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# Report On

Application for Grant of Equipment Authorization of the  
Inseego Corp.  
MD8800 Wireless Module

FCC CFR 47 Part 2, Part 22 and Part 24: 2018  
RSS-132 issue 3: 2013 and RSS-133 issue 6: 2018

**Report No. 72140633A Rev 1.0**

**March 2019**



|                           |                                                                                                                                                                                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REPORT ON</b>          | Radio Testing of the<br>Inseego Corp.<br>MD8800 Wireless Module                                                                                                                                          |
| <b>TEST REPORT NUMBER</b> | 72140633A Rev 1.0                                                                                                                                                                                        |
| <b>PREPARED FOR</b>       | Inseego Corp.<br>9605 Scranton Road, Suite 300<br>San Diego, CA 92121<br>USA                                                                                                                             |
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| <b>PREPARED BY</b>        | <br>Xiaoying Zhang<br><b>Name</b><br>Authorized Signatory<br>Title: EMC/Wireless Test Engineer                          |
| <b>APPROVED BY</b>        | <br>Ferdinand S. Custodio<br><b>Name</b><br>Authorized Signatory<br>Title: Senior EMC Test Engineer/Wireless Team Lead |
| <b>DATED</b>              | March 28, 2019                                                                                                                                                                                           |



## Revision History

| 72140633A Rev 1.0<br>Inseego Corp.<br>MD8800 Wireless Module |                 |                 |                |                   |                    |
|--------------------------------------------------------------|-----------------|-----------------|----------------|-------------------|--------------------|
| DATE                                                         | OLD REVISION    | NEW REVISION    | REASON         | PAGES<br>AFFECTED | APPROVED BY        |
| 12/28/2018                                                   | -               | Initial Release |                |                   | Ferdinand Custodio |
| 03/28/2019                                                   | Initial Release | Rev 1.0         | Changed FCC ID | All               | Ferdinand Custodio |
|                                                              |                 |                 |                |                   |                    |
|                                                              |                 |                 |                |                   |                    |



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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Inseego Corp.  
MD8800 Wireless Module



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Inseego Corp. MD8800 Wireless Module to the requirements of the following:

- FCC CFR 47 Part 2, Part 22 and Part 24: 2018
- RSS-132 issue 3: 2013 and RSS-133 issue 6: 2018

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                  | Inseego Corp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Product Trademark/Brand       | Inseego                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Product Marketing Name        | MD8800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Model Number(s)               | MD8800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| FCC ID Number                 | PKRISGMD8800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| IC Number                     | 3229A-MD8800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Serial Number(s)              | AS190818B00021<br>AZ280418A00044 (Host model MIFI8800L Serial Number)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Number of Samples Tested      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Test Specification/Issue/Date | <ul style="list-style-type: none"> <li>• FCC CRF 47 Part 2, Part 22 and Part 24 (October 1, 2018)</li> <li>• KDB412172 D01 Determining ERP and EIRP v01r01 August 07, 2015: Guidelines for determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of an RF transmitting system</li> <li>• KDB971168 D01 Power Meas License Digital Systems v03r01: April 9 2018: Measurement guidance for certification of licensed digital transmitters</li> <li>• RSS-132 issue 3 January 2013: Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz</li> <li>• RSS-133 issue 6 January 2018 Amendment: 2 GHz Personal Communications Services</li> <li>• RSS-Gen Issue 5: April 2018 - General Requirements for Compliance of Radio Apparatus</li> <li>• ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services</li> </ul> |
| Start of Test                 | June 06, 2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Finish of Test                | October 22, 2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Name of Engineer(s)           | Xiaoying Zhang                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Related Document(s)           | <ul style="list-style-type: none"> <li>• 72139211A_Novatel MIFI8800L_FCC Part 22 24_B2 B5_RSS-132 RSS 133_Test Report.pdf</li> <li>• Supporting documents for EUT certification are separate exhibits.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, Part 22 and Part 24: 2018 with cross-reference to the corresponding ISSED RSS standard is shown below.

| Section | FCC Part Sections(s)                    | ISED Sections                               | Test Description                     | Result     |
|---------|-----------------------------------------|---------------------------------------------|--------------------------------------|------------|
| 2.1     | 2.1046                                  | RSS-132: 5.4<br>RSS-133: 6.4                | Transmitter Conducted Output Power   | Compliant* |
| 2.2     | 2.1046<br>22.913(a)(5)                  | -                                           | Effective Radiated Power             | Compliant* |
| 2.3     | 2.1046<br>24.232(c)                     | RSS-132: 5.4<br>RSS-133: 6.4                | Equivalent Isotropic Radiated Power  | Compliant* |
| 2.4     | 24.232(d)                               | RSS-132: 5.4,<br>RSS-133: 6.4               | Peak-Average Ratio                   | Compliant* |
| 2.5     | 2.1049<br>22.917(b)<br>24.238(b)        | RSS-GEN 6.7                                 | Occupied Bandwidth                   | Compliant* |
| 2.6     | 2.1051,<br>22.917(a)(b)<br>24.238(a)(b) | RSS-132: 5.5<br>RSS-133: 6.5                | Band Edge                            | Compliant* |
| 2.7     | 2.1051<br>22.917(a)(b)<br>24.238(a)(b)  | RSS-132: 5.5<br>RSS-133: 6.5                | Conducted Spurious Emissions         | Compliant* |
| 2.8     | 2.1053<br>22.917(a)<br>24.238(a)        | RSS-132: 5.5<br>RSS-133: 6.5                | Field Strength of Spurious Radiation | Compliant  |
| 2.9     | 2.1055<br>22.355<br>24.235              | RSS-132: 5.3<br>RSS-133: 6.3                | Frequency Stability                  | Compliant* |
| 2.10    | -                                       | RSS-132: 5.6<br>RSS-133: 6.6<br>RSS-Gen 7.4 | Receiver Spurious Emissions          | Compliant* |

**Compliant\*:** The module was previously tested in a host under Model Number MIFI8800L. All the conducted measurements for WCDMA Band 2, 5 and LTE Band 2, 5 were from the host and covered under test report 72139211A\_Novatel MIFI8800L\_FCC Part 22 24\_B2 B5\_RSS-132 RSS 133\_Test Report.pdf.



### 1.3 PRODUCT INFORMATION

#### 1.3.1 EUT General Description

The Equipment Under Test (EUT) was an Inseego Corp. MD8800 Wireless Module. The EUT is a Wireless Module supporting 2G/3G/4G, Wi-Fi, and GPS/GLNSS Technologies. The EUT is mounted on a mini ground plane for the ease of testing. The EUT comes with a USB Port to connect to an AC Adaptor.

#### 1.3.2 Technical Description

|                                    |                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| EUT Description                    | Wireless Module                                                                                                                   |
| Product Marketing Name             | MD8800                                                                                                                            |
| Model Number(s)                    | MD8800                                                                                                                            |
| Rated Voltage                      | Input 100-240VAC, Output 5V (External AC-DC Power Adapter)                                                                        |
| Mode Verified<br>(Frequency Bands) | WCDMA Band 2: 1850-1910 MHz<br>WCDMA Band 5: 824-849 MHz<br>LTE Band 2: 1850-1910 MHz<br>LTE Band 5: 824-849 MHz                  |
| Capability                         | WCDMA Band 2, 5 and LTE Band 2, 4, 5, 7, 13, 14, 46, 48, 66                                                                       |
| Primary Unit (EUT)                 | <input checked="" type="checkbox"/> Production<br><input type="checkbox"/> Pre-Production<br><input type="checkbox"/> Engineering |
| Frequency Tolerance                | ±0.00025% (2.5ppm)                                                                                                                |

(Client declaration, max.  
antenna gain covered under this  
test report)

| Technologies / Bands | Frequency     | Antenna Gains |
|----------------------|---------------|---------------|
| WCDMA/LTE Band 2     | 1850-1910 MHz | 0.5 dBi       |
| WCDMA/LTE Band 5     | 824-849 MHz   | -0.5 dBi      |





### 1.3.3 Transmit Frequency Table

| Technology / Band | Tx Frequency (MHz) | Emission Designator | ERP (Part 22) /<br>EIRP (RSS-132 and Part 24/RSS-133) |                       |
|-------------------|--------------------|---------------------|-------------------------------------------------------|-----------------------|
|                   |                    |                     | ERP Max. Power (dBm)                                  | EIRP Max. Power (dBm) |
| WCDMA Band 2      | 1850-1910          | 4M14F9W             | —                                                     | 23.97                 |
| WCDMA Band 5      | 824-849            | 4M22F9W             | 21.32                                                 | 23.47                 |

| Technology / Band | Modulation | Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | ERP (Part 22) /<br>EIRP (RSS-132 and Part 24/RSS-133) |                       |
|-------------------|------------|-----------------|--------------------|---------------------|-------------------------------------------------------|-----------------------|
|                   |            |                 |                    |                     | ERP Max. Power (dBm)                                  | EIRP Max. Power (dBm) |
| LTE Band 2        | QPSK       | 1.4             | 1850-1910          | 1M09G7D             | —                                                     | 24.44                 |
|                   |            | 3               | 1850-1910          | 2M69G7D             | —                                                     | 24.41                 |
|                   |            | 5               | 1850-1910          | 4M49G7D             | —                                                     | 24.5                  |
|                   |            | 10              | 1850-1910          | 8M95G7D             | —                                                     | 24.5                  |
|                   |            | 15              | 1850-1910          | 13M4G7D             | —                                                     | 24.42                 |
|                   |            | 20              | 1850-1910          | 17M8G7D             | —                                                     | 24.46                 |
|                   | 16QAM      | 1.4             | 1850-1910          | 1M09W7D             | —                                                     | 23.56                 |
|                   |            | 3               | 1850-1910          | 2M69W7D             | —                                                     | 23.61                 |
|                   |            | 5               | 1850-1910          | 4M49W7D             | —                                                     | 23.68                 |
|                   |            | 10              | 1850-1910          | 8M95W7D             | —                                                     | 23.82                 |
|                   |            | 15              | 1850-1910          | 13M4W7D             | —                                                     | 23.69                 |
|                   |            | 20              | 1850-1910          | 17M9W7D             | —                                                     | 23.7                  |
| LTE Band 5        | QPSK       | 1.4             | 824-849            | 1M09G7D             | 21.33                                                 | 23.48                 |
|                   |            | 3               | 824-849            | 2M69G7D             | 21.27                                                 | 23.42                 |
|                   |            | 5               | 824-849            | 4M49G7D             | 21.34                                                 | 23.49                 |
|                   |            | 10              | 824-849            | 8M94G7D             | 21.33                                                 | 23.48                 |
|                   | 16QAM      | 1.4             | 824-849            | 1M09W7D             | 20.37                                                 | 22.52                 |
|                   |            | 3               | 824-849            | 2M69W7D             | 20.4                                                  | 22.55                 |
|                   |            | 5               | 824-849            | 4M47W7D             | 20.63                                                 | 22.78                 |
|                   |            | 10              | 824-849            | 8M93W7D             | 20.53                                                 | 22.68                 |

