

# FCC PART 27

## MEASUREMENT AND TEST REPORT

For

### Baicells Technologies Co., Ltd.

3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist.,  
Beijing, China

**FCC ID: 2AG32BRU3510**

|                                        |                                                                                                                                                                                                                                                                                             |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>LTE-TDD Base Station                                                                                                                                                                                                                                                |
| <b>Test Engineer:</b> Rocky Kang       | <i>Rocky Kang</i>                                                                                                                                                                                                                                                                           |
| <b>Report Number:</b> RSZ160517009-00B |                                                                                                                                                                                                                                                                                             |
| <b>Report Date:</b> 2016-06-27         |                                                                                                                                                                                                                                                                                             |
| <b>Reviewed By:</b> RF Engineer        | <i>Bell Hu</i>                                                                                                                                                                                                                                                                              |
| <b>Prepared By:</b>                    | Bay Area Compliance Laboratories Corp. (Shenzhen)<br>6/F, the 3rd Phase of WanLi Industrial Building<br>ShiHua Road, FuTian Free Trade Zone<br>Shenzhen, Guangdong, China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008<br><a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a> |

**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Baicells Technologies Co., Ltd.*'s product, model number: *BRU3510(FCC ID: 2AG32BRU3510)* or the "EUT" in this report was a *LTE-TDD Base Station*, which was measured approximately: 465 mm (L) × 390 mm (W) × 120 mm (H), rated with input voltage: rated with input voltage: -48V DC.

*\*All measurement and test data in this report was gathered from production sample serial number: 1602292 (Assigned by Shenzhen BACL). The EUT supplied by the applicant was received on 2016-05-17.*

### Objective

This type approval report is prepared on behalf of *Baicells Technologies Co., Ltd.* in accordance with Part 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, and band edge.

### Related Submittal(s)/Grant(s)

N/A

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-Part J as well as the following parts:

Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2103. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

### Equipment Modifications

No modifications were made to the EUT.

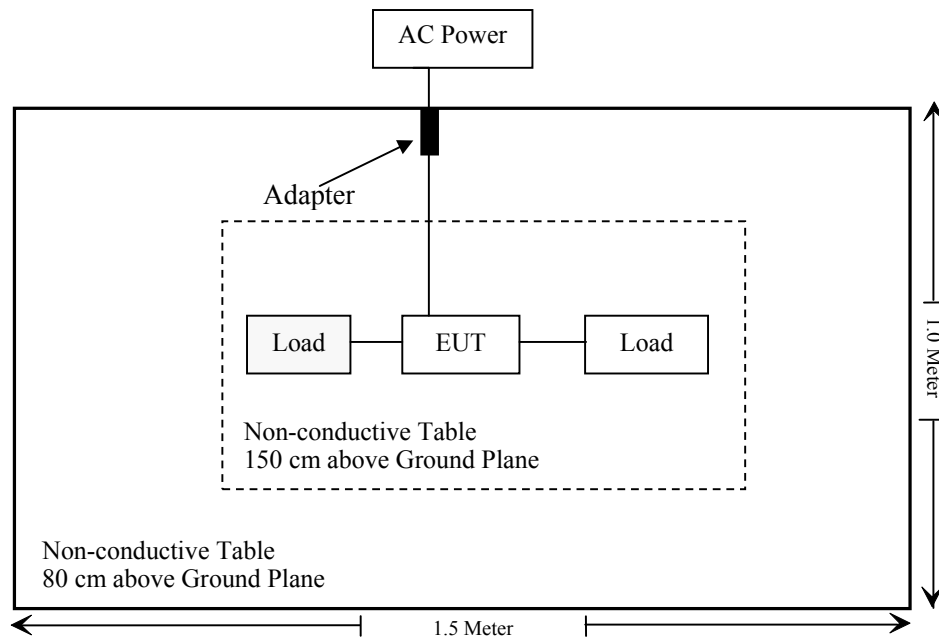
### Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| N/A          | Load        | N/A   | N/A           |

### External I/O Cable

| Cable Description                         | Length (m) | From/Port | To      |
|-------------------------------------------|------------|-----------|---------|
| Un-shielding Un-detachable DC Power Cable | 1.4        | Adapter   | EUT     |
| Un-shielding Detachable AC Power Cable    | 1.8        | AC Power  | Adapter |

## Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules       | Description of Test                    | Result         |
|-----------------|----------------------------------------|----------------|
| § 2.1091&§27.52 | Maximum Permissible exposure (MPE)     | Compliance     |
| § 27.50(h) (4)  | Spectral Power Density                 | Not Applicable |
| §27.50(h)       | RF Output Power                        | Compliance     |
| § 2.1047        | Modulation Characteristics             | Not Applicable |
| §2.1049 &§27    | Occupied Bandwidth                     | Compliance     |
| §27.53(m) (2)   | Spurious Emissions at Antenna Terminal | Compliance     |
| §27.53 (m) (2)  | Spurious Radiated Emissions            | Compliance     |
| §27.53 (m) (2)  | Band Edge                              | Compliance     |
| §27.54&§2.1055  | Frequency stability                    | Compliance     |

## FCC §1.1307 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

| Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|-----------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                               | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (Minutes) |
| 0.3-1.34                                            | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                             | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300                                              | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500                                            | /                             | /                             | f/1500                              | 30                       |
| 1500-100,000                                        | /                             | /                             | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For worst case:

| Test Band   | Frequency (MHz) | Tune-up power |       | Antenna Gain | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) |
|-------------|-----------------|---------------|-------|--------------|--------------------------|-------------------------------------|---------------------------------|
|             |                 | (dBm)         | (mW)  |              |                          |                                     |                                 |
| TDD Band 41 | 2496-2690       | 43.0          | 19953 | 17           | 400                      | 0.5                                 | 1.0                             |

The Maximum Gain is 17.0 dBi

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 400cm from nearby persons.

### Result: Compliance

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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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According to FCC § 2.1047(d) , Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

## **FCC § 27.50(h) - RF OUTPUT POWER**

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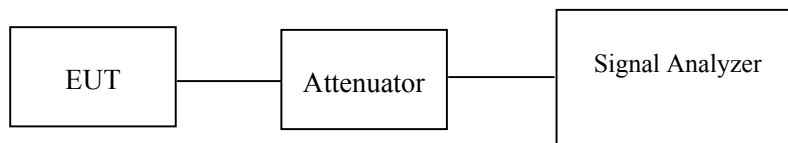
### **Applicable Standards**

According to §27.50(h).

### **Test Procedure**

*Conducted method:*

The RF output of the transmitter was connected to the Signal Analyzer through sufficient attenuation.



*Radiated method:*

TIA603-D section 2.2.17

**Test Equipment List and Details**

| Manufacturer          | Description     | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|---------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028    | 2015-12-11       | 2016-12-11           |
| Ducommun technologies | RF Cable        | RG-214          | 4             | 2015-06-15       | 2016-06-15           |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507  | 2015-06-12       | 2016-06-12           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 24 °C    |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by Rocky Kang on 2016-06-01.*

For QPSK:

| Frequency<br>(MHz) | Power (dBm) |           | Total power<br>(dBm) | Antenna<br>Gain<br>(dBi) | Total<br>EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-------------|-----------|----------------------|--------------------------|------------------------|----------------|----------------|
|                    | Antenna 1   | Antenna 2 |                      |                          |                        |                |                |
| 10 MHz Bandwidth   |             |           |                      |                          |                        |                |                |
| 2501               | 39.25       | 39.33     | 42.30                | 17                       | 59.30                  | 65.13          | 5.83           |
| 2593               | 38.77       | 39.55     | 42.19                | 17                       | 59.19                  | 64.75          | 5.56           |
| 2685               | 39.03       | 39.14     | 42.10                | 17                       | 59.10                  | 65.13          | 6.03           |
| 20MHz Bandwidth    |             |           |                      |                          |                        |                |                |
| 2506               | 39.37       | 39.26     | 42.33                | 17                       | 59.33                  | 68.14          | 8.81           |
| 2593               | 39.45       | 39.60     | 42.54                | 17                       | 59.54                  | 67.76          | 8.22           |
| 2680               | 39.16       | 38.88     | 42.03                | 17                       | 59.03                  | 68.14          | 9.11           |

For 64QAM:

| Frequency<br>(MHz) | Power (dBm) |           | Total<br>power<br>(dBm) | Antenna<br>Gain<br>(dBi) | Total<br>EIRP<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-------------|-----------|-------------------------|--------------------------|------------------------|----------------|----------------|
|                    | Antenna 1   | Antenna 2 |                         |                          |                        |                |                |
| 10 MHz Bandwidth   |             |           |                         |                          |                        |                |                |
| 2501               | 38.61       | 39.21     | 41.93                   | 17                       | 58.93                  | 65.13          | 6.20           |
| 2593               | 39.03       | 39.14     | 42.10                   | 17                       | 59.10                  | 64.75          | 5.65           |
| 2685               | 39.16       | 38.76     | 41.97                   | 17                       | 58.97                  | 65.13          | 6.16           |
| 20MHz Bandwidth    |             |           |                         |                          |                        |                |                |
| 2506               | 39.63       | 39.28     | 42.47                   | 17                       | 59.47                  | 68.14          | 8.67           |
| 2593               | 39.27       | 39.04     | 42.17                   | 17                       | 59.17                  | 67.76          | 8.59           |
| 2680               | 38.87       | 39.08     | 41.99                   | 17                       | 58.99                  | 68.14          | 9.15           |

**Note:**

1.  $EIRP = 33 \text{ dBW} + 10 \log(X/Y) \text{ dBW} + 10 \log(360/\text{beamwidth}) \text{ dBW}$ , where X is the actual channel width in MHz, Y is MBS (6MHz) or LBS & UBS (5.5MHz).
2. Lower Band Segment (LBS). Segment of the BRS/EBS band consisting of channels in the frequencies 2496-2572 MHz.
3. Middle Band Segment (MBS). Segment of the BRS/EBS band consisting of channels in the frequencies 2572-2614 MHz.
4. Upper Band Segment (UBS). Segment of the BRS/EBS band consisting of channels in the frequencies 2614-2690 MHz.
5. Beamwidth at 360 is the worst case.

