CERTIFICATION TEST REPORT

Report Number. : R12875567L-E1

Applicant	:	Bose Corporation 100 The Mountain Framingham, MA 01701, USA
Model	:	BL2L
FCC ID	:	A94BL2L
IC	:	3232A-BL2L
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

Prepared by:
UL LLC
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Research Triangle Park, NC 27709 U.S.A.
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NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

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

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Wireless Headset

MODEL: BL2L

SERIAL NUMBER: Radiated Samples: L2196
Conducted Samples: BL2L1

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
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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 v05, 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

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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)
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%.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a left 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	8.14	6.52

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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

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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 R12875567L-EP1 for setup diagrams

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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

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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 - 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

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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

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

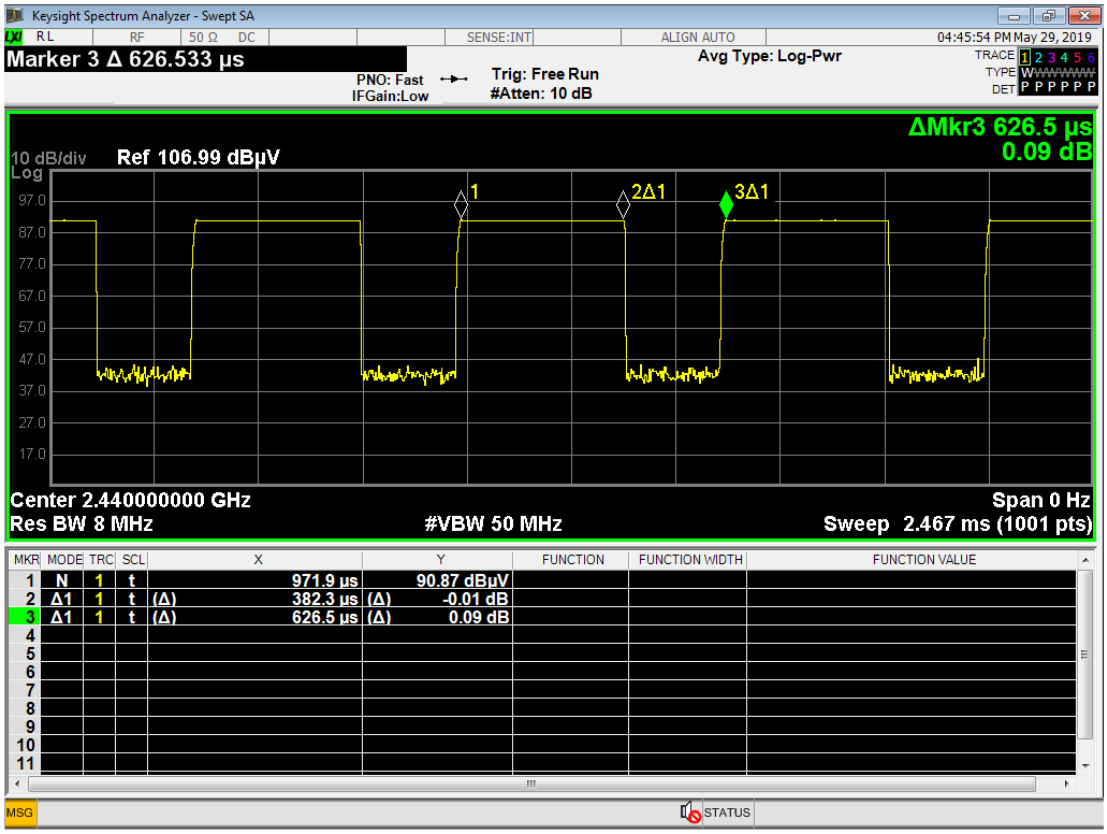
LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

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	0.382	0.627	0.610	61.02%	2.15	2.616



DUTY CYCLE BLE

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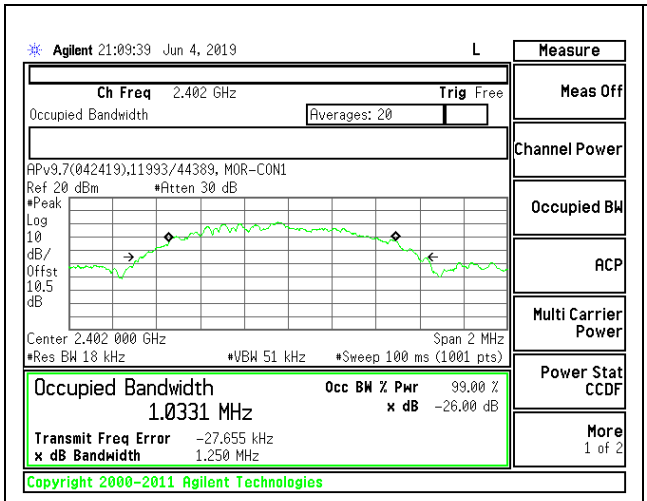
8.2. 99% BANDWIDTH

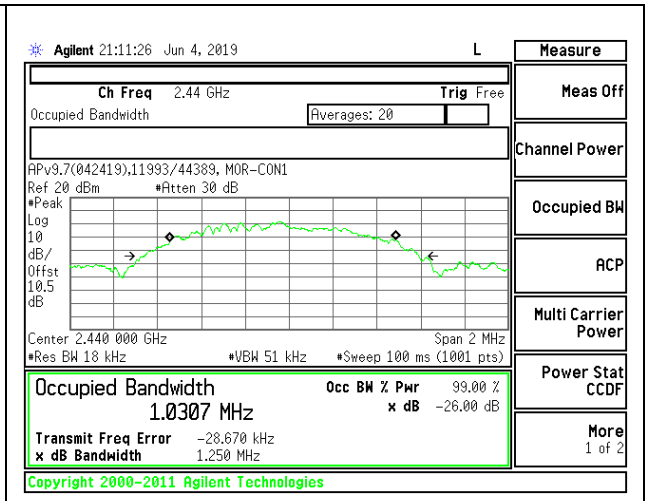
LIMITS

None; for reporting purposes only.

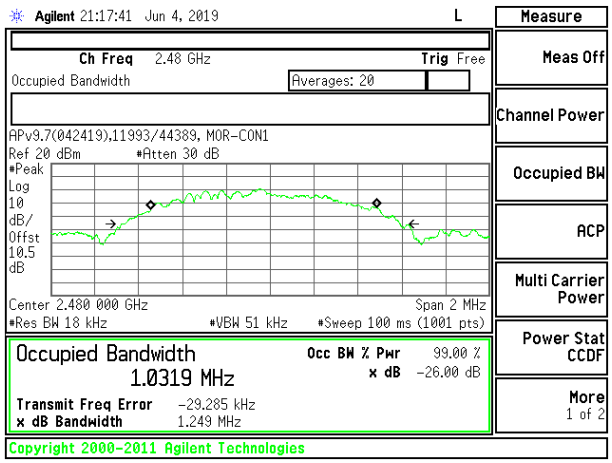
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0331
Middle	2440	1.0307
High	2480	1.0319



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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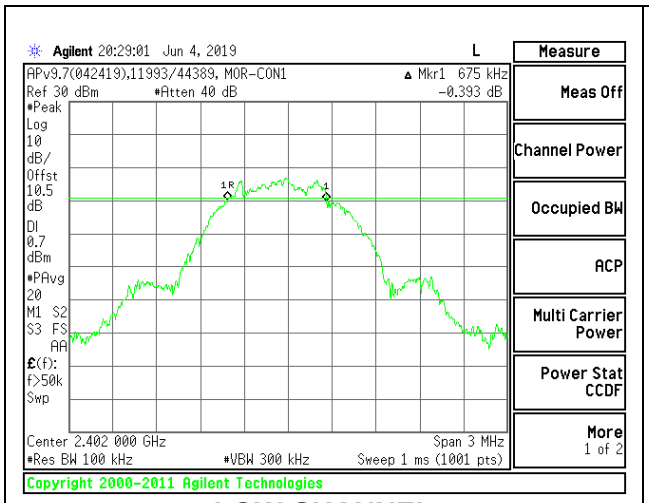
8.3. 6 dB BANDWIDTH

LIMITS

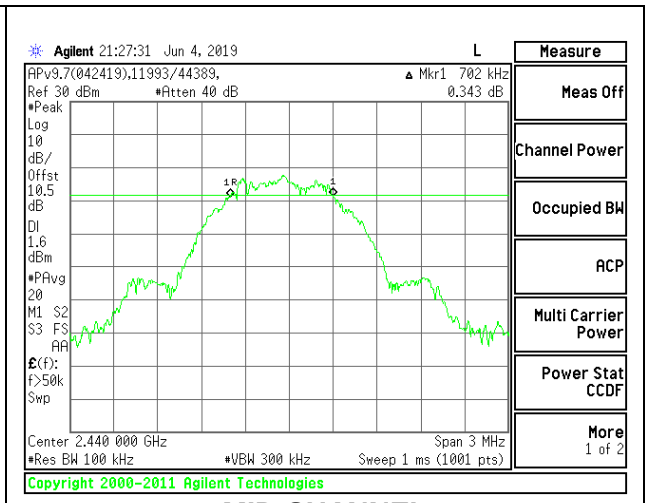
FCC §15.247 (a) (2)
RSS-247 5.2 (a)

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

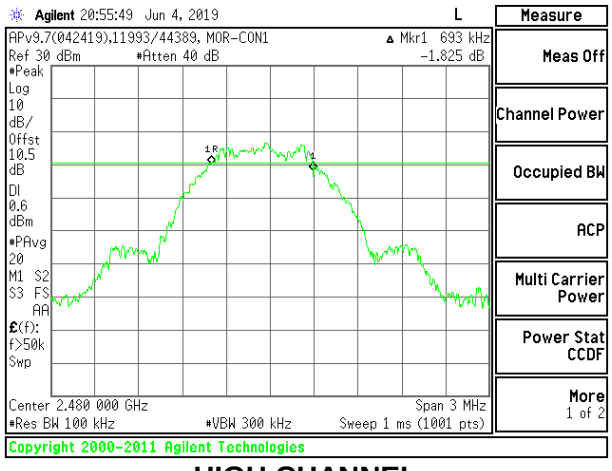
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.675	0.5
Middle	2440	0.702	0.5
High	2480	0.693	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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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 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	7.64	30	-22.360
Middle	2440	8.14	30	-21.860
High	2480	7.35	30	-22.650

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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.

