



**FCC 47 CFR PART 15 SUBPART C**

**CERTIFICATION TEST REPORT**

*For*

**CONSUMER CAMERA**

**MODEL NUMBER: IPC-S41FP**

**ADDITIONAL MODEL NUMBER: IPC-S41FP-0360B-imou; IPC-S41FP-0600B-imou;  
IPC-S41FN-0360B-imou; IPC-S41FN-0600B-imou; IPC-S41FP-0360B;  
IPC-S41FP-0600B; IPC-S41FN-0360B; IPC-S41FN-0600B; IPC-S41FN**

**PROJECT NUMBER: 4790279840**

**REPORT NUMBER: 4790279840-1**

**FCC ID: 2AVYF-IPC-S41F**

**ISSUE DATE: Feb 21, 2022**

*Prepared for*

**Hangzhou Huacheng Network Technology Co.,Ltd.**

*Prepared by*

**UL-CCIC COMPANY LIMITED**

**No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China**

**Tel: + 86-512-6808 6400**

**Fax: + 86-512-6808 4099**

**Website: [www.ul.com](http://www.ul.com)**

Form-ULID-008536-9 V1.0

The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.



Revision History

| Rev. | Issue Date | Revisions     | Revised By |
|------|------------|---------------|------------|
| V0   | 02/21/2022 | Initial Issue |            |



## TABLE OF CONTENTS

|                                                      |            |
|------------------------------------------------------|------------|
| <b>1. ATTESTATION OF TEST RESULTS .....</b>          | <b>4</b>   |
| <b>2. TEST METHODOLOGY .....</b>                     | <b>6</b>   |
| <b>3. FACILITIES AND ACCREDITATION .....</b>         | <b>6</b>   |
| <b>4. CALIBRATION AND UNCERTAINTY .....</b>          | <b>7</b>   |
| 4.1. MEASURING INSTRUMENT CALIBRATION .....          | 7          |
| 4.2. MEASUREMENT UNCERTAINTY.....                    | 7          |
| <b>5. EQUIPMENT UNDER TEST .....</b>                 | <b>8</b>   |
| 5.1. DESCRIPTION OF EUT .....                        | 8          |
| 5.2. MAXIMUM OUTPUT POWER .....                      | 9          |
| 5.3. CHANNEL LIST.....                               | 9          |
| 5.4. TEST CHANNEL CONFIGURATION.....                 | 10         |
| 5.5. THE WORSE CASE POWER SETTING PARAMETER.....     | 10         |
| 5.6. DESCRIPTION OF AVAILABLE ANTENNAS.....          | 11         |
| 5.7. THE WORSE CASE CONFIGURATIONS .....             | 11         |
| 5.8. DESCRIPTION OF TEST SETUP .....                 | 12         |
| 5.9. MEASURING INSTRUMENT AND SOFTWARE USED .....    | 13         |
| <b>6. MEASUREMENT METHODS .....</b>                  | <b>14</b>  |
| <b>7. ANTENNA PORT TEST RESULTS .....</b>            | <b>15</b>  |
| 7.1. TEST ENVIRONMENT .....                          | 15         |
| 7.2. ON TIME AND DUTY CYCLE.....                     | 16         |
| 7.3. 6 dB BANDWIDTH .....                            | 19         |
| 7.4. CONDUCTED POWER .....                           | 27         |
| 7.5. POWER SPECTRAL DENSITY.....                     | 29         |
| 7.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS ..... | 37         |
| 7.7. RADIATED TEST RESULTS.....                      | 68         |
| 7.7.1. LIMITS AND PROCEDURE .....                    | 68         |
| 7.7.2. RESTRICTED BANDEDGE .....                     | 73         |
| 7.7.3. SPURIOUS EMISSIONS .....                      | 90         |
| <b>8. AC POWER LINE CONDUCTED EMISSIONS .....</b>    | <b>147</b> |
| <b>9. ANTENNA REQUIREMENTS.....</b>                  | <b>150</b> |



## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: Hangzhou Huacheng Network Technology Co.,Ltd.  
Address: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China

### Manufacturer Information

Company Name: Hangzhou Huacheng Network Technology Co.,Ltd.  
Address: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China

### EUT Description

Product Name: CONSUMER CAMERA  
Model Name: IPC-S41FP  
Additional No.: IPC-S41FP-0360B-imou; IPC-S41FP-0600B-imou;  
IPC-S41FN-0360B-imou; IPC-S41FN-0600B-imou;  
IPC-S41FP-0360B; IPC-S41FP-0600B; IPC-S41FN-0360B; IPC-S41FN-0600B; IPC-S41FN  
Sample Number: 4623826  
Data of Receipt Sample: Jan 27, 2022  
Date Tested: Feb 7, 2022~ Feb 21, 2022

| APPLICABLE STANDARDS     |              |
|--------------------------|--------------|
| STANDARD                 | TEST RESULTS |
| CFR 47 Part 15 Subpart C | PASS         |



| Summary of Test Results                                                                                                                                                                                |                                           |                                            |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------|--------------|
| Clause                                                                                                                                                                                                 | Test Items                                | FCC Rules                                  | Test Results |
| 1                                                                                                                                                                                                      | 6db DTS Bandwidth                         | FCC 15.247 (a) (2)                         | Complied     |
| 2                                                                                                                                                                                                      | Conducted Power                           | FCC 15.247 (b) (3)                         | Complied     |
| 3                                                                                                                                                                                                      | Power Spectral Density                    | FCC 15.247 (e)                             | Complied     |
| 4                                                                                                                                                                                                      | Conducted Band edge And Spurious emission | FCC 15.247 (d)                             | Complied     |
| 5                                                                                                                                                                                                      | Radiated Band edges and Spurious emission | FCC 15.247 (d)<br>FCC 15.209<br>FCC 15.205 | Complied     |
| 6                                                                                                                                                                                                      | Conducted Emission Test For AC Power Port | FCC 15.207                                 | Complied     |
| 7                                                                                                                                                                                                      | Antenna Requirement                       | FCC 15.203                                 | Complied     |
| Remark:<br>2) The measurement result for the sample received is <Pass><br>according to < ANSI C63.10-2013,<br>FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied. |                                           |                                            |              |

Prepared By:

*Tom Tang*

Tom Tang  
Project Engineer

Reviewed By:

*Leon Wu*

Leon Wu  
Senior Project Engineer

Authorized By:

*Chris Zhong*

Chris Zhong  
Laboratory Leader



## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

## 3. FACILITIES AND ACCREDITATION

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accreditation Certificate | <b>A2LA (Certificate No.: 4829.01)</b><br><b>UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.</b><br><b>FCC (FCC Designation No.: CN1247)</b><br><b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b><br><b>IC (IC Designation No.: 25056; CAB No.:CN0073)</b><br><b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b> |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item                                                                                                                                     | Uncertainty          |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Conduction emission                                                                                                                           | 3.1Db                |
| Radiation Emission test(include Fundamental emission)<br>(9KHz-30MHz)                                                                         | 3.4Db                |
| Radiation Emission test(include Fundamental emission)<br>(30MHz-1GHz)                                                                         | 3.4Db                |
| Radiation Emission test<br>(1GHz to 26GHz)( include Fundamental emission)                                                                     | 3.9Db (1GHz-18Gz)    |
|                                                                                                                                               | 4.2Db (18GHz-26.5Gz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                      |



## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

|                       |                                                                                                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:         | CONSUMER CAMERA                                                                                                                                                      |
| Model No.:            | IPC-S41FP                                                                                                                                                            |
| Operating Frequency:  | IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>IEEE 802.11n(HT40): 2422MHz to 2452MHz                                                                                 |
| Type of Modulation:   | IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>IEEE for 802.11n (HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK) |
| Channels Step:        | Channels with 5MHz step                                                                                                                                              |
| Test software of EUT: | Secure CRT (manufacturer declare)                                                                                                                                    |
| Antenna Type:         | Monopole Antenna                                                                                                                                                     |
| Antenna Gain:         | 2.84 dBi                                                                                                                                                             |
| Test Voltage          | AC120V                                                                                                                                                               |

Remark:

Model No.:

| No.: | Name:                | No.: | Name:                | No.: | Name:                |
|------|----------------------|------|----------------------|------|----------------------|
| 1    | IPC-S41FP            | 2    | IPC-S41FP-0360B-imou | 3    | IPC-S41FP-0600B-imou |
| 4    | IPC-S41FN-0360B-imou | 5    | IPC-S41FN-0600B-imou | 6    | IPC-S41FP-0360B      |
| 7    | IPC-S41FP-0600B      | 8    | IPC-S41FN-0360B      | 9    | IPC-S41FN-0600B      |
| 10   | IPC-S41FN            |      |                      |      |                      |

Only the main model **IPC-S41FP** was tested and only the data of this model is shown in this test report.  
Since Their material, types of encloser, antenna location, electrical circuit design, layout, components used and internal wiring are identical, only the name of the models are different.



## 5.2. MAXIMUM OUTPUT POWER

| Number of Transmit Chains (NTX) | IEE Std. 802.11   | Channel Number | Max AV Conducted Power (dBm) |
|---------------------------------|-------------------|----------------|------------------------------|
| 1                               | IEEE 802.11B SISO | 1-11[11]       | 13.90                        |
| 1                               | IEEE 802.11G SISO | 1-11[11]       | 8.57                         |
| 1                               | IEEE 802.11nHT20  | 1-11[11]       | 8.41                         |
| 1                               | IEEE 802.11nHT40  | 3-9[7]         | 9.15                         |

Remark: Although this EUT looks like it has two antennas, but the only one antenna is working, another is no function just for decoration.

## 5.3. CHANNEL LIST

| Channel List for 802.11b/g/n (20 MHz) |                 |         |                 |         |                 |         |                 |
|---------------------------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel                               | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1                                     | 2412            | 4       | 2427            | 7       | 2442            | 10      | 2457            |
| 2                                     | 2417            | 5       | 2432            | 8       | 2447            | 11      | 2462            |
| 3                                     | 2422            | 6       | 2437            | 9       | 2452            |         |                 |

| Channel List for 802.11n (40 MHz) |                 |         |                 |         |                 |         |                 |
|-----------------------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel                           | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 3                                 | 2422            | 5       | 2432            | 7       | 2442            | 9       | 2452            |
| 4                                 | 2427            | 6       | 2437            | 8       | 2447            |         |                 |



#### 5.4. TEST CHANNEL CONFIGURATION

| Test Mode             | Test Channel      | Frequency                 |
|-----------------------|-------------------|---------------------------|
| WiFi TX(802.11b)      | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11g)      | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11n HT20) | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11n HT40) | CH 3, CH 6, CH 9  | 2422MHz, 2437MHz, 2452MHz |

#### 5.5. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band |                         |               |      |       |            |      |      |
|--------------------------------------------------------------------|-------------------------|---------------|------|-------|------------|------|------|
| Test Software                                                      |                         | EspRFtestTool |      |       |            |      |      |
| Modulation Mode                                                    | Transmit Antenna Number | Test Channel  |      |       |            |      |      |
|                                                                    |                         | NCB: 20MHz    |      |       | NCB: 40MHz |      |      |
|                                                                    |                         | CH 1          | CH 6 | CH 11 | CH 3       | CH 6 | CH 9 |
| 802.11b                                                            | 1                       | N/A           | N/A  | N/A   | /          |      |      |
| 802.11g                                                            | 1                       | 54            | 54   | 54    |            |      |      |
| 802.11n HT20                                                       | 1                       | 54            | 54   | 54    |            |      |      |
| 802.11n HT40                                                       | 1                       | /             |      |       | 54         | 54   | 54   |

Remark: Although this EUT looks like it has two antennas, but the only one antenna is working, another is no function just for decoration.



## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Ant. | Frequency (MHz) | Antenna Type     | Antenna Gain (dBi) |
|------|-----------------|------------------|--------------------|
| 1    | 2400-2483.5     | Monopole Antenna | 2.84               |

| Test Mode           | Transmit and Receive Mode                    | Description                                                           |
|---------------------|----------------------------------------------|-----------------------------------------------------------------------|
| IEEE 802.11b        | <input checked="" type="checkbox"/> 1TX, 1RX | Antenna1 can be used as transmitting/receiving antenna independently. |
| IEEE 802.11g        | <input checked="" type="checkbox"/> 1TX, 1RX | Antenna1 can be used as transmitting/receiving antenna independently. |
| IEEE 802.11N (HT20) | <input checked="" type="checkbox"/> 1TX, 1RX | Antenna1 can be used as transmitting/receiving antenna independently. |
| IEEE 802.11N (HT40) | <input checked="" type="checkbox"/> 1TX, 1RX | Antenna1 can be used as transmitting/receiving antenna independently. |

## 5.7. THE WORSE CASE CONFIGURATIONS

For the product, there only one transmission antenna, and worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps  
802.11g mode: 6 Mbps  
802.11n HT20 mode: MCS0  
802.11n HT40 mode: MCS0



## 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Item | Equipment | Brand Name | Model Name | Description      |
|------|-----------|------------|------------|------------------|
| 1    | Laptop    | ThinkPad   | E590       | N/A              |
| 2    | SD Card   | N/A        | N/A        | Supply by UL Lab |

### I/O PORT

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|----------|------|----------------|------------|-----------------|---------|
| 1        | USB  | USB to TTL     | USB        | 100cm Length    | N/A     |
| 2        | LAN  | LAN            | LAN        | 100cm Length    | N/A     |

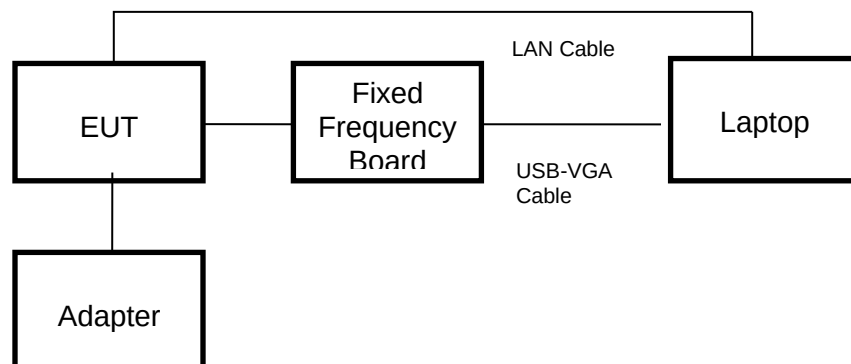
### ACCESSORY

| Item | Accessory  | Brand Name        | Model Name               | Description                                         |
|------|------------|-------------------|--------------------------|-----------------------------------------------------|
| 1    | AC Adapter | SWITCHING ADAPTER | ADS-12AM-12<br>12012EPCU | INPUT:100-240V~, 50/60Hz, 0.3A<br>OUTPUT:12.0V=1.0A |

### TEST SETUP

The EUT can work in an engineer mode with a software through a table PC.

### SETUP DIAGRAM FOR TESTS



Remark: The EUT has been built one SD card during the testing



## 5.9. MEASURING INSTRUMENT AND SOFTWARE USED

| Conducted Emissions (Instrument)    |                                         |                                  |                                     |            |                 |            |            |  |
|-------------------------------------|-----------------------------------------|----------------------------------|-------------------------------------|------------|-----------------|------------|------------|--|
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No. | Upper Last Cal. | Last Cal.  | Next Cal.  |  |
| <input checked="" type="checkbox"/> | EMI Test Receiver                       | R&S                              | ESR3                                | 126700     | 2020-12-05      | 2021-12-04 | 2022-12-03 |  |
| <input checked="" type="checkbox"/> | Two-Line V-Network                      | R&S                              | ENV216                              | 126701     | 2020-12-05      | 2021-12-04 | 2022-12-03 |  |
| Software                            |                                         |                                  |                                     |            |                 |            |            |  |
| Used                                | Description                             |                                  | Manufacturer                        |            | Name            | Version    |            |  |
| <input checked="" type="checkbox"/> | Test Software for Conducted disturbance |                                  | R&S                                 |            | EMC32           | Ver. 9.25  |            |  |
| Radiated Emissions (Instrument)     |                                         |                                  |                                     |            |                 |            |            |  |
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No. | Upper Last Cal. | Last Cal.  | Next Cal.  |  |
| <input checked="" type="checkbox"/> | Spectrum Analyzer                       | Keysight                         | N9010B                              | 155727     | 2020-05-10      | 2021-05-09 | 2022-05-08 |  |
| <input checked="" type="checkbox"/> | EMI test receiver                       | R&S                              | ESR26                               | 126703     | 2020-12-05      | 2021-12-04 | 2022-12-03 |  |
| <input checked="" type="checkbox"/> | Receiver Antenna (9kHz-30MHz)           | Schwarzbeck                      | FMZB 1513                           | 155456     | 2018-06-15      | 2021-06-03 | 2024-06-02 |  |
| <input checked="" type="checkbox"/> | Receiver Antenna (30MHz-1GHz)           | SunAR RF Motion                  | JB1                                 | 177821     | 2019-01-28      | 2022-01-18 | 2025-01-17 |  |
| <input checked="" type="checkbox"/> | Receiver Antenna (1GHz-18GHz)           | Schwarzbeck                      | BBHA9120D                           | 155392     | 2018-06-20      | 2021-06-07 | 2024-06-06 |  |
| <input checked="" type="checkbox"/> | Receiver Antenna (18GHz-26.5GHz)        | ETS                              | 3160-10                             | 155565     | 2018-06-20      | 2021-06-07 | 2024-06-06 |  |
| <input checked="" type="checkbox"/> | Pre-amplification (To 18GHz)            | Compliance Direction System Inc. | PAP-1G18-50                         | 177825     | 2019-03-18      | 2020-12-05 | 2022-03-25 |  |
| <input checked="" type="checkbox"/> | Pre-amplification (To 26.5GHz)          | R&S                              | SCU-26D                             | 135391     | 2020-12-05      | 2021-12-04 | 2022-12-03 |  |
| <input checked="" type="checkbox"/> | Band Reject Filter                      | Wainwright                       | WRCJV8-2350-2400-2483.5-2533.5-40SS | 1          | 2020-05-10      | 2021-05-09 | 2022-05-08 |  |
| <input checked="" type="checkbox"/> | Highpass Filter                         | Wainwright                       | WHKX10-2700-3000-18000-40SS         | 2          | 2020-05-10      | 2021-05-09 | 2022-05-08 |  |
| Software                            |                                         |                                  |                                     |            |                 |            |            |  |
| Used                                | Description                             |                                  | Manufacturer                        |            | Name            |            | Version    |  |
| <input checked="" type="checkbox"/> | Test Software for Radiated disturbance  |                                  | Tonscend                            |            | TS+             |            | Ver. 2.5   |  |
| Other instruments                   |                                         |                                  |                                     |            |                 |            |            |  |
| Used                                | Equipment                               | Manufacturer                     | Model No.                           | Serial No. | Upper Last Cal. | Last Cal.  | Next Cal.  |  |
| <input checked="" type="checkbox"/> | Spectrum Analyzer                       | Keysight                         | N9010B                              | 155368     | 2020-05-10      | 2021-05-09 | 2022-05-08 |  |
| <input checked="" type="checkbox"/> | Power Meter                             | Keysight                         | U2021XA                             | 155370     | 2020-05-10      | 2021-05-09 | 2022-05-08 |  |



## 6. MEASUREMENT METHODS

| No. | Test Item                                     | KDB Name                                   | Section |
|-----|-----------------------------------------------|--------------------------------------------|---------|
| 1   | 6dB Bandwidth                                 | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.2     |
| 2   | Conducted Output Power                        | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.3.2.3 |
| 3   | Power Spectral Density                        | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.4     |
| 4   | Out-of-band emissions in non-restricted bands | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.5     |
| 5   | Out-of-band emissions in restricted bands     | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.6     |
| 6   | Band-edge                                     | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.7     |
| 7   | Conducted Emission Test For AC Power Port     | ANSI C63.10-2013                           | 6.2     |



## 7. ANTENNA PORT TEST RESULTS

### 7.1. TEST ENVIRONMENT

| Environment Parameter | Selected Values During Tests |
|-----------------------|------------------------------|
| Relative Humidity     | 47.9%                        |
| Atmospheric Pressure: | 102.3kPa                     |
| Temperature           | 22.1°C                       |



## 7.2. ON TIME AND DUTY CYCLE

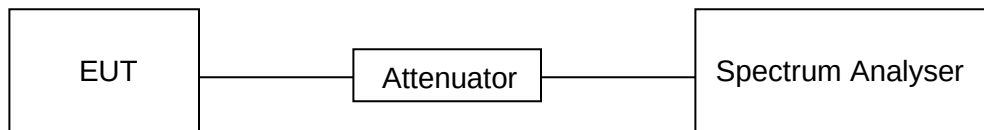
### LIMITS

None; for reporting purposes only

### PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

### TEST SETUP



### RESULTS

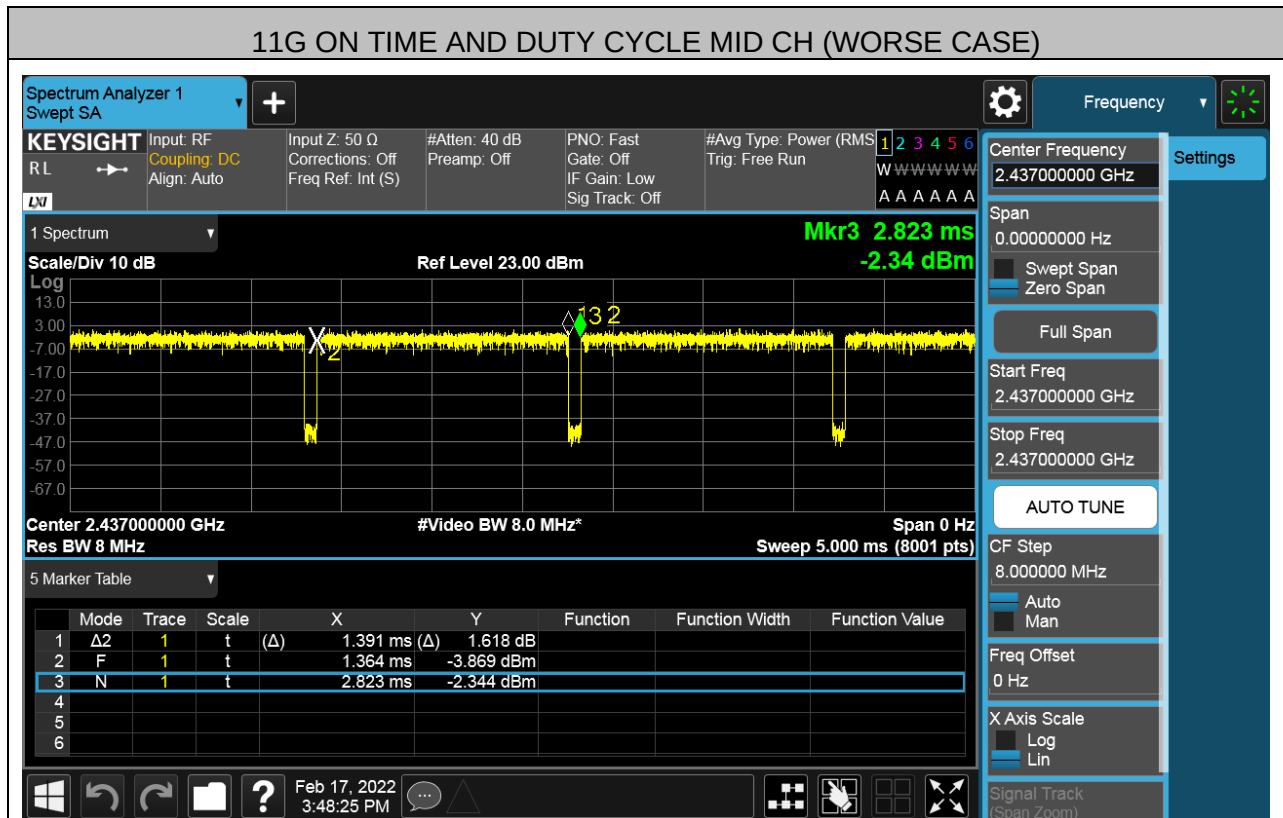
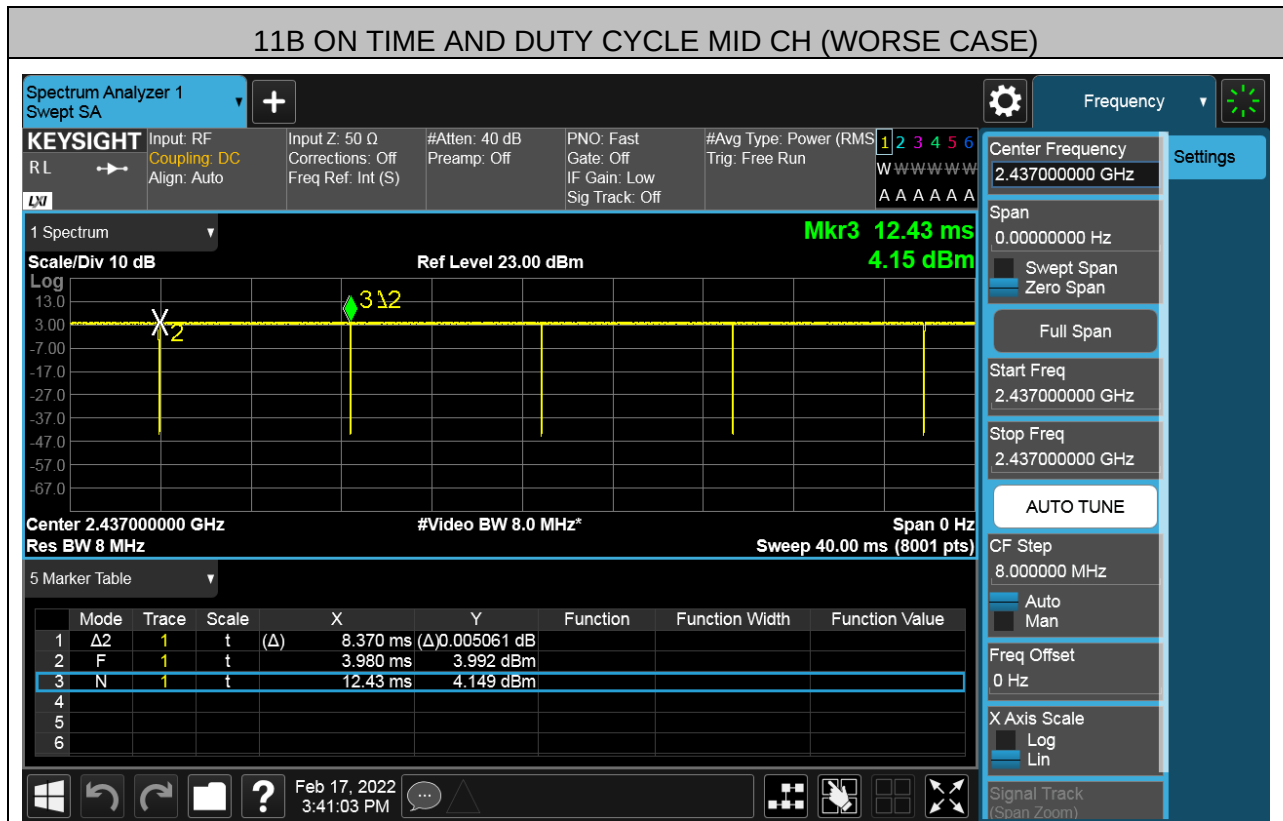
| Mode     | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (db) | 1/T Minimum VBW (KHz) | Final Minimum VBW (KHz) |
|----------|----------------|---------------|-----------------------|----------------|-----------------------------------|-----------------------|-------------------------|
| 11B      | 8.37           | 8.45          | 0.99                  | 99.0           | 0.04                              | 0.12                  | 0.01(Note4)             |
| 11G      | 1.391          | 1.459         | 0.953                 | 95.3           | 0.21                              | 0.72                  | 1                       |
| 11N HT20 | 5.079          | 5.151         | 0.986                 | 98.6           | 0.06                              | 0.20                  | 0.01(Note4)             |
| 11N HT40 | 2.466          | 2.536         | 0.972                 | 97.2           | 0.12                              | 0.41                  | 1                       |

Note: 1) Duty Cycle Correction Factor= $10\log(1/x)$ .

