CERTIFICATION TEST REPORT

Report Number : R12844817-E4

Applicant	:	Bose Corporation 100 The Mountain Framingham, MA 01701, USA
Model	:	BMD0005, BMD0006, BMD0007, BMD0008
FCC ID	:	A94429638A
IC	:	3232A-429638A
EUT Description	:	Wireless Headphones
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
2019-05-20

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 USA
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NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	--	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Wireless Headphones

MODEL: BMD0005, BMD0006, BMD0007, BMD0008

SERIAL NUMBER: Radiated: 080570U90451183AE, 080570U90451161AE
Conducted: 080570U90451221AE

DATE TESTED: 2019-05-03 to 2019-05-07

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.

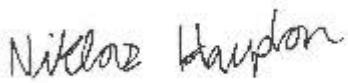
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. 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.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released For
UL LLC By:

Jeffrey Moser
Operations Leader
Consumer Technology Division
UL LLC

Prepared By:



Niklas Haydon
Engineer
Consumer Technology Division
UL LLC

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, North Carolina, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

12 Laboratory Dr.	2800 Perimeter Park Dr., Suite B
ISED Site Code: 2180C	
☐ Chamber A RTP	☐ North Chamber
☐ Chamber C RTP	☒ 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

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	2.50 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%.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a wireless headphone that contains BT/BLE transceivers.

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	5.01	3.17

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB etch PIFA antenna with a maximum gain of 1.89 dBi.

5.4. DESCRIPTION OF MODEL DIFFERENCES

This testing in the report is used to cover models BMD0005, BMD0006, BMD0007, and BMD0008. Model BMD0005 was tested. The only difference between the models is the design and form of the plastic frames. The units are electrically equivalent.

5.5. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 3.0.1.
The test utility software used during testing was Polycomm ver 0.1.5.0, CSR Blue Suite ver 3.1.4.

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5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emissions 1-18GHz were performed with the EUT set to low, mid, and high channels. Radiated emission 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.

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

Worst-case data rates as provided by the client were:

BLE: 1 Mbps.

The EUT only transmits when battery powered and shuts off transmission when charging. Line conducted emissions was not applicable to the EUT. For testing purposes only the sample was connected to a laptop during emissions testing.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T450	A2UQS	N/A
Laptop Power Supply	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS974CH2W9	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Charging	1	Charging Pins to USB	USB	<1m	Magnetic

TEST SETUP

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

SETUP DIAGRAMS

Please refer to R12844817-EP4 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 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)

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

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7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
72822	Spectrum Analyzer	Agilent Technologies	E4446A	2018-11-19	2019-11-19
PWM004	RF Power Meter	Keysight Technologies	N1911A	2018-07-30	2019-07-30
PWS004	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	E9323A	2018-07-30	2019-07-30
SN 181474341	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	N/A	N/A

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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	2019-01-24	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
	18-26 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	2018-09-06	2019-09-06
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2018-05-20	2019-05-20
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

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

ANSI C63.10, Section 11.6 : 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	0.391	0.625	0.625	62.52%	2.04	2.558

DUTY CYCLE PLOTS

DUTY CYCLE BLE

8.2. 99% BANDWIDTH

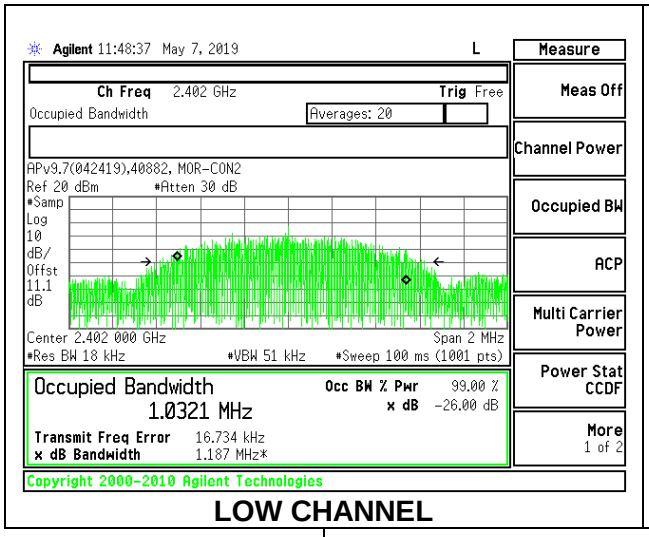
LIMITS

None; for reporting purposes only.

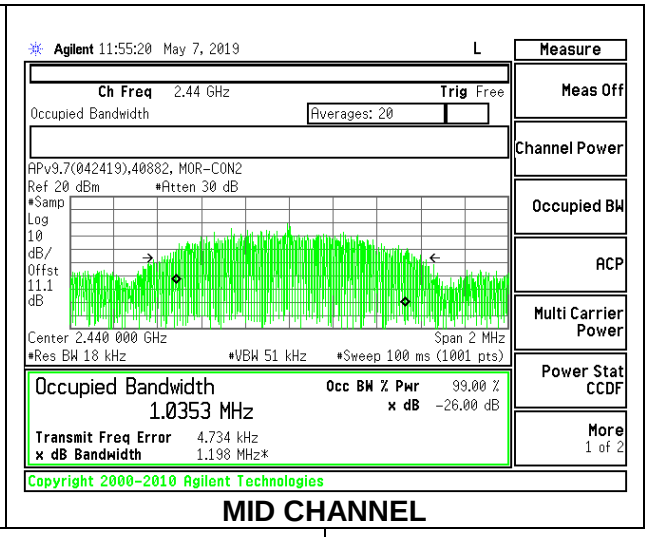
RESULTS

8.2.1. BLE (1Mbps)

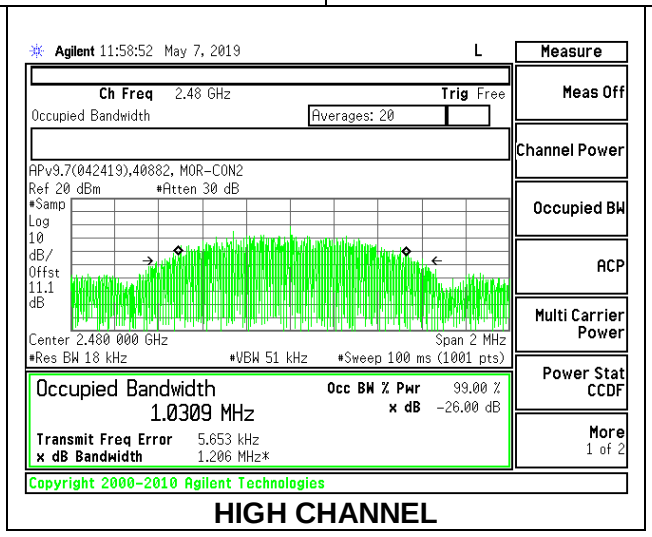
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0321
Middle	2440	1.0353
High	2480	1.0309



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. 6 dB BANDWIDTH

LIMITS

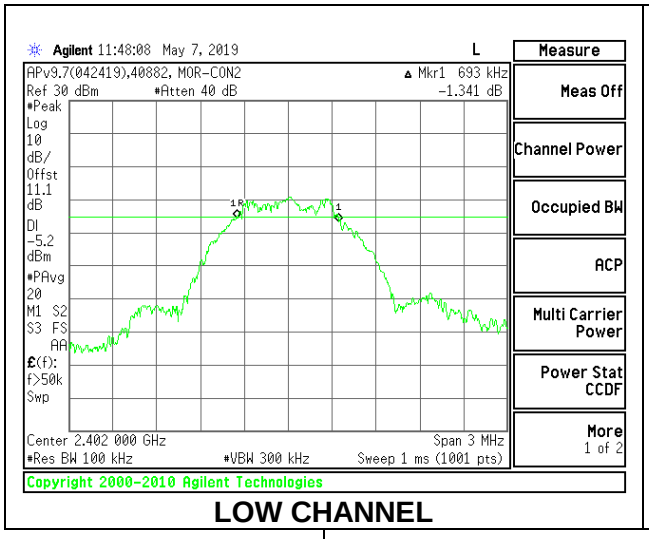
FCC §15.247 (a) (2)
RSS-247 5.2 (a)