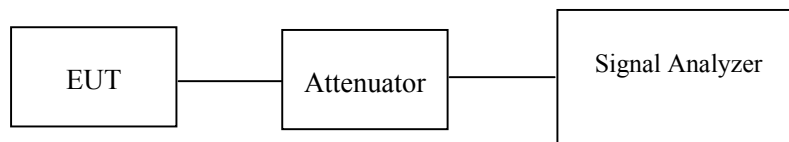
**FCC §2.1049&27.53- OCCUPIED BANDWIDTH****Applicable Standards**

FCC 47 §2.1049

**Test Procedure**

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at approximate 1% of the OBW and the 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

| Manufacturer          | Description     | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|---------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028    | 2015-12-11       | 2016-12-11           |
| Ducommun technologies | RF Cable        | RG-214          | 4             | 2015-06-15       | 2016-06-15           |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507  | 2015-06-12       | 2016-06-12           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

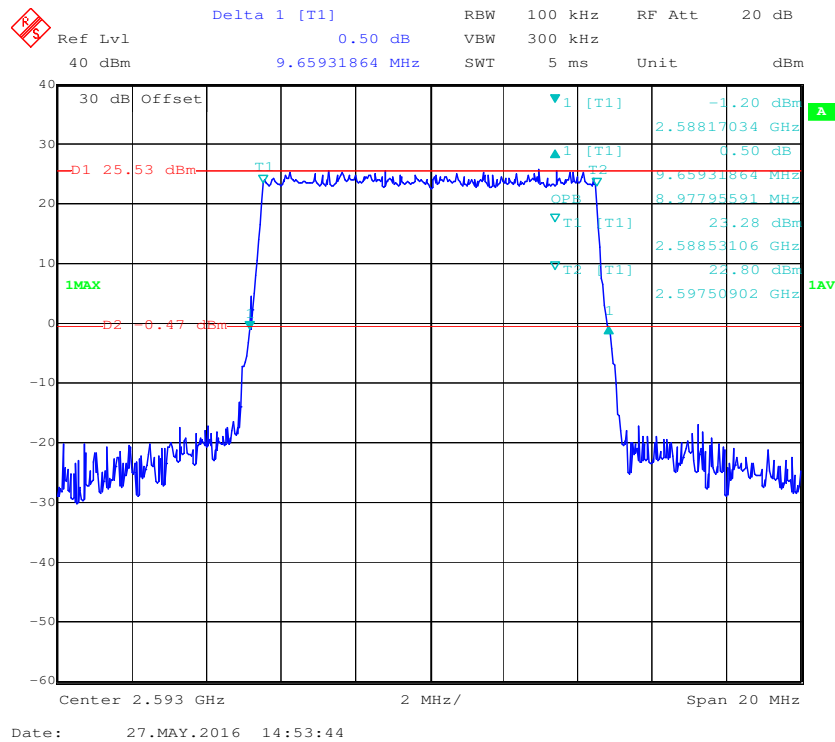
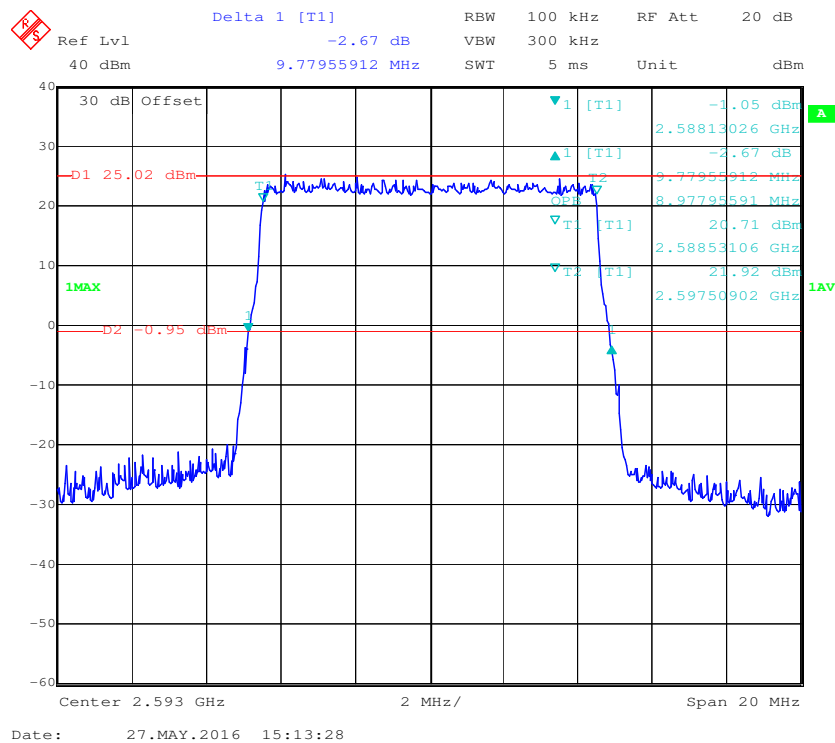
|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 25 °C    |
| <b>Relative Humidity:</b> | 53 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

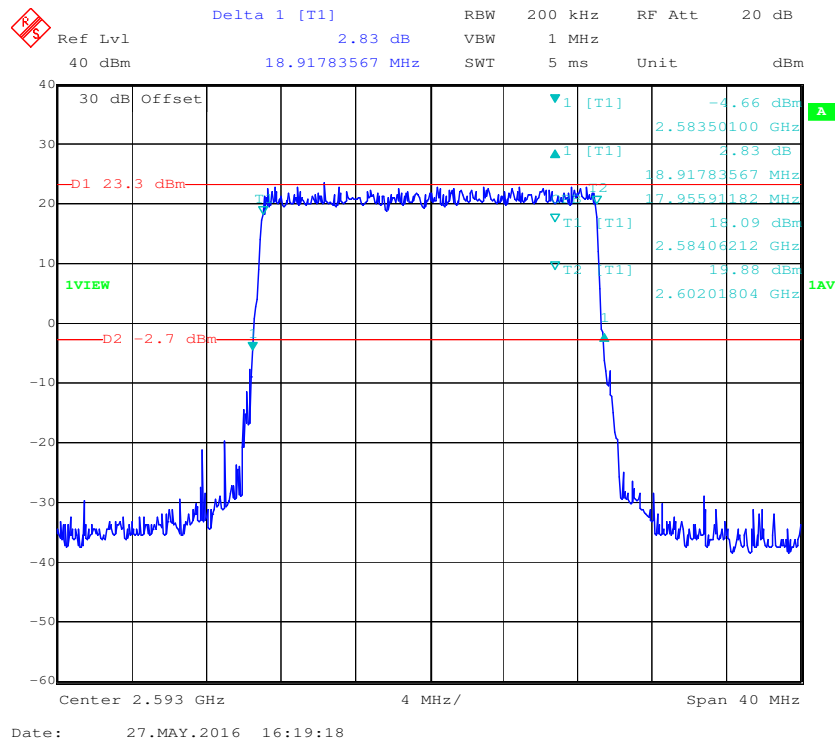
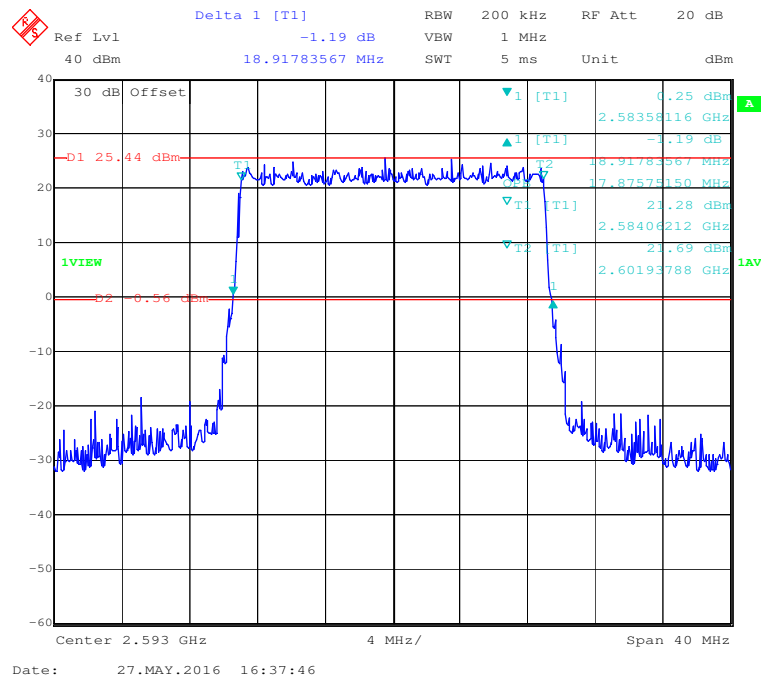
*The testing was performed by Rocky Kang on 2016-05-27.*

*EUT operation mode: Transmitting*

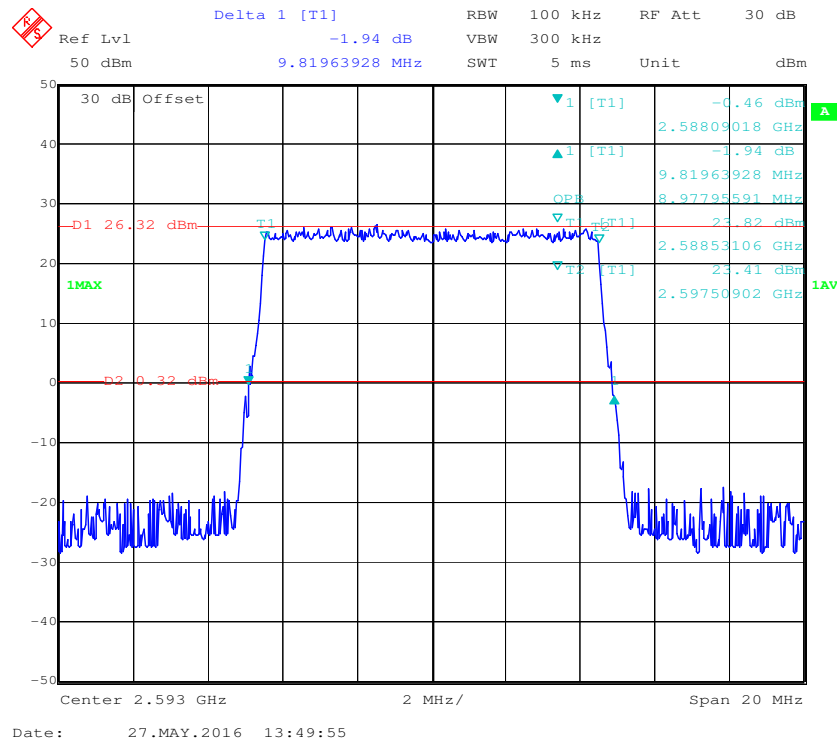
*Test Result: Compliance. Please refer to the following tables and plots.*

| Bandwidth (MHz) | Frequency (MHz) | Modulation | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------------|-----------------|------------|------------------------------|--------------------------------|
| Antenna 1       |                 |            |                              |                                |
| 10.0            | 2593            | QPSK       | 8.98                         | 9.66                           |
|                 | 2596            | 64QAM      | 8.98                         | 9.78                           |
| 20.0            | 2593            | QPSK       | 17.96                        | 18.92                          |
|                 | 2596            | 64QAM      | 17.88                        | 18.92                          |
| Antenna 2       |                 |            |                              |                                |
| 10.0            | 2593            | QPSK       | 8.98                         | 9.82                           |
|                 | 2596            | 64QAM      | 8.98                         | 9.70                           |
| 20.0            | 2593            | QPSK       | 17.88                        | 18.76                          |
|                 | 2596            | 64QAM      | 17.96                        | 18.84                          |

