

# Test Report # 319379 A (WLAN)

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**Equipment Under Test:** SmartCraft Connect

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**Test Date(s):** August 6<sup>th</sup> – November 17<sup>th</sup>, 2020

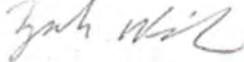
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**Prepared for:** Brunswick Corporation  
Attn: Andrew Sember  
W6250 Pioneer Road  
Fond du Lac, WI 54936

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**Report Issued by:** Zach Wilson, EMC Engineer

Signature: 

Date: 1/12/2021

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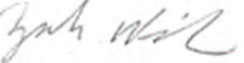
**Report Reviewed by:** Adam Alger, Quality Manager

Signature: 

Date: 11/18/2020

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**Report Constructed by:** Zach Wilson, EMC Engineer

Signature: 

Date: 10/29/2020

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## Laird Connectivity Test Services in Review

The Laird Connectivity, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



### **A2LA – American Association for Laboratory Accreditation**

*Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope*

*A2LA Certificate Number: 1255.01*

*Scope of accreditation includes all test methods listed herein unless otherwise noted*



### **Federal Communications Commission (FCC) – USA**

*Accredited Test Firm Registration Number: 953492*

*Recognition of two 3 meter Semi-Anechoic Chambers*



### **Innovation, Science and Economic Development Canada**

*Accredited U.S. Identification Number: US0218*

*Recognition of two 3 meter Semi-Anechoic Chambers*

|                                |              |                            |
|--------------------------------|--------------|----------------------------|
| Company: Brunswick Corporation | Page 3 of 53 | Name: SmartCraft Connect   |
| Report: TR319379 A             |              | Model: SCC-1               |
| Job: C-3380                    |              | Serial: Engineering Sample |

## 1 TEST REPORT SUMMARY

During **August 6<sup>th</sup> – November 17<sup>th</sup>, 2020** the Equipment Under Test (EUT), **SmartCraft Connect**, as provided by **Brunswick Corporation** was tested to the following requirements of the **Federal Communications Commission and Innovation, Science and Economic Development Canada**:

### FCC 15.247 and RSS-247, DTS

| Requirement                               | Description                                               | Specification             | Method      | Result    |
|-------------------------------------------|-----------------------------------------------------------|---------------------------|-------------|-----------|
| FCC: 15.247 (a)(2)<br>IC: RSS-247 5.2 (a) | Digital Modulation System 6 dB bandwidth                  | 500 kHz                   | ANSI C63.10 | Compliant |
| FCC: 2.1049<br>IC: RSS-GEN 6.7            | Occupied Bandwidth                                        | Reported                  | ANSI C63.10 | Reported  |
| FCC: 15.247 (b)(3)<br>IC: RSS-247 5.4 (d) | Maximum Conducted Output Power                            | 30 dBm                    | ANSI C63.10 | Compliant |
| FCC: 15.247 (e)<br>IC: RSS-247 5.2 (b)    | Digital Modulation System Power Spectral Density          | 8 dBm / 3 kHz             | ANSI C63.10 | Compliant |
| FCC: 15.247 (d)<br>IC: RSS-247 5.5        | RF Spurious Emissions at the Transmitter Antenna Terminal | 20 dBc                    | ANSI C63.10 | Compliant |
| FCC: 15.247 (d)<br>IC: RSS-GEN 8.10       | Spurious Radiated Emissions in Restricted Bands           | FCC 15.209<br>RSS-GEN 8.9 | ANSI C63.10 | Compliant |
| FCC: 2.1055 (d)<br>IC: RSS-GEN 6.11       | Frequency Stability                                       | Reported                  | ANSI C63.10 | Reported  |

### Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

| Measurement Type      | Rule                           |
|-----------------------|--------------------------------|
| Emissions – Amplitude | 1 dB below specified limit     |
| Emissions – Frequency | 1% less than the specification |
| Immunity              | Tested at specified level      |

## 2 CLIENT INFORMATION

|                       |                                             |
|-----------------------|---------------------------------------------|
| <b>Company Name</b>   | Brunswick Corporation                       |
| <b>Contact Person</b> | Andrew Sember                               |
| <b>Address</b>        | W6250 Pioneer Road<br>Fond du Lac, WI 54936 |

### 2.1 Equipment Under Test (EUT) Information

*The following information has been supplied by the client*

|                      |                    |
|----------------------|--------------------|
| <b>Product Name</b>  | SmartCraft Connect |
| <b>Model Number</b>  | SCC-1              |
| <b>Serial Number</b> | Engineering Sample |
| <b>FCC ID</b>        | 2APYL-GH19392020   |
| <b>IC ID</b>         | 26775-HG19392020   |

### 2.2 Product Description

The EUT is a multimedia device for a motorboat. It is powered by 12VDC. The EUT contains the SILabs WFM200S022XNN WLAN 2.4 GHz Module with a Johanson Chip Antenna. The EUT also contains the SILabs EFR32BG21A010F1024IM32-BR BLE module with a Johanson Chip Antenna. The radios are not capable of simultaneous transmission.

### 2.3 Modifications Incorporated for Compliance

None noted at time of test

### 2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

### 2.5 Channels and Orientations

The channels 1 (2412MHz), 6 (2437MHz), and 11 (2462MHz) were tested. Side and vertical orientations were tested.

## 2.6 Radio Programming

The radio is programmed via the customer created program; Mercury RF Tester, v1.0.4. This program was installed on a provided PC.

## 2.7 Power Tables

| Power Settings Used |          |           |               |
|---------------------|----------|-----------|---------------|
| Channel             | Protocol | Data Rate | Power Setting |
| 1                   | 802.11g  | 6 Mbps    | 8             |
| 11                  | 802.11g  | 6 Mbps    | 8             |
| 1                   | 802.11g  | 54 Mbps   | 30            |
| 11                  | 802.11g  | 54 Mbps   | 30            |
| 1                   | 802.11b  | 1 Mbps    | 30            |
| 11                  | 802.11b  | 1 Mbps    | 30            |
| 1                   | 802.11b  | 11 Mbps   | 30            |
| 11                  | 802.11b  | 11 Mbps   | 30            |
| 1                   | 802.11n  | MCS0      | 8             |
| 11                  | 802.11n  | MCS0      | 8             |
| 1                   | 802.11n  | MCS7      | 30            |
| 11                  | 802.11n  | MCS7      | 30            |

### 3 REFERENCES

| Publication    | Edition | Date | AMD 1 |
|----------------|---------|------|-------|
| CFR 47 Part 15 | -       | 2020 | -     |
| RSS-GEN        | 5       | 2014 | 2019  |
| RSS-247        | 2       | 2017 | -     |
| ANSI C63.10    |         | 2013 |       |

## 4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of  $k = 2$ .

| References      | Version / Date   |
|-----------------|------------------|
| CISPR 16-4-1    | Ed. 2 (2009-02)  |
| CISPR 16-4-2    | Ed. 2 (2011-06)  |
| CISPR 32        | Ed. 1 (2012-01)  |
| ANSI C63.23     | 2012             |
| A2LA P103       | February 4, 2016 |
| A2LA P103c      | August 10, 2015  |
| ETSI TR 100-028 | V1.3.1 (2001-03) |

| Measurement Type            | Configuration                 | Uncertainty $\pm$ |
|-----------------------------|-------------------------------|-------------------|
| Radiated Emissions          | Biconical Antenna             | 5.0 dB            |
| Radiated Emissions          | Log Periodic Antenna          | 5.3 dB            |
| Radiated Emissions          | Horn Antenna                  | 4.7 dB            |
| AC Line Conducted Emissions | Artificial Mains Network      | 3.4 dB            |
| Telecom Conducted Emissions | Asymmetric Artificial Network | 4.9 dB            |
| Disturbance Power Emissions | Absorbing Clamp               | 4.1 dB            |
| Radiated Immunity           | 3 Volts/meter                 | 2.2 dB            |
| Conducted Immunity          | CDN/EM/BCI                    | 2.4/3.5/3.4 dB    |
| EFT Burst/Surge             | Peak pulse voltage            | 164 volts         |
| ESD Immunity                | 15 kV level                   | 1377 Volts        |

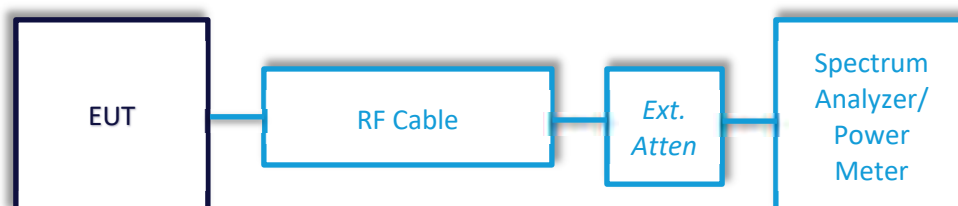
| Parameter                                  | ETSI U.C. $\pm$    | U.C. $\pm$            |
|--------------------------------------------|--------------------|-----------------------|
| Radio Frequency, from F0                   | $1 \times 10^{-7}$ | $0.55 \times 10^{-7}$ |
| Occupied Channel Bandwidth                 | 5 %                | 2 %                   |
| RF conducted Power (Power Meter)           | 1.5 dB             | 1.2 dB                |
| RF conducted emissions (Spectrum Analyzer) | 3.0 dB             | 1.7 dB                |
| All emissions, radiated                    | 6.0 dB             | 5.3 dB                |
| Temperature                                | 1° C               | 0.65° C               |
| Humidity                                   | 5 %                | 2.9 %                 |
| Supply voltages                            | 3 %                | 1 %                   |

## 5 TEST DATA

### 5.1 Antenna Port Conducted Emissions

|                                   |                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of Measurement</b> | <p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p> |
| <b>Example Calculations</b>       | <p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>                                                                                                                                                                  |

#### Block Diagram



## Instrumentation



Date : 29-Oct-2020 Test : Conducted Radio Job : C-3380  
 PE : Zach Wilson Customer : Mercury Marine Quote : 319379

| No. | Asset     | Description         | Manufacturer | Model        | Serial     | Cal Date  | Cal Due Date | Equipment Status    |
|-----|-----------|---------------------|--------------|--------------|------------|-----------|--------------|---------------------|
| 1   | EE 960087 | Analyzer - Spectrum | Agilent      | N9010A       | MY53400296 | 7/14/2019 | 7/14/2021    | Active Calibration  |
| 2   | AA 960144 | Cable               | Gore         | EKD01D010720 | 5800373    | 12/9/2019 | 12/9/2020    | Active Verification |



Date : 6-Nov-2020 Test : Conducted Radio Job : C-3380  
 PE : Zach Wilson Customer : Mercury Marine Quote : 319379

| No. | Asset    | Description    | Manufacturer | Model  | Serial     | Cal Date   | Cal Due Date | Equipment Status   |
|-----|----------|----------------|--------------|--------|------------|------------|--------------|--------------------|
| 1   | RE 20001 | Power Analyzer | Keysight     | 8990B  | MY51000458 | 7/14/2019  | 10/28/2021   | Active Calibration |
| 2   | RE 20002 | Power Sensor   | Keysight     | NI924A | MY55290003 | 10/27/2020 | 10/27/2021   | Active Calibration |

### 5.1.1 DTS and 99% Bandwidth

|                    |                 |                 |                                           |
|--------------------|-----------------|-----------------|-------------------------------------------|
| <b>Operator</b>    | Shane Dock      | <b>QA</b>       | Jon Dilley                                |
| <b>Temperature</b> | 22.7°C          | <b>R.H. %</b>   | 47.5%                                     |
| <b>Test Date</b>   | 8/13/2020       | <b>Location</b> | Conducted Radio                           |
| <b>Requirement</b> | FCC 15.247 §a.2 | <b>Method</b>   | ANSI C63.10 §11.8.2<br>ANSI C63.10 §6.9.3 |

#### Limits:

DTS BW: > 500 kHz

99%: Reported

#### Test Parameters

|                    |                             |              |                            |
|--------------------|-----------------------------|--------------|----------------------------|
| <b>Frequency</b>   | 2412MHz, 2437MHz, 2462MHz   | <b>Setup</b> | Conducted                  |
| <b>RBW</b>         | DTS: 100kHz<br>99%: 200kHz  | <b>VBW</b>   | DTS: 300kHz<br>99%: 620kHz |
| <b>Detector(s)</b> | Max hold with peak detector | <b>Span</b>  | 30MHz                      |

#### EUT Parameters

|                    |          |                   |                                                              |
|--------------------|----------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b> | 12VDC    | <b>Mode</b>       | WLAN TX                                                      |
| <b>Channels</b>    | 1, 6, 11 | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |

## Data Tables

| 802.11b 1Mbps |              |               |
|---------------|--------------|---------------|
| Channel       | 99% BW (kHz) | 6 dB BW (MHz) |
| 1             | 12693.00     | 8.05          |
| 6             | 12663.00     | 8.06          |
| 11            | 12634.00     | 8.08          |

| 802.11b 11Mbps |              |               |
|----------------|--------------|---------------|
| Channel        | 99% BW (kHz) | 6 dB BW (MHz) |
| 1              | 14538.00     | 10.60         |
| 6              | 14585.00     | 9.94          |
| 11             | 14564.00     | 10.79         |

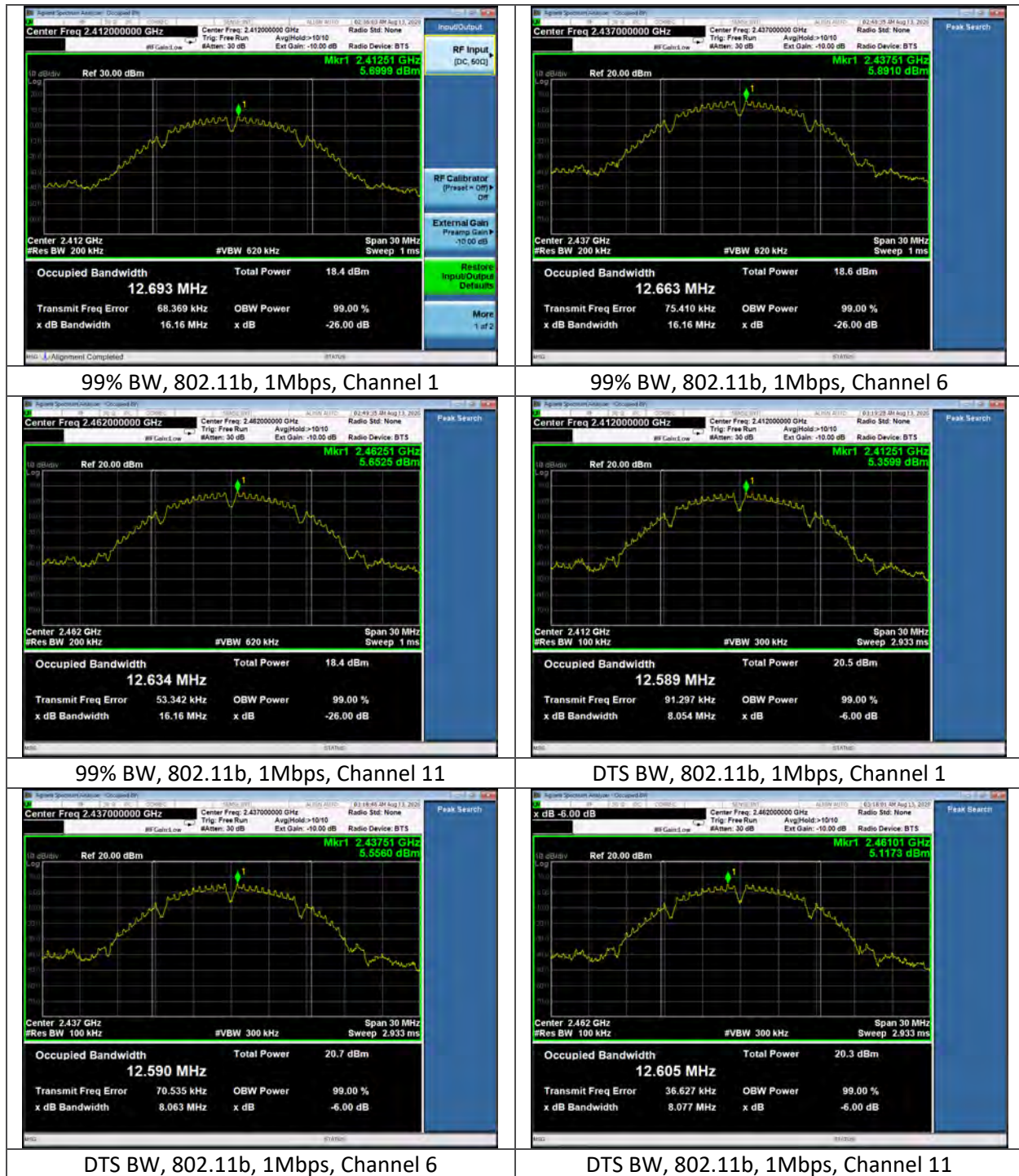
| 802.11g 6Mbps |              |               |
|---------------|--------------|---------------|
| Channel       | 99% BW (kHz) | 6 dB BW (MHz) |
| 1             | 17053.00     | 14.06         |
| 6             | 17022.00     | 15.11         |
| 11            | 17025.00     | 15.11         |

