



CERTIFICATION TEST REPORT

Report Number. : 12781776-E2V4

Applicant : Microsoft Corp.
One Microsoft Way
Redmond, WA 98052

Model : 1797

FCC ID : C3K1797

IC : 3048A-1797

EUT Description : Wireless Input Device

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

Date Of Issue:
May 31, 2019

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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	5/20/2019	Initial Issue	---
V2	5/23/2019	Section 5.5 Headset & Charger as worst case statement added	Henry Lau
V3	5/28/2019	Section 7 – Pre-Amp description fix Section 9 – Below 30MHz added to statement	Jose Martinez Henry Lau
V4	5/31/2019	Section 8.2 – 99% plots updated Section 8.5 – dBm/3kHz updated to dBm	Eric Yu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corp.
One Microsoft Way
Redmond, WA 98052

EUT DESCRIPTION: Wireless Input Device

MODEL: 1797

SERIAL NUMBER: 02630007536912 (Conducted)
02630001242912 (Radiated)

DATE TESTED: April 16, 2019 – May 31, 2019

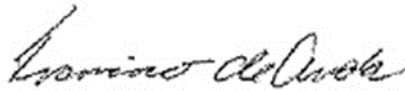
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance 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 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. 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.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
☐ Chamber A	☐ Chamber D	☒ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☒ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code 2324A.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a wireless input device.

5.2. MAXIMUM OUTPUT POWER

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

2.4GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1Tx			
2412 - 2462	802.11g	5.49	3.54
2412 - 2462	802.11n HT20	5.49	3.54

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an monopole antenna, with a maximum gain of 1.79 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was FW: 4.7.1774.0

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

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

The EUT was tested with headset and charger as worst case configuration.

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

802.11g mode: 6 Mbps

802.11n HT20mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter to EUT	SONY	N/A	N/A	N/A
Laptop	Lenovo	X1 Carbon	4973401	PD97265NGU
AC Adapter to Laptop	Lenovo	ADLX45NLC2A	45N0474	N/A
Earphone	SONY	N/A	N/A	N/A
Debug Board*	Microsoft	N/A	X930837-002	N/A

*Note: Debug board only used for programming EUT. Not used during tests.

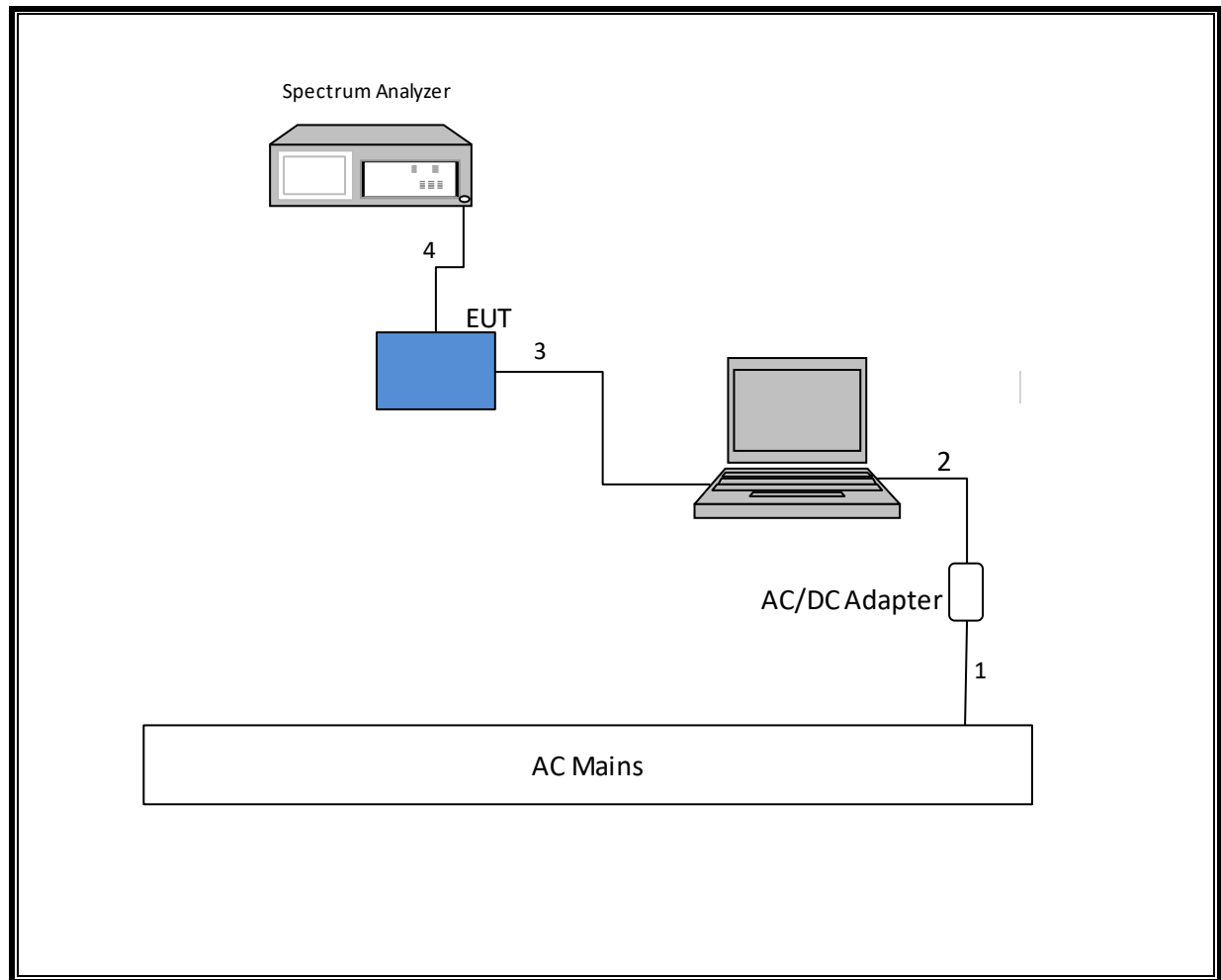
I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-Shielded	0.2	to AC/DC Adaptor
2	DC	1	DC	Shielded	1	to Laptop
3	USB	1	Type C	Un-shielded	2	Laptop to EUT
4	Antenna	1	SMA	Un-Shielded	0.2	to Analyzer

I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
2	earphone	1	3.5mm	Un-shielded	1	to EUT
3	USB	1	Type C	Un-shielded	2	Laptop to EUT

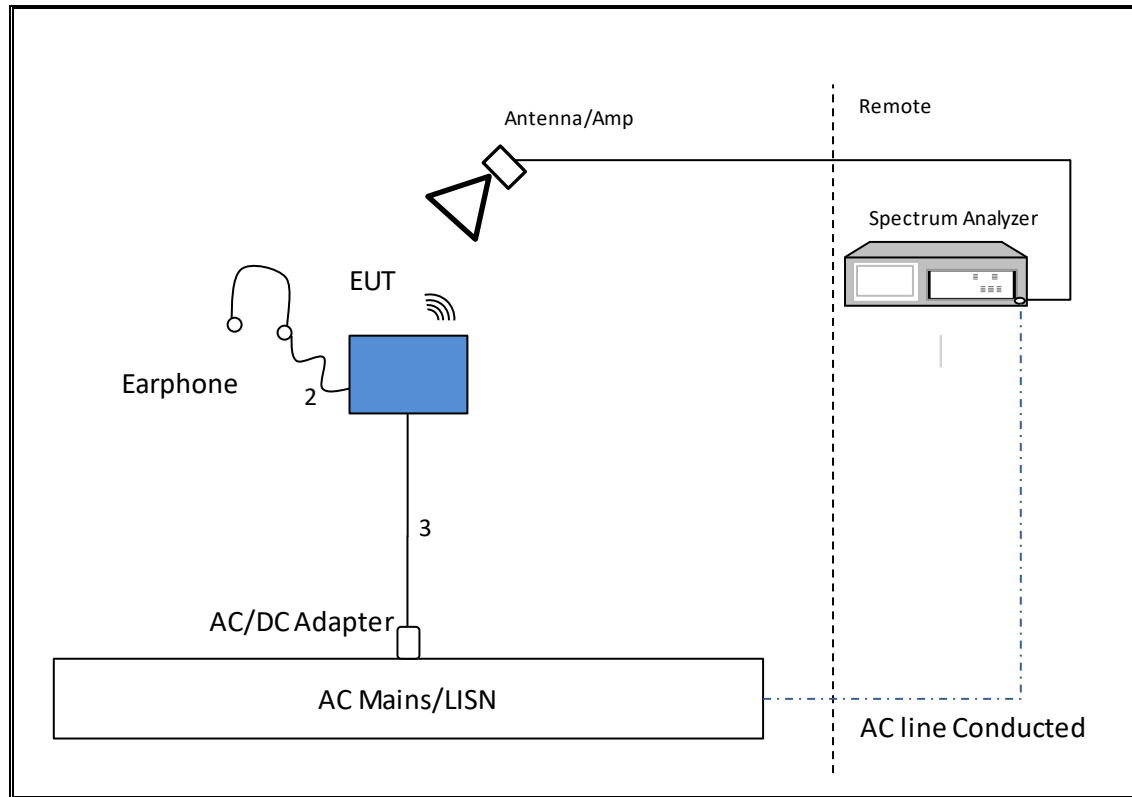
CONDCUTED TEST SETUP DIAGRAM



TEST SETUP

For conducted tests, the EUT was connected to a laptop. The test software exercises the radio.

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



TEST SETUP

For radiated tests: EUT is connected to a charger. The test software exercises the radio.

6. MEASUREMENT METHOD

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

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

6 dB BW: ANSI C63.10 Section 11.8.1

Output Power: ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Section 11.10.3 Method AVGPSD-1

Band-edge: ANSI C63.10 Section 11.13.3.4 Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction factor

Radiated emissions non-restricted frequency bands: ANSI C63.10 Section 11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Section 11.12.1

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

Conducted emissions in restricted frequency bands: ANSI C63.10 Section 11.12.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1265	01/29/2020	01/29/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1227	02/05/2020	02/05/2019
Antenna, Passive Loop 30Hz to 1MHz	ELETRO METRICS	EM-6871	PRE0179465	05/22/2019	05/22/2018
Antenna, Passive Loop 100kHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179467	05/22/2019	05/22/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/2019	04/30/2018
Amplifier, 1 to18GHz, 35dB	AMOLICAL	AMP1G18-35	T1569	06/03/2019	06/03/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/25/2019	05/25/2018
Amplifier, 1 to18GHz	MITEQ	AFS42-00101800-25-S-42	PRE018078	08/01/2019	08/01/2018
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184052	10/24/2019	10/24/2018
Amplifier, 100kHz to 1GHz, 32 dB	Agilent (Keysight) Technologies	8447D	PRE0186650	12/13/2019	12/13/2018
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	PRE0182188	08/29/2019	08/29/2018
Pre-Amp, 18-26.5GHz	Ampical	AMP18G26.5-60	PRE0181238	05/01/2020	05/01/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	02/14/2020	02/14/2019
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179372	02/16/2020	02/16/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/23/2020	01/23/2019
AC Line Conducted					
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/14/2020	02/14/2019
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	01/24/2020	01/24/2019
Test Software List					
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018		
Antenna Port Software	UL	UL RF	Ver 9.6, April 18, 2019		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

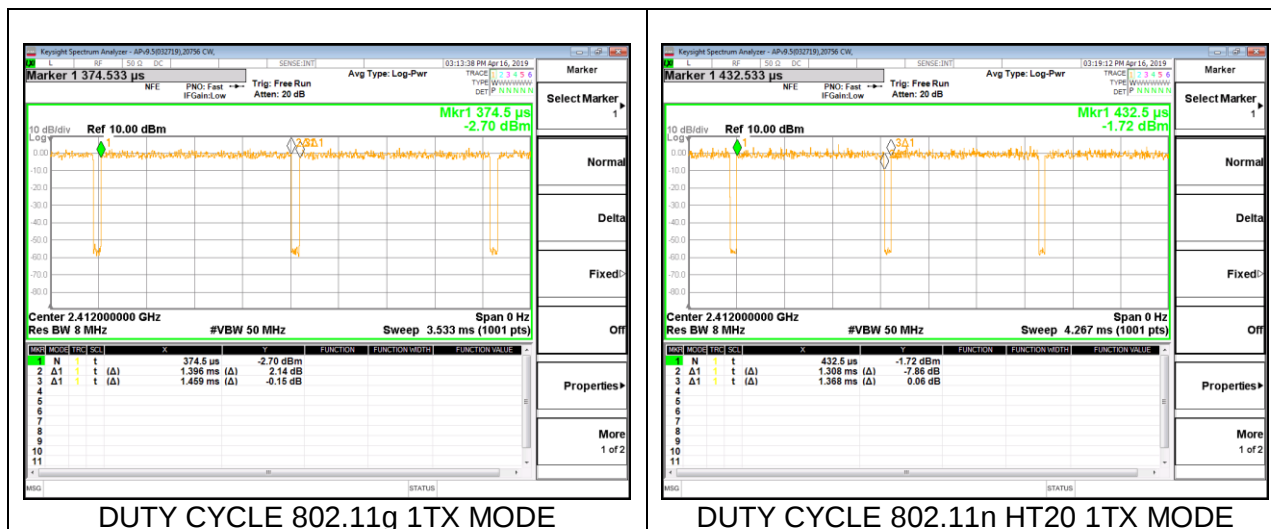
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11g 1TX	1.396	1.459	0.957	95.68%	0.19	0.716
802.11n HT20 1TX	1.308	1.368	0.956	95.61%	0.19	0.765

DUTY CYCLE PLOTS



8.2. 99% BANDWIDTH

LIMITS

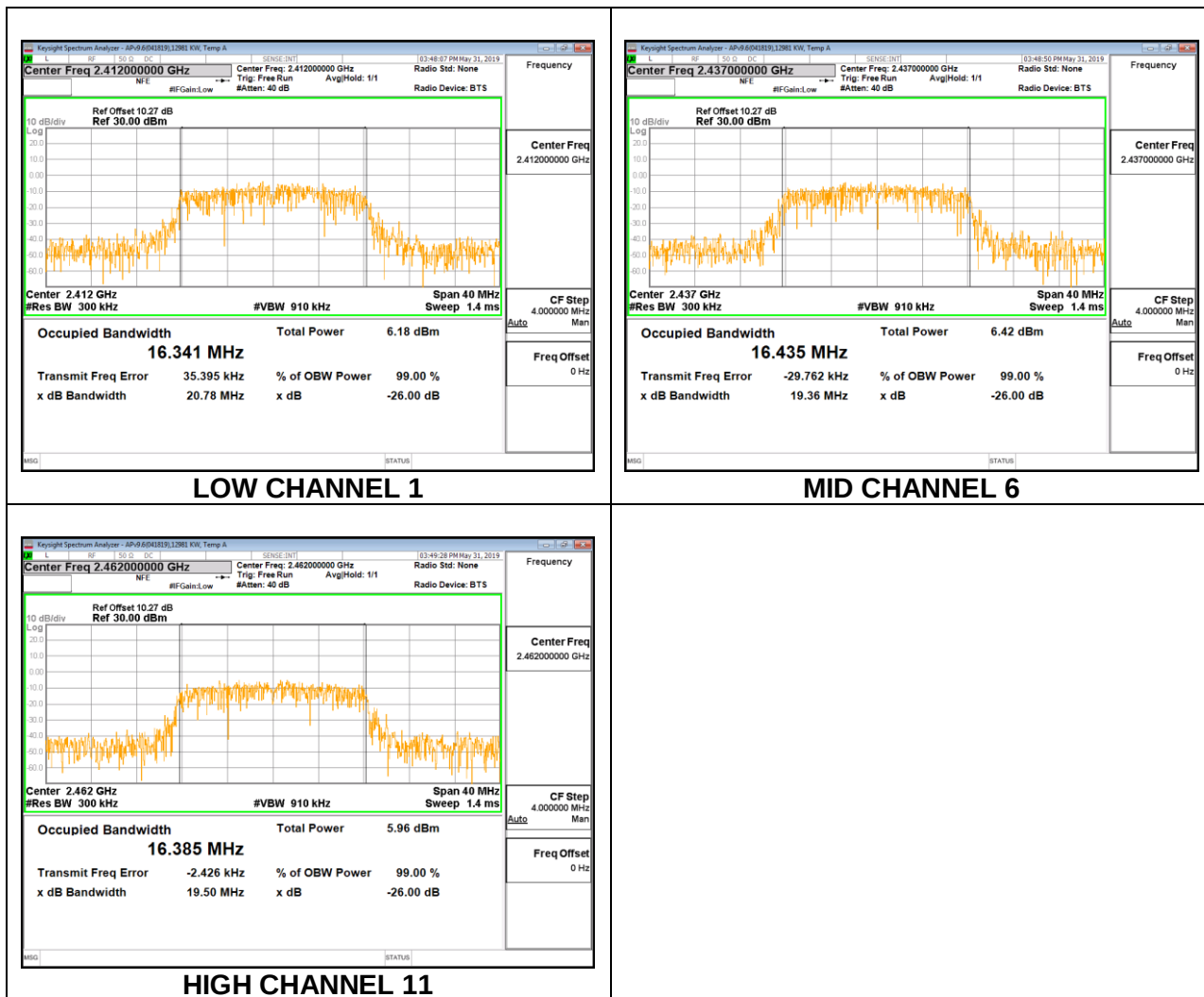
None; for reporting purposes only.

