CERTIFICATION TEST REPORT

Report Number. : R12570795-E2

Applicant	:	Bose Corporation 100 The Mountain Framingham, MA 01701, USA
Model	:	423352
FCC ID	:	A94423352
IC	:	3232A-423352
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:
January 29, 2019

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

NVLAP TESTING
NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
1	2019-01-29	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: 423352

SERIAL NUMBER: Radiated SN: 078702Z8319C125AE, 078702Z8319C047AE
Conducted SN: 079616Z8321I005AE

DATE TESTED: 2019-01-07 to 2019-01-22

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

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
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, North Carolina 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.
☐ Chamber A (ISED:2180C-1)	☒ Chamber North (ISED:2180C-3)
☐ Chamber C (ISED:2180C-2)	☒ Chamber South (ISED:2180C-4)

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)
RF output power, radiated (SAC)	4.52 dB
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	2.50 dB
All emissions, radiated	4.88 dB
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 headset with BT/BLE radio.

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	Basic GFSK	5.59	3.62
2402 - 2480	Enhanced DQPSK	7.04	5.06
2402 - 2480	Enhanced 8PSK	7.67	5.85

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance. For average power data please refer to section 8.4.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The highest gain antenna assembly has a peak gain of 4.8 dBi in the 2.4 GHz band.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 0.7.8-107+a36ecaa2f
The EUT driver software installed in the host support equipment during testing was 100.0.0.0
The test utility software, BlueTest3, used during testing was 3.1.4

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

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

Worst-case as determined by power measurements:

GFSK mode: DH1
8PSK mode: 3DH1

Note - DH1 testing represents DH3 and DH5 for GFSK and 8DPSK. DQPSK is represented by 8DPSK.

Additionally, the radios do not transmit when the USB charging cable is connected. Therefore, line conducted emissions was not performed.

5.6. DESCRIPTION OF TEST SETUP

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
None				

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
None						

TEST SETUP

EUT is configured as a standalone device during testing.

SETUP DIAGRAMS

Please refer to R12570795-EP2 for setup diagrams

6. 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.
72822	Spectrum Analyzer	Agilent Technologies	E4446A	2018-11-09	2019-11-09
T177	Spectrum Analyzer	Agilent Technologies	E4446A	2018-04-12	2019-04-12
SN 181474341	Environmental Meter	Fisherbrand	15-077-963	2018-07-27	2020-07-27
PWM005	Power Meter	Keysight	N1912A	2018-04-29	2019-04-29
PWS002	Power Sensor	Keysight	N1921A	2018-07-30	2019-07-30

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
1-18 GHz					
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2018-04-30	2019-04-30
Gain-Loss Chains					
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2018-03-20	2019-03-20
Receiver & Software					
SA0026	Spectrum Analyzer	Agilent	N9030A	2018-03-20	2019-03-20
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0059	Active Loop Antenna	EMCO	6502	2018-07-20	2019-07-20
30-1000 MHz					
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2018-08-06	2019-08-06
18-40 GHz					
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2018-11-08	2019-11-08
Gain-Loss Chains					
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2018-09-06	2019-09-06
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2018-05-20	2019-05-20
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-09-30	2019-03-31
Receiver & Software					
SA0027	Spectrum Analyzer	Agilent	N9030A	2018-04-04	2019-04-04
SA0025 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2018-11-20	2019-11-20
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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7. MEASUREMENT METHODS

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

Emissions BW (20dB): ANSI C63.10-2013 Section 6.9.2

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

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

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Out-of-band emissions in non-restricted bands: ANSI C63.10 Section 7.8.6, 7.8.8 & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10:2013 Sections 6.3-6.6, 6.10.5

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

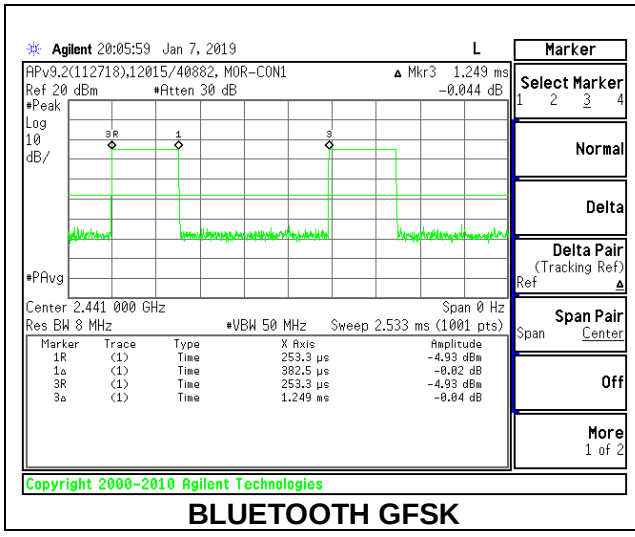
None; for reporting purposes only.

PROCEDURE

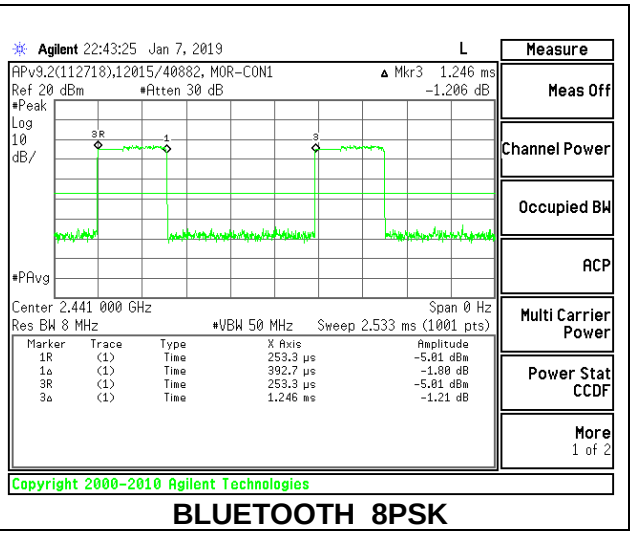
ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

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/T Minimum VBW (kHz)
Bluetooth GFSK	0.3825	1.249	0.306	30.6%	5.14	2.614
Bluetooth 8PSK	0.3927	1.246	0.315	31.5%	5.01	2.546



BLUETOOTH GFSK



BLUETOOTH 8PSK

8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

Test per ANSI C63.10 Sections 6.9.2 and 6.9.3 and RSS-Gen 6.6.

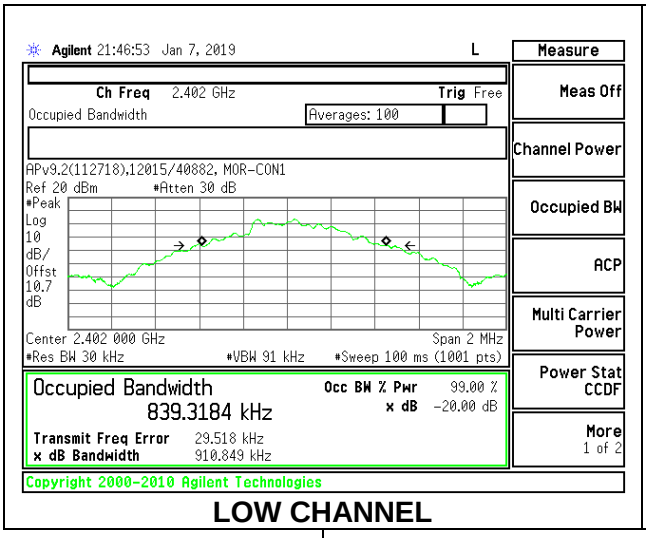
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1%-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

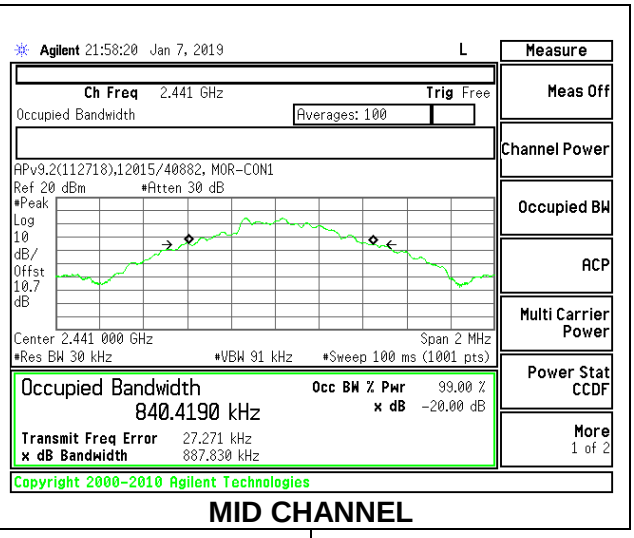
RESULTS

8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

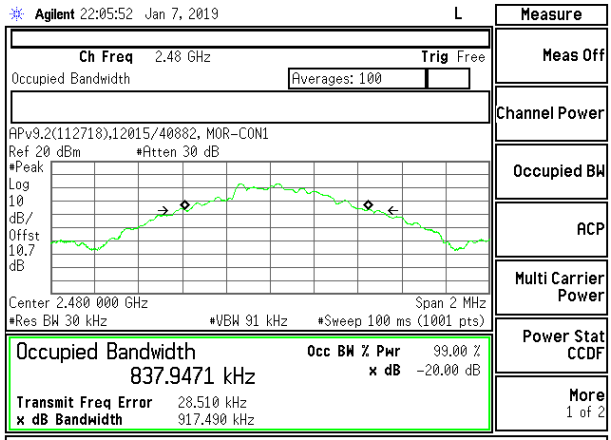
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.911	0.839
Mid	2441	0.888	0.84
High	2480	0.917	0.838



LOW CHANNEL



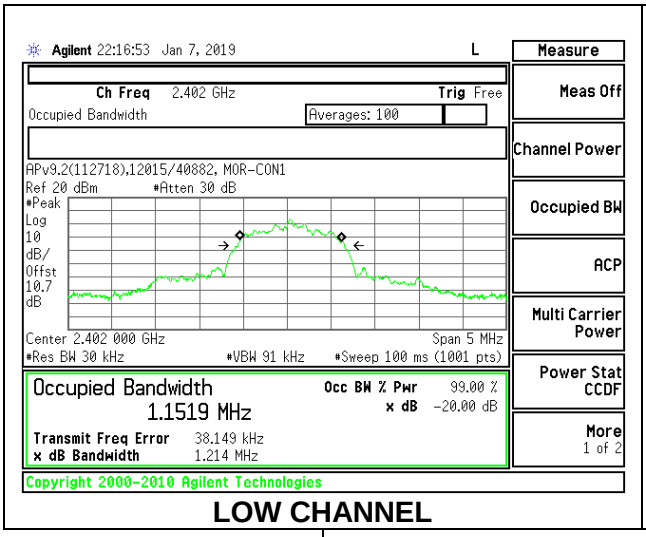
MID CHANNEL



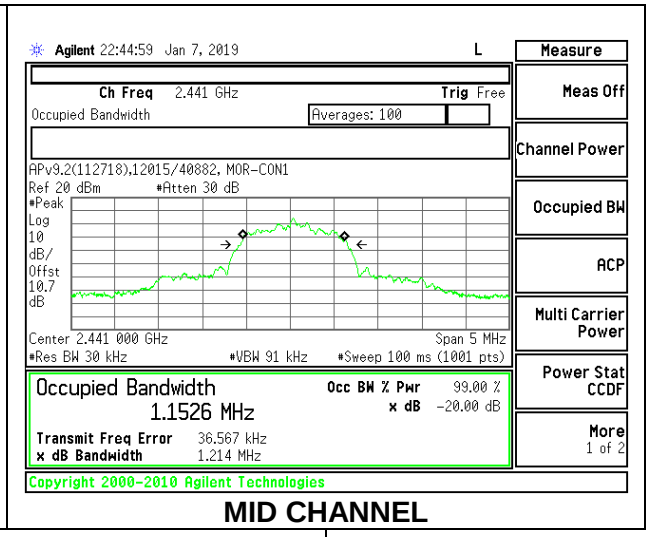
HIGH CHANNEL

8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

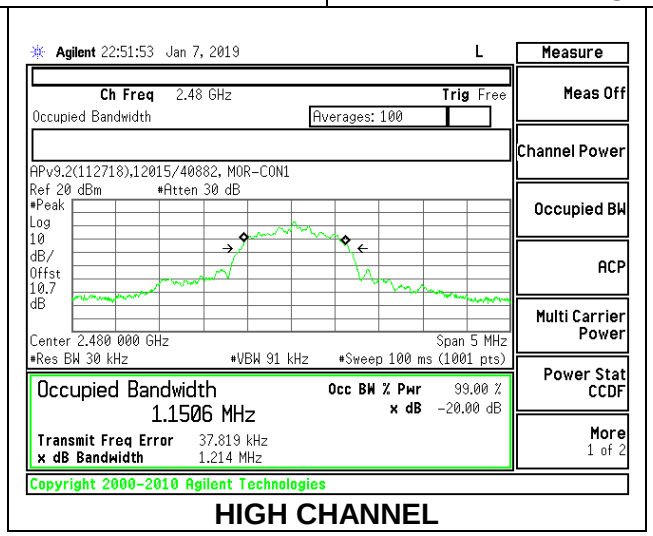
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.214	1.152
Mid	2441	1.214	1.153
High	2480	1.214	1.151



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. OUTPUT POWER

LIMITS

§15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 5.4 (b)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

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

RESULTS

GFSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.90	30	-25.100
Middle	2440	5.59	30	-24.410
High	2480	4.58	30	-25.420

DQPSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.36	30	-23.640
Middle	2440	7.04	30	-22.960
High	2480	6.07	30	-23.930

8PSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.05	30	-22.950
Middle	2440	7.67	30	-22.330
High	2480	6.76	30	-23.240

TEST INFORMATION

Test Date: 2019-01-08
Project: 12570795
Tested By: 12015 / 40882

8.4. 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.

GFSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.74	30	-25.260
Middle	2440	5.48	30	-24.520
High	2480	4.45	30	-25.550

DQPSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.12	30	-25.880
Middle	2440	4.88	30	-25.120
High	2480	3.82	30	-26.180

8PSK

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.10	30	-25.900
Middle	2440	4.87	30	-25.130
High	2480	3.63	30	-26.370

TEST INFORMATION
Test Date: 2019-01-08
Project: 12570795
Tested By: 12015 / 40882

8.5. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

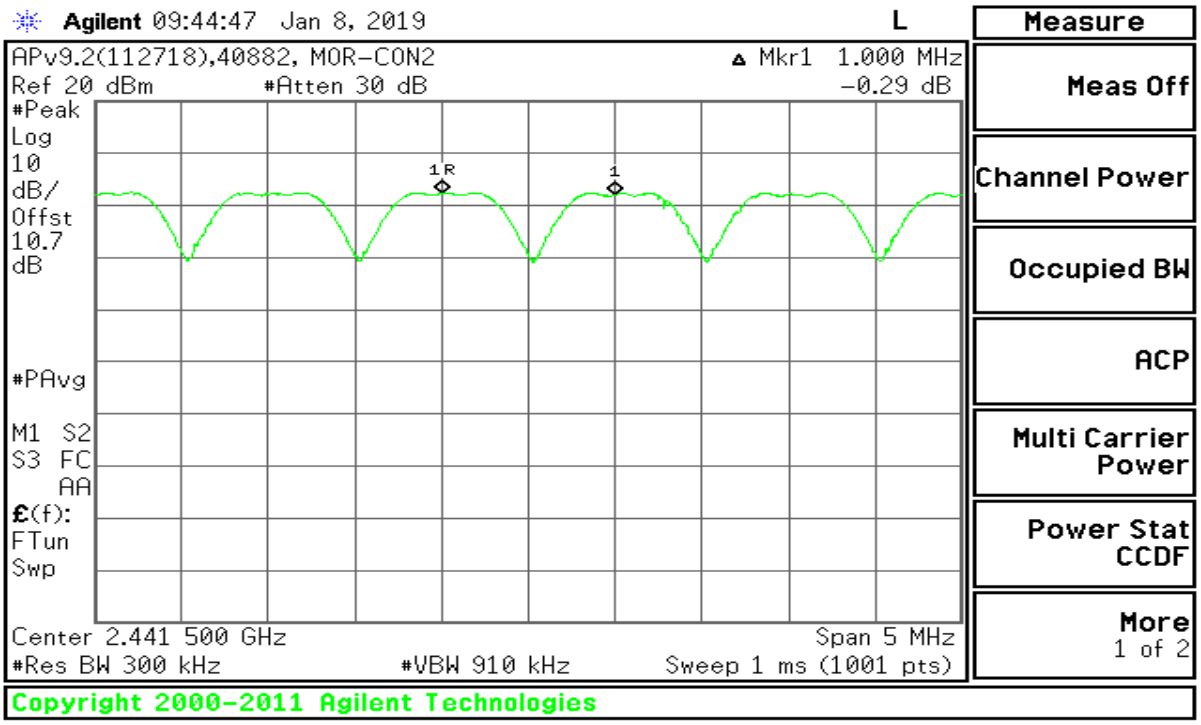
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz (approx. 30% of the channel spacing) and the VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

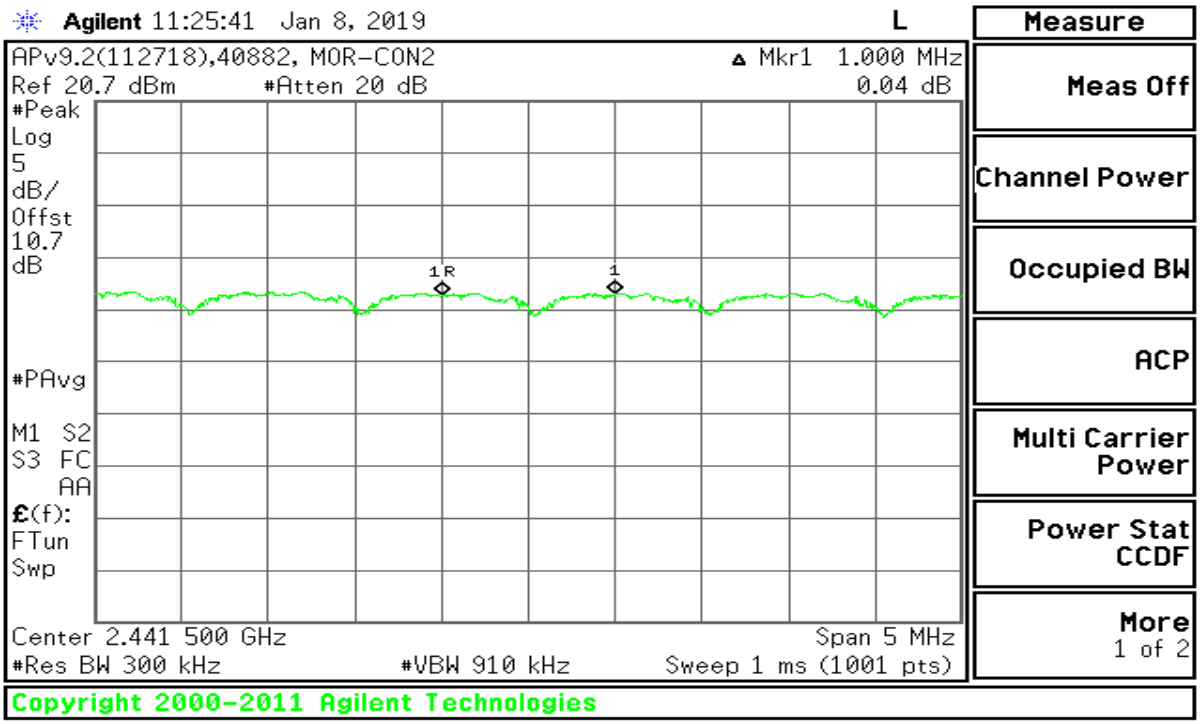
8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	Margin (MHz)
2441	2442	1.000	0.917	-0.083

8.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

Ch. A (MHz)	Ch. B (MHz)	Ch. 1 to Ch. 2 Sep. (MHz)	Max. 20 dB BW (MHz)	2/3 Max. 20dB BW (MHz)	Margin (MHz)
2441	2442	1.000	1.214	0.809	-0.191

Note: Frequency separation is greater than 2/3 of the maximum 20dB BW. Which is allowed as the maximum output power is 7.67dBm, which is less than 21dBm (125mW).

