
# Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.
MIFI8800L Wireless Hotspot Modem

FCC CFR 47 Part 2 90 and 96
RSS-192 Issue 3 January 2008
RSS-197 Issue 1 February 2010

**Report No. 72139211D** **August 2018**

| | |
|---|---|
| **REPORT ON** | Radio Testing of the<br>Novatel Wireless Inc.<br>MIFI8800L Wireless Hotspot Modem |
| **TEST REPORT NUMBER** | 72139211D |
| **PREPARED FOR** | Novatel Wireless Inc.<br>9605 Scranton Road, Suite 300<br>San Diego, CA 92121<br>USA |
| **CONTACT PERSON** | Roman Olmos<br>Senior Regulatory Engineer<br>(858) 812-3400<br>rolmos@nvtl.com |
| **PREPARED BY** | Xiaoying Zhang<br>**Name**<br>Authorized Signatory<br>Title: EMC/Wireless Test Engineer |
| **APPROVED BY** | Ferdinand S. Custodio<br>**Name**<br>Authorized Signatory<br>Title: Senior EMC Test Engineer/Wireless Team Lead |
| **DATED** | August 27, 2018 |



TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

**Revision History**

| 72139211D<br>Novatel Wireless Inc.<br>MIFI8800L Wireless Hotspot Modem | | | | | |
|---|---|---|---|---|---|
| DATE | OLD REVISION | NEW REVISION | REASON | PAGES AFFECTED | APPROVED BY |
| 08/27/2018 | Initial Release | | | | Ferdinand S. Custodio |
| | | | | | |
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**SECTION 1**

**REPORT SUMMARY**

Radio Testing of the
Novatel Wireless Inc.
MIFI8800L Wireless Hotspot Modem

## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. MIFI8800L Wireless Hotspot Modem to the requirements of the following:

- FCC CFR 47 Part 2 90 and 96
- RSS-Gen Issue 5 April 2018
- RSS-192 Issue 3 January 2008
- RSS-197 Issue 1 February 2010

| | |
|---|---|
| Objective | To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer | Novatel Wireless Inc. |
| Product Trademark/Brand | Inseego |
| Product Marketing Name | MiFi 8800L |
| Model Number(s) | MIFI8800L |
| FCC ID Number | PKRNVWMIFI8800 |
| IC Number | 3229A-MIFI8800 |
| Serial Number(s) | AZ280418A00132 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | • FCC CFR 47 Part 2 90 and 96 (October 1, 2017)<br>• RSS-192 Issue 3 January 2008 - Fixed Wireless Access Equipment Operating in the Band 3450-3650 MHz<br>• RSS-197 Issue 1 February 2010 – Wireless Broadband Access Equipment Operating in the Band 3650-3700 MHz<br>• RSS-Gen Issue 5: April 2018 - General Requirements for Compliance of Radio Apparatus<br>• ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services |
| Start of Test | June 25, 2018 |
| Finish of Test | July 26, 2018 |
| Name of Engineer(s) | Xiaoying Zhang |
| Related Document(s) | Supporting documents for EUT certification are separate exhibits. |

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 90 and 96 with cross-reference to the corresponding ISED RSS standard is shown below.

| Section | FCC Part Sections(s) | RSS Section(s) | Test Description | Result |
|---|---|---|---|---|
| 2.1 | 2.1046 | RSS-192 (5.4) | Transmitter Conducted Output Power | Compliant |
| 2.2 | 2.1046<br>96.41(b)<br>90.1321(c) | RSS-192 (5.4)<br>RSS-197 (5.6) | Effective Isotropic Radiated Power and Power Spectral Density | Compliant |
| - | 96.41(g) | - | Peak-Average Ratio | N/A* |
| 2.3 | 2.1049<br>96.41(e)(3)<br>90.1323(a) | RSS-Gen (6.7) | Occupied Bandwidth | Compliant |
| 2.4 | 2.1051<br>96.41(e)(1)(3)<br>90.1323(a) | RSS-192 (5.5)<br>RSS-197 (5.7) | Band Edge and Emission Mask | Compliant |
| 2.5 | 2.1051<br>96.41(e)(1)(2)(3)<br>90.1323(a) | RSS-192 (5.5)<br>RSS-197 (5.7) | Conducted Spurious Emissions | Compliant |
| 2.6 | 2.1053<br>96.41(e)<br>90.1323(a) | RSS-192 (5.5)<br>RSS-197 (5.7) | Field Strength of Spurious Radiation | Compliant |
| 2.7 | 2.1055 | RSS-192 (5.3)<br>RSS-197 (5.3) | Frequency Stability | Compliant |
| 2.8 | - | RSS-192 (5.6)<br>RSS-197 (5.8)<br>RSS-Gen 7.4 | Receiver Spurious Emissions | Compliant |
| 2.9 | - | RSS-GEN 8.8 | Power Line Conducted Emissions | Compliant |

N/A* Not applicable. For CBSD only.

## 1.3 PRODUCT INFORMATION

### 1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. MIFI8800L Wireless Hotspot Modem. The EUT is a Wireless Hotspot Modem supporting 2G/3G/4G Technologies. The EUT comes with a USB Port.

### 1.3.2 Technical Description

| | |
|---|---|
| EUT Description | Wireless Hotspot Modem |
| Product Marketing Name | MiFi 8800L |
| Model Number(s) | MIFI8800L |
| Rated Voltage | 3.8V, 4500mAh (Rechargeable Li-Ion battery pack)<br>Input 100-240VAC, Output 5V (External AC-DC Power Adapter) |
| Mode Verified | LTE Band 48: 3550-3700 MHz |
| Capability | WCDMA Band 2, 5, LTE Band 2, 4, 5, 7, 13, 14, 46, 48, 66 and 802.11 a/b/g/n/ac |
| Primary Unit (EUT) | ☐ Production<br>☒ Pre-Production<br>☐ Engineering |
| Manufacturer declared Rated Power | 23 dBm |
| (Client declaration, max. antenna gain covered under this test report) | |

| LTE Bands | Frequency(ies) | Antenna Gains |
|---|---|---|
| Band 48 | 3550-3700 MHz | 2.9 dBi |

### 1.3.3 Transmit Frequency Table

| LTE Band 48 | | | | | |
|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | EIRP / 10 MHz | |
| | | | | Max Power (dBm) | Max Power (Watts) |
| QPSK | 5 | 3550 - 3650 | 4M49G7D | 21.98 | 0.16 |
| | 10 | | 8M96G7D | 21.91 | 0.16 |
| | 15 | | 13M4G7D | 20.72 | 0.12 |
| | 20 | | 17M9G7D | 19.19 | 0.08 |
| 16QAM | 5 | | 4M47W7D | 21.0 | 0.13 |
| | 10 | | 8M96W7D | 20.86 | 0.12 |
| | 15 | | 13M4W7D | 19.63 | 0.09 |
| | 20 | | 17M9W7D | 18.21 | 0.07 |
| 64QAM | 5 | | 4M47W7D | 20.14 | 0.10 |
| | 10 | | 8M96W7D | 20.06 | 0.10 |
| | 15 | | 13M4W7D | 18.77 | 0.08 |
| | 20 | | 17M9W7D | 17.33 | 0.05 |

| LTE Band 48 | | | | | |
|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | EIRP / 25 MHz | |
| | | | | Max Power (dBm) | Max Power (Watts) |
| QPSK | 5 | 3650 - 3700 | 4M48G7D | 22.78 | 0.19 |
| | 10 | | 8M96G7D | 22.9 | 0.19 |
| | 15 | | 13M4G7D | 22.86 | 0.19 |
| | 20 | | 18M0G7D | 22.97 | 0.20 |
| 16QAM | 5 | | 4M48W7D | 22.07 | 0.16 |
| | 10 | | 8M97W7D | 22.05 | 0.16 |
| | 15 | | 13M5W7D | 22.01 | 0.16 |
| | 20 | | 17M9W7D | 22.17 | 0.16 |
| 64QAM | 5 | | 4M49W7D | 21.08 | 0.13 |
| | 10 | | 8M97W7D | 21.15 | 0.13 |
| | 15 | | 13M4W7D | 20.98 | 0.13 |
| | 20 | | 17M9W7D | 21.2 | 0.13 |

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

| Test Configuration | Description |
|---|---|
| A | Conducted antenna port measurement. EUT Transmits at max power and is powered by the internal battery and/or USB via AC Adapter. |
| B | Radiated test setup / case spurious emissions. Antenna port terminated by the call box. |
| C | Conducted antenna port measurement. EUT in receive mode and is powered by the internal battery and/or USB via AC Adapter. |

### 1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. There are no other test software used during verification.

### 1.4.3 Support Equipment and I/O cables

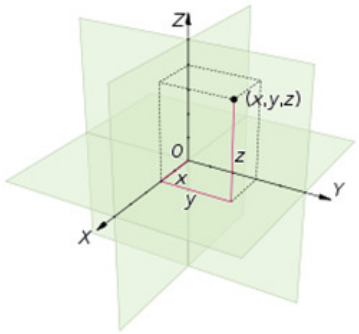
| Manufacturer | Equipment/Cable | Description |
|---|---|---|
| Novatel Wireless | USB Cable | Standard USB Type A to USB Type C |
| Novatel Wireless | External AC-DC Power Adapter | Model: SSW-2783, PN: 40123126.01<br>Input: 100-240VAC, 50/60Hz, 0.5A<br>Ouput: 5VDC, max. 2A |

### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per output power measurements:

| Band | Channel BW | Modulation | RB Size/Offset |
|---|---|---|---|
| Band 48 (3450 – 3650 MHz) | 15 MHz | QPSK | 1/0 |
| Band 48 (3650 – 3700 MHz) | 20 MHz | QPSK | 1/0 |

For radiated measurements X, Y, and Z orientations were verified. The verification was determined “Y” as worst case configuration.



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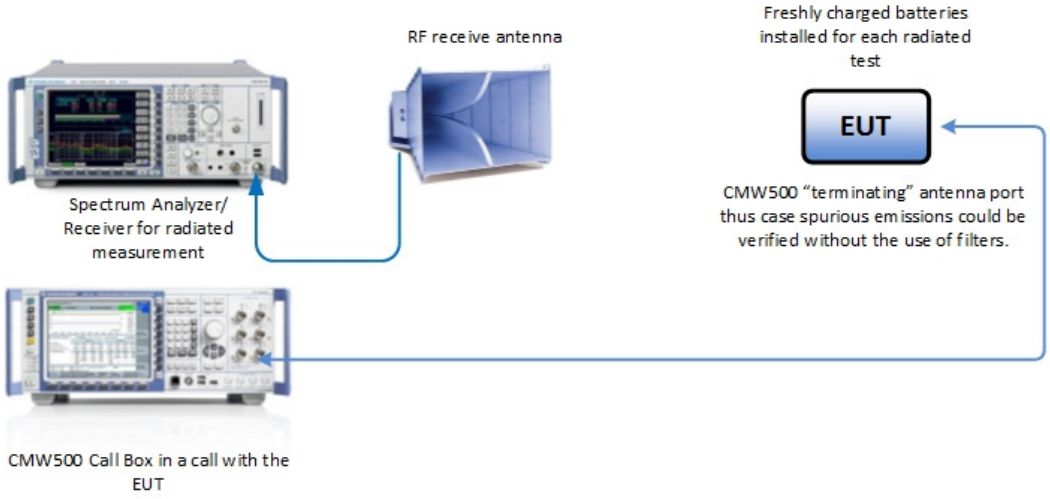
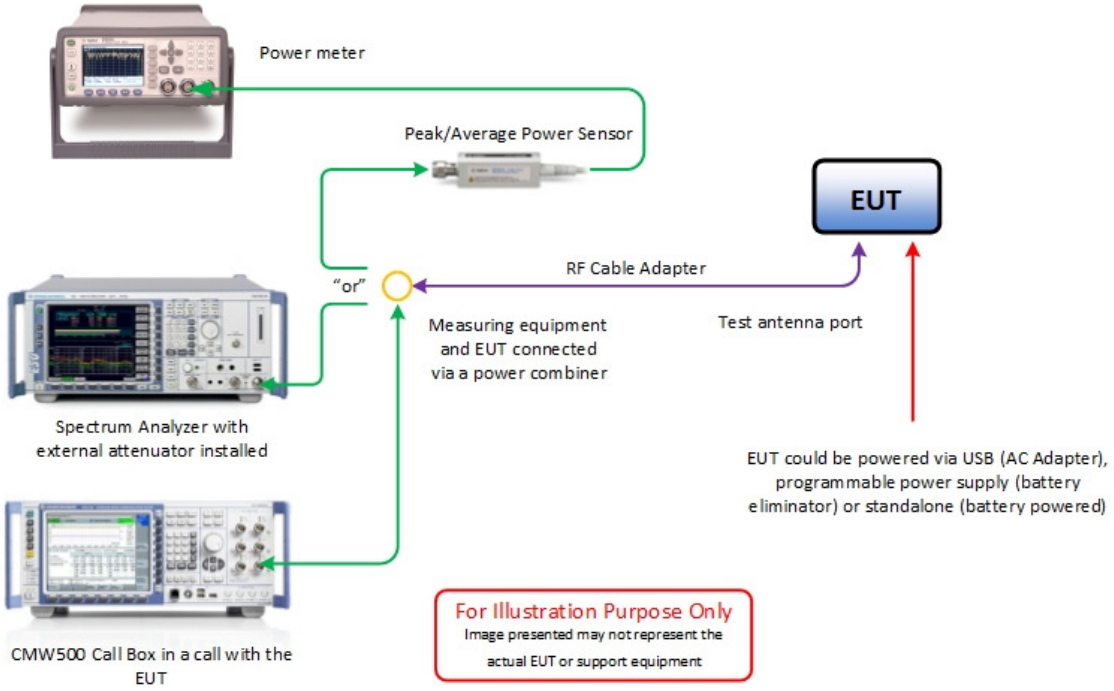
### 1.4.5 Simplified Test Configuration Diagram

**Radiated Test Configuration**




**Conducted (Antenna Port) Test Configuration**



## 1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

## 1.6 MODIFICATION RECORD

| Description of Modification | Modification Fitted By | Date Modification Fitted |
|---|---|---|
| Serial Number AZ280418A00132 | | |
| None | — | — |

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

## 1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

## 1.8 TEST FACILITY LOCATION

### 1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: (858) 678-1400 Fax: (858) 546-0364.

### 1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678-1400 Fax: (858) 546-0364.

## 1.9 TEST FACILITY REGISTRATION

### 1.9.1 FCC – Designation No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.

### 1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

### 1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

### 1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

### 1.9.5 VCCI – Registration No. A-0280 and A-0281

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

### 1.9.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

### 1.9.7 OFCA – U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



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## 1.10 SAMPLE CALCULATIONS

### 1.10.1 LTE Emission Designator (QPSK)

Emission Designator = 4M51G7D
G = Phase Modulation
7= Quantized/Digital Info
D = Data Transmission, telemetry, telecommand

### 1.10.2 LTE Emission Designator (16QAM)

Emission Designator = 4M50W7D
W = Frequency Modulation
7= Quantized/Digital Info
D = Data Transmission, telemetry, telecommand

### 1.10.3 Spurious Radiated Emission (below 1GHz)

| | | | |
|---|---|---|---|
| Measuring equipment raw measurement (dbµV) @ 30 MHz | | | 24.4 |
| Correction Factor (dB) | Asset# 1066 (cable) | 0.3 | -12.6 |
| | Asset# 1172 (cable) | 0.3 | |
| | Asset# 1016 (preamplifier) | -30.7 | |
| | Asset# 1175(cable) | 0.3 | |
| | Asset# 1002 (antenna) | 17.2 | |
| **Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz** | | | **11.8** |

### 1.10.4 Spurious Radiated Emission – Substitution Method

Example = 84dBµV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBµV/m @ 1413 MHz (2nd Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBµV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$P_{EIRP}$ = -18 dBm + 7.8 dBi – 1dB
= 11.2 dBm
$P_{ERP}$ = $P_{EIRP}$ – 2.15 dB
= 11.2 dBm – 2.15 dB
= 9.05 dBm

**SECTION 2**

**TEST DETAILS**

Radio Testing of the
Novatel Wireless Inc.
MIFI8800L Wireless Hotspot Modem

## 2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

### 2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
RSS-192, Clause 5.4

### 2.1.2 Standard Applicable

The conducted power mesurements were made in accordance to FCC Part 2 Clasue 2.1046 and RSS-192 Clause 5.4.

RSS-192, Clause 5.4:
The average output power, $P_{mean}$, shall be within ±2.0 dB of the manufacturer's rated power. The e.i.r.p shall comply with the limits sepcified in SRSP-303.4.

### 2.1.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration A

### 2.1.4 Date of Test/Initial of test personnel who performed the test

June 29, 2018 / XYZ

### 2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 2480 °C |
| Relative Humidity | 43.2 % |
| ATM Pressure | 98.8kPa |

### 2.1.7 Additional Observations

- This is a conducted test using Power Meter.
- The path loss were measured and entered as a level offset.
- Low, Middle and High channels for all bandwidths with different RB size and RB offset and modulations were verified and reported.

### 2.1.8 Test Results

| LTE Band 48 (3550-3650 MHz) according to FCC Part 96 / RSS-192 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 5.0 | 55265 | 3552.5 | QPSK | **1** | **0** | **19.45** | **27.0** |
| | | | | 1 | 13 | 19.42 | 26.91 |
| | | | | 1 | 24 | 19.44 | 27.02 |
| | | | | 25 | 0 | 18.53 | 27.45 |
| | | | 16QAM | **1** | **0** | **18.74** | **28.06** |
| | | | | 1 | 13 | 18.74 | 27.89 |
| | | | | 1 | 24 | 18.7 | 27.98 |
| | | | | 25 | 0 | 17.46 | 28.07 |
| | | | 64QAM | **1** | **0** | **17.67** | **28.88** |
| | | | | 1 | 13 | 17.66 | 28.78 |
| | | | | 1 | 24 | 17.62 | 28.84 |
| | | | | 25 | 0 | 16.52 | 27.98 |
| | 55740 | 3600 | QPSK | **1** | **0** | **20.04** | **27.6** |
| | | | | 1 | 13 | 20.0 | 27.55 |
| | | | | 1 | 24 | 19.99 | 27.52 |
| | | | | 25 | 0 | 19.08 | 28.08 |
| | | | 16QAM | **1** | **0** | **19.35** | **28.53** |
| | | | | 1 | 13 | 19.34 | 28.49 |
| | | | | 1 | 24 | 19.29 | 28.51 |
| | | | | 25 | 0 | 18.1 | 28.72 |
| | | | 64QAM | **1** | **0** | **18.46** | **28.49** |
| | | | | 1 | 13 | 18.36 | 28.61 |
| | | | | 1 | 24 | 18.3 | 28.49 |
| | | | | 25 | 0 | 17.24 | 28.94 |
| | 56215 | 3647.5 | QPSK | **1** | **0** | **19.63** | **27.34** |
| | | | | 1 | 13 | 19.55 | 27.07 |
| | | | | 1 | 24 | 19.48 | 27.11 |
| | | | | 25 | 0 | 18.44 | 27.86 |
| | | | 16QAM | **1** | **0** | **18.91** | **28.27** |
| | | | | 1 | 13 | 18.86 | 28.13 |
| | | | | 1 | 24 | 18.81 | 28.18 |
| | | | | 25 | 0 | 17.62 | 28.75 |
| | | | 64QAM | **1** | **0** | **17.88** | **28.98** |
| | | | | 1 | 13 | 17.88 | 28.77 |
| | | | | 1 | 24 | 17.86 | 28.72 |
| | | | | 25 | 0 | 16.64 | 27.72 |

| LTE Band 48 (3550-3650 MHz) according to FCC Part 96 / RSS-192 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 10.0 | 55290 | 3555 | QPSK | **1** | **0** | **19.39** | **26.94** |
| | | | | 1 | 25 | 19.27 | 26.81 |
| | | | | 1 | 49 | 19.29 | 26.86 |
| | | | | 50 | 0 | 18.38 | 27.83 |
| | | | 16QAM | **1** | **0** | **18.43** | **27.9** |
| | | | | 1 | 25 | 18.33 | 27.82 |
| | | | | 1 | 49 | 18.39 | 27.83 |
| | | | | 50 | 0 | 17.34 | 27.69 |
| | | | 64QAM | **1** | **0** | **17.71** | **28.88** |
| | | | | 1 | 25 | 17.68 | 28.64 |
| | | | | 1 | 49 | 17.7 | 28.8 |
| | | | | 50 | 0 | 16.5 | 28.08 |
| | 55740 | 3600 | QPSK | **1** | **0** | **20.09** | **27.49** |
| | | | | 1 | 25 | 19.94 | 27.38 |
| | | | | 1 | 49 | 19.85 | 27.41 |
| | | | | 50 | 0 | 19.01 | 28.22 |
| | | | 16QAM | **1** | **0** | **19.3** | **28.45** |
| | | | | 1 | 25 | 19.08 | 28.42 |
| | | | | 1 | 49 | 19.03 | 28.46 |
| | | | | 50 | 0 | 17.96 | 28.62 |
| | | | 64QAM | **1** | **0** | **18.31** | **28.48** |
| | | | | 1 | 25 | 18.09 | 28.4 |
| | | | | 1 | 49 | 18.02 | 28.43 |
| | | | | 50 | 0 | 17.16 | 28.36 |
| | 56190 | 3645 | QPSK | **1** | **0** | **19.6** | **27.14** |
| | | | | 1 | 25 | 19.35 | 26.92 |
| | | | | 1 | 49 | 19.19 | 26.89 |
| | | | | 50 | 0 | 18.48 | 27.7 |
| | | | 16QAM | **1** | **0** | **18.81** | **28.18** |
| | | | | 1 | 25 | 18.61 | 28.06 |
| | | | | 1 | 49 | 18.53 | 27.96 |
| | | | | 50 | 0 | 17.62 | 28.15 |
| | | | 64QAM | **1** | **0** | **17.71** | **28.65** |
| | | | | 1 | 25 | 17.45 | 28.38 |
| | | | | 1 | 49 | 17.33 | 28.84 |
| | | | | 50 | 0 | 16.55 | 29.21 |

| LTE Band 48 (3550-3650 MHz) according to FCC Part 96 / RSS-192 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 15.0 | 55315 | 3557.5 | QPSK | **1** | **0** | **19.52** | **27.01** |
| | | | | 1 | 38 | 19.36 | 26.77 |
| | | | | 1 | 74 | 19.47 | 26.9 |
| | | | | 75 | 0 | 18.36 | 27.68 |
| | | | 16QAM | **1** | **0** | **18.89** | **28.01** |
| | | | | 1 | 38 | 18.61 | 27.83 |
| | | | | 1 | 74 | 18.71 | 27.87 |
| | | | | 75 | 0 | 17.55 | 27.76 |
| | | | 64QAM | **1** | **0** | **17.75** | **28.88** |
| | | | | 1 | 38 | 17.61 | 28.74 |
| | | | | 1 | 74 | 17.72 | 28.71 |
| | | | | 75 | 0 | 16.51 | 27.81 |
| | 55740 | 3600 | QPSK | **1** | **0** | **20.26** | **27.62** |
| | | | | 1 | 38 | 20.01 | 27.45 |
| | | | | 1 | 74 | 19.99 | 27.53 |
| | | | | 75 | 0 | 19.10 | 28.23 |
| | | | 16QAM | **1** | **0** | **19.35** | **28.56** |
| | | | | 1 | 38 | 19.13 | 28.38 |
| | | | | 1 | 74 | 19.08 | 28.47 |
| | | | | 75 | 0 | 18.02 | 28.41 |
| | | | 64QAM | **1** | **0** | **18.33** | **28.53** |
| | | | | 1 | 38 | 18.19 | 28.42 |
| | | | | 1 | 74 | 18.18 | 28.44 |
| | | | | 75 | 0 | 17.15 | 28.96 |
| | 56165 | 3642.5 | QPSK | **1** | **0** | **19.88** | **27.33** |
| | | | | 1 | 38 | 19.41 | 27.0 |
| | | | | 1 | 74 | 19.27 | 26.87 |
| | | | | 75 | 0 | 18.59 | 17.89 |
| | | | 16QAM | **1** | **0** | **18.97** | **28.44** |
| | | | | 1 | 38 | 18.49 | 28.07 |
| | | | | 1 | 74 | 18.35 | 29.97 |
| | | | | 75 | 0 | 17.69 | 28.33 |
| | | | 64QAM | **1** | **0** | **18.26** | **29.3** |
| | | | | 1 | 38 | 17.82 | 29.0 |
| | | | | 1 | 74 | 17.66 | 28.33 |
| | | | | 75 | 0 | 16.73 | 27.98 |

| LTE Band 48 (3550-3650 MHz) according to FCC Part 96 / RSS-192 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 20.0 | 55340 | 3560 | QPSK | **1** | **0** | **19.59** | **27.09** |
| | | | | 1 | 50 | 19.53 | 26.92 |
| | | | | 1 | 99 | 19.57 | 27.03 |
| | | | | 100 | 0 | 18.34 | 27.7 |
| | | | 16QAM | **1** | **0** | **18.64** | **28.13** |
| | | | | 1 | 50 | 18.47 | 27.9 |
| | | | | 1 | 99 | 18.71 | 28.0 |
| | | | | 100 | 0 | 17.62 | 27.88 |
| | | | 64QAM | **1** | **0** | **17.89** | **28.99** |
| | | | | 1 | 50 | 17.58 | 28.68 |
| | | | | 1 | 99 | 17.85 | 28.87 |
| | | | | 100 | 0 | 16.6 | 27.72 |
| | 55740 | 3600 | QPSK | **1** | **0** | **20.03** | **27.42** |
| | | | | 1 | 50 | 19.83 | 27.2 |
| | | | | 1 | 99 | 19.76 | 27.24 |
| | | | | 100 | 0 | 18.81 | 27.89 |
| | | | 16QAM | **1** | **0** | **19.39** | **28.43** |
| | | | | 1 | 50 | 19.07 | 28.23 |
| | | | | 1 | 99 | 19.01 | 28.25 |
| | | | | 100 | 0 | 17.81 | 28.32 |
| | | | 64QAM | **1** | **0** | **18.34** | **29.17** |
| | | | | 1 | 50 | 18.16 | 29.05 |
| | | | | 1 | 99 | 18.07 | 29.18 |
| | | | | 100 | 0 | 16.96 | 28.52 |
| | 56140 | 3640 | QPSK | **1** | **0** | **20.03** | **27.67** |
| | | | | 1 | 50 | 19.52 | 27.14 |
| | | | | 1 | 99 | 19.23 | 26.91 |
| | | | | 100 | 0 | 18.72 | 27.76 |
| | | | 16QAM | **1** | **0** | **19.15** | **28.59** |
| | | | | 1 | 50 | 18.61 | 28.19 |
| | | | | 1 | 99 | 18.49 | 28.01 |
| | | | | 100 | 0 | 17.84 | 28.58 |
| | | | 64QAM | **1** | **0** | **18.26** | **29.54** |
| | | | | 1 | 50 | 17.67 | 29.0 |
| | | | | 1 | 99 | 17.57 | 28.97 |
| | | | | 100 | 0 | 16.86 | 28.22 |

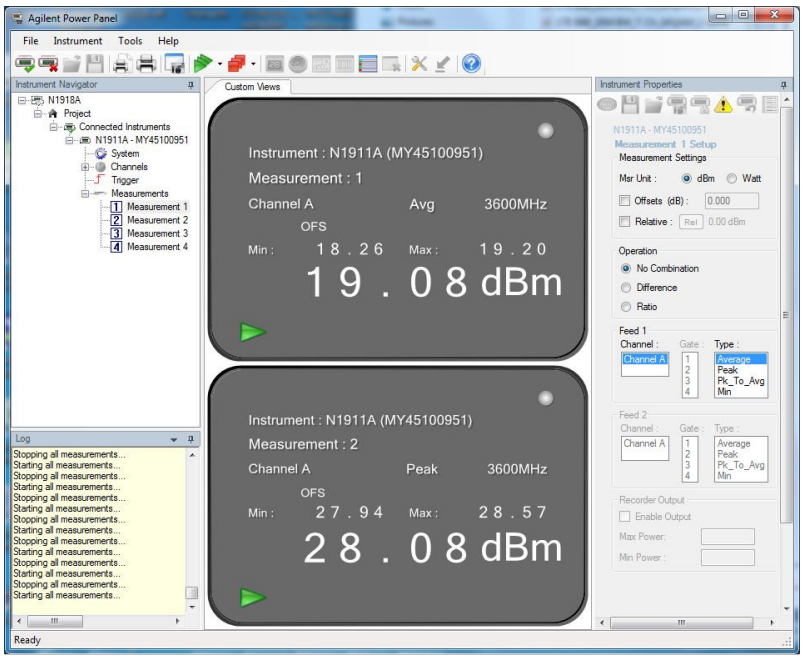
| LTE Band 48 (3650-3700 MHz) according to FCC Part 90 / RSS-197 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 5.0 | 56265 | 3652.5 | QPSK | **1** | **0** | **19.63** | **27.28** |
| | | | | 1 | 13 | 19.58 | 27.2 |
| | | | | 1 | 24 | 19.53 | 27.21 |
| | | | | 25 | 0 | 19.41 | 27.16 |
| | | | 16QAM | **1** | **0** | **18.94** | **28.28** |
| | | | | 1 | 13 | 18.94 | 28.15 |
| | | | | 1 | 24 | 18.83 | 28.16 |
| | | | | 25 | 0 | 17.66 | 27.9 |
| | | | 16QAM | **1** | **0** | **17.94** | **29.18** |
| | | | | 1 | 13 | 17.81 | 29.02 |
| | | | | 1 | 24 | 17.87 | 28.83 |
| | | | | 25 | 0 | 16.66 | 28.64 |
| | 56490 | 3675 | QPSK | **1** | **0** | **19.88** | **27.46** |
| | | | | 1 | 13 | 19.73 | 27.41 |
| | | | | 1 | 24 | 19.87 | 27.48 |
| | | | | 25 | 0 | 18.77 | 27.89 |
| | | | 16QAM | **1** | **0** | **19.17** | **28.5** |
| | | | | 1 | 13 | 19.16 | 28.46 |
| | | | | 1 | 24 | 19.13 | 28.49 |
| | | | | 25 | 0 | 17.94 | 28.84 |
| | | | 16QAM | **1** | **0** | **18.18** | **28.55** |
| | | | | 1 | 13 | 18.12 | 28.5 |
| | | | | 1 | 24 | 18.14 | 28.48 |
| | | | | 25 | 0 | 16.96 | 28.49 |
| | 56715 | 3697.5 | QPSK | **1** | **0** | **19.7** | **27.3** |
| | | | | 1 | 13 | 19.69 | 27.2 |
| | | | | 1 | 24 | 19.67 | 27.24 |
| | | | | 25 | 0 | 18.66 | 27.92 |
| | | | 16QAM | **1** | **0** | **19.02** | **28.37** |
| | | | | 1 | 13 | 19.12 | 28.33 |
| | | | | 1 | 24 | 19.05 | 28.46 |
| | | | | 25 | 0 | 17.9 | 28.25 |
| | | | 16QAM | **1** | **0** | **18.07** | **29.22** |
| | | | | 1 | 13 | 18.02 | 29.29 |
| | | | | 1 | 24 | 18.01 | 29.32 |
| | | | | 25 | 0 | 16.9 | 29.2 |

| LTE Band 48 (3650-3700 MHz) according to FCC Part 90 / RSS-197 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 10.0 | 56290 | 3655 | QPSK | **1** | **0** | **19.66** | **27.35** |
| | | | | 1 | 25 | 19.43 | 27.07 |
| | | | | 1 | 49 | 19.49 | 27.12 |
| | | | | 50 | 0 | 18.58 | 27.79 |
| | | | 16QAM | **1** | **0** | **18.92** | **28.32** |
| | | | | 1 | 25 | 18.71 | 28.19 |
| | | | | 1 | 49 | 18.65 | 28.09 |
| | | | | 50 | 0 | 17.73 | 28.3 |
| | | | 64QAM | **1** | **0** | **17.91** | **28.37** |
| | | | | 1 | 25 | 17.61 | 28.16 |
| | | | | 1 | 49 | 17.7 | 28.07 |
| | | | | 50 | 0 | 16.74 | 28.6 |
| | 56490 | 3675 | QPSK | **1** | **0** | **20.0** | **27.48** |
| | | | | 1 | 25 | 19.82 | 27.41 |
| | | | | 1 | 49 | 19.88 | 27.48 |
| | | | | 50 | 0 | 18.81 | 28.0 |
| | | | 16QAM | **1** | **0** | **19.15** | **28.49** |
| | | | | 1 | 25 | 19.15 | 28.43 |
| | | | | 1 | 49 | 19.07 | 28.5 |
| | | | | 50 | 0 | 17.98 | 28.66 |
| | | | 64QAM | **1** | **0** | **18.13** | **28.56** |
| | | | | 1 | 25 | 18.05 | 28.4 |
| | | | | 1 | 49 | 18.12 | 28.4 |
| | | | | 50 | 0 | 16.98 | 28.58 |
| | 56690 | 3695 | QPSK | **1** | **0** | **19.89** | **27.31** |
| | | | | 1 | 25 | 19.55 | 27.14 |
| | | | | 1 | 49 | 19.58 | 27.22 |
| | | | | 50 | 0 | 18.57 | 27.76 |
| | | | 16QAM | **1** | **0** | **18.79** | **28.26** |
| | | | | 1 | 25 | 18.68 | 28.23 |
| | | | | 1 | 49 | 18.7 | 28.22 |
| | | | | 50 | 0 | 17.68 | 28.52 |
| | | | 64QAM | **1** | **0** | **18.25** | **29.28** |
| | | | | 1 | 25 | 18.11 | 29.19 |
| | | | | 1 | 49 | 18.04 | 29.31 |
| | | | | 50 | 0 | 16.89 | 28.19 |

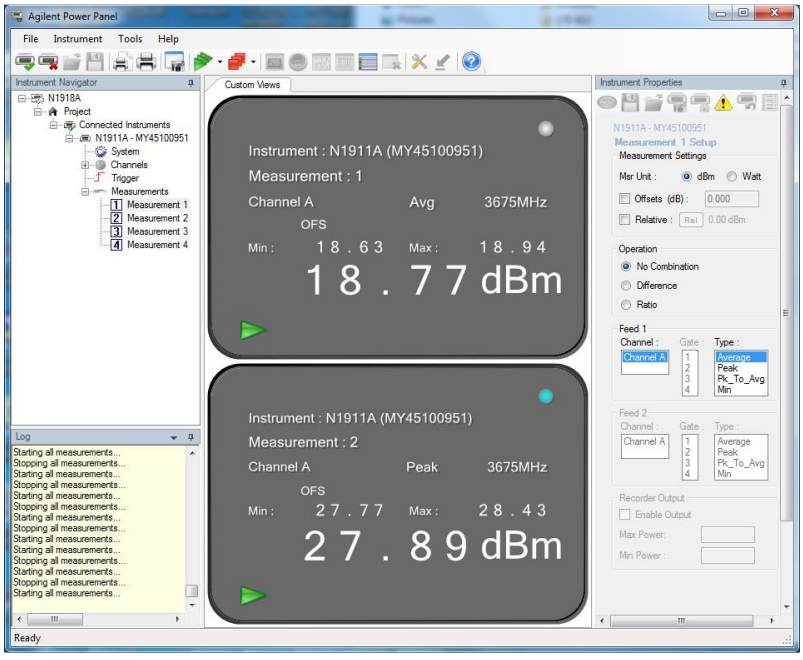
| LTE Band 48 (3650-3700 MHz) according to FCC Part 90 / RSS-197 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 15.0 | 56315 | 3657.5 | QPSK | **1** | **0** | **19.73** | **27.21** |
| | | | | 1 | 38 | 19.44 | 26.96 |
| | | | | 1 | 74 | 19.32 | 26.85 |
| | | | | 75 | 0 | 18.45 | 27.89 |
| | | | 16QAM | **1** | **0** | **18.84** | **28.29** |
| | | | | 1 | 38 | 18.47 | 27.94 |
| | | | | 1 | 74 | 18.39 | 27.87 |
| | | | | 75 | 0 | 17.61 | 28.19 |
| | | | 64QAM | **1** | **0** | **18.08** | **29.17** |
| | | | | 1 | 38 | 17.75 | 28.96 |
| | | | | 1 | 74 | 17.71 | 28.9 |
| | | | | 75 | 0 | 16.65 | 28.12 |
| | 56490 | 3675 | QPSK | **1** | **0** | **19.96** | **27.53** |
| | | | | 1 | 38 | 19.79 | 27.38 |
| | | | | 1 | 74 | 19.95 | 27.4 |
| | | | | 75 | 0 | 18.76 | 28.29 |
| | | | 16QAM | **1** | **0** | **19.11** | **28.41** |
| | | | | 1 | 38 | 18.97 | 28.34 |
| | | | | 1 | 74 | 19.06 | 28.53 |
| | | | | 75 | 0 | 17.99 | 28.51 |
| | | | 64QAM | **1** | **0** | **18.07** | **28.47** |
| | | | | 1 | 38 | 18.04 | 28.35 |
| | | | | 1 | 74 | 18.12 | 28.59 |
| | | | | 75 | 0 | 17.01 | 29.11 |
| | 56665 | 3692.5 | QPSK | **1** | **0** | **19.81** | **27.29** |
| | | | | 1 | 38 | 19.63 | 27.15 |
| | | | | 1 | 74 | 19.67 | 27.24 |
| | | | | 75 | 0 | 18.74 | 27.98 |
| | | | 16QAM | **1** | **0** | **18.99** | **28.23** |
| | | | | 1 | 38 | 18.87 | 28.18 |
| | | | | 1 | 74 | 18.96 | 28.29 |
| | | | | 75 | 0 | 17.73 | 28.82 |
| | | | 64QAM | **1** | **0** | **18.07** | **29.12** |
| | | | | 1 | 38 | 17.92 | 29.14 |
| | | | | 1 | 74 | 17.93 | 29.13 |
| | | | | 75 | 0 | 16.82 | 28.38 |

| LTE Band 48 (3650-3700 MHz) according to FCC Part 90 / RSS-197 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 20.0 | 56340 | 3660 | QPSK | **1** | **0** | **19.81** | **27.25** |
| | | | | 1 | 50 | 19.4 | 26.94 |
| | | | | 1 | 99 | 19.38 | 26.87 |
| | | | | 100 | 0 | 18.55 | 27.73 |
| | | | 16QAM | **1** | **0** | **18.98** | **28.39** |
| | | | | 1 | 50 | 18.71 | 28.07 |
| | | | | 1 | 99 | 18.63 | 27.92 |
| | | | | 100 | 0 | 17.63 | 28.17 |
| | | | 64QAM | **1** | **0** | **18.05** | **29.94** |
| | | | | 1 | 50 | 17.71 | 28.94 |
| | | | | 1 | 99 | 17.54 | 28.8 |
| | | | | 100 | 0 | 16.64 | 28.4 |
| | 56490 | 3675 | QPSK | **1** | **0** | **20.03** | **27.54** |
| | | | | 1 | 50 | 19.88 | 27.42 |
| | | | | 1 | 99 | 20.06 | 27.52 |
| | | | | 100 | 0 | 18.91 | 28.11 |
| | | | 16QAM | **1** | **0** | **19.27** | **28.47** |
| | | | | 1 | 50 | 19.08 | 28.27 |
| | | | | 1 | 99 | 19.33 | 28.59 |
| | | | | 100 | 0 | 17.96 | 28.69 |
| | | | 64QAM | **1** | **0** | **18.3** | **29.25** |
| | | | | 1 | 50 | 18.1 | 29.25 |
| | | | | 1 | 99 | 18.27 | 29.42 |
| | | | | 100 | 0 | 17.04 | 28.73 |
| | 56640 | 3690 | QPSK | **1** | **0** | **20.07** | **27.46** |
| | | | | 1 | 50 | 19.87 | 27.32 |
| | | | | 1 | 99 | 19.73 | 27.24 |
| | | | | 100 | 0 | 18.92 | 28.09 |
| | | | 16QAM | **1** | **0** | **19.17** | **28.38** |
| | | | | 1 | 50 | 19.05 | 28.28 |
| | | | | 1 | 99 | 19.05 | 28.34 |
| | | | | 100 | 0 | 18.08 | 28.96 |
| | | | 64QAM | **1** | **0** | **18.19** | **29.2** |
| | | | | 1 | 50 | 17.95 | 29.2 |
| | | | | 1 | 99 | 17.98 | 29.3 |
| | | | | 100 | 0 | 17.1 | 28.89 |

### 2.1.9 Sample Test Measurement Screen




**LTE Band 48 (3550 – 3650 MHz)_5M Bandwidth Middle Chanel QPSK Full RB**




**LTE Band 48 (3650 – 3700 MHz)_5 MHz Bandwidth_Middle Chanel QPSK Full RB**

## 2.2 EFFECTIVE ISOTROPIC RADIATED POWER AND POWER SPECTRAL DENSITY

### 2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 96, Clause 41(b)
FCC 47 CFR Part 90, Clause 90.1321(c)
RSS-192, Clause 5.4
RSS-197, Clause 5.6

### 2.2.2 Standard Applicable

FCC 47 CFR Part 96, Clause 96.41:
(b) Unless othewise specified in this sectin, the maximum effective isotropic radiated power (EIRP) and maximum Power Sepctral Density (PSD) of any CBSD and End User Device must comply with the limits show in the table below:

| Device | Maximum EIRP (dBm/10 MHz) | Maximum PSD (dBm/MHz) |
|---|---|---|
| End User Device | 23 | N/A |
| Category A CBSD | 30 | 20 |
| Category B CBSD | 47 | 37 |

RSS-192, Clause 5.4:
The average output power, $P_{mean}$, shall be within 2.0 dB of the manufacturer's rated power. The e.i.r.p shall comply with the limits sepcified in SRSP-303.4.