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

| Test Configuration | Description                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                  | Conducted antenna port measurement. EUT is powered via AC Adapter and controlled by a call box to transmit at max power.                                                                     |
| B                  | Radiated test setup / case spurious emissions. The EUT is mounted on a mini ground plane for the ease of testing and powered via AC Adaptor. The Antenna port is terminated by the call box. |
| C                  | Conducted antenna port measurement. EUT in receive mode and is powered AC Adapter.                                                                                                           |

### 1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester or a Keysight E7515A UXM Wireless Test Set. There are no other test software used during verification.

### 1.4.3 Support Equipment and I/O cables

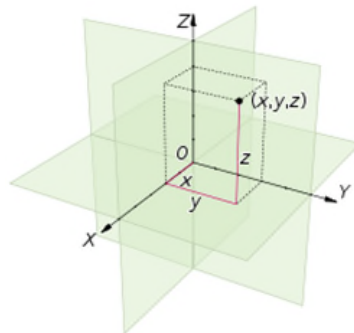
| Manufacturer  | Equipment/Cable              | Description                                                                                   |
|---------------|------------------------------|-----------------------------------------------------------------------------------------------|
| Inseego Corp. | USB Cable                    | Type A to Type C USB Cable. M/N: NOV7000USB                                                   |
| Inseego Corp. | External AC-DC Power Adapter | Model: SSW-2783, PN: 40123126.01<br>Input: 100-240VAC, 50/60Hz, 0.5A<br>Output: 5VDC, max. 2A |

### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report:

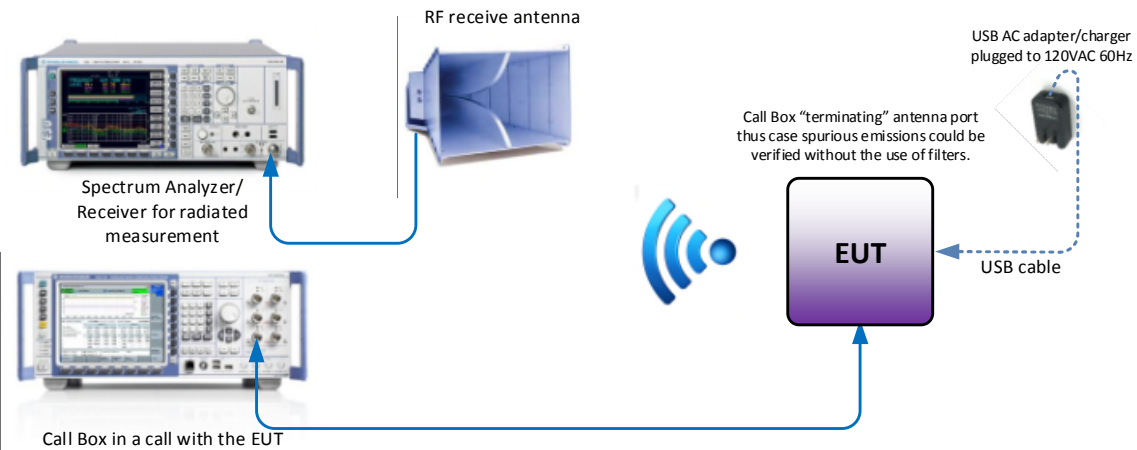
| Technology / Band  | Test Configuration                                                |
|--------------------|-------------------------------------------------------------------|
| WCDMA Band 2 and 5 | Connection Setup: Test Mode,<br>Type: RMC, Test Mode: Loop Mode 2 |
| LTE Band 2 and 5   | Modulation: QPSK                                                  |

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

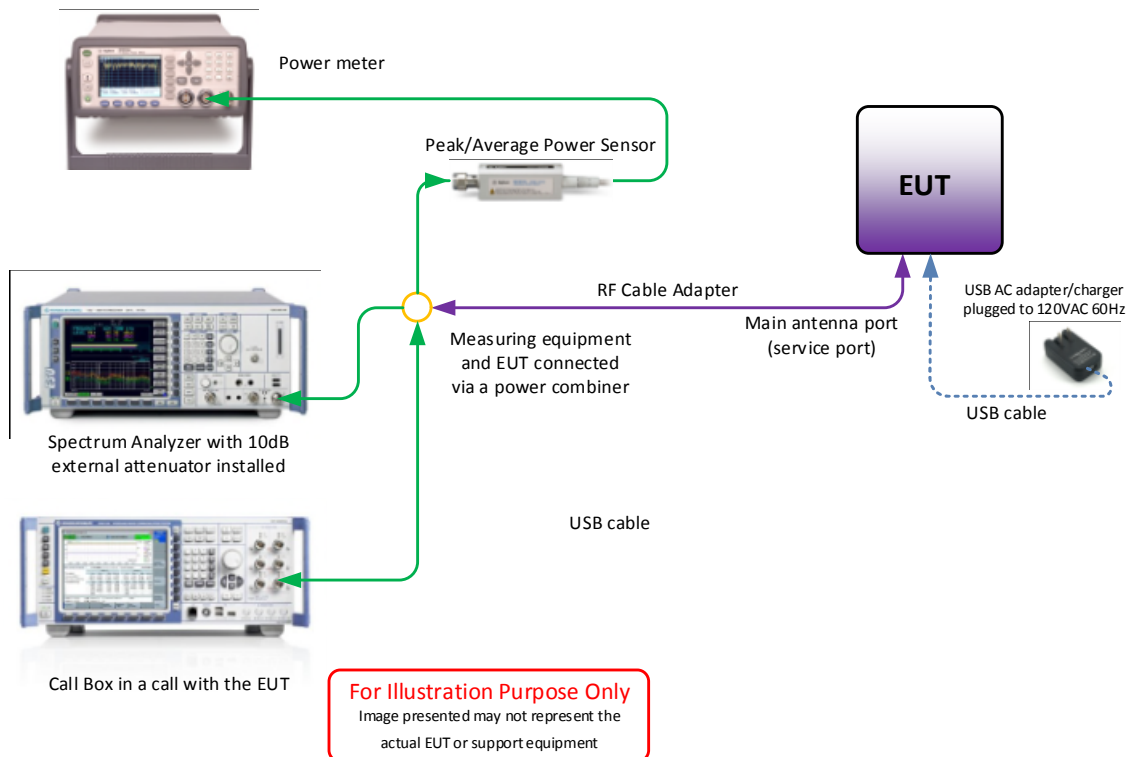


#### 1.4.5 Simplified Test Configuration Diagram

### Radiated Test Configuration/Conducted Emissions 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: AS190818B00021, AZ280418A00044 (Host Model MIFI8800L serial number) |                        |                          |
| 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.



## **1.10 SAMPLE CALCULATIONS**

### **1.10.1 GSM Emission Designator**

Emission Designator = 250KGXW  
GSM BW = 250 kHz  
G = Phase Modulation  
X = Cases not otherwise covered  
W = Combination (Audio/Data)

### **1.10.2 WCDMA Emission Designator**

Emission Designator = 4M15F9W  
WCDMA BW = 4.15 MHz  
F = Frequency Modulation  
9= Composite Digital Info  
W = Combination (Audio/Data)

### **1.10.3 CDMA Emission Designator**

Emission Designator = 1M30F9W  
F = Frequency Modulation  
9= Composite Digital Info  
W = Combination (Audio/Data)

### **1.10.4 LTE Emission Designator (QPSK)**

Emission Designator = 4M51G7D  
G = Phase Modulation  
7= Quantized/Digital Info  
D = Combination (Audio/Data)

### **1.10.5 LTE Emission Designator (16QAM)**

Emission Designator = 4M52W7D  
W = Frequency Modulation  
7= Quantized/Digital Info  
D = Combination (Audio/Data)



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

|                                                       |                            |       |       |
|-------------------------------------------------------|----------------------------|-------|-------|
| Measuring equipment raw measurement (dBμV/m) @ 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  |

#### 1.10.7 Spurious Radiated Emission – Substitution Method

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

The field strength reading of 84dBμV/m @ 1413 MHz (2<sup>nd</sup> 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:

$$\begin{aligned}
 P_{\text{EIRP}} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{\text{ERP}} &= P_{\text{EIRP}} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



## **SECTION 2**

### **TEST DETAILS**

Radio Testing of the  
Inseego Corp.  
MD8800 Wireless Module





## **2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS**

### **2.1.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
RSS-132, Clause 5.4  
RSS-133, Clause 6.4

### **2.1.2 Standard Applicable**

The conducted power measurements were made in accordance to FCC Part 2 Clause 2.1046 and RSS-132 Clause 5.4 and RSS-133 Clause 6.4.

