# FCC TEST REPORT
# (PART 96)

| | |
|---|---|
| Applicant: | i.safe MOBILE GmbH |
| Address: | i_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany |

| | |
|---|---|
| Manufacturer or Supplier: | i.safe MOBILE GmbH |
| Address: | i_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany |
| Product: | Smartphone |
| Brand Name: | i.safe MOBILE |
| Model Name: | M540A01 |
| Marketing Name: | IS540.1,IS540.M1,IS540.2,IS540.RG |
| FCC ID: | 2AACZ-M540A01 |
| Date of tests: | Nov. 24, 2022 ~ Feb. 06, 2023 |

The tests have been carried out according to the requirements of the following standard:

☒ **47 CFR FCC Part 96**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

| Prepared by Simon Wang<br>Engineer / Mobile Department | Approved by Luke Lu<br>Manager / Mobile Department |
|---|---|
| Simon Wang<br>Date: Feb. 06, 2023 | Luke Lu<br>Date: Feb. 06, 2023 |

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# RELEASE CONTROL RECORD

| ISSUE NO. | DESCRIPTION | DATE ISSUED |
|---|---|---|
| W7L-P22110036RF11 | Original release | Feb. 06, 2023 |

# 1 SUMMARY OF TEST RESULTS

| 47 CFR FCC PART 96 | | |
|---|---|---|
| FCC CLAUSE | TEST ITEM | RESULT |
| 2.1046<br>96.41(b) | Maximum Peak Output Power and Maximum EIRP | Compliance |
| 2.1046<br>96.41(e) | Conducted Band Edge | Compliance |
| 2.1049 | Occupied Bandwidth | Compliance |
| 2.1055 | Frequency Stability | Compliance |
| 2.1051<br>96.41(e) | Conducted Spurious Emissions | Compliance |
| 2.1053<br>96.41(e) | Radiated Spurious Emissions | Compliance |
| 96.41(g) | Peak-to-Average Power Ratio | Compliance |

Note:
Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT | UNCERTAINTY |
|---|---|
| Effective Radiated Power | ±1.48dB |
| Frequency Stability | ±39.27Hz |
| Radiated emissions (9KHz~30MHz) | ±2.68dB |
| Radiated emissions | ±4.98dB |
| Conducted emissions | ±4.01 dB |
| Occupied Channel Bandwidth | ±21.7KHz |
| Band Edge Measurements | ±1.48dB |
| Peak to average ratio | ±0.76dB |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.2 TEST SITE AND INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| MXE EMI Receiver | KEYSIGHT | N9038A-544 | MY54450026 | Feb. 21,22 | Feb. 20,23 |
| EXA Signal Analyzer | KEYSIGHT | N9010A-544 | MY54510355 | May.15,22 | May.14,23 |
| Loop Antenna | Schwarzbeck | FMZB 1519B | 00173 | Sep.04,22 | Sep.03,23 |
| Bilog Antenna | ETS-LINDGREN | 3143B | 00161965 | Mar. 06,22 | Mar. 05,23 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00168692 | Mar. 06,22 | Mar. 05,23 |
| Horn Antenna (18GHz-40GHz) | N/A | QWH-SL-18-40-K-SG/QMS-00361 | 15433 | Aug. 24, 22 | Aug. 23, 23 |
| Radio Communication Analyzer | ANRITSU | MT8820C | 6201465426 | Feb. 15,22 | Feb. 14,23 |
| Signal Pre-Amplifier | EMSI | EMC 9135 | 980249 | May.12,22 | May.11,23 |
| Signal Pre-Amplifier | EMSI | EMC 012645B | 980257 | May.12,22 | May.11,23 |
| Signal Pre-Amplifier | EMSI | EMC 184045B | 980259 | Feb. 21,22 | Feb.20,23 |
| 3m Semi-anechoic Chamber | ETS-LINDGREN | 9m*6m*6m | Euroshieldpn-CT0001143-1216 | May. 19,20 | May. 18,23 |
| Test Software | E3 | V 9.160323 | N/A | N/A | N/A |
| Test Software | JS1120 | 3.1.36 | N/A | N/A | N/A |
| 10dB Attenuator | JFW/USA | 50HF-010-SMA | 1505 | May. 07,22 | May. 06,23 |
| Power Meter | Anritsu | ML2495A | 1506002 | Feb. 22,22 | Feb. 21,23 |
| Power Sensor | Anritsu | MA2411B | 1339352 | May. 07,22 | May. 06,23 |
| Temperature Chamber | ESPEC | SH-242 | 93000855 | May. 12,22 | May. 11,23 |
| MXG Analog Microvave Signal Generator | KEYSIGHT | N5183A | MY50143024 | Feb. 18,22 | Feb. 17,23 |
| Base station R&S CMW500 | Rohde&Schwarz | CMW500 | 153085 | May.12,22 | May.11,23 |
| DC Source | Kikusui/JP | PMX18-5A | 0000001 | Aug. 24,22 | Aug. 23,23 |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.

3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

# 2 GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| **PRODUCT** | Smartphone | |
| **BRAND NAME** | i.safe MOBILE | |
| **MODEL NAME** | M540A01 | |
| **MARKETING NAME** | IS540.1,IS540.M1,IS540.2,IS540.RG | |
| **NOMINAL VOLTAGE** | 5.0Vdc(adapter or host equipment)<br>3.7Vdc (Li-ion, battery) | |
| **MODULATION TECHNOLOGY** | **5G NR** | DFT-s-OFMA(Pi/2 BPSK,QPSK,16QAM,64QAM,256QAM);<br>CP-OFMA(QPSK,16QAM,64QAM,256QAM); |
| **SUPPORT ENDC COMBINE** | **NR Band n48** | 2A_n48 |
| | | 5A_n48 |
| | | 13A_n48 |
| | | 66A_n48 |
| **FREQUENCY RANGE** | **NR Band n48** | 3555 MHz ~ 3694.98MHz |
| **EMISSION DESIGNATOR** | **NR Band n48**<br>**Channel Bandwidth: 10MHz** | Pi/2BPSK: 9M00G7D<br>QPSK: 9M00G7D<br>16QAM: 9M00W7D<br>64QAM: 8M95W7D<br>256QAM: 8M98W7D |
| | **NR Band n48**<br>**Channel Bandwidth: 20MHz** | Pi/2BPSK: 17M9G7D<br>QPSK: 17M9G7D<br>16QAM: 17M9W7D<br>64QAM: 17M9W7D<br>256QAM: 17M9W7D |
| | **NR Band n48**<br>**Channel Bandwidth: 40MHz** | Pi/2BPSK: 35M6G7D<br>QPSK: 35M6G7D<br>16QAM: 35M7W7D<br>64QAM: 35M7W7D<br>256QAM: 35M6W7D |
| **MAX. EIRP POWER** | **NR Band n48**<br>**Channel Bandwidth: 10MHz** | 171.79mW |
| | **NR Band n48**<br>**Channel Bandwidth: 20MHz z** | 170.61mW |

| | | |
|---|---|---|
| | **NR Band n48**<br>**Channel Bandwidth: 40MHz** | 178.38mW |
| **ANTENNA GAIN** | PIFA Antenna with -1.3dBi gain for NR Band n48 | |
| **HW VERSION** | V02 | |
| **SW VERSION** | IS540_ROW_00.00_1_20221017 | |
| **I/O PORTS** | Refer to user's manual | |
| **DATA CABLE** | USB cable1: non-shielded cable, with w/o ferrite core, 1.0 meter<br>USB cable2: non-shielded cable, with w/o ferrite core, 1.0 meter | |
| **EXTREME TEMPERATURE** | -10-50 ℃ | |
| **EXTREME VOLTAGE** | 3.6V - 4.2V | |

**NOTE**:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and four receiver.

| MODULATION MODE | TX FUNCTION |
|---|---|
| NR | 1TX/4RX |

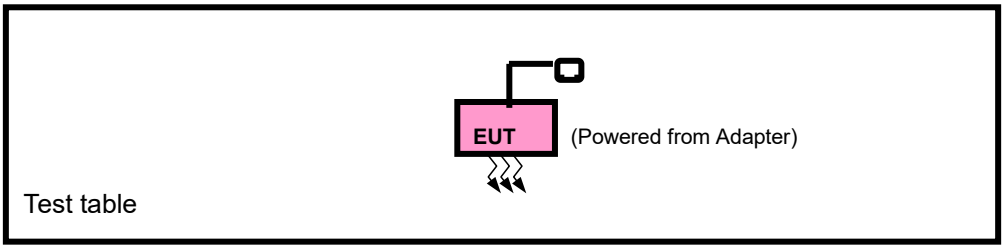
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

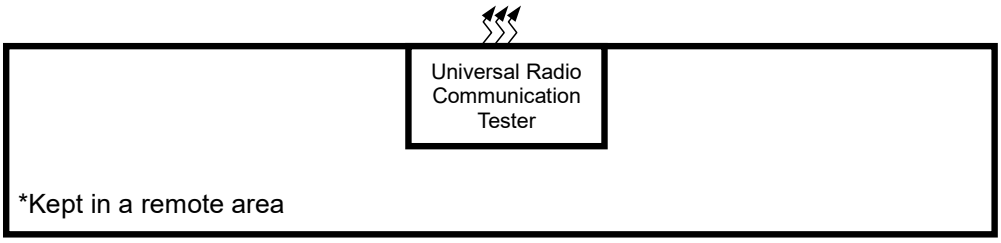
**List of Accessory:**

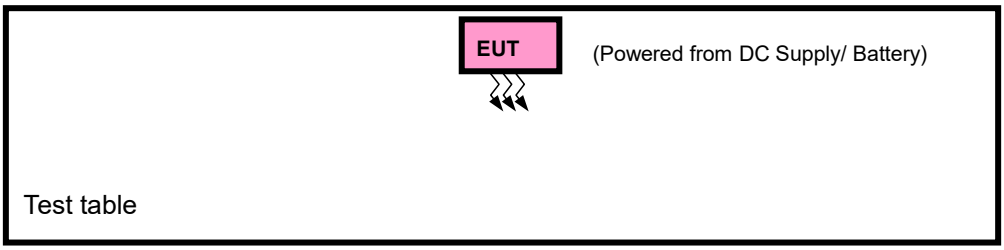
| ACCESSORIES | BRAND | MANUFACTURER | MODEL | SPECIFICATION |
|---|---|---|---|---|
| Battery | N/A | FPR Connectivity Technology Inc. | MBP540A01 | Capacity: 3.7Vdc, 4400mAh |
| AC Adapter | N/A | SHENZHEN SHI YINGYUAN POWER SUPPLY TECHNOLOGY CO., LTD. | ICP12-050-2000B | I/P: 100-240Vac, 0.3A,<br>O/P: 5.0Vdc, 2A |
| USB Cable 1 | N/A | Winpower Technology Co., LTD | PROTECTOR 2.0 | Signal Line,1.0meter |
| USB Cable 2 | N/A | Winpower Technology Co., LTD | USB2.0 | Signal Line,1.0meter |

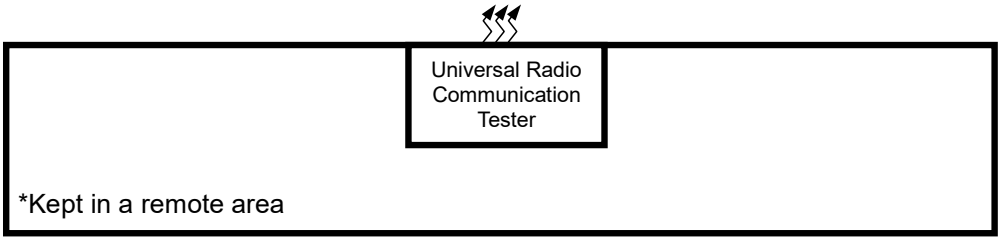
## 2.2 CONFIGURATION OF SYSTEM UNDER TEST

### FOR RADIATION EMISSION TEST



## 2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | DC source | LONG WEI | PS-6403D | 010934269 | N/A |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | DC Line: Unshielded, Detachable 1.8m |

## 2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports The worst case was found when positioned on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | DESCRIPTION |
|---|---|
| A | EUT + Adapter + USB Cable with 5G NR link |
| B | EUT + DC Supply with 5G NR link |

**5G NR n48 MODE (SA_n25, DC_2A_n48, DC_5A_n48, DC_13A_n48, DC_66A_n48,)**

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CP-OFDM CHANNEL | AVAILABLE DFT-S-OFDM CHANNEL | TESTED CHANNEL | CHANNEL BANDWIDTH | MODULATION | MODE(DFT-S-OFDM) (INCLUDE CP-OFDM) |
|---|---|---|---|---|---|---|---|
| A | EIRP | 637000 to 646332 | 637000 to 646332 | Low, Middle, High | 10MHz | QPSK | 1RB/ 0RB Offset |
| | | 637334 to 646000 | 637334 to 646000 | Low, Middle, High | 20MHz | QPSK, | 1RB/ 0RB Offset |
| | | 638000 to 645332 | 638000 to 645332 | Low, Middle, High | 40MHz | Pi/2BPSK,QPSK, 16QAM, 64QAM, 256QAM | 1RB/ 0RB Offset |
| B | FREQUENCY STABILITY | 637334 to 646000 | 637334 to 646000 | Low, Middle, High | 20MHz | QPSK | Outer_ Full |
| A | PEAK TO AVERAGE RATIO | 637334 to 646000 | 637334 to 646000 | Low, Middle, High | 20MHz | QPSK | Outer_ Full |
| A | OCCUPIED BANDWIDTH | 637000 to 646332 | 637000 to 646332 | Middle | 10MHz | Pi/2BPSK,QPSK, 16QAM, 64QAM, 256QAM | Outer_ Full |
| | | 637334 to 646000 | 637334 to 646000 | Middle | 20MHz | Pi/2BPSK,QPSK, 16QAM, 64QAM, 256QAM | Outer_ Full |
| | | 638000 to 645332 | 638000 to 645332 | Middle | 40MHz | Pi/2BPSK,QPSK, 16QAM, 64QAM, 256QAM | Outer_ Full |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | BAND EDGE | 637000 to 646332 | 637000 to 646332 | Low | 10MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 10MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |
| | | 637334 to 646000 | 637334 to 646000 | Low | 20MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 20MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |
| | | 638000 to 645332 | 638000 to 645332 | Low | 40MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 40MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |
| A | CONDUCTED EMISSION | 637000 to 646332 | 637000 to 646332 | Low, Middle, High | 10MHz | QPSK | 1RB/ 0RB Offset |
| | | 637334 to 646000 | 637334 to 646000 | Low, Middle, High | 20MHz | QPSK | 1RB/ 0RB Offset |
| | | 638000 to 645332 | 638000 to 645332 | Low, Middle, High | 40MHz | QPSK | 1RB/ 0RB Offset |
| A | RADIATED EMISSION | 637000 to 646332 | 637000 to 646332 | Low, Middle, High | 10MHz | QPSK | 1RB/ 0RB Offset |
| | | 637334 to 646000 | 637334 to 646000 | Middle | 20MHz | QPSK | 1RB/ 0RB Offset |
| | | 638000 to 645332 | 638000 to 645332 | Middle, | 40MHz | QPSK | 1RB/ 0RB Offset |
| A | ACLR | 637000 to 646332 | 637000 to 646332 | Low | 10MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 10MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |
| | | 637334 to 646000 | 637334 to 646000 | Low | 20MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 20MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |
| | | 638000 to 645332 | 638000 to 645332 | Low | 40MHz | QPSK | 1RB/ 0RB Offset |
| | | | | | | | Outer_ Full |
| | | | | High | 40MHz | QPSK | 1RB/ max Offset |
| | | | | | | | Outer_ Full |

**Note:** 1.This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

2. The test data presented in the report from worst SA_n48

## TEST CONDITION:

| TEST ITEM | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| ERP&EIRP | 23deg. C, 70%RH | DC 5V By Adapter | Jace Hu |
| FREQUENCY STABILITY | 23deg. C, 70%RH | DC 3.6V/3.7V/4.2V By DC Supply | James Fu |
| OCCUPIED BANDWIDTH | 23deg. C, 70%RH | DC5V By Adapter | James Fu |
| BAND EDGE | 23deg. C, 70%RH | DC 5V By Adapter | James Fu |
| CONDCUDETED EMISSION | 23deg. C, 70%RH | DC5V By Adapter | James Fu |
| RADIATED EMISSION | 23deg. C, 70%RH | DC5V By Adapter | Jace Hu |
| PEAK TO AVERAGE RATIO | 23deg. C, 70%RH | DC5V By Adapter | James Fu |

## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 96**

**KDB 971168 D02 Power Meas License Digital Systems v02r02**

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

**NOTE:** All test items have been performed and recorded as per the above standards.

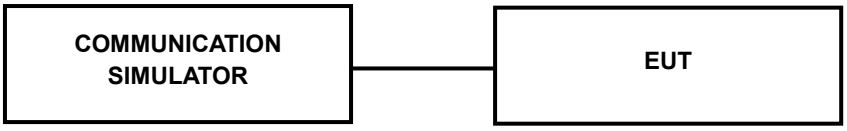
# 3 TEST TYPES AND RESULTS

## 3.1 MAXIMUM EIRP MEASUREMENT

### 3.1.1 LIMITS OF MAXIMUM EIRP MEASUREMENT

| Device | Maximum EIRP (dBm/10 MHz) |
|---|---|
| End User Device | 23 |
| Category A CBSD | 30 |
| Category B CBSD | 47 |

### 3.1.2 TEST SETUP




For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 3.1.3 TEST PROCEDURES

**EIRP MEASUREMENT:**

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determing the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP or EIRP = $P_{Meas} + G_T - L_C$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as $P_{Meas}$, typically dBW or dBm);

$P_{Meas}$ = measured transmitter output power or PSD, in dBm or dBW;

