

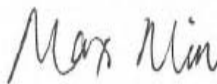
FCC PART 27  
FCC PART 22H, PART 24E  
MEASUREMENT AND TEST REPORT

For

**MeiG Smart Technology Co., Ltd**

3/F, No.88, Qinjiang Road, Xuhui District, Shanghai, China.

**FCC ID: 2APJ4-SLM756P**

|                                                                                                                                                                                                                                                   |                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                            | <b>Product Type:</b><br>Smart Module                                                  |
| <b>Test Engineer:</b> Max Min                                                                                                                                 |                                                                                       |
| <b>Report Number:</b> RSHA190708001-00D                                                                                                                                                                                                           |                                                                                       |
| <b>Report Date:</b> 2019-08-30                                                                                                                                                                                                                    |                                                                                       |
| <b>Reviewed By:</b> Oscar Ye<br>RF Leader                                                                                                                                                                                                         |  |
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## GENERAL INFORMATION

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

|              |                                |
|--------------|--------------------------------|
| Applicant    | MeiG Smart Technology Co., Ltd |
| Tested Model | SLM756P                        |
| Product Type | Smart Module                   |
| Dimension    | 44mm(L)*39mm(W)*3mm(H)         |
| Power Supply | DC 3.8V                        |

*\*All measurement and test data in this report was gathered from production sample serial number: 20190708001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2019-07-08)*

### Objective

This type approval report is prepared on behalf of *MeiG Smart Technology Co., LTD* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commissions' 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)

FCC Part 15.247 DTS, Part 15.247 DSS, and Part 15.407 NII submissions with FCC ID: 2APJ4-SLM756P.

### 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. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Measurement Uncertainty**

| Item                               |             | Uncertainty |
|------------------------------------|-------------|-------------|
| AC Power Lines Conducted Emissions |             | 3.19dB      |
| RF conducted test with spectrum    |             | 0.9dB       |
| RF Output Power with Power meter   |             | 0.5dB       |
| Radiated emission                  | 30MHz~1GHz  | 5.91dB      |
|                                    | 1GHz~6GHz   | 4.68dB      |
|                                    | 6GHz~18GHz  | 4.92dB      |
|                                    | 18GHz~40GHz | 5.21dB      |
| Occupied Bandwidth                 |             | 0.5kHz      |
| Temperature                        |             | 1.0℃        |
| Humidity                           |             | 6%          |

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

**Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

## 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.

### Channel List

| Mode          |      | Channel |       | Frequency (MHz) |
|---------------|------|---------|-------|-----------------|
| WCDMA Band II |      | Low     | 9262  | 1852.4          |
|               |      | Middle  | 9400  | 1880.0          |
|               |      | High    | 9538  | 1907.6          |
| WCDMA Band IV |      | Low     | 1312  | 1712.4          |
|               |      | Middle  | 1413  | 1732.6          |
|               |      | High    | 1513  | 1752.6          |
| WCDMA Band V  |      | Low     | 4132  | 826.4           |
|               |      | Middle  | 4183  | 836.6           |
|               |      | High    | 4233  | 846.6           |
| LTE Band 2    | 1.4M | Low     | 18607 | 1850.7          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19193 | 1909.3          |
|               | 3M   | Low     | 18615 | 1851.5          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19185 | 1908.5          |
|               | 5M   | Low     | 18625 | 1852.5          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19175 | 1907.5          |
|               | 10M  | Low     | 18650 | 1855.0          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19150 | 1905.0          |
|               | 15M  | Low     | 18675 | 1857.5          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19125 | 1902.5          |
|               | 20M  | Low     | 18700 | 1860.0          |
|               |      | Middle  | 18900 | 1880.0          |
|               |      | High    | 19100 | 1900.0          |

| Mode       |      | Channel |       | Frequency (MHz) |
|------------|------|---------|-------|-----------------|
| LTE Band 4 | 1.4M | Low     | 19957 | 1710.7          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20393 | 1754.3          |
|            | 3M   | Low     | 19965 | 1711.5          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20385 | 1753.5          |
|            | 5M   | Low     | 19975 | 1712.5          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20375 | 1752.5          |
|            | 10M  | Low     | 20000 | 1715.0          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20350 | 1750.0          |
|            | 15M  | Low     | 20025 | 1717.5          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20325 | 1747.5          |
|            | 20M  | Low     | 20050 | 1720.0          |
|            |      | Middle  | 20175 | 1732.5          |
|            |      | High    | 20300 | 1745.0          |
| LTE Band 5 | 1.4M | Low     | 20407 | 824.7           |
|            |      | Middle  | 20525 | 836.5           |
|            |      | High    | 20643 | 848.3           |
|            | 3M   | Low     | 20415 | 825.5           |
|            |      | Middle  | 20525 | 836.5           |
|            |      | High    | 20635 | 847.5           |
|            | 5M   | Low     | 20425 | 826.5           |
|            |      | Middle  | 20525 | 836.5           |
|            |      | High    | 20625 | 846.5           |
|            | 10M  | Low     | 20450 | 829.0           |
|            |      | Middle  | 20525 | 836.5           |
|            |      | High    | 20600 | 844.0           |
| LTE Band 7 | 5M   | Low     | 20775 | 2502.5          |
|            |      | Middle  | 21100 | 2535.0          |
|            |      | High    | 21425 | 2567.5          |
|            | 10M  | Low     | 20800 | 2505.0          |
|            |      | Middle  | 21100 | 2535.0          |
|            |      | High    | 21400 | 2565.0          |
|            | 15M  | Low     | 20825 | 2507.5          |
|            |      | Middle  | 21100 | 2535.0          |
|            |      | High    | 21375 | 2562.5          |
|            | 20M  | Low     | 20850 | 2510.0          |
|            |      | Middle  | 21100 | 2535.0          |
|            |      | High    | 21350 | 2560.0          |

| Mode        |      | Channel |       | Frequency (MHz) |
|-------------|------|---------|-------|-----------------|
| LTE Band 12 | 1.4M | Low     | 23017 | 699.7           |
|             |      | Middle  | 23095 | 707.5           |
|             |      | High    | 23173 | 715.3           |
|             | 3M   | Low     | 23025 | 700.5           |
|             |      | Middle  | 23095 | 707.5           |
|             |      | High    | 23165 | 714.5           |
|             | 5M   | Low     | 23035 | 701.5           |
|             |      | Middle  | 23095 | 707.5           |
|             |      | High    | 23155 | 713.5           |
|             | 10M  | Low     | 23060 | 704.0           |
|             |      | Middle  | 23095 | 707.5           |
|             |      | High    | 23130 | 711.0           |
| LTE Band 13 | 5M   | Low     | 23205 | 779.5           |
|             |      | Middle  | 23230 | 782.0           |
|             |      | High    | 23255 | 784.5           |
|             | 10M  | Low     | /     | /               |
|             |      | Middle  | 23230 | 782.0           |
|             |      | High    | /     | /               |
| LTE Band 17 | 5M   | Low     | 23755 | 706.5           |
|             |      | Middle  | 23790 | 710.0           |
|             |      | High    | 23825 | 713.5           |
|             | 10M  | Low     | 23780 | 709.0           |
|             |      | Middle  | 23790 | 710.0           |
|             |      | High    | 23800 | 711.0           |

**Equipment Modifications**

No modifications were made to the EUT.