RESULTS

8.2.1. 802.11g MODE

1TX Antenna 1 MODE

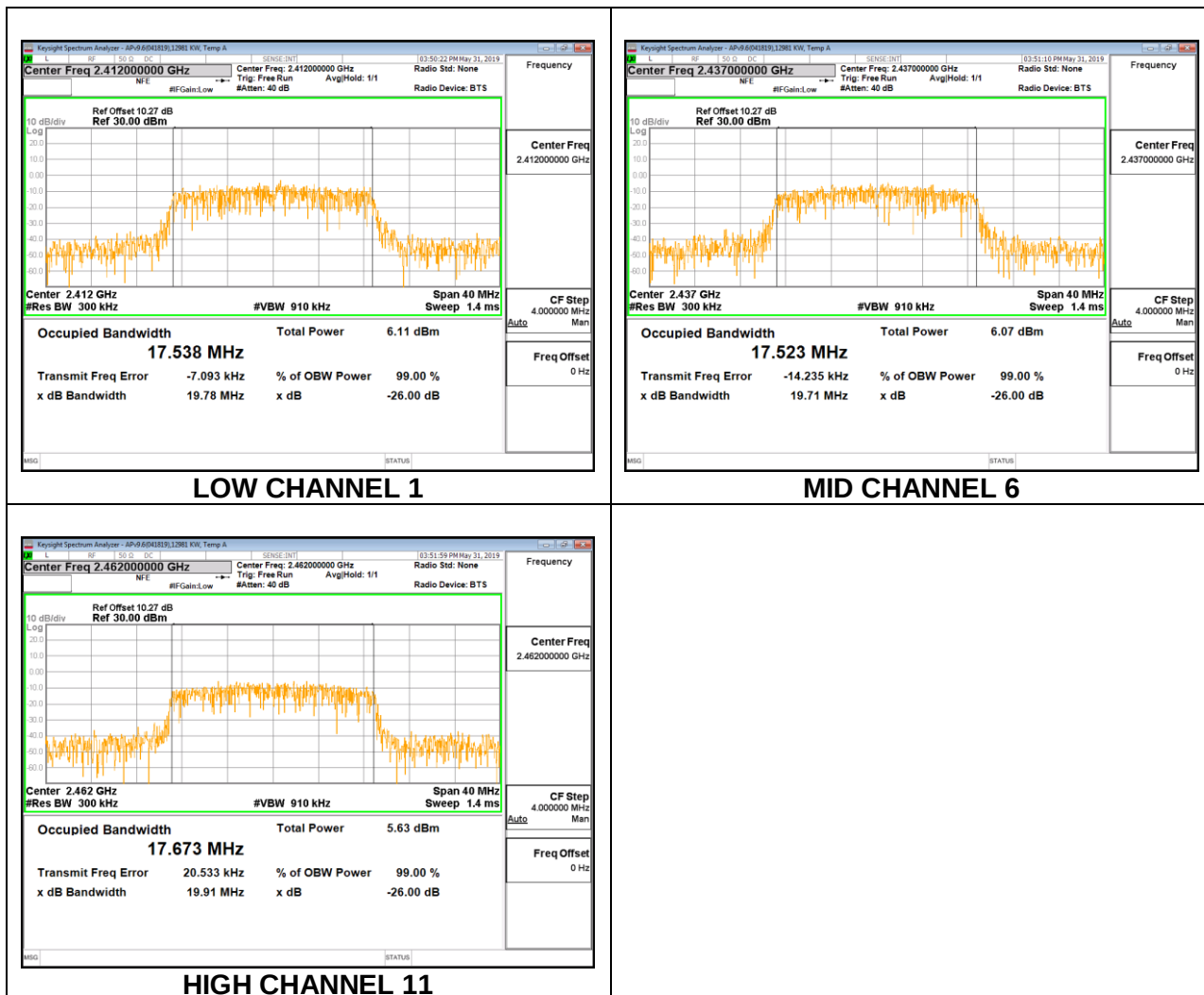
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	16.3410
Mid 6	2437	16.4350
High 11	2462	16.3850



8.2.2. 802.11n HT20 MODE

1TX Antenna 1 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.5380
Mid 6	2437	17.5230
High 11	2462	17.6730



8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

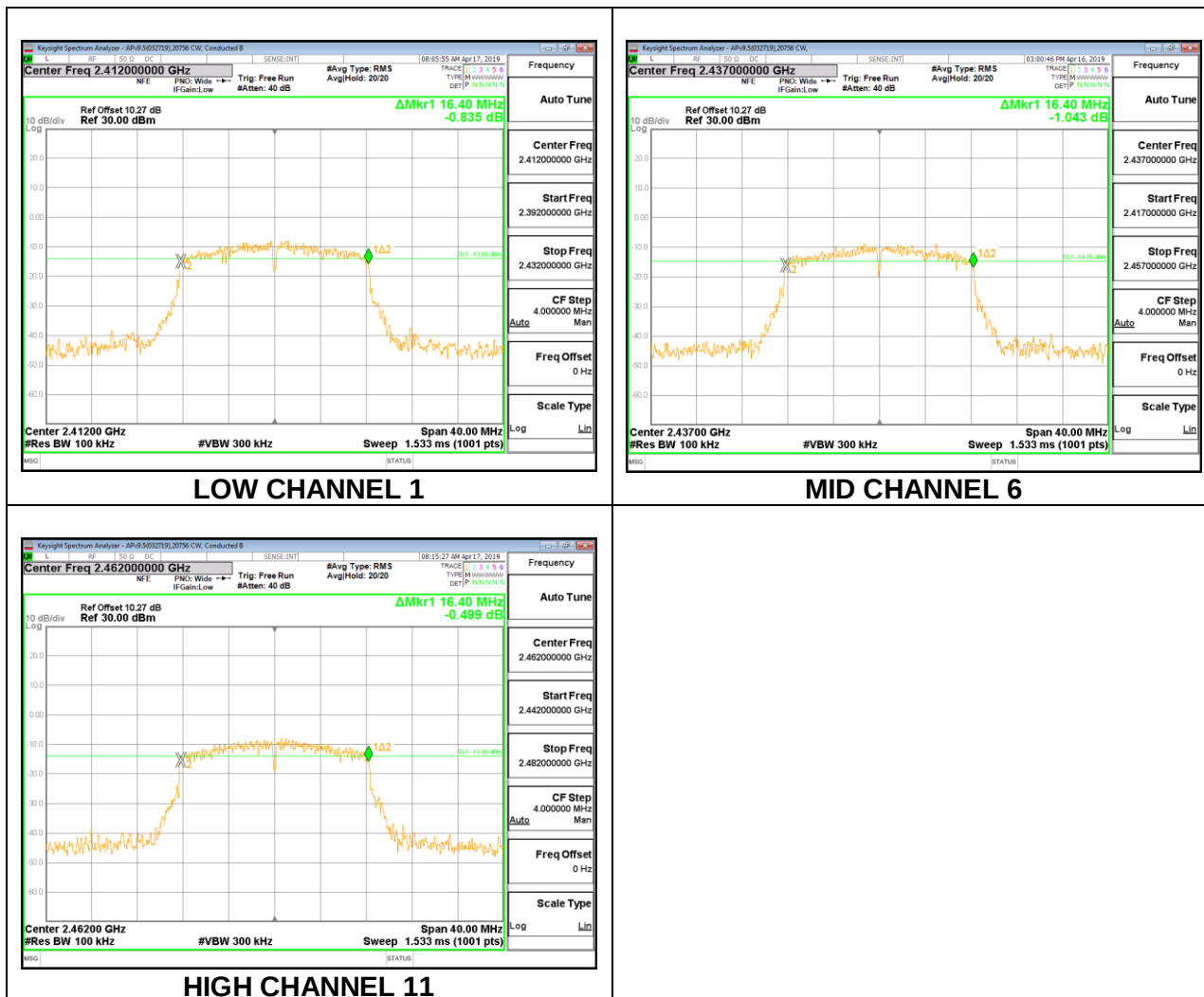
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

8.3.1. 802.11g MODE

1TX Antenna 1 MODE

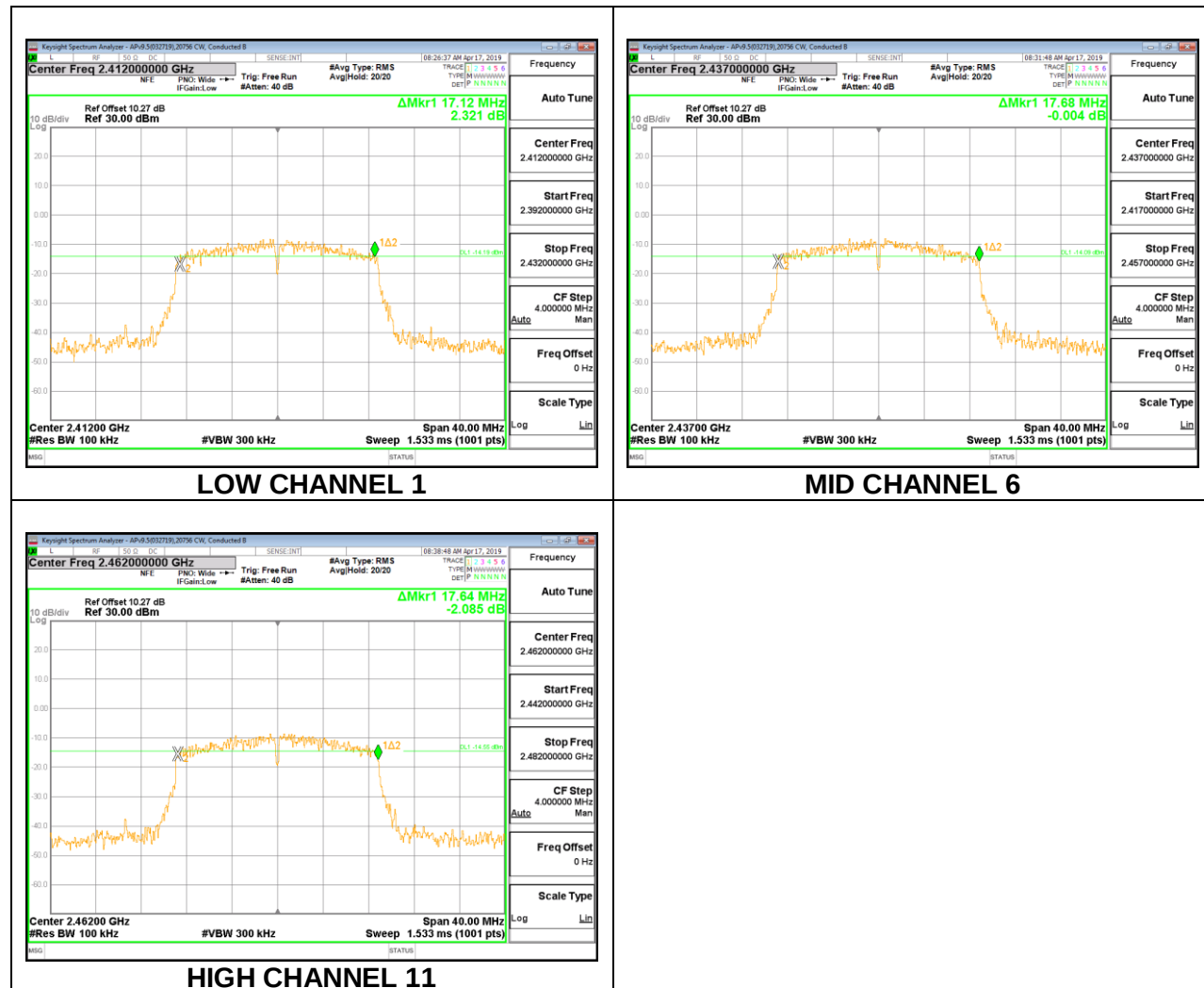
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	16.4000	0.5
Mid 6	2437	16.4000	0.5
High 11	2462	16.4000	0.5



8.3.2. 802.11n HT20 MODE

1TX Antenna 1 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	17.1200	0.5
Mid 6	2437	17.6800	0.5
High 11	2462	17.6400	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.27 dB (including 10 dB pad and 0.27 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

DIRECTIONAL ANTENNA GAIN

For 1 TX:

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

Tested By:	10649 JR
Date	4/19/2019

8.4.1. 802.11g MODE

1TX Antenna 1 MODE

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	1.79	30.00	30	36	30.00
Mid 6	2437	1.79	30.00	30	36	30.00
High 11	2462	1.79	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	5.46	5.46	30.00	-24.54
Mid 6	2437	5.48	5.48	30.00	-24.52
High 11	2462	5.49	5.49	30.00	-24.51

8.4.2. 802.11n HT20 MODE

1TX Antenna 1 MODE

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	1.79	30.00	30	36	30.00
Mid 6	2437	1.79	30.00	30	36	30.00
High 11	2462	1.79	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	5.49	5.49	30.00	-24.51
Mid 6	2437	5.47	5.47	30.00	-24.53
High 11	2462	5.30	5.30	30.00	-24.70

8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

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

RESULTS

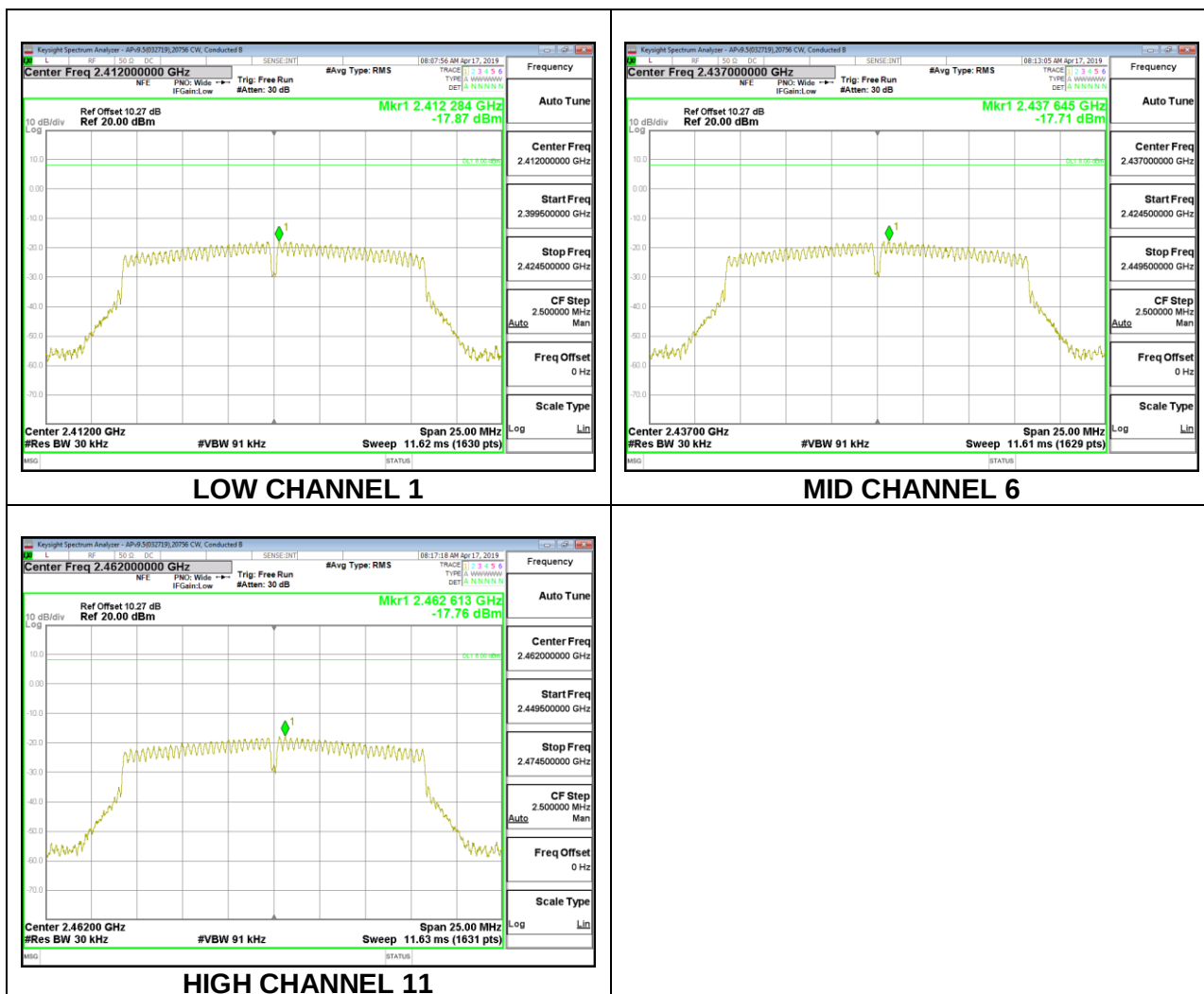
8.5.1. 802.11g MODE

1TX Antenna 1 MODE

Duty Cycle CF (dB)	0.19	Included in Calculations of Corr'd PSD
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PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-17.87	-17.68	8.0	-25.7
Mid 6	2437	-17.71	-17.52	8.0	-25.5
High 11	2462	-17.76	-17.57	8.0	-25.6