8.6. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps for visibility of the entire span. Then, smaller spans are set to more clearly identify the channels. The RBW is set to 30% of the channel spacing (approx. 300kHz). The analyzer is set to Max Hold.

RESULTS

Normal Mode: All Channels Observed

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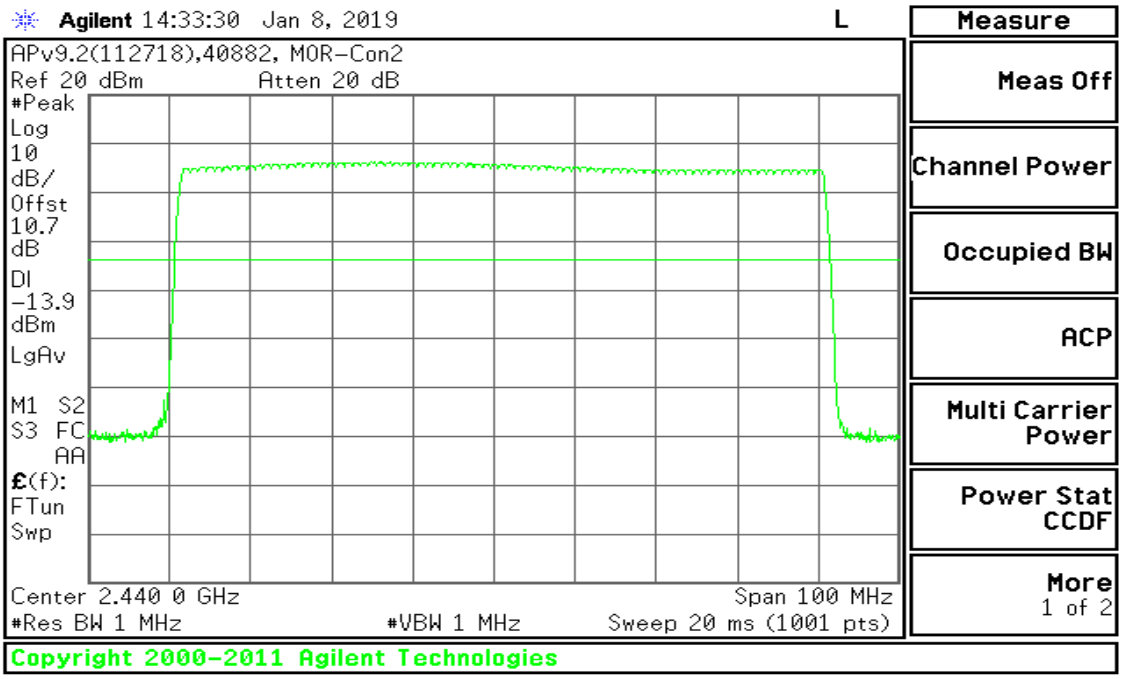
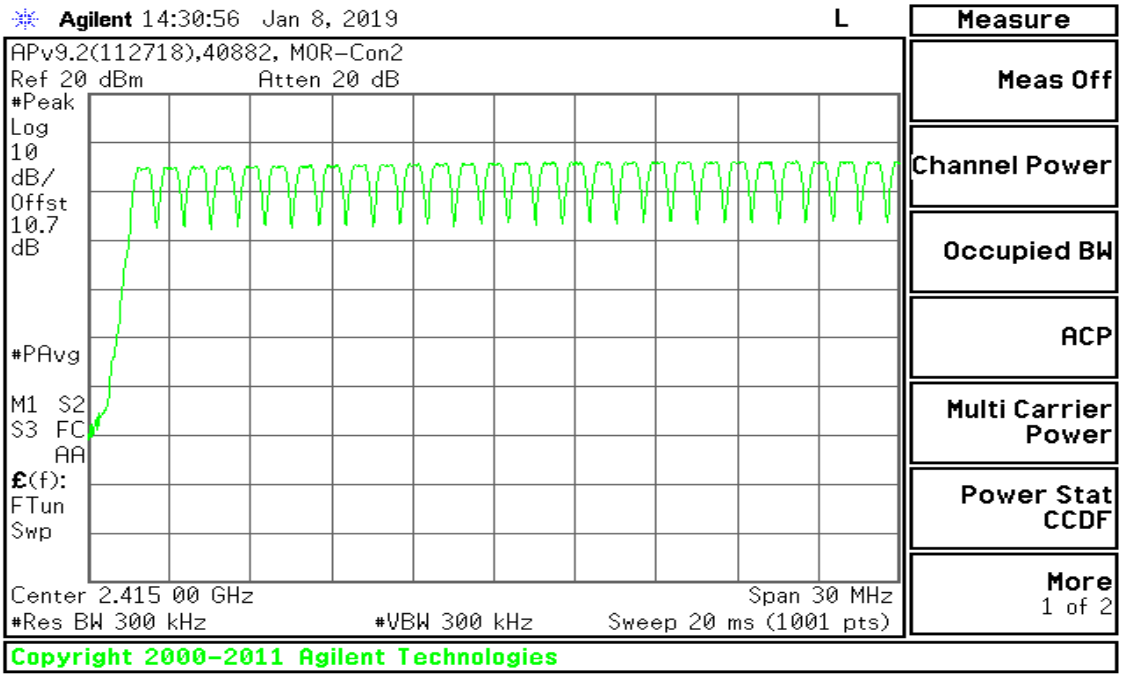
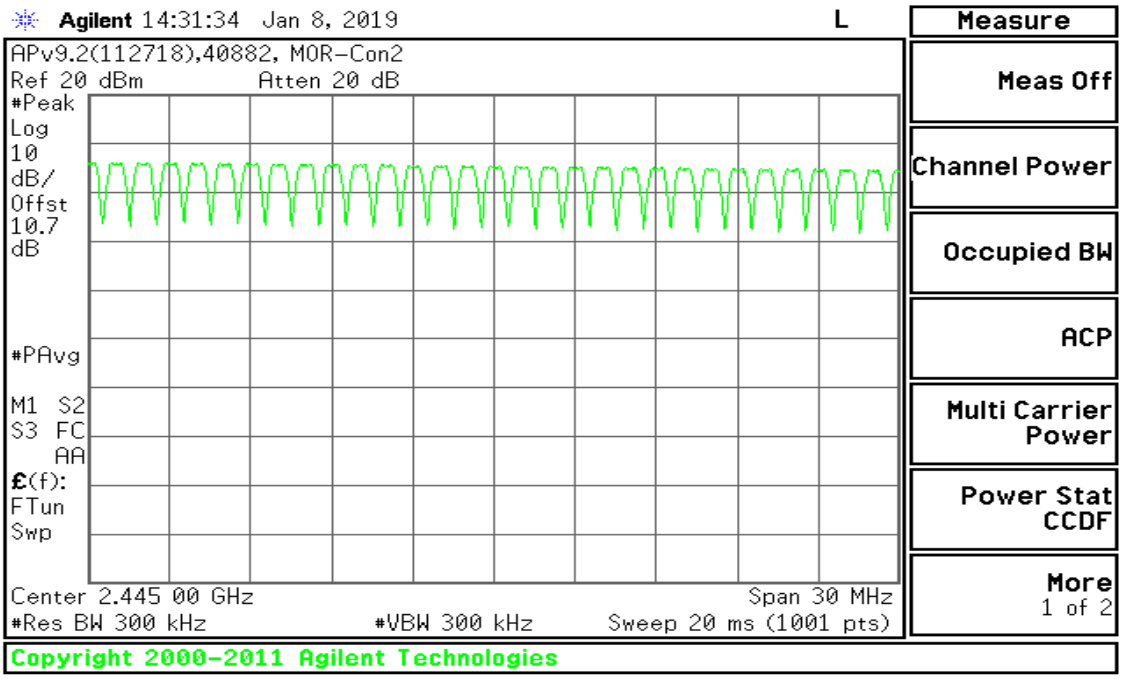
8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



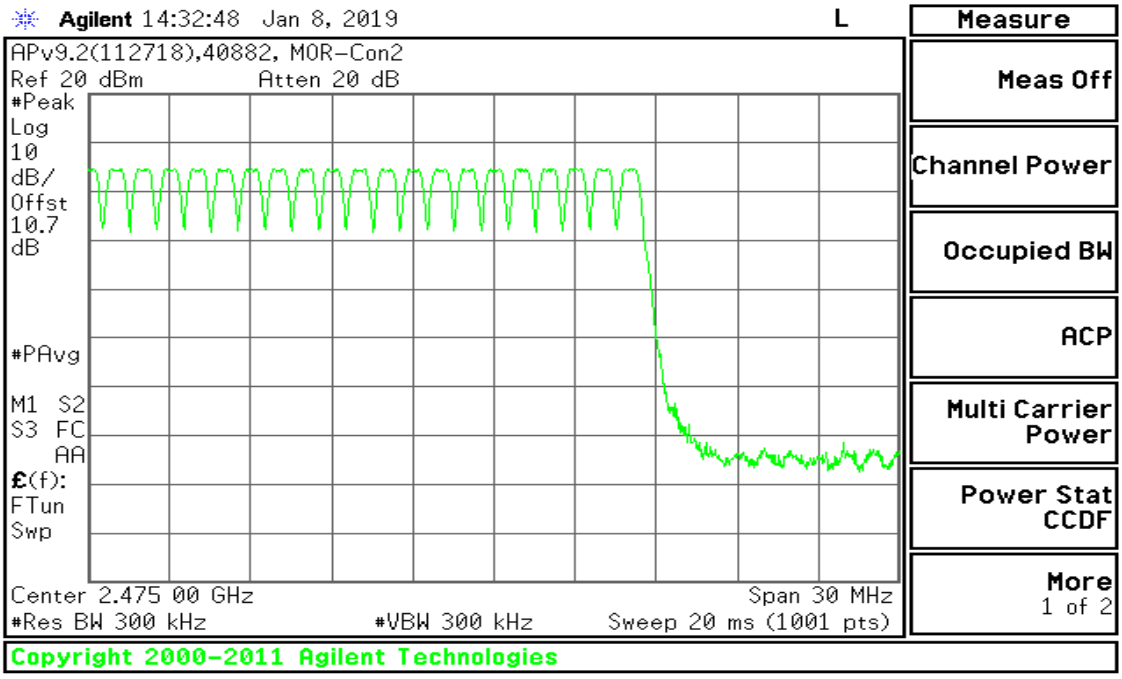
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

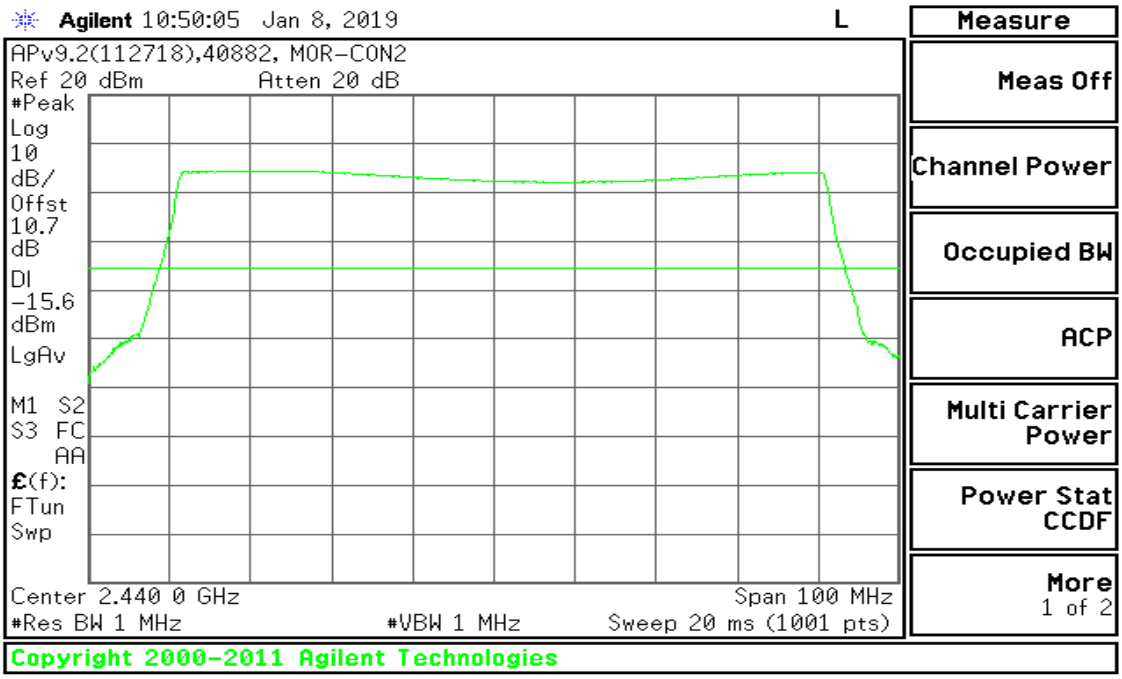


30MHz SPAN, SEGMENT 2 OF 3

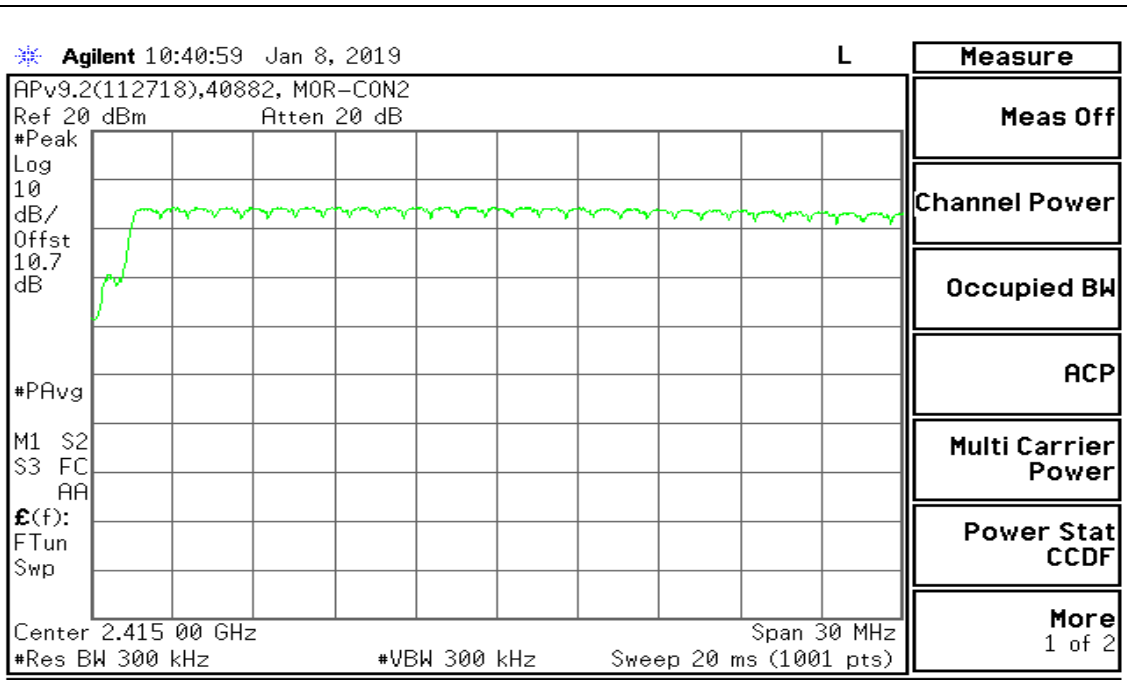


30MHz SPAN, SEGMENT 3 OF 3

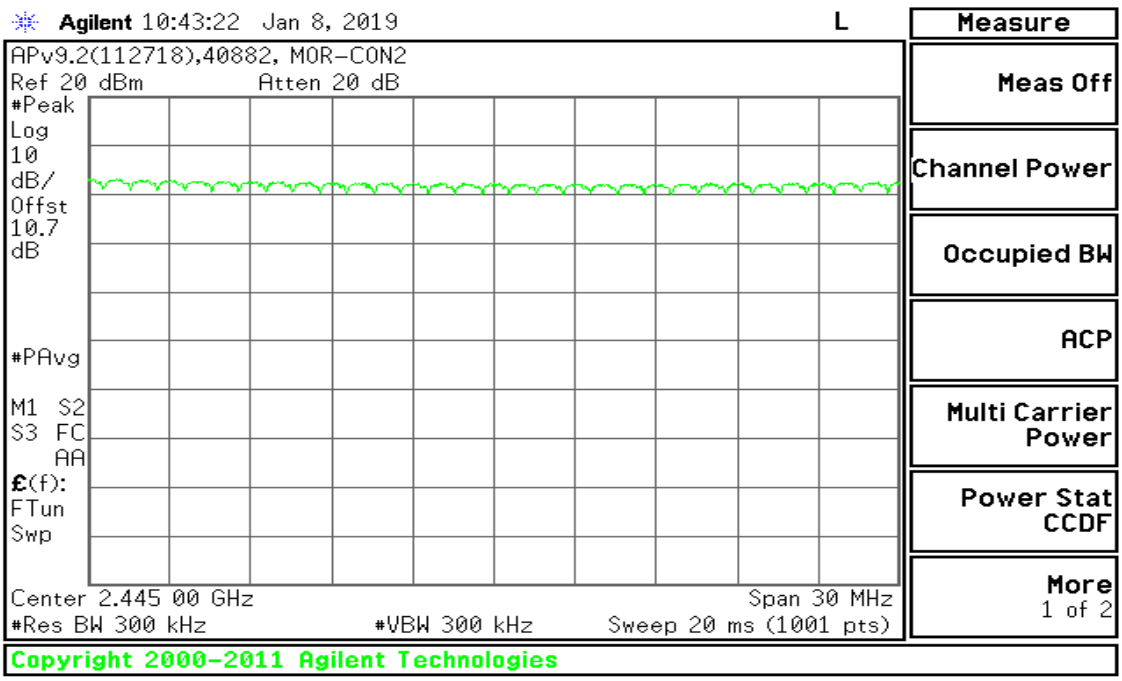
8.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



