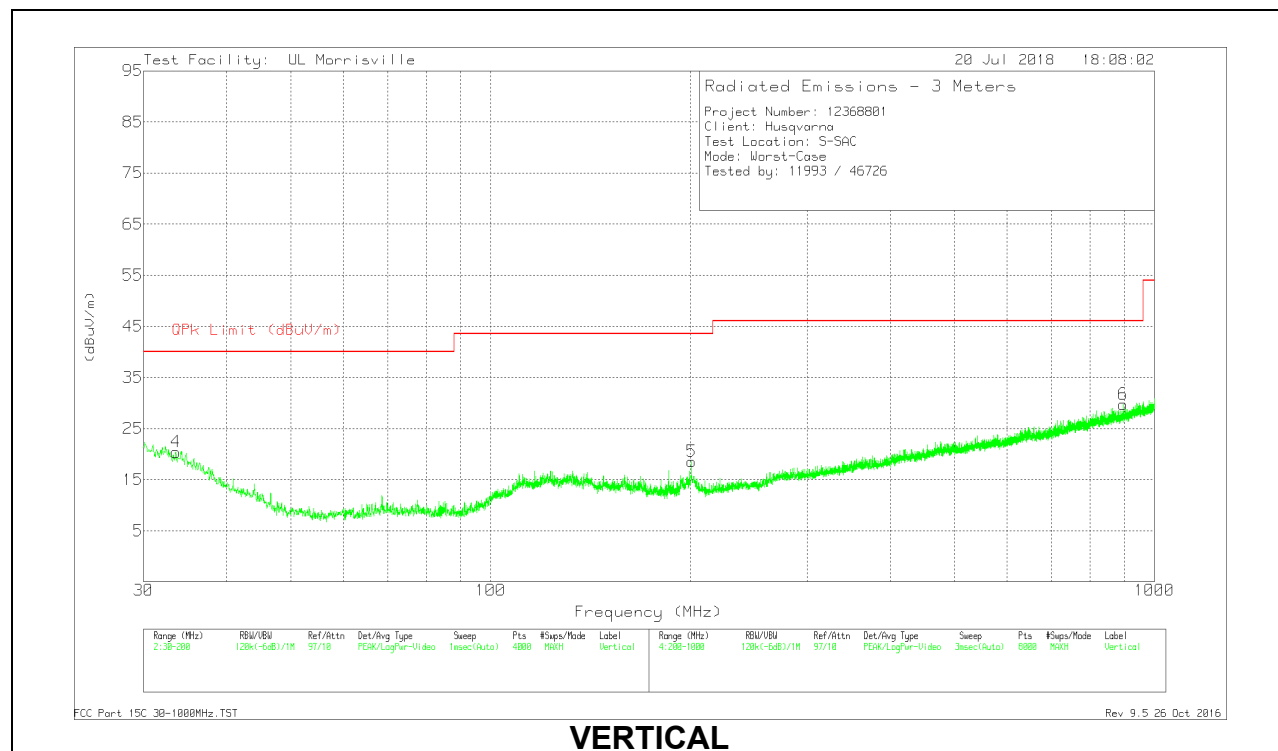
