



CERTIFICATION TEST REPORT

Report Number : R12844817-E5

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

Model : BMD0005, BMD0006, BMD0007, BMD0008

FCC ID : A94429638A

IC : 3232A-429638A

EUT Description : Wireless Headphones

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

Date Of Issue:
2019-05-21

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 USA
Tel: (919) 549-1400

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	--	Initial Issue	

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION	7
4. CALIBRATION AND UNCERTAINTY	8
4.1. MEASURING INSTRUMENT CALIBRATION	8
4.2. SAMPLE CALCULATION	8
4.3. MEASUREMENT UNCERTAINTY	8
5. EQUIPMENT UNDER TEST	9
5.1. EUT DESCRIPTION	9
5.2. MAXIMUM OUTPUT POWER	9
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	9
5.1. DESCRIPTION OF MODEL DIFFERENCES	9
5.2. SOFTWARE AND FIRMWARE	9
5.3. WORST-CASE CONFIGURATION AND MODE	10
5.4. DESCRIPTION OF TEST SETUP	11
6. TEST AND MEASUREMENT EQUIPMENT	12
7. MEASUREMENT METHODS	14
8. ANTENNA PORT TEST RESULTS	15
8.1. ON TIME AND DUTY CYCLE	15
8.2. 20 dB AND 99% BANDWIDTH	16
8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION	17
8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION	18
8.3. HOPPING FREQUENCY SEPARATION	19
8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION	20
8.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION	21
8.4. NUMBER OF HOPPING CHANNELS	22
8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION	23
8.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION	25
8.5. AVERAGE TIME OF OCCUPANCY	27
8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION	27
8.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION	29
8.5.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION	31

8.6.	OUTPUT POWER.....	33
8.6.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	33
8.6.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	34
8.6.3.	BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION	34
8.7.	AVERAGE POWER.....	35
8.7.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	35
8.7.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	36
8.7.3.	BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION	36
8.8.	CONDUCTED SPURIOUS EMISSIONS.....	37
8.8.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	38
8.8.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	40
9.	RADIATED TEST RESULTS.....	42
9.1.	TRANSMITTER ABOVE 1 GHz	44
9.1.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION	44
9.1.2.	BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION.....	54
9.2.	WORST CASE BELOW 30MHZ	64
9.3.	WORST CASE BELOW 1 GHZ.....	65
9.4.	WORST CASE 18-26 GHZ	67
10.	SETUP PHOTOS	69

1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Wireless Headphones

MODEL: BMD0005, BMD0006, BMD0007, BMD0008

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

DATE TESTED: 2019-05-04 to 2019-05-14

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

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

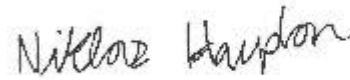
This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim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

Approved & Released For
UL LLC By:

Prepared By:



Jeffrey Moser
Operations Leader
Consumer Technology Division
UL LLC



Niklas Haydon
Engineer
Consumer Technology Division
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

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

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

The above test sites and facilities are covered under FCC Test Firm Registration # 703469. Chambers above are covered under Industry Canada company address and respective code.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	2.00%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	2.50 dB
All emissions, radiated	4.88 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

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

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	9.23	8.38
2402 - 2480	Enhanced DQPSK	7.78	6.00
2402 - 2480	Enhanced 8PSK	8.07	6.41

Note: GFSK, DQPSK, 8PSK peak and average power were all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

5.1. DESCRIPTION OF MODEL DIFFERENCES

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

5.2. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 3.0.1.

The test utility software used during testing was Polycmm ver 0.1.5.0, CSR Blue Suite ver 3.1.4.

5.3. WORST-CASE CONFIGURATION AND MODE

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

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

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

GFSK mode: DH5
DQPSK mode: 2-DH5
8PSK mode: 3-DH5

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

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O CABLES

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

TEST SETUP

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

SETUP DIAGRAMS

Please refer to R12844817-EP4 for setup diagrams

6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
T177	Spectrum Analyzer	Agilent Technologies	E4446A	2019-04-22	2020-04-22
PWM003	RF Power Meter	Keysight Technologies	N1911A	2018-07-30	2019-07-30
PWS002	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2018-07-30	2019-07-30
SN 181474341	Environmental Meter	Fisher Scientific	15-077-963	2019-07-27	2020-07-27
76021	DC Regulated Power Supply	CircuitSpecialist s.Com	CSI3005X5	N/A	N/A

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-01-24	2020-01-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2018-07-24	2019-07-24
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
	18-26 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2018-11-08	2019-11-08
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2018-09-06	2019-09-06
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2018-05-20	2019-05-20
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-09-30	2019-09-30
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2019-02-28	2020-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27

7. MEASUREMENT METHODS

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

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

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

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

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Out-of-Band Emissions in non-restricted band: ANSI C63.10-2013 Section 7.8.6, 7.8.8. & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10-2013 Section 6.3-6.5 & 6.10.5

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

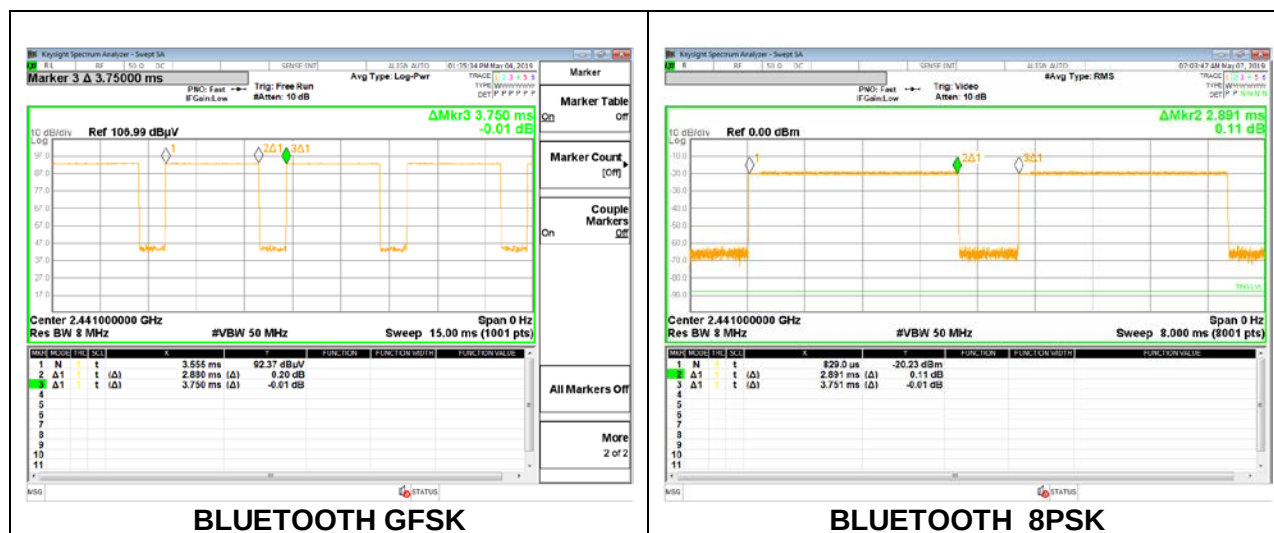
PROCEDURE

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	2.88	3.75	0.768	76.8%	1.15	0.347
Bluetooth 8PSK	2.89	3.75	0.771	77.1%	1.13	0.346

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

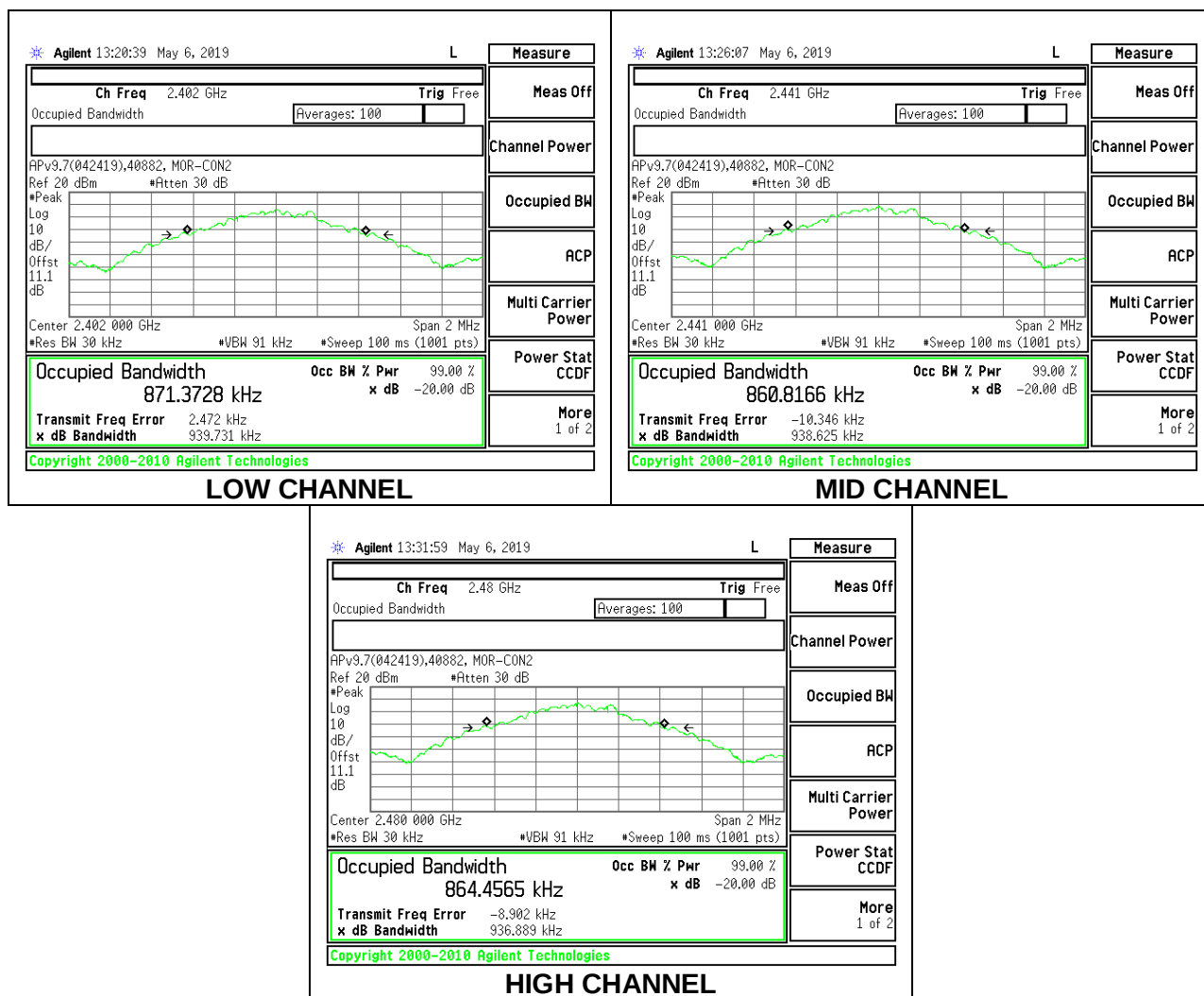
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to between 1-5% of the 20 dB or 99% occupied bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

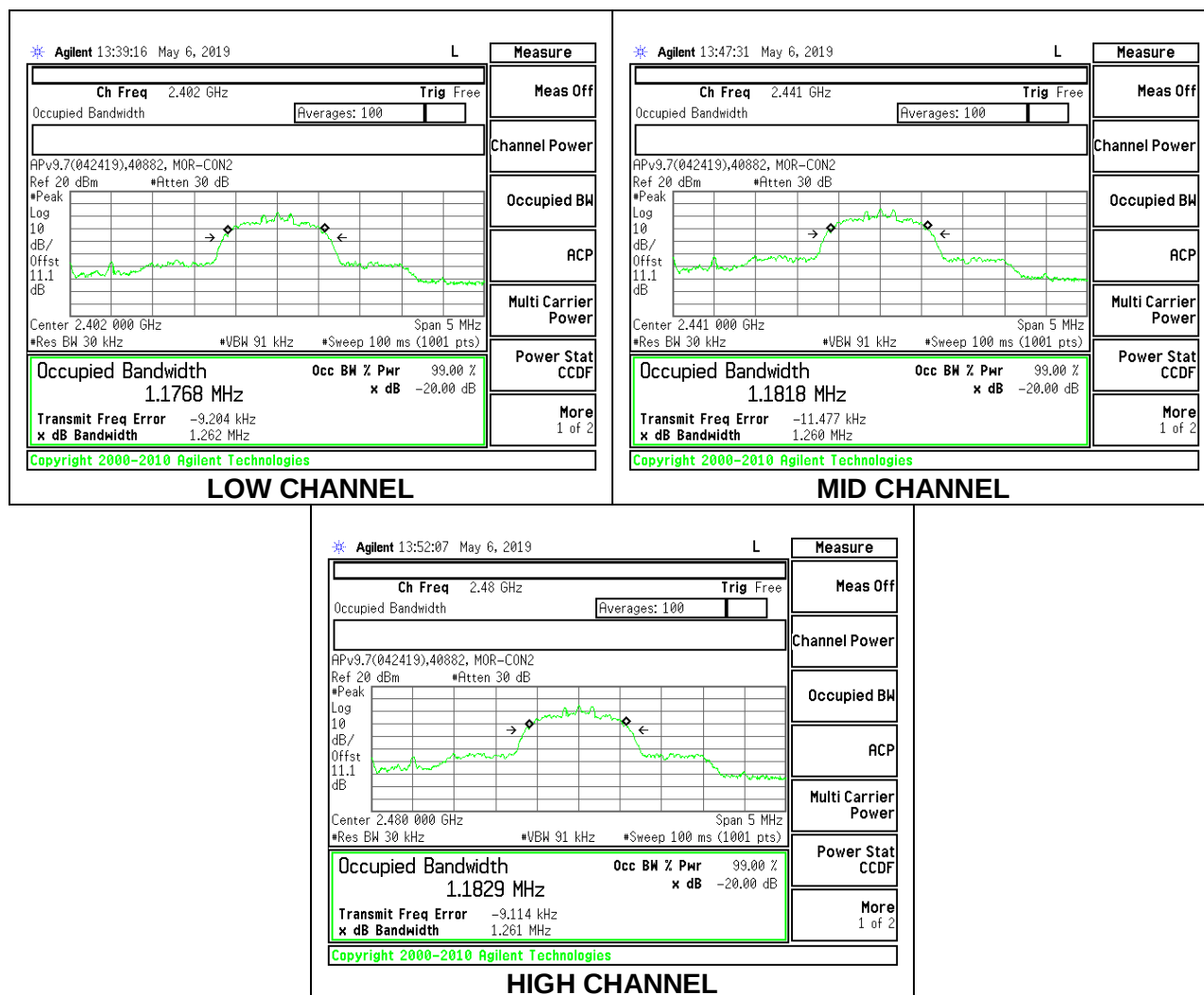
8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.940	0.871
Mid	2441	0.939	0.861
High	2480	0.937	0.864



8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.262	1.177
Mid	2441	1.26	1.182
High	2480	1.261	1.183



8.3. 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.

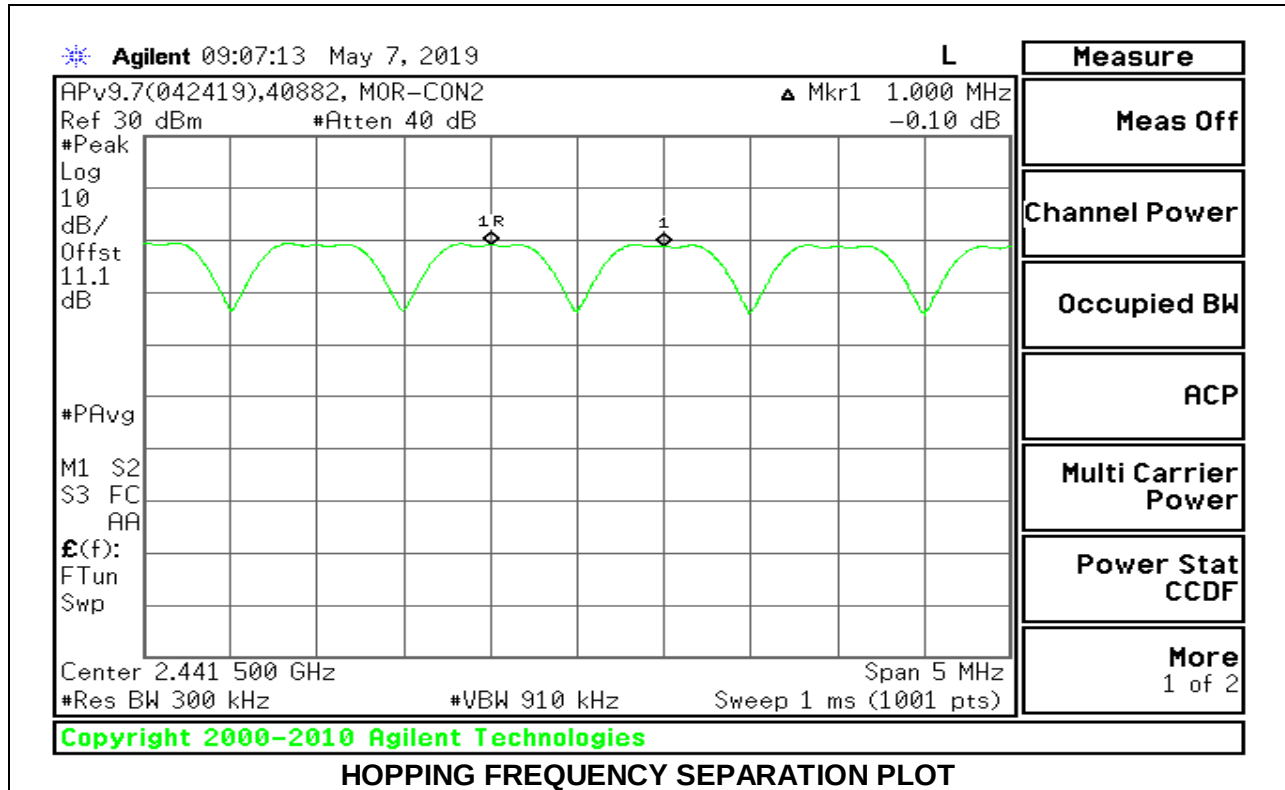
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 30% of the channel spacing or approx. 300 kHz and the VBW is set to $VBW \geq RBW$. The sweep time is coupled.

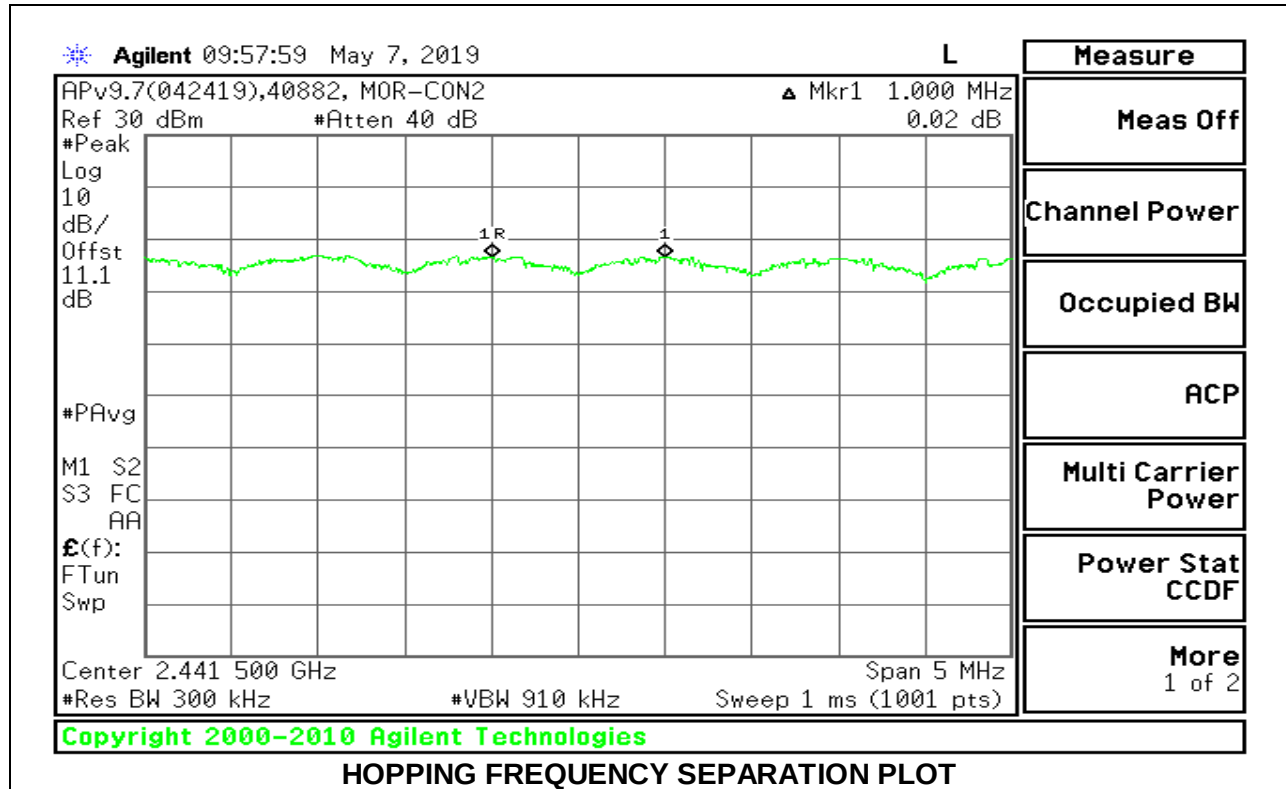
RESULTS

8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



Ch. A	Ch. B	Ch. 1 to Ch. 2 Sep.	Max. 20 dB BW	Margin
(MHz)	(MHz)	(MHz)	(MHz)	(MHz)
2441	2442	1.000	0.940	-0.060

8.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



Ch. A	Ch. B	Ch. 1 to Ch. 2 Sep.	Max. 20 dB BW	2/3 Max. 20dB BW	Margin
(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)
2441	2442	1.000	1.262	0.841	-0.159

Note: Frequency separation is greater than 2/3 of the maximum 20dB BW (841 kHz). Which is allowed as the maximum output power is 8.07dBm, which is less than 21dBm (125mW).