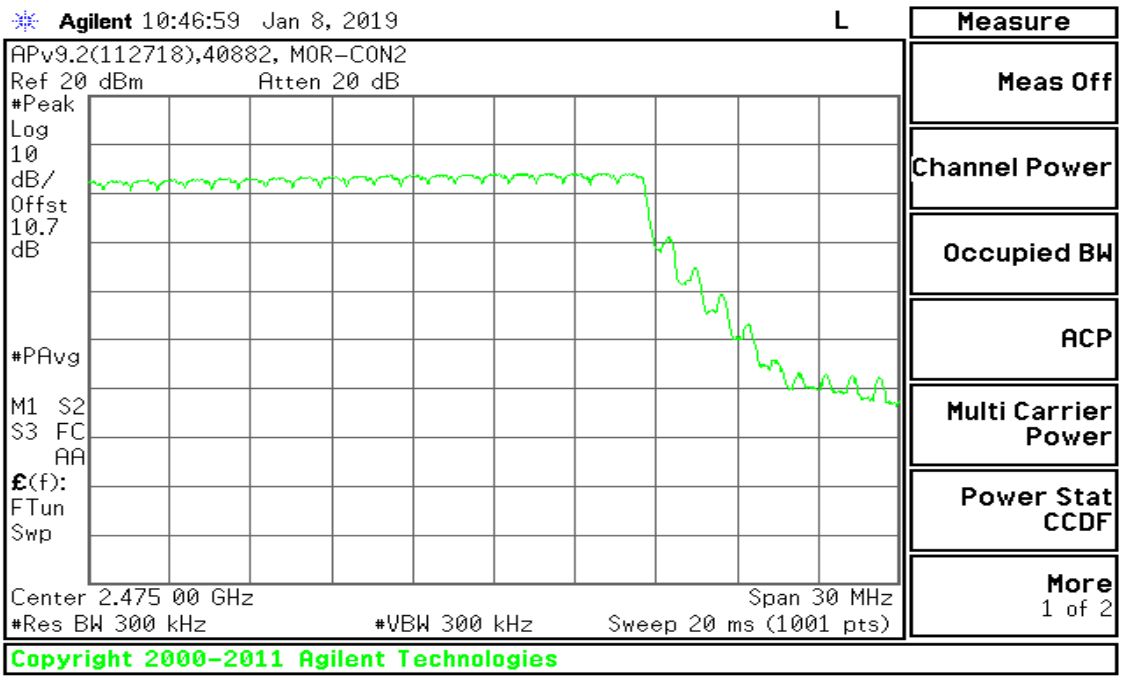
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

8.7. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

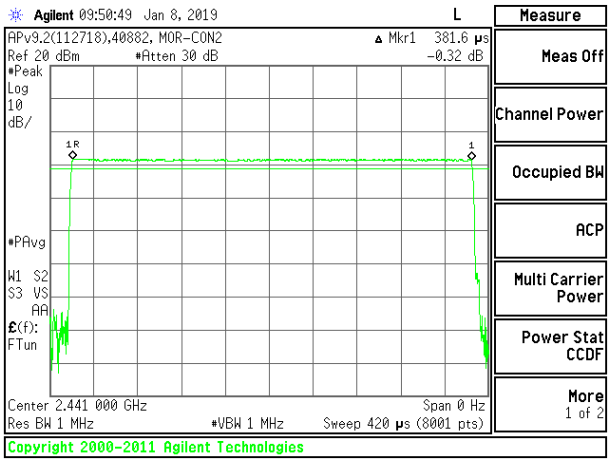
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

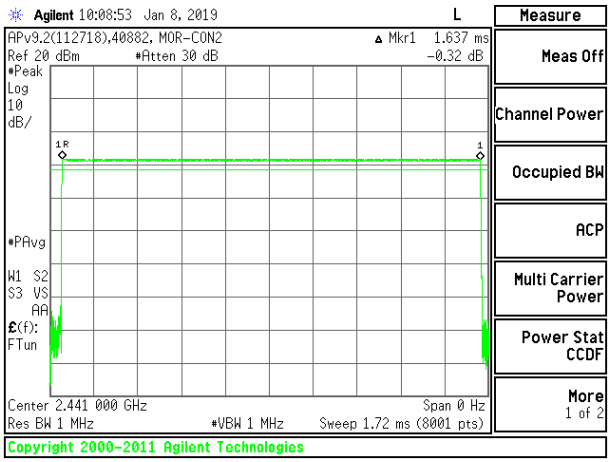
UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

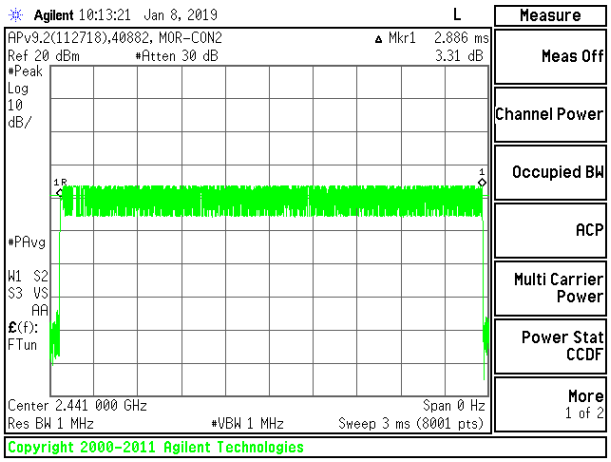
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.382	32	0.1222	0.4	-0.2778
DH3	1.637	16	0.2619	0.4	-0.1381
DH5	2.886	11	0.3175	0.4	-0.0825
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.382	8	0.03056	0.4	-0.3694
DH3	1.637	4	0.06548	0.4	-0.3345
DH5	2.886	2.75	0.07937	0.4	-0.3206



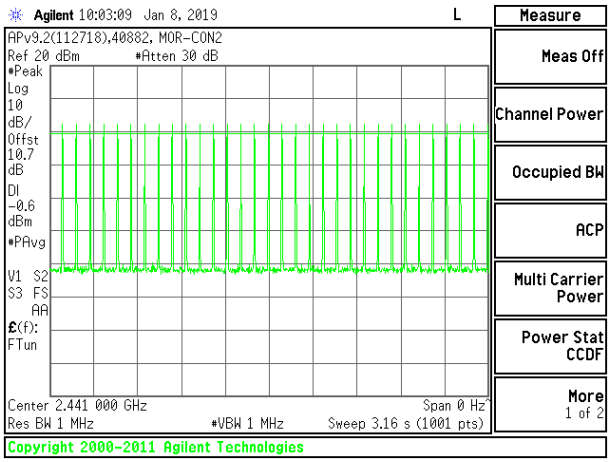
PULSE WIDTH – DH1



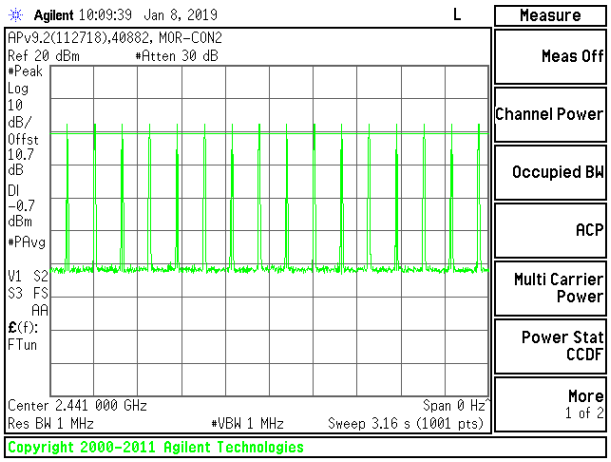
PULSE WIDTH – DH3



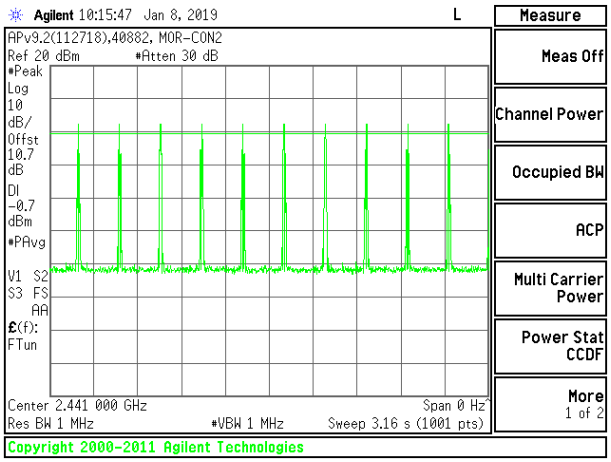
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

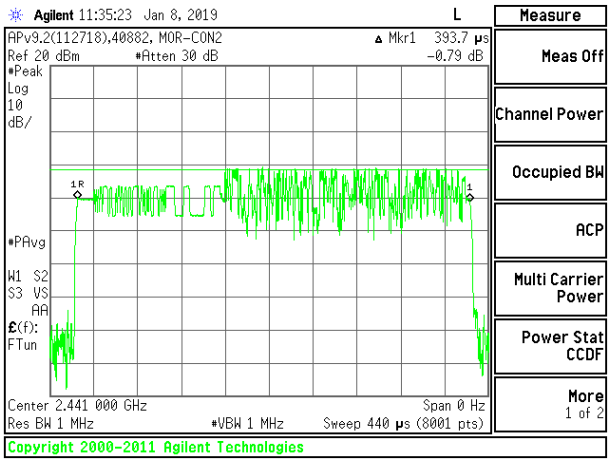


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

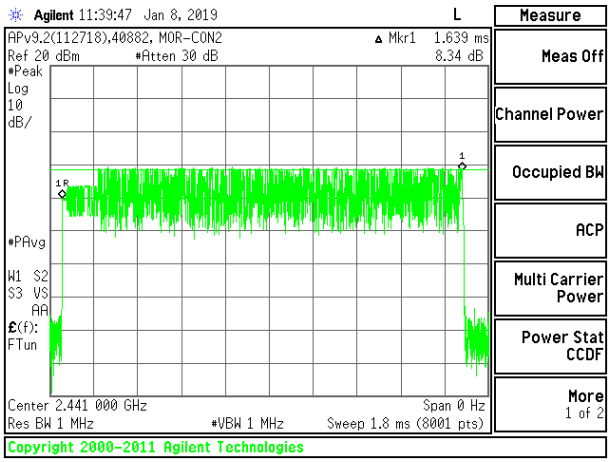
8.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.394	32	0.12608	0.4	-0.27392
3DH3	1.639	16	0.26224	0.4	-0.13776
3DH5	2.888	10	0.2888	0.4	-0.1112

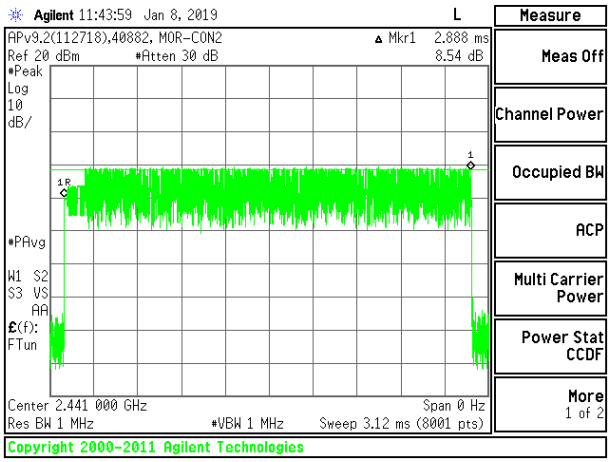
Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.



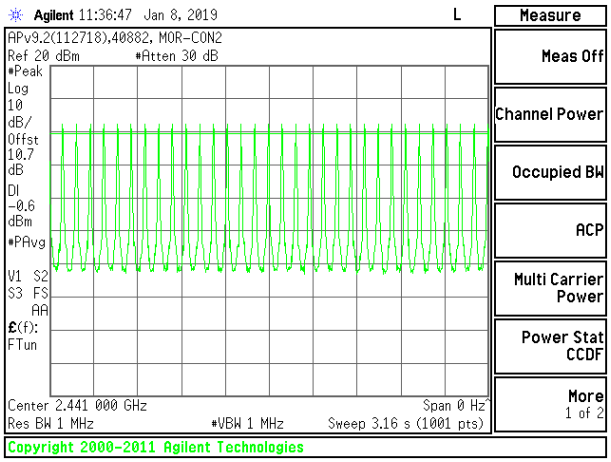
PULSE WIDTH – 3DH1



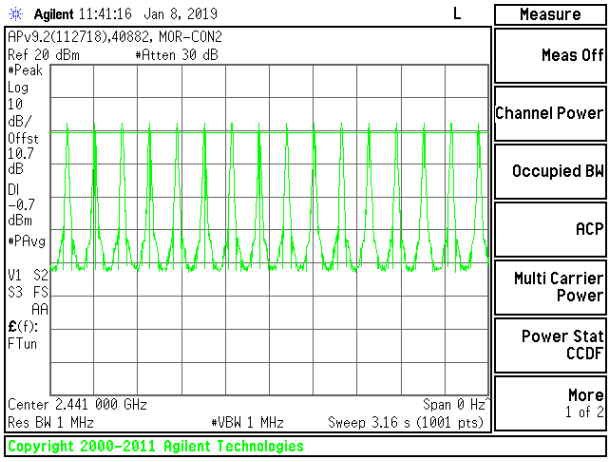
PULSE WIDTH – 3DH3



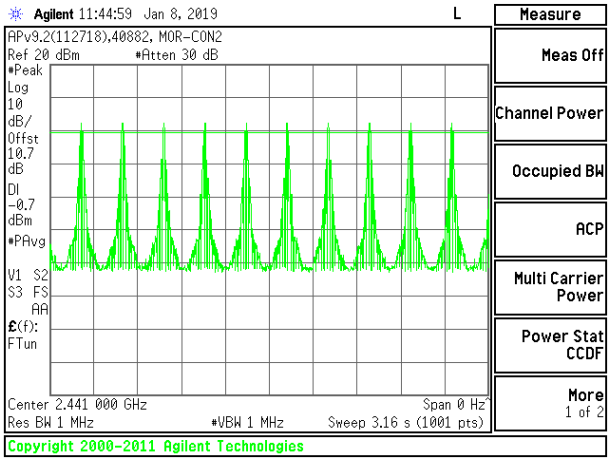
PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

IC RSS-247 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

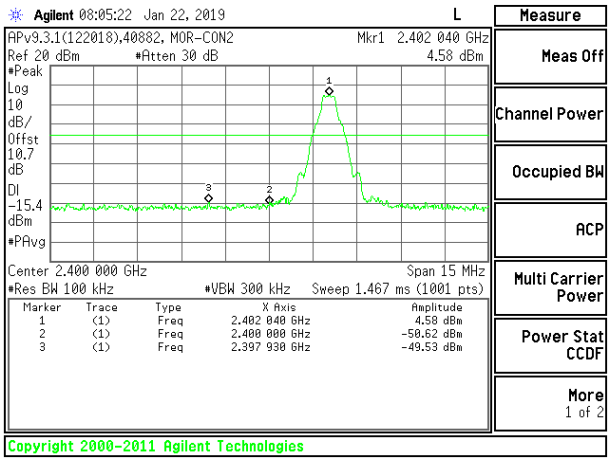
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

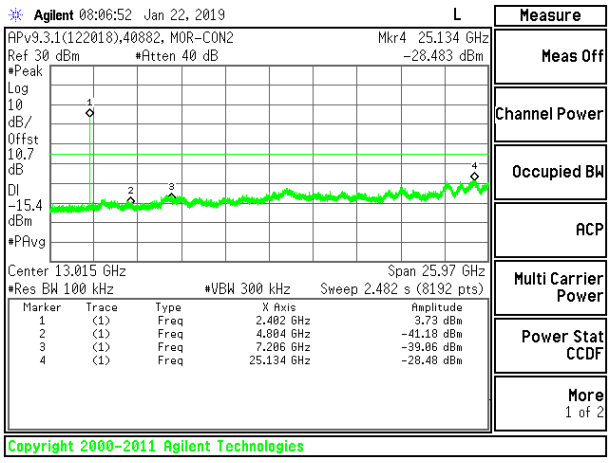
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

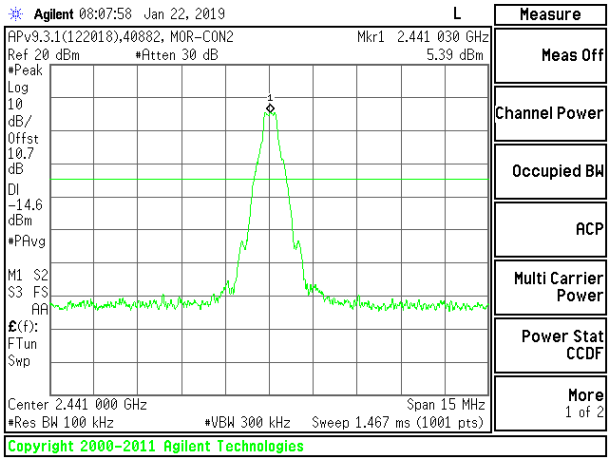
SPURIOUS EMISSIONS, NON-HOPPING



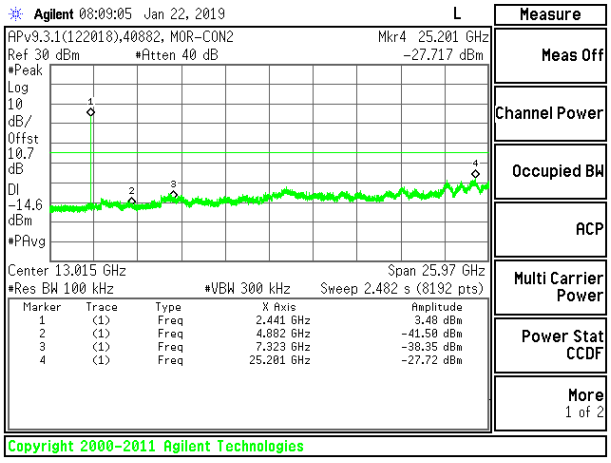
LOW CHANNEL BANDEDGE



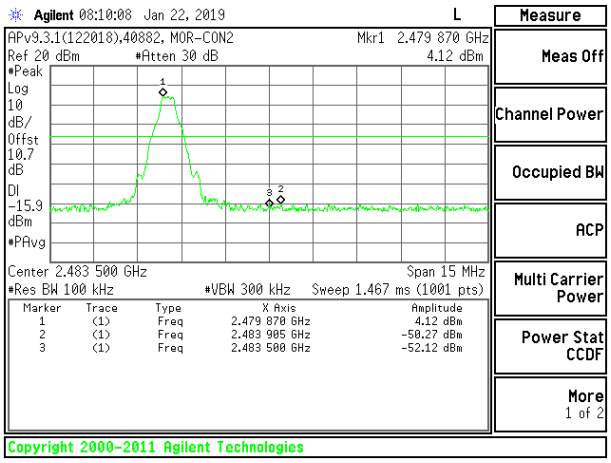
OUT-OF-BAND LOW CHANNEL



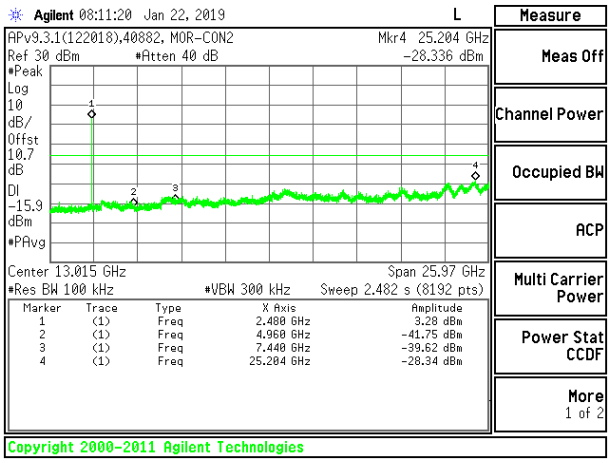
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

