CERTIFICATION TEST REPORT

Report Number: R12935938-E7

Applicant	:	Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 USA
Model	:	1868
FCC ID	:	C3K1868
IC	:	3048A-1868
EUT Description	:	Portable Computing Device
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
2019-09-16

Prepared by:
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NVLAP TESTING
NVLAP Lab code: 200246-0

REPORT REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2019-08-29	Initial Issue	Brian T. Kiewra
2	2019-08-30	Added 6dB bandwidth for straddle channels	Brian T. Kiewra
3	2019-09-10	Added AC power adaptor to support equipment. Added justification for waiving SISO testing to Section 5.5 Added model similarity explanation to Section 5.1. Revised 802.11nHT40 99%BW results in Section 8.1.	Brian T. Kiewra
4	2019-09-16	Added “Scope of Report” as Section 4	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
USA

EUT DESCRIPTION: Portable Computing Device

MODEL: 1868

SERIAL NUMBER: See Section 5.4

DATE TESTED: 2019-07-07 to 2019-09-10

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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:

Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
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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, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 789033 D02 v02r01, ANSI C63.10-2013, FCC 06-96, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27590, 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.
Site Code: 2180C	
☐ Chamber A RTP	☒ North Chamber
☐ Chamber C RTP	☒ South Chamber

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

4. SCOPE OF REPORT

This test report covers the radiated emissions and antenna port conducted emissions for model 1868 for 5.8 GHz 802.11a, n HT20, n HT40, and ac VHT80. Antenna port conducted emissions data in this report is leveraged by model 1867. For model 1867, radiated emissions can be found in UL report number R12922855-E7. For model 1868, AC mains line conducted emissions and worst-case radiated emisisons can be found in UL report number R12935938-E11.

For the antenna port conducted emissons portion of this report, the worst-case antenna gain across both models was used to represent a worst-case scenario. Both models will be implemented with the same power.

Models 1867 and 1868 are electrically and RF equivalent as they use the same motherboard, radio module and on-board RF components. Both models share a common WiFi and BT power table. The radio-related firmware and driver versions are the same for the two models. The peak antenna gains are in the antenna gain section of the report. Antenna port conducted emissions measurements are done on model 1868 (FCC ID: C3K1868, IC: 3048A-1868) and the data is leveraged for model 1867 (FCC ID: C3K1867, IC: 3048A-1867). Highest antenna gain across the two models in each band has been considered while doing the conducted emissions measurements. Separate radiated & SAR measurements are done on each model.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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

5.3. 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
All emissions, radiated	5.17 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a Portable Computing Device that contains 802.11 a/ac/ax/b/g/n 20/40/80/160MHz 2x2 dual band and BT/BLE radios.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.8 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 2TX			
5745-5825	802.11a CDD	21.62	145.21
5745-5825	802.11n HT20 SDM	21.54	142.56
5755-5795	802.11n HT40 SDM	21.69	147.57
5775	802.11ac VHT80 SDM	21.72	148.59

SISO and MIMO per chain power are set to the same level.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	Antenna Type	Peak Gain (dBi) Chain 0 (Right)	Peak Gain (dBi) Chain 1 (Left)
Model 1867			
2.4 to 2.48	PIFA	0.7	2.6
5.15 to 5.25		4.9	4.4
5.25 to 5.35		6.1	5.0
5.47 to 5.72		7.2	5.5
5.725 to 5.85		9.4	5.6
Model 1868			
2.4 to 2.48	PIFA	0.4	1.0
5.15 to 5.25		3.6	2.2
5.25 to 5.35		5.2	3.5
5.47 to 5.72		6.4	4.7
5.725 to 5.85		7.8	4.5

The 5 GHz WLAN radio utilizes Chain 0 and chain 1.
NOTE: Antenna 1 = Chain 0
Antenna 2 = Chain 1

6.4. SOFTWARE AND FIRMWARE

EUT	Serial Number	DRTU Version	OS Version	BT Driver Version	WiFi Driver Version	EUT's Power Supply (s/n)
R-557-1868-FCC-CONDUCTED-02	005210692757	11.1916.0 -09531	MTEOS 1.652.0	21.0.19157.20088	99.0.43.8	0D130P01P9596
R-557-1868-FCC-CONDUCTED-03	005216792757	11.1916.0 -09531	MTEOS 1.652.0	21.0.19157.20088	99.0.43.8	0D130P03GE596
R-557-1868-FCC-RADIATED-10	013886292757	11.1916.0 -09531	MTEOS 1.652.0	21.0.19157.20088	99.0.43.8	0D130P02KC596
R-557-1868-FCC-RADIATED-11	013891692757	11.1916.0 -09531	MTEOS 1.652.0	21.0.19157.20088	99.0.43.8	0D130P01S7596

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emissions were performed in worst-case test report R12935938-E11(FCC ID: C3K1868, IC: 3048A-1868).

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 EUT has one intended orientations, X; therefore, all final radiated testing was performed with the EUT in X orientation.

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

802.11a mode: 6 Mbps
802.11n HT20mode: MCS8
802.11n HT40mode: MCS8
802.11ac VHT80 mode: MCS0 (NSS=2)

All radios that can transmit simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

MIMO and SISO power are same setting per chain, therefore MIMO mode tested as worst-case to cover SISO mode.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
USB Hub	J5 Create	JCA374	AY2A1904000477 / AY6A1903004261	N/A
Earbuds	Sony	MDR-EX14AP	Non-Serialized	N/A
USB Flash Drive	Kingston	Data Traveler G4	Non-Serialized	N/A
AC Adaptor	Microsoft	1706	0D130P02KC596	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Mains	1	12-pin	Mains	<3m	None
2	USB-A	1	USB-A	USB	<3m	None
3	USB-C	1	USB-C	USB	<3m	None
4	Aux	1	Aux	Aux	<3m	None

TEST SETUP

The test utility software was located on the EUT during the tests and was used to exercised the radios.

SETUP DIAGRAMS

Please refer to 12935938-EP1 for setup diagrams

7. TEST AND MEASUREMENT EQUIPMENT

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

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
1-18 GHz					
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-03-22	2020-03-22
Gain-Loss Chains					
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-15	2020-03-15
Receiver & Software					
SA0026	Spectrum Analyzer	Agilent	N9030A	2019-03-19	2020-03-19
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27

NOTES:
1. For equipment listed above that was calibrated during the testing period, please note the equipment was used for testing after calibration.
2. For equipment listed above that has a calibration due date during the testing period, the testing was completed before the equipment expiration date.

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
1-18 GHz					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
Gain-Loss Chains					
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
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

NOTES:
1. For equipment listed above that was calibrated during the testing period, please note the equipment was used for testing after calibration.
2. For equipment listed above that has a calibration due date during the testing period, the testing was completed before the equipment expiration date.

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Test Equipment Used – Antenna Port Conducted Testing (Morrisville)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SA0027	PXA Signal Analyzer	Keysight Technologies	MY54490254	2019-05-15	2020-05-15
s/n 160938893	Environmental Meter	Fisher Scientific	14-650-118	2019-06-17	2020-06-17
224604-002	Coaxial Testing Cable	Uti-flex	UFA147A-0-0180-200200	NA	NA
Antenna Port	Antenna Port Software	Antenna	Version 10.0.1	NA	NA
126431 (PRE0128068)	RF Power Meter	Anritsu	ML2495A	2019-04-30	2020-04-30
126430 (PRE0128067)	Pulse Power Sensor, 300MHz to 40GHz	Anritsu	MA2411B	2019-04-30	2020-04-30
PWM001 (PRE0136343)	RF Power Meter	Keysight Technologies	N1912A	2019-06-14	2020-06-14
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2019-05-06	2020-05-06
T177	PSA Signal Analyzer	Keysight Technologies	E4446A	2019-04-22	2020-04-22
HI0090	Environmental Meter	Fisher Scientific	17-E670X-80-1	2019-06-17	2020-06-17
Antenna Port	Antenna Port Software	Antenna	Version 10.0.1	NA	NA

NOTES:

1. For equipment listed above that was calibrated during the testing period, please note the equipment was used for testing after calibration.
2. For equipment listed above that has a calibration due date during the testing period, the testing was completed before the equipment expiration date.

8. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

Conducted Output Power: KDB 789033 D02 v02r01, Section E.3.b (Method PM-G)

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.5 and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3 and G.5.

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

5.8 Band

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a CDD	2.086	2.132	0.978	97.84%	0.09	0.479
802.11n HT20 SDM	3.979	4.026	0.988	98.83%	0.00	0.010
802.11n HT40 SDM	3.981	4.030	0.988	98.78%	0.00	0.010
802.11ac VHT80 SDM	3.965	4.012	0.988	98.83%	0.00	0.010

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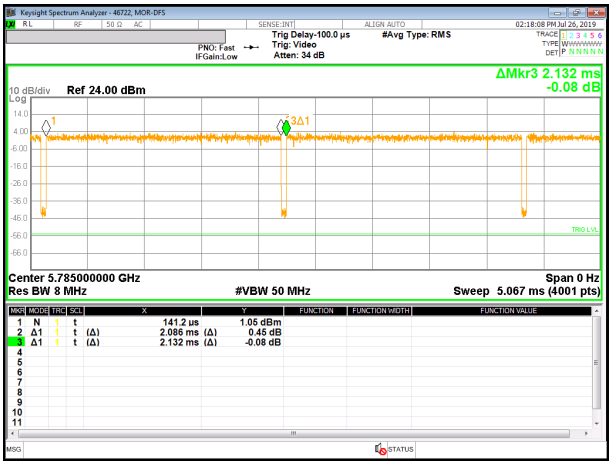
DUTY CYCLE PLOTS



DUTY CYCLE 802.11a CDD MODE

DUTY CYCLE 802.11n HT20 SDM MODE

DUTY CYCLE 802.11n HT40 SDM MODE

DUTY CYCLE 802.11ac VHT80 SDM MODE

9.1. 99% BANDWIDTH

LIMITS

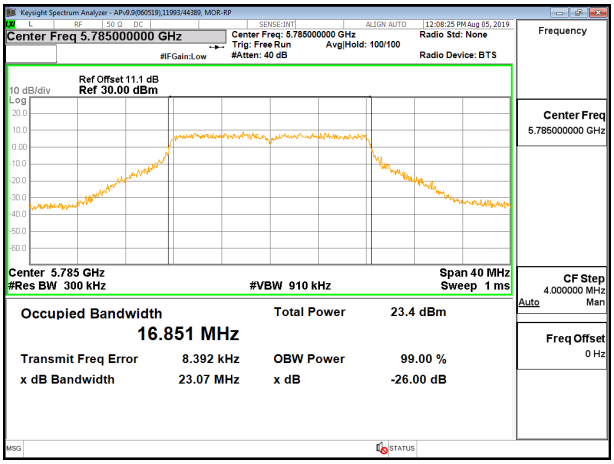
None; for reporting purposes only.

9.1.1. 802.11a MODE IN THE 5.8 GHz BAND

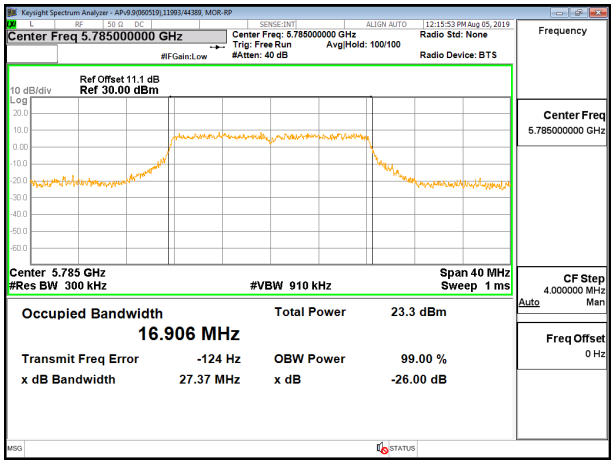
2TX Antenna 1 + Antenna 2 CDD MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna 1 (MHz)	99% Bandwidth Antenna 2 (MHz)
Low	5745	17.017	16.754
Mid	5785	16.851	16.906
High	5825	16.950	16.919

MID CHANNEL



MID CHANNEL CHAIN 0



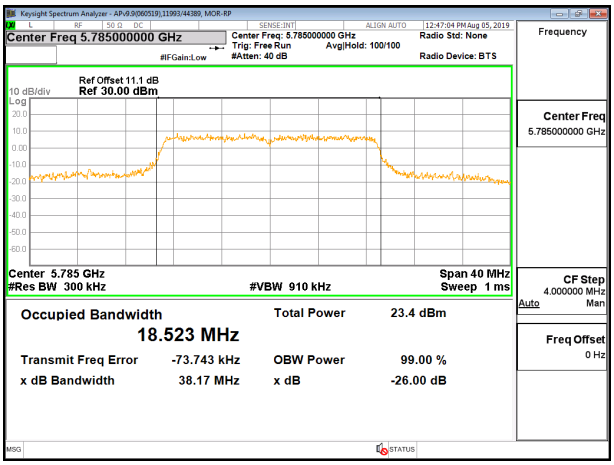
MID CHANNEL CHAIN 1

9.1.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna 1 (MHz)	99% Bandwidth Antenna 2 (MHz)
Low	5745	18.104	18.002
Mid	5785	18.523	18.028
High	5825	18.030	18.215

MID CHANNEL



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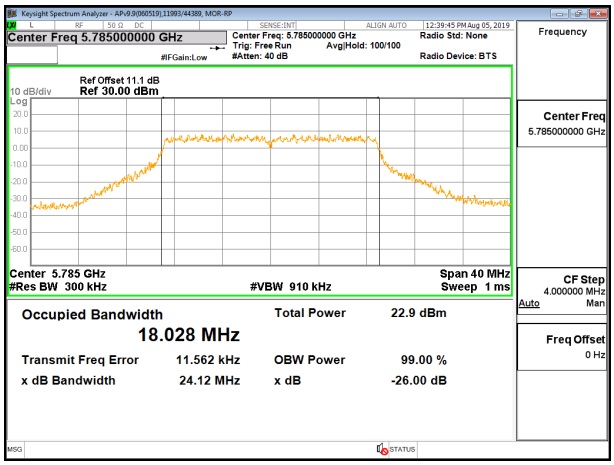


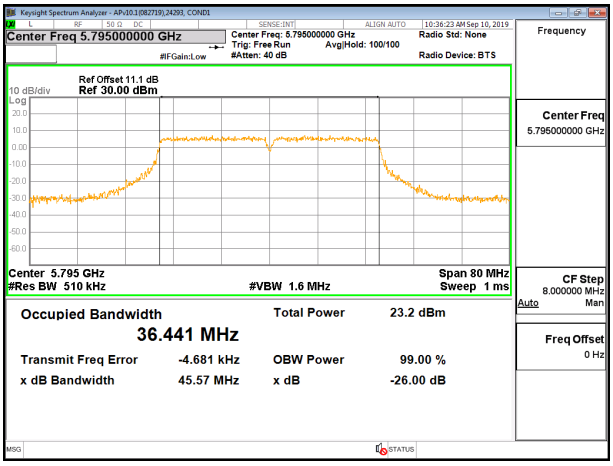
MID CHANNEL CHAIN 1

9.1.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

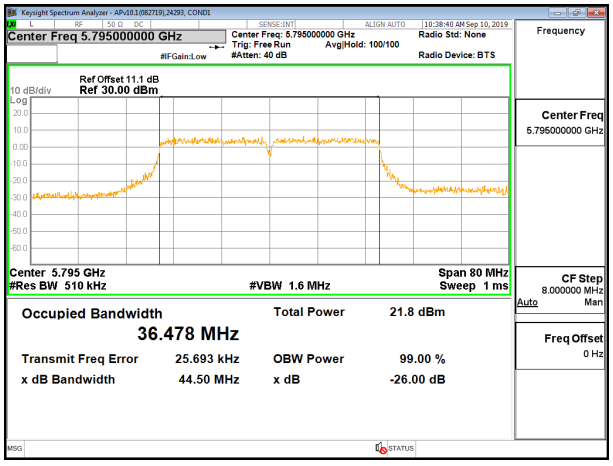
2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna 1 (MHz)	99% Bandwidth Antenna 2 (MHz)
Low	5755	37.091	36.457
High	5795	36.441	36.478

HIGH CHANNEL



HIGH CHANNEL CHAIN 0



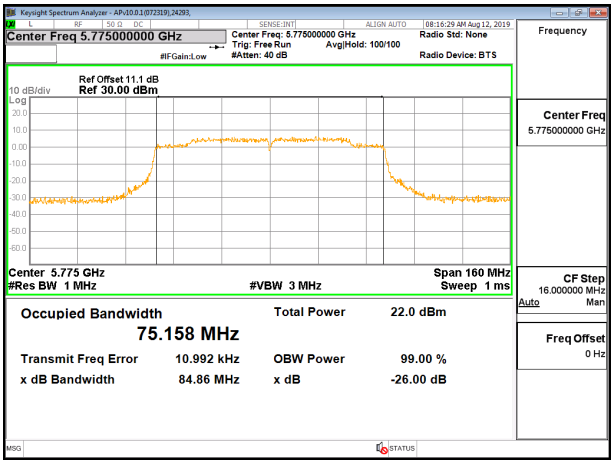
HIGH CHANNEL CHAIN 1

9.1.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

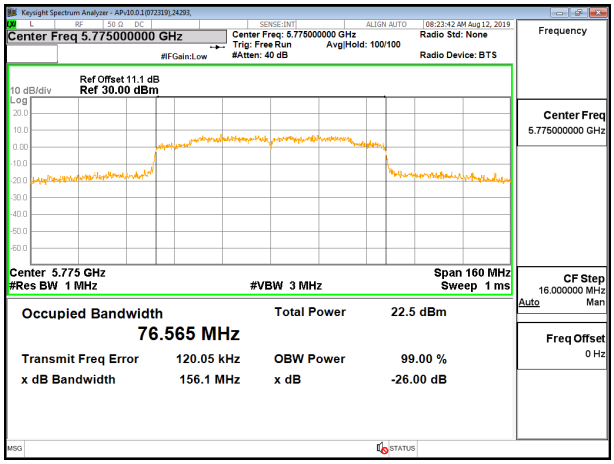
2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	99% Bandwidth Antenna 1 (MHz)	99% Bandwidth Antenna 2 (MHz)
Mid	5775	75.158	76.565

MID CHANNEL



MID CHANNEL CHAIN 0



MID CHANNEL CHAIN 1

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)
RSS-247 6.2.4.1

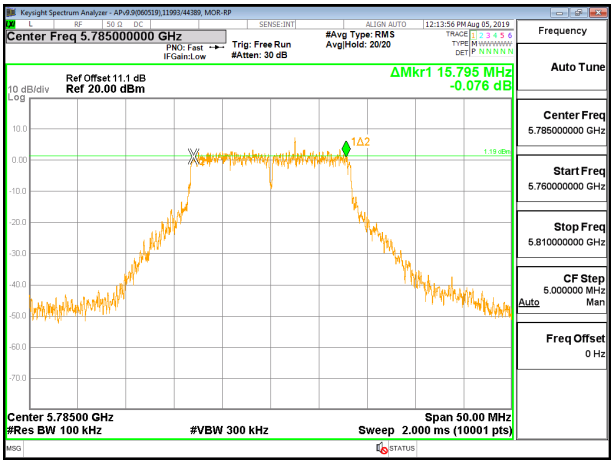
The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2.1. 802.11a MODE IN THE 5.8 GHz BAND

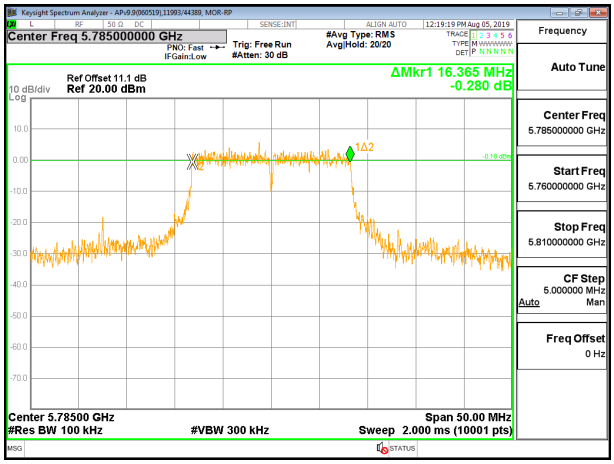
2TX Antenna 1 + Antenna 2 CDD MODE

Channel	Frequency (MHz)	6 dB BW Ant 1 (MHz)	6 dB BW Ant 2 (MHz)	Minimum Limit (MHz)
Low	5745	16.585	16.525	0.5
Mid	5785	15.795	16.365	0.5
High	5825	16.295	16.570	0.5
144	5720	3.9270	3.9460	0.5

