TEST REPORT

Report Number. : R13548896-E1

Applicant	:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
Model	:	SM-M127F and SM-M127F/DS
FCC ID	:	A3LSMM127F
EUT Description	:	GSM/WCDMA/LTE Phablet with BT/BLE and DTS b/g/n
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2020

Date Of Issue:
2020-11-30

Prepared by:
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NVLAP TESTING
NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
v.1	2020-11-30	Initial Issue	Haley Ackun
v.2	2020-12-08	Updated Model, Power Test procedure and Wording	Haley Ackun

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
EUT DESCRIPTION:	GSM/WCDMA/LTE Phablet with BT/BLE and DTS b/g/n
MODEL:	SM-M127F and SM-M127F/DS
SERIAL NUMBER:	Radiated: TJG0333H Conducted: TJF2546
DATE TESTED:	2020-10-28 to 2020-11-04
SAMPLE RECEIVED:	2020-10-23 & 2020-10-29

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C: 2020	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.

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
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Prepared By:

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Consumer Technology Division
UL LLC

2. TEST RESULTS SUMMARY

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	6dB BW	Complies	None.
15.247 (b) (3)	Output Power	Complies	None.
See Comment	Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	PSD	Complies	None.
15.247 (d)	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	Radiated Emissions	Complies	None.
15.207	AC Mains Conducted Emissions	Complies	None.

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15: 2020, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01.

4. 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 Perimeter Park Dr., Suite B, 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 Perimeter Park Dr.
☐ Chamber A RTP	☒ North Chamber
☐ Chamber C RTP	☒ South Chamber

The above test sites and facilities are covered under FCC Test Firm Registration # 703469.

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

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	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	2.26°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS 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

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE Phablet with BT/BLE and DTS b/g/n. There are two models, SM-M127F and SM-M127F/DS. The SM-M127F/DS was tested in this report.

The models are electronically equivalent with the only difference being that the SM-M127F/DS has dual sim capability.

This test report covers BLE only.

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 125 kbps	5.95	3.94
2402 - 2480	BLE 500 kbps	5.98	3.96
2402 - 2480	BLE 1 Mbps	5.97	3.95
2402 - 2480	BLE 2 Mbps	9.65	9.23

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an antenna with a maximum gain of -0.8 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was REV 0.1

The test utility software used during testing was vendor.ril.sw_ver: M127FXXU0FCC_test .

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.

Worst case data rate was determined to be 125 kbps based on PSD Data. Therefore, final worst-case radiated emissions performed at 125kbps. AC mains emissions tested at 125 kbps and 2 Mbps.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charging Adapter	Samsung	EP-TA200	R37M3FV0M01DK3	N/A
Earbuds	N/A	N/A	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	USB-C	1	USB-C	USB-C	<3m	None.
2	Auxiliary	1	Auxiliary	Auxiliary	<3m	Auxiliary to Earbuds.

TEST SETUP

Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R13548896-EP1 for setup diagrams

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7. MEASUREMENT METHOD

Duty Cycle: ANSI C63.10 Subclause -11.6

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW ≥ DTS BW

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

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)

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

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 Spurious Emissions: ANSI C63.10-2013 Sections 6.3-6.6

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

8. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA027	Spectrum Analyzer	Keysight Technologies	N9030A	2020-06-10	2021-06-10
PWM001 (PRE0136343)	RF Power Meter	Keysight Technologies	N1912A	2020-07-17	2021-07-17
PWS002 (PRE0137348)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-09-10	2021-09-10
HI0090 (PRE0191271)	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port	UL	Version 2020-10-14		

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	**(Loop Ant.)**			
AT0079 (In @ 0800 09/02/2020)	Active Loop Antenna	ETS-Lindgren	6502	2020-08-20	2021-08-20
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-07-27	2021-07-27
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-27	2021-04-27
	18-40 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2019-11-07	2020-11-07
	Gain-Loss Chains				
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-29	2021-07-29
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-29	2021-07-29
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-28	2021-07-28
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-07-31	2021-07-31
	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
1153.9000.35	Bluetooth Tester	Rohde and Schwartz	CBT	NA	NA

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2020-03-26	2021-03-26
HI0091	Environmental Meter	Fisher Scientific	14-650-118	2020-06-26	2021-06-26
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2020-08-18	2021-08-18
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2020-08-18	2021-08-18
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2020-03-26	2021-03-26
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (2015-08-20)		
	Miscellaneous (if needed)				
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2020-08-08	2021-08-08

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

	B (msec)	(msec)	x (linear)	Cycle (%)	Correction Factor (dB)	Minimum VBW (kHz)
2.4GHz Band						
BLE 125 kbps	3.090	3.750	0.824	82.40%	1.68	0.324
BLE 500 kbps	1.063	1.874	0.567	56.72%	4.92	0.941
BLE 1 Mbps	0.386	0.624	0.619	61.88%	4.17	2.588
BLE 2 Mbps	0.201	0.625	0.322	32.19%	9.84	4.968

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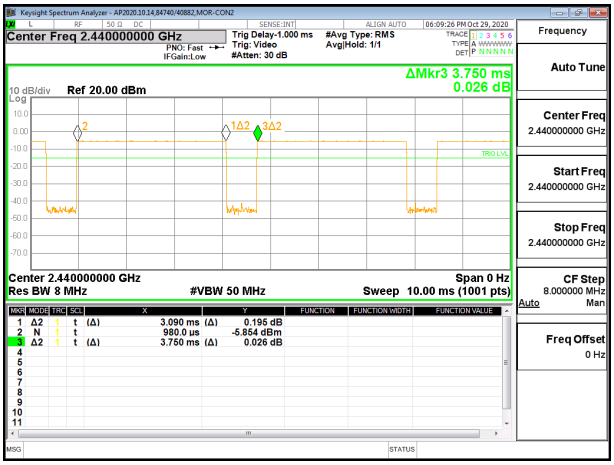
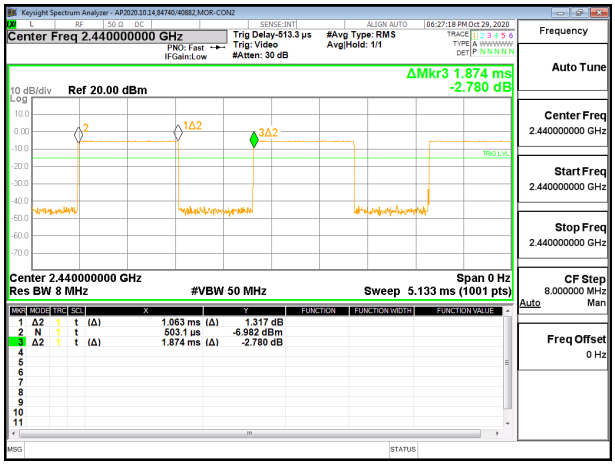
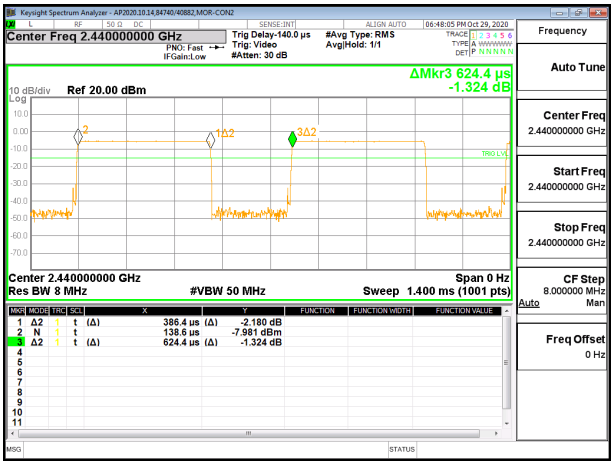
DUTY CYCLE PLOTS



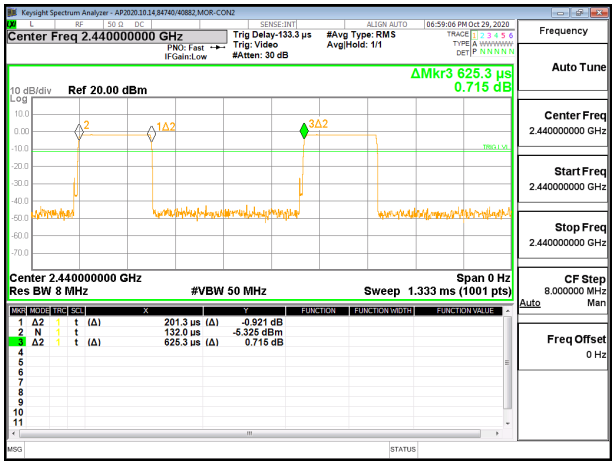
BLE 125 kbps



BLE 500 kbps



BLE 1 Mbps



BLE 2 Mbps

9.2. 99% BANDWIDTH

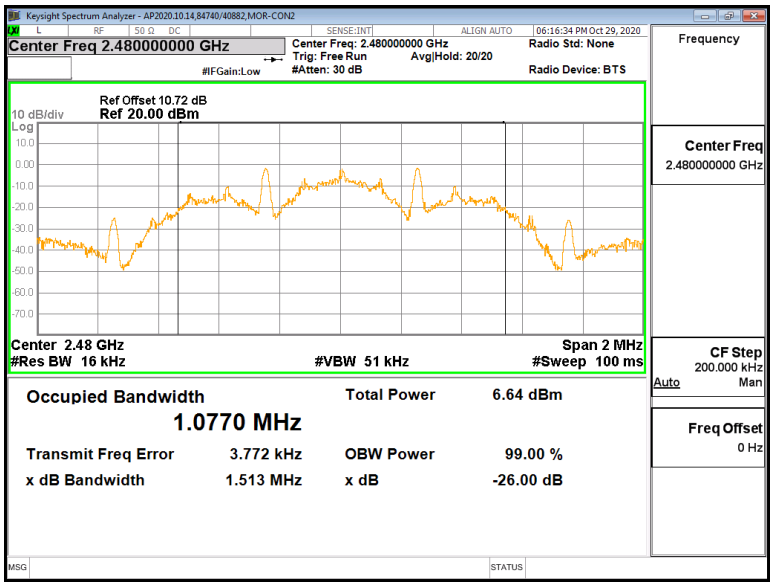
LIMITS

None; for reporting purposes only.

RESULTS

9.2.1. BLE (125 kbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.081
Middle	2440	1.110
High	2480	1.077



HIGH CHANNEL

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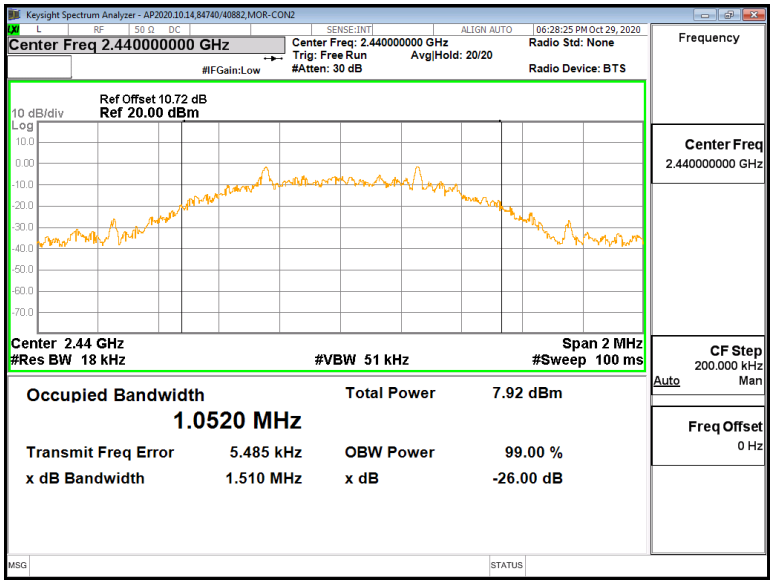
9.2.2. BLE (500 kbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.055
Middle	2440	1.052
High	2480	1.057



MID CHANNEL

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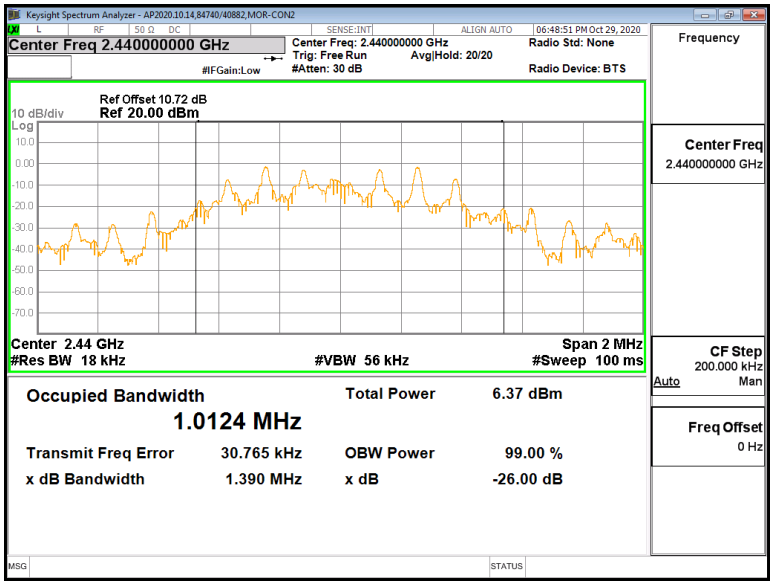
9.2.3. BLE (1 Mbps)

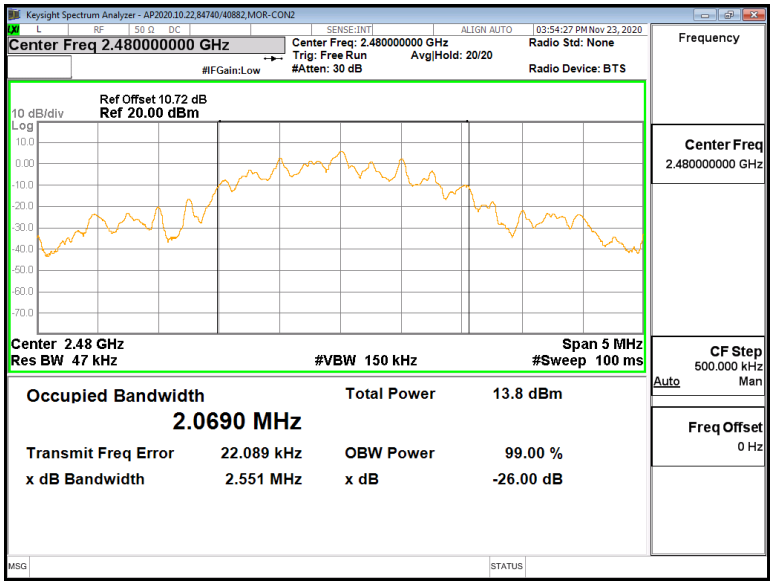
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.070
Middle	2440	1.012
High	2480	1.014



MID CHANNEL

9.2.4. BLE (2 Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.078
Middle	2440	2.077
High	2480	2.069



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9.3. 6 dB BANDWIDTH

LIMITS

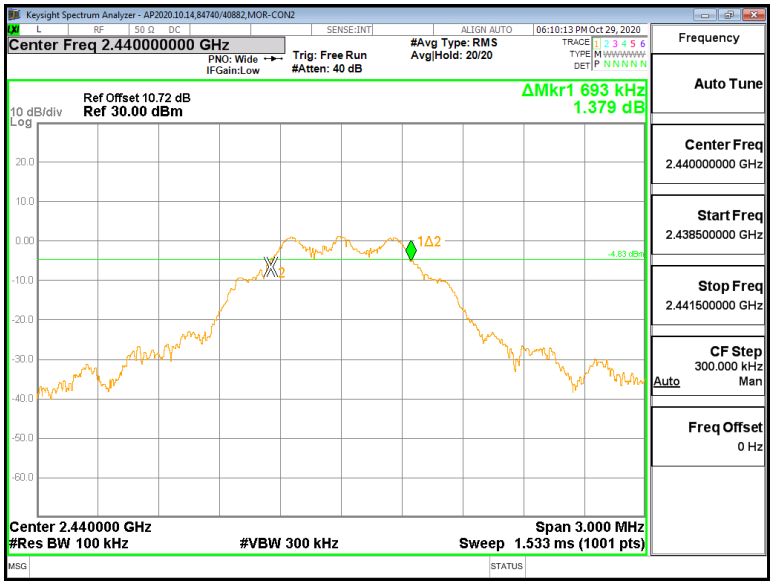
FCC §15.247 (a) (2)

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

RESULTS

9.3.1. BLE (125 kbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.705	0.500
Middle	2440	0.693	0.500
High	2480	0.705	0.500



MID CHANNEL

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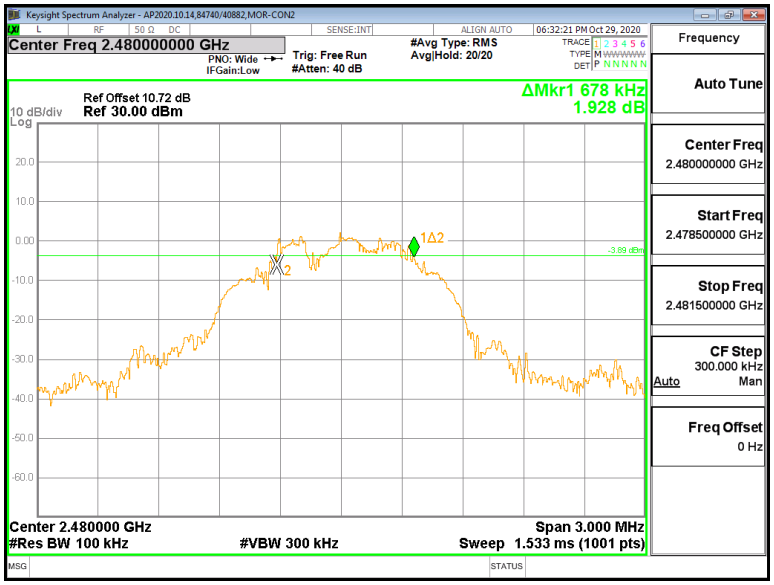
9.3.2. BLE (500 kbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.720	0.500
Middle	2440	0.708	0.500
High	2480	0.678	0.500