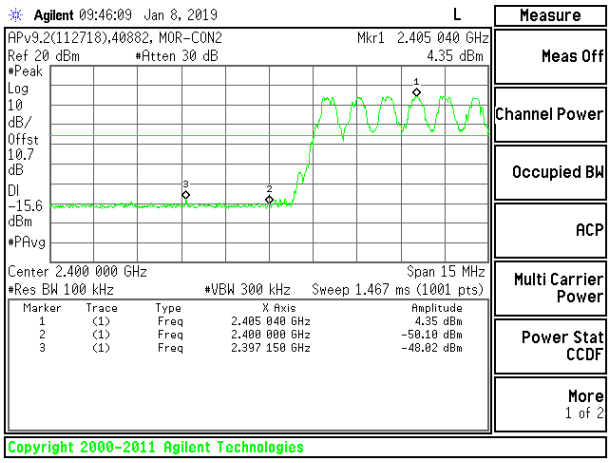


HIGH CHANNEL BANDEDGE

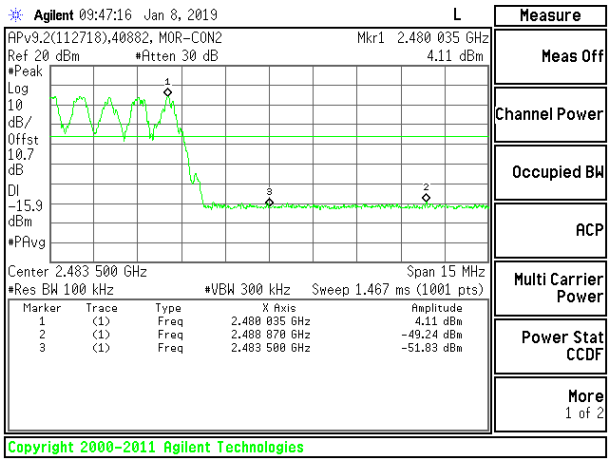


OUT-OF-BAND HIGH CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



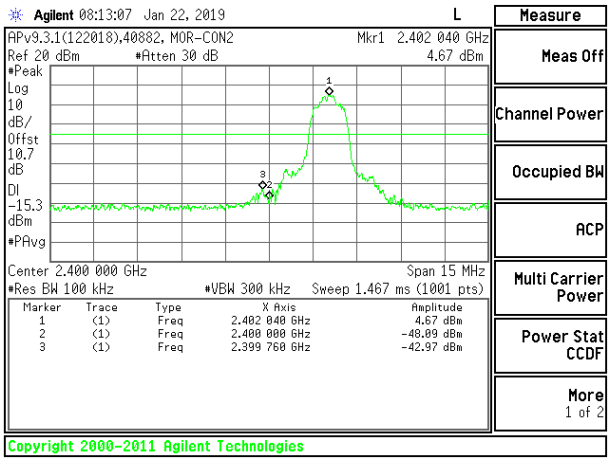
LOW BANDEDGE



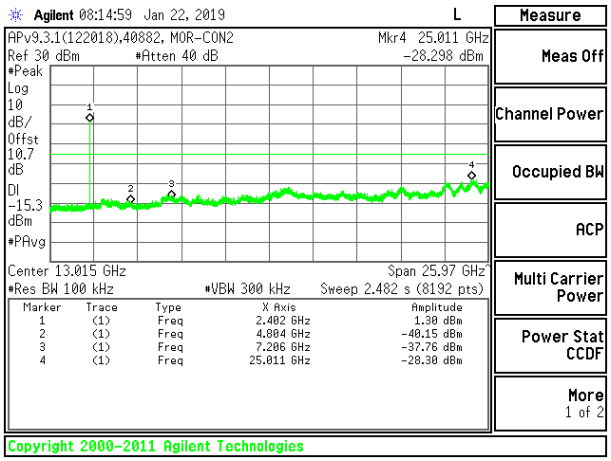
HIGH BANDEDGE

8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

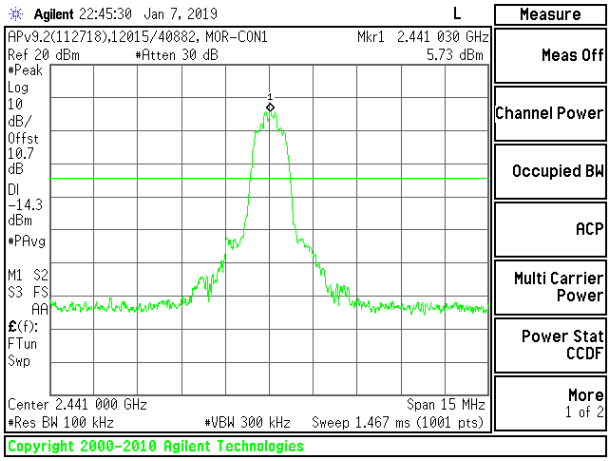
SPURIOUS EMISSIONS, NON-HOPPING



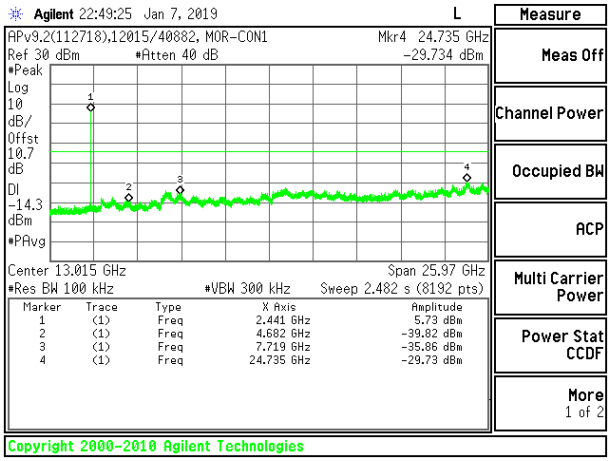
LOW CHANNEL BANDEDGE



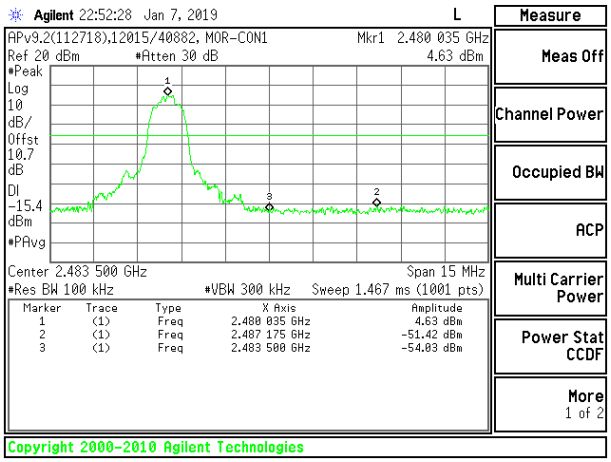
OUT-OF-BAND LOW CHANNEL



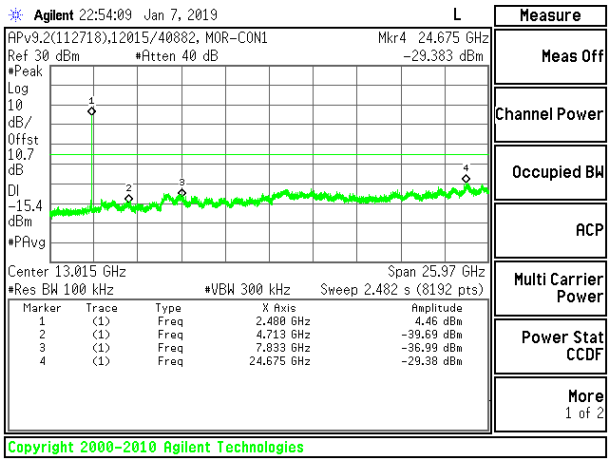
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

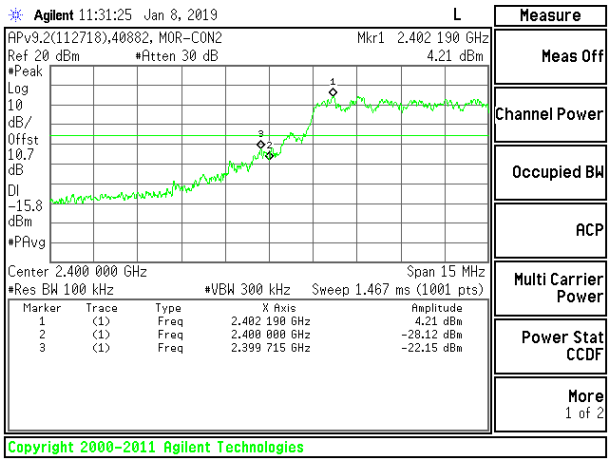


HIGH CHANNEL BANDEDGE

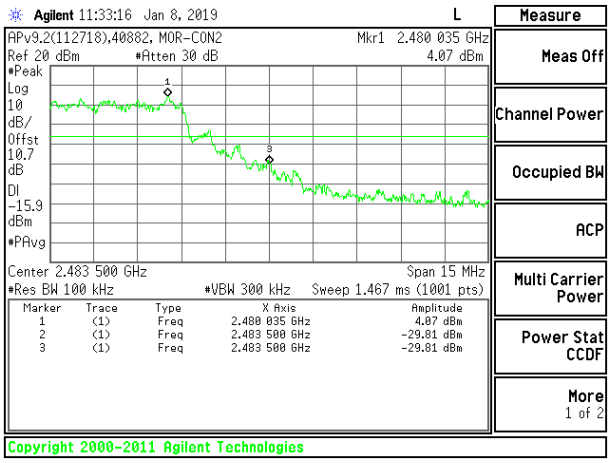


OUT-OF-BAND HIGH CHANNEL

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

9. RADIATED TEST RESULTS

LIMITS

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

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements. 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 V1TR, where VBW =1/ T_{on} and T_{on} is the on time.

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

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

KDB 414788 OATS and Chamber Correlation Justification

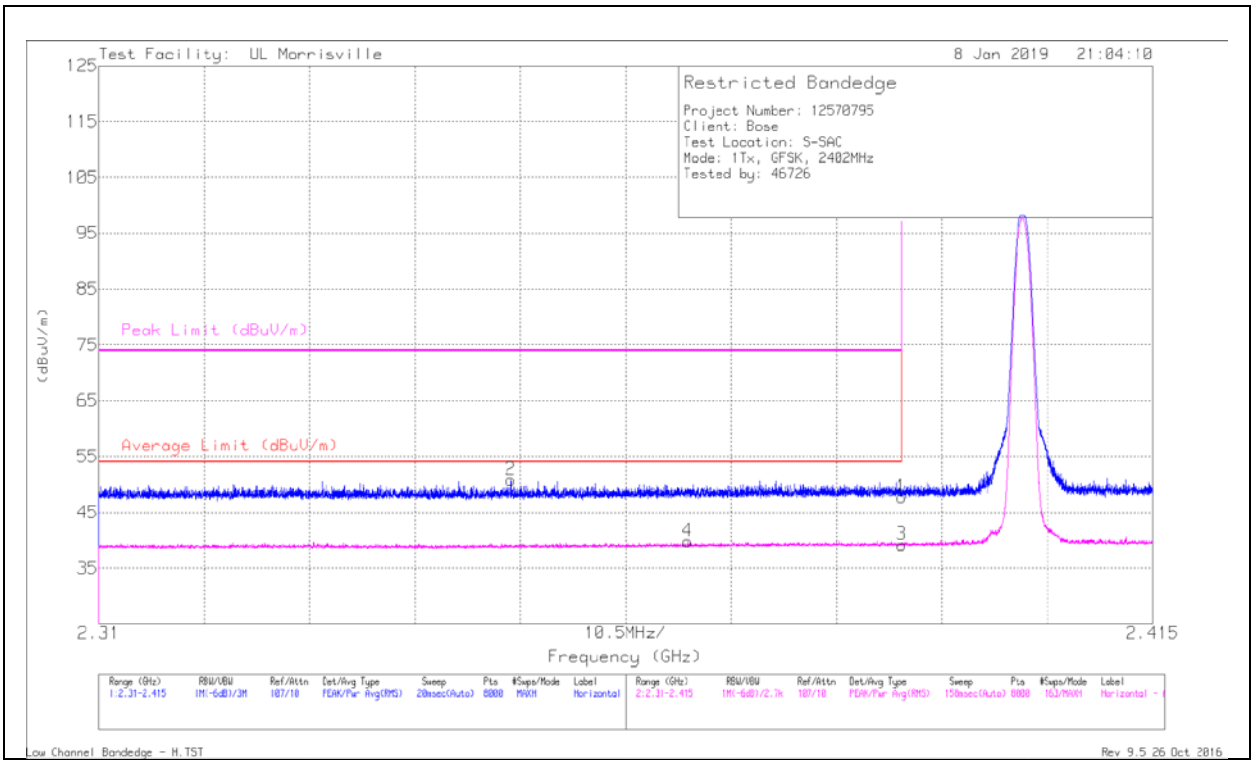
Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

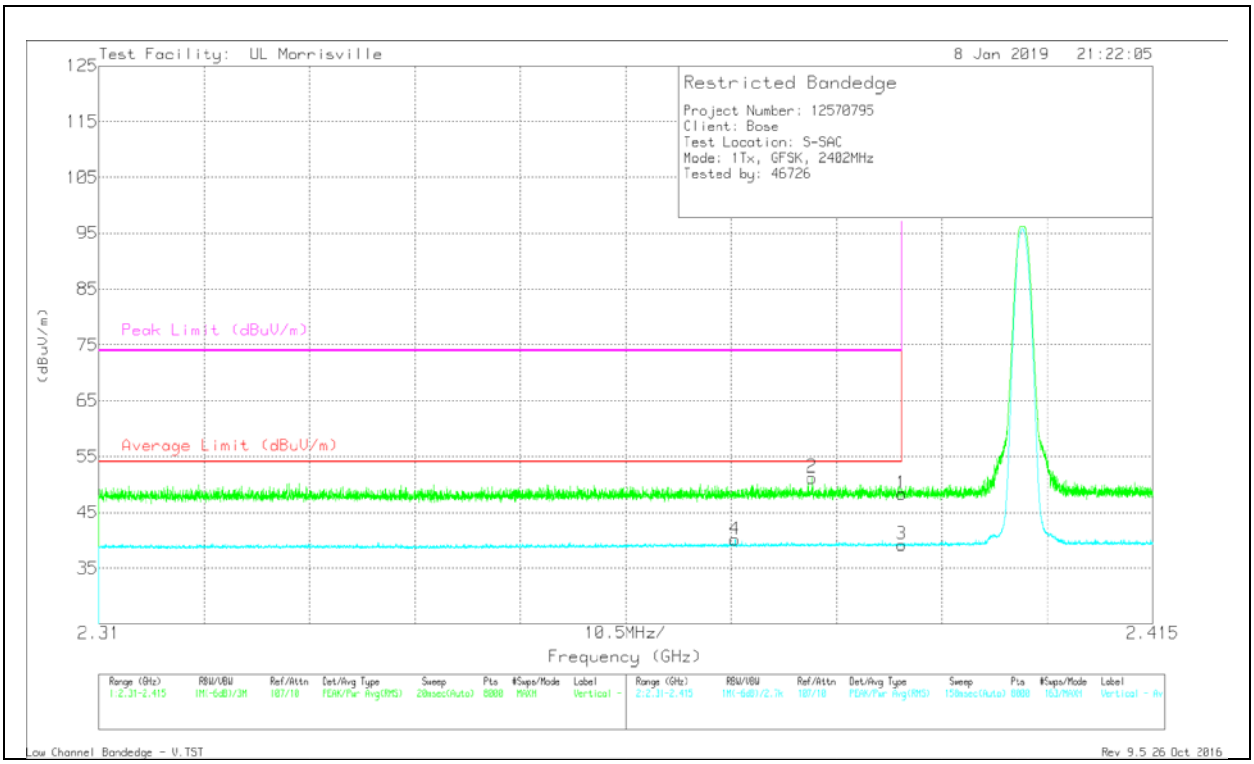
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	39.94	Pk	32	-24.2	47.74	-	-	74	-26.26	329	273	H
2	* ** 2.351	43.41	Pk	31.7	-24.3	50.81	-	-	74	-23.19	329	273	H
3	* ** 2.39	31.41	V1TR	32	-24.2	39.21	54	-14.79	-	-	329	273	H
4	* ** 2.369	32.32	V1TR	31.8	-24.3	39.82	54	-14.18	-	-	329	273	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