FCC 47 CFR Part 90, Clause 90.1321:
(c) Mobile and portable stations are limited to 1 watt/25 MHz EIRP. In any event, the peak EIRP density shall not exceed 40 milliwatts in any one-mega-hertz slice of specturem.

RSS-197, Clause 5.6;
The maximum e.i.r.p density of mobile equipment shall not exceed 40 mW in any 1 MHz bandwidth.

### 2.2.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132, Test Configuration A

### 2.2.4 Date of Test/Initial of test personnel who performed the test

July 09, 2018 / XYZ

### 2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 27.8 °C |
| Relative Humidity | 39.4 % |
| ATM Pressure | 98.8 kPa |

### 2.2.7 Additional Observations

- EIRP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$EIRP = P_T + G_T - L_C$$

Where:

$P_T$ = transmitter conducted output power dBm (Section 2.1 of this test report)
$G_T$ = gain of the transmitting antenna, in dBi (EIRP);
$L_C$ = signal attenuation in the connecting cable between the transmitter and antenna, in dB (EUT posees an internal Antenna. The loss between the EUT and the antenna port is considered negligible).

- Maximum EIRP (dBm/10 MHz) for 3550 – 3650 MHz 15 MHz and 20 MHz bandwidth is calculated using the following formular:

$$\text{Maximum EIRP (dBm/10 MHz)} = EIRP_{(\text{Full RB})} - 10\lg(\text{OBW}/10)$$

- This is a conducted test for EIRP Density in any 1 MHz.
- The path loss were measured and entered as a level offset.
- Low, Middle and High channels for all modulations were verified and reported.

### 2.2.8 Test Results

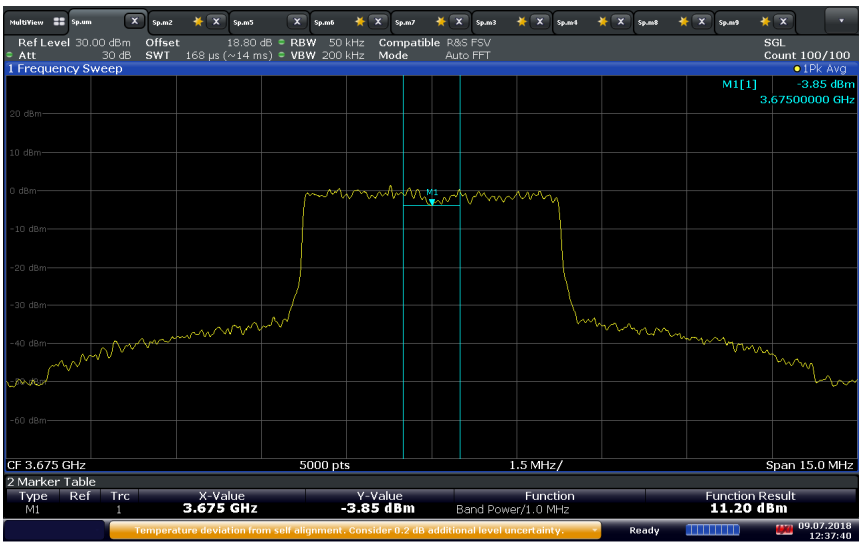
| LTE Band 48 (3550 – 3650 MHz) EIRP according to FCC Part 96 / RSS-192 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels | Frequency (MHz) | Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Compliance |
| QPSK | 5 | 1 / 0 | 55265 | 3552.5 | 19.45 | 2.9 | 22.35 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 20.04 | 2.9 | 22.94 | 23 ± 2 | Yes |
| | | 1 / 0 | 56215 | 3647.5 | 19.63 | 2.9 | 22.53 | 23 ± 2 | Yes |
| | 10 | 1 / 0 | 55290 | 3555 | 19.39 | 2.9 | 22.29 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 20.09 | 2.9 | 22.99 | 23 ± 2 | Yes |
| | | 1 / 0 | 56190 | 3645 | 19.6 | 2.9 | 22.5 | 23 ± 2 | Yes |
| | 15 | 1 / 0 | 55315 | 3557.5 | 19.52 | 2.9 | 22.42 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 20.26 | 2.9 | 23.16 | 23 ± 2 | Yes |
| | | 1 / 0 | 56165 | 3642.5 | 19.88 | 2.9 | 22.78 | 23 ± 2 | Yes |
| | 20 | 1 / 0 | 55340 | 3560 | 19.59 | 2.9 | 22.49 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 20.03 | 2.9 | 22.93 | 23 ± 2 | Yes |
| | | 1 / 0 | 56140 | 3640 | 20.03 | 2.9 | 22.93 | 23 ± 2 | Yes |
| 16QAM | 5 | 1 / 0 | 55265 | 3552.5 | 18.74 | 2.9 | 21.64 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 19.35 | 2.9 | 22.25 | 23 ± 2 | Yes |
| | | 1 / 0 | 56215 | 3647.5 | 18.91 | 2.9 | 21.81 | 23 ± 2 | Yes |
| | 10 | 1 / 0 | 55290 | 3555 | 18.43 | 2.9 | 21.33 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 19.3 | 2.9 | 22.2 | 23 ± 2 | Yes |
| | | 1 / 0 | 56190 | 3645 | 18.81 | 2.9 | 21.71 | 23 ± 2 | Yes |
| | 15 | 1 / 0 | 55315 | 3557.5 | 18.89 | 2.9 | 21.79 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 19.35 | 2.9 | 22.25 | 23 ± 2 | Yes |
| | | 1 / 0 | 56165 | 3642.5 | 18.97 | 2.9 | 21.87 | 23 ± 2 | Yes |
| | 20 | 1 / 0 | 55340 | 3560 | 18.64 | 2.9 | 21.54 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 19.39 | 2.9 | 22.29 | 23 ± 2 | Yes |
| | | 1 / 0 | 56140 | 3640 | 19.15 | 2.9 | 22.05 | 23 ± 2 | Yes |
| 64QAM | 5 | 1 / 0 | 55265 | 3552.5 | 17.67 | 2.9 | 20.57 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 18.46 | 2.9 | 21.36 | 23 ± 2 | Yes |
| | | 1 / 0 | 56215 | 3647.5 | 17.88 | 2.9 | 20.78 | 23 ± 2 | Yes |
| | 10 | 1 / 0 | 55290 | 3555 | 17.71 | 2.9 | 20.61 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 18.31 | 2.9 | 21.21 | 23 ± 2 | Yes |
| | | 1 / 0 | 56190 | 3645 | 17.71 | 2.9 | 20.61 | 23 ± 2 | Yes |
| | 15 | 1 / 0 | 55315 | 3557.5 | 17.75 | 2.9 | 20.65 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 18.33 | 2.9 | 21.23 | 23 ± 2 | Yes |
| | | 1 / 0 | 56165 | 3642.5 | 18.26 | 2.9 | 21.16 | 23 ± 2 | Yes |
| | 20 | 1 / 0 | 55340 | 3560 | 17.89 | 2.9 | 20.79 | 23 ± 2 | Yes |
| | | 1 / 0 | 55740 | 3600 | 18.34 | 2.9 | 21.24 | 23 ± 2 | Yes |
| | | 1 / 0 | 56140 | 3640 | 18.26 | 2.9 | 21.16 | 23 ± 2 | Yes |

| LTE Band 48 (3550 – 3650 MHz) EIRP/10 MHz according to FCC Part 96 / RSS-192 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | Channels | Frequency (MHz) | Peak Power (dBm) | Antenna Gain (dBi) | EIRP (dBm/10MHz) | Limit (dBm/10MHz) | Margin (dBm) |
| QPSK | 5 | 55265 | 3552.5 | 18.53 | 2.9 | 21.43 | 23 | 1.57 |
| | | 55740 | 3600 | 19.08 | 2.9 | 21.98 | 23 | 1.02 |
| | | 56215 | 3647.5 | 18.44 | 2.9 | 21.34 | 23 | 1.66 |
| | 10 | 55290 | 3555 | 18.38 | 2.9 | 21.28 | 23 | 1.72 |
| | | 55740 | 3600 | 19.01 | 2.9 | 21.91 | 23 | 1.09 |
| | | 56190 | 3645 | 18.48 | 2.9 | 21.38 | 23 | 1.62 |
| | 15 | 55315 | 3557.5 | 18.36 | 2.9 | 19.98 | 23 | 3.02 |
| | | 55740 | 3600 | 19.1 | 2.9 | 20.72 | 23 | 2.28 |
| | | 56165 | 3642.5 | 18.59 | 2.9 | 20.21 | 23 | 2.79 |
| | 20 | 55340 | 3560 | 18.34 | 2.9 | 18.72 | 23 | 4.28 |
| | | 55740 | 3600 | 18.81 | 2.9 | 19.19 | 23 | 3.81 |
| | | 56140 | 3640 | 18.72 | 2.9 | 19.10 | 23 | 3.90 |
| 16QAM | 5 | 55265 | 3552.5 | 17.46 | 2.9 | 20.36 | 23 | 2.64 |
| | | 55740 | 3600 | 18.1 | 2.9 | 21.0 | 23 | 2 |
| | | 56215 | 3647.5 | 17.62 | 2.9 | 20.52 | 23 | 2.48 |
| | 10 | 55290 | 3555 | 17.34 | 2.9 | 20.24 | 23 | 2.76 |
| | | 55740 | 3600 | 17.96 | 2.9 | 20.86 | 23 | 2.14 |
| | | 56190 | 3645 | 17.62 | 2.9 | 20.52 | 23 | 2.48 |
| | 15 | 55315 | 3557.5 | 17.55 | 2.9 | 19.16 | 23 | 3.84 |
| | | 55740 | 3600 | 18.02 | 2.9 | 19.63 | 23 | 3.37 |
| | | 56165 | 3642.5 | 17.69 | 2.9 | 19.3 | 23 | 3.7 |
| | 20 | 55340 | 3560 | 17.62 | 2.9 | 17.99 | 23 | 5.01 |
| | | 55740 | 3600 | 17.81 | 2.9 | 18.18 | 23 | 4.82 |
| | | 56140 | 3640 | 17.84 | 2.9 | 18.21 | 23 | 4.79 |
| 64QAM | 5 | 55265 | 3552.5 | 16.52 | 2.9 | 19.42 | 23 | 3.58 |
| | | 55740 | 3600 | 17.24 | 2.9 | 20.14 | 23 | 2.86 |
| | | 56215 | 3647.5 | 16.64 | 2.9 | 19.54 | 23 | 3.46 |
| | 10 | 55290 | 3555 | 16.5 | 2.9 | 19.4 | 23 | 3.6 |
| | | 55740 | 3600 | 17.16 | 2.9 | 20.06 | 23 | 2.94 |
| | | 56190 | 3645 | 16.55 | 2.9 | 19.45 | 23 | 3.55 |
| | 15 | 55315 | 3557.5 | 16.51 | 2.9 | 18.13 | 23 | 4.87 |
| | | 55740 | 3600 | 17.15 | 2.9 | 18.77 | 23 | 4.23 |
| | | 56165 | 3642.5 | 16.73 | 2.9 | 18.35 | 23 | 4.65 |
| | 20 | 55340 | 3560 | 16.6 | 2.9 | 16.97 | 23 | 6.03 |
| | | 55740 | 3600 | 16.96 | 2.9 | 17.33 | 23 | 5.67 |
| | | 56140 | 3640 | 16.86 | 2.9 | 17.23 | 23 | 5.77 |

| LTE Band 48 (3650 – 3700 MHz) EIRP according to FCC Part 90 / RSS-197 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dBm) |
| QPSK | 5 | 1 / 0 | 56265 | 3652.5 | 19.63 | 2.9 | 22.53 | 30 | 7.47 |
| | | 1 / 0 | 56490 | 3675 | 19.88 | 2.9 | 22.78 | 30 | 7.22 |
| | | 1 / 0 | 56715 | 3697.5 | 19.7 | 2.9 | 22.6 | 30 | 7.4 |
| | 10 | 1 / 0 | 56290 | 3655 | 19.66 | 2.9 | 22.56 | 30 | 7.44 |
| | | 1 / 0 | 56490 | 3675 | 20.0 | 2.9 | 22.9 | 30 | 7.1 |
| | | 1 / 0 | 56690 | 3695 | 19.89 | 2.9 | 22.79 | 30 | 7.21 |
| | 15 | 1 / 0 | 56315 | 3675.5 | 19.73 | 2.9 | 22.63 | 30 | 7.37 |
| | | 1 / 0 | 56490 | 3675 | 19.96 | 2.9 | 22.86 | 30 | 7.14 |
| | | 1 / 0 | 56665 | 3692.5 | 19.81 | 2.9 | 22.71 | 30 | 7.29 |
| | 20 | 1 / 0 | 56340 | 3660 | 19.81 | 2.9 | 22.71 | 30 | 7.29 |
| | | 1 / 0 | 56490 | 3675 | 20.03 | 2.9 | 22.93 | 30 | 7.07 |
| | | 1 / 0 | 56640 | 3690 | 20.07 | 2.9 | 22.97 | 30 | 7.03 |
| 16QAM | 5 | 1 / 0 | 56265 | 3652.5 | 18.94 | 2.9 | 21.84 | 30 | 8.16 |
| | | 1 / 0 | 56490 | 3675 | 19.17 | 2.9 | 22.07 | 30 | 7.93 |
| | | 1 / 0 | 56715 | 3697.5 | 19.02 | 2.9 | 21.92 | 30 | 8.08 |
| | 10 | 1 / 0 | 56290 | 3655 | 18.92 | 2.9 | 21.82 | 30 | 8.18 |
| | | 1 / 0 | 56490 | 3675 | 19.15 | 2.9 | 22.05 | 30 | 7.95 |
| | | 1 / 0 | 56690 | 3695 | 18.79 | 2.9 | 21.69 | 30 | 8.31 |
| | 15 | 1 / 0 | 56315 | 3675.5 | 18.84 | 2.9 | 21.74 | 30 | 8.26 |
| | | 1 / 0 | 56490 | 3675 | 19.11 | 2.9 | 22.01 | 30 | 7.99 |
| | | 1 / 0 | 56665 | 3692.5 | 18.99 | 2.9 | 21.89 | 30 | 8.11 |
| | 20 | 1 / 0 | 56340 | 3660 | 18.98 | 2.9 | 21.88 | 30 | 8.12 |
| | | 1 / 0 | 56490 | 3675 | 19.27 | 2.9 | 22.17 | 30 | 7.83 |
| | | 1 / 0 | 56640 | 3690 | 19.17 | 2.9 | 21.84 | 30 | 8.16 |
| 64QAM | 5 | 1 / 0 | 56265 | 3652.5 | 17.94 | 2.9 | 20.84 | 30 | 9.16 |
| | | 1 / 0 | 56490 | 3675 | 18.18 | 2.9 | 21.08 | 30 | 8.92 |
| | | 1 / 0 | 56715 | 3697.5 | 18.07 | 2.9 | 20.97 | 30 | 9.03 |
| | 10 | 1 / 0 | 56290 | 3655 | 17.91 | 2.9 | 20.81 | 30 | 9.19 |
| | | 1 / 0 | 56490 | 3675 | 18.13 | 2.9 | 21.03 | 30 | 8.97 |
| | | 1 / 0 | 56690 | 3695 | 18.25 | 2.9 | 21.15 | 30 | 8.85 |
| | 15 | 1 / 0 | 56315 | 3675.5 | 18.08 | 2.9 | 20.98 | 30 | 9.02 |
| | | 1 / 0 | 56490 | 3675 | 18.07 | 2.9 | 20.97 | 30 | 9.03 |
| | | 1 / 0 | 56665 | 3692.5 | 18.07 | 2.9 | 20.97 | 30 | 9.03 |
| | 20 | 1 / 0 | 56340 | 3660 | 18.05 | 2.9 | 20.95 | 30 | 9.05 |
| | | 1 / 0 | 56490 | 3675 | 18.3 | 2.9 | 21.2 | 30 | 8.8 |
| | | 1 / 0 | 56640 | 3690 | 18.19 | 2.9 | 21.09 | 30 | 8.91 |

| LTE Band 48 (3650 – 3700 MHz) EIRP Density according to FCC Part 90 / RSS-197 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Modulation | Bandwidth (MHz) | Channels | Frequency (MHz) | Peak Power Density (dBm / 1 MHz) | Antenna Gain (dBi) | EIRP Density (dBm / 1 MHz) | Limit (dBm) | Margin (dBm) |
| QPSK | 5 | 56265 | 3652.5 | 11.29 | 2.9 | 14.19 | 16.02 | 1.83 |
| | | 56490 | 3675 | 11.2 | 2.9 | 14.1 | 16.02 | 1.92 |
| | | 56715 | 3697.5 | 11.79 | 2.9 | 14.69 | 16.02 | 1.33 |
| | 10 | 56290 | 3655 | 8.79 | 2.9 | 11.69 | 16.02 | 4.33 |
| | | 56490 | 3675 | 8.3 | 2.9 | 11.2 | 16.02 | 4.82 |
| | | 56690 | 3695 | 8.97 | 2.9 | 11.87 | 16.02 | 4.15 |
| | 15 | 56315 | 3675.5 | 6.37 | 2.9 | 9.27 | 16.02 | 6.75 |
| | | 56490 | 3675 | 6.11 | 2.9 | 9.01 | 16.02 | 7.01 |
| | | 56665 | 3692.5 | 6.47 | 2.9 | 9.37 | 16.02 | 6.65 |
| | 20 | 56340 | 3660 | 6.77 | 2.9 | 9.67 | 16.02 | 6.35 |
| | | 56490 | 3675 | 6.5 | 2.9 | 9.4 | 16.02 | 6.62 |
| | | 56640 | 3690 | 6.48 | 2.9 | 9.38 | 16.02 | 6.64 |
| 16QAM | 5 | 56265 | 3652.5 | 10.36 | 2.9 | 13.26 | 16.02 | 2.76 |
| | | 56490 | 3675 | 10.13 | 2.9 | 13.03 | 16.02 | 2.99 |
| | | 56715 | 3697.5 | 10.75 | 2.9 | 13.65 | 16.02 | 2.37 |
| | 10 | 56290 | 3655 | 7.52 | 2.9 | 10.42 | 16.02 | 5.6 |
| | | 56490 | 3675 | 7.81 | 2.9 | 10.71 | 16.02 | 5.31 |
| | | 56690 | 3695 | 7.9 | 2.9 | 10.8 | 16.02 | 5.22 |
| | 15 | 56315 | 3675.5 | 5.61 | 2.9 | 8.51 | 16.02 | 7.51 |
| | | 56490 | 3675 | 5.3 | 2.9 | 8.2 | 16.02 | 7.82 |
| | | 56665 | 3692.5 | 5.71 | 2.9 | 8.61 | 16.02 | 7.41 |
| | 20 | 56340 | 3660 | 5.82 | 2.9 | 8.72 | 16.02 | 7.3 |
| | | 56490 | 3675 | 5.83 | 2.9 | 8.73 | 16.02 | 7.29 |
| | | 56640 | 3690 | 5.89 | 2.9 | 8.79 | 16.02 | 7.23 |
| 64QAM | 5 | 56265 | 3652.5 | 9.15 | 2.9 | 12.05 | 16.02 | 3.97 |
| | | 56490 | 3675 | 9.68 | 2.9 | 12.58 | 16.02 | 3.44 |
| | | 56715 | 3697.5 | 9.22 | 2.9 | 12.12 | 16.02 | 3.9 |
| | 10 | 56290 | 3655 | 6.82 | 2.9 | 9.72 | 16.02 | 6.3 |
| | | 56490 | 3675 | 6.13 | 2.9 | 9.03 | 16.02 | 6.99 |
| | | 56690 | 3695 | 5.13 | 2.9 | 8.03 | 16.02 | 7.99 |
| | 15 | 56315 | 3675.5 | 4.74 | 2.9 | 7.64 | 16.02 | 8.38 |
| | | 56490 | 3675 | 4.16 | 2.9 | 7.06 | 16.02 | 8.96 |
| | | 56665 | 3692.5 | 4.77 | 2.9 | 7.67 | 16.02 | 8.35 |
| | 20 | 56340 | 3660 | 4.66 | 2.9 | 7.56 | 16.02 | 8.46 |
| | | 56490 | 3675 | 4.74 | 2.9 | 7.64 | 16.02 | 8.38 |
| | | 56640 | 3690 | 4.75 | 2.9 | 7.65 | 16.02 | 8.37 |

### 2.2.9 Sample Test Measurement Screen




12:37:41 09.07.2018

**LTE Band 48 (3650 – 3700 MHz) 5 MHz Bandwidth Middle Channel 3675 MHz QPSK Power Spectral Density**

## 2.3 OCCUPIED BANDWIDTH

### 2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 96, Clause 96.41 (e)(3)
FCC 47 CFR Part 90, Clause 90.1323 (a)
RSS-GEN 6.7

### 2.3.2 Standard Applicable

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, that is the frequency bandwidth suuch that, below its lower and above its upper frequency limits, the mean powers radiated are eqch equal to 0.5 percent of the total mean power radiated by a give emission.

26dB Bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least 26 dB below the transmitter power.

Using the occupied bandwidth meansurement function in the spectrum analyzer, the 99% occupied bandwith was measured.

In addition, the 26dB bandwidth was measured in accorance with FCC KDB 971168 D01 v03r01 Clause 4.1 using the ndB measurement function in the spectrum analyzer.

### 2.3.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration A

### 2.3.4 Date of Test/Initial of test personnel who performed the test

June 25 and 30, 2018 / XYZ

### 2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.3 - 27.1°C |
| Relative Humidity | 46.2 - 49.0% |
| ATM Pressure | 98.8 - 98.9 kPa |

### 2.3.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth meansurement function in the spectrum analyzer, the 99% occupied bandwith was measured.
- The 26dB bandwidth was measured in accorance with ANSI C63.26 clause 5.4.3 using the ndB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

### 2.3.8 Test Results

| LTE Band 48 (3550 – 3650 MHz) | | | | | |
|---|---|---|---|---|---|
| ***Modulation*** | ***Bandwidth (MHz)*** | ***Channel*** | ***Frequency (MHz)*** | ***99% OBW (MHz)*** | ***26dB BW (MHz)*** |
| QPSK | 5 | 55740 | 3600 | 4.49 | 5.01 |
| | 10 | | | 8.96 | 9.72 |
| | 15 | | | 13.44 | 14.59 |
| | 20 | | | 17.88 | 19.28 |
| 16QAM | 5 | 55740 | 3600 | 4.47 | 4.88 |
| | 10 | | | 8.96 | 9.6 |
| | 15 | | | 13.46 | 14.65 |
| | 20 | | | 17.91 | 19.19 |
| 64QAM | 5 | 55740 | 3600 | 4.47 | 5.08 |
| | 10 | | | 8.96 | 9.68 |
| | 15 | | | 13.43 | 14.59 |
| | 20 | | | 17.9 | 19.28 |

| LTE Band 48 (3650 – 3700 MHz) | | | | | |
|---|---|---|---|---|---|
| ***Modulation*** | ***Bandwidth (MHz)*** | ***Channel*** | ***Frequency (MHz)*** | ***99% OBW (MHz)*** | ***26dB BW (MHz)*** |
| QPSK | 5 | 56490 | 3675 | 4.48 | 5.01 |
| | 10 | | | 8.96 | 9.81 |
| | 15 | | | 13.44 | 14.65 |
| | 20 | | | 17.95 | 19.28 |
| 16QAM | 5 | 56490 | 3675 | 4.48 | 4.91 |
| | 10 | | | 8.97 | 9.68 |
| | 15 | | | 13.46 | 14.65 |
| | 20 | | | 17.89 | 19.28 |
| 64QAM | 5 | 56490 | 3675 | 4.49 | 5.08 |
| | 10 | | | 8.97 | 9.81 |
| | 15 | | | 13.43 | 14.46 |
| | 20 | | | 17.91 | 19.28 |

### 2.3.9 Example Test Plots

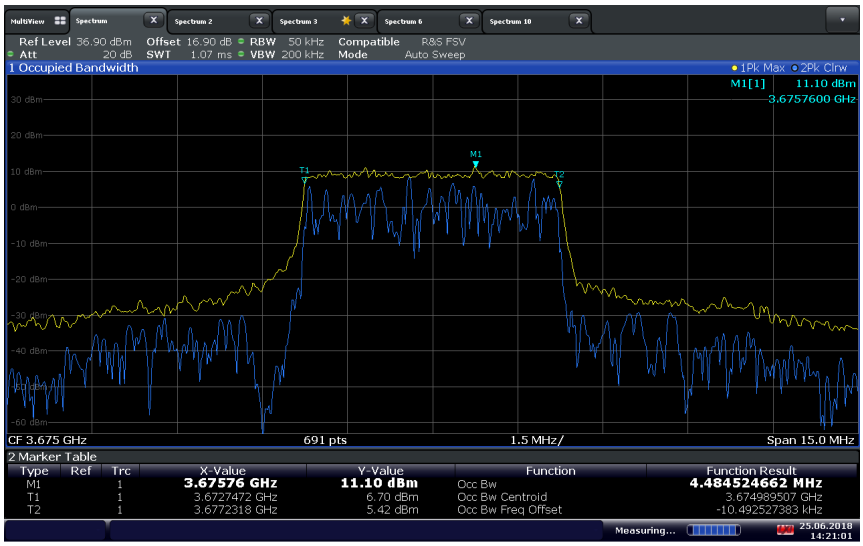
**LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / Middle Channel 3600 MHz / QPSK / 99%OBW**


13:25:14 25.06.2018

**LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / Middle Channel 3600 MHz / QPSK / 26dB BW**

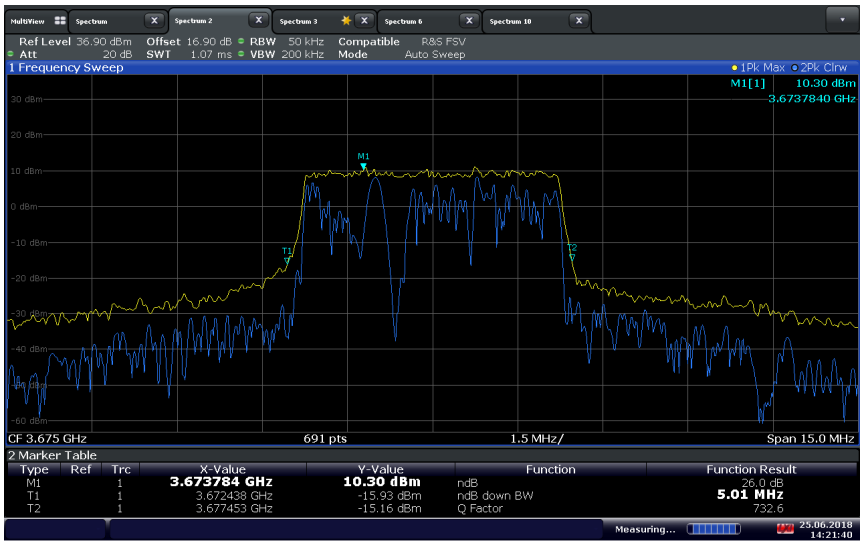

13:29:18 25.06.2018

**LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / Middle Channel 3675 MHz / QPSK / 99%OBW**




14:21:02 25.06.2018

**LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / Middle Channel 3675 MHz / QPSK / 26dB BW**




14:21:40 25.06.2018

## 2.4 BAND EDGE

### 2.4.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 96, Clause 96.41(e)(1)(3)
FCC 47 CFR Part 90, Clause 90.1323(a)
RSS-192, Clause 5.5
RSS-197, Clause 5.7

### 2.4.2 Standard Applicable

FCC 47 CFR Part 96.41:
(e) 3.5 GHz Emissions and Interference Limits - (1) General protection levels. Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the uper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

RSS-192, Clause 5.5:
The unwanted emissions shall comply with the following limits:
(i) In any 30 kHz bandwidth, the unwanted emission spectral density that is relative to the inband spectral density shall be attenuated at least to the limits shown in Table 1 according to the equipment modulation. The attenuation shall be linearly interpolated between the turning point attenuation limits.

**Table 1: Attenuation of Unwanted Emission Limits for Various Access Schemes**

**Orthogonal Frequency Division Multiple Access (OFDMA)**

| Turning Point (F/ChS) | 0 | 0.21 | 0.56 | 1.5 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | 8 dB | 25 dB | 27 dB | 50 dB | 50 dB |
| EMO = 4 | 8 dB | 27 dB | 32 dB | 50 dB | 50 dB |
| EMO = 6 | 8 dB | 32 dB | 38 dB | 50 dB | 50 dB |

**Code Division Multiple Access (CDMA)**

| Turning Point (F/ChS) | 0 | 0.3 | 0.5 | 1 | 2 |
|---|---|---|---|---|---|
| EMO Not applicable | 0 dB | 25 dB | 25 dB | 45 dB | 45 dB |

**Frequency Division Multiple Access (FDMA)**

| Turning Point (F/ChS) | 0 | 0.1 | 0.35 | 1 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | 23 dB | 25 dB | 25 dB | 45 dB | 45 dB |
| EMO = 3 | 27 dB | 29 dB | 29 dB | 45 dB | 45 dB |
| EMO = 4 or 6 | 31 dB | 33 dB | 33 dB | 45 dB | 45 dB |

**Time Division Multiple Access (TDMA)**

| Turning Point (F/ChS) | 0 | 0.3 | 0.56 | 1.5 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | Not applicable | 25 dB | 25 dB | 45 dB | 45 dB |
| EMO = 4 | Not applicable | 32 dB | 37 dB | 45 dB | 45 dB |
| EMO = 6 | 13 dB | 34 dB | 42 dB | 45 dB | 45 dB |

The offset frequency from the block edge, F, at each turning point can be determined as follows:
F = ChS * (Turning Point); where ChS is defined as the frequency spacing between the centre frequencies of two adjacent channels.

EMO is the equivalent modulation order of the transmitter, defined as log2(number of discrete states which may be assigned to each symbol). For example, for quadrature amplitude modulation (QAM):

2 = 4 QAM
4 = 16 QAM
6 = 64 QAM

(ii) In any 1.0 MHz band that is removed from the assigned centre frequency by more than ±250% of the necessary bandwidth, the power of any emission must be attenuated below $P_{mean}$ by at least 43 + 10 log10($P_{mean}$) dB, or 70 dB, whichever is less stringent. Pmean is the mean output power of the transmitter in watts.

FCC 47 CFR Part 90.1323:
(a) The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

RSS-197, Clause 5.7:
The unwanted emissions shall be measured at the frequencies of the highest and lowest channel of all bandwidths and types of modulation that the equipment can operate with a resolution bandwidth of 1 MHz or less, but at least 1% of the occupied bandwidth of the transmitter, provided that the measured power is integrated over a 1 MHz bandwidth.

The power of any emissions outside the frequency band 3650-3700 MHz shall be attenuated below the channel transmitter power P (dBW) by 43 + 10 Log (p), where p is measured in watts.

### 2.4.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration A

### 2.4.4 Date of Test/Initial of test personnel who performed the test

July 01 and 10, 2018 / XYZ

### 2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.2 - 26.8 °C |
| Relative Humidity | 44.4 - 49.3 % |
| ATM Pressure | 99.0 - 99.1 kPa |

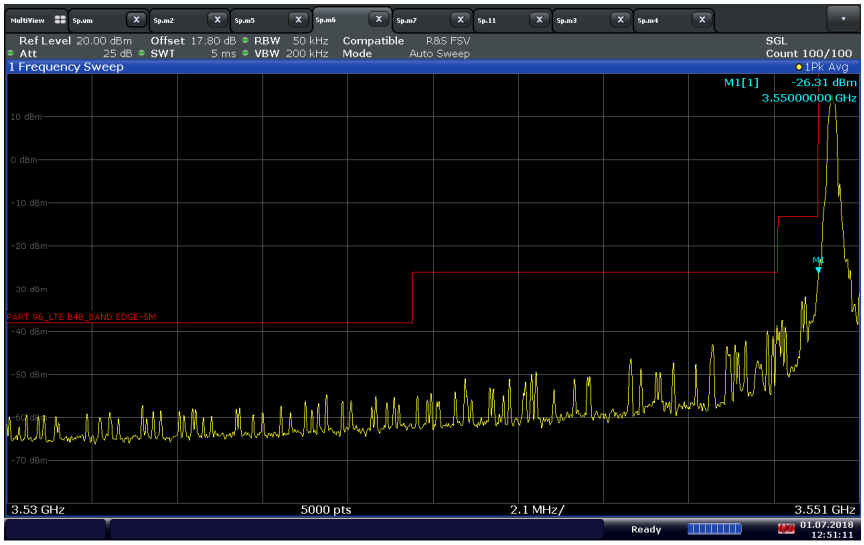
### 2.4.7 Additional Observations

- This is a conducted test.
- The path loss were measured and entered as a level offset.
- All channel bandwidth, RB Size and offset and modulation are verified. Only the worst case modulation (QPSK) for band edge verification presented in this test report.