HIGH CHANNEL

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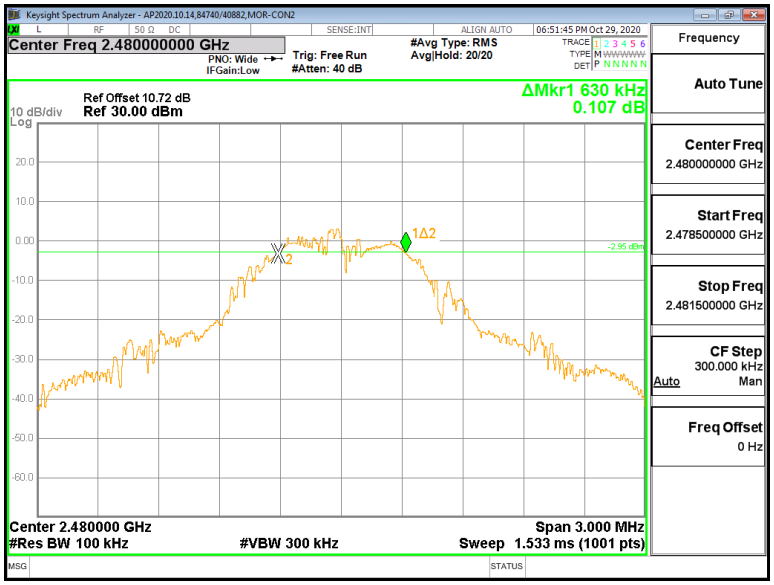
9.3.3. BLE (1 Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.708	0.500
Middle	2440	0.651	0.500
High	2480	0.630	0.500



HIGH CHANNEL

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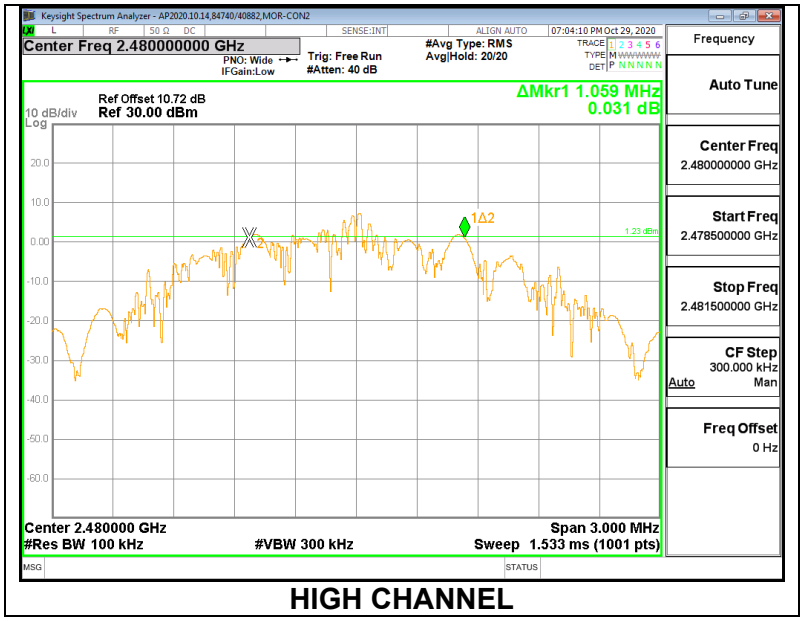
9.3.4. BLE (2 Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.104	0.500
Middle	2440	1.095	0.500
High	2480	1.059	0.500



HIGH CHANNEL

9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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

TEST PROCEDURE

The transmitter output is connected to a wideband power meter and power sensor for a peak measurement of power.

The cable assembly insertion loss of 10.72 dB (including 10.33 dB pad and 0.39 dB cable) was entered as an offset in the power meter.

RESULTS

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9.4.1. BLE (125 kbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.23	30	-24.770
Middle	2440	5.95	30	-24.050
High	2480	5.74	30	-24.260

9.4.2. BLE (500 kbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.23	30	-24.770
Middle	2440	5.98	30	-24.020
High	2480	5.81	30	-24.190

9.4.3. BLE (1 Mbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.25	30	-24.750
Middle	2440	5.97	30	-24.030
High	2480	5.79	30	-24.210

9.4.4. BLE (2 Mbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.30	30	-20.700
Middle	2440	9.65	30	-20.350
High	2480	9.35	30	-20.650

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to an average power meter and power sensor for a gated average measurement of power.

The cable assembly insertion loss of 10.72 dB (including 10.33 dB pad and 0.39 dB cable) was entered as an offset in the power meter.

RESULTS

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9.5.1. BLE (125 kbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.55
Middle	2440	5.30
High	2480	5.12

9.5.2. BLE (500 kbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.57
Middle	2440	5.32
High	2480	5.16

9.5.3. BLE (1 Mbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.54
Middle	2440	5.29
High	2480	5.13

9.5.4. BLE (2 Mbps)

Tested By:	84740/40882
Date:	2020-10-28

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	8.64
Middle	2440	9.06
High	2480	8.77

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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

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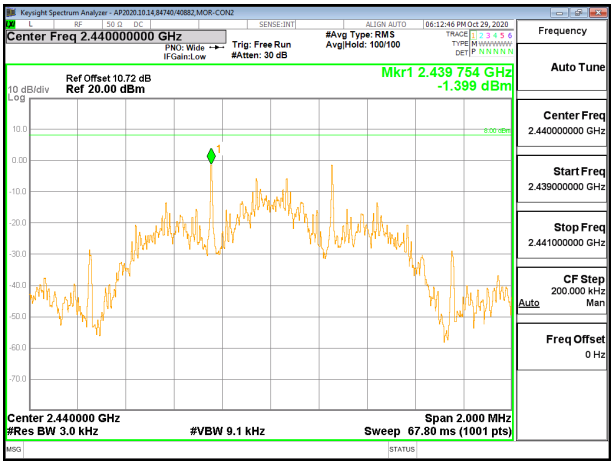
9.6.1. BLE (125 kbps)

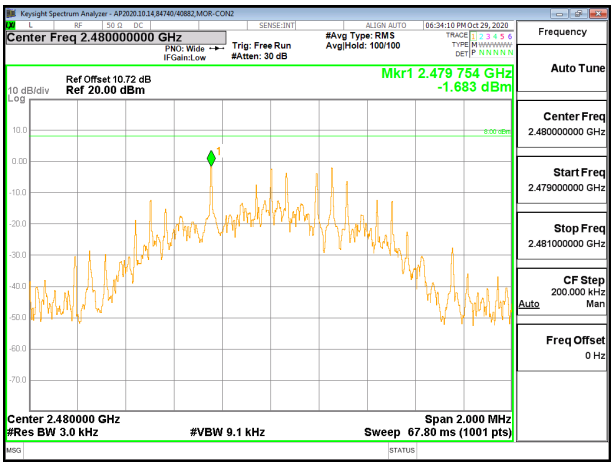
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.19	8	-10.19
Middle	2440	-1.40	8	-9.40
High	2480	-1.82	8	-9.82



MID CHANNEL

9.6.2. BLE (500 kbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.63	8	-10.63
Middle	2440	-1.86	8	-9.86
High	2480	-1.68	8	-9.68



HIGH CHANNEL

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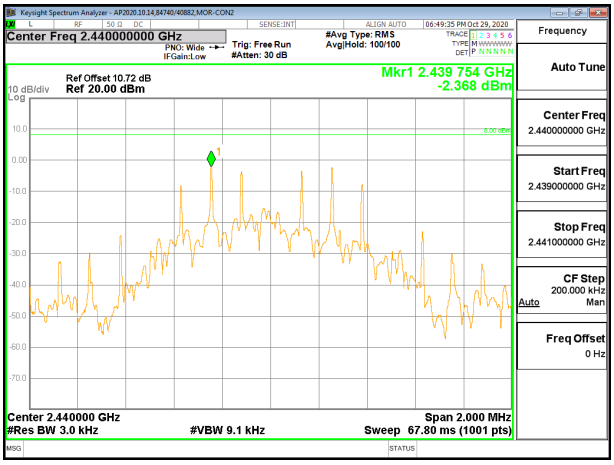
9.6.3. BLE (1 Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-11.78	8	-19.78
Middle	2440	-2.37	8	-10.37
High	2480	-2.64	8	-10.64



MID CHANNEL

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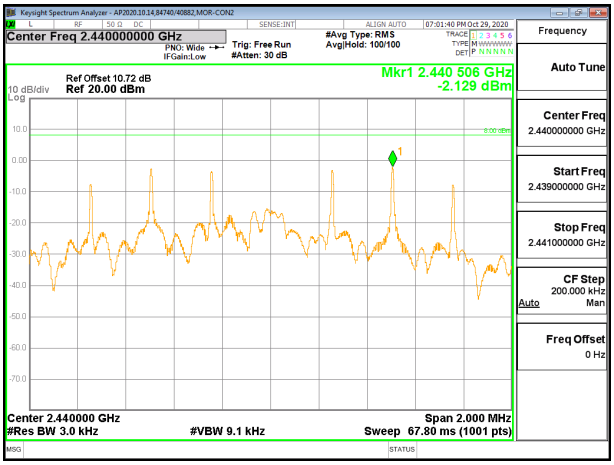
9.6.4. BLE (2 Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.51	8	-10.51
Middle	2440	-2.13	8	-10.13
High	2480	-2.64	8	-10.64



MID CHANNEL

9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Output power was measured based on the use of a peak measurement; therefore, spurious emissions are required to be 20 dBc.

RESULTS

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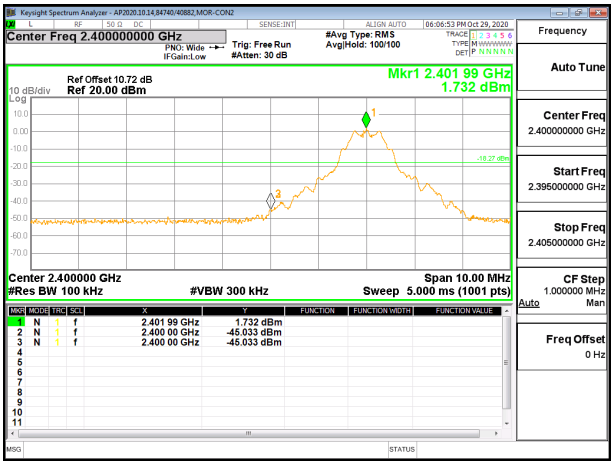
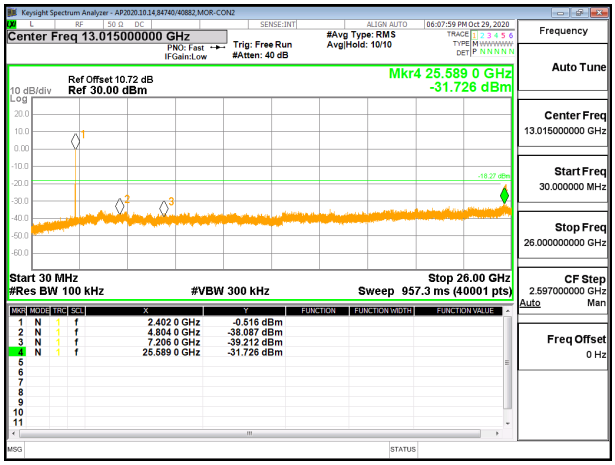
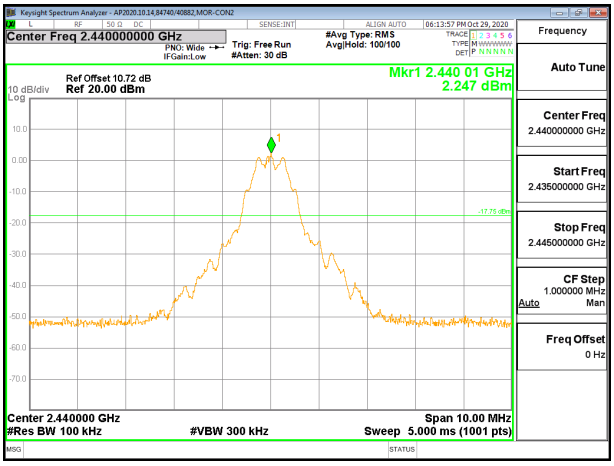
9.7.1. BLE (125 kbps)



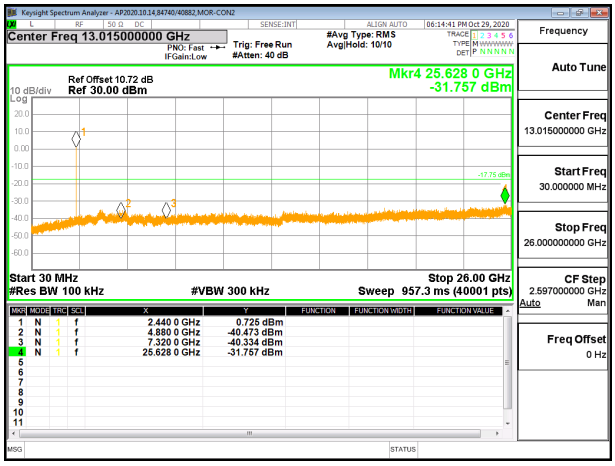
LOW CHANNEL BANDEDGE



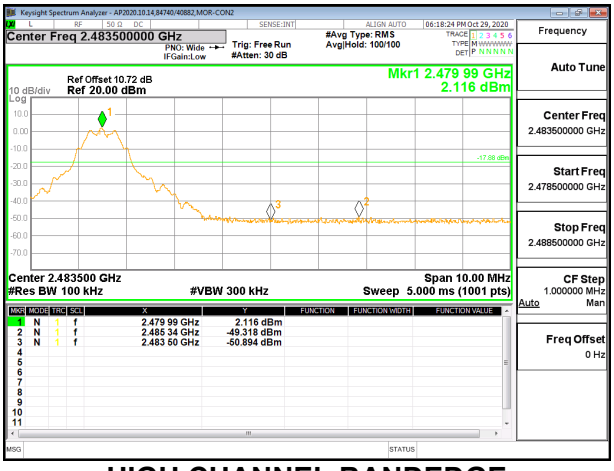
OUT-OF-BAND LOW CHANNEL



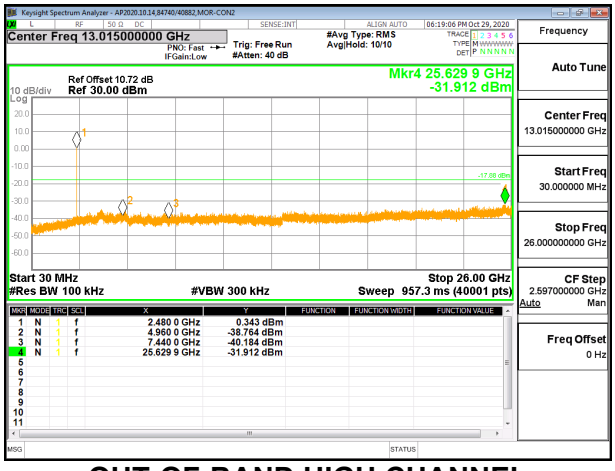
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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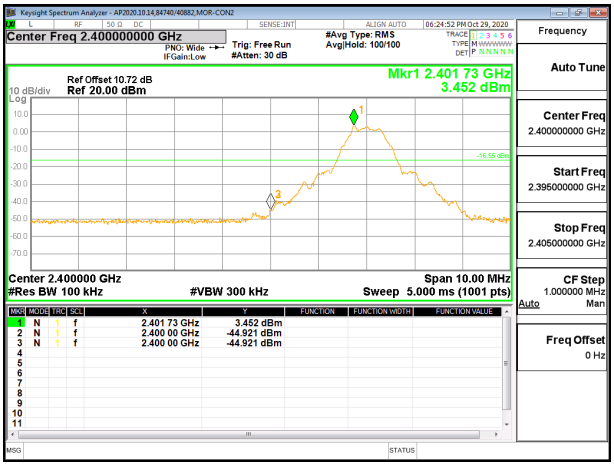
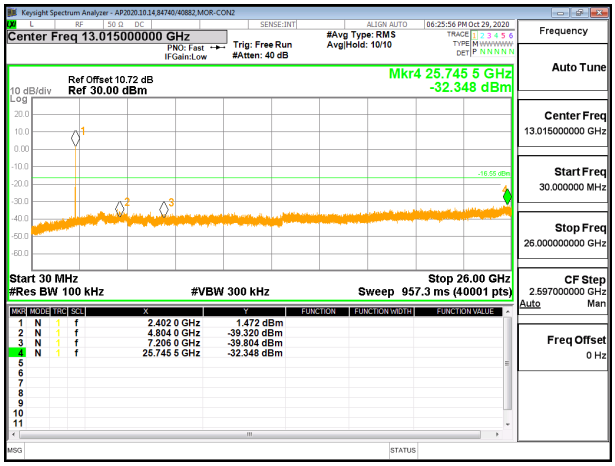
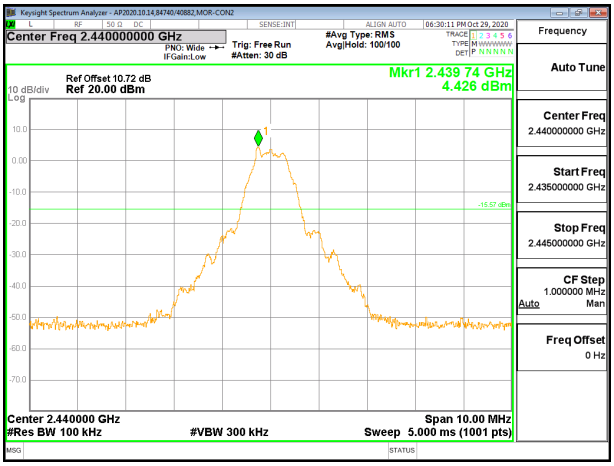
9.7.2. BLE (500 kbps)