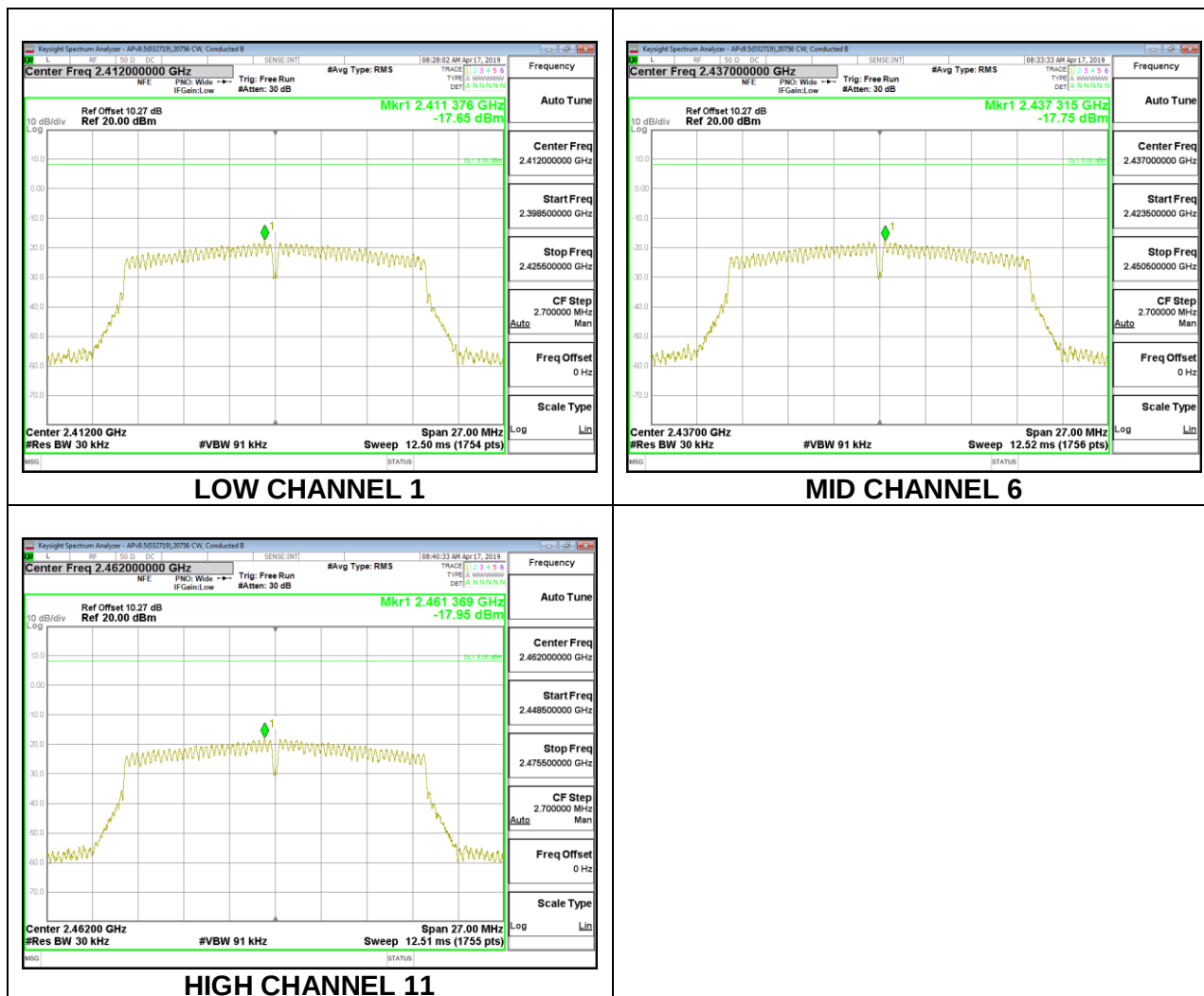
8.5.2. 802.11n HT20 MODE

1TX Antenna 1 MODE

Duty Cycle CF (dB)	0.19	Included in Calculations of Corr'd PSD
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PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-17.65	-17.46	8.0	-25.5
Mid 6	2437	-17.75	-17.56	8.0	-25.6
High 11	2462	-17.95	-17.76	8.0	-25.8



8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

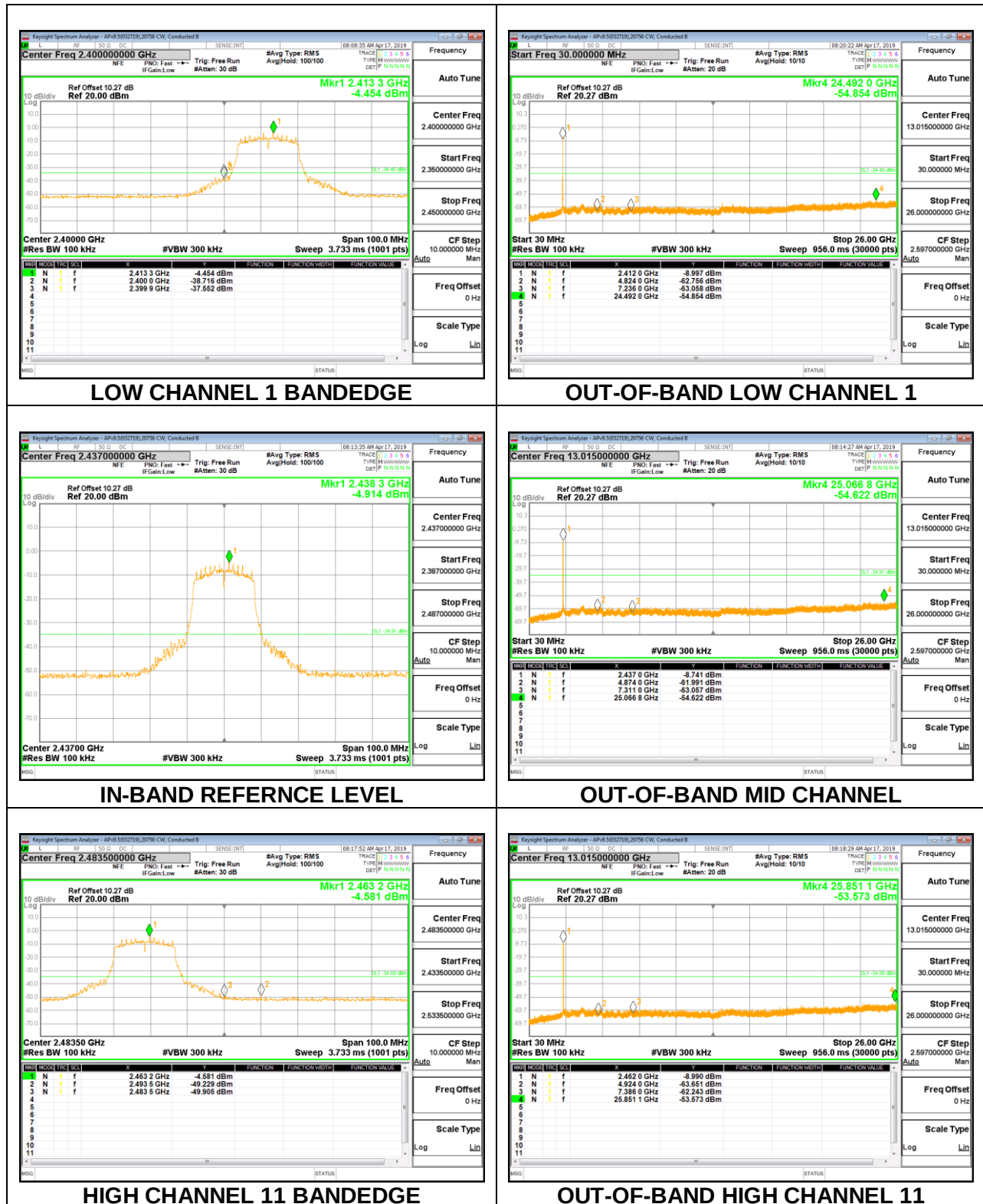
RSS-247 5.5

Output power was measured based on the use of peak measurement, therefore the required attenuation is 30 dB.

RESULTS

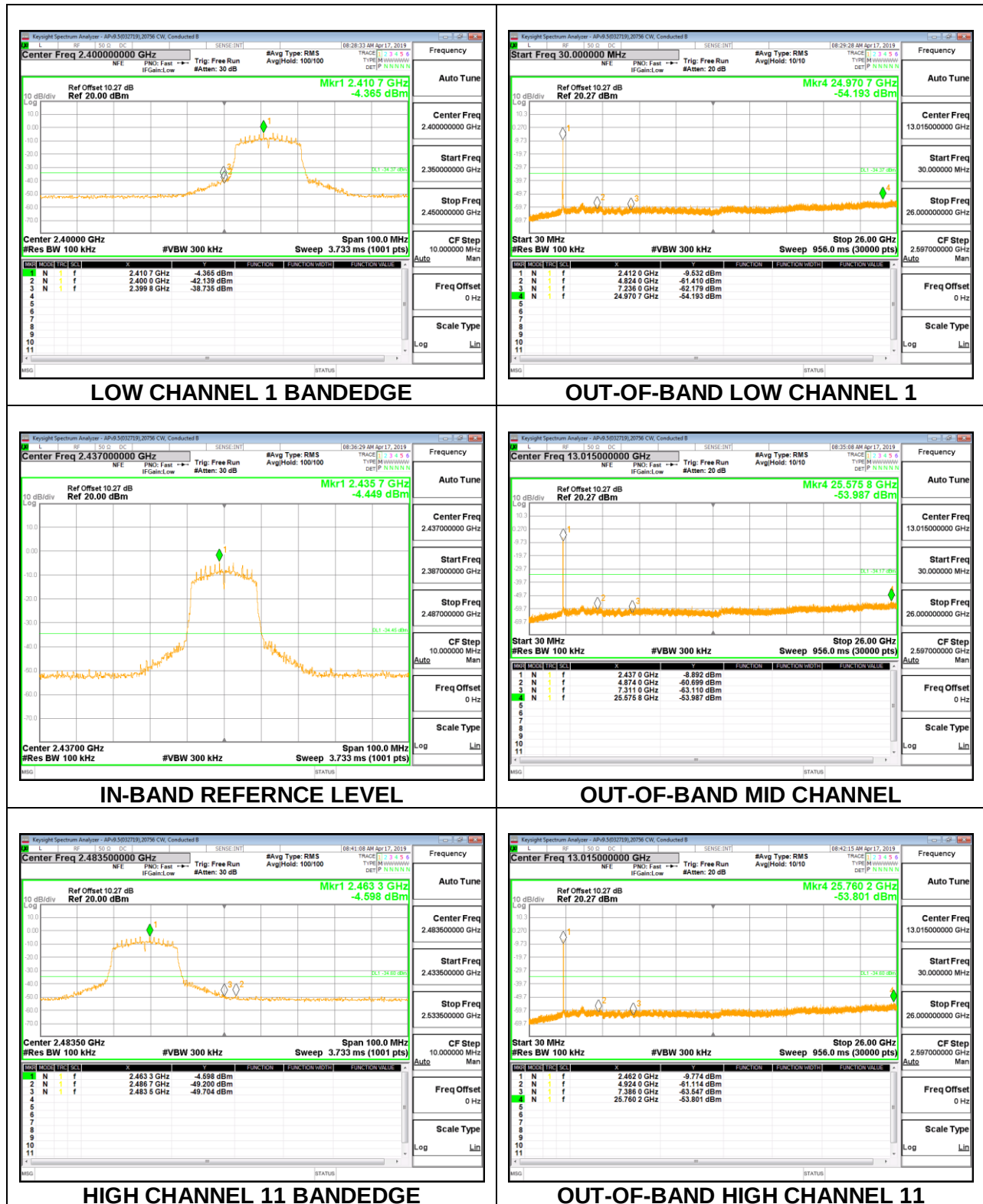
8.6.1. 802.11g MODE

1TX Antenna 1 MODE



8.6.2. 802.11n HT20 MODE

1TX Antenna 1 MODE



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 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. 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 as applicable for average measurements.

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 30MHz, 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.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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.

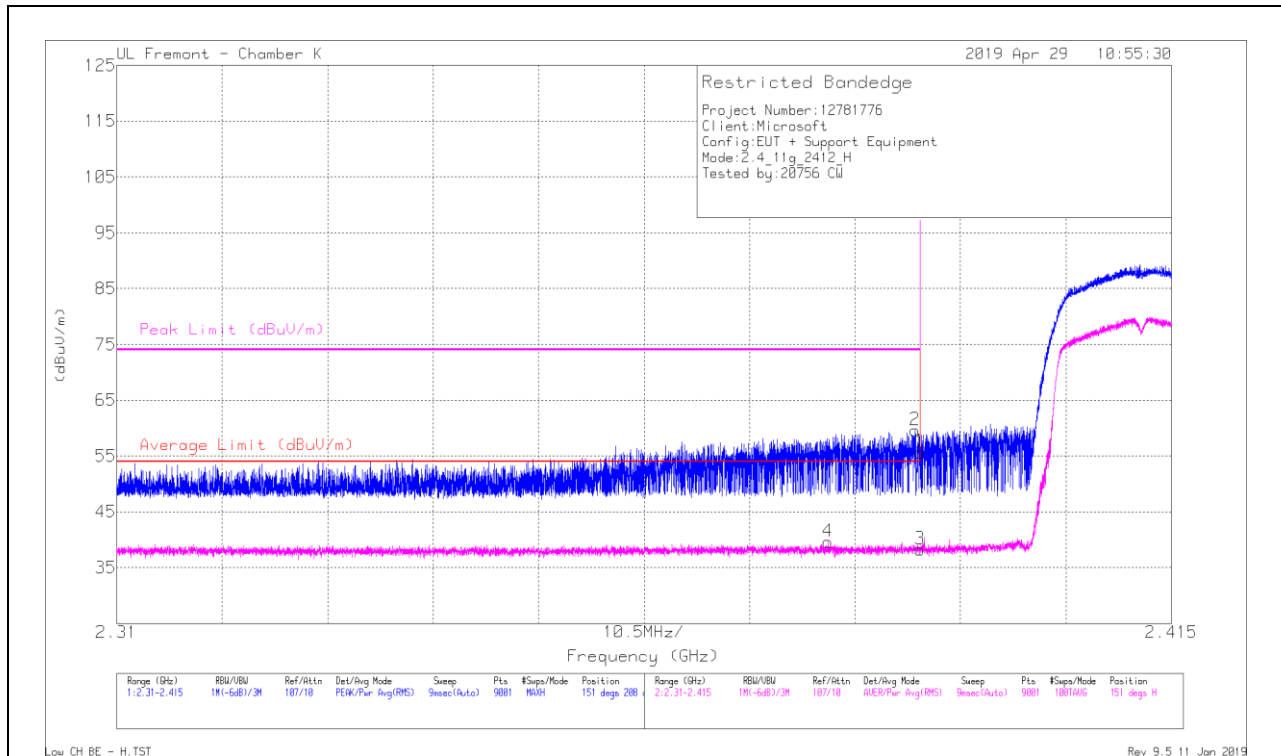
9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

1TX Antenna 1 MODE

BANDEDGE (LOW CHANNEL, CH 1)