**Support Equipment List and Details**

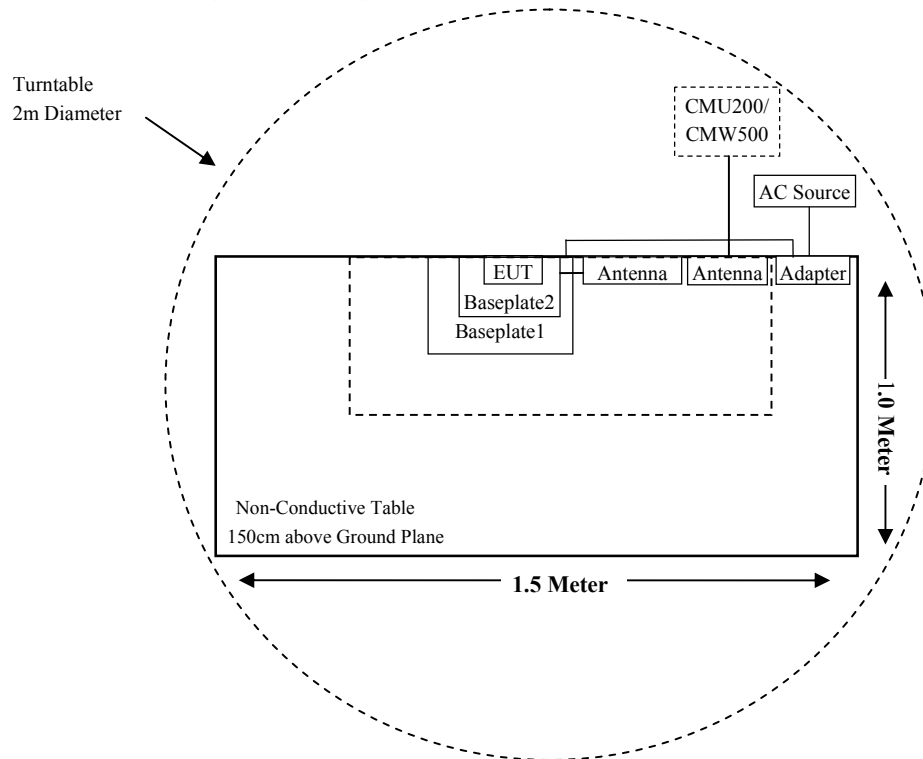
| Manufacturer         | Description                          | Model               | Serial Number |
|----------------------|--------------------------------------|---------------------|---------------|
| Waylens Inc.         | Antenna                              | /                   | /             |
| Rohde & Schwarz      | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200              | 110605        |
| R & S                | Wideband Radio Communication Tester  | CMW500              | 104478        |
| Dian Yuan Technology | Adapter                              | DYS-0502000C        | /             |
| MEIG                 | Baseplate1                           | MEIG_EVB_V1.03      | /             |
| MEIG                 | Baseplate2                           | SLM756_ZB_V1.03_PCB | /             |
| MeiG Smart           | Antenna                              | /                   | /             |

**External I/O Cable**

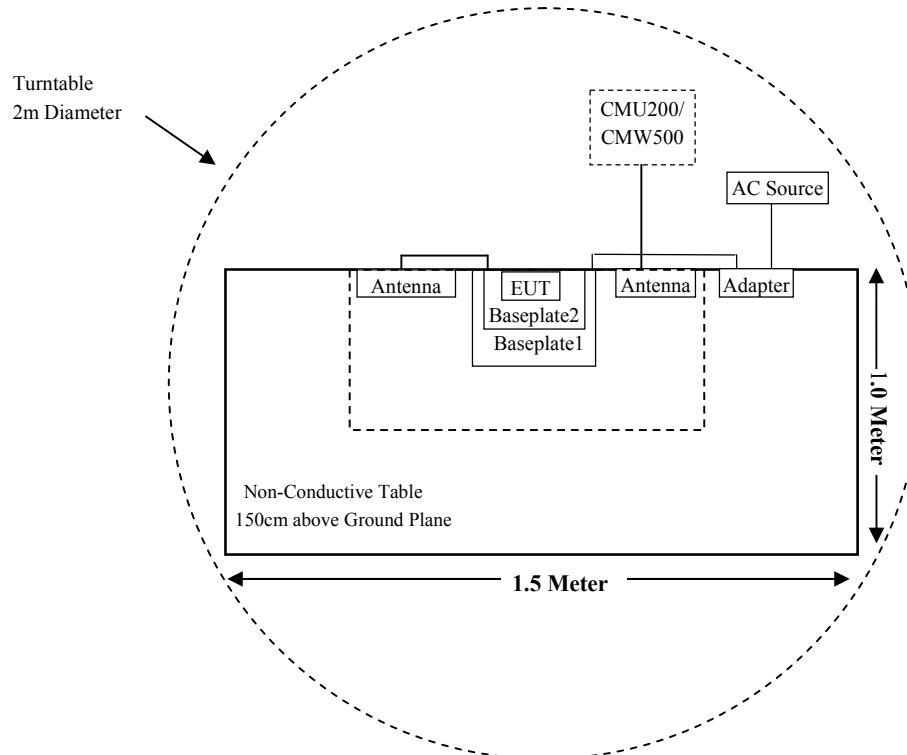
| Cable Description | Length (m) | From Port  | To                 |
|-------------------|------------|------------|--------------------|
| Power Cable       | 1.0        | Baseplate1 | Adapter            |
| Antenna Cable     | 0.3        | Baseplate2 | MeiG Smart Antenna |

## Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



**SUMMARY OF TEST RESULTS**

| FCC Rules                                                               | Description of Test                    | Result         |
|-------------------------------------------------------------------------|----------------------------------------|----------------|
| §1.1307 & §2.1091                                                       | MAXIMUM PERMISSIBLE EXPOSURE (MPE)     | Compliant      |
| §2.1046; § 22.913 (a);§ 24.232 (c);<br>§ 27.50 (b)(c)(d);§27.50(h) (2); | RF Output Power                        | Compliant      |
| § 2.1047                                                                | Modulation Characteristics             | Not Applicable |
| § 2.1049; § 22.905;<br>§ 22.917; § 24.238; §27.53;                      | Occupied Bandwidth                     | Compliant      |
| § 2.1051; § 22.917 (a);<br>§ 24.238 (a); §27.53;                        | Spurious Emissions at Antenna Terminal | Compliant      |
| § 2.1053; § 22.917 (a);<br>§ 24.238 (a); §27.53 (h) (m);                | Spurious Radiated Emissions            | Compliant      |
| § 22.917 (a);<br>§ 24.238 (a); §27.53 (h) (m);                          | Band Edge                              | Compliant      |
| § 2.1055; § 22.355;<br>§ 24.235; §27.54;                                | Frequency stability                    | Compliant      |

**TEST EQUIPMENT LIST**

| Manufacturer                               | Description                          | Model    | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------------------------|--------------------------------------|----------|---------------|------------------|----------------------|
| <b>Radiated Emission Test (Chamber 1#)</b> |                                      |          |               |                  |                      |
| Rohde & Schwarz                            | EMI Test Receiver                    | ESCI     | 100195        | 2018-11-30       | 2019-11-29           |
| HP                                         | Signal Generator                     | HP 8341B | 2624A00116    | 2018-11-30       | 2019-11-29           |
| Sunol Sciences                             | Broadband Antenna                    | JB3      | A090413-1     | 2016-12-26       | 2019-12-25           |
| Sunol Sciences                             | Broadband Antenna                    | JB3      | A090314-2     | 2019-01-09       | 2022-01-08           |
| Sonoma Instrunent                          | Pre-amplifier                        | 310N     | 171205        | 2019-08-14       | 2020-08-13           |
| Rohde & Schwarz                            | Auto test Software                   | EMC32    | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-6  | 006           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-8  | 008           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-9  | 009           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-10 | 010           | 2018-08-15       | 2019-08-14           |
| Rohde & Schwarz                            | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200   | 110605        | 2018-11-30       | 2019-11-29           |
| R & S                                      | Wideband Radio Communication Tester  | CMW500   | 104478        | 2019-08-05       | 2020-08-04           |
| <b>Radiated Emission Test (Chamber 2#)</b> |                                      |          |               |                  |                      |
| HP                                         | Signal Generator                     | HP 8341B | 2624A00116    | 2018-11-30       | 2019-11-29           |
| Rohde & Schwarz                            | EMI Test Receiver                    | ESU40    | 100207        | 2019-05-30       | 2020-05-29           |
| ETS-LINDGREN                               | Horn Antenna                         | 3115     | 9207-3900     | 2017-07-15       | 2020-07-14           |
| ETS-LINDGREN                               | Horn Antenna                         | 3115     | 6229          | 2016-12-12       | 2019-12-11           |
| ETS-LINDGREN                               | Horn Antenna                         | 3116     | 00084159      | 2016-12-12       | 2019-12-11           |
| ETS-LINDGREN                               | Horn Antenna                         | 3116     | 2516          | 2016-12-12       | 2019-12-11           |
| A.H.Systems, inc                           | Amplifier                            | 2641-1   | 491           | 2019-02-20       | 2020-02-19           |
| SELECTOR                                   | Amplifier                            | EM18G40G | 060726        | 2019-03-22       | 2020-03-21           |
| Rohde & Schwarz                            | Auto test Software                   | EMC32    | 100361        | /                | /                    |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-6  | 006           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-11 | 011           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-12 | 012           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-13 | 013           | 2019-08-15       | 2020-08-14           |
| MICRO-COAX                                 | Coaxial Cable                        | Cable-16 | 016           | 2019-08-15       | 2020-08-14           |
| Rohde & Schwarz                            | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200   | 110605        | 2018-11-30       | 2019-11-29           |
| R & S                                      | Wideband Radio Communication Tester  | CMW500   | 104478        | 2019-08-05       | 2020-08-04           |

| Manufacturer             | Description                          | Model          | Serial Number | Calibration Date | Calibration Due Date |
|--------------------------|--------------------------------------|----------------|---------------|------------------|----------------------|
| <b>RF Conducted Test</b> |                                      |                |               |                  |                      |
| Rohde & Schwarz          | Signal Analyzer                      | FSIQ26         | 836131/009    | 2018-11-30       | 2019-11-29           |
| Narda                    | Attenuator                           | 2dB            | 002           | 2019-08-15       | 2020-08-14           |
| Rohde & Schwarz          | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200         | 110605        | 2018-11-30       | 2019-11-29           |
| R & S                    | Wideband Radio Communication Tester  | CMW500         | 104478        | 2019-08-05       | 2020-08-04           |
| Mini-Circuits            | Power splitter                       | ZFRSC-14-S+    | SF019411452   | 2018-11-10       | 2019-11-09           |
| BACL                     | Temperature & Humidity Chamber       | BTH-150        | 30023         | 2018-12-20       | 2019-12-19           |
| MeiG Smart               | RF Cable                             | MeiG Smart C01 | C01           | Each Time        | /                    |