2) Where: x is Duty Cycle(Linear)

3) Where: T is On Time (transmit duration)

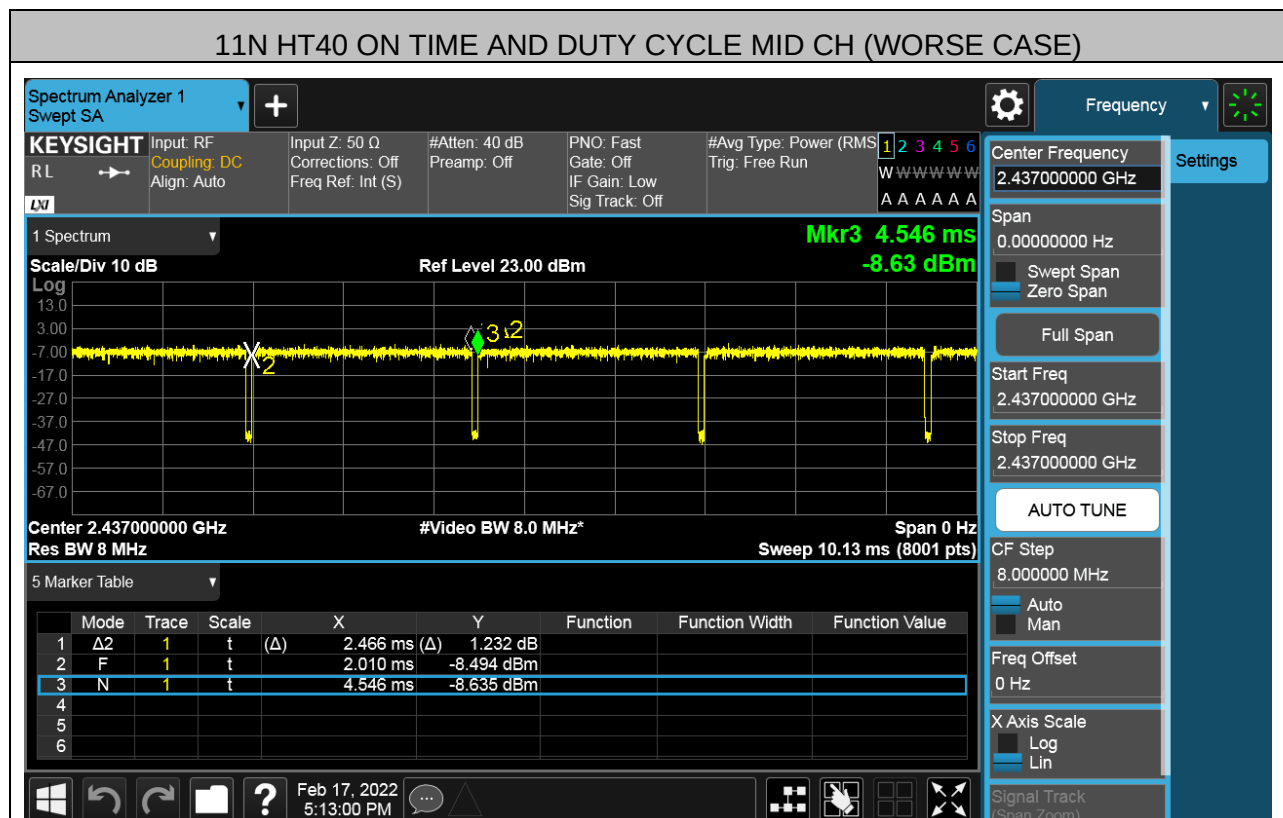
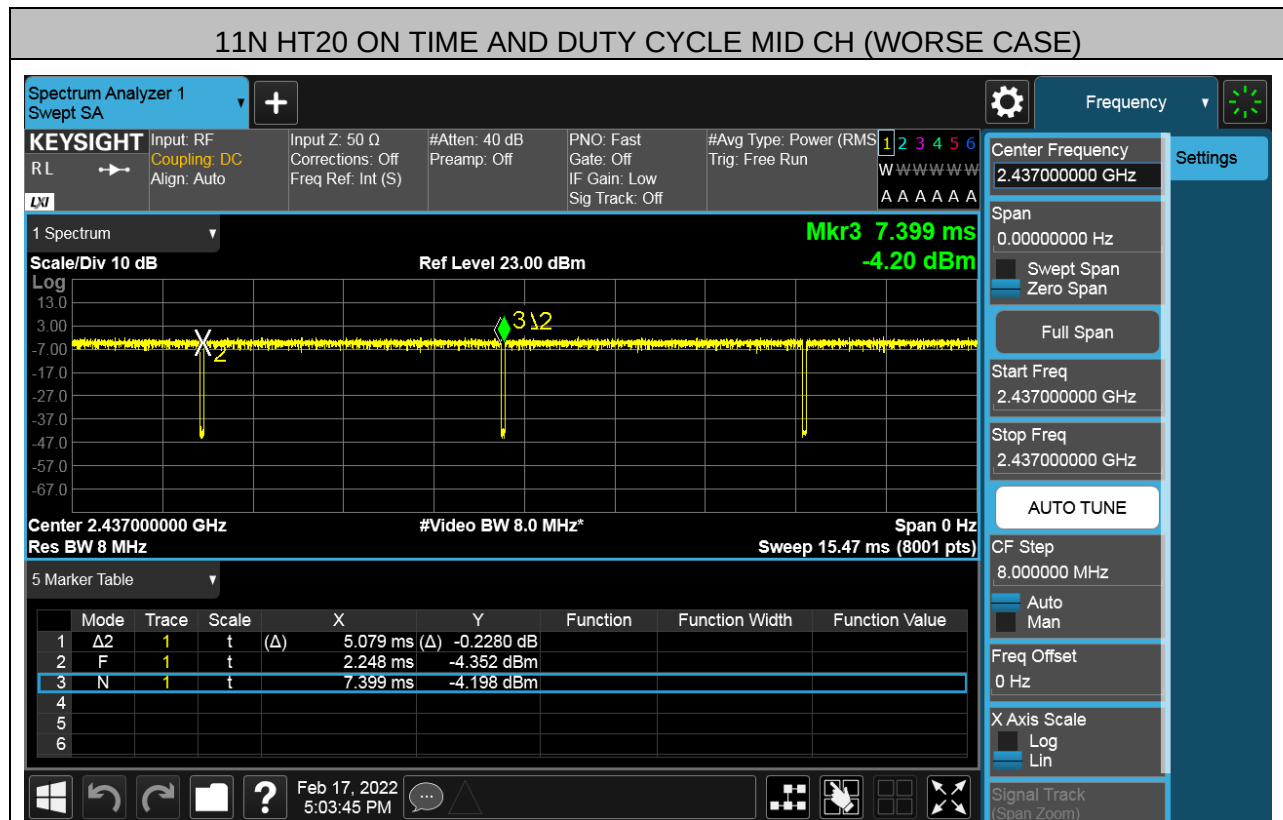
4) The minimum VBW should be 10Hz if the duty cycle is over 98%.



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.





### 7.3. 6 dB BANDWIDTH

#### LIMITS

| FCC Part15 (15.247) Subpart C |               |                      |                       |
|-------------------------------|---------------|----------------------|-----------------------|
| Section                       | Test Item     | Limit                | Frequency Range (MHz) |
| FCC 15.247(a)(2)              | 6dB Bandwidth | $\geq 500\text{KHz}$ | 2400-2483.5           |

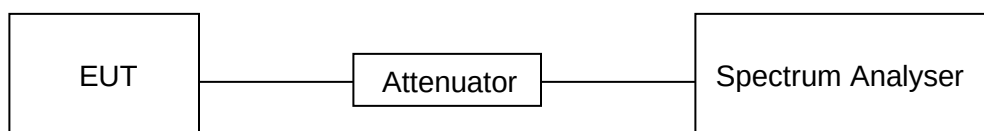
#### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyzer and use the following settings:

|                  |                                                |
|------------------|------------------------------------------------|
| Center Frequency | The centre frequency of the channel under test |
| Detector         | Peak                                           |
| RBW              | For 6dB Bandwidth :100K                        |
| VBW              | For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ |
| Trace            | Max hold                                       |
| Sweep            | Auto couple                                    |

Allow the trace to stabilize and 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 SETUP



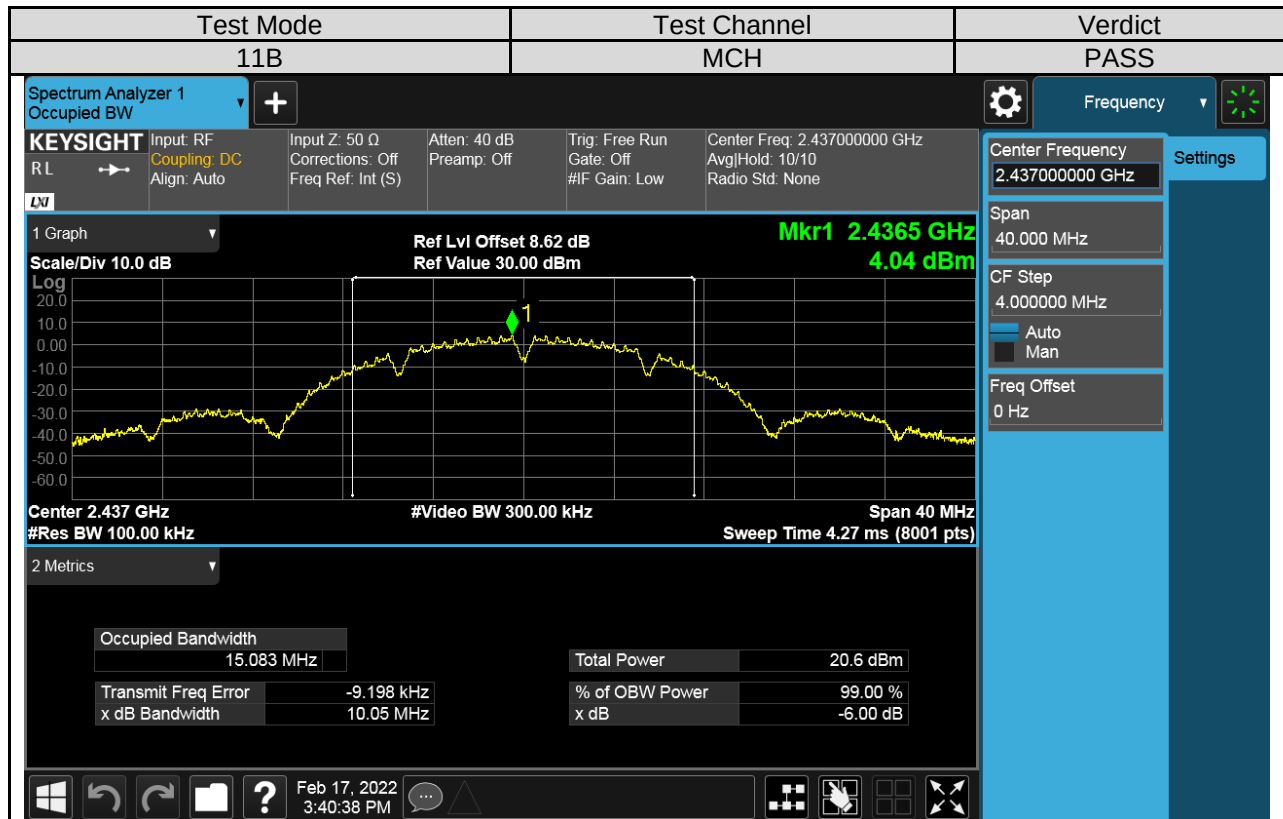
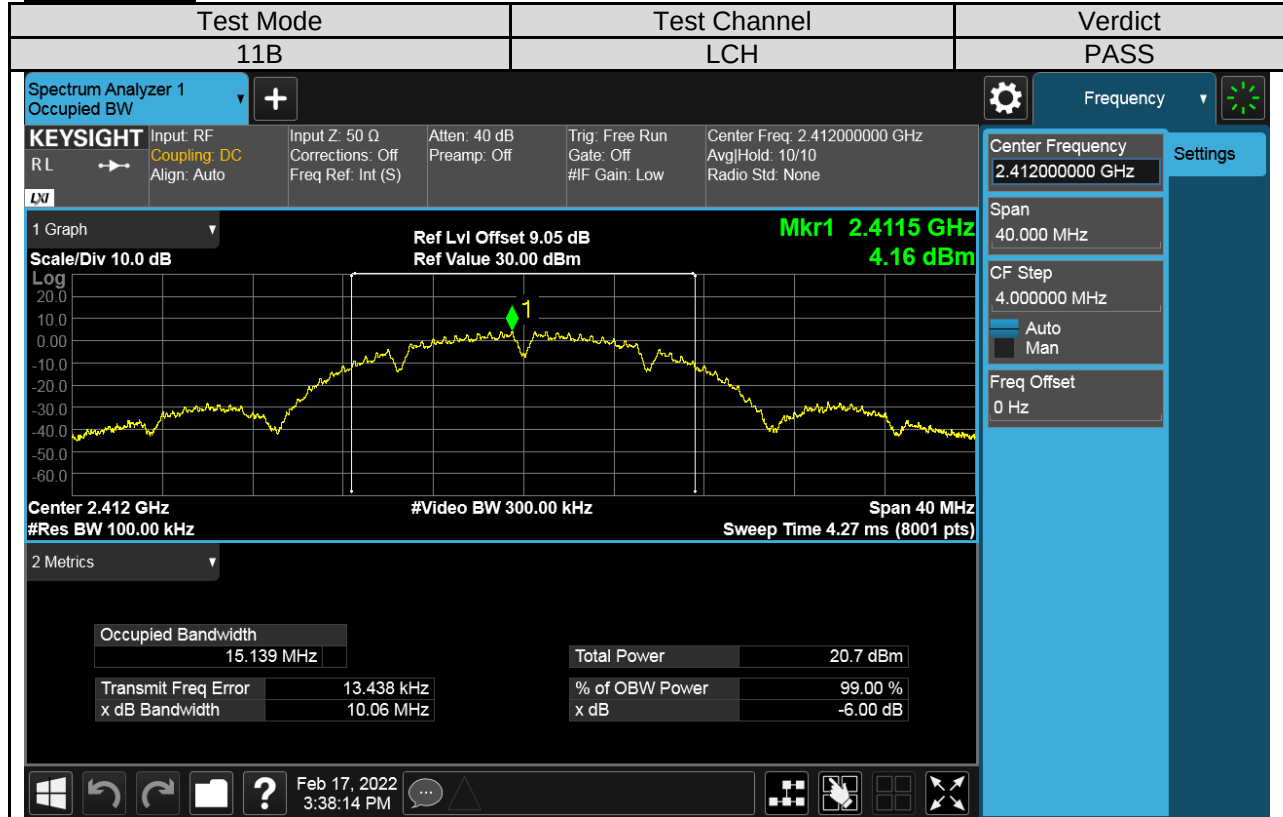


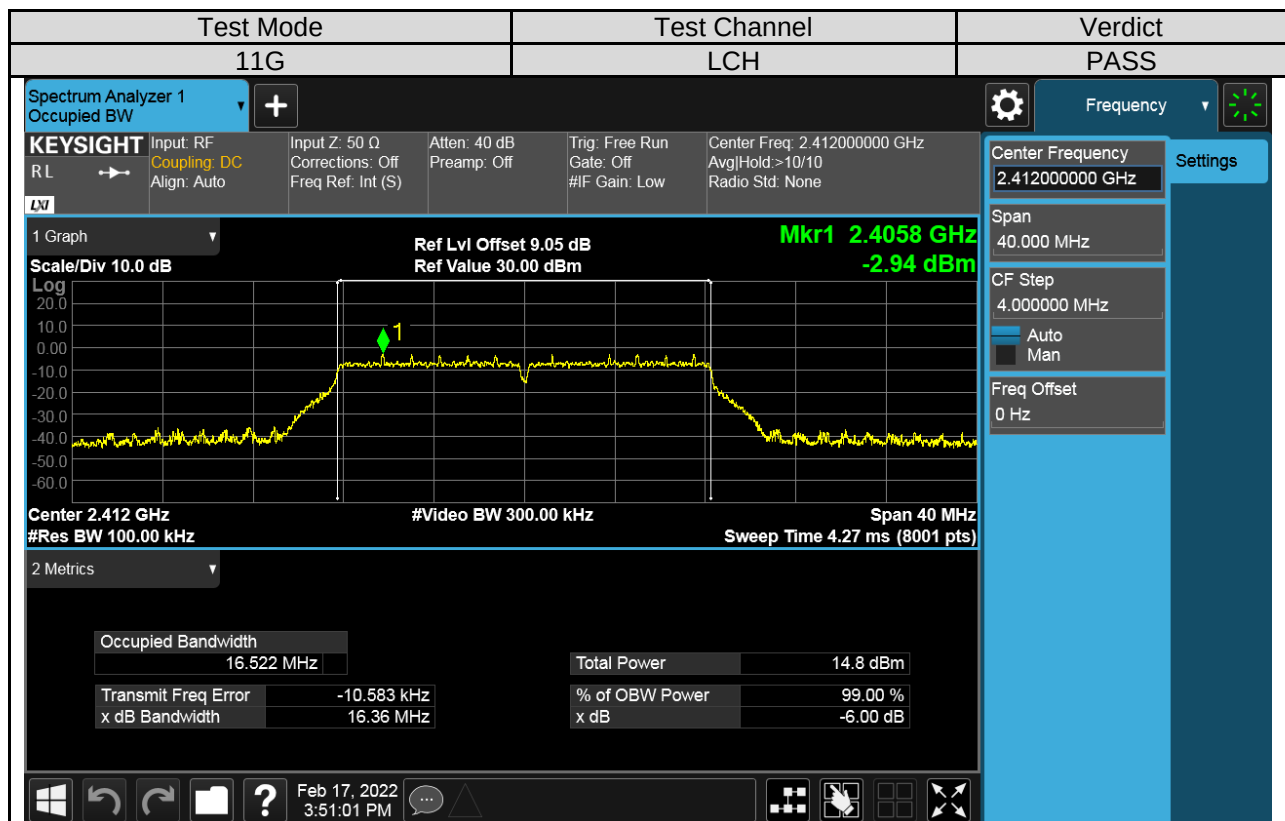
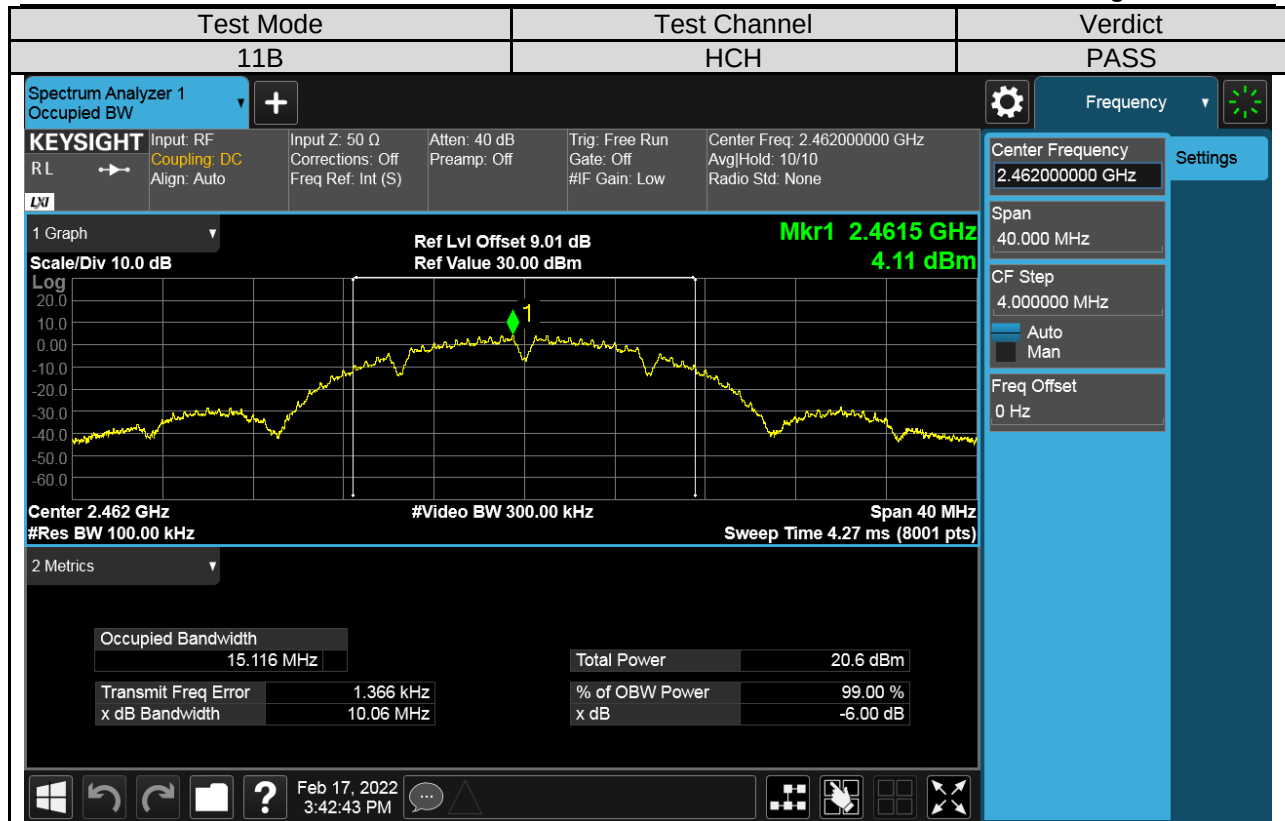
**RESULTS**

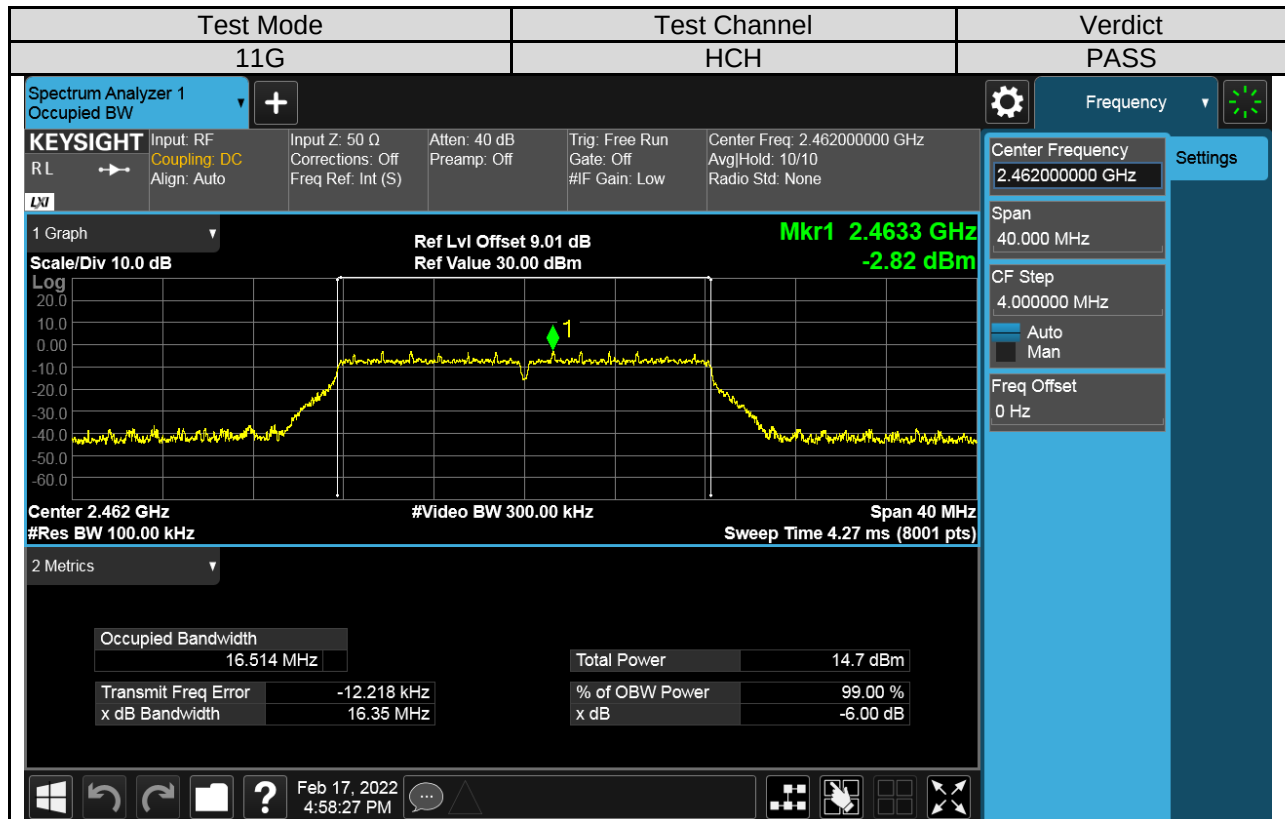
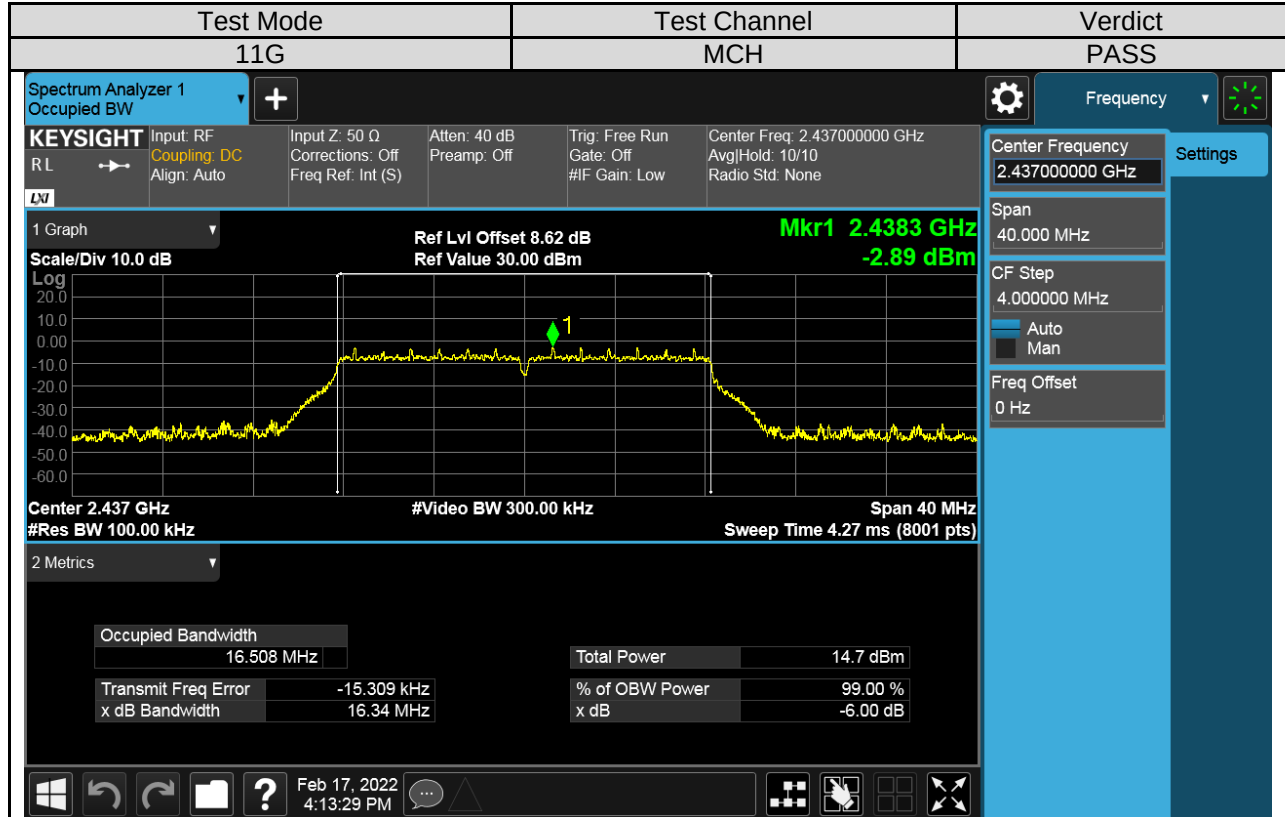
| Test Mode | Test Channel | 6dB bandwidth (MHz) | Result |
|-----------|--------------|---------------------|--------|
| 11B       | LCH          | 10.06               | Pass   |
|           | MCH          | 10.05               | Pass   |
|           | HCH          | 10.06               | Pass   |
| 11G       | LCH          | 16.36               | Pass   |
|           | MCH          | 16.34               | Pass   |
|           | HCH          | 16.35               | Pass   |
| 11N HT20  | LCH          | 17.61               | Pass   |
|           | MCH          | 17.61               | Pass   |
|           | HCH          | 17.60               | Pass   |
| 11N HT40  | LCH          | 36.31               | Pass   |
|           | MCH          | 36.32               | Pass   |
|           | HCH          | 36.31               | Pass   |

