



# **TEST REPORT**

**Report Number :** R13274094-E1

**Applicant :** Raspberry Pi Limited  
Maurice Wilkes Building  
St. Johns Innovation Park, Crowley Road  
Cambridge, CB4 0DS  
United Kingdom

**Model :** Pi Zero 2

**FCC ID :** 2ABCB-RPIZ2

**IC :** 20953-RPIZ2

**EUT Description :** Radio Module with BT/BLE/2.4GHz WLAN

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 5+A2

**Date Of Issue:**  
2021-08-19

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## REPORT REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2021-03-26	Initial Issue	Brian T. Kiewra
2	2021-07-16	Editorial revisions	Brian T. Kiewra
3	2021-08-19	Further editorial revisions	Brian T. Kiewra

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Raspberry Pi Limited  
Maurice Wilkes Building  
St. Johns Innovation Park, Crowley Road  
Cambridge, CB4 0DS  
United Kingdom

**EUT DESCRIPTION:** Radio Module with BT/BLE/2.4GHz WLAN.

**MODEL:** Pi Zero 2

**BRAND:** Raspberry Pi

**SERIAL NUMBER:** DVT2 #72, DVT2 #42

**SAMPLE RECEIPT DATE:** 2020-11-09

**DATE TESTED:** 2020-12-02 to 2020-12-16

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2 / RSS-GEN Issue 5+A2	Complies

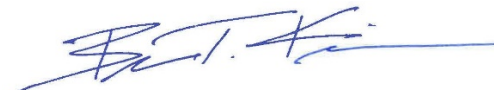
UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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.

Approved & Released  
For UL LLC By:

Prepared By:



Francisco de Anda  
Operations Leader  
Consumer Technology Division  
UL LLC

Brian T. Kiewra  
Project Engineer  
Consumer Technology Division  
UL LLC

## 2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Compliant	None
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Compliant	None
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Compliant	None
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Compliant	None

## 3. 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, KDB 414788 D01 Radiated Test Site V01r01, RSS-GEN Issue 5+ A2, and RSS-247 Issue 2.

## 4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	703469
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr Morrisville, NC 27560, U.S.A		27265	

## 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

### 5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 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	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
RF output power, radiated (SAC)	4.52 dB
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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

### 5.4. 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

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is a BT/BLE/2.4GHz WLAN radio module. This report only covers the 2.4GHz WLAN testing. The PMN is Raspberry Pi Zero 2 and HVIN is 1.0.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	22.59	181.55
2412 - 2462	802.11g	25.78	378.44
2412 - 2462	802.11n HT20	25.68	369.83

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain, as provided by the manufacturer are as follows:  
The radio utilizes an antenna, with a maximum gain of 2.5 dBi.

### 6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v1.0.

The test utility software used during testing was v1.0.

### 6.5. 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.

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

802.11b mode: 1 Mbps  
802.11g mode: 6 Mbps  
802.11n HT20mode: MCS0



## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Monitor	Viewsonic	VX2452MH	TVT171081663	N/A
Power Supply	Stontronics	DSA-12CA-05	4314HB	V100236

### I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Micro USB	1	USB	USB	1	To AC/DC power supply with USB

### SETUP DIAGRAM

Please refer to R13274094-EP1 for setup diagrams.

## 7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause 11.8.1

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

Output Power: ANSI C63.10 Subclause 11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G

PSD: ANSI C63.10 Subclause 11.10.2 Method PKPSD (Peak PSD)

Conducted Spurious Emissions: ANSI C63.10-2013 Section 11.12.2

Out-of-band emissions in non-restricted bands: ANSI C63.10-2013 Section 11.11 & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10-2013 Section 11.12.1 & 6.10.5

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

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

## 8. 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 - South Chamber)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
<b>0.009-30MHz (Loop Ant.)</b>					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2020-08-20	2021-08-20
<b>30-1000 MHz</b>					
AT0075	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2020-10-27	2021-10-27
<b>1-18 GHz</b>					
AT0067	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-28	2021-04-28
<b>Gain-Loss Chains</b>					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2020-07-10	2021-07-10
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2020-07-10	2021-07-10
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-06	2021-07-06
<b>Analyzer &amp; Software</b>					
SA0025	Spectrum Analyzer	Agilent	N9030A	2020-03-17	2021-03-17
SOFTEMI	EMI Software	UL	Version 9.5 (2020-08-18)		
<b>Additional Equipment used</b>					
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22

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

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
<b>1-18 GHz</b>					
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-04-27	2021-04-27
<b>18-40 GHz</b>					
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2020-10-30	2021-10-30
<b>Gain-Loss Chains</b>					
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2020-07-28	2021-07-28
N-SAC04	Gain-loss string: 18-40GHz	Various	Various	2020-07-31	2021-07-31
<b>Analyzer &amp; Software</b>					
SA0026	Spectrum Analyzer	Agilent	N9030A	2020-07-16	2021-07-16
SA0027	Spectrum Analyzer	Agilent	N9030A	2020-06-10	2021-06-10
SOFTEMI	EMI Software	UL	Version 9.5 (2020-08-18)		
<b>Additional Equipment used</b>					
s/n 200037610	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
72822	Spectrum Analyzer	Agilent Technologies	E4446A	2020-01-02	2021-01-21
PWM005	RF Power Meter	Keysight Technologies	N1912A	2020-07-14	2021-07-14
PWS005	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2020-05-26	2021-05-26
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2020-06-26	2021-06-26
SOFTEMI	Antenna Port Software	UL	Version 2020.12.3		
MM0167	True RMS Multimeter	Agilent	U1232A	2020-08-05	2021-08-05

Test Equipment Used - Conducted Disturbance Emissions – Voltage

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
85496	EMI Test Receiver 9kHz-3.6GHz	Rohde & Schwarz	ESR3	2020-08-18	2021-08-18
CBL004	Coaxial cable, 20 ft., BNC -male to BNC-male	UL	RG-223	2020-07-23	2021-07-23
HI0085	Temp/Humid/Pressure Meter	Extech	SD700	2020-04-20	2021-04-30
SOFTEMI	EMI Software	UL	Version 9.5 (2020-08-18)		
ATA508	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2020-07-21	2021-07-21
LISN002	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2020-08-17	2021-08-17

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

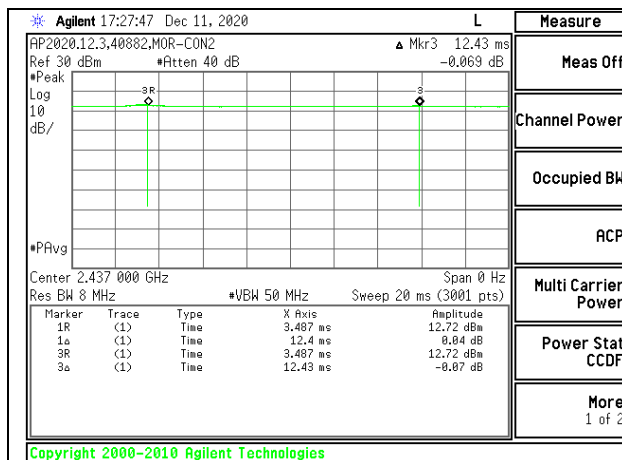
#### LIMITS

None; for reporting purposes only.

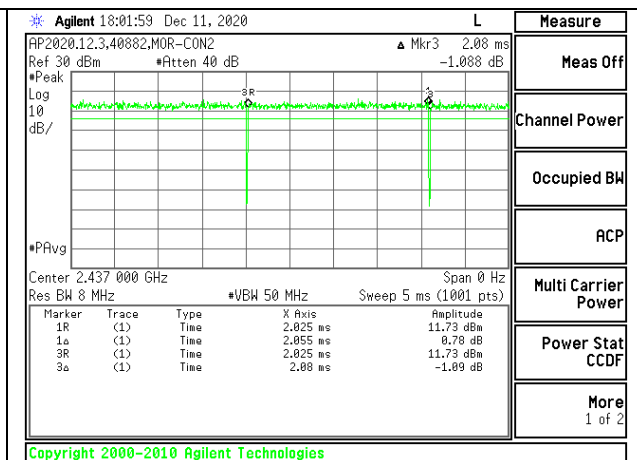
#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

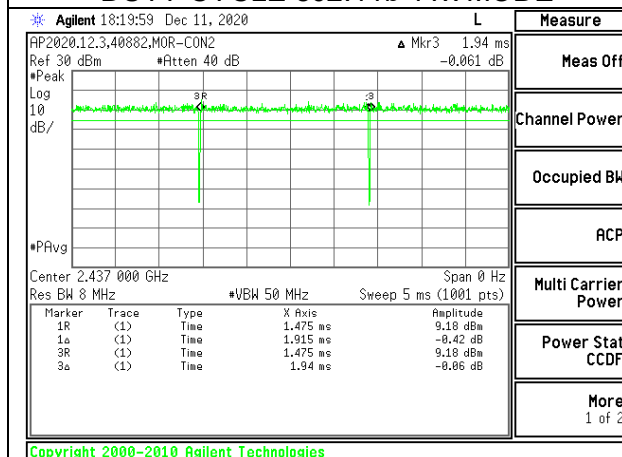
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
<b>2.4GHz Band</b>						
802.11b 1TX	12.400	12.430	0.998	99.76%	0.00	0.010
802.11g 1TX	2.055	2.080	0.988	98.80%	0.00	0.010
802.11n HT20 1TX	1.915	1.940	0.987	98.71%	0.00	0.010



DUTY CYCLE 802.11b 1Tx MODE



DUTY CYCLE 802.11g 1Tx MODE



DUTY CYCLE 802.11nHT20 1Tx MODE

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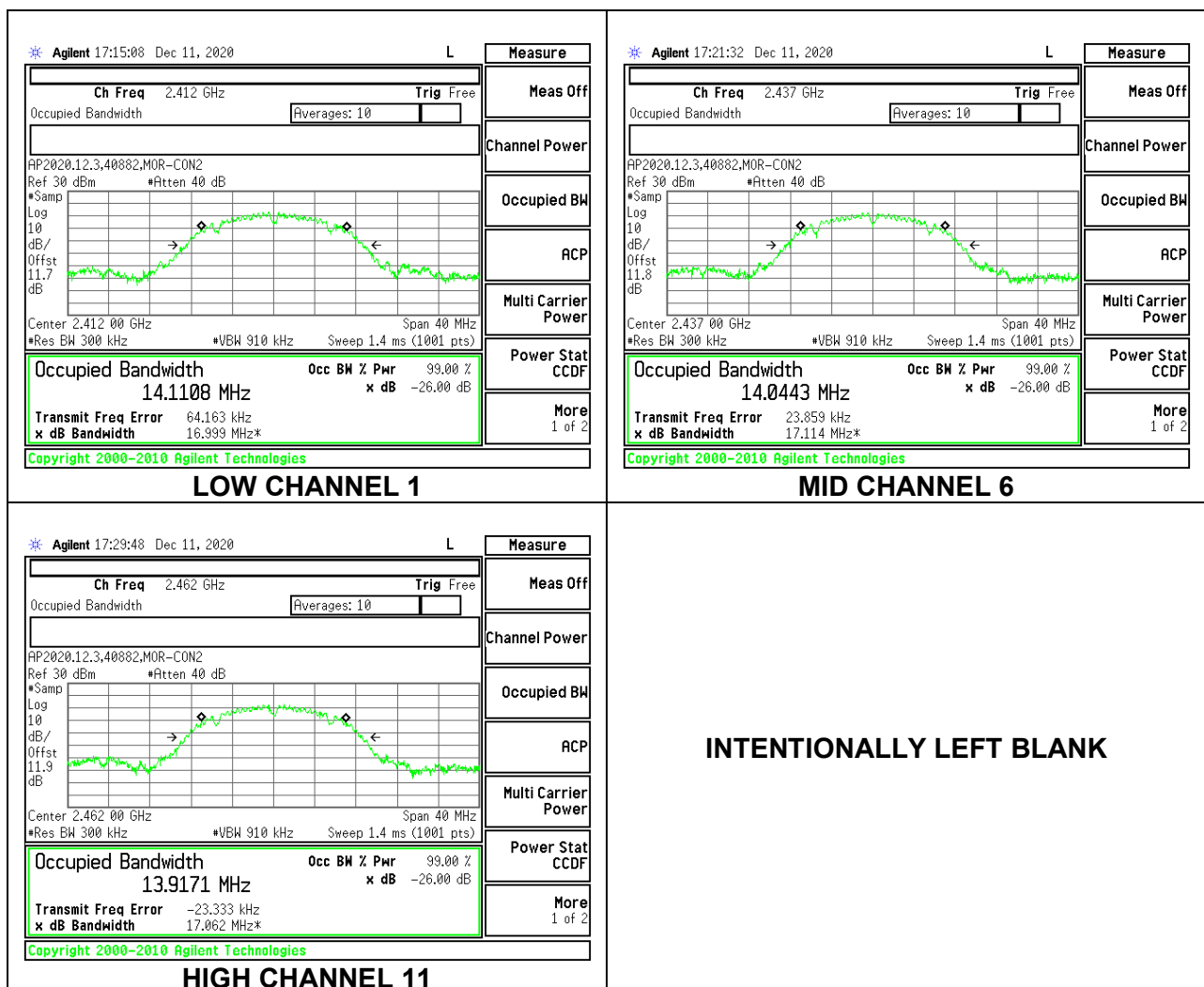
## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### 9.2.1. 802.11b MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	14.1108
Mid 6	2437	14.0443
High 11	2462	13.9171



### 9.2.2. 802.11g MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	16.3160
Mid 6	2437	16.3949
High 11	2462	16.3478

<p>* Agilent 17:42:12 Dec 11, 2020</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 10</p> <p>AP2020.12.3.40882.MOR-CON2                  Ref 30 dBm #Atten 40 dB</p> <p>Center 2.412 00 GHz Span 40 MHz                  #Res BW 300 kHz #VBW 910 kHz Sweep 1.4 ms (1001 pts)</p> <p><b>Occupied Bandwidth 16.3160 MHz</b></p> <p>Occ BW % Pwr 99.00 %                  x dB -26.00 dB</p> <p>Transmit Freq Error 5.120 kHz                  x dB Bandwidth 19.458 MHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p> <p><b>LOW CHANNEL 1</b></p>	<p>* Agilent 17:55:53 Dec 11, 2020</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 10</p> <p>AP2020.12.3.40882.MOR-CON2                  Ref 30 dBm #Atten 40 dB</p> <p>Center 2.437 00 GHz Span 40 MHz                  #Res BW 300 kHz #VBW 910 kHz Sweep 1.4 ms (1001 pts)</p> <p><b>Occupied Bandwidth 16.3949 MHz</b></p> <p>Occ BW % Pwr 99.00 %                  x dB -26.00 dB</p> <p>Transmit Freq Error 30.993 kHz                  x dB Bandwidth 23.438 MHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p> <p><b>MID CHANNEL 6</b></p>
<p>* Agilent 18:03:48 Dec 11, 2020</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 10</p> <p>AP2020.12.3.40882.MOR-CON2                  Ref 30 dBm #Atten 40 dB</p> <p>Center 2.462 00 GHz Span 40 MHz                  #Res BW 300 kHz #VBW 910 kHz Sweep 1.4 ms (1001 pts)</p> <p><b>Occupied Bandwidth 16.3478 MHz</b></p> <p>Occ BW % Pwr 99.00 %                  x dB -26.00 dB</p> <p>Transmit Freq Error 17.786 kHz                  x dB Bandwidth 21.701 MHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p> <p><b>HIGH CHANNEL 11</b></p>	<p style="text-align: center;"><b>INTENTIONALLY LEFT BLANK</b></p>



### 9.2.3. 802.11n HT20 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.5343
Mid 6	2437	17.3776
High 11	2462	17.4629

**LOW CHANNEL 1**

Agilent 18:11:03 Dec 11, 2020

Ch Freq: 2.412 GHz

Occupied Bandwidth: 17.5343 MHz

Transmit Freq Error: 44.442 kHz

x dB Bandwidth: 21.314 MHz\*

**MID CHANNEL 6**

Agilent 18:15:58 Dec 11, 2020

Ch Freq: 2.437 GHz

Occupied Bandwidth: 17.3776 MHz

Transmit Freq Error: 7.236 kHz

x dB Bandwidth: 21.128 MHz\*

**HIGH CHANNEL 11**

Agilent 18:21:48 Dec 11, 2020

Ch Freq: 2.462 GHz

Occupied Bandwidth: 17.4629 MHz

Transmit Freq Error: 20.427 kHz

x dB Bandwidth: 21.199 MHz\*

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### 9.3. 6 dB BANDWIDTH

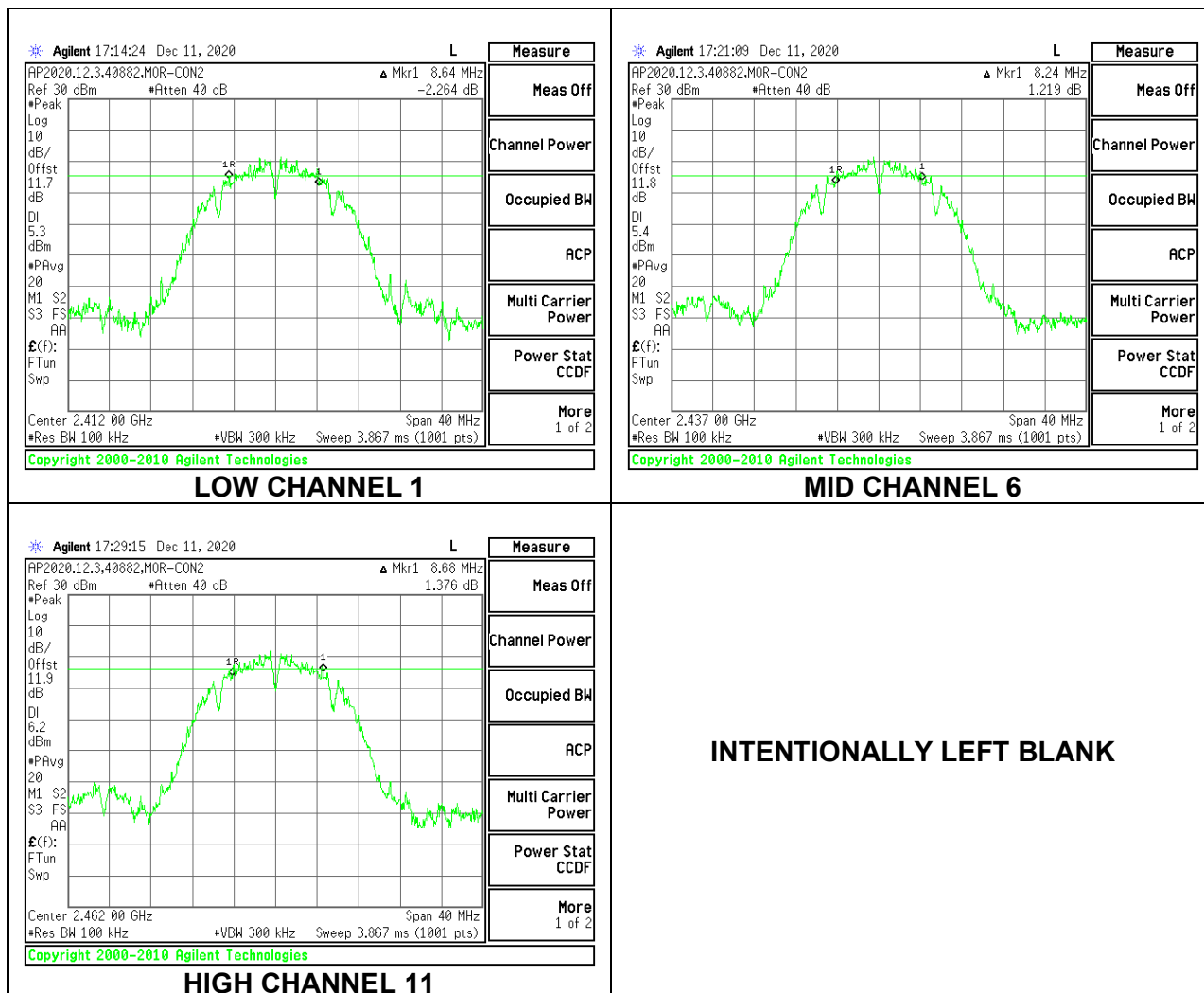
#### LIMITS

FCC §15.247 (a) (2)  
 RSS-247 5.2 (a)

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

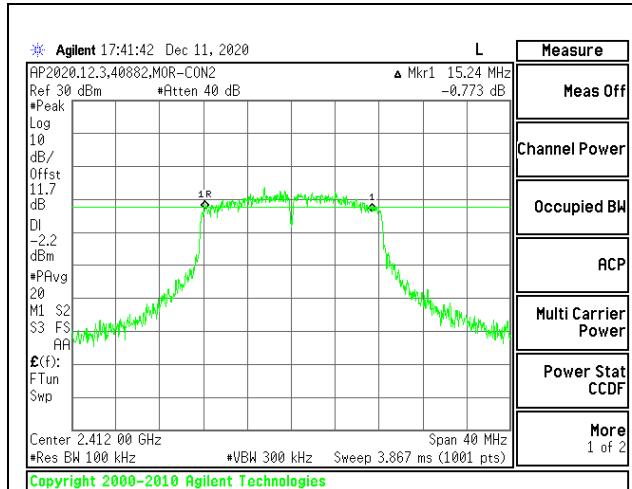
#### 9.3.1. 802.11b MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	8.64	0.5
Mid 6	2437	8.24	0.5
High 11	2462	8.68	0.5

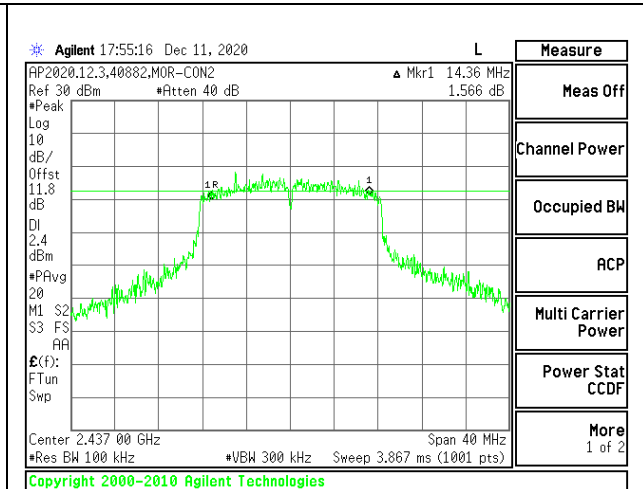


### 9.3.2. 802.11g MODE

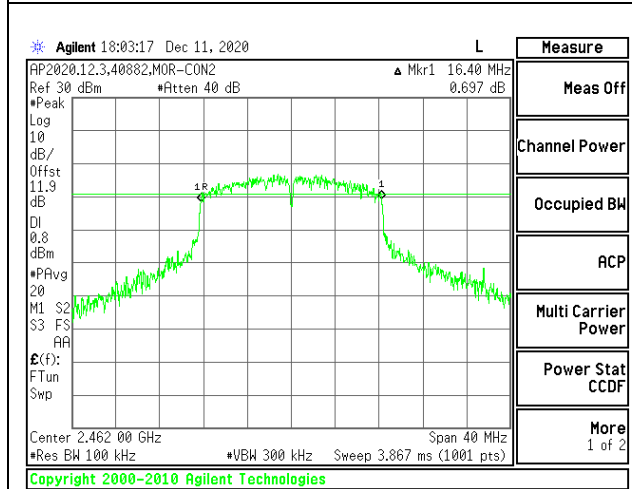
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	15.24	0.5
Mid 6	2437	14.36	0.5
High 11	2462	16.40	0.5



**LOW CHANNEL 1**



**MID CHANNEL 6**

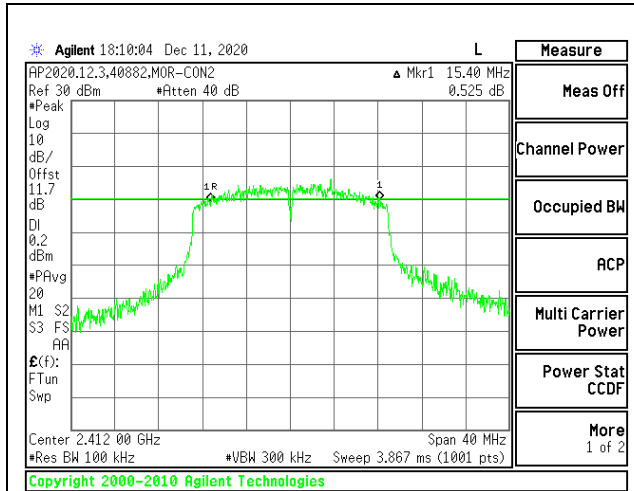


**HIGH CHANNEL 11**

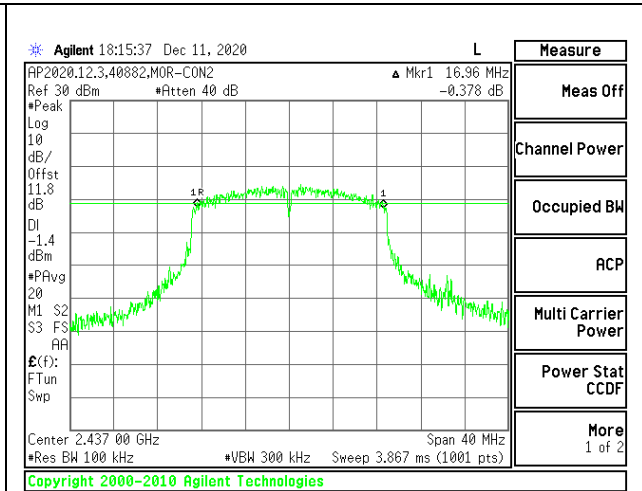
**INTENTIONALLY LEFT BLANK**

### 9.3.3. 802.11n HT20 MODE

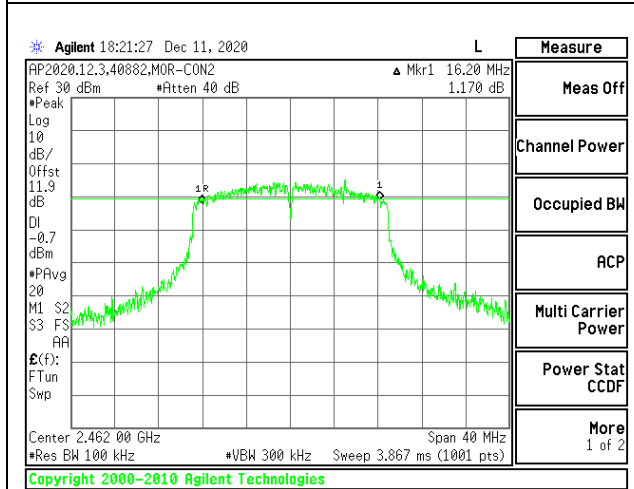
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	15.40	0.5
Mid 6	2437	16.96	0.5
High 11	2462	16.20	0.5



**LOW CHANNEL 1**



**MID CHANNEL 6**



**HIGH CHANNEL 11**

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## 9.4. 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 wideband peak power meter and sensor.

The cable assembly insertion loss of 11.61 dB (including 10.13 dB pad and 1.48 dB cable) was entered as an offset in the power meter. Measurement is a 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

#### 9.4.1. 802.11b MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07

#### Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	20.44	20.44	30.00	-9.56
Low 2	2417	19.94	19.94	30.00	-10.06
Low 3	2422	22.28	22.28	30.00	-7.72
Mid 6	2437	21.90	21.90	30.00	-8.10
High 10	2457	22.59	22.59	30.00	-7.41
High 11	2462	22.27	22.27	30.00	-7.73

### 9.4.2. 802.11g MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07 and 2020-12-16

**Results**

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	23.45	23.45	30.00	-6.55
Low 2	2417	25.73	25.73	30.00	-4.27
Mid 6	2437	25.78	25.78	30.00	-4.22
High 8	2447	25.76	25.76	30.00	-4.24
High 9	2452	24.67	24.67	30.00	-5.33
High 10	2457	25.28	25.28	30.00	-4.72
High 11	2462	25.11	25.11	30.00	-4.89

### 9.4.3. 802.11n HT20 MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07

**Results**

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	23.90	23.90	30.00	-6.10
Low 2	2417	24.88	24.88	30.00	-5.12
Low 3	2422	25.14	25.14	30.00	-4.86
Mid 6	2437	25.68	25.68	30.00	-4.32
High 10	2457	25.29	25.29	30.00	-4.71
High 11	2462	24.50	24.50	30.00	-5.50

## 9.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only

### TEST PROCEDURE

The transmitter output is connected to an average power meter and sensor.

The cable assembly insertion loss of 10.72 dB (including 10.33 dB pad and 0.39 dB cable) was entered as an offset in the power meter. Measurement is a gated average reading of power.

