

FCC PART 27  
FCC PART 22H, PART 24E  
MEASUREMENT AND TEST REPORT

For

**Quectel Wireless Solutions Company Limited**

Room501,Building 13,No.99 TianZhou Road, Xuhui District, Shanghai, China

Test Model: EC25-A  
FCC ID: XMR201605EC25A

|                                                                                                                                             |                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                      | <b>Product Type:</b><br>LTE Module                                   |
| <b>Test Engineer:</b> <u>David. Hsu</u> <i>David. Hsu</i>                                                                                   |                                                                      |
| <b>Report Number:</b> <u>RTWK160705001-00</u>                                                                                               |                                                                      |
| <b>Report Date:</b> <u>2016-07-01</u>                                                                                                       |                                                                      |
| <b>Reviewed By:</b> <u>Jerry.Chang</u> <i>Jerry.Chang</i>                                                                                   |                                                                      |
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**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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INVT

## GENERAL INFORMATION

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

The Quectel Wireless Solutions Company Limited's product, model number: EC25-A (FCC ID: XMR201605EC25A) or the "EUT" in this report was a LTE Module , which was measured approximately 32mm(L) × 29mm(W) × 2.4mm(H) . rated with input voltage: DC 3.8 V , EUT Operating Voltage Range: 3.5~4.2V.

*\* Note: The product ' s series model number: EC25-A and EC25-A MiniPCIE. The difference between them was explained in the attached declaration letter.*

*\* All measurement and test data in this report was gathered from production sample serial number: 20160519001 (Assigned by BACL, Shenzhen).The EUT supplied by the applicant was received on 2016-05-19.*

### Objective

This type approval report is prepared on behalf of Quectel Wireless Solutions Company Limited in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and 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 22 Subpart H - Public Mobile Services  
Part 24 Subpart E - Personal Communication Services  
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. (Taiwan). 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.(Taiwan) 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Test site at Bay Area Compliance Laboratories Corp. (Taiwan) 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.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 431084. 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.

### Specific accessory equipment

| Description   | parameter                                                                              | Serial Number |
|---------------|----------------------------------------------------------------------------------------|---------------|
| WCDMA antenna | PCB Antenna,<br>antenna Gain: 1dBi for 850 MHz<br>1dBi for 1900 MHz                    | N/A           |
| LTE antenna   | PCB Antenna,<br>antenna Gain: 1dBi for 700MHz<br>1dBi for 1700MHz<br>1dBi for 1900 MHz | N/A           |

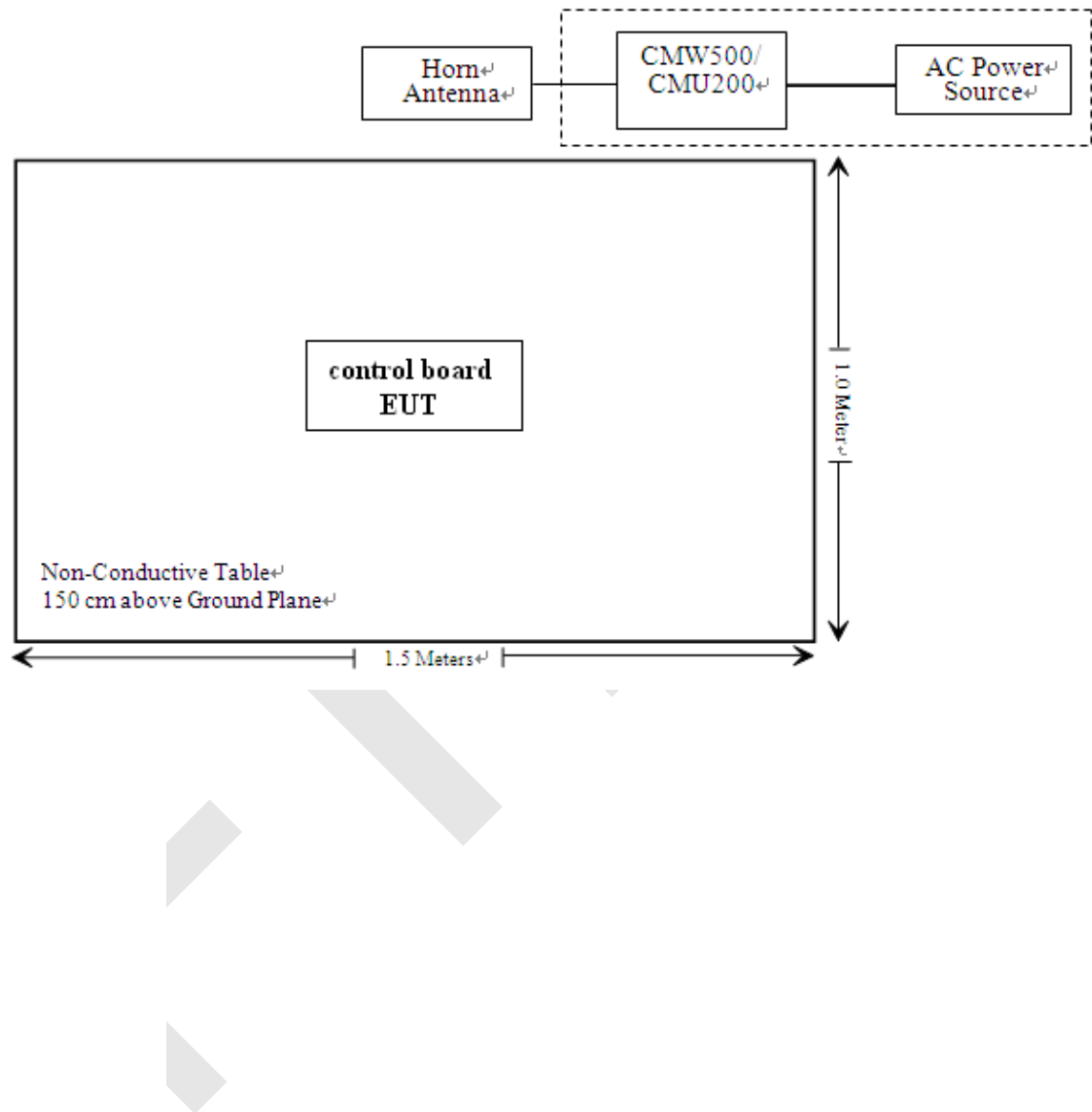
### Support Equipment List and Details

| Manufacturer                                          | Description                                                  | Model    | Serial Number   |
|-------------------------------------------------------|--------------------------------------------------------------|----------|-----------------|
| Rohde & Schwarz                                       | Universal Radio Communication Tester                         | CMU200   | 106891          |
| Rohde & Schwarz                                       | Wideband Radio Communication Tester                          | CMW500   | 1201.0002K50    |
| Dell                                                  | Notebook                                                     | E6410    | N/A             |
| Quectel                                               | Test Fixer                                                   | N/A      | N/A             |
| Shanghai Jingsai<br>Electronic Technology<br>Co.,Ltd. | ADAPATER<br>I/P: AC 100-240V, 50-60Hz<br>O/P: DC 5V, 2A, 12W | JS-400K  | N/A             |
| Quectel Wireless<br>Solutions                         | Control Board                                                | S2-W2231 | MP76121D4000228 |

External Cable List and Details

| Cable Description | Length (m) | From Port | To |
|-------------------|------------|-----------|----|
| /                 | /          | /         | /  |

Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                                              | Description of Test                    | Result         |
|--------------------------------------------------------|----------------------------------------|----------------|
| §1.1307, §2.1091                                       | MAXIMUM PERMISSIBLE EXPOSURE (MPE)     | Compliance     |
| §2.1046; § 22.913 (a);<br>§ 24.232 (c); §27.50 (d) (h) | RF Output Power                        | Compliance     |
| § 2.1047                                               | Modulation Characteristics             | Not Applicable |
| § 2.1049; § 22.905;<br>§ 22.917; § 24.238; §27.53      | Occupied Bandwidth                     | Compliance     |
| § 2.1051; § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m) | Spurious Emissions at Antenna Terminal | Compliance     |
| § 2.1053; § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m) | Spurious Radiated Emissions            | Compliance     |
| § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m)           | Band Edge                              | Compliance     |
| § 2.1055; § 22.355;<br>§ 24.235; §27.54;               | Frequency stability                    | Compliance     |

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

### **Applicable Standard**

According to subpart § 2.1051 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                                      |                                      |                                          |                                 |
|----------------------------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------------|---------------------------------|
| <b>Frequency Range (MHz)</b>                                   | <b>Electric Field Strength (V/m)</b> | <b>Magnetic Field Strength (A/m)</b> | <b>Power Density (mW/cm<sup>2</sup>)</b> | <b>Averaging Time (minutes)</b> |
| 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = 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);

Calculated Data:

| <b>Mode</b>     | <b>Frequency (MHz)</b> | <b>Antenna Gain</b> |                  | <b>Target Power</b> |             | <b>Evaluation Distance (cm)</b> | <b>Power Density (mW/cm<sup>2</sup>)</b> | <b>MPE Limit (mW/cm<sup>2</sup>)</b> |
|-----------------|------------------------|---------------------|------------------|---------------------|-------------|---------------------------------|------------------------------------------|--------------------------------------|
|                 |                        | <b>(dBi)</b>        | <b>(numeric)</b> | <b>(dBm)</b>        | <b>(mW)</b> |                                 |                                          |                                      |
| WCDMA (Band V)  | 824.0                  | 1.0                 | 1.26             | 23.5                | 223.87      | 20                              | 0.056                                    | 0.549                                |
| WCDMA (Band II) | 1850.0                 | 1.0                 | 1.26             | 23.5                | 223.87      | 20                              | 0.056                                    | 1.0                                  |
| LTE (Band II)   | 1850.0                 | 1.0                 | 1.26             | 24                  | 251.19      | 20                              | 0.063                                    | 1.0                                  |
| LTE (Band IV)   | 1755.0                 | 1.0                 | 1.26             | 24                  | 251.19      | 20                              | 0.063                                    | 1.0                                  |
| (Band XII)      | 699                    | 1.0                 | 1.26             | 24                  | 251.19      | 20                              | 0.063                                    | 0.466                                |

Note :

(1) Target Power =the max power including Tune-up tolerance, the tune up power declared by manufacture as:

WCDMA Band V =  $22.5 \pm 1$ dBm; WCDMA Band II =  $22.5 \pm 1$ dBm; FDD Band II =  $22 \pm 2$ dBm ;

FDD Band IV =  $22 \pm 2$ dBm ; FDD Band XII =  $22 \pm 2$ dBm

Result: The device meet FCC MPE at 20 cm distance

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

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According to FCC § 2.1047(d) , Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

**§2.1046; § 22.913 (a);§ 24.232 (c); §27.50 (d) - RF OUTPUT POWER****Applicable Standards**

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

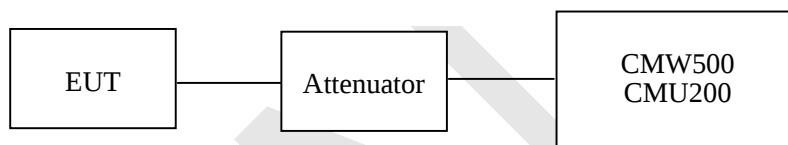
According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz. The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

According to §27.50, the maximum EIRP must not exceed 3Watts (34.77dBm) for 699-716MHz.

**Test Procedure***Conducted method:*

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.



**Test Equipment List and Details**

| Manufacturer    | Description                          | Model  | Serial Number         | Calibration Date | Calibration Interval |
|-----------------|--------------------------------------|--------|-----------------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver                    | ESCI   | 100540                | 2015-07-25       | 2016-07-24           |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200 | 106891                | 2015-11-23       | 2016-11-23           |
| R&S             | Wideband Radio Communication tester  | CMW500 | 1201.002K50-146520-wh | 2015-11-23       | 2016-11-23           |
| Rohde & Schwarz | Spectrum Analyzer                    | FSU 26 | 200268                | 2015-07-29       | 2016-08-28           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) 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> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by David. Hsu on 2016-05-27.*

**Conducted Power****Cellular Band (Part 22H)**

| Mode           | Test Condition | Test Mode   | 3GPP Sub Test | Average Output Power (dBm) |                  |                |
|----------------|----------------|-------------|---------------|----------------------------|------------------|----------------|
|                |                |             |               | Low Frequency              | Middle Frequency | High Frequency |
| WCDMA (Band V) | Normal         | Rel 99      | 1             | 22.96                      | 22.81            | 22.87          |
|                |                | Rel 8 HSDPA | 1             | 23.21                      | 23.18            | 23.10          |
|                |                |             | 2             | 23.02                      | 22.86            | 22.95          |
|                |                |             | 3             | 22.88                      | 22.79            | 22.85          |
|                |                |             | 4             | 22.82                      | 22.73            | 22.83          |
|                |                | Rel 8 HSUPA | 1             | 23.03                      | 23.05            | 23.04          |
|                |                |             | 2             | 22.86                      | 22.73            | 22.69          |
|                |                |             | 3             | 22.88                      | 22.72            | 22.82          |
|                |                |             | 4             | 22.82                      | 22.69            | 22.72          |
|                |                |             | 5             | 22.85                      | 22.68            | 22.76          |
|                |                | HSPA+       | 1             | 23.05                      | 22.54            | 22.76          |

**PCS Band (Part 24E)**

| Mode            | Test Condition | Test Mode   | 3GPP Sub Test | Average Output Power (dBm) |                  |                |
|-----------------|----------------|-------------|---------------|----------------------------|------------------|----------------|
|                 |                |             |               | Low Frequency              | Middle Frequency | High Frequency |
| WCDMA (Band II) | Normal         | Rel 99      | 1             | 22.96                      | 22.92            | 22.92          |
|                 |                | Rel 8 HSDPA | 1             | 23.12                      | 22.81            | 22.96          |
|                 |                |             | 2             | 23.03                      | 22.91            | 22.88          |
|                 |                |             | 3             | 22.68                      | 22.75            | 22.84          |
|                 |                |             | 4             | 22.58                      | 22.77            | 22.63          |
|                 |                | Rel 8 HSUPA | 1             | 22.77                      | 22.92            | 22.87          |
|                 |                |             | 2             | 22.81                      | 22.72            | 22.65          |
|                 |                |             | 3             | 22.73                      | 22.53            | 22.76          |
|                 |                |             | 4             | 22.89                      | 22.77            | 22.54          |
|                 |                |             | 5             | 22.81                      | 22.75            | 22.57          |
|                 |                | HSPA+       | 1             | 23.10                      | 22.83            | 22.97          |

**Peak-to-average ratio (PAR)****Cellular Band**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| WCDMA (BPSK)  | Low     | 3.21     | 13         |
|               | Middle  | 3.26     | 13         |
|               | High    | 3.22     | 13         |
| HSDPA (16QAM) | Low     | 2.93     | 13         |
|               | Middle  | 2.82     | 13         |
|               | High    | 2.59     | 13         |
| HSUPA (BPSK)  | Low     | 2.81     | 13         |
|               | Middle  | 2.85     | 13         |
|               | High    | 2.77     | 13         |
| HSPA+ (16QAM) | Low     | 2.63     | 13         |
|               | Middle  | 2.52     | 13         |
|               | High    | 2.41     | 13         |

**PCS Band**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| WCDMA (BPSK)  | Low     | 2.75     | 13         |
|               | Middle  | 2.78     | 13         |
|               | High    | 2.80     | 13         |
| HSDPA (16QAM) | Low     | 2.64     | 13         |
|               | Middle  | 2.43     | 13         |
|               | High    | 2.54     | 13         |
| HSUPA (BPSK)  | Low     | 2.52     | 13         |
|               | Middle  | 2.36     | 13         |
|               | High    | 2.66     | 13         |
| HSPA+ (16QAM) | Low     | 2.43     | 13         |
|               | Middle  | 2.29     | 13         |
|               | High    | 2.16     | 13         |

**LTE Band II:****Maximum Output Power**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 1.4M           | QPSK            | 1#0                        | 23.55             | 23.84                | 23.62              | 33.00       |
|                |                 | 1#3                        | 23.48             | 23.76                | 23.56              |             |
|                |                 | 1#5                        | 23.59             | 23.78                | 23.69              |             |
|                |                 | 3#0                        | 23.33             | 23.43                | 23.37              |             |
|                |                 | 3#1                        | 23.27             | 23.49                | 23.30              |             |
|                |                 | 3#3                        | 23.21             | 23.38                | 23.26              |             |
|                |                 | 6#0                        | 22.73             | 22.74                | 22.58              |             |
|                | 16-QAM          | 1#0                        | 23.02             | 22.66                | 22.94              |             |
|                |                 | 1#3                        | 22.93             | 22.60                | 22.87              |             |
|                |                 | 1#5                        | 22.97             | 22.57                | 22.81              |             |
|                |                 | 3#0                        | 22.57             | 22.34                | 22.46              |             |
|                |                 | 3#1                        | 22.63             | 22.42                | 22.55              |             |
|                |                 | 3#3                        | 22.61             | 22.37                | 22.51              |             |
|                |                 | 6#0                        | 21.98             | 21.74                | 21.87              |             |
| 3M             | QPSK            | 1#0                        | 23.74             | 23.80                | 23.87              | 33.00       |
|                |                 | 1#7                        | 23.79             | 23.69                | 23.82              |             |
|                |                 | 1#14                       | 23.75             | 23.66                | 23.84              |             |
|                |                 | 8#0                        | 23.39             | 23.33                | 23.40              |             |
|                |                 | 8#4                        | 23.44             | 23.37                | 23.34              |             |
|                |                 | 8#7                        | 23.38             | 23.40                | 23.38              |             |
|                |                 | 15#0                       | 22.80             | 22.67                | 22.79              |             |
|                | 16-QAM          | 1#0                        | 22.98             | 22.78                | 22.90              |             |
|                |                 | 1#7                        | 22.92             | 22.61                | 22.85              |             |
|                |                 | 1#14                       | 22.94             | 22.68                | 22.99              |             |
|                |                 | 8#0                        | 22.63             | 22.64                | 22.44              |             |
|                |                 | 8#4                        | 22.62             | 22.59                | 22.51              |             |
|                |                 | 8#7                        | 22.55             | 22.62                | 22.48              |             |
|                |                 | 15#0                       | 22.00             | 21.56                | 21.93              |             |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 5M             | QPSK            | 1#0                        | 23.75             | 23.81                | 23.67              | 33.00       |
|                |                 | 1#12                       | 23.80             | 23.73                | 23.63              |             |
|                |                 | 1#24                       | 23.67             | 23.79                | 23.69              |             |
|                |                 | 12#0                       | 23.38             | 23.42                | 23.46              |             |
|                |                 | 12#6                       | 23.41             | 23.37                | 23.33              |             |
|                |                 | 12#11                      | 23.34             | 23.29                | 23.39              |             |
|                |                 | 25#0                       | 22.69             | 22.85                | 22.67              |             |
|                | 16-QAM          | 1#0                        | 22.79             | 22.78                | 22.46              |             |
|                |                 | 1#12                       | 22.72             | 22.80                | 22.49              |             |
|                |                 | 1#24                       | 22.78             | 22.82                | 22.53              |             |
|                |                 | 12#0                       | 22.48             | 22.46                | 22.22              |             |
|                |                 | 12#6                       | 22.37             | 22.43                | 22.28              |             |
|                |                 | 12#11                      | 22.43             | 22.38                | 22.26              |             |
|                |                 | 25#0                       | 21.97             | 21.94                | 21.85              |             |
| 10M            | QPSK            | 1#0                        | 23.72             | 23.88                | 23.72              | 33.00       |
|                |                 | 1#24                       | 23.66             | 23.69                | 23.80              |             |
|                |                 | 1#49                       | 23.69             | 23.77                | 23.69              |             |
|                |                 | 25#0                       | 23.47             | 23.55                | 23.48              |             |
|                |                 | 25#12                      | 23.49             | 23.58                | 23.47              |             |
|                |                 | 25#24                      | 23.55             | 23.52                | 23.50              |             |
|                |                 | 50#0                       | 22.72             | 22.86                | 22.84              |             |
|                | 16-QAM          | 1#0                        | 22.78             | 22.62                | 22.56              |             |
|                |                 | 1#24                       | 22.83             | 22.51                | 22.48              |             |
|                |                 | 1#49                       | 22.77             | 22.47                | 22.63              |             |
|                |                 | 25#0                       | 22.58             | 22.32                | 22.28              |             |
|                |                 | 25#12                      | 22.46             | 22.29                | 22.20              |             |
|                |                 | 25#24                      | 22.33             | 22.36                | 22.29              |             |
|                |                 | 50#0                       | 21.84             | 21.69                | 21.61              |             |
| 15M            | QPSK            | 1#0                        | 23.71             | 23.72                | 23.65              | 33.00       |
|                |                 | 1#37                       | 23.60             | 23.69                | 23.62              |             |
|                |                 | 1#74                       | 23.66             | 23.64                | 23.69              |             |
|                |                 | 36#0                       | 23.40             | 23.31                | 23.26              |             |
|                |                 | 36#17                      | 23.31             | 23.36                | 23.20              |             |
|                |                 | 36#35                      | 23.38             | 23.32                | 23.27              |             |
|                |                 | 75#0                       | 22.78             | 22.92                | 22.81              |             |
|                | 16-QAM          | 1#0                        | 22.60             | 22.73                | 22.58              |             |
|                |                 | 1#37                       | 22.65             | 22.77                | 22.51              |             |
|                |                 | 1#74                       | 22.71             | 22.79                | 22.57              |             |
|                |                 | 36#0                       | 22.26             | 22.45                | 22.29              |             |
|                |                 | 36#17                      | 22.19             | 22.49                | 22.21              |             |
|                |                 | 36#35                      | 22.13             | 22.43                | 22.18              |             |
|                |                 | 75#0                       | 21.72             | 21.60                | 21.66              |             |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 20M            | QPSK            | 1#0                        | 23.57             | 23.71                | 23.60              | 33.00       |
|                |                 | 1#49                       | 23.62             | 23.59                | 23.55              |             |
|                |                 | 1#99                       | 23.64             | 23.68                | 23.69              |             |
|                |                 | 50#0                       | 23.39             | 23.38                | 23.48              |             |
|                |                 | 50#24                      | 23.28             | 23.33                | 23.40              |             |
|                |                 | 50#49                      | 23.32             | 23.39                | 23.41              |             |
|                |                 | 100#0                      | 22.91             | 22.97                | 22.60              |             |
|                | 16-QAM          | 1#0                        | 22.69             | 22.62                | 22.85              |             |
|                |                 | 1#49                       | 22.64             | 22.61                | 22.81              |             |
|                |                 | 1#99                       | 22.62             | 22.58                | 22.78              |             |
|                |                 | 50#0                       | 22.27             | 22.32                | 22.46              |             |
|                |                 | 50#24                      | 22.30             | 22.27                | 22.42              |             |
|                |                 | 50#49                      | 22.34             | 22.30                | 22.39              |             |
|                |                 | 100#0                      | 21.77             | 21.58                | 21.73              |             |

**Peak-to-average ratio (PAR)**

| Test Modulation |        | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|--------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB   | 20M            | 3.64             | 4.48                | 3.96              | 13.00     |
|                 | 100 RB |                | 6.20             | 6.52                | 6.40              | 13.00     |
| 16-QAM          | 1 RB   | 20M            | 4.36             | 5.56                | 4.60              | 13.00     |
|                 | 100 RB |                | 7.08             | 7.04                | 7.16              | 13.00     |

**LTE Band IV****Maximum Output Power**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 1.4M           | QPSK            | 1#0                        | 23.74             | 23.67                | 23.78              | 30.00       |
|                |                 | 1#3                        | 23.71             | 23.61                | 23.81              |             |
|                |                 | 1#5                        | 23.67             | 23.63                | 23.75              |             |
|                |                 | 3#0                        | 23.49             | 23.47                | 23.64              |             |
|                |                 | 3#1                        | 23.53             | 23.40                | 23.47              |             |
|                |                 | 3#3                        | 23.45             | 23.45                | 23.55              |             |
|                | 16-QAM          | 6#0                        | 22.75             | 22.50                | 22.81              |             |
|                |                 | 1#0                        | 23.07             | 23.02                | 23.14              |             |
|                |                 | 1#3                        | 23.15             | 22.95                | 23.22              |             |
|                |                 | 1#5                        | 23.20             | 22.99                | 23.16              |             |
|                |                 | 3#0                        | 22.70             | 22.56                | 22.73              |             |
|                |                 | 3#1                        | 22.67             | 22.60                | 22.68              |             |
|                |                 | 3#3                        | 22.74             | 22.58                | 22.75              |             |
|                |                 | 6#0                        | 22.21             | 22.06                | 22.17              |             |
| 3M             | QPSK            | 1#0                        | 23.65             | 23.48                | 23.74              | 30.00       |
|                |                 | 1#7                        | 23.63             | 23.45                | 23.67              |             |
|                |                 | 1#14                       | 23.72             | 23.49                | 23.72              |             |
|                |                 | 8#0                        | 23.31             | 23.22                | 23.41              |             |
|                |                 | 8#4                        | 23.35             | 23.14                | 23.35              |             |
|                |                 | 8#7                        | 23.40             | 23.10                | 23.32              |             |
|                |                 | 15#0                       | 22.64             | 22.47                | 22.88              |             |
|                | 16-QAM          | 1#0                        | 22.96             | 22.91                | 23.02              |             |
|                |                 | 1#7                        | 22.92             | 22.86                | 22.97              |             |
|                |                 | 1#14                       | 22.88             | 22.90                | 23.05              |             |
|                |                 | 8#0                        | 22.54             | 22.54                | 22.75              |             |
|                |                 | 8#4                        | 22.58             | 22.42                | 22.66              |             |
|                |                 | 8#7                        | 22.62             | 22.50                | 22.80              |             |
|                |                 | 15#0                       | 22.03             | 21.91                | 22.08              |             |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 5M             | QPSK            | 1#0                        | 23.69             | 23.20                | 23.51              | 30.00       |
|                |                 | 1#12                       | 23.67             | 23.14                | 23.44              |             |
|                |                 | 1#24                       | 23.74             | 23.16                | 23.49              |             |
|                |                 | 12#0                       | 23.36             | 22.83                | 23.07              |             |
|                |                 | 12#6                       | 23.32             | 22.79                | 23.22              |             |
|                |                 | 12#11                      | 23.27             | 22.77                | 23.15              |             |
|                |                 | 25#0                       | 22.52             | 22.39                | 22.70              |             |
|                | 16-QAM          | 1#0                        | 23.01             | 22.80                | 22.97              |             |
|                |                 | 1#12                       | 23.04             | 22.83                | 22.92              |             |
|                |                 | 1#24                       | 22.97             | 22.89                | 22.95              |             |
|                |                 | 12#0                       | 22.70             | 22.45                | 22.58              |             |
|                |                 | 12#6                       | 22.62             | 22.43                | 22.56              |             |
|                |                 | 12#11                      | 22.64             | 22.36                | 22.63              |             |
|                |                 | 25#0                       | 21.97             | 21.85                | 22.06              |             |
| 10M            | QPSK            | 1#0                        | 23.67             | 23.33                | 23.55              | 30.00       |
|                |                 | 1#24                       | 23.63             | 23.39                | 23.47              |             |
|                |                 | 1#49                       | 23.72             | 23.45                | 23.54              |             |
|                |                 | 25#0                       | 23.27             | 22.96                | 23.17              |             |
|                |                 | 25#12                      | 23.21             | 22.84                | 23.24              |             |
|                |                 | 25#24                      | 23.18             | 22.93                | 23.20              |             |
|                |                 | 50#0                       | 22.62             | 22.54                | 22.73              |             |
|                | 16-QAM          | 1#0                        | 22.89             | 22.81                | 22.92              |             |
|                |                 | 1#24                       | 22.82             | 22.75                | 22.90              |             |
|                |                 | 1#49                       | 22.86             | 22.78                | 22.97              |             |
|                |                 | 25#0                       | 22.59             | 22.47                | 22.60              |             |
|                |                 | 25#12                      | 22.64             | 22.55                | 22.65              |             |
|                |                 | 25#24                      | 22.65             | 22.48                | 22.69              |             |
|                |                 | 50#0                       | 21.84             | 21.78                | 21.95              |             |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 15M            | QPSK            | 1#0                        | 23.64             | 23.32                | 23.61              | 30.00       |
|                |                 | 1#37                       | 23.71             | 23.39                | 23.67              |             |
|                |                 | 1#74                       | 23.68             | 23.27                | 23.55              |             |
|                |                 | 36#0                       | 23.27             | 22.97                | 23.28              |             |
|                |                 | 36#17                      | 23.33             | 22.93                | 23.33              |             |
|                |                 | 36#35                      | 23.24             | 22.88                | 23.31              |             |
|                |                 | 75#0                       | 22.47             | 22.15                | 22.61              |             |
|                | 16-QAM          | 1#0                        | 22.84             | 22.68                | 22.86              |             |
|                |                 | 1#37                       | 22.79             | 22.74                | 22.73              |             |
|                |                 | 1#74                       | 22.72             | 22.66                | 22.79              |             |
|                |                 | 36#0                       | 22.43             | 22.24                | 22.44              |             |
|                |                 | 36#17                      | 22.47             | 22.20                | 22.42              |             |
|                |                 | 36#35                      | 22.40             | 22.28                | 22.51              |             |
|                |                 | 75#0                       | 21.73             | 21.66                | 21.83              |             |
| 20M            | QPSK            | 1#0                        | 23.46             | 22.98                | 23.26              | 30.00       |
|                |                 | 1#49                       | 23.50             | 22.92                | 23.20              |             |
|                |                 | 1#99                       | 23.44             | 22.96                | 23.14              |             |
|                |                 | 50#0                       | 23.03             | 22.60                | 22.85              |             |
|                |                 | 50#24                      | 22.98             | 22.54                | 22.82              |             |
|                |                 | 50#49                      | 23.07             | 22.48                | 22.77              |             |
|                |                 | 100#0                      | 22.34             | 22.00                | 22.27              |             |
|                | 16-QAM          | 1#0                        | 22.95             | 22.82                | 23.01              |             |
|                |                 | 1#49                       | 22.92             | 22.77                | 22.98              |             |
|                |                 | 1#99                       | 22.99             | 22.85                | 22.92              |             |
|                |                 | 50#0                       | 22.73             | 22.40                | 22.52              |             |
|                |                 | 50#24                      | 22.66             | 22.35                | 22.54              |             |
|                |                 | 50#49                      | 22.79             | 22.38                | 22.60              |             |
|                |                 | 100#0                      | 21.97             | 21.74                | 21.85              |             |

### Peak-to-average ratio (PAR)

| Test Modulation |        | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|--------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB   | 20M            | 4.48             | 3.88                | 4.36              | 13.00     |
|                 | 100 RB |                | 6.48             | 6.20                | 6.48              | 13.00     |
| 16-QAM          | 1 RB   | 20M            | 5.48             | 4.68                | 5.16              | 13.00     |
|                 | 100 RB |                | 6.96             | 7.00                | 7.08              | 13.00     |

**LTE Band XII:****Maximum Output Power**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 1.4M           | QPSK            | 1#0                        | 23.52             | 23.37                | 23.29              | 34.77       |
|                |                 | 1#3                        | 23.46             | 23.25                | 23.35              |             |
|                |                 | 1#5                        | 23.55             | 23.31                | 23.30              |             |
|                |                 | 3#0                        | 23.21             | 22.90                | 23.04              |             |
|                |                 | 3#1                        | 23.26             | 22.96                | 23.07              |             |
|                |                 | 3#3                        | 23.17             | 22.92                | 22.99              |             |
|                |                 | 6#0                        | 22.61             | 22.73                | 22.12              |             |
|                | 16-QAM          | 1#0                        | 22.83             | 22.81                | 22.62              |             |
|                |                 | 1#3                        | 22.77             | 22.78                | 22.68              |             |
|                |                 | 1#5                        | 22.75             | 22.76                | 22.76              |             |
|                |                 | 3#0                        | 22.31             | 22.41                | 22.35              |             |
|                |                 | 3#1                        | 22.36             | 22.46                | 22.41              |             |
|                |                 | 3#3                        | 22.57             | 22.68                | 22.36              |             |
|                |                 | 6#0                        | 21.70             | 21.94                | 21.69              |             |
| 3M             | QPSK            | 1#0                        | 23.58             | 23.71                | 23.41              | 34.77       |
|                |                 | 1#7                        | 23.63             | 23.77                | 23.36              |             |
|                |                 | 1#14                       | 23.66             | 23.65                | 23.44              |             |
|                |                 | 8#0                        | 23.16             | 23.22                | 23.04              |             |
|                |                 | 8#4                        | 23.08             | 23.27                | 23.06              |             |
|                |                 | 8#7                        | 23.13             | 23.31                | 23.12              |             |
|                |                 | 15#0                       | 22.92             | 22.89                | 22.62              |             |
|                | 16-QAM          | 1#0                        | 22.88             | 23.03                | 22.67              |             |
|                |                 | 1#7                        | 22.91             | 22.96                | 22.71              |             |
|                |                 | 1#14                       | 22.94             | 22.98                | 22.66              |             |
|                |                 | 8#0                        | 22.39             | 22.53                | 22.20              |             |
|                |                 | 8#4                        | 22.35             | 22.59                | 22.17              |             |
|                |                 | 8#7                        | 22.40             | 22.56                | 22.15              |             |
|                |                 | 15#0                       | 21.77             | 22.01                | 21.83              |             |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) | Limit (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|-------------|
| 5M             | QPSK            | 1#0                        | 23.67             | 23.64                | 23.61              | 34.77       |
|                |                 | 1#12                       | 23.75             | 23.61                | 23.69              |             |
|                |                 | 1#24                       | 23.70             | 23.65                | 23.66              |             |
|                |                 | 12#0                       | 23.26             | 23.48                | 23.28              |             |
|                |                 | 12#6                       | 23.21             | 23.44                | 23.19              |             |
|                |                 | 12#11                      | 23.25             | 23.47                | 23.24              |             |
|                |                 | 25#0                       | 22.58             | 22.59                | 22.41              |             |
|                | 16-QAM          | 1#0                        | 22.89             | 23.00                | 22.56              |             |
|                |                 | 1#12                       | 22.81             | 22.96                | 22.48              |             |
|                |                 | 1#24                       | 22.84             | 23.04                | 22.52              |             |
|                |                 | 12#0                       | 22.44             | 22.71                | 22.25              |             |
|                |                 | 12#6                       | 22.49             | 22.66                | 22.31              |             |
|                |                 | 12#11                      | 22.41             | 22.63                | 22.22              |             |
|                |                 | 25#0                       | 21.79             | 21.89                | 21.69              |             |
| 10M            | QPSK            | 1#0                        | 23.52             | 23.84                | 23.43              | 34.77       |
|                |                 | 1#24                       | 23.47             | 23.82                | 23.51              |             |
|                |                 | 1#49                       | 23.56             | 23.87                | 23.46              |             |
|                |                 | 25#0                       | 23.20             | 23.40                | 22.99              |             |
|                |                 | 25#12                      | 23.22             | 23.48                | 22.92              |             |
|                |                 | 25#24                      | 23.16             | 23.41                | 22.95              |             |
|                |                 | 50#0                       | 22.49             | 22.70                | 22.28              |             |
|                | 16-QAM          | 1#0                        | 22.96             | 23.09                | 22.73              |             |
|                |                 | 1#24                       | 23.03             | 23.14                | 22.65              |             |
|                |                 | 1#49                       | 22.99             | 23.10                | 22.69              |             |
|                |                 | 25#0                       | 22.56             | 22.74                | 22.26              |             |
|                |                 | 25#12                      | 22.50             | 22.79                | 22.30              |             |
|                |                 | 25#24                      | 22.53             | 22.71                | 22.24              |             |
|                |                 | 50#0                       | 21.72             | 21.96                | 21.64              |             |

**Peak-to-average ratio (PAR)**

| Test Modulation |       | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|-------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB  | 10M            | 3.92             | 4.72                | 4.68              | 13.00     |
|                 | 50 RB |                | 5.24             | 5.56                | 5.40              | 13.00     |
| 16-QAM          | 1 RB  | 10M            | 4.68             | 5.64                | 5.56              | 13.00     |
|                 | 50 RB |                | 6.28             | 6.52                | 6.40              | 13.00     |

## FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53 - OCCUPIED BANDWIDTH

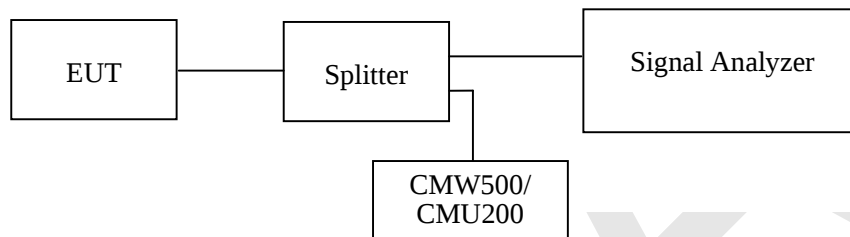
### Applicable Standards

FCC 47 §2.1049, §22.917, §22.905, §24.238 and §27.53.

