# FCC RF Test Report

| | | |
|---|---|---|
| **APPLICANT** | **:** | **Fibocom Wireless Inc.** |
| **EQUIPMENT** | **:** | **5G Module** |
| **BRAND NAME** | **:** | **Fibocom** |
| **MODEL NAME** | **:** | **FM350-GL** |
| **FCC ID** | **:** | **ZMOFM350GL** |
| **STANDARD** | **:** | **47 CFR Part 2, 27** |
| **CLASSIFICATION** | **:** | **PCS Licensed Transmitter (PCB)** |

**The product was received on May 18, 2020 and completely tested on Feb. 10, 2021. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.**

**Reviewed by: Derreck Chen / Supervisor**

**Approved by: Eric Shih / Manager**

Cert #5145.01

***Sporton International (ShenZhen) Inc.***

***1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055***

***People's Republic of China***

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FG051802J | Rev. 01 | Initial issue of report | Apr. 02, 2021 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 3.4 | §2.1046 | Conducted Output Power | Reporting Only | PASS | - |
| 3.5 | - | Peak-to-Average Ratio | <13dB | N/A | Reporting only |
| 3.6 | §27.50 (a)(3) | EIRP | EIRP < 250mW/5MHz | PASS | - |
| 3.7 | §2.1049 | Occupied Bandwidth | Reporting Only | PASS | - |
| 3.8 | §2.1051<br>§27.53 (a)(4) | Conducted Band Edge Measurement | Refer standard | PASS | - |
| 3.9 | §2.1051<br>§27.53 (a)(4) | Conducted Spurious Emission | < $70+10\log_{10}$(P[Watts]) | PASS | - |
| 3.10 | §2.1055<br>§27.54 | Frequency Stability Temperature & Voltage | Within the band | PASS | - |
| 4.4 | §2.1053<br>§27.53 (a)(4) | Radiated Spurious Emission | < $70+10\log_{10}$(P[Watts]) | PASS | Under limit 14.43 dB at 9223.200 MHz |

| **Declaration of Conformity:** |
|---|
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| **Comments and Explanations:** |
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

# 1 General Description

## 1.1 Applicant

**Fibocom Wireless Inc.**
1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

## 1.2 Manufacturer

**Fibocom Wireless Inc.**
1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | 5G Module |
| **Brand Name** | Fibocom |
| **Model Name** | FM350-GL |
| **FCC ID** | ZMOFM350GL |
| **EUT supports Radios application** | WCDMA/LTE/5G NR<br>GNSS |
| **IMEI Code** | Conducted: 862146050001310<br>Radiation: 882146050002276 |
| **HW Version** | V1.0.6 |
| **SW Version** | 81600.0000.00.09.03.03 |
| **EUT Stage** | Identical Prototype |

## 1.4 Product Specification of Equipment Under Test

| Product Feature | |
|---|---|
| **Tx Frequency** | 5G NR n30 : 2305 MHz ~ 2315 MHz |
| **Rx Frequency** | 5G NR n30 : 2350 MHz ~ 2360 MHz |
| **Bandwidth** | 5MHz / 10MHz |
| **SCS** | 15KHz/30KHz |
| **NR Mode** | SA |
| **Antenna Gain** | 1.0 dBi |
| **Type of Modulation** | CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM<br>DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM |

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Maximum Conducted Power, Frequency Tolerance and Emission Designator

| 5G NR n30 (SCS 15) | | PI/2 BPSK / QPSK | | 16QAM / 64QAM / 256QAM | |
|---|---|---|---|---|---|
| BW (MHz) | Frequency Range (MHz) | Emission Designator (99%OBW) | Maximum Conducted power (W) | Emission Designator (99%OBW) | Maximum Conducted power (W) |
| 5 | 2307.5 ~ 2312.5 | 4M46G7D | 0.1791 | 4M50W7D | 0.1774 |
| 10 | 2310.0 | 9M27G7D | 0.1742 | 9M31W7D | 0.1337 |
| Frequency Tolerance (ppm) | | 0.0021 | | | |

## 1.7 Testing Site

Sporton International (Shenzhen) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

| Test Firm | Sporton International (Shenzhen) Inc. | | |
|---|---|---|---|
| Test Site Location | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China<br>TEL: +86-755-86379589<br>FAX: +86-755-86379595 | | |
| Test Site No. | Sporton Site No. | FCC Designation No. | FCC Test Firm Registration No. |
| | TH01-SZ | CN1256 | 421272 |

| Test Firm | Sporton International (Shenzhen) Inc. | | |
|---|---|---|---|
| Test Site Location | 101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103<br>TEL: +86-755-33202398 | | |
| Test Site No. | Sporton Site No. | FCC Designation No. | FCC Test Firm Registration No. |
| | 03CH03-SZ | CN1256 | 421272 |

## 1.8 Test Software

| Item | Site | Manufacturer | Name | Version |
|---|---|---|---|---|
| 1. | 03CH03-SZ | AUDIX | E3 | 6.2009-8-24 |

## 1.9 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, Part 27(D)
- ANSI C63.26-2015
- FCC KDB 971168 Power Meas License Digital Systems D01 v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
-

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

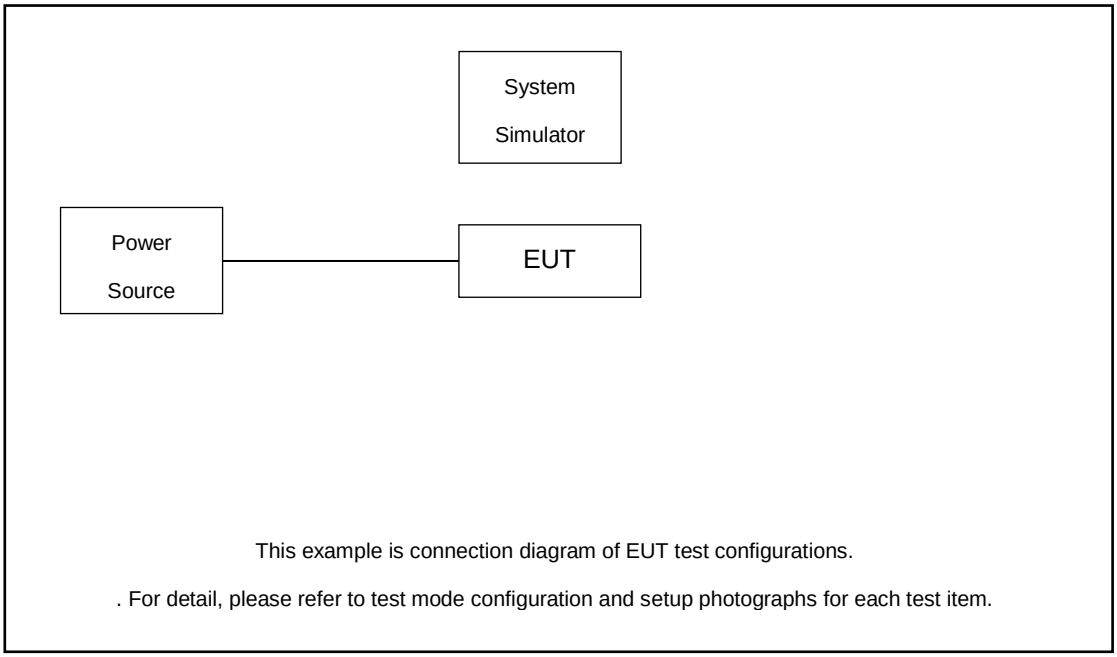
## 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

| Conducted Test Cases | Band | Bandwidth (MHz) | | | | | | Modulation | | | | | RB # | | Test Channel | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | PI/2 BPSK | QPSK | 16QAM | 64QAM | 256QAM | 1 | Full | L | M | H |
| Max. Output Power | n30 | - | - | V | | - | - | V | V | V | V | V | V | V | V | V | V |
| | | - | - | | V | - | - | V | V | V | V | V | V | V | | V | |
| Peak-to-Average Ratio | n30 | - | - | V | | - | - | V | V | | | | V | V | V | V | V |
| E.I.R.P | n30 | - | - | V | | - | - | V | V | V | V | V | V | | V | V | V |
| | | - | - | | V | - | - | V | V | V | V | V | V | | | V | |
| 26dB and 99% Bandwidth | n30 | - | - | V | | - | - | | V | V | V | V | | V | | V | |
| | | - | - | | V | - | - | | V | V | V | V | | V | | V | |
| Conducted Band Edge | n30 | - | - | V | | - | - | V | V | V | V | V | V | V | V | | V |
| | | - | - | | V | - | - | V | V | V | V | V | V | V | V | | V |
| Conducted Spurious Emission | n30 | - | - | V | | - | - | V | V | | | | V | | V | V | V |
| | | - | - | | V | - | - | V | V | | | | V | | | V | |
| Frequency Stability | n30 | - | - | | V | - | - | | V | | | | | V | | V | |
| Radiated Spurious Emission | n30 | Worst Case | | | | | | | | | | | | | | V | |
| Note | 1. The mark “v “ means that this configuration is chosen for testing<br>2. The mark “-“ means that this bandwidth is not supported.<br>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.<br>4. 5G NR supports SCS 15KHz and 30KHz, according to engineering evaluation, only choose the SCS 15KHz (the highest conducted power) perform for all tests.<br>5. Based on engineering evaluation, only the worst modulation test results are shown in the report. | | | | | | | | | | | | | | | | |

## 2.2 Connection Diagram of Test System




## 2.3 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | Power Supply | GWINSTEK | PSS-2002 | N/A | N/A | Unshielded, 1.8 m |
| 2. | Base Station | Keysight | UXM E7515B | N/A | N/A | Unshielded, 1.5 m |
| 3. | Test jig | N/A | N/A | N/A | N/A | N/A |

## 2.4 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

*Offset = RF cable loss.*

Following shows an offset computation example with cable loss 4.4 dB.

Example :

*Offset(dB) = RF cable loss(dB).*

= 4.4 (dB)

## 2.5 Frequency List of Low/Middle/High Channels

| 5G NR n30 Channel and Frequency List | | | | |
|---|---|---|---|---|
| **BW [MHz]** | **Channel/Frequency(MHz)** | **Lowest** | **Middle** | **Highest** |
| 10 | Channel | - | 462000 | - |
| | Frequency | - | 2310 | - |
| 5 | Channel | 461500 | 462000 | 462500 |
| | Frequency | 2307.5 | 2310 | 2312.5 |

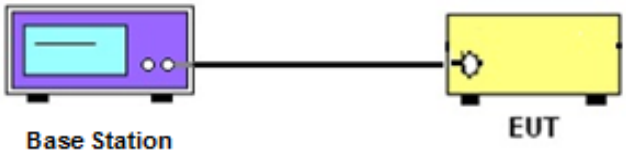
# 3 Conducted Test Items

## 3.1 Measuring Instruments

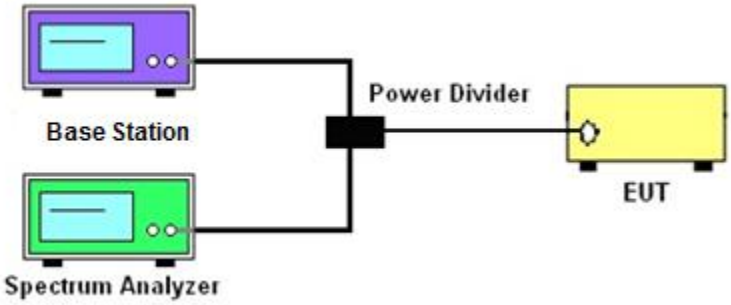
See list of measuring instruments of this test report.

## 3.2 Test Setup

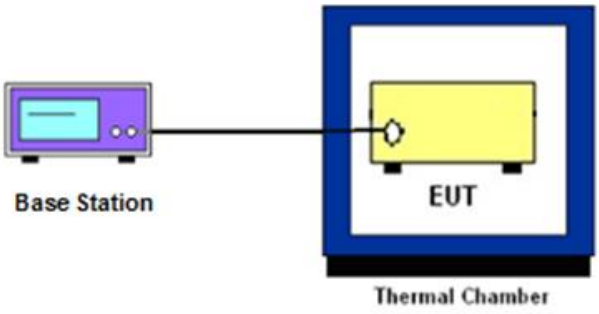
### 3.2.1 Conducted Output Power




### 3.2.2 Peak-to-Average Ratio, Occupied / 26dB Bandwidth ,Band-Edge and Conducted Spurious Emission




### 3.2.3 Frequency Stability




## 3.3 Test Result of Conducted Test

Please refer to Appendix A.

## 3.4 Conducted Output Power Measurement

### 3.4.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

### 3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

## 3.5 Peak-to-Average Ratio

### 3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.

### 3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

# 3.6 EIRP

## 3.6.1 Description of EIRP

For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, *except that* for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

## 3.6.2 Test Procedures

1. According to KDB 412172 D01 Power Approach,
2. EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

   $P_T$ = transmitter output power in dBm

   $G_T$ = gain of the transmitting antenna in dBi

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

# 3.7 Occupied Bandwidth

## 3.7.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is 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 transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

## 3.7.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

# 3.8 Conducted Band Edge Measurement

## 3.8.1 Description of Conducted Band Edge Measurement

27.53 (a)(4)

For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

## 3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

   Example:

   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.