### RESULTS

#### 9.5.1. 802.11b MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07

#### Results

Channel	Frequency (MHz)	Meas Power (dBm)
Low 1	2412	18.05
Low 2	2417	17.54
Low 3	2422	19.95
Mid 6	2437	19.54
High 10	2457	20.23
High 11	2462	19.92

### 9.5.2. 802.11g MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07 and 2020-12-16

#### Results

Channel	Frequency (MHz)	Meas Power (dBm)
Low 1	2412	15.41
Low 2	2417	19.67
Mid 6	2437	19.28
High 8	2447	19.34
High 9	2452	18.26
High 10	2457	17.78
High 11	2462	16.40

### 9.5.3. 802.11n HT20 MODE

<b>Test Engineer:</b>	11993/40882
<b>Test Date:</b>	2020-12-07

#### Results

Channel	Frequency (MHz)	Meas Power (dBm)
Low 1	2412	15.07
Low 2	2417	16.65
Low 3	2422	17.66
Mid 6	2437	17.17
High 10	2457	17.65
High 11	2462	15.79



## **9.6. POWER SPECTRAL DENSITY**

### **LIMITS**

FCC §15.247 (e)

RSS-247 (5.2) (b)

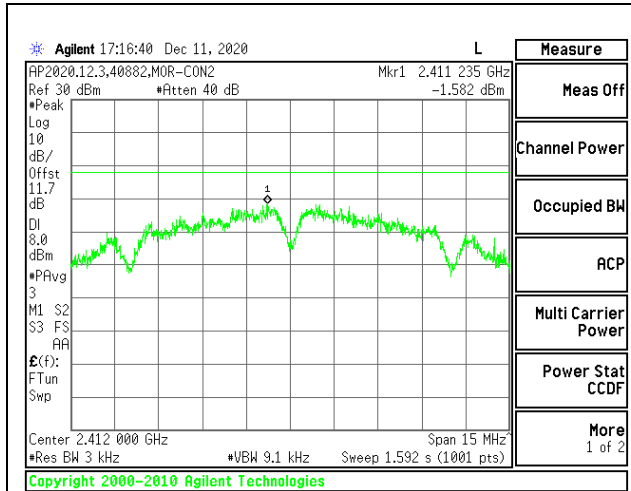
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### **RESULTS**

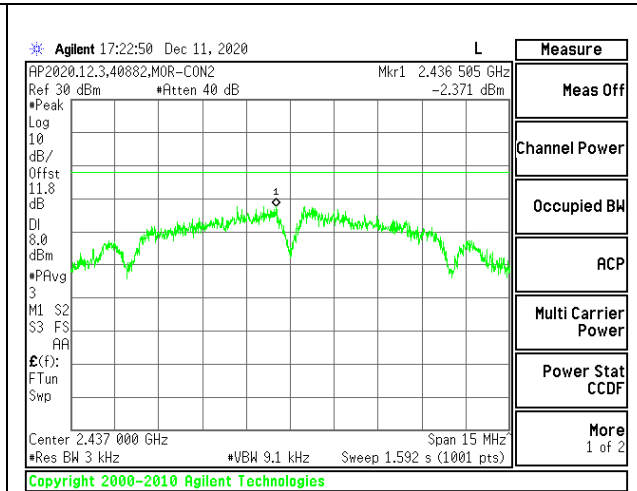
### 9.6.1. 802.11b MODE

#### PSD Results

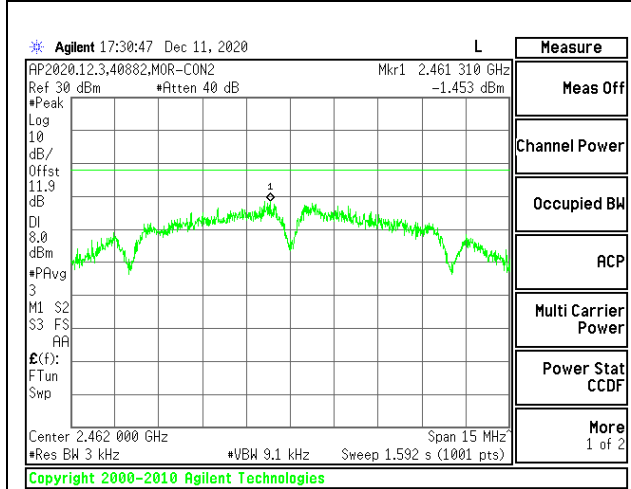
Channel	Frequency (MHz)	Chain 0 Meas (dBm/3kHz)	Total Corr'd PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low 1	2412	-1.58	-1.58	8.0	-9.6
Mid 6	2437	-2.37	-2.37	8.0	-10.4
High 11	2462	-1.45	-1.45	8.0	-9.5



**LOW CHANNEL 1**



**MID CHANNEL 6**



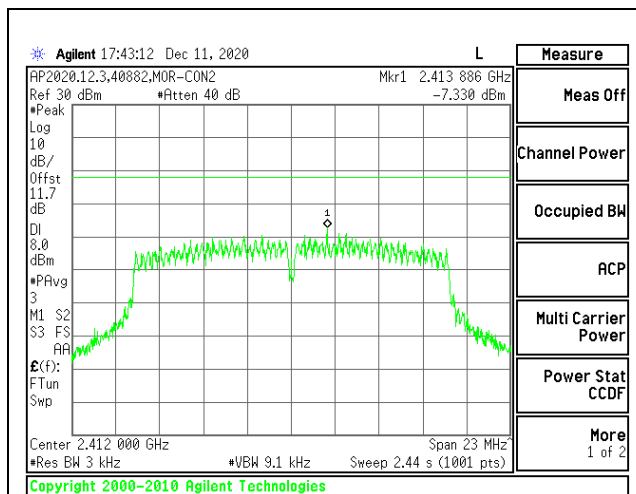
**HIGH CHANNEL 11**

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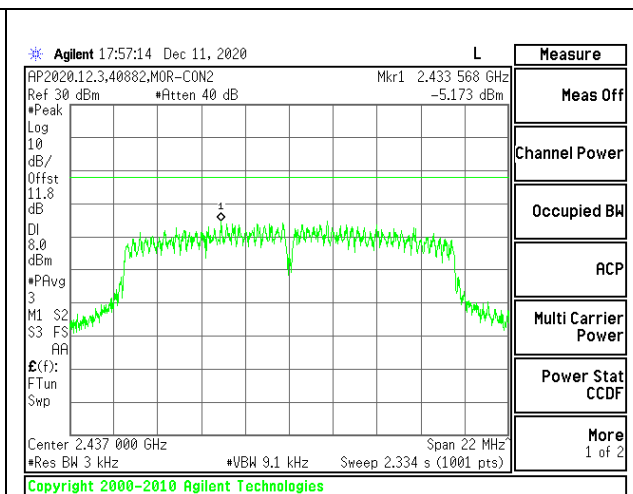
### 9.6.2. 802.11g MODE

#### PSD Results

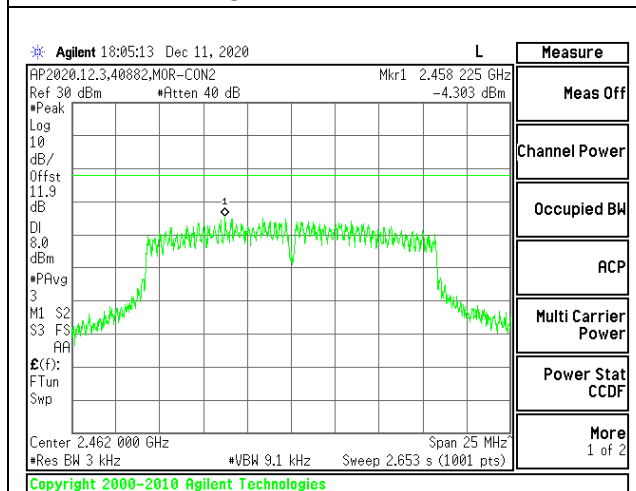
Channel	Frequency (MHz)	Chain 0 Meas (dBm/3kHz)	Total Corr'd PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low 1	2412	-7.33	-7.33	8.0	-15.3
Mid 6	2437	-5.17	-5.17	8.0	-13.2
High 11	2462	-4.30	-4.30	8.0	-12.3



**LOW CHANNEL 1**



**MID CHANNEL 6**



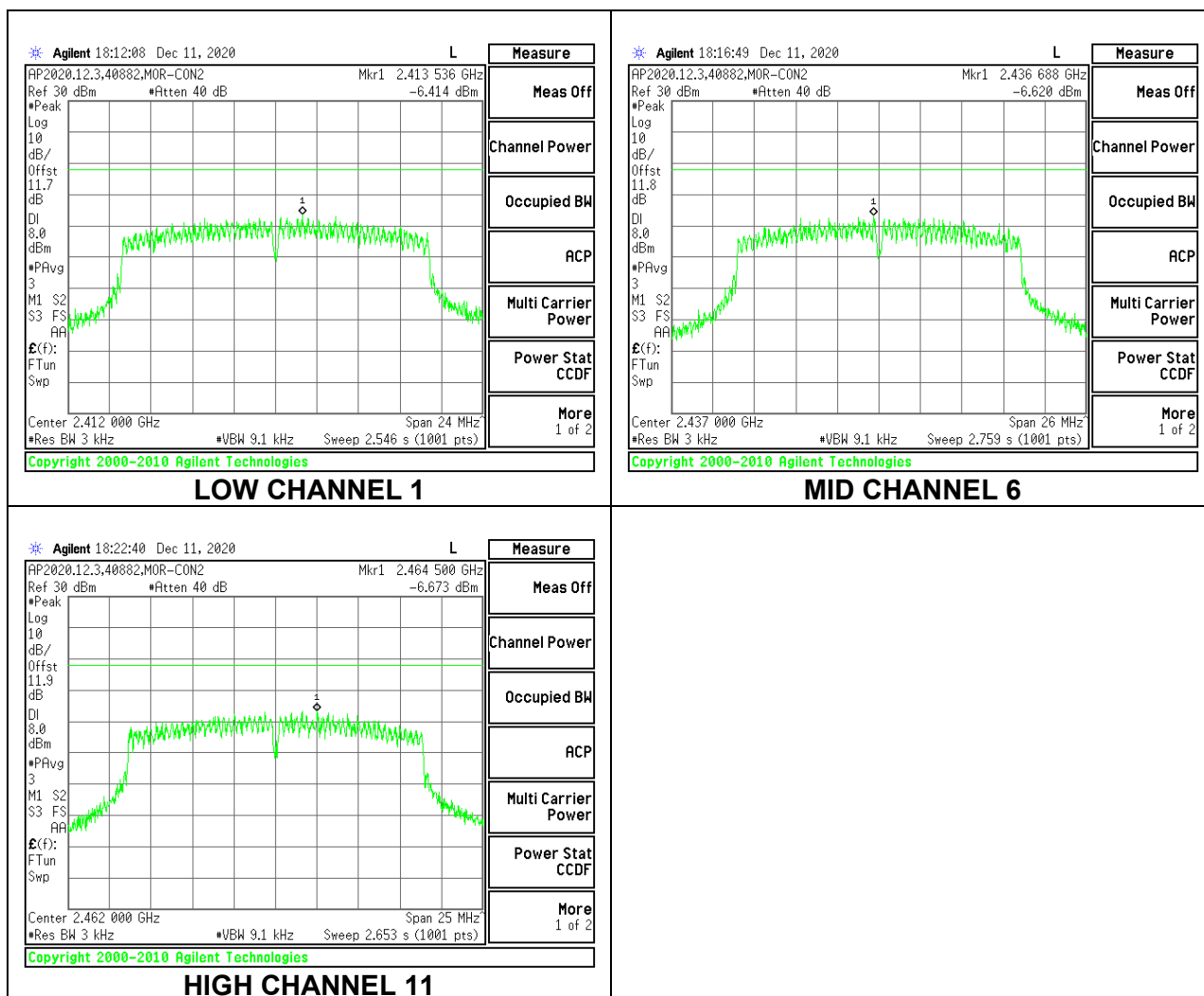
**HIGH CHANNEL 11**

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### 9.6.3. 802.11n HT20 MODE

#### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/3kHz)	Total Corr'd PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low 1	2412	-6.41	-6.41	8.0	-14.4
Mid 6	2437	-6.62	-6.62	8.0	-14.6
High 11	2462	-6.67	-6.67	8.0	-14.7



## **9.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

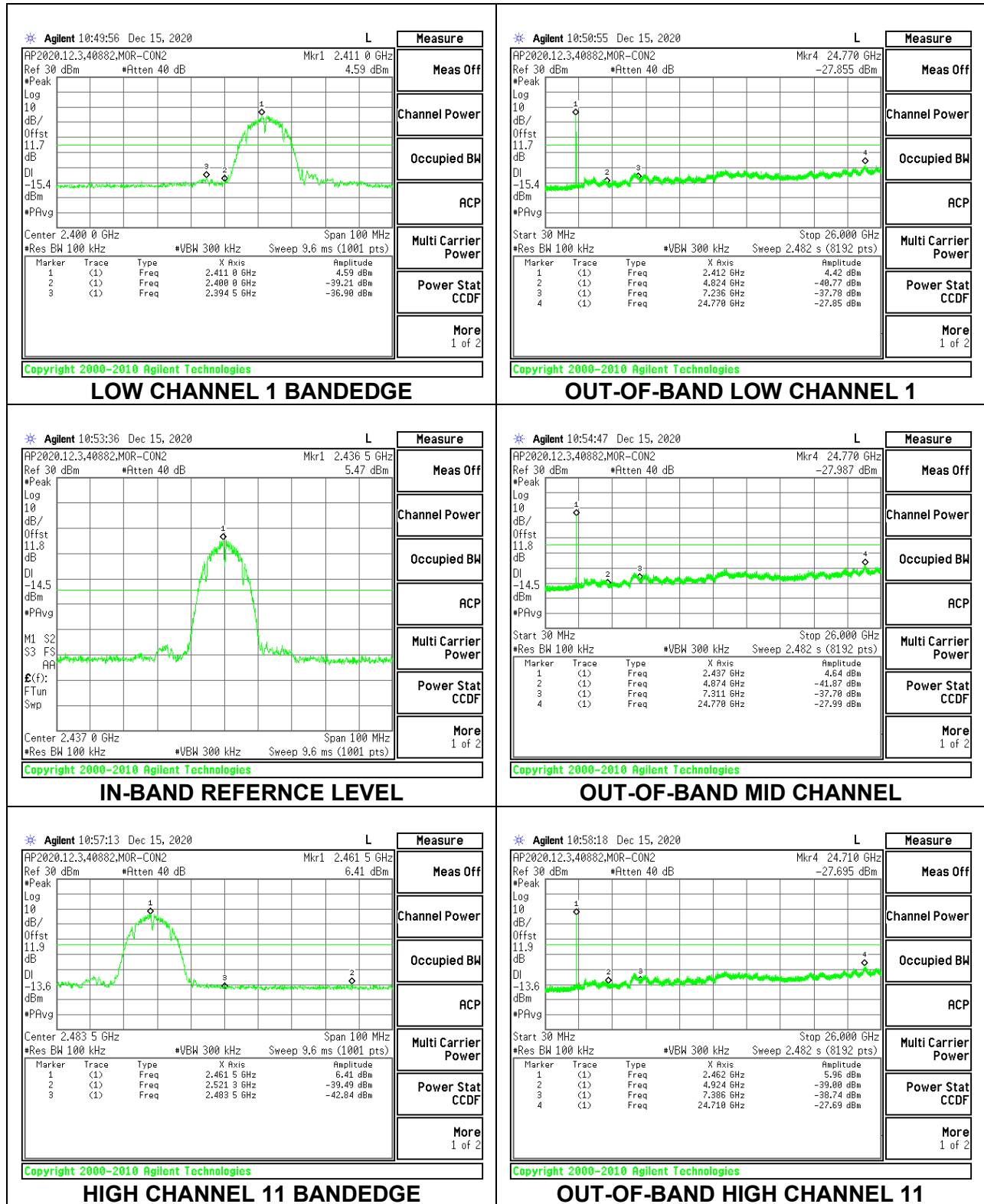
FCC §15.247 (d)

RSS-247 5.5

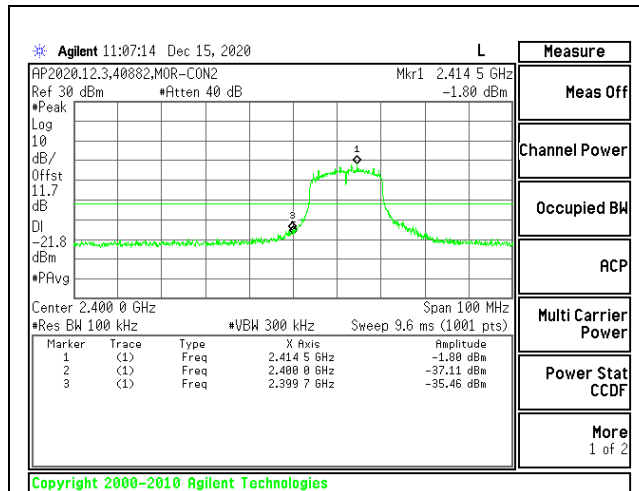
Output power was measured based on the use of peak measurement, therefore the required attenuation is 20 dB.

### **RESULTS**

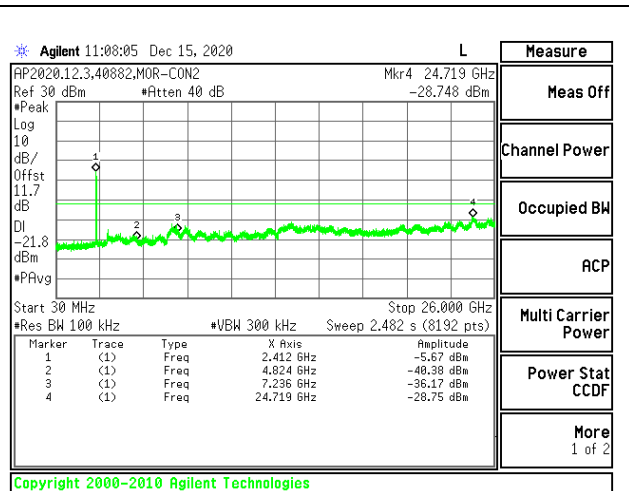
9.7.1. 802.11b MODE



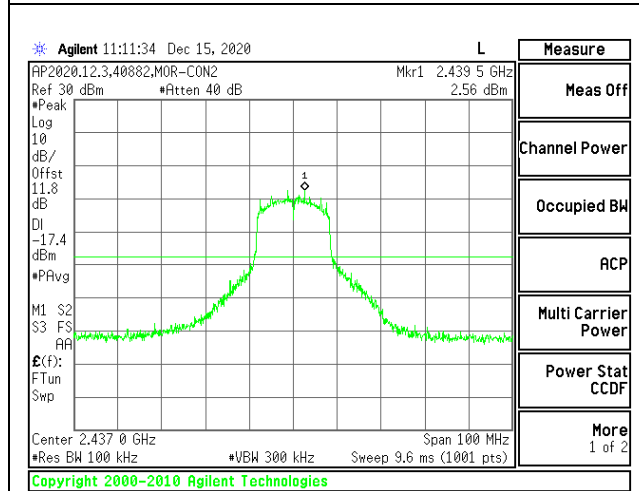
### 9.7.2. 802.11g MODE



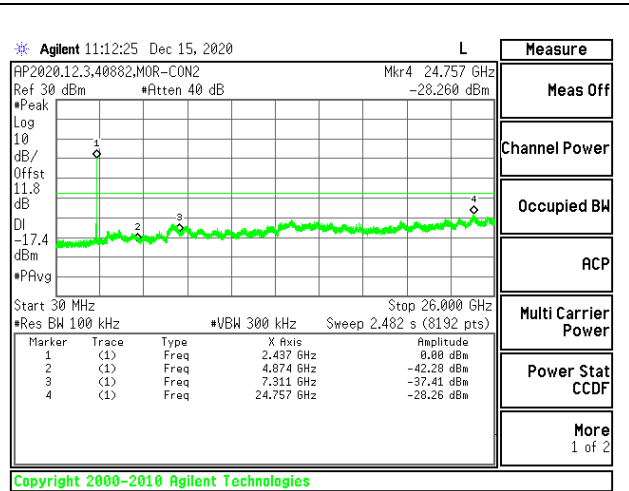
**LOW CHANNEL 1 BANDEDGE**



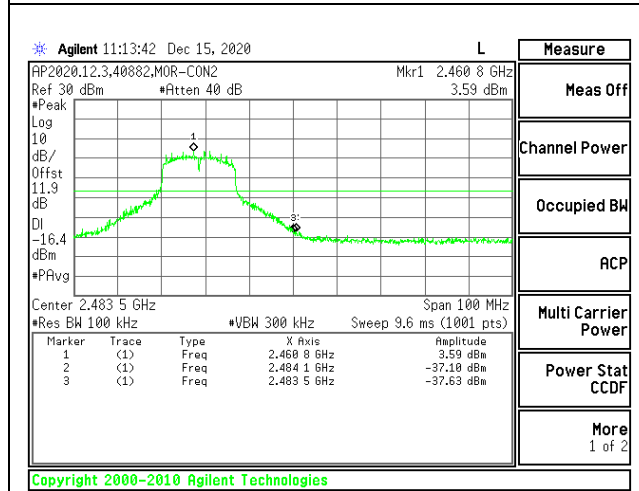
**OUT-OF-BAND LOW CHANNEL 1**



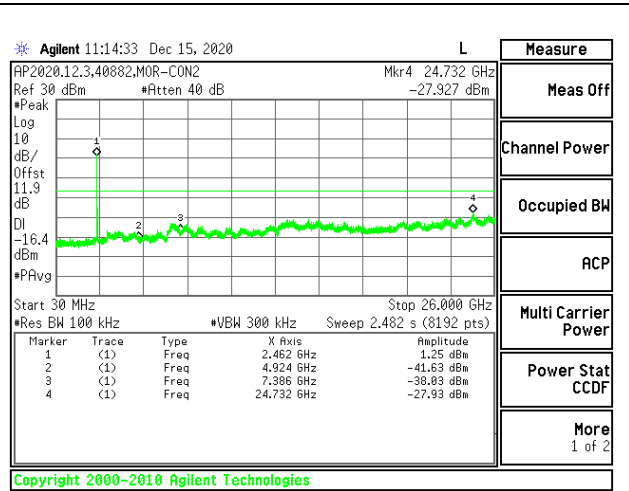
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND MID CHANNEL**

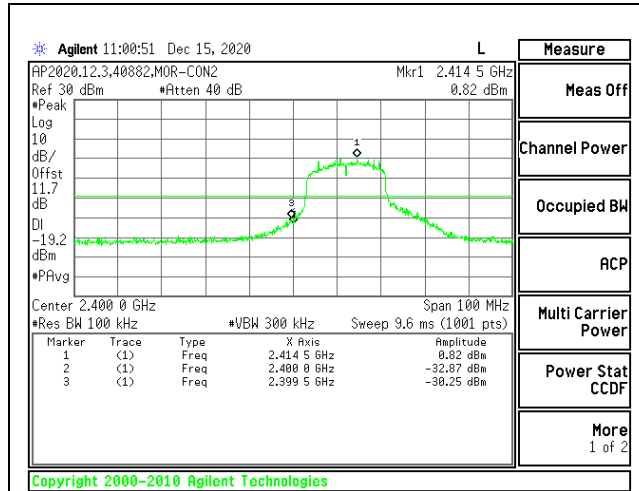


**HIGH CHANNEL 11 BANDEDGE**

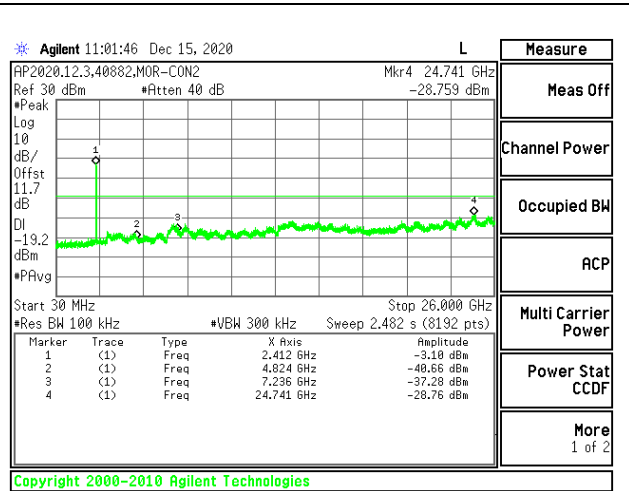


**OUT-OF-BAND HIGH CHANNEL 11**

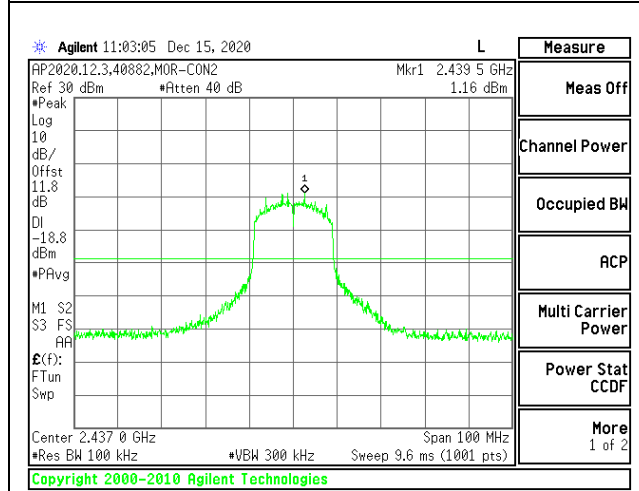
### 9.7.3. 802.11n HT20 MODE



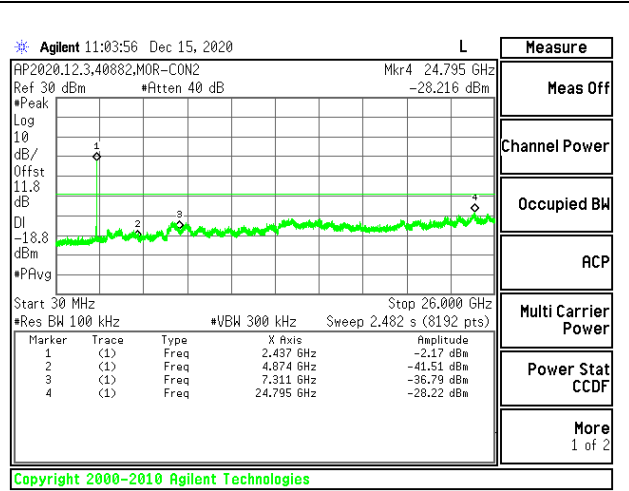
**LOW CHANNEL 1 BANDEDGE**



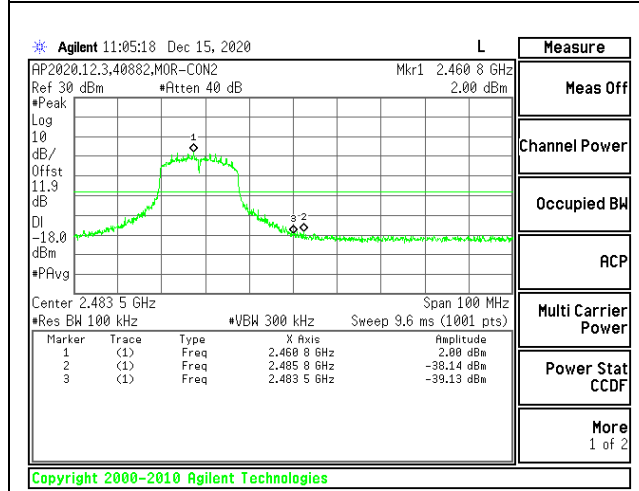
**OUT-OF-BAND LOW CHANNEL 1**



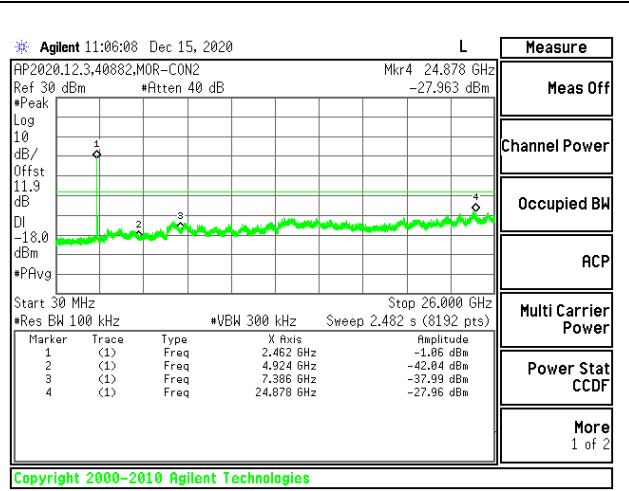
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND MID CHANNEL**



**HIGH CHANNEL 11 BANDEDGE**



**OUT-OF-BAND HIGH CHANNEL 11**



## 10. 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 in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak.

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

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and 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 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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

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

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.

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

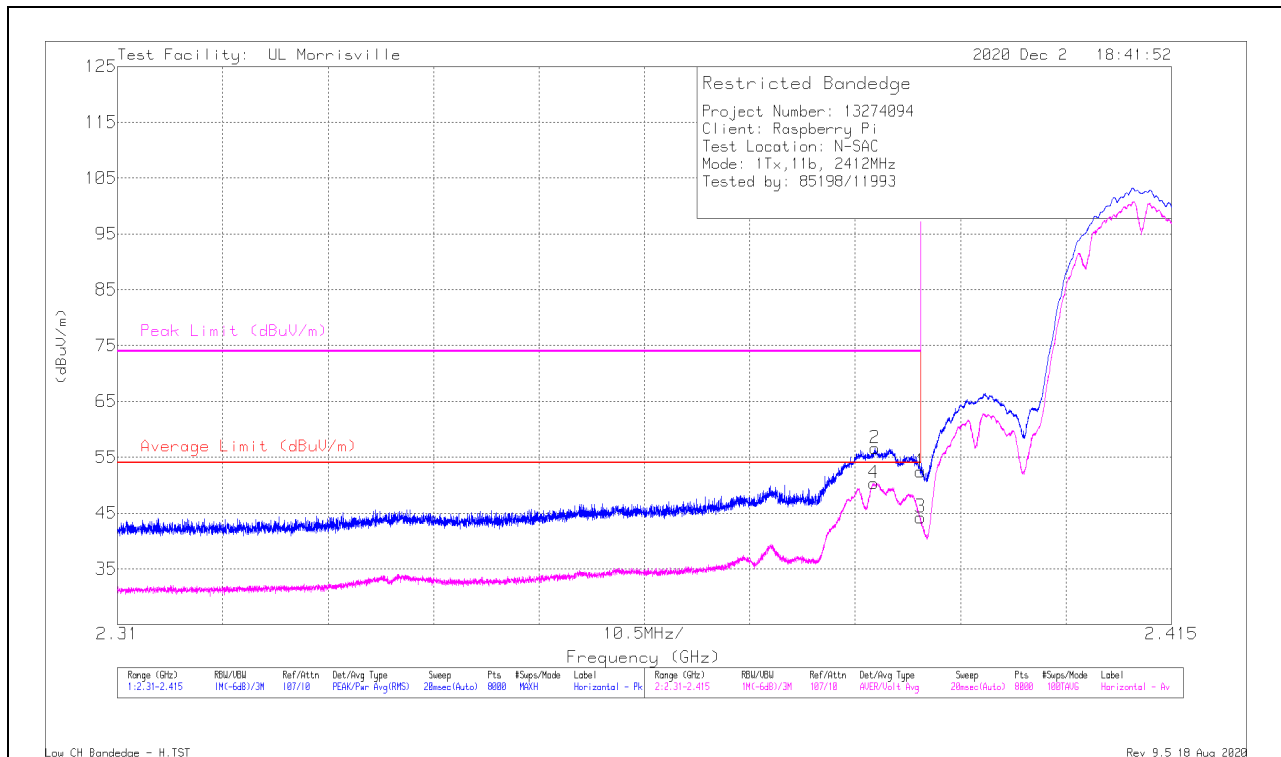
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 10.1. TRANSMITTER ABOVE 1 GHz

### 10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

#### BANDEDGE (LOW CHANNEL, CH 1)

#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	45	Pk	31.8	-24.4	52.4	-	-	74	-21.6	98	268	H
2	* ** 2.38547	49.23	Pk	31.8	-24.4	56.63	-	-	74	-17.37	98	268	H
3	* ** 2.39	36.84	ADV	31.8	-24.4	44.24	54	-9.76	-	-	98	268	H
4	* ** 2.38535	42.95	ADV	31.8	-24.4	50.35	54	-3.65	-	-	98	268	H

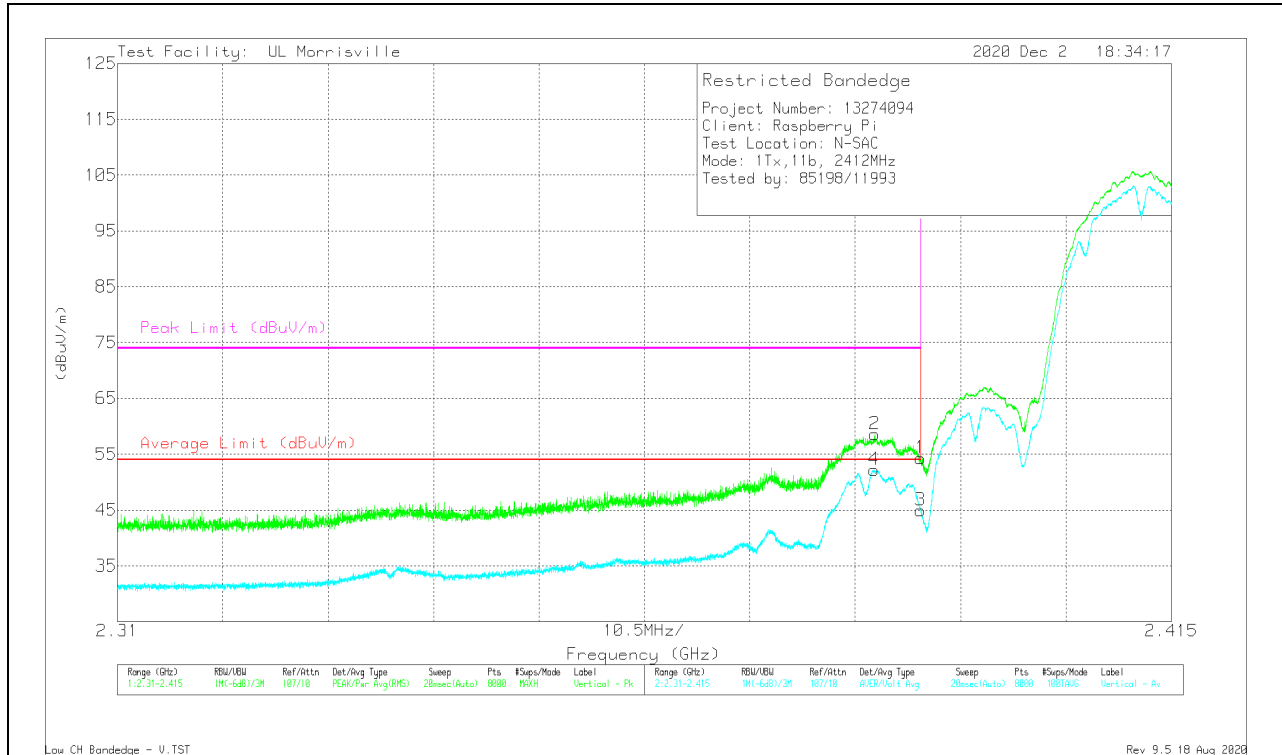
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

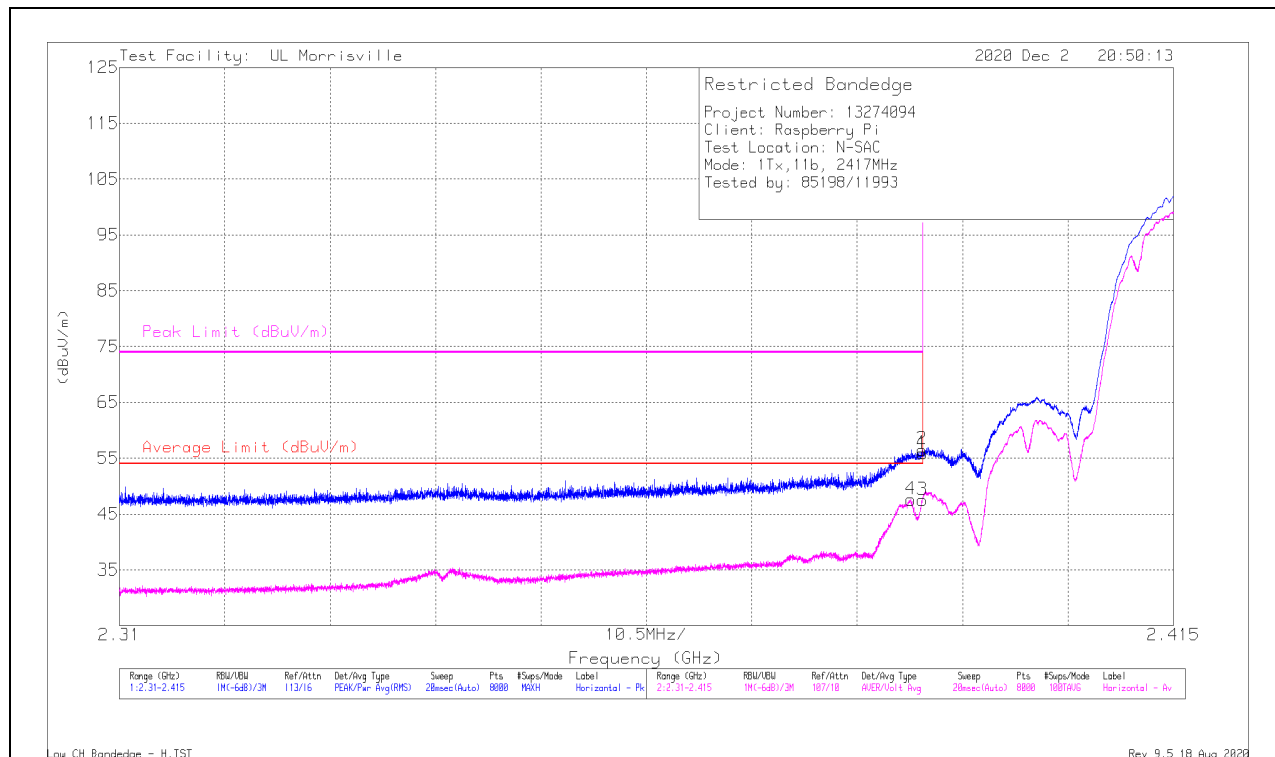


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* * * 2.39	46.9	Pk	31.8	-24.4	54.3	-	-	74	-19.7	319	261	V
2	* * * 2.38544	51.18	Pk	31.8	-24.4	58.58	-	-	74	-15.42	319	261	V
3	* * * 2.39	37.5	ADV	31.8	-24.4	44.9	54	-9.1	-	-	319	261	V
4	* * * 2.38538	44.79	ADV	31.8	-24.4	52.19	54	-1.81	-	-	319	261	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

