



TEST REPORT

Report Number. : R13335074-E5

Applicant : eero LLC
660 3rd Street
4th Floor
San Francisco, CA 94107
United States

Model : K010001

FCC ID : 2AEM4-30317

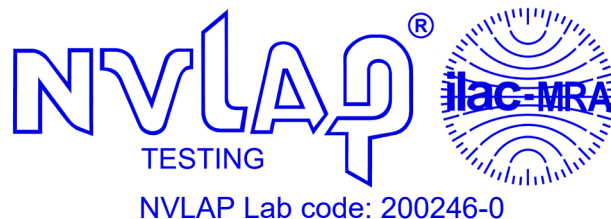
IC : 20631-30317

EUT Description : Wireless router for home and small office

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

Date Of Issue:
2020-09-23

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2020-08-10	Initial Issue	Niklas Haydon
V2	2020-09-22	Updated statement on simultaneous transmission and output power	Niklas Haydon
V3	2020-09-23	Added statement in worst case section	Niklas Haydon

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	7
3. TEST METHODOLOGY	8
4. FACILITIES AND ACCREDITATION	8
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	9
5.1. <i>METROLOGICAL TRACEABILITY</i>	<i>9</i>
5.2. <i>DECISION RULES.....</i>	<i>9</i>
5.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>9</i>
5.4. <i>SAMPLE CALCULATION</i>	<i>10</i>
6. EQUIPMENT UNDER TEST	11
6.1. <i>EUT DESCRIPTION</i>	<i>11</i>
6.2. <i>MAXIMUM OUTPUT POWER.....</i>	<i>11</i>
6.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	<i>11</i>
6.4. <i>SOFTWARE AND FIRMWARE.....</i>	<i>11</i>
6.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>12</i>
6.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>13</i>
7. MEASUREMENT METHOD.....	14
8. TEST AND MEASUREMENT EQUIPMENT	15
9. ANTENNA PORT TEST RESULTS	18
9.1. <i>ON TIME AND DUTY CYCLE.....</i>	<i>18</i>
9.2. <i>99% BANDWIDTH.....</i>	<i>19</i>
9.2.1. <i>BLE (1Mbps).....</i>	<i>19</i>
9.2.2. <i>BLE (2Mbps).....</i>	<i>20</i>
9.3. <i>6 dB BANDWIDTH.....</i>	<i>21</i>
9.3.1. <i>BLE (1Mbps).....</i>	<i>21</i>
9.3.2. <i>BLE (2Mbps).....</i>	<i>22</i>
9.4. <i>OUTPUT POWER.....</i>	<i>23</i>
9.4.1. <i>BLE (1Mbps).....</i>	<i>23</i>
9.4.2. <i>BLE (2Mbps).....</i>	<i>23</i>
9.5. <i>AVERAGE POWER.....</i>	<i>24</i>

9.5.1.	BLE (1Mbps).....	24
9.5.2.	BLE (2Mbps).....	24
9.6.	<i>POWER SPECTRAL DENSITY</i>	25
9.6.1.	BLE (1Mbps).....	26
9.6.2.	BLE (2Mbps).....	27
9.7.	<i>CONDUCTED SPURIOUS EMISSIONS</i>	28
9.7.1.	BLE (1Mbps).....	29
9.7.2.	BLE (2Mbps).....	30
10.	RADIATED TEST RESULTS	31
10.1.	<i>LIMITS AND PROCEDURE</i>	31
10.2.	<i>TRANSMITTER ABOVE 1 GHz</i>	33
10.2.1.	BLE (1Mbps)	33
10.2.2.	BLE (2Mbps)	43
10.3.	<i>WORST CASE BELOW 30MHZ</i>	53
10.4.	<i>WORST CASE BELOW 1 GHZ</i>	55
10.5.	<i>WORST CASE 18-26 GHZ</i>	57
11.	AC POWER LINE CONDUCTED EMISSIONS	59
11.1.1.	AC Power Line Host.....	60
12.	SETUP PHOTOS	62

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: eero LLC
660 3rd Street
4th Floor
San Francisco, CA 94107
United States

EUT DESCRIPTION: Wireless router for home and small office

MODEL: K010001

SERIAL NUMBER: ZU12WF9, ZU12WF5

SAMPLE RECEIPT DATE: 2020-06-02 and 2020-06-25

DATE TESTED: 2020-06-04 to 2020-09-22

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

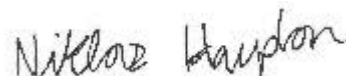
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Approved & Released For
UL Verification Services Inc. By:



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Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Niklas Haydon
Operations Leader
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	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None.
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	Compliant	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Compliant	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Compliant	None.

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, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, 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.
Site Code: 2180C	
<input type="checkbox"/> Chamber A RTP	<input checked="" type="checkbox"/> North Chamber
<input type="checkbox"/> Chamber C RTP	<input checked="" type="checkbox"/> South Chamber

The above test sites and facilities are covered under FCC Test Firm Registration # 703469. Chambers above are covered under Industry Canada company address and respective code.

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	2.00%
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	4.88 dB
Conducted Emissions (0.150-30MHz) - LISN	3.07 dB
Temperature	2.26°C
Humidity	6.79%
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)

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

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.

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a wireless router for home and small office.

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 (1Mbps)	15.88	38.73
2402 - 2480	BLE (2Mbps)	14.96	31.33

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range	Max Gain (dBi)
2.4 GHz; BLE/ZigBee	4.0

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was eeroQSDK version builder@4162cb4b0759.
The test utility software used during testing was Qorvo RadioControlConsole v4.0.0.0.

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 and data rate with highest power spectral density across all data rates 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 conducted power was lowered after the radiated emissions was performed, therefore the radiated emissions data is considered worst case.

The EUT only operates in one orientation X, therefore, all final radiated testing was performed with the EUT in X orientation.

Simultaneous transmission of the following combinations was investigated and there were not any non-conformances found:

BLE radio, 2.4 WLAN radio, and 5.8 WLAN radio
BLE radio, 5.2 WLAN radio, and 5.8 WLAN radio

The BLE radio duty cycle is limited to 25% based on proprietary software within the chipset that ensures that time shared transmission with the 802.15.4 radio on the same antenna is maintained.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Dell	Latitude E6430	J29SNX1	N/A
Laptop PC	Dell	Latitude E5450	HRR5N72	N/A
AC adapter (EUT)	Foxlink	C210001	A019F0000171	N/A
AC adapter (EUT)	RF Tech	C210001	A027A0000361	N/A

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC In	1	USB-C	Unshielded	1.5	Cable captured to AC power supply
2	LAN	2	RJ45-unshielded	Unshielded	15	Includes 1.7m cable that accompanied the EUT

TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R13335074-EP1 for setup diagrams.

7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause -11.8.1

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-08-08	2020-08-08
	30-1000 MHz				
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2019-008-08	2020-08-08
	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	2020-04-24	2021-04-24
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-04-24	2021-04-24
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-03-22	2021-03-22
	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	NA	NA
	Additional Equipment used				
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-1-22	2022-01-22

Test Equipment Used - Wireless Powerline Conducted Measurement Equipment

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
s/n 161024885	Environmental Meter	Fisher Scientific	15-077-936	2019-06-17	2020-06-17
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	2019-08-19	2020-08-19
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2019-08-20	2020-08-20
ATA222	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2020-03-26	2021-03-26
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2019-07-10	2020-07-10
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2020-08-08	2021-08-08

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-08-08	2020-08-08
	30-1000 MHz				
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2019-08-08	2020-08-08
	1-18 GHz				
AT0078	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-10-28	2020-10-28
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-10	2021-07-10
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-10	2021-07-10
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-05-15	2021-05-15
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2020-03-27	2021-03-27
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
s/n 200037610	Environmental Meter	Fisher Scientific	06-662-4	2020-1-22	2022-01-22

Test Equipment Used - Wireless Antenna Port Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
72822	Spectrum Analyzer	Agilent Technologies	E4446A	2020-01-02	2021-01-02
PWM003	RF Power Meter	Keysight Technologies	N1911A	2019-08-23	2020-08-23
PWS004	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	E1921A	2019-08-23	2020-08-23
PWM001	RF Power Meter	Keysight Technologies	N1912A	2020-07-17	2021-07-17
PWS001	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2020-05-27	2020-05-27
HI0090 SN 161016511	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
SN 181562858	Environmental Meter	Fisher Scientific	14-650-118	2018-09-04	2020-09-04
SOFTEMI	EMC Software	UL	Version 2020.3.11 and 2020.4.17	NA	NA

NOTES:

1. For equipment listed above that was calibrated during the testing period, please note the equipment was used for testing after calibration.
2. For equipment listed above that has a calibration due date during the testing period, the testing was completed before the equipment expiration date.
3. Exception to 1. and 2. CDECABLE001 testing was performed between characterization. CDECABLE001 was found to still be within specification.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

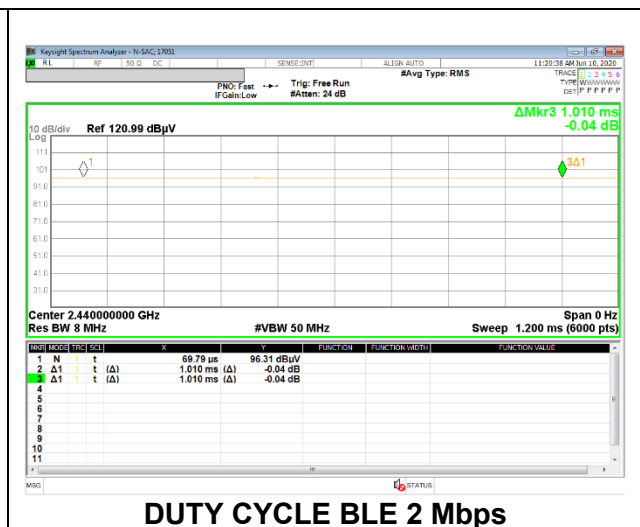
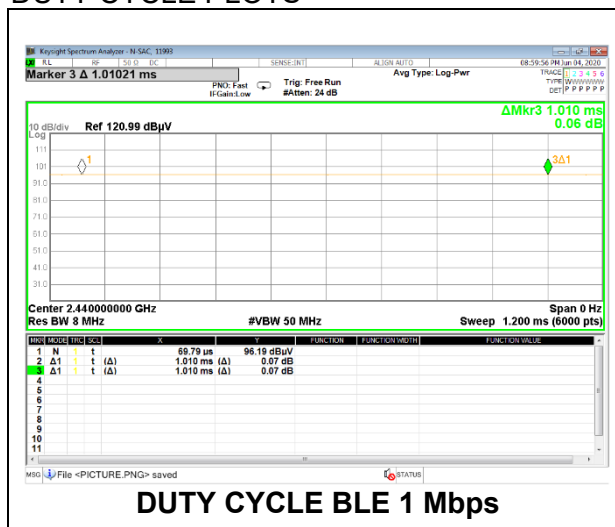
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

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	1.010	1.010	1.000	100.00%	0.00	0.010
BLE 2Mbps	1.010	1.010	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH

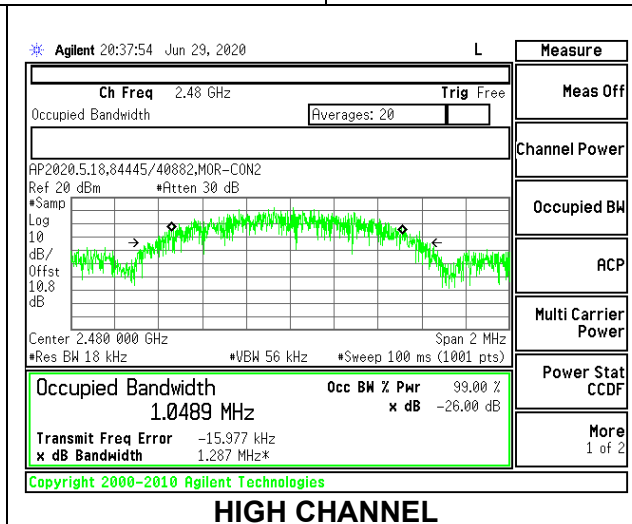
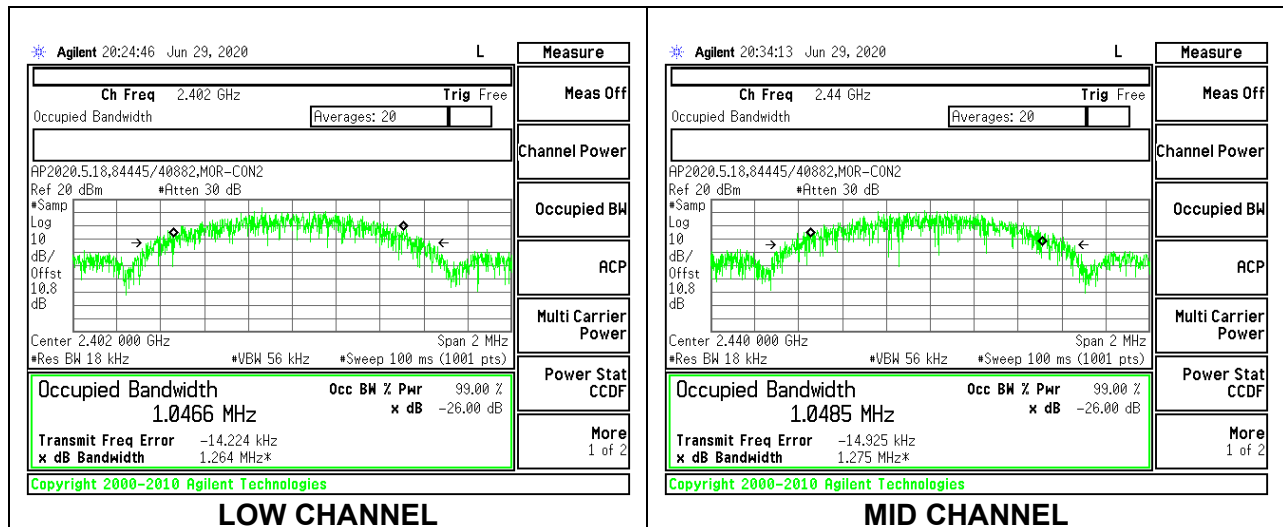
LIMITS

None; for reporting purposes only.

RESULTS

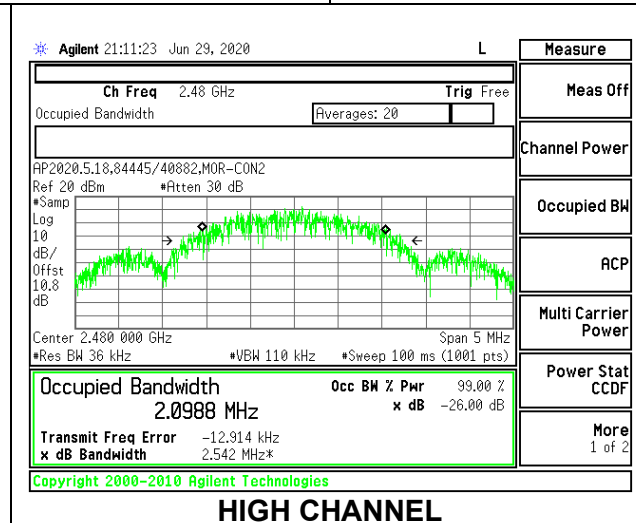
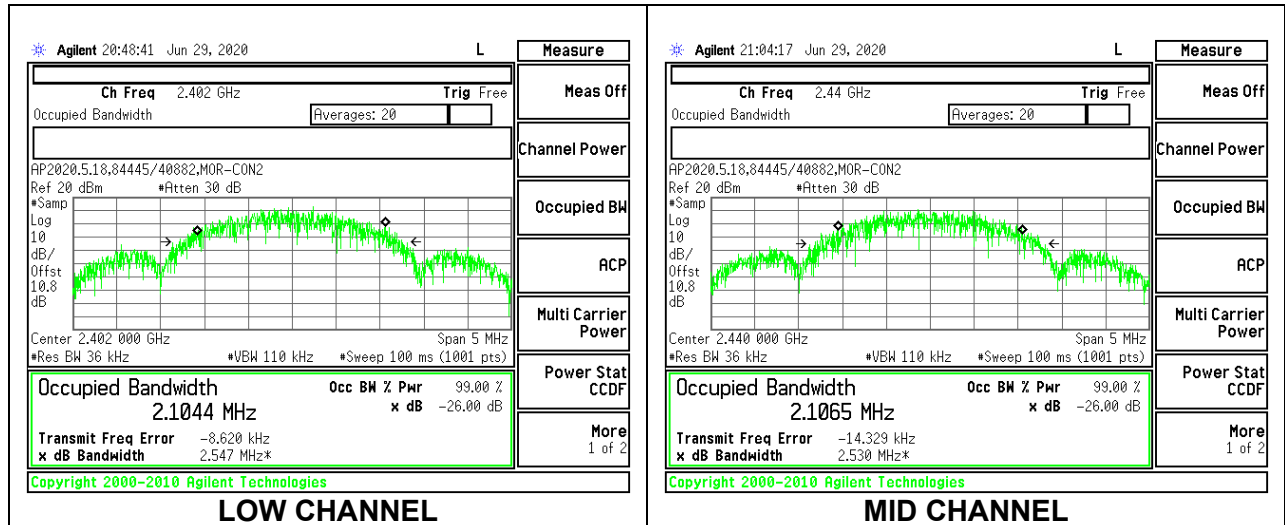
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0466
Middle	2440	1.0485
High	2480	1.0489



9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.1044
Middle	2440	2.1065
High	2480	2.0988



9.3. 6 dB BANDWIDTH

LIMITS

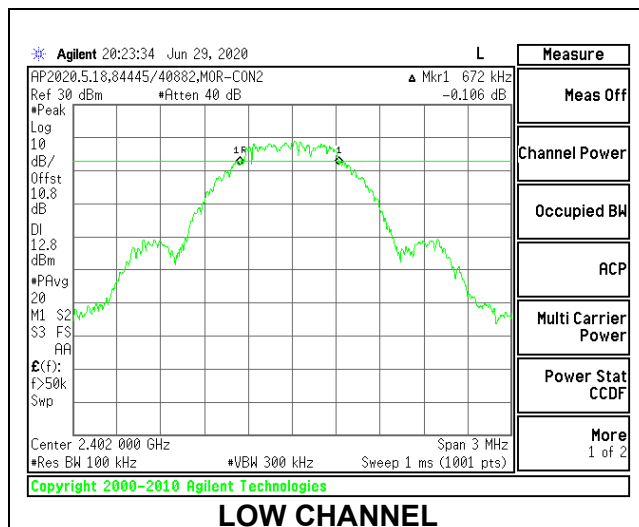
FCC §15.247 (a) (2)
 RSS-247 5.2 (a)