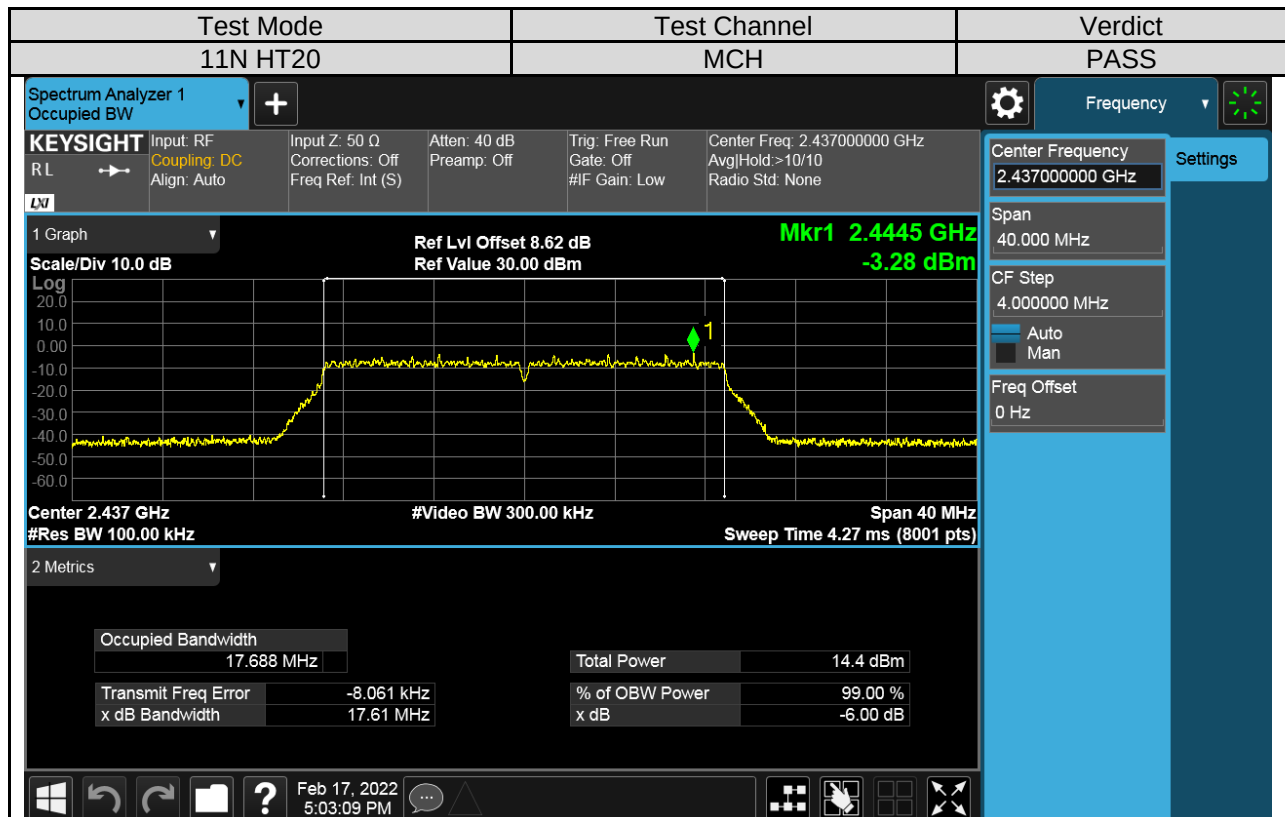
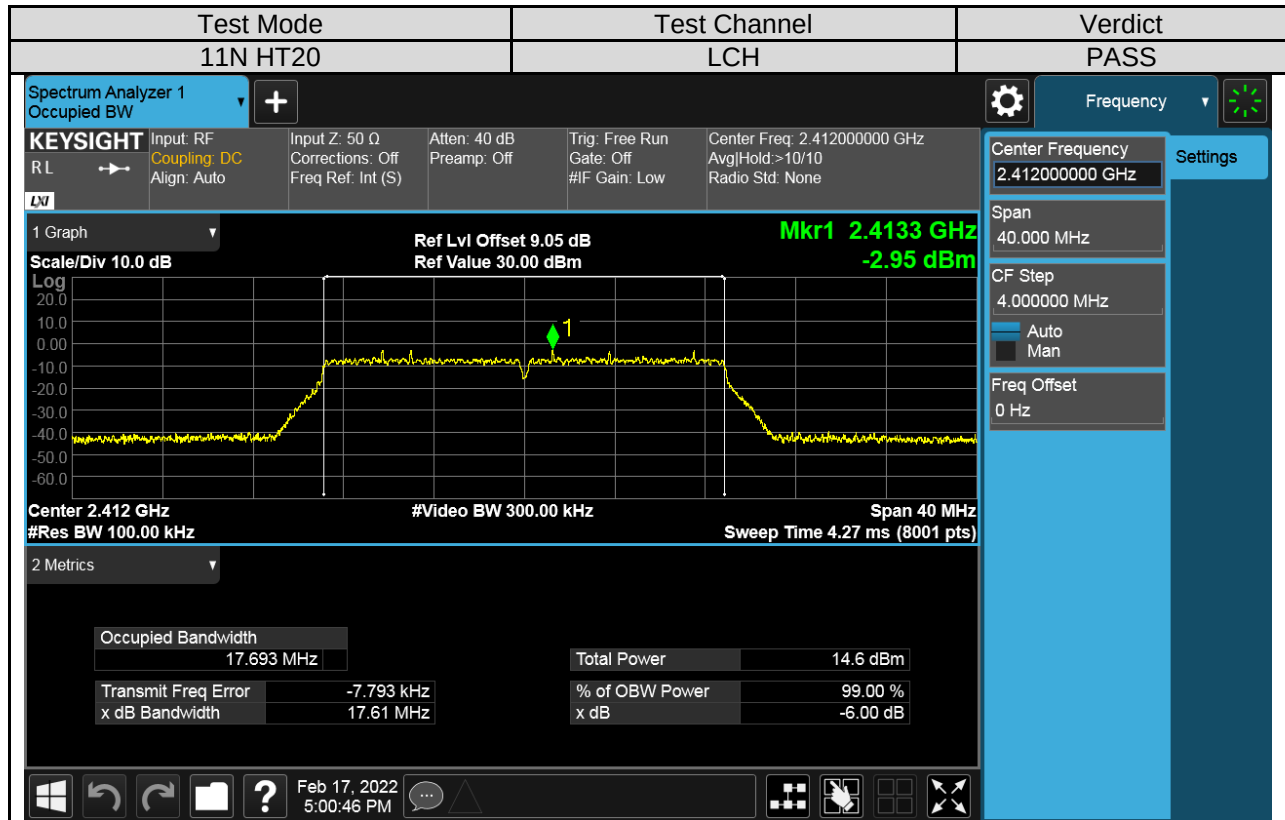


## Test Graphs





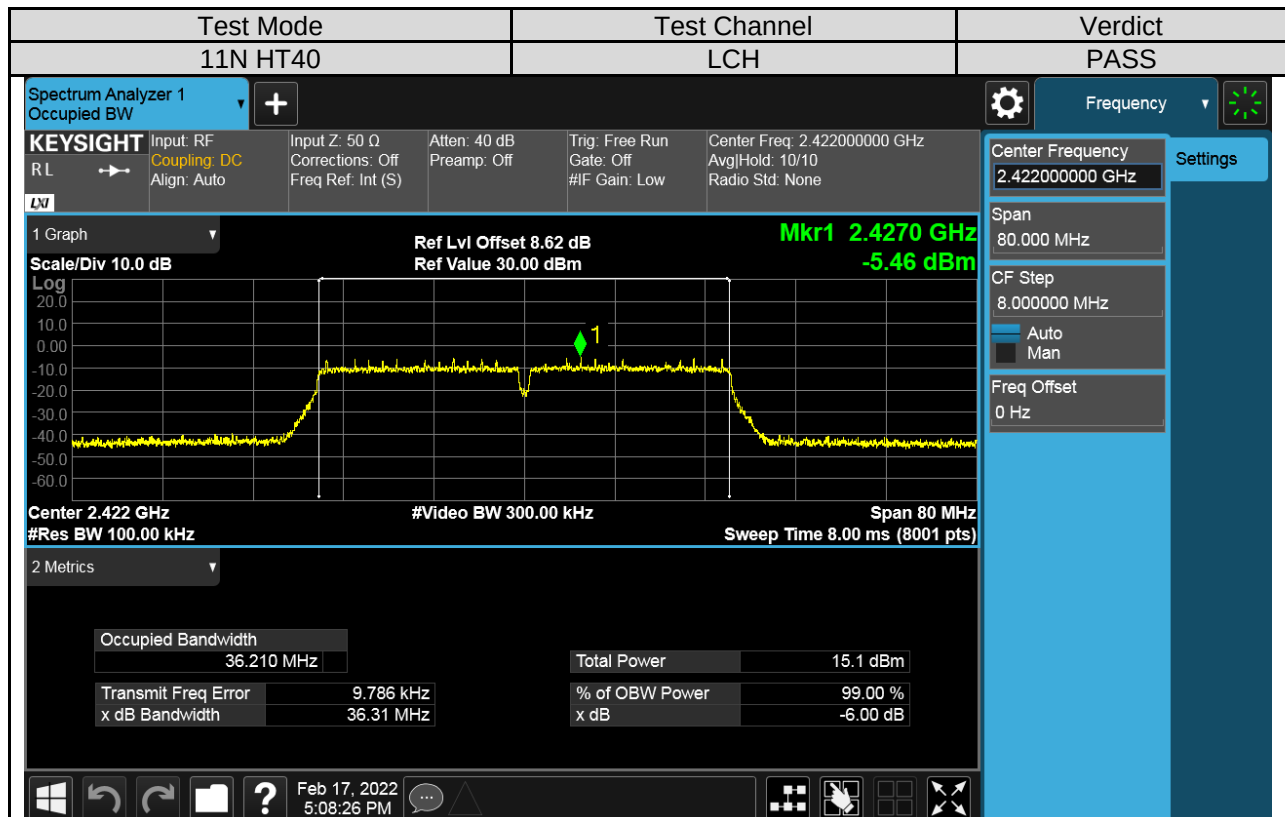
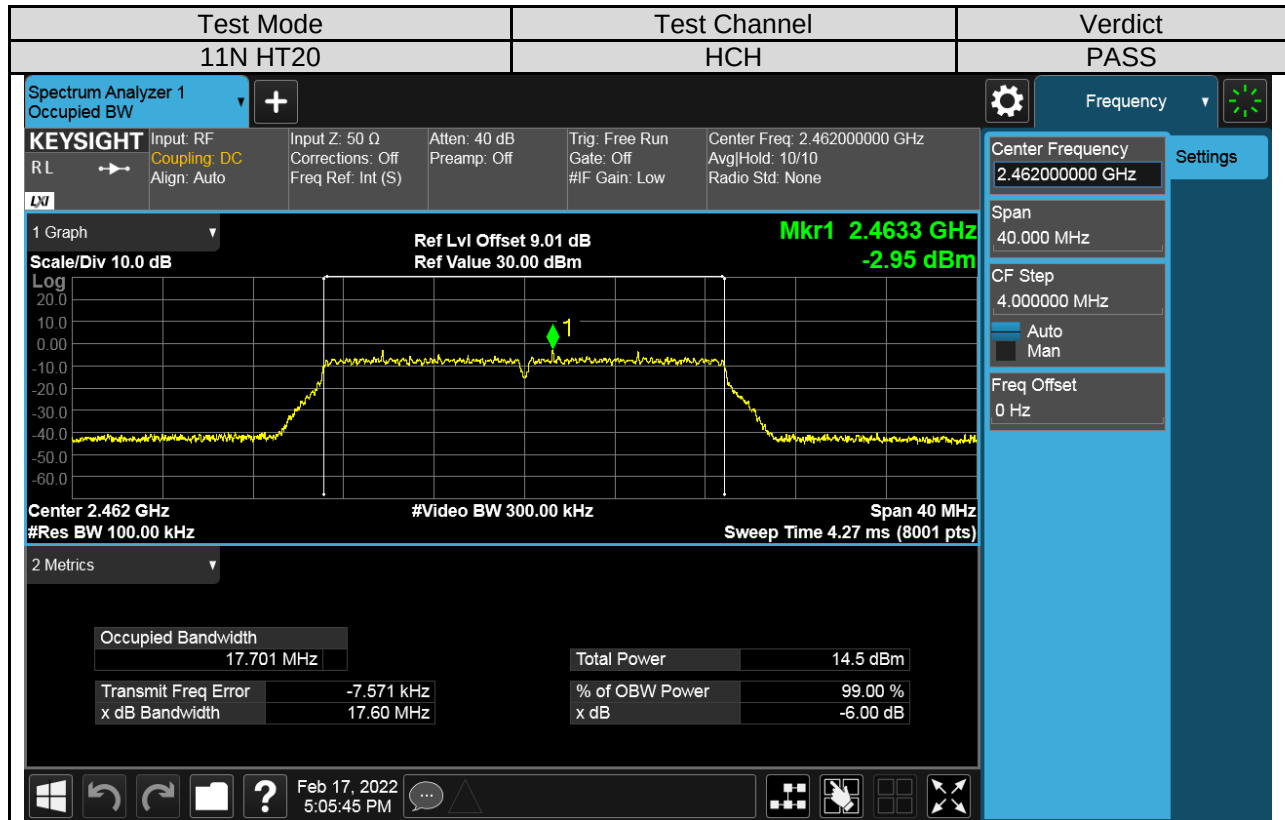




Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

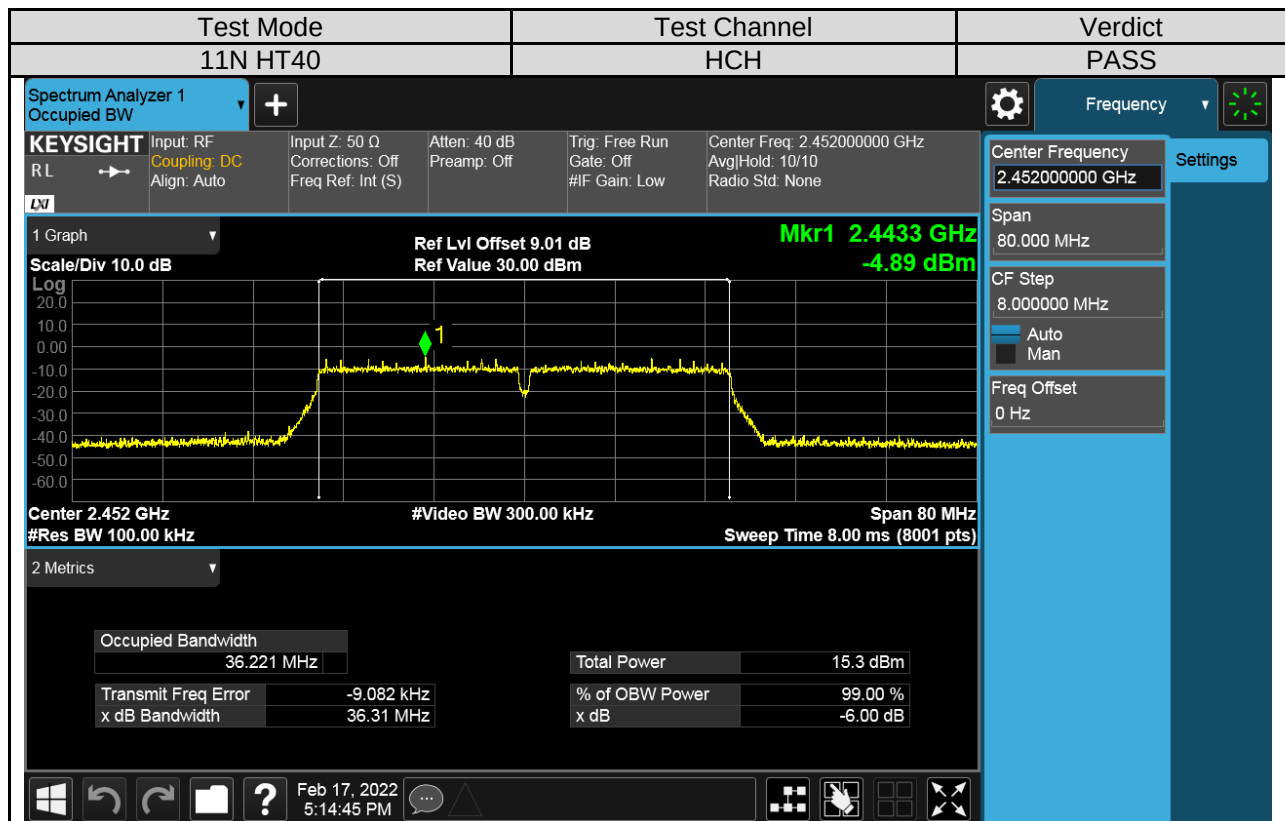
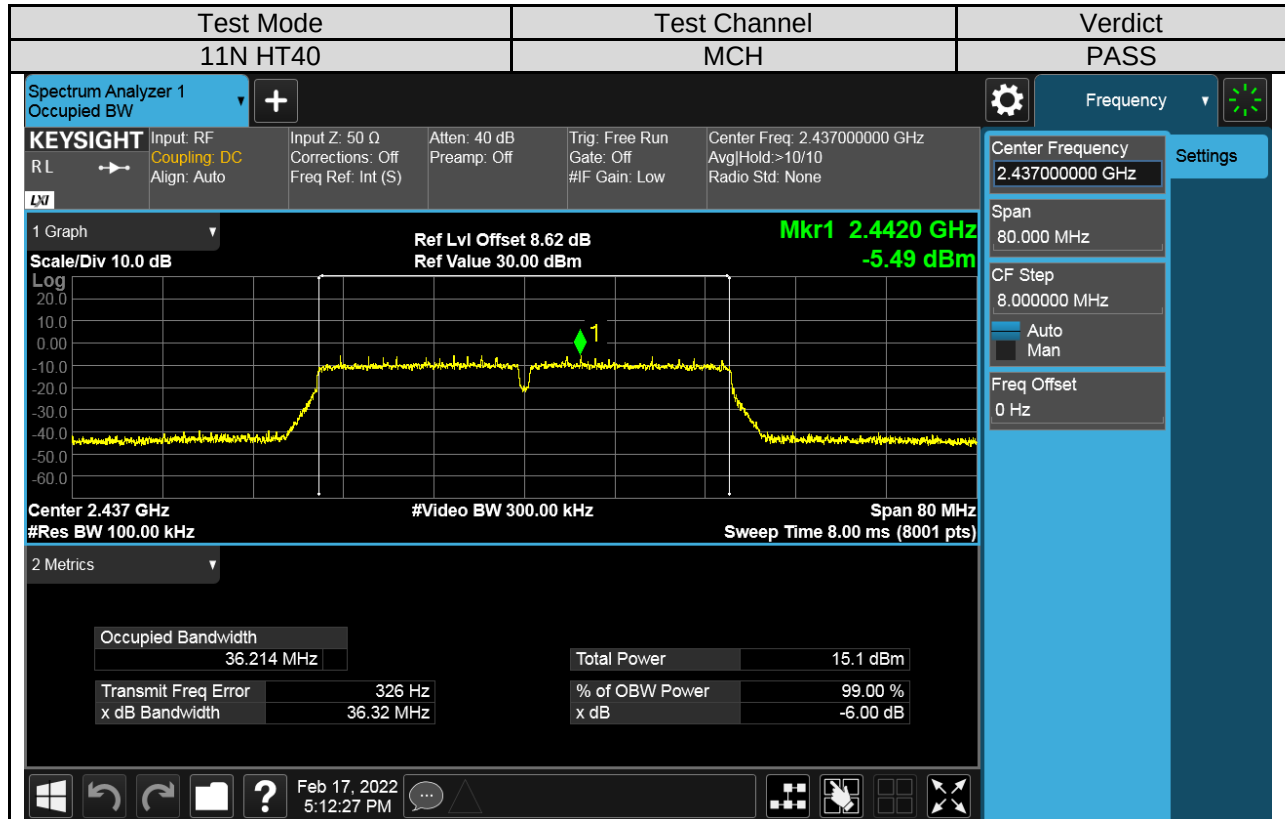
This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.





## 7.4. CONDUCTED POWER

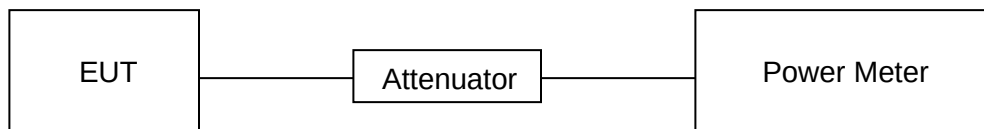
### LIMITS

| FCC Part15 (15.247) Subpart C |              |                 |                       |
|-------------------------------|--------------|-----------------|-----------------------|
| Section                       | Test Item    | Limit           | Frequency Range (MHz) |
| FCC 15.247(b)(3)              | Output Power | 1 watt or 30dBm | 2400-2483.5           |

### TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power Meter.  
Measure the power of each channel.  
AVG Detector use for AVG result.

### TEST SETUP





## RESULTS

| Test Mode | Test Channel | Measurement Output Power (AV) | 10log(1/x) Factor | Maximum Conducted Output Power (AV) | Result |
|-----------|--------------|-------------------------------|-------------------|-------------------------------------|--------|
|           |              | dBm                           | dB                | dBm                                 |        |
| 11B       | LCH          | 13.90                         | N/A(Remark3)      | 13.90                               | Pass   |
|           | MCH          | 13.77                         | N/A(Remark3)      | 13.77                               | Pass   |
|           | HCH          | 13.85                         | N/A(Remark3)      | 13.85                               | Pass   |
| 11G       | LCH          | 8.36                          | 0.21              | 8.57                                | Pass   |
|           | MCH          | 8.13                          | 0.21              | 8.34                                | Pass   |
|           | HCH          | 8.26                          | 0.21              | 8.47                                | Pass   |
| 11N HT20  | LCH          | 8.41                          | N/A(Remark3)      | 8.41                                | Pass   |
|           | MCH          | 8.24                          | N/A(Remark3)      | 8.24                                | Pass   |
|           | HCH          | 8.38                          | N/A(Remark3)      | 8.38                                | Pass   |
| 11N HT40  | LCH          | 8.69                          | 0.12              | 8.81                                | Pass   |
|           | MCH          | 8.72                          | 0.12              | 8.84                                | Pass   |
|           | HCH          | 9.03                          | 0.12              | 9.15                                | Pass   |

Remark:

- 1) For all the test results has been adjusted the duty cycle factor.
- 2) For Correction Factor is refer to the result in section 7.2
- 3) For duty cycle is higher than 98% and according to KDB 558074, it is not required to be adjusted with duty factor for output power



## 7.5. POWER SPECTRAL DENSITY

### LIMITS

| FCC Part15 (15.247) Subpart C |                        |                         |                       |
|-------------------------------|------------------------|-------------------------|-----------------------|
| Section                       | Test Item              | Limit                   | Frequency Range (MHz) |
| FCC §15.247 (e)               | Power Spectral Density | 8 dBm in any 3 kHz band | 2400-2483.5           |

### TEST PROCEDURE

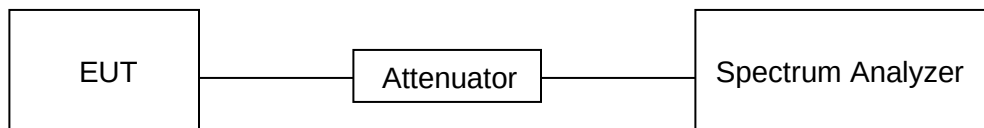
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

|                  |                                                      |
|------------------|------------------------------------------------------|
| Center Frequency | The centre frequency of the channel under test       |
| Detector         | Peak                                                 |
| RBW              | $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ |
| VBW              | $\geq 3 \times \text{RBW}$                           |
| Span             | $1.5 \times \text{DTS bandwidth}$                    |
| Trace            | Max hold                                             |
| Sweep time       | Auto couple.                                         |

Allow trace to fully stabilize and 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 SETUP



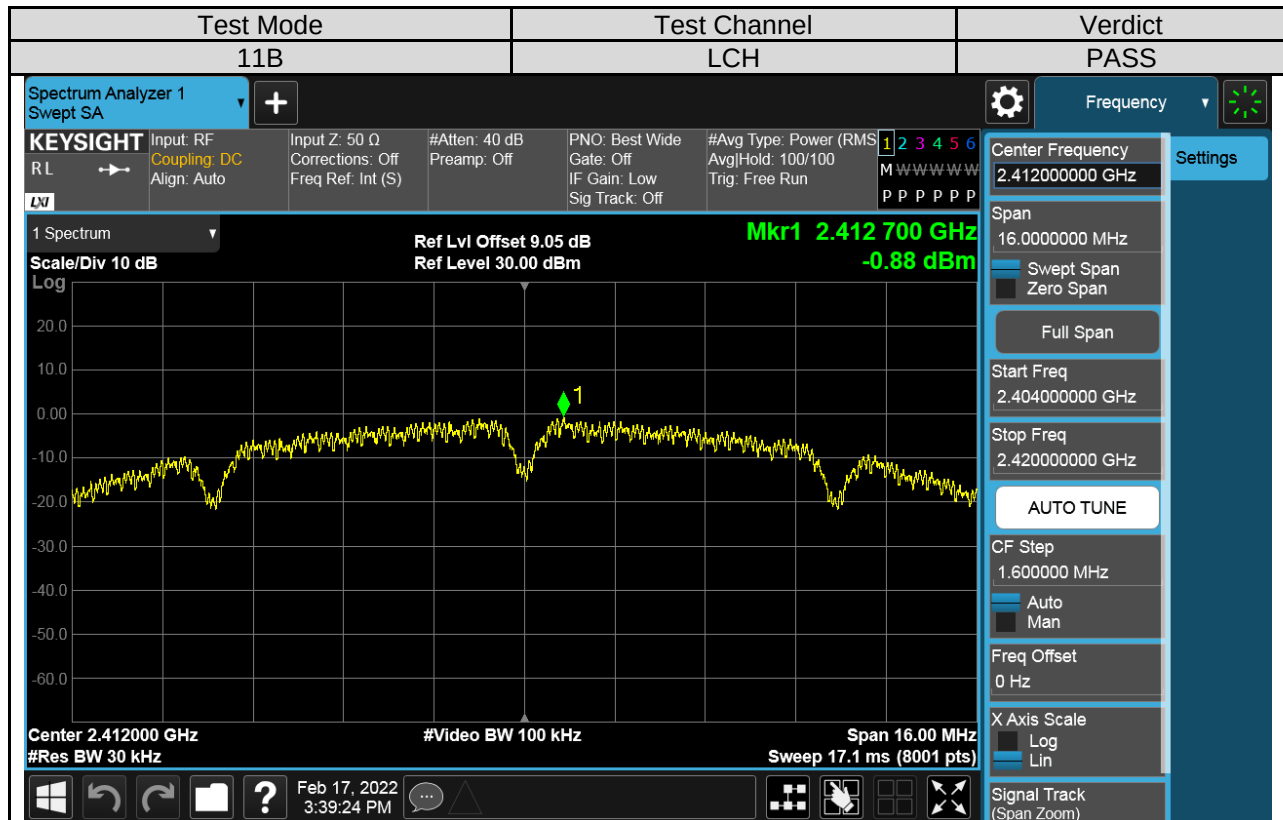


**RESULTS**

| Test Mode | Test Channel | Maximum Peak power spectral density (dBm/30kHz) | Result |
|-----------|--------------|-------------------------------------------------|--------|
| 11B       | LCH          | -0.88                                           | Pass   |
|           | MCH          | -0.35                                           | Pass   |
|           | HCH          | -0.48                                           | Pass   |
| 11G       | LCH          | -7.55                                           | Pass   |
|           | MCH          | -8.02                                           | Pass   |
|           | HCH          | -7.19                                           | Pass   |
| 11N HT20  | LCH          | -8.40                                           | Pass   |
|           | MCH          | -8.19                                           | Pass   |
|           | HCH          | -8.58                                           | Pass   |
| 11N HT40  | LCH          | -11.21                                          | Pass   |
|           | MCH          | -10.45                                          | Pass   |
|           | HCH          | -10.52                                          | Pass   |