## BANDEDGE (LOW CHANNEL, CH 2)

### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	48.46	Pk	31.8	-24.4	55.86	-	-	74	-18.14	81	163	H
2	* ** 2.38996	49.15	Pk	31.8	-24.4	56.55	-	-	74	-17.45	81	163	H
3	* ** 2.39	40.08	ADV	31.8	-24.4	47.48	54	-6.52	-	-	81	163	H
4	* ** 2.38881	40.19	ADV	31.8	-24.4	47.59	54	-6.41	-	-	81	163	H

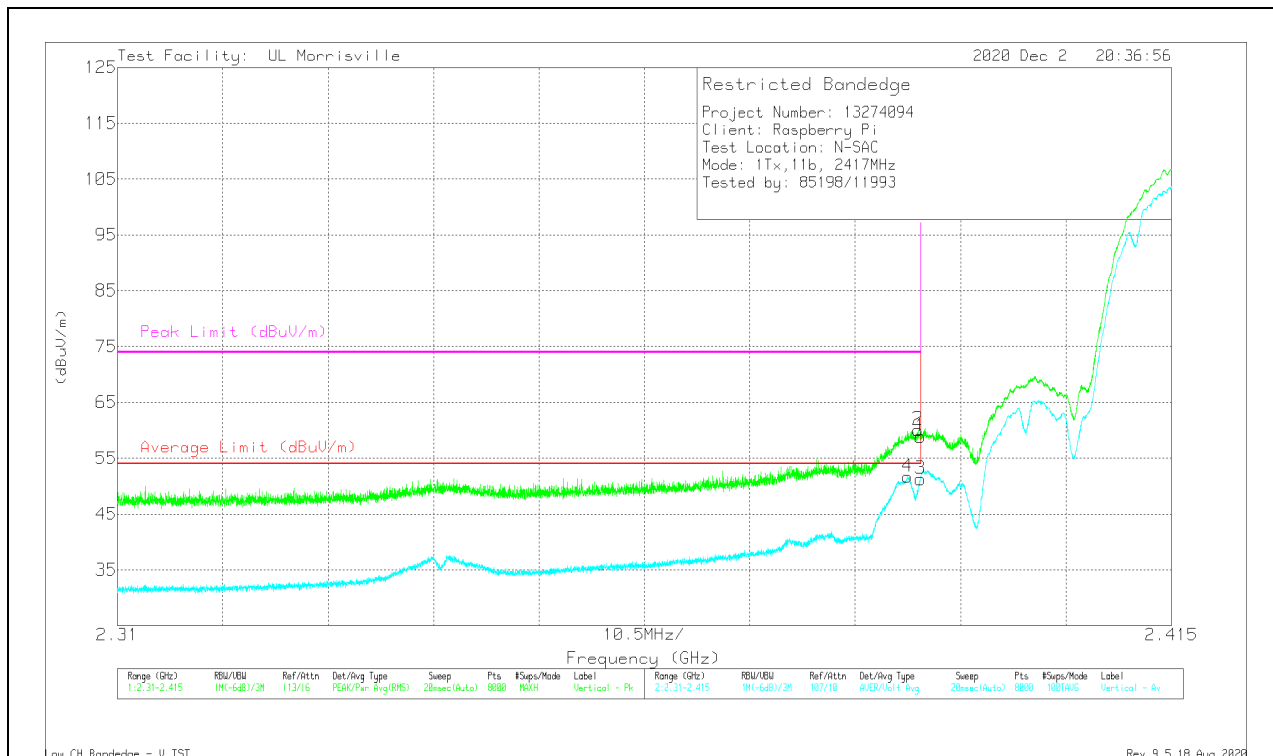
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

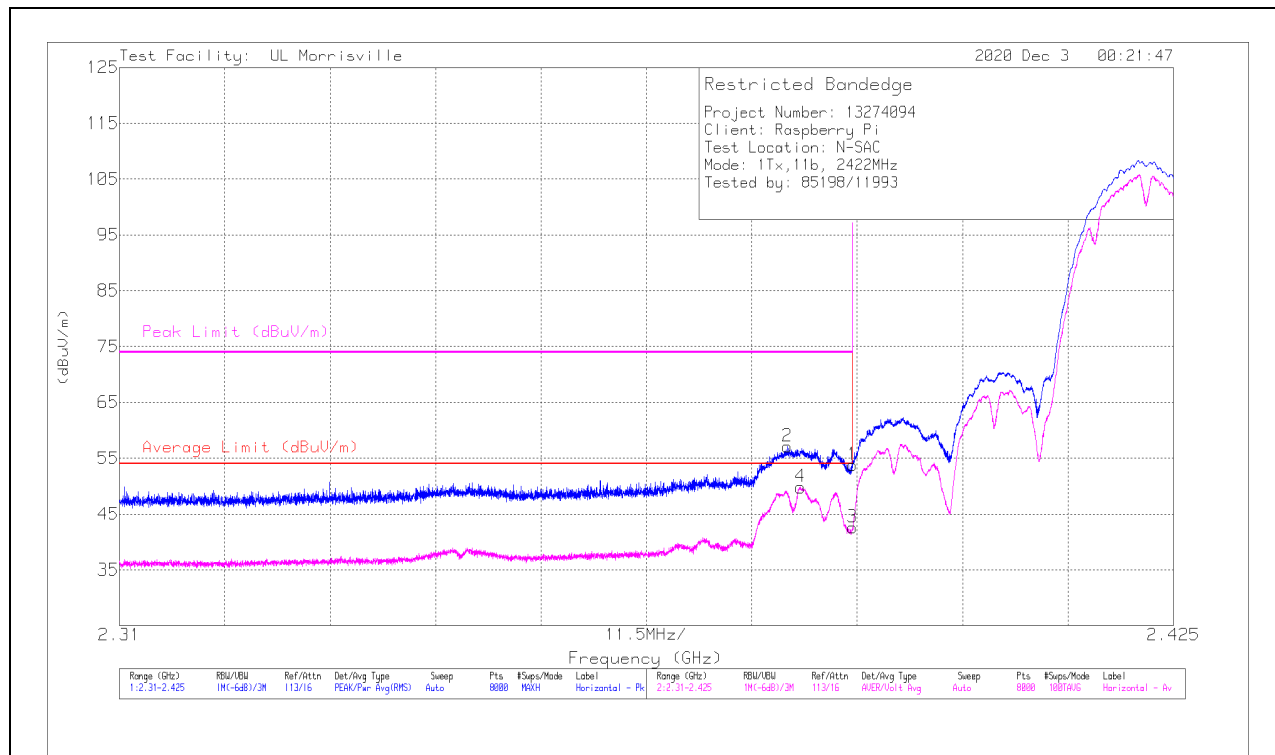


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* * * 2.39	51.5	Pk	31.8	-24.4	58.9	-	-	74	-15.1	356	204	V
2	* * * 2.38975	52.7	Pk	31.8	-24.4	60.1	-	-	74	-13.9	356	204	V
3	* * * 2.39	43.88	ADV	31.8	-24.4	51.28	54	-2.72	-	-	356	204	V
4	* * * 2.38874	44.32	ADV	31.8	-24.4	51.72	54	-2.28	-	-	356	204	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

**BANDEDGE (LOW CHANNEL, CH 3)**

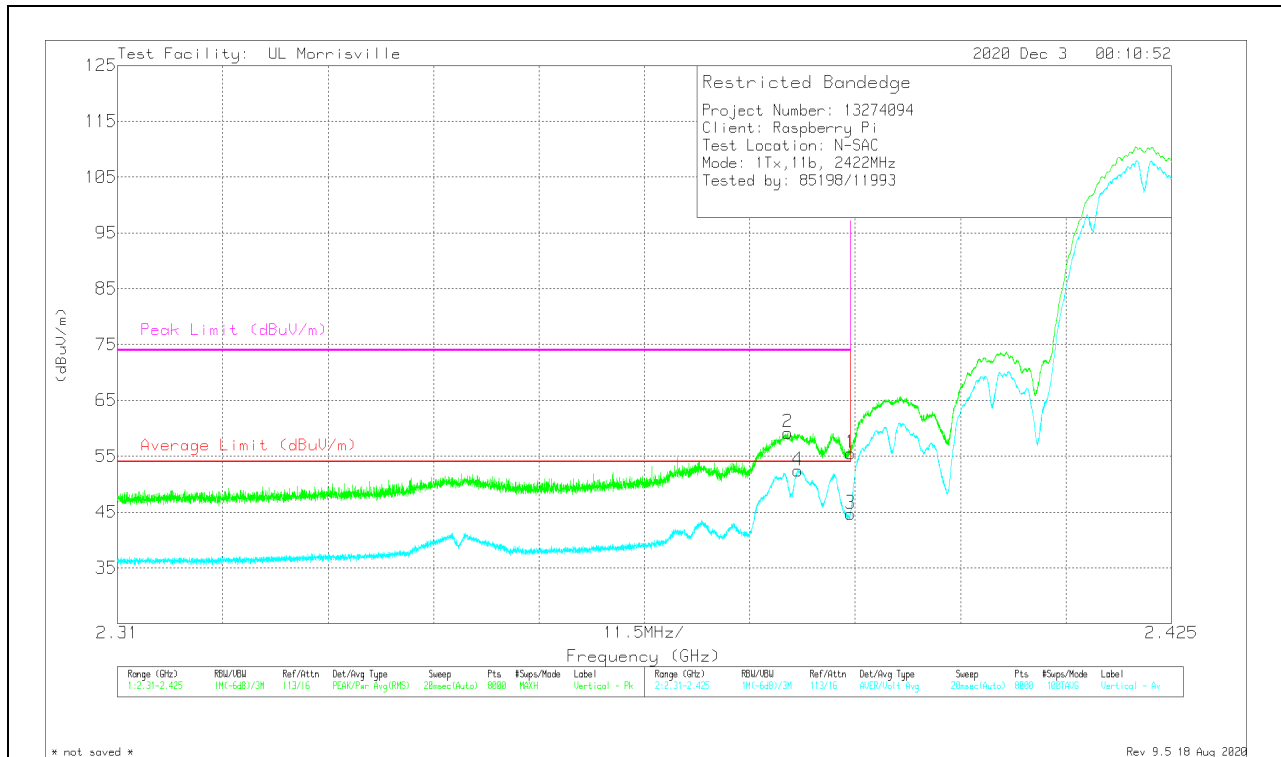
**HORIZONTAL RESULT**



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	46.37	Pk	31.8	-24.4	53.77	-	-	74	-20.23	132	124	H
2	* ** 2.38288	49.73	Pk	31.8	-24.4	57.13	-	-	74	-16.87	132	124	H
3	* ** 2.38999	35.17	ADV	31.8	-24.4	42.57	54	-11.43	-	-	132	124	H
4	* ** 2.38429	42.4	ADV	31.8	-24.4	49.8	54	-4.2	-	-	132	124	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

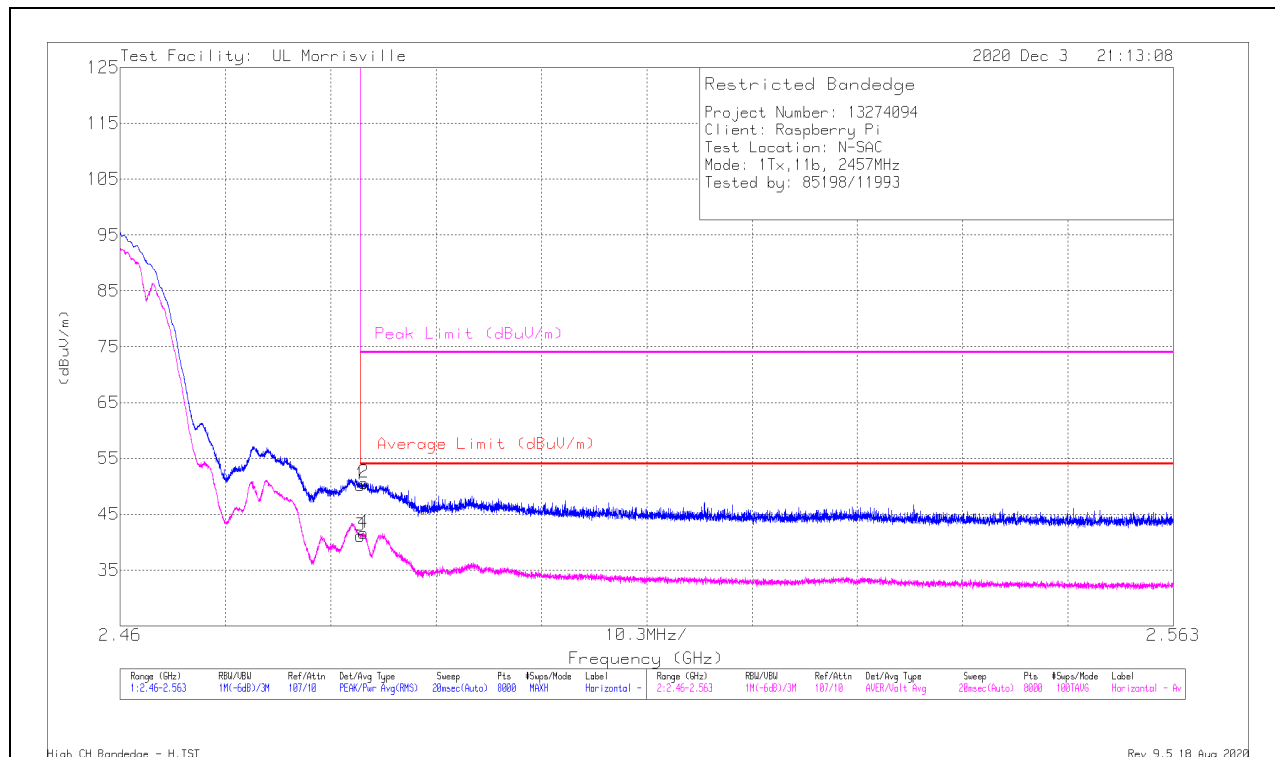


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	48.17	Pk	31.8	-24.4	55.57	-	-	74	-18.43	344	109	V
2	* ** 2.38315	51.85	Pk	31.8	-24.4	59.25	-	-	74	-14.75	344	109	V
3	* ** 2.38999	37.33	ADV	31.8	-24.4	44.73	54	-9.27	-	-	344	109	V
4	* ** 2.38426	45.08	ADV	31.8	-24.4	52.48	54	-1.52	-	-	344	109	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### BANDEDGE (HIGH CHANNEL, CH 10)

### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	42.15	Pk	32.4	-24.3	50.25	-	-	74	-23.75	86	161	H
2	* ** 2.48387	42.52	Pk	32.4	-24.3	50.62	-	-	74	-23.38	86	161	H
3	* ** 2.4835	33.05	ADV	32.4	-24.3	41.15	54	-12.85	-	-	86	161	H
4	* ** 2.4838	33.55	ADV	32.4	-24.3	41.65	54	-12.35	-	-	86	161	H

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

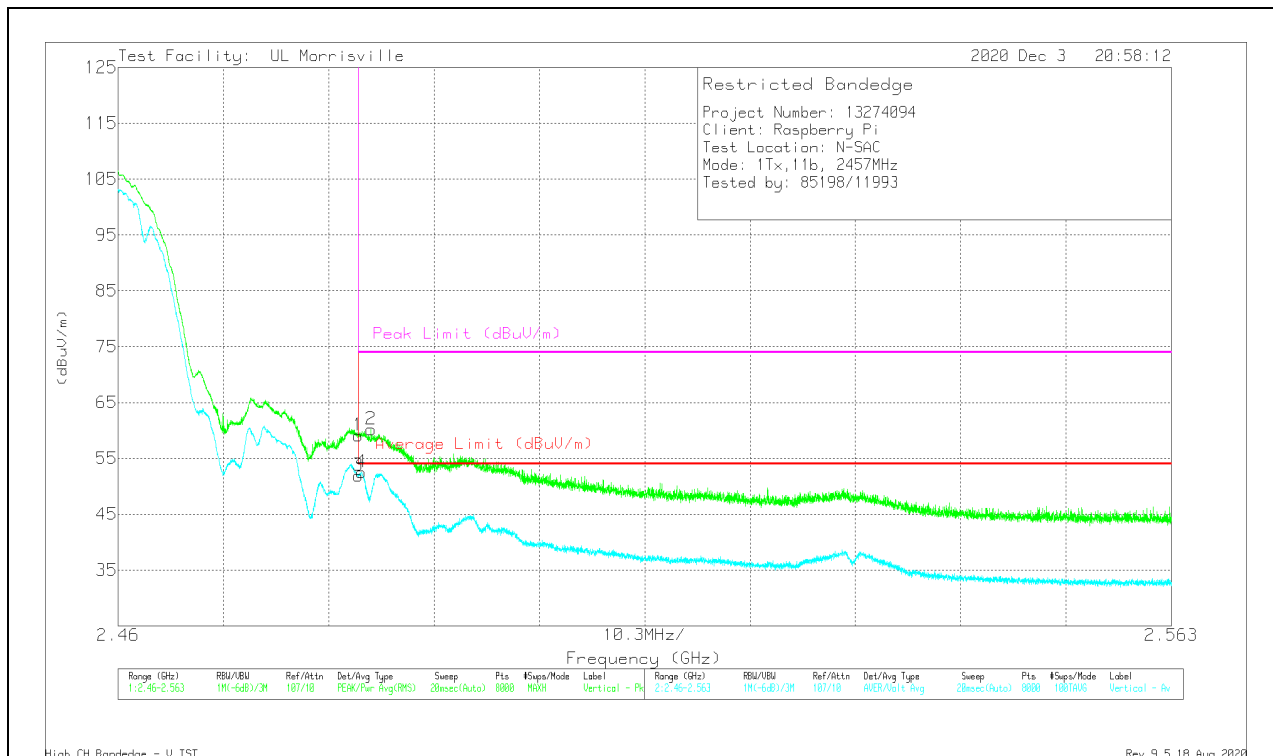
\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average



### VERTICAL RESULT

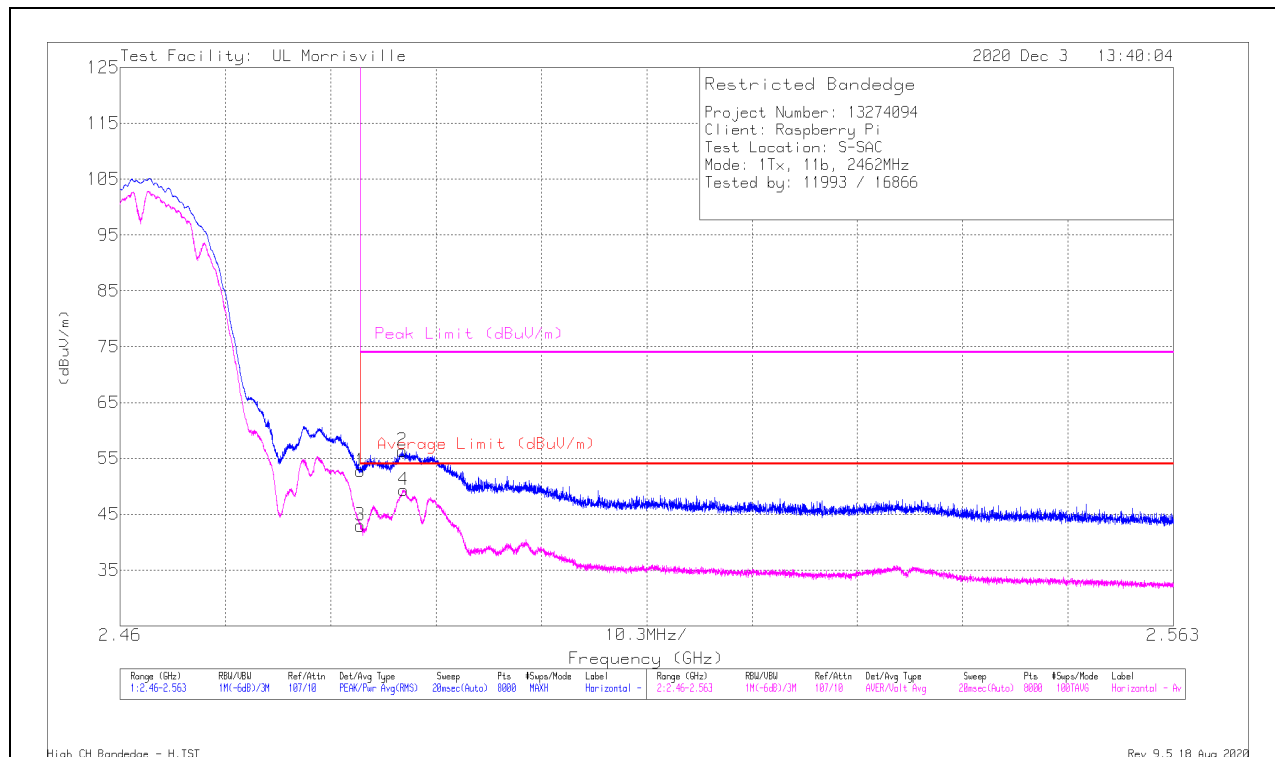


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	50.98	Pk	32.4	-24.3	59.08	-	-	74	-14.92	123	145	V
2	* ** 2.48474	51.96	Pk	32.5	-24.3	60.16	-	-	74	-13.84	123	145	V
3	* ** 2.4835	43.78	ADV	32.4	-24.3	51.88	54	-2.12	-	-	123	145	V
4	* ** 2.4838	44.39	ADV	32.4	-24.3	52.49	54	-1.51	-	-	123	145	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### BANDEDGE (HIGH CHANNEL, CH 11)

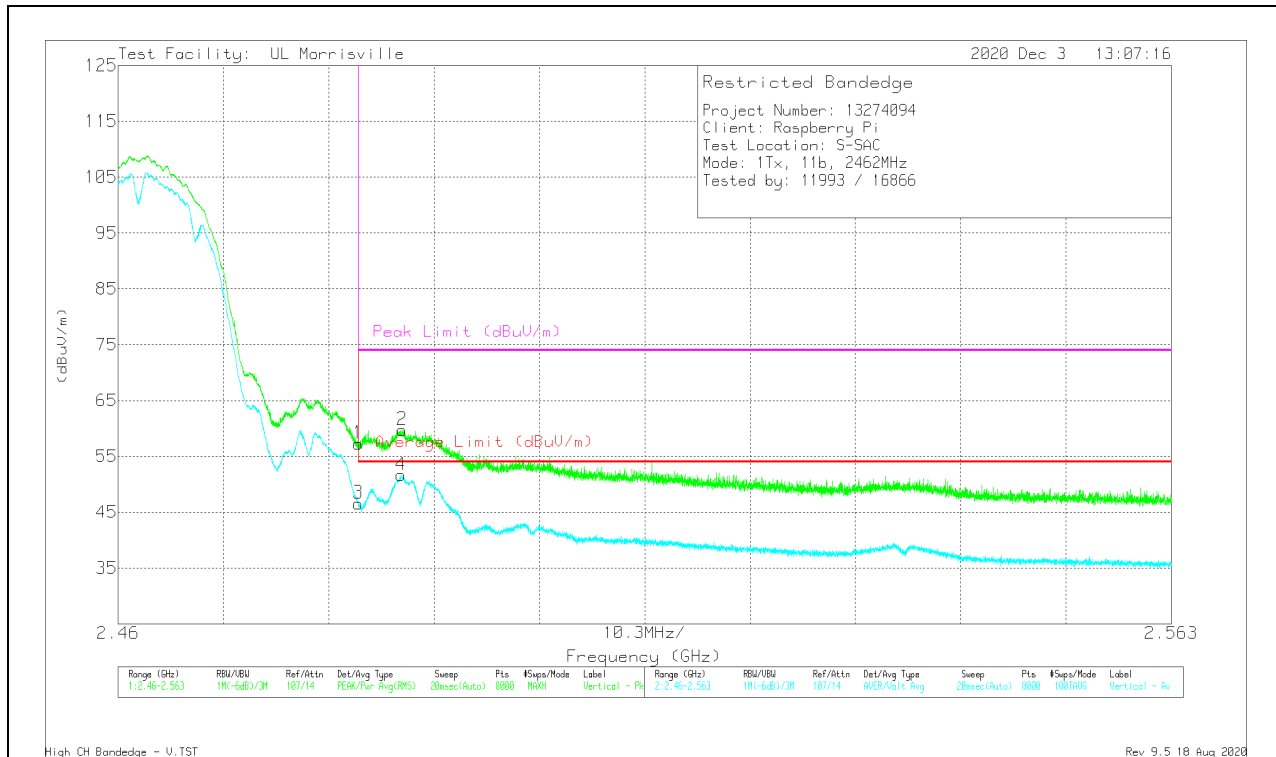
### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	44.73	Pk	32.4	-24.4	52.73	-	-	74	-21.27	208	199	H
2	* ** 2.48761	48.56	Pk	32.4	-24.6	56.36	-	-	74	-17.64	208	199	H
3	* ** 2.4835	34.97	ADV	32.4	-24.4	42.97	54	-11.03	-	-	208	198	H
4	* ** 2.48772	41.54	ADV	32.4	-24.6	49.34	54	-4.66	-	-	208	198	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

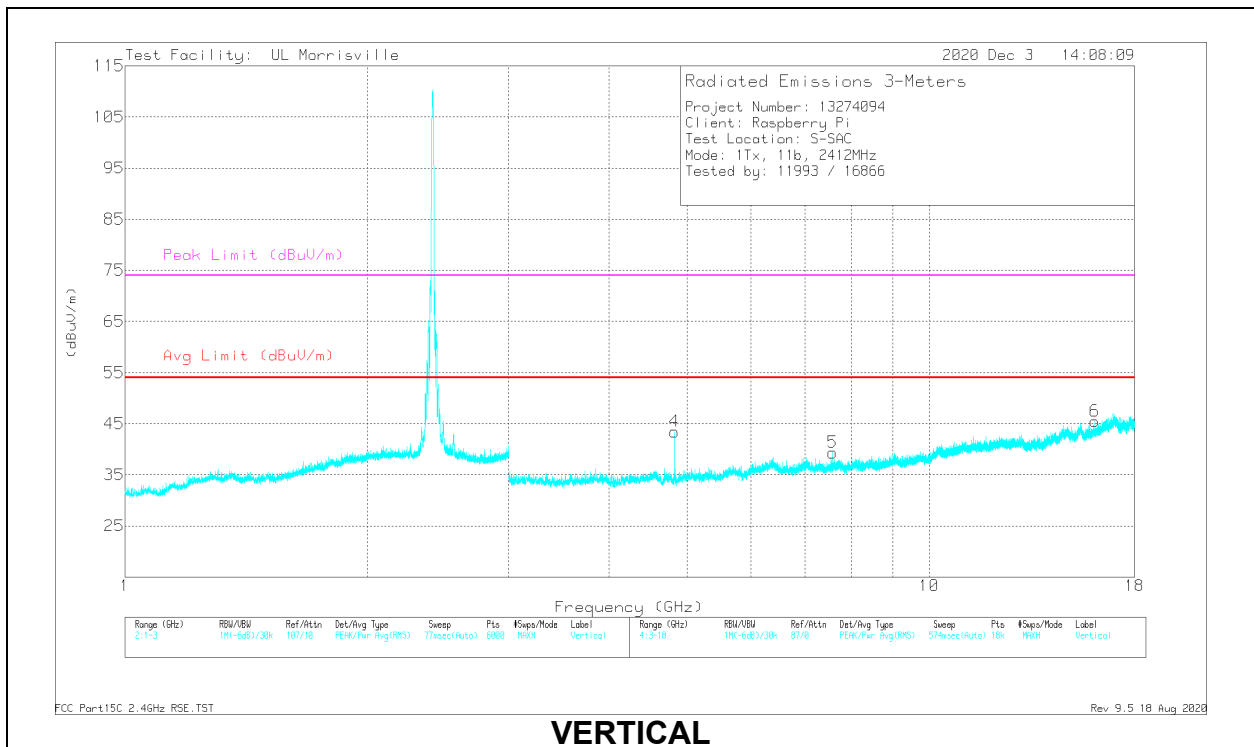
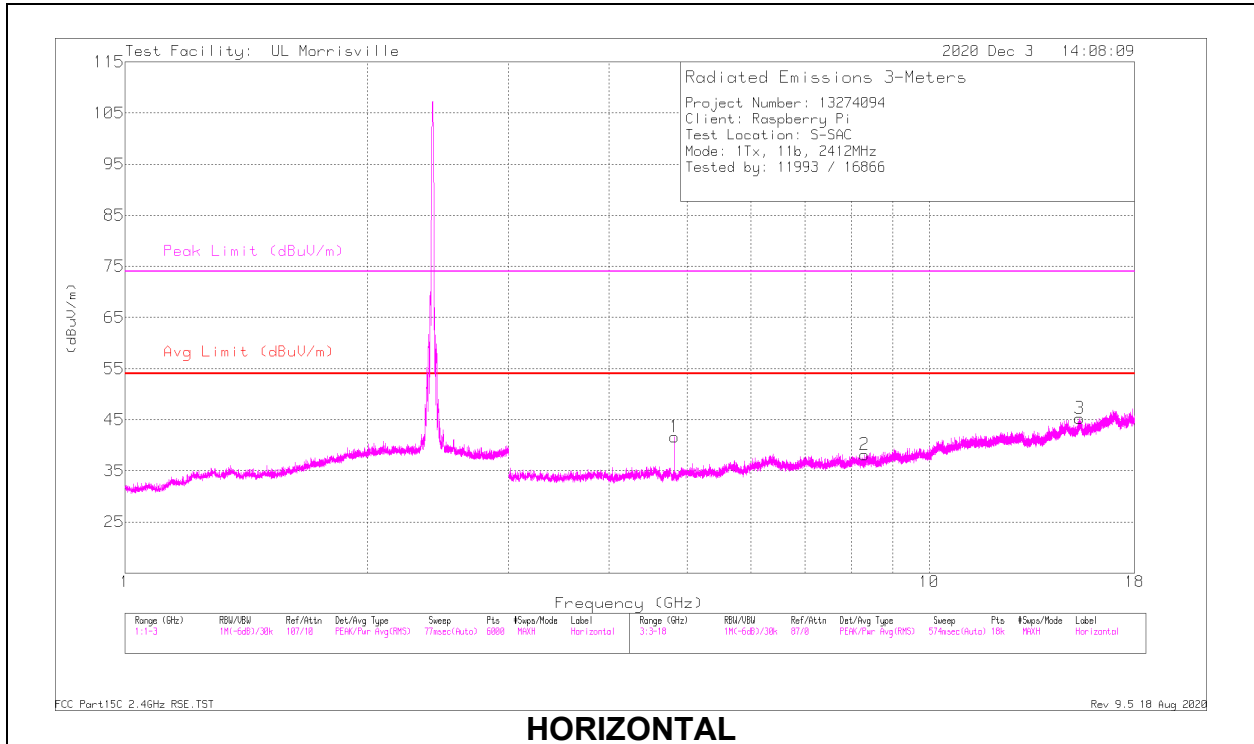


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	49.31	Pk	32.4	-24.4	57.31	-	-	74	-16.69	20	113	V
2	*** 2.48776	51.92	Pk	32.4	-24.6	59.72	-	-	74	-14.28	20	113	V
3	*** 2.4835	38.59	ADV	32.4	-24.4	46.59	54	-7.41	-	-	20	113	V
4	*** 2.48766	43.84	ADV	32.4	-24.6	51.64	54	-2.36	-	-	20	113	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL, CH 1 RESULTS