FCC 47 CFR Part 2.1046:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

### **2.1.3 Equipment Under Test and Modification State**

Serial No: AZ280418A00044 / Test Configuration A

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

June 16 and 18, 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 performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |                 |
|---------------------|-----------------|
| Ambient Temperature | 24.0 - 26.3 °C  |
| Relative Humidity   | 44.0 - 52.5 %   |
| ATM Pressure        | 98.4 - 99.1 kPa |



### 2.1.7 Additional Observations

- This is a conducted test using Power Meter.
- The path loss was 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

| Band         | Channel     | Frequency (MHz) | Average Max Power (dBm) | Peak Max Power (dBm) |
|--------------|-------------|-----------------|-------------------------|----------------------|
| WCDMA Band 2 | 9262        | 1852.4          | 23.22                   | 26.51                |
|              | <b>9400</b> | <b>1880.0</b>   | <b>23.47</b>            | <b>26.17</b>         |
|              | 9538        | 1907.6          | 23.07                   | 25.83                |
| WCDMA Band 5 | <b>4132</b> | <b>826.4</b>    | <b>23.97</b>            | <b>26.75</b>         |
|              | 4183        | 836.6           | 23.66                   | 25.21                |
|              | 4233        | 846.6           | 23.74                   | 26.26                |



| LTE Band 2      |         |                 |            |          |          |                     |                  |
|-----------------|---------|-----------------|------------|----------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 1.4             | 18607   | 1850.7          | QPSK       | <b>1</b> | <b>0</b> | <b>23.87</b>        | <b>27.0</b>      |
|                 |         |                 |            | 1        | 3        | 23.87               | 26.86            |
|                 |         |                 |            | 1        | 5        | 23.77               | 26.87            |
|                 |         |                 |            | 6        | 0        | 23.06               | 27.39            |
|                 |         |                 | 16QAM      | 1        | 0        | 22.89               | 27.33            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>22.92</b>        | <b>27.25</b>     |
|                 |         |                 |            | 1        | 5        | 22.85               | 27.2             |
|                 |         |                 |            | 6        | 0        | 22.17               | 27.80            |
|                 | 18900   | 1880            | QPSK       | 1        | 0        | 23.88               | 27.38            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.94</b>        | <b>27.29</b>     |
|                 |         |                 |            | 1        | 5        | 23.86               | 27.34            |
|                 |         |                 |            | 6        | 0        | 23.08               | 27.87            |
|                 |         |                 | 16QAM      | 1        | 0        | 22.99               | 27.96            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.06</b>        | <b>28.05</b>     |
|                 |         |                 |            | 1        | 5        | 22.98               | 27.98            |
|                 |         |                 |            | 6        | 0        | 22.12               | 28.17            |
|                 | 19193   | 1909.3          | QPSK       | <b>1</b> | <b>0</b> | <b>23.11</b>        | <b>26.04</b>     |
|                 |         |                 |            | 1        | 3        | 22.75               | 25.59            |
|                 |         |                 |            | 1        | 5        | 22.38               | 25.33            |
|                 |         |                 |            | 6        | 0        | 21.77               | 25.1             |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b> | <b>21.56</b>        | <b>25.57</b>     |
|                 |         |                 |            | 1        | 3        | 21.3                | 25.3             |
|                 |         |                 |            | 1        | 5        | 21.01               | 25.03            |
|                 |         |                 |            | 6        | 0        | 21.3                | 25.51            |



| LTE Band 2      |         |                 |            |        |          |                     |                  |
|-----------------|---------|-----------------|------------|--------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 3               | 18615   | 1851.5          | QPSK       | 1      | 0        | 23.91               | 26.99            |
|                 |         |                 |            | 1      | 8        | 23.91               | 26.91            |
|                 |         |                 |            | 1      | 14       | 23.78               | 28.80            |
|                 |         |                 |            | 15     | 0        | 23.11               | 27.31            |
|                 |         |                 | 16QAM      | 1      | 0        | 22.96               | 27.38            |
|                 |         |                 |            | 1      | 8        | 22.94               | 27.32            |
|                 |         |                 |            | 1      | 14       | 22.88               | 27.2             |
|                 |         |                 |            | 15     | 0        | 22.14               | 27.57            |
|                 | 18900   | 1880            | QPSK       | 1      | 0        | 23.91               | 27.23            |
|                 |         |                 |            | 1      | 8        | 23.91               | 27.21            |
|                 |         |                 |            | 1      | 14       | 23.86               | 27.16            |
|                 |         |                 |            | 15     | 0        | 23.07               | 27.86            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.11               | 28.02            |
|                 |         |                 |            | 1      | 8        | 23.1                | 28.01            |
|                 |         |                 |            | 1      | 14       | 23.07               | 27.99            |
|                 |         |                 |            | 15     | 0        | 22.09               | 28.13            |
|                 | 19185   | 1908.5          | QPSK       | 1      | 0        | 22.96               | 25.78            |
|                 |         |                 |            | 1      | 8        | 22.29               | 25.13            |
|                 |         |                 |            | 1      | 14       | 21.52               | 24.4             |
|                 |         |                 |            | 15     | 0        | 22.4                | 25.62            |
|                 |         |                 | 16QAM      | 1      | 0        | 22.4                | 26.26            |
|                 |         |                 |            | 1      | 8        | 21.8                | 25.66            |
|                 |         |                 |            | 1      | 14       | 21.1                | 25.07            |
|                 |         |                 |            | 15     | 0        | 21.87               | 26.06            |



| LTE Band 2      |         |                 |            |          |           |                     |                  |
|-----------------|---------|-----------------|------------|----------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start  | Average Power (dBm) | Peak Power (dBm) |
| 5               | 18625   | 1852.5          | QPSK       | 1        | 0         | 23.81               | 27.26            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>23.82</b>        | <b>27.06</b>     |
|                 |         |                 |            | 1        | 24        | 23.85               | 27.04            |
|                 |         |                 |            | 25       | 0         | 22.92               | 27.57            |
|                 |         |                 | 16QAM      | 1        | 0         | 23.17               | 27.89            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>23.18</b>        | <b>27.53</b>     |
|                 |         |                 |            | 1        | 24        | 23.04               | 27.42            |
|                 |         |                 |            | 25       | 0         | 22.1                | 27.91            |
|                 | 18900   | 1880            | QPSK       | 1        | 0         | 23.97               | 27.36            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>24.0</b>         | <b>27.26</b>     |
|                 |         |                 |            | 1        | 24        | 23.9                | 27.38            |
|                 |         |                 |            | 25       | 0         | 23.01               | 27.28            |
|                 |         |                 | 16QAM      | 1        | 0         | 23.08               | 28.17            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>23.1</b>         | <b>28.04</b>     |
|                 |         |                 |            | 1        | 24        | 22.96               | 28.1             |
|                 |         |                 |            | 25       | 0         | 21.99               | 27.39            |
|                 | 19175   | 1907.5          | QPSK       | <b>1</b> | <b>0</b>  | <b>23.9</b>         | <b>27.0</b>      |
|                 |         |                 |            | 1        | 13        | 23.08               | 25.81            |
|                 |         |                 |            | 1        | 24        | 21.76               | 24.70            |
|                 |         |                 |            | 25       | 0         | 22.98               | 27.06            |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>23.15</b>        | <b>27.76</b>     |
|                 |         |                 |            | 1        | 13        | 22.83               | 26.43            |
|                 |         |                 |            | 1        | 24        | 21.63               | 25.45            |
|                 |         |                 |            | 25       | 0         | 22.05               | 27.35            |



| LTE Band 2      |         |                 |            |        |          |                     |                  |
|-----------------|---------|-----------------|------------|--------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 10              | 18650   | 1855            | QPSK       | 1      | 0        | 23.97               | 27.08            |
|                 |         |                 |            | 1      | 25       | 23.86               | 26.9             |
|                 |         |                 |            | 1      | 49       | 22.92               | 26.27            |
|                 |         |                 |            | 50     | 0        | 23.15               | 27.57            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.19               | 27.77            |
|                 |         |                 |            | 1      | 25       | 23.11               | 27.46            |
|                 |         |                 |            | 1      | 49       | 22.33               | 27.2             |
|                 |         |                 |            | 50     | 0        | 22.25               | 27.54            |
|                 | 18900   | 1880            | QPSK       | 1      | 0        | 23.94               | 27.25            |
|                 |         |                 |            | 1      | 25       | 23.82               | 27.19            |
|                 |         |                 |            | 1      | 49       | 23.92               | 27.2             |
|                 |         |                 |            | 50     | 0        | 23.09               | 28.01            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.32               | 28.38            |
|                 |         |                 |            | 1      | 25       | 23.2                | 28.12            |
|                 |         |                 |            | 1      | 49       | 23.17               | 28.02            |
|                 |         |                 |            | 50     | 0        | 22.1                | 28.03            |
|                 | 19150   | 1905            | QPSK       | 1      | 0        | 24.0                | 27.12            |
|                 |         |                 |            | 1      | 25       | 23.9                | 26.9             |
|                 |         |                 |            | 1      | 49       | 21.76               | 24.77            |
|                 |         |                 |            | 50     | 0        | 23.13               | 27.54            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.11               | 27.63            |
|                 |         |                 |            | 1      | 25       | 23.0                | 27.63            |
|                 |         |                 |            | 1      | 49       | 21.28               | 25.42            |
|                 |         |                 |            | 50     | 0        | 22.14               | 27.8             |