MID CHANNEL



MID CHANNEL CHAIN 0



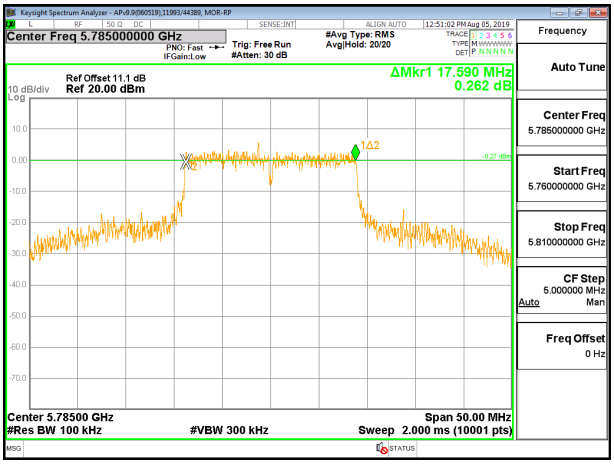
MID CHANNEL CHAIN 1

9.2.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

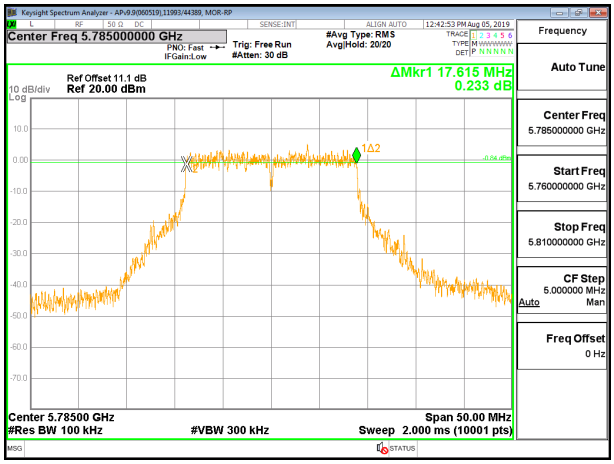
2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	6 dB BW Ant 1 (MHz)	6 dB BW Ant 2 (MHz)	Minimum Limit (MHz)
Low	5745	17.375	17.580	0.5
Mid	5785	17.590	17.615	0.5
High	5825	17.795	17.670	0.5
144	5720	3.8360	3.7990	0.5

MID CHANNEL



MID CHANNEL CHAIN 0



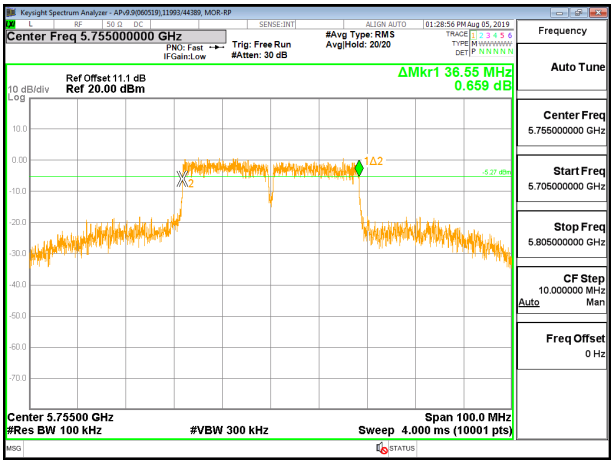
MID CHANNEL CHAIN 1

9.2.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

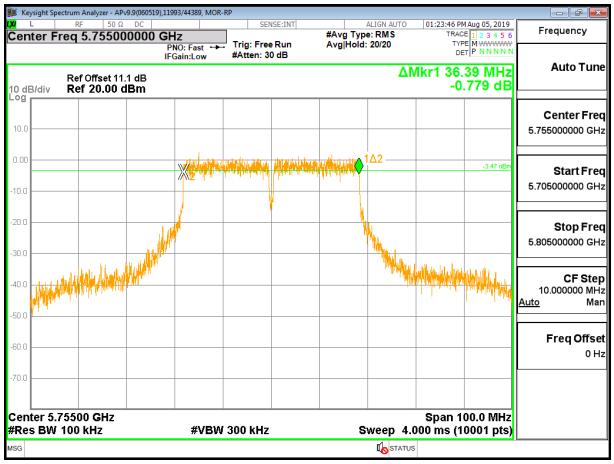
2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	6 dB BW Ant 1 (MHz)	6 dB BW Ant 2 (MHz)	Minimum Limit (MHz)
Low	5755	36.55	36.39	0.5
High	5795	36.53	36.42	0.5
142	5710	3.294	3.307	0.5

LOW CHANNEL



LOW CHANNEL CHAIN 0



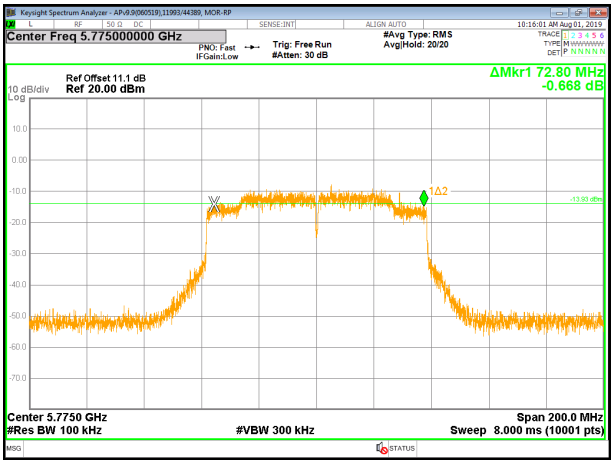
LOW CHANNEL CHAIN 1

9.2.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE

Channel	Frequency (MHz)	6 dB BW Ant 1 (MHz)	6 dB BW Ant 2 (MHz)	Minimum Limit (MHz)
Mid	5775	72.80	73.60	0.5
138	5690	3.176	3.225	0.5

MID CHANNEL



MID CHANNEL CHAIN 0

MID CHANNEL CHAIN 1

9.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

Band 5.15–5.25 GHz

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Bands 5.25-5.35 GHz and 5.47-5.725 GHz
The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Band 5.725-5.85 GHz

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

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Band 5.15-5.25 GHz
The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

Band 5.25-5.35 GHz
The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Bands 5.47-5.6 GHz and 5.65-5.725 GHz
The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Band 5.725-5.85 GHz
The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F.

DIRECTIONAL ANTENNA GAIN

For 2 TX:

Tx chains are uncorrelated for power and correlated for PSD for CDD MIMO mode and uncorrelated for both power and PSD for SDM MIMO mode. The directional gains are as follows:

Band (GHz)	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
1868				
5.8	7.8	4.5	6.46	9.32
1867				
5.8	9.4	5.6	7.90	10.72

9.3.1. 802.11a MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 CDD MODE (FCC+IC)

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	7.90	10.72	28.10	25.28
Mid	5785	7.90	10.72	28.10	25.28
High	5825	7.90	10.72	28.10	25.28
144	5720	7.90	10.72	28.10	25.28

Duty Cycle CF (dB)	0.09	Included in Calculations of Corr'd PSD

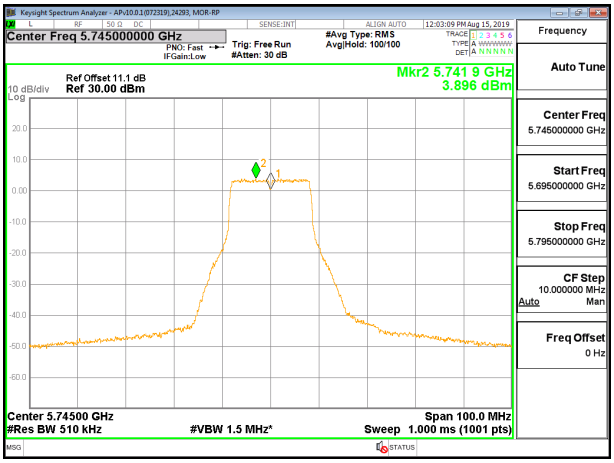
Output Power Results

Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	18.56	18.60	21.59	28.10	-6.51
Mid	5785	18.53	18.53	21.54	28.10	-6.56
High	5825	18.56	18.65	21.62	28.10	-6.48
144	5720	14.43	14.49	17.47	28.10	-10.63

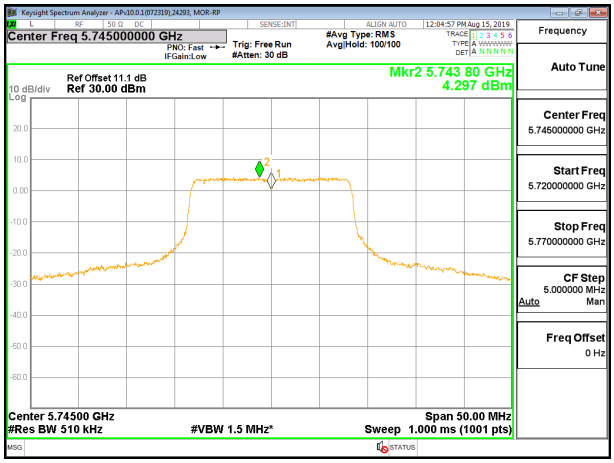
PSD Results

Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	3.896	4.297	7.201	25.28	-18.08
Mid	5785	4.299	4.302	7.401	25.28	-17.88
High	5825	4.184	4.346	7.366	25.28	-17.91
144	5720	0.874	1.563	4.332	25.28	-20.95

LOW CHANNEL

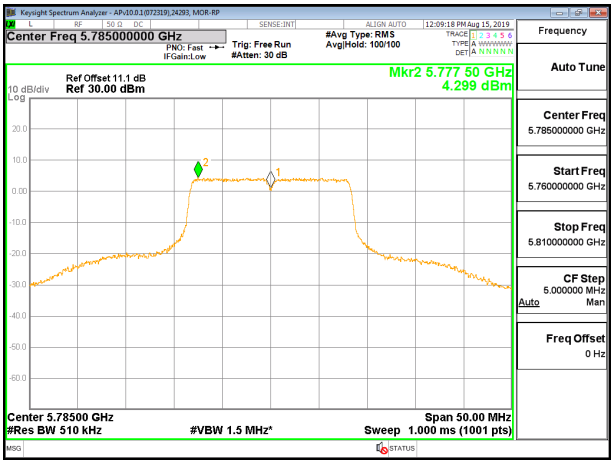


LOW CHANNEL CHAIN 0

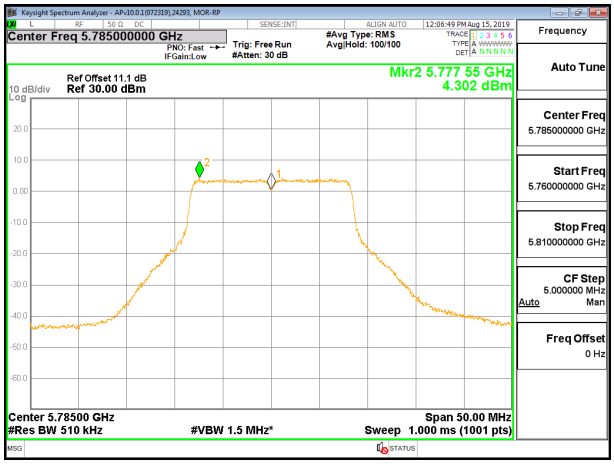


LOW CHANNEL CHAIN 1

MID CHANNEL

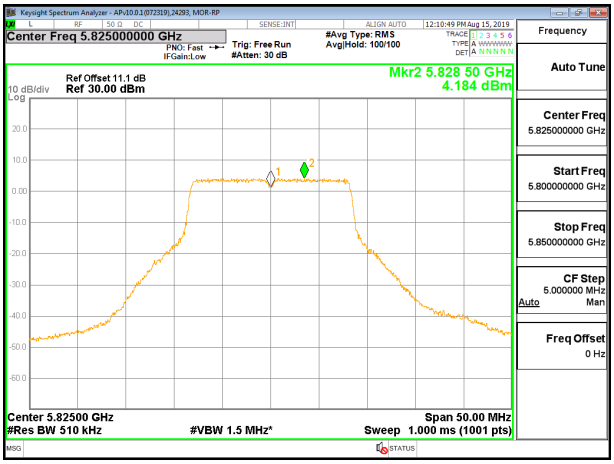


MID CHANNEL CHAIN 0

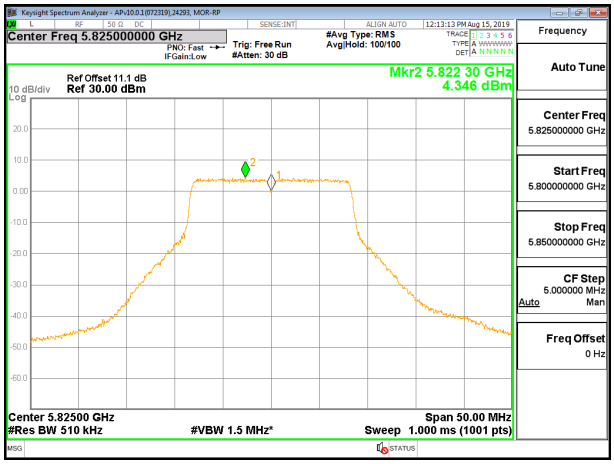


MID CHANNEL CHAIN 1

HIGH CHANNEL

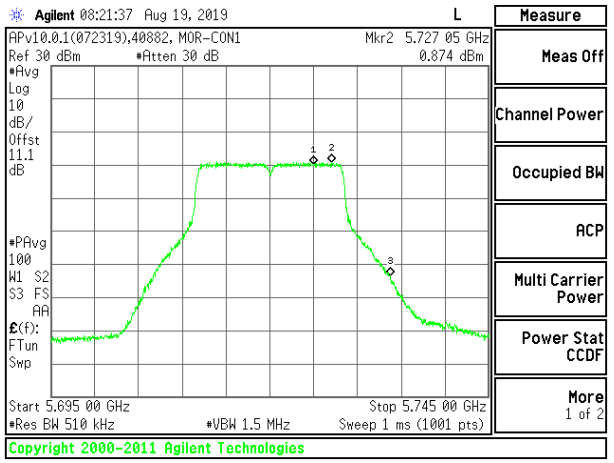


HIGH CHANNEL CHAIN 0

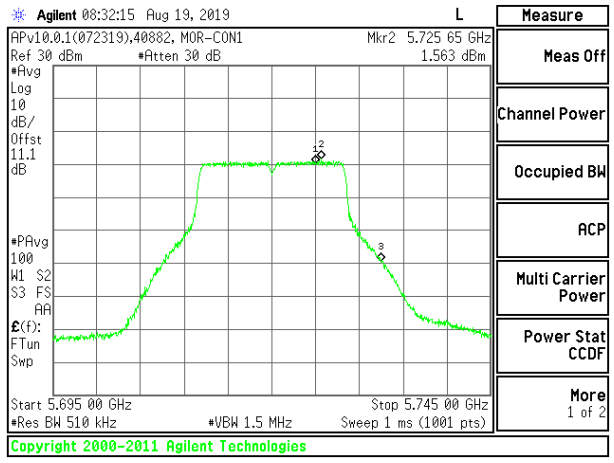


HIGH CHANNEL CHAIN 1

CHANNEL 144



CHANNEL 144 CHAIN 0



CHANNEL 144 CHAIN 1

9.3.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE (FCC+IC)

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5745	7.90	7.90	28.10	28.10
Mid	5785	7.90	7.90	28.10	28.10
High	5825	7.90	7.90	28.10	28.10
144	5720	7.90	7.90	28.10	28.10

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD

Output Power Results

Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	18.45	18.59	21.53	28.10	-6.57
Mid	5785	18.56	18.50	21.54	28.10	-6.56
High	5825	18.39	18.54	21.48	28.10	-6.62
144	5720	16.55	16.45	19.51	28.10	-8.59

PSD Results

Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5745	3.732	4.183	6.974	28.10	-21.13
Mid	5785	3.799	3.596	6.709	28.10	-21.39
High	5825	4.006	3.565	6.801	28.10	-21.30
144	5720	3.928	4.111	7.031	28.10	-21.07

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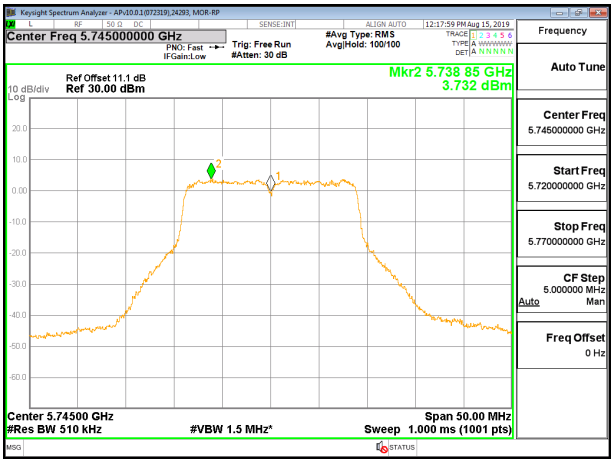
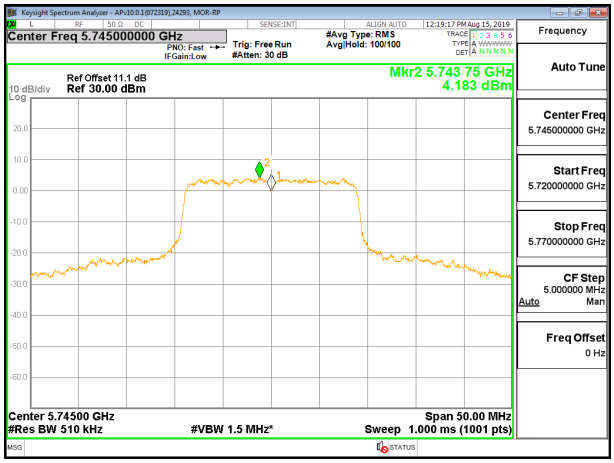
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

LOW CHANNEL

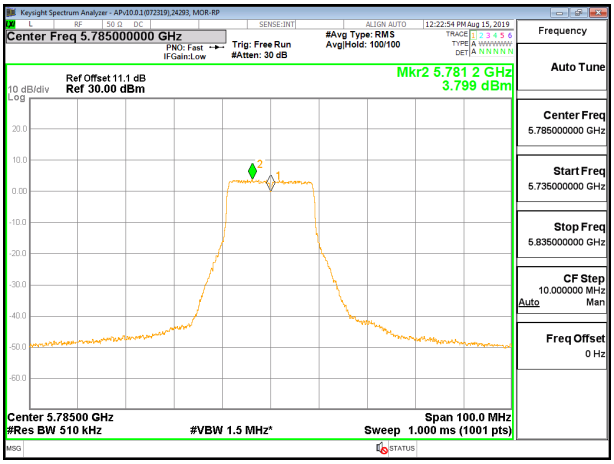


LOW CHANNEL CHAIN 0

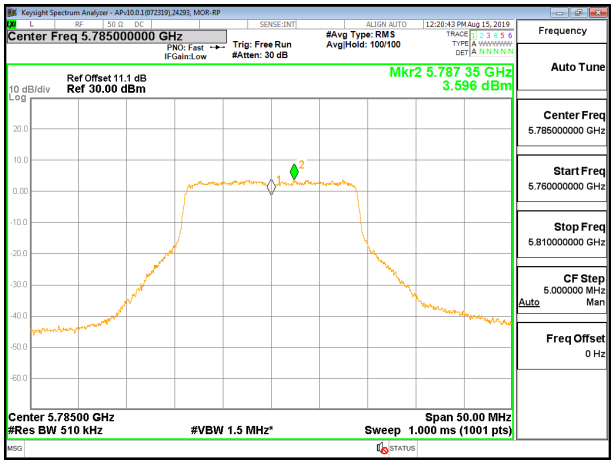


LOW CHANNEL CHAIN 1

MID CHANNEL

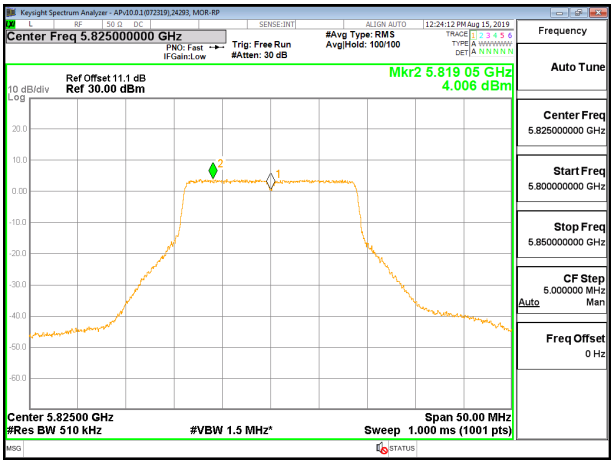


MID CHANNEL CHAIN 0



MID CHANNEL CHAIN 1

HIGH CHANNEL



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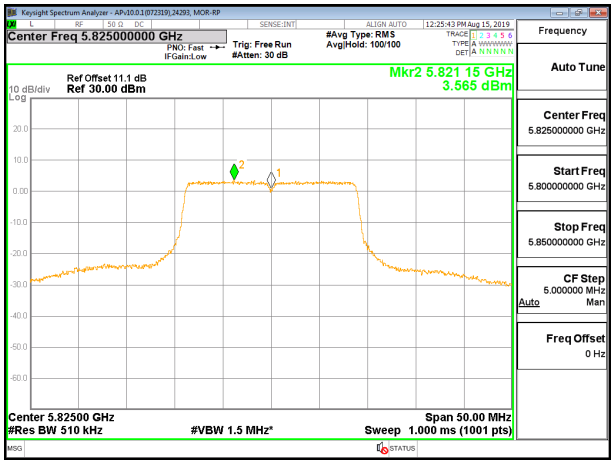
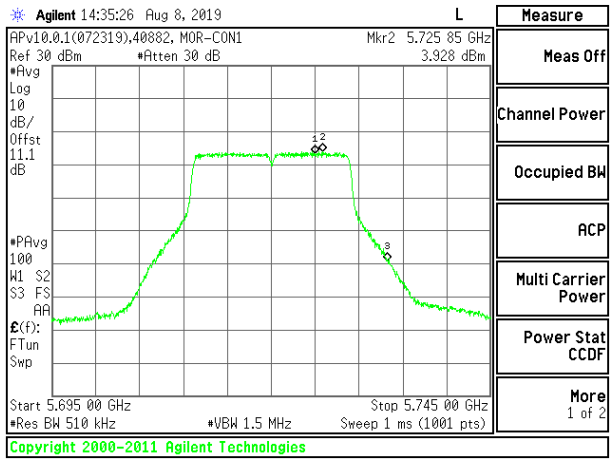
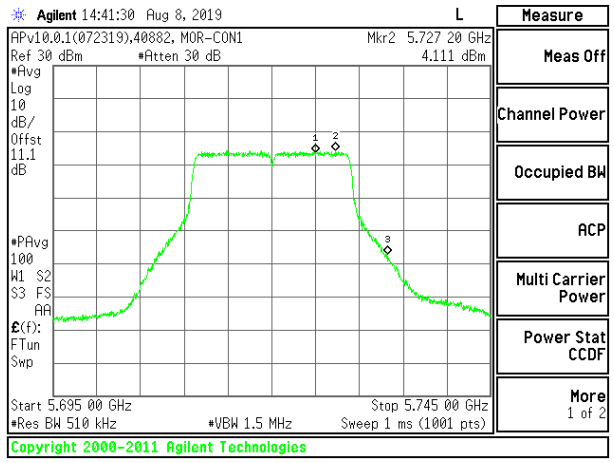


