FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 4

CERTIFICATION TEST REPORT

FOR

WIRELESS MODULE

MODEL NUMBER: 424821

FCC ID: A94424821
IC: 3232A-424821

REPORT NUMBER: R12053557-E11

ISSUE DATE: 2018-06-06

Prepared for
BOSE CORPORATION
100 THE MOUNTAIN ROAD
FRAMINGHAM, MA 01701, USA

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NVLAP TESTING
NVLAP LAB CODE 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2018-04-24	Initial Issue	Brian T. Kiewra
2	2018-05-23	Added KDB558074 D01v04 reference to Section 2 Added 'ac' to Section 5.1. Added reference to monitor and headphones in Section 5.5. Added calibration note to Section 6.	Brian T. Kiewra
3	2018-06-06	Added simultaneous transmission statement to Section 5.5. Revised antenna description in Section 5.3.	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 Module

MODEL: 424821

SERIAL NUMBER: Radiated: 0122, 0180; Conducted: 0199

DATE TESTED: 2018-02-26 to 2018-03-29

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Compliant
ISED CANADA RSS-247 Issue 2	Compliant
ISED CANADA RSS-GEN Issue 4	Compliant

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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
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, KDB 558074 D01 v04, ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Drive, Suite B,Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560
☒ Chamber NORTH
☒ Chamber SOUTH

The onsite chambers (A, C, North and South) are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at https://www.nist.gov/nvlap.

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

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

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY	REQUIRED BY STANDARD
Occupied Channel Bandwidth	2.00%	±5 %
RF output power, conducted	1.3 dB	±1,5 dB
Power Spectral Density, conducted	2.47 dB	±3 dB
Unwanted Emissions, conducted	2.94 dB	±3 dB
All emissions, radiated	5.36 dB	±6 dB
Temperature	2.26 °C	±3 °C
Supply voltages	2.40%	±3 %
Time	3.39%	±5 %

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless module with 802.11a/b/g/n/ac, BT, and BLE capabilities.

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	2.40	1.74

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The module was tested with two different types external antennas; flexible and PCB trace antennas.

BT/BLE only transmits on Antenna 2

Etched PCB Antennas		
Frequency (MHz)	**Antenna Gain Antenna 1 (dBi)**	**Antenna Gain Antenna 2 (dBi)**
2.4GHz	3.34	1.61
5GHz	1.52	2.28

External Antennas			
Frequency (MHz)	**Antenna Gain (dBi)**	**Cable Loss (dB)**	**Net gain (dBi)**
2.4GHz	2.403	1.06	1.343
5GHz	3.994	1.83	2.164

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was PCS2.
The EUT driver software installed during testing was 2.1.2.9.
The test utility software used during testing was QRCT3 V6.1.29QPST.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions in range of 1-18GHz, EUT was set to transmit at low, a middle, and high channels. Radiated emissions <1GHz, >18GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power and PSD as worst-case scenario.

EUT was populated with headphones and monitor to maximize emissions.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y, and Z using both external and etched PCB antenna configurations. It was determined that X orientation was worst-case orientation for PCB antenna configuration and Y orientation was worst-case orientation for external antenna configuration. Therefore, all final radiated testing was performed with the EUT in X orientation for PCB antennas and Y orientation for external antennas.

Simultaneous transmission of BT/2.4GHz and BT/5GHz was investigated. Device was found to still be compliant. BT used to cover BLE since BT/BLE does not transmit simultaneously and BT is worst-case power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T440	PC041B0G	NA
Monitor	ViewSonic	VS15562	TVT171081663	N/A
AC/DC Adaptor	Bose	S024RU1700100	344666-0020	N/A

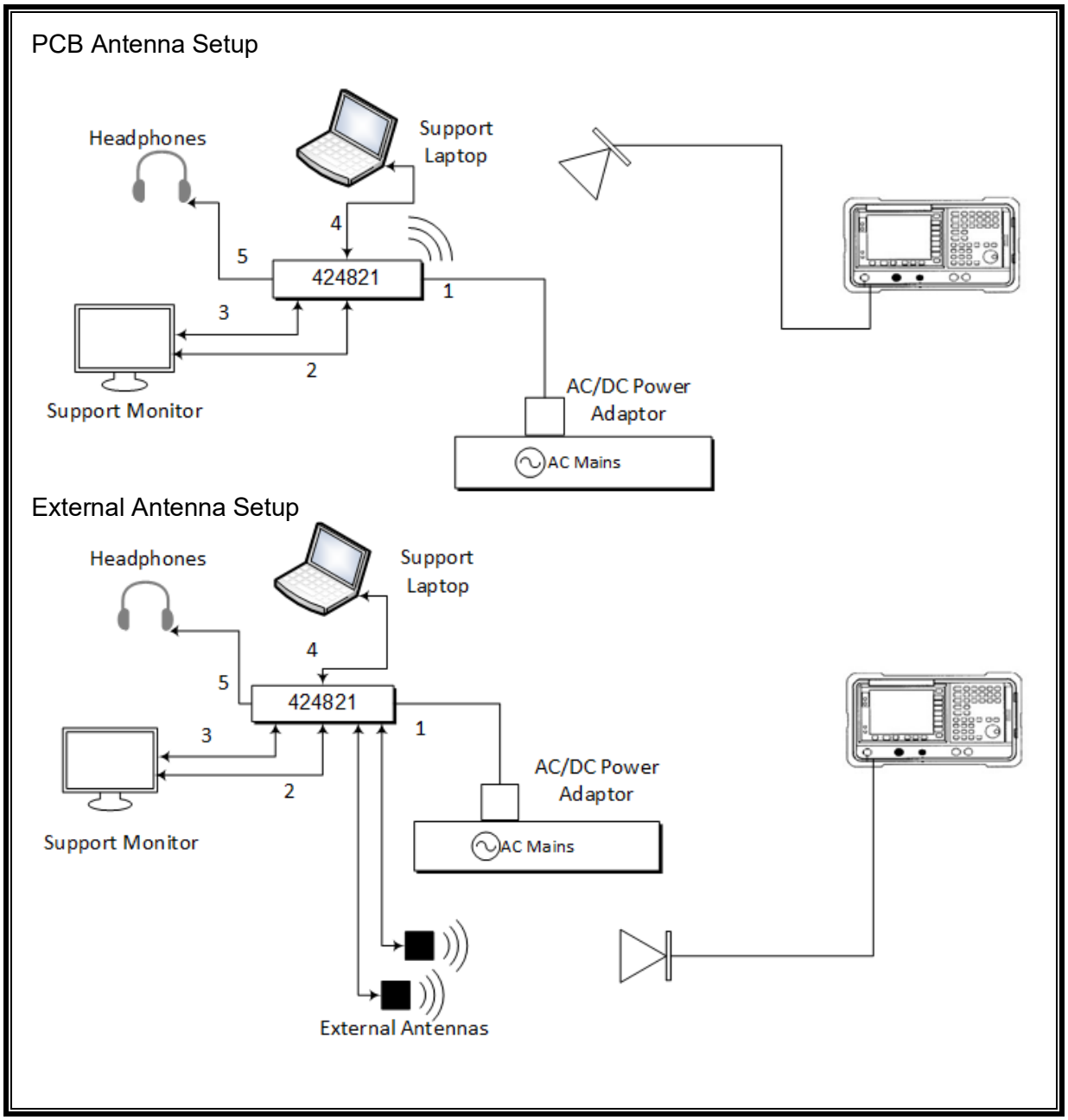
I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	AC/ DC Adaptor	DC Mains	<3m	None
2	HDMI	1	HDMI	HDMI	<3m	Connects to monitor
3	Audio	2	3.5mm plug	Audio	<3m	Connects to monitor
4	USB	1	USB	USB	<3m	Connects to Laptop
5	Audio	2	3.5mm plug	Audio	<3m	Connects to headphones

TEST SETUP

EUT installed as a standalone device.

SETUP DIAGRAM FOR TESTS



Note: Conducted setups were the same, except spectrum analyzer was connected directly to the antenna port.

6. TEST AND MEASUREMENT EQUIPMENT

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

Note: All tests performed within equipment calibration intervals. Unless test date occurred between calibration intervals, in which case both calibrations intervals were included.

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2017-06-05	2018-06-05
30-1000 MHz					
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-07-18	2018-07-31
1-18 GHz					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2017-04-05	2018-04-05
18-40 GHz					
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2017-10-10	2018-10-10
Gain-Loss Chains					
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
N-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2017-08-18	2018-08-18
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2017-03-03	2018-03-03
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-04-03	2019-04-03
Receiver & Software					
SA0027	Spectrum Analyzer	Agilent	N9030A	2017-03-16	2018-03-16
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

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.)					
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2017-06-05	2018-06-05
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-06-15	2018-06-15
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2017-04-10	2018-04-10
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024887	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Conducted Room 2					
SA0020	Spectrum Analyzer	Agilent Technologies	E4446A	2017-04-25	2018-04-25
PWM003	RF Power Meter	Keysight Technologies	N1911A	2017-07-14	2018-07-14
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2017-07-17	2018-07-17
SN 161016511	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL076	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2017-06-12	2018-06-12
s/n 160938893	Environmental Meter	Fisher Scientific	14-650-118	2016-11-02	2018-11-02
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2017-08-22	2018-08-22
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2017-08-23	2018-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2017-06-12	2018-06-12
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2017-07-03	2018-07-03
LISN008	LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.)	Solar Electronics	8012-50-R-24-BNC	2017-08-22	2018-08-22

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 v04 Section 6.0

6 dB BW: KDB 558074 D01 v04 Section 8.1

99% Occupied Bandwidth: ANSI C63.10-2013, Section 6.9.3

Output Power: KDB 558074 D01 v04 Section 9.1.3

Power Spectral Density: KDB 558074 D01 v04 Section 10.2

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04 Section 11.0

Out-of-band emissions in restricted bands: KDB 558074 D01 v04 Section 12.1

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

Line Conducted Emissions: ANSI C63.10:2013 Sections 6.2

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.

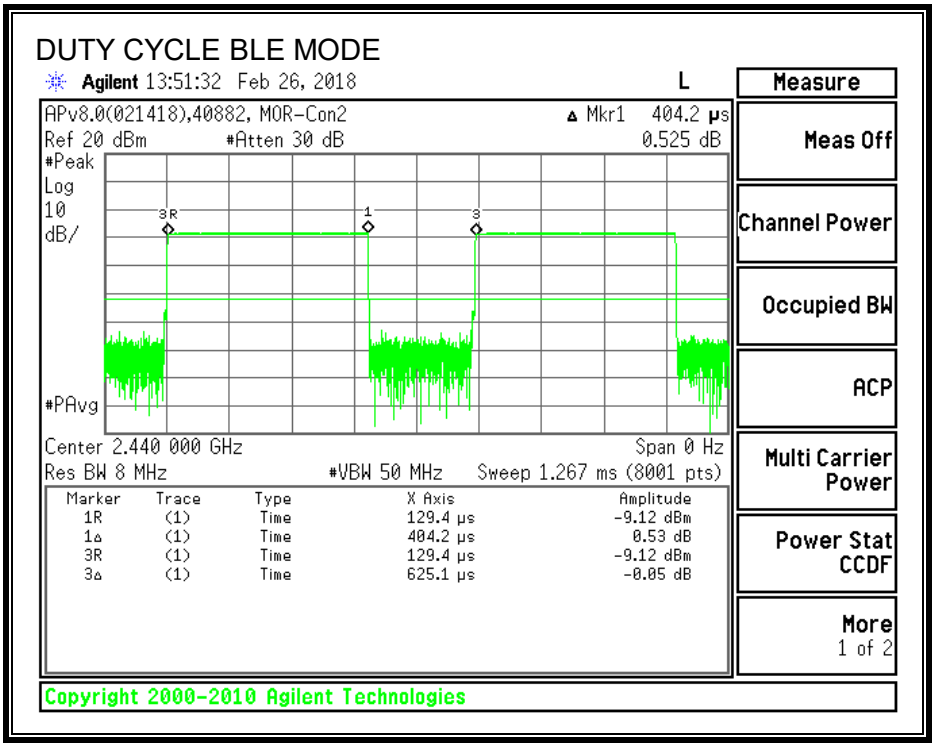
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	0.404	0.625	0.647	64.66%	1.89	2.474

TEST INFORMATION

Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

DUTY CYCLE PLOTS



8.2.6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-247 5.2 (a)

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

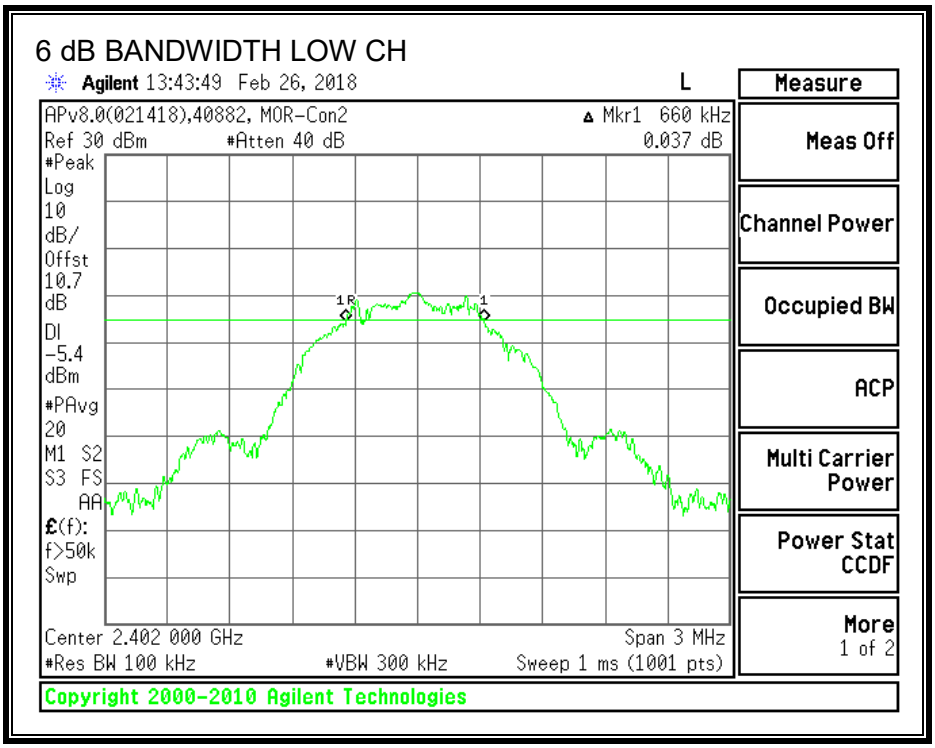
RESULTS

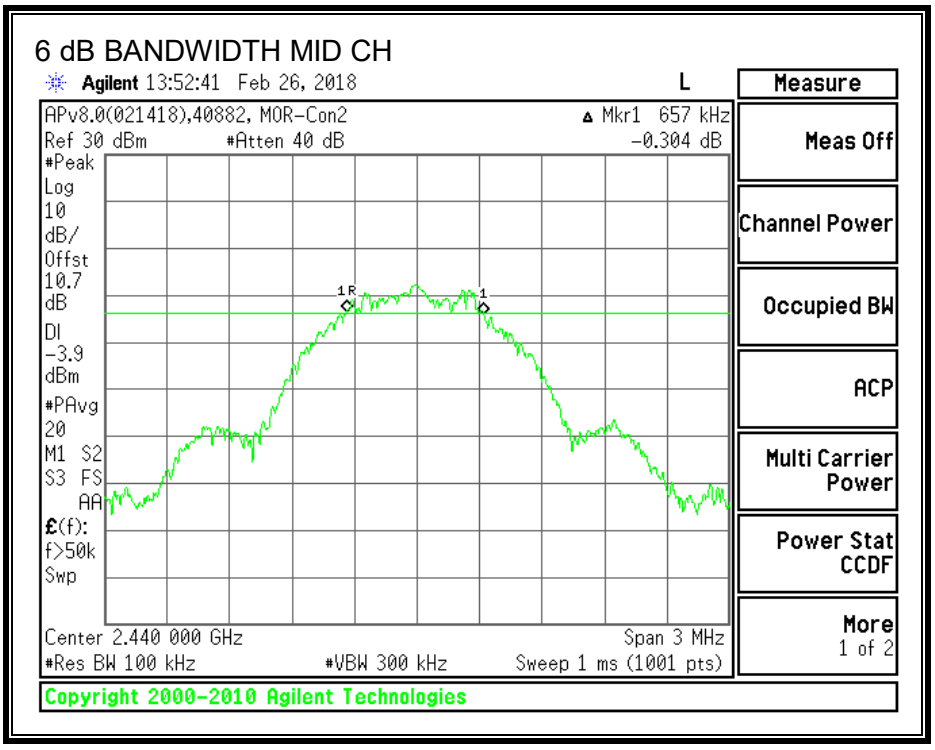
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.660	0.5
Middle	2440	0.657	0.5
High	2480	0.693	0.5