### 2.4.8 Test Results

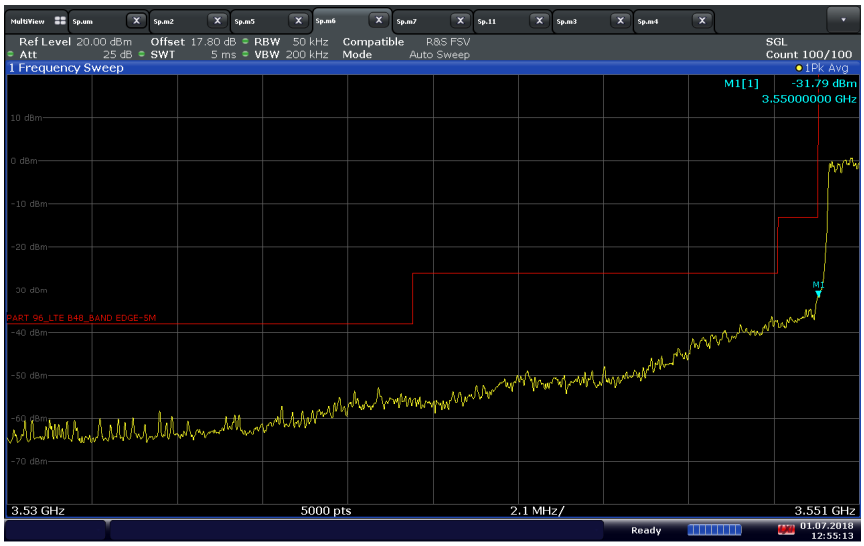
See attached test plots.

**LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz 1 RB 0 offset**
**Low Band Edge**

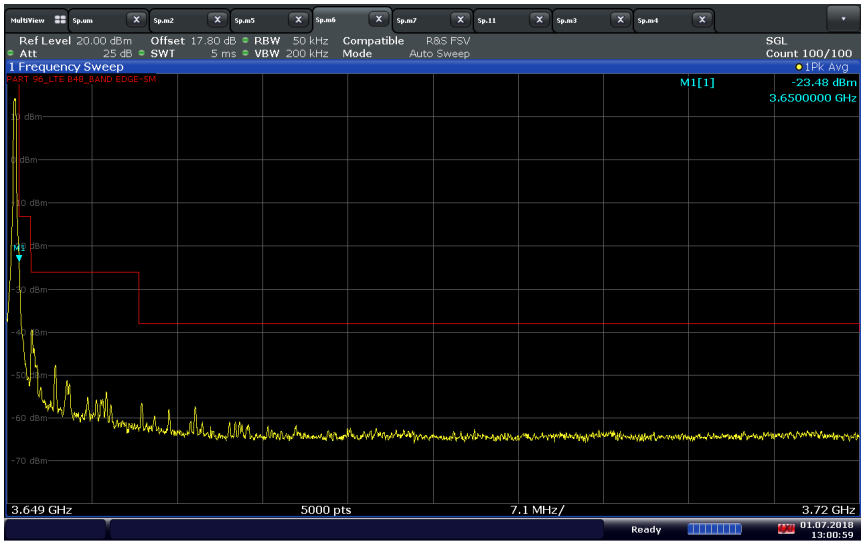


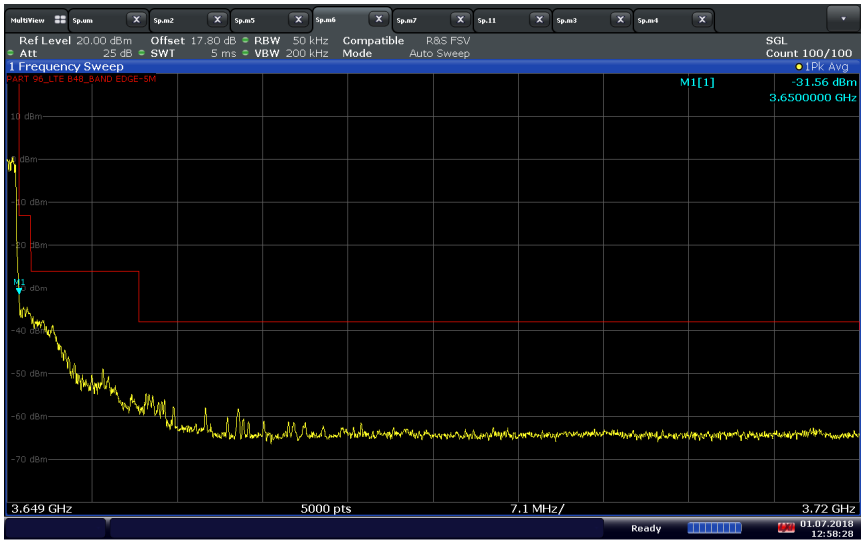

12:51:12 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz Full RB**
**Low Band Edge**

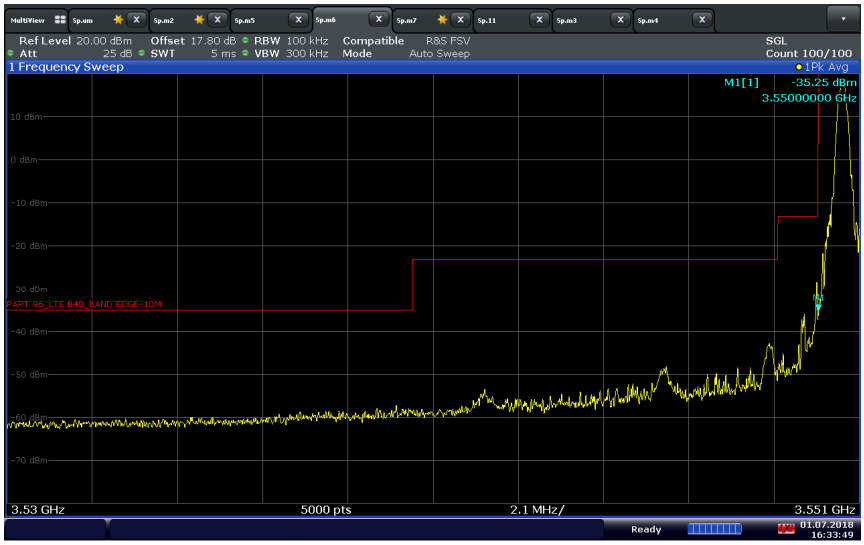



12:55:13 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz 1 RB 24 offset<br>High Band Edge |
|---|
|  <br><br>13:00:59 01.07.2018 |

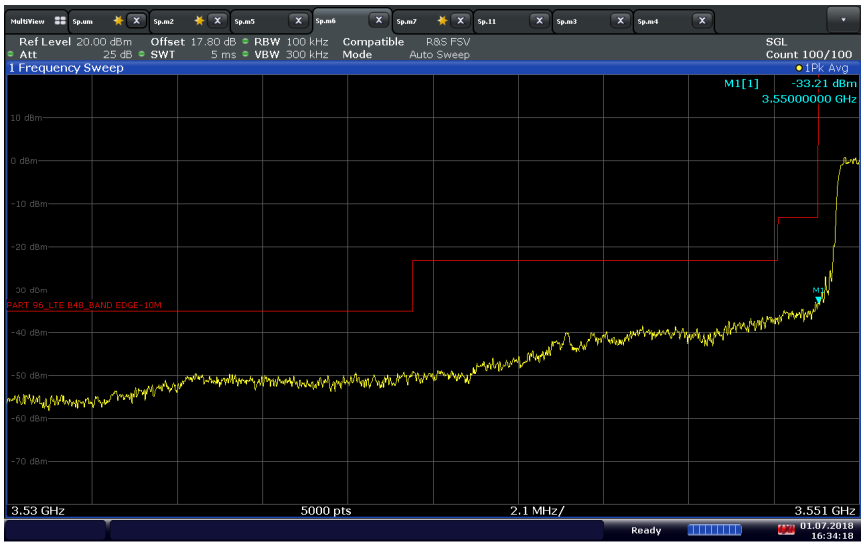
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>12:58:29 01.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz 1 RB 0 offset**
**Low Band Edge**

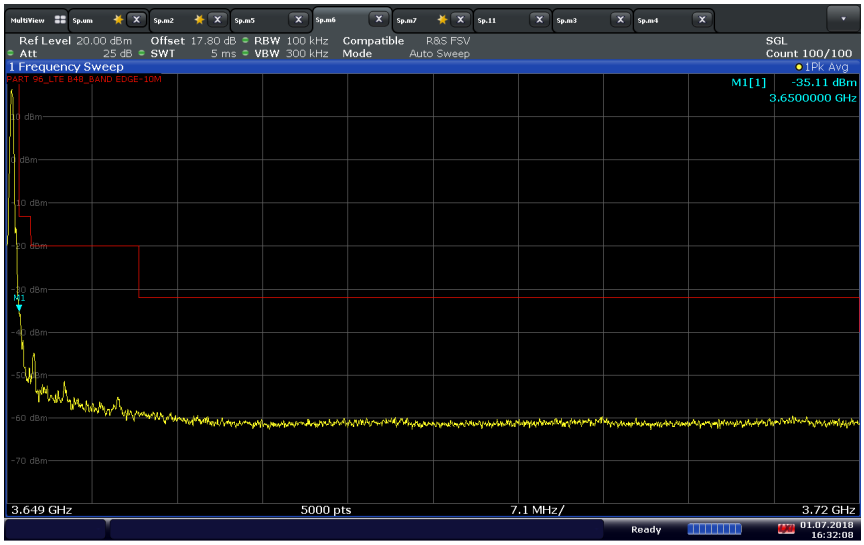


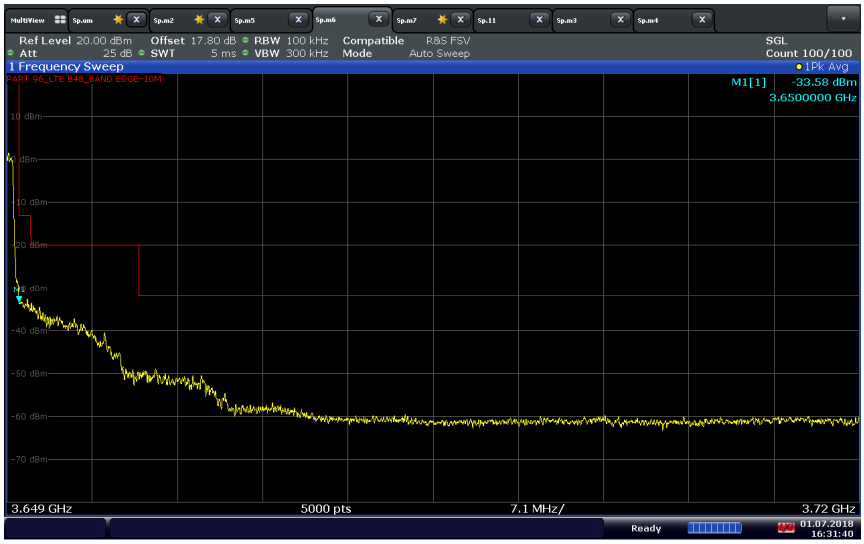

16:33:50 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz Full RB**
**Low Band Edge**

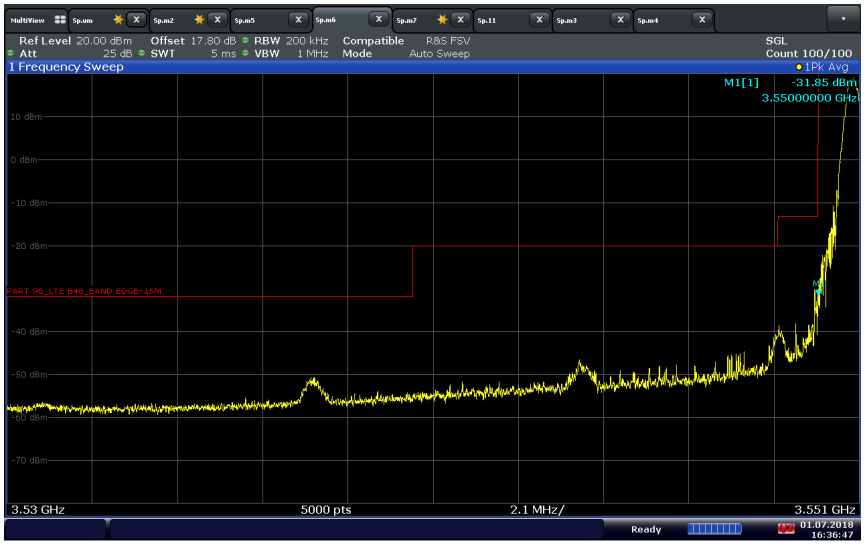



16:34:19 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz 1 RB 49 offset<br>High Band Edge |
|---|
|  <br><br>16:32:09 01.07.2018 |

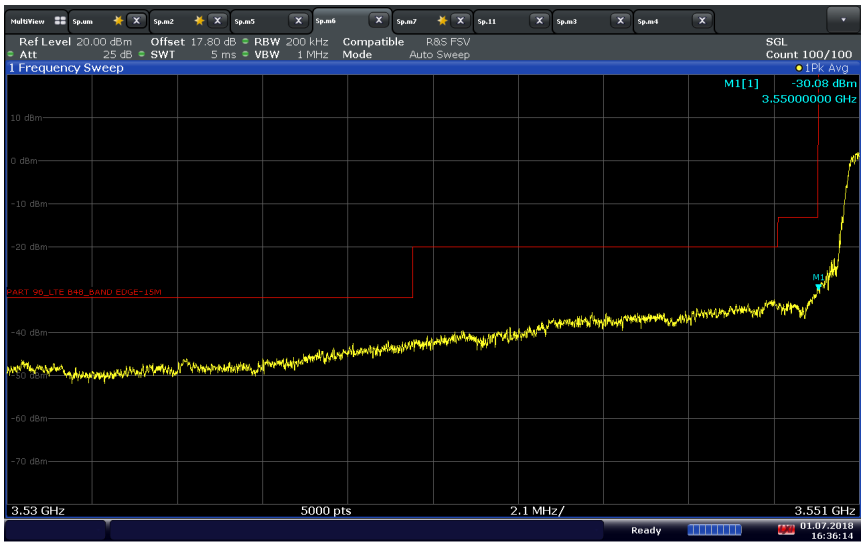
| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>16:31:40 01.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 3557.5 MHz 1 RB 0 offset**
**Low Band Edge**

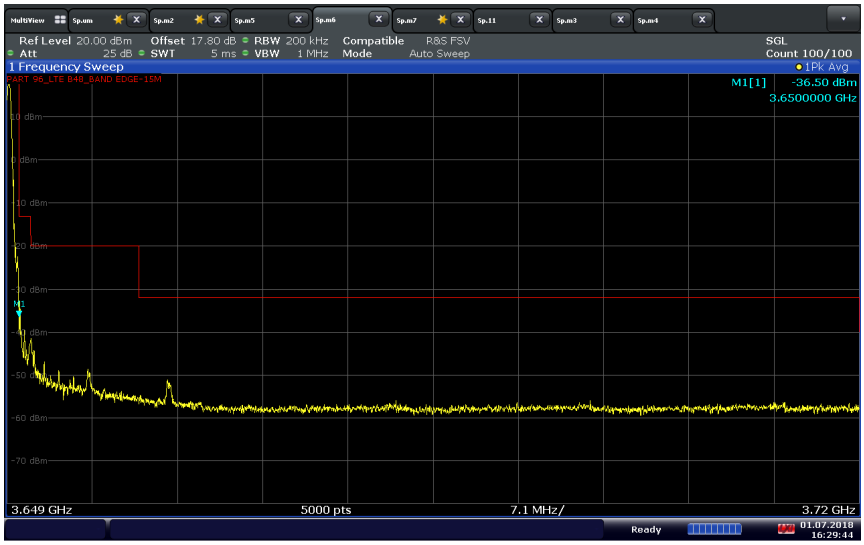
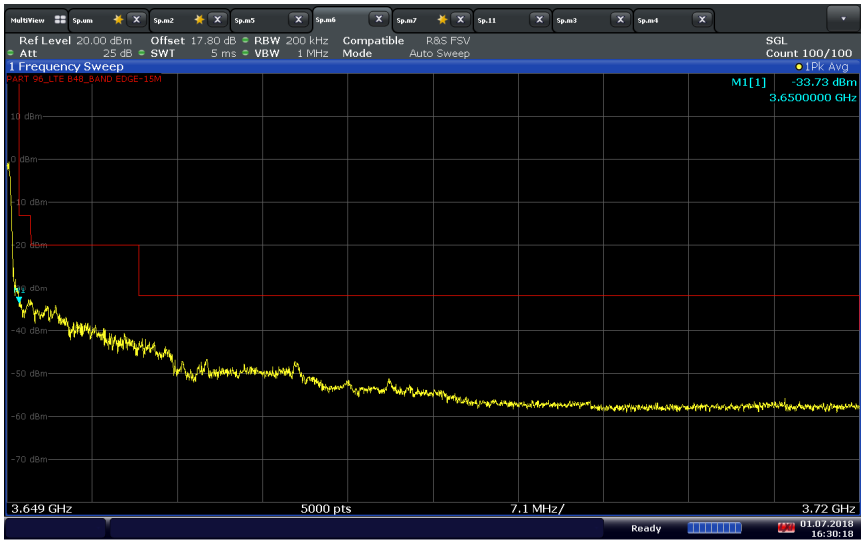



16:36:48 01.07.2018

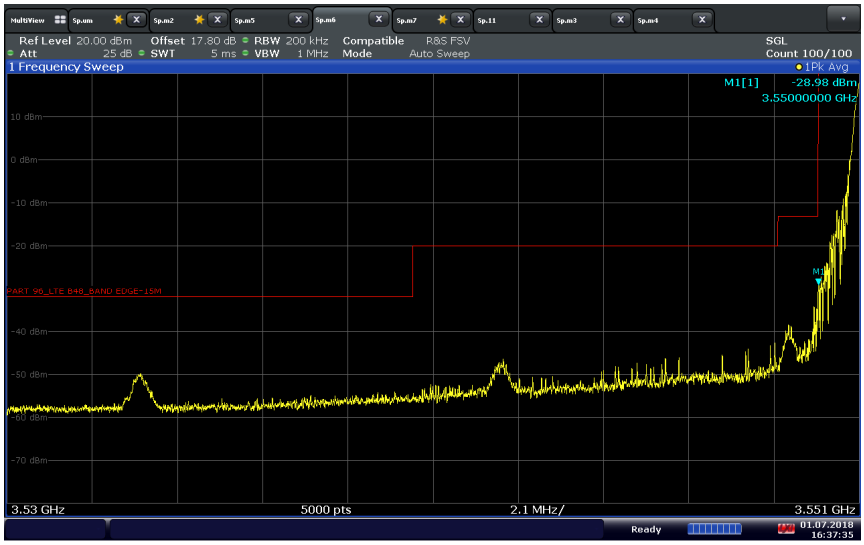
**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 3557.5 MHz Full RB**
**Low Band Edge**




16:36:15 01.07.2018

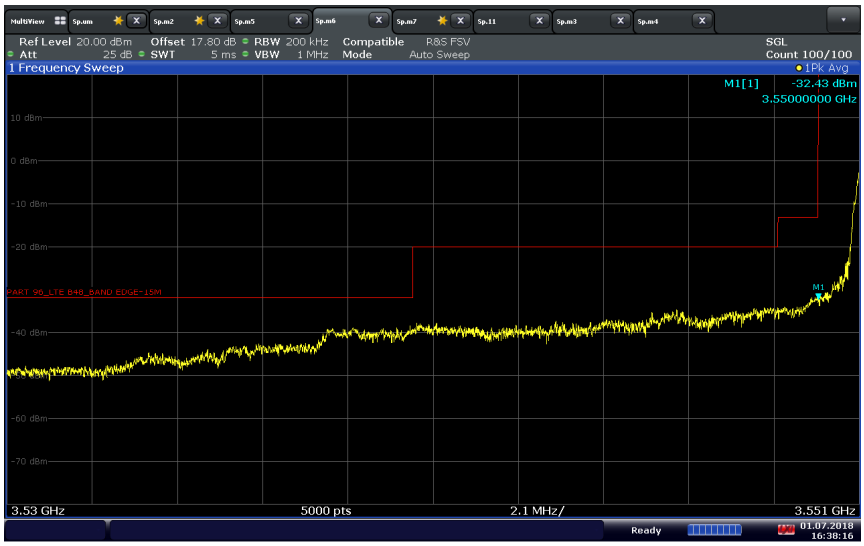
| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz 1 RB 74 offset<br>High Band Edge |
|---|
|  <br><br>16:29:44 01.07.2018 |
| **LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz Full RB<br>High Band Edge** |
|  <br><br>16:30:19 01.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz 1 RB 0 offset**
**Low Band Edge**

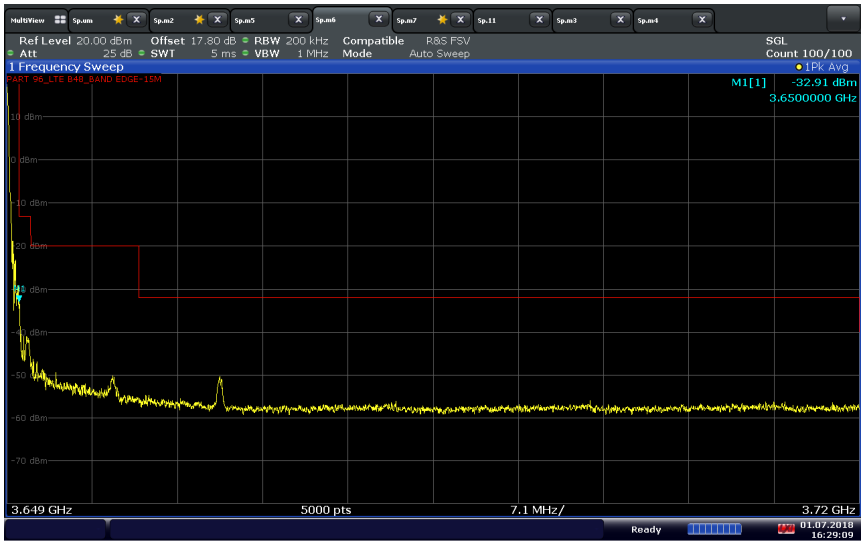


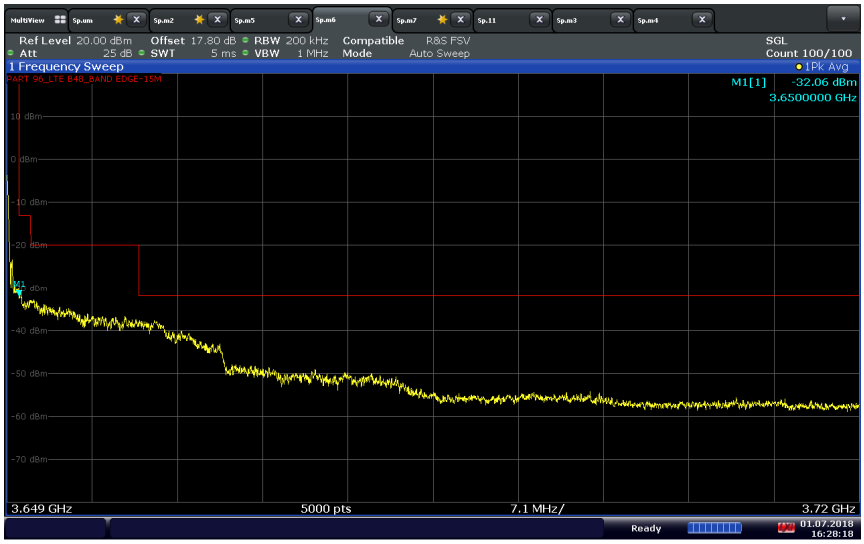

16:37:36 01.07.2018

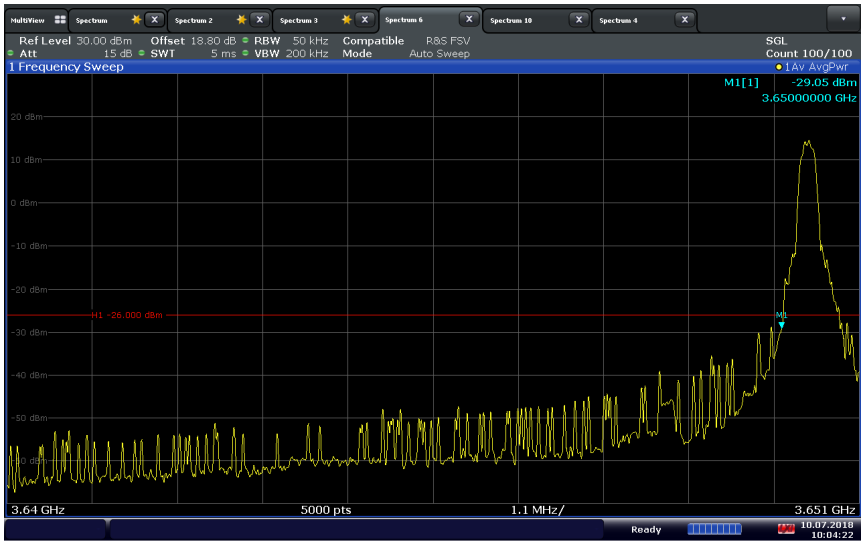
**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz Full RB**
**Low Band Edge**

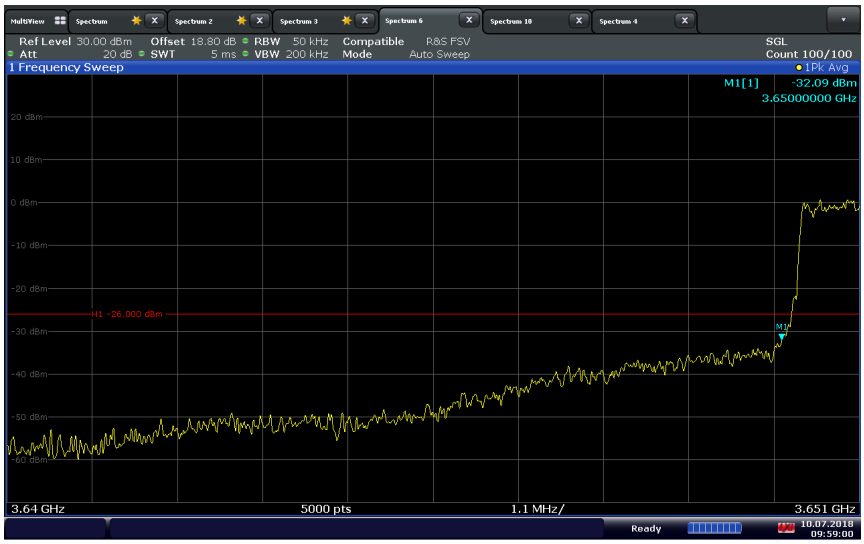


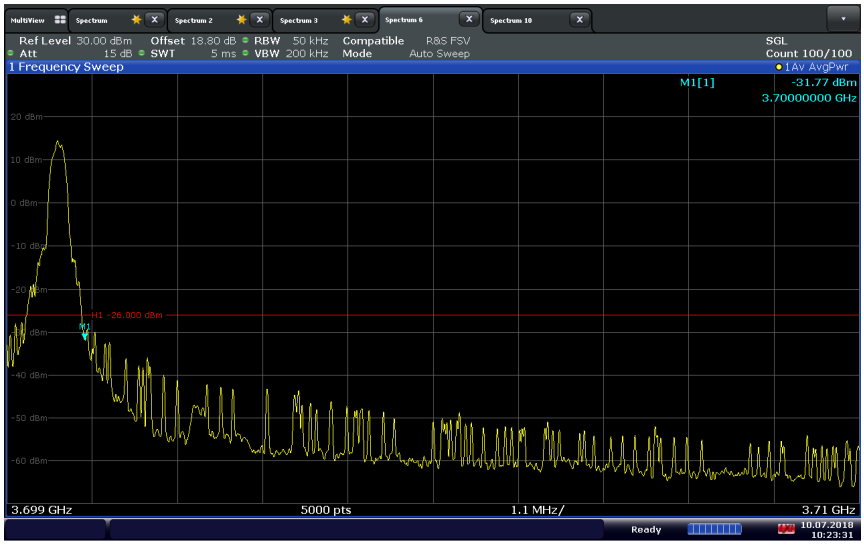

16:38:16 01.07.2018

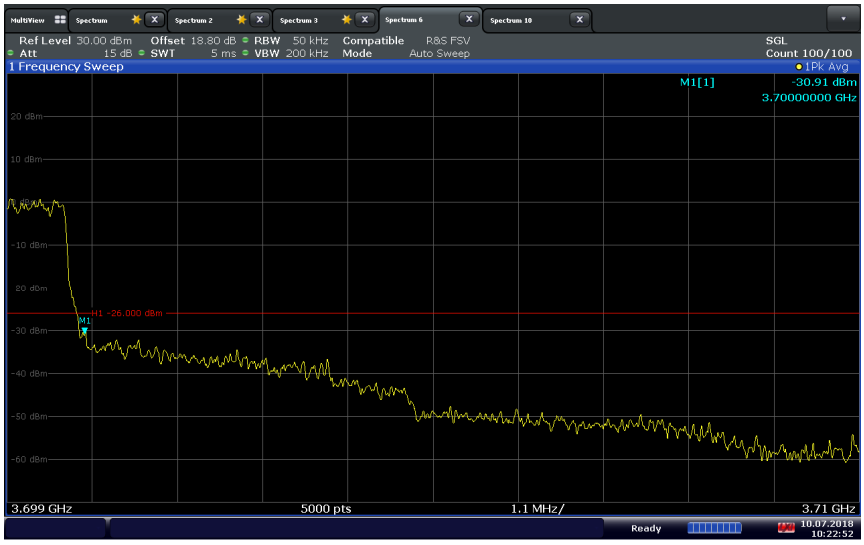
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz 1 RB 99 offset<br>High Band Edge |
|---|
|  <br><br>16:29:09 01.07.2018 |

| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>16:28:19 01.07.2018 |

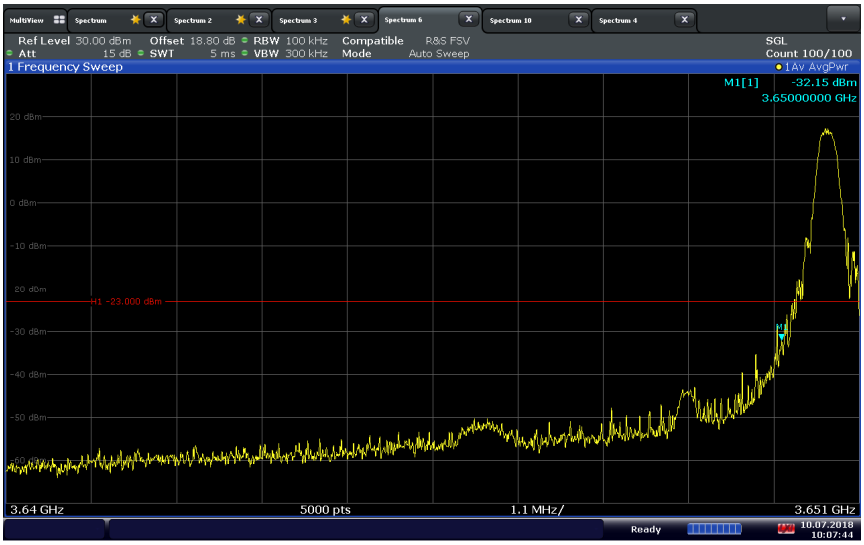
| LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / QPSK / High Channel 3652.5 MHz 1 RB 0 offset<br>Low Band Edge |
|---|
|  <br><br>10:04:22 10.07.2018 |

| LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / QPSK / Low Channel 3652.5 MHz Full RB<br>Low Band Edge |
|---|
|  <br><br>09:59:01 10.07.2018 |

| LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / QPSK / High Channel 3697.5 MHz 1 RB 24 offset<br>High Band Edge |
|---|
|  <br><br>10:23:32 10.07.2018 |

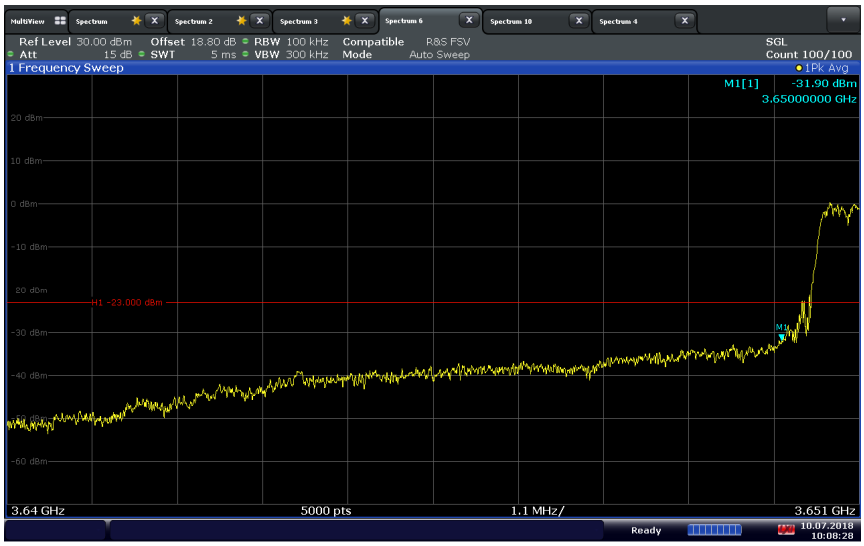
| LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / QPSK / High Channel 3697.5 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>10:22:52 10.07.2018 |

**LTE Band 48 (3650 – 3700 MHz)_10 MHz BW / QPSK / Low Channel 3655 MHz 1 RB 0 offset**
**Low Band Edge**

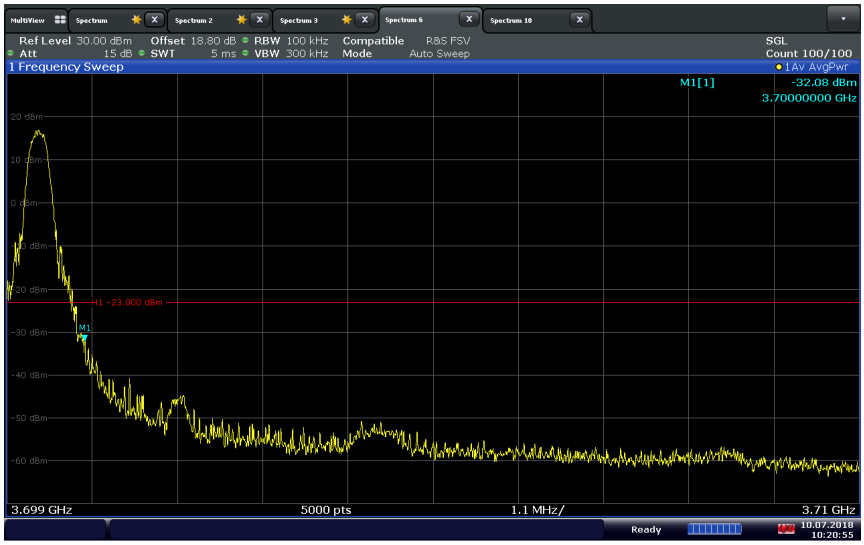


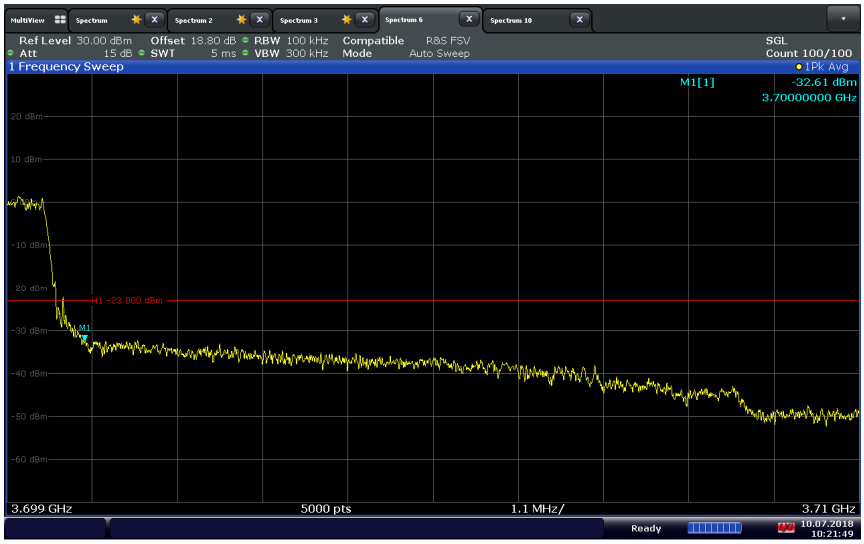

10:07:45 10.07.2018

**LTE Band 48 (3650 – 3700 MHz)_10 MHz BW / QPSK / Low Channel 3655 MHz Full RB**
**Low Band Edge**

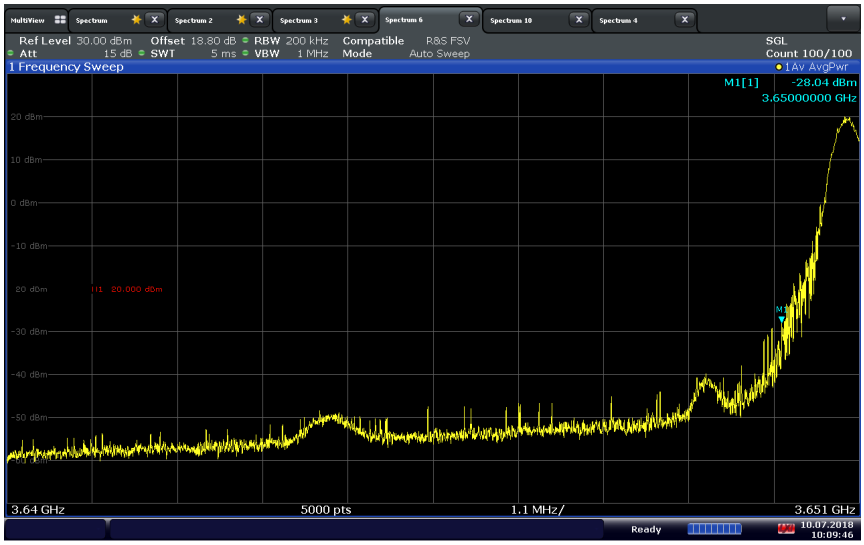



10:08:29 10.07.2018

| LTE Band 48 (3650 – 3700 MHz)_10 MHz BW / QPSK / High Channel 3695 MHz 1 RB 49 offset<br>High Band Edge |
|---|
|  <br><br>10:20:56 10.07.2018 |