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

## FCC §15.247 (I) & §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

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

f = frequency in MHz; \* = Plane-wave equivalent power density

### 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);

**For simultaneously transmit system, the calculated power density should comply with:**

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

**Calculated Data (worst case):**

| Mode         | Frequency Range (MHz) | Maximum Antenna Gain |           | Tune-up Conducted Power |        | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) | MPE ratio     |
|--------------|-----------------------|----------------------|-----------|-------------------------|--------|--------------------------|-------------------------------------|---------------------------------|---------------|
|              |                       | (dBi)                | (numeric) | (dBm)                   | (mW)   |                          |                                     |                                 |               |
| 802.11b      | 2412-2462             | 0.00                 | 1.00      | 19.00                   | 79.43  | 20                       | 0.0158                              | 1.00                            | 0.0158        |
| 802.11g      |                       | 0.00                 | 1.00      | 20.00                   | 100.00 | 20                       | 0.0199                              | 1.00                            | <b>0.0199</b> |
| 802.11n-HT20 |                       | 0.00                 | 1.00      | 18.50                   | 70.79  | 20                       | 0.0141                              | 1.00                            | 0.0141        |
| 802.11n-HT40 | 2422-2452             | 0.00                 | 1.00      | 17.50                   | 56.23  | 20                       | 0.0112                              | 1.00                            | 0.0112        |
| 802.11a      | 5150~5250             | 0.00                 | 1.00      | 12.00                   | 15.85  | 20                       | 0.0032                              | 1.00                            | 0.0032        |
|              | 5250~5350             | 0.00                 | 1.00      | 12.00                   | 15.85  | 20                       | 0.0032                              | 1.00                            | 0.0032        |
|              | 5470~5725             | 0.00                 | 1.00      | 12.50                   | 17.78  | 20                       | 0.0035                              | 1.00                            | 0.0035        |
|              | 5725~5850             | 0.00                 | 1.00      | 12.50                   | 17.78  | 20                       | 0.0035                              | 1.00                            | 0.0035        |
| 802.11n-HT20 | 5150~5250             | 0.00                 | 1.00      | 12.50                   | 17.78  | 20                       | 0.0035                              | 1.00                            | 0.0035        |
|              | 5250~5350             | 0.00                 | 1.00      | 11.50                   | 14.13  | 20                       | 0.0028                              | 1.00                            | 0.0028        |
|              | 5470~5725             | 0.00                 | 1.00      | 12.50                   | 17.78  | 20                       | 0.0035                              | 1.00                            | 0.0035        |
|              | 5725~5850             | 0.00                 | 1.00      | 12.50                   | 17.78  | 20                       | 0.0035                              | 1.00                            | 0.0035        |
| 802.11n-HT40 | 5150~5250             | 0.00                 | 1.00      | 9.50                    | 8.91   | 20                       | 0.0018                              | 1.00                            | 0.0018        |
|              | 5250~5350             | 0.00                 | 1.00      | 9.00                    | 7.94   | 20                       | 0.0016                              | 1.00                            | 0.0016        |
|              | 5470~5725             | 0.00                 | 1.00      | 11.50                   | 14.13  | 20                       | 0.0028                              | 1.00                            | 0.0028        |
|              | 5725~5850             | 0.00                 | 1.00      | 11.50                   | 14.13  | 20                       | 0.0028                              | 1.00                            | 0.0028        |
| BLE          | 2402-2480             | 0.00                 | 1.00      | 1.50                    | 1.41   | 20                       | 0.0003                              | 1.00                            | 0.0003        |
| BT 3.0       | 2402-2480             | 0.00                 | 1.00      | 11.50                   | 14.13  | 20                       | 0.0028                              | 1.00                            | 0.0032        |

## Calculation of maximum antenna gain based on ERP/EIRP

| Mode          | Max Tune-up Power (dBm) | ERP/EIRP Limit (dBm) | Max Antenna Gain (dBd) | Max Antenna Gain (dBi) |
|---------------|-------------------------|----------------------|------------------------|------------------------|
| WCDMA Band II | 23.00                   | 33.00                | /                      | 10.00                  |
| WCDMA Band IV | 23.00                   | 30.00                | /                      | 7.00                   |
| WCDMA Band V  | 24.00                   | 38.45                | 14.45                  | 16.60                  |
| FDD (Band 2)  | 22.00                   | 33.00                | /                      | 11.00                  |
| FDD (Band 4)  | 22.50                   | 30.00                | /                      | 7.00                   |
| FDD (Band 5)  | 22.50                   | 38.45                | 15.95                  | 18.10                  |
| FDD (Band 7)  | 22.50                   | 33.00                | /                      | 10.00                  |
| FDD (Band 12) | 23.00                   | 34.77                | 11.77                  | 13.92                  |
| FDD (Band 13) | 23.00                   | 34.77                | 11.77                  | 13.92                  |
| FDD (Band 17) | 23.00                   | 34.77                | 11.77                  | 13.92                  |

Note:0dBd=2.15dBi

## Calculation of maximum antenna gain based on MPE Ratio

| Mode          | Frequency Range | Tune-up Conducted Power |        | Power Density Limit   | Maximum Power Density | Evaluation Distance | Maximum Antenna Gain Allowed based on MPE |       | MPE ratio     |
|---------------|-----------------|-------------------------|--------|-----------------------|-----------------------|---------------------|-------------------------------------------|-------|---------------|
|               | (MHz)           | (dBm)                   | (mW)   | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) | (cm)                | (numeric)                                 | (dBi) |               |
| WCDMA Band II | 1850.0-1910.0   | 23.00                   | 199.53 | 1.00                  | 0.9788                | 20                  | 24.66                                     | 13.92 | 0.9788        |
| WCDMA Band IV | 1710.0-1755.0   | 23.00                   | 199.53 | 1.00                  | 0.9788                | 20                  | 24.66                                     | 13.92 | 0.9788        |
| WCDMA Band V  | 824.0-849.0     | 24.00                   | 251.19 | 0.55                  | 0.5619                | 20                  | 19.59                                     | 12.92 | 0.9788        |
| FDD (Band 2)  | 1850.0-1910.0   | 22.00                   | 158.49 | 1.00                  | 0.9789                | 20                  | 31.05                                     | 14.92 | <b>0.9789</b> |
| FDD (Band 4)  | 1710.0-1755.0   | 22.50                   | 177.83 | 1.00                  | 0.9788                | 20                  | 22.67                                     | 14.42 | 0.9788        |
| FDD (Band 5)  | 824.0-849.0     | 22.50                   | 177.83 | 0.55                  | 0.5619                | 20                  | 22.67                                     | 14.42 | 0.9788        |
| FDD (Band 7)  | 2500.0-2570.0   | 22.50                   | 177.83 | 1.00                  | 0.9788                | 20                  | 22.67                                     | 14.42 | 0.9788        |
| FDD (Band 12) | 699.0-716.0     | 23.00                   | 199.53 | 0.47                  | 0.4802                | 20                  | 24.66                                     | 13.92 | 0.9788        |
| FDD (Band 13) | 777.0-787.0     | 23.00                   | 199.53 | 0.52                  | 0.5313                | 20                  | 24.66                                     | 13.92 | 0.9788        |
| FDD (Band 17) | 704.0-716.0     | 23.00                   | 199.53 | 0.47                  | 0.4802                | 20                  | 24.66                                     | 13.92 | 0.9788        |

**Note:** Wi-Fi/ BLE/ BT 3.0& WCDMA/FDD can transmit simultaneously; the worst condition is 802.11b of Wi-Fi & FDD (Band13), as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0199 + 0.9789 = 0.9988 < 1.0$$

| Mode                      | Max Allow Antenna Gain (dBi) |
|---------------------------|------------------------------|
| WCDMA Band II/LTE Band 2  | 10.0                         |
| WCDMA Band IV/ LTE Band 4 | 7.00                         |
| WCDMA Band V/ LTE Band 5  | 12.92                        |
| LTE Band 7                | 10.00                        |
| LTE Band 12/ LTE Band 17  | 13.92                        |
| LTE Band 13               | 13.92                        |

**Result:** To meet RF exposure & ERP/ERIP, the maximum net gains of antennas allowed are 10dBi@ WCDMA Band II/LTE Band 2 , 7dBi@ WCDMA Band IV/ LTE Band 4 , 12.92dBi@ WCDMA Band V/ LTE Band 5 , 10.00dBi @LTE Band 7, 13.92dBi @ LTE Band 12/LTE Band 17, 13.92dBi @ LTE Band 13. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm. Transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

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## **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.