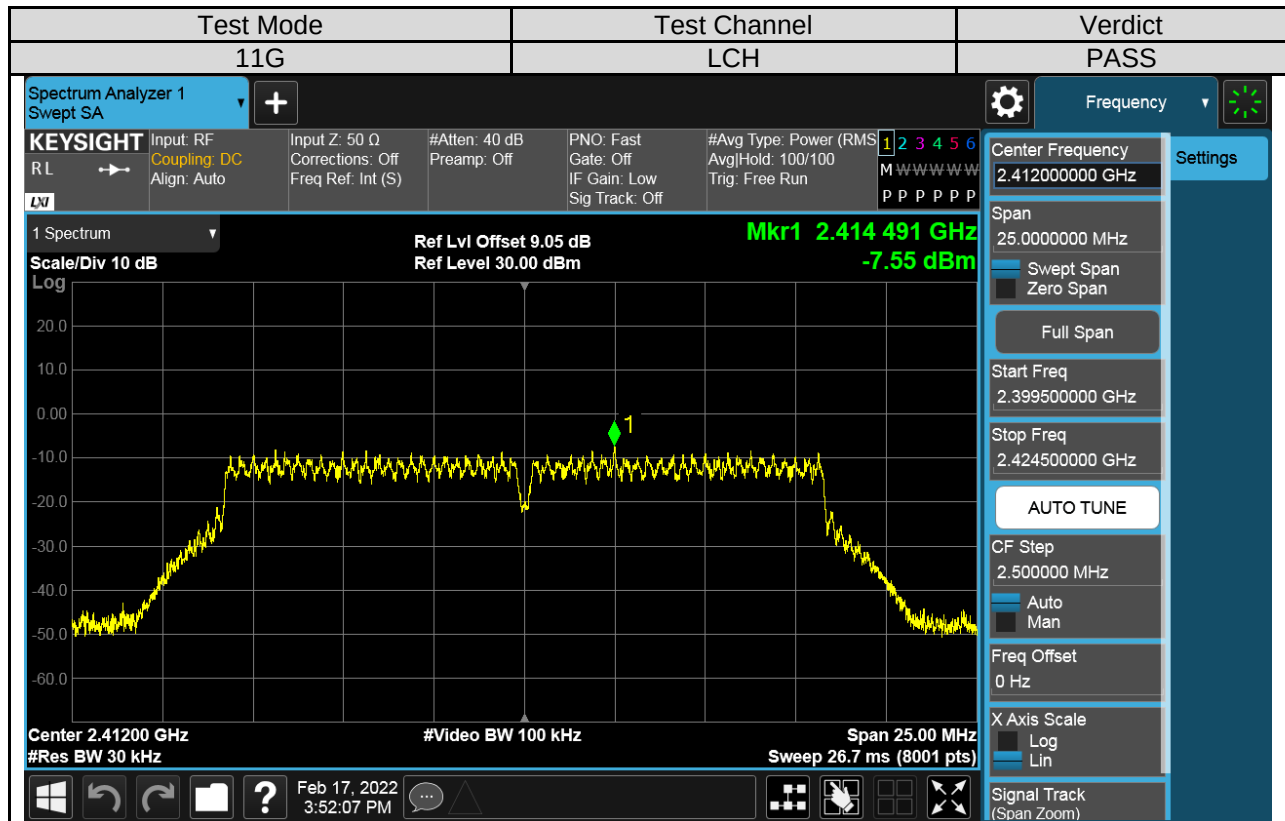
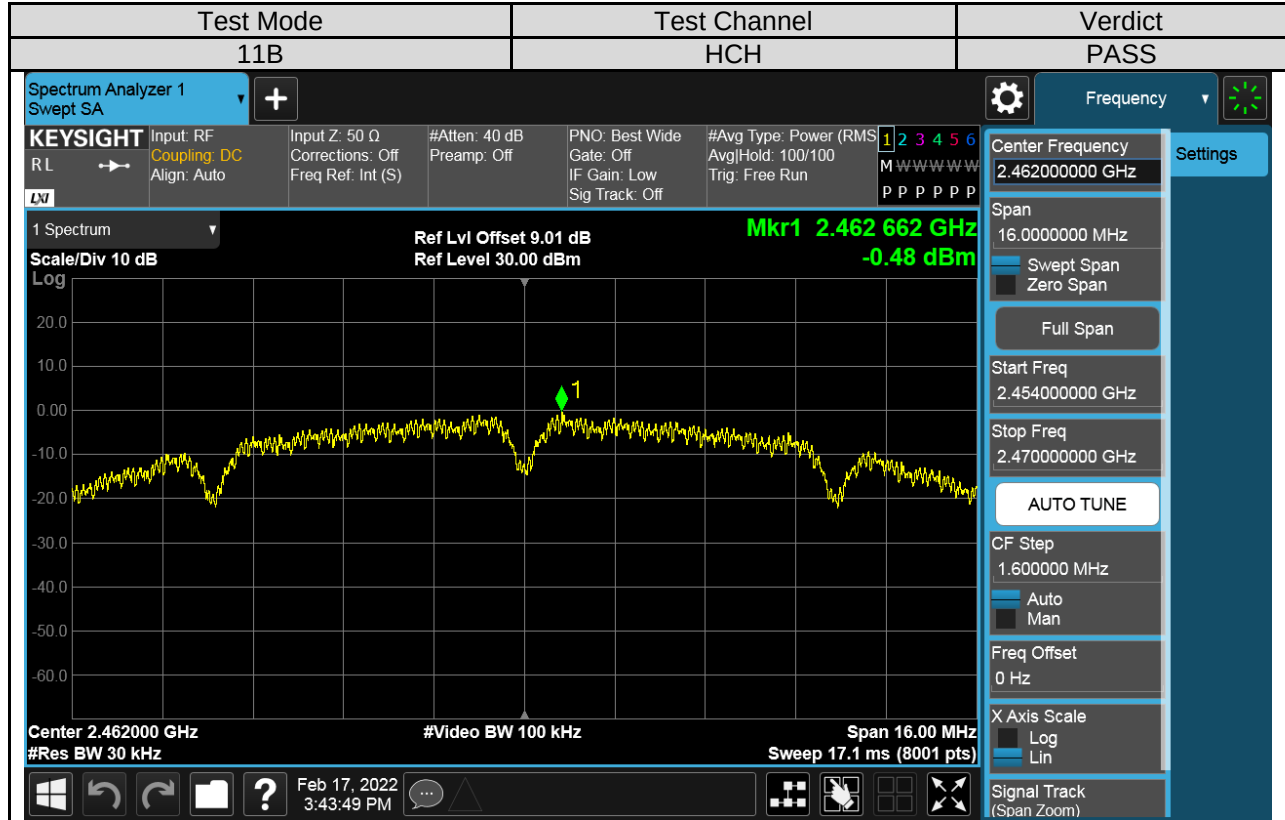
### Test Graphs:

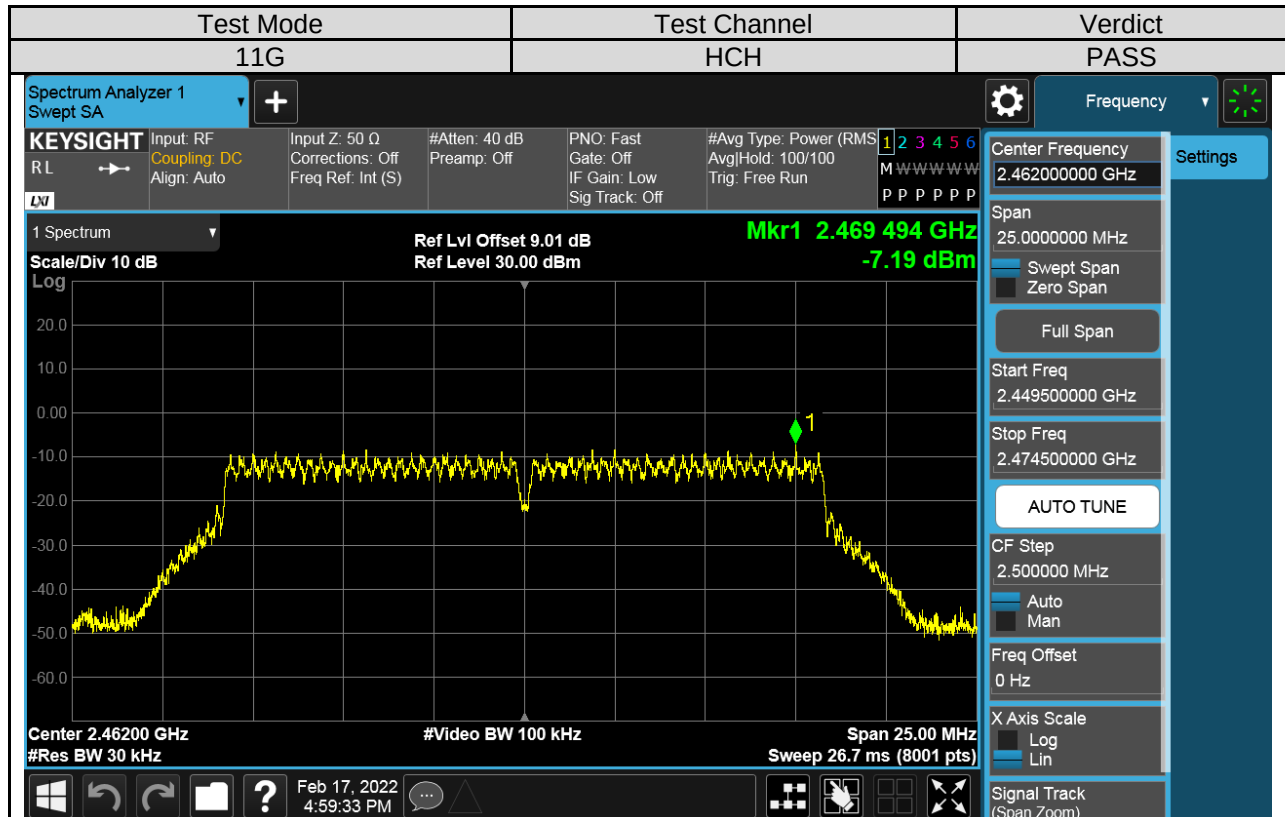
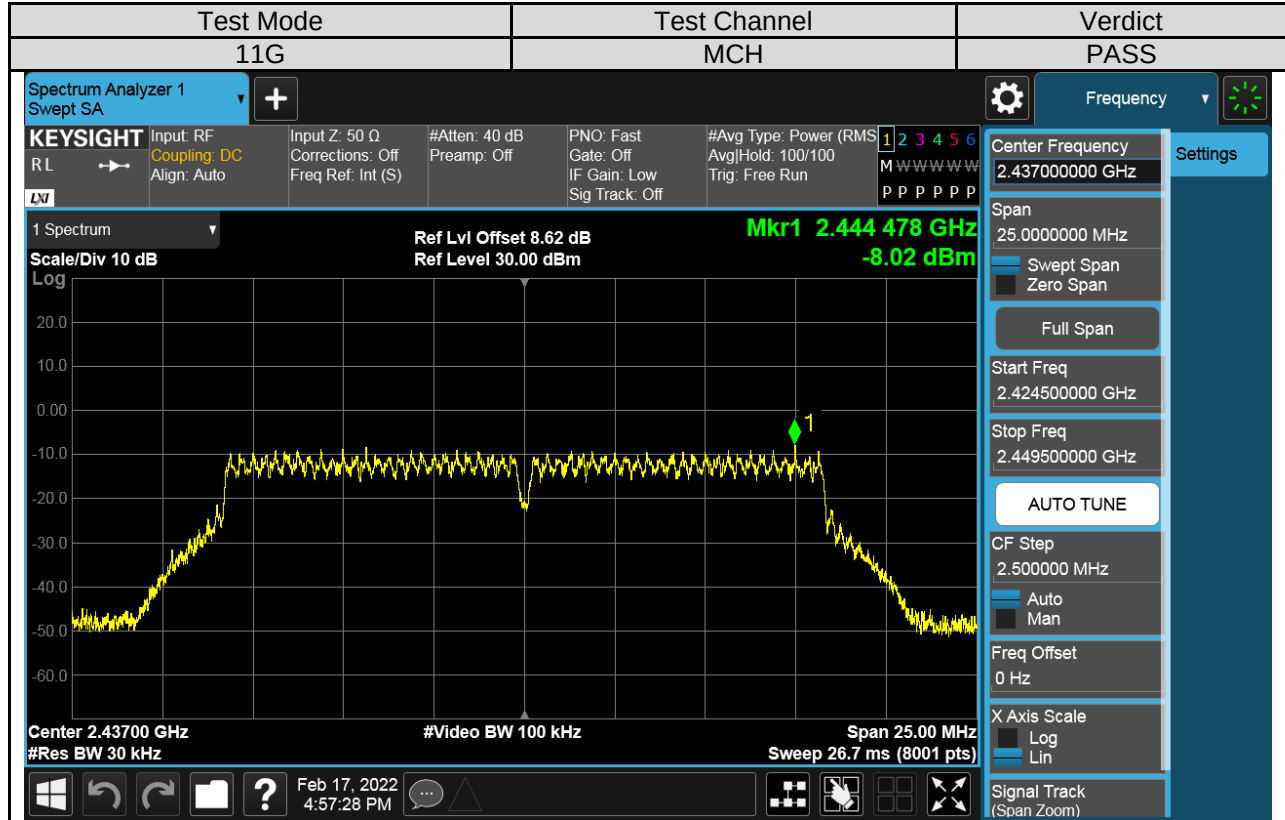


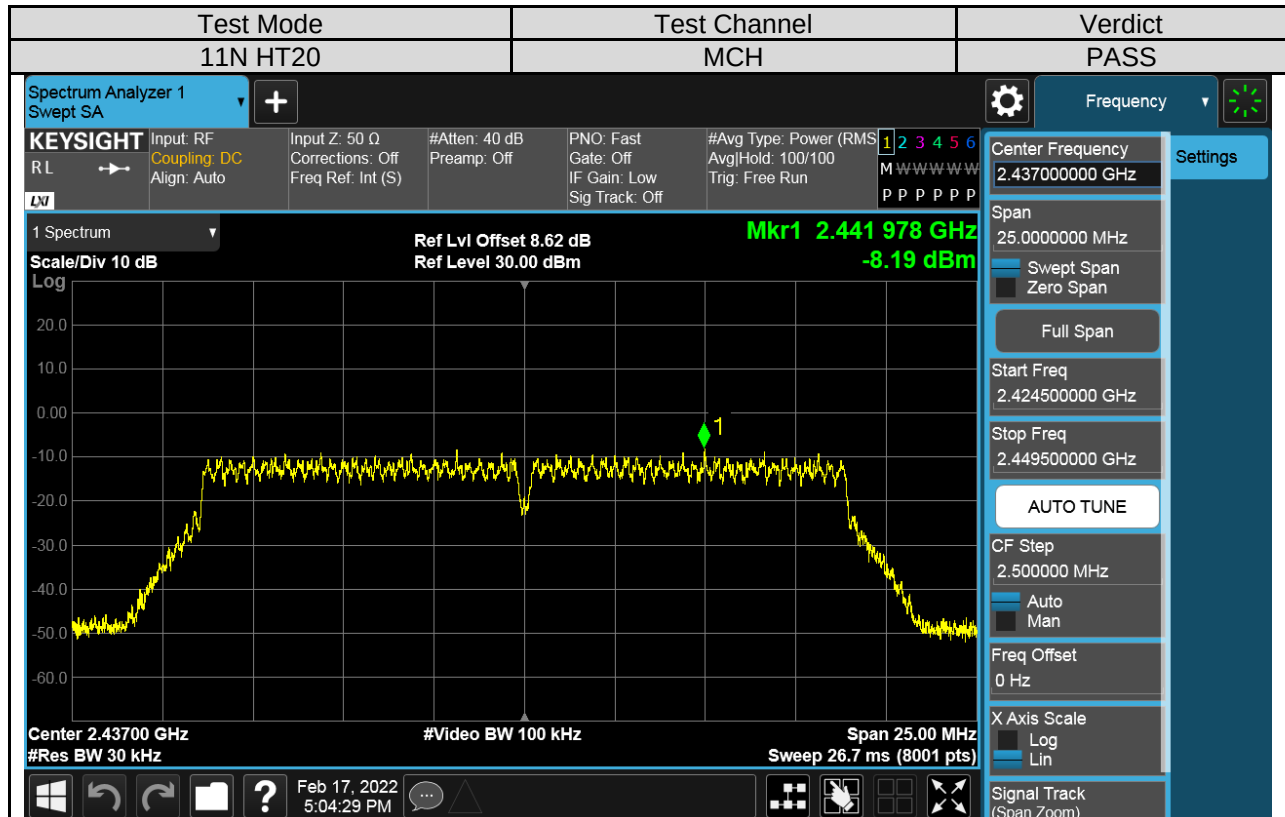
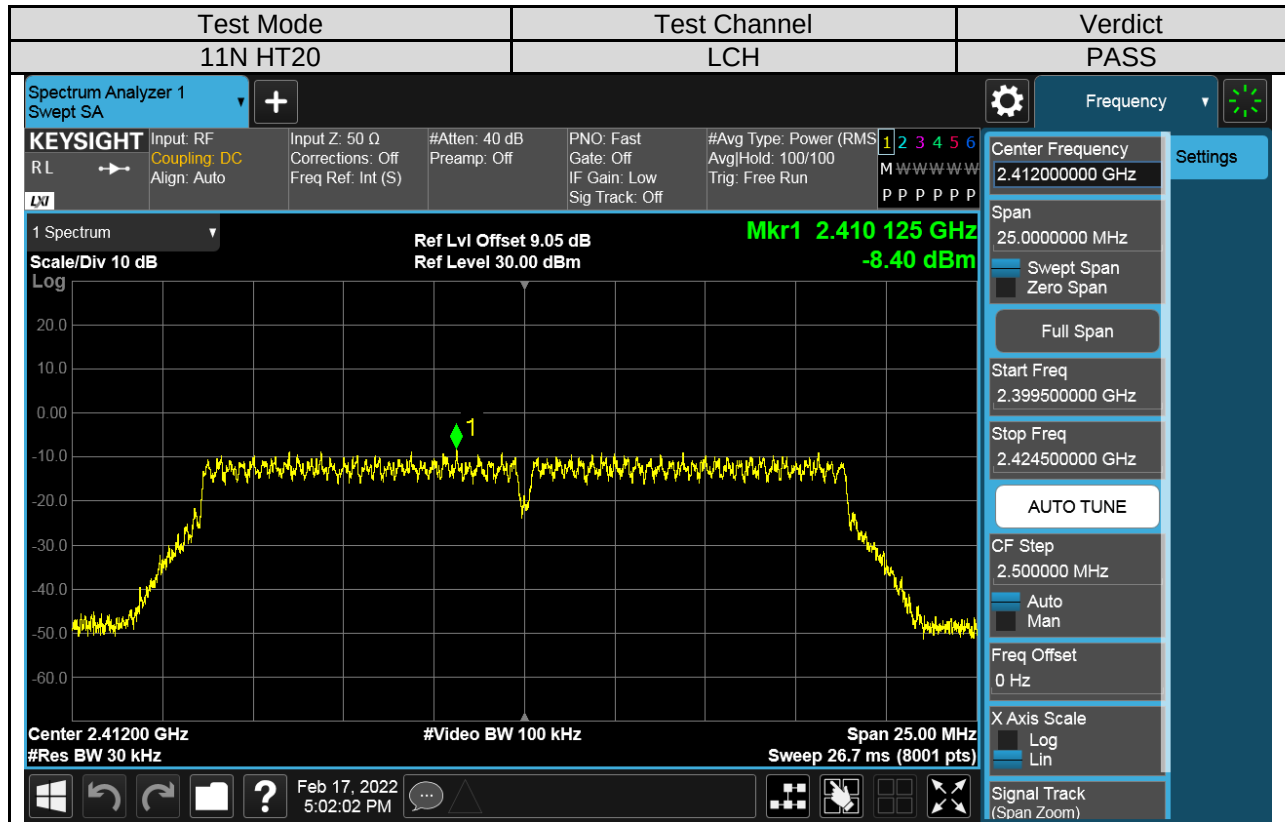
Form-ULID-008536-9 V1.0

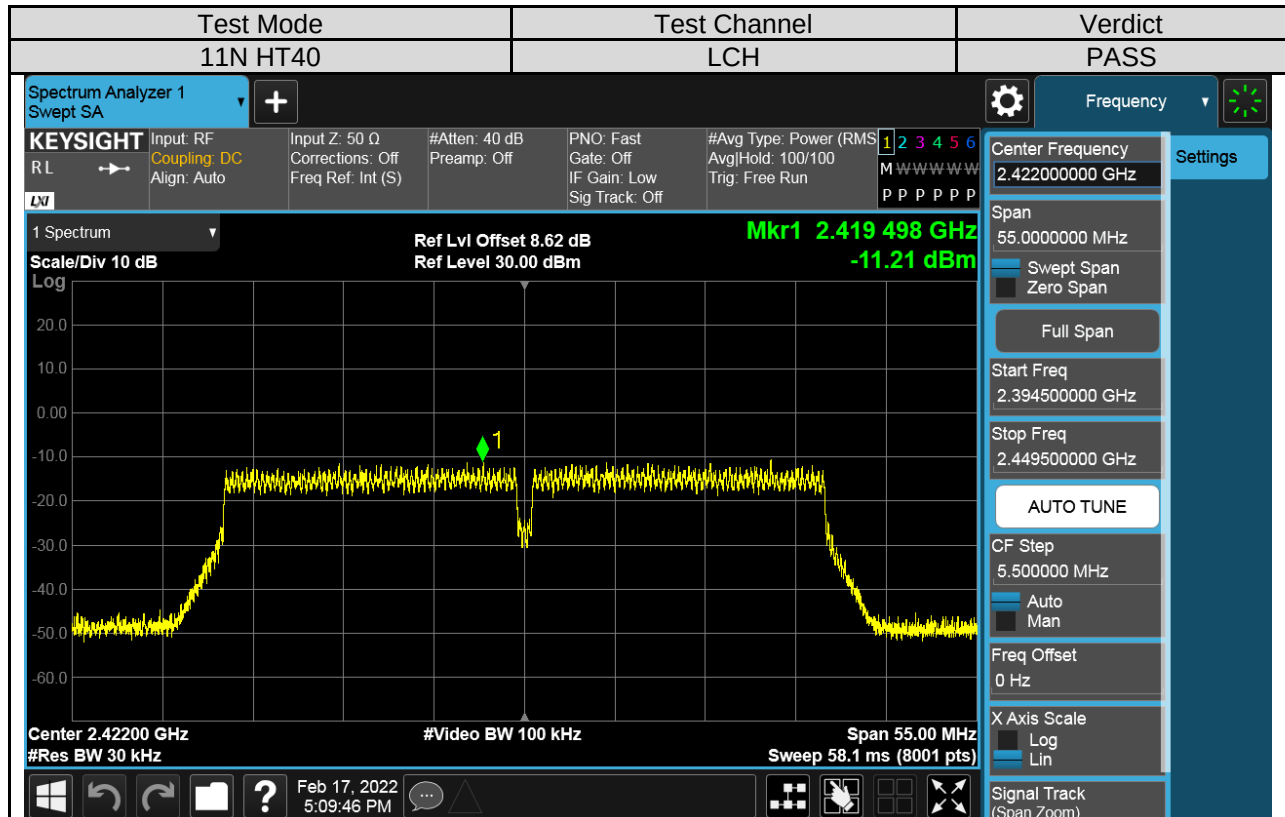
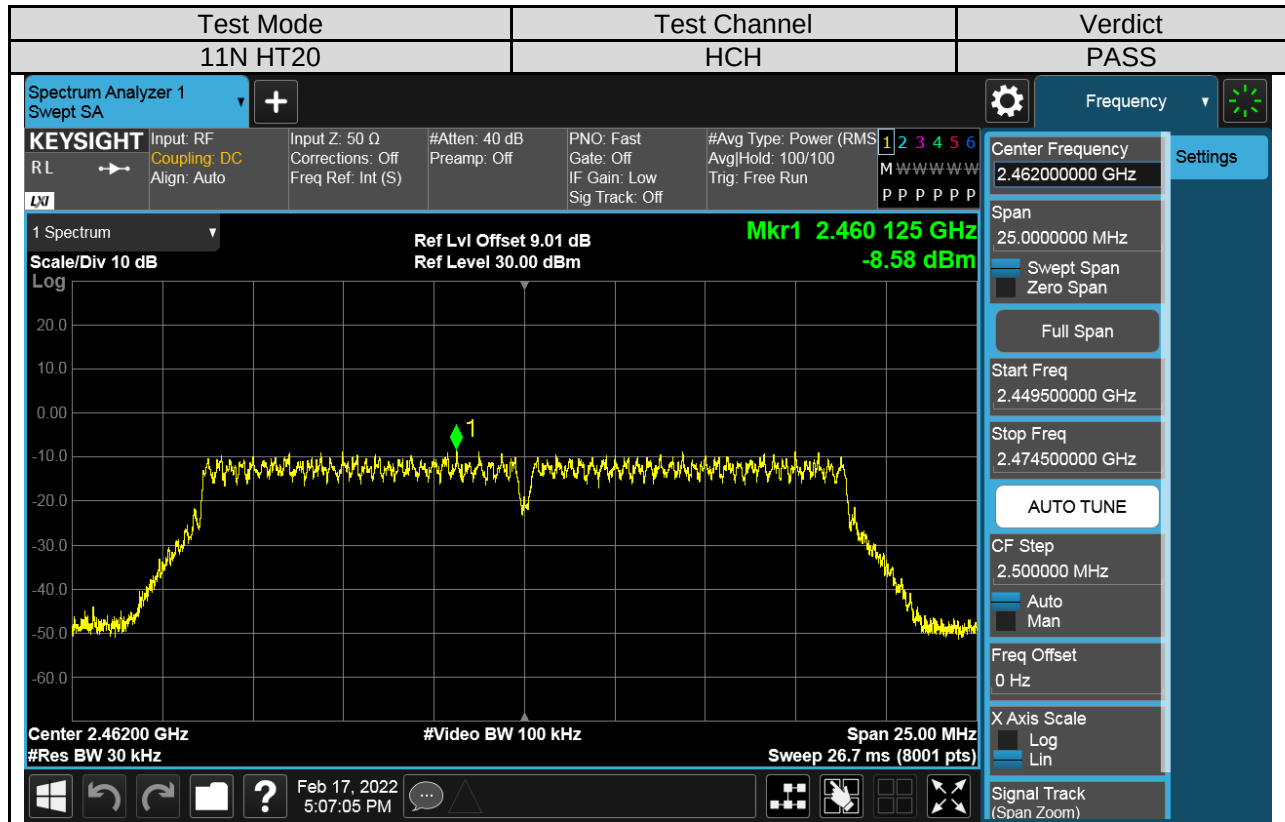
UL-CCIC COMPANY LIMITED