TEST INFORMATION

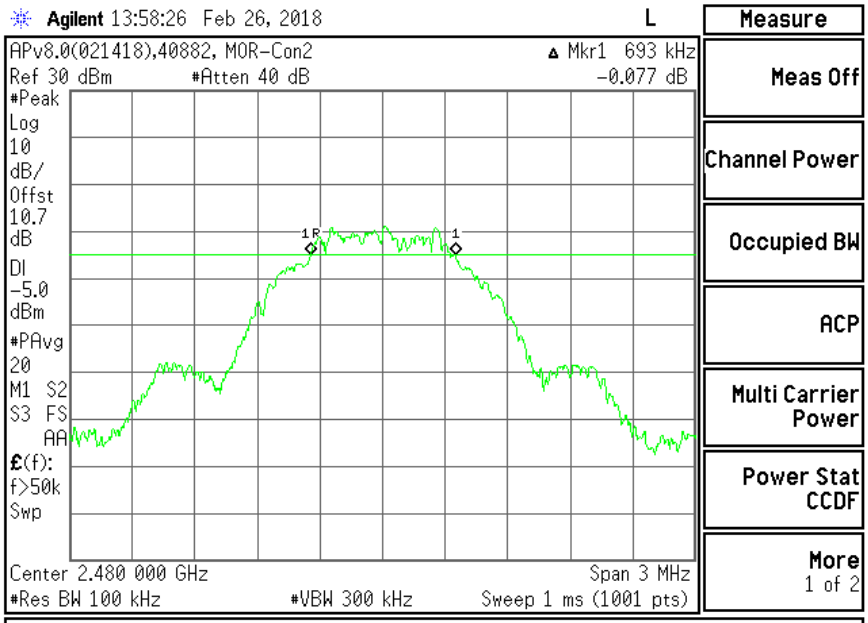
Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

6 dB BANDWIDTH PLOTS





6 dB BANDWIDTH HIGH CH



8.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

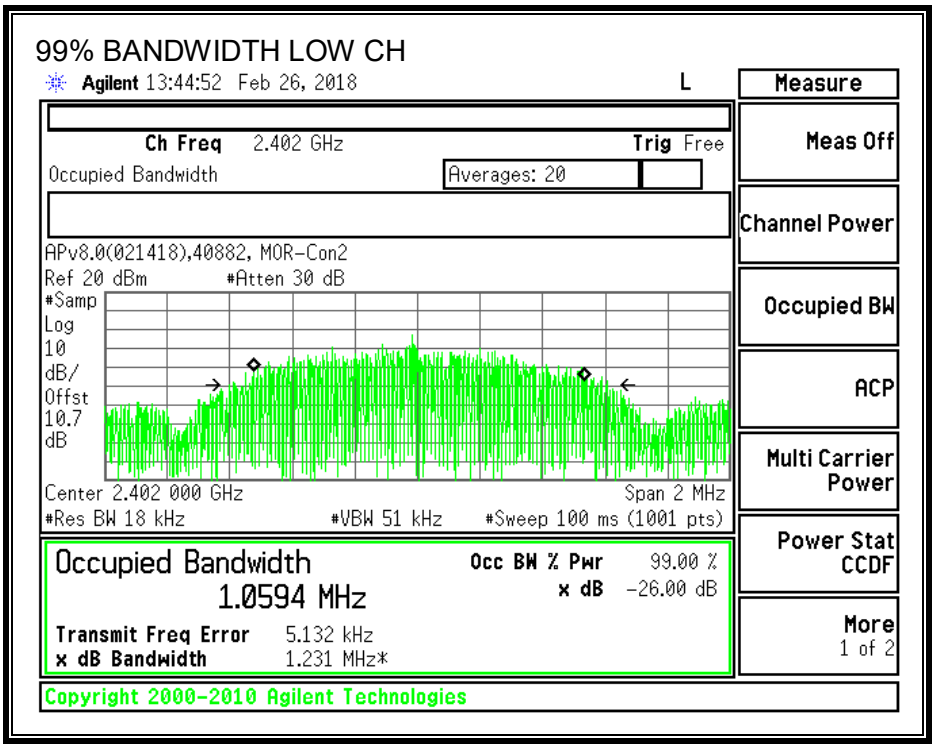
RESULTS

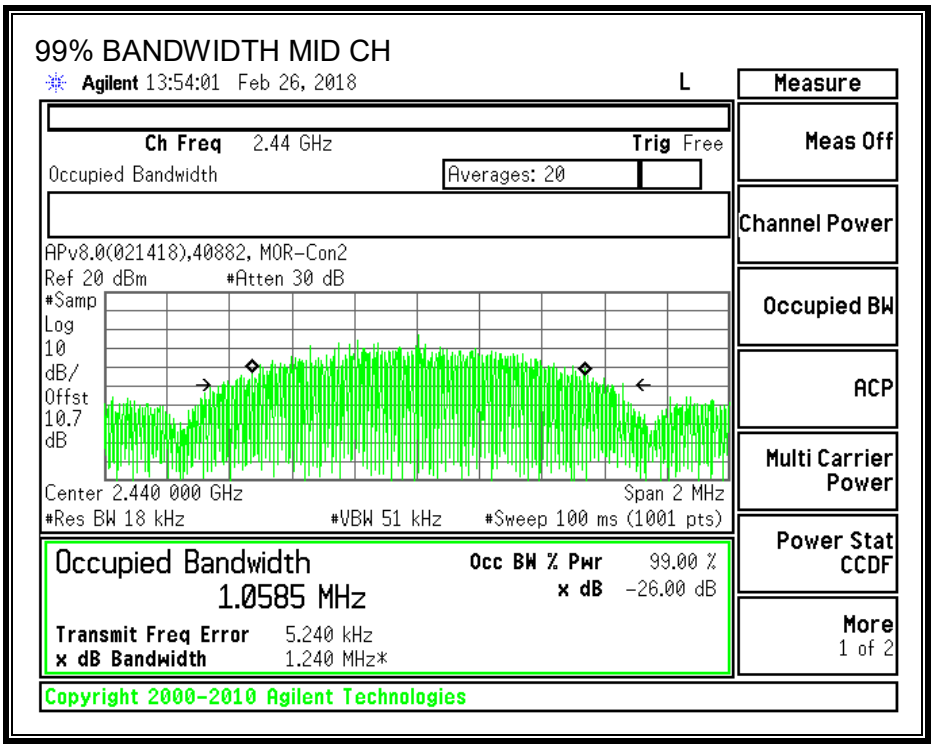
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0594
Middle	2440	1.0585
High	2480	1.0553

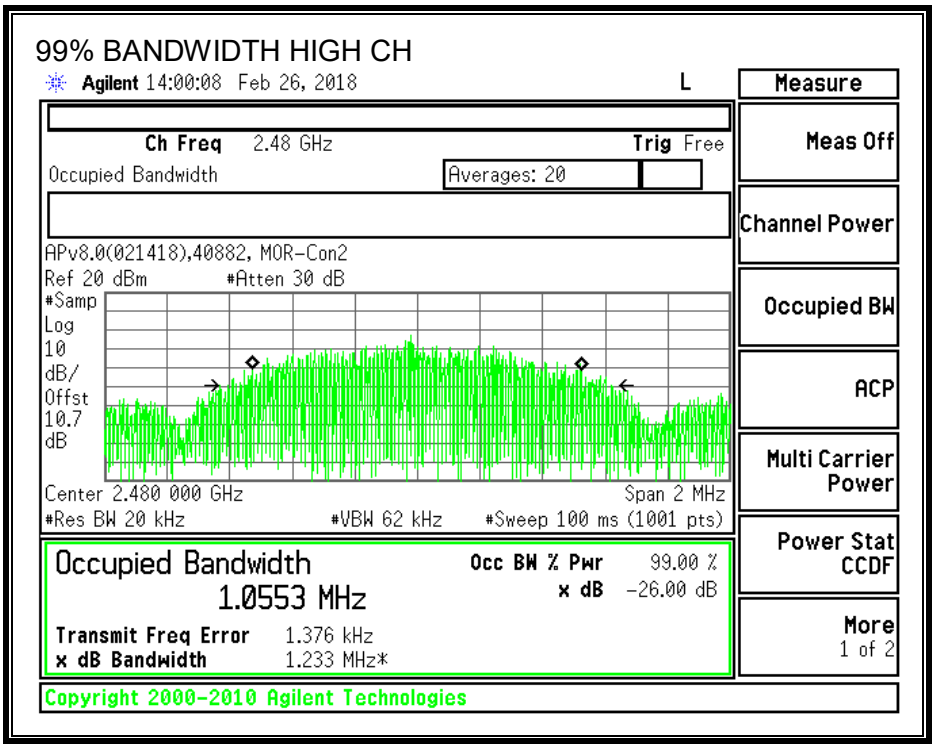
TEST INFORMATION

Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

99% BANDWIDTH PLOTS







8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-247 5.4

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

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	0.92	30	-29.080
Middle	2440	2.40	30	-27.600
High	2480	1.95	30	-28.050

TEST INFORMATION

Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-0.1
Middle	2440	2.08
High	2480	1.91

TEST INFORMATION
Test Date: 2018-02-26
Project No: 12053557
Tested By: Jeffrey Cabrera

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC 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

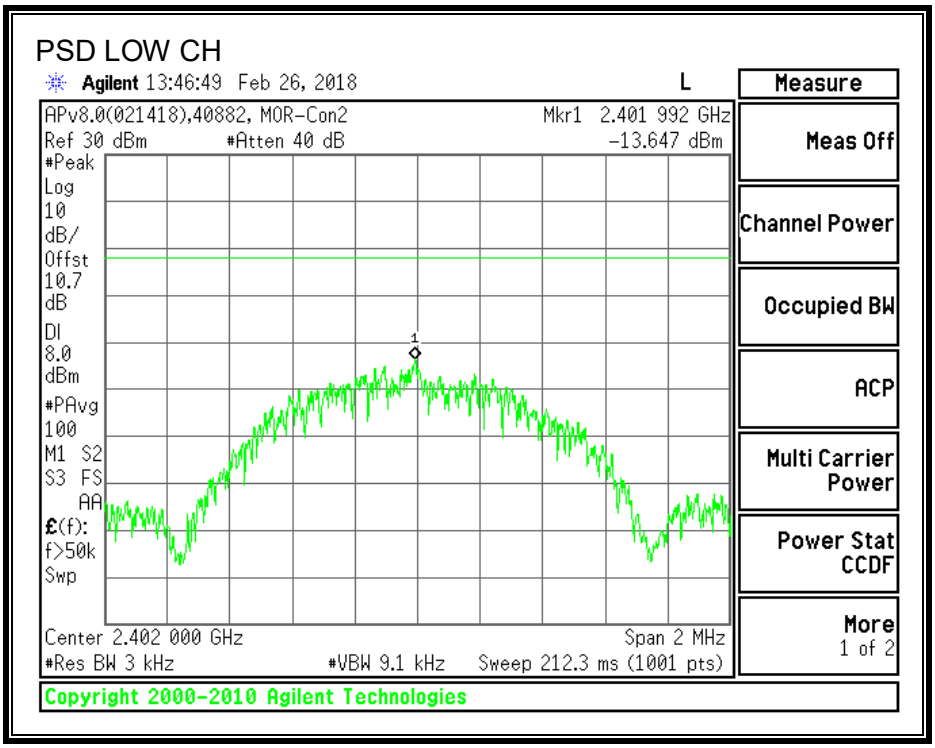
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-13.65	8	-21.65
Middle	2440	-12.22	8	-20.22
High	2480	-12.57	8	-20.57

TEST INFORMATION

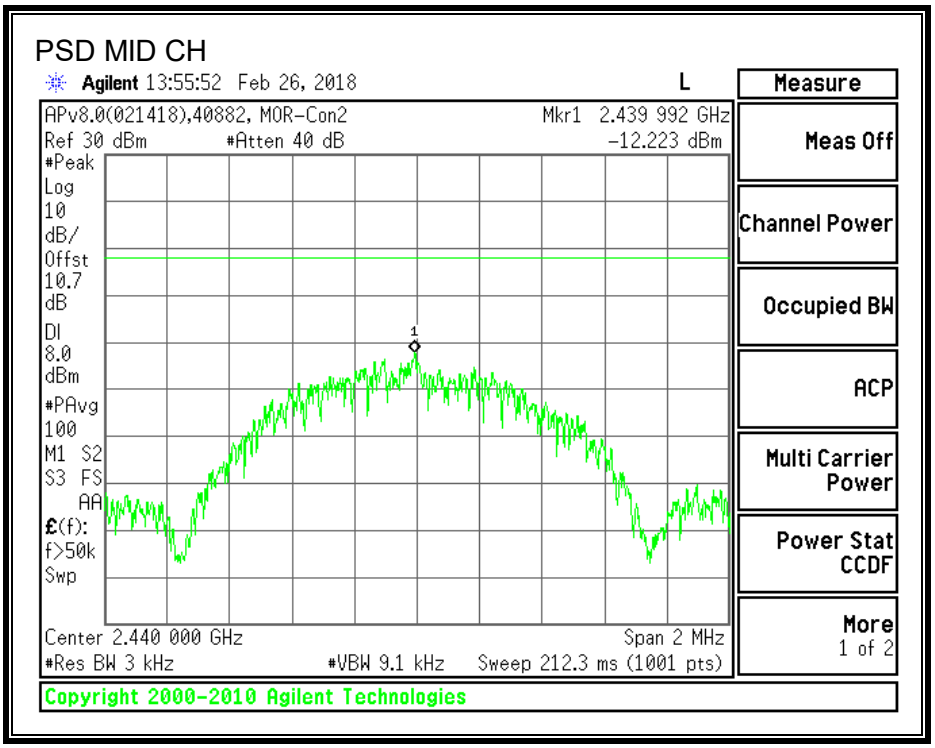
Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