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

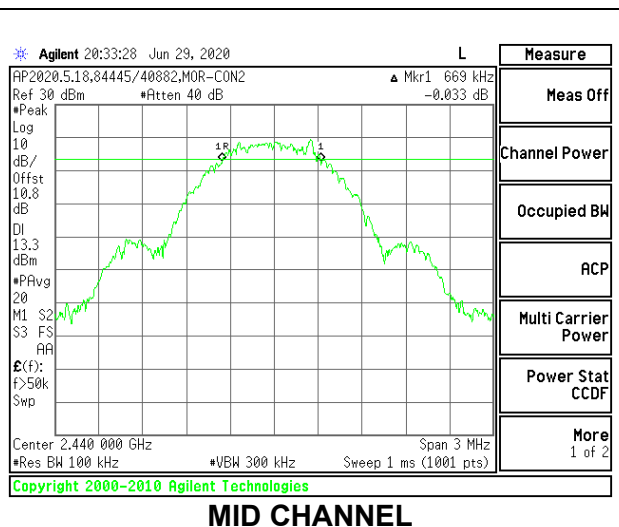
RESULTS

9.3.1. BLE (1Mbps)

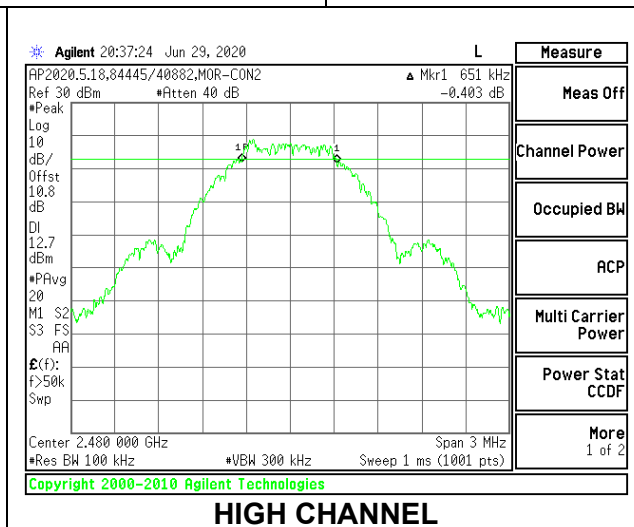
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.672	0.5
Middle	2440	0.669	0.5
High	2480	0.651	0.5



LOW CHANNEL



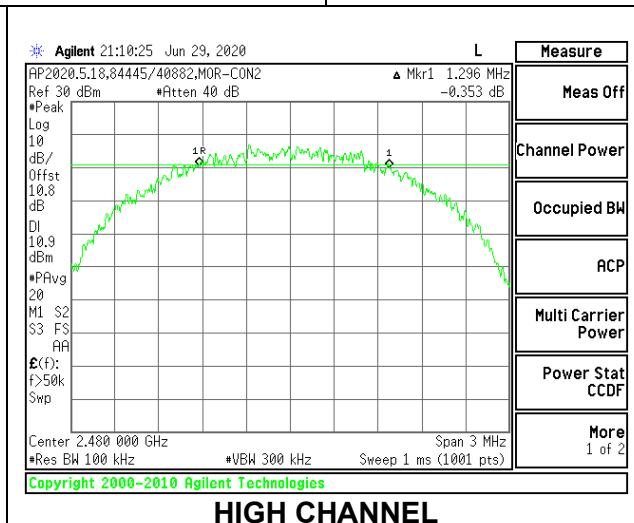
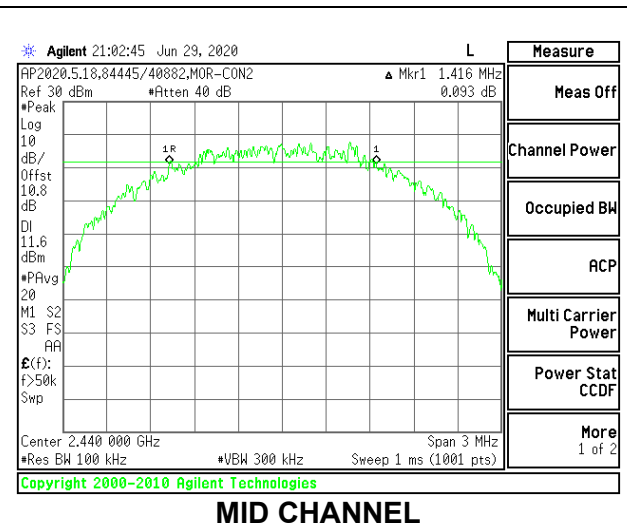
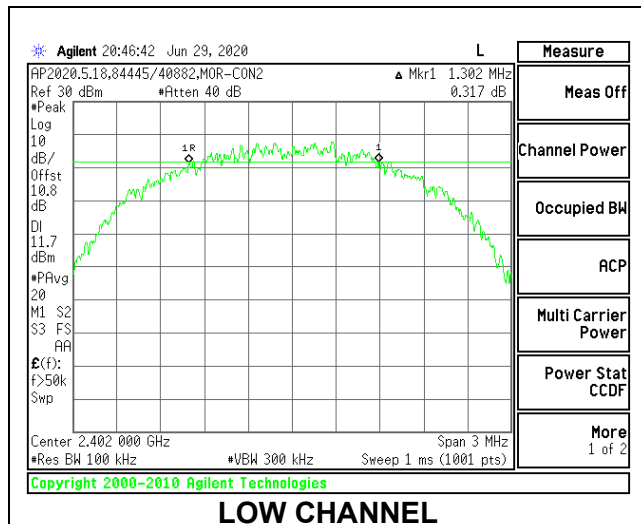
MID CHANNEL



HIGH CHANNEL

9.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.302	0.5
Middle	2440	1.416	0.5
High	2480	1.296	0.5



9.4. 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 transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.78 dB (including 10.49 dB pad and 0.29 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	84740/44389
Date:	2020-09-22

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	15.77	30	-14.23
Middle	2440	15.88	30	-14.12
High	2480	13.83	30	-16.17

9.4.2. BLE (2Mbps)

Tested By:	84740/44389
Date:	2020-09-22

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	14.91	30	-15.09
Middle	2440	14.96	30	-15.04
High	2480	13.49	30	-16.51

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.78 dB (including 10.49 dB pad and 0.29 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	84740/44389
Date:	2020-09-22

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	15.63
Middle	2440	15.73
High	2480	13.65

9.5.2. BLE (2Mbps)

Tested By:	84740/44389
Date:	2020-09-22

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	14.73
Middle	2440	14.78
High	2480	13.3

9.6. POWER SPECTRAL DENSITY

LIMITS

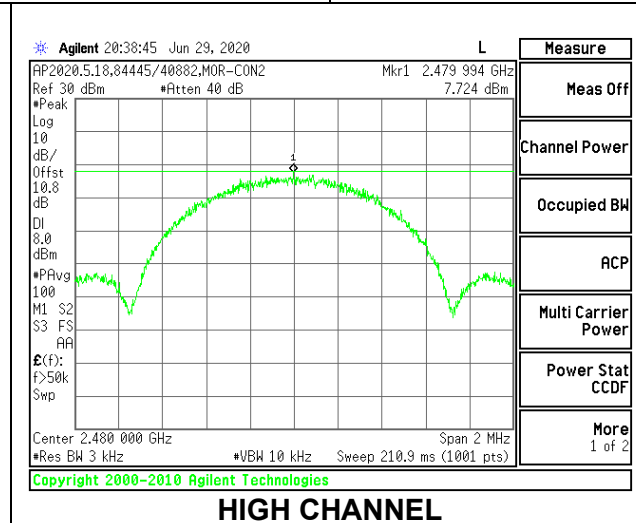
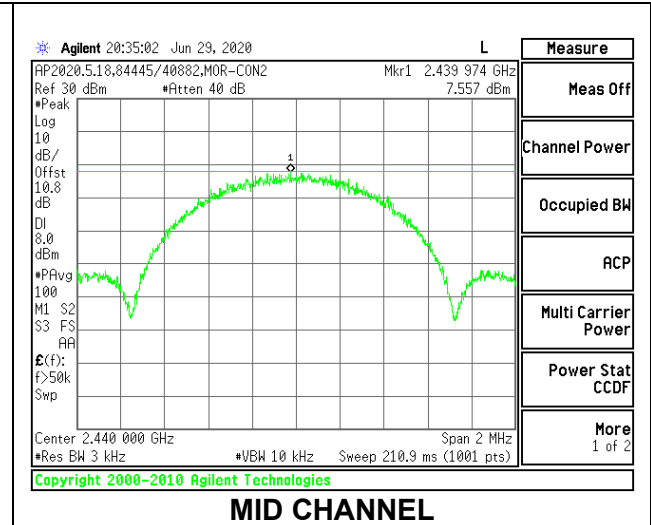
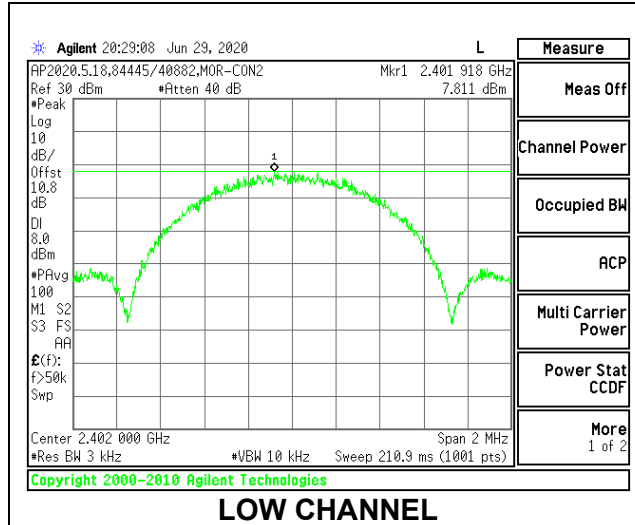
FCC §15.247 (e)
RSS-247 (5.2) (b)

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

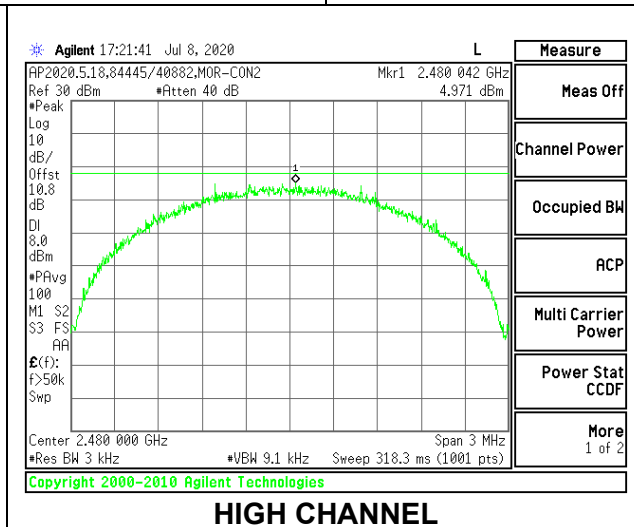
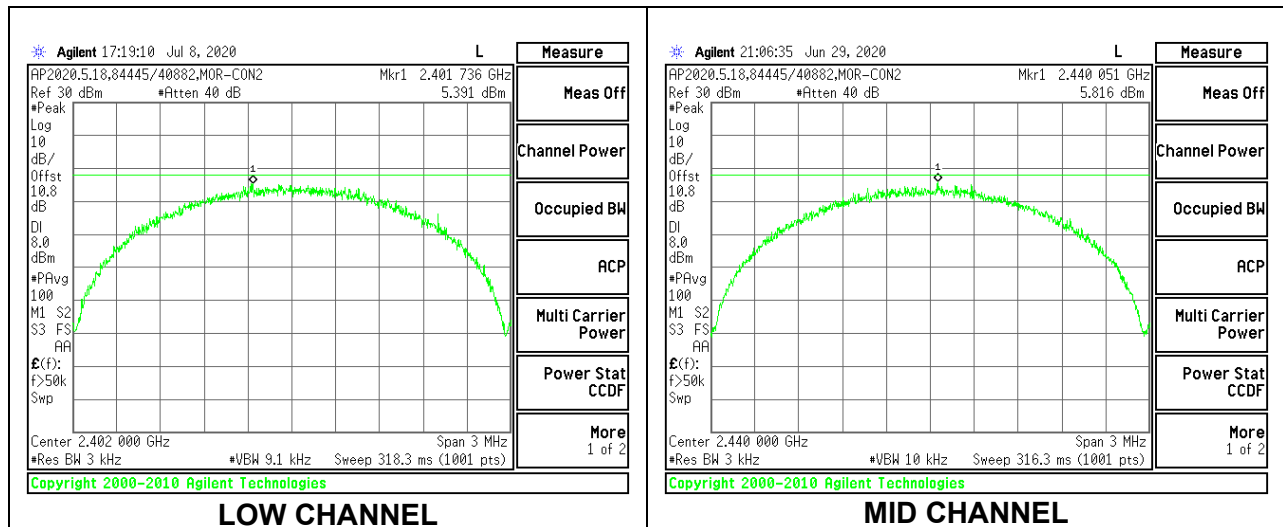
9.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	7.81	8	-0.19
Middle	2440	7.56	8	-0.44
High	2480	7.72	8	-0.28



9.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	5.39	8	-2.61
Middle	2440	5.82	8	-2.18
High	2480	4.97	8	-3.03



9.7. CONDUCTED SPURIOUS EMISSIONS

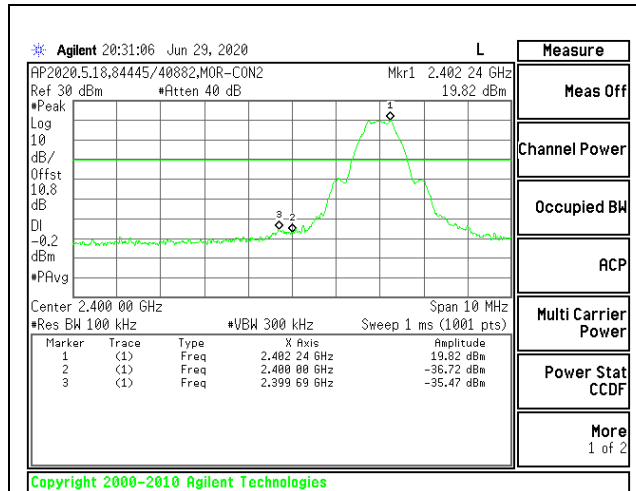
LIMITS

FCC §15.247 (d)
RSS-247 5.5

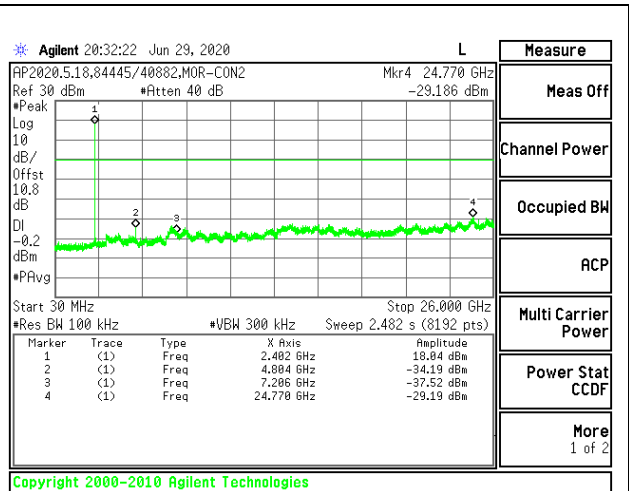
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

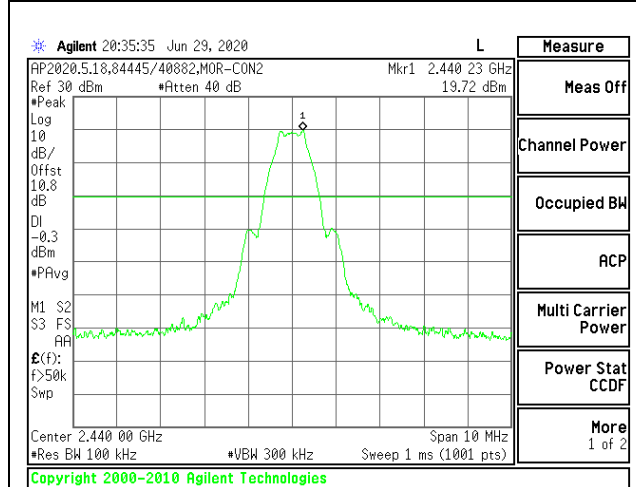
9.7.1. BLE (1Mbps)



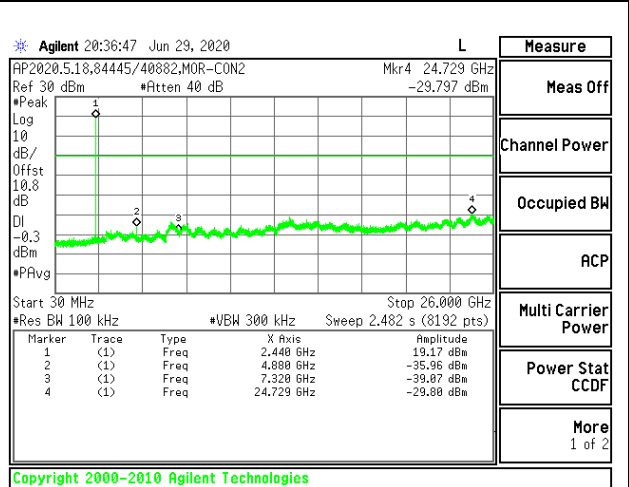
LOW CHANNEL BANDEGE



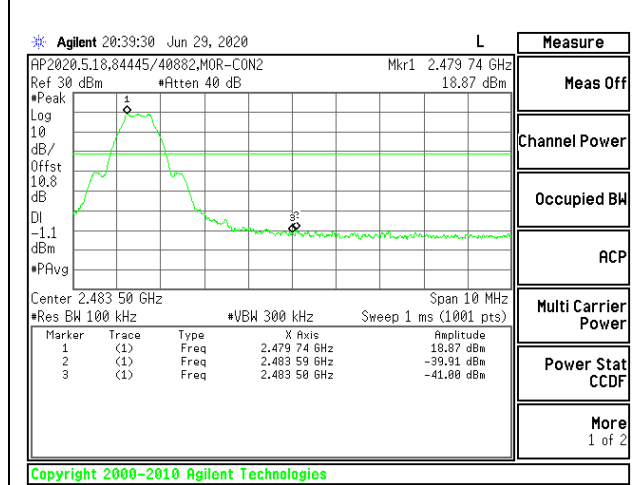
OUT-OF-BAND LOW CHANNEL



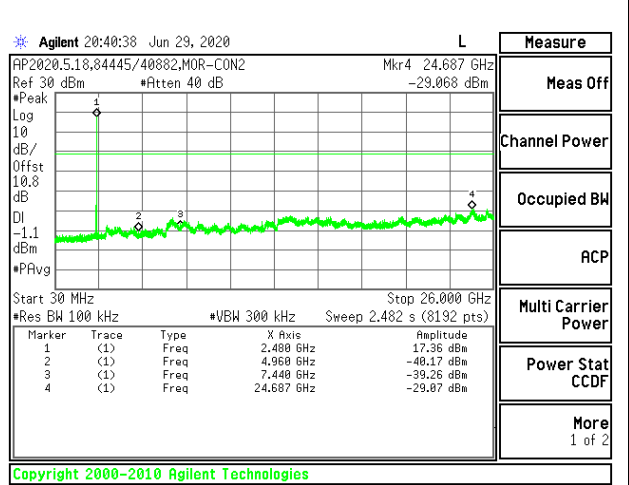
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