VERTICAL RESULT

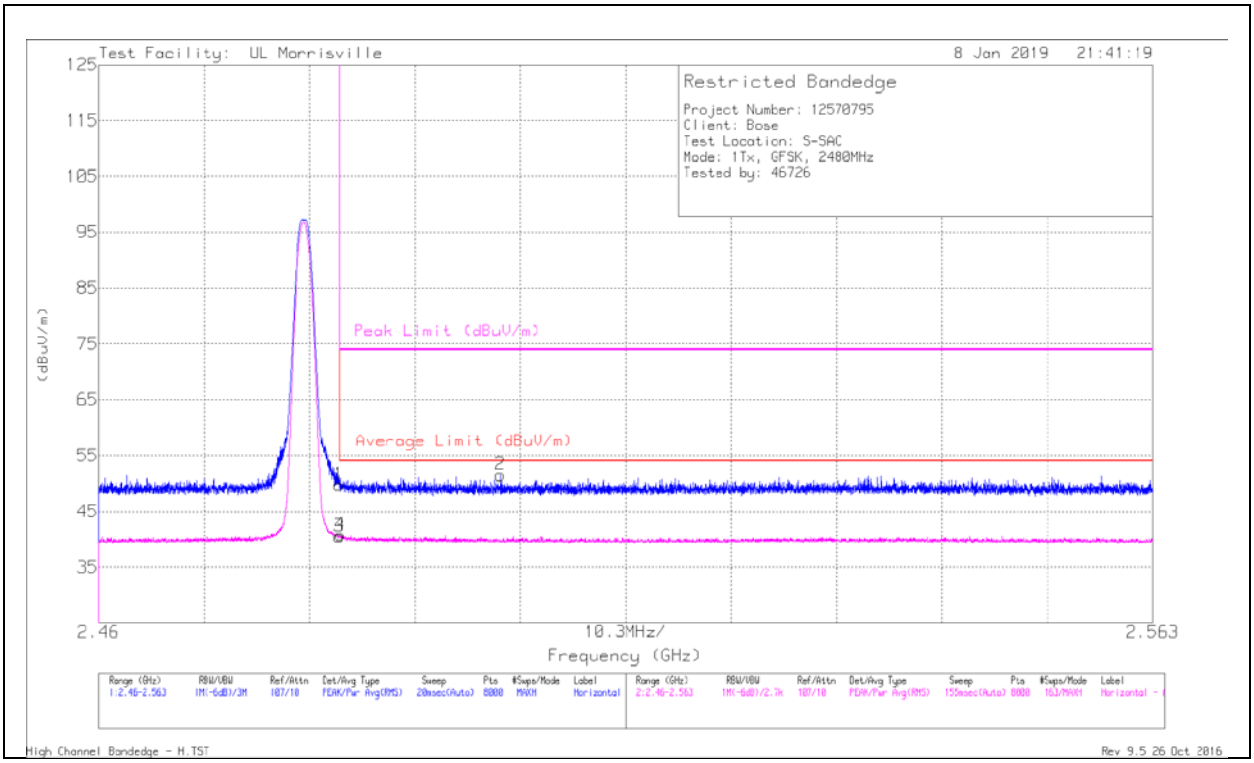


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	40.53	Pk	32	-24.2	48.33	-	-	74	-25.67	90	222	V
2	* ** 2.381	43.56	Pk	32	-24.3	51.26	-	-	74	-22.74	90	222	V
3	* ** 2.39	31.42	V1TR	32	-24.2	39.22	54	-14.78	-	-	90	222	V
4	* ** 2.373	32.5	V1TR	31.9	-24.3	40.1	54	-13.9	-	-	90	222	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

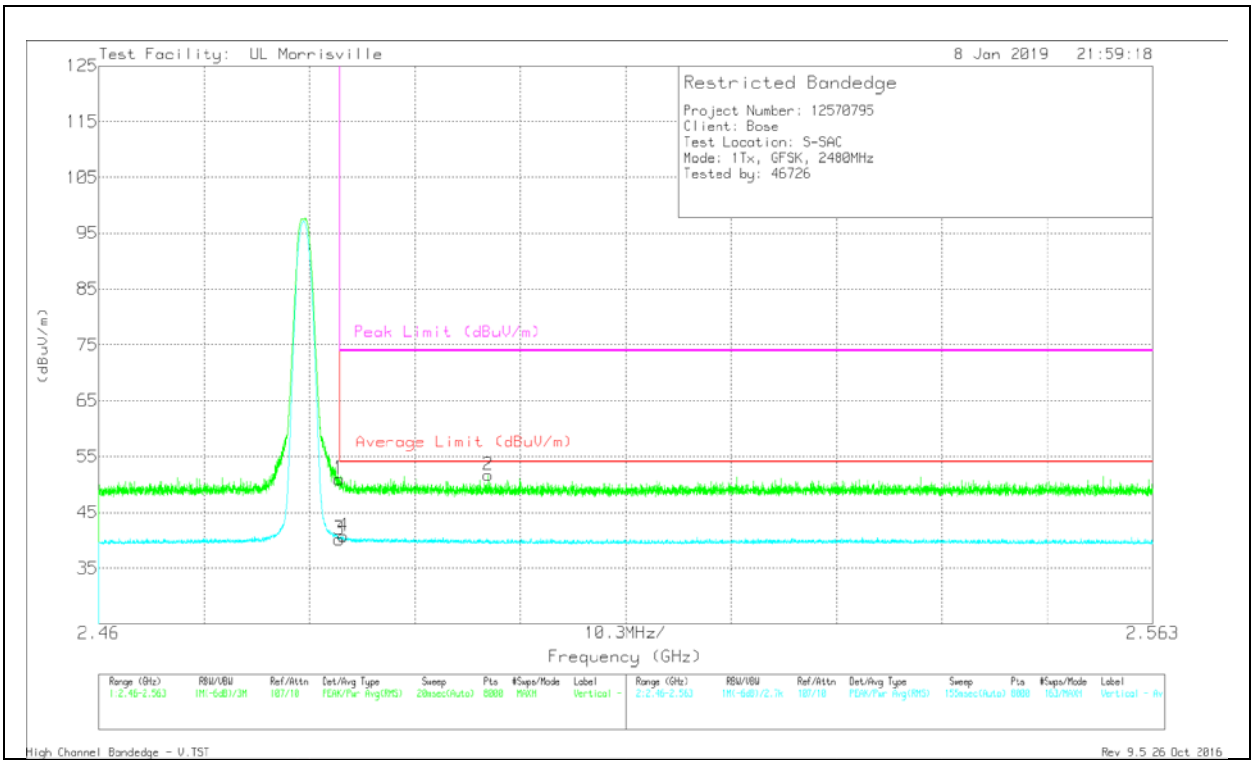
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (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	41.4	Pk	32.4	-24.1	49.7	-	-	74	-24.3	346	343	H
2	* ** 2.499	43.33	Pk	32.3	-24.1	51.53	-	-	74	-22.47	346	343	H
3	* ** 2.484	32.24	V1TR	32.4	-24.1	40.54	54	-13.46	-	-	346	343	H
4	* ** 2.484	32.45	V1TR	32.4	-24.1	40.75	54	-13.25	-	-	346	343	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

VERTICAL RESULT

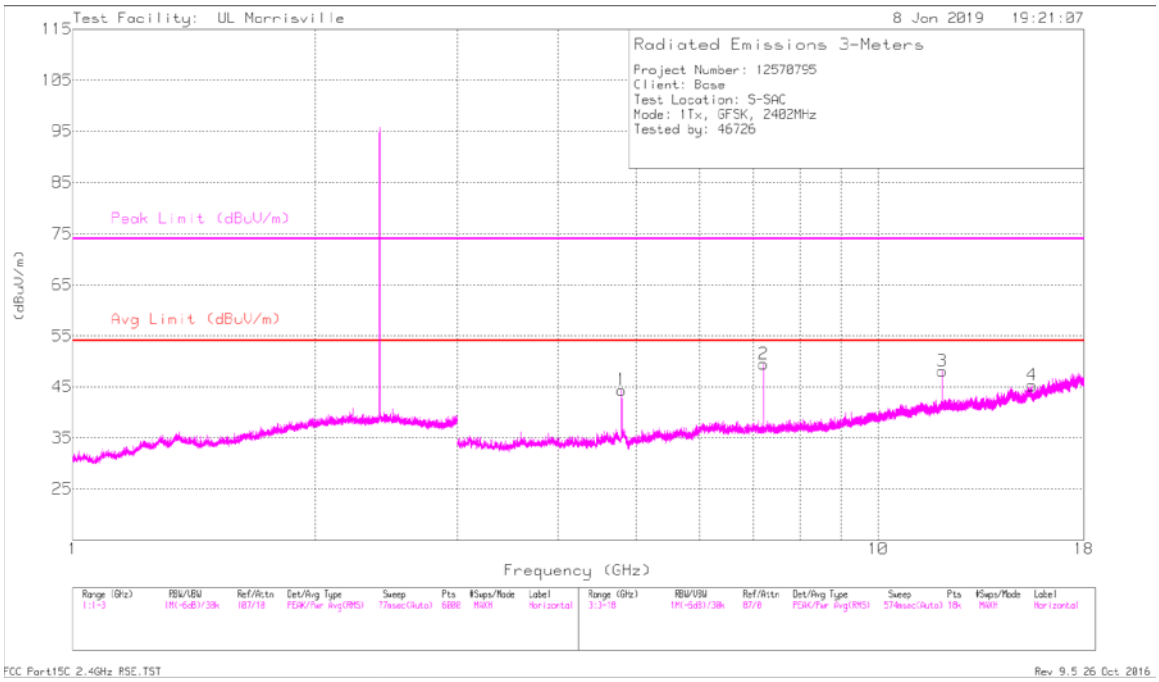


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.484	42.71	Pk	32.4	-24.1	51.01	-	-	74	-22.99	199	331	V
2	* ** 2.498	43.52	Pk	32.3	-24.1	51.72	-	-	74	-22.28	199	331	V
3	* ** 2.484	31.88	V1TR	32.4	-24.1	40.18	54	-13.82	-	-	199	331	V
4	* ** 2.484	32.43	V1TR	32.4	-24.1	40.73	54	-13.27	-	-	199	331	V

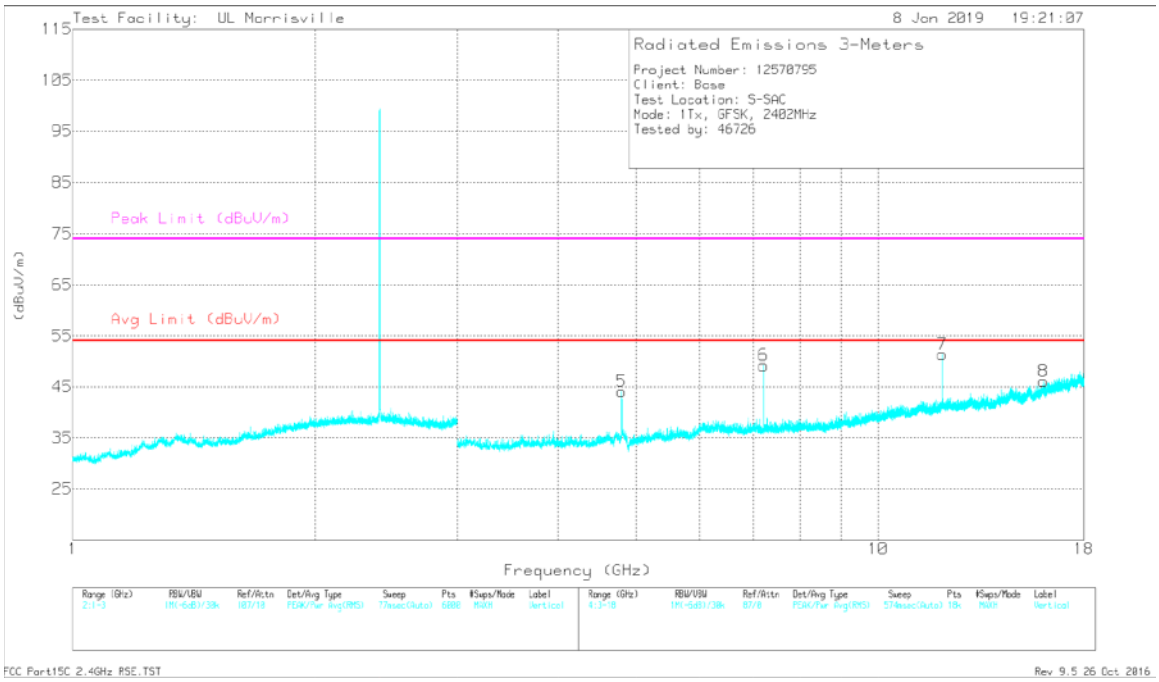
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.804	46.79	PK-U	34	-31.2	49.59	-	-	74	-24.41	57	103	H
	* ** 4.804	41.8	V1TR	34	-31.2	44.6	54	-9.4	-	-	57	103	H
3	* ** 12.011	39.4	PK-U	38.7	-24	54.1	-	-	74	-19.9	139	216	H
	* ** 12.011	32.03	V1TR	38.7	-24	46.73	54	-7.27	-	-	139	216	H
4	* ** 15.518	34.29	PK-U	40.1	-23.7	50.69	-	-	74	-23.31	178	368	H
	* ** 15.518	23.63	V1TR	40.1	-23.7	40.03	54	-13.97	-	-	178	368	H
5	* ** 4.804	47.48	PK-U	34	-31.2	50.28	-	-	74	-23.72	19	116	V
	* ** 4.804	42.04	V1TR	34	-31.2	44.84	54	-9.16	-	-	19	116	V
7	* ** 12.011	40.81	PK-U	38.7	-24	55.51	-	-	74	-18.49	162	106	V
	* ** 12.011	33.88	V1TR	38.7	-24	48.58	54	-5.42	-	-	162	106	V
8	* ** 16.043	35.84	PK-U	40.5	-23.8	52.54	-	-	74	-21.46	128	211	V
	* ** 16.043	24.77	V1TR	40.5	-23.8	41.47	54	-12.53	-	-	128	211	V
2	7.206	45	PK-U	35.5	-28.2	52.3	-	-	-	-	47	377	H
	7.206	39.21	V1TR	35.5	-28.2	46.51	-	-	-	-	47	377	H
6	7.206	44.87	PK-U	35.5	-28.2	52.17	-	-	-	-	253	263	V
	7.206	39.72	V1TR	35.5	-28.2	47.02	-	-	-	-	253	263	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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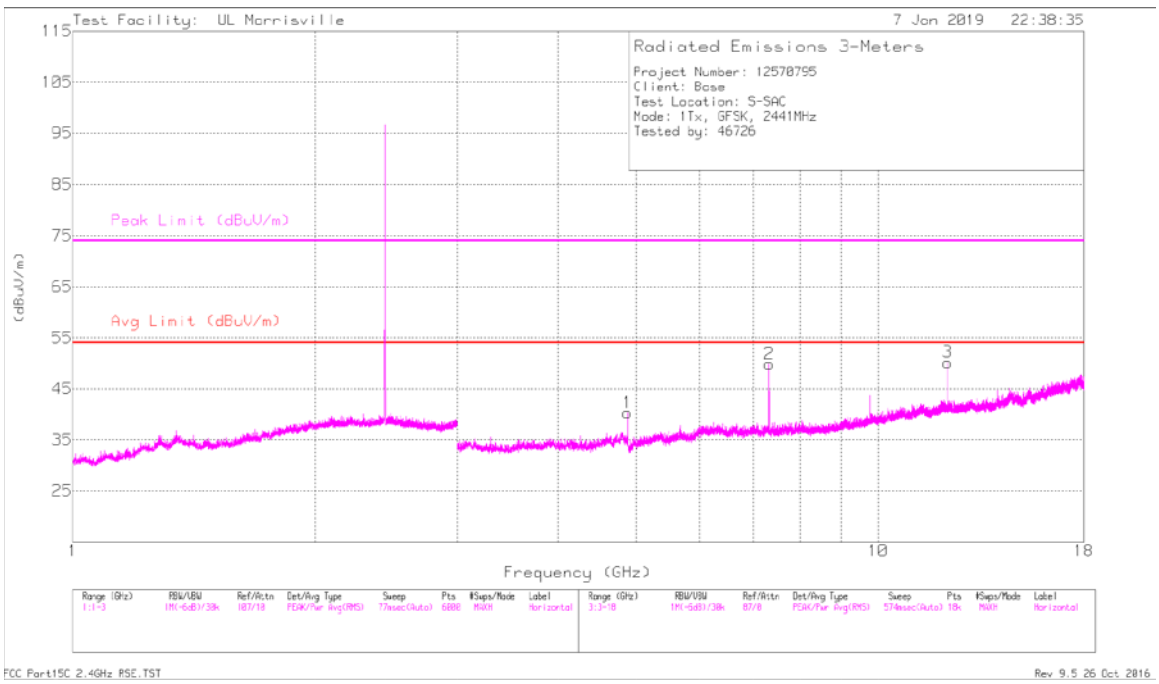
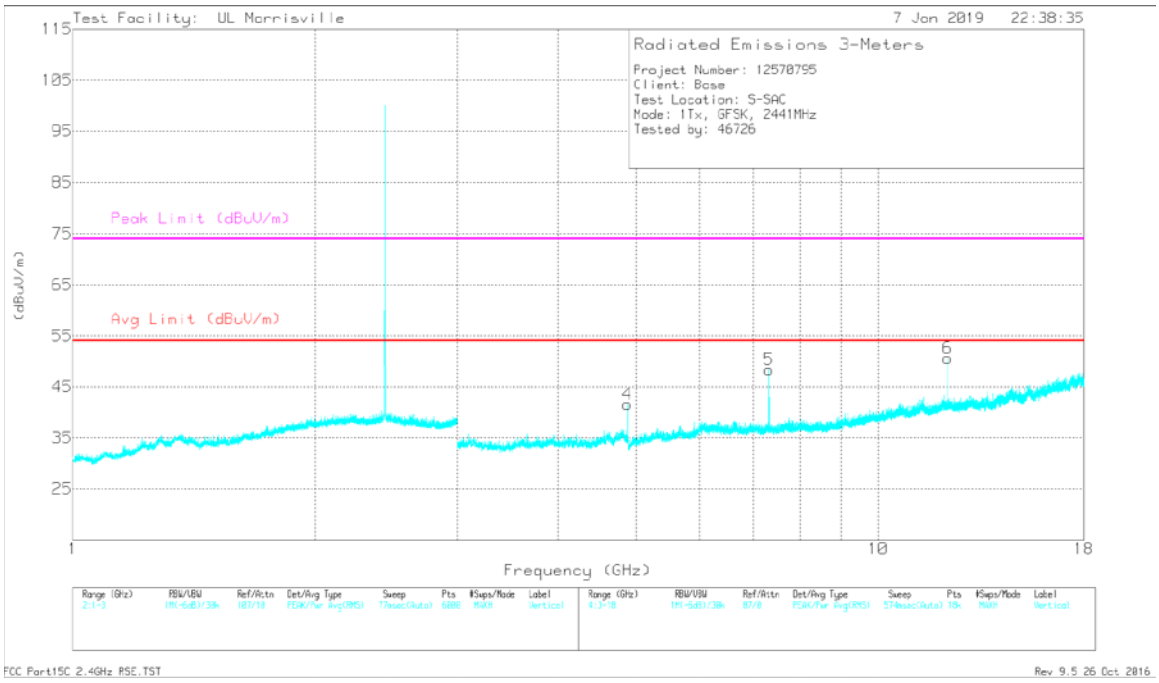
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.882	42.34	PK-U	34	-30.9	45.44	-	-	74	-28.56	52	108	H
	* ** 4.882	34.61	V1TR	34	-30.9	37.71	54	-16.29	-	-	52	108	H
2	* ** 7.323	45.69	PK-U	35.5	-27.6	53.59	-	-	74	-20.41	31	103	H
	* ** 7.323	40.5	V1TR	35.5	-27.6	48.4	54	-5.6	-	-	31	103	H
3	* ** 12.205	39.87	PK-U	38.8	-24.2	54.47	-	-	74	-19.53	158	102	H
	* ** 12.205	30.58	V1TR	38.8	-24.2	45.18	54	-8.82	-	-	158	102	H
4	* ** 4.882	42.81	PK-U	34	-30.9	45.91	-	-	74	-28.09	15	101	V
	* ** 4.882	36.31	V1TR	34	-30.9	39.41	54	-14.59	-	-	15	101	V
5	* ** 7.323	45.14	PK-U	35.5	-27.6	53.04	-	-	74	-20.96	254	106	V
	* ** 7.323	40.09	V1TR	35.5	-27.6	47.99	54	-6.01	-	-	254	106	V
6	* ** 12.204	42.39	PK-U	38.8	-24.2	56.99	-	-	74	-17.01	80	116	V
	* ** 12.204	36.63	V1TR	38.8	-24.2	51.23	54	-2.77	-	-	80	116	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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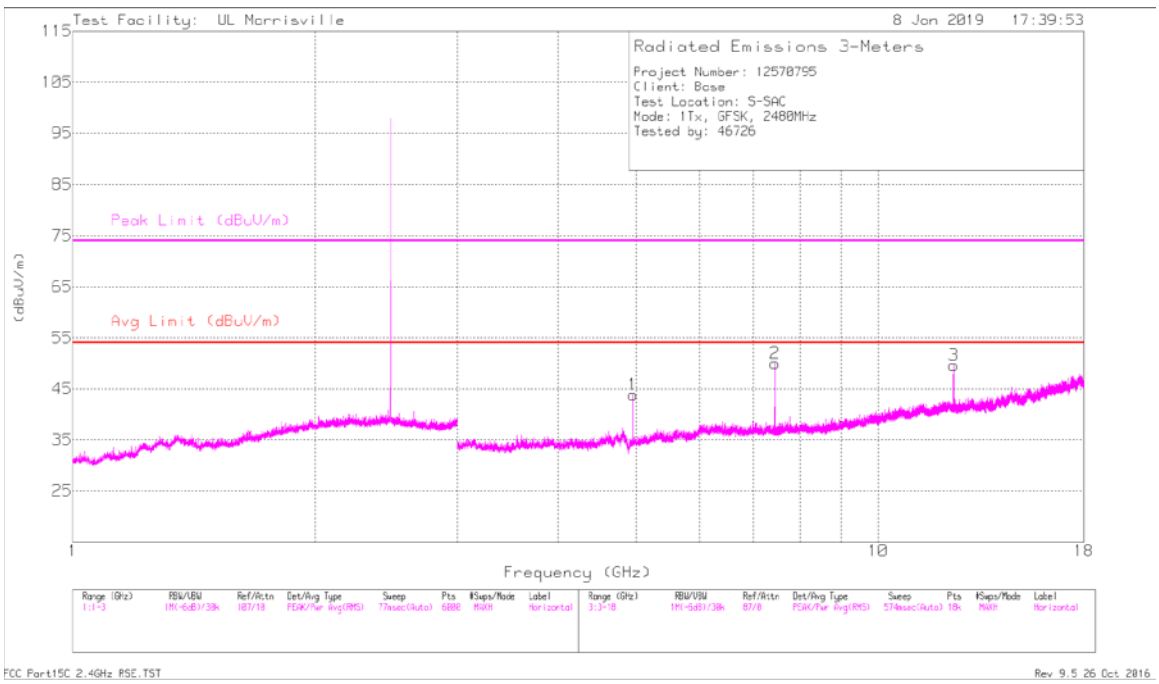
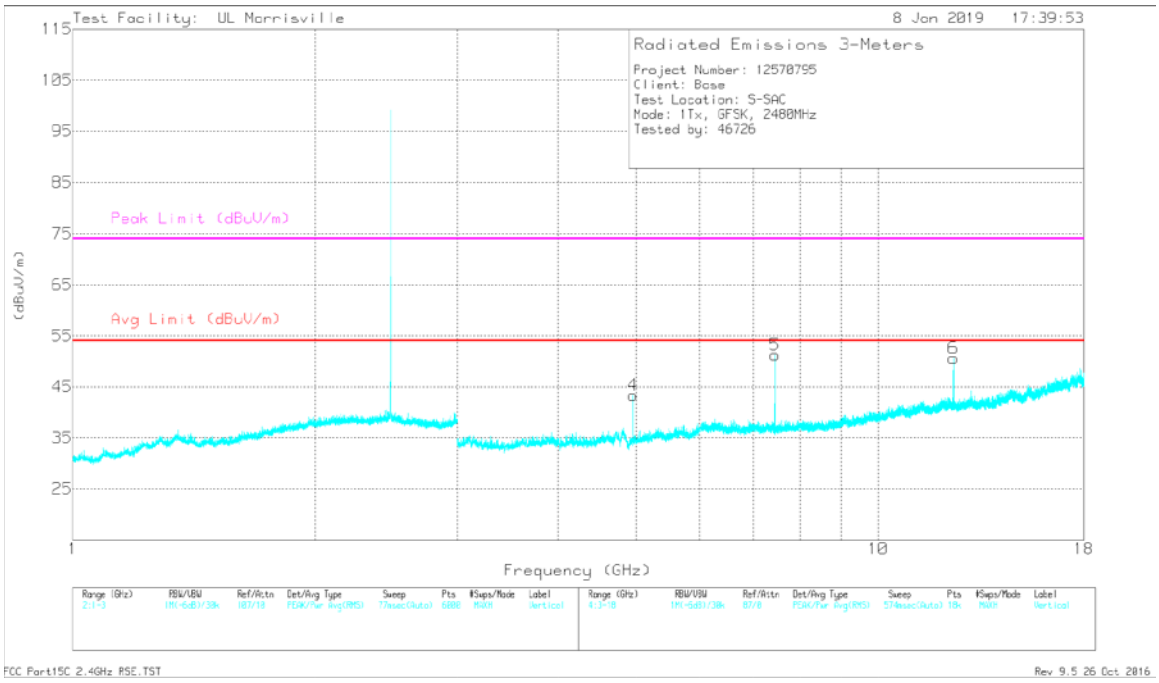
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.96	44.17	PK-U	34	-31.1	47.07	-	-	74	-26.93	76	101	H
	* ** 4.96	39.12	V1TR	34	-31.1	42.02	54	-11.98	-	-	76	101	H
2	* ** 7.44	45.46	PK-U	35.5	-27.9	53.06	-	-	74	-20.94	53	103	H
	* ** 7.44	40.41	V1TR	35.5	-27.9	48.01	54	-5.99	-	-	53	103	H
3	* ** 12.401	40.47	PK-U	38.8	-24.2	55.07	-	-	74	-18.93	165	107	H
	* ** 12.401	32.66	V1TR	38.8	-24.2	47.26	54	-6.74	-	-	165	107	H
4	* ** 4.96	43.55	PK-U	34	-31.1	46.45	-	-	74	-27.55	16	109	V
	* ** 4.96	37.42	V1TR	34	-31.1	40.32	54	-13.68	-	-	16	109	V
5	* ** 7.44	47.18	PK-U	35.5	-27.9	54.78	-	-	74	-19.22	140	105	V
	* ** 7.44	42.51	V1TR	35.5	-27.9	50.11	54	-3.89	-	-	140	105	V
6	* ** 12.4	42.1	PK-U	38.8	-24.2	56.7	-	-	74	-17.3	88	212	V
	* ** 12.4	33.7	V1TR	38.8	-24.2	48.3	54	-5.7	-	-	88	212	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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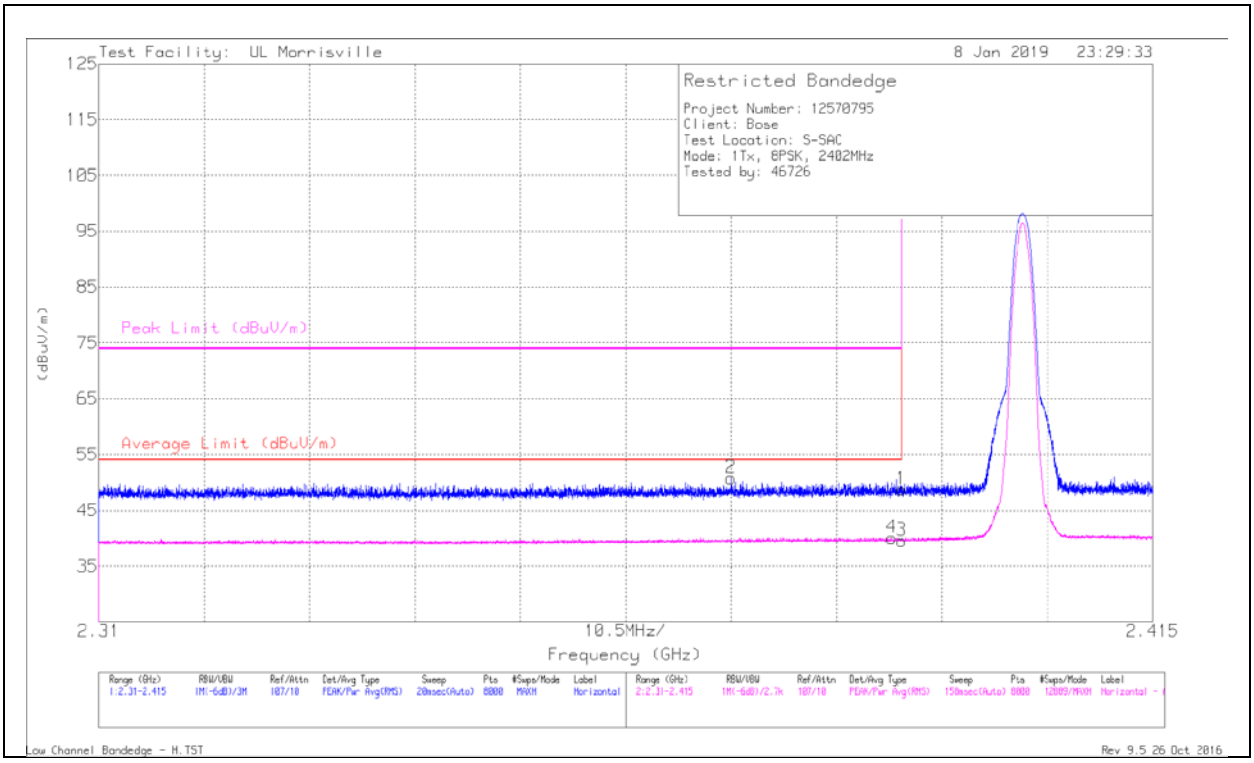
9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