8.4. 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.

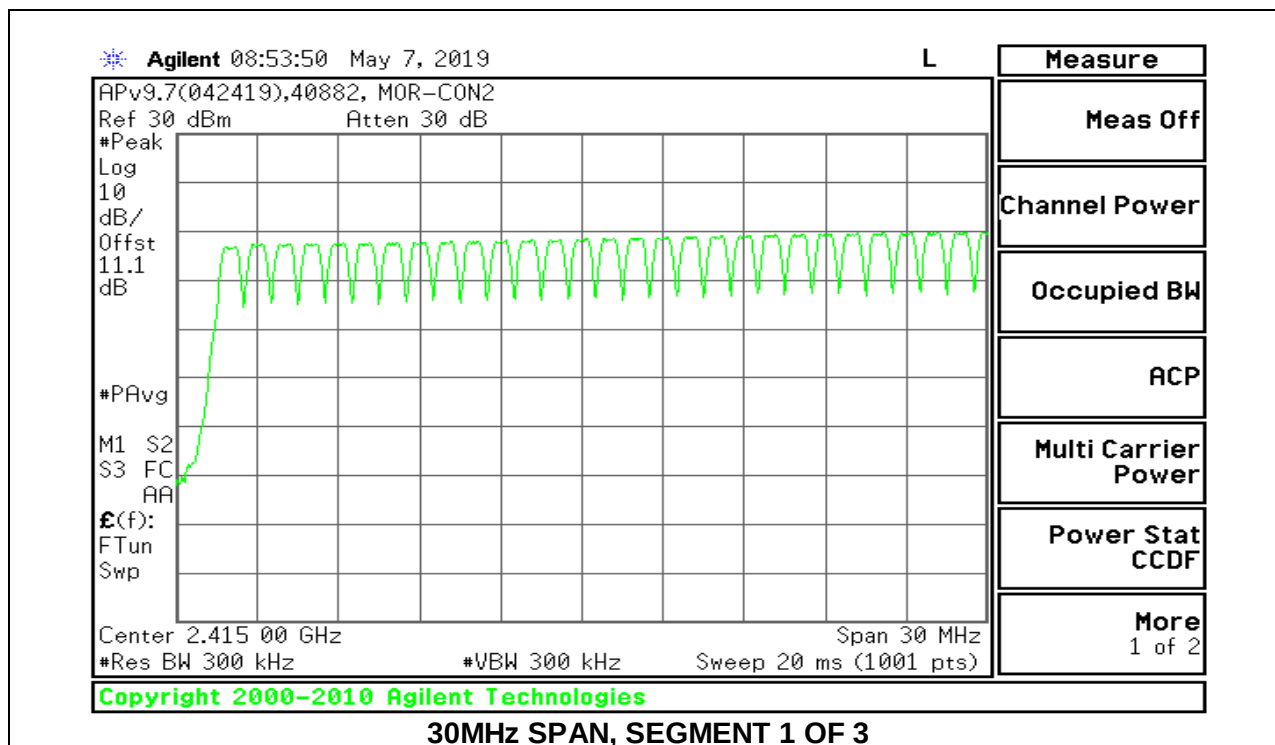
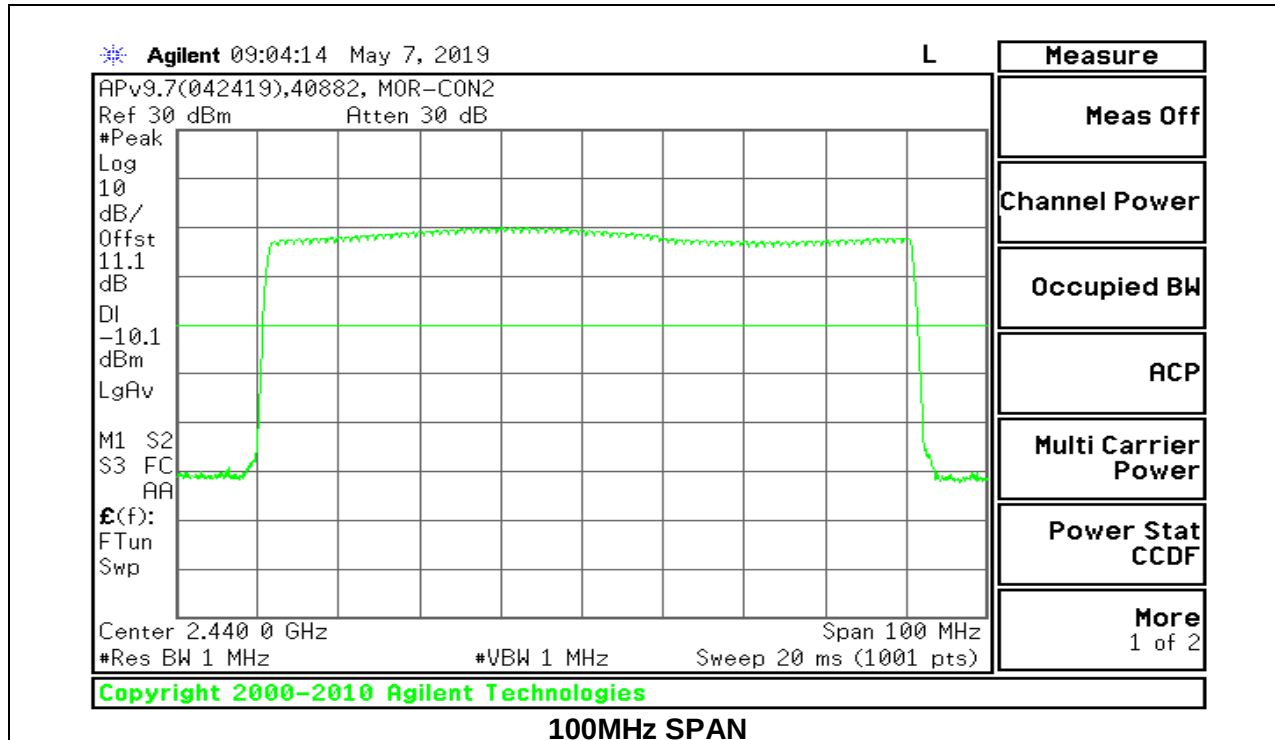
TEST PROCEDURE

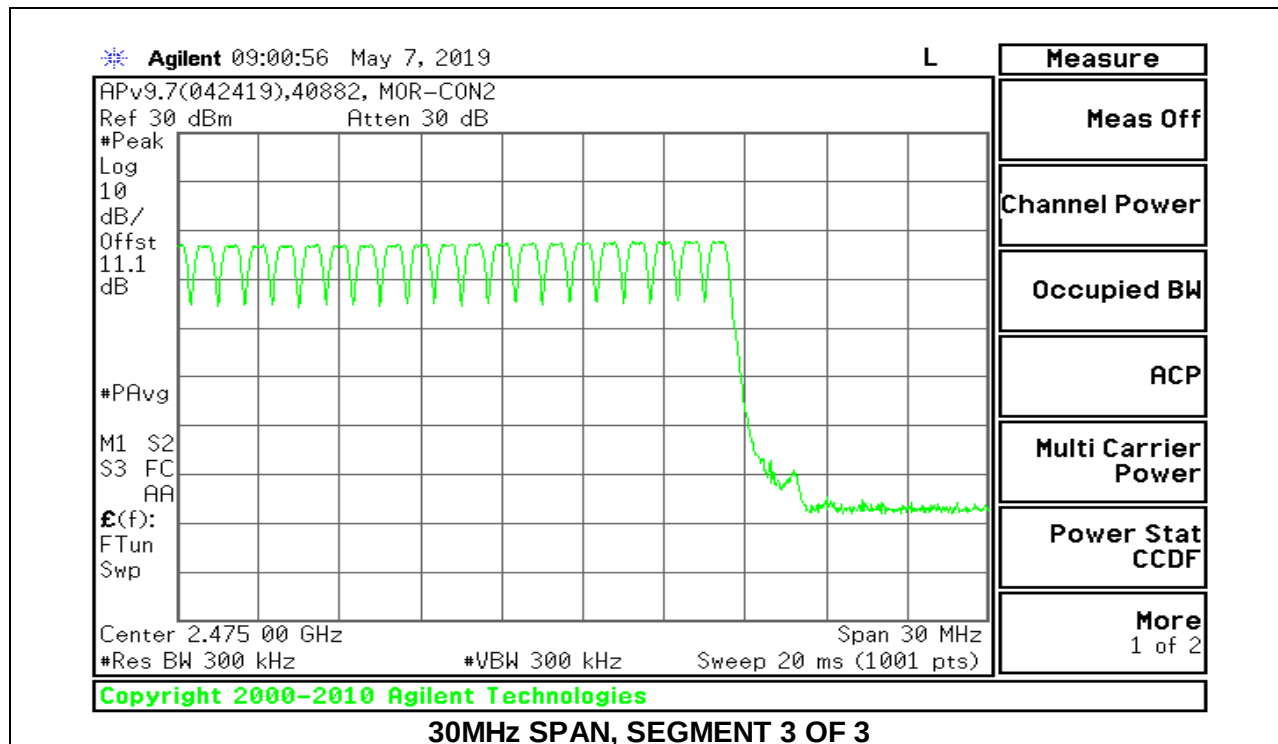
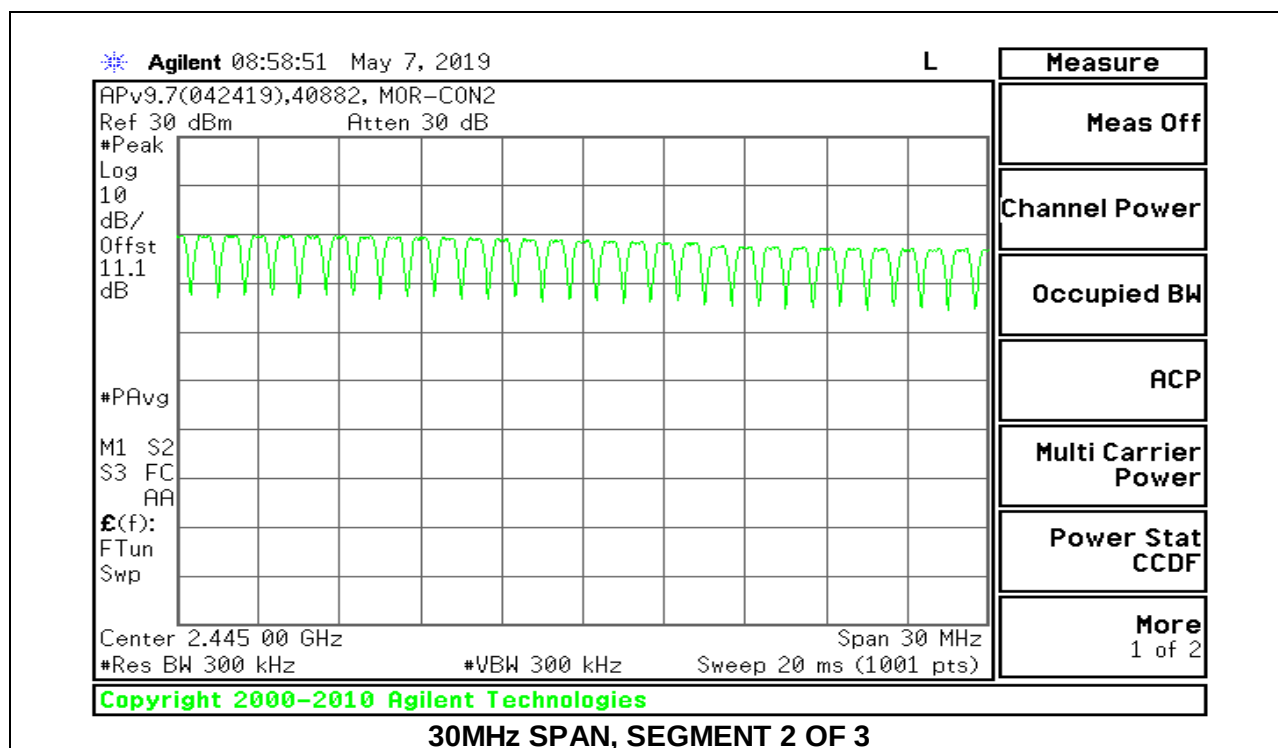
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. The analyzer is set to Max Hold.

RESULTS

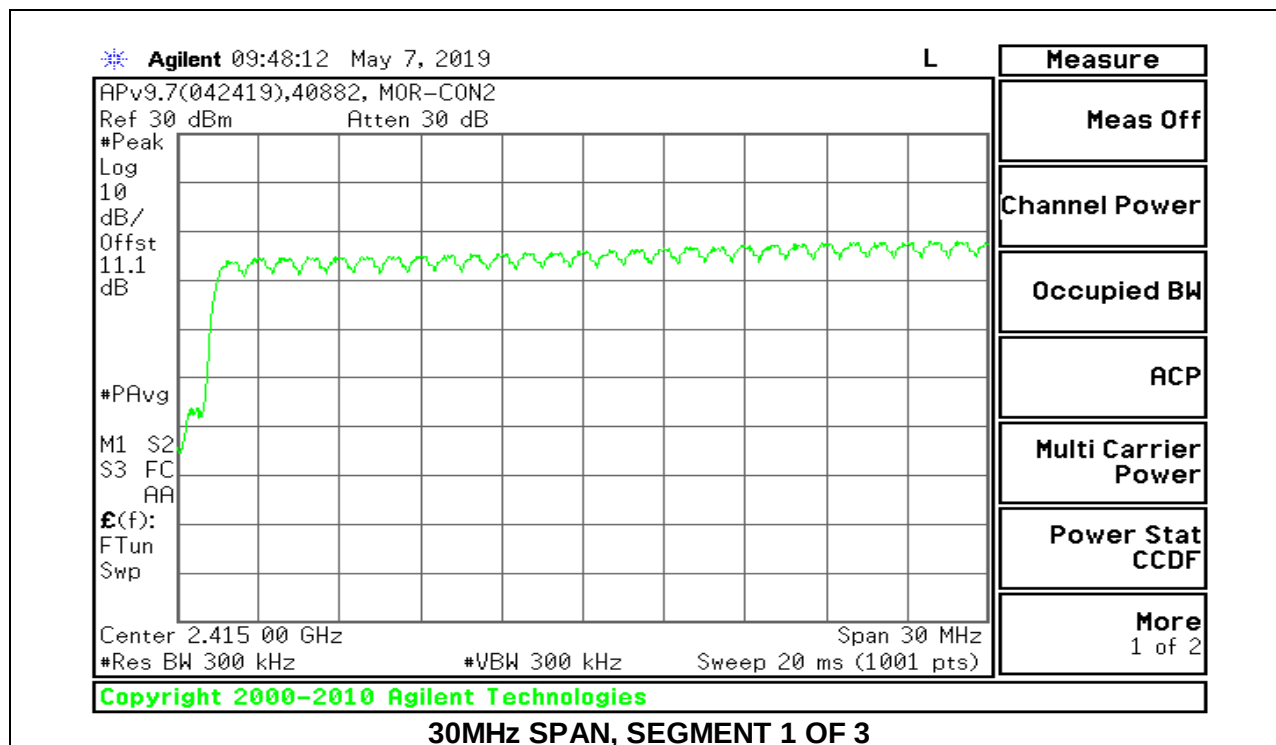
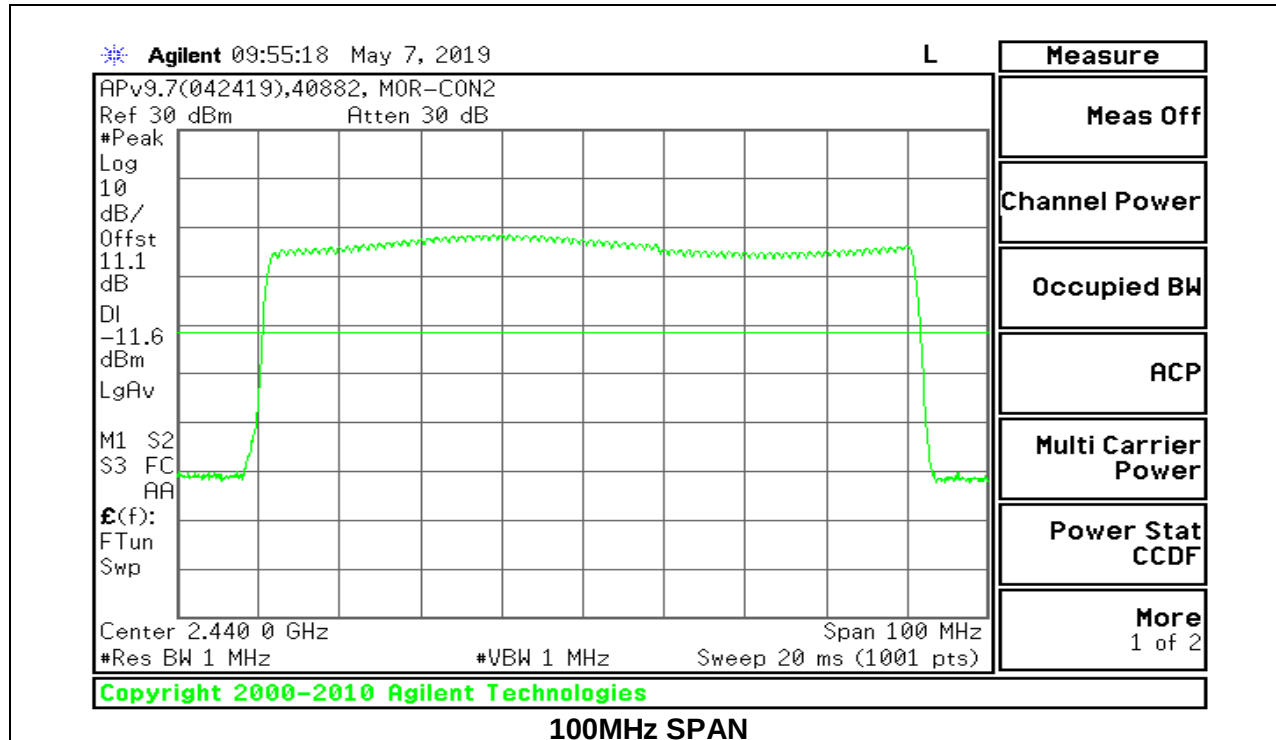
Normal Mode: All Channels Observed