**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 4.82405	42.54	PK2	34	-30.8	45.74	-	-	74	-28.26	49	114	H
	*** 4.82399	37.05	ADV	34	-30.8	40.25	54	-13.75	-	-	49	114	H
2	*** 8.30748	35.95	PK2	35.8	-27.4	44.35	-	-	74	-29.65	229	144	H
	*** 8.30191	22.74	ADV	35.8	-27.5	31.04	54	-22.96	-	-	229	144	H
3	*** 15.35342	33.45	PK2	40.3	-22.9	50.85	-	-	74	-23.15	0	375	H
	*** 15.35914	20.62	ADV	40.3	-22.8	38.12	54	-15.88	-	-	0	375	H
4	*** 4.82414	44.43	PK2	34	-30.8	47.63	-	-	74	-26.37	345	114	V
	*** 4.82405	39.54	ADV	34	-30.8	42.74	54	-11.26	-	-	345	114	V
5	*** 7.5842	36.54	PK2	35.7	-27.5	44.74	-	-	74	-29.26	154	172	V
	*** 7.58833	22.9	ADV	35.7	-27.6	31	54	-23	-	-	154	172	V
6	*** 16.05619	34.1	PK2	40.5	-24.6	50	-	-	74	-24	342	393	V
	*** 16.05479	22.1	ADV	40.5	-24.6	38	54	-16	-	-	342	393	V

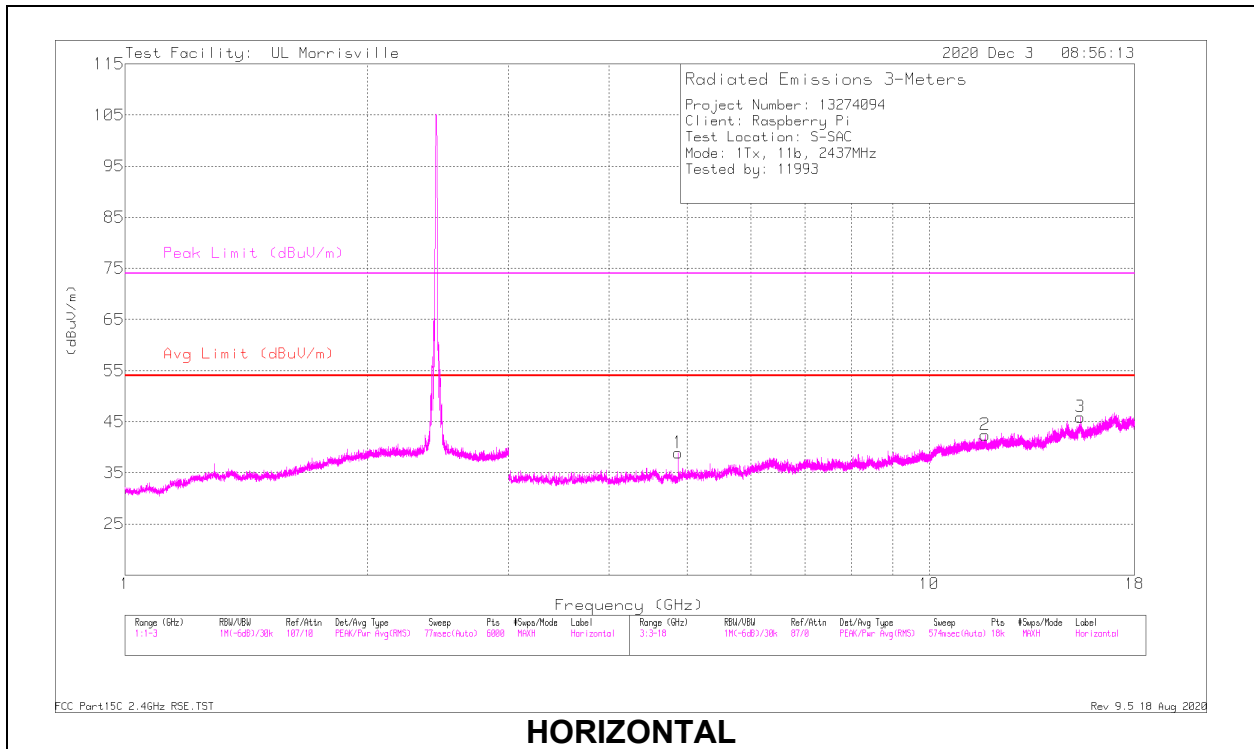
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

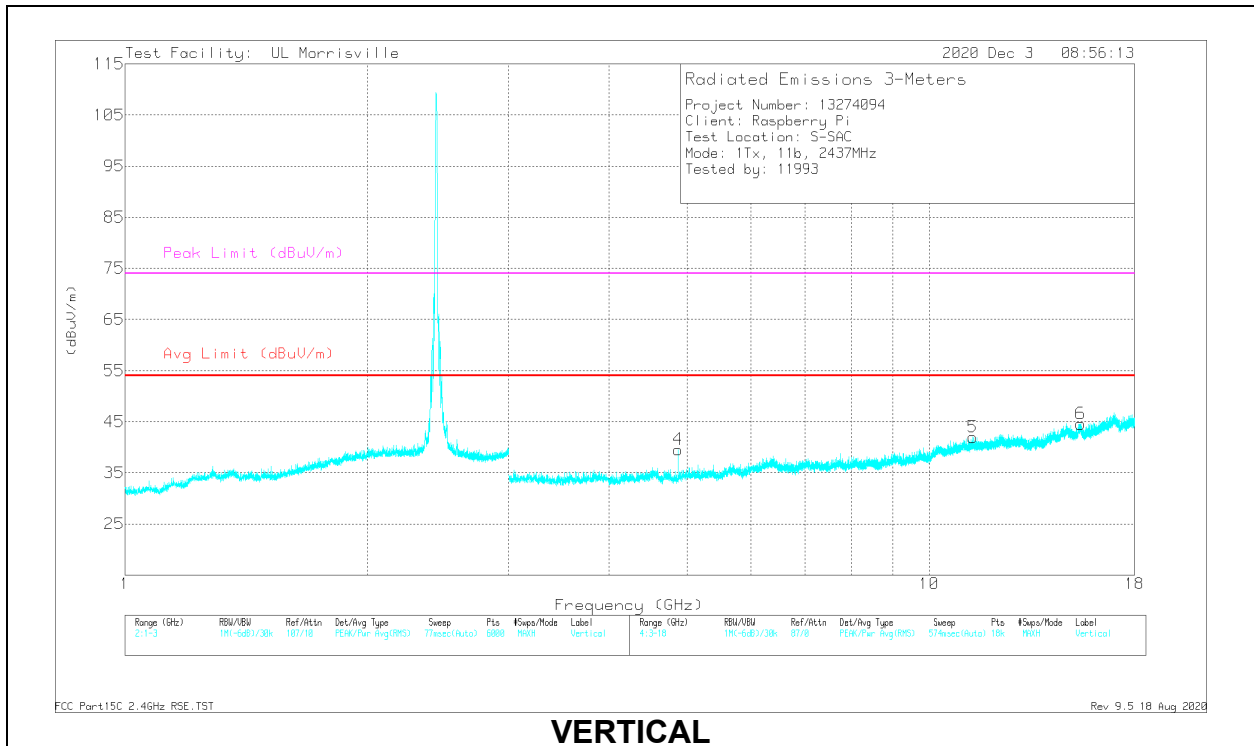
PK2 - Maximum Peak

ADV - Linear Voltage Average

### MID CHANNEL, CH 6 RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.87404	41.54	PK2	34	-30.9	44.64	-	-	74	-29.36	37	137	H
	* ** 4.87397	34.66	ADV	34	-30.9	37.76	54	-16.24	-	-	37	137	H
2	* ** 11.73394	32.75	PK2	38.5	-24.1	47.15	-	-	74	-26.85	37	199	H
	* ** 11.73496	21.55	ADV	38.5	-24.1	35.95	54	-18.05	-	-	37	199	H
3	* ** 15.42108	32.54	PK2	40.3	-21.9	50.94	-	-	74	-23.06	112	285	H
	* ** 15.41979	20.09	ADV	40.3	-21.9	38.49	54	-15.51	-	-	112	285	H
4	* ** 4.87396	41.27	PK2	34	-30.9	44.37	-	-	74	-29.63	324	106	V
	* ** 4.874	34.89	ADV	34	-30.9	37.99	54	-16.01	-	-	324	106	V
6	* ** 15.42863	32.17	PK2	40.3	-21.9	50.57	-	-	74	-23.43	86	393	V
	* ** 15.42903	20.02	ADV	40.3	-21.9	38.42	54	-15.58	-	-	86	393	V
5	* ** 11.32454	32.48	PK2	38.1	-23.1	47.48	-	-	74	-26.52	57	149	V
	* ** 11.32418	20.11	ADV	38.1	-23.1	35.11	54	-18.89	-	-	57	149	V

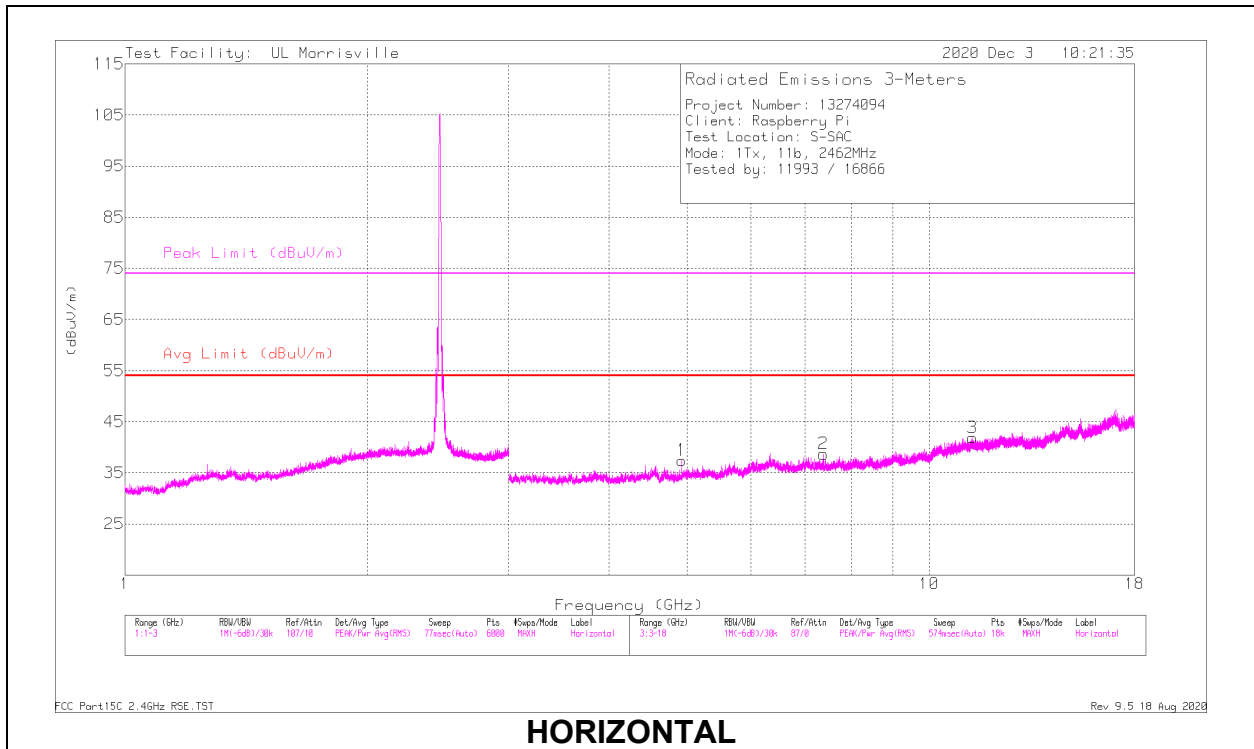
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

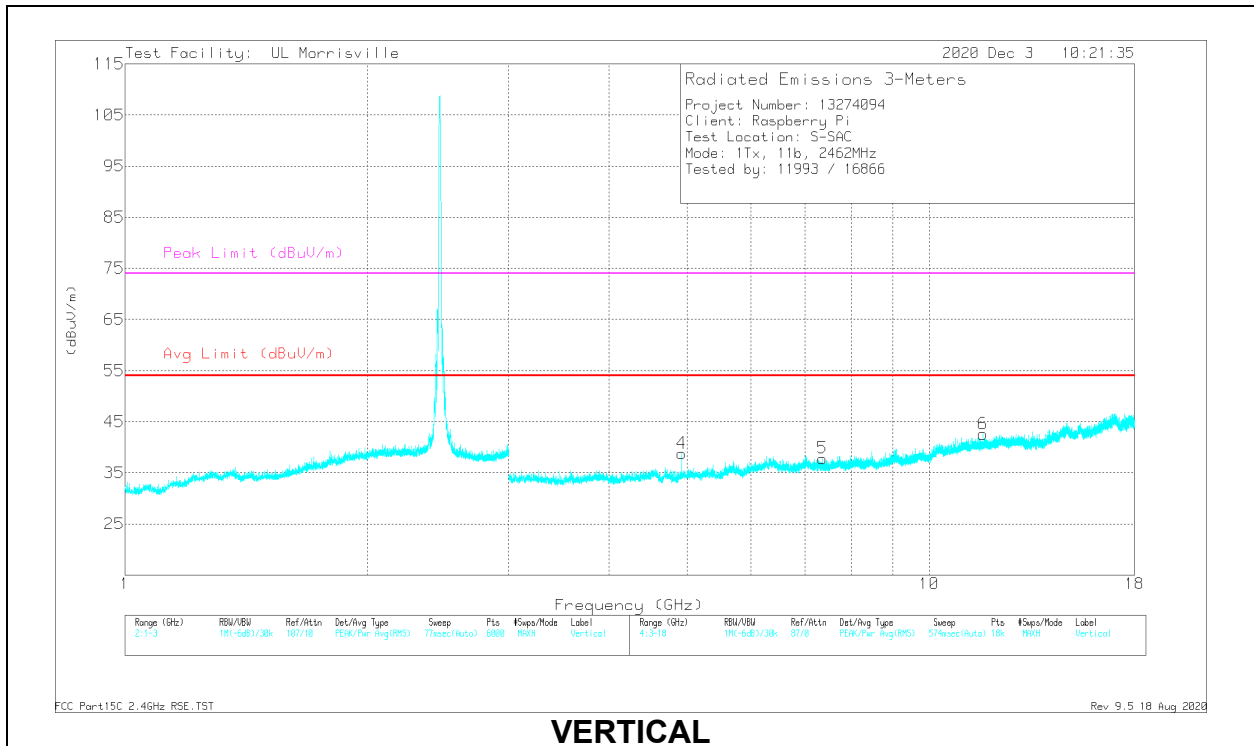
PK2 - Maximum Peak

ADV - Linear Voltage Average

### HIGH CHANNEL, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**



**RADIATED EMISSIONS**

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.92396	40.11	PK2	33.9	-30.9	43.11	-	-	74	-30.89	45	112	H
	* ** 4.92405	31.41	ADV	33.9	-30.9	34.41	54	-19.59	-	-	45	112	H
2	* ** 7.38608	36.4	PK2	35.6	-27.5	44.5	-	-	74	-29.5	262	222	H
	* ** 7.38603	25.61	ADV	35.6	-27.5	33.71	54	-20.29	-	-	262	222	H
3	* ** 11.30454	32.53	PK2	38.1	-23.1	47.53	-	-	74	-26.47	12	239	H
	* ** 11.30625	20.11	ADV	38.1	-23.1	35.11	54	-18.89	-	-	12	239	H
4	* ** 4.92392	41.38	PK2	33.9	-30.9	44.38	-	-	74	-29.62	340	201	V
	* ** 4.92404	34.08	ADV	33.9	-30.9	37.08	54	-16.92	-	-	340	201	V
5	* ** 7.36351	34.78	PK2	35.6	-27.3	43.08	-	-	74	-30.92	290	136	V
	* ** 7.36339	22.51	ADV	35.6	-27.3	30.81	54	-23.19	-	-	290	136	V
6	* ** 11.66411	33.9	PK2	38.4	-24.5	47.8	-	-	74	-26.2	327	246	V
	* ** 11.66418	21.05	ADV	38.4	-24.5	34.95	54	-19.05	-	-	327	246	V

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

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

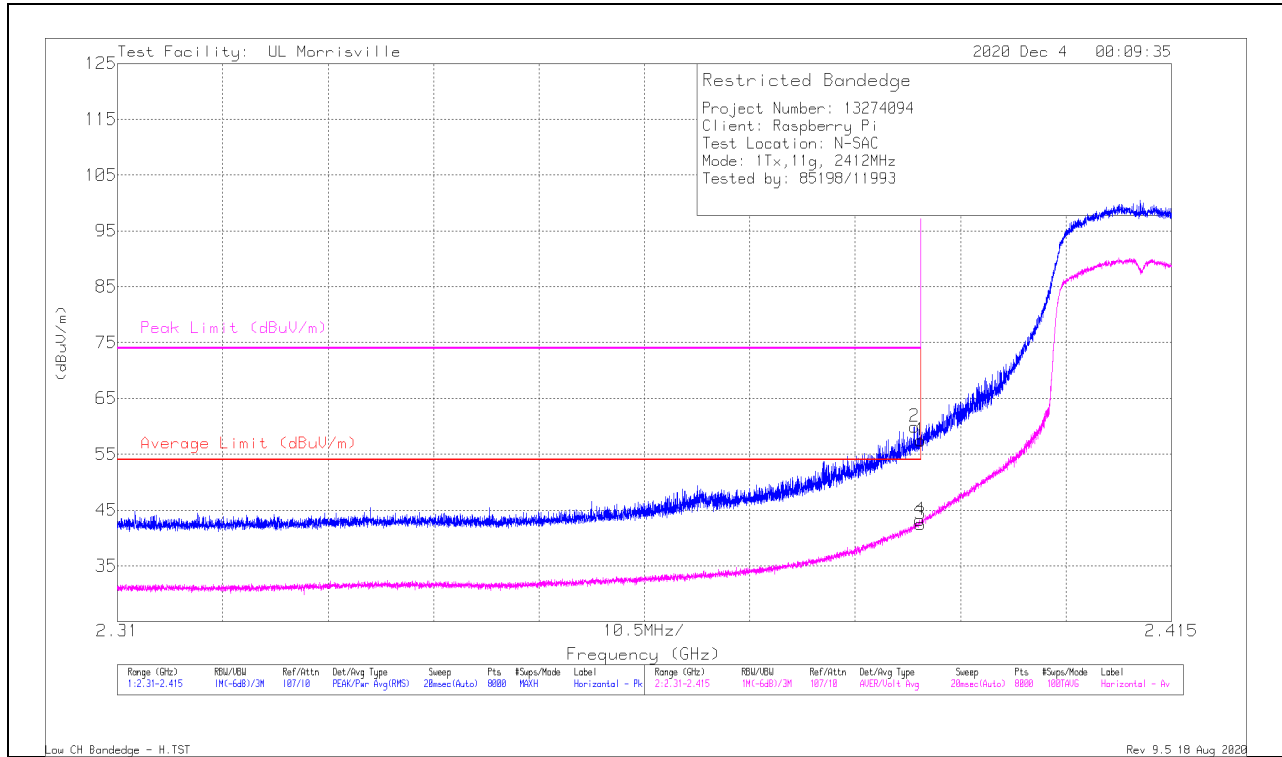
PK2 - Maximum Peak

ADV - Linear Voltage Average

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

#### BANDEDGE (LOW CHANNEL, CH 1)

#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/(m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	50.09	Pk	31.8	-24.4	57.49	-	-	74	-16.51	346	103	H
2	* ** 2.38938	52.5	PK	31.8	-24.4	59.9	-	-	74	-14.1	346	103	H
3	* ** 2.39	35.05	ADV	31.8	-24.4	42.45	54	-11.55	-	-	346	103	H
4	* ** 2.38993	35.83	ADV	31.8	-24.4	43.23	54	-10.77	-	-	346	103	H

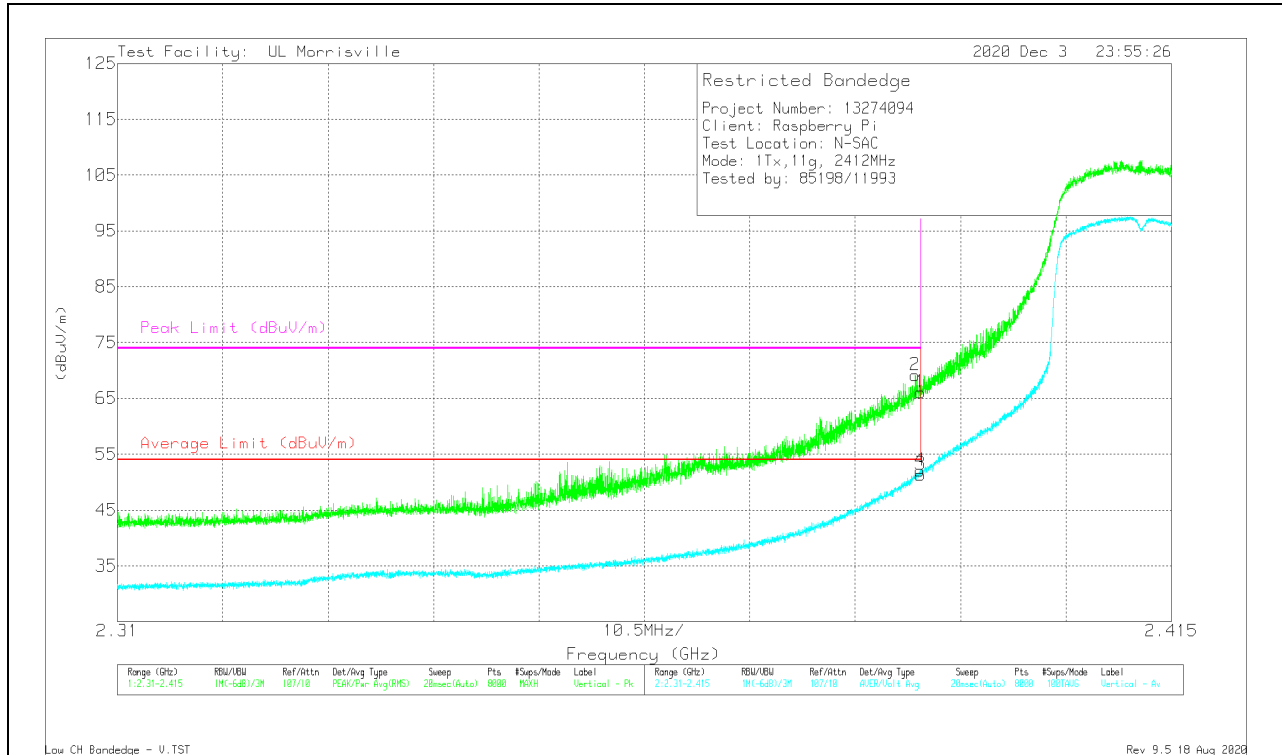
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

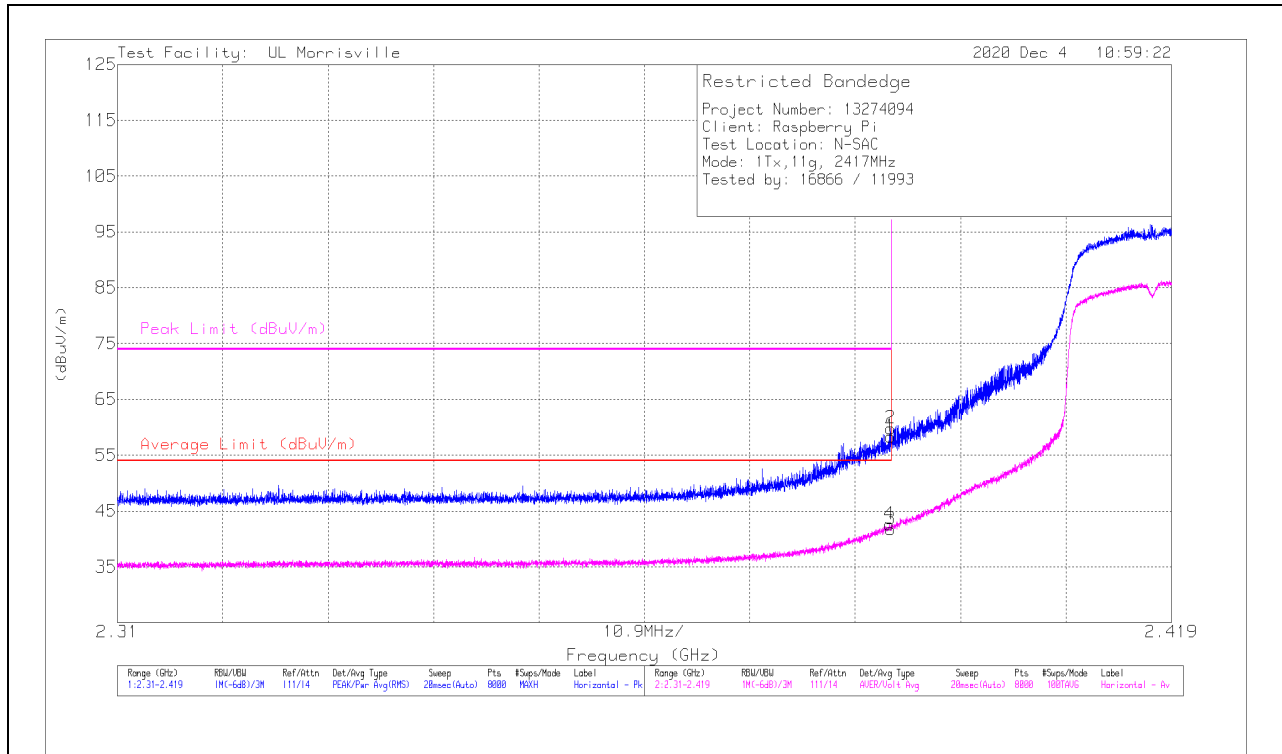


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	58.66	Pk	31.8	-24.4	66.06	-	-	74	-7.94	17	103	V
2	* ** 2.38944	61.74	Pk	31.8	-24.4	69.14	-	-	74	-4.86	17	103	V
3	* ** 2.39	43.98	ADV	31.8	-24.4	51.38	54	-2.62	-	-	17	103	V
4	* ** 2.38997	44.63	ADV	31.8	-24.4	52.03	54	-1.97	-	-	17	103	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

**BANDEDGE (LOW CHANNEL, CH 2)**

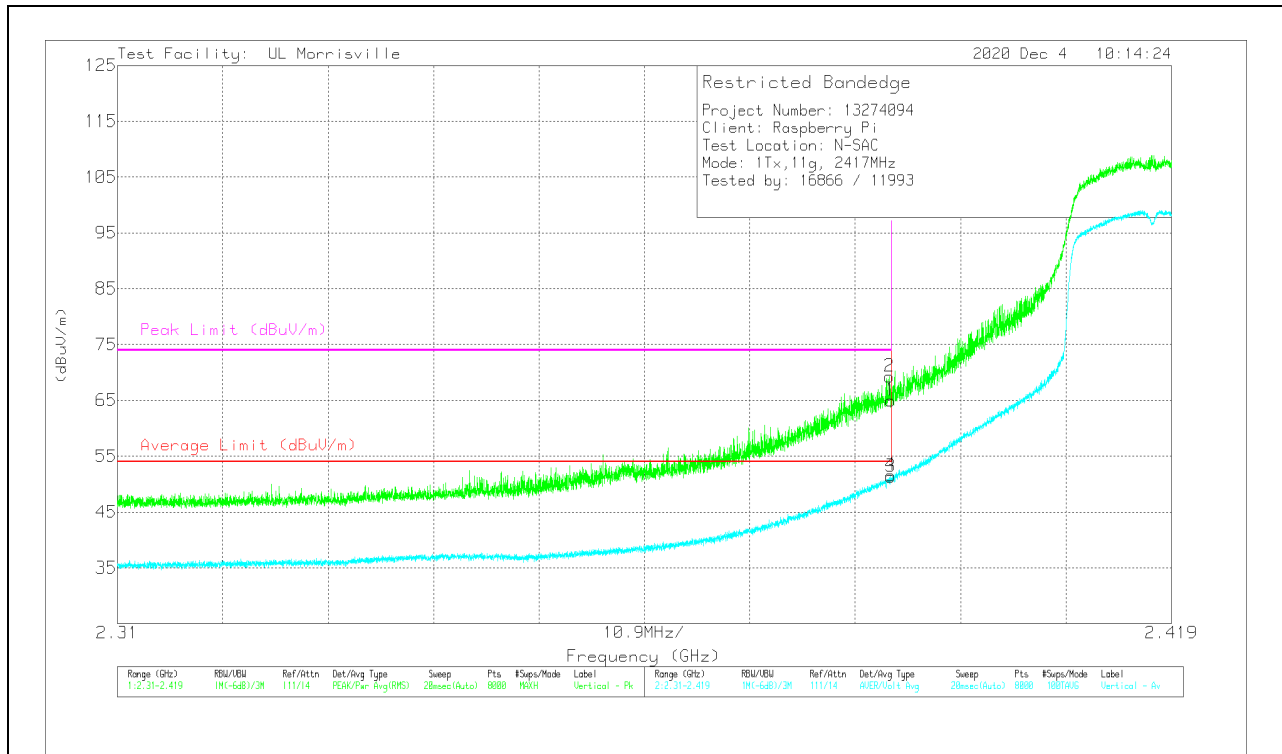
**HORIZONTAL RESULT**



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	50.24	Pk	32.1	-24	58.34	-	-	74	-15.66	262	291	H
2	* ** 2.38995	51.71	Pk	32.1	-24	59.81	-	-	74	-14.19	262	291	H
3	* ** 2.38999	33.62	ADV	32.1	-24	41.72	54	-12.28	-	-	262	291	H
4	* ** 2.38985	34.49	ADV	32.1	-24	42.59	54	-11.41	-	-	262	291	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

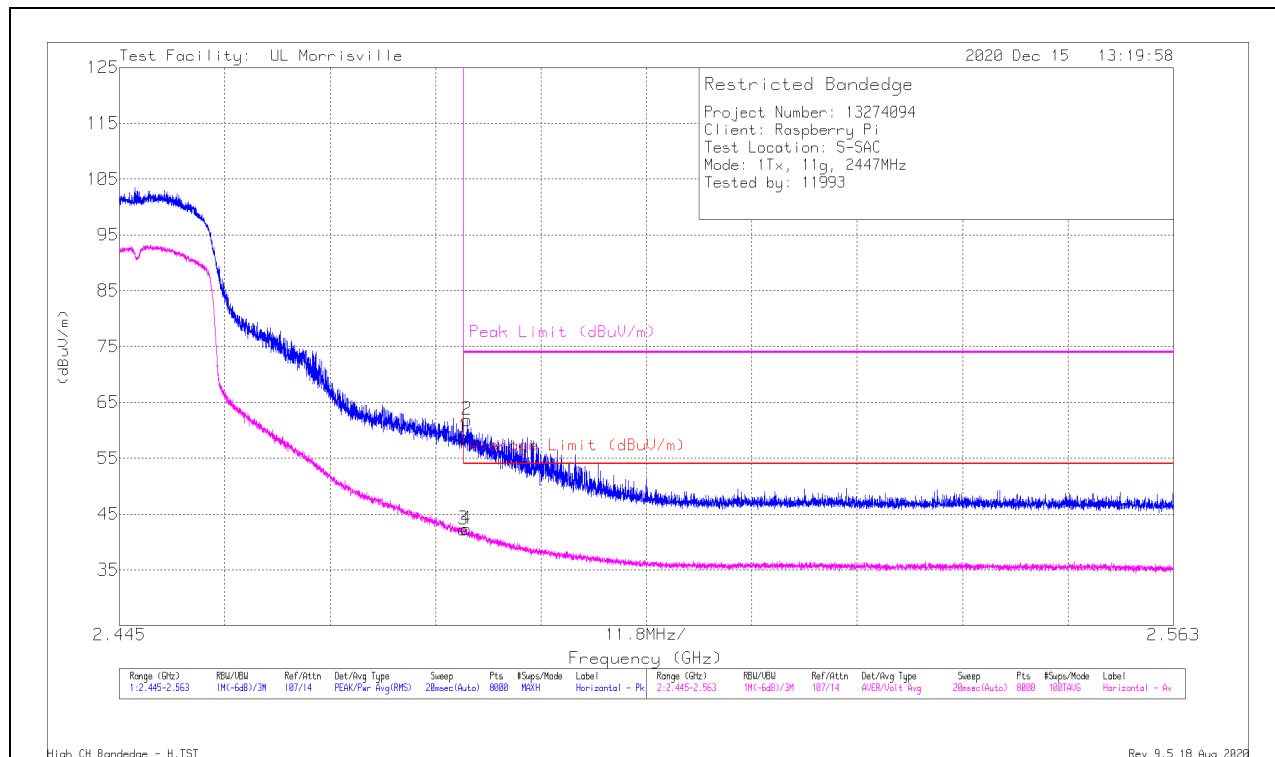


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	56.84	Pk	32.1	-24	64.94	-	-	74	-9.06	53	132	V
2	* ** 2.38983	61.17	Pk	32.1	-24	69.27	-	-	74	-4.73	53	132	V
3	* ** 2.38999	43.21	ADV	32.1	-24	51.31	54	-2.69	-	-	53	132	V
4	* ** 2.38998	43.5	ADV	32.1	-24	51.6	54	-2.4	-	-	53	132	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### BANDEDGE (HIGH CHANNEL, CH 8)