## **FCC §2.1046; § 22.913 (a); § 24.232 (c); §27.50 (b) (c) (d); §27.50(h) (2); - 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 (38.45dBm).

According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts (33dBm) EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(b), Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

According to §27.50(c), Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP..

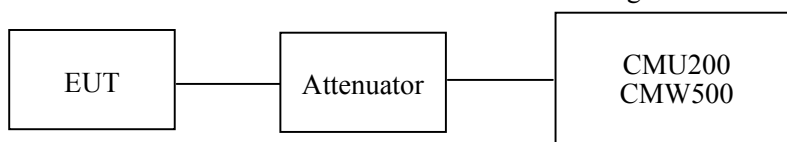
According to §27.50(h) (2), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

### **Test Procedure**

#### **Conducted method:**

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



#### **Radiated Output Power:**

The measurements procedures specified in ANSI/TIA-603-D were applied.

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360o azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.  
 $\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:

$$\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$

f) The maximum ERP is the maximum value determined in the preceding step.

(Note: Effective Isotropic Radiated Power (EIRP) can be computed using the following:

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 \text{ (dB)}$$

## Test Data

### Environmental Conditions

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 23.2°C   |
| <b>Relative Humidity:</b> | 51 %     |
| <b>ATM Pressure:</b>      | 101.3kPa |

The testing was performed by Max Min on 2019-08-27.

### Conducted Power:

#### WCDMA Band V

| 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             | 23.22                      | 23.37            | 23.36          |
|                |                | HSDPA     | 1             | 22.55                      | 22.80            | 22.75          |
|                |                |           | 2             | 22.50                      | 22.60            | 22.61          |
|                |                |           | 3             | 22.07                      | 22.32            | 22.28          |
|                |                |           | 4             | 21.73                      | 21.87            | 21.73          |
|                |                | HSUPA     | 1             | 21.96                      | 22.30            | 22.33          |
|                |                |           | 2             | 22.15                      | 22.39            | 22.18          |
|                |                |           | 3             | 21.86                      | 21.83            | 21.98          |
|                |                |           | 4             | 21.26                      | 21.45            | 21.44          |
|                |                |           | 5             | 20.81                      | 21.14            | 21.07          |
|                |                | HSPA+     | 1             | 22.81                      | 22.87            | 22.67          |

**WCDMA Band II**

| 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             | 22.63                      | 22.74            | 22.71          |
|                 |                | HSDPA     | 1             | 22.20                      | 22.09            | 22.15          |
|                 |                |           | 2             | 22.08                      | 21.99            | 21.92          |
|                 |                |           | 3             | 21.66                      | 21.72            | 21.60          |
|                 |                |           | 4             | 21.27                      | 21.33            | 21.10          |
|                 |                | HSUPA     | 1             | 21.86                      | 21.76            | 21.55          |
|                 |                |           | 2             | 21.57                      | 21.40            | 21.74          |
|                 |                |           | 3             | 21.41                      | 21.46            | 21.36          |
|                 |                |           | 4             | 21.21                      | 20.95            | 21.32          |
|                 |                |           | 5             | 21.01                      | 20.87            | 21.26          |
|                 |                | HSPA+     | 1             | 21.98                      | 22.09            | 22.23          |

**WCDMA Band IV**

| Mode            | Test Condition | Test Mode | 3GPP Sub Test | Average Output Power (dBm) |                  |                |
|-----------------|----------------|-----------|---------------|----------------------------|------------------|----------------|
|                 |                |           |               | Low Frequency              | Middle Frequency | High Frequency |
| WCDMA (Band IV) | Normal         | Rel 99    | 1             | 22.46                      | 22.58            | 22.54          |
|                 |                | HSDPA     | 1             | 21.87                      | 21.92            | 22.04          |
|                 |                |           | 2             | 21.86                      | 21.99            | 21.82          |
|                 |                |           | 3             | 21.41                      | 21.58            | 21.68          |
|                 |                |           | 4             | 20.94                      | 20.99            | 21.38          |
|                 |                | HSUPA     | 1             | 21.34                      | 21.55            | 21.52          |
|                 |                |           | 2             | 21.40                      | 21.48            | 21.61          |
|                 |                |           | 3             | 21.30                      | 21.21            | 21.30          |
|                 |                |           | 4             | 21.49                      | 21.50            | 21.66          |
|                 |                |           | 5             | 21.11                      | 21.18            | 21.23          |
|                 |                | HSPA+     | 1             | 21.86                      | 22.13            | 22.13          |

**Maximum Output Power:****LTE Band 2**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 1.4M           | QPSK            | 1#0                        | 21.45             | 21.64                | 21.58              |
|                |                 | 1#3                        | 21.15             | 21.37                | 21.38              |
|                |                 | 1#5                        | 21.06             | 21.36                | 21.35              |
|                |                 | 3#0                        | 21.16             | 21.43                | 21.20              |
|                |                 | 3#1                        | 21.31             | 21.34                | 21.35              |
|                |                 | 3#3                        | 21.22             | 21.27                | 21.21              |
|                |                 | 6#0                        | 20.99             | 20.98                | 20.90              |
|                | 16-QAM          | 1#0                        | 20.89             | 21.05                | 20.96              |
|                |                 | 1#3                        | 20.65             | 20.83                | 20.75              |
|                |                 | 1#5                        | 20.45             | 20.68                | 20.71              |
|                |                 | 3#0                        | 20.64             | 20.87                | 20.80              |
|                |                 | 3#1                        | 20.64             | 20.81                | 20.67              |
|                |                 | 3#3                        | 20.60             | 20.89                | 20.70              |
|                |                 | 6#0                        | 20.32             | 20.66                | 20.38              |
| 3M             | QPSK            | 1#0                        | 21.47             | 21.66                | 21.56              |
|                |                 | 1#7                        | 21.24             | 21.30                | 21.30              |
|                |                 | 1#14                       | 21.08             | 21.30                | 21.25              |
|                |                 | 8#0                        | 21.10             | 21.39                | 21.08              |
|                |                 | 8#4                        | 21.25             | 21.31                | 21.40              |
|                |                 | 8#7                        | 21.24             | 21.55                | 21.23              |
|                |                 | 15#0                       | 20.93             | 21.30                | 21.03              |
|                | 16-QAM          | 1#0                        | 20.67             | 21.11                | 20.99              |
|                |                 | 1#7                        | 20.38             | 20.90                | 20.66              |
|                |                 | 1#14                       | 20.34             | 20.90                | 20.62              |
|                |                 | 8#0                        | 20.17             | 20.66                | 20.54              |
|                |                 | 8#4                        | 20.32             | 20.96                | 20.86              |
|                |                 | 8#7                        | 20.41             | 20.92                | 20.72              |
|                |                 | 15#0                       | 20.18             | 20.60                | 20.32              |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 21.46             | 21.56                | 21.43              |
|                |                 | 1#12                       | 21.13             | 21.34                | 21.12              |
|                |                 | 1#24                       | 21.26             | 21.22                | 21.19              |
|                |                 | 12#0                       | 21.13             | 21.07                | 21.19              |
|                |                 | 12#6                       | 21.08             | 21.29                | 21.29              |
|                |                 | 12#11                      | 21.17             | 21.17                | 21.28              |
|                |                 | 25#0                       | 20.85             | 20.89                | 21.02              |
|                | 16-QAM          | 1#0                        | 20.82             | 20.97                | 20.94              |
|                |                 | 1#12                       | 20.55             | 20.67                | 20.57              |
|                |                 | 1#24                       | 20.58             | 20.65                | 20.66              |
|                |                 | 12#0                       | 20.36             | 20.62                | 20.44              |
|                |                 | 12#6                       | 20.56             | 20.62                | 20.76              |
|                |                 | 12#11                      | 20.55             | 20.68                | 20.59              |
|                |                 | 25#0                       | 20.20             | 20.35                | 20.37              |
| 10M            | QPSK            | 1#0                        | 21.42             | 21.55                | 21.51              |
|                |                 | 1#24                       | 21.13             | 21.33                | 21.28              |
|                |                 | 1#49                       | 21.20             | 21.32                | 21.17              |
|                |                 | 25#0                       | 21.12             | 21.16                | 21.07              |
|                |                 | 25#12                      | 21.20             | 21.22                | 21.17              |
|                |                 | 25#24                      | 21.07             | 21.27                | 21.24              |
|                |                 | 50#0                       | 20.70             | 20.96                | 21.00              |
|                | 16-QAM          | 1#0                        | 20.83             | 20.94                | 20.87              |
|                |                 | 1#24                       | 20.54             | 20.73                | 20.60              |
|                |                 | 1#49                       | 20.55             | 20.64                | 20.59              |
|                |                 | 25#0                       | 20.54             | 20.53                | 20.58              |
|                |                 | 25#12                      | 20.45             | 20.72                | 20.57              |
|                |                 | 25#24                      | 20.45             | 20.70                | 20.52              |
|                |                 | 50#0                       | 20.20             | 20.44                | 20.12              |