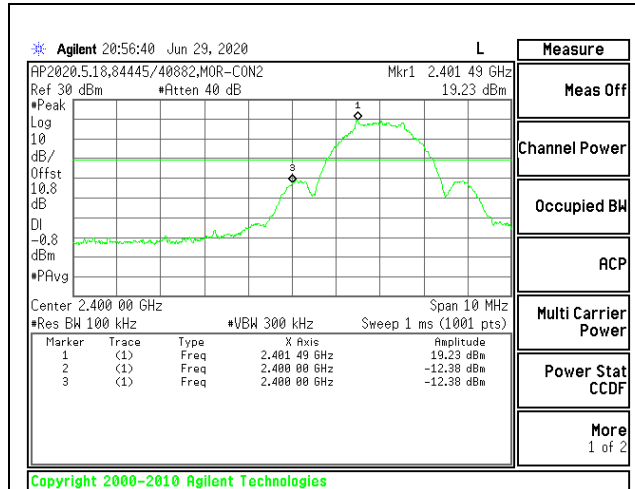


HIGH CHANNEL BANDEGE

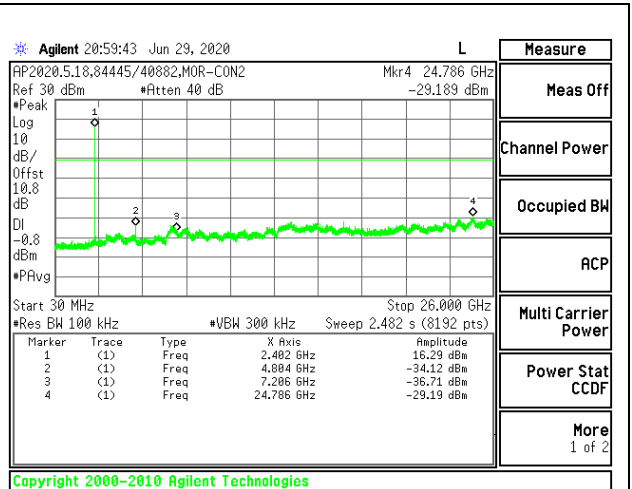


OUT-OF-BAND HIGH CHANNEL

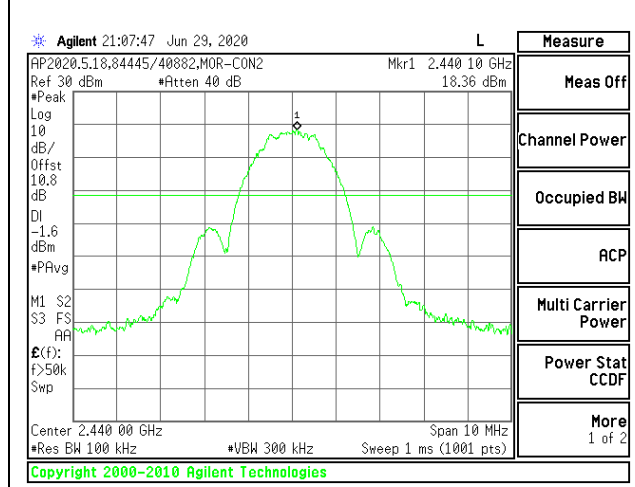
9.7.2. BLE (2Mbps)



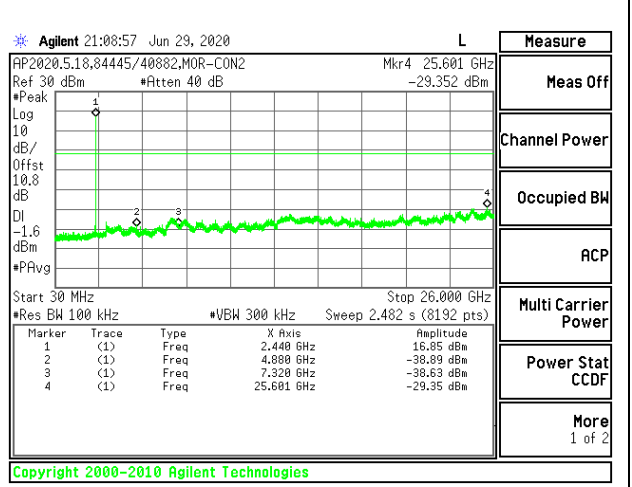
LOW CHANNEL BANDEDGE



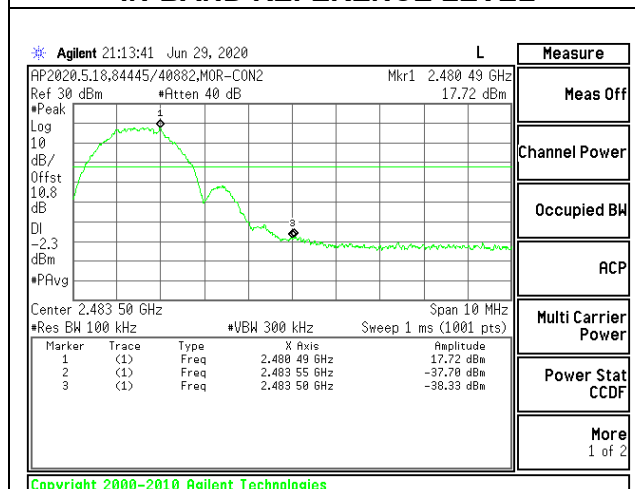
OUT-OF-BAND LOW CHANNEL



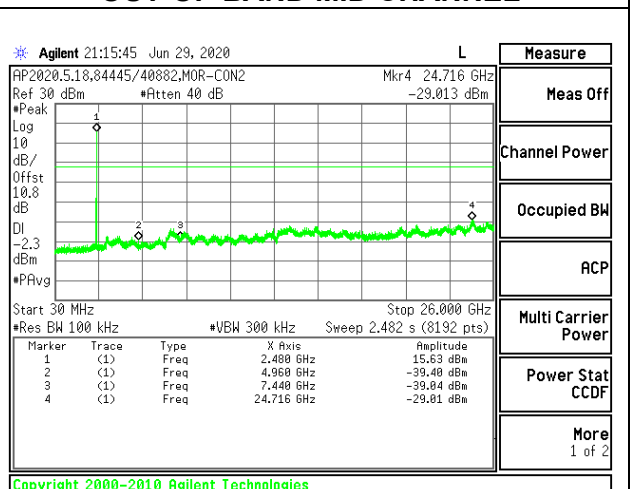
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. 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 120 kHz for peak and/or 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.

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. For this test program, voltage average detection with duty cycle correction per KDB 558074 D01 15.247 V05r02, FAQ Answer 3c) was used.

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).

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

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.

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

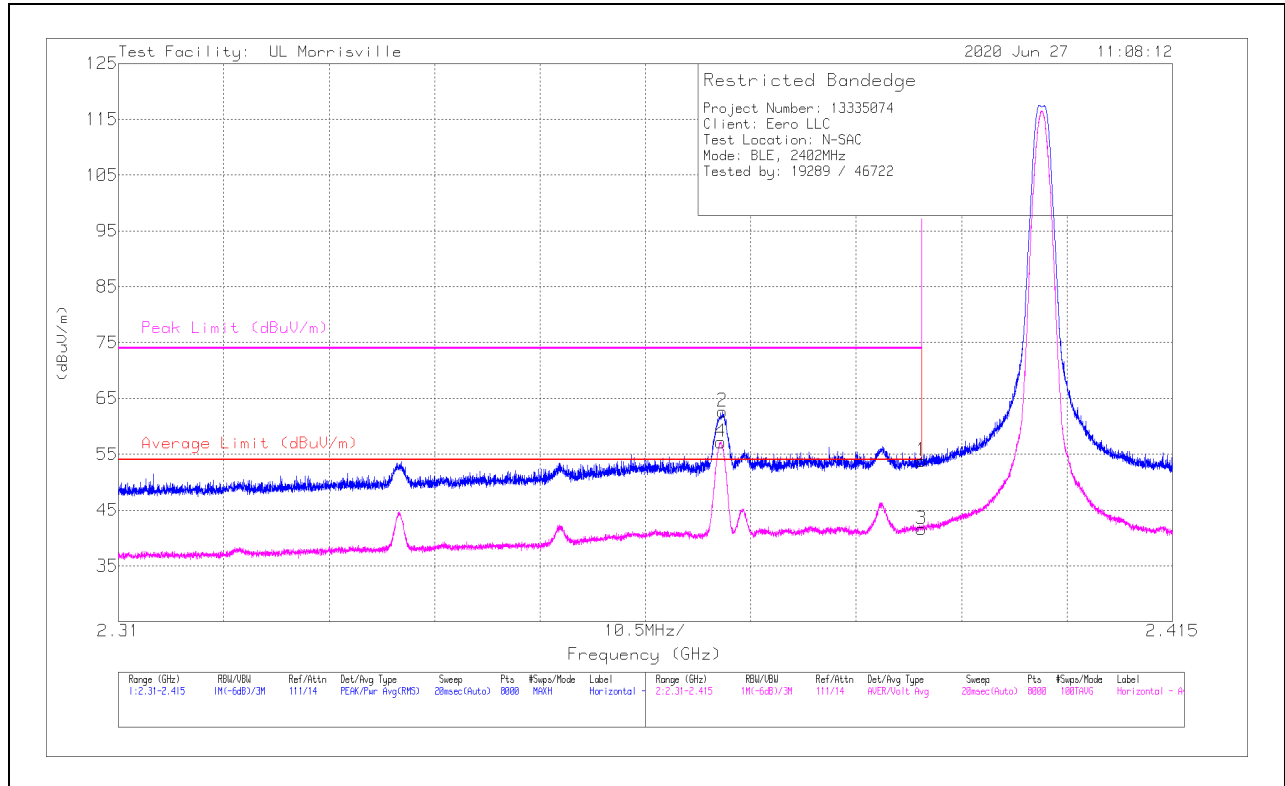
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	45.63	Pk	31.8	-23.6	0	53.83	-	-	74	-20.17	328	228	H
2	* ** 2.37016	54.58	Pk	31.7	-23.6	0	62.68	-	-	74	-11.32	328	228	H
3	* ** 2.39	33.44	ADV	31.8	-23.6	-12.04	41.64	54	-24.4	-	-	328	228	H
4	* ** 2.37002	49.08	ADV	31.7	-23.6	-12.04	57.18	54	-8.86	-	-	328	228	H

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

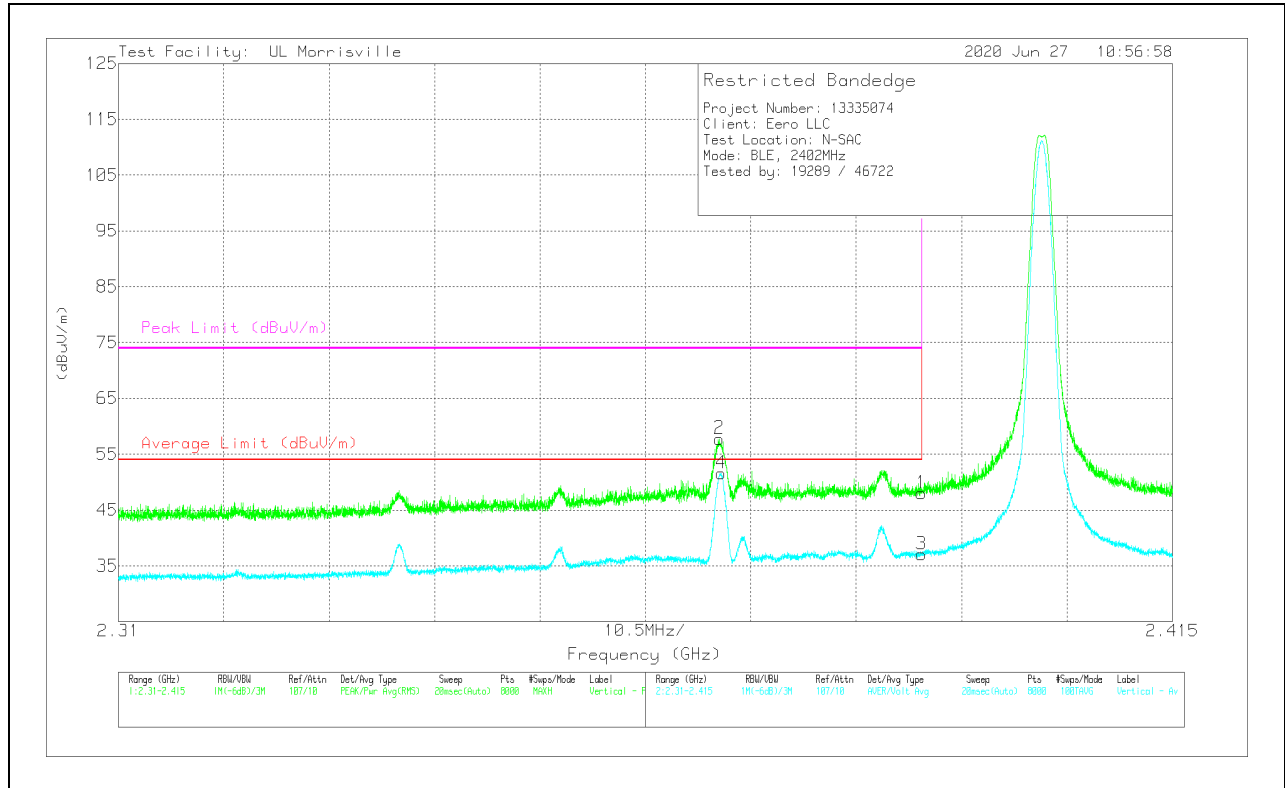
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	39.77	Pk	31.8	-23.6	0	47.97	-	-	74	-26.03	260	333	V
2	* ** 2.36987	49.67	Pk	31.7	-23.6	0	57.77	-	-	74	-16.23	260	333	V
3	* ** 2.39	28.83	ADV	31.8	-23.6	-12.04	37.03	54	-29.01	-	-	260	333	V
4	* ** 2.37004	43.47	ADV	31.7	-23.6	-12.04	51.57	54	-14.47	-	-	260	333	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

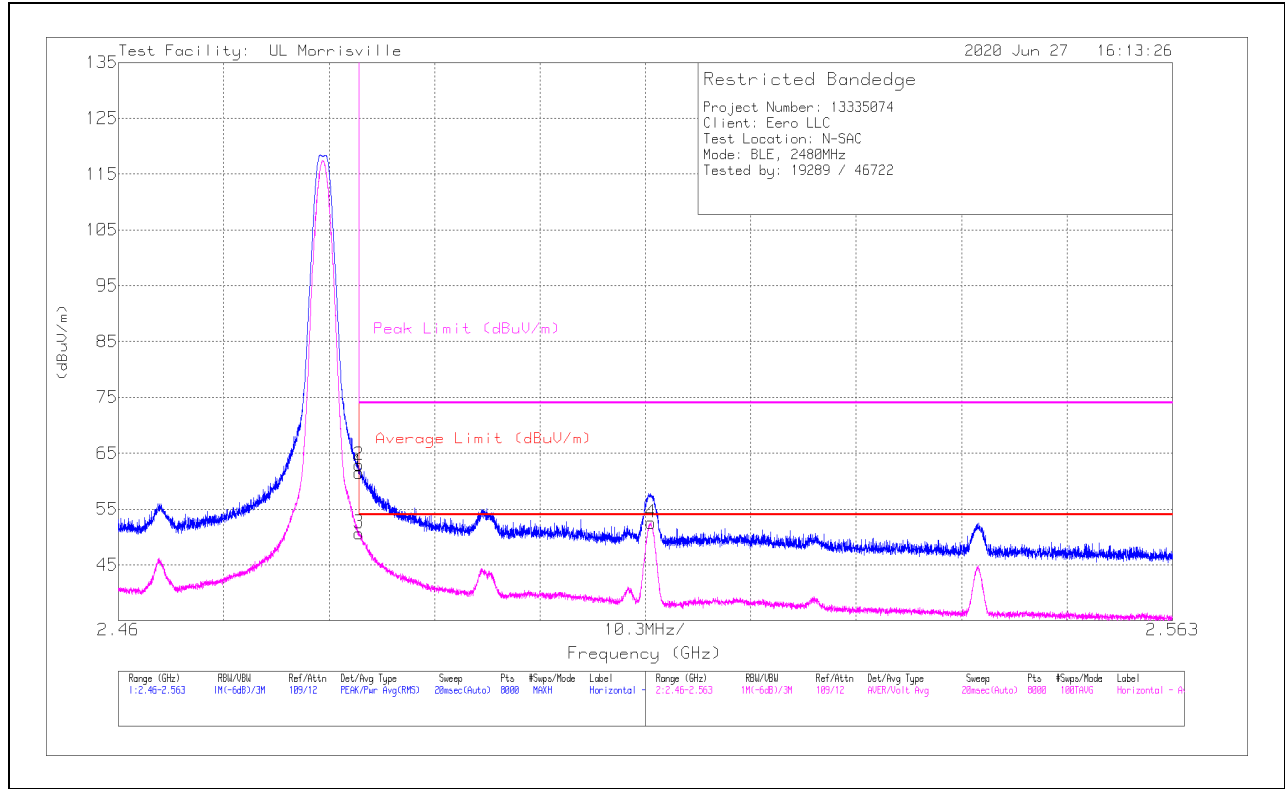
Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

BANDEGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	*** 2.4835	52.52	Pk	32.4	-23.4	0	61.52	-	-	74	-12.48	317	232	H
2	*** 2.48351	53.93	Pk	32.4	-23.4	0	62.93	-	-	74	-11.07	317	232	H
3	* ** 2.4835	41.69	ADV	32.4	-23.4	-12.04	50.69	54	-15.35	-	-	317	232	H
4	** 2.51205	43.45	ADV	32.5	-23.4	-12.04	52.55	54	-13.49	-	-	317	232	H