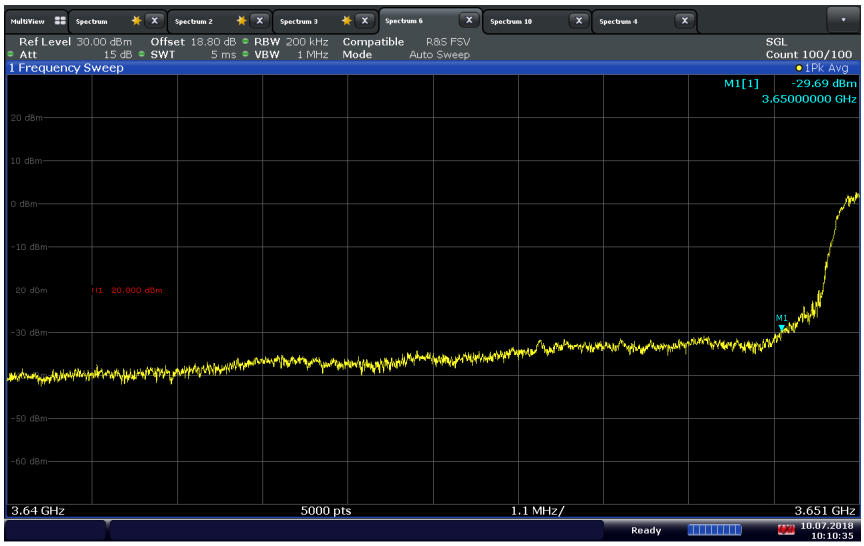
| LTE Band 48 (3650 – 3700 MHz)_10 MHz BW / QPSK / High Channel 3695 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>10:21:50 10.07.2018 |

**LTE Band 48 (3650 – 3700 MHz)_15 MHz BW / QPSK / Low Channel 3657.5 MHz 1 RB 0 offset**
**Low Band Edge**

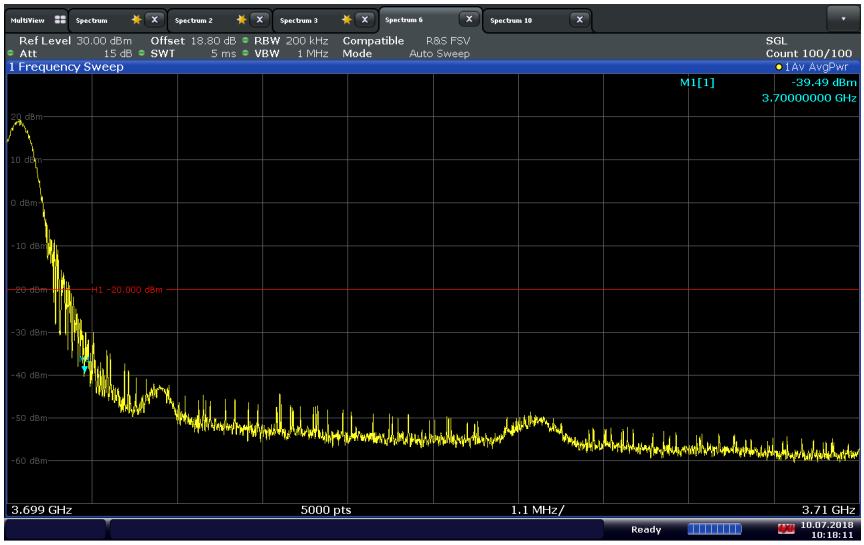
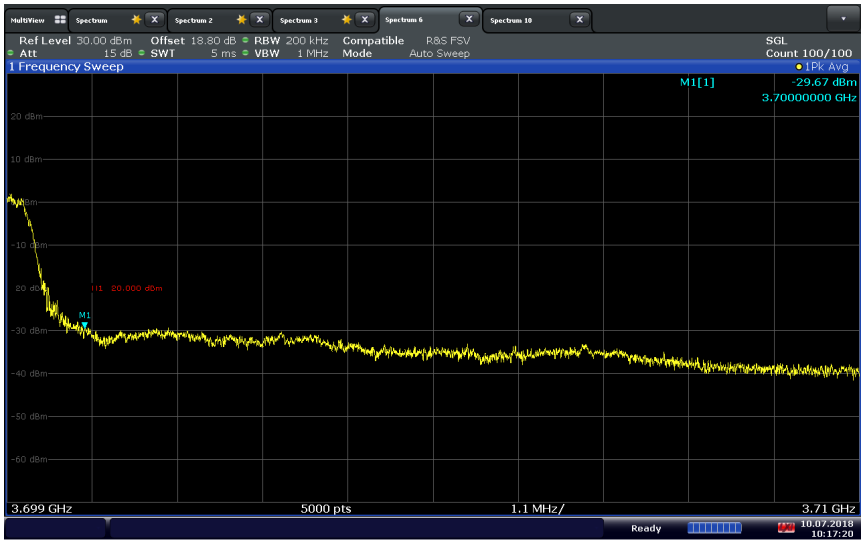



10:09:47 10.07.2018

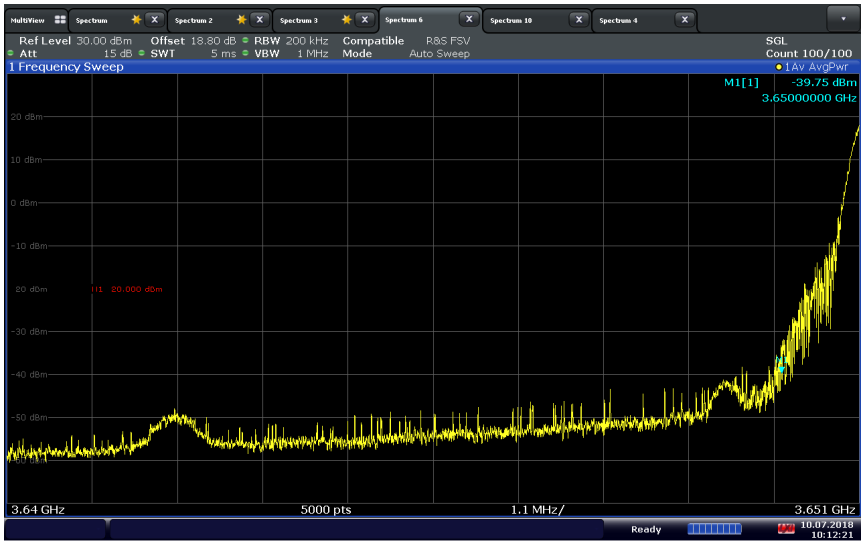
**LTE Band 48 (3650 – 3700 MHz)_15 MHz BW / QPSK / Low Channel 3657.5 MHz Full RB**
**Low Band Edge**




10:10:35 10.07.2018

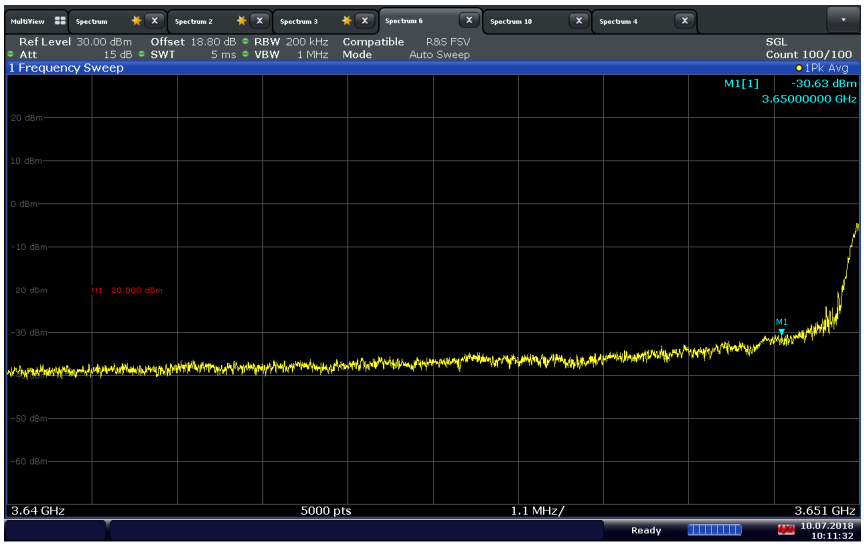
| LTE Band 48 (3650 – 3700 MHz)_15 MHz BW / QPSK / High Channel 3692.5 MHz 1 RB 74 offset<br>High Band Edge |
|---|
|  <br><br>10:18:11 10.07.2018 |
| **LTE Band 48 (3650 – 3700 MHz)_15 MHz BW / QPSK / High Channel 3692.5 MHz Full RB<br>High Band Edge** |
|  <br><br>10:17:21 10.07.2018 |

**LTE Band 48 (3650 – 3700 MHz)_20 MHz BW / QPSK / Low Channel 3660 MHz 1 RB 0 offset**
**Low Band Edge**

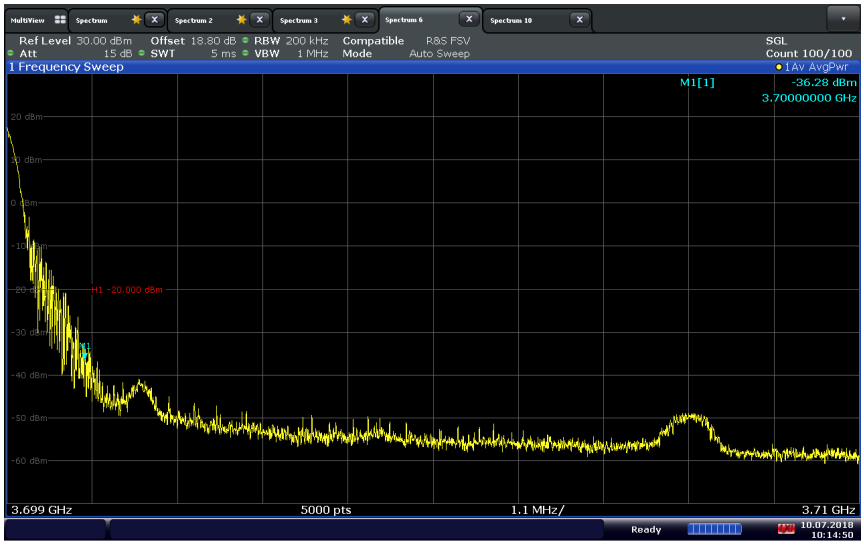


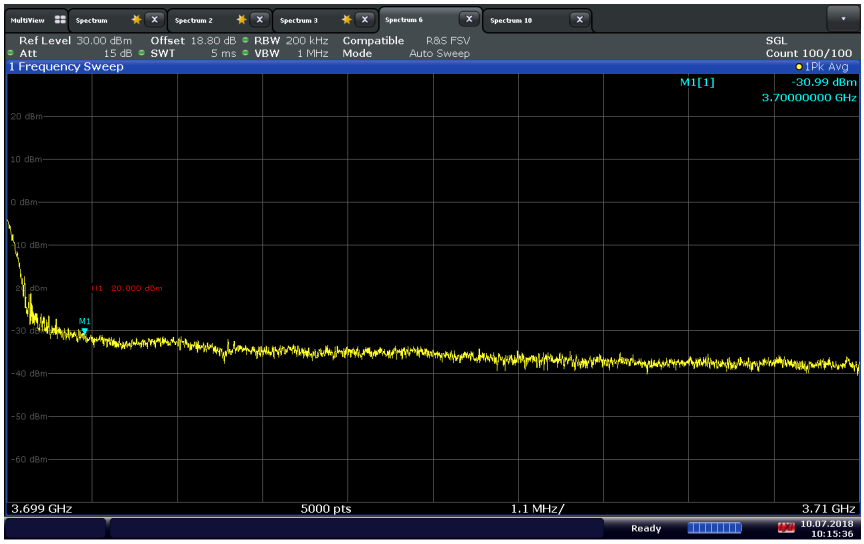

10:12:22 10.07.2018

**LTE Band 48 (3650 – 3700 MHz)_20 MHz BW / QPSK / Low Channel 3660 MHz Full RB**
**Low Band Edge**




10:11:33 10.07.2018

| LTE Band 48 (3650 – 3700 MHz)_20 MHz BW / QPSK / High Channel 3690 MHz 1 RB 99 offset<br>High Band Edge |
|---|
|  <br><br>10:14:51 10.07.2018 |

| LTE Band 48 (3650 – 3700 MHz)_20 MHz BW / QPSK / High Channel 3690 MHz Full RB<br>High Band Edge |
|---|
|  <br><br>10:15:36 10.07.2018 |

## 2.5 CONDUCTED SPURIOUS EMISSIONS

### 2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 96, Clause 96.41(e)(1)(2)(3)
FCC 47 CFR Part 90, Clause 90.1323(a)
RSS-192, Clause 5.5
RSS-197, Clause 5.7

### 2.5.2 Standard Applicable

FCC 47 CFR Part 96.41:
(e) 3.5 GHz Emissions and Interference Limits - (1) General protection levels. Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the uper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(2) Additional protection levels: Not withstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

RSS-192, Clause 5.5:
The unwanted emissions shall comply with the following limits:
(i) In any 30 kHz bandwidth, the unwanted emission spectral density that is relative to the inband spectral density shall be attenuated at least to the limits shown in Table 1 according to the equipment modulation. The attenuation shall be linearly interpolated between the turning point attenuation limits.

**Table 1: Attenuation of Unwanted Emission Limits for Various Access Schemes**

**Orthogonal Frequency Division Multiple Access (OFDMA)**

| Turning Point (F/ChS) | 0 | 0.21 | 0.56 | 1.5 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | 8 dB | 25 dB | 27 dB | 50 dB | 50 dB |
| EMO = 4 | 8 dB | 27 dB | 32 dB | 50 dB | 50 dB |
| EMO = 6 | 8 dB | 32 dB | 38 dB | 50 dB | 50 dB |

**Code Division Multiple Access (CDMA)**

| Turning Point (F/ChS) | 0 | 0.3 | 0.5 | 1 | 2 |
|---|---|---|---|---|---|
| EMO Not applicable | 0 dB | 25 dB | 25 dB | 45 dB | 45 dB |

**Frequency Division Multiple Access (FDMA)**

| Turning Point (F/ChS) | 0 | 0.1 | 0.35 | 1 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | 23 dB | 25 dB | 25 dB | 45 dB | 45 dB |
| EMO = 3 | 27 dB | 29 dB | 29 dB | 45 dB | 45 dB |
| EMO = 4 or 6 | 31 dB | 33 dB | 33 dB | 45 dB | 45 dB |

**Time Division Multiple Access (TDMA)**

| Turning Point (F/ChS) | 0 | 0.3 | 0.56 | 1.5 | 2 |
|---|---|---|---|---|---|
| EMO = 2 | Not applicable | 25 dB | 25 dB | 45 dB | 45 dB |
| EMO = 4 | Not applicable | 32 dB | 37 dB | 45 dB | 45 dB |
| EMO = 6 | 13 dB | 34 dB | 42 dB | 45 dB | 45 dB |

The offset frequency from the block edge, F, at each turning point can be determined as follows:
F = ChS * (Turning Point); where ChS is defined as the frequency spacing between the centre frequencies of two adjacent channels.

EMO is the equivalent modulation order of the transmitter, defined as log2(number of discrete states which may be assigned to each symbol). For example, for quadrature amplitude modulation (QAM):

2 = 4 QAM
4 = 16 QAM
6 = 64 QAM

(ii) In any 1.0 MHz band that is removed from the assigned centre frequency by more than ±250% of the necessary bandwidth, the power of any emission must be attenuated below $P_{mean}$ by at least 43 + 10 log10($P_{mean}$) dB, or 70 dB, whichever is less stringent. Pmean is the mean output power of the transmitter in watts.

FCC 47 CFR Part 90.1323:
(a) The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

RSS-197, Clause 5.7:
The unwanted emissions shall be measured at the frequencies of the highest and lowest channel of all bandwidths and types of modulation that the equipment can operate with a resolution bandwidth of 1 MHz or less, but at least 1% of the occupied bandwidth of the transmitter, provided that the measured power is integrated over a 1 MHz bandwidth.

The power of any emissions outside the frequency band 3650-3700 MHz shall be attenuated below the channel transmitter power P (dBW) by 43 + 10 Log (p), where p is measured in watts.

### 2.5.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration A

### 2.5.4 Date of Test/Initial of test personnel who performed the test

July 01, 09 and 10, 2018 / ZXY

### 2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.6 Environmental Conditions/ Test Location

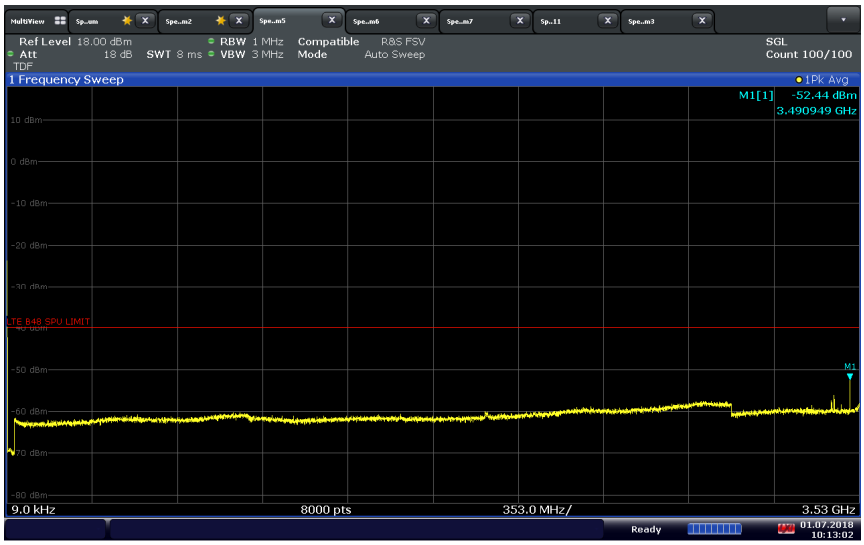
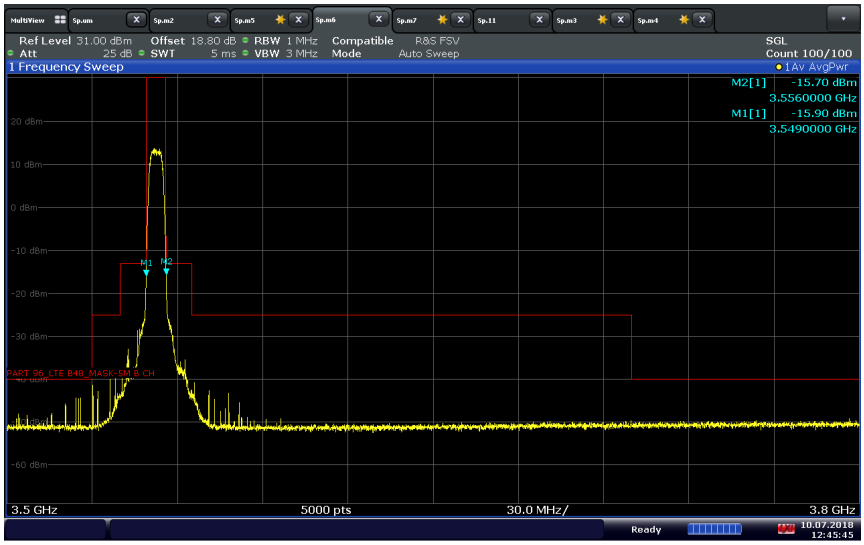
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.2 - 27.8°C |
| Relative Humidity | 39.4 - 49.3 % |
| ATM Pressure | 98.8 - 99.1 kPa |

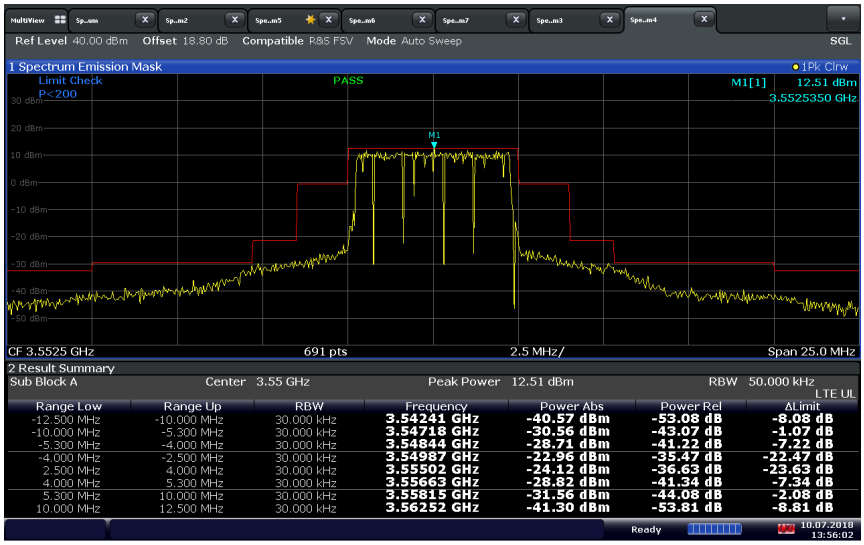
### 2.5.7 Additional Observations

- This is a conducted test.
- The spectrum was searched from 30MHz to the 10$^{th}$ harmonic.
- Only noise floor measurements observed above 26.5 GHz.
- Low, Middle and High channels on all channel bandwidth and modulation are verified. Only the worst case channel of each band presented.

### 2.5.8 Test Results

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:13:03 01.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz Full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|  <br><br>12:45:46 10.07.2018 |

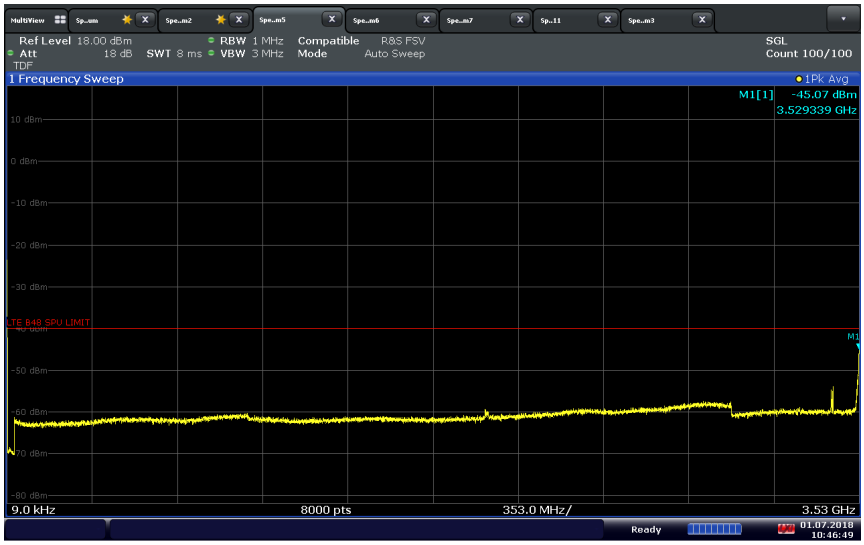
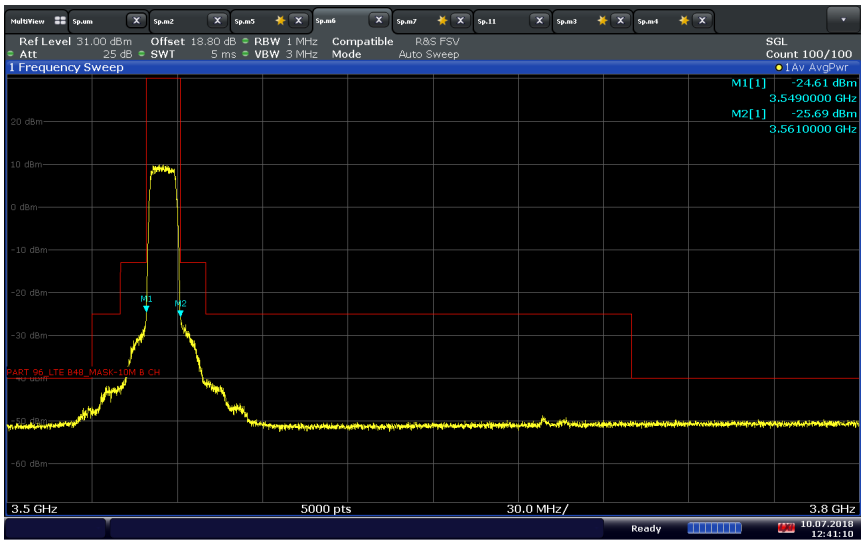
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz Full RB unwanted emission spectral density Mask according to RSS-192 |
|---|



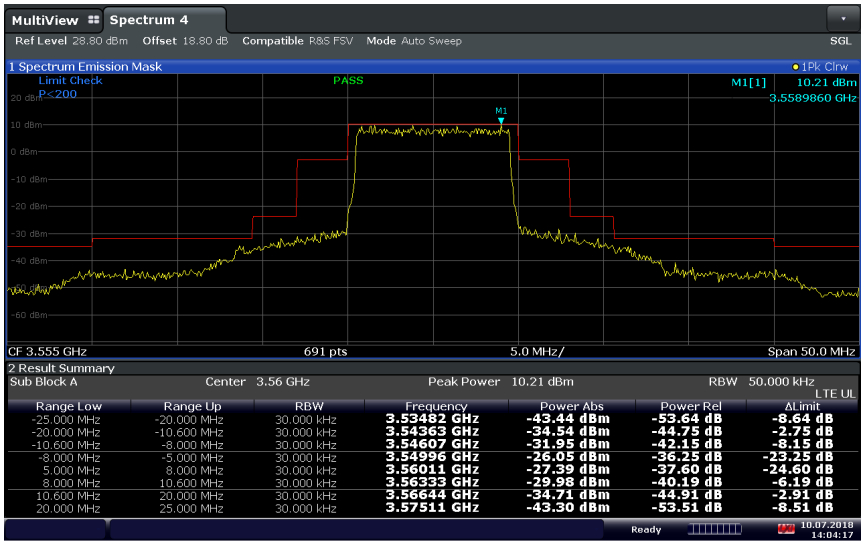

13:56:02 10.07.2018

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Low Channel 3552.5 MHz 3720 MHz - 26.5 GHz |
|---|


10:14:43 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:46:50 01.07.2018 |
| **LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz Full RB<br>3530 kHz - 3720 MHz according to FCC Part 96** |
|  <br><br>12:41:10 10.07.2018 |

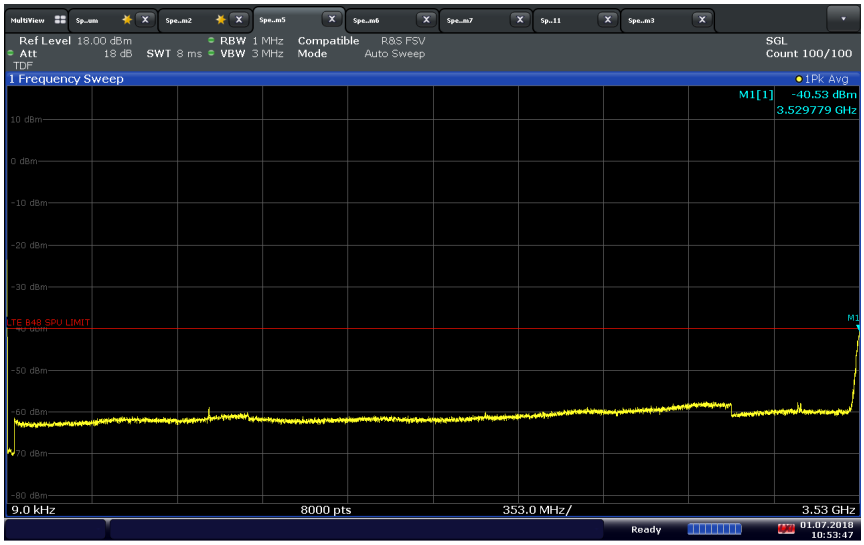
**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz full RB unwanted emission spectral density Mask according to RSS-192**

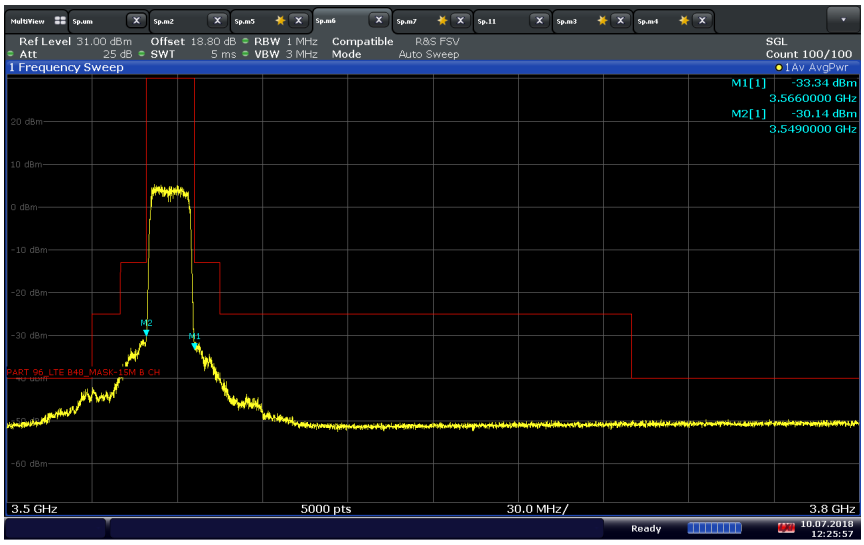



14:04:18 10.07.2018

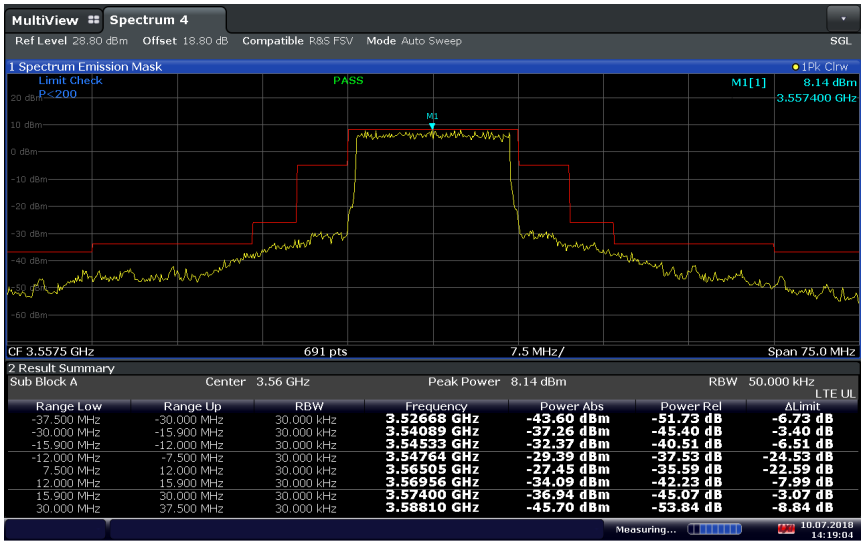
**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Low Channel 3555 MHz 3720 MHz - 26.5 GHz**


10:46:07 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 35557.5 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:53:48 01.07.2018 |

| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 35557.5 MHz 1RB 0 offset<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|---|
|  <br><br>12:25:58 10.07.2018 |

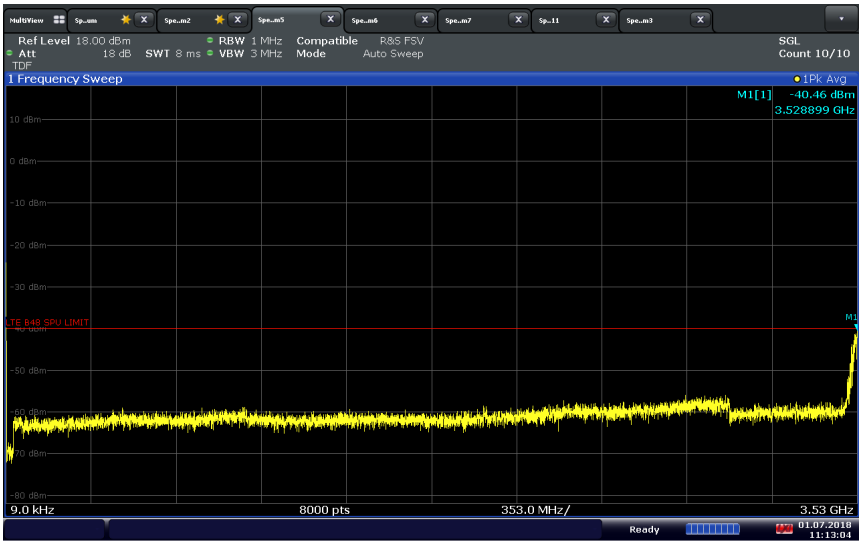
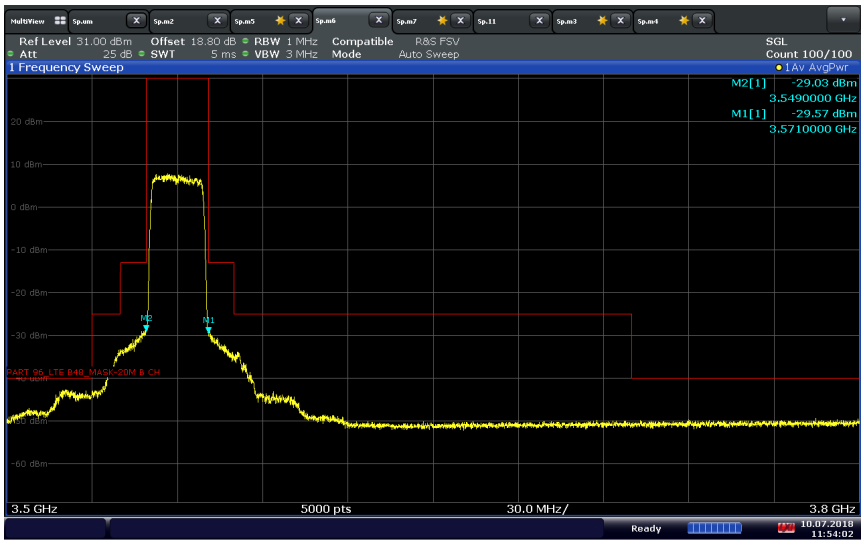
**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 3557.5 MHz full RB unwanted emission spectral density Mask according to RSS-192**



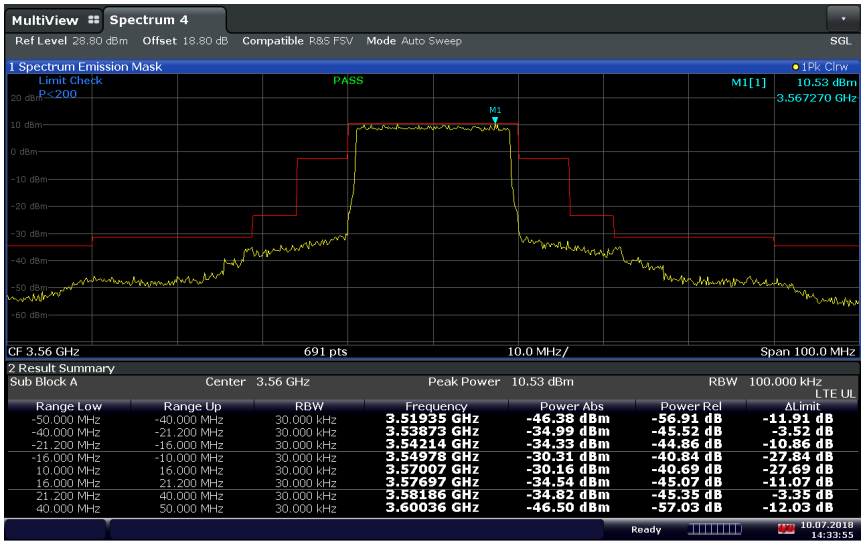

14:19:04 10.07.2018

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Low Channel 3557.5 MHz 3720 MHz - 26.5 GHz**