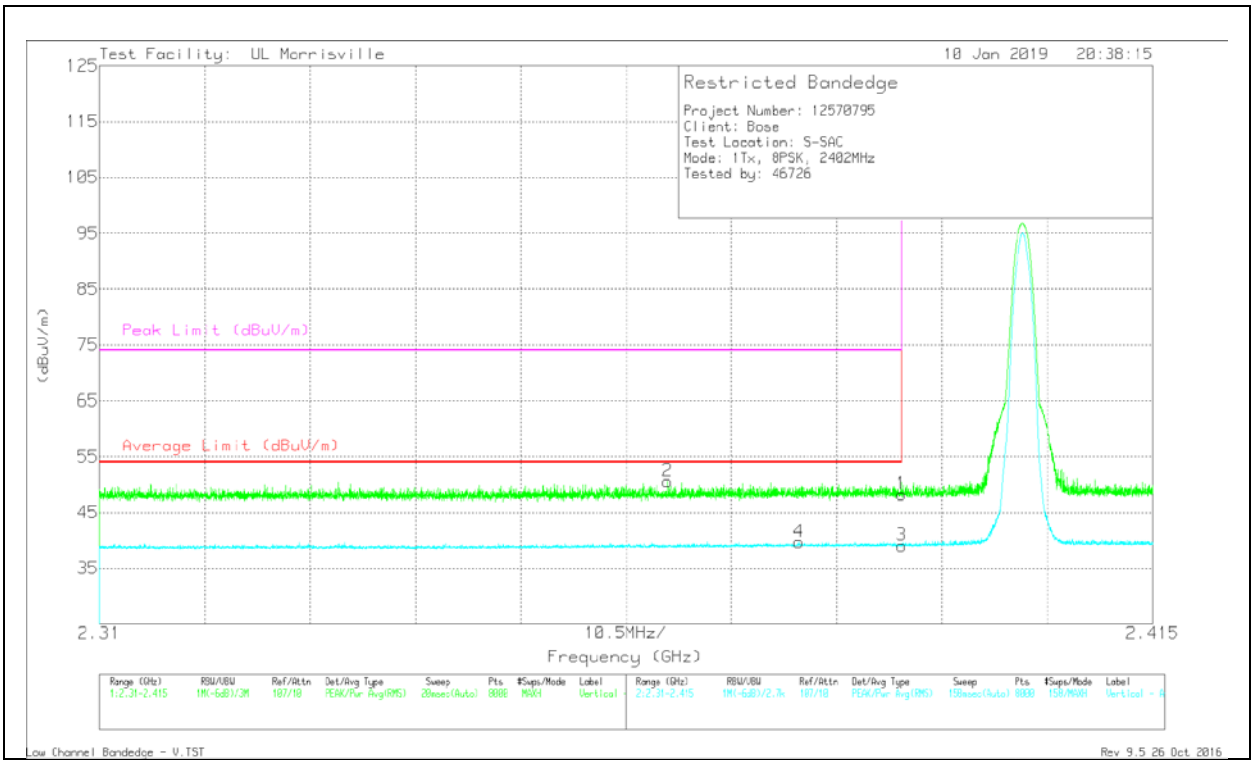
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	40.99	Pk	32	-24.2	48.79	-	-	74	-25.21	324	353	H
2	* ** 2.373	43.18	Pk	31.9	-24.3	50.78	-	-	74	-23.22	324	353	H
3	* ** 2.39	31.77	V1TR	32	-24.2	39.57	54	-14.43	-	-	324	353	H
4	* ** 2.389	32.28	V1TR	32	-24.2	40.08	54	-13.92	-	-	324	353	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

VERTICAL RESULT

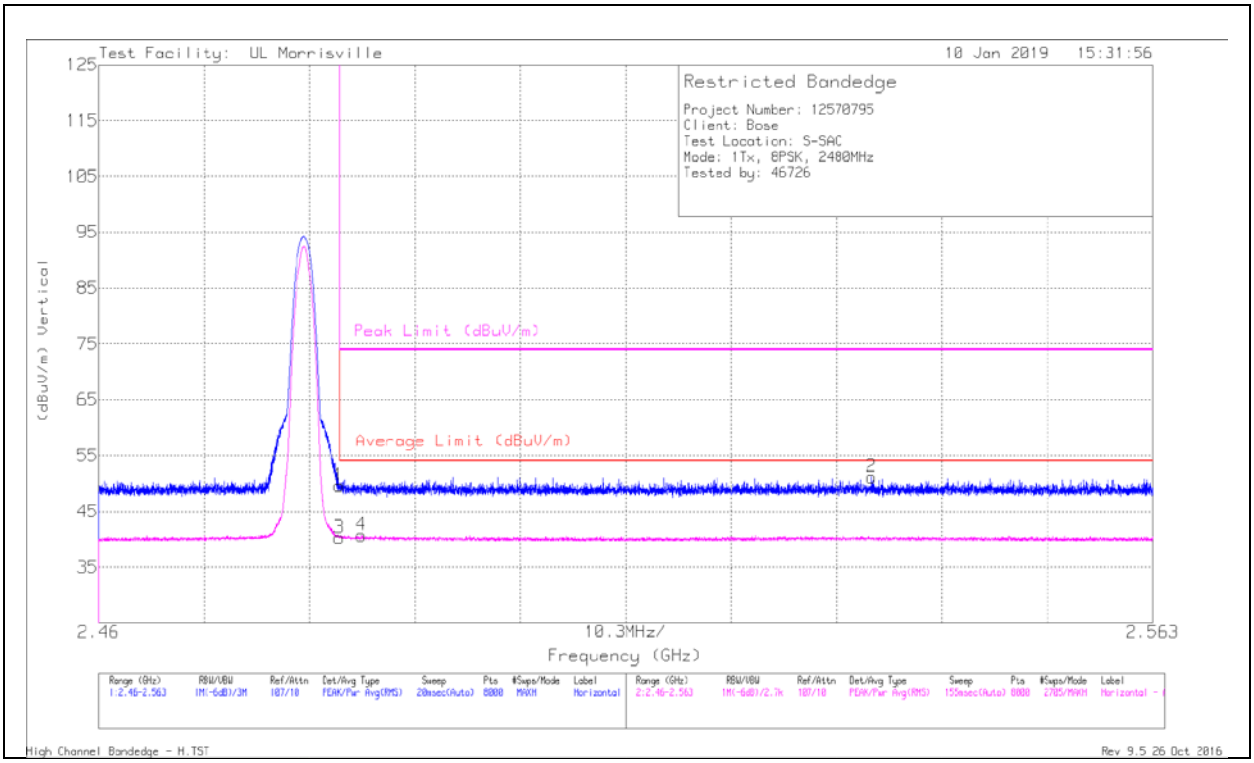


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	40.42	Pk	32	-24.2	48.22	-	-	74	-25.78	325	107	V
2	* ** 2.367	43.07	Pk	31.8	-24.3	50.57	-	-	74	-23.43	325	107	V
3	* ** 2.39	31.24	V1TR	32	-24.2	39.04	54	-14.96	-	-	325	107	V
4	* ** 2.38	31.98	V1TR	32	-24.3	39.68	54	-14.32	-	-	325	107	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (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	41.33	Pk	32.4	-24.1	49.63	-	-	74	-24.37	70	106	H
3	* ** 2.484	31.95	V1TR	32.4	-24.1	40.25	54	-13.75	-	-	70	106	H
4	* ** 2.486	32.4	V1TR	32.4	-24.1	40.7	54	-13.3	-	-	70	106	H
2	2.536	42.85	Pk	32.4	-24.1	51.15	-	-	74	-22.85	70	106	H