| Test Bandwidth | Test Modulation | Resource Block<br>& RB offset | Low Channel<br>(dBm) | Middle<br>Channel (dBm) | High Channel<br>(dBm) |
|----------------|-----------------|-------------------------------|----------------------|-------------------------|-----------------------|
| 15M            | QPSK            | 1#0                           | 21.55                | 21.67                   | 21.61                 |
|                |                 | 1#37                          | 21.21                | 21.29                   | 21.27                 |
|                |                 | 1#74                          | 21.34                | 21.28                   | 21.35                 |
|                |                 | 36#0                          | 21.25                | 21.24                   | 21.39                 |
|                |                 | 36#17                         | 21.27                | 21.38                   | 21.33                 |
|                |                 | 36#35                         | 21.35                | 21.39                   | 21.43                 |
|                |                 | 75#0                          | 21.04                | 21.01                   | 21.15                 |
|                | 16-QAM          | 1#0                           | 21.09                | 21.21                   | 21.15                 |
|                |                 | 1#37                          | 20.89                | 20.91                   | 20.82                 |
|                |                 | 1#74                          | 20.85                | 20.86                   | 20.91                 |
|                |                 | 36#0                          | 20.64                | 20.86                   | 20.86                 |
|                |                 | 36#17                         | 20.87                | 20.98                   | 21.04                 |
|                |                 | 36#35                         | 20.77                | 21.01                   | 21.04                 |
|                |                 | 75#0                          | 20.56                | 20.64                   | 20.73                 |
| 20M            | QPSK            | 1#0                           | 21.42                | 21.57                   | 21.51                 |
|                |                 | 1#49                          | 21.22                | 21.33                   | 21.28                 |
|                |                 | 1#99                          | 21.05                | 21.36                   | 21.14                 |
|                |                 | 50#0                          | 21.03                | 21.36                   | 21.21                 |
|                |                 | 50#24                         | 21.18                | 21.19                   | 21.26                 |
|                |                 | 50#49                         | 21.18                | 21.18                   | 21.32                 |
|                |                 | 100#0                         | 20.82                | 20.81                   | 21.08                 |
|                | 16-QAM          | 1#0                           | 20.67                | 20.98                   | 20.86                 |
|                |                 | 1#49                          | 20.41                | 20.64                   | 20.60                 |
|                |                 | 1#99                          | 20.46                | 20.62                   | 20.58                 |
|                |                 | 50#0                          | 20.25                | 20.74                   | 20.53                 |
|                |                 | 50#24                         | 20.41                | 20.73                   | 20.58                 |
|                |                 | 50#49                         | 20.53                | 20.86                   | 20.60                 |
|                |                 | 100#0                         | 20.18                | 20.48                   | 20.29                 |

**LTE Band 4**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 1.4M           | QPSK            | 1#0                        | 22.03             | 22.21                | 22.13              |
|                |                 | 1#3                        | 21.76             | 22.00                | 21.87              |
|                |                 | 1#5                        | 21.67             | 21.83                | 21.92              |
|                |                 | 3#0                        | 21.82             | 21.82                | 21.72              |
|                |                 | 3#1                        | 21.87             | 21.95                | 22.00              |
|                |                 | 3#3                        | 21.73             | 22.06                | 21.79              |
|                |                 | 6#0                        | 21.45             | 21.71                | 21.43              |
|                | 16-QAM          | 1#0                        | 21.44             | 21.67                | 21.53              |
|                |                 | 1#3                        | 21.18             | 21.38                | 21.25              |
|                |                 | 1#5                        | 21.07             | 21.43                | 21.14              |
|                |                 | 3#0                        | 21.23             | 21.41                | 21.12              |
|                |                 | 3#1                        | 21.24             | 21.34                | 21.42              |
|                |                 | 3#3                        | 21.32             | 21.28                | 21.35              |
|                |                 | 6#0                        | 21.08             | 20.94                | 21.10              |
| 3M             | QPSK            | 1#0                        | 21.91             | 22.13                | 22.06              |
|                |                 | 1#7                        | 21.69             | 21.76                | 21.75              |
|                |                 | 1#14                       | 21.58             | 21.79                | 21.80              |
|                |                 | 8#0                        | 21.66             | 21.75                | 21.63              |
|                |                 | 8#4                        | 21.72             | 22.01                | 21.69              |
|                |                 | 8#7                        | 21.70             | 21.93                | 21.82              |
|                |                 | 15#0                       | 21.41             | 21.70                | 21.50              |
|                | 16-QAM          | 1#0                        | 21.54             | 21.83                | 21.73              |
|                |                 | 1#7                        | 21.26             | 21.63                | 21.42              |
|                |                 | 1#14                       | 21.16             | 21.51                | 21.50              |
|                |                 | 8#0                        | 21.09             | 21.47                | 21.44              |
|                |                 | 8#4                        | 21.43             | 21.73                | 21.50              |
|                |                 | 8#7                        | 21.15             | 21.45                | 21.48              |
|                |                 | 15#0                       | 20.76             | 21.09                | 21.22              |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 21.42             | 21.67                | 21.53              |
|                |                 | 1#12                       | 21.18             | 21.33                | 21.23              |
|                |                 | 1#24                       | 21.02             | 21.37                | 21.28              |
|                |                 | 12#0                       | 21.22             | 21.31                | 21.20              |
|                |                 | 12#6                       | 21.21             | 21.56                | 21.33              |
|                |                 | 12#11                      | 21.09             | 21.40                | 21.41              |
|                |                 | 25#0                       | 20.74             | 21.06                | 21.09              |
|                | 16-QAM          | 1#0                        | 21.02             | 21.13                | 21.16              |
|                |                 | 1#12                       | 20.67             | 20.89                | 20.81              |
|                |                 | 1#24                       | 20.72             | 20.83                | 20.83              |
|                |                 | 12#0                       | 20.76             | 20.91                | 20.95              |
|                |                 | 12#6                       | 20.71             | 20.94                | 20.82              |
|                |                 | 12#11                      | 20.70             | 20.98                | 21.00              |
|                |                 | 25#0                       | 20.48             | 20.65                | 20.69              |
| 10M            | QPSK            | 1#0                        | 21.55             | 21.86                | 21.67              |
|                |                 | 1#24                       | 21.25             | 21.59                | 21.36              |
|                |                 | 1#49                       | 21.30             | 21.50                | 21.40              |
|                |                 | 25#0                       | 21.35             | 21.44                | 21.44              |
|                |                 | 25#12                      | 21.42             | 21.69                | 21.43              |
|                |                 | 25#24                      | 21.30             | 21.70                | 21.42              |
|                |                 | 50#0                       | 20.92             | 21.40                | 21.09              |
|                | 16-QAM          | 1#0                        | 21.21             | 21.34                | 21.43              |
|                |                 | 1#24                       | 21.00             | 21.04                | 21.15              |
|                |                 | 1#49                       | 21.00             | 20.95                | 21.05              |
|                |                 | 25#0                       | 20.82             | 21.03                | 21.16              |
|                |                 | 25#12                      | 21.10             | 21.00                | 21.11              |
|                |                 | 25#24                      | 20.91             | 21.15                | 21.19              |
|                |                 | 50#0                       | 20.64             | 20.80                | 20.89              |

