



CERTIFICATION TEST REPORT

Report Number. : R12875567R-E1

Applicant : Bose Corporation
100 The Mountain
Framingham, MA 01701, USA

Model : BL2R

FCC ID : A94BL2R

IC : 3232A-BL2R

EUT Description : Wireless Headset

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

Date Of Issue:
2019-06-07

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REPORT REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2019-06-07	Initial Issue	Brian T. Kiewra

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION	6
4.3. MEASUREMENT UNCERTAINTY	6
5. EQUIPMENT UNDER TEST	7
5.1. EUT DESCRIPTION	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	7
5.4. SOFTWARE AND FIRMWARE.....	7
5.5. WORST-CASE CONFIGURATION AND MODE.....	7
5.6. DESCRIPTION OF TEST SETUP.....	8
6. MEASUREMENT METHOD.....	9
7. TEST AND MEASUREMENT EQUIPMENT	10
8. ANTENNA PORT TEST RESULTS.....	12
8.1. ON TIME AND DUTY CYCLE.....	12
8.2. 99% BANDWIDTH.....	13
8.3. 6 dB BANDWIDTH.....	14
8.4. OUTPUT POWER.....	15
8.5. AVERAGE POWER.....	16
8.5.1. BLE (1Mbps).....	16
8.6. POWER SPECTRAL DENSITY	17
8.7. CONDUCTED SPURIOUS EMISSIONS.....	18
9. RADIATED TEST RESULTS.....	20
9.1. LIMITS AND PROCEDURE	20
9.2. TRANSMITTER ABOVE 1 GHz	22
9.3. WORST CASE BELOW 30MHZ	32
9.4. WORST CASE BELOW 1 GHZ.....	33
9.5. WORST CASE 18-26 GHZ	35
10. SETUP PHOTOS	37
END OF TEST REPORT	37

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Bose Corporation
100 The Mountain
Framingham, MA 01701, USA

EUT DESCRIPTION: Wireless Headset

MODEL: BL2R

SERIAL NUMBER: Radiated Samples: R3088, R0863
Conducted Samples: BL2R1

DATE TESTED: 2019-05-28 to 2019-06-04

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.

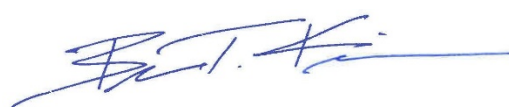
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Approved & Released
For UL LLC By:



Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:



Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, 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., Suite B
ISED Site Code: 2180C	
☐ Chamber A RTP	☐ North Chamber
☐ Chamber C RTP	☒ South Chamber

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

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

4.3. 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)
RF output power, radiated (SAC)	4.52 dB
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	2.00 dB
All emissions, radiated	4.88 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. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a right earbud of a wireless headset with a BT/BLE transceiver.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	8.44	6.98

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an LDS antenna with a maximum gain of 0 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was:

- BT firmware version 13944.
- Audio firmware version 5360.
- Apps0 firmware version 1213.
- Apps1 firmware version 1547165335.

The EUT driver software installed in the host equipment during testing was 97.0.0.0

The test utility software, BlueTest3, used during testing was 3.1.4

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT only transmits while battery powered therefore powerline conducted emissions were not performed.

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

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	L470	PF0ZV66P	NA
Debugger	Qualcomm	TRBI 200	N171219	NA

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	I/O	1	Hardwired	Single strand	<1m	For testing purposes only. Connects to laptop through debugger for configuration.
2	DC	1	hardwired	Single strand	<3m	For testing purposes only. Provides DC power.

SETUP DIAGRAMS

Please refer to R12875567R-EP1 for setup diagrams

6. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause 11.8.1

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

Output Power: ANSI C63.10 Subclause 11.9.1.3 (PKPM1)

PSD: ANSI C63.10 Subclause 11.10.2 (Peak PSD)

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

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

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

7. TEST AND MEASUREMENT EQUIPMENT

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

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-01-24	2020-01-31
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2018-07-24	2019-07-24
1-18 GHz					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
18-40 GHz					
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2018-11-08	2019-11-08
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2019-05-02	2020-05-02
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2019-05-02	2020-05-02
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-09-30	2019-09-30
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2019-02-28	2020-02-28
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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
T177 (PRE0079253)	Spectrum Analyzer	Agilent Technologies	E4446A	2019-04-22	2020-04-22
PWM003 (PRE0137345)	RF Power Meter	Keysight Technologies	N1911A	2018-07-30	2019-07-30
PWS003 (PRE0126442)	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2018-07-30	2019-07-30
SN 181562858	Environmental Meter	Fisher Scientific	14-650-118	2018-09-04	2020-09-04

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

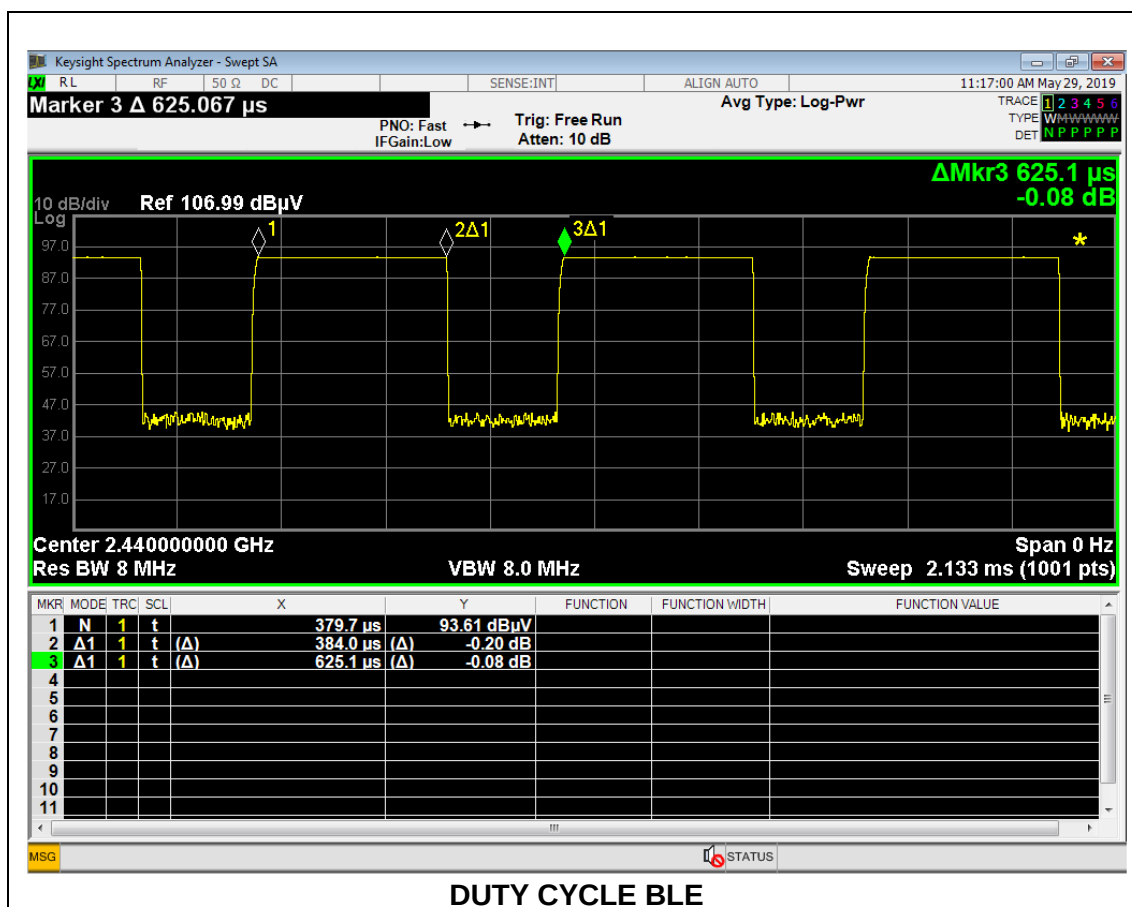
None; for reporting purposes only.

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	0.384	0.625	0.614	61.44%	2.12	2.604

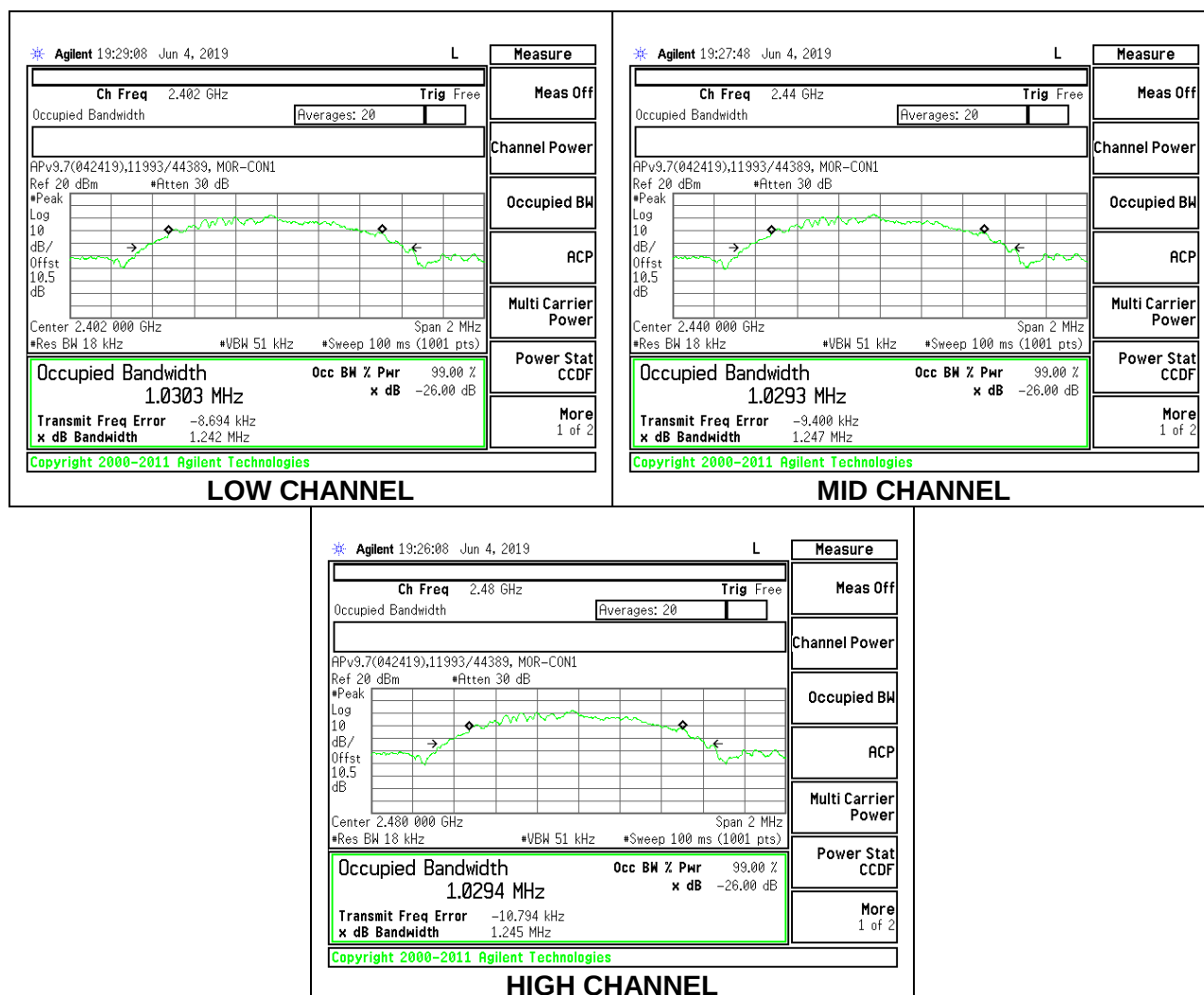


8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0303
Middle	2440	1.0293
High	2480	1.0294