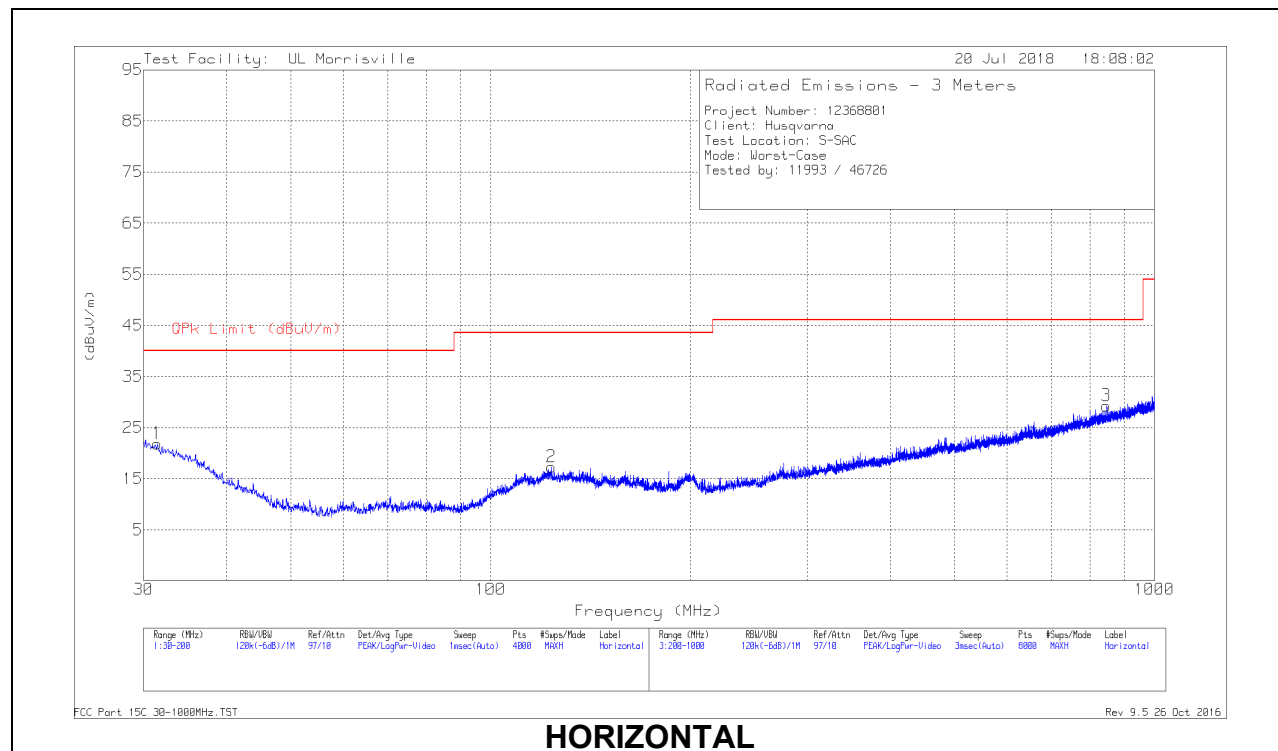