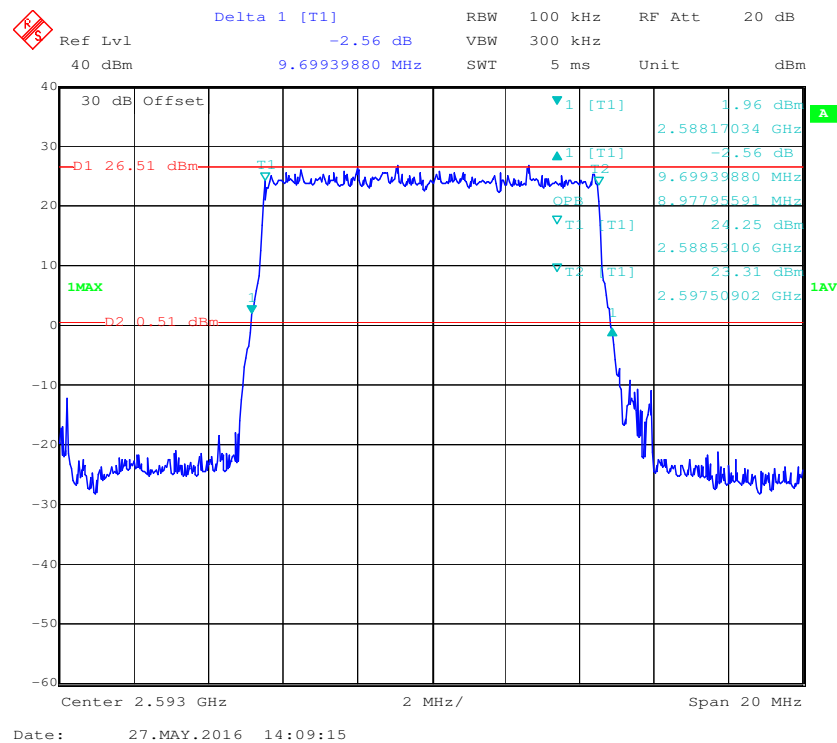
**QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth for Antenna 1****64-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth for Antenna 1**

**QPSK (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, for Antenna 1****64-QAM (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, for Antenna 1**

**QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth for Antenna 2**



### 64-QAM (10.0 MHz) - 99% Occupied&26 dB Bandwidth for Antenna 2



Delta 1 [T1] -1.78 dB

Ref Lvl 40 dBm

RBW 200 kHz

VBW 1 MHz

SWT 5 ms

Unit dBm

30 dB Offset

D1 24.34 dBm

D2 -1.66 dBm

T1 [T1] -1.78 dB

T2 [T1] -1.53 dB

2.58366132 GHz

2.5875751503 MHz

2.587575150 MHz

2.58406212 GHz

2.60193788 GHz

Center 2.593 GHz

4 MHz/

Span 40 MHz

Date: 27.MAY.2016 15:49:40

Delta 1 [T1]

RBW 200 kHz RF Att 20 dB

Ref Lvl -0.17 dB VBW 1 MHz

40 dBm 18.83767535 MHz SWT 5 ms Unit dBm

30 dB Offset

D1 25.82 dBm

1VIEW

1A

1

2

3

4

5

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39

40

Center 2.593 GHz 4 MHz/ Span 40 MHz

Date: 27.MAY.2016 16:49:53

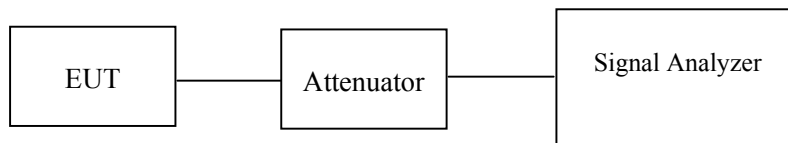
**FCC §27.53(m) (2) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS****Applicable Standards**

FCC§27.53(m) (2)

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

**Test Procedure**

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

**Test Equipment List and Details**

| Manufacturer          | Description     | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|---------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028    | 2015-12-11       | 2016-12-11           |
| Ducommun technologies | RF Cable        | RG-214          | 4             | 2015-06-15       | 2016-06-15           |
|                       | Notch filter    |                 |               |                  |                      |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507  | 2015-06-12       | 2016-06-12           |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

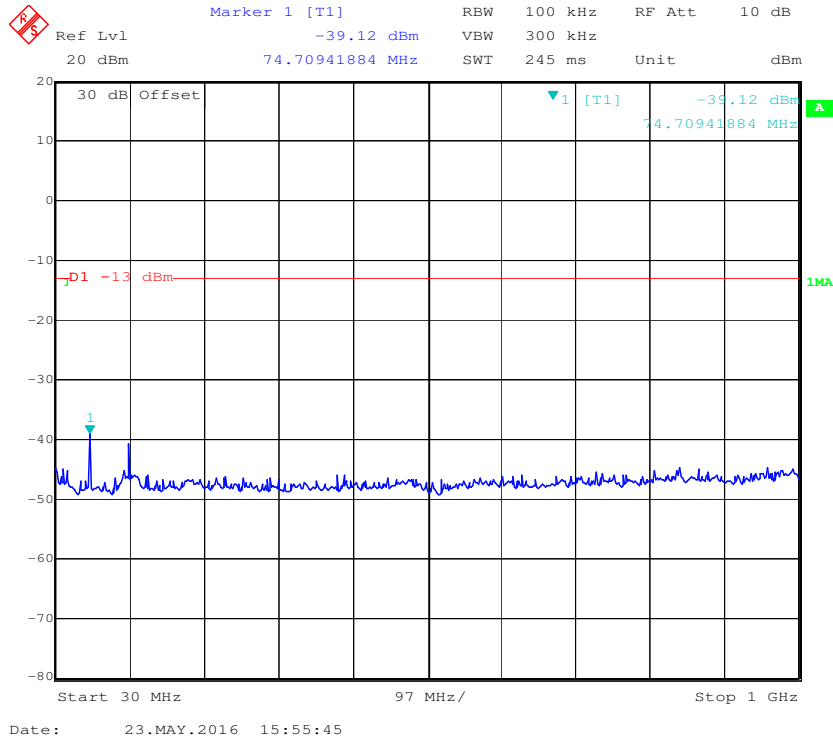
|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 25 °C    |
| <b>Relative Humidity:</b> | 56 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by Rocky Kang on 2016-05-23.*