POWER SPECTRAL DENSITY PLOTS

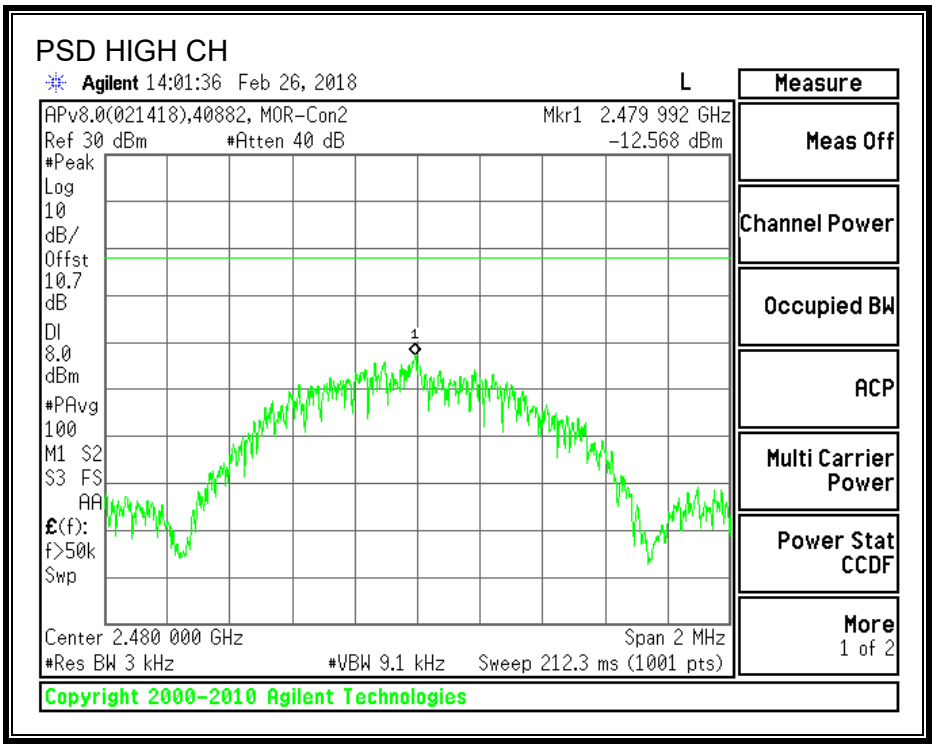
PSD LOW CH



PSD MID CH



PSD HIGH CH



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

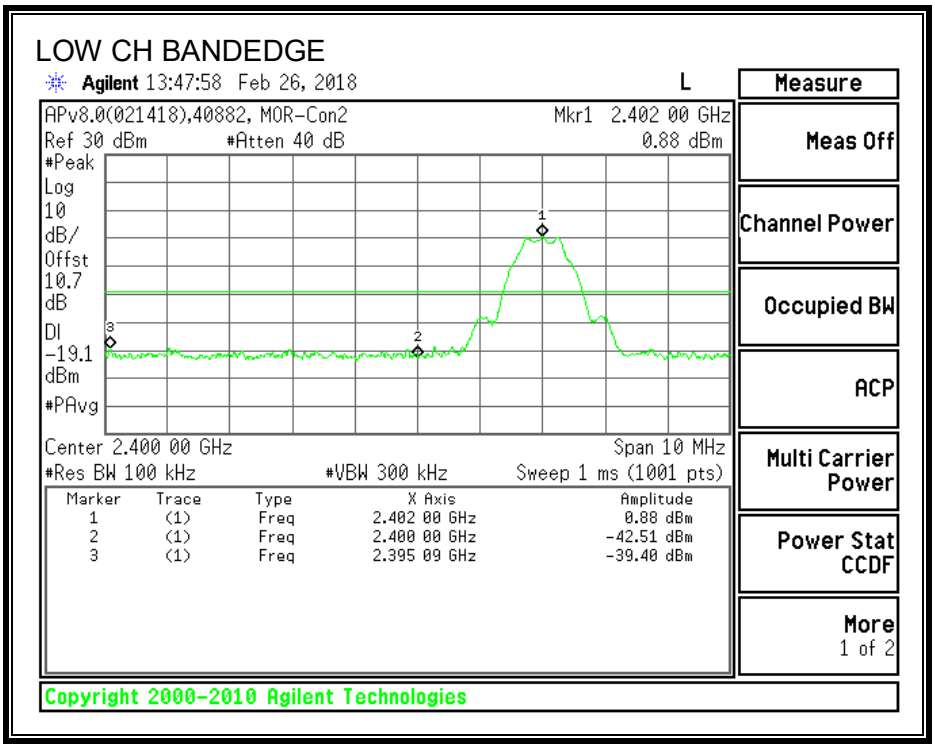
IC RSS-247 5.5

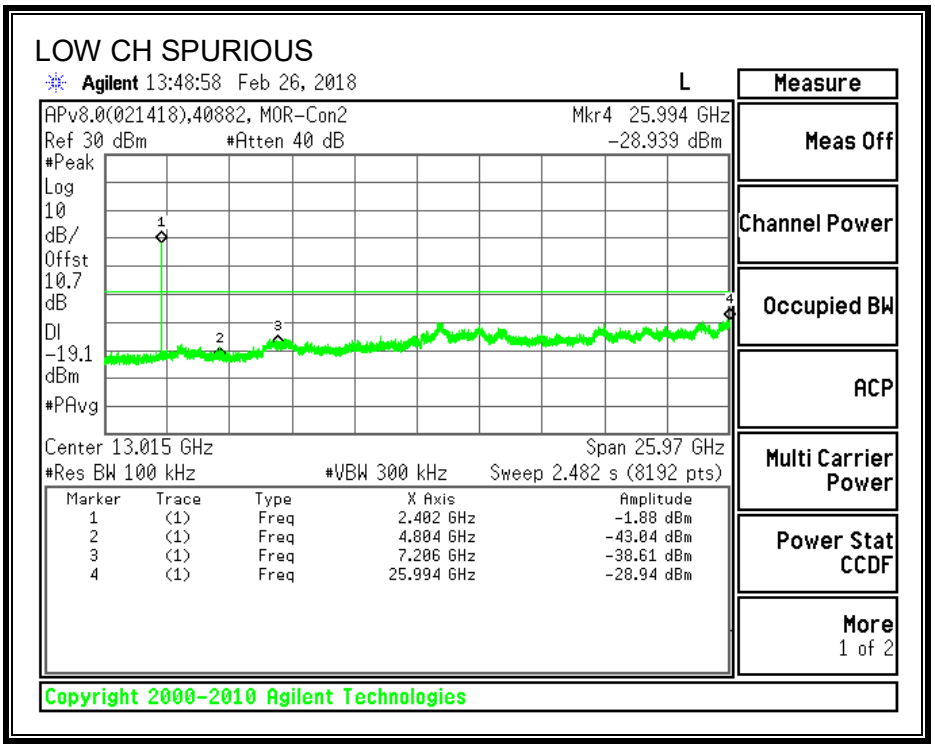
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST INFORMATION

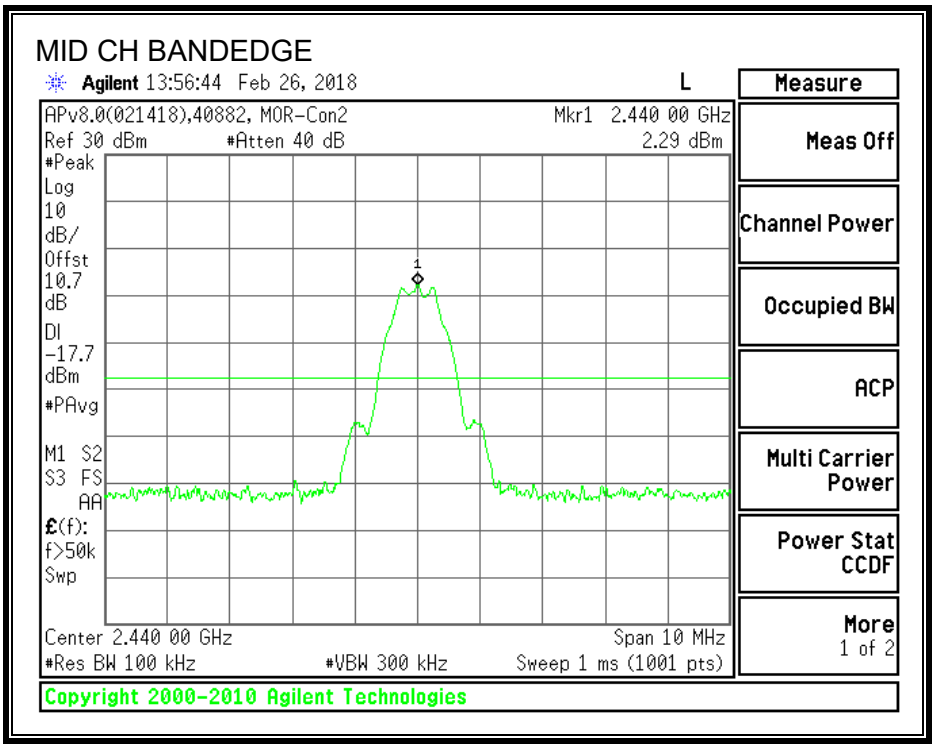
Test Date: 2018-02-26
Project: 12053557
Tested By: Jeffrey Cabrera

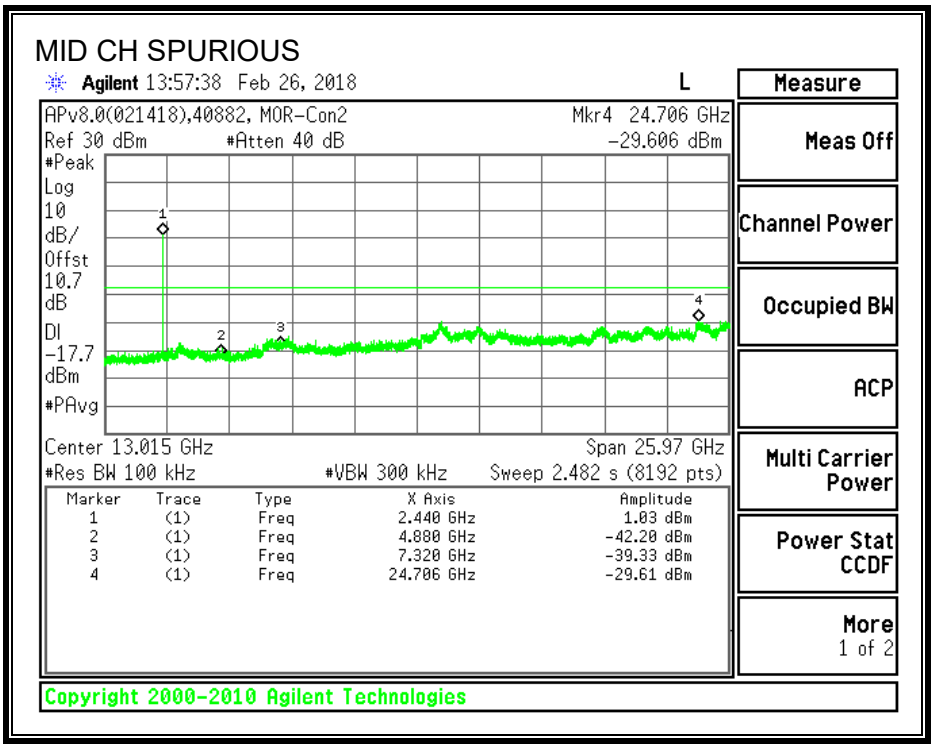
SPURIOUS EMISSIONS, LOW CHANNEL



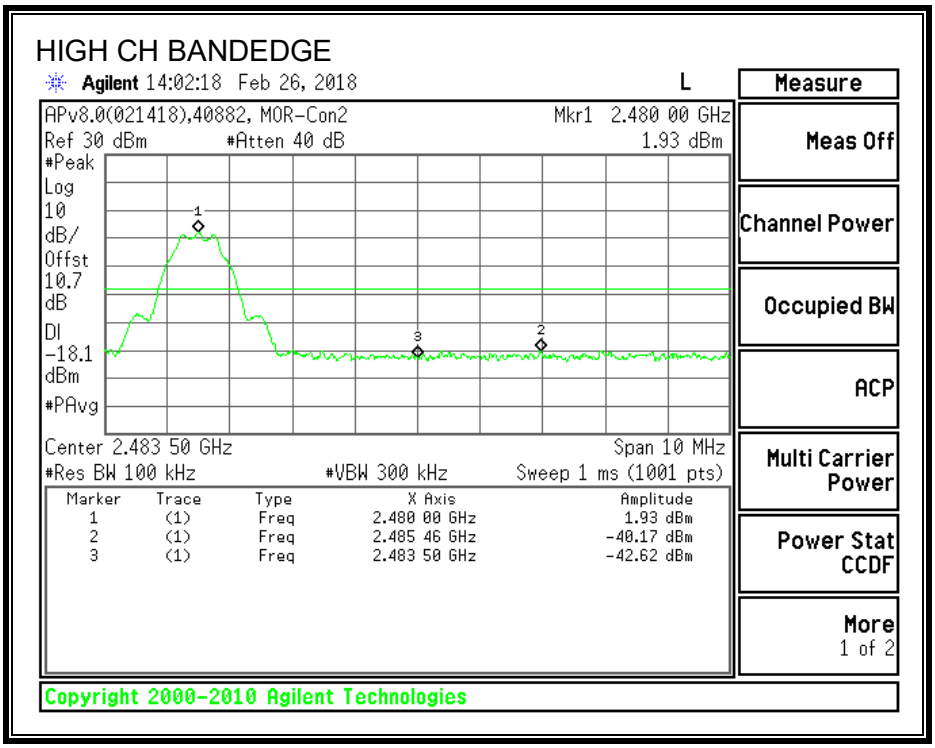


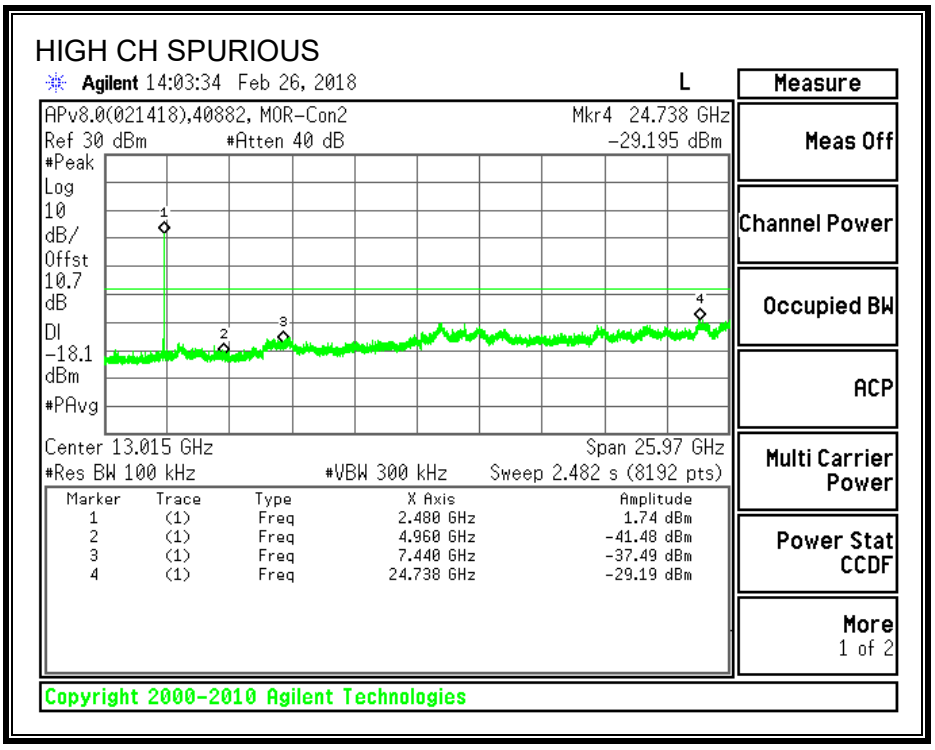
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
IC RSS-GEN Clause 8.9 (Transmitter)

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 below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

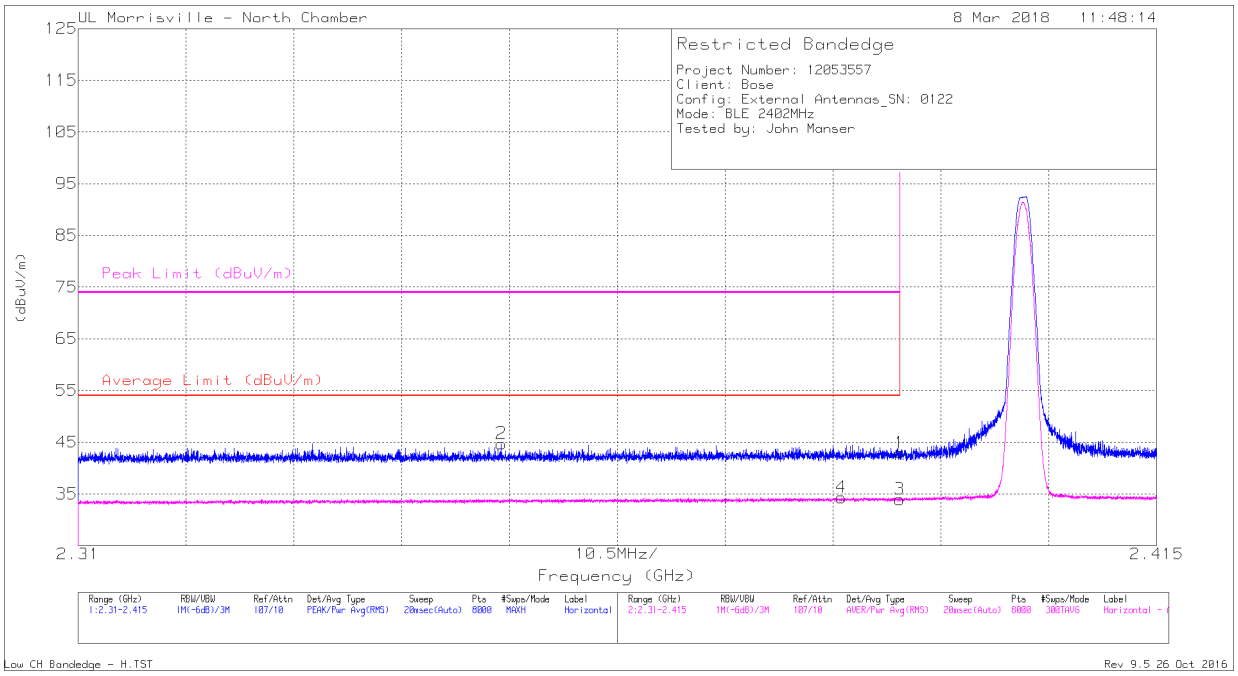
For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was RMS.

The spectrum from 1 to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. The spectrum from 9kHz to 1000MHz and 18 to 26GHz was investigated on the worst-case channel.

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.