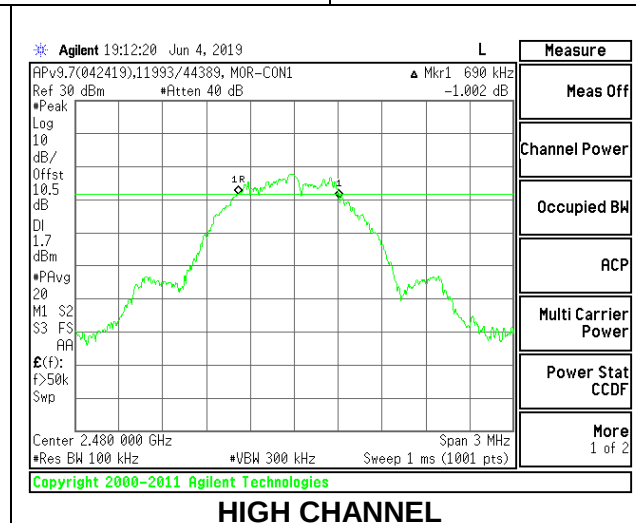
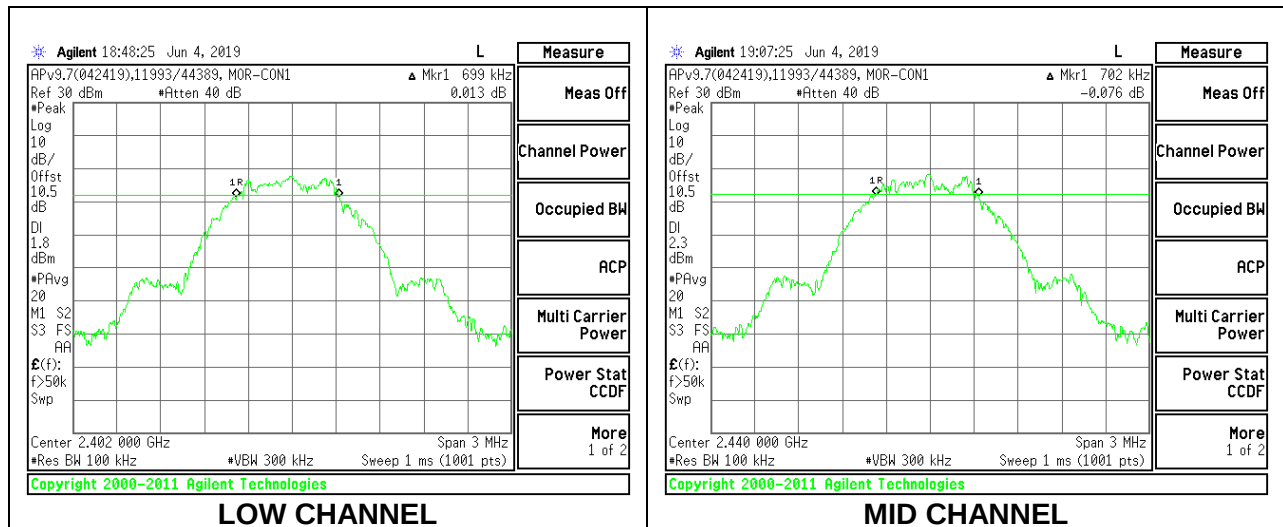
8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
RSS-247 5.2 (a)

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

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.699	0.5
Middle	2440	0.702	0.5
High	2480	0.690	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)
RSS-247 5.4 (d)

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

Tested By:	11993/44389
Date:	2019-06-04

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.010	30	-21.990
Middle	2440	8.440	30	-21.560
High	2480	7.830	30	-22.170

8.5. 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

8.5.1. BLE (1Mbps)

Tested By:	11993 / 44389
Date:	2019-06-04

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.85
Middle	2440	8.29
High	2480	7.64

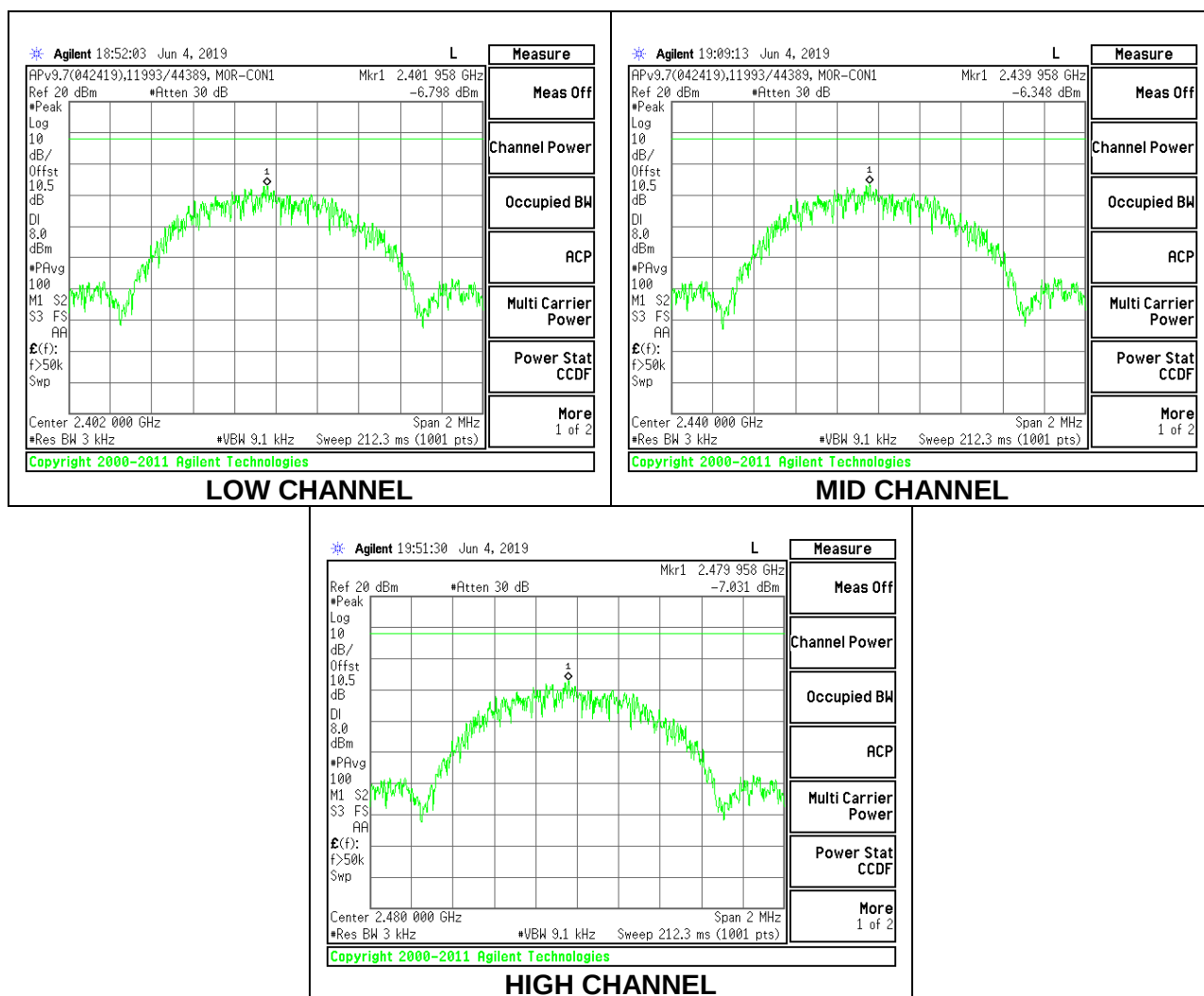
8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
RSS-247 (5.2) (b)

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

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-6.80	8	-14.80
Middle	2440	-6.35	8	-14.35
High	2480	-7.09	8	-15.09



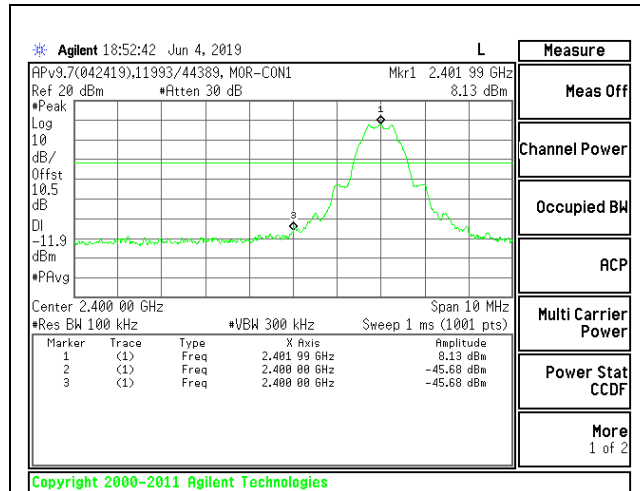
8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

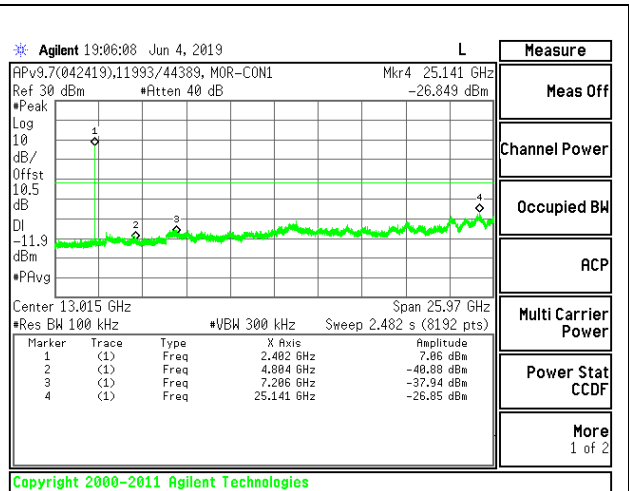
FCC §15.247 (d)

RSS-247 5.5

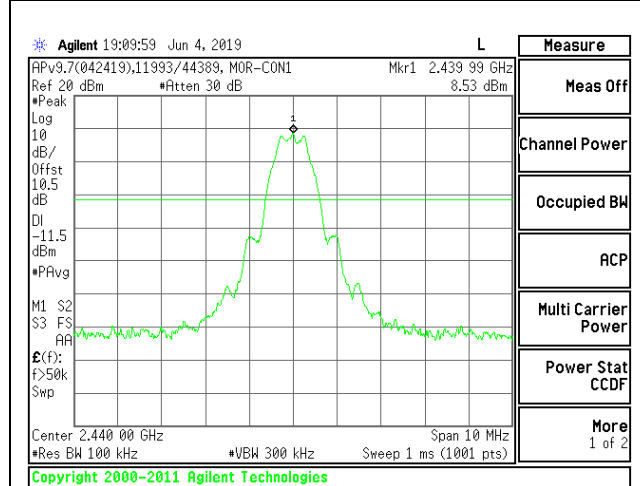
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.