### 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 5 kHz (Cellular /PCS) & 100 kHz (WCDMA) 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           |
| Rohde & Schwarz | Signal Analyzer                      | FSV40       | 101116                | 2015-09-02       | 2016-09-02           |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200      | 106891                | 2015-11-23       | 2016-11-23           |
| R&S             | Wideband Radio Communication tester  | CMW500      | 1201.002K50-146520-wh | 2015-11-23       | 2016-11-23           |
| Mini            | Splitter                             | ZFRSC-14-S+ | SF019411452           | 2016-01-11       | 2016-07-10           |
| BACL            | RF cable                             | KS-LAB-020  | KS-LAB-020            | 2016-01-11       | 2016-07-10           |
| Mini            | attenuator                           | 10dB        | N/A                   | 2016-01-11       | 2016-07-10           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) 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>       | 21 °C    |
| <b>Relative Humidity:</b> | 49 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by David. Hsu on 2016-05-23&2016-05-31.*

*EUT operation mode: Transmitting*

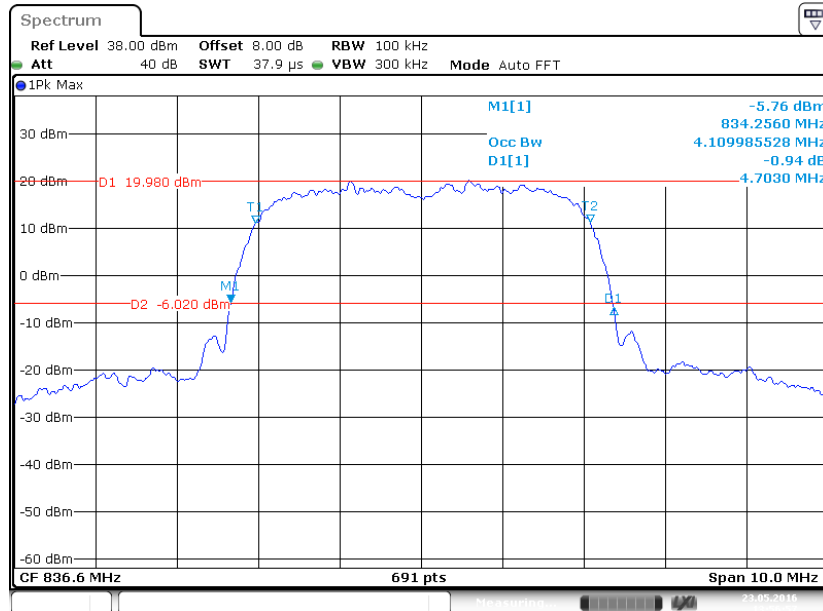
*Test Result: Compliance. Please refer to the following tables and plots.*

**Cellular Band (Part 22H)**

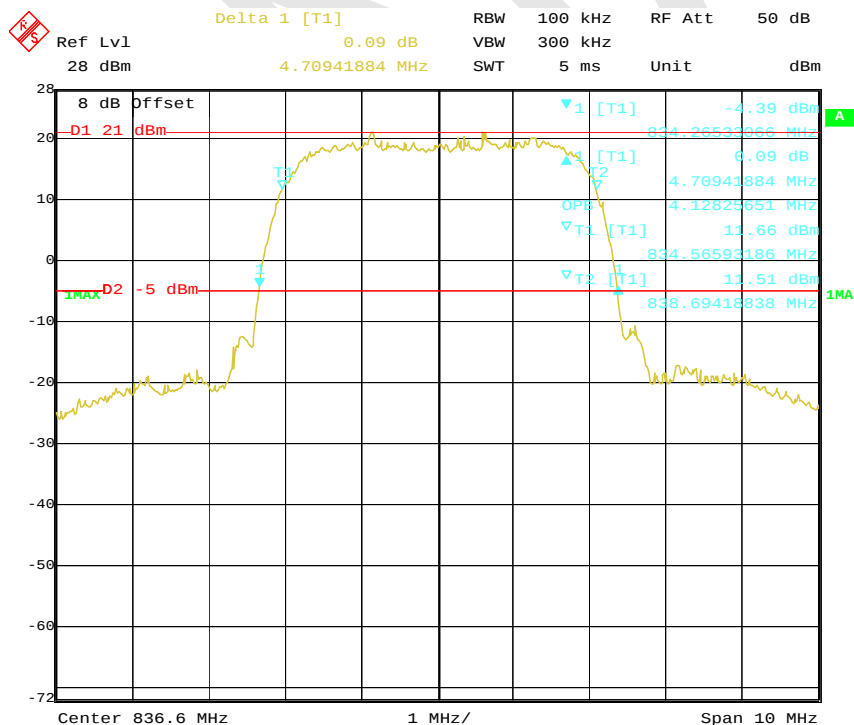
| <b>Mode</b>   | <b>Frequency (MHz)</b> | <b>99% Occupied Bandwidth (MHz)</b> | <b>26 dB Emission Bandwidth (MHz)</b> |
|---------------|------------------------|-------------------------------------|---------------------------------------|
| WCDMA (BPSK)  | 836.6                  | 4.110                               | 4.703                                 |
| HSUPA (BPSK)  | 836.6                  | 4.128                               | 4.709                                 |
| HSDPA (16QAM) | 836.6                  | 4.148                               | 4.749                                 |

**PCS Band (Part 24E)**

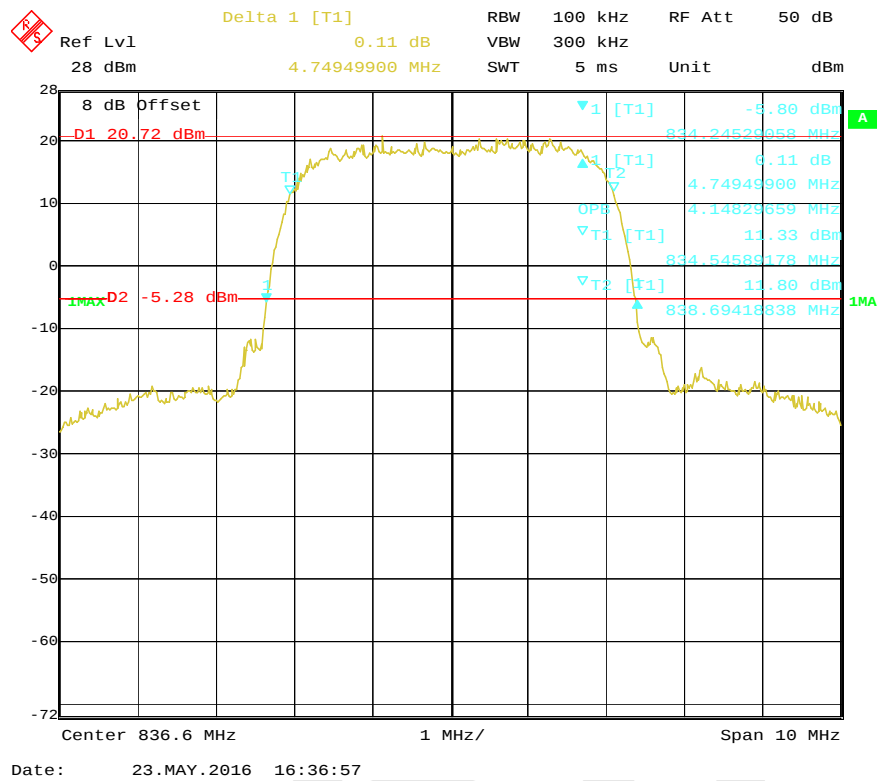
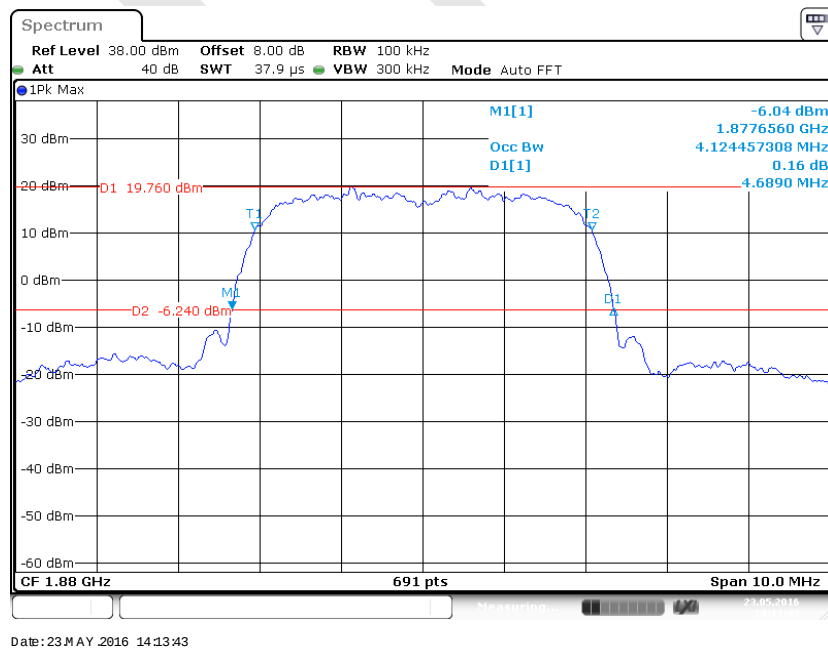
| <b>Mode</b>   | <b>Frequency (MHz)</b> | <b>99% Occupied Bandwidth (MHz)</b> | <b>26 dB Emission Bandwidth (MHz)</b> |
|---------------|------------------------|-------------------------------------|---------------------------------------|
| WCDMA (BPSK)  | 1880.0                 | 4.124                               | 4.689                                 |
| HSUPA (BPSK)  | 1880.0                 | 4.148                               | 4.729                                 |
| HSDPA (16QAM) | 1880.0                 | 4.148                               | 4.749                                 |

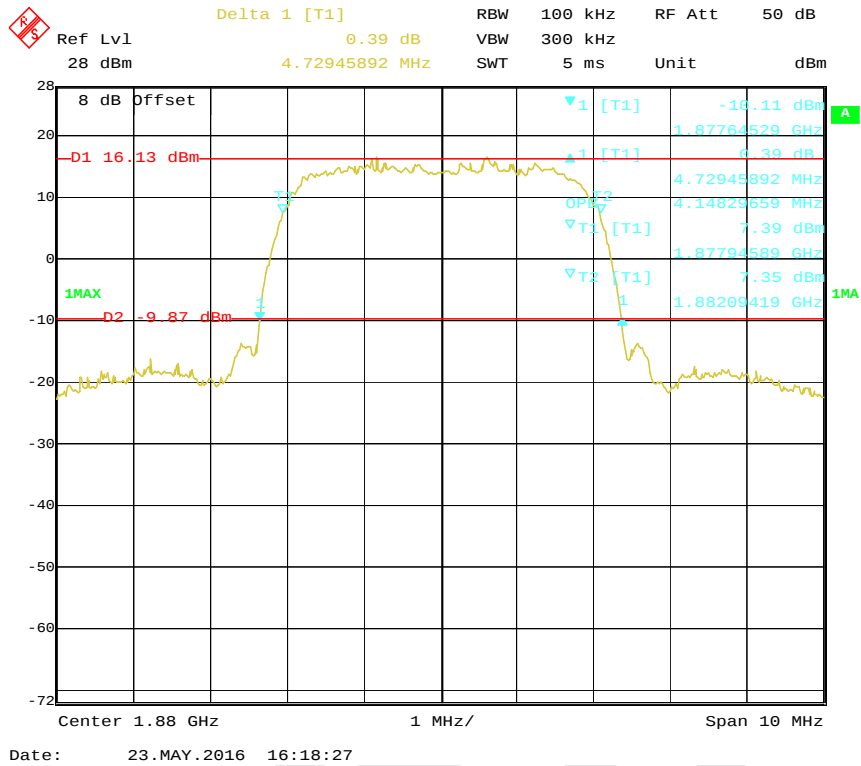
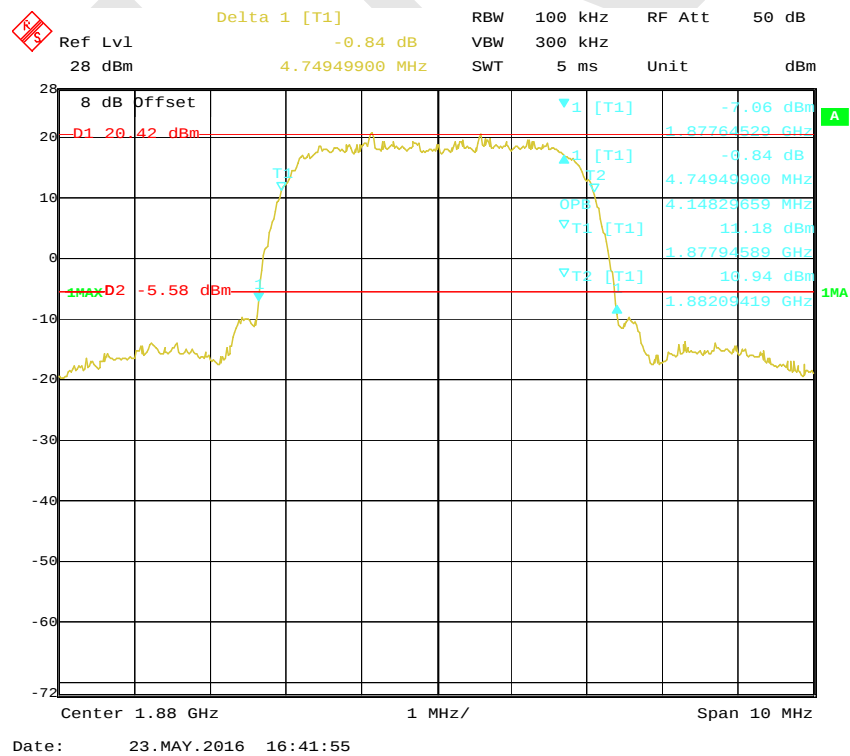
**Cellular Band (Part 22H)****99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode**

Date: 23 MAY 2016 13:56:57

**99% Occupied & 26 dB Emissions Bandwidth for HSUPA (BPSK) Mode**

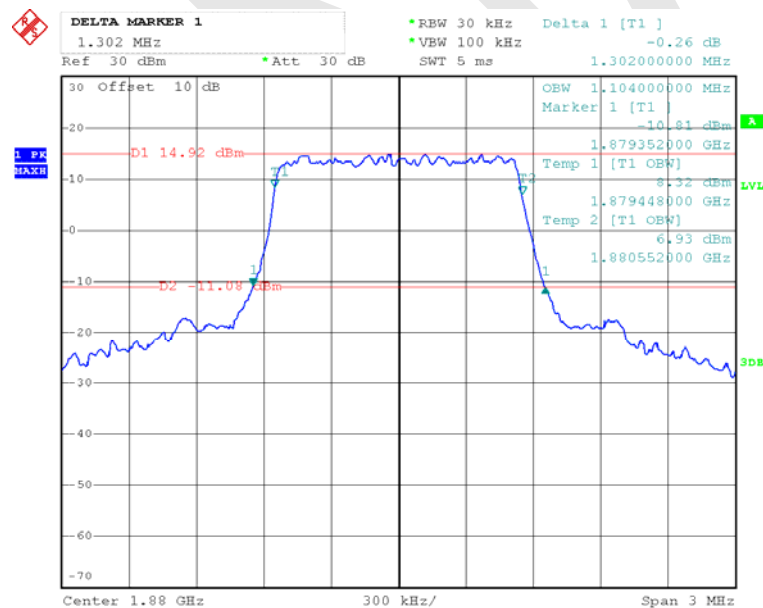
Date: 23.MAY.2016 16:23:46

**99% Occupied & 26 dB Emissions Bandwidth for HSDPA (16QAM) Mode****PCS Band (Part 24E)****99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode**

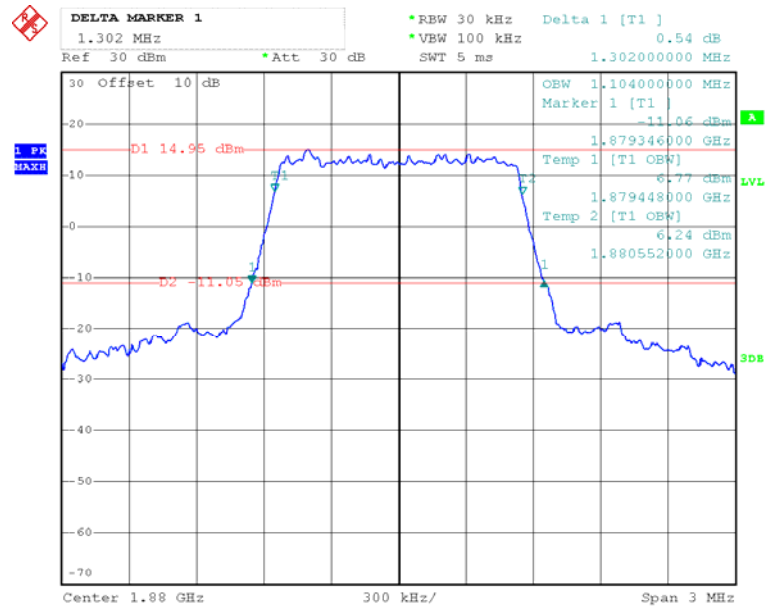
**99% Occupied & 26 dB Emissions Bandwidth for HSUPA (BPSK) Mode****99% Occupied & 26 dB Emissions Bandwidth for HSDPA (16QAM) Mode**

**LTE Band II:**

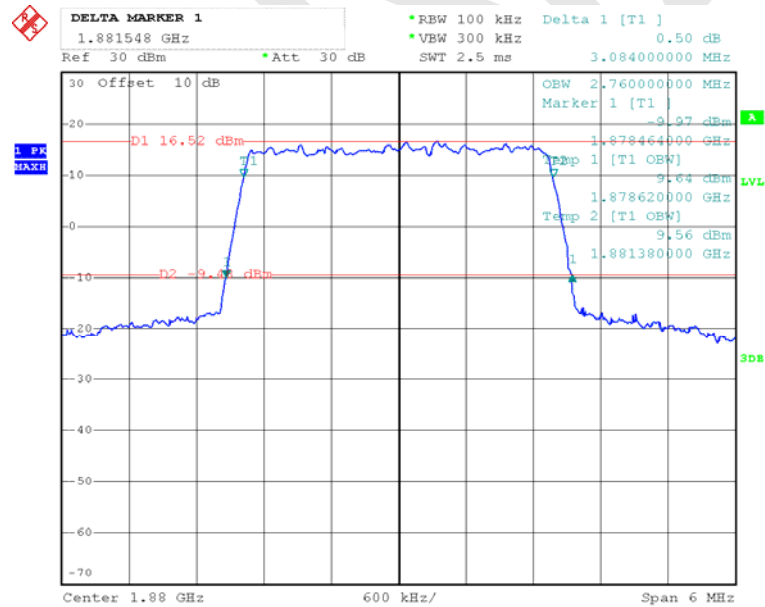
| Test Modulation | Test Bandwidth | Test Channel | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|-----------------|----------------|--------------|------------------------------|-----------------------|
| QPSK            | 1.4M           | Middle       | 1.104                        | 1.302                 |
|                 | 3M             |              | 2.760                        | 3.084                 |
|                 | 5M             |              | 4.540                        | 5.048                 |
|                 | 10M            |              | 9.120                        | 10.228                |
|                 | 15M            |              | 13.560                       | 14.988                |
|                 | 20M            |              | 18.640                       | 21.360                |
| 16-QAM          | 1.4M           | Middle       | 1.104                        | 1.302                 |
|                 | 3M             |              | 2.760                        | 3.072                 |
|                 | 5M             |              | 4.540                        | 5.068                 |
|                 | 10M            |              | 9.120                        | 10.280                |
|                 | 15M            |              | 13.560                       | 15.060                |
|                 | 20M            |              | 18.640                       | 21.440                |

**QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

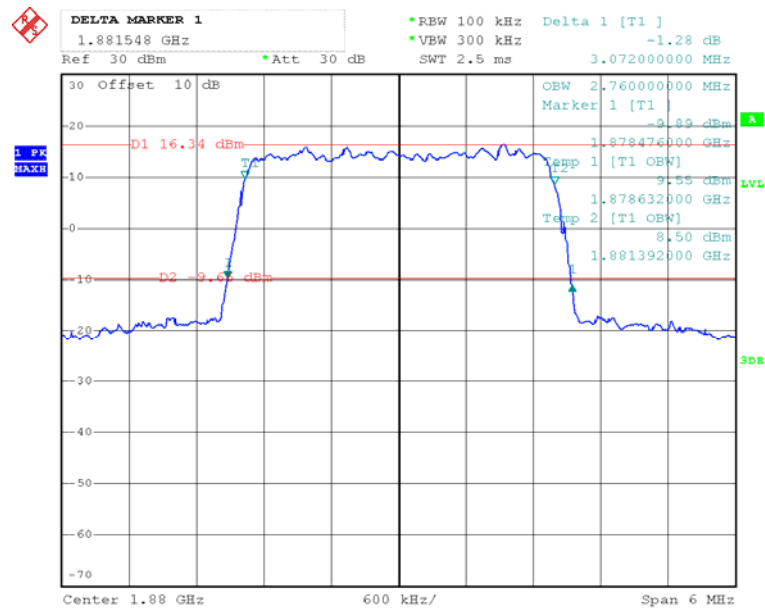
Date: 31.MAY.2016 13:25:44

**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

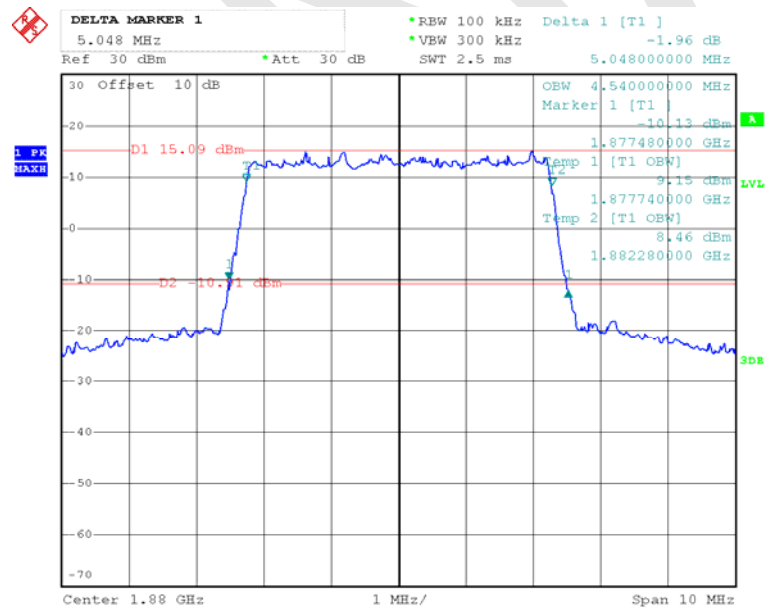
Date: 31.MAY.2016 13:28:04

**QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

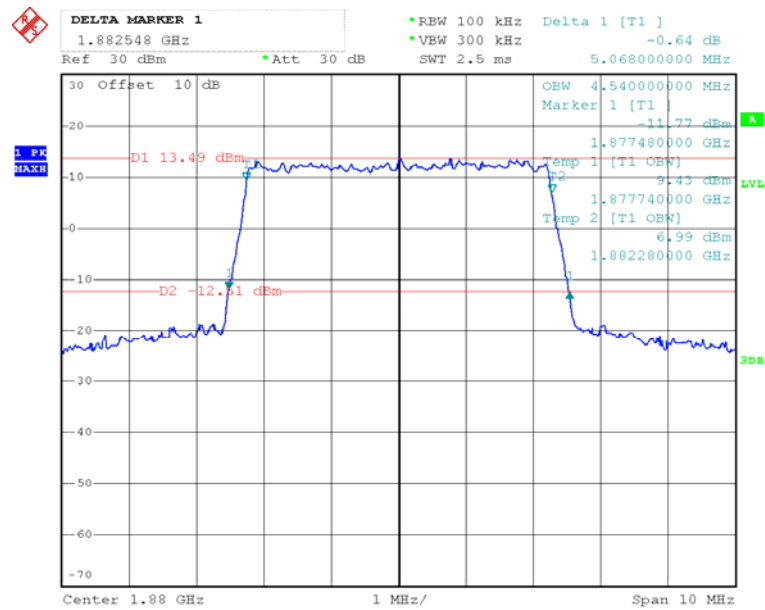
Date: 31.MAY.2016 13:33:21

**16-QAM (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

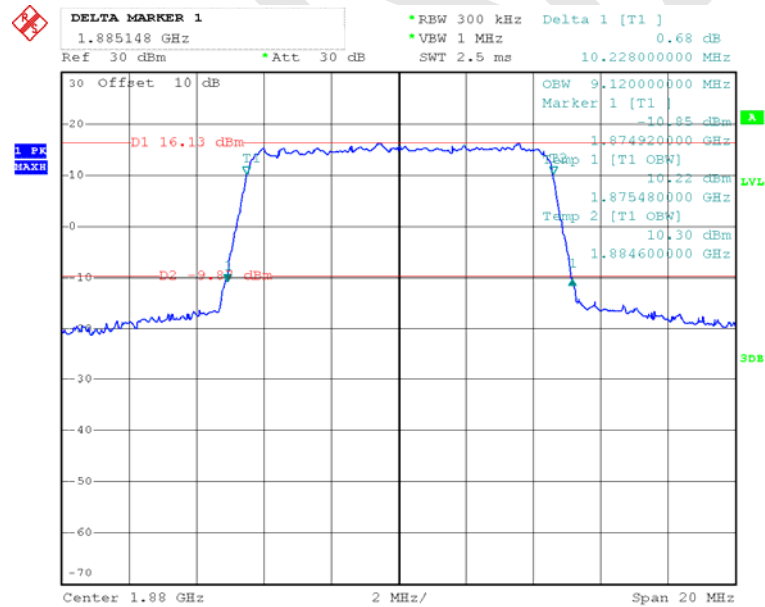
Date: 31.MAY.2016 13:31:26

**QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

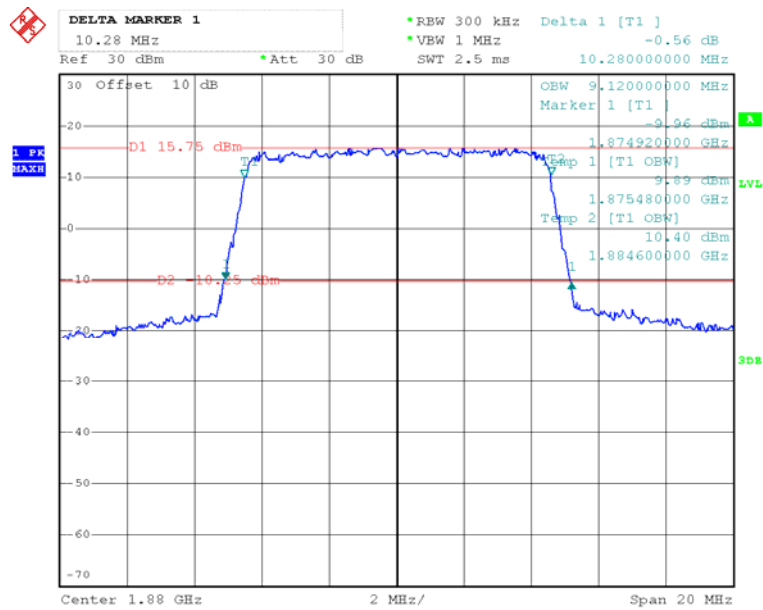
Date: 31.MAY.2016 13:35:34

**16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

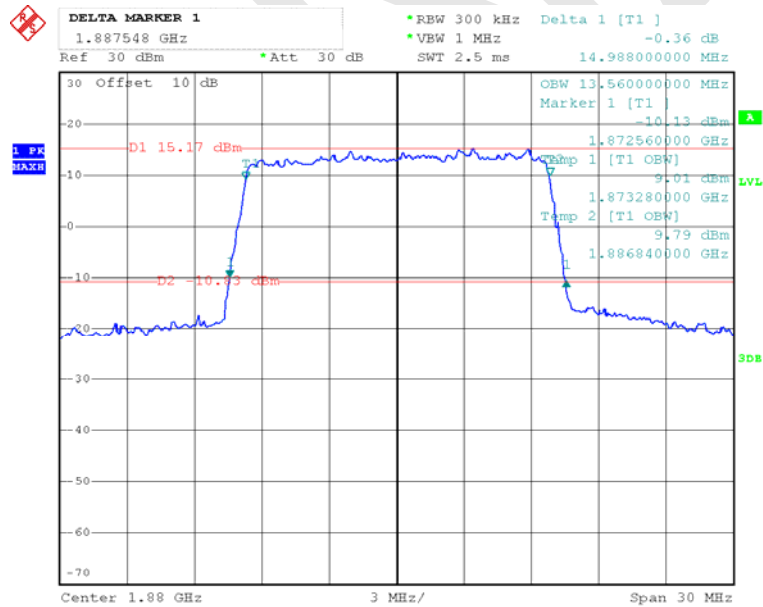
Date: 31.MAY.2016 13:38:22

**QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 13:41:19

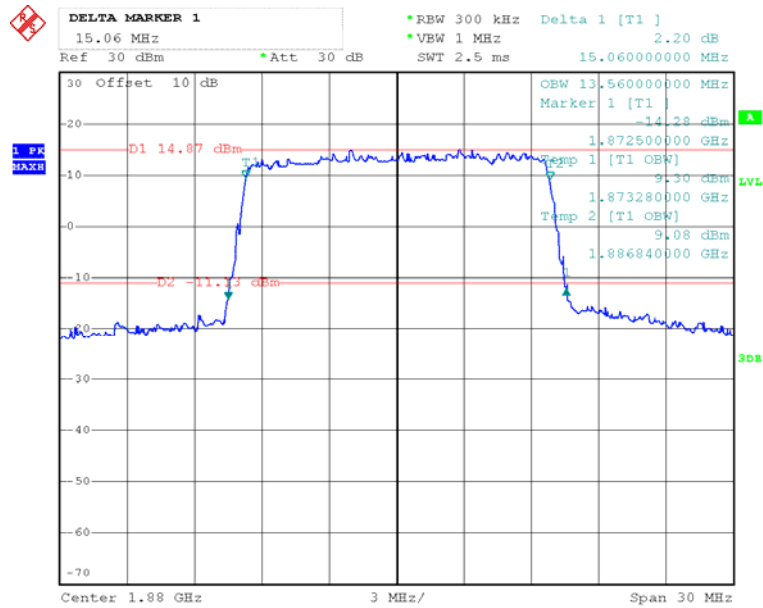
**16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 19:44:33

**QPSK (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

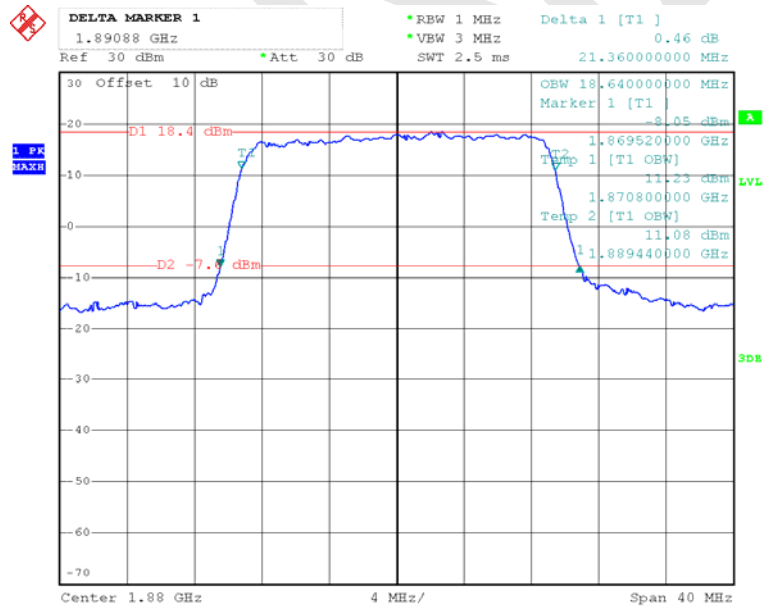
Date: 31.MAY.2016 13:47:30

### 16-QAM (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



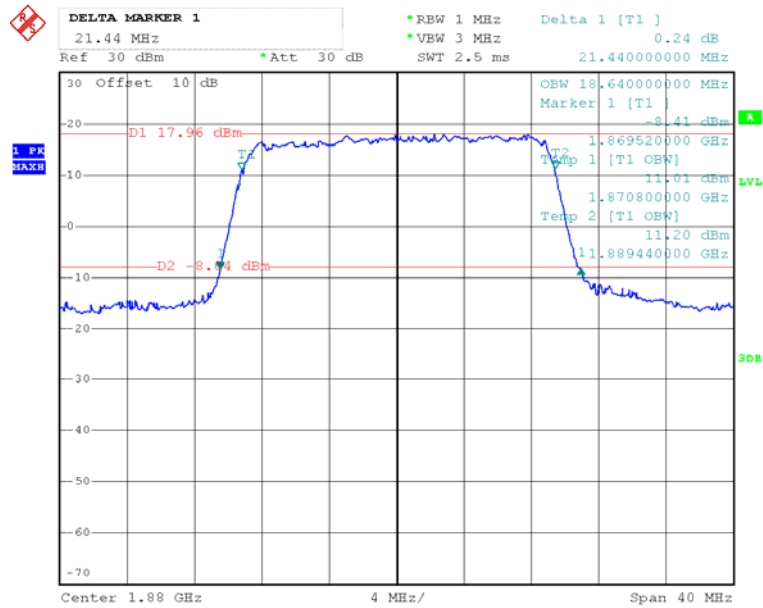
Date: 31.MAY.2016 19:41:35

### QPSK (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



Date: 31.MAY.2016 13:50:51

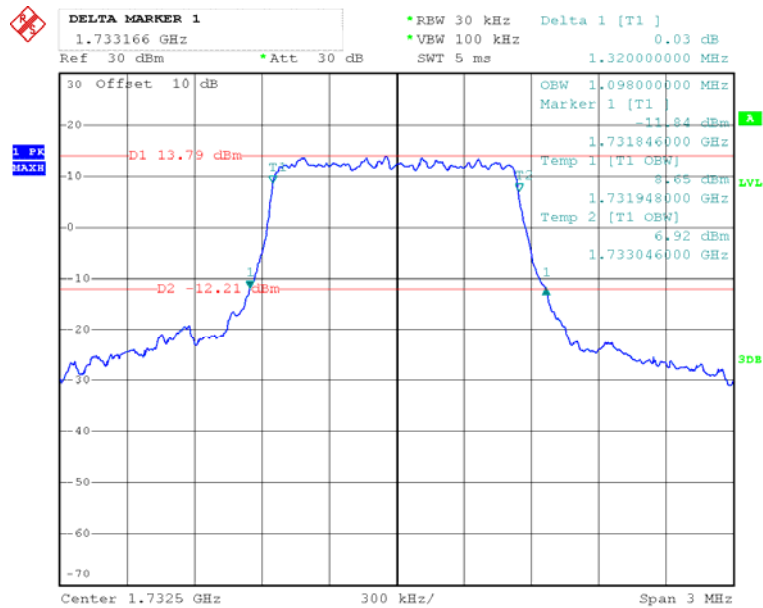
**16-QAM (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**



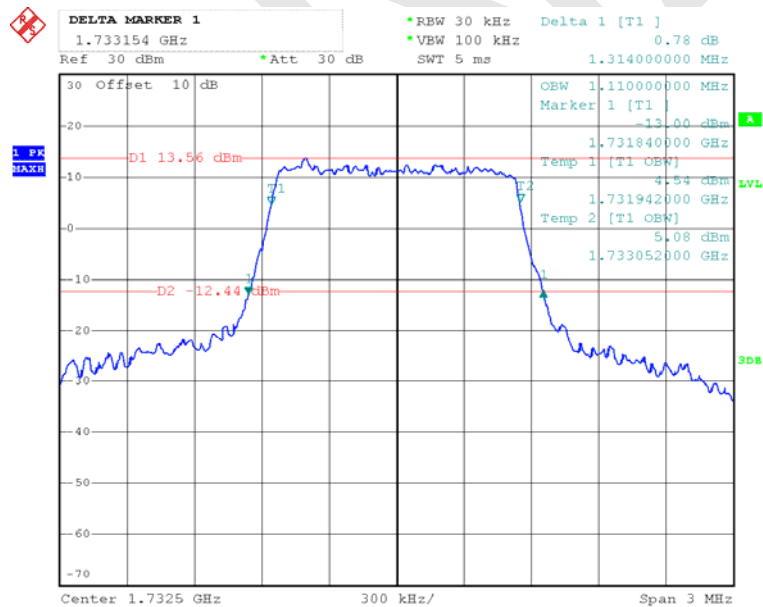
Date: 31.MAY.2016 19:38:43

**LTE Band IV:**

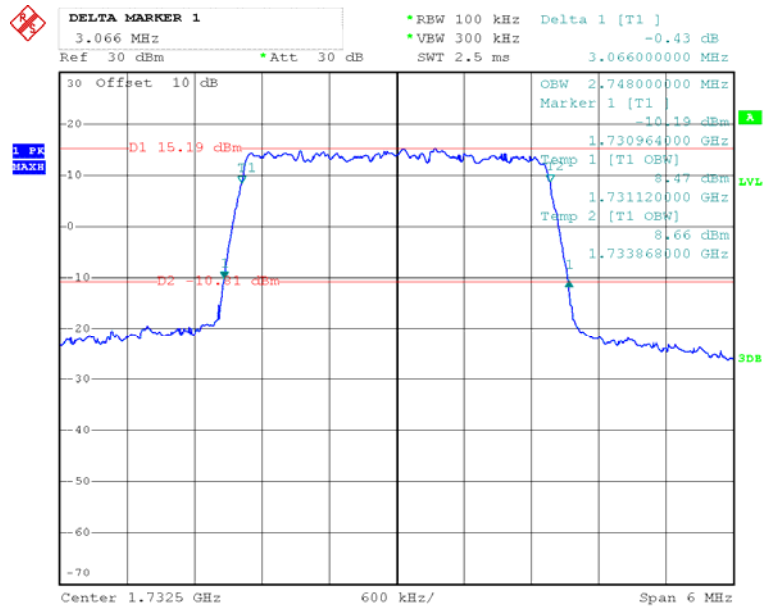
| Test Modulation | Test Bandwidth | Test Channel | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|-----------------|----------------|--------------|------------------------------|-----------------------|
| QPSK            | 1.4M           | Middle       | 1.098                        | 1.320                 |
|                 | 3M             |              | 2.748                        | 3.066                 |
|                 | 5M             |              | 4.520                        | 5.010                 |
|                 | 10M            |              | 9.080                        | 10.270                |
|                 | 15M            |              | 13.500                       | 15.010                |
|                 | 20M            |              | 18.480                       | 20.950                |
| 16-QAM          | 1.4M           | Middle       | 1.110                        | 1.314                 |
|                 | 3M             |              | 2.760                        | 3.078                 |
|                 | 5M             |              | 4.520                        | 5.050                 |
|                 | 10M            |              | 9.080                        | 10.360                |
|                 | 15M            |              | 13.500                       | 15.060                |
|                 | 20M            |              | 18.480                       | 21.120                |