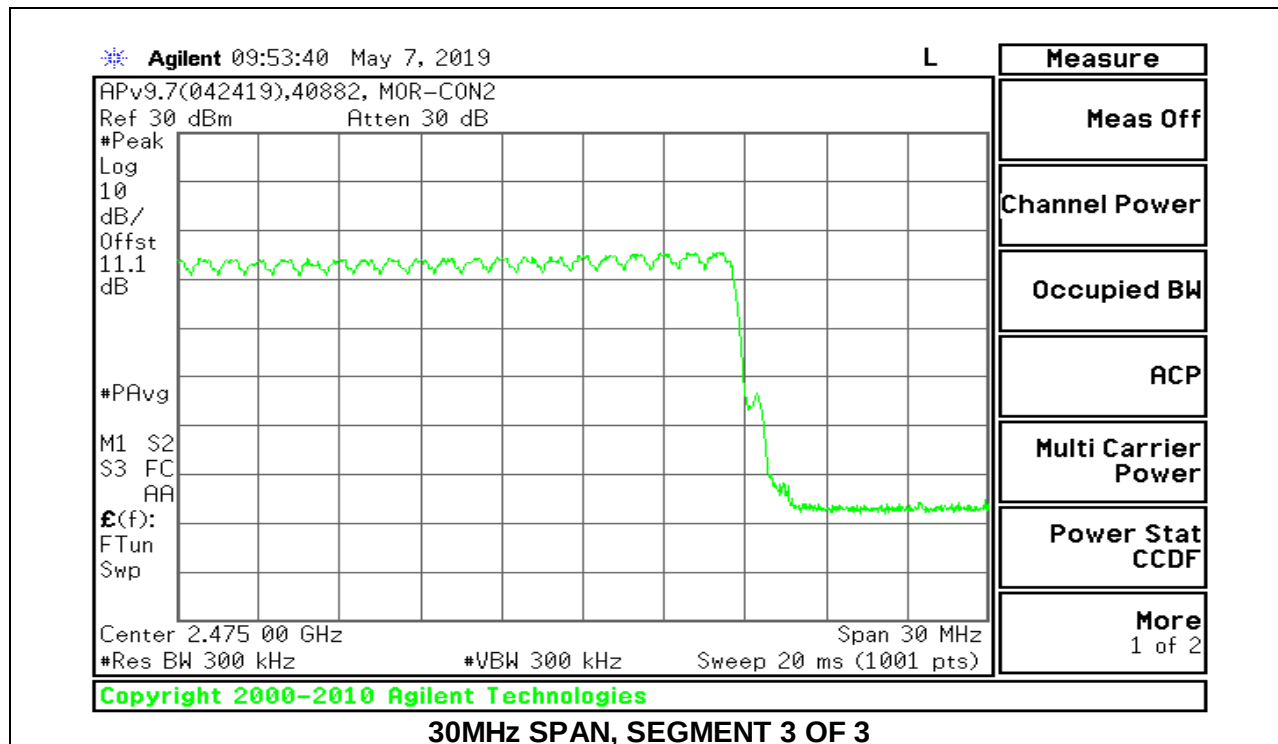
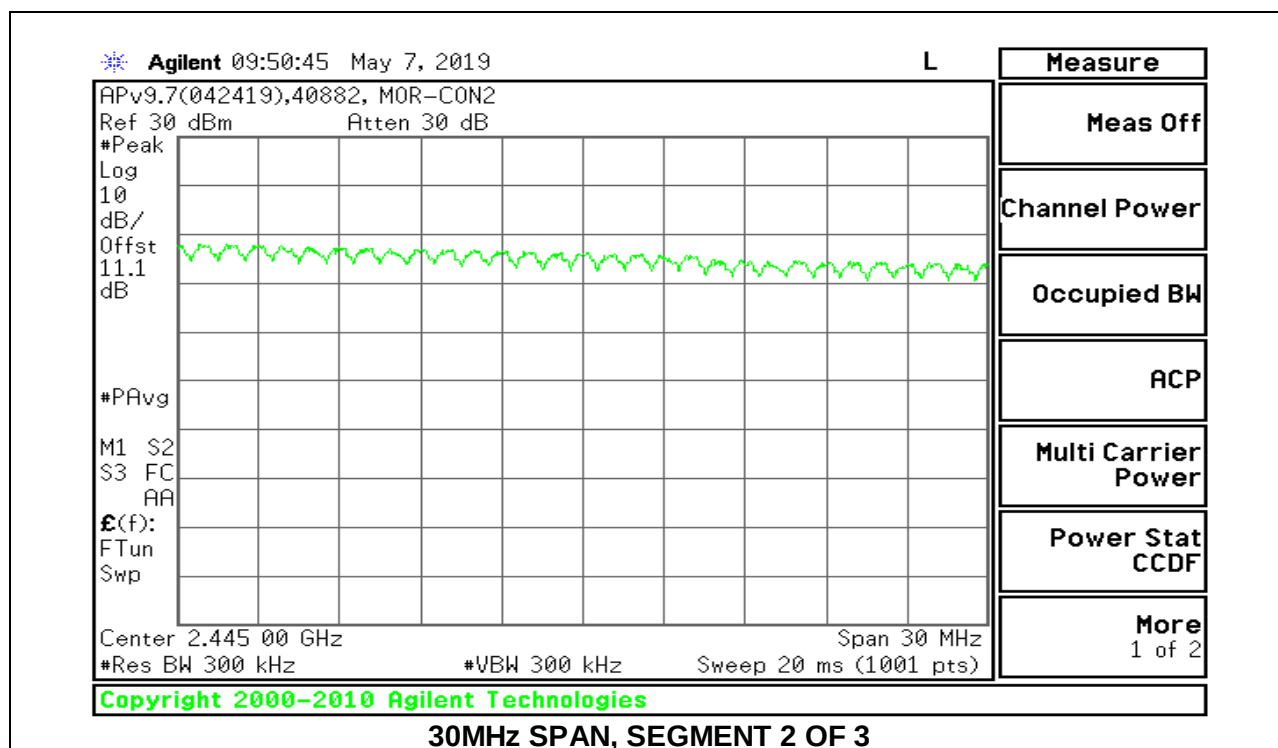
8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





8.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





8.5. 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.

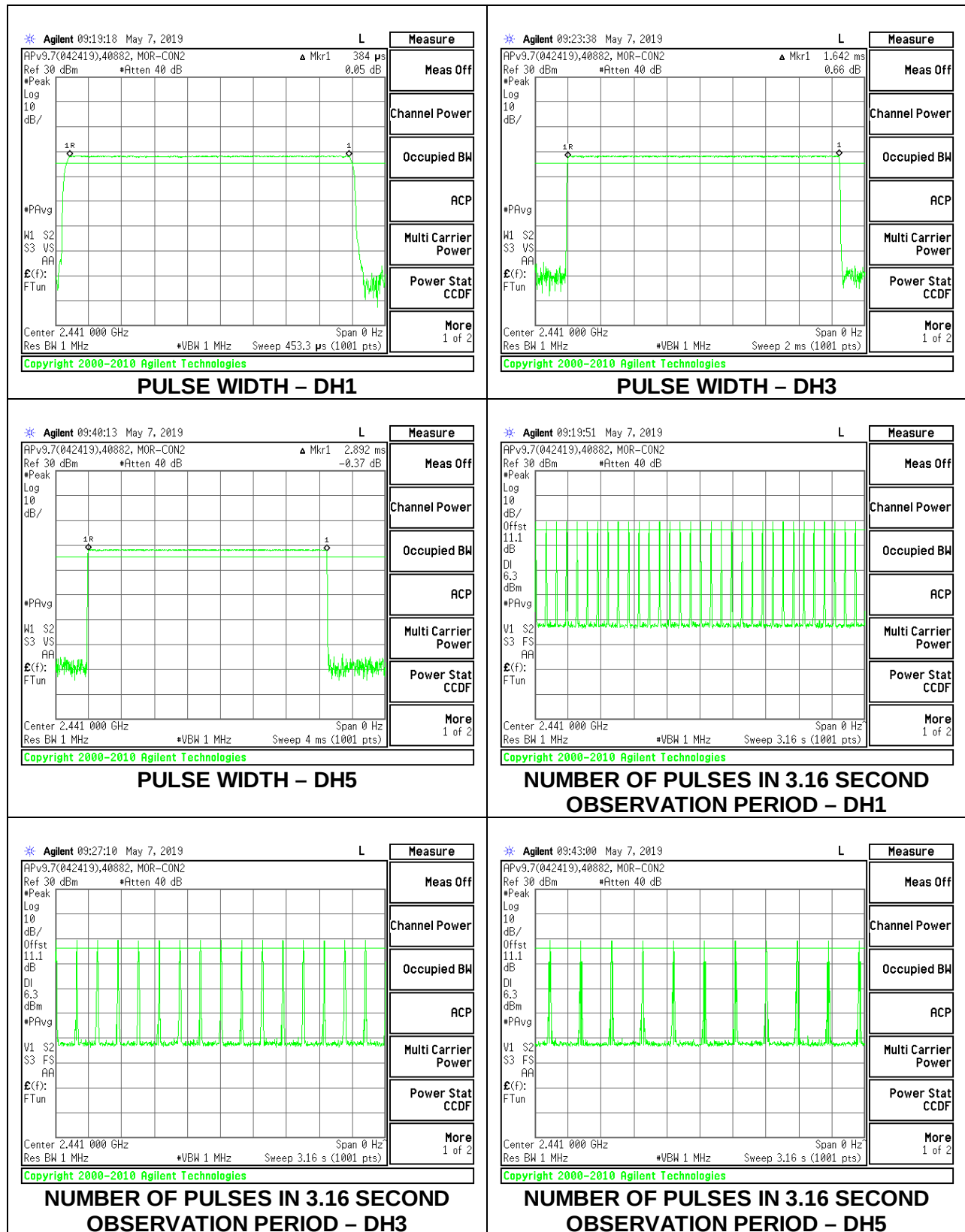
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

RESULTS

8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

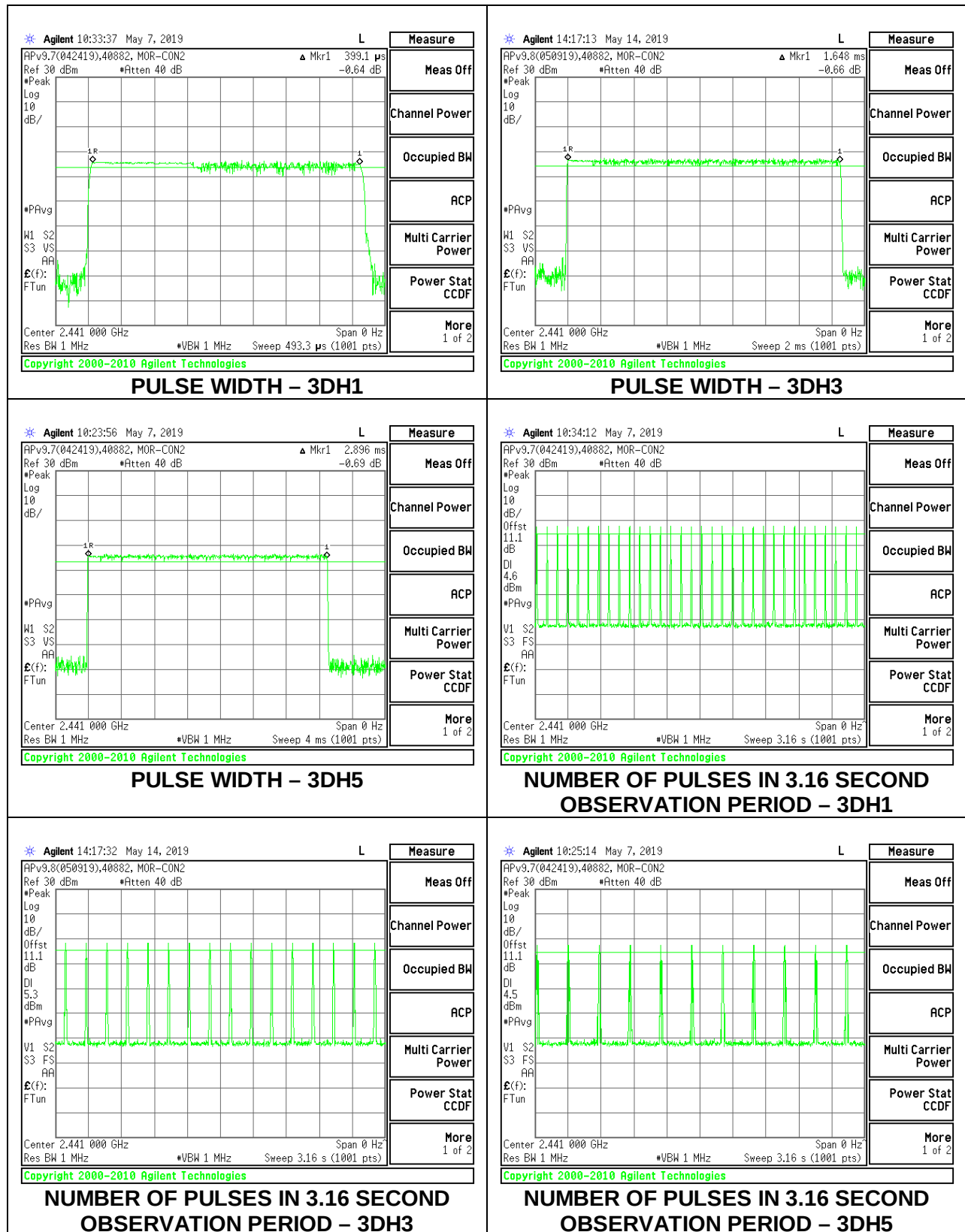
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.384	32	0.1229	0.4	-0.2771
DH3	1.642	16	0.2627	0.4	-0.1373
DH5	2.892	11	0.3181	0.4	-0.0819
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.384	8	0.03072	0.4	-0.3693
DH3	1.642	4	0.06568	0.4	-0.3343
DH5	2.892	2.75	0.07953	0.4	-0.3205



8.5.2. 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 EDR Mode					
3DH1	0.3991	32	0.12771	0.4	-0.27229
3DH3	1.6480	16	0.26368	0.4	-0.13632
3DH5	2.8960	11	0.31856	0.4	-0.08144

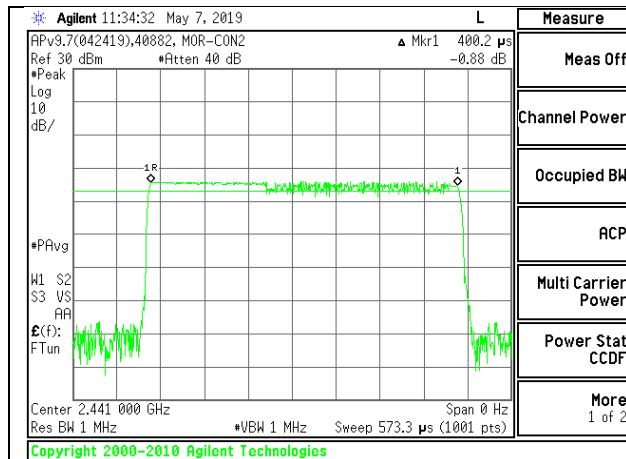
Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.



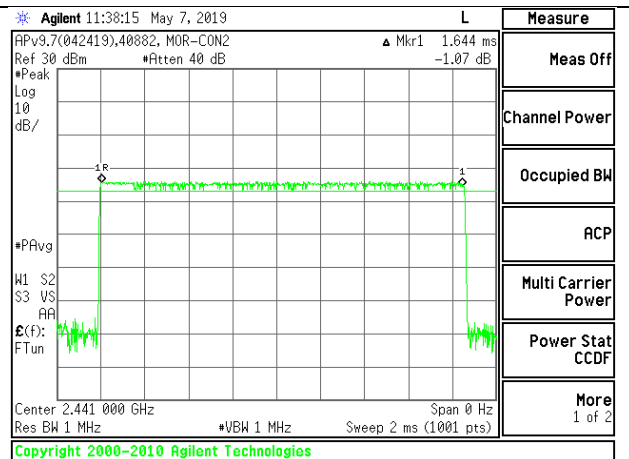
8.5.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DQPSK EDR Mode					
2DH1	0.4002	32	0.12806	0.4	-0.27194
2DH3	1.6440	16	0.26304	0.4	-0.13696
2DH5	2.9040	11	0.31944	0.4	-0.08056

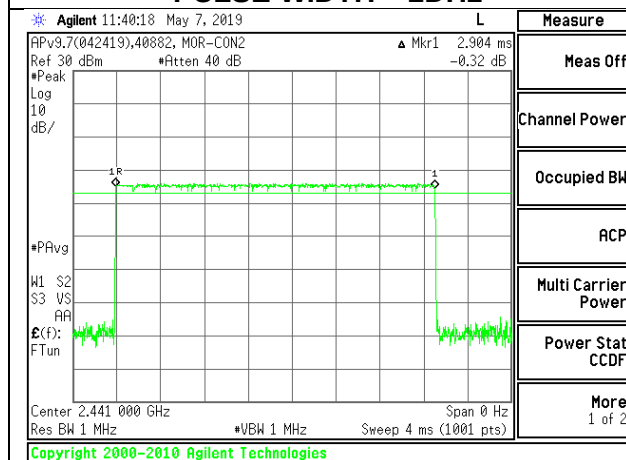
Note: for AFH(DQPSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.



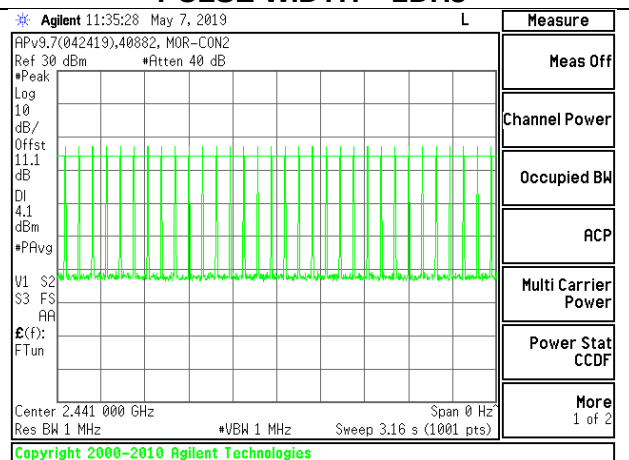
PULSE WIDTH – 2DH1



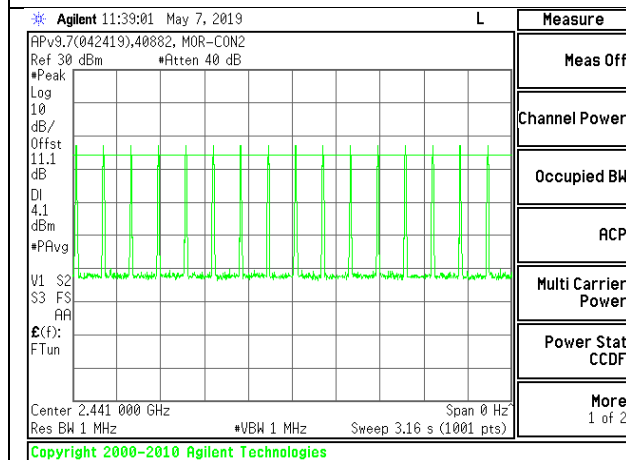
PULSE WIDTH – 2DH3



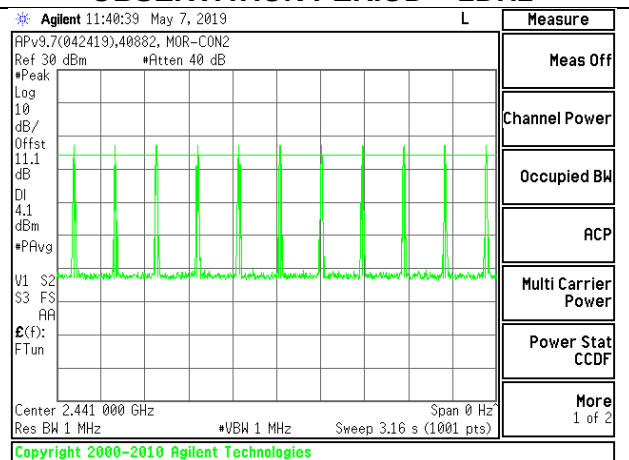
PULSE WIDTH – 2DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 2DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 2DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 2DH5

8.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

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

Measurements perform using a wideband gated RF power meter.

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

RESULTS

8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	40882
Date:	2019-05-08

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.94	30	-23.06
Middle	2441	9.23	30	-20.77
High	2480	7.68	30	-22.32

8.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	40882
Date:	2019-05-08

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.43	21	-15.57
Middle	2441	8.07	21	-12.93
High	2480	6.91	21	-14.09

8.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	40882
Date:	2019-05-08

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.04	21	-15.96
Middle	2441	7.78	21	-13.22
High	2480	6.39	21	-14.61

8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

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

RESULTS

8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	40882
Date	2019-05-08

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.6
Middle	2441	8.97
High	2480	7.54

8.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	40882
Date	2019-05-08

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.65
Middle	2441	5.5
High	2480	4.44

8.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	40882
Date	2019-05-08

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.43
Middle	2441	5.52
High	2480	4.24

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

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.