| Test Bandwidth | Test Modulation | Resource Block<br>& RB offset | Low Channel<br>(dBm) | Middle<br>Channel (dBm) | High Channel<br>(dBm) |
|----------------|-----------------|-------------------------------|----------------------|-------------------------|-----------------------|
| 15M            | QPSK            | 1#0                           | 21.86                | 22.13                   | 22.01                 |
|                |                 | 1#37                          | 21.50                | 21.76                   | 21.77                 |
|                |                 | 1#74                          | 21.64                | 21.76                   | 21.78                 |
|                |                 | 36#0                          | 21.44                | 21.69                   | 21.79                 |
|                |                 | 36#17                         | 21.55                | 21.75                   | 21.79                 |
|                |                 | 36#35                         | 21.65                | 21.91                   | 21.62                 |
|                |                 | 75#0                          | 21.26                | 21.67                   | 21.40                 |
|                | 16-QAM          | 1#0                           | 21.37                | 21.53                   | 21.42                 |
|                |                 | 1#37                          | 21.06                | 21.26                   | 21.05                 |
|                |                 | 1#74                          | 20.98                | 21.27                   | 21.18                 |
|                |                 | 36#0                          | 20.97                | 21.15                   | 21.20                 |
|                |                 | 36#17                         | 21.23                | 21.28                   | 21.19                 |
|                |                 | 36#35                         | 21.22                | 21.13                   | 21.05                 |
|                |                 | 75#0                          | 20.87                | 20.76                   | 20.65                 |
| 20M            | QPSK            | 1#0                           | 22.01                | 22.34                   | 22.1                  |
|                |                 | 1#49                          | 21.62                | 22.10                   | 21.71                 |
|                |                 | 1#99                          | 21.63                | 22.05                   | 21.80                 |
|                |                 | 50#0                          | 21.67                | 21.96                   | 21.87                 |
|                |                 | 50#24                         | 21.73                | 22.12                   | 21.93                 |
|                |                 | 50#49                         | 21.76                | 22.21                   | 21.74                 |
|                |                 | 100#0                         | 21.42                | 21.87                   | 21.52                 |
|                | 16-QAM          | 1#0                           | 21.19                | 21.37                   | 21.42                 |
|                |                 | 1#49                          | 20.90                | 21.08                   | 21.11                 |
|                |                 | 1#99                          | 20.95                | 21.15                   | 21.11                 |
|                |                 | 50#0                          | 20.96                | 20.96                   | 20.98                 |
|                |                 | 50#24                         | 21.05                | 21.15                   | 21.13                 |
|                |                 | 50#49                         | 20.83                | 21.07                   | 21.21                 |
|                |                 | 100#0                         | 20.52                | 20.75                   | 20.86                 |

**LTE Band 5**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 1.4M           | QPSK            | 1#0                        | 22.35             | 22.42                | 22.37              |
|                |                 | 1#3                        | 22.05             | 22.20                | 22.14              |
|                |                 | 1#5                        | 22.04             | 22.14                | 22.05              |
|                |                 | 3#0                        | 22.14             | 21.95                | 21.95              |
|                |                 | 3#1                        | 22.22             | 22.26                | 22.15              |
|                |                 | 3#3                        | 22.07             | 22.03                | 22.22              |
|                |                 | 6#0                        | 21.67             | 21.77                | 21.92              |
|                | 16-QAM          | 1#0                        | 21.83             | 21.89                | 21.81              |
|                |                 | 1#3                        | 21.55             | 21.53                | 21.44              |
|                |                 | 1#5                        | 21.52             | 21.57                | 21.48              |
|                |                 | 3#0                        | 21.56             | 21.44                | 21.48              |
|                |                 | 3#1                        | 21.50             | 21.68                | 21.64              |
|                |                 | 3#3                        | 21.55             | 21.67                | 21.67              |
|                |                 | 6#0                        | 21.34             | 21.27                | 21.38              |
| 3M             | QPSK            | 1#0                        | 22.25             | 22.37                | 22.21              |
|                |                 | 1#7                        | 22.01             | 22.11                | 21.88              |
|                |                 | 1#14                       | 21.98             | 22.02                | 21.87              |
|                |                 | 8#0                        | 21.90             | 22.12                | 21.81              |
|                |                 | 8#4                        | 22.15             | 22.14                | 21.84              |
|                |                 | 8#7                        | 22.05             | 22.25                | 21.88              |
|                |                 | 15#0                       | 21.76             | 21.93                | 21.52              |
|                | 16-QAM          | 1#0                        | 21.57             | 21.67                | 21.59              |
|                |                 | 1#7                        | 21.21             | 21.28                | 21.27              |
|                |                 | 1#14                       | 21.22             | 21.30                | 21.24              |
|                |                 | 8#0                        | 21.34             | 21.42                | 21.36              |
|                |                 | 8#4                        | 21.45             | 21.35                | 21.42              |
|                |                 | 8#7                        | 21.42             | 21.32                | 21.28              |
|                |                 | 15#0                       | 21.09             | 21.09                | 20.90              |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 22.24             | 22.34                | 22.29              |
|                |                 | 1#12                       | 22.02             | 21.97                | 21.90              |
|                |                 | 1#24                       | 21.87             | 21.95                | 22.05              |
|                |                 | 12#0                       | 21.83             | 21.99                | 21.83              |
|                |                 | 12#6                       | 22.00             | 22.12                | 21.96              |
|                |                 | 12#11                      | 22.06             | 22.06                | 21.99              |
|                |                 | 25#0                       | 21.86             | 21.86                | 21.75              |
|                | 16-QAM          | 1#0                        | 21.64             | 21.71                | 21.58              |
|                |                 | 1#12                       | 21.28             | 21.45                | 21.27              |
|                |                 | 1#24                       | 21.40             | 21.48                | 21.18              |
|                |                 | 12#0                       | 21.39             | 21.40                | 21.37              |
|                |                 | 12#6                       | 21.53             | 21.60                | 21.34              |
|                |                 | 12#11                      | 21.54             | 21.37                | 21.20              |
|                |                 | 25#0                       | 21.31             | 21.01                | 21.00              |
| 10M            | QPSK            | 1#0                        | 22.11             | 22.21                | 22.15              |
|                |                 | 1#24                       | 21.89             | 21.92                | 21.86              |
|                |                 | 1#49                       | 21.80             | 21.90                | 21.86              |
|                |                 | 25#0                       | 21.69             | 21.94                | 21.82              |
|                |                 | 25#12                      | 21.78             | 21.88                | 22.04              |
|                |                 | 25#24                      | 21.95             | 22.03                | 21.99              |
|                |                 | 50#0                       | 21.72             | 21.75                | 21.72              |
|                | 16-QAM          | 1#0                        | 21.71             | 21.85                | 21.67              |
|                |                 | 1#24                       | 21.40             | 21.54                | 21.33              |
|                |                 | 1#49                       | 21.49             | 21.64                | 21.44              |
|                |                 | 25#0                       | 21.41             | 21.46                | 21.21              |
|                |                 | 25#12                      | 21.52             | 21.49                | 21.40              |
|                |                 | 25#24                      | 21.54             | 21.59                | 21.29              |
|                |                 | 50#0                       | 21.26             | 21.20                | 20.93              |

**LTE Band 7**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 22.05             | 22.12                | 22.03              |
|                |                 | 1#12                       | 21.82             | 21.76                | 21.73              |
|                |                 | 1#24                       | 21.72             | 21.74                | 21.77              |
|                |                 | 12#0                       | 21.63             | 21.62                | 21.64              |
|                |                 | 12#6                       | 21.79             | 21.94                | 21.92              |
|                |                 | 12#11                      | 21.89             | 21.89                | 21.90              |
|                |                 | 25#0                       | 21.66             | 21.61                | 21.50              |
|                | 16-QAM          | 1#0                        | 21.44             | 21.56                | 21.41              |
|                |                 | 1#12                       | 21.04             | 21.25                | 21.11              |
|                |                 | 1#24                       | 21.23             | 21.35                | 21.06              |
|                |                 | 12#0                       | 21.10             | 21.21                | 20.92              |
|                |                 | 12#6                       | 21.13             | 21.45                | 21.20              |
|                |                 | 12#11                      | 21.24             | 21.35                | 21.04              |
|                |                 | 25#0                       | 20.95             | 20.99                | 20.69              |
| 10M            | QPSK            | 1#0                        | 21.87             | 22.03                | 21.86              |
|                |                 | 1#24                       | 21.67             | 21.66                | 21.62              |
|                |                 | 1#49                       | 21.64             | 21.73                | 21.48              |
|                |                 | 25#0                       | 21.52             | 21.74                | 21.65              |
|                |                 | 25#12                      | 21.73             | 21.92                | 21.50              |
|                |                 | 25#24                      | 21.76             | 21.88                | 21.69              |
|                |                 | 50#0                       | 21.49             | 21.58                | 21.46              |
|                | 16-QAM          | 1#0                        | 21.33             | 21.46                | 21.37              |
|                |                 | 1#24                       | 21.04             | 21.19                | 21.08              |
|                |                 | 1#49                       | 20.99             | 21.20                | 21.07              |
|                |                 | 25#0                       | 21.13             | 21.00                | 21.15              |
|                |                 | 25#12                      | 21.05             | 21.33                | 20.99              |
|                |                 | 25#24                      | 21.15             | 21.31                | 21.08              |
|                |                 | 50#0                       | 20.83             | 20.92                | 20.80              |