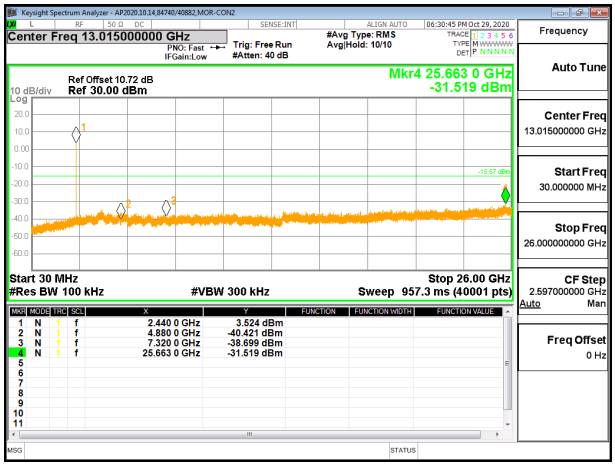
LOW CHANNEL BANDEDGE



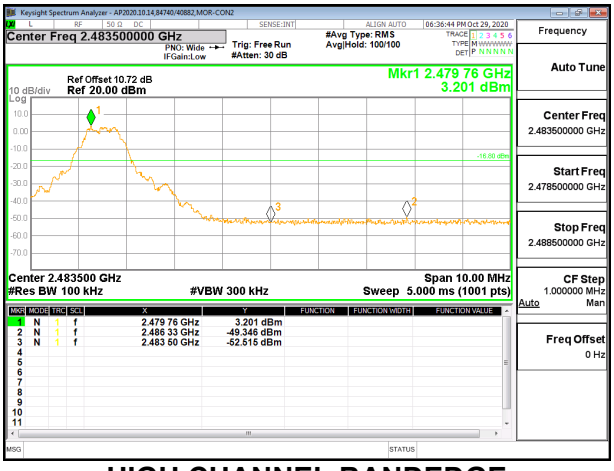
OUT-OF-BAND LOW CHANNEL



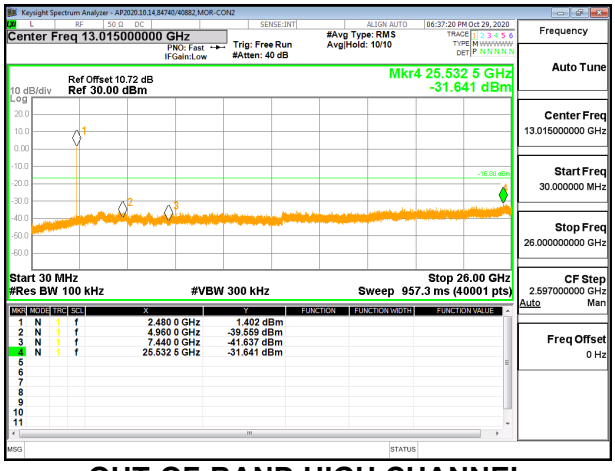
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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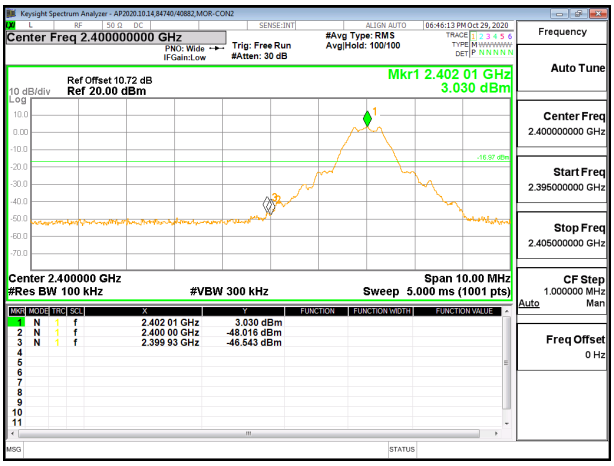
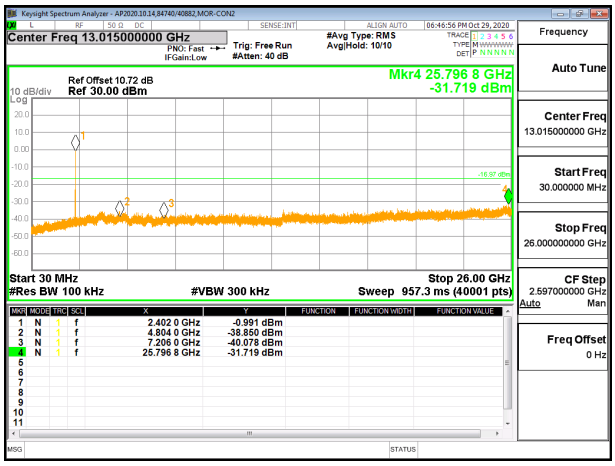
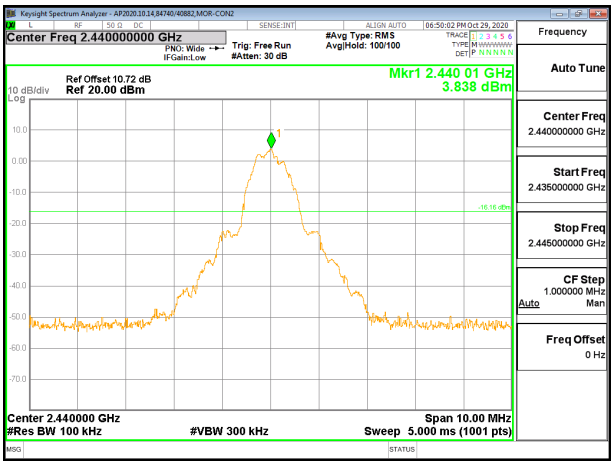
9.7.3. BLE (1 Mbps)



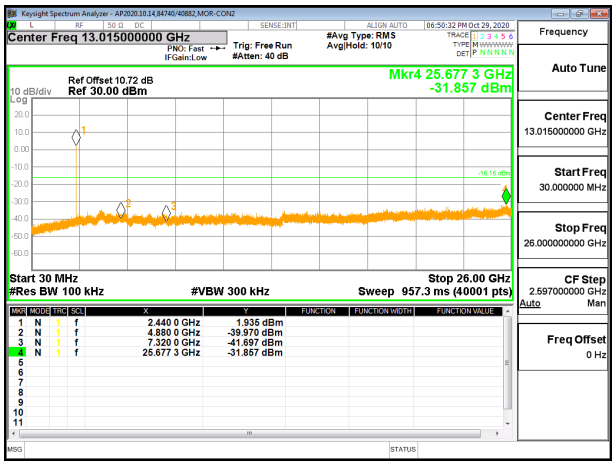
LOW CHANNEL BANDEDGE



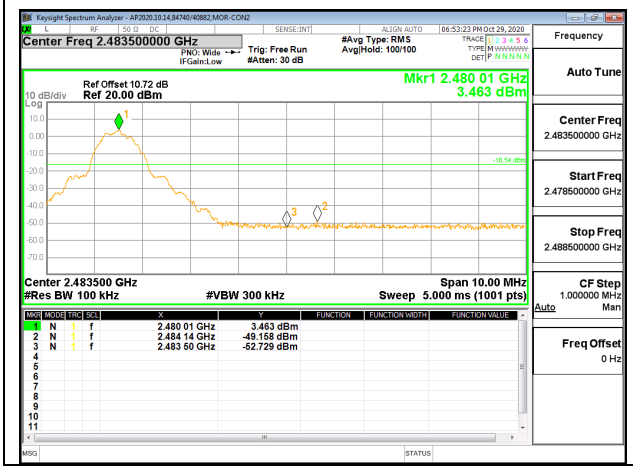
OUT-OF-BAND LOW CHANNEL

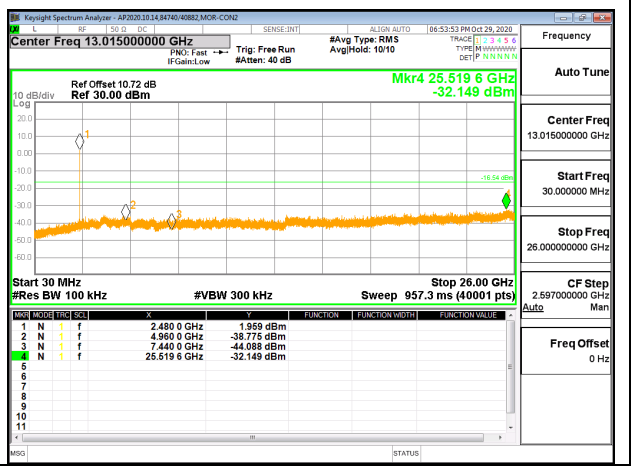


IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL





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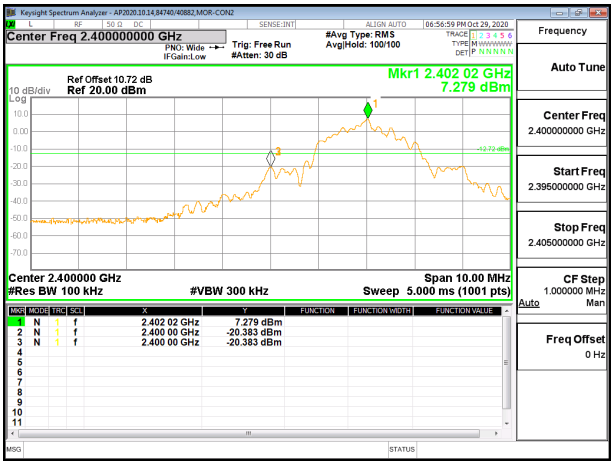
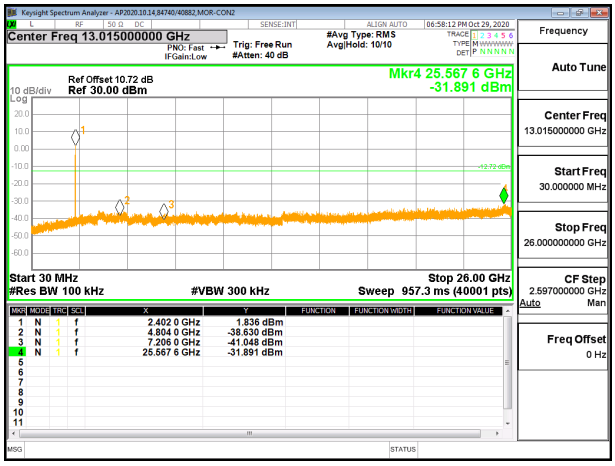
HIGH CHANNEL BANDEDGE	OUT-OF-BAND HIGH CHANNEL

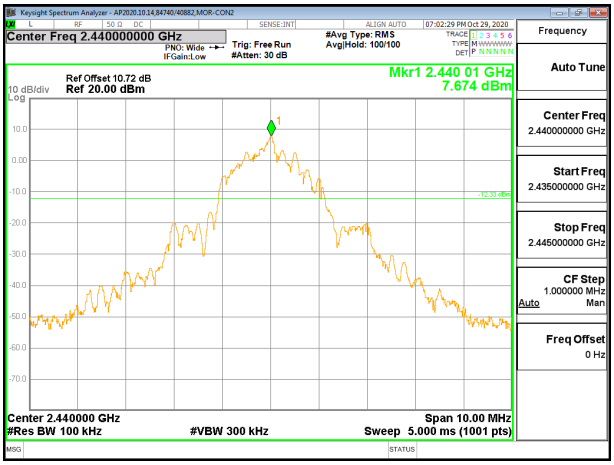
9.7.4. BLE (2 Mbps)



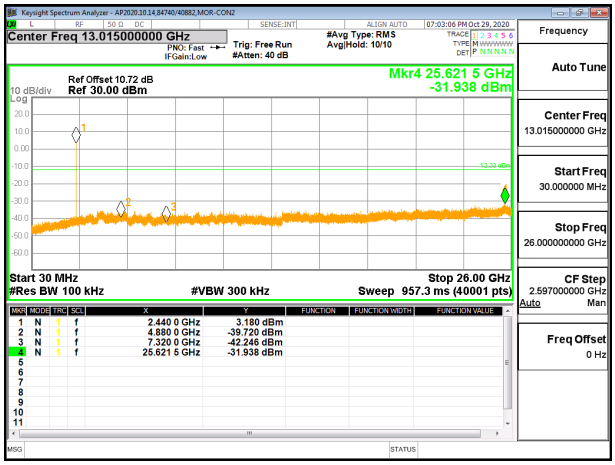
LOW CHANNEL BANDEDGE



OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

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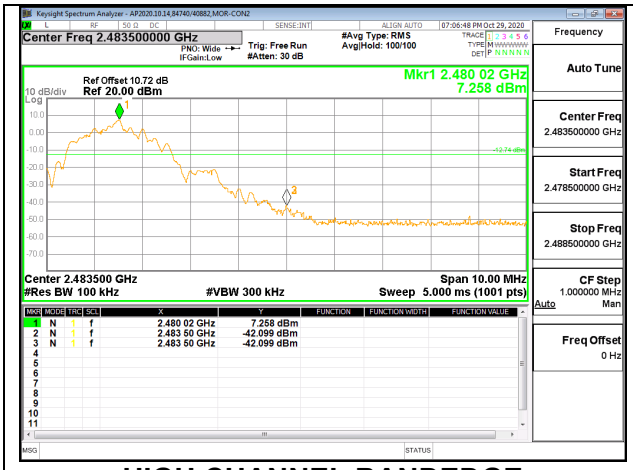
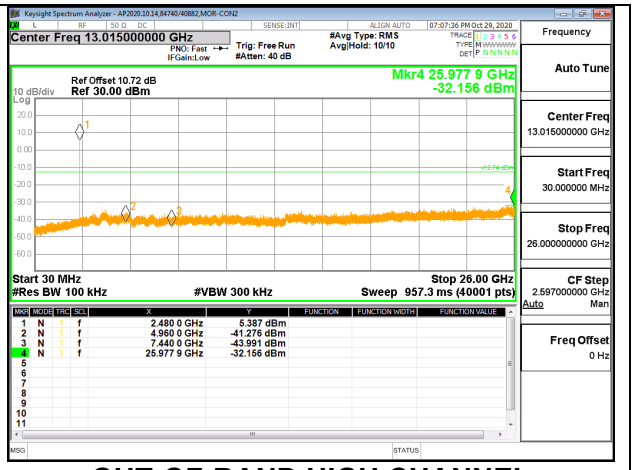


HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. 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

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 in the 30-1000MHz 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 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.

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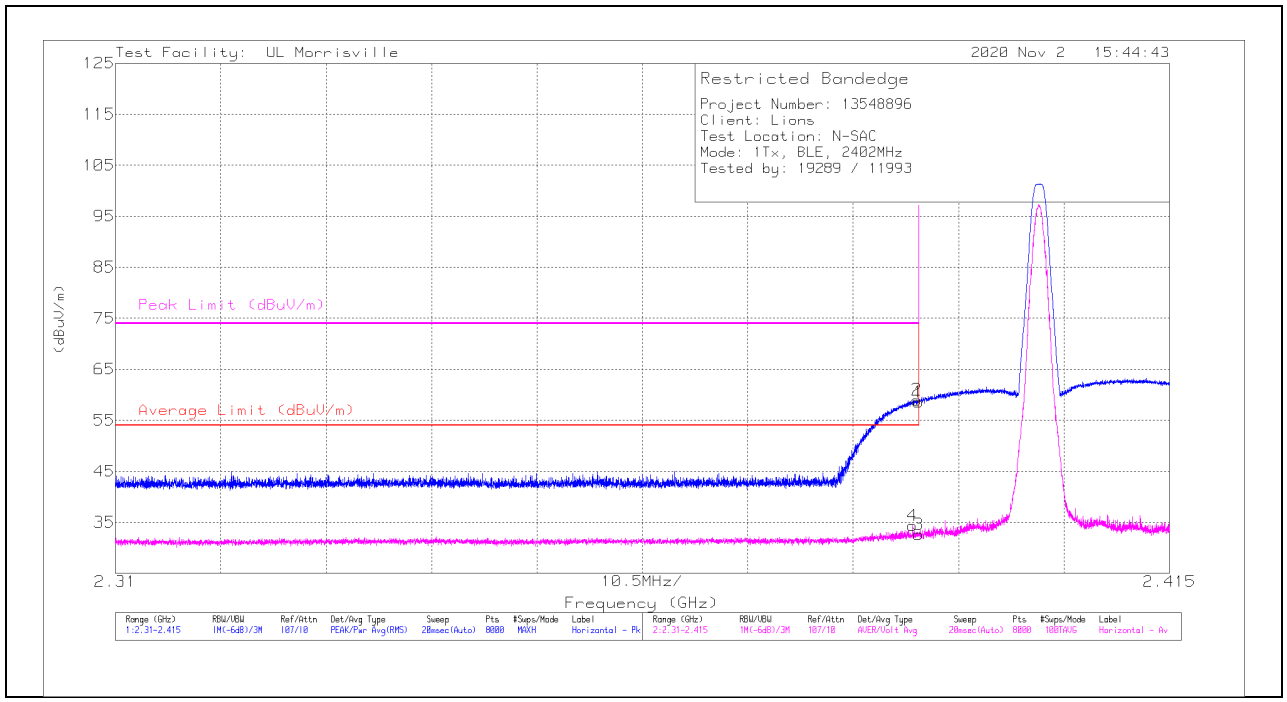
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (125 kbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	51.16	Pk	31.8	-24.4	0	58.56	-	-	74	-15.44	137	198	H
2	* ** 2.38984	51.59	Pk	31.8	-24.4	0	58.99	-	-	74	-15.01	137	198	H
3	* ** 2.39	23.58	ADV	31.8	-24.4	1.68	32.66	54	-21.34	-	-	137	198	H
4	* ** 2.38942	25.31	ADV	31.8	-24.4	1.68	34.39	54	-19.61	-	-	137	198	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

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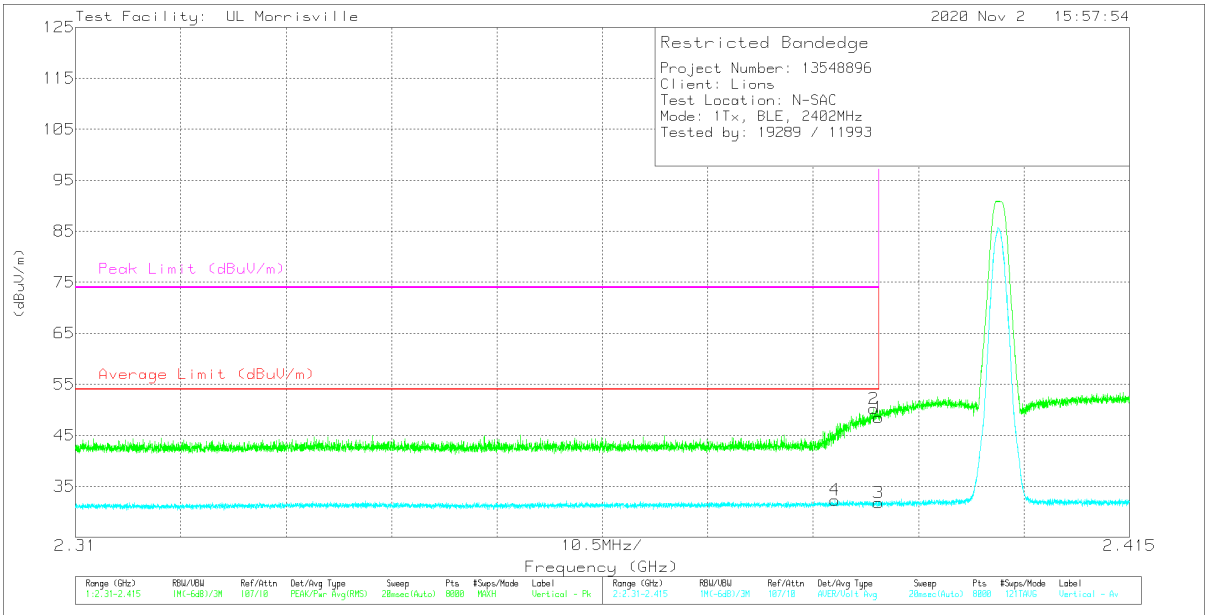
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	41.06	Pk	31.8	-24.4	0	48.46	-	-	74	-25.54	18	225	V
2	* ** 2.38955	42.79	Pk	31.8	-24.4	0	50.19	-	-	74	-23.81	18	225	V
3	* ** 2.39	22.73	ADV	31.8	-24.4	1.68	31.81	54	-22.19	-	-	18	225	V
4	* ** 2.38564	23.25	ADV	31.8	-24.4	1.68	32.33	54	-21.67	-	-	18	225	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