**QPSK (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

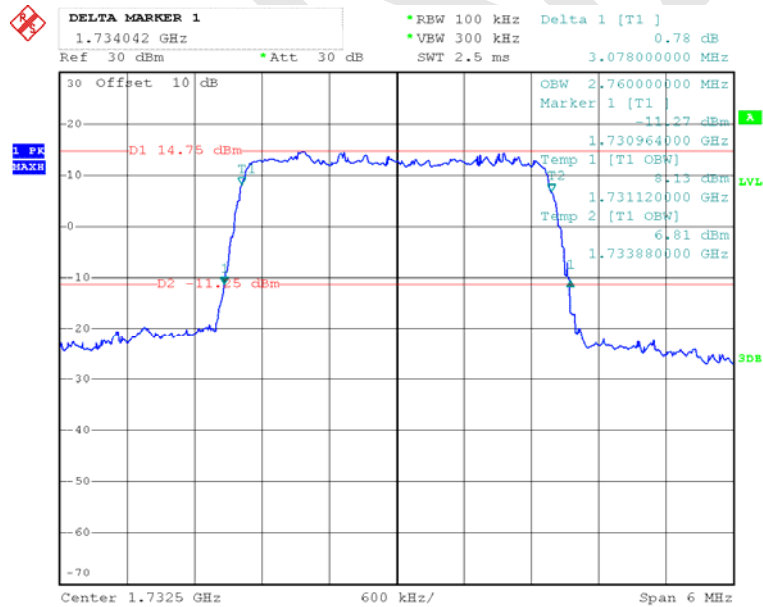
Date: 31.MAY.2016 16:46:59

**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

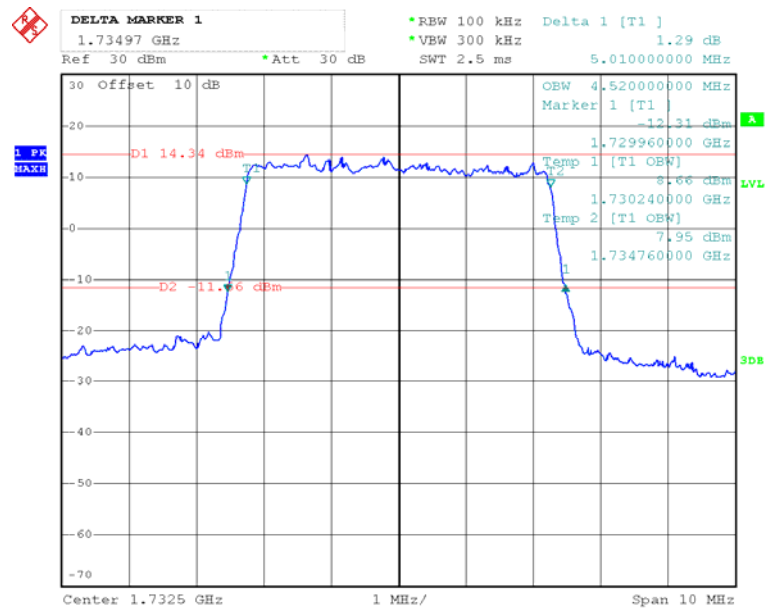
Date: 31.MAY.2016 16:43:24

**QPSK (3.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

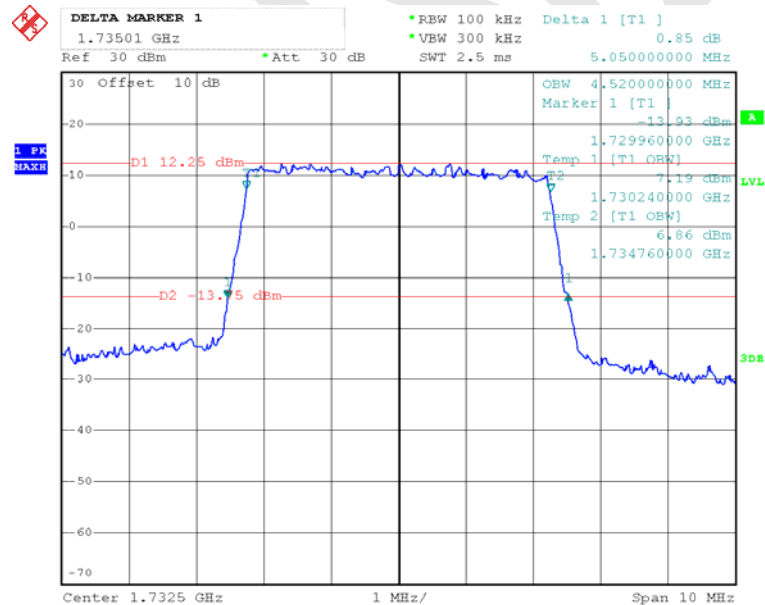
Date: 31.MAY.2016 16:51:07

**16-QAM (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

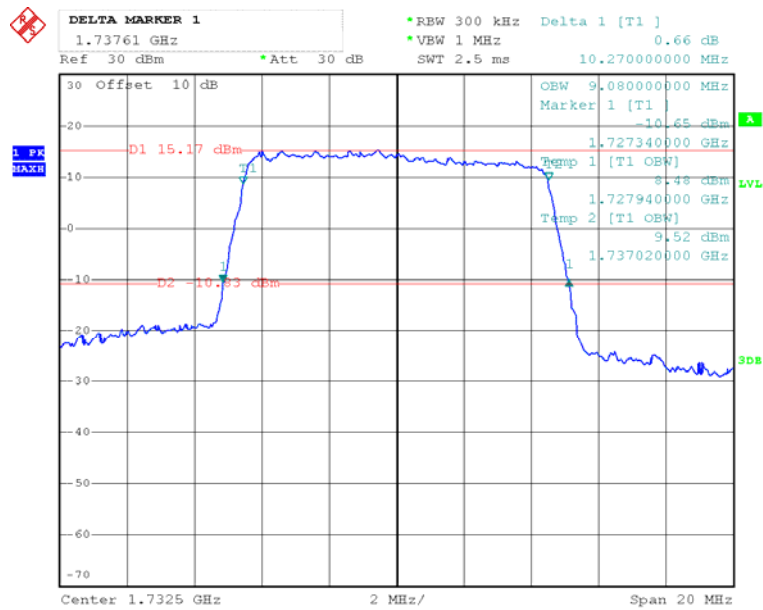
Date: 31.MAY.2016 16:48:54

**QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

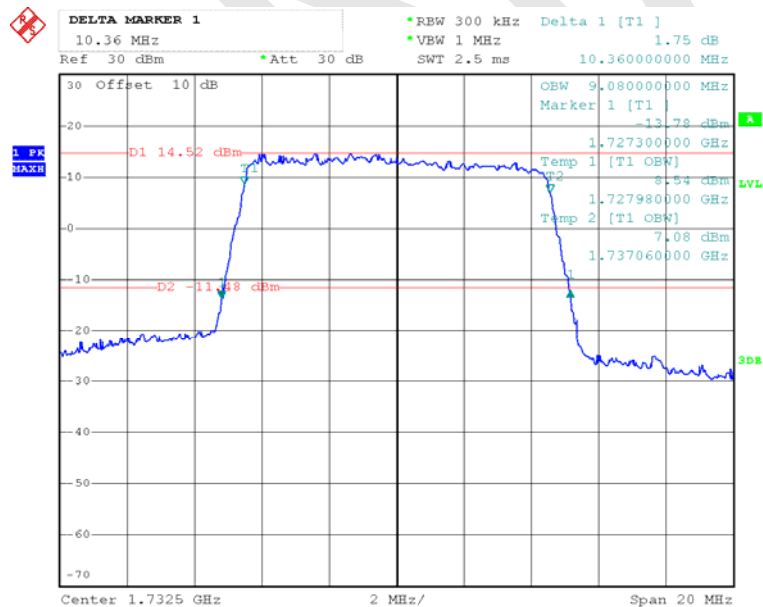
Date: 31.MAY.2016 16:55:59

**16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

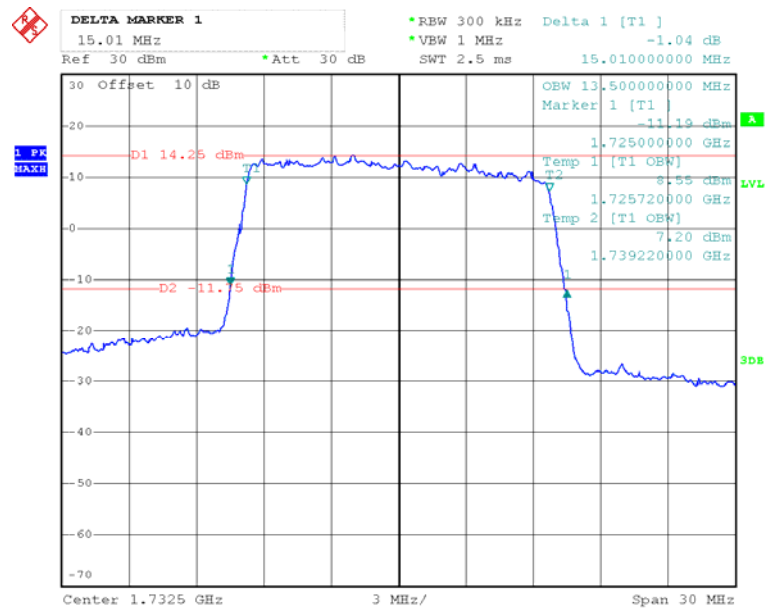
Date: 31.MAY.2016 16:53:20

**QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

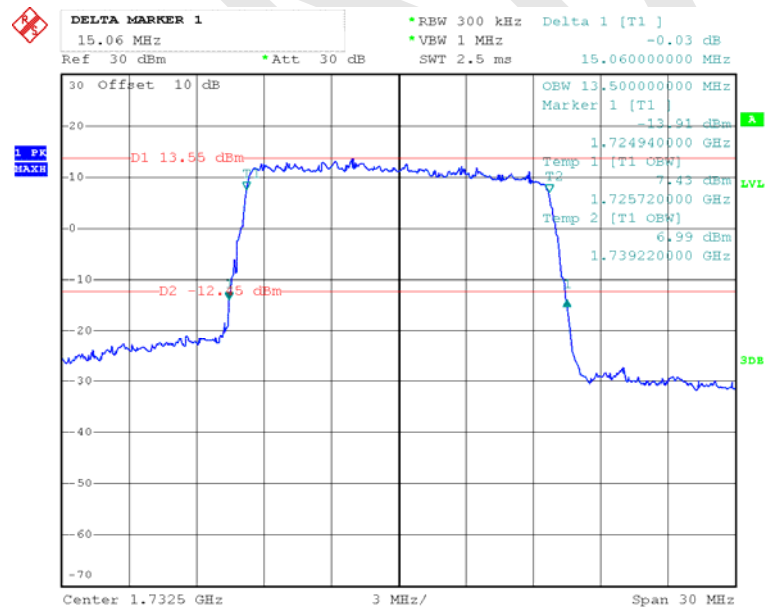
Date: 31.MAY.2016 16:59:05

**16-QAM (10.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

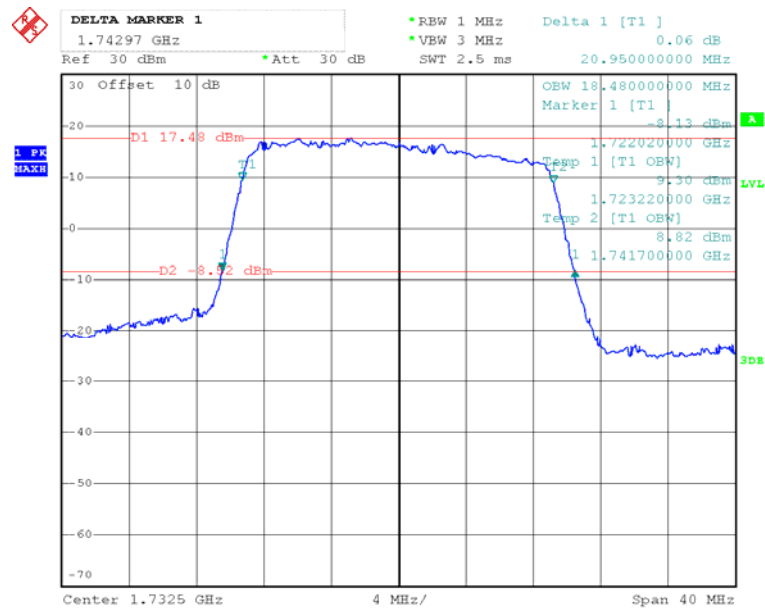
Date: 31.MAY.2016 19:47:08

**QPSK (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

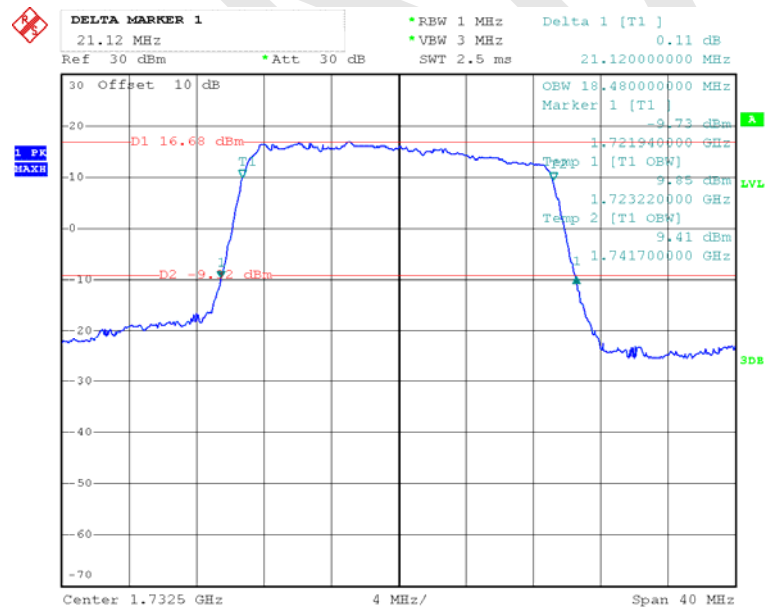
Date: 31.MAY.2016 17:02:15

**16-QAM (15.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 19:48:41

**QPSK (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

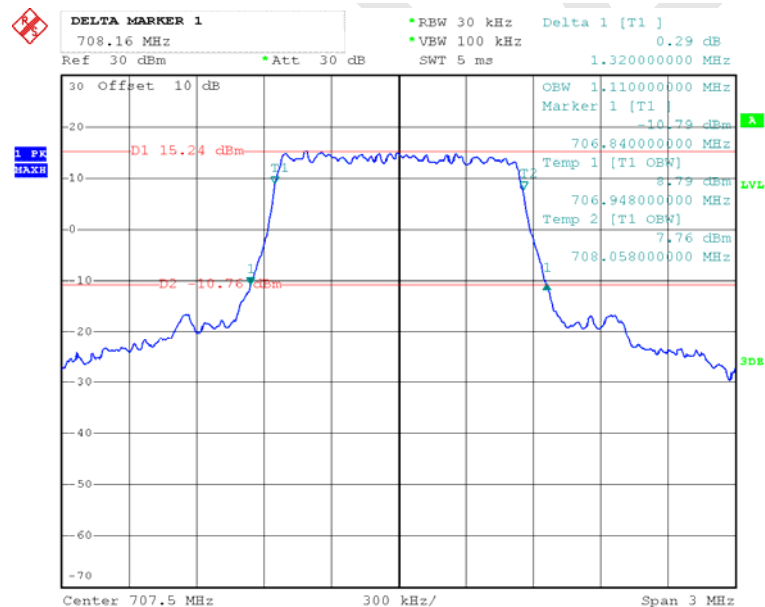
Date: 31.MAY.2016 17:03:35

**16-QAM (20.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

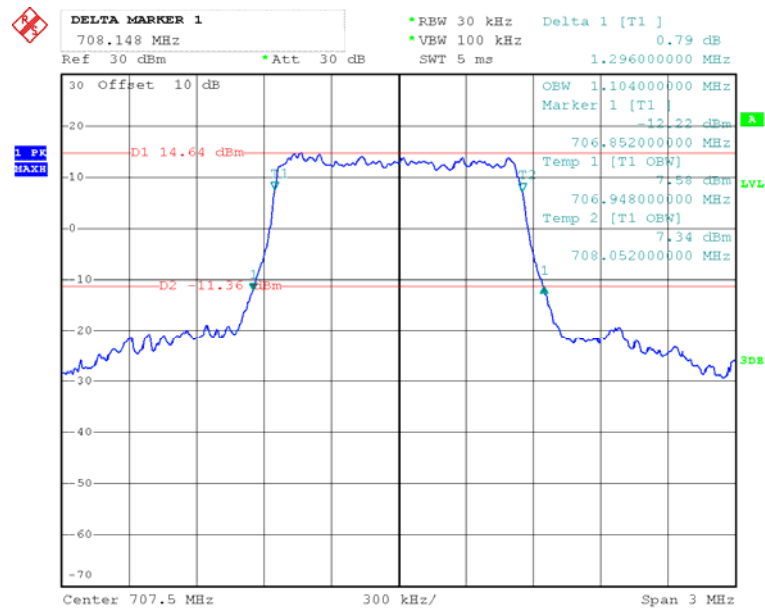
Date: 31.MAY.2016 19:52:29

**LTE Band XII:**

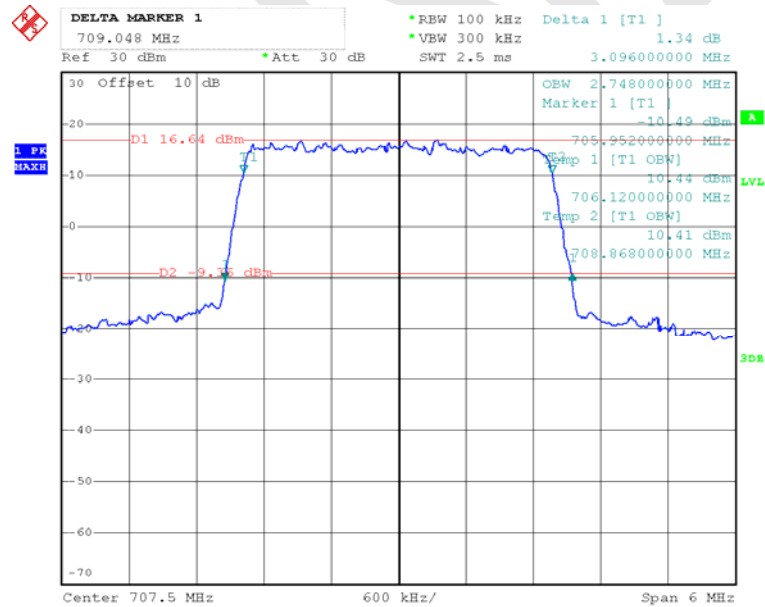
| Test Modulation | Test Bandwidth | Test Channel | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|-----------------|----------------|--------------|------------------------------|-----------------------|
| QPSK            | 1.4M           | Middle       | 1.110                        | 1.320                 |
|                 | 3M             |              | 2.748                        | 3.096                 |
|                 | 5M             |              | 4.540                        | 4.988                 |
|                 | 10M            |              | 9.120                        | 10.280                |
| 16-QAM          | 1.4M           | Middle       | 1.104                        | 1.296                 |
|                 | 3M             |              | 2.760                        | 3.084                 |
|                 | 5M             |              | 4.540                        | 5.060                 |
|                 | 10M            |              | 9.120                        | 10.320                |

**QPSK (1.4MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

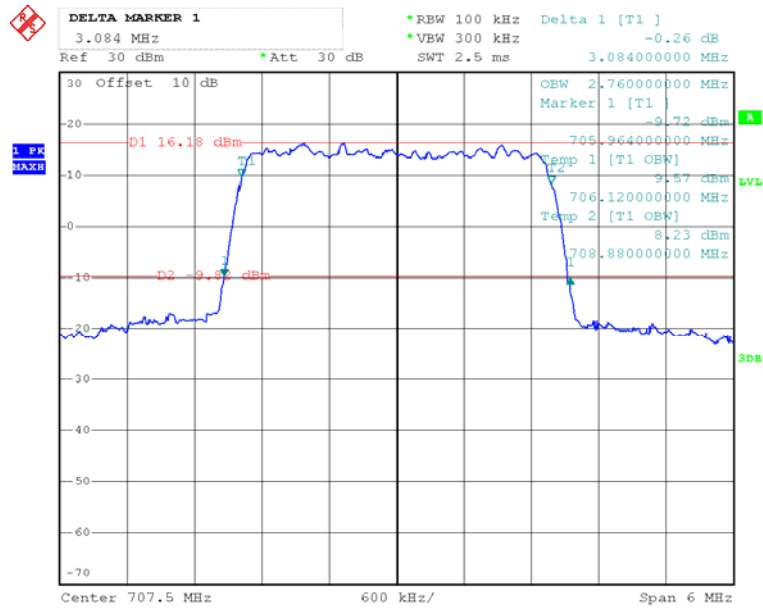
Date: 31.MAY.2016 17:07:55

**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

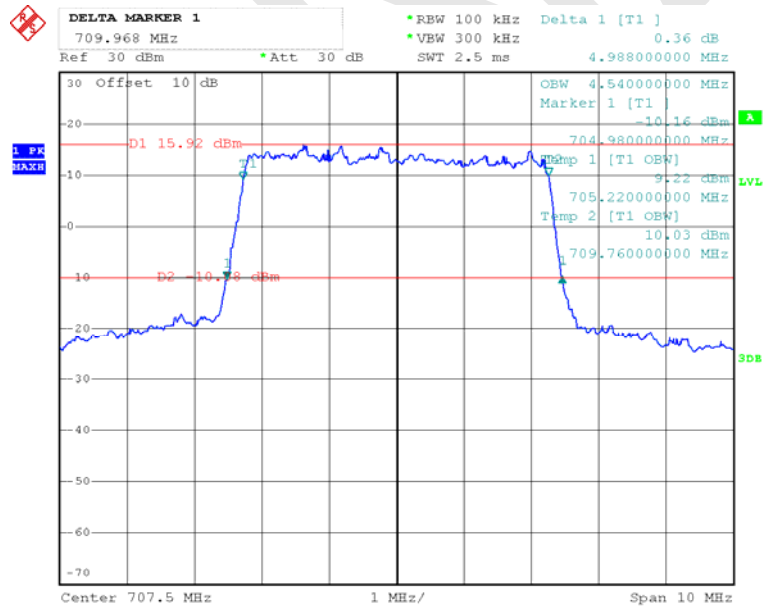
Date: 31.MAY.2016 17:09:52

**QPSK (3.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

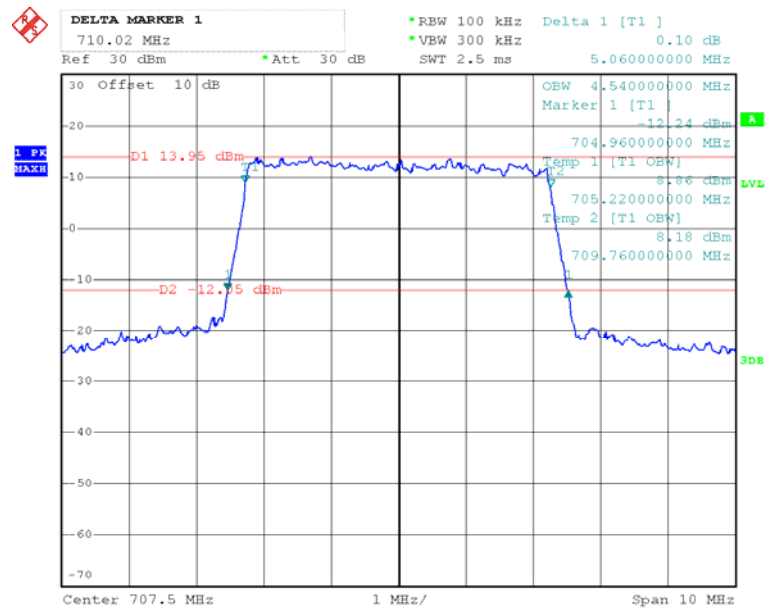
Date: 31.MAY.2016 17:12:18

**16-QAM (3.0MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

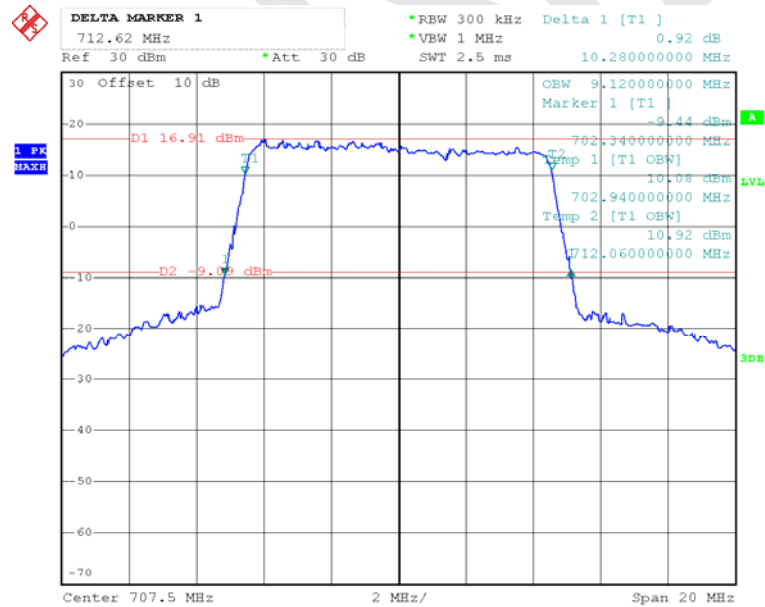
Date: 31.MAY.2016 17:15:02

**QPSK (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 17:16:57

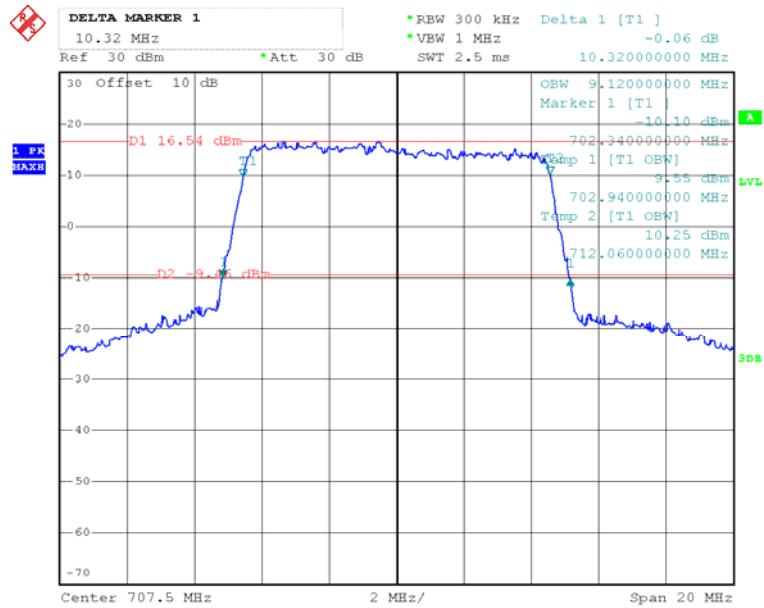
**16-QAM (5.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 17:19:27

**QPSK (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel**

Date: 31.MAY.2016 17:21:43

16-QAM (10.0 MHz) - 99% Occupied & 26 dB Bandwidth, Middle channel



Date: 31.MAY.2016 19:54:09

## § 2.1051; § 22.917 (a);§ 24.238 (a); §27.53 (h)(m) SPURIOUS EMISSIONS AT ANTENNA TERMINALS

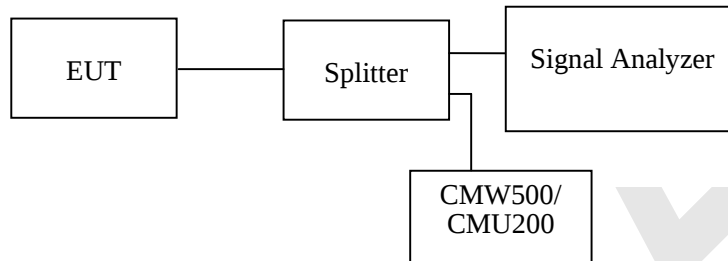
### Applicable Standards

FCC §2.1051, §22.917(a) and §24.238(a) and §27.53(h)(m).

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           |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200      | 106891                | 2015-11-23       | 2016-11-23           |
| R&S             | Wideband Radio Communication tester  | CMW500      | 1201.002K50-146520-wh | 2015-11-23       | 2016-11-23           |
| Mini            | Splitter                             | ZFRSC-14-S+ | SF019411452           | 2016-01-11       | 2016-07-10           |
| BACL            | RF cable                             | KS-LAB-020  | KS-LAB-020            | 2016-01-11       | 2016-07-10           |
| Mini            | attenuator                           | 10dB        | N/A                   | 2016-01-11       | 2016-07-10           |

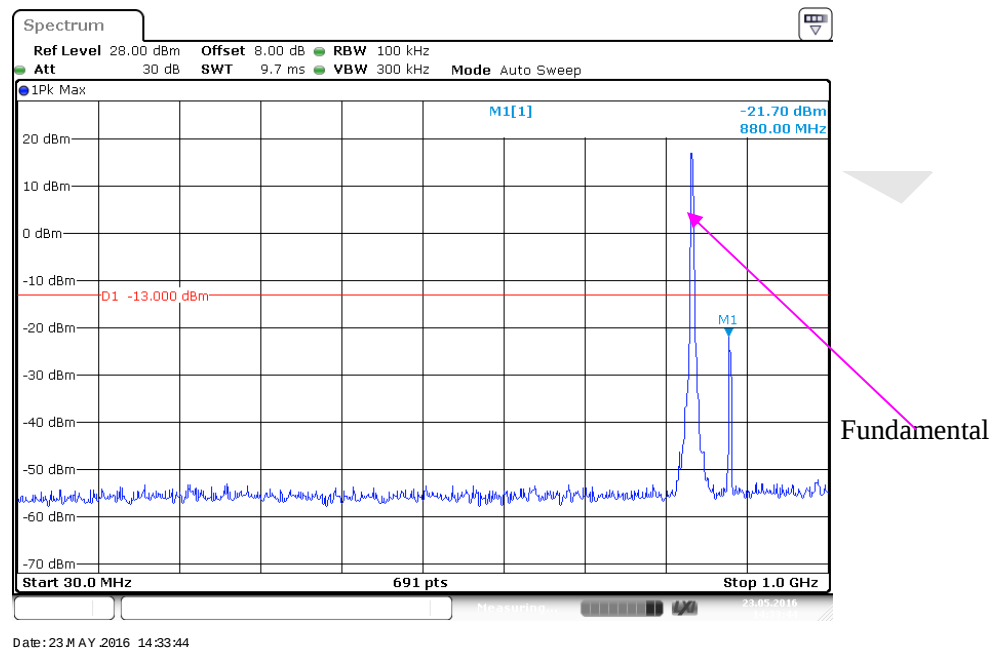
**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

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

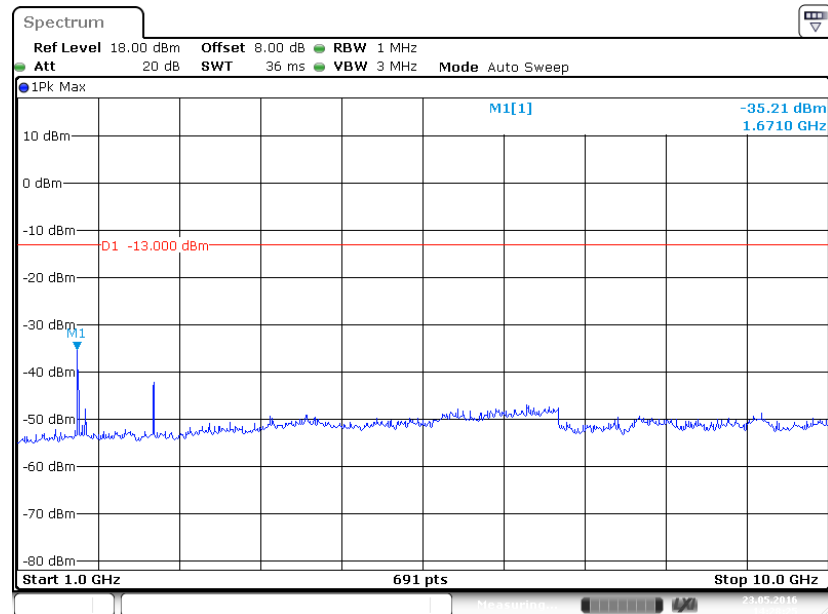
|                    |                |
|--------------------|----------------|
| Temperature:       | 20~23 °C       |
| Relative Humidity: | 48~50 %        |
| ATM Pressure:      | 100.5~101.0kPa |

The testing was performed by David. Hsu on 2016-05-23&2016-05-31.

Please refer to the following plots.