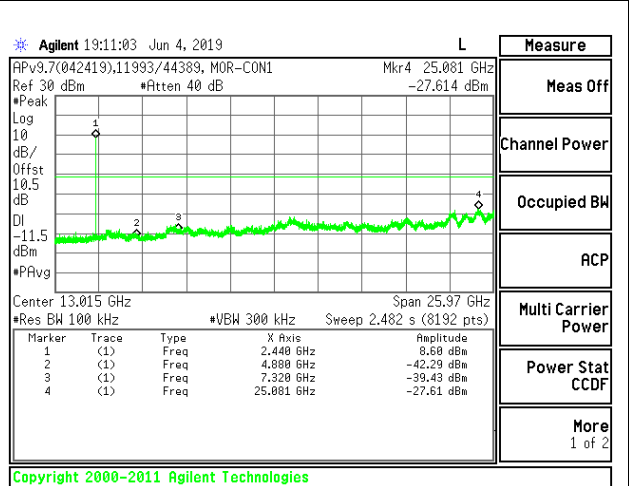
LOW CHANNEL BANDEDGE



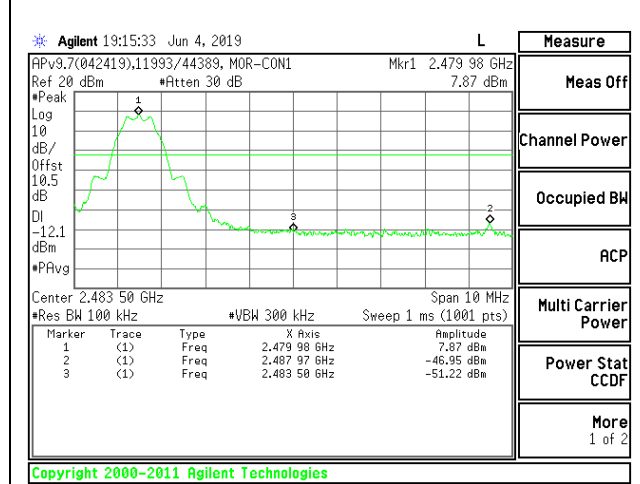
OUT-OF-BAND LOW CHANNEL



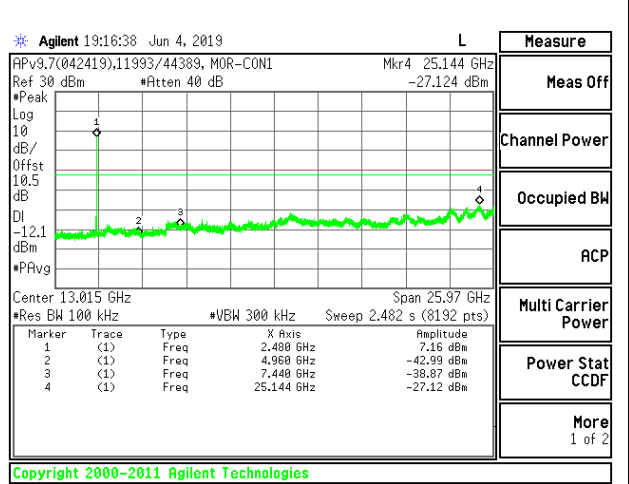
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
RSS-GEN, Section 8.9 and 8.10.

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurements below 1GHz; 1.5 m above the ground plane for measurements 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. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was RMS.

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

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

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

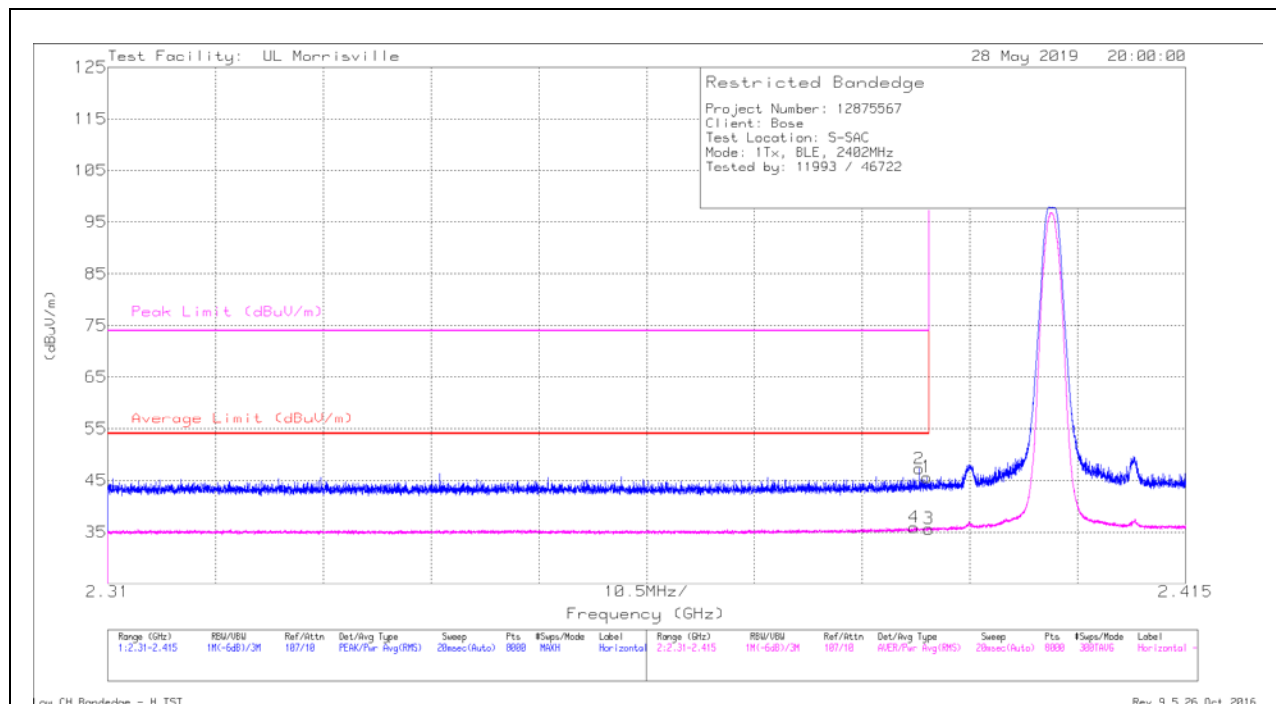
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

9.2. TRANSMITTER ABOVE 1 GHz

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	37.69	Pk	31.9	-24	0	45.59	-	-	74	-28.41	221	108	H
2	*** 2.389	39.34	Pk	31.9	-24	0	47.24	-	-	74	-26.76	221	108	H
3	*** 2.39	25.6	RMS	31.9	-24	2.12	35.62	54	-18.38	-	-	221	108	H
4	*** 2.389	25.87	RMS	31.9	-24	2.12	35.89	54	-18.11	-	-	221	108	H

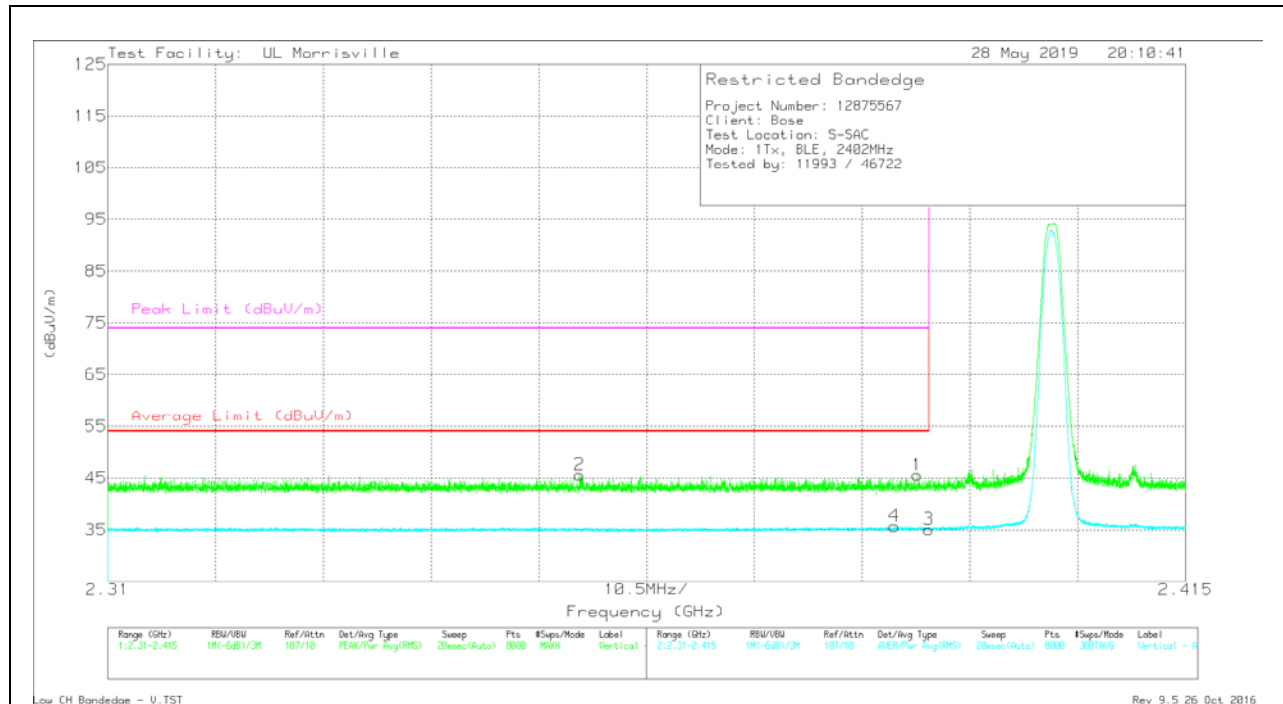
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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
2	* ** 2.356	37.68	Pk	31.7	-23.8	0	45.58	-	-	74	-28.42	139	262	V
4	* ** 2.387	25.69	RMS	31.9	-24	2.12	35.71	54	-18.29	-	-	139	262	V
1	* ** 2.389	37.64	Pk	31.9	-24	0	45.54	-	-	74	-28.46	139	262	V
3	* ** 2.39	25.08	RMS	31.9	-24	2.12	35.1	54	-18.9	-	-	139	262	V