9kHz - 30 MHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 PK (projected to 3m)	FCC 15.209 AV (projected to 3m)	FCC 15.209 QP (projected to 3m)	Worst-Case Margin (dB)	Azimuth (Degs)
1	.25766	43.38	Pk	11.5	.1	54.98	119.38	99.38	-	-44.4	0-360
2	2.8102	21.18	Pk	11.7	.3	33.18	-	-	69.54	-36.36	0-360
3	5.83825	17.14	Pk	11.4	.4	28.94	-	-	69.54	-40.6	0-360
4	.02773	44.83	Pk	13.8	.1	58.73	138.74	118.74	-	-60.01	0-360
5	.73318	34.39	Pk	11.5	.1	45.99	-	-	70.3	-24.31	0-360
6	1.67524	25.57	Pk	11.6	.2	37.37	-	-	63.12	-25.75	0-360

Pk - Peak detector

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



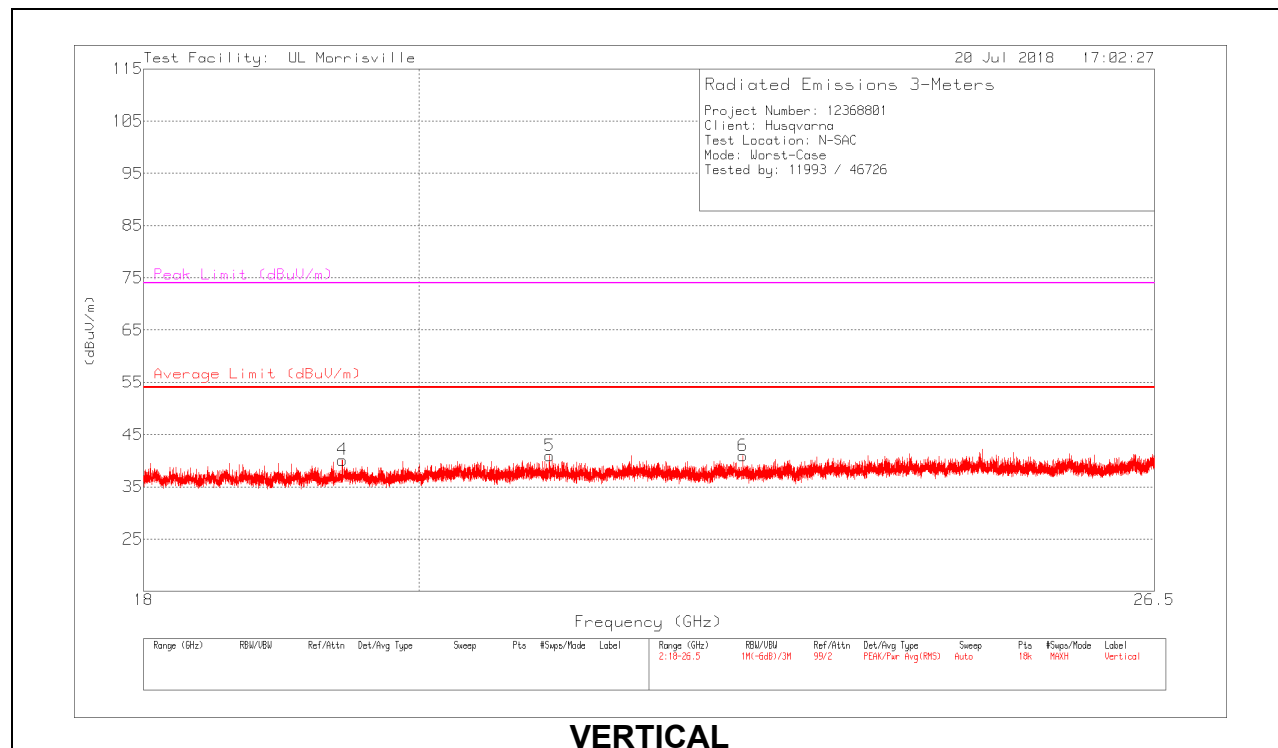
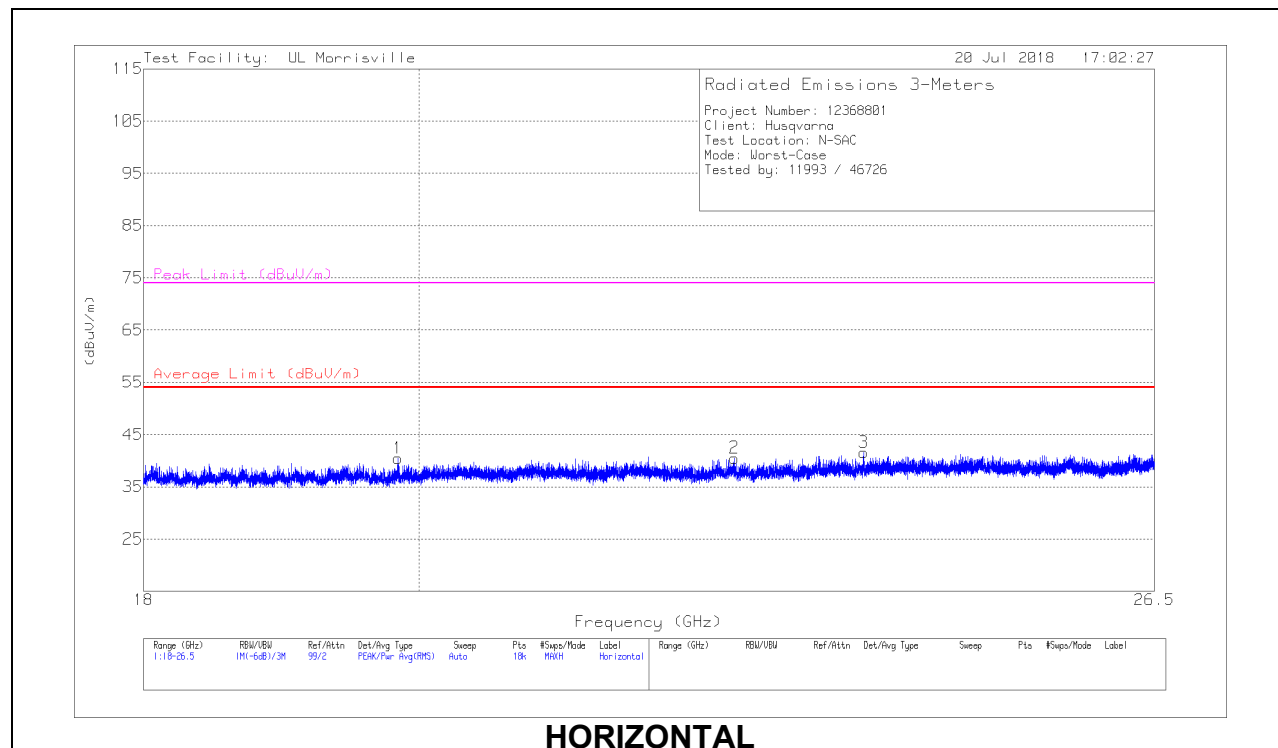
30-1000 MHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0075 AF (dB/m)	Cbl/Amp	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.4879	28.77	Pk	24.9	-31.8	21.87	40	-18.13	0-360	99	H
2	123.5242	29.83	Pk	18.3	-30.8	17.33	43.52	-26.19	0-360	99	H
3	846.6841	30.68	Pk	26.3	-27.7	29.28	46.02	-16.74	0-360	102	H
4	33.5709	28.78	Pk	23.3	-31.7	20.38	40	-19.62	0-360	101	V
5	200.8001	31.07	Pk	17.7	-30.2	18.57	43.52	-24.95	0-360	199	V
6	896.6906	30.15	Pk	26.7	-27.1	29.75	46.02	-16.27	0-360	199	V