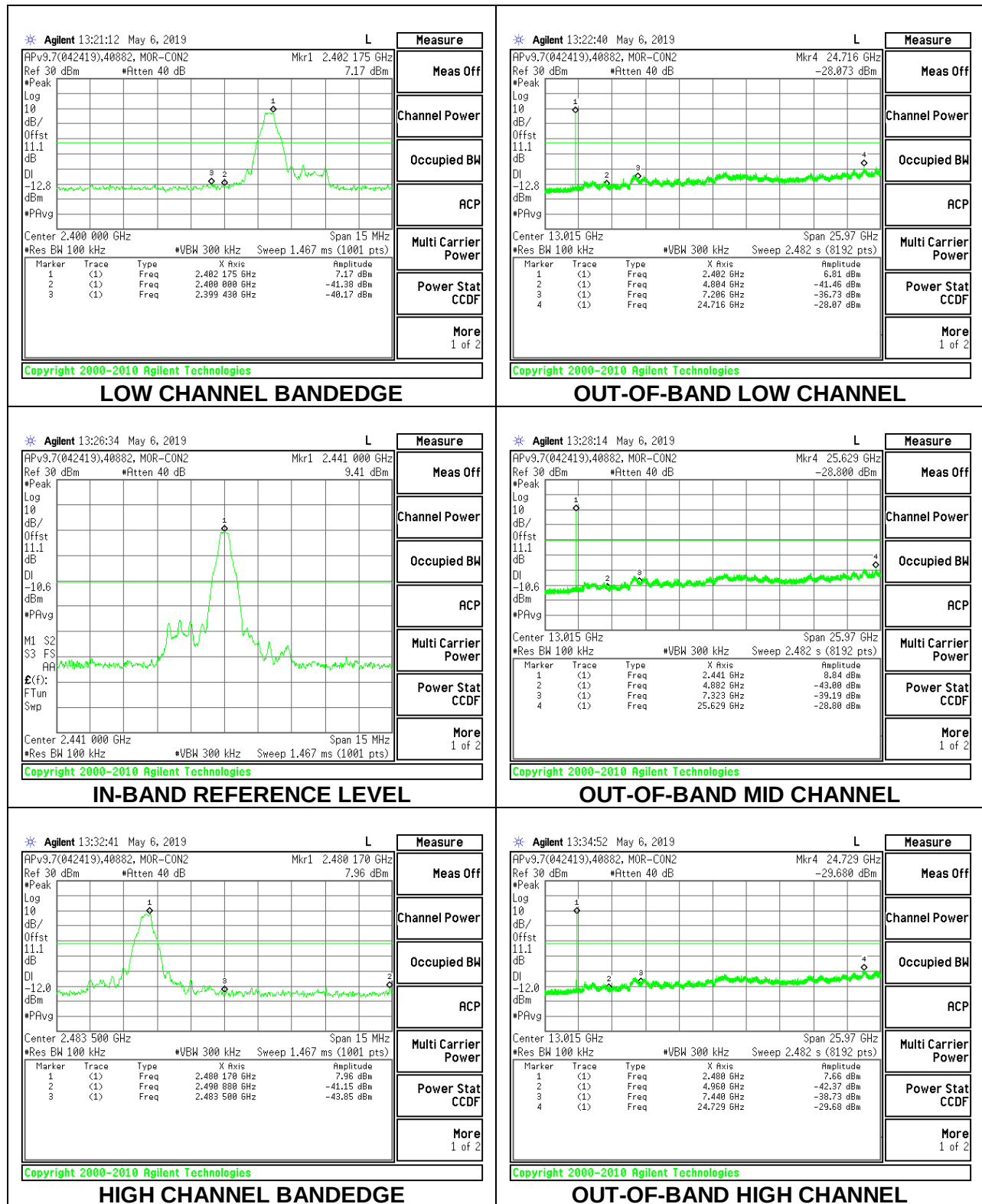
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

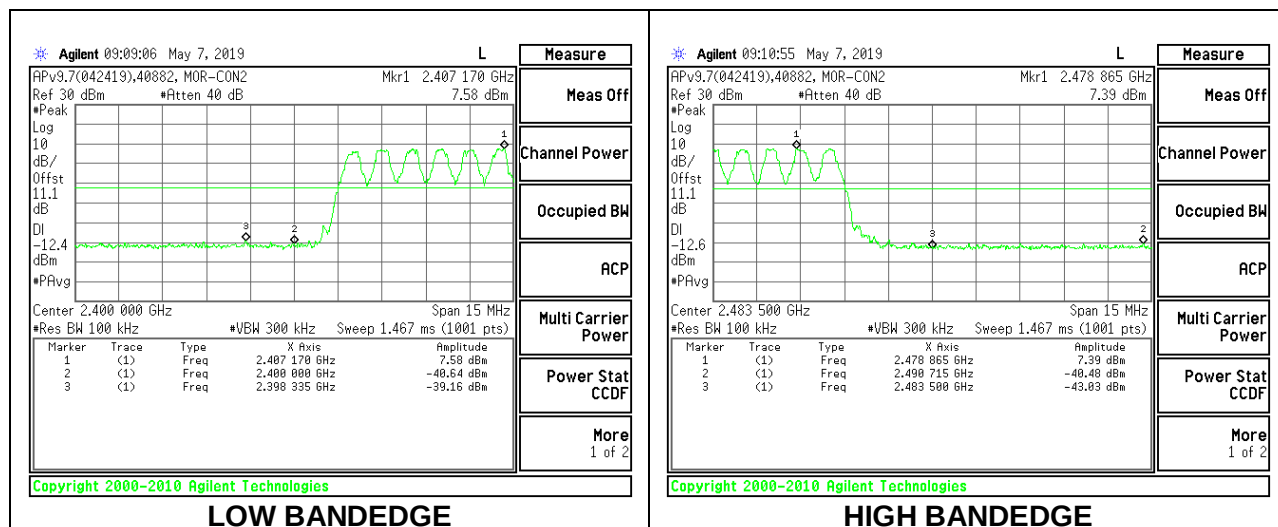
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

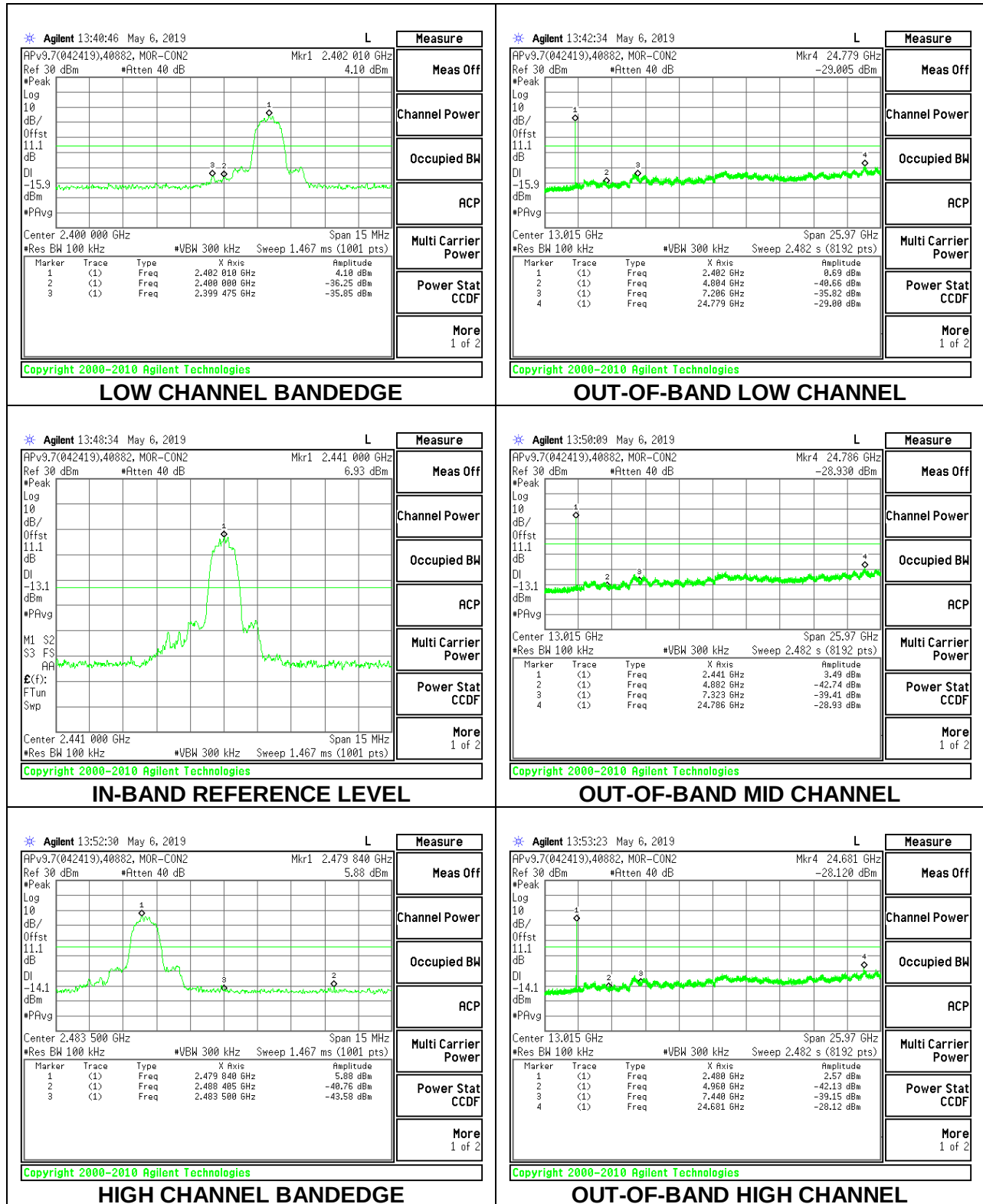


Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

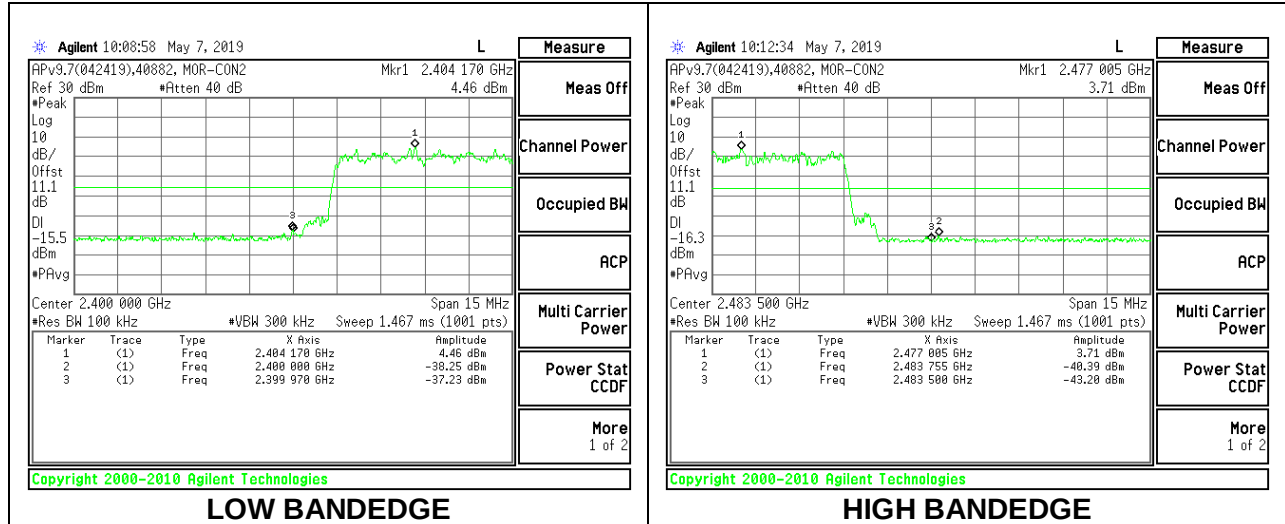


8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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 and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements where T = 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.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

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

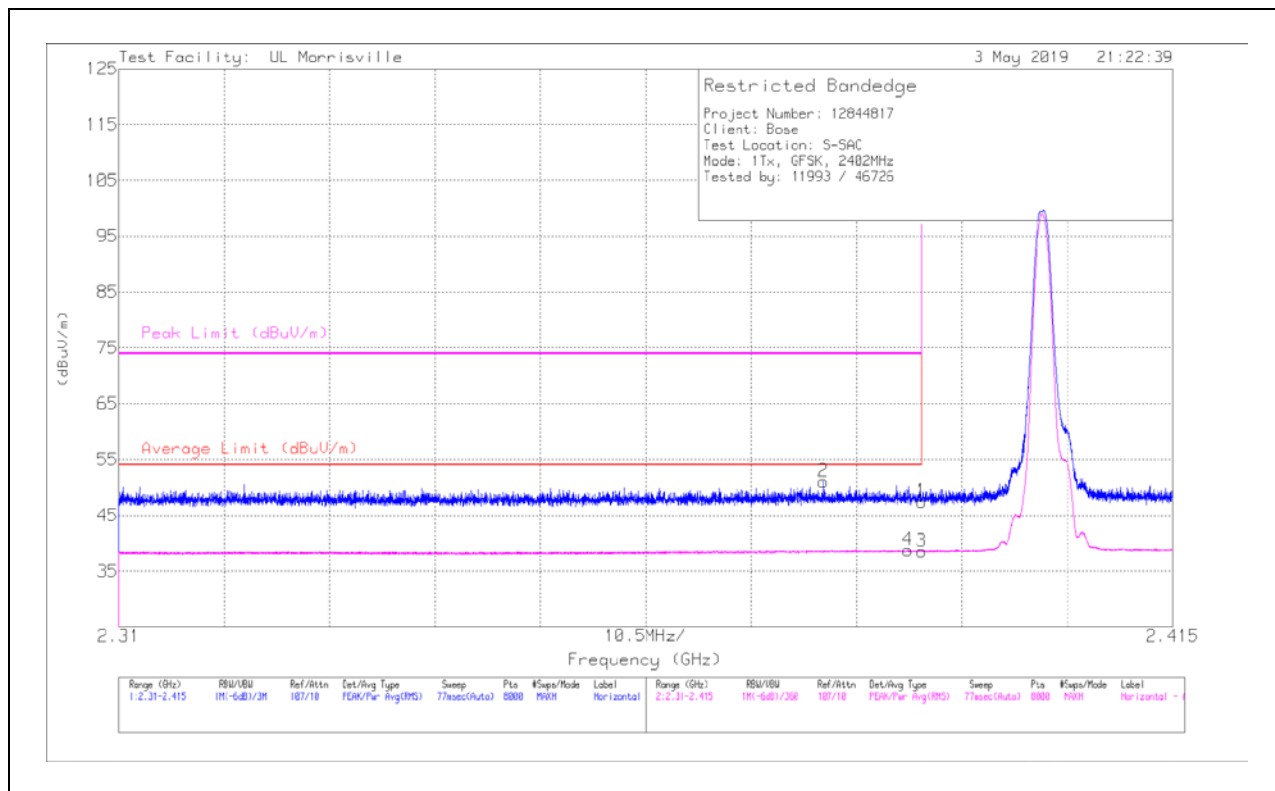
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

9.1. 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	AT0072 (dB/m)	Amp/Cbl/Filtr/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	39.65	Pk	31.9	-24.1	47.45	-	-	74	-26.55	270	309	H
2	* ** 2.38	43.31	Pk	31.9	-24.1	51.11	-	-	74	-22.89	270	309	H
3	* ** 2.39	30.74	V1TR	31.9	-24.1	38.54	54	-15.46	-	-	270	309	H
4	* ** 2.389	31	V1TR	31.9	-24.1	38.8	54	-15.2	-	-	270	309	H

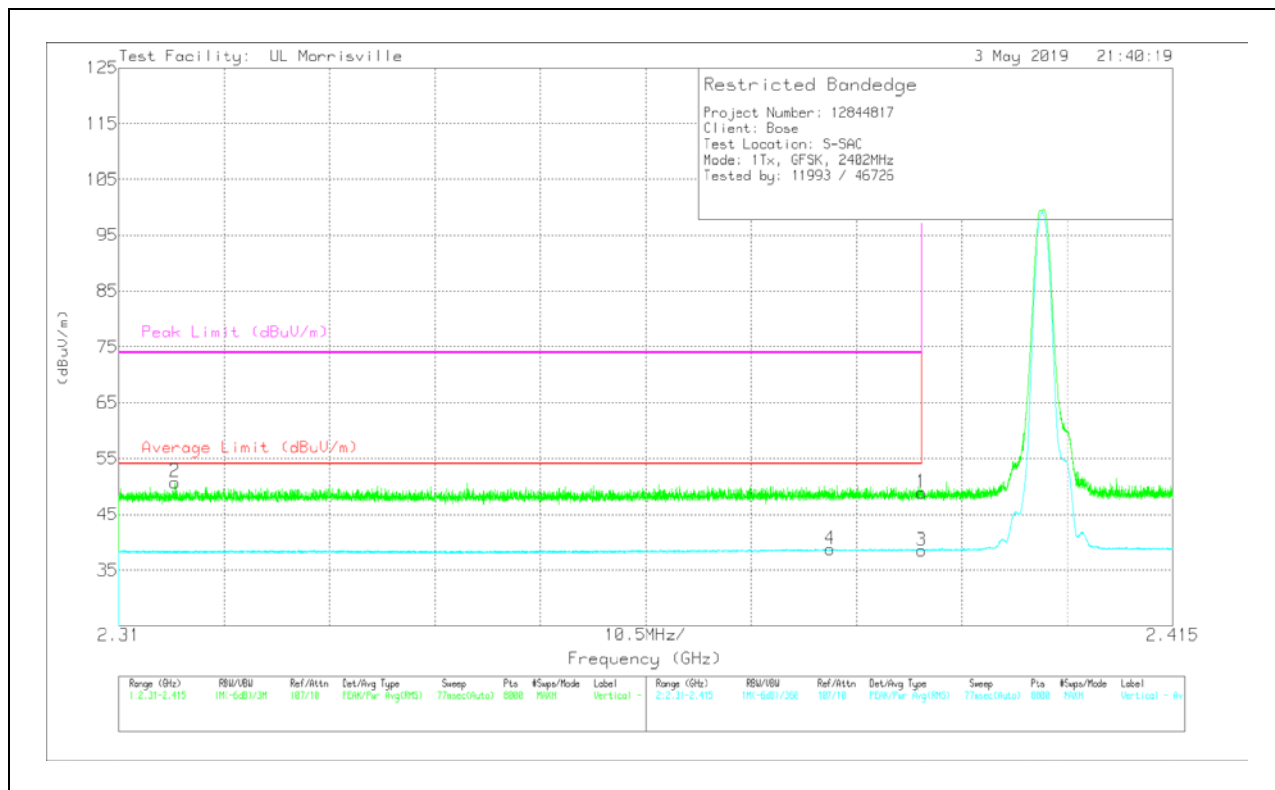
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - $VB=1/Ton$, where: Ton is packet duration

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	41.11	Pk	31.9	-24.1	48.91	-	-	74	-25.09	30	369	V
2	*** 2.316	43.27	Pk	31.7	-24.2	50.77	-	-	74	-23.23	30	369	V
3	*** 2.39	30.75	V1TR	31.9	-24.1	38.55	54	-15.45	-	-	30	369	V
4	*** 2.381	30.99	V1TR	31.9	-24.1	38.79	54	-15.21	-	-	30	369	V

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

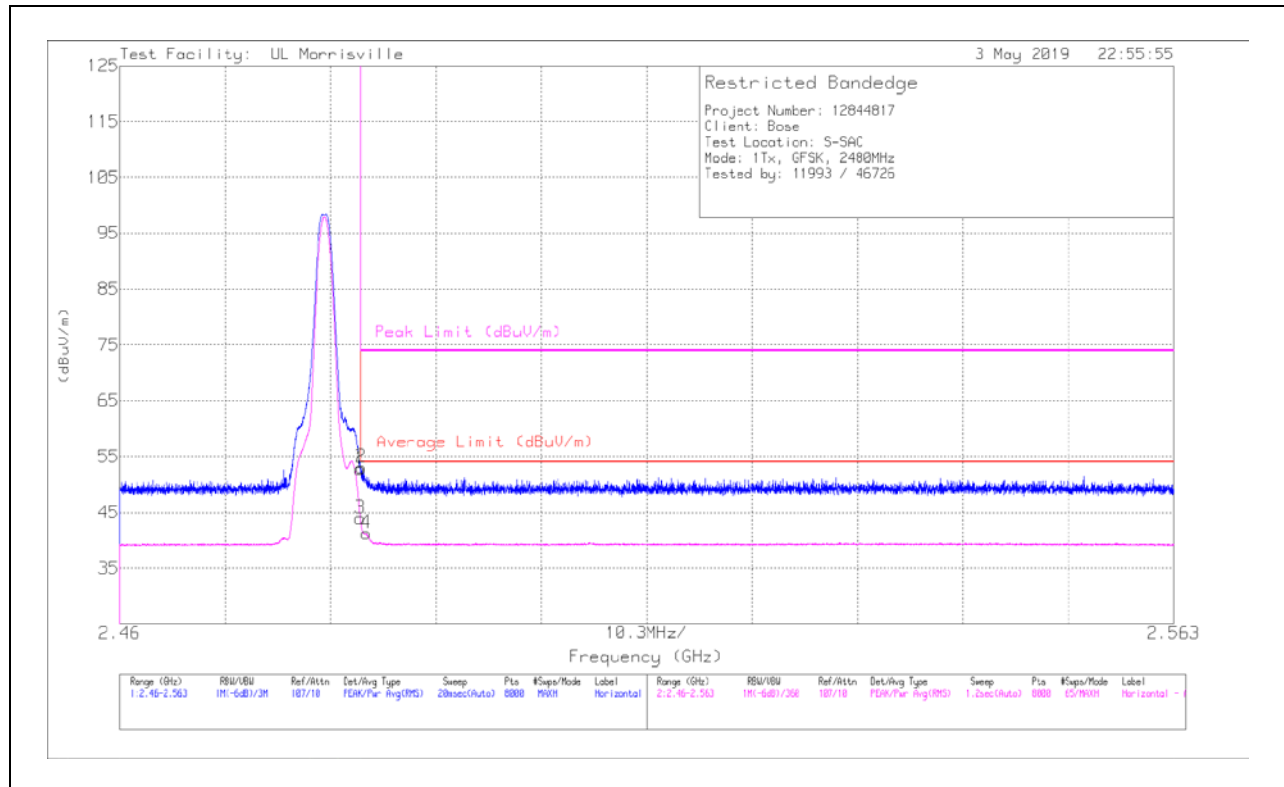
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - $VB=1/Ton$, where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	44.47	Pk	32.3	-24	52.77	-	-	74	-21.23	291	396	H
2	*** 2.484	44.8	Pk	32.3	-24	53.1	-	-	74	-20.9	291	396	H
3	*** 2.484	35.66	V1TR	32.3	-24	43.96	54	-10.04	-	-	291	396	H
4	*** 2.484	32.99	V1TR	32.3	-24	41.29	54	-12.71	-	-	291	396	H