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

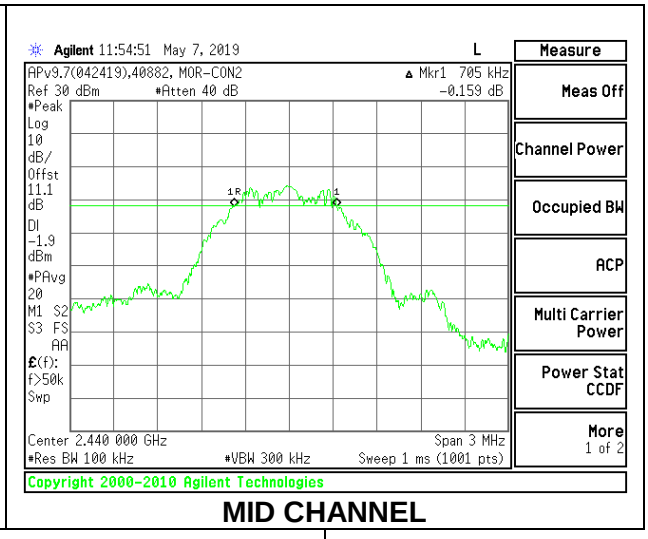
RESULTS

8.3.1. BLE (1Mbps)

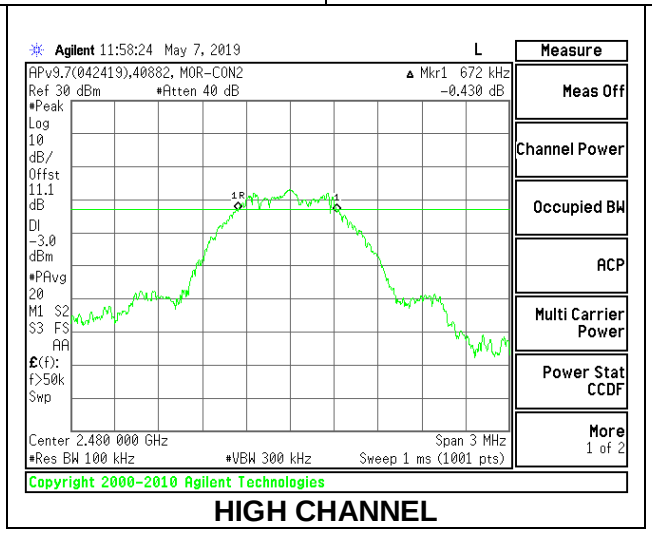
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6930	0.5
Middle	2440	0.7050	0.5
High	2480	0.6720	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.1 dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

8.4.1. BLE (1Mbps)

Tested By:	11993
Date:	2019-05-07

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.60	30	-28.400
Middle	2440	5.01	30	-24.990
High	2480	3.63	30	-26.370

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 11.1 dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

8.5.1. BLE (1Mbps)

Tested By:	11993
Date:	2019-05-07

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	1.02
Middle	2440	4.45
High	2480	3.14

8.6. POWER SPECTRAL DENSITY

LIMITS

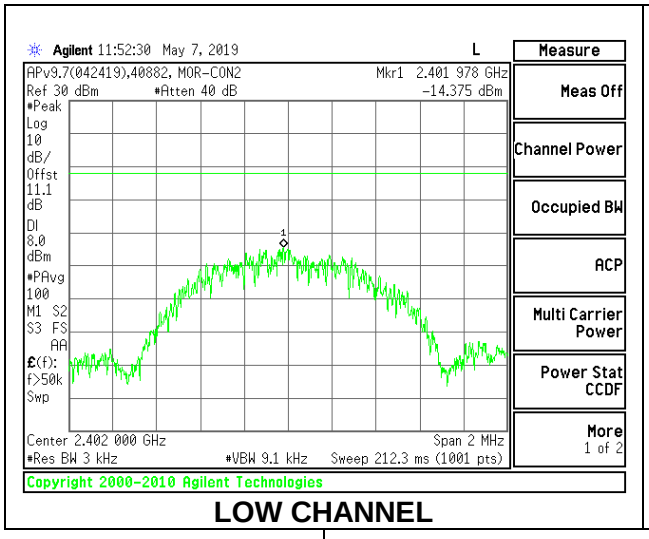
FCC §15.247 (e)
RSS-247 (5.2) (b)

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

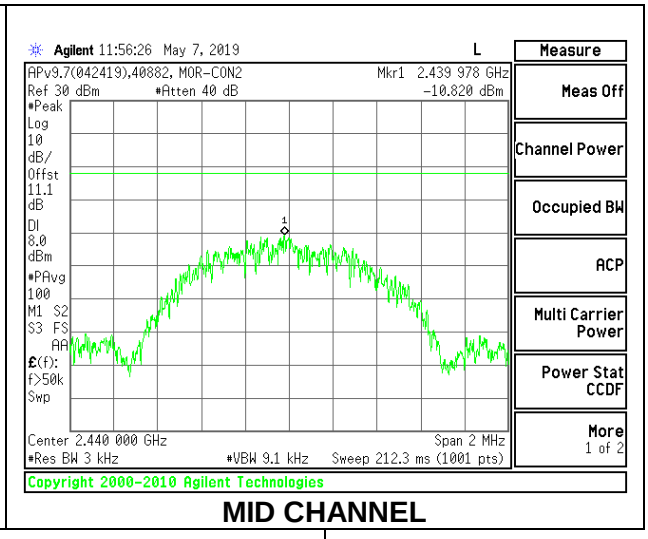
RESULTS

8.6.1. BLE (1Mbps)

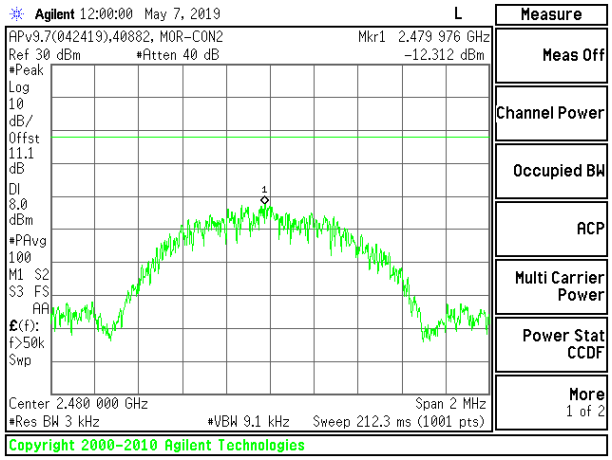
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-14.37	8	-22.37
Middle	2440	-10.82	8	-18.82
High	2480	-12.31	8	-20.31



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

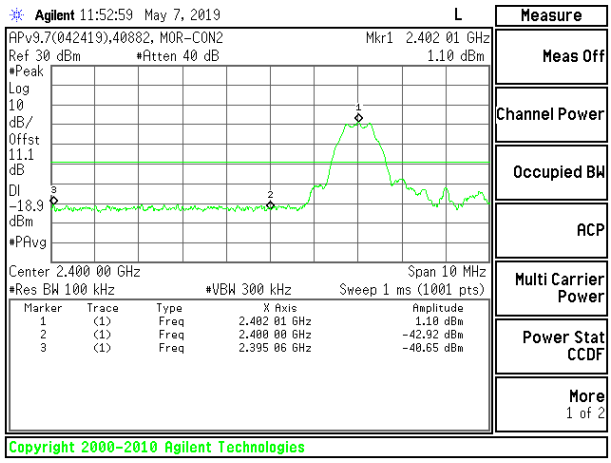
FCC §15.247 (d)

RSS-247 5.5

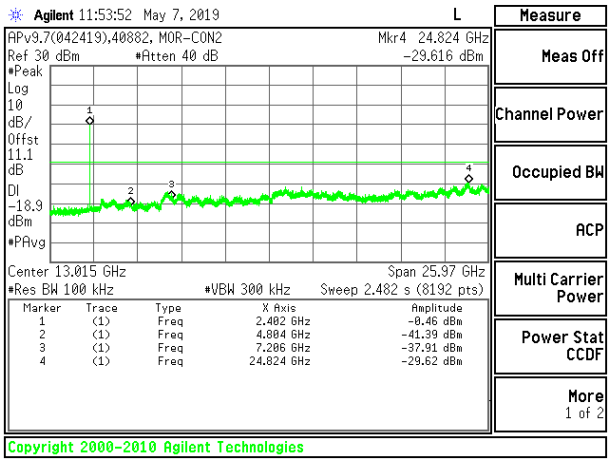
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

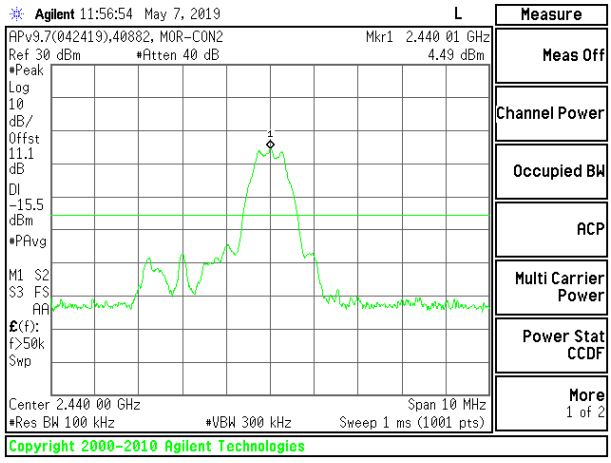
8.7.1. BLE (1Mbps)