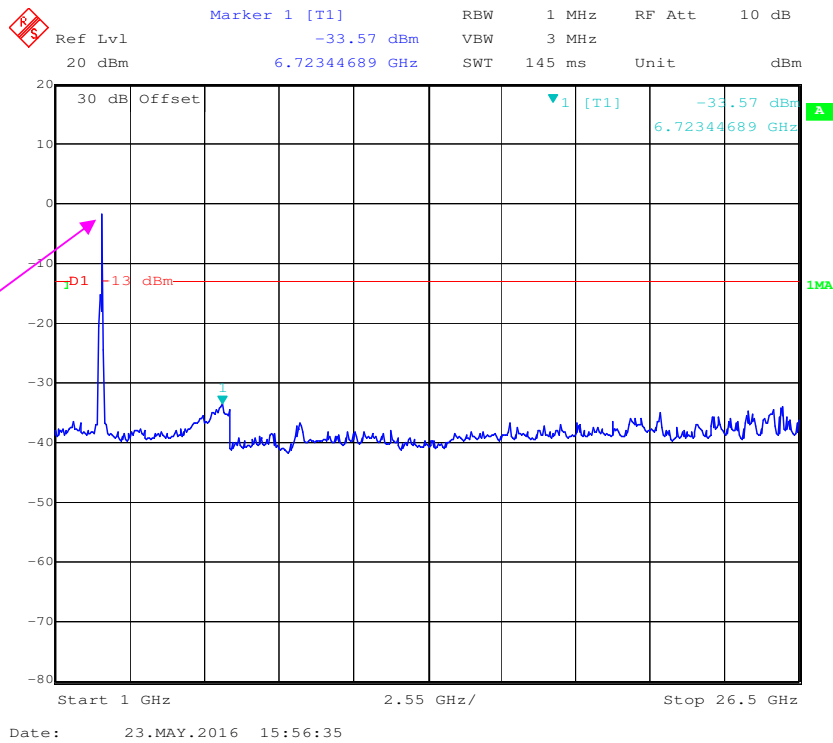
*Please refer to the following plots.*

**LTE Band 41:**

**30 MHz - 1 GHz (10.0 MHz, Antenna1)**

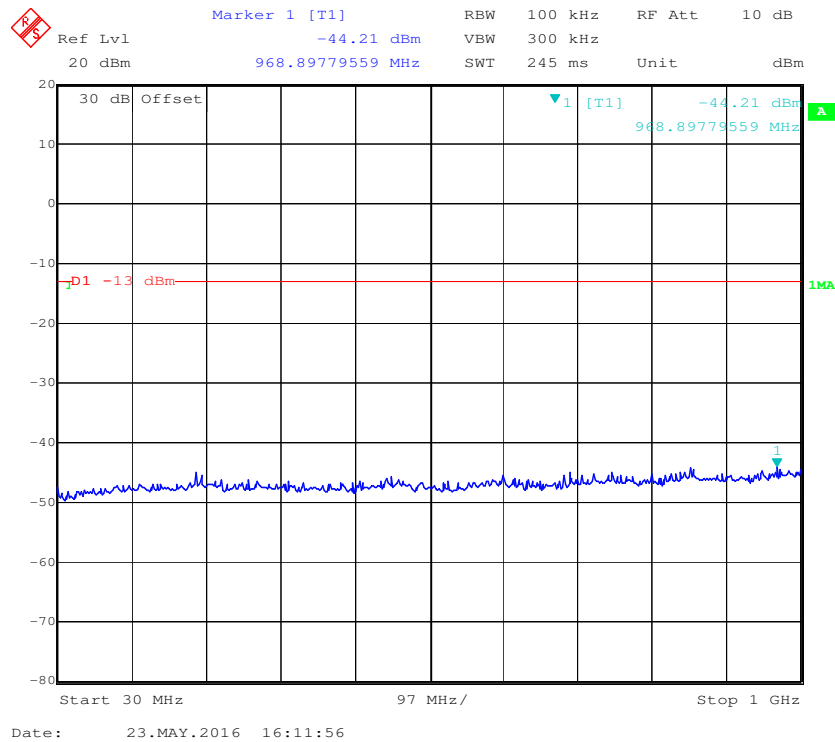


**1 GHz – 26.5 GHz (10.0 MHz, Antenna1)**

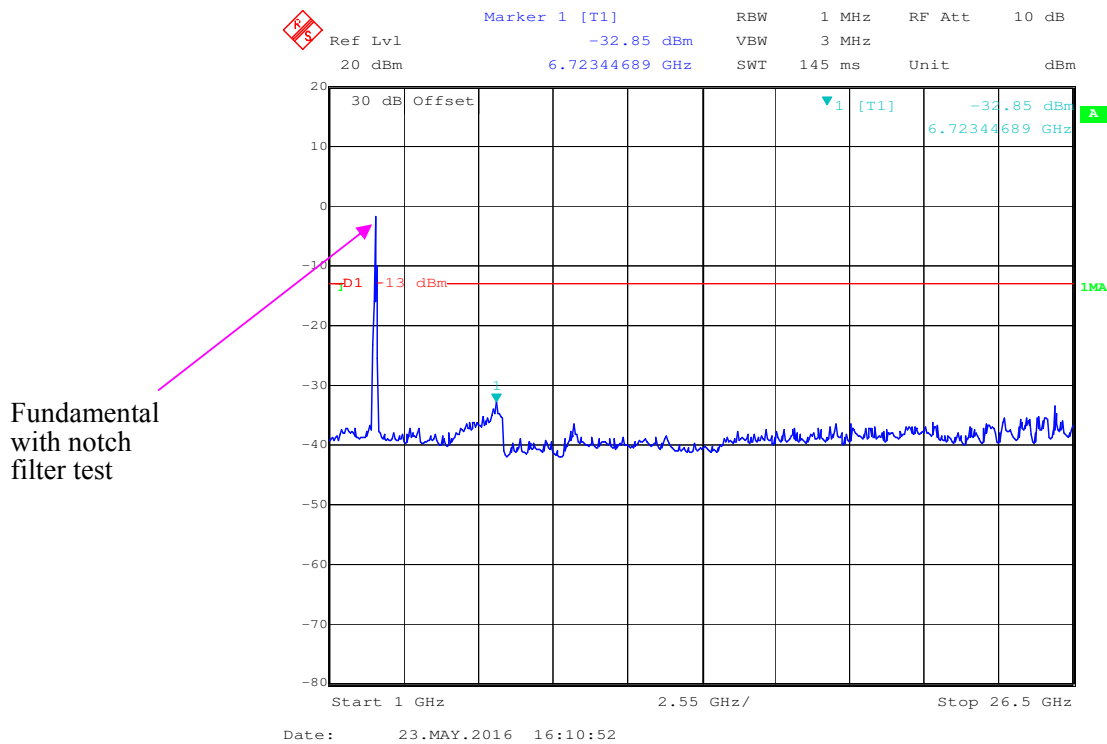


Fundamental  
with notch  
filter test

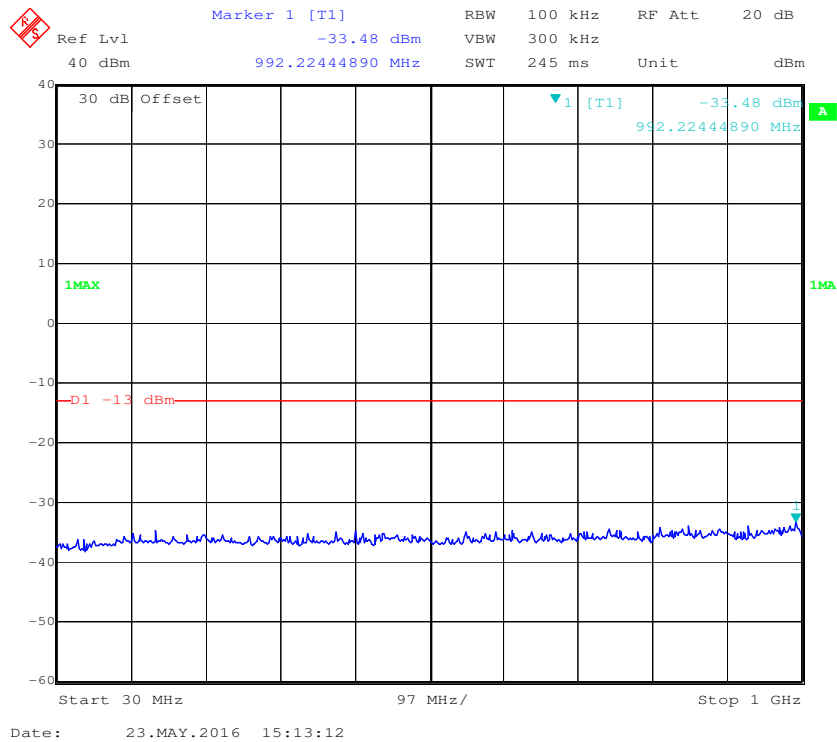
### 30 MHz - 1 GHz (20.0 MHz, Antenna1)



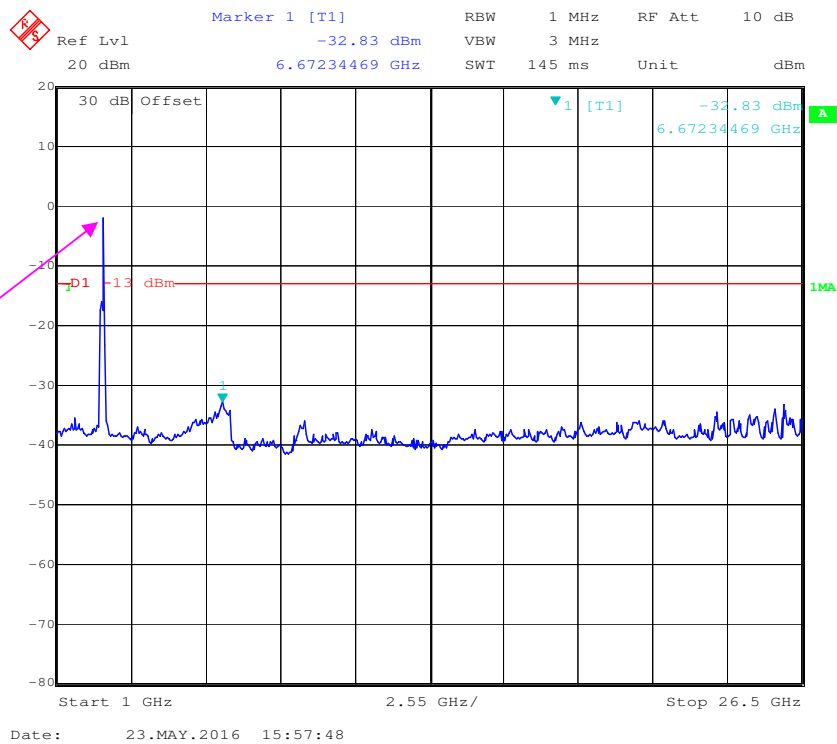
### 1 GHz – 26.5 GHz (20.0 MHz, Antenna1)



### 30 MHz - 1 GHz (10.0 MHz, Antenna2)

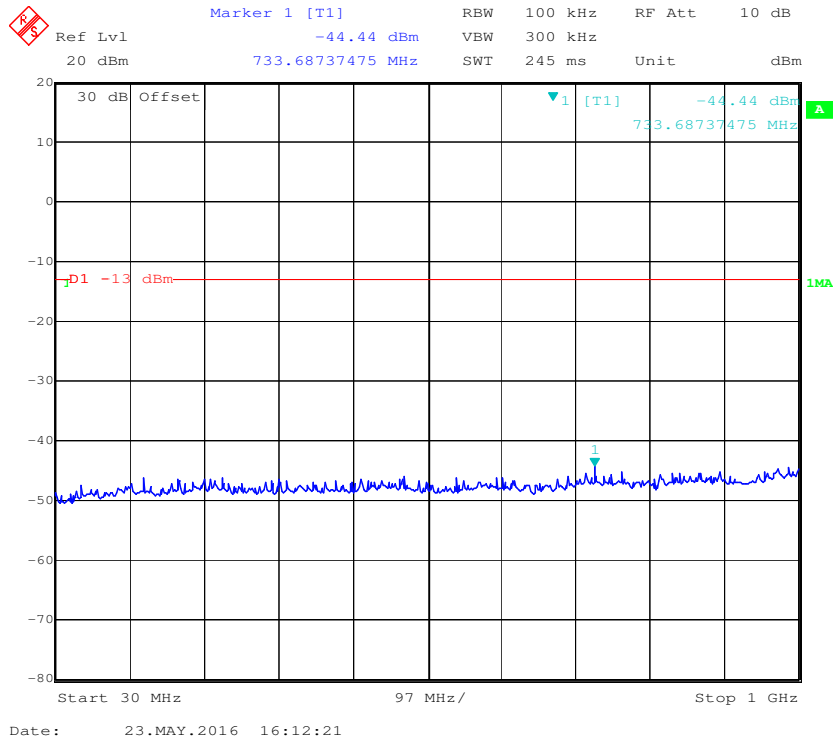


### 1 GHz – 26.5 GHz (10.0 MHz, Antenna2)

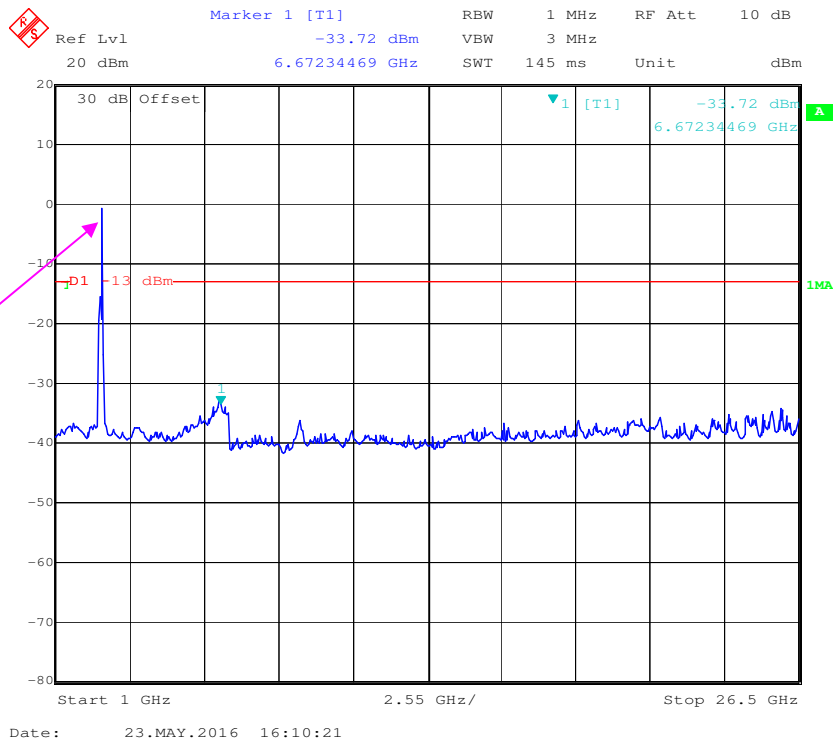


Fundamental  
with notch  
filter test

### 30 MHz - 1 GHz (20.0 MHz, Antenna2)



### 1 GHz – 26.5 GHz (20.0 MHz, Antenna2)



Fundamental  
with notch  
filter test

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**FCC§27.53 (m) (2) - SPURIOUS RADIATED EMISSIONS**

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**Applicable Standards**

FCC §27.53 (m) (2)

**Test Procedure**

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log<sub>10</sub> (power out in Watts)