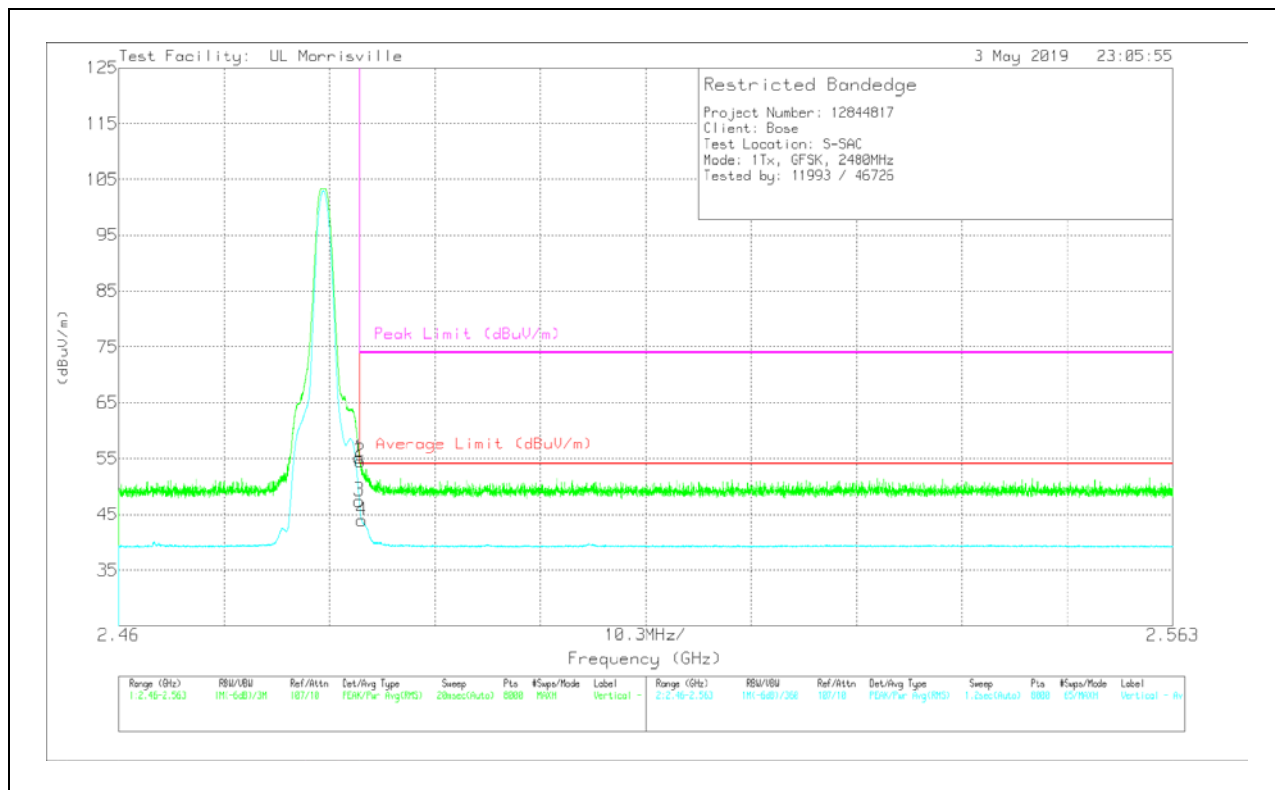
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - VB=1/Ton, where: Ton is packet duration

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	46.85	Pk	32.3	-24	55.15	-	-	74	-18.85	22	346	V
2	*** 2.484	46.19	Pk	32.3	-24	54.49	-	-	74	-19.51	22	346	V
3	*** 2.484	39.15	V1TR	32.3	-24	47.45	54	-6.55	-	-	22	346	V
4	*** 2.484	35.65	V1TR	32.3	-24	43.95	54	-10.05	-	-	22	346	V

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

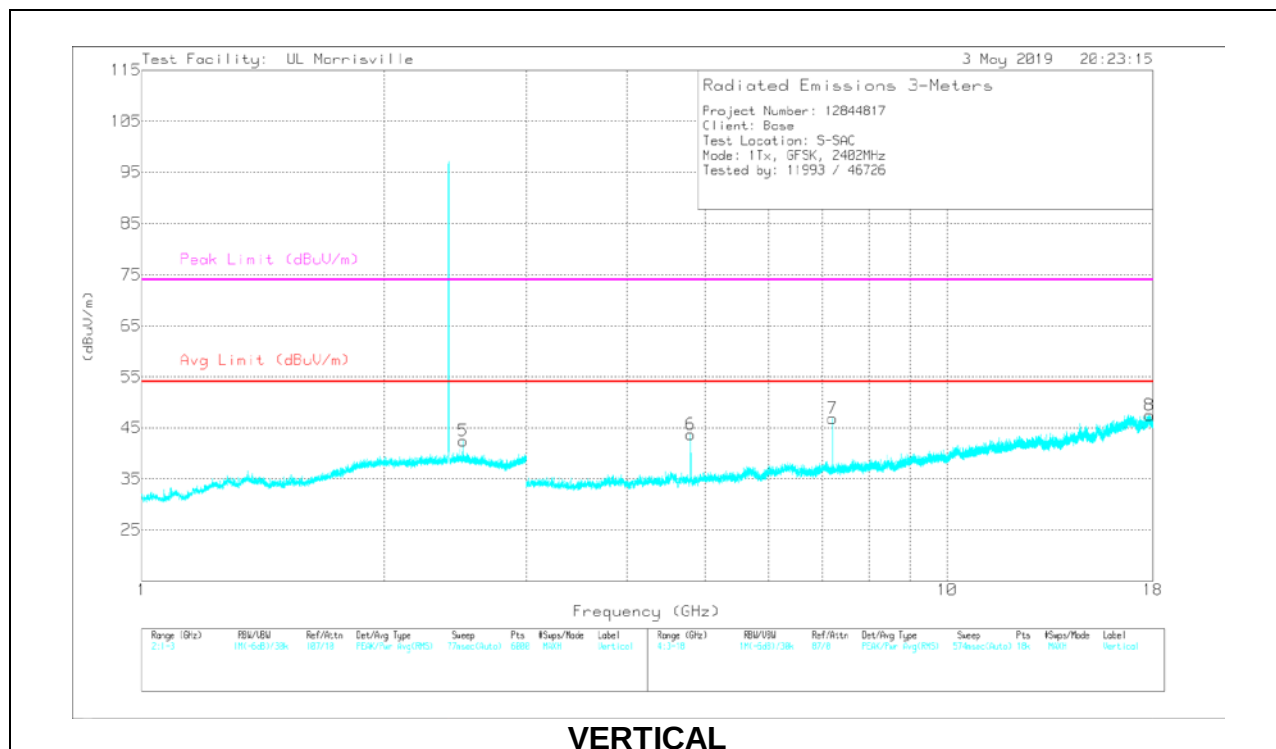
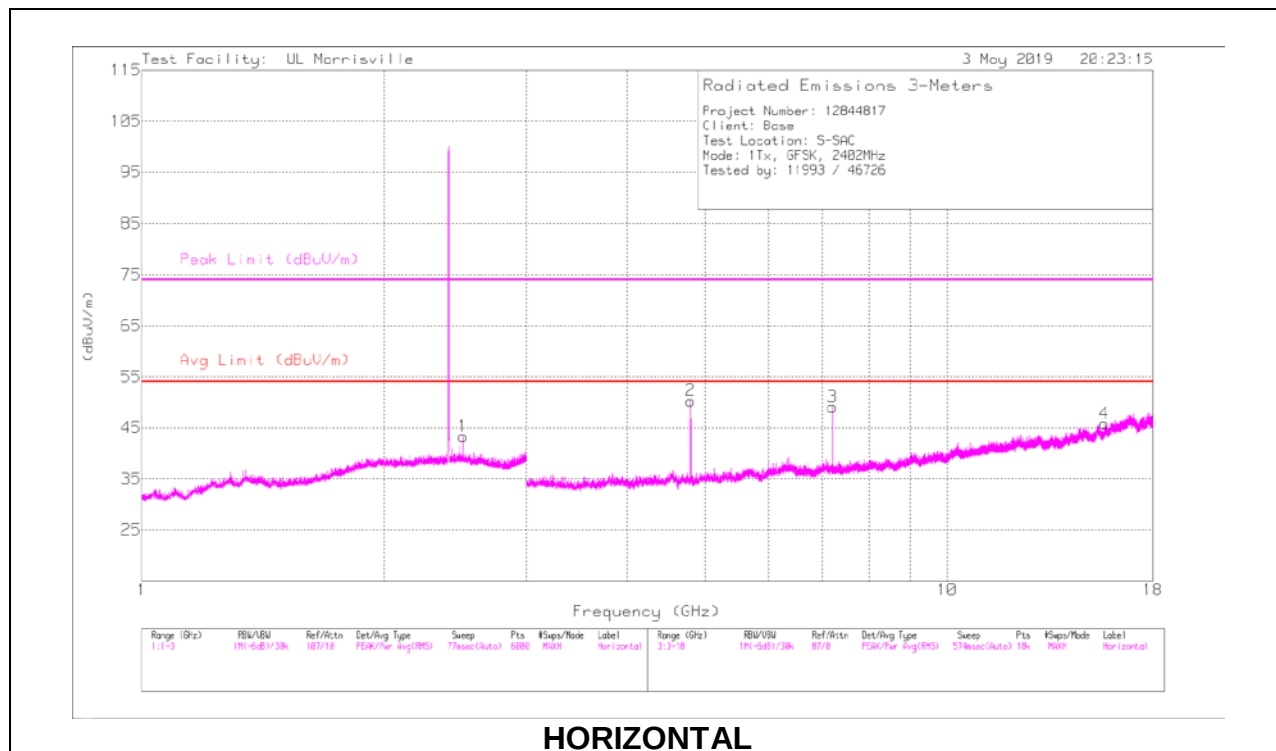
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - VB=1/Ton, where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 4.804	49.37	PK-U	34.2	-31	52.57	-	-	74	-21.43	135	108	H
	* ** 4.804	45.32	V1TR	34.2	-31	48.52	54	-5.48	-	-	135	108	H
4	* ** 15.674	33.69	PK-U	40.2	-22.7	51.19	-	-	74	-22.81	190	266	H
	* ** 15.672	22.36	V1TR	40.1	-22.7	39.76	54	-14.24	-	-	190	266	H
6	* ** 4.804	44.12	PK-U	34.2	-31	47.32	-	-	74	-26.68	250	104	V
	* ** 4.804	38.22	V1TR	34.2	-31	41.42	54	-12.58	-	-	250	104	V
8	* ** 17.825	33.62	PK-U	41.2	-20.8	54.02	-	-	74	-19.98	286	276	V
	* ** 17.825	22.22	V1TR	41.2	-20.8	42.62	54	-11.38	-	-	286	276	V
1	** 2.506	41.07	PK-U	32.4	-24.6	48.87	-	-	74	-25.13	351	221	H
	** 2.506	34.32	V1TR	32.4	-24.6	42.12	54	-11.88	-	-	351	221	H
5	** 2.506	40.23	PK-U	32.4	-24.6	48.03	-	-	74	-25.97	43	291	V
	** 2.506	31.95	V1TR	32.4	-24.6	39.75	54	-14.25	-	-	43	291	V
3	7.206	41.43	Pk	35.7	-28	49.13	-	-	-	-	0-360	199	H
7	7.206	39.16	Pk	35.7	-28	46.86	-	-	-	-	0-360	101	V

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

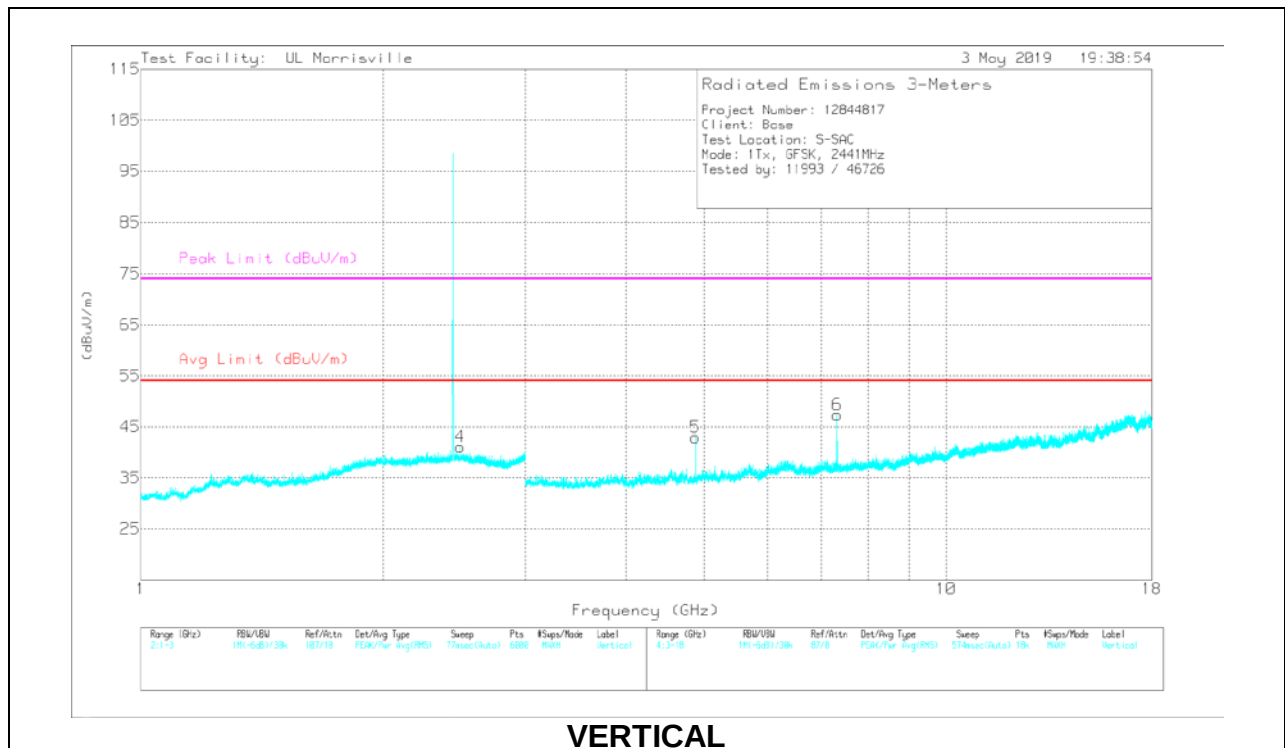
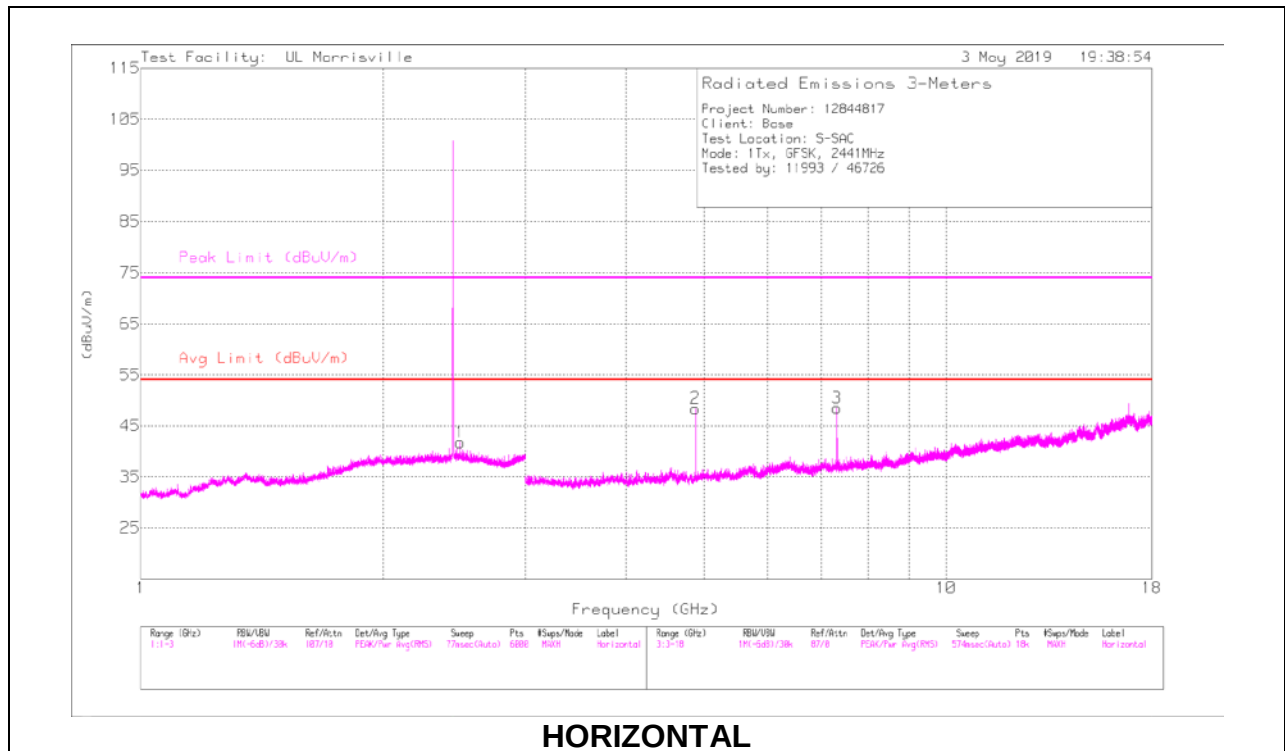
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK-U - Maximum Peak

V1TR - VB=1/Ton, where: Ton is packet duration

Pk - Peak detector

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	*** 2.493	39.88	PK-U	32.3	-24.5	47.68	-	-	74	-26.32	3	153	H
	*** 2.493	31.22	V1TR	32.3	-24.5	39.02	54	-14.98	-	-	3	153	H
4	*** 2.493	39.9	PK-U	32.3	-24.5	47.7	-	-	74	-26.3	27	267	V
	*** 2.493	31.08	V1TR	32.3	-24.5	38.88	54	-15.12	-	-	27	267	V
2	*** 4.882	47.35	PK-U	34	-30.6	50.75	-	-	74	-23.25	159	111	H
	*** 4.882	43.15	V1TR	34	-30.6	46.55	54	-7.45	-	-	159	111	H
3	*** 7.322	43.83	PK-U	35.7	-27.5	52.03	-	-	74	-21.97	175	160	H
	*** 7.323	37.2	V1TR	35.7	-27.5	45.4	54	-8.6	-	-	175	160	H
5	*** 4.882	43.88	PK-U	34	-30.6	47.28	-	-	74	-26.72	257	106	V
	*** 4.882	37.62	V1TR	34	-30.6	41.02	54	-12.98	-	-	257	106	V
6	*** 7.324	42.85	PK-U	35.7	-27.5	51.05	-	-	74	-22.95	25	110	V
	*** 7.323	36.39	V1TR	35.7	-27.5	44.59	54	-9.41	-	-	25	110	V