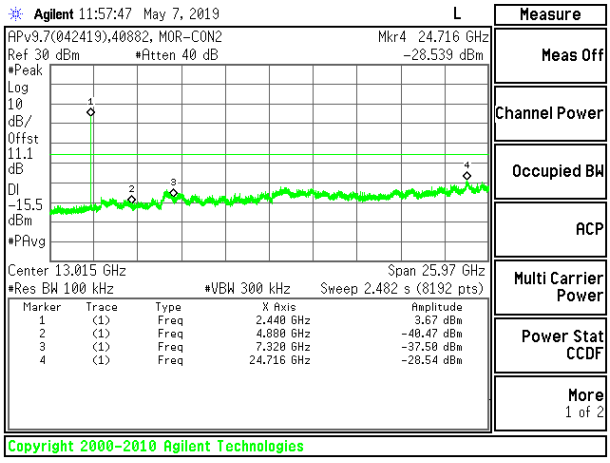
LOW CHANNEL BANDEDGE



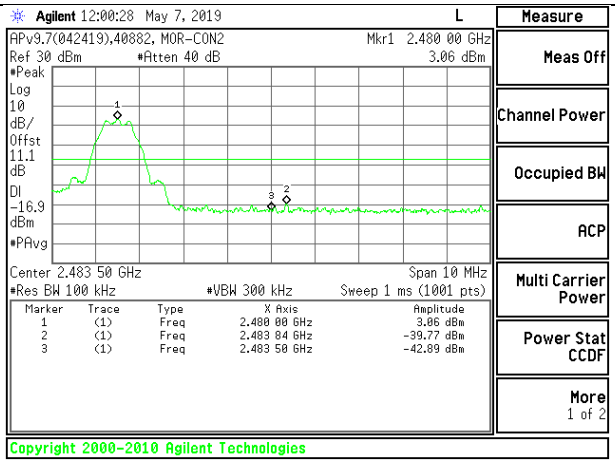
OUT-OF-BAND LOW CHANNEL



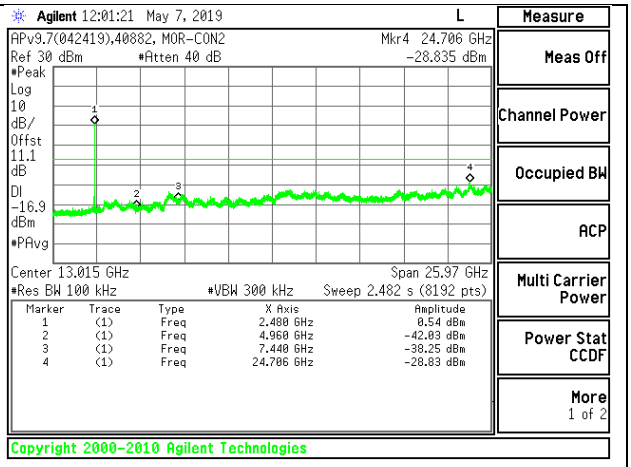
IN-BAND REFERENCE LEVEL



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.

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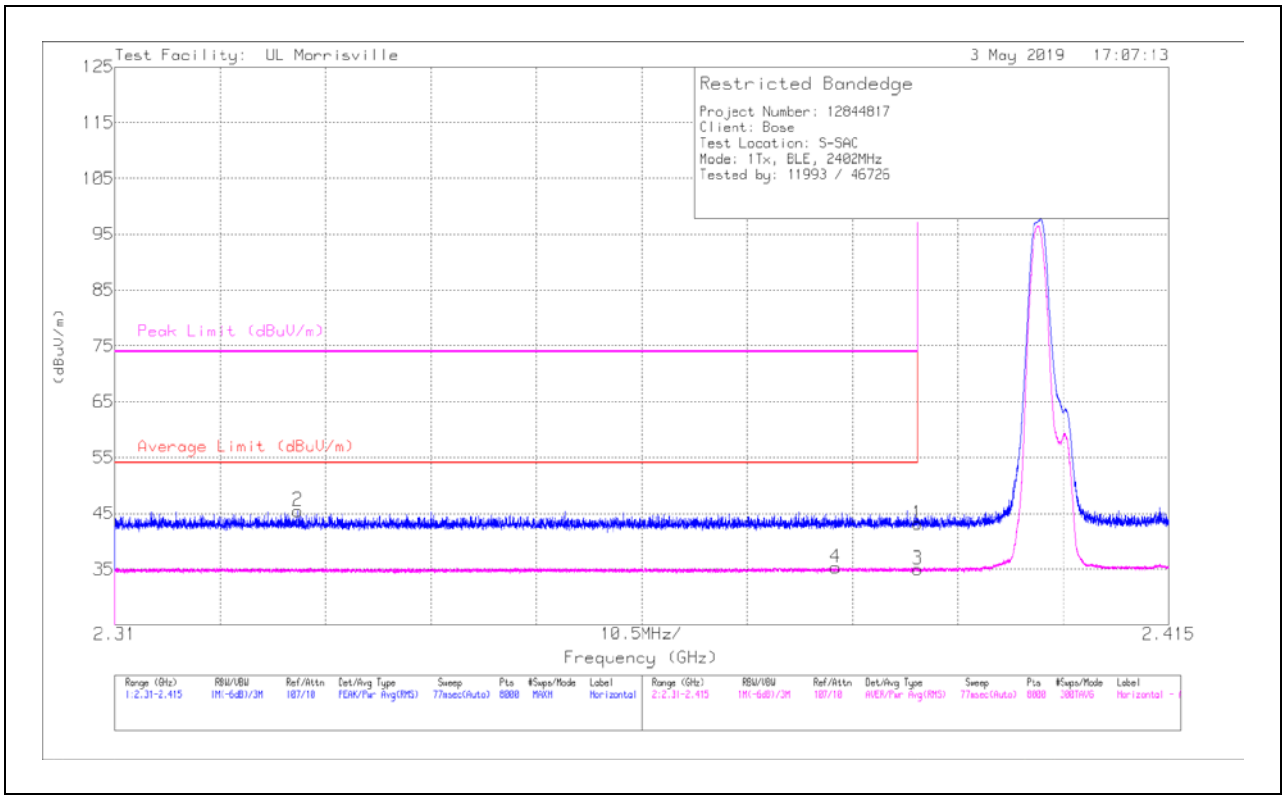
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

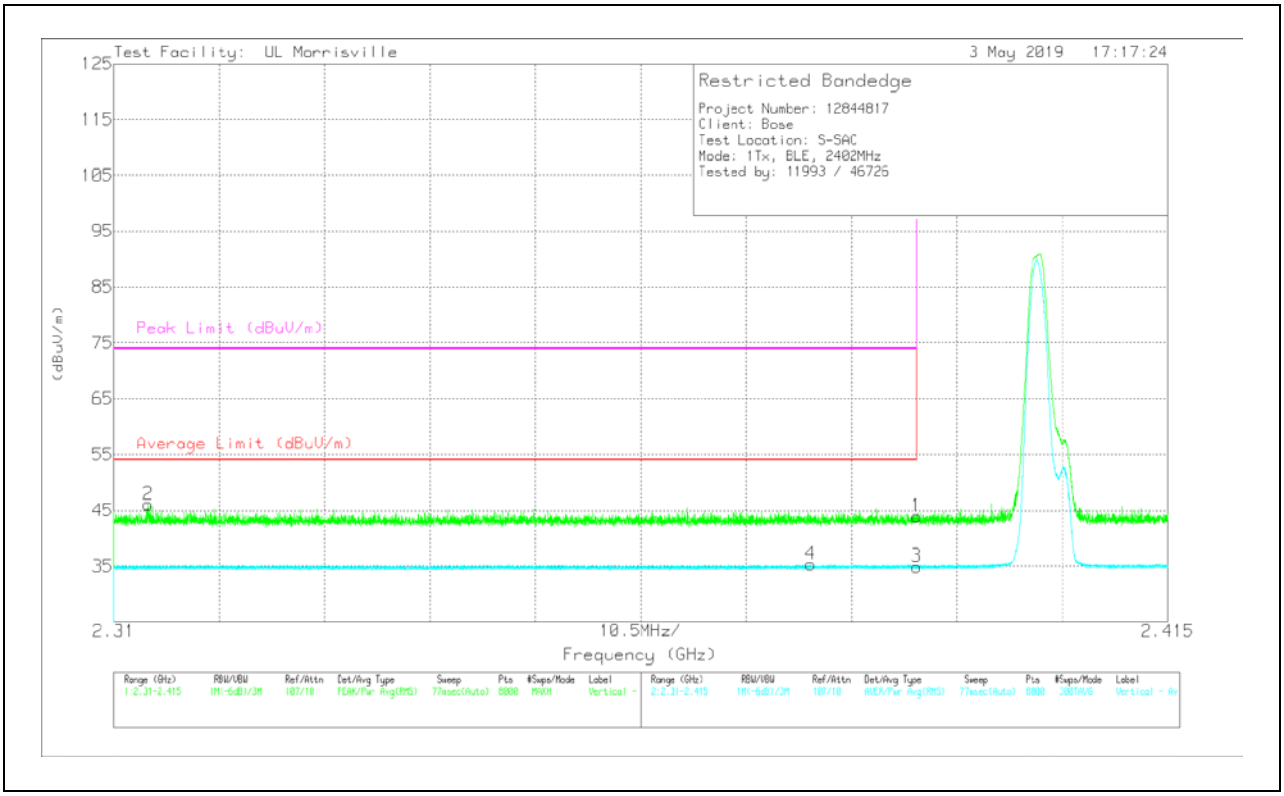
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	35.27	Pk	31.9	-24	0	43.17	-	-	74	-30.83	272	176	H
2	* ** 2.328	37.48	Pk	31.7	-23.7	0	45.48	-	-	74	-28.52	272	176	H
3	* ** 2.39	25.09	RMS	31.9	-24	2.04	35.03	54	-18.97	-	-	272	176	H
4	* ** 2.382	25.29	RMS	31.9	-23.9	2.04	35.33	54	-18.67	-	-	272	176	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