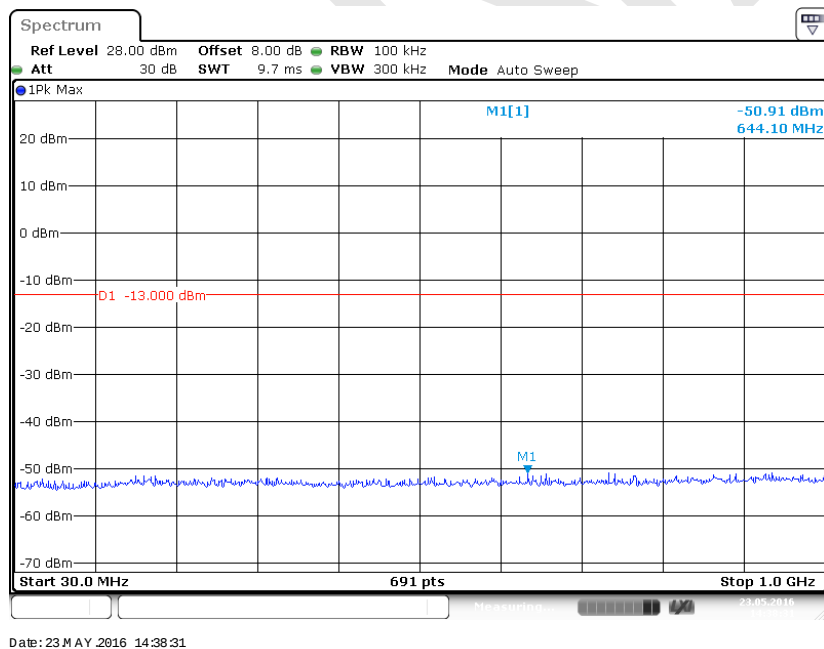
**Cellular Band (Part 22H)****30 MHz – 1GHz(WCDMA Mode)**

## 1 GHz – 10 GHz (WCDMA Mode)

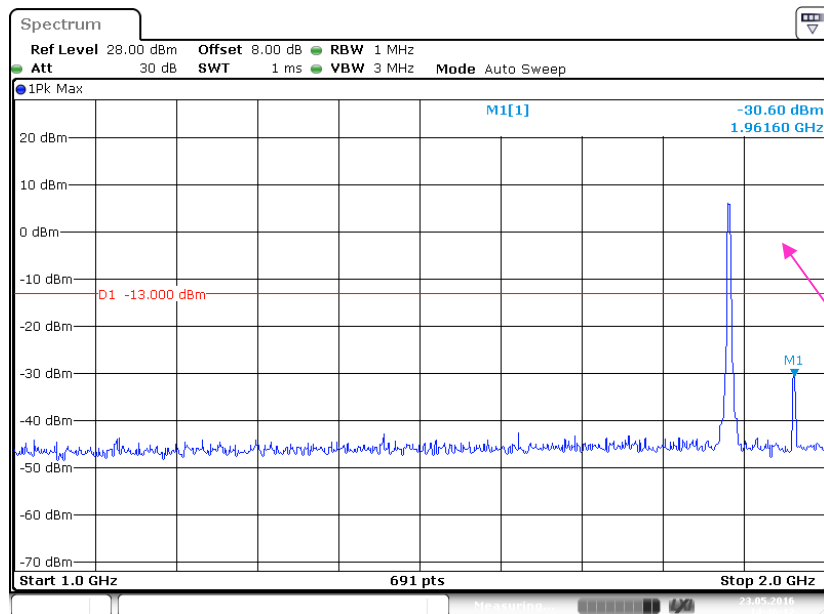


## PCS Band (Part 24E)

## 30 MHz – 1 GHz (WCDMA Mode)



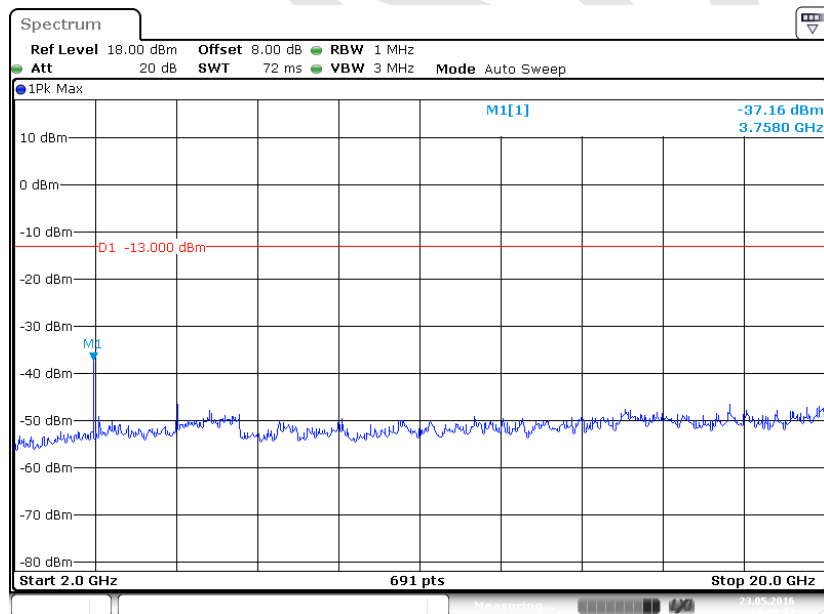
# 1 GHz – 2 GHz (WCDMA Mode)



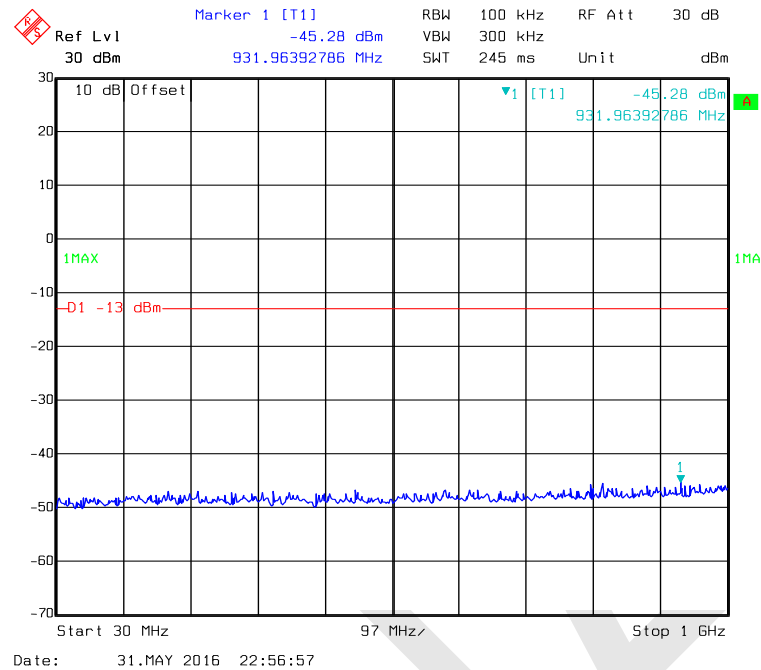
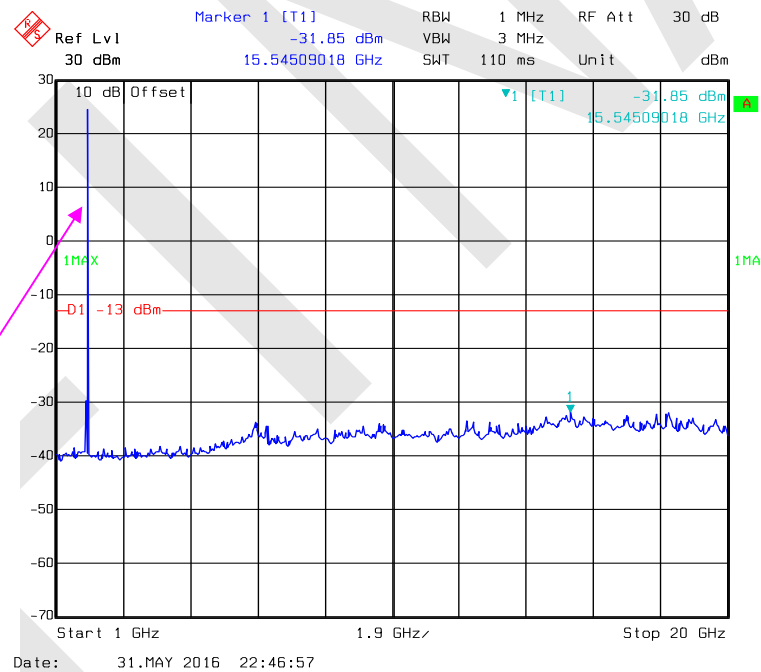
Date: 23 MAY 2016 14:46:12

Fundamental

# 2 GHz – 20 GHz (WCDMA Mode)

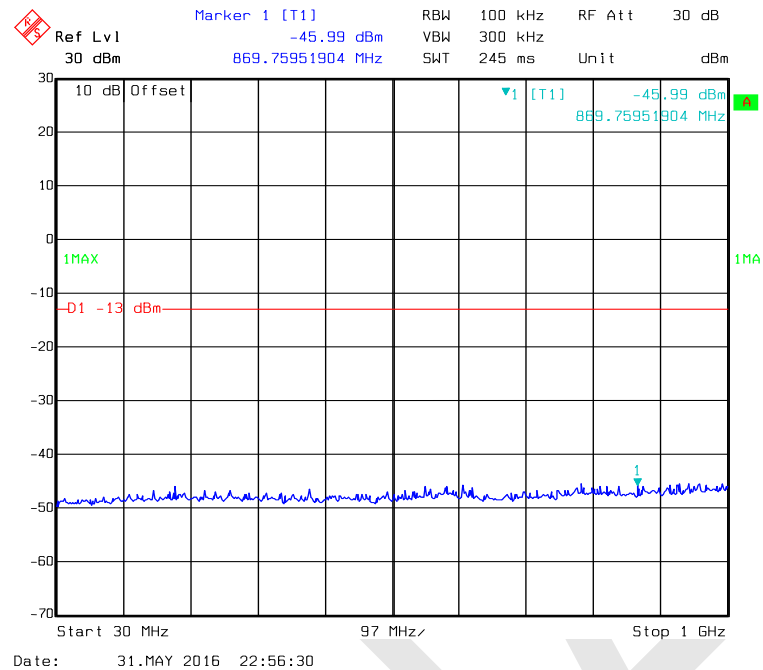


Date: 23 MAY 2016 14:48:33

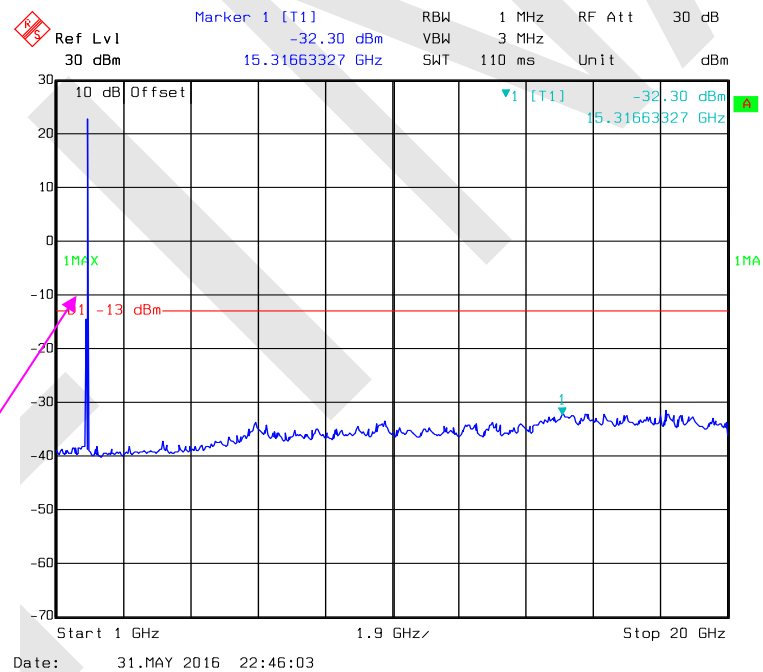
**LTE Band II:****30 MHz - 1 GHz (1.4 MHz, Middle Channel)****1 GHz - 20 GHz (1.4 MHz, Middle Channel)**

Fundamental test

### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)

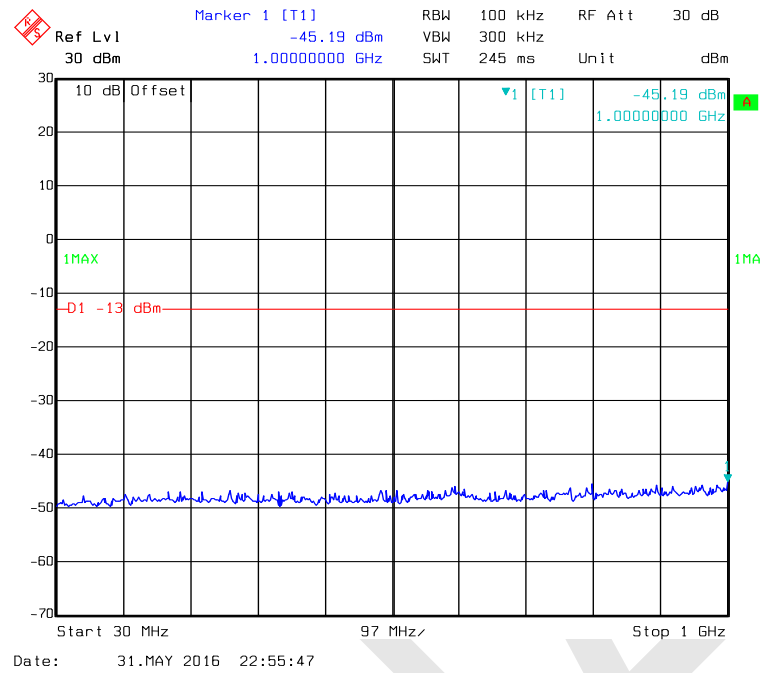


### 1 GHz - 20 GHz (3.0 MHz, Middle Channel)

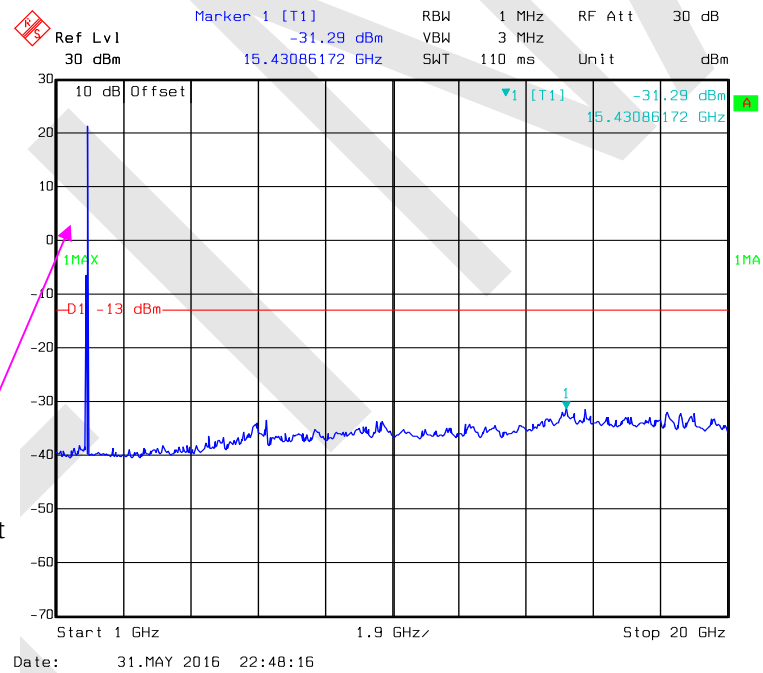


Fundamental test

### 30 MHz - 1 GHz (5.0 MHz, Middle Channel)

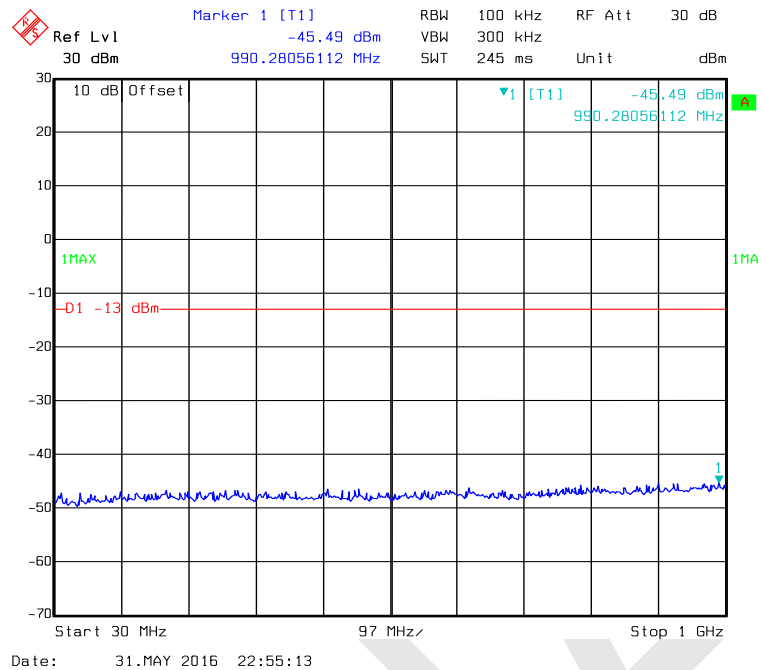


### 1 GHz - 20 GHz (5.0 MHz, Middle Channel)

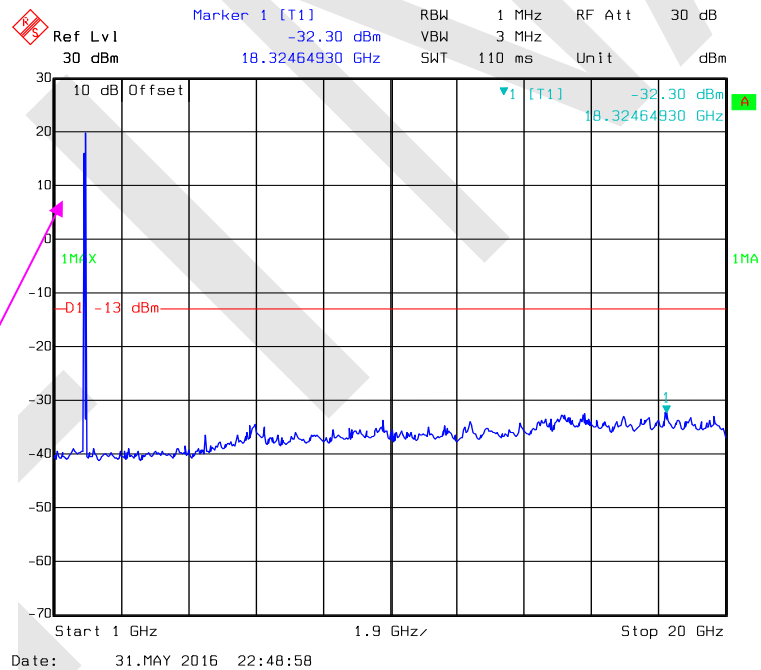


Fundamental test

### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)

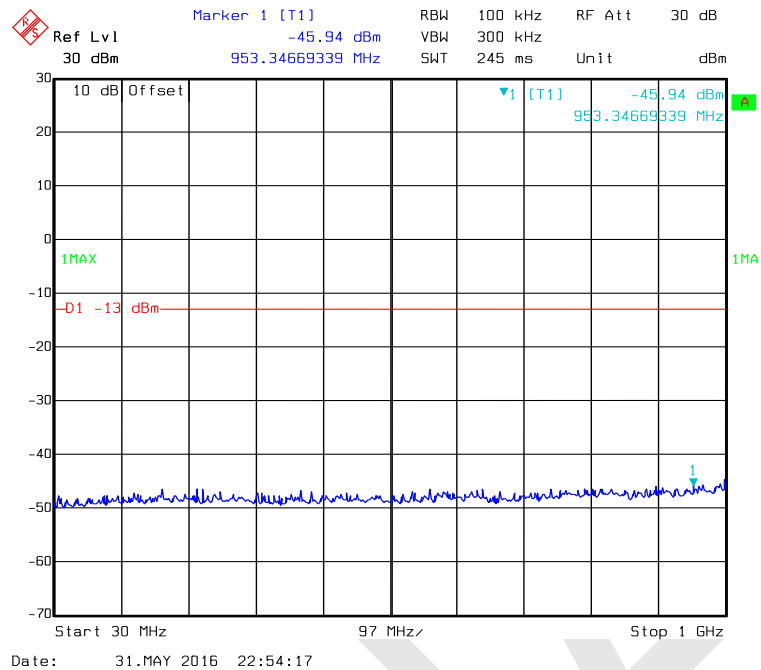


### 1 GHz - 20 GHz (10.0 MHz, Middle Channel)

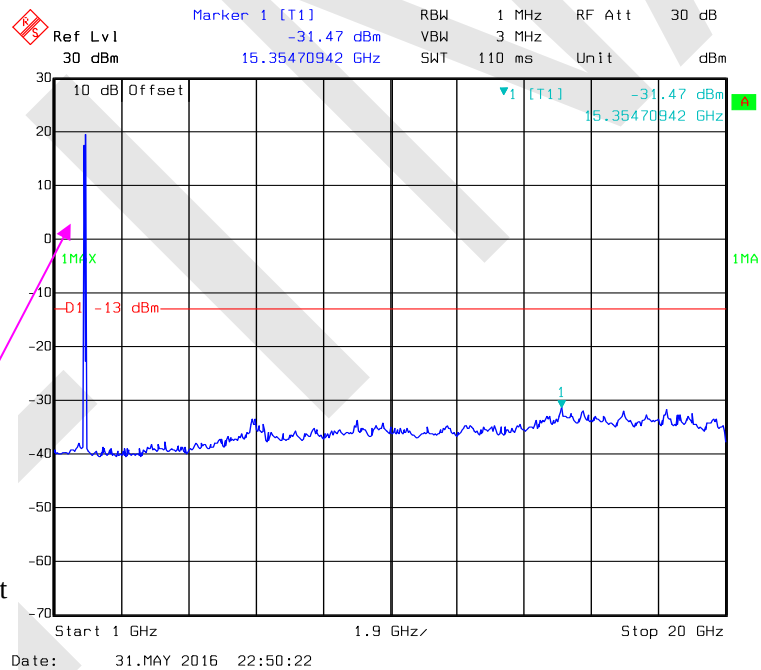


Fundamental test

### 30 MHz - 1 GHz (15.0 MHz, Middle Channel)

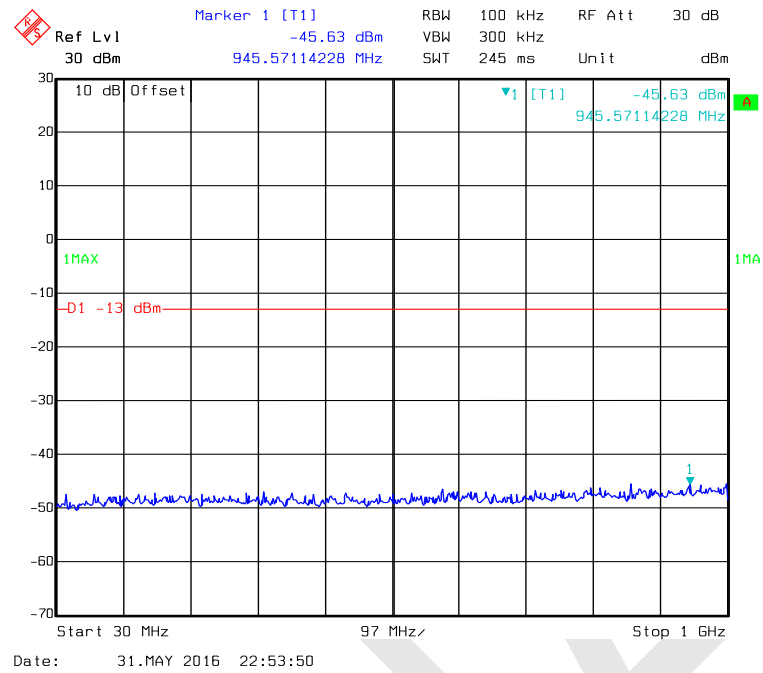


### 1 GHz -20 GHz (15.0 MHz, Middle Channel)

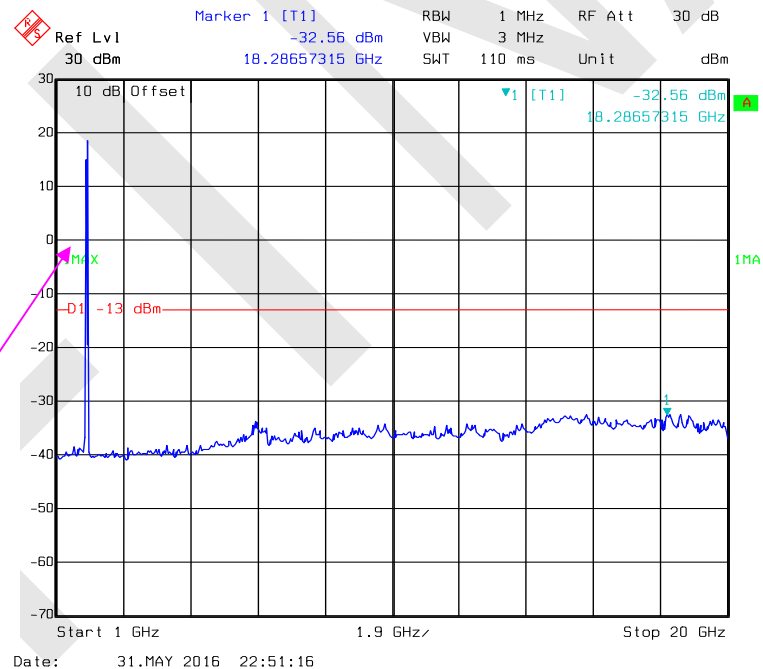


Fundamental test

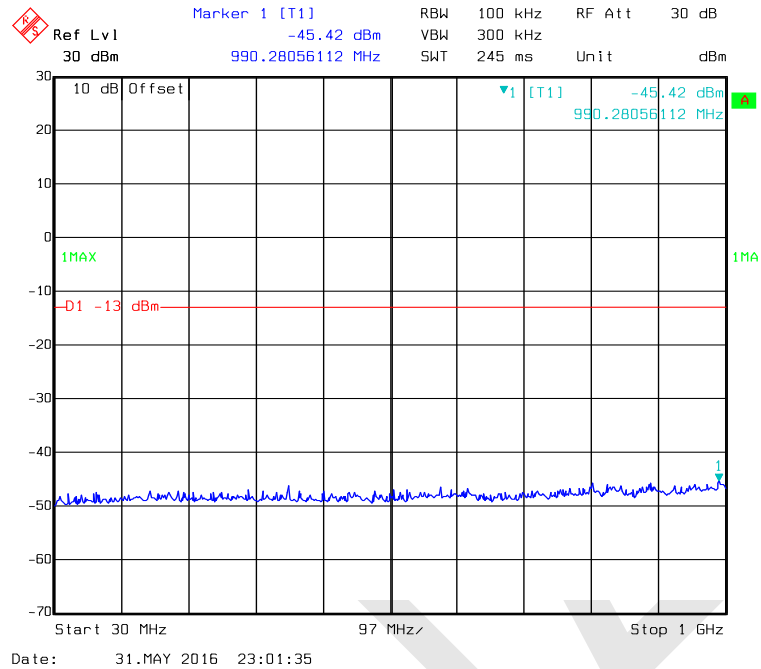
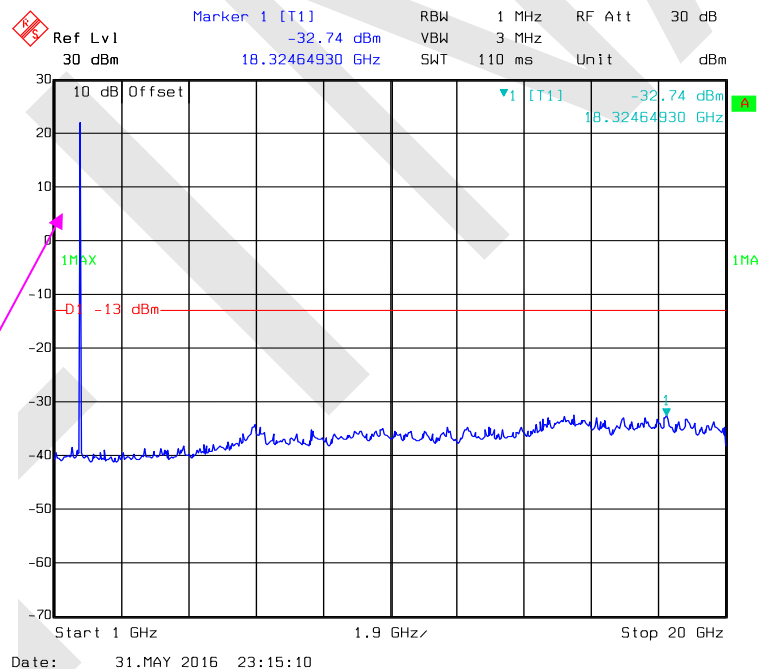
### 30 MHz - 1 GHz (20.0 MHz, Middle Channel)



### 1 GHz - 20 GHz (20.0 MHz, Middle Channel)

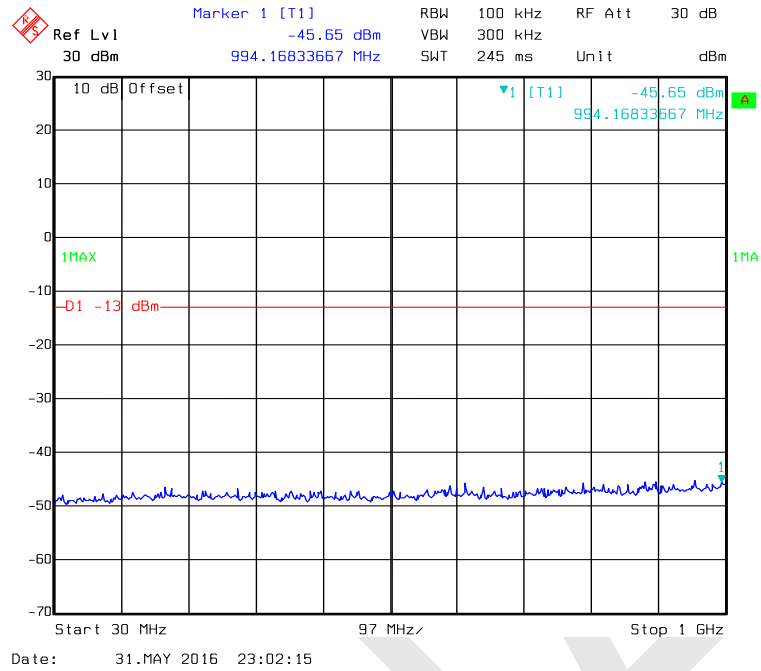


Fundamental test

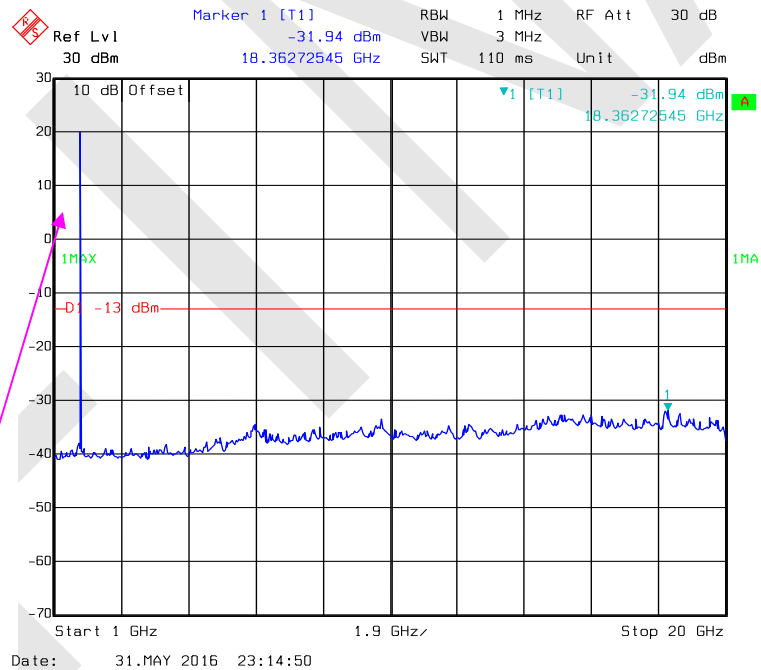
**LTE Band IV:****30 MHz - 1 GHz (1.4 MHz, Middle Channel)****1 GHz - 20 GHz (1.4 MHz, Middle Channel)**

Fundamental test

### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)

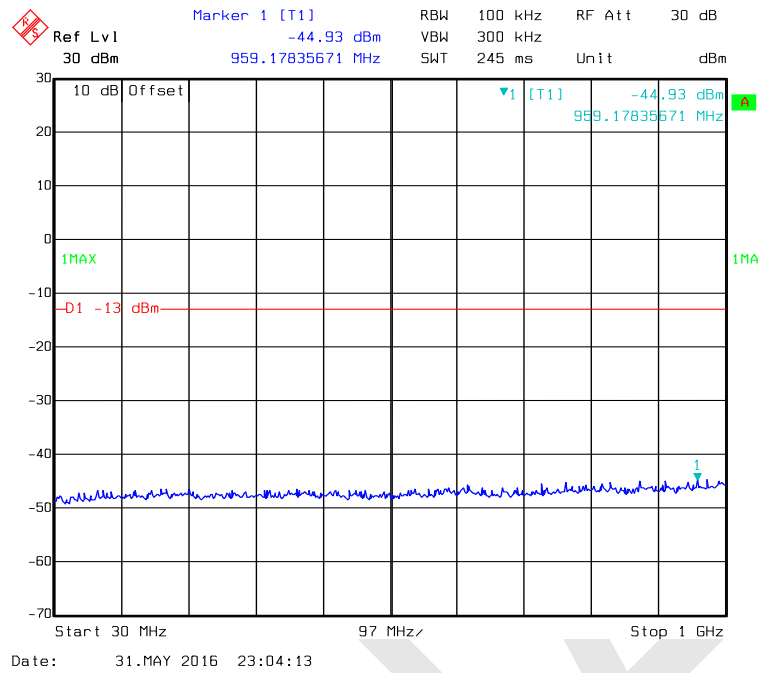


### 1 GHz - 20 GHz (3.0 MHz, Middle Channel)

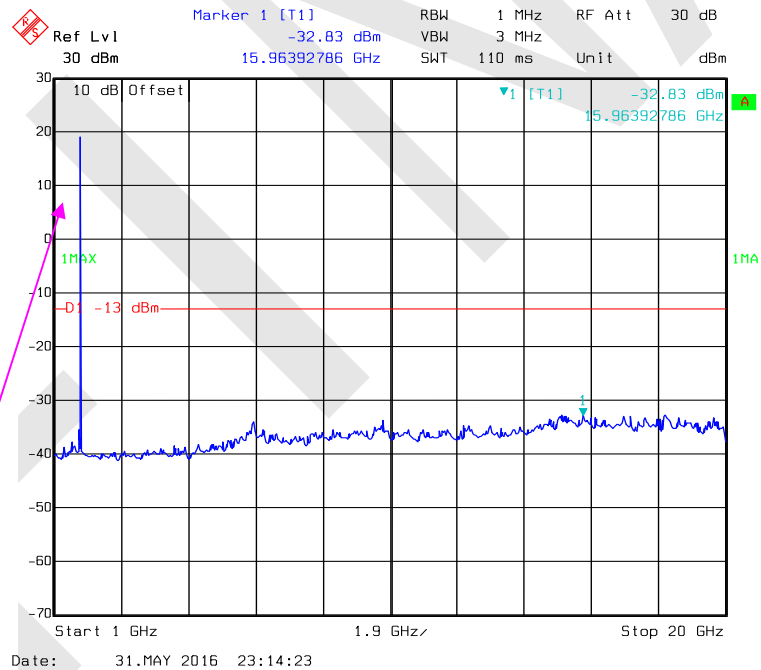


Fundamental test

### 30 MHz - 1 GHz (5.0 MHz, Middle Channel)

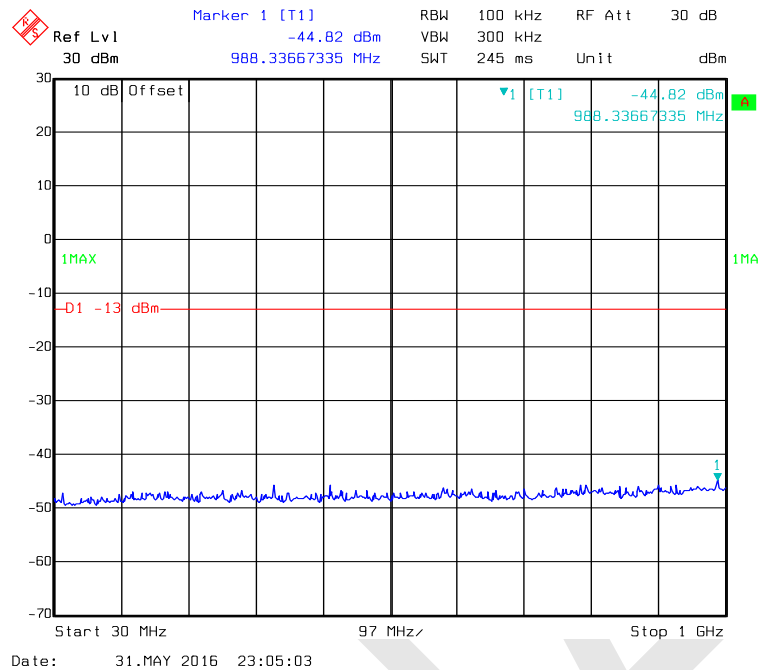


### 1 GHz - 20 GHz (5.0 MHz, Middle Channel)

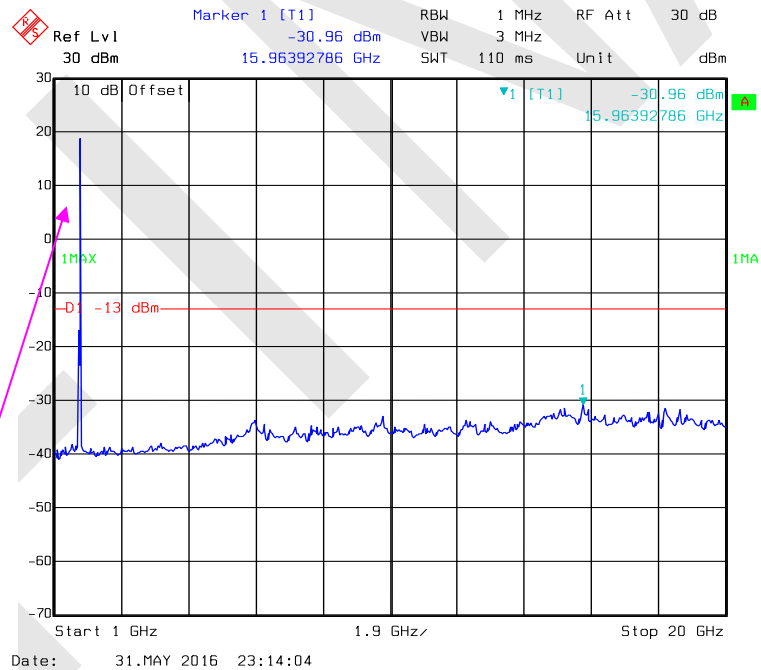


Fundamental test

### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)