| LTE Band 2      |         |                 |            |          |           |                     |                  |
|-----------------|---------|-----------------|------------|----------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start  | Average Power (dBm) | Peak Power (dBm) |
| 15              | 18675   | 1857.5          | QPSK       | <b>1</b> | <b>0</b>  | <b>23.68</b>        | <b>26.73</b>     |
|                 |         |                 |            | 1        | 38        | 22.73               | 25.99            |
|                 |         |                 |            | 1        | 74        | 23.63               | 26.76            |
|                 |         |                 |            | 75       | 0         | 23.17               | 27.16            |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>22.91</b>        | <b>27.17</b>     |
|                 |         |                 |            | 1        | 38        | 21.93               | 26.67            |
|                 |         |                 |            | 1        | 74        | 23.07               | 28               |
|                 |         |                 |            | 75       | 0         | 22.26               | 27.22            |
|                 | 18900   | 1880            | QPSK       | <b>1</b> | <b>0</b>  | <b>23.91</b>        | <b>27.20</b>     |
|                 |         |                 |            | 1        | 38        | 23.89               | 27.08            |
|                 |         |                 |            | 1        | 74        | 23.42               | 26.44            |
|                 |         |                 |            | 75       | 0         | 23.08               | 28.01            |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>23.16</b>        | <b>28.12</b>     |
|                 |         |                 |            | 1        | 38        | 23.1                | 27.89            |
|                 |         |                 |            | 1        | 74        | 22.78               | 26.98            |
|                 |         |                 |            | 75       | 0         | 22.15               | 28.23            |
|                 | 19125   | 1902.5          | QPSK       | 1        | 0         | 23.46               | 26.47            |
|                 |         |                 |            | <b>1</b> | <b>38</b> | <b>23.92</b>        | <b>27.19</b>     |
|                 |         |                 |            | 1        | 74        | 22.53               | 25.51            |
|                 |         |                 |            | 75       | 0         | 23.16               | 28.14            |
|                 |         |                 | 16QAM      | 1        | 0         | 22.66               | 26.8             |
|                 |         |                 |            | <b>1</b> | <b>38</b> | <b>23.19</b>        | <b>28.25</b>     |
|                 |         |                 |            | 1        | 74        | 22.03               | 26.12            |
|                 |         |                 |            | 75       | 0         | 22.19               | 28.14            |



| LTE Band 2      |         |                 |            |          |           |                     |                  |
|-----------------|---------|-----------------|------------|----------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start  | Average Power (dBm) | Peak Power (dBm) |
| 20              | 18700   | 1860            | QPSK       | 1        | 0         | 23.62               | 26.77            |
|                 |         |                 |            | 1        | 50        | 22.93               | 26.24            |
|                 |         |                 |            | <b>1</b> | <b>99</b> | <b>23.91</b>        | <b>27.13</b>     |
|                 |         |                 |            | 100      | 0         | 23.01               | 27.81            |
|                 |         |                 | 16QAM      | 1        | 0         | 22.80               | 27.23            |
|                 |         |                 |            | 1        | 50        | 22.13               | 26.86            |
|                 |         |                 |            | <b>1</b> | <b>99</b> | <b>22.87</b>        | <b>27.97</b>     |
|                 |         |                 |            | 100      | 0         | 22.05               | 27.64            |
|                 | 18900   | 1880            | QPSK       | <b>1</b> | <b>0</b>  | <b>23.95</b>        | <b>27.27</b>     |
|                 |         |                 |            | 1        | 50        | 23.94               | 27.29            |
|                 |         |                 |            | 1        | 99        | 22.56               | 25.91            |
|                 |         |                 |            | 100      | 0         | 23.06               | 27.7             |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>23.2</b>         | <b>28.25</b>     |
|                 |         |                 |            | 1        | 50        | 23.14               | 28.01            |
|                 |         |                 |            | 1        | 99        | 21.97               | 26.69            |
|                 |         |                 |            | 100      | 0         | 22.1                | 28.22            |
|                 | 19100   | 1900            | QPSK       | 1        | 0         | 22.63               | 25.65            |
|                 |         |                 |            | <b>1</b> | <b>50</b> | <b>23.96</b>        | <b>26.87</b>     |
|                 |         |                 |            | 1        | 99        | 21.6                | 24.69            |
|                 |         |                 |            | 100      | 0         | 23.2                | 28.04            |
|                 |         |                 | 16QAM      | 1        | 0         | 22.01               | 26.21            |
|                 |         |                 |            | <b>1</b> | <b>50</b> | <b>23.09</b>        | <b>27.21</b>     |
|                 |         |                 |            | 1        | 99        | 21.16               | 25.44            |
|                 |         |                 |            | 100      | 0         | 22.4                | 28.53            |





| LTE Band 5      |         |                 |            |          |          |                     |                  |
|-----------------|---------|-----------------|------------|----------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 1.4             | 20407   | 824.7           | QPSK       | 1        | 0        | 23.91               | 27.47            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.98</b>        | <b>27.32</b>     |
|                 |         |                 |            | 1        | 5        | 23.91               | 27.39            |
|                 |         |                 |            | 6        | 0        | 23.11               | 27.82            |
|                 |         |                 | 16QAM      | 1        | 0        | 22.97               | 28.06            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.02</b>        | <b>27.93</b>     |
|                 |         |                 |            | 1        | 5        | 22.95               | 28.1             |
|                 |         |                 |            | 6        | 0        | 22.14               | 28.26            |
|                 | 20525   | 836.5           | QPSK       | 1        | 0        | 23.76               | 27.47            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.79</b>        | <b>27.24</b>     |
|                 |         |                 |            | 1        | 5        | 23.73               | 27.45            |
|                 |         |                 |            | 6        | 0        | 22.77               | 27.25            |
|                 |         |                 | 16QAM      | 1        | 0        | 22.83               | 28.07            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>22.87</b>        | <b>27.87</b>     |
|                 |         |                 |            | 1        | 5        | 22.8                | 27.94            |
|                 |         |                 |            | 6        | 0        | 21.78               | 27.31            |
|                 | 20643   | 848.3           | QPSK       | 1        | 0        | 23.65               | 27.14            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>23.69</b>        | <b>26.87</b>     |
|                 |         |                 |            | 1        | 5        | 23.63               | 26.72            |
|                 |         |                 |            | 6        | 0        | 22.63               | 27.31            |
|                 |         |                 | 16QAM      | 1        | 0        | 22.74               | 27.62            |
|                 |         |                 |            | <b>1</b> | <b>3</b> | <b>22.78</b>        | <b>27.39</b>     |
|                 |         |                 |            | 1        | 5        | 22.68               | 27.19            |
|                 |         |                 |            | 6        | 0        | 21.65               | 27.59            |



| LTE Band 5      |         |                 |            |        |          |                     |                  |
|-----------------|---------|-----------------|------------|--------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 3               | 20415   | 825.5           | QPSK       | 1      | 0        | 23.92               | 27.19            |
|                 |         |                 |            | 1      | 8        | 23.89               | 27.12            |
|                 |         |                 |            | 1      | 14       | 23.88               | 27.16            |
|                 |         |                 |            | 15     | 0        | 23.12               | 27.53            |
|                 |         |                 | 16QAM      | 1      | 0        | 22.97               | 27.92            |
|                 |         |                 |            | 1      | 8        | 22.92               | 27.72            |
|                 |         |                 |            | 1      | 14       | 22.92               | 27.83            |
|                 |         |                 |            | 15     | 0        | 22.16               | 27.97            |
|                 | 20525   | 836.5           | QPSK       | 1      | 0        | 23.82               | 27.3             |
|                 |         |                 |            | 1      | 8        | 23.79               | 27.21            |
|                 |         |                 |            | 1      | 14       | 23.77               | 27.25            |
|                 |         |                 |            | 15     | 0        | 22.82               | 27.19            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.05               | 28.15            |
|                 |         |                 |            | 1      | 8        | 23.0                | 27.9             |
|                 |         |                 |            | 1      | 14       | 22.97               | 27.82            |
|                 |         |                 |            | 15     | 0        | 21.86               | 27.29            |
|                 | 20635   | 847.5           | QPSK       | 1      | 0        | 23.77               | 27.04            |
|                 |         |                 |            | 1      | 8        | 23.72               | 26.98            |
|                 |         |                 |            | 1      | 14       | 23.71               | 26.71            |
|                 |         |                 |            | 15     | 0        | 22.67               | 27.42            |
|                 |         |                 | 16QAM      | 1      | 0        | 22.84               | 27.73            |
|                 |         |                 |            | 1      | 8        | 22.81               | 27.59            |
|                 |         |                 |            | 1      | 14       | 22.76               | 27.11            |
|                 |         |                 |            | 15     | 0        | 21.73               | 27.65            |