# 3.9 Conducted Spurious Emission Measurement

## 3.9.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 9 kHz up to a frequency including its $10^{th}$ harmonic.

## 3.9.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [70 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [70 + 10log(P)] (dB)
    = -40dBm

# 3.10 Frequency Stability Measurement

## 3.10.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

## 3.10.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

## 3.10.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5.
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

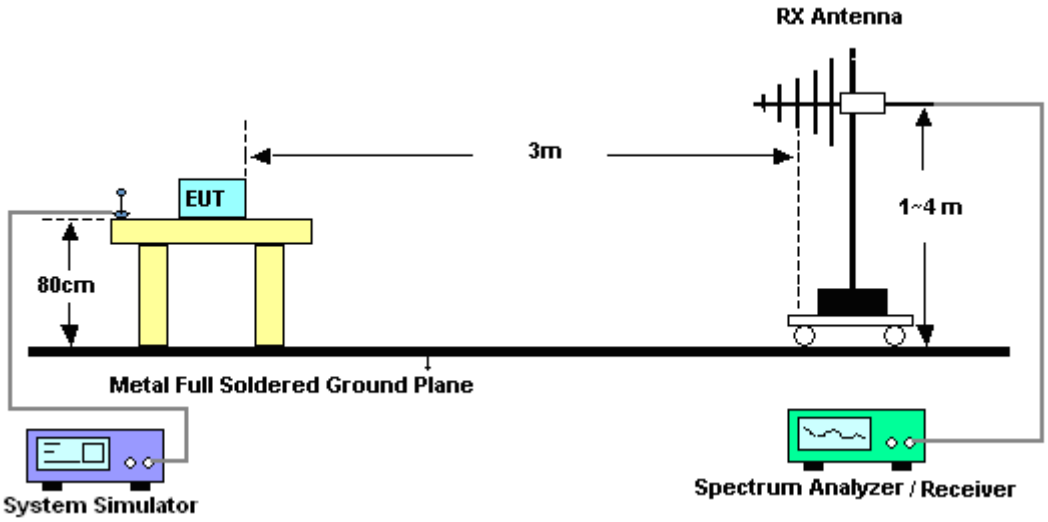
# 4 Radiated Test Items

## 4.1 Measuring Instruments

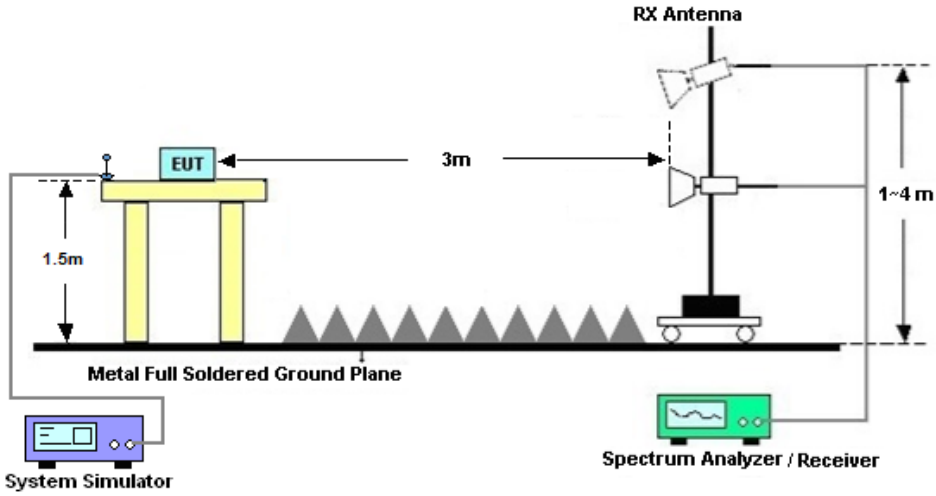
See list of measuring instruments of this test report.

## 4.2 Test Setup

### 4.2.1 For radiated test from 30MHz to 1GHz




### 4.2.2 For radiated test above 1GHz




## 4.3 Test Result of Radiated Test

Please refer to Appendix B.

## 4.4 Radiated Spurious Emission Measurement

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI/TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
   EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
   ERP (dBm) = EIRP - 2.15
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [70 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [70 + 10log(P)] (dB)
    = -40dBm.

# 5 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV40 | 101078 | 10Hz~40GHz | Apr. 17, 2020 | Jan. 13, 2021~ Feb. 10, 2021 | Apr. 16, 2021 | Conducted (TH01-SZ) |
| Thermal Chamber | Ten Billion Hongzhangroup | LP-150U | H2014081803 | -40~+150°C | Jul. 22, 2020 | Jan. 13, 2021~ Feb. 10, 2021 | Jul. 21, 2021 | Conducted (TH01-SZ) |
| EMI Test Receiver&SA | KEYSIGHT | N9038A | MY54450083 | 20Hz~8.4GHz | Apr. 17, 2020 | Jan. 27, 2021 | Apr. 16, 2021 | Radiation (03CH03-SZ) |
| EXA Spectrum Anaiyzer | KEYSIGHT | N9010A | MY55150246 | 10Hz~44GHz; | Apr. 17, 2020 | Jan. 27, 2021 | Apr. 16, 2021 | Radiation (03CH03-SZ) |
| Bilog Antenna | TeseQ | CBL6112D | 35408 | 30MHz-2GHz | Jun. 22, 2020 | Jan. 27, 2021 | Jun. 21, 2021 | Radiation (03CH03-SZ) |
| Double Ridge Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-1355 | 1GHz~18GHz | Apr. 30, 2020 | Jan. 27, 2021 | Apr. 29, 2021 | Radiation (03CH03-SZ) |
| Amplifier | Burgeon | BPA-530 | 102210 | 0.01Hz ~3000MHz | Oct. 17, 2020 | Jan. 27, 2021 | Oct. 16, 2021 | Radiation (03CH03-SZ) |
| HF Amplifier | MITEQ | TTA1840-35-HG | 1871923 | 18GHz~40GHz | Jul. 21, 2020 | Jan. 27, 2021 | Jul. 20, 2021 | Radiation (03CH03-SZ) |
| SHF-EHF Horn | com-power | AH-840 | 101071 | 18Ghz-40GHz | Apr. 23, 2020 | Jan. 27, 2021 | Apr. 22, 2021 | Radiation (03CH03-SZ) |
| Amplifier | Agilent Technologies | 83017A | MY395013002 | 500MHz~26.5GHz | Dec. 25, 2020 | Jan. 27, 2021 | Dec. 24, 2021 | Radiation (03CH03-SZ) |
| AC Power Source | Chroma | 61601 | 616010001985 | N/A | NCR | Jan. 27, 2021 | NCR | Radiation (03CH03-SZ) |
| Turn Table | EM | EM1000 | N/A | 0~360 degree | NCR | Jan. 27, 2021 | NCR | Radiation (03CH03-SZ) |
| Antenna Mast | EM | EM1000 | N/A | 1 m~4 m | NCR | Jan. 27, 2021 | NCR | Radiation (03CH03-SZ) |

NCR: No Calibration Required

# 6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.0dB** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.6dB** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.8dB** |

# Appendix A. Test Results of Conducted Test

## Conducted Output Power(Average power) and EIRP

| SCS 15 | | | | | | | |
|---|---|---|---|---|---|---|---|
| SA n30 (ANT M) 10MHz (GT - LC = 1 dB) | | | | | | | |
| Channel | Mode | NR RB | | Conducted | | EIRP | |
| | | Size | Offset | Power (dBm/5MHz) | Power (W/5MHz) | EIRP (dBm/5MHz) | EIRP (W/5MHz) |
| Middle | PI/2 BPSK DFT-s-OFDM | 1 | 1 | 22.10 | 0.1622 | 23.10 | 0.2042 |
| | | 1 | 50 | 22.41 | 0.1742 | 23.41 | 0.2193 |
| | | 25 | 12 | 22.24 | 0.1675 | 23.24 | 0.2109 |
| | QPSK DFT-s-OFDM | 1 | 1 | 21.94 | 0.1563 | 22.94 | 0.1968 |
| | | 1 | 50 | 22.26 | 0.1683 | 23.26 | 0.2118 |
| | | 25 | 12 | 22.27 | 0.1687 | 23.27 | 0.2123 |
| | 16QAM DFT-s-OFDM | 1 | 1 | 21.16 | 0.1306 | 22.16 | 0.1644 |
| | | 1 | 50 | 21.22 | 0.1324 | 22.22 | 0.1667 |
| | | 25 | 12 | 21.26 | 0.1337 | 22.26 | 0.1683 |
| | 64QAM DFT-s-OFDM | 1 | 1 | 20.12 | 0.1028 | 21.12 | 0.1294 |
| | | 1 | 50 | 20.16 | 0.1038 | 21.16 | 0.1306 |
| | | 25 | 12 | 20.23 | 0.1054 | 21.23 | 0.1327 |
| | 256QAM DFT-s-OFDM | 1 | 1 | 17.36 | 0.0545 | 18.36 | 0.0685 |
| | | 1 | 50 | 17.41 | 0.0551 | 18.41 | 0.0693 |
| | | 25 | 12 | 17.39 | 0.0548 | 18.39 | 0.069 |

| SCS 15 | | | | | | | |
|---|---|---|---|---|---|---|---|
| SA n30 (ANT) 5MHz (GT - LC = 1 dB) | | | | | | | |
| Channel | Mode | NR RB | | Conducted | | EIRP | |
| | | Size | Offset | Power (dBm/5MHz) | Power (W/5MHz) | EIRP (dBm/5MHz) | EIRP (W/5MHz) |
| Lowest | PI/2 BPSK DFT-s-OFDM | 1 | 1 | 22.24 | 0.1675 | 23.24 | 0.2109 |
| | | 1 | 23 | 22.53 | 0.1791 | 23.53 | 0.2254 |
| | | 12 | 6 | 22.32 | 0.1706 | 23.32 | 0.2148 |
| | QPSK DFT-s-OFDM | 1 | 1 | 22.20 | 0.166 | 23.20 | 0.2089 |
| | | 1 | 23 | 22.37 | 0.1726 | 23.37 | 0.2173 |
| | | 12 | 6 | 22.31 | 0.1702 | 23.31 | 0.2143 |
| | 16QAM DFT-s-OFDM | 1 | 1 | 21.38 | 0.1374 | 22.38 | 0.173 |
| | | 1 | 23 | 21.43 | 0.139 | 22.43 | 0.175 |
| | | 12 | 6 | 21.42 | 0.1387 | 22.42 | 0.1746 |
| | 64QAM DFT-s-OFDM | 1 | 1 | 20.15 | 0.1035 | 21.15 | 0.1303 |
| | | 1 | 23 | 20.21 | 0.105 | 21.21 | 0.1321 |
| | | 12 | 6 | 20.26 | 0.1062 | 21.26 | 0.1337 |
| | 256QAM DFT-s-OFDM | 1 | 1 | 17.65 | 0.0582 | 18.65 | 0.0733 |
| | | 1 | 23 | 17.61 | 0.0577 | 18.61 | 0.0726 |
| | | 12 | 6 | 17.66 | 0.0583 | 18.66 | 0.0735 |
| Middle | | 1 | 1 | 22.27 | 0.1687 | 23.27 | 0.2123 |