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

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	6.48
Middle	2440	8.05
High	2480	7.17

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8.6. POWER SPECTRAL DENSITY

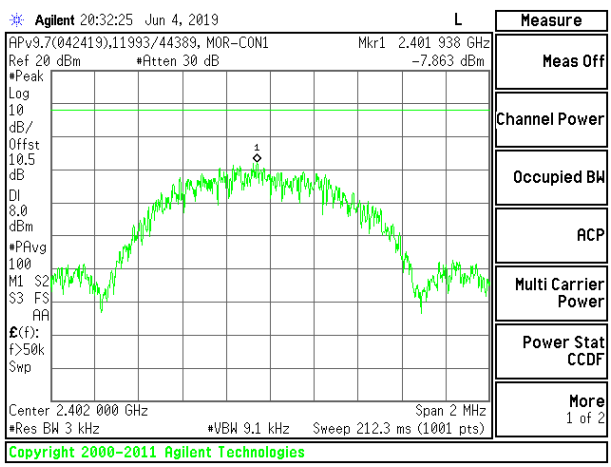
LIMITS

FCC §15.247 (e)

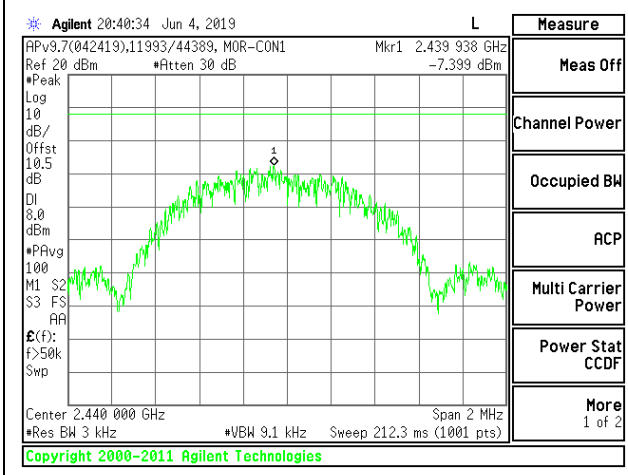
RSS-247 (5.2) (b)

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.

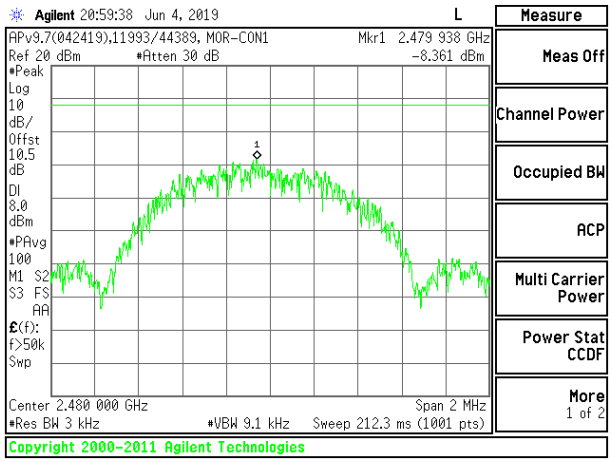
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-7.86	8	-15.86
Middle	2440	-7.40	8	-15.40
High	2480	-8.36	8	-16.36



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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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.

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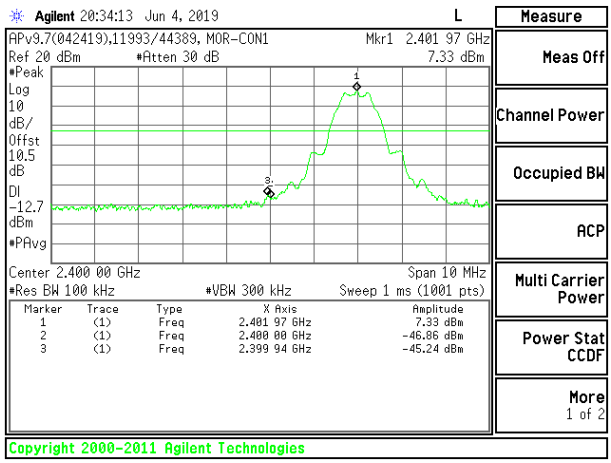
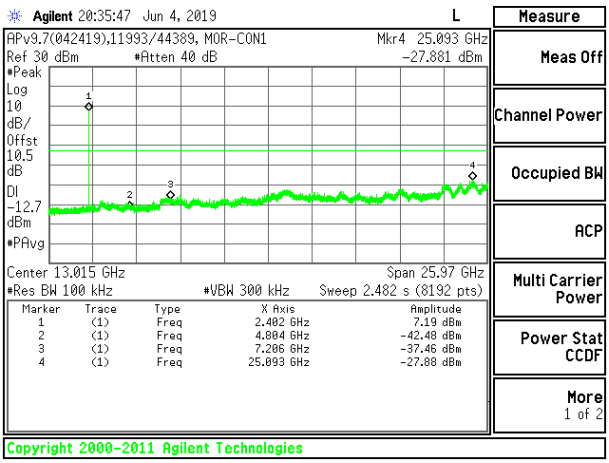
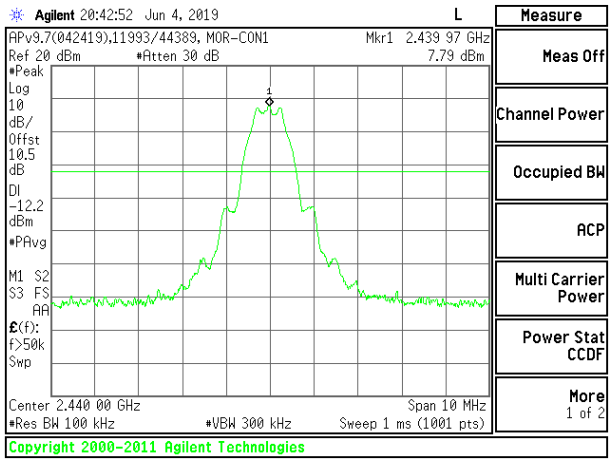
8.7.1. BLE (1Mbps)



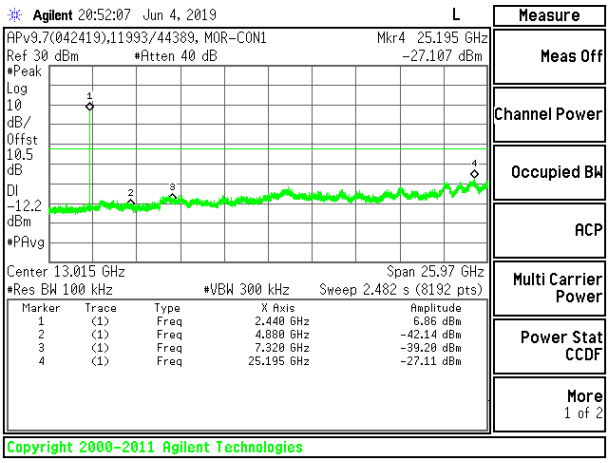
LOW CHANNEL BANDEDGE



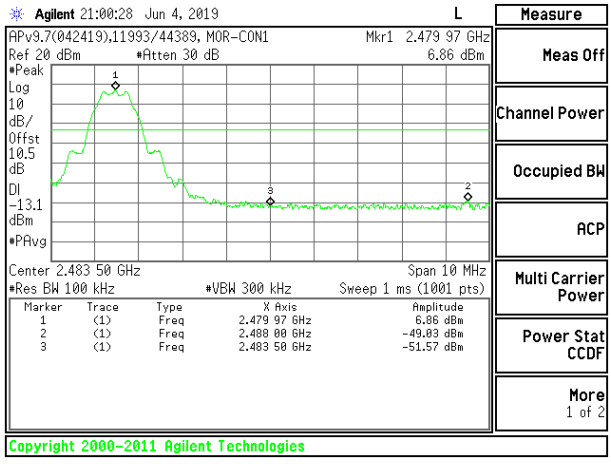
OUT-OF-BAND LOW CHANNEL



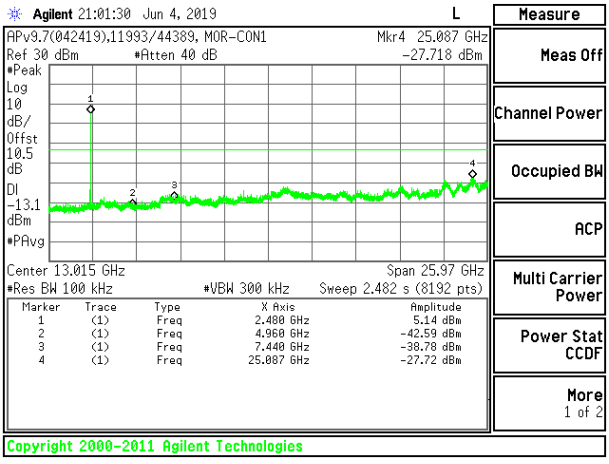
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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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).