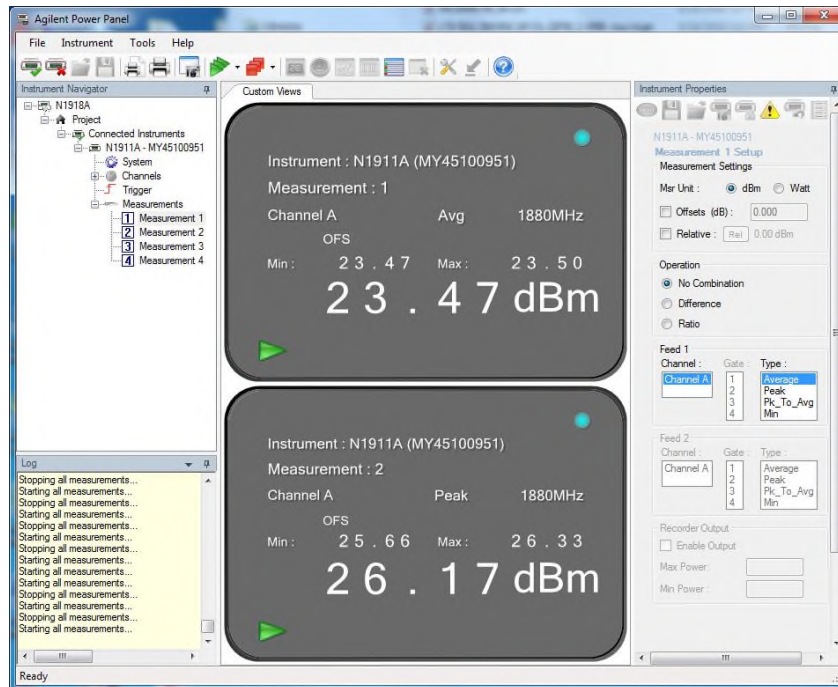


| LTE Band 5      |         |                 |            |          |           |                     |                  |
|-----------------|---------|-----------------|------------|----------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB   | RB Start  | Average Power (dBm) | Peak Power (dBm) |
| 5               | 20425   | 826.5           | QPSK       | 1        | 0         | 23.98               | 27.29            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>23.99</b>        | <b>27.18</b>     |
|                 |         |                 |            | 1        | 24        | 23.93               | 27.22            |
|                 |         |                 |            | 25       | 0         | 23.07               | 27.6             |
|                 |         |                 | 16QAM      | 1        | 0         | 23.26               | 28.07            |
|                 |         |                 |            | <b>1</b> | <b>13</b> | <b>23.28</b>        | <b>27.94</b>     |
|                 |         |                 |            | 1        | 24        | 23.19               | 27.95            |
|                 |         |                 |            | 25       | 0         | 22.13               | 28.08            |
|                 | 20525   | 836.5           | QPSK       | <b>1</b> | <b>0</b>  | <b>23.85</b>        | <b>27.32</b>     |
|                 |         |                 |            | 1        | 13        | 23.85               | 27.14            |
|                 |         |                 |            | 1        | 24        | 23.75               | 26.94            |
|                 |         |                 |            | 25       | 0         | 22.78               | 27.12            |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>22.94</b>        | <b>28.0</b>      |
|                 |         |                 |            | 1        | 13        | 22.89               | 27.54            |
|                 |         |                 |            | 1        | 24        | 22.8                | 27.14            |
|                 |         |                 |            | 25       | 0         | 21.77               | 27.12            |
|                 | 20625   | 846.5           | QPSK       | <b>1</b> | <b>0</b>  | <b>23.78</b>        | <b>27.1</b>      |
|                 |         |                 |            | 1        | 13        | 23.77               | 27.02            |
|                 |         |                 |            | 1        | 24        | 23.66               | 26.91            |
|                 |         |                 |            | 25       | 0         | 22.68               | 27.54            |
|                 |         |                 | 16QAM      | <b>1</b> | <b>0</b>  | <b>23.0</b>         | <b>27.65</b>     |
|                 |         |                 |            | 1        | 13        | 22.99               | 27.63            |
|                 |         |                 |            | 1        | 24        | 22.89               | 27.38            |
|                 |         |                 |            | 25       | 0         | 21.27               | 26.08            |

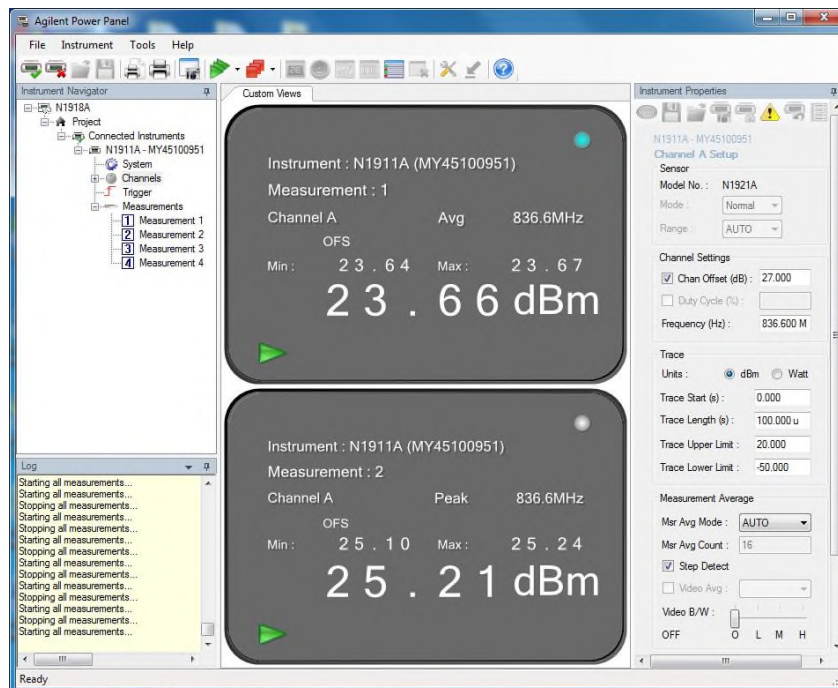


| LTE Band 5      |         |                 |            |        |          |                     |                  |
|-----------------|---------|-----------------|------------|--------|----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Start | Average Power (dBm) | Peak Power (dBm) |
| 10              | 20450   | 829             | QPSK       | 1      | 0        | 23.97               | 27.22            |
|                 |         |                 |            | 1      | 25       | 23.85               | 27.09            |
|                 |         |                 |            | 1      | 49       | 23.69               | 27.08            |
|                 |         |                 |            | 50     | 0        | 22.92               | 27.71            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.01               | 27.9             |
|                 |         |                 |            | 1      | 25       | 22.87               | 27.75            |
|                 |         |                 |            | 1      | 49       | 22.75               | 27.74            |
|                 |         |                 |            | 50     | 0        | 21.93               | 28.0             |
|                 | 20525   | 836.5           | QPSK       | 1      | 0        | 23.98               | 27.29            |
|                 |         |                 |            | 1      | 25       | 23.84               | 27.25            |
|                 |         |                 |            | 1      | 49       | 23.82               | 27.12            |
|                 |         |                 |            | 50     | 0        | 22.83               | 27.29            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.18               | 27.99            |
|                 |         |                 |            | 1      | 25       | 23.04               | 28.02            |
|                 |         |                 |            | 1      | 49       | 23.0                | 27.77            |
|                 |         |                 |            | 50     | 0        | 21.88               | 27.61            |
|                 | 20600   | 844             | QPSK       | 1      | 0        | 23.89               | 27.2             |
|                 |         |                 |            | 1      | 25       | 23.8                | 26.96            |
|                 |         |                 |            | 1      | 49       | 23.72               | 26.91            |
|                 |         |                 |            | 50     | 0        | 22.76               | 28.21            |
|                 |         |                 | 16QAM      | 1      | 0        | 23.03               | 27.82            |
|                 |         |                 |            | 1      | 25       | 22.87               | 27.59            |
|                 |         |                 |            | 1      | 49       | 22.81               | 27.41            |
|                 |         |                 |            | 50     | 0        | 21.76               | 27.15            |

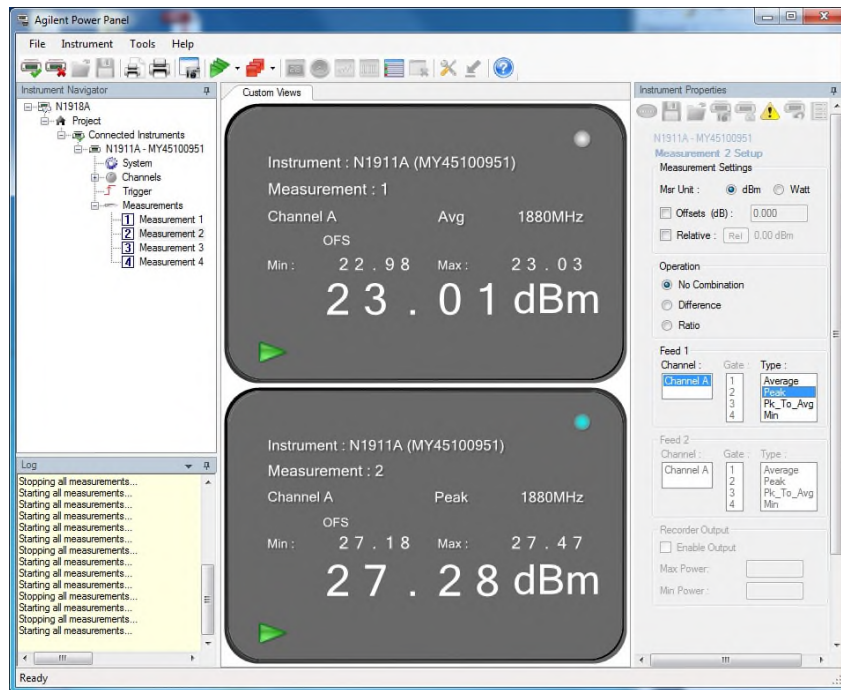
## 2.1.9 Sample Test Measurement Screen



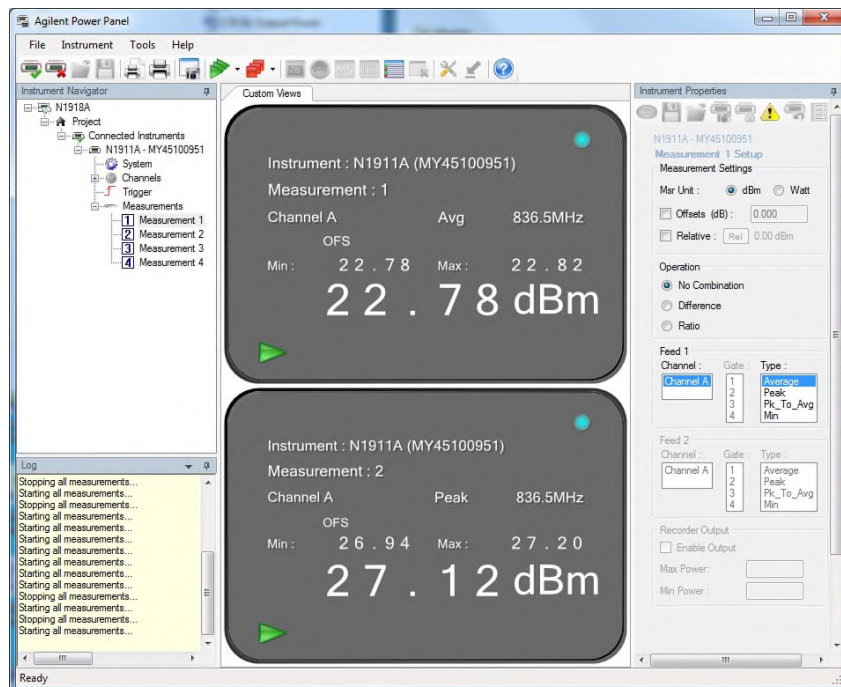
WCDMA Band 2 Middle Channel



WCDMA Band 5 Middle Channel



**LTE Band 2\_5M Bandwidth Middle Channel QPSK Full RB**



**LTE Band 5\_5M Bandwidth Middle Channel QPSK Full RB**



## **2.2 EFFECTIVE RADIATED POWER**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
FCC 47 CFR Part 22, Clause 22.913(a)(5)

### **2.2.2 Standard Applicable**

FCC 47 CFR Part 22.913(a):  
(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

### **2.2.3 Equipment Under Test and Modification State**

Serial No: AZ280418A00044 / Test Configuration (N/A, calculation only)

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

June 16 and 18, 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 Additional Observations**

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

$$\text{ERP} = P_T + G_T - L_c - 2.15\text{dB}$$

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: the -2.15 in the formula is to convert EIRP to ERP);  
 $L_c$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB (EUT configuration during verification is mounted on an interface board with short direct connection to the antenna port. The loss between the EUT and the antenna port is considered negligible).