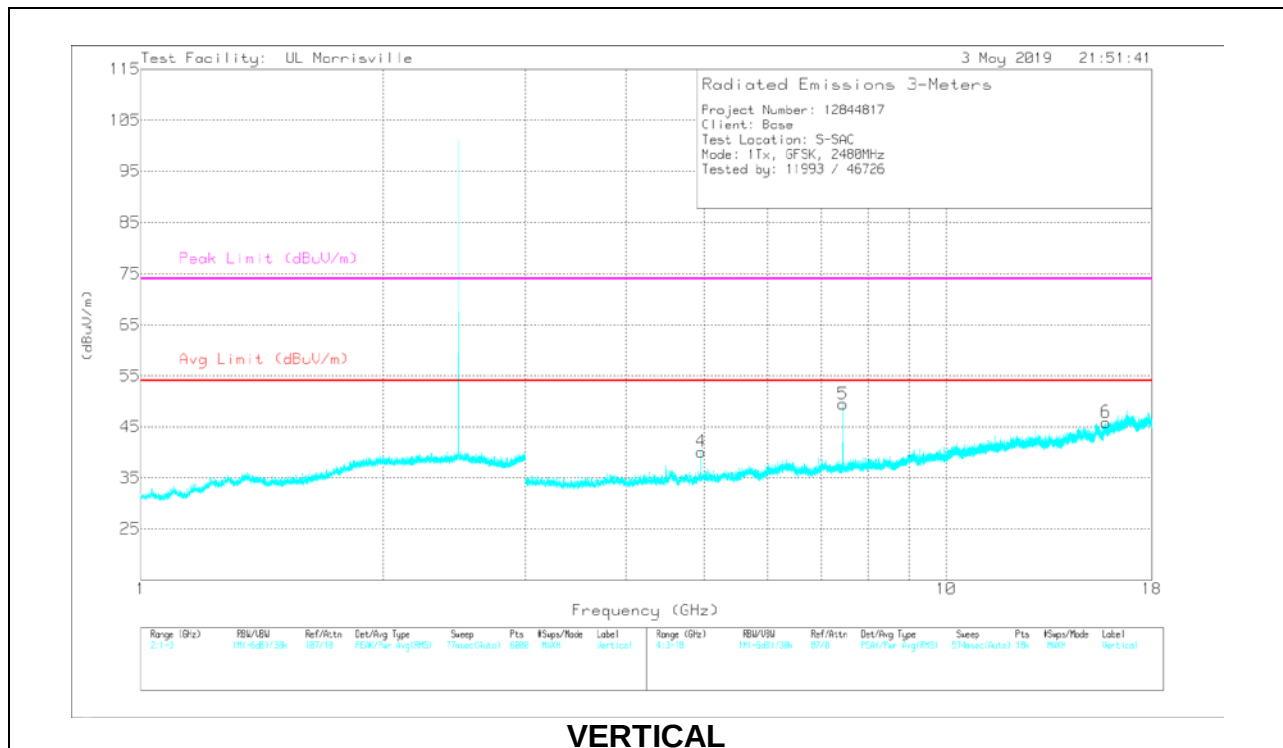
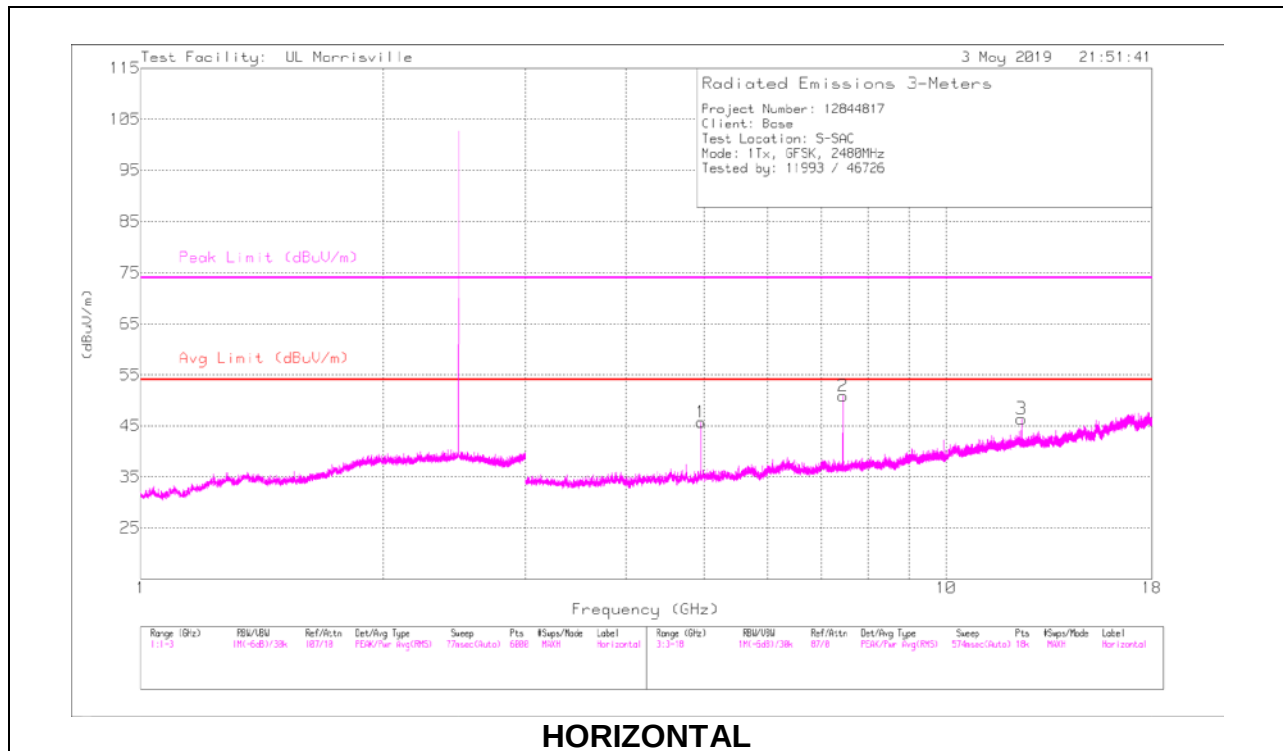
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK-U - Maximum Peak

V1TR - VB=1/Ton, where: Ton is packet duration

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	46.92	PK-U	34.1	-31	50.02	-	-	74	-23.98	80	132	H
	* ** 4.96	41.4	V1TR	34.1	-31.1	44.4	54	-9.6	-	-	80	132	H
2	* ** 7.44	46.52	PK-U	35.8	-27.8	54.52	-	-	74	-19.48	203	128	H
	* ** 7.44	41.18	V1TR	35.8	-27.8	49.18	54	-4.82	-	-	203	128	H
3	* ** 12.399	36.72	PK-U	38.8	-23.9	51.62	-	-	74	-22.38	140	132	H
	* ** 12.399	26.27	V1TR	38.8	-23.9	41.17	54	-12.83	-	-	140	132	H
4	* ** 4.96	43.6	PK-U	34.1	-31	46.7	-	-	74	-27.3	109	111	V
	* ** 4.96	36.73	V1TR	34.1	-31.1	39.73	54	-14.27	-	-	109	111	V
5	* ** 7.44	45.36	PK-U	35.8	-27.8	53.36	-	-	74	-20.64	227	101	V
	* ** 7.44	39.23	V1TR	35.8	-27.8	47.23	54	-6.77	-	-	227	101	V
6	* ** 15.784	34.16	PK-U	40.4	-22.4	52.16	-	-	74	-21.84	75	400	V
	* ** 15.784	22.45	V1TR	40.4	-22.4	40.45	54	-13.55	-	-	75	400	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

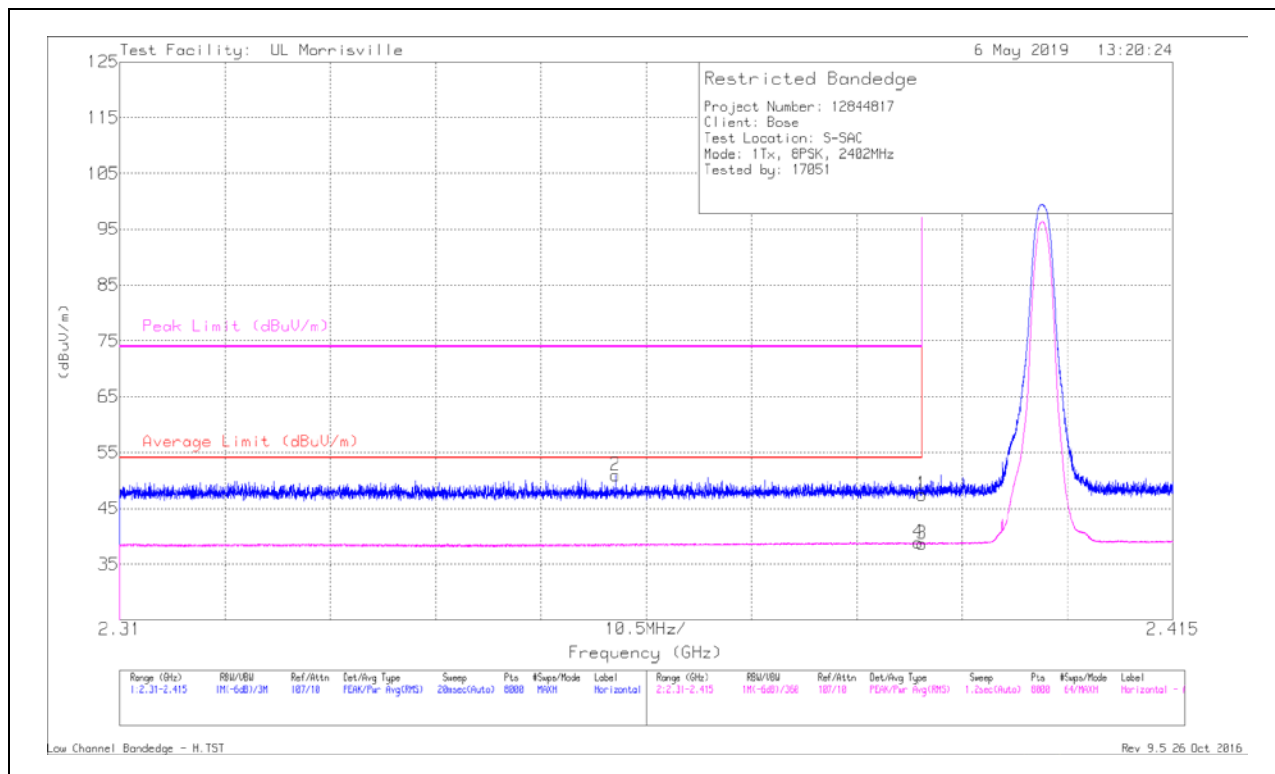
PK-U - Maximum Peak

V1TR - $VB=1/Ton$, where: Ton is packet duration

9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	39.66	Pk	31.9	-24.1	47.46	-	-	74	-26.54	260	139	H
2	** 2.359	43.48	Pk	31.7	-24.2	50.98	-	-	74	-23.02	260	139	H
3	* ** 2.39	30.86	V1TR	31.9	-24.1	38.66	54	-15.34	-	-	260	139	H
4	* ** 2.39	31.09	V1TR	31.9	-24.1	38.89	54	-15.11	-	-	260	139	H

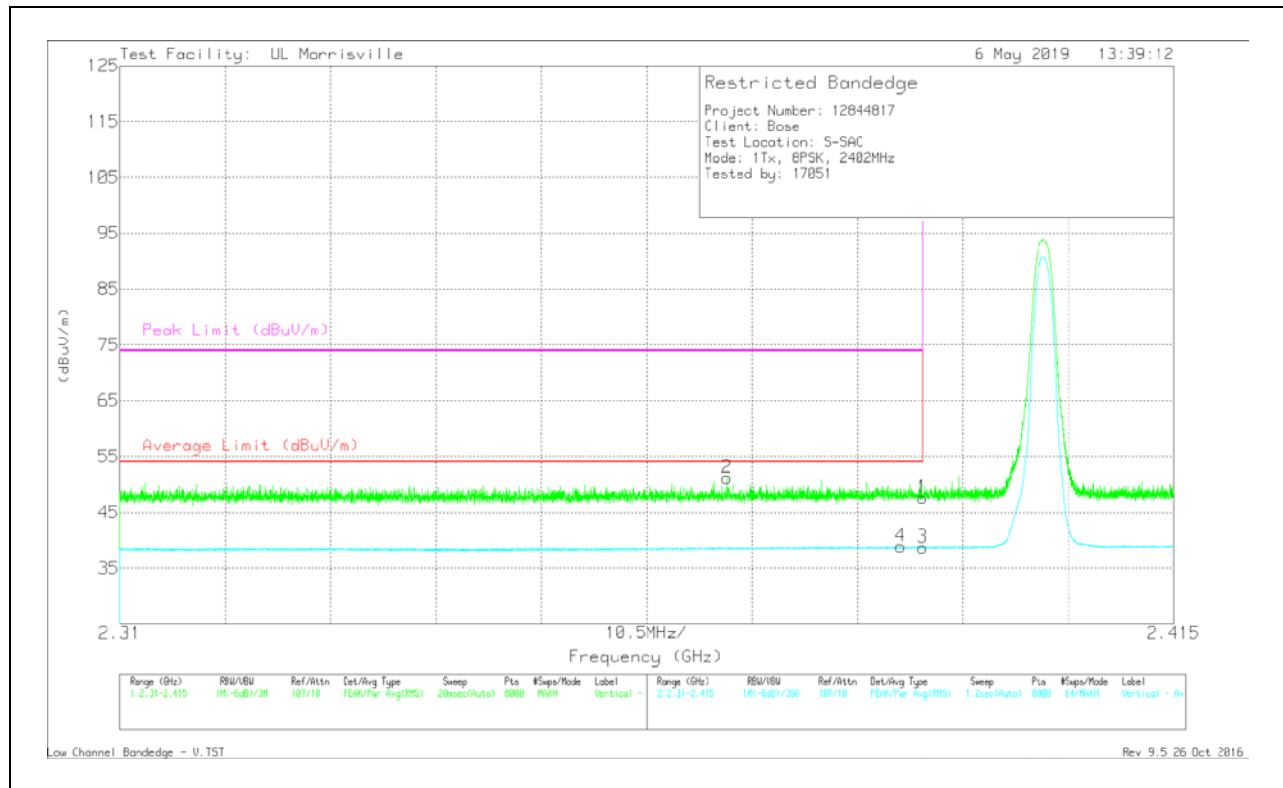
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - $VB=1/Ton$, where: Ton is packet duration

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*** 2.371	43.6	Pk	31.8	-24.2	51.2	-	-	74	-22.8	334	114	V
4	*** 2.388	31.11	V1TR	31.9	-24.1	38.91	54	-15.09	-	-	334	114	V
1	*** 2.39	39.84	Pk	31.9	-24.1	47.64	-	-	74	-26.36	334	114	V
3	*** 2.39	30.92	V1TR	31.9	-24.1	38.72	54	-15.28	-	-	334	114	V

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

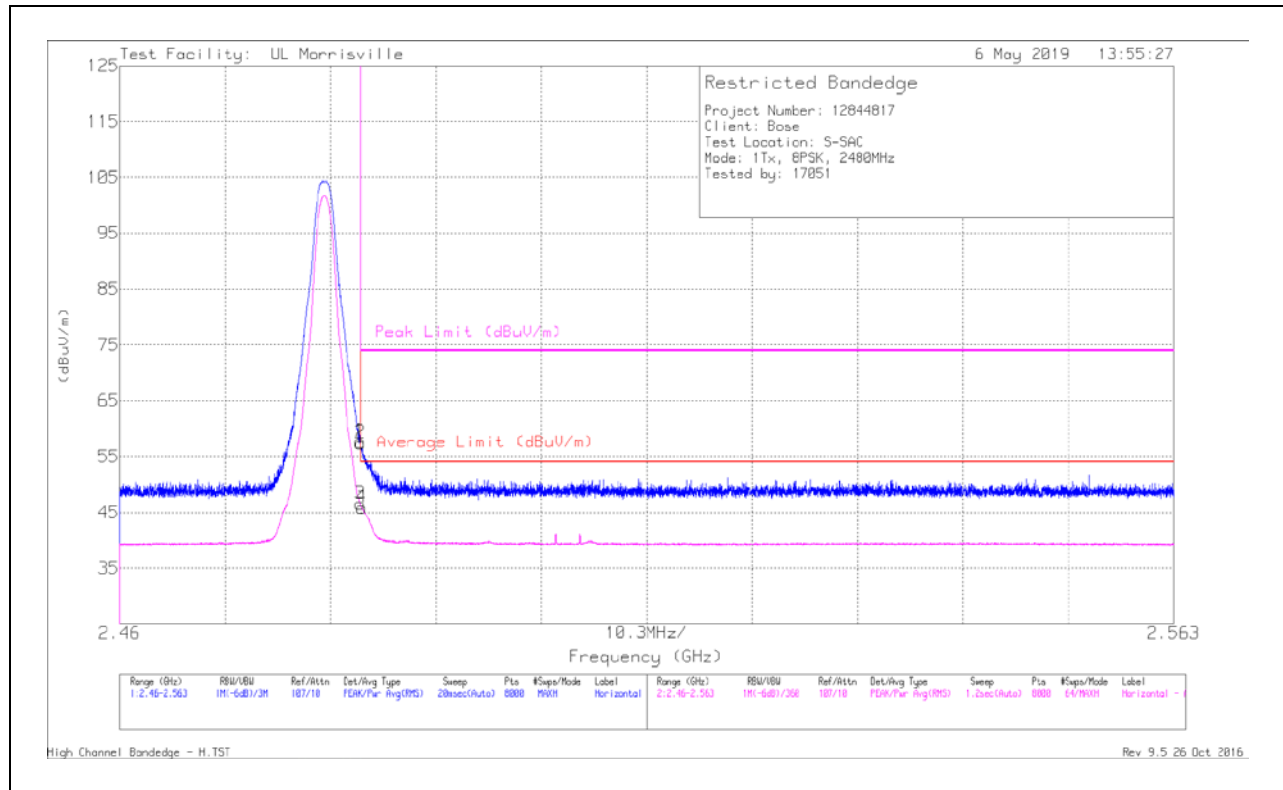
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - VB=1/Ton, where: Ton is packet duration

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	49.37	Pk	32.3	-24	57.67	-	-	74	-16.33	263	152	H
2	*** 2.484	49.1	Pk	32.3	-24	57.4	-	-	74	-16.6	263	152	H
3	*** 2.484	38.25	V1TR	32.3	-24	46.55	54	-7.45	-	-	263	152	H
4	*** 2.484	37.57	V1TR	32.3	-24	45.87	54	-8.13	-	-	263	152	H

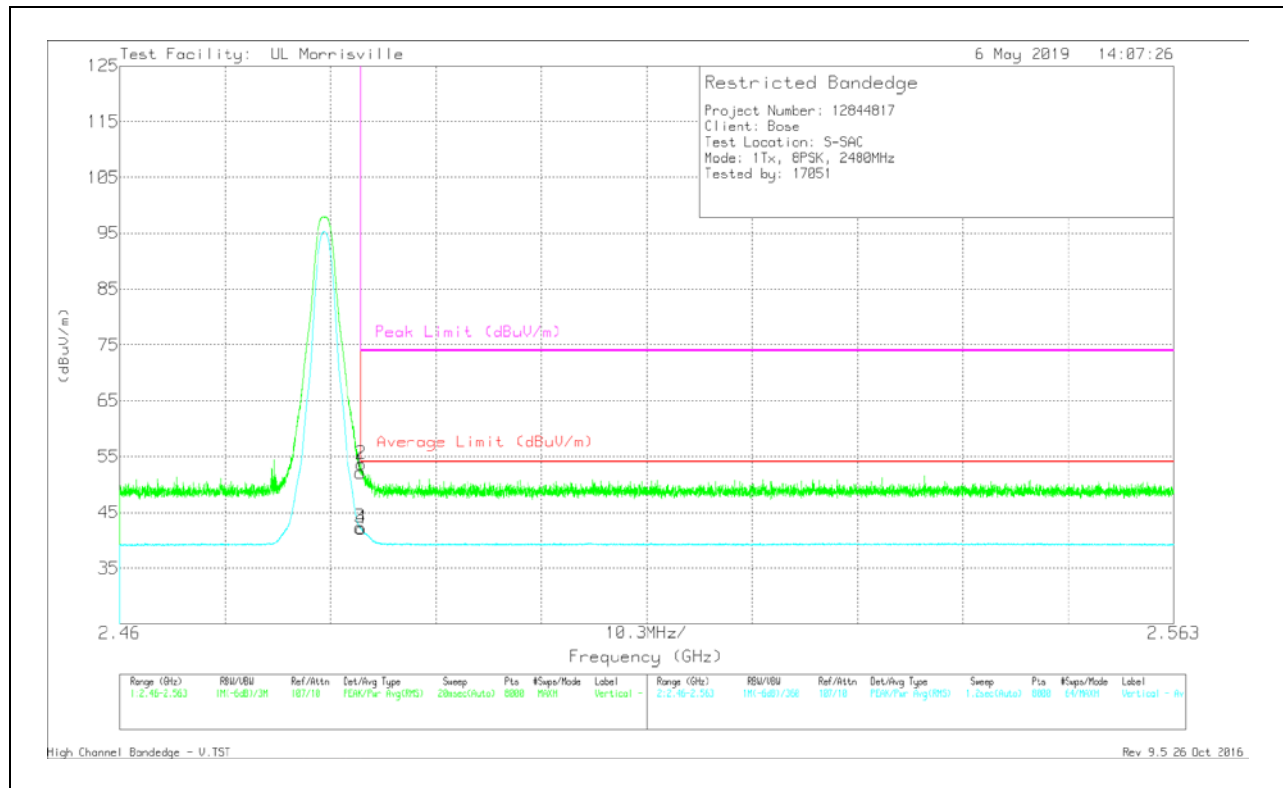
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - VB=1/Ton, where: Ton is packet duration