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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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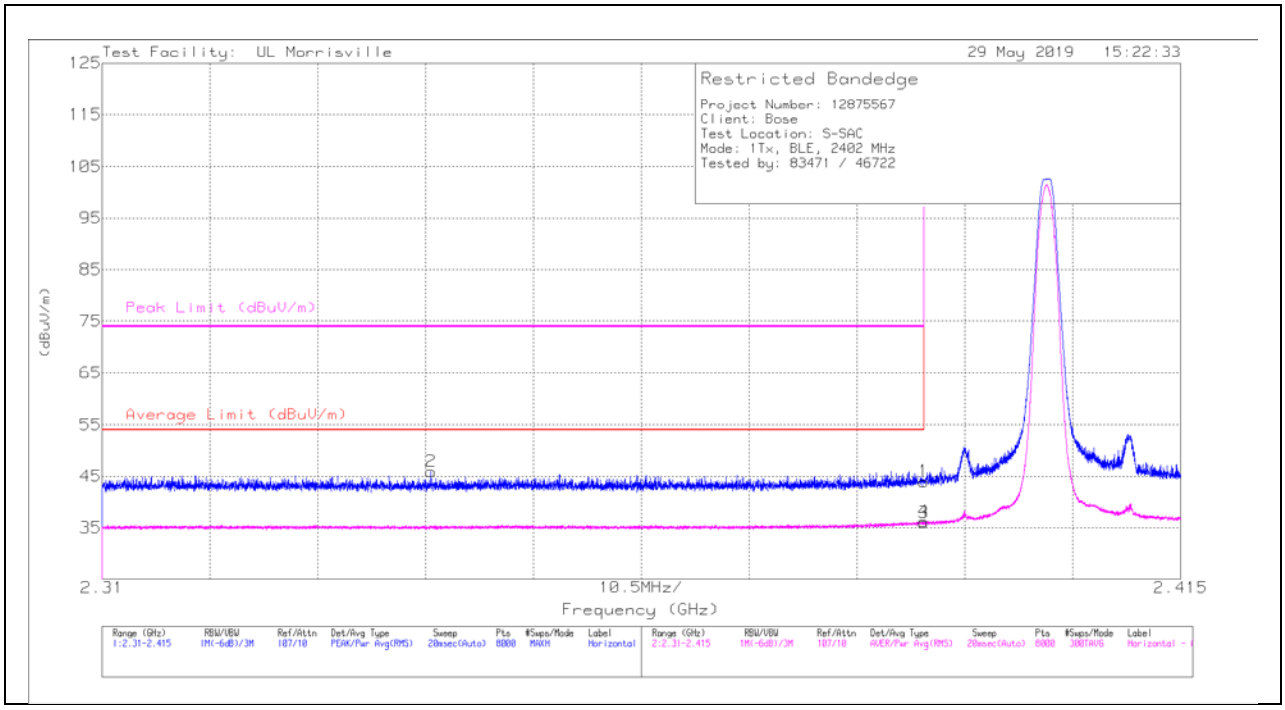
9.2. TRANSMITTER ABOVE 1 GHz

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	36.11	Pk	31.9	-24	0	44.01	-	-	74	-29.99	311	276	H
2	* ** 2.342	38.01	Pk	31.6	-23.7	0	45.91	-	-	74	-28.09	311	276	H
3	* ** 2.39	25.91	RMS	31.9	-24	2.15	35.96	54	-18.04	-	-	311	276	H
4	* ** 2.39	26.17	RMS	31.9	-24	2.15	36.22	54	-17.78	-	-	311	276	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

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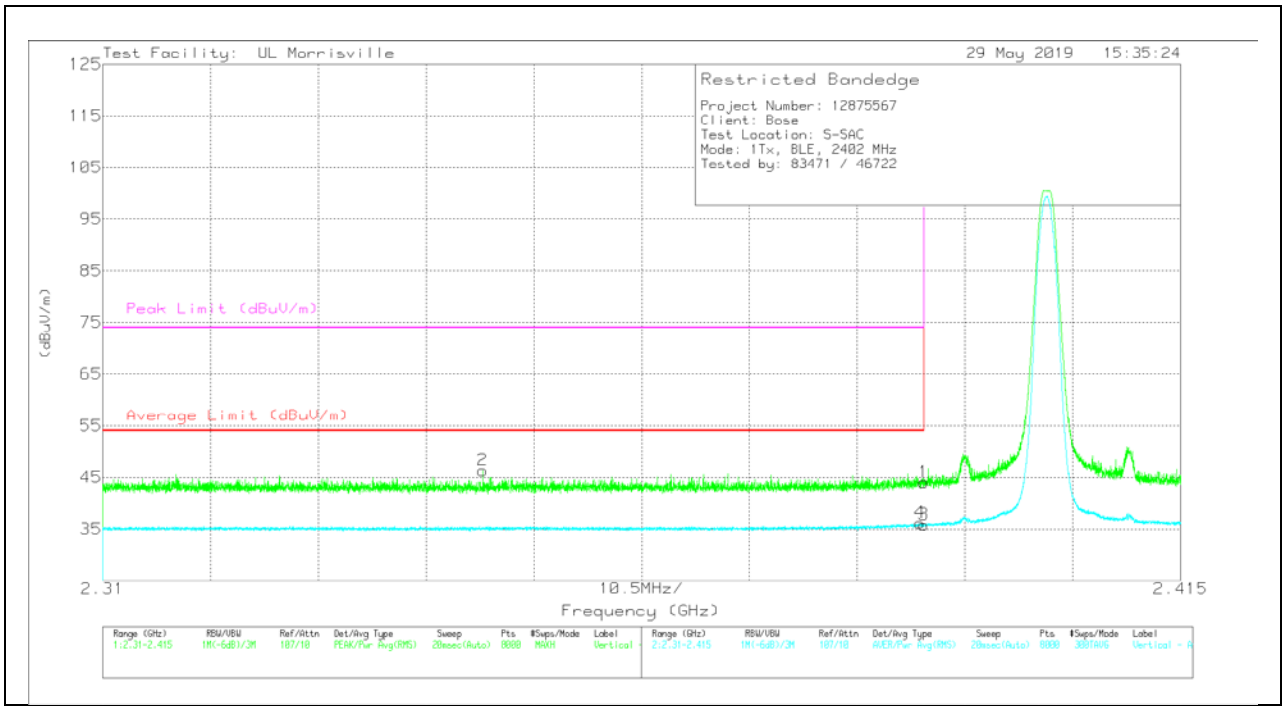
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 2.347	38.46	Pk	31.6	-23.7	0	46.36	-	-	74	-27.64	194	321	V
1	* ** 2.39	36.16	Pk	31.9	-24	0	44.06	-	-	74	-29.94	194	321	V
3	* ** 2.39	25.79	RMS	31.9	-24	2.15	35.84	54	-18.16	-	-	194	321	V
4	* ** 2.39	26.15	RMS	31.9	-24	2.15	36.2	54	-17.8	-	-	194	321	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