## 2.2.7 Test Results

| WCDMA Band 5    |                         |                    |       |      |                 |             |
|-----------------|-------------------------|--------------------|-------|------|-----------------|-------------|
| Frequency (MHz) | Max Power Average (dBm) | Antenna Gain (dBi) | ERP   |      |                 |             |
|                 |                         |                    | (dBm) | (W)  | ERP Limit (dBm) | Margin (dB) |
| 826.4           | 23.97                   | -0.5               | 21.32 | 0.14 | 38.45           | 17.13       |
| 836.6           | 23.66                   | -0.5               | 21.01 | 0.13 | 38.45           | 17.44       |
| 846.6           | 23.74                   | -0.5               | 21.09 | 0.13 | 38.45           | 17.36       |

| LTE Band 5 |                 |                |          |                 |                        |                    |           |             |              |
|------------|-----------------|----------------|----------|-----------------|------------------------|--------------------|-----------|-------------|--------------|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | ERP (dBm) | Limit (dBm) | Margin (dBm) |
| QPSK       | 1.4             | 1 / 3          | 20407    | 824.7           | 23.98                  | -0.5               | 21.33     | 38.45       | 17.13        |
|            |                 | 1 / 3          | 20525    | 836.5           | 22.79                  | -0.5               | 20.14     | 38.45       | 18.31        |
|            |                 | 1 / 3          | 20643    | 848.3           | 23.69                  | -0.5               | 21.04     | 38.45       | 17.41        |
|            | 3               | 1 / 0          | 20415    | 825.5           | 23.92                  | -0.5               | 21.27     | 38.45       | 17.18        |
|            |                 | 1 / 0          | 20525    | 836.5           | 23.82                  | -0.5               | 21.17     | 38.45       | 17.13        |
|            |                 | 1 / 0          | 20635    | 847.5           | 23.77                  | -0.5               | 21.12     | 38.45       | 17.33        |
|            | 5               | 1 / 13         | 20425    | 826.5           | 23.99                  | -0.5               | 21.34     | 38.45       | 17.11        |
|            |                 | 1 / 0          | 20525    | 836.5           | 23.85                  | -0.5               | 21.2      | 38.45       | 17.25        |
|            |                 | 1 / 0          | 20625    | 846.5           | 23.78                  | -0.5               | 21.13     | 38.45       | 17.32        |
|            | 10              | 1 / 0          | 20450    | 829             | 23.97                  | -0.5               | 21.32     | 38.45       | 17.13        |
|            |                 | 1 / 0          | 20525    | 836.5           | 23.98                  | -0.5               | 21.33     | 38.45       | 17.12        |
|            |                 | 1 / 0          | 20600    | 844             | 23.89                  | -0.5               | 21.24     | 38.45       | 17.21        |
| 16QAM      | 1.4             | 1 / 3          | 20407    | 824.7           | 23.02                  | -0.5               | 20.37     | 38.45       | 18.08        |
|            |                 | 1 / 3          | 20525    | 836.5           | 22.87                  | -0.5               | 20.22     | 38.45       | 18.23        |
|            |                 | 1 / 3          | 20643    | 848.3           | 22.78                  | -0.5               | 20.13     | 38.45       | 18.32        |
|            | 3               | 1 / 0          | 20415    | 825.5           | 22.97                  | -0.5               | 20.32     | 38.45       | 18.13        |
|            |                 | 1 / 0          | 20525    | 836.5           | 23.05                  | -0.5               | 20.4      | 38.45       | 18.05        |
|            |                 | 1 / 0          | 20635    | 847.5           | 22.84                  | -0.5               | 20.19     | 38.45       | 18.26        |
|            | 5               | 1 / 13         | 20425    | 826.5           | 23.28                  | -0.5               | 20.63     | 38.45       | 17.82        |
|            |                 | 1 / 0          | 20525    | 836.5           | 22.94                  | -0.5               | 20.29     | 38.45       | 18.16        |
|            |                 | 1 / 0          | 20625    | 846.5           | 23.0                   | -0.5               | 20.35     | 38.45       | 18.1         |
|            | 10              | 1 / 0          | 20450    | 829             | 23.01                  | -0.5               | 20.36     | 38.45       | 18.09        |
|            |                 | 1 / 0          | 20525    | 836.5           | 23.18                  | -0.5               | 20.53     | 38.45       | 17.92        |
|            |                 | 1 / 0          | 20600    | 844             | 23.03                  | -0.5               | 20.38     | 38.45       | 18.07        |





## **2.3 EQUIVALENT ISOTROPIC RADIATED POWER**

### **2.3.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
RSS-132, Clause 5.4  
FCC 47 CFR Part 24, Clause 24.232(c)  
RSS-133, Clause 6.4

### **2.3.2 Standard Applicable**

RSS-132, Clause 5.4:  
The EIRP for mobile equipment shall not exceed 11.5 watts

FCC 47 CFR Part 24.232:  
(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

RSS-133, Clause 6.4:  
The equivalent isotropically radiated power (e.i.r.p.) for Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p.

### **2.3.3 Equipment Under Test and Modification State**

Serial No: AZ280418A00044 / Test Configuration (N/A, calculation only)

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

June 16 and 18, 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 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:

$$\text{EIRP} = P_T + G_T - L_c$$

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 poses an internal Antenna. The loss between the EUT and the antenna port is considered negligible).



### 2.3.7 Test Results

| WCDMA Band 2    |                         |                    |              |             |             |             |
|-----------------|-------------------------|--------------------|--------------|-------------|-------------|-------------|
| Frequency (MHz) | Max Power Average (dBm) | Antenna Gain (dBi) | EIRP         |             |             |             |
|                 |                         |                    | (dBm)        | (W)         | Limit (dBm) | Margin (dB) |
| 1852.4          | 23.22                   | 0.5                | 23.72        | 0.24        | 33          | 9.28        |
| <b>1880.0</b>   | <b>23.47</b>            | <b>0.5</b>         | <b>23.97</b> | <b>0.25</b> | <b>33</b>   | <b>9.03</b> |
| 1907.6          | 23.07                   | 0.5                | 23.57        | 0.23        | 33          | 9.43        |

| WCDMA Band 5    |                         |                    |              |             |                  |              |
|-----------------|-------------------------|--------------------|--------------|-------------|------------------|--------------|
| Frequency (MHz) | Max Power Average (dBm) | Antenna Gain (dBi) | EIRP         |             |                  |              |
|                 |                         |                    | (dBm)        | (W)         | EIRP Limit (dBm) | Margin (dB)  |
| <b>826.4</b>    | <b>23.97</b>            | <b>-0.5</b>        | <b>23.47</b> | <b>0.22</b> | <b>40.61</b>     | <b>17.14</b> |
| 836.6           | 23.66                   | -0.5               | 23.16        | 0.21        | 40.61            | 17.45        |
| 846.6           | 23.74                   | -0.5               | 23.24        | 0.21        | 40.61            | 17.37        |



| LTE Band 2 |                 |                |              |                 |                        |                    |             |             |              |
|------------|-----------------|----------------|--------------|-----------------|------------------------|--------------------|-------------|-------------|--------------|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels     | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm)  | Limit (dBm) | Margin (dBm) |
| QPSK       | 1.4             | 1 / 0          | 18607        | 1850.7          | 23.87                  | 0.5                | 24.37       | 33          | 8.63         |
|            |                 | 1 / 3          | 18900        | 1880.0          | 23.94                  | 0.5                | 24.44       | 33          | 8.56         |
|            |                 | 1 / 0          | 19193        | 1909.3          | 23.11                  | 0.5                | 23.61       | 33          | 10.39        |
|            | 3               | 1 / 0          | 18615        | 1851.5          | 23.91                  | 0.5                | 24.41       | 33          | 8.59         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.91                  | 0.5                | 24.41       | 33          | 9.59         |
|            |                 | 1 / 0          | 19185        | 1908.5          | 22.96                  | 0.5                | 23.46       | 33          | 9.54         |
|            | 5               | 1 / 13         | 18625        | 1852.5          | 23.82                  | 0.5                | 24.32       | 33          | 9.63         |
|            |                 | 1 / 13         | 18900        | 1880.0          | 24.0                   | 0.5                | 24.5        | 33          | 8.5          |
|            |                 | 1 / 0          | 19175        | 1907.5          | 23.9                   | 0.5                | 24.4        | 33          | 8.6          |
|            | 10              | 1 / 0          | 18650        | 1855.0          | 23.97                  | 0.5                | 24.47       | 33          | 8.53         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.94                  | 0.5                | 24.44       | 33          | 9.56         |
|            |                 | <b>1 / 0</b>   | <b>19150</b> | <b>1905.0</b>   | <b>24.0</b>            | <b>0.5</b>         | <b>24.5</b> | <b>33</b>   | <b>8.5</b>   |
|            | 15              | 1 / 0          | 18675        | 1857.5          | 23.68                  | 0.5                | 24.18       | 33          | 8.82         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.91                  | 0.5                | 24.41       | 33          | 8.59         |
|            |                 | 1 / 0          | 19125        | 1902.5          | 23.92                  | 0.5                | 24.42       | 33          | 8.58         |
|            | 20              | 1 / 99         | 18700        | 1860.0          | 23.91                  | 0.5                | 24.41       | 33          | 8.59         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.95                  | 0.5                | 24.45       | 33          | 8.55         |
|            |                 | 1 / 50         | 19100        | 1900.0          | 23.96                  | 0.5                | 24.46       | 33          | 8.54         |