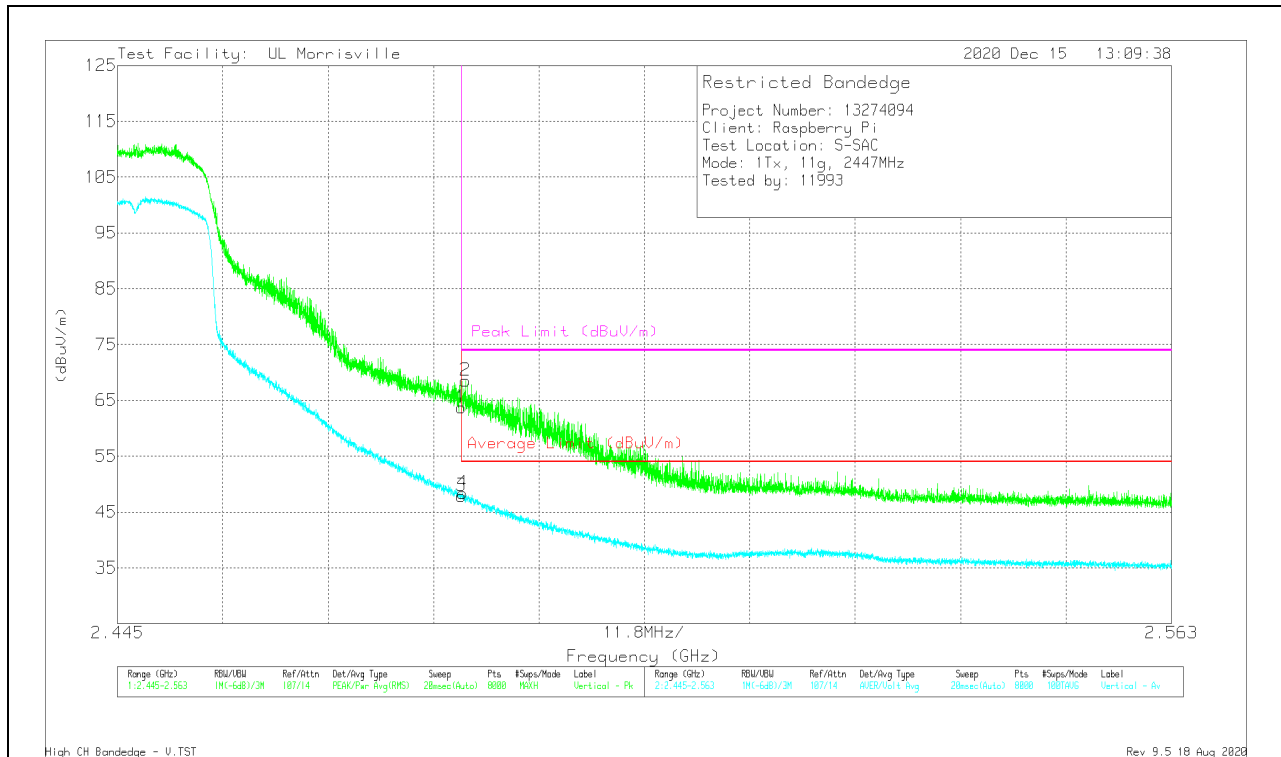
### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	50.77	Pk	32.4	-24.4	58.77	-	-	74	-15.23	211	345	H
2	* ** 2.48395	53.85	Pk	32.4	-24.4	61.85	-	-	74	-12.15	211	345	H
3	* ** 2.4835	34.28	ADV	32.4	-24.4	42.28	54	-11.72	-	-	211	345	H
4	* ** 2.48386	34.33	ADV	32.4	-24.4	42.33	54	-11.67	-	-	211	345	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

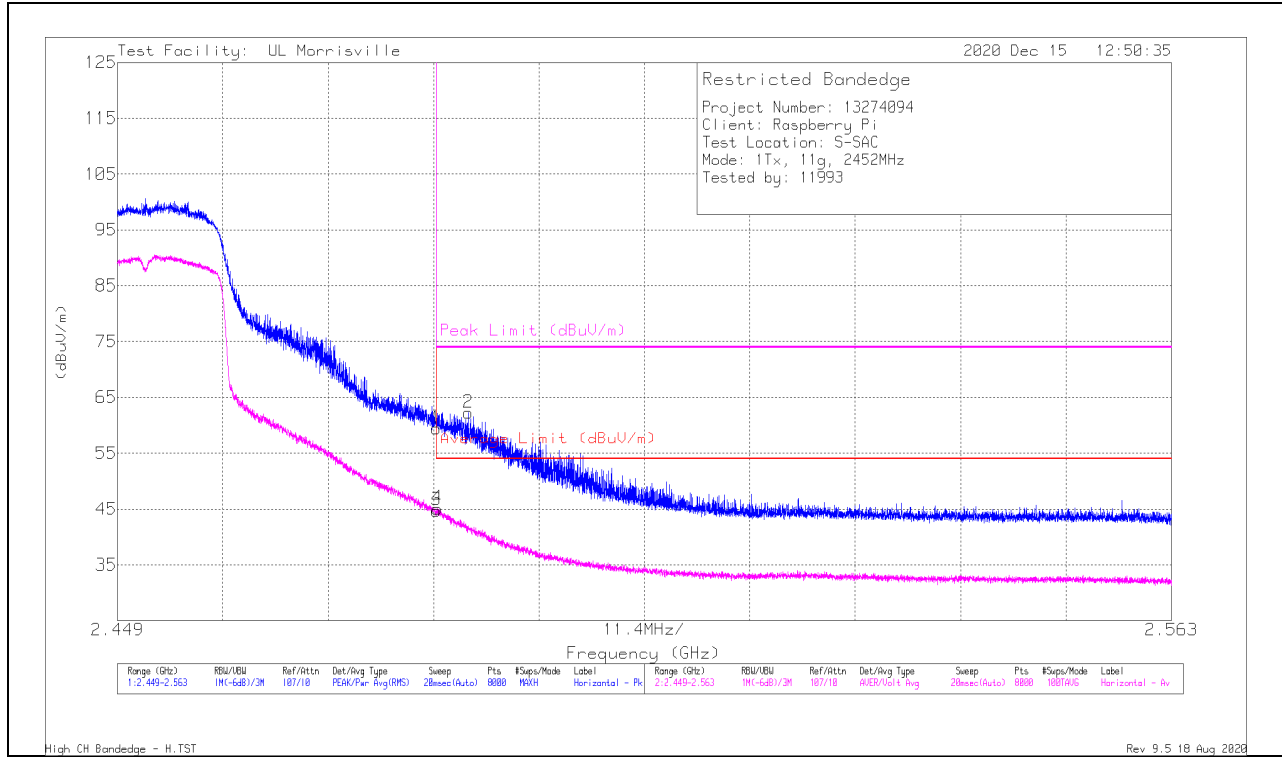


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	55.77	Pk	32.4	-24.4	63.77	-	-	74	-10.23	138	126	V
2	*** 2.48396	60.51	Pk	32.4	-24.4	68.51	-	-	74	-5.49	138	126	V
3	*** 2.4835	39.91	ADV	32.4	-24.4	47.91	54	-6.09	-	-	138	125	V
4	*** 2.48364	40.37	ADV	32.4	-24.4	48.37	54	-5.63	-	-	138	125	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

**BANDEDGE (HIGH CHANNEL, CH 9)**

**HORIZONTAL RESULT**

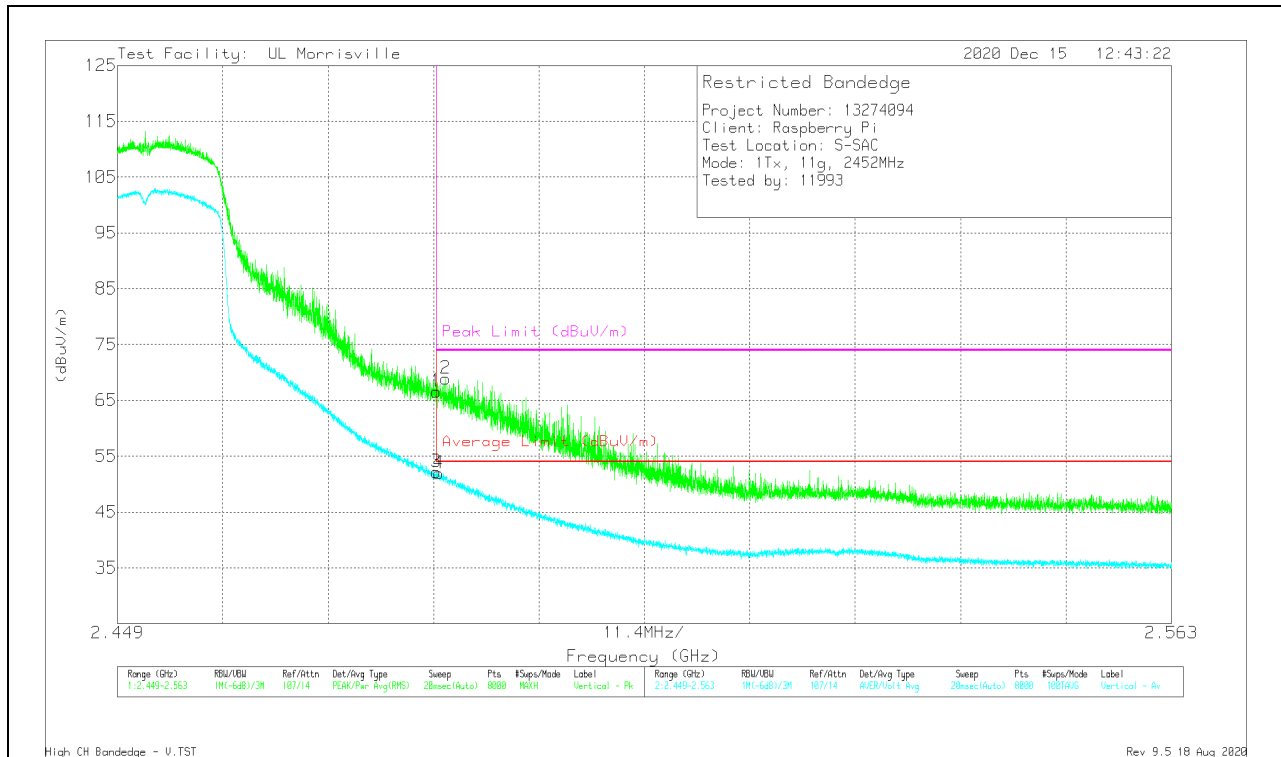


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	51.47	Pk	32.4	-24.4	59.47	-	-	74	-14.53	214	340	H
2	* ** 2.48692	54.37	Pk	32.4	-24.5	62.27	-	-	74	-11.73	214	340	H
3	* ** 2.4835	36.75	ADV	32.4	-24.4	44.75	54	-9.25	-	-	214	340	H
4	* ** 2.48359	37.09	ADV	32.4	-24.4	45.09	54	-8.91	-	-	214	340	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average



### VERTICAL RESULT

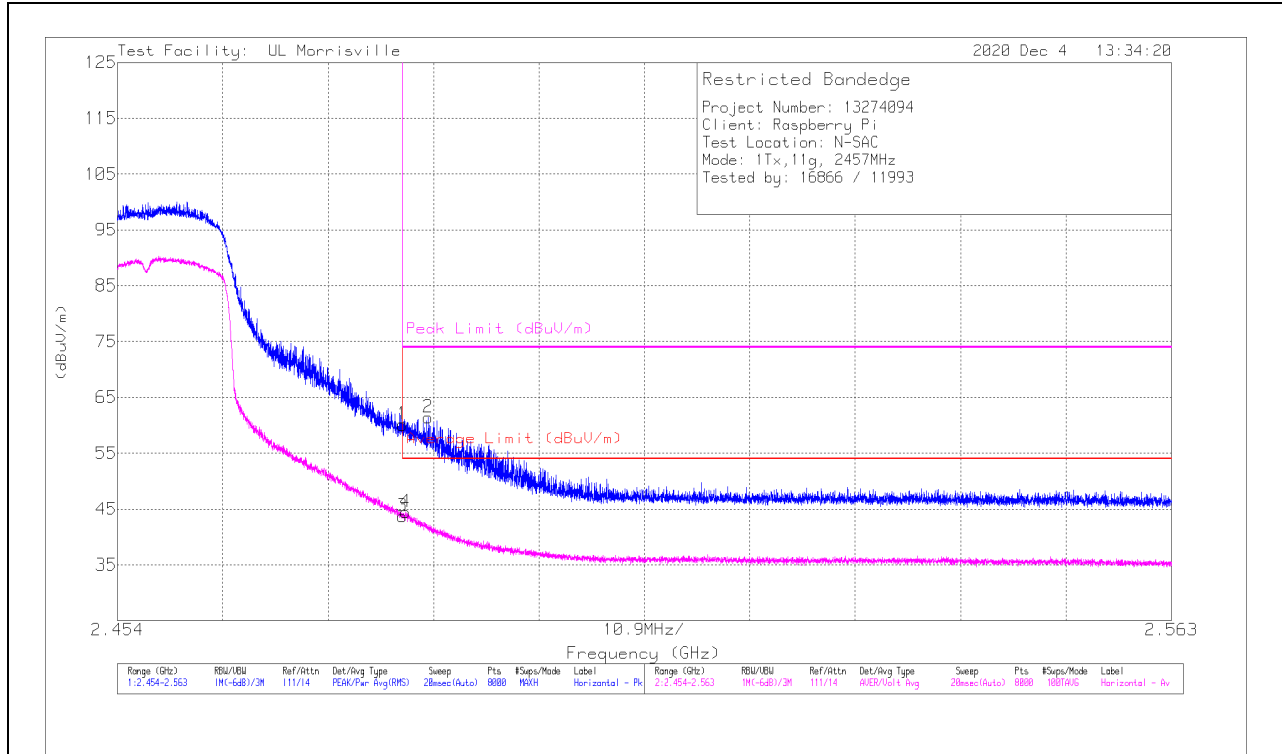


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	58.6	Pk	32.4	-24.4	66.6	-	-	74	-7.4	110	128	V
2	*** 2.48449	60.87	Pk	32.4	-24.4	68.87	-	-	74	-5.13	110	128	V
3	*** 2.4835	44.16	ADV	32.4	-24.4	52.16	54	-1.84	-	-	110	128	V
4	*** 2.48375	43.97	ADV	32.4	-24.4	51.97	54	-2.03	-	-	110	128	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### BANDEDGE (HIGH CHANNEL, CH 10)

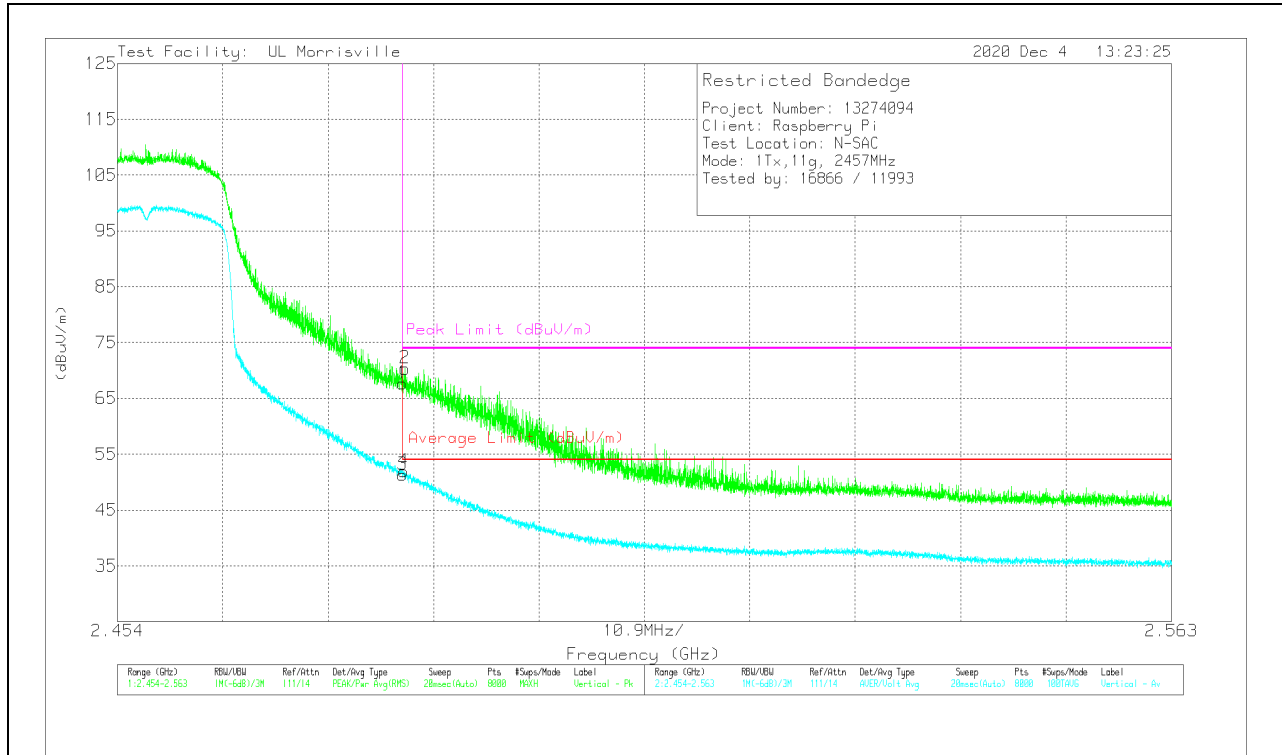
### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	52.13	Pk	32.4	-24.4	60.13	-	-	74	-13.87	185	167	H
2	* ** 2.48612	53.5	Pk	32.4	-24.5	61.4	-	-	74	-12.6	185	167	H
3	* ** 2.4835	35.69	ADV	32.4	-24.4	43.69	54	-10.31	-	-	185	167	H
4	* ** 2.48378	36.42	ADV	32.4	-24.4	44.42	54	-9.58	-	-	185	167	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

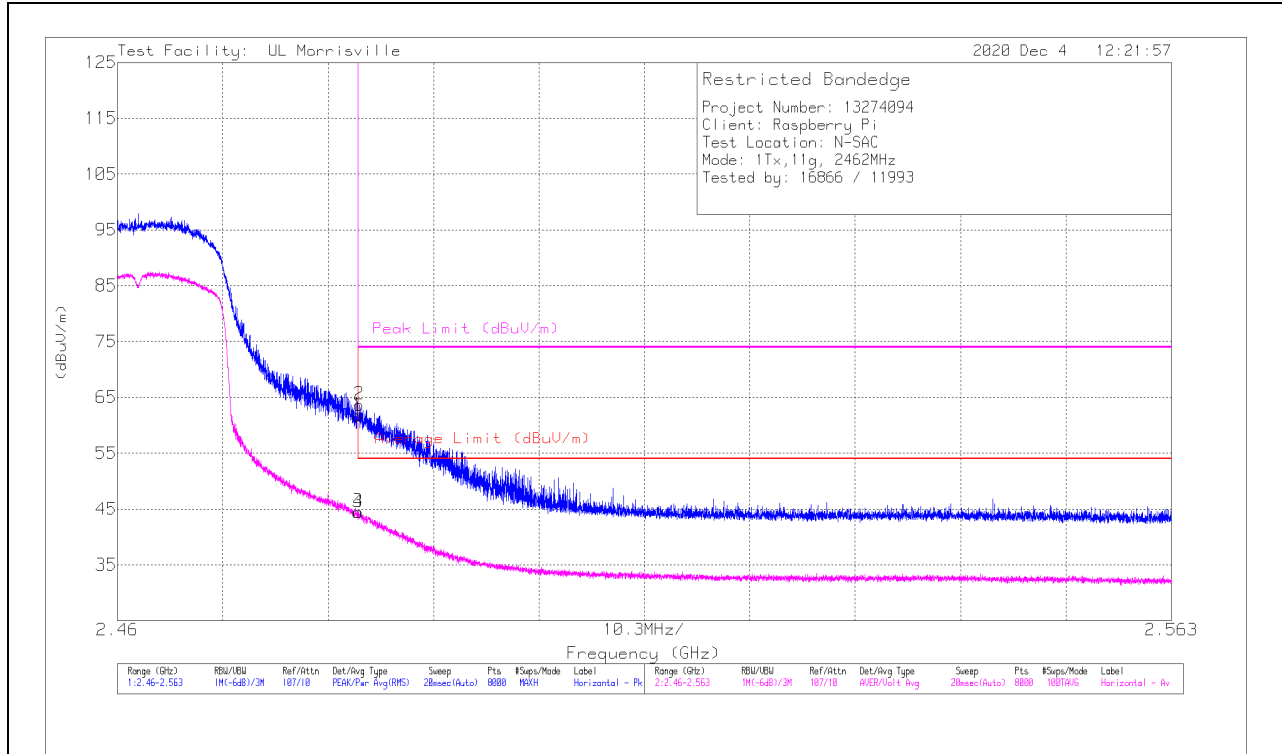


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	59.7	Pk	32.4	-24.4	67.7	-	-	74	-6.3	159	152	V
2	** 2.48375	62.33	Pk	32.4	-24.4	70.33	-	-	74	-3.67	159	152	V
3	*** 2.4835	43.3	ADV	32.4	-24.4	51.3	54	-2.7	-	-	159	152	V
4	** 2.4836	43.9	ADV	32.4	-24.4	51.9	54	-2.1	-	-	159	152	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

**BANDEDGE (HIGH CHANNEL, CH 11)**

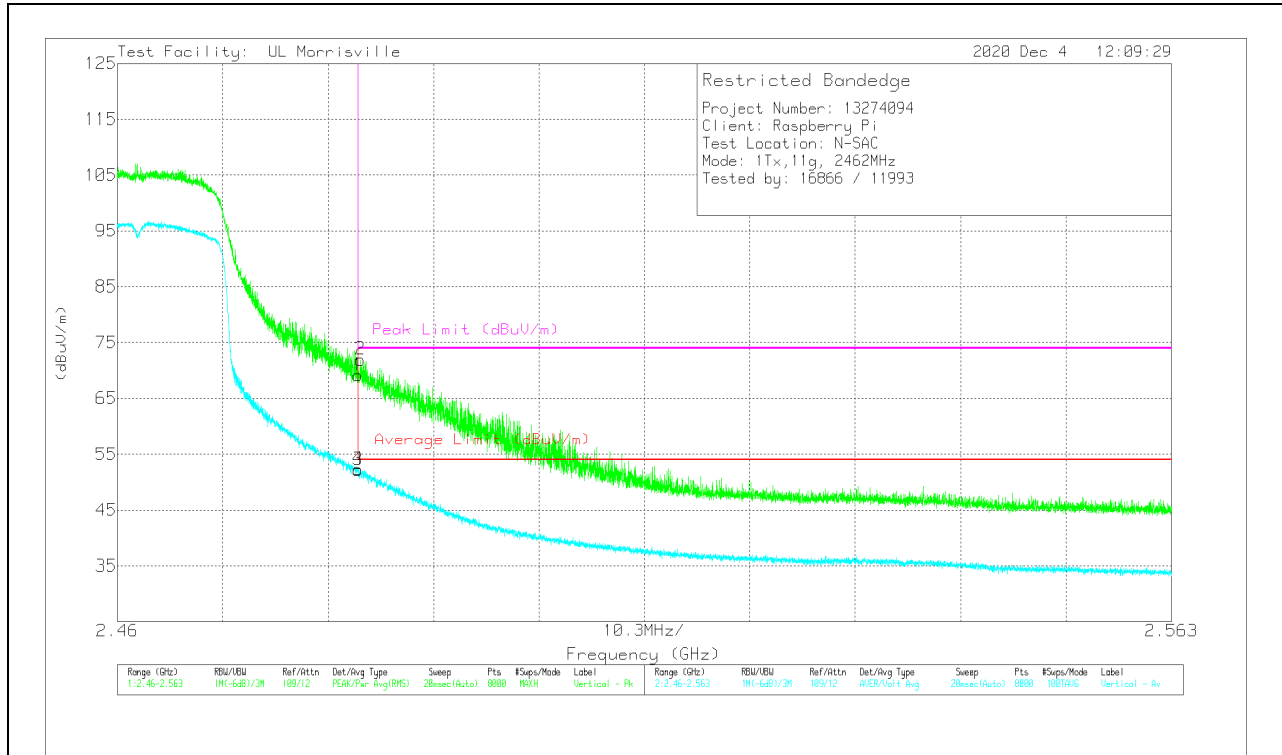
**HORIZONTAL RESULT**



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	53.79	Pk	32.4	-24.4	61.79	-	-	74	-12.21	263	127	H
2	* ** 2.48363	55.68	Pk	32.4	-24.4	63.68	-	-	74	-10.32	263	127	H
3	* ** 2.4835	36.48	ADV	32.4	-24.4	44.48	54	-9.52	-	-	263	127	H
4	* ** 2.48358	36.47	ADV	32.4	-24.4	44.47	54	-9.53	-	-	263	127	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

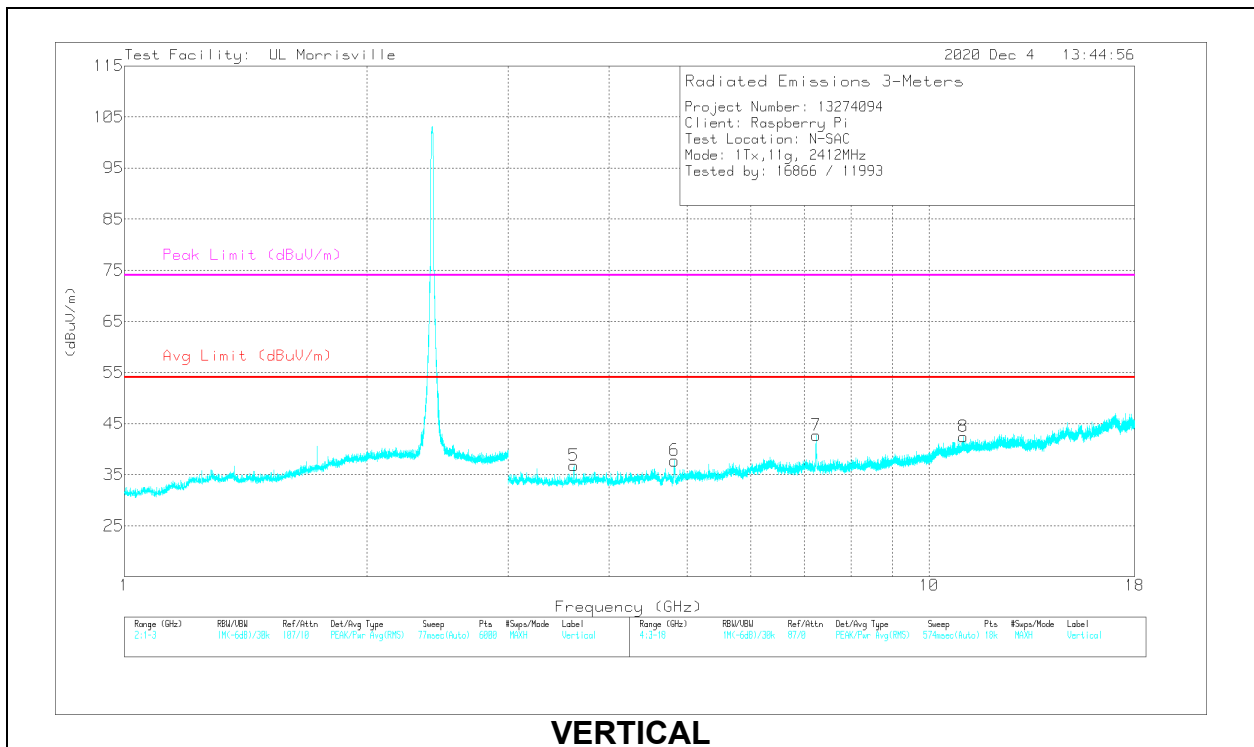
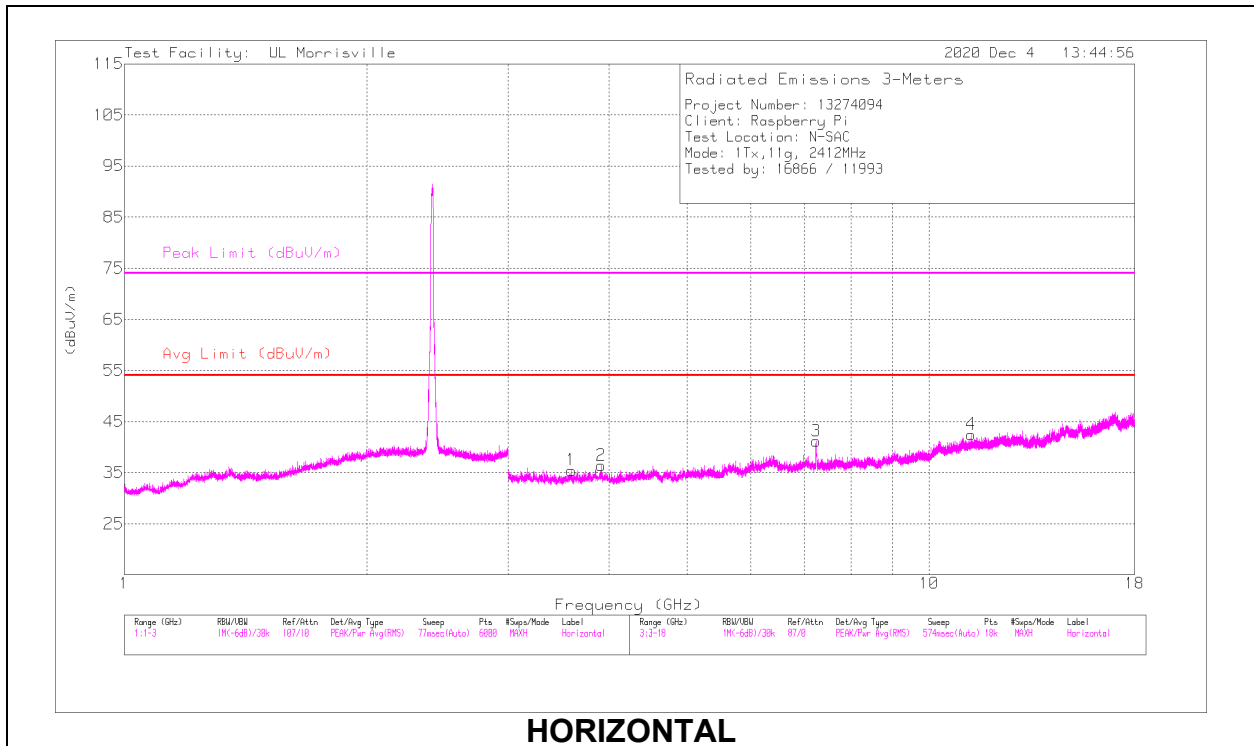


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dBm)	Amp/Cable/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 2.4835	61.13	Pk	32.4	-24.4	69.13	-	-	74	-4.87	123	128	V
2	** 2.48375	63.92	Pk	32.4	-24.4	71.92	-	-	74	-2.08	123	128	V
3	** 2.4835	44.17	ADV	32.4	-24.4	52.17	54	-1.83	-	-	123	128	V
4	** 2.48353	44.29	ADV	32.4	-24.4	52.29	54	-1.71	-	-	123	128	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - U-NII AD primary method, Linear Voltage Average

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL, CH 1 RESULTS



**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/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	*** 3.59066	41.27	PK2	32.9	-31.8	42.37	-	-	74	-31.63	355	287	H
	*** 3.58497	27.46	ADV	32.9	-31.9	28.46	54	-25.54	-	-	355	287	H
2	*** 3.90619	39.93	PK2	33.4	-32	41.33	-	-	74	-32.67	73	336	H
	*** 3.90513	27.18	ADV	33.4	-32.1	28.48	54	-25.52	-	-	73	336	H
4	*** 11.27801	32.72	PK2	38.1	-23.3	47.52	-	-	74	-26.48	17	171	H
	*** 11.27742	20.18	ADV	38.1	-23.3	34.98	54	-19.02	-	-	17	171	H
5	*** 3.61782	40.32	PK2	33	-31.7	41.62	-	-	74	-32.38	17	199	V
	*** 3.61804	28.32	ADV	33	-31.7	29.62	54	-24.38	-	-	17	199	V
6	*** 4.82396	40.9	PK2	34	-30.8	44.1	-	-	74	-29.9	199	214	V
	*** 4.82378	27.65	ADV	34	-30.8	30.85	54	-23.15	-	-	199	214	V
8	*** 11.02385	33.14	PK2	38.1	-24	47.24	-	-	74	-26.76	234	101	V
	*** 11.02438	21.66	ADV	38.1	-24	35.76	54	-18.24	-	-	234	101	V
3	7.23607	33.37	Pk	35.6	-27.8	41.17	-	-	-	-	0-360	199	H
7	7.2369	34.9	Pk	35.6	-27.8	42.7	-	-	-	-	0-360	199	V