$G_T$ = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

$L_C$ = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

**CONDUCTED POWER MEASUREMENT:**

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

## 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

## 3.1.5 TEST RESULTS

**5G SA**

**N48**

| BW | MCS Index | RB Size | RB Offset | Low CH 637000 | Mid CH 641666 | High CH 646332 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3555MHz | Frequency 3624.99MHz | Frequency 3694.98MHz |
| 10M | CP-OFDM QPSK | 1 | 1 | 22.13 | 22.14 | 22.09 |

| BW | MCS Index | RB Size | RB Offset | Low CH 637334 | Mid CH 641666 | High CH 646000 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3560.01MHz | Frequency 3624.99MHz | Frequency 3690MHz |
| 20M | CP-OFDM QPSK | 1 | 1 | 22.09 | 22.09 | 22.18 |

| BW | MCS Index | RB Size | RB Offset | Low CH 638000 | Mid CH 641666 | High CH 645332 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3570MHz | Frequency 3624.99MHz | Frequency 3679.98MHz |
| 40M | CP-OFDM QPSK | 1 | 1 | 22.13 | 22.15 | 22.17 |

| BW | MCS Index | RB Size | RB Offset | Low CH 637000 | Mid CH 641666 | High CH 646332 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3555MHz | Frequency 3624.99MHz | Frequency 3694.98MHz |
| 10M | DFT-s-OFDM QPSK | 1 | 1 | 23.63 | 23.65 | 23.59 |

| BW | MCS Index | RB Size | RB Offset | Low CH 637334 | Mid CH 641666 | High CH 646000 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3560.01MHz | Frequency 3624.99MHz | Frequency 3690MHz |
| 20M | DFT-s-OFDM QPSK | 1 | 1 | 23.60 | 23.62 | 23.58 |

| BW | MCS Index | RB Size | RB Offset | Low CH 638000 | Mid CH 641666 | High CH 645332 |
|---|---|---|---|---|---|---|
| | | | | Frequency 3570MHz | Frequency 3624.99MHz | Frequency 3679.98MHz |
| 40M | DFT-s-OFDM Pi/2 BPSK | 1 | 1 | 23.57 | 23.65 | 23.67 |
| | | 1 | 53 | 23.41 | 23.51 | 23.46 |
| | | 1 | 104 | 23.39 | 23.57 | 23.48 |
| | | 50 | 0 | 23.01 | 23.11 | 23.10 |
| | | 50 | 28 | 23.35 | 23.50 | 23.42 |
| | | 50 | 56 | 22.97 | 23.10 | 23.08 |
| | | 100 | 0 | 22.95 | 23.12 | 23.04 |
| | DFT-s-OFDM QPSK | 1 | 1 | 23.63 | 23.69 | 23.65 |
| | | 1 | 53 | 23.32 | 23.45 | 23.38 |
| | | 1 | 104 | 23.38 | 23.53 | 23.44 |
| | | 50 | 0 | 22.46 | 22.54 | 22.56 |
| | | 50 | 28 | 23.43 | 23.53 | 23.48 |
| | | 50 | 56 | 22.46 | 22.63 | 22.55 |
| | | 100 | 0 | 22.41 | 22.46 | 22.47 |
| | DFT-s-OFDM 16QAM | 1 | 1 | 22.29 | 22.39 | 22.38 |
| | DFT-s-OFDM 64QAM | 1 | 1 | 20.48 | 20.63 | 20.55 |
| | DFT-s-OFDM 256QAM | 1 | 1 | 18.54 | 18.67 | 18.65 |

**EIRP**

**N48**

**CHANNEL BANDWIDTH: 10MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MH) |
|---|---|---|---|---|---|---|
| 637000 | 3555.00 | 23.63 | -1.3 | 22.33 | 171 | 23 |
| 641666 | 3624.99 | 23.65 | -1.3 | 22.35 | 171.79 | 23 |
| 646332 | 3694.98 | 23.59 | -1.3 | 22.29 | 169.43 | 23 |

**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 637334 | 3560.01 | 23.6 | -1.3 | 22.3 | 169.82 | 23 |
| 641666 | 3624.99 | 23.62 | -1.3 | 22.32 | 170.61 | 23 |
| 646000 | 3690.00 | 23.58 | -1.3 | 22.28 | 169.04 | 23 |

**CHANNEL BANDWIDTH: 40MHz Pi/2 BPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 638000 | 3570.00 | 23.57 | -1.3 | 22.27 | 168.66 | 23 |
| 641666 | 3624.99 | 23.65 | -1.3 | 22.35 | 171.79 | 23 |
| 645332 | 3679.98 | 23.67 | -1.3 | 22.37 | 172.58 | 23 |

**CHANNEL BANDWIDTH: 40MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 638000 | 3570.00 | 23.63 | -1.3 | 22.33 | 171 | 23 |
| 641666 | 3624.99 | 23.69 | -1.3 | 22.39 | 173.38 | 23 |
| 645332 | 3679.98 | 23.65 | -1.3 | 22.35 | 171.79 | 23 |

**CHANNEL BANDWIDTH: 40MHz 16QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 638000 | 3570.00 | 22.29 | -1.3 | 20.99 | 125.6 | 23 |
| 641666 | 3624.99 | 22.39 | -1.3 | 21.09 | 128.53 | 23 |
| 645332 | 3679.98 | 22.38 | -1.3 | 21.08 | 128.23 | 23 |

**CHANNEL BANDWIDTH: 40MHz 64QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 638000 | 3570.00 | 20.48 | -1.3 | 19.18 | 82.79 | 23 |
| 641666 | 3624.99 | 20.63 | -1.3 | 19.33 | 85.7 | 23 |
| 645332 | 3679.98 | 20.55 | -1.3 | 19.25 | 84.14 | 23 |

**CHANNEL BANDWIDTH: 40MHz 256QAM**

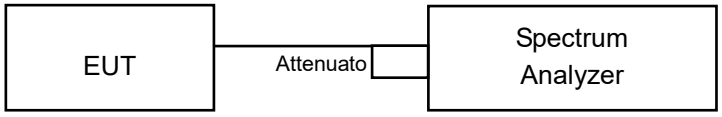
| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_T$-$L_C$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (dBm/10MHz) |
|---|---|---|---|---|---|---|
| 638000 | 3570.00 | 18.54 | -1.3 | 17.24 | 52.97 | 23 |
| 641666 | 3624.99 | 18.67 | -1.3 | 17.37 | 54.58 | 23 |
| 645332 | 3679.98 | 18.65 | -1.3 | 17.35 | 54.33 | 23 |

## 3.2 CONDUCTED BAND EDGE

### 3.2.1 LIMITS OF CONDUCTED BAND EDGE MEASUREMENT

The conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed-13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within O to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

### 3.2.2 TEST SETUP




### 3.2.3 TEST INSTRUMENTS

Refer to section 1.2 to get information of above instrument.

### 3.2.4 TEST PROCEDURE

## For the Conducted Band Edge:

a. Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
b. Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW).

c. Set the resolution bandwidth (RBW) ≧ 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
d. Beyond the 1MHz band from the band edge, RBW=1MHz was used.

e. Set the video bandwidth (VBW) to ≧3 x RBW.

f. Select the average power (RMS) display detector.

g. Set the number of measurement points to ≧ 1001.

h. Use auto-coupled sweep time.

i. Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.

j. The RF fundamental frequency should be excluded against the limit line in the operating frequency band and use RBW is 10KHz or 100KHz.

k. Record the max trace plot into the test report.

## For Adjacent Channel Leakage Ratio (ACLR) measurement:

1. The Adjacent Channel Leakage Ratio (ACLR) is the ratio of the average power in the assigned aggregated channel bandwidth to the average power over the equivalent adjacent channel bandwidth.

2. The option ACLR of spectrum analyzer is used and measures the ACLR ratio by setting equivalent channel bandwidth.

3. The measured ACLR ratio shall be at least 30 dB.

### 3.2.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.2.6 TEST RESULTS

Please Refer to Appendix Of this test report.

## 3.3 FREQUENCY STABILITY MEASUREMENT

### 3.3.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band.

### 3.3.2 TEST PROCEDURE

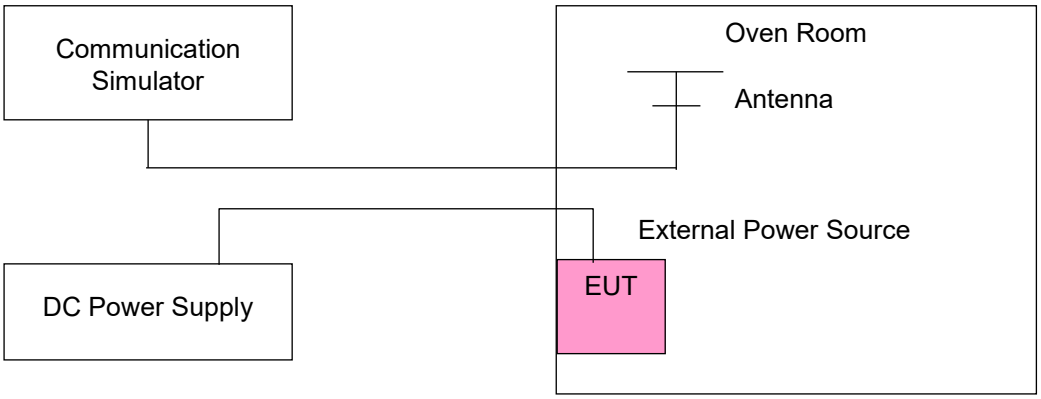
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

### 3.3.3 TEST SETUP



## 3.3.4 TEST RESULTS

Please Refer to Appendix Of this test report.

**LTE BAND CA_48C**

| LTE BAND CA_48C channel and Frequency List | | | | | |
|---|---|---|---|---|---|
| **BW(MHz)** | **Channel/Frequcncy(MHz)** | | **Lowest** | **Middle** | **Highest** |
| 5+20 | PCC | channel | 55273 | 55898 | 56523 |
| | | Frequcncy | 3553.3 | 3615.8 | 3678.3 |
| | SCC | channel | 55390 | 56015 | 56640 |
| | | Frequcncy | 3565 | 3627.5 | 3690 |
| 10+20 | PCC | channel | 55295 | 55896 | 56496 |
| | | Frequcncy | 3555.5 | 3615.6 | 3675.6 |
| | SCC | channel | 55439 | 56040 | 56640 |
| | | Frequcncy | 3569.9 | 3630 | 3690 |
| 15+20 | PCC | channel | 55318 | 55893 | 56496 |
| | | Frequcncy | 3557.8 | 3615.3 | 3672.9 |
| | SCC | channel | 55489 | 55064 | 56640 |
| | | Frequcncy | 3574.9 | 3632.4 | 3690 |
| 20+5 | PCC | channel | 55340 | 55965 | 56590 |
| | | Frequcncy | 3560 | 3622.5 | 3685 |
| | SCC | channel | 55457 | 56082 | 56707 |
| | | Frequcncy | 3571.7 | 3634.2 | 3696.7 |
| 20+10 | PCC | channel | 55340 | 55941 | 56541 |
| | | Frequcncy | 3560 | 3620.1 | 3680.1 |
| | SCC | channel | 55484 | 56085 | 56685 |
| | | Frequcncy | 3574.4 | 3634.5 | 3694.5 |
| 20+15 | PCC | channel | 55340 | 55916 | 56491 |
| | | Frequcncy | 3560 | 3617.6 | 3675.1 |
| | SCC | channel | 55511 | 56087 | 56662 |
| | | Frequcncy | 3577.1 | 3634.7 | 3692.2 |
| 20+20 | PCC | channel | 55340 | 55891 | 56442 |
| | | Frequcncy | 3560 | 3615.1 | 3670.2 |

| | | | | | |
|---|---|---|---|---|---|
| | SCC | channel | 55538 | 56089 | 56640 |
| | | Frequcncy | 3579.8 | 3634.9 | 3690 |

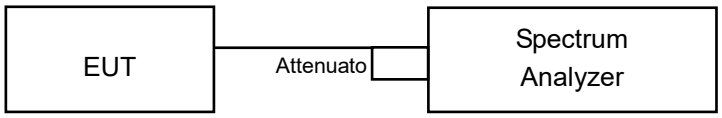
Note: VL = Low voltage(3.6V); VN/NV = Normal voltage(3.7V); VH = High voltage(4.2V);
NT = Normal temperature (25℃)

## 3.4 OCCUPIED BANDWIDTH MEASUREMENT

### 3.4.1 OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

### 3.4.2 TEST SETUP




### 3.4.3 TEST INSTRUMENTS

Refer to section 1.2 to get information of above instrument.

### 3.4.4 TEST PROCEDURE

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4.6 TEST RESULT

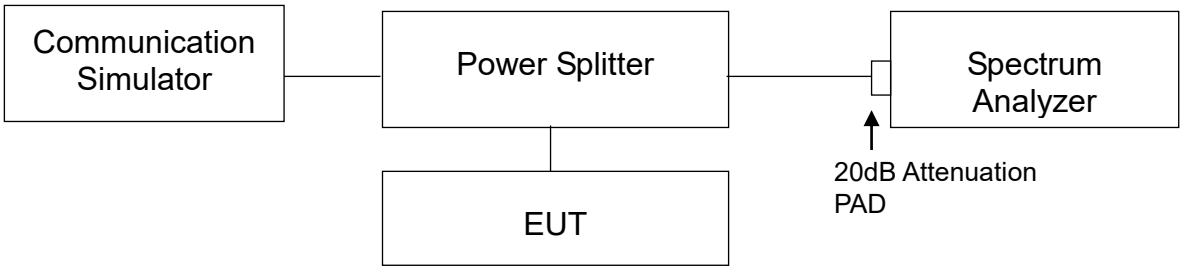
Please Refer to Appendix Of this test report.

## 3.5 CONDUCTED SPURIOUS EMISSIONS

### 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

### 3.5.2 TEST SETUP




### 3.5.3 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 40 GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 3.5.4 TEST RESULTS

Please Refer to Appendix Of this test report.

## 3.6 RADIATED EMISSION MEASUREMENT

### 3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

### 3.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

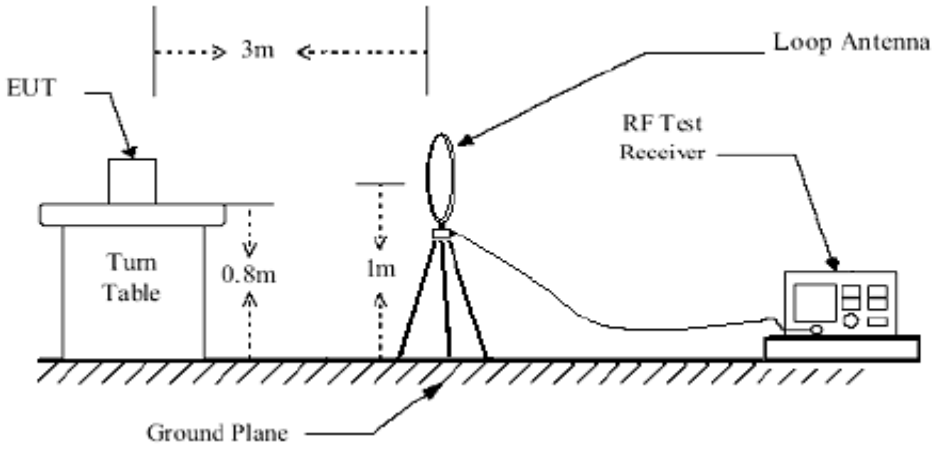
**Note:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 3.6.3 DEVIATION FROM TEST STANDARD

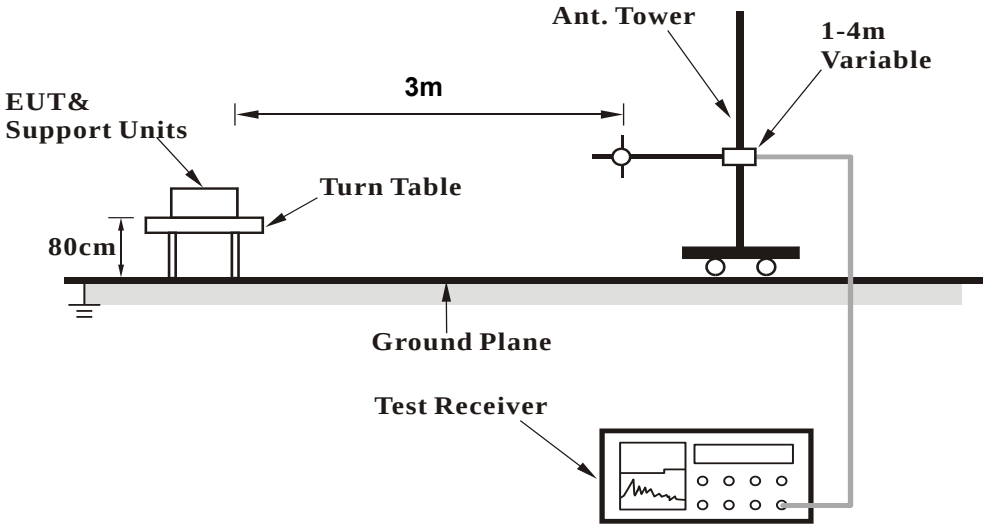
No deviation.