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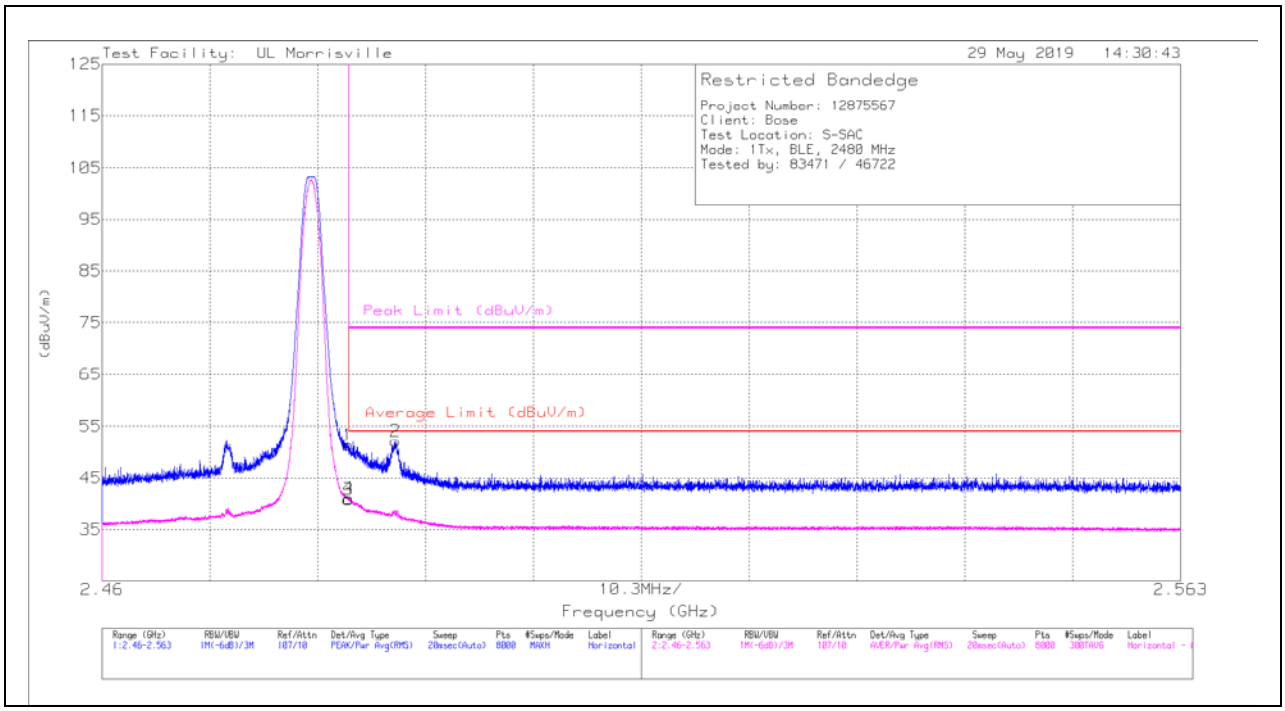
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	43.54	Pk	32.3	-24.5	0	51.34	-	-	74	-22.66	286	152	H
2	* ** 2.488	44.3	Pk	32.3	-24.5	0	52.1	-	-	74	-21.9	286	152	H
3	* ** 2.484	30.92	RMS	32.3	-24.5	2.15	40.87	54	-13.13	-	-	286	152	H
4	* ** 2.484	31.13	RMS	32.3	-24.5	2.15	41.08	54	-12.92	-	-	286	152	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

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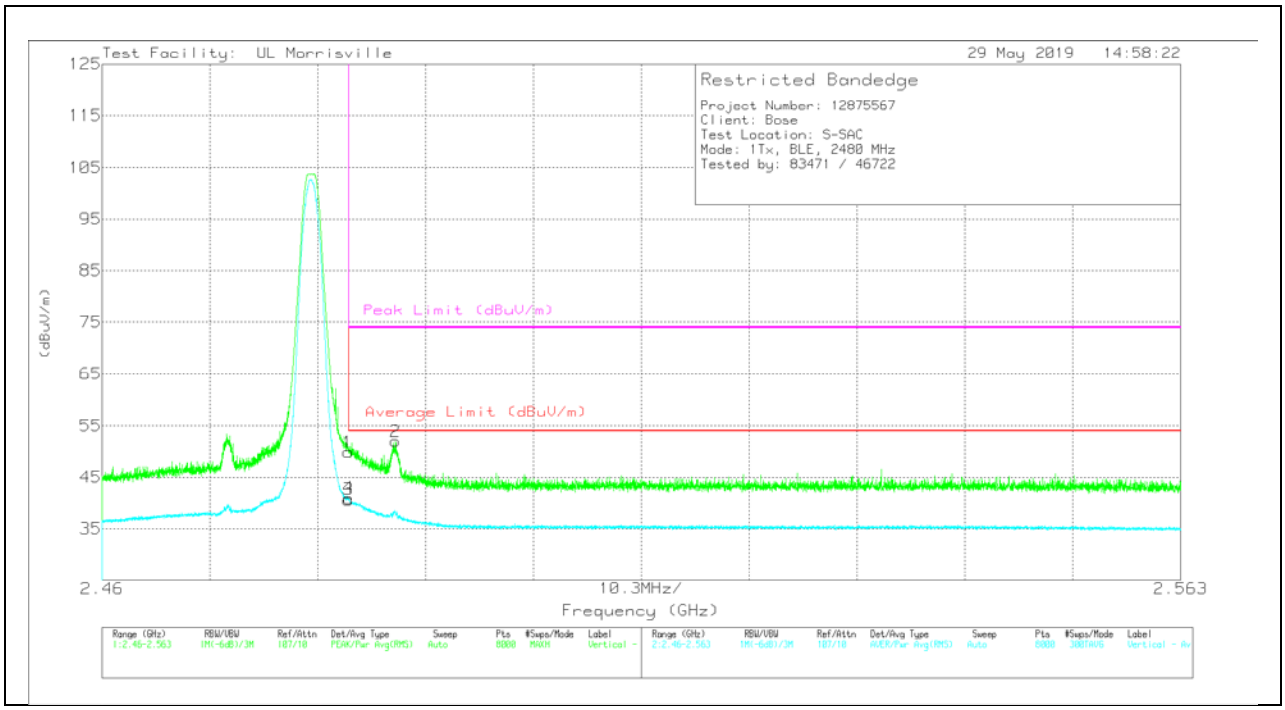
VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	42.01	Pk	32.3	-24.5	0	49.81	-	-	74	-24.19	275	154	V
2	* ** 2.488	44.15	Pk	32.3	-24.5	0	51.95	-	-	74	-22.05	275	154	V
3	* ** 2.484	30.75	RMS	32.3	-24.5	2.15	40.7	54	-13.3	-	-	275	154	V
4	* ** 2.484	31.01	RMS	32.3	-24.5	2.15	40.96	54	-13.04	-	-	275	154	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

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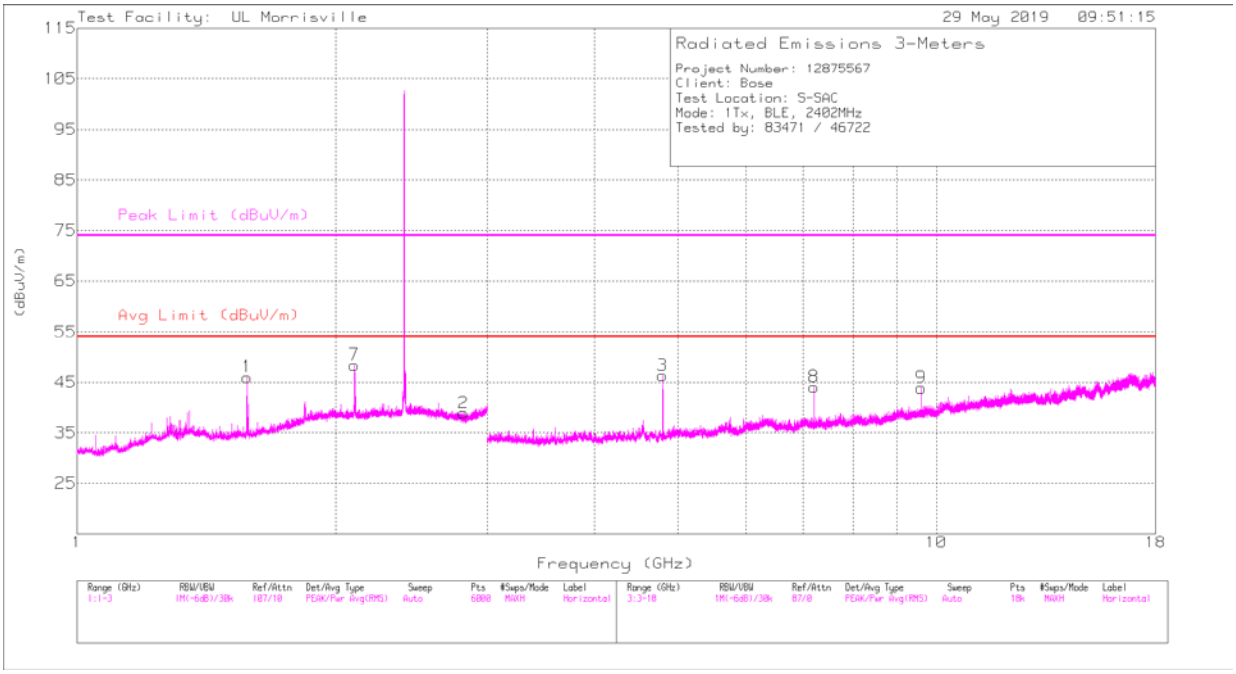
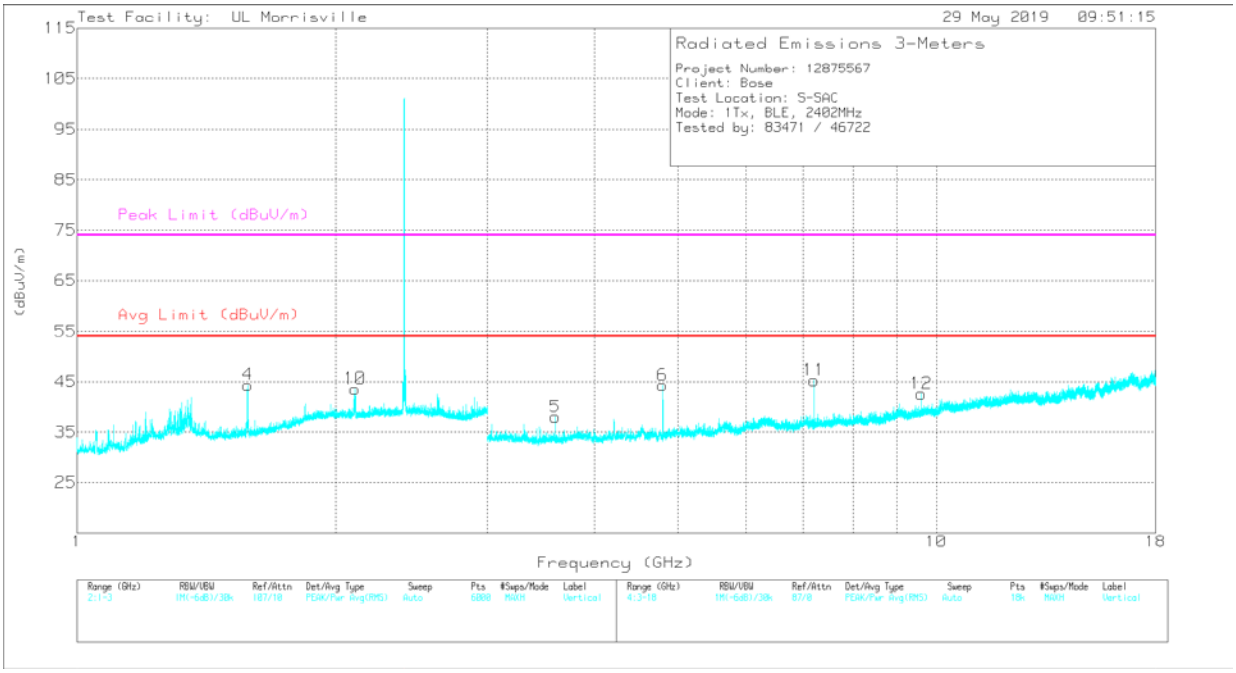
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.576	49.43	PK2	27.9	-22.2	0	55.13	-	-	74	-18.87	108	300	H
	* ** 1.576	26.06	MAv1	27.9	-22.2	2.15	33.91	54	-20.09	-	-	108	300	H
2	* ** 2.814	37.65	PK2	32.1	-25.9	0	43.85	-	-	74	-30.15	116	281	H
	* ** 2.814	25.94	MAv1	32.1	-25.9	2.15	34.29	54	-19.71	-	-	116	281	H
4	* ** 1.578	42.49	PK2	27.9	-22.2	0	48.19	-	-	74	-25.81	221	218	V
	* ** 1.579	24.79	MAv1	27.9	-22.2	2.15	32.64	54	-21.36	-	-	221	218	V
3	* ** 4.804	47.11	PK2	34.2	-31	0	50.31	-	-	74	-23.69	198	285	H
	* ** 4.804	39.76	MAv1	34.2	-31	2.15	45.11	54	-8.89	-	-	198	285	H
5	* ** 3.603	43.26	PK2	32.9	-31.6	0	44.56	-	-	74	-29.44	247	124	V
	* ** 3.603	33.89	MAv1	32.9	-31.6	2.15	37.34	54	-16.66	-	-	247	124	V
6	* ** 4.803	46.5	PK2	34.2	-31	0	49.7	-	-	74	-24.3	225	372	V
	* ** 4.804	38.57	MAv1	34.2	-31	2.15	43.92	54	-10.08	-	-	225	372	V
7	2.102	40.09	Pk	31.2	-22.9	0	48.39	-	-	-	-	0-360	199	H
10	2.106	35.42	Pk	31.2	-23	0	43.62	-	-	-	-	0-360	199	V
8	7.205	36.41	Pk	35.7	-28	0	44.11	-	-	-	-	0-360	102	H
11	7.205	37.58	Pk	35.7	-28	0	45.28	-	-	-	-	0-360	101	V
9	9.606	32.8	Pk	37.1	-26	0	43.9	-	-	-	-	0-360	102	H
12	9.609	31.54	Pk	37.1	-26	0	42.64	-	-	-	-	0-360	200	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