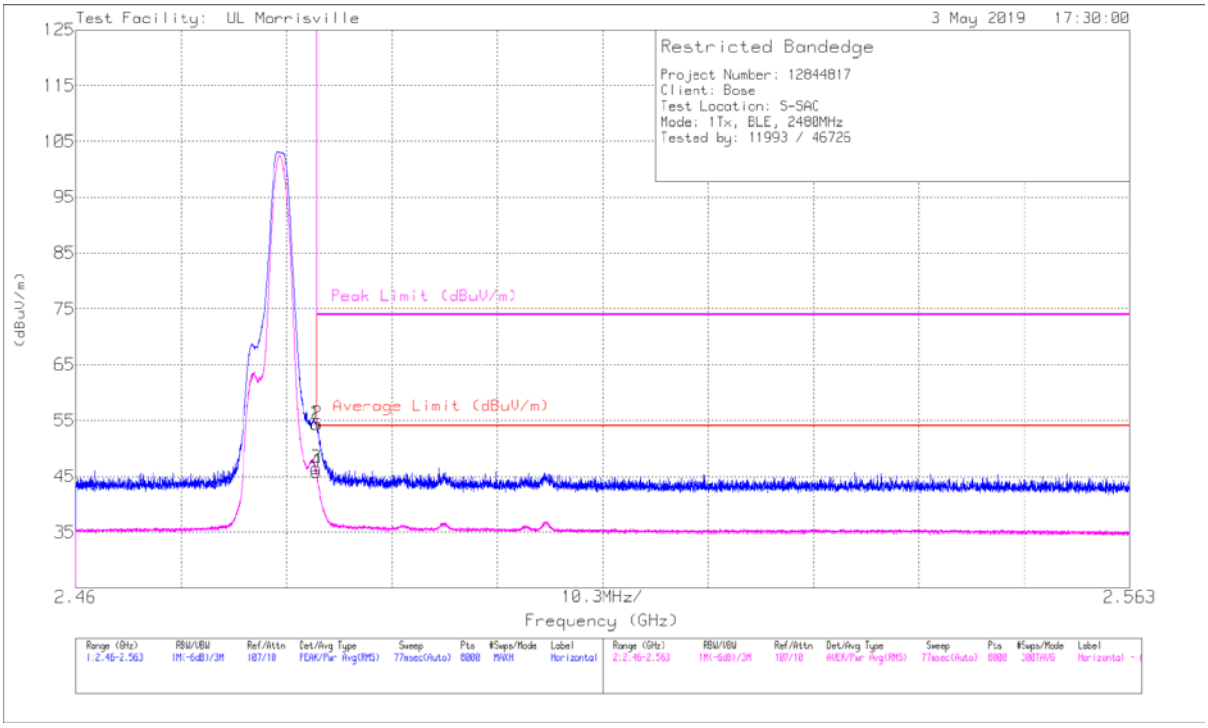


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	36.01	Pk	31.9	-24	0	43.91	-	-	74	-30.09	40	249	V
2	* ** 2.313	38.05	Pk	31.7	-23.7	0	46.05	-	-	74	-27.95	40	249	V
3	* ** 2.39	24.96	RMS	31.9	-24	2.04	34.9	54	-19.1	-	-	40	249	V
4	* ** 2.379	25.33	RMS	31.9	-23.9	2.04	35.37	54	-18.63	-	-	40	249	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)

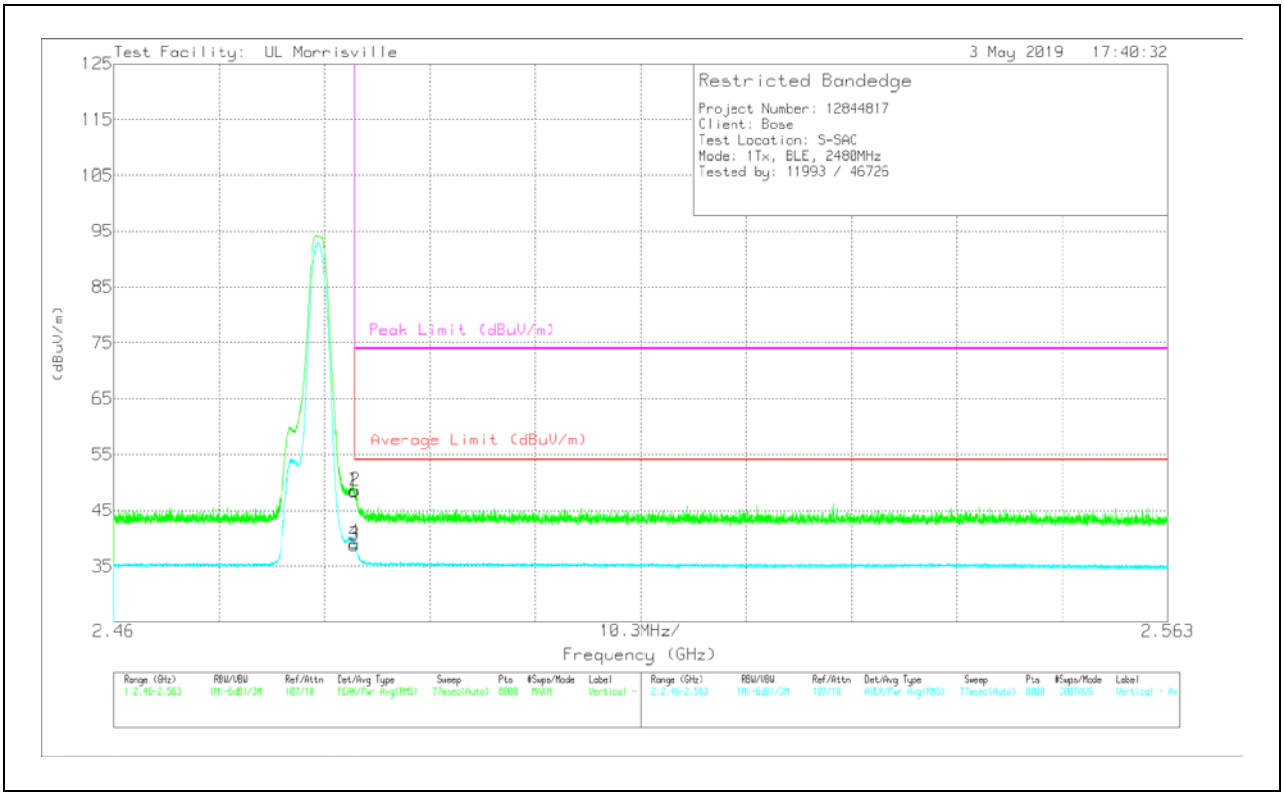
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	46.6	Pk	32.3	-24.5	0	54.4	-	-	74	-19.6	278	104	H
2	* ** 2.484	46.59	Pk	32.3	-24.5	0	54.39	-	-	74	-19.61	278	104	H
3	* ** 2.484	36.65	RMS	32.3	-24.5	2.04	46.49	54	-7.51	-	-	278	104	H
4	* ** 2.484	35.99	RMS	32.3	-24.5	2.04	45.83	54	-8.17	-	-	278	104	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