## 3.6.4 TEST SET UP

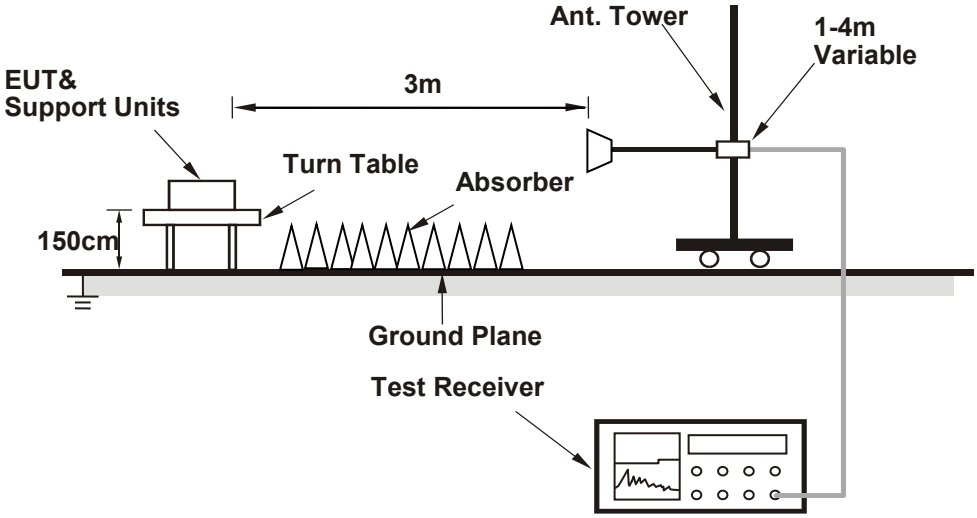
**< Frequency Range below 30MHz >**




**<Frequency Range below 1GHz>**



**<Frequency Range above 1GHz>**




For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 3.6.5 TEST RESULTS

NOTE ： The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

**5G SA BELOW 1GHz WORST-CASE DATA**

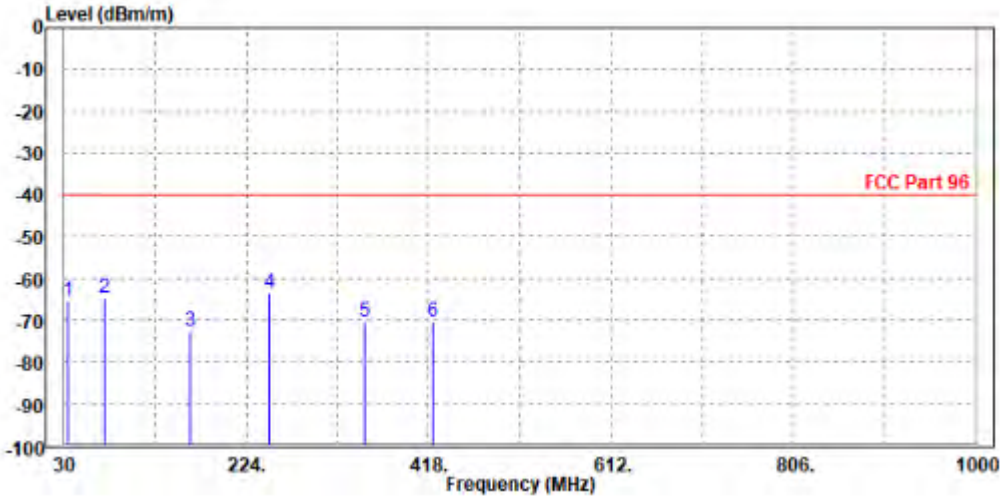
**30 MHz – 1GHz data:**

**N48**

**CHANNEL BANDWIDTH: 10MHz / QPSK**

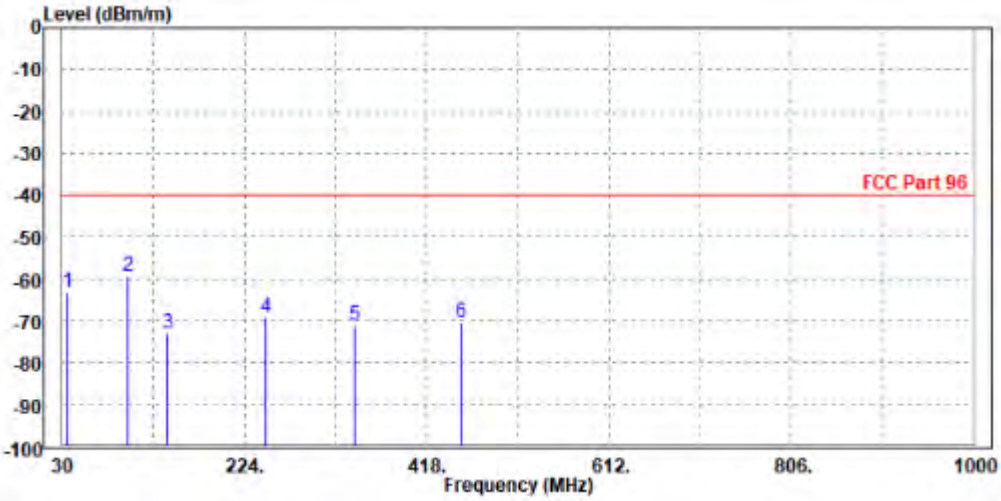
| **MODE** | TX channel 646332 | **FREQUENCY RANGE** | Below 1000MHz |
|---|---|---|---|
| **ENVIRONMENTAL CONDITIONS** | 23deg. C, 70%RH | **INPUT POWER** | AC 120V/60HZ |
| **TESTED BY** | Jace Hu | | |
| **ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M** | | | |

| | | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | | 34.850 | -65.39 | -53.35 | -40.00 | -25.39 | -12.04 | Peak | Horizontal |
| 2 | | 72.680 | -64.64 | -43.39 | -40.00 | -24.64 | -21.25 | Peak | Horizontal |
| 3 | | 164.830 | -72.53 | -56.41 | -40.00 | -32.53 | -16.12 | Peak | Horizontal |
| 4 | PP | 248.250 | -63.52 | -51.86 | -40.00 | -23.52 | -11.66 | Peak | Horizontal |
| 5 | | 349.130 | -70.32 | -59.05 | -40.00 | -30.32 | -11.27 | Peak | Horizontal |
| 6 | | 422.850 | -70.30 | -60.68 | -40.00 | -30.30 | -9.62 | Peak | Horizontal |



| MODE | TX channel 646332 | FREQUENCY RANGE | Below 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60HZ |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | | 35.820 | -63.23 | -41.85 | -40.00 | -23.23 | -21.38 | Peak | Vertical |
| 2 | PP | 99.840 | -59.31 | -52.80 | -40.00 | -19.31 | -6.51 | Peak | Vertical |
| 3 | | 142.520 | -73.16 | -58.91 | -40.00 | -33.16 | -14.25 | Peak | Vertical |
| 4 | | 247.280 | -69.20 | -55.36 | -40.00 | -29.20 | -13.84 | Peak | Vertical |
| 5 | | 341.370 | -71.28 | -61.22 | -40.00 | -31.28 | -10.06 | Peak | Vertical |
| 6 | | 454.860 | -70.41 | -61.92 | -40.00 | -30.41 | -8.49 | Peak | Vertical |



**ABOVE 1GHz**

**Note:** For higher frequency, the emission is too low to be detected.

**N48**

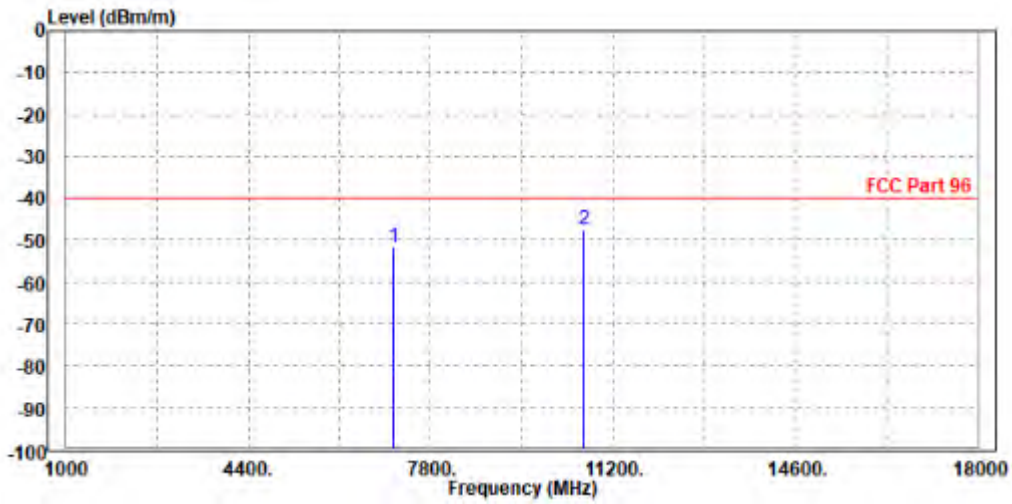
**Note: For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet.**

**CHANNEL BANDWIDTH: 10MHz / QPSK**

**CH637000**

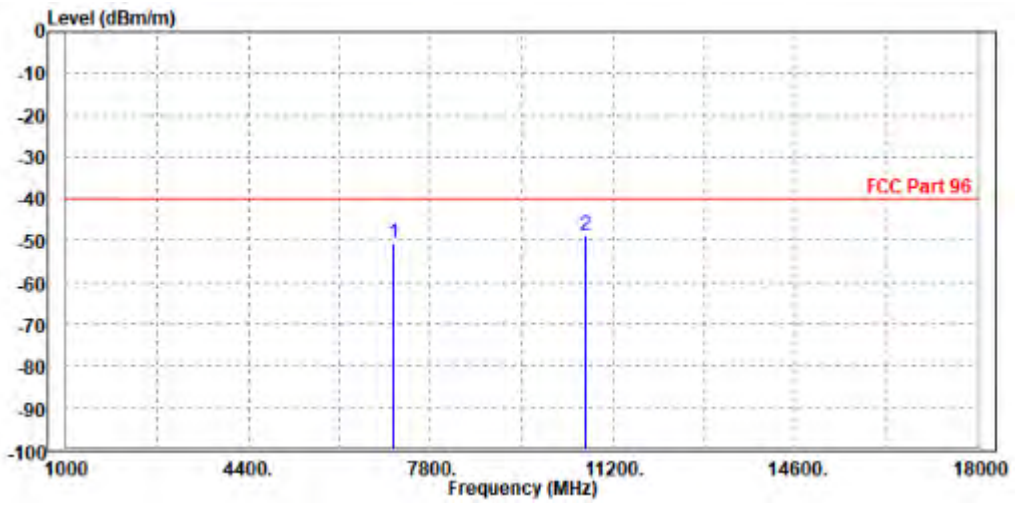
| **MODE** | TX channel 637000 | **FREQUENCY RANGE** | Above 1000MHz |
|---|---|---|---|
| **ENVIRONMENTAL CONDITIONS** | 23deg. C, 70%RH | **INPUT POWER** | AC 120V/60Hz |
| **TESTED BY** | Jace Hu | | |
| **ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M** | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7103.000 | -51.58 | -63.64 | -40.00 | -11.58 | 12.06 | Peak | Horizontal |
| 2 | PP10665.000 | -47.36 | -66.40 | -40.00 | -7.36 | 19.04 | Peak | Horizontal |



| MODE | TX channel 637000 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

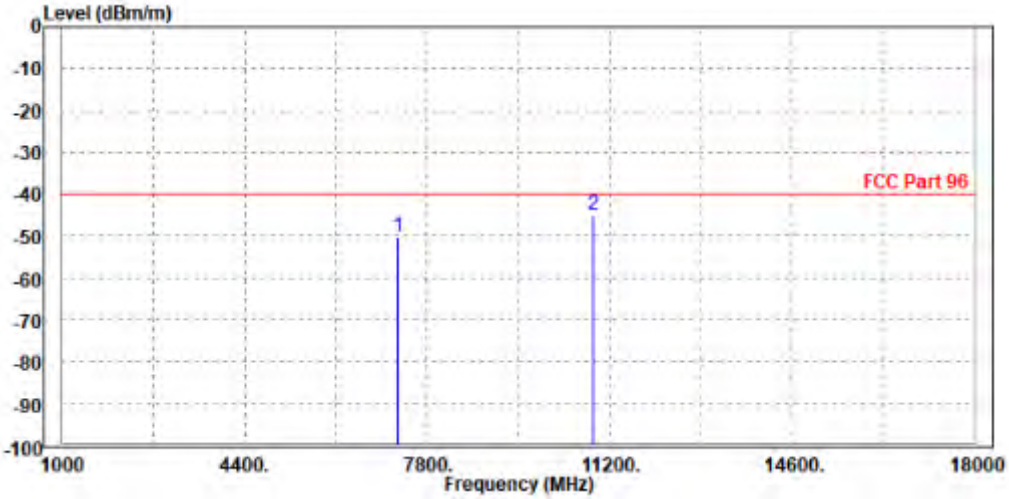
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7110.000 | -50.48 | -63.64 | -40.00 | -10.48 | 13.16 | Peak | Vertical |
| 2 | PP10673.000 | -48.77 | -67.49 | -40.00 | -8.77 | 18.72 | Peak | Vertical |



**CH641666**

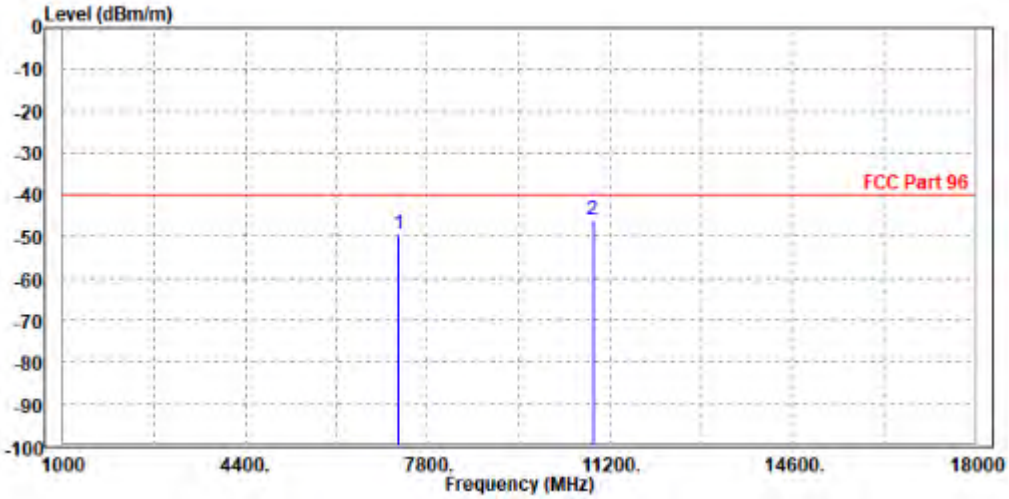
| MODE | TX channel 641666 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7249.980 | -50.12 | -61.94 | -40.00 | -10.12 | 11.82 | Peak | Horizontal |
| 2 | PP10877.000 | -44.98 | -64.60 | -40.00 | -4.98 | 19.62 | Peak | Horizontal |



| MODE | TX channel 641666 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

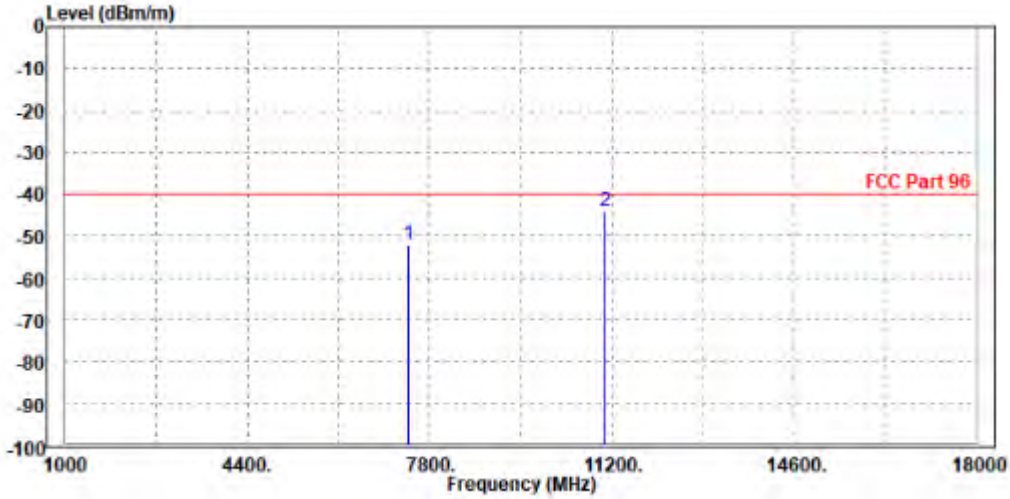
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7256.000 | -49.49 | -63.23 | -40.00 | -9.49 | 13.74 | Peak | Vertical |
| 2 | PP10874.970 | -46.15 | -65.82 | -40.00 | -6.15 | 19.67 | Peak | Vertical |



**CH646332**

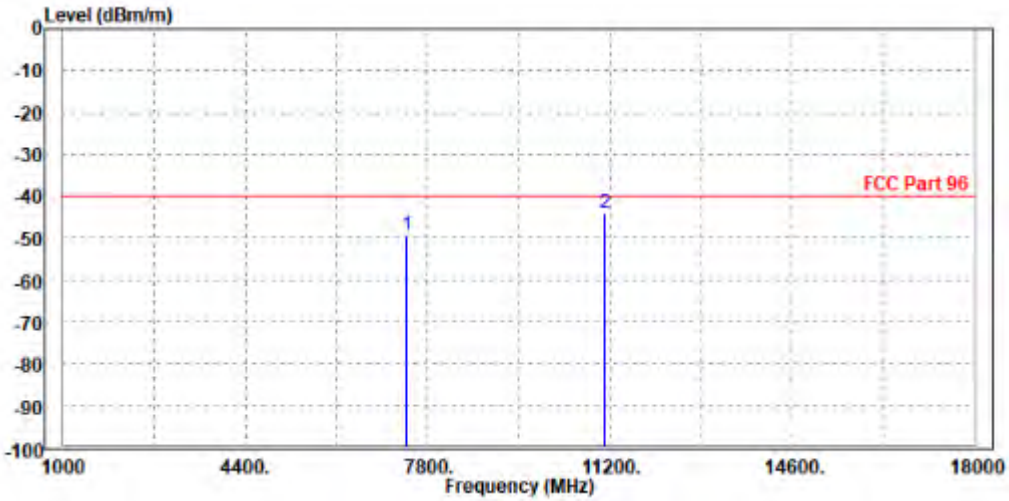
| MODE | TX channel 646332 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7389.960 | -52.15 | -63.75 | -40.00 | -12.15 | 11.60 | Peak | Horizontal |
| 2 | PP11081.000 | -44.14 | -64.20 | -40.00 | -4.14 | 20.06 | Peak | Horizontal |



| MODE | TX channel 646332 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

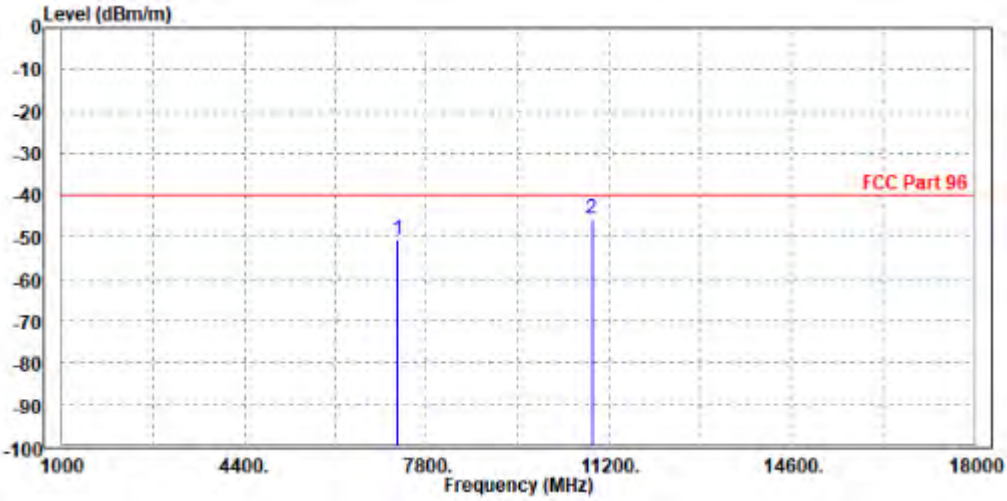
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7392.000 | -49.49 | -63.76 | -40.00 | -9.49 | 14.27 | Peak | Vertical |
| 2 | PP11084.940 | -43.97 | -63.77 | -40.00 | -3.97 | 19.80 | Peak | Vertical |