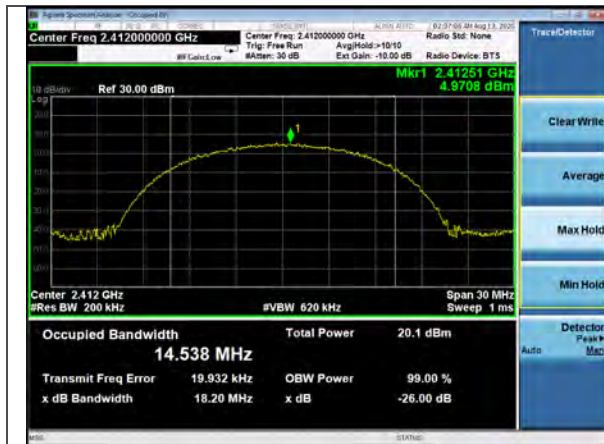
| 802.11g 54Mbps |              |               |
|----------------|--------------|---------------|
| Channel        | 99% BW (kHz) | 6 dB BW (MHz) |
| 1              | 16518.00     | 16.47         |
| 6              | 16494.00     | 16.49         |
| 11             | 16494.00     | 16.48         |

| 802.11n MCS0 |              |               |
|--------------|--------------|---------------|
| Channel      | 99% BW (kHz) | 6 dB BW (MHz) |
| 1            | 17802.00     | 15.09         |
| 6            | 17796.00     | 15.11         |
| 11           | 17750.00     | 15.11         |

| 802.11n MCS7 |              |               |
|--------------|--------------|---------------|
| Channel      | 99% BW (kHz) | 6 dB BW (MHz) |
| 1            | 17583.00     | 17.62         |
| 6            | 17619.00     | 17.70         |
| 11           | 17633.00     | 17.63         |

## Plots

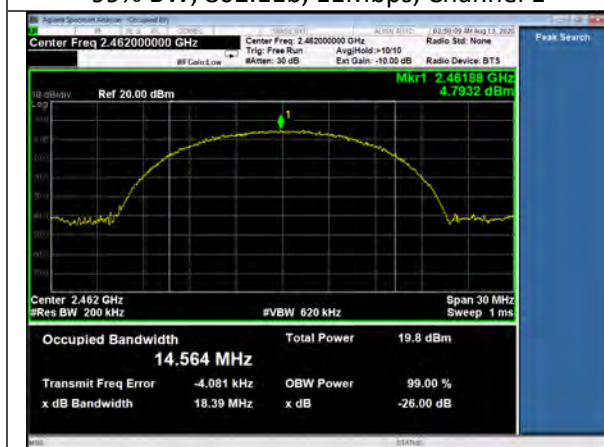




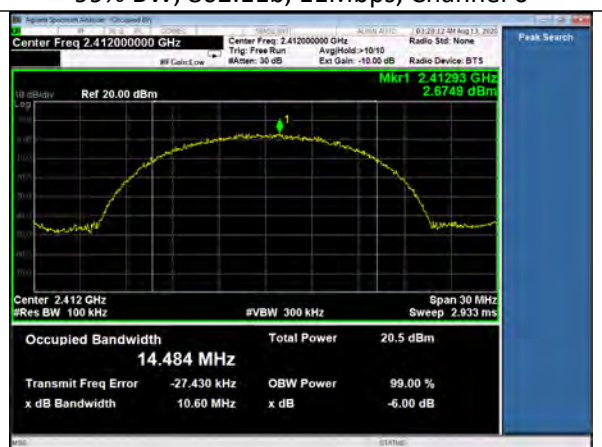
99% BW, 802.11b, 11Mbps, Channel 1



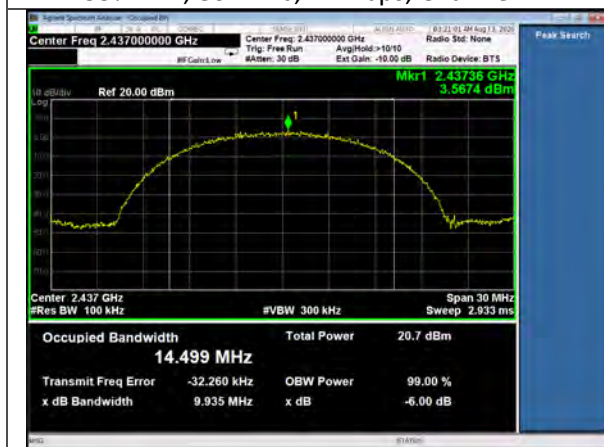
99% BW, 802.11b, 11Mbps, Channel 6



99% BW, 802.11b, 11Mbps, Channel 11



DTS BW, 802.11b, 11Mbps, Channel 1



DTS BW, 802.11b, 11Mbps, Channel 6



DTS BW, 802.11b, 11Mbps, Channel 11



99% BW, 802.11g, 6Mbps, Channel 1



99% BW, 802.11g, 6Mbps, Channel 6



99% BW, 802.11g, 6Mbps, Channel 11



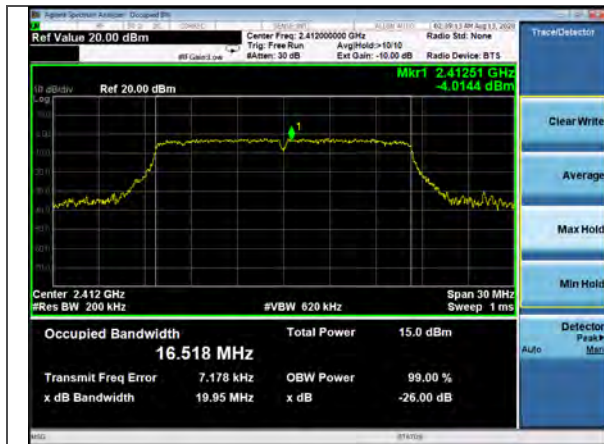
DTS BW, 802.11g, 6Mbps, Channel 1



DTS BW, 802.11g, 6Mbps, Channel 6



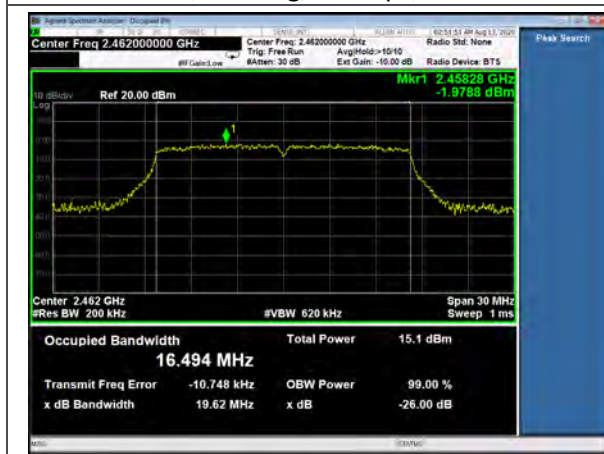
DTS BW, 802.11g, 6Mbps, Channel 11



99% BW, 802.11g, 54Mbps, Channel 1



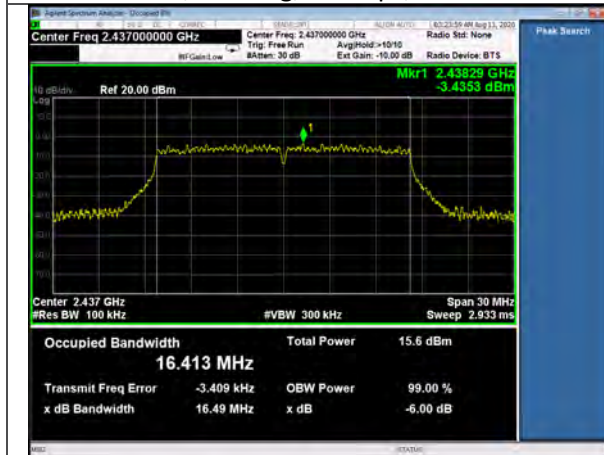
99% BW, 802.11g, 54Mbps, Channel 6



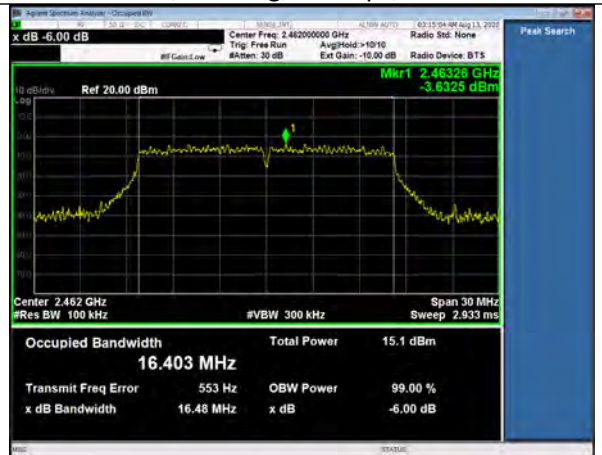
99% BW, 802.11g, 54Mbps, Channel 11



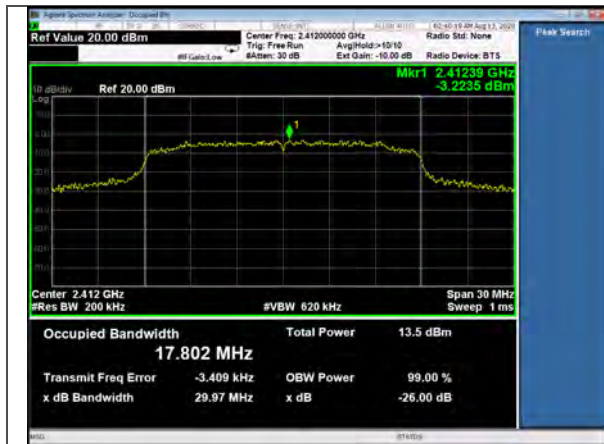
DTS BW, 802.11g, 54Mbps, Channel 1



DTS BW, 802.11g, 54Mbps, Channel 6



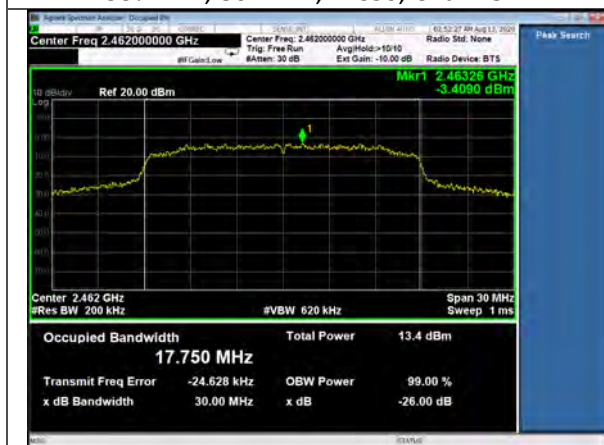
DTS BW, 802.11g, 54Mbps, Channel 11



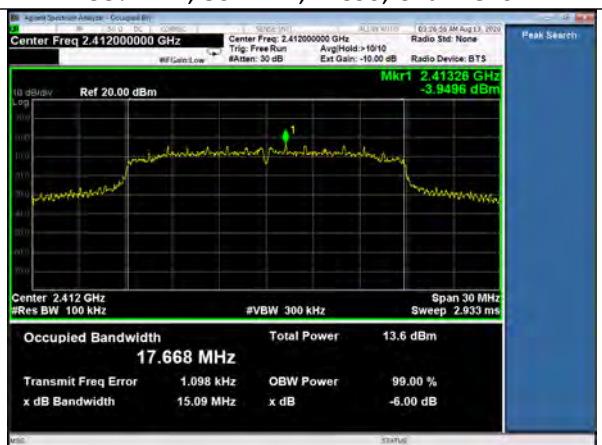
99% BW, 802.11n, MCS0, Channel 1



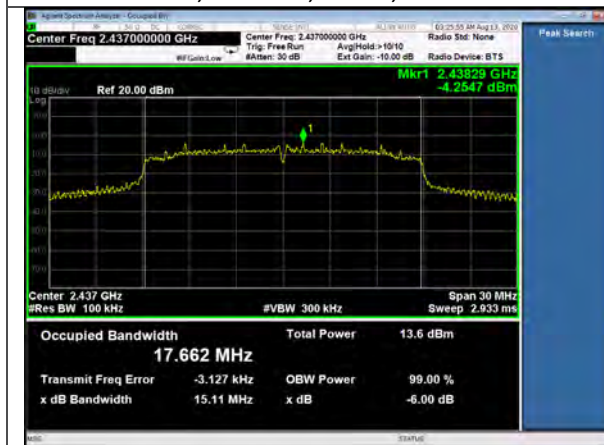
99% BW, 802.11n, MCS0, Channel 6



99% BW, 802.11n, MCS0, Channel 11



DTS BW, 802.11n, MCS0, Channel 1



DTS BW, 802.11n, MCS0, Channel 6



DTS BW, 802.11n, MCS0, Channel 11



### 5.1.2 Duty Cycle

|                    |                   |                 |                 |
|--------------------|-------------------|-----------------|-----------------|
| <b>Operator</b>    | Shane Dock        | <b>QA</b>       | Jon Dilley      |
| <b>Temperature</b> | 22.7°C            | <b>R.H. %</b>   | 47.5%           |
| <b>Test Date</b>   | 8/13/2020         | <b>Location</b> | Conducted Radio |
| <b>Method</b>      | ANSI C63.10 §11.6 |                 |                 |

For reference only

#### Test Parameters

|                    |                                |              |           |
|--------------------|--------------------------------|--------------|-----------|
| <b>Frequency</b>   | 2412MHz                        | <b>Setup</b> | Conducted |
| <b>RBW</b>         | 8Mhz                           | <b>VBW</b>   | 50MHz     |
| <b>Detector(s)</b> | Clear write with RMS detector. | <b>Span</b>  | 0Hz       |

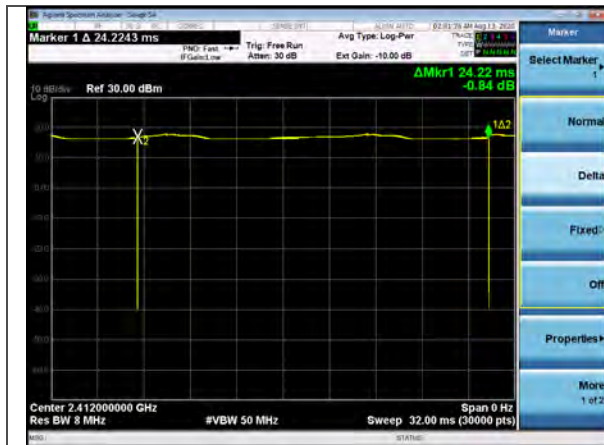
#### EUT Parameters

|                    |       |                   |                                                              |
|--------------------|-------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b> | 12VDC | <b>Mode</b>       | WLAN TX                                                      |
| <b>Channels</b>    | 1     | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |

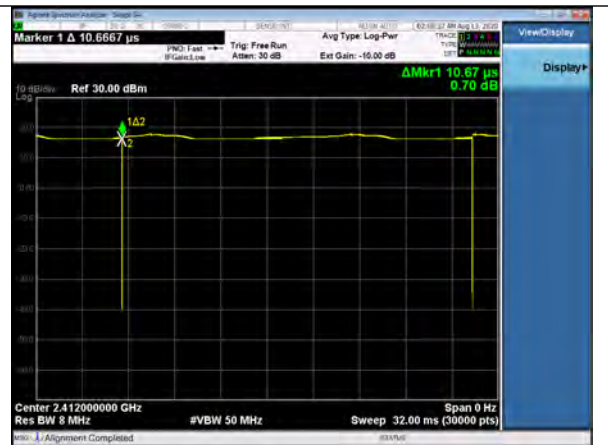
## Data Tables

| Protocol | Data Rate | Observation Period (ms) | On Time (ms) | Duty Cycle % |
|----------|-----------|-------------------------|--------------|--------------|
| 802.11b  | 1Mbps     | 24.230                  | 24.220       | 99.96%       |
| 802.11b  | 11Mbps    | 2.380                   | 2.377        | 99.87%       |
| 802.11g  | 6Mbps     | 4.048                   | 4.032        | 99.60%       |
| 802.11g  | 54Mbps    | 0.484                   | 0.467        | 96.49%       |
| 802.11n  | MCS0      | 3.756                   | 3.740        | 99.57%       |
| 802.11n  | MCS7      | 0.424                   | 0.408        | 96.20%       |

## Plots



On Time, 802.11b, 1Mbps



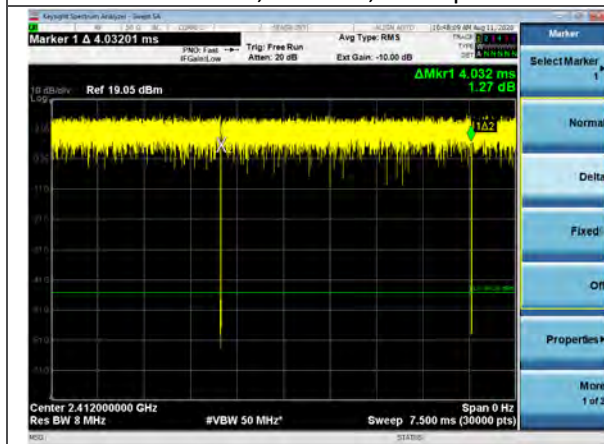
Off Time, 802.11b, 1Mbps



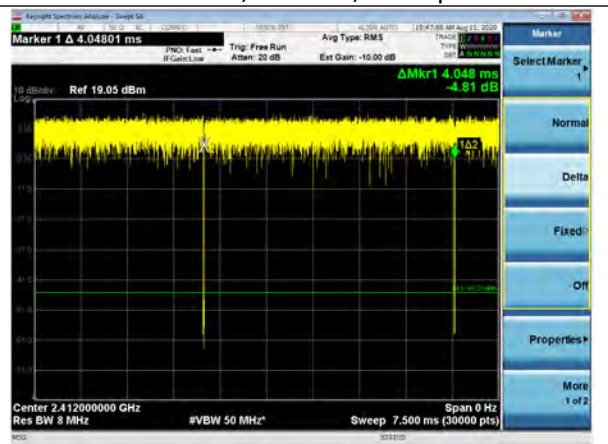
On Time, 802.11b, 11Mbps



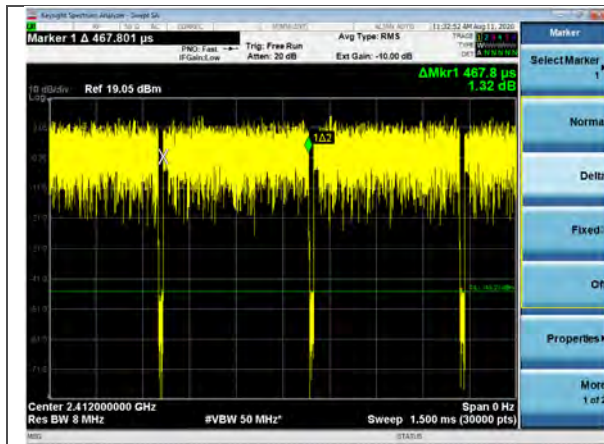
Off Time, 802.11b, 11Mbps



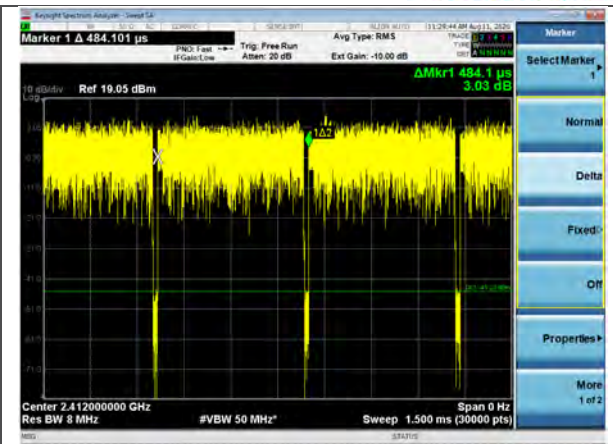
On Time, 802.11g, 6Mbps



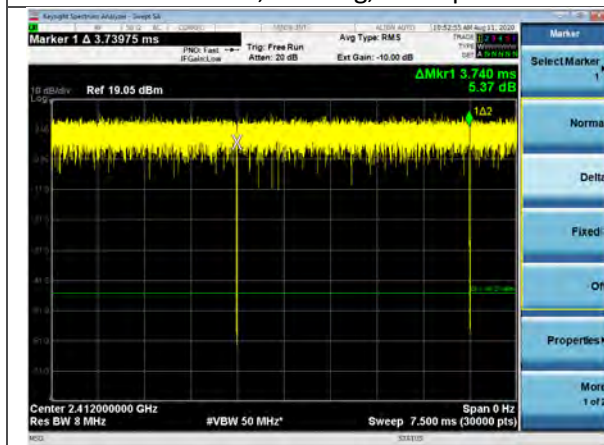
Observation Period, 802.11g, 6Mbps



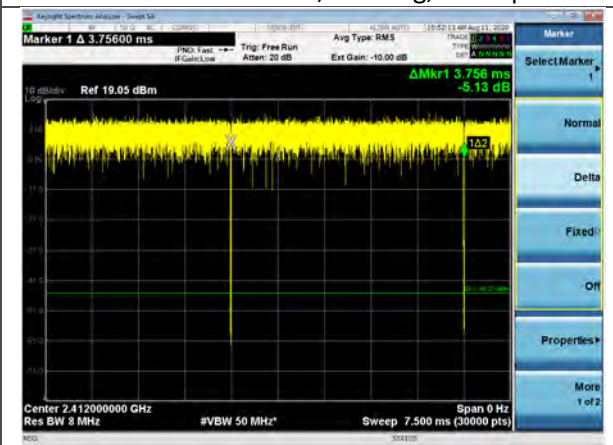
On Time, 802.11g, 54Mbps



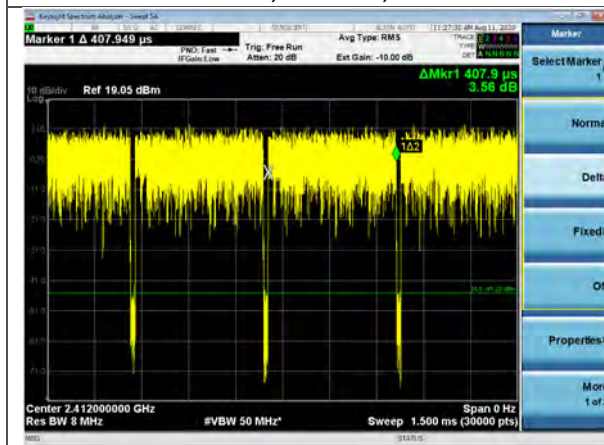
Observation Period, 802.11g, 54Mbps



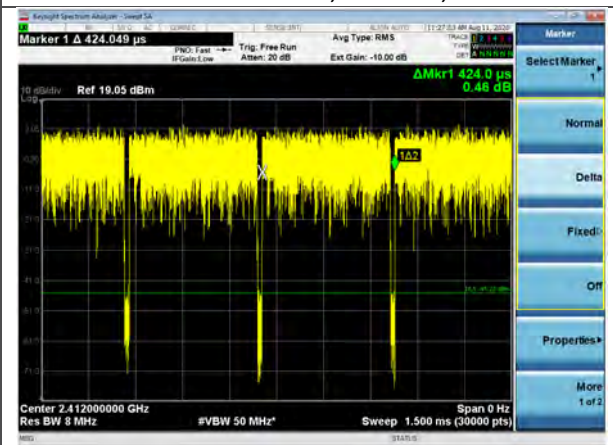
On Time, 802.11n, MCS0



Observation Period, 802.11n, MCS0



On Time, 802.11n, MCS7



Observation Period, 802.11n, MCS7

### 5.1.3 Output Power

|                    |                 |                 |                       |
|--------------------|-----------------|-----------------|-----------------------|
| <b>Operator</b>    | Zach Wilson     | <b>QA</b>       | Anthony Smith         |
| <b>Temperature</b> | 21.6°C          | <b>R.H. %</b>   | 32.9%                 |
| <b>Test Date</b>   | 11/5/2020       | <b>Location</b> | Conducted Radio       |
| <b>Requirement</b> | FCC 15.247 §b.3 | <b>Method</b>   | ANSI C63.10 §11.9.1.3 |

#### Limits:

1W/30dBm

#### Test Parameters

|                    |                           |              |                       |
|--------------------|---------------------------|--------------|-----------------------|
| <b>Frequency</b>   | 2412MHz, 2437MHz, 2462MHz | <b>Setup</b> | Conducted Power Meter |
| <b>Detector(s)</b> | Peak                      |              |                       |

#### EUT Parameters

|                    |          |                   |                                                              |
|--------------------|----------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b> | 12VDC    | <b>Mode</b>       | WLAN TX                                                      |
| <b>Channels</b>    | 1, 6, 11 | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |

**Data Table**

| Channel | Protocol | Data Rate | Conducted Output Power (dBm) | Output Power Limit (dBm) | Margin (dB) |
|---------|----------|-----------|------------------------------|--------------------------|-------------|
| 1       | 802.11b  | 1Mbps     | 16.0                         | 30.0                     | 14.0        |
| 6       | 802.11b  | 1Mbps     | 15.9                         | 30.0                     | 14.1        |
| 11      | 802.11b  | 1Mbps     | 15.9                         | 30.0                     | 14.1        |
| 1       | 802.11b  | 11Mbps    | 14.1                         | 30.0                     | 15.9        |
| 6       | 802.11b  | 11Mbps    | 14.0                         | 30.0                     | 16.0        |
| 11      | 802.11b  | 11Mbps    | 14.0                         | 30.0                     | 16.0        |
| 1       | 802.11g  | 6Mbps     | 13.4                         | 30.0                     | 16.6        |
| 6       | 802.11g  | 6Mbps     | 13.0                         | 30.0                     | 17.0        |
| 11      | 802.11g  | 6Mbps     | 13.1                         | 30.0                     | 16.9        |
| 1       | 802.11g  | 54Mbps    | 17.5                         | 30.0                     | 12.5        |
| 6       | 802.11g  | 54Mbps    | 16.9                         | 30.0                     | 13.1        |
| 11      | 802.11g  | 54Mbps    | 17.1                         | 30.0                     | 12.9        |
| 1       | 802.11n  | MCS0      | 12.8                         | 30.0                     | 17.2        |
| 6       | 802.11n  | MCS0      | 12.9                         | 30.0                     | 17.1        |
| 11      | 802.11n  | MCS0      | 12.8                         | 30.0                     | 17.2        |
| 1       | 802.11n  | MCS7      | 16.3                         | 30.0                     | 13.8        |
| 6       | 802.11n  | MCS7      | 15.8                         | 30.0                     | 14.2        |
| 11      | 802.11n  | MCS7      | 16.0                         | 30.0                     | 14.0        |

#### 5.1.4 Power Spectral Density

|                    |               |                 |                      |
|--------------------|---------------|-----------------|----------------------|
| <b>Operator</b>    | Jon Dille     | <b>QA</b>       | Shane Dock           |
| <b>Temperature</b> | 21.8°C        | <b>R.H. %</b>   | 24.8%                |
| <b>Test Date</b>   | 11/17/2020    | <b>Location</b> | Conducted Radio      |
| <b>Requirement</b> | FCC 15.247 §e | <b>Method</b>   | ANSI C63.10 §11.10.2 |

#### Limits:

8dBm/3kHz

#### Test Parameters

|                    |                              |              |                      |
|--------------------|------------------------------|--------------|----------------------|
| <b>Frequency</b>   | 2412MHz, 2437MHz, 2462MHz    | <b>Setup</b> | Conducted            |
| <b>RBW</b>         | 100kHz                       | <b>VBW</b>   | 300kHz               |
| <b>Detector(s)</b> | Peak detector with max hold. | <b>Span</b>  | 1.5 times the DTS BW |

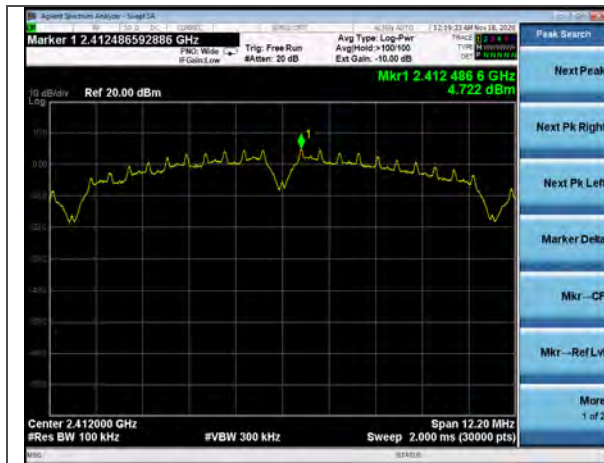
#### EUT Parameters

|                    |          |                   |                                                              |
|--------------------|----------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b> | 12VDC    | <b>Mode</b>       | WLAN TX                                                      |
| <b>Channels</b>    | 1, 6, 11 | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |

## Data Tables

| Channel | Protocol | Data Rate | Peak PSD<br>(dBm/100kHz) | PSD Limit<br>(dBm/3kHz) | Margin<br>(dB) |
|---------|----------|-----------|--------------------------|-------------------------|----------------|
| 1       | 802.11g  | 6Mbps     | -5.7                     | 8.0                     | 13.7           |
| 6       | 802.11g  | 6Mbps     | -5.6                     | 8.0                     | 13.6           |
| 11      | 802.11g  | 6Mbps     | -6.0                     | 8.0                     | 14.0           |
| 1       | 802.11g  | 54Mbps    | -4.5                     | 8.0                     | 12.5           |
| 6       | 802.11g  | 54Mbps    | -4.3                     | 8.0                     | 12.3           |
| 11      | 802.11g  | 54Mbps    | -4.5                     | 8.0                     | 12.5           |
| 1       | 802.11b  | 1Mbps     | 4.7                      | 8.0                     | 3.3            |
| 6       | 802.11b  | 1Mbps     | 4.8                      | 8.0                     | 3.2            |
| 11      | 802.11b  | 1Mbps     | 5.0                      | 8.0                     | 3.0            |
| 1       | 802.11b  | 11Mbps    | 2.1                      | 8.0                     | 5.9            |
| 6       | 802.11b  | 11Mbps    | 2.8                      | 8.0                     | 5.2            |
| 11      | 802.11b  | 11Mbps    | 2.0                      | 8.0                     | 6.0            |
| 1       | 802.11n  | MCS0      | -4.9                     | 8.0                     | 12.9           |
| 6       | 802.11n  | MCS0      | -4.9                     | 8.0                     | 12.9           |
| 11      | 802.11n  | MCS0      | -5.2                     | 8.0                     | 13.2           |
| 1       | 802.11n  | MCS7      | -6.1                     | 8.0                     | 14.1           |
| 6       | 802.11n  | MCS7      | -6.0                     | 8.0                     | 14.0           |
| 11      | 802.11n  | MCS7      | -6.2                     | 8.0                     | 14.2           |

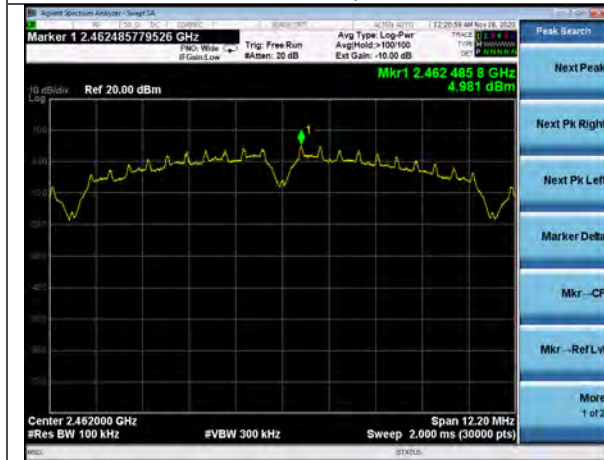
## Plots



PSD, 802.11b, 1Mbps, Channel 1



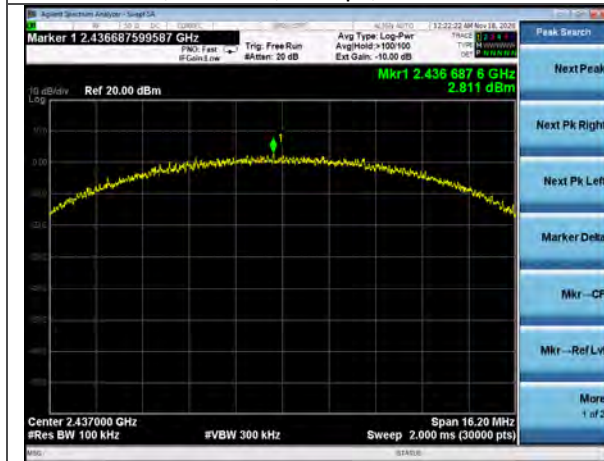
PSD, 802.11b, 1Mbps, Channel 6



PSD, 802.11b, 1Mbps, Channel 11



PSD, 802.11b, 11Mbps, Channel 1

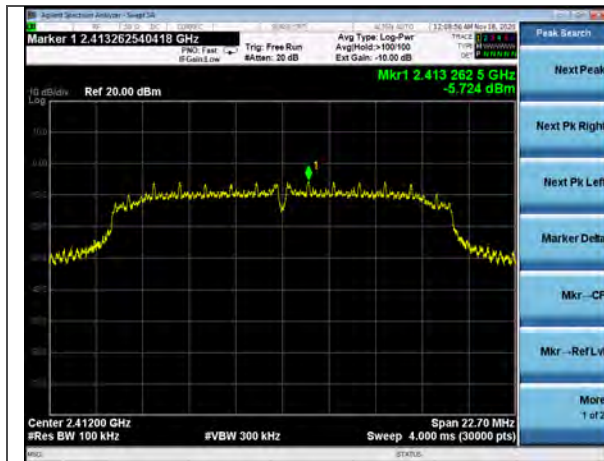


PSD, 802.11b, 1Mbps, Channel 6



PSD, 802.11b, 11Mbps, Channel 11

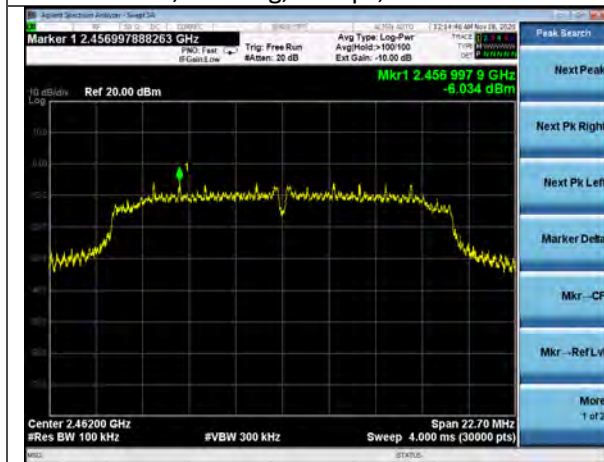
|                                |               |                            |
|--------------------------------|---------------|----------------------------|
| Company: Brunswick Corporation | Page 27 of 53 | Name: SmartCraft Connect   |
| Report: TR319379 A             |               | Model: SCC-1               |
| Job: C-3380                    |               | Serial: Engineering Sample |



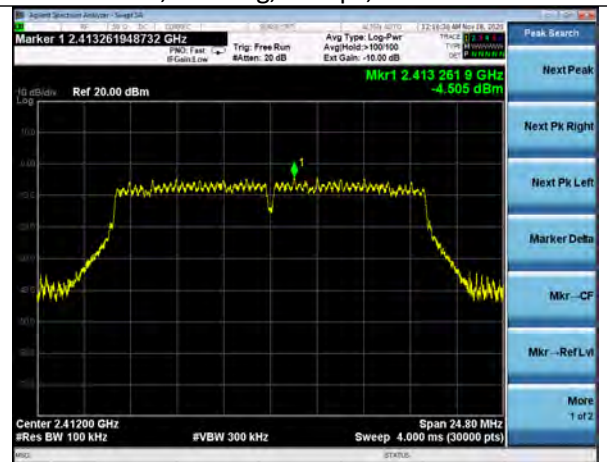
PSD, 802.11g, 6Mbps, Channel 1



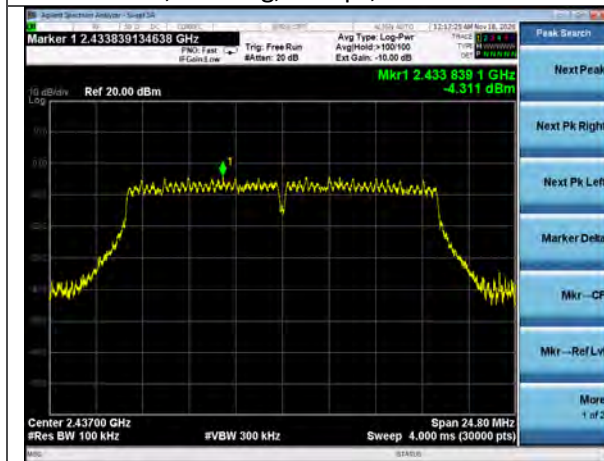
PSD, 802.11g, 6Mbps, Channel 6



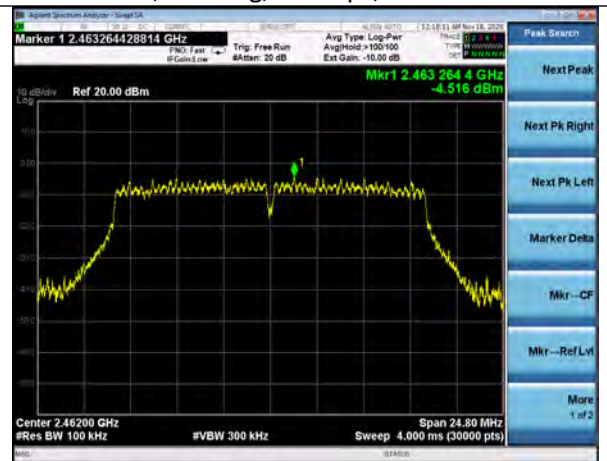
PSD, 802.11g, 6Mbps, Channel 11



PSD, 802.11g, 54Mbps, Channel 1



PSD, 802.11g, 54Mbps, Channel 6



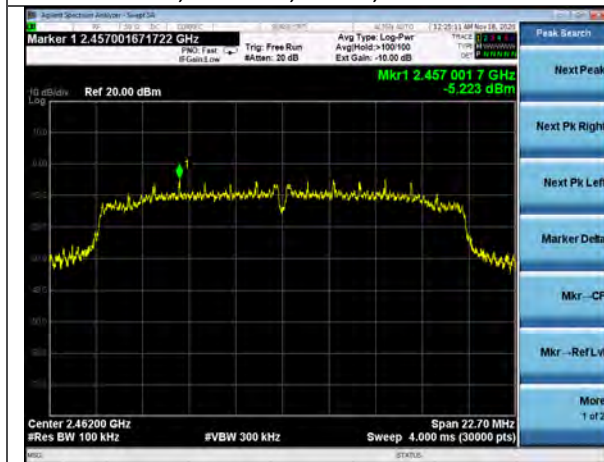
PSD, 802.11g, 54Mbps, Channel 11



PSD, 802.11n, MCS0, Channel 1



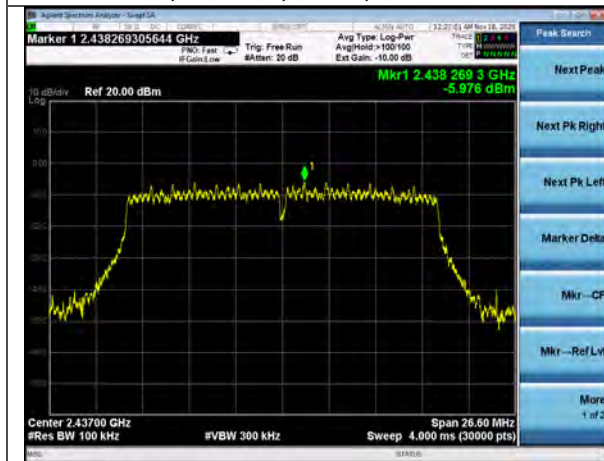
PSD, 802.11n, MCS0, Channel 6



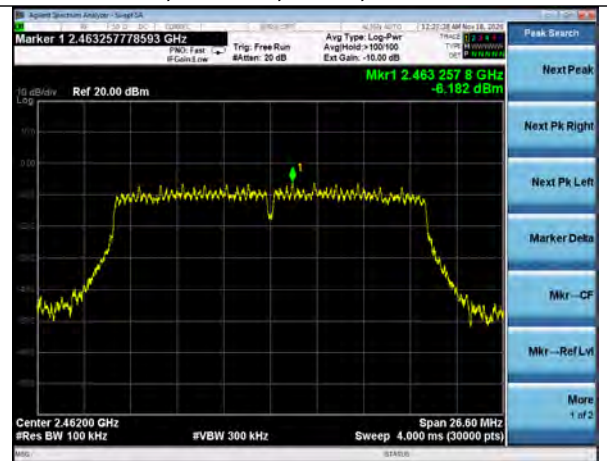
PSD, 802.11n, MCS0, Channel 11



PSD, 802.11n, MCS7, Channel 1



PSD, 802.11n, MCS7, Channel 6



PSD, 802.11n, MCS7, Channel 11

### 5.1.5 Conducted Transmitter Spurious

|                    |                         |                 |                           |
|--------------------|-------------------------|-----------------|---------------------------|
| <b>Operator</b>    | Shane Dock, Zach Wilson | <b>QA</b>       | Jon Dilley, Anthony Smith |
| <b>Temperature</b> | 22.7°C                  | <b>R.H. %</b>   | 47.5%                     |
| <b>Test Date</b>   | 8/13/2020, 11/5/2020    | <b>Location</b> | Conducted Radio           |
| <b>Requirement</b> | FCC 15.247 §d           | <b>Method</b>   | ANSI C63.10 §11.11        |

#### Limits:

-20 dBc

| Protocol | Data Rate | Channel | Reference Level (dBm) | Limit (dBm) |
|----------|-----------|---------|-----------------------|-------------|
| 802.11b  | 1Mbps     | 1       | 3.5                   | -16.5       |
| 802.11b  | 1Mbps     | 11      | 3.9                   | -16.1       |
| 802.11b  | 11Mbps    | 1       | 1.0                   | -19.0       |
| 802.11b  | 11Mbps    | 11      | 1.4                   | -18.6       |
| 802.11g  | 6Mbps     | 1       | -6.6                  | -26.6       |
| 802.11g  | 6Mbps     | 11      | -6.0                  | -26.0       |
| 802.11g  | 54Mbps    | 1       | -4.4                  | -24.4       |
| 802.11g  | 54Mbps    | 11      | -4.3                  | -24.3       |
| 802.11n  | MCS0      | 1       | -7.4                  | -27.4       |
| 802.11n  | MCS0      | 11      | -4.8                  | -24.8       |
| 802.11n  | MCS7      | 1       | -5.9                  | -25.9       |
| 802.11n  | MCS7      | 11      | -6.0                  | -26.0       |

#### Test Parameters

|                    |                                        |              |           |
|--------------------|----------------------------------------|--------------|-----------|
| <b>Frequency</b>   | 2412MHz, 2437MHz, 2462MHz              | <b>Setup</b> | Conducted |
| <b>RBW</b>         | 100kHz                                 | <b>VBW</b>   | 300kHz    |
| <b>Detector(s)</b> | Max hold with peak detector for plots. | <b>Span</b>  | 30MHz     |

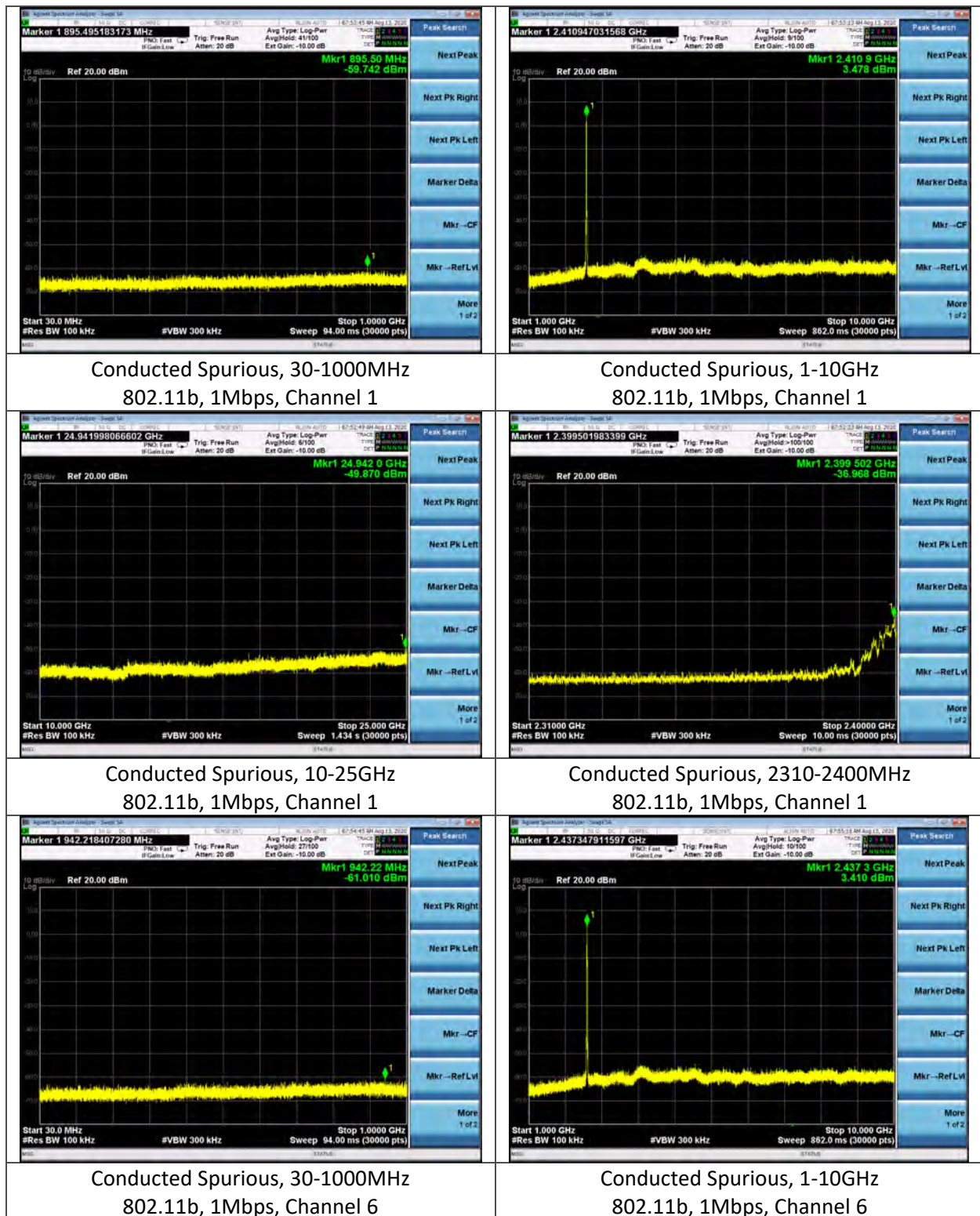
#### EUT Parameters

|                    |          |                   |                                                              |
|--------------------|----------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b> | 12VDC    | <b>Mode</b>       | WLAN TX                                                      |
| <b>Channels</b>    | 1, 6, 11 | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |

**Data Table**

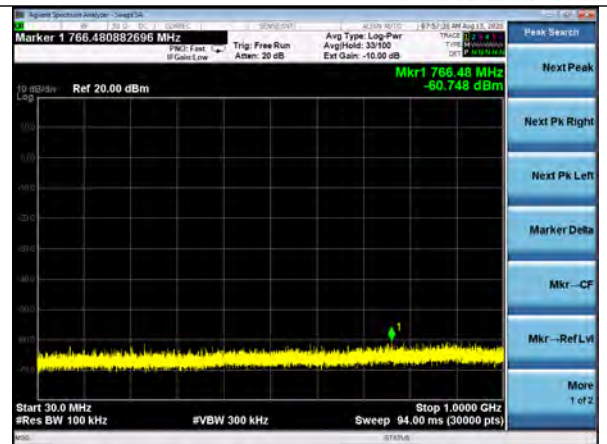
| Channel | Protocol | Data Rate | Closest Emission to Margin (MHz) | Peak Reading (dBm) | Limit (dBm) | Margin (dBm) |
|---------|----------|-----------|----------------------------------|--------------------|-------------|--------------|
| 1       | 802.11b  | 1Mbps     | 2399.5                           | -37.0              | -15.3       | 21.7         |
| 11      | 802.11b  | 1Mbps     | 2486.0                           | -54.6              | -15.0       | 39.6         |
| 1       | 802.11b  | 11Mbps    | 2397.0                           | -44.1              | -17.9       | 26.2         |
| 11      | 802.11b  | 11Mbps    | 2487.0                           | -55.4              | -18.0       | 37.4         |
| 1       | 802.11g  | 6Mbps     | 2399.1                           | -27.8              | -25.7       | 2.1          |
| 11      | 802.11g  | 6Mbps     | 2483.9                           | -44.3              | -26.0       | 18.3         |
| 1       | 802.11g  | 54Mbps    | 2399.0                           | -37.9              | -24.5       | 13.4         |
| 11      | 802.11g  | 54Mbps    | 2483.6                           | -47.6              | -24.5       | 23.1         |
| 1       | 802.11n  | MCS0      | 2399.8                           | -28.5              | -24.9       | 3.6          |
| 11      | 802.11n  | MCS0      | 2483.5                           | -40.9              | -25.2       | 15.7         |
| 1       | 802.11n  | MCS7      | 2397.5                           | -44.0              | -26.1       | 17.9         |
| 11      | 802.11n  | MCS7      | 2484.2                           | -49.9              | -26.2       | 23.7         |

## Plots

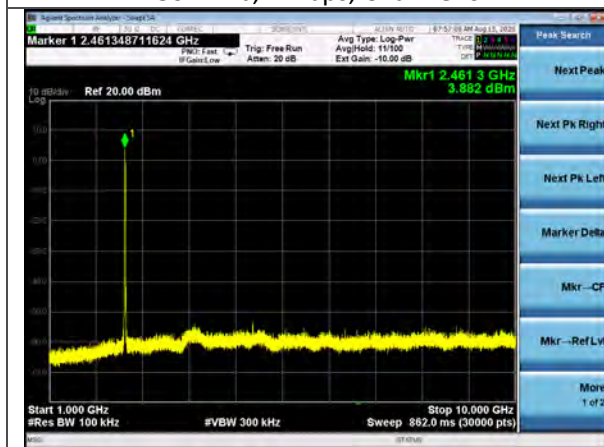




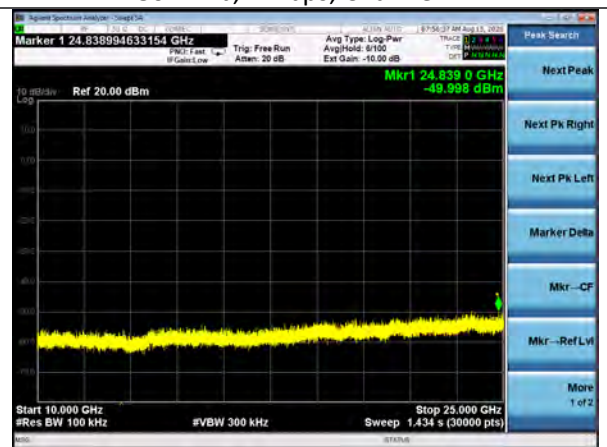
Conducted Spurious, 10-25GHz  
802.11b, 1Mbps, Channel 6



Conducted Spurious, 30-100MHz  
802.11b, 1Mbps, Channel 11



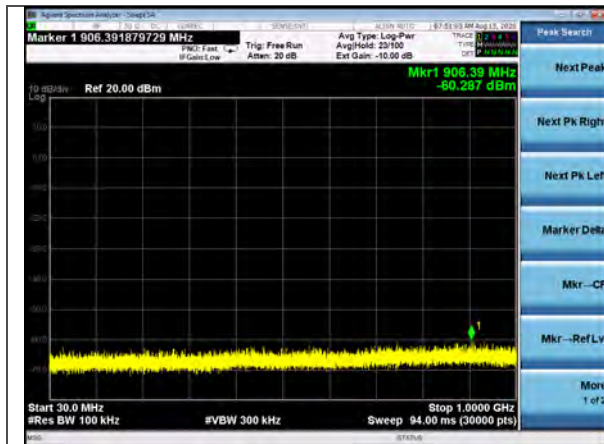
Conducted Spurious, 1-10GHz  
802.11b, 1Mbps, Channel 11



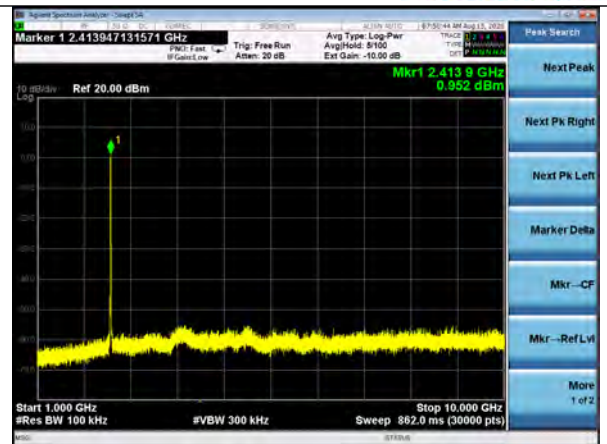
Conducted Spurious, 10-25GHz  
802.11b, 1Mbps, Channel 11



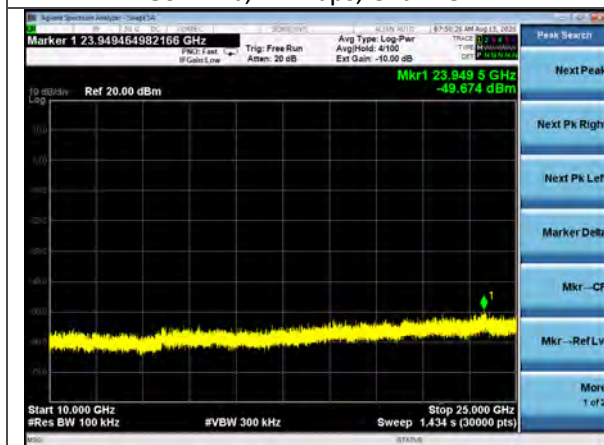
Conducted Spurious, 2483.5-2500MHz  
802.11b, 1Mbps, Channel 11



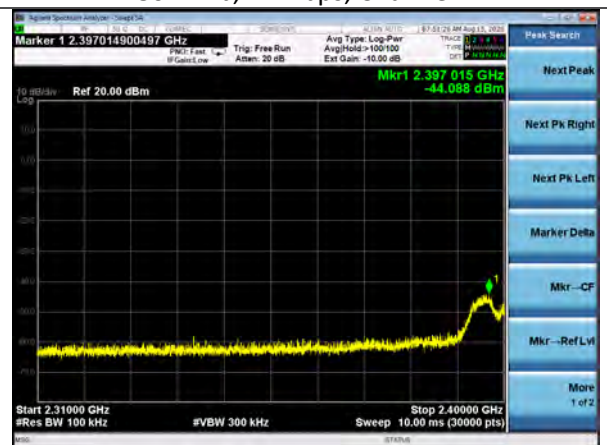
Conducted Spurious, 30-1000MHz  
802.11b, 11Mbps, Channel 1



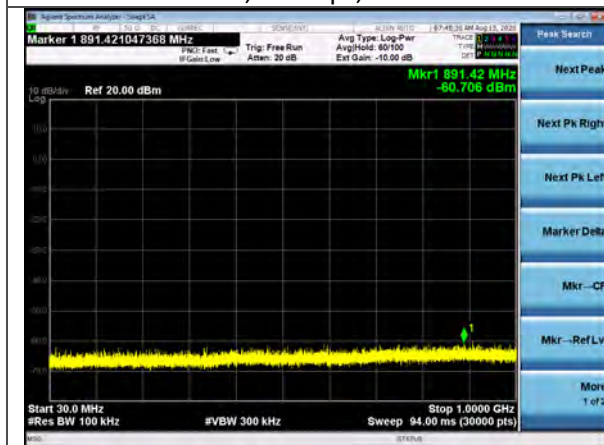
Conducted Spurious, 1-10GHz  
802.11b, 11Mbps, Channel 1



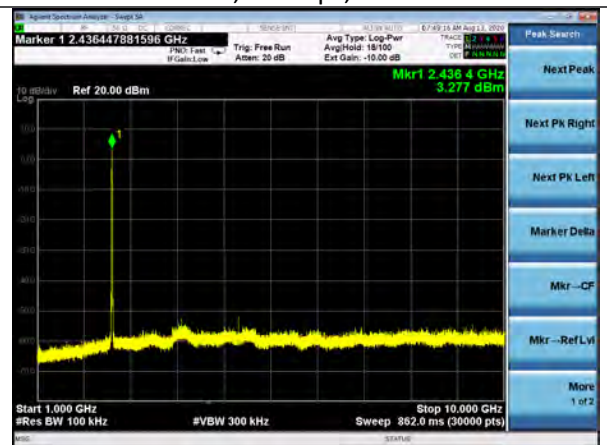
Conducted Spurious, 10-25GHz  
802.11b, 11Mbps, Channel 1



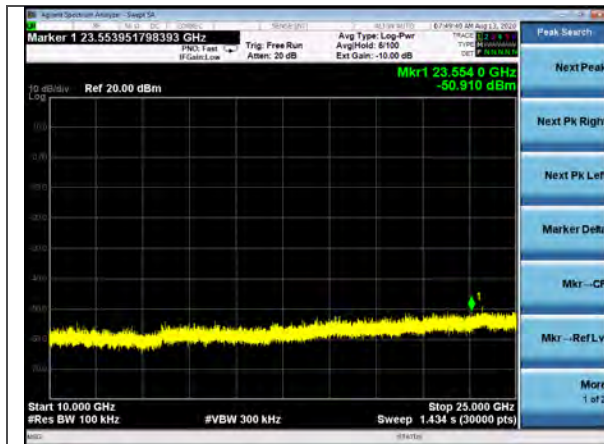
Conducted Spurious, 2310-2400MHz  
802.11b, 11Mbps, Channel 1



Conducted Spurious, 30-1000MHz  
802.11b, 11Mbps, Channel 6



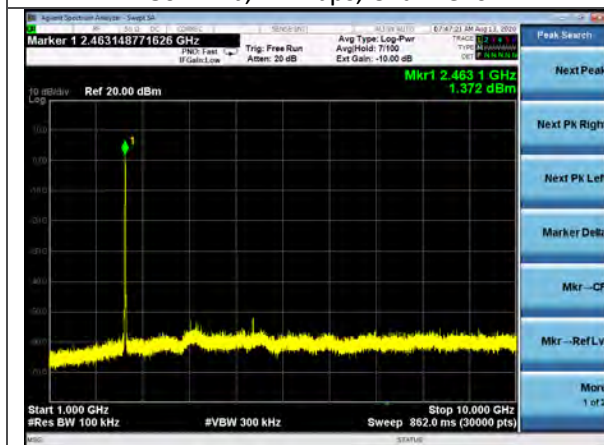
Conducted Spurious, 1-10GHz  
802.11b, 11Mbps, Channel 6



Conducted Spurious, 10-25GHz  
802.11b, 11Mbps, Channel 6



Conducted Spurious, 30-1000MHz  
802.11b, 11Mbps, Channel 11



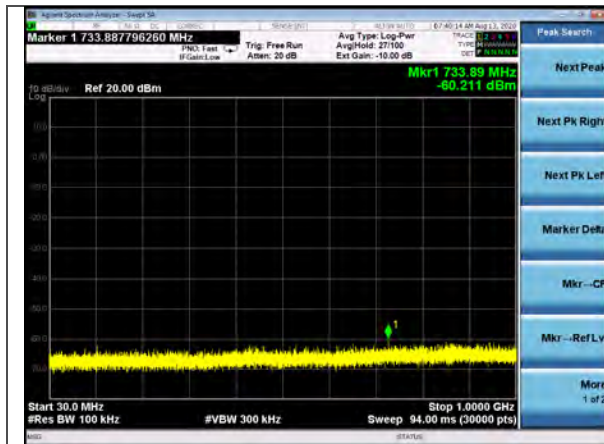
Conducted Spurious, 1-10GHz  
802.11b, 11Mbps, Channel 11



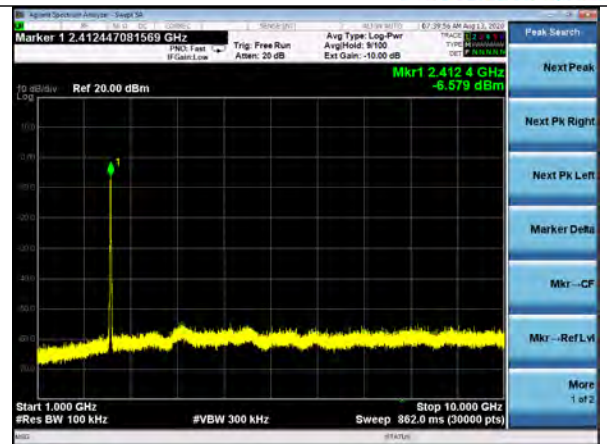
Conducted Spurious, 10-25GHz  
802.11b, 11Mbps, Channel 11



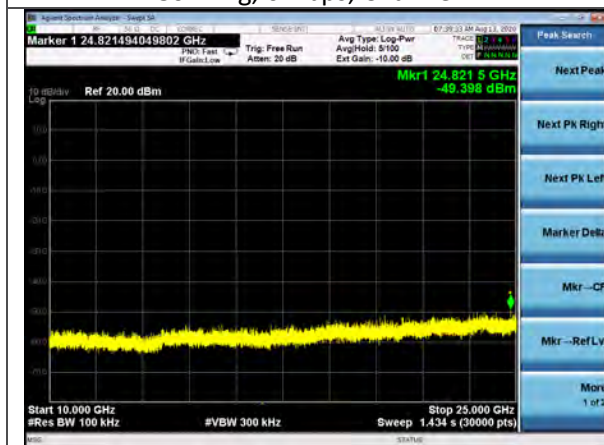
Conducted Spurious, 2483.5-2500MHz  
802.11b, 11Mbps, Channel 11



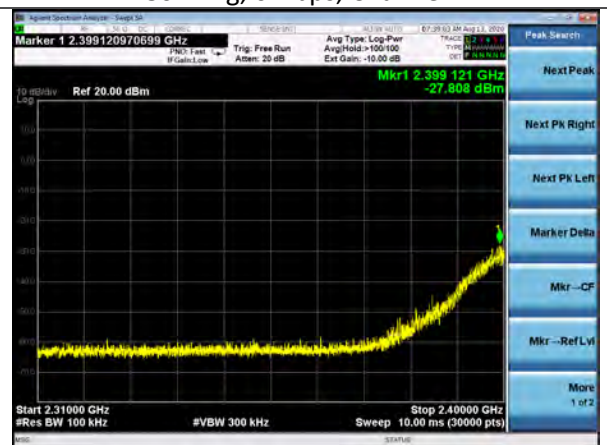
Conducted Spurious, 30-1000MHz  
802.11g, 6Mbps, Channel 1



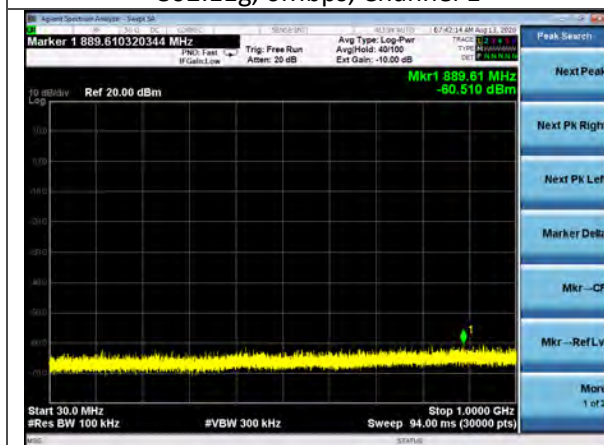
Conducted Spurious, 1-10GHz  
802.11g, 6Mbps, Channel 1



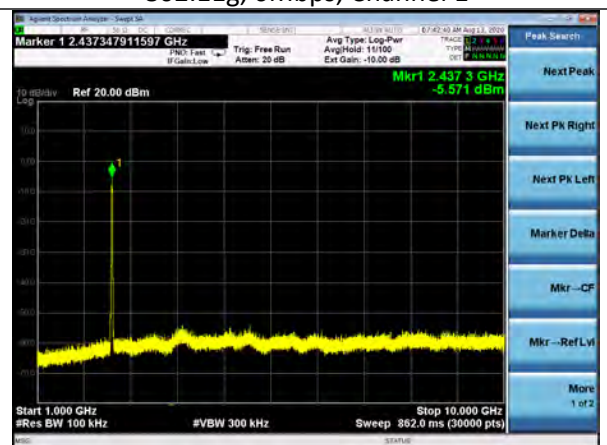
Conducted Spurious, 10-25GHz  
802.11g, 6Mbps, Channel 1



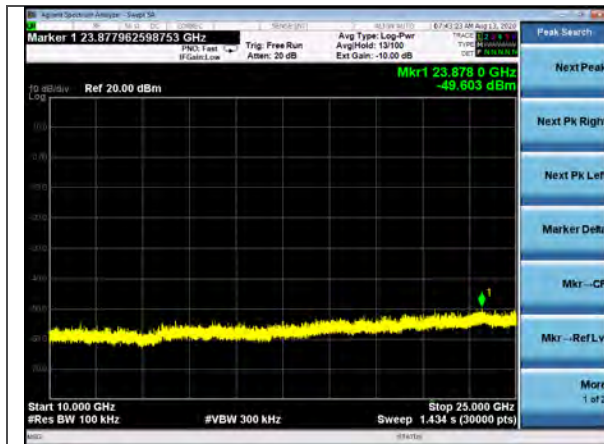
Conducted Spurious, 2310-2400MHz  
802.11g, 6Mbps, Channel 1



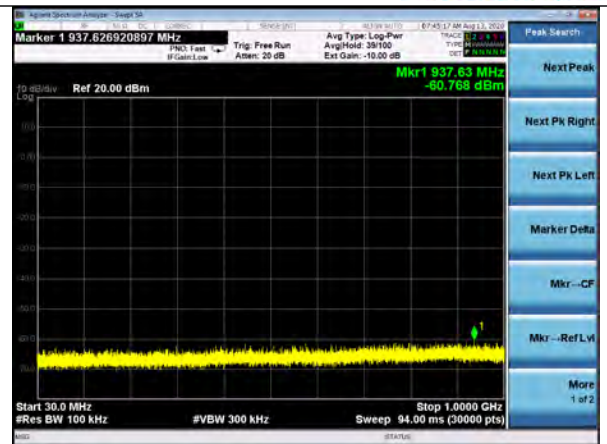
Conducted Spurious, 30-1000MHz  
802.11g, 6Mbps, Channel 6



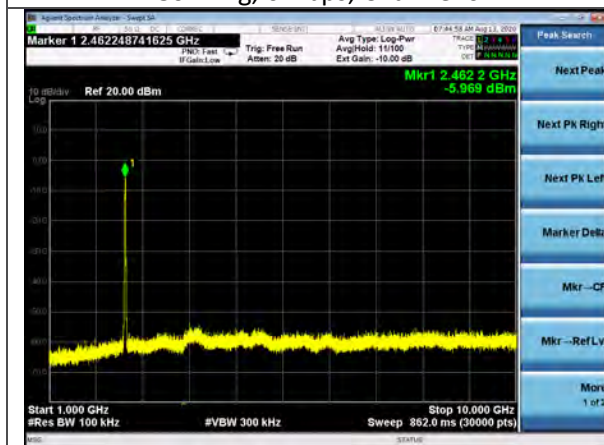
Conducted Spurious, 1-10GHz  
802.11g, 6Mbps, Channel 6



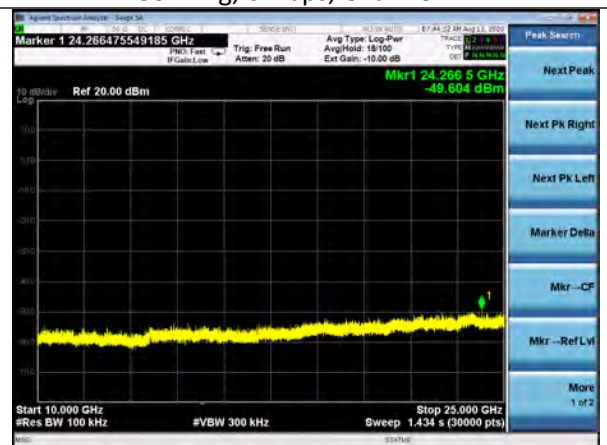
Conducted Spurious, 10-25GHz  
802.11g, 6Mbps, Channel 6



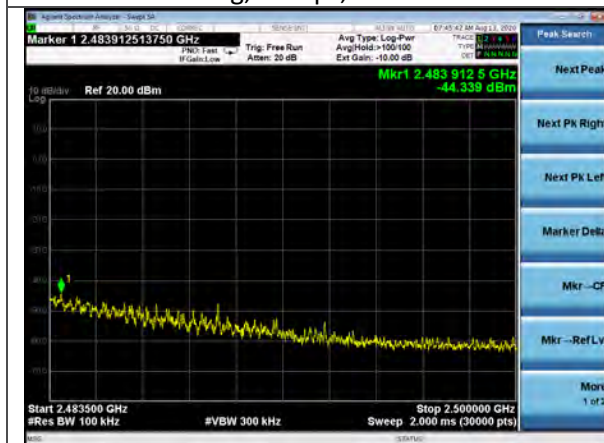
Conducted Spurious, 30-1000MHz  
802.11g, 6Mbps, Channel 11



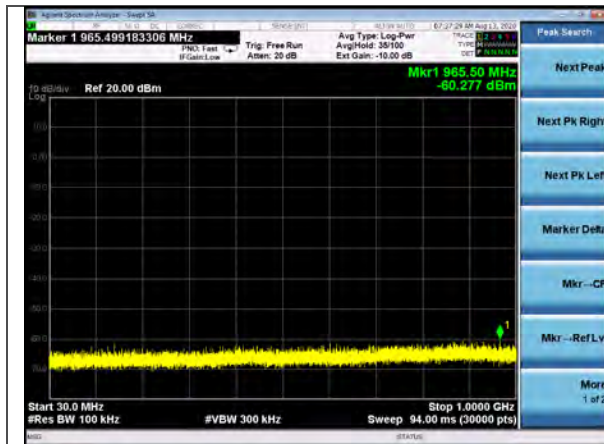
Conducted Spurious, 1-10GHz  
802.11g, 6Mbps, Channel 11



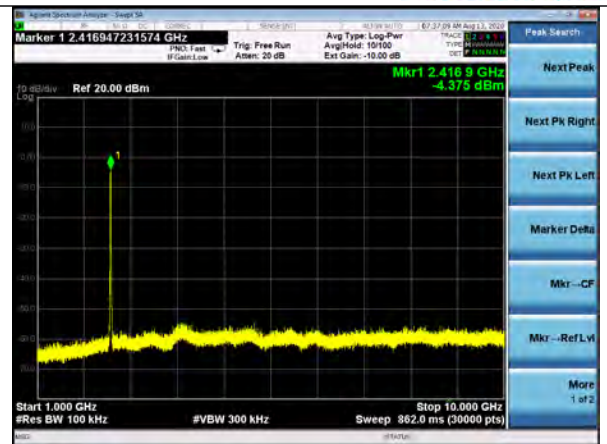
Conducted Spurious, 10-25GHz  
802.11g, 6Mbps, Channel 11



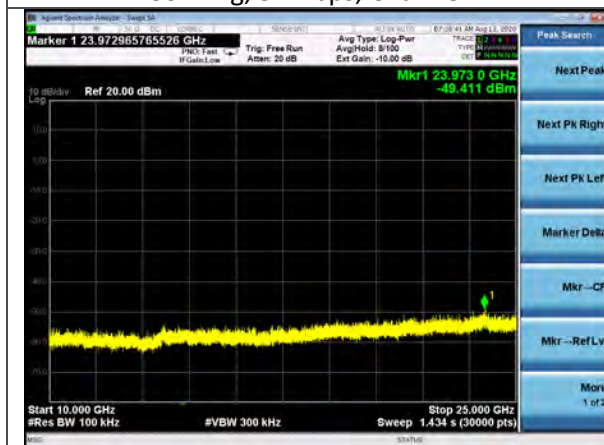
Conducted Spurious, 2483.5-2500MHz  
802.11g, 6Mbps, Channel 11



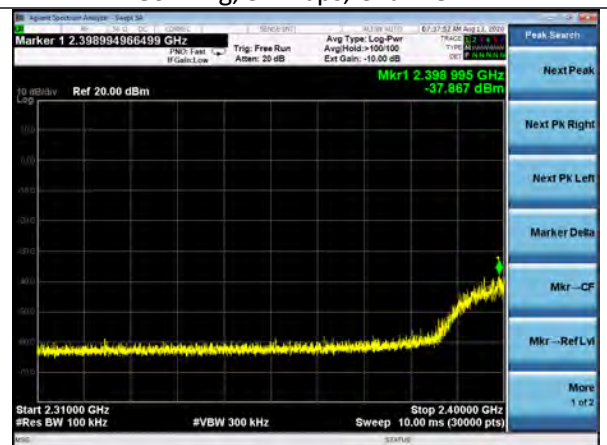
Conducted Spurious, 30-1000MHz  
802.11g, 54Mbps, Channel 1



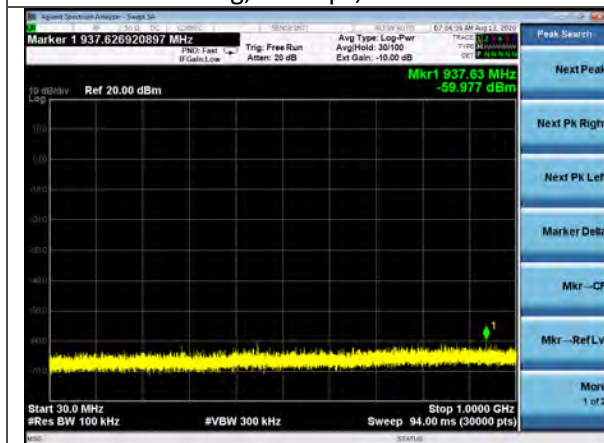
Conducted Spurious, 1-10GHz  
802.11g, 54Mbps, Channel 1



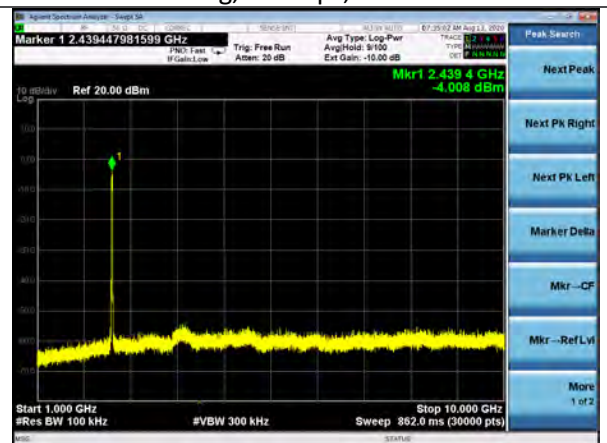
Conducted Spurious, 10-25GHz  
802.11g, 54Mbps, Channel 1



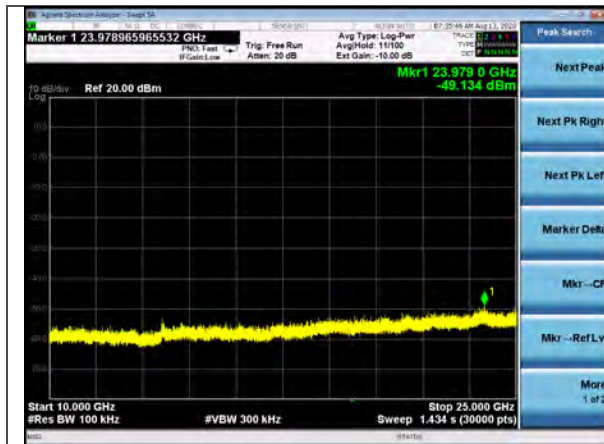
Conducted Spurious, 2310-2400MHz  
802.11g, 54Mbps, Channel 1



Conducted Spurious, 30-1000MHz  
802.11g, 54Mbps, Channel 6



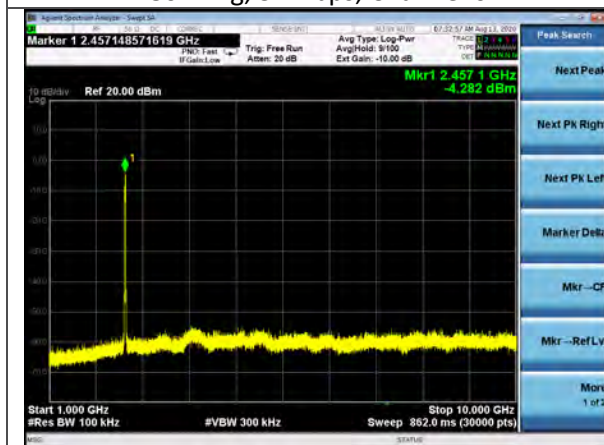
Conducted Spurious, 1-10GHz  
802.11g, 54Mbps, Channel 6



Conducted Spurious, 10-25GHz  
802.11g, 54Mbps, Channel 6



Conducted Spurious, 30-1000MHz  
802.11g, 54Mbps, Channel 11



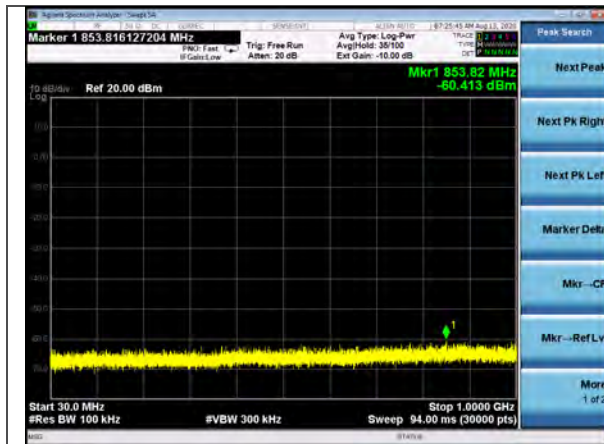
Conducted Spurious, 1-10GHz  
802.11g, 54Mbps, Channel 11



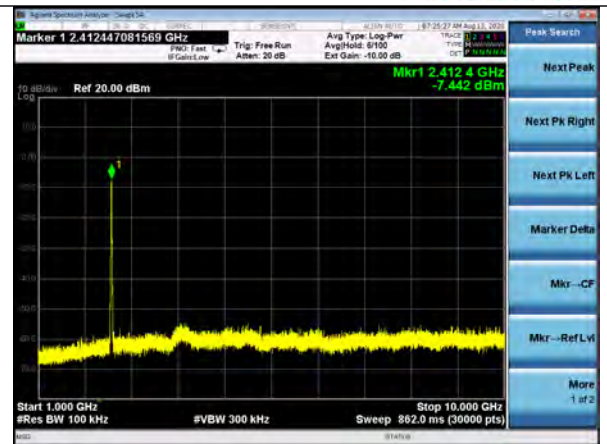
Conducted Spurious, 10-25GHz  
802.11g, 54Mbps, Channel 11



Conducted Spurious, 2483.5-2500MHz  
802.11g, 54Mbps, Channel 11



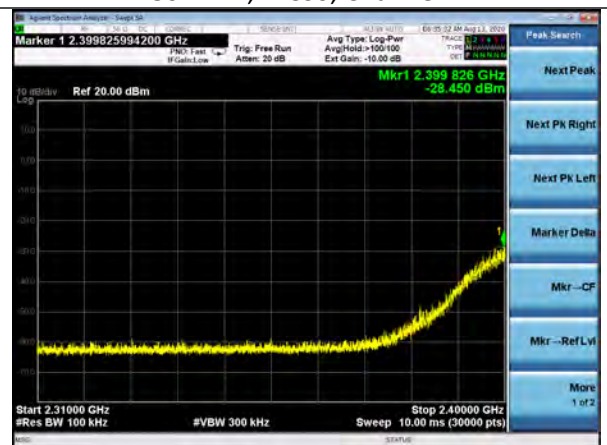
Conducted Spurious, 30-100MHz  
802.11n, MCS0, Channel 1



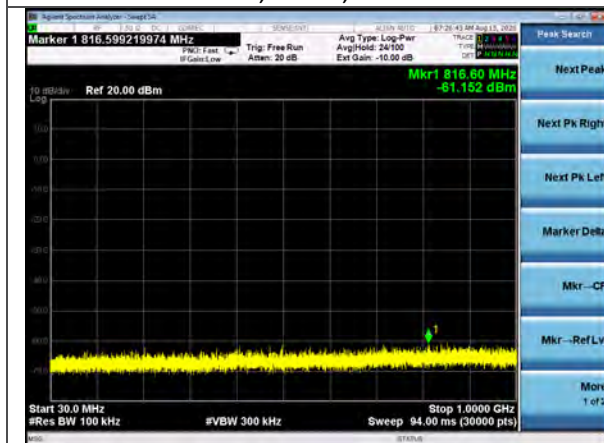
Conducted Spurious, 1-10GHz  
802.11n, MCS0, Channel 1



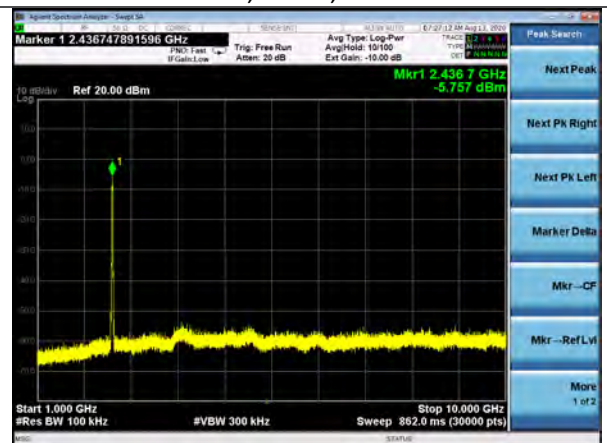
Conducted Spurious, 10-25GHz  
802.11n, MCS0, Channel 1



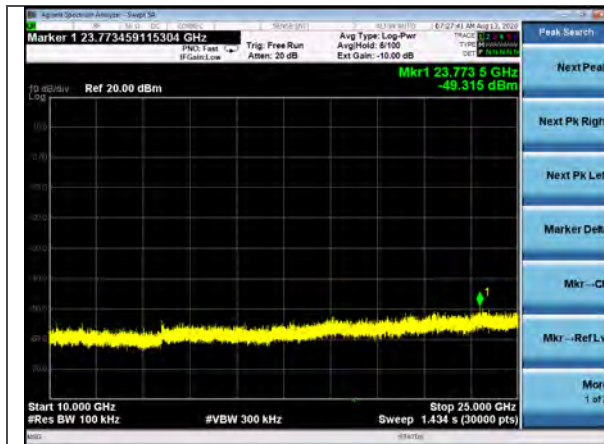
Conducted Spurious, 2310-2400MHz  
802.11n, MCS0, Channel 1



Conducted Spurious, 30-100MHz  
802.11n, MCS0, Channel 6



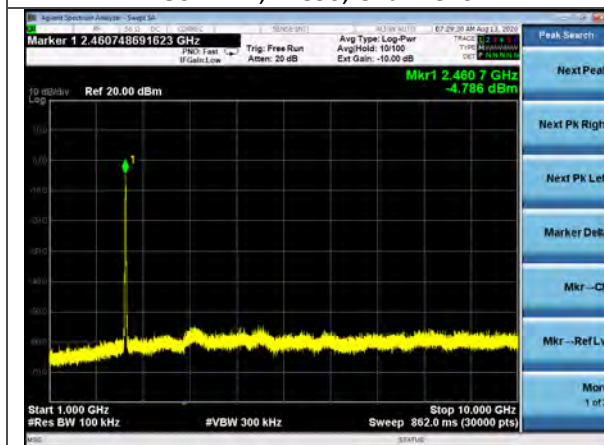
Conducted Spurious, 1-10GHz  
802.11n, MCS0, Channel 6



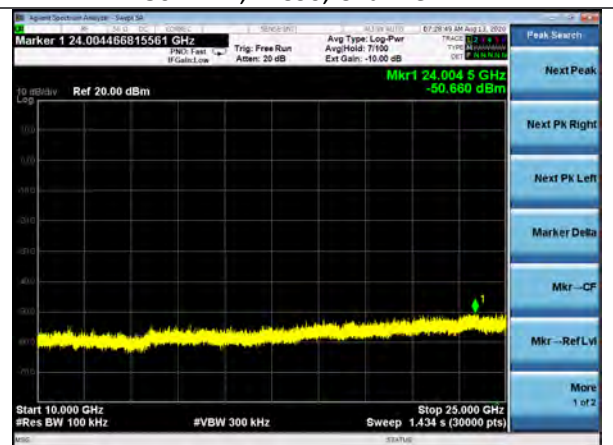
Conducted Spurious, 10-25GHz  
802.11n, MCS0, Channel 6



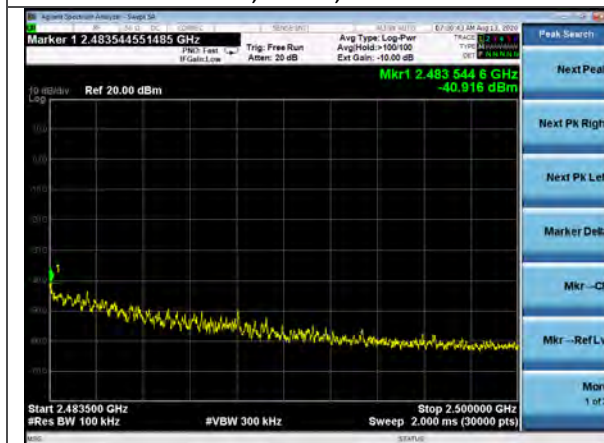
Conducted Spurious, 30-1000MHz  
802.11n, MCS0, Channel 11



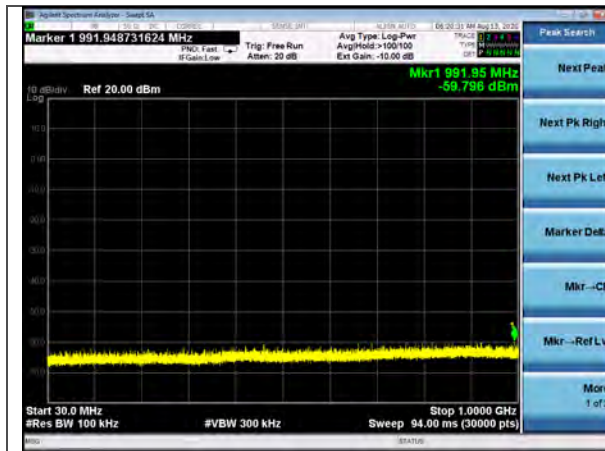
Conducted Spurious, 1-10GHz  
802.11n, MCS0, Channel 11



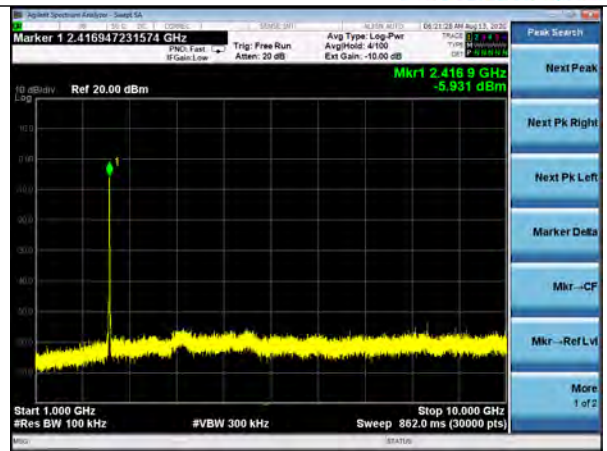
Conducted Spurious, 10-25GHz  
802.11n, MCS0, Channel 11



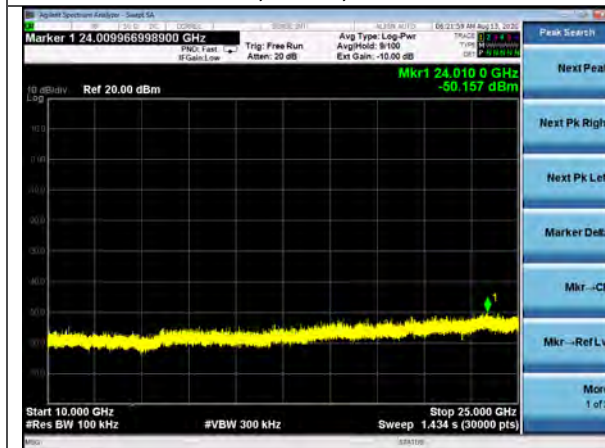
Conducted Spurious, 2483.5-2500MHz  
802.11n, MCS0, Channel 11



Conducted Spurious, 30-1000MHz  
802.11n, MCS7, Channel 1



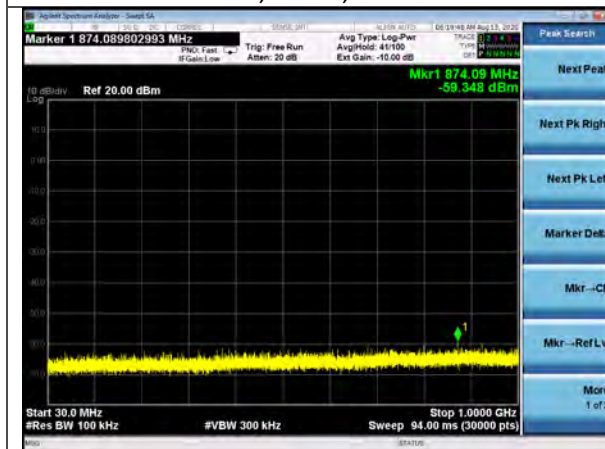
Conducted Spurious, 1-10GHz  
802.11n, MCS7, Channel 1



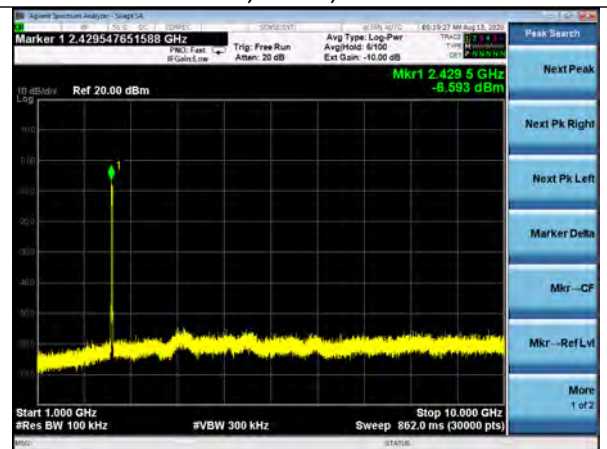
Conducted Spurious, 10-25GHz  
802.11n, MCS7, Channel 1



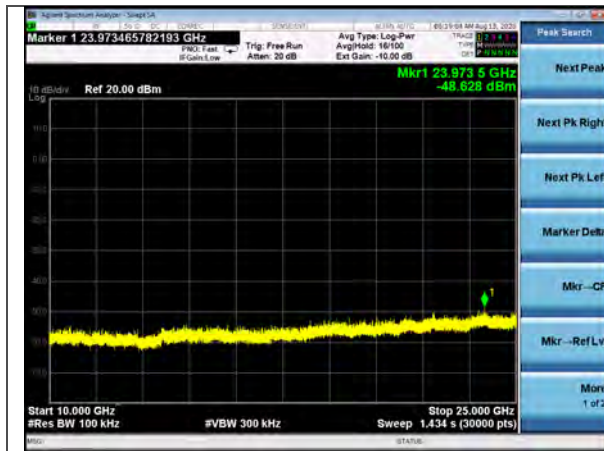
Conducted Spurious, 2310-2400MHz  
802.11n, MCS7, Channel 1



Conducted Spurious, 30-1000MHz  
802.11n, MCS7, Channel 6



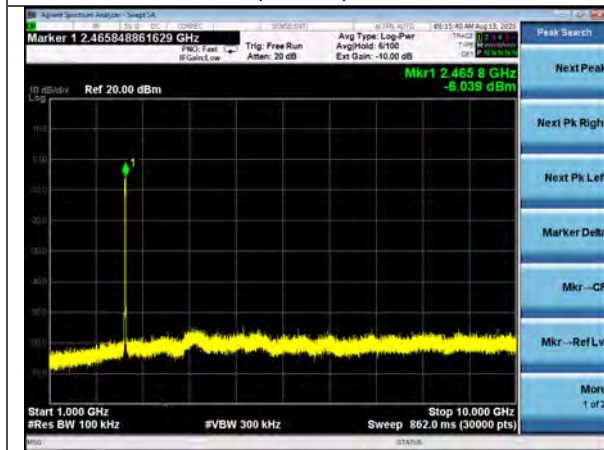
Conducted Spurious, 1-10GHz  
802.11n, MCS7, Channel 6



Conducted Spurious, 10-25GHz  
802.11n, MCS7, Channel 6



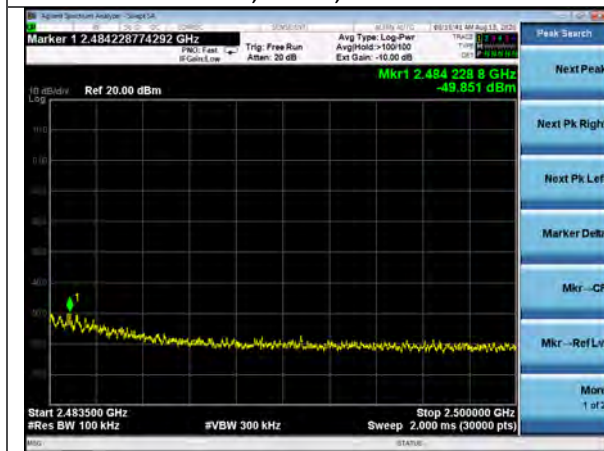
Conducted Spurious, 30-1000MHz  
802.11n, MCS7, Channel 11



Conducted Spurious, 1-10GHz  
802.11n, MCS7, Channel 11



Conducted Spurious, 10-25GHz  
802.11n, MCS7, Channel 11



Conducted Spurious, 2483.5-2500MHz  
802.11n, MCS7, Channel 11

### 5.1.6 Frequency Stability

|                    |                 |                 |                    |
|--------------------|-----------------|-----------------|--------------------|
| <b>Operator</b>    | Shane Dock      | <b>QA</b>       | Jon Dilley         |
| <b>Temperature</b> | 22.7°C          | <b>R.H. %</b>   | 47.5%              |
| <b>Test Date</b>   | 8/13/2020       | <b>Location</b> | Conducted Radio    |
| <b>Requirement</b> | FCC 2.1055 §d.1 | <b>Method</b>   | ANSI C63.10 §6.8.2 |

#### Limits:

Reported Only

#### Test Parameters

|                    |                                |              |           |
|--------------------|--------------------------------|--------------|-----------|
| <b>Frequency</b>   | 2412MHz, 2437MHz, 2462MHz      | <b>Setup</b> | Conducted |
| <b>RBW</b>         | 100kHz                         | <b>VBW</b>   | 300kHz    |
| <b>Detector(s)</b> | RMS detector with average hold | <b>Span</b>  | 30MHz     |

#### EUT Parameters

|                    |                           |                   |            |
|--------------------|---------------------------|-------------------|------------|
| <b>Input Power</b> | 11.7VDCn 13.8VDC, 15.9VDC | <b>Mode</b>       | WLAN TX CW |
| <b>Channels</b>    | 1, 6, 11                  | <b>Data Rates</b> | CW Wave    |

#### Data Table

|         | Input Voltage (VDC) |                      |                      | Deviation (Hz) |
|---------|---------------------|----------------------|----------------------|----------------|
|         | 11.7                | 13.8                 | 15.9                 |                |
| Channel | Frequency (Hz)      | Voltage 2 Freq. (Hz) | Voltage 3 Freq. (Hz) |                |
| 1       | 2412000775          | 2411998558           | 2412004158           | 5600           |
| 6       | 2437002042          | 2436998658           | 2437002725           | 4067           |
| 11      | 2461998892          | 2462003042           | 2462004442           | 5550           |

## 5.2 Radiated Emissions

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of Measurement</b> | <p>The frequency spectrum is investigated for intentional and / or unintentional signals emanating from the EUT by use of a standardized test site and measurement antenna.</p> <p>The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer when the measurements are performed allowing the data to be gathered and reported as corrected values.</p> <p>The maximum emissions from the EUT are determined by turn-table azimuth rotation (360°) and scanning of the measurement antenna. Maximized levels are noted at degree values of azimuth, measurement antenna height, and measurement antenna polarity.</p> |
| <b>Example Calculations</b>       | <p>Measurement (dBμV) + Cable factor (dB) + Other (dB) + Antenna Factor (dB/m) = Corrected Reading (dBμV/m)</p> <p>Margin (dB) = Limit (dBμV/m) - Corrected Reading (dBμV/m)</p> <p>Example at 4000 MHz:<br/> Reading = 40 dBμV + 3.4 dB + 0.9 dB + 6.5 dB/m = 50.8 dBμV/m<br/> Average Limit = 20 log (500) = 54 dBμV/m<br/> Margin = 54 dBμV/m - 50.8 dBμV/m = 3.2 dB</p>                                                                                                                                                                                                                                                                                                                             |

### Block Diagram



### 5.2.1 Radiated Emissions 30-1000 MHz

|                    |                     |                 |               |
|--------------------|---------------------|-----------------|---------------|
| <b>Operator</b>    | Jon Dille           | <b>QA</b>       | Anthony Smith |
| <b>Temperature</b> | 24.0°C              | <b>R.H. %</b>   | 46.00%        |
| <b>Test Date</b>   | 8/6/2020            | <b>Location</b> | Chamber 3     |
| <b>Requirement</b> | FCC 15.209, RSS-GEN | <b>Method</b>   | ANSI C63.10   |

Limits: FCC 15.209, RSS-GEN @ 3m

| Frequency (MHz) | Quasi Peak Limit (dBμV/m) |
|-----------------|---------------------------|
| 30-88           | 40.0                      |
| 88-216          | 43.5                      |
| 216-960         | 46.0                      |
| 960-1000        | 54.0                      |

### Test Parameters

|                    |                                                                                   |                     |        |
|--------------------|-----------------------------------------------------------------------------------|---------------------|--------|
| <b>Frequency</b>   | 30-1000MHz                                                                        | <b>Distance</b>     | 3 m    |
| <b>Detector(s)</b> | Max hold with peak detector for plots. Quasi peak detector for final measurement. | <b>Table height</b> | 80 cm  |
| <b>RBW</b>         | 120kHz                                                                            | <b>VBW</b>          | 1.2MHz |

### Instrumentation



Date : 29-Oct-2020

Test : Radiated Emissions 209

Job : C-3380

PE : Zach Wilson

Customer : Mercury Marine

Quote : 319379

| No. | Asset     | Description             | Manufacturer      | Model     | Serial     | Cal Date  | Cal Due Date | Equipment Status    |
|-----|-----------|-------------------------|-------------------|-----------|------------|-----------|--------------|---------------------|
| 1   | EE 960203 | Analyzer - EMI Receiver | Keysight          | N9038A    | MY56400072 | 7/14/2020 | 7/14/2021    | Active Calibration  |
| 2   | AA 960194 | Antenna - Biconical     | A.H. Systems, Inc | SAS-540   | 780        | 9/21/2019 | 9/22/2021    | Active Calibration  |
| 3   | LSC-300   | Cable                   | Chamber 3 Emiss - | -         | -          | 8/9/2019  | 8/9/2021     | Active Verification |
| 4   | AA 960195 | Antenna - Log Periodic  | A.H. Systems, Inc | SAS-512-2 | 557        | 7/24/2020 | 7/24/2021    | Active Calibration  |

|                                |               |                            |
|--------------------------------|---------------|----------------------------|
| Company: Brunswick Corporation | Page 46 of 53 | Name: SmartCraft Connect   |
| Report: TR319379 A             |               | Model: SCC-1               |
| Job: C-3380                    |               | Serial: Engineering Sample |

## EUT Parameters

|                         |                        |                   |                                                              |
|-------------------------|------------------------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b>      | 12VDC via Bench Supply | <b>Mode</b>       | WLAN Transmit                                                |
| <b>EUT Orientations</b> | Side, Vertical         | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |
| <b>Channels</b>         | 1,6,11                 | <b>Notes</b>      | Showing worst case plots only.                               |

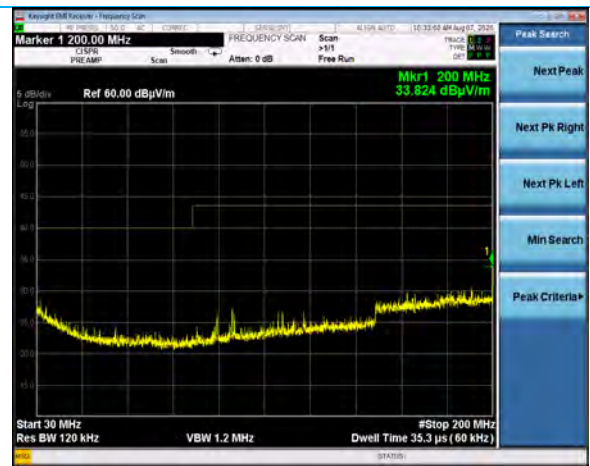
## Data Table

| Frequency (MHz) | Antenna Polarity | EUT Orientation | Channel | Data Rate      | Height (cm) | Azimuth (degree) | Quasi-Peak Reading (dBμV/m) | Quasi-Peak Limit (dBμV/m) | Quasi-Peak Margin (dB) |
|-----------------|------------------|-----------------|---------|----------------|-------------|------------------|-----------------------------|---------------------------|------------------------|
| 182.3           | Horizontal       | Vertical        | 6       | 802.11b 1Mbps  | 199         | 0                | 25.5                        | 43.5                      | 18.0                   |
| 408.0           | Horizontal       | Vertical        | 6       | 802.11g 6Mbps  | 100         | 0                | 39.4                        | 46.0                      | 6.7                    |
| 408.0           | Horizontal       | Vertical        | 6       | 802.11b 11Mbps | 100         | 0                | 39.4                        | 46.0                      | 6.6                    |
| 408.0           | Horizontal       | Vertical        | 6       | 802.11b 1Mbps  | 100         | 0                | 31.5                        | 46.0                      | 14.5                   |
| 408.0           | Vertical         | Side            | 6       | 802.11b 1Mbps  | 150         | 265              | 40.0                        | 46.0                      | 6.0                    |

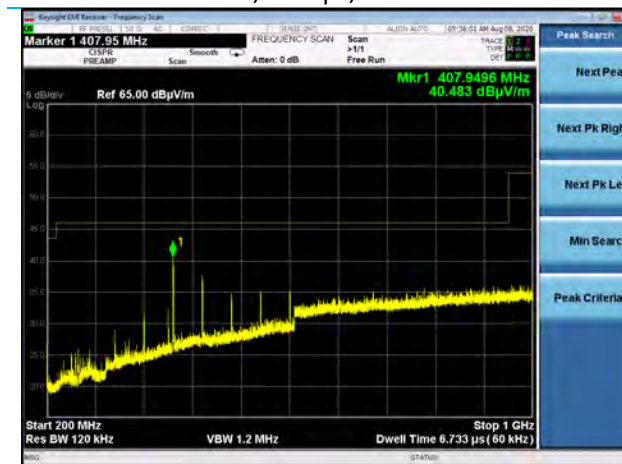
## Plots



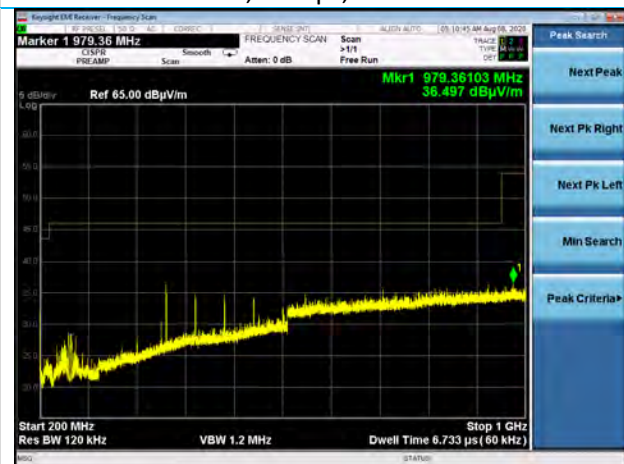
30-200 MHz, Horizontal Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 1



30-200 MHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 1



200-1000 MHz, Horizontal Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 6



200-1000 MHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 6

## 5.2.2 Radiated Emissions 1-25 GHz

|                    |                      |                 |                      |
|--------------------|----------------------|-----------------|----------------------|
| <b>Operator</b>    | Anthony Smith        | <b>QA</b>       | Braden Smith         |
| <b>Temperature</b> | 21.9°C, 22.2°C       | <b>R.H. %</b>   | 62.3%, 65.0%         |
| <b>Test Date</b>   | 8/10/2020, 8/13/2020 | <b>Location</b> | Chamber 5, Chamber 3 |
| <b>Requirement</b> | FCC 15.209, RSS-GEN  | <b>Method</b>   | ANSI C63.10          |

Limits: FCC 15.209, RSS-GEN @ 3m

| Frequency (MHz) | Average Limit (dBμV/m) | Peak Limit (dBμV/m) |
|-----------------|------------------------|---------------------|
| 1-25 GHz        | 54                     | 74                  |

### Test Parameters

|                    |                                                                                                                  |                     |                                                                                                                                                                                                                     |
|--------------------|------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency</b>   | 1-25 GHz                                                                                                         | <b>Distance</b>     | 3 m                                                                                                                                                                                                                 |
| <b>Detector(s)</b> | Max hold with peak detector for plots.<br>Reduced VBW method in relation to duty cycle for average measurements. | <b>Table height</b> | 150 cm                                                                                                                                                                                                              |
| <b>RBW</b>         | 1MHz                                                                                                             | <b>VBW</b>          | Peak: 3MHz<br>Average: 802.11b, 1Mbps, 50Hz<br>Average: 802.11b, 11Mbps, 430Hz<br>Average: 802.11g, 6Mbps, 250Hz<br>Average: 802.11g, 54Mbps, 3kHz<br>Average: 802.11n, MCS0, 270Hz<br>Average: 802.11n, MCS7, 3kHz |

### Instrumentation



Date : 29-Oct-2020 Test : Radiated Emissions 209 Job : C-3380  
PE : Zach Wilson Customer : Mercury Marine Quote : 319379

| No. | Asset     | Description                   | Manufacturer      | Model       | Serial     | Cal Date   | Cal Due Date | Equipment Status    |
|-----|-----------|-------------------------------|-------------------|-------------|------------|------------|--------------|---------------------|
| 1   | EE 960203 | Analyzer - EMI Receiver       | Keysight          | N9038A      | MY56400072 | 7/14/2020  | 7/14/2021    | Active Calibration  |
| 2   | AA 960171 | Cable                         | A.H. Systems, Inc | SAC-26G-6   | 386        | 9/21/2019  | 12/31/2020   | Active Verification |
| 3   | AA 960153 | Filter - High Pass 2.4 GHz    | KwM               | HPF-L-14186 | 7272-04    | 8/9/2019   | 7/16/2021    | Active Calibration  |
| 4   | AA 960081 | Antenna - Double Ridge Horn   | EMCO              | 3115        | 6907       | 10/18/2019 | 10/18/2020   | Active Calibration  |
| 5   | EE 960096 | Antenna - Low Noise Amplifier | Mini-Circuits     | ZVA-213X-S+ | 40201429   | 10/18/2019 | 10/18/2020   | Active Calibration  |

|                                |               |                            |
|--------------------------------|---------------|----------------------------|
| Company: Brunswick Corporation | Page 49 of 53 | Name: SmartCraft Connect   |
| Report: TR319379 A             |               | Model: SCC-1               |
| Job: C-3380                    |               | Serial: Engineering Sample |

## EUT Parameters

|                         |                        |                   |                                                              |
|-------------------------|------------------------|-------------------|--------------------------------------------------------------|
| <b>Input Power</b>      | 12VDC via Bench Supply | <b>Mode</b>       | WLAN Transmit                                                |
| <b>EUT Orientations</b> | Side, Vertical         | <b>Data Rates</b> | 802.11b: 1,11Mbps<br>802.11g: 6,54Mbps<br>802.11n: MCS0,MCS7 |
| <b>Channels</b>         | 1,6,11                 | <b>Notes</b>      | Showing worst case plots only.                               |

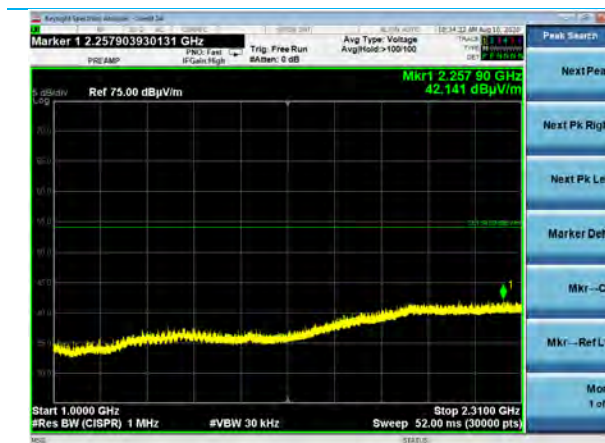
## Data Tables

| Frequency (MHz) | Antenna Polarity | Data Rate      | Channel | Height (cm) | Azimuth (degree) | Average Reading (dBμV/m) | Average Limit (dBμV/m) | Average Margin (dB) | Peak Reading (dBμV/m) | Peak Limit (dBμV/m) | Peak Margin (dB) |
|-----------------|------------------|----------------|---------|-------------|------------------|--------------------------|------------------------|---------------------|-----------------------|---------------------|------------------|
| 2343.9          | Vertical         | 802.11b 1Mbps  | 1       | 158         | 320              | 40.6                     | 54.0                   | 13.4                | 57.2                  | 74.0                | 16.8             |
| 2546.7          | Vertical         | 802.11b 1Mbps  | 1       | 292         | 263              | 41.8                     | 54.0                   | 12.2                | 59.7                  | 74.0                | 14.3             |
| 2483.5          | Vertical         | 802.11b 1Mbps  | 11      | 144         | 0                | 41.4                     | 54.0                   | 12.6                | 51.5                  | 74.0                | 22.5             |
| 2390.0          | Vertical         | 802.11g 6Mbps  | 1       | 205         | 93               | 49.3                     | 54.0                   | 4.7                 | 64.7                  | 74.0                | 9.3              |
| 2483.5          | Vertical         | 802.11g 6Mbps  | 11      | 205         | 92               | 52.0                     | 54.0                   | 2.0                 | 65.2                  | 74.0                | 8.8              |
| 2484.2          | Vertical         | 802.11g 6Mbps  | 11      | 205         | 92               | 49.0                     | 54.0                   | 5.0                 | 69.3                  | 74.0                | 4.7              |
| 2483.6          | Vertical         | 802.11g 54Mbps | 11      | 200         | 93               | 49.9                     | 54.0                   | 4.1                 | 66.2                  | 74.0                | 7.8              |
| 2483.7          | Vertical         | 802.11g 54Mbps | 11      | 200         | 93               | 47.0                     | 54.0                   | 7.0                 | 67.8                  | 74.0                | 6.2              |
| 2389.9          | Vertical         | 802.11g 54Mbps | 1       | 205         | 93               | 46.6                     | 54.0                   | 7.4                 | 60.7                  | 74.0                | 13.3             |
| 2483.5          | Vertical         | 802.11n MCS0   | 11      | 205         | 93               | 52.9                     | 54.0                   | 1.1                 | 70.1                  | 74.0                | 3.9              |
| 2390.0          | Vertical         | 802.11n MCS0   | 1       | 205         | 93               | 49.9                     | 54.0                   | 4.1                 | 65.2                  | 74.0                | 8.8              |
| 2390.0          | Vertical         | 802.11n MCS0   | 1       | 205         | 93               | 51.6                     | 54.0                   | 2.4                 | 67.9                  | 74.0                | 6.1              |

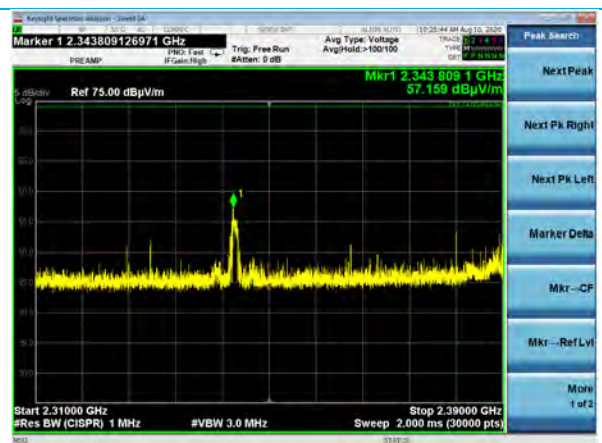
| Frequency (MHz) | Antenna Polarity | Data Rate      | Channel | EUT Orientation | Height (cm) | Azimuth (degree) | Average Reading (dBμV/m) | Average Limit (dBμV/m) | Average Margin (dB) | Peak Reading (dBμV/m) | Peak Limit (dBμV/m) | Peak Margin (dB) |
|-----------------|------------------|----------------|---------|-----------------|-------------|------------------|--------------------------|------------------------|---------------------|-----------------------|---------------------|------------------|
| 4923.9          | Vertical         | 802.11b, 1Mbps | 11      | Side            | 105         | 14               | 35.3                     | 54.0                   | 18.7                | 43.5                  | 74.0                | 30.5             |
| 4924.0          | Horizontal       | 802.11b, 1Mbps | 11      | Side            | 155         | 190              | 37.9                     | 54.0                   | 16.1                | 44.7                  | 74.0                | 29.3             |
| 4923.9          | Horizontal       | 802.11b, 1Mbps | 11      | Vertical        | 140         | 53               | 38.1                     | 54.0                   | 15.9                | 44.2                  | 74.0                | 29.8             |
| 4923.9          | Vertical         | 802.11b, 1Mbps | 11      | Vertical        | 145         | 53               | 38.0                     | 54.0                   | 16.0                | 44.5                  | 74.0                | 29.5             |
| 4824.0          | Horizontal       | 802.11b, 1Mbps | 1       | Vertical        | 145         | 55               | 42.0                     | 54.0                   | 12.0                | 47.4                  | 74.0                | 26.6             |
| 4873.9          | Horizontal       | 802.11b, 1Mbps | 6       | Vertical        | 145         | 54               | 39.2                     | 54.0                   | 14.8                | 45.3                  | 74.0                | 28.7             |

| Frequency (MHz) | Antenna Polarity | Data Rate      | Channel | EUT Orientation | Height (cm) | Azimuth (degree) | Average Reading (dBμV/m) | Average Limit (dBμV/m) | Average Margin (dB) | Peak Reading (dBμV/m) | Peak Limit (dBμV/m) | Peak Margin (dB) |
|-----------------|------------------|----------------|---------|-----------------|-------------|------------------|--------------------------|------------------------|---------------------|-----------------------|---------------------|------------------|
| 7386.7          | Vertical         | 802.11b, 1Mbps | 11      | Side            | 185         | 193              | 33.8                     | 54.0                   | 20.2                | 45.0                  | 74.0                | 29.0             |
| 7386.7          | Horizontal       | 802.11b, 1Mbps | 11      | Side            | 125         | 284              | 35.8                     | 54.0                   | 18.2                | 45.8                  | 74.0                | 28.2             |
| 7386.7          | Horizontal       | 802.11b, 1Mbps | 11      | Vertical        | 142         | 59               | 35.0                     | 54.0                   | 19.0                | 45.2                  | 74.0                | 28.8             |
| 7386.7          | Vertical         | 802.11b, 1Mbps | 11      | Vertical        | 170         | 52               | 35.2                     | 54.0                   | 18.8                | 45.3                  | 74.0                | 28.7             |
| 7311.7          | Horizontal       | 802.11b, 1Mbps | 6       | Side            | 140         | 281              | 35.1                     | 54.0                   | 18.9                | 45.0                  | 74.0                | 29.0             |

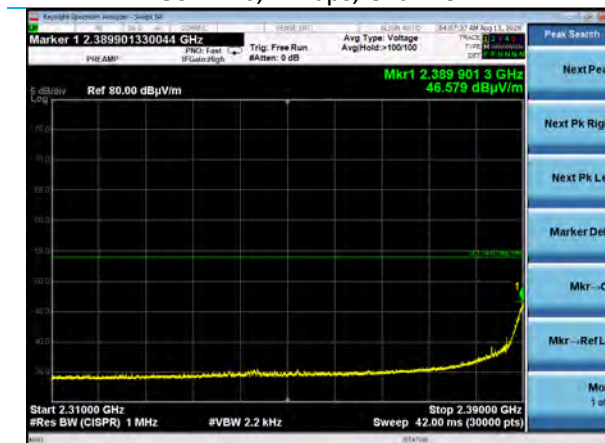
## Plots



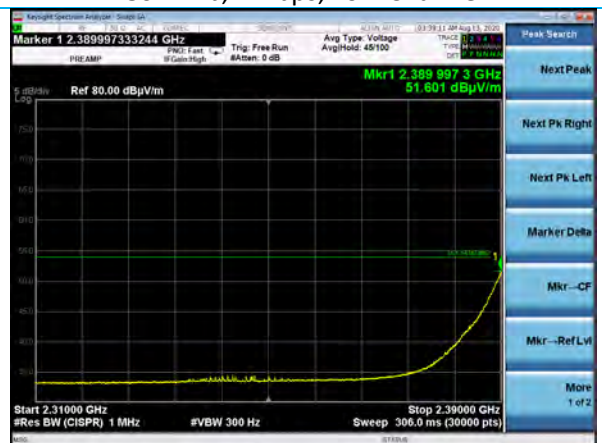
1000-2310 MHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 1



2310-2390 MHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Low Channel

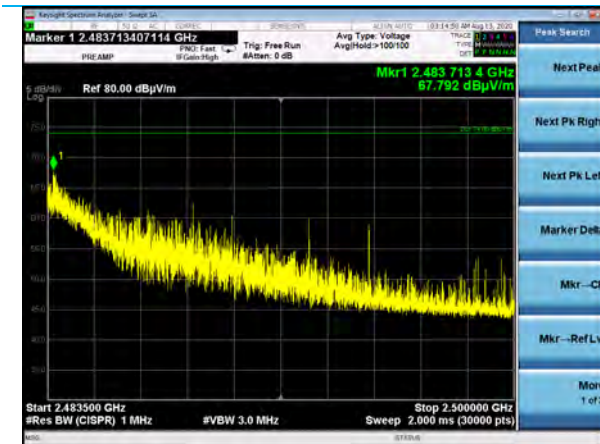


2310-2390 MHz, Vertical Antenna, Vertical EUT  
802.11g, 6Mbps, Low Channel

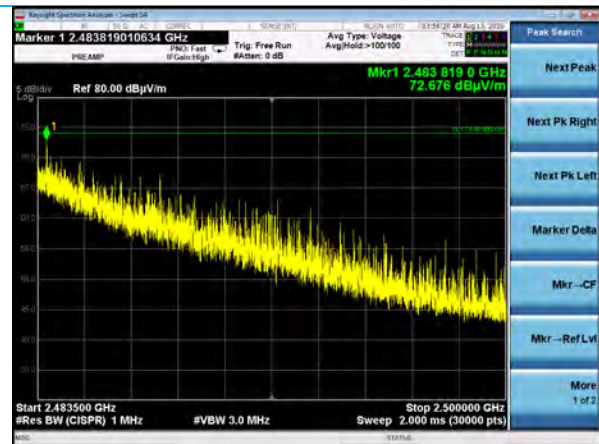


2310-2390 MHz, Vertical Antenna, Vertical EUT  
802.11n, MCS0, Low Channel

|                                |               |                            |
|--------------------------------|---------------|----------------------------|
| Company: Brunswick Corporation | Page 51 of 53 | Name: SmartCraft Connect   |
| Report: TR319379 A             |               | Model: SCC-1               |
| Job: C-3380                    |               | Serial: Engineering Sample |



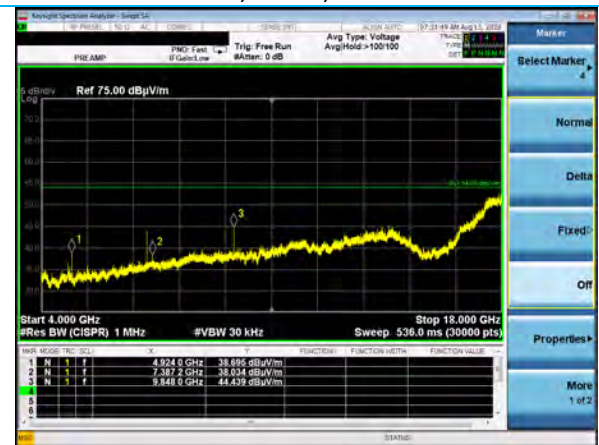
2483.5-2500 MHz, Vertical Antenna, Side EUT  
802.11g, 54Mbps, Channel 11



2483.5-2500 MHz, Vertical Antenna, Side EUT  
802.11n, MCS0, Channel 11



2.5-4 GHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 11



4-18 GHz, Horizontal Antenna, Side EUT  
802.11b, 1Mbps, Channel 1



4-18 GHz, Vertical Antenna, Side EUT  
802.11b, 1Mbps, Low Channel



18-25 GHz, Vertical Antenna, Vertical EUT  
802.11b, 1Mbps, Channel 11

## 6 REVISION HISTORY

| Version | Date       | Notes                       | Person      |
|---------|------------|-----------------------------|-------------|
| 1       | 10/30/2020 | Initial Draft               | Zach Wilson |
| 2       | 11/13/2020 | Revised per internal review | Zach Wilson |

**END OF REPORT**