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/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	43.83	Pk	32.3	-24	52.13	-	-	74	-21.87	334	121	V
2	*** 2.484	45.4	Pk	32.3	-24	53.7	-	-	74	-20.3	334	121	V
3	*** 2.484	34	V1TR	32.3	-24	42.3	54	-11.7	-	-	334	121	V
4	*** 2.484	33.79	V1TR	32.3	-24	42.09	54	-11.91	-	-	334	121	V

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

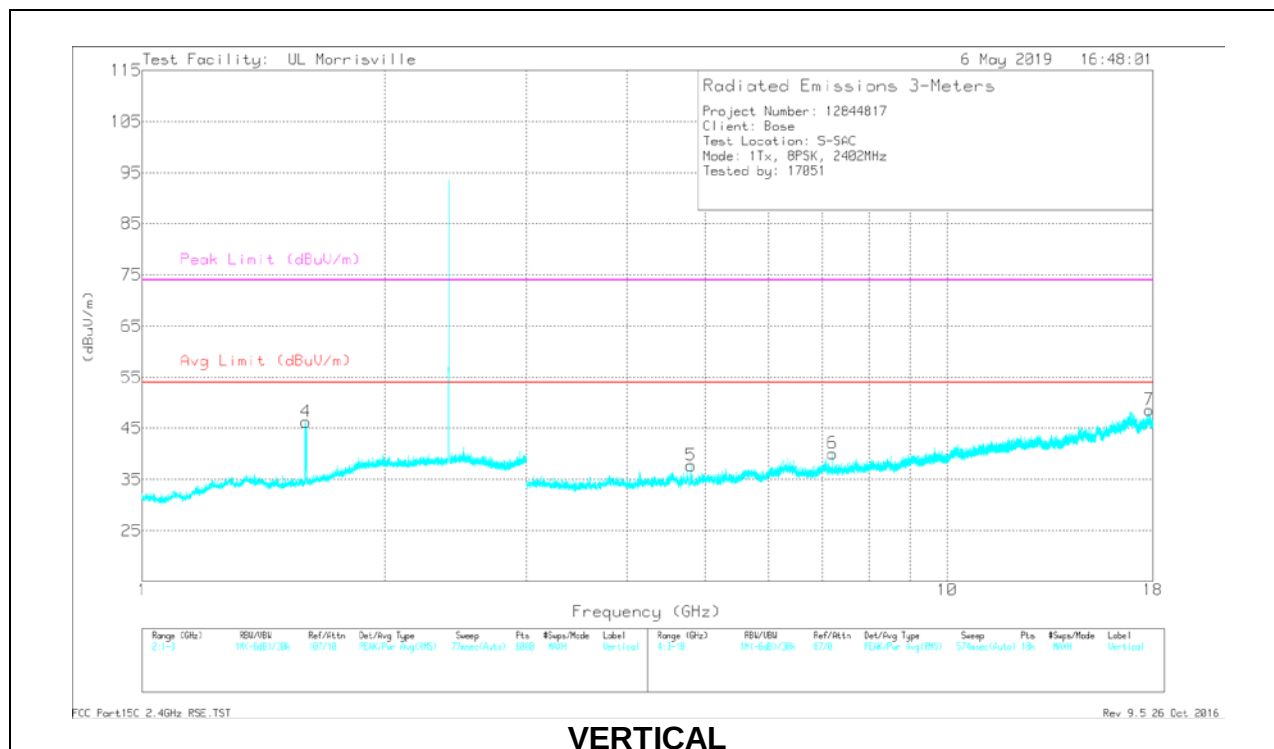
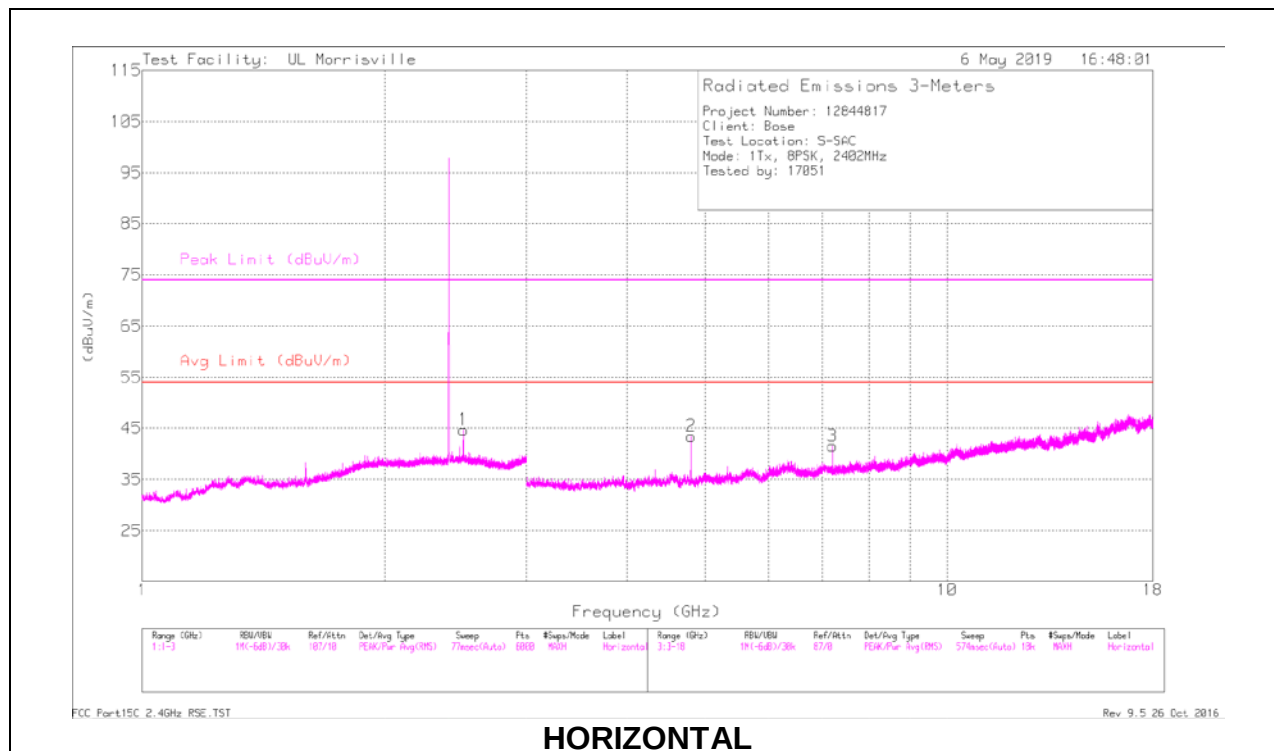
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

V1TR - VB=1/Ton, where: Ton is packet duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* ** 1.593	48.1	PK2	27.8	-22.2	53.7	-	-	74	-20.3	225	191	V
* ** 1.595	29.47	V1TR	27.8	-22.2	35.07	54	-18.93	-	-	225	191	V
* ** 4.804	45.74	PK2	34.2	-31	48.94	-	-	74	-25.06	152	148	H
* ** 4.804	38.02	V1TR	34.2	-31	41.22	54	-12.78	-	-	152	148	H
* ** 4.804	42.53	PK2	34.2	-31	45.73	-	-	74	-28.27	250	101	V
* ** 4.804	32.76	V1TR	34.2	-31	35.96	54	-18.04	-	-	250	101	V
* ** 17.815	33.13	PK2	41.2	-20.8	53.53	-	-	74	-20.47	251	198	V
* ** 17.811	22.36	V1TR	41.2	-20.8	42.76	54	-11.24	-	-	251	198	V
2.506	42.76	PK2	32.4	-24.6	50.56	-	-	-	-	262	101	H
2.506	35.03	V1TR	32.4	-24.6	42.83	-	-	-	-	262	101	H

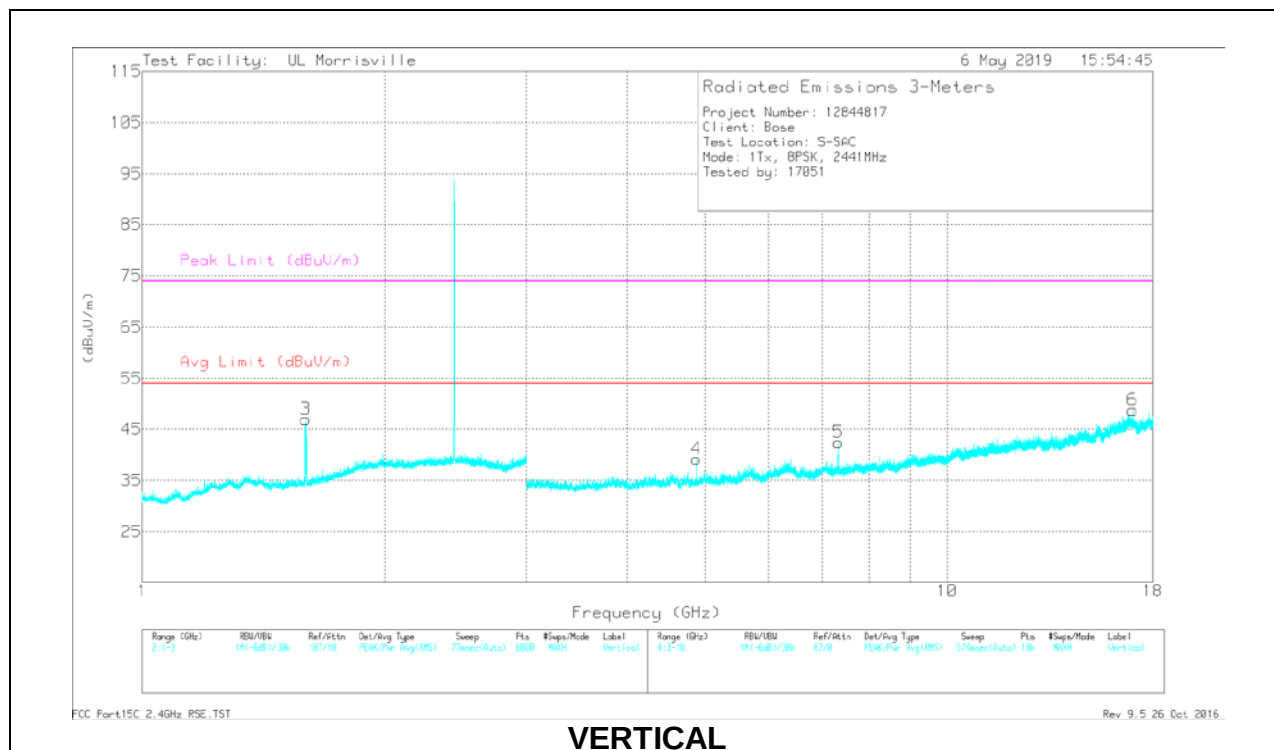
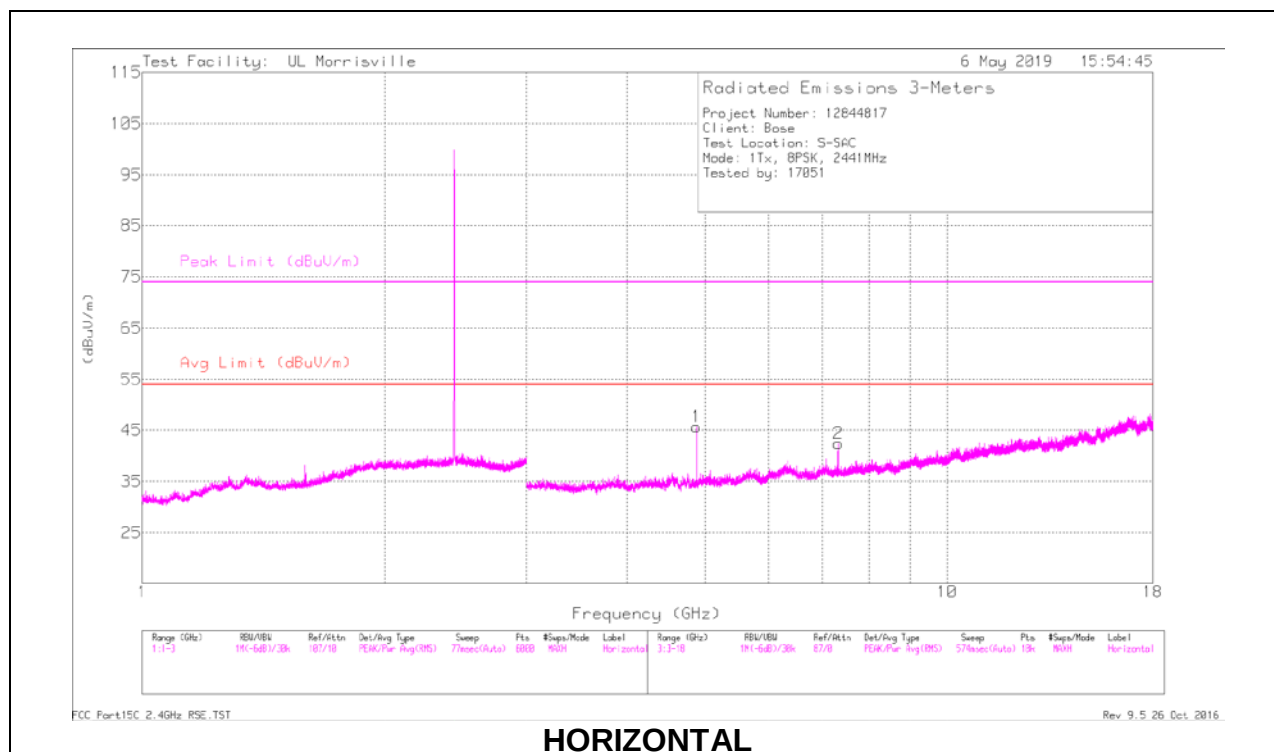
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

V1TR - $V_B=1/Ton$, where: Ton is packet duration

MID CHANNEL RESULTS



RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* ** 1.595	47.99	PK2	27.8	-22.2	53.59	-	-	74	-20.41	225	193	V
* ** 1.599	28.71	V1TR	27.8	-22.2	34.31	54	-19.69	-	-	225	193	V
* ** 4.882	46.51	PK2	34	-30.6	49.91	-	-	74	-24.09	156	109	H
* ** 4.882	39.28	V1TR	34	-30.6	42.68	54	-11.32	-	-	156	109	H
* ** 7.322	41.61	PK2	35.7	-27.5	49.81	-	-	74	-24.19	175	134	H
* ** 7.323	32.71	V1TR	35.7	-27.5	40.91	54	-13.09	-	-	175	134	H
* ** 4.882	42.55	PK2	34	-30.6	45.95	-	-	74	-28.05	250	105	V
* ** 4.882	33.15	V1TR	34	-30.6	36.55	54	-17.45	-	-	250	105	V
* ** 7.323	41.23	PK2	35.7	-27.5	49.43	-	-	74	-24.57	21	101	V
* ** 7.323	32.29	V1TR	35.7	-27.5	40.49	54	-13.51	-	-	21	101	V

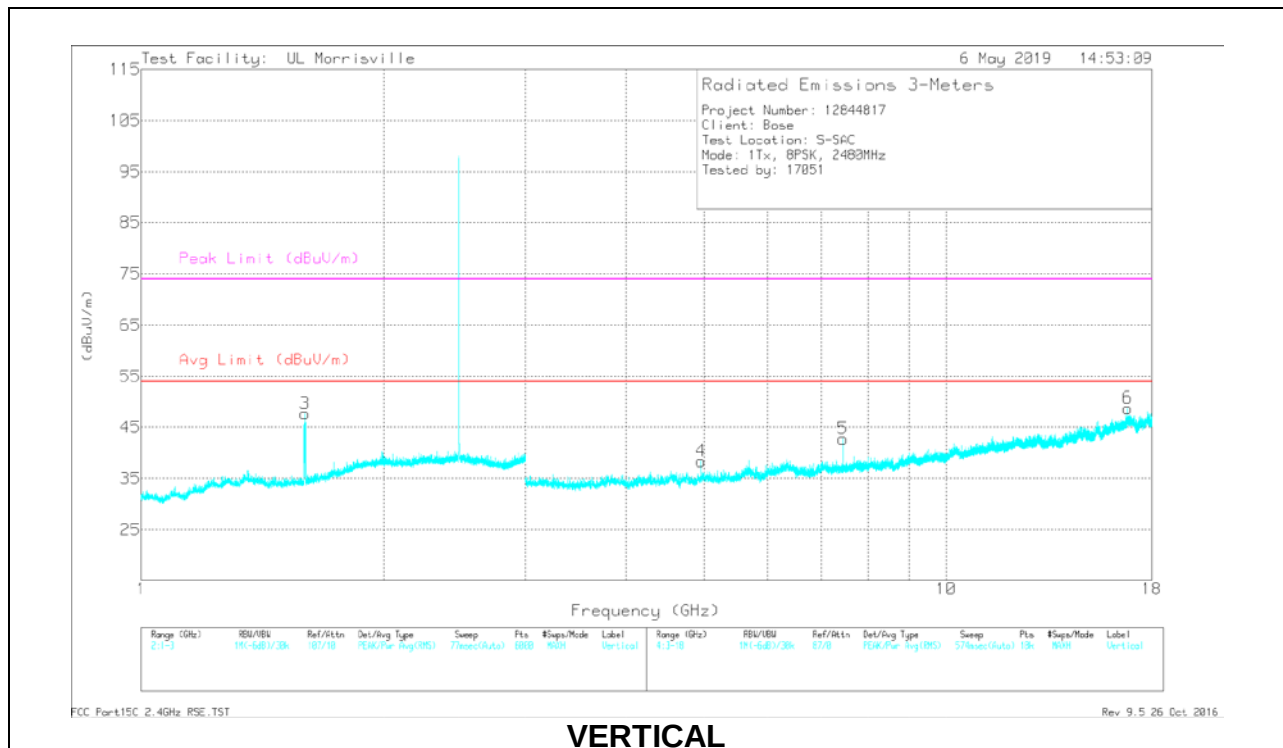
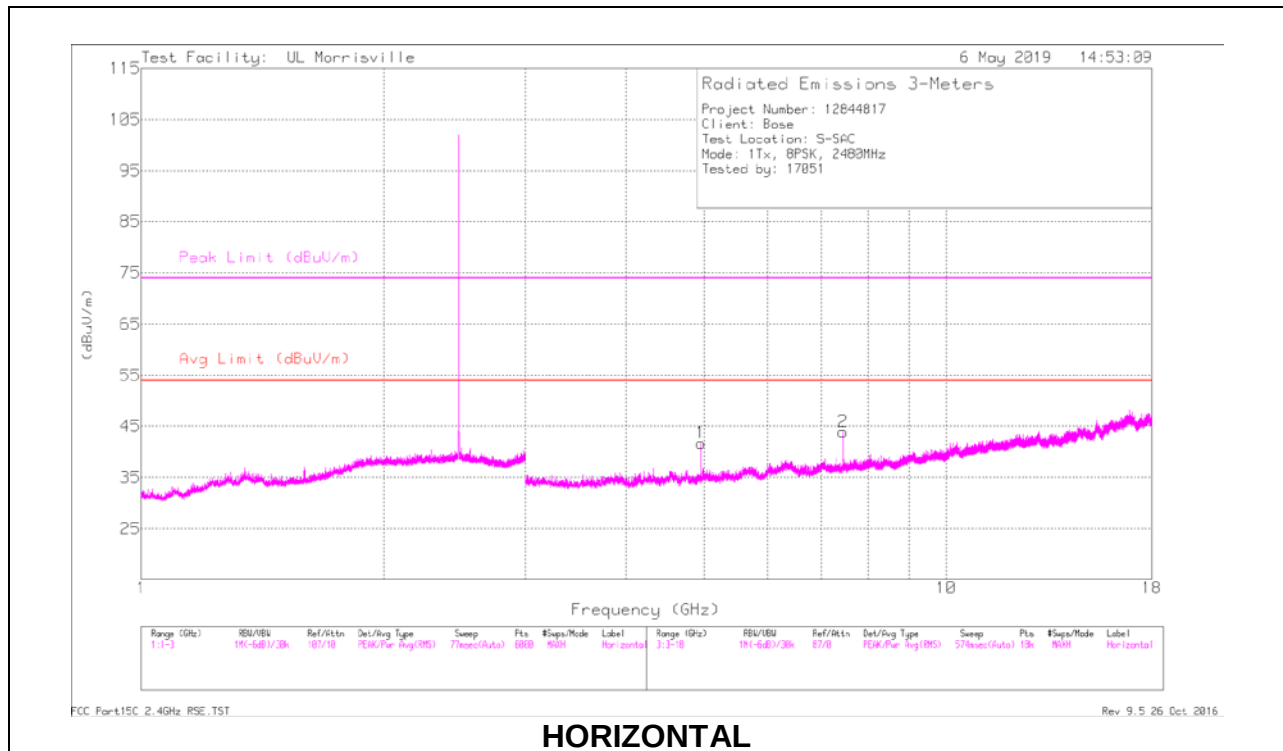
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