**CHANNEL BANDWIDTH: 20MHz / QPSK**

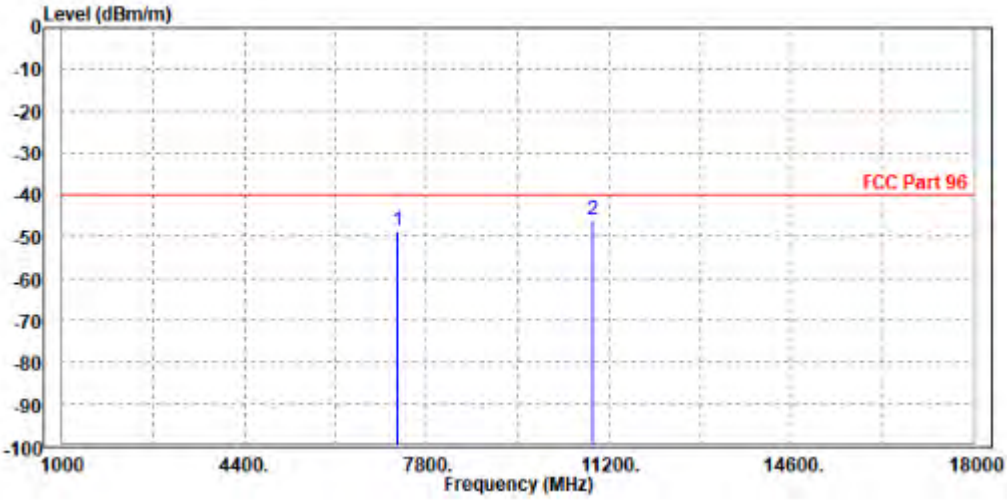
| | | | |
|---|---|---|---|
| **MODE** | TX channel 641666 | **FREQUENCY RANGE** | Above 1000MHz |
| **ENVIRONMENTAL CONDITIONS** | 23deg. C, 70%RH | **INPUT POWER** | AC 120V/60Hz |
| **TESTED BY** | Jace Hu | | |
| **ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M** | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7256.000 | -50.49 | -62.30 | -40.00 | -10.49 | 11.81 | Peak | Horizontal |
| 2 | PP10874.970 | -45.54 | -65.15 | -40.00 | -5.54 | 19.61 | Peak | Horizontal |



| MODE | TX channel 641666 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

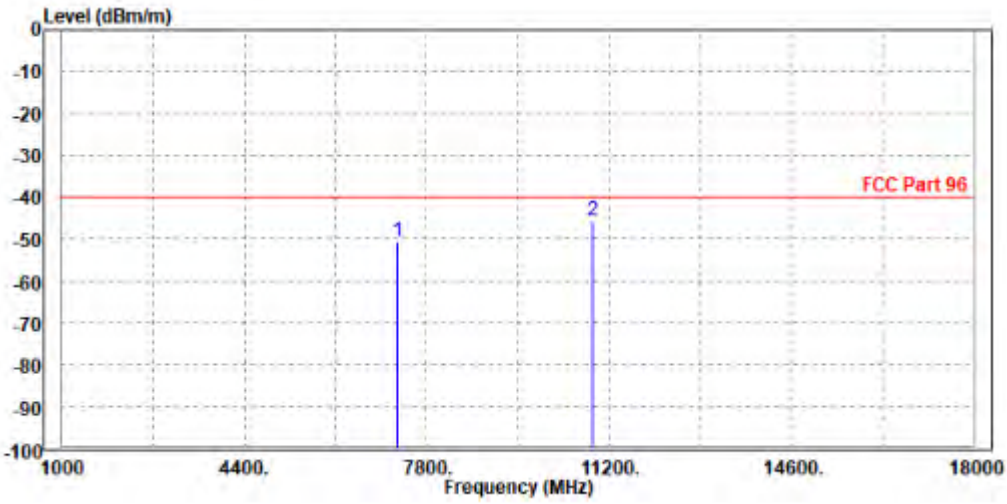
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7249.970 | -48.74 | -62.45 | -40.00 | -8.74 | 13.71 | Peak | Vertical |
| 2 | PP10877.000 | -45.98 | -65.66 | -40.00 | -5.98 | 19.68 | Peak | Vertical |



**CHANNEL BANDWIDTH: 40MHz / QPSK**

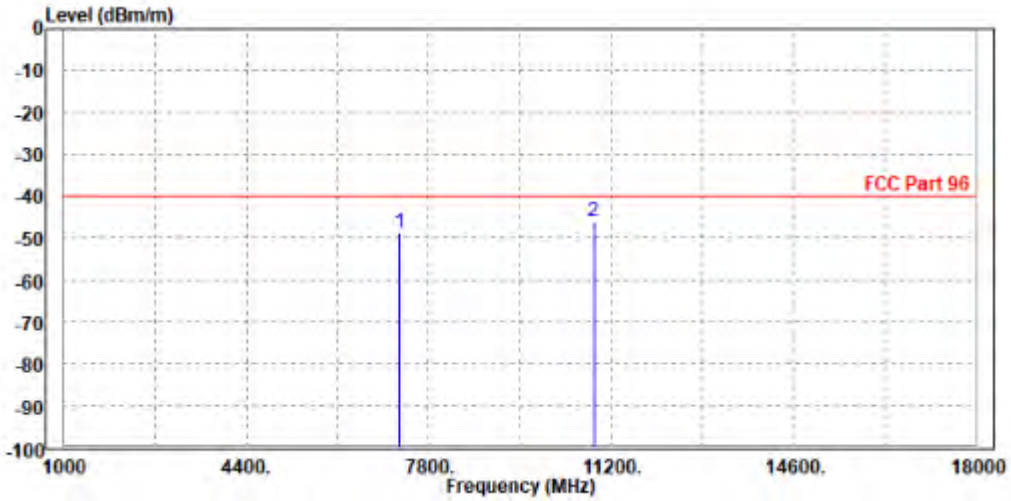
| | | | |
|---|---|---|---|
| **MODE** | TX channel 641666 | **FREQUENCY RANGE** | Above 1000MHz |
| **ENVIRONMENTAL CONDITIONS** | 23deg. C, 70%RH | **INPUT POWER** | AC 120V/60Hz |
| **TESTED BY** | Jace Hu | | |
| **ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M** | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7249.980 | -50.53 | -62.35 | -40.00 | -10.53 | 11.82 | Peak | Horizontal |
| 2 | PP10877.000 | -45.71 | -65.33 | -40.00 | -5.71 | 19.62 | Peak | Horizontal |



| MODE | TX channel 641666 | FREQUENCY RANGE | Above 1000MHz |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | AC 120V/60Hz |
| TESTED BY | Jace Hu | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 7256.000 | -48.53 | -62.27 | -40.00 | -8.53 | 13.74 | Peak | Vertical |
| 2 | PP10874.970 | -46.05 | -65.72 | -40.00 | -6.05 | 19.67 | Peak | Vertical |

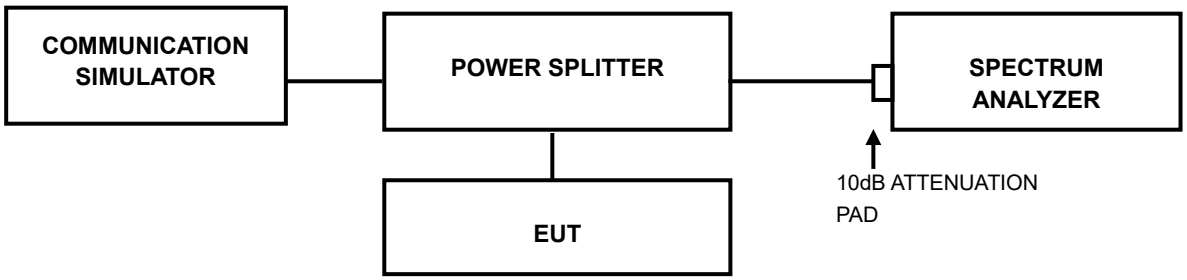


## 3.7 PEAK TO AVERAGE RATIO

### 3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

### 3.7.2 TEST SETUP




### 3.7.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

### 3.7.4 TEST RESULTS

Please Refer to Appendix Of this test report.

# 4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Shenzhen EMC/RF Lab**:
Tel: +86-755-88696566
Fax: +86-755-88696577

**Email:** customerservice.sw@cn.bureauveritas.com
**Web Site**: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

# 5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

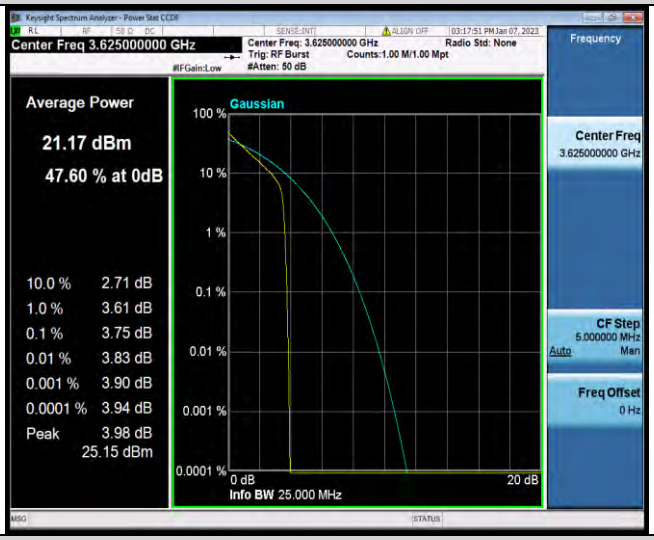
# 6 Appendix

## NR BAND N48
## PEAK-TO-AVERAGE RATIO(CCDF)
## TEST RESULT

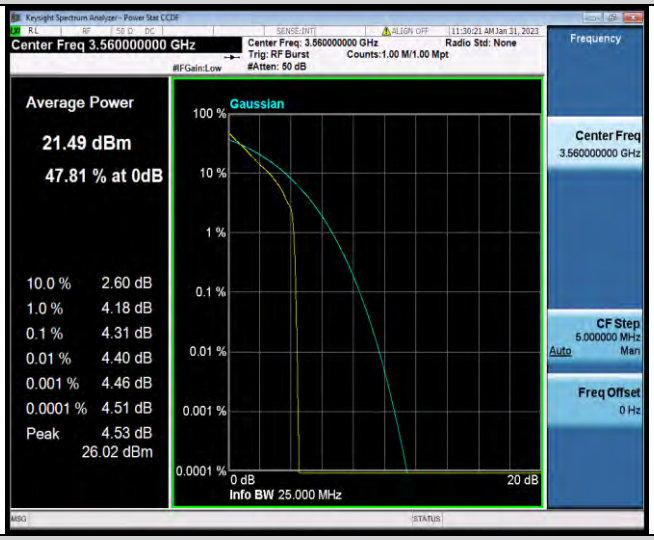
| Band | Bandwidth | Modulation | Channel | RB Configuration | Result(dB) | Limit(dB) | Verdict |
|---|---|---|---|---|---|---|---|
| N48 | 20MHz | QPSK | 637334 | 1RB#0 | 4.31 | 13 | PASS |
| N48 | 20MHz | QPSK | 637334 | 50RB#0 | 4.70 | 13 | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#0 | 3.75 | 13 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | 4.88 | 13 | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#0 | 3.97 | 13 | PASS |
| N48 | 20MHz | QPSK | 646000 | 50RB#0 | 4.57 | 13 | PASS |

## TEST GRAPHS

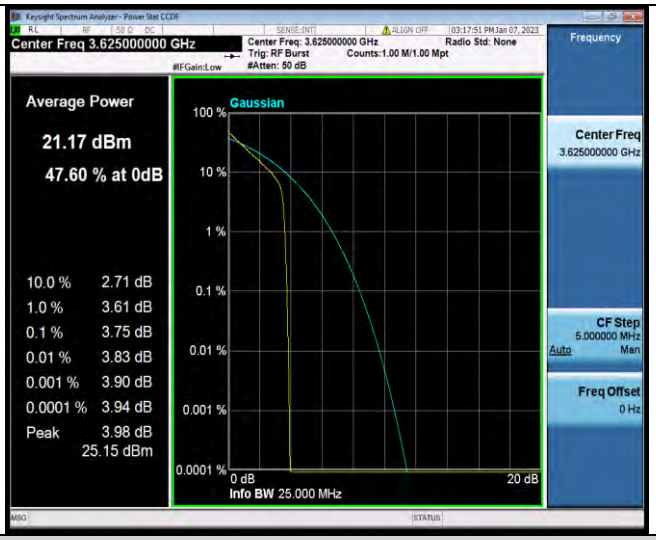
N48-20MHz-QPSK-637334-1RB#0




N48-20MHz-QPSK-637334-50RB#0

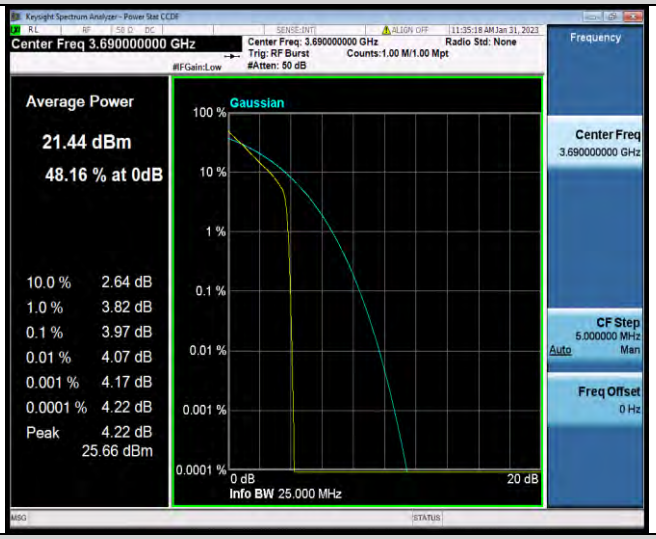



N48-20MHz-QPSK-641666-1RB#0

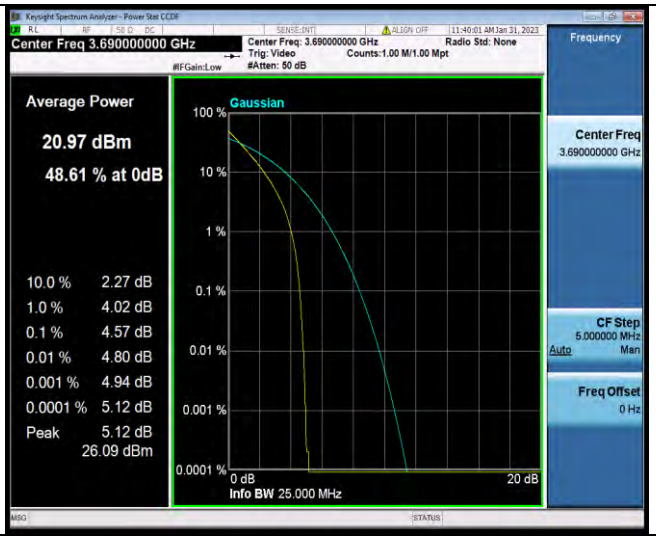



N48-20MHz-QPSK-641666-50RB#0

N48-20MHz-QPSK-646000-1RB#0




N48-20MHz-QPSK-646000-50RB#0


Keysight Spectrum Analyzer - Power Stat CCDF
Center Freq 3.690000000 GHz
Center Freq: 3.690000000 GHz
Trig: Video
#Atten: 50 dB
Counts:1.00 M/1.00 Mpt
Radio Std: None
11:40:01 AM Jan 31, 2023
Frequency
Average Power
20.97 dBm
48.61 % at 0dB
10.0 % 2.27 dB
1.0 % 4.02 dB
0.1 % 4.57 dB
0.01 % 4.80 dB
0.001 % 4.94 dB
0.0001 % 5.12 dB
Peak 5.12 dB
26.09 dBm
Gaussian
100 %
10 %
1 %
0.1 %
0.01 %
0.001 %
0.0001 %
0 dB
20 dB
Info BW 25.000 MHz
Center Freq
3.690000000 GHz
CF Step
5.000000 MHz
Auto
Man
Freq Offset
0 Hz

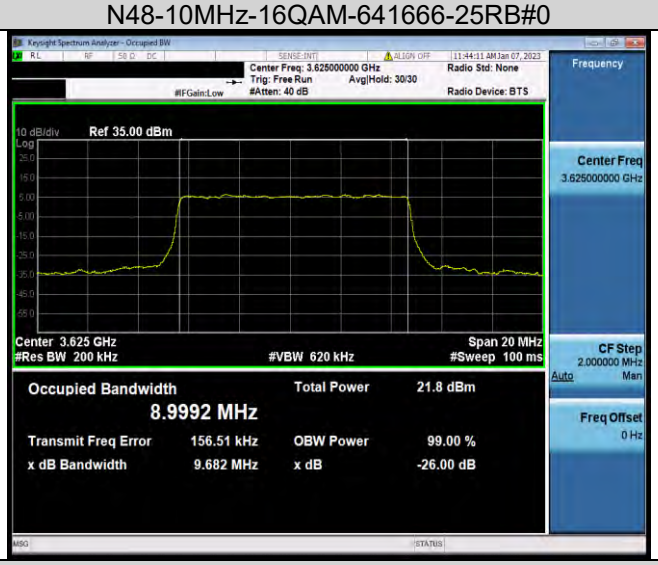
# 26DB BANDWIDTH AND OCCUPIED BANDWIDTH
## TEST RESULT

| Band | Bandwidth | Modulation | Channel | RB Configuration | Occupied Bandwidth (MHz) | 26dB Bandwidth (MHz) | Verdict |
|---|---|---|---|---|---|---|---|
| N48 | 10MHz | QPSK | 641666 | 25RB#0 | 9.0064 | 9.699 | PASS |
| N48 | 10MHz | 16QAM | 641666 | 25RB#0 | 8.9992 | 9.682 | PASS |
| N48 | 10MHz | 64QAM | 641666 | 25RB#0 | 8.9542 | 9.604 | PASS |
| N48 | 10MHz | 256QAM | 641666 | 25RB#0 | 8.9754 | 9.659 | PASS |
| N48 | 10MHz | BPSK | 641666 | 25RB#0 | 9.0018 | 9.706 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | 17.881 | 18.79 | PASS |
| N48 | 20MHz | 16QAM | 641666 | 50RB#0 | 17.872 | 18.82 | PASS |
| N48 | 20MHz | 64QAM | 641666 | 50RB#0 | 17.872 | 18.82 | PASS |
| N48 | 20MHz | 256QAM | 641666 | 50RB#0 | 17.870 | 18.75 | PASS |
| N48 | 20MHz | BPSK | 641666 | 50RB#0 | 17.877 | 18.79 | PASS |
| N48 | 40MHz | QPSK | 641666 | 100RB#0 | 35.636 | 37.00 | PASS |
| N48 | 40MHz | 16QAM | 641666 | 100RB#0 | 35.688 | 37.05 | PASS |
| N48 | 40MHz | 64QAM | 641666 | 100RB#0 | 35.681 | 37.04 | PASS |
| N48 | 40MHz | 256QAM | 641666 | 100RB#0 | 35.602 | 36.99 | PASS |
| N48 | 40MHz | BPSK | 641666 | 100RB#0 | 35.632 | 37.01 | PASS |