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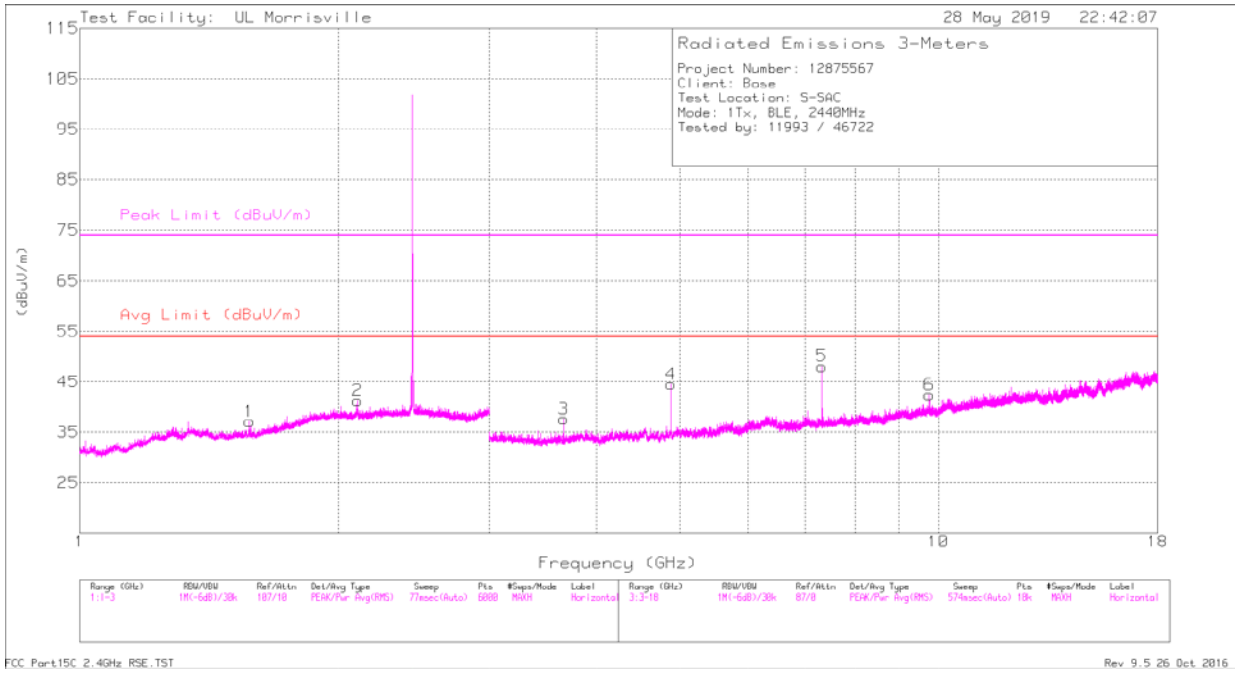
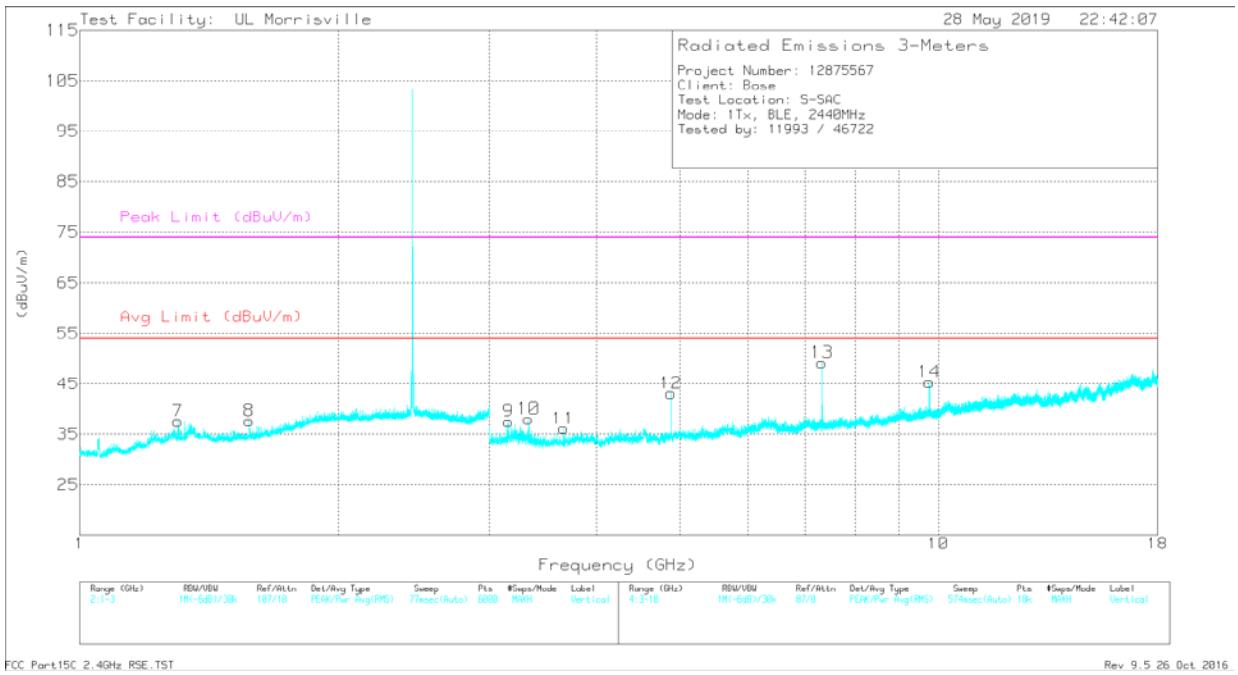
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.576	47.02	PK2	27.9	-22.2	0	52.72	-	-	74	-21.28	111	368	H
	* ** 1.575	24.13	MAv1	27.9	-22.2	2.15	31.98	54	-22.02	-	-	111	368	H
7	* ** 1.301	37.77	PK2	28.9	-23.2	0	43.47	-	-	74	-30.53	38	197	V
	* ** 1.301	23.8	MAv1	28.9	-23.2	2.15	31.65	54	-22.35	-	-	38	197	V
8	* ** 1.576	42.54	PK2	27.9	-22.2	0	48.24	-	-	74	-25.76	187	167	V
	* ** 1.579	23.95	MAv1	27.9	-22.2	2.15	31.8	54	-22.2	-	-	187	167	V
3	* ** 3.659	43.07	PK2	32.9	-32	0	43.97	-	-	74	-30.03	42	326	H
	* ** 3.66	32.24	MAv1	32.9	-32.1	2.15	35.19	54	-18.81	-	-	42	326	H
4	* ** 4.88	45.31	PK2	34	-30.6	0	48.71	-	-	74	-25.29	41	109	H
	* ** 4.88	36.79	MAv1	34	-30.6	2.15	42.34	54	-11.66	-	-	41	109	H
5	* ** 7.319	43.66	PK2	35.7	-27.5	0	51.86	-	-	74	-22.14	307	105	H
	* ** 7.319	35.04	MAv1	35.7	-27.5	2.15	45.39	54	-8.61	-	-	307	105	H
10	* ** 3.333	44.08	PK2	32.9	-32.4	0	44.58	-	-	74	-29.42	245	142	V
	* ** 3.333	28.9	MAv1	32.9	-32.4	2.15	31.55	54	-22.45	-	-	245	142	V
11	* ** 3.66	43.79	PK2	32.9	-32	0	44.69	-	-	74	-29.31	340	380	V
	* ** 3.66	33.91	MAv1	32.9	-32.1	2.15	36.86	54	-17.14	-	-	340	380	V
12	* ** 4.879	44.04	PK2	34	-30.6	0	47.44	-	-	74	-26.56	108	113	V
	* ** 4.88	35.24	MAv1	34	-30.6	2.15	40.79	54	-13.21	-	-	108	113	V
13	* ** 7.32	44.85	PK2	35.7	-27.5	0	53.05	-	-	74	-20.95	1	110	V
	* ** 7.319	36.51	MAv1	35.7	-27.5	2.15	46.86	54	-7.14	-	-	1	110	V
2	2.109	33.08	Pk	31.2	-23	0	41.28	-	-	-	-	0-360	199	H
9	3.158	36.99	Pk	33.2	-32.6	0	37.59	-	-	-	-	0-360	199	V
6	9.759	30.92	Pk	37.1	-25.6	0	42.42	-	-	-	-	0-360	102	H
14	9.759	33.84	Pk	37.1	-25.6	0	45.34	-	-	-	-	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