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

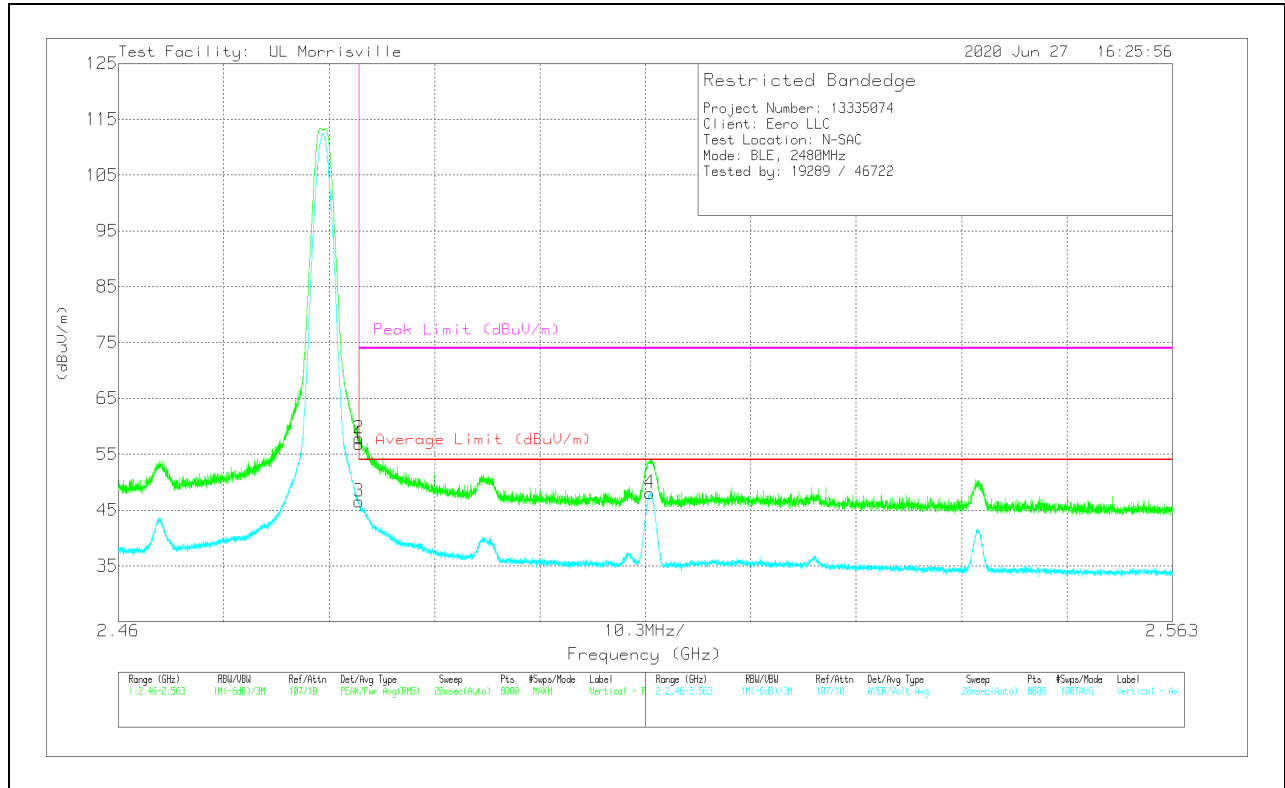
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	*** 2.4835	47.84	Pk	32.4	-23.4	0	56.84	-	-	74	-17.16	250	386	V
2	*** 2.48353	48.84	Pk	32.4	-23.4	0	57.84	-	-	74	-16.16	250	386	V
3	*** 2.4835	37.5	ADV	32.4	-23.4	-12.04	46.5	54	-19.54	-	-	250	386	V
4	** 2.51195	38.94	ADV	32.5	-23.4	-12.04	48.04	54	-18	-	-	250	386	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

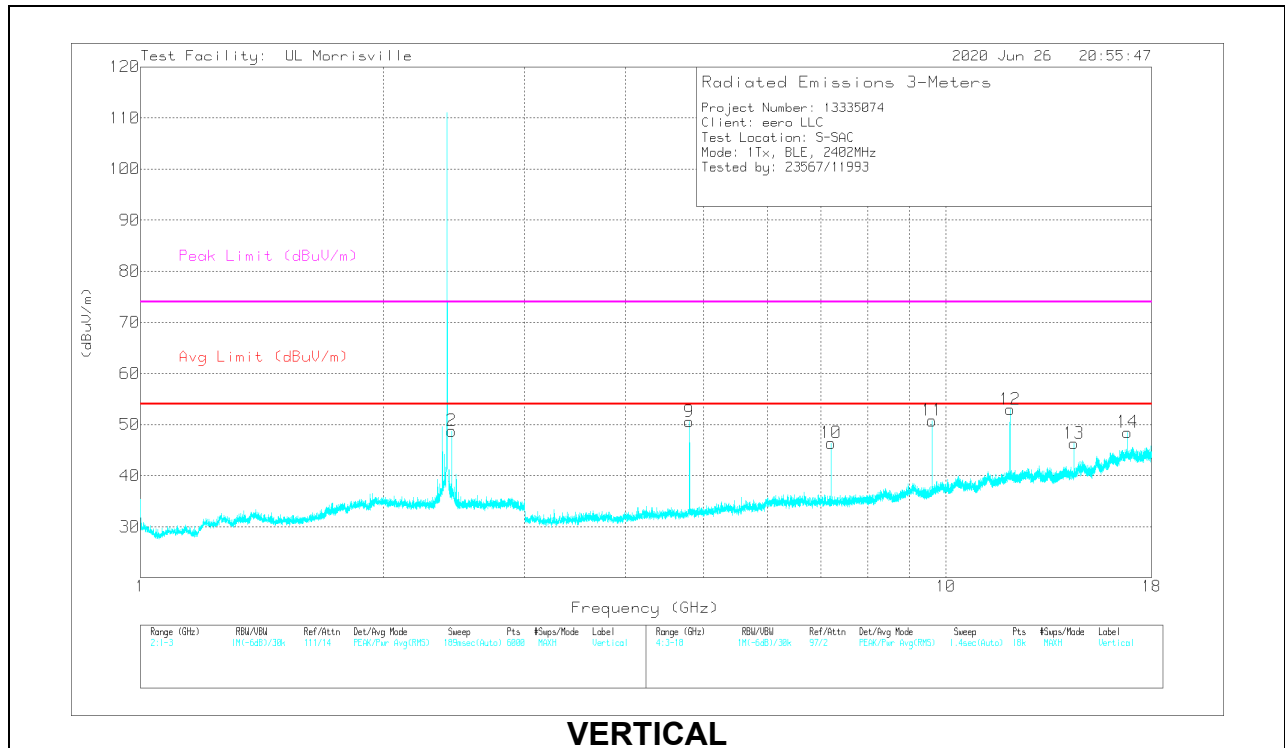
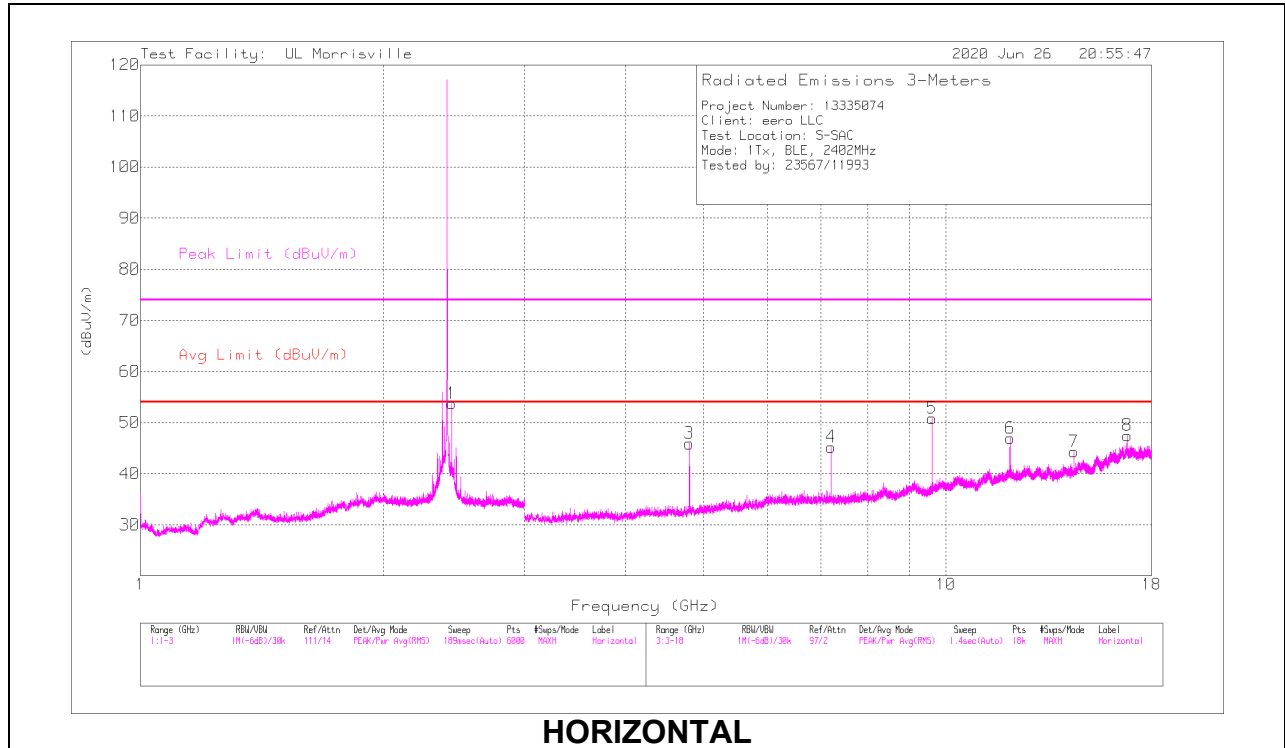
Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0078 (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
3	*** 4.80443	48.45	PK2	33.9	-31.1	0	51.25	-	-	74	-22.75	7	106	H
	*** 4.80378	42.41	ADV	33.9	-31.1	-12.04	33.17	54	-20.83	-	-	7	106	H
6	*** 12.01118	43.36	PK2	38.6	-23.9	0	58.06	-	-	74	-15.94	38	101	H
	*** 12.01114	34.69	ADV	38.6	-23.9	-12.04	37.35	54	-16.65	-	-	38	101	H
9	*** 4.80448	52.65	PK2	33.9	-31.1	0	55.45	-	-	74	-18.55	11	231	V
	*** 4.80427	47.73	ADV	33.9	-31.1	-12.04	38.49	54	-15.51	-	-	11	231	V
12	*** 12.01124	45.36	PK2	38.6	-23.9	0	60.06	-	-	74	-13.94	253	192	V
	*** 12.01103	38.12	ADV	38.6	-23.9	-12.04	40.78	54	-13.22	-	-	253	192	V
2	2.43391	40.57	Pk	32.1	-23.9		48.77	-	-	-	-	0-360	199	V
1	2.43424	45.53	Pk	32.1	-23.9		53.73	-	-	-	-	0-360	199	H
10	7.20524	38.98	Pk	35.6	-28.2		46.38	-	-	-	-	0-360	101	V
4	7.2069	37.72	Pk	35.6	-28.1		45.22	-	-	-	-	0-360	199	H
5	9.60704	40.25	Pk	36.6	-26		50.85	-	-	-	-	0-360	101	H
11	9.6087	40.28	Pk	36.6	-26.1		50.78	-	-	-	-	0-360	199	V
7	14.41064	29.52	Pk	39.2	-24.4		44.32	-	-	-	-	0-360	199	H
13	14.41397	31.54	Pk	39.2	-24.4		46.34	-	-	-	-	0-360	199	V
8	16.81327	29.28	Pk	41.4	-23.2		47.48	-	-	-	-	0-360	199	H
14	16.81577	30.2	Pk	41.4	-23.1		48.5	-	-	-	-	0-360	199	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

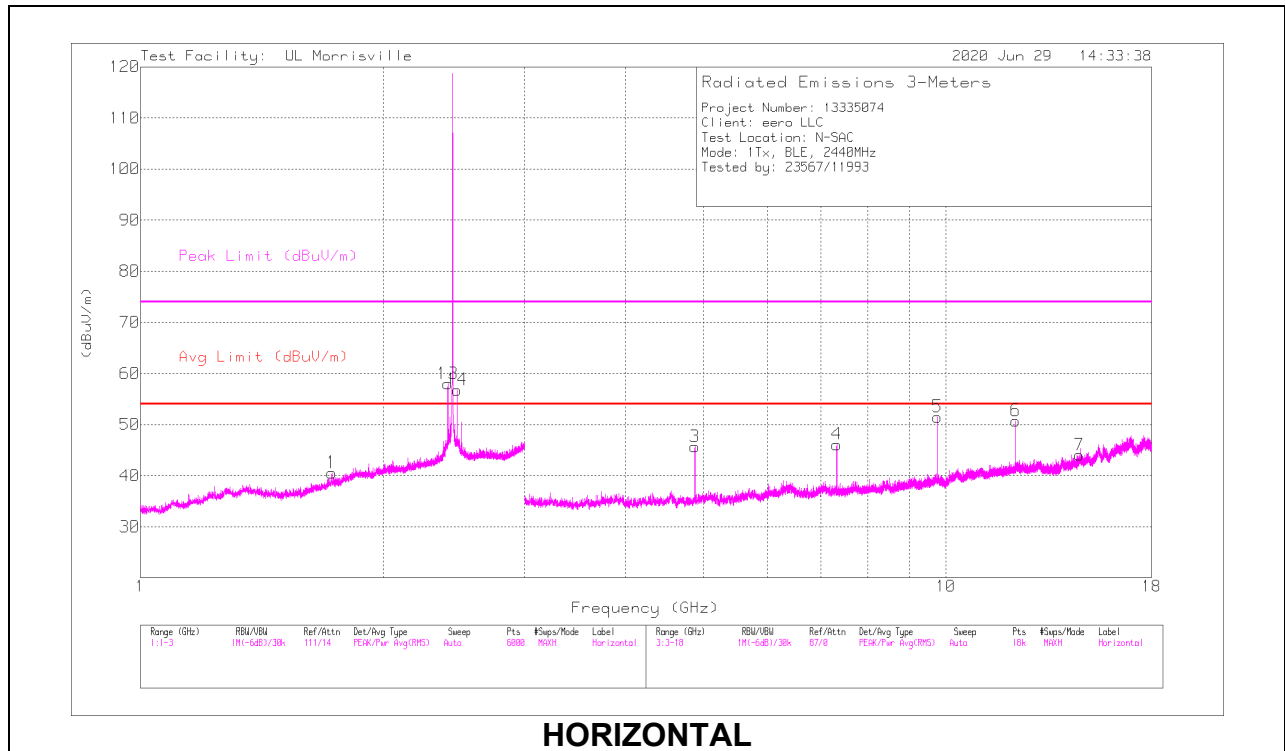
PK2 - Maximum Peak

ADV - Linear Voltage Average

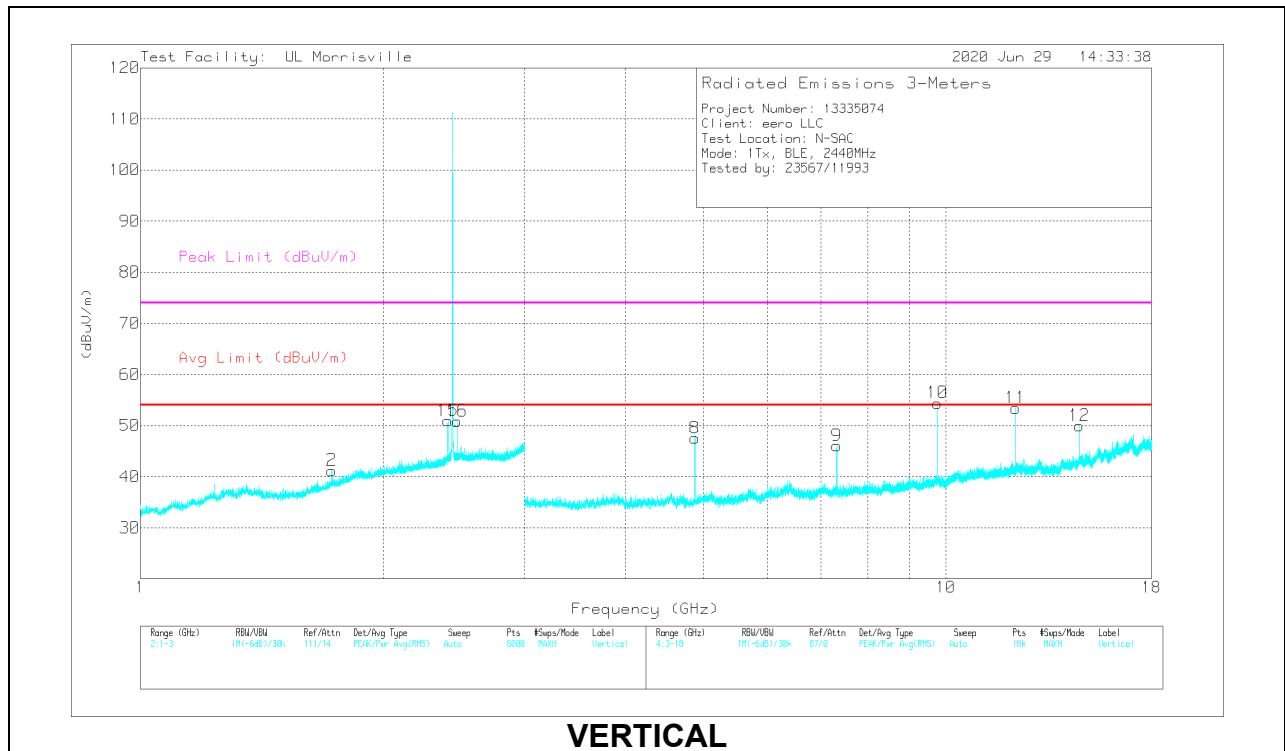
Pk - Peak detector

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	** 1.72835	40.77	PK2	29.4	-23.6	0	46.57	-	-	74	-27.43	277	117	H
	** 1.72793	27.55	ADV	29.4	-23.6	-12.04	21.31	54	-32.69	-	-	277	117	H
2	** 1.72831	40.02	PK2	29.4	-23.6	0	45.82	-	-	74	-28.18	57	105	V
	** 1.72802	27.82	ADV	29.4	-23.6	-12.04	21.58	54	-32.42	-	-	57	105	V
3	*** 4.87964	47.41	PK2	34.1	-30.8	0	50.71	-	-	74	-23.29	131	240	H
	*** 4.87999	40.45	ADV	34.1	-30.8	-12.04	31.71	54	-22.29	-	-	131	240	H
4	** 7.32041	42.32	PK2	35.6	-28.4	0	49.52	-	-	74	-24.48	185	205	H
	*** 7.32058	32.68	ADV	35.6	-28.4	-12.04	27.84	54	-26.16	-	-	185	205	H
6	*** 12.20115	40.02	PK2	38.9	-25.8	0	53.12	-	-	74	-20.88	262	227	H
	*** 12.20108	29.11	ADV	38.9	-25.8	-12.04	30.17	54	-23.83	-	-	262	227	H
8	*** 4.87956	53.5	PK2	34.1	-30.8	0	56.8	-	-	74	-17.2	293	315	V
	*** 4.88001	48.19	ADV	34.1	-30.8	-12.04	39.45	54	-14.55	-	-	293	315	V
9	*** 7.32075	43.32	PK2	35.6	-28.4	0	50.52	-	-	74	-23.48	235	228	V
	** 7.3206	34.37	ADV	35.6	-28.4	-12.04	29.53	54	-24.47	-	-	235	228	V
11	*** 12.19863	43.07	PK2	38.9	-25.9	0	56.07	-	-	74	-17.93	257	112	V
	*** 12.19885	33.87	ADV	38.9	-25.9	-12.04	34.83	54	-19.17	-	-	257	112	V
15	2.4079	42.59	Pk	31.9	-23.5	50.99	-	-	-	-	0-360	198	V	15
13	2.40807	49.61	Pk	31.9	-23.5	58.01	-	-	-	-	0-360	198	H	13
14	2.47191	48	Pk	32.3	-23.5	56.8	-	-	-	-	0-360	198	H	14
16	2.47191	42.08	Pk	32.3	-23.5	50.88	-	-	-	-	0-360	198	V	16
5	9.76038	41.11	Pk	37	-26.6	51.51	-	-	-	-	0-360	198	H	5
10	9.76038	44.02	Pk	37	-26.6	54.42	-	-	-	-	0-360	102	V	10
7	14.63815	30.02	Pk	39.7	-25.7	44.02	-	-	-	-	0-360	102	H	7
12	14.64149	36.09	Pk	39.6	-25.7	49.99	-	-	-	-	0-360	198	V	12