## TEST GRAPHS

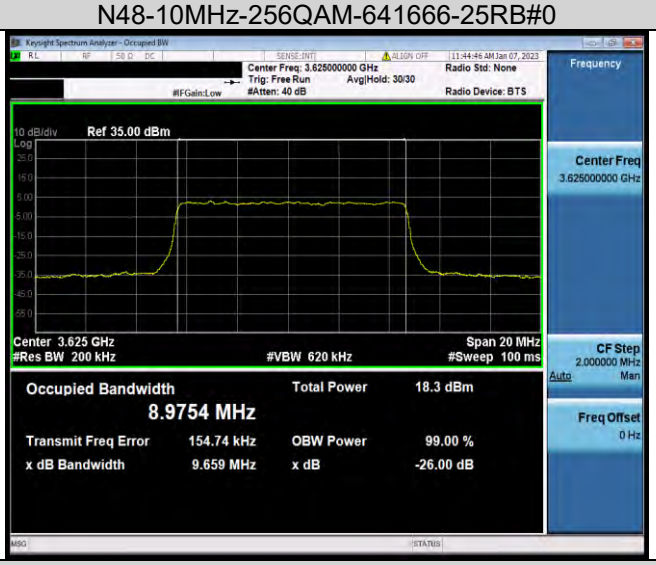
N48-10MHz-QPSK-641666-25RB#0

N48-10MHz-16QAM-641666-25RB#0




N48-10MHz-64QAM-641666-25RB#0

N48-10MHz-256QAM-641666-25RB#0




N48-10MHz-BPSK-641666-25RB#0

N48-20MHz-QPSK-641666-50RB#0

N48-20MHz-16QAM-641666-50RB#0

N48-20MHz-64QAM-641666-50RB#0

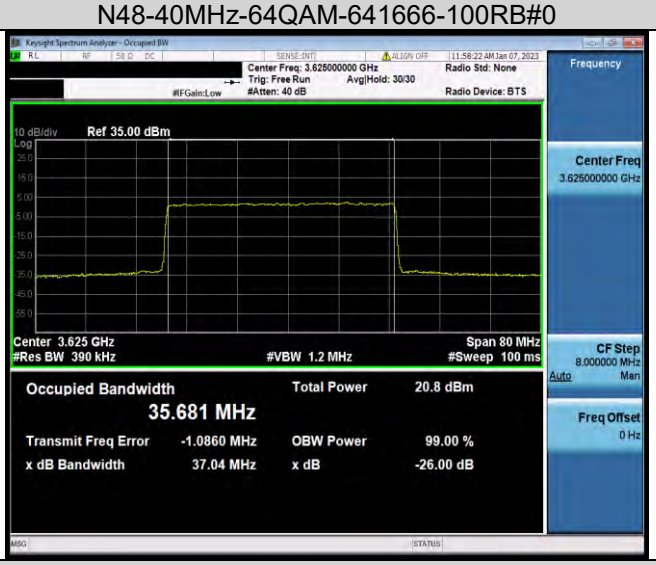
N48-20MHz-256QAM-641666-50RB#0

N48-20MHz-BPSK-641666-50RB#0

N48-40MHz-QPSK-641666-100RB#0

N48-40MHz-16QAM-641666-100RB#0

N48-40MHz-64QAM-641666-100RB#0




N48-40MHz-256QAM-641666-100RB#0

N48-40MHz-BPSK-641666-100RB#0

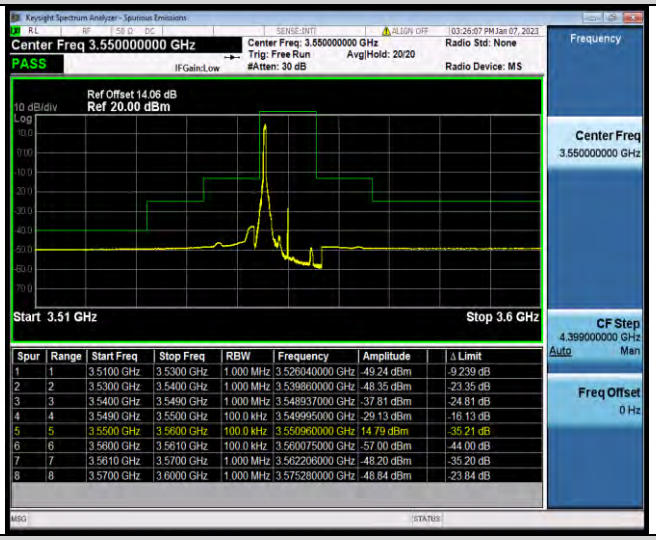
Keysight Spectrum Analyzer - Occupied BW
Center Freq: 3.625000000 GHz
Trig: Free Run
Avg|Hold: 30/30
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
11:57:33 AM Jan 07, 2023
Frequency
10 dB/div
Ref 35.00 dBm
Center Freq
3.625000000 GHz
Center 3.625 GHz
#Res BW 390 kHz
#VBW 1.2 MHz
Span 80 MHz
#Sweep 100 ms
CF Step
8.000000 MHz
Auto
Man
Occupied Bandwidth
35.632 MHz
Total Power
21.9 dBm
Transmit Freq Error
-1.0972 MHz
OBW Power
99.00 %
x dB Bandwidth
37.01 MHz
x dB
-26.00 dB
Freq Offset
0 Hz

# BAND EDGE
## TEST RESULT

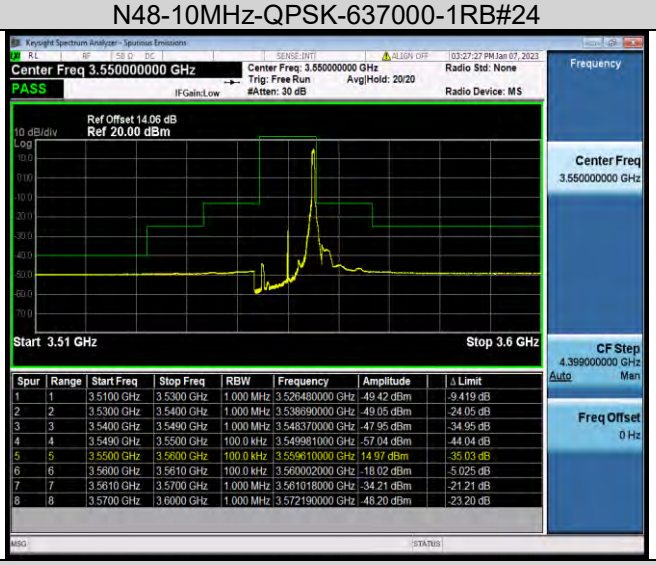
| Band | Bandwidth | Modulation | Channel | RB Configuration | Result(dBm) | Verdict |
|---|---|---|---|---|---|---|
| N48 | 10MHz | QPSK | 637000 | 1RB#0 | -49.24,-48.35,-37.81,-29.13 | PASS |
| N48 | 10MHz | QPSK | 637000 | 1RB#24 | -49.42,-49.05,-47.95,-57.04 | PASS |
| N48 | 10MHz | QPSK | 637000 | 25RB#0 | -43.77,-38.22,-25.99,-33.48 | PASS |
| N48 | 10MHz | QPSK | 641666 | 1RB#0 | -55.45,-46.12,-46.58 | PASS |
| N48 | 10MHz | QPSK | 641666 | 1RB#24 | -19.04,-33.99,-46.18 | PASS |
| N48 | 10MHz | QPSK | 641666 | 25RB#0 | -30.88,-26.72,-38.54 | PASS |
| N48 | 10MHz | QPSK | 646332 | 1RB#0 | -54.50,-45.29,-45.72,-45.72 | PASS |
| N48 | 10MHz | QPSK | 646332 | 1RB#24 | -21.64,-35.25,-45.43,-45.68 | PASS |
| N48 | 10MHz | QPSK | 646332 | 25RB#0 | -30.92,-26.85,-39.43,-43.42 | PASS |
| N48 | 20MHz | QPSK | 637334 | 1RB#0 | -49.12,-48.23,-38.24,-31.53 | PASS |
| N48 | 20MHz | QPSK | 637334 | 1RB#50 | -49.31,-48.70,-48.87,-55.47 | PASS |
| N48 | 20MHz | QPSK | 637334 | 50RB#0 | -40.65,-31.89 | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#0 | -53.22,-53.01,-46.53 | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#50 | -31.95,-39.89,-46.45 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | -35.19,-35.73,-40.62 | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#0 | -52.32,-45.68,-45.57,-45.56 | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#50 | -32.90,-38.56,-45.26,-45.60 | PASS |
| N48 | 20MHz | QPSK | 646000 | 50RB#0 | -36.44,-31.30,-35.74,-41.60 | PASS |
| N48 | 40MHz | QPSK | 638000 | 1RB#0 | -49.10,-48.25,-36.66,-32.16 | PASS |
| N48 | 40MHz | QPSK | 638000 | 1RB#104 | -49.05,-49.11,-48.84,-53.36 | PASS |
| N48 | 40MHz | QPSK | 638000 | 100RB#0 | -43.97,-40.54,-37.60,-39.71 | PASS |
| N48 | 40MHz | QPSK | 641666 | 1RB#0 | -50.65,-45.99,-45.91 | PASS |
| N48 | 40MHz | QPSK | 641666 | 1RB#104 | -35.68,-35.87,-45.94 | PASS |
| N48 | 40MHz | QPSK | 641666 | 100RB#0 | -36.01,-32.58,-42.53 | PASS |
| N48 | 40MHz | QPSK | 645332 | 1RB#0 | -50.10,-45.88,-45.66,-45.59 | PASS |
| N48 | 40MHz | QPSK | 645332 | 1RB#104 | -35.13,-36.38,-44.53,-45.56 | PASS |
| N48 | 40MHz | QPSK | 645332 | 100RB#0 | -39.56,-37.21,-40.38,-43.36 | PASS |

## TEST GRAPHS

N48-10MHz-QPSK-637000-1RB#0



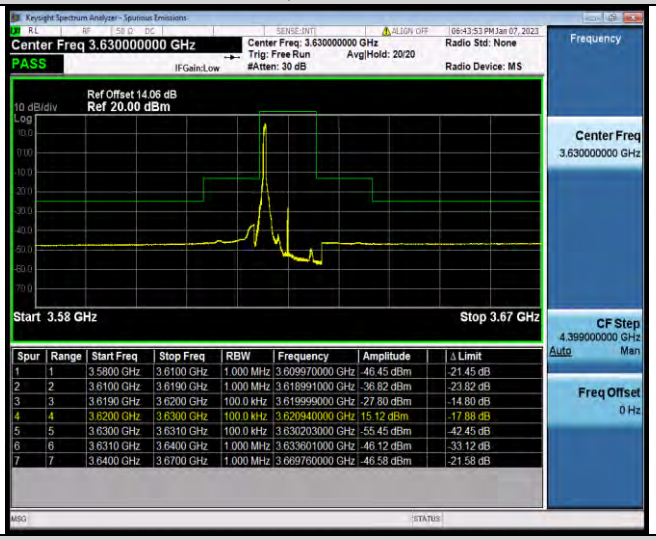

N48-10MHz-QPSK-637000-1RB#24




N48-10MHz-QPSK-637000-25RB#0

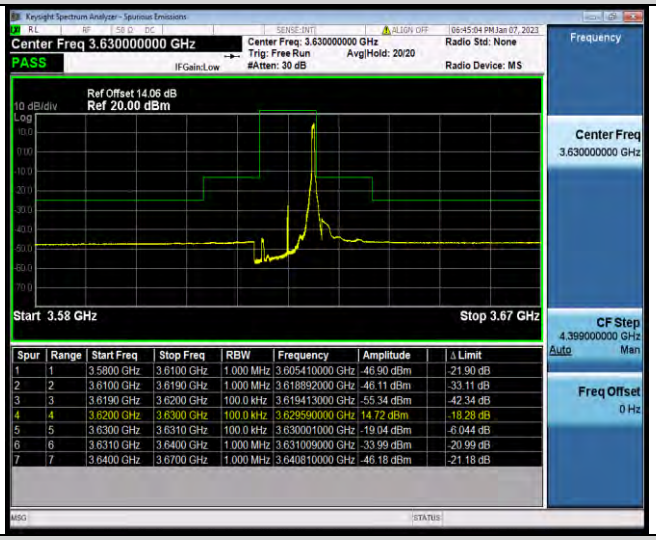
| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5100 GHz | 3.5300 GHz | 1.000 MHz | 3.529760000 GHz | -43.77 dBm | -3.769 dB |
| 2 | 2 | 3.5300 GHz | 3.5400 GHz | 1.000 MHz | 3.538490000 GHz | -38.22 dBm | -13.22 dB |
| 3 | 3 | 3.5400 GHz | 3.5490 GHz | 1.000 MHz | 3.548946000 GHz | -25.99 dBm | -12.99 dB |
| 4 | 4 | 3.5490 GHz | 3.5500 GHz | 100.0 kHz | 3.549985000 GHz | -33.48 dBm | -20.48 dB |
| 5 | 5 | 3.5500 GHz | 3.5600 GHz | 100.0 kHz | 3.552940000 GHz | 1.810 dBm | -48.19 dB |
| 6 | 6 | 3.5600 GHz | 3.5610 GHz | 100.0 kHz | 3.560014000 GHz | -30.12 dBm | -17.12 dB |
| 7 | 7 | 3.5610 GHz | 3.5700 GHz | 1.000 MHz | 3.561117000 GHz | -25.47 dBm | -12.47 dB |
| 8 | 8 | 3.5700 GHz | 3.6000 GHz | 1.000 MHz | 3.571770000 GHz | -37.79 dBm | -12.79 dB |

N48-10MHz-QPSK-641666-1RB#0




| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5800 GHz | 3.6100 GHz | 1.000 MHz | 3.609970000 GHz | -46.45 dBm | -21.45 dB |
| 2 | 2 | 3.6100 GHz | 3.6190 GHz | 1.000 MHz | 3.618991000 GHz | -36.82 dBm | -23.82 dB |
| 3 | 3 | 3.6190 GHz | 3.6200 GHz | 100.0 kHz | 3.619999000 GHz | -27.80 dBm | -14.80 dB |
| 4 | 4 | 3.6200 GHz | 3.6300 GHz | 100.0 kHz | 3.620940000 GHz | 15.12 dBm | -17.88 dB |
| 5 | 5 | 3.6300 GHz | 3.6310 GHz | 100.0 kHz | 3.630203000 GHz | -55.45 dBm | -42.45 dB |
| 6 | 6 | 3.6310 GHz | 3.6400 GHz | 1.000 MHz | 3.633601000 GHz | -46.12 dBm | -33.12 dB |
| 7 | 7 | 3.6400 GHz | 3.6700 GHz | 1.000 MHz | 3.669760000 GHz | -46.58 dBm | -21.58 dB |

N48-10MHz-QPSK-641666-1RB#24




| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5800 GHz | 3.6100 GHz | 1.000 MHz | 3.605410000 GHz | -46.90 dBm | -21.90 dB |
| 2 | 2 | 3.6100 GHz | 3.6190 GHz | 1.000 MHz | 3.618892000 GHz | -46.11 dBm | -33.11 dB |
| 3 | 3 | 3.6190 GHz | 3.6200 GHz | 100.0 kHz | 3.619413000 GHz | -55.34 dBm | -42.34 dB |
| 4 | 4 | 3.6200 GHz | 3.6300 GHz | 100.0 kHz | 3.629590000 GHz | 14.72 dBm | -18.28 dB |
| 5 | 5 | 3.6300 GHz | 3.6310 GHz | 100.0 kHz | 3.630001000 GHz | -19.04 dBm | -6.044 dB |
| 6 | 6 | 3.6310 GHz | 3.6400 GHz | 1.000 MHz | 3.631009000 GHz | -33.99 dBm | -20.99 dB |
| 7 | 7 | 3.6400 GHz | 3.6700 GHz | 1.000 MHz | 3.640810000 GHz | -46.18 dBm | -21.18 dB |

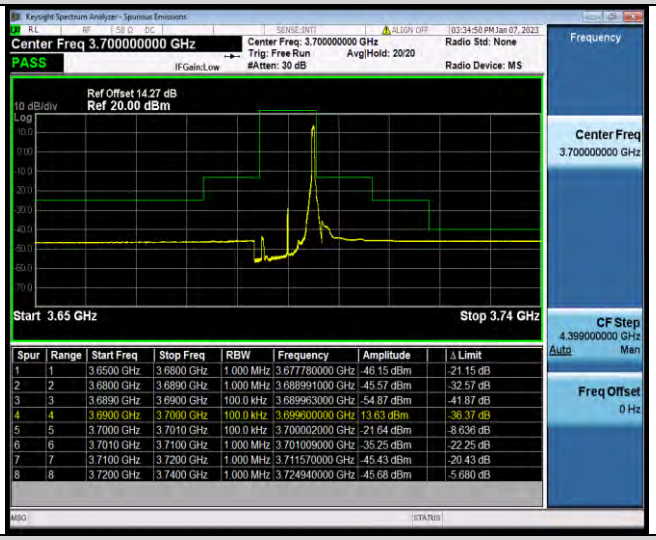
N48-10MHz-QPSK-641666-25RB#0

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5800 GHz | 3.6100 GHz | 1.000 MHz | 3.608410000 GHz | -39.19 dBm | -14.19 dB |
| 2 | 2 | 3.6100 GHz | 3.6190 GHz | 1.000 MHz | 3.618955000 GHz | -27.13 dBm | -14.13 dB |
| 3 | 3 | 3.6190 GHz | 3.6200 GHz | 100.0 kHz | 3.619977000 GHz | -34.34 dBm | -21.34 dB |
| 4 | 4 | 3.6200 GHz | 3.6300 GHz | 100.0 kHz | 3.627760000 GHz | 1.542 dBm | -31.46 dB |
| 5 | 5 | 3.6300 GHz | 3.6310 GHz | 100.0 kHz | 3.630007000 GHz | -30.88 dBm | -17.88 dB |
| 6 | 6 | 3.6310 GHz | 3.6400 GHz | 1.000 MHz | 3.631234000 GHz | -26.72 dBm | -13.72 dB |
| 7 | 7 | 3.6400 GHz | 3.6700 GHz | 1.000 MHz | 3.641620000 GHz | -38.54 dBm | -13.54 dB |