HORIZONTAL RESULT



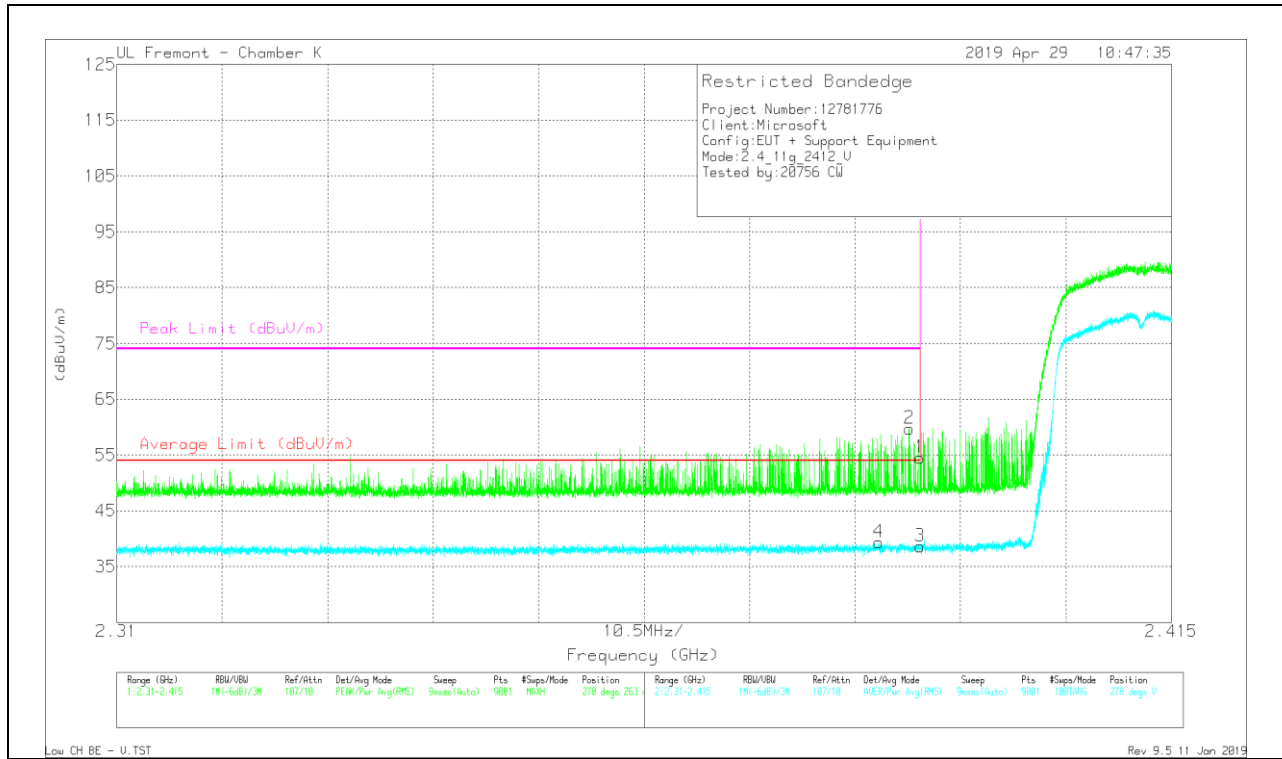
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	48.49	Pk	31.9	-24.7	0	55.69	-	-	74	-18.31	151	208	H
2	* 2.389	52.41	Pk	31.9	-24.7	0	59.61	-	-	74	-14.39	151	208	H
3	* 2.39	30.9	RMS	31.9	-24.7	19	38.29	54	-15.71	-	-	151	208	H
4	* 2.381	32.23	RMS	31.9	-24.7	19	39.62	54	-14.38	-	-	151	208	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CM/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.32	PK	31.9	-24.7	0	54.52	-	-	74	-19.48	278	263	V
2	* 2.389	52.51	PK	31.9	-24.7	0	59.71	-	-	74	-14.29	278	263	V
3	* 2.39	31.21	RMS	31.9	-24.7	.19	38.6	54	-15.4	-	-	278	263	V
4	* 2.386	31.86	RMS	31.9	-24.6	.19	39.35	54	-14.65	-	-	278	263	V

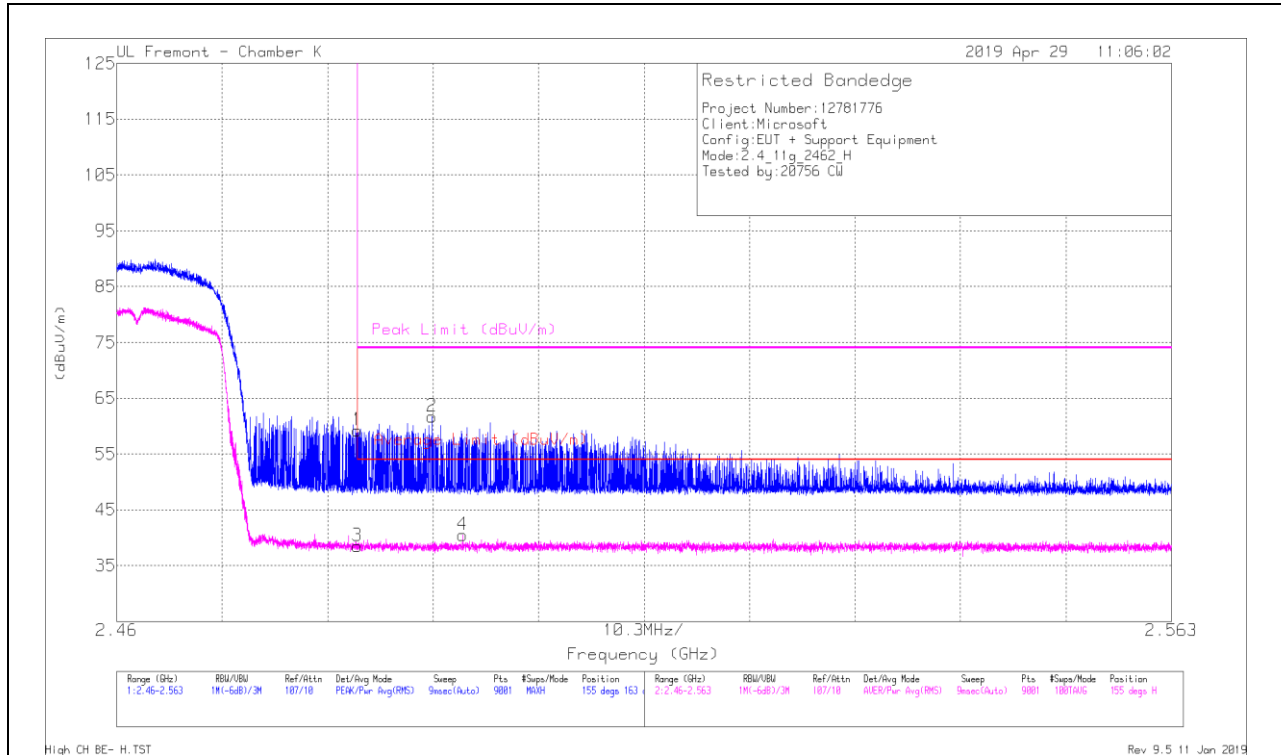
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL, CH 11)

HORIZONTAL RESULT



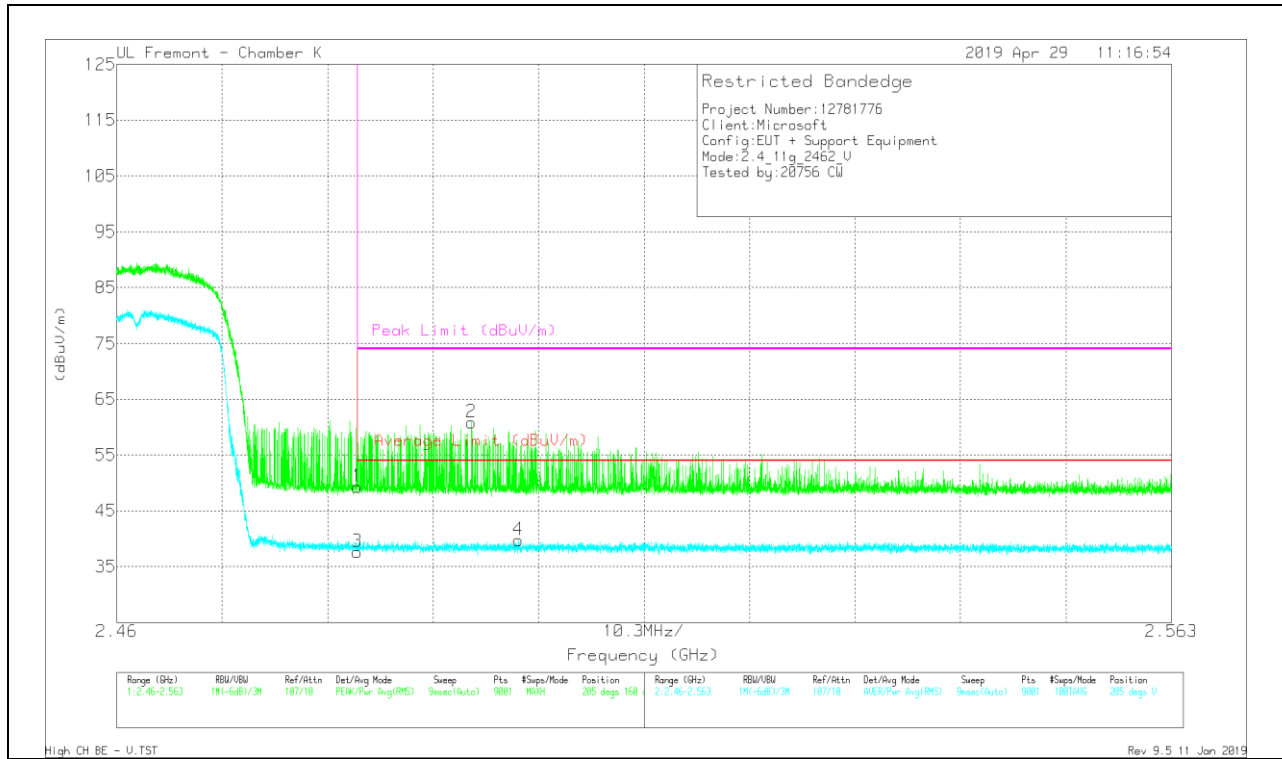
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF-T344 (dBm)	Amp/CBI/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	51.75	Pk	32.3	-24.8	0	59.25	-	-	74	-14.75	155	163	H
2	* 2.491	54.2	Pk	32.3	-24.8	0	61.7	-	-	74	-12.3	155	163	H
3	* 2.484	30.86	RMS	32.3	-24.8	.19	38.55	54	-15.45	-	-	155	163	H
4	* 2.494	32.84	RMS	32.3	-24.8	.19	40.53	54	-13.47	-	-	155	163	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CM/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.81	PK	32.3	-24.8	0	49.31	-	-	74	-24.69	205	160	V
2	* 2.495	53.36	PK	32.3	-24.8	0	60.86	-	-	74	-13.14	205	160	V
3	* 2.484	29.9	RMS	32.3	-24.8	.19	37.59	54	-16.41	-	-	205	160	V
4	* 2.499	32.07	RMS	32.3	-24.8	.19	39.76	54	-14.24	-	-	205	160	V

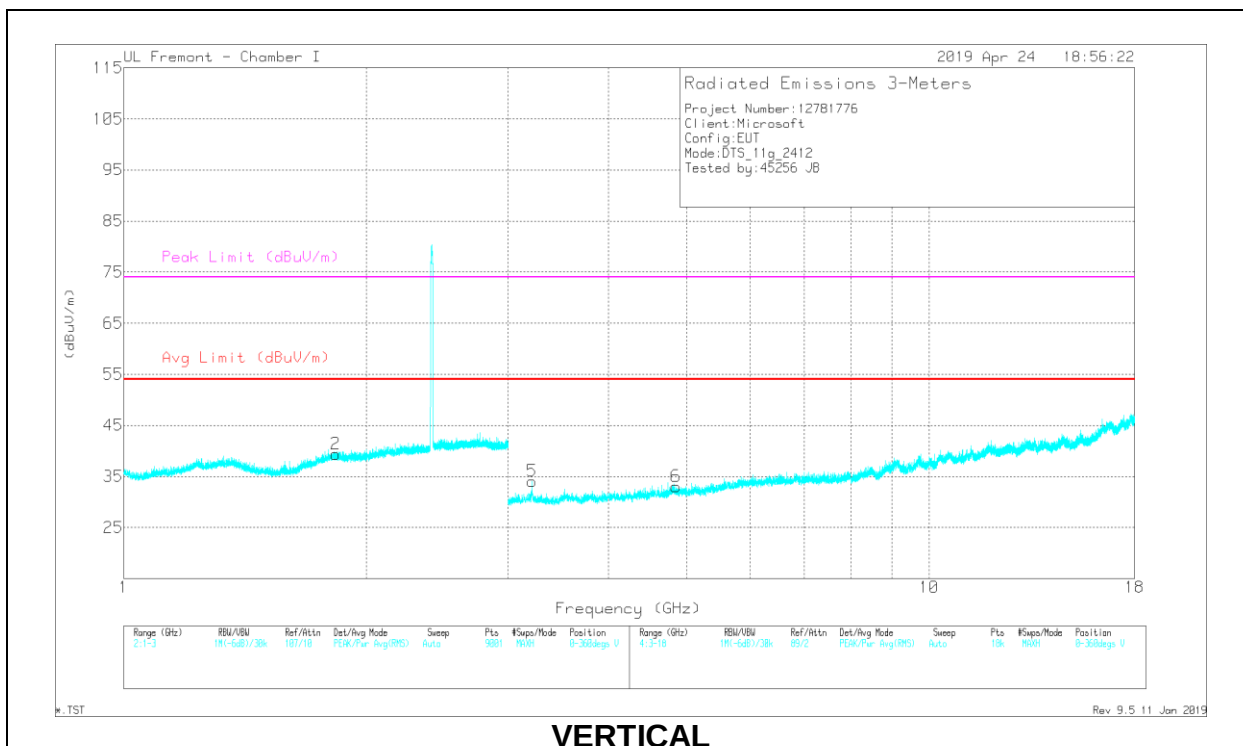
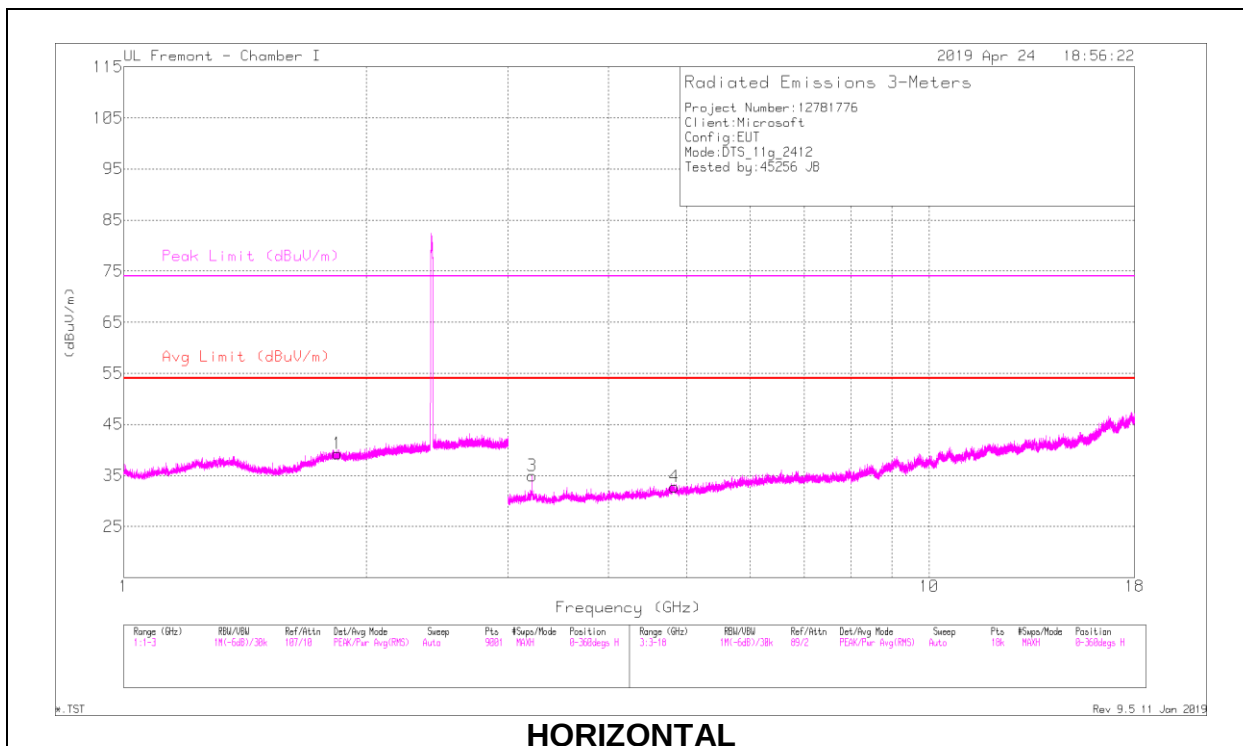
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL, CH 1 RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dBm)	Ampl/Cbl/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.842	30.79	Pk	30.7	-22.2	0	39.29	-	-	-	-	0-360	100	H
2	1.833	30.92	Pk	30.7	-22.2	0	39.42	-	-	-	-	0-360	102	V
3	3.216	31.18	Pk	33.5	-29.7	0	34.98	-	-	-	-	0-360	198	H
4	*4.829	35.23	PK2	34.2	-28.2	0	41.23	-	-	74	-32.77	104	128	H
	*4.827	25.63	MAV1	34.2	-28.2	.19	31.82	54	-22.18	-	-	104	128	H
5	3.216	30.24	Pk	33.5	-29.7	0	34.04	-	-	-	-	0-360	100	V
6	*4.85	34.37	PK2	34.1	-28.2	0	40.27	-	-	74	-33.73	2	172	V
	*4.85	24.5	MAV1	34.2	-28.2	.19	30.69	54	-23.31	-	-	2	172	V