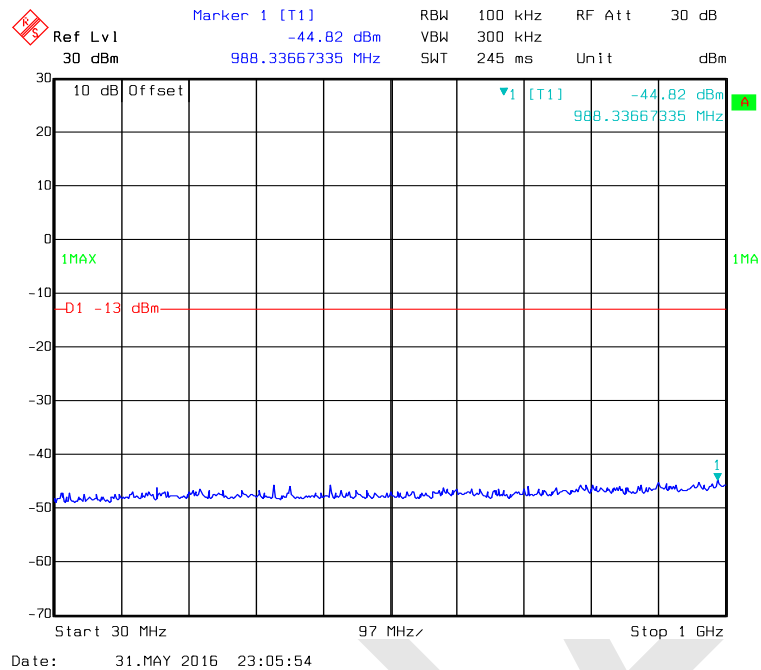


### 1 GHz -20 GHz (10.0 MHz, Middle Channel)

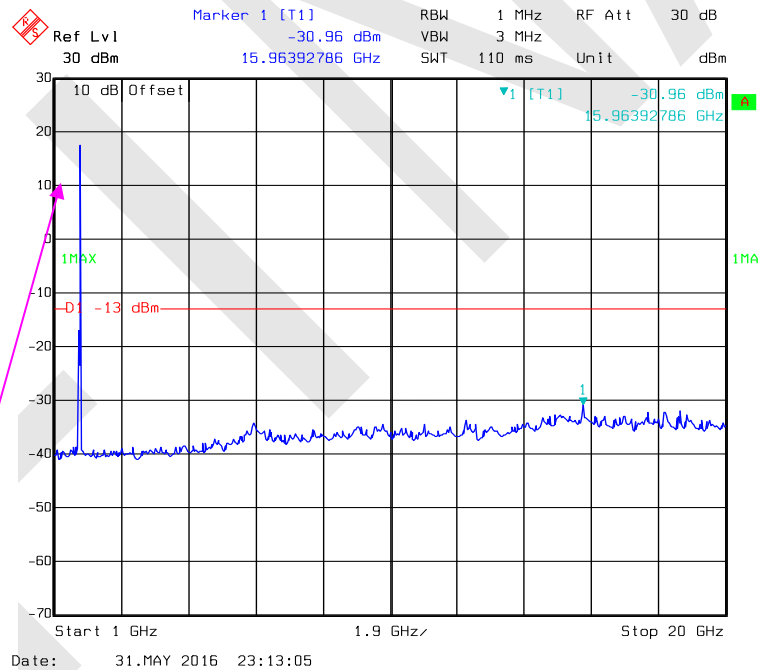


Fundamental test

### 30 MHz - 1 GHz (15.0 MHz, Middle Channel)

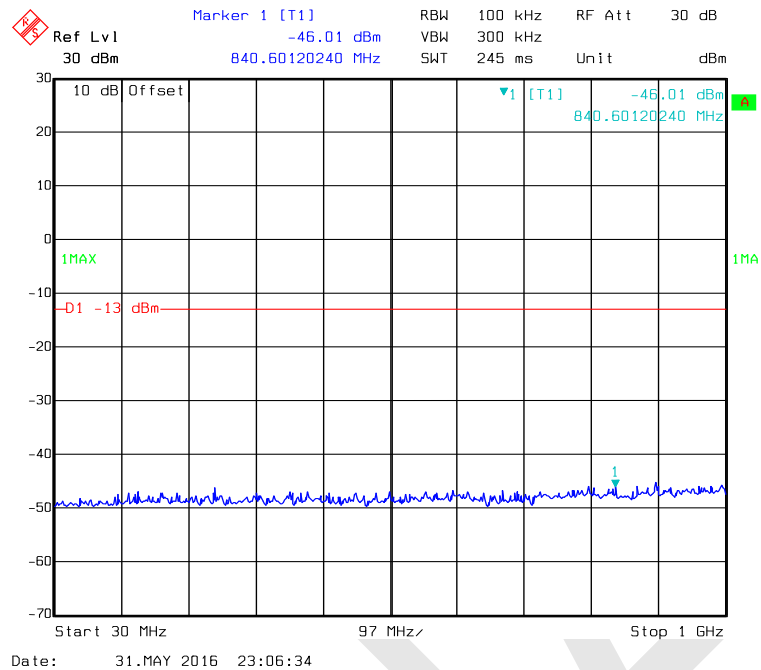


### 1 GHz -20 GHz (15.0 MHz, Middle Channel)

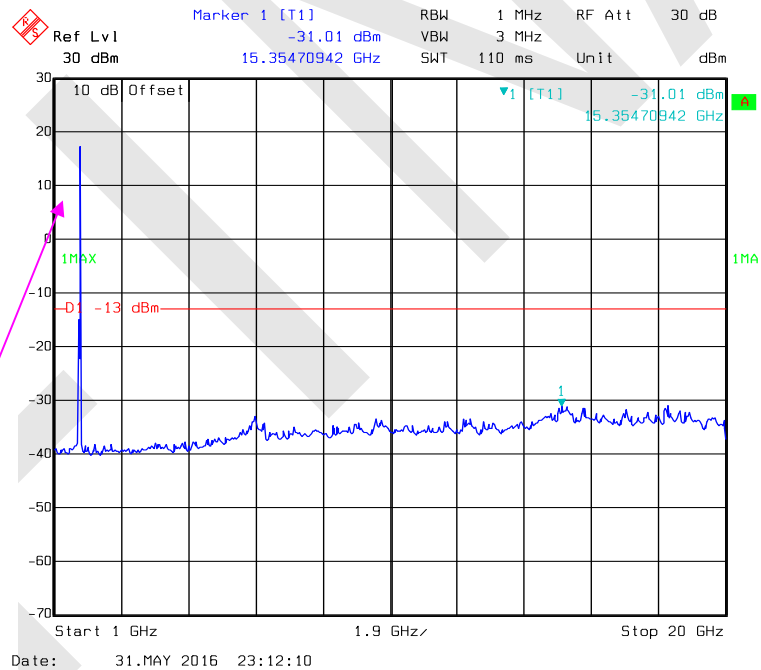


Fundamental test

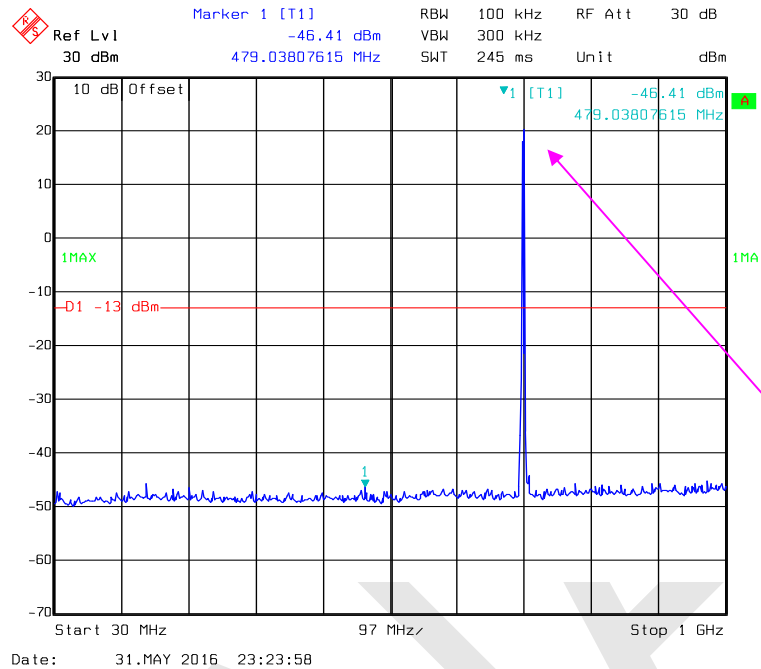
### 30 MHz - 1 GHz (20.0 MHz, Middle Channel)



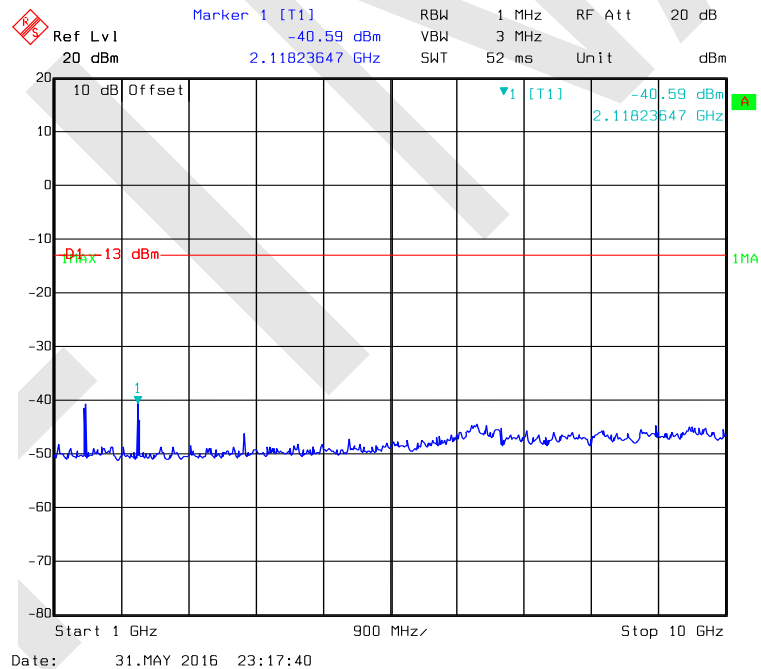
### 1 GHz -20 GHz (20.0 MHz, Middle Channel)



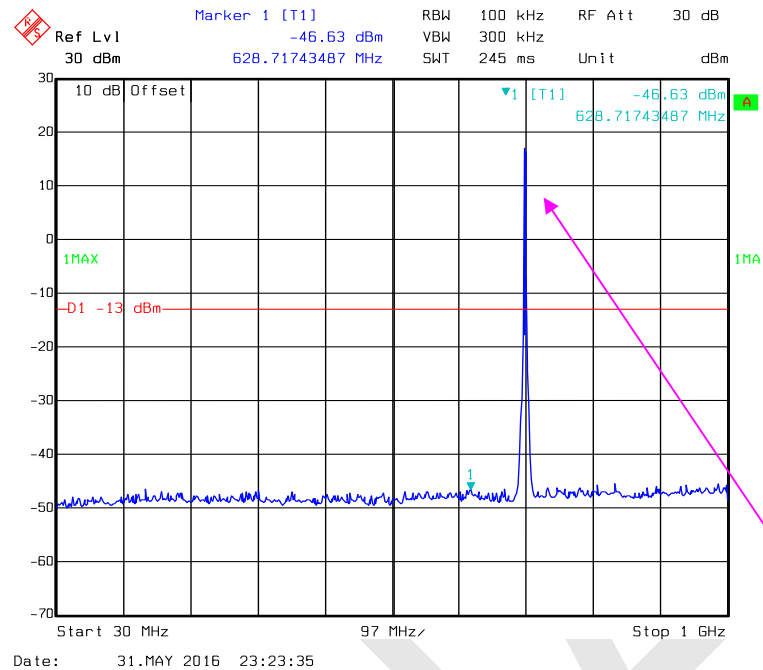
Fundamental test

**LTE Band XII:****30 MHz - 1 GHz (1.4 MHz, Middle Channel)**

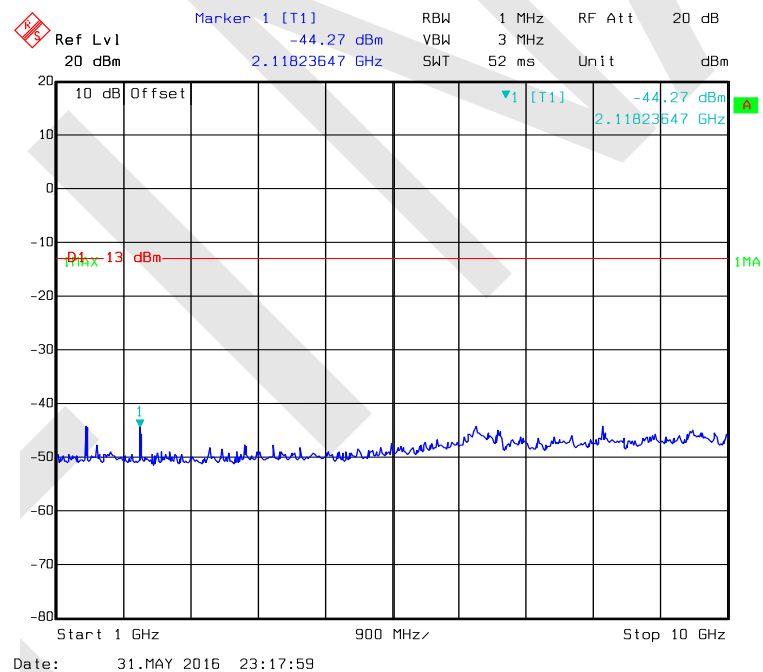
Fundamental test

**1 GHz - 10 GHz (1.4 MHz, Middle Channel)**

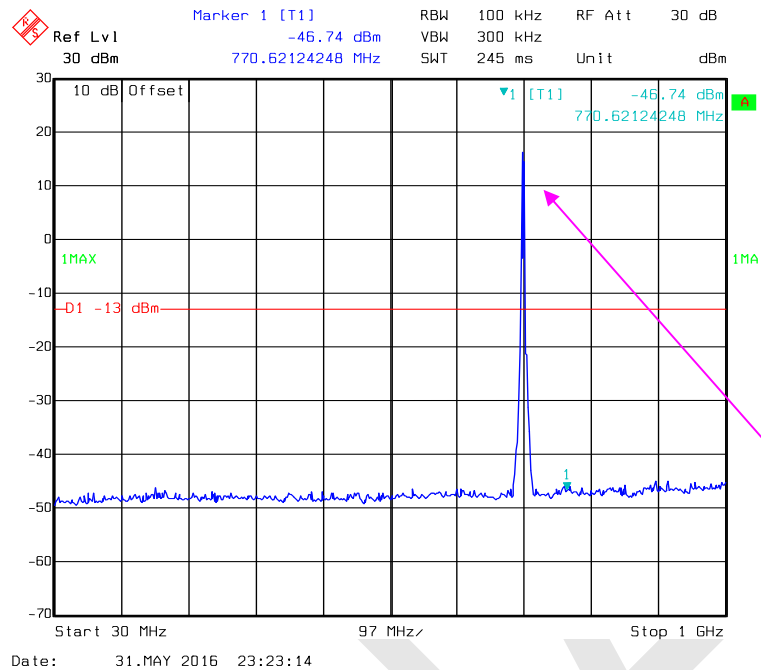
### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)



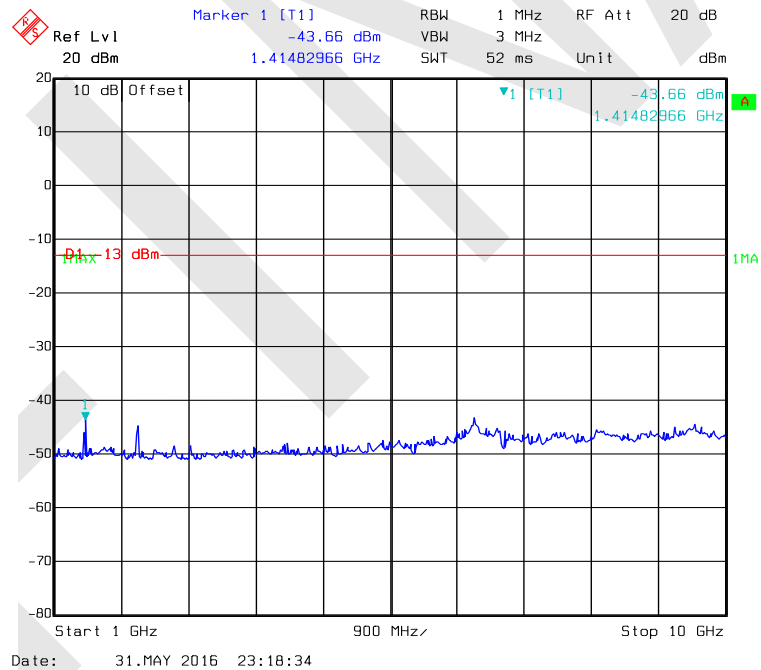
### 1 GHz - 10 GHz (3.0 MHz, Middle Channel)

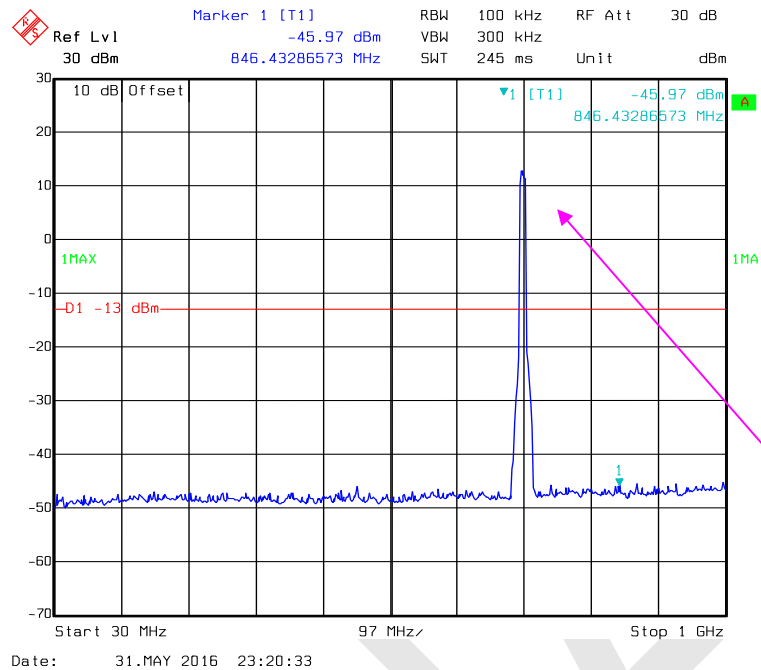


### 30 MHz - 1 GHz (5.0 MHz, Middle Channel)

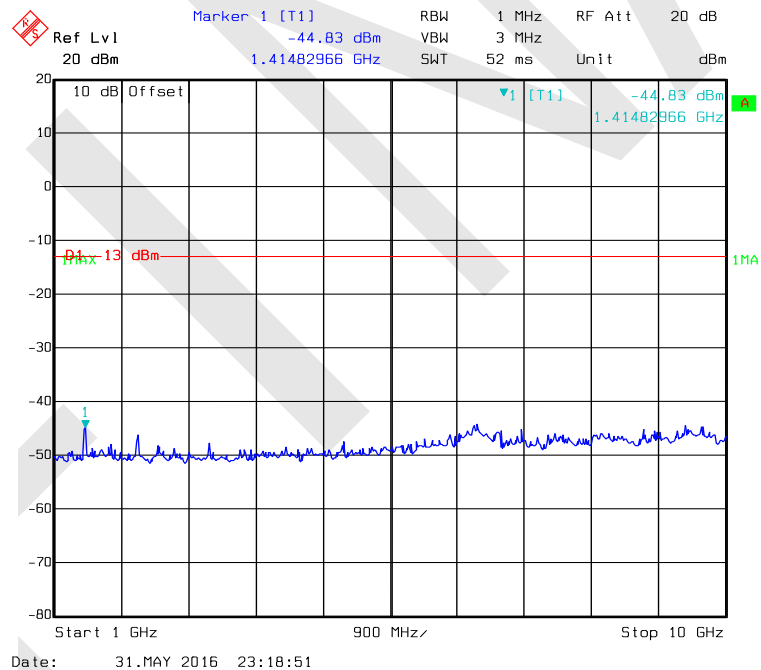


### 1 GHz - 10 GHz (5.0 MHz, Middle Channel)



**30 MHz - 1 GHz (10.0 MHz, Middle Channel)**

Fundamental test

**1 GHz -10 GHz (10.0 MHz, Middle Channel)**

## **FCC § 2.1053; § 22.917 (a);§ 24.238 (a); §27.53 (h)(m)**

### **SPURIOUS RADIATED EMISSIONS**

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#### **Applicable Standards**

FCC § 2.1053, §22.917(a) and § 24.238(a) and § 27.53(h)(m)

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

#### **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 =  $10 \lg (\text{TX pwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

**Test Equipment List and Details**

| Manufacturer    | Description       | Model      | Serial Number | Calibration Date | Calibration Interval |
|-----------------|-------------------|------------|---------------|------------------|----------------------|
| Sonoma          | Amplifier         | 310N       | 130601        | 2015-07-02       | 2016-07-01           |
| Rohde & Schwarz | EMI Test Receiver | ESCI       | 100540        | 2015-07-25       | 2016-07-24           |
| Sunol Sciences  | Broadband Antenna | JB6        | A050115       | 2015-06-15       | 2016-06-14           |
| Mini            | Amplifier         | ZVA-213-S+ | 460901516     | 2015-08-21       | 2016-08-21           |
| EMCO            | Horn Antenna      | 3115       | 9311-4158     | 2015-05-08       | 2016-05-07           |
| ETS             | Horn Antenna      | 3115       | 6431          | 2015-11-07       | 2016-11-06           |
| Rohde & Schwarz | Spectrum Analyzer | FSU 26     | 200268        | 2015-07-29       | 2016-08-28           |
| EMCO            | Turn Table        | 2081-1.21  | 9709-1885     | N.C.R            | N.C.R                |
| EMCO            | Antenna Tower     | 2075-2     | 9707-2060     | N.C.R            | N.C.R                |
| Controller      | EMCO              | 2090       | 9709-1256     | N.C.R            | N.C.R                |
| R&S             | Software          | EMC32      | V9.10.00      | NCR              | NCR                  |
| BACL            | RF cable          | KS-LAB-012 | KS-LAB-012    | 2015-12-16       | 2016-12-15           |
| BACL            | RF cable          | KS-LAB-010 | KS-LAB-010    | 2015-12-16       | 2016-12-15           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) 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> | 48 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

The testing was performed by David. Hsu on 2016-05-04&2016-05-31.

Test mode: Transmitting

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

30 MHz ~ 10 GHz:

**Cellular Band (Part 22H)**

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | FCC Part 22H   |                |
|----------------------------|-------------------------------|------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            | Limit<br>(dBm) | Margin<br>(dB) |
| WCDMA Mode, Middle channel |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 477.50                     | 35.25                         | 185                          | 1.8           | H              | -61.66               | 0.47                  | 0                       | -62.13                     | -13            | 49.13          |
| 477.50                     | 36.51                         | 165                          | 2.3           | V              | -60.40               | 0.47                  | 0                       | -60.87                     | -13            | 47.87          |
| 1673.20                    | 37.68                         | 120                          | 2.0           | H              | -62.85               | 1.60                  | 6.90                    | -57.55                     | -13            | 44.55          |
| 1673.20                    | 38.78                         | 35                           | 2.1           | V              | -61.75               | 1.60                  | 6.90                    | -56.45                     | -13            | 43.45          |

30 MHz ~ 20 GHz:

**PCS Band (Part 24E)**

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | FCC Part 24E   |                |
|----------------------------|-------------------------------|------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            | Limit<br>(dBm) | Margin<br>(dB) |
| WCDMA Mode, Middle channel |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 477.50                     | 34.84                         | 202                          | 1.8           | H              | -62.07               | 0.47                  | 0                       | -62.54                     | -13            | 49.54          |
| 477.50                     | 36.35                         | 89                           | 2.0           | V              | -60.56               | 0.47                  | 0                       | -61.03                     | -13            | 48.03          |
| 3760.00                    | 46.68                         | 255                          | 1.9           | H              | -56.55               | 1.90                  | 9.90                    | -48.55                     | -13            | 35.55          |
| 3760.00                    | 47.83                         | 235                          | 2.2           | V              | -55.40               | 1.90                  | 9.90                    | -47.40                     | -13            | 34.40          |

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

### LTE Band II:

#### QPSK

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                      |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 3760.000                             | H              | 45.21                         | -49.1                  | 13.8                         | 2.9                | -38.2                      | -13.0          | 25.2           |
| 3760.000                             | V              | 48.56                         | -44.5                  | 13.8                         | 2.9                | -33.6                      | -13.0          | 20.6           |
| 5640.000                             | H              | 44.35                         | -47.3                  | 14.0                         | 2.1                | -35.4                      | -13.0          | 22.4           |
| 5640.000                             | V              | 47.82                         | -43.8                  | 14.0                         | 2.1                | -31.9                      | -13.0          | 18.9           |
| 291.500                              | H              | 36.09                         | -71.5                  | 0.0                          | 0.5                | -72.0                      | -13.0          | 59.0           |
| 273.800                              | V              | 37.46                         | -67.9                  | 0.0                          | 0.5                | -68.4                      | -13.0          | 55.4           |

#### 16-QAM

| Frequency<br>(MHz)                     | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                        |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 3760.000                               | H              | 44.71                         | -49.6                  | 13.8                         | 2.9                | -38.7                      | -13.0          | 25.7           |
| 3760.000                               | V              | 47.13                         | -45.9                  | 13.8                         | 2.9                | -35.0                      | -13.0          | 22.0           |
| 5640.000                               | H              | 43.85                         | -47.8                  | 14.0                         | 2.1                | -35.9                      | -13.0          | 22.9           |
| 5640.000                               | V              | 47.13                         | -44.5                  | 14.0                         | 2.1                | -32.6                      | -13.0          | 19.6           |
| 291.500                                | H              | 36.28                         | -71.3                  | 0.0                          | 0.5                | -71.8                      | -13.0          | 58.8           |
| 273.800                                | V              | 37.01                         | -68.4                  | 0.0                          | 0.5                | -68.9                      | -13.0          | 55.9           |

### LTE Band IV

#### QPSK:

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                      |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 3465.000                             | H              | 45.31                         | -51.6                  | 13.9                         | 1.9                | -39.6                      | -13.0          | 26.6           |
| 3465.000                             | V              | 48.79                         | -47.4                  | 13.9                         | 1.9                | -35.4                      | -13.0          | 22.4           |
| 5197.500                             | H              | 43.27                         | -47.7                  | 14.0                         | 2.3                | -36.0                      | -13.0          | 23.0           |
| 5197.500                             | V              | 46.13                         | -46.4                  | 14.0                         | 2.3                | -34.7                      | -13.0          | 21.7           |
| 241.900                              | H              | 36.18                         | -71.9                  | 0.0                          | 0.5                | -72.4                      | -13.0          | 59.4           |
| 280.400                              | V              | 37.52                         | -67.8                  | 0.0                          | 0.5                | -68.3                      | -13.0          | 55.3           |

**16-QAM:**

| Frequency<br>(MHz)                     | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                        |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 3465.000                               | H              | 45.08                         | -51.9                  | 13.9                         | 1.9                | -39.9                      | -13.0          | 26.9           |
| 3465.000                               | V              | 47.65                         | -48.5                  | 13.9                         | 1.9                | -36.5                      | -13.0          | 23.5           |
| 5197.500                               | H              | 43.62                         | -47.4                  | 14.0                         | 2.3                | -35.7                      | -13.0          | 22.7           |
| 5197.500                               | V              | 45.97                         | -46.6                  | 14.0                         | 2.3                | -34.9                      | -13.0          | 21.9           |
| 241.900                                | H              | 36.61                         | -71.5                  | 0.0                          | 0.5                | -72.0                      | -13.0          | 59.0           |
| 280.400                                | V              | 37.48                         | -67.8                  | 0.0                          | 0.5                | -68.3                      | -13.0          | 55.3           |

**LTE Band XII:****QPSK:**

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                      |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 1415.000                             | H              | 47.61                         | -53.2                  | 9.0                          | 1.3                | -45.5                      | -13.0          | 32.5           |
| 1415.000                             | V              | 49.13                         | -51.4                  | 9.0                          | 1.3                | -43.7                      | -13.0          | 30.7           |
| 2122.500                             | H              | 45.12                         | -50.8                  | 11.2                         | 1.4                | -41.0                      | -13.0          | 28.0           |
| 2122.500                             | V              | 46.34                         | -48.3                  | 11.2                         | 1.4                | -38.5                      | -13.0          | 25.5           |
| 260.700                              | H              | 36.89                         | -71.1                  | 0.0                          | 0.5                | -71.6                      | -13.0          | 58.6           |
| 299.400                              | V              | 37.60                         | -67.4                  | 0.0                          | 0.5                | -67.9                      | -13.0          | 54.9           |

**16-QAM:**

| Frequency<br>(MHz)                     | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method     |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|----------------|-------------------------------|------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                                        |                |                               | S.G.<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                |                               |                        |                              |                    |                            |                |                |
| 1415.000                               | H              | 44.87                         | -56                    | 9.0                          | 1.3                | -48.3                      | -13.0          | 35.3           |
| 1415.000                               | V              | 46.70                         | -53.9                  | 9.0                          | 1.3                | -46.2                      | -13.0          | 33.2           |
| 2122.500                               | H              | 43.13                         | -52.8                  | 11.2                         | 1.4                | -43.0                      | -13.0          | 30.0           |
| 2122.500                               | V              | 44.06                         | -50.6                  | 11.2                         | 1.4                | -40.8                      | -13.0          | 27.8           |
| 260.700                                | H              | 36.41                         | -71.6                  | 0.0                          | 0.5                | -72.1                      | -13.0          | 59.1           |
| 299.400                                | V              | 37.25                         | -67.7                  | 0.0                          | 0.5                | -68.2                      | -13.0          | 55.2           |

Note:

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

2) Margin = Limit- Absolute Level

**FCC § 22.917 (a);§ 24.238 (a); §27.53 (h)(m) - BAND EDGES****Applicable Standards**

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

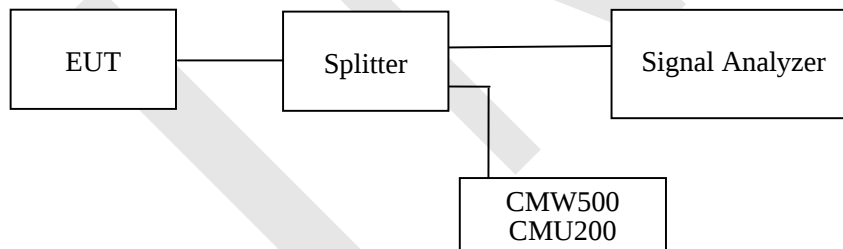
According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

**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           |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200      | 106891                | 2015-11-23       | 2016-11-23           |
| R&S             | Wideband Radio Communication tester  | CMW500      | 1201.002K50-146520-wh | 2015-11-23       | 2016-11-23           |
| Mini            | Splitter                             | ZFRSC-14-S+ | SF019411452           | 2016-01-11       | 2016-07-10           |
| BACL            | RF cable                             | KS-LAB-020  | KS-LAB-020            | 2016-01-11       | 2016-07-10           |
| Mini            | attenuator                           | 10dB        | N/A                   | 2016-01-11       | 2016-07-10           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) 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>       | 20~23 °C       |
| <b>Relative Humidity:</b> | 48~52 %        |
| <b>ATM Pressure:</b>      | 100.5~101.0kPa |

*The testing was performed by David. Hsu on 2016-05-23&2016-06-01&2016-06-29.*

*EUT operation mode: Transmitting*

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

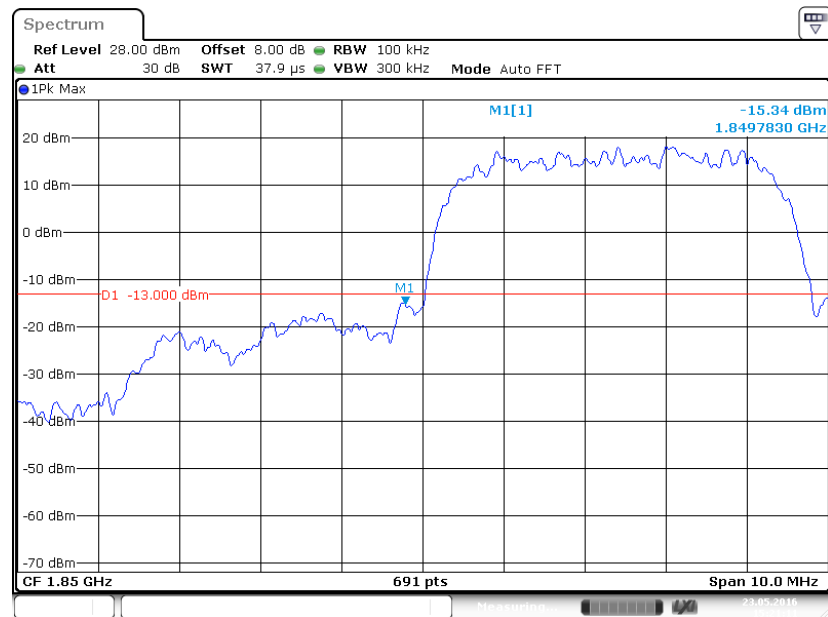
## Cellular Band, Left Band Edge for WCDMA Mode



## Cellular Band, Right Band Edge for WCDMA Mode



## PCS Band, Left Band Edge for WCDMA Mode



Date: 23 MAY 2016 15:21:11

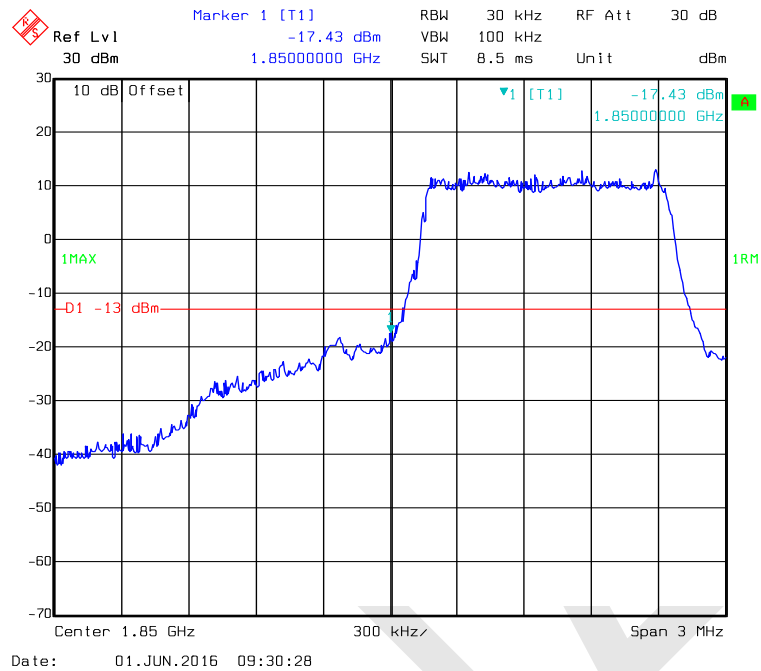
## PCS Band, Right Band Edge for WCDMA Mode