| LTE Band 2 |                 |                |              |                 |                        |                    |              |             |              |
|------------|-----------------|----------------|--------------|-----------------|------------------------|--------------------|--------------|-------------|--------------|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels     | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm)   | Limit (dBm) | Margin (dBm) |
| 16QAM      | 1.4             | 1 / 0          | 18607        | 1850.7          | 22.92                  | 0.5                | 23.42        | 33          | 9.58         |
|            |                 | 1 / 3          | 18900        | 1880.0          | 23.06                  | 0.5                | 23.56        | 33          | 9.44         |
|            |                 | 1 / 0          | 19193        | 1909.3          | 21.56                  | 0.5                | 22.06        | 33          | 10.94        |
|            | 3               | 1 / 0          | 18615        | 1851.5          | 22.96                  | 0.5                | 23.46        | 33          | 9.54         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.11                  | 0.5                | 23.61        | 33          | 9.39         |
|            |                 | 1 / 0          | 19185        | 1908.5          | 22.4                   | 0.5                | 22.9         | 33          | 10.1         |
|            | 5               | 1 / 13         | 18625        | 1852.5          | 23.18                  | 0.5                | 23.68        | 33          | 9.32         |
|            |                 | 1 / 13         | 18900        | 1880.0          | 23.1                   | 0.5                | 23.6         | 33          | 9.4          |
|            |                 | 1 / 0          | 19175        | 1907.5          | 23.15                  | 0.5                | 23.65        | 33          | 9.35         |
|            | 10              | 1 / 0          | 18650        | 1855.0          | 23.19                  | 0.5                | 23.69        | 33          | 9.31         |
|            |                 | <b>1 / 0</b>   | <b>18900</b> | <b>1880.0</b>   | <b>23.32</b>           | <b>0.5</b>         | <b>23.82</b> | <b>33</b>   | <b>9.18</b>  |
|            |                 | 1 / 0          | 19150        | 1905.0          | 23.11                  | 0.5                | 23.61        | 33          | 9.39         |
|            | 15              | 1 / 0          | 18675        | 1857.5          | 22.91                  | 0.5                | 23.41        | 33          | 9.59         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.16                  | 0.5                | 23.66        | 33          | 9.34         |
|            |                 | 1 / 38         | 19125        | 1902.5          | 23.19                  | 0.5                | 23.69        | 33          | 9.31         |
|            | 20              | 1 / 99         | 18700        | 1860.0          | 22.87                  | 0.5                | 23.37        | 33          | 9.63         |
|            |                 | 1 / 0          | 18900        | 1880.0          | 23.2                   | 0.5                | 23.7         | 33          | 9.3          |
|            |                 | 1 / 50         | 19100        | 1900.0          | 23.09                  | 0.5                | 23.59        | 33          | 9.41         |



| LTE Band 5 |                 |                |              |                 |                        |                    |              |              |              |
|------------|-----------------|----------------|--------------|-----------------|------------------------|--------------------|--------------|--------------|--------------|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels     | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm)   | Limit (dBm)  | Margin (dBm) |
| QPSK       | 1.4             | 1 / 3          | 20407        | 824.7           | 23.98                  | -0.5               | 23.48        | 40.61        | 17.13        |
|            |                 | 1 / 3          | 20525        | 836.5           | 22.79                  | -0.5               | 22.29        | 40.61        | 18.32        |
|            |                 | 1 / 3          | 20643        | 848.3           | 23.69                  | -0.5               | 23.19        | 40.61        | 17.42        |
|            | 3               | 1 / 0          | 20415        | 825.5           | 23.92                  | -0.5               | 23.42        | 40.61        | 17.19        |
|            |                 | 1 / 0          | 20525        | 836.5           | 23.82                  | -0.5               | 23.32        | 40.61        | 17.29        |
|            |                 | 1 / 0          | 20635        | 847.5           | 23.77                  | -0.5               | 23.27        | 40.61        | 17.34        |
|            | 5               | <b>1 / 13</b>  | <b>20425</b> | <b>826.5</b>    | <b>23.99</b>           | <b>-0.5</b>        | <b>23.49</b> | <b>40.61</b> | <b>17.12</b> |
|            |                 | 1 / 0          | 20525        | 836.5           | 23.85                  | -0.5               | 23.35        | 40.61        | 17.26        |
|            |                 | 1 / 0          | 20625        | 846.5           | 23.78                  | -0.5               | 23.28        | 40.61        | 17.33        |
|            | 10              | 1 / 0          | 20450        | 829             | 23.97                  | -0.5               | 23.47        | 40.61        | 17.14        |
|            |                 | 1 / 0          | 20525        | 836.5           | 23.98                  | -0.5               | 23.48        | 40.61        | 17.13        |
|            |                 | 1 / 0          | 20600        | 844             | 23.89                  | -0.5               | 23.39        | 40.61        | 17.22        |
| 16QAM      | 1.4             | 1 / 3          | 20407        | 824.7           | 23.02                  | -0.5               | 22.52        | 40.61        | 18.09        |
|            |                 | 1 / 3          | 20525        | 836.5           | 22.87                  | -0.5               | 22.37        | 40.61        | 18.24        |
|            |                 | 1 / 3          | 20643        | 848.3           | 22.78                  | -0.5               | 22.28        | 40.61        | 18.33        |
|            | 3               | 1 / 0          | 20415        | 825.5           | 22.97                  | -0.5               | 22.47        | 40.61        | 18.14        |
|            |                 | 1 / 0          | 20525        | 836.5           | 23.05                  | -0.5               | 22.55        | 40.61        | 18.06        |
|            |                 | 1 / 0          | 20635        | 847.5           | 22.84                  | -0.5               | 22.34        | 40.61        | 18.27        |
|            | 5               | <b>1 / 13</b>  | <b>20425</b> | <b>826.5</b>    | <b>23.28</b>           | <b>-0.5</b>        | <b>22.78</b> | <b>40.61</b> | <b>17.83</b> |
|            |                 | 1 / 0          | 20525        | 836.5           | 22.94                  | -0.5               | 22.44        | 40.61        | 18.17        |
|            |                 | 1 / 0          | 20625        | 846.5           | 23.0                   | -0.5               | 22.5         | 40.61        | 18.11        |
|            | 10              | 1 / 0          | 20450        | 829             | 23.01                  | -0.5               | 22.51        | 40.61        | 18.1         |
|            |                 | 1 / 0          | 20525        | 836.5           | 23.18                  | -0.5               | 22.68        | 40.61        | 17.93        |
|            |                 | 1 / 0          | 20600        | 844             | 23.03                  | -0.5               | 22.53        | 40.61        | 18.08        |



## **2.4 PEAK-AVERAGE RATIO**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 24, Clause 24.232 (d)  
RSS-133, Clause 6.4  
RSS-132, Clause 5.4

### **2.4.2 Standard Applicable**

FCC 47 CFR Part 24.232:

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

RSS-132 and RSS-133:

The transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

### **2.4.3 Equipment Under Test and Modification State**

Serial No: AZ280418A00044 / Test Configuration A

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

June 12 and 13, 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 | 24.9 - 25.7 °C |
| Relative Humidity   | 53.3 - 54.2%   |
| ATM Pressure        | 98.5 kPa       |



#### **2.4.7 Additional Observations**

- This is a conducted test.
- As per FCC KDB 971168 D01 v03r01 clause 5.7, the PAPR was measured in accordance with ANSI C63.26 clause 5.2.3.4.
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio). The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signals spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth.
- Low, Middle and High channels for all bandwidths and modulations were verified.
- The path loss for was measured and entered as a level offset.
- There are no measured PAPR levels greater than 13dB. EUT complies.



## 2.4.8 Test Results

| WCDMA |          |                 |          |                    |
|-------|----------|-----------------|----------|--------------------|
| Band  | Channels | Frequency (MHz) | PAR (dB) | Limit for PAR (dB) |
| 2     | 12       | 1852.5          | 3.5      | 13                 |
|       | 9400     | 1880            | 2.46     | 13                 |
|       | 287      | 1907.5          | 3.13     | 13                 |
| 5     | 4132     | 826.4           | 2.04     | 13                 |
|       | 4183     | 836.6           | 1.76     | 13                 |
|       | 4233     | 846.6           | 2.83     | 13                 |

| LTE Band 2 |                 |          |                 |          |                    |
|------------|-----------------|----------|-----------------|----------|--------------------|
| Modulation | Bandwidth (MHz) | Channels | Frequency (MHz) | PAR (dB) | Limit for PAR (dB) |
| QPSK       | 1.4             | 18607    | 1850.7          | 4.39     | 13                 |
|            |                 | 18900    | 1880            | 4.35     | 13                 |
|            |                 | 19193    | 1909.3          | 3.01     | 13                 |
|            | 3               | 18615    | 1851.5          | 4.34     | 13                 |
|            |                 | 18900    | 1880            | 4.45     | 13                 |
|            |                 | 19185    | 1908.5          | 2.99     | 13                 |
|            | 5               | 18625    | 1852.5          | 4.24     | 13                 |
|            |                 | 18900    | 1880            | 4.59     | 13                 |
|            |                 | 19175    | 1907.5          | 3.65     | 13                 |
|            | 10              | 18650    | 1855            | 4.83     | 13                 |
|            |                 | 18900    | 1880            | 5.34     | 13                 |
|            |                 | 19150    | 1905            | 4.5      | 13                 |
|            | 15              | 18675    | 1857.5          | 5.75     | 13                 |
|            |                 | 18900    | 1880            | 5.47     | 13                 |
|            |                 | 19125    | 1902.5          | 5.08     | 13                 |
|            | 20              | 18700    | 1860            | 6.57     | 13                 |
|            |                 | 18900    | 1880            | 6.33     | 13                 |
|            |                 | 19100    | 1900            | 6.61     | 13                 |
| 16QAM      | 1.4             | 18607    | 1850.7          | 5.58     | 13                 |
|            |                 | 18900    | 1880            | 5.44     | 13                 |
|            |                 | 19193    | 1909.3          | 4.05     | 13                 |
|            | 3               | 18615    | 1851.5          | 5.47     | 13                 |
|            |                 | 18900    | 1880            | 5.55     | 13                 |
|            |                 | 19185    | 1908.5          | 4.28     | 13                 |
|            | 5               | 18625    | 1852.5          | 5.37     | 13                 |
|            |                 | 18900    | 1880            | 5.61     | 13                 |
|            |                 | 19175    | 1907.5          | 5.04     | 13                 |
|            | 10              | 18650    | 1855            | 5.88     | 13                 |
|            |                 | 18900    | 1880            | 6.92     | 13                 |
|            |                 | 19150    | 1905            | 5.82     | 13                 |
|            | 15              | 18675    | 1857.5          | 6.66     | 13                 |
|            |                 | 18900    | 1880            | 7.0      | 13                 |
|            |                 | 19125    | 1902.5          | 6.78     | 13                 |
|            | 20              | 18700    | 1860            | 7.95     | 13                 |
|            |                 | 18900    | 1880            | 7.66     | 13                 |
|            |                 | 19100    | 1900            | 7.82     | 13                 |