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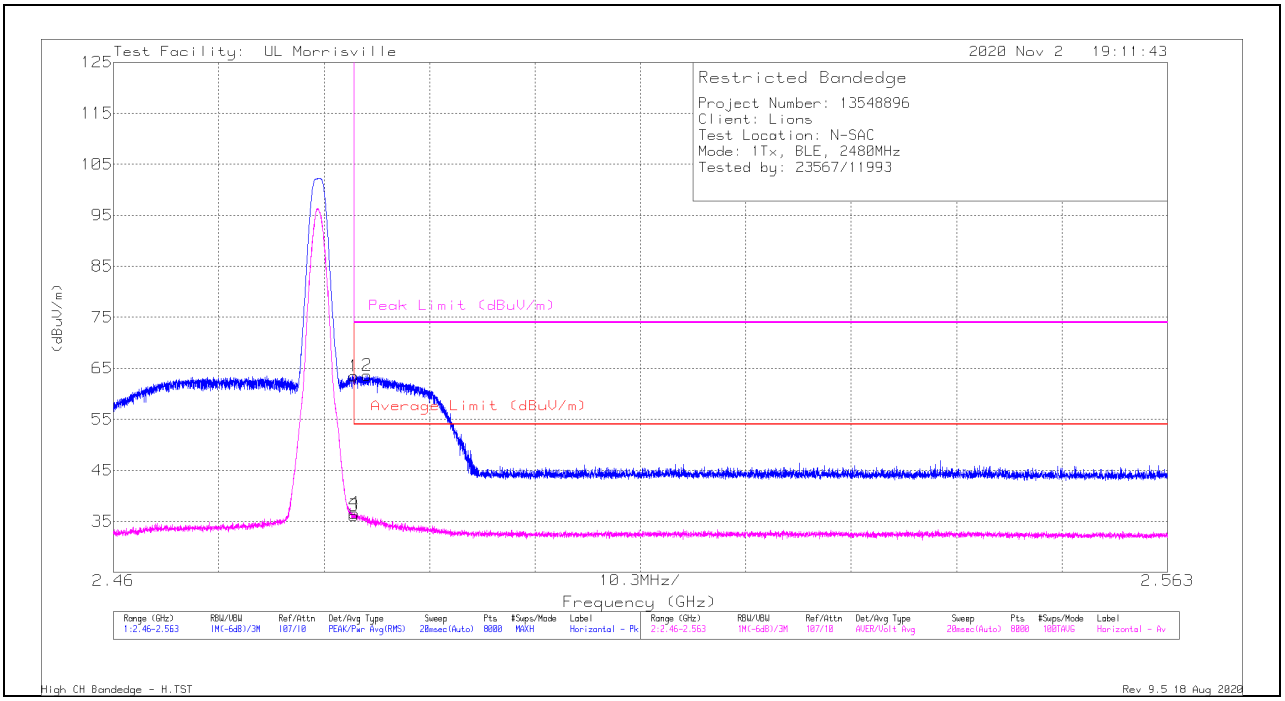
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 2.4835	55.41	Pk	32.4	-24.3	0	63.51	-	-	74	-10.49	130	194	H
2	* ** 2.48481	55.45	Pk	32.5	-24.3	0	63.65	-	-	74	-10.35	130	194	H
3	* ** 2.4835	26.36	ADV	32.4	-24.3	1.68	36.14	54	-17.86	-	-	130	193	H
4	* ** 2.48354	26.85	ADV	32.4	-24.3	1.68	36.63	54	-17.37	-	-	130	193	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

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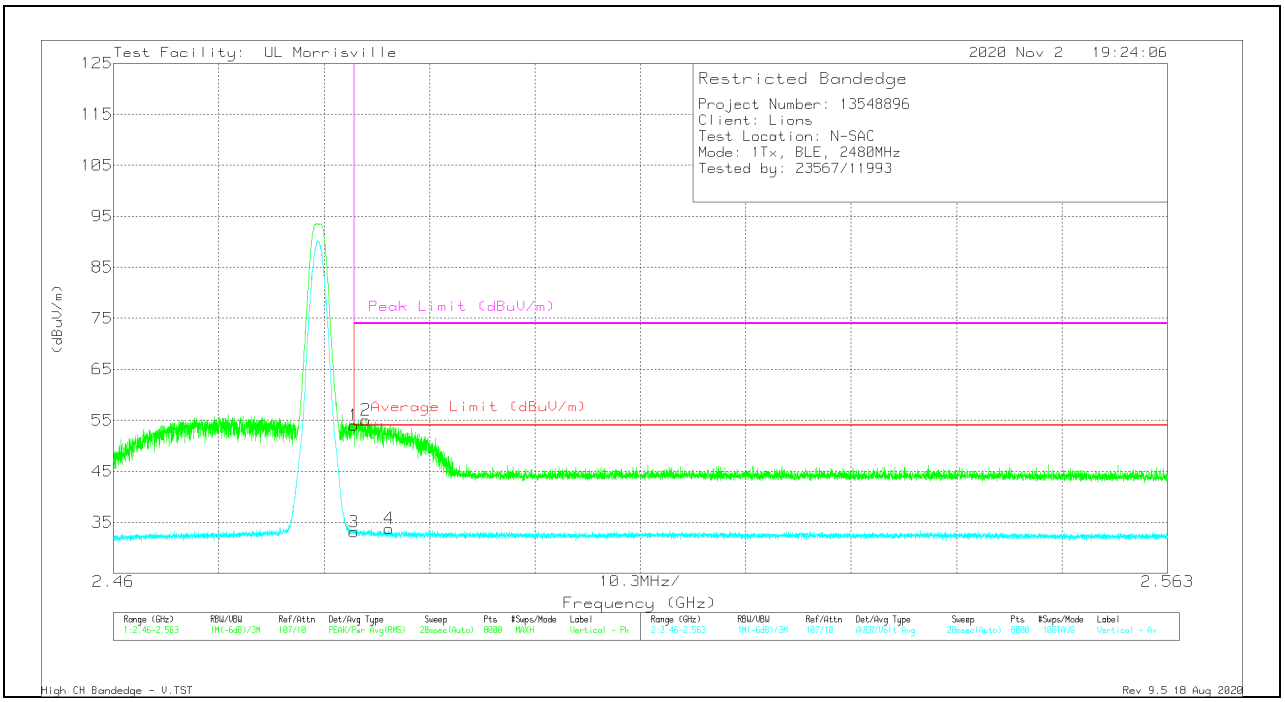
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 2.4835	45.92	Pk	32.4	-24.3	0	54.02	-	-	74	-19.98	218	128	V
2	* ** 2.48466	46.95	Pk	32.4	-24.3	0	55.05	-	-	74	-18.95	218	128	V
3	* ** 2.4835	23.35	ADV	32.4	-24.3	1.68	33.13	54	-20.87	-	-	218	128	V
4	* ** 2.48691	23.91	ADV	32.5	-24.3	1.68	33.79	54	-20.21	-	-	218	128	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

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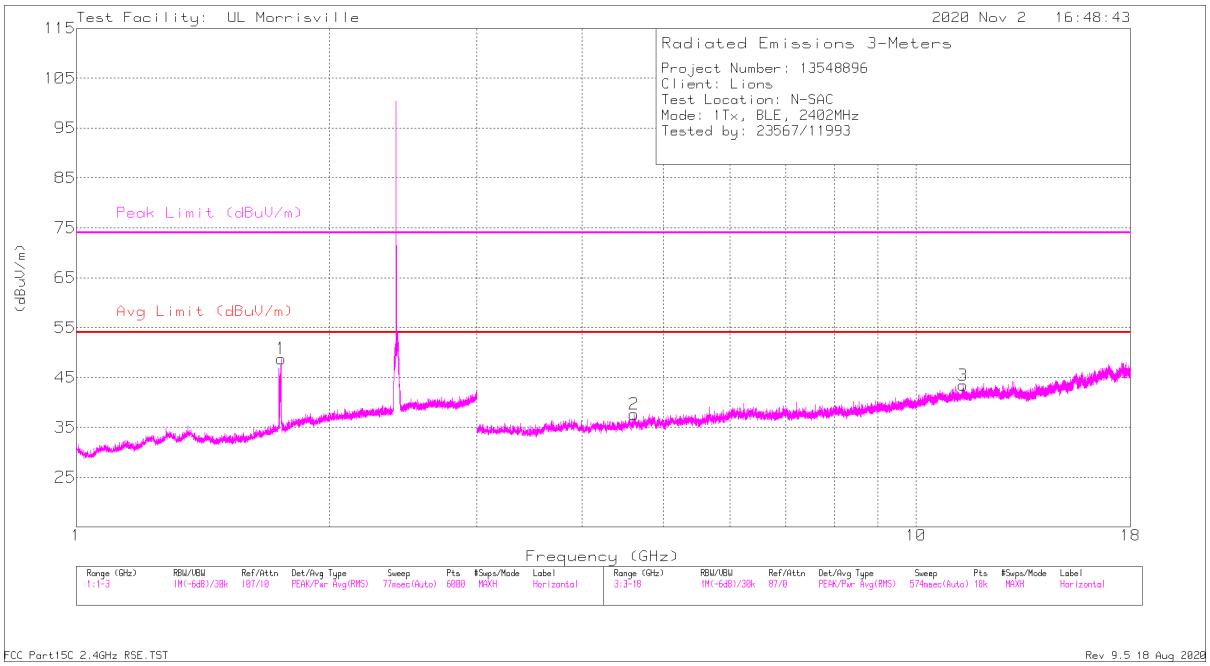
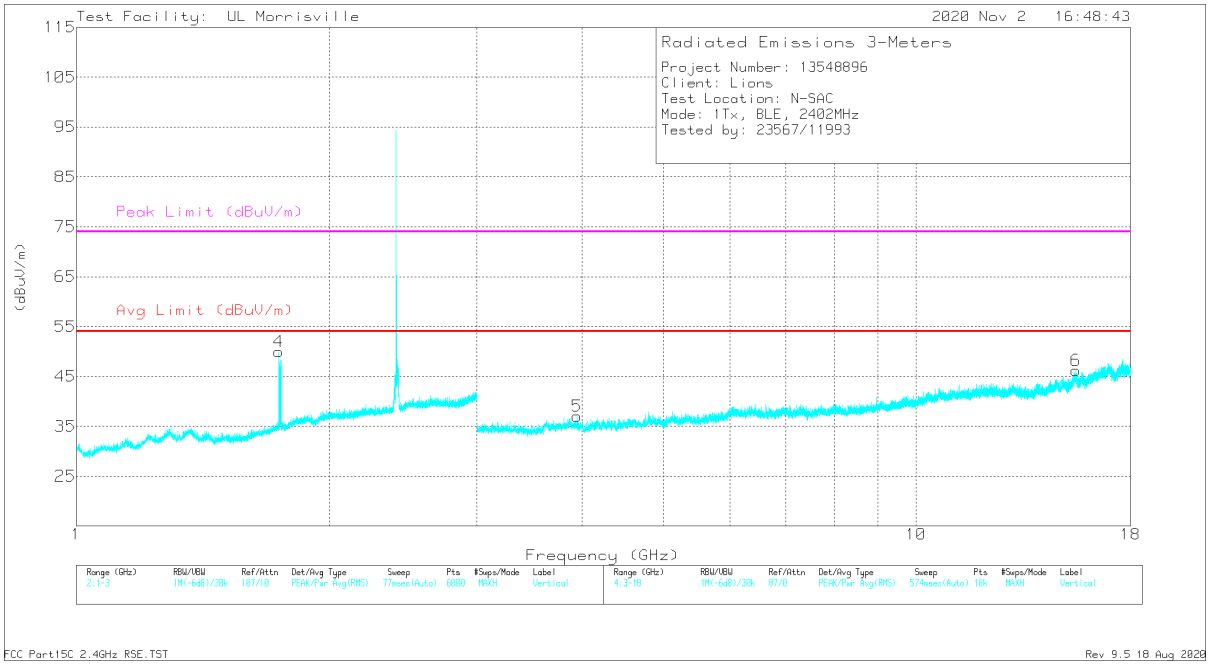
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	** 1.75379	42.14	PK2	29.6	-24.4	0	47.34	-	-	74	-26.66	302	153	H
	** 1.7539	23.63	ADV	29.6	-24.4	1.68	30.51	54	-23.49	-	-	302	153	H
4	** 1.74461	41.28	PK2	29.5	-24.3	0	46.48	-	-	74	-27.52	106	112	V
	** 1.74176	23.67	ADV	29.5	-24.3	1.68	30.55	54	-23.45	-	-	106	112	V
2	* ** 4.61483	42.01	PK2	34.2	-32.4	0	43.81	-	-	74	-30.19	222	245	H
	* ** 4.61556	29.03	ADV	34.2	-32.4	1.68	32.51	54	-21.49	-	-	222	245	H
3	* ** 11.37937	36.18	PK2	38.1	-25	0	49.28	-	-	74	-24.72	293	264	H
	* ** 11.37789	22.93	ADV	38	-25	1.68	37.61	54	-16.39	-	-	293	264	H
5	* ** 3.94876	41.51	PK2	33.6	-31.6	0	43.51	-	-	74	-30.49	92	131	V
	* ** 3.94915	28.14	ADV	33.6	-31.6	1.68	31.82	54	-22.18	-	-	92	131	V
6	* ** 15.49287	36.27	PK2	40.2	-24	0	52.47	-	-	74	-21.53	6	127	V
	* ** 15.49252	22.87	ADV	40.2	-24	1.68	40.75	54	-13.25	-	-	6	127	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

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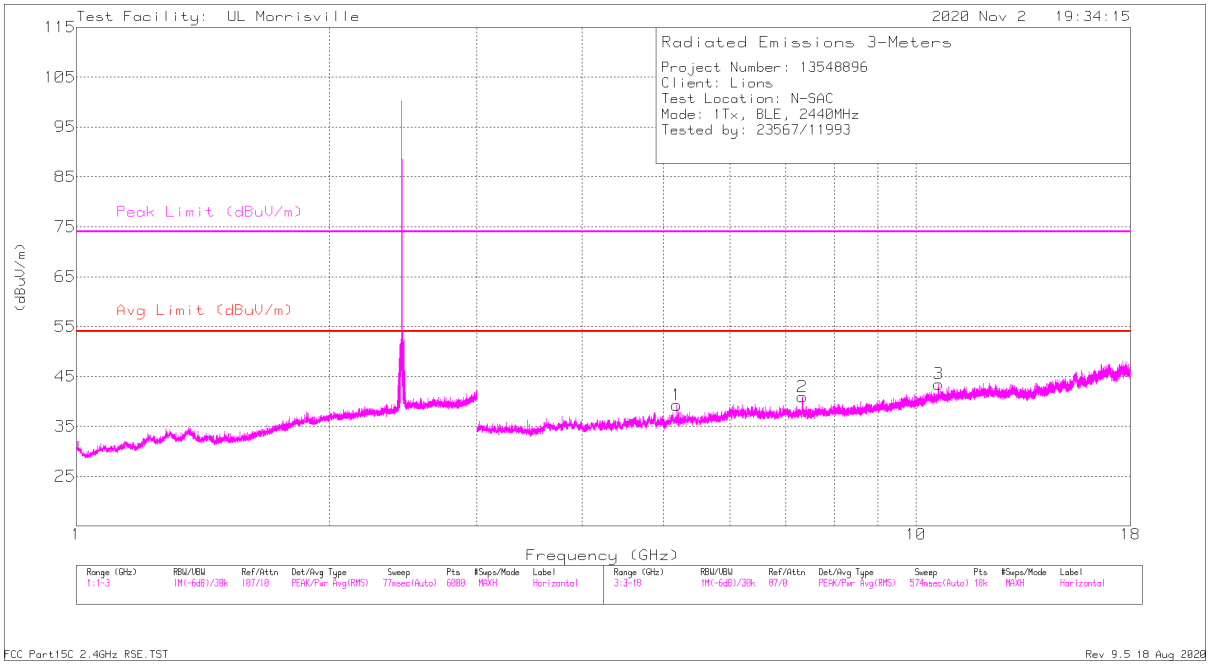
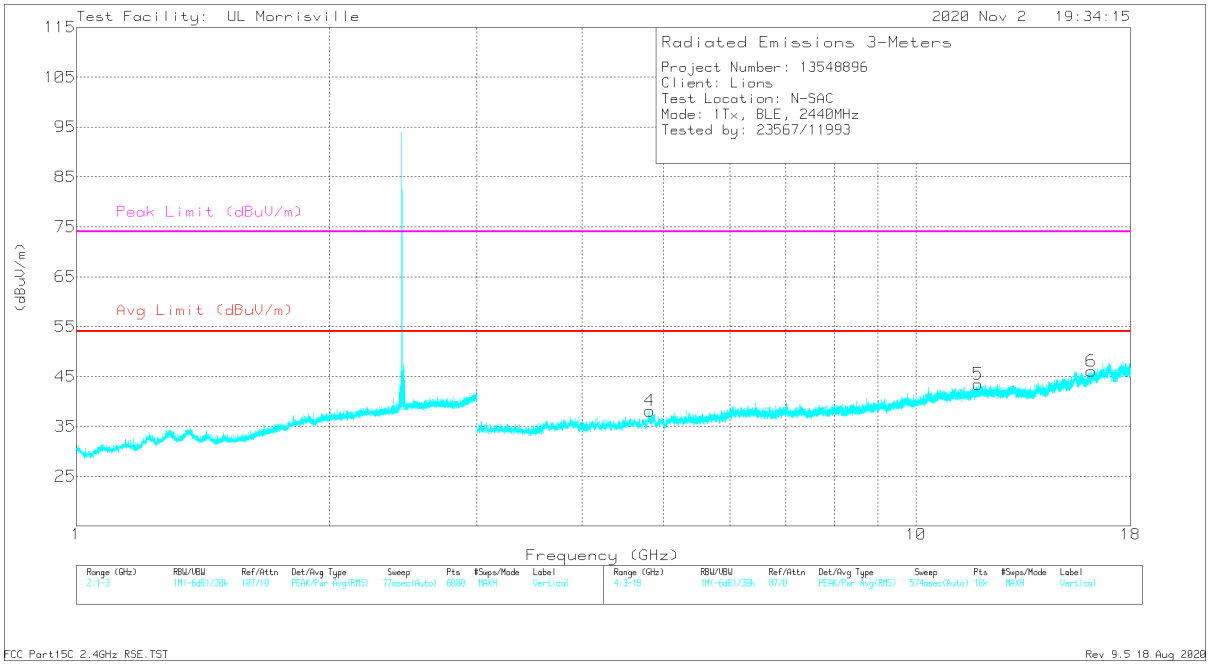
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	** 5.18589	41.32	PK2	34.3	-32.2	0	43.42	-	-	74	-30.58	138	294	H
	** 5.18729	28.59	ADV	34.3	-32.3	1.68	32.27	54	-21.73	-	-	138	294	H
2	* ** 7.32021	41.66	PK2	35.6	-29.2	0	48.06	-	-	74	-25.94	343	117	H
	* ** 7.32063	28.63	ADV	35.6	-29.2	1.68	36.71	54	-17.29	-	-	343	117	H
3	* ** 10.64432	36.54	PK2	37.7	-25.3	0	48.94	-	-	74	-25.06	9	311	H
	* ** 10.64468	23.27	ADV	37.7	-25.3	1.68	37.35	54	-16.65	-	-	9	311	H
4	* ** 4.81688	41.16	PK2	34.2	-31.3	0	44.06	-	-	74	-29.94	120	133	V
	* ** 4.81772	27.87	ADV	34.2	-31.3	1.68	32.45	54	-21.55	-	-	120	133	V
5	* ** 11.84702	37.51	PK2	38.5	-25.7	0	50.31	-	-	74	-23.69	264	137	V
	* ** 11.8479	23.47	ADV	38.5	-25.7	1.68	37.95	54	-16.05	-	-	264	137	V
6	* ** 16.16861	37.74	PK2	40.7	-26.5	0	51.94	-	-	74	-22.06	272	381	V
	* ** 16.16744	24.68	ADV	40.7	-26.5	1.68	40.56	54	-13.44	-	-	272	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