| Test Bandwidth | Test Modulation | Resource Block<br>& RB offset | Low Channel<br>(dBm) | Middle<br>Channel (dBm) | High Channel<br>(dBm) |
|----------------|-----------------|-------------------------------|----------------------|-------------------------|-----------------------|
| 15M            | QPSK            | 1#0                           | 22.07                | 22.34                   | 22.11                 |
|                |                 | 1#37                          | 21.71                | 21.94                   | 21.81                 |
|                |                 | 1#74                          | 21.84                | 22.03                   | 21.78                 |
|                |                 | 36#0                          | 21.63                | 22.04                   | 21.84                 |
|                |                 | 36#17                         | 21.95                | 22.09                   | 21.82                 |
|                |                 | 36#35                         | 21.95                | 22.19                   | 21.74                 |
|                |                 | 75#0                          | 21.58                | 21.88                   | 21.39                 |
|                | 16-QAM          | 1#0                           | 21.73                | 21.89                   | 21.76                 |
|                |                 | 1#37                          | 21.43                | 21.56                   | 21.38                 |
|                |                 | 1#74                          | 21.35                | 21.64                   | 21.43                 |
|                |                 | 36#0                          | 21.47                | 21.63                   | 21.49                 |
|                |                 | 36#17                         | 21.36                | 21.56                   | 21.37                 |
|                |                 | 36#35                         | 21.53                | 21.53                   | 21.54                 |
|                |                 | 75#0                          | 21.18                | 21.33                   | 21.23                 |
| 20M            | QPSK            | 1#0                           | 21.93                | 22.11                   | 21.89                 |
|                |                 | 1#49                          | 21.58                | 21.78                   | 21.66                 |
|                |                 | 1#99                          | 21.62                | 21.79                   | 21.59                 |
|                |                 | 50#0                          | 21.50                | 21.86                   | 21.42                 |
|                |                 | 50#24                         | 21.57                | 21.74                   | 21.51                 |
|                |                 | 50#49                         | 21.75                | 21.96                   | 21.62                 |
|                |                 | 100#0                         | 21.37                | 21.72                   | 21.25                 |
|                | 16-QAM          | 1#0                           | 21.45                | 21.56                   | 21.41                 |
|                |                 | 1#49                          | 21.12                | 21.19                   | 21.18                 |
|                |                 | 1#99                          | 21.14                | 21.19                   | 21.05                 |
|                |                 | 50#0                          | 21.10                | 21.24                   | 20.93                 |
|                |                 | 50#24                         | 21.10                | 21.24                   | 21.29                 |
|                |                 | 50#49                         | 21.11                | 21.43                   | 21.30                 |
|                |                 | 100#0                         | 20.86                | 21.21                   | 20.90                 |

**LTE Band 12**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 1.4M           | QPSK            | 1#0                        | 22.71             | 22.56                | 22.64              |
|                |                 | 1#3                        | 22.38             | 22.35                | 22.31              |
|                |                 | 1#5                        | 22.47             | 22.25                | 22.38              |
|                |                 | 3#0                        | 22.38             | 22.15                | 22.22              |
|                |                 | 3#1                        | 22.51             | 22.19                | 22.28              |
|                |                 | 3#3                        | 22.43             | 22.45                | 22.35              |
|                |                 | 6#0                        | 22.03             | 22.21                | 22.05              |
|                | 16-QAM          | 1#0                        | 21.97             | 21.89                | 21.91              |
|                |                 | 1#3                        | 21.58             | 21.61                | 21.58              |
|                |                 | 1#5                        | 21.70             | 21.50                | 21.69              |
|                |                 | 3#0                        | 21.52             | 21.57                | 21.42              |
|                |                 | 3#1                        | 21.67             | 21.70                | 21.54              |
|                |                 | 3#3                        | 21.81             | 21.58                | 21.77              |
|                |                 | 6#0                        | 21.43             | 21.22                | 21.48              |
| 3M             | QPSK            | 1#0                        | 22.71             | 22.43                | 22.46              |
|                |                 | 1#7                        | 22.34             | 22.18                | 22.17              |
|                |                 | 1#14                       | 22.43             | 22.04                | 22.11              |
|                |                 | 8#0                        | 22.35             | 21.97                | 21.99              |
|                |                 | 8#4                        | 22.43             | 22.25                | 22.33              |
|                |                 | 8#7                        | 22.35             | 22.16                | 22.30              |
|                |                 | 15#0                       | 21.99             | 21.87                | 21.98              |
|                | 16-QAM          | 1#0                        | 21.61             | 21.5                 | 21.43              |
|                |                 | 1#7                        | 21.34             | 21.21                | 21.19              |
|                |                 | 1#14                       | 21.40             | 21.10                | 21.16              |
|                |                 | 8#0                        | 21.38             | 21.13                | 21.22              |
|                |                 | 8#4                        | 21.29             | 21.21                | 21.16              |
|                |                 | 8#7                        | 21.49             | 21.25                | 21.17              |
|                |                 | 15#0                       | 21.27             | 20.92                | 20.92              |

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 22.43             | 22.31                | 22.11              |
|                |                 | 1#12                       | 22.10             | 22.09                | 21.75              |
|                |                 | 1#24                       | 22.18             | 21.96                | 21.78              |
|                |                 | 12#0                       | 22.12             | 21.92                | 21.64              |
|                |                 | 12#6                       | 22.28             | 21.98                | 21.95              |
|                |                 | 12#11                      | 22.25             | 22.05                | 21.95              |
|                |                 | 25#0                       | 22.04             | 21.72                | 21.56              |
|                | 16-QAM          | 1#0                        | 21.81             | 21.65                | 21.68              |
|                |                 | 1#12                       | 21.54             | 21.31                | 21.35              |
|                |                 | 1#24                       | 21.58             | 21.25                | 21.44              |
|                |                 | 12#0                       | 21.54             | 21.26                | 21.46              |
|                |                 | 12#6                       | 21.59             | 21.44                | 21.42              |
|                |                 | 12#11                      | 21.65             | 21.33                | 21.39              |
|                |                 | 25#0                       | 21.27             | 21.12                | 21.19              |
| 10M            | QPSK            | 1#0                        | 22.31             | 22.54                | 22.24              |
|                |                 | 1#24                       | 21.98             | 22.30                | 21.94              |
|                |                 | 1#49                       | 21.94             | 22.18                | 21.91              |
|                |                 | 25#0                       | 21.90             | 22.14                | 21.88              |
|                |                 | 25#12                      | 22.13             | 22.25                | 22.12              |
|                |                 | 25#24                      | 22.11             | 22.34                | 22.12              |
|                |                 | 50#0                       | 21.86             | 22.05                | 21.85              |
|                | 16-QAM          | 1#0                        | 21.72             | 21.83                | 21.64              |
|                |                 | 1#24                       | 21.41             | 21.63                | 21.28              |
|                |                 | 1#49                       | 21.33             | 21.55                | 21.34              |
|                |                 | 25#0                       | 21.28             | 21.43                | 21.19              |
|                |                 | 25#12                      | 21.44             | 21.66                | 21.34              |
|                |                 | 25#24                      | 21.36             | 21.56                | 21.46              |
|                |                 | 50#0                       | 21.07             | 21.35                | 21.08              |