10:58:14 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>11:13:05 01.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|  <br><br>11:54:03 10.07.2018 |

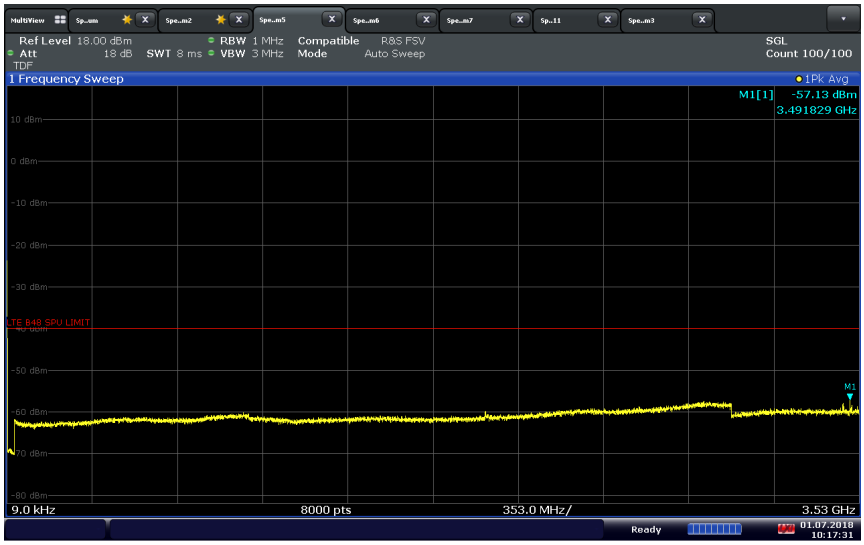
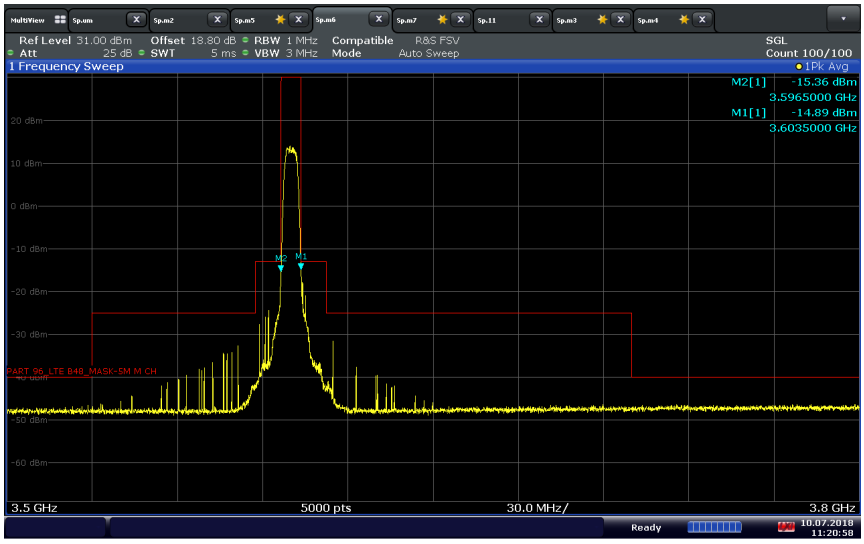
**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz full RB unwanted emission spectral density Mask according to RSS-192**



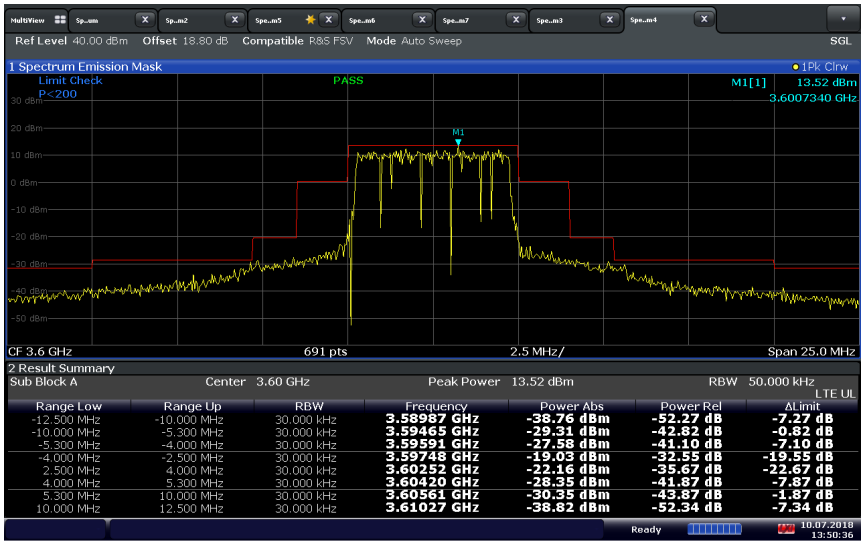

14:33:55 10.07.2018

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Low Channel 3560 MHz 3720 MHz - 26.5 GHz**


11:15:44 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Middle Channel 3600 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:17:32 01.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Middle Channel 3600 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|  <br><br>11:20:58 10.07.2018 |

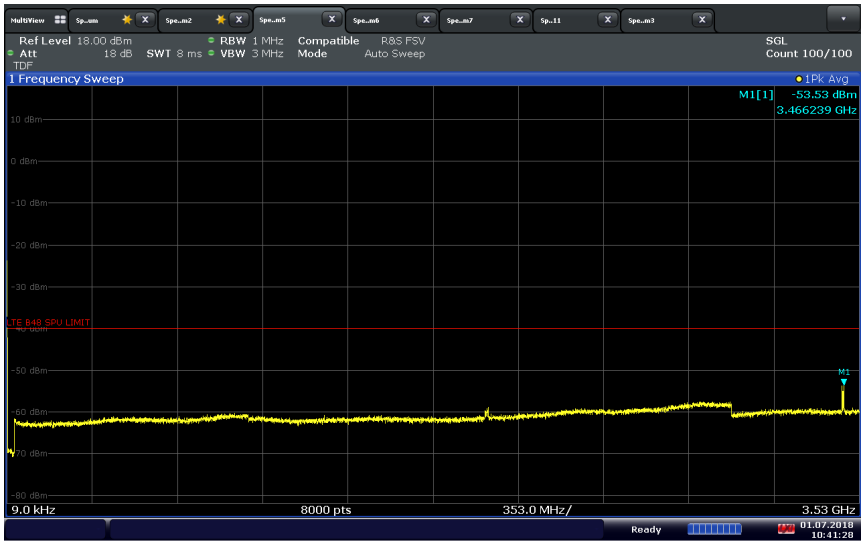
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Middle Channel 3600 MHz full RB<br>unwanted emission spectral density Mask according to RSS-192 |
|---|

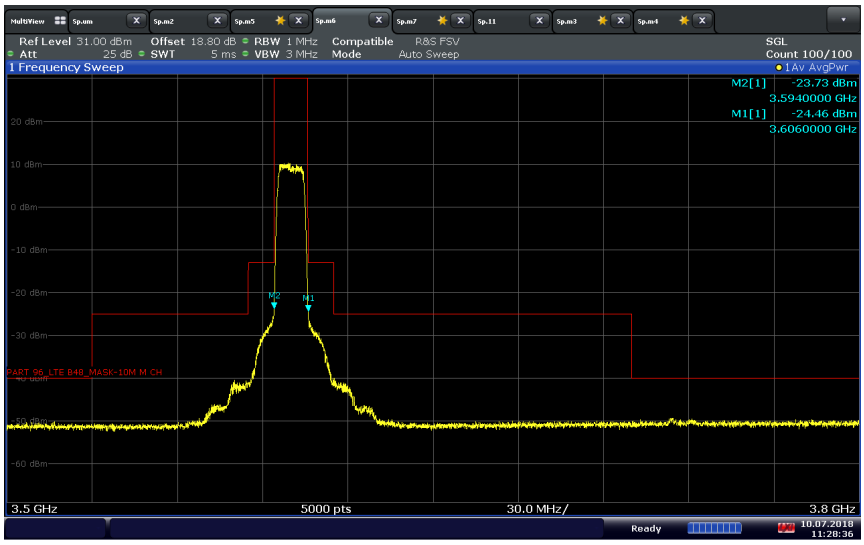



13:50:37 10.07.2018

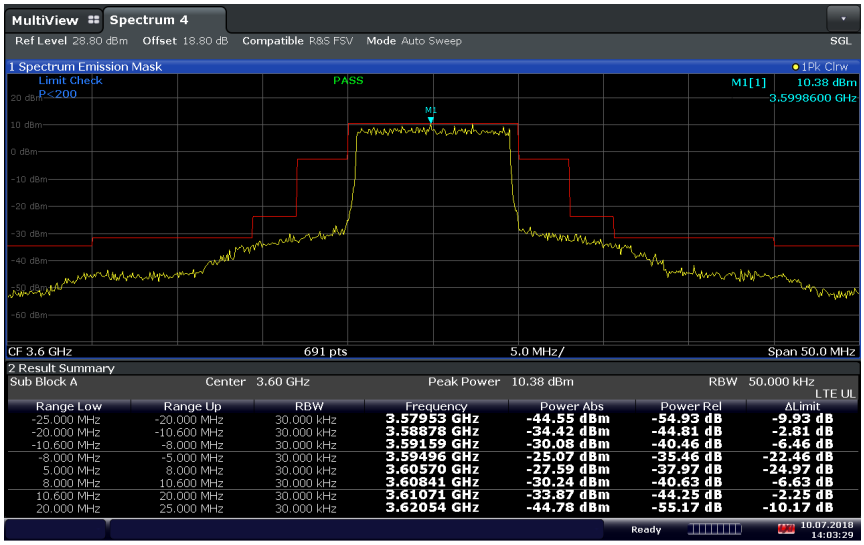
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Middle Channel 3600 MHz<br>3720 MHz - 26.5 GHz |
|---|


10:15:57 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Middle Channel 3600 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:41:29 01.07.2018 |

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Middle Channel 3600 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|---|
|  <br><br>11:28:37 10.07.2018 |

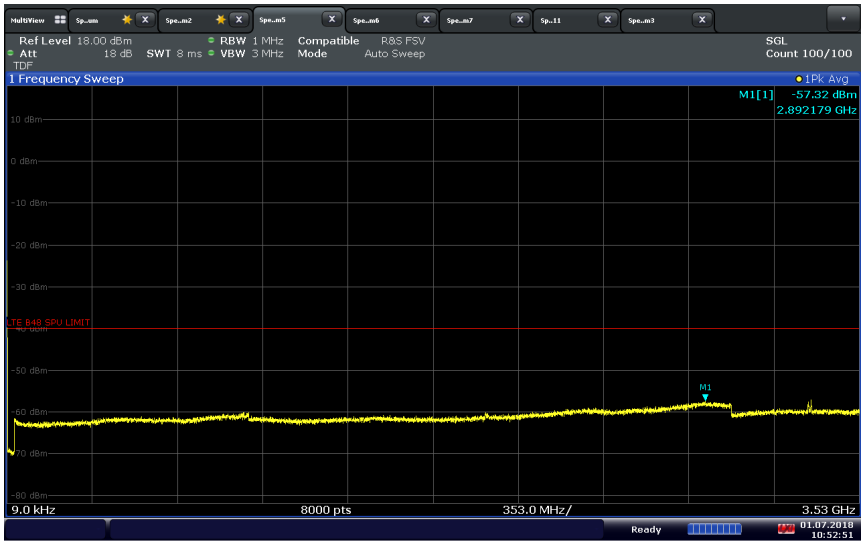
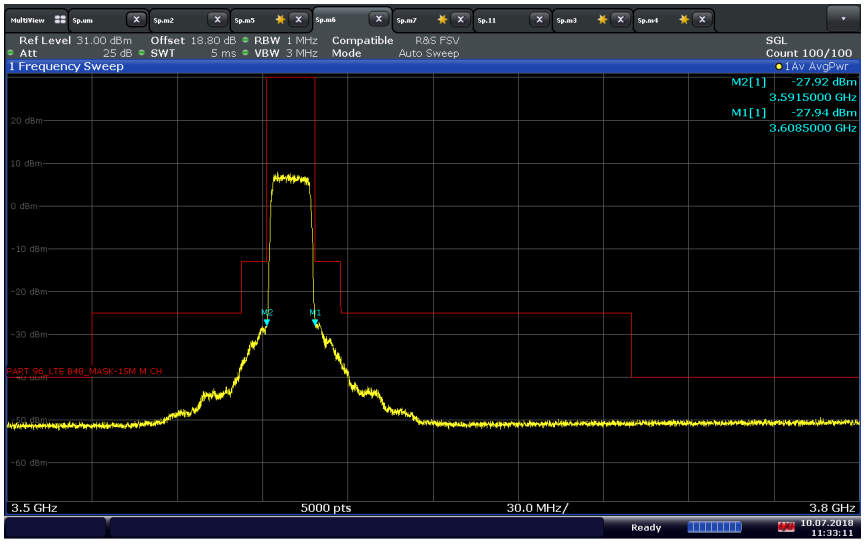
| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Middle Channel 3600 MHz full RB unwanted emission spectral density Mask according to RSS-192 |
|---|



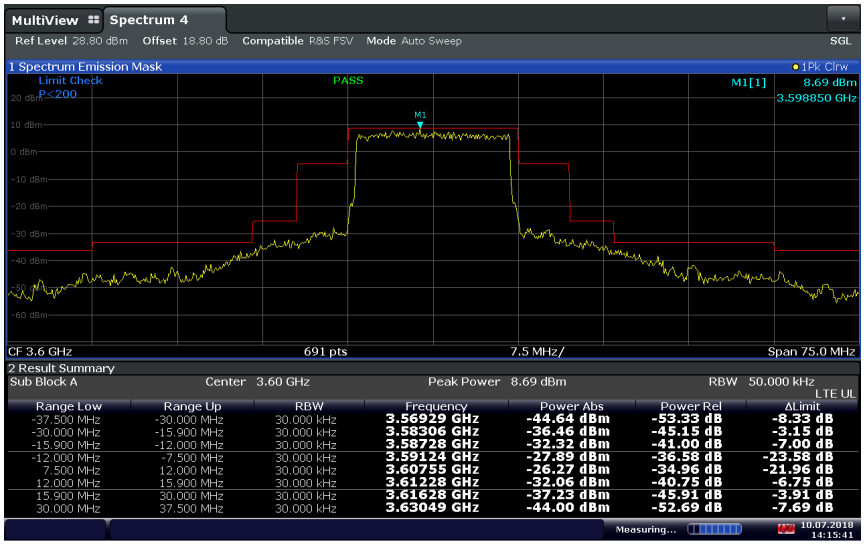

14:03:29 10.07.2018

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Middle Channel 3600 MHz 3720 MHz - 26.5 GHz |
|---|


10:46:07 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Middle Channel 3600 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:52:52 01.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Middle Channel 3600 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|  <br><br>11:33:11 10.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Middle Channel 3600 MHz full RB unwanted emission spectral density Mask according to RSS-192**

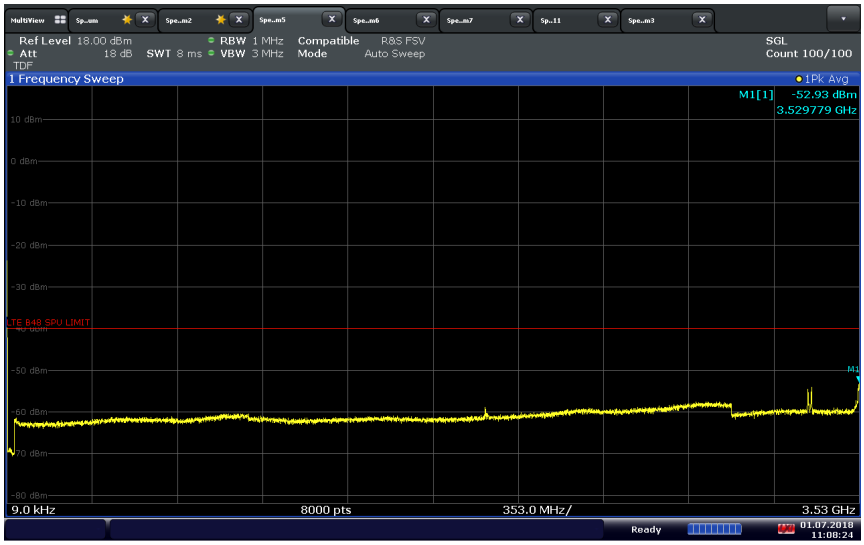



14:15:42 10.07.2018

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Middle Channel 3600 MHz 3720 MHz - 26.5 GHz**

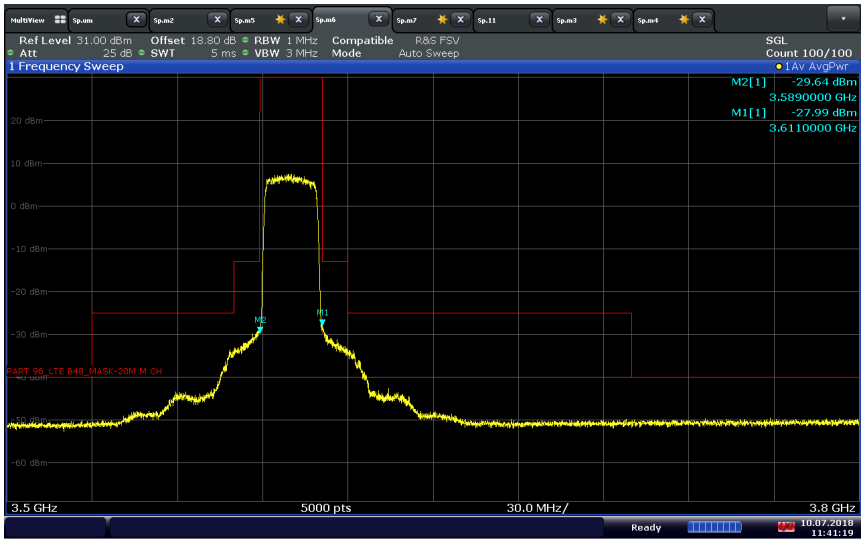

10:58:14 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Middle Channel 3600 MHz**
**9 kHz - 3530 MHz**



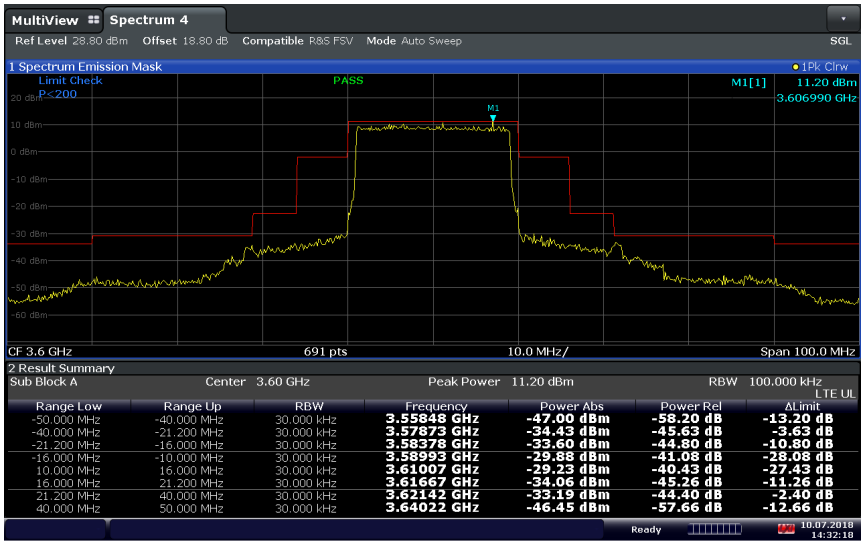

11:08:25 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Middle Channel 3600 MHz full RB**
**3530 kHz - 3720 MHz according to FCC Part 96**




11:41:20 10.07.2018

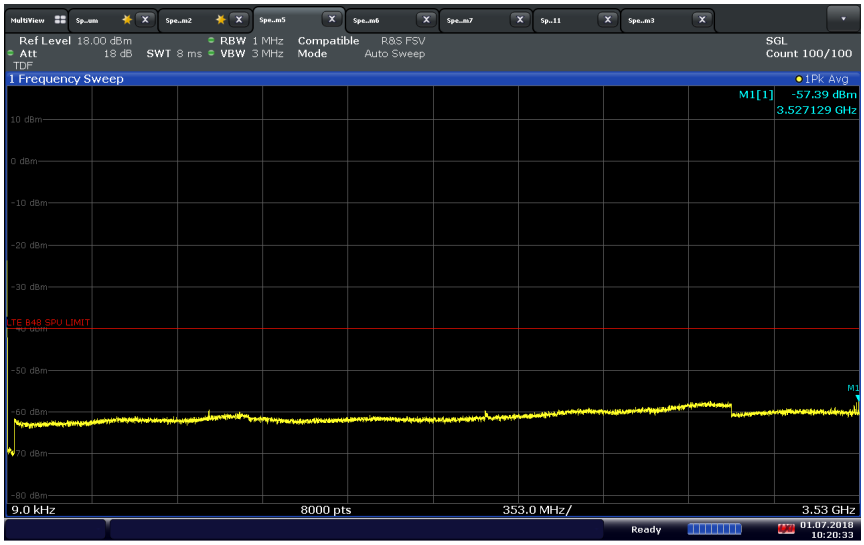
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Middle Channel 3600 MHz full RB unwanted emission spectral density Mask according to RSS-192 |
|---|

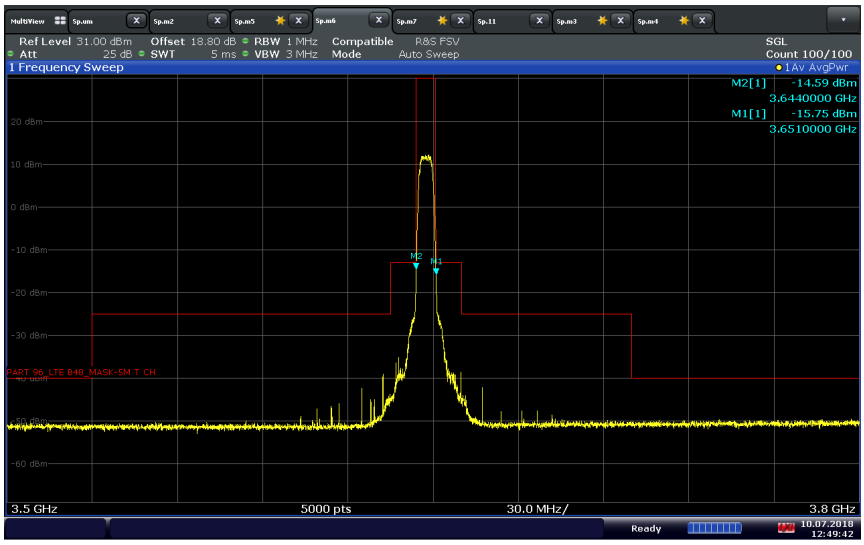



14:32:18 10.07.2018

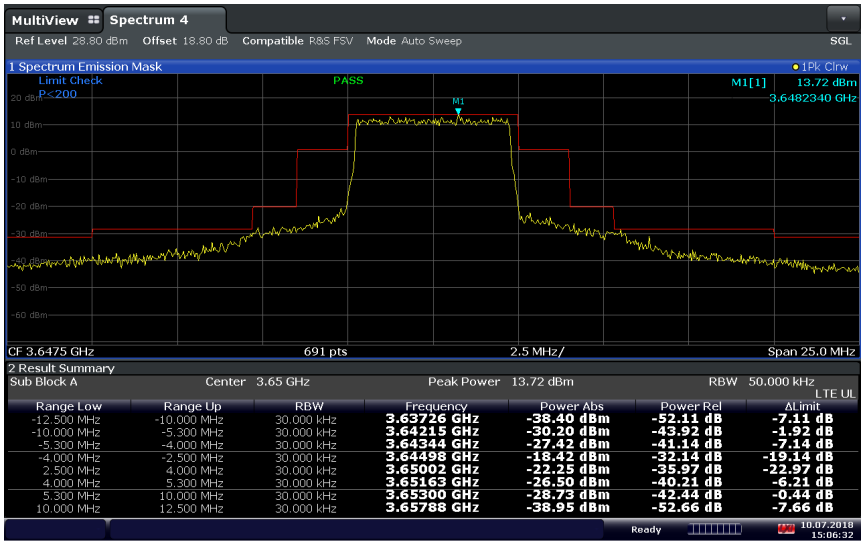
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Middle Channel 3600 MHz 3720 MHz - 26.5 GHz according to FCC Part 96 |
|---|


11:07:02 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:20:33 01.07.2018 |

| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|---|
|  <br><br>12:49:42 10.07.2018 |

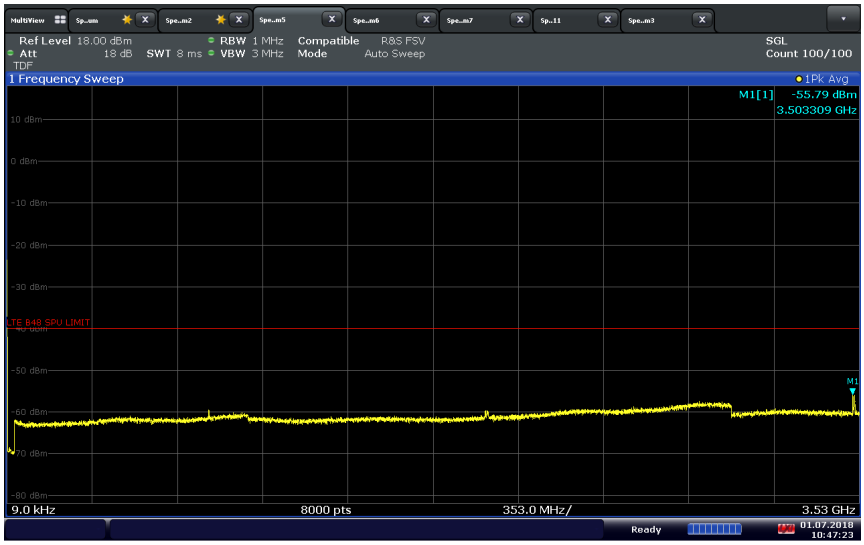
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz full RB unwanted emission spectral density Mask according to RSS-192 |
|---|

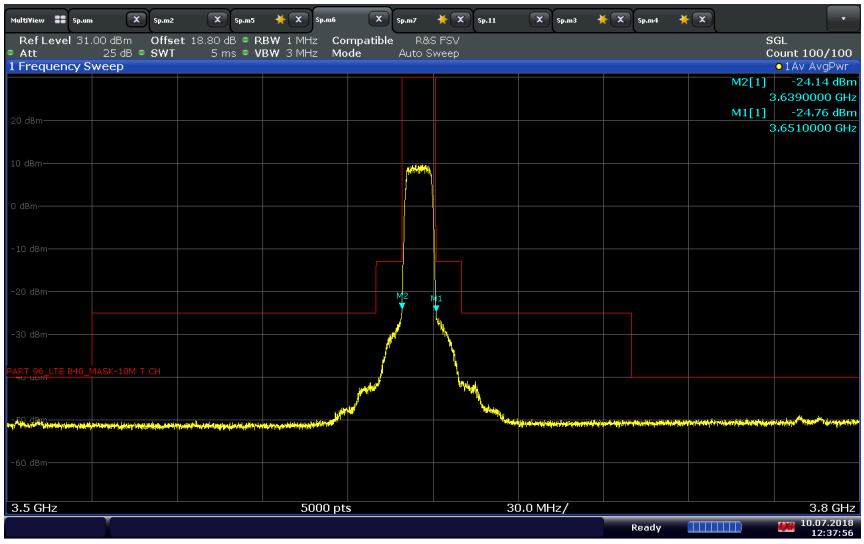



15:06:33 10.07.2018

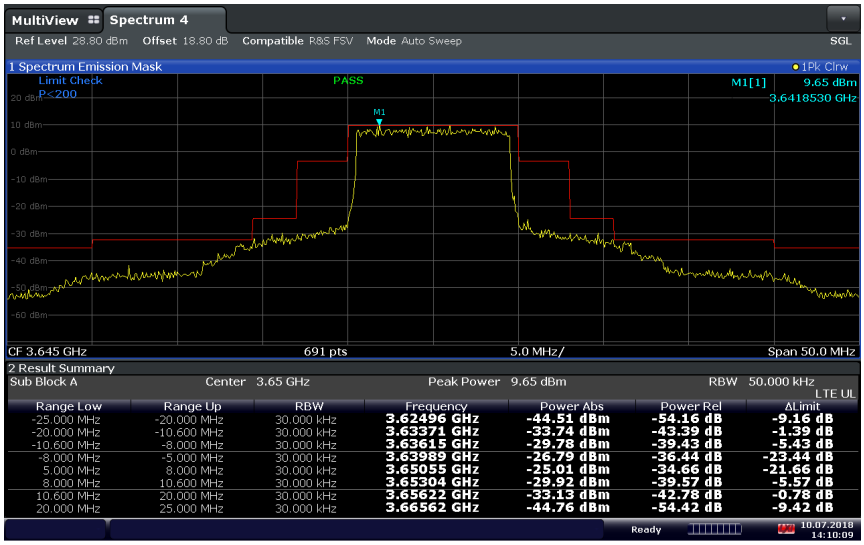
| LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / High Channel 3647.5 MHz 3720 MHz - 26.5 GHz |
|---|


10:19:00 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>10:47:23 01.07.2018 |

| LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz Full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|---|
|  <br><br>12:37:56 10.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz full RB unwanted emission spectral density Mask according to RSS-192**

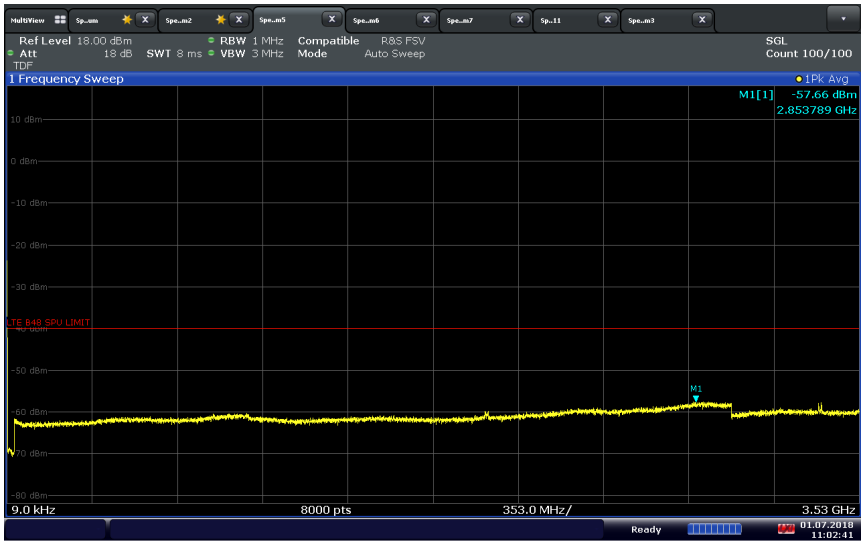



14:10:09 10.07.2018

**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / High Channel 3645 MHz 3720 MHz - 26.5 GHz**

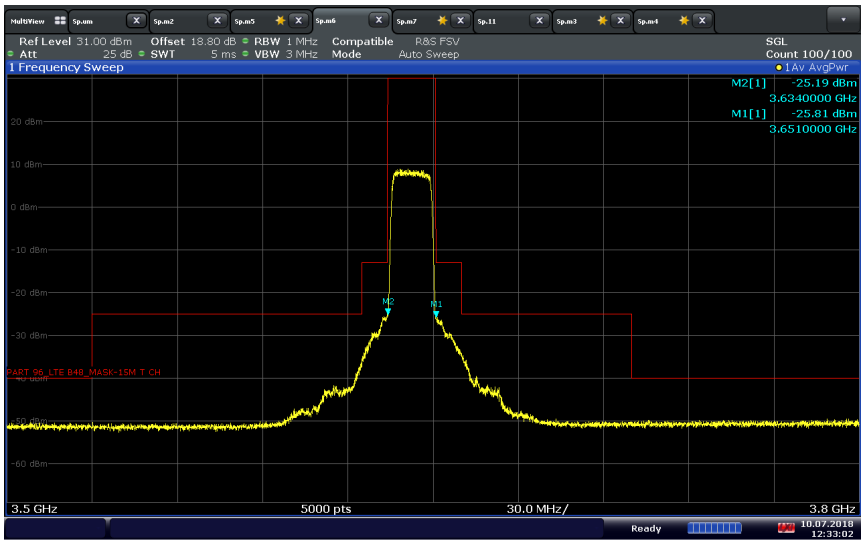

10:49:01 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz**
**9 kHz - 3530 MHz**



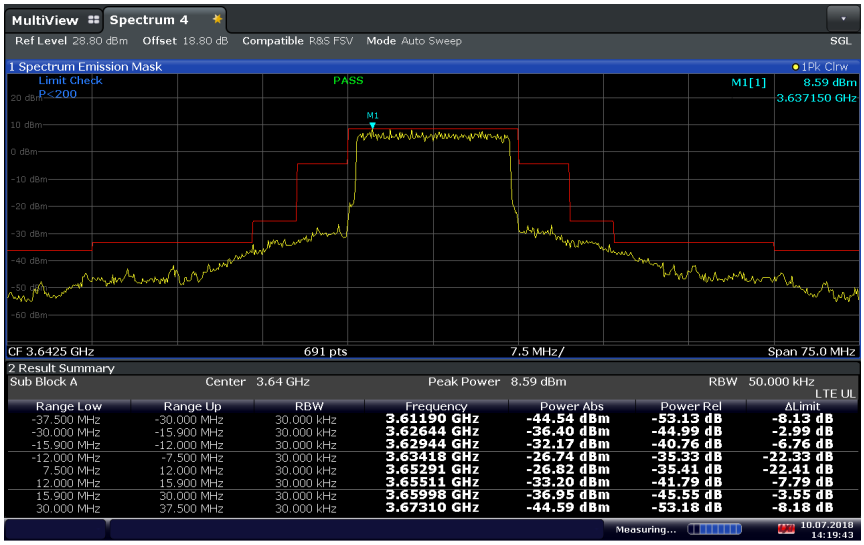

11:02:42 01.07.2018

**LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz full RB**
**3530 kHz - 3720 MHz according to FCC Part 96**




12:33:02 10.07.2018

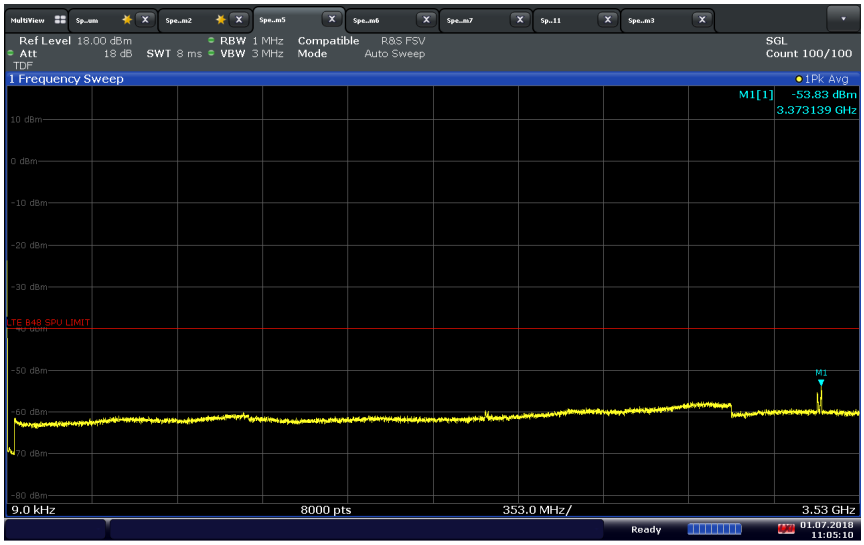
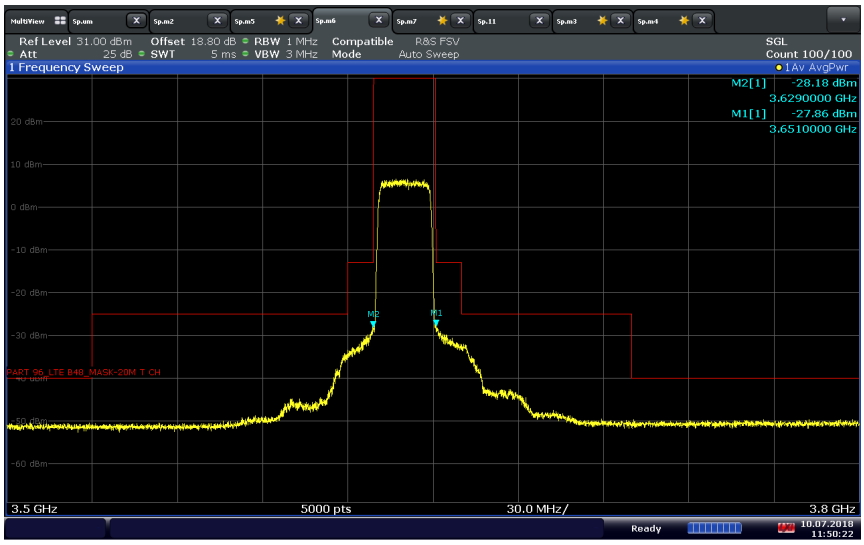
| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz full RB unwanted emission spectral density Mask according to RSS-192 |
|---|