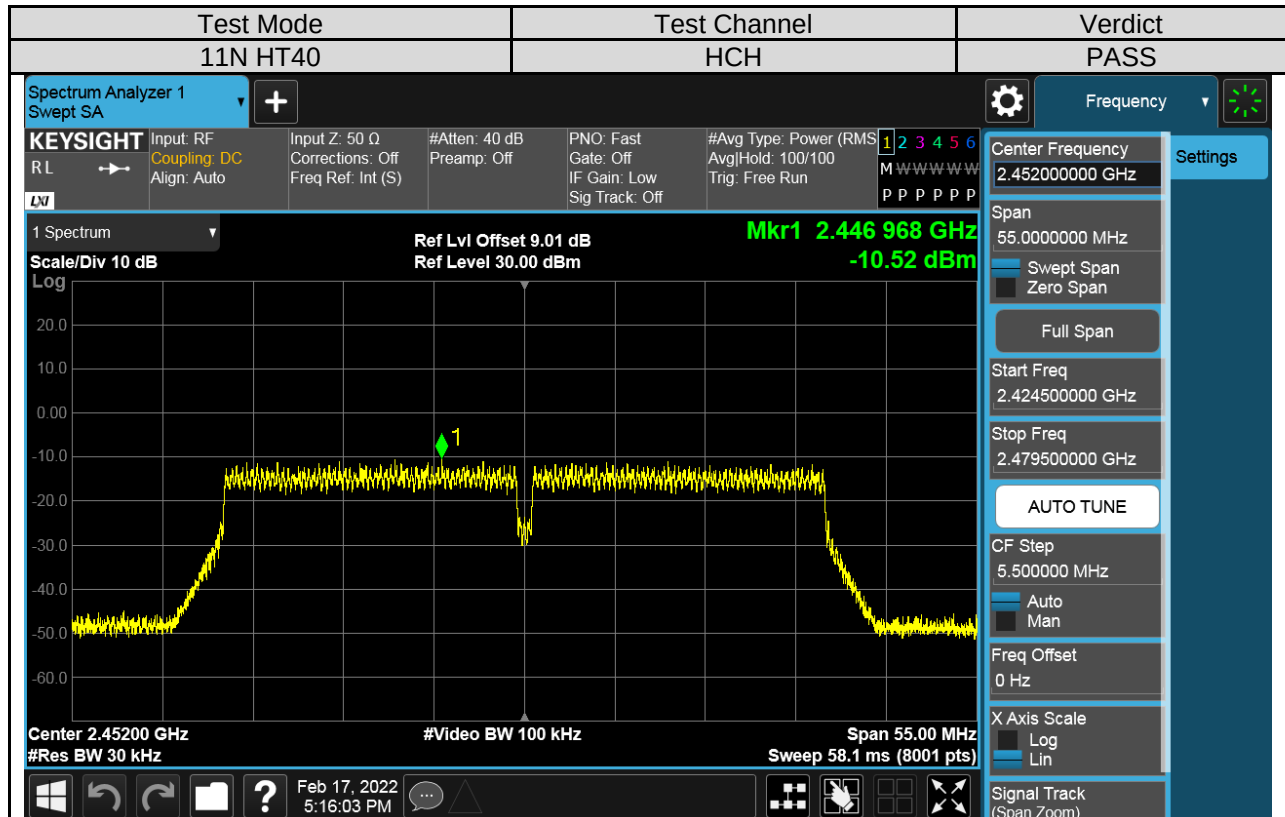
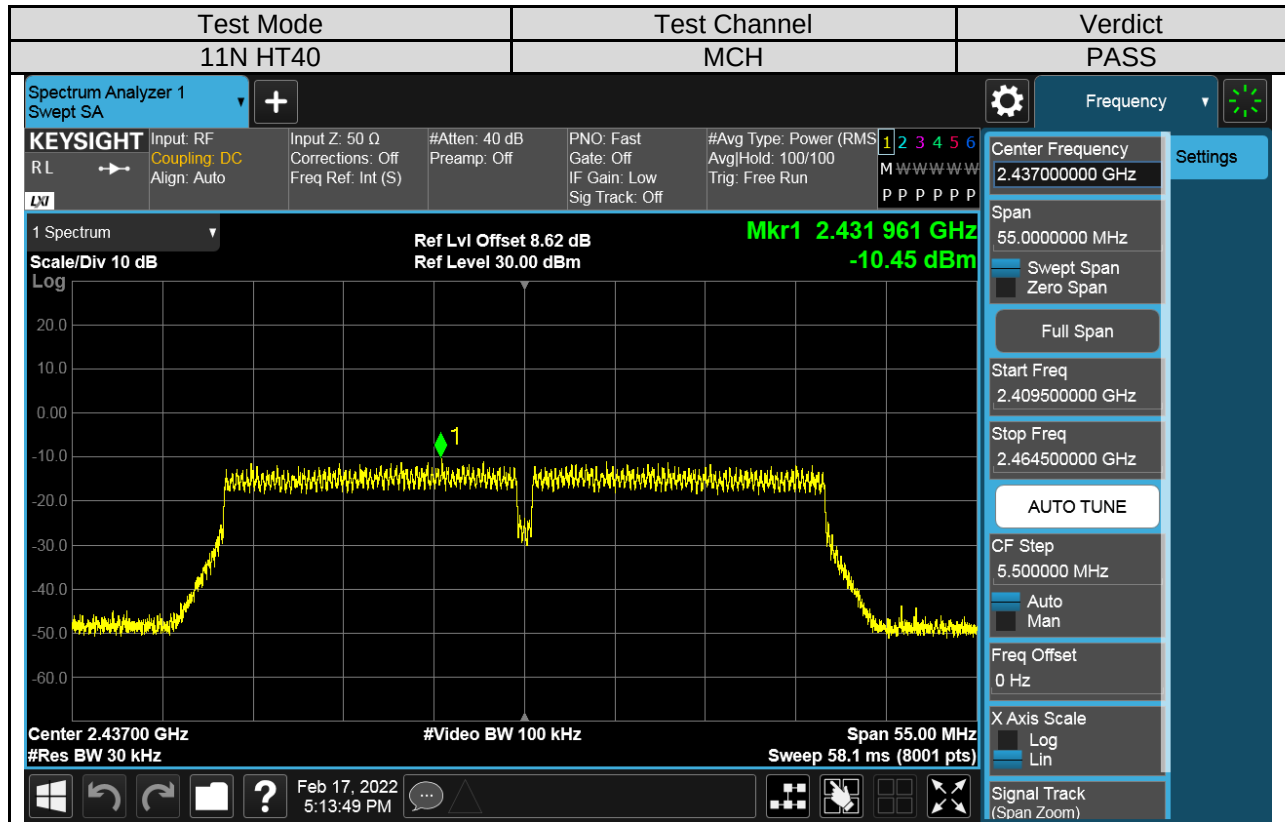
This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.













## 7.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

### LIMITS

| FCC Part15 (15.247) Subpart C |                                           |                                                                                                                         |
|-------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Section                       | Test Item                                 | Limit                                                                                                                   |
| FCC §15.247 (d)               | Conducted Bandedge and Spurious Emissions | At least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power |

### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following

|                  |                                                |
|------------------|------------------------------------------------|
| Center Frequency | The centre frequency of the channel under test |
| Detector         | Peak                                           |
| RBW              | 100K                                           |
| VBW              | $\geq 3 \times \text{RBW}$                     |
| Span             | 1.5 x DTS bandwidth                            |
| Trace            | Max hold                                       |
| Sweep time       | Auto couple.                                   |

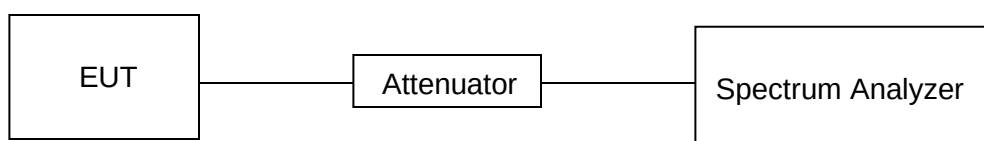
settings:

Use the peak marker function to determine the maximum PSD level.

|                    |                                                                               |
|--------------------|-------------------------------------------------------------------------------|
| Span               | Set the center frequency and span to encompass frequency range to be measured |
| Detector           | Peak                                                                          |
| RBW                | 100K                                                                          |
| VBW                | $\geq 3 \times \text{RBW}$                                                    |
| measurement points | $\geq \text{span}/\text{RBW}$                                                 |
| Trace              | Max hold                                                                      |
| Sweep time         | Auto couple.                                                                  |

Use the peak marker function to determine the maximum amplitude level.

### TEST SETUP





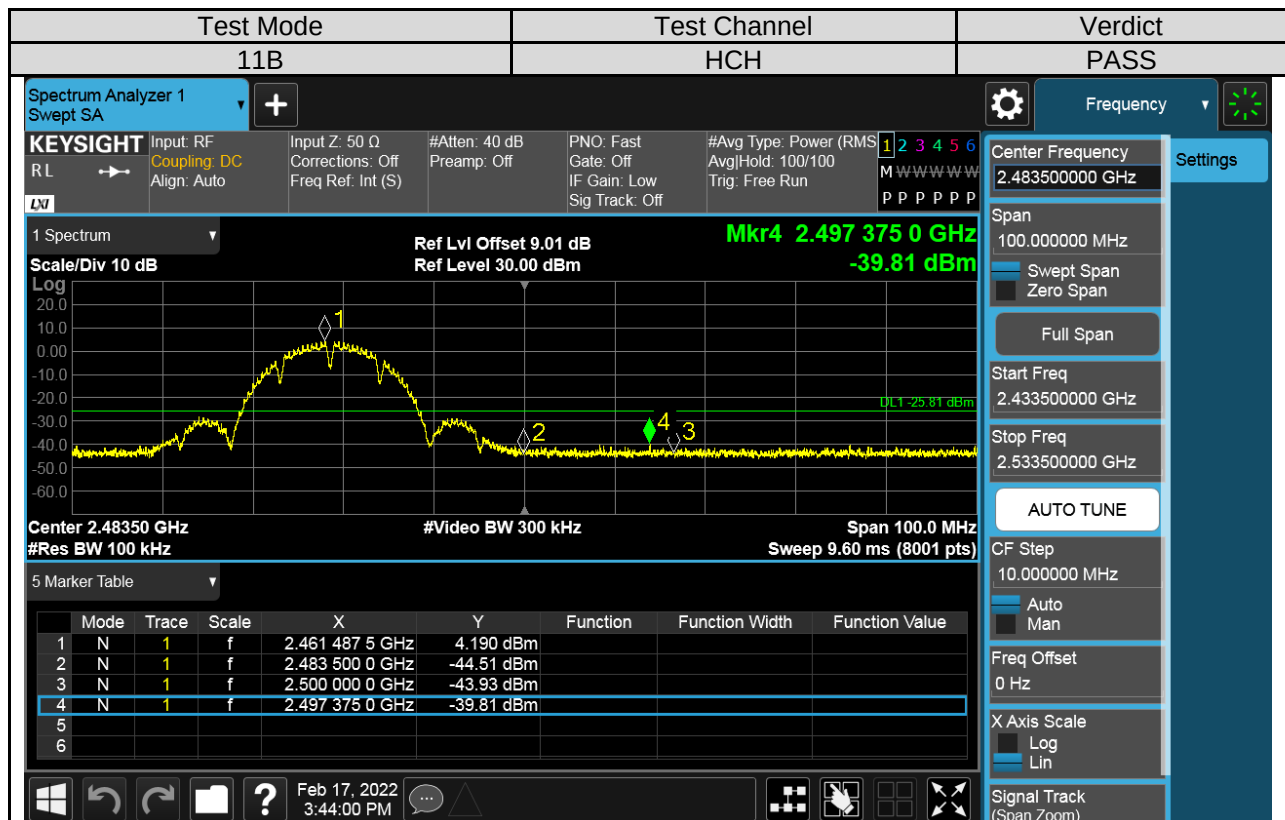
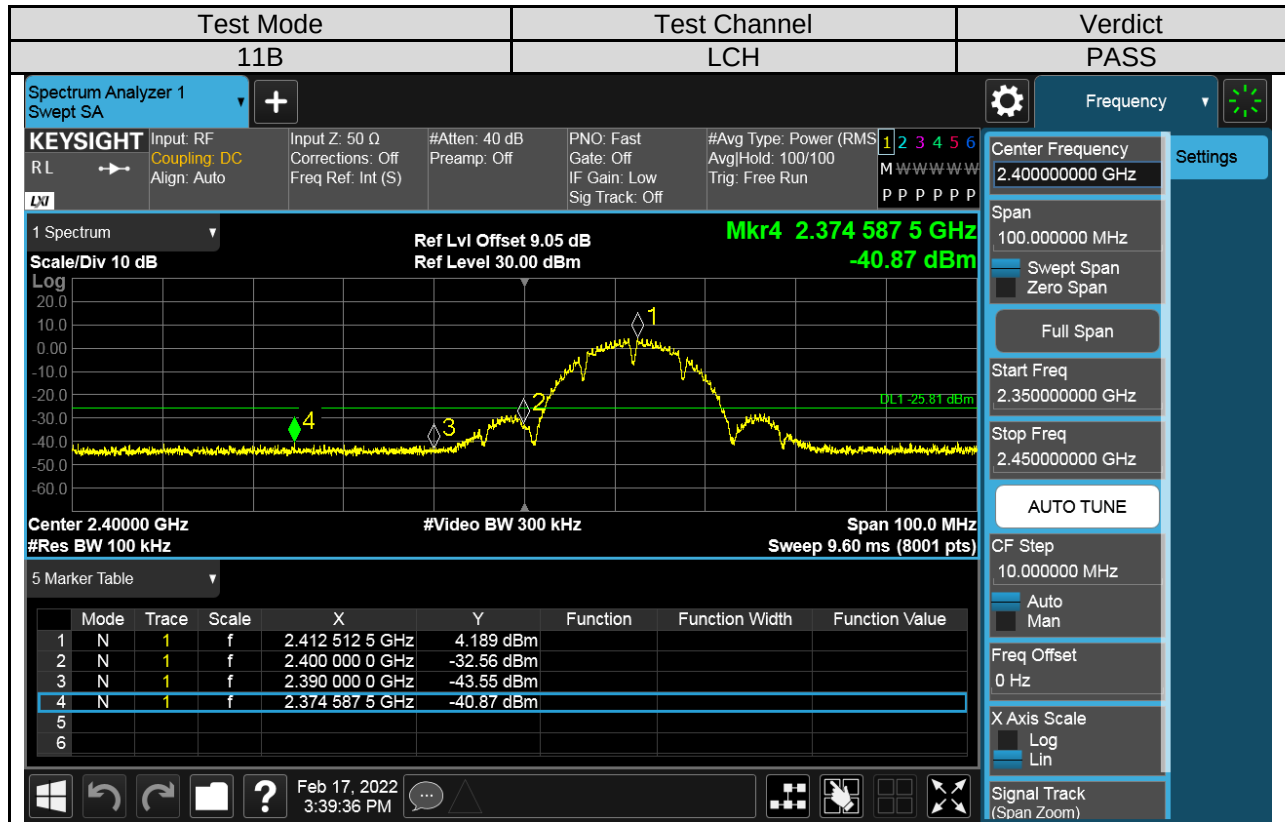
**Part I :Conducted Bandedge**

**RESULTS TABLE**

| Test Mode | Test Antenna | Test Channel | Test Result         | Verdict |
|-----------|--------------|--------------|---------------------|---------|
| 11B       | Antenna 1    | LCH          | See the test graphs | PASS    |
|           |              | HCH          | See the test graphs | PASS    |
| 11G       | Antenna 1    | LCH          | See the test graphs | PASS    |
|           |              | HCH          | See the test graphs | PASS    |
| 11N HT20  | Antenna 1    | LCH          | See the test graphs | PASS    |
|           |              | HCH          | See the test graphs | PASS    |
| 11N HT40  | Antenna 1    | LCH          | See the test graphs | PASS    |
|           |              | HCH          | See the test graphs | PASS    |



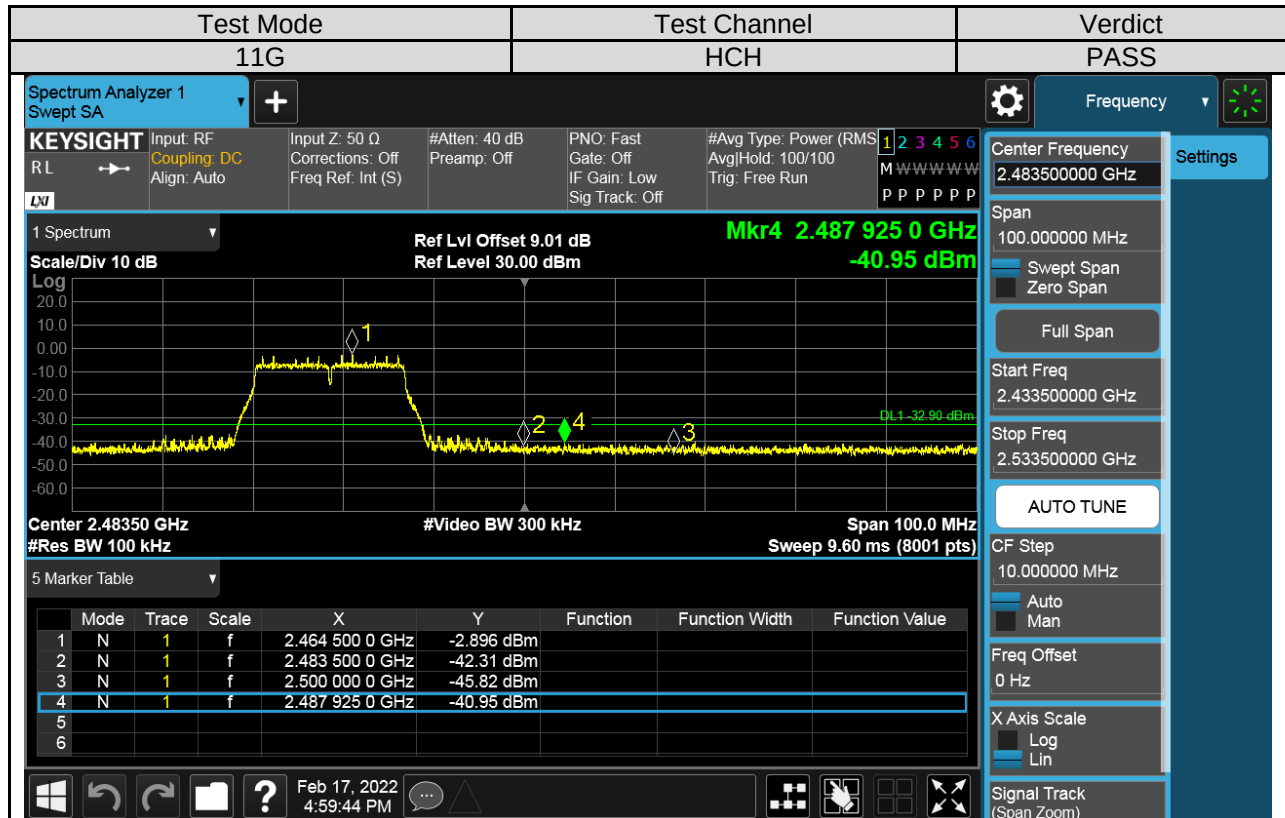
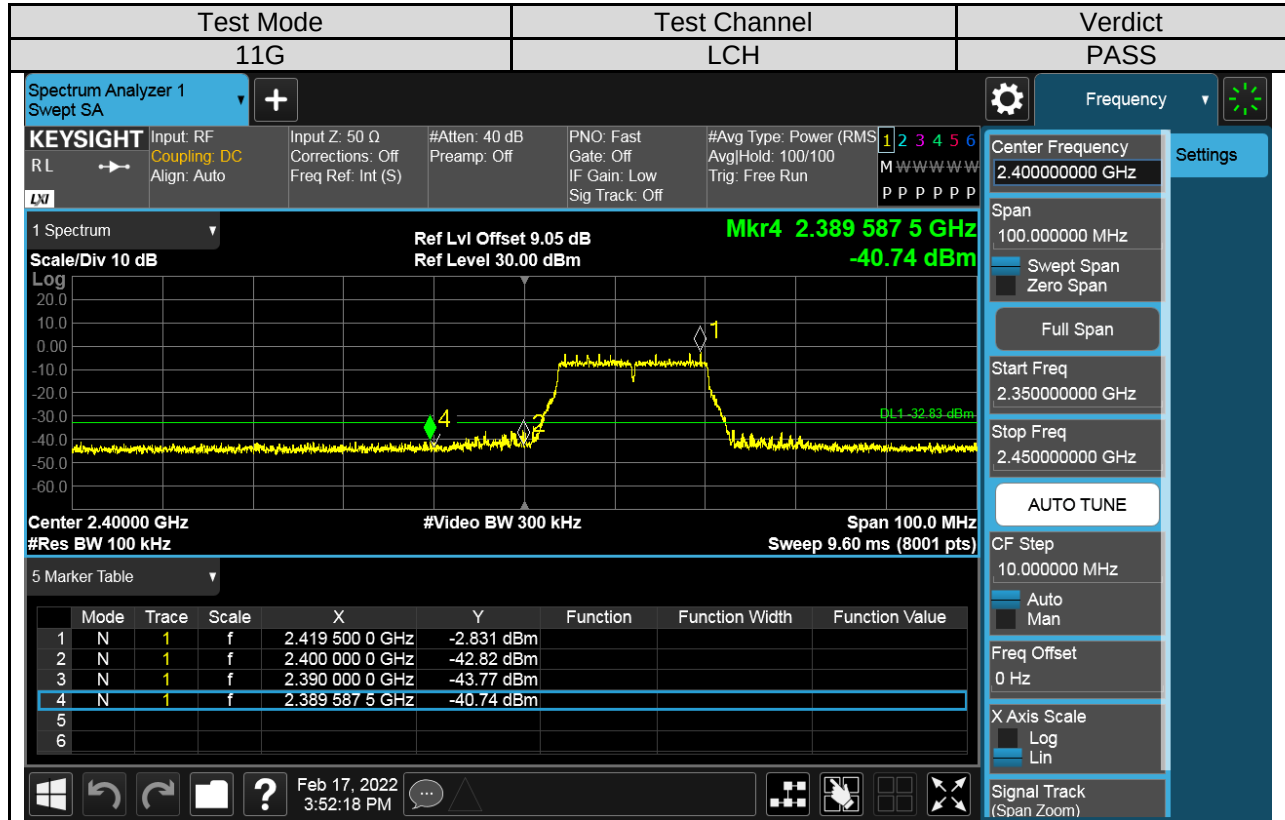
## TEST GRAPHS



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

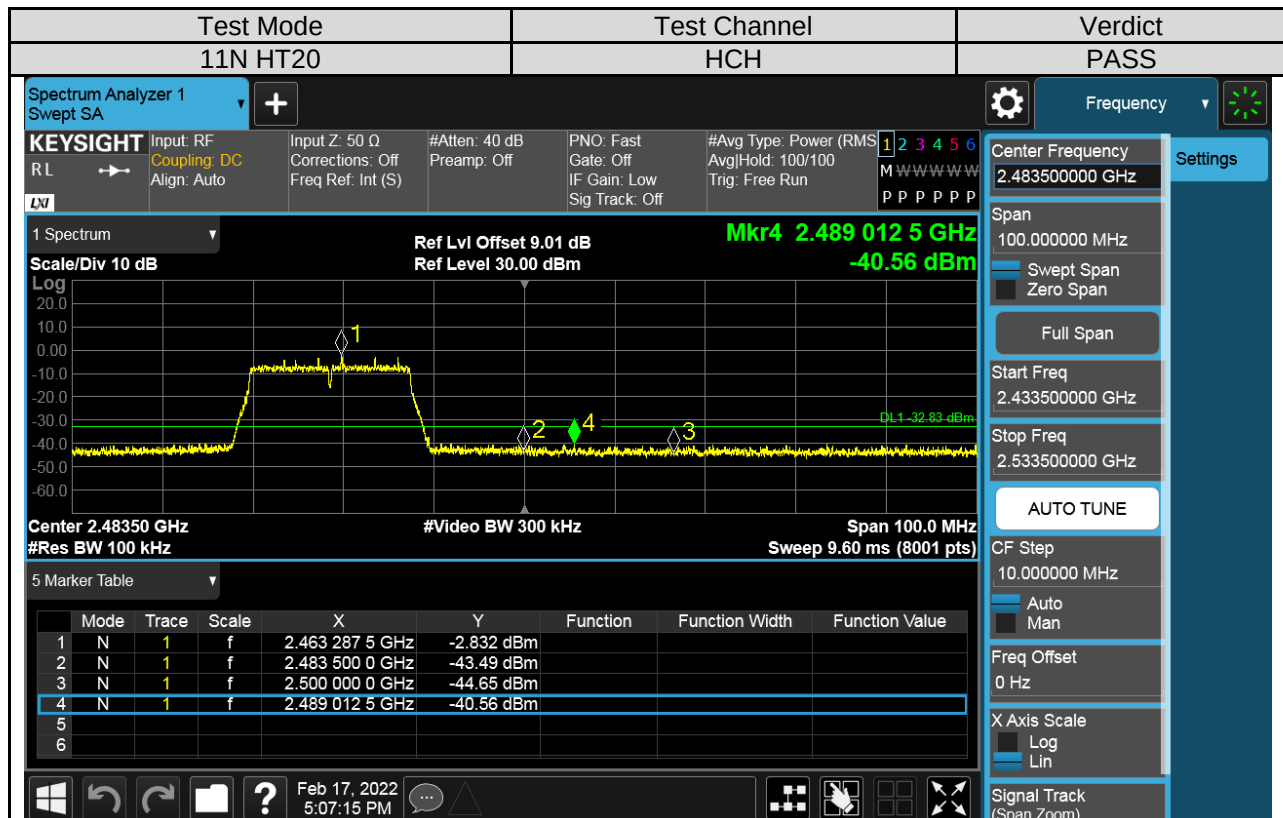
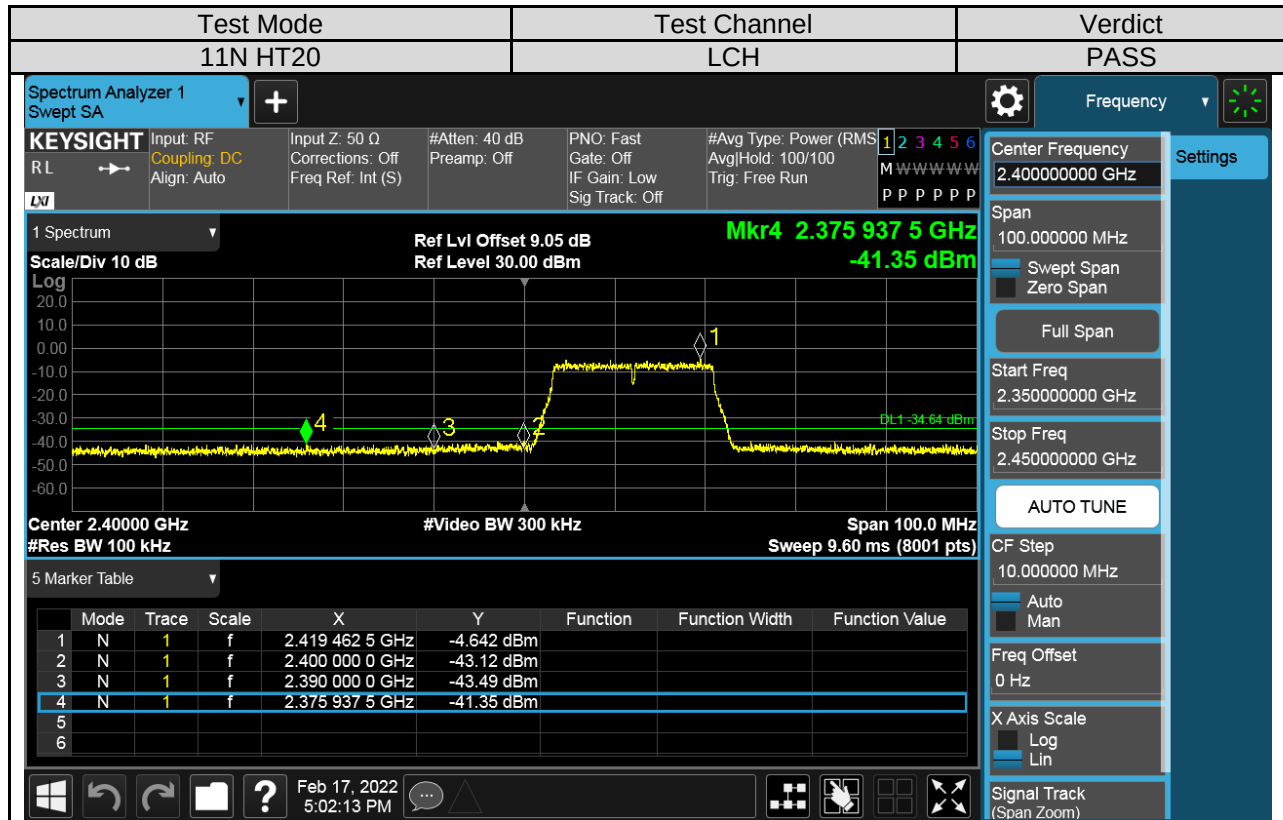
This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