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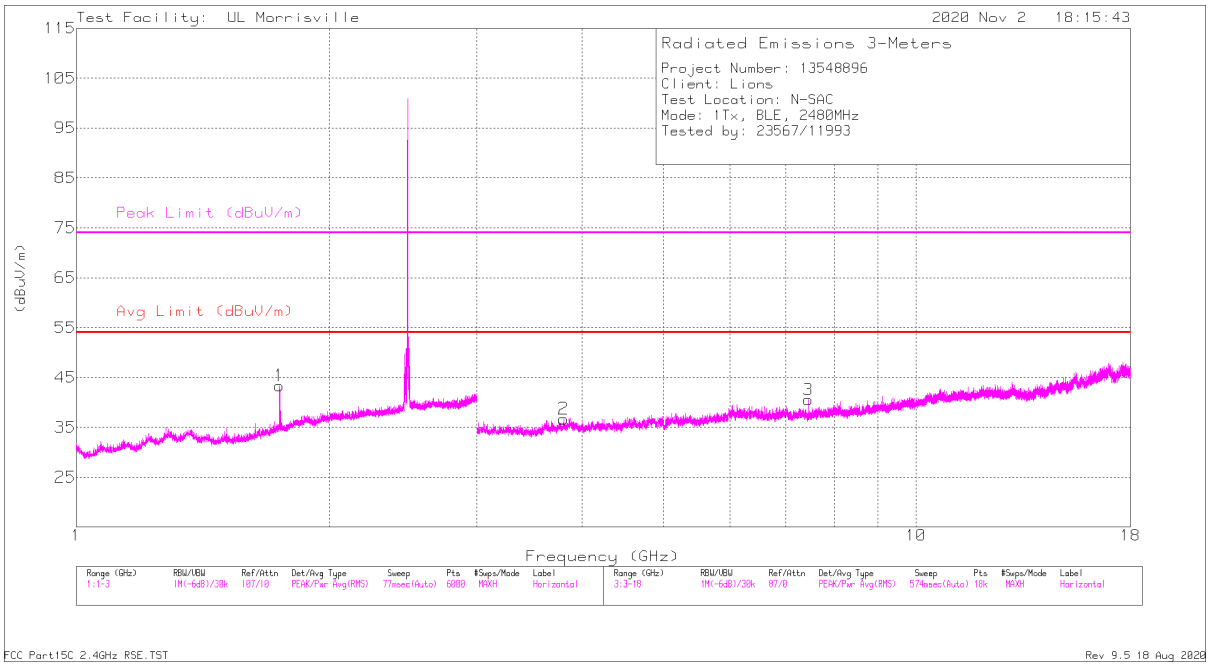
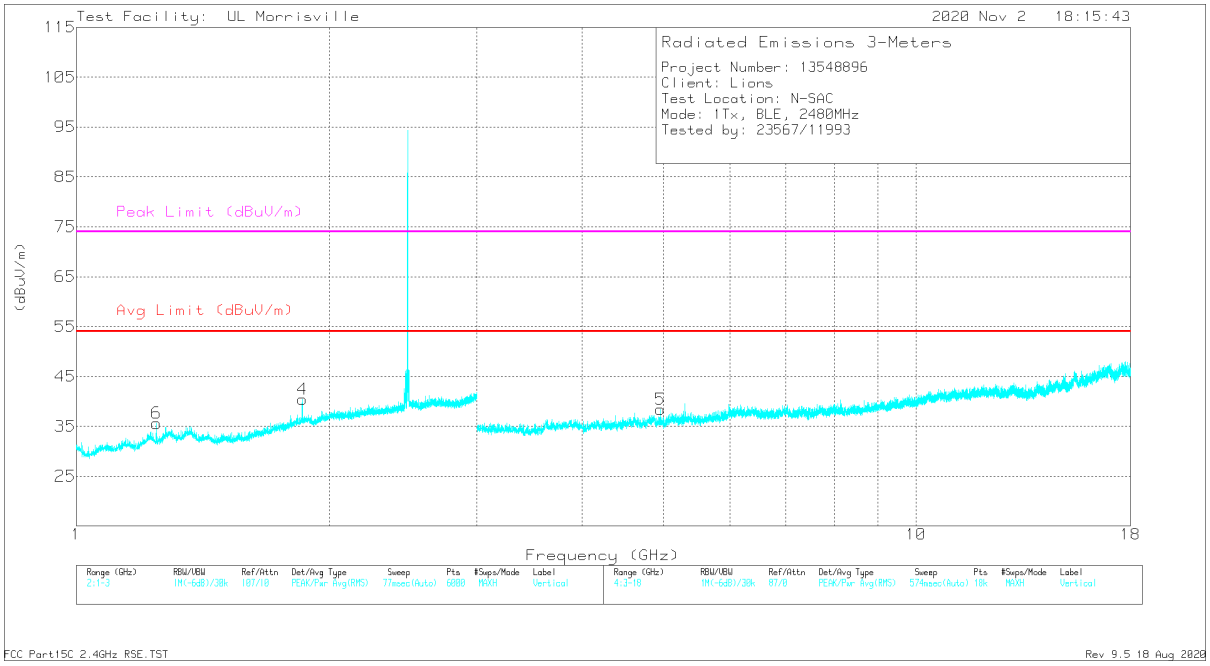
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

RADIATED EMISSIONS

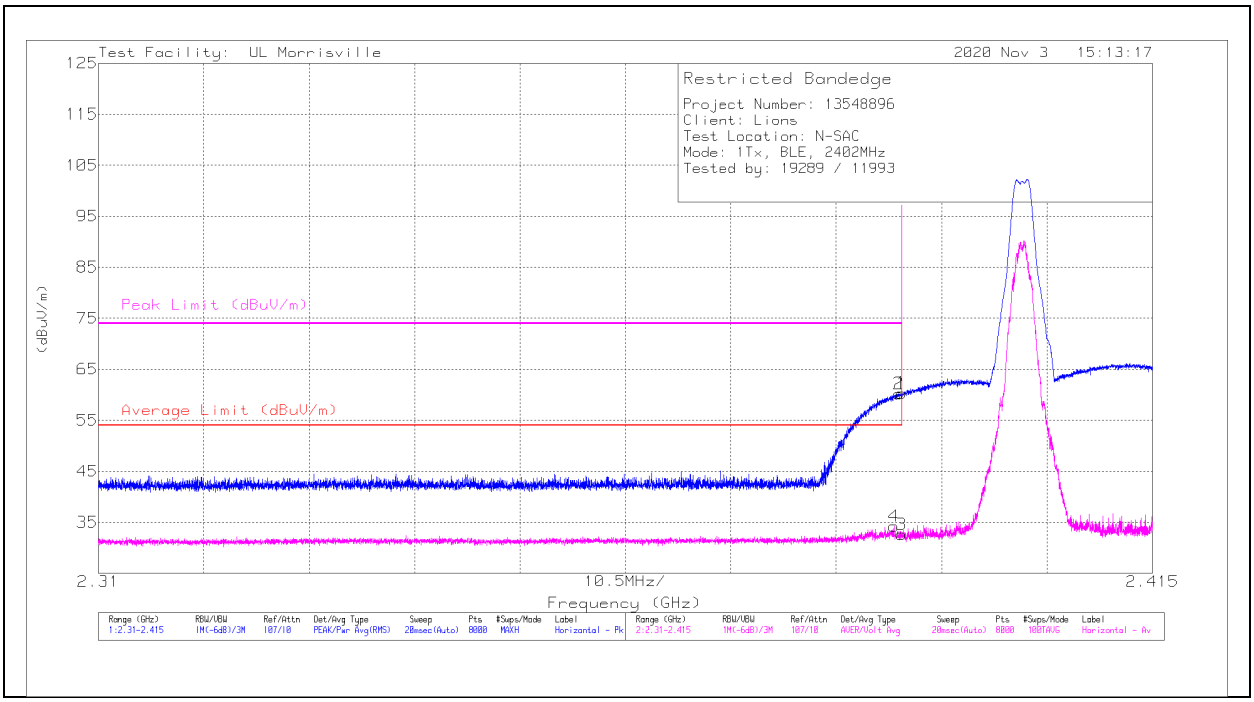
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.7429	36.39	PK2	29.5	-24.3	0	41.59	-	-	74	-32.41	329	373	H
	** 1.7458	23.61	ADV	29.5	-24.3	1.68	30.49	54	-23.51	-	-	329	373	H
4	** 1.86057	37.04	PK2	30.9	-24.3	0	43.64	-	-	74	-30.36	145	199	V
	** 1.85968	23.12	ADV	30.9	-24.3	1.68	31.4	54	-22.6	-	-	145	199	V
6	* 1.24428	35.34	PK2	28.9	-25.8	0	38.44	-	-	74	-35.56	207	193	V
	* 1.24452	22.9	ADV	28.9	-25.8	1.68	27.68	54	-26.32	-	-	207	193	V
2	* ** 3.80238	42.54	PK2	33.5	-32.9	0	43.14	-	-	74	-30.86	76	227	H
	* ** 3.80378	29.24	ADV	33.5	-32.8	1.68	31.62	54	-22.38	-	-	76	227	H
3	* ** 7.44038	41.01	PK2	35.7	-29.3	0	47.41	-	-	74	-26.59	357	118	H
	* ** 7.4406	28.79	ADV	35.7	-29.3	1.68	36.87	54	-17.13	-	-	357	118	H
5	* ** 4.96059	41.5	PK2	34.1	-32.4	0	43.2	-	-	74	-30.8	328	105	V
	* ** 4.95991	28.77	ADV	34.1	-32.4	1.68	32.15	54	-21.85	-	-	328	105	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

10.2.2. BLE (2 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	52.95	Pk	31.8	-24.4	0	60.35	-	-	74	-13.65	149	298	H
2	* ** 2.38973	52.83	Pk	31.8	-24.4	0	60.23	-	-	74	-13.77	149	298	H
3	* ** 2.39	15.43	ADV	31.8	-24.4	9.84	32.67	54	-21.33	-	-	149	298	H
4	* ** 2.38925	17.01	ADV	31.8	-24.4	9.84	34.25	54	-19.75	-	-	149	298	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

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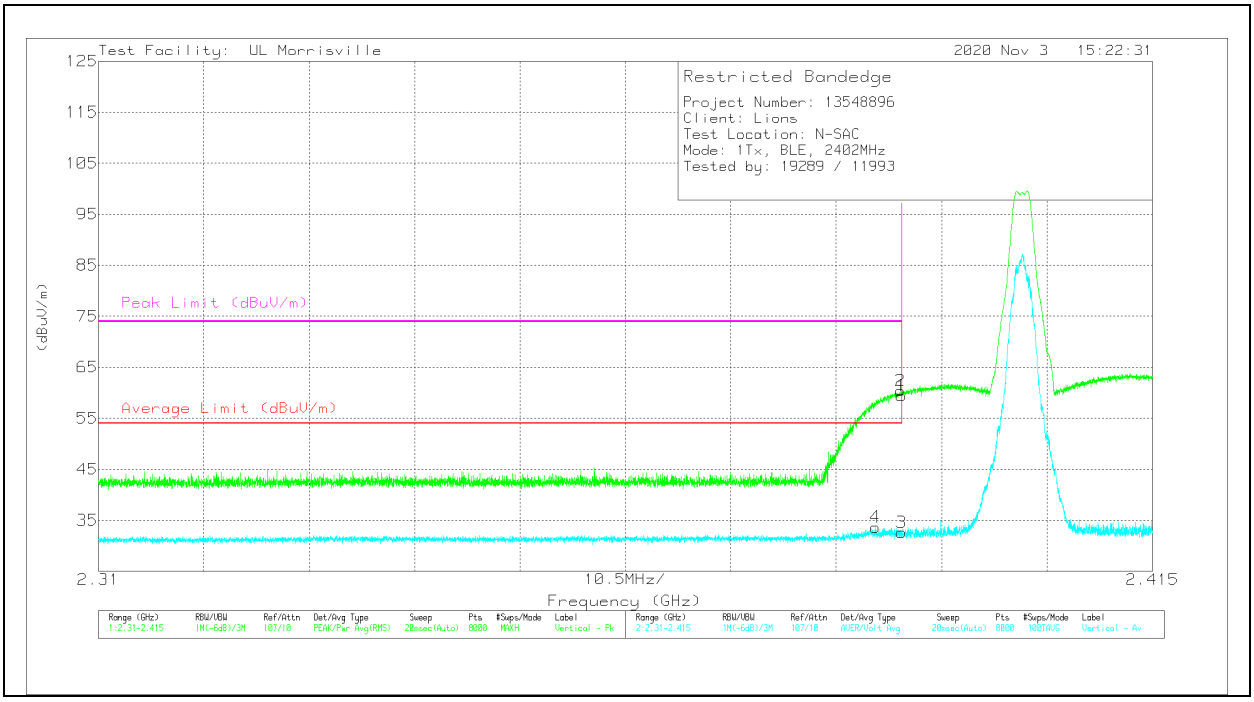
VERITCAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	52.04	Pk	31.8	-24.4	0	59.44	-	-	74	-14.56	179	370	V
2	* ** 2.38989	53.03	Pk	31.8	-24.4	0	60.43	-	-	74	-13.57	179	370	V
3	* ** 2.39	15.42	ADV	31.8	-24.4	9.84	32.66	54	-21.34	-	-	179	370	V
4	* ** 2.38741	16.42	ADV	31.8	-24.4	9.84	33.66	54	-20.34	-	-	179	370	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

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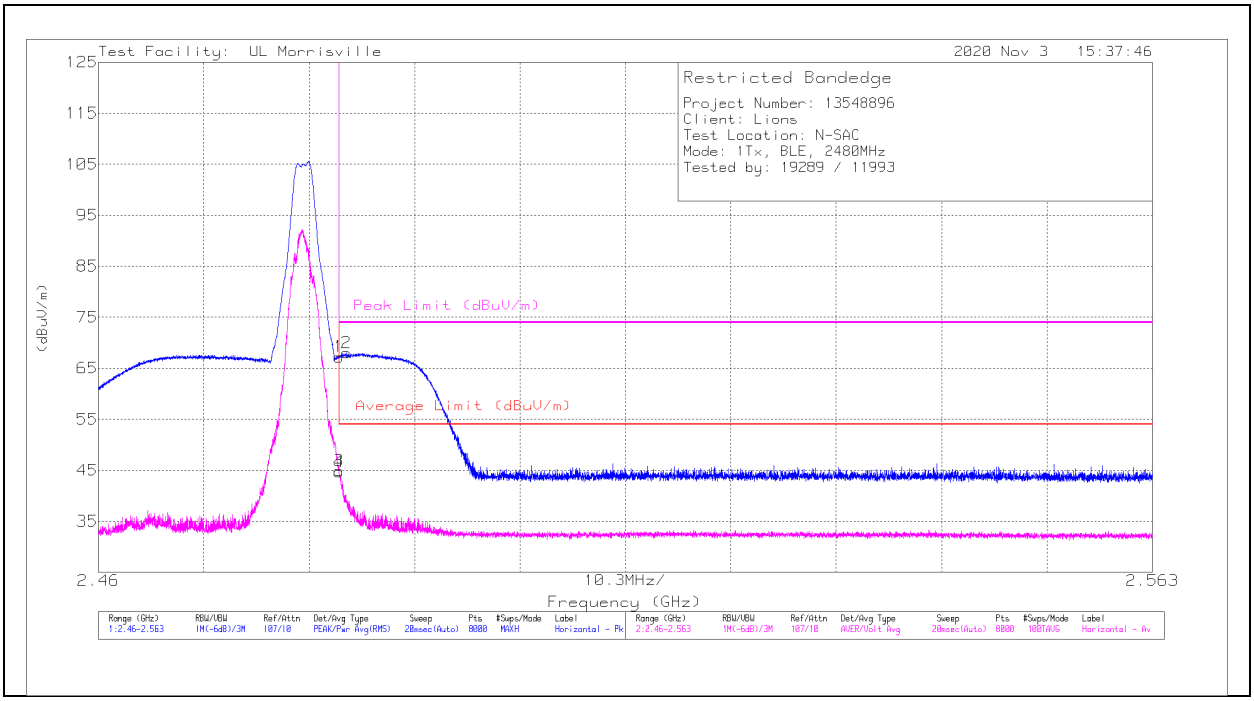
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 2.4835	59.14	Pk	32.4	-24.3	0	67.24	-	-	74	-6.76	139	166	H
2	* ** 2.48425	59.95	Pk	32.4	-24.3	0	68.05	-	-	74	-5.95	139	166	H
3	* ** 2.4835	27.01	ADV	32.4	-24.3	9.84	44.95	54	-9.05	-	-	139	166	H
4	* ** 2.48353	26.73	ADV	32.4	-24.3	9.84	44.67	54	-9.33	-	-	139	166	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