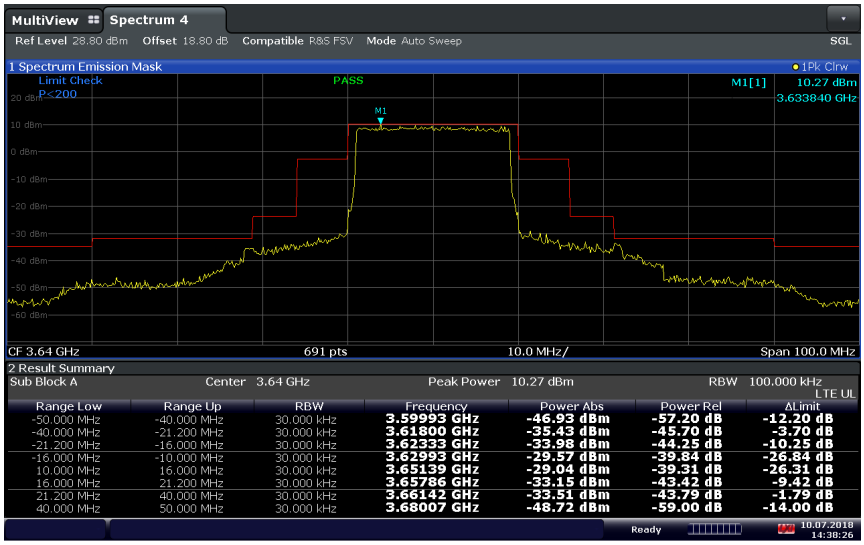

14:19:44 10.07.2018

| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / High Channel 3642.5 MHz 3720 MHz - 26.5 GHz |
|---|


10:59:33 01.07.2018

| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz<br>9 kHz - 3530 MHz |
|---|
|  <br><br>11:05:10 01.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz full RB<br>3530 kHz - 3720 MHz according to FCC Part 96 |
|  <br><br>11:50:23 10.07.2018 |

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz full RB unwanted emission spectral density Mask according to RSS-192**

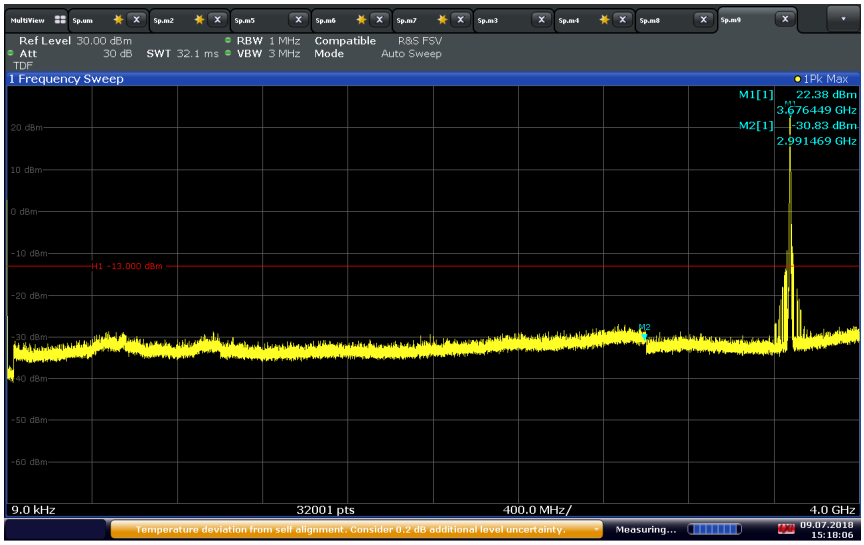



14:38:26 10.07.2018

**LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / High Channel 3640 MHz 3720 MHz - 26.5 GHz**

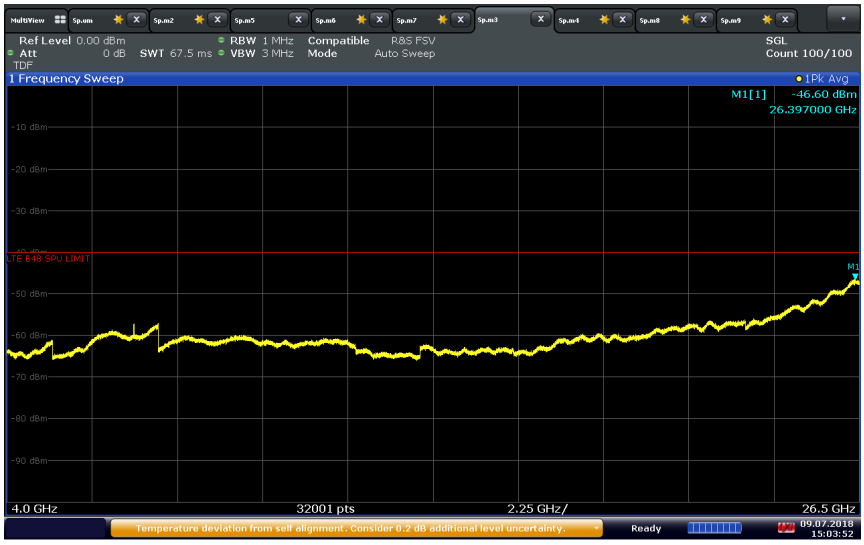

11:05:56 01.07.2018

**LTE Band 48 (3650 – 3700 MHz)_5 MHz BW / QPSK / Middle Channel 3675 MHz**
**9 kHz - 4 GHz**



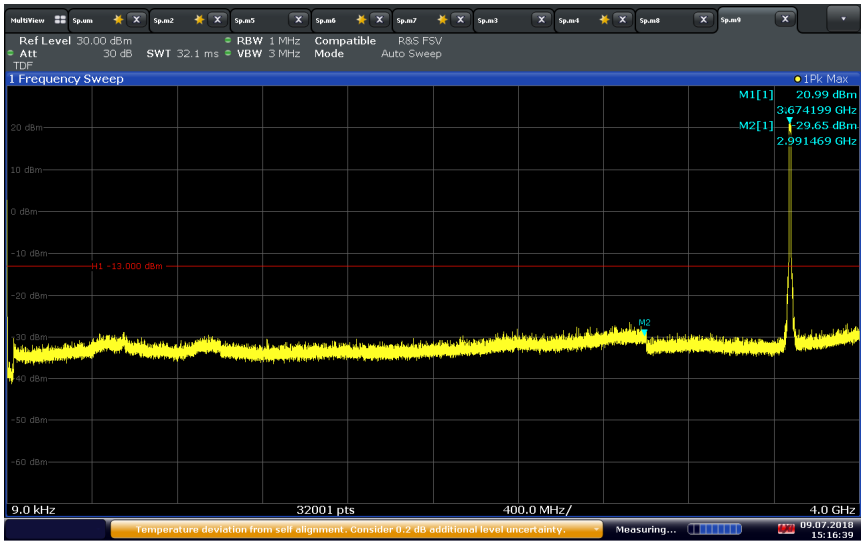

15:18:06 09.07.2018

**LTE Band 48 (3550 – 3650 MHz)_5 MHz BW / QPSK / Middle Channel 3675 MHz**
**4 GHz - 26.5 GHz**



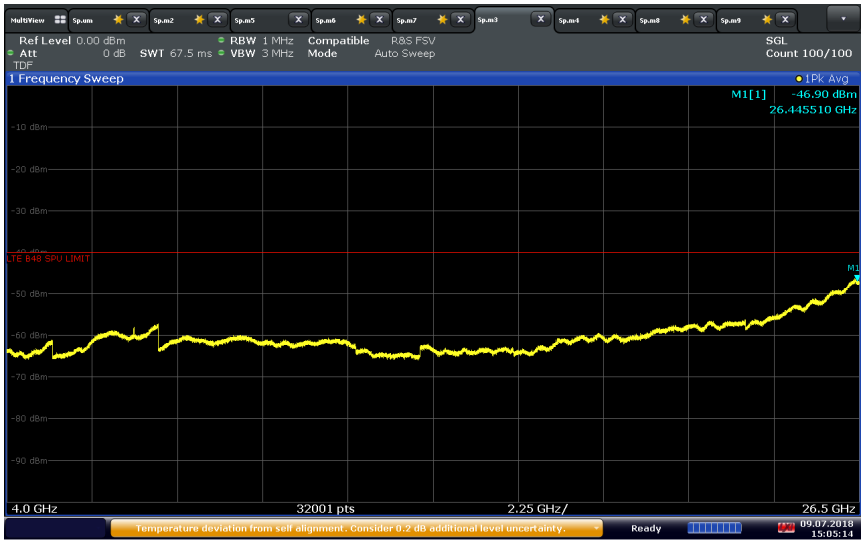

15:03:53 09.07.2018

**LTE Band 48 (3650 – 3700 MHz)_10 MHz BW / QPSK / Middle Channel 3675 MHz**
**9 kHz - 4 GHz**

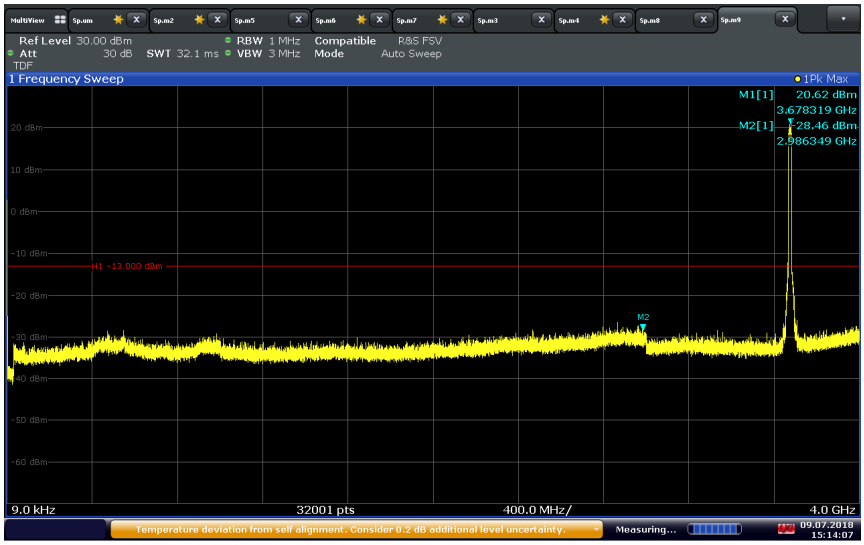
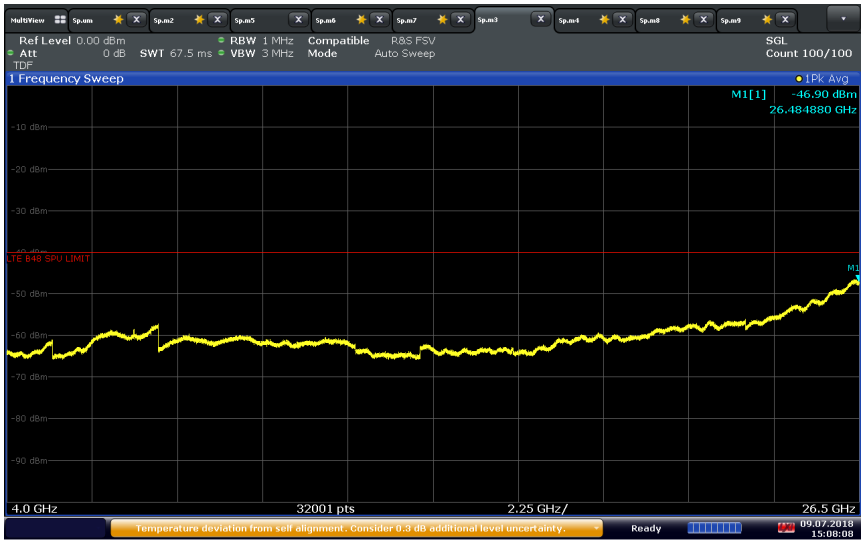


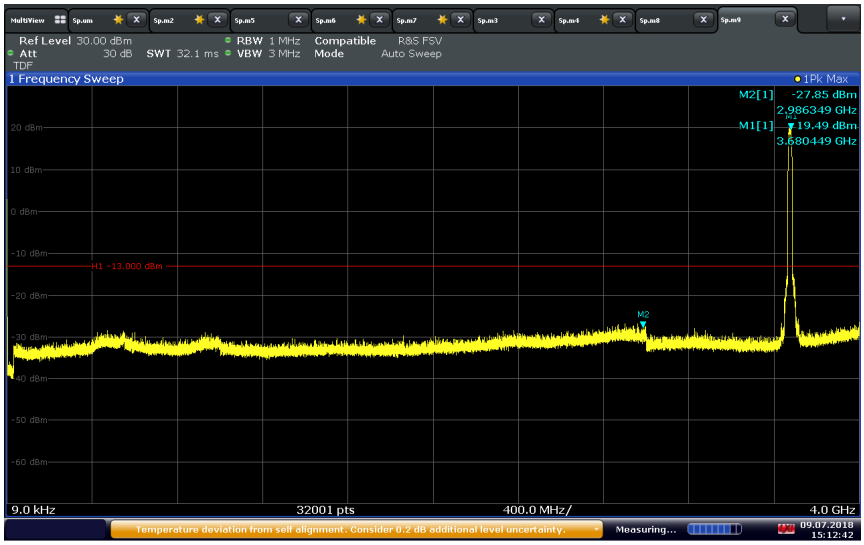
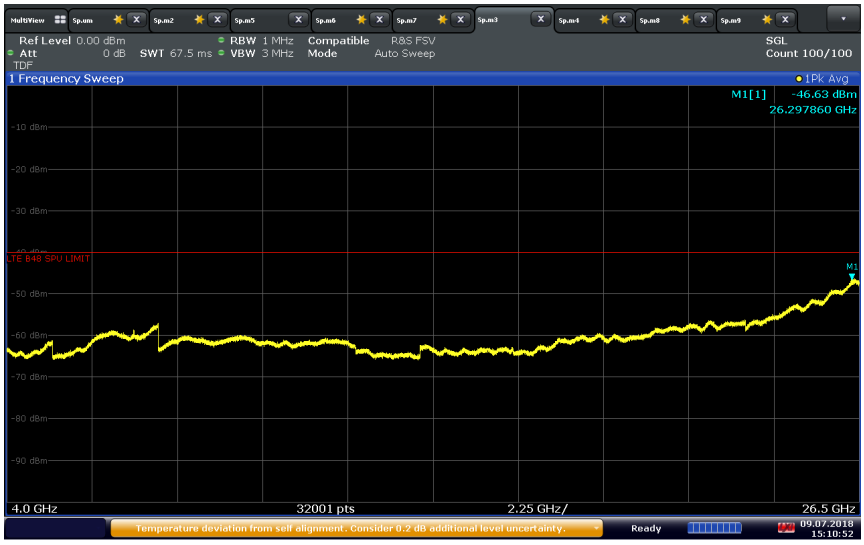

15:16:40 09.07.2018

**LTE Band 48 (3550 – 3650 MHz)_10 MHz BW / QPSK / Middle Channel 3675 MHz**
**4 GHz - 26.5 GHz**




15:05:14 09.07.2018

| LTE Band 48 (3650 – 3700 MHz)_15 MHz BW / QPSK / Middle Channel 3675 MHz<br>9 kHz - 4 GHz |
|---|
|  <br><br>15:14:07 09.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_15 MHz BW / QPSK / Middle Channel 3675 MHz<br>4 GHz - 26.5 GHz |
|  <br><br>15:08:08 09.07.2018 |

| LTE Band 48 (3650 – 3700 MHz)_20 MHz BW / QPSK / Middle Channel 3675 MHz<br>9 kHz - 4 GHz |
|---|
|  <br><br>15:12:42 09.07.2018 |
| LTE Band 48 (3550 – 3650 MHz)_20 MHz BW / QPSK / Middle Channel 3675 MHz<br>4 GHz - 26.5 GHz |
|  <br><br>15:10:52 09.07.2018 |

## 2.6 FIELD STRENGTH OF SPURIOUS RADIATION

### 2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 96, Clause 96.41(e)
FCC 47 CFR Part 90, Clause 90.1323(a)
RSS-192, Clause 5.5
RSS-197, Clause 5.7

### 2.6.2 Standard Applicable

FCC 47 CFR Part 96.41:
(e) 3.5 GHz Emissions and Interference Limits - (1) General protection levels. Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the uper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(2) Additional protection levels: Not withstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

RSS-192, Clause 5.5:
(ii) In any 1.0 MHz band that is removed from the assigned centre frequency by more than ±250% of the necessary bandwidth, the power of any emission must be attenuated below $P_{mean}$ by at least 43 + 10 log10($P_{mean}$) dB, or 70 dB, whichever is less stringent. Pmean is the mean output power of the transmitter in watts.

FCC 47 CFR Part 90.1323:
(a) The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

RSS-197, Clause 5.7:
The unwanted emissions shall be measured at the frequencies of the highest and lowest channel of all bandwidths and types of modulation that the equipment can operate with a resolution bandwidth of 1 MHz or less, but at least 1% of the occupied bandwidth of the transmitter, provided that the measured power is integrated over a 1 MHz bandwidth.

The power of any emissions outside the frequency band 3650-3700 MHz shall be attenuated below the channel transmitter power P (dBW) by 43 + 10 Log (p), where p is measured in watts.

### 2.6.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration B

### 2.6.4 Date of Test/Initial of test personnel who performed the test

July 05 and 06, 2018 / XYZ

### 2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.6.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.2 - 26.7 °C |
| Relative Humidity | 45.7 - 49.3 % |
| ATM Pressure | 98.6 - 98.7 kPa |

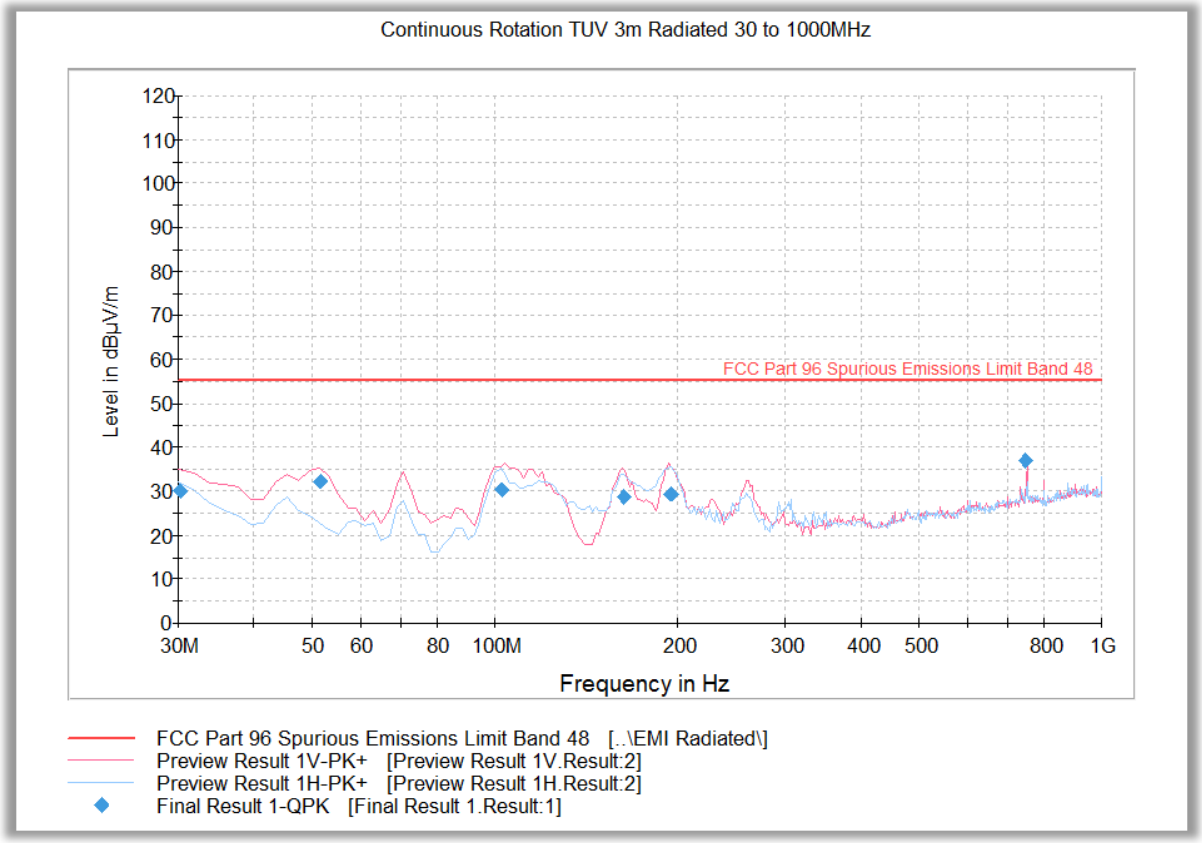
### 2.6.7 Additional Observations

- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of Sub clause 5.5 of ANSI C63.16-2015.
- Emissions within 6dB of the limit will be proven by substitution method.
- Only the worst case configuration presented in this test report.
- Only noise floor measurements observed above 18GHz.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

### 2.6.8 Test Results

See attached plots.

### 2.6.9 Radiated Emission Test Results Below 1GHz – Worst Case Band 48 (3550 – 3650 MHz)_QPSK_15 MHz BW 1RB 0 offset_High Channel 3600 MHz

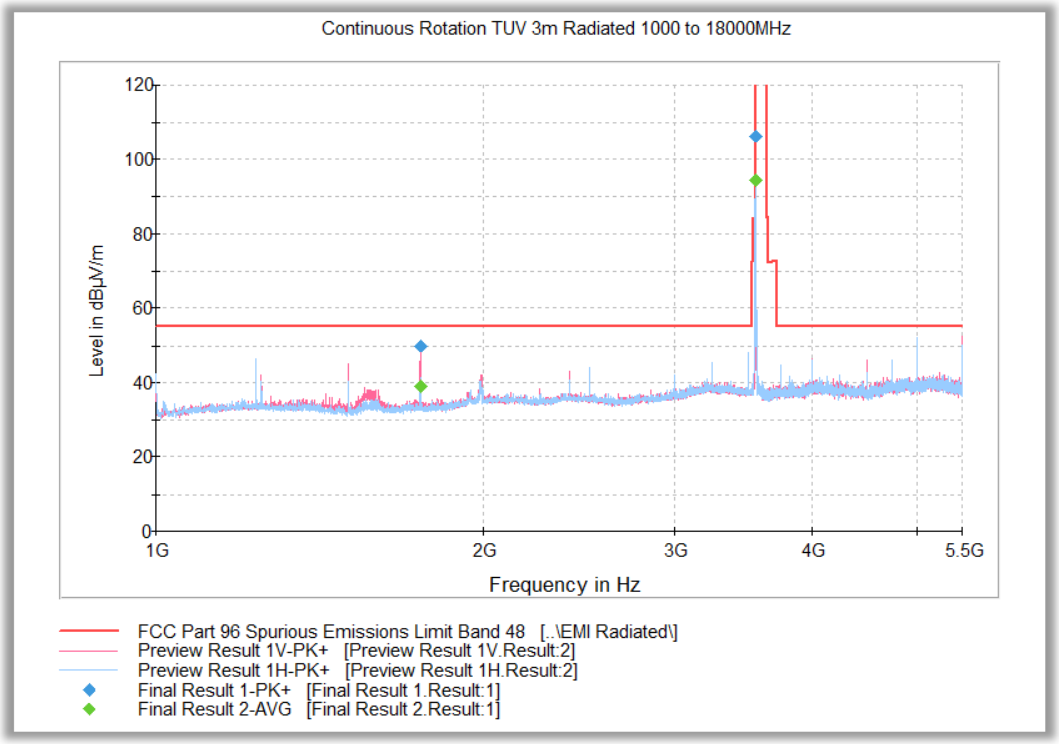


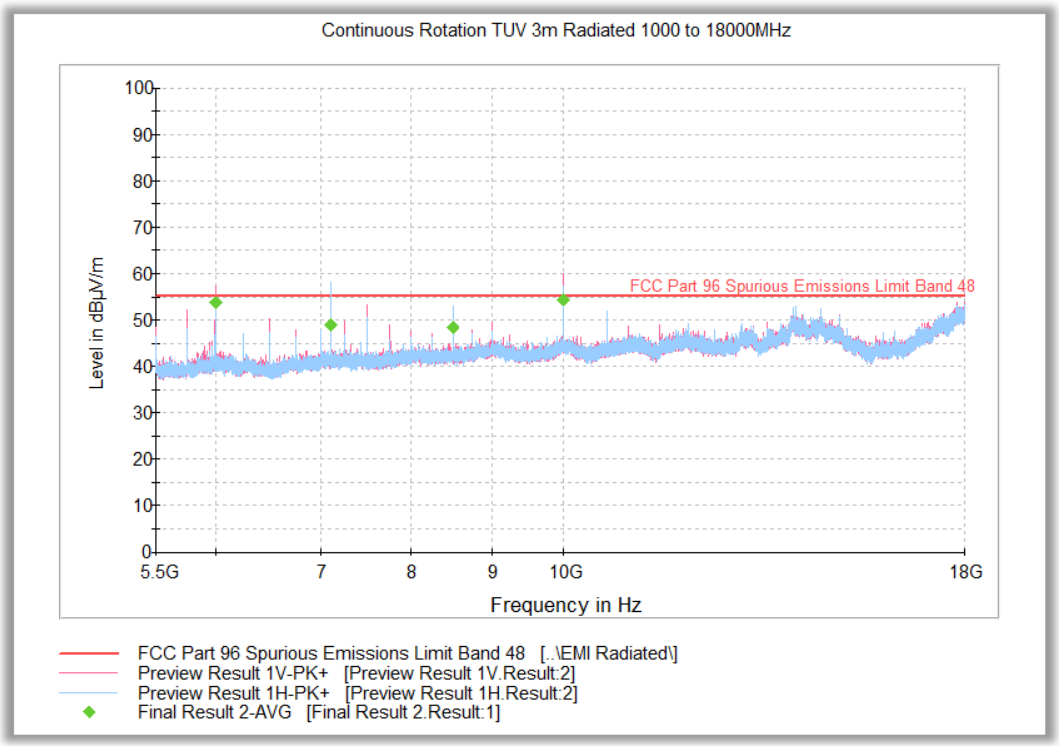

**Quasi Peak Data**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 30.240000 | 30.1 | 1000.0 | 120.000 | 100.0 | V | 190.0 | -6.6 | 25.1 | 55.2 |
| 51.422766 | 32.1 | 1000.0 | 120.000 | 100.0 | V | 182.0 | -15.1 | 23.1 | 55.2 |
| 102.827735 | 30.3 | 1000.0 | 120.000 | 100.0 | V | 159.0 | -14.9 | 24.9 | 55.2 |
| 163.384369 | 28.7 | 1000.0 | 120.000 | 100.0 | V | 301.0 | -12.8 | 26.5 | 55.2 |
| 195.166573 | 29.4 | 1000.0 | 120.000 | 100.0 | V | -9.0 | -12.1 | 25.8 | 55.2 |
| 749.982365 | 37.0 | 1000.0 | 120.000 | 150.0 | V | 257.0 | 4.0 | 18.2 | 55.2 |

**Test Notes:** Only worst case modulation/bandwidth/channel presented for spurious emissions below 1GHz.

### 2.6.10 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3550 – 3650 MHz)_QPSK_15 MHz BW 1RB 0 offset_Low Channel 3657.5 MHz



**Average Data**

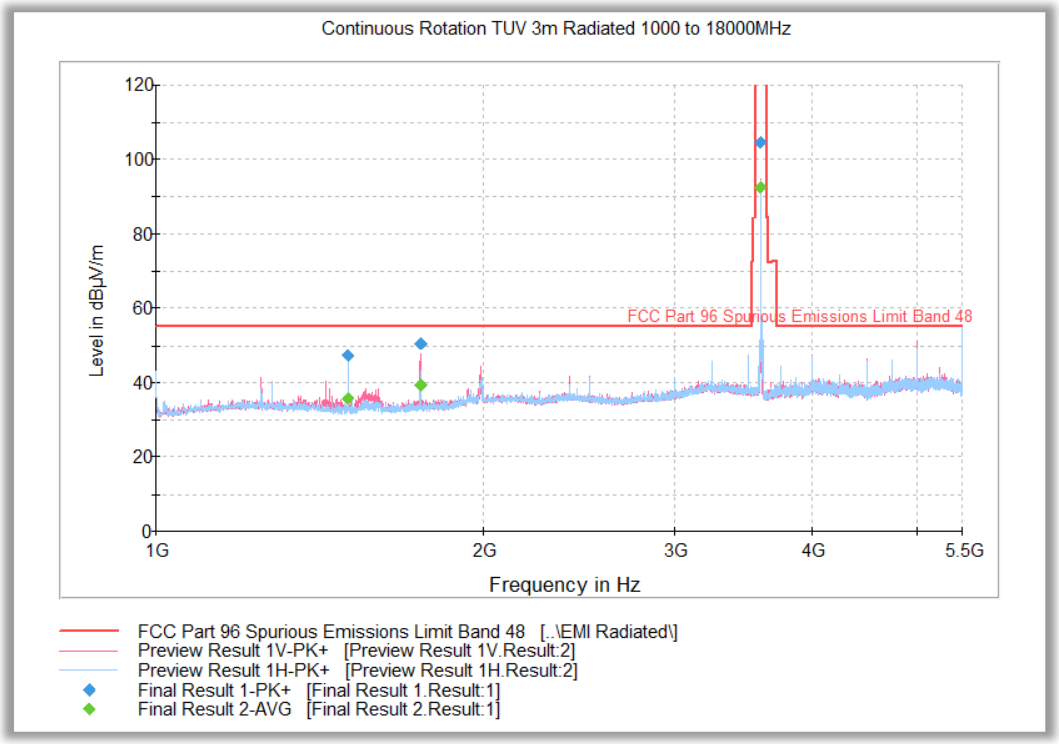
| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1749.900000 | 39.1 | 1000.0 | 1000.000 | 227.4 | V | -8.0 | -6.9 | 16.1 | 55.2 |
| 3550.766667 | 94.4 | 1000.0 | 1000.000 | 138.7 | H | -8.0 | -0.5 | * Fundamental Freq. | |
| 5999.783333 | 53.6 | 1000.0 | 1000.000 | 276.2 | V | 189.0 | 4.5 | 1.6 | 55.2 |
| 7101.866667 | 49.0 | 1000.0 | 1000.000 | 302.2 | V | 155.0 | 6.1 | 6.2 | 55.2 |
| 8499.783333 | 48.3 | 1000.0 | 1000.000 | 307.2 | H | 21.0 | 8.5 | 6.9 | 55.2 |
| 9999.783333 | 54.5 | 1000.0 | 1000.000 | 313.1 | V | 100.0 | 10.3 | 0.7 | 55.2 |

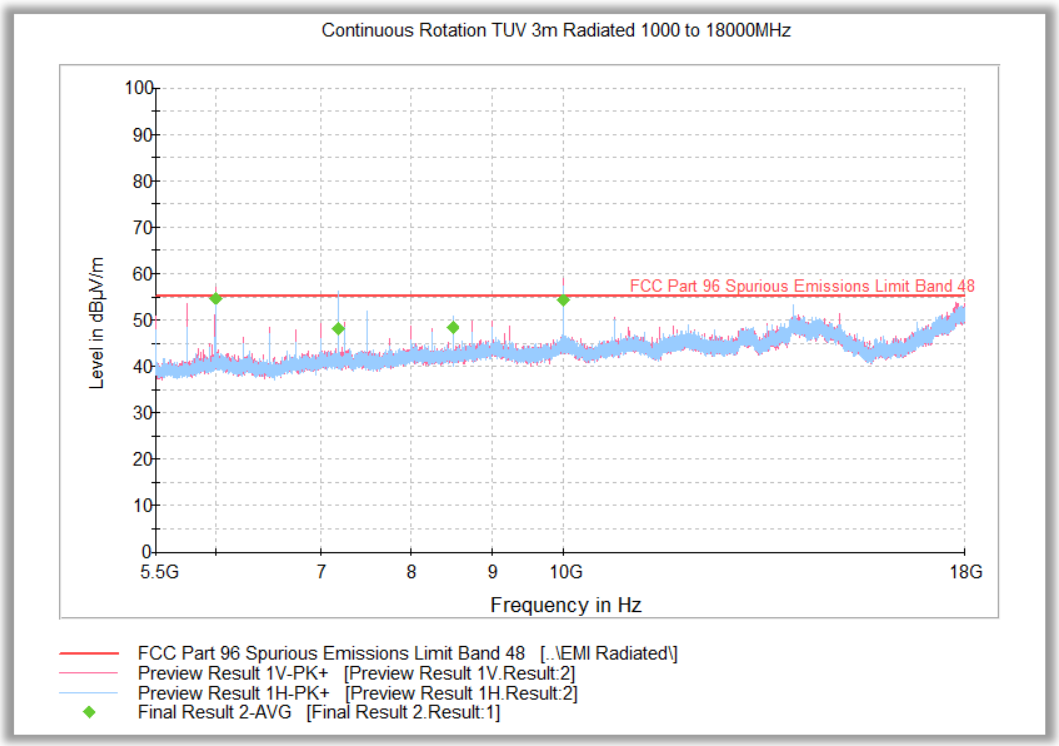
***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

**Substitution Data**

| Frequency (MHz) | Field Strength @ 3 meters (dbµV/m) | Cable Loss (dB) | Substitution Antenna Gain (dBi) | Signal Generator Level (dBm) | Substitution Data SGL+AG-CL (dBm) | Limit (dBm) | Compliance |
|---|---|---|---|---|---|---|---|
| 5999.783333 | 53.6 | 6.4 | 11.7 | -47.0 | -41.7 | -40 | Yes |
| 9999.783333 | 54.5 | 9.1 | 12.2 | -43.9 | -40.8 | -40 | Yes |

### 2.6.11 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3550 – 3650 MHz)_QPSK_15 MHz BW 1RB 0 offset_Low Channel 3660 MHz



**Average Data**

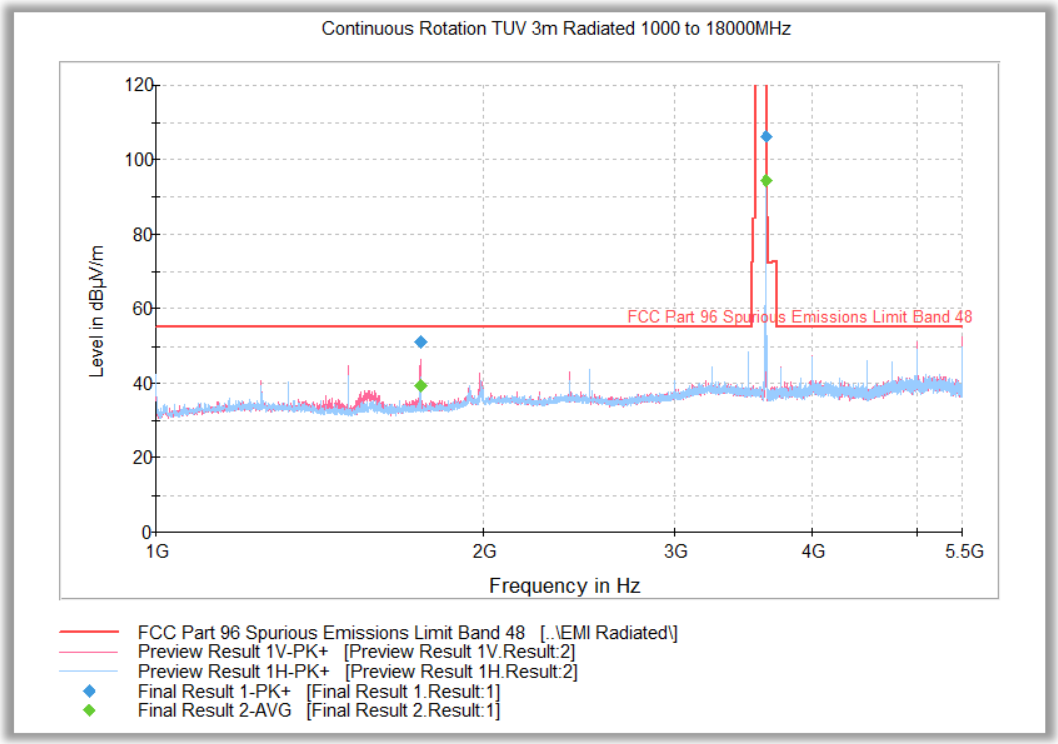
| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1500.000000 | 35.9 | 1000.0 | 1000.000 | 190.5 | V | 174.0 | -9.0 | 19.3 | 55.2 |
| 1749.900000 | 39.5 | 1000.0 | 1000.000 | 218.4 | V | 358.0 | -6.9 | 15.7 | 55.2 |
| 3593.266667 | 92.4 | 1000.0 | 1000.000 | 388.0 | V | -1.0 | -0.5 | * Fundamental Freq. | |
| 5999.783333 | 54.6 | 1000.0 | 1000.000 | 286.2 | V | 191.0 | 4.5 | 0.6 | 55.2 |
| 7186.650000 | 48.2 | 1000.0 | 1000.000 | 187.5 | H | 25.0 | 6.5 | 7.0 | 55.2 |
| 8499.800000 | 48.4 | 1000.0 | 1000.000 | 311.2 | H | 22.0 | 8.5 | 6.8 | 55.2 |
| 9999.800000 | 54.3 | 1000.0 | 1000.000 | 307.2 | V | 100.0 | 10.3 | 0.9 | 55.2 |