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

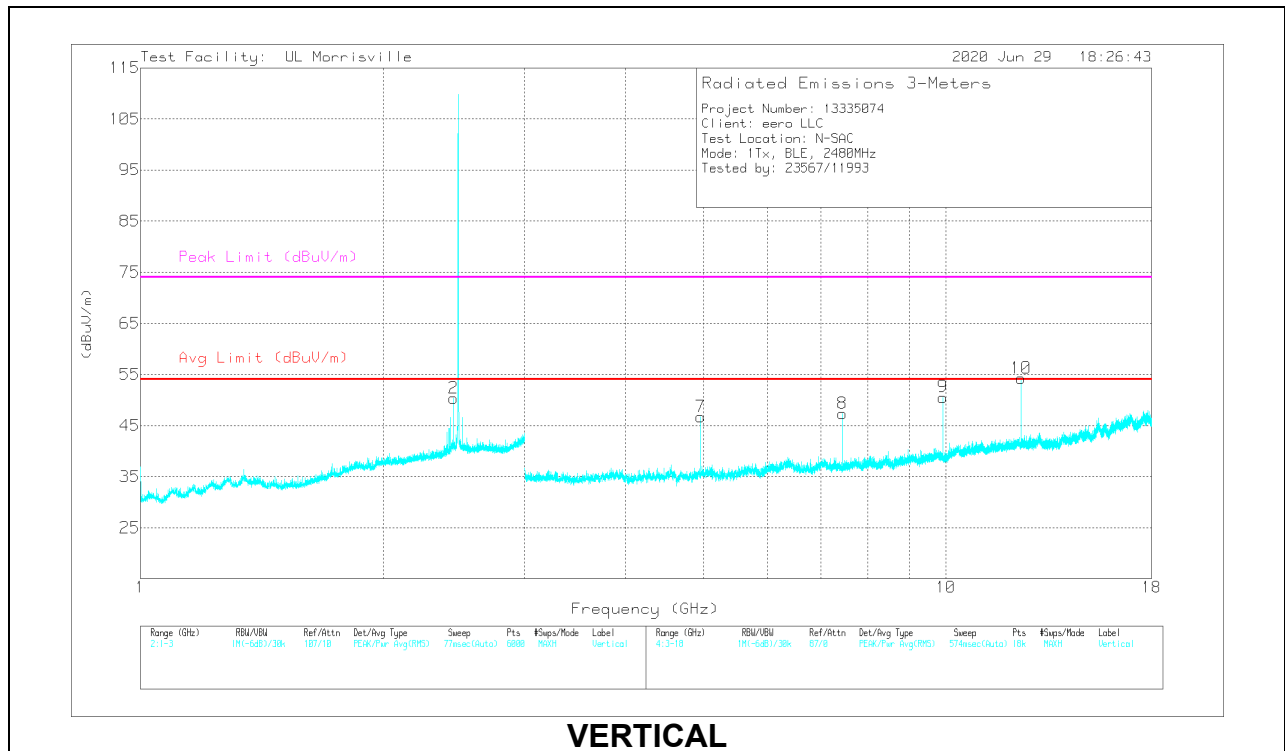
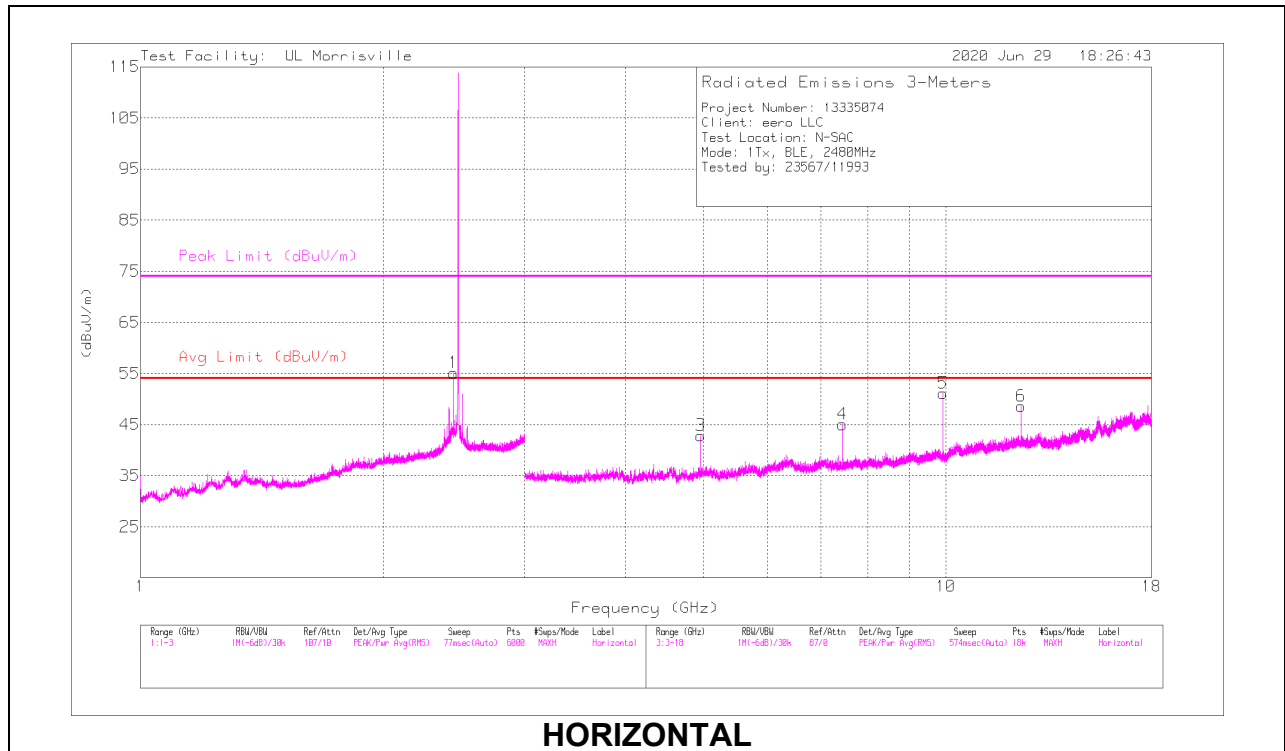
PK2 - Maximum Peak

ADV - Linear Voltage Average

Pk - Peak detector

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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
3	* ** 4.9594	45.07	PK2	34.1	-31.7	0	47.47	-	-	74	-26.53	18	104	H
	* ** 4.95996	36.11	ADV	34.1	-31.7	-12.04	26.47	54	-27.53	-	-	18	104	H
4	* ** 7.44073	43.43	PK2	35.7	-28.4	0	50.73	-	-	74	-23.27	54	231	H
	* ** 7.4406	34.66	ADV	35.7	-28.4	-12.04	29.92	54	-24.08	-	-	54	231	H
6	* ** 12.40114	42.42	PK2	38.9	-25.8	0	55.52	-	-	74	-18.48	4	390	H
	* ** 12.40105	32.86	ADV	39	-25.8	-12.04	34.02	54	-19.98	-	-	4	390	H
7	* ** 4.96048	49.83	PK2	34.1	-31.7	0	52.23	-	-	74	-21.77	301	280	V
	* ** 4.95982	43.33	ADV	34.1	-31.7	-12.04	33.69	54	-20.31	-	-	301	280	V
8	* ** 7.44073	43.7	PK2	35.7	-28.4	0	51	-	-	74	-23	16	211	V
	* ** 7.44061	34.58	ADV	35.7	-28.4	-12.04	29.84	54	-24.16	-	-	16	211	V
10	* ** 12.3987	44.75	PK2	38.9	-25.8	0	57.85	-	-	74	-16.15	265	112	V
	* ** 12.39875	35.99	ADV	38.9	-25.8	-12.04	37.05	54	-16.95	-	-	265	112	V
1	2.44791	46.49	Pk	32.1	-23.5	55.09	-	-	-	-	0-360	198	H	1
2	2.44791	41.79	Pk	32.1	-23.5	50.39	-	-	-	-	0-360	198	V	2
5	9.91872	41.18	Pk	37	-27.1	51.08	-	-	-	-	0-360	198	H	5
9	9.92039	40.65	Pk	37	-27.1	50.55	-	-	-	-	0-360	198	V	9

* - 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

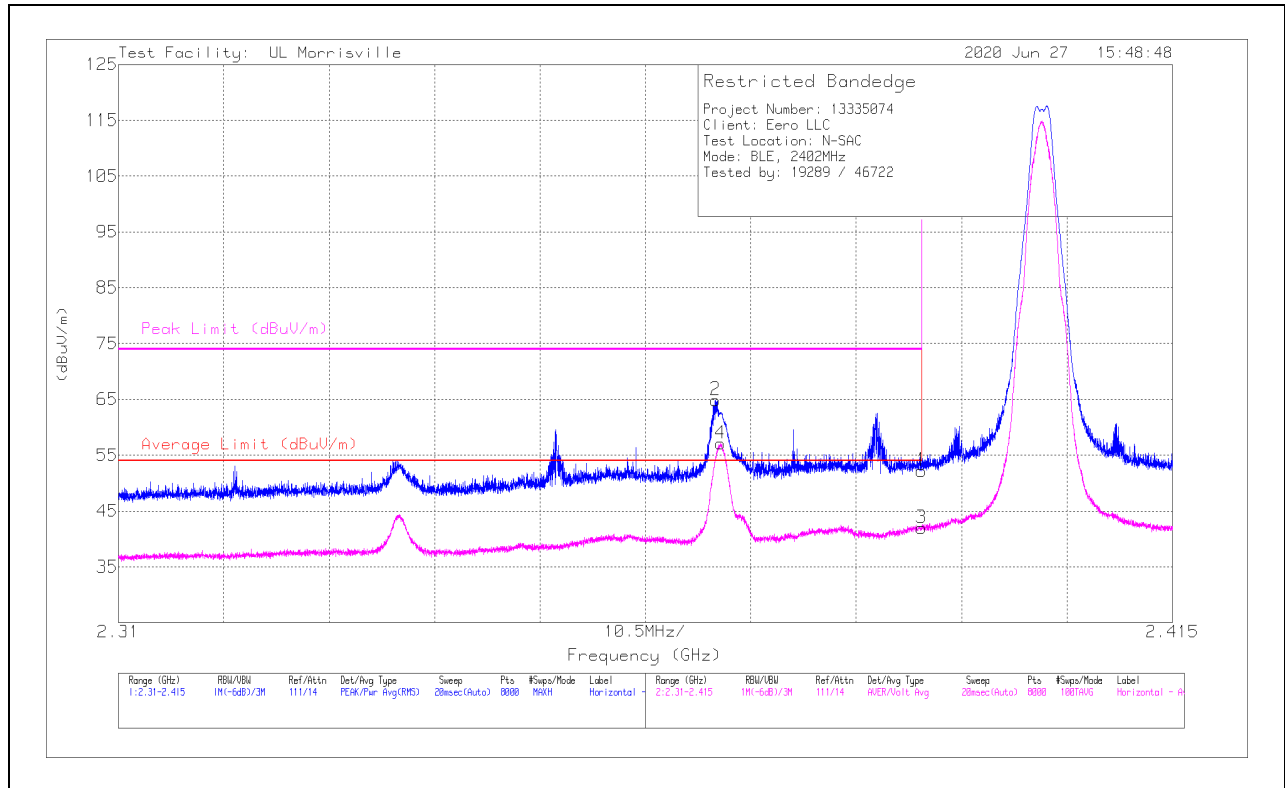
Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

10.2.2. BLE (2Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	44.02	Pk	31.8	-23.6	0	52.22	-	-	74	-21.78	340	128	H
2	* ** 2.36947	56.78	Pk	31.7	-23.6	0	64.88	-	-	74	-9.12	340	128	H
3	* ** 2.39	33.78	ADV	31.8	-23.6	-12.04	41.98	54	-24.06	-	-	340	128	H
4	* ** 2.37	49.02	ADV	31.7	-23.6	-12.04	57.12	54	-8.92	-	-	340	128	H

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

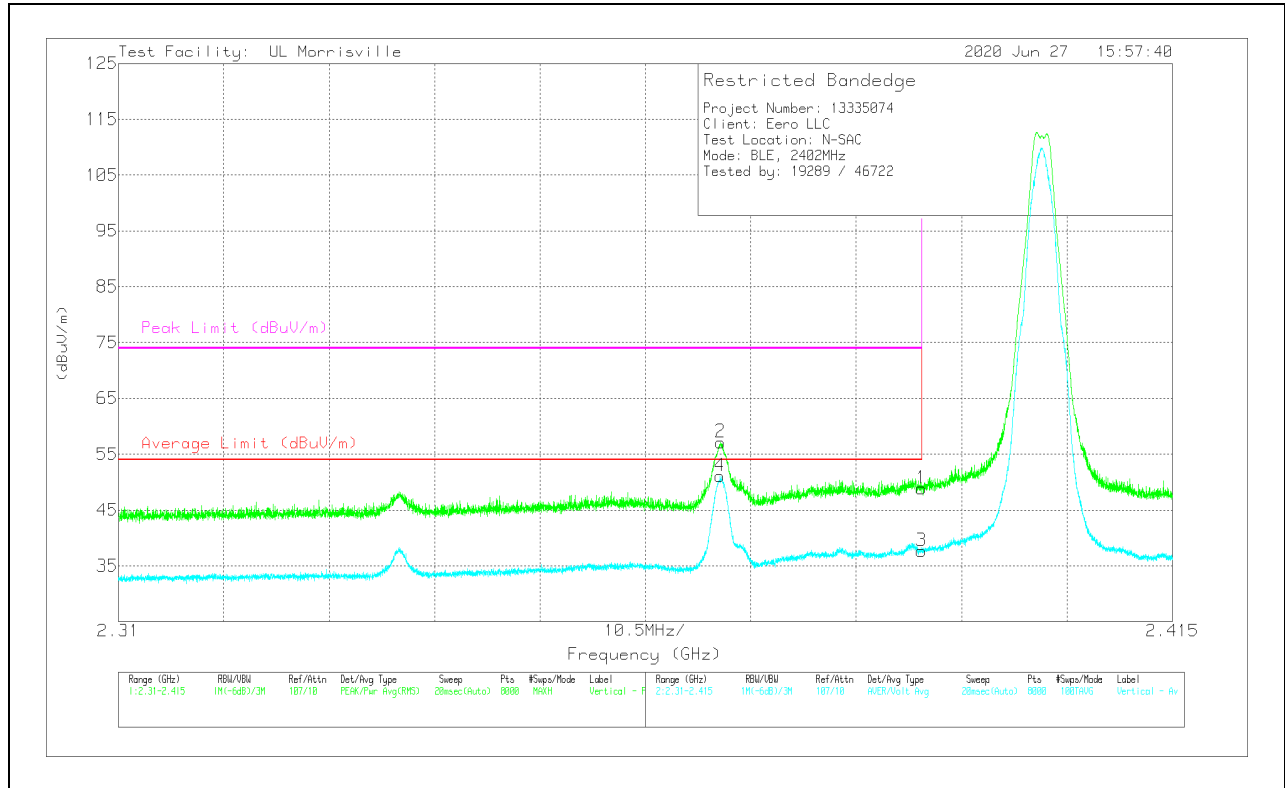
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	40.68	Pk	31.8	-23.6	0	48.88	-	-	74	-25.12	69	386	V
2	* ** 2.37	49.05	Pk	31.7	-23.6	0	57.15	-	-	74	-16.85	69	386	V
3	* ** 2.39	29.5	ADV	31.8	-23.6	-12.04	37.7	54	-28.34	-	-	69	386	V
4	* ** 2.36993	42.98	ADV	31.7	-23.6	-12.04	51.08	54	-14.96	-	-	69	386	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

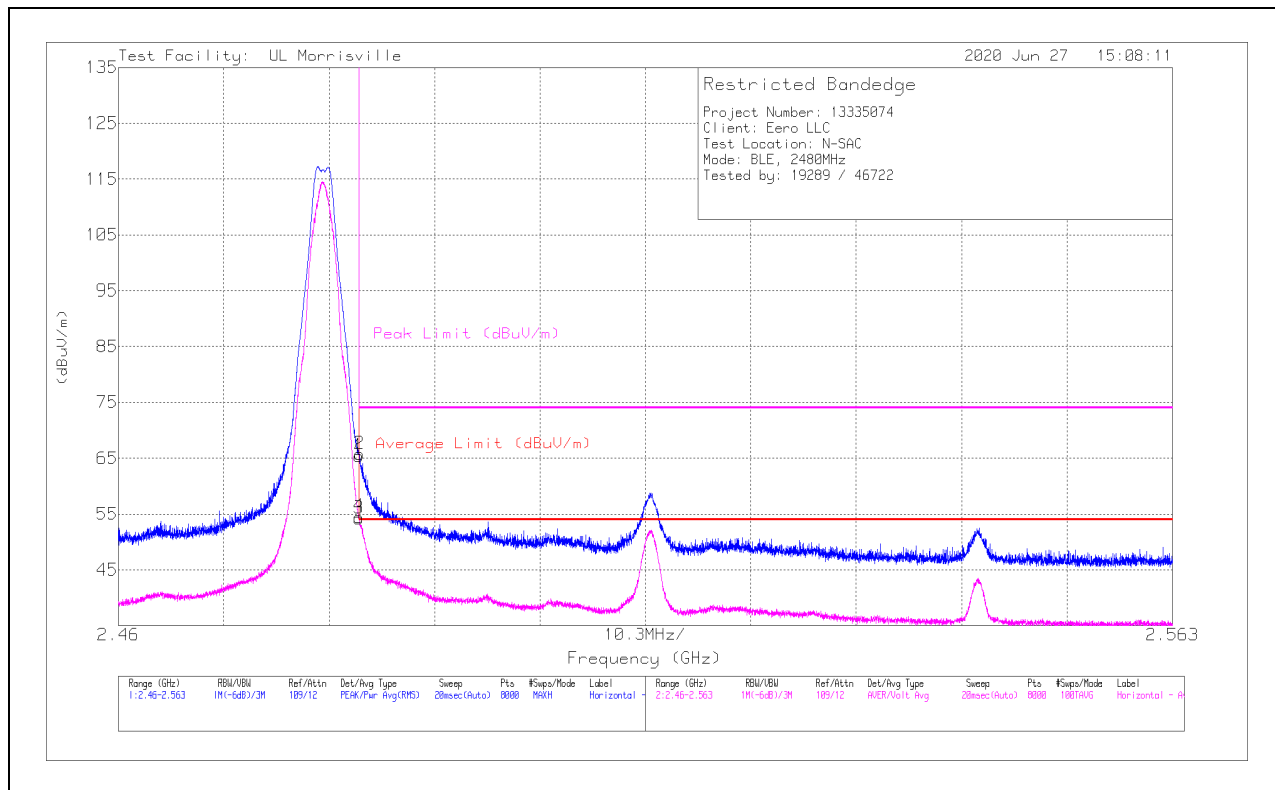
Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	*** 2.4835	56.38	Pk	32.4	-23.4	0	65.38	-	-	74	-8.62	290	380	H
2	*** 2.48359	56.76	Pk	32.4	-23.4	0	65.76	-	-	74	-8.24	290	380	H
3	*** 2.4835	45.19	ADV	32.4	-23.4	-12.04	54.19	54	-11.85	-	-	290	380	H
4	*** 2.48351	45.5	ADV	32.4	-23.4	-12.04	54.5	54	-11.54	-	-	290	380	H