9.2. TX ABOVE 1 GHz - BLE MODE, EXTERNAL ANTENNAS

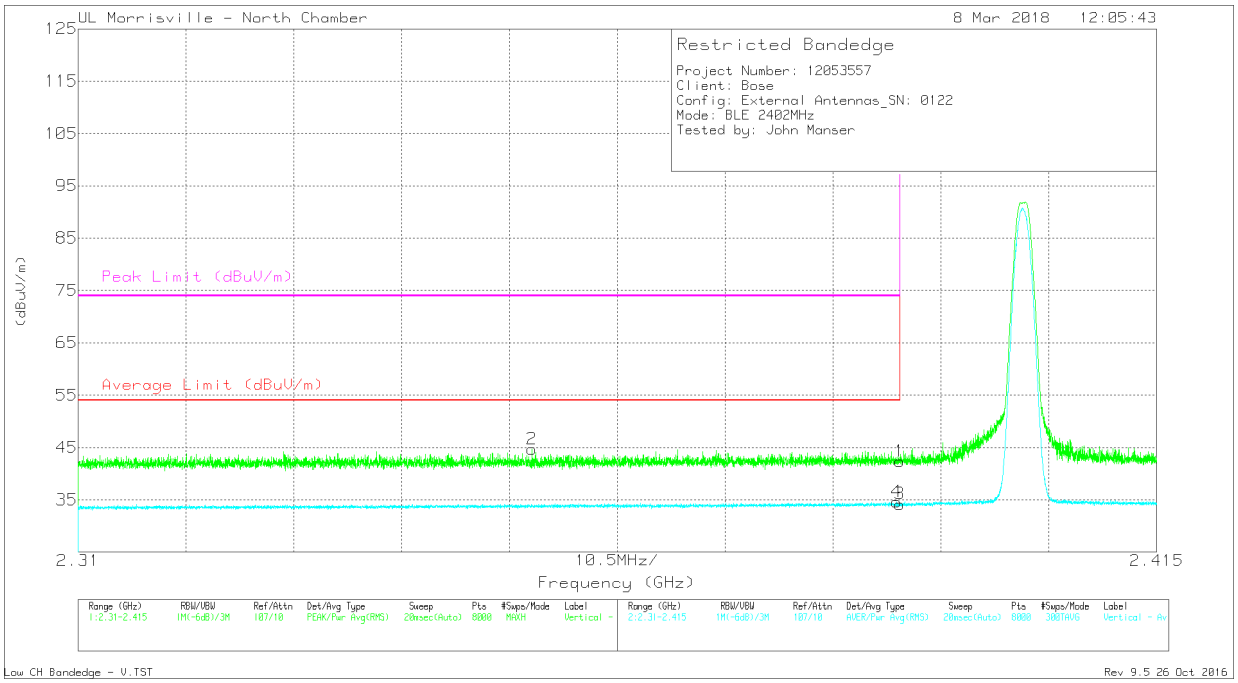
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	35.05	Pk	31.8	-23.9	0	42.95	-	-	74	-31.05	182	123	H
2	* ** 2.351	37.03	Pk	31.6	-23.9	0	44.73	-	-	74	-29.27	182	123	H
3	* ** 2.39	24.16	RMS	31.8	-23.9	1.89	33.95	54	-20.05	-	-	182	123	H
4	* ** 2.384	24.52	RMS	31.8	-23.9	1.89	34.31	54	-19.69	-	-	182	123	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

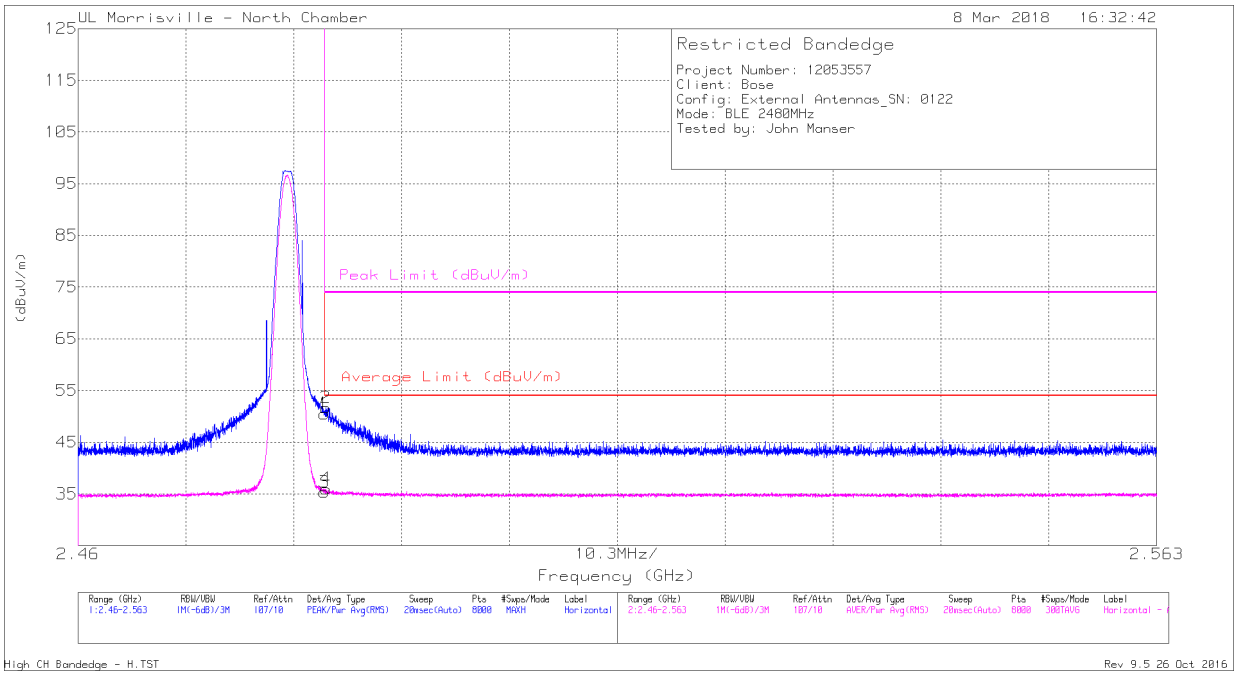
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	34.44	Pk	31.8	-23.9	0	42.34	-	-	74	-31.66	155	277	V
2	* ** 2.354	36.95	Pk	31.6	-23.9	0	44.65	-	-	74	-29.35	155	277	V
3	* ** 2.39	24.39	RMS	31.8	-23.9	1.89	34.18	54	-19.82	-	-	155	277	V
4	* ** 2.39	24.78	RMS	31.8	-23.9	1.89	34.57	54	-19.43	-	-	155	277	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

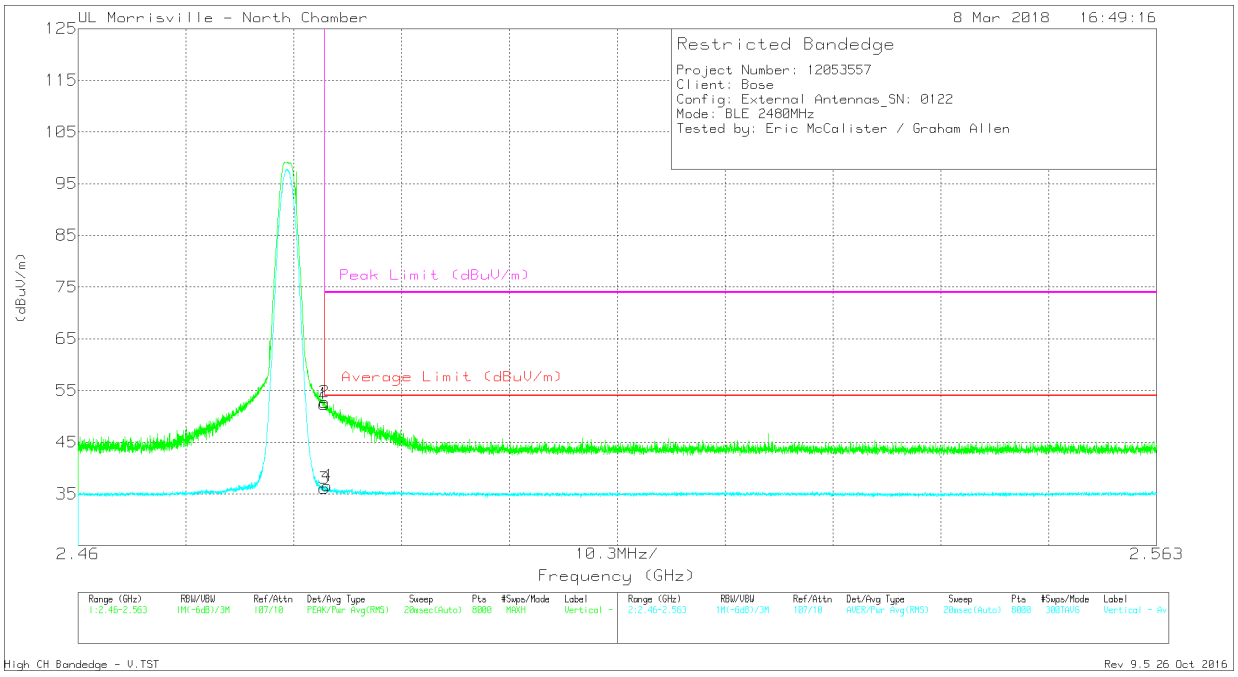
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	-23.8	0	50.51	-	-	74	-23.49	264	127	H
2	* ** 2.484	43.17	Pk	32.3	-23.8	0	51.67	-	-	74	-22.33	264	127	H
3	* ** 2.484	24.93	RMS	32.3	-23.8	1.89	35.32	54	-18.68	-	-	264	127	H
4	* ** 2.484	25.62	RMS	32.3	-23.8	1.89	36.01	54	-17.99	-	-	264	127	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

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

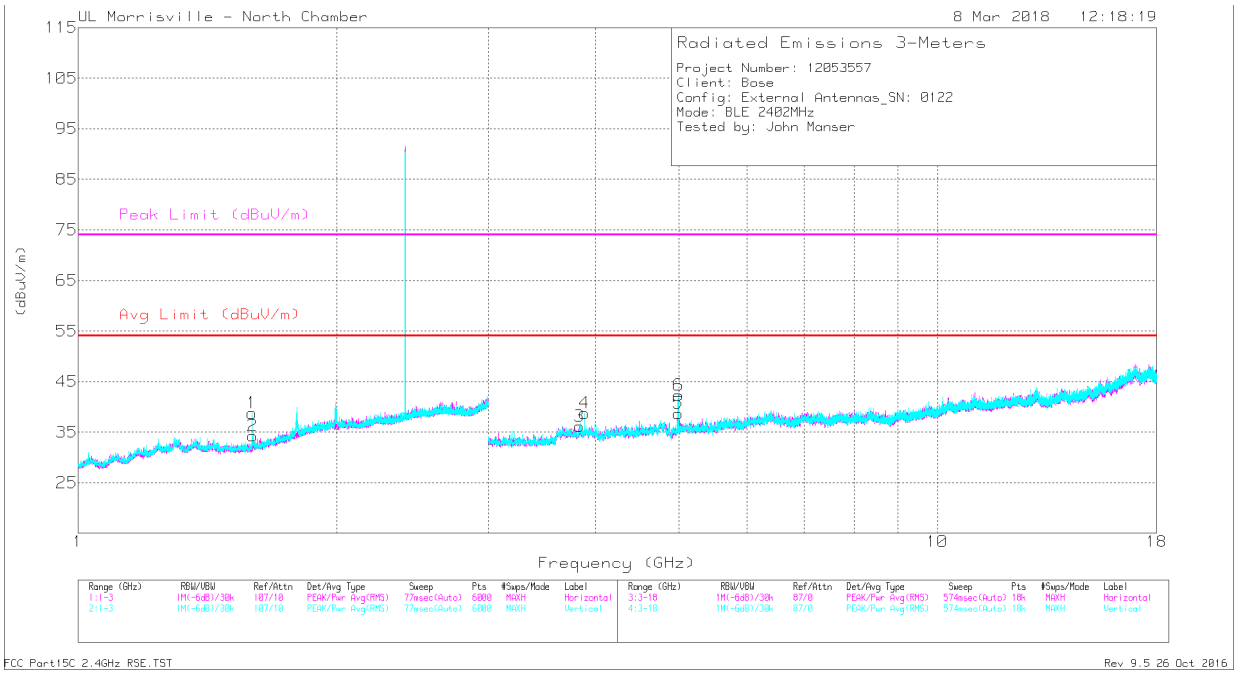


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	43.88	Pk	32.3	-23.8	0	52.38	-	-	74	-21.62	142	280	V
2	* ** 2.484	44.25	Pk	32.3	-23.8	0	52.75	-	-	74	-21.25	142	280	V
3	* ** 2.484	25.71	RMS	32.3	-23.8	1.89	36.1	54	-17.9	-	-	142	280	V
4	* ** 2.484	26.19	RMS	32.3	-23.8	1.89	36.58	54	-17.42	-	-	142	280	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

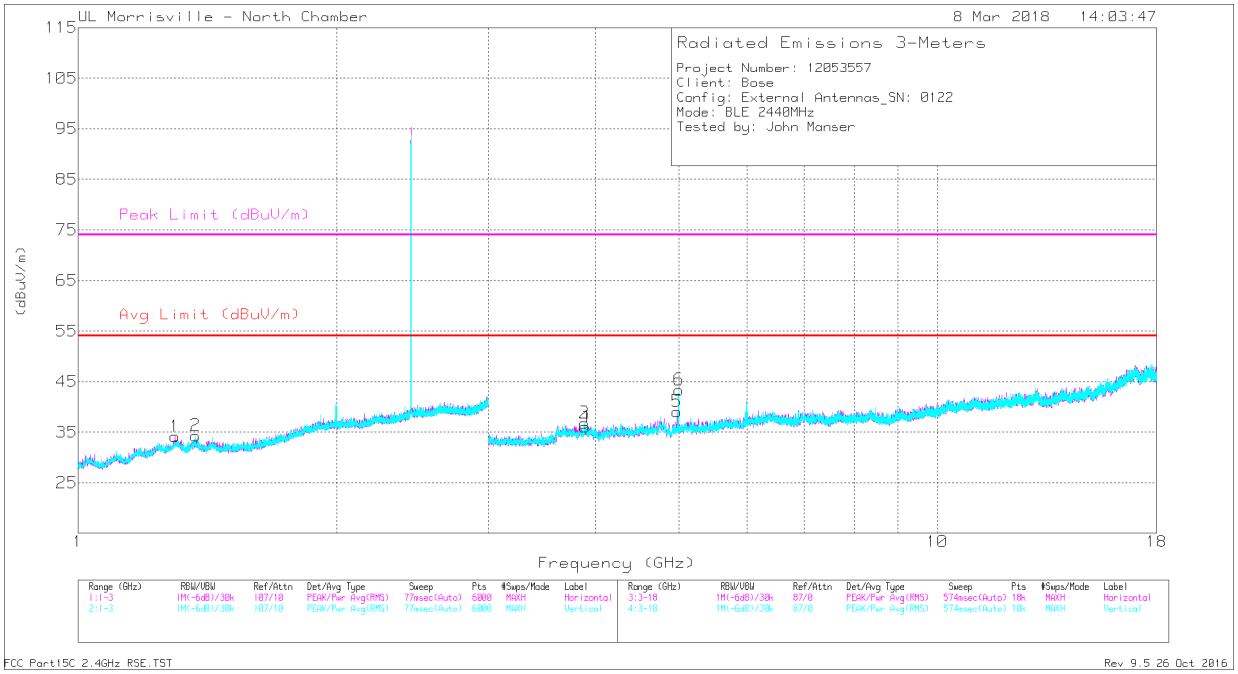
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	* ** 1.594	40.13	PK2	27.9	-24.1	0	43.93	-	-	74	-30.07	98	175	H
	* ** 1.594	23.72	MAv1	27.9	-24.1	1.89	29.41	54	-24.59	-	-	98	175	H
1	* ** 1.594	40.6	PK2	27.9	-24.1	0	44.4	-	-	74	-29.6	181	141	V
	* ** 1.594	23.83	MAv1	27.9	-24.1	1.89	29.52	54	-24.48	-	-	181	141	V
3	* ** 3.829	41.54	PK2	33.4	-32	0	42.94	-	-	74	-31.06	84	246	H
	* ** 3.834	29.29	MAv1	33.4	-31.9	1.89	32.68	54	-21.32	-	-	84	246	H
5	* ** 4.993	44.08	PK2	34.1	-32.2	0	45.98	-	-	74	-28.02	223	122	H
	* ** 4.994	28.95	MAv1	34.1	-32.2	1.89	32.74	54	-21.26	-	-	223	122	H
4	* ** 3.887	40.89	PK2	33.4	-31.3	0	42.99	-	-	74	-31.01	0	143	V
	* ** 3.887	28.78	MAv1	33.4	-31.3	1.89	32.77	54	-21.23	-	-	0	143	V
6	* ** 4.99	54.46	PK2	34.1	-32.2	0	56.36	-	-	74	-17.64	256	163	V
	* ** 4.994	30.01	MAv1	34.1	-32.2	1.89	33.8	54	-20.2	-	-	256	163	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