**Test Equipment List and Details**

| Manufacturer              | Description       | Model                 | Serial Number          | Calibration Date | Calibration Due Date |
|---------------------------|-------------------|-----------------------|------------------------|------------------|----------------------|
| Sunol Sciences            | Horn Antenna      | DRH-118               | A052604                | 2014-12-29       | 2017-12-28           |
| Sunol Sciences            | Bi-log Antenna    | JB1                   | A040904-2              | 2014-12-07       | 2017-12-06           |
| Rohde & Schwarz           | Signal Analyzer   | FSIQ26                | 8386001028             | 2015-12-11       | 2016-12-11           |
| Mini                      | Pre-amplifier     | ZVA-183-S+            | 5969001149             | 2016-04-23       | 2017-04-23           |
| HP                        | Amplifier         | HP8447E               | 1937A01046             | 2016-05-06       | 2017-05-06           |
| HP                        | Signal Generator  | HP 8341B              | 2624A00116             | 2015-07-02       | 2016-07-01           |
| COM POWER                 | Dipole Antenna    | AD-100                | 041000                 | 2015-08-18       | 2016-08-18           |
| A.H. System               | Horn Antenna      | SAS-200/571           | 135                    | 2015-08-18       | 2018-08-17           |
| Rohde & Schwarz           | EMI Test Receiver | ESCI                  | 101120                 | 2015-12-15       | 2016-12-14           |
| the electro-Mechanics Co. | Horn Antenna      | 3116                  | 9510-2270              | 2013-10-14       | 2016-10-13           |
| Ducommun technologies     | RF Cable          | UFA210A-1-4724-30050U | MFR64369<br>223410-001 | 2015-06-15       | 2016-06-15           |
| Ducommun technologies     | RF Cable          | 104PEA                | 218124002              | 2015-06-15       | 2016-06-15           |
| Ducommun technologies     | RF Cable          | RG-214                | 1                      | 2015-06-15       | 2016-06-15           |
| Ducommun technologies     | RF Cable          | RG-214                | 2                      | 2015-06-15       | 2016-06-15           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 24 °C    |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by Rocky Kang on 2016-05-27.*

*Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)*

| Frequency       | Receiver       | Turntable    | Rx Antenna |             | Substituted    |                 |                   | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|----------------|--------------|------------|-------------|----------------|-----------------|-------------------|----------------------|-------------|-------------|
| (MHz)           | Reading (dBμV) | Angle Degree | Height (m) | Polar (H/V) | SG Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) |                      |             |             |
| <b>QPSK 10M</b> |                |              |            |             |                |                 |                   |                      |             |             |
| 143.99          | 35.69          | 343          | 2.3        | H           | -61.3          | 0.26            | 0                 | -61.56               | -13         | 48.56       |
| 143.99          | 36.26          | 215          | 1.7        | V           | -60.7          | 0.26            | 0                 | -60.96               | -13         | 47.96       |
| 5186.00         | 41.39          | 93           | 1.9        | H           | -52.5          | 1.80            | 10.10             | -44.20               | -13         | 31.20       |
| 5186.00         | 42.89          | 243          | 1.4        | V           | -50.3          | 1.80            | 10.10             | -42.00               | -13         | 29.00       |
| <b>QPSK 20M</b> |                |              |            |             |                |                 |                   |                      |             |             |
| 143.99          | 36.58          | 330          | 1.7        | H           | -60.4          | 0.26            | 0                 | -60.66               | -13         | 47.66       |
| 143.99          | 36.21          | 115          | 2.1        | V           | -60.8          | 0.26            | 0                 | -61.06               | -13         | 48.06       |
| 5186.00         | 41.49          | 277          | 1.4        | H           | -52.4          | 1.80            | 10.10             | -44.10               | -13         | 31.10       |
| 5186.00         | 41.15          | 60           | 2.5        | V           | -52.0          | 1.80            | 10.10             | -43.70               | -13         | 30.70       |

**Note:**

- 1) Absolute Level = SG Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

## **FCC §27.53 (m) (2)- BAND EDGES**

### **Applicable Standards**

According to FCC §27.53(m) (2), For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

For digital base stations, the attenuation shall be not less than  $43 + 10 \log (P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least  $67 + 10 \log (P)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least  $67 + 10 \log (P)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least  $67 + 10 \log (P) - 20 \log (D\text{km}/1.5)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than  $-107$  dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least  $67 + 10 \log (P)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least  $67 + 10 \log (P)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

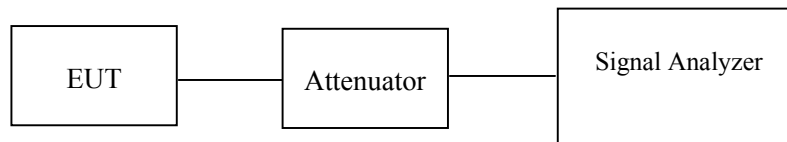
(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOB by at least  $67 + 10 \log (P) - 20 \log (D\text{km}/1.5)$  measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than  $-107$  dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least  $67 + 10 \log (P)$  dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than  $43 + 10 \log (P)$  dB at the channel edge.

## Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency



## Test Equipment List and Details

| Manufacturer          | Description     | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|-----------------|-----------------|---------------|------------------|----------------------|
| Rohde & Schwarz       | Signal Analyzer | FSIQ26          | 8386001028    | 2015-12-11       | 2016-12-11           |
| Ducommun technologies | RF Cable        | RG-214          | 4             | 2016-06-15       | 2017-06-15           |
| JFW                   | 30dB Attenuator | 50FH-030-100 RF | 170006716507  | 2016-06-12       | 2017-06-12           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

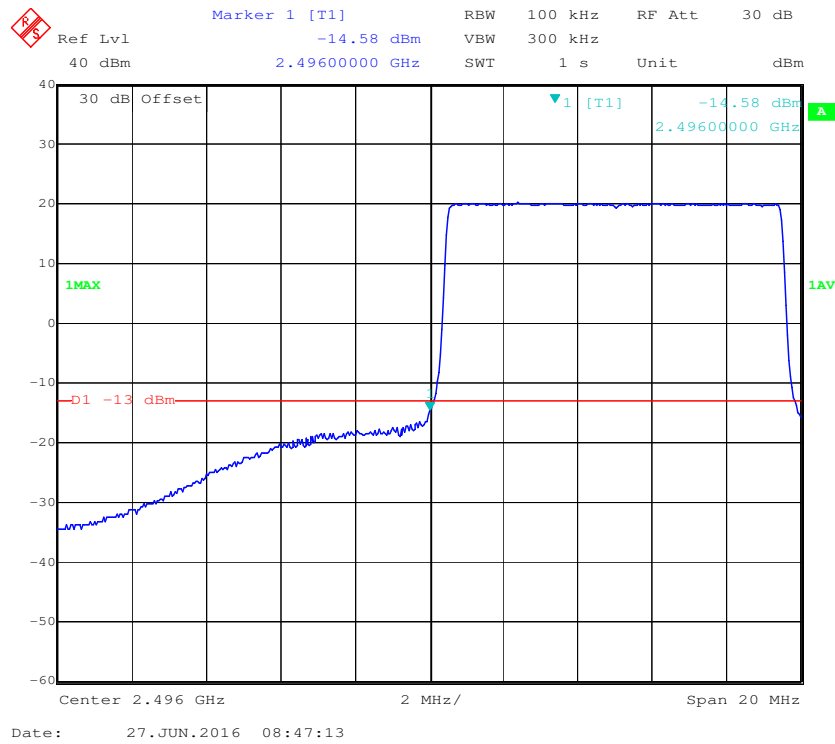
|                    |          |
|--------------------|----------|
| Temperature:       | 24-25 °C |
| Relative Humidity: | 50-53 %  |
| ATM Pressure:      | 101.0kPa |

*The testing was performed by Rocky Kang on 2016-06-27.*

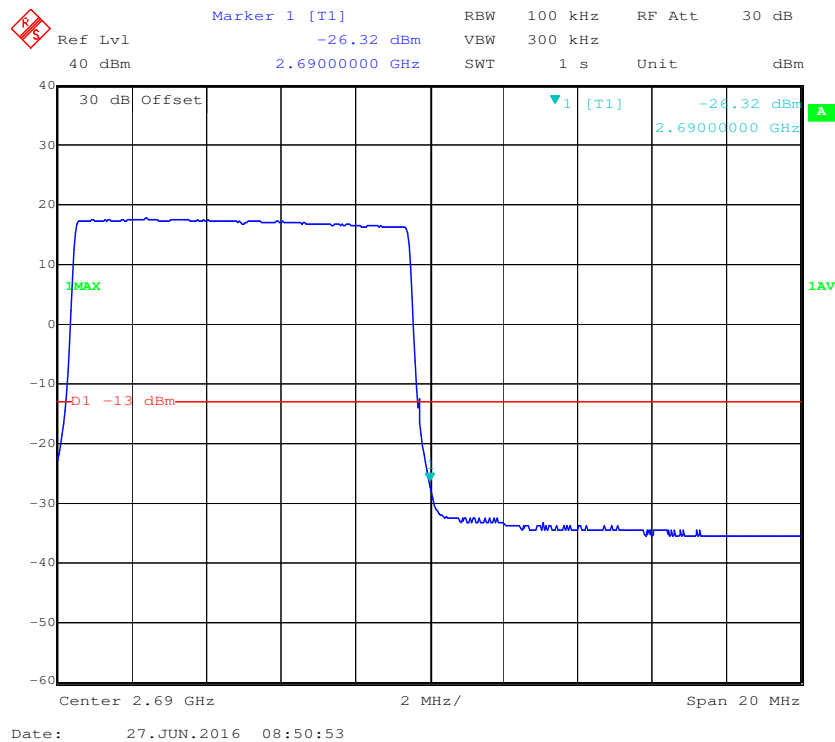
*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to the following plots.*

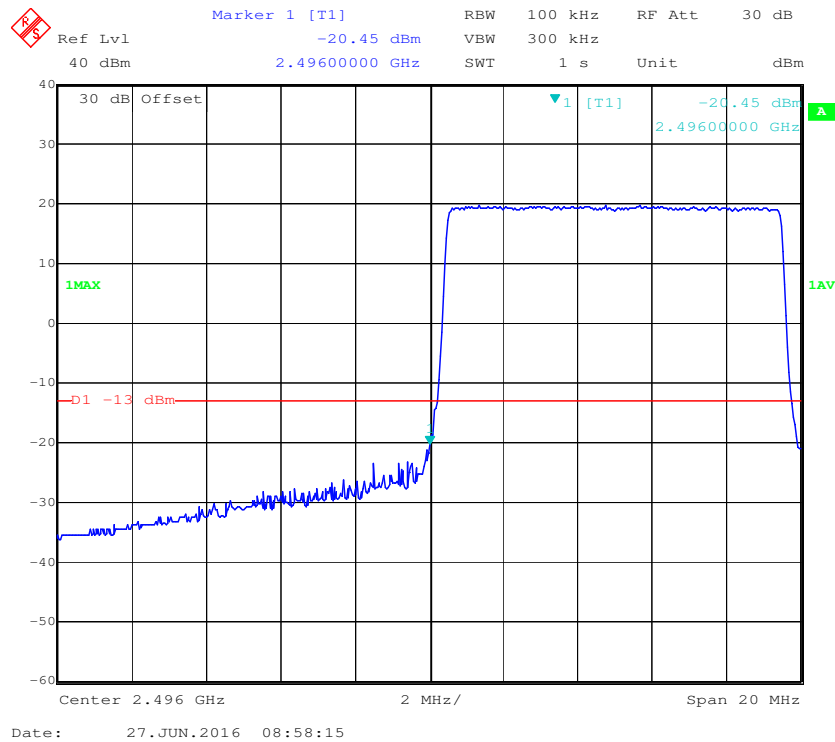
**Band 41:**  
**QPSK (10.0 MHz, FULL RB) - Left Band Edge for Antenna1**