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

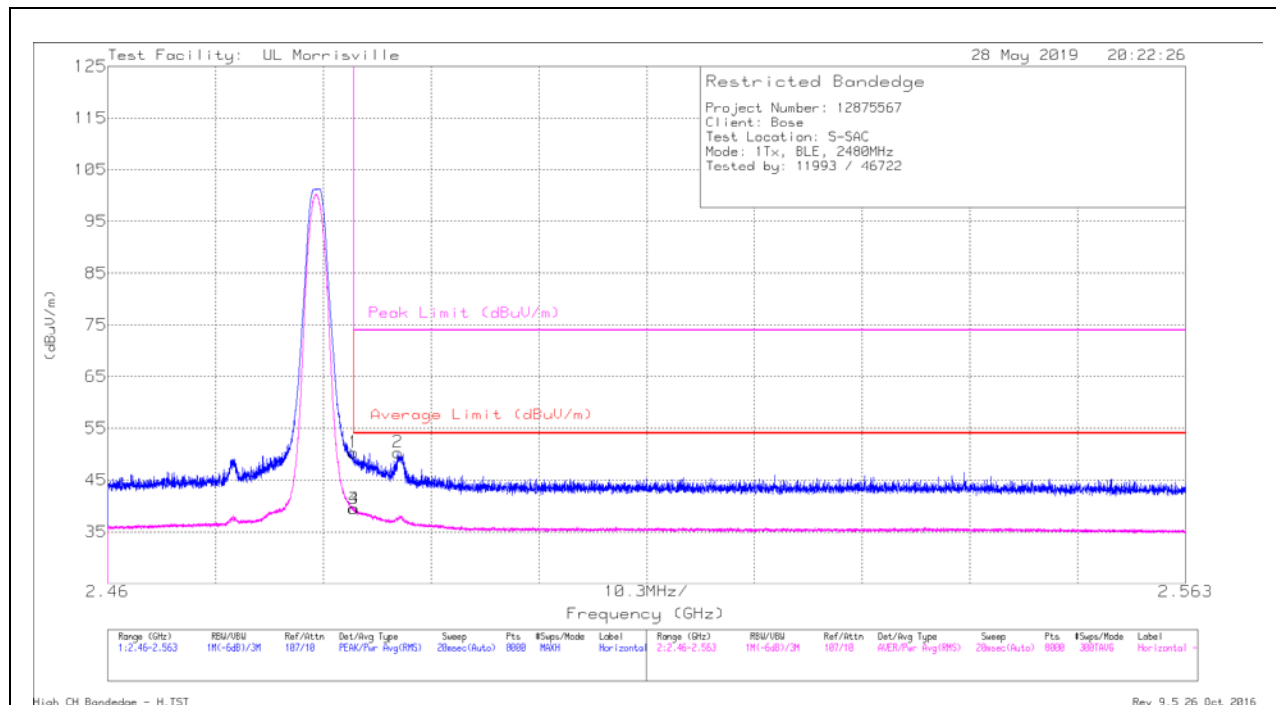
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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	* ** 2.484	42.54	Pk	32.3	-24.5	0	50.34	-	-	74	-23.66	243	116	H
3	* ** 2.484	29.53	RMS	32.3	-24.5	2.12	39.45	54	-14.55	-	-	243	116	H
4	* ** 2.484	29.58	RMS	32.3	-24.5	2.12	39.5	54	-14.5	-	-	243	116	H
2	* ** 2.488	42.58	Pk	32.3	-24.5	0	50.38	-	-	74	-23.62	243	116	H

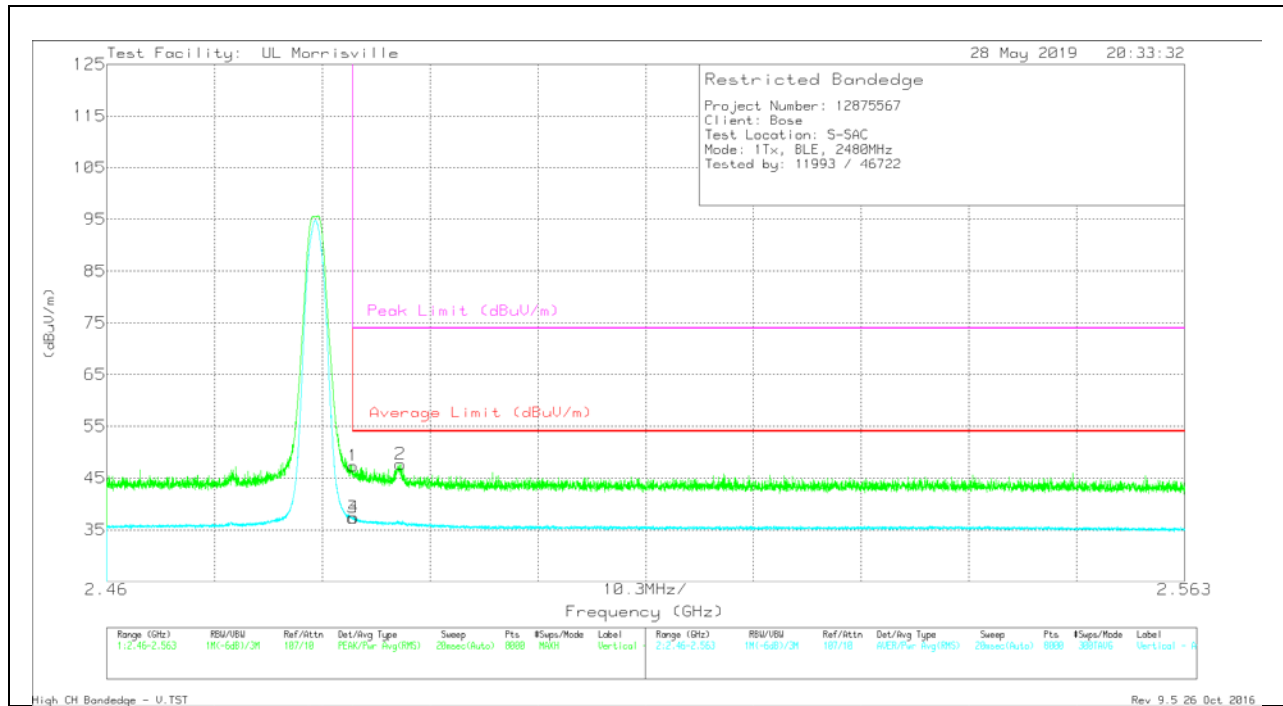
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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	* ** 2.484	39.53	Pk	32.3	-24.5	0	47.33	-	-	74	-26.67	345	264	V
3	* ** 2.484	27.4	RMS	32.3	-24.5	2.12	37.32	54	-16.68	-	-	345	264	V
4	* ** 2.484	27.42	RMS	32.3	-24.5	2.12	37.34	54	-16.66	-	-	345	264	V
2	* ** 2.488	39.87	Pk	32.3	-24.5	0	47.67	-	-	74	-26.33	345	264	V