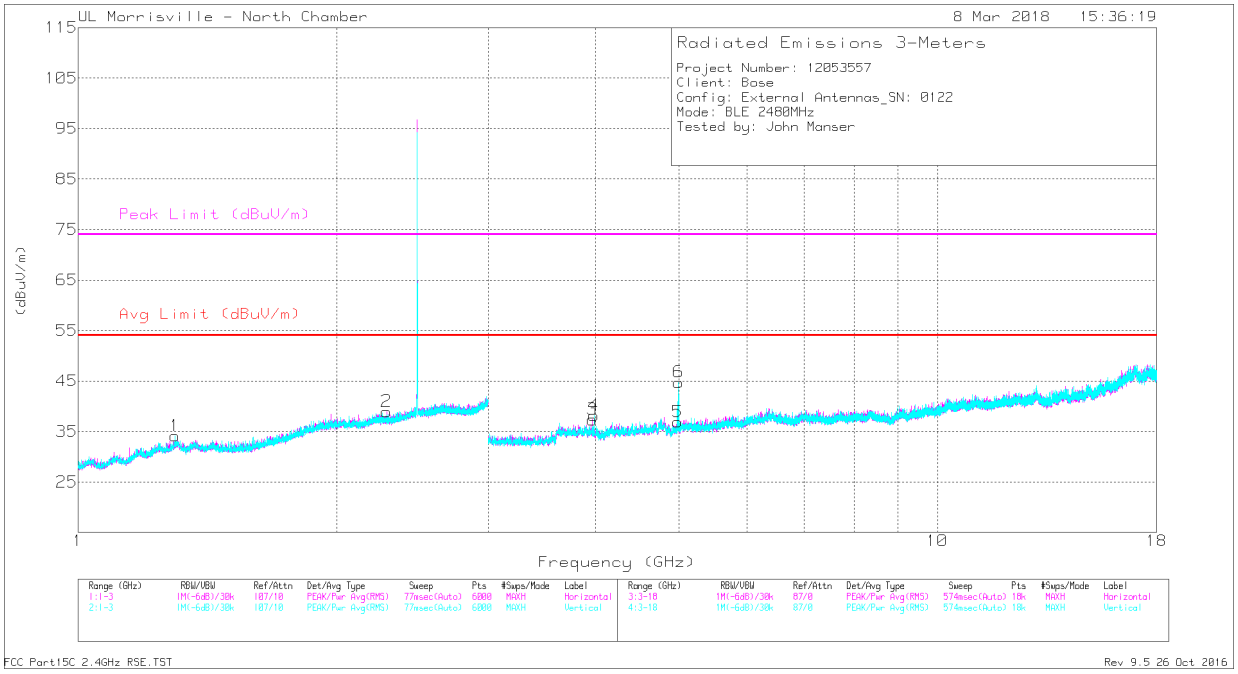
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	* 1.298	36.02	PK2	29.3	-25.2	0	40.12	-	-	74	-33.88	169	162	H
	* 1.298	23.97	MAv1	29.3	-25.2	1.89	29.96	54	-24.04	-	-	169	162	H
2	* ** 1.369	35.74	PK2	29	-24.9	0	39.84	-	-	74	-34.16	244	310	V
	* ** 1.368	24.09	MAv1	29	-24.9	1.89	30.08	54	-23.92	-	-	244	310	V
4	* ** 3.889	40.79	PK2	33.4	-31.3	0	42.89	-	-	74	-31.11	255	263	H
	* ** 3.888	29.14	MAv1	33.4	-31.3	1.89	33.13	54	-20.87	-	-	255	263	H
5	* ** 4.978	45.5	PK2	34.1	-32.1	0	47.5	-	-	74	-26.5	177	354	H
	* ** 4.978	28.48	MAv1	34.1	-32.1	1.89	32.37	54	-21.63	-	-	177	354	H
3	* ** 3.884	40.61	PK2	33.4	-31.3	0	42.71	-	-	74	-31.29	326	176	V
	* ** 3.882	28.66	MAv1	33.4	-31.3	1.89	32.65	54	-21.35	-	-	326	176	V
6	* ** 4.999	51.16	PK2	34.1	-32.2	0	53.06	-	-	74	-20.94	193	130	V
	* ** 4.998	29.06	MAv1	34.1	-32.2	1.89	32.85	54	-21.15	-	-	193	130	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

High Channel

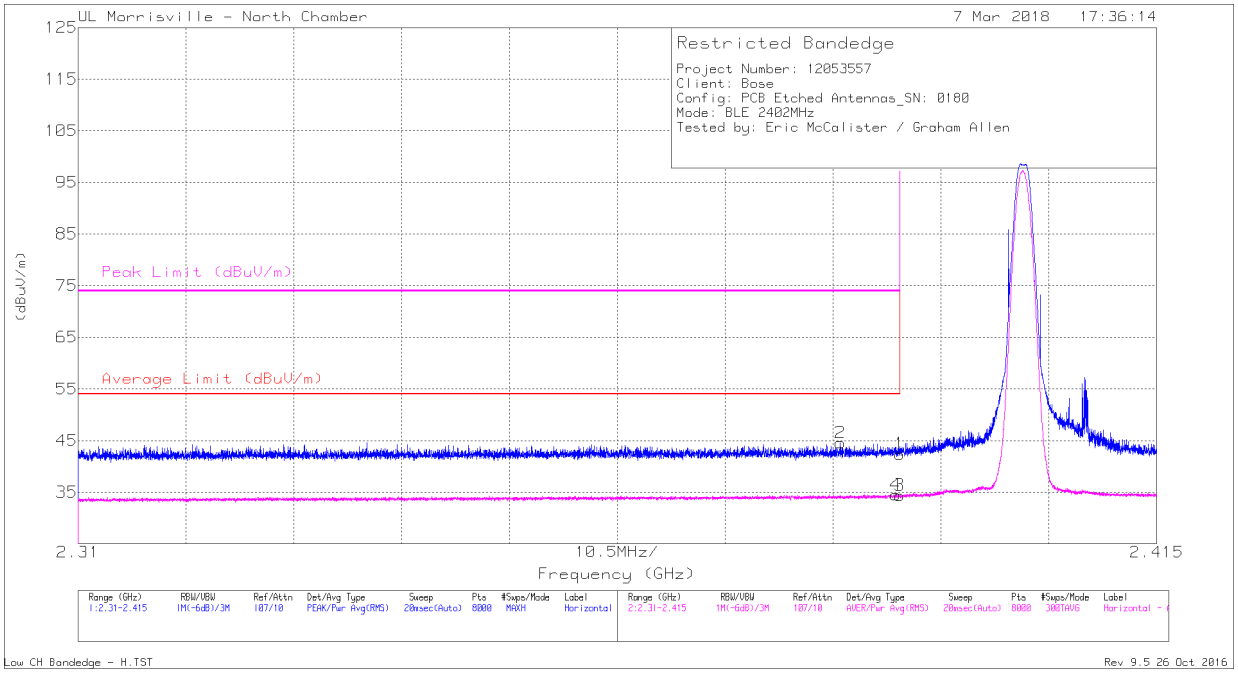


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 2.288	36.01	PK2	31.5	-23.9	0	43.61	-	-	74	-30.39	229	224	H
	* ** 2.286	24.26	MAv1	31.6	-23.9	1.89	33.85	54	-20.15	-	-	229	224	H
1	* 1.298	35.67	PK2	29.3	-25.2	0	39.77	-	-	74	-34.23	284	266	V
	* 1.297	24.27	MAv1	29.3	-25.2	1.89	30.26	54	-23.74	-	-	284	266	V
3	* ** 3.967	39.6	PK2	33.4	-31.2	0	41.8	-	-	74	-32.2	197	277	H
	* ** 3.967	28.28	MAv1	33.4	-31.2	1.89	32.37	54	-21.63	-	-	197	277	H
5	* ** 4.984	47.82	PK2	34.1	-32.2	0	49.72	-	-	74	-24.28	245	117	H
	* ** 4.984	28.93	MAv1	34.1	-32.2	1.89	32.72	54	-21.28	-	-	245	117	H
4	* ** 3.983	44.91	PK2	33.4	-31.3	0	47.01	-	-	74	-26.99	231	117	V
	* ** 3.987	28.07	MAv1	33.4	-31.3	1.89	32.06	54	-21.94	-	-	231	117	V
6	* ** 4.999	48.31	PK2	34.1	-32.2	0	50.21	-	-	74	-23.79	305	117	V
	* ** 4.994	29.18	MAv1	34.1	-32.2	1.89	32.97	54	-21.03	-	-	305	117	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

9.3. TX ABOVE 1 GHz - BLE MODE, PCB ANTENNAS

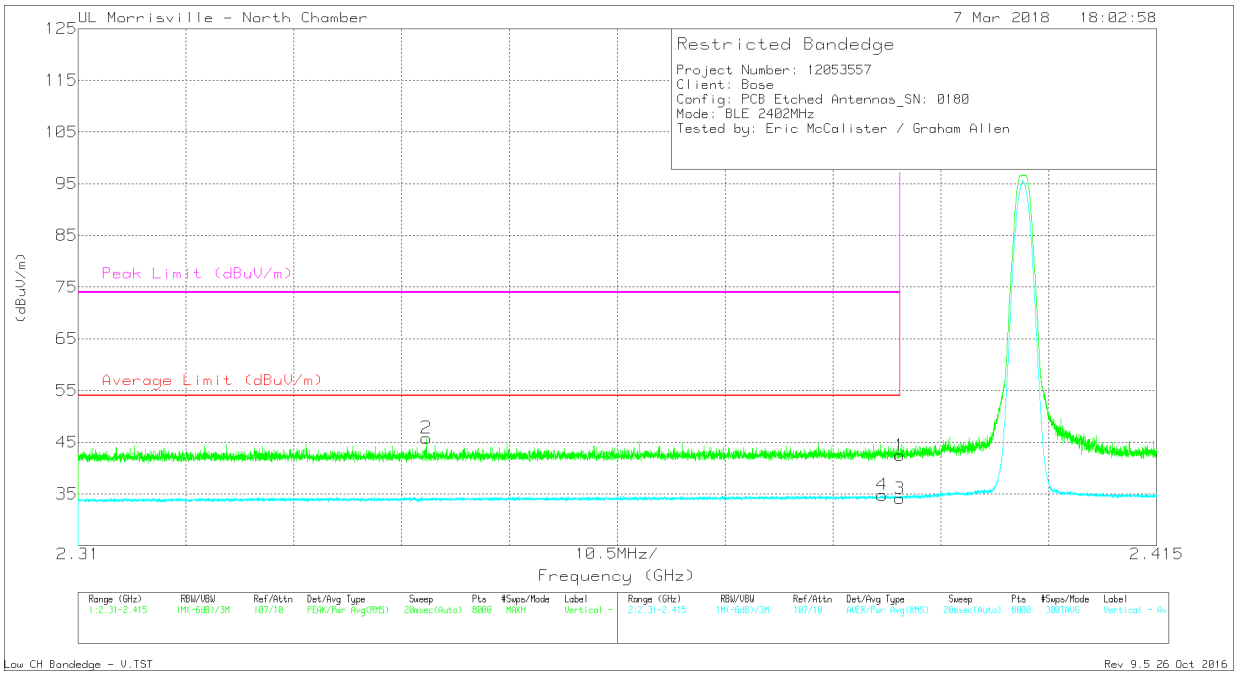
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	34.52	Pk	31.8	-23.9	0	42.42	-	-	74	-31.58	300	162	H
2	* ** 2.384	36.66	Pk	31.8	-23.9	0	44.56	-	-	74	-29.44	300	162	H
3	* ** 2.39	24.62	RMS	31.8	-23.9	1.89	34.41	54	-19.59	-	-	300	162	H
4	* ** 2.39	24.7	RMS	31.8	-23.9	1.89	34.49	54	-19.51	-	-	300	162	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

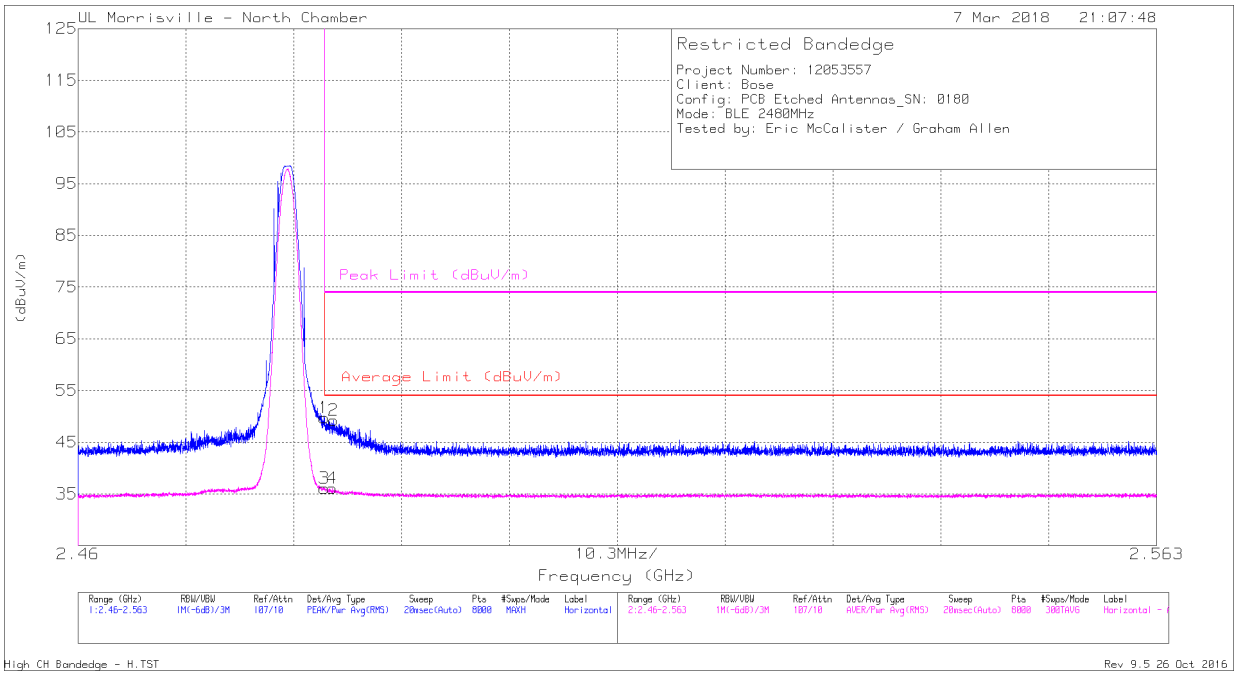
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	34.55	Pk	31.8	-23.9	0	42.45	-	-	74	-31.55	131	272	V
2	* ** 2.344	38.13	Pk	31.6	-23.9	0	45.83	-	-	74	-28.17	131	272	V
3	* ** 2.39	24.34	RMS	31.8	-23.9	1.89	34.13	54	-19.87	-	-	131	272	V
4	* ** 2.388	25.01	RMS	31.8	-23.9	1.89	34.8	54	-19.2	-	-	131	272	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

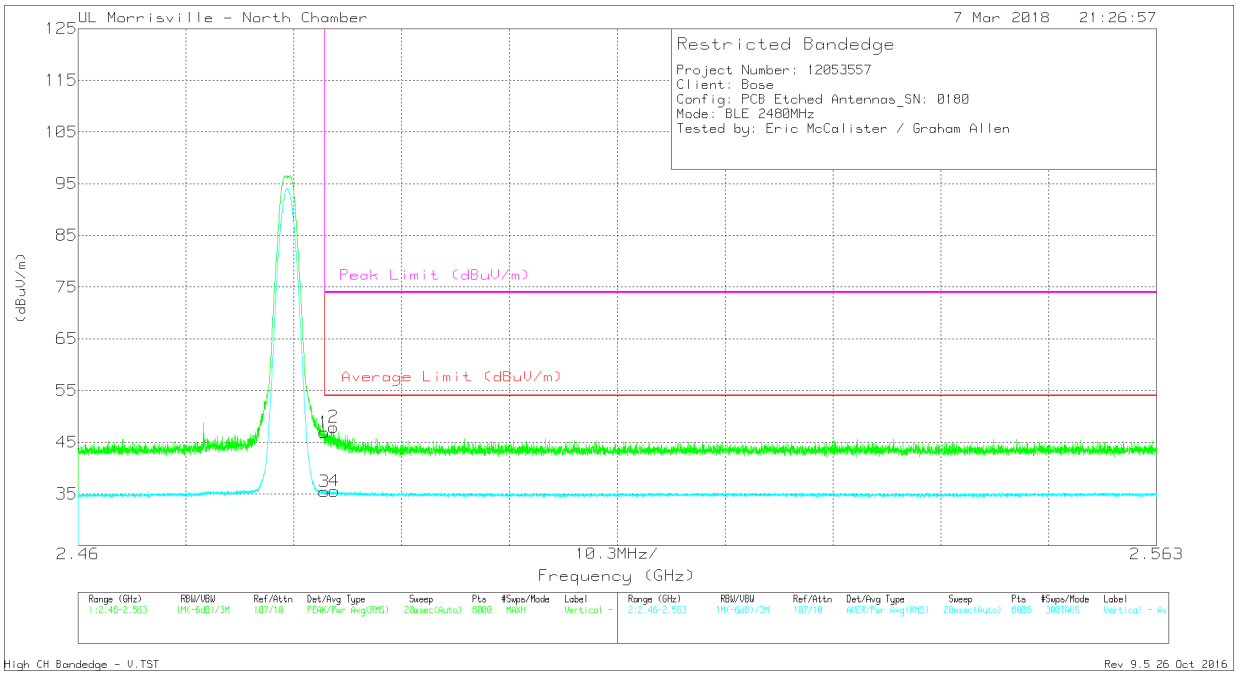
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	41.23	Pk	32.3	-23.8	0	49.73	-	-	74	-24.27	301	127	H
2	* ** 2.484	40.7	Pk	32.3	-23.8	0	49.2	-	-	74	-24.8	301	127	H
3	* ** 2.484	25.7	RMS	32.3	-23.8	1.89	36.09	54	-17.91	-	-	301	127	H
4	* ** 2.484	25.68	RMS	32.3	-23.8	1.89	36.07	54	-17.93	-	-	301	127	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