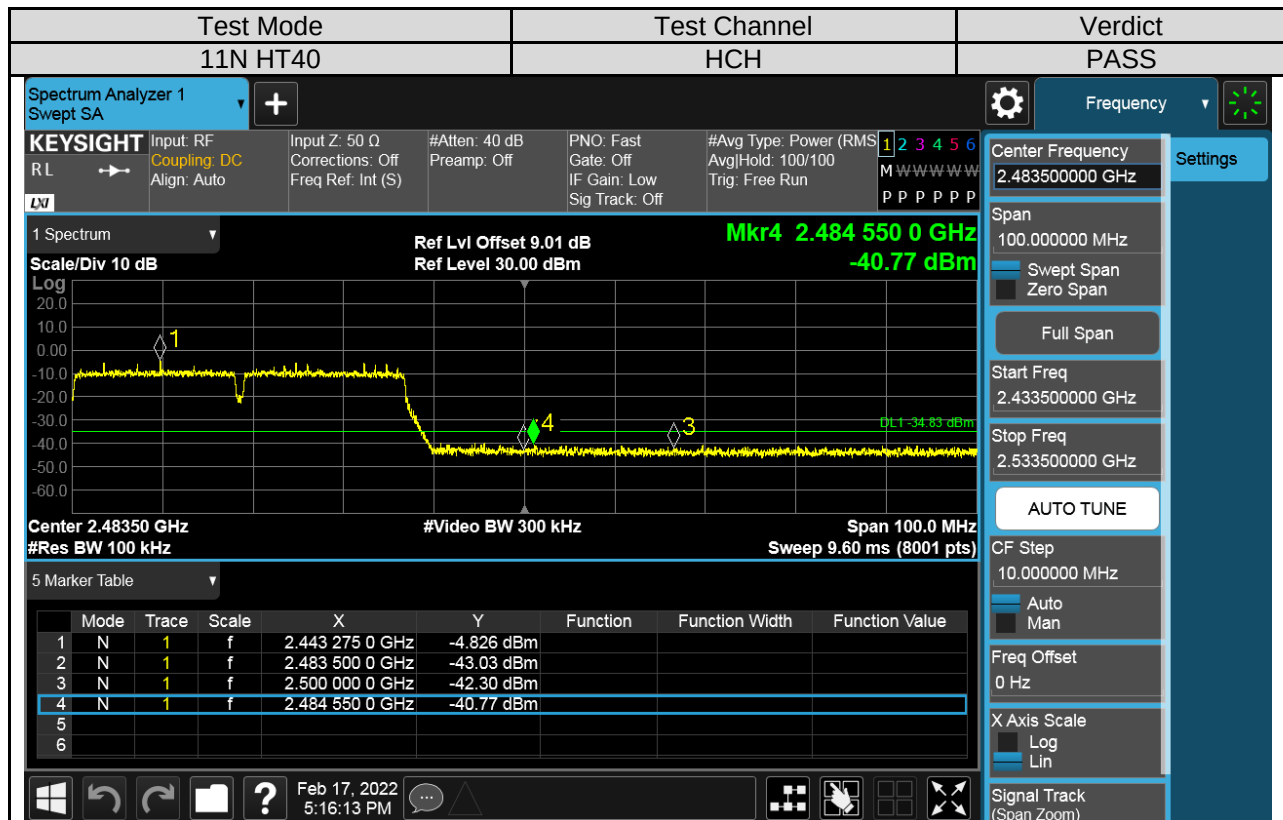
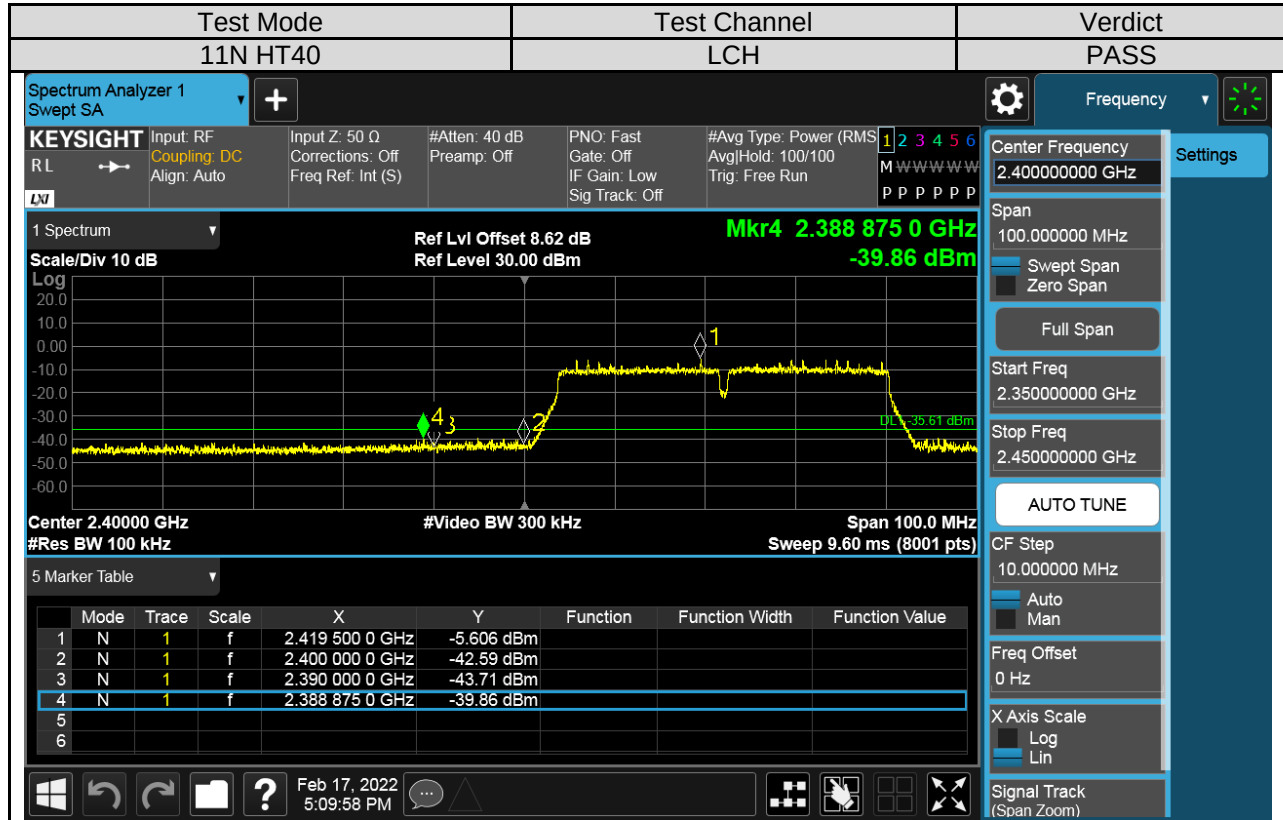
This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



Form-ULID-008536-9 V1.0

UL-CCIC COMPANY LIMITED

This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



**Part II :Conducted Emission**

Test Result Table

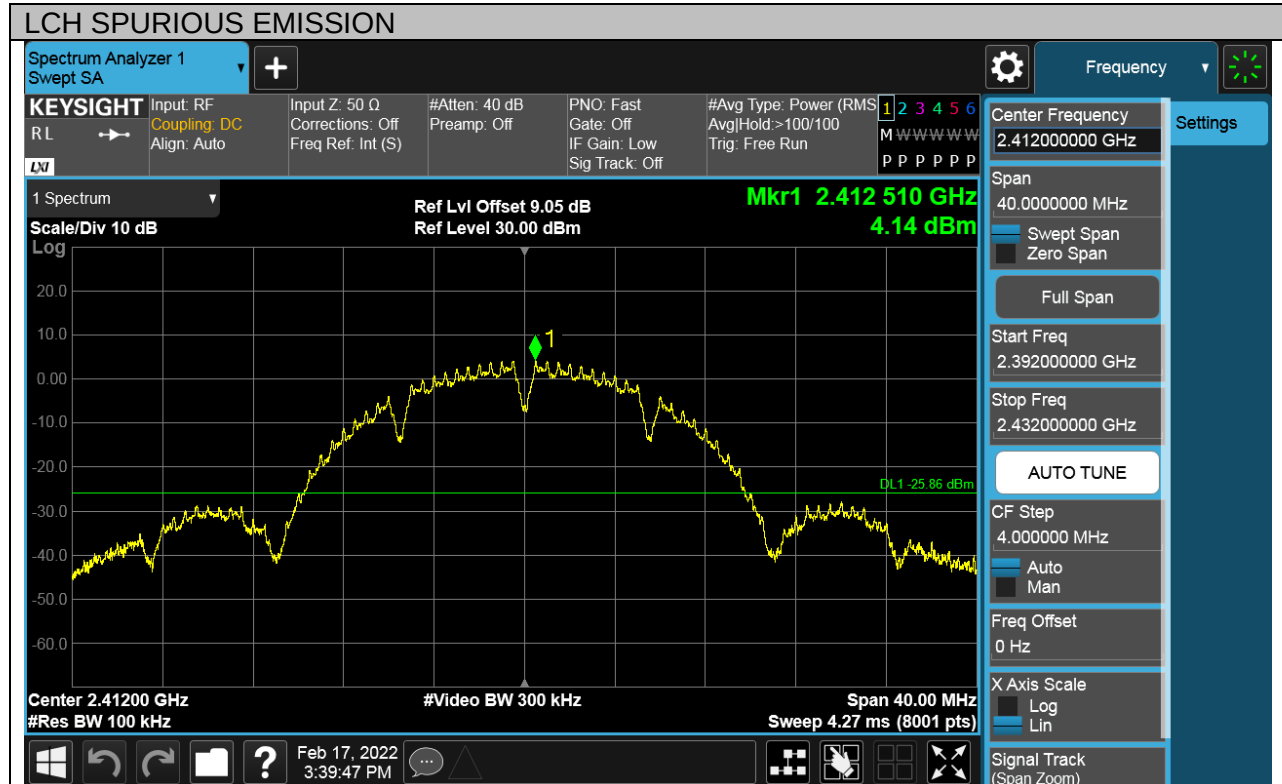
| Test Mode | Test Antenna | Channel | Pref(dBm)           | Puw(dBm) | Verdict |
|-----------|--------------|---------|---------------------|----------|---------|
| 11B SISO  | Antenna 1    | LCH     | See the test graphs | <Limit   | PASS    |
|           |              | MCH     | See the test graphs | <Limit   | PASS    |
|           |              | HCH     | See the test graphs | <Limit   | PASS    |
| 11G SISO  | Antenna 1    | LCH     | See the test graphs | <Limit   | PASS    |
|           |              | MCH     | See the test graphs | <Limit   | PASS    |
|           |              | HCH     | See the test graphs | <Limit   | PASS    |
| 11N HT20  | Antenna 1    | LCH     | See the test graphs | <Limit   | PASS    |
|           |              | MCH     | See the test graphs | <Limit   | PASS    |
|           |              | HCH     | See the test graphs | <Limit   | PASS    |
| 11N HT40  | Antenna 1    | LCH     | See the test graphs | <Limit   | PASS    |
|           |              | MCH     | See the test graphs | <Limit   | PASS    |
|           |              | HCH     | See the test graphs | <Limit   | PASS    |



## Test Plots

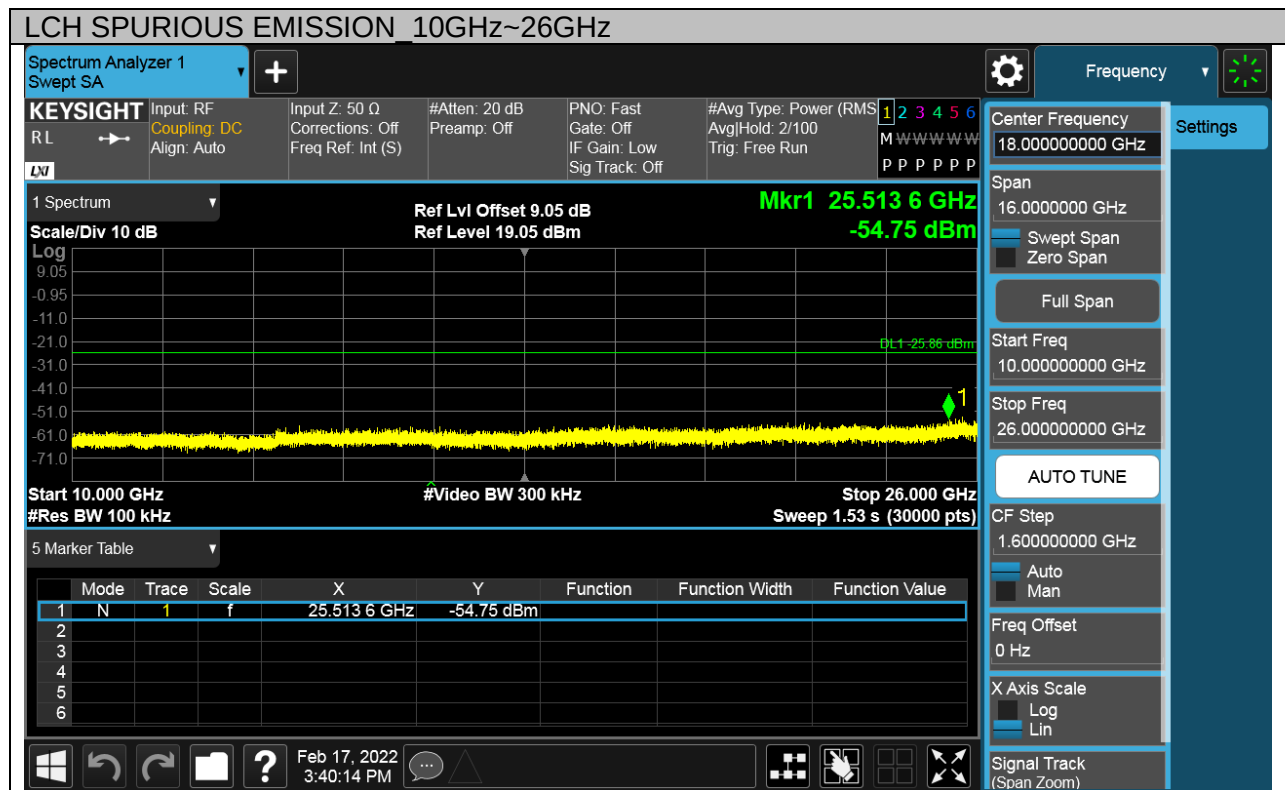
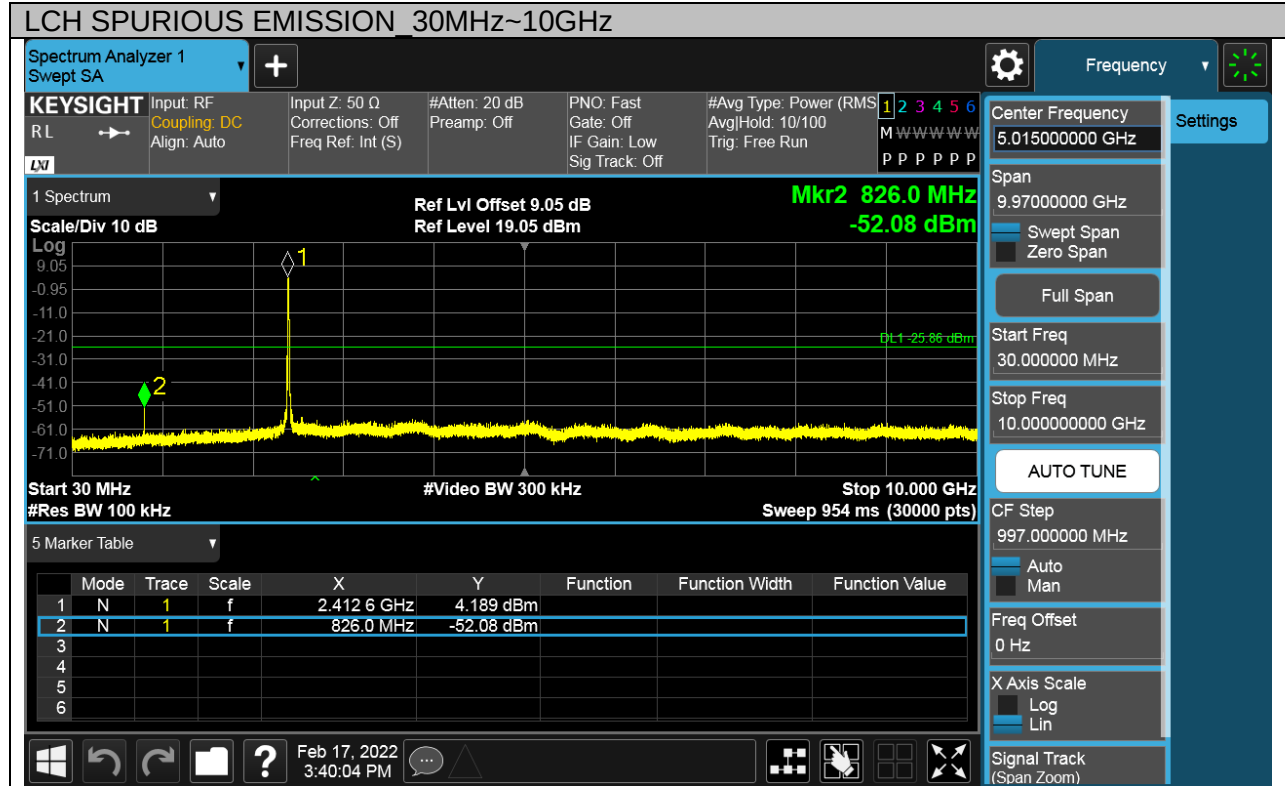
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11B       | LCH     | PASS    |

### Pref test Plot





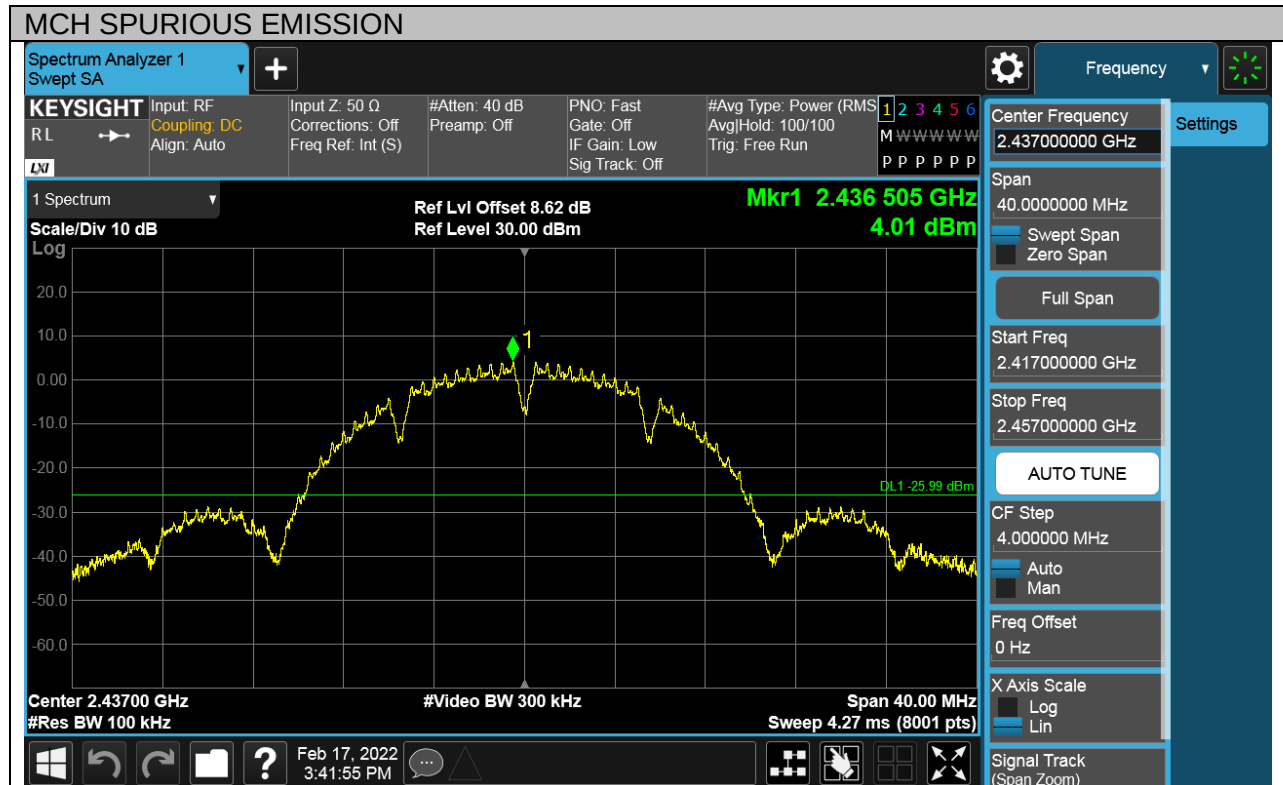
Puw test Plot





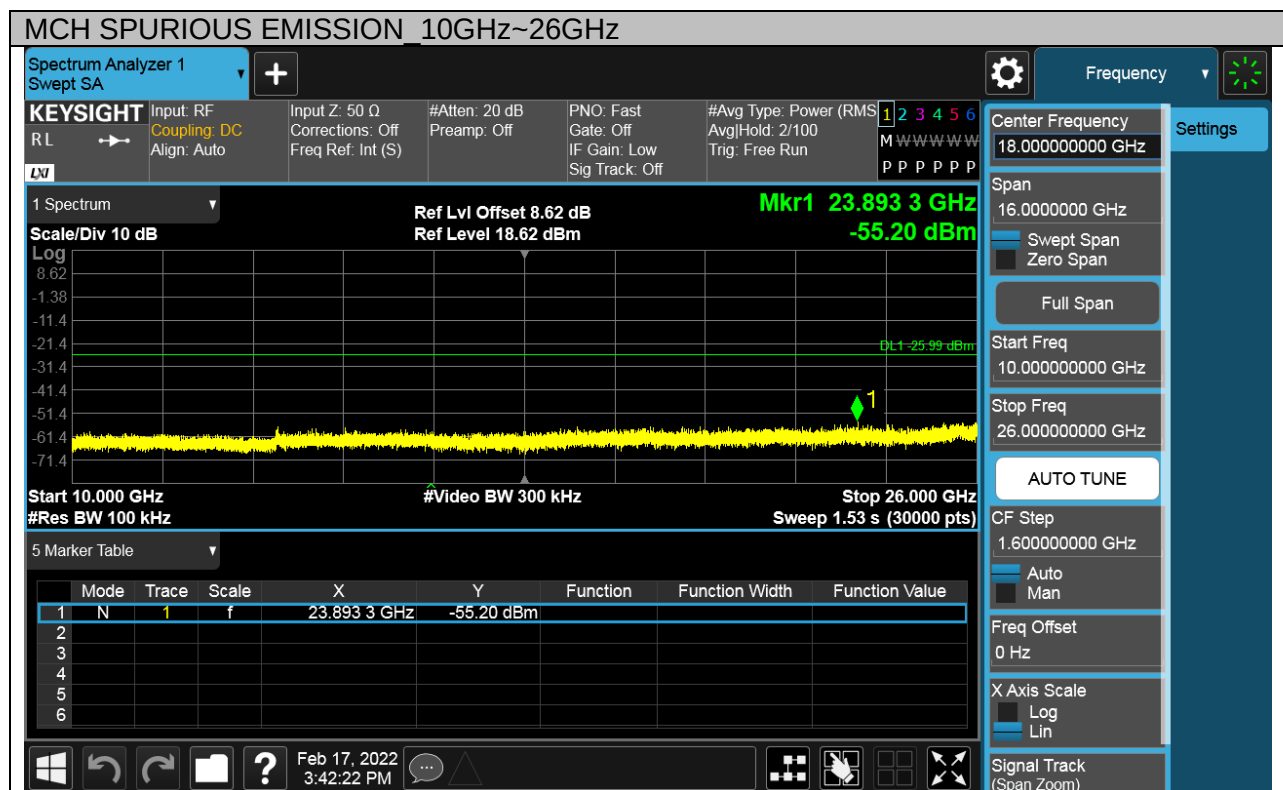
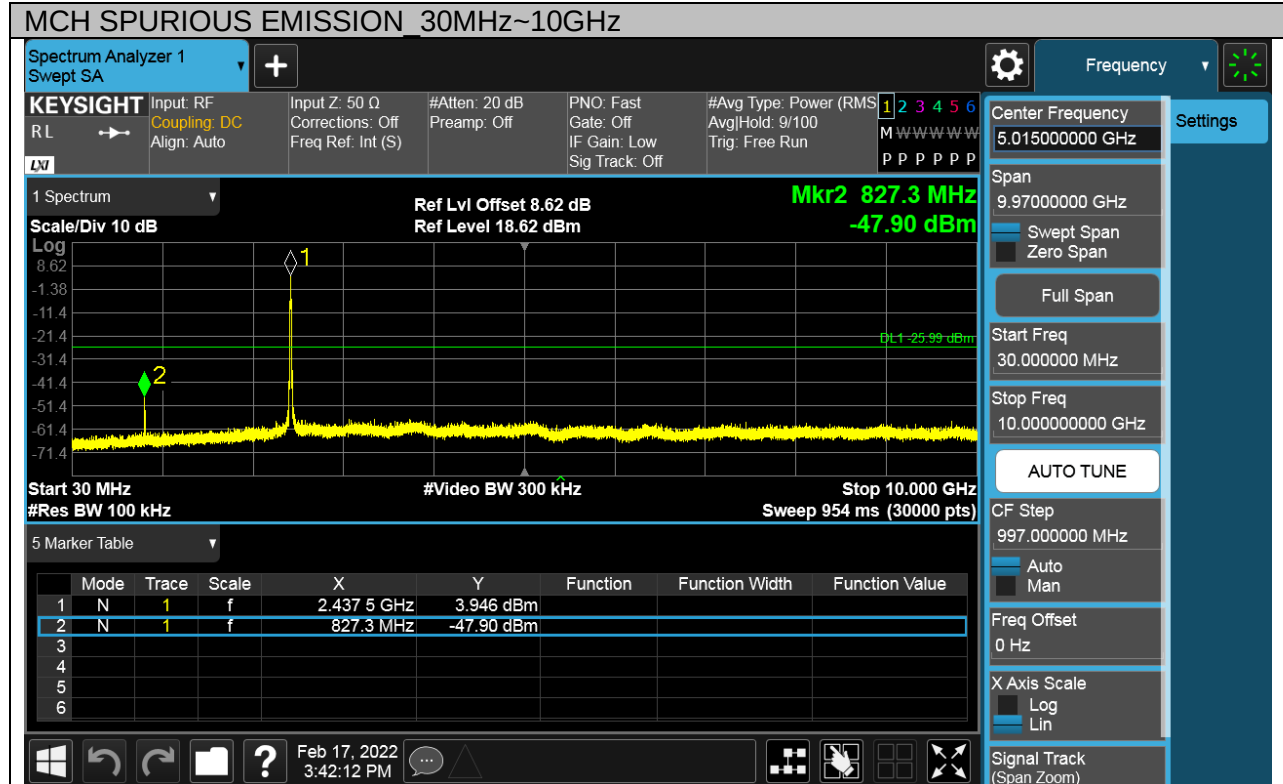
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11B       | MCH     | PASS    |