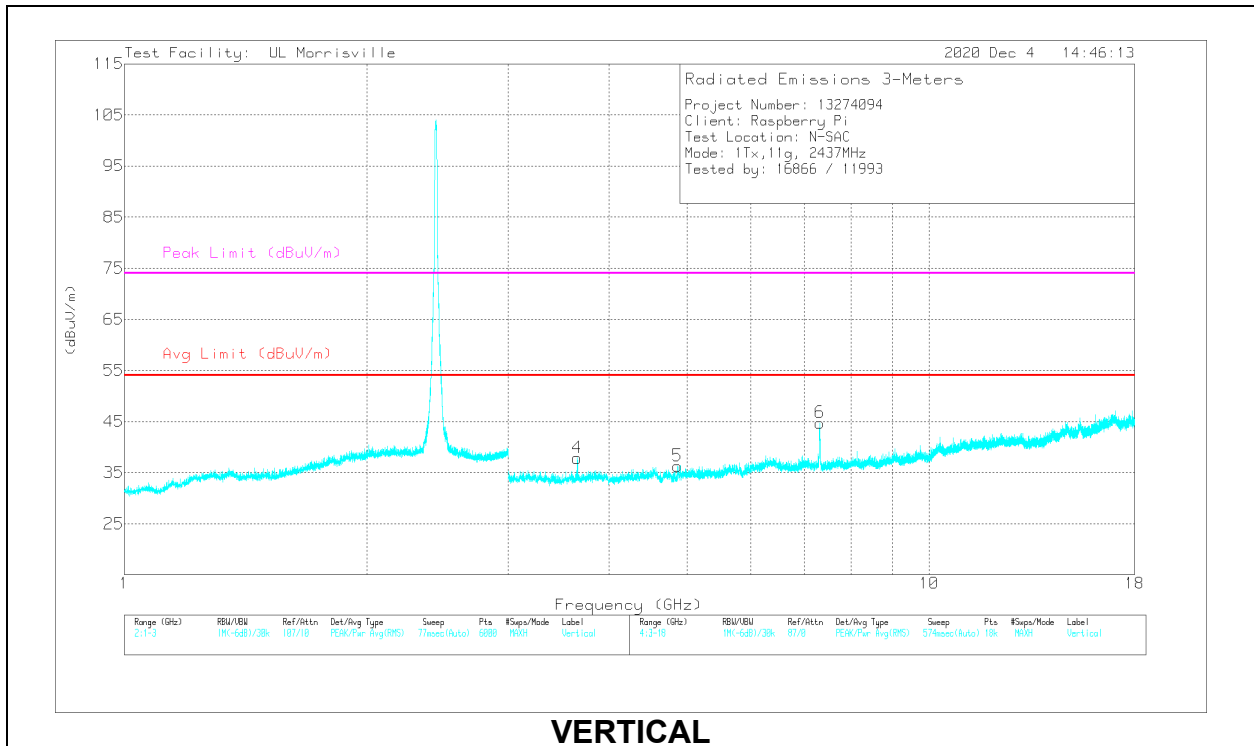
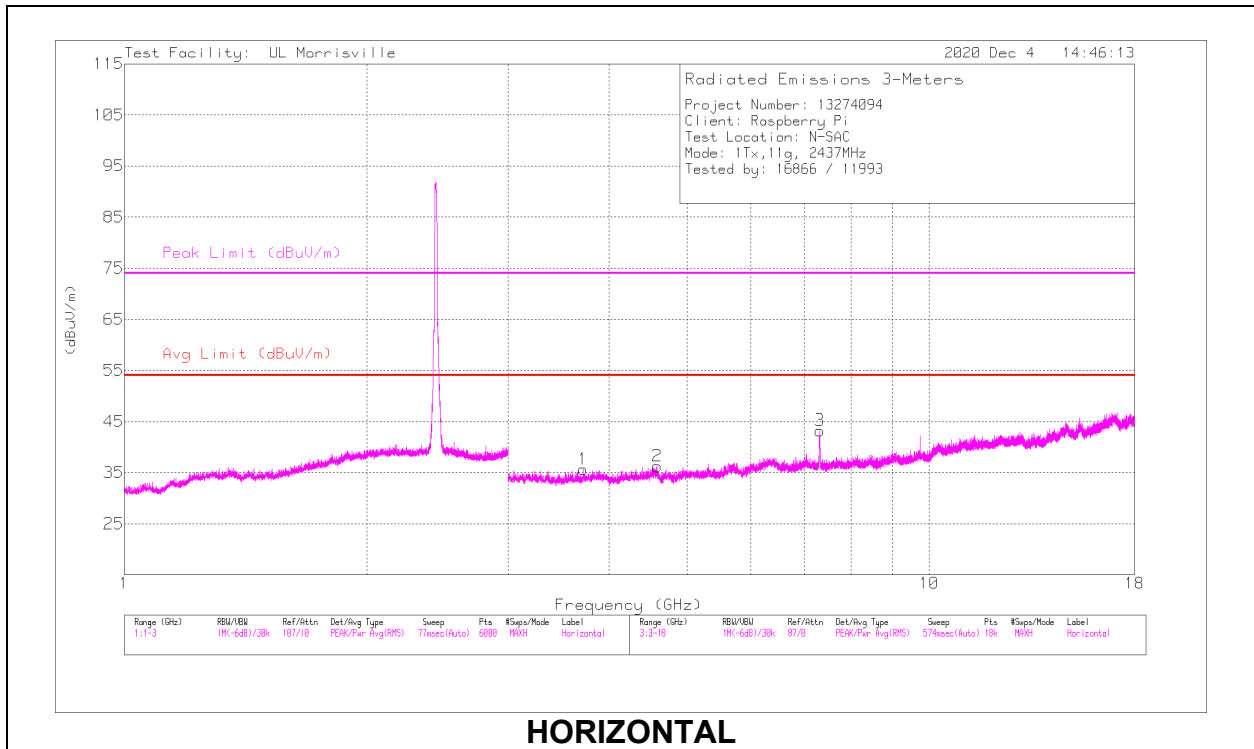
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

PK2 - Maximum Peak

ADV - Linear Voltage Average

### MID CHANNEL, CH 6 RESULTS





**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 3.71259	40.76	PK2	33.2	-32.5	41.46	-	-	74	-32.54	359	163	H
	* ** 3.71462	27.84	ADV	33.2	-32.6	28.44	54	-25.56	-	-	359	163	H
2	* ** 4.59379	39.27	PK2	34.1	-31.8	41.57	-	-	74	-32.43	74	138	H
	* ** 4.59232	26.54	ADV	34.1	-31.8	28.84	54	-25.16	-	-	74	138	H
3	* ** 7.31059	41.52	PK2	35.6	-27.5	49.62	-	-	74	-24.38	255	203	H
	* ** 7.31105	29.6	ADV	35.6	-27.5	37.7	54	-16.3	-	-	255	203	H
4	* ** 3.65536	42.42	PK2	33.1	-32.2	43.32	-	-	74	-30.68	236	279	V
	* ** 3.65551	34.26	ADV	33.1	-32.2	35.16	54	-18.84	-	-	236	279	V
5	* ** 4.8703	38.78	PK2	34	-30.9	41.88	-	-	74	-32.12	198	106	V
	* ** 4.87036	26.42	ADV	34	-30.9	29.52	54	-24.48	-	-	198	106	V
6	* ** 7.31091	45.17	PK2	35.6	-27.5	53.27	-	-	74	-20.73	225	194	V
	* ** 7.31108	33	ADV	35.6	-27.5	41.1	54	-12.9	-	-	225	194	V

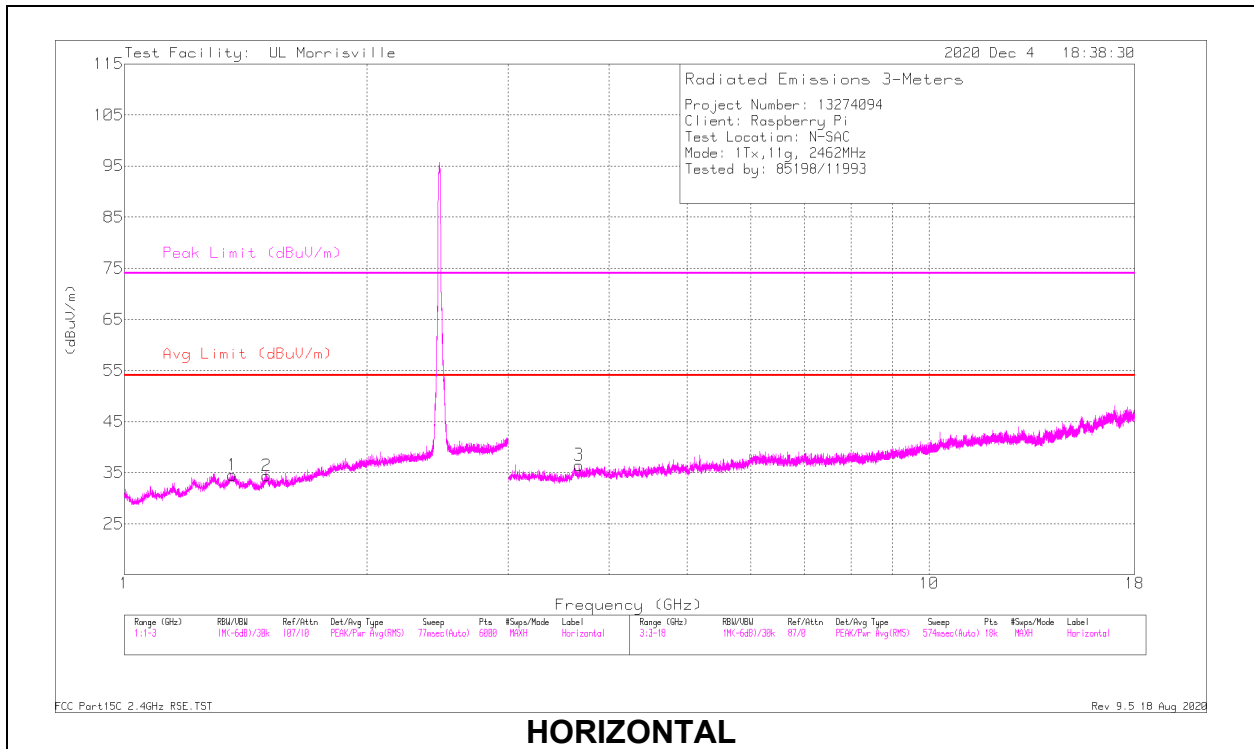
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

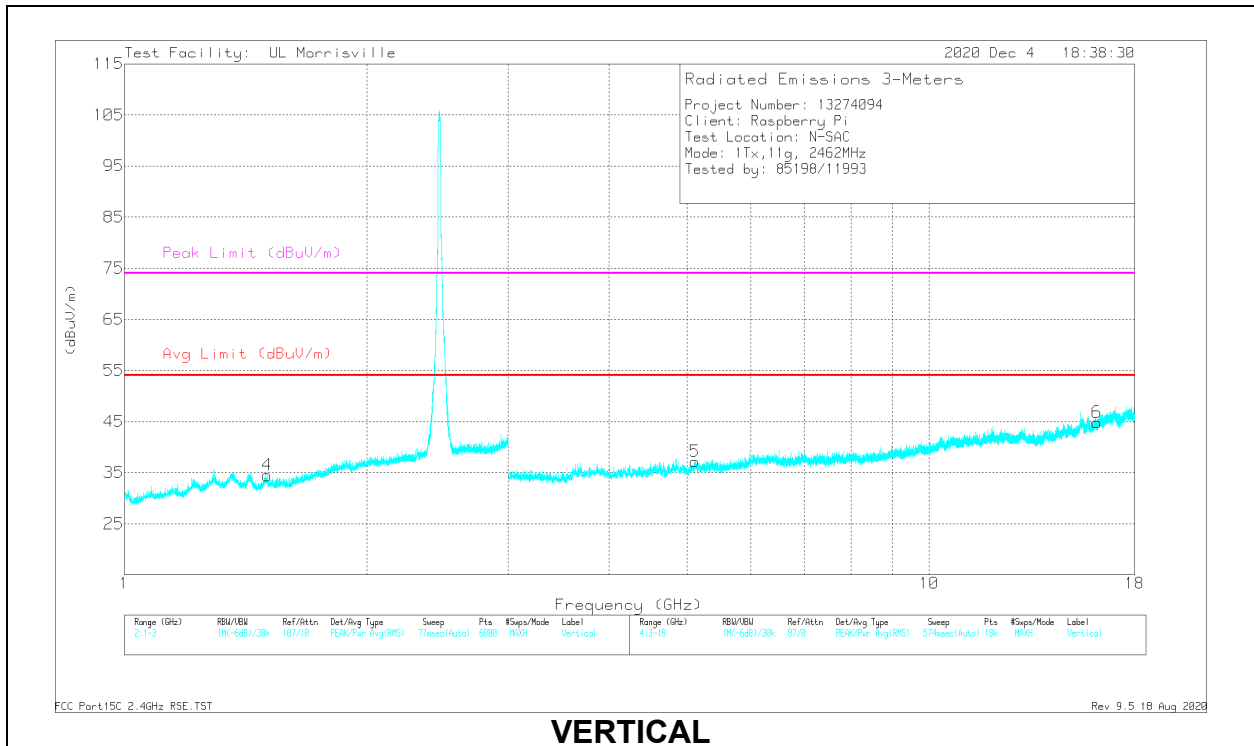
PK2 - Maximum Peak

ADV - Linear Voltage Average

### HIGH CHANNEL, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(/m)	Amp/Cbl/Fitr/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	*** 1.36246	38.87	PK2	29.4	-25.3	42.97	-	-	74	-31.03	61	118	H
	*** 1.36117	24.65	ADV	29.4	-25.3	28.75	54	-25.25	-	-	61	118	H
2	*** 1.50417	38.48	PK2	27.8	-24.7	41.58	-	-	74	-32.42	66	118	H
	*** 1.50137	25.95	ADV	27.8	-24.8	28.95	54	-25.05	-	-	66	118	H
4	*** 1.50596	38.13	PK2	27.8	-24.7	41.23	-	-	74	-32.77	172	250	V
	*** 1.50501	24.95	ADV	27.8	-24.7	28.05	54	-25.95	-	-	172	250	V
3	*** 3.67407	40.42	PK2	33.1	-31.7	41.82	-	-	74	-32.18	320	237	H
	*** 3.67438	27.78	ADV	33.1	-31.7	29.18	54	-24.82	-	-	320	237	H
5	*** 5.11653	40.86	PK2	34.3	-31.2	43.96	-	-	74	-30.04	291	139	V
	*** 5.11626	27.78	ADV	34.3	-31.2	30.88	54	-23.12	-	-	291	139	V
6	*** 16.16325	36.9	PK2	40.7	-26.4	51.2	-	-	74	-22.8	296	269	V
	*** 16.16574	24.65	ADV	40.7	-26.4	38.95	54	-15.05	-	-	296	269	V

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

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

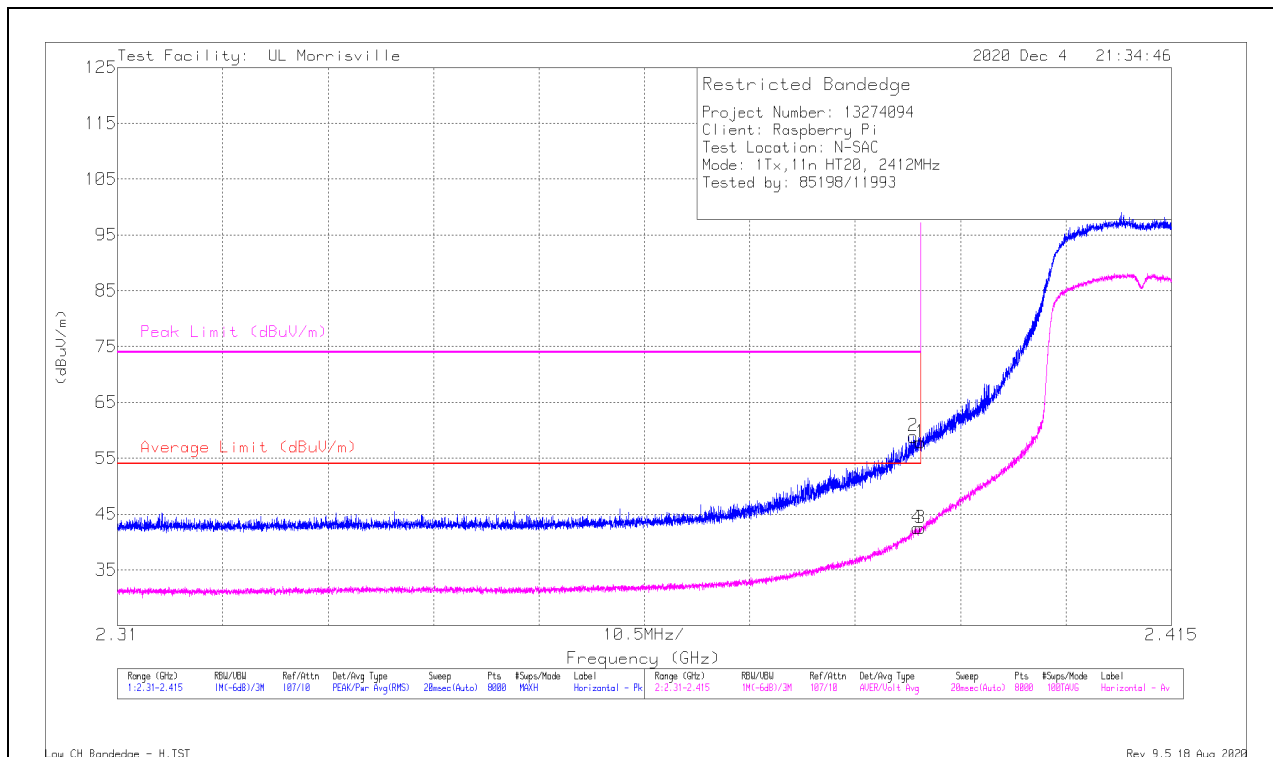
PK2 - Maximum Peak

ADV - Linear Voltage Average

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

#### BANDEDGE (LOW CHANNEL, CH 1)

#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/(m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.39	50.44	Pk	31.8	-24.4	57.84	-	-	74	-16.16	314	289	H
2	*** 2.38927	51.5	PK	31.8	-24.4	58.9	-	-	74	-15.1	314	289	H
3	** 2.39	35.07	ADV	31.8	-24.4	42.47	54	-11.53	-	-	314	289	H
4	*** 2.38967	35.06	ADV	31.8	-24.4	42.46	54	-11.54	-	-	314	289	H

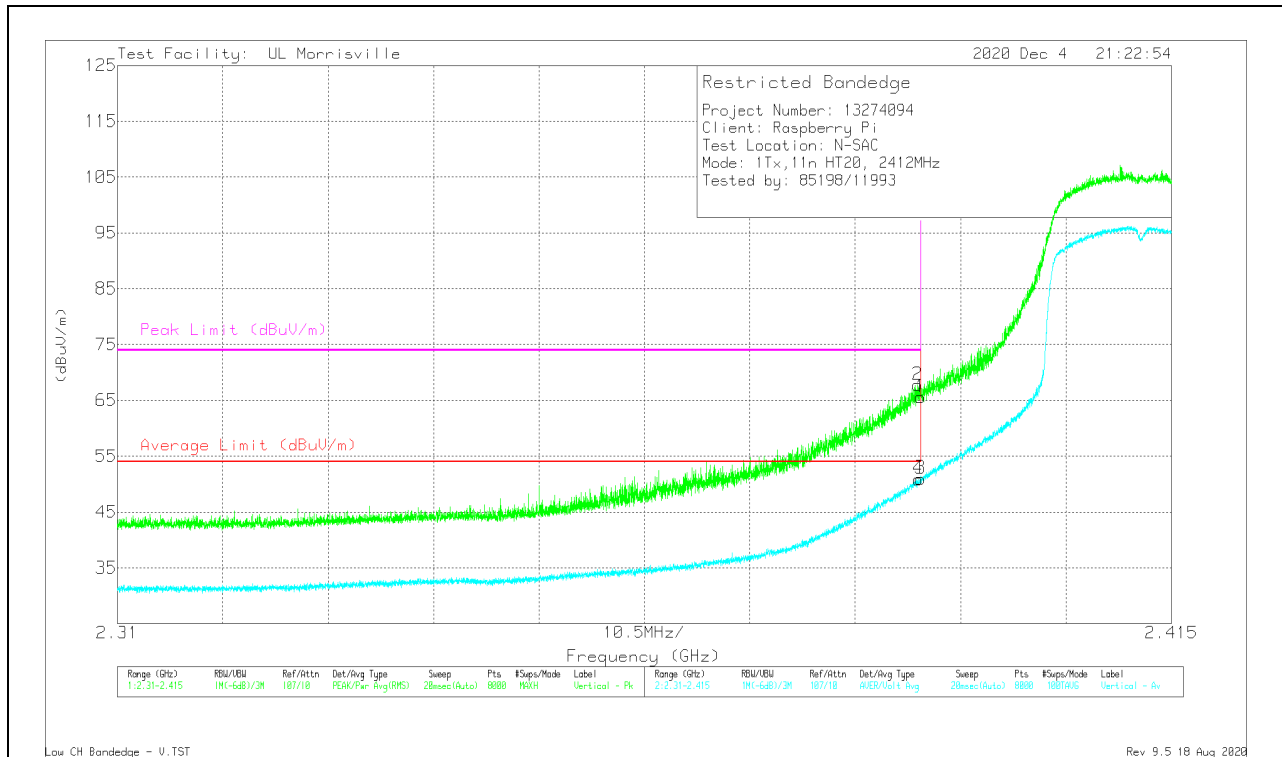
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

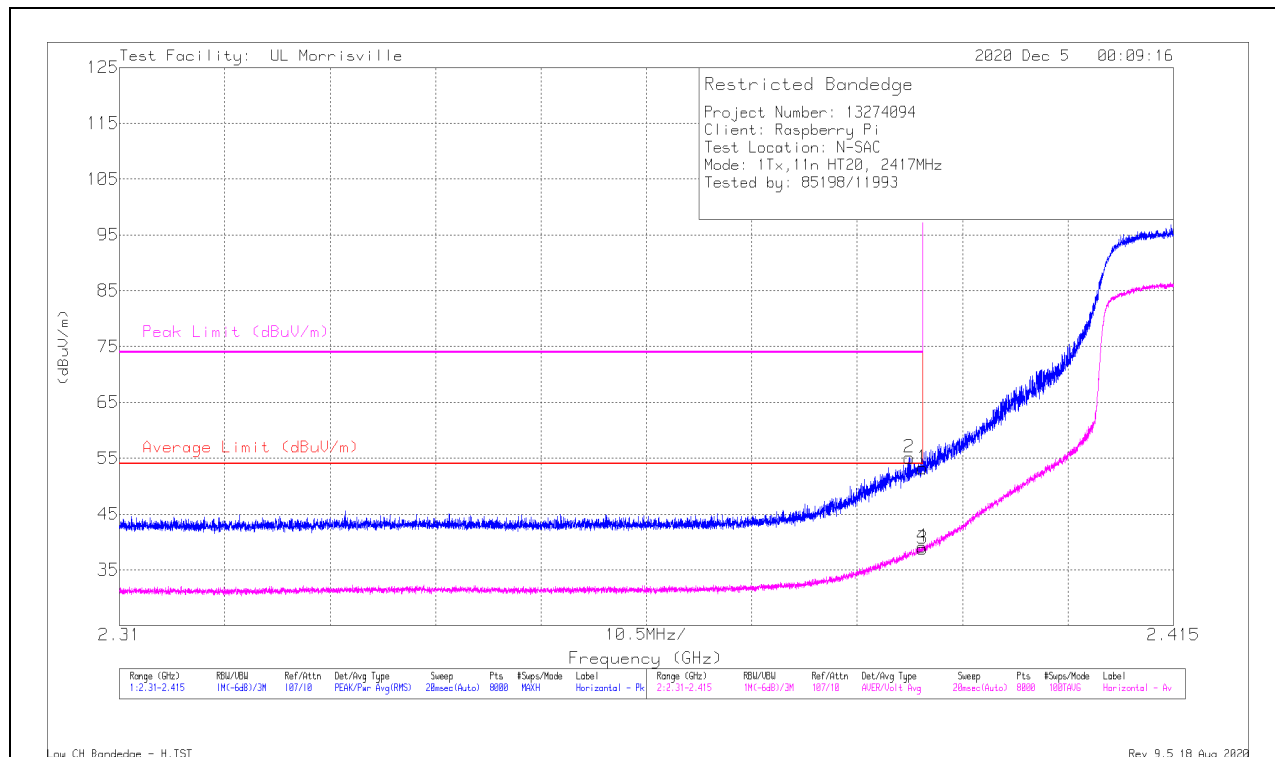


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	58.21	Pk	31.8	-24.4	65.61	-	-	74	-8.39	37	290	V
2	* ** 2.38973	60.42	Pk	31.8	-24.4	67.82	-	-	74	-6.18	37	290	V
3	* ** 2.39	43.61	ADV	31.8	-24.4	51.01	54	-2.99	-	-	37	290	V
4	* ** 2.38977	43.5	ADV	31.8	-24.4	50.9	54	-3.1	-	-	37	290	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

# BANDEDGE (LOW CHANNEL, CH 2)

## HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB(m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	45.84	Pk	31.8	-24.4	53.24	-	-	74	-20.76	154	370	H
2	* ** 2.38868	47.69	Pk	31.8	-24.4	55.09	-	-	74	-18.91	154	370	H
3	* ** 2.39	31.41	ADV	31.8	-24.4	38.81	54	-15.19	-	-	154	370	H
4	* ** 2.38994	31.78	ADV	31.8	-24.4	39.18	54	-14.82	-	-	154	370	H

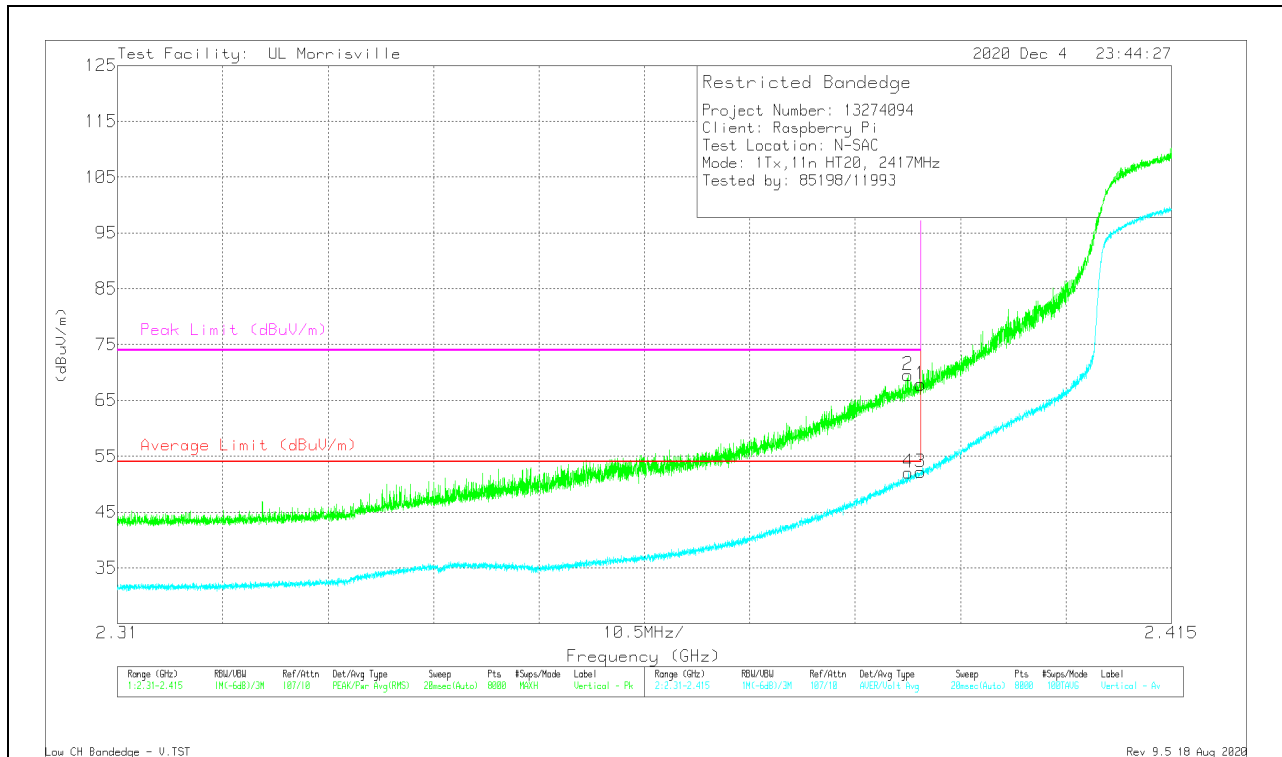
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

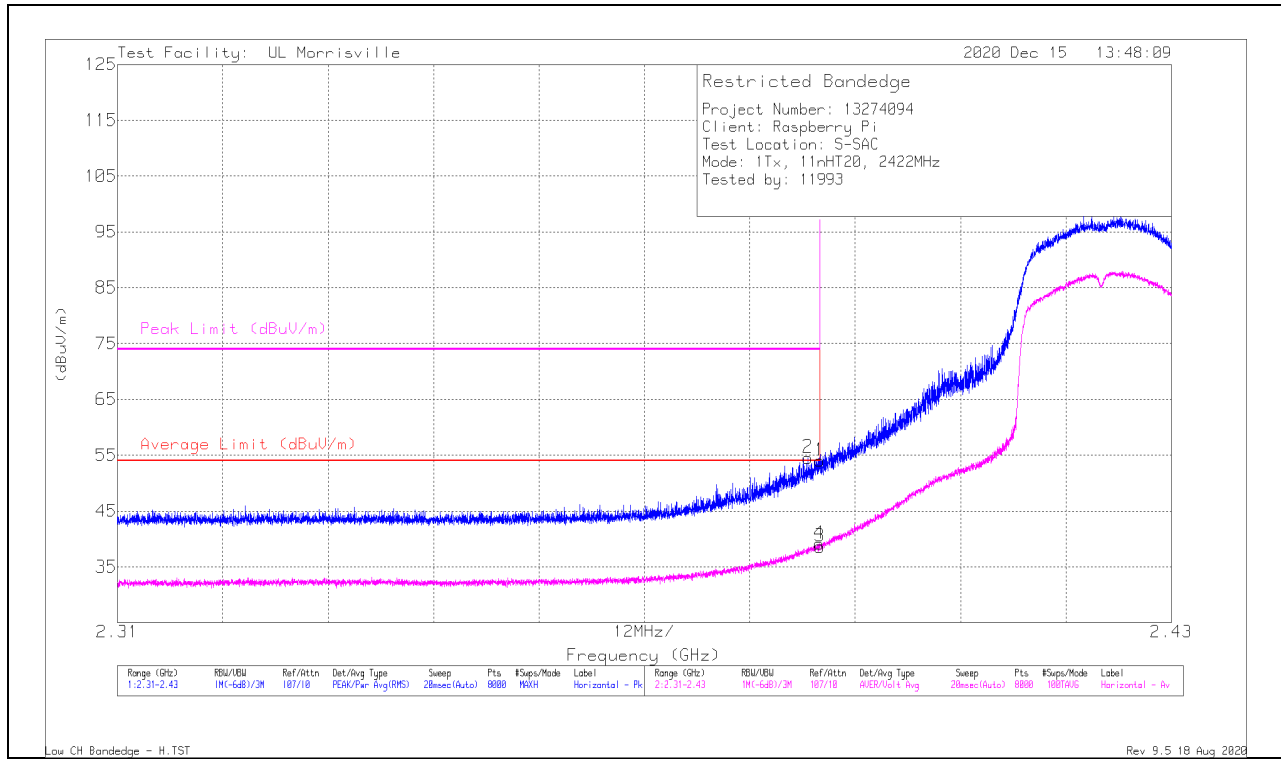


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	60.47	Pk	31.8	-24.4	67.87	-	-	74	-6.13	127	124	V
2	* ** 2.38875	62.17	Pk	31.8	-24.4	69.57	-	-	74	-4.43	127	124	V
3	* ** 2.39	44.8	ADV	31.8	-24.4	52.2	54	-1.8	-	-	127	124	V
4	* ** 2.3888	44.71	ADV	31.8	-24.4	52.11	54	-1.89	-	-	127	124	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

# BANDEDGE (LOW CHANNEL, CH 3)

## HORIZONTAL RESULT

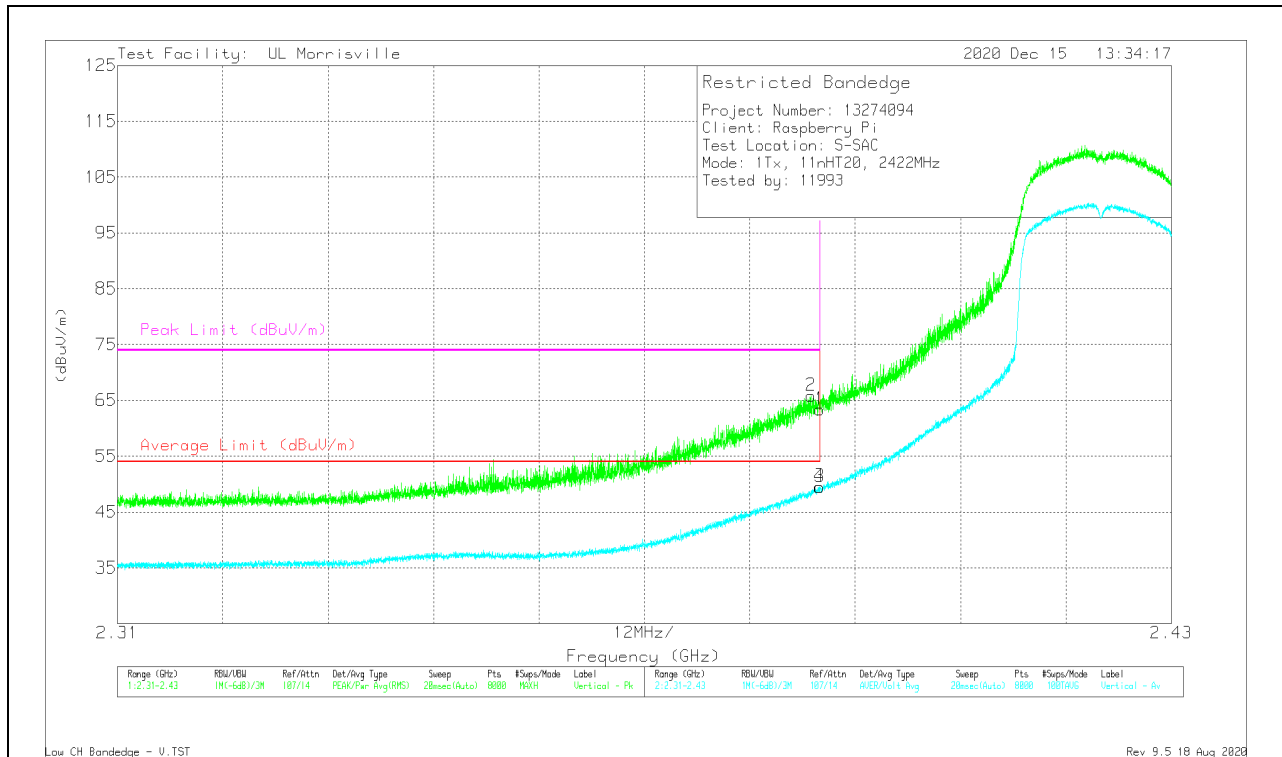


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	45.96	Pk	32.1	-24	54.06	-	-	74	-19.94	34	256	H
2	* ** 2.3886	46.47	Pk	32.1	-24	54.57	-	-	74	-19.43	34	256	H
3	* ** 2.38999	30.52	ADV	32.1	-24	38.62	54	-15.38	-	-	34	256	H
4	* ** 2.38987	31.06	ADV	32.1	-24	39.16	54	-14.84	-	-	34	256	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average