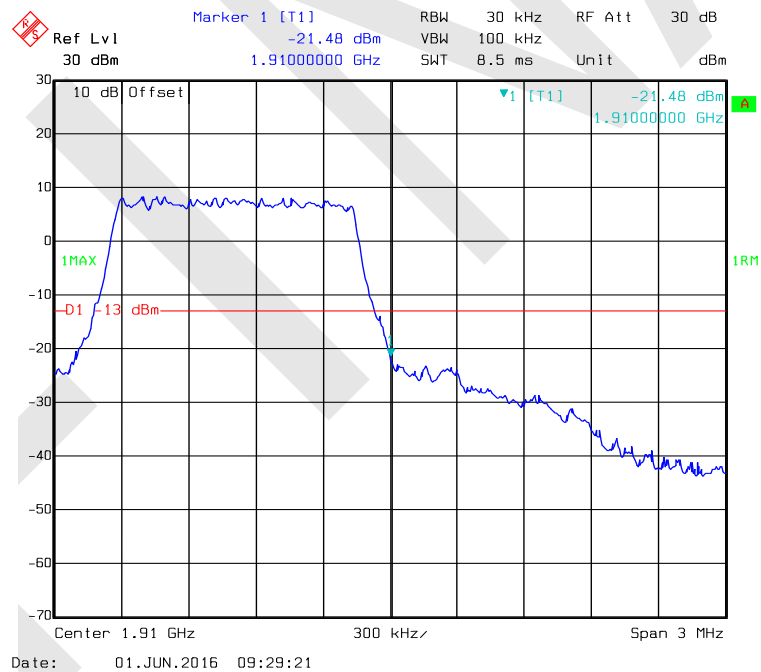
Date: 23 MAY 2016 15:26:24

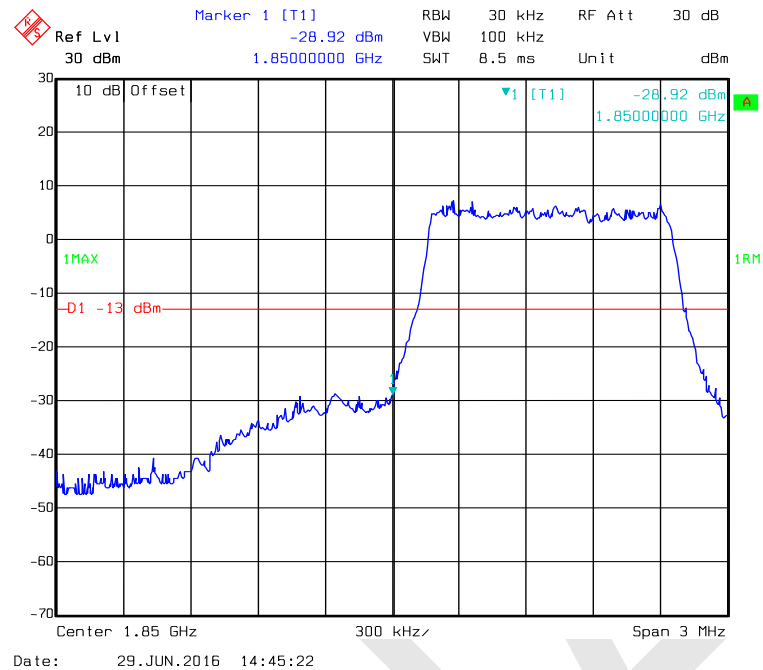
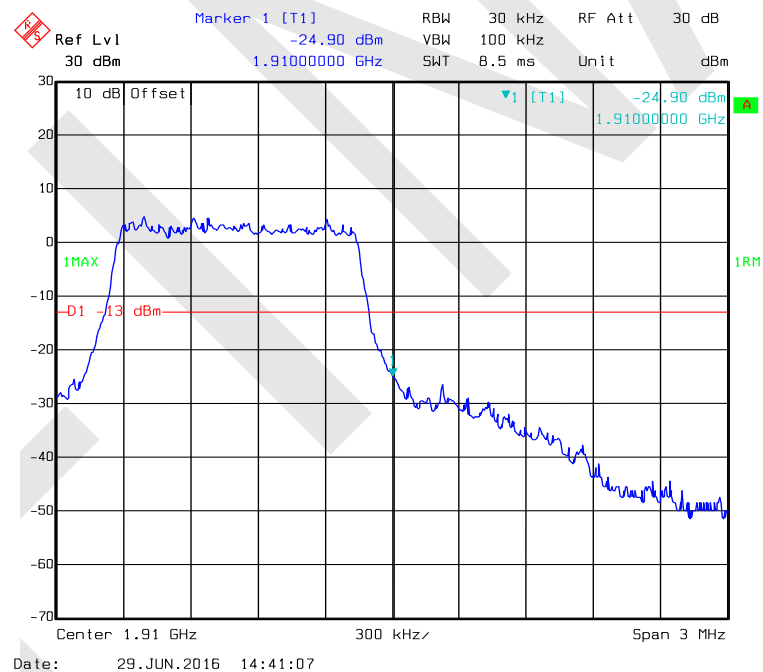
## LTE Band II:

## QPSK (1.4 MHz, FULL RB) - Left Band Edge

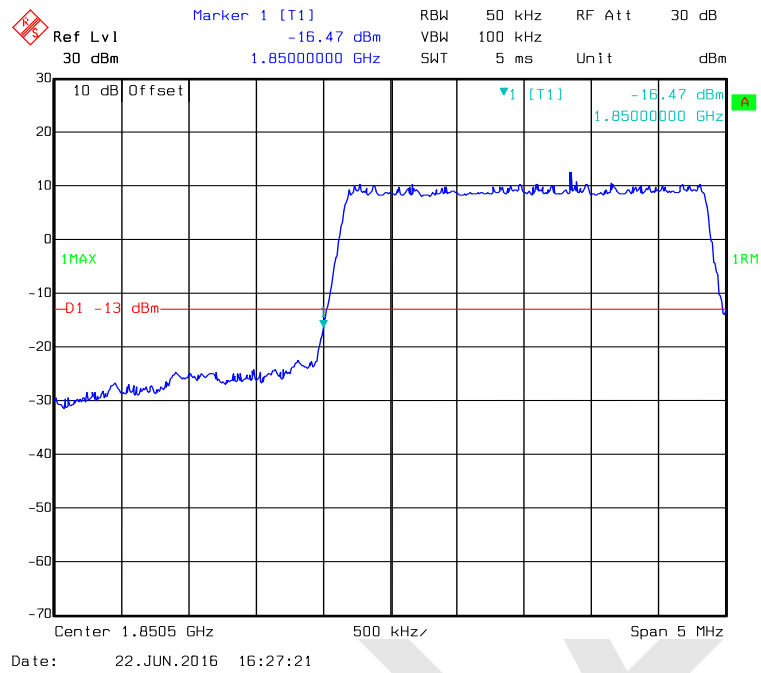


## QPSK (1.4 MHz, FULL RB) - Right Band Edge

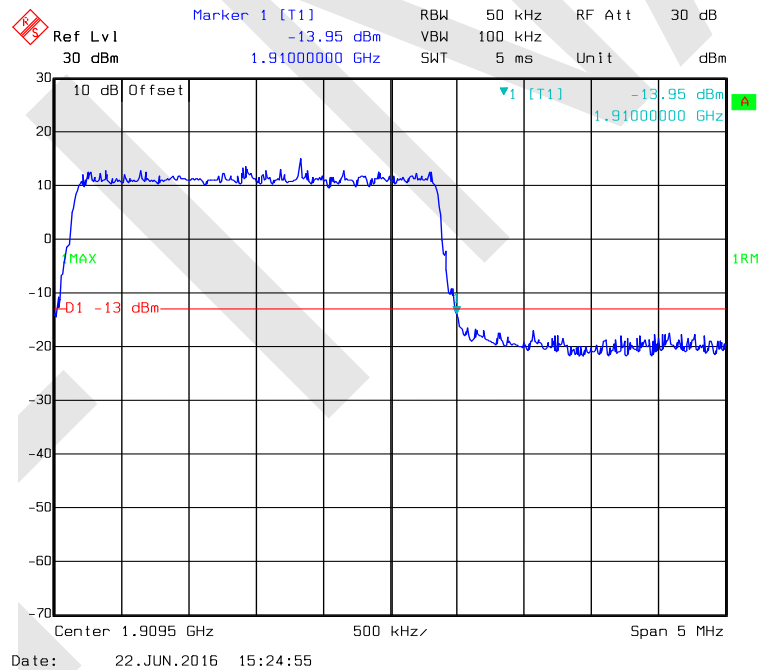


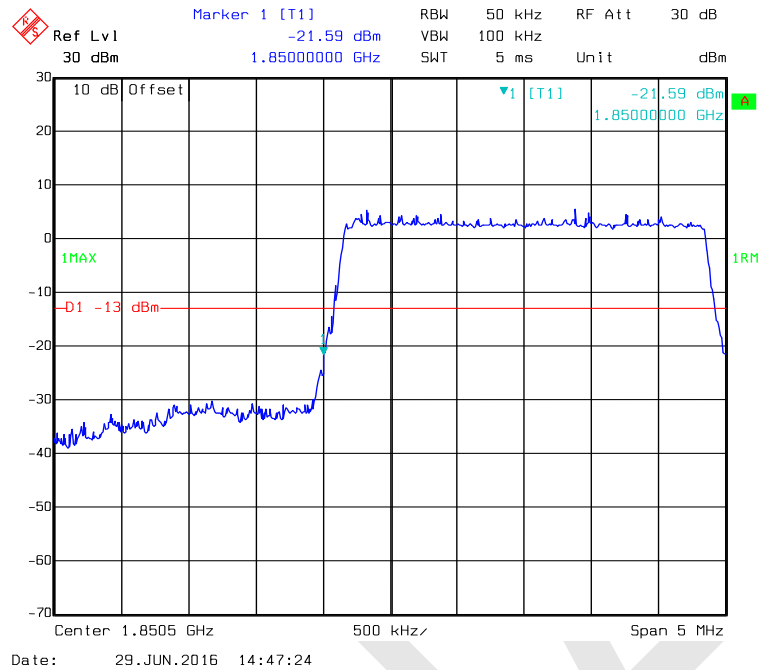
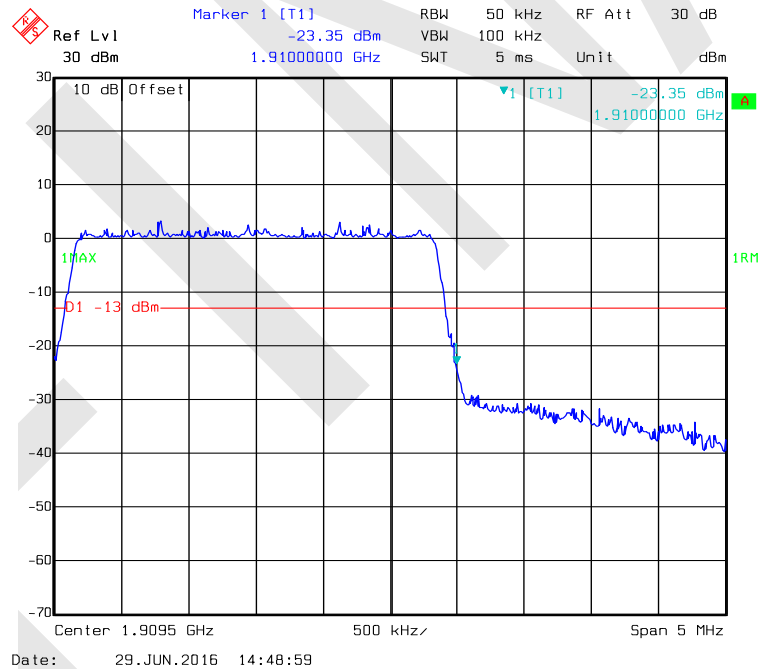
**16-QAM (1.4 MHz, FULL RB) - Left Band Edge****16-QAM (1.4 MHz, FULL RB) - Right Band Edge**

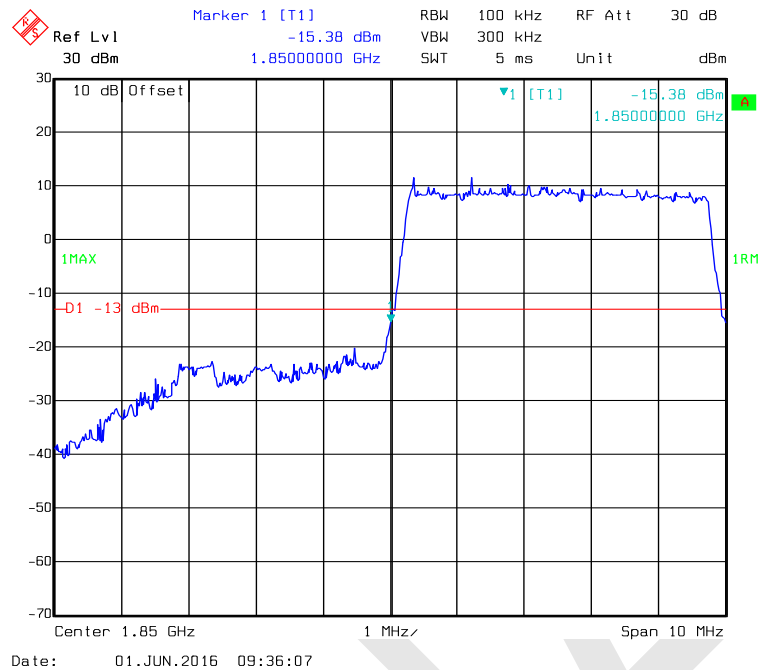
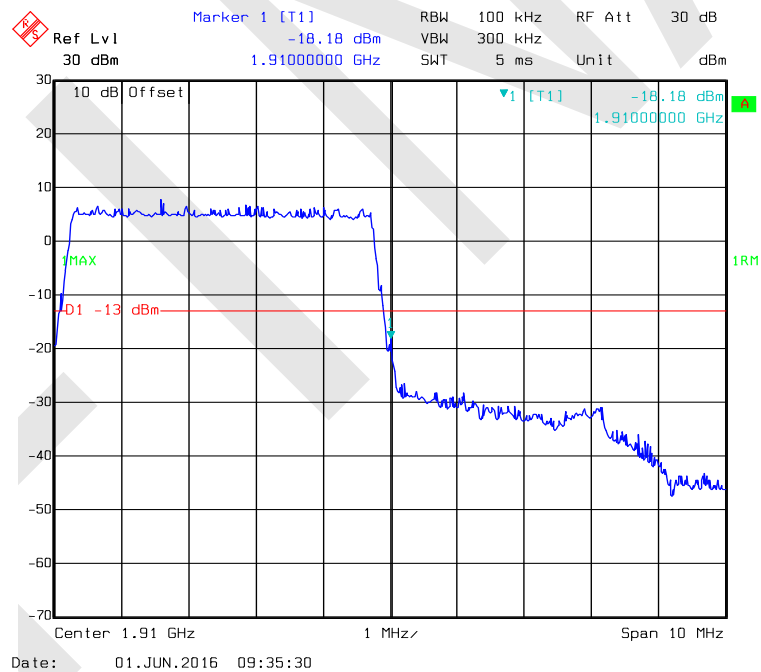
### QPSK (3.0 MHz, FULL RB) - Left Band Edge

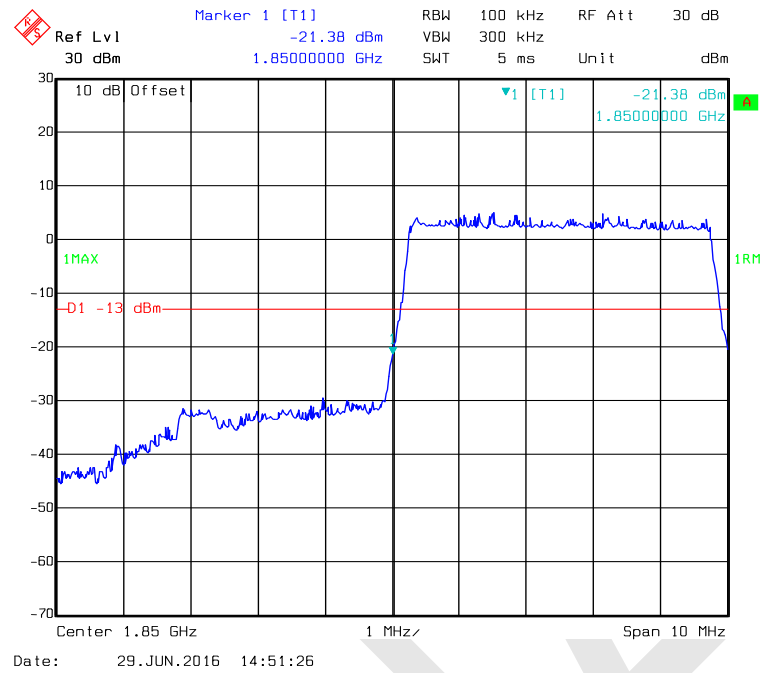
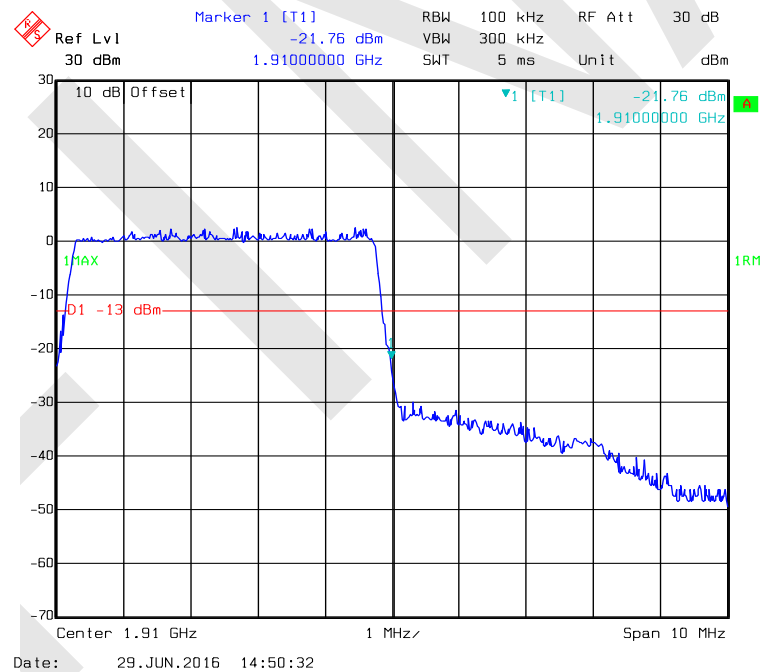


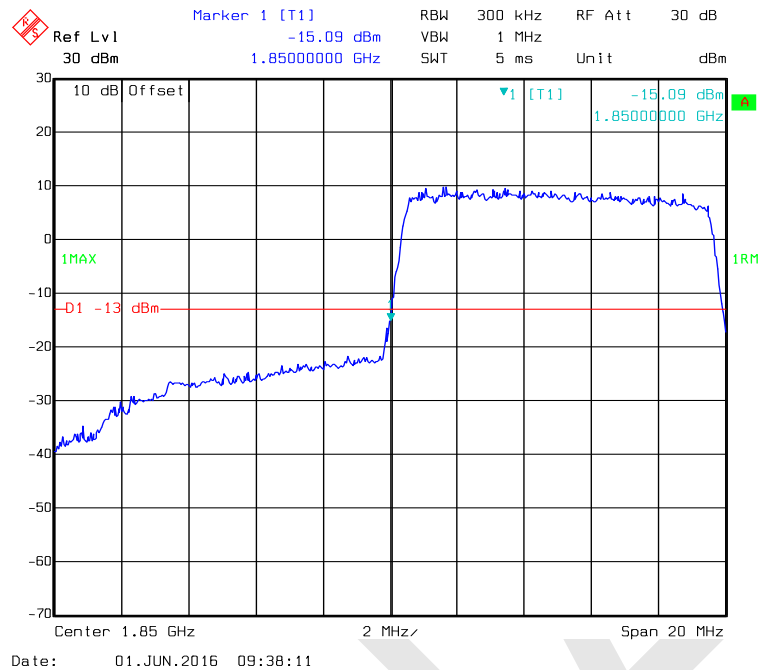
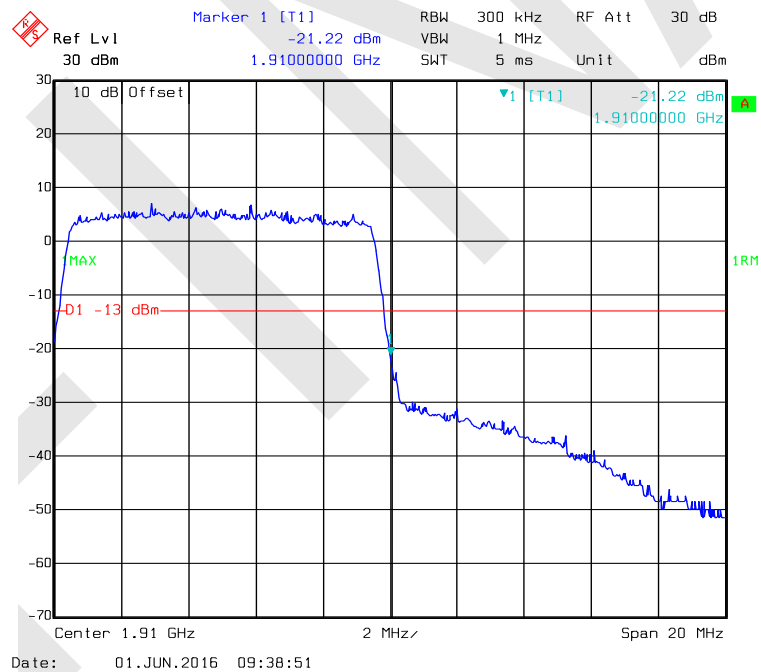
### QPSK (3.0 MHz, FULL RB) - Right Band Edge

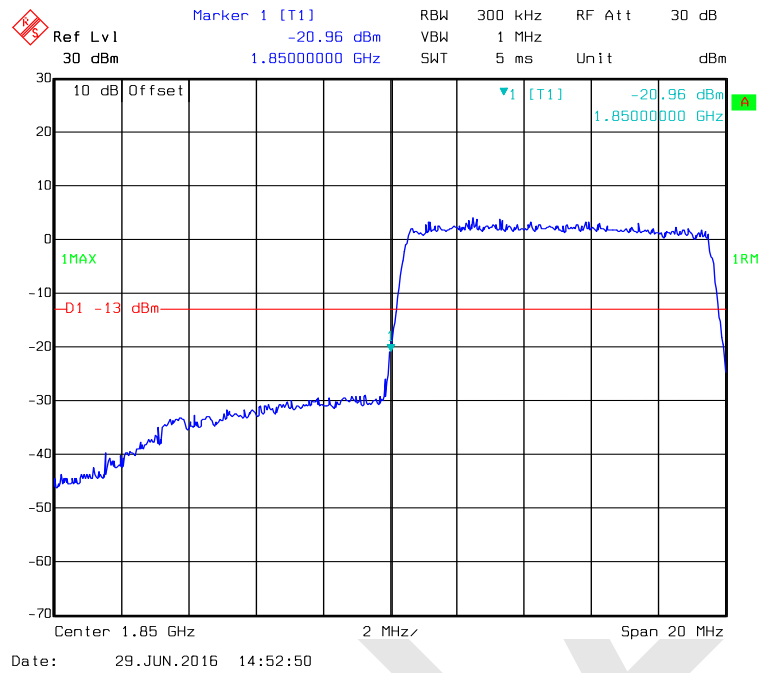
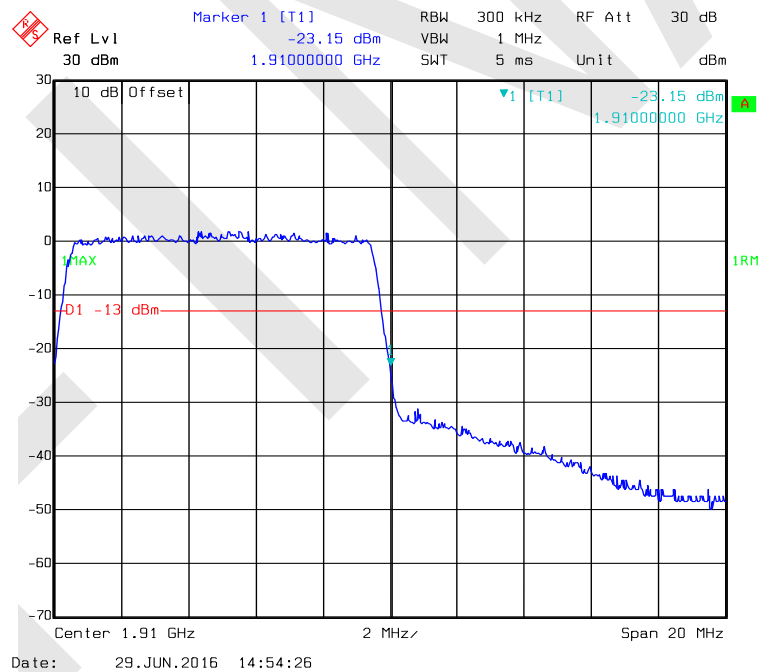


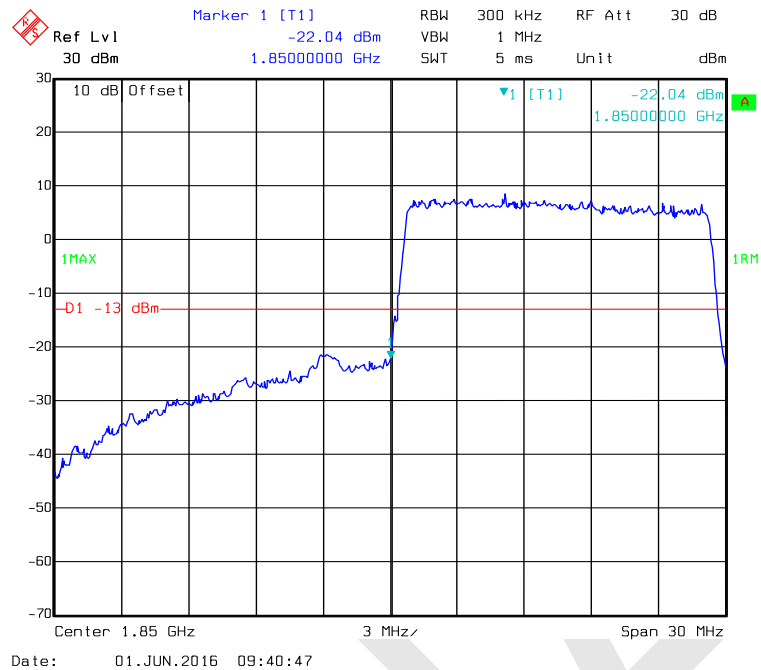
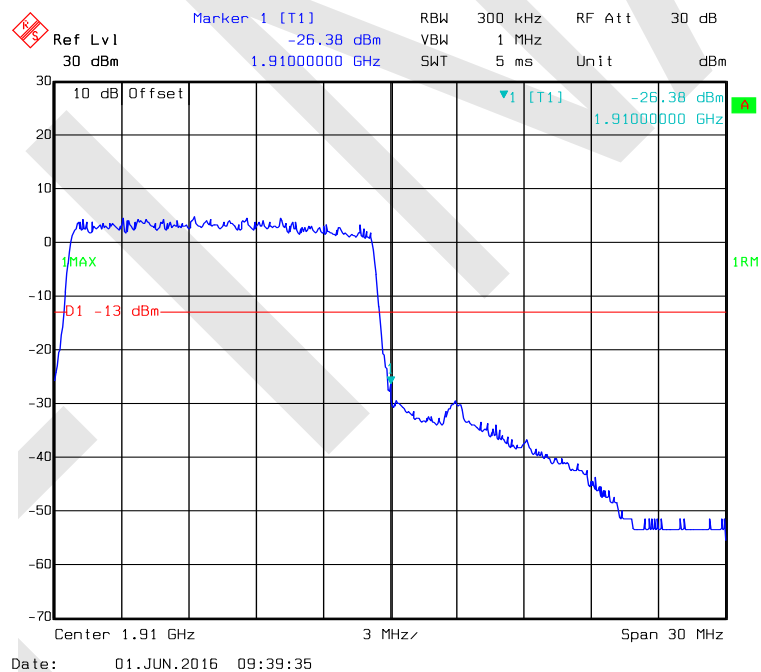
**16-QAM (3.0 MHz, FULL RB) - Left Band Edge****16-QAM (3.0 MHz, FULL RB) - Right Band Edge**

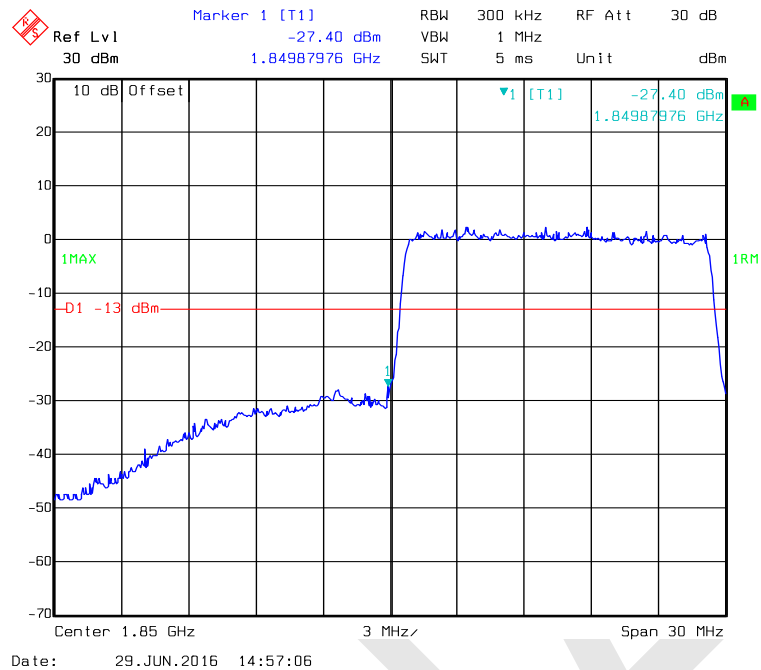
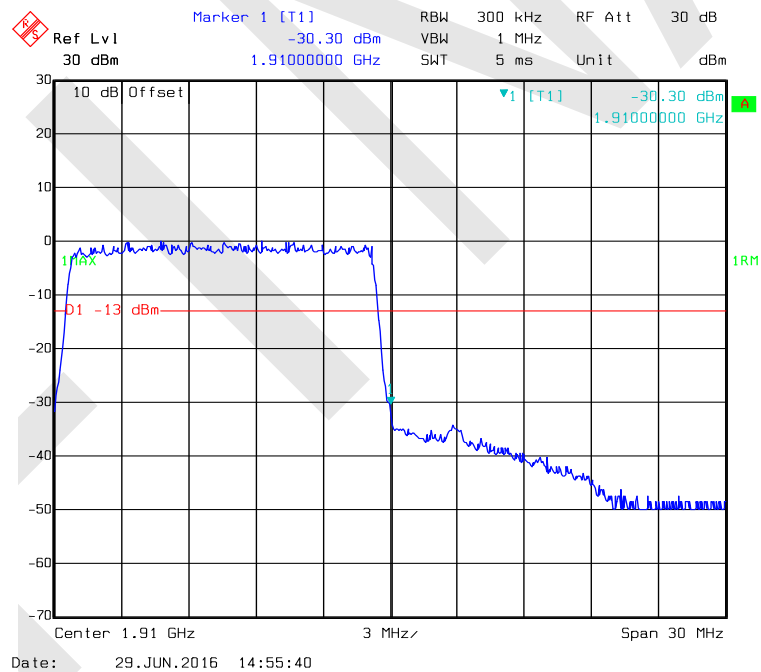
**QPSK (5.0 MHz, FULL RB) - Left Band Edge****QPSK (5.0 MHz, FULL RB) - Right Band Edge**

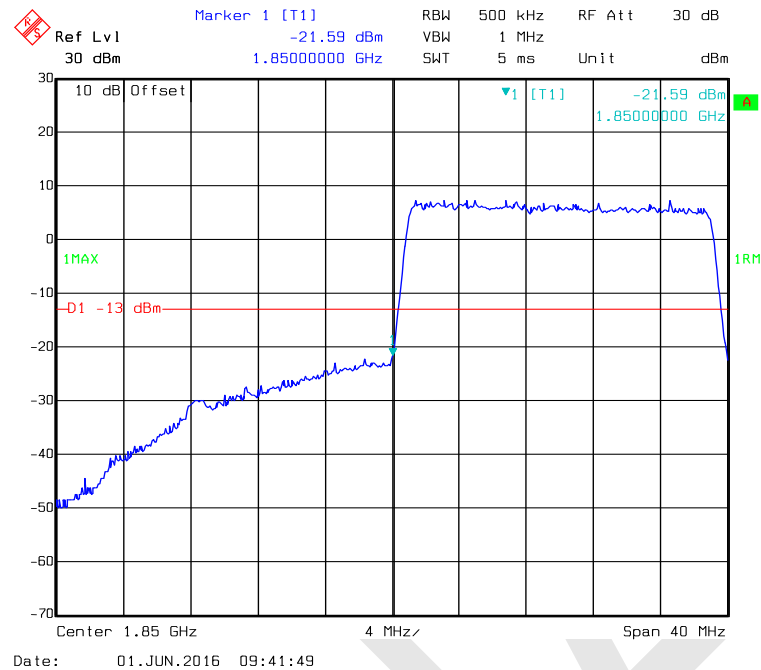
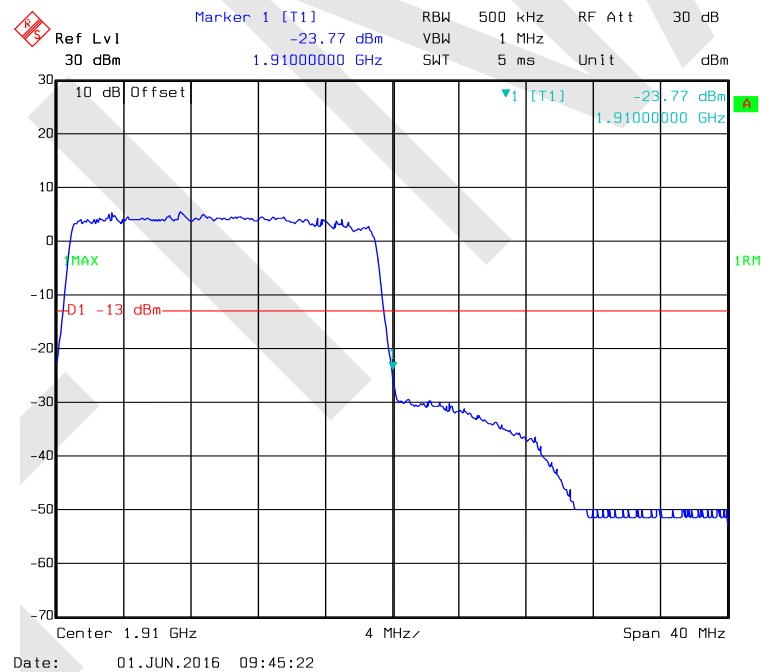
**16-QAM (5.0 MHz, FULL RB) - Left Band Edge****16-QAM (5.0 MHz, FULL RB) - Right Band Edge**

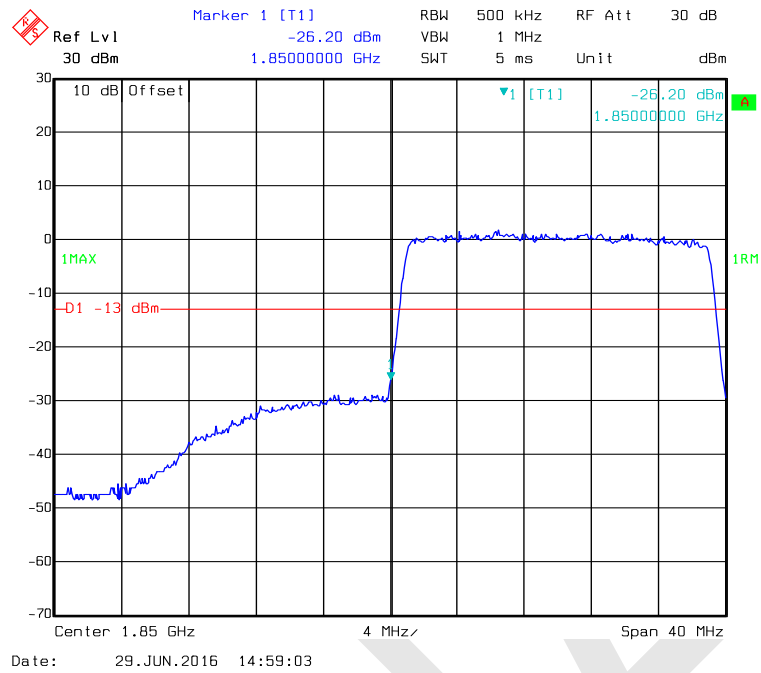
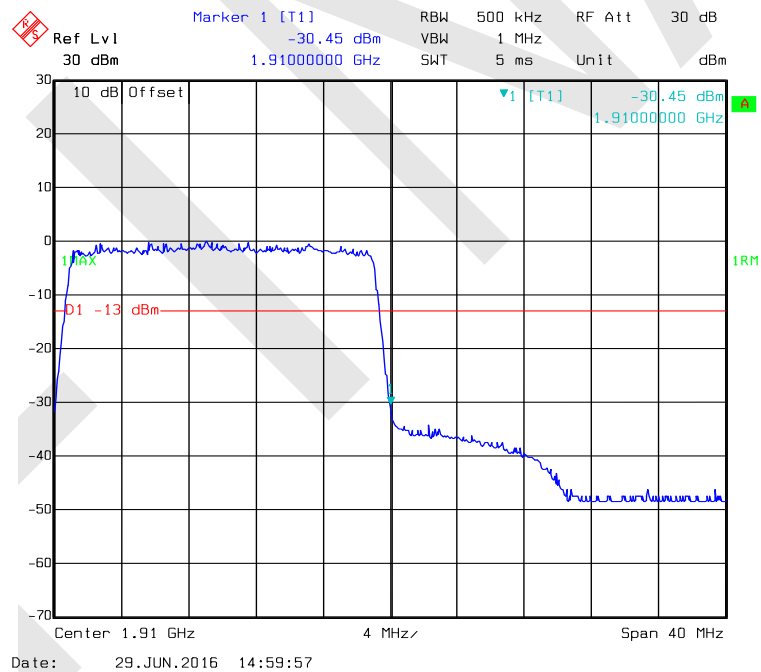
**QPSK (10.0 MHz, FULL RB) - Left Band Edge****QPSK (10.0 MHz, FULL RB) - Right Band Edge**