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

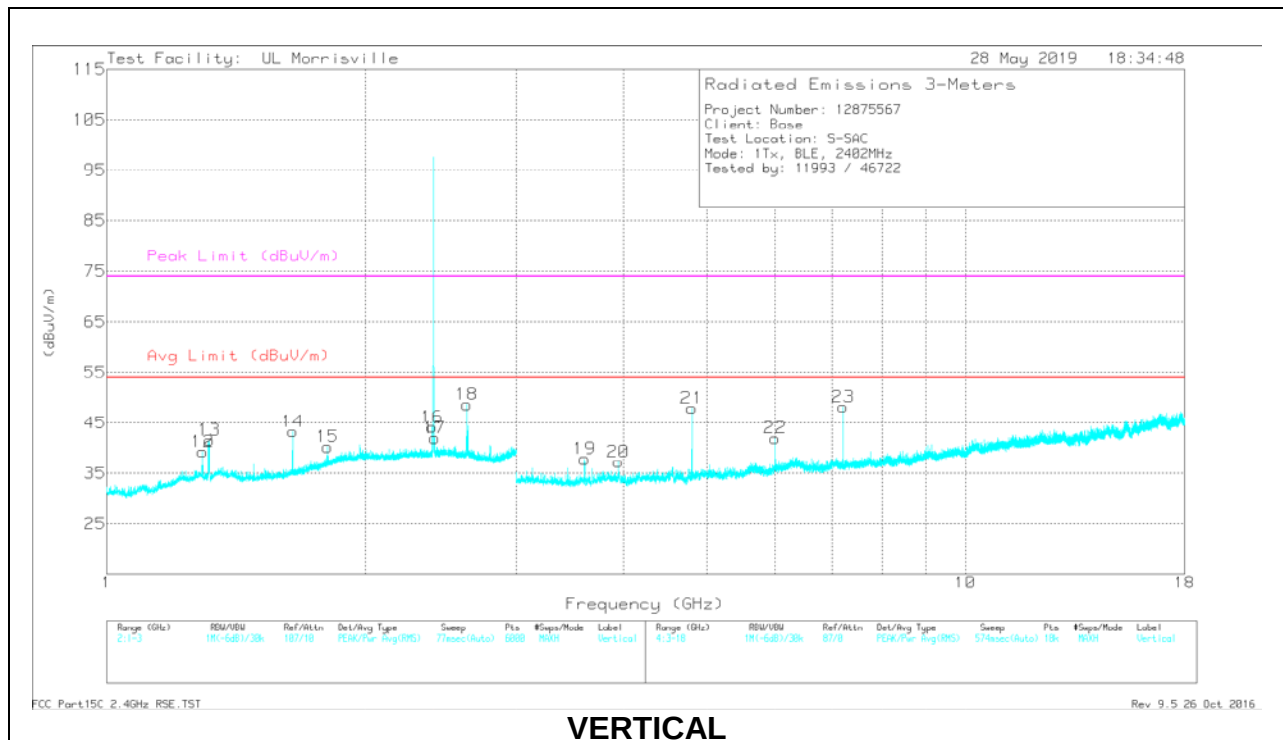
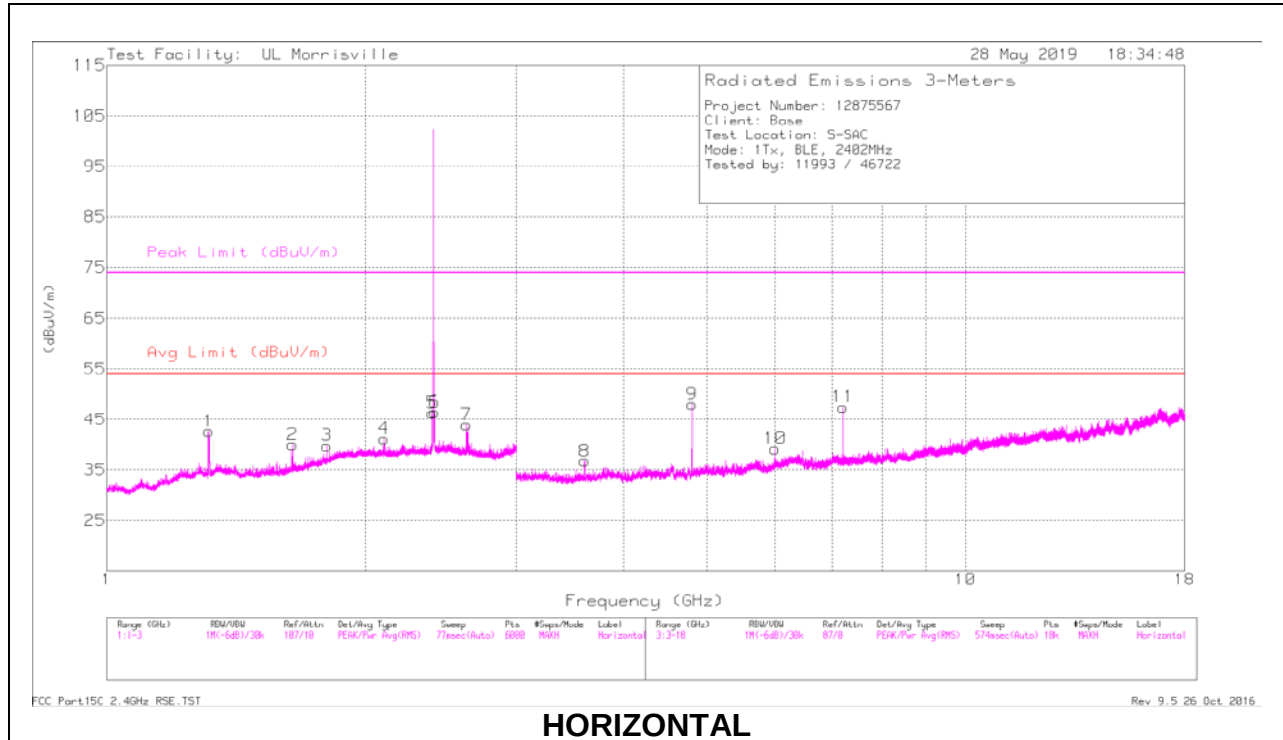
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	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	*** 1.314	43.77	PK2	28.9	-23.1	0	49.57	-	-	74	-24.43	180	218	H
	*** 1.314	24.63	MAv1	28.9	-23.1	2.12	32.55	54	-21.45	-	-	180	218	H
2	* 1.646	35.38	PK2	28.3	-22.1	0	41.58	-	-	74	-32.42	85	116	H
	* 1.646	23.97	MAv1	28.3	-22.1	2.12	32.29	54	-21.71	-	-	85	116	H
12	* 1.291	41.15	PK2	29	-23.2	0	46.95	-	-	74	-27.05	207	113	V
	* 1.293	24.25	MAv1	29	-23.2	2.12	32.17	54	-21.83	-	-	207	113	V
13	*** 1.317	39.36	PK2	28.9	-23.1	0	45.16	-	-	74	-28.84	215	139	V
	*** 1.314	23.67	MAv1	28.9	-23.1	2.12	31.59	54	-22.41	-	-	215	139	V
8	*** 3.603	42.73	PK2	32.9	-31.6	0	44.03	-	-	74	-29.97	82	114	H
	*** 3.603	31.59	MAv1	32.9	-31.6	2.12	35.01	54	-18.99	-	-	82	114	H
9	*** 4.804	48.1	PK2	34.2	-31	0	51.3	-	-	74	-22.7	1	106	H
	*** 4.804	40.49	MAv1	34.2	-31	2.12	45.81	54	-8.19	-	-	1	106	H
19	*** 3.603	42.65	PK2	32.9	-31.6	0	43.95	-	-	74	-30.05	28	269	V
	*** 3.603	31.94	MAv1	32.9	-31.6	2.12	35.36	54	-18.64	-	-	28	269	V
20	*** 3.943	39.75	PK2	33.4	-31.7	0	41.45	-	-	74	-32.55	97	192	V
	*** 3.942	27.78	MAv1	33.4	-31.7	2.12	31.6	54	-22.4	-	-	97	192	V
21	*** 4.804	48.58	PK2	34.2	-31	0	51.78	-	-	74	-22.22	8	285	V
	*** 4.804	41.76	MAv1	34.2	-31	2.12	47.08	54	-6.92	-	-	8	285	V
14	1.648	37.06	Pk	28.3	-22.1	0	43.26	-	-	-	-	0-360	200	V
3	1.805	31.94	Pk	30.2	-22.3	0	39.84	-	-	-	-	0-360	101	H
15	1.808	32.33	Pk	30.2	-22.3	0	40.23	-	-	-	-	0-360	200	V
4	2.105	33	Pk	31.2	-23	0	41.2	-	-	-	-	0-360	199	H
5	2.394	38.42	Pk	31.9	-24	0	46.32	-	-	-	-	0-360	101	H
16	2.394	36.22	Pk	31.9	-24	0	44.12	-	-	-	-	0-360	200	V
6	2.41	38.54	Pk	31.9	-24	0	46.44	-	-	-	-	0-360	101	H
17	2.41	34.08	Pk	31.9	-24	0	41.98	-	-	-	-	0-360	101	V
7	2.625	36.85	Pk	32.4	-25.3	0	43.95	-	-	-	-	0-360	199	H
18	2.626	41.5	Pk	32.4	-25.3	0	48.6	-	-	-	-	0-360	101	V
10	6.004	32.44	Pk	35	-28.2	0	39.24	-	-	-	-	0-360	102	H
22	6.005	35.16	Pk	35	-28.2	0	41.96	-	-	-	-	0-360	101	V
11	7.206	39.76	Pk	35.7	-28	0	47.46	-	-	-	-	0-360	102	H
23	7.207	40.43	Pk	35.7	-28	0	48.13	-	-	-	-	0-360	101	V

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

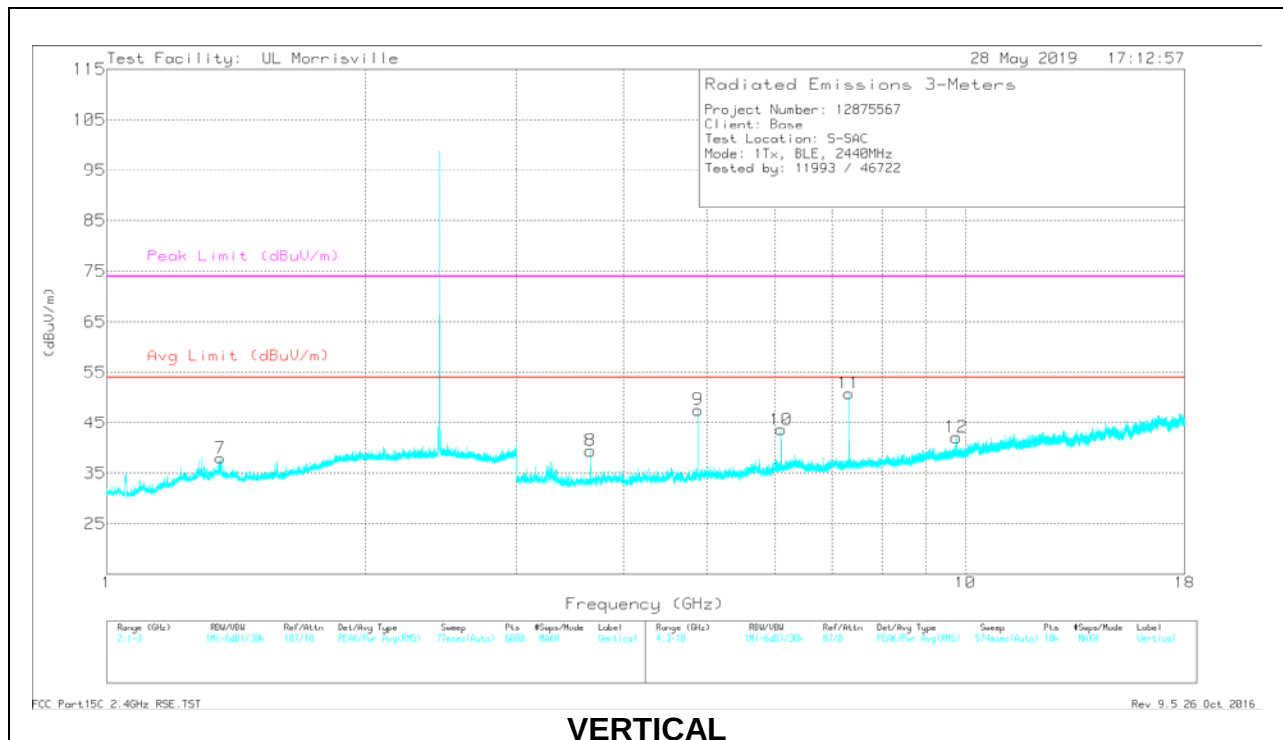
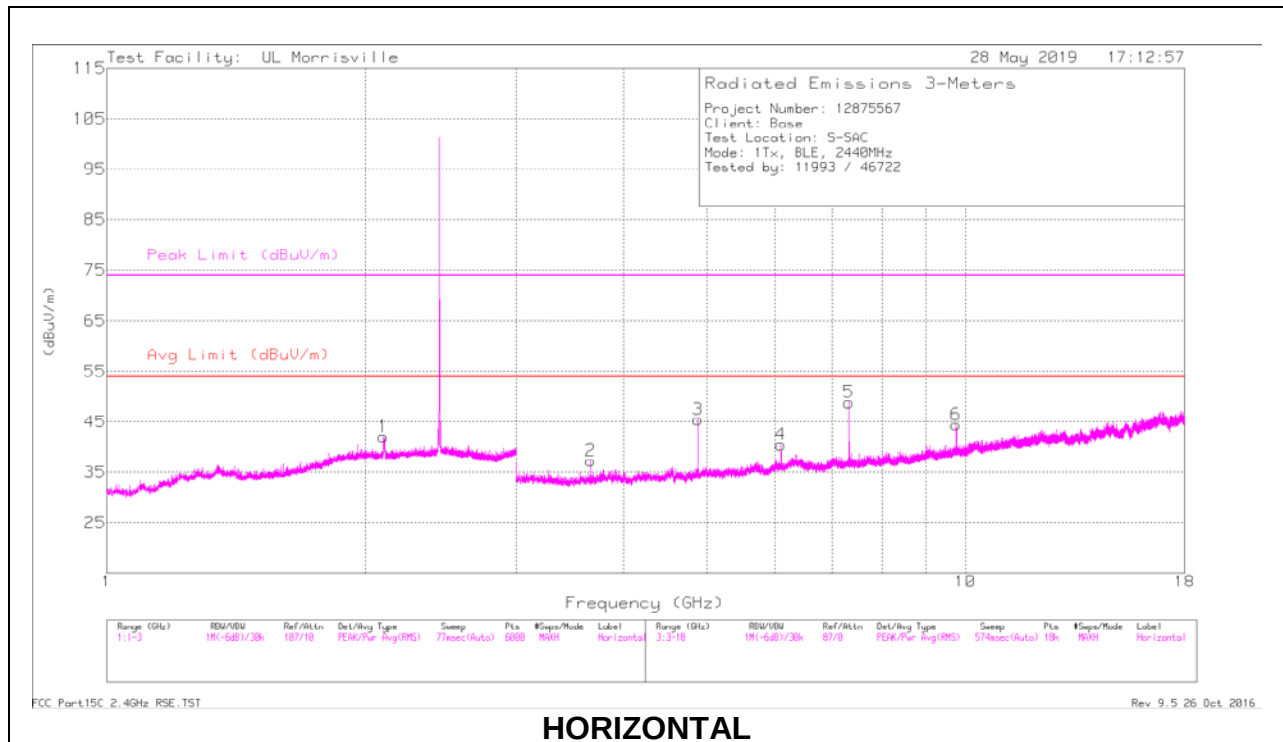
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