### Pref test Plot





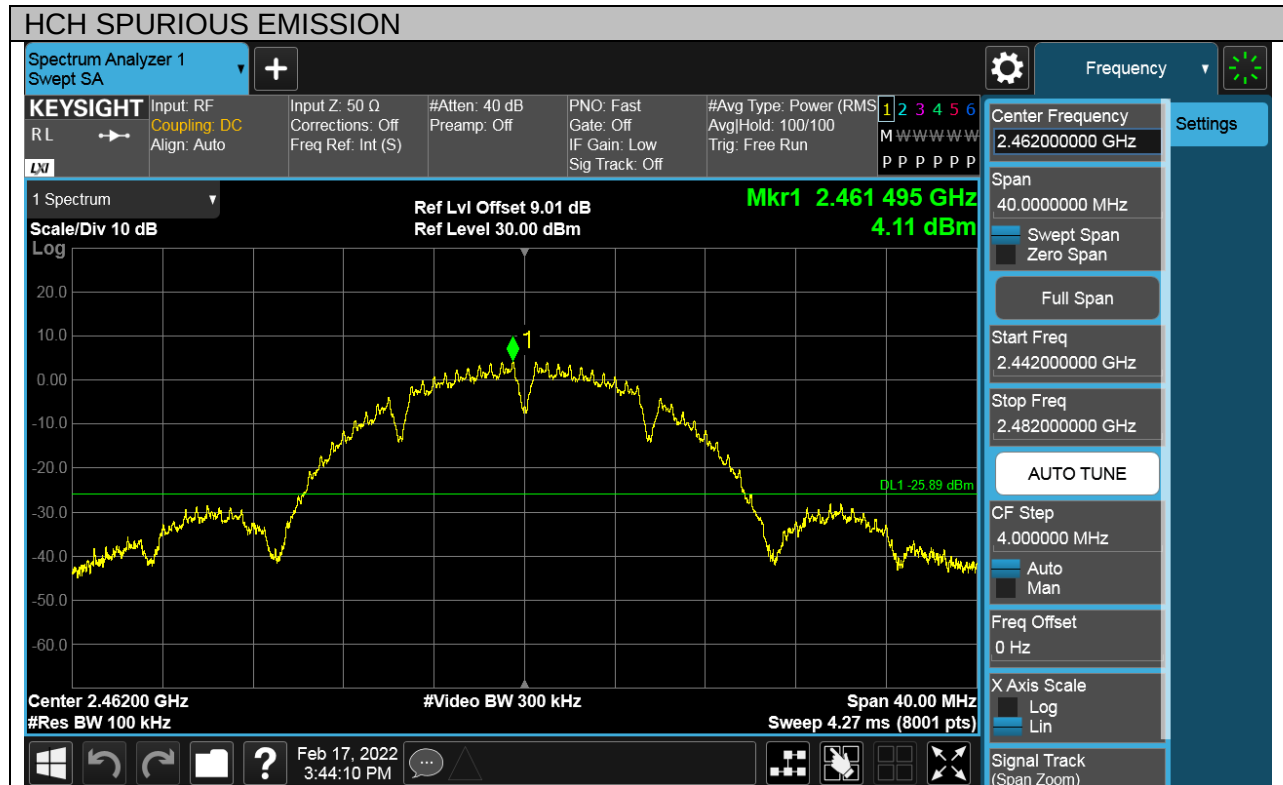
Puw test Plot





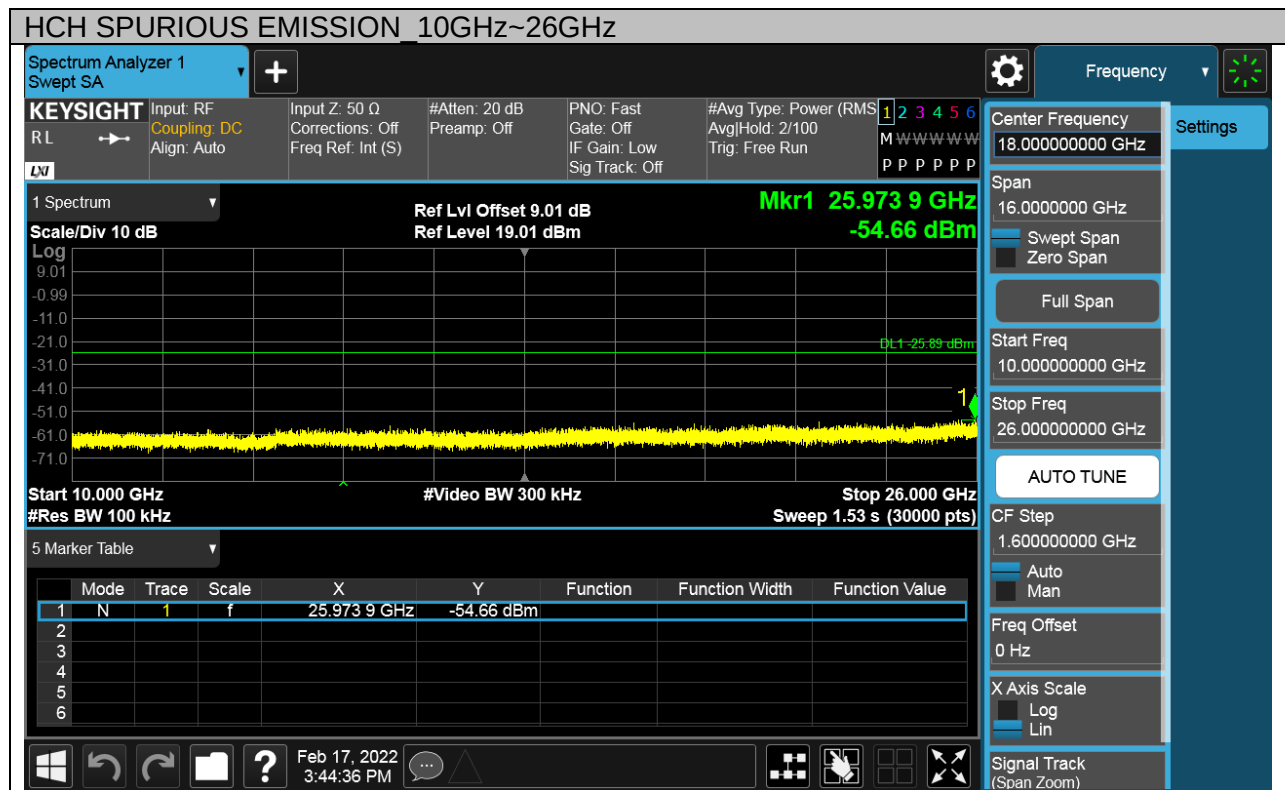
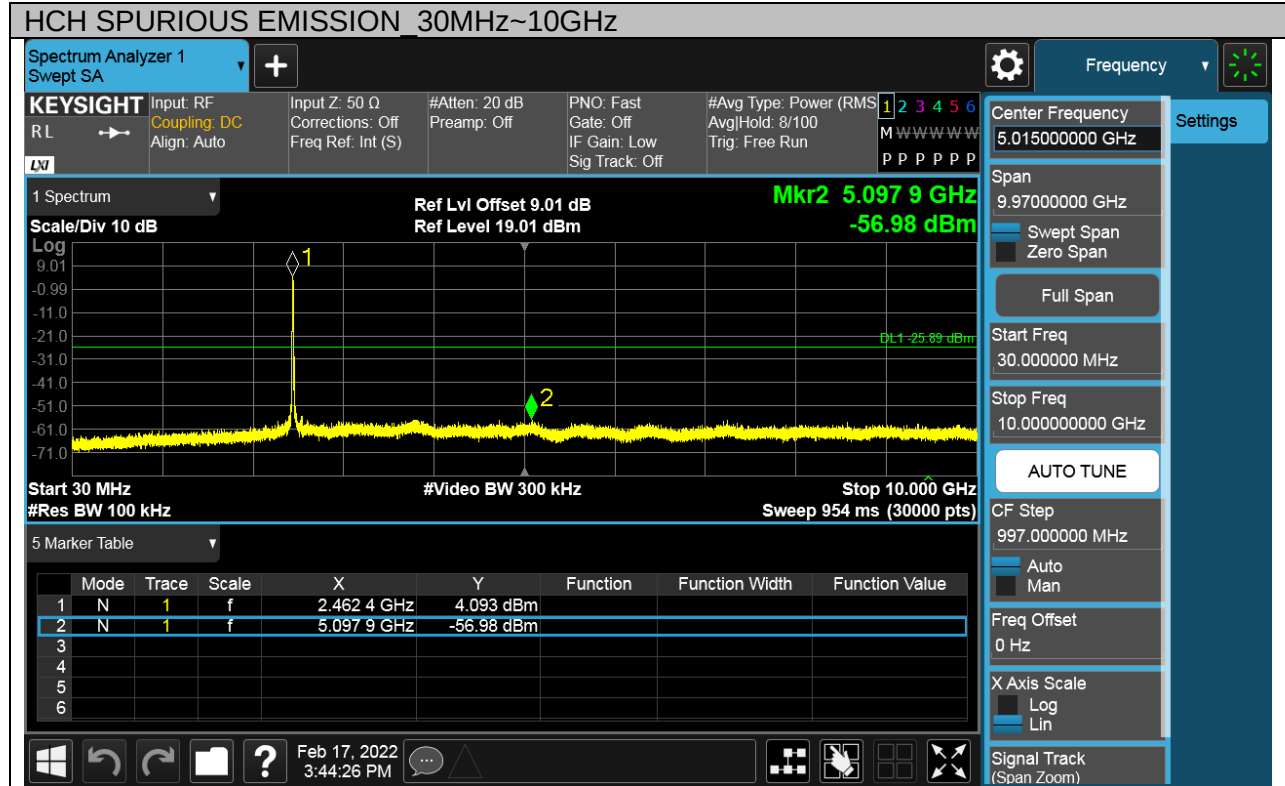
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11B       | HCH     | PASS    |

### Pref test Plot





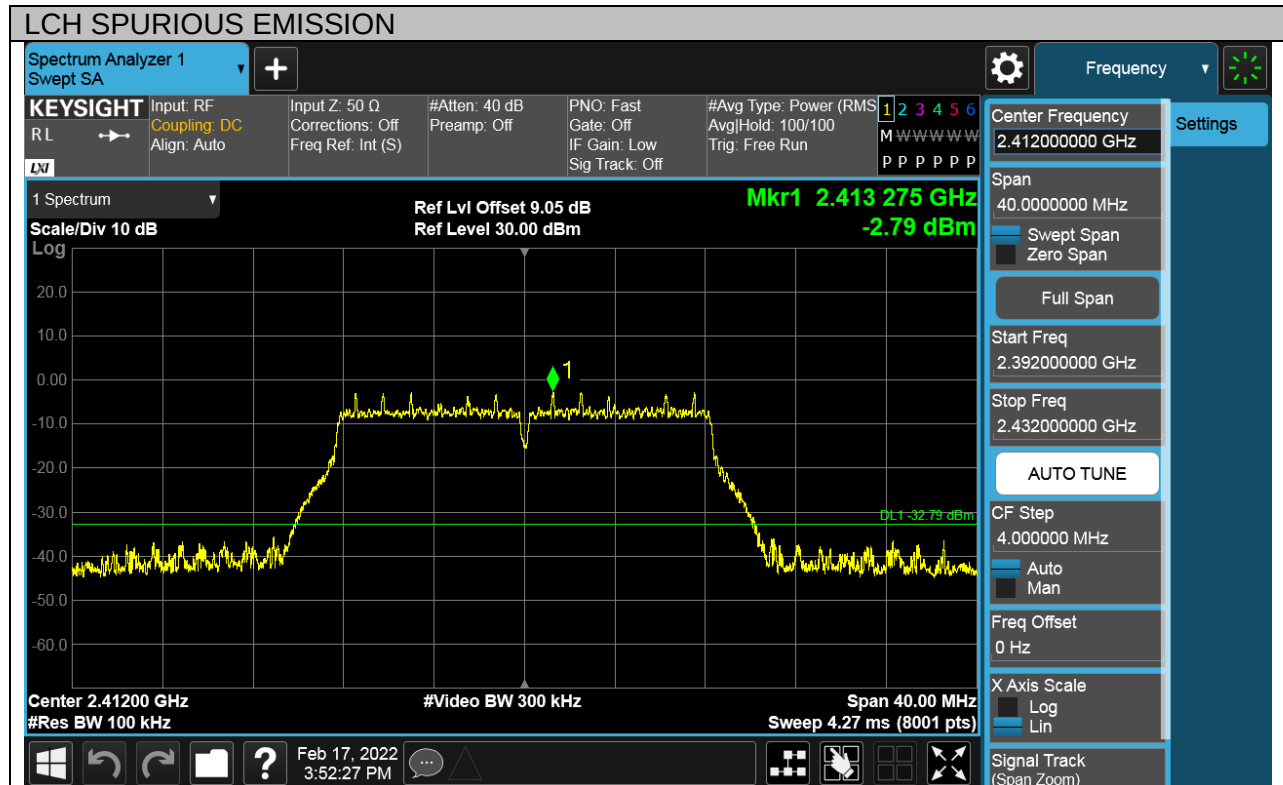
Puw test Plot





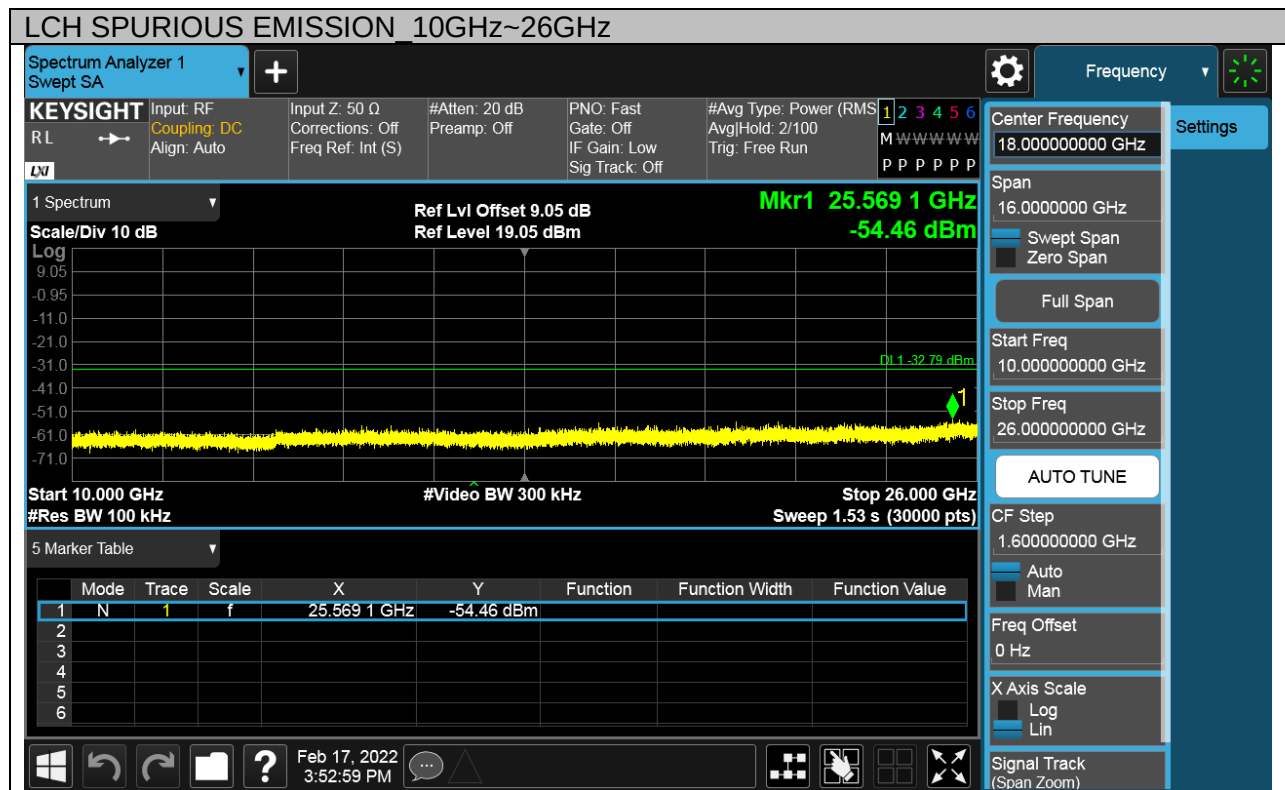
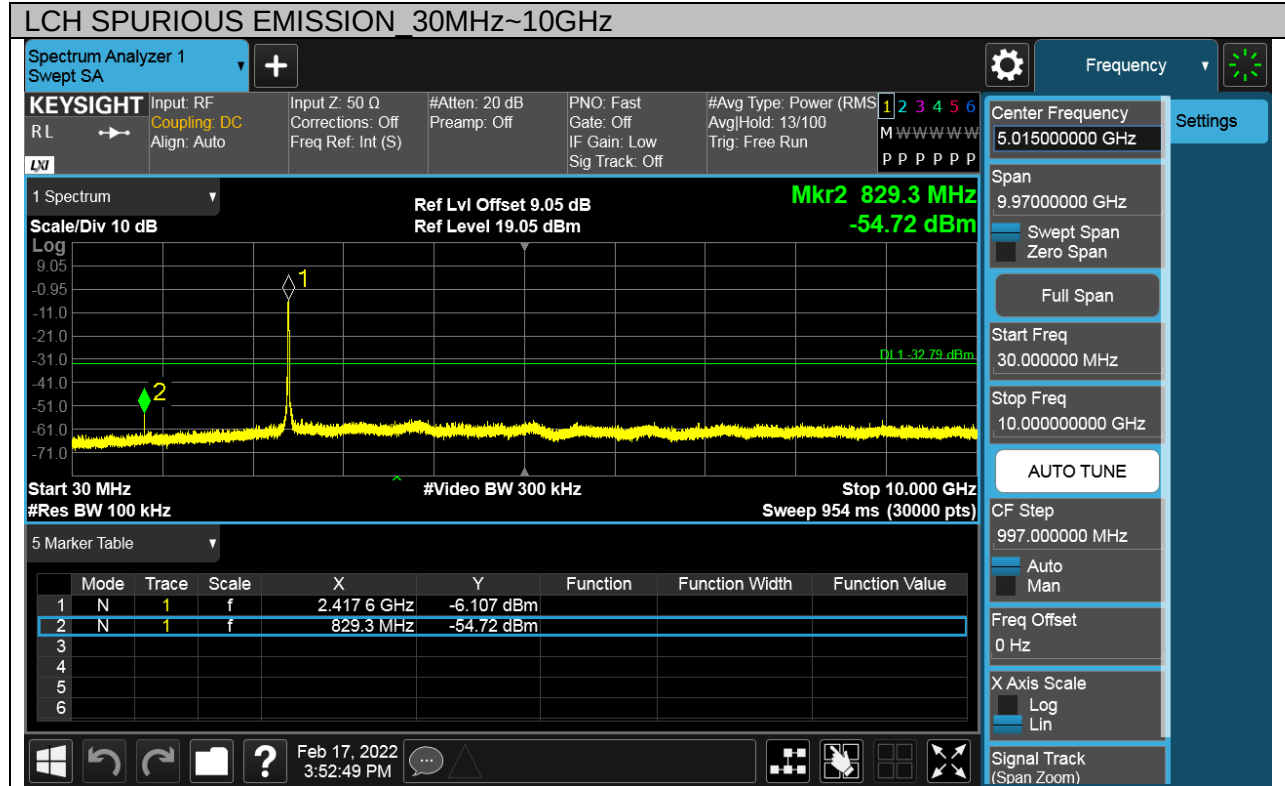
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11G       | LCH     | PASS    |

### Pref test Plot





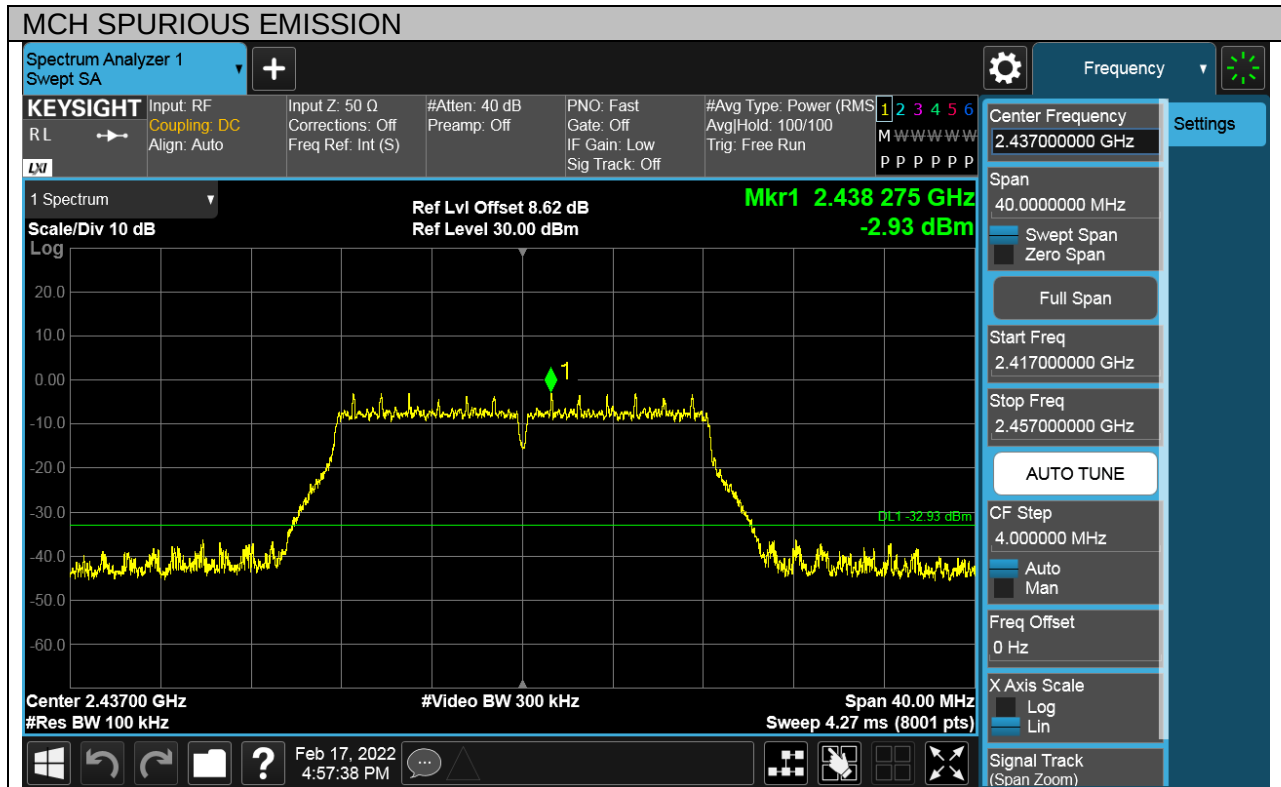
Puw test Plot





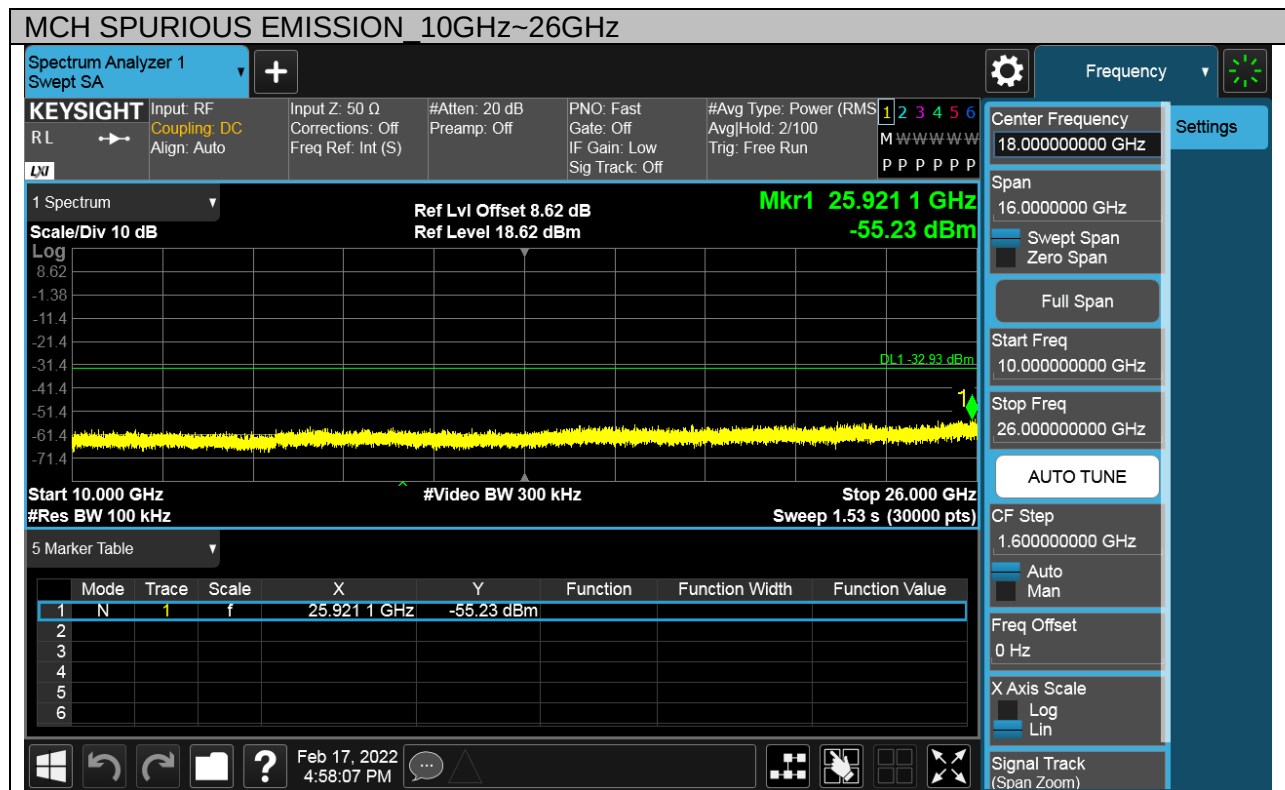
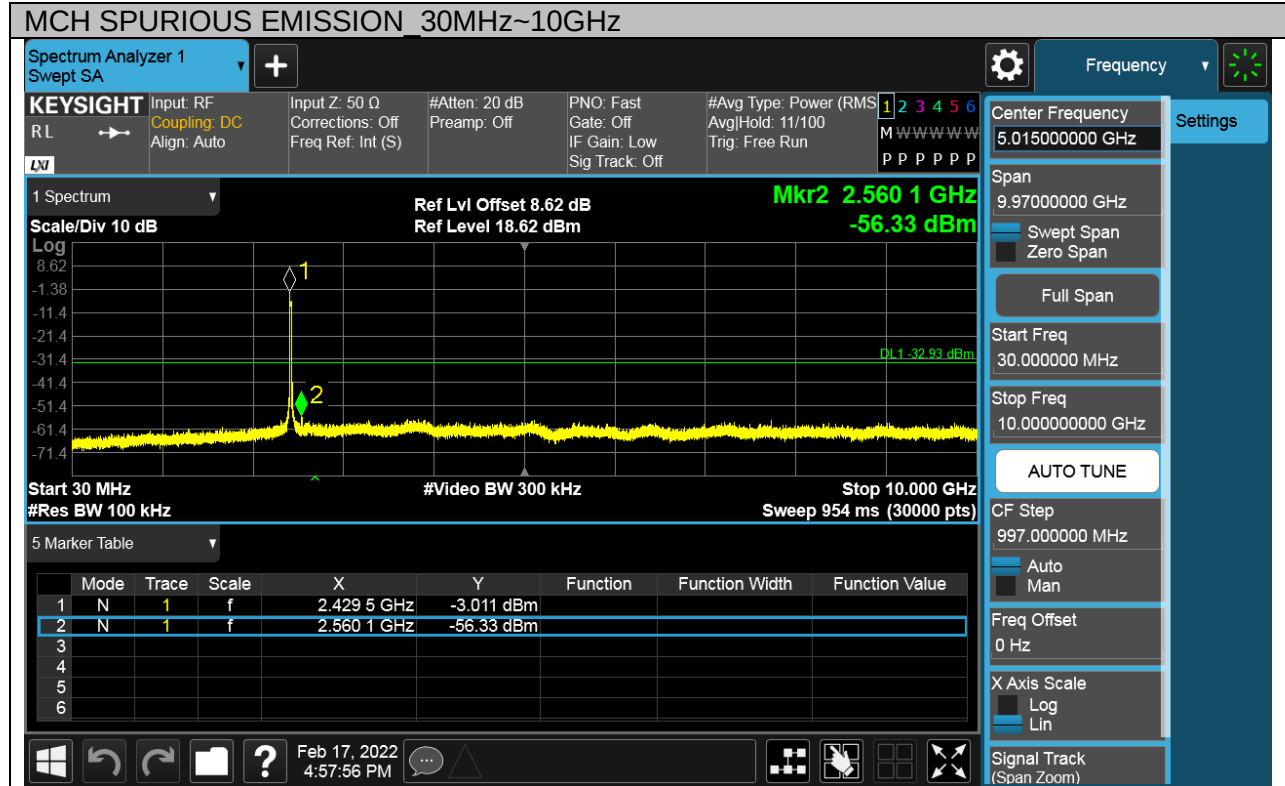
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11G       | MCH     | PASS    |