### VERTICAL RESULT

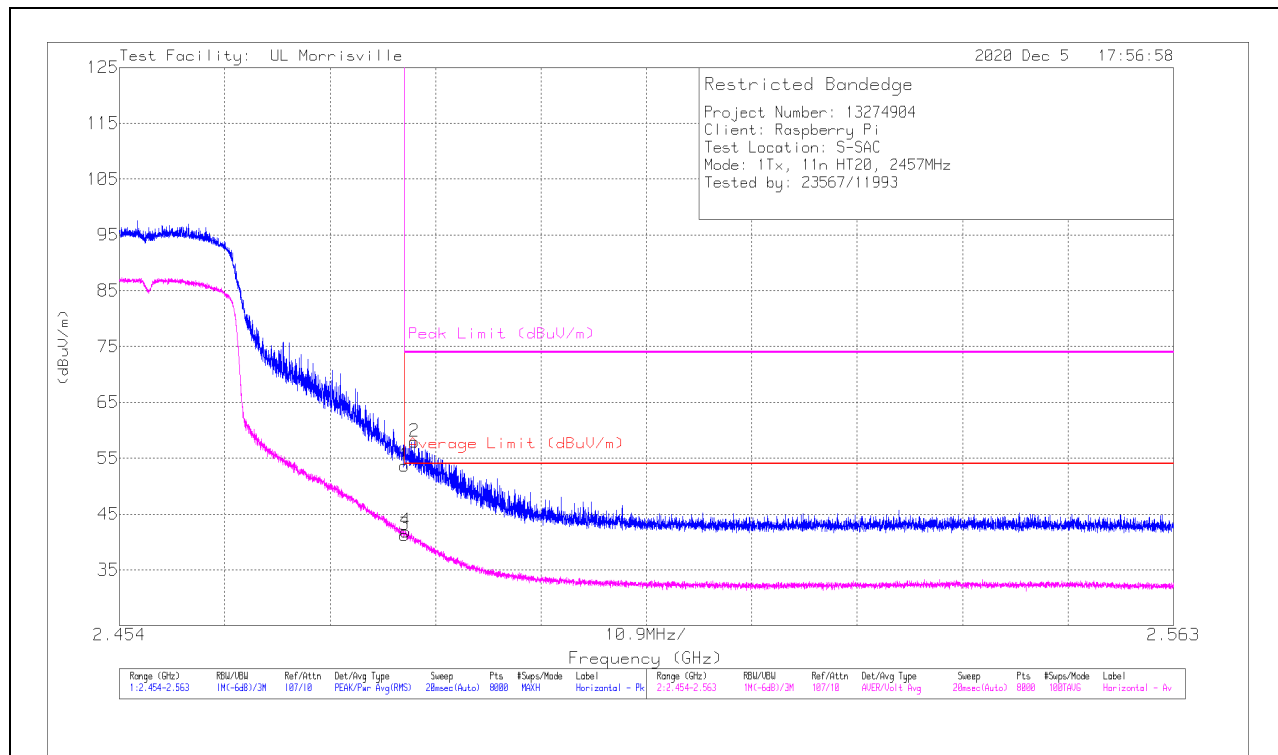


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	55.25	Pk	32.1	-24	63.35	-	-	74	-10.65	128	103	V
2	* ** 2.38896	57.74	Pk	32.1	-24	65.84	-	-	74	-8.16	128	103	V
3	* ** 2.38999	41.42	ADV	32.1	-24	49.52	54	-4.48	-	-	128	103	V
4	* ** 2.38993	41.35	ADV	32.1	-24	49.45	54	-4.55	-	-	128	103	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

## BANDEDGE (HIGH CHANNEL, CH 10)

### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	45.62	Pk	32.4	-24.4	53.62	-	-	74	-20.38	276	308	H
2	*** 2.48451	49.99	Pk	32.4	-24.4	57.99	-	-	74	-16.01	276	308	H
3	*** 2.4835	33.23	ADV	32.4	-24.4	41.23	54	-12.77	-	-	276	308	H
4	*** 2.48358	33.92	ADV	32.4	-24.4	41.92	54	-12.08	-	-	276	308	H

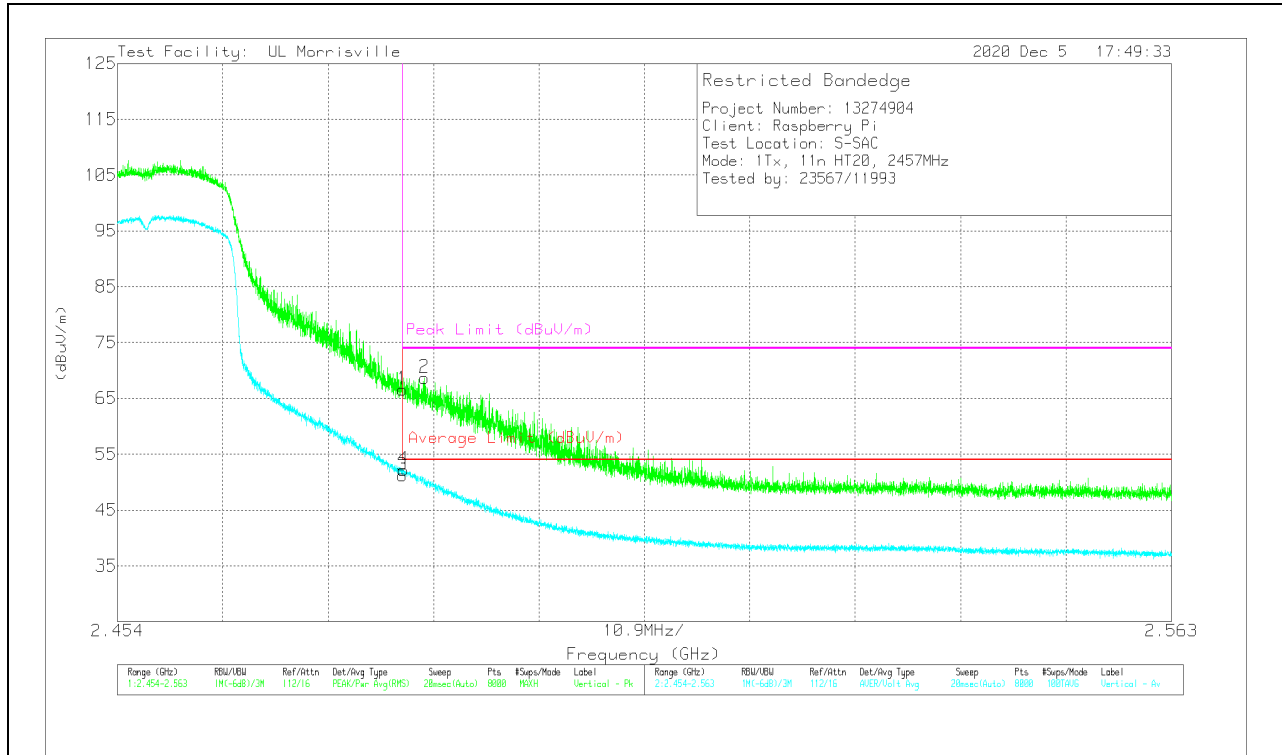
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV - Linear Voltage Average

### VERTICAL RESULT

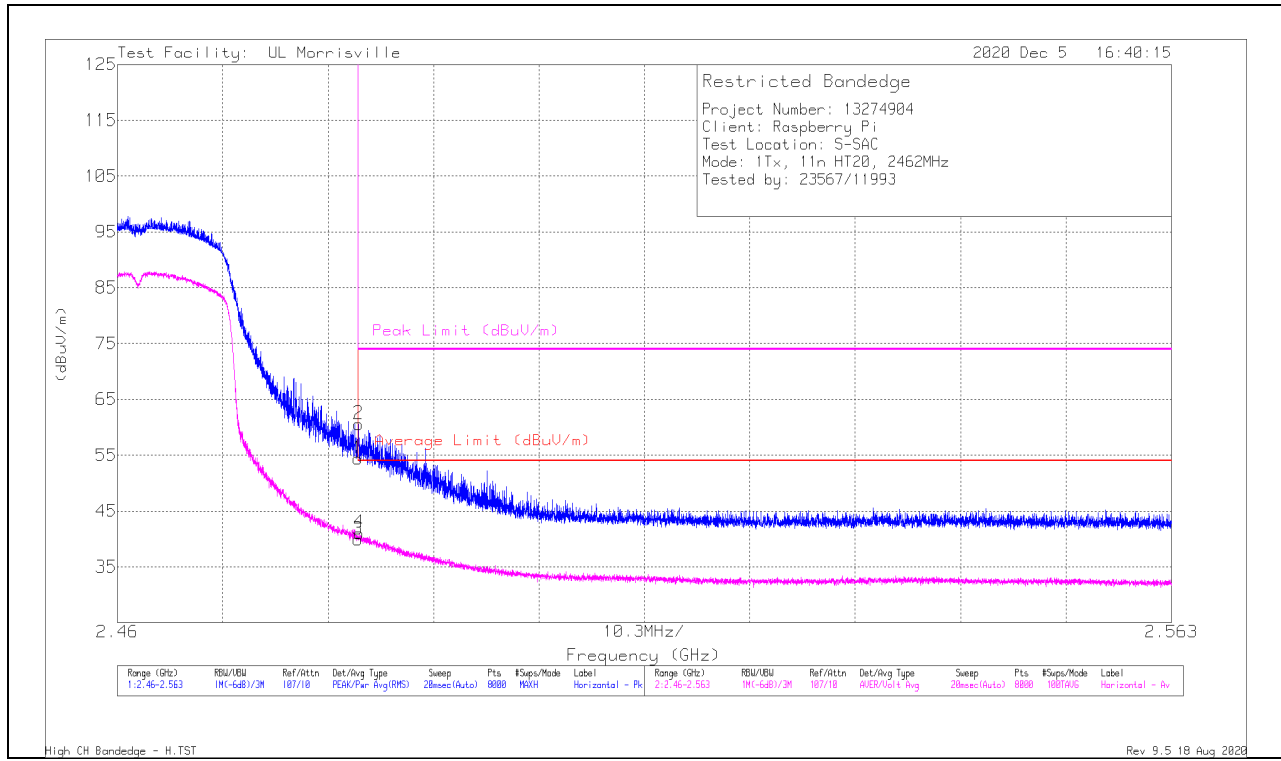


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	58.62	Pk	32.4	-24.4	66.62	-	-	74	-7.38	124	174	V
2	*** 2.48576	60.81	Pk	32.4	-24.5	68.71	-	-	74	-5.29	124	174	V
3	*** 2.4835	43.2	ADV	32.4	-24.4	51.2	54	-2.8	-	-	124	174	V
4	*** 2.48357	44.25	ADV	32.4	-24.4	52.25	54	-1.75	-	-	124	174	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

# BANDEDGE (HIGH CHANNEL, CH 11)

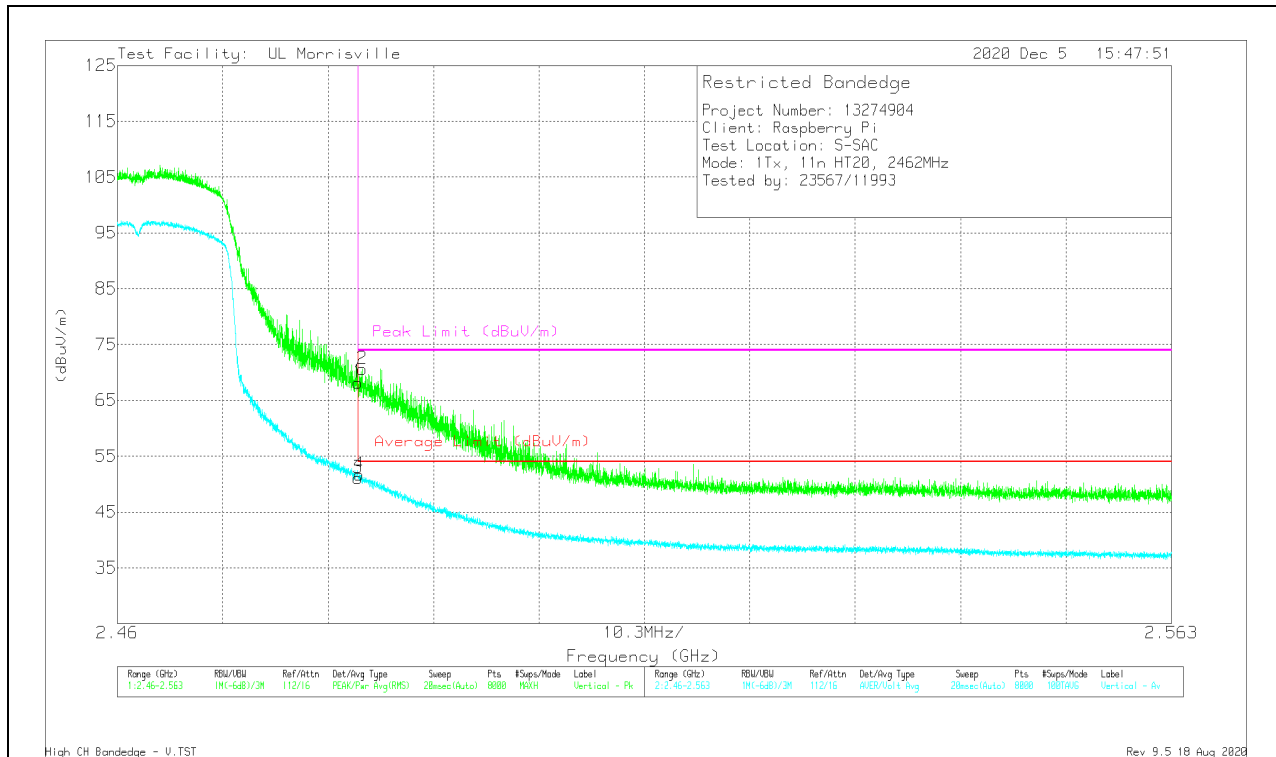
## HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	46.41	Pk	32.4	-24.4	54.41	-	-	74	-19.59	18	127	H
2	* ** 2.48358	52.59	Pk	32.4	-24.4	60.59	-	-	74	-13.41	18	127	H
3	* ** 2.4835	31.92	ADV	32.4	-24.4	39.92	54	-14.08	-	-	18	127	H
4	* ** 2.48362	33.06	ADV	32.4	-24.4	41.06	54	-12.94	-	-	18	127	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

### VERTICAL RESULT

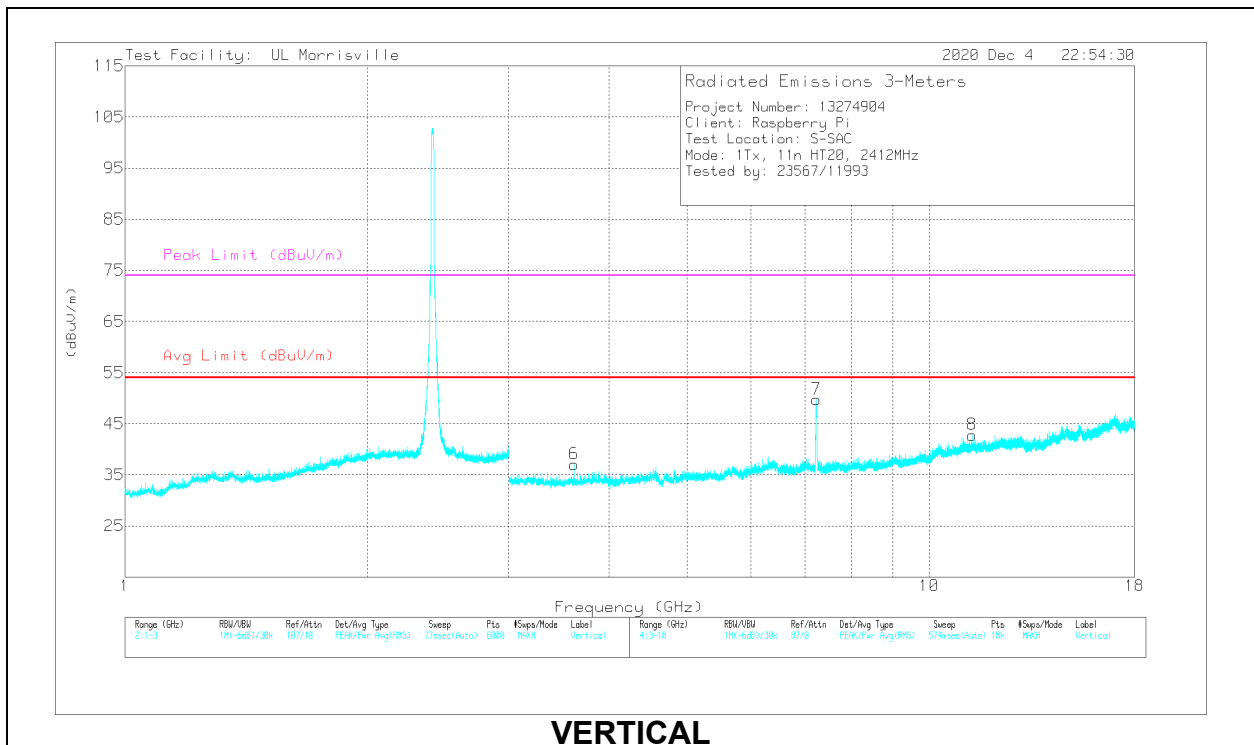
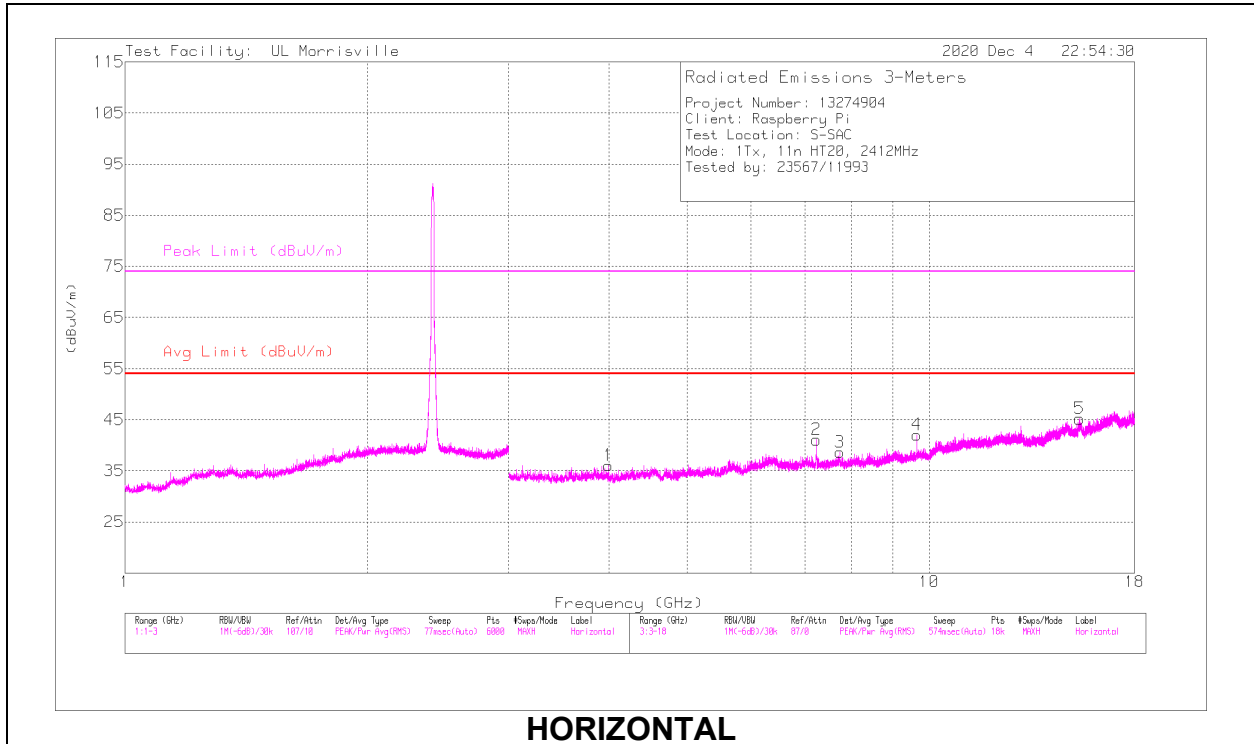


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.4835	60.21	Pk	32.4	-24.4	68.21	-	-	74	-5.79	166	150	V
2	** 2.48391	62.65	Pk	32.4	-24.4	70.65	-	-	74	-3.35	166	150	V
3	*** 2.4835	43.1	ADV	32.4	-24.4	51.1	54	-2.9	-	-	166	150	V
4	*** 2.48362	43.66	ADV	32.4	-24.4	51.66	54	-2.34	-	-	166	150	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 Pk - Peak detector  
 ADV - Linear Voltage Average

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL, CH 1 RESULTS

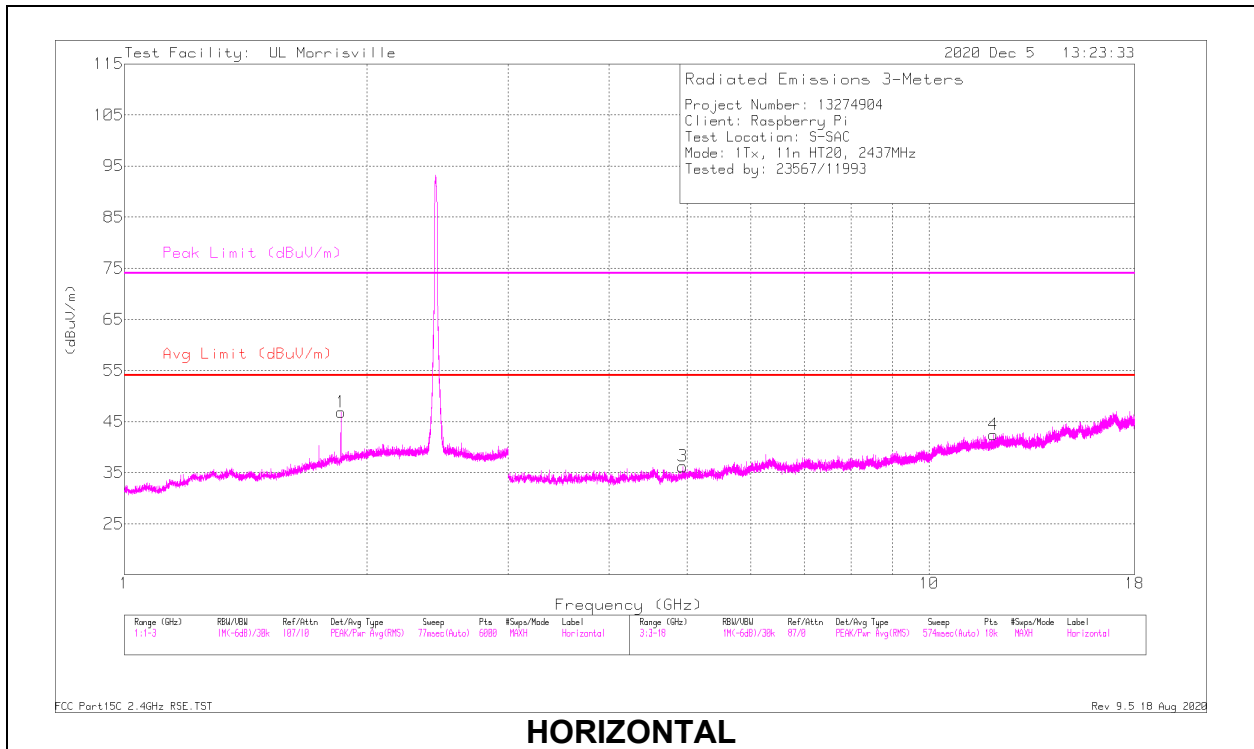


**RADIATED EMISSIONS**

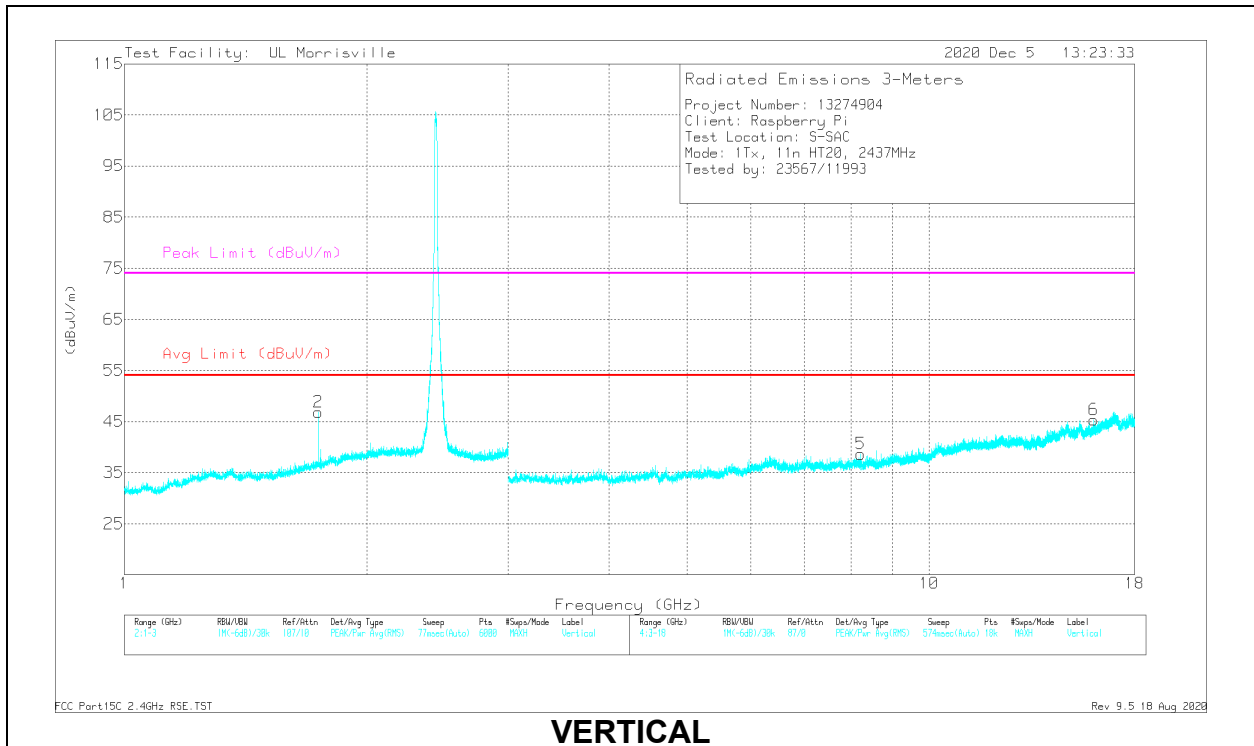
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 3.99001	39.24	PK2	33.4	-31.8	40.84	-	-	74	-33.16	59	161	H
	*** 3.98904	26.19	ADV	33.4	-31.8	27.79	54	-26.21	-	-	59	161	H
3	*** 7.74614	36	PK2	35.7	-27.3	44.4	-	-	74	-29.6	65	322	H
	*** 7.74478	22.61	ADV	35.7	-27.3	31.01	54	-22.99	-	-	65	322	H
5	*** 15.37528	33.26	PK2	40.3	-22.7	50.86	-	-	74	-23.14	132	160	H
	*** 15.37491	20.51	ADV	40.3	-22.7	38.11	54	-15.89	-	-	132	160	H
6	*** 3.61817	42.71	PK2	33	-31.7	44.01	-	-	74	-29.99	206	271	V
	*** 3.61801	33.22	ADV	33	-31.7	34.52	54	-19.48	-	-	206	271	V
8	*** 11.30056	33.58	PK2	38.1	-23.1	48.58	-	-	74	-25.42	28	384	V
	*** 11.30182	20.13	ADV	38.1	-23.1	35.13	54	-18.87	-	-	28	384	V
2	7.23607	33.29	Pk	35.6	-27.8	41.09	-	-	-	-	0-360	101	H
7	7.23607	41.95	Pk	35.6	-27.8	49.75	-	-	-	-	0-360	101	V
4	9.64787	31.56	Pk	36.6	-26.1	42.06	-	-	-	-	0-360	199	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 \*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band  
 PK2 - Maximum Peak  
 ADV - Linear Voltage Average  
 Pk - Peak detector

### MID CHANNEL, CH 6 RESULTS



**HORIZONTAL**



**VERTICAL**



**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/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	** 1.85715	35.26	PK2	30.8	-22.3	43.76	-	-	74	-30.24	64	142	H
	** 1.86013	22.63	ADV	30.8	-22.2	31.23	54	-22.77	-	-	64	142	H
2	** 1.74316	35.76	PK2	29.7	-22.2	43.26	-	-	74	-30.74	157	292	V
	** 1.74135	22.91	ADV	29.7	-22.2	30.41	54	-23.59	-	-	157	292	V
3	*** 4.94091	39.13	PK2	33.9	-30.8	42.23	-	-	74	-31.77	330	251	H
	*** 4.93993	25.91	ADV	33.9	-30.8	29.01	54	-24.99	-	-	330	251	H
4	*** 12.02678	33.8	PK2	38.7	-24	48.5	-	-	74	-25.5	231	157	H
	*** 12.02787	20.43	ADV	38.7	-24	35.13	54	-18.87	-	-	231	157	H
5	*** 8.21692	35.66	PK2	35.8	-27.3	44.16	-	-	74	-29.84	349	340	V
	*** 8.21706	22.33	ADV	35.8	-27.3	30.83	54	-23.17	-	-	349	340	V
6	*** 16.01442	34.51	PK2	40.5	-23.8	51.21	-	-	74	-22.79	4	261	V
	*** 16.01622	21.65	ADV	40.5	-23.8	38.35	54	-15.65	-	-	4	261	V

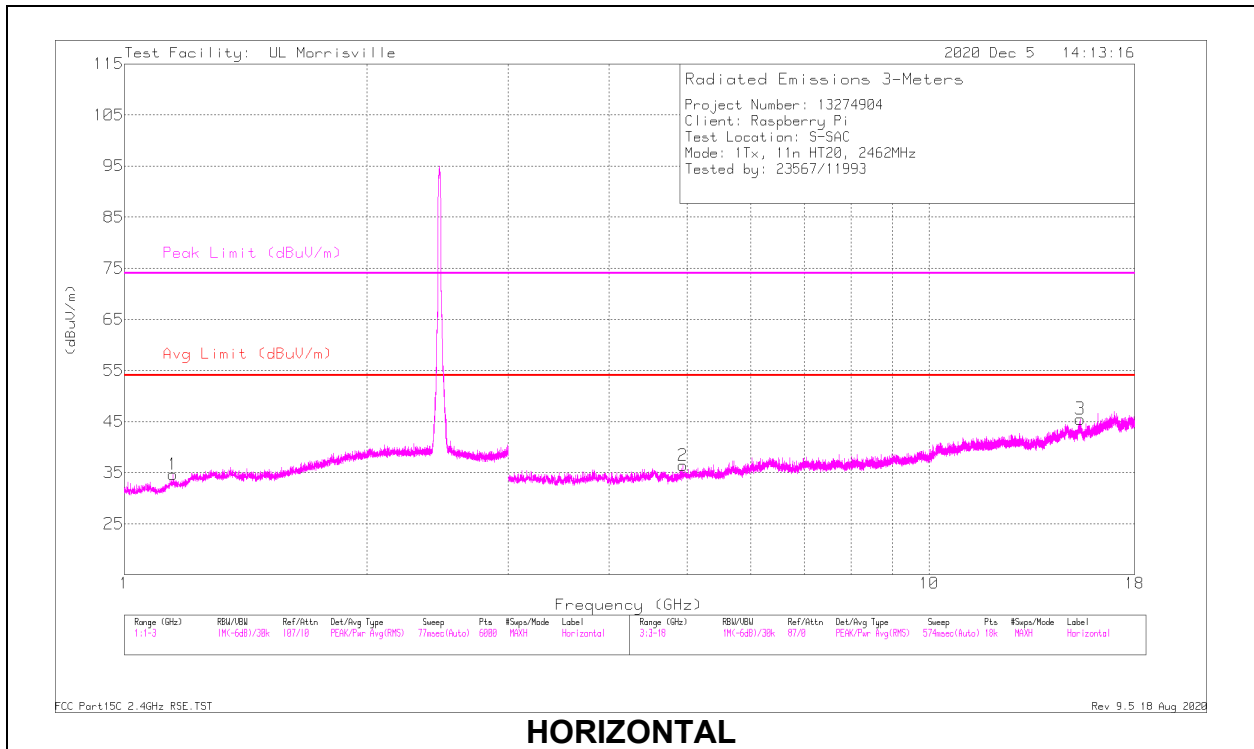
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