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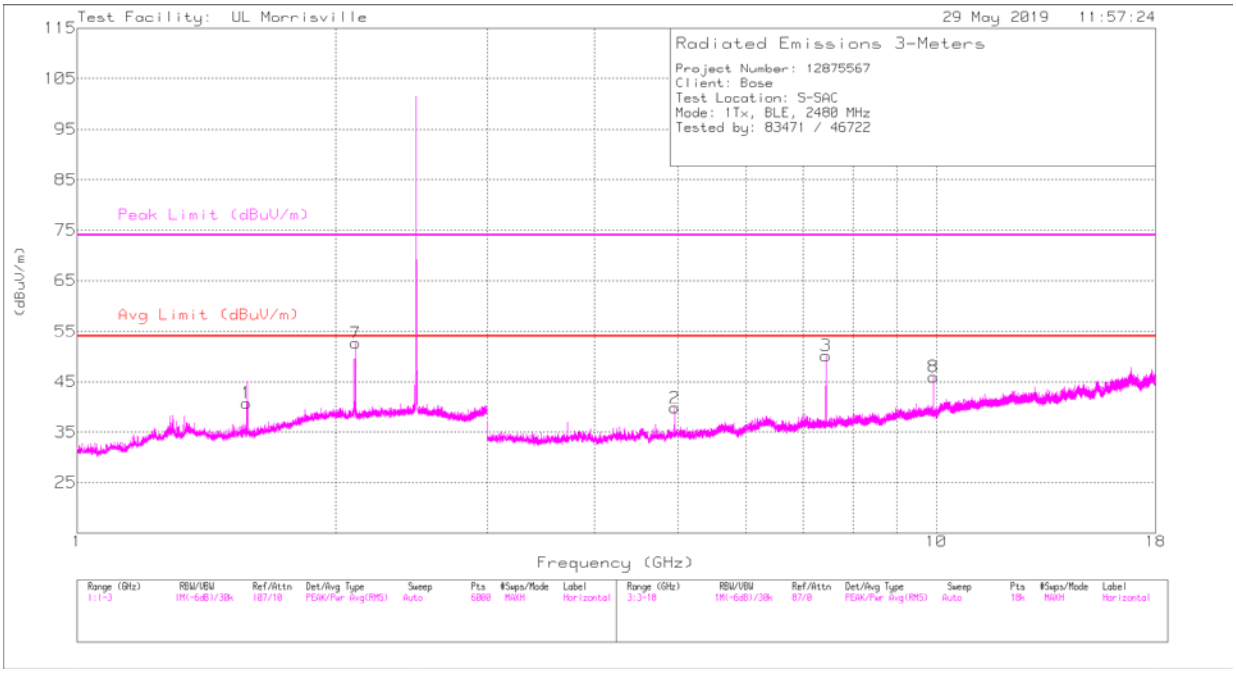
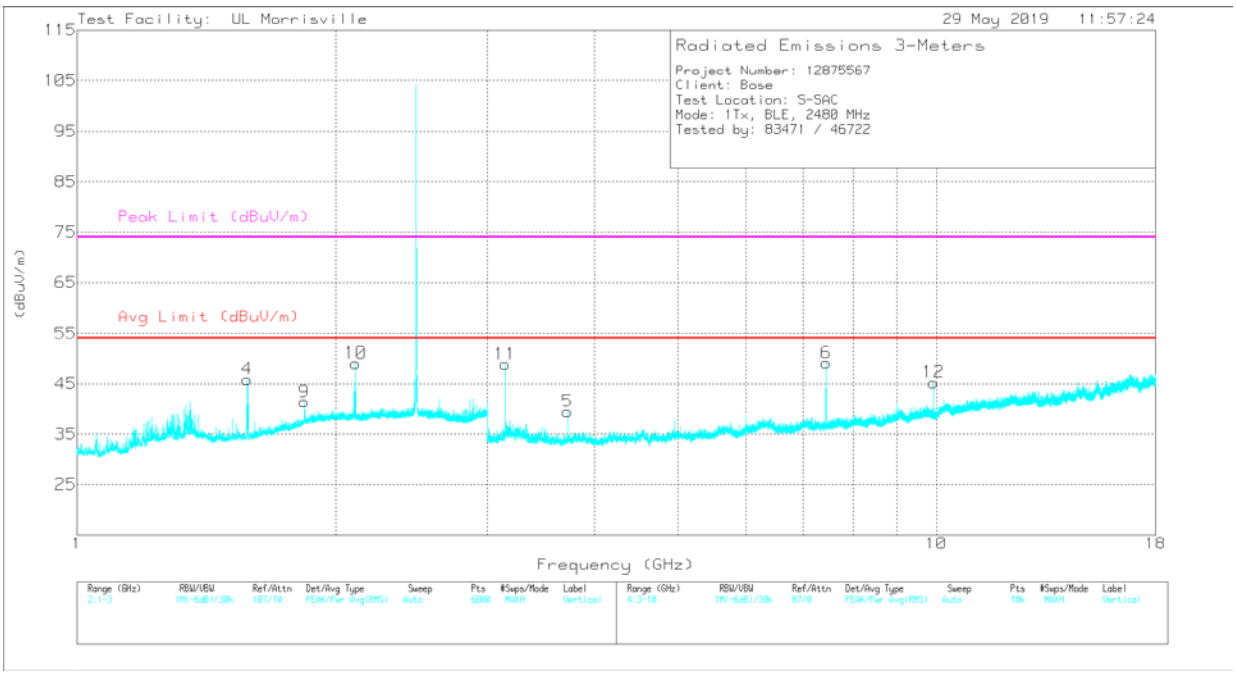
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 1.576	38.78	PK2	27.9	-22.2	0	44.48	-	-	74	-29.52	169	337	H
	* ** 1.576	23.91	MAv1	27.9	-22.2	2.15	31.76	54	-22.24	-	-	169	337	H
4	* ** 1.575	39.63	PK2	27.9	-22.2	0	45.33	-	-	74	-28.67	107	178	V
	* ** 1.577	23.95	MAv1	27.9	-22.2	2.15	31.8	54	-22.2	-	-	107	178	V
2	* ** 4.96	42.01	PK2	34.1	-31.1	0	45.01	-	-	74	-28.99	191	153	H
	* ** 4.96	32.42	MAv1	34.1	-31.1	2.15	37.57	54	-16.43	-	-	191	153	H
3	* ** 7.439	44.13	PK2	35.8	-27.8	0	52.13	-	-	74	-21.87	348	102	H
	* ** 7.439	36.85	MAv1	35.8	-27.8	2.15	47	54	-7	-	-	348	102	H
5	* ** 3.72	44.35	PK2	33.1	-32.5	0	44.95	-	-	74	-29.05	218	136	V
	* ** 3.72	36.33	MAv1	33.1	-32.5	2.15	39.08	54	-14.92	-	-	218	136	V
6	* ** 7.439	45.2	PK2	35.8	-27.8	0	53.2	-	-	74	-20.8	8	128	V
	* ** 7.439	37.6	MAv1	35.8	-27.8	2.15	47.75	54	-6.25	-	-	8	128	V
9	1.838	32.96	Pk	30.8	-22.3	0	41.46	-	-	-	-	0-360	200	V
7	2.109	44.38	Pk	31.2	-23	0	52.58	-	-	-	-	0-360	199	H
10	2.109	40.82	Pk	31.2	-23	0	49.02	-	-	-	-	0-360	101	V
11	3.148	48.17	Pk	33.2	-32.5	0	48.87	-	-	-	-	0-360	199	V
12	9.919	33.57	Pk	37.2	-25.5	0	45.27	-	-	-	-	0-360	101	V
8	9.92	34.27	Pk	37.2	-25.5	0	45.97	-	-	-	-	0-360	102	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
RMS - RMS detection
PK2 - Maximum Peak
MAv1 - Maximum RMS Average
Pk - Peak detector