N48-10MHz-QPSK-646332-1RB#0

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6500 GHz | 3.6800 GHz | 1.000 MHz | 3.679700000 GHz | -45.73 dBm | -20.73 dB |
| 2 | 2 | 3.6800 GHz | 3.6890 GHz | 1.000 MHz | 3.688982000 GHz | -36.91 dBm | -23.91 dB |
| 3 | 3 | 3.6890 GHz | 3.6900 GHz | 100.0 kHz | 3.689993000 GHz | -28.05 dBm | -15.05 dB |
| 4 | 4 | 3.6900 GHz | 3.7000 GHz | 100.0 kHz | 3.690930000 GHz | 15.18 dBm | -34.82 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 100.0 kHz | 3.700301000 GHz | -54.50 dBm | -41.50 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.702206000 GHz | -45.29 dBm | -32.29 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.710670000 GHz | -45.72 dBm | -20.72 dB |
| 8 | 8 | 3.7200 GHz | 3.7400 GHz | 1.000 MHz | 3.739200000 GHz | -45.72 dBm | -5.724 dB |

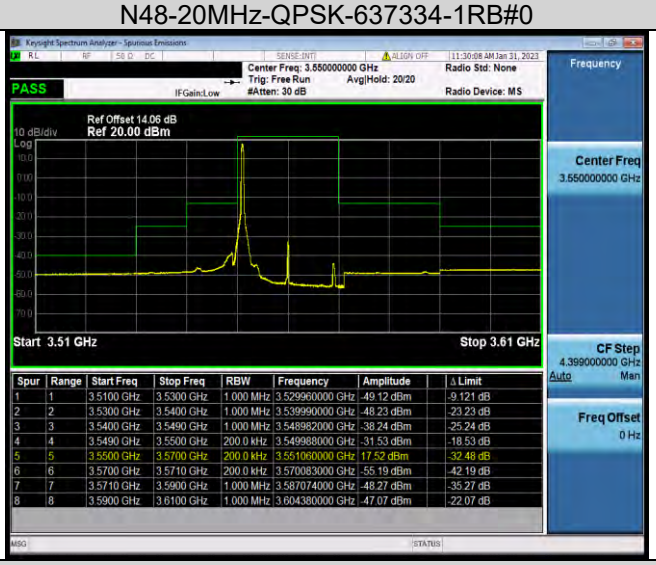
N48-10MHz-QPSK-646332-1RB#24



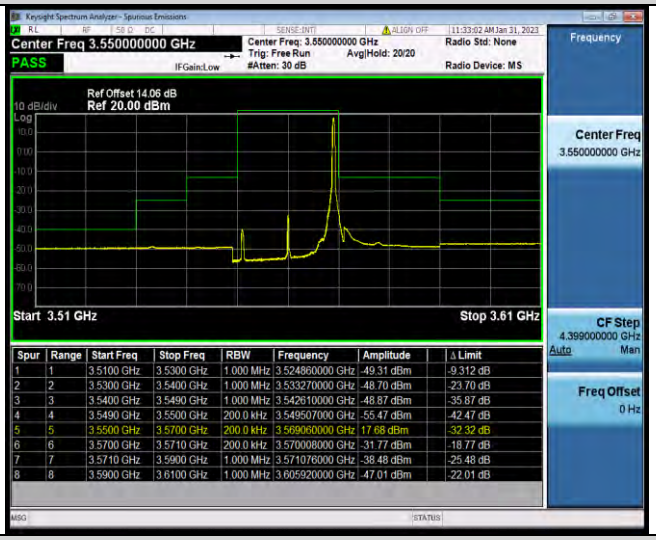

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6500 GHz | 3.6800 GHz | 1.000 MHz | 3.677780000 GHz | -46.15 dBm | -21.15 dB |
| 2 | 2 | 3.6800 GHz | 3.6890 GHz | 1.000 MHz | 3.688991000 GHz | -45.57 dBm | -32.57 dB |
| 3 | 3 | 3.6890 GHz | 3.6900 GHz | 100.0 kHz | 3.689963000 GHz | -54.87 dBm | -41.87 dB |
| 4 | 4 | 3.6900 GHz | 3.7000 GHz | 100.0 kHz | 3.699600000 GHz | 13.63 dBm | -36.37 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 100.0 kHz | 3.700002000 GHz | -21.64 dBm | -8.636 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.701009000 GHz | -35.25 dBm | -22.25 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.711570000 GHz | -45.43 dBm | -20.43 dB |
| 8 | 8 | 3.7200 GHz | 3.7400 GHz | 1.000 MHz | 3.724940000 GHz | -45.68 dBm | -5.680 dB |

N48-10MHz-QPSK-646332-25RB#0

N48-20MHz-QPSK-637334-1RB#0



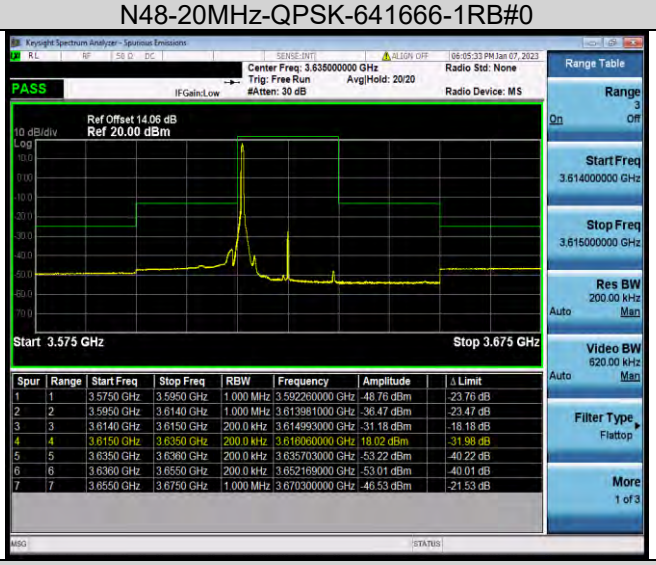

N48-20MHz-QPSK-637334-1RB#50




N48-20MHz-QPSK-637334-50RB#0

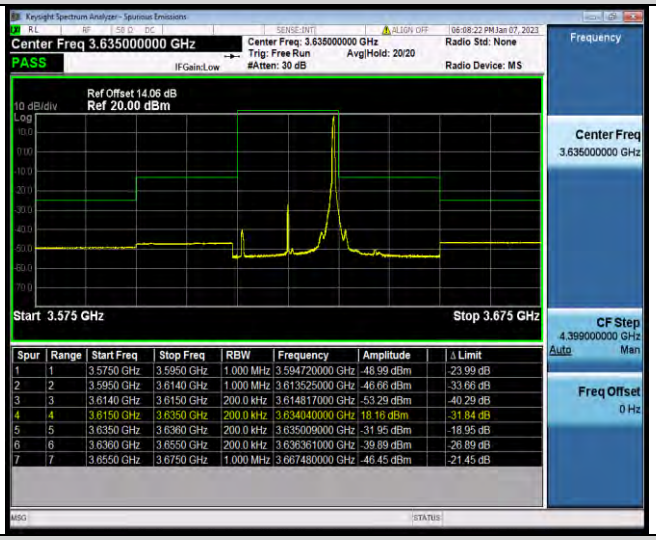
| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5100 GHz | 3.5300 GHz | 1.000 MHz | 3.522940000 GHz | -40.65 dBm | -0.648 dB |
| 2 | 2 | 3.5300 GHz | 3.5400 GHz | 1.000 MHz | 3.539980000 GHz | -31.89 dBm | -6.894 dB |
| 3 | 3 | 3.5400 GHz | 3.5490 GHz | 1.000 MHz | 3.548973000 GHz | -29.30 dBm | -16.30 dB |
| 4 | 4 | 3.5490 GHz | 3.5500 GHz | 200.0 kHz | 3.549333000 GHz | -35.27 dBm | -22.27 dB |
| 5 | 5 | 3.5500 GHz | 3.5700 GHz | 200.0 kHz | 3.560180000 GHz | 1.253 dBm | -48.75 dB |
| 6 | 6 | 3.5700 GHz | 3.5710 GHz | 200.0 kHz | 3.570205000 GHz | -35.23 dBm | -22.23 dB |
| 7 | 7 | 3.5710 GHz | 3.5900 GHz | 1.000 MHz | 3.571038000 GHz | -29.29 dBm | -16.29 dB |
| 8 | 8 | 3.5900 GHz | 3.6100 GHz | 1.000 MHz | 3.593480000 GHz | -40.34 dBm | -15.34 dB |

N48-20MHz-QPSK-641666-1RB#0



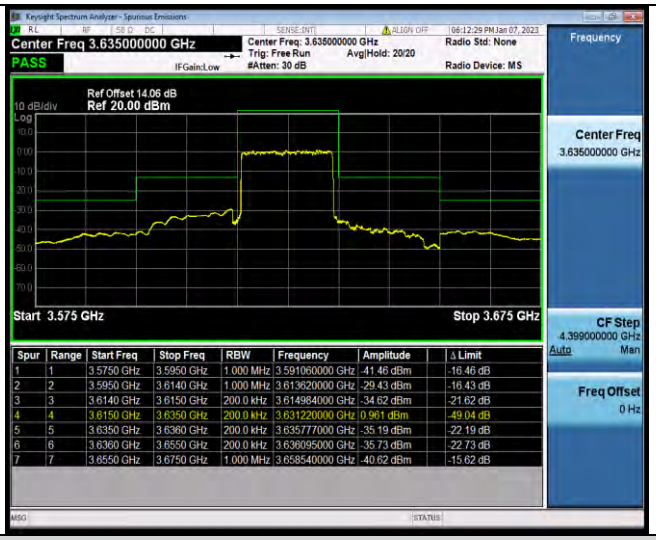

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5750 GHz | 3.5950 GHz | 1.000 MHz | 3.592260000 GHz | -48.76 dBm | -23.76 dB |
| 2 | 2 | 3.5950 GHz | 3.6140 GHz | 1.000 MHz | 3.613981000 GHz | -36.47 dBm | -23.47 dB |
| 3 | 3 | 3.6140 GHz | 3.6150 GHz | 200.0 kHz | 3.614993000 GHz | -31.18 dBm | -18.18 dB |
| 4 | 4 | 3.6150 GHz | 3.6350 GHz | 200.0 kHz | 3.616060000 GHz | 18.02 dBm | -31.98 dB |
| 5 | 5 | 3.6350 GHz | 3.6360 GHz | 200.0 kHz | 3.635703000 GHz | -53.22 dBm | -40.22 dB |
| 6 | 6 | 3.6360 GHz | 3.6550 GHz | 200.0 kHz | 3.652169000 GHz | -53.01 dBm | -40.01 dB |
| 7 | 7 | 3.6550 GHz | 3.6750 GHz | 1.000 MHz | 3.670300000 GHz | -46.53 dBm | -21.53 dB |

N48-20MHz-QPSK-641666-1RB#50



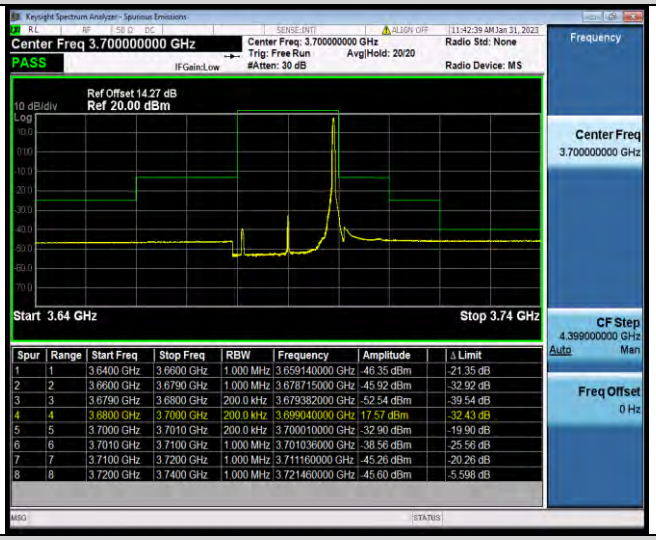

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5750 GHz | 3.5950 GHz | 1.000 MHz | 3.594720000 GHz | -48.99 dBm | -23.99 dB |
| 2 | 2 | 3.5950 GHz | 3.6140 GHz | 1.000 MHz | 3.613525000 GHz | -46.66 dBm | -33.66 dB |
| 3 | 3 | 3.6140 GHz | 3.6150 GHz | 200.0 kHz | 3.614817000 GHz | -53.29 dBm | -40.29 dB |
| 4 | 4 | 3.6150 GHz | 3.6350 GHz | 200.0 kHz | 3.634040000 GHz | 18.16 dBm | -31.84 dB |
| 5 | 5 | 3.6350 GHz | 3.6360 GHz | 200.0 kHz | 3.635009000 GHz | -31.95 dBm | -18.95 dB |
| 6 | 6 | 3.6360 GHz | 3.6550 GHz | 200.0 kHz | 3.636361000 GHz | -39.89 dBm | -26.89 dB |
| 7 | 7 | 3.6550 GHz | 3.6750 GHz | 1.000 MHz | 3.667480000 GHz | -46.45 dBm | -21.45 dB |

N48-20MHz-QPSK-641666-50RB#0




N48-20MHz-QPSK-646000-1RB#0

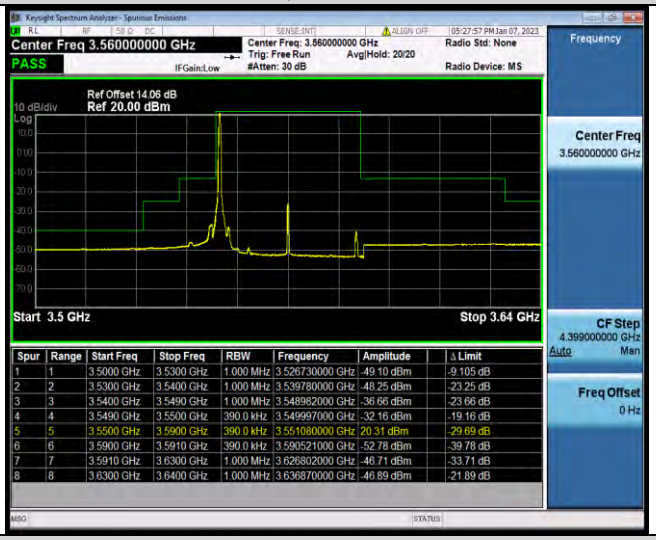
N48-20MHz-QPSK-646000-1RB#50




N48-20MHz-QPSK-646000-50RB#0

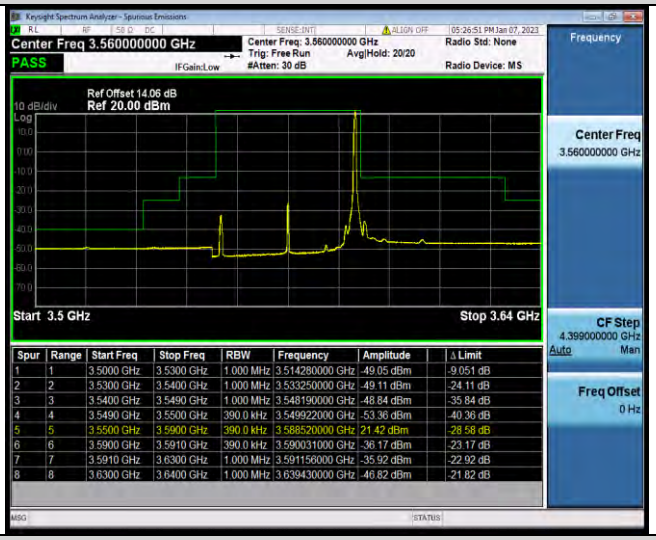
| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6400 GHz | 3.6600 GHz | 1.000 MHz | 3.652840000 GHz | -42.05 dBm | -17.05 dB |
| 2 | 2 | 3.6600 GHz | 3.6790 GHz | 1.000 MHz | 3.678924000 GHz | -31.48 dBm | -18.48 dB |
| 3 | 3 | 3.6790 GHz | 3.6800 GHz | 200.0 kHz | 3.679939000 GHz | -36.10 dBm | -23.10 dB |
| 4 | 4 | 3.6800 GHz | 3.7000 GHz | 200.0 kHz | 3.697300000 GHz | 0.592 dBm | -49.41 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 200.0 kHz | 3.700445000 GHz | -36.44 dBm | -23.44 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.701009000 GHz | -31.30 dBm | -18.30 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.712230000 GHz | -35.74 dBm | -10.74 dB |
| 8 | 8 | 3.7200 GHz | 3.7400 GHz | 1.000 MHz | 3.726820000 GHz | -41.60 dBm | -1.598 dB |

N48-40MHz-QPSK-638000-1RB#0



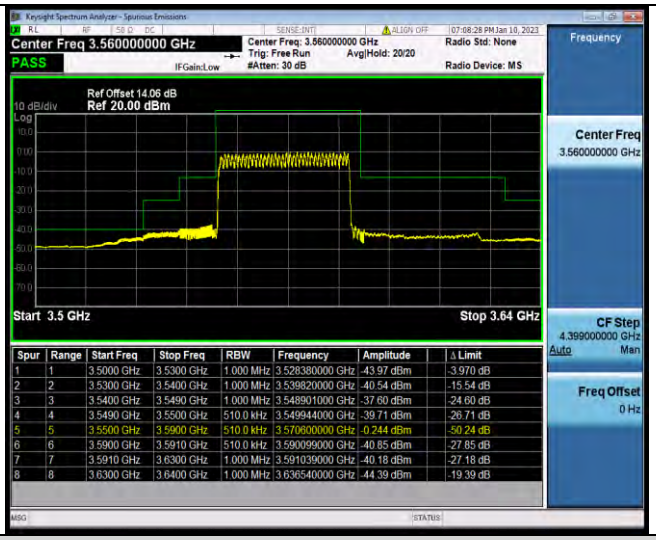

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5000 GHz | 3.5300 GHz | 1.000 MHz | 3.526730000 GHz | -49.10 dBm | -9.105 dB |
| 2 | 2 | 3.5300 GHz | 3.5400 GHz | 1.000 MHz | 3.539780000 GHz | -48.25 dBm | -23.25 dB |
| 3 | 3 | 3.5400 GHz | 3.5490 GHz | 1.000 MHz | 3.548982000 GHz | -36.66 dBm | -23.66 dB |
| 4 | 4 | 3.5490 GHz | 3.5500 GHz | 390.0 kHz | 3.549997000 GHz | -32.16 dBm | -19.16 dB |
| 5 | 5 | 3.5500 GHz | 3.5900 GHz | 390.0 kHz | 3.551080000 GHz | 20.31 dBm | -29.69 dB |
| 6 | 6 | 3.5900 GHz | 3.5910 GHz | 390.0 kHz | 3.590521000 GHz | -52.78 dBm | -39.78 dB |
| 7 | 7 | 3.5910 GHz | 3.6300 GHz | 1.000 MHz | 3.626802000 GHz | -46.71 dBm | -33.71 dB |
| 8 | 8 | 3.6300 GHz | 3.6400 GHz | 1.000 MHz | 3.636870000 GHz | -46.89 dBm | -21.89 dB |