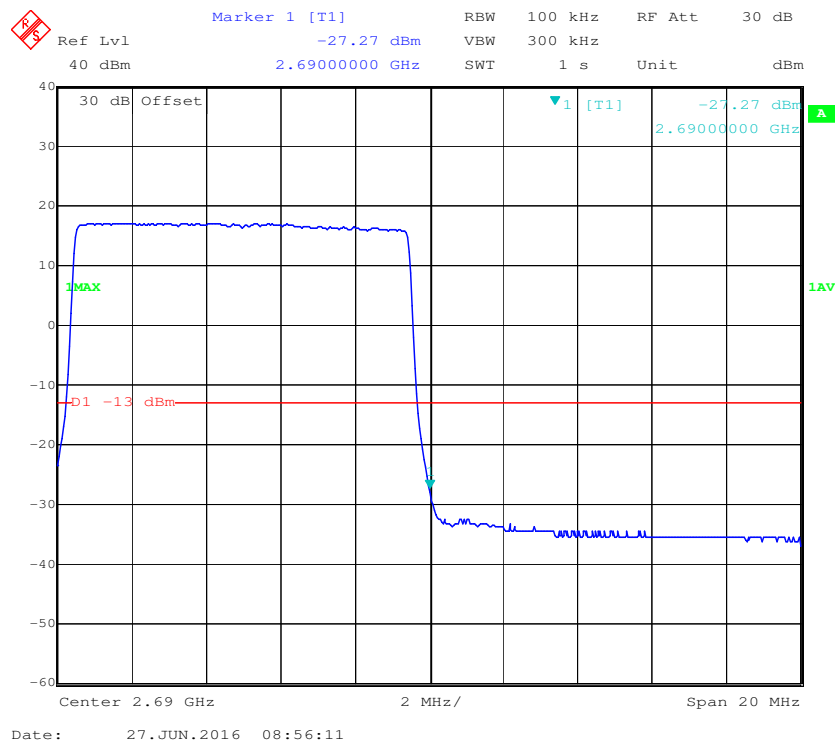
**QPSK (10.0 MHz, FULL RB) - Right Band Edge for Antenna1**



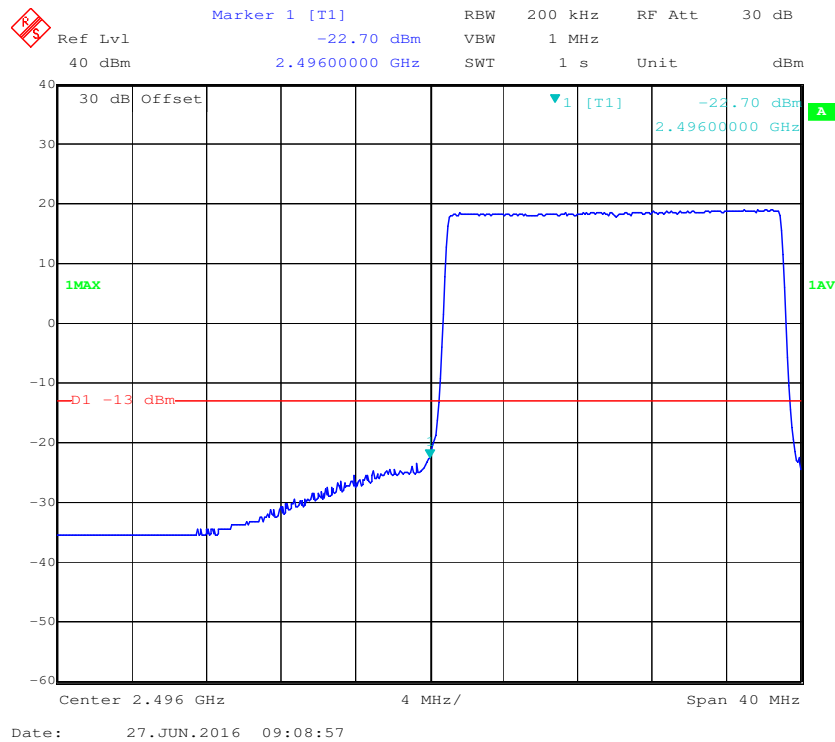
### 64-QAM (10.0 MHz, FULL RB) - Left Band Edge for Antenna1



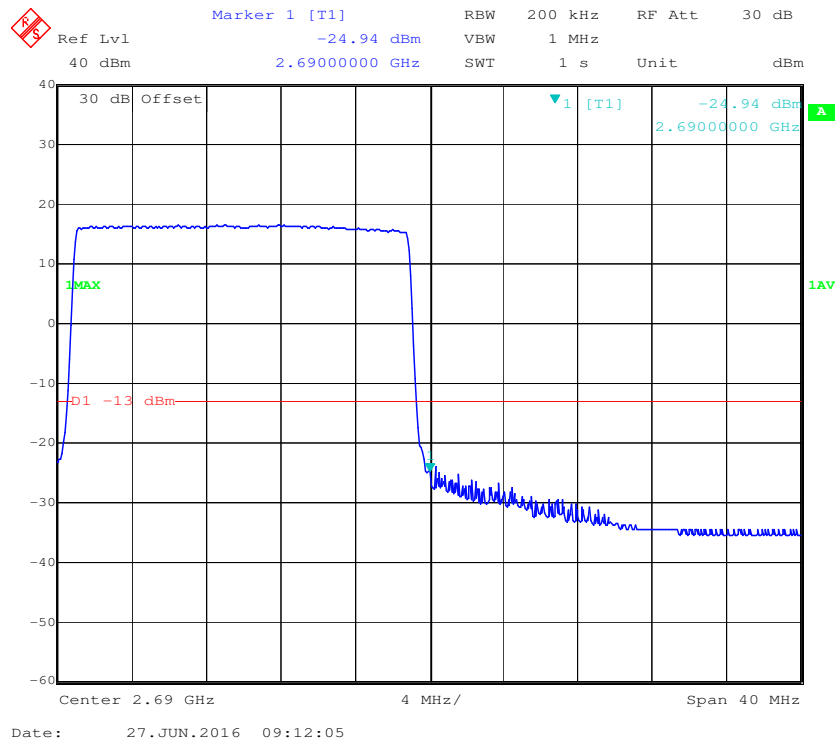
### 64-QAM (10.0 MHz, FULL RB) - Right Band Edge for Antenna1



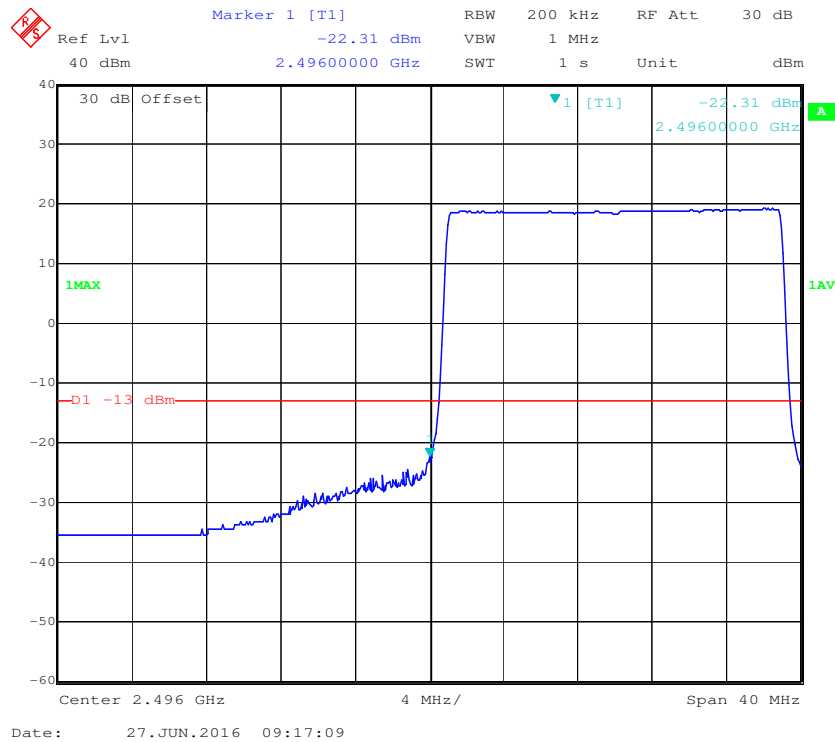
### QPSK (20.0 MHz, FULL RB) - Left Band Edge for Antenna1



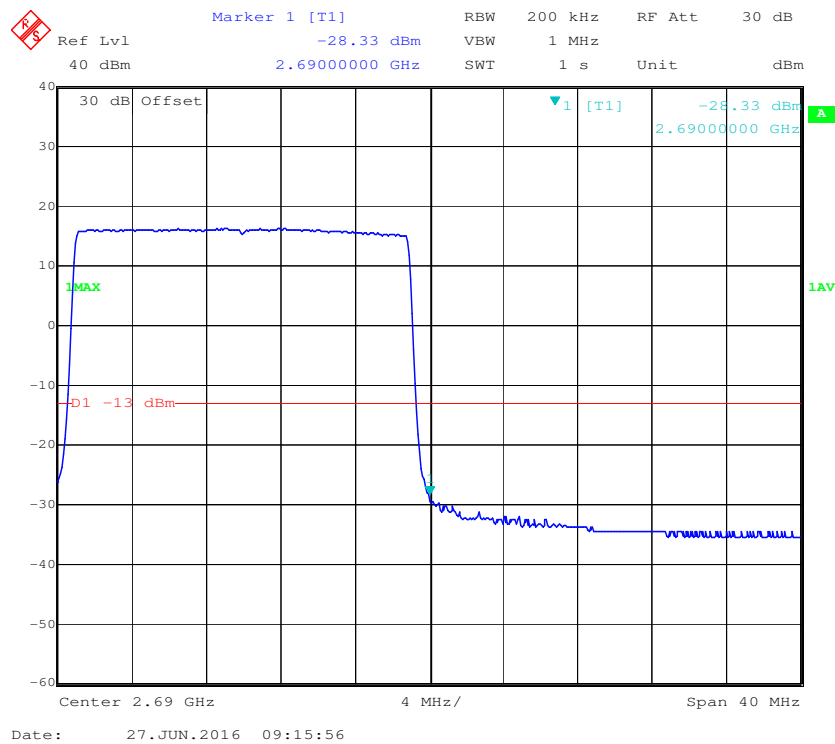
### QPSK (20.0 MHz, FULL RB) - Right Band Edge for Antenna1