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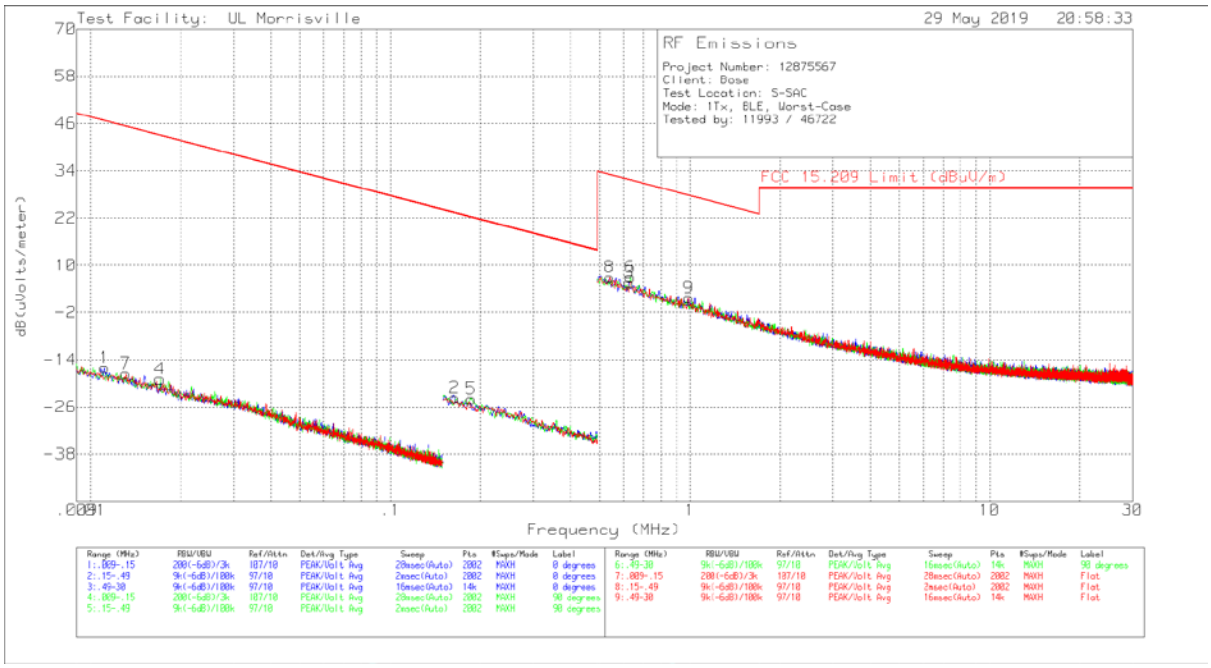
9.3. WORST CASE BELOW 30MHZ

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 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uV/mr)	FCC 15.209 QP Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	FCC 15.209 AV Limit (dBuV/m)	Worst-Csae Margin (dB)	Azimuth (Degs)	Antenna Face
1	.0111	46.08	Pk	17.8	.1	-80	-16.02	-	46.7	66.7	-62.72	0-360	On
7	.01313	45.36	Pk	17	.1	-80	-17.54	-	45.24	65.24	-62.78	0-360	Flat
4	.01705	45.66	Pk	15.3	.1	-80	-18.94	-	42.97	62.97	-61.91	0-360	Off
2	.16377	45.52	Pk	10.7	.1	-80	-23.68	-	23.32	43.32	-47	0-360	On
5	.18672	45.26	Pk	10.7	.1	-80	-23.94	-	22.18	42.18	-46.12	0-360	Off
8	.54059	36.02	Pk	10.8	.1	-40	6.92	32.95	-	-	-26.03	0-360	Flat
3	.62702	34.74	Pk	10.8	.1	-40	5.64	31.66	-	-	-26.02	0-360	On
6	.63334	36.12	Pk	10.8	.1	-40	7.02	31.57	-	-	-24.55	0-360	Off
9	.9917	30.61	Pk	11	.1	-40	1.71	27.68	-	-	-25.97	0-360	Flat

Pk - Peak detector

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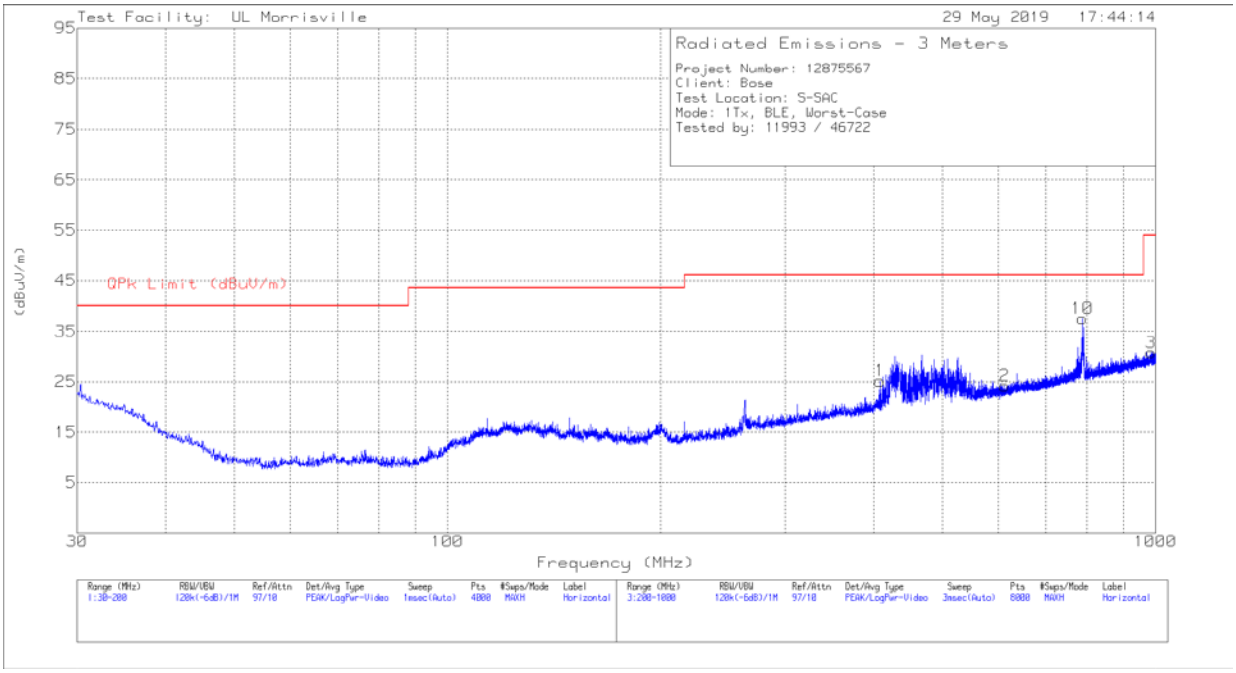
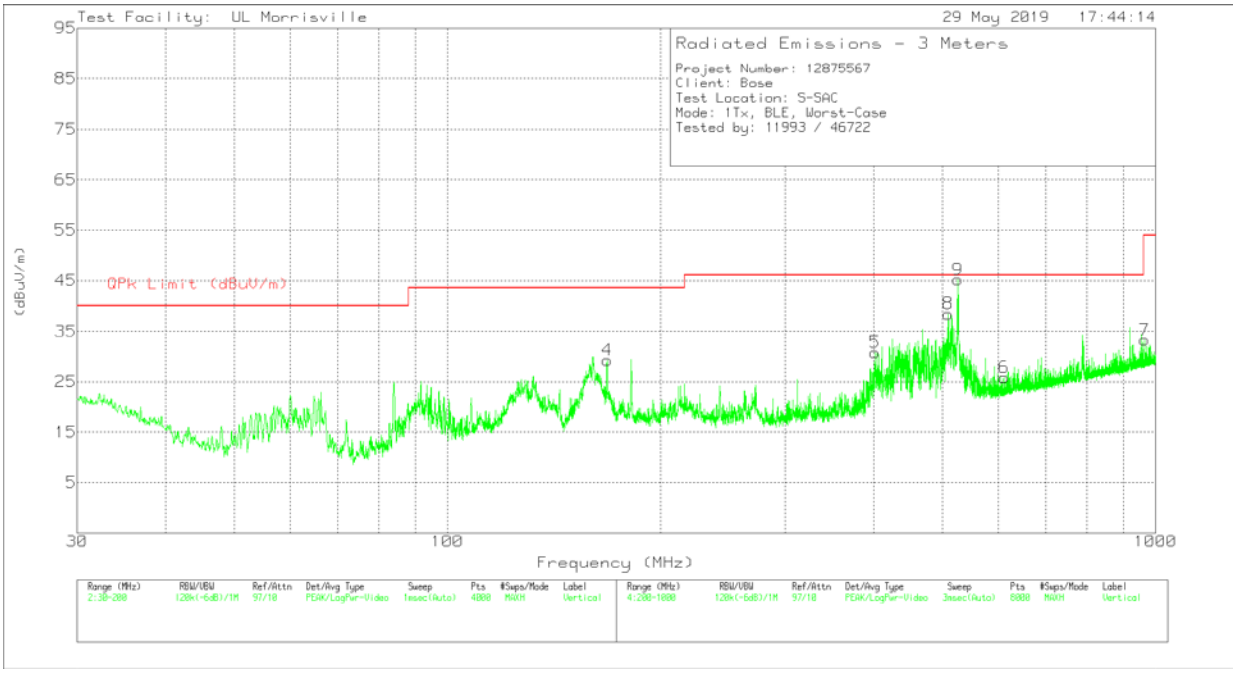
9.4. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