MAv1 - Maximum RMS Average

Pk - Peak detector

MID 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
7	* ** 1.356	37.57	PK2	29.3	-22.9	0	43.97	-	-	74	-30.03	35	153	V
	* ** 1.357	24	MAv1	29.3	-22.9	2.12	32.52	54	-21.48	-	-	35	153	V
2	* ** 3.659	43.1	PK2	32.9	-32	0	44	-	-	74	-30	91	127	H
	* ** 3.66	33.2	MAv1	32.9	-32.1	2.12	36.12	54	-17.88	-	-	91	127	H
3	* ** 4.88	46.61	PK2	34	-30.6	0	50.01	-	-	74	-23.99	1	133	H
	* ** 4.88	39.8	MAv1	34	-30.6	2.12	45.32	54	-8.68	-	-	1	133	H
5	* ** 7.321	44.25	PK2	35.7	-27.5	0	52.45	-	-	74	-21.55	224	120	H
	* ** 7.319	36.04	MAv1	35.7	-27.5	2.12	46.36	54	-7.64	-	-	224	120	H
8	* ** 3.66	44.43	PK2	32.9	-32.1	0	45.23	-	-	74	-28.77	25	204	V
	* ** 3.66	33.64	MAv1	32.9	-32.1	2.12	36.56	54	-17.44	-	-	25	204	V
9	* ** 4.879	46.99	PK2	34	-30.6	0	50.39	-	-	74	-23.61	14	154	V
	* ** 4.88	38.57	MAv1	34	-30.6	2.12	44.09	54	-9.91	-	-	14	154	V
11	* ** 7.32	44.86	PK2	35.7	-27.5	0	53.06	-	-	74	-20.94	358	109	V
	* ** 7.319	36.71	MAv1	35.7	-27.5	2.12	47.03	54	-6.97	-	-	358	109	V
1	2.1	33.75	Pk	31.2	-22.9	0	42.05	-	-	-	-	0-360	199	H
4	6.099	34.19	Pk	35.2	-28.9	0	40.49	-	-	-	-	0-360	102	H
10	6.1	37.34	Pk	35.2	-28.9	0	43.64	-	-	-	-	0-360	101	V
6	9.758	32.95	Pk	37.1	-25.6	0	44.45	-	-	-	-	0-360	102	H
12	9.76	30.61	Pk	37.1	-25.6	0	42.11	-	-	-	-	0-360	101	V

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

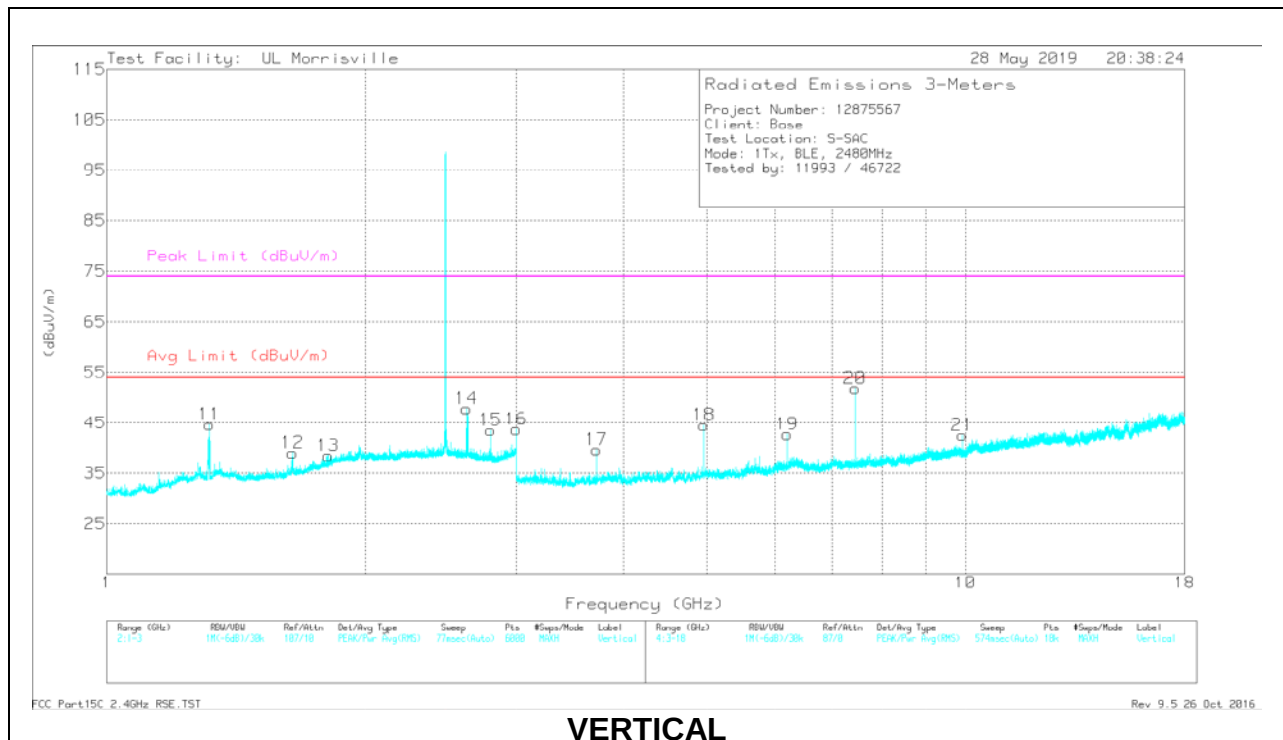
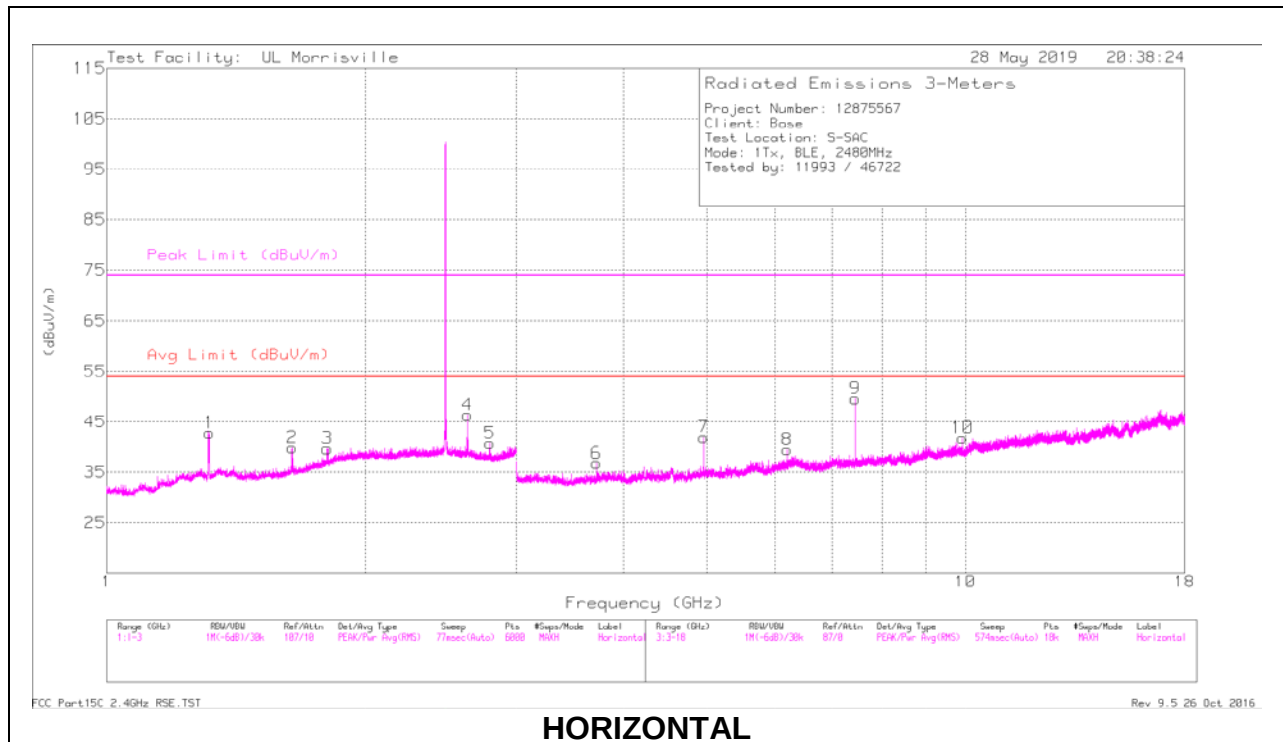
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