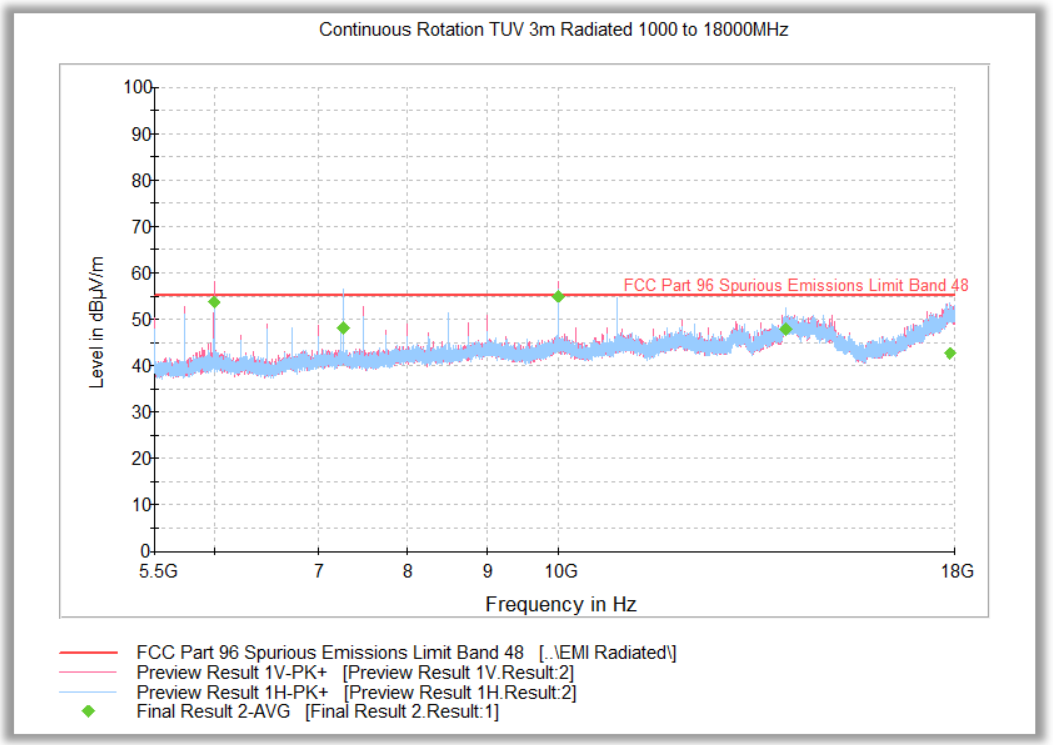
***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

**Substitution Data**

| Frequency (MHz) | Field Strength @ 3 meters (dbµV/m) | Cable Loss (dB) | Substitution Antenna Gain (dBi) | Signal Generator Level (dBm) | Substitution Data SGL+AG-CL (dBm) | Limit (dBm) | Compliance |
|---|---|---|---|---|---|---|---|
| 5999.783333 | 54.6 | 6.4 | 11.7 | -46.0 | -40.7 | -40 | Yes |
| 9999.800000 | 54.3 | 9.1 | 12.2 | -44.1 | -41.0 | -40 | Yes |

### 2.6.12 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3550 – 3650 MHz)_QPSK_15 MHz BW 1RB 0 offset_Low Channel 3642.5 MHz



**Average Data**

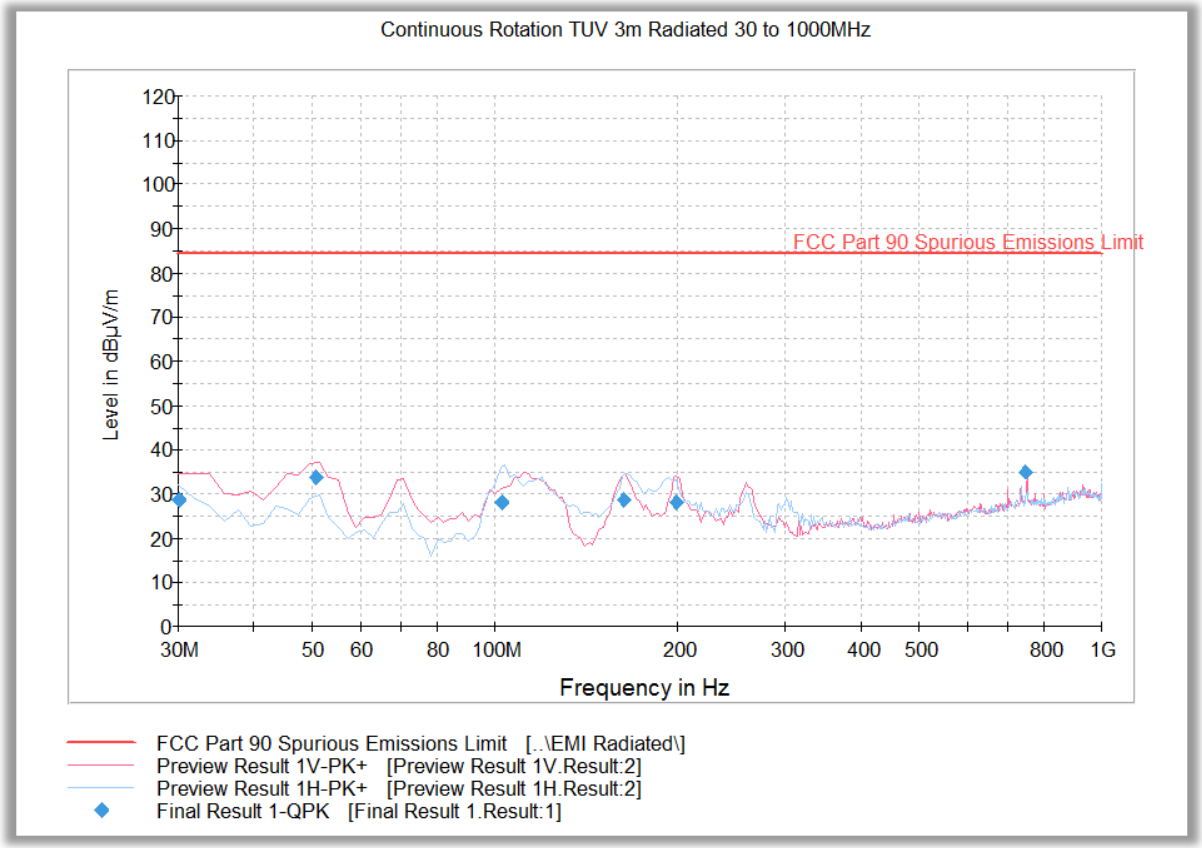
| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1749.900000 | 39.3 | 1000.0 | 1000.000 | 226.4 | V | 20.0 | -6.9 | 15.9 | 55.2 |
| 3635.766667 | 94.3 | 1000.0 | 1000.000 | 146.7 | H | -7.0 | -0.2 | * Fundamental Freq. | |
| 5999.783333 | 53.7 | 1000.0 | 1000.000 | 352.7 | V | 192.0 | 4.5 | 1.5 | 55.2 |
| 7271.650000 | 48.0 | 1000.0 | 1000.000 | 186.5 | H | 22.0 | 7.1 | 7.2 | 55.2 |
| 9999.800000 | 55.0 | 1000.0 | 1000.000 | 313.1 | V | 100.0 | 10.3 | 0.2 | 55.2 |
| 14000.200000 | 48.0 | 1000.0 | 1000.000 | 352.7 | H | 30.0 | 16.6 | 7.2 | 55.2 |
| 17882.700000 | 42.7 | 1000.0 | 1000.000 | 124.7 | H | 57.0 | 21.2 | 12.5 | 55.2 |

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

**Substitution Data**

| Frequency (MHz) | Field Strength @ 3 meters (dbµV/m) | Cable Loss (dB) | Substitution Antenna Gain (dBi) | Signal Generator Level (dBm) | Substitution Data SGL+AG-CL (dBm) | Limit (dBm) | Compliance |
|---|---|---|---|---|---|---|---|
| 5999.783333 | 53.7 | 6.4 | 11.7 | -46.9 | -41.6 | -40 | Yes |
| 9999.800000 | 55.0 | 9.1 | 12.2 | -43.4 | -40.3 | -40 | Yes |

### 2.6.13 Radiated Emission Test Results Below 1GHz – Worst Case Band 48 (3650 – 3700 MHz)_QPSK_20 MHz BW 1RB 0 offset_High Channel 3690 MHz

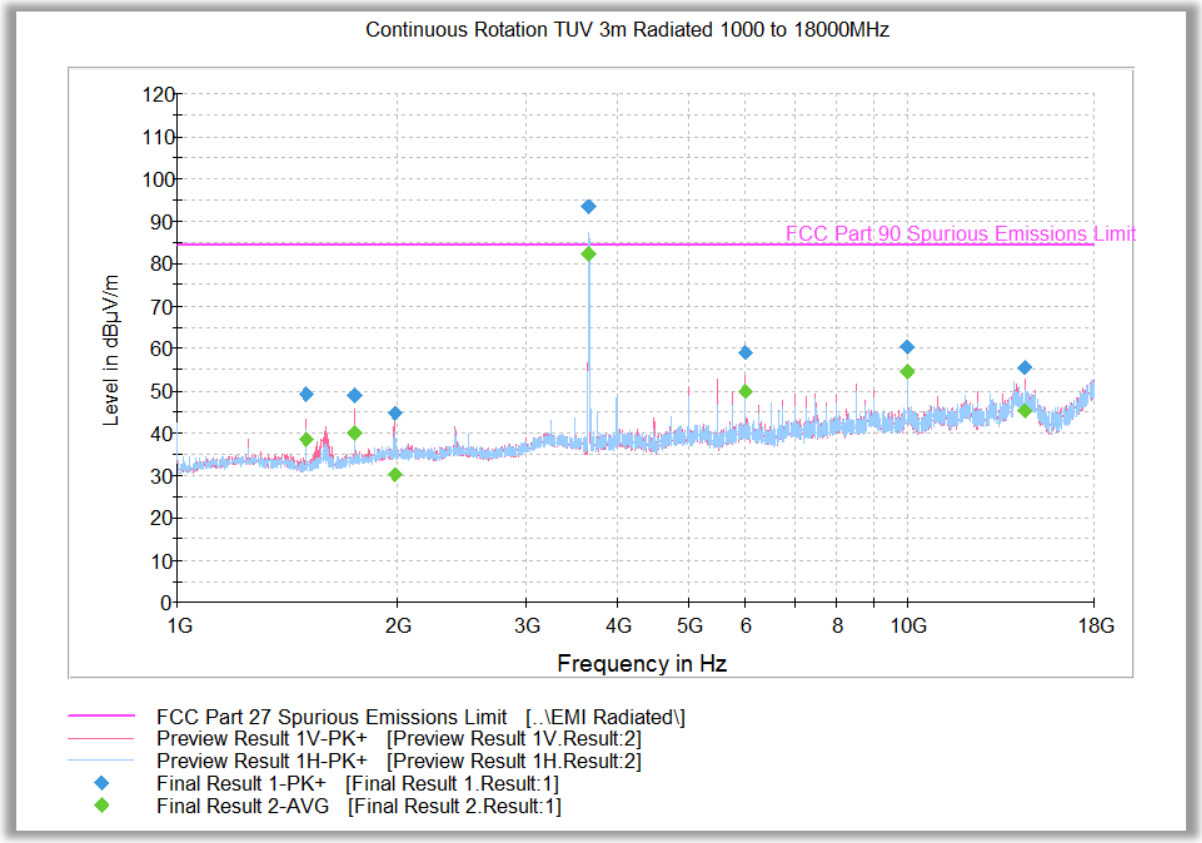



**Quasi Peak Data**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 30.120000 | 28.8 | 1000.0 | 120.000 | 100.0 | V | -4.0 | -6.5 | 55.6 | 84.4 |
| 50.822766 | 33.9 | 1000.0 | 120.000 | 100.0 | V | 217.0 | -14.9 | 50.5 | 84.4 |
| 102.827735 | 28.2 | 1000.0 | 120.000 | 172.0 | H | 154.0 | -14.9 | 56.2 | 84.4 |
| 162.968257 | 28.7 | 1000.0 | 120.000 | 100.0 | V | 324.0 | -12.8 | 55.7 | 84.4 |
| 199.158236 | 28.1 | 1000.0 | 120.000 | 100.0 | V | -8.0 | -12.0 | 56.3 | 84.4 |
| 749.982365 | 35.2 | 1000.0 | 120.000 | 141.0 | V | 331.0 | 4.0 | 49.2 | 84.4 |

**Test Notes:** Only worst case modulation/bandwidth/channel presented for spurious emissions below 1GHz.

### 2.6.14 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3650 – 3700 MHz)_QPSK_20 MHz BW 1RB 0 offset_Low Channel 3660 MHz




**Peak Data**

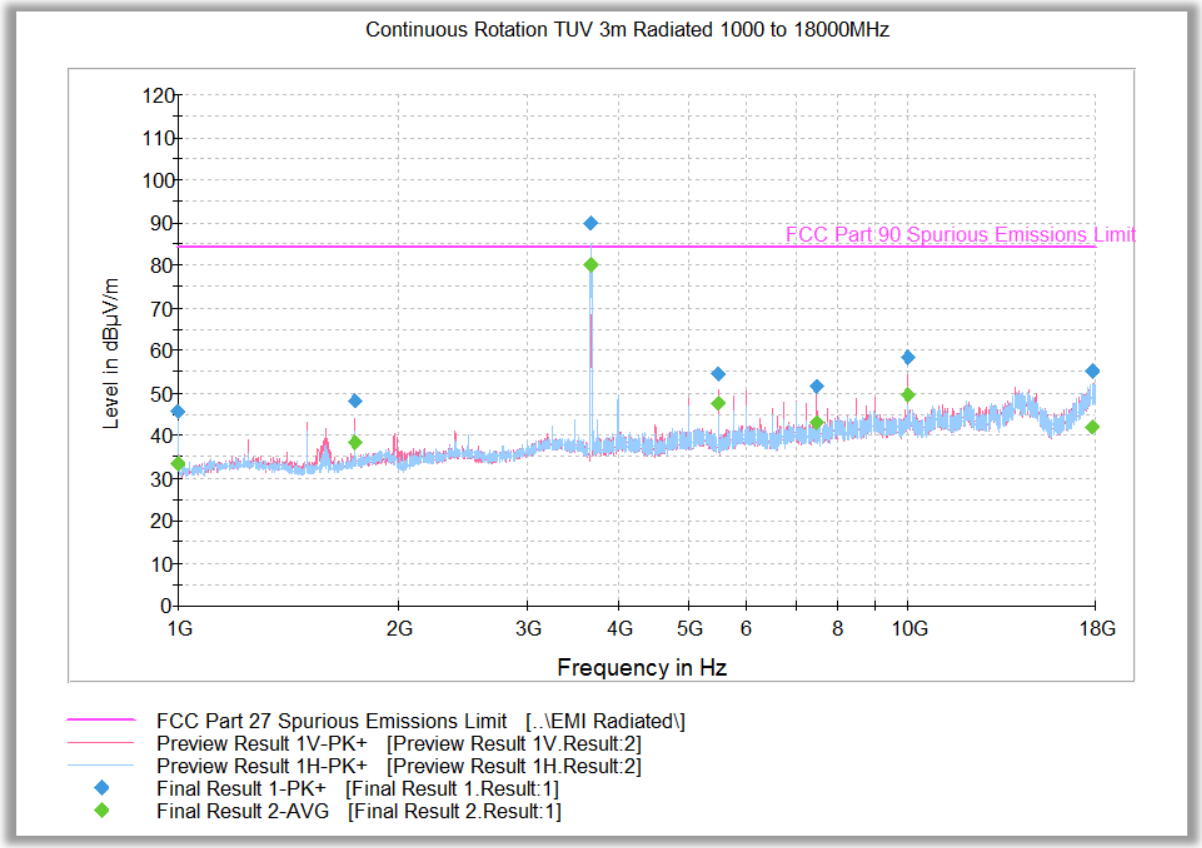
| Frequency (MHz) | Max Peak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1500.000000 | 49.1 | 1000.0 | 1000.000 | 205.5 | V | 53.0 | -9.0 | 35.3 | 84.4 |
| 1749.900000 | 48.9 | 1000.0 | 1000.000 | 301.2 | V | 174.0 | -6.9 | 35.5 | 84.4 |
| 1981.666667 | 44.7 | 1000.0 | 1000.000 | 302.2 | V | 51.0 | -6.1 | 39.7 | 84.4 |
| 3653.700000 | 93.4 | 1000.0 | 1000.000 | 151.6 | H | 72.0 | -0.1 | * Fundamental Freq. | |
| 5999.900000 | 59.0 | 1000.0 | 1000.000 | 307.2 | V | 220.0 | 4.5 | 25.4 | 84.4 |
| 10000.000000 | 60.2 | 1000.0 | 1000.000 | 352.7 | H | 150.0 | 10.3 | 24.2 | 84.4 |
| 14499.666667 | 55.6 | 1000.0 | 1000.000 | 291.2 | V | 52.0 | 17.5 | 28.8 | 84.4 |

**Average Data**

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1500.000000 | 38.4 | 1000.0 | 1000.000 | 205.5 | V | 53.0 | -9.0 | 46.0 | 84.4 |
| 1749.900000 | 39.9 | 1000.0 | 1000.000 | 301.2 | V | 174.0 | -6.9 | 44.5 | 84.4 |
| 1981.666667 | 30.2 | 1000.0 | 1000.000 | 302.2 | V | 51.0 | -6.1 | 54.2 | 84.4 |
| 3653.700000 | 82.3 | 1000.0 | 1000.000 | 151.6 | H | 72.0 | -0.1 | * Fundamental Freq. | |
| 5999.900000 | 49.7 | 1000.0 | 1000.000 | 307.2 | V | 220.0 | 4.5 | 34.7 | 84.4 |
| 10000.000000 | 54.5 | 1000.0 | 1000.000 | 352.7 | H | 150.0 | 10.3 | 29.9 | 84.4 |
| 14499.666667 | 45.3 | 1000.0 | 1000.000 | 291.2 | V | 52.0 | 17.5 | 39.1 | 84.4 |

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

### 2.6.15 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3650 – 3700 MHz)_QPSK_20 MHz BW 1RB 0 offset_Middle Channel 3675 MHz




**Peak Data**

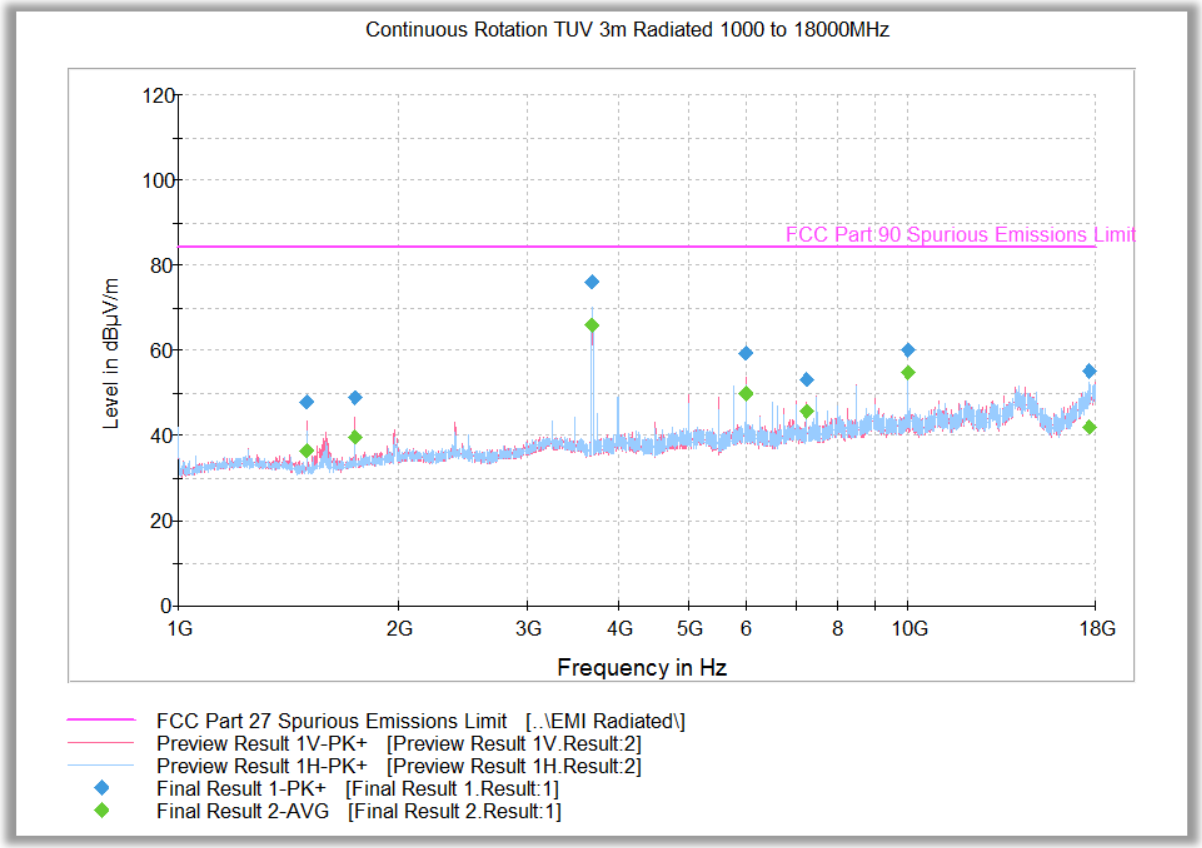
| Frequency (MHz) | Max Peak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1000.000000 | 45.5 | 1000.0 | 1000.000 | 102.7 | H | 126.0 | -10.7 | 38.9 | 84.4 |
| 1749.900000 | 48.3 | 1000.0 | 1000.000 | 124.7 | V | 173.0 | -6.9 | 36.1 | 84.4 |
| 3665.600000 | 89.7 | 1000.0 | 1000.000 | 250.5 | H | 350.0 | 0.0 | * Fundamental Freq. | |
| 5500.100000 | 54.5 | 1000.0 | 1000.000 | 209.4 | V | 176.0 | 4.0 | 29.9 | 84.4 |
| 7499.866667 | 51.6 | 1000.0 | 1000.000 | 242.3 | V | 338.0 | 7.3 | 32.8 | 84.4 |
| 10000.000000 | 58.2 | 1000.0 | 1000.000 | 205.4 | V | 53.0 | 10.3 | 26.2 | 84.4 |
| 17810.166667 | 55.2 | 1000.0 | 1000.000 | 151.2 | H | 4.0 | 20.8 | 29.2 | 84.4 |

**Average Data**

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1000.000000 | 33.3 | 1000.0 | 1000.000 | 102.7 | H | 126.0 | -10.7 | 51.1 | 84.4 |
| 1749.900000 | 38.4 | 1000.0 | 1000.000 | 124.7 | V | 173.0 | -6.9 | 46.0 | 84.4 |
| 3665.600000 | 80.0 | 1000.0 | 1000.000 | 250.5 | H | 350.0 | 0.0 | * Fundamental Freq. | |
| 5500.100000 | 47.7 | 1000.0 | 1000.000 | 209.4 | V | 176.0 | 4.0 | 36.7 | 84.4 |
| 7499.866667 | 42.9 | 1000.0 | 1000.000 | 242.3 | V | 338.0 | 7.3 | 41.5 | 84.4 |
| 10000.000000 | 49.4 | 1000.0 | 1000.000 | 205.4 | V | 53.0 | 10.3 | 35.0 | 84.4 |
| 17810.166667 | 41.9 | 1000.0 | 1000.000 | 151.2 | H | 4.0 | 20.8 | 42.5 | 84.4 |

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

### 2.6.16 Radiated Emission Test Results Above 1GHz – Worst Case Band 48 (3650 – 3700 MHz)_QPSK_20 MHz BW 1RB 0 offset_Middle Channel 3690 MHz




**Peak Data**

| Frequency (MHz) | Max Peak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1500.000000 | 47.8 | 1000.0 | 1000.000 | 217.4 | V | 338.0 | -9.0 | 36.6 | 84.4 |
| 1750.066667 | 48.8 | 1000.0 | 1000.000 | 242.4 | V | 172.0 | -6.9 | 35.6 | 84.4 |
| 3684.300000 | 76.2 | 1000.0 | 1000.000 | 143.7 | H | -13.0 | 0.2 | * Fundamental Freq. | |
| 6000.100000 | 59.3 | 1000.0 | 1000.000 | 329.2 | V | 137.0 | 4.5 | 25.1 | 84.4 |
| 7249.566667 | 53.2 | 1000.0 | 1000.000 | 203.5 | V | 98.0 | 7.0 | 31.2 | 84.4 |
| 10000.000000 | 60.1 | 1000.0 | 1000.000 | 352.7 | H | 150.0 | 10.3 | 24.3 | 84.4 |
| 17717.833333 | 55.1 | 1000.0 | 1000.000 | 316.2 | H | 10.0 | 20.5 | 29.3 | 84.4 |

**Average Data**

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Peak Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1500.000000 | 36.3 | 1000.0 | 1000.000 | 217.4 | V | 338.0 | -9.0 | 48.1 | 84.4 |
| 1750.066667 | 39.6 | 1000.0 | 1000.000 | 242.4 | V | 172.0 | -6.9 | 44.8 | 84.4 |
| 3684.300000 | 65.8 | 1000.0 | 1000.000 | 143.7 | H | -13.0 | 0.2 | * Fundamental Freq. | |
| 6000.100000 | 49.7 | 1000.0 | 1000.000 | 329.2 | V | 137.0 | 4.5 | 34.7 | 84.4 |
| 7249.566667 | 45.4 | 1000.0 | 1000.000 | 203.5 | V | 98.0 | 7.0 | 39.0 | 84.4 |
| 10000.000000 | 54.7 | 1000.0 | 1000.000 | 352.7 | H | 150.0 | 10.3 | 29.7 | 84.4 |
| 17717.833333 | 42.1 | 1000.0 | 1000.000 | 316.2 | H | 10.0 | 20.5 | 42.3 | 84.4 |

***** This is the fundamental frequency not part of spurious emission evaluation. Data provided for information purpose only.

## 2.7 FREQUENCY STABILITY

### 2.7.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.213
RSS-192, Clause 5.3
RSS-197, Clause 5.3

### 2.7.2 Standard Applicable

RSS-192, Clause 5.3
The carrier frequency shall not depart from the reference frequency in excess of ±20 ppm.

RSS-197, Clause 5.3
(a) The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;
(b) Using a resolution bandwidth of 1% of the occupied bandwidth, a reference point at the unwanted emission level which complies with the attenuation of 43 + 10 log10 p (watts) on the emission mask of the lowest and highest channel shall be selected, and the frequency at these points shall be recorded as $f_L$ and $f_H$ respectively.
The applicant shall ensure frequency stability by showing that $f_L$ minus the frequency offset and $f_H$ plus the frequency offset shall be within 3650 – 3700 MHz.

### 2.7.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration A

### 2.7.4 Date of Test/Initial of test personnel who performed the test

June 25 and 29, July 09, 2018 / XYZ

### 2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.7.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 24.8 - 27.8 °C |
| Relative Humidity | 39.4 - 49.0 % |
| ATM Pressure | 98.8 - 98.9 kPa |

### 2.7.7 Additional Observations

- This is a conducted test. The EUT was operated at 3.7 VDC nominal voltage and was placed in the temperature chamber for this evaluation. The EUT was controlled by a CMW500 and utilizing a spectrum analyser for measurement.
- Test performed in 5 MHz Bandwidth Middle channel as the representative configuration.
- Measurement was done using the CMW 500 measurement function.
- The EUT was tested over the temperature -30°C to +50°C in 10°C steps and allowed to sit for 1 hour to allow the equipment and chamber temperature to stabilize. The measurements were then performed.
- Voltage variation was also performed at voltage 3.3VDC and higher 4.3VDC of the nominal voltage at 20°C.
- The maximum frequency deviation for LTE Band 48 was verified against the frequency band edges using reference points $F_L$ and $F_H$ at the unwanted emission level which complies with the attenuation of 43 + 10 log10 p (watts) on the emission mask of the lowest and highest channel.

### 2.7.8 Test Results

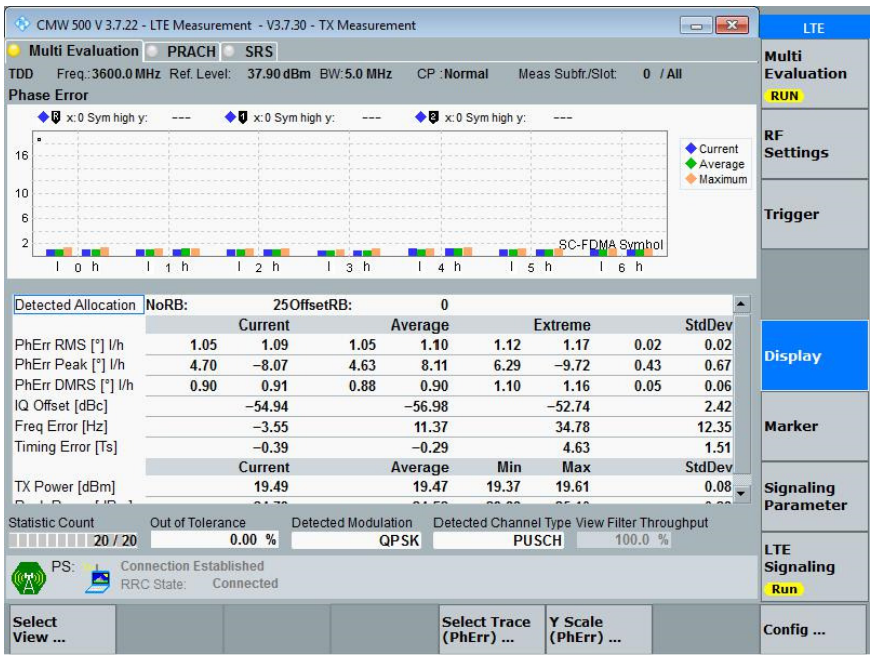
| LTE Band 48 (3550-3650 MHz) – QPSK 5 MHz BW-Middle Channel 3600 MHz | | | | |
|---|---|---|---|---|
| Voltage (VDC) | Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| 3.7 | -30 | 44.42 | 0.012 | 20 |
| | -20 | 44.76 | 0.012 | 20 |
| | -10 | 43.80 | 0.012 | 20 |
| | 0 | 46.35 | 0.013 | 20 |
| | +10 | 44.45 | 0.012 | 20 |
| | +20 | 34.78 | 0.014 | 20 |
| | +30 | 45.98 | 0.013 | 20 |
| | +40 | 42.43 | 0.012 | 20 |
| | +50 | 40.08 | 0.011 | 20 |
| 3.3 | 20 | 39.54 | 0.011 | 20 |
| 4.3 | | 39.95 | 0.011 | 20 |

| LTE Band 48 (3550-3650 MHz) – QPSK 5 MHz BW | | | | | | |
|---|---|---|---|---|---|---|
| Voltage (VDC) | Temperature (°C) | $F_L$ (MHz) | $F_L$ – Freq Error (MHz) | $F_H$ (MHz) | $F_L$ + Freq Error (MHz) | Compliance |
| 3.7 | -30 | 3550.1427 | 3550.1427 | 3649.8988 | 3649.8988 | Yes |
| | +20 | 3550.1385 | 3550.1385 | 3649.8631 | 3649.8631 | Yes |
| | +50 | 3550.1526 | 3550.1526 | 3649.8866 | 3649.8866 | Yes |
| 3.3 | 20 | 3550.1941 | 3550.1941 | 3649.8631 | 3649.8631 | Yes |
| 4.3 | | 3550.1552 | 3550.1552 | 3649.9086 | 3649.9086 | Yes |

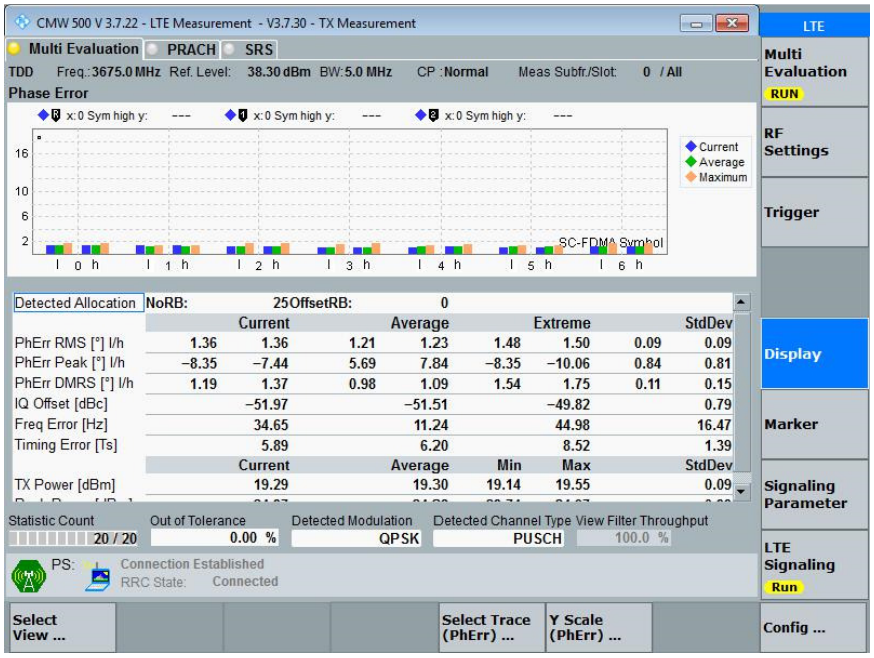
| LTE Band 48 (3650-3700 MHz) – QPSK 5 MHz BW-Middle Channel 3675 MHz | | | |
|---|---|---|---|
| Voltage (VDC) | Temperature (°C) | Frequency Error (Hz) | Frequency Error (ppm) |
| 3.7 | -30 | 45.09 | 0.012 |
| | -20 | 46.53 | 0.013 |
| | -10 | 48.09 | 0.013 |
| | 0 | 51.13 | 0.014 |
| | +10 | 47.31 | 0.013 |
| | +20 | 44.98 | 0.012 |
| | +30 | 46.23 | 0.013 |
| | +40 | 44.59 | 0.012 |
| | +50 | 40.77 | 0.011 |
| 3.3 | 20 | 40.91 | 0.011 |
| 4.3 | | 43.09 | 0.012 |

| LTE Band 48 (3650-3700 MHz) – QPSK 5 MHz BW | | | | | | |
|---|---|---|---|---|---|---|
| Voltage (VDC) | Temperature (°C) | $F_L$ (MHz) | $F_L$ – Freq Error (MHz) | $F_H$ (MHz) | $F_L$ + Freq Error (MHz) | Compliance |
| 3.7 | -30 | 3650.1261 | 3650.1260 | 3699.857 | 3699.8571 | Yes |
| | +20 | 3650.1177 | 3650.1176 | 3699.8762 | 3699.8763 | Yes |
| | +50 | 3650.1350 | 3650.1349 | 3699.8528 | 3699.8529 | Yes |
| 3.3 | 20 | 3650.1064 | 3650.1063 | 3699.8716 | 3699.8717 | Yes |
| 4.3 | | 3650.0892 | 3650.0891 | 3699.8608 | 3699.8609 | Yes |

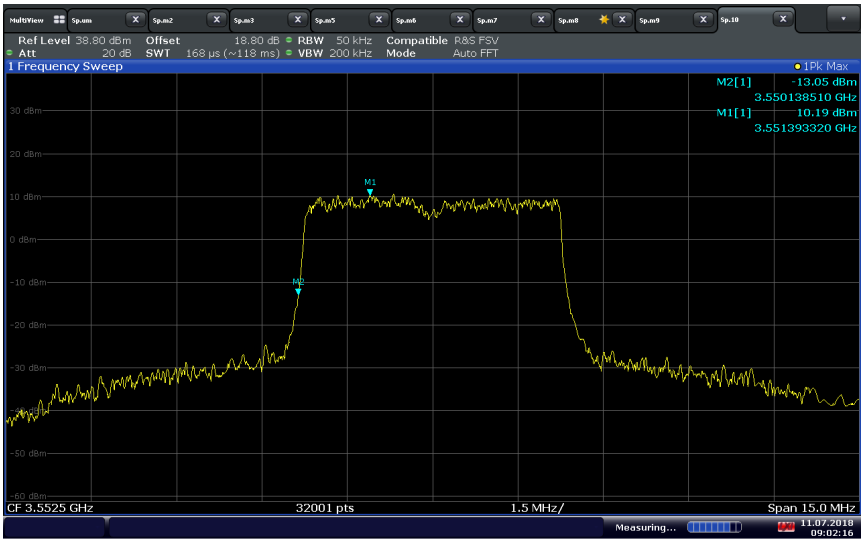
### 2.7.9 Sample Test Results




**LTE Band 48 (3550-3650 MHz) – QPSK 5 MHz BW-Middle Channel 3600 MHz at Normal Voltage 20ºC**

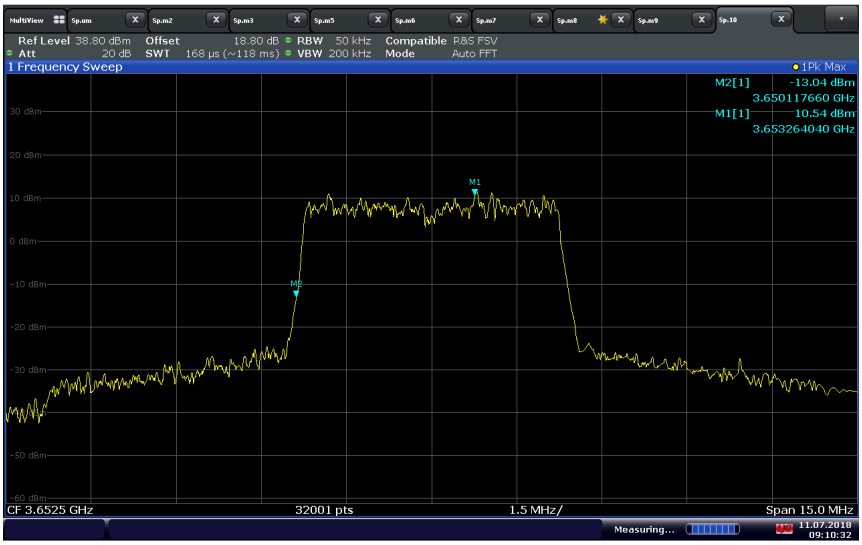



**LTE Band 48 (3650-3700 MHz) – QPSK 5 MHz BW-Middle Channel 3675 MHz at Normal Voltage 20ºC**




09:02:16 11.07.2018

**Band 48 (3550-3650 MHz) – QPSK 5 MHz BW Low Channel $F_L$ at Normal Voltage 20ºC**




09:10:32 11.07.2018

**LTE Band 48 (3650-3700 MHz) – QPSK 5 MHz BW Low Channel $F_L$ at Normal Voltage 20ºC**

## 2.8 RECEIVER SPURIOUS EMISSIONS

### 2.8.1 Specification Reference

RSS-192, Clause 5.6
RSS-197, Clause 5.8
RSS-GEN, Clause 7.4

### 2.8.2 Standard Applicable

RSS-192, Clause 5.6
Recevier spurious emissions shall not exceed -10 dBW/MHz below 21.2 GHz, and -60 dBW/MHz above 21.2 GHz at the antenna connector. A spectrum analyzer resolution bandwidth of 100 kHz shall be used to measure spurious emissions for emissions below 1.0 GHz, and a bandwidth of 1.0 MHz shall be used for emissions above 1.0 GHz.