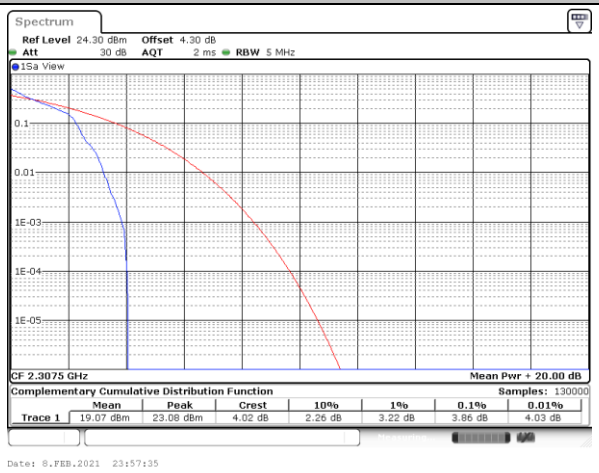
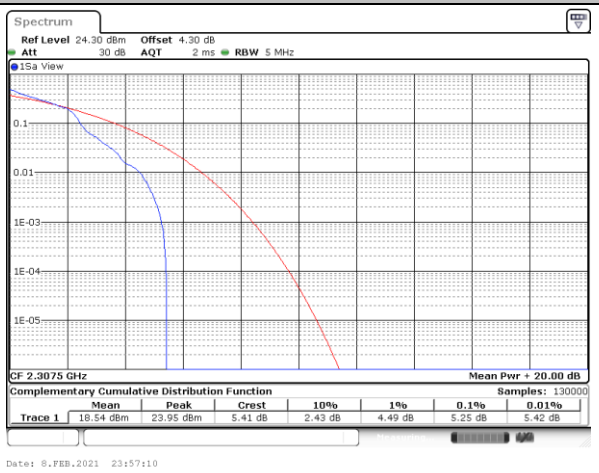
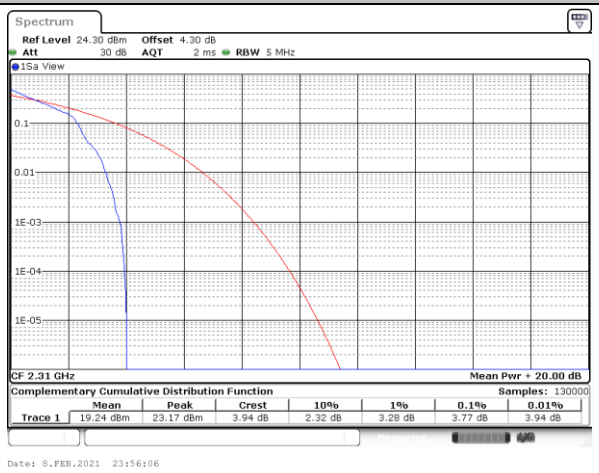
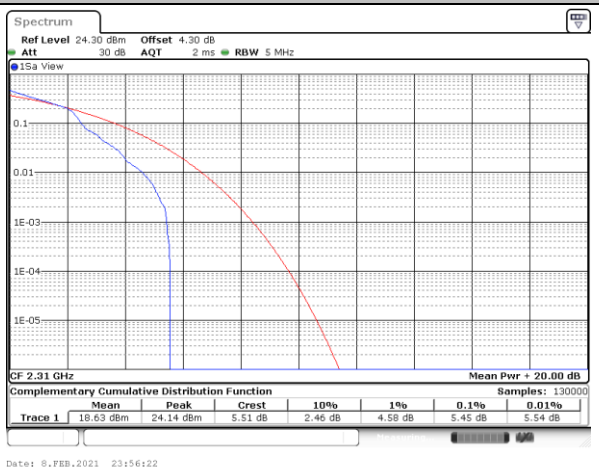
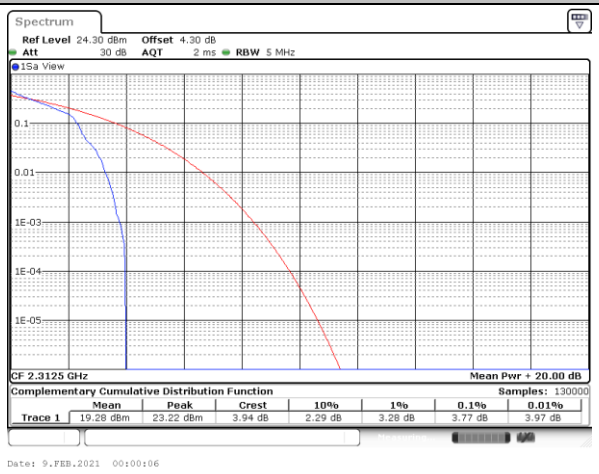
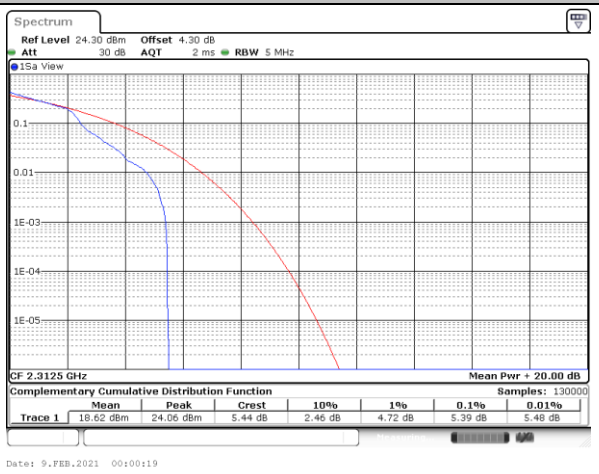
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | PI/2 BPSK DFT-s-OFDM | 1 | 23 | 22.45 | 0.1758 | 23.45 | 0.2213 |
| | | 12 | 6 | 22.43 | 0.175 | 23.43 | 0.2203 |
| | QPSK DFT-s-OFDM | 1 | 1 | 22.23 | 0.1671 | 23.23 | 0.2104 |
| | | 1 | 23 | 22.37 | 0.1726 | 23.37 | 0.2173 |
| | | 12 | 6 | 22.41 | 0.1742 | 23.41 | 0.2193 |
| | 16QAM DFT-s-OFDM | 1 | 1 | 21.41 | 0.1384 | 22.41 | 0.1742 |
| | | 1 | 23 | 21.40 | 0.138 | 22.40 | 0.1738 |
| | | 12 | 6 | 21.52 | 0.1419 | 22.52 | 0.1786 |
| | 64QAM DFT-s-OFDM | 1 | 1 | 20.22 | 0.1052 | 21.22 | 0.1324 |
| | | 1 | 23 | 20.02 | 0.1005 | 21.02 | 0.1265 |
| | | 12 | 6 | 20.05 | 0.1012 | 21.05 | 0.1274 |
| | 256QAM DFT-s-OFDM | 1 | 1 | 17.88 | 0.0614 | 18.88 | 0.0773 |
| | | 1 | 23 | 17.92 | 0.0619 | 18.92 | 0.078 |
| | | 12 | 6 | 17.76 | 0.0597 | 18.76 | 0.0752 |
| | QPSK CP-s-OFDM | 1 | 1 | 21.03 | 0.1268 | 22.03 | 0.1596 |
| | | 1 | 23 | 21.13 | 0.1297 | 22.13 | 0.1633 |
| | | 13 | 6 | 21.22 | 0.1324 | 22.22 | 0.1667 |
| Highest | PI/2 BPSK DFT-s-OFDM | 1 | 1 | 22.52 | 0.1786 | 23.52 | 0.2249 |
| | | 1 | 23 | 22.53 | 0.1791 | 23.53 | 0.2254 |
| | | 12 | 6 | 22.41 | 0.1742 | 23.41 | 0.2193 |
| | QPSK DFT-s-OFDM | 1 | 1 | 22.39 | 0.1734 | 23.39 | 0.2183 |
| | | 1 | 23 | 22.36 | 0.1722 | 23.36 | 0.2168 |
| | | 12 | 6 | 22.49 | 0.1774 | 23.49 | 0.2234 |
| | 16QAM DFT-s-OFDM | 1 | 1 | 21.35 | 0.1365 | 22.35 | 0.1718 |
| | | 1 | 23 | 21.23 | 0.1327 | 22.23 | 0.1671 |
| | | 12 | 6 | 21.41 | 0.1384 | 22.41 | 0.1742 |
| | 64QAM DFT-s-OFDM | 1 | 1 | 20.21 | 0.105 | 21.21 | 0.1321 |
| | | 1 | 23 | 20.13 | 0.103 | 21.13 | 0.1297 |
| | | 12 | 6 | 20.09 | 0.1021 | 21.09 | 0.1285 |
| | 256QAM DFT-s-OFDM | 1 | 1 | 18.06 | 0.064 | 19.06 | 0.0805 |
| | | 1 | 23 | 17.63 | 0.0579 | 18.63 | 0.0729 |
| | | 12 | 6 | 17.71 | 0.059 | 18.71 | 0.0743 |

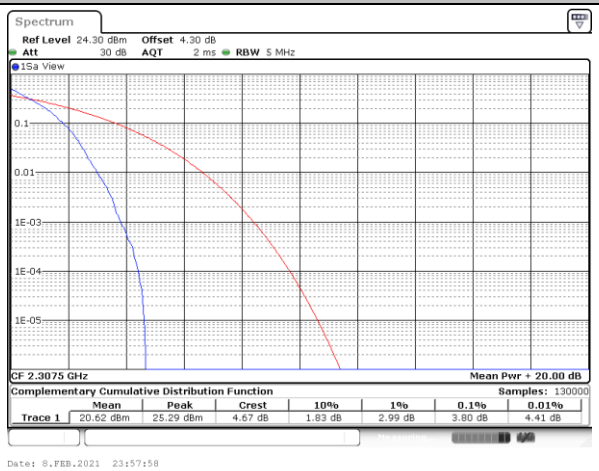
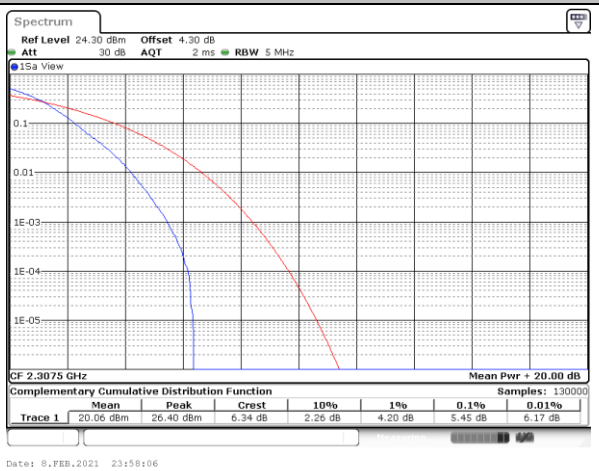
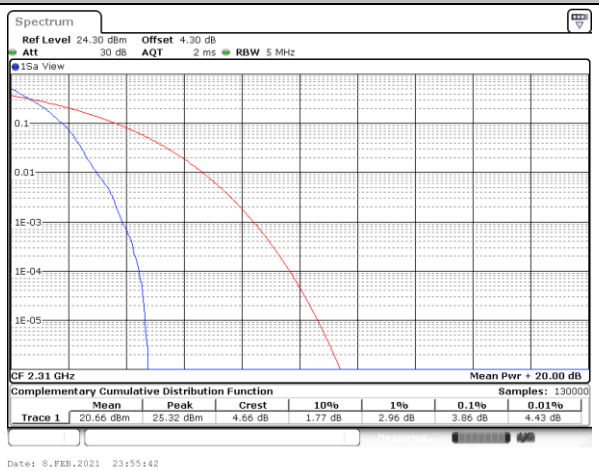
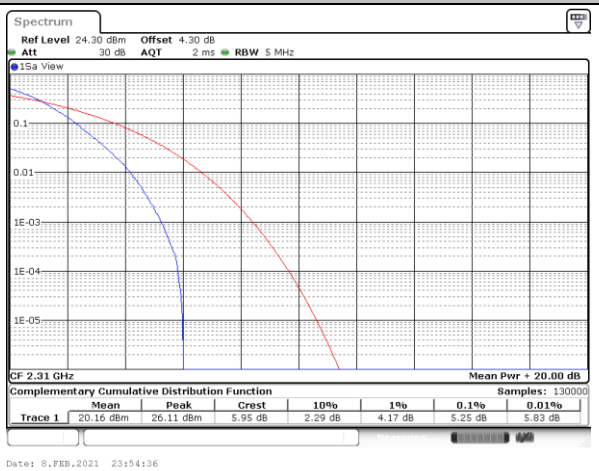
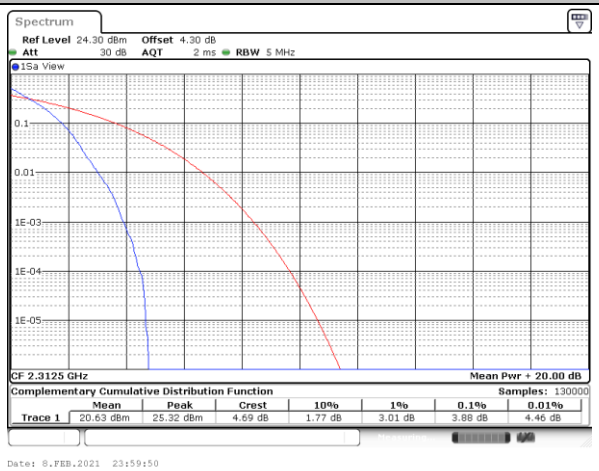
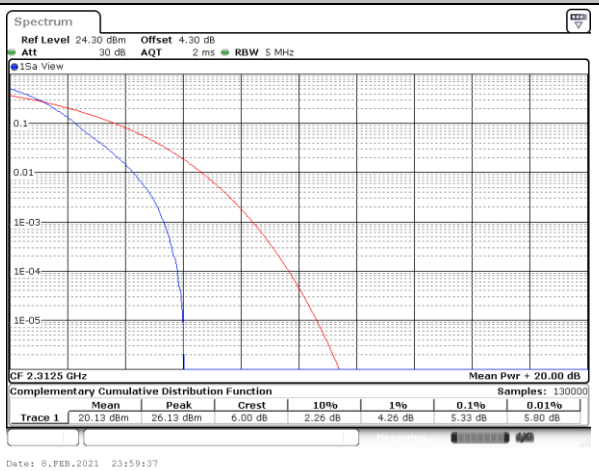
| EIRP Limit | EIRP Result |
|---|---|
| **< 250mW/5MHz** | **PASS** |