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

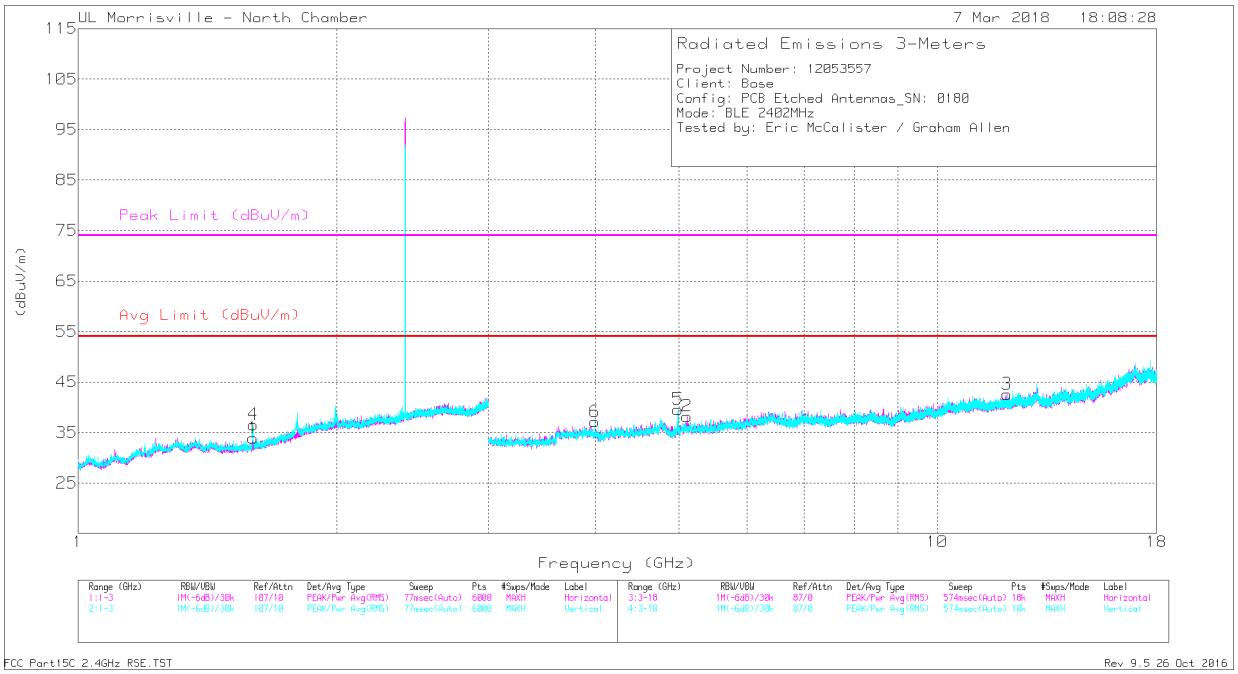


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	38.4	Pk	32.3	-23.8	0	46.9	-	-	74	-27.1	222	232	V
2	* ** 2.484	39.44	Pk	32.3	-23.8	0	47.94	-	-	74	-26.06	222	232	V
3	* ** 2.484	25.06	RMS	32.3	-23.8	1.89	35.45	54	-18.55	-	-	222	232	V
4	* ** 2.484	25.16	RMS	32.3	-23.8	1.89	35.55	54	-18.45	-	-	222	232	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

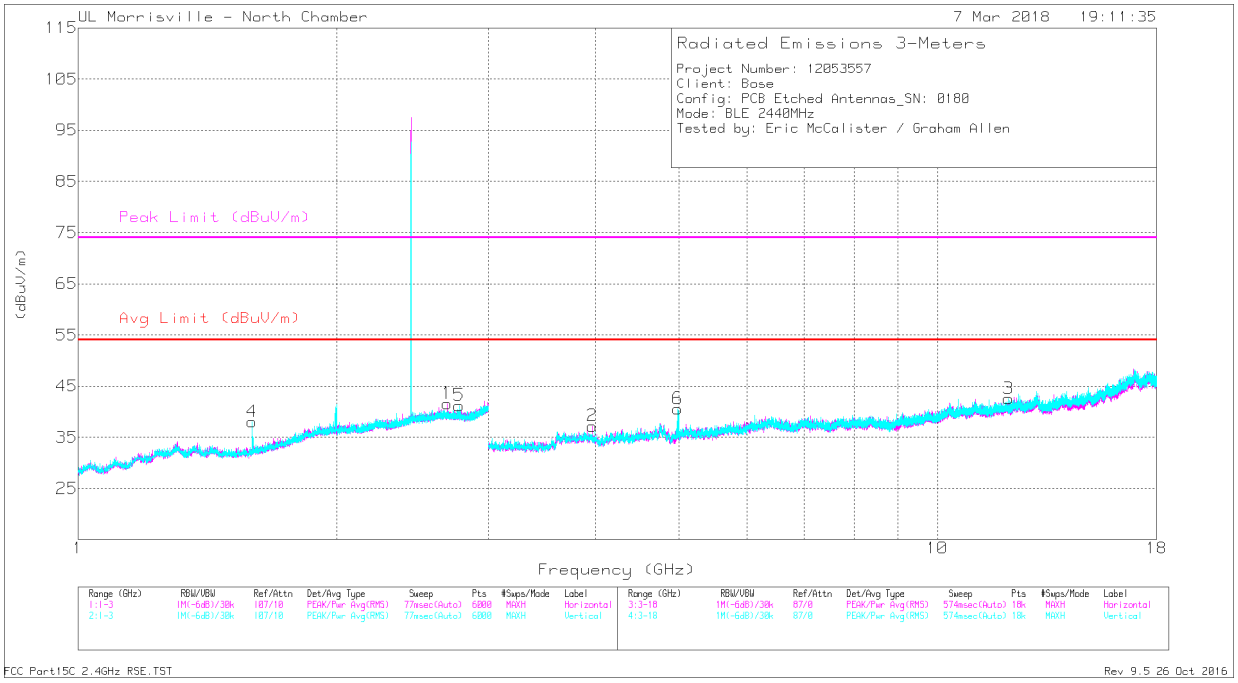
Low Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	* ** 1.599	41.07	PK2	28	-24.1	0	44.97	-	-	74	-29.03	95	165	H
	* ** 1.599	23.92	MAv1	28	-24.1	1.89	29.71	54	-24.29	-	-	95	165	H
2	* ** 5.11	39.43	PK2	34.2	-30.8	0	42.83	-	-	74	-31.17	143	149	H
	* ** 5.11	28.09	MAv1	34.2	-30.8	1.89	33.38	54	-20.62	-	-	143	149	H
3	* ** 12.057	34.13	PK2	38.7	-25.6	0	47.23	-	-	74	-26.77	256	227	H
	* ** 12.055	22.62	MAv1	38.7	-25.6	1.89	37.61	54	-16.39	-	-	256	227	H
4	* ** 1.6	40.72	PK2	28	-24.1	0	44.62	-	-	74	-29.38	165	129	V
	* ** 1.6	24	MAv1	28	-24.1	1.89	29.79	54	-24.21	-	-	165	129	V
5	* ** 4.99	50.57	PK2	34.1	-32.2	0	52.47	-	-	74	-21.53	262	167	V
	* ** 4.991	28.83	MAv1	34.1	-32.2	1.89	32.62	54	-21.38	-	-	262	167	V
6	* ** 3.994	41.13	PK2	33.4	-31.5	0	43.03	-	-	74	-30.97	4	213	V
	* ** 3.994	28.2	MAv1	33.4	-31.5	1.89	31.99	54	-22.01	-	-	4	213	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

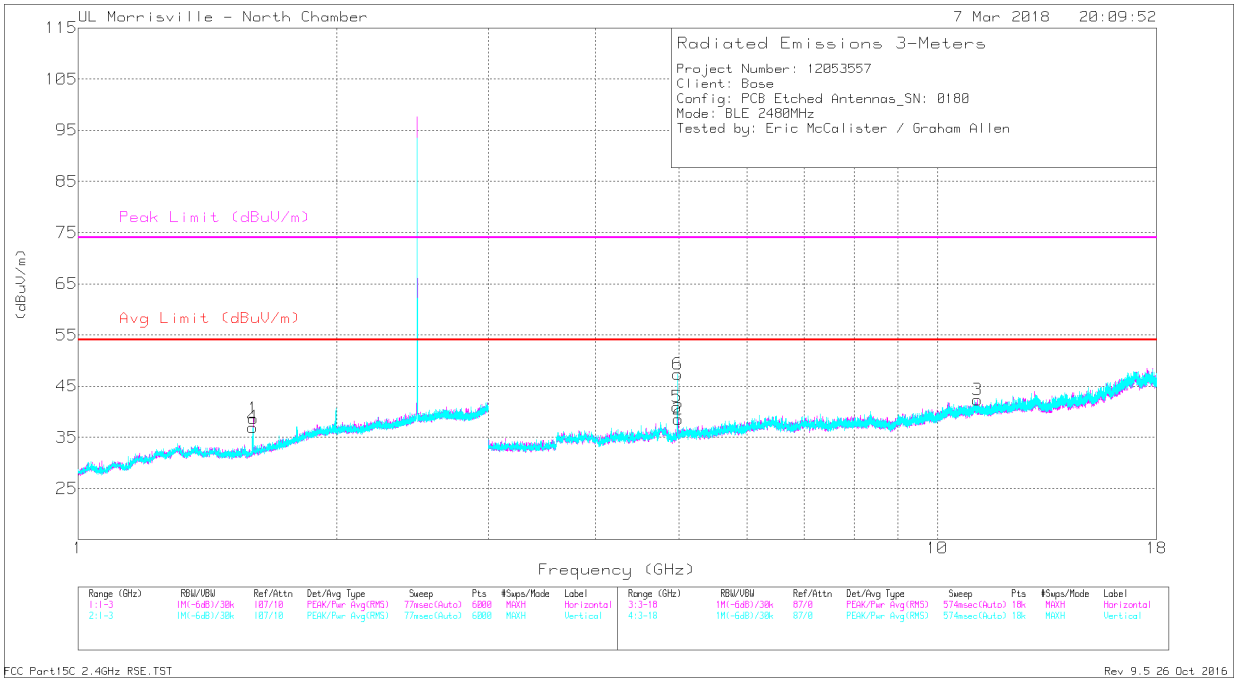
Mid Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	* ** 2.691	36.49	PK2	32.4	-23.5	0	45.39	-	-	74	-28.61	182	176	H
	* ** 2.691	24.81	MAv1	32.4	-23.5	1.89	35.6	54	-18.4	-	-	182	176	H
2	* ** 3.965	40.03	PK2	33.4	-31.2	0	42.23	-	-	74	-31.77	257	243	H
	* ** 3.964	28.32	MAv1	33.4	-31.2	1.89	32.41	54	-21.59	-	-	257	243	H
3	* ** 12.102	34.42	PK2	38.8	-25.9	0	47.32	-	-	74	-26.68	0	219	H
	* ** 12.101	22.74	MAv1	38.8	-25.9	1.89	37.53	54	-16.47	-	-	0	219	H
4	* ** 1.594	38.4	PK2	27.9	-24.1	0	42.2	-	-	74	-31.8	227	112	V
	* ** 1.591	22.92	MAv1	27.9	-24.1	1.89	28.61	54	-25.39	-	-	227	112	V
5	* ** 2.774	36.59	PK2	32.2	-23.3	0	45.49	-	-	74	-28.51	166	170	V
	* ** 2.775	24.66	MAv1	32.2	-23.3	1.89	35.45	54	-18.55	-	-	166	170	V
6	* ** 4.989	47.56	PK2	34.1	-32.2	0	49.46	-	-	74	-24.54	204	150	V
	* ** 4.99	28.91	MAv1	34.1	-32.2	1.89	32.7	54	-21.3	-	-	204	150	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

High Channel



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 AF (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	* ** 1.598	42.65	PK2	28	-24.1	0	46.55	-	-	74	-27.45	42	261	H
	* ** 1.599	23.95	MAv1	28	-24.1	1.89	29.74	54	-24.26	-	-	42	261	H
2	* ** 4.995	40.42	PK2	34.1	-32.2	0	42.32	-	-	74	-31.68	269	103	H
	* ** 4.994	28.94	MAv1	34.1	-32.2	1.89	32.73	54	-21.27	-	-	269	103	H
3	* ** 11.144	35.39	PK2	37.9	-25.6	0	47.69	-	-	74	-26.31	37	372	H
	* ** 11.142	23.47	MAv1	37.9	-25.6	1.89	37.66	54	-16.34	-	-	37	372	H
4	* ** 1.595	43.34	PK2	27.9	-24.1	0	47.14	-	-	74	-26.86	15	289	V
	* ** 1.593	24.05	MAv1	27.9	-24.1	1.89	29.74	54	-24.26	-	-	15	289	V
5	* ** 4.978	46.8	PK2	34.1	-32.1	0	48.8	-	-	74	-25.2	215	206	V
	* ** 4.979	28.41	MAv1	34.1	-32.1	1.89	32.3	54	-21.7	-	-	215	206	V
6	* ** 4.98	52.63	PK2	34.1	-32.1	0	54.63	-	-	74	-19.37	265	127	V
	* ** 4.98	28.99	MAv1	34.1	-32.1	1.89	32.88	54	-21.12	-	-	265	127	V

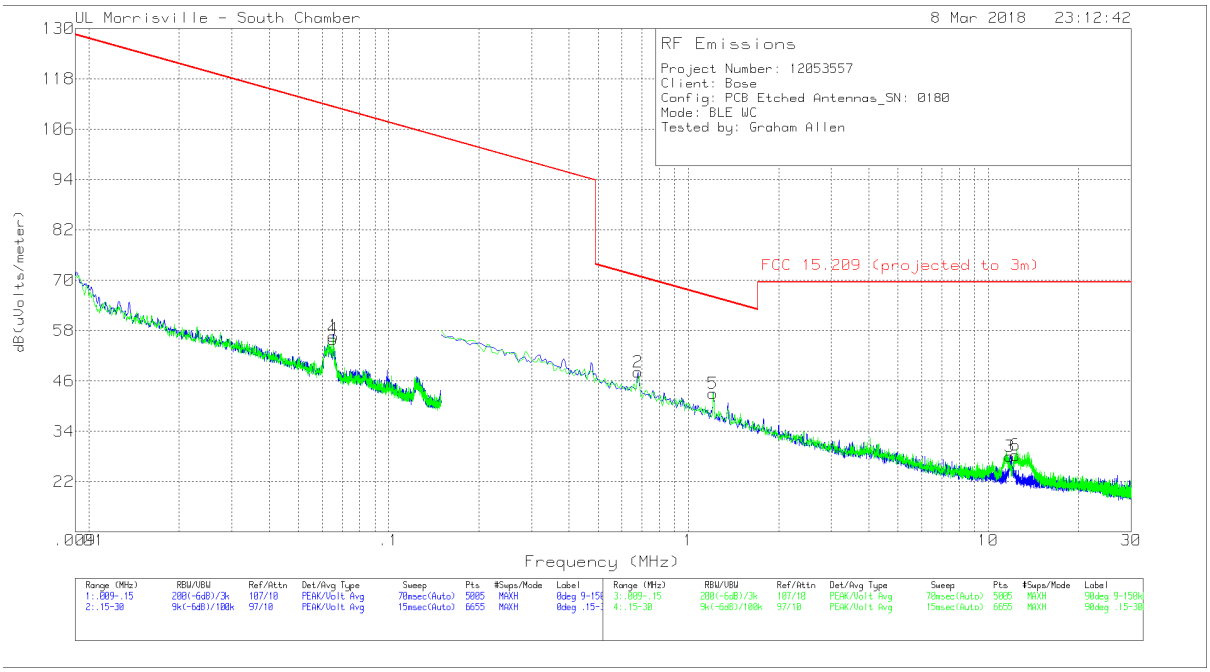
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK2 - Maximum Peak
MAv1 - Maximum RMS Average

9.4. RADIATED WORST-CASE

SPURIOUS EMISSIONS 0.009 TO 30 MHz (WORST-CASE CONFIGURATION, PCB ANT)

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance 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 (specification distance / test distance).