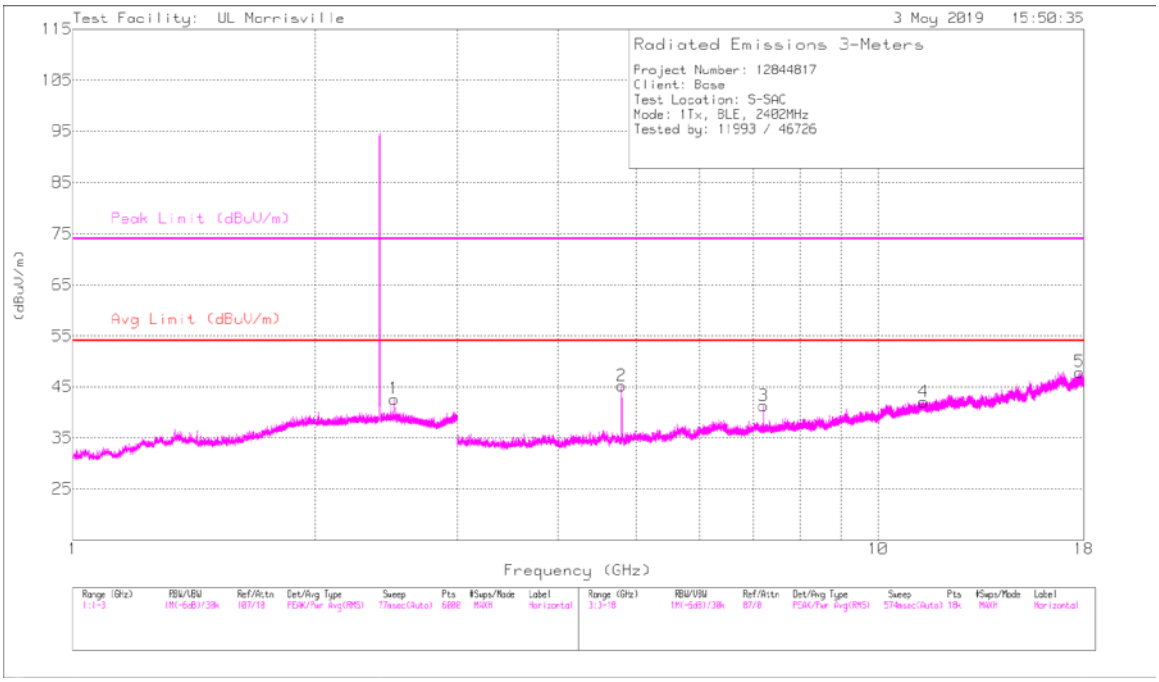


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	40.65	Pk	32.3	-24.5	0	48.45	-	-	74	-25.55	191	103	V
2	* ** 2.484	40.74	Pk	32.3	-24.5	0	48.54	-	-	74	-25.46	191	103	V
3	* ** 2.484	28.94	RMS	32.3	-24.5	2.04	38.78	54	-15.22	-	-	191	103	V
4	* ** 2.484	29.36	RMS	32.3	-24.5	2.04	39.2	54	-14.8	-	-	191	103	V

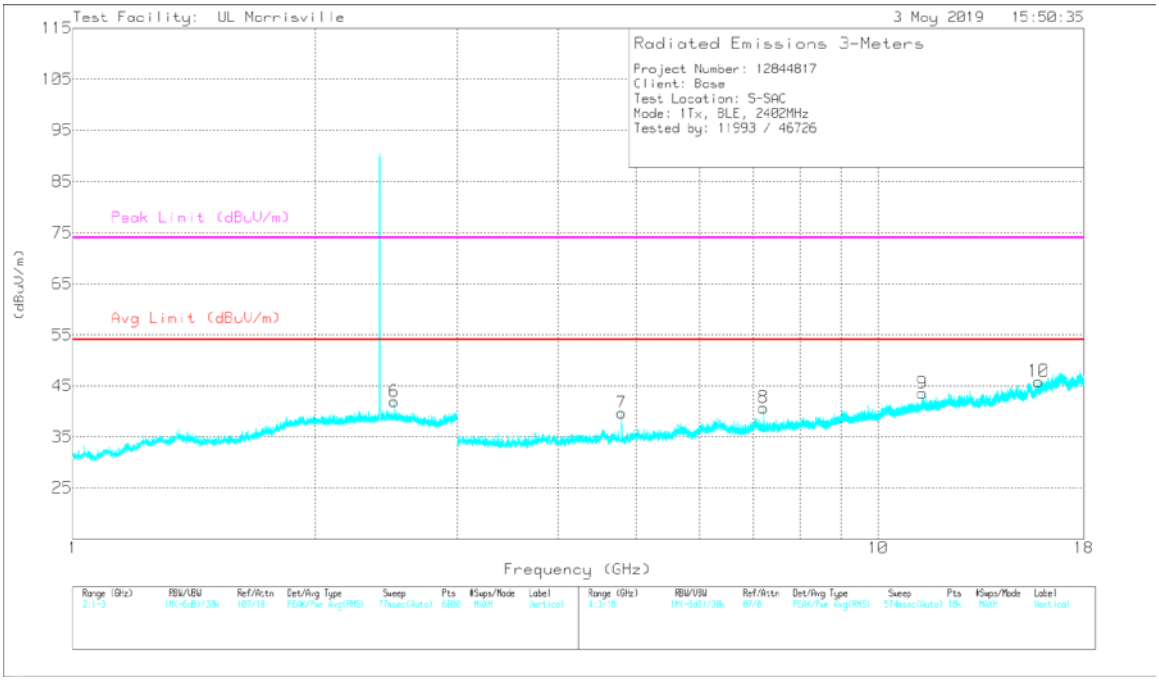
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 4.805	45.9	PK2	34.2	-31	0	49.1	-	-	74	-24.9	159	124	H
	* ** 4.804	37.44	MAv1	34.2	-31	2.04	42.68	54	-11.32	-	-	159	124	H
4	* ** 11.383	33.82	PK2	38.1	-23.2	0	48.72	-	-	74	-25.28	321	243	H
	* ** 11.383	21.88	MAv1	38.1	-23.2	2.04	38.82	54	-15.18	-	-	321	243	H
5	* ** 17.781	33.67	PK2	41.2	-21.3	0	53.57	-	-	74	-20.43	133	374	H
	* ** 17.784	21.92	MAv1	41.2	-21.3	2.04	43.86	54	-10.14	-	-	133	374	H
7	* ** 4.805	42.72	PK2	34.2	-31	0	45.92	-	-	74	-28.08	252	104	V
	* ** 4.804	32.88	MAv1	34.2	-31	2.04	38.12	54	-15.88	-	-	252	104	V
9	* ** 11.35	33.81	PK2	38	-23	0	48.81	-	-	74	-25.19	122	134	V
	* ** 11.35	21.66	MAv1	38	-23	2.04	38.7	54	-15.3	-	-	122	134	V
10	* ** 15.826	34.57	PK2	40.4	-23.2	0	51.77	-	-	74	-22.23	337	345	V
	* ** 15.826	22.65	MAv1	40.4	-23.2	2.04	41.89	54	-12.11	-	-	337	345	V
1	**2.506	41.2	PK2	32.4	-24.6	0	49	-	-	74	-25	273	189	H
	**2.506	32.61	MAv1	32.4	-24.6	2.04	42.45	54	-11.55	-	-	273	189	H
6	**2.506	41.21	PK2	32.4	-24.6	0	49.01	-	-	74	-24.99	47	358	V
	**2.506	31.36	MAv1	32.4	-24.6	2.04	41.2	54	-12.8	-	-	47	358	V
8	7.205	33.03	Pk	35.7	-28	0	40.73	-	-	-	-	0-360	101	V
3	7.206	33.6	Pk	35.7	-28	0	41.3	-	-	-	-	0-360	199	H