HIGH CHANNEL CHAIN 1

CHANNEL 144



CHANNEL 144 CHAIN 0



CHANNEL 144 CHAIN 1

9.3.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE (FCC+IC)

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Low	5755	7.90	7.90	28.10	28.10
High	5795	7.90	7.90	28.10	28.10
142	5710	7.90	7.90	28.10	28.10

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power

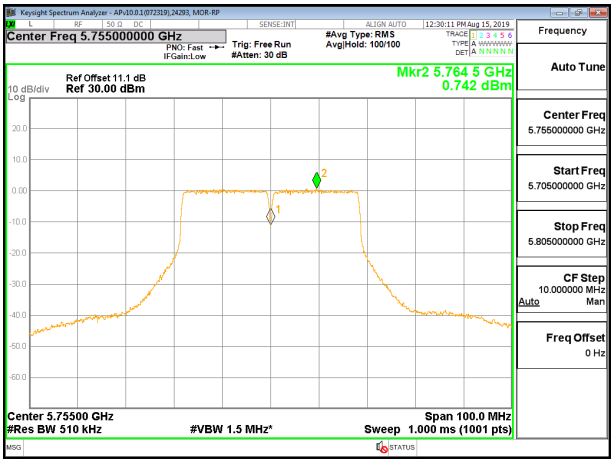
Output Power Results

Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	18.68	18.67	21.69	28.10	-6.41
High	5795	18.74	18.52	21.64	28.10	-6.46
142	5710	16.13	15.99	19.07	28.10	-9.03

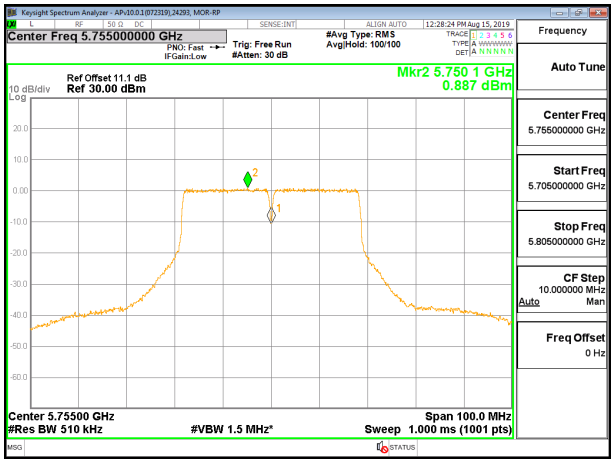
PSD Results

Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Low	5755	0.742	0.887	3.825	28.10	-24.27
High	5795	0.417	0.300	3.369	28.10	-24.73
142	5710	2.317	2.951	5.656	28.10	-22.44

LOW CHANNEL

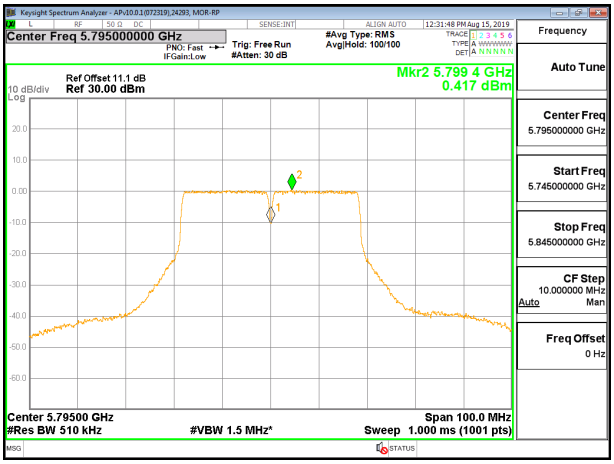


LOW CHANNEL CHAIN 0

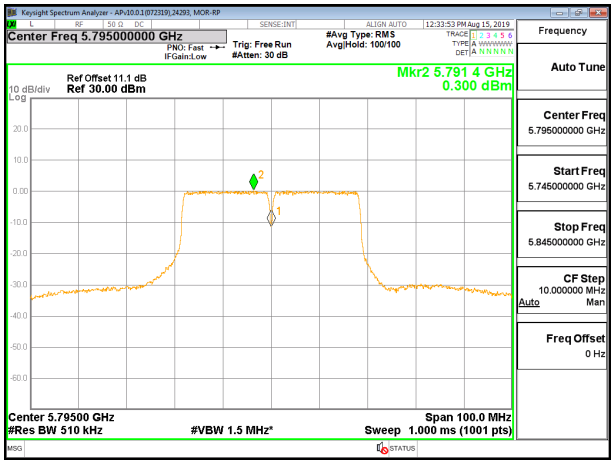


LOW CHANNEL CHAIN 1

HIGH CHANNEL

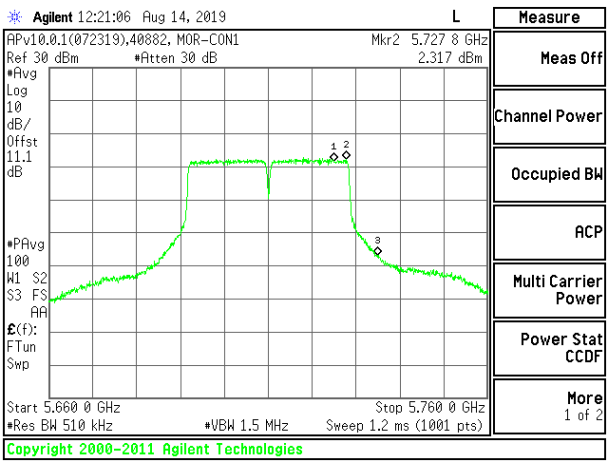


HIGH CHANNEL CHAIN 0

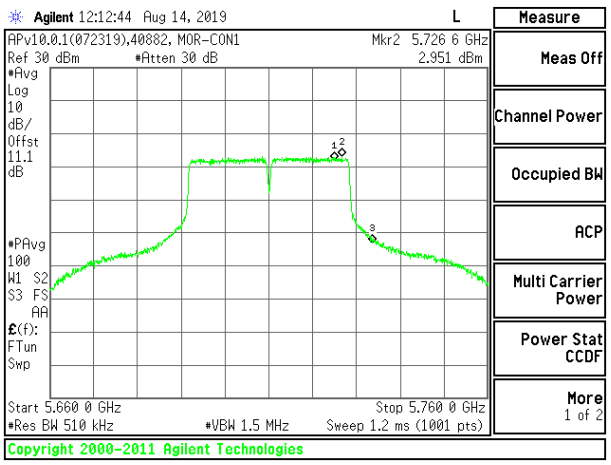


HIGH CHANNEL CHAIN 1

CHANNEL 142



CHANNEL 142 CHAIN 0



CHANNEL 142 CHAIN 1

9.3.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE (FCC+IC)

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 500KHz)
Mid	5755	7.90	7.90	28.10	28.10
138	5690	7.90	7.90	28.10	28.10

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power

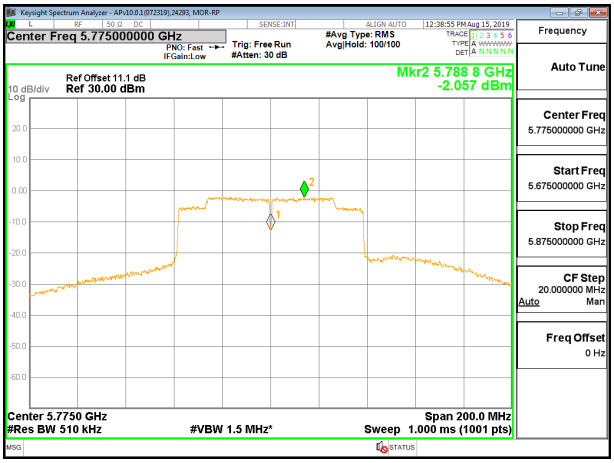
Output Power Results

Channel	Frequency (MHz)	Antenna 1 Meas Power (dBm)	Antenna 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5755	18.71	18.70	21.72	28.10	-6.38
138	5690	16.12	16.14	19.14	28.10	-8.96

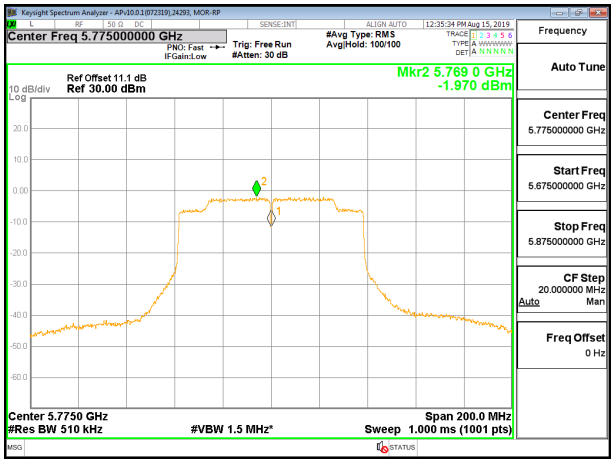
PSD Results

Channel	Frequency (MHz)	Antenna 1 Meas PSD (dBm/ 500KHz)	Antenna 2 Meas PSD (dBm/ 500KHz)	Total Corr'd PSD (dBm/ 500KHz)	PSD Limit (dBm/ 500KHz)	PSD Margin (dB)
Mid	5775	-2.057	-1.970	0.997	28.10	-27.10
138	5690	-4.831	-4.638	-1.723	28.10	-29.82

MID CHANNEL

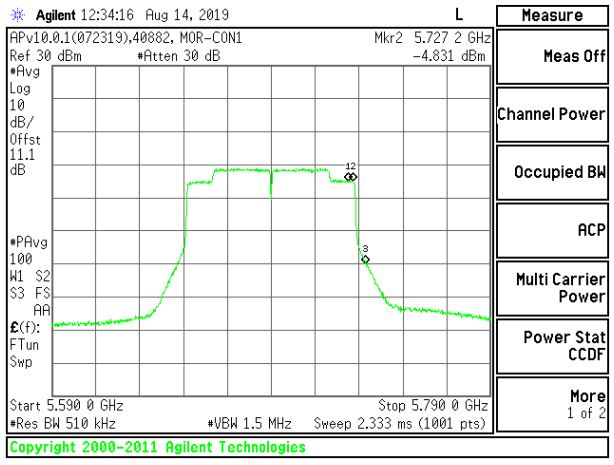


MID CHANNEL CHAIN 0

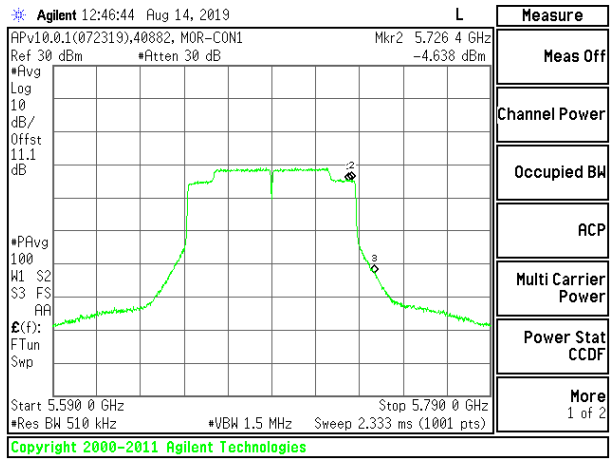


MID CHANNEL CHAIN 1

CHANNEL 138



CHANNEL 138 CHAIN 0



CHANNEL 138 CHAIN 1

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209 -Restriced bands
FCC §15.407(b)(1-4) -Un-Restriced bands

After January 01, 2019 for Outside of the Restricted Bands Emissions

RSS 247 Issue 2 Sections
6.2.1.2 (for 5150-5250 MHz band)
6.2.2.2 (for 5250-5350 MHz band)
6.2.3.2 (for 5470-5600 MHz and 5650-5725 MHz bands)
6.2.4.2 (for 5725-5850 MHz band)

NCC LP0002 §2.7 and §2.8

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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 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 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. Detector used was RMS average detector.

The spectrum from 1GHz to 18GHz was investigated with the transmitter set to transmit the lowest, middle, and highest channels in the 5 GHz bands.

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.

Note: All frequencies were marked at the maximum emissions within the restricted band. This was due to the observed margins of the emissions to the non-restricted limit.

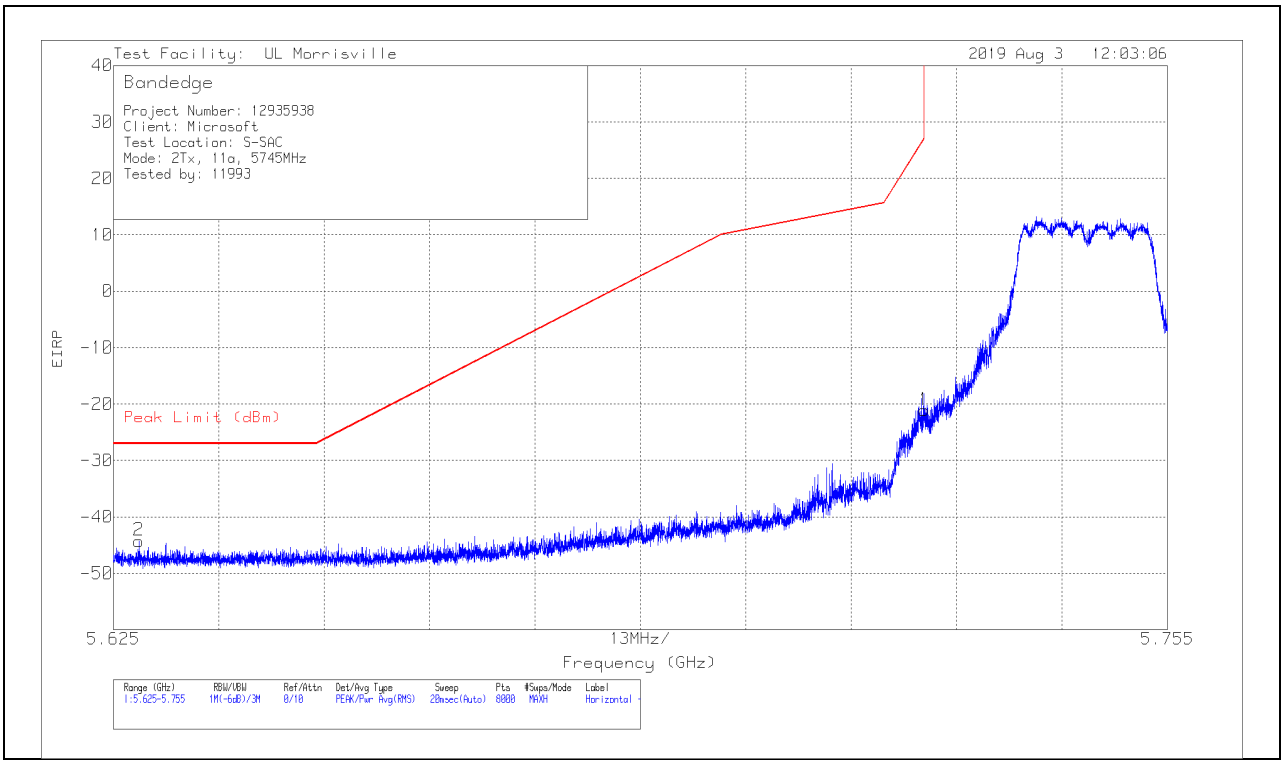
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 CDD MODE

BANDEDGE (LOW CHANNEL)

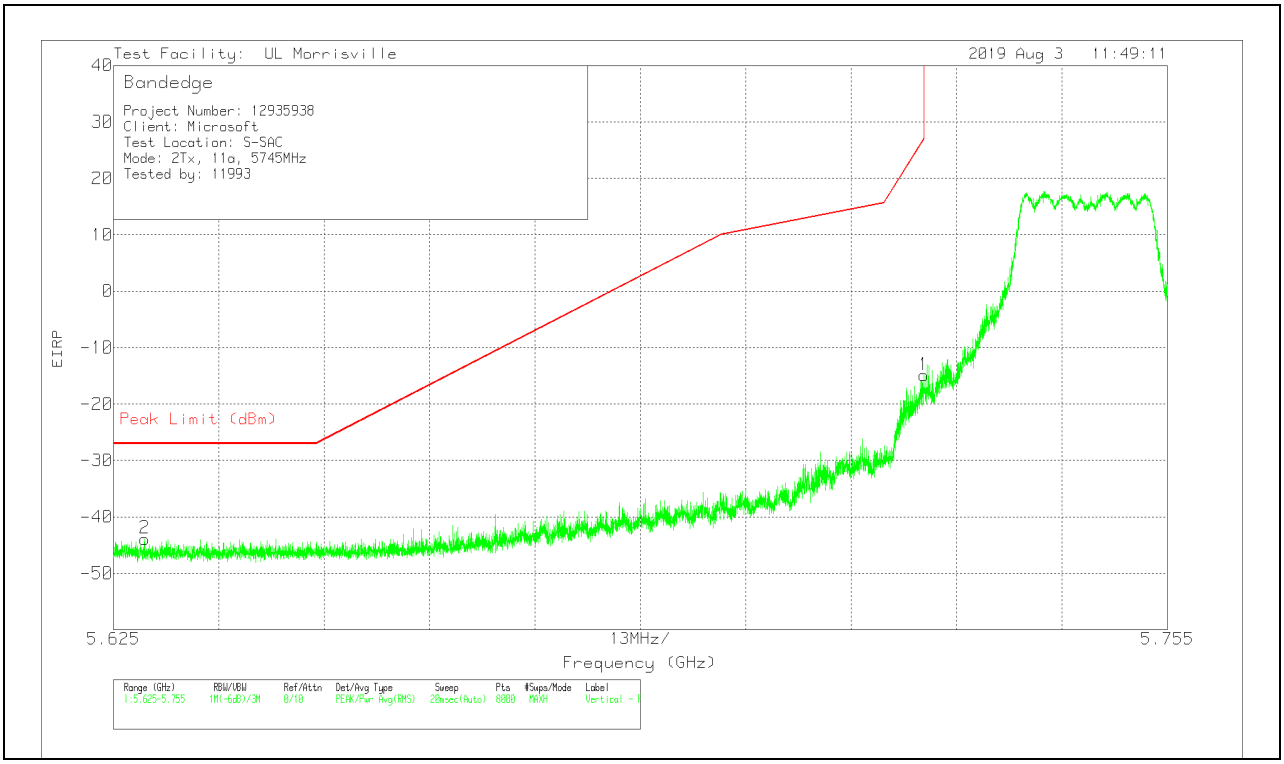
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.62812	-67.34	Pk	34.7	-23.4	11.8	-44.24	-27	-17.24	8	376	H
1	5.725	-44.28	Pk	34.7	-23.3	11.8	-21.08	27	-48.08	8	376	H

Pk - Peak detector

VERTICAL RESULT

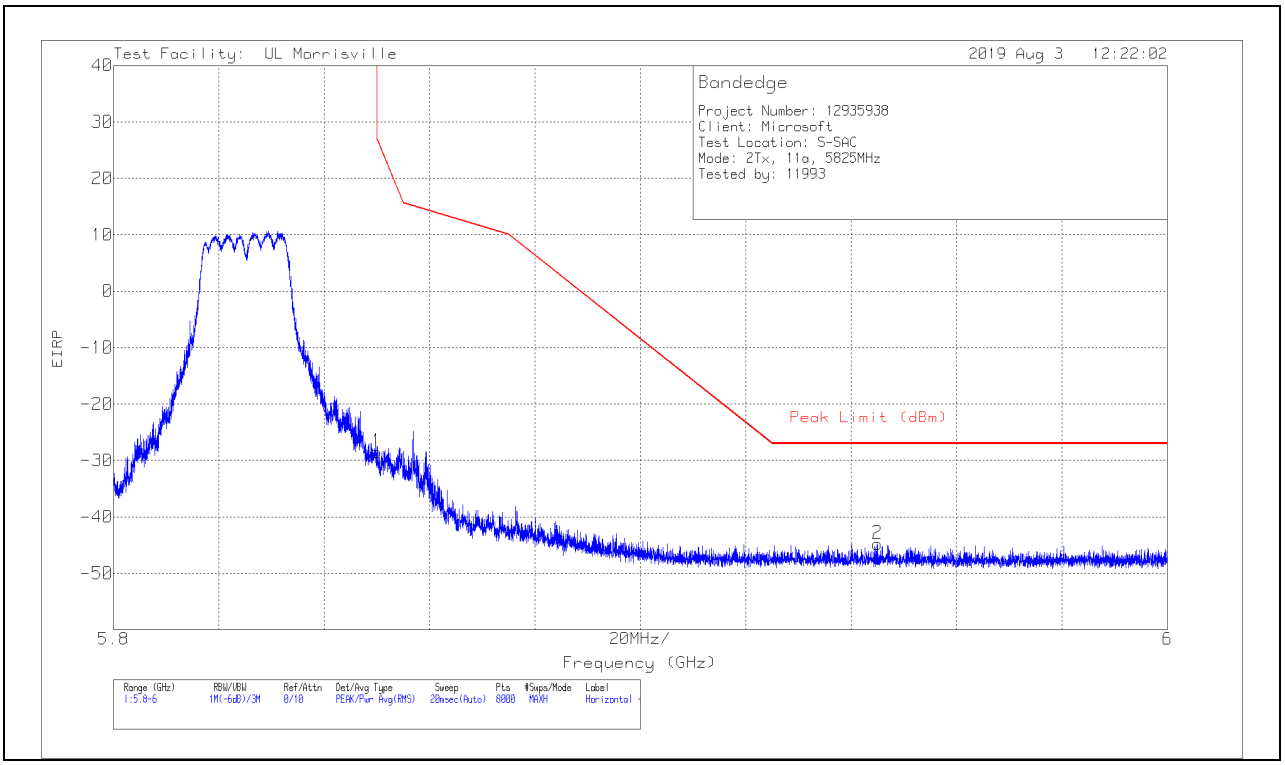


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.62885	-66.98	Pk	34.7	-23.4	11.8	-43.88	-27	-16.88	336	269	V
1	5.72495	-38.06	Pk	34.7	-23.3	11.8	-14.86	26.89	-41.75	336	269	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