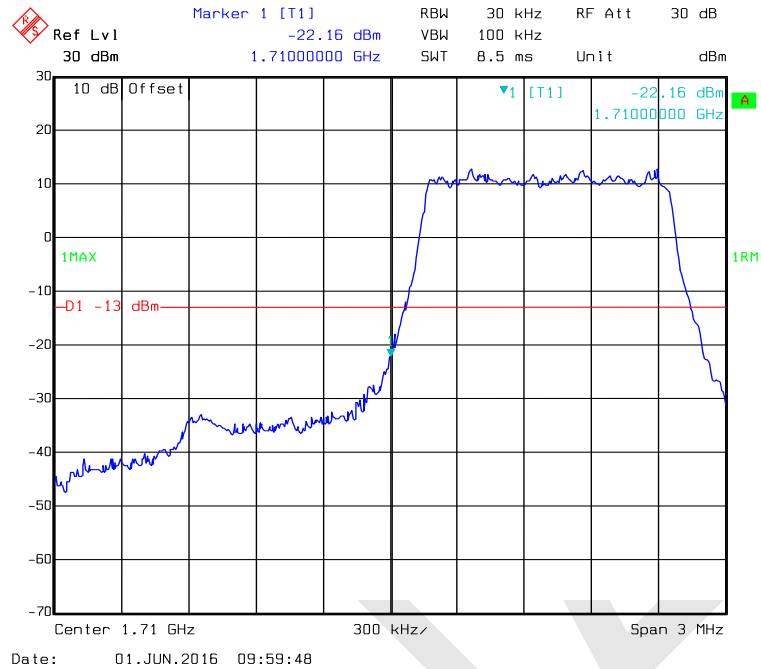
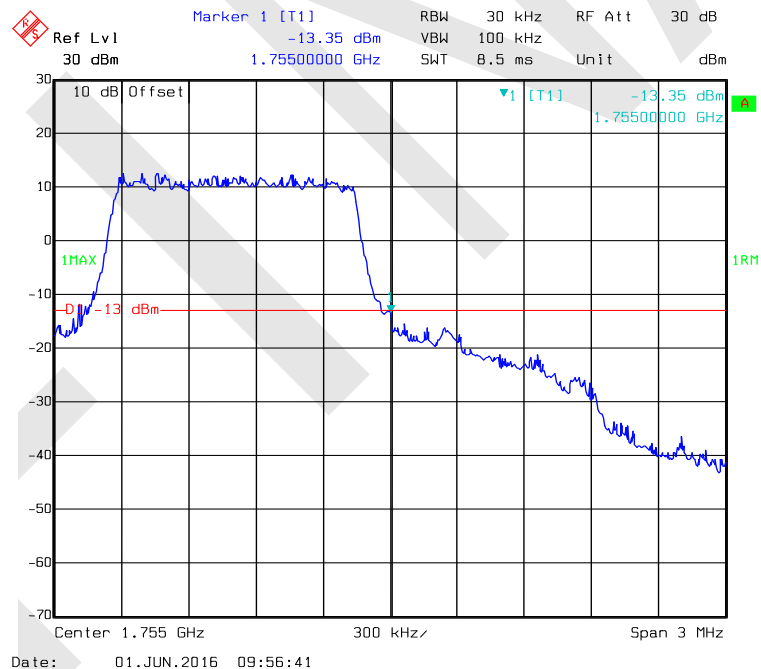
**16-QAM (10.0 MHz, FULL RB) - Left Band Edge****16-QAM (10.0 MHz, FULL RB) - Right Band Edge**

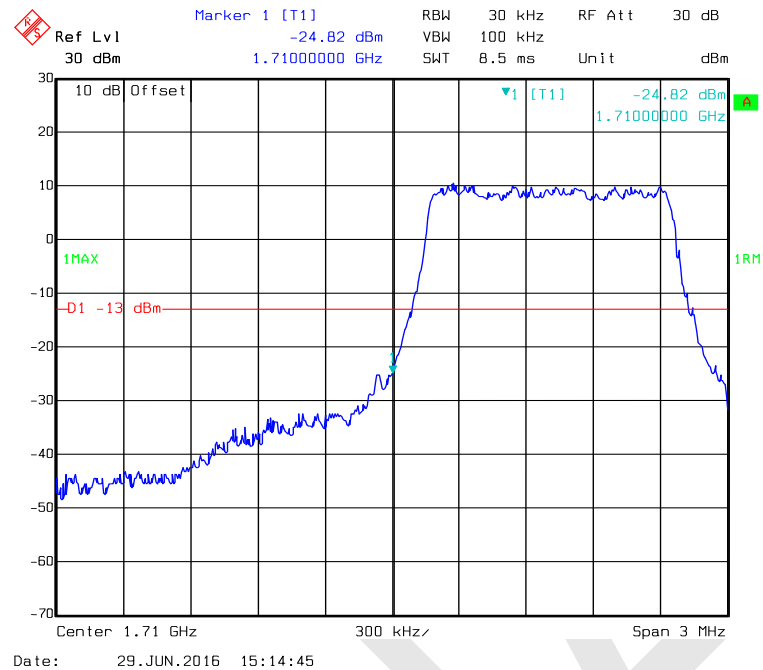
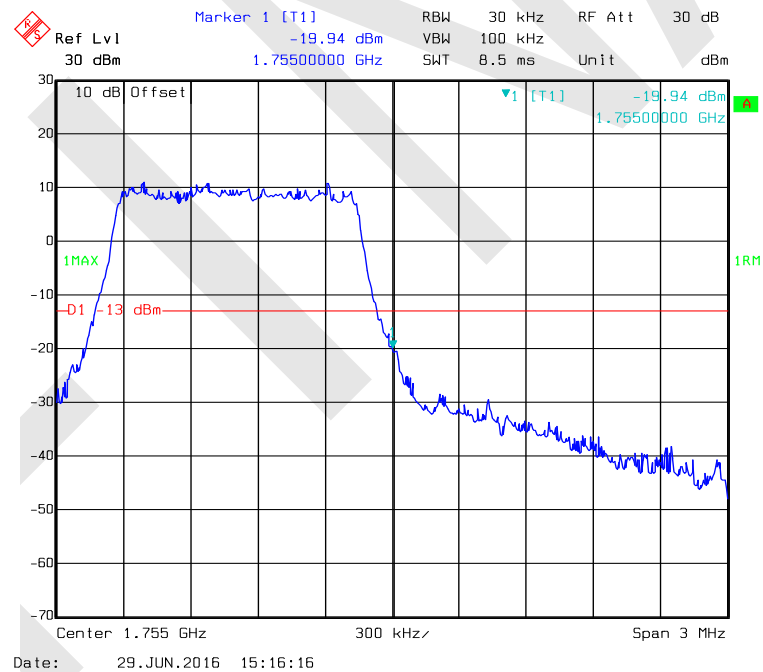
**QPSK (15.0 MHz, FULL RB) - Left Band Edge****QPSK (15.0 MHz, FULL RB) - Right Band Edge**

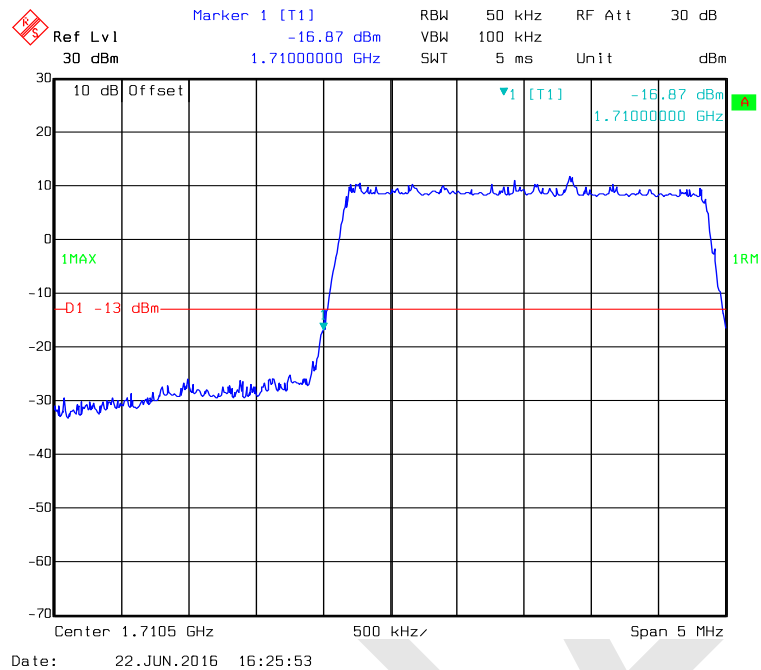
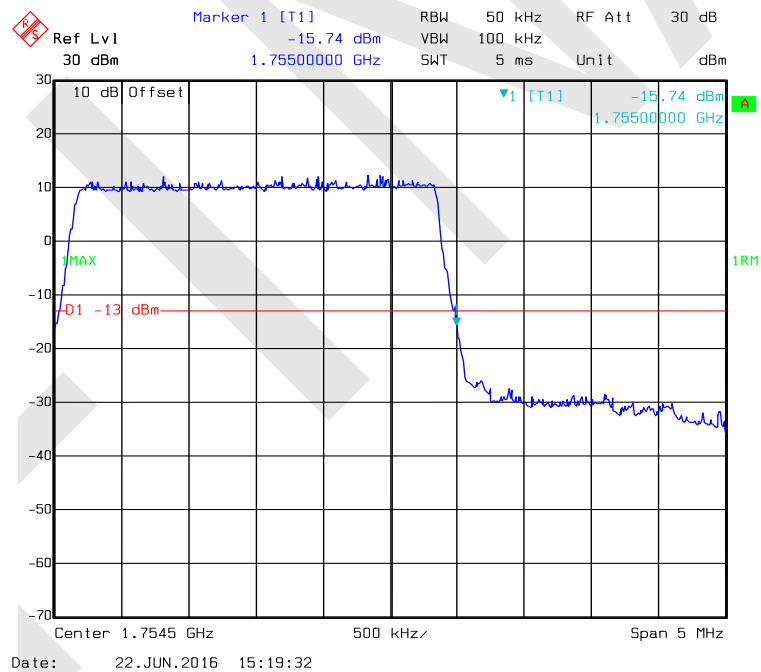
**16-QAM (15.0 MHz, FULL RB) - Left Band Edge****16-QAM (15.0 MHz, FULL RB) - Right Band Edge**

**QPSK (20.0 MHz, FULL RB) - Left Band Edge****QPSK (20.0 MHz, FULL RB) - Right Band Edge**

**16-QAM (20.0 MHz, FULL RB) - Left Band Edge****16-QAM (20.0 MHz, FULL RB) - Right Band Edge**

**LTE Band IV:****QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

**16-QAM (1.4 MHz, FULL RB) - Left Band Edge****16-QAM (1.4 MHz, FULL RB) - Right Band Edge**

**QPSK (3.0 MHz, FULL RB) - Left Band Edge****QPSK (3.0 MHz, FULL RB) - Right Band Edge**

Ref Lvl 30 dBm

Marker 1 [T1] -18.88 dBm

RBW 50 kHz RF Att 30 dB

VBW 100 kHz

SWT 5 ms Unit dBm

10 dB Offset

1MAX

D1 -13 dBm

▼1 [T1] -18.88 dBm 1.7100000 GHz

Center 1.7105 GHz 500 kHz Span 5 MHz

Date: 29.JUN.2016 15:13:01

Ref Lvl 30 dBm

Marker 1 [T1] -17.71 dBm

RBW 50 kHz

VBW 100 kHz

SWT 5 ms

RF Att 30 dB

Unit dBm

10 dB Offset

▼1 [T1] -17.71 dBm

1.7550000 GHz

1MAX

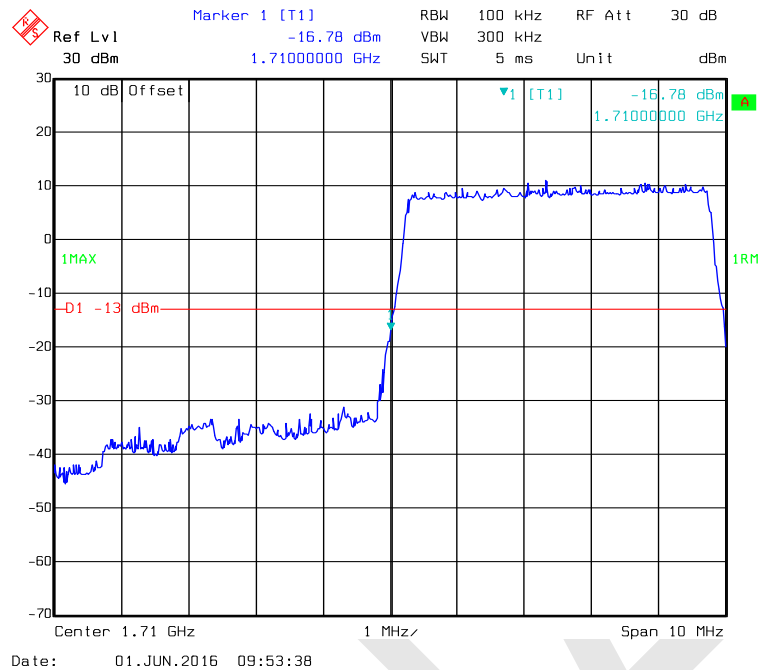
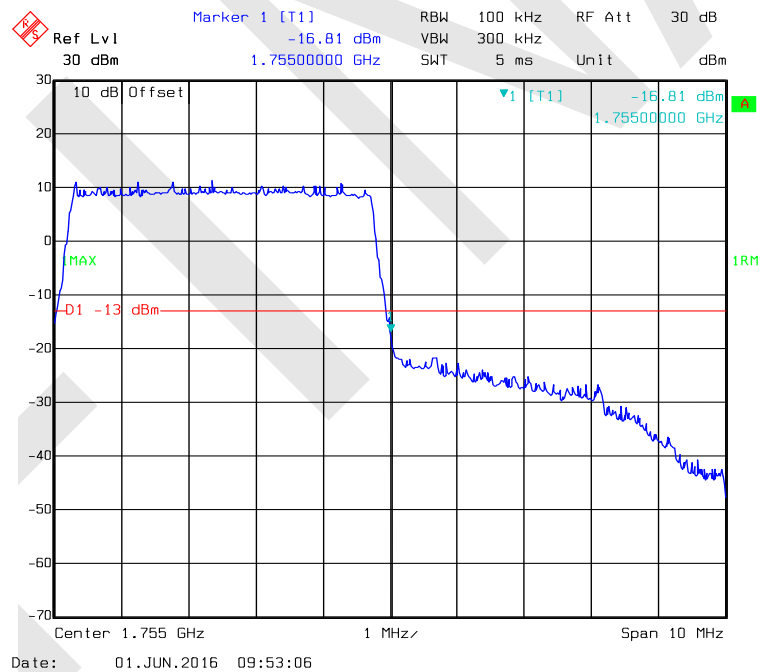
D1 -13 dBm

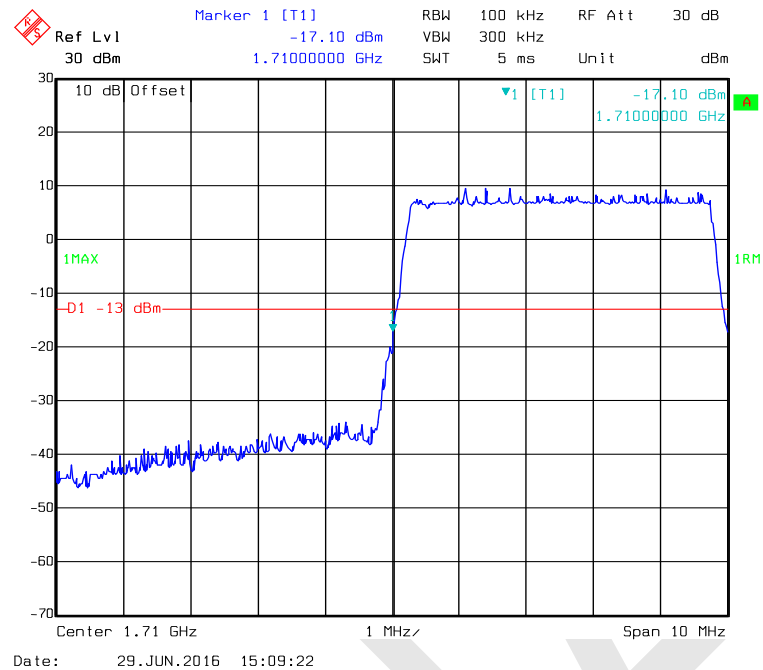
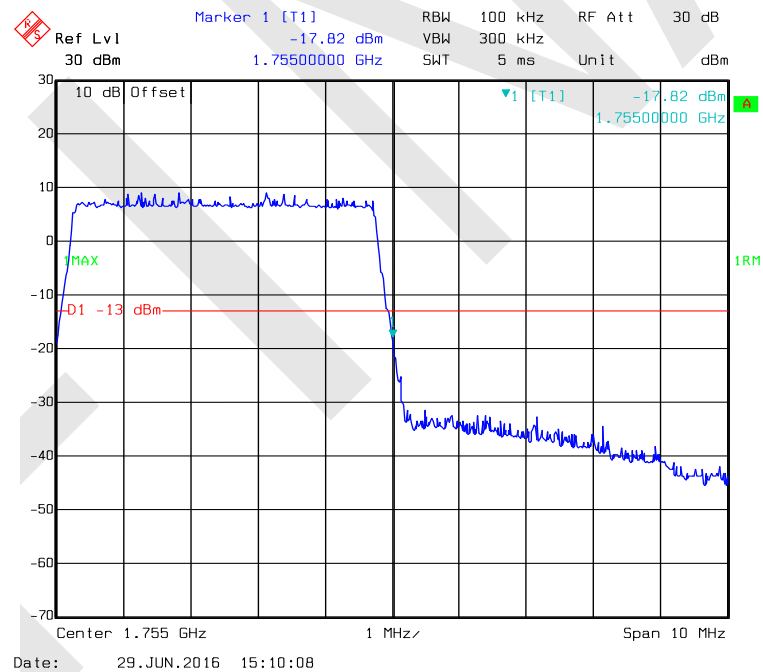
Center 1.7545 GHz

500 kHz

Span 5 MHz

Date: 29.JUN.2016 15:11:47

**QPSK (5.0 MHz, FULL RB) - Left Band Edge****QPSK (5.0 MHz, FULL RB) - Right Band Edge**

**16-QAM (5.0 MHz, FULL RB) - Left Band Edge****16-QAM (5.0 MHz, FULL RB) - Right Band Edge**

The screenshot displays a spectrum analyzer interface. At the top, a red 'A' icon is visible. The main display area shows a blue trace of a signal. A red horizontal line is drawn across the plot at -13 dBm, labeled 'D1 -13 dBm'. A green vertical line is positioned at the center of the signal, labeled '1MAX'. A blue marker is placed on the signal trace at 1.7100000 GHz, labeled 'Marker 1 [T1] -16.02 dBm'. The plot has a grid with a center frequency of 1.71 GHz, a span of 20 MHz, and a resolution bandwidth (RBW) of 300 kHz. The frequency axis is labeled 'Center 1.71 GHz' and 'Span 20 MHz'. The power axis is labeled 'Ref Lvl 30 dBm' and 'Unit dBm'. The signal trace shows a sharp peak at the center frequency, with a noise floor around -40 dBm. The signal level is approximately -16 dBm at the peak. The plot also shows a red line at -13 dBm and a green line at 1MAX. The signal trace is labeled '1MAX' and '1RM'.



Ref Lvl 30 dBm

Marker 1 [T1] -16.59 dBm

RBW 300 kHz

VBW 1 MHz

SWT 5 ms

RF Att 30 dB

Unit dBm

10 dB Offset

MAX

D1 -13 dBm

1 [T1] -16.59 dBm

1.7550000 GHz

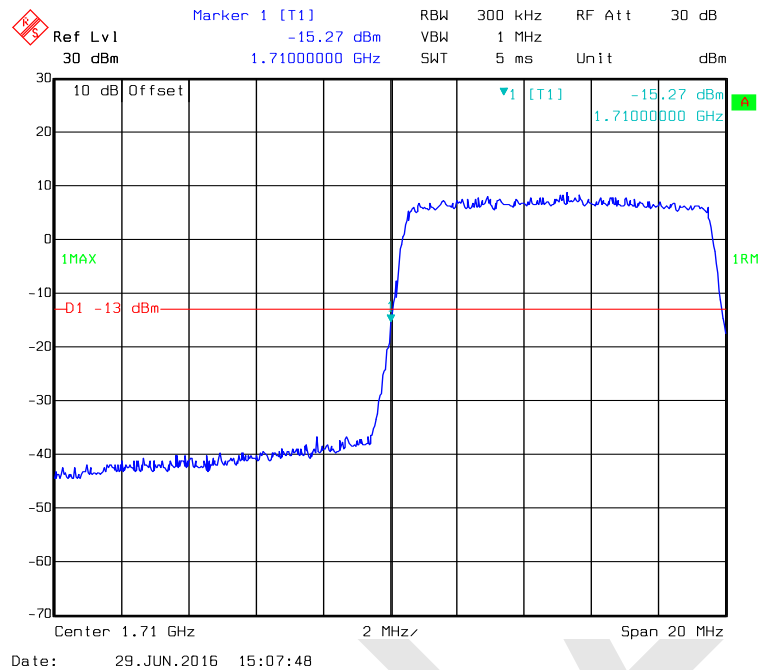
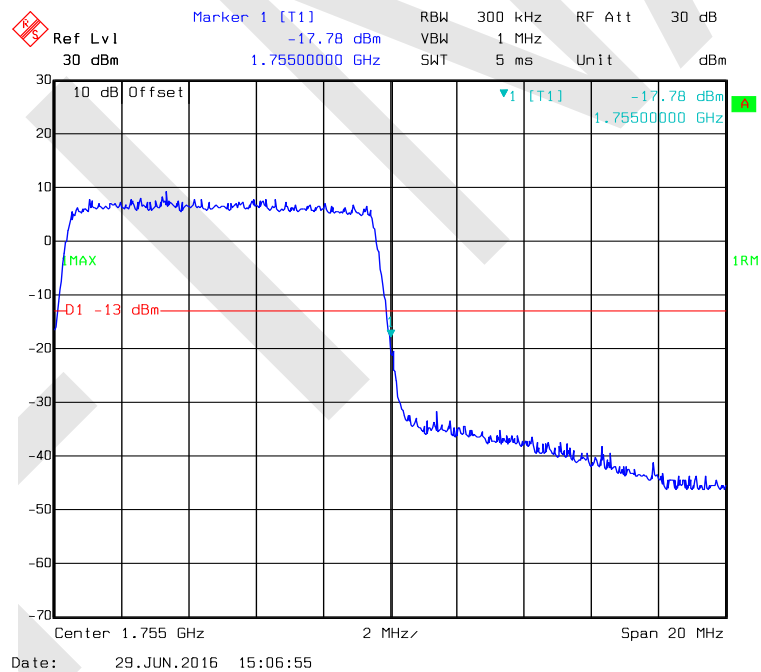
1RM

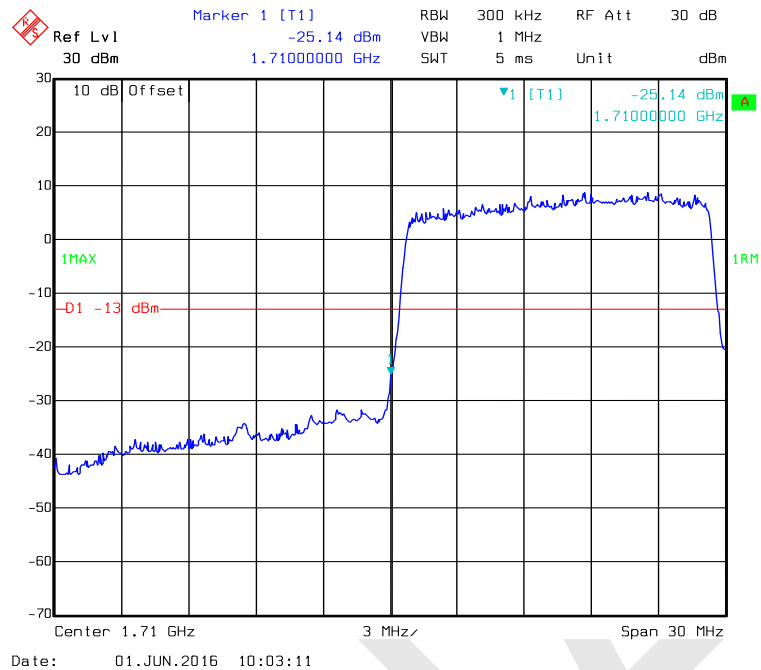
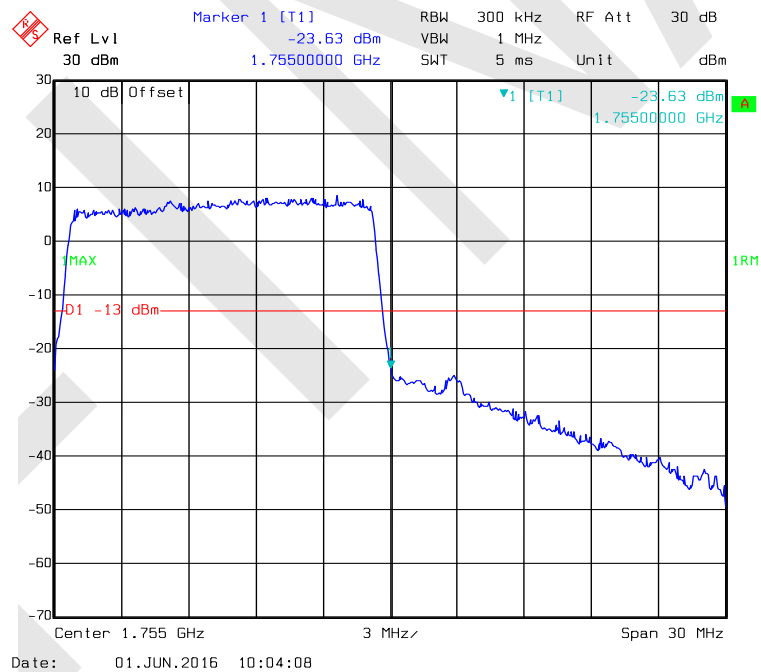
Center 1.755 GHz

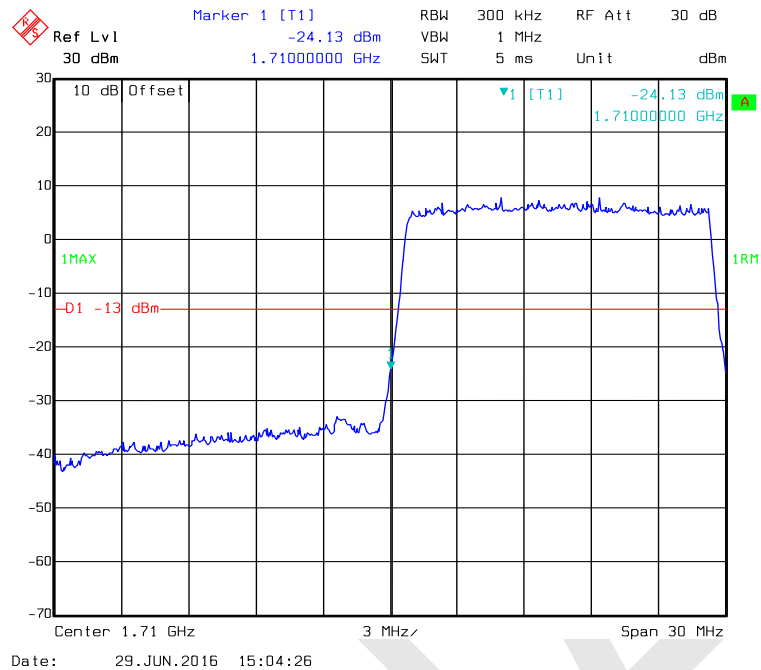
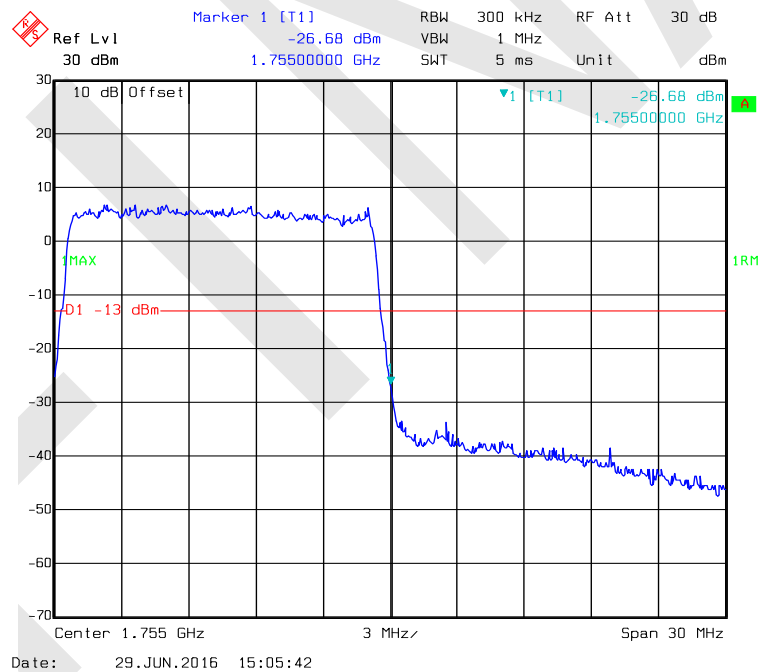
2 MHz

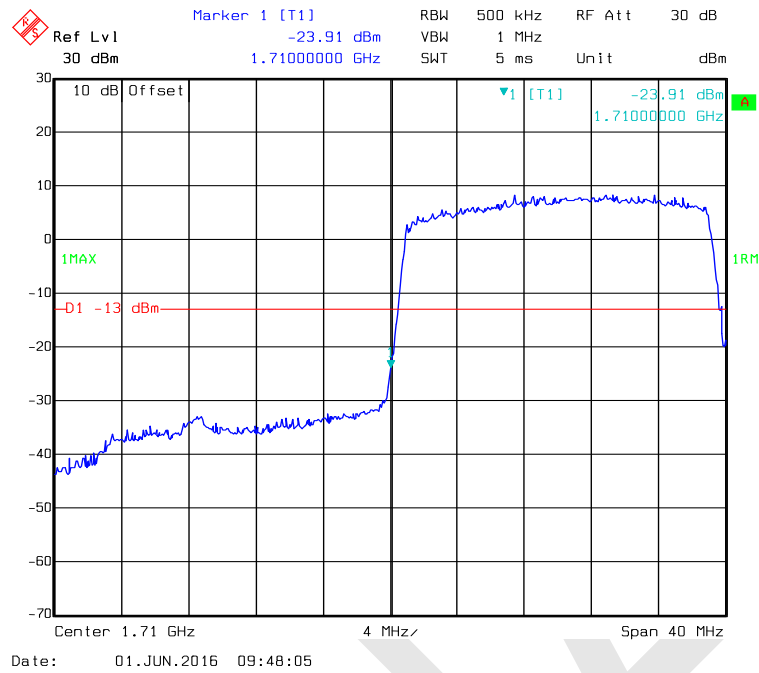
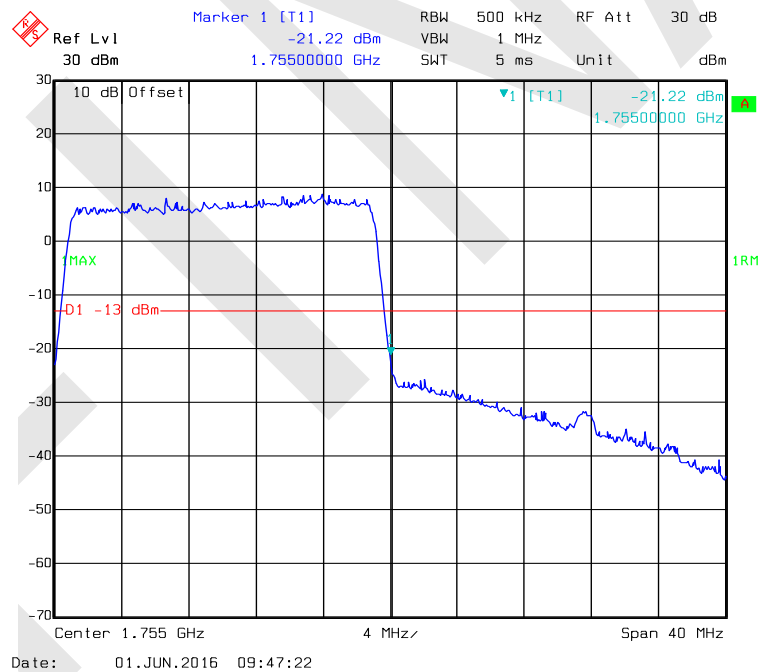
Span 20 MHz

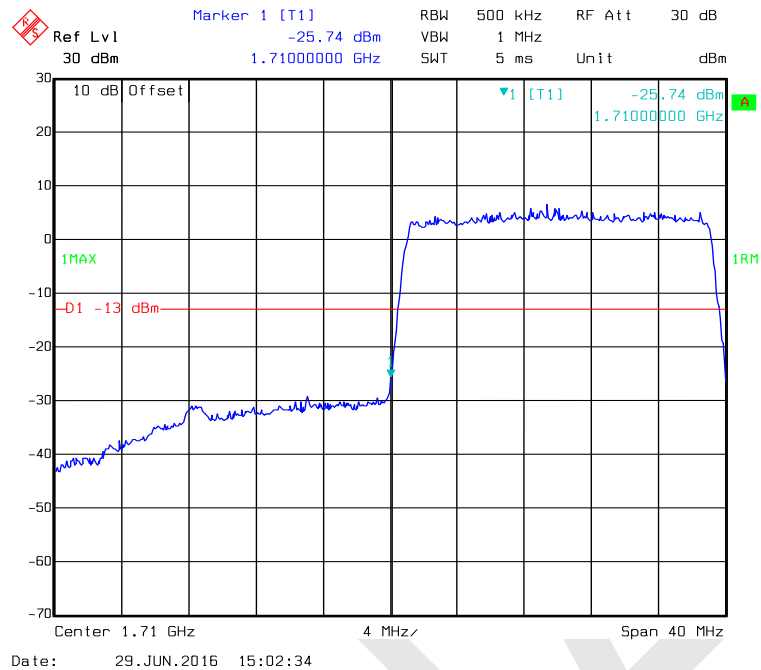
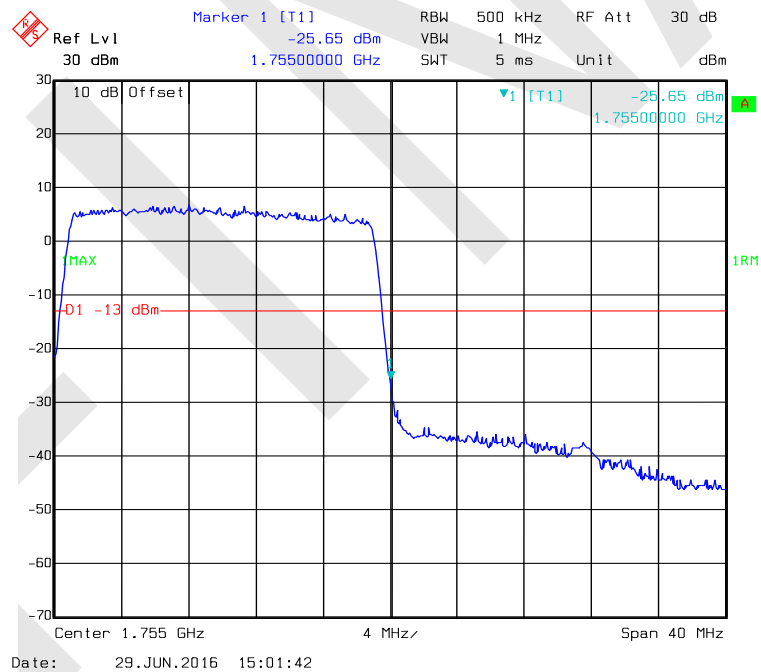
Date: 01.JUN.2016 09:51:58