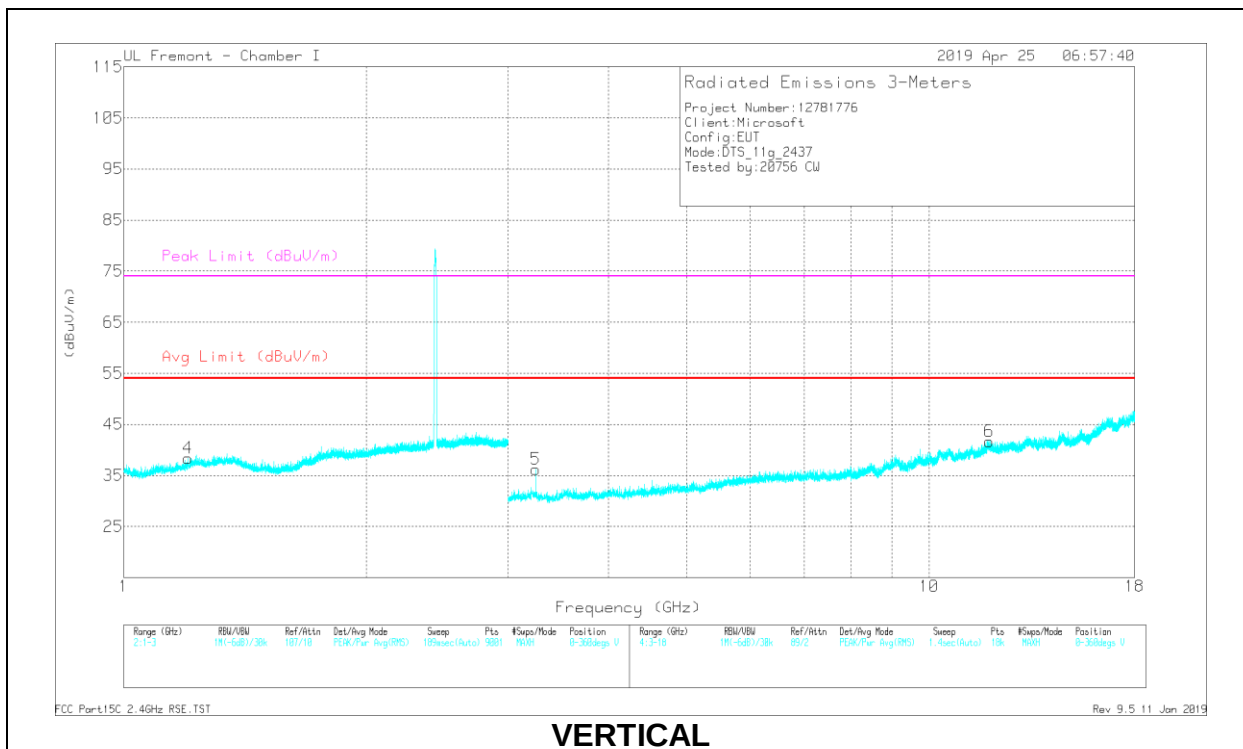
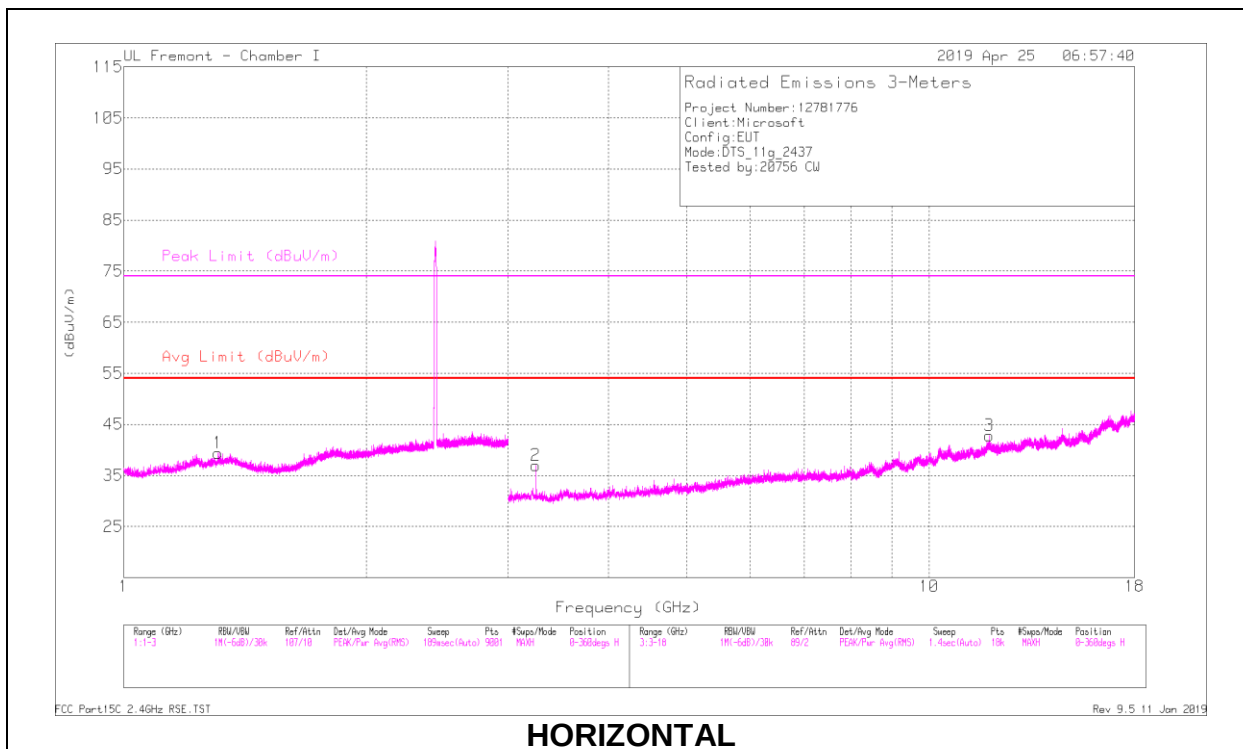
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL, CH 6 RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.311	39.22	Pk	29.4	-23	0	45.62	-	-	74	-28.38	29	262	H
	* 1.309	30.01	MAv1	29.5	-23	.19	36.7	54	-17.3	-	-	29	262	H
4	* 1.2	39.69	PK2	28.4	-23	0	45.09	-	-	74	-28.91	133	305	V
	* 1.2	30.02	MAv1	28.4	-23	.19	35.61	54	-18.39	-	-	133	305	V
2	3.249	39.39	PK2	32.9	-30.1	0	42.19	-	-	-	-	254	169	H
3	* 11.882	29.07	PK2	38.7	-20.8	0	46.97	-	-	74	-27.03	123	134	H
	* 11.879	21.77	MAv1	38.7	-20.8	.19	39.86	54	-14.14	-	-	123	134	H
5	3.249	37.67	Pk	32.9	-30.1	0	40.47	-	-	-	-	78	107	V
6	* 11.881	30.83	PK2	38.7	-20.8	0	48.73	-	-	74	-25.27	212	253	V
	* 11.881	20.75	MAv1	38.7	-20.8	.19	38.84	54	-15.16	-	-	212	253	V

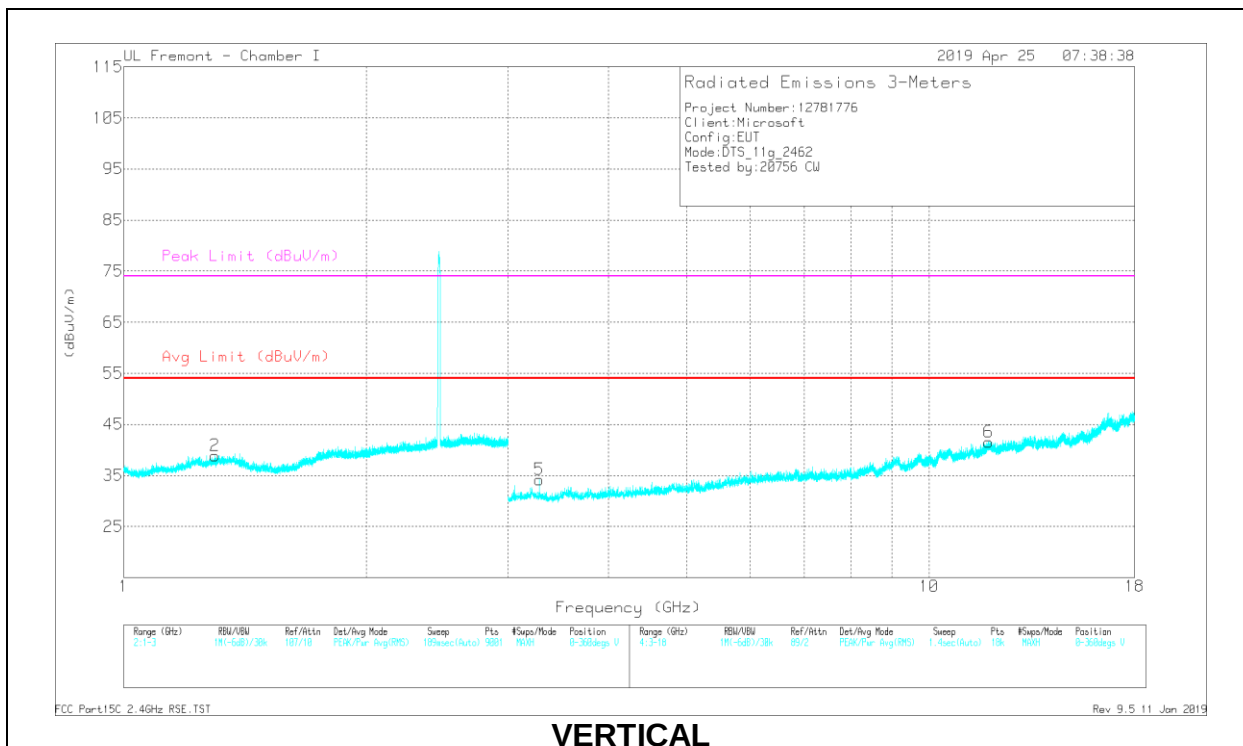
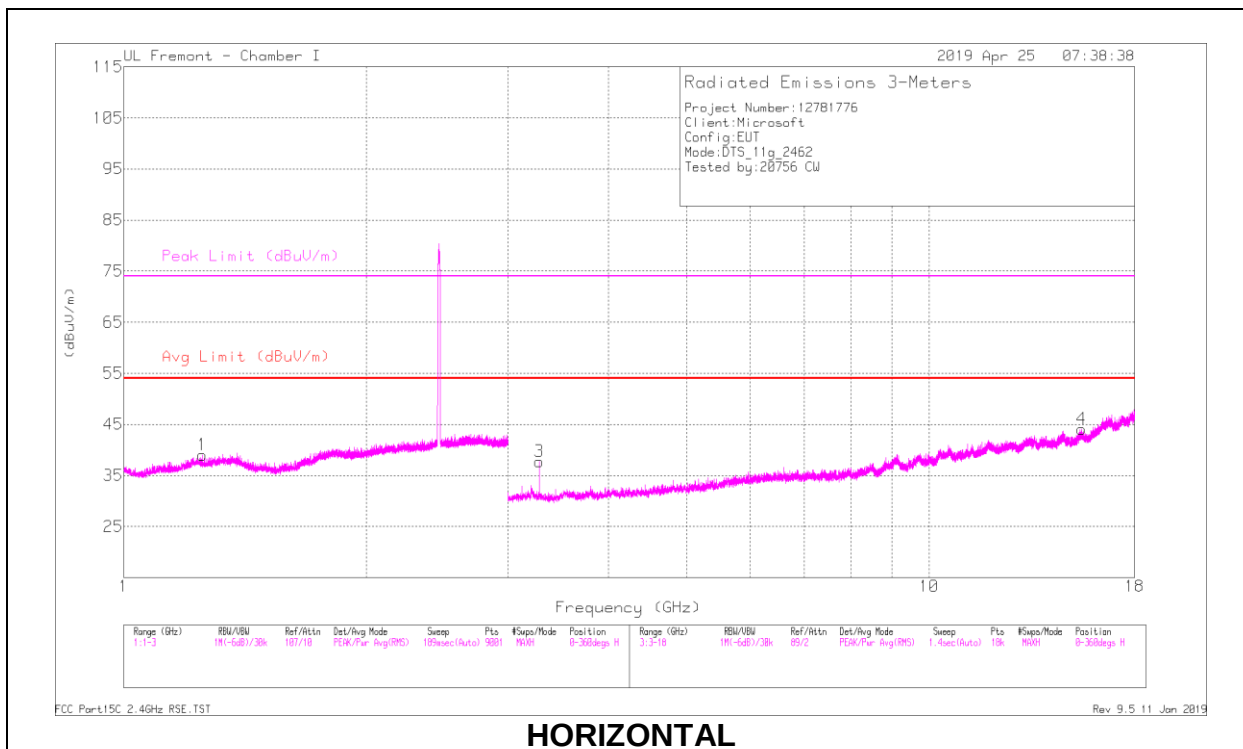
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL, CH 11 RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.25	38.09	PK2	28.9	-22.9	0	44.09	-	-	74	-29.91	75	183	H
	* 1.25	29.58	MAv1	28.9	-22.9	.19	35.77	54	-18.23	-	-	75	183	H
2	* 1.299	38.83	PK2	29.2	-23	0	45.03	-	-	74	-28.97	158	118	V
	* 1.3	28.85	MAv1	29.2	-23	.19	35.24	54	-18.76	-	-	158	118	V
3	3.283	39.03	PK2	32.8	-30.1	0	41.73	-	-	-	-	248	214	H
4	* 15.46	29.2	PK2	40	-19.8	0	49.4	-	-	74	-24.6	258	212	H
	* 15.463	20.53	MAv1	40.1	-19.8	.19	41.02	54	-12.98	-	-	258	212	H
5	3.283	37.11	PK2	32.8	-30.1	0	39.81	-	-	-	-	206	146	V
6	* 11.868	29.72	PK2	38.7	-20.7	0	47.72	-	-	74	-26.28	85	304	V
	* 11.866	21.2	MAv1	38.7	-20.7	.19	39.39	54	-14.61	-	-	85	304	V

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

PK2 - KDB558074 Method: Maximum Peak

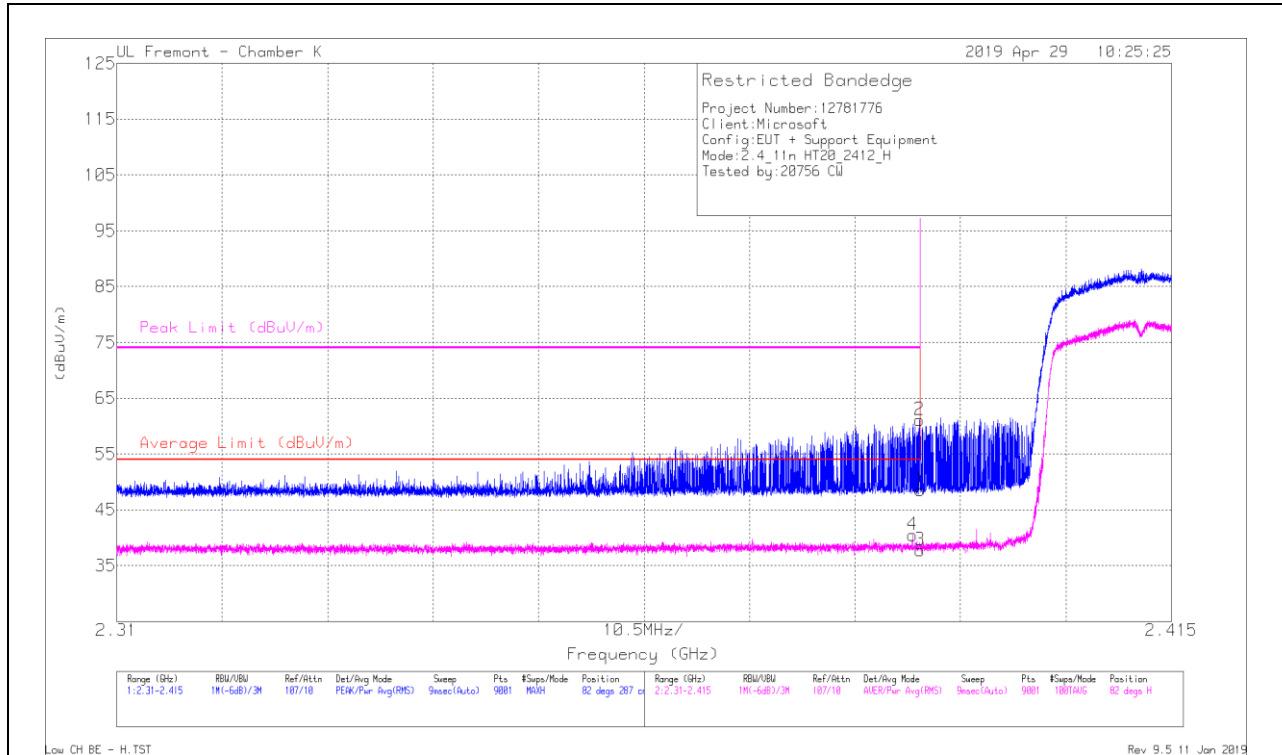
MAv1 - KDB558074 Option 1 Maximum RMS Average