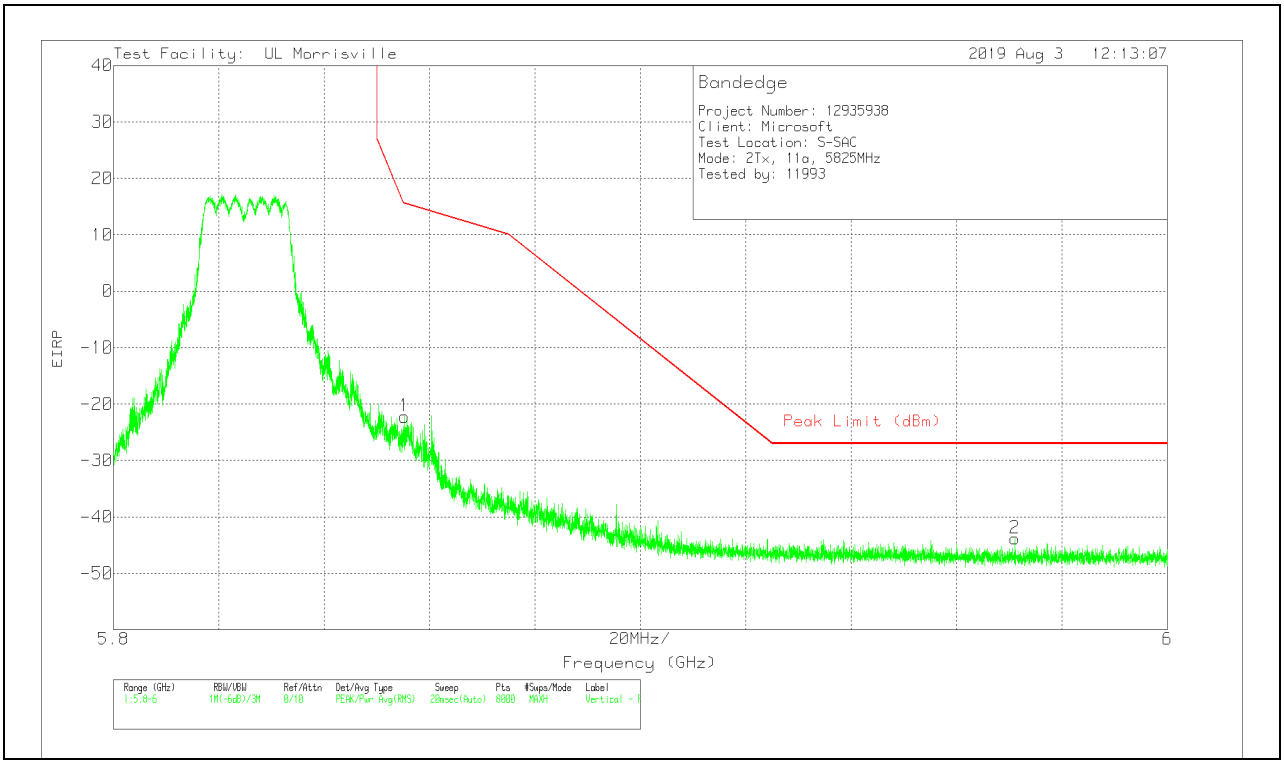
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-51.95	Pk	34.8	-23.1	11.8	-28.45	26.99	-55.44	56	393	H
2	5.94494	-68.64	Pk	34.9	-22.8	11.8	-44.74	-27	-17.74	56	393	H

Pk - Peak detector

VERTICAL RESULT

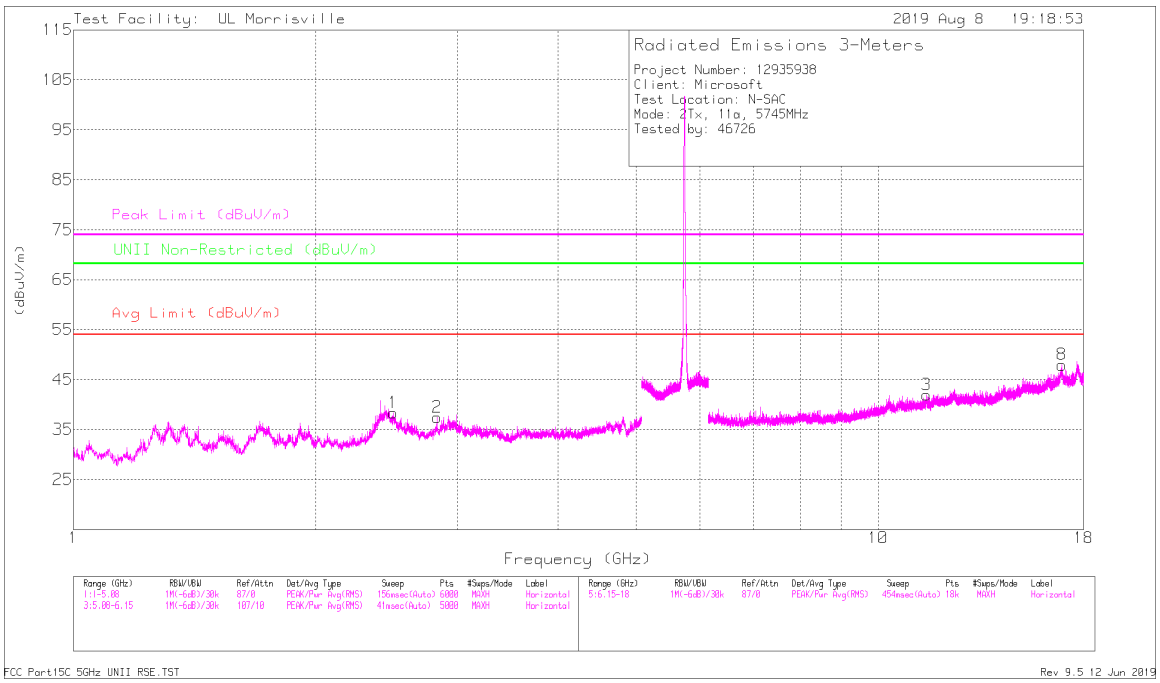


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85521	-45.72	Pk	34.8	-23.1	11.8	-22.22	15.54	-37.76	342	255	V
2	5.97105	-67.71	Pk	35	-22.9	11.8	-43.81	-27	-16.81	342	255	V

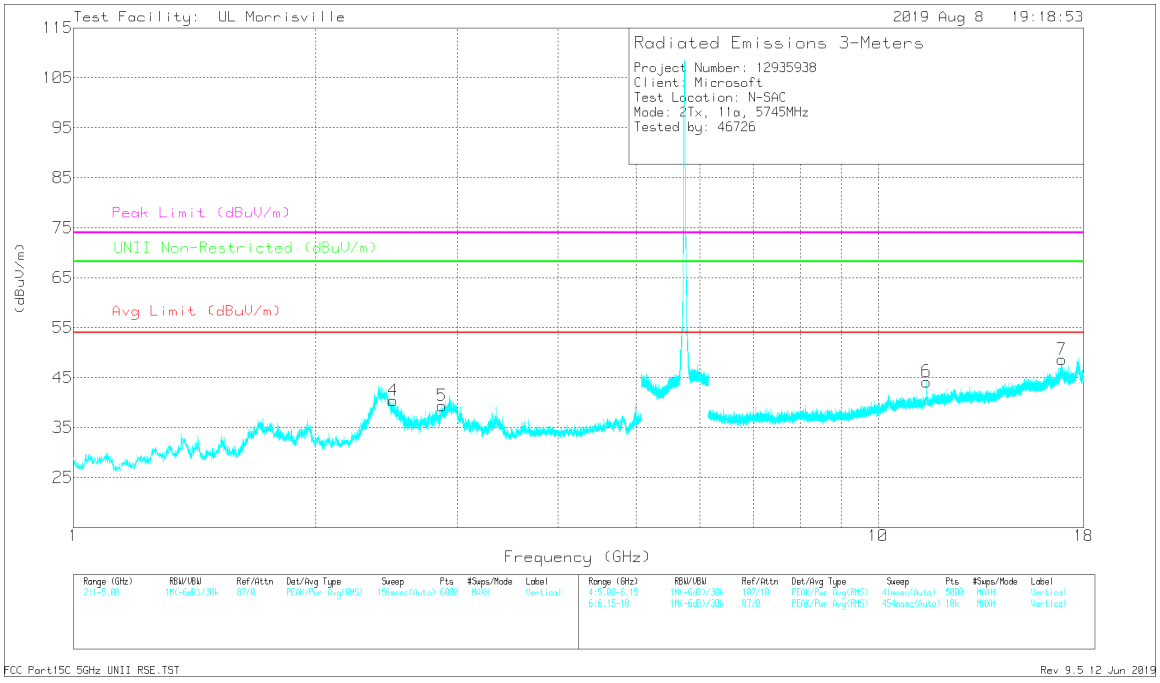
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 AF (dBuV/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.49747	47.9	PK-U	32.5	-34.2	0	46.2	-	-	74	-27.8	-	-	273	230	H
	* ** 2.49746	35.64	ADR	32.5	-34.2	.09	34.03	54	-19.97	-	-	-	-	273	230	H
2	* ** 2.8317	45.98	PK-U	32.4	-33.9	0	44.48	-	-	74	-29.52	-	-	67	118	H
	* ** 2.83168	33.95	ADR	32.4	-33.9	.09	32.54	54	-21.46	-	-	-	-	67	118	H
4	* ** 2.49513	50.15	PK-U	32.5	-34.2	0	48.45	-	-	74	-25.55	-	-	29	259	V
	* ** 2.49514	37.89	ADR	32.5	-34.2	.09	36.28	54	-17.72	-	-	-	-	29	259	V
5	* ** 2.88398	47.14	PK-U	32.6	-33.8	0	45.94	-	-	74	-28.06	-	-	25	176	V
	* ** 2.88398	34.93	ADR	32.6	-33.8	.09	33.82	54	-20.18	-	-	-	-	25	176	V
3	* ** 11.49129	39.97	PK-U	38.2	-25.3	0	52.87	-	-	74	-21.13	-	-	241	364	H
	* ** 11.49129	27.76	ADR	38.2	-25.3	.09	40.75	54	-13.25	-	-	-	-	241	364	H
6	* ** 11.49099	38.4	PK-U	38.2	-25.3	0	51.3	-	-	74	-22.7	-	-	309	245	V
	* ** 11.49097	25.92	ADR	38.2	-25.3	.09	38.91	54	-15.09	-	-	-	-	309	245	V
8	16.89543	35.8	PK-U	41.3	-23	0	54.1	-	-	-	-	68.2	-14.1	228	262	H
7	16.90484	35.68	PK-U	41.3	-22.8	0	54.18	-	-	-	-	68.2	-14.02	274	197	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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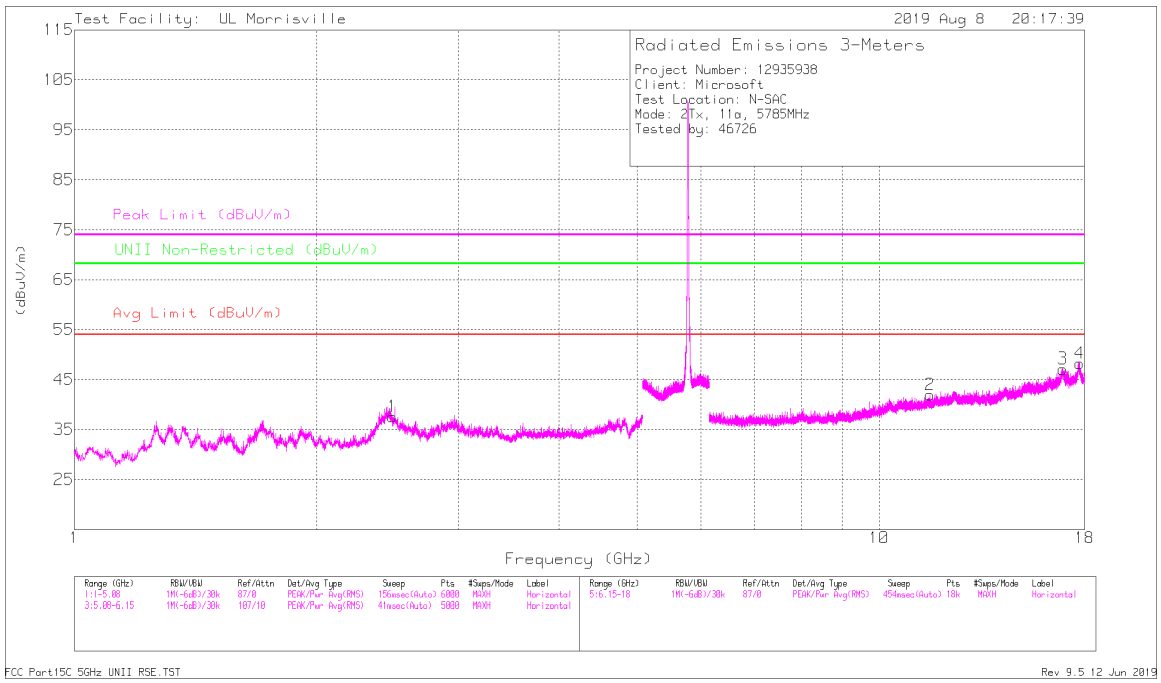
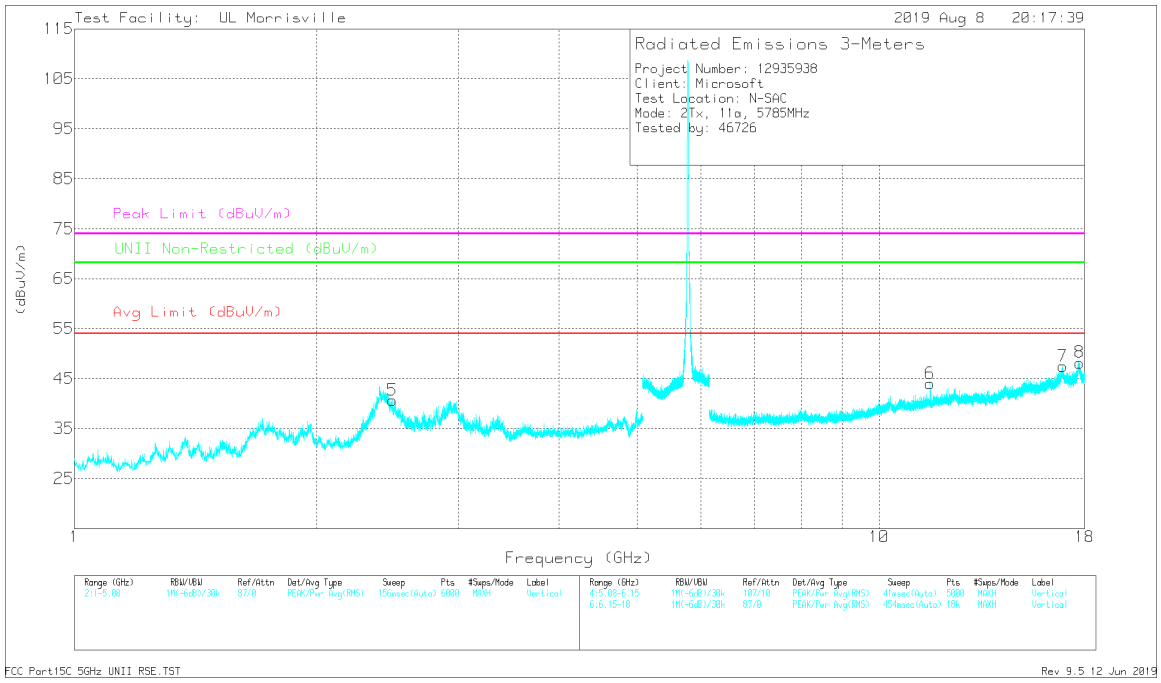
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 AF (dBuV/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48479	47.83	PK-U	32.4	-34.2	0	46.03	-	-	74	-27.97	-	-	204	121	H
	* ** 2.48478	35.78	ADR	32.4	-34.2	.09	34.07	54	-19.93	-	-	-	-	204	121	H
5	* ** 2.49175	48.52	PK-U	32.4	-34.2	0	46.72	-	-	74	-27.28	-	-	19	314	V
	* ** 2.49171	36.44	ADR	32.4	-34.2	.09	34.73	54	-19.27	-	-	-	-	19	314	V
2	* ** 11.57462	41.62	PK-U	38.3	-26.3	0	53.62	-	-	74	-20.38	-	-	241	327	H
	* ** 11.57462	28.85	ADR	38.3	-26.3	.09	40.94	54	-13.06	-	-	-	-	241	327	H
4	* ** 17.74587	33.87	PK-U	41.1	-20.5	0	54.47	-	-	74	-19.53	-	-	38	173	H
	* ** 17.74593	22.14	ADR	41.1	-20.5	.09	42.83	54	-11.17	-	-	-	-	38	173	H
6	* ** 11.56879	41.56	PK-U	38.2	-26.3	0	53.46	-	-	74	-20.54	-	-	309	230	V
	* ** 11.56879	28.84	ADR	38.2	-26.3	.09	40.83	54	-13.17	-	-	-	-	309	230	V
8	* ** 17.7392	34.11	PK-U	41.1	-20.4	0	54.81	-	-	74	-19.19	-	-	125	266	V
	* ** 17.7392	22.09	ADR	41.1	-20.4	.09	42.88	54	-11.12	-	-	-	-	125	266	V
3	16.90816	35.75	PK-U	41.3	-22.9	0	54.15	-	-	-	-	68.2	-14.05	59	168	H
7	16.92301	35.79	PK-U	41.4	-23.5	0	53.69	-	-	-	-	68.2	-14.51	179	240	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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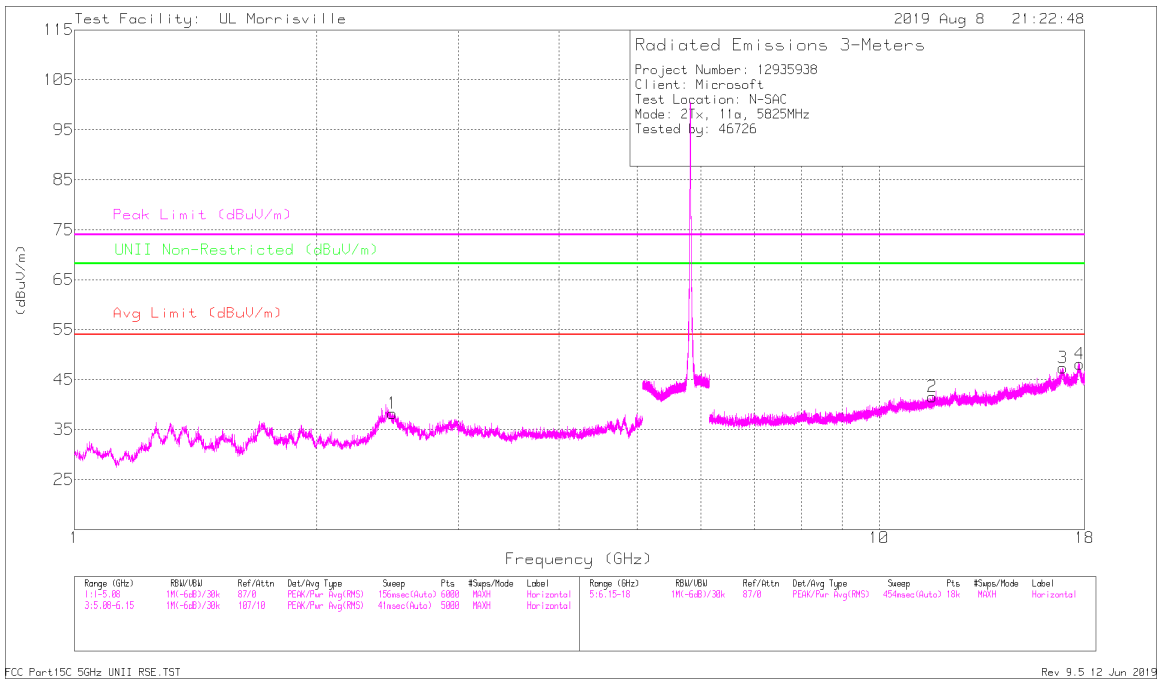
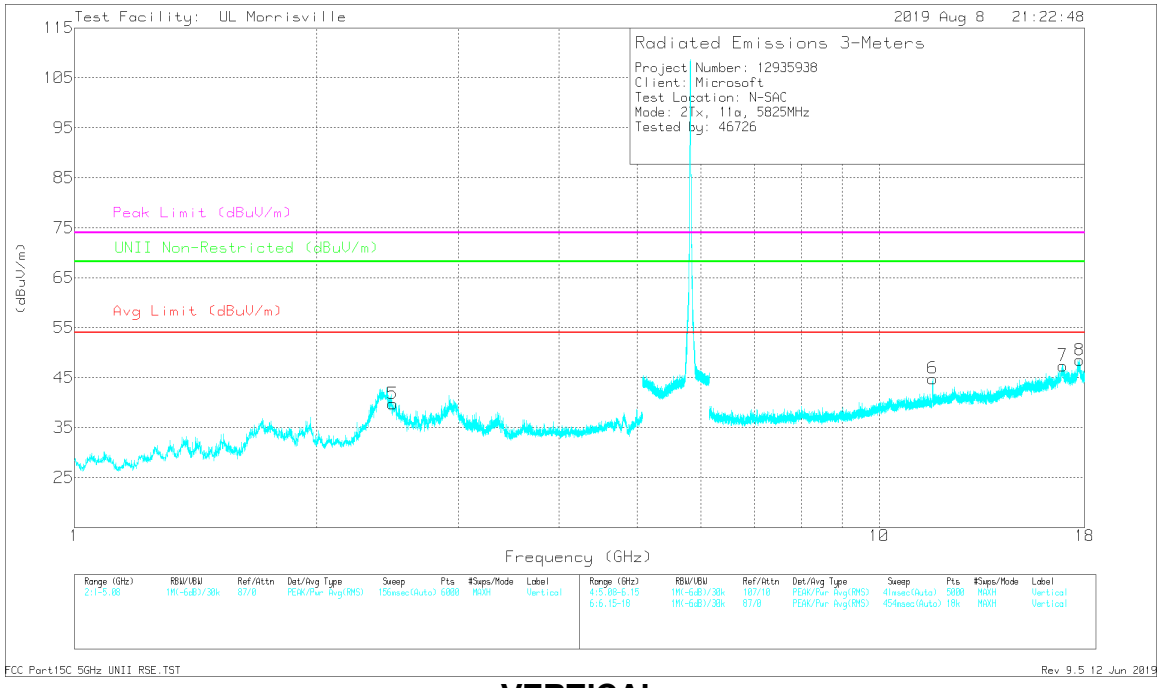
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 AF (dBuV/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48749	44.74	PK-U	32.4	-34.2	0	42.94	-	-	74	-31.06	-	-	201	379	H
	* ** 2.48752	32.79	ADR	32.4	-34.2	.09	31.08	54	-22.92	-	-	-	-	201	379	H
5	* ** 2.4847	48.63	PK-U	32.4	-34.2	0	46.83	-	-	74	-27.17	-	-	19	316	V
	* ** 2.48474	36.65	ADR	32.4	-34.2	.09	34.94	54	-19.06	-	-	-	-	19	316	V
2	* ** 11.65007	41.93	PK-U	38.4	-26.3	0	54.03	-	-	74	-19.97	-	-	246	326	H
	* ** 11.65007	29.16	ADR	38.4	-26.3	.09	41.35	54	-12.65	-	-	-	-	246	326	H
4	* ** 17.72858	35.05	PK-U	41.1	-20.3	0	55.85	-	-	74	-18.15	-	-	46	372	H
	* ** 17.72857	21.92	ADR	41.1	-20.3	.09	42.81	54	-11.19	-	-	-	-	46	372	H
6	* ** 11.64825	40.14	PK-U	38.4	-26.3	0	52.24	-	-	74	-21.76	-	-	290	215	V
	* ** 11.64822	27.61	ADR	38.4	-26.3	.09	39.8	54	-14.2	-	-	-	-	290	215	V
8	* ** 17.73794	33.99	PK-U	41.1	-20.3	0	54.79	-	-	74	-19.21	-	-	220	179	V
	* ** 17.73794	22.01	ADR	41.1	-20.3	.09	42.9	54	-11.1	-	-	-	-	220	179	V
7	16.91013	36.03	PK-U	41.3	-23	0	54.33	-	-	-	-	68.2	-13.87	278	248	V
3	16.93712	35.68	PK-U	41.4	-23.8	0	53.28	-	-	-	-	68.2	-14.92	257	147	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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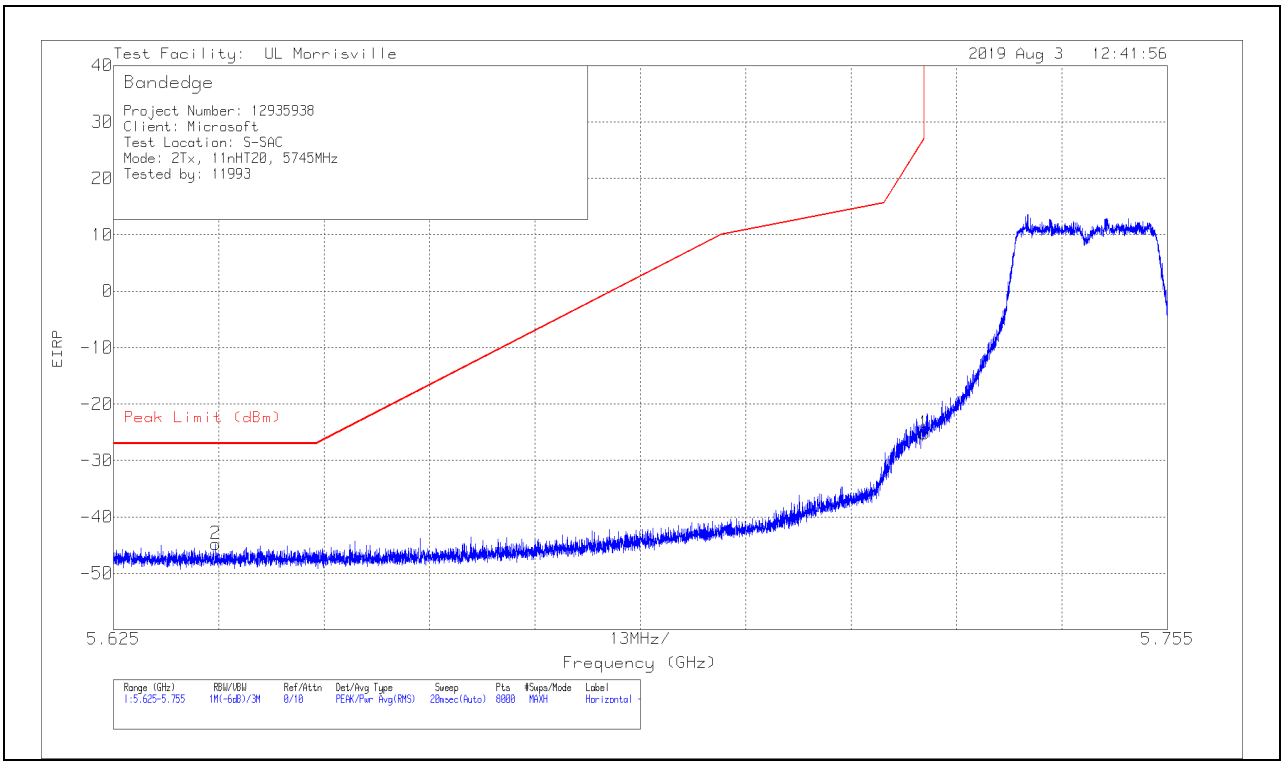
10.1.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE

BANDEDGE (LOW CHANNEL)

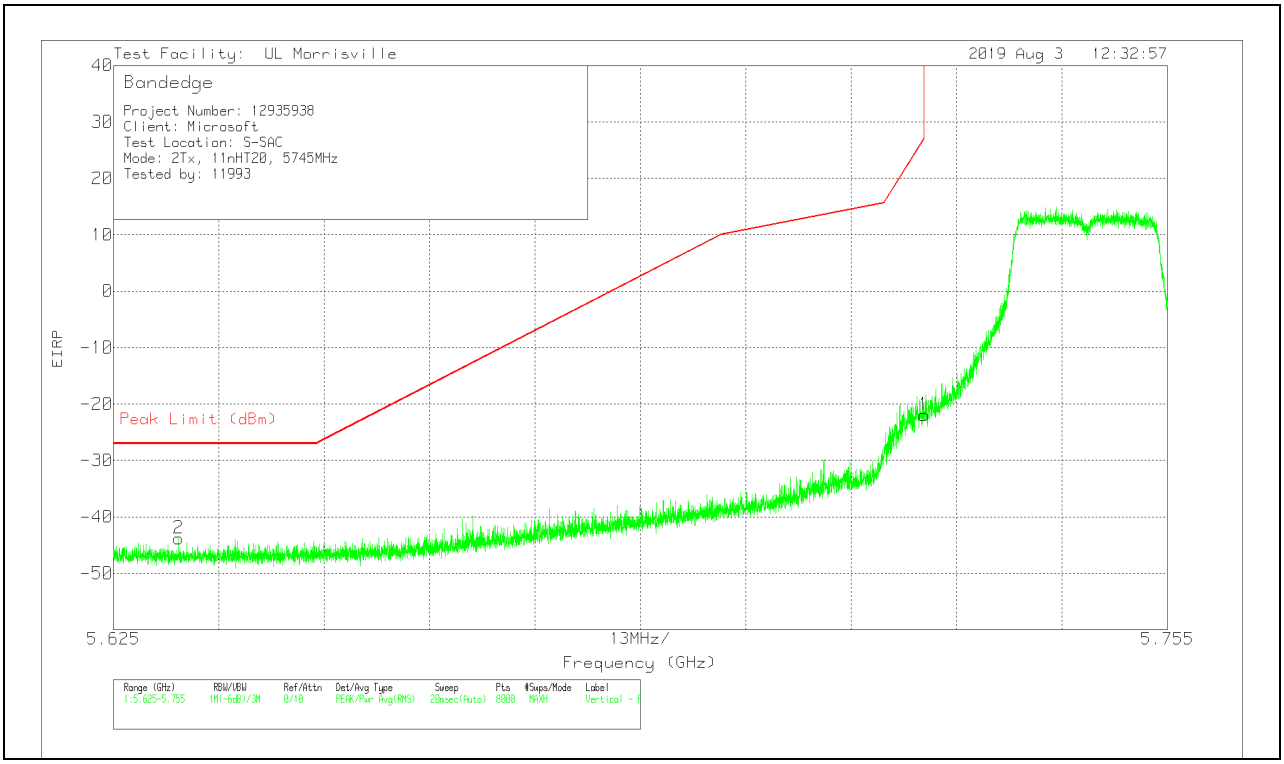
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.63763	-68.02	Pk	34.7	-23.3	11.8	-44.82	-27	-17.82	318	320	H
1	5.725	-48.45	Pk	34.7	-23.3	11.8	-25.25	27	-52.25	318	320	H

Pk - Peak detector

VERTICAL RESULT

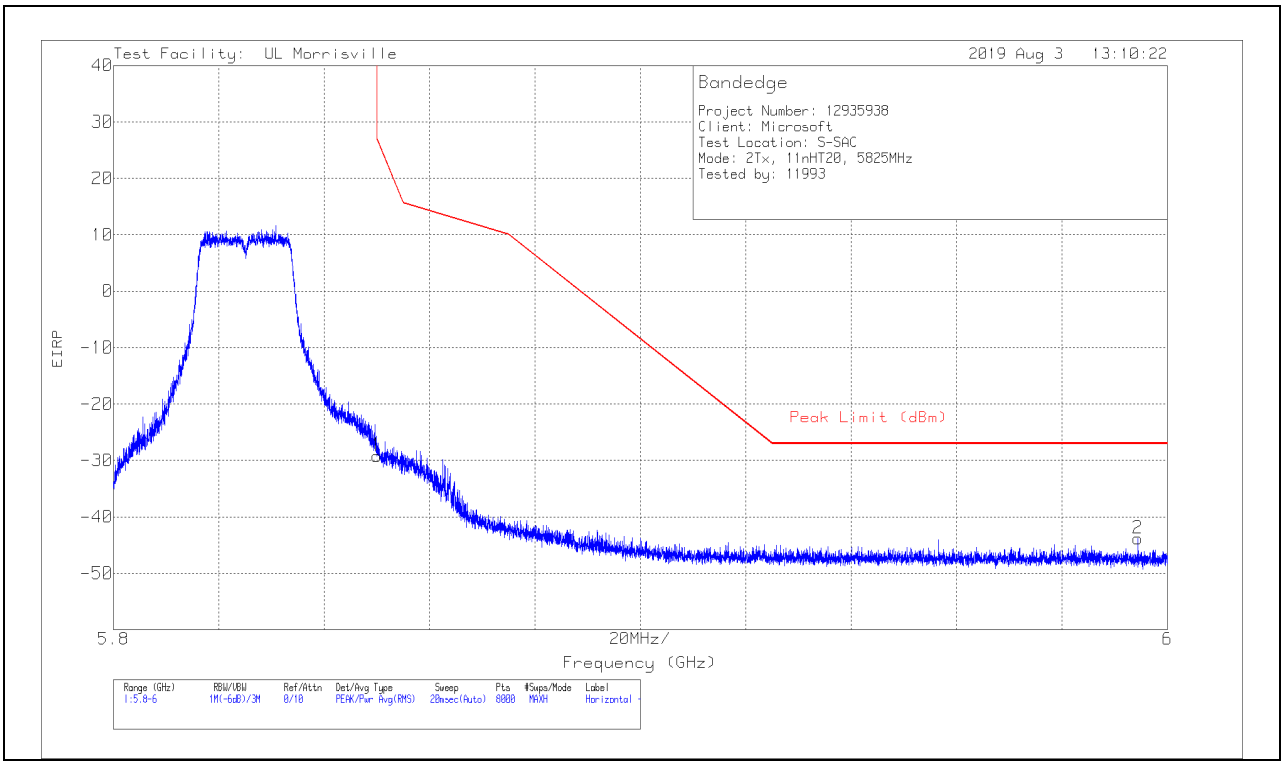


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.63301	-66.89	Pk	34.7	-23.4	11.8	-43.79	-27	-16.79	99	255	V
1	5.725	-45.11	Pk	34.7	-23.3	11.8	-21.91	27	-48.91	99	255	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

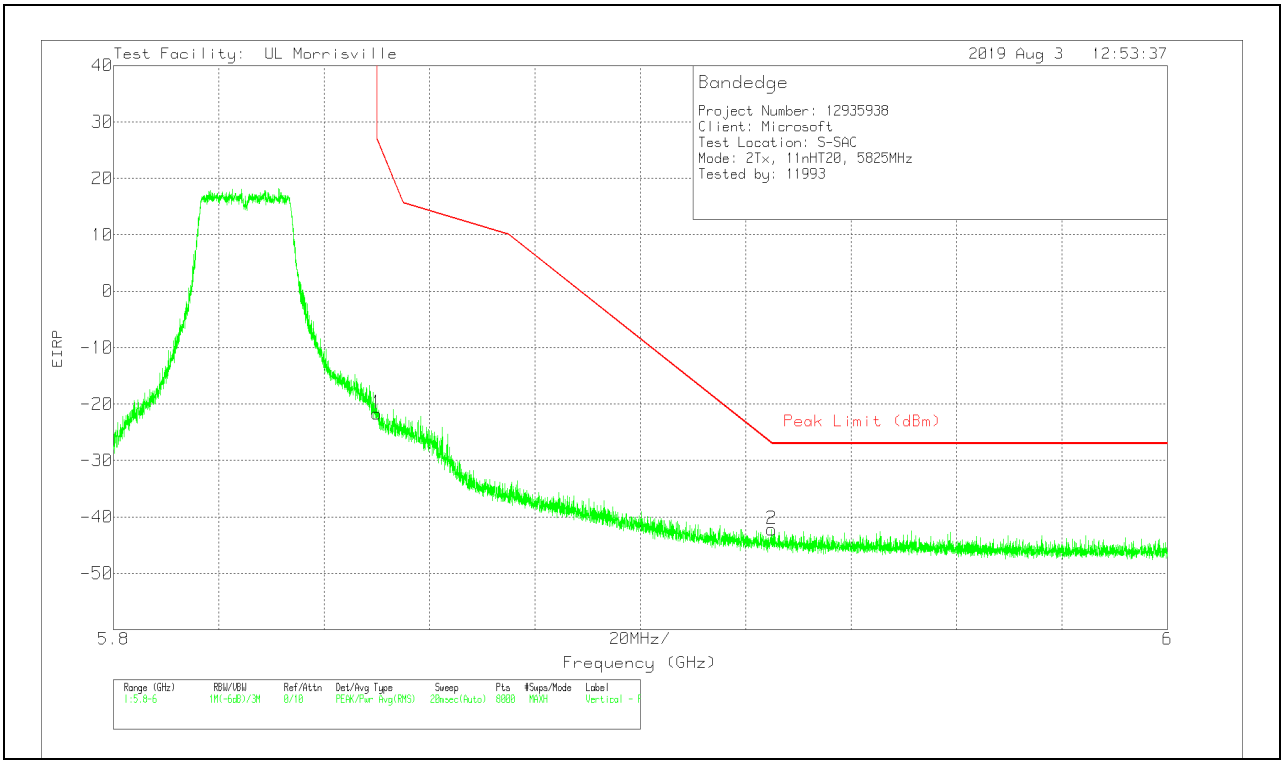
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-52.68	Pk	34.8	-23.1	11.8	-29.18	26.99	-56.17	0	374	H
2	5.99442	-67.69	Pk	35	-22.9	11.8	-43.79	-27	-16.79	0	374	H

Pk - Peak detector

VERTICAL RESULT

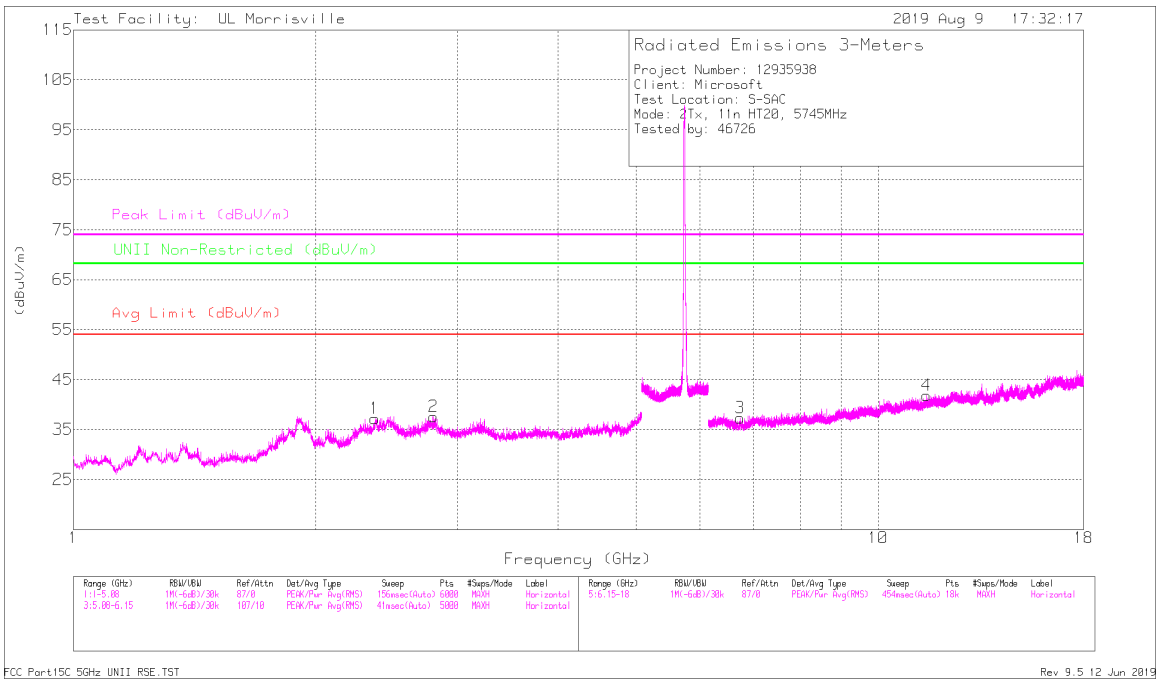


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-45.15	Pk	34.8	-23.1	11.8	-21.65	26.99	-48.64	359	203	V
2	5.92492	-65.97	Pk	34.9	-22.9	11.8	-42.17	-26.94	-15.23	359	203	V