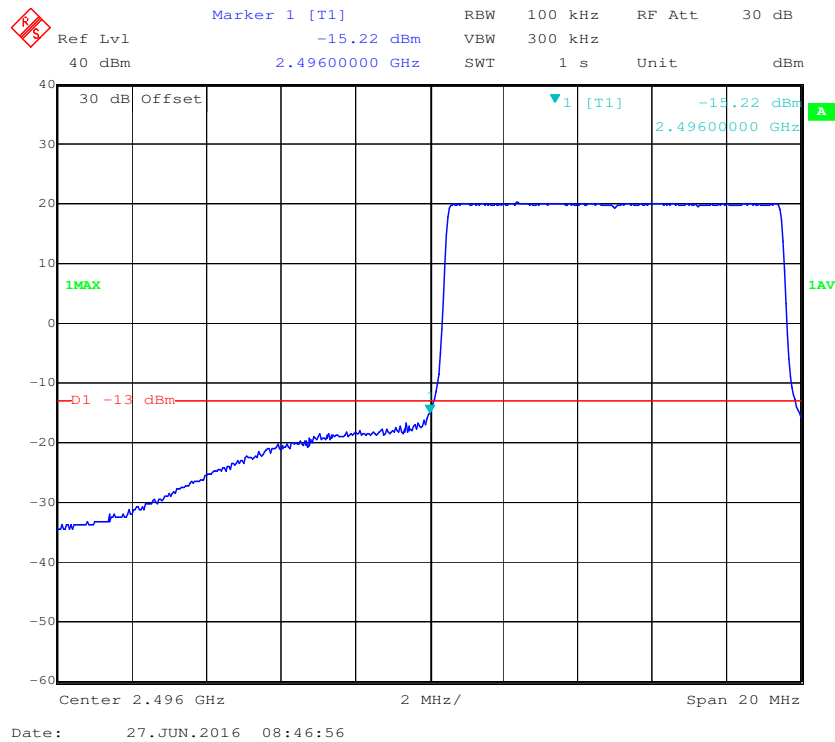
### 64-QAM (20.0 MHz, FULL RB) - Left Band Edge for Antenna1



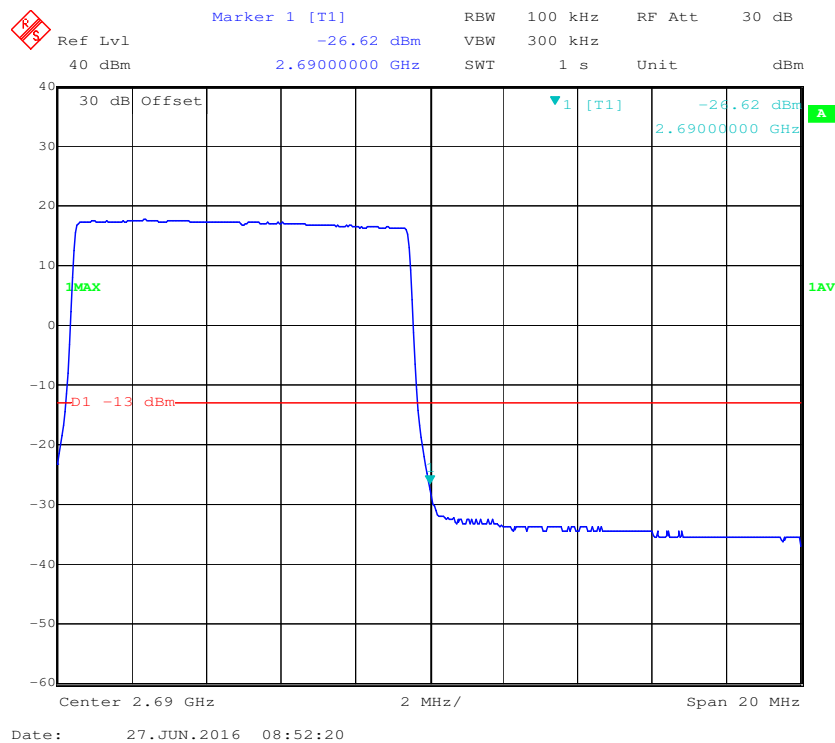
### 64-QAM (20.0 MHz, FULL RB) - Right Band Edge for Antenna1



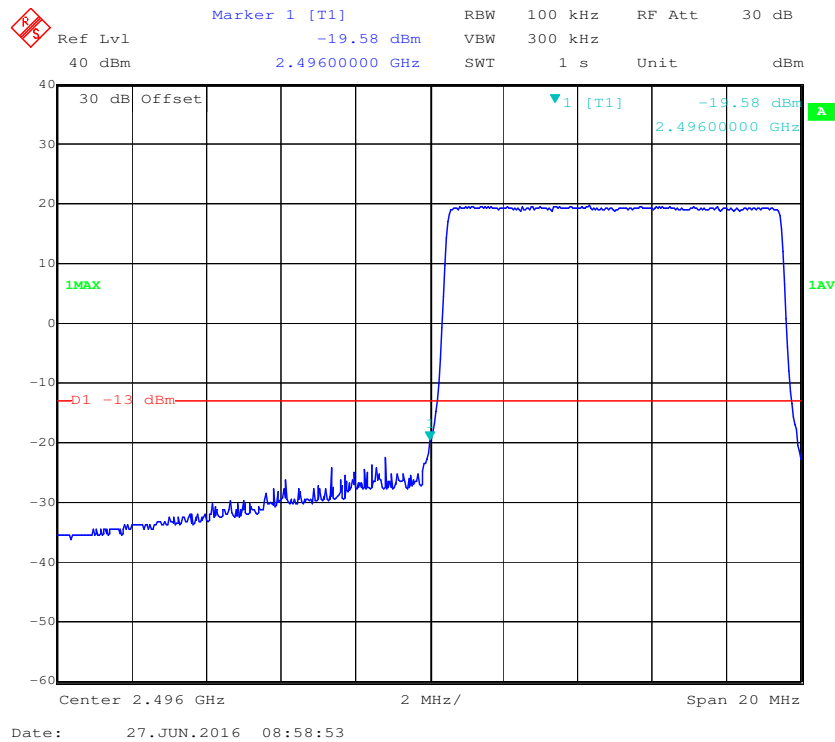
### QPSK (10.0 MHz, FULL RB) - Left Band Edge for Antenna2



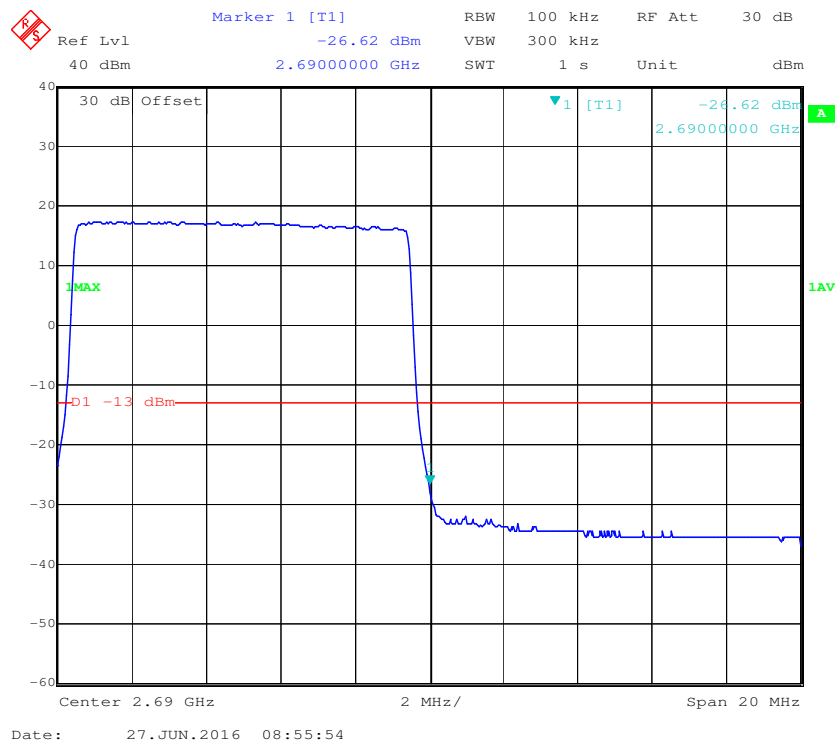
### QPSK (10.0 MHz, FULL RB) - Right Band Edge for Antenna2



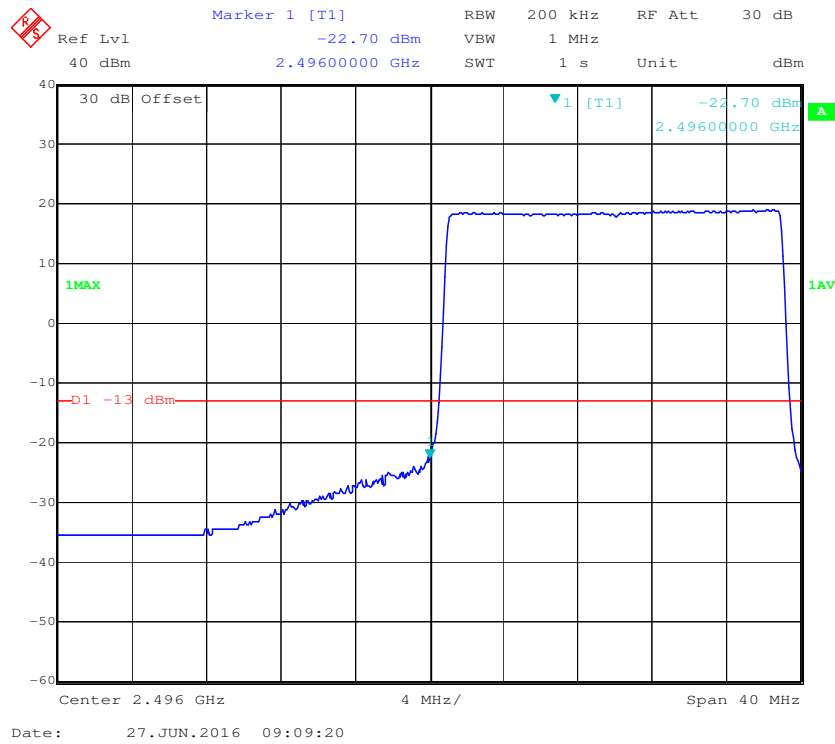
### 64-QAM (10.0 MHz, FULL RB) - Left Band Edge for Antenna2