* - 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

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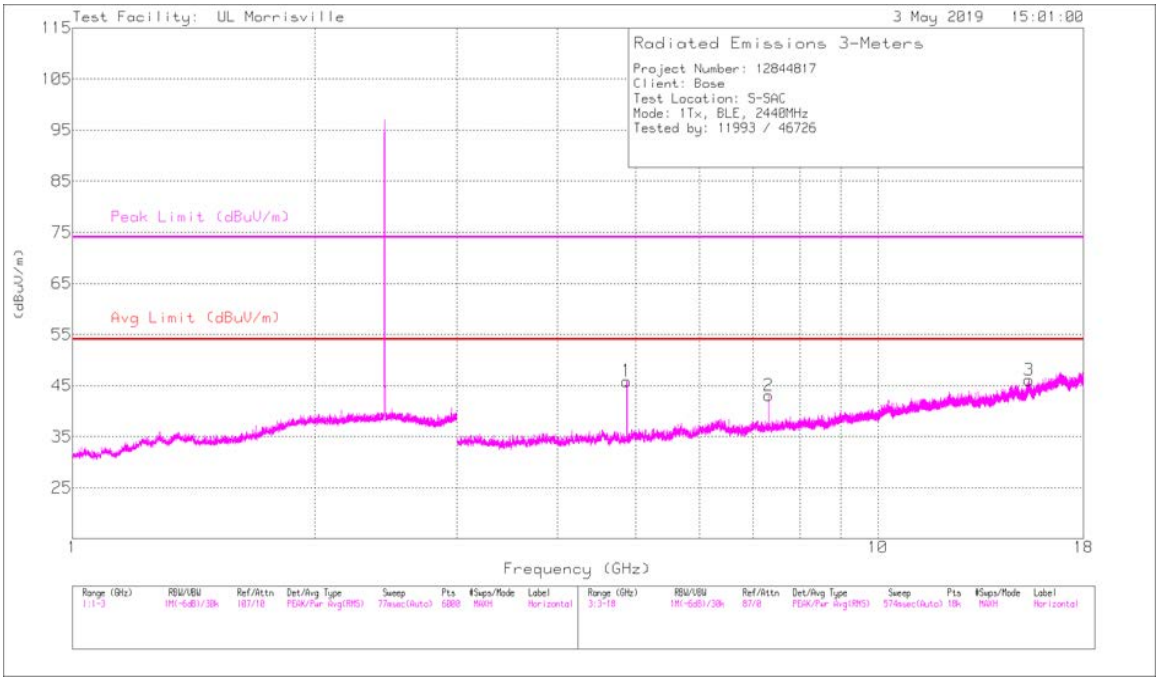
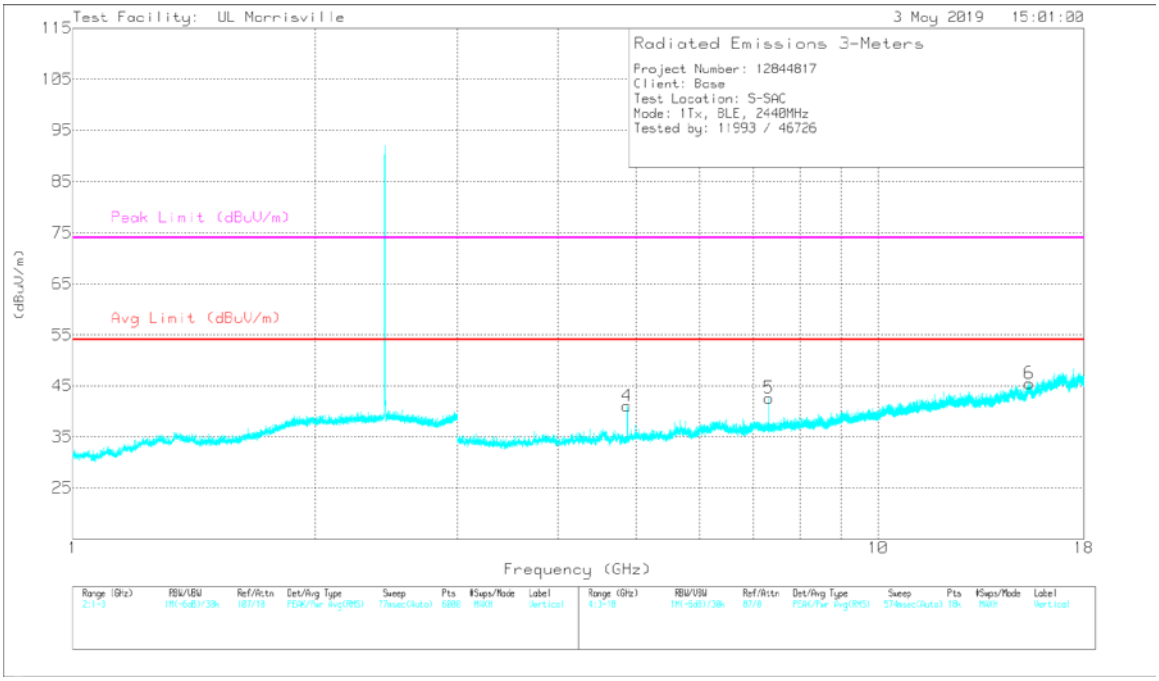
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.879	47.18	PK2	34	-30.6	0	50.58	-	-	74	-23.42	159	152	H
	* ** 4.88	39.16	MAv1	34	-30.6	2.04	44.6	54	-9.4	-	-	159	152	H
2	* ** 7.319	40.52	PK2	35.7	-27.5	0	48.72	-	-	74	-25.28	189	200	H
	* ** 7.319	30.05	MAv1	35.7	-27.5	2.04	40.29	54	-13.71	-	-	189	200	H
3	* ** 15.401	33.44	PK2	39.9	-21.4	0	51.94	-	-	74	-22.06	130	284	H
	* ** 15.401	21.57	MAv1	39.9	-21.4	2.04	42.11	54	-11.89	-	-	130	284	H
4	* ** 4.88	43.36	PK2	34	-30.6	0	46.76	-	-	74	-27.24	255	180	V
	* ** 4.88	33.68	MAv1	34	-30.6	2.04	39.12	54	-14.88	-	-	255	180	V
5	* ** 7.32	39.79	PK2	35.7	-27.5	0	47.99	-	-	74	-26.01	26	123	V
	* ** 7.32	29.04	MAv1	35.7	-27.5	2.04	39.28	54	-14.72	-	-	26	123	V
6	* ** 15.4	33.96	PK2	39.9	-21.4	0	52.46	-	-	74	-21.54	253	283	V
	* ** 15.4	21.79	MAv1	39.9	-21.4	2.04	42.33	54	-11.67	-	-	253	283	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

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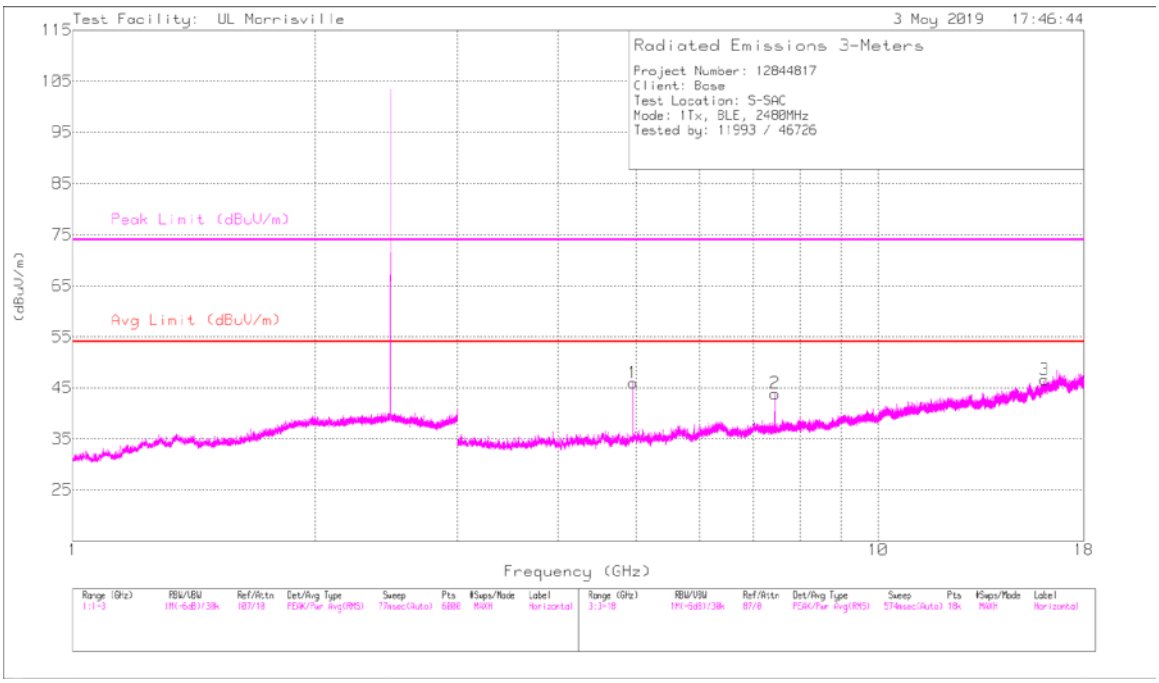
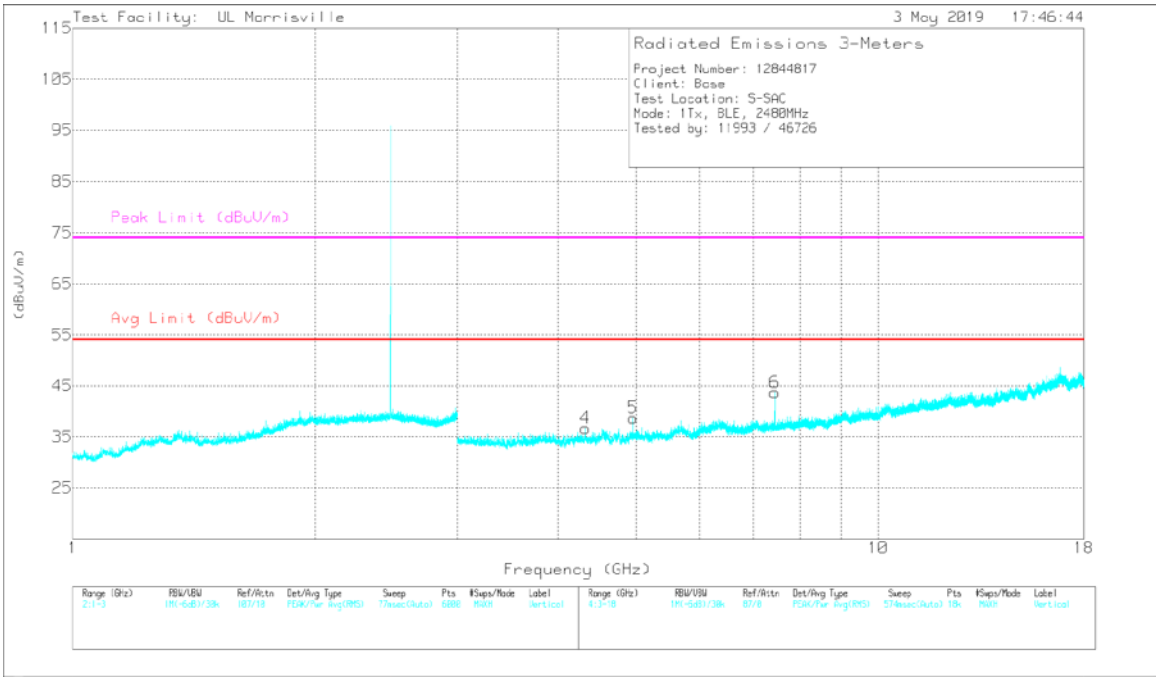
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.958	39.23	PK2	34.1	-31	0	42.33	-	-	74	-31.67	337	321	H
	* ** 4.958	27.25	MAv1	34.1	-31	2.04	32.39	54	-21.61	-	-	337	321	H
2	* ** 7.443	36.65	PK2	35.8	-27.8	0	44.65	-	-	74	-29.35	71	335	H
	* ** 7.443	24.27	MAv1	35.8	-27.8	2.04	34.31	54	-19.69	-	-	71	335	H
3	* ** 16.091	35.23	PK2	40.9	-23.6	0	52.53	-	-	74	-21.47	51	349	H
	* ** 16.091	23.43	MAv1	40.9	-23.6	2.04	42.77	54	-11.23	-	-	51	349	H
4	* ** 4.33	40.69	PK2	33.6	-32	0	42.29	-	-	74	-31.71	235	229	V
	* ** 4.33	28.61	MAv1	33.6	-32	2.04	32.25	54	-21.75	-	-	235	229	V
5	* ** 4.961	39.46	PK2	34.1	-31.1	0	42.46	-	-	74	-31.54	173	125	V
	* ** 4.961	27.35	MAv1	34.1	-31.1	2.04	32.39	54	-21.61	-	-	173	125	V
6	* ** 7.439	36.64	PK2	35.8	-27.8	0	44.64	-	-	74	-29.36	319	263	V
	* ** 7.44	24.25	MAv1	35.8	-27.8	2.04	34.29	54	-19.71	-	-	319	263	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

