

TEST REPORT

Report Number: R13573691-E2

Applicant : Crown Equipment Corporation
44 South Washington Street
New Bremen, OH 45869 USA

Model : HD4100

Contains FCC ID : YGP4000-01

Contains IC : 9016A-HD4000A

EUT Description : HD4100 Wearable Remote

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5+A2

Date Of Issue:
2023-02-09

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
1	2021-09-27	Initial Issue	Brian T. Kiewra
2	2022-08-09	Revised test procedure in Sections 10 and 11.	Brian T. Kiewra
3	2023-02-03	Revised EUT description	Brian T. Kiewra
4	2023-02-09	Revised section 5.4	Niklas Haydon

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Crown Equipment Corporation
44 South Washington Street
New Bremen, OH 45869 USA

EUT DESCRIPTION: HD4100 Wearable Remote

MODEL: HD4100

SERIAL NUMBER: Non-Serialized

SAMPLE RECEIPT DATE: 2020-11-09

DATE TESTED: 2020-11-09 to 2020-11-12

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 +A2	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

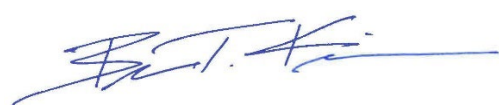
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Approved & Released
For UL LLC By:

Prepared By:



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Consumer Technology Division
UL LLC



Brian T. Kiewra
Project Engineer
Consumer Technology Division
UL LLC

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	See Comment	See Note
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW		
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Compliant	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	See Comment	See Note
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	See Comment	See Note

Note: This report is a C2PC report for a limited certified module in a host. Conducted antenna port testing other than output power will be covered by the report in the original filing.

3. 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, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5+A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
AV Power Measurement Direct Method (Power Meter)	0.45 dB
PK Power Measurement Direct Method (Power Meter)	1.30 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

5.4. 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)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a HD4100 Wearable Remote.

6.2. 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	0.90	1.23

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Refer to module reports for antenna information.

6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Application code Compliance-ring.hex.

6.5. 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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation at 1Mbps.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	Remarks
Laptop	Dell	Latitude E6450	00186-252-799-454	For configuration only, not present during test
USB to Serial Interface	Phytools	Peak	IPEH-0020220216002	For configuration only, not present during test

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Mains	1	quick connect	Single conductor	<3m	Provides DC power to EUT

SETUP DIAGRAMS

Please refer to 13573691-EP2 for setup diagrams

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	2020-08-20	2021-08-20
1-18 GHz					
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-28	2021-04-28
18-40 GHz					
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2020-10-30	2021-10-30
AT0061	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2020-10-30	2021-10-30
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-10	2021-07-10
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-06	2021-07-06
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-07-07	2021-07-07
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2020-03-17	2021-03-17
SA0027	Spectrum Analyzer	Agilent	N9030A	2020-06-10	2021-06-10
SOFTEMI	EMI Software	UL	Version 9.5 (2020-08-18)		
Additional Equipment used					
s/n 181474409	Environmental Meter	Fisherbrand	15-077-963	2020-08-06	2021-08-06
76022	DC Regulated Power Supply	Circuit Specialists	CSI3005X5	NA	NA

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-07-27	2021-07-27
Gain-Loss Chains					
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-29	2021-07-29
Receiver & Software					
SA0026	Spectrum Analyzer	Agilent	N9030A	2020-07-16	2021-07-16
SOFTEMI	EMI Software	UL	Version 9.5 (2020-08-18)		
Additional Equipment used					
s/n 200037610	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22
76022	DC Regulated Power Supply	Circuit Specialists	CSI3005X5	NA	NA

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-05-27	2021-05-27
PWM002 (PRE0137344)	RF Power Meter	Keysight Technologies	N1911A	2020-07-31	2021-07-31
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
76022	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA

8. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6.

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter
ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a
gated RF average-reading power meter)

Emissions in non-restricted frequency bands: ANSI C63.10 Subclause -11.11 and 6.10.4

Emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.1 and 6.10.5

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

9. ON TIME AND DUTY CYCLE

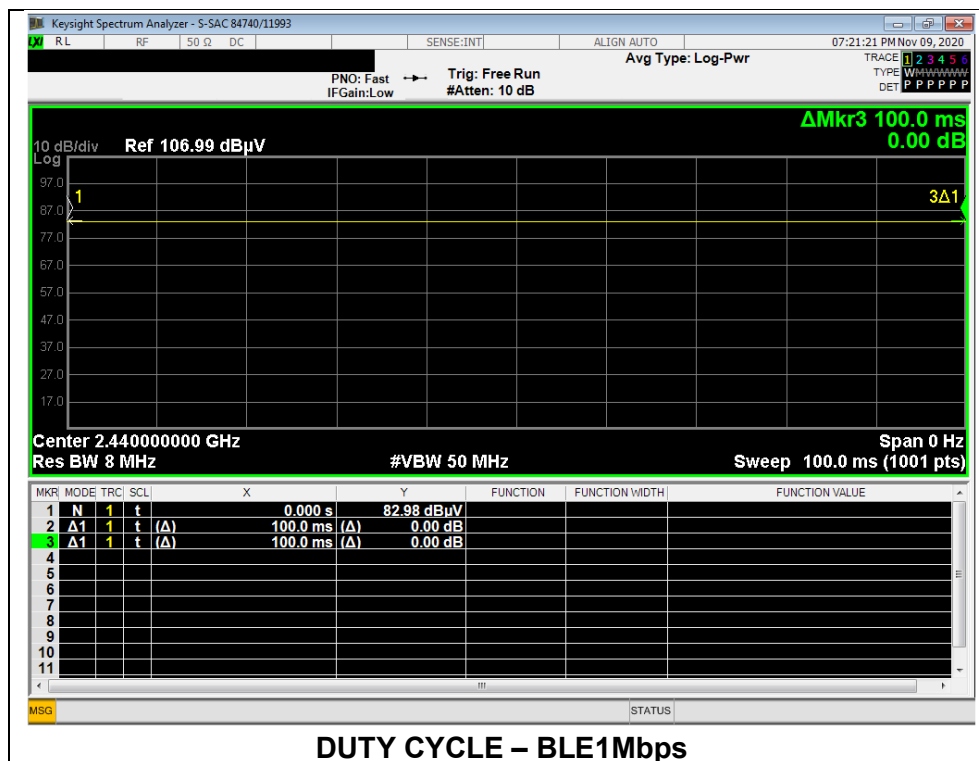
LIMITS

None; for reporting purposes only.

PROCEDURE

ANSI C63.10 Zero-Span Spectrum Analyzer Method.

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 - 1Mbps	100.00	100.00	1.00	100.00%	0.00	0.010



10. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE

The cable assembly insertion loss of 10.71 dB (including 10.22 dB pad + 0.49 cable) was entered as an offset in the power meter.

The power output was measured at the EUT antenna port using an SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Peak output power was read directly from the power meter.

DIRECTIONAL ANTENNA GAIN

For 1 TX:

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

10.1.1. BLE (1Mbps)

Tested By:	84740/40882
Date:	2020-11-10

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	0.120	30	-29.88
Middle	2440	0.440	30	-29.56
High	2480	0.900	30	-29.10

11. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The cable assembly insertion loss of 10.71 dB (including 10.22 dB pad + 0.49 cable) was entered as an offset in the power meter.

The power output was measured at the EUT antenna port using an SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Gated average output power was read directly from the power meter.

RESULTS

11.1.1. BLE (1Mbps)

Tested By:	84740/40882
Date:	2020-11-10

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-0.22
Middle	2440	-0.34
High	2480	0.65

12. RADIATED TEST RESULTS

12.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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

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	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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 final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

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 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 (for >30MHz) to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

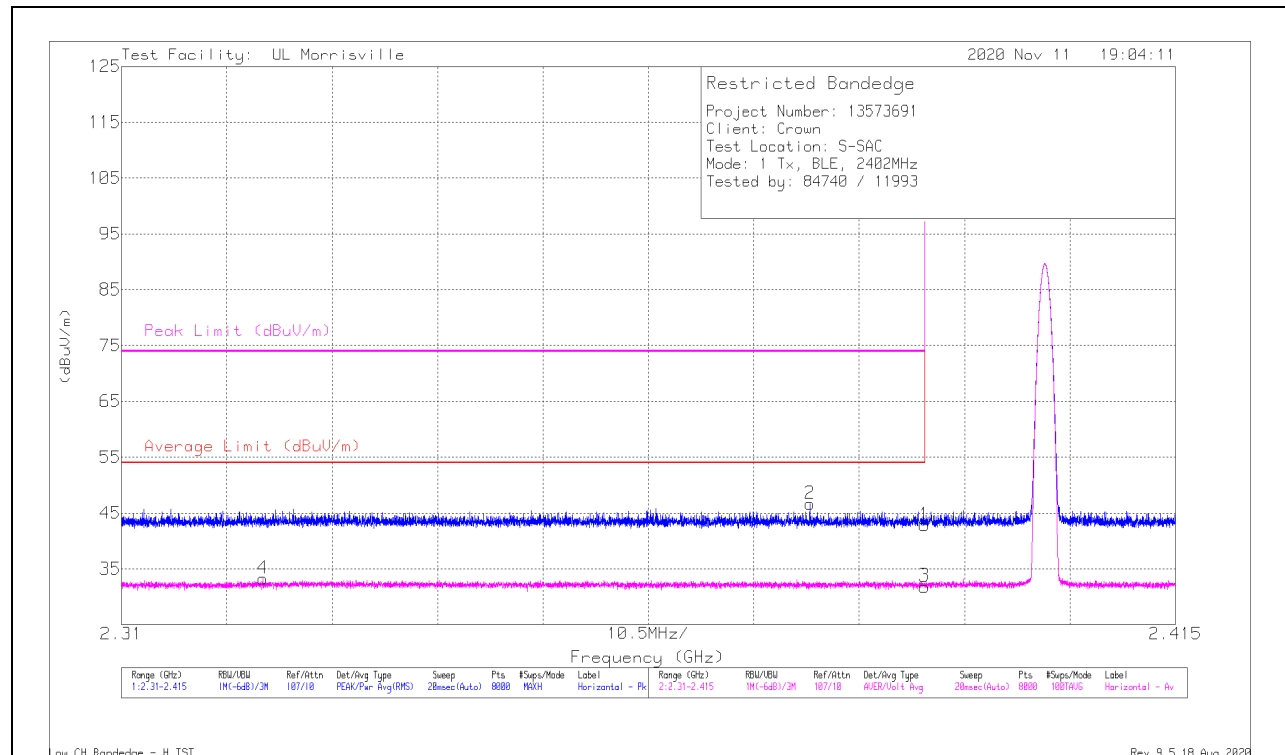
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

12.2. TRANSMITTER ABOVE 1 GHz

12.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (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	34.77	Pk	32.1	-24	42.87	-	-	74	-31.13	31	118	H
2	* ** 2.37858	38.33	Pk	32.2	-23.9	46.63	-	-	74	-27.37	31	118	H
3	* ** 2.39	23.74	ADV	32.1	-24	31.84	54	-22.16	-	-	31	118	H
4	* ** 2.32407	24.82	ADV	32.1	-23.7	33.22	54	-20.78	-	-	31	118	H

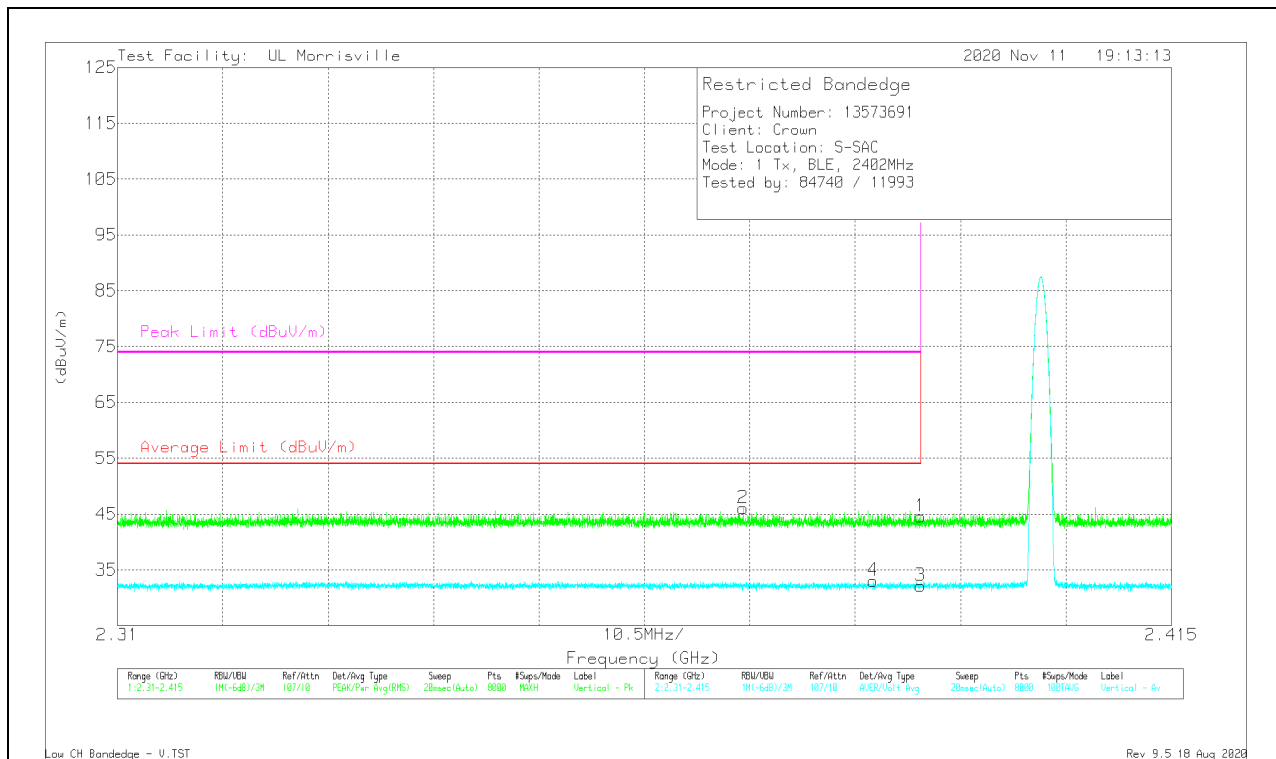
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (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	36.45	Pk	32.1	-24	44.55	-	-	74	-29.45	111	392	V
2	* ** 2.37233	37.7	Pk	32.2	-23.9	46	-	-	74	-28	111	392	V
3	* ** 2.39	24.08	ADV	32.1	-24	32.18	54	-21.82	-	-	111	392	V
4	* ** 2.3853	24.75	ADV	32.2	-23.9	33.05	54	-20.95	-	-	111	392	V

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

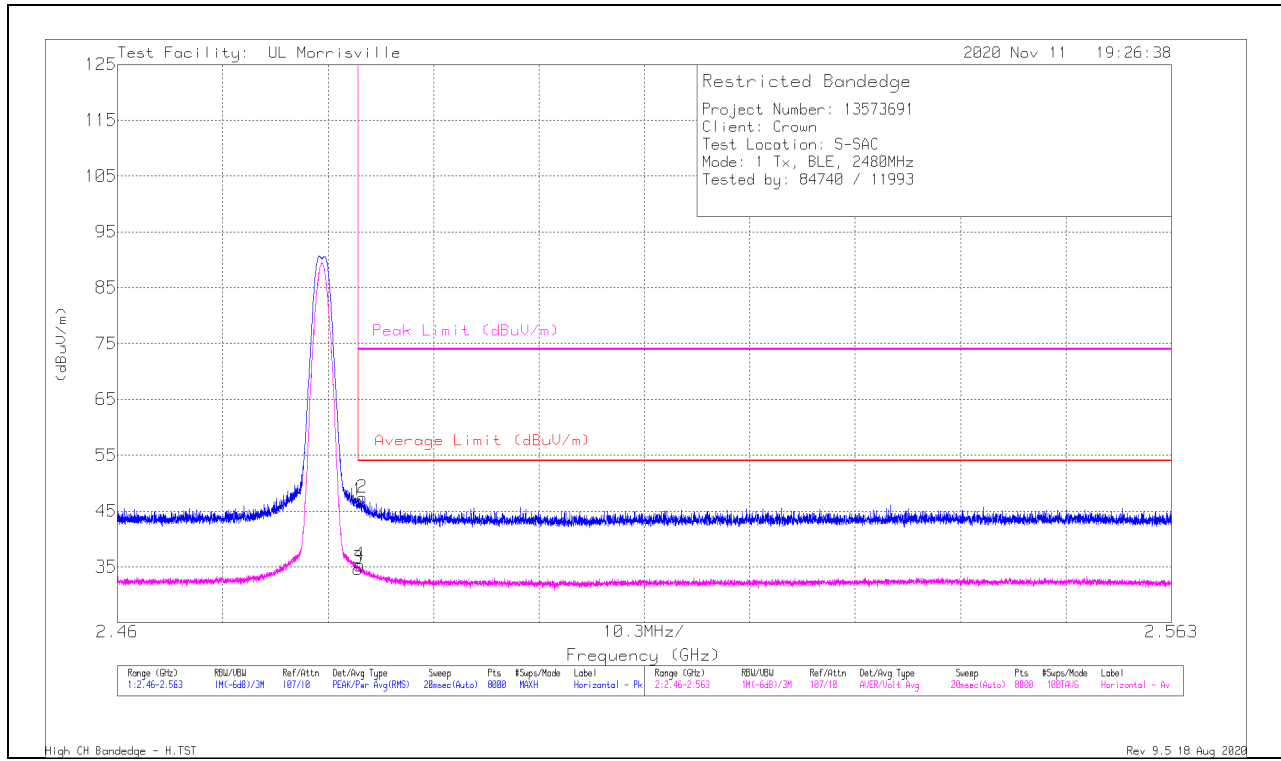
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	38.89	Pk	32.4	-24.4	46.89	-	-	74	-27.11	22	249	H
2	* ** 2.48393	39.41	Pk	32.4	-24.4	47.41	-	-	74	-26.59	22	249	H
3	* ** 2.4835	26.67	ADV	32.4	-24.4	34.67	54	-19.33	-	-	22	249	H
4	* ** 2.48369	27.3	ADV	32.4	-24.4	35.3	54	-18.7	-	-	22	249	H

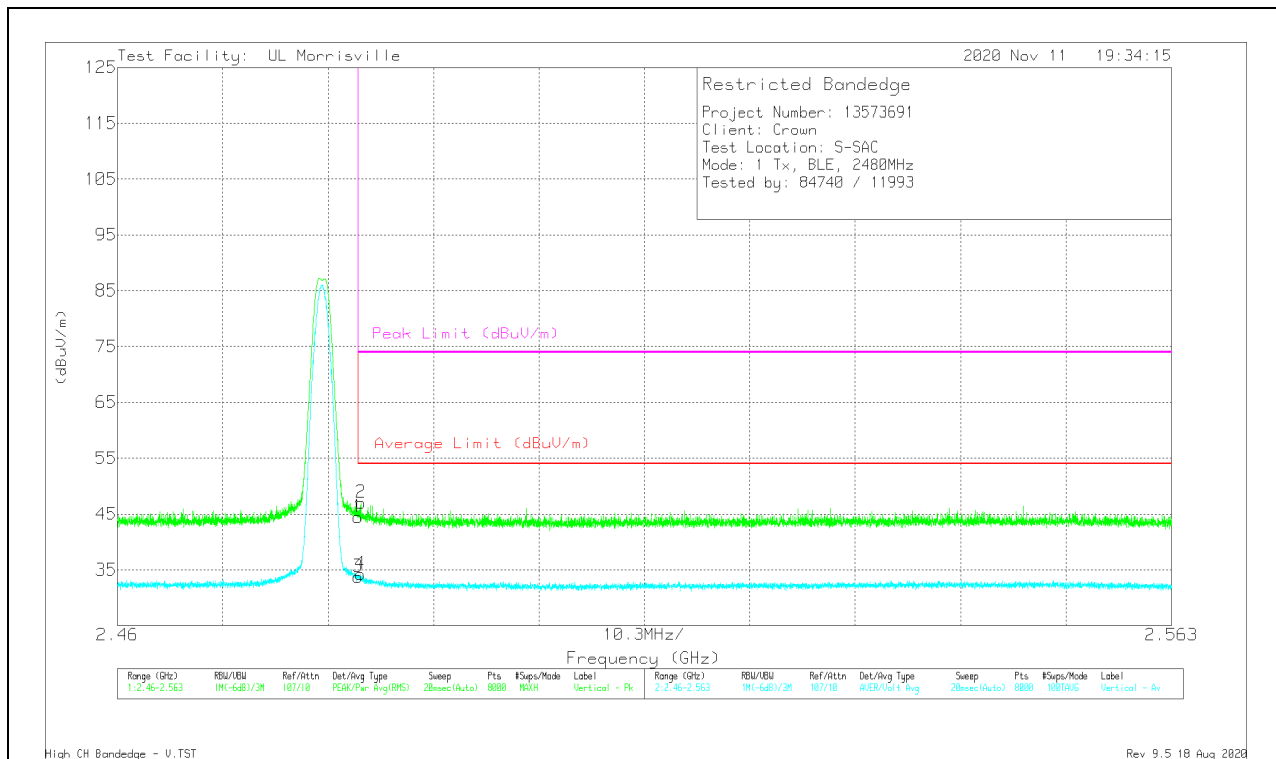
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	36.43	Pk	32.4	-24.4	44.43	-	-	74	-29.57	106	251	V
2	* ** 2.48381	39.02	Pk	32.4	-24.4	47.02	-	-	74	-26.98	106	251	V
3	* ** 2.4835	25.71	ADV	32.4	-24.4	33.71	54	-20.29	-	-	106	251	V
4	* ** 2.48375	26.21	ADV	32.4	-24.4	34.21	54	-19.79	-	-	106	251	V

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

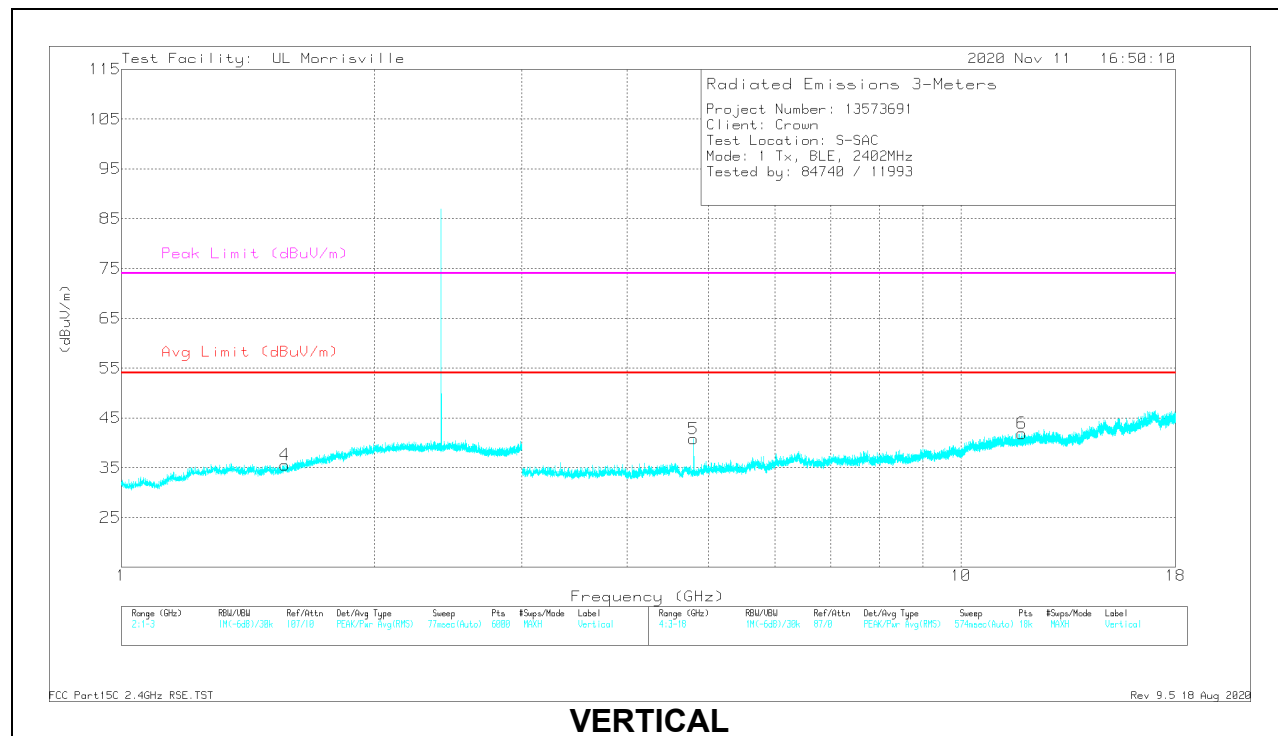
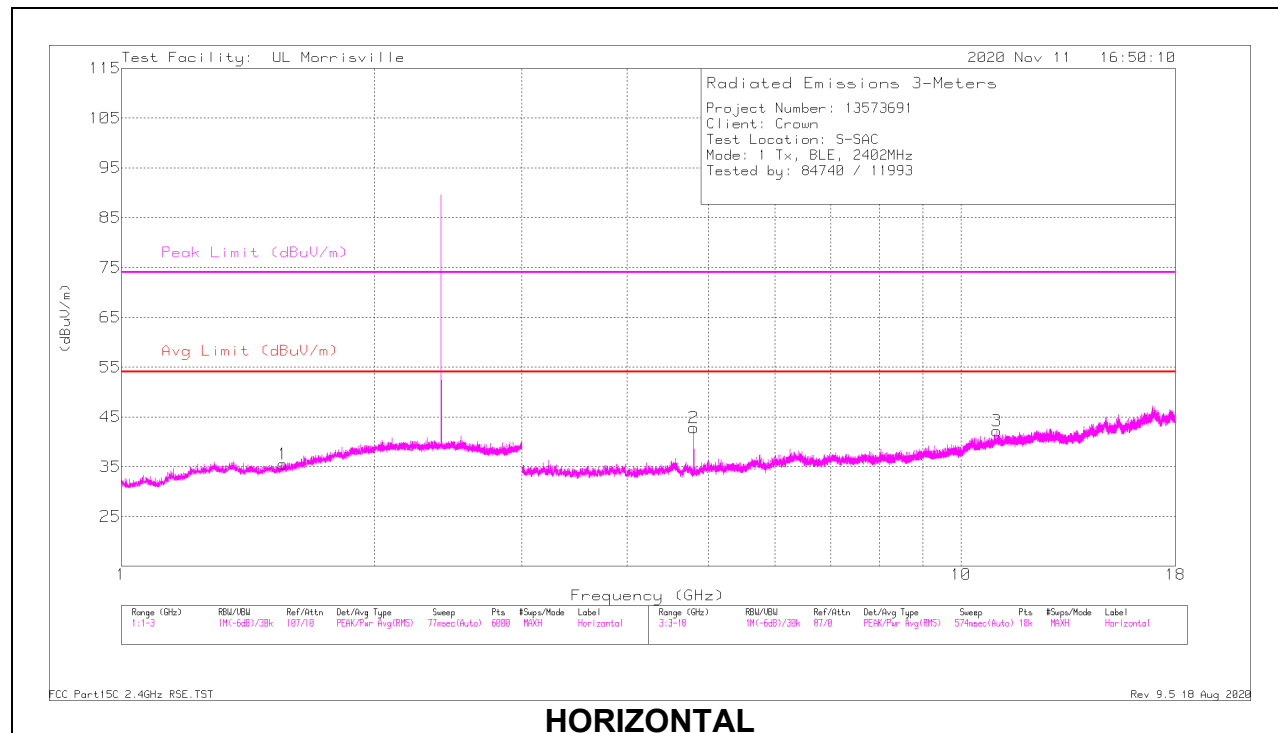
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.55835	35.73	PK2	28	-22.2	41.53	-	-	74	-32.47	232	334	H
	* ** 1.55817	22.83	ADV	28	-22.2	28.63	54	-25.37	-	-	232	334	H
4	* ** 1.5659	35.76	PK2	28.1	-22.2	41.66	-	-	74	-32.34	136	396	V
	* ** 1.56352	22.77	ADV	28	-22.2	28.57	54	-25.43	-	-	136	396	V
2	* ** 4.80398	43.24	PK2	34	-30.9	46.34	-	-	74	-27.66	24	121	H
	* ** 4.80399	38.13	ADV	34	-30.9	41.23	54	-12.77	-	-	24	121	H
3	* ** 11.03008	33.03	PK2	38.1	-24	47.13	-	-	74	-26.87	342	257	H
	* ** 11.02934	20.86	ADV	38.1	-24	34.96	54	-19.04	-	-	342	257	H
5	* ** 4.80385	42.46	PK2	34	-30.9	45.56	-	-	74	-28.44	285	352	V
	* ** 4.80385	36.89	ADV	34	-30.9	39.99	54	-14.01	-	-	285	352	V
6	* ** 11.80918	33.18	PK2	38.6	-24.3	47.48	-	-	74	-26.52	356	372	V
	* ** 11.81083	20.73	ADV	38.6	-24.3	35.03	54	-18.97	-	-	356	372	V

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

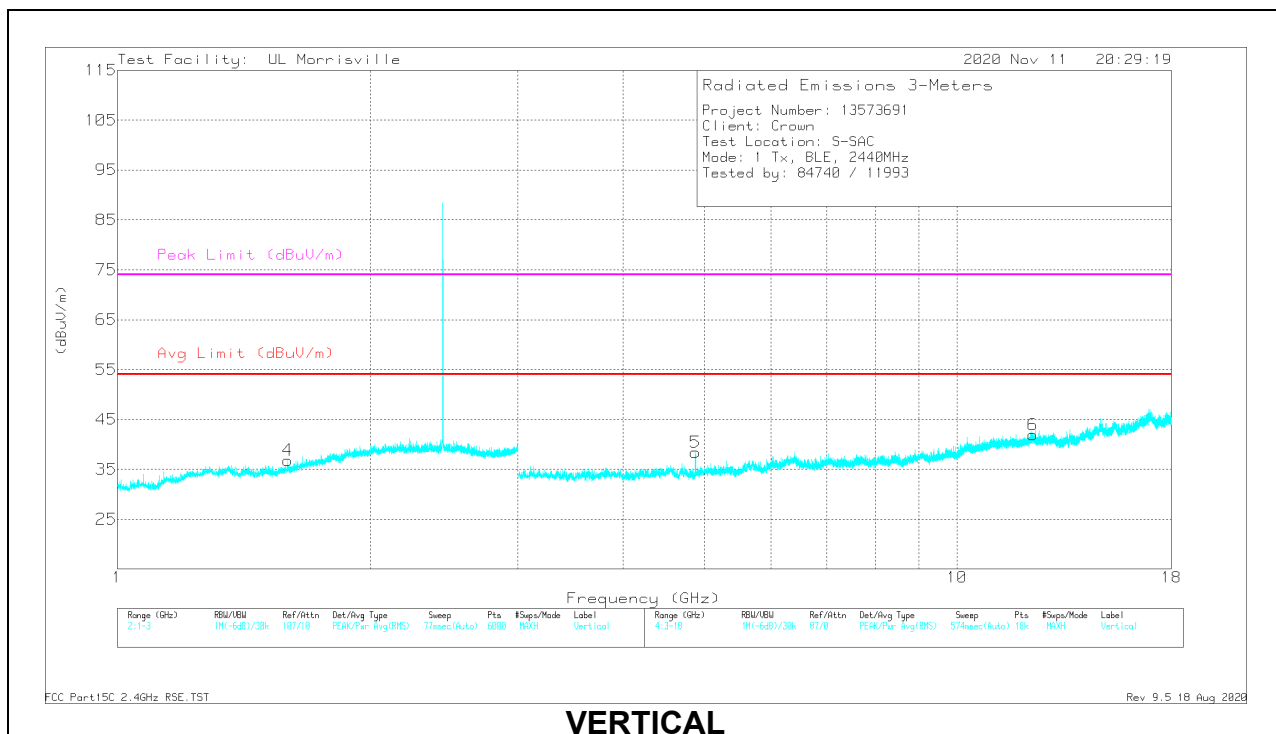
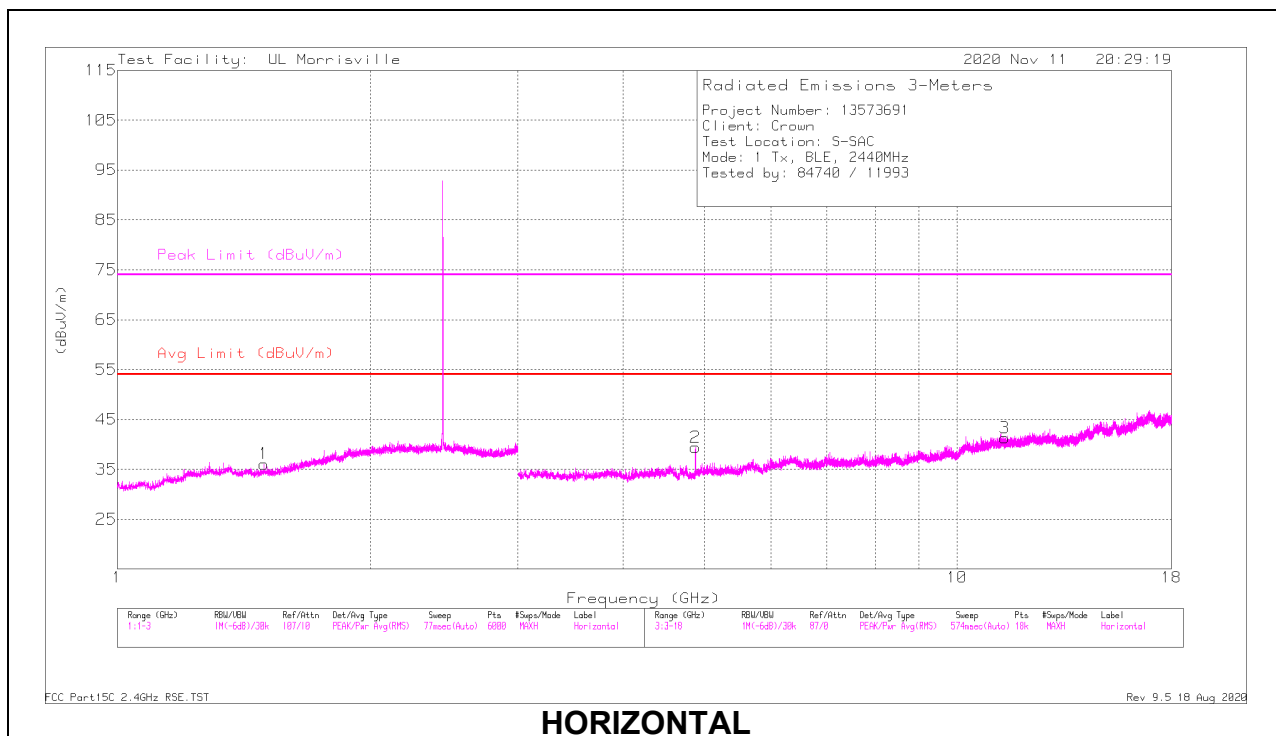
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

ADV - Linear Voltage Average

Pk - Peak detector

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.49375	35.99	PK2	28	-22.4	41.59	-	-	74	-32.41	317	174	H
	* ** 1.49567	22.84	ADV	28	-22.4	28.44	54	-25.56	-	-	317	174	H
4	* ** 1.59534	35.64	PK2	28.4	-22.2	41.84	-	-	74	-32.16	88	274	V
	* ** 1.59522	22.7	ADV	28.4	-22.2	28.9	54	-25.1	-	-	88	274	V
2	* ** 4.8803	42.11	PK2	34	-30.8	45.31	-	-	74	-28.69	21	108	H
	* ** 4.88023	32.82	ADV	34	-30.8	36.02	54	-17.98	-	-	21	108	H
3	* ** 11.39138	32.36	PK2	38.1	-23.6	46.86	-	-	74	-27.14	262	273	H
	* ** 11.39174	20.35	ADV	38.1	-23.6	34.85	54	-19.15	-	-	262	273	H
5	* ** 4.87955	42	PK2	34	-30.8	45.2	-	-	74	-28.8	304	142	V
	* ** 4.87968	30.81	ADV	34	-30.8	34.01	54	-19.99	-	-	304	142	V
6	* ** 12.32133	33.82	PK2	38.9	-24.1	48.62	-	-	74	-25.38	144	202	V
	* ** 12.32119	21.09	ADV	38.9	-24.1	35.89	54	-18.11	-	-	144	202	V

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

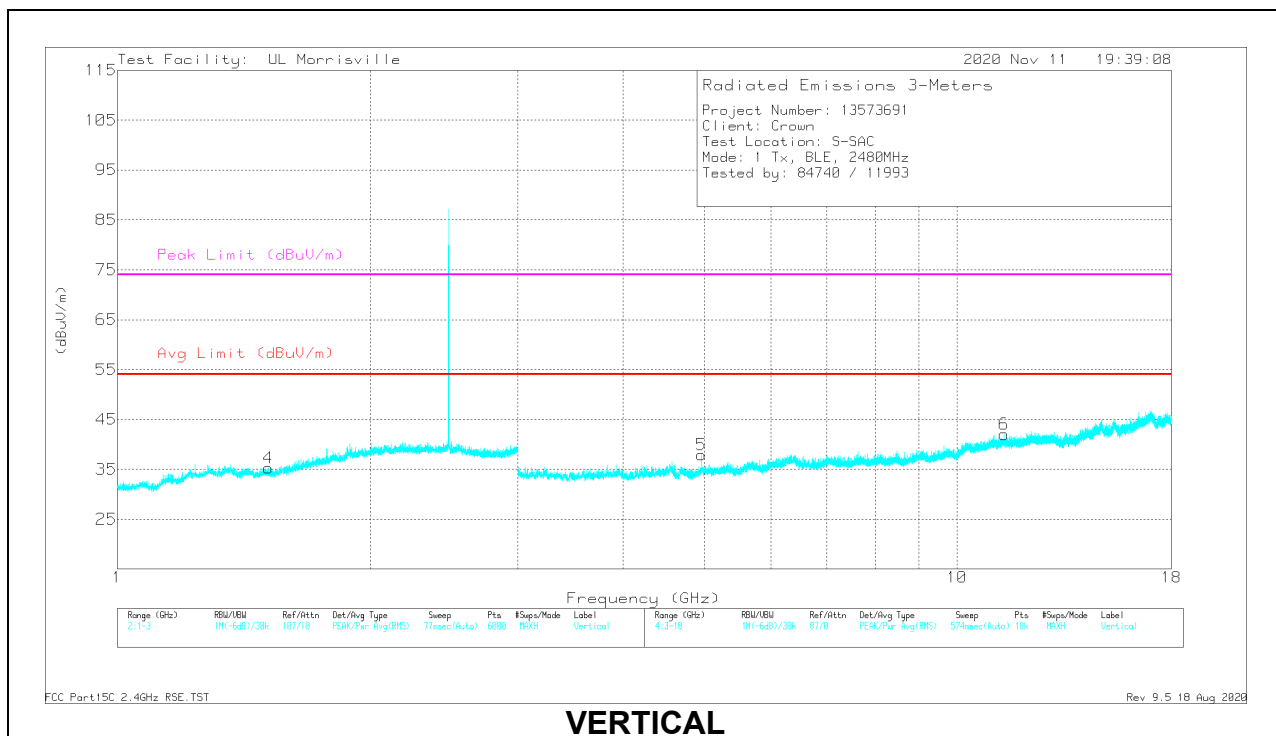
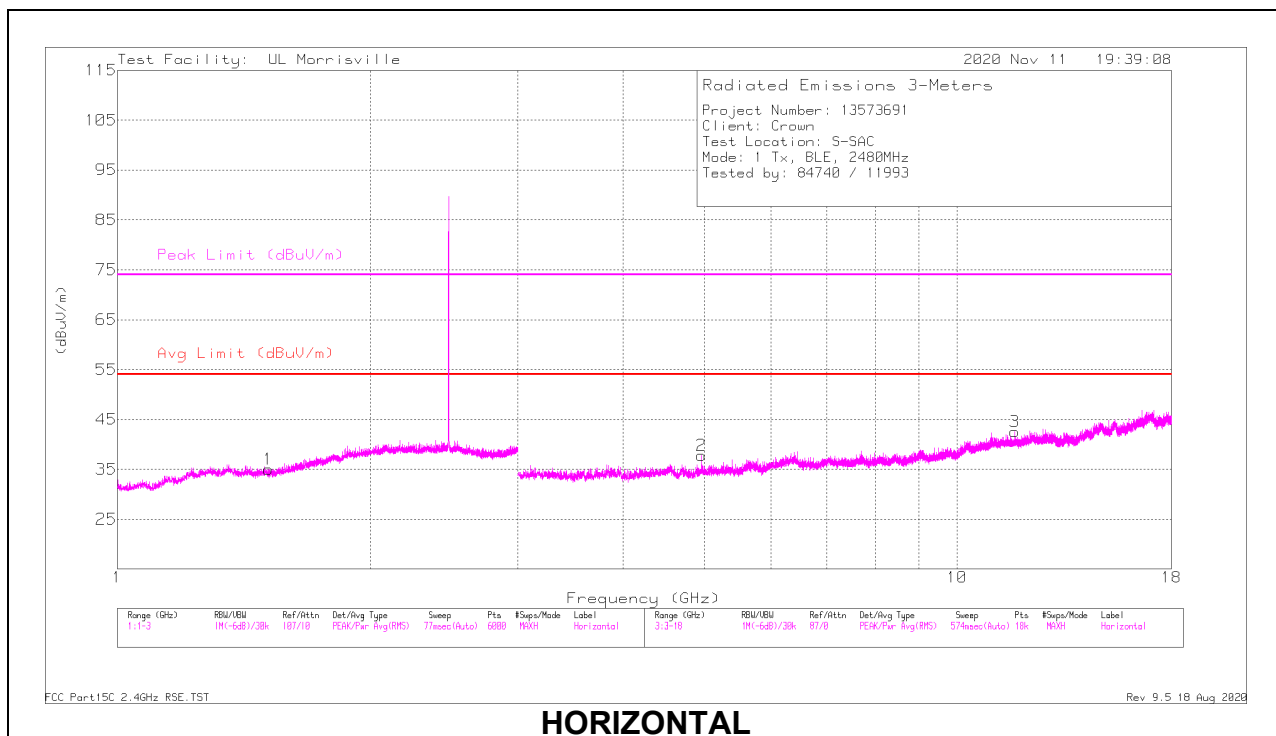
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

ADV - Linear Voltage Average

Pk - Peak detector

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.51398	35.63	PK2	28	-22.5	41.13	-	-	74	-32.87	189	369	H
	* ** 1.51155	22.69	ADV	28	-22.5	28.19	54	-25.81	-	-	189	369	H
4	* ** 1.51115	35.59	PK2	28	-22.4	41.19	-	-	74	-32.81	349	382	V
	* ** 1.51361	22.82	ADV	28	-22.5	28.32	54	-25.68	-	-	349	382	V
2	* ** 4.96047	40.95	PK2	33.9	-31	43.85	-	-	74	-30.15	202	136	H
	* ** 4.96034	30.69	ADV	33.9	-31	33.59	54	-20.41	-	-	202	136	H
3	* ** 11.72069	32.99	PK2	38.5	-24.1	47.39	-	-	74	-26.61	4	302	H
	* ** 11.7201	20.71	ADV	38.5	-24.1	35.11	54	-18.89	-	-	4	302	H
5	* ** 4.96056	41.65	PK2	33.9	-31	44.55	-	-	74	-29.45	303	139	V
	* ** 4.96033	30.59	ADV	33.9	-31	33.49	54	-20.51	-	-	303	139	V
6	* ** 11.37779	33.12	PK2	38.1	-23.5	47.72	-	-	74	-26.28	153	381	V
	* ** 11.37879	20.15	ADV	38.1	-23.5	34.75	54	-19.25	-	-	153	381	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

ADV - Linear Voltage Average

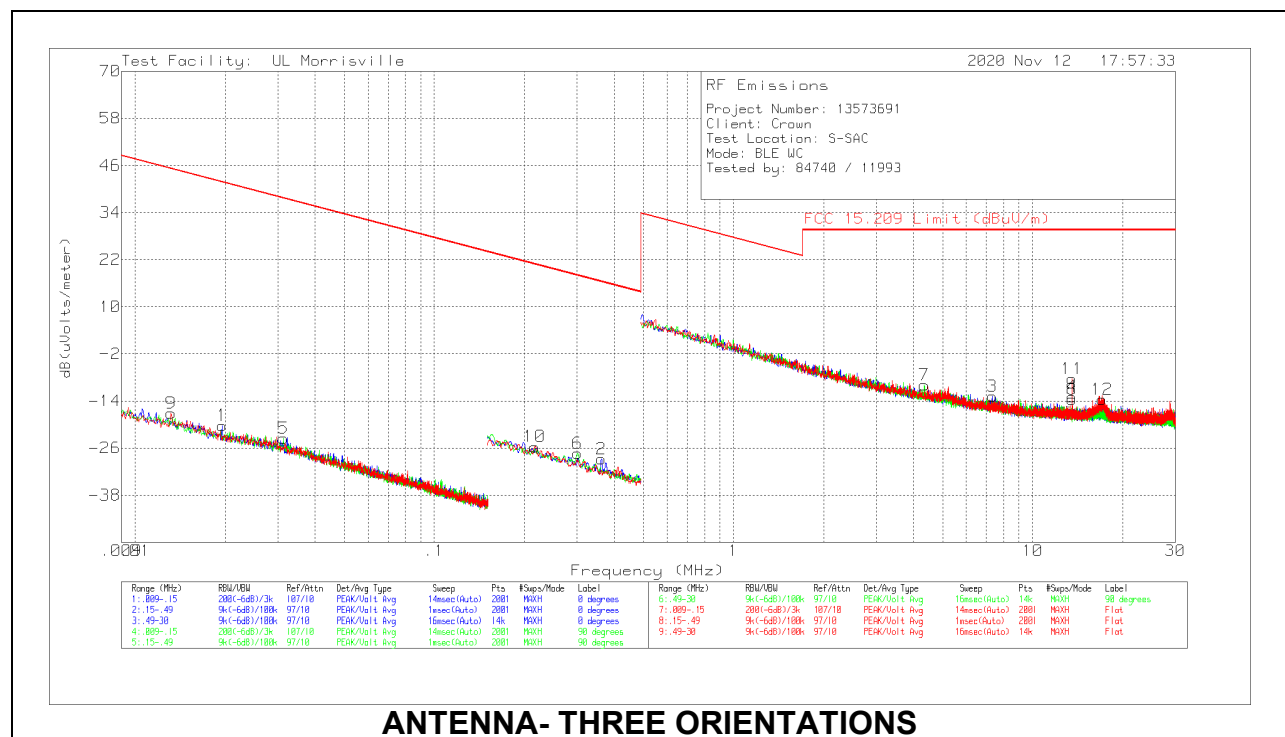
Pk - Peak detector

12.3. WORST CASE RADIATED

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note for below 30 MHz scans: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) 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 $40 \cdot \log(\text{test distance} / \text{specification distance})$.

The below 30 MHz limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency 19.51 kHz resulted in a level of -20.26 dBuV/m, which is equivalent to $-20.26 - 51.5 = -71.76$ dBuA/m, which has the same margin, -62.06 dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

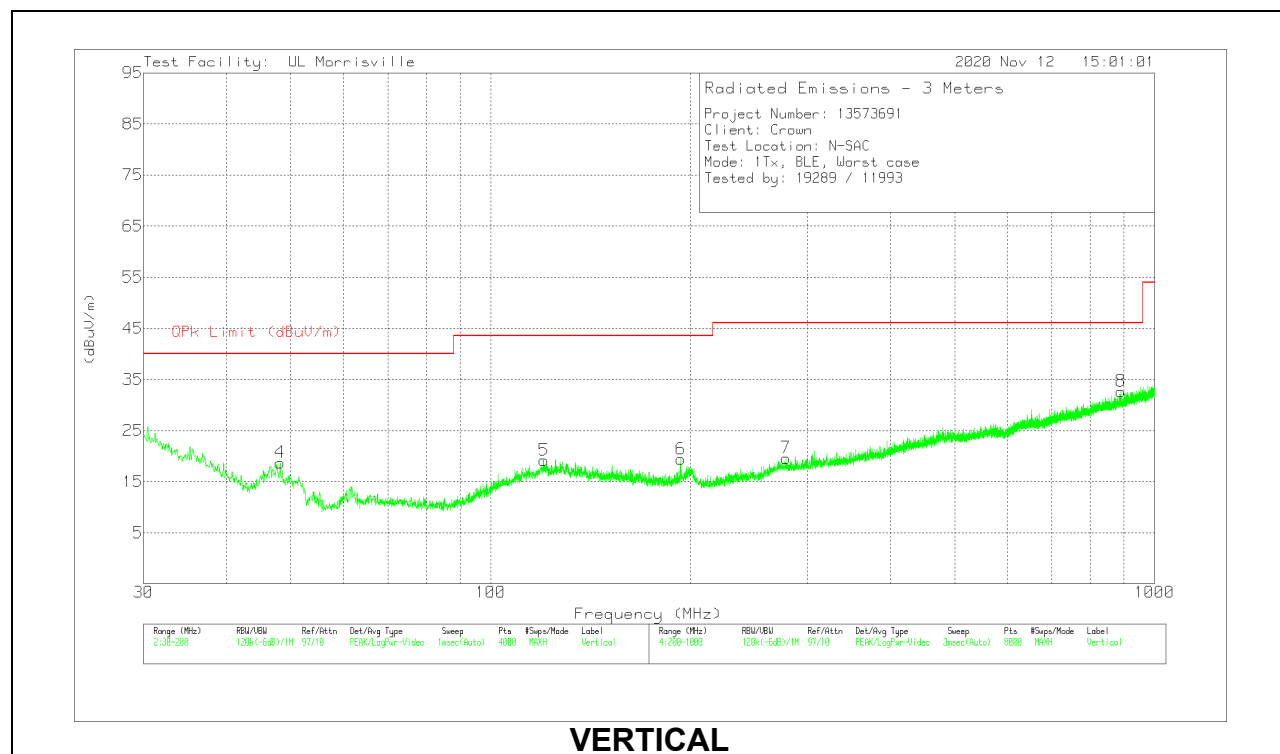
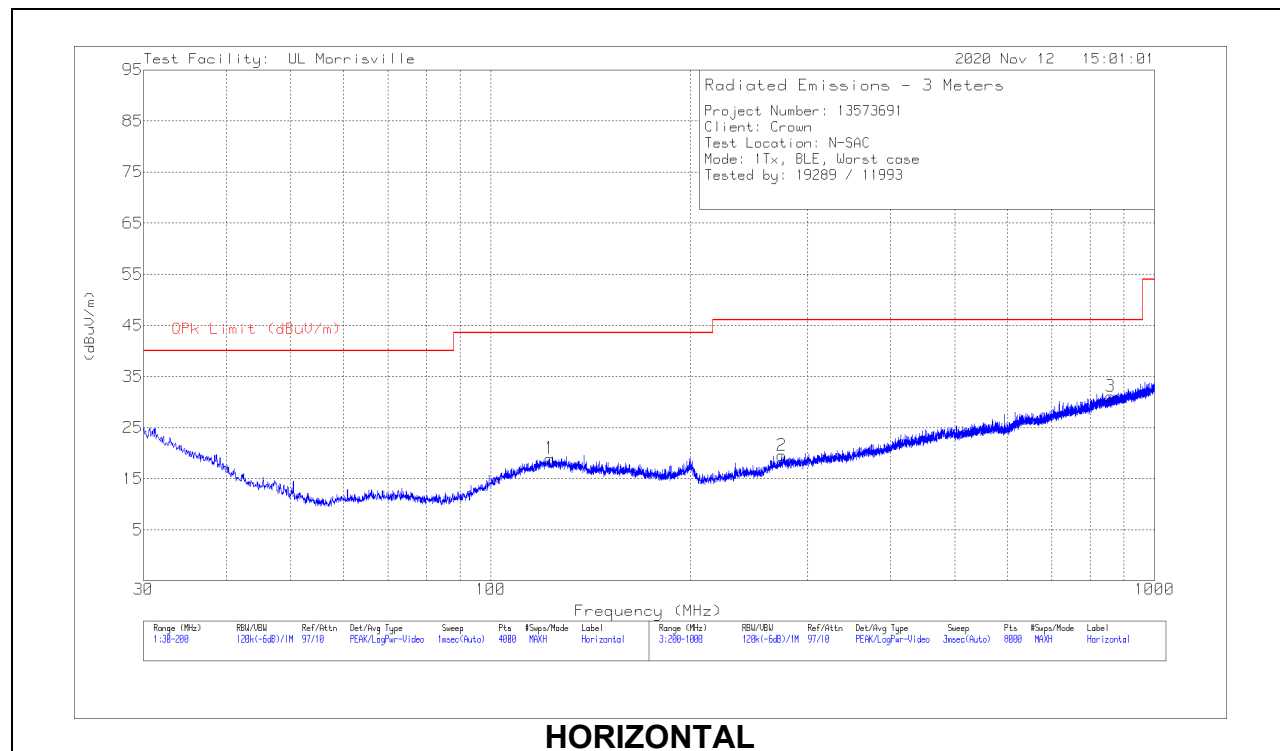


Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 QP/AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Orientation
1	.01951	45.74	Pk	13.9	.1	-80	-20.26	41.8	61.8	-62.06	0-360	Face on
2	.36191	40.49	Pk	10.6	.1	-80	-28.81	16.43	36.43	-45.24	0-360	Face on
3	7.32414	15.98	Pk	10.7	.5	-40	-12.82	29.54	-	-42.36	0-360	Face on
4	13.5596	15.99	Pk	10.4	.7	-40	-12.91	29.54	-	-42.45	0-360	Face on
5	.03129	43.15	Pk	13.2	.1	-80	-23.55	37.7	57.7	-61.25	0-360	Face off
6	.30079	41.82	Pk	10.7	.1	-80	-27.38	18.04	38.04	-45.42	0-360	Face off
7	4.34553	18.54	Pk	11.1	.4	-40	-9.96	29.54	-	-39.5	0-360	Face off
8	13.56065	15.26	Pk	10.4	.7	-40	-13.64	29.54	-	-43.18	0-360	Face off
9	.01319	46.14	Pk	16.6	.1	-80	-17.16	45.2	65.2	-62.36	0-360	Flat
10	.21647	43.44	Pk	10.8	.1	-80	-25.66	20.9	40.9	-46.56	0-360	Flat
11	13.56171	20.58	Pk	10.4	.7	-40	-8.32	29.54	-	-37.86	0-360	Flat
12	17.05045	15.42	Pk	10.2	.8	-40	-13.58	29.54	-	-43.12	0-360	Flat

Pk - Peak detector

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



Below 1GHz Data

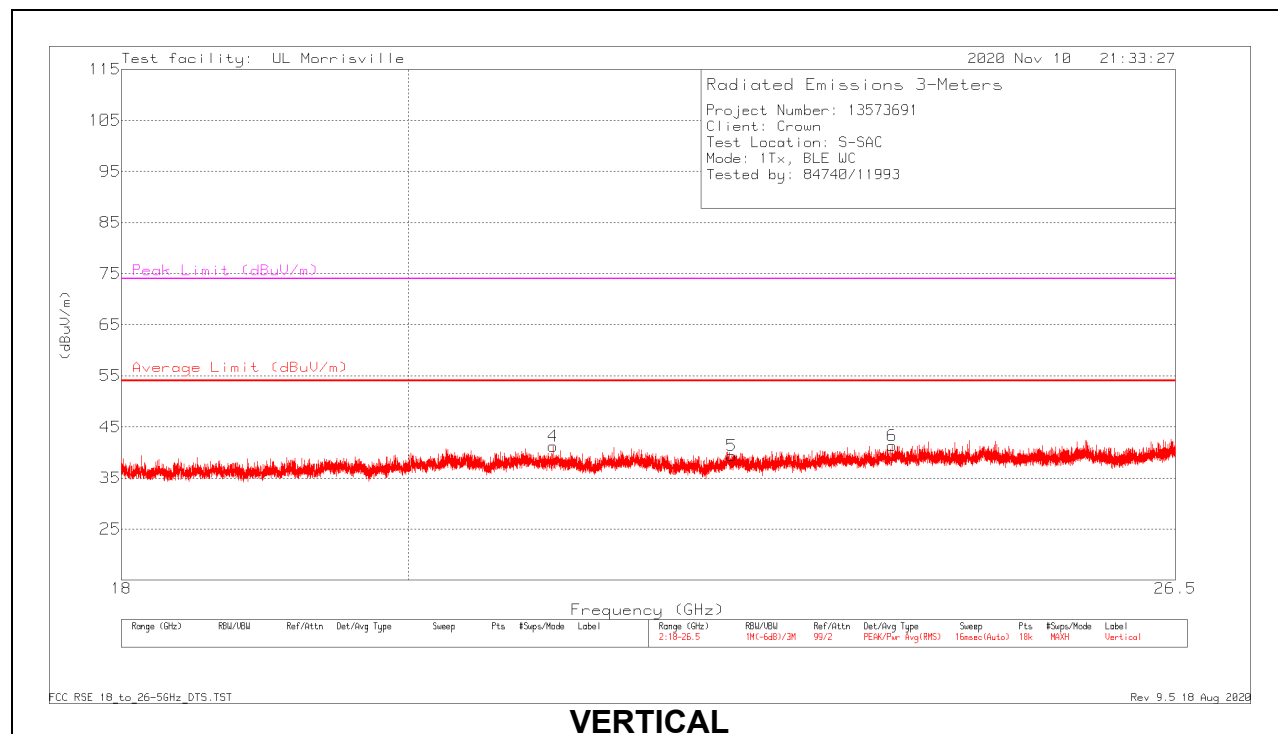
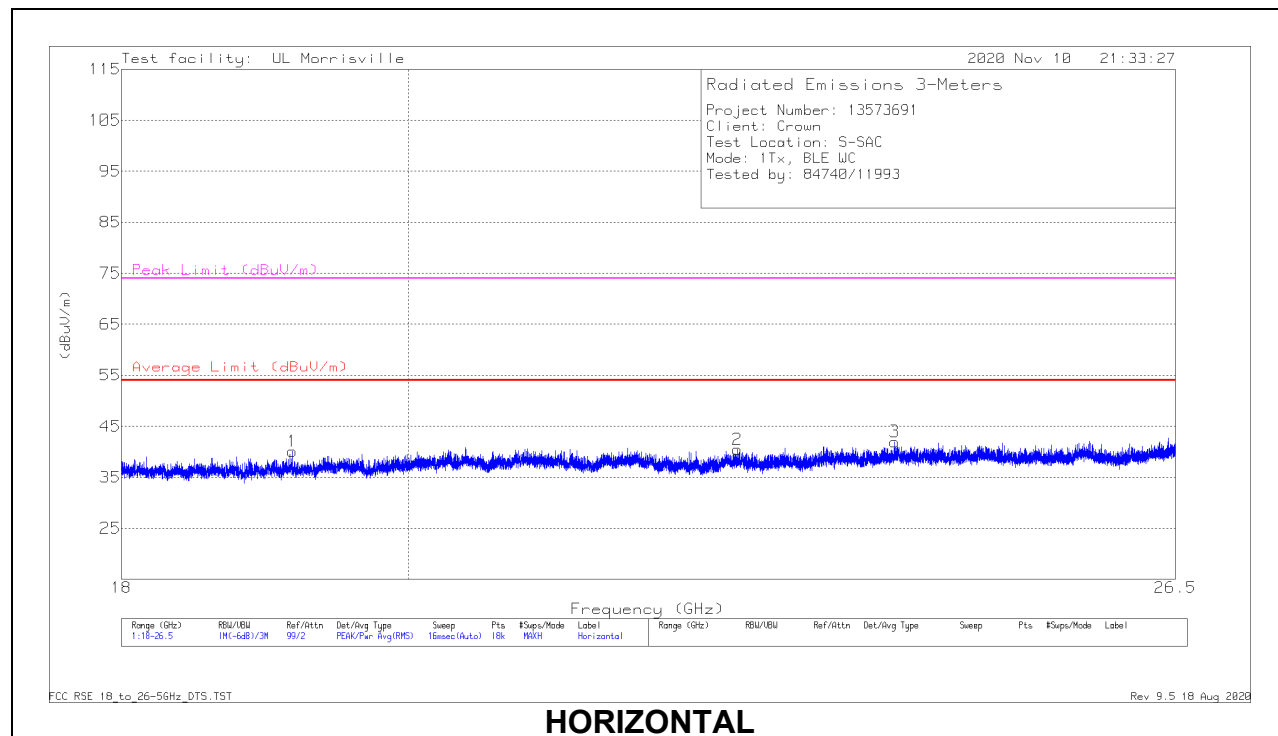
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 122.7165	29.18	Pk	20	-30.2	18.98	43.52	-24.54	0-360	200	H
5	* ** 120.3359	29.45	Pk	19.9	-30.2	19.15	43.52	-24.37	0-360	100	V
2	* ** 274.3097	28.94	Pk	19.4	-28.8	19.54	46.02	-26.48	0-360	299	H
3	** 859.2857	28.41	Pk	28	-25.3	31.11	46.02	-14.91	0-360	299	H
7	* ** 278.5102	29.02	Pk	19.4	-28.8	19.62	46.02	-26.4	0-360	299	V
8	** 889.9897	29.17	Pk	28.3	-24.8	32.67	46.02	-13.35	0-360	100	V
4	48.1947	35.23	Pk	14.6	-31.1	18.73	-	-	0-360	100	V
6	193.2422	30.82	Pk	18	-29.4	19.42	-	-	0-360	100	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

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)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.16692	46.5	Pk	32.7	-39.1	40.1	54	-13.9	74	-33.9	0-360	299	H
2	* ** 22.5638	46.26	Pk	33.5	-39.3	40.46	54	-13.54	74	-33.54	0-360	299	H
3	* ** 23.90357	46.39	Pk	34.1	-38.5	41.99	54	-12.01	74	-32.01	0-360	299	H
4	* ** 21.08897	47.47	Pk	33.2	-39.5	41.17	54	-12.83	74	-32.83	0-360	299	V
5	* ** 22.51611	44.83	Pk	33.6	-39.1	39.33	54	-14.67	74	-34.67	0-360	101	V
6	* ** 23.88563	45.81	Pk	34.1	-38.6	41.31	54	-12.69	74	-32.69	0-360	200	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

13. SETUP PHOTOS

Please refer to R13573691-EP2 for setup photos

END OF TEST REPORT