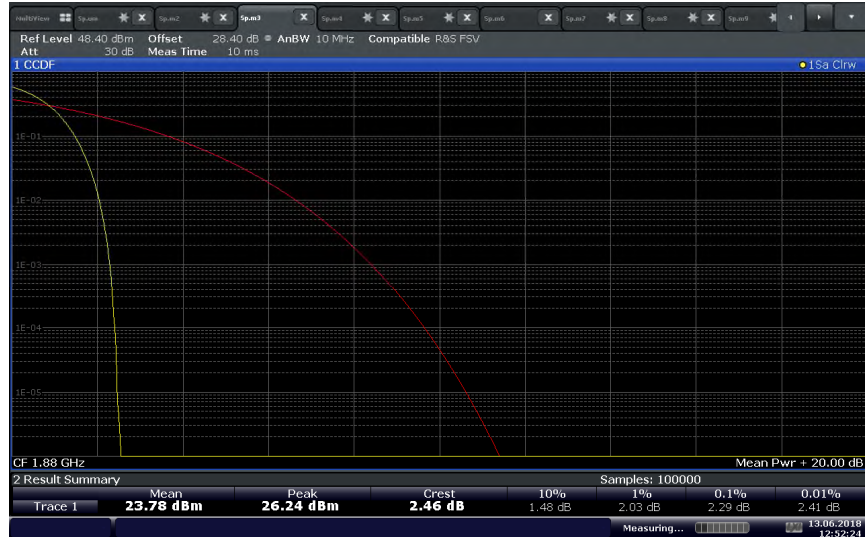




| LTE Band 5 |                 |          |                 |          |                    |
|------------|-----------------|----------|-----------------|----------|--------------------|
| Modulation | Bandwidth (MHz) | Channels | Frequency (MHz) | PAR (dB) | Limit for PAR (dB) |
| QPSK       | 1.4             | 20407    | 824.7           | 4.83     | 13                 |
|            |                 | 20525    | 836.5           | 4.6      | 13                 |
|            |                 | 20643    | 848.3           | 3.9      | 13                 |
|            | 3               | 20415    | 825.5           | 4.66     | 13                 |
|            |                 | 20525    | 836.5           | 5.09     | 13                 |
|            |                 | 20635    | 847.5           | 4.76     | 13                 |
|            | 5               | 20425    | 826.5           | 4.91     | 13                 |
|            |                 | 20525    | 836.5           | 4.97     | 13                 |
|            |                 | 20625    | 846.5           | 5.41     | 13                 |
|            | 10              | 20450    | 829             | 5.24     | 13                 |
|            |                 | 20525    | 836.5           | 4.98     | 13                 |
|            |                 | 20600    | 844             | 5.7      | 13                 |
| 16QAM      | 1.4             | 20407    | 824.7           | 6.2      | 13                 |
|            |                 | 20525    | 836.5           | 5.05     | 13                 |
|            |                 | 20643    | 848.3           | 5.07     | 13                 |
|            | 3               | 20415    | 825.5           | 6.08     | 13                 |
|            |                 | 20525    | 836.5           | 6.16     | 13                 |
|            |                 | 20635    | 847.5           | 5.93     | 13                 |
|            | 5               | 20425    | 826.5           | 6.1      | 13                 |
|            |                 | 20525    | 836.5           | 6.27     | 13                 |
|            |                 | 20625    | 846.5           | 6.28     | 13                 |
|            | 10              | 20450    | 829             | 6.42     | 13                 |
|            |                 | 20525    | 836.5           | 6.39     | 13                 |
|            |                 | 20600    | 844             | 6.79     | 13                 |

## 2.4.9 Example Test Plots

### WCDMA – Band 2 Middle Channel 1880.0 MHz



12:52:25 13.06.2018

### WCDMA – Band 5 Middle Chncl 836.6 MHz



12:58:05 13.06.2018

### LTE Band 2 (1.4 MHz BW) / Middle Channel 1880 MHz / QPSK



16:17:35 12.06.2018

### LTE Band 2 (1.4 MHz BW) / Middle Channel 1880 MHz / 16QAM



16:17:01 12.06.2018

Ref Level 48.00 dBm Att 30 dB Offset 28.00 dB AnBW 10 MHz Compatible R&S FSV
 Meas Time 10 ms

1 CCDF

CF 1.88 GHz Mean Pwr + 20.00 dB

2 Result Summary

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 22.79 dBm | 27.24 dBm | 4.45 dB | 2.32 dB | 3.51 dB | 3.94 dB | 4.23 dB |

Measuring... 12.06.2018 16:16:08

WinRF

Spectrum 3

Ref Level 48.00 dBm Offset 28.00 dB AnBW 10 MHz Compatible R85 FSV

Att 30 dB Meas Time 10 ms

1 CCDF

CF 1.88 GHz

Mean Pwr + 20.00 dB

2 Result Summary

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 21.79 dBm | 27.34 dBm | 5.55 dB | 2.81 dB | 4.46 dB | 5.10 dB | 5.36 dB |

Measuring...

12/06/2014 16:15:58

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Ref Level 48.00 dBm Att 30 dB Offset 28.00 dB AnBW 10 MHz Compatible R&S FSV

Meas Time 10 ms

1 CCDF

CF 1.88 GHz Mean Pwr + 20.00 dB

2 Result Summary

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 22.81 dBm | 27.41 dBm | 4.59 dB | 2.23 dB | 3.51 dB | 4.09 dB | 4.35 dB |

Samples: 100000

Measuring...

12.06.2018 16:14:12

Ref Level 48.00 dBm Att 30 dB Offset 28.00 dB Meas Time 10 ms AnBW 10 MHz Compatible R&S FSV

1 CCDF

CF 1.88 GHz

2 Result Summary

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 21.82 dBm | 27.43 dBm | 5.61 dB | 2.75 dB | 4.43 dB | 5.13 dB | 5.45 dB |

Samples: 100000

Measuring...

12.06.2018 16:14:53

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LTE Band 2 (10 MHz BW) / Middle Channel 1880 MHz / QPSK



16:12:52 12.06.2018

LTE Band 2 (10 MHz BW) / Middle Channel 1880 MHz / 16QAM



16:13:23 12.06.2018



LTE Band 2 (15 MHz BW) / Middle Channel 1880 MHz / QPSK



16:11:37 12.06.2018

LTE Band 2 (15 MHz BW) / Middle Channel 1880 MHz / 16QAM



16:12:13 12.06.2018



LTE Band 2 (20 MHz BW) / Middle Channel 1880 MHz / QPSK



16:10:01 12.06.2018

LTE Band 2 (20 MHz BW) / Middle Channel 1880 MHz / 16QAM



16:10:58 12.06.2018

### LTE Band 5 (1.4 MHz BW) / Middle Channel 836.5 MHz / QPSK



12:10:41 13.06.2018

### LTE Band 5 (1.4 MHz BW) / Middle Channel 836.5 MHz / 16QAM



10:18:06 13.06.2018

### LTE Band 5 (3 MHz BW) / Middle Channel 836.5 MHz / QPSK



10:17:26 13.06.2018

### LTE Band 5 (3 MHz BW) / Middle Channel 836.5 MHz / 16QAM



10:18:06 13.06.2018

Ref Level 47.10 dBm Att 30 dB Offset 27.10 dB AnBW 10 MHz Compatible R&S FSV

1 CCDF

CF 836.5 MHz

Mean Pwr + 20.00 dB

2 Result Summary

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 22.80 dBm | 27.77 dBm | 4.97 dB | 2.35 dB | 3.71 dB | 4.41 dB | 4.72 dB |

Measuring...

13.06.2018 10:04:27

The screenshot displays the iSa ClrW software interface. At the top, there are tabs for various measurement views: 'Ref Level', 'Offset', 'Att', 'Meas Time', 'AnBW', 'Compatible', 'R&S FSV', 'Spectrum 1', 'Spectrum 2', 'Spectrum 3', 'Spectrum 4', 'Spectrum 5', and 'Spectrum 6'. The 'Spectrum 3' tab is active.

The main plot area shows a CCDF (Complementary Cumulative Distribution Function) plot. The y-axis is labeled '1 CCDF' and ranges from 1E-01 to 1E-05. The x-axis is labeled 'Mean Pwr + 20.00 dB' and ranges from CF 836.5 MHz to 1000.0 MHz. A red curve represents the measured data, and a green curve represents the reference data. The curves are very close, indicating good performance.

Below the plot, there is a '2 Result Summary' section. It contains a table with the following data:

| Trace 1 | Mean      | Peak      | Crest   | 10%     | 1%      | 0.1%    | 0.01%   |
|---------|-----------|-----------|---------|---------|---------|---------|---------|
|         | 21.86 dBm | 28.13 dBm | 6.27 dB | 2.78 dB | 4.70 dB | 5.51 dB | 6.09 dB |

At the bottom right, there is a 'Measuring...' status bar with a progress indicator and a timestamp of 13.06.2018 10:00:52.

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### LTE Band 5 (10 MHz BW) / Middle Channel 836.5 MHz / QPSK



10:13:21 13.06.2018

### LTE Band 5 (10 MHz BW) / Middle Channel 836.5 MHz / 16QAM



10:12:15 13.06.2018