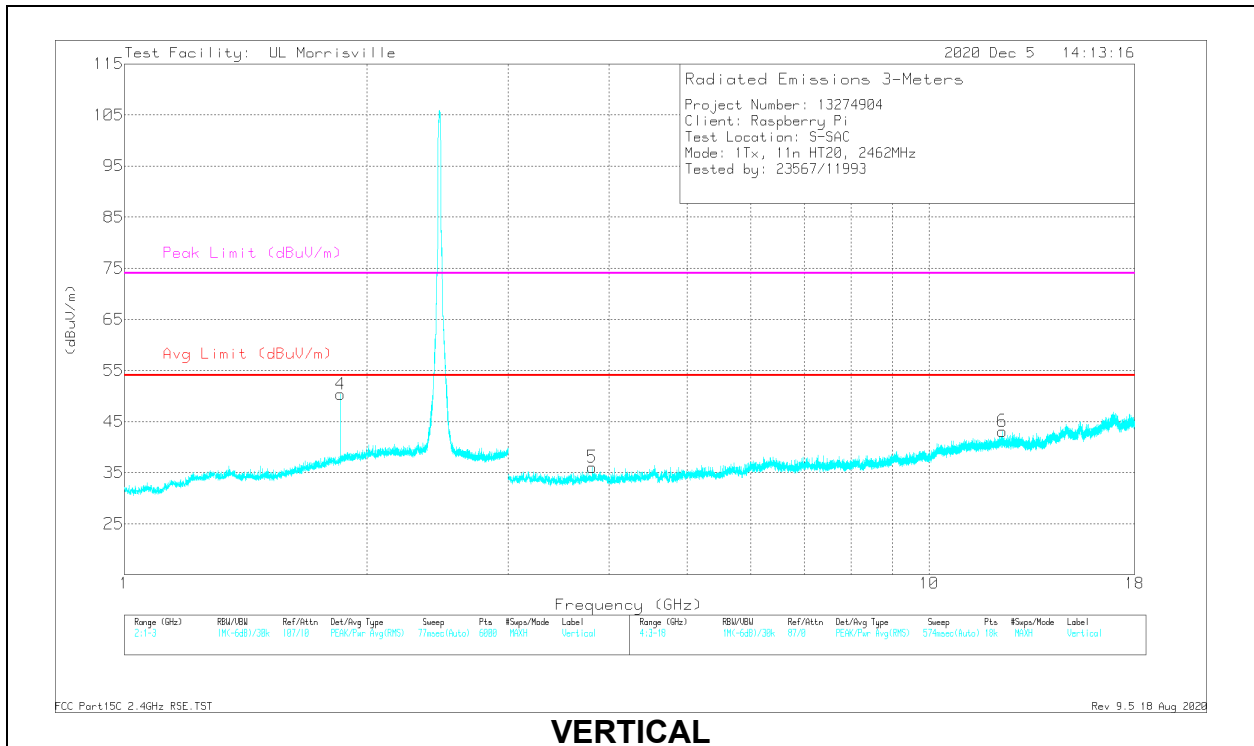
PK2 - Maximum Peak

ADV - Linear Voltage Average

### HIGH CHANNEL, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0067 (dB/m)	Amp/Cbl/Fitr/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	*** 1.15009	36.08	PK2	28.4	-24	40.48	-	-	74	-33.52	96	152	H
	*** 1.14944	22.87	ADV	28.4	-24	27.27	54	-26.73	-	-	96	152	H
4	** 1.85841	35.46	PK2	30.8	-22.2	44.06	-	-	74	-29.94	113	191	V
	** 1.85912	22.85	ADV	30.8	-22.2	31.45	54	-22.55	-	-	113	191	V
2	*** 4.94577	39.23	PK2	33.9	-30.9	42.23	-	-	74	-31.77	62	329	H
	*** 4.94606	25.96	ADV	33.9	-30.9	28.96	54	-25.04	-	-	62	329	H
3	*** 15.4089	33.35	PK2	40.3	-21.9	51.75	-	-	74	-22.25	354	384	H
	*** 15.40935	19.96	ADV	40.3	-21.9	38.36	54	-15.64	-	-	354	384	H
5	*** 3.8164	40.76	PK2	33.3	-32.3	41.76	-	-	74	-32.24	315	164	V
	*** 3.81686	27.47	ADV	33.3	-32.3	28.47	54	-25.53	-	-	315	164	V
6	*** 12.34273	34.22	PK2	38.9	-24	49.12	-	-	74	-24.88	317	144	V
	*** 12.34201	20.86	ADV	38.9	-24	35.76	54	-18.24	-	-	317	144	V

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

\*\* - indicates frequency in Taiwan NCC LP0002 Restricted Band

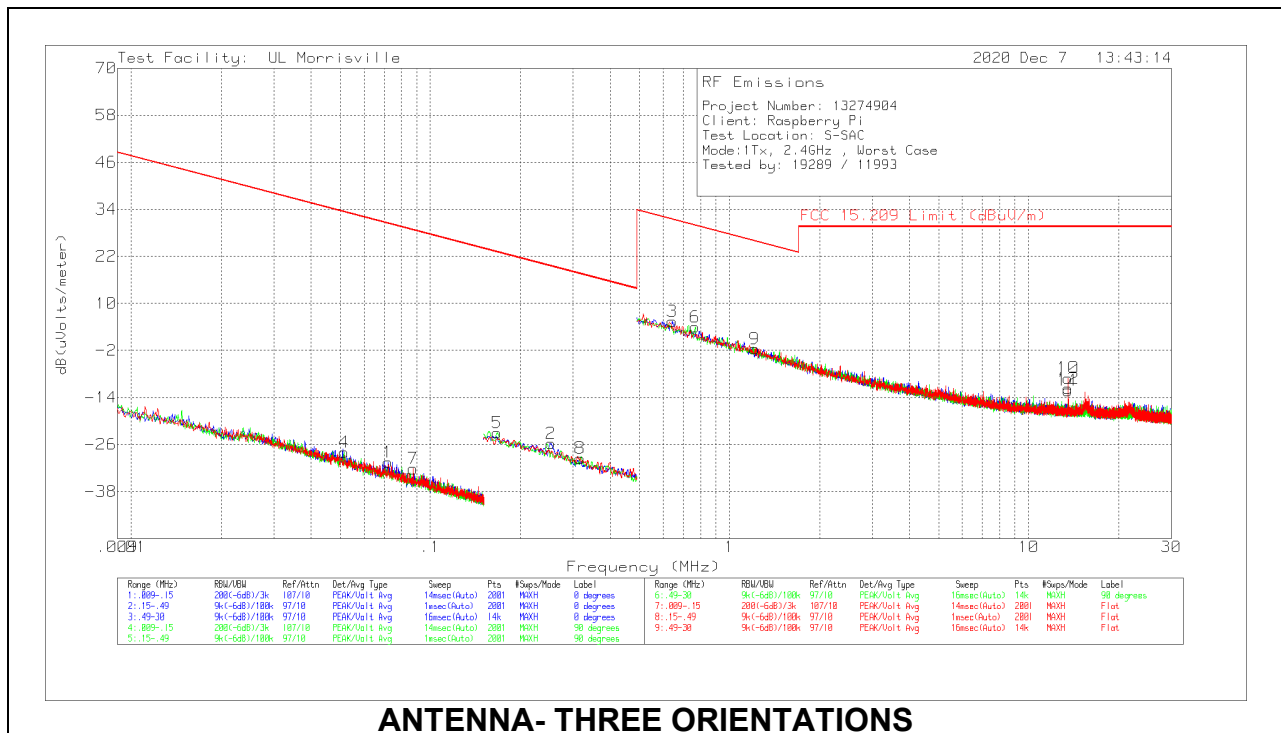
PK2 - Maximum Peak

ADV - Linear Voltage Average

## 10.2. WORST CASE BELOW 30MHZ

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were  $40 \cdot \log(\text{test distance} / \text{specification distance})$ .

The below 30 MHz limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of  $377\Omega$ . For example, the measurement frequency 51.53 kHz resulted in a level of -28.01 dBuV/m, which is equivalent to  $-28.01 - 51.5 = -79.51$  dBuA/m, which has the same margin, -61.37dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

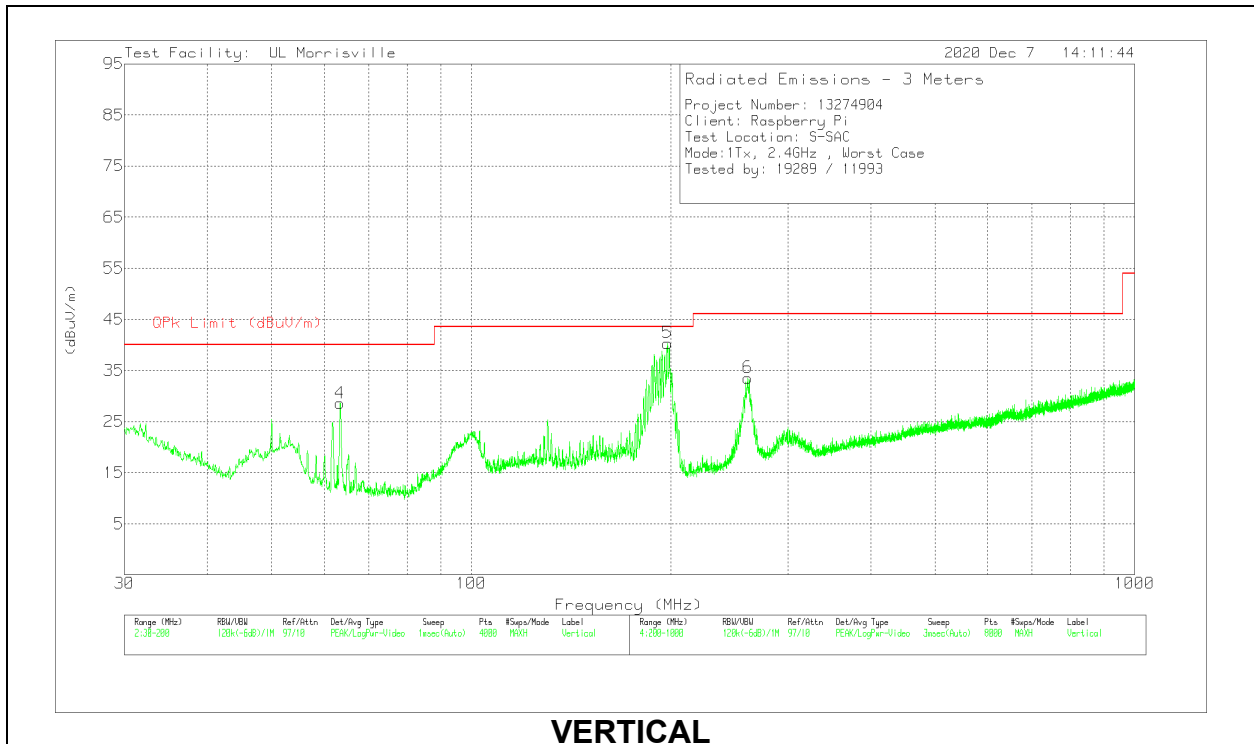
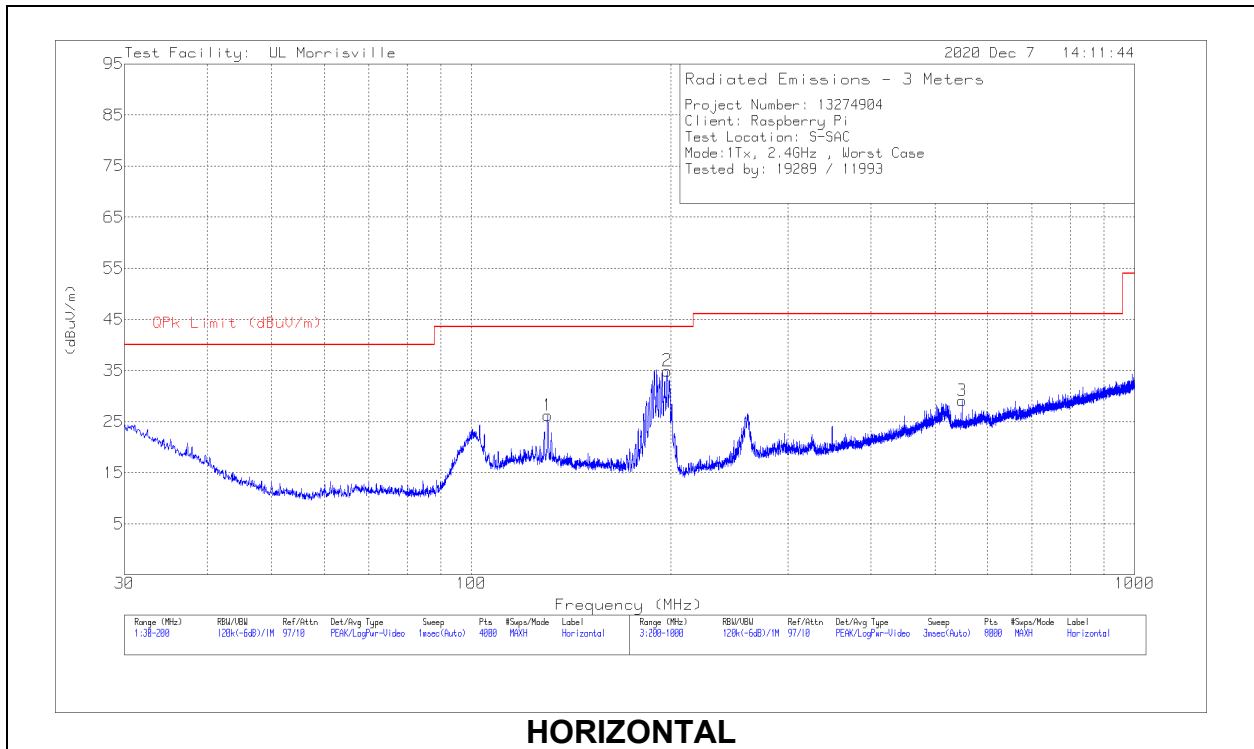


**ANTENNA- THREE ORIENTATIONS**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 AV/QP Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)
4	.05153	40.39	Pk	11.5	.1	-80	-28.01	33.36	53.36	-61.37	0-360
1	.07226	38.19	Pk	11.2	.1	-80	-30.51	30.43	50.43	-60.94	0-360
7	.08767	36.51	Pk	11.2	.1	-80	-32.19	28.75	48.75	-60.94	0-360
5	.16717	46.03	Pk	10.8	.1	-80	-23.07	23.14	43.14	-46.21	0-360
2	.25353	43.41	Pk	10.7	.1	-80	-25.79	19.52	39.52	-45.31	0-360
8	.31677	39.68	Pk	10.7	.1	-80	-29.52	17.59	37.59	-47.11	0-360
3	.64388	34.37	Pk	10.8	.2	-40	5.37	31.43	-	-26.06	0-360
6	.76826	32.93	Pk	10.8	.2	-40	3.93	29.89	-	-25.96	0-360
9	1.21515	27.2	Pk	11	.2	-40	-1.6	25.91	-	-27.51	0-360
12	13.5596	17.25	Pk	10.4	.7	-40	-11.65	29.54	-	-41.19	0-360
11	13.56171	16.68	Pk	10.4	.7	-40	-12.22	29.54	-	-41.76	0-360
10	13.56171	19.85	Pk	10.4	.7	-40	-9.05	29.54	-	-38.59	0-360

Pk - Peak detector

### 10.3. WORST CASE 30-1000MHZ

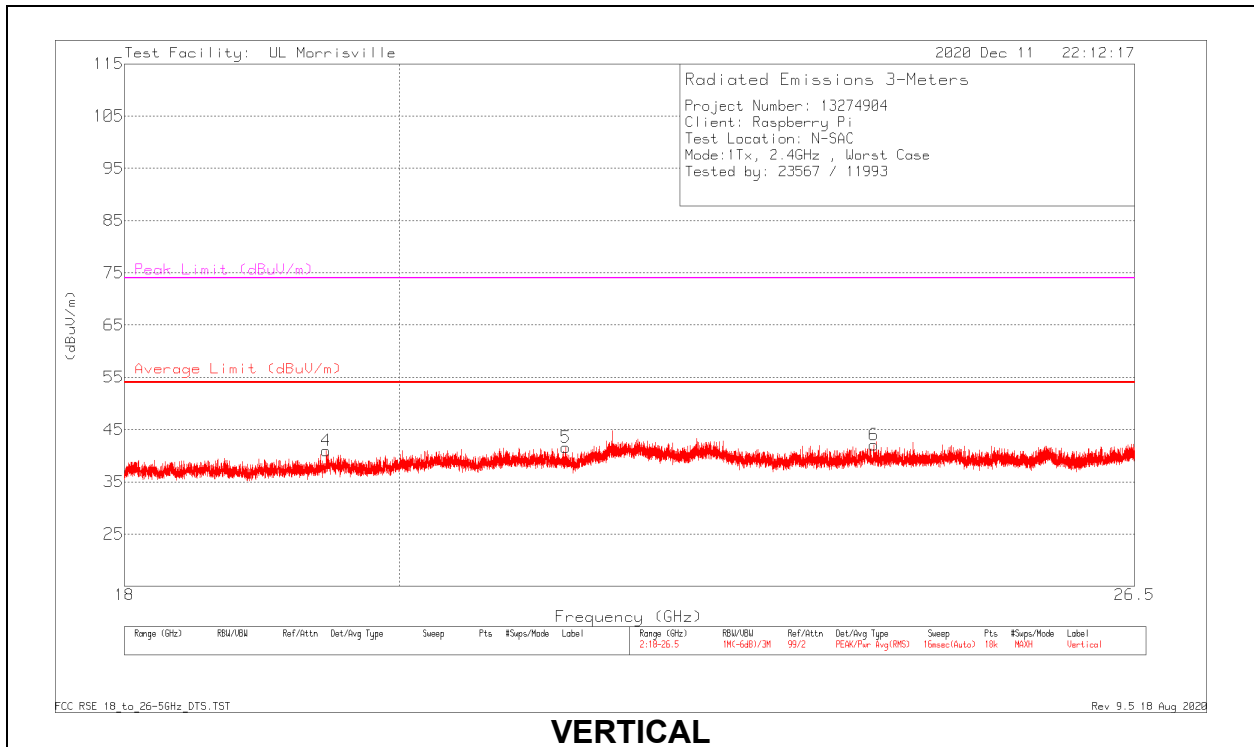
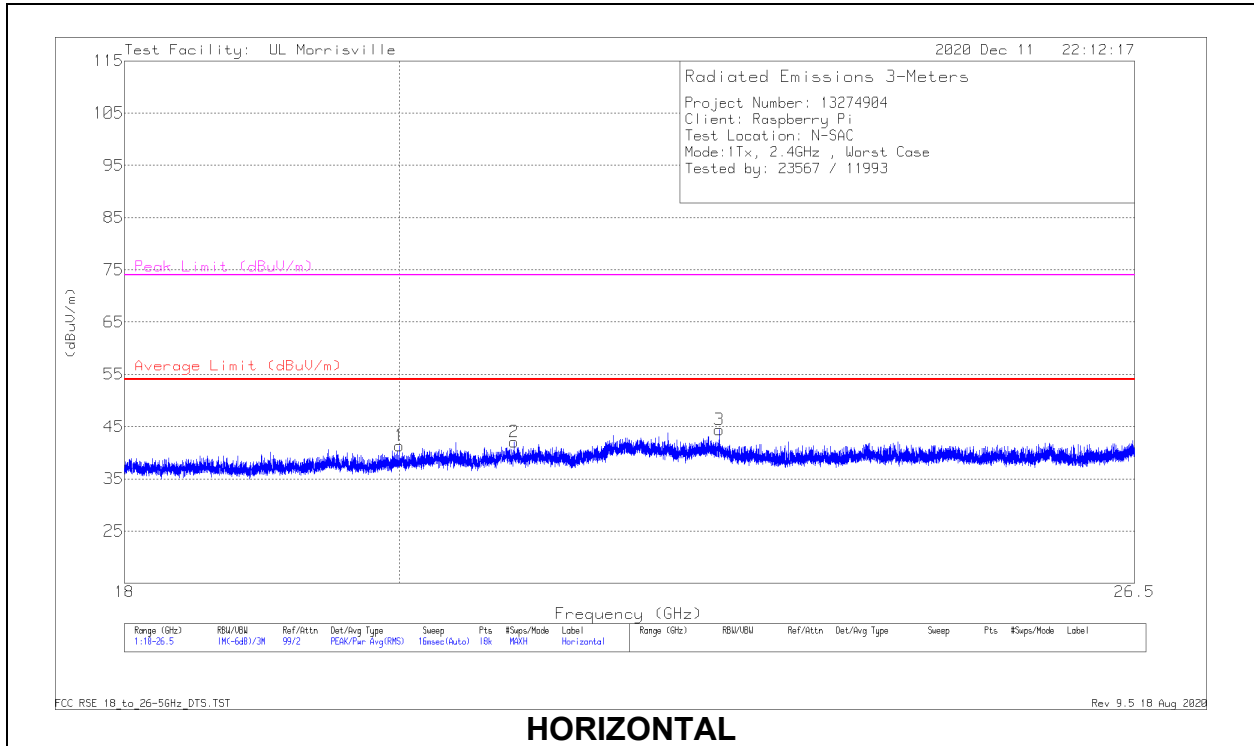


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0075 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	63.4136	45.81	Pk	13.9	-31.1	28.61	40	-11.39	0-360	101	V
1	130.3685	36.39	Pk	20	-30.2	26.19	43.52	-17.33	0-360	200	H
2	197.5359	46.03	Pk	18.5	-29.6	34.93	43.52	-8.59	0-360	200	H
5	197.5684	47.09	Qp	18.5	-29.6	35.99	43.52	-7.53	18	103	V
6	261.208	44.46	Pk	18.1	-29	33.56	46.02	-12.46	0-360	101	V
3	550.0455	32.4	Pk	24.3	-27.6	29.1	46.02	-16.92	0-360	101	H

QP- Quasi Peak detector

Pk - Peak detector

### 10.4. WORST CASE 18-26 GHZ



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0063 AF (dB/m)	Amp/CBL (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 19.99666	48.43	Pk	33.7	-40.8	41.33	54	-12.67	74	-32.67	0-360	150	H
2	*** 20.8963	48.68	Pk	34.1	-40.7	42.08	54	-11.92	74	-31.92	0-360	200	H
3	*** 22.60395	49.16	Pk	36.1	-40.9	44.36	54	-9.64	74	-29.64	0-360	299	H
4	*** 19.44555	48.02	Pk	33.4	-40.5	40.92	54	-13.08	74	-33.08	0-360	200	V
5	*** 21.31471	48.25	Pk	34.5	-41.2	41.55	54	-12.45	74	-32.45	0-360	150	V
6	*** 23.98102	47.75	Pk	34.9	-40.6	42.05	54	-11.95	74	-31.95	0-360	150	V

Pk - Peak detector



## 11. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

\*Decreases with the logarithm of the frequency.

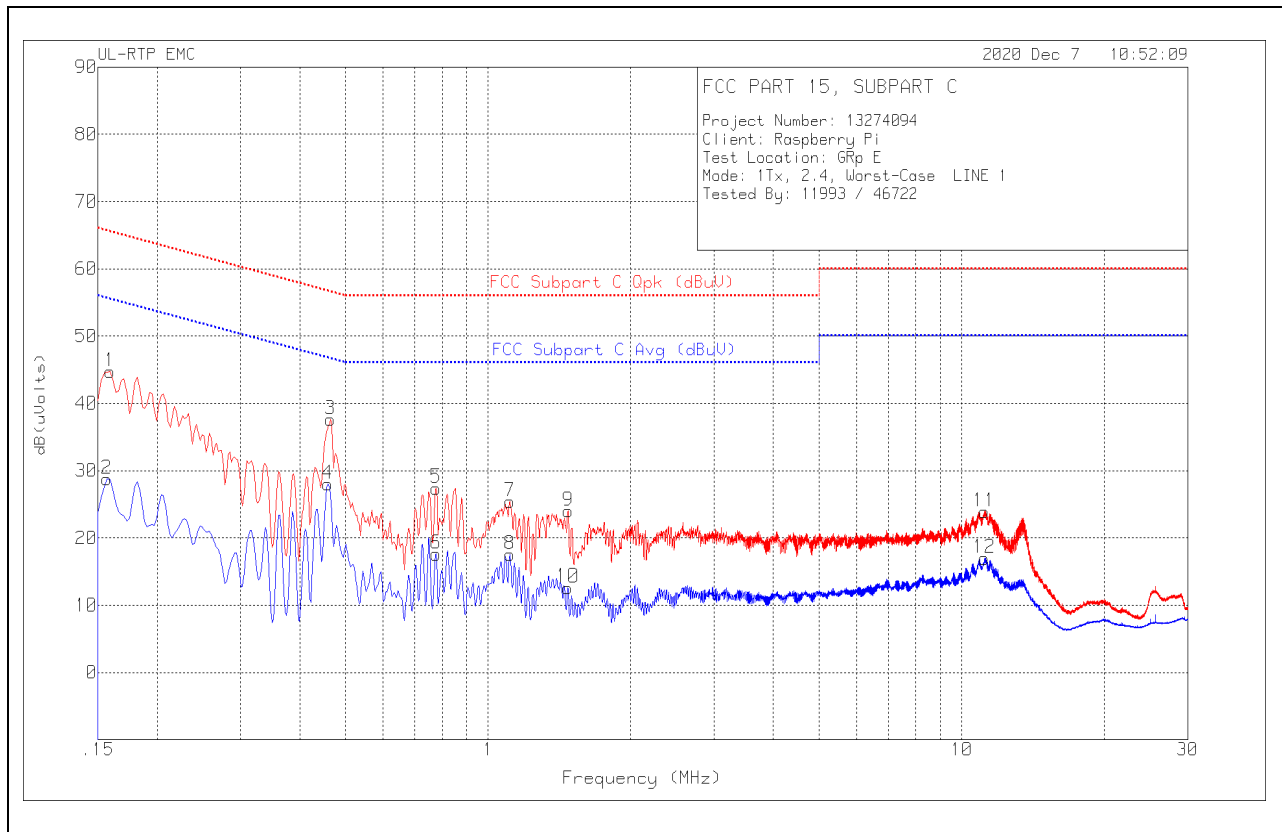
### TEST PROCEDURE

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

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

Line conducted data is recorded for both lines.

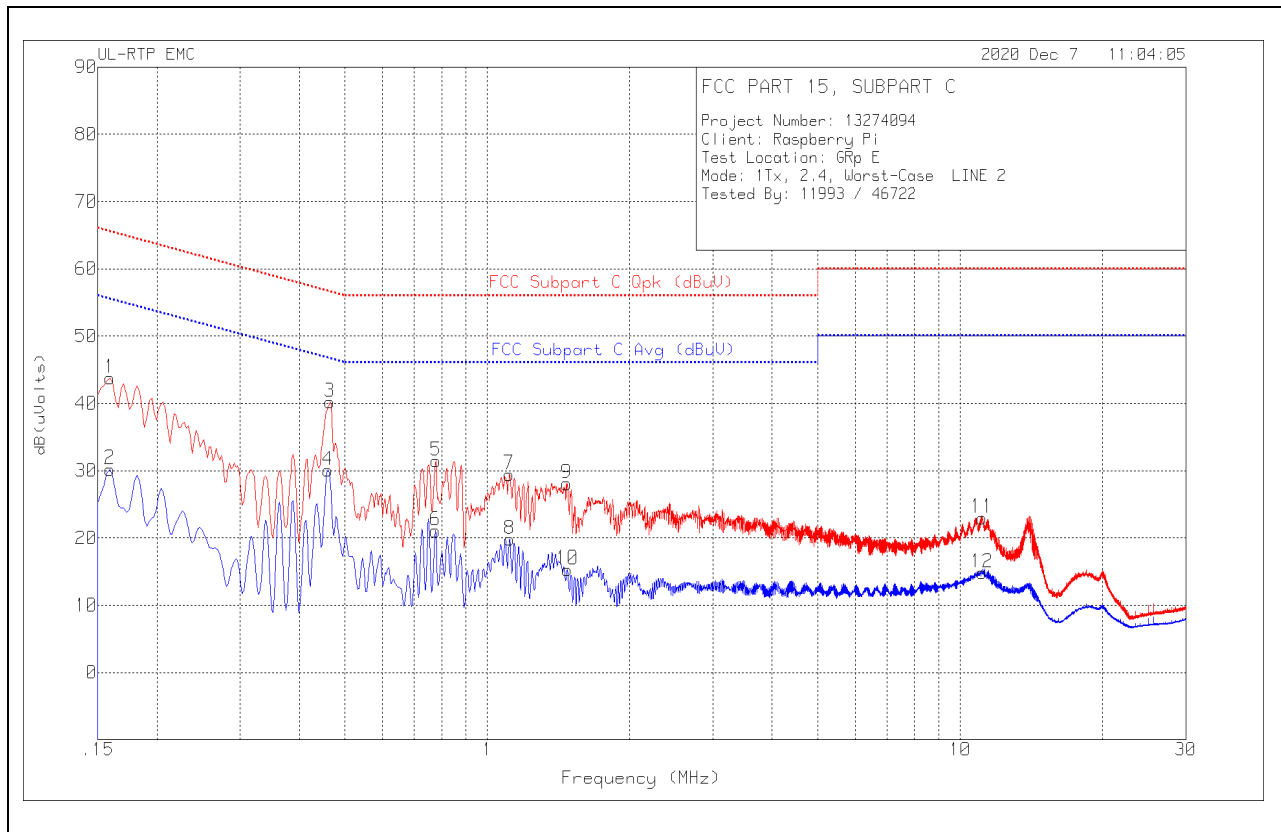
### 11.1. LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_ATA508 (dB)	Corrected Reading dB(uVolts)	FCC Subpart C Qpk (dBuV)	Margin (dB)	FCC Subpart C Avg (dBuV)	Margin (dB)
2	.15675	19.37	Ca	.1	9.3	28.77	-	-	55.63	-26.86
4	.45825	18.68	Ca	0	9.3	27.98	-	-	46.72	-18.74
6	.7755	8.21	Ca	0	9.4	17.61	-	-	46	-28.39
8	1.11075	8.12	Ca	0	9.4	17.52	-	-	46	-28.48
10	1.473	3.21	Ca	0	9.4	12.61	-	-	46	-33.39
12	11.148	7.35	Ca	0	9.6	16.95	-	-	50	-33.05
1	.159	35.34	Qp	.1	9.3	44.74	65.52	-20.78	-	-
3	.465	28.29	Qp	0	9.3	37.59	56.6	-19.01	-	-
5	.7755	18	Qp	0	9.4	27.4	56	-28.6	-	-
7	1.11075	16	Qp	0	9.4	25.4	56	-30.6	-	-
9	1.47525	14.59	Qp	0	9.4	23.99	56	-32.01	-	-
11	11.148	14.31	Qp	0	9.6	23.91	60	-36.09	-	-

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

### 11.2. LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_ATA508 (dB)	Corrected Reading dB(uVolts)	FCC Subpart C Qpk (dBuV)	Margin (dB)	FCC Subpart C Avg (dBuV)	Margin (dB)
2	.159	20.81	Ca	.1	9.3	30.21	-	-	55.52	-25.31
4	.4605	20.77	Ca	0	9.3	30.07	-	-	46.68	-16.61
6	.7755	11.66	Ca	0	9.4	21.06	-	-	46	-24.94
8	1.11525	10.37	Ca	0	9.4	19.77	-	-	46	-26.23
10	1.47525	5.9	Ca	0	9.4	15.3	-	-	46	-30.7
12	11.1255	5.22	Ca	0	9.6	14.82	-	-	50	-35.18
1	.159	34.36	Qp	.1	9.3	43.76	65.52	-21.76	-	-
3	.465	30.9	Qp	0	9.3	40.2	56.6	-16.4	-	-
5	.77775	22.03	Qp	0	9.4	31.43	56	-24.57	-	-
7	1.113	20.06	Qp	0	9.4	29.46	56	-26.54	-	-
9	1.47075	18.67	Qp	0	9.4	28.07	56	-27.93	-	-
11	11.12775	13.37	Qp	0	9.6	22.97	60	-37.03	-	-

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

## 12. SETUP PHOTOS

Please refer to R13274094-EP1 for setup photos.

**END OF TEST REPORT**