RSS-197, Clause 5.8
Reciver spurious emissions shall comply with the limit specified in RSS-Gen.

RSS-Gen, Clause 7.4

The spurious emissions from the receiver at any discrete frequency, measured at the antenna port by the antenna-conducted method, shall not exceed 2 nW (-57dBm) in the frequency range 30-1000 MHz and 5 nW (-53dBm) above 1 GHz.

### 2.8.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132 / Test Configuration C

### 2.8.4 Date of Test/Initial of test personnel who performed the test

July 26, 2018 / XYZ

### 2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.8.6 Environmental Conditions/ Test Location

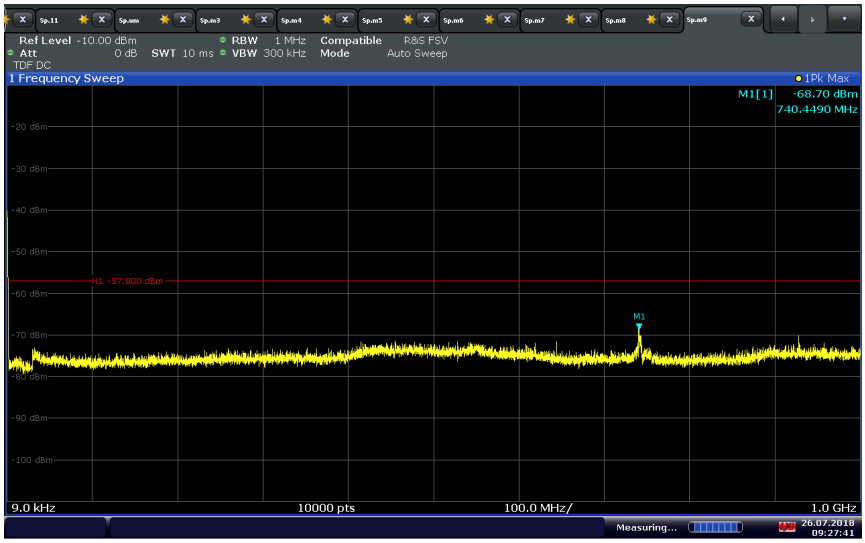
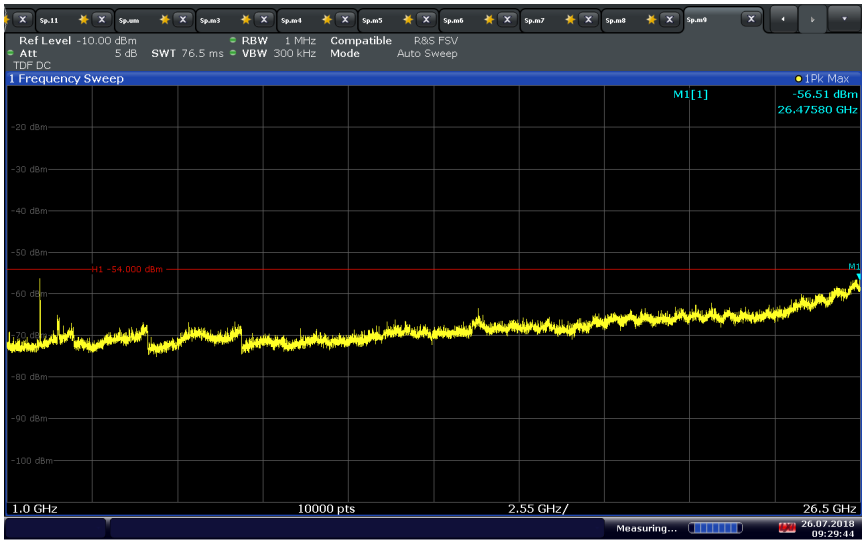
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.9 °C |
| Relative Humidity | 56.1 % |
| ATM Pressure | 99.7 kPa |

### 2.8.7 Additional Observations

- This is a conducted test. The spectrum was searched from 30MHz to the 26.5GHz.
- Test performed on RX only antenna port of the EUT.

### 2.8.8 Test Results

| Receiver Spurious below 1 GHz |
|---|
|  <br>09:27:43 26.07.2018 |
| **Receiver Spurious Above 1 GHz** |
|  <br>09:29:44 26.07.2018 |

## 2.9 CONDUCTED EMISSIONS

### 2.9.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.207(a)
RSS-Gen, Section 8.8

### 2.9.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

| Frequency of emission (MHz) | Conducted limit (dBµV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| 0.5–5 | 56 | 46 |
| 5–30 | 60 | 50 |

**Decreases with the logarithm of the frequency.*

### 2.9.3 Equipment Under Test and Modification State

Serial No: AZ280418A00132/Test Configuration B

### 2.9.4 Date of Test/Initial of test personnel who performed the test

July 16, 2018/XYZ

### 2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.9.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---|---|
| Ambient Temperature | 25.1 °C |
| Relative Humidity | 53.7 % |
| ATM Pressure | 99.0 kPa |

### 2.9.7 Additional Observations

Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.1.8 for sample computation.

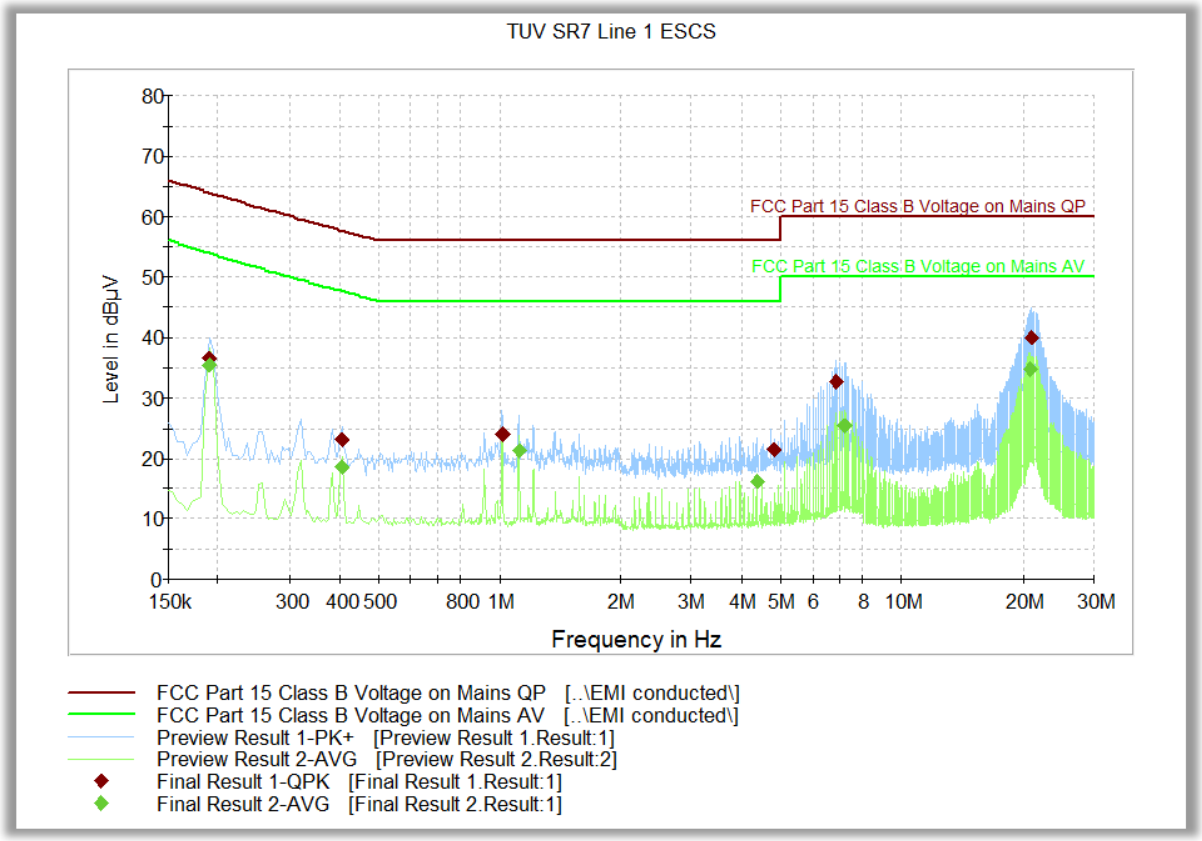
### 2.9.8 Sample Computation (Conducted Emission – Quasi Peak)

| | | | |
|---|---|---|---|
| Measuring equipment raw measurement (dbµV) @ 150kHz | | | 5.5 |
| Correction Factor (dB) | Asset# 8607 (20dB attenuator) | 19.9 | 20.7 |
| | Asset# 1177 (cable) | 0.15 | |
| | Asset# 1176 (cable) | 0.35 | |
| | Asset# 7568 (LISN) | 0.30 | |
| **Reported QuasiPeak Final Measurement (dbµV) @ 150kHz** | | | **26.2** |

### 2.9.9 Test Results

Compliant. See attached plots and tables.

### 2.9.10 MIFI8800L 120VAC 60Hz (Line 1)



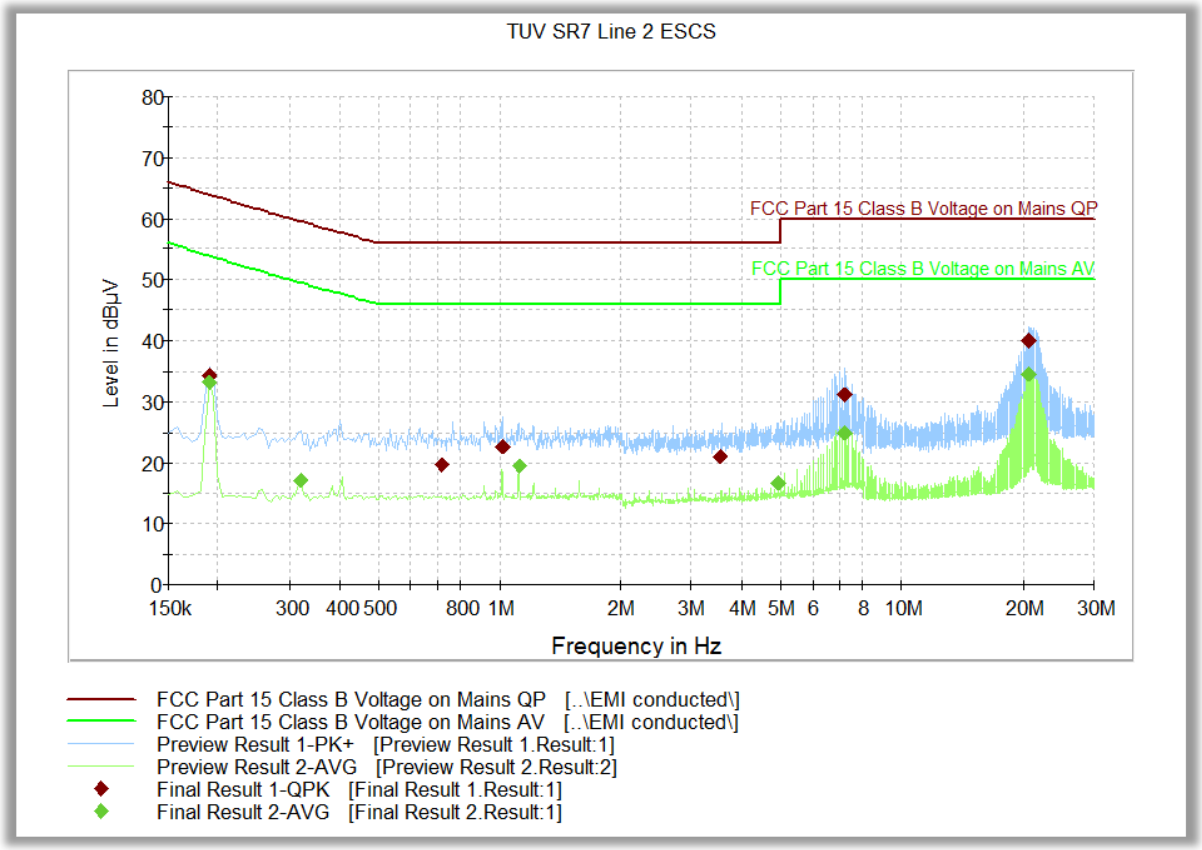

**Quasi Peak**

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.190500 | 36.6 | 1000.0 | 9.000 | Off | L1 | 20.2 | 27.3 | 63.9 |
| 0.406500 | 23.1 | 1000.0 | 9.000 | Off | L1 | 20.2 | 34.6 | 57.6 |
| 1.018500 | 23.9 | 1000.0 | 9.000 | Off | L1 | 20.2 | 32.1 | 56.0 |
| 4.830000 | 21.4 | 1000.0 | 9.000 | Off | L1 | 20.4 | 34.6 | 56.0 |
| 6.900000 | 32.6 | 1000.0 | 9.000 | Off | L1 | 20.5 | 27.4 | 60.0 |
| 20.998500 | 40.1 | 1000.0 | 9.000 | Off | L1 | 20.8 | 19.9 | 60.0 |

**Average**

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.190500 | 35.4 | 1000.0 | 9.000 | Off | L1 | 20.2 | 18.4 | 53.9 |
| 0.406500 | 18.6 | 1000.0 | 9.000 | Off | L1 | 20.2 | 29.0 | 47.6 |
| 1.117500 | 21.3 | 1000.0 | 9.000 | Off | L1 | 20.2 | 24.7 | 46.0 |
| 4.366500 | 16.2 | 1000.0 | 9.000 | Off | L1 | 20.4 | 29.8 | 46.0 |
| 7.197000 | 25.4 | 1000.0 | 9.000 | Off | L1 | 20.5 | 24.6 | 50.0 |
| 20.800500 | 34.7 | 1000.0 | 9.000 | Off | L1 | 20.7 | 15.3 | 50.0 |

### 2.9.11 MIFI8800L 120VAC 60Hz (Line 2)




**Quasi Peak**

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.190500 | 34.3 | 1000.0 | 9.000 | Off | N | 20.2 | 29.6 | 63.9 |
| 0.717000 | 19.5 | 1000.0 | 9.000 | Off | N | 20.2 | 36.5 | 56.0 |
| 1.018500 | 22.7 | 1000.0 | 9.000 | Off | N | 20.2 | 33.3 | 56.0 |
| 3.547500 | 21.0 | 1000.0 | 9.000 | Off | N | 20.4 | 35.0 | 56.0 |
| 7.197000 | 31.0 | 1000.0 | 9.000 | Off | N | 20.4 | 29.0 | 60.0 |
| 20.701500 | 39.9 | 1000.0 | 9.000 | Off | N | 20.7 | 20.1 | 60.0 |

**Average**

| Frequency (MHz) | Average (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin - Ave (dB) | Limit - Ave (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.190500 | 33.1 | 1000.0 | 9.000 | Off | N | 20.2 | 20.8 | 53.9 |
| 0.321000 | 17.1 | 1000.0 | 9.000 | Off | N | 20.3 | 32.4 | 49.5 |
| 1.117500 | 19.5 | 1000.0 | 9.000 | Off | N | 20.3 | 26.5 | 46.0 |
| 4.929000 | 16.6 | 1000.0 | 9.000 | Off | N | 20.5 | 29.4 | 46.0 |
| 7.197000 | 24.9 | 1000.0 | 9.000 | Off | N | 20.4 | 25.1 | 50.0 |
| 20.701500 | 34.4 | 1000.0 | 9.000 | Off | N | 20.7 | 15.6 | 50.0 |

**SECTION 3**

**TEST EQUIPMENT USED**

## 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| ID Number (SDGE/SDRB) | Test Equipment | Type | Serial Number | Manufacturer | Cal Date | Cal Due Date |
|---|---|---|---|---|---|---|
| Antenna Conducted Port Setup | | | | | | |
| 7662 | P-Series Power Meter | N1911A | MY45100951 | Agilent | 06/15/18 | 06/15/19 |
| 7661 | 50MHz-18GHz Wideband Power Sensor | N1921A | MY45241383 | Agilent | 06/15/18 | 06/15/19 |
| 7608 | Vector Signal Generator | SMBV100A | 259021 | Rhode & Schwarz | 09/19/17 | 09/19/19 |
| 7582 | Signal/Spectrum Analyzer | FSW26 | 101614 | Rhode & Schwarz | 12/14/17 | 12/14/18 |
| - | Wideband Radio Communication Tester | CMW 500 | 158164 | Rhode & Schwarz | 04/04/18 | 04/04/19 |
| 8825 | 20dB Attenuator | 46-20-34 | BK5773 | Weinschel Corp. | Verified by 7608 and 7582 | |
| - | 10dB Attenuator | VAT-10W2+2W | N/A | MCL | Verified by 7608 and 7582 | |
| AC Conducted Emissions Test Setup | | | | | | |
| 1024 | EMI Test Receiver | ESCS 30 | 847793/001 | Rhode & Schwarz | 09/15/17 | 09/15/18 |
| 7567 | LISN | FCC-LISN-50-25-2 | 120304 | Fischer Custom Comm. | 12/14/17 | 12/14/19 |
| 8822 | 20dB Attenuator | 34-20-34 | N/A | MCE / Weinschel | Verified by 7608 and 7582 | |
| 8824 | 20dB Attenuator | 34-20-34 | N/A | MCE / Weinschel | Verified by 7608 and 7582 | |
| 7582 | Signal/Spectrum Analyzer | FSW26 | 101614 | Rhode & Schwarz | 12/14/17 | 12/14/18 |
| 7608 | Vector Signal Generator | SMBV100A | 259021 | Rhode & Schwarz | 09/19/17 | 09/19/19 |
| - | Wideband Radio Communication Tester | CMW 500 | 158164 | Rhode & Schwarz | 04/04/18 | 04/04/19 |
| Radiated Test Setup | | | | | | |
| 7582 | Signal/Spectrum Analyzer | FSW26 | 101614 | Rhode & Schwarz | 12/14/17 | 12/14/18 |
| 7608 | Vector Signal Generator | SMBV100A | 259021 | Rhode & Schwarz | 09/19/17 | 09/19/19 |
| 1033 | Bilog Antenna | 3142C | 00044556 | EMCO | 10/11/16 | 10/11/18 |
| 7575 | Double-ridged waveguide horn antenna | 3117 | 00155511 | EMCO | 06/16/18 | 06/16/20 |
| 1193 | Pre-amplifier | PAM-0202 | 185 | A.H. Systems, Inc. | 04/11/18 | 04/11/19 |
| 8921 | High-frequency cable | SucoFlex 100 SX | N/A | Suhner | Verified by 7608 and 7582 | |
| 8923 | High-frequency cable | Micropore 19057793 | N/A | United Microwave Products | Verified by 7608 and 7582 | |
| 1040 | EMI Test Receiver | ESIB40 | 100292 | Rhode & Schwarz | 10/25/17 | 10/25/18 |
| 1049 | EMI Test Receiver | ESU | 100133 | Rhode & Schwarz | 07/13/18 | 07/13/19 |
| 8628 | Pre-amplifier | QLI-01182835-JO | 8986002 | Quinstar | 02/06/18 | 02/06/19 |
| - | Wideband Radio Communication Tester | CMW 500 | 158164 | Rhode & Schwarz | 04/04/18 | 04/04/19 |

| Miscellaneous | | | | | | |
|---|---|---|---|---|---|---|
| 6708 | Multimeter | 34401A | US36086974 | Hewlett Packard | 07/05/17 | 07/05/18 |
| 7579 | Temperature Chamber | 115 | 151617 | TestQuity | 08/22/17 | 08/22/18 |
| 11312 | Mini Environmental Quality Meter | 850027 | CF099-56010-340 | Sper Scientific | 02/26/18 | 02/26/19 |
| | Test Software | EMC32 | V8.53 | Rhode & Schwarz | N/A | |

## 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

### 3.2.1 Radiated Emission Measurements (Below 1GHz)

| | Contribution | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---|---|---|---|---|---|
| 1 | Receiver/Spectrum Analyzer | Rectangular | 0.45 | 0.26 | 0.07 |
| 2 | Cables | Rectangular | 0.50 | 0.29 | 0.08 |
| 3 | Preamp | Rectangular | 0.50 | 0.29 | 0.08 |
| 4 | Antenna | Rectangular | 0.75 | 0.43 | 0.19 |
| 5 | Site | Rectangular | 3.52 | 1.44 | 2.07 |
| 6 | EUT Setup | Rectangular | 1.00 | 0.58 | 0.33 |
| | | | | Combined Uncertainty ($u_c$): | 1.68 |
| | | | | Coverage Factor (k): | 2 |
| | | | | Expanded Uncertainty: | 3.36 |

### 3.2.2 Radiated Emission Measurements (Above 1GHz)

| | Contribution | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---|---|---|---|---|---|
| 1 | Receiver/Spectrum Analyzer | Rectangular | 0.57 | 0.33 | 0.11 |
| 2 | Cables | Rectangular | 0.70 | 0.40 | 0.16 |
| 3 | Preamp | Rectangular | 0.50 | 0.29 | 0.08 |
| 4 | Antenna | Rectangular | 0.37 | 0.21 | 0.05 |
| 5 | Site | Rectangular | 3.00 | 1.22 | 1.50 |
| 6 | EUT Setup | Rectangular | 1.00 | 0.58 | 0.33 |
| | | | | Combined Uncertainty ($u_c$): | 1.49 |
| | | | | Coverage Factor (k): | 2 |
| | | | | Expanded Uncertainty: | 2.99 |

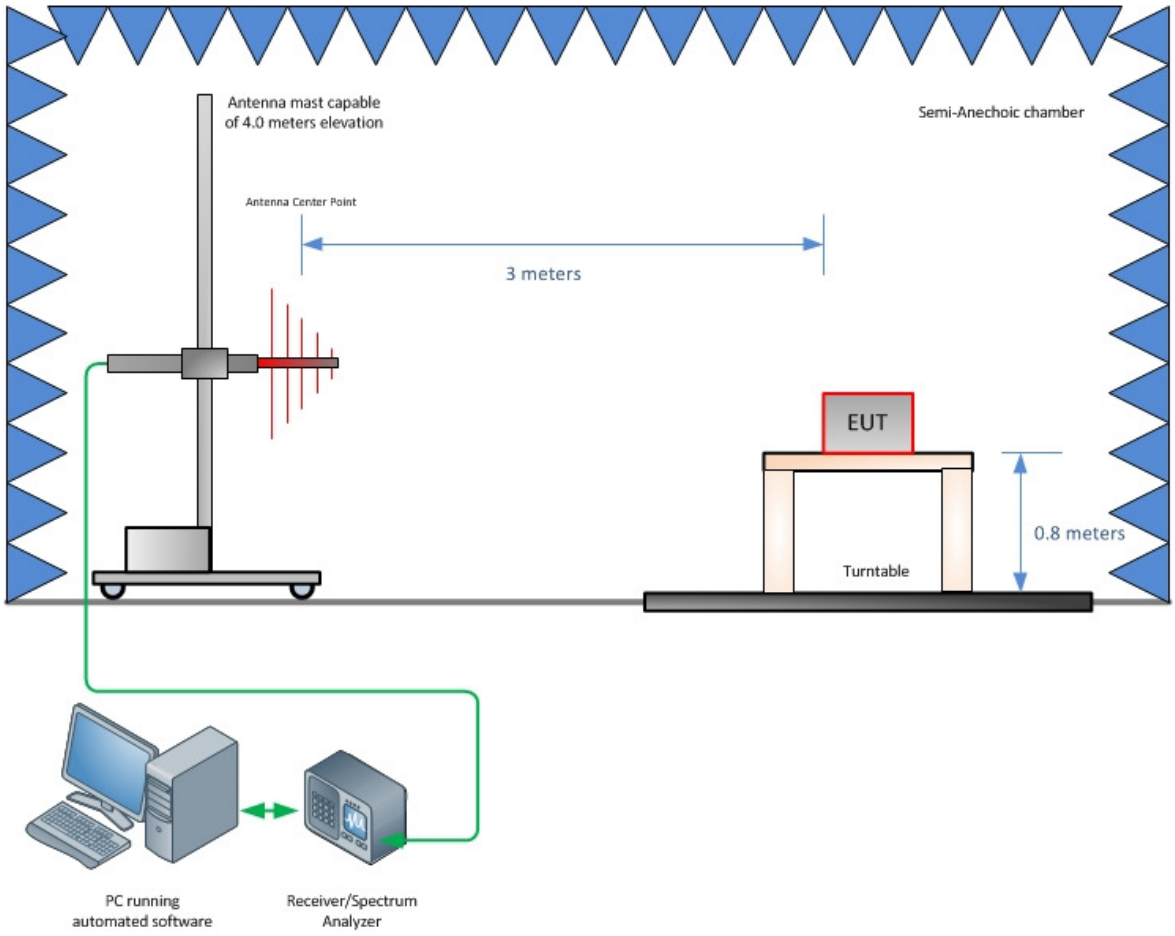
### 3.2.3 Conducted Antenna Port Measurement

| | Contribution | Probability Distribution Type | Probability Distribution $x_i$ | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---|---|---|---|---|---|
| 1 | Receiver/Spectrum Analyzer | Rectangular | 0.34 | 0.20 | 0.04 |
| 2 | Cables | Rectangular | 0.30 | 0.17 | 0.03 |
| 3 | EUT Setup | Rectangular | 0.50 | 0.29 | 0.08 |
| | | | | Combined Uncertainty ($u_c$): | 0.39 |
| | | | | Coverage Factor (k): | 1.96 |
| | | | | Expanded Uncertainty: | 0.76 |

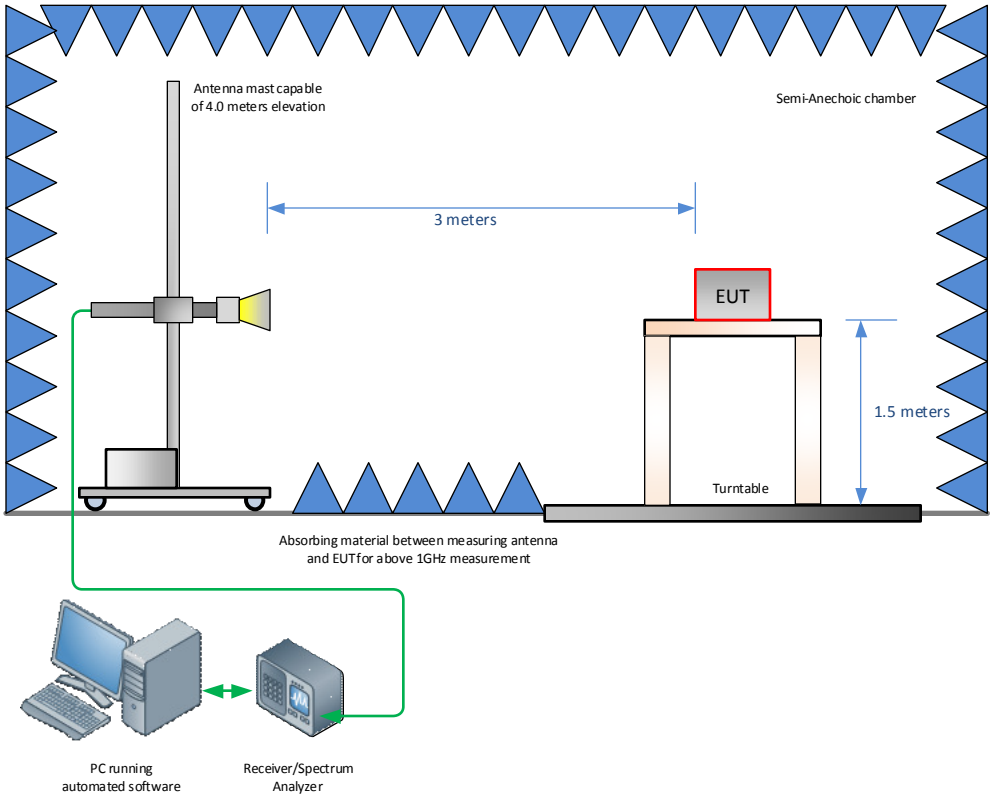
**SECTION 4**

**DIAGRAM OF TEST SETUP**

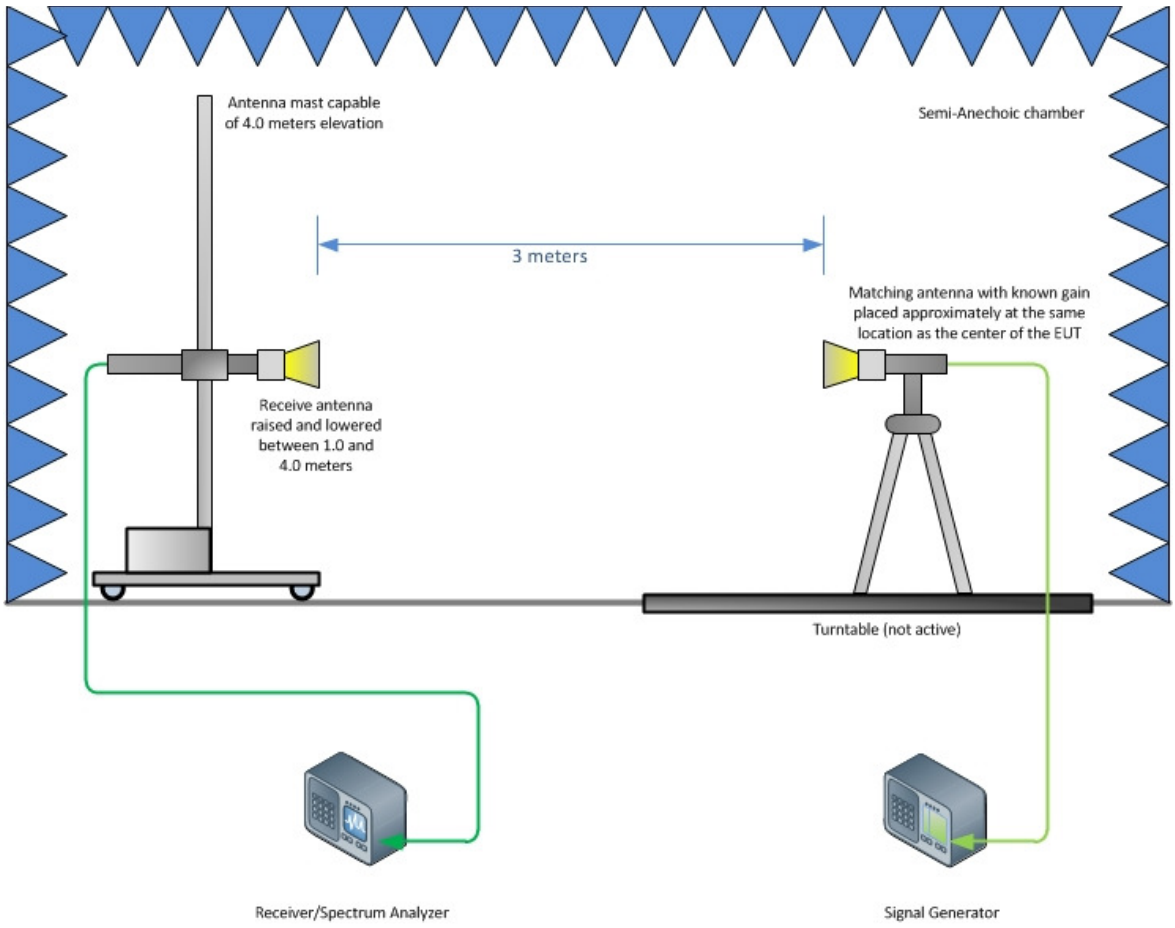
## 4.1 TEST SETUP DIAGRAM



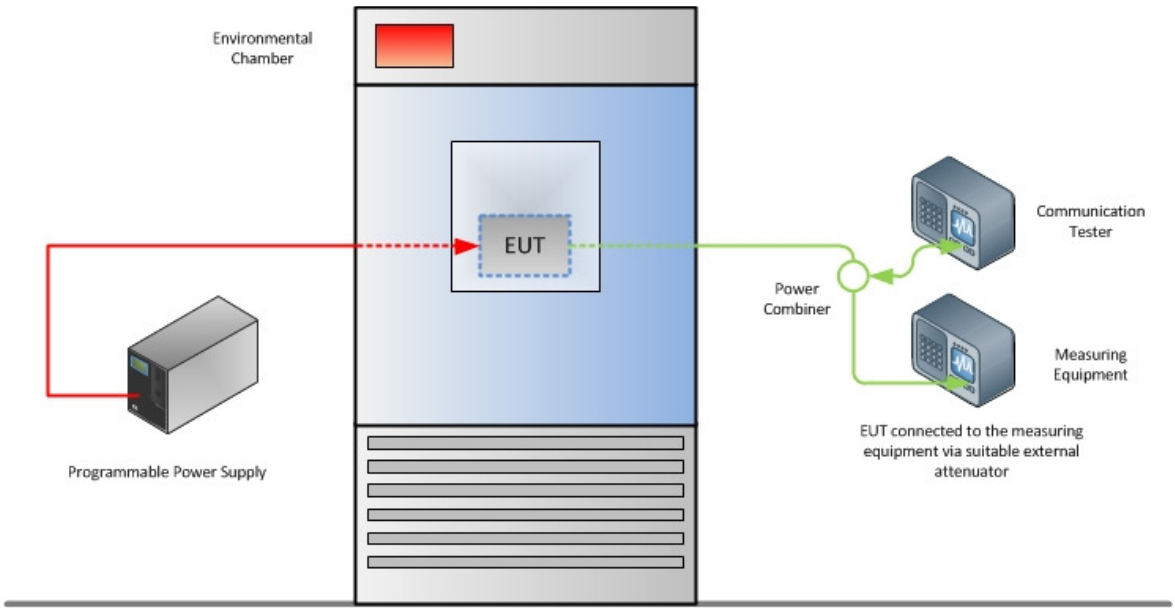

**Radiated Emission Test Setup (Below 1GHz)**




**Radiated Emission Test Setup (Above 1GHz)**




**Substitution Test Method (Above 1GHz)**




**Frequency Stability Test Comfiguration**

**SECTION 5**

**ACCREDITATION, DISCLAIMERS AND COPYRIGHT**

## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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