9.1.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

1TX Antenna 1 MODE

BANDEDGE (LOW CHANNEL, CH 1)

HORIZONTAL RESULT



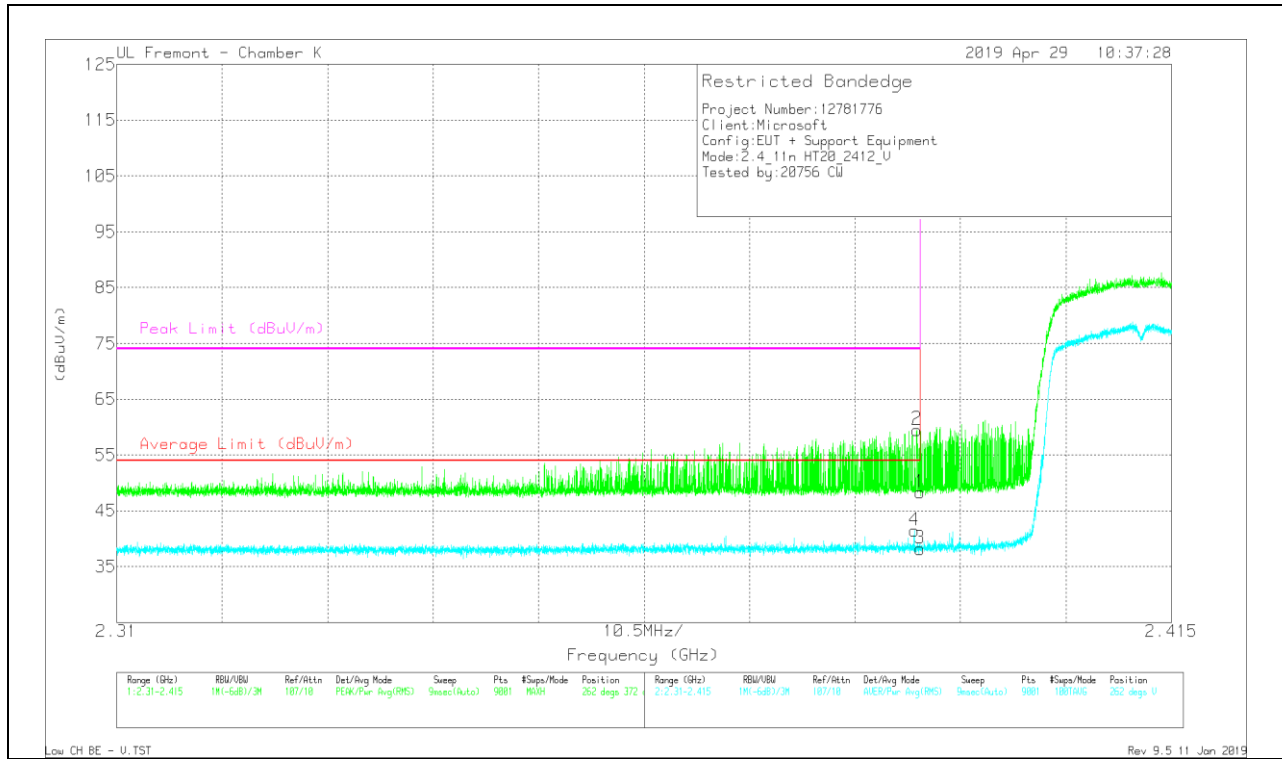
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CDI/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.38	Pk	31.9	-24.7	0	48.58	-	-	74	-25.42	82	287	H
2	* 2.39	53.85	Pk	31.9	-24.7	0	61.05	-	-	74	-12.95	82	287	H
3	* 2.39	30.34	RMS	31.9	-24.7	19	37.73	54	-16.27	-	-	82	287	H
4	* 2.389	33.1	RMS	31.9	-24.7	19	40.49	54	-13.51	-	-	82	287	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CM/Filt/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.1	PK	31.9	-24.7	0	48.3	-	-	74	-25.7	262	372	V
2	* 2.39	52.34	PK	31.9	-24.7	0	59.54	-	-	74	-14.46	262	372	V
3	* 2.39	30.8	RMS	31.9	-24.7	.19	38.19	54	-15.81	-	-	262	372	V
4	* 2.389	34.09	RMS	31.9	-24.7	.19	41.48	54	-12.52	-	-	262	372	V

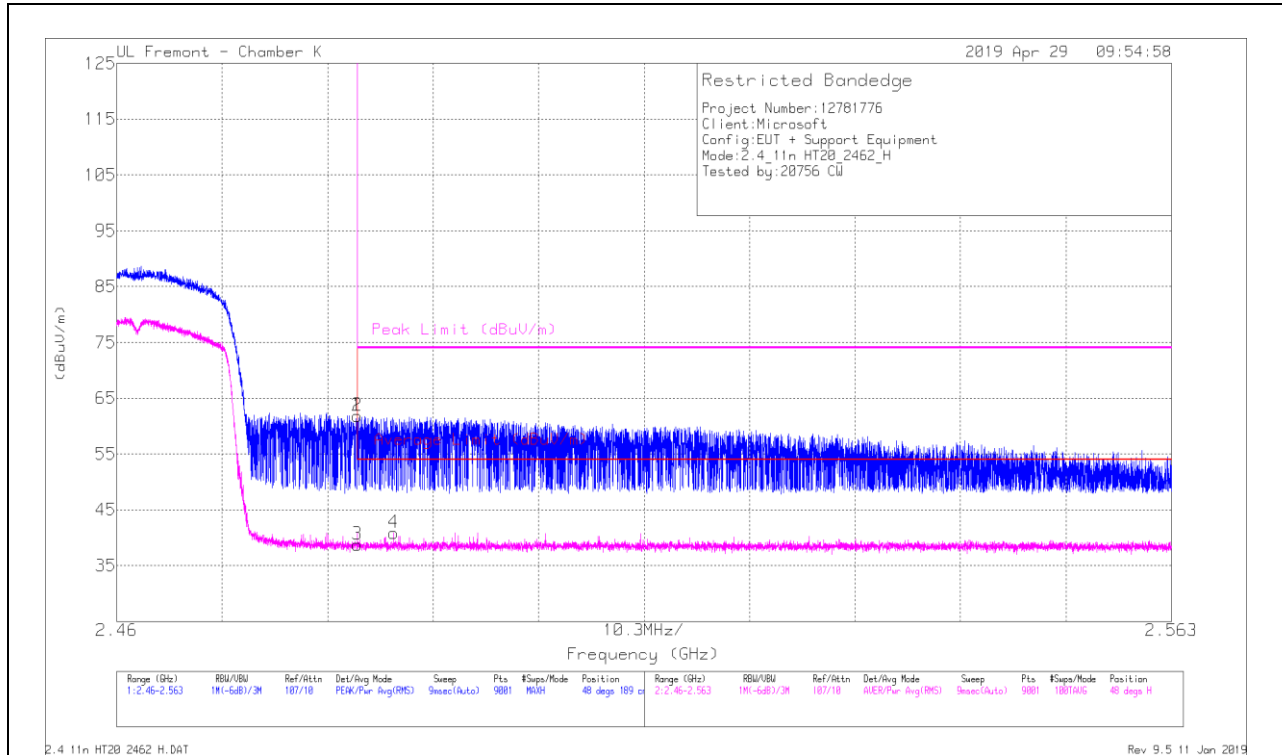
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL, CH 11)

HORIZONTAL RESULT



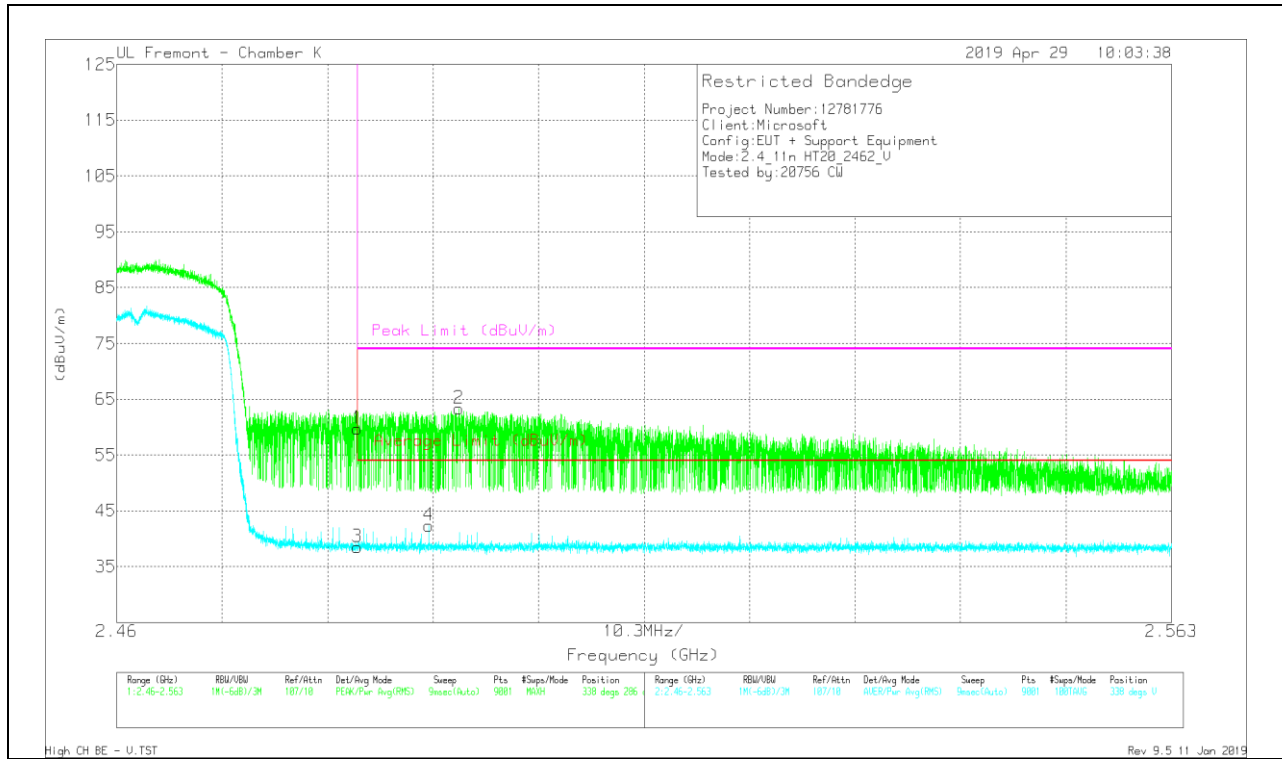
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF-T344 (dB/m)	Amp/CBI/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	54.29	Pk	32.3	-24.8	0	61.79	-	-	74	-12.21	48	189	H
2	* 2.484	54.3	Pk	32.3	-24.8	0	61.8	-	-	74	-12.2	48	189	H
3	* 2.484	31.06	RMS	32.3	-24.8	.19	38.75	54	-15.25	-	-	48	189	H
4	* 2.487	33.22	RMS	32.3	-24.8	.19	40.91	54	-13.09	-	-	48	189	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dBm)	Amp/CM/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 2.484	52.23	PK	32.3	-24.8	0	59.73	-	-	74	-14.27	338	286	V
2	* 2.493	55.83	PK	32.3	-24.8	0	63.33	-	-	74	-10.67	338	286	V
3	* 2.484	30.77	RMS	32.3	-24.8	.19	38.46	54	-15.54	-	-	338	286	V
4	* 2.49	34.66	RMS	32.3	-24.8	.19	42.35	54	-11.65	-	-	338	286	V

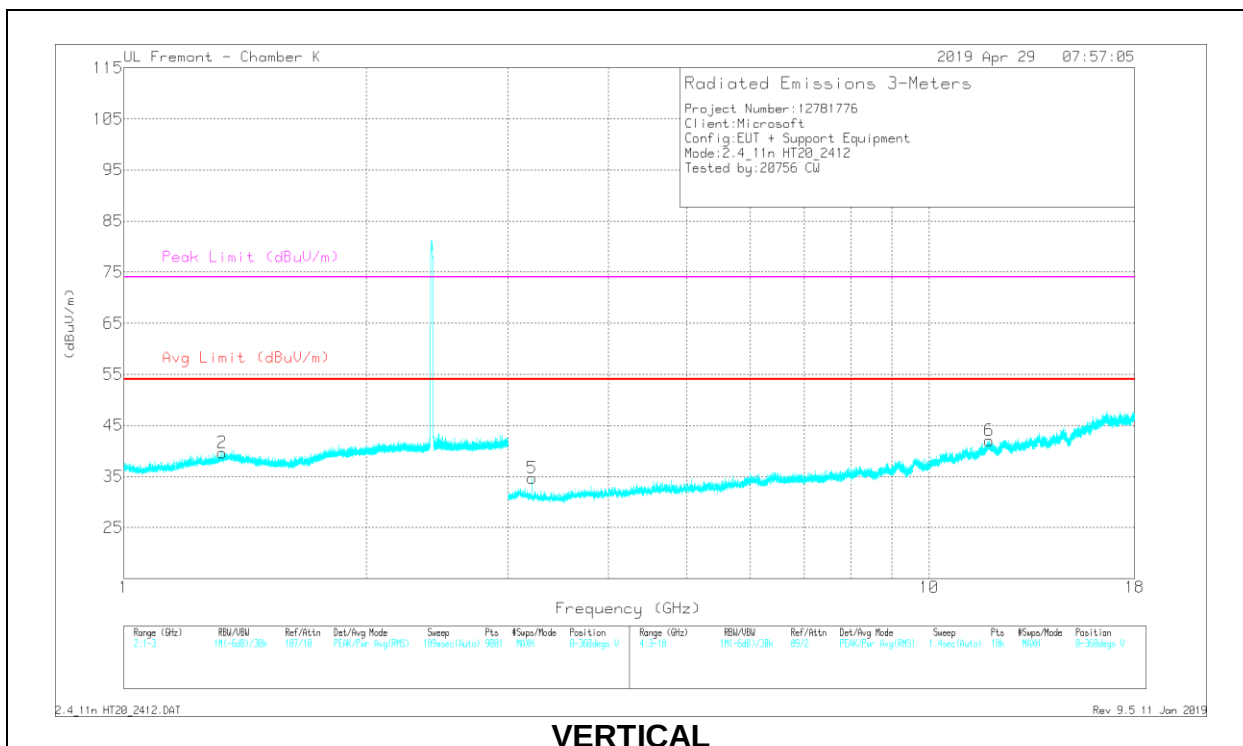
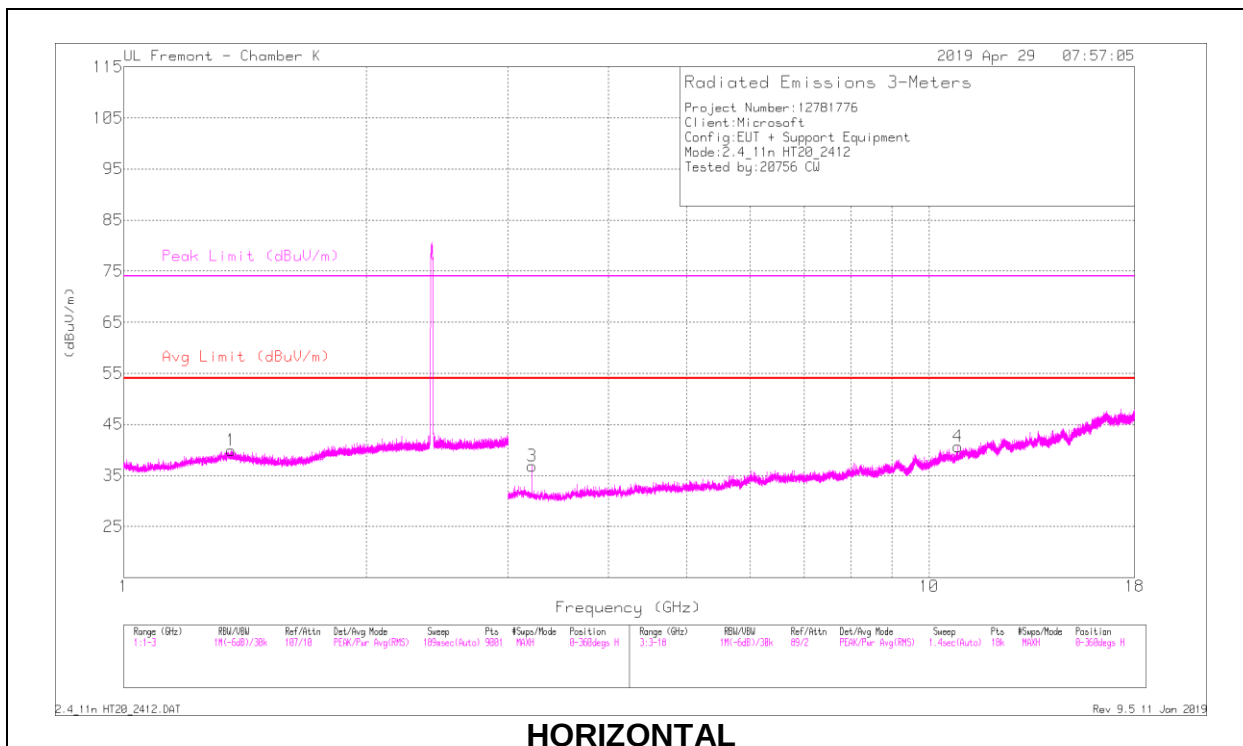
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL, CH 1 RESULTS