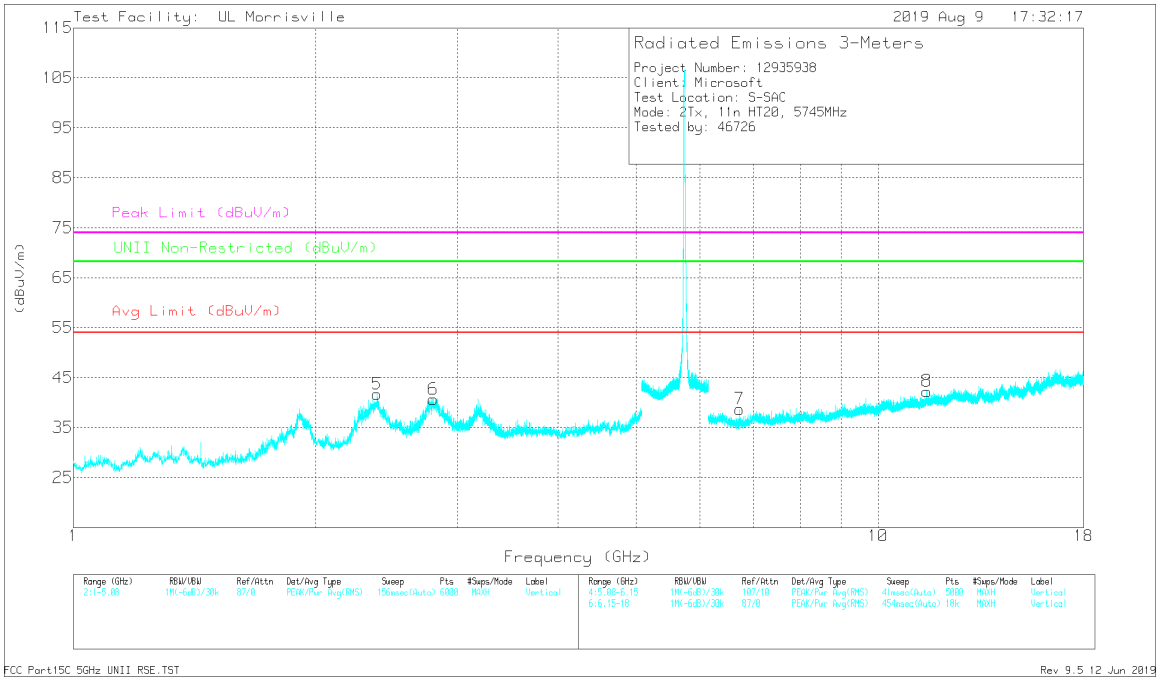
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.3793	47.88	PK-U	31.9	-33.9	45.88	-	-	74	-28.12	-	-	352	129	H
	* ** 2.37929	35.93	ADR	31.9	-33.9	33.93	54	-20.07	-	-	-	-	352	129	H
2	* ** 2.81019	47.38	PK-U	32.1	-33.5	45.98	-	-	74	-28.02	-	-	142	152	H
	* ** 2.81018	35.53	ADR	32.1	-33.5	34.13	54	-19.87	-	-	-	-	142	152	H
5	* ** 2.36037	51.74	PK-U	31.7	-34	49.44	-	-	74	-24.56	-	-	98	240	V
	* ** 2.36034	40.16	ADR	31.7	-34	37.86	54	-16.14	-	-	-	-	98	240	V
6	* ** 2.77843	50.55	PK-U	32.2	-33.5	49.25	-	-	74	-24.75	-	-	95	264	V
	* ** 2.77842	39.18	ADR	32.2	-33.5	37.88	54	-16.12	-	-	-	-	95	264	V
4	* ** 11.48236	35.67	PK-U	38.1	-24.4	49.37	-	-	74	-24.63	-	-	26	375	H
	* ** 11.4824	23.46	ADR	38.1	-24.4	37.16	54	-16.84	-	-	-	-	26	375	H
8	* ** 11.49242	37.49	PK-U	38.1	-24.3	51.29	-	-	74	-22.71	-	-	5	219	V
	* ** 11.49241	25.2	ADR	38.1	-24.3	39	54	-15	-	-	-	-	5	219	V
3	6.74134	36.66	PK-U	35.6	-28.9	43.36	-	-	-	-	68.2	-24.84	99	299	H
7	6.75697	37.49	PK-U	35.6	-28.7	44.39	-	-	-	-	68.2	-23.81	55	335	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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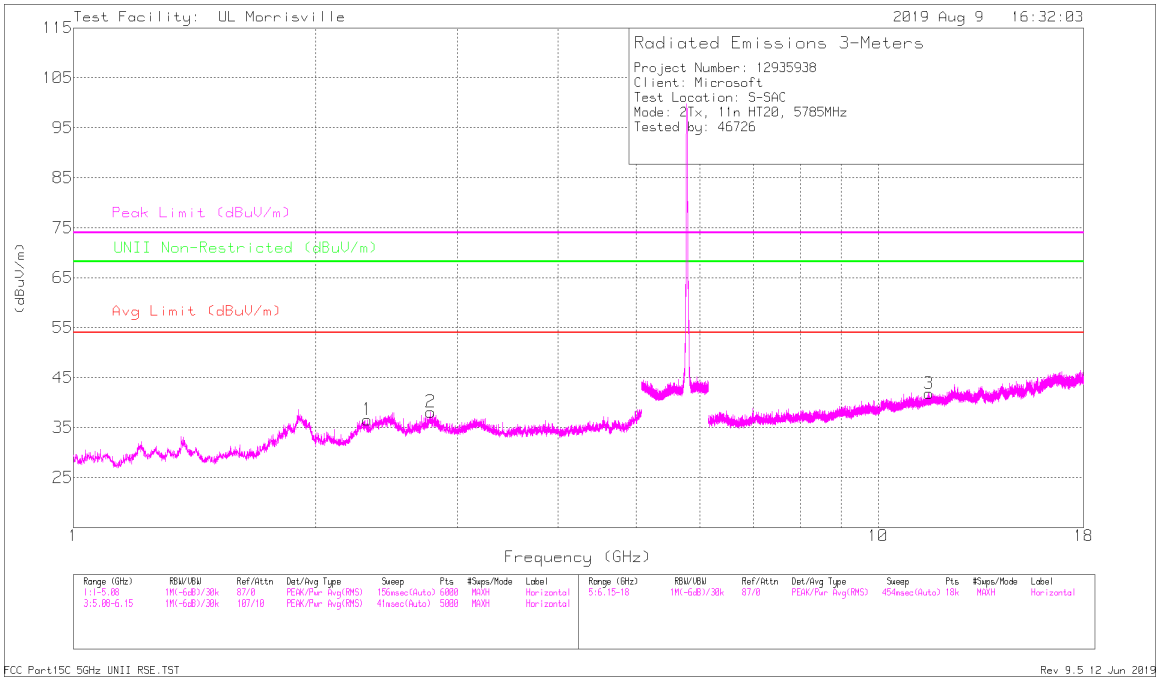
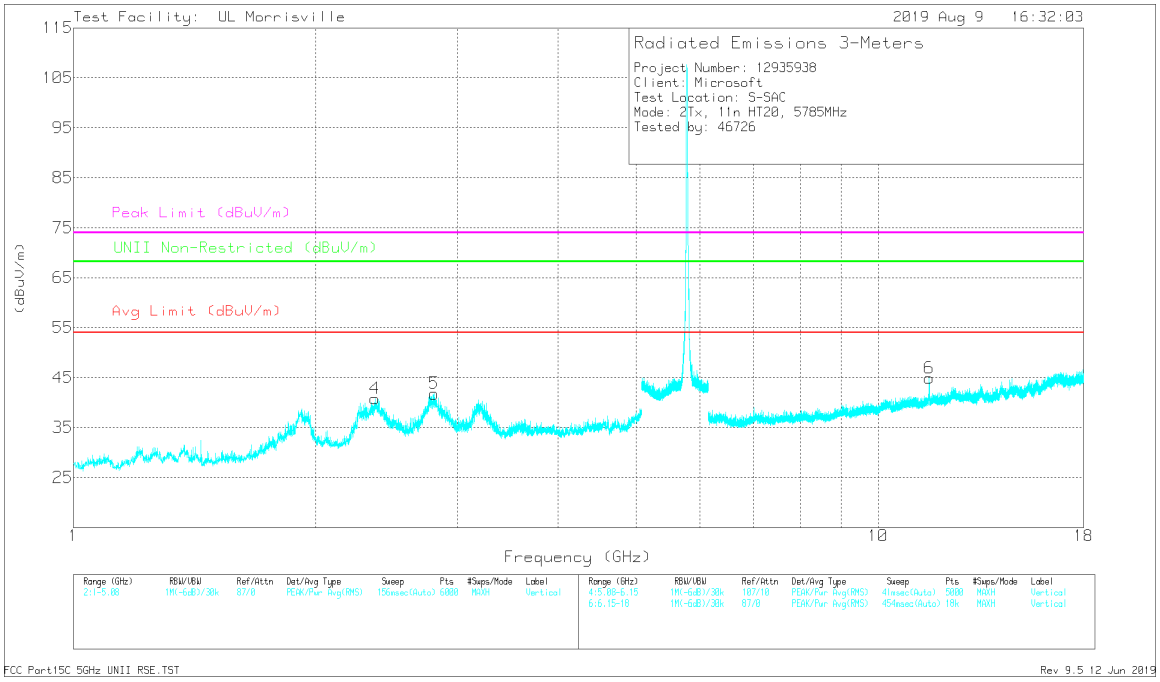
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.31046	47.23	PK-U	31.7	-33.9	45.03	-	-	74	-28.97	-	-	60	293	H
	* ** 2.31054	33.58	ADR	31.7	-33.9	31.38	54	-22.62	-	-	-	-	60	293	H
2	* ** 2.78089	48.17	PK-U	32.2	-33.5	46.87	-	-	74	-27.13	-	-	143	153	H
	* ** 2.7808	36.66	ADR	32.2	-33.5	35.36	54	-18.64	-	-	-	-	143	153	H
4	* ** 2.36649	51.19	PK-U	31.8	-34	48.99	-	-	74	-25.01	-	-	96	231	V
	* ** 2.36651	39.14	ADR	31.8	-34	36.94	54	-17.06	-	-	-	-	96	231	V
5	* ** 2.81094	51.99	PK-U	32.1	-33.5	50.59	-	-	74	-23.41	-	-	96	236	V
	* ** 2.81099	40.48	ADR	32.1	-33.5	39.08	54	-14.92	-	-	-	-	96	236	V
3	* ** 11.56906	38.84	PK-U	38.2	-24.5	52.54	-	-	74	-21.46	-	-	326	286	H
	* ** 11.56907	26.32	ADR	38.2	-24.5	40.02	54	-13.98	-	-	-	-	326	286	H
6	* ** 11.57349	38.49	PK-U	38.3	-24.5	52.29	-	-	74	-21.71	-	-	8	205	V
	* ** 11.57342	25.4	ADR	38.3	-24.5	39.2	54	-14.8	-	-	-	-	8	205	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

UL LLC
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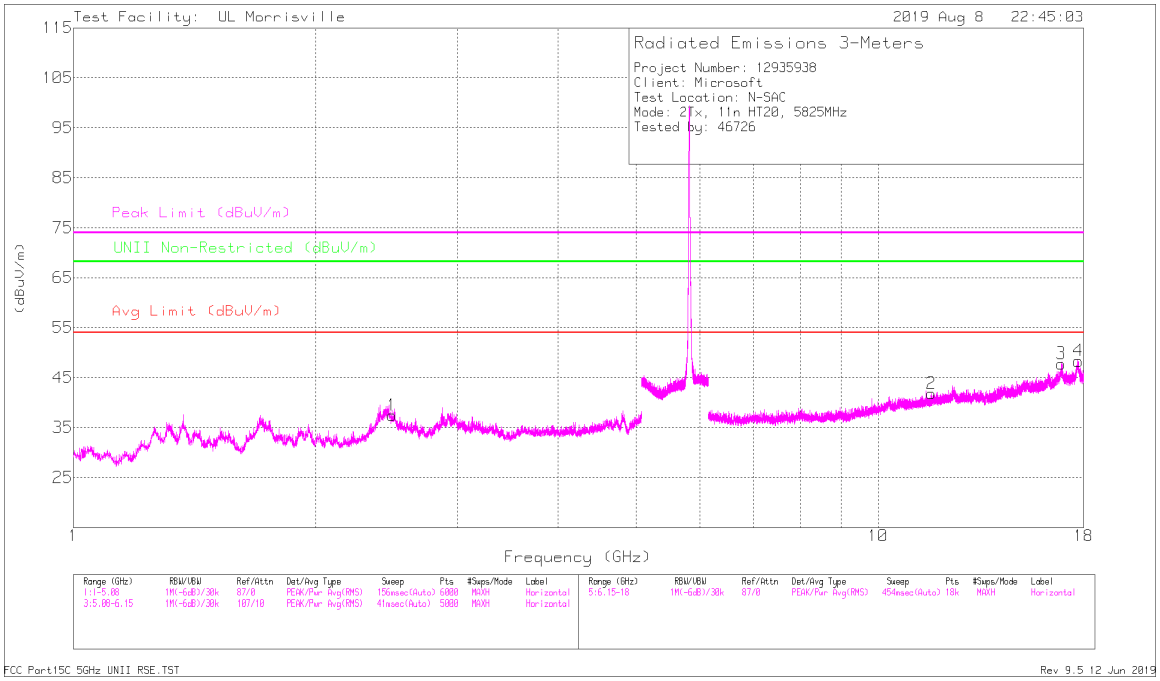
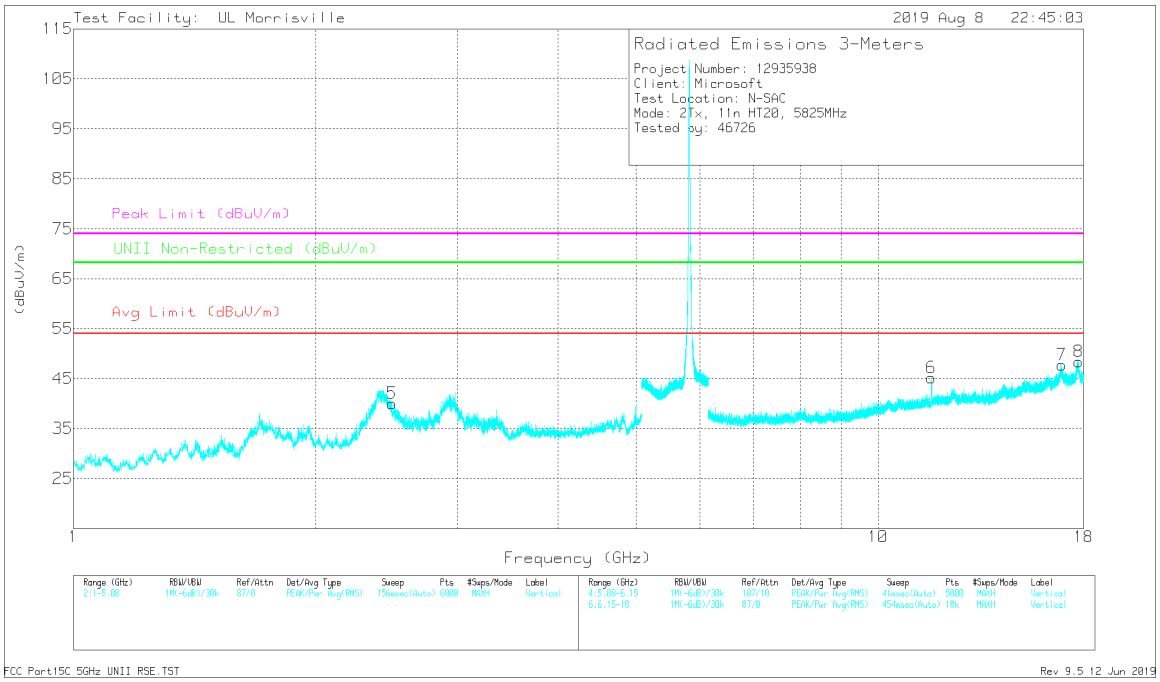
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 AF (dBuV/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4854	48.01	PK-U	32.4	-34.2	46.21	-	-	74	-27.79	-	-	208	176	H
	* ** 2.48534	35.75	ADR	32.4	-34.2	33.95	54	-20.05	-	-	-	-	208	176	H
5	* ** 2.48722	47.8	PK-U	32.4	-34.2	46	-	-	74	-28	-	-	25	316	V
	* ** 2.48723	35.77	ADR	32.4	-34.2	33.97	54	-20.03	-	-	-	-	25	316	V
2	* ** 11.64884	41.77	PK-U	38.4	-26.3	53.87	-	-	74	-20.13	-	-	245	322	H
	* ** 11.64874	28.96	ADR	38.4	-26.3	41.06	54	-12.94	-	-	-	-	245	322	H
4	* ** 17.73323	34.11	PK-U	41.1	-20.3	54.91	-	-	74	-19.09	-	-	240	242	H
	* ** 17.73299	21.9	ADR	41.1	-20.3	42.7	54	-11.3	-	-	-	-	240	242	H
6	* ** 11.64891	39.77	PK-U	38.4	-26.3	51.87	-	-	74	-22.13	-	-	306	363	V
	* ** 11.64877	26.93	ADR	38.4	-26.3	39.03	54	-14.97	-	-	-	-	306	363	V
8	* ** 17.75448	34.34	PK-U	41.1	-20.8	54.64	-	-	74	-19.36	-	-	195	196	V
	* ** 17.75445	22	ADR	41.1	-20.8	42.3	54	-11.7	-	-	-	-	195	196	V
3	16.89366	34.93	PK-U	41.3	-23	53.23	-	-	-	-	68.2	-14.97	89	266	H
7	16.91243	35.79	PK-U	41.4	-23.1	54.09	-	-	-	-	68.2	-14.11	294	206	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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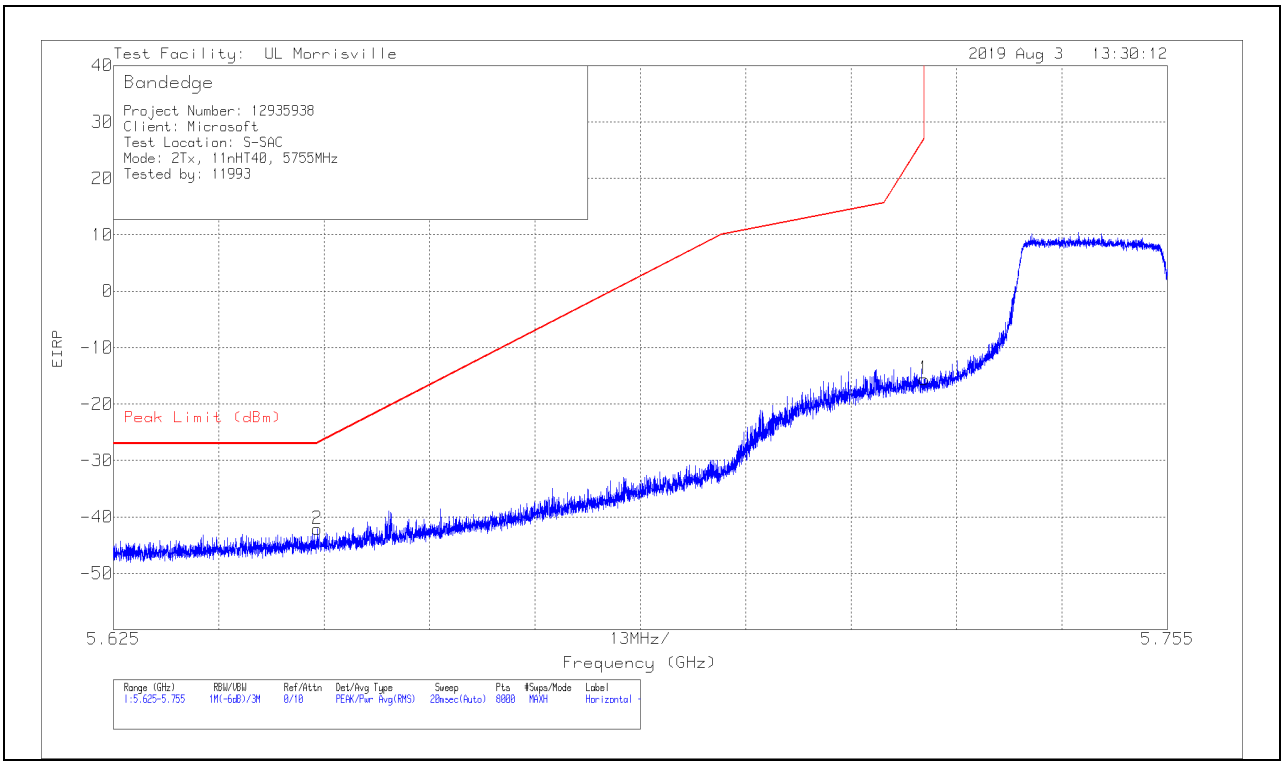
10.1.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE

BANDEDGE (LOW CHANNEL)