N48-40MHz-QPSK-638000-1RB#104

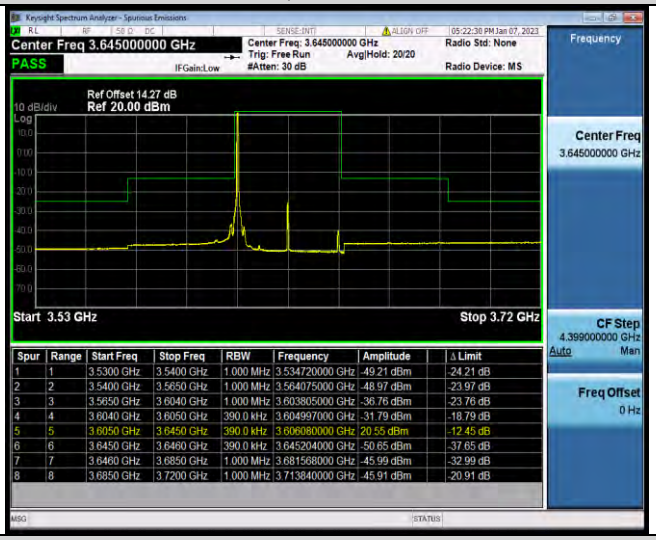



| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5000 GHz | 3.5300 GHz | 1.000 MHz | 3.514280000 GHz | -49.05 dBm | -9.051 dB |
| 2 | 2 | 3.5300 GHz | 3.5400 GHz | 1.000 MHz | 3.533250000 GHz | -49.11 dBm | -24.11 dB |
| 3 | 3 | 3.5400 GHz | 3.5490 GHz | 1.000 MHz | 3.548190000 GHz | -48.84 dBm | -35.84 dB |
| 4 | 4 | 3.5490 GHz | 3.5500 GHz | 390.0 kHz | 3.549922000 GHz | -53.36 dBm | -40.36 dB |
| 5 | 5 | 3.5500 GHz | 3.5900 GHz | 390.0 kHz | 3.588520000 GHz | 21.42 dBm | -28.58 dB |
| 6 | 6 | 3.5900 GHz | 3.5910 GHz | 390.0 kHz | 3.590031000 GHz | -36.17 dBm | -23.17 dB |
| 7 | 7 | 3.5910 GHz | 3.6300 GHz | 1.000 MHz | 3.591156000 GHz | -35.92 dBm | -22.92 dB |
| 8 | 8 | 3.6300 GHz | 3.6400 GHz | 1.000 MHz | 3.639430000 GHz | -46.82 dBm | -21.82 dB |

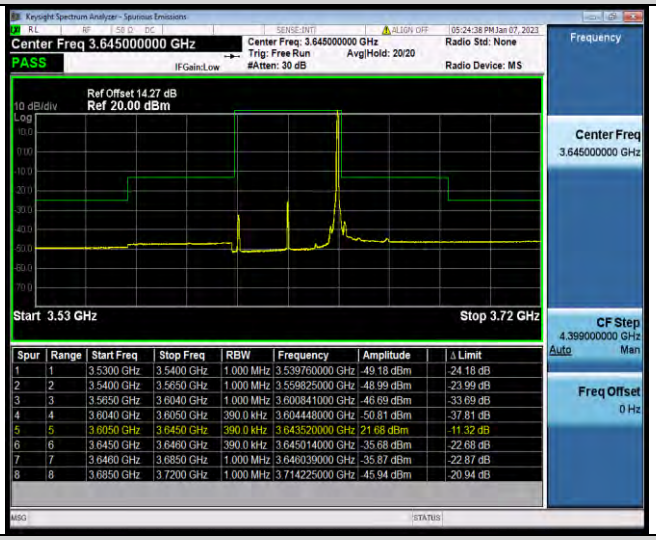
N48-40MHz-QPSK-638000-100RB#0




N48-40MHz-QPSK-641666-1RB#0




N48-40MHz-QPSK-641666-1RB#104



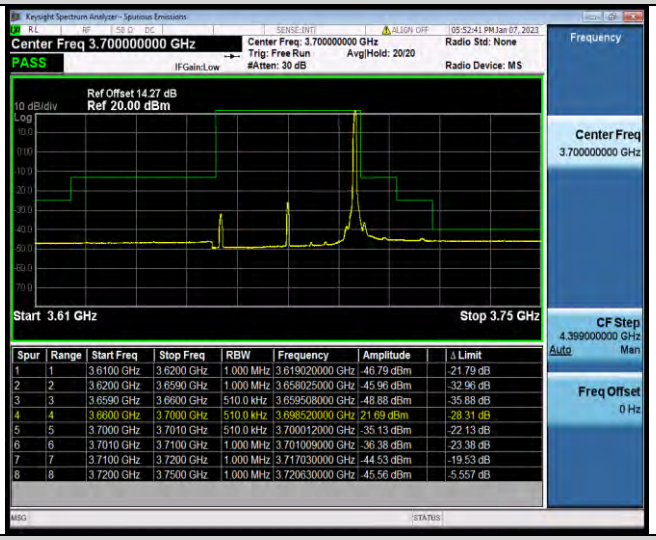

N48-40MHz-QPSK-641666-100RB#0

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.5300 GHz | 3.5400 GHz | 1.000 MHz | 3.539790000 GHz | -45.42 dBm | -20.42 dB |
| 2 | 2 | 3.5400 GHz | 3.5650 GHz | 1.000 MHz | 3.547925000 GHz | -43.59 dBm | -18.59 dB |
| 3 | 3 | 3.5650 GHz | 3.6040 GHz | 1.000 MHz | 3.602752000 GHz | -31.13 dBm | -18.13 dB |
| 4 | 4 | 3.6040 GHz | 3.6050 GHz | 390.0 kHz | 3.604809000 GHz | -34.11 dBm | -21.11 dB |
| 5 | 5 | 3.6050 GHz | 3.6450 GHz | 390.0 kHz | 3.638640000 GHz | 1.287 dBm | -31.71 dB |
| 6 | 6 | 3.6450 GHz | 3.6460 GHz | 390.0 kHz | 3.645889000 GHz | -36.01 dBm | -23.01 dB |
| 7 | 7 | 3.6460 GHz | 3.6850 GHz | 1.000 MHz | 3.646078000 GHz | -32.58 dBm | -19.58 dB |
| 8 | 8 | 3.6850 GHz | 3.7200 GHz | 1.000 MHz | 3.695710000 GHz | -42.53 dBm | -17.53 dB |

N48-40MHz-QPSK-645332-1RB#0

| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6100 GHz | 3.6200 GHz | 1.000 MHz | 3.618200000 GHz | -46.51 dBm | -21.51 dB |
| 2 | 2 | 3.6200 GHz | 3.6590 GHz | 1.000 MHz | 3.658805000 GHz | -37.42 dBm | -24.42 dB |
| 3 | 3 | 3.6590 GHz | 3.6600 GHz | 390.0 kHz | 3.659996000 GHz | -32.38 dBm | -19.38 dB |
| 4 | 4 | 3.6600 GHz | 3.7000 GHz | 390.0 kHz | 3.661080000 GHz | 20.35 dBm | -29.65 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 390.0 kHz | 3.700824000 GHz | -50.10 dBm | -37.10 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.704672000 GHz | -45.88 dBm | -32.88 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.717990000 GHz | -45.66 dBm | -20.66 dB |
| 8 | 8 | 3.7200 GHz | 3.7500 GHz | 1.000 MHz | 3.736740000 GHz | -45.59 dBm | -5.589 dB |

N48-40MHz-QPSK-645332-1RB#104




| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6100 GHz | 3.6200 GHz | 1.000 MHz | 3.619020000 GHz | -46.79 dBm | -21.79 dB |
| 2 | 2 | 3.6200 GHz | 3.6590 GHz | 1.000 MHz | 3.658025000 GHz | -45.96 dBm | -32.96 dB |
| 3 | 3 | 3.6590 GHz | 3.6600 GHz | 510.0 kHz | 3.659508000 GHz | -48.88 dBm | -35.88 dB |
| 4 | 4 | 3.6600 GHz | 3.7000 GHz | 510.0 kHz | 3.698520000 GHz | 21.69 dBm | -28.31 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 510.0 kHz | 3.700012000 GHz | -35.13 dBm | -22.13 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.701009000 GHz | -36.38 dBm | -23.38 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.717030000 GHz | -44.53 dBm | -19.53 dB |
| 8 | 8 | 3.7200 GHz | 3.7500 GHz | 1.000 MHz | 3.720630000 GHz | -45.56 dBm | -5.557 dB |

N48-40MHz-QPSK-645332-100RB#0

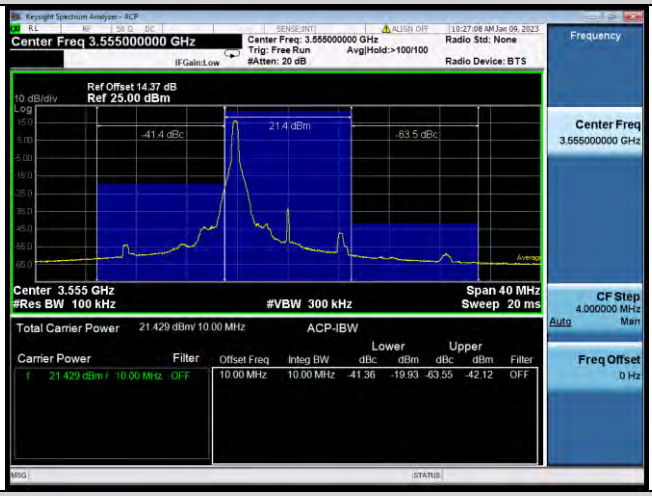
| Spur | Range | Start Freq | Stop Freq | RBW | Frequency | Amplitude | Δ Limit |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.6100 GHz | 3.6200 GHz | 1.000 MHz | 3.618550000 GHz | -45.87 dBm | -20.87 dB |
| 2 | 2 | 3.6200 GHz | 3.6590 GHz | 1.000 MHz | 3.657245000 GHz | -36.67 dBm | -23.67 dB |
| 3 | 3 | 3.6590 GHz | 3.6600 GHz | 510.0 kHz | 3.659856000 GHz | -37.47 dBm | -24.47 dB |
| 4 | 4 | 3.6600 GHz | 3.7000 GHz | 510.0 kHz | 3.670360000 GHz | -1.722 dBm | -51.72 dB |
| 5 | 5 | 3.7000 GHz | 3.7010 GHz | 510.0 kHz | 3.700036000 GHz | -39.56 dBm | -26.56 dB |
| 6 | 6 | 3.7010 GHz | 3.7100 GHz | 1.000 MHz | 3.701216000 GHz | -37.21 dBm | -24.21 dB |
| 7 | 7 | 3.7100 GHz | 3.7200 GHz | 1.000 MHz | 3.711180000 GHz | -40.38 dBm | -15.38 dB |
| 8 | 8 | 3.7200 GHz | 3.7500 GHz | 1.000 MHz | 3.720750000 GHz | -43.36 dBm | -3.363 dB |

# ACLR
## TEST RESULT

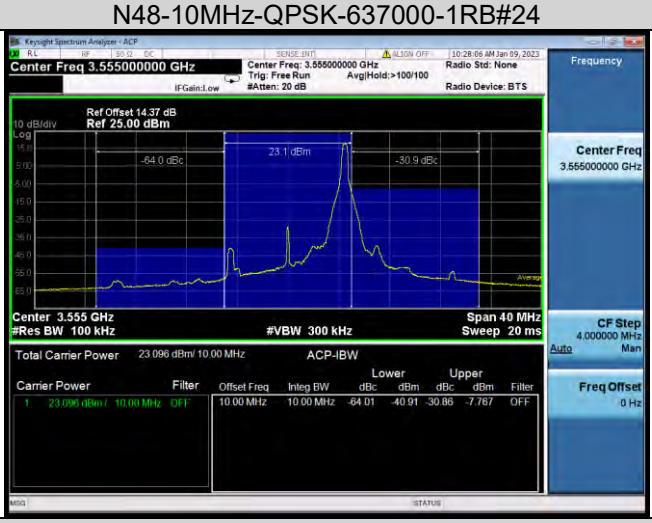
| Band | Bandwidth | Modulation | Channel | RB Configuration | Result(dBm) | Verdict |
|---|---|---|---|---|---|---|
| N48 | 10MHz | QPSK | 637000 | 1RB#0 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 637000 | 1RB#24 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 637000 | 25RB#0 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 641666 | 1RB#0 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 641666 | 1RB#24 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 641666 | 25RB#0 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 646332 | 1RB#0 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 646332 | 1RB#24 | SeeGarph | PASS |
| N48 | 10MHz | QPSK | 646332 | 25RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 637334 | 1RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 637334 | 1RB#50 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 637334 | 50RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#50 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#0 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#50 | SeeGarph | PASS |
| N48 | 20MHz | QPSK | 646000 | 50RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 638000 | 1RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 638000 | 1RB#104 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 638000 | 100RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 641666 | 1RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 641666 | 1RB#104 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 641666 | 100RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 645332 | 1RB#0 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 645332 | 1RB#104 | SeeGarph | PASS |
| N48 | 40MHz | QPSK | 645332 | 100RB#0 | SeeGarph | PASS |