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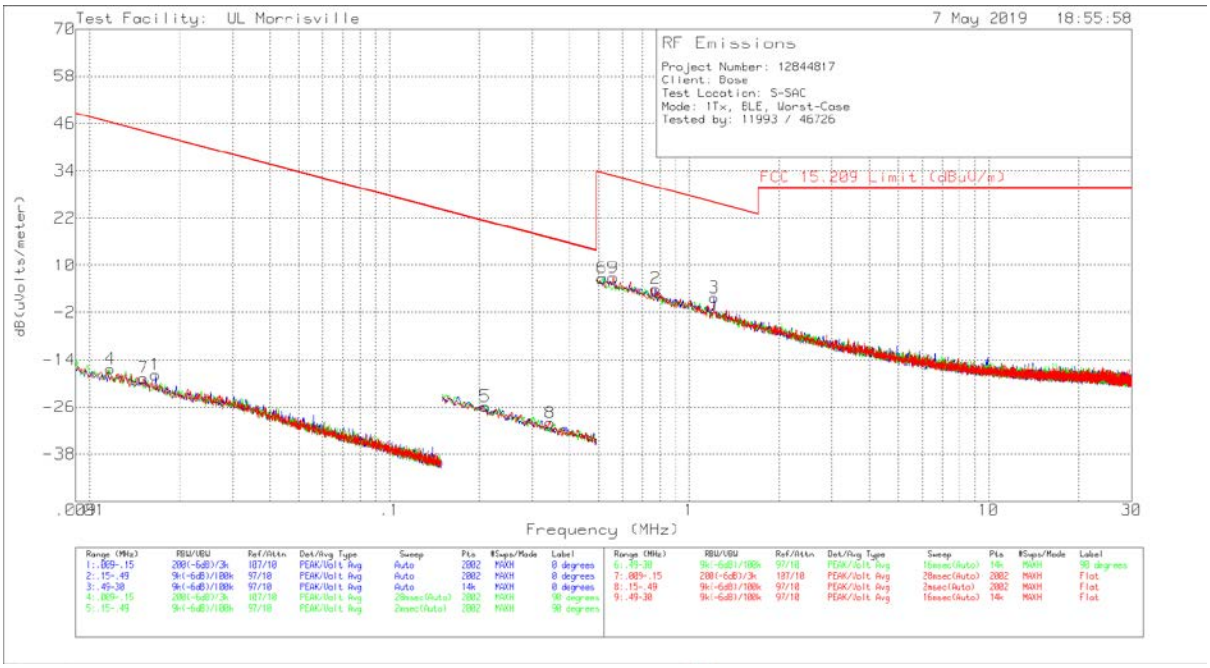
9.3. WORST CASE BELOW 30MHZ

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).



ANTENNA- THREE ORIENTATIONS

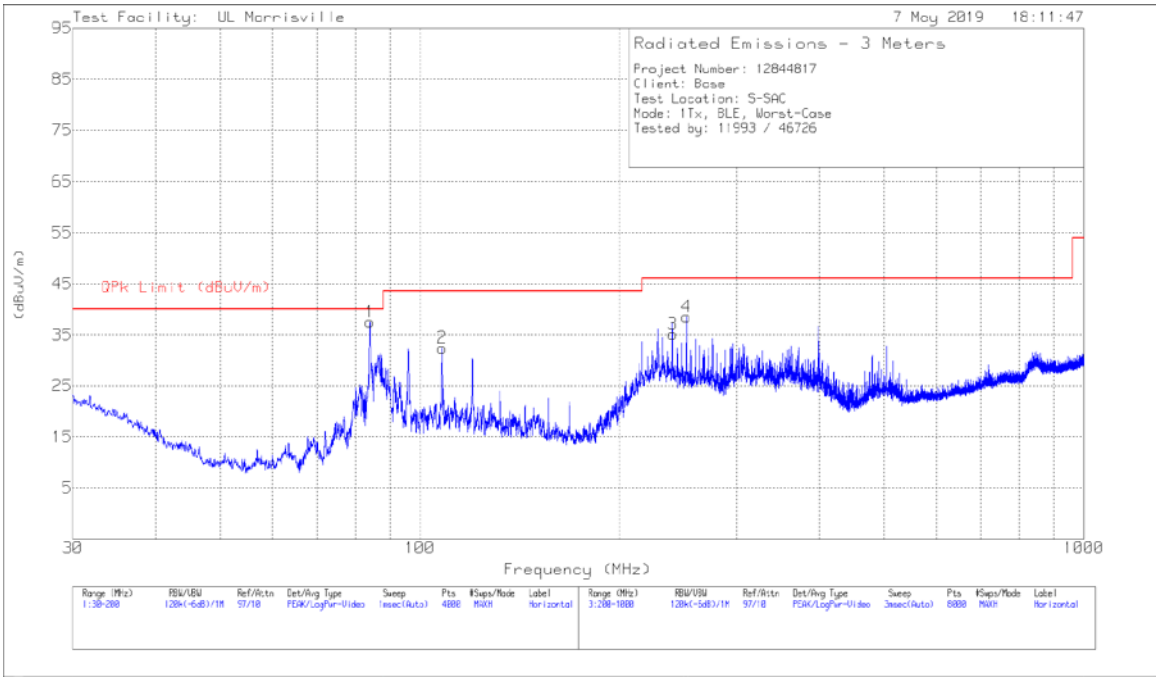
Below 30 MHz Data

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 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
4	.01173	45.94	Pk	17.6	.1	-80	-16.36	-	46.22	66.22	-62.58	0-360	Off
7	.01516	45.17	Pk	16.1	.1	-80	-18.63	-	43.99	63.99	-62.62	0-360	Flat
1	.01663	46.67	Pk	15.4	.1	-80	-17.83	-	43.19	63.19	-61.02	0-360	On
5	.20899	43.35	Pk	10.7	.1	-80	-25.85	-	21.2	41.2	-47.05	0-360	Off
8	.34414	39.23	Pk	10.6	.1	-80	-30.07	-	16.87	36.87	-46.94	0-360	Flat
6	.51108	35.86	Pk	10.8	.1	-40	6.76	33.43	-	-	-26.67	0-360	Off
9	.55956	35.89	Pk	10.8	.1	-40	6.79	32.65	-	-	-25.86	0-360	Flat
2	.77458	33.15	Pk	10.8	.1	-40	4.05	29.82	-	-	-25.77	0-360	On
3	1.21515	30.59	Pk	11	.2	-40	1.79	25.91	-	-	-24.12	0-360	On