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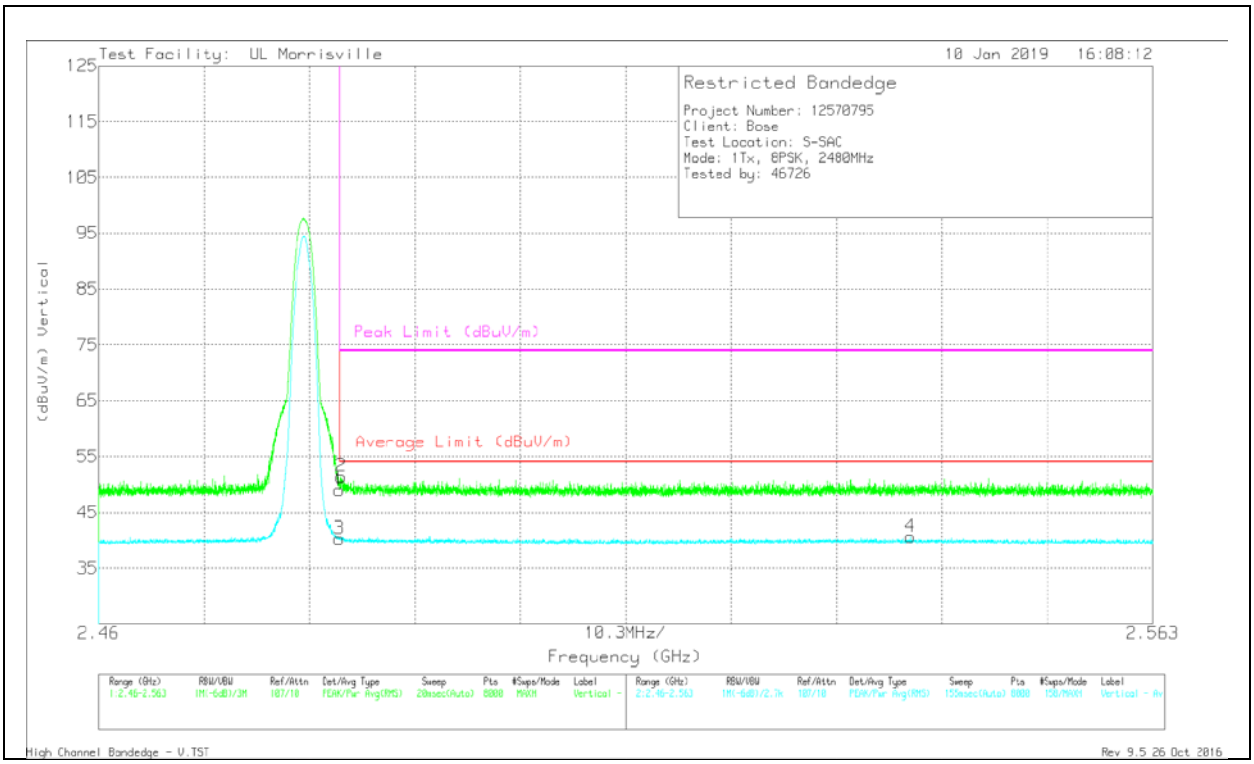
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (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	40.66	Pk	32.4	-24.1	48.96	-	-	74	-25.04	285	110	V
2	* ** 2.484	43.1	Pk	32.4	-24.1	51.4	-	-	74	-22.6	285	110	V
3	* ** 2.484	31.94	V1TR	32.4	-24.1	40.24	54	-13.76	-	-	285	110	V
4	2.539	32.36	V1TR	32.4	-24.1	40.66	54	-13.34	-	-	285	110	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
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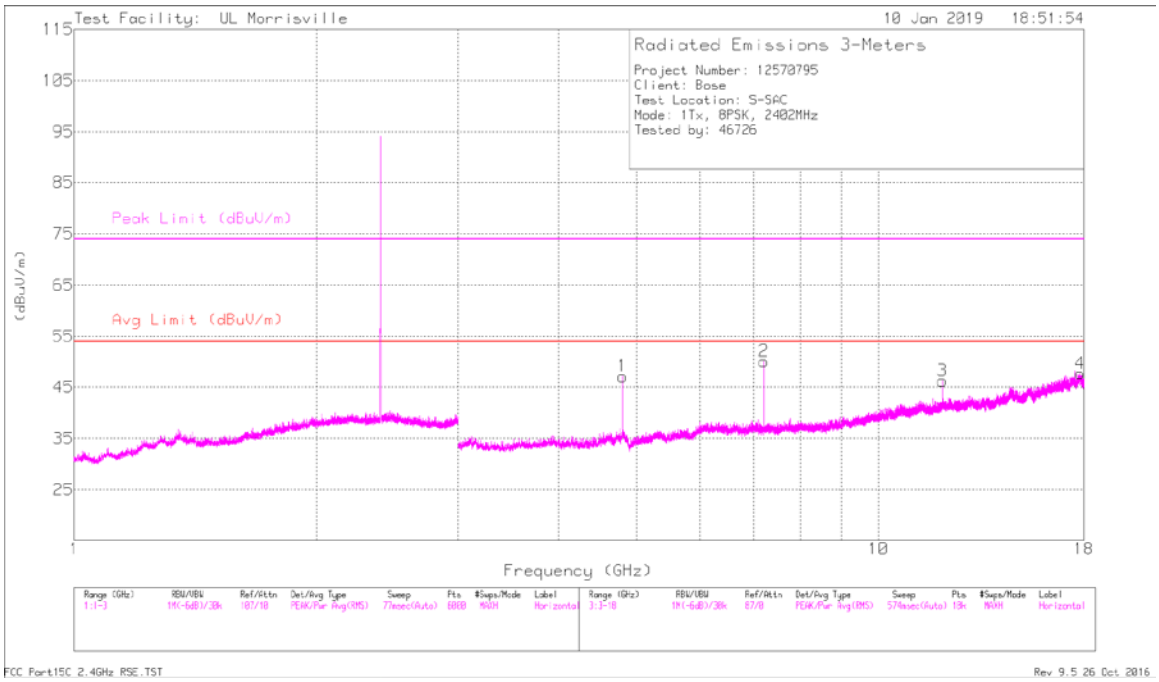
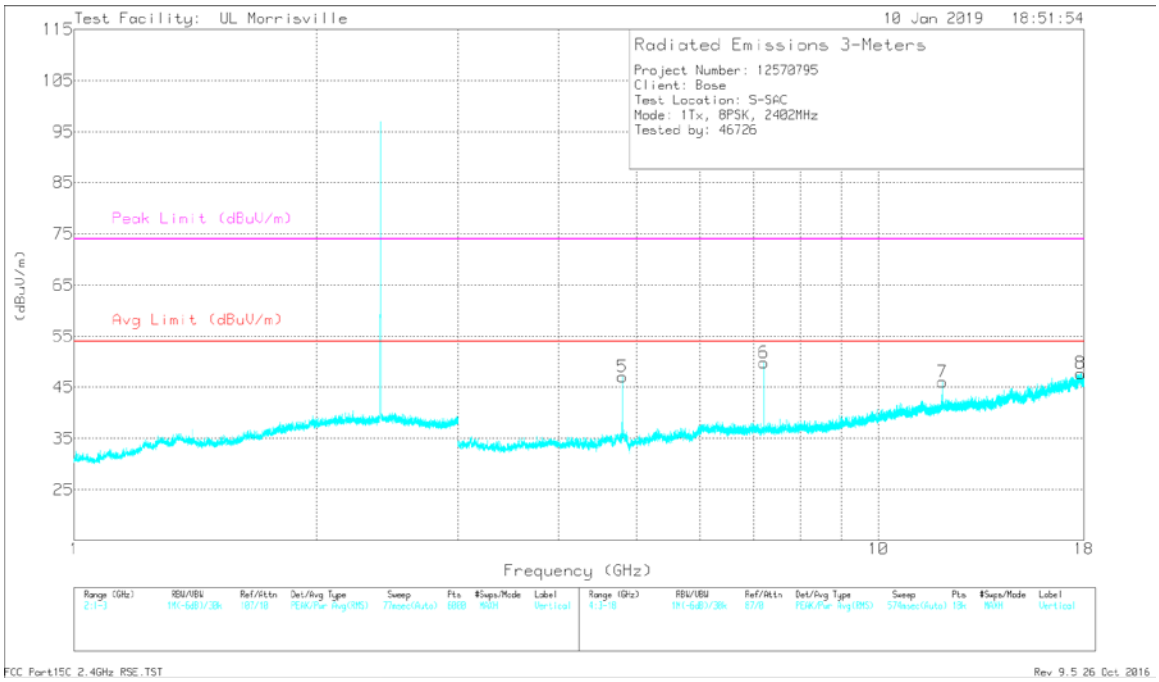
Pk - Peak detector
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.804	50.13	PK-U	34	-31.2	52.93	-	-	74	-21.07	76	110	H
	* ** 4.804	45.47	V1TR	34	-31.2	48.27	54	-5.73	-	-	76	110	H
3	* ** 12.01	39.11	PK-U	38.7	-24	53.81	-	-	74	-20.19	88	103	H
	* ** 12.01	30.16	V1TR	38.7	-24	44.86	54	-9.14	-	-	88	103	H
4	* ** 17.805	33.65	PK-U	41.3	-20.9	54.05	-	-	74	-19.95	249	283	H
	* ** 17.805	23.3	V1TR	41.3	-20.9	43.7	54	-10.3	-	-	249	283	H
5	* ** 4.804	47.68	PK-U	34	-31.2	50.48	-	-	74	-23.52	28	127	V
	* ** 4.804	42.34	V1TR	34	-31.2	45.14	54	-8.86	-	-	28	127	V
7	* ** 12.01	38.55	PK-U	38.7	-24	53.25	-	-	74	-20.75	328	220	V
	* ** 12.01	29.29	V1TR	38.7	-24	43.99	54	-10.01	-	-	328	220	V
8	* ** 17.828	33.33	PK-U	41.3	-21	53.63	-	-	74	-20.37	97	259	V
	* ** 17.828	23.24	V1TR	41.3	-21	43.54	54	-10.46	-	-	97	259	V
2	7.206	45.39	PK-U	35.5	-28.2	52.69	-	-	-	-	82	107	H
	7.206	39.49	V1TR	35.5	-28.2	46.79	-	-	-	-	82	107	H
6	7.206	45.61	PK-U	35.5	-28.2	52.91	-	-	-	-	257	199	V
	7.206	39.67	V1TR	35.5	-28.2	46.97	-	-	-	-	257	199	V

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PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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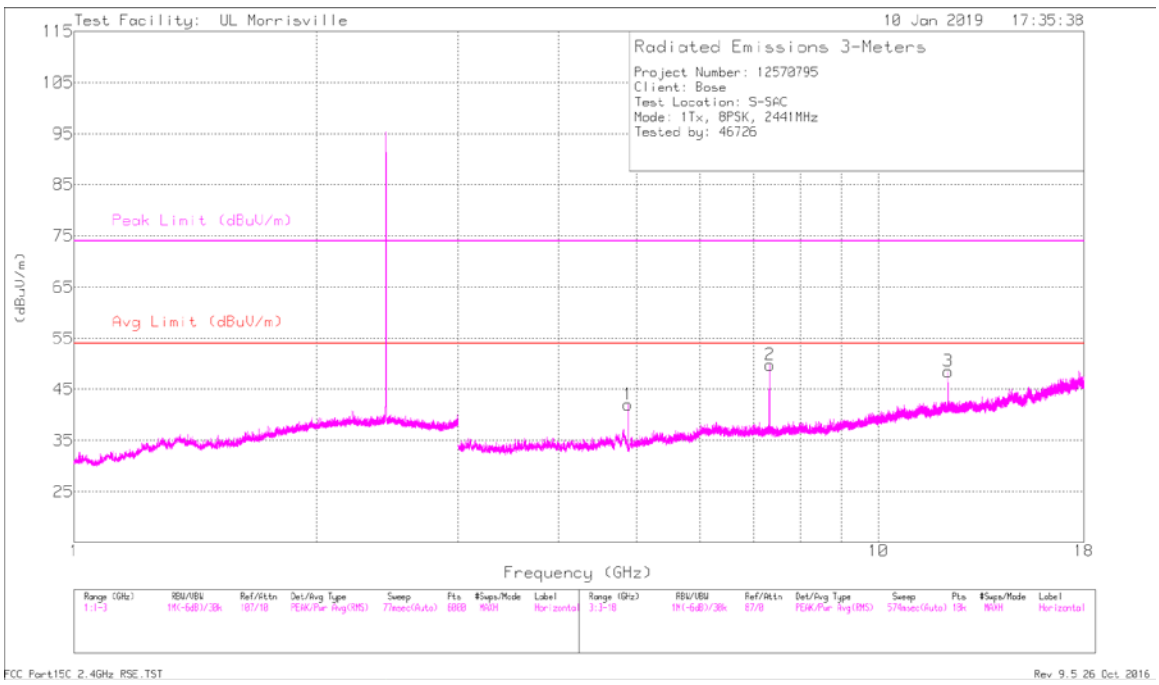
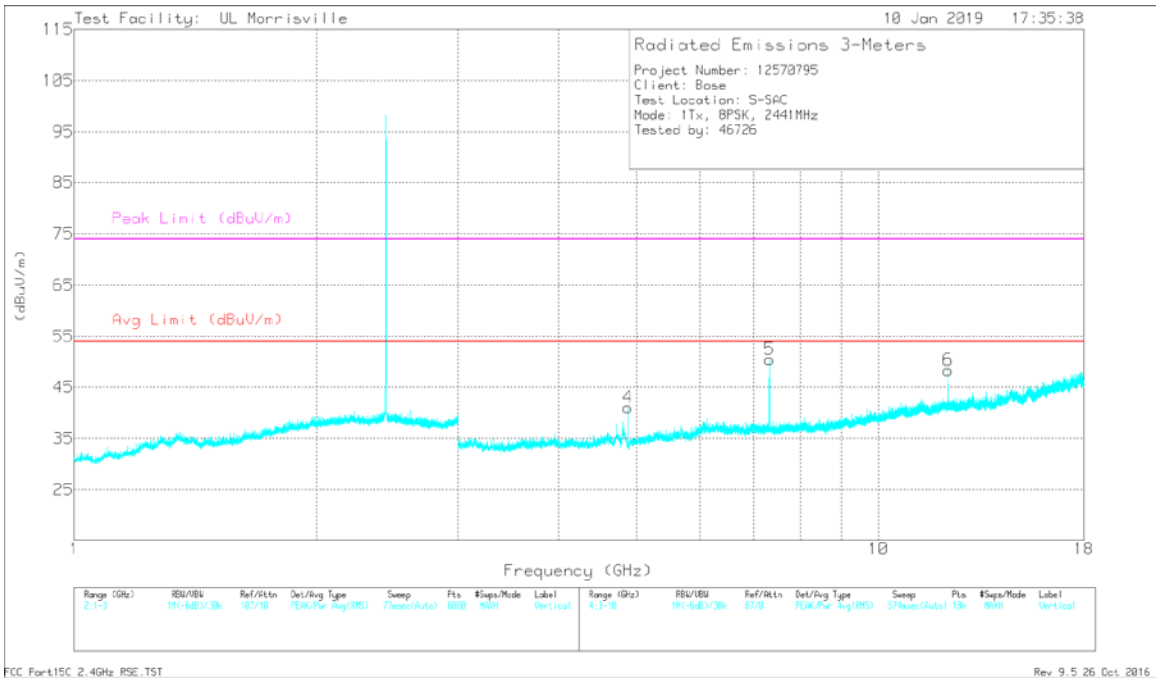
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.882	45.22	PK-U	34	-30.9	48.32	-	-	74	-25.68	71	123	H
	* ** 4.882	39.33	V1TR	34	-30.9	42.43	54	-11.57	-	-	71	123	H
2	* ** 7.323	44.99	PK-U	35.5	-27.6	52.89	-	-	74	-21.11	74	107	H
	* ** 7.323	38.93	V1TR	35.5	-27.6	46.83	54	-7.17	-	-	74	107	H
3	* ** 12.205	39.4	PK-U	38.8	-24.2	54	-	-	74	-20	89	116	H
	* ** 12.205	31.01	V1TR	38.8	-24.2	45.61	54	-8.39	-	-	89	116	H
4	* ** 4.882	43.91	PK-U	34	-30.9	47.01	-	-	74	-26.99	16	115	V
	* ** 4.882	37.72	V1TR	34	-30.9	40.82	54	-13.18	-	-	16	115	V
5	* ** 7.323	45.57	PK-U	35.5	-27.6	53.47	-	-	74	-20.53	303	109	V
	* ** 7.323	39.75	V1TR	35.5	-27.6	47.65	54	-6.35	-	-	303	109	V
6	* ** 12.205	39.55	PK-U	38.8	-24.2	54.15	-	-	74	-19.85	335	103	V
	* ** 12.205	30.6	V1TR	38.8	-24.2	45.2	54	-8.8	-	-	335	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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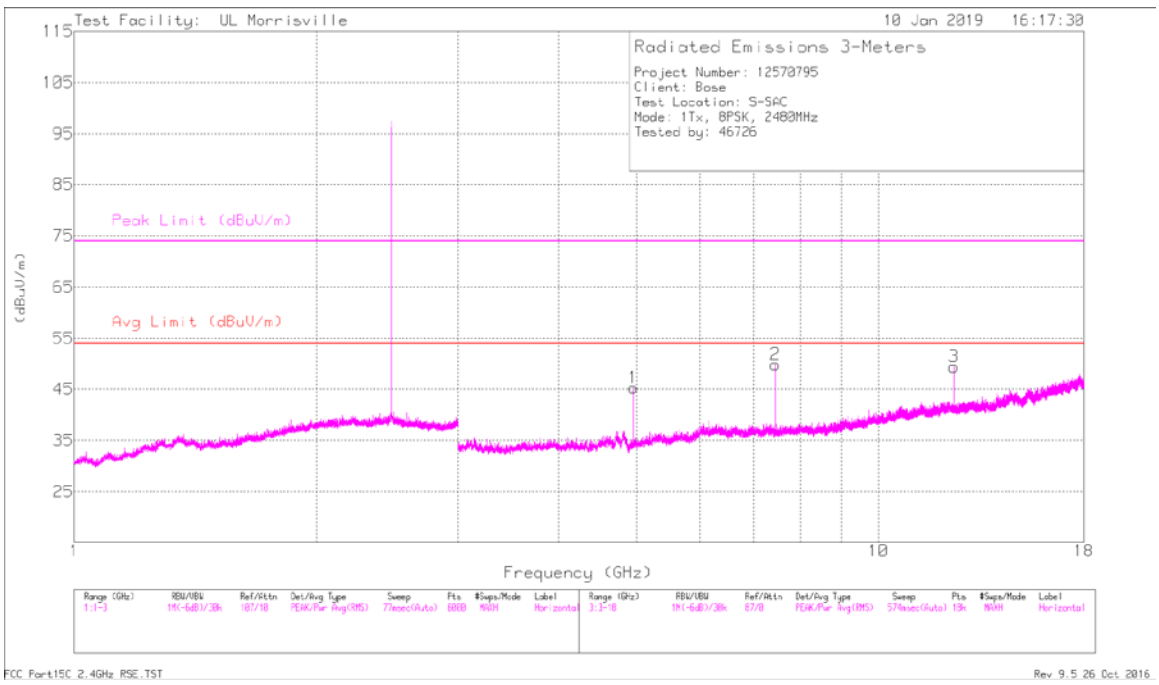
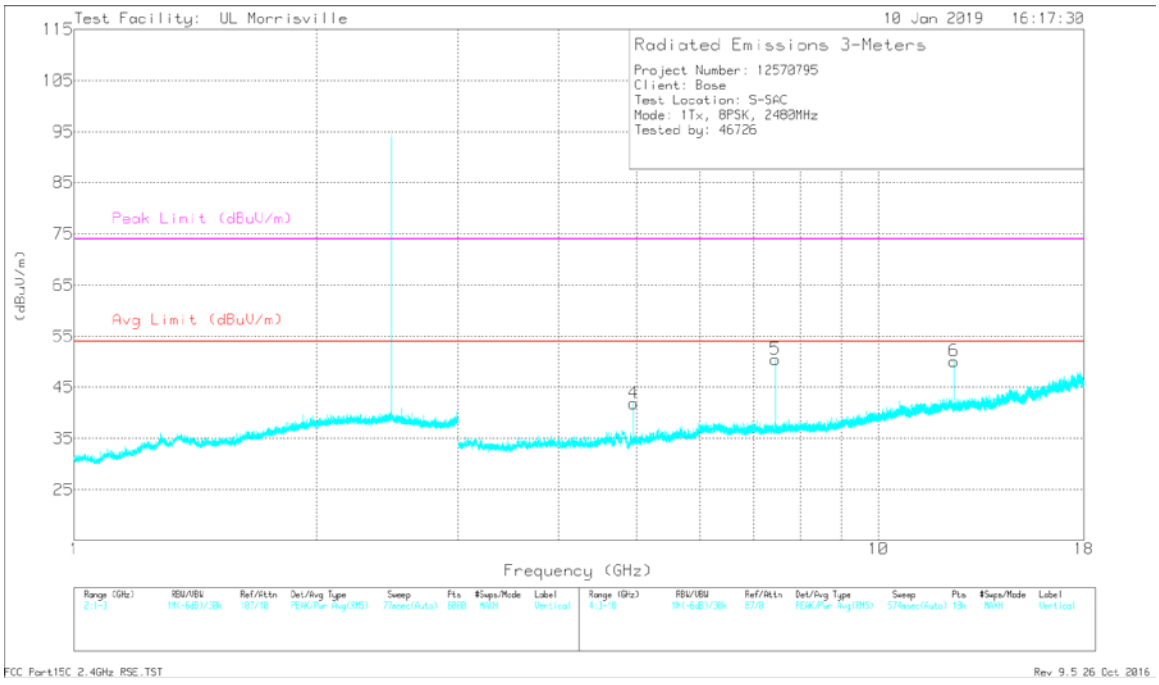
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0069 AF (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.96	46.51	PK-U	34	-31.1	49.41	-	-	74	-24.59	41	102	H
	* ** 4.96	41.08	V1TR	34	-31.1	43.98	54	-10.02	-	-	41	102	H
2	* ** 7.44	45.4	PK-U	35.5	-27.9	53	-	-	74	-21	68	109	H
	* ** 7.44	39.2	V1TR	35.5	-27.9	46.8	54	-7.2	-	-	68	109	H
3	* ** 12.4	41.07	PK-U	38.8	-24.2	55.67	-	-	74	-18.33	93	113	H
	* ** 12.4	32.64	V1TR	38.8	-24.2	47.24	54	-6.76	-	-	93	113	H
4	* ** 4.96	39.9	PK-U	34	-31.1	42.8	-	-	74	-31.2	25	226	V
	* ** 4.96	33.92	V1TR	34	-31.1	36.82	54	-17.18	-	-	25	226	V
5	* ** 7.44	45.58	PK-U	35.5	-27.9	53.18	-	-	74	-20.82	270	204	V
	* ** 7.44	39.52	V1TR	35.5	-27.9	47.12	54	-6.88	-	-	270	204	V
6	* ** 12.4	39.15	PK-U	38.8	-24.2	53.75	-	-	74	-20.25	278	192	V
	* ** 12.4	29.76	V1TR	38.8	-24.2	44.36	54	-9.64	-	-	278	192	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U: Maximum Peak
V1TR - VB=1/Ton, RMS Average where: Ton is packet duration