# FR1 n30

## Peak-to-Average Ratio

| Mode | FR1 n30 / 5MHz / DFT-S OFDM | | | | |
|---|---|---|---|---|---|
| Mod. | PI/2 BPSK | PI/2 BPSK | QPSK | QPSK | Limit: 13dB |
| RB Size | 1RB | Full RB | 1RB | Full RB | Result |
| Lowest CH | 3.86 | 3.80 | 5.25 | 5.45 | PASS |
| Middle CH | 3.77 | 3.86 | 5.45 | 5.25 | |
| Highest CH | 3.77 | 3.88 | 5.39 | 5.33 | |

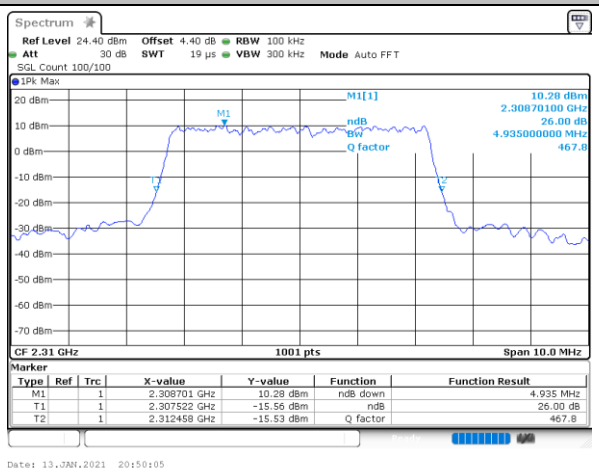
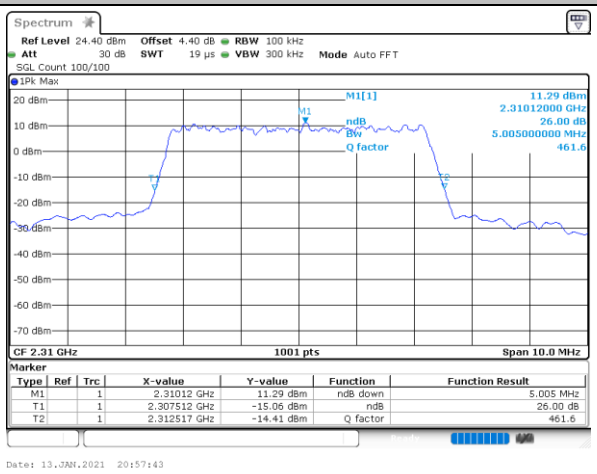
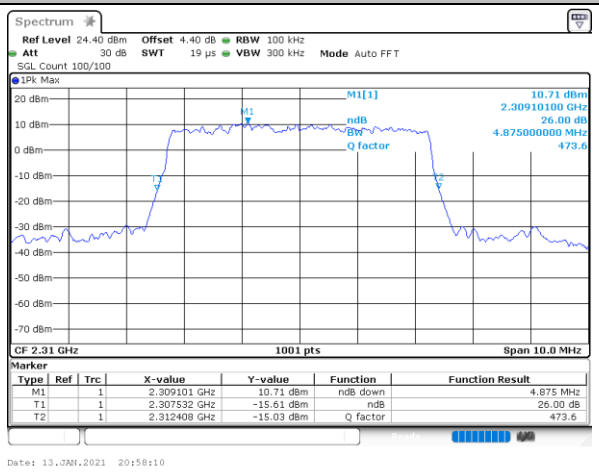
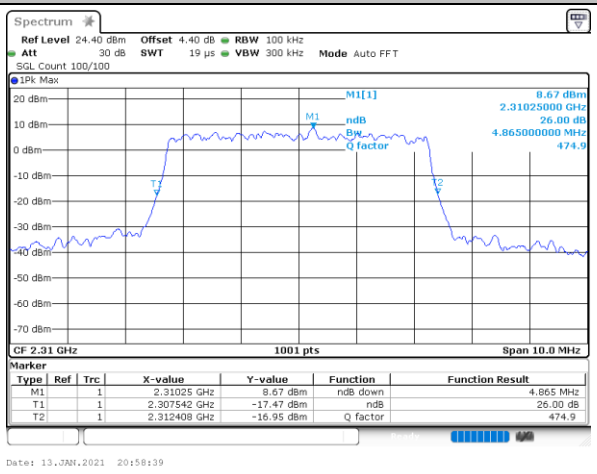
| FR1 n30 / 5MHz / DFT-S OFDM | |
|---|---|
| **PI/2 BPSK** | **QPSK** |
| **Lowest Channel / 1RB** | **Lowest Channel / 1RB** |
|  |  |
| **Middle Channel / 1 RB** | **Middle Channel / 1 RB** |
|  |  |
| **Highest Channel / 1 RB** | **Highest Channel / 1 RB** |
|  |  |

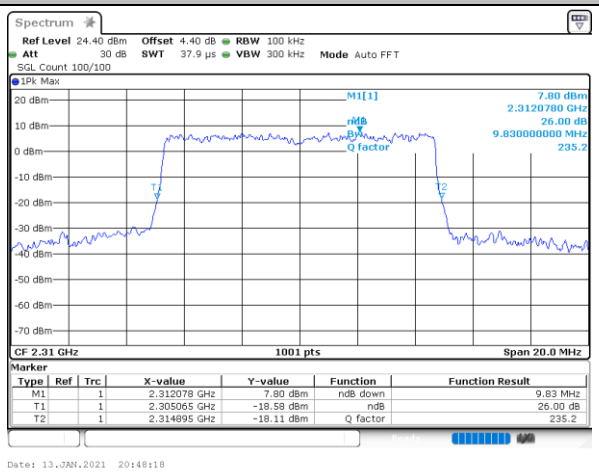
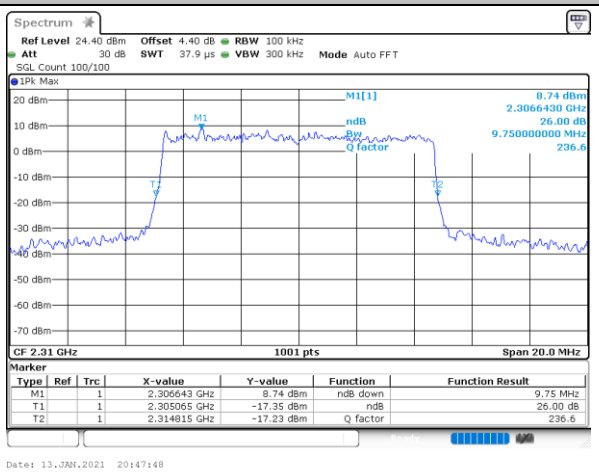
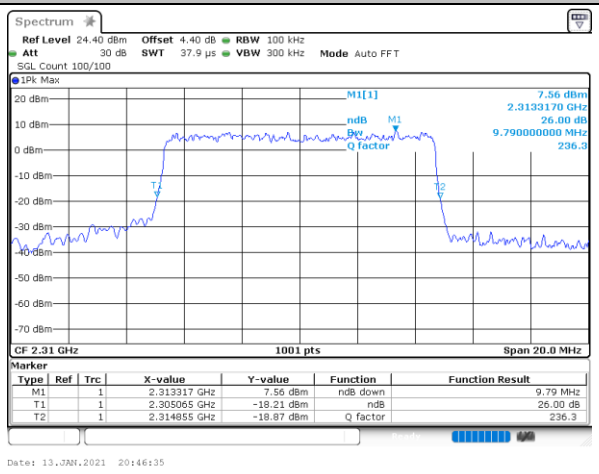
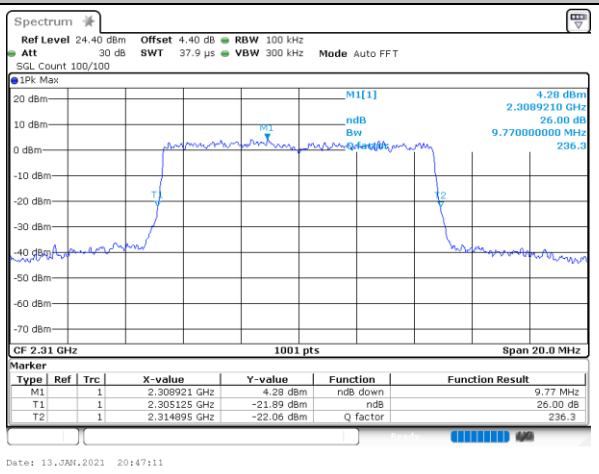
| FR1 n30 / 5MHz / DFT-S OFDM | |
|---|---|
| **PI/2 BPSK** | **QPSK** |
| **Lowest Channel / Full RB** | **Lowest Channel / Full RB** |
|  |  |
| **Middle Channel / Full RB** | **Middle Channel / Full RB** |
|  |  |
| **Highest Channel / Full RB** | **Highest Channel / Full RB** |
|  |  |

# 26dB Bandwidth

| Mode | FR1 n30 : 26dB BW(MHz) / CP-OFDM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW | 5MHz | 5MHz | 5MHz | 5MHz | | | | |
| Mod. | QPSK | 16QAM | 64QAM | 256QAM | | | | |
| Middle CH | 4.93 | 5.00 | 4.88 | 4.87 | | | | |

| Mode | FR1 n30 : 26dB BW(MHz) / CP-OFDM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW | 10MHz | 10MHz | 10MHz | 10MHz | | | | |
| Mod. | QPSK | 16QAM | 64QAM | 256QAM | | | | |
| Middle CH | 9.83 | 9.75 | 9.79 | 9.77 | | | | |

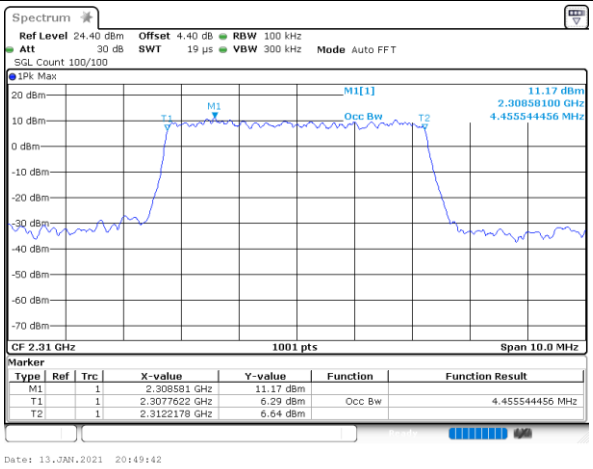
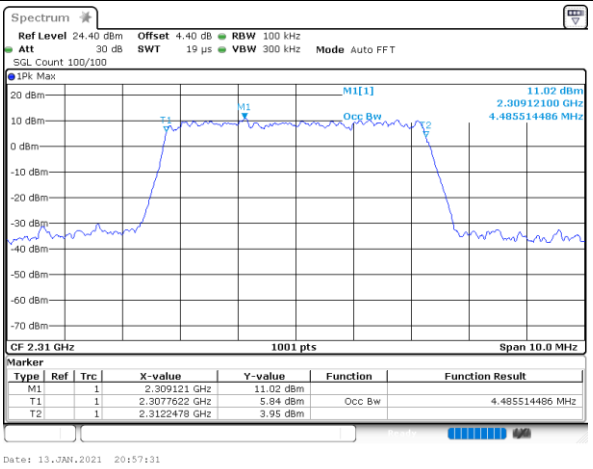
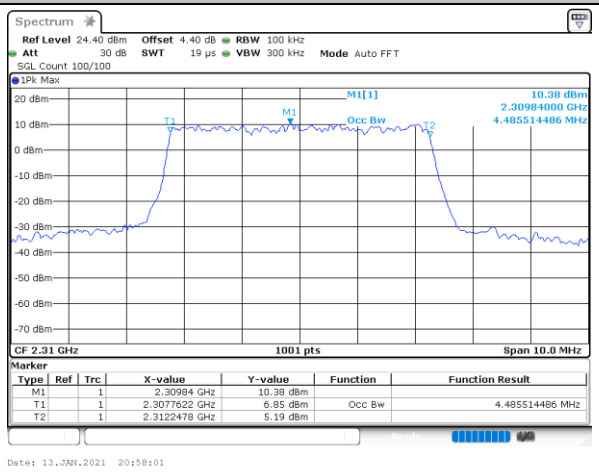
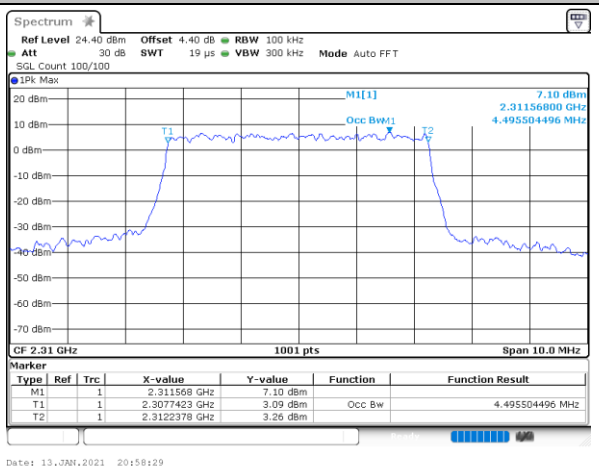
| FR1 n30 / 5MHz / CP-OFDM | |
|---|---|
| **QPSK** | **16QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |
| **64QAM** | **256QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |

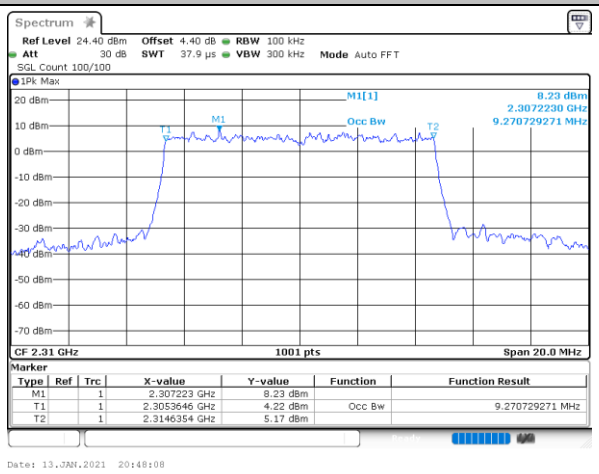
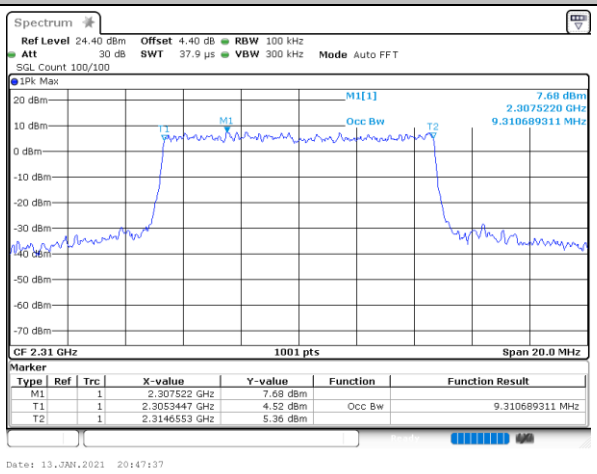
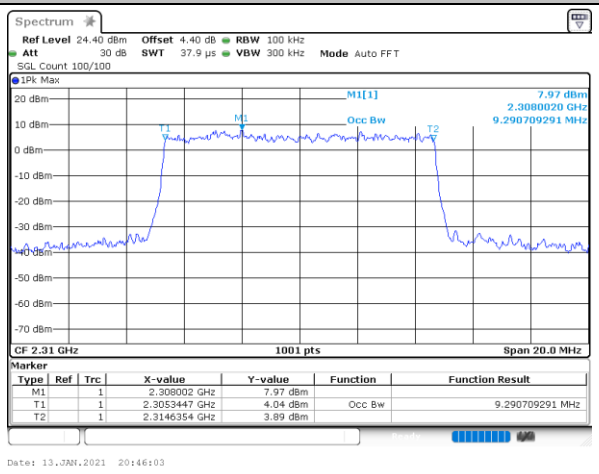
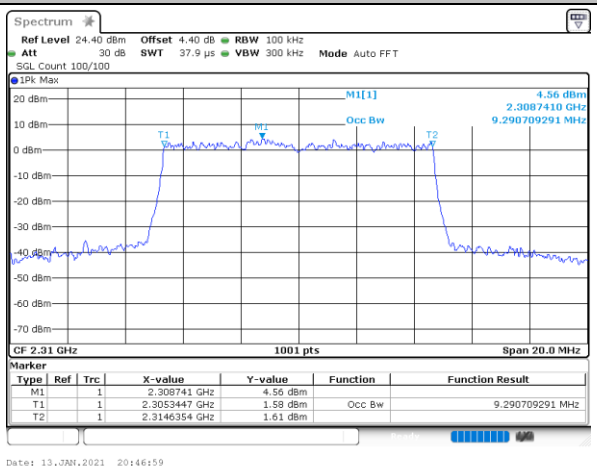
| FR1 n30 / 10MHz / CP-OFDM | |
|---|---|
| **QPSK** | **16QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |
| **64QAM** | **256QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |

# Occupied Bandwidth

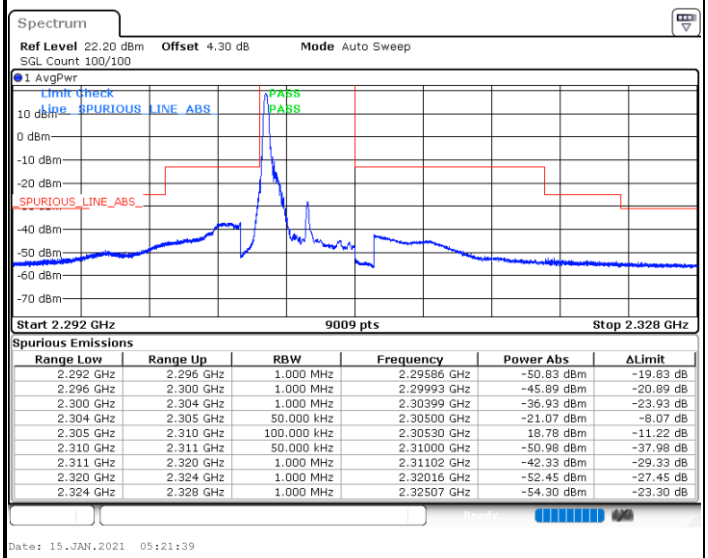
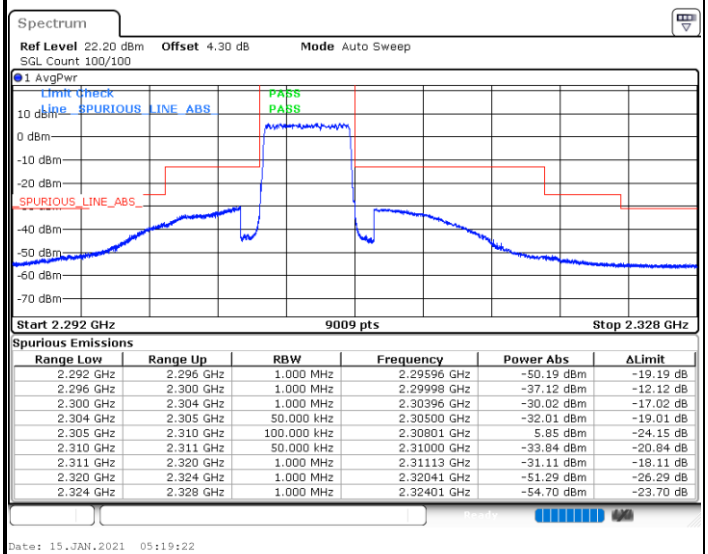
| Mode | FR1 n30 : OBW(MHz) / CP-OFDM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW | 5MHz | 5MHz | 5MHz | 5MHz | | | | |
| Mod. | QPSK | 16QAM | 64QAM | 256QAM | | | | |
| Middle CH | 4.46 | 4.49 | 4.49 | 4.50 | | | | |

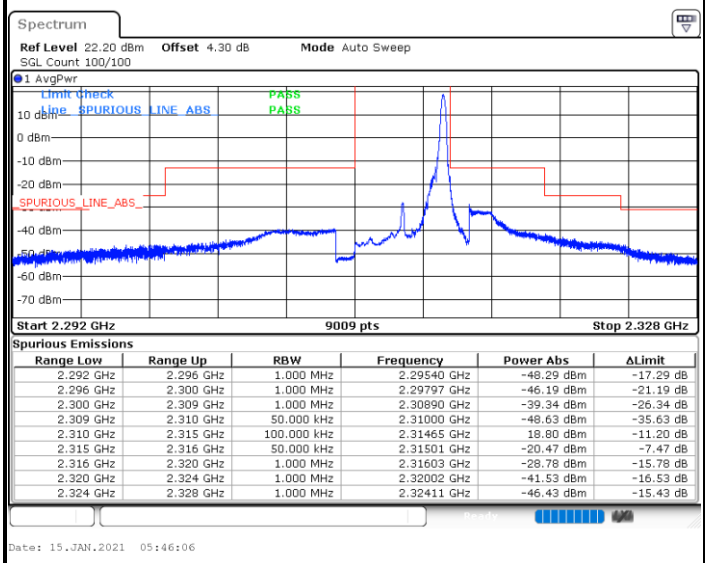
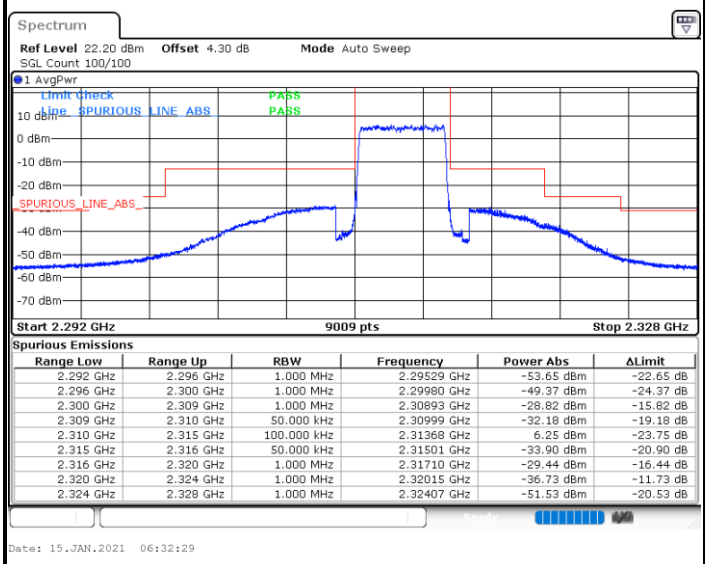
| Mode | FR1 n30 : OBW(MHz) / CP-OFDM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BW | 10MHz | 10MHz | 10MHz | 10MHz | | | | |
| Mod. | QPSK | 16QAM | 64QAM | 256QAM | | | | |
| Middle CH | 9.27 | 9.31 | 9.29 | 9.29 | | | | |

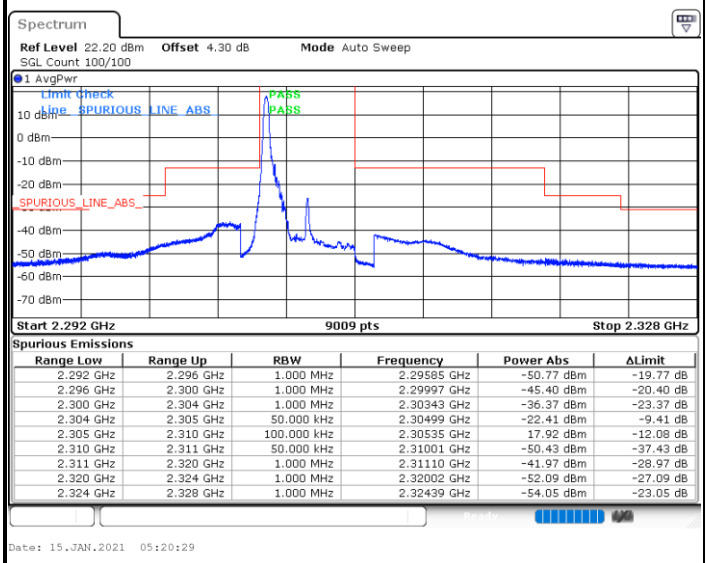
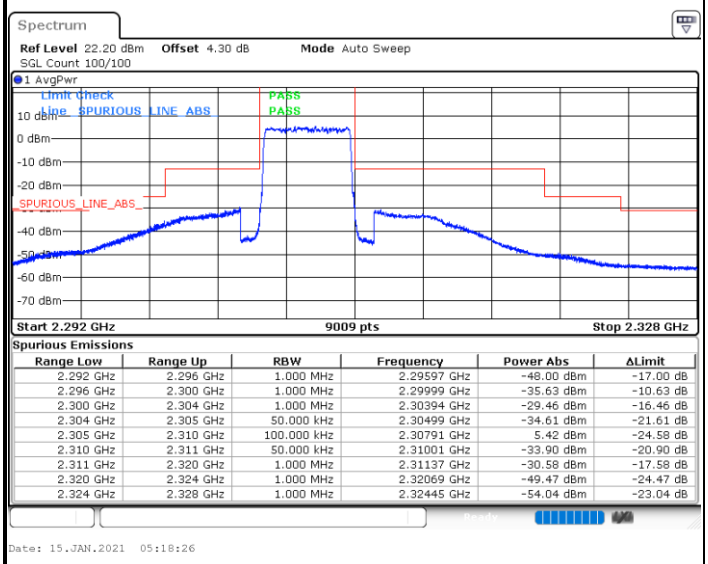
| FR1 n30 / 5MHz / CP-OFDM | |
|---|---|
| **QPSK** | **16QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |
| **64QAM** | **256QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |

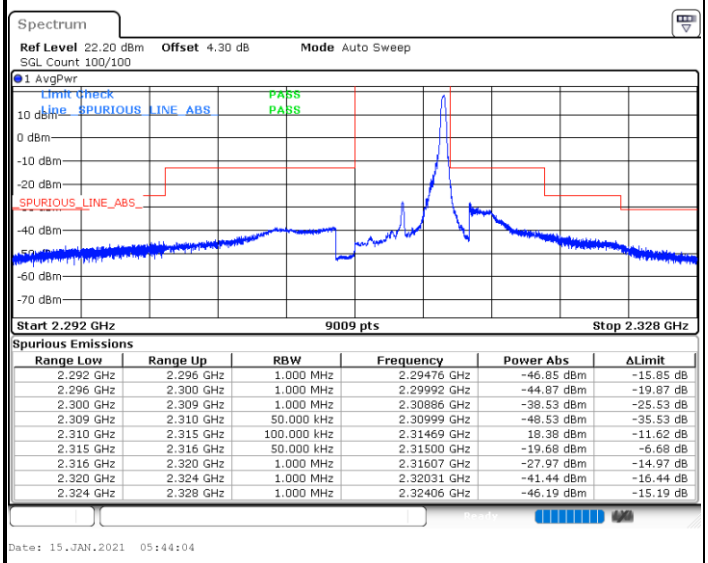
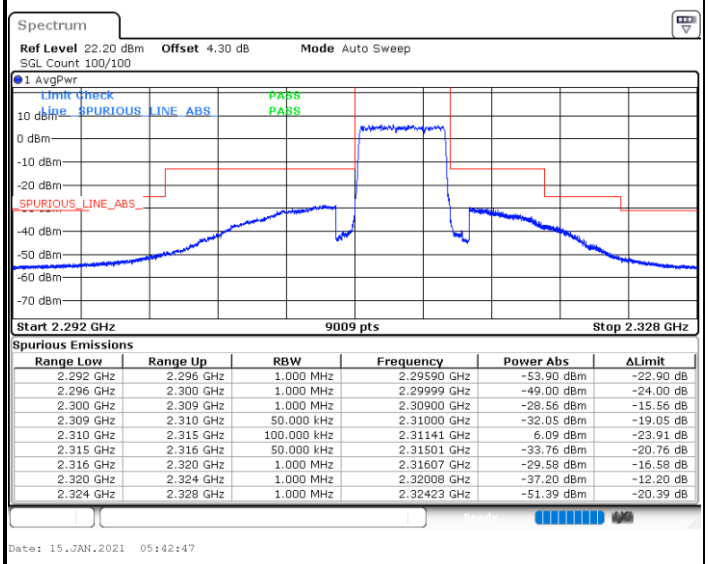
| FR1 n30 / 10MHz / CP-OFDM | |
|---|---|
| **QPSK** | **16QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |
| **64QAM** | **256QAM** |
| **Middle Channel** | **Middle Channel** |
|  |  |

# Conducted Band Edge

| FR1 n30 / 5MHz / DFT-S OFDM BPSK | |
|---|---|
| **Lowest Band Edge / 1 RB** | **Channel Power < -13dBm Pass** |
|  | |
| **Lowest Band Edge / Full RB** | **Channel Power < -13dBm Pass** |
|  | / |

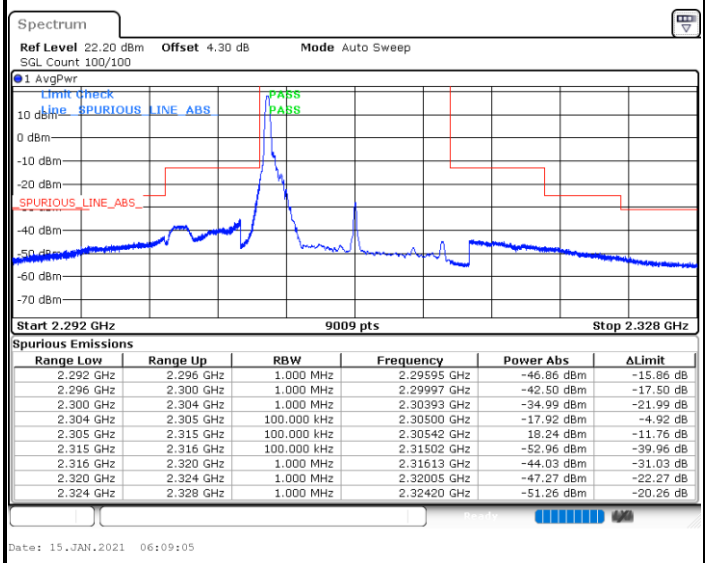
| FR1 n30 / 5MHz / DFT-S OFDM BPSK | |
|---|---|
| **Highest Band Edge / 1 RB** | **Channel Power < -13dBm Pass** |
|  | / |
| **Highest Band Edge / Full RB** | **Channel Power < -13dBm Pass** |
|  | / |

| FR1 n30 / 5MHz / DFT-S OFDM QPSK | |
|---|---|
| **Lowest Band Edge / 1 RB** | **Channel Power < -13dBm Pass** |
|  | / |
| **Lowest Band Edge / Full RB** | **Channel Power < -13dBm Pass** |
|  | / |

| FR1 n30 / 5MHz / DFT-S OFDM QPSK | |
|---|---|
| **Highest Band Edge / 1 RB** | **Channel Power < -13dBm Pass** |
|  | / |
| **Highest Band Edge / Full RB** | **Channel Power < -13dBm Pass** |
|  | / |

## FR1 n30 / 10MHz / DFT-S OFDM BPSK

### Lowest Band Edge / 1 RB

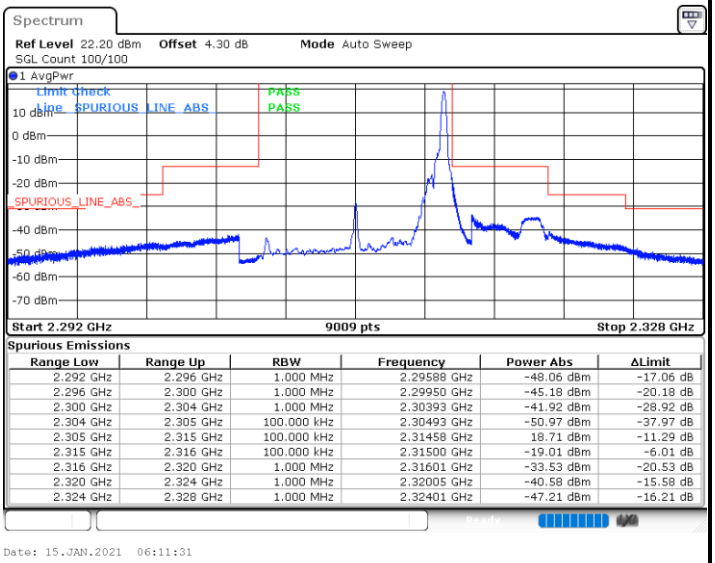



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29595 GHz | -46.86 dBm | -15.86 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29997 GHz | -42.50 dBm | -17.50 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30393 GHz | -34.99 dBm | -21.99 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30500 GHz | -17.92 dBm | -4.92 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.30542 GHz | 18.24 dBm | -11.76 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31502 GHz | -52.96 dBm | -39.96 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31613 GHz | -44.03 dBm | -31.03 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32005 GHz | -47.27 dBm | -22.27 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32420 GHz | -51.26 dBm | -20.26 dB |

Date: 15.JAN.2021 06:09:05

### Highest Band Edge / 1 RB

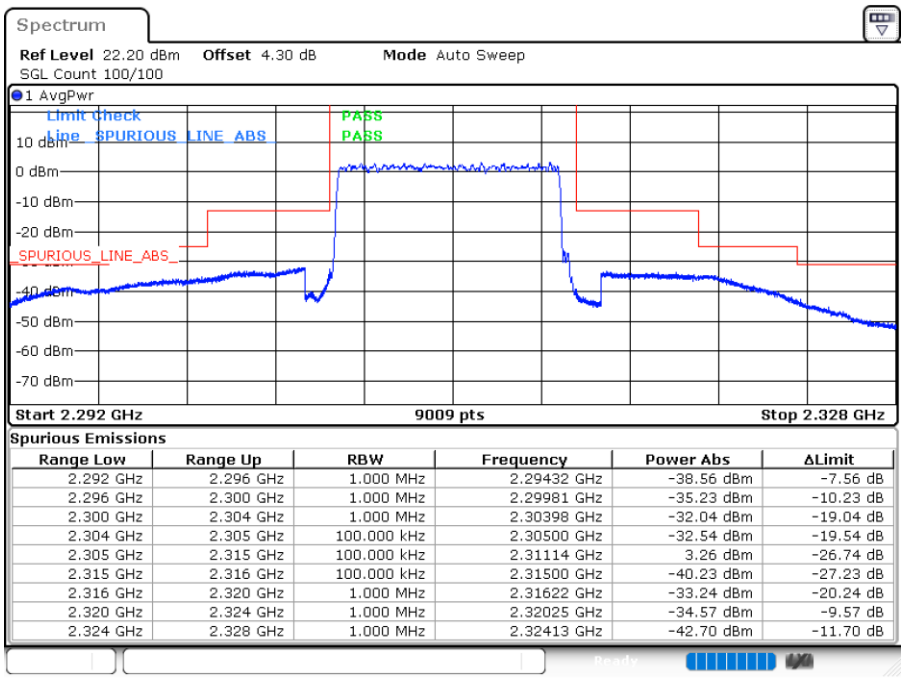



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29588 GHz | -48.06 dBm | -17.06 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29950 GHz | -45.18 dBm | -20.18 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30393 GHz | -41.92 dBm | -28.92 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30493 GHz | -50.97 dBm | -37.97 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31458 GHz | 18.71 dBm | -11.29 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -19.01 dBm | -6.01 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31601 GHz | -33.53 dBm | -20.53 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32005 GHz | -40.58 dBm | -15.58 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32401 GHz | -47.21 dBm | -16.21 dB |

Date: 15.JAN.2021 06:11:31

### Band Edge / Full RB




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29432 GHz | -38.56 dBm | -7.56 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29981 GHz | -35.23 dBm | -10.23 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30398 GHz | -32.04 dBm | -19.04 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30500 GHz | -32.54 dBm | -19.54 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31114 GHz | 3.26 dBm | -26.74 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -40.23 dBm | -27.23 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31622 GHz | -33.24 dBm | -20.24 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32025 GHz | -34.57 dBm | -9.57 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32413 GHz | -42.70 dBm | -11.70 dB |

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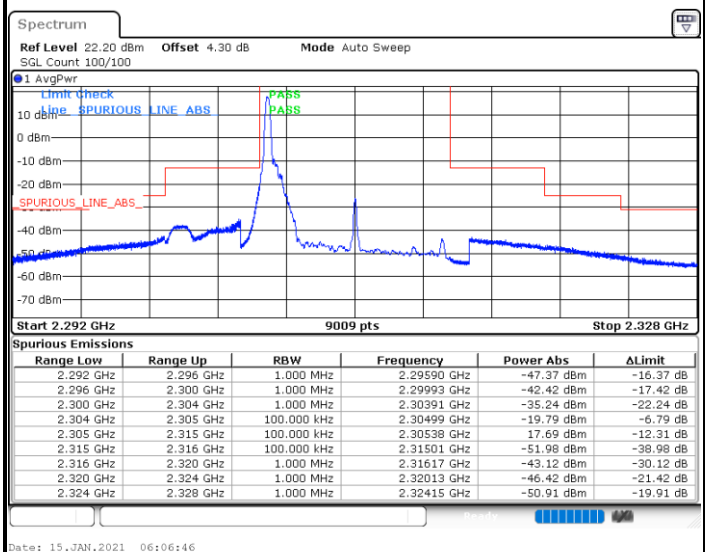
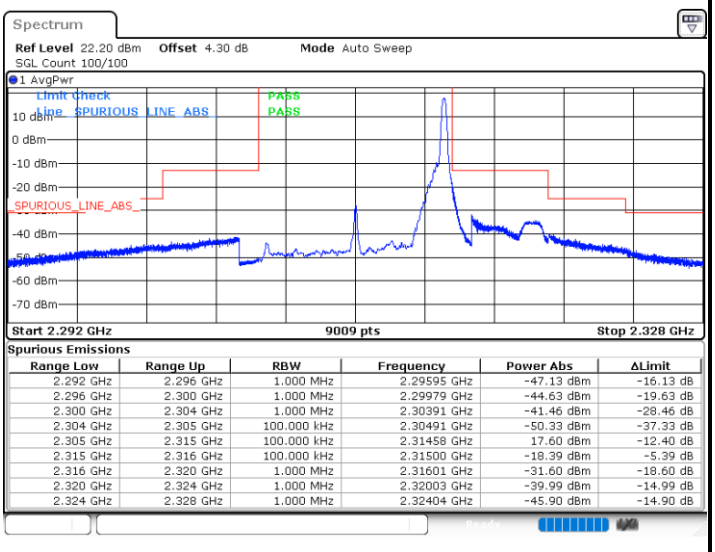
| FR1 n30 / 10MHz / DFT-S OFDM QPSK | |
|---|---|
| **Lowest Band Edge / 1 RB** | **Highest Band Edge / 1 RB** |