RADIATED EMISSIONS

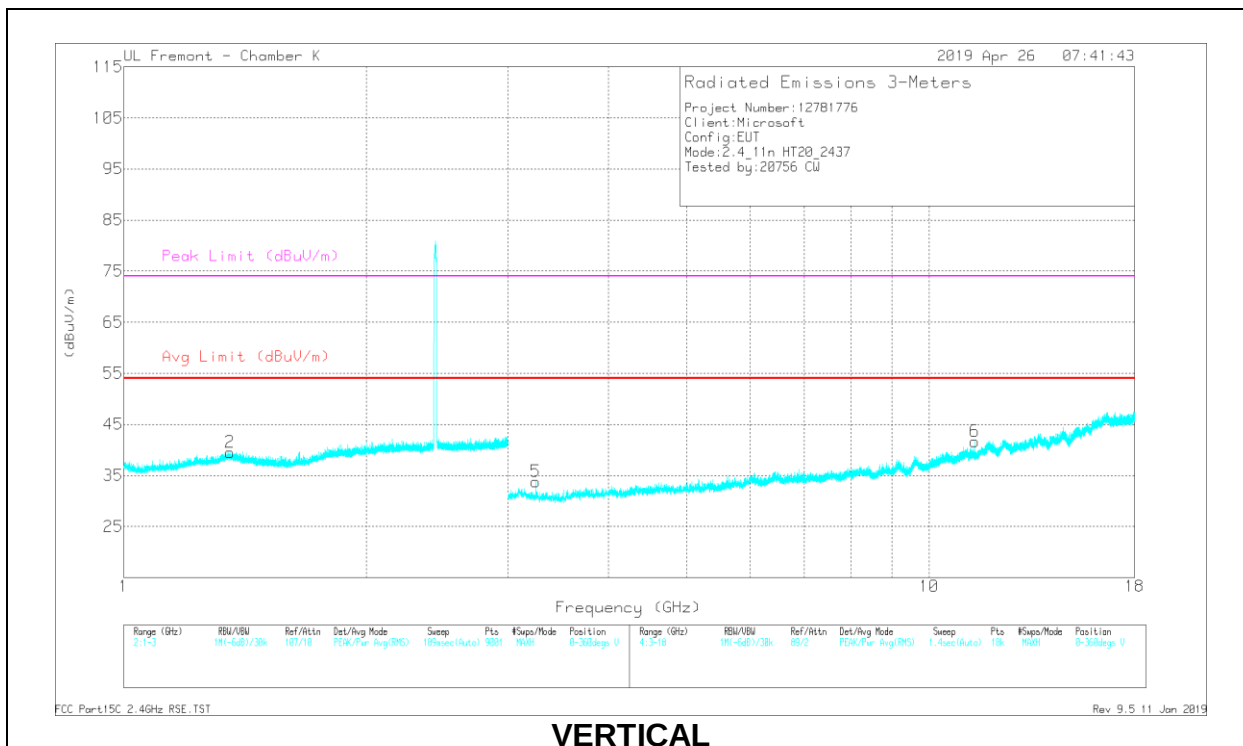
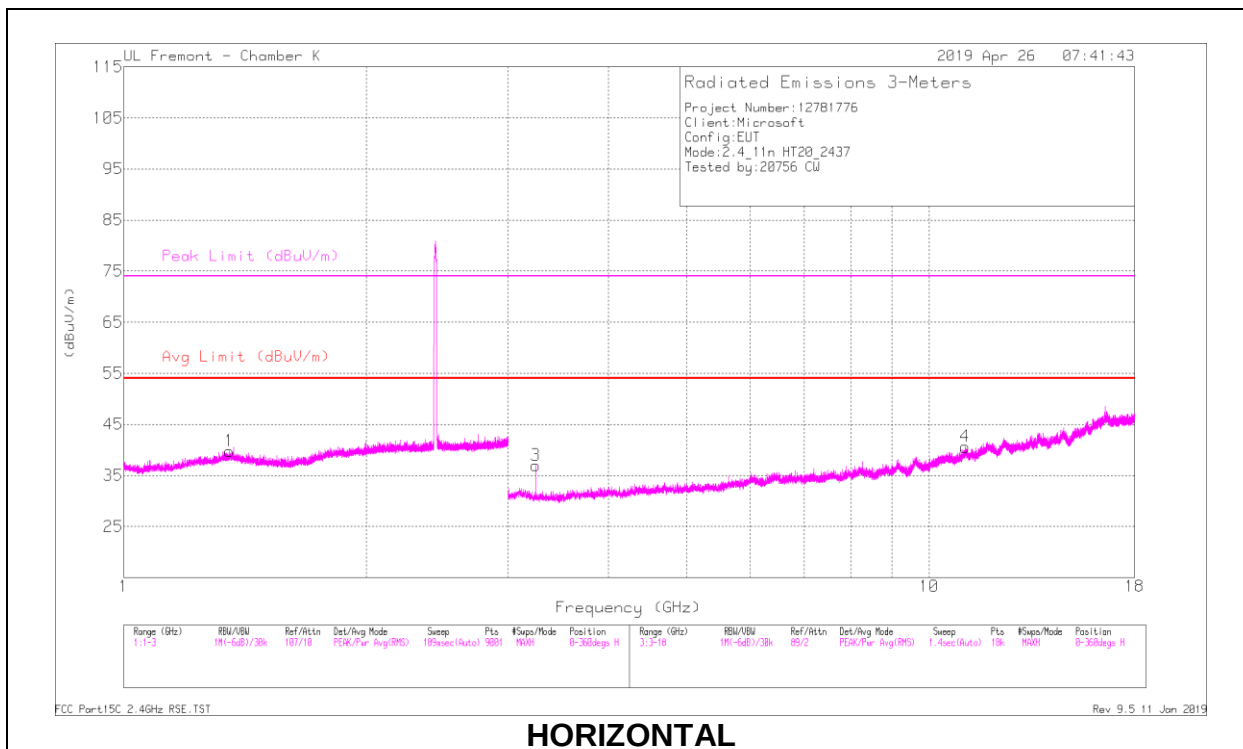
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.359	41.07	PK2	29.3	-23.9	0	46.47	-	-	74	-27.53	86	367	H
* 1.359	31.56	MAv1	29.3	-23.9	.19	37.15	54	-16.85	-	-	86	367	H
* 1.325	40.77	PK2	29.1	-23.9	0	45.97	-	-	74	-28.03	184	289	V
* 1.327	31.18	MAv1	29.1	-23.9	.19	36.57	54	-17.43	-	-	184	289	V
3.216	41.78	PK2	32.9	-32.7	0	41.98	-	-	-	-	190	226	H
* 10.857	29.78	PK2	38	-21.8	0	45.98	-	-	74	-28.02	79	180	H
* 10.859	20.62	MAv1	38	-21.8	.19	37.01	54	-16.99	-	-	79	180	H
3.216	40.6	PK2	32.9	-32.7	0	40.8	-	-	-	-	47	101	V
* 11.885	28.6	PK2	38.4	-20	0	47	-	-	74	-27	315	209	V
* 11.882	20.55	MAv1	38.4	-19.9	.19	39.24	54	-14.76	-	-	315	209	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL, CH 6 RESULTS



RADIATED EMISSIONS

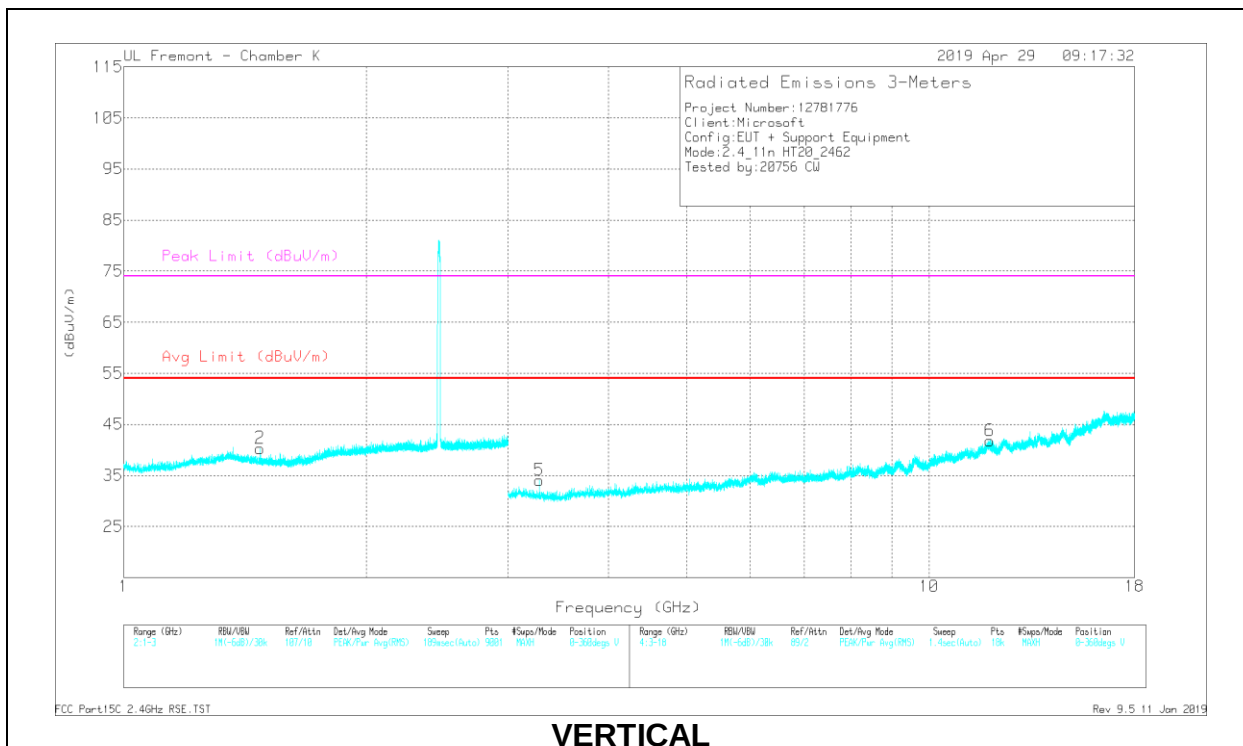
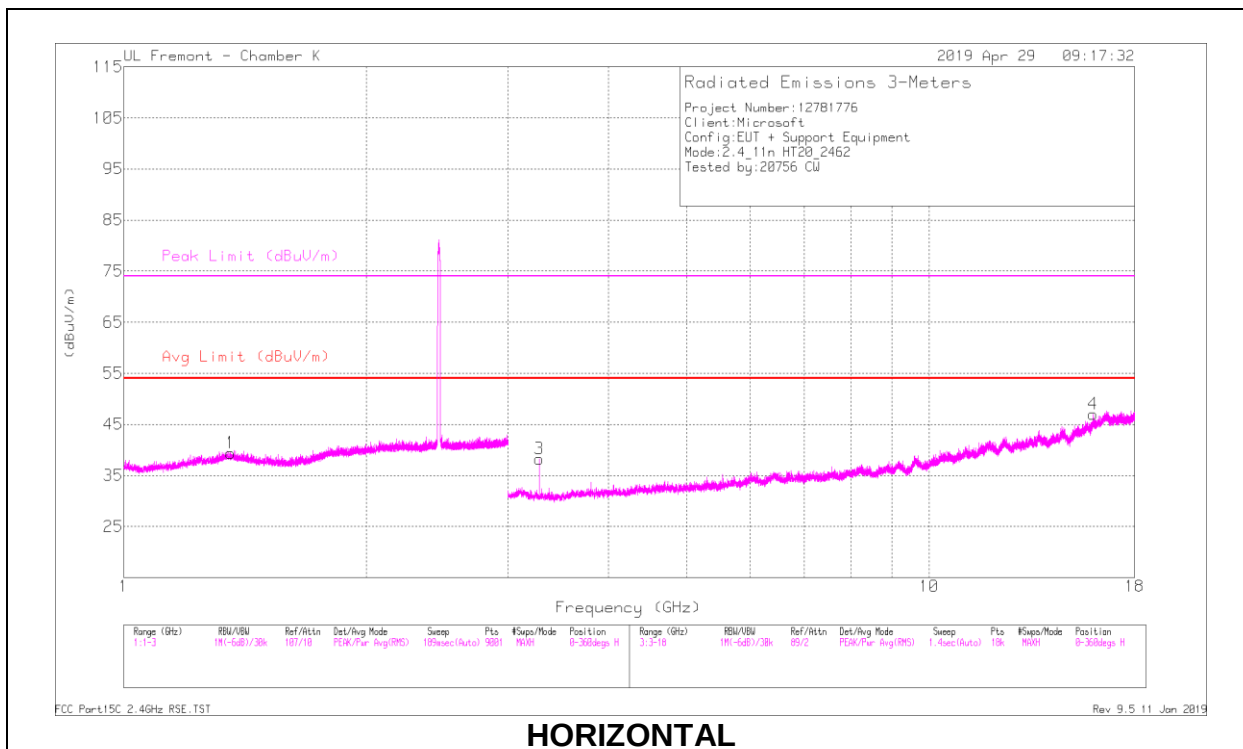
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.354	39.24	PK2	29.4	-23.8	44.84	-	-	74	-29.16	207	137	H
* 1.352	31.07	MAv1	29.4	-23.9	36.57	54	-17.43	-	-	207	137	H
* 1.357	39.41	PK2	29.4	-23.8	45.01	-	-	74	-28.99	134	185	V
* 1.357	31.86	MAv1	29.4	-23.8	37.46	54	-16.54	-	-	134	185	V
3.249	43.48	PK2	32.9	-33	43.38	-	-	-	-	331	162	H
3.249	38.89	PK	32.9	-33	38.79	-	-	-	-	257	157	V
* 11.098	27.7	PK2	37.9	-20.7	44.9	-	-	74	-29.1	69	225	H
* 11.098	20.62	MAv1	37.9	-20.7	37.82	54	-16.18	-	-	69	225	H
* 11.403	27.09	PK2	38	-20.8	44.29	-	-	74	-29.71	131	179	V
* 11.403	19.67	MAv1	38	-20.8	36.87	54	-17.13	-	-	131	179	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL, CH 11 RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.357	42.13	PK2	29.4	-23.8	0	47.73	-	-	74	-26.27	132	180	H
	* 1.357	31.65	MAv1	29.4	-23.8	.19	37.44	54	-16.56	-	-	132	180	H
2	* 1.479	40.82	PK2	28.2	-23.9	0	45.12	-	-	74	-28.88	259	213	V
	* 1.477	31.89	MAv1	28.3	-23.8	.19	36.58	54	-17.42	-	-	259	213	V
3	3.283	42.55	PK2	32.9	-32.8	0	42.65	-	-	-	-	318	267	H
4	* 15.993	27.75	PK2	41.1	-17.5	0	51.35	-	-	74	-22.65	131	280	H
	* 15.996	18.82	MAv1	41.1	-17.5	.19	42.61	54	-11.39	-	-	131	280	H
5	3.283	40.55	PK2	32.9	-32.8	0	40.65	-	-	-	-	197	289	V
6	* 11.901	28.67	PK2	38.4	-20.2	0	46.87	-	-	74	-27.13	48	189	V
	* 11.899	20.33	MAv1	38.4	-20.2	.19	38.72	54	-15.28	-	-	48	189	V