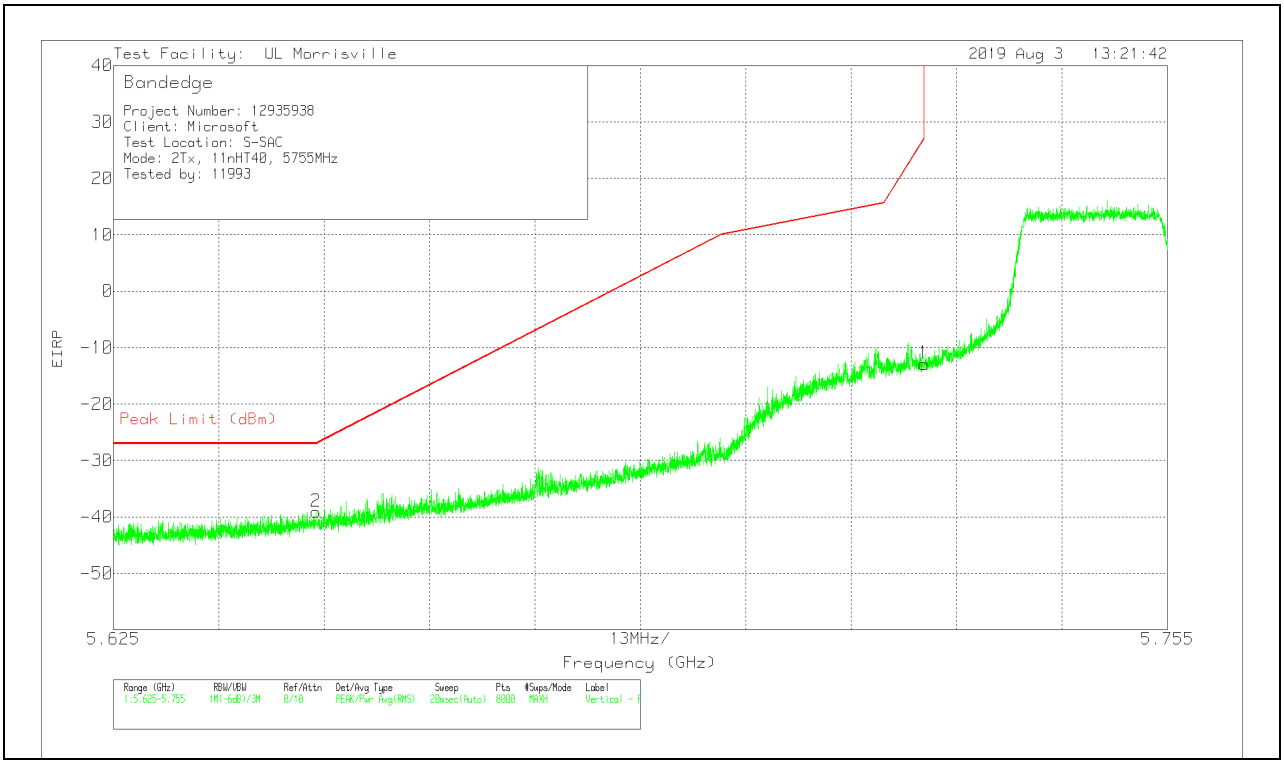
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.65013	-65.39	Pk	34.7	-23.2	11.8	-42.09	-26.91	-15.18	322	345	H
1	5.725	-38.76	Pk	34.7	-23.3	11.8	-15.56	27	-42.56	322	345	H

Pk - Peak detector

VERTICAL RESULT

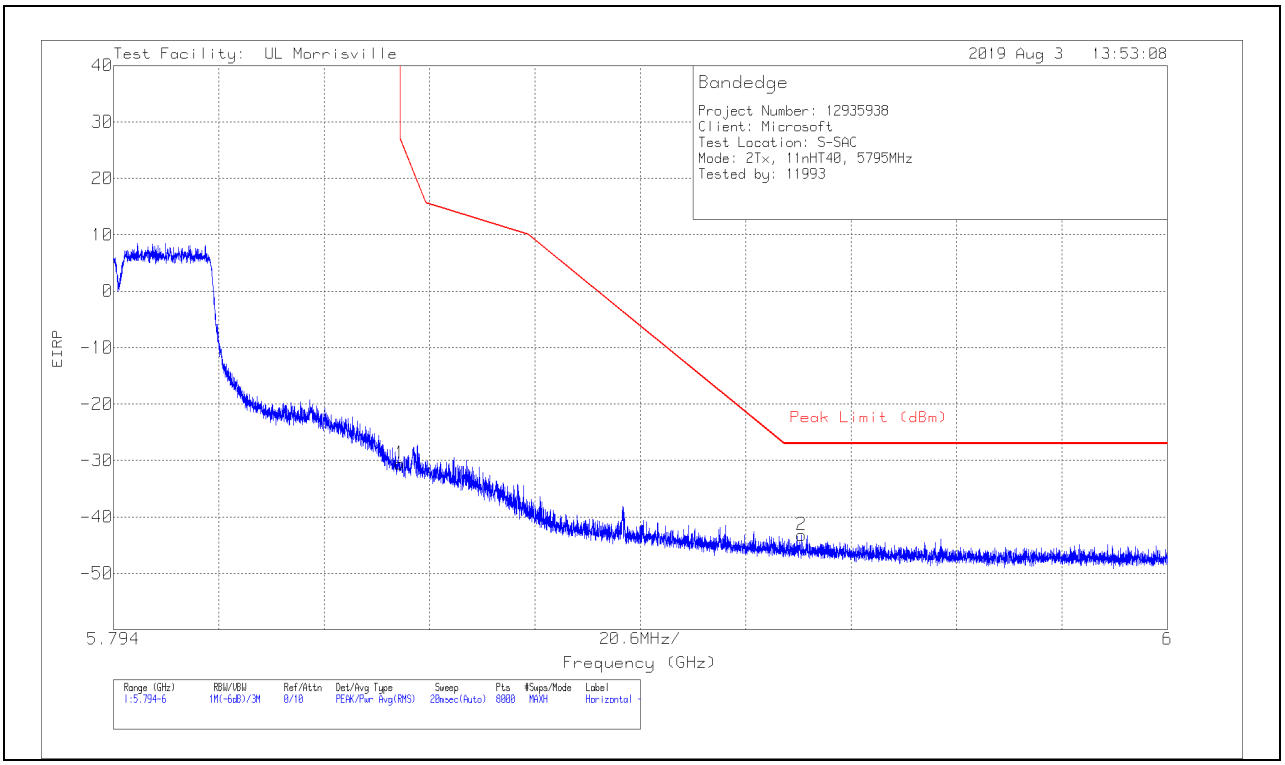


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.64998	-62.4	Pk	34.7	-23.2	11.8	-39.1	-27	-12.1	70	240	V
1	5.725	-36.09	Pk	34.7	-23.3	11.8	-12.89	27	-39.89	70	240	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

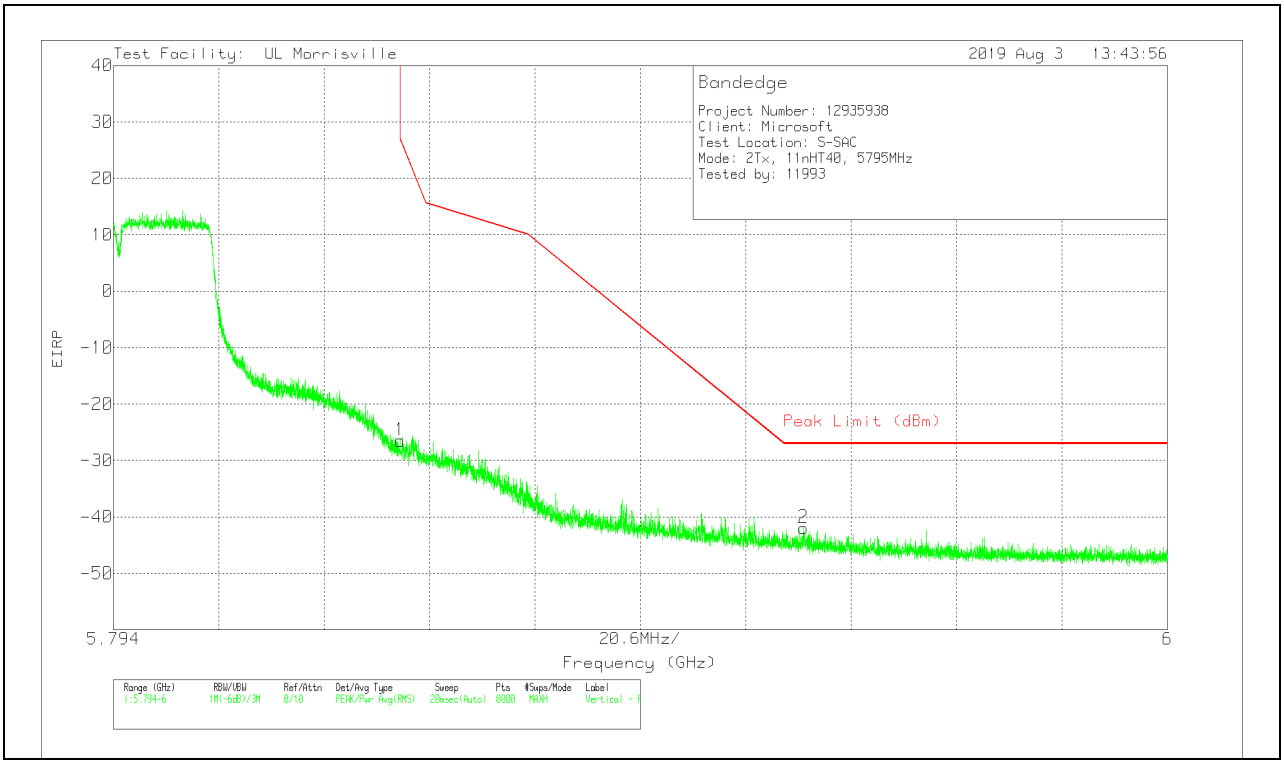
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-54.04	Pk	34.8	-23.1	11.8	-30.54	26.97	-57.51	359	390	H
2	5.92853	-67.13	Pk	34.9	-22.8	11.8	-43.23	-27	-16.23	359	390	H

Pk - Peak detector

VERTICAL RESULT

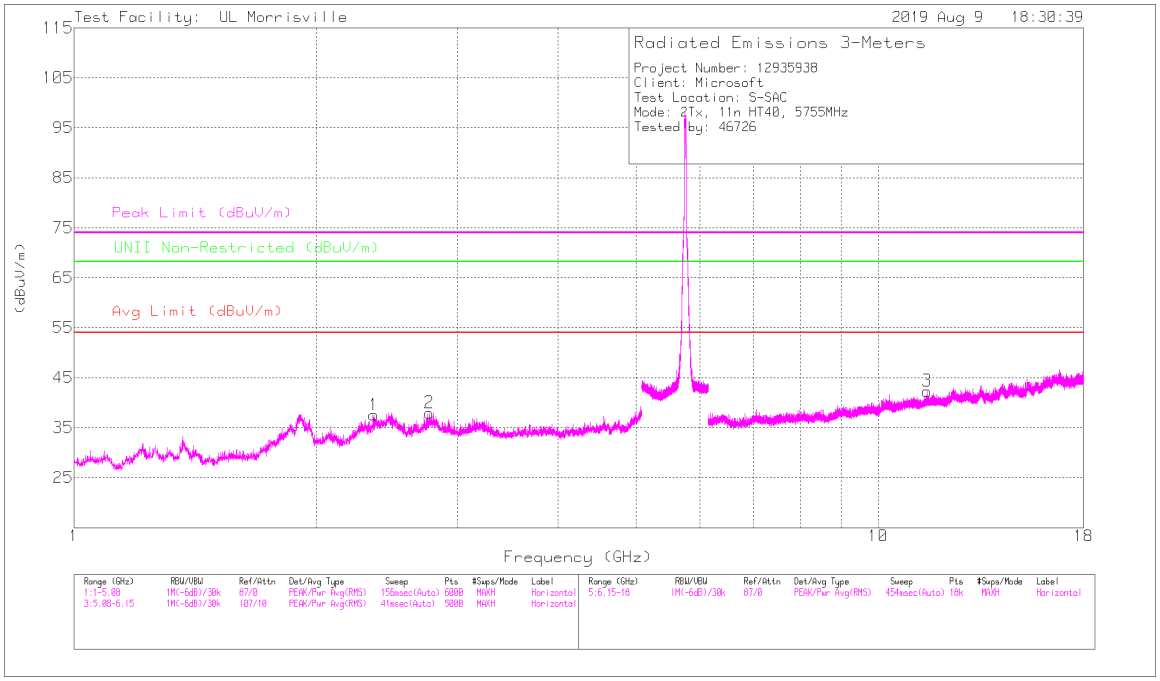


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-49.98	Pk	34.8	-23.1	11.8	-26.48	26.97	-53.45	344	301	V
2	5.92884	-65.86	Pk	34.9	-22.8	11.8	-41.96	-27	-14.96	344	301	V

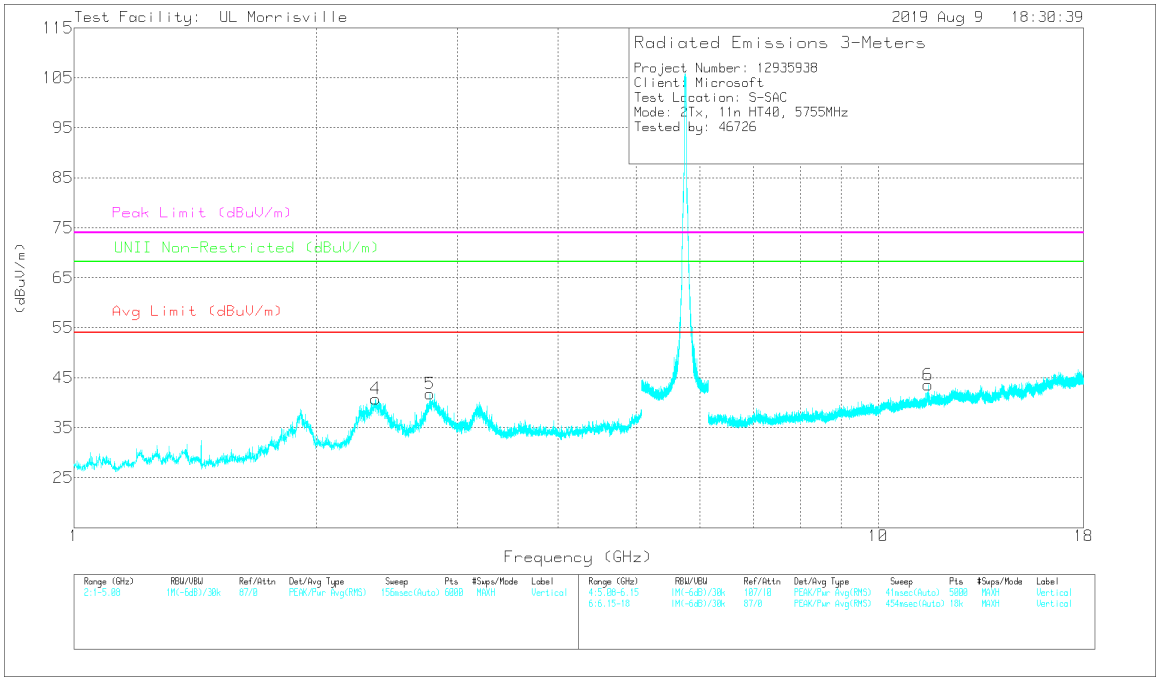
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.36203	48.13	PK-U	31.7	-34	45.83	-	-	74	-28.17	-	-	352	128	H
	* ** 2.36207	35.92	ADR	31.7	-34	33.62	54	-20.38	-	-	-	-	352	128	H
2	* ** 2.77577	47.5	PK-U	32.2	-33.5	46.2	-	-	74	-27.8	-	-	142	156	H
	* ** 2.77592	35.6	ADR	32.2	-33.5	34.3	54	-19.7	-	-	-	-	142	156	H
4	* ** 2.36199	52.01	PK-U	31.7	-34	49.71	-	-	74	-24.29	-	-	95	244	V
	* ** 2.3618	40.16	ADR	31.7	-34	37.86	54	-16.14	-	-	-	-	95	244	V
5	* ** 2.8117	51.52	PK-U	32.1	-33.5	50.12	-	-	74	-23.88	-	-	100	219	V
	* ** 2.81157	39.7	ADR	32.1	-33.5	38.3	54	-15.7	-	-	-	-	100	219	V
3	* ** 11.50883	37.61	PK-U	38.1	-24.4	51.31	-	-	74	-22.69	-	-	315	356	H
	* ** 11.50882	25.32	ADR	38.1	-24.4	39.02	54	-14.98	-	-	-	-	315	356	H
6	* ** 11.51293	36.78	PK-U	38.1	-24.4	50.48	-	-	74	-23.52	-	-	21	230	V
	* ** 11.51295	24.55	ADR	38.1	-24.4	38.25	54	-15.75	-	-	-	-	21	230	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

UL LLC
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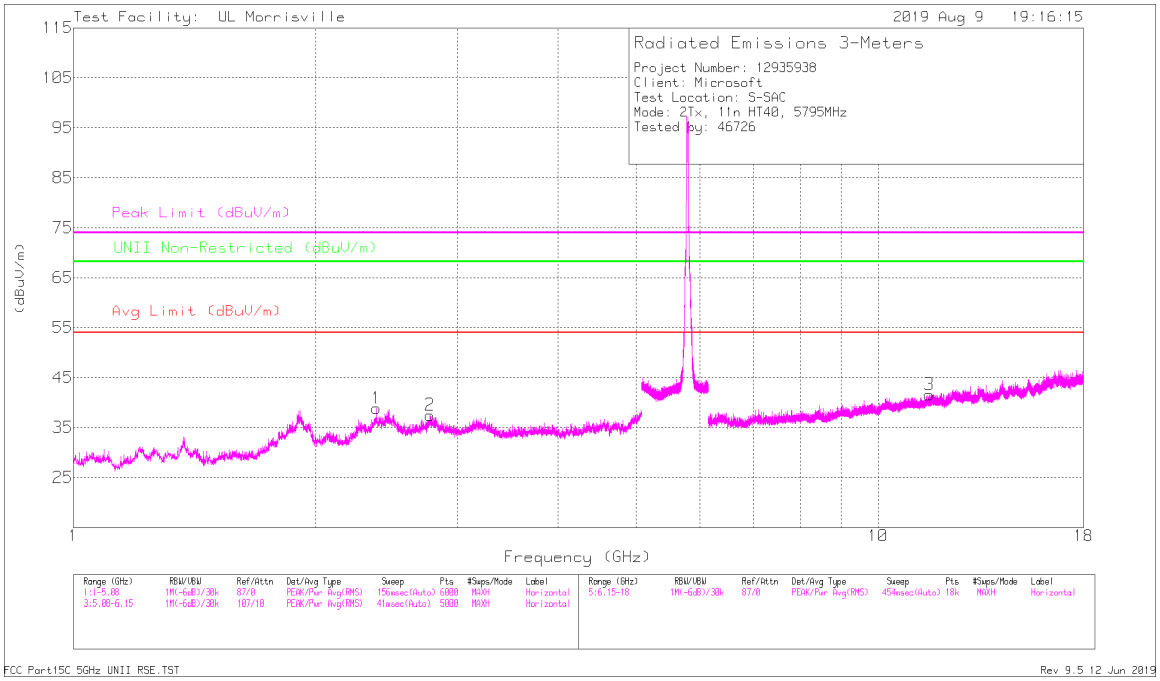
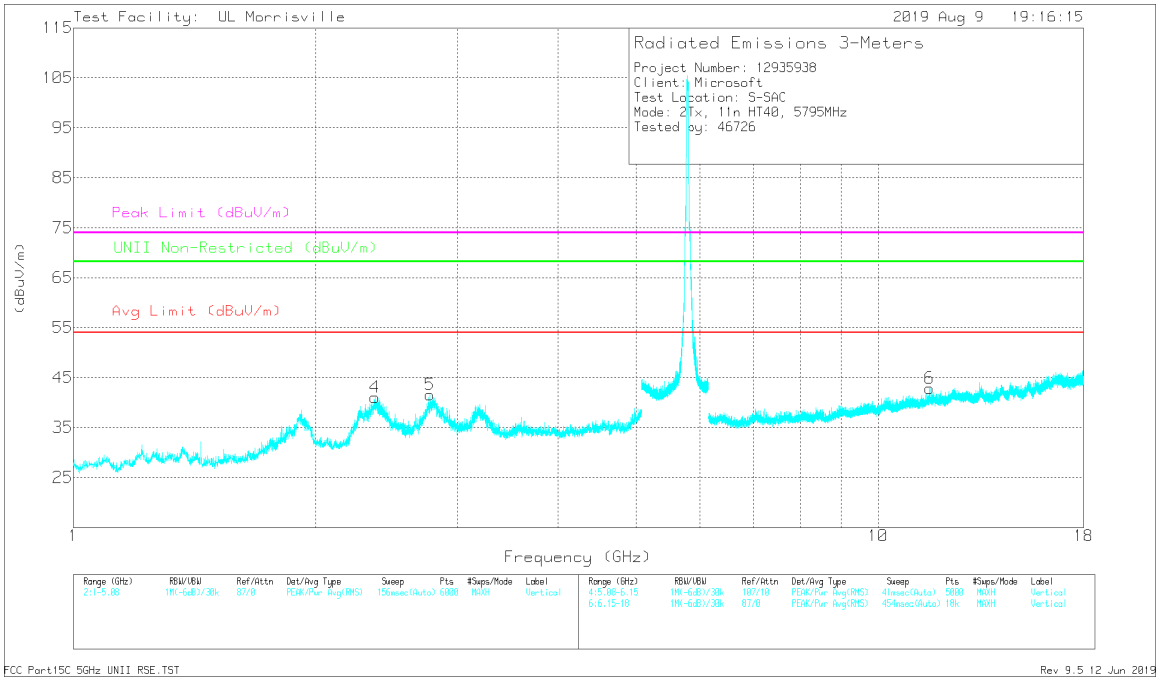
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38197	45.97	PK-U	31.9	-33.9	43.97	-	-	74	-30.03	-	-	352	233	H
	* ** 2.38194	33.9	ADR	31.9	-33.9	31.9	54	-22.1	-	-	-	-	352	233	H
2	* ** 2.78148	47.09	PK-U	32.2	-33.5	45.79	-	-	74	-28.21	-	-	142	159	H
	* ** 2.7815	35.42	ADR	32.2	-33.5	34.12	54	-19.88	-	-	-	-	142	159	H
4	* ** 2.35779	52.16	PK-U	31.7	-34	49.86	-	-	74	-24.14	-	-	93	228	V
	* ** 2.35772	40.1	ADR	31.7	-34	37.8	54	-16.2	-	-	-	-	93	228	V
5	* ** 2.81209	50.61	PK-U	32.1	-33.5	49.21	-	-	74	-24.79	-	-	95	227	V
	* ** 2.81208	39.35	ADR	32.1	-33.5	37.95	54	-16.05	-	-	-	-	95	227	V
3	* ** 11.62012	34.35	PK-U	38.3	-24.6	48.05	-	-	74	-25.95	-	-	241	372	H
	* ** 11.62013	22.28	ADR	38.3	-24.6	35.98	54	-18.02	-	-	-	-	241	372	H
6	* ** 11.58877	37.11	PK-U	38.3	-24.6	50.81	-	-	74	-23.19	-	-	17	224	V
	* ** 11.58876	23.67	ADR	38.3	-24.6	37.37	54	-16.63	-	-	-	-	17	224	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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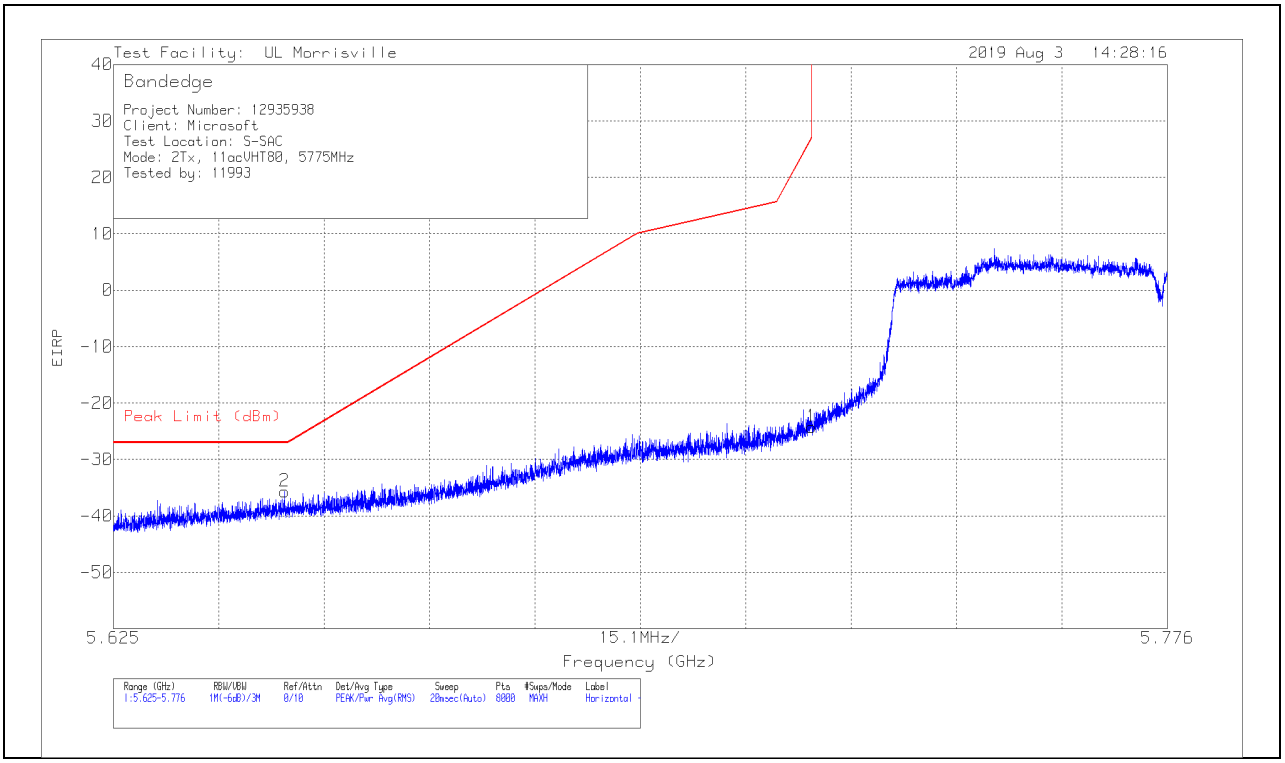
10.1.4. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