## TEST GRAPHS

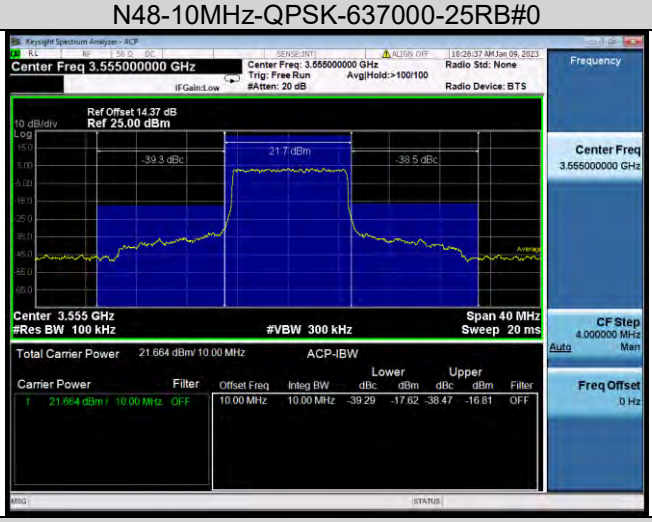
N48-10MHz-QPSK-637000-1RB#0



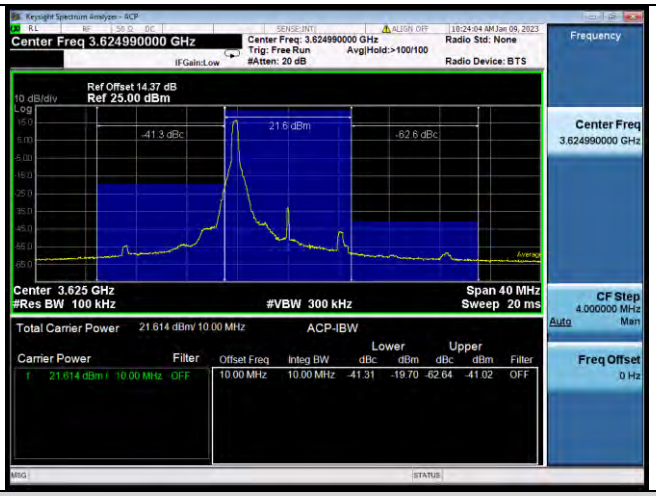

N48-10MHz-QPSK-637000-1RB#24



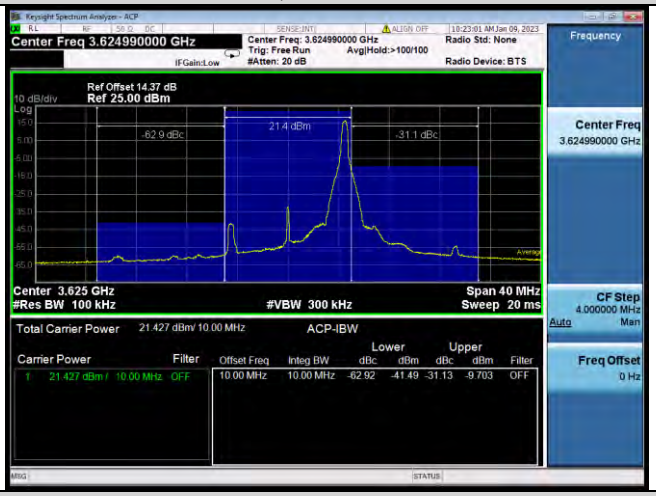

N48-10MHz-QPSK-637000-25RB#0



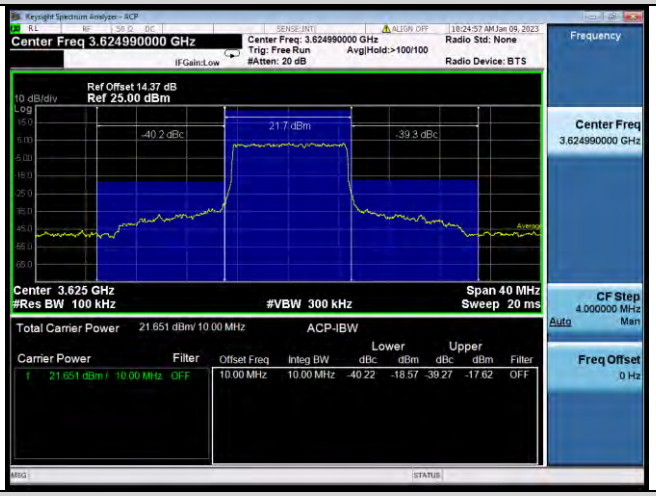

N48-10MHz-QPSK-641666-1RB#0



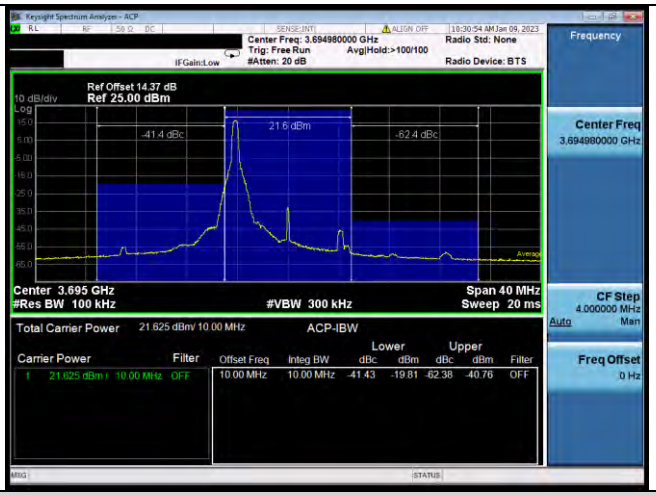

N48-10MHz-QPSK-641666-1RB#24



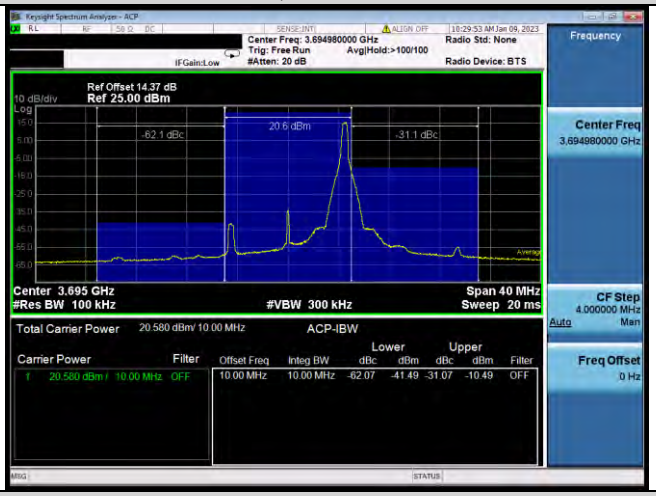

N48-10MHz-QPSK-641666-25RB#0




N48-10MHz-QPSK-646332-1RB#0

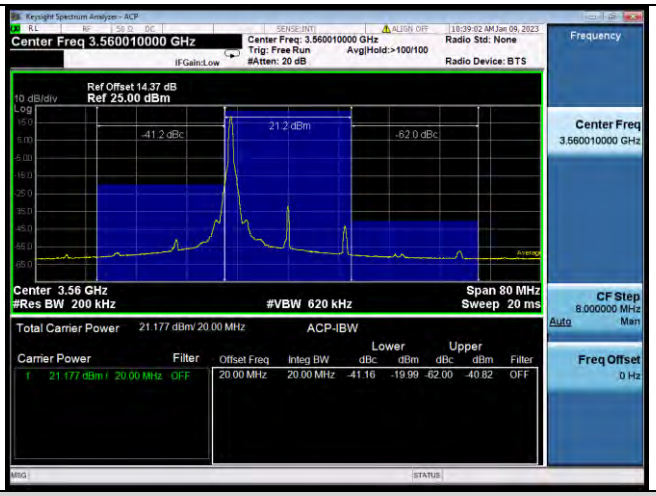



N48-10MHz-QPSK-646332-1RB#24

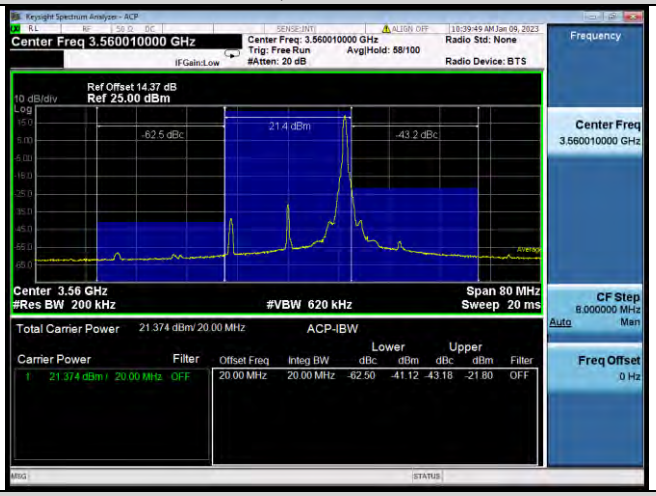



N48-10MHz-QPSK-646332-25RB#0

N48-20MHz-QPSK-637334-1RB#0

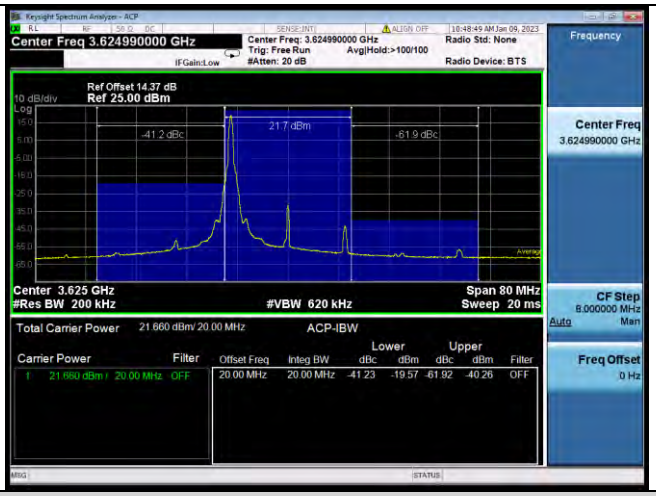



N48-20MHz-QPSK-637334-1RB#50

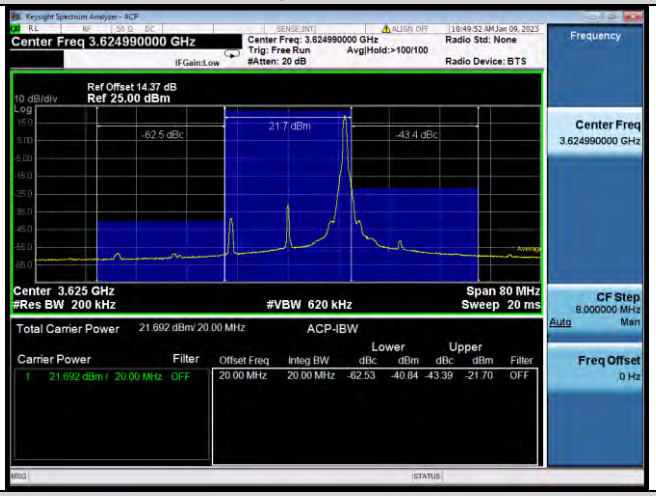



N48-20MHz-QPSK-637334-50RB#0

N48-20MHz-QPSK-641666-1RB#0

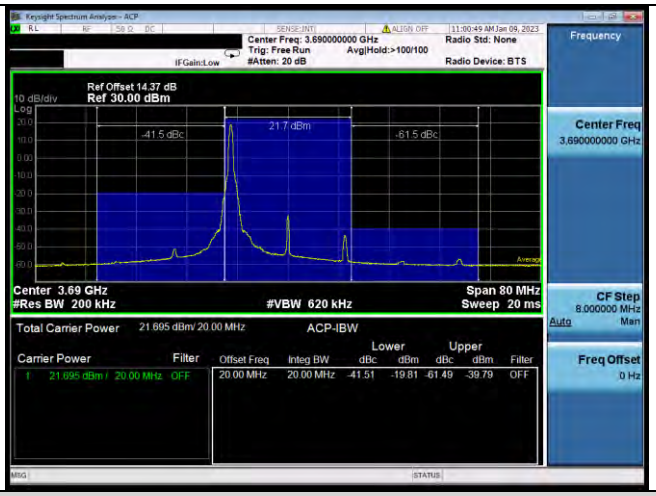



N48-20MHz-QPSK-641666-1RB#50

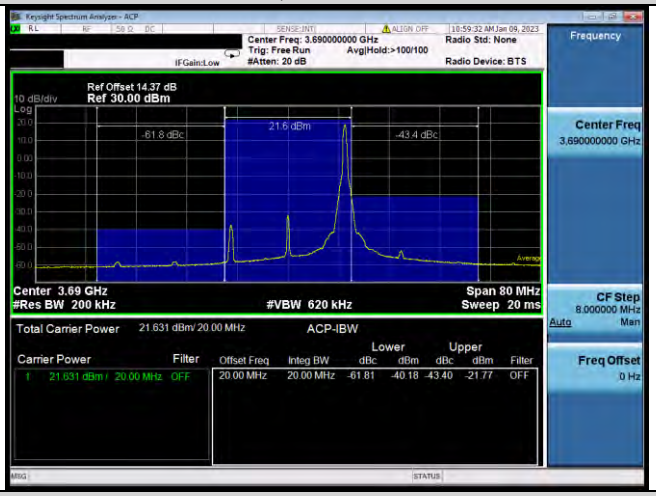



N48-20MHz-QPSK-641666-50RB#0

N48-20MHz-QPSK-646000-1RB#0

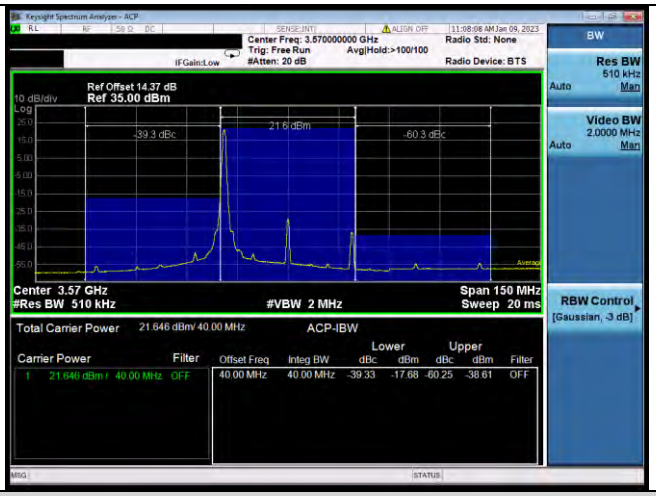



N48-20MHz-QPSK-646000-1RB#50

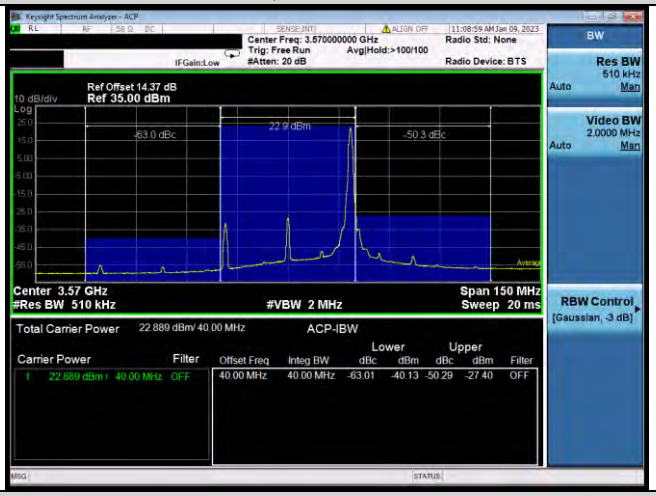



N48-20MHz-QPSK-646000-50RB#0

N48-40MHz-QPSK-638000-1RB#0

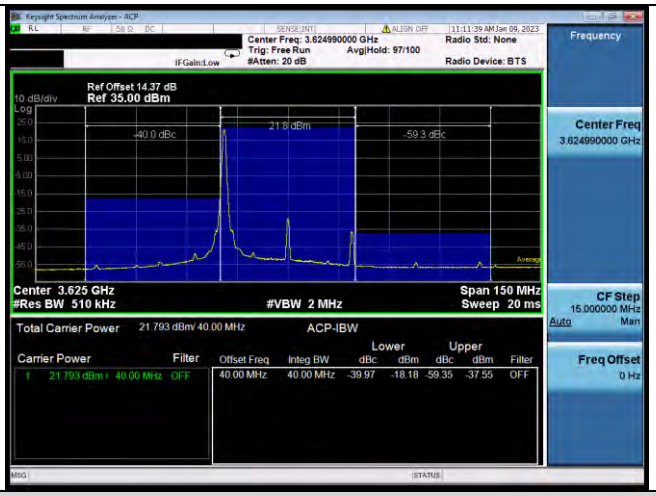



N48-40MHz-QPSK-638000-1RB#104

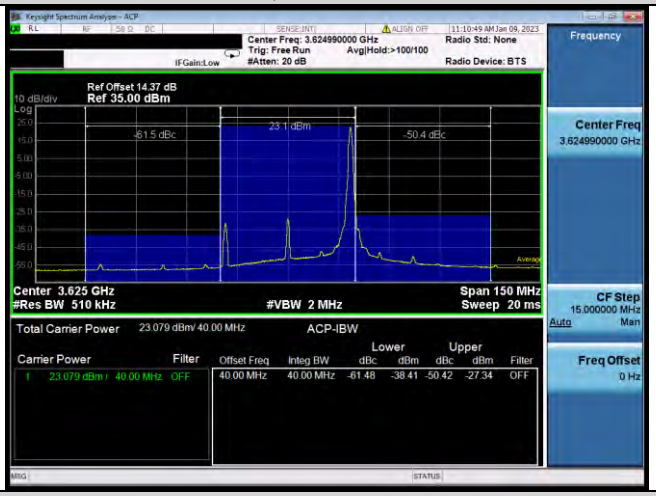



N48-40MHz-QPSK-638000-100RB#0

N48-40MHz-QPSK-641666-1RB#0

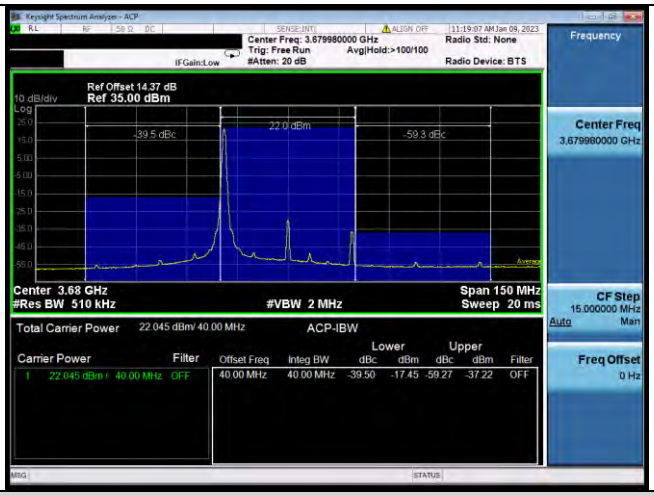



N48-40MHz-QPSK-641666-1RB#104

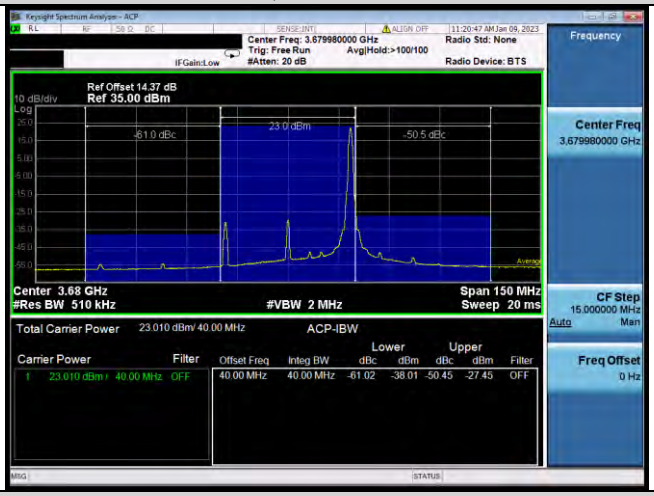



N48-40MHz-QPSK-641666-100RB#0

N48-40MHz-QPSK-645332-1RB#0




N48-40MHz-QPSK-645332-1RB#104




N48-40MHz-QPSK-645332-100RB#0

# CONDUCTED SPURIOUS EMISSION
## TEST RESULT

| Band | Bandwidth | Modulation | Channel | RB Configuration | Frequency Range | Result (dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| N48 | 10MHz | QPSK | 637000 | 1RB#0 | Range1:30~40000MHz | -47.62 | PASS |
| N48 | 10MHz | QPSK | 641666 | 1RB#0 | Range1:30~40000MHz | -47.90 | PASS |
| N48 | 10MHz | QPSK | 646332 | 1RB#0 | Range1:30~40000MHz | -47.67 | PASS |
| N48 | 20MHz | QPSK | 637334 | 1RB#0 | Range1:30~40000MHz | -47.86 | PASS |
| N48 | 20MHz | QPSK | 641666 | 1RB#0 | Range1:30~40000MHz | -46.77 | PASS |
| N48 | 20MHz | QPSK | 646000 | 1RB#0 | Range1:30~40000MHz | -47.99 | PASS |
| N48 | 40MHz | QPSK | 638000 | 1RB#0 | Range1:30~40000MHz | -48.10 | PASS |
| N48 | 40MHz | QPSK | 641666 | 1RB#0 | Range1:30~40000MHz | -47.33 | PASS |
| N48 | 40MHz | QPSK | 645332 | 1RB#0 | Range1:30~40000MHz | -47.47 | PASS |

## TEST GRAPHS

N48-10MHz-QPSK-637000-1RB#0-Range1:30~40000MHz

N48-10MHz-QPSK-641666-1RB#0-Range1:30~40000MHz

N48-10MHz-QPSK-646332-1RB#0-Range1:30~40000MHz

N48-20MHz-QPSK-637334-1RB#0-Range1:30~40000MHz

N48-20MHz-QPSK-641666-1RB#0-Range1:30~40000MHz

N48-20MHz-QPSK-646000-1RB#0-Range1:30~40000MHz

N48-40MHz-QPSK-638000-1RB#0-Range1:30~40000MHz

N48-40MHz-QPSK-641666-1RB#0-Range1:30~40000MHz

N48-40MHz-QPSK-645332-1RB#0-Range1:30~40000MHz

Keysight Spectrum Analyzer - Swept SA
Center Freq 20.015000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
12:06:38 PM Jan 07, 2023
Frequency
Auto Tune
Ref Offset 11.28 dB
10 dB/div
Ref 21.28 dBm
Log
Mkr2 38.500 1 GHz
-47.467 dBm
Center Freq
20.015000000 GHz
Start Freq
30.000000 MHz
Stop Freq
40.000000000 GHz
CF Step
3.997000000 GHz
Auto
Man
Freq Offset
0 Hz
Start 30 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 40.00 GHz
Sweep 66.67 ms (40001 pts)

# FREQUENCY STABILITY
## TEST RESULT

| Voltage&Temperature | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Band | Bandwidth | Modulation | Channel | RB Configure | Voltage [Vdc] | Temperature (°C) | Deviation (Hz) | Deviation (ppm) | Limit (ppm) | Verdict |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | VL | NT | 23.24 | 0.006412 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | VN | NT | 44.71 | 0.012334 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | VH | NT | 31.82 | 0.008779 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | -30 | 45.35 | 0.012512 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | -20 | 34.27 | 0.009454 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 0 | 49.80 | 0.013738 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 10 | 40.22 | 0.011095 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 20 | 42.59 | 0.011749 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 30 | 47.02 | 0.012971 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 40 | 21.05 | 0.005806 | ±2.5 | PASS |
| N48 | 20MHz | QPSK | 641666 | 50RB#0 | NV | 50 | 22.08 | 0.006090 | ±2.5 | PASS |

**---END---**