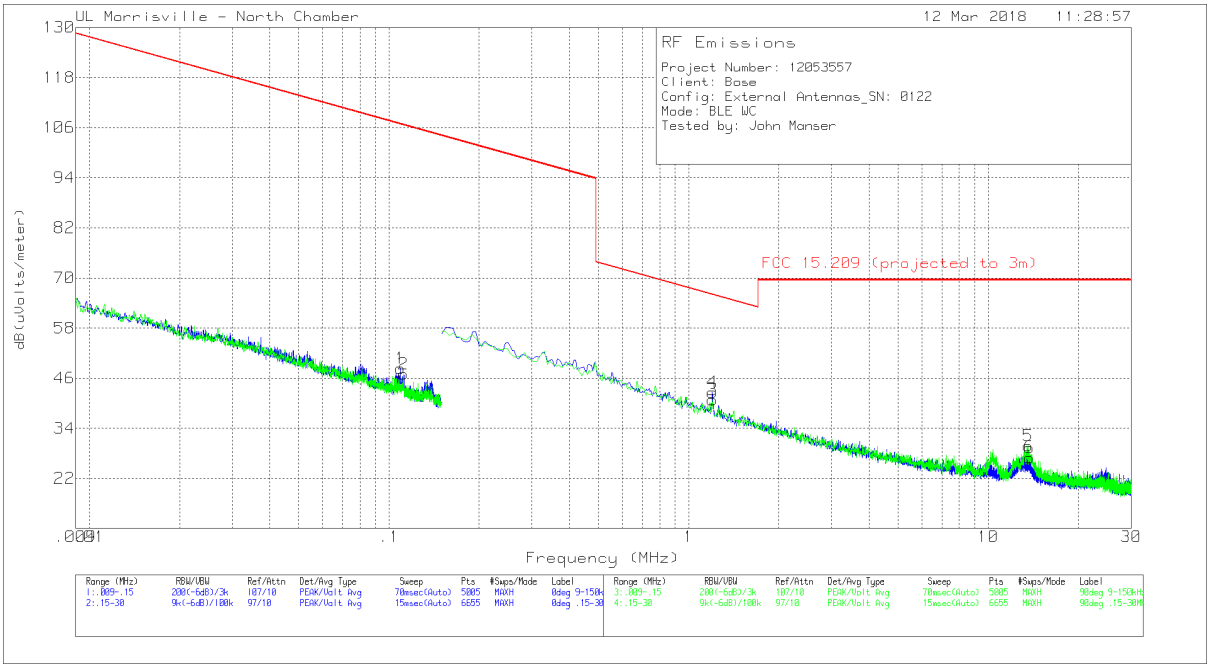
Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uV/m)	FCC 15.209 QP (projected to 3m)	QP Margin (dB)	FCC 15.209 AV (projected to 3m)	AV Margin (dB)	FCC 15.209 PK (projected to 3m)	PK Margin (dB)	Azimuth (Degs)
4	.06536	44.09	Pk	11.8	.1	55.99	-	-	111.3	-55.31	131.3	-75.31	0-360
5	1.2087	31.34	Pk	11.5	.2	43.04	65.96	-22.92	-	-	-	-22.92	0-360
6	12.31155	17.1	Pk	10.6	.6	28.3	69.54	-41.24	-	-	-	-41.24	0-360
1	.06545	44.85	Pk	11.8	.1	56.75	-	-	111.29	-54.54	131.29	-74.54	0-360
2	.67935	36.5	Pk	11.5	.1	48.1	70.96	-22.86	-	-	-	-22.86	0-360
3	11.8136	16.75	Pk	10.7	.6	28.05	69.54	-41.49	-	-	-	-41.49	0-360

Pk - Peak detector

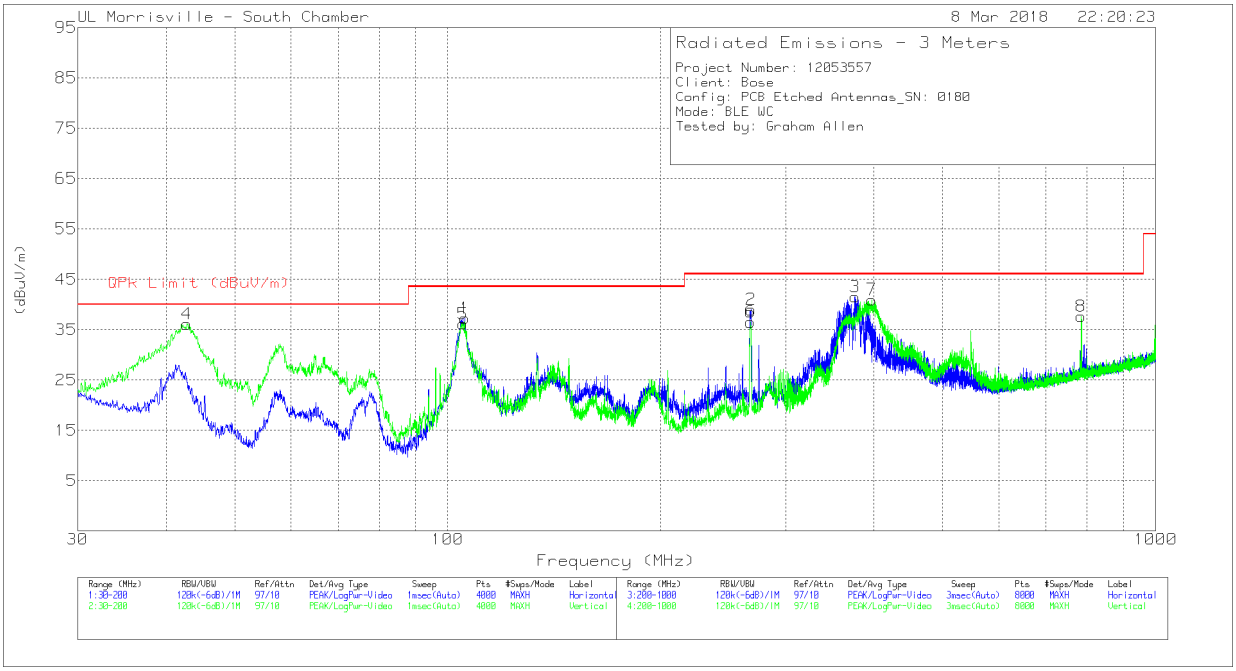
SPURIOUS EMISSIONS 0.009 TO 30 MHz (WORST-CASE CONFIGURATION, EXTERNAL ANT)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uV/m)	FCC 15.209 QP (projected to 3m)	QP Margin (dB)	FCC 15.209 AV (projected to 3m)	AV Margin (dB)	FCC 15.209 PK (projected to 3m)	PK Margin (dB)	Azimuth (Degs)
1	.10913	36.67	Pk	11.6	.1	48.37	106.85	-58.48	-	-	-	-	0-360
2	.11176	35.34	Pk	11.6	.1	47.04	-	-	106.64	-59.6	126.64	-79.6	0-360
4	1.19972	30.92	Pk	11.5	.2	42.62	66.02	-23.4	-	-	-	-	0-360
3	1.19972	29.17	Pk	11.5	.2	40.87	66.02	-25.15	-	-	-	-	0-360
5	13.57211	18.72	Pk	10.5	.6	29.82	69.54	-39.72	-	-	-	-	0-360
6	13.71118	15.99	Pk	10.4	.6	26.99	69.54	-42.55	-	-	-	-	0-360

Pk - Peak detector

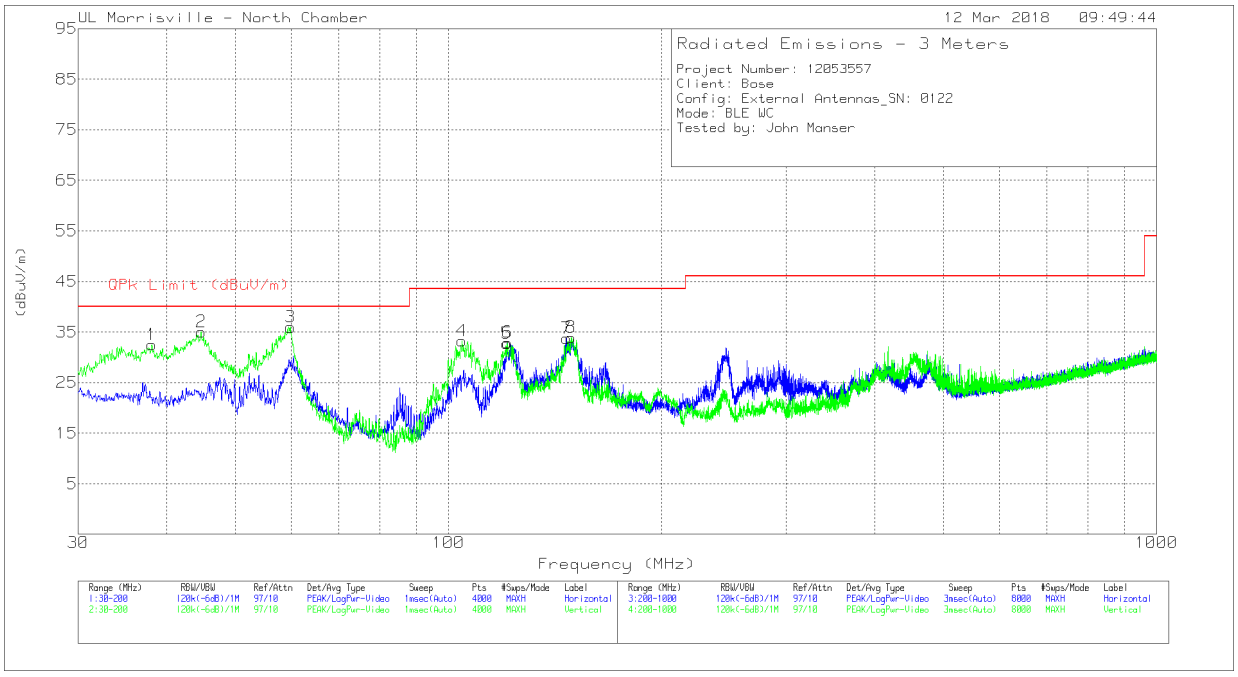
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, PCB ANT)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	105.8182	44.67	Qp	16	-31	29.67	43.52	-13.85	20	289	H
2	268.1089	51.07	Pk	17.7	-29.8	38.97	46.02	-7.05	0-360	102	H
3	376.3949	47.93	Qp	19.8	-29.1	38.63	46.02	-7.39	226	232	H
4	42.7433	46.15	Qp	16.4	-31.6	30.95	40	-9.05	28	124	V
5	105.1169	51.33	Pk	15.8	-31	36.13	43.52	-7.39	0-360	101	V
6	267.6088	48.58	Pk	17.7	-29.8	36.48	46.02	-9.54	0-360	199	V
7	397.4521	48.18	Qp	20.2	-29.2	39.18	46.02	-6.84	333	142	V
8	785.2761	39.61	Pk	25.9	-27.9	37.61	46.02	-8.41	0-360	199	V

PK –peak detector
Qp - Quasi-Peak detector

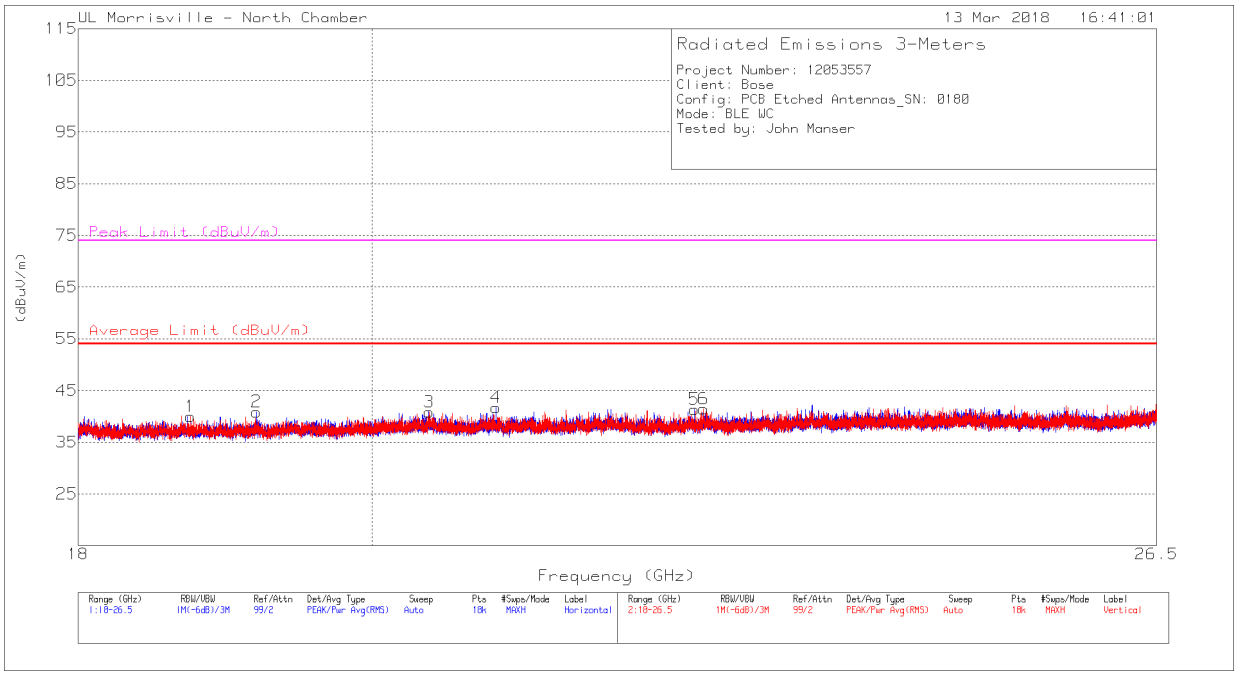
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, EXT ANT)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* ** 121.541	38.39	Qp	19.1	-30.8	26.69	43.52	-16.83	256	353	H
1	* ** 38.1196	38.31	Qp	20.6	-31.7	27.21	40	-12.79	344	128	V
6	* ** 121.4164	38.71	Qp	19.1	-30.8	27.01	43.52	-16.51	211	105	V
2	44.7413	45.98	Qp	15.9	-31.5	30.38	40	-9.62	261	110	V
3	59.6452	50.77	Qp	12.7	-31.3	32.17	40	-7.83	280	105	V
4	104.1993	41.24	Qp	16.4	-30.9	26.74	43.52	-16.78	155	111	V
7	147.274	42.27	Qp	17.8	-30.5	29.57	43.52	-13.95	100	203	H
8	149.7558	43.19	Qp	17.7	-30.5	30.39	43.52	-13.13	182	137	V

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

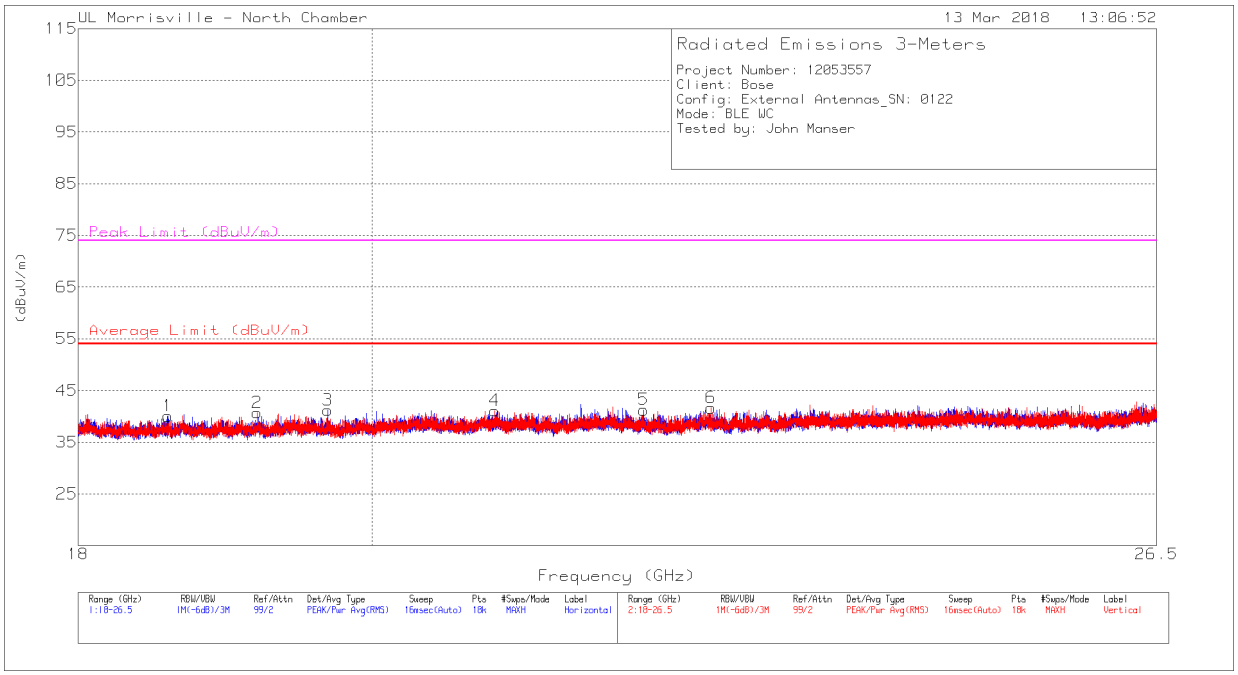
SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION) PCB ANT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 19.189	48.6	PK2	32.8	-41	0	40.4	-	-	74	-33.6	80	387	H
	* ** 19.19	36.98	MAv1	32.8	-41	1.89	30.67	54	-23.33	-	-	80	387	H
4	* ** 20.909	48.84	PK2	33.1	-41.2	0	40.74	-	-	74	-33.26	241	337	H
	* ** 20.906	37.44	MAv1	33.1	-41.2	1.89	31.23	54	-22.77	-	-	241	337	H
5	* ** 22.452	48.37	PK2	33.7	-41	0	41.07	-	-	74	-32.93	59	372	H
	* ** 22.45	36.73	MAv1	33.7	-41	1.89	31.32	54	-22.68	-	-	59	372	H
1	* ** 18.741	48.08	PK2	32.5	-41.1	0	39.48	-	-	74	-34.52	130	321	V
	* ** 18.739	36.63	MAv1	32.5	-41	1.89	30.02	54	-23.98	-	-	130	321	V
3	* ** 20.415	49.15	PK2	33.1	-41.3	0	40.95	-	-	74	-33.05	244	155	V
	* ** 20.413	37.54	MAv1	33.1	-41.3	1.89	31.23	54	-22.77	-	-	244	155	V
6	* ** 22.527	48.34	PK2	33.7	-40.9	0	41.14	-	-	74	-32.86	112	263	V
	* ** 22.526	36.93	MAv1	33.7	-40.9	1.89	31.62	54	-22.38	-	-	112	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

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION) EXT ANT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 18.592	49.25	PK2	32.6	-40.9	0	40.95	-	-	74	-33.05	111	253	H
	* ** 18.591	36.86	MAv1	32.6	-40.9	1.89	30.45	54	-23.55	-	-	111	253	H
3	* ** 19.683	49.31	PK2	32.7	-41.2	0	40.81	-	-	74	-33.19	88	283	H
	* ** 19.684	37.26	MAv1	32.7	-41.2	1.89	30.65	54	-23.35	-	-	88	283	H
5	* ** 22.044	49.19	PK2	33.7	-40.8	0	42.09	-	-	74	-31.91	349	162	H
	* ** 22.044	36.66	MAv1	33.7	-40.9	1.89	31.35	54	-22.65	-	-	349	162	H
2	* ** 19.197	49.67	PK2	32.8	-41	0	41.47	-	-	74	-32.53	46	131	V
	* ** 19.196	37.08	MAv1	32.8	-41	1.89	30.77	54	-23.23	-	-	46	131	V
4	* ** 20.897	49.52	PK2	33.1	-41.2	0	41.42	-	-	74	-32.58	0	104	V
	* ** 20.897	37.58	MAv1	33.1	-41.2	1.89	31.37	54	-22.63	-	-	0	104	V
6	* ** 22.581	48.85	PK2	33.6	-40.9	0	41.55	-	-	74	-32.45	258	129	V
	* ** 22.581	36.97	MAv1	33.6	-40.9	1.89	31.56	54	-22.44	-	-	258	129	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

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

* Decreases with the logarithm of the frequency.