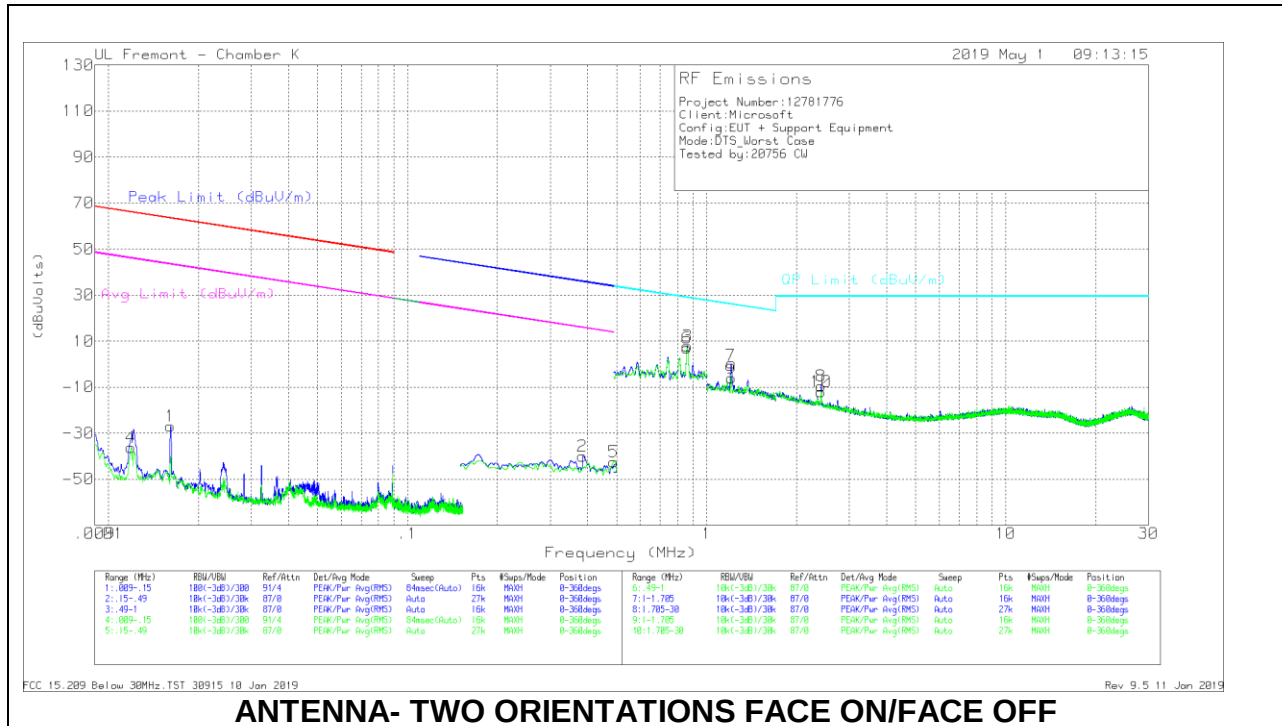
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.2. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



Below 30MHz Data

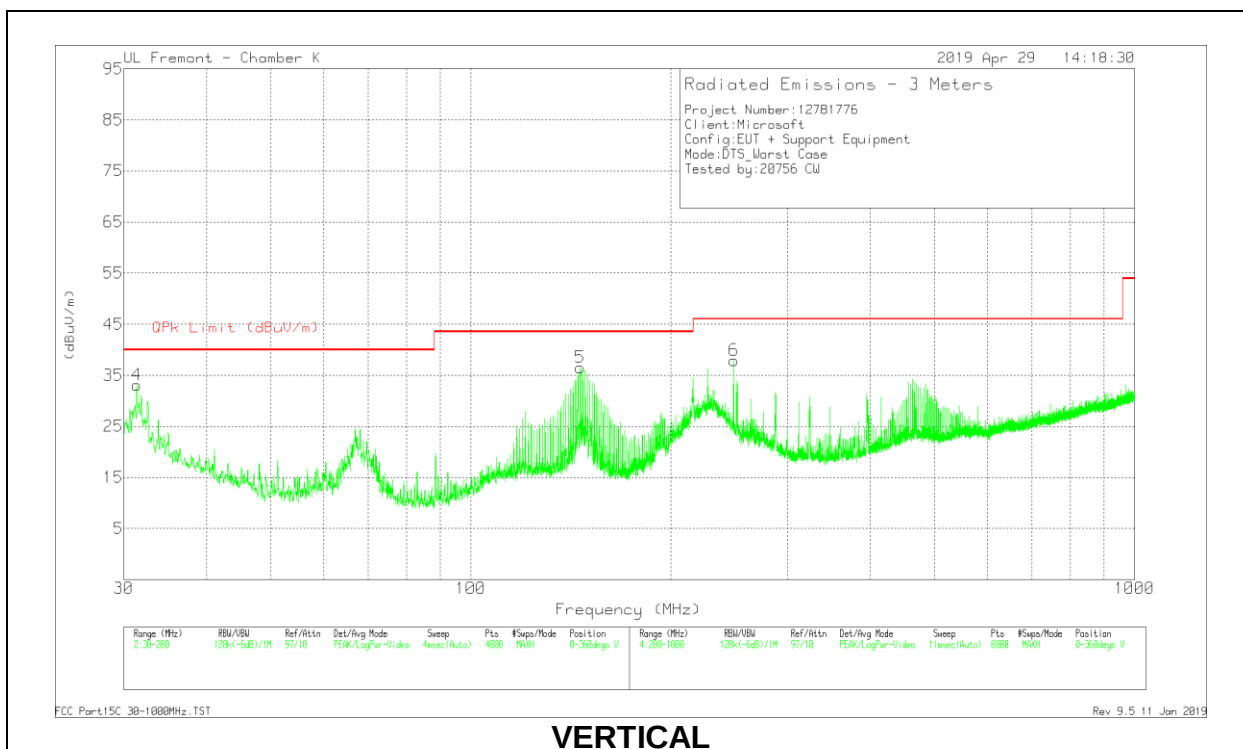
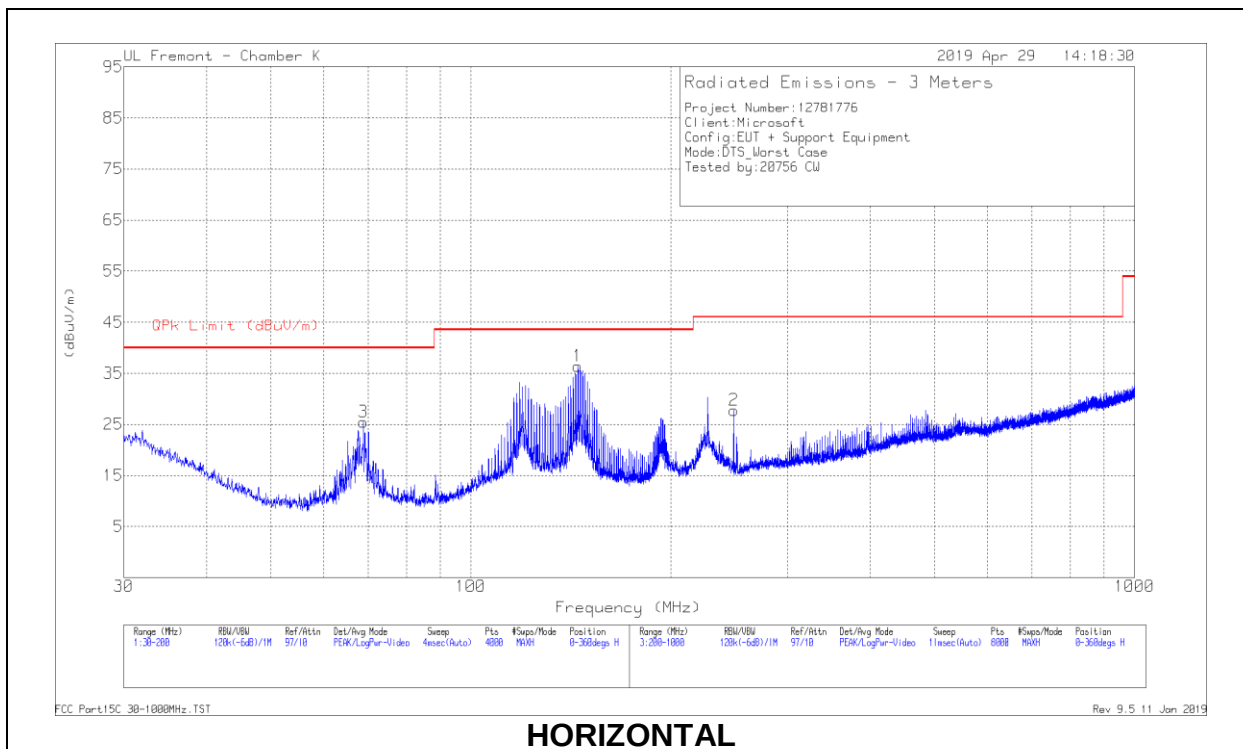
Marker	Frequency (MHz)	Meas Reading (dBuV)	Det	Loop Antenna (ACP)	Cables w/ PRE01866 50	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01615	25.53	PK	59.5	-31.9	-80	-26.87	63.42	-90.29	43.42	-70.29	-	-	-	-	-	-	0-360
2	.38445	16.01	PK	56.2	-32.1	-80	-39.89	-	-	-	-	-	-	35.91	-75.8	15.91	-55.8	0-360
4	.01192	15.62	PK	60.1	-31.8	-80	-36.08	66.06	-102.14	46.06	-82.14	-	-	-	-	-	-	0-360
5	.49	13.51	PK	56.2	-32.1	-80	-42.39	-	-	-	-	33.8	-76.19	33.8	-76.19	13.8	-56.19	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meas Reading (dBuV)	Det	Loop Antenna (ACP)	Cables w/ PRE01866 50	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.8616	23.76	PK	56.3	-32.1	-40	7.96	28.91	-20.95	0-360
6	.86074	22.79	PK	56.3	-32.1	-40	6.99	28.92	-21.93	0-360
7	1.205	26.25	PK	45.3	-32.1	-40	-5.55	26.01	-26.56	0-360
8	2.41659	22.4	PK	40	-32	-40	-9.6	29.5	-39.1	0-360
9	1.20674	20.73	PK	45.3	-32.1	-40	-6.07	25.98	-32.05	0-360
10	2.41554	20.11	PK	40	-32	-40	-11.89	29.5	-41.39	0-360

Pk - Peak detector

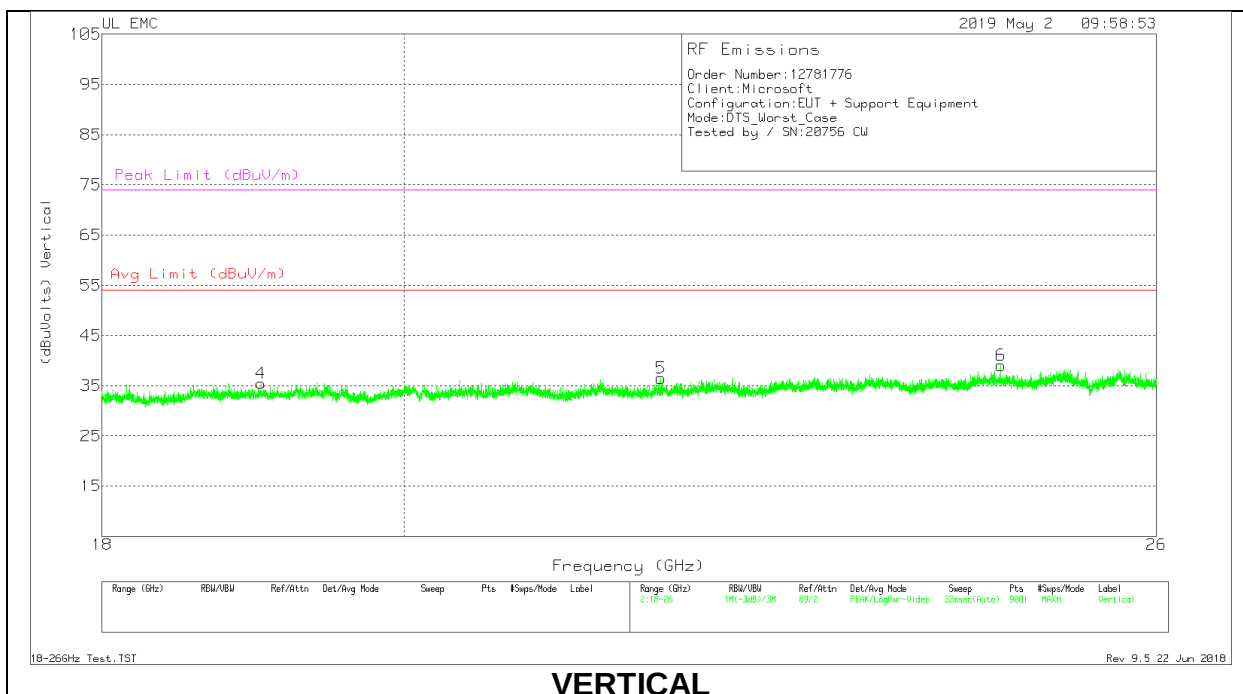
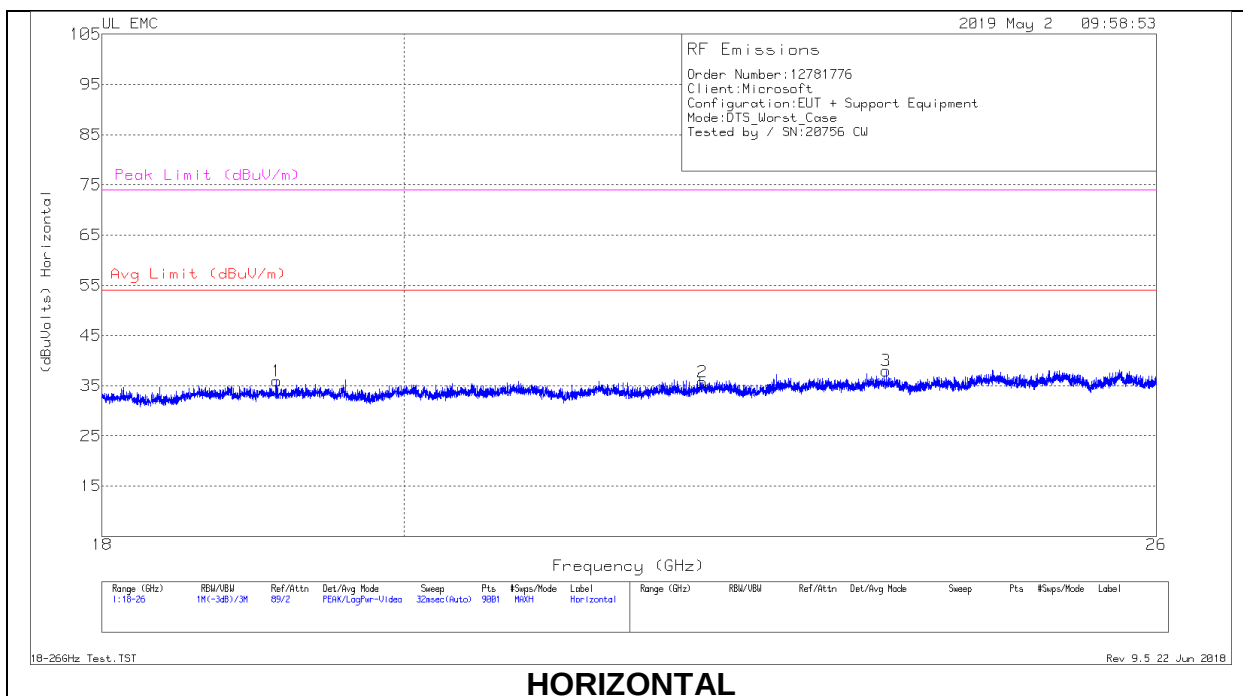
9.3. WORST CASE BELOW 1 GHZ



Below 1GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184052 (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	145.0348	48.42	Pk	18.6	-30.6	0	36.42	43.52	-7.1	0-360	199	H
3	68.8976	42.7	Pk	14	-31.2	0	25.5	40	-14.5	0-360	399	H
4	31.4029	38.97	Pk	25.7	-31.6	0	33.07	40	-6.93	0-360	100	V
5	146.2676	48.54	Pk	18.6	-30.6	0	36.54	43.52	-6.98	0-360	100	V
2	* 248.9064	40.24	Pk	17.4	-29.9	0	27.74	46.02	-18.28	0-360	299	H
6	* 248.9064	50.46	Pk	17.4	-29.9	0	37.96	46.02	-8.06	0-360	99	V

9.4. WORST CASE 18-26 GHZ



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE018218 8 (dB/m)	AmplCbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.13	69.85	Pk	33.2	-57.6	-9.5	35.95	54	-18.05	74	-38.05
2	22.192	68.51	Pk	34.1	-57.4	-9.5	35.71	54	-18.29	74	-38.29
3	23.66	70.26	Pk	34.4	-57.2	-9.5	37.96	54	-16.04	74	-36.04
4	19.026	68.97	Pk	33.3	-57.3	-9.5	35.47	54	-18.53	74	-38.53
5	21.874	69.35	Pk	34	-57.4	-9.5	36.45	54	-17.55	74	-37.55
6	24.627	69.65	Pk	34.8	-55.9	-9.5	39.05	54	-14.95	74	-34.95

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS