

RF TEST REPORT



Report No.: FCC_RF_SL19030501-SEV-015
Supersede Report No.:

| | | |
|--|---|--|
| Applicant | : | Lippert Components, Inc. |
| Product Name | : | AquaFi Hotspot |
| Model No. | : | WE826-WD |
| Test Standard | : | 47 CFR 15.247 RSS 247 Issue 2, February 2017 |
| Test Method | : | ANSI C63.10: 2013 RSS Gen Issue 5, April 2018 558074 D01 15.247 Meas Guidance v05r01 |
| FCC ID | : | XNI-IDS23005 |
| Dates of test | : | 04/20/2019 – 05/17/2019 |
| Issue Date | : | 05/20/2019 |
| Test Result | : | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail |
| Equipment complied with the specification [X] Equipment did not comply with the specification [] | | |

| This Test Report is Issued Under the Authority of: | |
|--|-------------------|
| | |
| Deon Dai | Chen Ge |
| Test Engineer | Engineer Reviewer |

Issued By:
SIEMIC Laboratories
 775 Montague Expressway, Milpitas, 95035 CA



775 Montague Expressway, Milpitas, CA 95035, USA • Phone: (+1) 408 526 1188 • Facsimile (+1) 408 526 1088

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Laboratory Introduction

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Accreditations for Conformity Assessment

| Country/Region | Accreditation Body | Scope |
|----------------|------------------------|-----------------------------------|
| USA | FCC, A2LA | EMC, RF/Wireless, Telecom |
| Canada | IC, A2LA, NIST | EMC, RF/Wireless, Telecom |
| Taiwan | BSMI, NCC, NIST | EMC, RF, Telecom, Safety |
| Hong Kong | OFTA, NIST | RF/Wireless, Telecom |
| Australia | NATA, NIST | EMC, RF, Telecom, Safety |
| Korea | KCC/RRA, NIST | EMI, EMS, RF, Telecom, Safety |
| Japan | VCCI, JATE, TELEC, RFT | EMI, RF/Wireless, Telecom |
| Mexico | NOM, COFETEL, Caniety | Safety, EMC, RF/Wireless, Telecom |
| Europe | A2LA, NIST | EMC, RF, Telecom, Safety |
| Israel | MOC, NIST | EMC, RF, Telecom, Safety |

Accreditations for Product Certifications

| Country | Accreditation Body | Scope |
|-----------|--------------------|-----------------------|
| USA | FCC TCB, NIST | EMC, RF, Telecom |
| Canada | IC FCB, NIST | EMC, RF, Telecom |
| Singapore | iDA, NIST | EMC, RF, Telecom |
| EU | NB | EMC & R&TTE Directive |
| Japan | MIC (RCB 208) | RF, Telecom |
| Hong Kong | OFTA (US002) | RF, Telecom |

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1 Report Revision History

| Report No. | Report Version | Description | Issue Date |
|---------------------------|----------------|-------------|------------|
| FCC_RF_SL19030501-SEV-015 | None | Original | 05/20/2019 |
| | | | |
| | | | |
| | | | |
| | | | |

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Lippert Components, Inc.
Product: AquaFi Hotspot
Model: WE826-WD

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

| | | |
|----------------------|---|---|
| Applicant Name | : | Lippert Components Inc. |
| Applicant Address | : | 6801 15 Mile Rd. Sterling Heights, MI 48312 |
| Manufacturer Name | : | Lippert Components Inc. |
| Manufacturer Address | : | 6801 15 Mile Rd. Sterling Heights, MI 48312 |

4 Test site information

| | |
|----------------------|---|
| Lab performing tests | SIEMIC Laboratories |
| Lab Address | 775 Montague Expressway, Milpitas, CA 95035 |
| FCC Test Site No. | 540430 |
| IC Test Site No. | 4842D |
| VCCI Test Site No. | A0133 |

5 Modification

| Index | Item | Description | Note |
|-------|------|-------------|------|
| - | - | - | - |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

6 EUT Information

6.1 EUT Description

| | |
|---------------------------|--|
| Product Name | AquaFi Hotspot |
| Model No. | WE826-WD |
| Trade Name | Lippert Components |
| Serial No. | - |
| Input Power | 2.4 W nominal |
| Power Adapter Manu/Model | Shenzhen Fushigang Technology Co., Ltd, AS1201A-1201000USL |
| Power Adapter SN | N/A |
| Date of EUT received | 03/13/2019 |
| Equipment Class/ Category | DTS |
| Clock Frequencies | Processor 20 MHz, Internal USB Hub 12 MHz |
| Port/Connectors | N/A |
| AC Power Cord Type | Wall plug transformer |
| DC Power Cable Type | N/A |

6.2 Radio Description

| Radio Type | 802.11b | 802.11g | 802.11n-20M | 802.11n-40M |
|------------------------|-----------------------------|-------------------------------------|---------------------------------|---------------------------------|
| Operating Frequency | 2412-2462MHz | 2412-2462MHz | 2412-2462MHz | 2422-2452MHz |
| Modulation | DSSS (CCK, DQPSK, DBPSK) | OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM) | OFDM (BPSK, QPSK, 16QAM, 64QAM) | OFDM (BPSK, QPSK, 16QAM, 64QAM) |
| Channel Spacing | 5MHz | 5MHz | 5MHz | 5MHz |
| Number of Channels | 11 | 11 | 11 | 7 |
| Antenna Type | Internal Omni PCB Antenna | | | |
| Antenna Gain (Peak) | 3 dBi | | | |
| Directional Gain | 6 dBi | | | |
| Antenna Connector Type | U.FL | | | |

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

| Item | Supporting Equipment Description | Model | Serial Number | Manufacturer | Note |
|------|----------------------------------|----------------------|---------------|---|------|
| 1 | Laptop | PP01L Latitude E5440 | F1WPF12 | Dell | - |
| 2 | Power Adapter | AS1201A-1201000USL | - | Shenzhen Fushigang Technology Co., Ltd, | - |
| | | | | | |

7.2 Cabling Description

| Name | Connection Start | | Connection Stop | | Length / shielding Info | | Note |
|------|------------------|----------|-----------------|----------|-------------------------|-----------|------|
| | From | I/O Port | To | I/O Port | Length (m) | Shielding | |
| | | | | | | | |
| | | | | | | | |

7.3 Test Software Description

| Test Item | Software | Description |
|------------|----------|--|
| RF Testing | MT7620 | Set the EUT to transmit continuously in diferent test mode |
| | | |
| | | |

8 Test Summary

| Test Item | Test standard | | Test Method/Procedure | | Pass / Fail |
|------------------------------|---------------|-----------|-----------------------|---|--|
| Restricted Band of Operation | FCC | 15.205 | FCC | ANSI C63.10:2013 558074 D01 DTS Meas Guidance v05r01 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| AC Conducted Emissions | FCC | 15.207(a) | FCC | ANSI C63.10:2013 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |

DTS Band Requirement

| Test Item | Test standard | | Test Method/Procedure | | Pass / Fail |
|---|--|--------------|-----------------------|---|--|
| 6dB Bandwidth | FCC | 15.247(a)(2) | FCC | ANSI C63.10:2013 558074 D01 DTS Meas Guidance v05r01 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| Band Edge and Radiated Spurious Emissions | FCC | 15.247(d) | FCC | ANSI C63.10:2013 558074 D01 DTS Meas Guidance v05r01 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| Output Power | FCC | 15.247(b) | FCC | ANSI C63.10:2013 558074 D01 DTS Meas Guidance v05r01 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| Antenna Gain > 6 dBi | FCC | 15.247(e) | FCC | - | <input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A |
| Power Spectral Density | FCC | 15.247(e) | FCC | ANSI C63.10:2013 558074 D01 DTS Meas Guidance v05r01 | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| RF Exposure requirement | FCC | 15.247(i) | FCC | - | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A |
| Remark | <ol style="list-style-type: none"> All measurement uncertainties do not take into consideration for all presented test results. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. | | | | |

9 Measurement Uncertainty

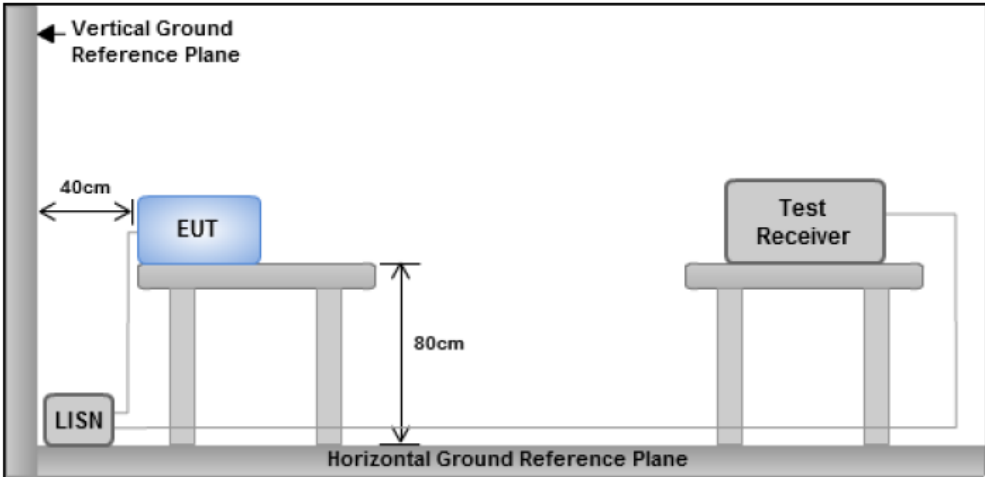
| Emissions | | | |
|-----------------------------|-----------------|---|-------------|
| Test Item | Frequency Range | Description | Uncertainty |
| AC Conducted Emissions | 150KHz – 30MHz | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 | ±3.5dB |
| RF conducted measurement | 150KHz – 40GHz | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 | ±0.95dB |
| Radiated Spurious Emissions | 30MHz – 1GHz | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | ±6dB |
| Radiated Spurious Emissions | 1GHz – 40GHz | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | ±6dB |

10 Measurements, Examination and Derived Results

10.1 Conducted Emissions

Conducted Emission Limit

| Frequency ranges (MHz) | Limit (dBuV) | |
|------------------------|--------------|---------|
| | QP | Average |
| 0.15 ~ 0.5 | 66 – 56 | 56 – 46 |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

| Spec | Item | Requirement | Applicable |
|------------|---|---|-------------------------------------|
| FCC 15.207 | a) | For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges. | <input checked="" type="checkbox"/> |
| Test Setup |  <p>Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes</p> | | |
| Procedure | <ul style="list-style-type: none"> - The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply. | | |
| Remark | EUT was tested at 120VAC, 60Hz | | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | | |

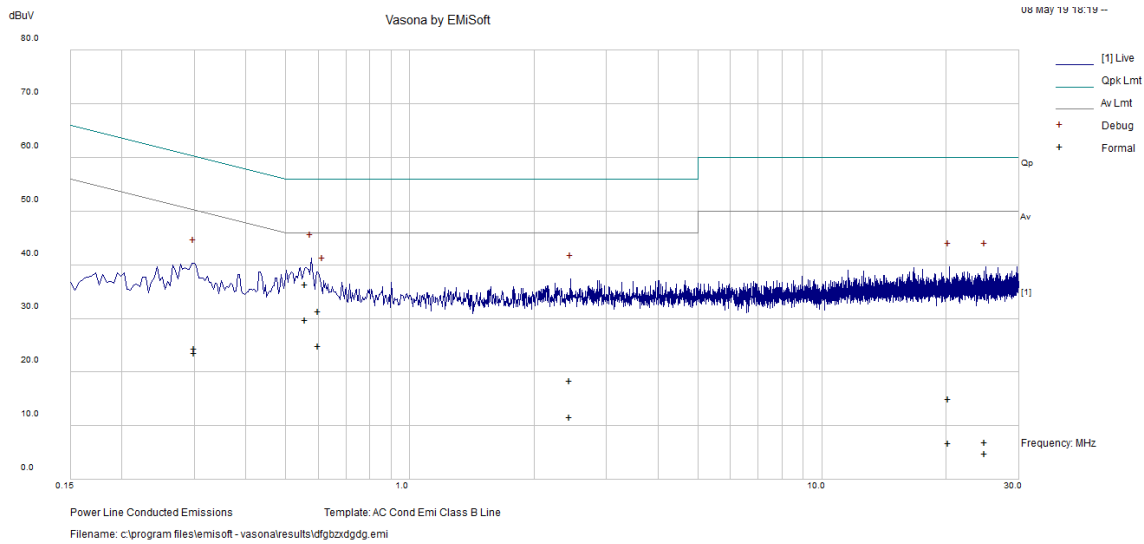
Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Sagar Bombaywala at Conducted Emission test site.

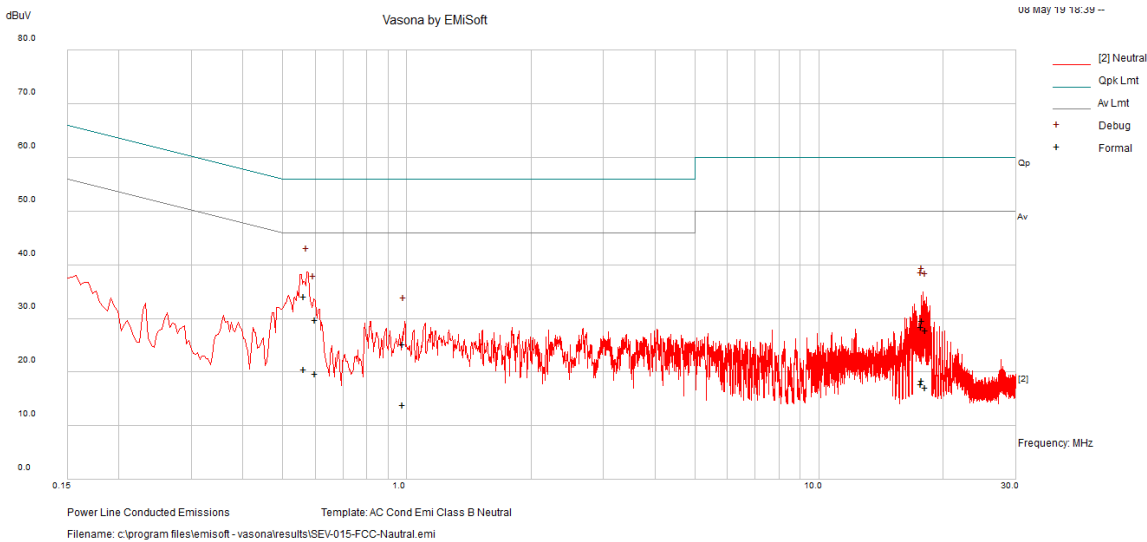
Conducted Emission Test Results

| Test specification: | Conducted Emissions | | |
|--|---------------------------|------|---------------------|
| Environmental Conditions: | Temp(°C): | 20 | Result: PASS |
| | Humidity (%): | 50 | |
| | Atmospheric(mbar): | 1021 | |
| Mains Power: | 120V 60Hz | | Result: PASS |
| Tested by: | Sagar Bombaywala | | |
| Test Date: | May 8 th ,2019 | | |
| Set Up Modes, Configurations, and Notes: | Line | | |



| Frequency (MHz) | Raw (dBuV) | Cable Loss (dB) | Factors (dB) | Level (dBuV) | Measurement Type | Line/Neutral | Limit (dBuV) | Margin (dB) | Pass /Fail |
|-----------------|------------|-----------------|--------------|--------------|------------------|--------------|--------------|-------------|------------|
| 0.559311 | 29 | 7.4 | 0.04 | 36.44 | Quasi Peak | Line | 56 | -19.56 | Pass |
| 2.452788 | 10.45 | 7.91 | 0.07 | 18.42 | Quasi Peak | Line | 56 | -37.58 | Pass |
| 0.600806 | 23.85 | 7.44 | 0.04 | 31.33 | Quasi Peak | Line | 56 | -24.67 | Pass |
| 0.301419 | 17.05 | 7.25 | 0.04 | 24.34 | Quasi Peak | Line | 60.2 | -35.86 | Pass |
| 24.96826 | -2.61 | 9.03 | 0.54 | 6.96 | Quasi Peak | Line | 60 | -53.04 | Pass |
| 20.39553 | 5.58 | 8.92 | 0.47 | 14.96 | Quasi Peak | Line | 60 | -45.04 | Pass |
| 0.559311 | 22.27 | 7.4 | 0.04 | 29.71 | Average | Line | 46 | -16.29 | Pass |
| 2.452788 | 3.71 | 7.91 | 0.07 | 11.68 | Average | Line | 46 | -34.32 | Pass |
| 0.600806 | 17.44 | 7.44 | 0.04 | 24.92 | Average | Line | 46 | -21.08 | Pass |
| 0.301419 | 16.31 | 7.25 | 0.04 | 23.6 | Average | Line | 50.2 | -26.6 | Pass |
| 24.96826 | -4.71 | 9.03 | 0.54 | 4.86 | Average | Line | 50 | -45.14 | Pass |
| 20.39553 | -2.63 | 8.92 | 0.47 | 6.76 | Average | Line | 50 | -43.24 | Pass |

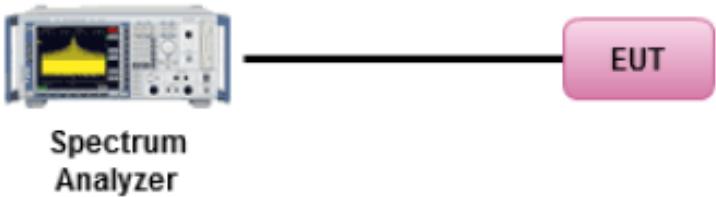
| Test specification: | Conducted Emissions | | |
|--|-----------------------------|------|---------------------|
| Environmental Conditions: | Temp(°C): | 20 | Result: PASS |
| | Humidity (%): | 50 | |
| | Atmospheric(mbar): | 1021 | |
| Mains Power: | 120V 60Hz | | Result: PASS |
| Tested by: | Sagar Bombaywala | | |
| Test Date: | May 8 th , 2019. | | |
| Set Up Modes, Configurations, and Notes: | Neutral | | |



| Frequency (MHz) | Raw (dBuV) | Cable Loss (dB) | Factors (dB) | Level (dBuV) | Measurement Type | Line/Neutral | Limit (dBuV) | Margin (dB) | Pass /Fail |
|-----------------|------------|-----------------|--------------|--------------|------------------|--------------|--------------|-------------|------------|
| 0.565743 | 26.76 | 7.41 | 0.03 | 34.2 | Quasi Peak | Neutral | 56 | -21.8 | Pass |
| 0.600012 | 22.22 | 7.44 | 0.03 | 29.68 | Quasi Peak | Neutral | 56 | -26.32 | Pass |
| 17.8707 | 20.18 | 8.97 | 0.4 | 29.55 | Quasi Peak | Neutral | 60 | -30.45 | Pass |
| 17.73373 | 19.08 | 8.97 | 0.4 | 28.44 | Quasi Peak | Neutral | 60 | -31.56 | Pass |
| 18.21585 | 18.39 | 8.96 | 0.41 | 27.75 | Quasi Peak | Neutral | 60 | -32.25 | Pass |
| 0.979671 | 17.58 | 7.68 | 0.04 | 25.29 | Quasi Peak | Neutral | 56 | -30.71 | Pass |
| 0.565743 | 13.05 | 7.41 | 0.03 | 20.49 | Average | Neutral | 46 | -25.51 | Pass |
| 0.600012 | 12.2 | 7.44 | 0.03 | 19.66 | Average | Neutral | 46 | -26.34 | Pass |
| 17.8707 | 9.11 | 8.97 | 0.4 | 18.48 | Average | Neutral | 50 | -31.52 | Pass |
| 17.73373 | 8.45 | 8.97 | 0.4 | 17.81 | Average | Neutral | 50 | -32.19 | Pass |
| 18.21585 | 7.72 | 8.96 | 0.41 | 17.09 | Average | Neutral | 50 | -32.91 | Pass |
| 0.979671 | 6.23 | 7.68 | 0.04 | 13.95 | Average | Neutral | 46 | -32.05 | Pass |

10.2 6dB Bandwidth

Requirement(s):

| Spec | Requirement | Applicable |
|----------------|--|---|
| § 15.247 | 6dB BW≥500KHz; | <input checked="" type="checkbox"/> |
| RSS Gen 6.7 | For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth). | <input checked="" type="checkbox"/> |
| Test Setup |  <p style="text-align: center;">Spectrum Analyzer EUT</p> | |
| Test Procedure | 558074 D01 DTS Meas Guidance v05r01, 8.2 DTS bandwidth ANSI C63.10, 11.8 <u>Measurement procedure</u> <ul style="list-style-type: none"> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. | |
| Test Date | 04/23/2019-04/24/2019 | Environmental condition Temperature 23°C Relative Humidity 42% Atmospheric Pressure 1021mbar |
| Remark | N/A | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | |

Test Data Yes N/A

Test Plot Yes N/A

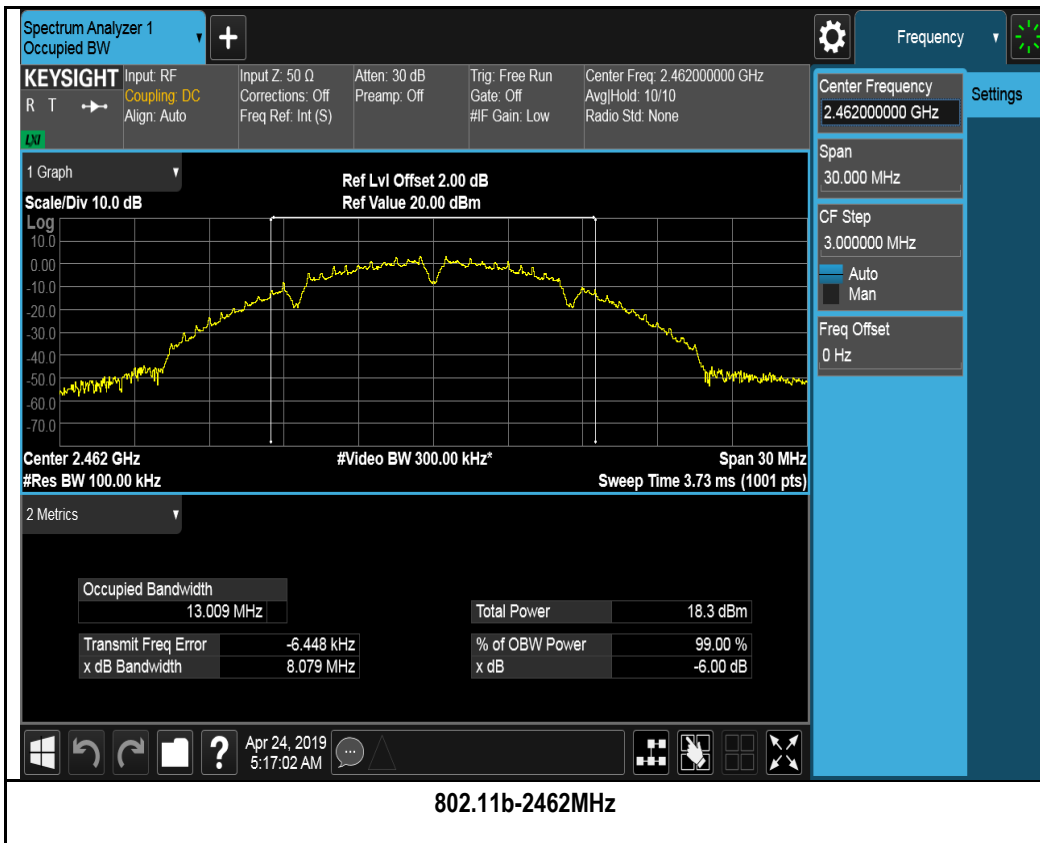
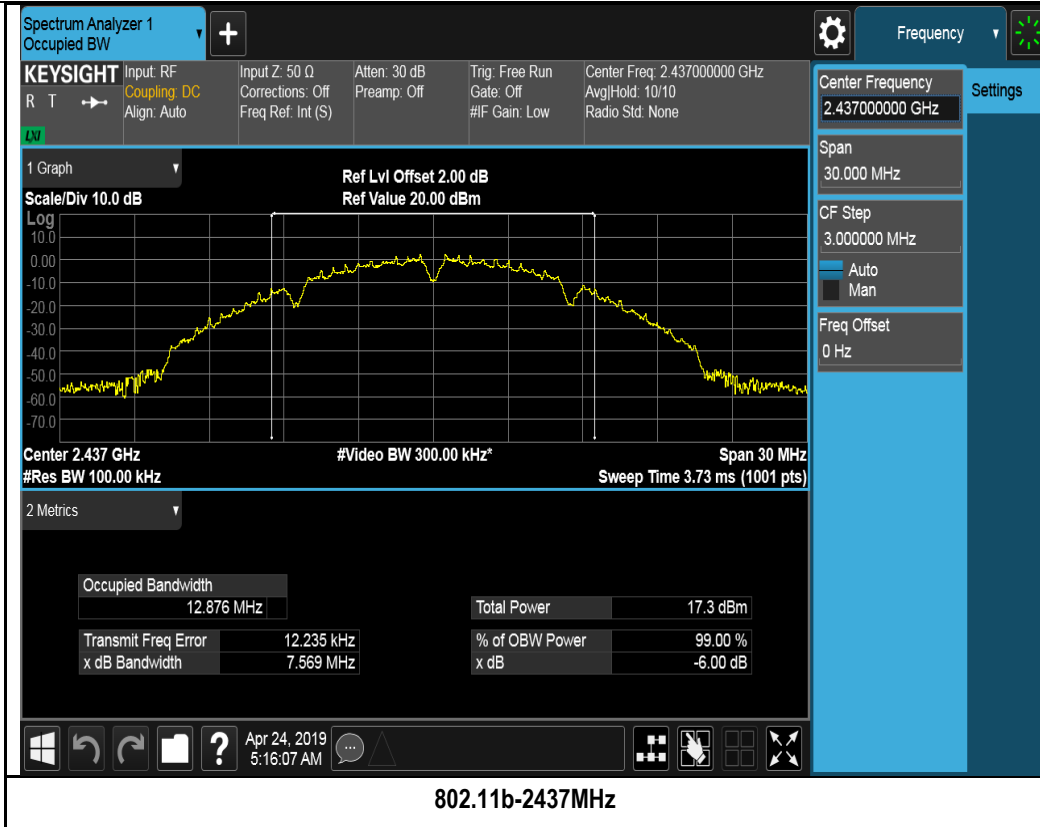
Test was done by Deon Dai at RF test site.

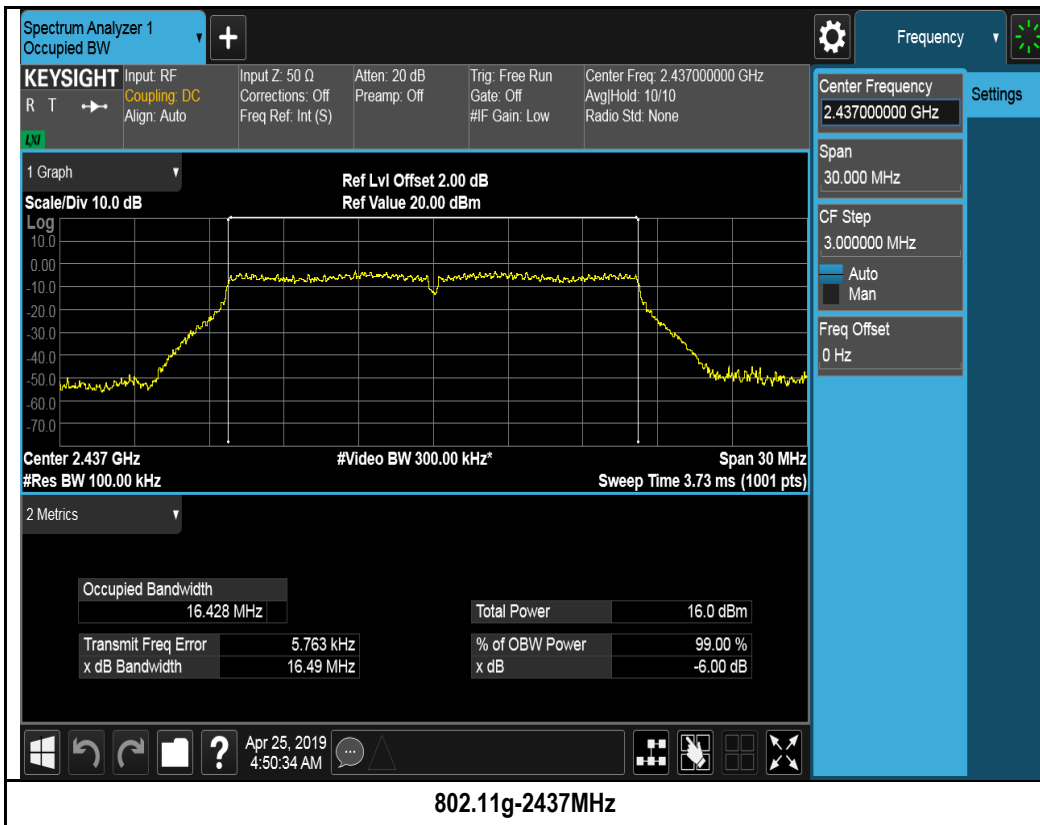
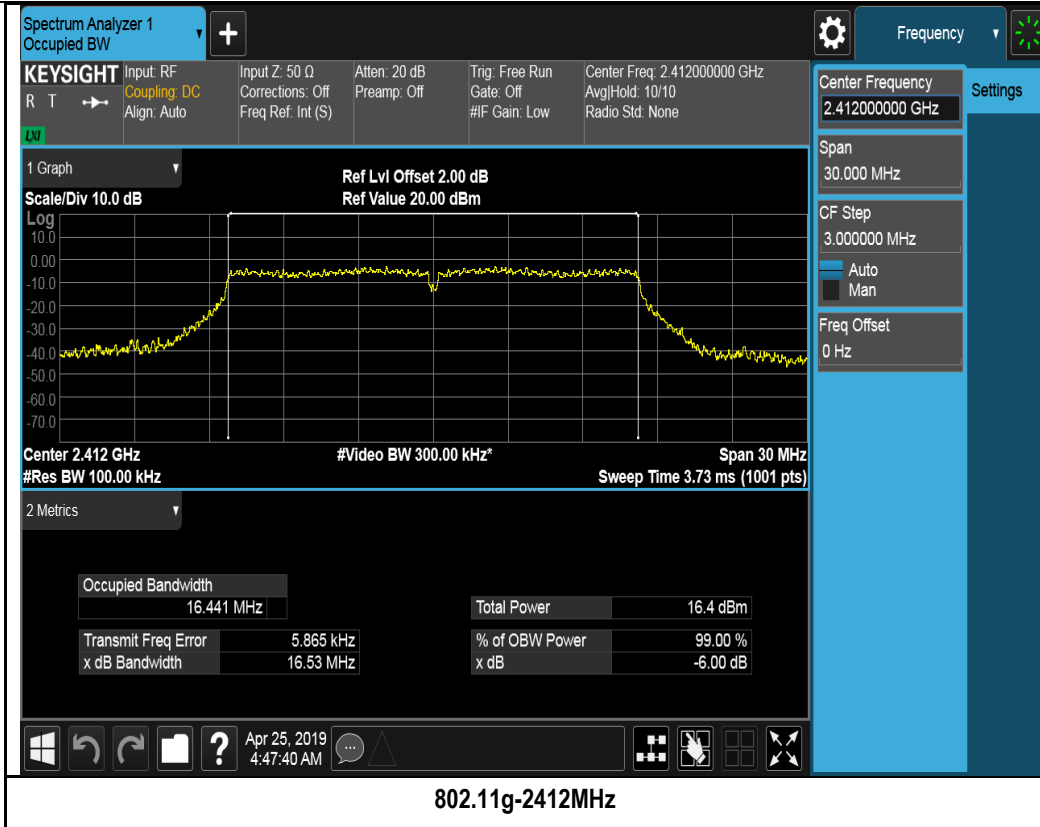
6dB Bandwidth measurement result for 2.4GHz

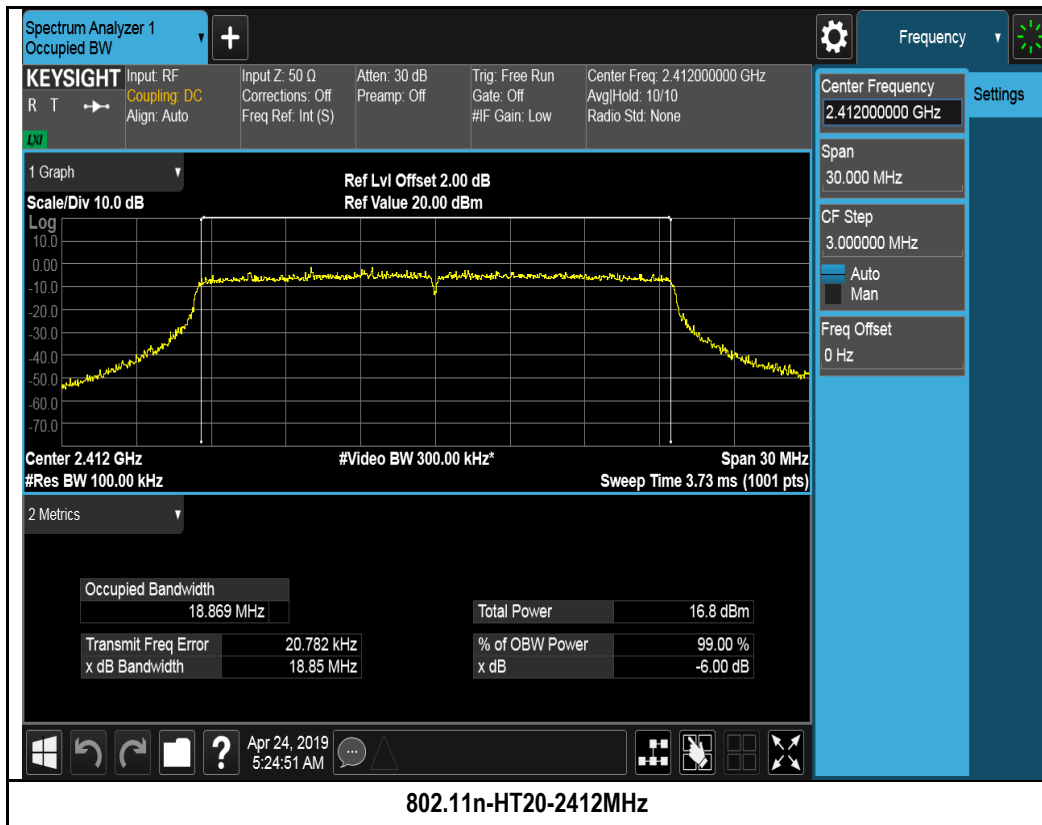
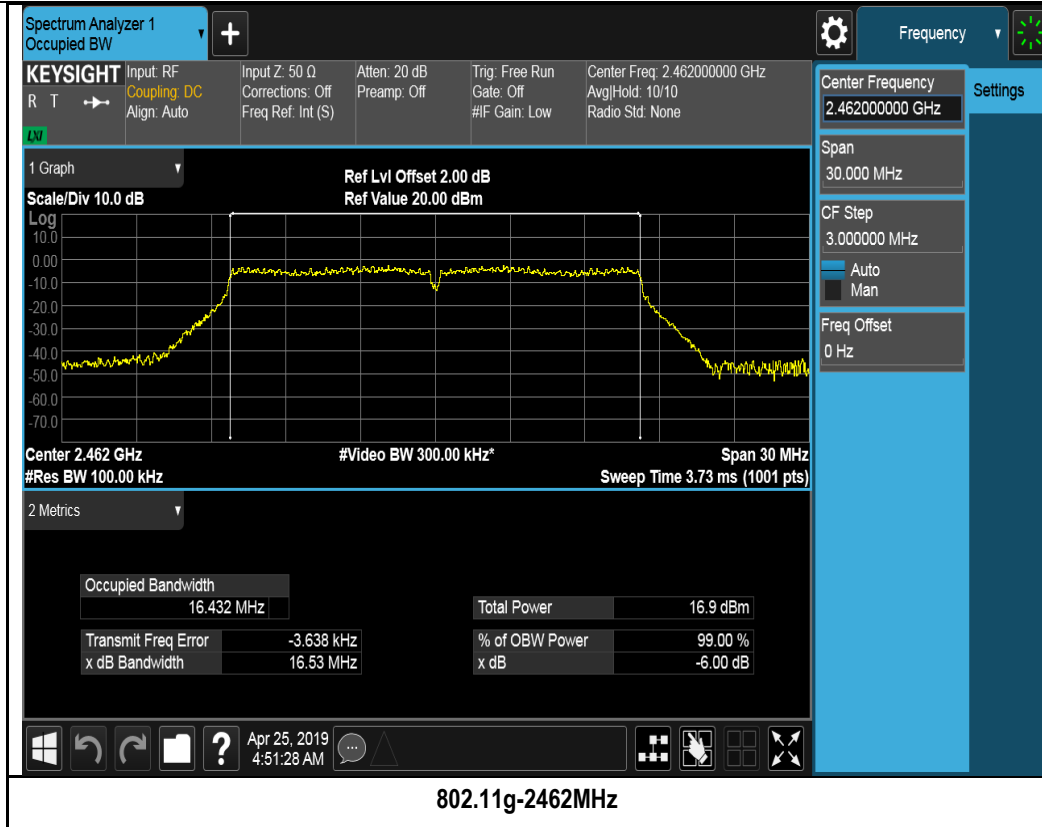
| Type | Test mode | Freq (MHz) | CH | Result (MHz) | Limit (MHz) | Result |
|--------|-------------|------------|------|--------------|-------------|--------|
| 6dB BW | 802.11b | 2412 | Low | 7.062 | ≥0.5 | Pass |
| | | 2437 | Mid | 7.569 | ≥0.5 | Pass |
| | | 2462 | High | 8.079 | ≥0.5 | Pass |
| | 802.11g | 2412 | Low | 16.531 | ≥0.5 | Pass |
| | | 2437 | Mid | 16.490 | ≥0.5 | Pass |
| | | 2462 | High | 16.531 | ≥0.5 | Pass |
| | 802.11n-20M | 2412 | Low | 18.852 | ≥0.5 | Pass |
| | | 2437 | Mid | 18.904 | ≥0.5 | Pass |
| | | 2462 | High | 19.008 | ≥0.5 | Pass |
| | 802.11n-40M | 2422 | Low | 37.866 | ≥0.5 | Pass |
| | | 2437 | Mid | 36.755 | ≥0.5 | Pass |
| | | 2452 | High | 36.377 | ≥0.5 | Pass |

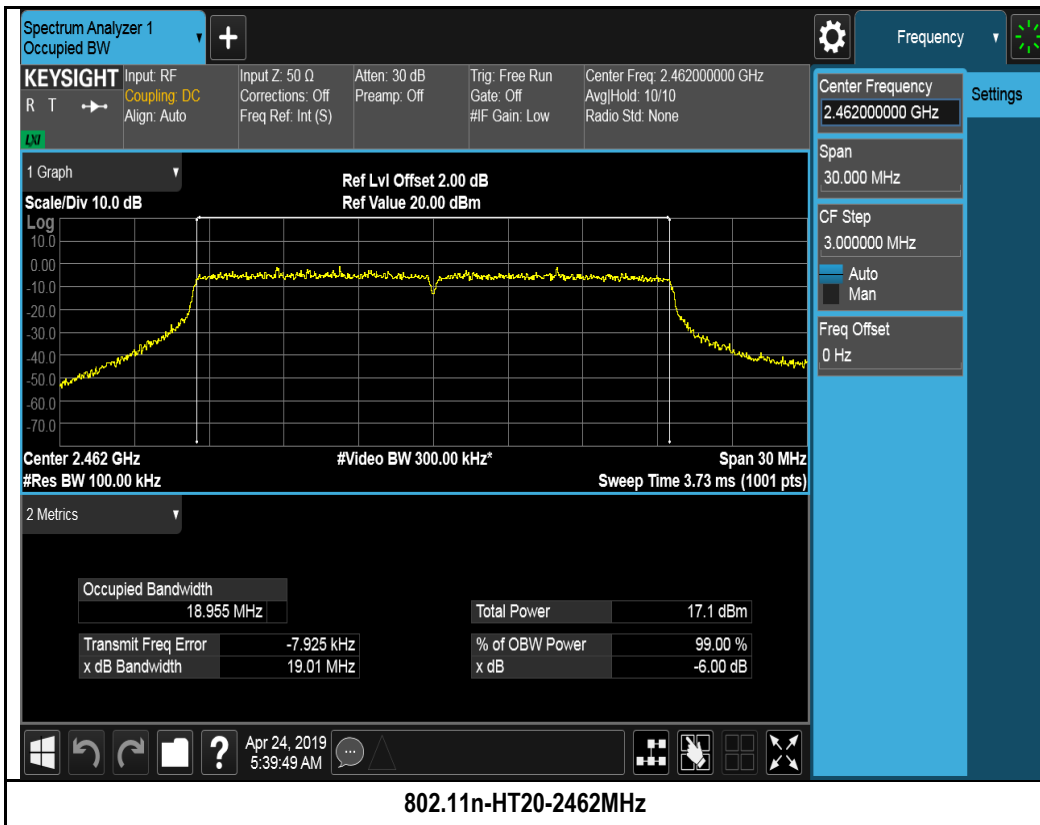
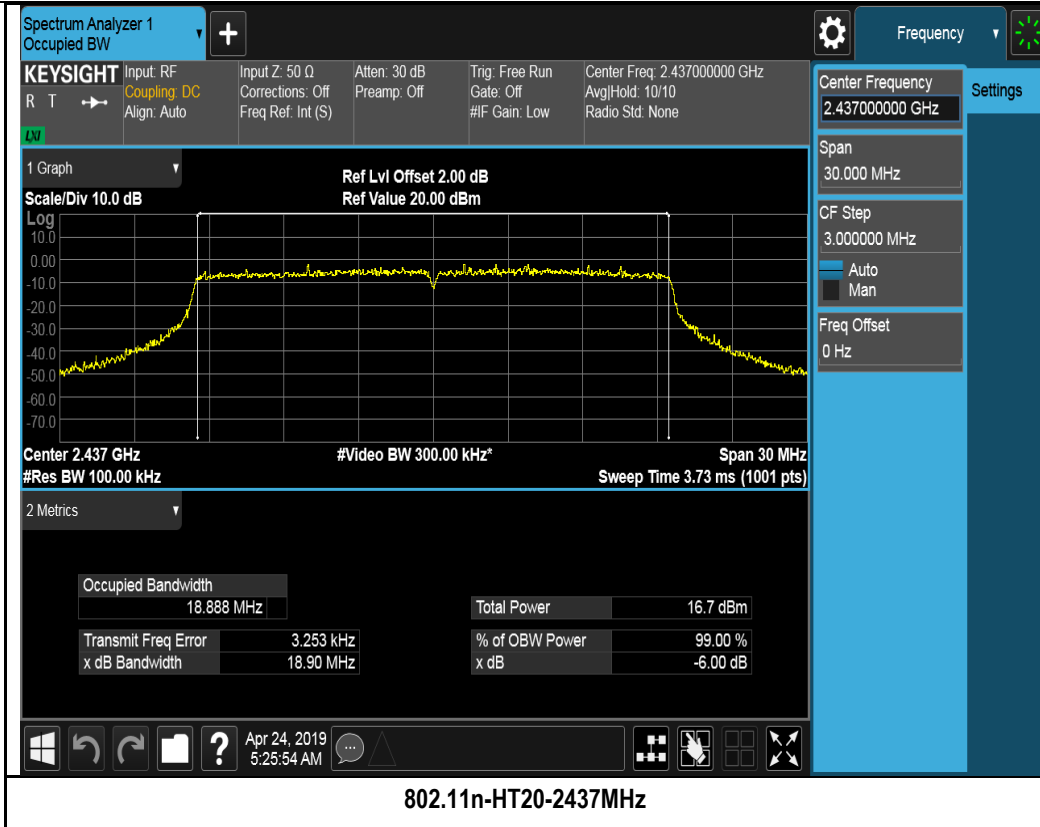
6dB Bandwidth Test Plots

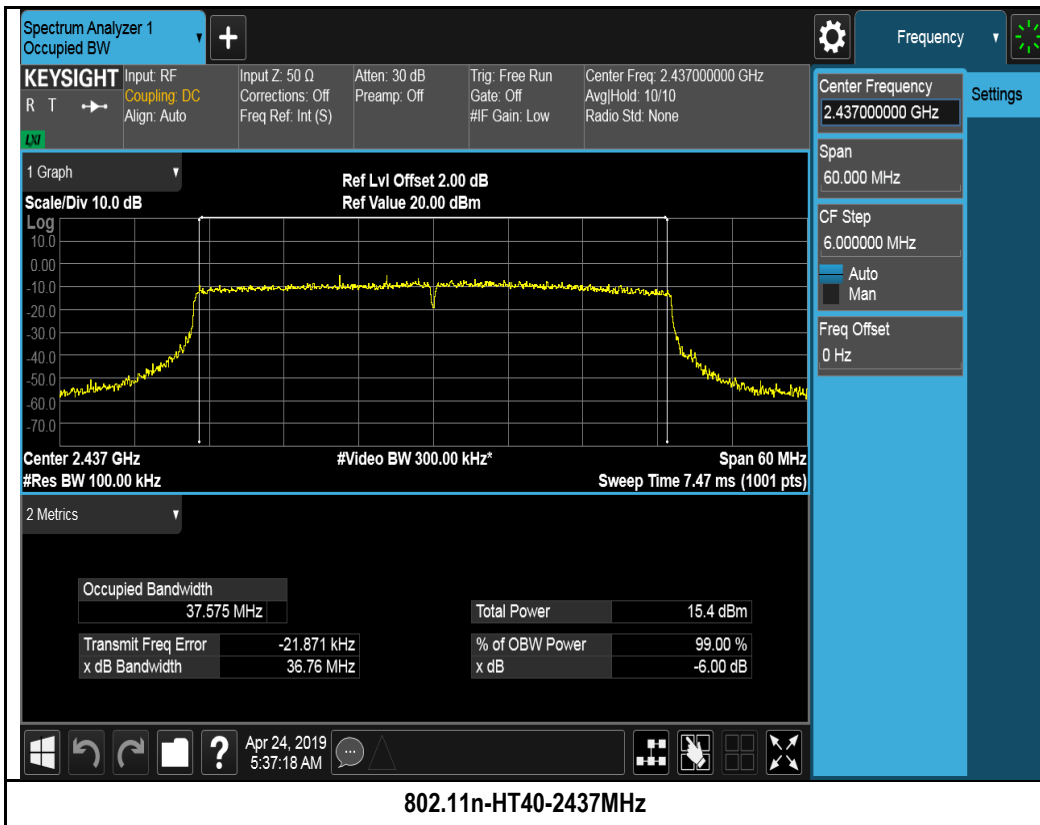
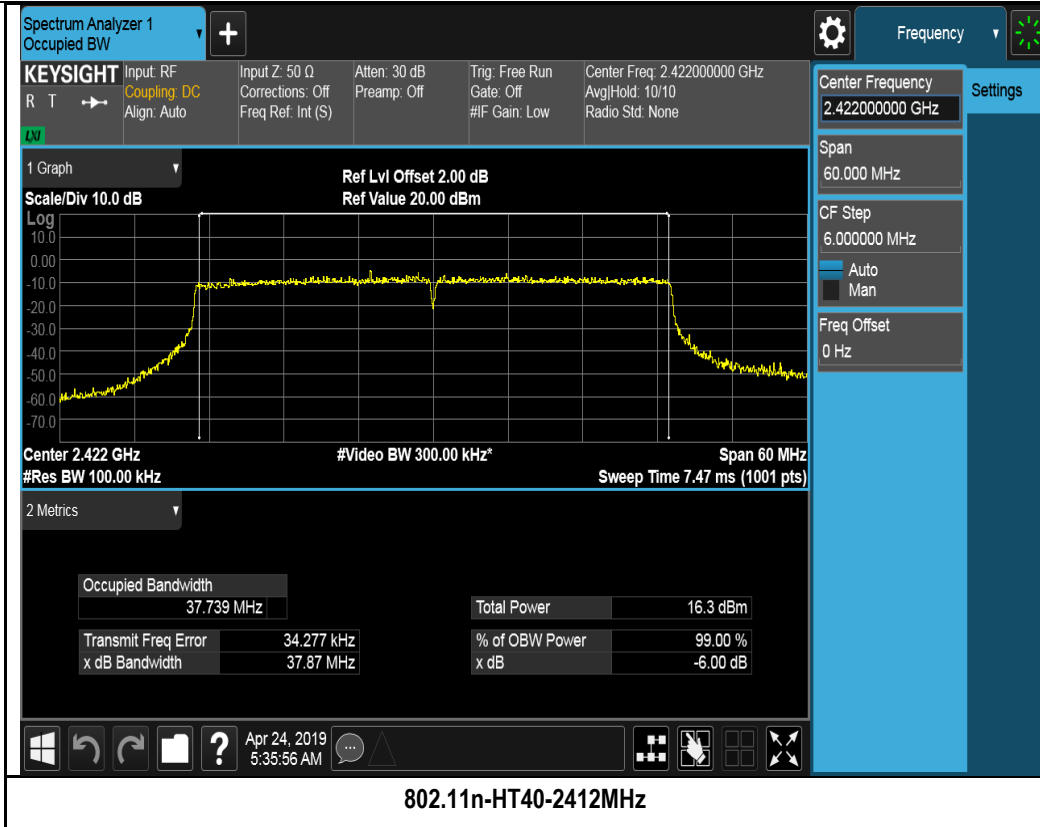


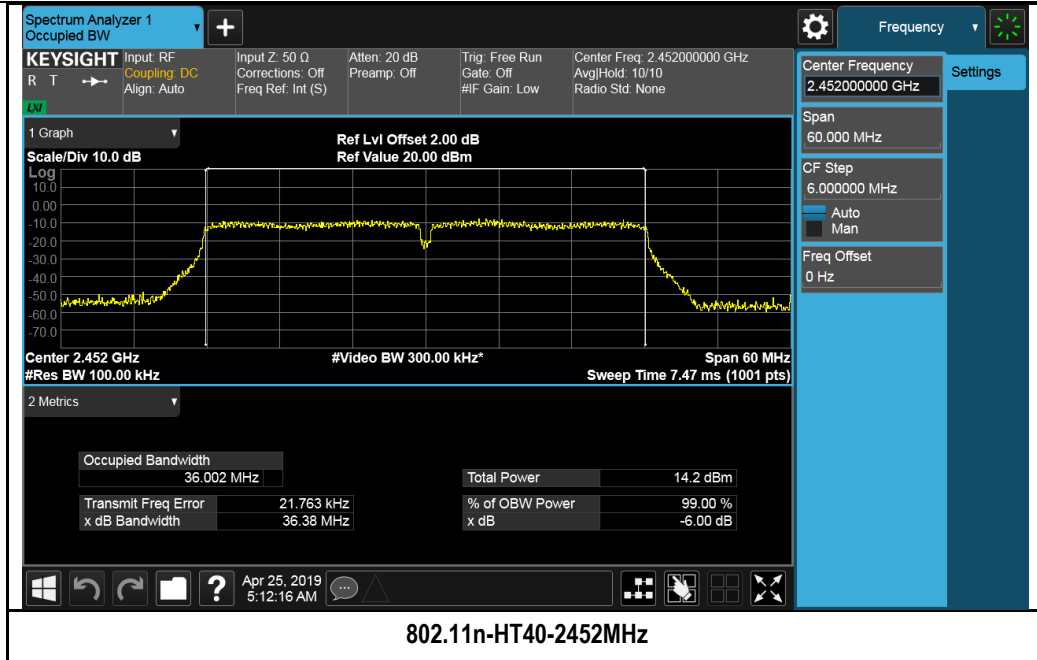










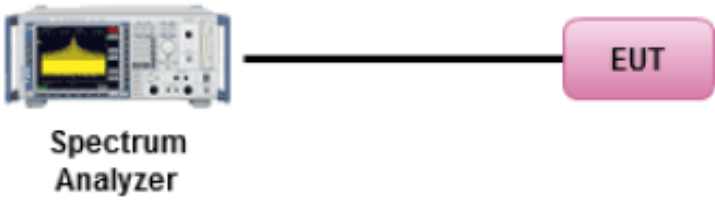


Output Power measurement result

| Type | Test mode | Freq (MHz) | CH | Conducted Power (dBm) | | | Limit (dBm) | Result |
|--------------|-------------|------------|------|-----------------------|--------|----------------|-------------|--------|
| | | | | Chain0 | Chain1 | Combined Power | | |
| Output power | 802.11b | 2412 | Low | 14.29 | 14.45 | 17.38 | 30 | Pass |
| | | 2437 | Mid | 14.39 | 14.18 | 17.30 | 30 | Pass |
| | | 2462 | High | 14.52 | 14.29 | 17.42 | 30 | Pass |
| | 802.11g | 2412 | Low | 12.42 | 12.15 | 15.30 | 30 | Pass |
| | | 2437 | Mid | 12.35 | 12.40 | 15.39 | 30 | Pass |
| | | 2462 | High | 12.24 | 12.32 | 15.29 | 30 | Pass |
| | 802.11n-20M | 2412 | Low | 11.21 | 11.32 | 14.28 | 30 | Pass |
| | | 2437 | Mid | 11.25 | 11.41 | 14.34 | 30 | Pass |
| | | 2462 | High | 11.28 | 11.31 | 14.31 | 30 | Pass |
| | 802.11n-40M | 2422 | Low | 9.20 | 9.15 | 12.19 | 30 | Pass |
| | | 2437 | Mid | 9.28 | 9.21 | 12.26 | 30 | Pass |
| | | 2452 | High | 9.15 | 9.20 | 12.19 | 30 | Pass |

10.4 Band Edge

Requirement(s):

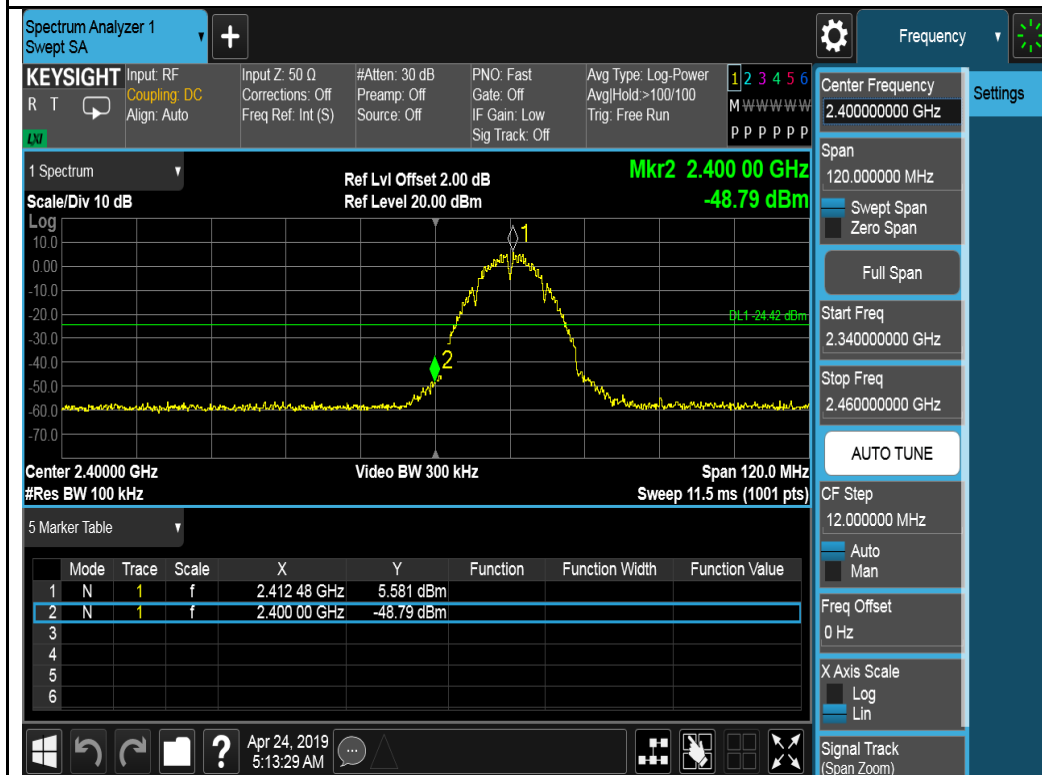
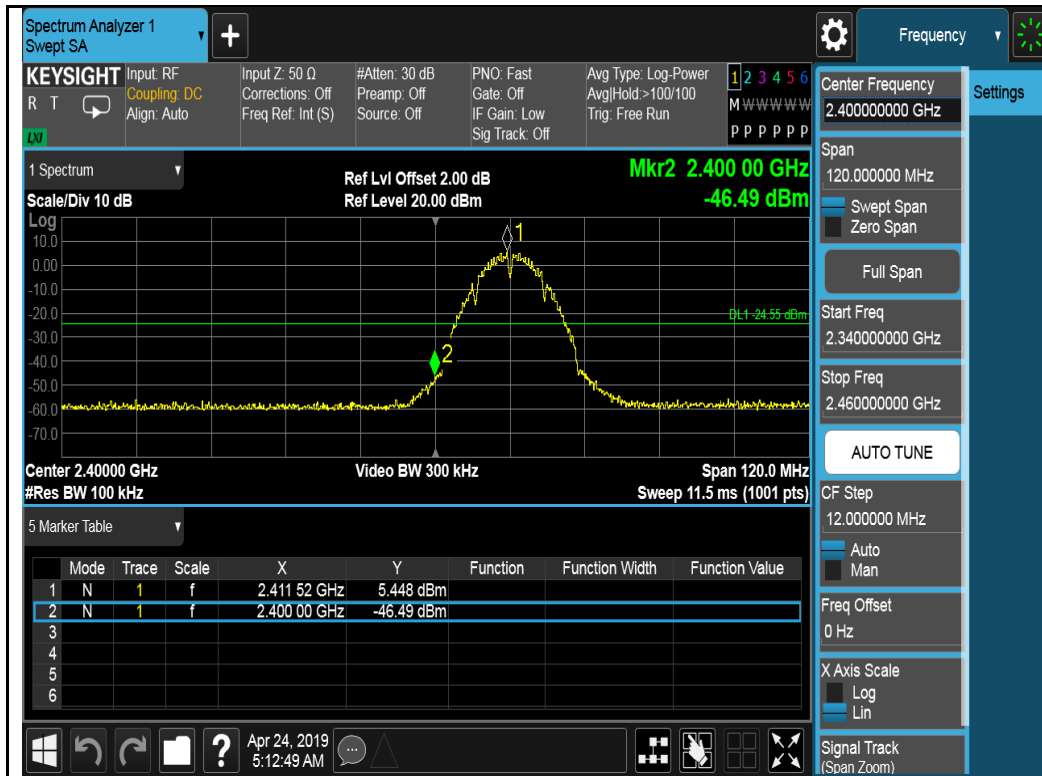
| Spec | Item | Requirement | Applicable |
|----------------|---|--|---|
| § 15.247 | d) | For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209 (a) is not required <input type="checkbox"/> 20 dB down <input checked="" type="checkbox"/> 30 dB down | ☒ |
| Test Setup |  <p>Spectrum Analyzer EUT</p> | | |
| Test Procedure | <p>558074 D01 DTS Meas Guidance v05r01 ANSI C63.10</p> <p><u>Band Edge measurement procedure</u></p> <ol style="list-style-type: none"> 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 dB down from the highest emission level within the authorized band as a measured. The attenuation shall be 30 dB instead of 20 dB when Peak conducted output power procedure is used. 3. Change modulation and channel bandwidth then repeat step 1 to 2. 4. Measured and record the results in the test report. | | |
| Test Date | 04/23/2019 – 04/24/2019 | Environmental condition | Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar |
| Remark | - | | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | | |

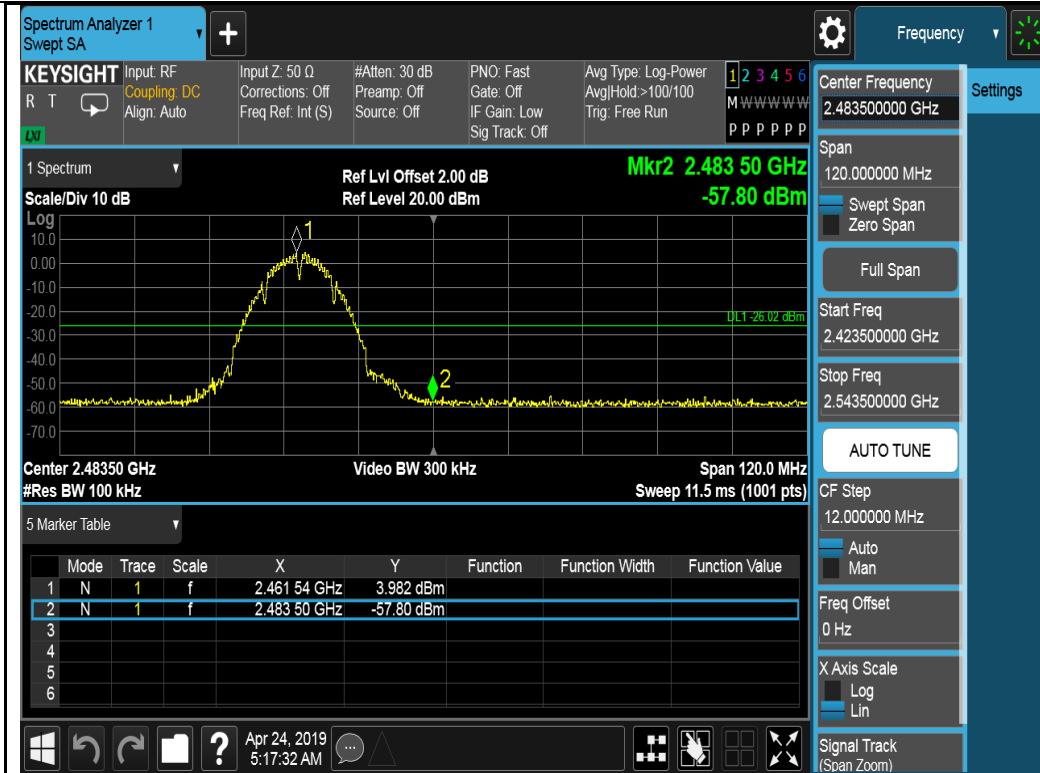
Test Data Yes N/A

Test Plot Yes (See below) N/A

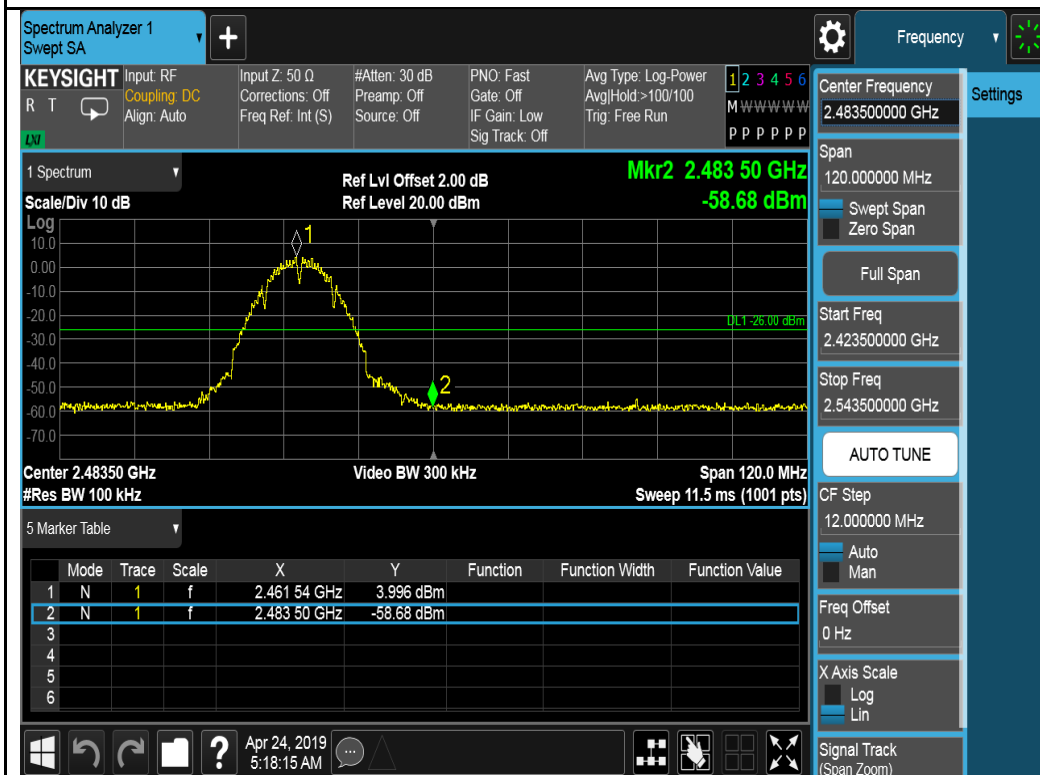
Test was done by Deon Dai at RF test site.

Test Plots

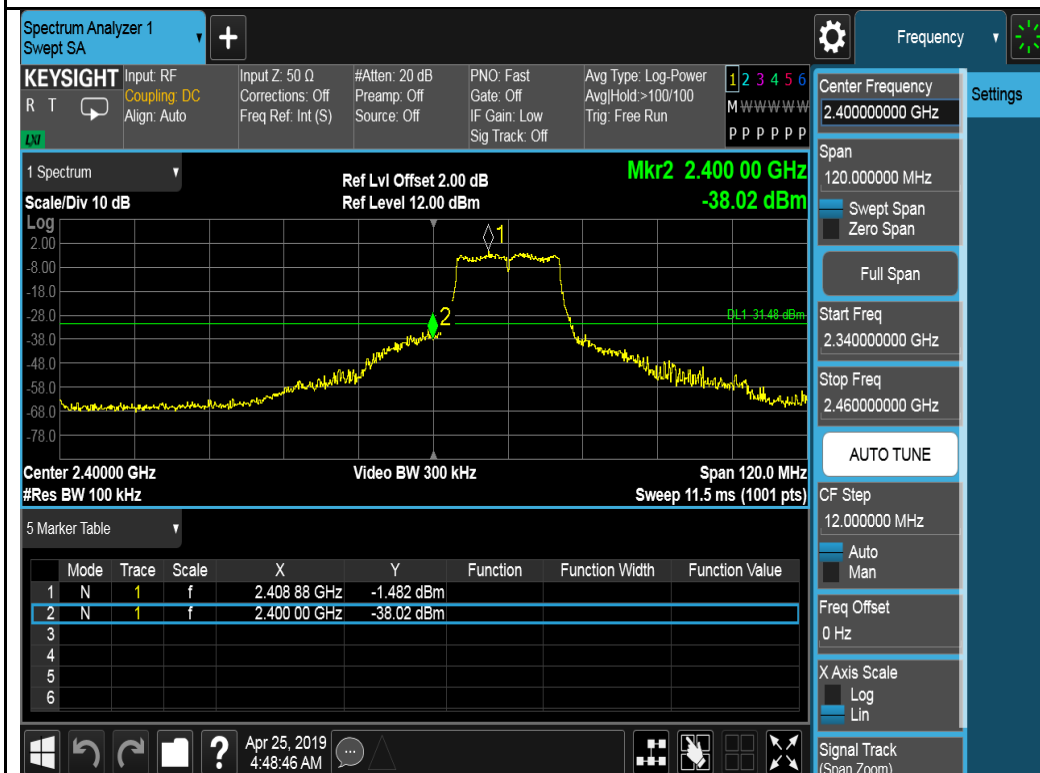
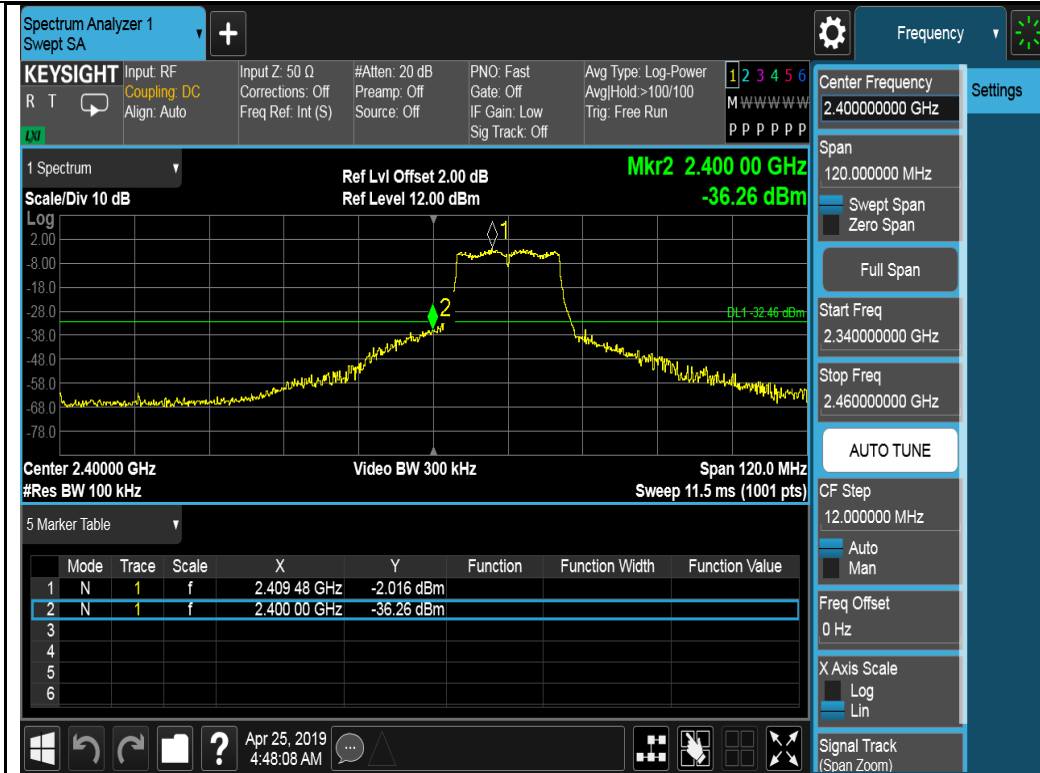


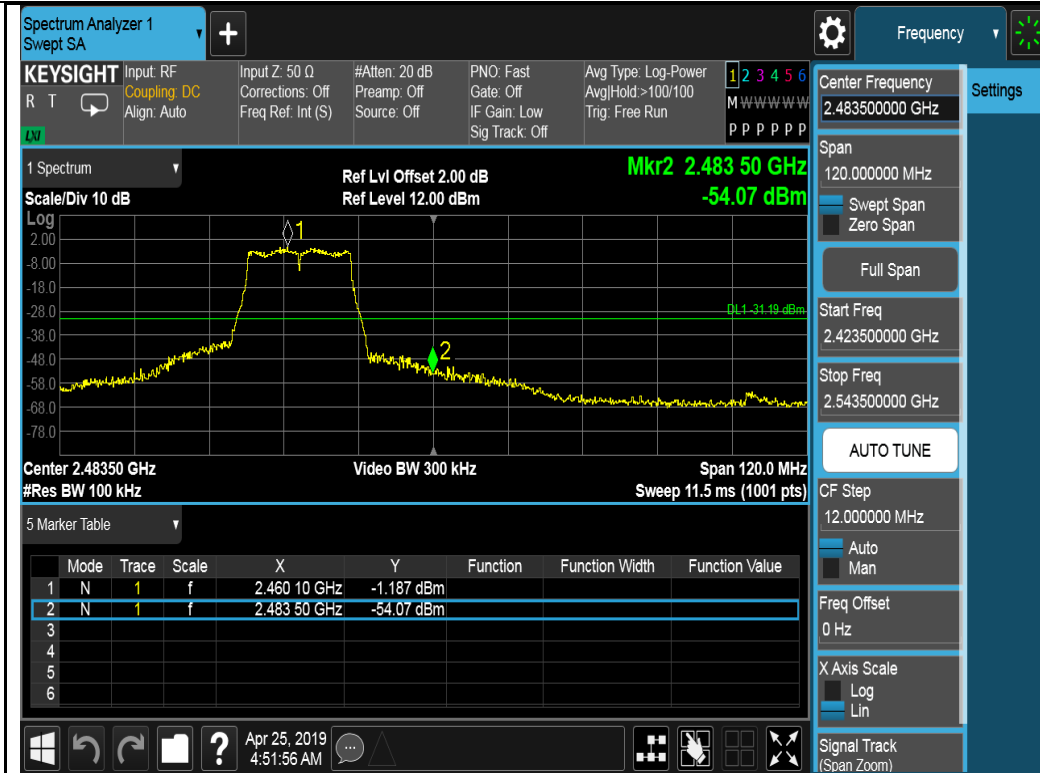


802.11b-2462MHz TX0



802.11b-2462MHz TX1

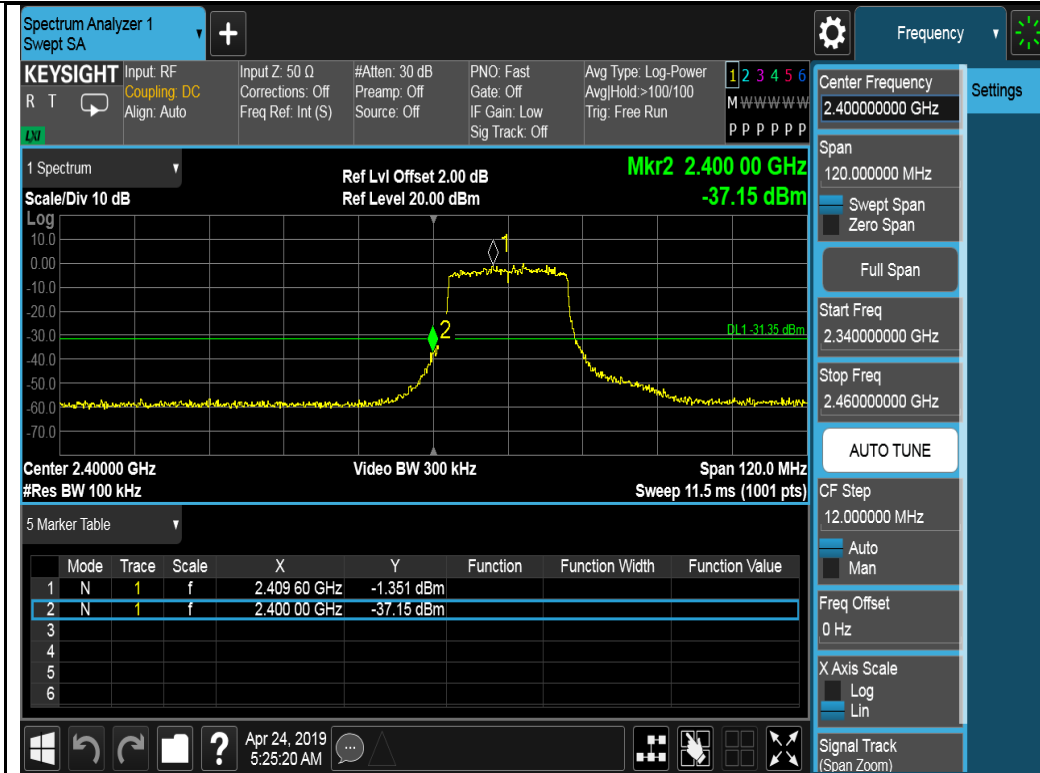




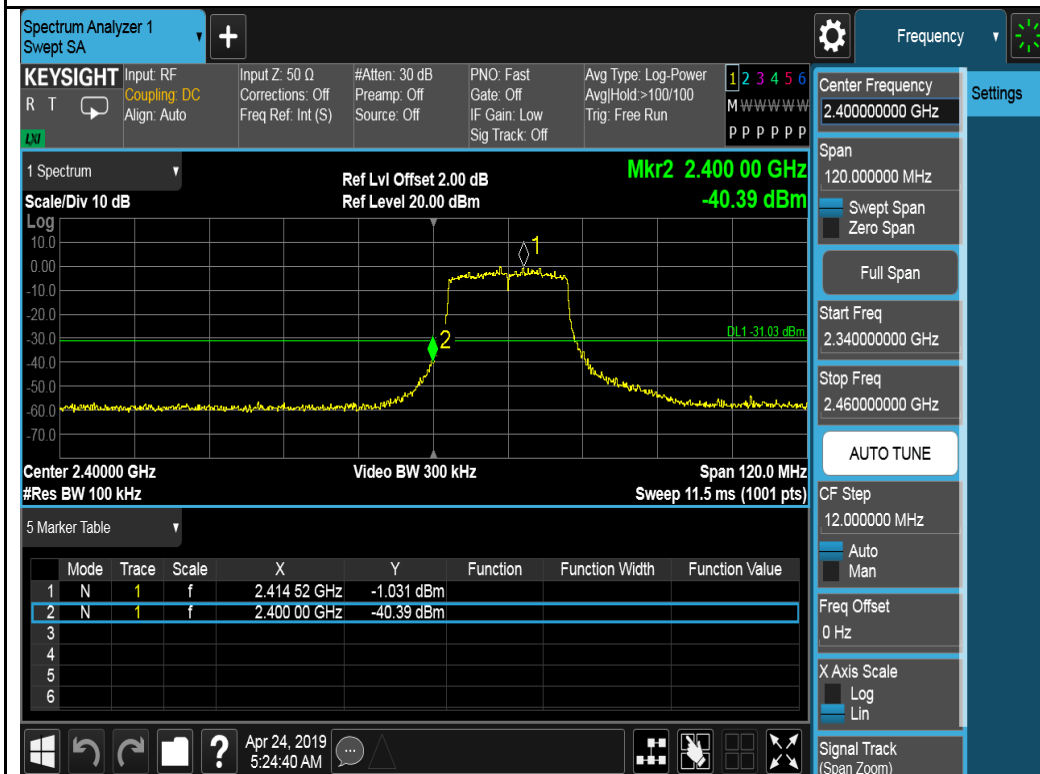
802.11g-2462MHz TX0



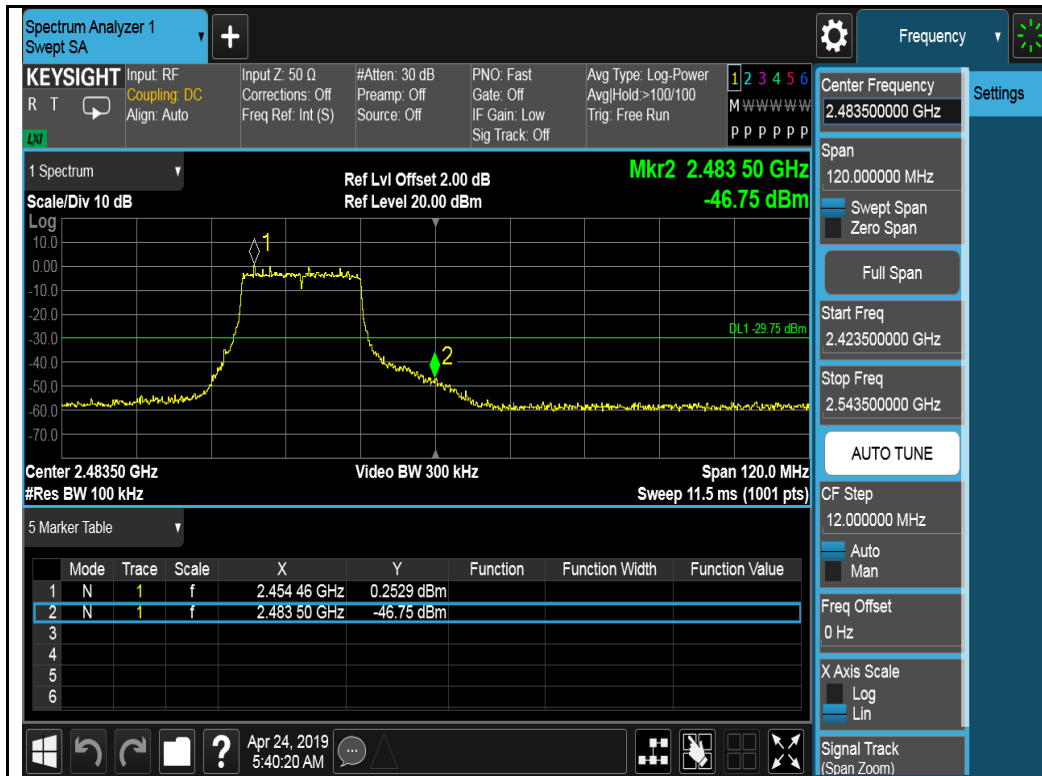
802.11g-2462MHz TX1



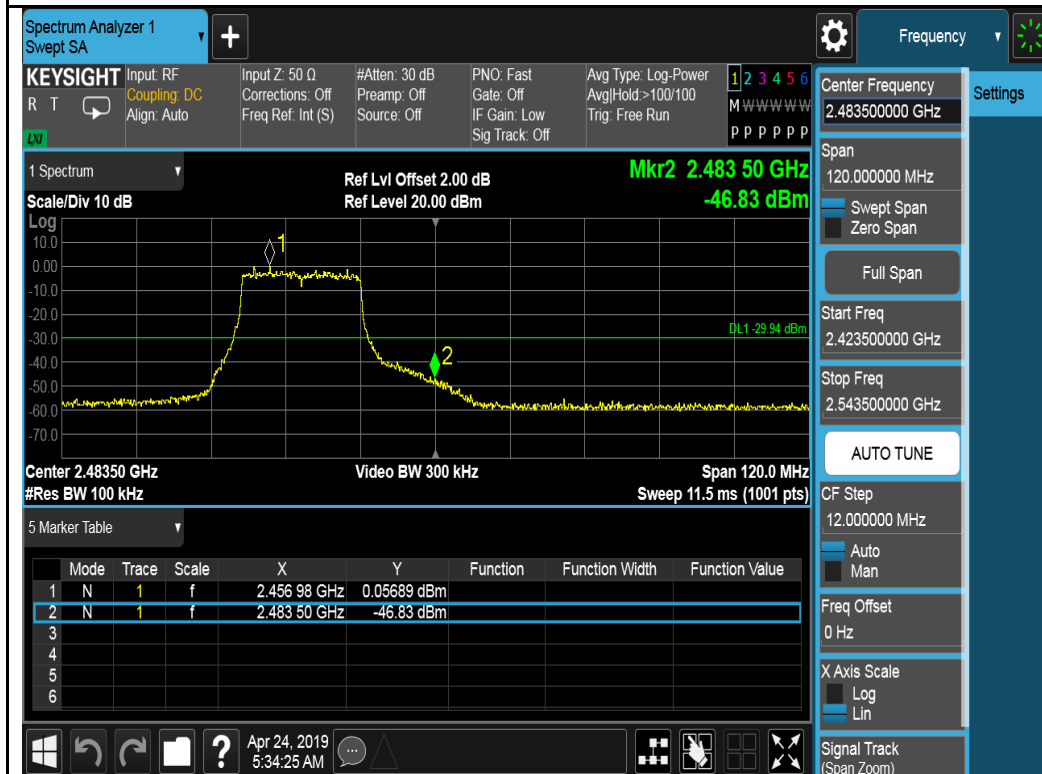
802.11n-HT20-2412MHz TX0



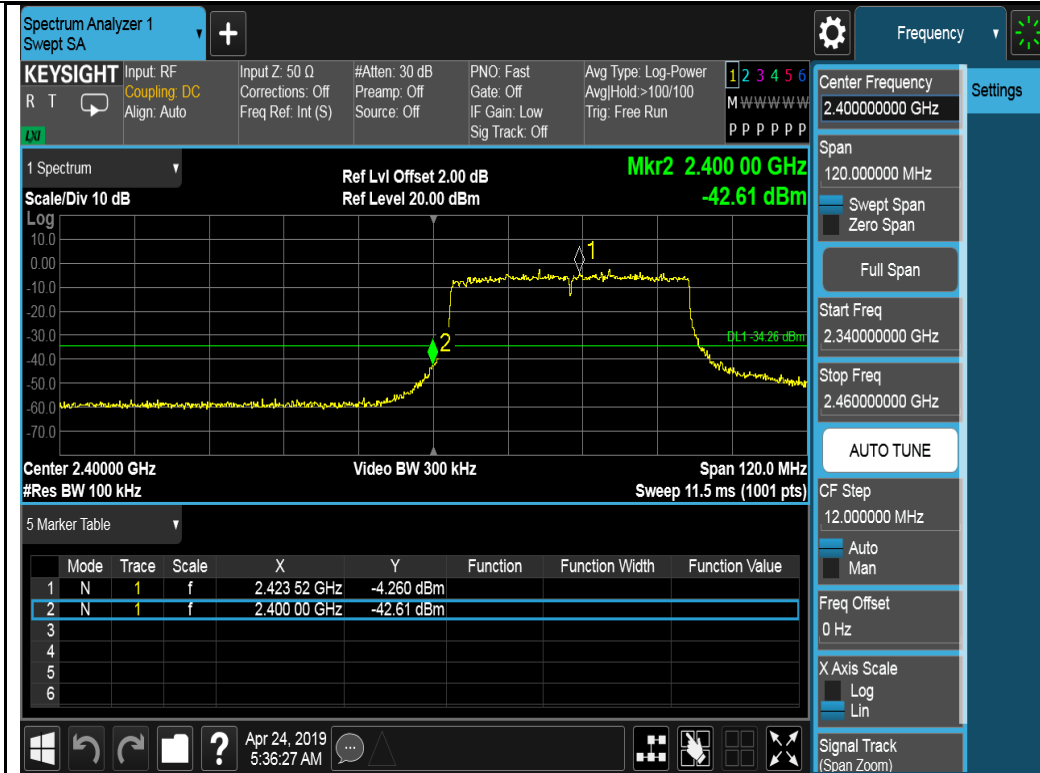
802.11n-HT20-2412MHz TX1



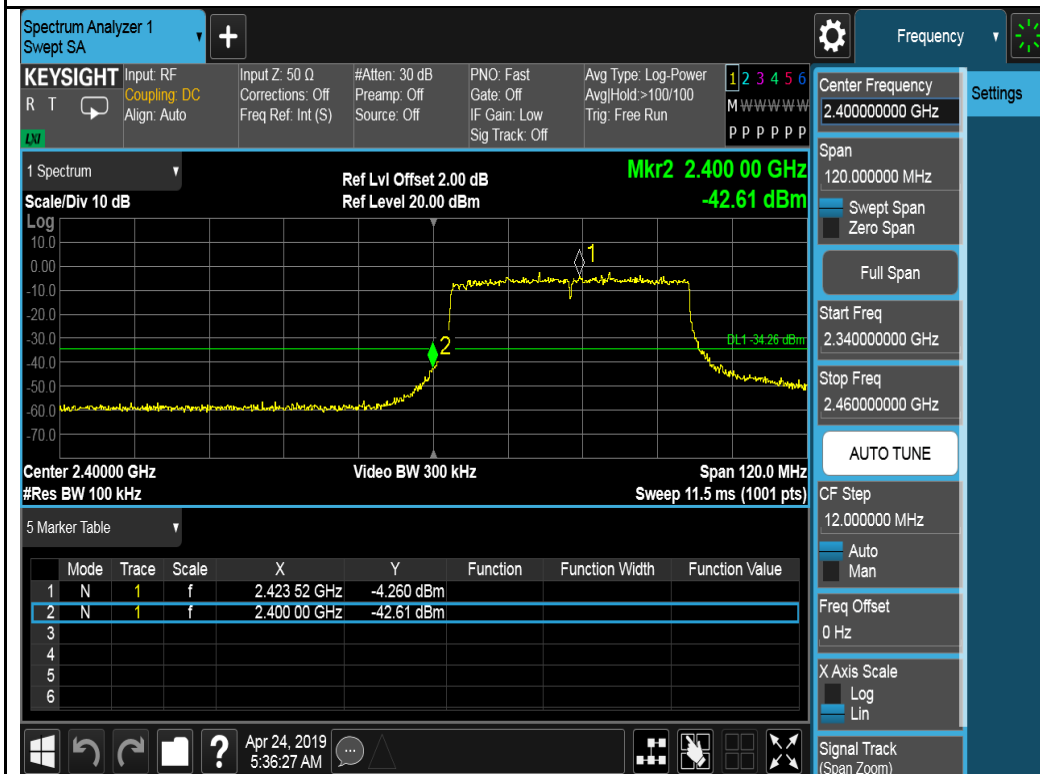
802.11n-HT20-2462MHz TX0



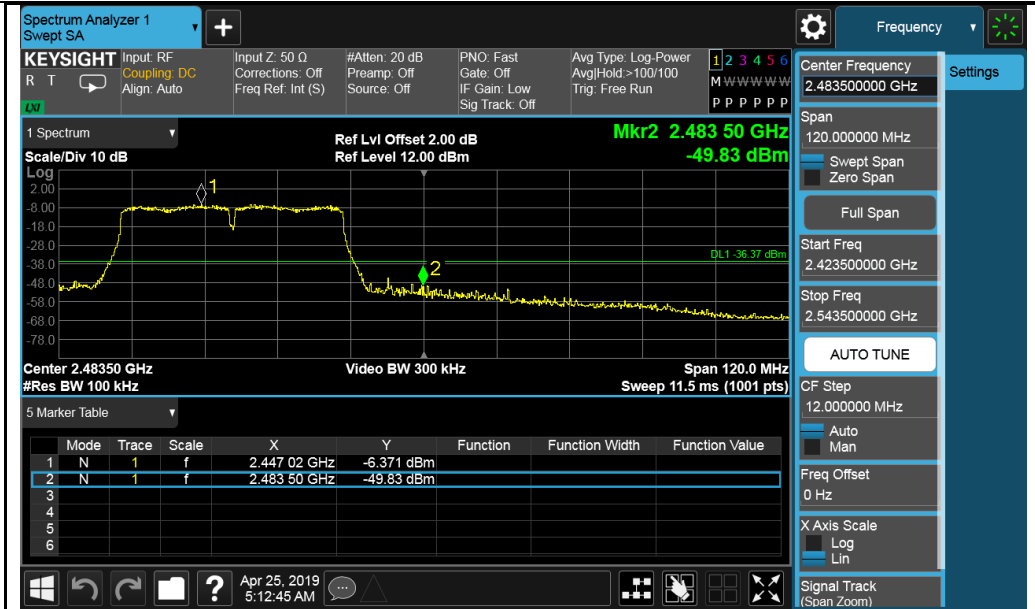
802.11n-HT20-2462MHz TX1



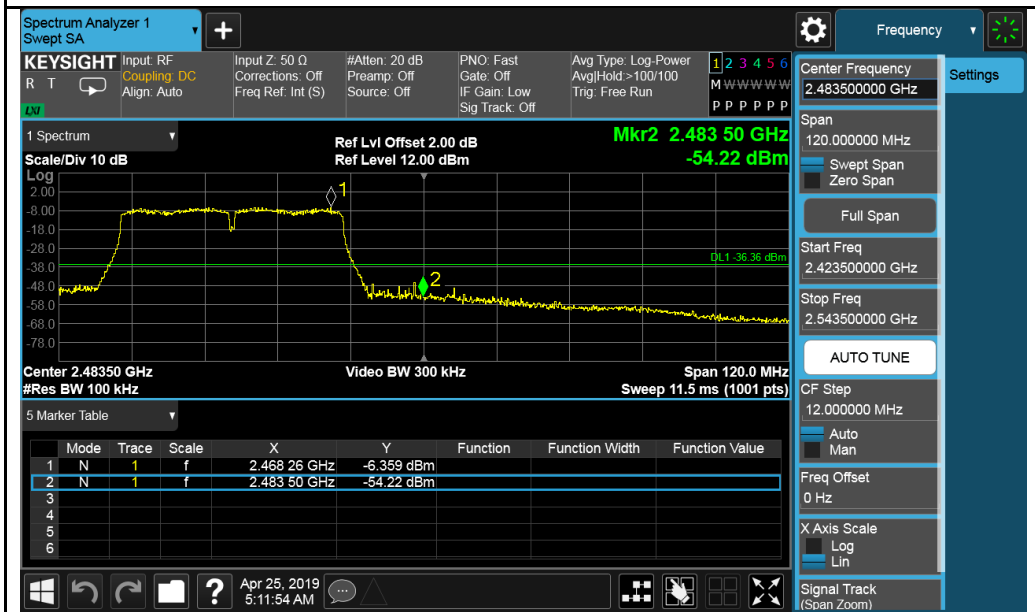
802.11n-HT40-2422MHz TX0



802.11n-HT40-2422MHz TX1



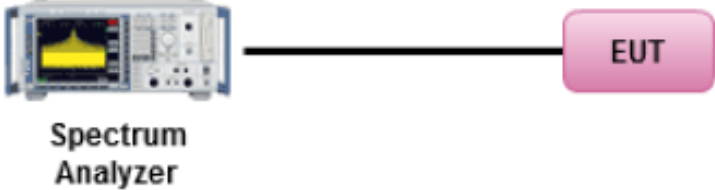
802.11n-HT40-2452MHz TX0



802.11n-HT40-2452MHz TX1

10.5 Peak Spectral Density

Requirement(s):

| Spec | Item | Requirement | Applicable |
|----------------|---|---|--|
| § 15.247(e) | e) | DSSS: $\leq 8\text{dBm}/3\text{KHz}$ | <input checked="" type="checkbox"/> |
| | f) | DSSS in hybrid sys with FH turned off: $\leq 8\text{dBm}/3\text{KHz}$ | <input type="checkbox"/> |
| Test Setup |  <p style="text-align: center;">Spectrum Analyzer EUT</p> | | |
| Test Procedure | <p>558074 D01 DTS Meas Guidance v05r01, 8.4 ANSI C63.10:2013, 11.10.2</p> <p><u>Peak spectral density measurement procedure</u></p> <ul style="list-style-type: none"> - Set analyzer center frequency to DTS channel center frequency. - Set the span to 1.5 times the DTS bandwidth. - Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$. - Set the VBW $\geq 3 \times \text{RBW}$. - Detector = Peak - Sweep time = auto couple. - Trace mode = Max Hold - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude level within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. | | |
| Test Date | 04/23/2019 – 04/24/2019 | Environmental condition | Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar |
| Remark | The EUT has two antennas which are cross-polarized, the directional gain = 6dBi. | | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | | |

Test Data Yes N/A

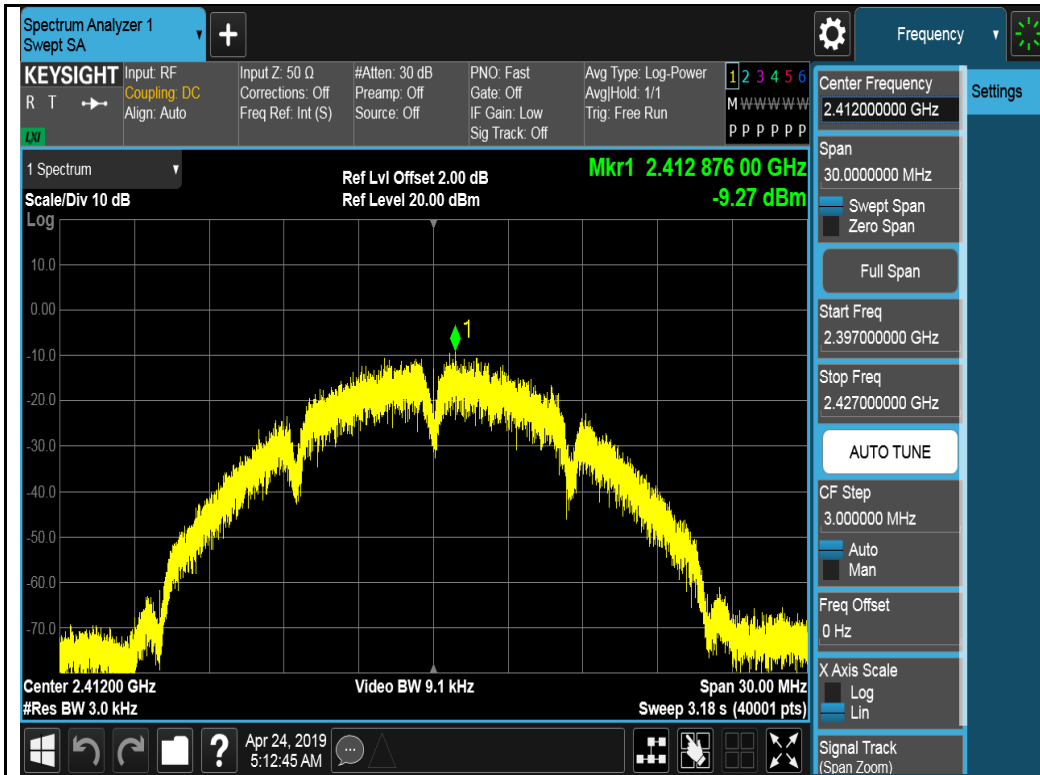
Test Plot Yes (See below) N/A

Test was done by Deon Dai at RF test site.

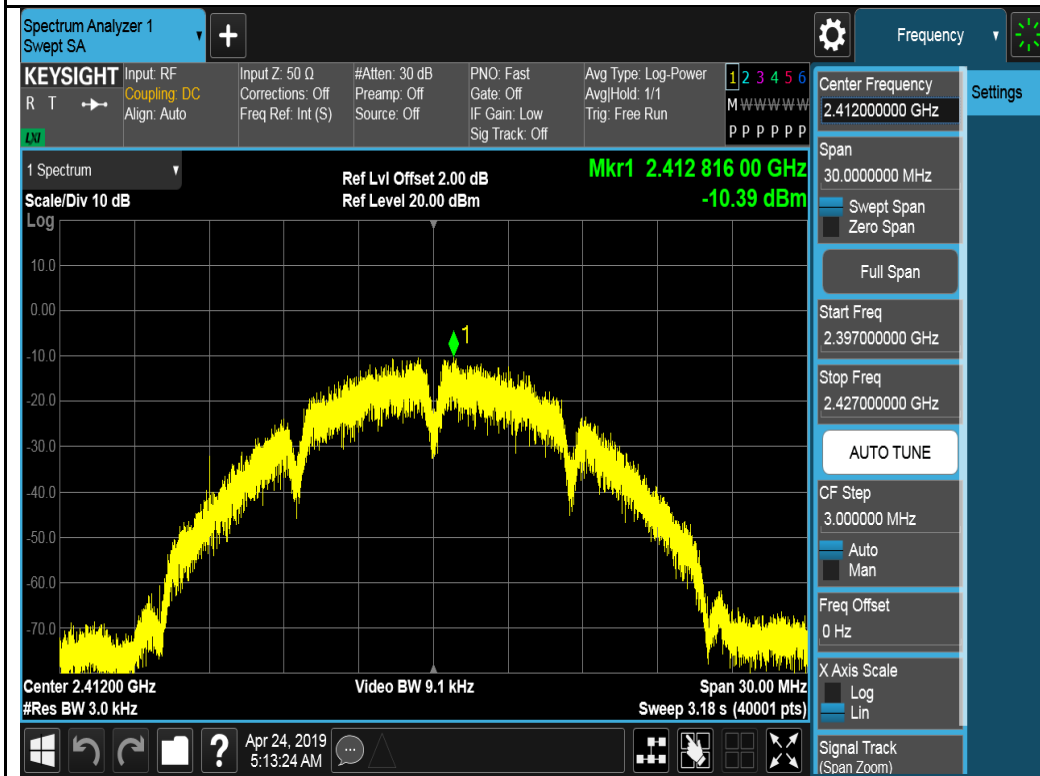
PSD measurement results

| Type | Test mode | Freq (MHz) | CH | Conducted PSD (dBm/3KHz) | | | Limit (dBm/3K Hz) | Result |
|------|-------------|------------|------|--------------------------|---------|--------------|-------------------|--------|
| | | | | Chain0 | Chain1 | Combined PSD | | |
| PSD | 802.11b | 2412 | Low | -9.271 | -10.392 | -6.79 | ≤8 | Pass |
| | | 2437 | Mid | -11.604 | -11.076 | -8.32 | ≤8 | Pass |
| | | 2462 | High | -11.139 | -10.731 | -7.92 | ≤8 | Pass |
| | 802.11g | 2412 | Low | -14.754 | -14.672 | -11.70 | ≤8 | Pass |
| | | 2437 | Mid | -15.040 | -15.188 | -12.10 | ≤8 | Pass |
| | | 2462 | High | -14.516 | -14.301 | -11.40 | ≤8 | Pass |
| | 802.11n-20M | 2412 | Low | -14.181 | -14.481 | -11.32 | ≤8 | Pass |
| | | 2437 | Mid | -14.225 | -15.754 | -11.91 | ≤8 | Pass |
| | | 2462 | High | -14.361 | -14.378 | -11.36 | ≤8 | Pass |
| | 802.11n-40M | 2422 | Low | -17.859 | -17.185 | -14.50 | ≤8 | Pass |
| | | 2437 | Mid | -16.927 | -17.934 | -14.39 | ≤8 | Pass |
| | | 2452 | High | -17.603 | -17.544 | -14.56 | ≤8 | Pass |
| Note | | | | | | | | |

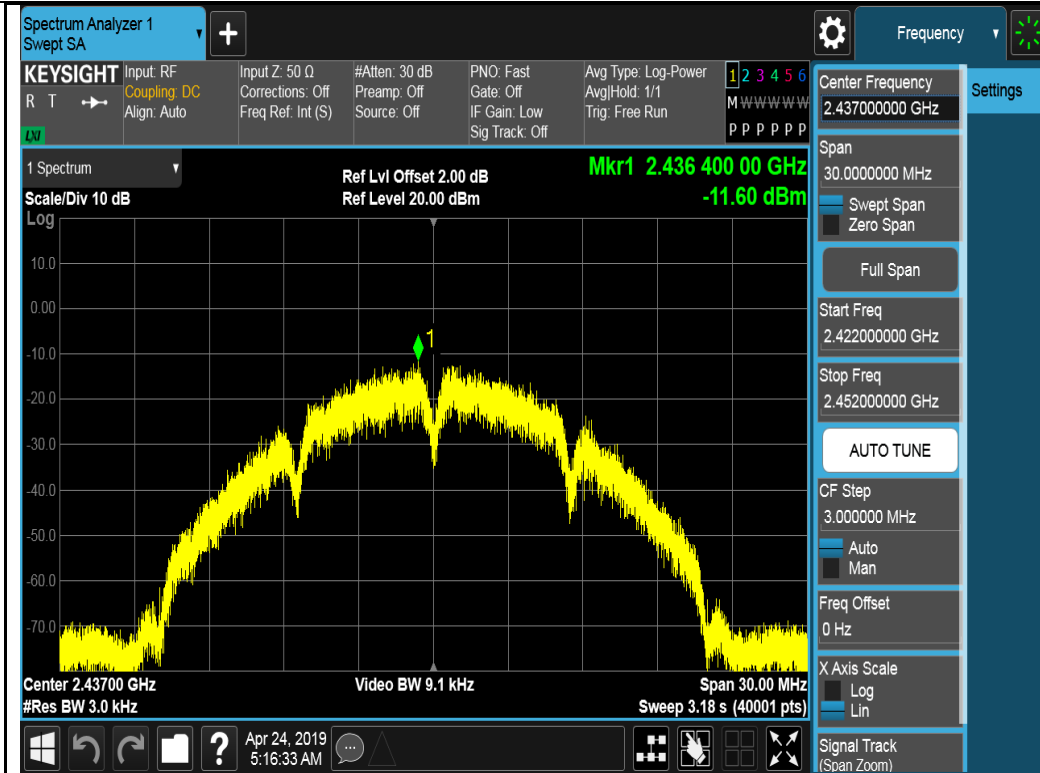
Test Plots



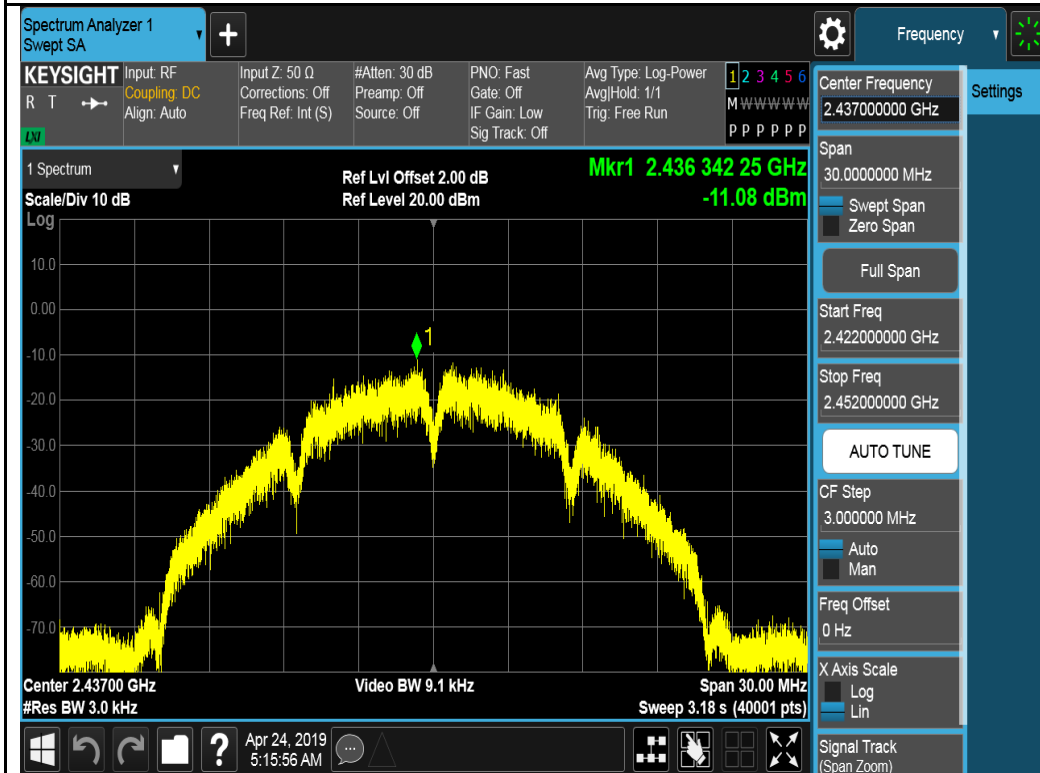
802.11b-2412MHz TX0



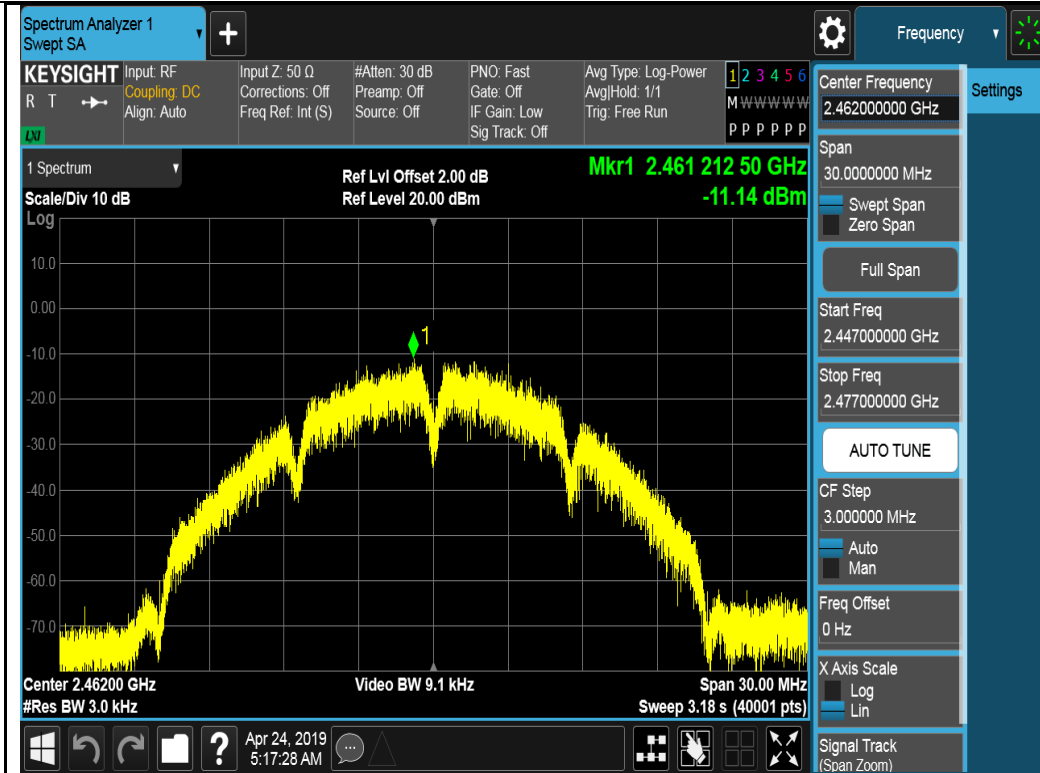
802.11b-2412MHz TX1



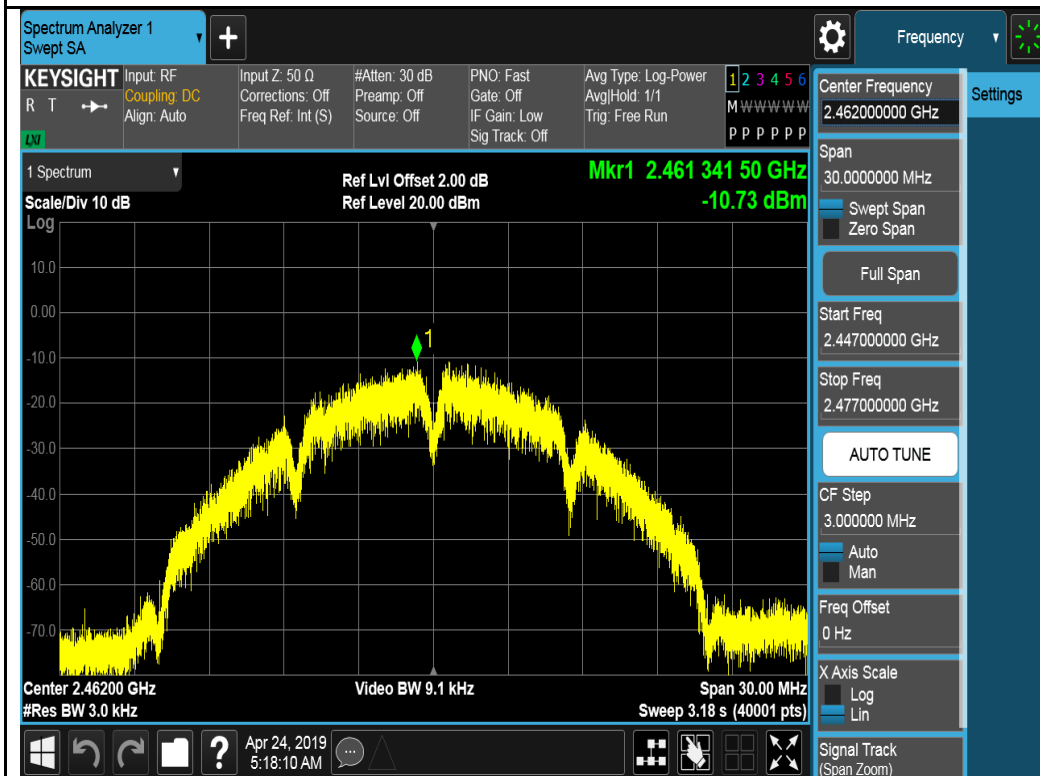
802.11b-2437MHz TX0



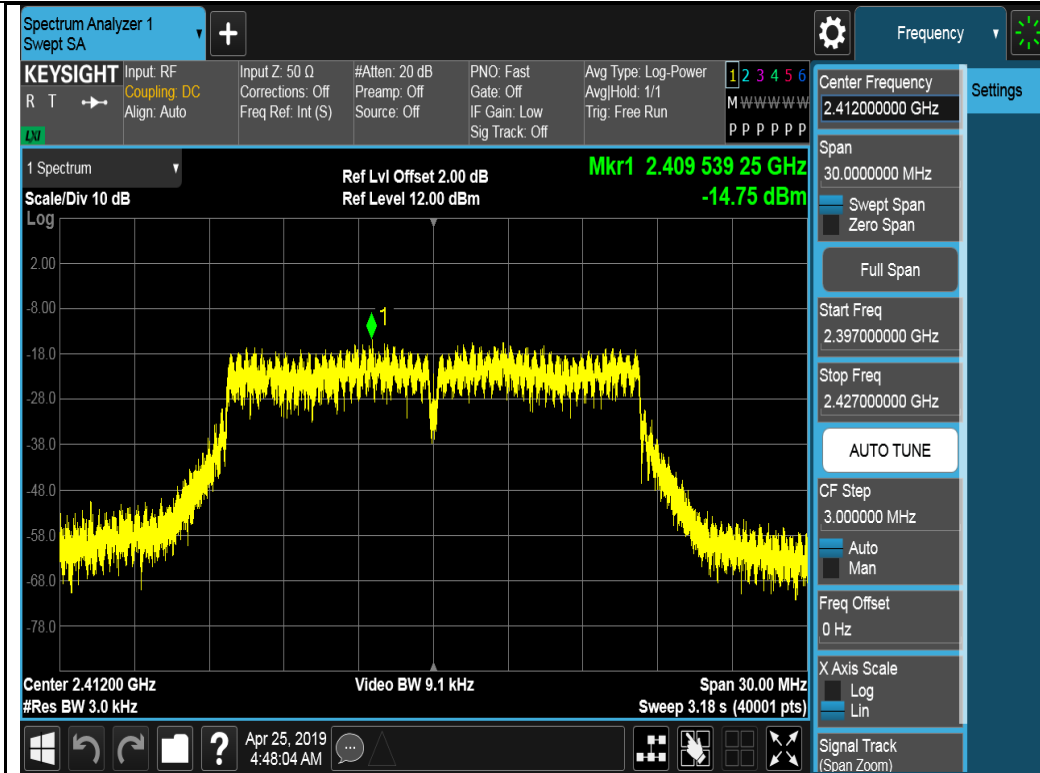
802.11b-2437MHz TX1



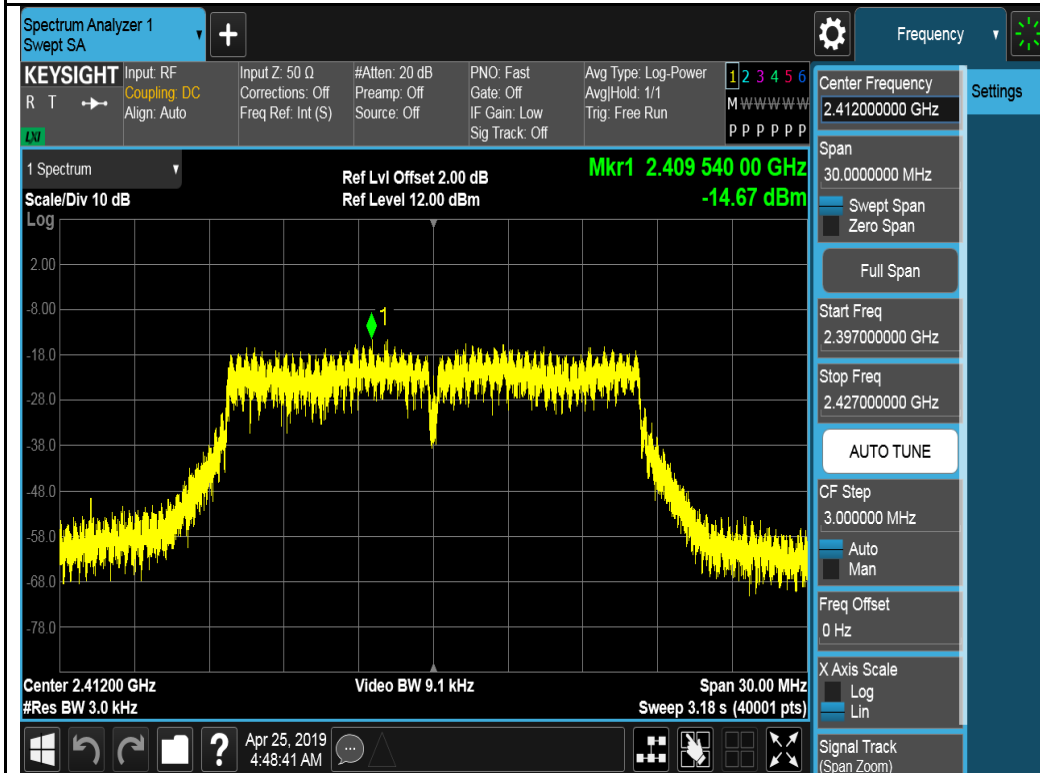
802.11b-2462MHz TX0



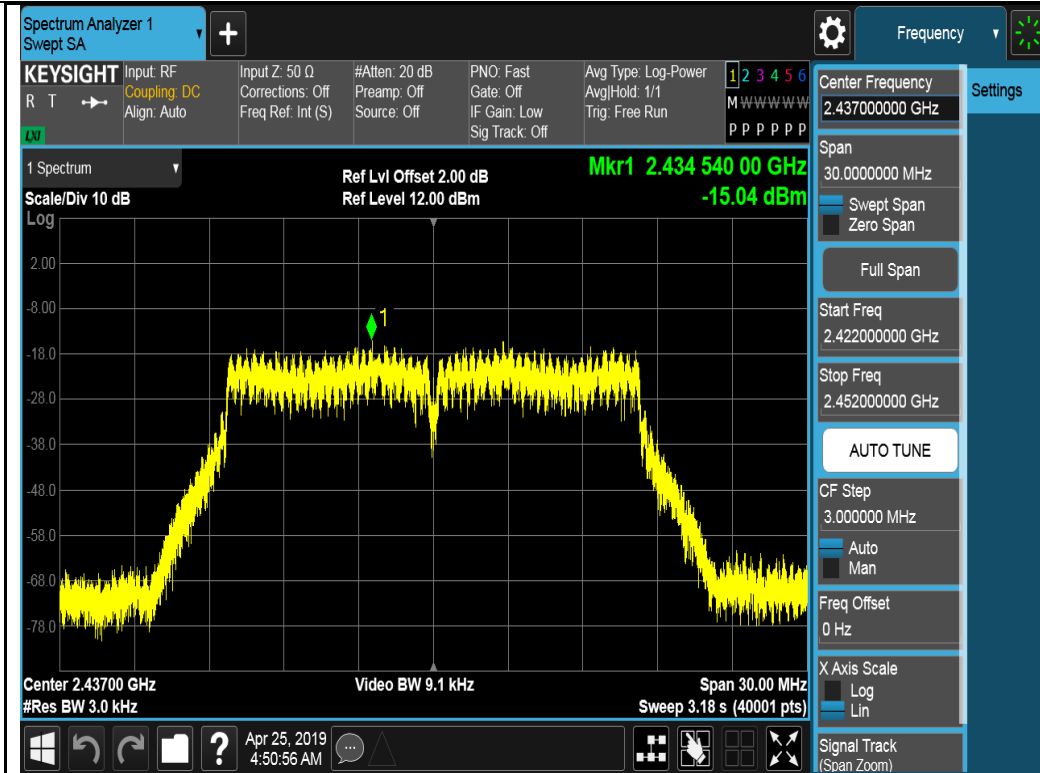
802.11b-2462MHz TX1



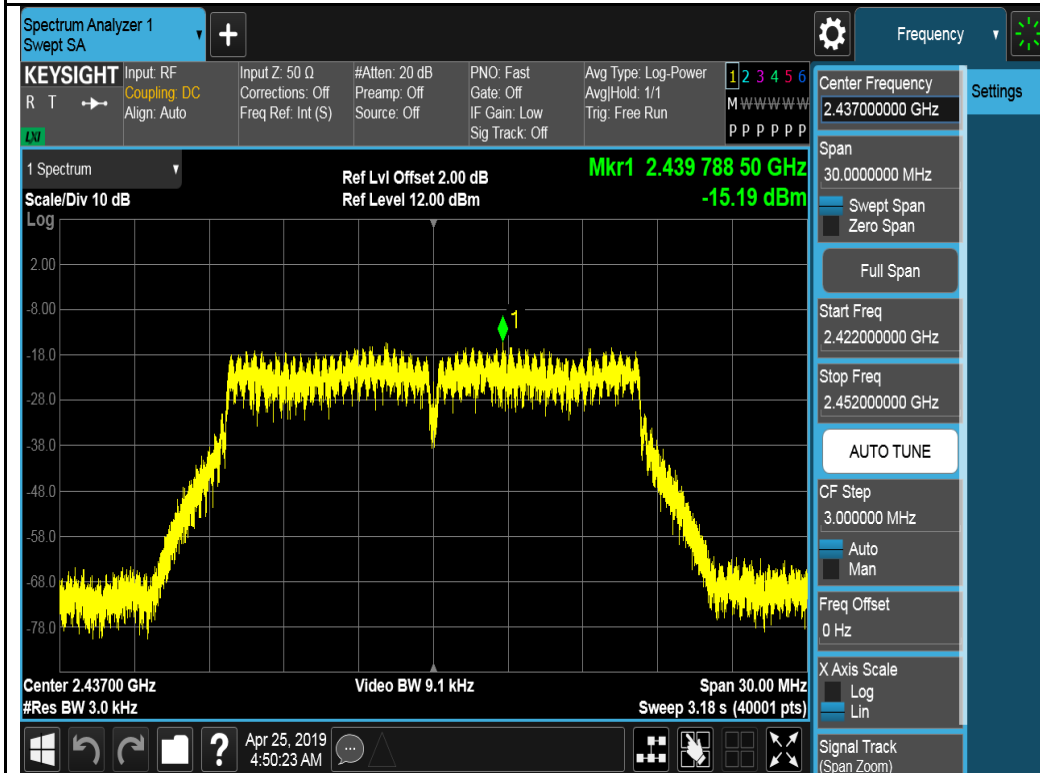
802.11g-2412MHz TX0



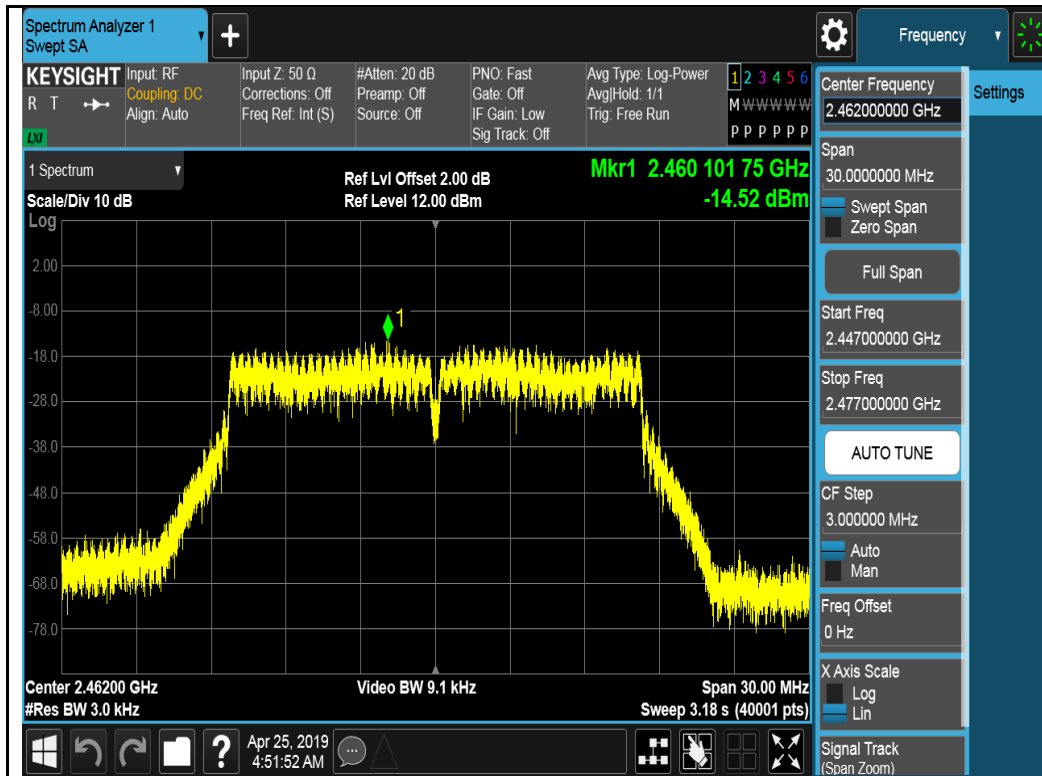
802.11g-2412MHz TX1



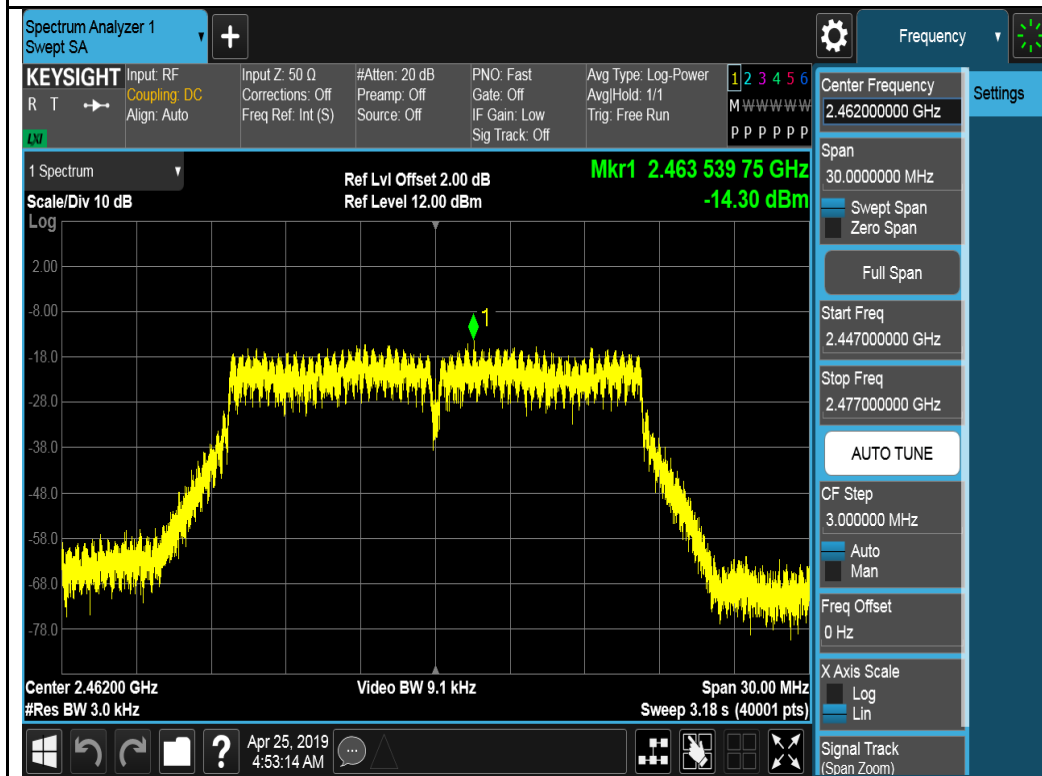
802.11g-2437MHz TX0



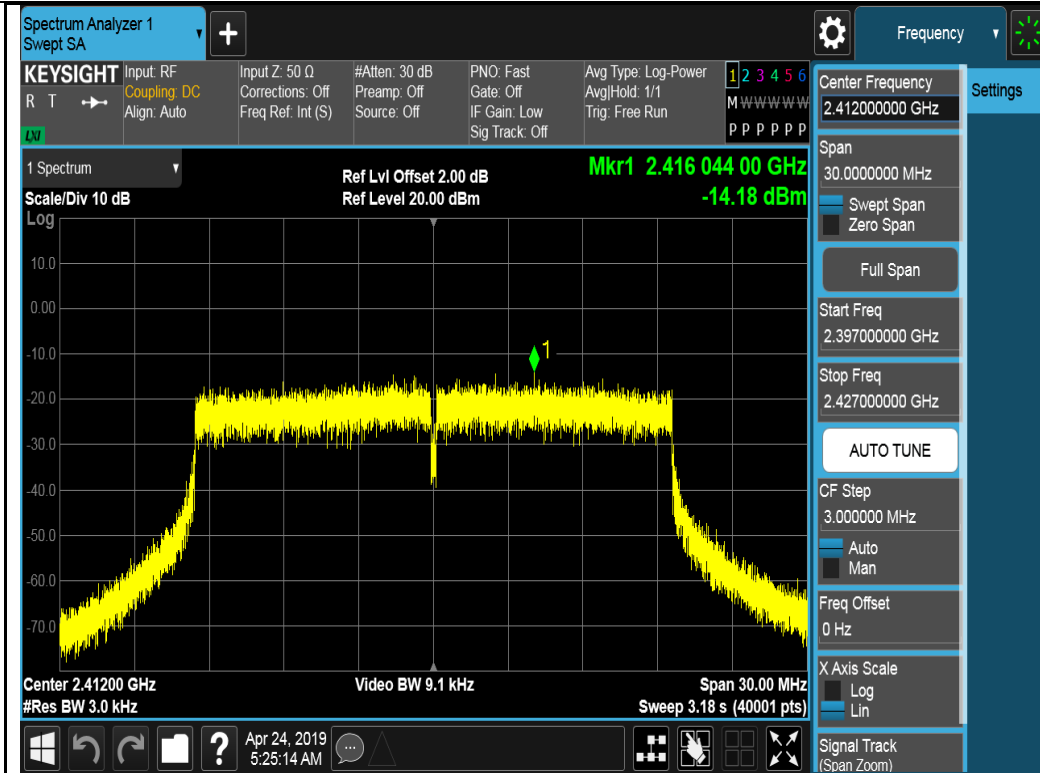
802.11g-2437MHz TX1



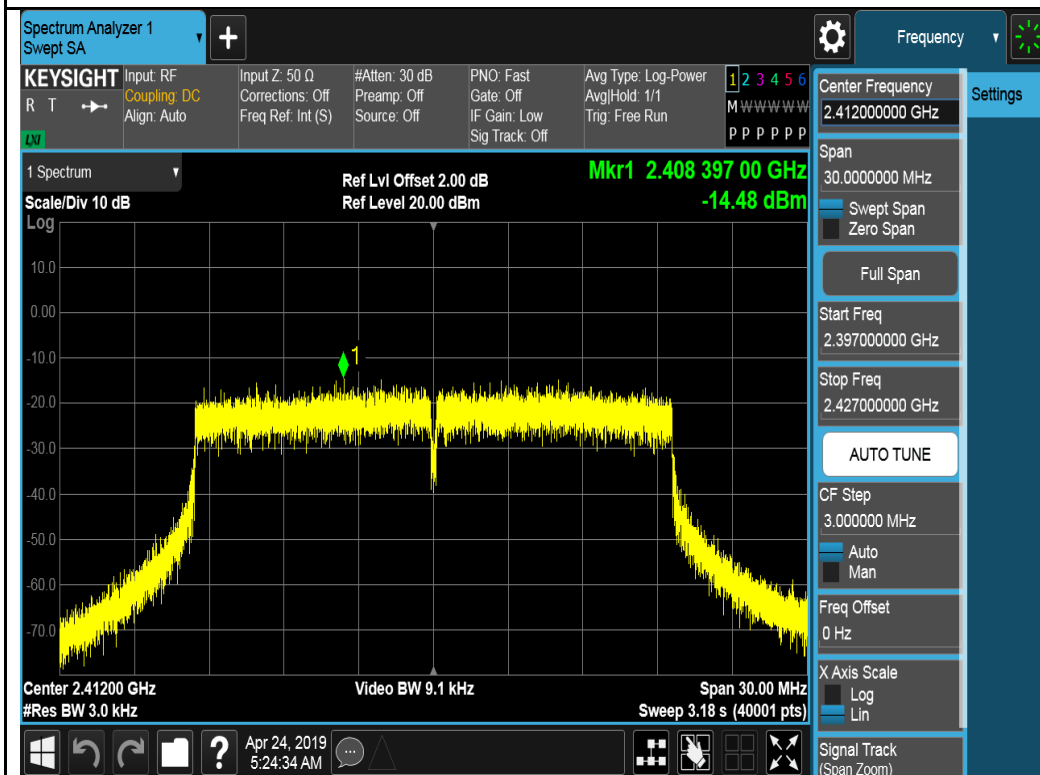
802.11g-2462MHz TX0



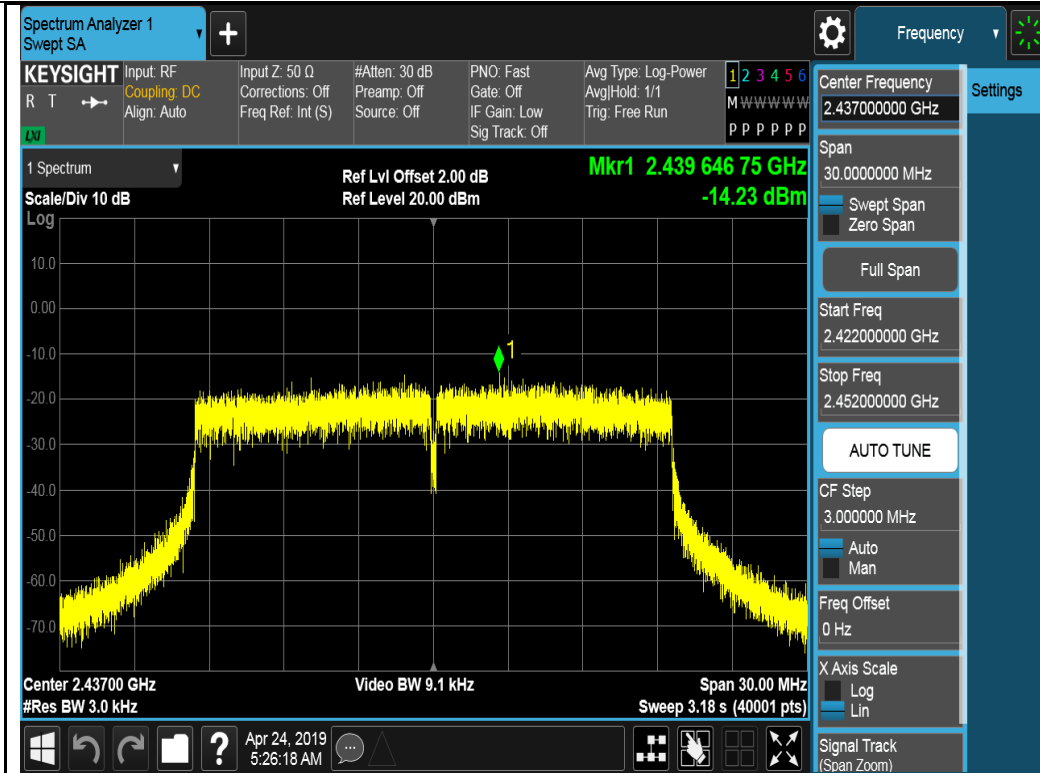
802.11g-2462MHz TX1



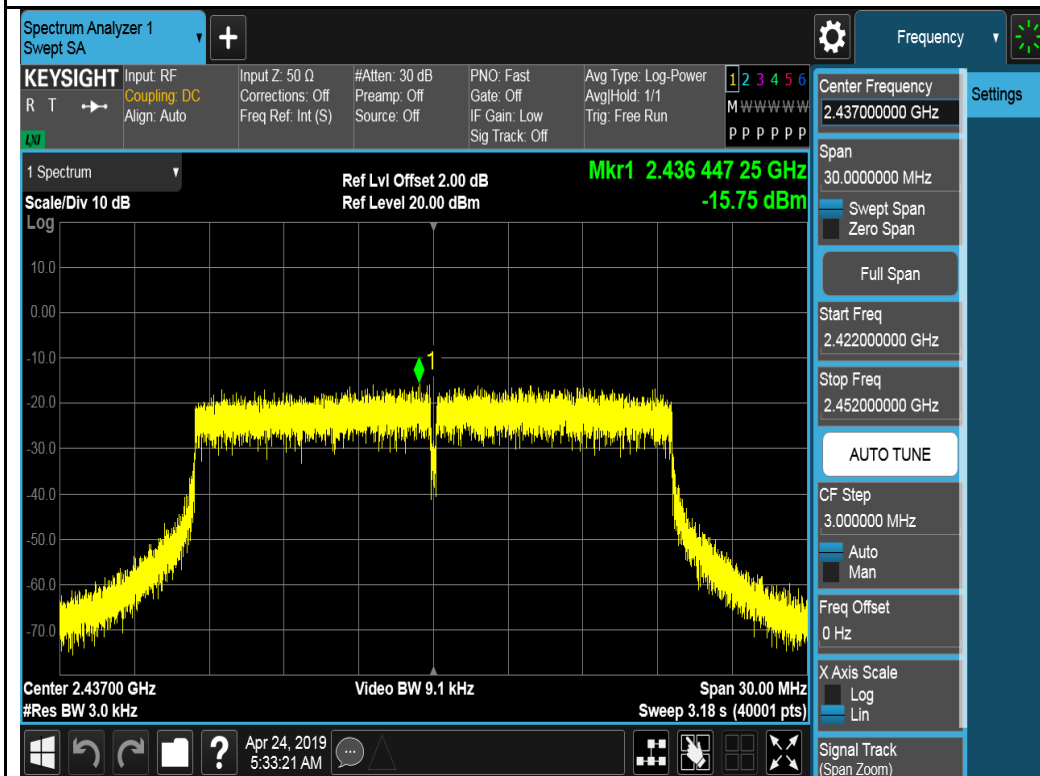
802.11n-HT20 2412MHz TX0



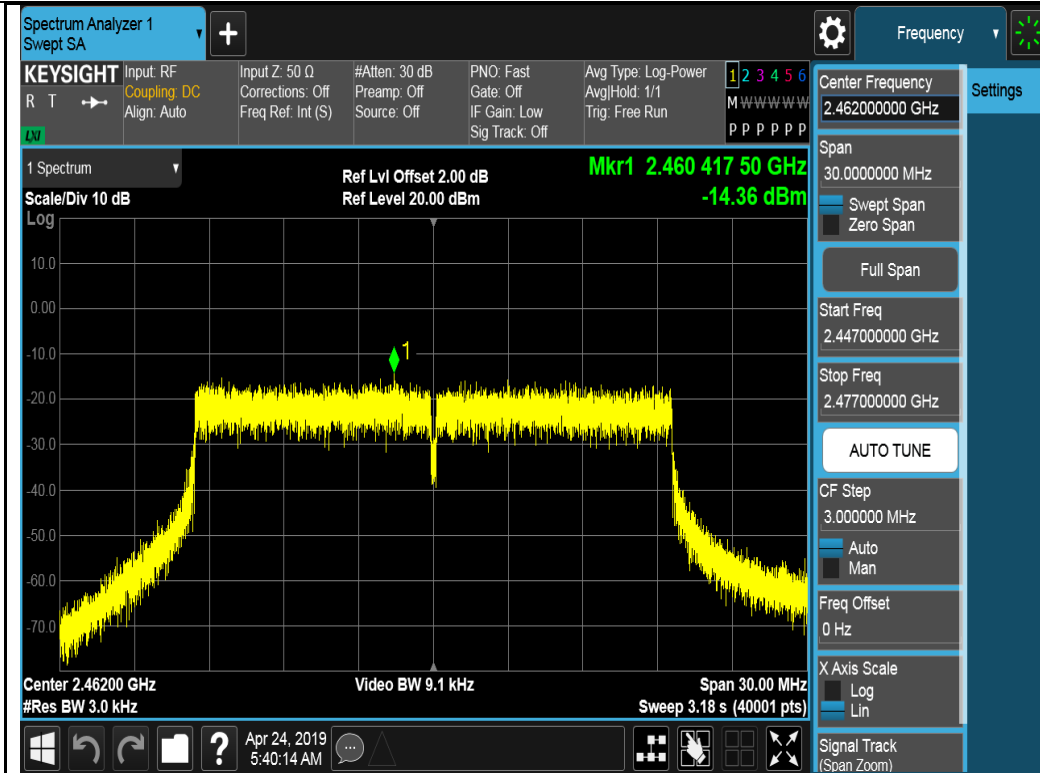
802.11n-HT20 2412MHz TX1



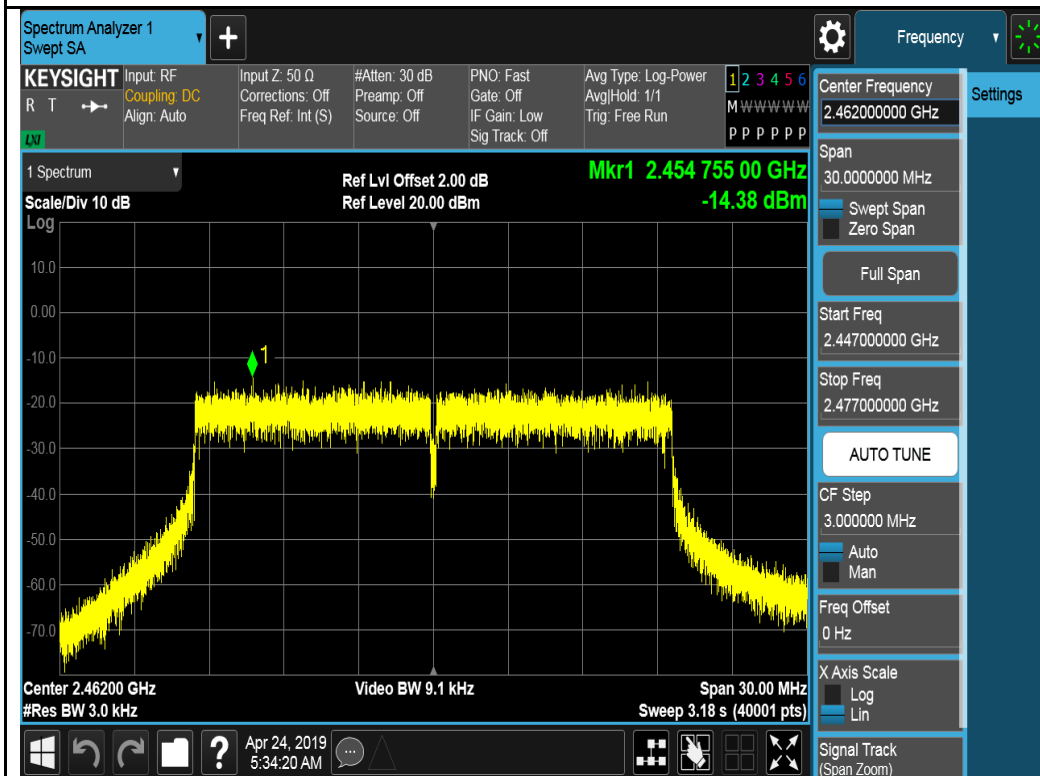
802.11n-HT20 2437MHz TX0



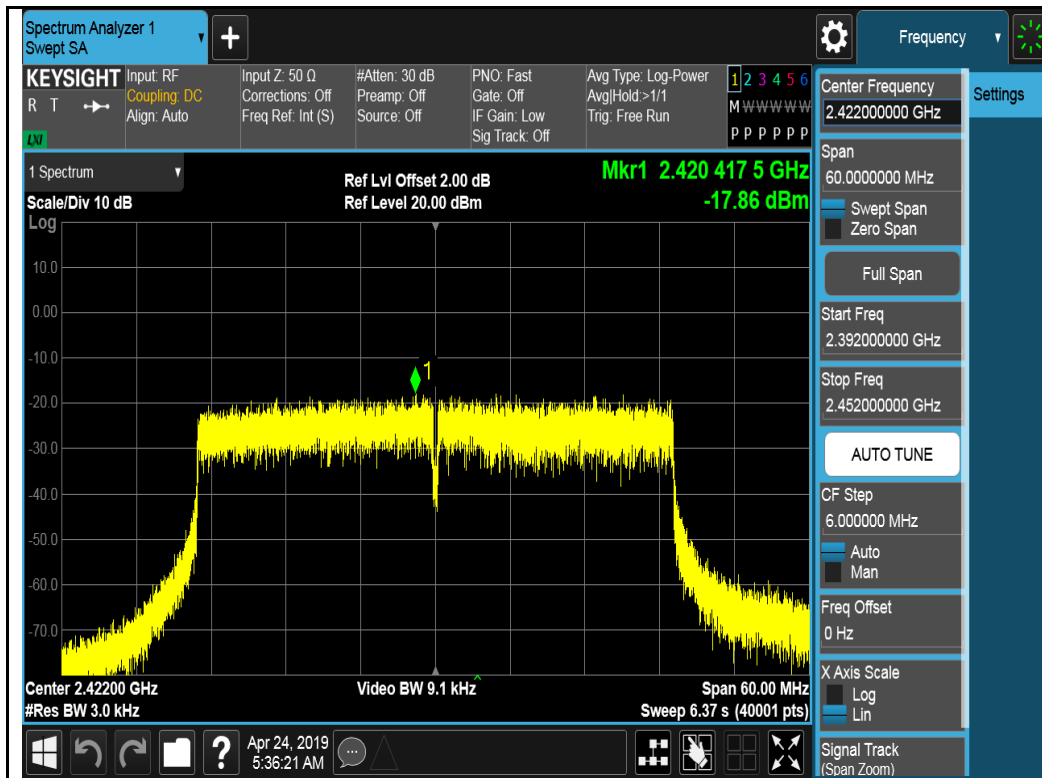
802.11n-HT20 2437MHz TX1



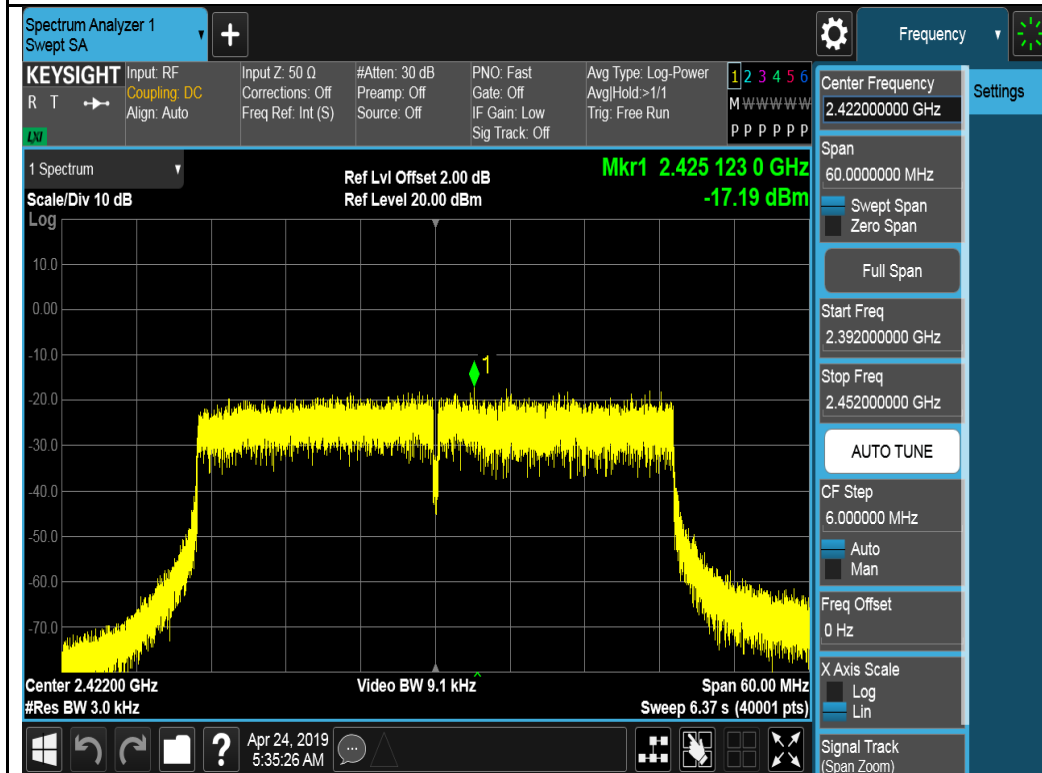
802.11n-HT20 2462MHz TX0



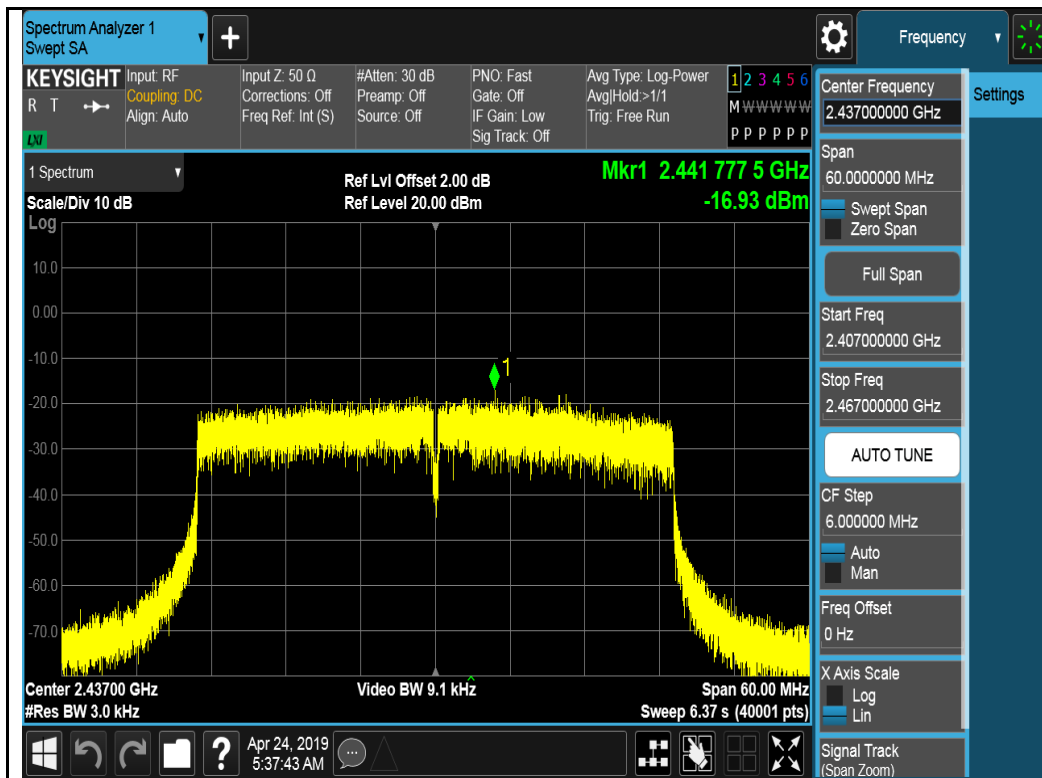
802.11n-HT20 2462MHz TX1



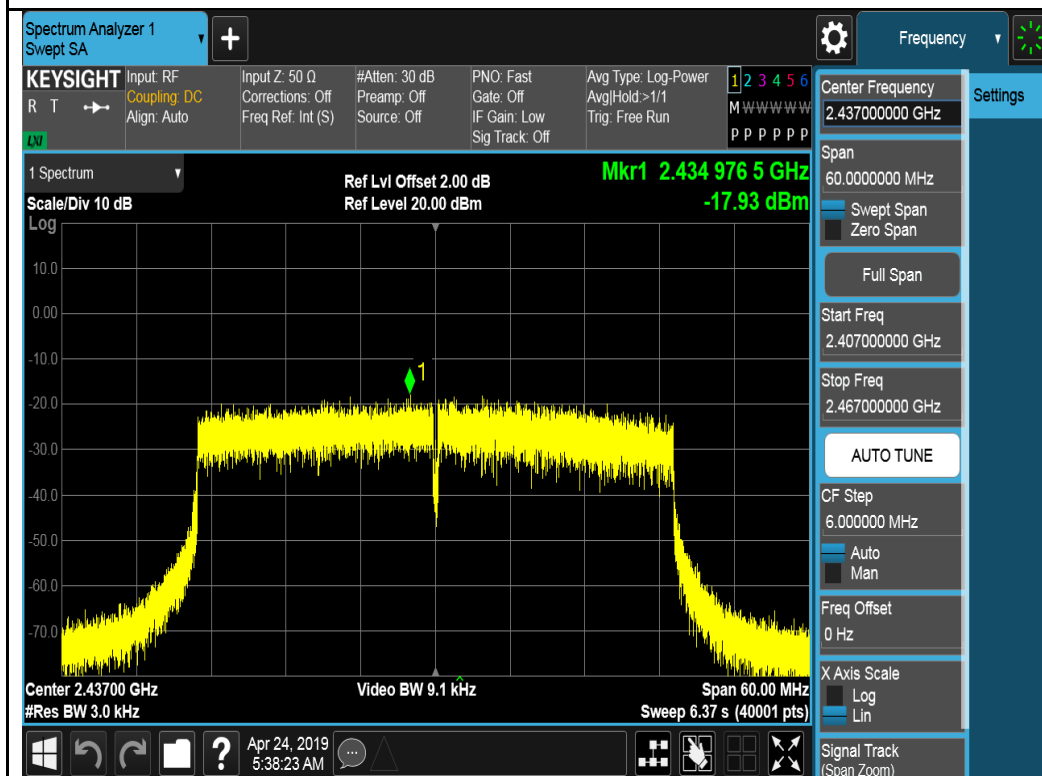
802.11n-HT40 2422MHz TX0



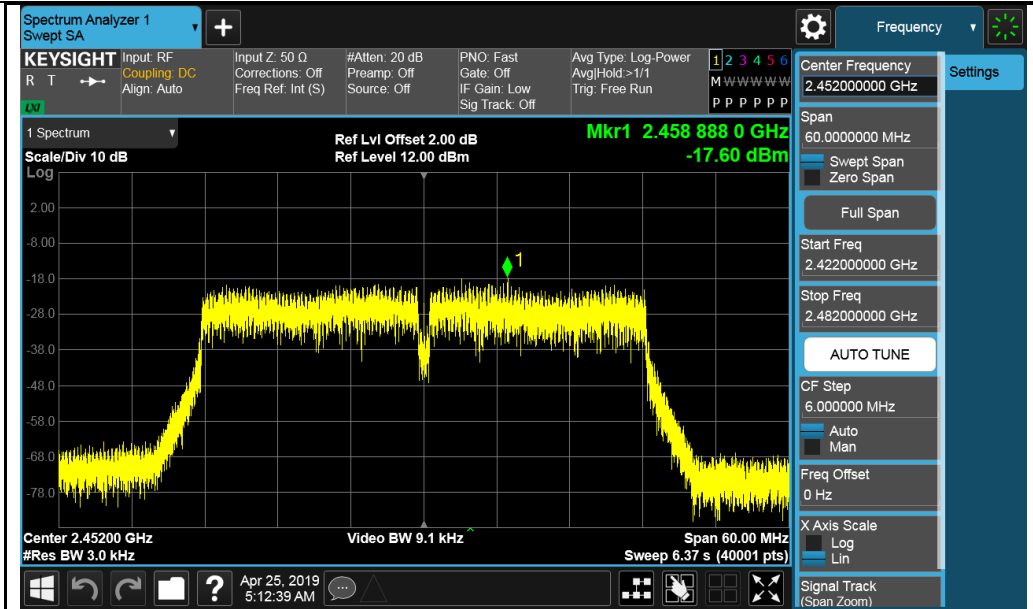
802.11n-HT40 2422MHz TX1



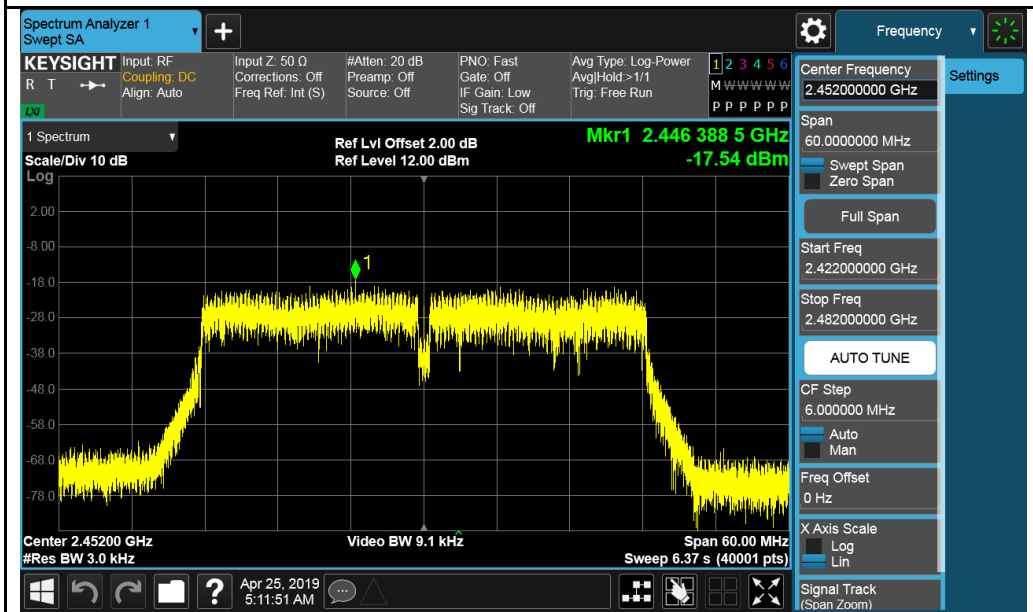
802.11n-HT40 2437MHz TX0



802.11n-HT40 2437MHz TX1



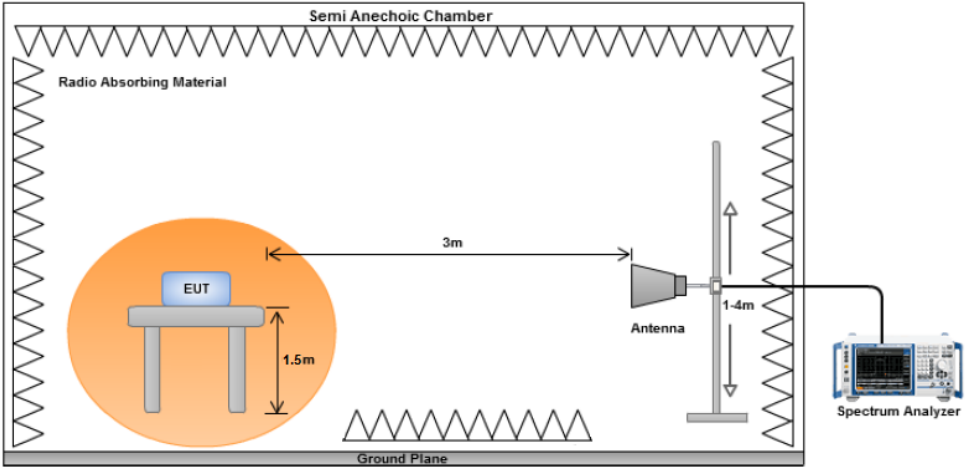
802.11n-HT40 2452MHz TX0



802.11n-HT40 2452MHz TX1

10.6 Radiated Spurious Emissions in restricted band

Requirement(s):

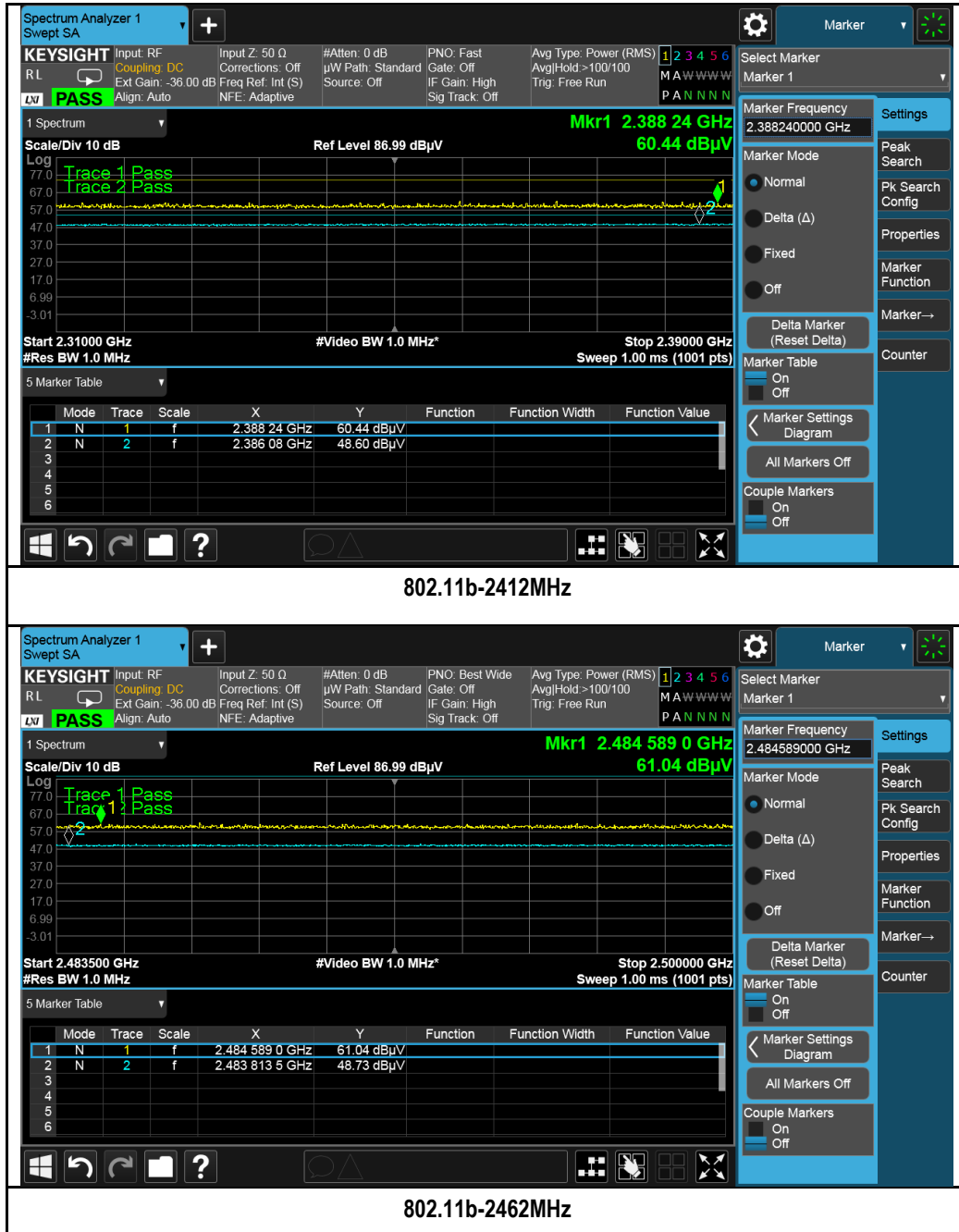
| Spec | Item | Requirement | Applicable |
|-----------------|--|---|-------------------------------------|
| 47CFR§15.247(d) | a) | For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required <input type="checkbox"/> 20 dB down <input checked="" type="checkbox"/> 30 dB down | <input checked="" type="checkbox"/> |
| | b) | or restricted band, emission must also comply with the radiated emission limits specified in 15.209 | <input checked="" type="checkbox"/> |
| Test Setup |  | | |
| Procedure | <ol style="list-style-type: none"> The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. An average measurement was then made for that frequency point. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured. | | |
| Remark | The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. Radiated measurement was measured with antenna port terminated, there isn't outstanding emission found at the edge of restricted frequency, within x dB margin | | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | | |

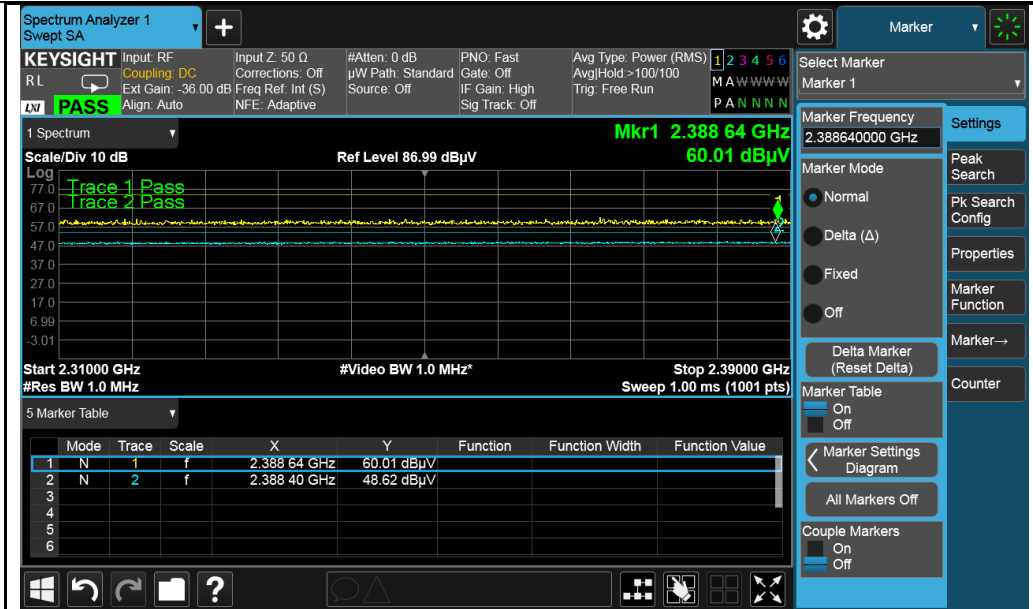
Test Data Yes (See below) N/A

Test Plot Yes (See below) N/A

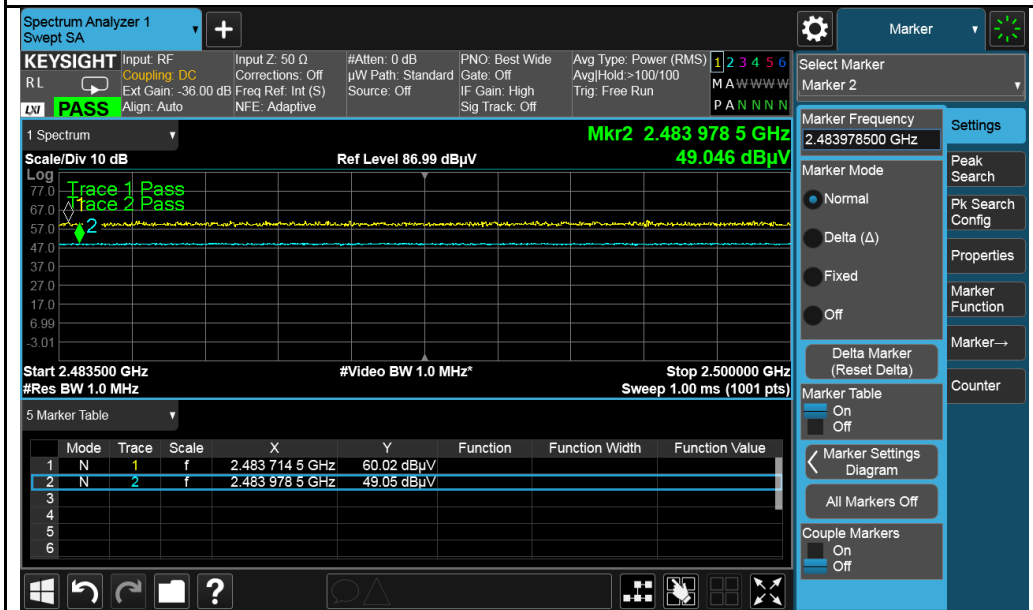
Test was done by Deon Dai at 10m chamber.

Restricted Band Measurement Plots:

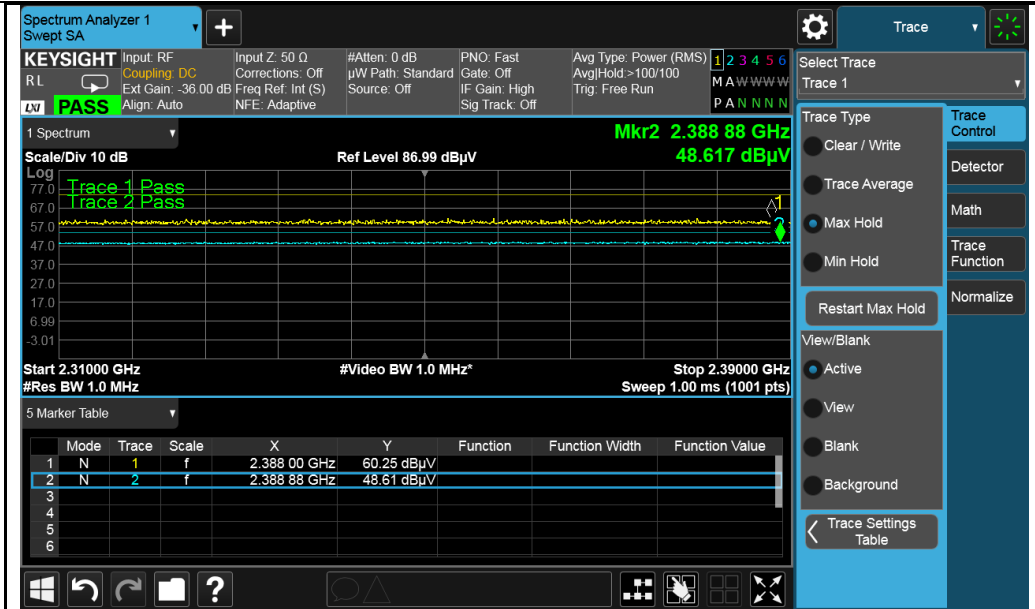




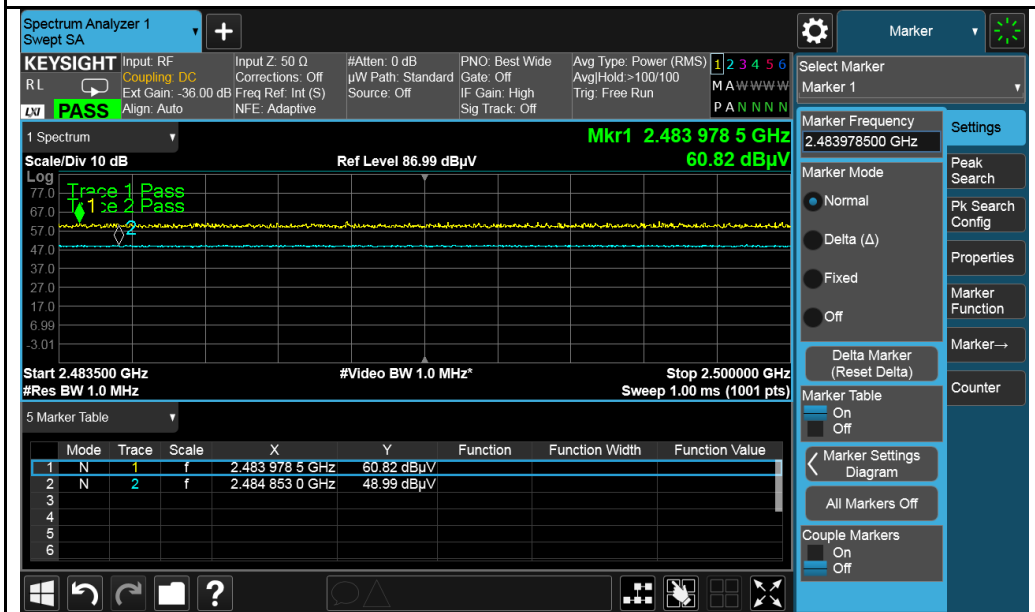
802.11g-2412MHz



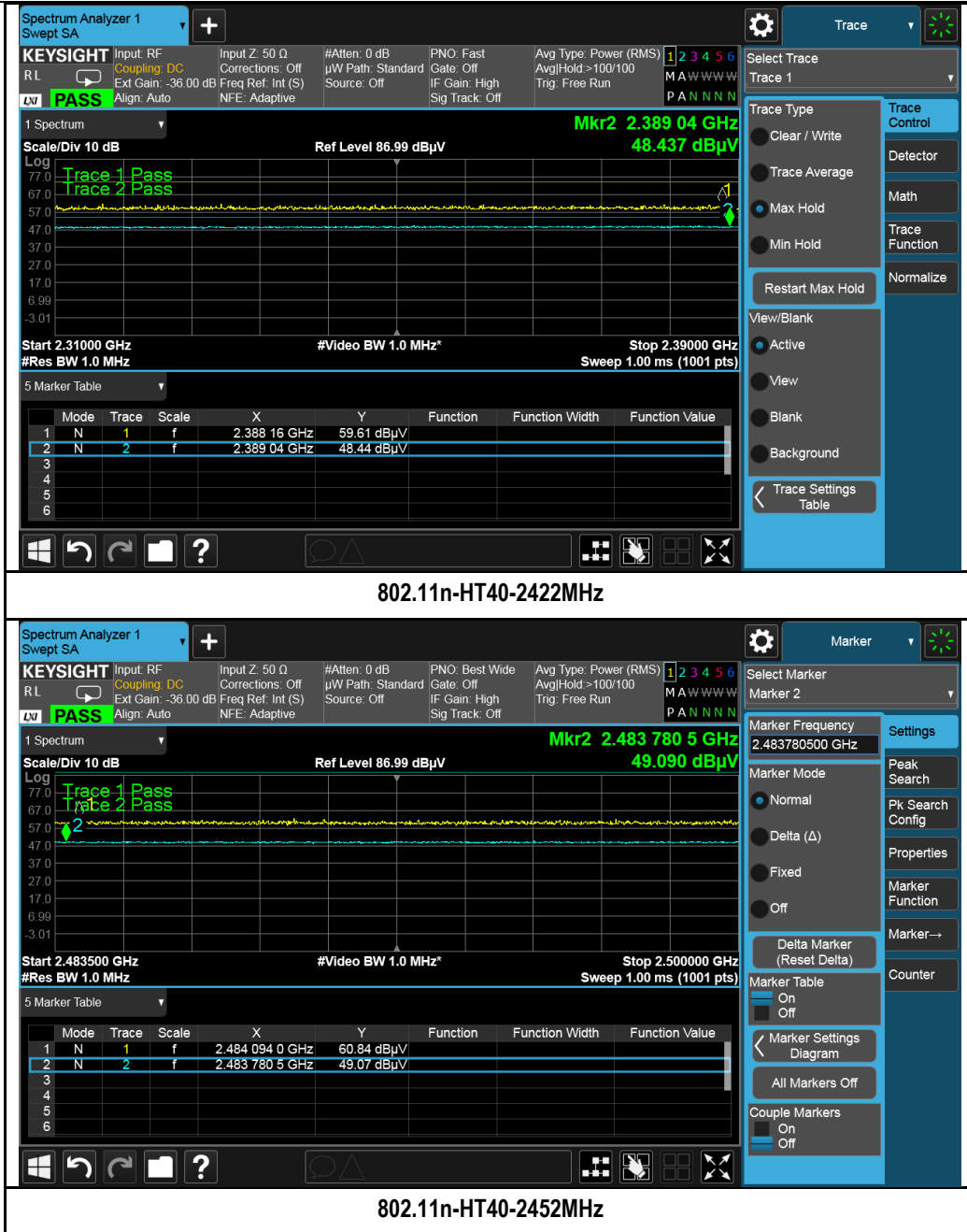
802.11g-2462MHz



802.11n-HT20-2412MHz

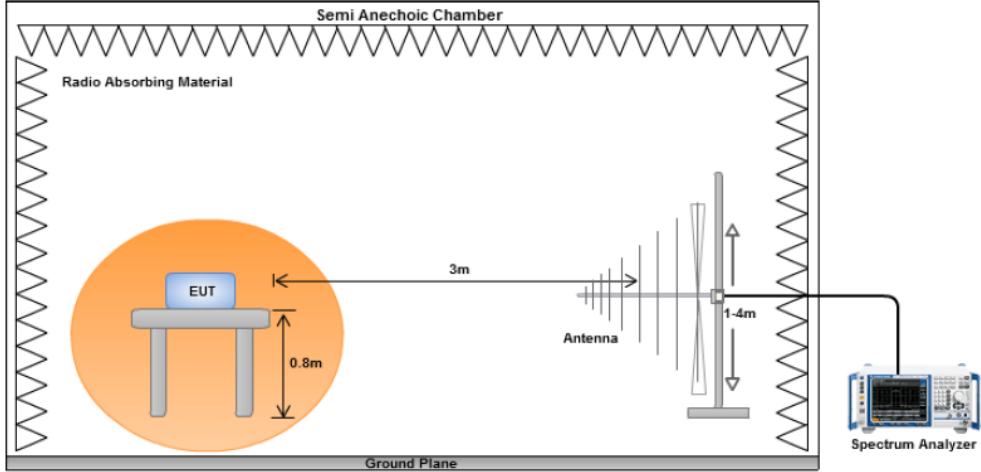


802.11n-HT20-2462MHz



10.7 Radiated Spurious Emissions below 1GHz

Requirement(s):

| Spec | Item | Requirement | Applicable | | | | | | | | | | |
|-----------------------|-----------------------|--|-----------------------|-----------------------|---------|-----|----------|-----|---------|-----|-----------|-----|---|
| 47CFR§15.247(d) | a) | <p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (uV/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table> | Frequency range (MHz) | Field Strength (uV/m) | 30 – 88 | 100 | 88 – 216 | 150 | 216 960 | 200 | Above 960 | 500 | ☒ |
| Frequency range (MHz) | Field Strength (uV/m) | | | | | | | | | | | | |
| 30 – 88 | 100 | | | | | | | | | | | | |
| 88 – 216 | 150 | | | | | | | | | | | | |
| 216 960 | 200 | | | | | | | | | | | | |
| Above 960 | 500 | | | | | | | | | | | | |
| Test Setup | |  | | | | | | | | | | | |
| Procedure | | <ol style="list-style-type: none"> The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. A Quasi-peak measurement was then made for that frequency point. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured. | | | | | | | | | | | |
| Remark | | The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. | | | | | | | | | | | |
| Result | | ☒ Pass ☐ Fail | | | | | | | | | | | |

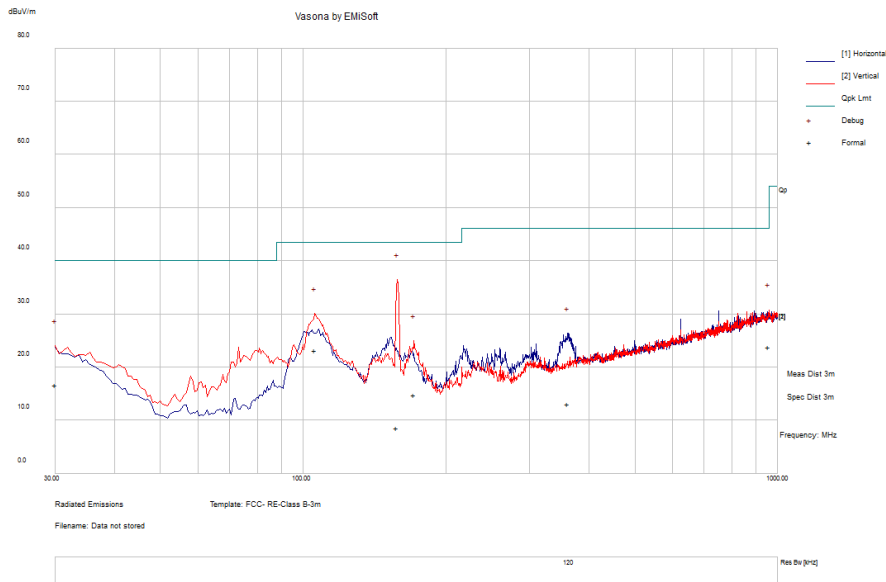
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

| | | | | | |
|---------------------------|------------------------------|------|--|--------|------|
| Test specification | below 1GHz | | | Result | Pass |
| Environmental Conditions: | Temp (°C): | 22 | | | |
| | Humidity (%) | 47 | | | |
| | Atmospheric (mbar): | 1016 | | | |
| Mains Power: | 120VAC, 60Hz | | | | |
| Tested by: | Deon Dai | | | | |
| Test Date: | 05/10/2019 | | | | |
| Remarks: | 802.11n HT40, middle channel | | | | |



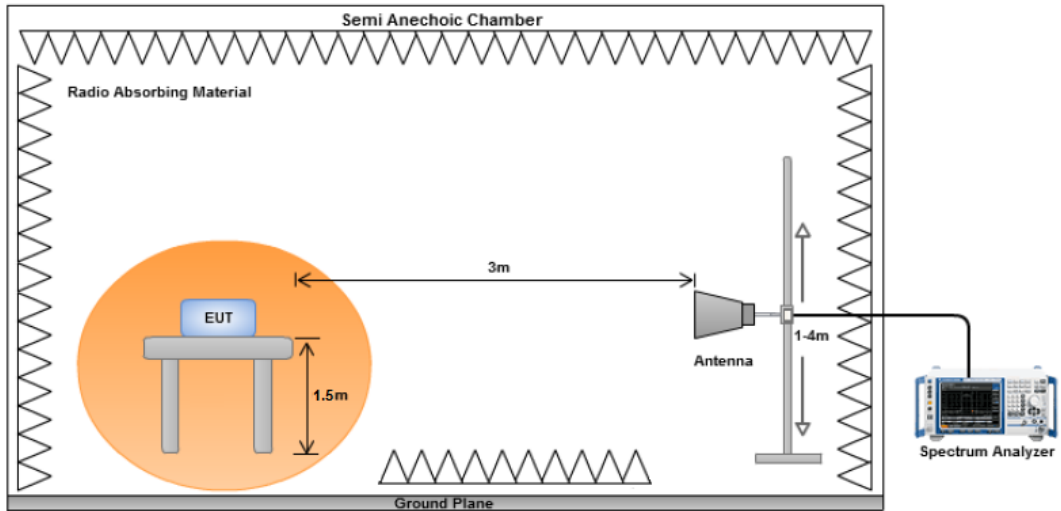
Test Data

| Frequency MHz | Raw dBuV/m | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|------------|------------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 157.70 | 19.65 | 12.25 | -23.3 | 8.6 | Quasi Max | V | 218 | 258 | 43.5 | -34.9 | Pass |
| 105.62 | 35.56 | 11.92 | -24.31 | 23.17 | Quasi Max | V | 176 | 263 | 43.5 | -20.34 | Pass |
| 957.61 | 20.29 | 16.08 | -12.52 | 23.85 | Quasi Max | H | 344 | 68 | 46 | -22.15 | Pass |
| 30.02 | 17.72 | 11.12 | -12.1 | 16.73 | Quasi Max | V | 212 | 142 | 40 | -23.27 | Pass |
| 171.02 | 26.48 | 12.36 | -24.01 | 14.84 | Quasi Max | V | 176 | 7 | 43.5 | -28.66 | Pass |
| 361.56 | 20.19 | 13.57 | -20.66 | 13.1 | Quasi Max | H | 143 | 292 | 46 | -32.9 | Pass |

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.8 Radiated Spurious Emissions between 1GHz – 25GHz

Requirement(s):

| Spec | Item | Requirement | Applicable |
|-----------------|--|---|-------------------------------------|
| 47CFR§15.247(d) | a) | For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required <input type="checkbox"/> 20 dB down <input checked="" type="checkbox"/> 30 dB down | <input checked="" type="checkbox"/> |
| | b) | or restricted band, emission must also comply with the radiated emission limits specified in 15.209 | <input checked="" type="checkbox"/> |
| Test Setup |  | | |
| Procedure | <ol style="list-style-type: none"> The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. An average measurement was then made for that frequency point. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured. | | |
| Remark | The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. There isn't outstanding emission found at the edge of restricted frequency. | | |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail | | |

Test Data Yes (See below) N/A

Test Plot Yes (See below) N/A

Test was done by Deon Dai at 10m chamber.

Radiated Emission Test Results (Above 1GHz)

Above 1GHz-25GHz – 802.11b – 2412MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4824.06 | 53.61 | 7.09 | 33.1 | 50.6 | 43.2 | Peak | V | 115 | 174 | 74 | -30.8 | Pass |
| 7238.06 | 52.7 | 7.4 | 36.83 | 48.58 | 48.35 | Peak | V | 194 | 327 | 74 | -25.65 | Pass |
| 4823.97 | 55.15 | 7.09 | 33.1 | 50.6 | 44.74 | Peak | H | 110 | 356 | 74 | -29.26 | Pass |
| 7236.84 | 53.67 | 7.4 | 36.83 | 48.58 | 49.32 | Peak | H | 110 | 356 | 74 | -24.68 | Pass |
| 4824.06 | 48.07 | 7.09 | 33.1 | 50.6 | 37.66 | Average | V | 115 | 174 | 54 | -16.34 | Pass |
| 7238.06 | 42.45 | 7.4 | 36.83 | 48.58 | 38.1 | Average | V | 194 | 327 | 54 | -15.9 | Pass |
| 4823.97 | 47.99 | 7.09 | 33.1 | 50.6 | 37.58 | Average | H | 110 | 356 | 54 | -16.42 | Pass |
| 7236.84 | 46.71 | 7.4 | 36.83 | 48.58 | 42.36 | Average | H | 110 | 356 | 54 | -11.64 | Pass |

Above 1GHz-25GHz- 802.11b - 2437MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4874.06 | 52.54 | 7.09 | 33.32 | 50.28 | 42.67 | Peak | V | 115 | 174 | 74 | -31.33 | Pass |
| 7309.38 | 54.02 | 7.4 | 36.85 | 48.58 | 49.69 | Peak | V | 194 | 327 | 74 | -24.31 | Pass |
| 4874.06 | 53.35 | 7.09 | 33.32 | 50.28 | 43.48 | Peak | H | 110 | 356 | 74 | -30.52 | Pass |
| 7236.84 | 55.28 | 7.4 | 36.85 | 48.58 | 50.95 | Peak | H | 110 | 356 | 74 | -23.05 | Pass |
| 4874.06 | 43.82 | 7.09 | 33.32 | 50.28 | 33.95 | Average | V | 115 | 174 | 54 | -20.05 | Pass |
| 7309.38 | 43.57 | 7.4 | 36.85 | 48.58 | 39.24 | Average | V | 194 | 327 | 54 | -14.76 | Pass |
| 4874.06 | 45.85 | 7.09 | 33.32 | 50.28 | 35.98 | Average | H | 110 | 356 | 54 | -18.02 | Pass |
| 7236.84 | 44.78 | 7.4 | 36.85 | 48.58 | 40.45 | Average | H | 110 | 356 | 54 | -13.55 | Pass |

Above 1GHz-25GHz – 802.11b – 2462MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4924.13 | 54.14 | 7.09 | 33.32 | 50.28 | 44.27 | Peak | V | 115 | 174 | 74 | -29.73 | Pass |
| 7384.81 | 55.26 | 7.4 | 36.6 | 48.19 | 51.07 | Peak | V | 194 | 327 | 74 | -22.93 | Pass |
| 4923.91 | 54.04 | 7.09 | 33.32 | 50.28 | 44.17 | Peak | H | 110 | 356 | 74 | -29.83 | Pass |
| 7385.22 | 56.46 | 7.4 | 36.6 | 48.19 | 52.27 | Peak | H | 110 | 356 | 74 | -21.73 | Pass |
| 4924.13 | 44.79 | 7.09 | 33.32 | 50.28 | 34.92 | Average | V | 115 | 174 | 54 | -19.08 | Pass |
| 7384.81 | 45.1 | 7.4 | 36.6 | 48.19 | 40.91 | Average | V | 194 | 327 | 54 | -13.09 | Pass |
| 4923.91 | 44.47 | 7.09 | 33.32 | 50.28 | 34.6 | Average | H | 110 | 356 | 54 | -19.40 | Pass |
| 7385.22 | 49.39 | 7.4 | 36.6 | 48.19 | 45.2 | Average | H | 110 | 356 | 54 | -8.80 | Pass |

Above 1GHz-25GHz- 802.11g - 2412MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4824.13 | 51.38 | 7.09 | 33.1 | 50.6 | 40.97 | Peak | V | 115 | 174 | 74 | -33.03 | Pass |
| 7234.06 | 50.69 | 7.4 | 36.83 | 48.58 | 46.34 | Peak | V | 194 | 327 | 74 | -27.66 | Pass |
| 4822.94 | 52.25 | 7.09 | 33.1 | 50.6 | 41.84 | Peak | H | 110 | 356 | 74 | -32.16 | Pass |
| 7235.88 | 50.48 | 7.4 | 36.83 | 48.58 | 46.13 | Peak | H | 110 | 356 | 74 | -27.87 | Pass |
| 4824.13 | 42.06 | 7.09 | 33.1 | 50.6 | 31.65 | Average | V | 115 | 174 | 54 | -22.35 | Pass |
| 7234.06 | 40.71 | 7.4 | 36.83 | 48.58 | 36.36 | Average | V | 194 | 327 | 54 | -17.64 | Pass |
| 4822.94 | 42.09 | 7.09 | 33.1 | 50.6 | 31.68 | Average | H | 110 | 356 | 54 | -22.32 | Pass |
| 7235.88 | 31.82 | 7.4 | 36.83 | 48.58 | 27.47 | Average | H | 110 | 356 | 54 | -26.53 | Pass |

Above 1GHz-25GHz – 802.11g – 2437MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4873.78 | 52.64 | 7.09 | 33.32 | 50.28 | 42.77 | Peak | V | 115 | 174 | 74 | -31.23 | Pass |
| 7310.91 | 51.88 | 7.4 | 36.85 | 48.58 | 47.55 | Peak | V | 194 | 327 | 74 | -26.45 | Pass |
| 4873.91 | 53.52 | 7.09 | 33.32 | 50.28 | 43.65 | Peak | H | 110 | 356 | 74 | -30.35 | Pass |
| 7310.18 | 51.89 | 7.4 | 36.85 | 48.58 | 47.56 | Peak | H | 110 | 356 | 74 | -26.44 | Pass |
| 4873.78 | 42.53 | 7.09 | 33.32 | 50.28 | 32.66 | Average | V | 115 | 174 | 54 | -21.34 | Pass |
| 7310.91 | 40.99 | 7.4 | 36.85 | 48.58 | 36.66 | Average | V | 194 | 327 | 54 | -17.34 | Pass |
| 4873.91 | 43.05 | 7.09 | 33.32 | 50.28 | 33.18 | Average | H | 110 | 356 | 54 | -20.82 | Pass |
| 7310.18 | 41.79 | 7.4 | 36.85 | 48.58 | 37.46 | Average | H | 110 | 356 | 54 | -16.54 | Pass |

Above 1GHz-25GHz- 802.11g - 2462MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4924.13 | 50.6 | 7.09 | 33.32 | 50.28 | 40.73 | Peak | V | 115 | 174 | 74 | -33.27 | Pass |
| 7384.81 | 52.73 | 7.4 | 36.6 | 48.19 | 48.54 | Peak | V | 194 | 327 | 74 | -25.46 | Pass |
| 4923.91 | 56.01 | 7.09 | 33.32 | 50.28 | 46.14 | Peak | H | 110 | 356 | 74 | -27.86 | Pass |
| 7385.22 | 52.59 | 7.4 | 36.6 | 48.19 | 48.4 | Peak | H | 110 | 356 | 74 | -25.6 | Pass |
| 4924.13 | 42.72 | 7.09 | 33.32 | 50.28 | 32.85 | Average | V | 115 | 174 | 54 | -21.15 | Pass |
| 7384.81 | 41.99 | 7.4 | 36.6 | 48.19 | 37.8 | Average | V | 194 | 327 | 54 | -16.2 | Pass |
| 4923.91 | 47.2 | 7.09 | 33.32 | 50.28 | 37.33 | Average | H | 110 | 356 | 54 | -16.67 | Pass |
| 7385.22 | 43.75 | 7.4 | 36.6 | 48.19 | 39.56 | Average | H | 110 | 356 | 54 | -14.44 | Pass |

Above 1GHz-25GHz- 802.11n20 - 2412MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4824.13 | 53.4 | 7.09 | 33.1 | 50.6 | 42.99 | Peak | V | 115 | 174 | 74 | -31.01 | Pass |
| 7234.06 | 52.9 | 7.4 | 36.83 | 48.58 | 48.55 | Peak | V | 194 | 327 | 74 | -25.45 | Pass |
| 4822.94 | 52.86 | 7.09 | 33.1 | 50.6 | 42.45 | Peak | H | 110 | 356 | 74 | -31.55 | Pass |
| 7235.88 | 53.72 | 7.4 | 36.83 | 48.58 | 49.37 | Peak | H | 110 | 356 | 74 | -24.63 | Pass |
| 4824.13 | 42.75 | 7.09 | 33.1 | 50.6 | 32.34 | Average | V | 115 | 174 | 54 | -21.66 | Pass |
| 7234.06 | 42.25 | 7.4 | 36.83 | 48.58 | 37.9 | Average | V | 194 | 327 | 54 | -16.1 | Pass |
| 4822.94 | 43.2 | 7.09 | 33.1 | 50.6 | 32.79 | Average | H | 110 | 356 | 54 | -21.21 | Pass |
| 7235.88 | 42.57 | 7.4 | 36.83 | 48.58 | 38.22 | Average | H | 110 | 356 | 54 | -15.78 | Pass |

Above 1GHz-25GHz – 802.11n20 – 2437MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4873.78 | 53.06 | 7.09 | 33.32 | 50.28 | 43.19 | Peak | V | 115 | 174 | 74 | -30.81 | Pass |
| 7310.91 | 52.28 | 7.4 | 36.85 | 48.58 | 47.95 | Peak | V | 194 | 327 | 74 | -26.05 | Pass |
| 4873.91 | 54.87 | 7.09 | 33.32 | 50.28 | 45 | Peak | H | 110 | 356 | 74 | -29 | Pass |
| 7310.18 | 53.54 | 7.4 | 36.85 | 48.58 | 49.21 | Peak | H | 110 | 356 | 74 | -24.79 | Pass |
| 4873.78 | 43.98 | 7.09 | 33.32 | 50.28 | 34.11 | Average | V | 115 | 174 | 54 | -19.89 | Pass |
| 7310.91 | 42.33 | 7.4 | 36.85 | 48.58 | 38 | Average | V | 194 | 327 | 54 | -16 | Pass |
| 4873.91 | 44.81 | 7.09 | 33.32 | 50.28 | 34.94 | Average | H | 110 | 356 | 54 | -19.06 | Pass |
| 7310.18 | 42.77 | 7.4 | 36.85 | 48.58 | 38.44 | Average | H | 110 | 356 | 54 | -15.56 | Pass |

Above 1GHz-25GHz- 802.11n20 - 2462MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4924.13 | 52.71 | 7.09 | 33.32 | 50.28 | 42.84 | Peak | V | 115 | 174 | 74 | -31.16 | Pass |
| 7384.81 | 53.63 | 7.4 | 36.6 | 48.19 | 49.44 | Peak | V | 194 | 327 | 74 | -24.56 | Pass |
| 4923.91 | 55.37 | 7.09 | 33.32 | 50.28 | 45.5 | Peak | H | 110 | 356 | 74 | -28.5 | Pass |
| 7385.22 | 52.44 | 7.4 | 36.6 | 48.19 | 48.25 | Peak | H | 110 | 356 | 74 | -25.75 | Pass |
| 4924.13 | 43.6 | 7.09 | 33.32 | 50.28 | 33.73 | Average | V | 115 | 174 | 54 | -20.27 | Pass |
| 7384.81 | 43.3 | 7.4 | 36.6 | 48.19 | 39.11 | Average | V | 194 | 327 | 54 | -14.89 | Pass |
| 4923.91 | 44.1 | 7.09 | 33.32 | 50.28 | 34.23 | Average | H | 110 | 356 | 54 | -19.77 | Pass |
| 7385.22 | 42.98 | 7.4 | 36.6 | 48.19 | 38.79 | Average | H | 110 | 356 | 54 | -15.21 | Pass |

Above 1GHz-25GHz- 802.11n40 - 2422MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4844.18 | 53.28 | 7.09 | 33.1 | 50.28 | 43.19 | Peak | V | 115 | 174 | 74 | -30.81 | Pass |
| 7265.75 | 53.22 | 7.4 | 36.85 | 48.58 | 48.89 | Peak | V | 194 | 327 | 74 | -25.11 | Pass |
| 4844.18 | 53.23 | 7.09 | 33.1 | 50.28 | 43.14 | Peak | H | 110 | 356 | 74 | -30.86 | Pass |
| 7265.68 | 52.57 | 7.4 | 36.85 | 48.58 | 48.24 | Peak | H | 110 | 356 | 74 | -25.76 | Pass |
| 4844.18 | 43.83 | 7.09 | 33.1 | 50.28 | 33.74 | Average | V | 115 | 174 | 54 | -20.26 | Pass |
| 7265.75 | 42.78 | 7.4 | 36.85 | 48.58 | 38.45 | Average | V | 194 | 327 | 54 | -15.55 | Pass |
| 4844.18 | 42.83 | 7.09 | 33.1 | 50.28 | 32.74 | Average | H | 110 | 356 | 54 | -21.26 | Pass |
| 7265.68 | 42.54 | 7.4 | 36.85 | 48.58 | 38.21 | Average | H | 110 | 356 | 54 | -15.79 | Pass |

Above 1GHz-25GHz – 802.11n40 – 2437MHz

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4873.78 | 53.96 | 7.09 | 33.32 | 50.28 | 44.09 | Peak | V | 115 | 174 | 74 | -29.91 | Pass |
| 7310.91 | 54.22 | 7.4 | 36.85 | 48.58 | 49.89 | Peak | V | 194 | 327 | 74 | -24.11 | Pass |
| 4873.91 | 54.36 | 7.09 | 33.32 | 50.28 | 44.49 | Peak | H | 110 | 356 | 74 | -29.51 | Pass |
| 7310.18 | 52.6 | 7.4 | 36.85 | 48.58 | 48.27 | Peak | H | 110 | 356 | 74 | -25.73 | Pass |
| 4873.78 | 44.24 | 7.09 | 33.32 | 50.28 | 34.37 | Average | V | 115 | 174 | 54 | -19.63 | Pass |
| 7310.91 | 42.49 | 7.4 | 36.85 | 48.58 | 38.16 | Average | V | 194 | 327 | 54 | -15.84 | Pass |
| 4873.91 | 44.63 | 7.09 | 33.32 | 50.28 | 34.76 | Average | H | 110 | 356 | 54 | -19.24 | Pass |
| 7310.18 | 43.73 | 7.4 | 36.85 | 48.58 | 39.4 | Average | H | 110 | 356 | 54 | -14.6 | Pass |

















Above 1GHz-25GHz- 802.11n40 - 2452MHz








| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Amp dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|---------------|----------|------------|-------|--------|--------------|------------------|-----|--------|---------|--------------|-----------|------------|
| 4904.4 | 53.79 | 7.09 | 33.32 | 50.28 | 43.92 | Peak | V | 115 | 174 | 74 | -30.08 | Pass |
| 7355.56 | 52.4 | 7.4 | 36.6 | 48.19 | 48.21 | Peak | V | 194 | 327 | 74 | -25.79 | Pass |
| 4903.87 | 52.32 | 7.09 | 33.32 | 50.28 | 42.45 | Peak | H | 110 | 356 | 74 | -31.55 | Pass |
| 7356.06 | 52.61 | 7.4 | 36.6 | 48.19 | 48.42 | Peak | H | 110 | 356 | 74 | -25.58 | Pass |
| 4904.4 | 42.89 | 7.09 | 33.32 | 50.28 | 33.02 | Average | V | 115 | 174 | 54 | -20.98 | Pass |
| 7355.56 | 42.97 | 7.4 | 36.6 | 48.19 | 38.78 | Average | V | 194 | 327 | 54 | -15.22 | Pass |
| 4903.87 | 43.65 | 7.09 | 33.32 | 50.28 | 33.78 | Average | H | 110 | 356 | 54 | -20.22 | Pass |
| 7356.06 | 42.84 | 7.4 | 36.6 | 48.19 | 38.65 | Average | H | 110 | 356 | 54 | -15.35 | Pass |

Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Cycle | Cal Due | In use |
|---------------------------------|--------------|-------------|------------|-----------|------------|-------------------------------------|
| Conducted Emissions | | | | | | |
| R & S Receiver | ESIB 40 | 100179 | 08/28/2018 | 1 Year | 08/29/2019 | <input checked="" type="checkbox"/> |
| LISN | 3816/2NM | 214372 | 01/10/2019 | 1 Year | 01/10/2020 | <input checked="" type="checkbox"/> |
| Radiated Emissions | | | | | | |
| 50GHz Spectrum Analyzer | N9030B(PXA) | MY57140374 | 08/20/2018 | 1 Year | 08/20/2019 | <input checked="" type="checkbox"/> |
| Bi-Log antenna (30MHz~6GHz) | JB6 | A111717 | 08/12/2018 | 1 Year | 08/12/2019 | <input checked="" type="checkbox"/> |
| Horn Antenna (1GHz~26GHz) | 3115 | 100059 | 01/26/2019 | 1 Year | 01/26/2020 | <input checked="" type="checkbox"/> |
| Horn Antenna (26GHz~40GHz) | AH-840 | 101013 | 08/28/2018 | 1 Year | 08/28/2019 | <input checked="" type="checkbox"/> |
| Pre-Amplifier(0.3MHz-6.5GHz) | LPA-6-30 | 11170602 | 02/06/2019 | 1 Year | 02/06/2020 | <input checked="" type="checkbox"/> |
| Pre-Amplifier (1-26.5GHz) | 8449B | 3008A00715 | 08/16/2018 | 1 Year | 08/16/2019 | <input checked="" type="checkbox"/> |
| Pre-Amp (10MHz~50GHz) | RAMP00M50GA | 17032300047 | 02/10/2019 | 1 Year | 02/10/2020 | <input checked="" type="checkbox"/> |
| RF Conducted Measurement | | | | | | |
| 50GHz Spectrum Analyzer | N9030B (PXA) | MY57140584 | 10/02/2018 | 1 Year | 10/02/2019 | <input checked="" type="checkbox"/> |

Annex B. SIEMIC Accreditation

| Accreditations | Document | Scope / Remark |
|---|---|---|
| ISO 17025 (A2LA) |  | Please see the documents for the detailed scope |
| ISO Guide 65 (A2LA) |  | Please see the documents for the detailed scope |
| TCB Designation | | A1 , A2 , A3 , A4 , B1 , B2 , B3 , B4 , C |
| FCC DoC Accreditation |  | FCC Declaration of Conformity Accreditation |
| FCC Site Registration |  | 3 meter site |
| FCC Site Registration |  | 10 meter site |
| IC Site Registration |  | 3 meter site |
| IC Site Registration |  | 10 meter site |
| EU NB |  | Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025 |
| |  | Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025 |
| Singapore iDA CB(Certification Body) |   | Phase I , Phase II |
| Vietnam MIC CAB Accreditation |  | Please see the document for the detailed scope |
| Hong Kong OFCA |  | (Phase II) OFCA Foreign Certification Body for Radio and Telecom |
| |  | (Phase I) Conformity Assessment Body for Radio and Telecom |
| Industry Canada CAB |  | Radio: Scope A – All Radio Standard Specification in Category I |
| |  | Telecom: CS-03 Part I, II, V, VI, VII, VIII |

| | | |
|---|---|--|
| Japan Recognized Certification Body Designation |  | <p>Radio: A1. Terminal equipment for purpose of calling</p> <p>Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p> |
| Korea CAB Accreditation |  | <p>EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI</p> <p>EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS</p> |
| | | <p>Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68</p> <p>Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4</p> |
| Taiwan NCC CAB Recognition |  | LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08 |
| Taiwan BSMI CAB Recognition |  | CNS 13438 |
| Japan VCCI |  | <p>R-3083: Radiation 3 meter site</p> <p>C-3421: Main Ports Conducted Interference Measurement</p> <p>T-1597: Telecommunication Ports Conducted Interference Measurement</p> |
| Australia CAB Recognition |  | <p>EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p> |
| | | <p>Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771</p> |
| | | <p>Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1</p> |
| Australia NATA Recognition |  | AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2 |