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

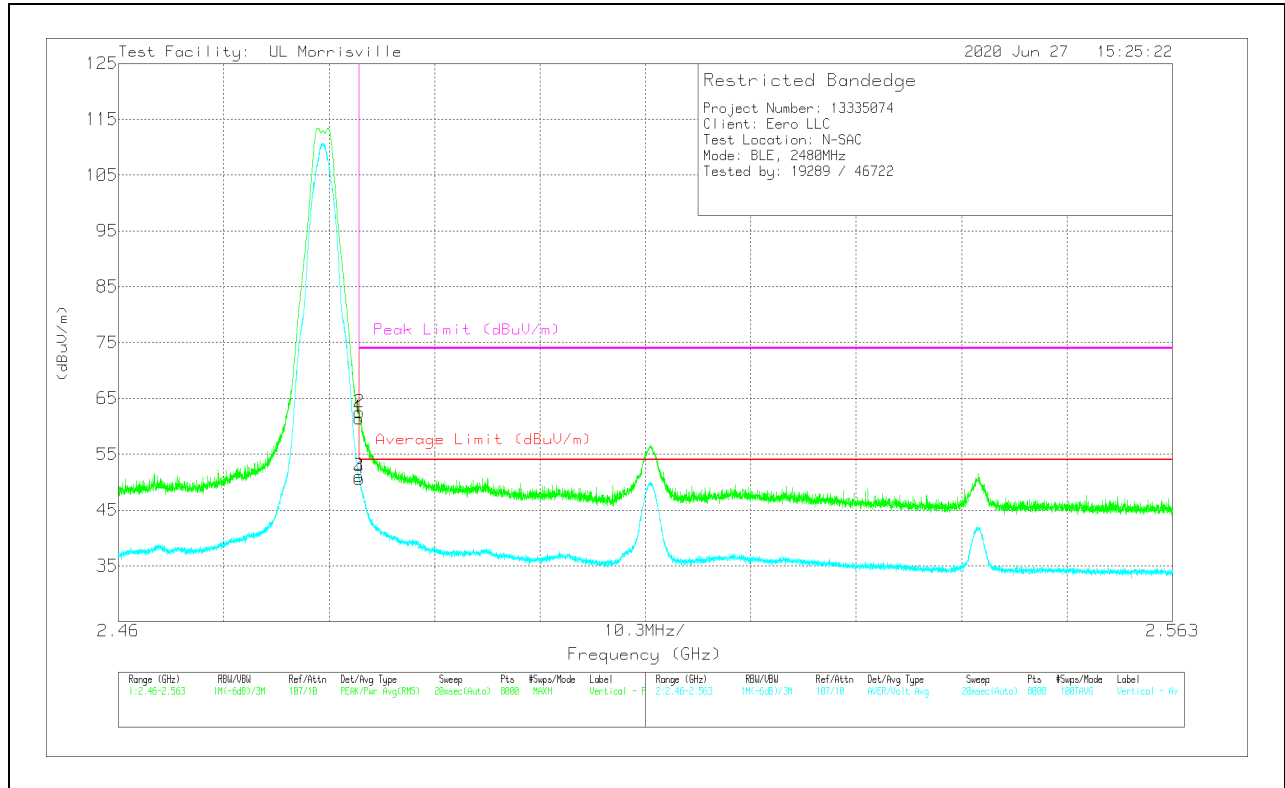
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 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	* ** 2.4835	52.47	Pk	32.4	-23.4	0	61.47	-	-	74	-12.53	247	369	V
2	* ** 2.48354	53.51	Pk	32.4	-23.4	0	62.51	-	-	74	-11.49	247	369	V
3	* ** 2.4835	42.08	ADV	32.4	-23.4	-12.04	51.08	54	-14.96	-	-	247	369	V
4	* ** 2.48354	41.63	ADV	32.4	-23.4	-12.04	50.63	54	-15.41	-	-	247	369	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

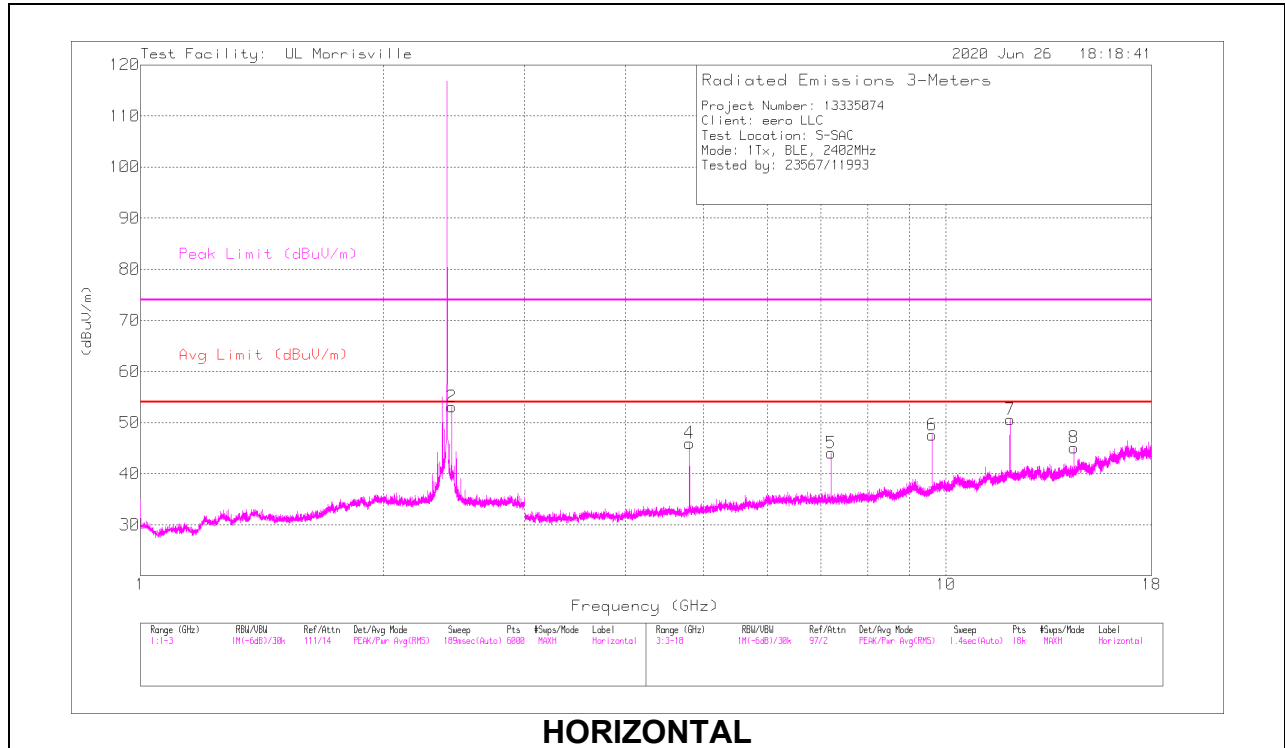
Pk - Peak detector

ADV - Linear Voltage Average

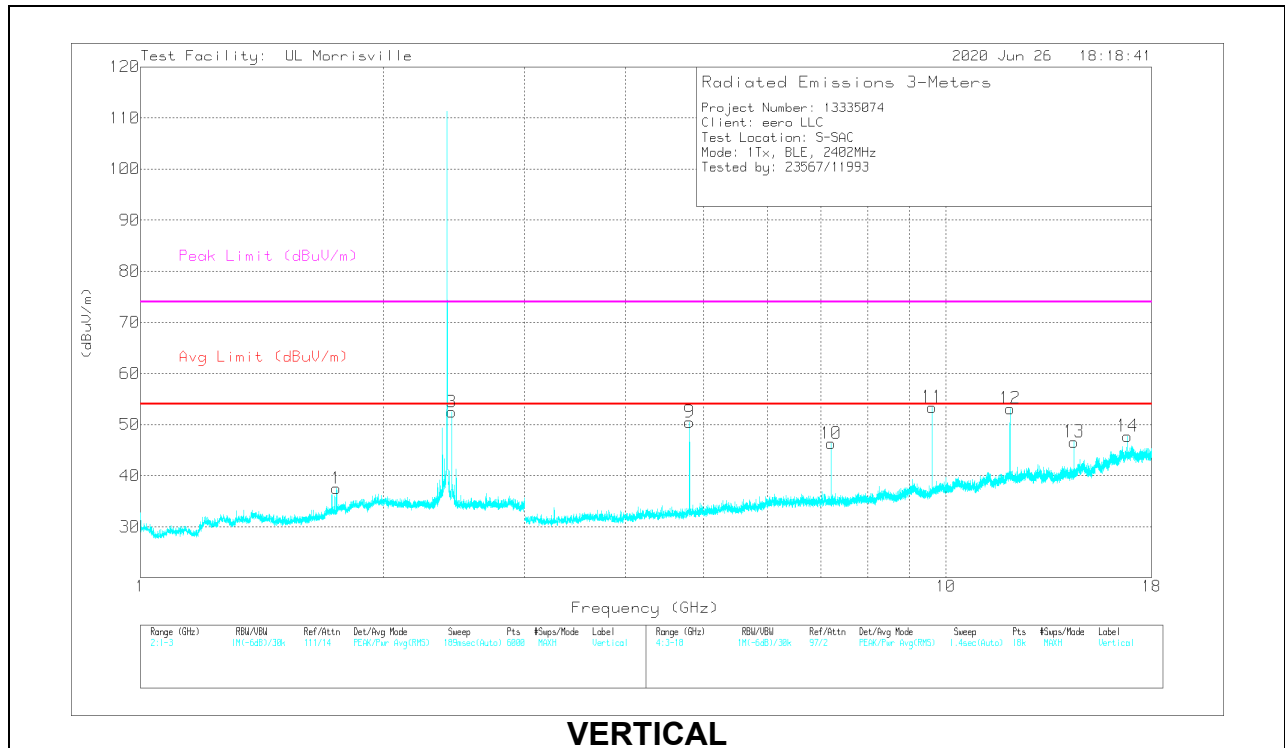
Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0078 (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	** 1.75443	31.8	PK2	29.8	-22.2	0	39.4	-	-	74	-34.6	337	349	V
	** 1.7536	20.67	ADV	29.8	-22.2	-12.04	16.23	54	-37.77	-	-	337	349	V
4	*** 4.80451	47.33	PK2	33.9	-31.1	0	50.13	-	-	74	-23.87	202	243	H
	*** 4.80392	40.89	ADV	33.9	-31.1	-12.04	31.65	54	-22.35	-	-	202	243	H
7	*** 12.01118	40.9	PK2	38.6	-23.9	0	55.6	-	-	74	-18.4	41	107	H
	*** 12.01098	32	ADV	38.6	-23.9	-12.04	34.66	54	-19.34	-	-	41	107	H
9	*** 4.80448	52.03	PK2	33.9	-31.1	0	54.83	-	-	74	-19.17	8	233	V
	*** 4.80397	46.14	ADV	33.9	-31.1	-12.04	36.9	54	-17.1	-	-	8	233	V
12	*** 12.01117	43.61	PK2	38.6	-23.9	0	58.31	-	-	74	-15.69	334	101	V
	*** 12.01093	33.16	ADV	38.6	-23.9	-12.04	35.82	54	-18.18	-	-	334	101	V
2	2.43391	44.92	Pk	32.1	-23.9		53.12	-	-	-	-	0-360	100	H
3	2.43424	44.26	Pk	32.1	-23.9		52.46	-	-	-	-	0-360	199	V
10	7.20524	38.91	Pk	35.6	-28.2		46.31	-	-	-	-	0-360	199	V
5	7.20607	36.53	Pk	35.6	-28.1		44.03	-	-	-	-	0-360	199	H
6	9.6087	37.03	Pk	36.6	-26.1		47.53	-	-	-	-	0-360	199	H
11	9.6087	42.89	Pk	36.6	-26.1		53.39	-	-	-	-	0-360	101	V
8	14.41064	30.29	Pk	39.2	-24.4		45.09	-	-	-	-	0-360	199	H
13	14.41397	31.82	Pk	39.2	-24.4		46.62	-	-	-	-	0-360	199	V
14	16.81577	29.44	Pk	41.4	-23.1		47.74	-	-	-	-	0-360	101	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

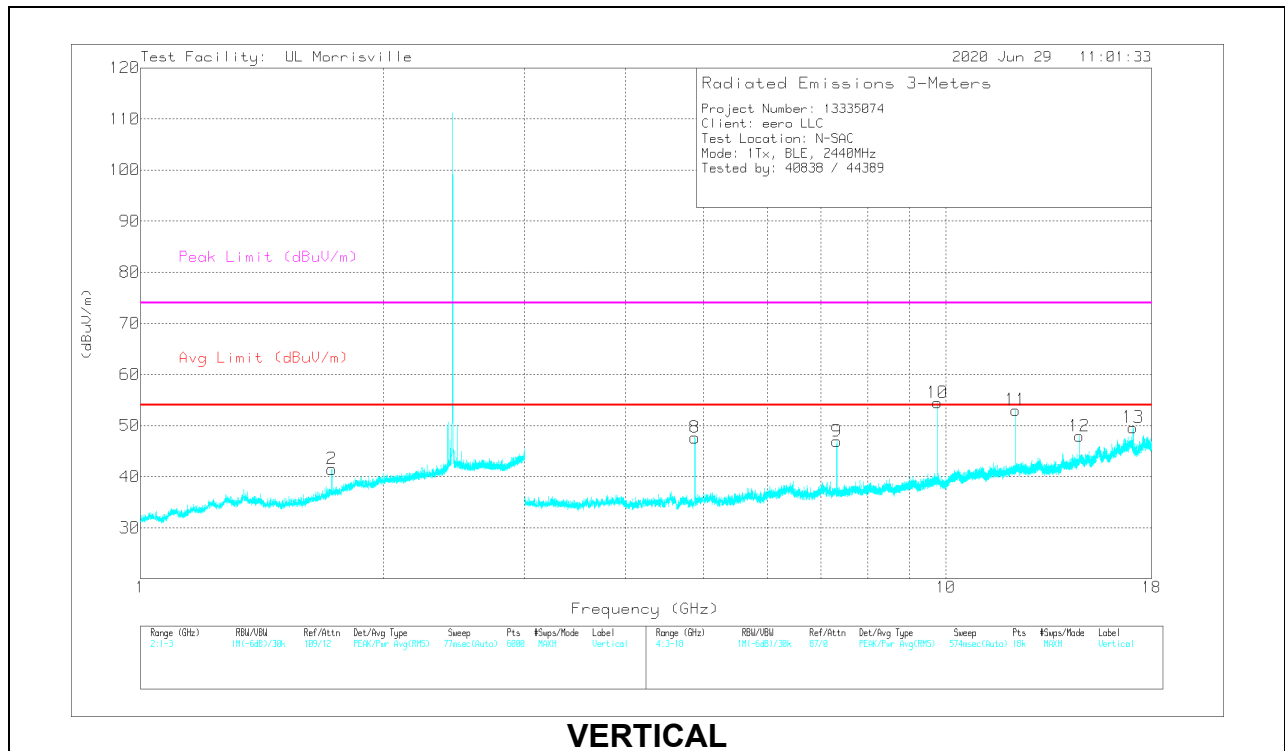
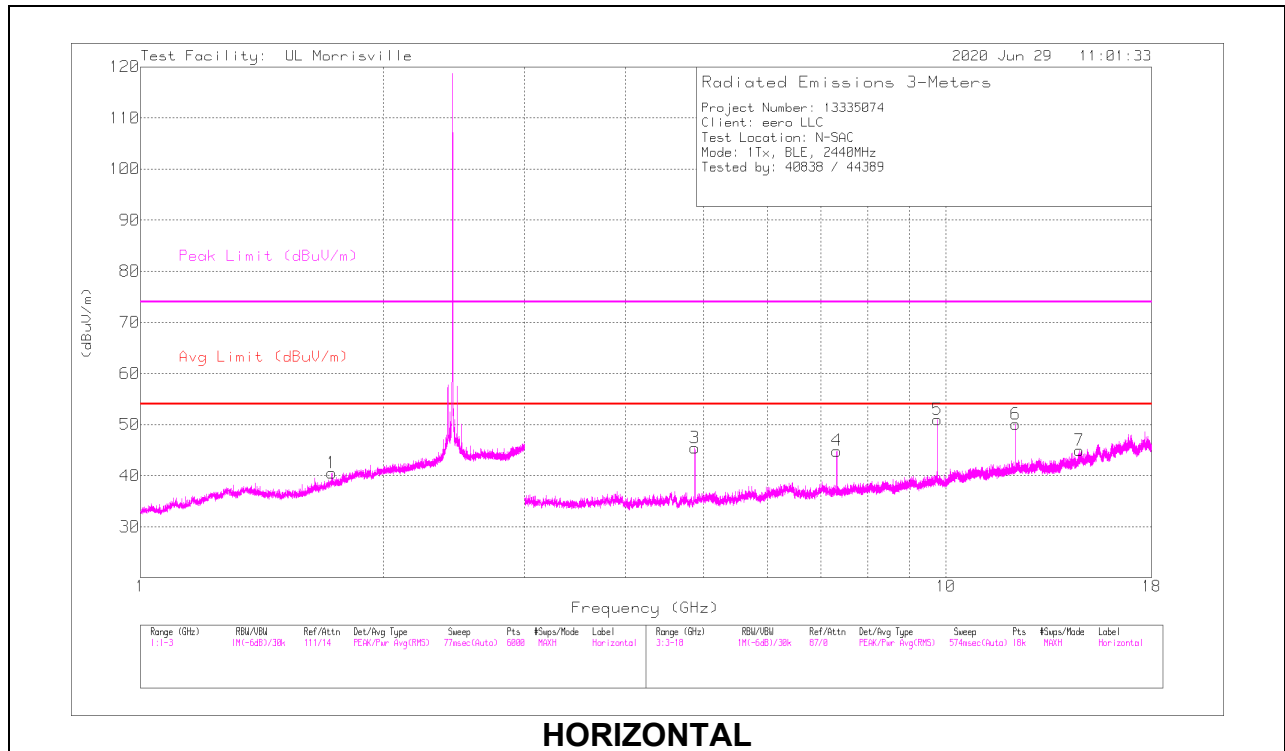
PK2 - Maximum Peak