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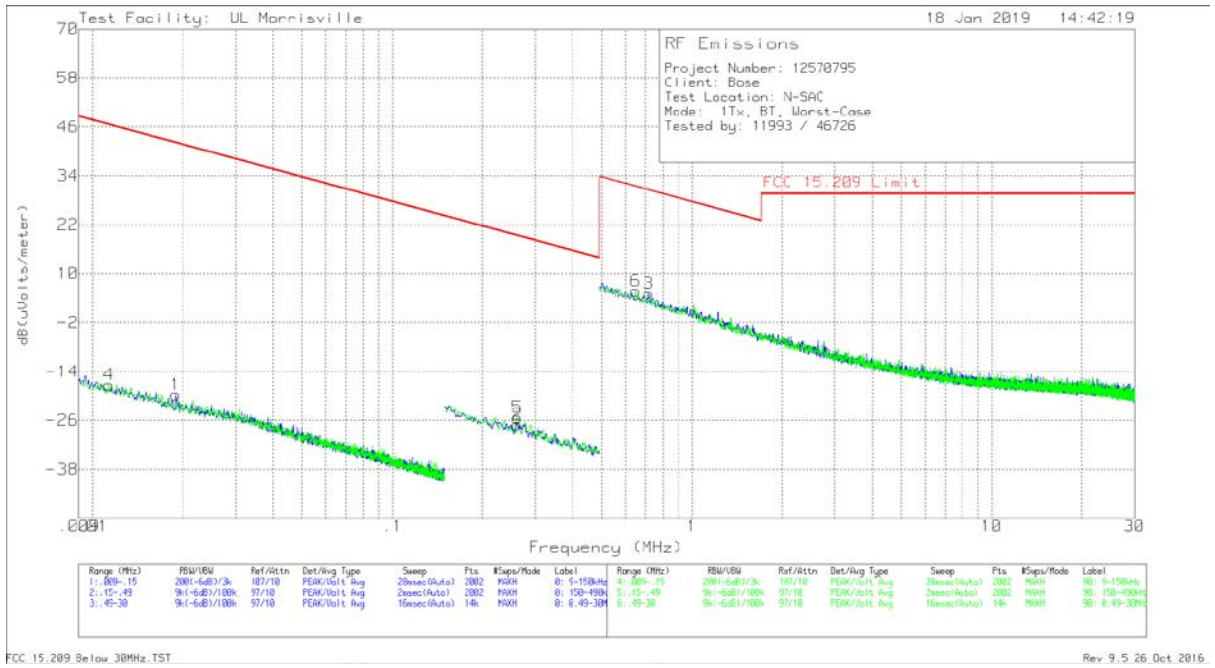
9.2. WORST-CASE BELOW 30MHz

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- TWO ORIENTATIONS FACE ON/FACE OFF

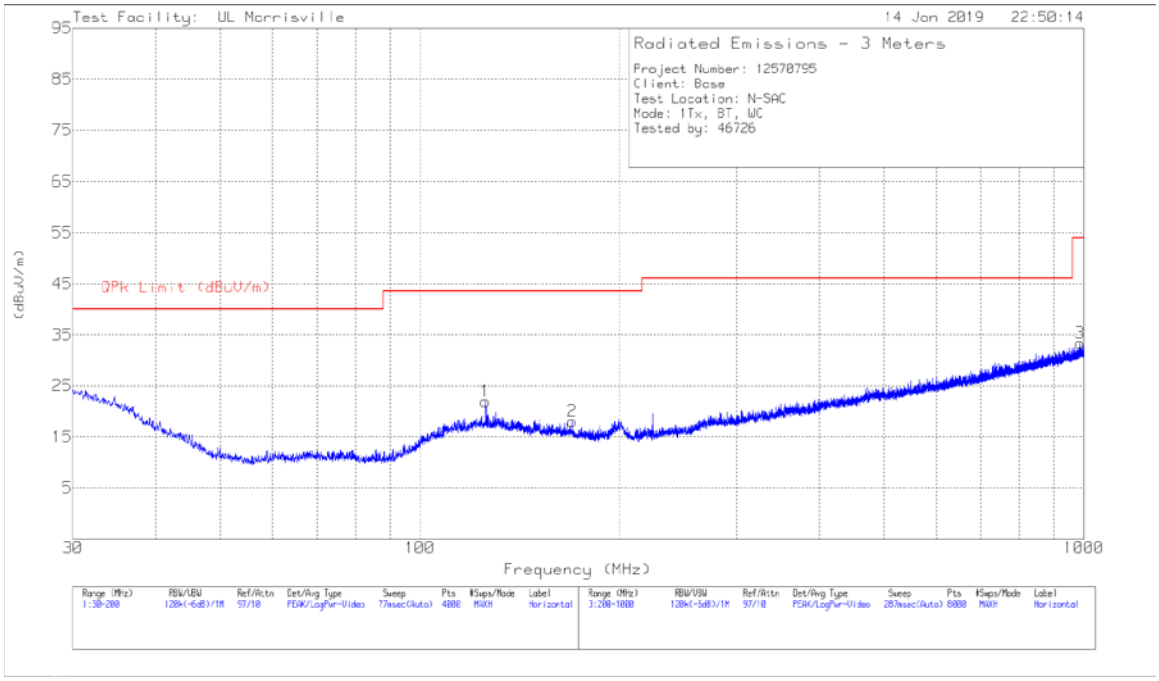
BELOW 30MHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC QP 15.209 Limit	FCC AV 15.209 Limit	FCC PK 15.209 Limit	Worst-Case Margin (dB)	Azimuth (Degs)
4	.01131	43.91	Pk	18.7	.1	-80	-17.29	-	46.54	66.54	-63.83	0-360
1	.01894	45.17	Pk	15	.1	-80	-19.73	-	42.06	62.06	-61.79	0-360
5	.26144	44.4	Pk	10.2	.1	-80	-25.3	-	19.26	39.26	-44.56	0-360
2	.26169	42.57	Pk	10.2	.1	-80	-27.13	-	19.25	39.25	-46.38	0-360
6	.6481	35.26	Pk	10.4	.1	-40	5.76	31.37	-	-	-25.61	0-360
3	.71766	34.69	Pk	10.4	.1	-40	5.19	30.49	-	-	-25.3	0-360

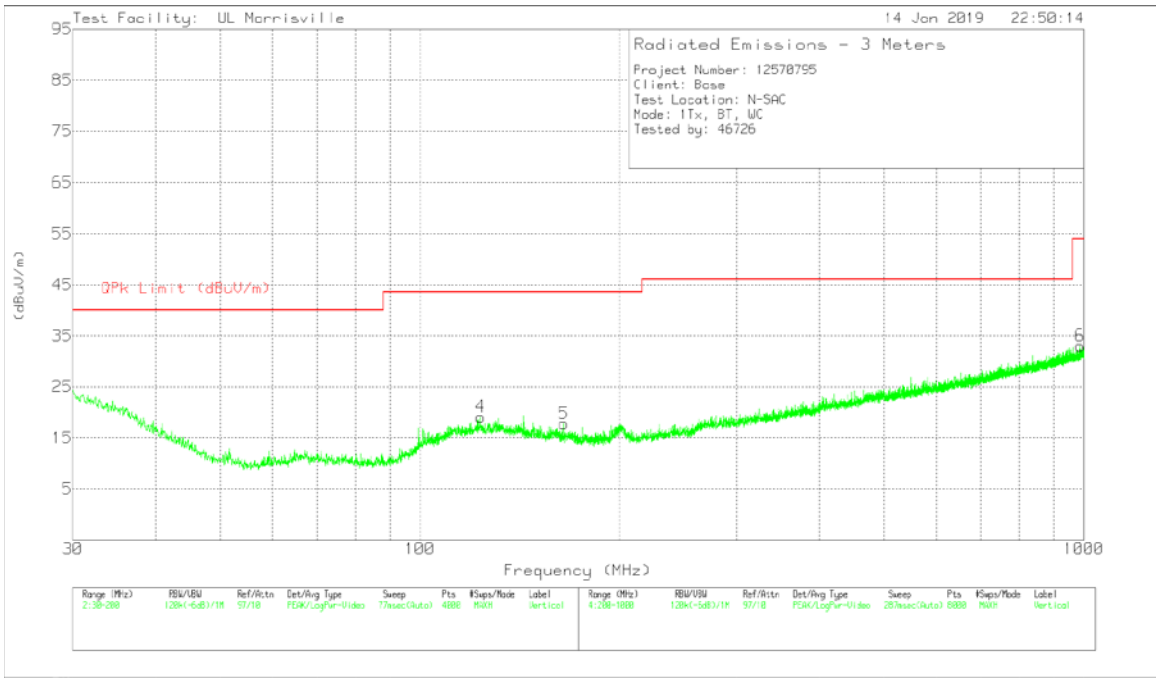
Pk - Peak detector

9.3. WORST-CASE 30-1000 MHz

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



HORIZONTAL



VERTICAL

30 TO 1000MHz DATA

Markers	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 ACF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 125.5562	26.62	Qp	20.2	-30.7	16.12	43.52	-27.4	234	192	H
2	* ** 169.6721	23.49	Qp	18.3	-30.3	11.49	43.52	-32.03	333	279	H
4	* ** 123.3564	23.67	Qp	20.1	-30.7	13.07	43.52	-30.45	273	244	V
5	* ** 164.9277	23.21	Qp	18.6	-30.4	11.41	43.52	-32.11	5	103	V
3	* ** 988.2517	21.71	Qp	29.8	-25.2	26.31	53.97	-27.66	199	282	H
6	* ** 987.8357	21.69	Qp	29.8	-25.2	26.29	53.97	-27.68	79	209	V

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

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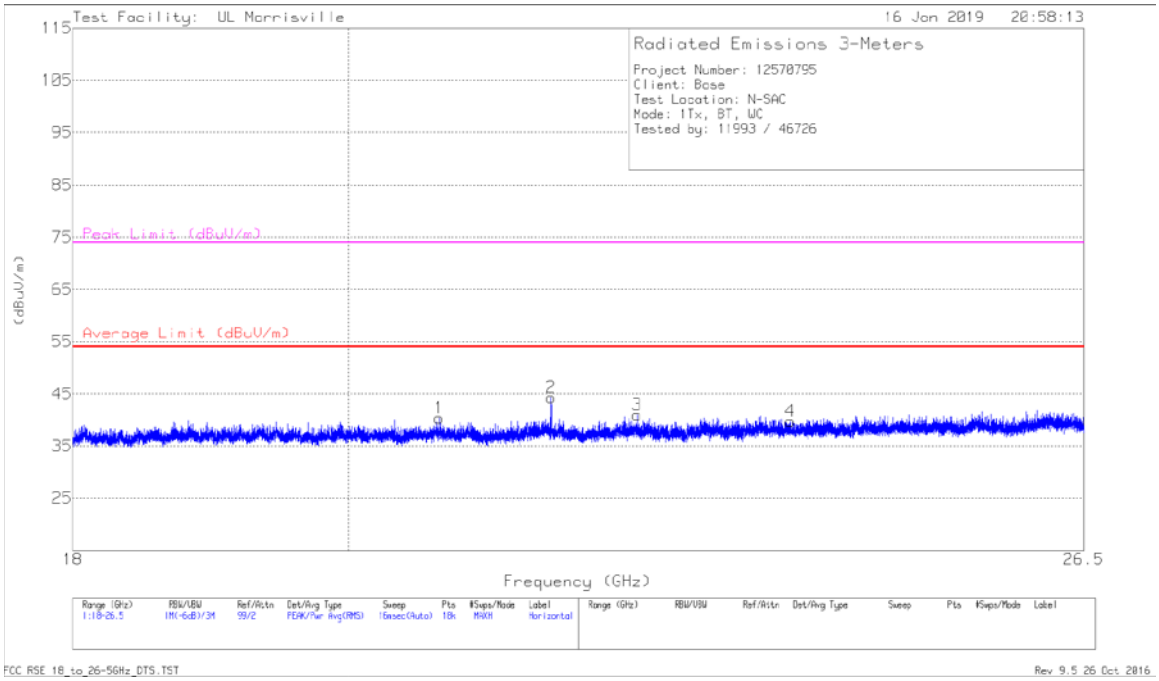
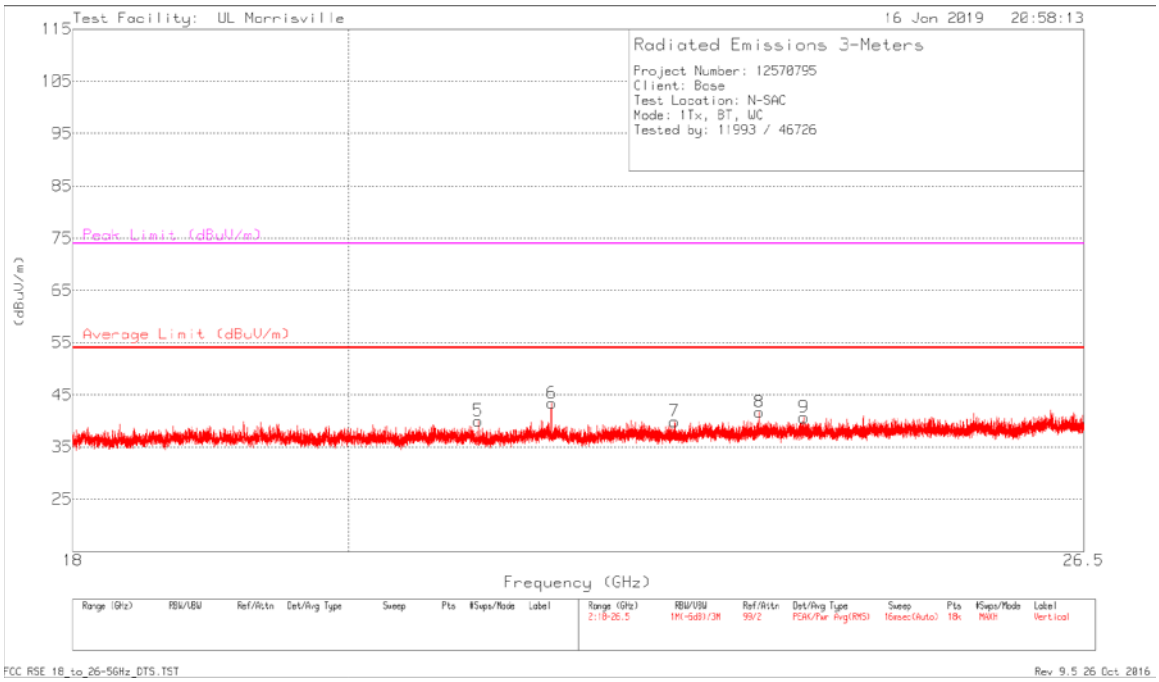
9.4. WORST-CASE 18 to 26 GHz

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



HORIZONTAL



VERTICAL

18 TO 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.708	46.95	Pk	33.1	-39.7	40.35	54	-13.65	74	-33.65	0-360	199	H
3	* ** 22.337	46.75	Pk	33.5	-39.3	40.95	54	-13.05	74	-33.05	0-360	249	H
4	* ** 23.686	44.75	Pk	34	-39	39.75	54	-14.25	74	-34.25	0-360	249	H
5	* ** 21.019	46.61	Pk	33.2	-39.8	40.01	54	-13.99	74	-33.99	0-360	252	V
7	* ** 22.661	45.71	Pk	33.5	-39.3	39.91	54	-14.09	74	-34.09	0-360	202	V
9	* ** 23.808	45.66	Pk	34	-39	40.66	54	-13.34	74	-33.34	0-360	152	V
2	21.616	50.49	Pk	33.3	-39.5	44.29	54	-9.71	74	-29.71	0-360	199	H
6	21.619	49.6	Pk	33.3	-39.5	43.4	54	-10.6	74	-30.6	0-360	102	V
8	23.407	46.7	Pk	34.1	-39.1	41.7	54	-12.3	74	-32.3	0-360	252	V

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

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10. SETUP PHOTOS

Please refer to R12570795-EP2 for setup photos

END OF TEST REPORT

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