Pk - Peak detector

9.4. WORST CASE 18-26 GHz

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.841	48.76	Pk	32.8	-41.1	0	40.46	54	-13.54	74	-33.54	0-360	103	H
2	* ** 22.563	47.82	Pk	33.6	-40.9	0	40.52	54	-13.48	74	-33.48	0-360	249	H
3	* ** 23.712	47.95	Pk	34	-40.4	0	41.55	54	-12.45	74	-32.45	0-360	299	H
4	* ** 19.422	48.36	Pk	32.9	-41.1	0	40.16	54	-13.84	74	-33.84	0-360	300	V
5	* ** 21.027	48.97	Pk	33.2	-41.2	0	40.97	54	-13.03	74	-33.03	0-360	300	V
6	* ** 22.638	48.08	Pk	33.7	-40.8	0	40.98	54	-13.02	74	-33.02	0-360	252	V

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

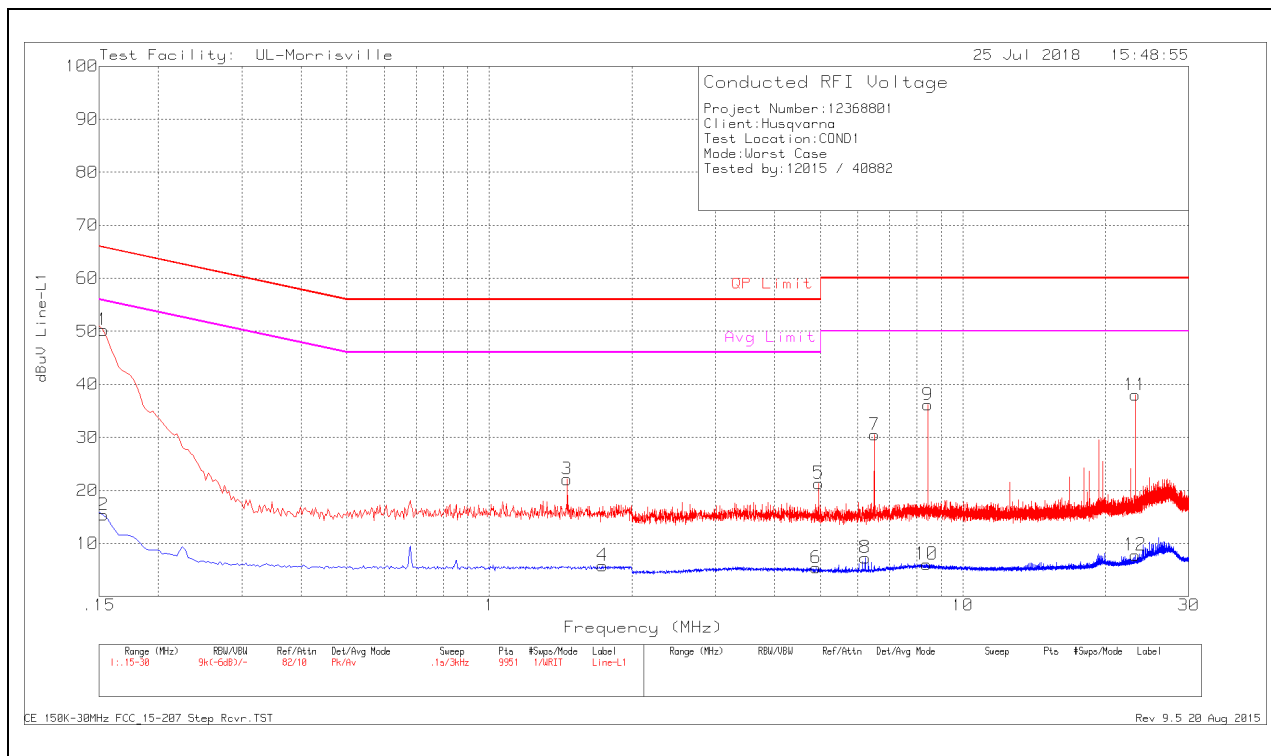
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS

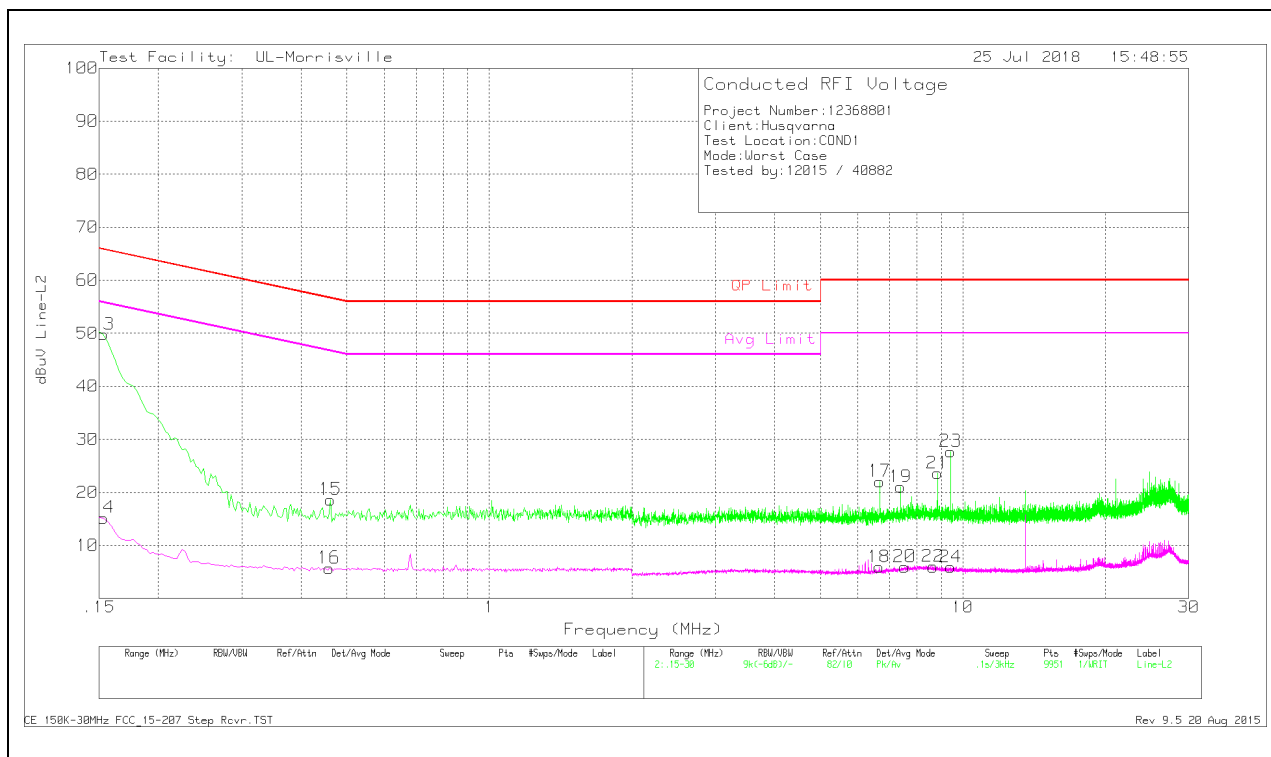


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.153	40.04	Pk	.2	10	50.24	65.84	-15.6	-	-
2	.153	5.19	Av	.2	10	15.39	-	-	55.84	-40.45
3	1.461	12.1	Pk	0	10	22.1	56	-33.9	-	-
4	1.734	-4.16	Av	0	10	5.84	-	-	46	-40.16
5	4.962	11.14	Pk	0	10.2	21.34	56	-34.66	-	-
6	4.902	-4.76	Av	0	10.2	5.44	-	-	46	-40.56
7	6.501	20.18	Pk	.1	10.2	30.48	60	-29.52	-	-
8	6.219	-2.98	Av	.1	10.2	7.32	-	-	50	-42.68
9	8.43	25.73	Pk	.1	10.3	36.13	60	-23.87	-	-
10	8.388	-4.31	Av	.1	10.3	6.09	-	-	50	-43.91
11	23.142	27.18	Pk	.2	10.6	37.98	60	-22.02	-	-
12	23.13	-2.99	Av	.2	10.6	7.81	-	-	50	-42.19

Pk - Peak detector

Av - Average detector

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.153	39.58	Pk	.2	10	49.78	65.84	-16.06	-	-
14	.153	5	Av	.2	10	15.2	-	-	55.84	-40.64
15	.462	8.54	Pk	.1	10	18.64	56.66	-38.02	-	-
16	.459	-4.37	Av	.1	10	5.73	-	-	46.71	-40.98
17	6.675	11.78	Pk	.1	10.2	22.08	60	-37.92	-	-
18	6.648	-4.41	Av	.1	10.2	5.89	-	-	50	-44.11
19	7.389	10.71	Pk	.1	10.2	21.01	60	-38.99	-	-
20	7.539	-4.34	Av	.1	10.2	5.96	-	-	50	-44.04
21	8.847	13.24	Pk	.1	10.3	23.64	60	-36.36	-	-
22	8.649	-4.41	Av	.1	10.3	5.99	-	-	50	-44.01
23	9.423	17.33	Pk	.1	10.3	27.73	60	-32.27	-	-
24	9.432	-4.5	Av	.1	10.3	5.9	-	-	50	-44.1

Pk - Peak detector
Av - Average detector

11. SETUP PHOTOS

Please refer to R12368801-EP1 for setup photos

END OF REPORT