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29590 GHz | -47.37 dBm | -16.37 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29993 GHz | -42.42 dBm | -17.42 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30391 GHz | -35.24 dBm | -22.24 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30499 GHz | -19.79 dBm | -6.79 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.30538 GHz | 17.69 dBm | -12.31 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31501 GHz | -51.98 dBm | -38.98 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31617 GHz | -43.12 dBm | -30.12 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32013 GHz | -46.42 dBm | -21.42 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32415 GHz | -50.91 dBm | -19.91 dB |

Date: 15.JAN.2021 06:06:46

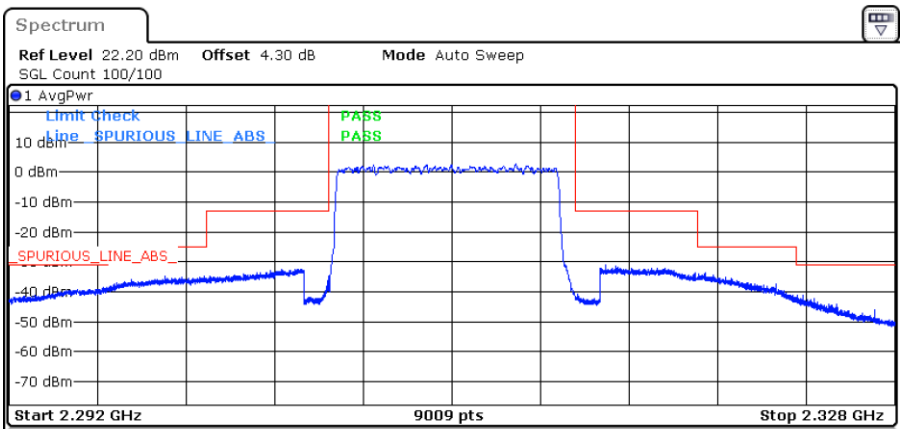



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29595 GHz | -47.13 dBm | -16.13 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29979 GHz | -44.63 dBm | -19.63 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30391 GHz | -41.46 dBm | -28.46 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30491 GHz | -50.33 dBm | -37.33 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31458 GHz | 17.60 dBm | -12.40 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31500 GHz | -18.39 dBm | -5.39 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31601 GHz | -31.60 dBm | -18.60 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32003 GHz | -39.99 dBm | -14.99 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32404 GHz | -45.90 dBm | -14.90 dB |

Date: 15.JAN.2021 06:14:32

| Band Edge / Full RB |
|---|




Spurious Emissions

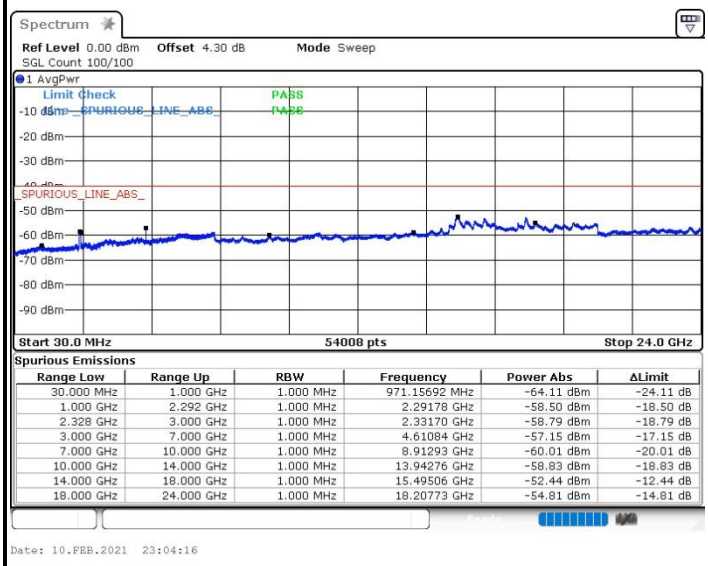
| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 2.292 GHz | 2.296 GHz | 1.000 MHz | 2.29595 GHz | -38.47 dBm | -7.47 dB |
| 2.296 GHz | 2.300 GHz | 1.000 MHz | 2.29833 GHz | -34.59 dBm | -9.59 dB |
| 2.300 GHz | 2.304 GHz | 1.000 MHz | 2.30307 GHz | -32.32 dBm | -19.32 dB |
| 2.304 GHz | 2.305 GHz | 100.000 kHz | 2.30499 GHz | -34.89 dBm | -21.89 dB |
| 2.305 GHz | 2.315 GHz | 100.000 kHz | 2.31259 GHz | 2.66 dBm | -27.34 dB |
| 2.315 GHz | 2.316 GHz | 100.000 kHz | 2.31510 GHz | -40.77 dBm | -27.77 dB |
| 2.316 GHz | 2.320 GHz | 1.000 MHz | 2.31625 GHz | -31.01 dBm | -18.01 dB |
| 2.320 GHz | 2.324 GHz | 1.000 MHz | 2.32032 GHz | -33.59 dBm | -8.59 dB |
| 2.324 GHz | 2.328 GHz | 1.000 MHz | 2.32424 GHz | -41.05 dBm | -10.05 dB |

Date: 15.JAN.2021 06:06:22

# Conducted Spurious Emission

## FR1 n30 / 5MHz / DFT-S OFDM / BPSK

### Lowest Channel / 1RB

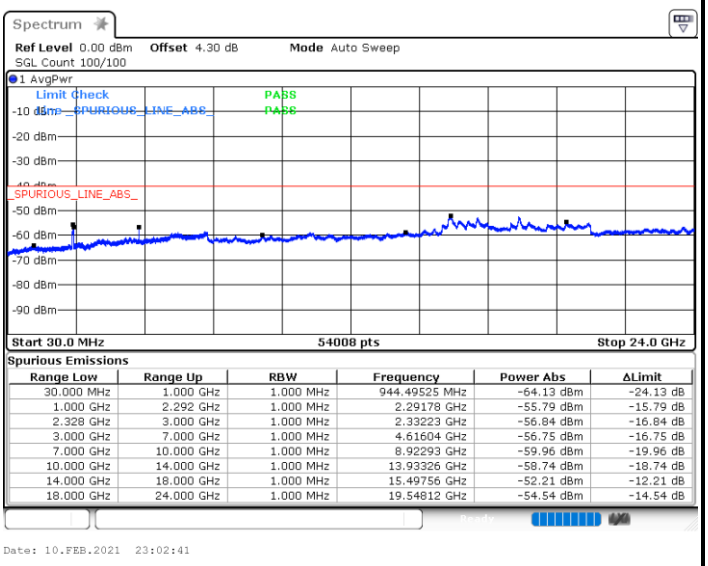



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 971.15692 MHz | -64.11 dBm | -24.11 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29178 GHz | -58.50 dBm | -18.50 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33170 GHz | -58.79 dBm | -18.79 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.61084 GHz | -57.15 dBm | -17.15 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.91293 GHz | -60.01 dBm | -20.01 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.94276 GHz | -58.83 dBm | -18.83 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.49506 GHz | -52.44 dBm | -12.44 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.20773 GHz | -54.81 dBm | -14.81 dB |

Date: 10.FEB.2021 23:04:16

### Middle Channel / 1RB

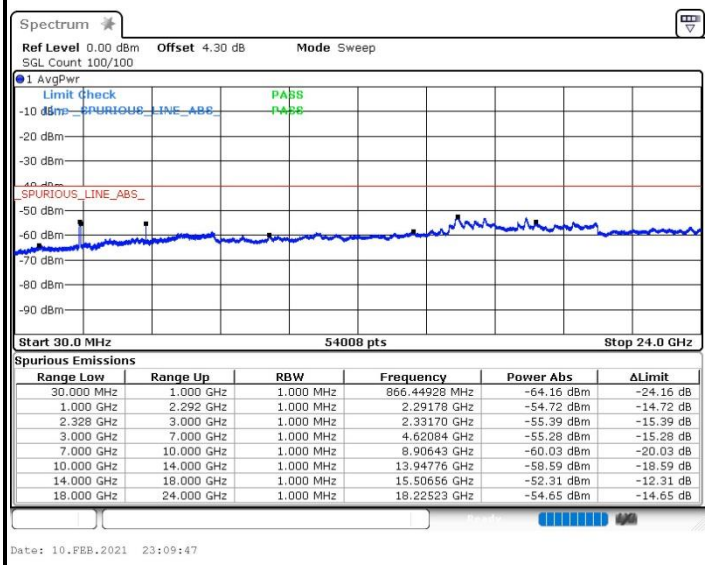



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 944.49525 MHz | -64.13 dBm | -24.13 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29178 GHz | -55.79 dBm | -15.79 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33223 GHz | -56.84 dBm | -16.84 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.61604 GHz | -56.75 dBm | -16.75 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.92293 GHz | -59.96 dBm | -19.96 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.93326 GHz | -58.74 dBm | -18.74 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.49756 GHz | -52.21 dBm | -12.21 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 19.54812 GHz | -54.54 dBm | -14.54 dB |

Date: 10.FEB.2021 23:02:41

### Highest Channel / 1RB



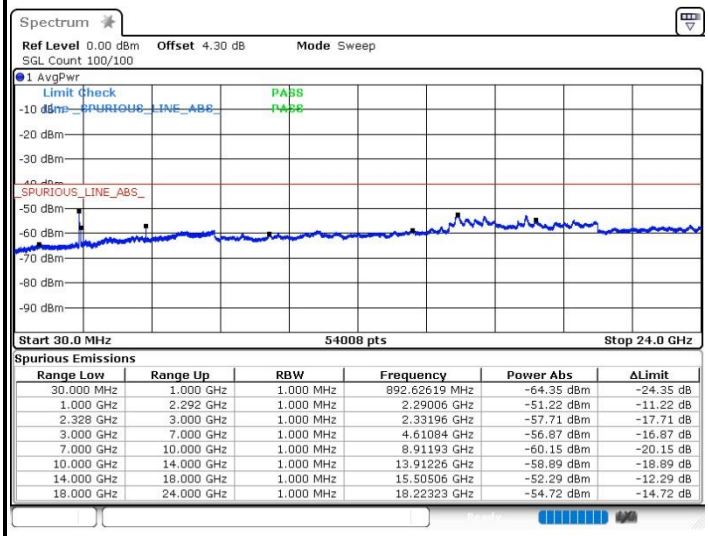

Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 866.44928 MHz | -64.16 dBm | -24.16 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29178 GHz | -54.72 dBm | -14.72 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33170 GHz | -55.39 dBm | -15.39 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.62084 GHz | -55.28 dBm | -15.28 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.90643 GHz | -60.03 dBm | -20.03 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.94776 GHz | -58.59 dBm | -18.59 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.50656 GHz | -52.31 dBm | -12.31 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.22523 GHz | -54.65 dBm | -14.65 dB |

Date: 10.FEB.2021 23:09:47

## FR1 n30 / 5MHz / DFT-S OFDM / QPSK

### Lowest Channel / 1RB

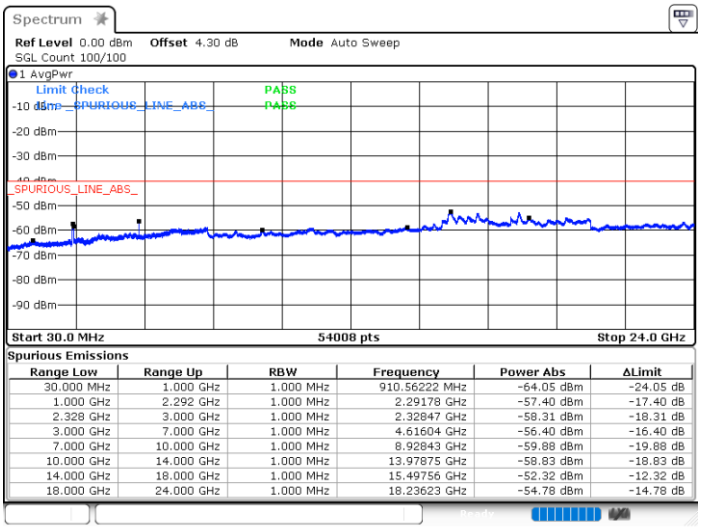



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 892.62619 MHz | -64.35 dBm | -24.35 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29006 GHz | -51.22 dBm | -11.22 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33196 GHz | -57.71 dBm | -17.71 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.61084 GHz | -56.87 dBm | -16.87 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.91193 GHz | -60.15 dBm | -20.15 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.91226 GHz | -58.89 dBm | -18.89 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.50506 GHz | -52.29 dBm | -12.29 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.22323 GHz | -54.72 dBm | -14.72 dB |