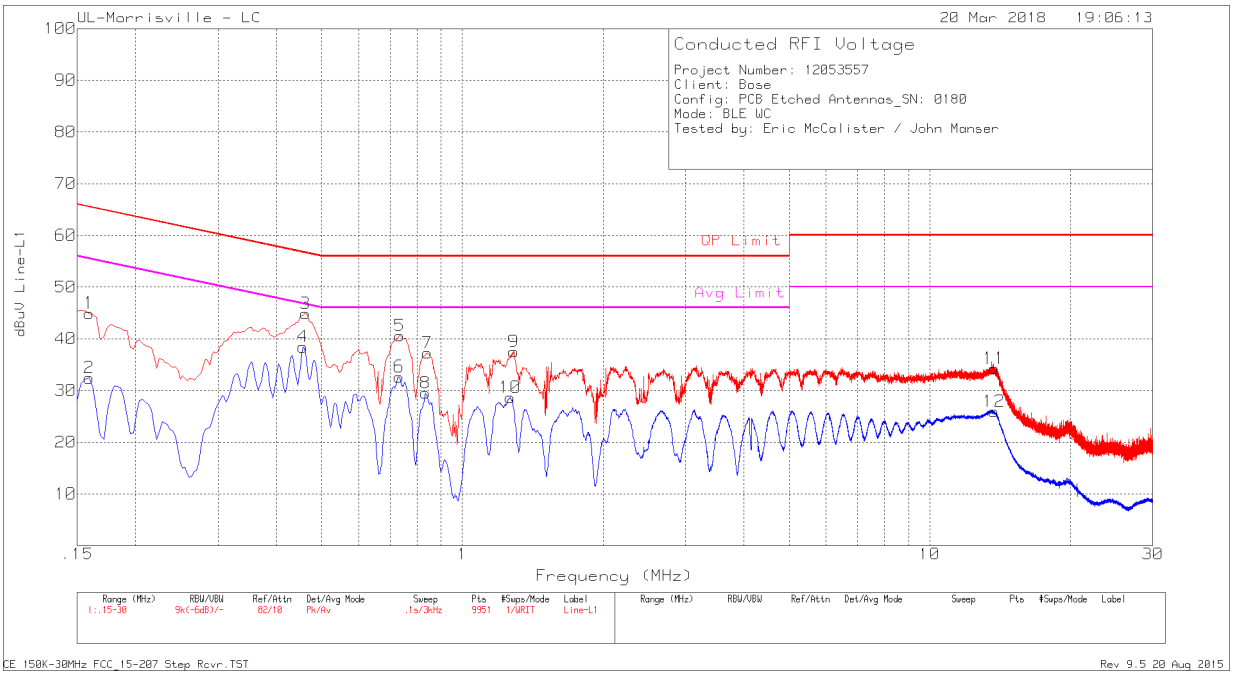
TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

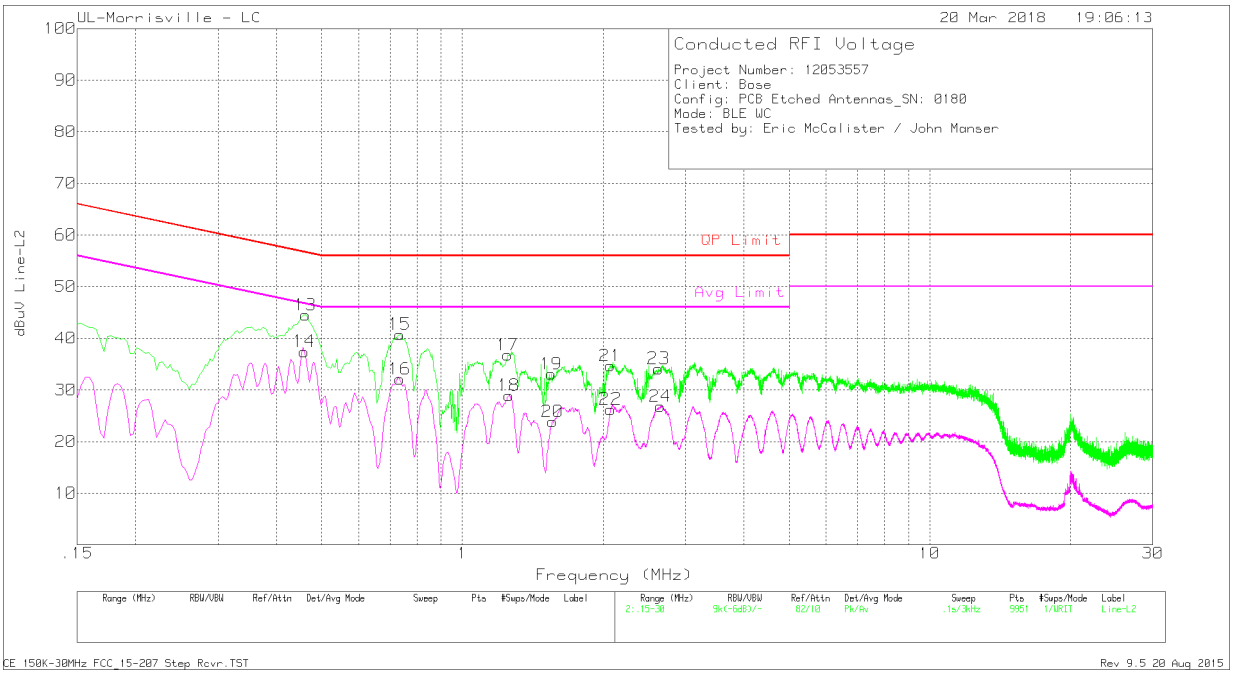
LINE 1 RESULTS – PCB ANTENNA



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.159	34.74	Pk	.2	10	44.94	65.52	-20.58	-	-
2	.159	22.22	Av	.2	10	32.42	-	-	55.52	-23.1
3	.462	34.97	Pk	0	9.9	44.87	56.66	-11.79	-	-
4	.456	28.54	Av	0	9.9	38.44	-	-	46.77	-8.33
5	.735	30.71	Pk	0	9.9	40.61	56	-15.39	-	-
6	.732	22.75	Av	0	9.9	32.65	-	-	46	-13.35
7	.843	27.36	Pk	0	9.9	37.26	56	-18.74	-	-
8	.834	19.6	Av	0	9.9	29.5	-	-	46	-16.5
9	1.2885	27.51	Pk	0	10	37.51	56	-18.49	-	-
10	1.266	18.66	Av	0	10	28.66	-	-	46	-17.34
11	13.728	24.04	Pk	.1	10.1	34.24	60	-25.76	-	-
12	13.719	15.72	Av	.1	10.1	25.92	-	-	50	-24.08

Pk - Peak detector
Av - Average detection

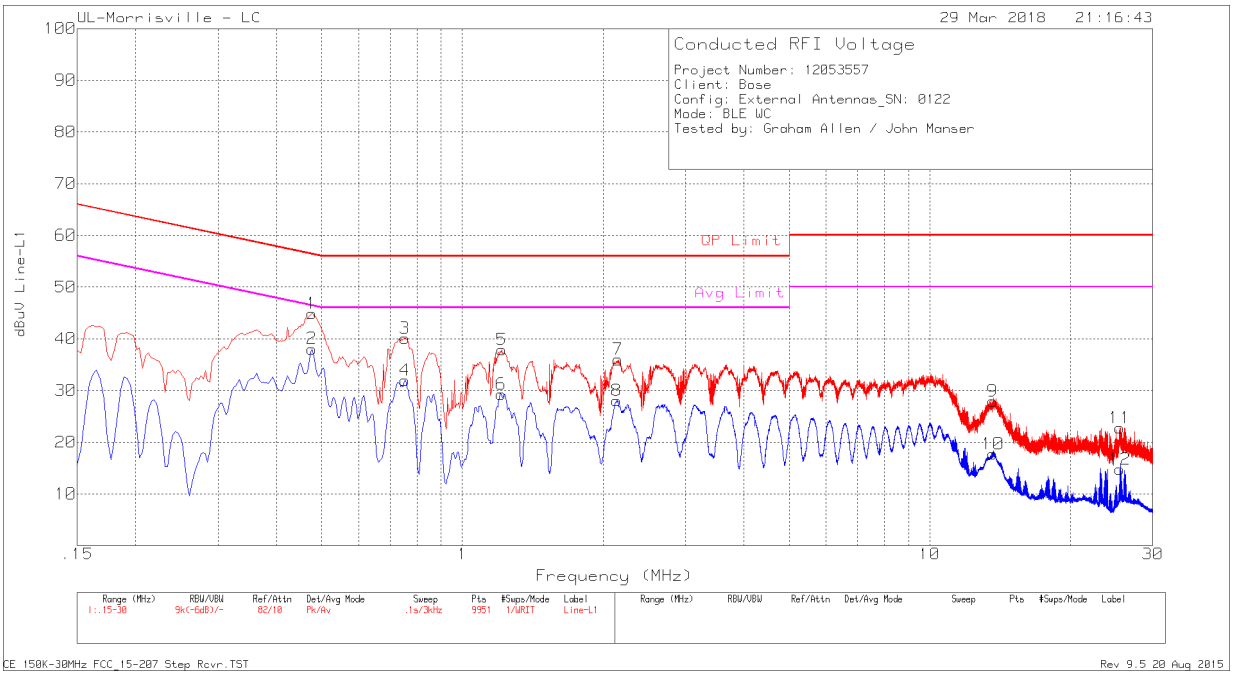
LINE 2 RESULTS – PCB ANTENNA



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.462	34.52	Pk	.1	9.9	44.52	56.66	-12.14	-	-
14	.459	27.44	Av	.1	9.9	37.44	-	-	46.71	-9.27
15	.735	30.85	Pk	0	9.9	40.75	56	-15.25	-	-
16	.735	22.23	Av	0	9.9	32.13	-	-	46	-13.87
17	1.251	26.78	Pk	0	10	36.78	56	-19.22	-	-
18	1.257	18.94	Av	0	10	28.94	-	-	46	-17.06
19	1.551	23.08	Pk	0	10	33.08	56	-22.92	-	-
20	1.56	13.83	Av	0	10	23.83	-	-	46	-22.17
21	2.073	24.68	Pk	0	10	34.68	56	-21.32	-	-
22	2.076	16.26	Av	0	10	26.26	-	-	46	-19.74
23	2.631	24.11	Pk	0	10	34.11	56	-21.89	-	-
24	2.655	16.79	Av	0	10	26.79	-	-	46	-19.21

Pk - Peak detector
Av - Average detection

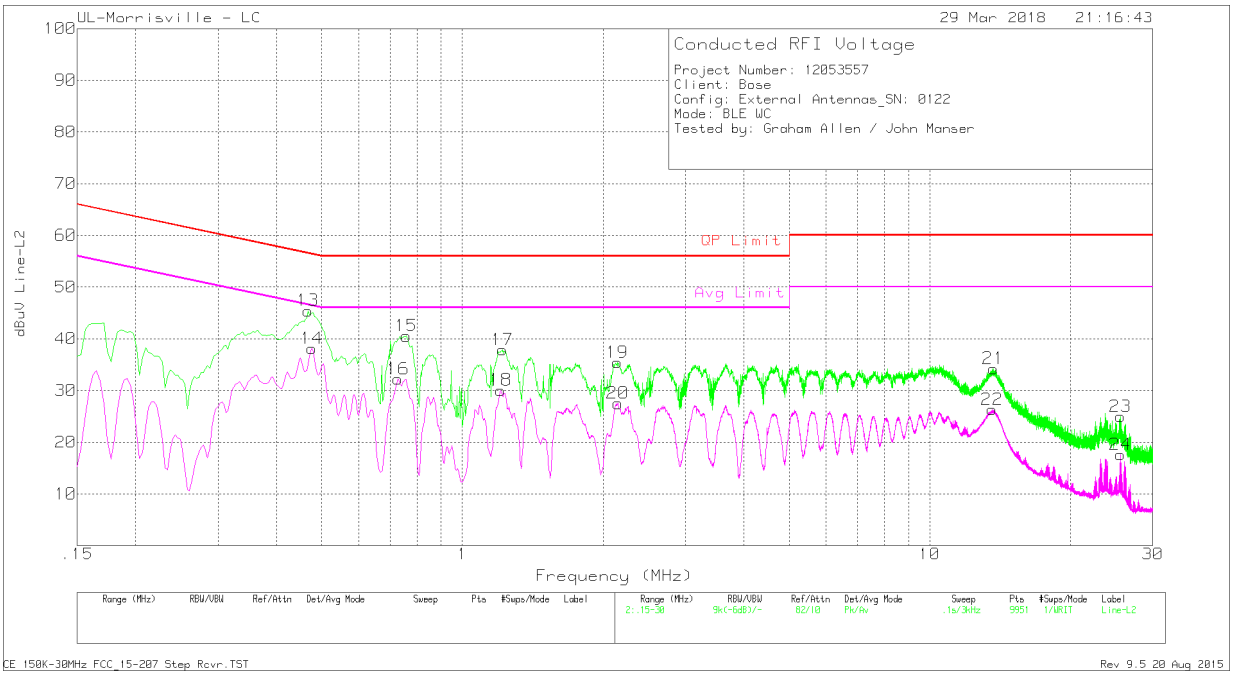
LINE 1 RESULTS – EXTERNAL ANTENNA



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
1	.477	34.98	Pk	0	9.9	44.88	56.39	-11.51	-	-
2	.477	28.16	Av	0	9.9	38.06	-	-	46.39	-8.33
3	.753	30.07	Pk	0	10	40.07	56	-15.93	-	-
4	.753	21.95	Av	0	10	31.95	-	-	46	-14.05
5	1.215	27.91	Pk	0	10	37.91	56	-18.09	-	-
6	1.212	19.24	Av	0	10	29.24	-	-	46	-16.76
7	2.151	25.98	Pk	0	10	35.98	56	-20.02	-	-
8	2.142	18.01	Av	0	10	28.01	-	-	46	-17.99
9	13.6485	17.69	Pk	.1	10.1	27.89	60	-32.11	-	-
10	13.653	7.51	Av	.1	10.1	17.71	-	-	50	-32.29
11	25.479	12.24	Pk	.3	10.2	22.74	60	-37.26	-	-
12	25.521	4.26	Av	.3	10.2	14.76	-	-	50	-35.24

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS – EXTERNAL ANTENNA



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit	Margin (dB)	Avg Limit	Margin (dB)
13	.468	35.44	Pk	.1	9.9	45.44	56.55	-11.11	-	-
14	.477	28.15	Av	.1	9.9	38.15	-	-	46.39	-8.24
15	.759	30.64	Pk	0	9.9	40.54	56	-15.46	-	-
16	.729	22.29	Av	0	9.9	32.19	-	-	46	-13.81
17	1.218	27.85	Pk	0	10	37.85	56	-18.15	-	-
18	1.209	20.06	Av	0	10	30.06	-	-	46	-15.94
19	2.148	25.45	Pk	0	10	35.45	56	-20.55	-	-
20	2.151	17.51	Av	0	10	27.51	-	-	46	-18.49
21	13.695	24.04	Pk	.1	10.1	34.24	60	-25.76	-	-
22	13.608	16.09	Av	.1	10.1	26.29	-	-	50	-23.71
23	25.569	14.58	Pk	.2	10.2	24.98	60	-35.02	-	-
24	25.608	7.22	Av	.2	10.2	17.62	-	-	50	-32.38

Pk - Peak detector
Av - Average detection