ADV - Linear Voltage Average

Pk - Peak detector

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.72763	40.79	PK2	29.4	-23.6	0	46.59	-	-	74	-27.41	59	206	H
	** 1.72808	30.6	ADV	29.4	-23.6	-12	36.4	54	-29.6	-	-	59	206	H
2	** 1.72799	40.24	PK2	29.4	-23.6	0	46.04	-	-	74	-27.96	274	260	V
	** 1.72801	29.85	ADV	29.4	-23.6	-12	35.65	54	-30.35	-	-	274	260	V
3	*** 4.87942	45.98	PK2	34.1	-30.8	0	49.28	-	-	74	-24.72	293	246	H
	*** 4.87995	38.28	ADV	34.1	-30.8	-12	41.58	54	-24.42	-	-	293	246	H
4	*** 7.31925	43.12	PK2	35.6	-28.4	0	50.32	-	-	74	-23.68	45	311	H
	*** 7.31935	33.87	ADV	35.6	-28.4	-12	41.07	54	-24.93	-	-	45	311	H
6	*** 12.20111	42.57	PK2	38.9	-25.8	0	55.67	-	-	74	-18.33	275	363	H
	*** 12.20105	33.69	ADV	38.9	-25.8	-12	46.79	54	-19.21	-	-	275	363	H
8	*** 4.87946	49.65	PK2	34.1	-30.8	0	52.95	-	-	74	-21.05	295	268	V
	*** 4.87998	43.44	ADV	34.1	-30.8	-12	46.74	54	-19.26	-	-	295	268	V
9	*** 7.31917	43.72	PK2	35.6	-28.4	0	50.92	-	-	74	-23.08	261	296	V
	*** 7.32059	35.7	ADV	35.6	-28.4	-12	42.9	54	-23.1	-	-	261	296	V
11	*** 12.20109	46.68	PK2	38.9	-25.8	0	59.78	-	-	74	-14.22	199	286	V
	*** 12.20097	38.77	ADV	38.9	-25.8	-12	51.87	54	-26.13	-	-	199	286	V
5	9.75871	40.55	Pk	37	-26.6	0	50.95	-	-	-	-	0-360	102	H
10	9.75871	44.1	Pk	37	-26.6	0	54.5	-	-	-	-	0-360	198	V
7	14.64149	31.01	Pk	39.6	-25.7	0	44.91	-	-	-	-	0-360	198	H
12	14.64149	34.01	Pk	39.6	-25.7	0	47.91	-	-	-	-	0-360	198	V
13	17.07829	31.93	Pk	41.3	-23.6	0	49.63	-	-	-	-	0-360	102	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

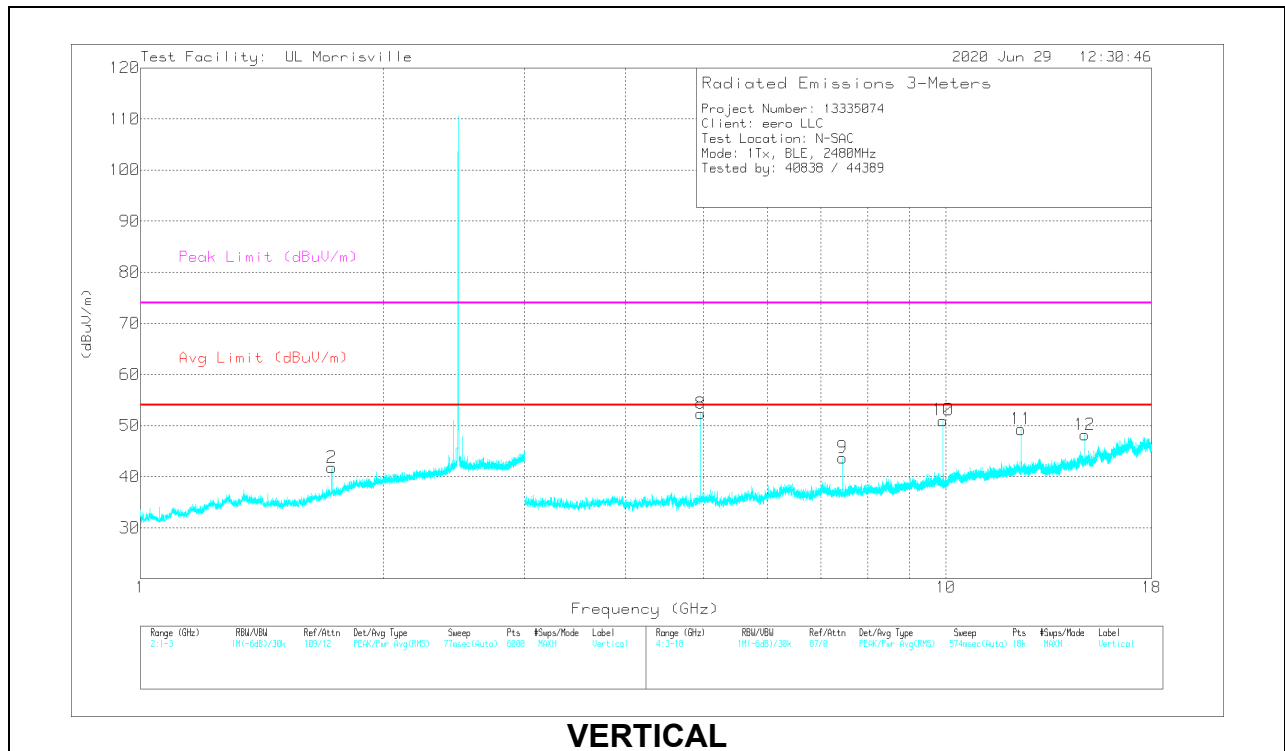
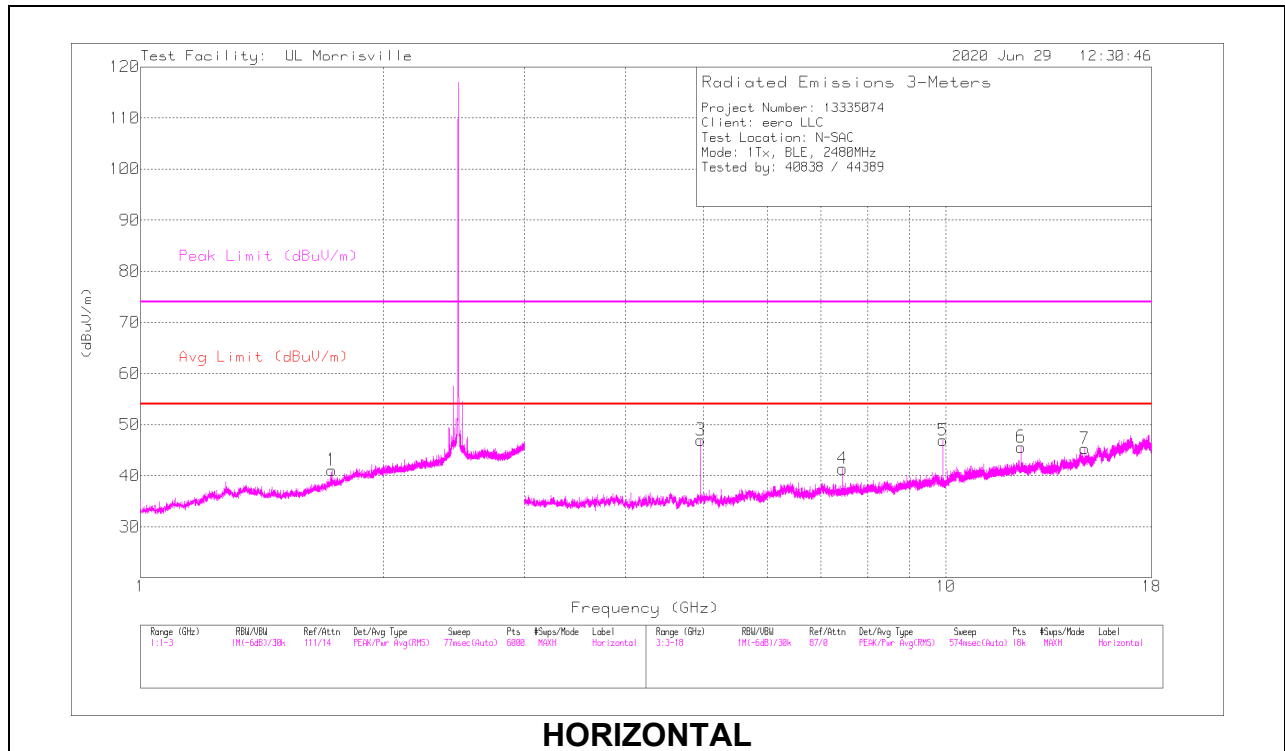
PK2 - Maximum Peak

ADV - Linear Voltage Average

Pk - Peak detector

Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 1.72805	41.16	PK2	29.4	-23.6	0	46.96	-	-	74	-27.04	62	202	H
	** 1.72802	30.95	ADV	29.4	-23.6	-12	36.75	54	-29.25	-	-	62	202	H
2	** 1.72811	40.17	PK2	29.4	-23.6	0	45.97	-	-	74	-28.03	290	243	V
	** 1.72804	30.91	ADV	29.4	-23.6	-12	36.71	54	-29.29	-	-	290	243	V
3	*** 4.96038	51.38	PK2	34.1	-31.7	0	53.78	-	-	74	-20.22	357	390	H
	*** 4.95992	45.42	ADV	34.1	-31.7	-12	47.82	54	-18.18	-	-	357	390	H
4	*** 7.44072	40.09	PK2	35.7	-28.4	0	47.39	-	-	74	-26.61	263	398	H
	*** 7.44051	30.31	ADV	35.7	-28.4	-12	37.61	54	-28.39	-	-	263	398	H
6	*** 12.40104	39.62	PK2	39	-25.8	0	52.82	-	-	74	-21.18	18	371	H
	*** 12.40109	29.56	ADV	38.9	-25.8	-12	42.66	54	-23.34	-	-	18	371	H
8	*** 4.95945	53.25	PK2	34.1	-31.7	0	55.65	-	-	74	-18.35	298	280	V
	*** 4.95993	47.89	ADV	34.1	-31.7	-12	50.29	54	-15.71	-	-	298	280	V
9	*** 7.43917	41.77	PK2	35.8	-28.4	0	49.17	-	-	74	-24.83	271	347	V
	*** 7.43935	32.58	ADV	35.7	-28.4	-12	39.88	54	-26.12	-	-	271	347	V
11	*** 12.39865	42.44	PK2	38.9	-25.8	0	55.54	-	-	74	-18.46	339	331	V
	*** 12.39882	33.79	ADV	38.9	-25.8	-12	46.89	54	-19.11	-	-	339	331	V
5	9.92039	37.05	Pk	37	-27.1	0	46.95	-	-	-	-	0-360	198	H
10	9.92039	41.12	Pk	37	-27.1	0	51.02	-	-	-	-	0-360	198	V
12	14.879	34.87	Pk	39.5	-26.2	0	48.17	-	-	-	-	0-360	198	V
7	14.8815	32.01	Pk	39.5	-26.2	0	45.31	-	-	-	-	0-360	198	H

* - 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

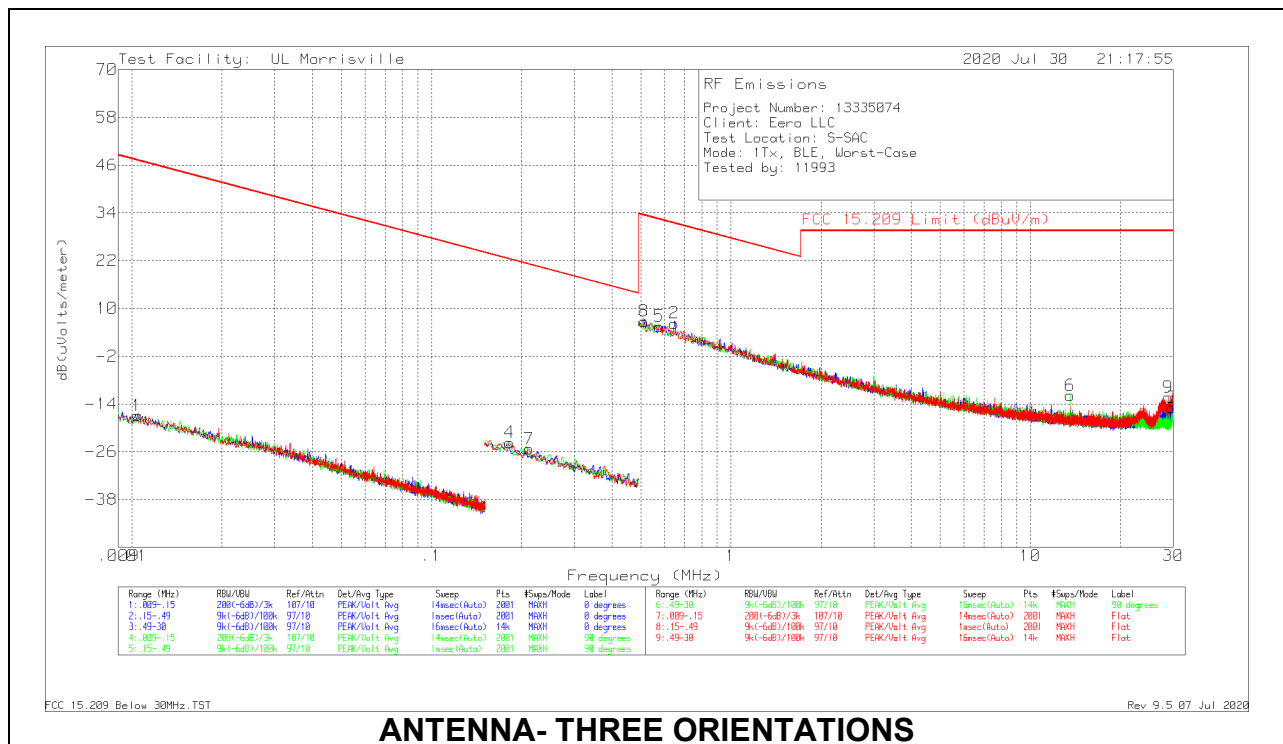
Note: DCCF based on manufacturer's declared duty cycle of 25%, $20\log(0.25) = -12.04\text{dB}$.

10.3. WORST CASE BELOW 30MHZ

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*Log (test distance / 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 10.42 KHz resulted in a level of -16.93 dBuV/m, which is equivalent to -16.93-51.5 = -68.43 dBuA/m, which has the same margin, -64.18 dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



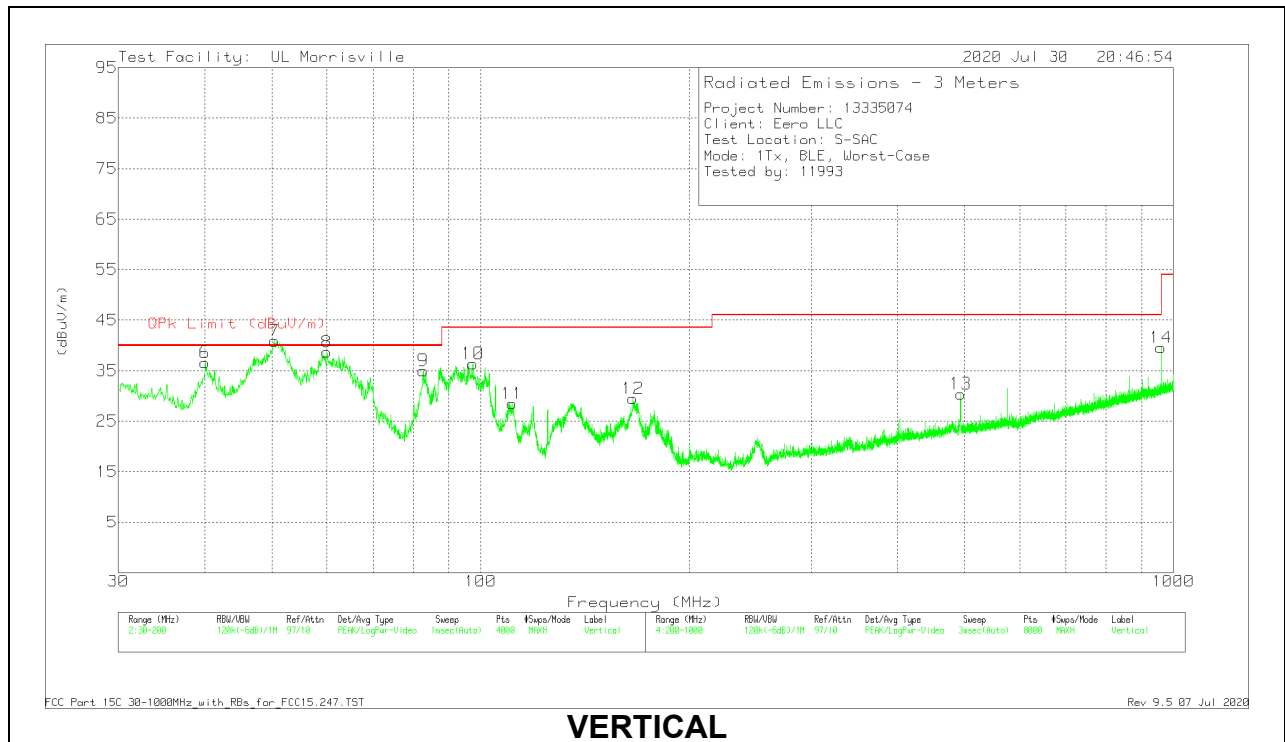
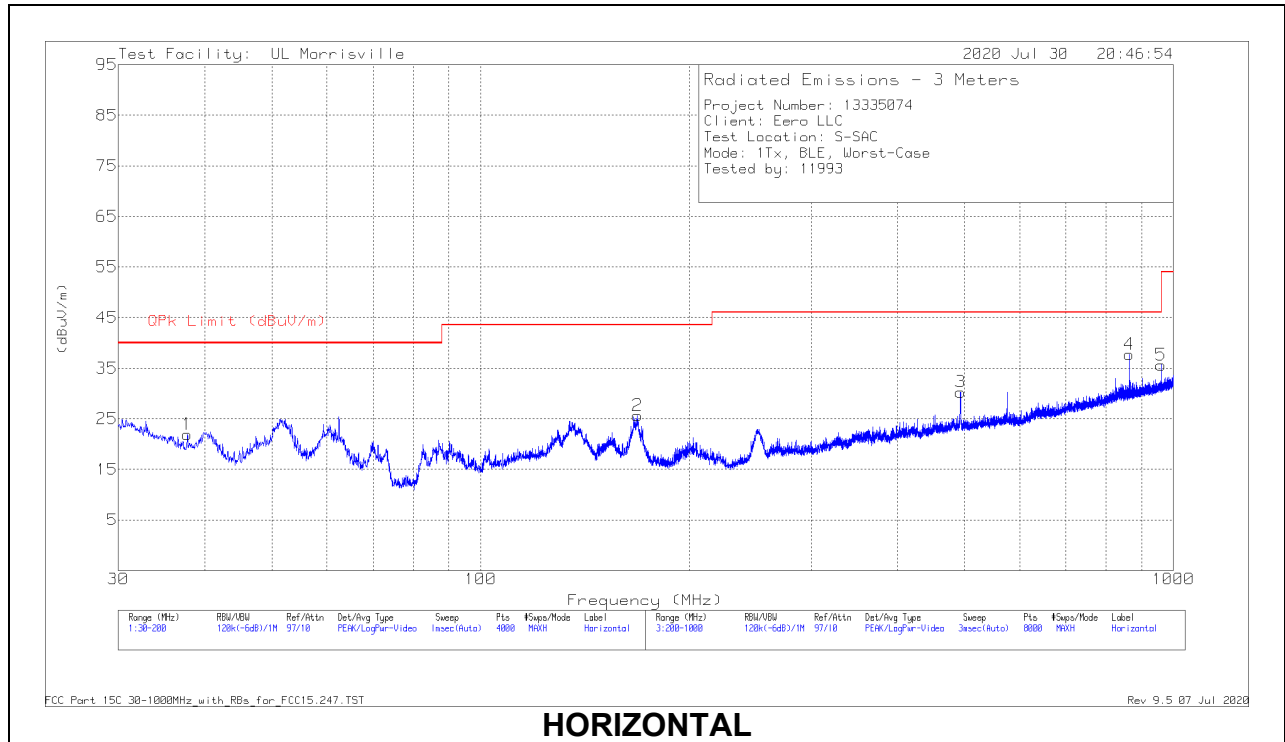
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 Avg/QP Limit (dBuV/m)	FCC 15.209 Pk Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)
1	.01042	44.97	Pk	18	.1	-80	-16.93	47.25	67.25	-64.18	0-360
4	.18247	45.2	Pk	11	.1	-80	-23.7	22.38	42.38	-46.08	0-360
7	.21188	43.57	Pk	11	.1	-80	-25.33	21.08	41.08	-46.41	0-360
8	.51319	35.65	Pk	11	.1	-40	6.75	33.4	-	-26.65	0-360
5	.57643	34.36	Pk	11	.1	-40	5.46	32.39	-	-26.93	0-360
2	.64599	35.06	Pk	11	.2	-40	6.26	31.4	-	-25.14	0-360
6	13.5596	17.44	Pk	10	.7	-40	-11.86	29.54	-	-41.4	0-360
9	28.88265	18.33	Pk	8.2	1.1	-40	-12.37	29.54	-	-41.91	0-360
3	29.76169	16.04	Pk	8	1.1	-40	-14.86	29.54	-	-44.4	0-360