Date: 10.FEB.2021 23:06:57

### Middle Channel / 1RB

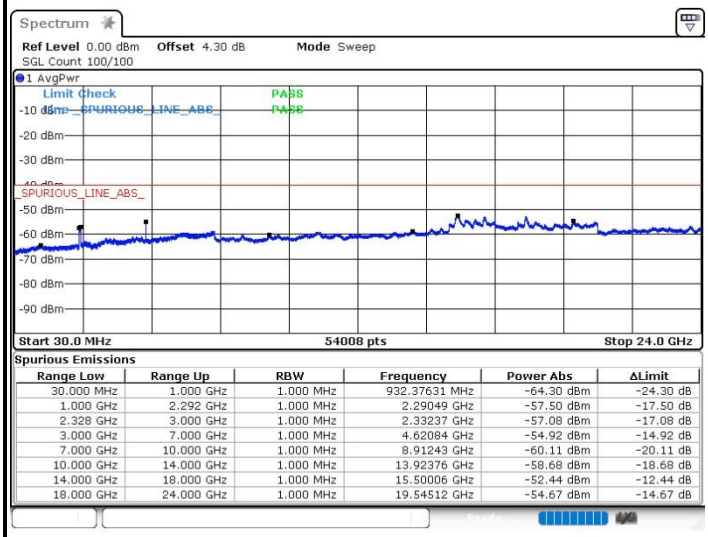



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 910.56222 MHz | -64.05 dBm | -24.05 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29178 GHz | -57.40 dBm | -17.40 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.32847 GHz | -58.31 dBm | -18.31 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.61604 GHz | -56.40 dBm | -16.40 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.92843 GHz | -59.88 dBm | -19.88 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.97875 GHz | -58.83 dBm | -18.83 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.49756 GHz | -52.32 dBm | -12.32 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.23623 GHz | -54.78 dBm | -14.78 dB |

Date: 10.FEB.2021 23:00:34

### Highest Channel / 1RB

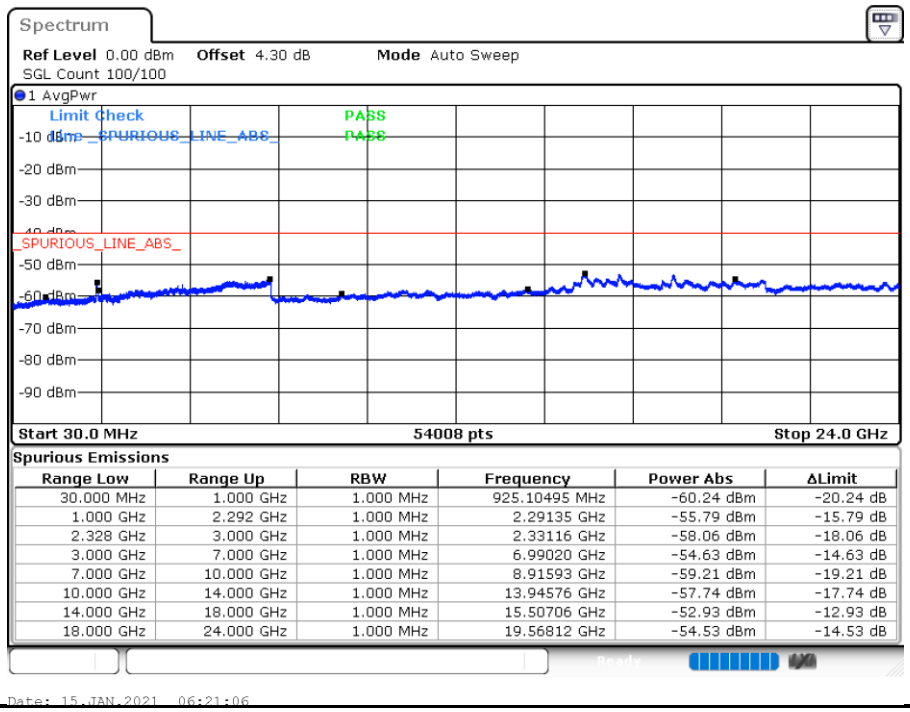



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 932.37631 MHz | -64.30 dBm | -24.30 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29049 GHz | -57.50 dBm | -17.50 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33237 GHz | -57.08 dBm | -17.08 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 4.62084 GHz | -54.92 dBm | -14.92 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.91243 GHz | -60.11 dBm | -20.11 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.92376 GHz | -58.68 dBm | -18.68 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.50006 GHz | -52.44 dBm | -12.44 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 19.54512 GHz | -54.67 dBm | -14.67 dB |

Date: 10.FEB.2021 23:08:43

| FR1 n30 / 10MHz / DFT-S OFDM / BPSK |
|---|
| Middle Channel / 1RB |

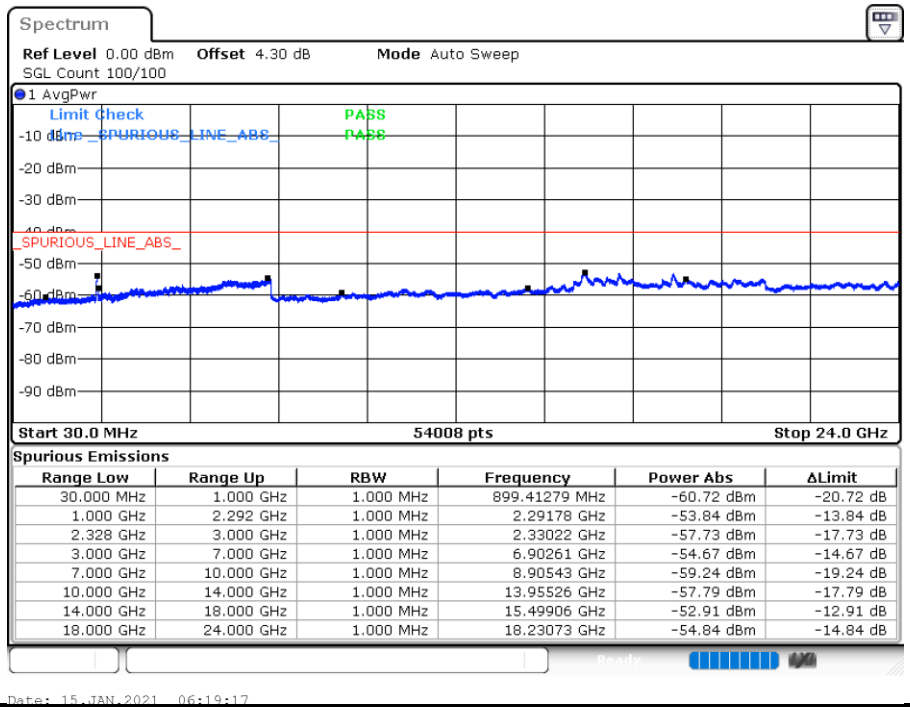



Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 925.10495 MHz | -60.24 dBm | -20.24 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29135 GHz | -55.79 dBm | -15.79 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33116 GHz | -58.06 dBm | -18.06 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.99020 GHz | -54.63 dBm | -14.63 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.91593 GHz | -59.21 dBm | -19.21 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.94576 GHz | -57.74 dBm | -17.74 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.50706 GHz | -52.93 dBm | -12.93 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 19.56812 GHz | -54.53 dBm | -14.53 dB |

Date: 15.JAN.2021 06:21:06

| FR1 n30 / 10MHz / DFT-S OFDM / QPSK |
|---|
| Middle Channel / 1RB |




Spurious Emissions

| Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit |
|---|---|---|---|---|---|
| 30.000 MHz | 1.000 GHz | 1.000 MHz | 899.41279 MHz | -60.72 dBm | -20.72 dB |
| 1.000 GHz | 2.292 GHz | 1.000 MHz | 2.29178 GHz | -53.84 dBm | -13.84 dB |
| 2.328 GHz | 3.000 GHz | 1.000 MHz | 2.33022 GHz | -57.73 dBm | -17.73 dB |
| 3.000 GHz | 7.000 GHz | 1.000 MHz | 6.90261 GHz | -54.67 dBm | -14.67 dB |
| 7.000 GHz | 10.000 GHz | 1.000 MHz | 8.90543 GHz | -59.24 dBm | -19.24 dB |
| 10.000 GHz | 14.000 GHz | 1.000 MHz | 13.95526 GHz | -57.79 dBm | -17.79 dB |
| 14.000 GHz | 18.000 GHz | 1.000 MHz | 15.49906 GHz | -52.91 dBm | -12.91 dB |
| 18.000 GHz | 24.000 GHz | 1.000 MHz | 18.23073 GHz | -54.84 dBm | -14.84 dB |

Date: 15.JAN.2021 06:19:17

# Frequency Stability

| Test Conditions | | NR n30 (BPSK) / Middle Channel | Limit |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | BW 10MHz | Within Band |
| | | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0014 | PASS |
| 40 | Normal Voltage | 0.0017 | |
| 30 | Normal Voltage | 0.0012 | |
| 20(Ref.) | Normal Voltage | 0.0013 | |
| 10 | Normal Voltage | 0.0013 | |
| 0 | Normal Voltage | 0.0012 | |
| -10 | Normal Voltage | 0.0019 | |
| -20 | Normal Voltage | 0.0015 | |
| -30 | Normal Voltage | 0.0017 | |
| 20 | Maximum Voltage | 0.0019 | |
| 20 | Normal Voltage | 0.0013 | |
| 20 | Battery End Point | 0.0021 | |

**Note:**

1. Normal Voltage =3.3 V. ; Battery End Point (BEP) =3.14 V. ; Maximum Voltage =4.4 V.
2. Note: The frequency fundamental emissions stay within the authorized frequency block.

# Appendix B. Test Results of Radiated Test

## Radiated Spurious Emission

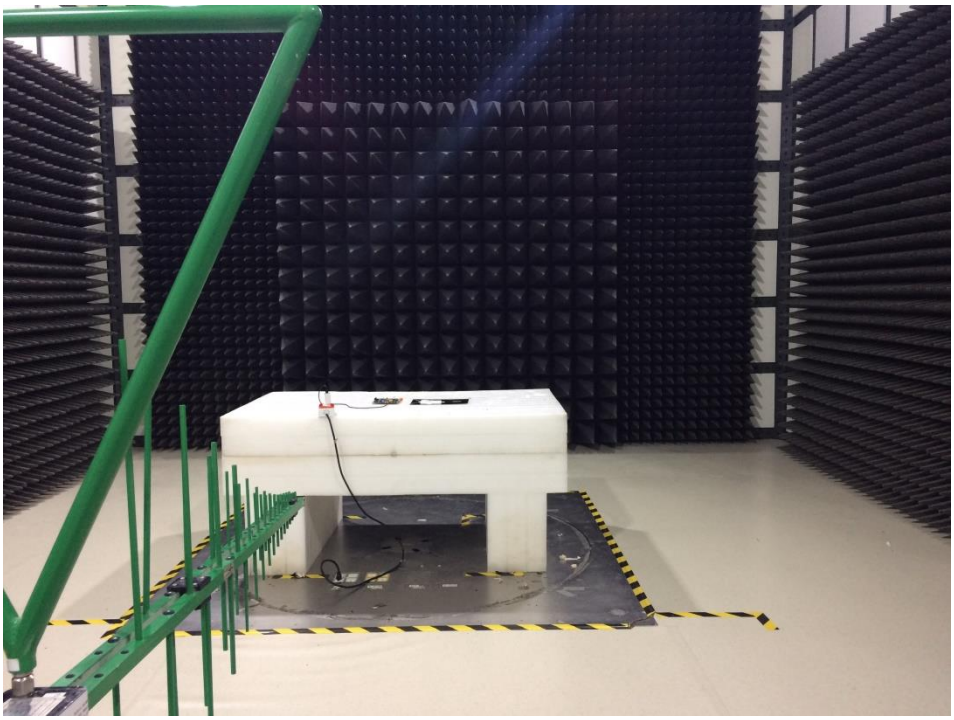
| LTE Band 30 / 10MHz / QPSK / RB Size 1 Offset 0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Channel | Frequency ( MHz ) | EIRP ( dBm ) | Limit ( dBm ) | Over Limit ( dB ) | SPA Reading (dBm) | S.G. Power ( dBm ) | TX Cable loss ( dB ) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Middle | 4611.60 | -62.32 | -40 | -22.32 | -55.11 | -68.57 | 6.45 | 12.70 | H |
| | 6917.40 | -59.53 | -40 | -19.53 | -54.92 | -62.93 | 8.40 | 11.80 | H |
| | 9223.20 | -54.43 | -40 | -14.43 | -55.51 | -56.78 | 9.65 | 12.00 | H |
| | 4611.60 | -62.59 | -40 | -22.59 | -55.23 | -68.84 | 6.45 | 12.70 | V |
| | 6917.40 | -59.74 | -40 | -19.74 | -55.1 | -63.14 | 8.40 | 11.80 | V |
| | 9223.20 | -54.85 | -40 | -14.85 | -55.51 | -57.20 | 9.65 | 12.00 | V |

**Remark:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

# Appendix C. Setup Photographs

## <Radiated Emission>

**LF**



**HF**