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Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* ** 168.0332	43.13	Pk	16.5	-30.4	29.23	43.52	-14.29	0-360	101	V
1	* ** 407.927	33.75	Pk	20.6	-29.2	25.15	46.02	-20.87	0-360	199	H
2	* ** 611.8535	29.17	Pk	23.7	-28.7	24.17	46.02	-21.85	0-360	199	H
3	* ** 985.6021	28.61	Pk	28	-25.9	30.71	53.97	-23.26	0-360	298	H
5	* ** 401.7262	39.48	Pk	20.4	-29.1	30.78	46.02	-15.24	0-360	102	V
6	* ** 611.2535	30.82	Pk	23.7	-28.7	25.82	46.02	-20.2	0-360	102	V
7	* ** 964.6994	31.88	Pk	27.7	-26.3	33.28	53.97	-20.69	0-360	102	V
8	509.7403	44.85	Pk	22.2	-28.6	38.45	46.02	-7.57	0-360	102	V
9	526.0424	51.38	Pk	22.5	-28.7	45.18	46.02	-.84	0-360	102	V
10	787.6764	39.52	Pk	25.9	-27.9	37.52	46.02	-8.5	0-360	199	H

Pk - Peak detector

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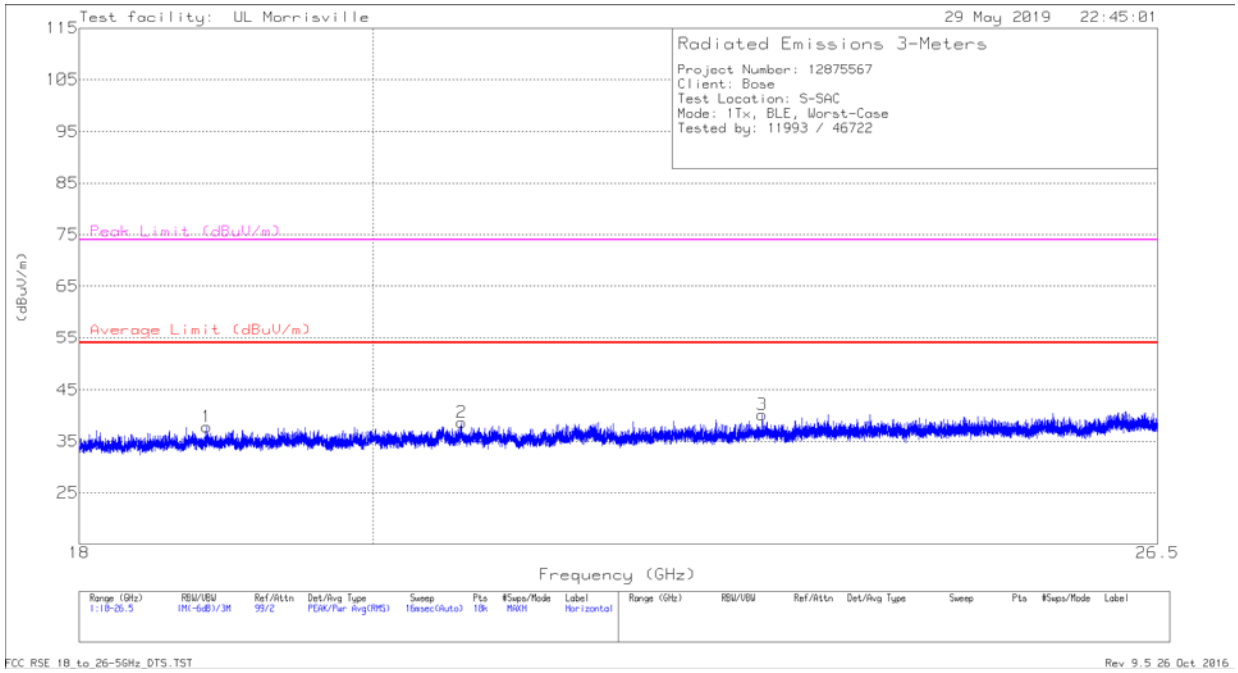
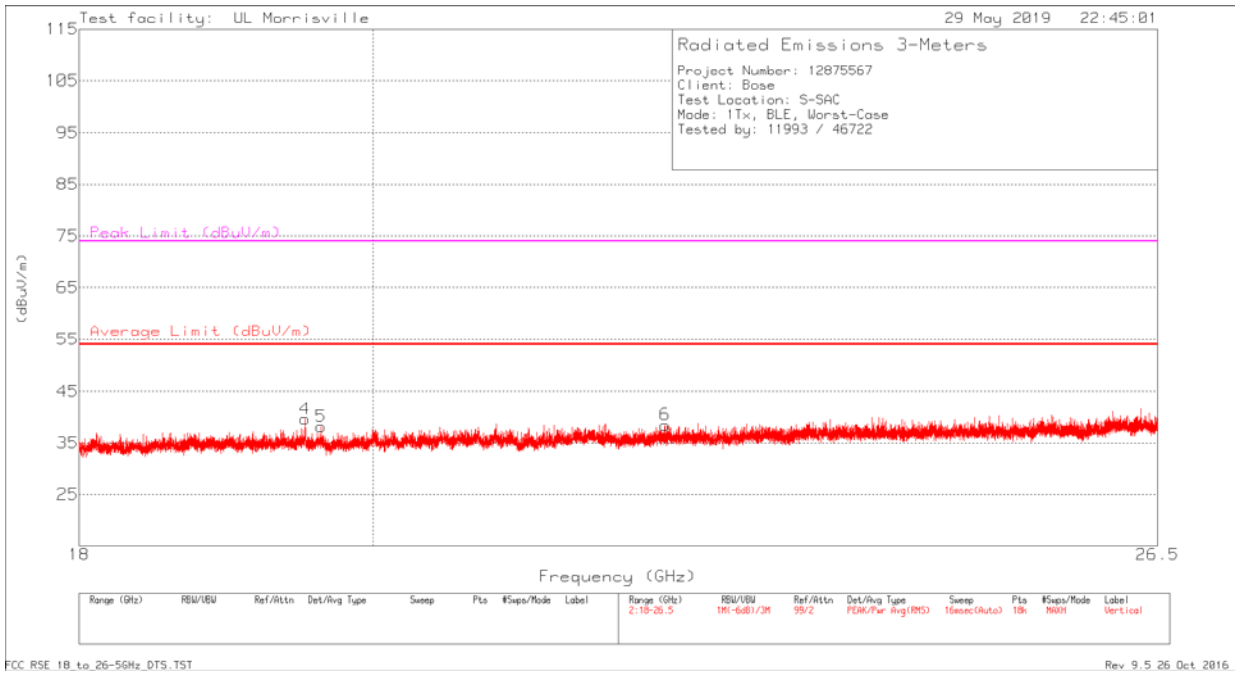
9.5. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

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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	* ** 18.844	43.96	Pk	32.6	-38.8	37.76	54	-16.24	74	-36.24	0-360	299	H
2	* ** 20.646	43.59	Pk	33	-38	38.59	54	-15.41	74	-35.41	0-360	249	H
3	* ** 22.996	44.15	Pk	33.7	-37.7	40.15	54	-13.85	74	-33.85	0-360	299	H
4	* ** 19.517	45.63	Pk	32.8	-38.8	39.63	54	-14.37	74	-34.37	0-360	101	V
5	* ** 19.63	44.13	Pk	32.7	-38.7	38.13	54	-15.87	74	-35.87	0-360	300	V
6	* ** 22.209	42.74	Pk	33.6	-37.9	38.44	54	-15.56	74	-35.56	0-360	300	V

Pk - Peak detector

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10. SETUP PHOTOS

Please refer to R12875567L-EP1 for setup photos

END OF TEST REPORT

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