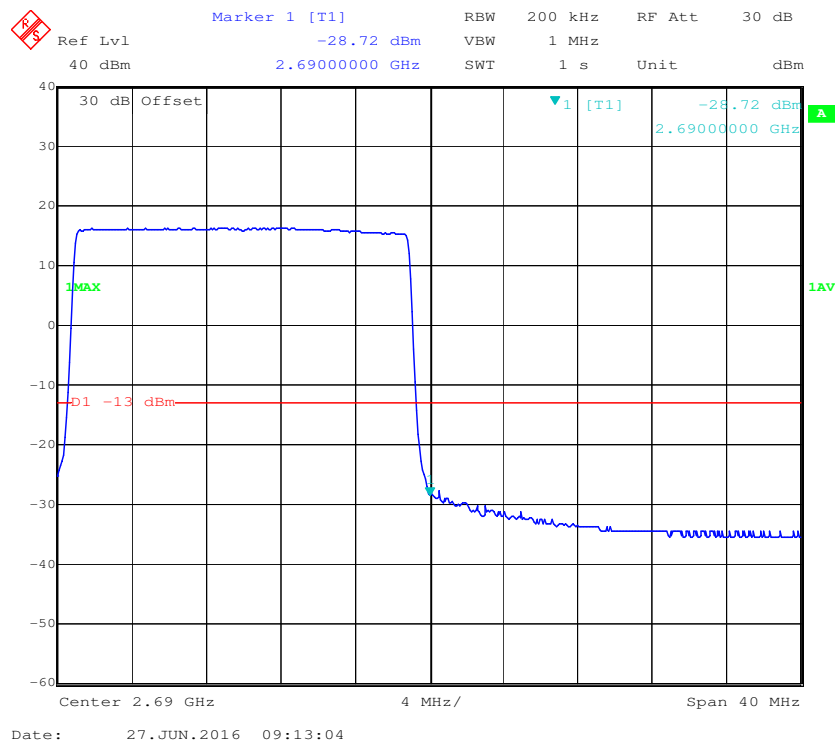
### 64-QAM (10.0 MHz, FULL RB) - Right Band Edge for Antenna2



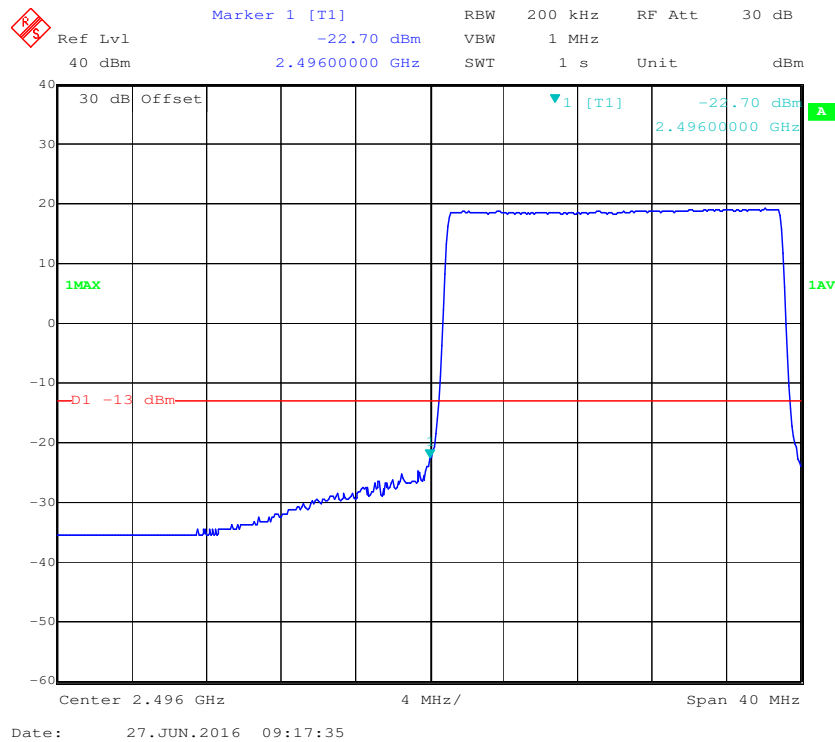
### QPSK (20.0 MHz, FULL RB) - Left Band Edge for Antenna2



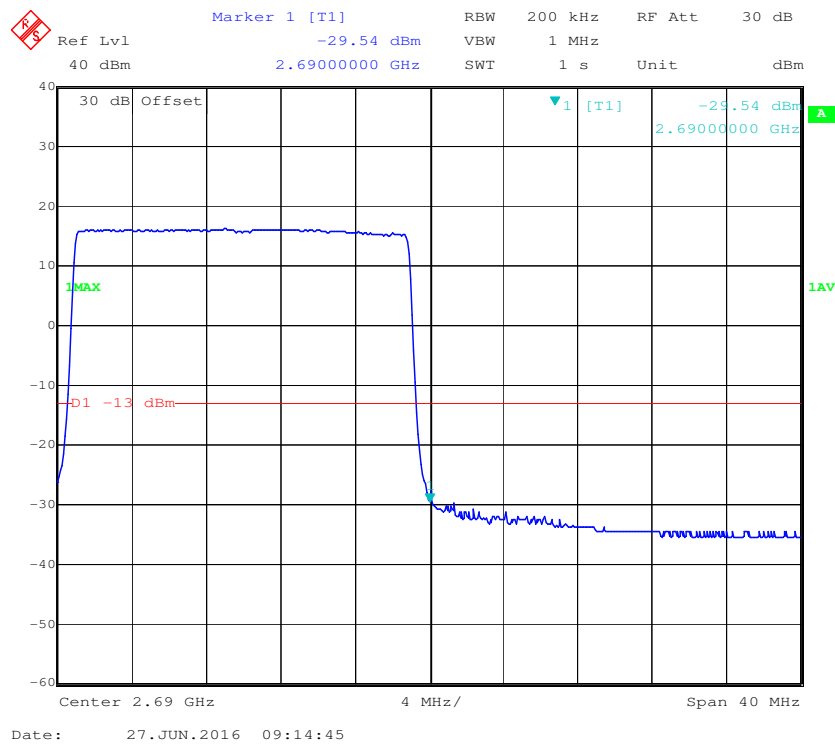
### QPSK (20.0 MHz, FULL RB) - Right Band Edge for Antenna2



### 64-QAM (20.0 MHz, FULL RB) - Left Band Edge for Antenna2



### 64-QAM (20.0 MHz, FULL RB) - Right Band Edge for Antenna2



## FCC§27.54&§2.1055 - FREQUENCY STABILITY

### Applicable Standards

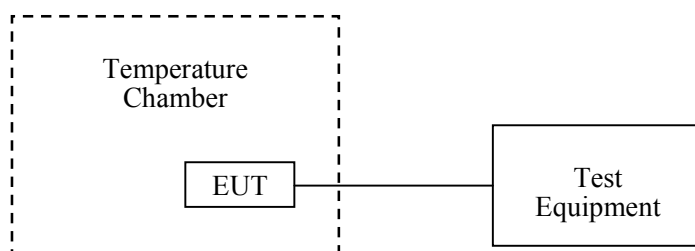
According to FCC §27.54., the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



### Test Equipment List and Details

| Manufacturer          | Description                    | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------|--------------------------------|-----------------|---------------|------------------|----------------------|
| ESPEC                 | Temperature & Humidity Chamber | EL-10KA         | 09107726      | 2015-11-01       | 2016-10-31           |
| Ducommun technologies | RF Cable                       | RG-214          | 4             | 2015-06-15       | 2016-06-15           |
| JFW                   | 30dB Attenuator                | 50FH-030-100 RF | 170006716507  | 2015-06-12       | 2016-06-12           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 24 °C    |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

The testing was performed by Rocky Kang on 2016-06-02.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

|                                 | Temperature (°C) | Power Supplied (DC V) | Measured Low Frequency (MHz) | Measured High Frequency (MHz) | Low frequency (MHz) | High frequency (MHz) | Result |
|---------------------------------|------------------|-----------------------|------------------------------|-------------------------------|---------------------|----------------------|--------|
| <b>10.0 MHz, Middle Channel</b> | -30              | -48V                  | 2500.999992                  | 2684.979952                   | 2496                | 2690                 | Pass   |
|                                 | -20              |                       | 2500.999993                  | 2684.979951                   | 2496                | 2690                 | Pass   |
|                                 | -10              |                       | 2500.999997                  | 2684.979959                   | 2496                | 2690                 | Pass   |
|                                 | 0                |                       | 2500.999991                  | 2684.979952                   | 2496                | 2690                 | Pass   |
|                                 | 10               |                       | 2500.999992                  | 2684.979956                   | 2496                | 2690                 | Pass   |
|                                 | 20               |                       | 2500.999999                  | 2684.979959                   | 2496                | 2690                 | Pass   |
|                                 | 30               |                       | 2500.999997                  | 2684.979957                   | 2496                | 2690                 | Pass   |
|                                 | 40               |                       | 2500.999999                  | 2684.979952                   | 2496                | 2690                 | Pass   |
|                                 | 50               |                       | 2500.999989                  | 2684.979953                   | 2496                | 2690                 | Pass   |
|                                 | 25               | -43.2V                | 2500.999993                  | 2684.97995                    | 2496                | 2690                 | Pass   |
|                                 | 25               | -52.8V                | 2500.999995                  | 2684.979954                   | 2496                | 2690                 | Pass   |

|                                 | Temperature (°C) | Power Supplied (DC V) | Measured Low Frequency (MHz) | Measured High Frequency (MHz) | Low frequency (MHz) | High frequency (MHz) | Result |
|---------------------------------|------------------|-----------------------|------------------------------|-------------------------------|---------------------|----------------------|--------|
| <b>20.0 MHz, Middle Channel</b> | -30              | -48V                  | 2506.080151                  | 2679.919836                   | 2496                | 2690                 | Pass   |
|                                 | -20              |                       | 2506.080154                  | 2679.919833                   | 2496                | 2690                 | Pass   |
|                                 | -10              |                       | 2506.080156                  | 2679.919831                   | 2496                | 2690                 | Pass   |
|                                 | 0                |                       | 2506.080158                  | 2679.919837                   | 2496                | 2690                 | Pass   |
|                                 | 10               |                       | 2506.080157                  | 2679.919837                   | 2496                | 2690                 | Pass   |
|                                 | 20               |                       | 2506.080158                  | 2679.919838                   | 2496                | 2690                 | Pass   |
|                                 | 30               |                       | 2506.080155                  | 2679.919831                   | 2496                | 2690                 | Pass   |
|                                 | 40               |                       | 2506.08015                   | 2679.919828                   | 2496                | 2690                 | Pass   |
|                                 | 50               |                       | 2506.080151                  | 2679.919838                   | 2496                | 2690                 | Pass   |
|                                 | 25               | -43.2V                | 2506.080149                  | 2679.919833                   | 2496                | 2690                 | Pass   |
|                                 | 25               | -52.8V                | 2506.080157                  | 2679.919834                   | 2496                | 2690                 | Pass   |

\*\*\*\*\* END OF REPORT \*\*\*\*\*