### Pref test Plot





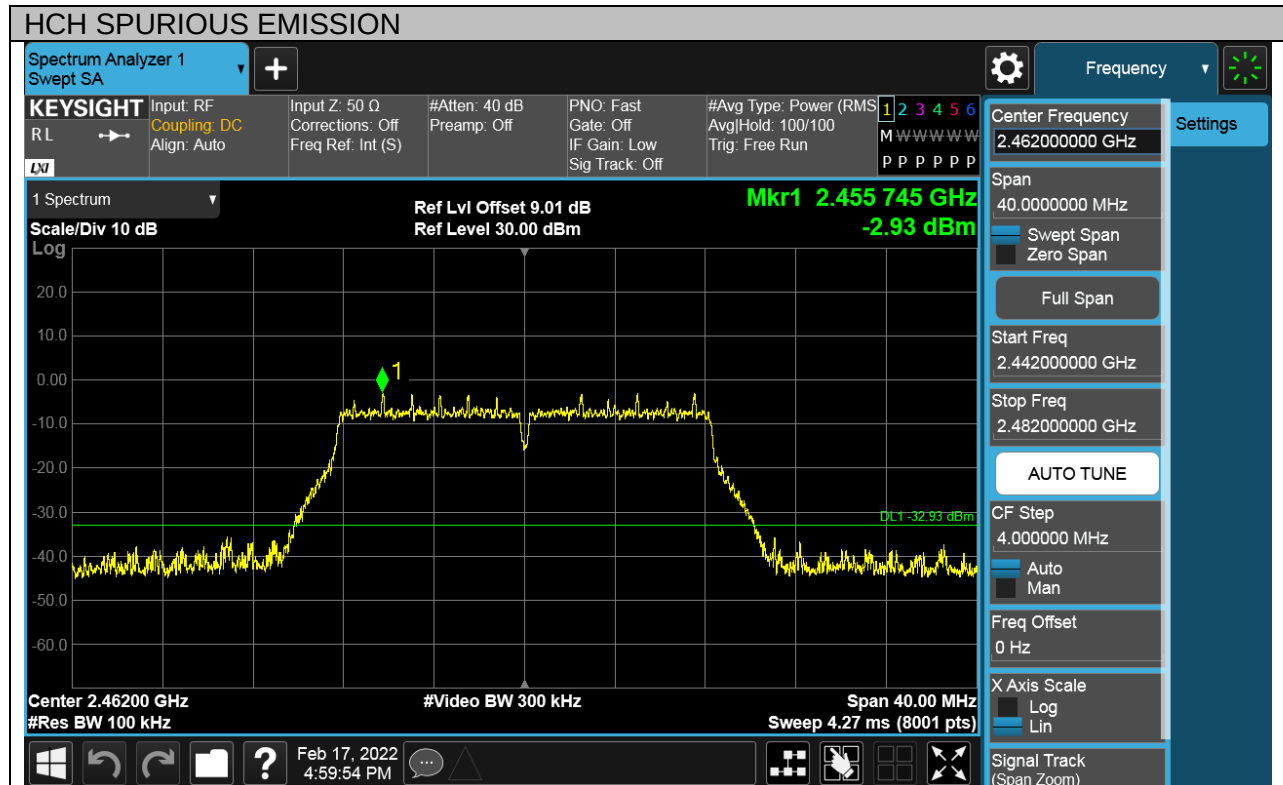
Puw test Plot





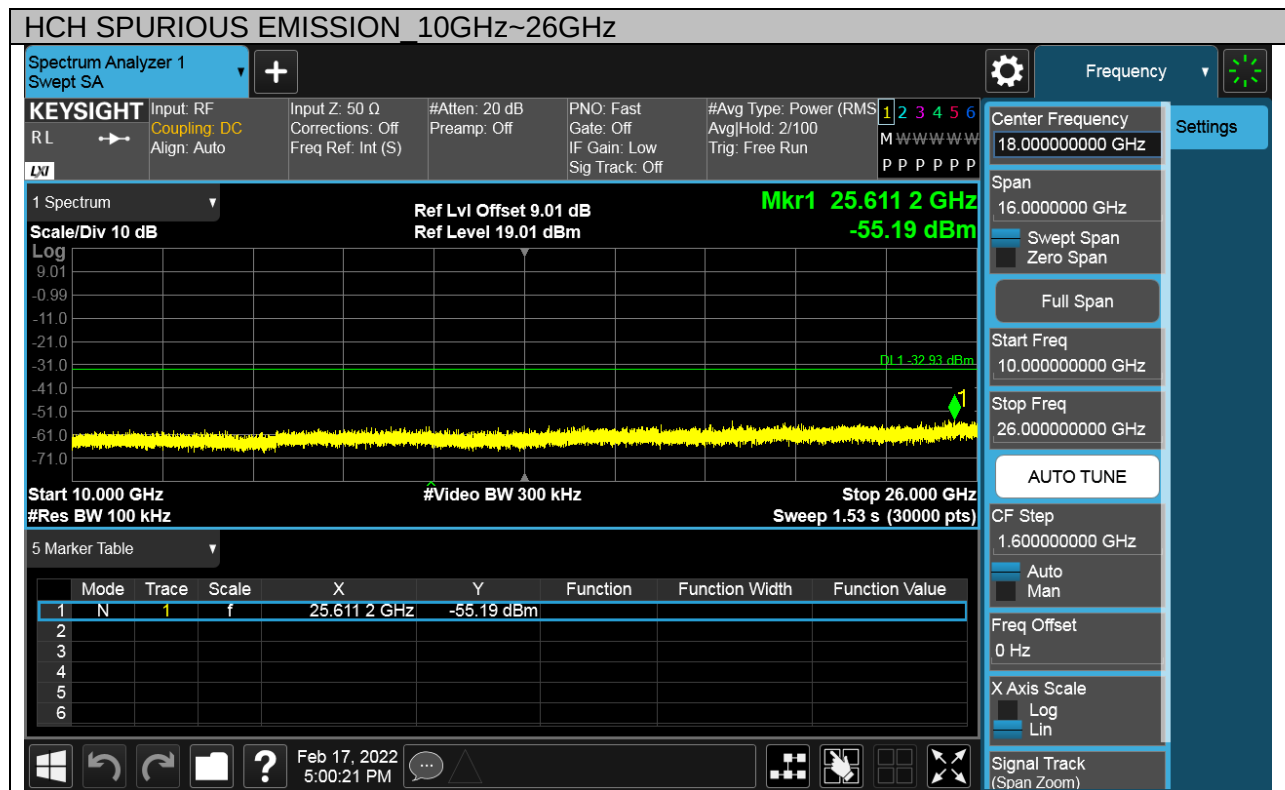
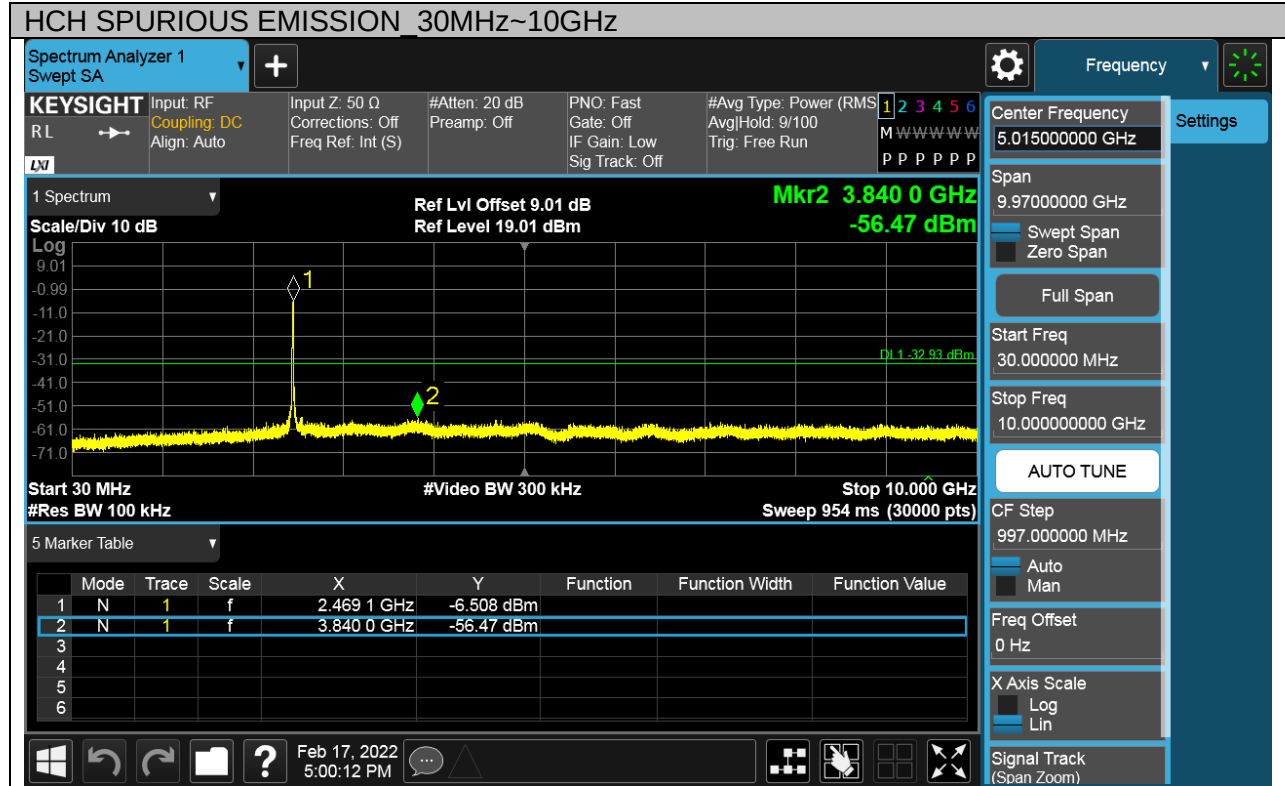
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11G       | HCH     | PASS    |

### Pref test Plot





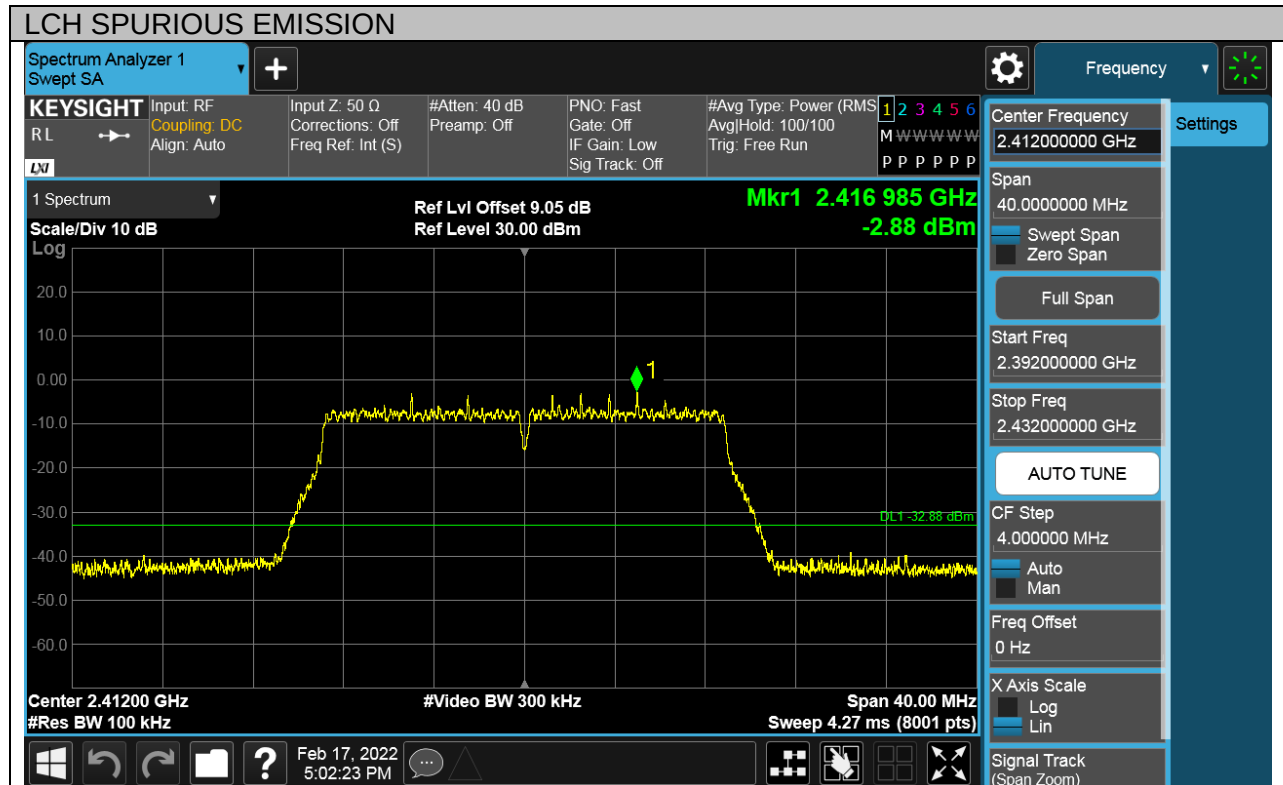
Puw test Plot





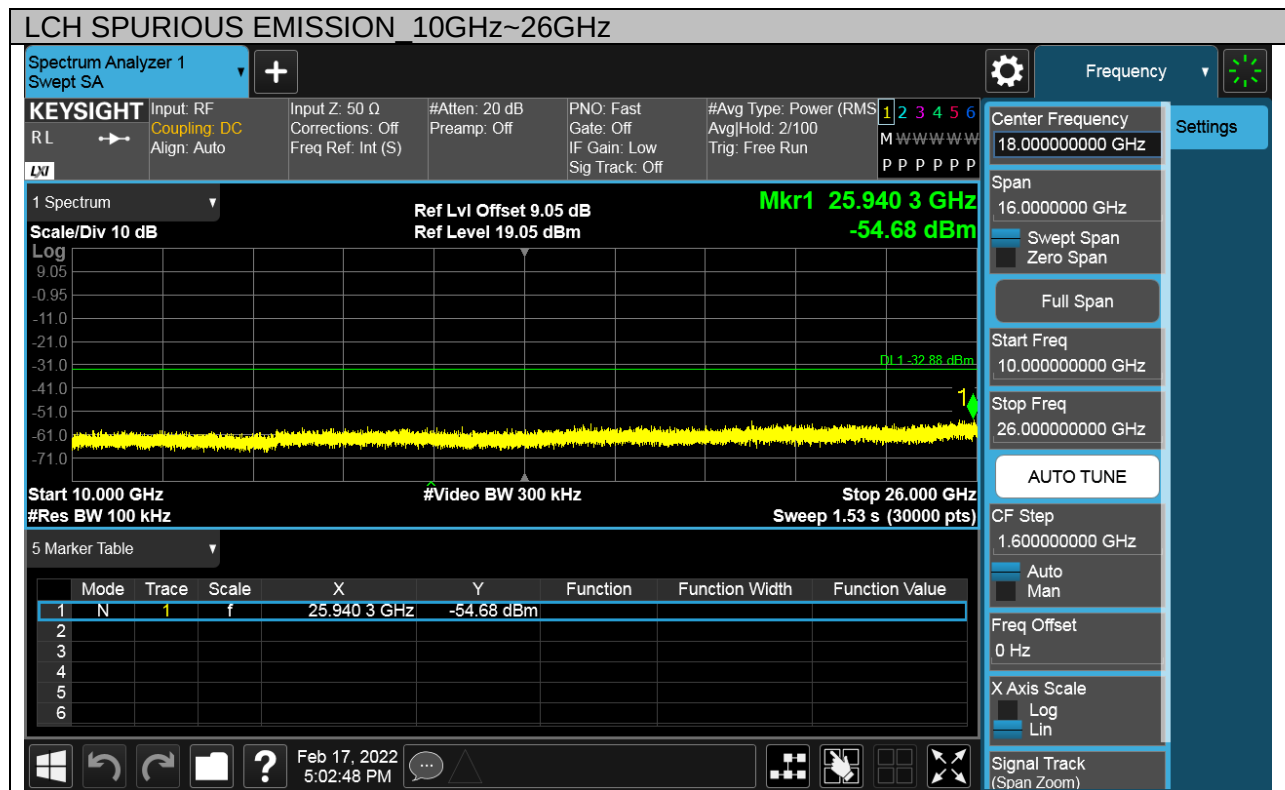
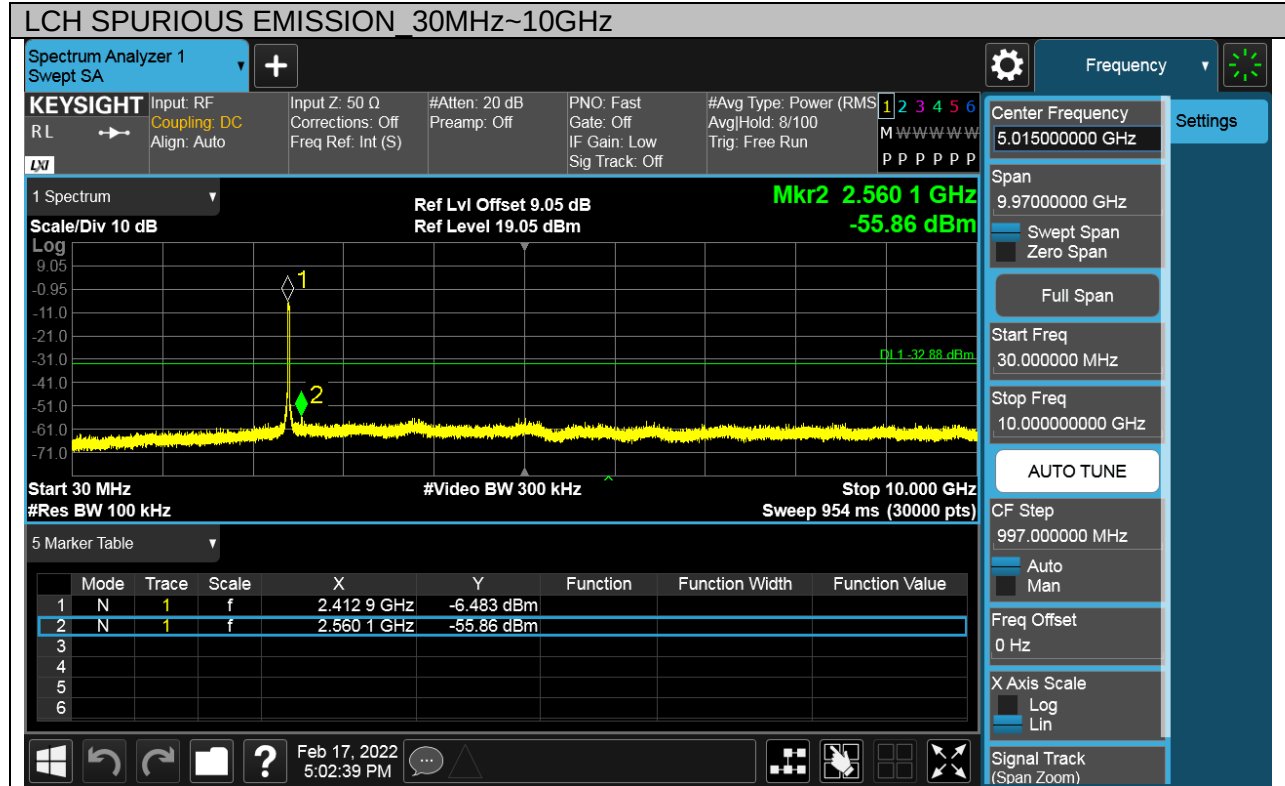
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11N HT20  | LCH     | PASS    |

### Pref test Plot





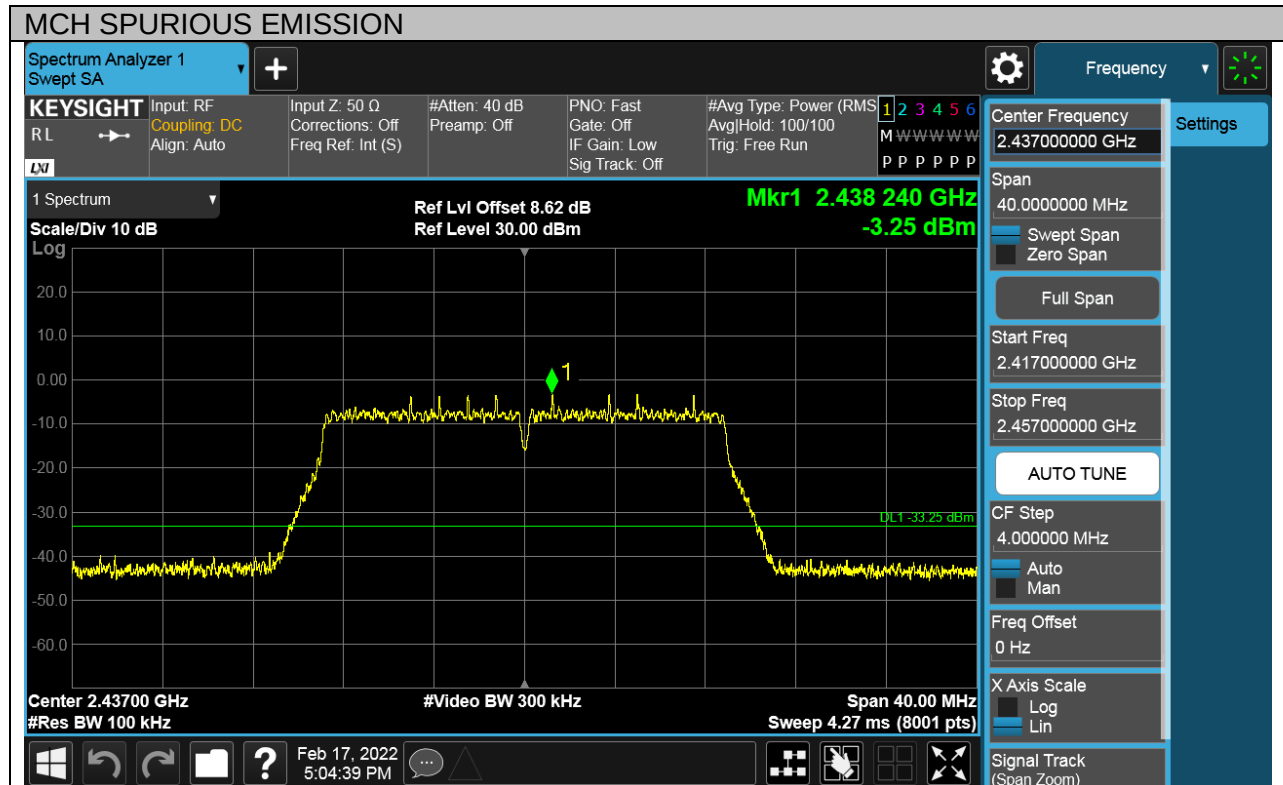
Puw test Plot





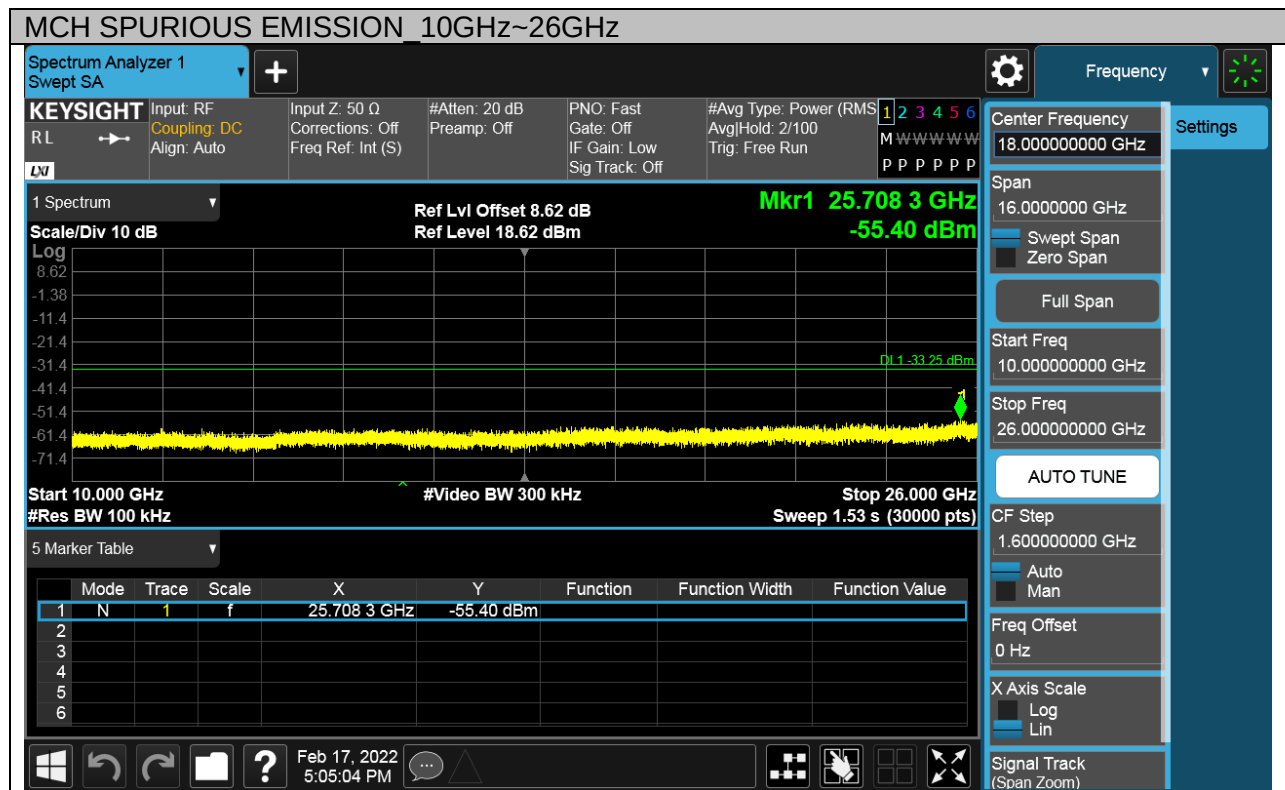
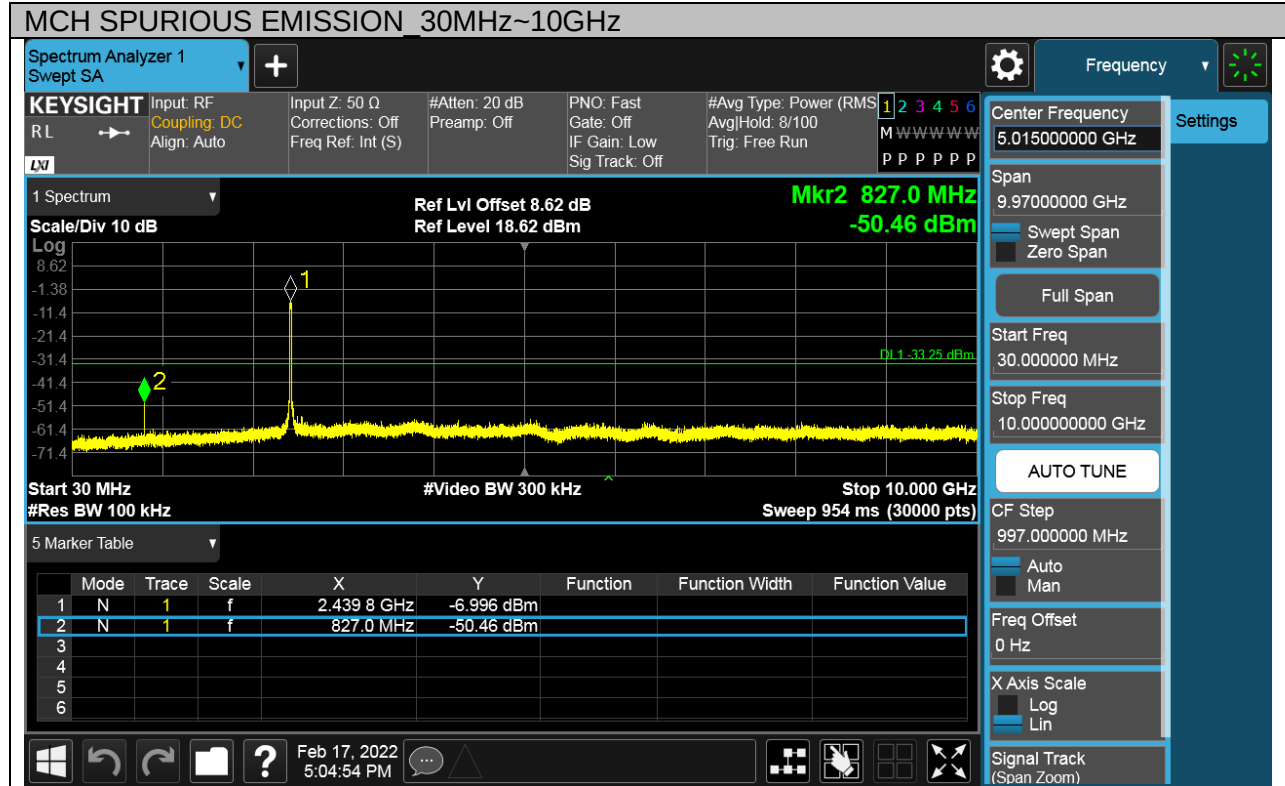
| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11N HT20  | MCH     | PASS    |

### Pref test Plot





Puw test Plot





| Test Mode | Channel | Verdict |
|-----------|---------|---------|
| 11N HT20  | HCH     | PASS    |

### Pref test Plot