MAv1 - Maximum RMS Average

Pk - Peak detector

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
1	*** 1.316	36.72	PK2	28.9	-23.1	0	42.52	-	-	74	-31.48	175	270	H
	*** 1.317	23.58	MAv1	28.9	-23.1	2.12	31.5	54	-22.5	-	-	175	270	H
5	*** 2.793	38.29	PK2	32.2	-25.8	0	44.69	-	-	74	-29.31	277	312	H
	*** 2.795	26.19	MAv1	32.2	-25.8	2.12	34.71	54	-19.29	-	-	277	312	H
11	*** 1.315	36.16	PK2	28.9	-23.1	0	41.96	-	-	74	-32.04	221	193	V
	*** 1.316	23.67	MAv1	28.9	-23.1	2.12	31.59	54	-22.41	-	-	221	193	V
12	* 1.646	37.59	PK2	28.3	-22.1	0	43.79	-	-	74	-30.21	224	196	V
	* 1.646	23.99	MAv1	28.3	-22.1	2.12	32.31	54	-21.69	-	-	224	196	V
15	*** 2.799	38.47	PK2	32.2	-25.8	0	44.87	-	-	74	-29.13	271	301	V
	*** 2.798	26.15	MAv1	32.2	-25.8	2.12	34.67	54	-19.33	-	-	271	301	V
6	*** 3.72	43.26	PK2	33.1	-32.5	0	43.86	-	-	74	-30.14	163	132	H
	*** 3.72	32.27	MAv1	33.1	-32.5	2.12	34.99	54	-19.01	-	-	163	132	H
7	*** 4.96	43.88	PK2	34.1	-31.1	0	46.88	-	-	74	-27.12	6	110	H
	*** 4.96	34.33	MAv1	34.1	-31	2.12	39.55	54	-14.45	-	-	6	110	H
9	*** 7.439	44.75	PK2	35.8	-27.8	0	52.75	-	-	74	-21.25	231	240	H
	*** 7.439	36.47	MAv1	35.8	-27.8	2.12	46.59	54	-7.41	-	-	231	240	H
17	*** 3.72	44.51	PK2	33.1	-32.5	0	45.11	-	-	74	-28.89	0	108	V
	*** 3.72	34.08	MAv1	33.1	-32.5	2.12	36.8	54	-17.2	-	-	0	108	V
18	*** 4.96	45.13	PK2	34.1	-31.1	0	48.13	-	-	74	-25.87	19	260	V
	*** 4.96	36.11	MAv1	34.1	-31	2.12	41.33	54	-12.67	-	-	19	260	V
20	*** 7.441	46.57	PK2	35.8	-27.8	0	54.57	-	-	74	-19.43	1	116	V
	*** 7.439	38.92	MAv1	35.8	-27.8	2.12	49.04	54	-4.96	-	-	1	116	V
2	1.645	33.71	Pk	28.3	-22.1	0	39.91	-	-	-	-	0-360	199	H
3	1.807	31.84	Pk	30.2	-22.3	0	39.74	-	-	-	-	0-360	199	H
13	1.81	30.49	Pk	30.3	-22.3	0	38.49	-	-	-	-	0-360	199	V
14	2.625	40.72	Pk	32.4	-25.3	0	47.82	-	-	-	-	0-360	199	V
4	2.632	39.26	Pk	32.4	-25.3	0	46.36	-	-	-	-	0-360	199	H
16	3	36.63	Pk	33	-25.9	0	43.73	-	-	-	-	0-360	199	V
8	6.199	33.24	Pk	35.4	-29.1	0	39.54	-	-	-	-	0-360	102	H
19	6.2	36.43	Pk	35.4	-29.1	0	42.73	-	-	-	-	0-360	101	V
10	9.919	30.12	Pk	37.2	-25.5	0	41.82	-	-	-	-	0-360	102	H
21	9.92	30.85	Pk	37.2	-25.5	0	42.55	-	-	-	-	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

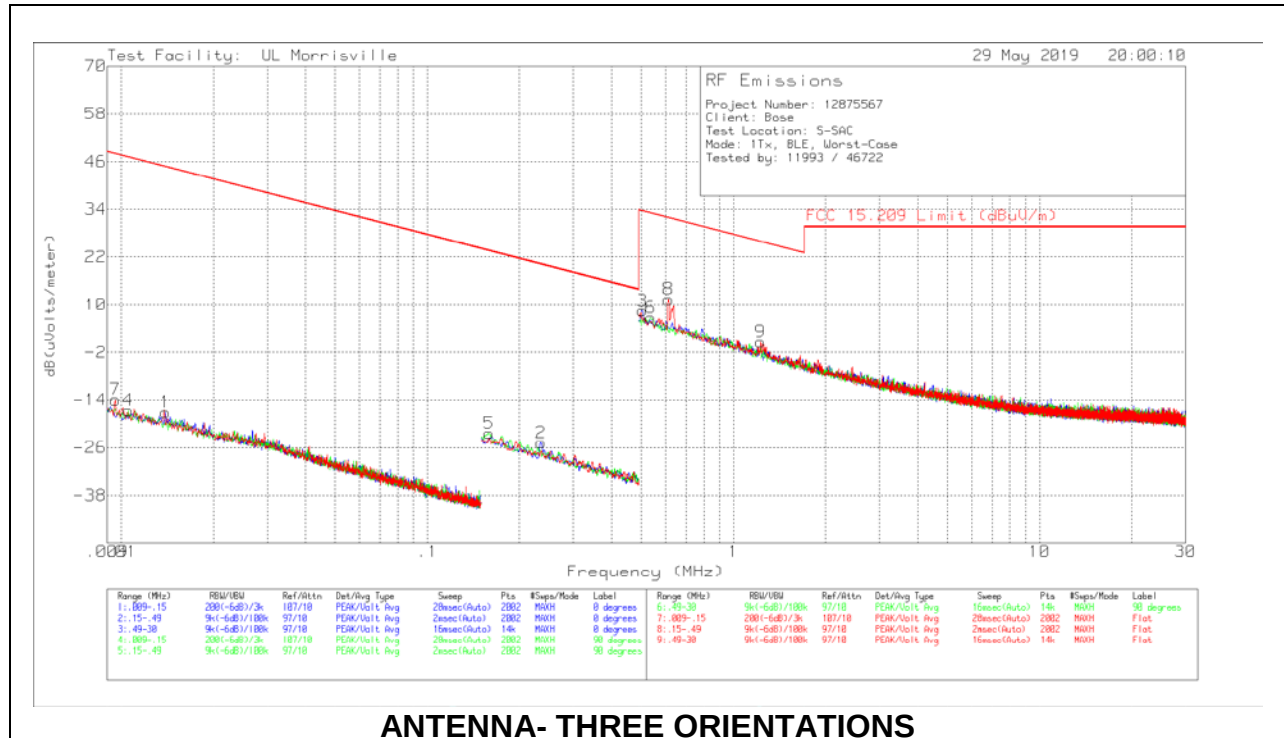
MAv1 - Maximum RMS Average

Pk - Peak detector

9.3. 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).



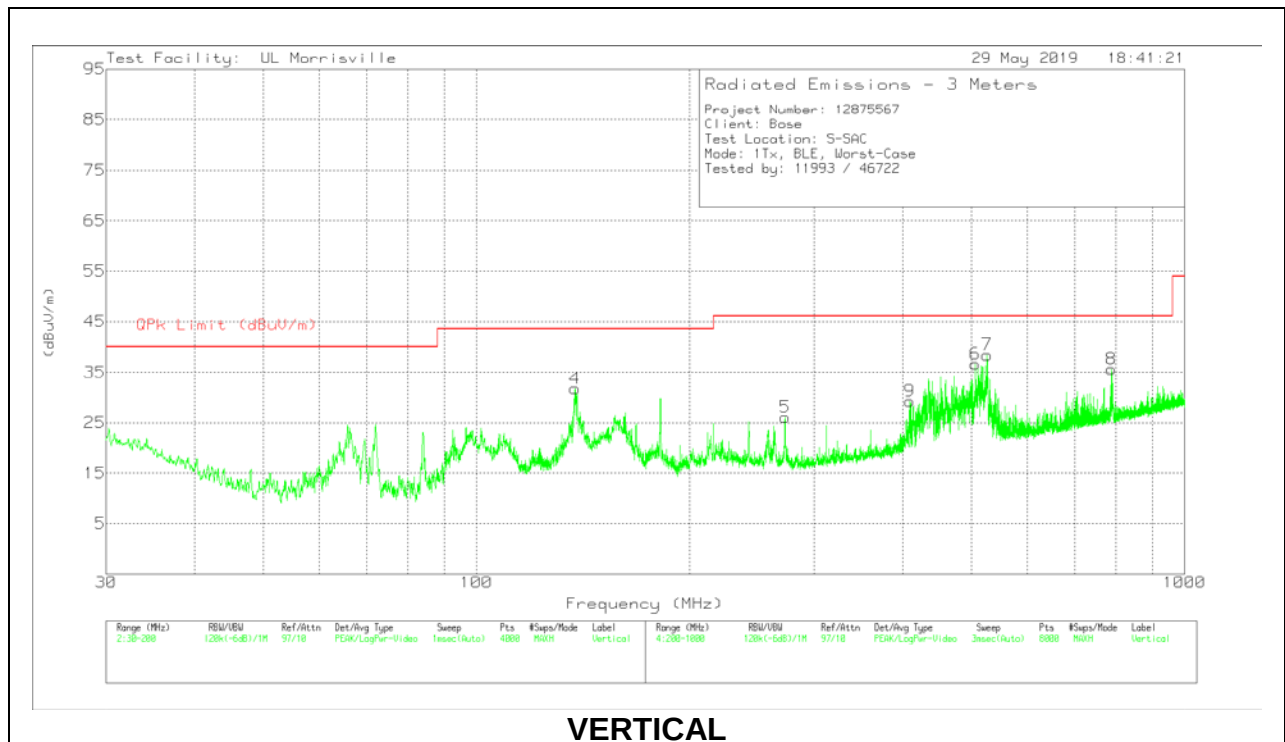
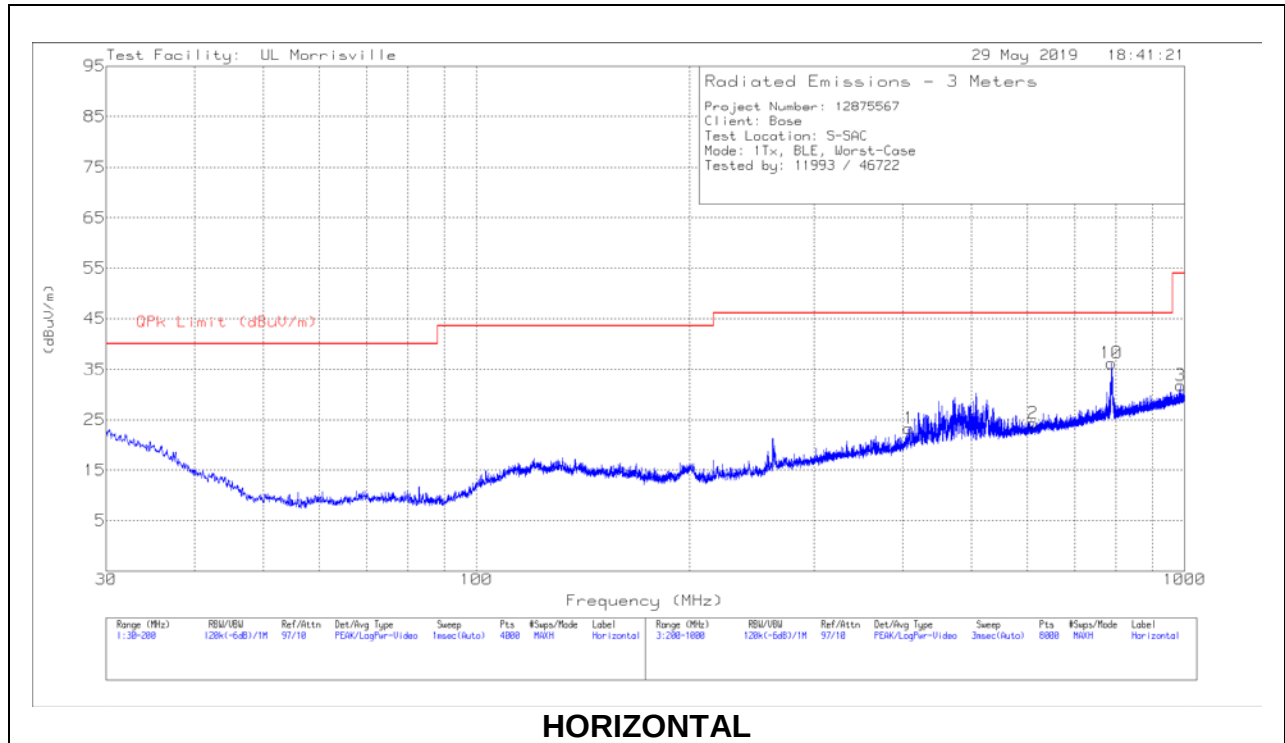
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected dB(uV/m)	FCC 15.209 QP Limit (dBuV/m)	FCC 15.209 AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)	Antenna Face
7	.00956	47.11	Pk	18.8	.1	-80	-13.99	-	48	68	-61.99	0-360	Flat
4	.01054	45.14	Pk	18.1	.1	-80	-16.66	47.15	-	-	-63.81	0-360	Off
1	.01397	46.2	Pk	16.6	.1	-80	-17.1	-	44.7	64.7	-61.8	0-360	On
5	.15918	46.79	Pk	10.7	.1	-80	-22.41	-	23.57	43.57	-45.98	0-360	Off
2	.23475	44.44	Pk	10.7	.1	-80	-24.76	-	20.19	40.19	-44.95	0-360	On
3	.50476	37.5	Pk	10.8	.1	-40	8.4	33.54	-	-	-25.14	0-360	On
6	.53638	35.84	Pk	10.8	.1	-40	6.74	33.01	-	-	-26.27	0-360	Off
8	.61332	40.47	Pk	10.8	.1	-40	11.37	31.85	-	-	-20.48	0-360	Flat
9	1.2278	29.4	Pk	11	.2	-40	.6	25.82	-	-	-25.22	0-360	Flat