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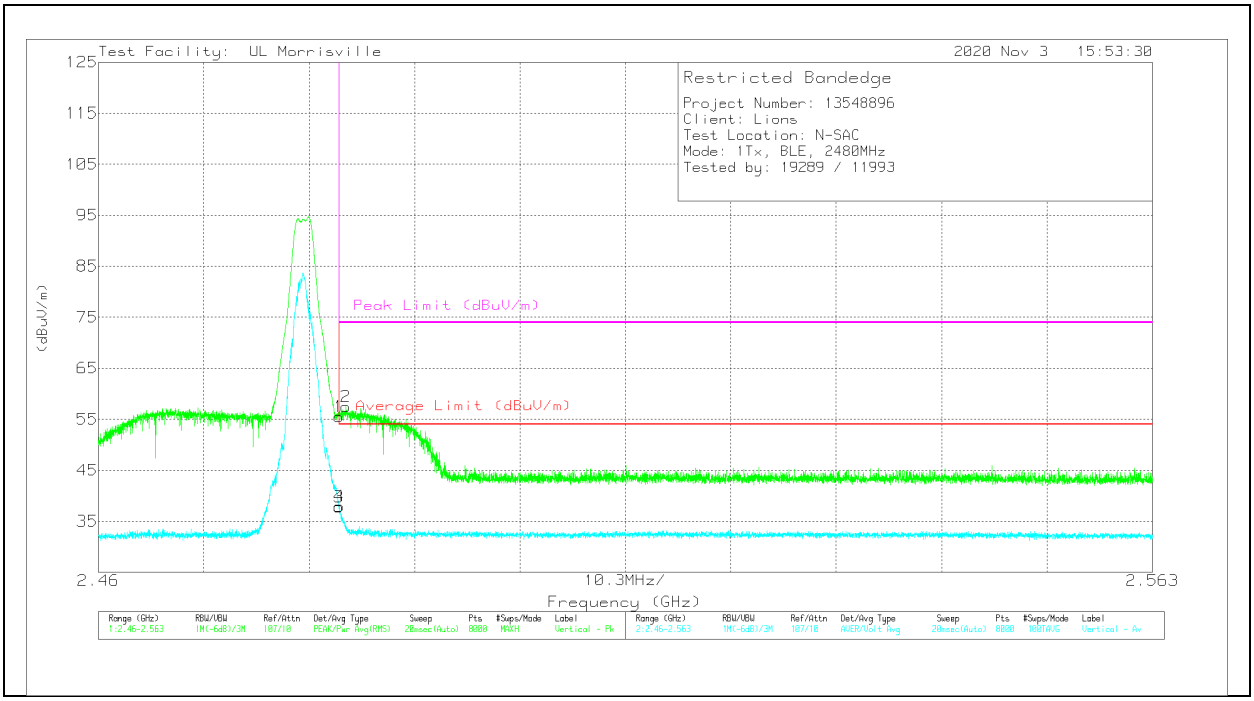
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 2.4835	47.43	Pk	32.4	-24.3	0	55.53	-	-	74	-18.47	343	158	V
2	* ** 2.4842	49.36	Pk	32.4	-24.3	0	57.46	-	-	74	-16.54	343	158	V
3	* ** 2.4835	19.84	ADV	32.4	-24.3	9.84	37.78	54	-16.22	-	-	343	158	V
4	* ** 2.48354	19.99	ADV	32.4	-24.3	9.84	37.93	54	-16.07	-	-	343	158	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

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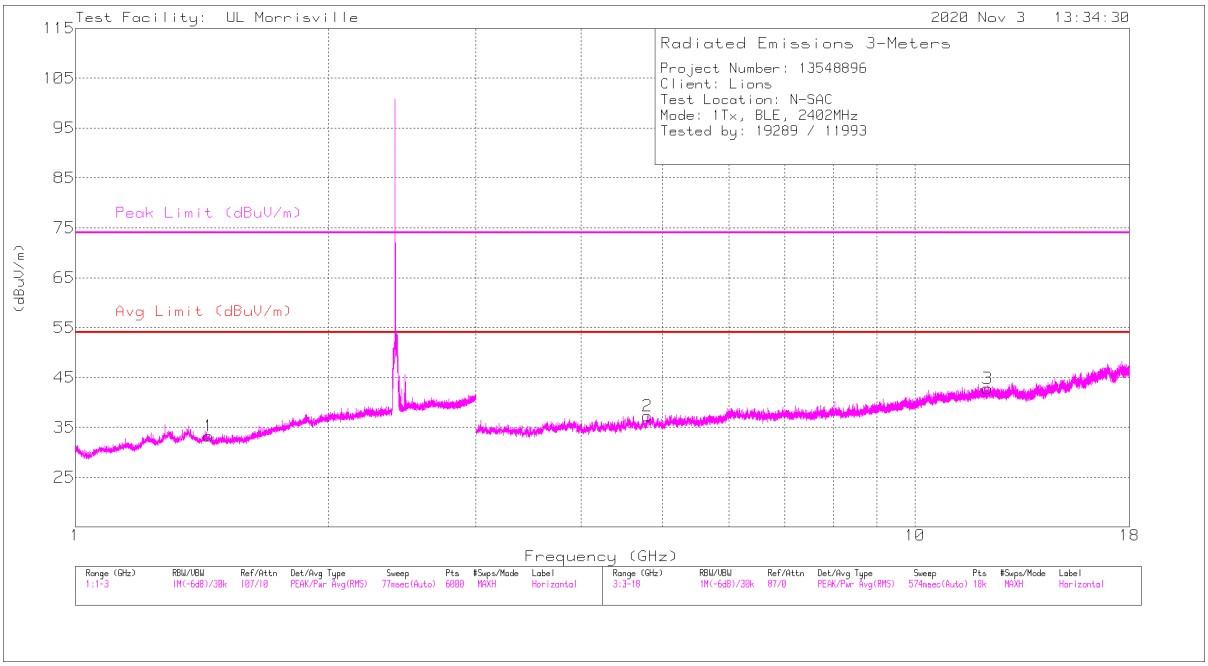
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL

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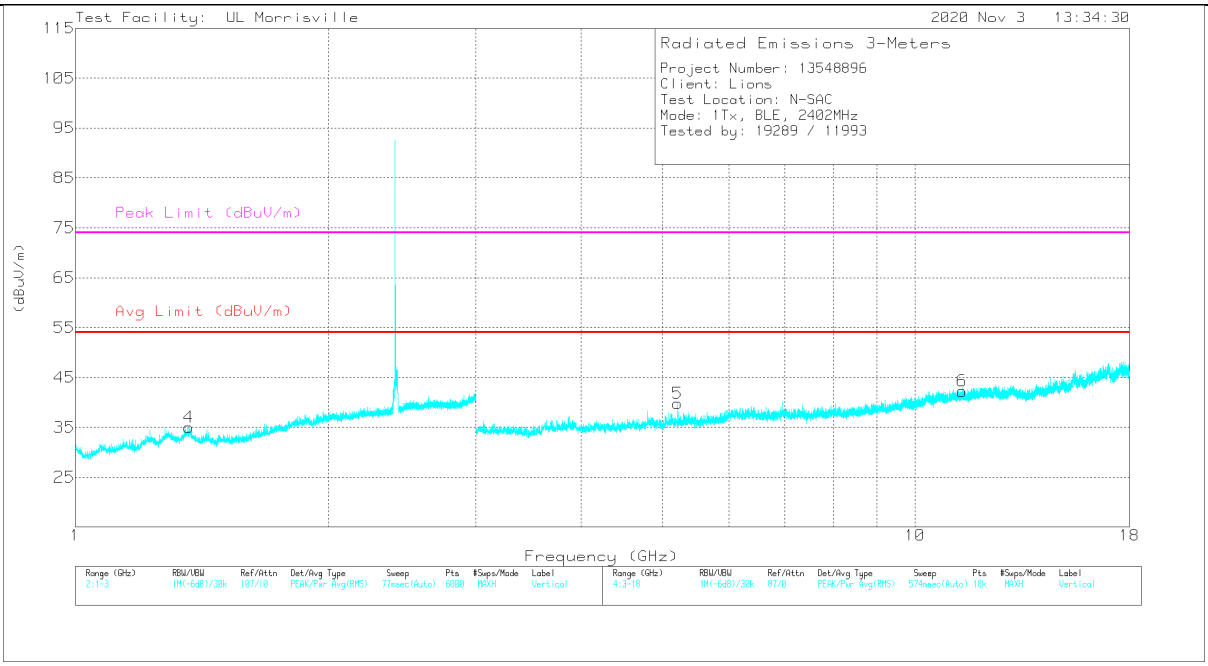

VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 1.44072	36.9	PK2	28.3	-25	0	40.2	-	-	74	-33.8	57	196	H
	* ** 1.44005	23.34	ADV	28.3	-25	9.84	36.48	54	-17.52	-	-	57	196	H
4	* ** 1.36242	36.9	PK2	29.4	-25.3	0	41	-	-	74	-33	327	236	V
	* ** 1.36238	23.63	ADV	29.4	-25.3	9.84	37.57	54	-16.43	-	-	327	236	V
2	* ** 4.8028	40.69	PK2	34.2	-31.5	0	43.39	-	-	74	-30.61	255	174	H
	* ** 4.80256	27.69	ADV	34.2	-31.5	9.84	40.23	54	-13.77	-	-	255	174	H
3	* ** 12.19613	37.63	PK2	38.9	-26.7	0	49.83	-	-	74	-24.17	101	203	H
	* ** 12.19597	23.8	ADV	38.9	-26.7	9.84	45.84	54	-8.16	-	-	101	203	H
5	** 5.21565	41.78	PK2	34.3	-32.5	0	43.58	-	-	74	-30.42	99	234	V
	** 5.21645	28.31	ADV	34.3	-32.4	9.84	40.05	54	-13.95	-	-	99	234	V
6	* ** 11.37944	35.92	PK2	38.1	-25	0	49.02	-	-	74	-24.98	44	347	V
	* ** 11.37942	22.73	ADV	38.1	-25	9.84	45.67	54	-8.33	-	-	44	347	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

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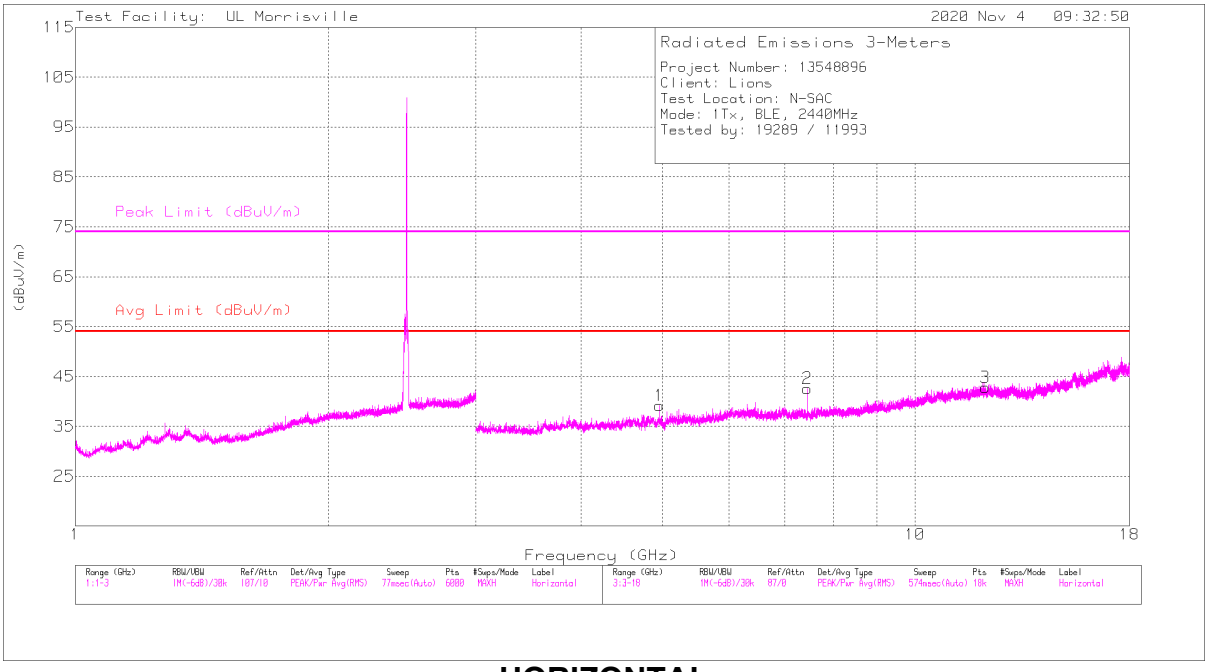
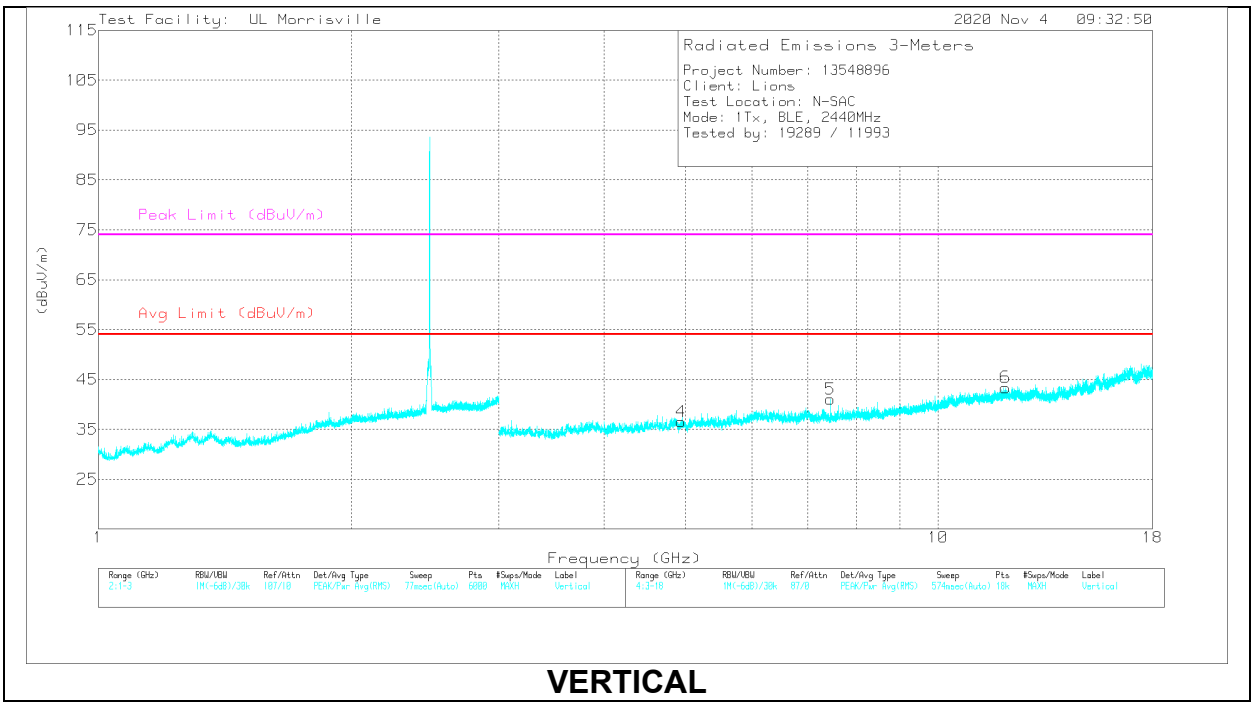
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/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	* ** 4.96107	48.34	PK2	34.1	-32.4	0	50.04	-	-	74	-23.96	283	233	H
	* ** 4.96093	28.47	ADV	34.1	-32.4	9.84	40.01	54	-13.99	-	-	283	233	H
2	* ** 7.4384	41.28	PK2	35.7	-29.3	0	47.68	-	-	74	-26.32	222	250	H
	* ** 7.43877	26.94	ADV	35.8	-29.3	9.84	43.28	54	-10.72	-	-	222	250	H
3	* ** 12.11665	37.07	PK2	38.8	-26	0	49.87	-	-	74	-24.13	28	151	H
	* ** 12.11663	23.51	ADV	38.8	-26	9.84	46.15	54	-7.85	-	-	28	151	H
4	* ** 4.94729	41.39	PK2	34.1	-32.2	0	43.29	-	-	74	-30.71	39	149	V
	* ** 4.9474	28.15	ADV	34.1	-32.2	9.84	39.89	54	-14.11	-	-	39	149	V
5	* ** 7.43831	41.38	PK2	35.7	-29.3	0	47.78	-	-	74	-26.22	160	150	V
	* ** 7.43877	26.83	ADV	35.8	-29.3	9.84	43.17	54	-10.83	-	-	160	150	V
6	* ** 12.02906	36.19	PK2	38.7	-25.8	0	49.09	-	-	74	-24.91	43	324	V
	* ** 12.02916	23.34	ADV	38.7	-25.8	9.84	46.08	54	-7.92	-	-	43	324	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