V1TR - $V_B=1/\text{Ton}$, where: Ton is packet duration

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* ** 1.597	48.1	PK2	27.8	-22.2	53.7	-	-	74	-20.3	225	191	V
* ** 1.593	28.67	V1TR	27.8	-22.2	34.27	54	-19.73	-	-	225	191	V
* ** 4.96	45.31	PK2	34.1	-31	48.41	-	-	74	-25.59	162	123	H
* ** 4.96	37.31	V1TR	34.1	-31.1	40.31	54	-13.69	-	-	162	123	H
* ** 7.44	43.03	PK2	35.8	-27.8	51.03	-	-	74	-22.97	183	169	H
* ** 7.44	33.52	V1TR	35.8	-27.8	41.52	54	-12.48	-	-	183	169	H
* ** 4.96	42.03	PK2	34.1	-31.1	45.03	-	-	74	-28.97	251	108	V
* ** 4.96	32.01	V1TR	34.1	-31.1	35.01	54	-18.99	-	-	251	108	V
* ** 7.44	42.22	PK2	35.8	-27.8	50.22	-	-	74	-23.78	220	101	V
* ** 7.44	32.59	V1TR	35.8	-27.8	40.59	54	-13.41	-	-	220	101	V

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

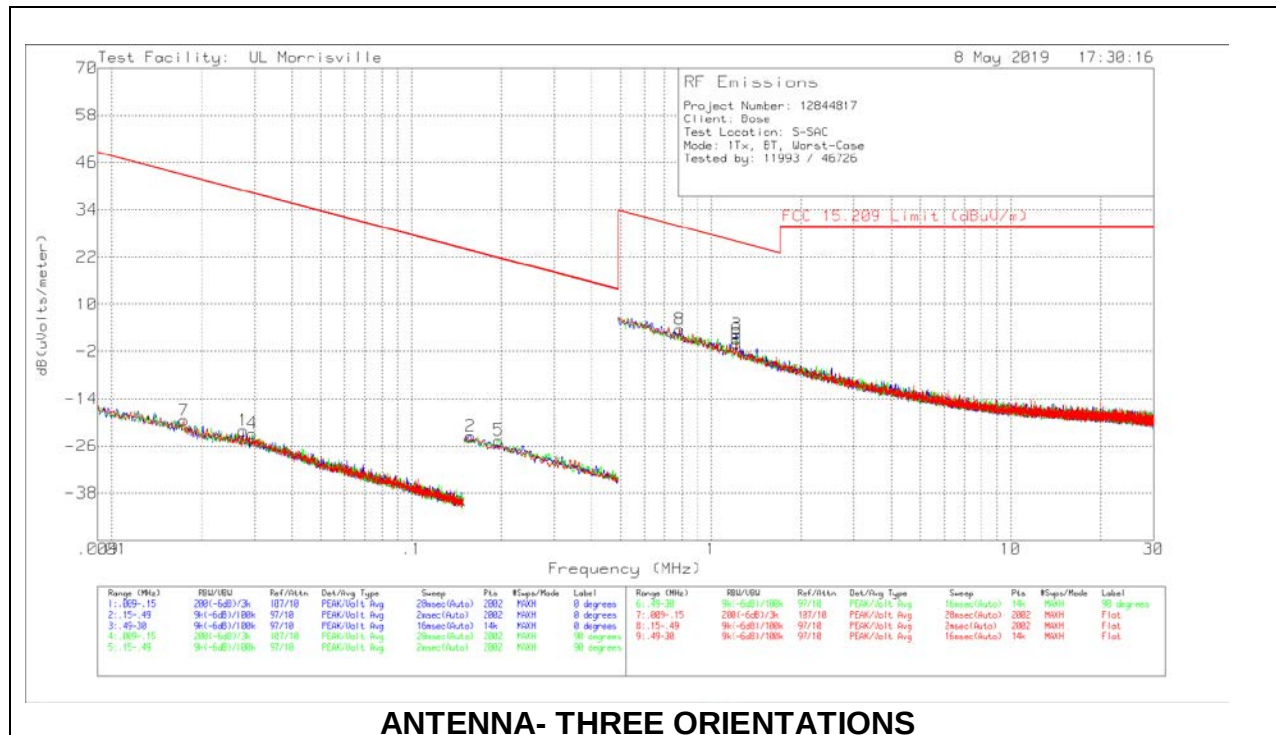
PK2 - Maximum Peak

V1TR - $V_B=1/\text{Ton}$, where: Ton is packet duration

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 $40 \cdot \log(\text{test distance} / \text{specification distance})$.



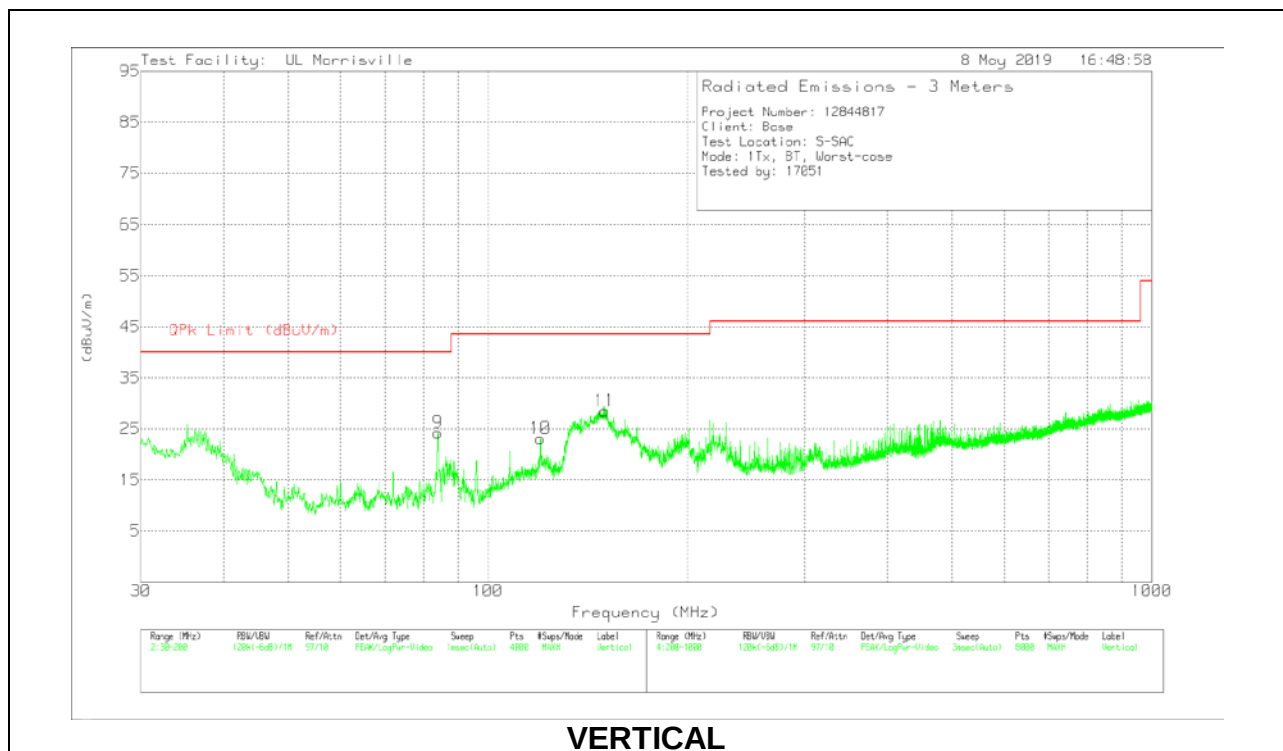
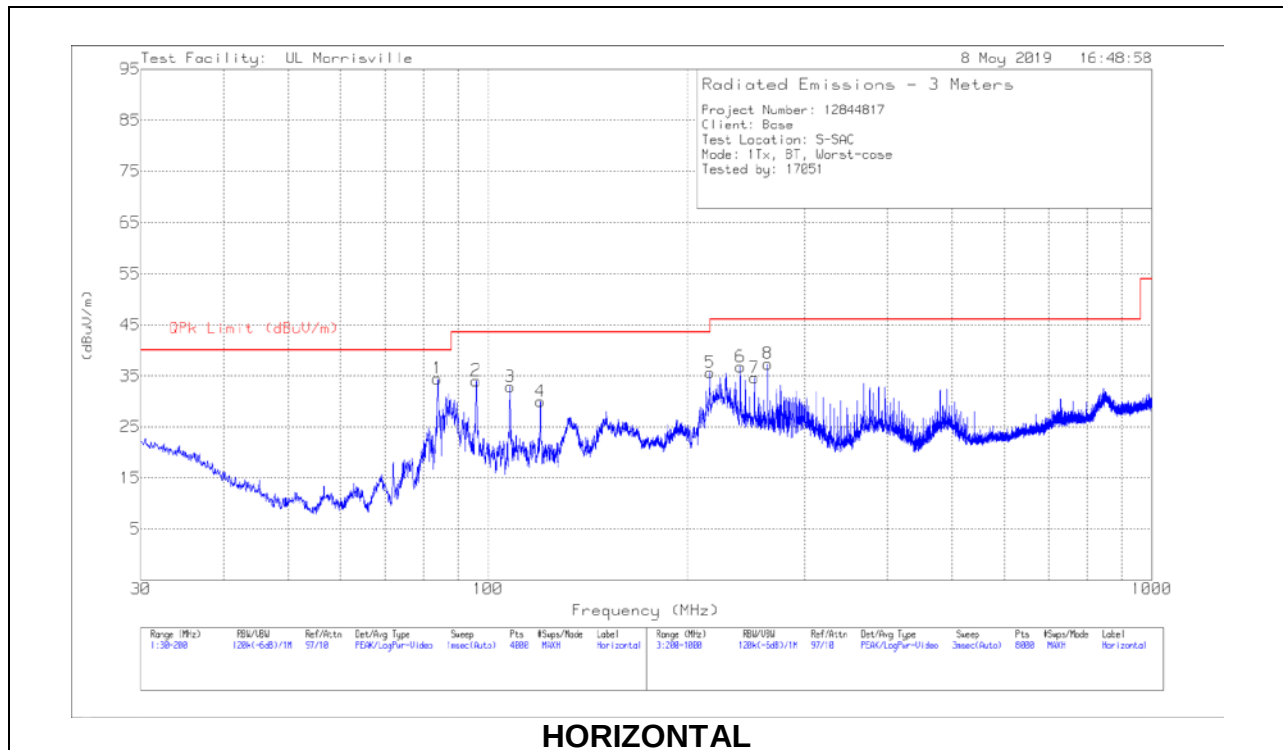
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 QP Limit (dBuV/m)	FCC 15.209 AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)	Antenna Face
7	.0174	45.26	PK	15.1	.1	-80	-19.54	-	42.79	62.79	-62.33	0-360	Flat
1	.02755	44.17	PK	13.6	.1	-80	-22.13	-	38.8	58.8	-60.93	0-360	On
4	.02944	43.58	PK	13.5	.1	-80	-22.82	-	38.23	58.23	-61.05	0-360	Off
2	.15748	45.63	PK	10.7	.1	-80	-23.57	-	23.66	43.66	-47.23	0-360	On
5	.1959	44.65	PK	10.7	.1	-80	-24.55	-	21.76	41.76	-46.31	0-360	Off
8	.78512	32.7	PK	10.8	.1	-40	3.6	29.71	-	-	-26.11	0-360	Flat
3	1.21726	31.18	PK	11	.2	-40	2.38	25.9	-	-	-23.52	0-360	On
6	1.21726	29.98	PK	11	.2	-40	1.18	25.9	-	-	-24.72	0-360	Off
9	1.21726	28.81	PK	11	.2	-40	.01	25.9	-	-	-25.89	0-360	Flat

PK - Peak detector

9.3. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

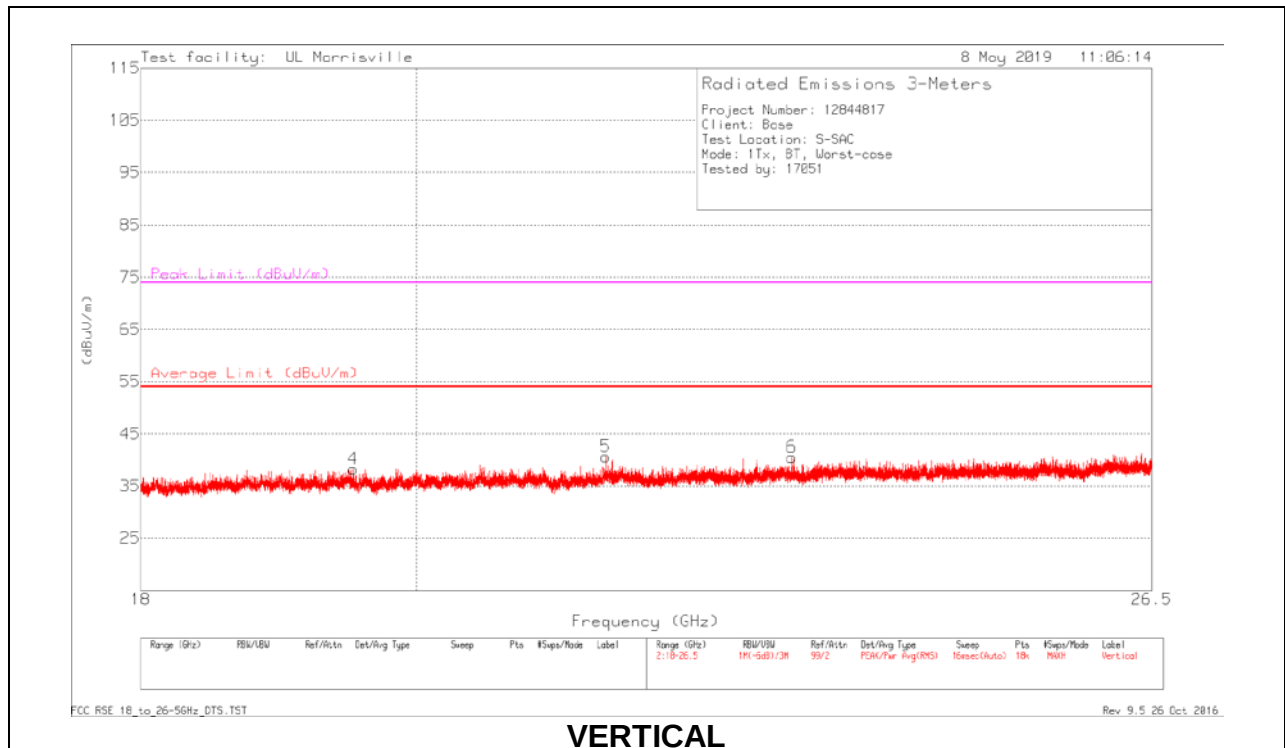
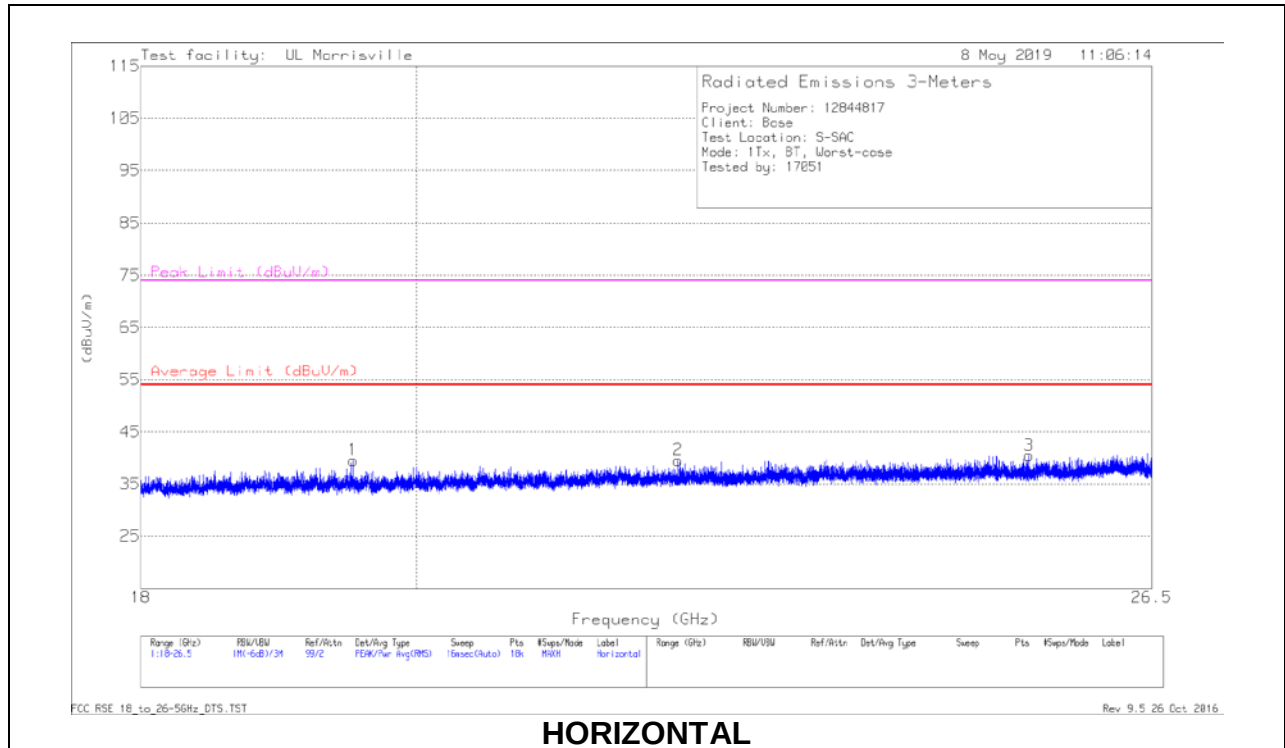
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	83.976	51.48	Qp	11.8	-31.1	32.18	40	-7.82	156	235	H
2	96.0196	51.85	Pk	13.2	-31	34.05	43.52	-9.47	0-360	299	H
3	108.0502	47.2	Pk	16.6	-30.9	32.9	43.52	-10.62	0-360	399	H
4	119.9958	42.67	Pk	18.1	-30.8	29.97	43.52	-13.55	0-360	299	H
5	216.0021	50.24	Pk	15.5	-30.1	35.64	46.02	-10.38	0-360	102	H
6	240.0052	50.47	Pk	16.3	-30	36.77	46.02	-9.25	0-360	102	H
7	252.0068	48.3	Pk	16.3	-30	34.6	46.02	-11.42	0-360	102	H
8	264.0083	49.94	Pk	17.3	-29.9	37.34	46.02	-8.68	0-360	102	H
9	84.0315	43.54	Pk	11.8	-31.1	24.24	40	-15.76	0-360	101	V
10	119.9958	35.82	Pk	18.1	-30.8	23.12	43.52	-20.4	0-360	101	V
11	149.9235	42.12	Pk	17	-30.6	28.52	43.52	-15	0-360	101	V

Pk - Peak detector

QP – Quasi-peak detector

9.4. WORST CASE 18-26 GHZ

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.524	49.07	PK2	32.8	-38.8	43.07	-	-	74	-30.93	170	240	H
	* ** 19.524	43.3	V1TR	32.8	-38.8	37.3	54	-16.7	-	-	170	240	H
2	* ** 22.109	44.44	Pk	33.3	-38.2	39.54	54	-14.46	74	-34.46	0-360	299	H
4	* ** 19.524	49.3	PK2	32.8	-38.8	43.3	-	-	74	-30.7	246	201	V
	* ** 19.524	42.77	V1TR	32.8	-38.8	36.77	54	-17.23	-	-	246	201	V
6	* ** 23.09	44.32	Pk	33.7	-37.5	40.52	54	-13.48	74	-33.48	0-360	151	V
5	21.504	45.52	Pk	33.4	-38.3	40.62	-	-	-	-	0-360	201	V
3	25.285	42.78	Pk	34.2	-36.5	40.48	-	-	-	-	0-360	299	H

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

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

V1TR - $VB=1/Ton$, where: Ton is packet duration

Pk – Peak detector

10. SETUP PHOTOS

Please refer to R12844817-EP4 for setup photos

END OF TEST REPORT