Pk - Peak detector

9.4. WORST CASE BELOW 1 GHZ

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



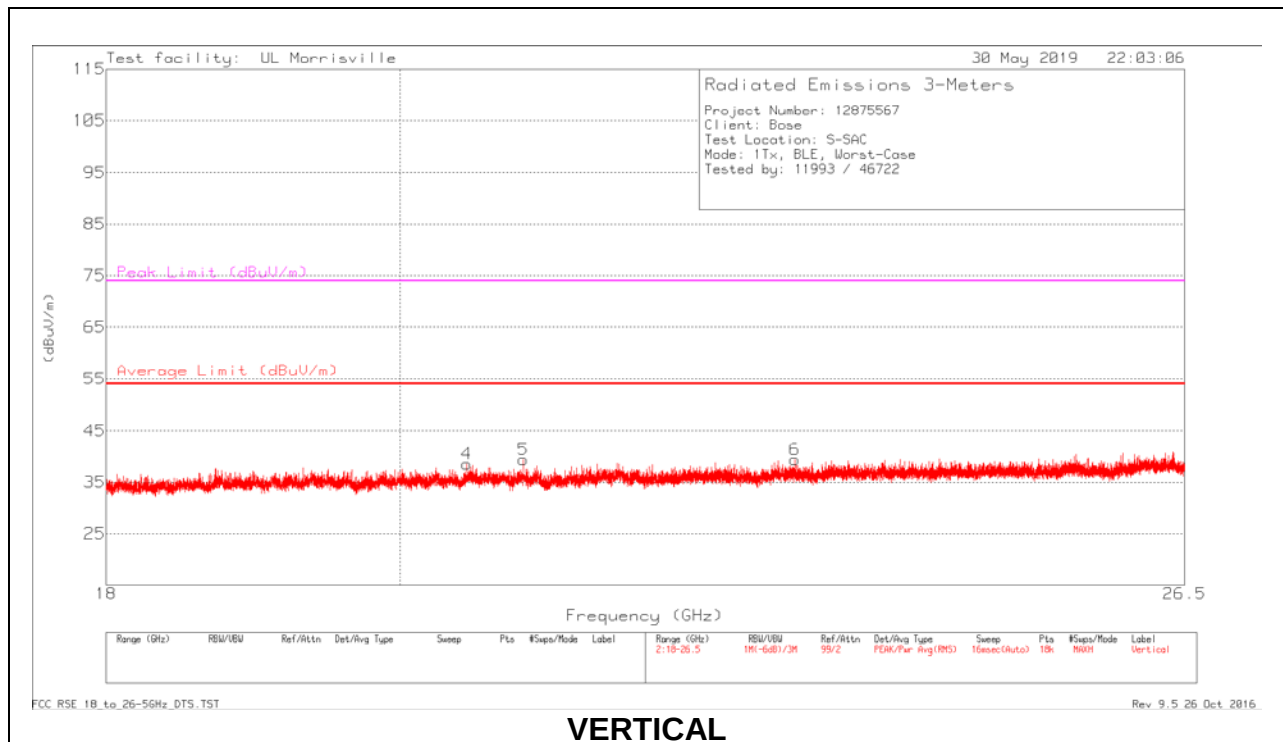
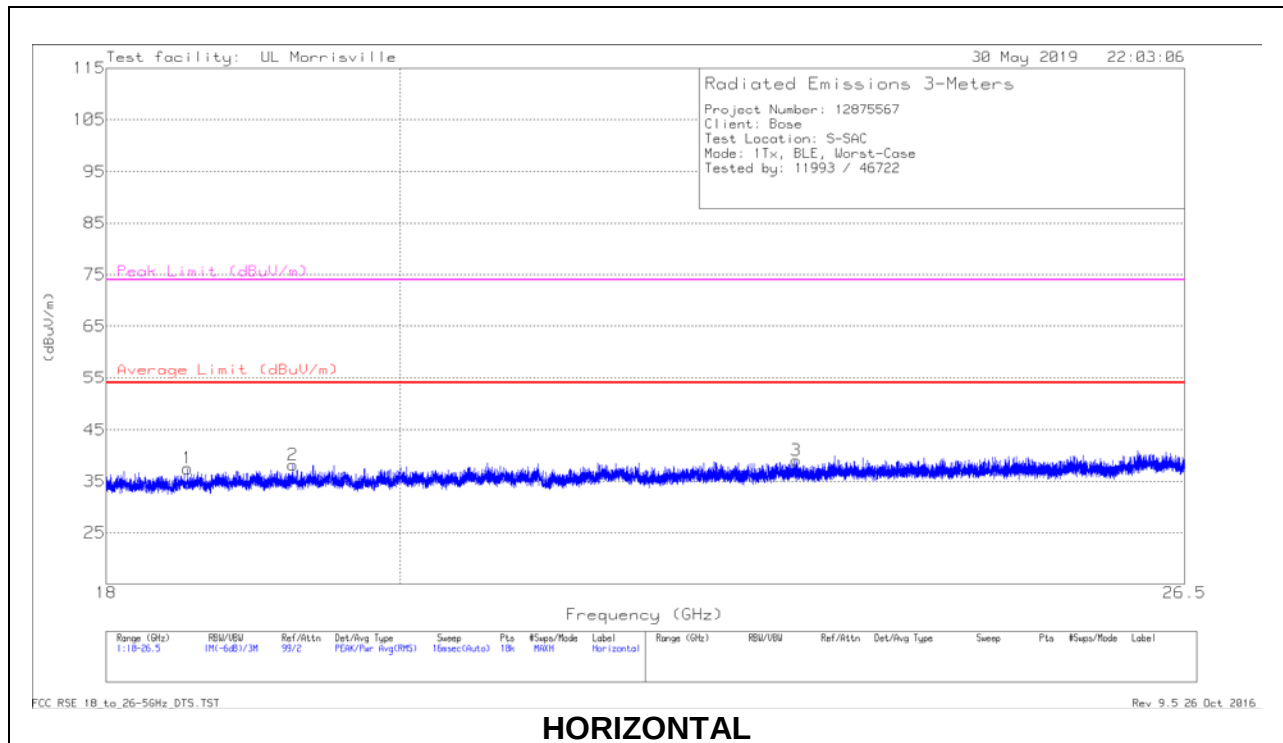
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	*** 137.7654	44.76	Pk	17.7	-30.7	31.76	43.52	-11.76	0-360	101	V
1	*** 407.927	31.89	Pk	20.6	-29.2	23.29	46.02	-22.73	0-360	198	H
2	*** 611.1534	29.3	Pk	23.7	-28.7	24.3	46.02	-21.72	0-360	198	H
3	*** 987.3023	29.69	Pk	28	-25.9	31.79	53.97	-22.18	0-360	198	H
5	*** 272.7095	37.91	Pk	17.9	-29.7	26.11	46.02	-19.91	0-360	102	V
9	*** 409.5272	37.72	Pk	20.7	-29.2	29.22	46.02	-16.8	0-360	102	V
6	506.0398	43.35	Pk	22.2	-28.9	36.65	46.02	-9.37	0-360	102	V
7	526.1424	44.64	Pk	22.5	-28.7	38.44	46.02	-7.58	0-360	199	V
8	787.5764	37.6	Pk	25.9	-27.9	35.6	46.02	-10.42	0-360	102	V
10	788.3765	38.22	Pk	25.9	-27.9	36.22	46.02	-9.8	0-360	198	H

Pk - Peak detector

9.5. 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)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 18.532	44.16	Pk	32.5	-39.2	37.46	54	-16.54	74	-36.54	0-360	199	H
2	* ** 19.247	44.21	Pk	32.7	-38.8	38.11	54	-15.89	74	-35.89	0-360	102	H
3	* ** 23.054	42.89	Pk	33.7	-37.6	38.99	54	-15.01	74	-35.01	0-360	199	H
4	* ** 20.485	43.36	Pk	33.2	-38.1	38.46	54	-15.54	74	-35.54	0-360	201	V
5	* ** 20.905	44.45	Pk	33.1	-38.2	39.35	54	-14.65	74	-34.65	0-360	151	V
6	* ** 23.044	43.23	Pk	33.7	-37.6	39.33	54	-14.67	74	-34.67	0-360	300	V

Pk - Peak detector

10. SETUP PHOTOS

Please refer to R12875567R-EP1 for setup photos

END OF TEST REPORT