2TX Antenna 1 + Antenna 2 SDM MODE

BANDEDGE (CHANNEL 155 LOW EDGE)

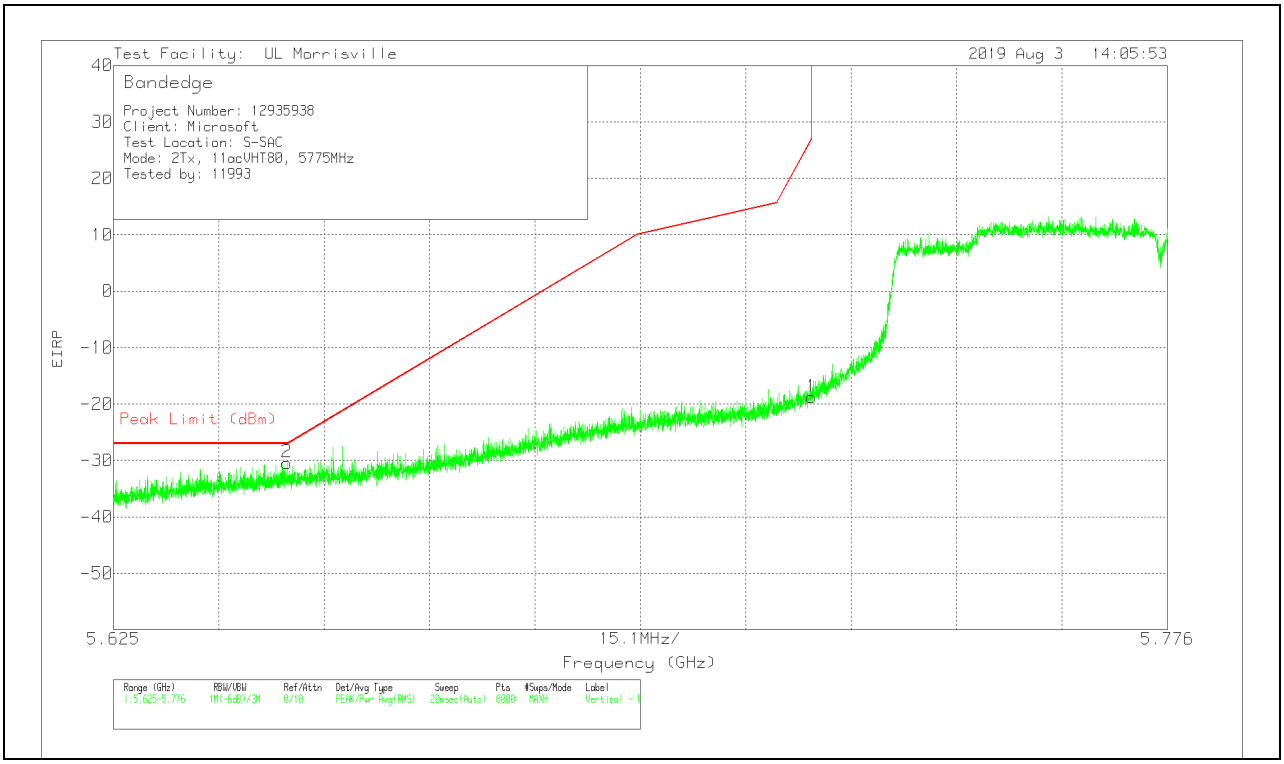
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.64954	-58.95	Pk	34.7	-23.2	11.8	-35.65	-27	-8.65	318	287	H
1	5.72499	-47.44	Pk	34.7	-23.3	11.8	-24.24	26.98	-51.22	318	287	H

Pk - Peak detector

VERTICAL RESULT

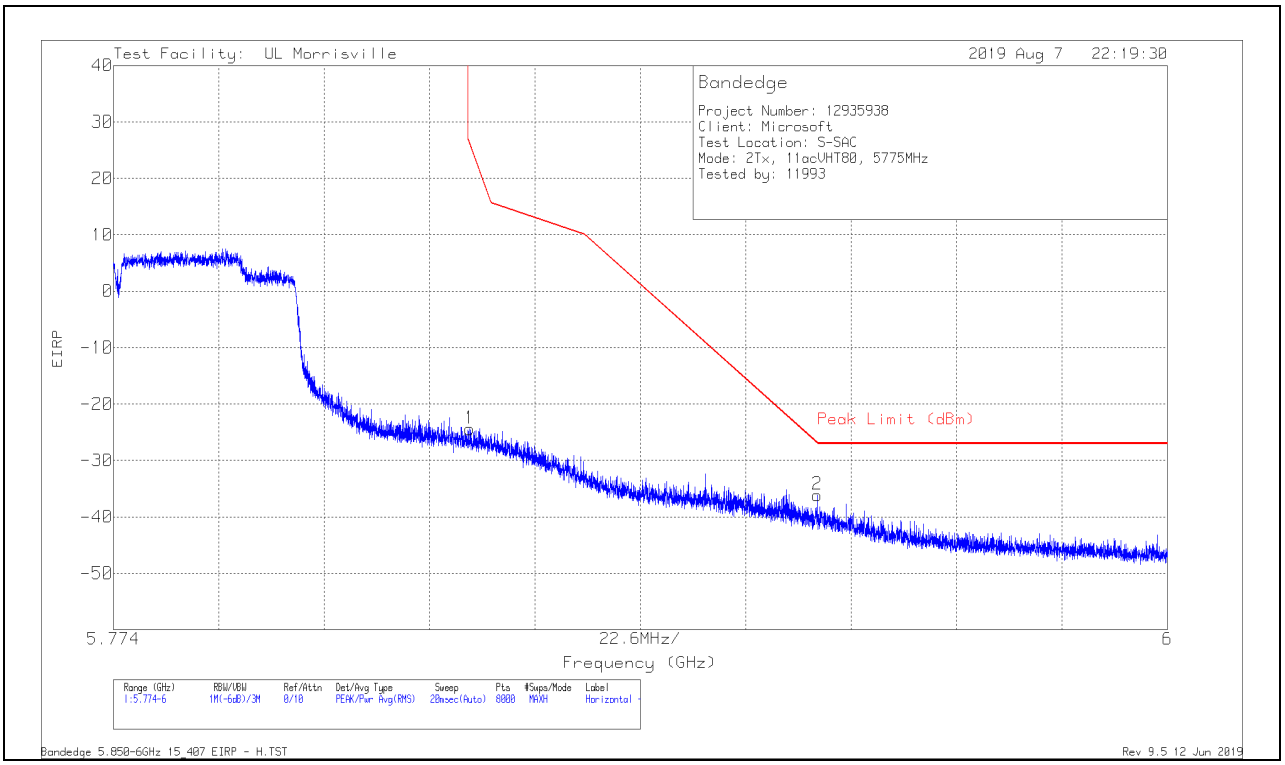


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.64984	-53.68	Pk	34.7	-23.2	11.8	-30.38	-27	-3.38	342	250	V
1	5.72499	-41.97	Pk	34.7	-23.3	11.8	-18.77	26.98	-45.75	342	250	V

Pk - Peak detector

BANDEDGE (CHANNEL 155 HIGH EDGE)

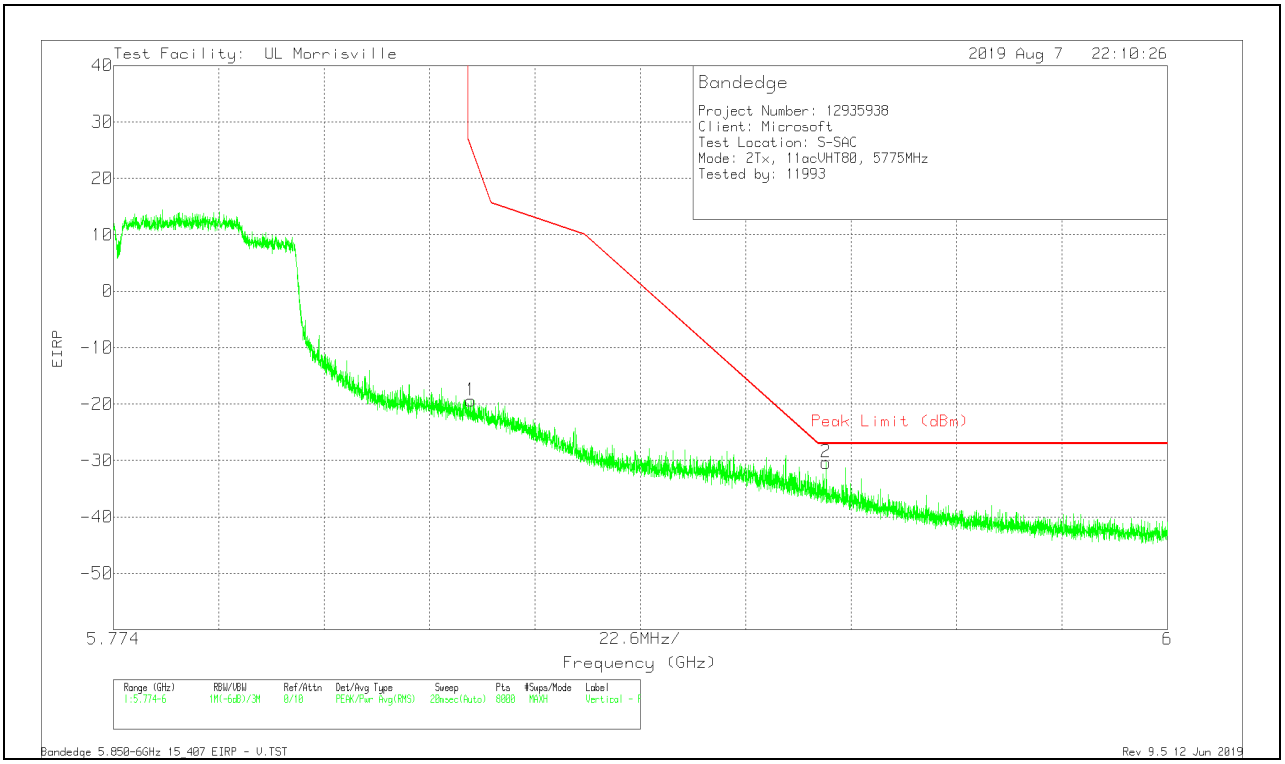
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85043	-47.91	Pk	34.8	-23.1	11.8	-24.41	26.03	-50.44	67	374	H
2	5.92493	-59.9	Pk	34.9	-22.9	11.8	-36.1	-26.95	-9.15	67	374	H

Pk - Peak detector

VERTICAL RESULT

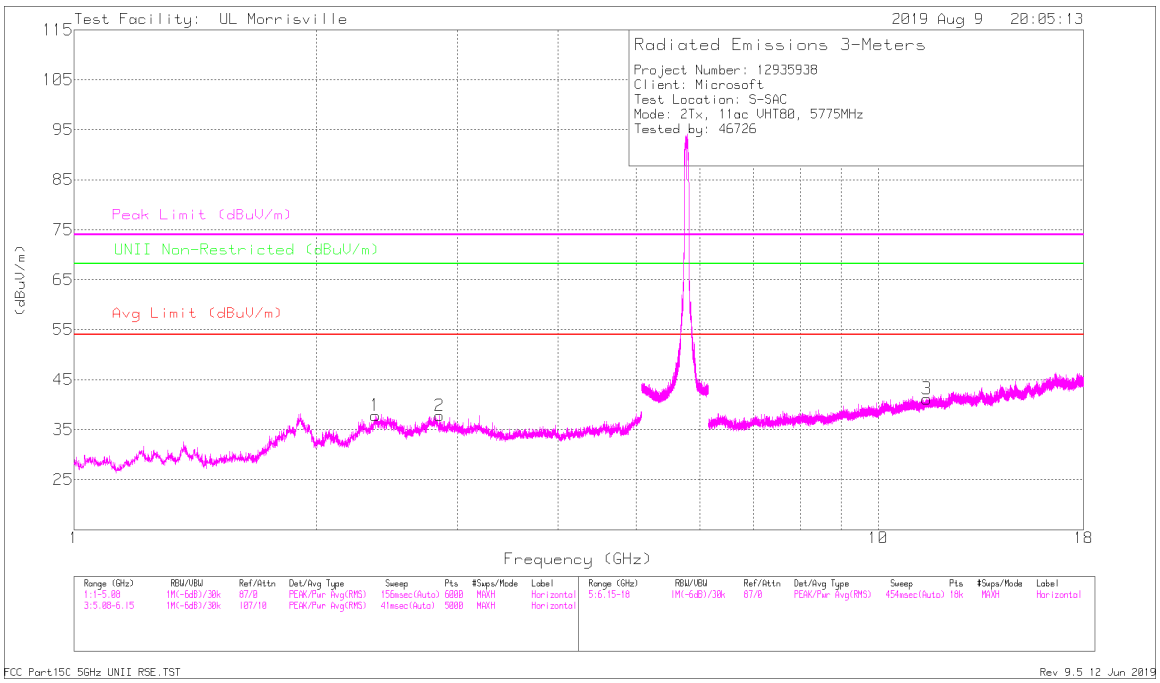


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.8506	-42.86	Pk	34.8	-23.1	11.8	-19.36	25.64	-45	70	245	V
2	5.92685	-54.17	Pk	34.9	-22.9	11.8	-30.37	-27	-3.37	70	245	V

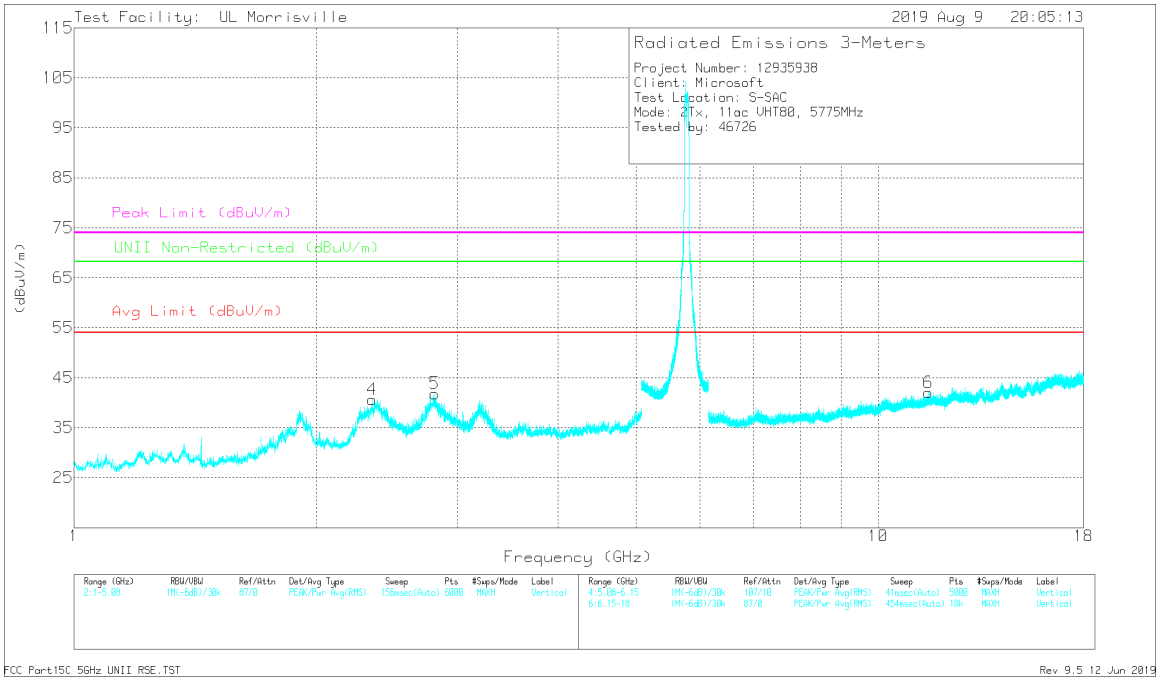
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.37478	48.51	PK-U	31.8	-33.9	46.41	-	-	74	-27.59	-	-	354	118	H
	* ** 2.37478	36.45	ADR	31.8	-33.9	34.35	54	-19.65	-	-	-	-	354	118	H
2	* ** 2.81782	47.4	PK-U	32.1	-33.6	45.9	-	-	74	-28.1	-	-	5	160	H
	* ** 2.81784	35.52	ADR	32.1	-33.6	34.02	54	-19.98	-	-	-	-	5	160	H
4	* ** 2.37277	50.85	PK-U	31.8	-33.9	48.75	-	-	74	-25.25	-	-	99	207	V
	* ** 2.37276	39.19	ADR	31.8	-33.9	37.09	54	-16.91	-	-	-	-	99	207	V
5	* ** 2.82174	51.92	PK-U	32.1	-33.6	50.42	-	-	74	-23.58	-	-	95	237	V
	* ** 2.82168	40.36	ADR	32.1	-33.6	38.86	54	-15.14	-	-	-	-	95	237	V
3	* ** 11.53697	35.19	PK-U	38.2	-24.4	48.99	-	-	74	-25.01	-	-	284	283	H
	* ** 11.537	22.66	ADR	38.2	-24.4	36.46	54	-17.54	-	-	-	-	284	283	H
6	* ** 11.53504	35.61	PK-U	38.2	-24.4	49.41	-	-	74	-24.59	-	-	20	229	V
	* ** 11.53504	23.63	ADR	38.2	-24.4	37.43	54	-16.57	-	-	-	-	20	229	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

10.2. WORST-CASE BELOW 1GHz AND ABOVE 18 GHz

Radiated emissions below 1GHz, above 18GHz, and power line conducted emissions were performed in worst-case test report R12935938-E11 (FCC ID: C3K1868, IC: 3048A-1868)

11. AC LINE CONDUCTED EMISSIONS

Radiated emissions below 1GHz, above 18GHz, and power line conducted emissions were performed in worst-case test report R12935938-E11 (FCC ID: C3K1868, IC: 3048A-1868).

12. SETUP PHOTOS

Please refer to R12935938-EP1 for setup photos

END OF TEST REPORT

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