UL LLC
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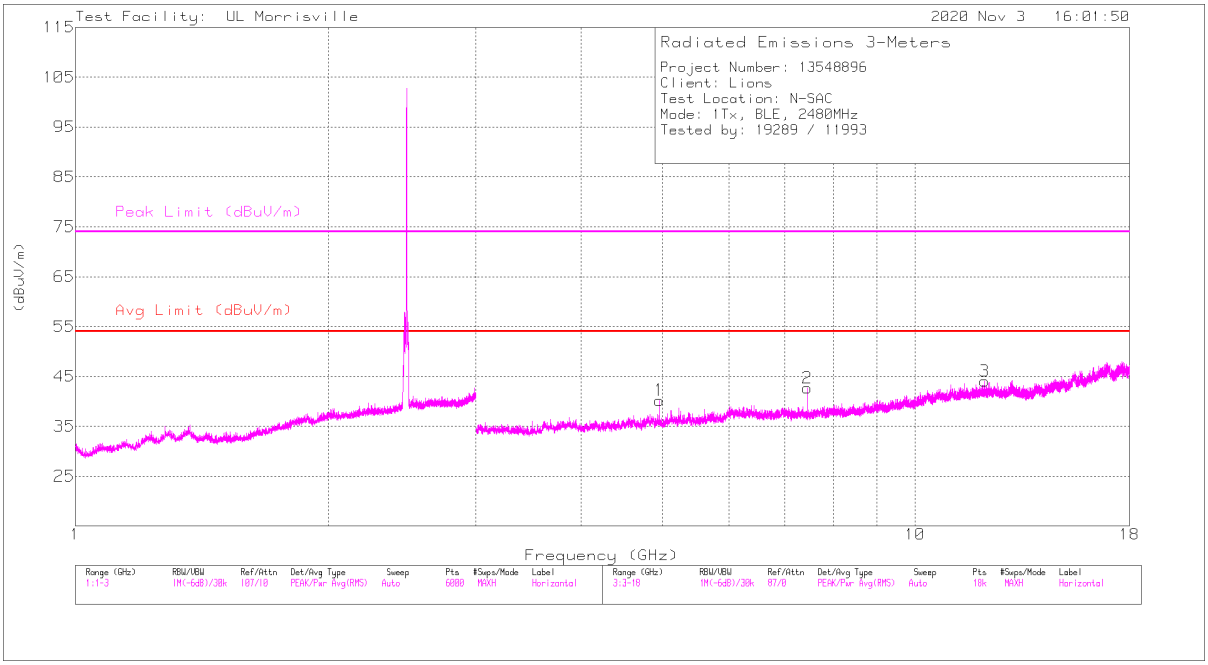
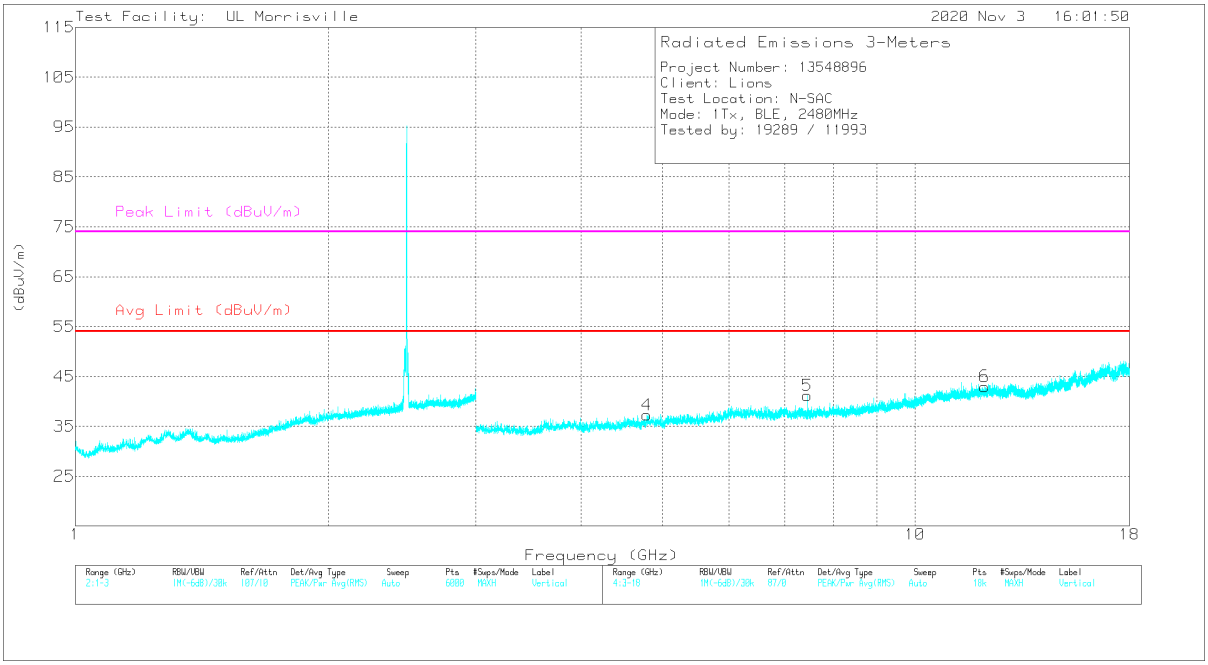
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

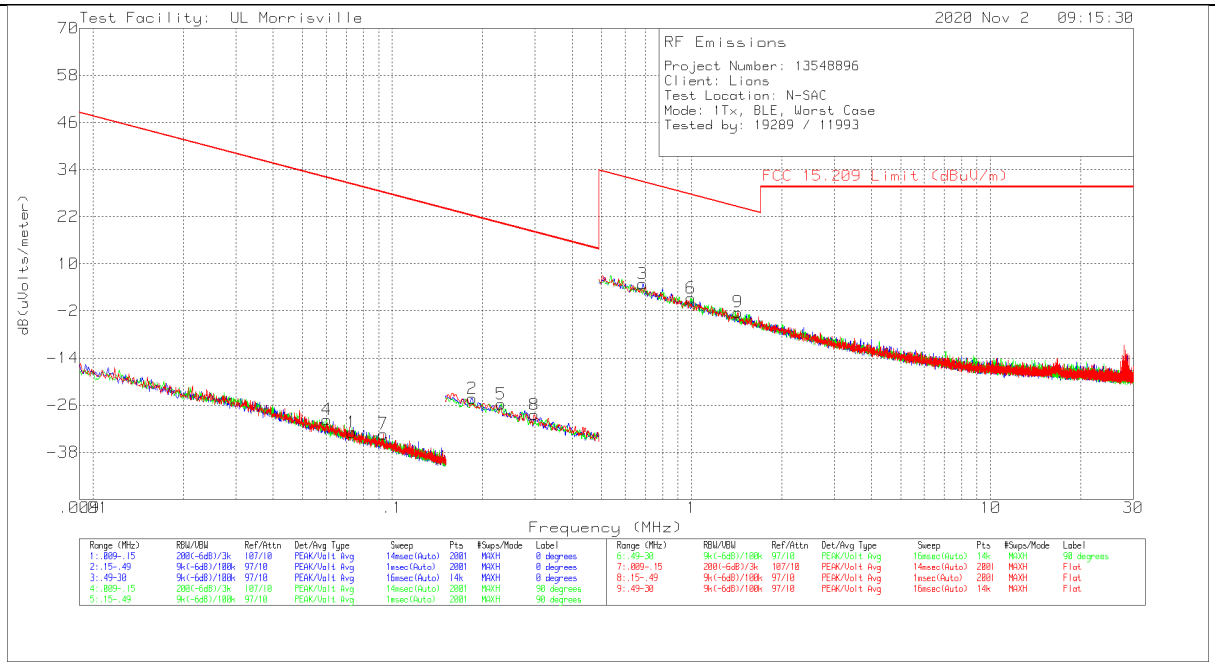
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.95639	41.91	PK2	34.1	-32.3	0	43.71	-	-	74	-30.29	19	188	H
	* ** 4.95587	28.38	ADV	34.1	-32.3	9.84	40.02	54	-13.98	-	-	19	188	H
2	* ** 7.44151	43.02	PK2	35.7	-29.3	0	49.42	-	-	74	-24.58	3	124	H
	* ** 7.44124	27.25	ADV	35.7	-29.3	9.84	43.49	54	-10.51	-	-	3	124	H
3	* ** 12.10698	36.19	PK2	38.8	-26	0	48.99	-	-	74	-25.01	334	354	H
	* ** 12.10474	23.48	ADV	38.8	-26	9.84	46.12	54	-7.88	-	-	334	354	H
4	* ** 4.79043	40.65	PK2	34.1	-31.7	0	43.05	-	-	74	-30.95	171	152	V
	* ** 4.79073	28.16	ADV	34.1	-31.7	9.84	40.4	54	-13.6	-	-	171	152	V
5	* ** 7.43832	42.14	PK2	35.7	-29.3	0	48.54	-	-	74	-25.46	165	164	V
	* ** 7.43869	26.97	ADV	35.7	-29.3	9.84	43.21	54	-10.79	-	-	165	164	V
6	* ** 12.09284	37.21	PK2	38.8	-26	0	50.01	-	-	74	-23.99	215	178	V
	* ** 12.09287	23.52	ADV	38.8	-26	9.84	46.16	54	-7.84	-	-	215	178	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

10.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note: 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*Log (test distance / specification distance).



ANTENNA- THREE ORIENTATIONS

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

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)
4	.06048	38.71	Pk	11.5	.1	-80	-29.69	31.97	51.97	-61.66	0-360
1	.07333	35.75	Pk	11.2	.1	-80	-32.95	30.3	50.3	-63.25	0-360
7	.09328	35.44	Pk	11.1	.1	-80	-33.36	28.21	-	-61.57	0-360
2	.18468	44.75	Pk	10.8	.1	-80	-24.35	22.28	42.28	-46.63	0-360
5	.23135	43.37	Pk	10.8	.1	-80	-25.73	20.32	40.32	-46.05	0-360
8	.29867	40.72	Pk	10.7	.1	-80	-28.48	18.1	38.1	-46.58	0-360
3	.68815	33.9	Pk	10.8	.2	-40	4.9	30.85	-	-25.95	0-360
6	.99592	30.06	Pk	11	.2	-40	1.26	27.64	-	-26.38	0-360
9	1.42806	26.46	Pk	11	.2	-40	-2.34	24.51	-	-26.85	0-360

Pk - Peak detector

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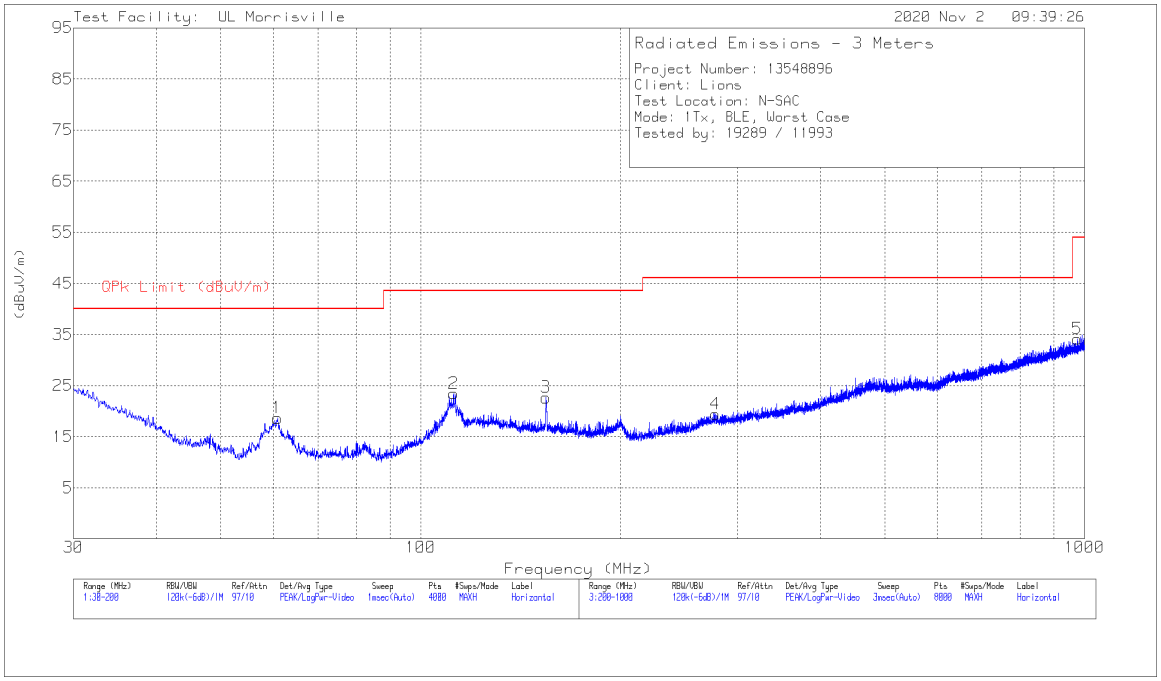
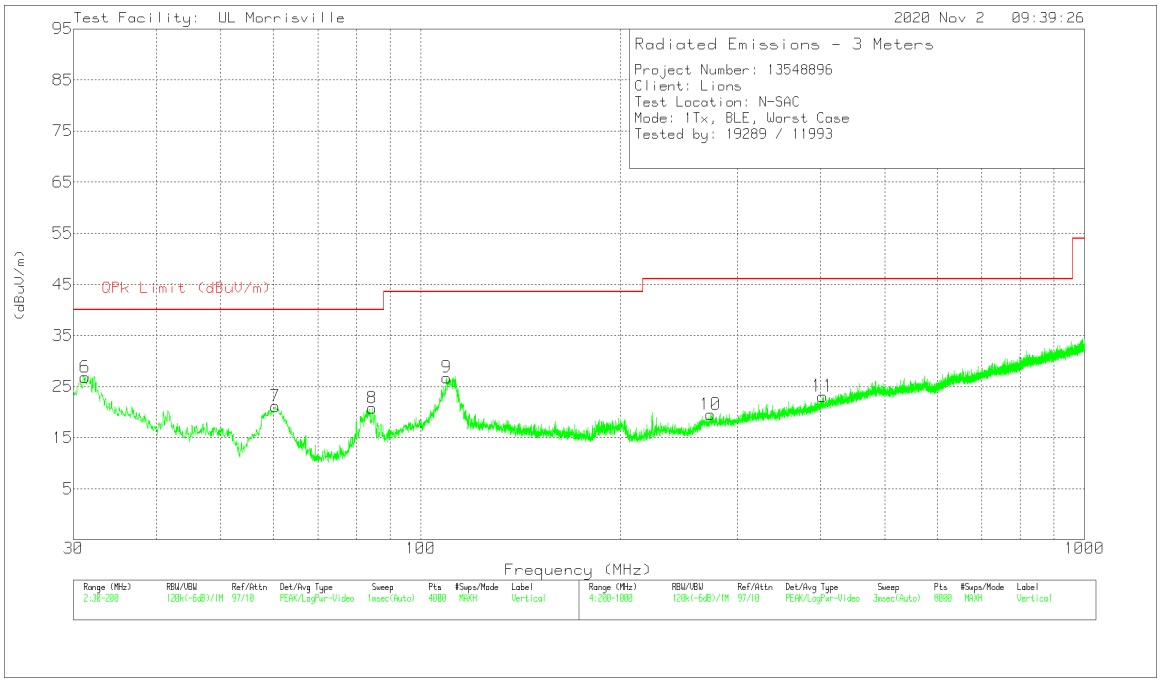
10.4. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

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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
2	* ** 112.1313	34.73	Pk	19	-30.3	23.43	43.52	-20.09	0-360	299	H
9	* ** 109.4105	38.48	Pk	18.6	-30.3	26.78	43.52	-16.74	0-360	101	V
4	* ** 278.0101	28.83	Pk	19.4	-28.8	19.43	46.02	-26.59	0-360	399	H
5	* ** 975.4008	28.8	Pk	29.1	-23.8	34.1	53.97	-19.87	0-360	199	H
10	* ** 273.4095	28.95	Pk	19.4	-28.8	19.55	46.02	-26.47	0-360	300	V
11	* ** 403.3264	29.11	Pk	21.8	-27.8	23.11	46.02	-22.91	0-360	300	V
6	31.2328	32.14	Pk	26.1	-31.4	26.84	-	-	0-360	101	V
7	60.4379	38.53	Pk	13.5	-30.9	21.13	-	-	0-360	101	V
1	60.863	35.92	Pk	13.6	-30.9	18.62	-	-	0-360	399	H
8	84.5416	38.12	Pk	13.3	-30.6	20.82	-	-	0-360	101	V
3	154.5147	33.94	Pk	18.6	-29.9	22.64	-	-	0-360	299	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

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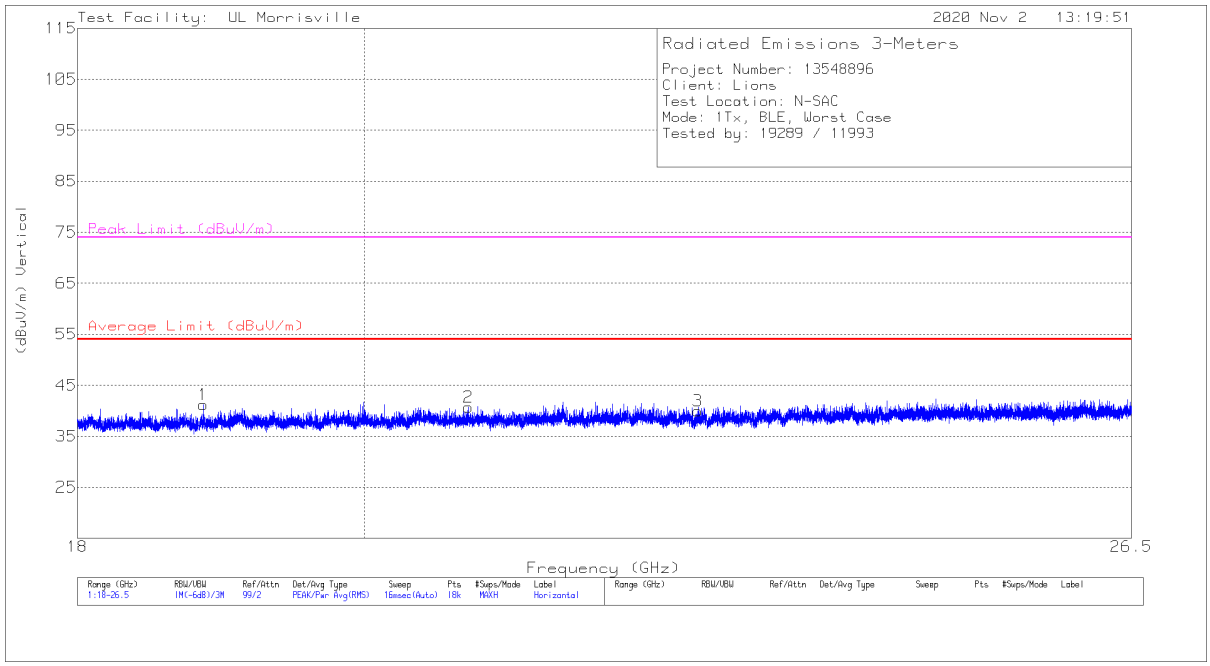
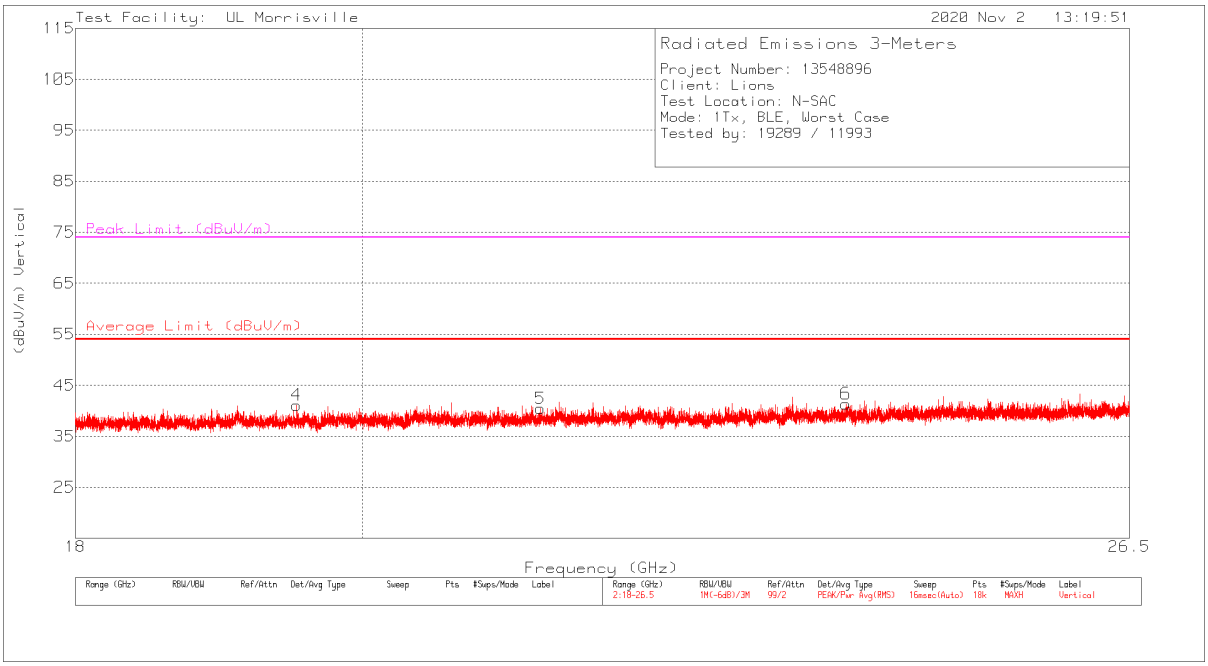
10.5. WORST CASE 18-26 GHz