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0081 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 37.737	31.53	Pk	21.8	-31.4	21.93	40	-18.07	0-360	399	H
2	* ** 168.5008	37.63	Pk	17.9	-29.9	25.63	43.52	-17.89	0-360	299	H
11	* ** 111.0685	40.07	Pk	18.9	-30.5	28.47	43.52	-15.05	0-360	101	V
12	* ** 165.9927	41.28	Pk	18.1	-29.9	29.48	43.52	-14.04	0-360	101	V
3	** 493.1381	34.29	Pk	23.7	-27.7	30.29	46.02	-15.73	0-360	101	H
4	** 863.9863	35.73	Pk	28	-26	37.73	46.02	-8.29	0-360	101	H
5	* ** 960.0988	31.52	Pk	29	-24.9	35.62	53.97	-18.35	0-360	101	H
13	** 493.2381	34.38	Pk	23.7	-27.7	30.38	46.02	-15.64	0-360	101	V
14	* ** 960.0988	35.47	Pk	29	-24.9	39.57	53.97	-14.4	0-360	101	V
6	40.0326	47.89	Pk	20.1	-31.4	36.59	-	-	0-360	101	V
7	50.4478	57.99	Pk	14.1	-31.2	40.89	-	-	0-360	101	V
8	60.0128	56.07	Pk	13.7	-31.1	38.67	-	-	0-360	101	V
9	82.6711	52.19	Pk	13.6	-30.8	34.99	-	-	0-360	101	V
10	97.5075	51.17	Pk	15.8	-30.6	36.37	-	-	0-360	101	V

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

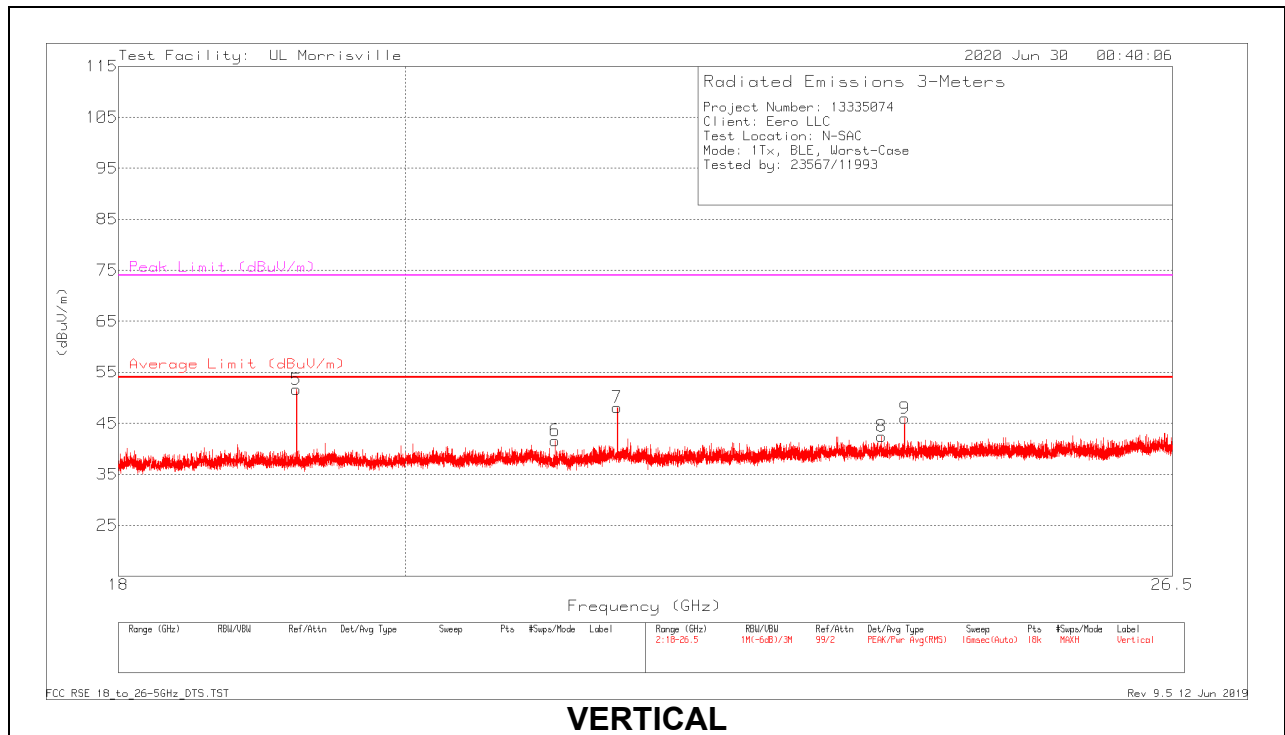
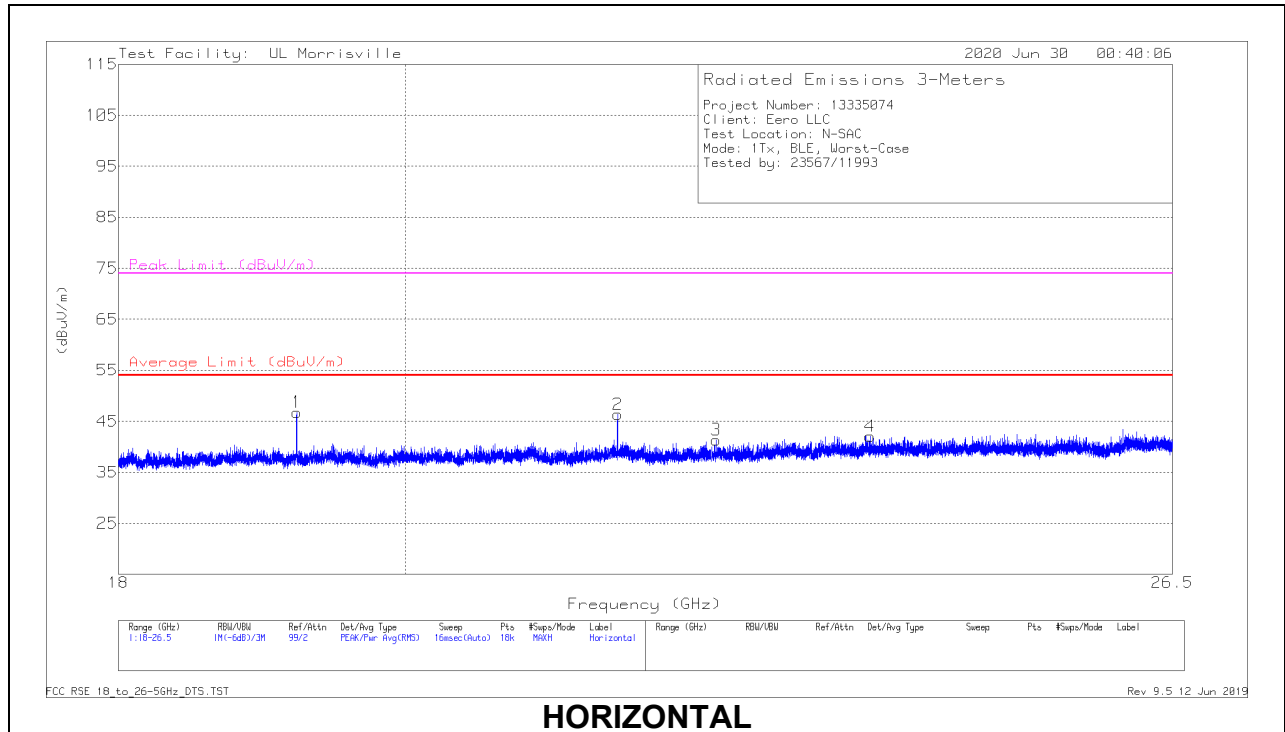
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

10.5. 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)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 19.21793	53.48	Pk	32.6	-39.3	46.78	54	-7.22	74	-27.22	0-360	198	H
3	*** 22.41552	47.06	Pk	33.5	-39.2	41.36	54	-12.64	74	-32.64	0-360	148	H
4	*** 23.71703	46.77	Pk	34	-38.7	42.07	54	-11.93	74	-31.93	0-360	102	H
5	*** 19.21386	59.4	PK2	32.6	-39.3	52.7	-	-	74	-21.3	204	235	V
	*** 19.21407	50.66	ADV	32.6	-39.3	43.96	54	-10.04	-	-	204	235	V
6	*** 21.12723	47.82	Pk	33	-39.2	41.62	54	-12.38	74	-32.38	0-360	252	V
8	*** 23.81715	47.07	Pk	34	-38.6	42.47	54	-11.53	74	-31.53	0-360	152	V
7	21.61553	53.93	Pk	33.3	-39.1	48.13	-	-	-	-	0-360	252	V
2	21.61978	52.14	Pk	33.3	-39.1	46.34	-	-	-	-	0-360	298	H
9	24.02258	50.59	Pk	34	-38.6	45.99	-	-	-	-	0-360	298	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

ADV - Linear Voltage Average

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

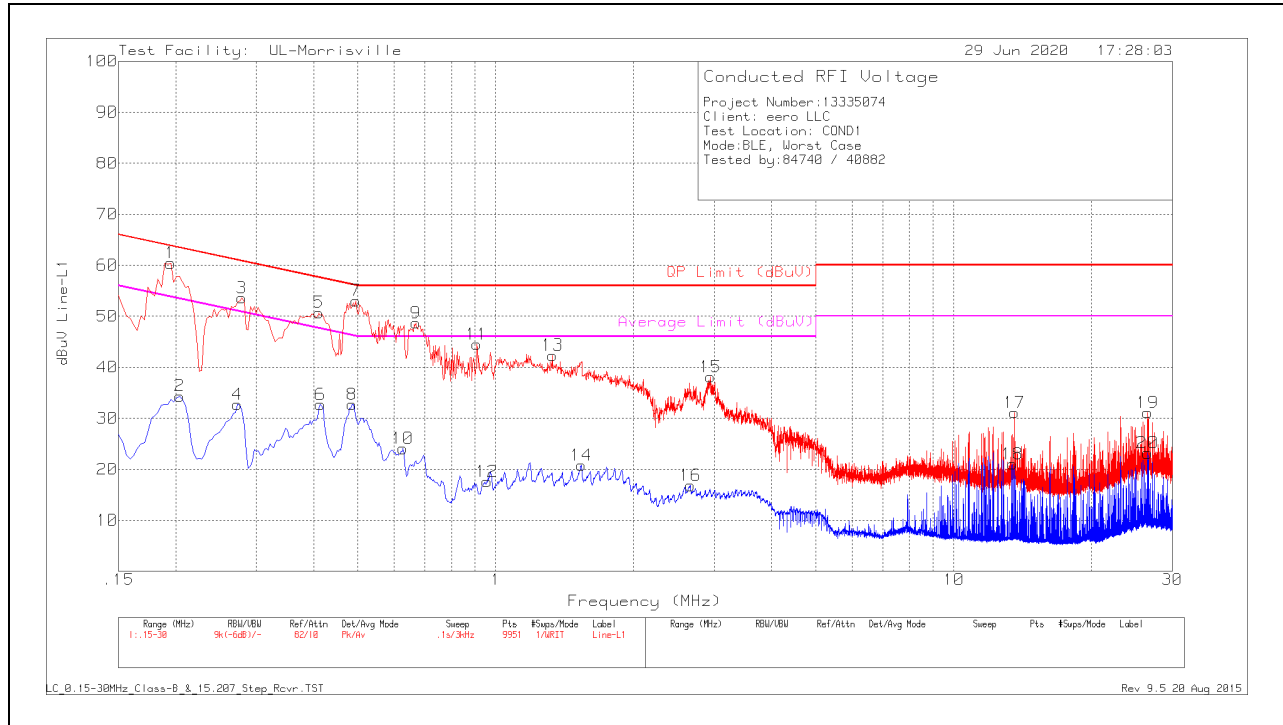
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

RESULTS

11.1.1. AC Power Line Host

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	.1925	39.3	Qp	.2	9.7	49.2	63.93	-14.73	-	-
2	.204	24.58	Av	.1	9.7	34.38	-	-	53.45	-19.07
3	.279	43.81	Pk	.1	9.7	53.61	60.85	-7.24	-	-
4	.273	22.89	Av	.1	9.7	32.69	-	-	51.03	-18.34
5	.411	40.92	Pk	.1	9.7	50.72	57.63	-6.91	-	-
6	.414	22.94	Av	.1	9.7	32.74	-	-	47.57	-14.83
7	.49401	36.75	Qp	.1	9.8	46.65	56.1	-9.45	-	-
8	.486	22.82	Av	.1	9.8	32.72	-	-	46.24	-13.52
9	.669	38.81	Pk	.1	9.8	48.71	56	-7.29	-	-
10	.627	14.17	Av	.1	9.8	24.07	-	-	46	-21.93
11	.909	34.71	Pk	0	9.8	44.51	56	-11.49	-	-
12	.957	7.8	Av	0	9.8	17.6	-	-	46	-28.4
13	1.329	32.56	Pk	0	9.8	42.36	56	-13.64	-	-
14	1.536	11.02	Av	0	9.8	20.82	-	-	46	-25.18
15	2.94	28.2	Pk	.1	9.8	38.1	56	-17.9	-	-
16	2.658	7.02	Av	0	9.8	16.82	-	-	46	-29.18
17	13.56	20.99	Pk	.1	10	31.09	60	-28.91	-	-
18	13.419	10.92	Av	.1	10	21.02	-	-	50	-28.98
19	26.487	20.59	Pk	.3	10.2	31.09	60	-28.91	-	-
20	26.487	12.71	Av	.3	10.2	23.21	-	-	50	-26.79

Pk - Peak detector
 Av - Average detection
 Qp - Quasi-Peak detector

NOTE: Markers 17, 13.56MHz is an external NFC signal unrelated to the EUT.

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	.189	38.66	Pk	.2	9.7	48.56	64.08	-15.52	-	-
22	.204	13.74	Av	.1	9.7	23.54	-	-	53.45	-29.91
23	.42005	36.35	Qp	.1	9.7	46.15	57.45	-11.3	-	-
24	.42	18.54	Av	.1	9.7	28.34	-	-	47.45	-19.11
25	.504	40.1	Pk	0	9.8	49.9	56	-6.1	-	-
26	.489	14.67	Av	.1	9.8	24.57	-	-	46.18	-21.61
27	.62902	31.12	Qp	0	9.8	40.92	56	-15.08	-	-
28	.627	12.61	Av	0	9.8	22.41	-	-	46	-23.59
29	.756	37.99	Pk	0	9.8	47.79	56	-8.21	-	-
30	.765	13.07	Av	0	9.8	22.87	-	-	46	-23.13
31	.834	36.85	Pk	0	9.8	46.65	56	-9.35	-	-
32	.834	14.32	Av	0	9.8	24.12	-	-	46	-21.88
33	.954	36.06	Pk	0	9.8	45.86	56	-10.14	-	-
34	.912	13.13	Av	0	9.8	22.93	-	-	46	-23.07
35	1.893	29.27	Pk	0	9.8	39.07	56	-16.93	-	-
36	1.887	8.22	Av	0	9.8	18.02	-	-	46	-27.98
37	2.664	27.8	Pk	0	9.8	37.6	56	-18.4	-	-
38	2.733	7.26	Av	0	9.8	17.06	-	-	46	-28.94
39	3.993	19.28	Pk	0	9.9	29.18	56	-26.82	-	-
40	3.987	3.06	Av	0	9.9	12.96	-	-	46	-33.04
41	13.56	20.57	Pk	.1	10	30.67	60	-29.33	-	-
42	13.56	10.16	Av	.1	10	20.26	-	-	50	-29.74

Pk - Peak detector
 Av - Average detection
 Qp - Quasi-Peak detector

Note: Markers 41 and 42, 13.56MHz is an external NFC signal unrelated to the EUT.

12. SETUP PHOTOS

Please refer to R13335074-EP1 for setup photos.

END OF TEST REPORT