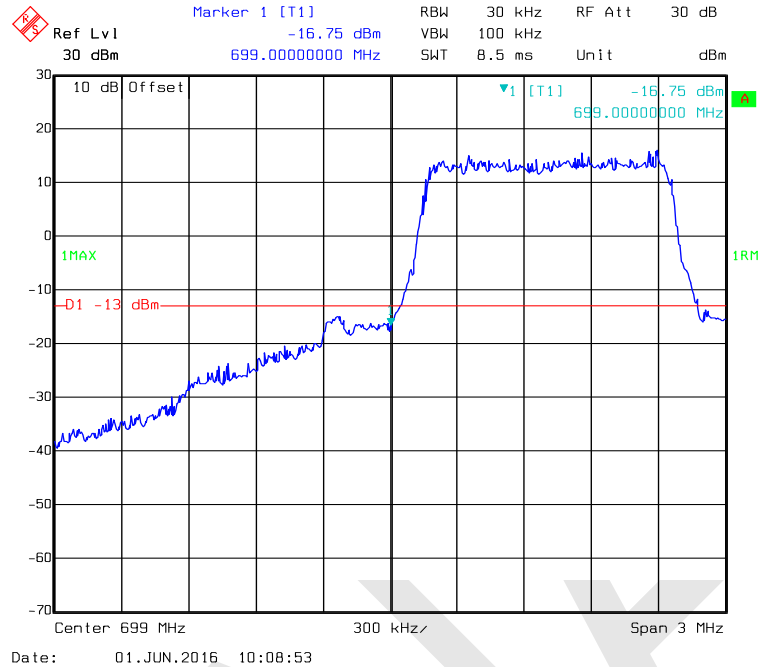
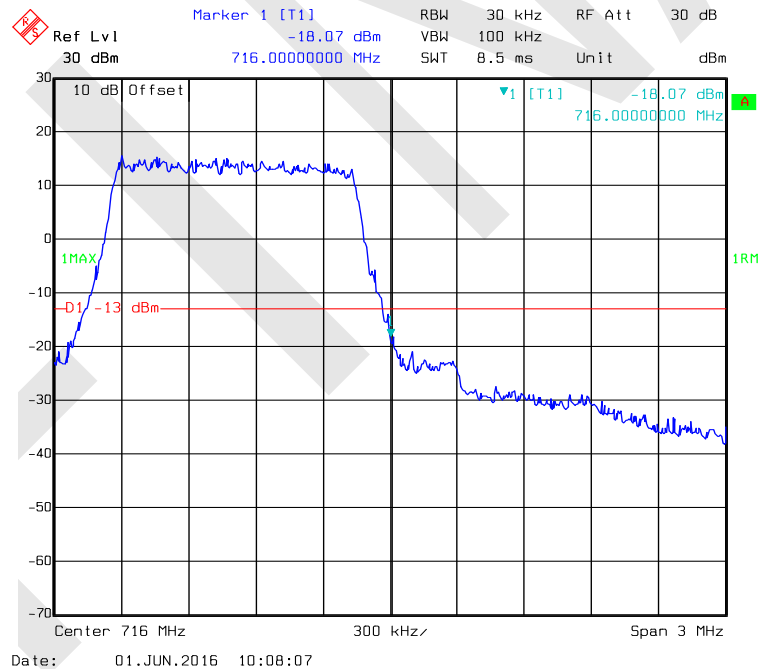
**16-QAM (10.0 MHz, FULL RB) - Left Band Edge****16-QAM (10.0 MHz, FULL RB) - Right Band Edge**

**QPSK (15.0MHz, FULL RB) - Left Band Edge****QPSK (15.0MHz, FULL RB) - Right Band Edge**

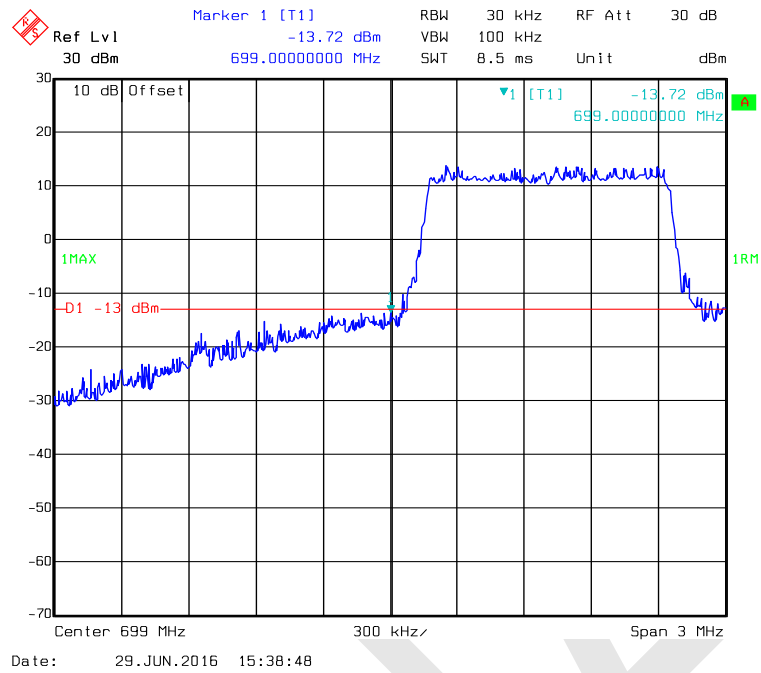
**16-QAM (15.0 MHz, FULL RB) - Left Band Edge****16-QAM (15.0 MHz, FULL RB) - Right Band Edge**

**QPSK (20.0MHz, FULL RB) - Left Band Edge****QPSK (20.0MHz, FULL RB) - Right Band Edge**

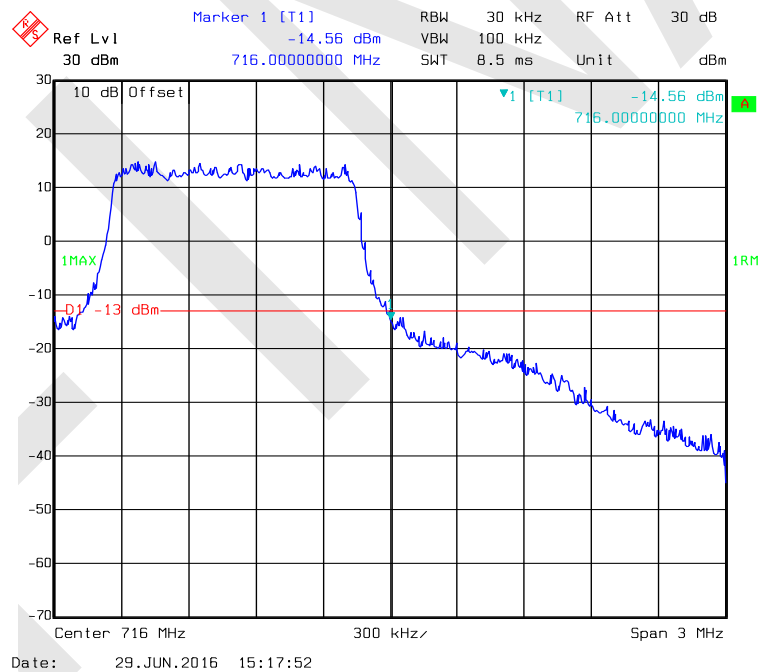
**16-QAM (20.0 MHz, FULL RB) - Left Band Edge****16-QAM (20.0 MHz, FULL RB) - Right Band Edge**

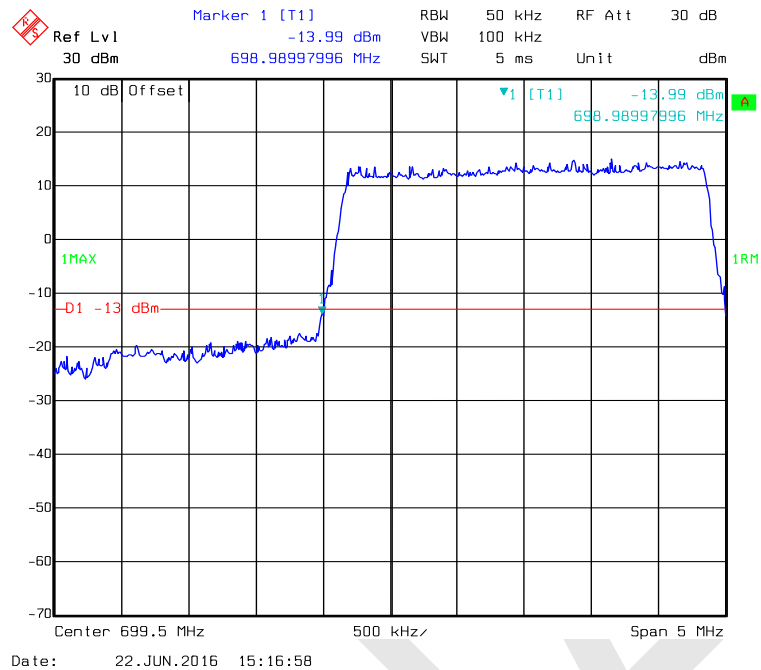
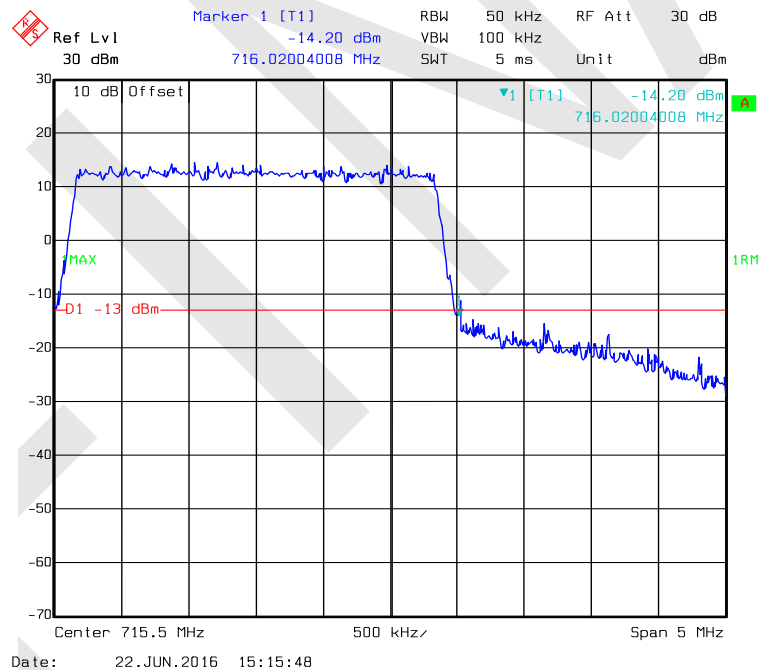
**LTE Band XII:****QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge

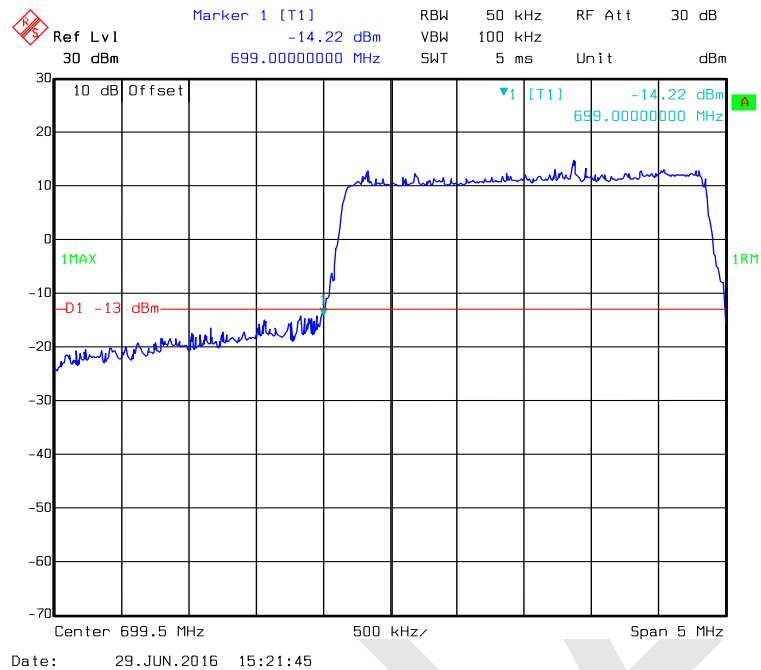


### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge

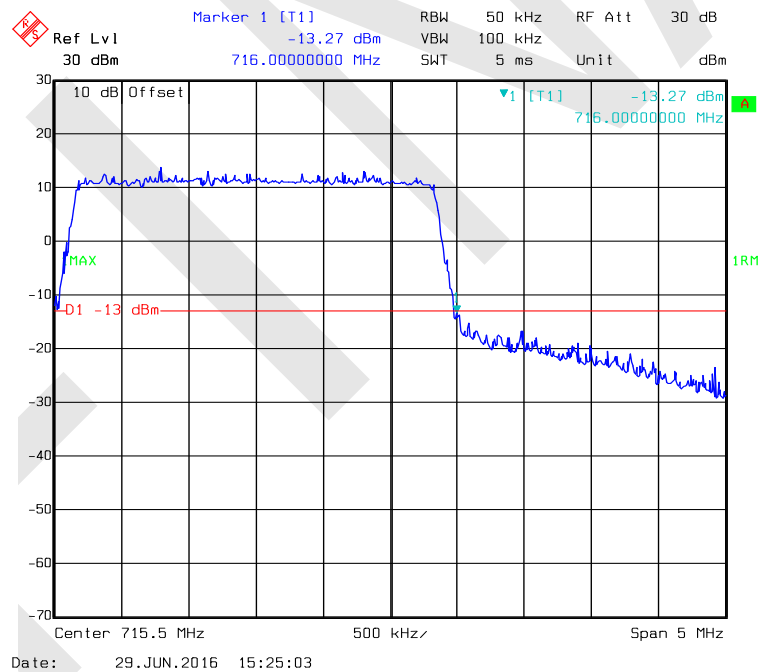


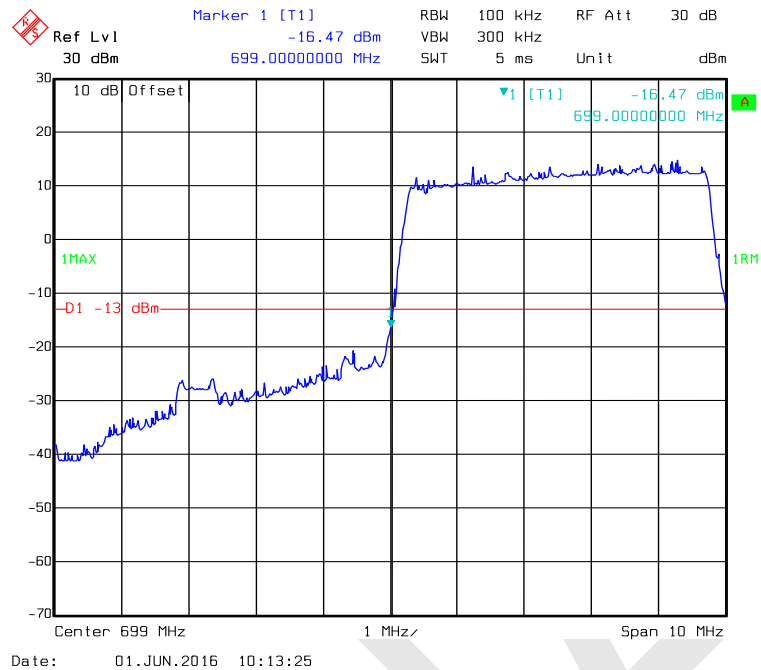
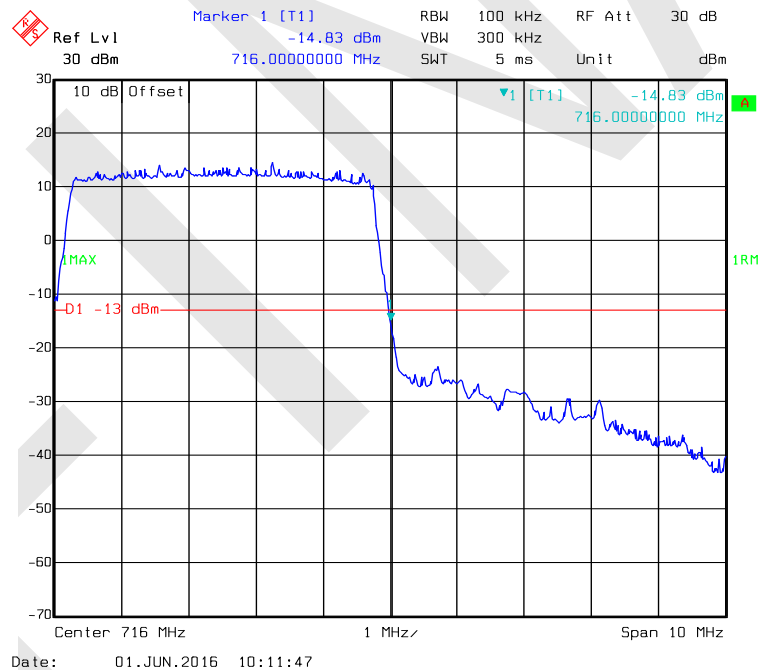
**QPSK (3.0 MHz, FULL RB) - Left Band Edge****QPSK (3.0 MHz, FULL RB) - Right Band Edge**

### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge

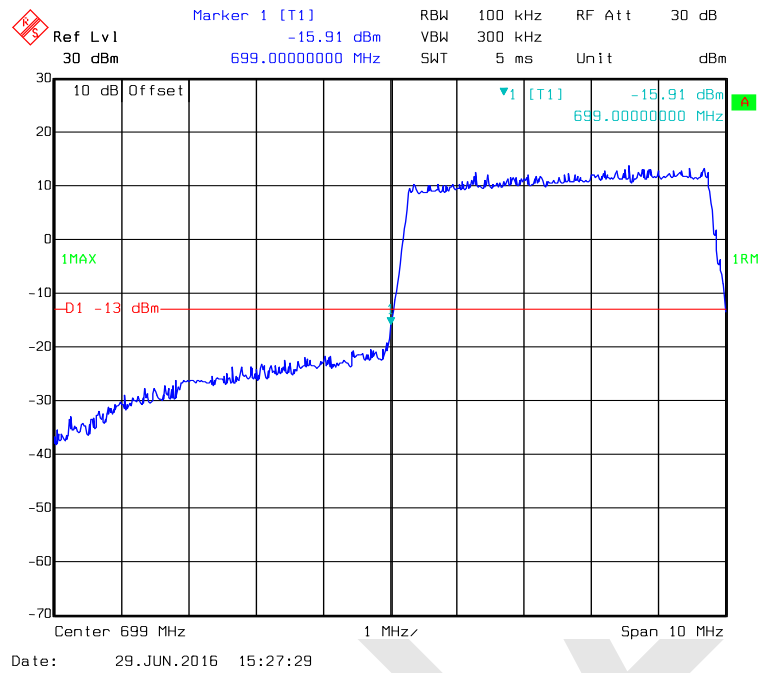


### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge

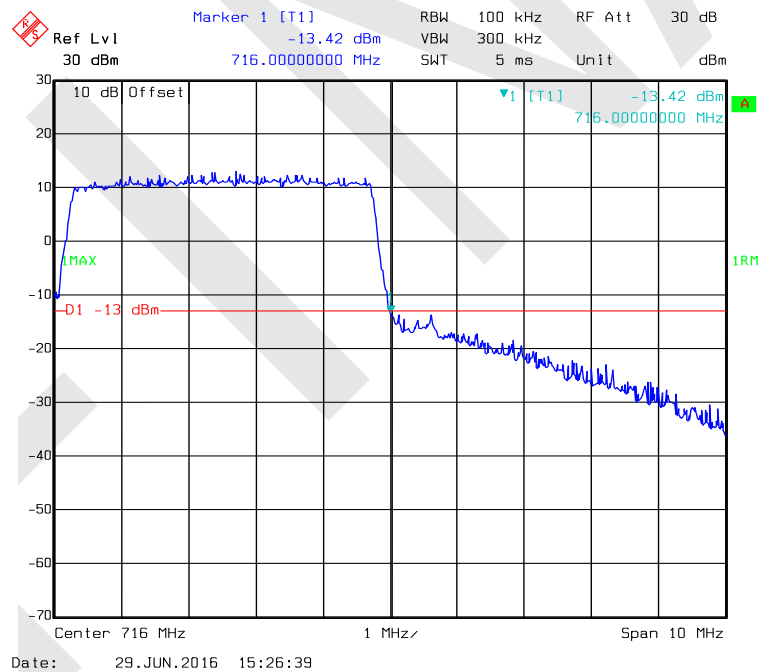


**QPSK (5.0 MHz, FULL RB) - Left Band Edge****QPSK (5.0 MHz, FULL RB) - Right Band Edge**

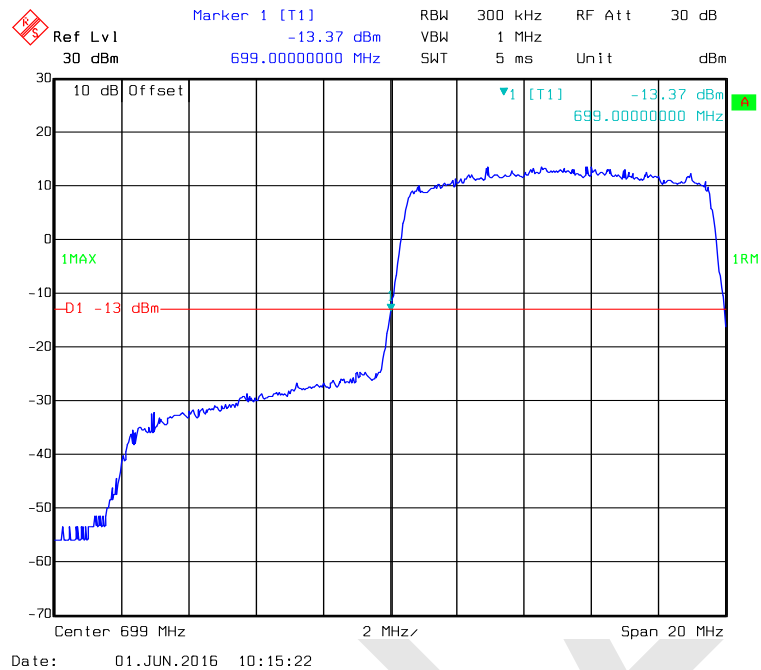
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



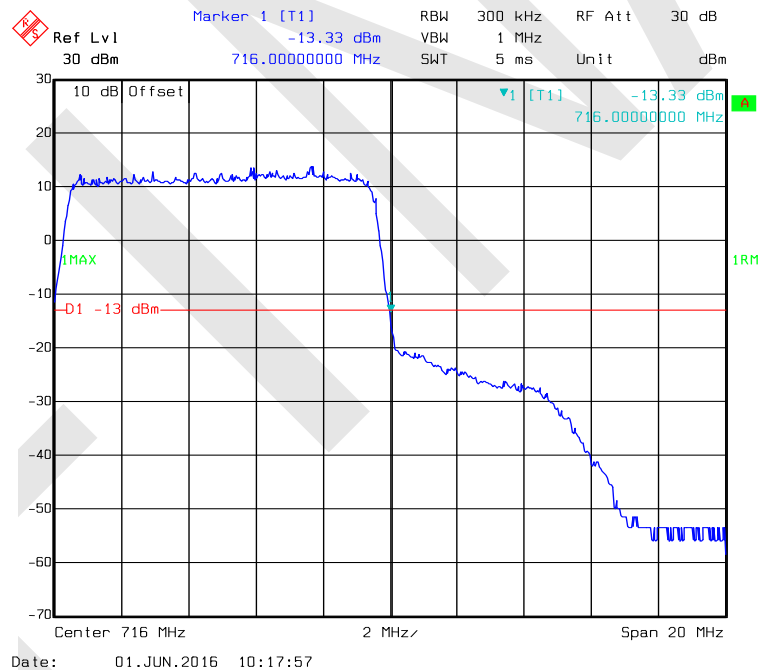
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge

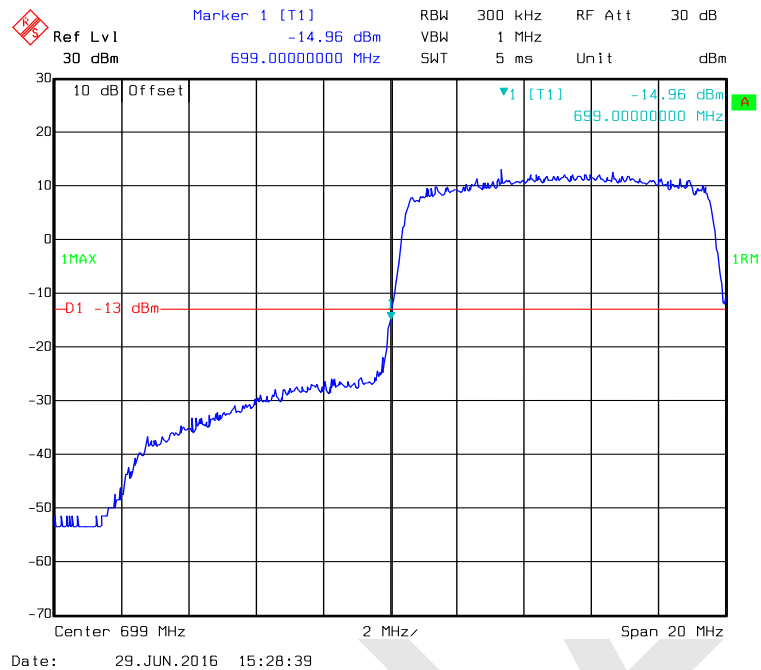
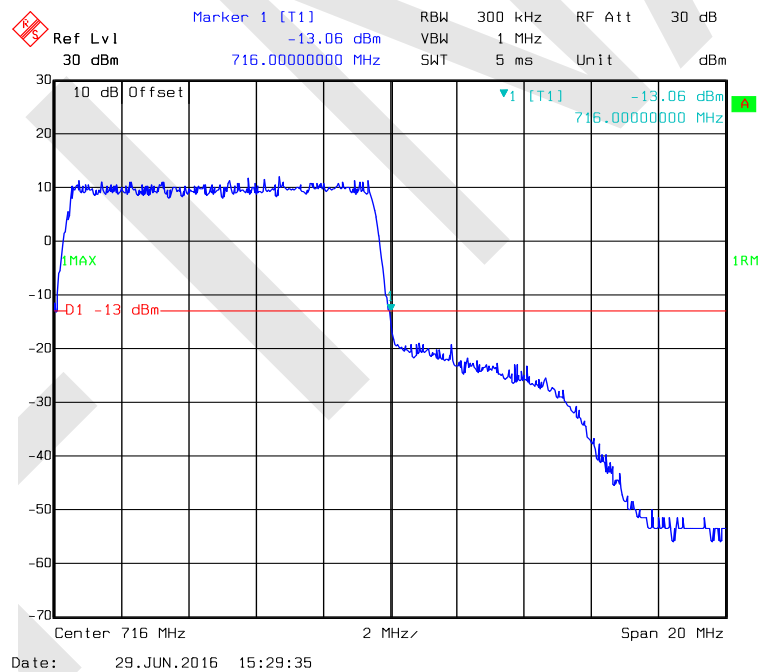


### QPSK (10.0MHz, FULL RB) - Left Band Edge



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



**16-QAM (10.0 MHz, FULL RB) - Left Band Edge****16-QAM (10.0 MHz, FULL RB) - Right Band Edge**

## **FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY**

### **Applicable Standards**

FCC § 2.1055, §22.355, §24.235 and & §27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

**Frequency Tolerance for Transmitters in the Public Mobile Services**

| <b>Frequency Range (MHz)</b> | <b>Base, fixed (ppm)</b> | <b>Mobile &gt; 3 watts (ppm)</b> | <b>Mobile ≤ 3 watts (ppm)</b> |
|------------------------------|--------------------------|----------------------------------|-------------------------------|
| 25 to 50                     | 20.0                     | 20.0                             | 50.0                          |
| 50 to 450                    | 5.0                      | 5.0                              | 50.0                          |
| 450 to 512                   | 2.5                      | 5.0                              | 5.0                           |
| 821 to 896                   | 1.5                      | 2.5                              | 2.5                           |
| 928 to 929.                  | 5.0                      | N/A                              | N/A                           |
| 929 to 960.                  | 1.5                      | N/A                              | N/A                           |
| 2110 to 2220                 | 10.0                     | N/A                              | N/A                           |

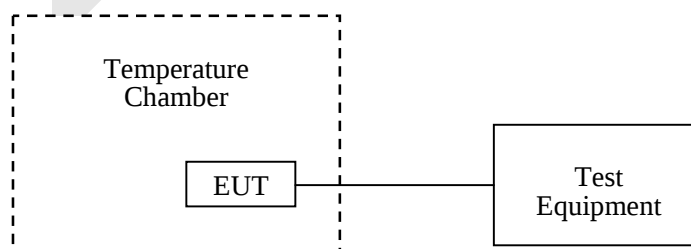
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **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 |
|-----------------|--------------------------------------|-------------|-----------------------|------------------|----------------------|
| Rohde &Schwarz  | Signal Analyzer                      | FSIQ26      | 8386001028            | 2015-12-11       | 2016-12-11           |
| BACL            | Temperature Chamber                  | BTH - 150   | 30023                 | 2015-11-12       | 2016-11-11           |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200      | 106891                | 2015-11-23       | 2016-11-23           |
| R&S             | Wideband Radio Communication tester  | CMW500      | 1201.002K50-146520-wh | 2015-11-23       | 2016-11-23           |
| Mini            | Splitter                             | ZFRSC-14-S+ | SF019411452           | 2016-01-11       | 2016-07-10           |
| BACL            | RF cable                             | KS-LAB-020  | KS-LAB-020            | 2016-01-11       | 2016-07-10           |
| Mini            | attenuator                           | 10dB        | N/A                   | 2016-01-11       | 2016-07-10           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) 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>       | 23 °C    |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by David. Hsu on 2016-05-23&2016-06-01.*

*EUT operation mode: Transmitting*

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

**Cellular Band (Part 22H)****WCDMA Mode**

| Middle Channel, $f_0 = 836.6$ MHz |                      |                      |                       |             |
|-----------------------------------|----------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                  | Power Supplied (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                               | 3.8                  | 4.31                 | 0.0052                | 2.5         |
| -20                               |                      | 3.23                 | 0.0039                | 2.5         |
| -10                               |                      | 3.21                 | 0.0038                | 2.5         |
| 0                                 |                      | 3.12                 | 0.0037                | 2.5         |
| 10                                |                      | 2.31                 | 0.0028                | 2.5         |
| 20                                |                      | 2.15                 | 0.0026                | 2.5         |
| 30                                |                      | 1.61                 | 0.0019                | 2.5         |
| 40                                |                      | 3.10                 | 0.0037                | 2.5         |
| 50                                |                      | 2.30                 | 0.0027                | 2.5         |
| 25                                | V min.= 3.5          | 5.24                 | 0.0063                | 2.5         |
| 25                                | V max.= 4.2          | 6.36                 | 0.0076                | 2.5         |

**PCS Band (Part 24E)****WCDMA Mode**

| Middle Channel, $f_0 = 1880.0$ MHz |                      |                      |                       |        |
|------------------------------------|----------------------|----------------------|-----------------------|--------|
| Temperature (°C)                   | Power Supplied (VDC) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                | 3.8                  | 5.22                 | 0.0027                | pass   |
| -20                                |                      | 3.14                 | 0.0016                | pass   |
| -10                                |                      | 3.16                 | 0.0016                | pass   |
| 0                                  |                      | 2.38                 | 0.0011                | pass   |
| 10                                 |                      | 4.19                 | 0.0021                | pass   |
| 20                                 |                      | 6.34                 | 0.0032                | pass   |
| 30                                 |                      | 4.25                 | 0.0021                | pass   |
| 40                                 |                      | 2.17                 | 0.0011                | pass   |
| 50                                 |                      | 5.27                 | 0.0027                | pass   |
| 25                                 | V min.= 3.5          | 6.03                 | 0.0032                | pass   |
| 25                                 | V max.= 4.2          | 7.10                 | 0.0037                | pass   |

**Band II:**

| 10.0 MHz Middle Channel, $f_o=1880.0$ MHz (QPSK) |                                   |                      |                       |        |
|--------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                 | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                              | 3.8                               | -2.31                | -0.0012               | pass   |
| -20                                              |                                   | -2.16                | -0.0011               | pass   |
| -10                                              |                                   | -2.28                | -0.0012               | pass   |
| 0                                                |                                   | -2.19                | -0.0012               | pass   |
| 10                                               |                                   | -2.25                | -0.0012               | pass   |
| 20                                               |                                   | -2.22                | -0.0012               | pass   |
| 30                                               |                                   | -2.32                | -0.0012               | pass   |
| 40                                               |                                   | -2.21                | -0.0012               | pass   |
| 50                                               |                                   | -2.31                | -0.0012               | pass   |
| 25                                               | V min.= 3.5                       | -2.26                | -0.0012               | pass   |
| 25                                               | V max.= 4.2                       | -2.28                | -0.0012               | pass   |

| 10.0 MHz Middle Channel, $f_o=1880.0$ MHz (16QAM) |                                   |                      |                       |        |
|---------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                  | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                               | 3.8                               | -3.20                | -0.0017               | pass   |
| -20                                               |                                   | -3.08                | -0.0016               | pass   |
| -10                                               |                                   | -3.11                | -0.0017               | pass   |
| 0                                                 |                                   | -3.13                | -0.0017               | pass   |
| 10                                                |                                   | -3.16                | -0.0017               | pass   |
| 20                                                |                                   | -3.14                | -0.0017               | pass   |
| 30                                                |                                   | -3.15                | -0.0017               | pass   |
| 40                                                |                                   | -3.13                | -0.0017               | pass   |
| 50                                                |                                   | -3.18                | -0.0017               | pass   |
| 25                                                | V min.= 3.5                       | -3.16                | -0.0017               | pass   |
| 25                                                | V max.= 4.2                       | -3.15                | -0.0017               | pass   |

**Band IV:**

| 10.0 MHz Middle Channel, $f_0=1732.5$ MHz (QPSK) |                                   |                      |                       |        |
|--------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                 | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                              | 3.8                               | 0.16                 | 0.0001                | pass   |
| -20                                              |                                   | 0.18                 | 0.0001                | pass   |
| -10                                              |                                   | 0.12                 | 0.0001                | pass   |
| 0                                                |                                   | 0.24                 | 0.0001                | pass   |
| 10                                               |                                   | 0.22                 | 0.0001                | pass   |
| 20                                               |                                   | 0.19                 | 0.0001                | pass   |
| 30                                               |                                   | 0.59                 | 0.0003                | pass   |
| 40                                               |                                   | 0.51                 | 0.0003                | pass   |
| 50                                               |                                   | 0.67                 | 0.0004                | pass   |
| 25                                               | V min.= 3.5                       | 0.63                 | 0.0004                | pass   |
| 25                                               | V max.= 4.2                       | 0.61                 | 0.0004                | pass   |

| 10.0 MHz Middle Channel, $f_0=1732.5$ MHz (16QAM) |                                   |                      |                       |        |
|---------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                  | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                               | 3.8                               | 0.11                 | 0.0001                | pass   |
| -20                                               |                                   | 0.29                 | 0.0002                | pass   |
| -10                                               |                                   | 0.21                 | 0.0001                | pass   |
| 0                                                 |                                   | 0.18                 | 0.0001                | pass   |
| 10                                                |                                   | 0.23                 | 0.0001                | pass   |
| 20                                                |                                   | 0.17                 | 0.0001                | pass   |
| 30                                                |                                   | 0.11                 | 0.0001                | pass   |
| 40                                                |                                   | 0.21                 | 0.0001                | pass   |
| 50                                                |                                   | 0.21                 | 0.0001                | pass   |
| 25                                                | V min.= 3.5                       | 0.25                 | 0.0001                | pass   |
| 25                                                | V max.= 4.2                       | 0.17                 | 0.0001                | pass   |

**LTE Band XII:**

| 10.0 MHz Middle Channel, $f_0=707.5$ MHz (QPSK) |                                   |                      |                       |        |
|-------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                             | 3.8                               | 3.79                 | 0.0015                | pass   |
| -20                                             |                                   | 3.71                 | 0.0015                | pass   |
| -10                                             |                                   | 3.70                 | 0.0015                | pass   |
| 0                                               |                                   | 3.68                 | 0.0015                | pass   |
| 10                                              |                                   | 3.80                 | 0.0015                | pass   |
| 20                                              |                                   | 3.61                 | 0.0014                | pass   |
| 30                                              |                                   | 3.77                 | 0.0015                | pass   |
| 40                                              |                                   | 3.81                 | 0.0015                | pass   |
| 50                                              |                                   | 3.72                 | 0.0015                | pass   |
| 25                                              | V min.= 3.5                       | 3.71                 | 0.0015                | pass   |
| 25                                              | V max.= 4.2                       | 3.84                 | 0.0015                | pass   |

| 10.0 MHz Middle Channel, $f_0=707.5$ MHz (16QAM) |                                   |                      |                       |        |
|--------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                 | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                              | 3.8                               | 3.20                 | 0.0013                | 0.0001 |
| -20                                              |                                   | 3.18                 | 0.0013                | 0.0002 |
| -10                                              |                                   | 3.14                 | 0.0012                | 0.0001 |
| 0                                                |                                   | 3.17                 | 0.0013                | 0.0001 |
| 10                                               |                                   | 3.16                 | 0.0012                | 0.0001 |
| 20                                               |                                   | 3.35                 | 0.0013                | 0.0001 |
| 30                                               |                                   | 3.39                 | 0.0013                | 0.0001 |
| 40                                               |                                   | 3.21                 | 0.0013                | 0.0001 |
| 50                                               |                                   | 3.14                 | 0.0012                | 0.0001 |
| 25                                               | V min.= 3.5                       | 3.21                 | 0.0013                | 0.0001 |
| 25                                               | V max.= 4.2                       | 3.16                 | 0.0012                | 0.0001 |

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