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



HORIZONTAL



VERTICAL

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18-26 GHz 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	* ** 18.84957	48.93	Pk	32.7	-40.4	41.23	54	-12.77	74	-32.77	0-360	101	H
2	* ** 20.77776	48.14	Pk	33.1	-40.5	40.74	54	-13.26	74	-33.26	0-360	200	H
3	* ** 22.60017	47.39	Pk	33.4	-40.8	39.99	54	-14.01	74	-34.01	0-360	300	H
4	* ** 19.51969	49.23	Pk	32.7	-40.8	41.13	54	-12.87	74	-32.87	0-360	101	V
5	* ** 21.34918	48.26	Pk	33.2	-41	40.46	54	-13.54	74	-33.54	0-360	250	V
6	* ** 23.8809	47.78	Pk	34.1	-40.5	41.38	54	-12.62	74	-32.62	0-360	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

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11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

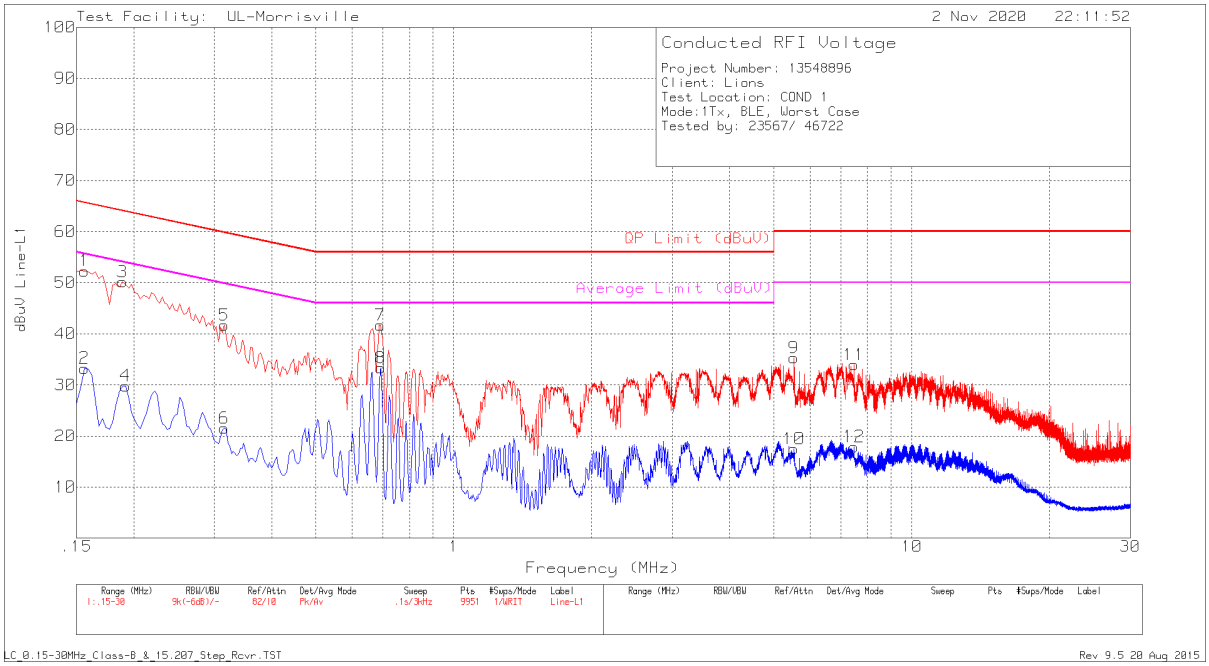
* Decreases with the logarithm of the frequency.

RESULTS

11.1. AC Power Line

11.1.1. BLE (125 kbps)

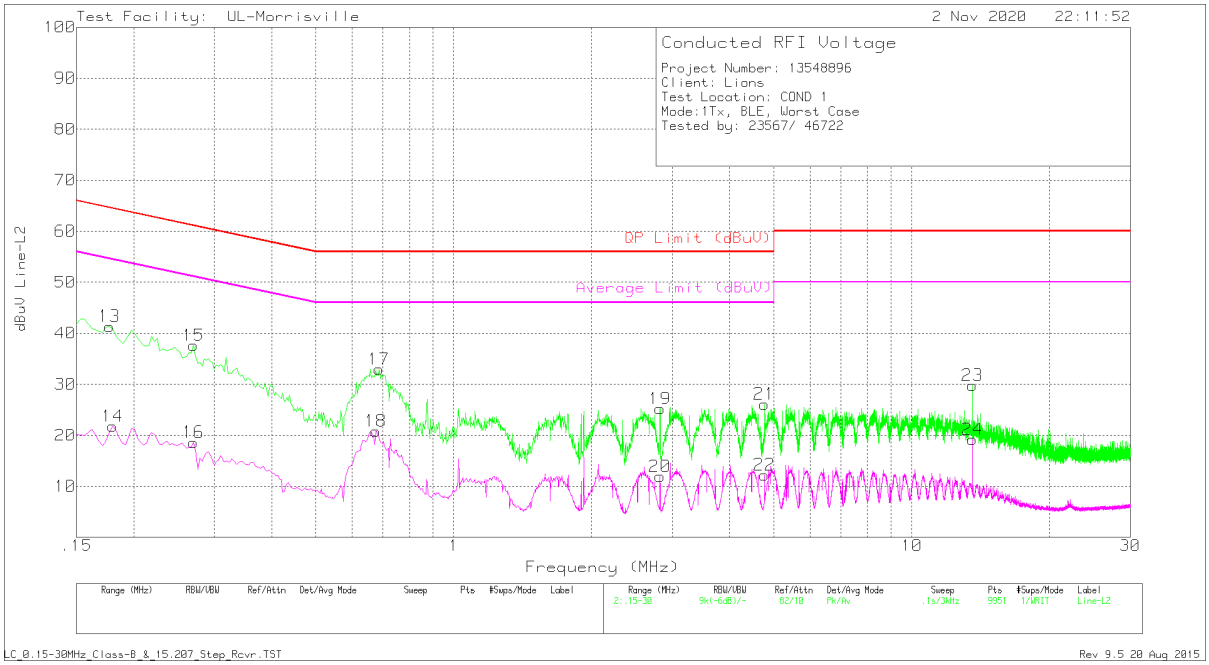
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.156	42.42	Pk	.2	9.7	52.32	65.67	-13.35	-	-
2	.156	23.36	Av	.2	9.7	33.26	-	-	55.67	-22.41
3	.189	40.23	Pk	.2	9.7	50.13	64.08	-13.95	-	-
4	.192	19.92	Av	.2	9.7	29.82	-	-	53.95	-24.13
5	.315	31.8	Pk	.1	9.8	41.7	59.84	-18.14	-	-
6	.315	11.62	Av	.1	9.8	21.52	-	-	49.84	-28.32
7	.69	31.91	Pk	0	9.8	41.71	56	-14.29	-	-
8	.693	23.55	Av	0	9.8	33.35	-	-	46	-12.65
9	5.532	25.3	Pk	.1	9.9	35.3	60	-24.7	-	-
10	5.532	7.5	Av	.1	9.9	17.5	-	-	50	-32.5
11	7.485	23.95	Pk	.1	9.9	33.95	60	-26.05	-	-
12	7.482	7.9	Av	.1	9.9	17.9	-	-	50	-32.1

Pk - Peak detector
Av - Average detection

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 (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.177	31.46	Pk	.2	9.7	41.36	64.63	-23.27	-	-
14	.18	11.86	Av	.2	9.7	21.76	-	-	54.49	-32.73
15	.27	27.82	Pk	.1	9.7	37.62	61.12	-23.5	-	-
16	.27	8.82	Av	.1	9.7	18.62	-	-	51.12	-32.5
17	.687	23.14	Pk	0	9.8	32.94	56	-23.06	-	-
18	.675	11.03	Av	0	9.8	20.83	-	-	46	-25.17
19	2.82	15.41	Pk	0	9.8	25.21	56	-30.79	-	-
20	2.82	2.11	Av	0	9.8	11.91	-	-	46	-34.09
21	4.764	16.13	Pk	.1	9.9	26.13	56	-29.87	-	-
22	4.767	2.24	Av	.1	9.9	12.24	-	-	46	-33.76
23	13.56	19.7	Pk	.1	10	29.8	60	-30.2	-	-
24	13.56	9.09	Av	.1	10	19.19	-	-	50	-30.81

Pk - Peak detector
Av - Average detection

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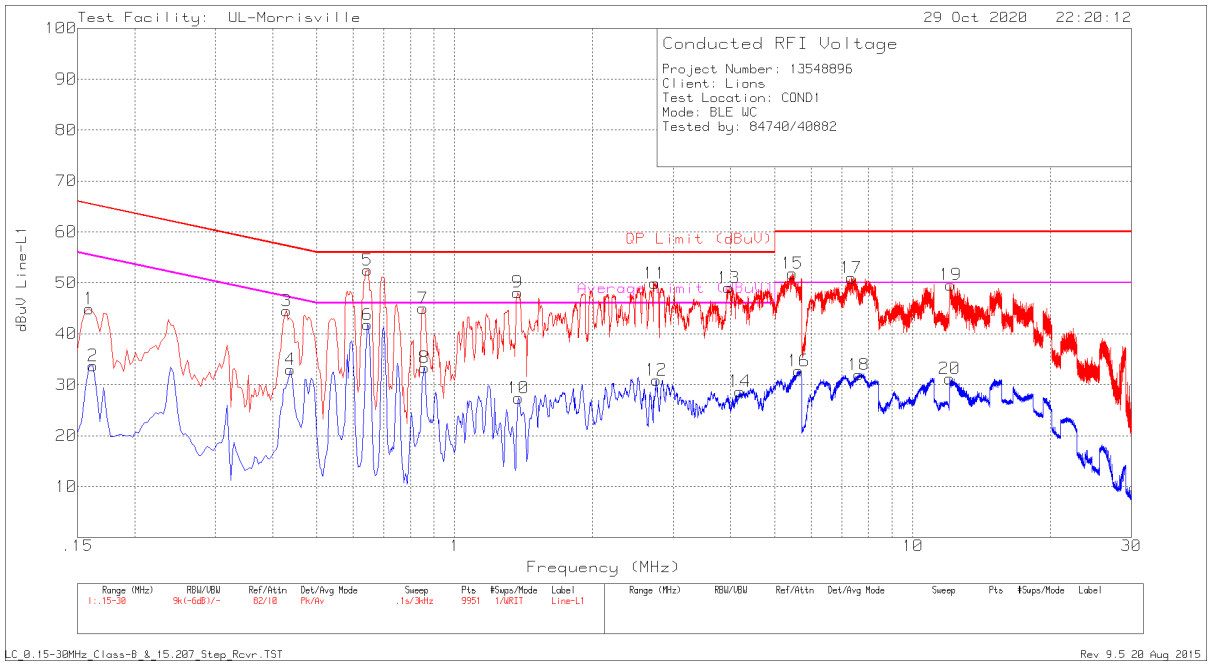
11.1.2. BLE (2 Mbps)

LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.159	35.03	Pk	.2	9.7	44.93	65.52	-20.59	-	-
2	.162	23.84	Av	.2	9.7	33.74	-	-	55.36	-21.62
3	.429	34.63	Pk	.1	9.8	44.53	57.27	-12.74	-	-
4	.438	23.1	Av	.1	9.8	33	-	-	47.1	-14.1
5	.6407	40.12	Qp	0	9.8	49.92	56	-6.08	-	-
6	.65225	20.58	Ca	0	9.8	30.38	-	-	46	-15.62
7	.852	35.17	Pk	0	9.8	44.97	56	-11.03	-	-
8	.858	23.57	Av	0	9.8	33.37	-	-	46	-12.63
9	1.371	38.34	Pk	0	9.8	48.14	56	-7.86	-	-
10	1.377	17.58	Av	0	9.8	27.38	-	-	46	-18.62
11	2.733	40.12	Pk	0	9.8	49.92	56	-6.08	-	-
12	2.754	21.13	Av	0	9.8	30.93	-	-	46	-15.07
13	3.963	39.15	Pk	0	9.9	49.05	56	-6.95	-	-
14	4.194	18.8	Av	0	9.9	28.7	-	-	46	-17.3
15	5.457	41.84	Pk	.1	9.9	51.84	60	-8.16	-	-
16	5.637	22.75	Av	.1	9.9	32.75	-	-	50	-17.25
17	7.332	40.98	Pk	.1	9.9	50.98	60	-9.02	-	-
18	7.623	21.99	Av	.1	9.9	31.99	-	-	50	-18.01
19	12.09	39.52	Pk	.1	10	49.62	60	-10.38	-	-
20	12.042	21.09	Av	.1	10	31.19	-	-	50	-18.81

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

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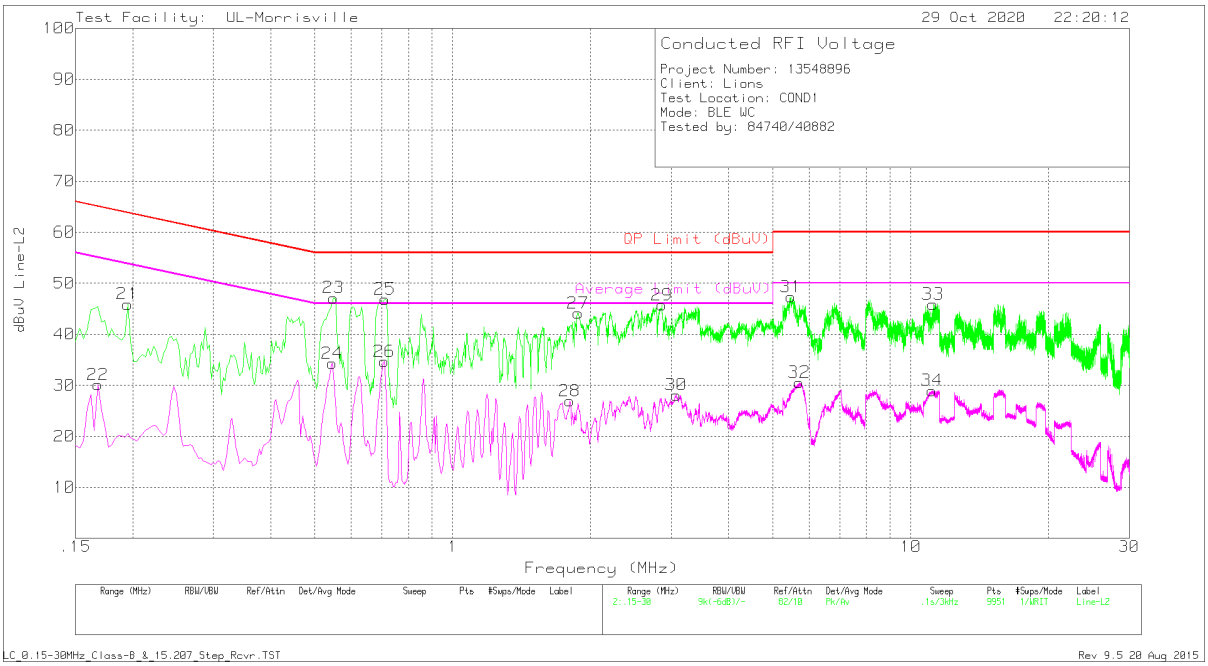
LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
21	.195	36.03	Pk	.2	9.7	45.93	63.82	-17.89	-	-
22	.168	20.24	Av	.2	9.7	30.14	-	-	55.06	-24.92
23	.549	37.26	Pk	.1	9.8	47.16	56	-8.84	-	-
24	.546	24.39	Av	.1	9.8	34.29	-	-	46	-11.71
25	.711	37.1	Pk	0	9.8	46.9	56	-9.1	-	-
26	.708	24.88	Av	0	9.8	34.68	-	-	46	-11.32
27	1.878	34.37	Pk	0	9.8	44.17	56	-11.83	-	-
28	1.8	17.11	Av	0	9.8	26.91	-	-	46	-19.09
29	2.859	35.96	Pk	0	9.8	45.76	56	-10.24	-	-
30	3.072	18.31	Av	0	9.8	28.11	-	-	46	-17.89
31	5.472	37.31	Pk	.1	9.9	47.31	60	-12.69	-	-
32	5.709	20.55	Av	.1	9.9	30.55	-	-	50	-19.45
33	11.175	35.81	Pk	.1	10	45.91	60	-14.09	-	-
34	11.127	18.87	Av	.1	10	28.97	-	-	50	-21.03

Pk - Peak detector
Av - Average detection

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12. SETUP PHOTOS

Please refer to R13548896-EP1 for setup photos

END OF TEST REPORT