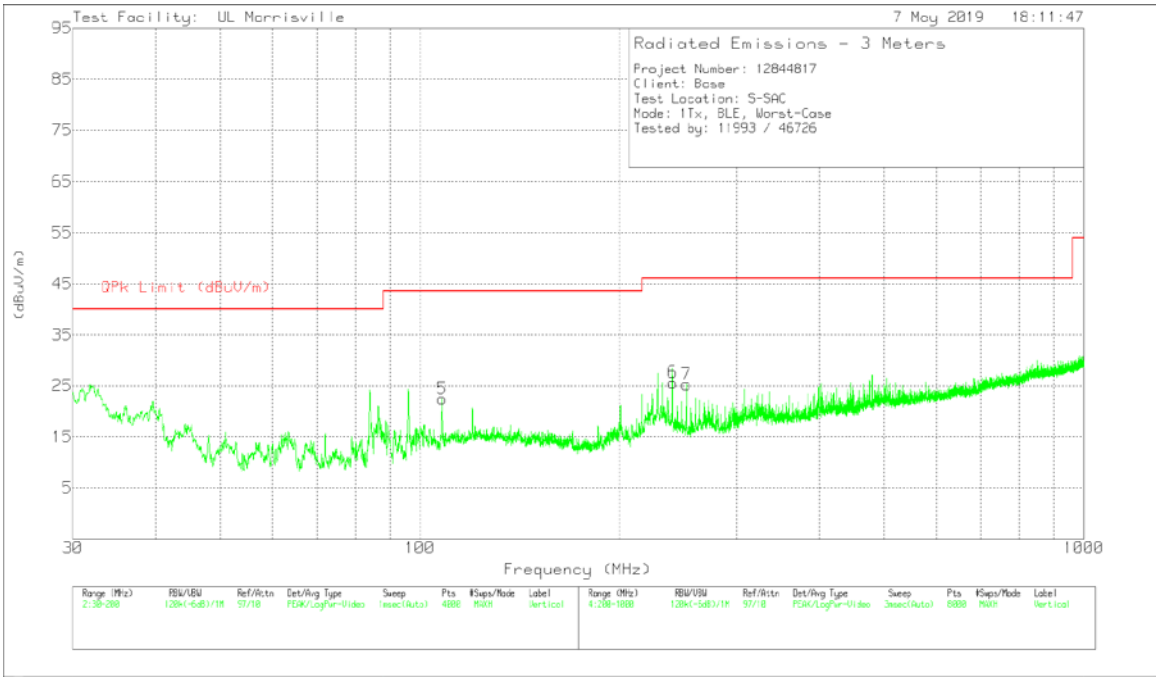
Pk - Peak detector

9.4. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

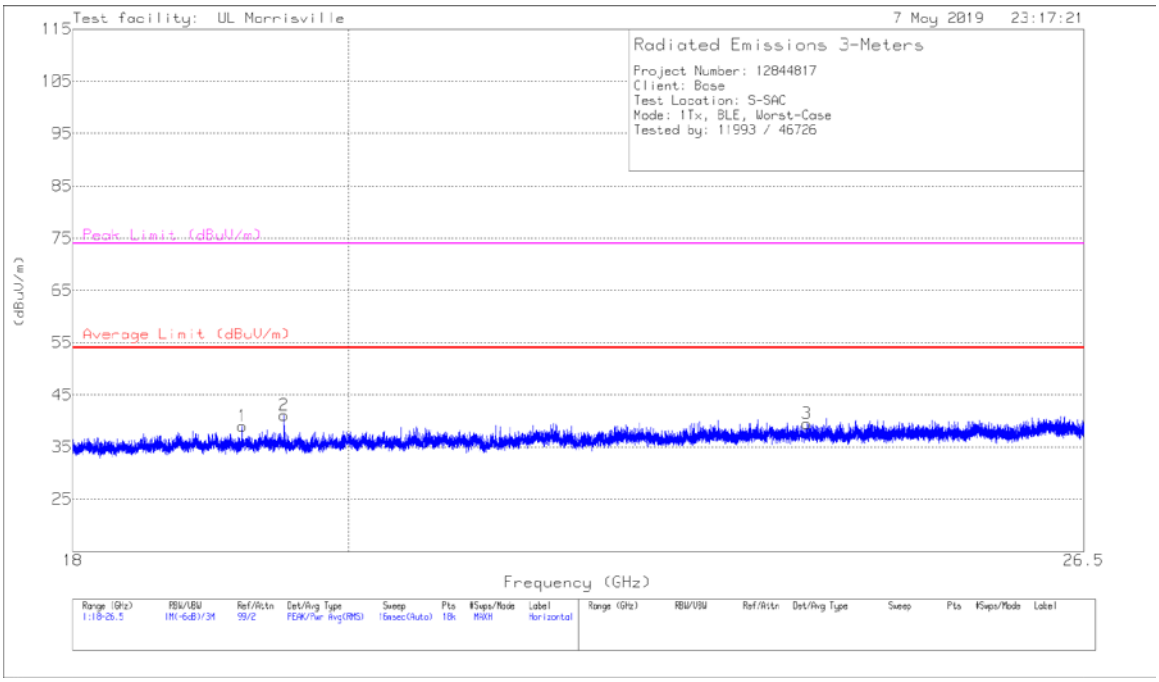
Below 1GHz Data

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
2	* ** 108.0077	46.72	Pk	16.6	-30.9	32.42	43.52	-11.1	0-360	299	H
5	* ** 108.0502	36.75	Pk	16.6	-30.9	22.45	43.52	-21.07	0-360	101	V
3	* ** 240.1052	48.81	Pk	16.3	-30	35.11	46.02	-10.91	0-360	102	H
4	* ** 252.0068	52.22	Pk	16.3	-30	38.52	46.02	-7.5	0-360	102	H
6	* ** 240.1052	39.34	Pk	16.3	-30	25.64	46.02	-20.38	0-360	102	V
7	* ** 252.0068	38.99	Pk	16.3	-30	25.29	46.02	-20.73	0-360	199	V
1	84.0315	56.8	Pk	11.8	-31.1	37.5	40	-2.5	0-360	398	H

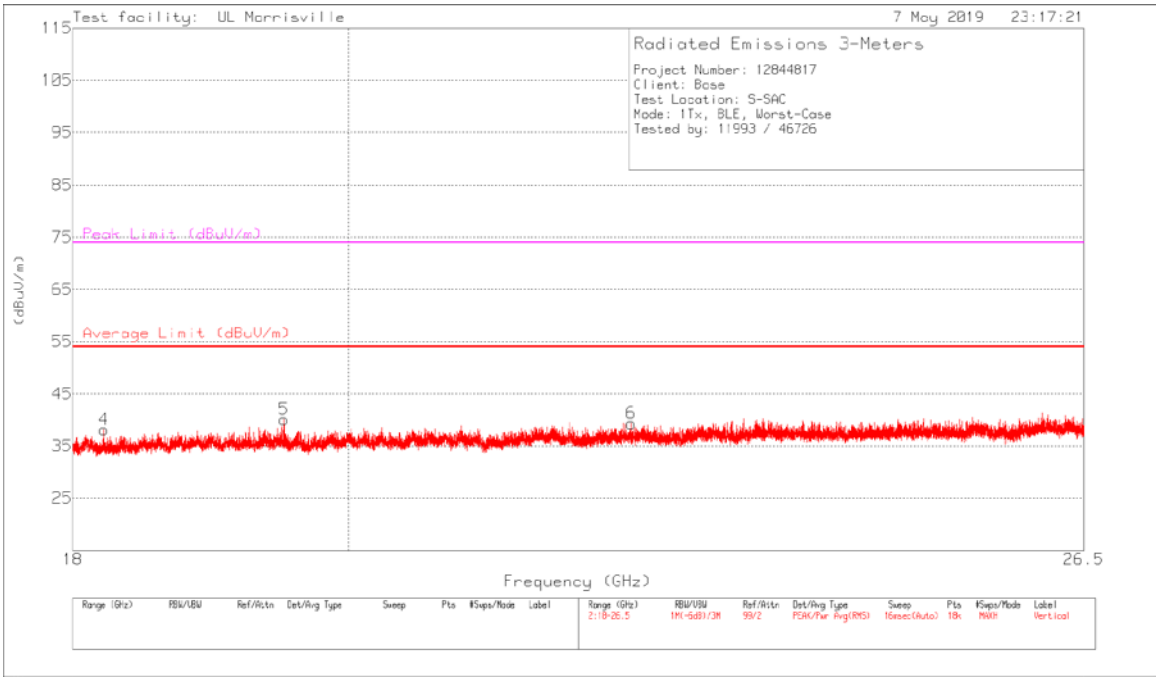
Pk - Peak detector

9.5. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

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	* ** 19.208	45.22	Pk	32.6	-38.8	39.02	54	-14.98	74	-34.98	0-360	199	H
2	* ** 19.516	47.1	Pk	32.8	-38.8	41.1	54	-12.9	74	-32.9	0-360	102	H
3	* ** 23.838	42.79	Pk	34	-37.3	39.49	54	-14.51	74	-34.51	0-360	299	H
4	* ** 18.216	45.01	Pk	32.2	-39.1	38.11	54	-15.89	74	-35.89	0-360	151	V
5	* ** 19.516	46.07	Pk	32.8	-38.8	40.07	54	-13.93	74	-33.93	0-360	251	V
6	* ** 22.285	43.91	Pk	33.5	-38.1	39.31	54	-14.69	74	-34.69	0-360	299	V

Pk - Peak detector

10. SETUP PHOTOS

Please refer to R12844817-EP4 for setup photos

END OF TEST REPORT

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