**LTE Band 13**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 22.41             | 22.43                | 22.52              |
|                |                 | 1#12                       | 22.14             | 22.19                | 22.14              |
|                |                 | 1#24                       | 22.05             | 22.20                | 22.17              |
|                |                 | 12#0                       | 22.05             | 22.05                | 22.31              |
|                |                 | 12#6                       | 22.03             | 22.13                | 22.31              |
|                |                 | 12#11                      | 22.21             | 22.06                | 22.33              |
|                |                 | 25#0                       | 21.89             | 21.70                | 21.99              |
|                | 16-QAM          | 1#0                        | 21.76             | 21.83                | 21.86              |
|                |                 | 1#12                       | 21.54             | 21.51                | 21.66              |
|                |                 | 1#24                       | 21.54             | 21.50                | 21.53              |
|                |                 | 12#0                       | 21.44             | 21.56                | 21.66              |
|                |                 | 12#6                       | 21.46             | 21.66                | 21.48              |
|                |                 | 12#11                      | 21.45             | 21.60                | 21.70              |
|                |                 | 25#0                       | 21.16             | 21.29                | 21.50              |
| 10M            | QPSK            | 1#0                        | /                 | 22.16                | /                  |
|                |                 | 1#24                       | /                 | 21.81                | /                  |
|                |                 | 1#49                       | /                 | 21.78                | /                  |
|                |                 | 25#0                       | /                 | 21.95                | /                  |
|                |                 | 25#12                      | /                 | 21.83                | /                  |
|                |                 | 25#24                      | /                 | 21.87                | /                  |
|                |                 | 50#0                       | /                 | 21.55                | /                  |
|                | 16-QAM          | 1#0                        | /                 | 21.54                | /                  |
|                |                 | 1#24                       | /                 | 21.27                | /                  |
|                |                 | 1#49                       | /                 | 21.29                | /                  |
|                |                 | 25#0                       | /                 | 21.23                | /                  |
|                |                 | 25#12                      | /                 | 21.41                | /                  |
|                |                 | 25#24                      | /                 | 21.20                | /                  |
|                |                 | 50#0                       | /                 | 20.98                | /                  |

**LTE Band 17**

| Test Bandwidth | Test Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|----------------|-----------------|----------------------------|-------------------|----------------------|--------------------|
| 5M             | QPSK            | 1#0                        | 22.43             | 22.57                | 22.36              |
|                |                 | 1#12                       | 22.15             | 22.31                | 22.14              |
|                |                 | 1#24                       | 22.06             | 22.32                | 22.09              |
|                |                 | 12#0                       | 22.17             | 22.10                | 22.15              |
|                |                 | 12#6                       | 22.07             | 22.37                | 22.12              |
|                |                 | 12#11                      | 22.07             | 22.23                | 21.98              |
|                |                 | 25#0                       | 21.81             | 21.90                | 21.76              |
|                | 16-QAM          | 1#0                        | 21.55             | 21.81                | 21.64              |
|                |                 | 1#12                       | 21.31             | 21.50                | 21.40              |
|                |                 | 1#24                       | 21.28             | 21.49                | 21.42              |
|                |                 | 12#0                       | 21.09             | 21.47                | 21.42              |
|                |                 | 12#6                       | 21.21             | 21.57                | 21.44              |
|                |                 | 12#11                      | 21.42             | 21.42                | 21.38              |
|                |                 | 25#0                       | 21.06             | 21.02                | 21.17              |
| 10M            | QPSK            | 1#0                        | 22.34             | 22.41                | 22.54              |
|                |                 | 1#24                       | 22.00             | 22.06                | 22.33              |
|                |                 | 1#49                       | 22.03             | 22.18                | 22.25              |
|                |                 | 25#0                       | 21.95             | 21.94                | 22.21              |
|                |                 | 25#12                      | 21.99             | 22.11                | 22.39              |
|                |                 | 25#24                      | 22.12             | 22.12                | 22.26              |
|                |                 | 50#0                       | 21.79             | 21.86                | 21.87              |
|                | 16-QAM          | 1#0                        | 21.71             | 21.67                | 21.59              |
|                |                 | 1#24                       | 21.48             | 21.37                | 21.25              |
|                |                 | 1#49                       | 21.39             | 21.35                | 21.35              |
|                |                 | 25#0                       | 21.40             | 21.34                | 21.34              |
|                |                 | 25#12                      | 21.48             | 21.44                | 21.48              |
|                |                 | 25#24                      | 21.35             | 21.52                | 21.34              |
|                |                 | 50#0                       | 21.13             | 21.18                | 21.11              |

**Peak-to-average ratio (PAR):****WCDMA Band V:**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| WCDMA (Rel99) | Low     | 3.21     | ≤ 13       |
|               | Middle  | 3.14     | ≤ 13       |
|               | High    | 3.14     | ≤ 13       |
| WCDMA (HSDPA) | Low     | 2.74     | ≤ 13       |
|               | Middle  | 2.71     | ≤ 13       |
|               | High    | 2.78     | ≤ 13       |
| WCDMA (HSUPA) | Low     | 2.67     | ≤ 13       |
|               | Middle  | 2.71     | ≤ 13       |
|               | High    | 2.76     | ≤ 13       |
| WCDMA (HSPA+) | Low     | 2.55     | ≤ 13       |
|               | Middle  | 2.53     | ≤ 13       |
|               | High    | 2.62     | ≤ 13       |

**WCDMA Band II**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| WCDMA (Rel99) | Low     | 2.69     | ≤ 13       |
|               | Middle  | 2.76     | ≤ 13       |
|               | High    | 2.80     | ≤ 13       |
| WCDMA (HSDPA) | Low     | 2.61     | ≤ 13       |
|               | Middle  | 2.63     | ≤ 13       |
|               | High    | 2.71     | ≤ 13       |
| WCDMA (HSUPA) | Low     | 2.62     | ≤ 13       |
|               | Middle  | 2.69     | ≤ 13       |
|               | High    | 2.71     | ≤ 13       |
| WCDMA (HSPA+) | Low     | 2.53     | ≤ 13       |
|               | Middle  | 2.61     | ≤ 13       |
|               | High    | 2.7      | ≤ 13       |

**WCDMA Band IV**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| WCDMA (Rel99) | Low     | 2.77     | ≤ 13       |
|               | Middle  | 2.85     | ≤ 13       |
|               | High    | 2.89     | ≤ 13       |
| WCDMA (HSDPA) | Low     | 2.61     | ≤ 13       |
|               | Middle  | 2.64     | ≤ 13       |
|               | High    | 2.72     | ≤ 13       |
| WCDMA (HSUPA) | Low     | 2.51     | ≤ 13       |
|               | Middle  | 2.45     | ≤ 13       |
|               | High    | 2.47     | ≤ 13       |
| WCDMA (HSPA+) | Low     | 2.42     | ≤ 13       |
|               | Middle  | 2.36     | ≤ 13       |
|               | High    | 2.34     | ≤ 13       |

**LTE Band 2**

| Test Modulation |        | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit (dB) |
|-----------------|--------|----------------|------------------|---------------------|-------------------|------------|
| QPSK            | 1 RB   | 20M            | 3.53             | 3.72                | 3.66              | 13         |
|                 | 100 RB |                | 5.58             | 5.75                | 5.63              | 13         |
| 16-QAM          | 1 RB   | 20M            | 4.42             | 4.6                 | 4.56              | 13         |
|                 | 100 RB |                | 6.39             | 6.64                | 6.53              | 13         |

**LTE Band 4**

| Test Modulation |        | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|--------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB   | 20M            | 3.46             | 3.6                 | 3.66              | 13        |
|                 | 100 RB |                | 5.54             | 5.58                | 5.66              | 13        |
| 16-QAM          | 1 RB   | 20M            | 4.31             | 4.61                | 4.56              | 13        |
|                 | 100 RB |                | 6.41             | 6.53                | 6.65              | 13        |

**LTE Band 5**

| Test Modulation |       | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|-------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB  | 10M            | 3.36             | 3.66                | 3.66              | 13        |
|                 | 50 RB |                | 5.35             | 5.62                | 5.57              | 13        |
| 16-QAM          | 1 RB  | 10M            | 4.6              | 4.71                | 4.56              | 13        |
|                 | 50 RB |                | 6.65             | 6.81                | 6.62              | 13        |

**LTE Band 7**

| Test Modulation |        | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|--------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB   | 20M            | 3.25             | 3.71                | 3.66              | 13        |
|                 | 100 RB |                | 5.17             | 5.64                | 5.64              | 13        |
| 16-QAM          | 1 RB   | 20M            | 4.41             | 4.8                 | 4.56              | 13        |
|                 | 100 RB |                | 6.44             | 6.73                | 6.56              | 13        |

**LTE Band 12**

| Test Modulation |       | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|-------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB  | 10M            | 3.45             | 2.6                 | 3.66              | 13        |
|                 | 50 RB |                | 5.47             | 4.55                | 5.66              | 13        |
| 16-QAM          | 1 RB  | 10M            | 4.35             | 4.82                | 4.56              | 13        |
|                 | 50 RB |                | 6.31             | 6.88                | 6.53              | 13        |

**LTE Band 13**

| Test Modulation |       | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|-------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB  | 10M            | /                | 3.66                | /                 | 13        |
|                 | 50 RB |                | /                | 5.73                | /                 | 13        |
| 16-QAM          | 1 RB  | 10M            | /                | 4.71                | /                 | 13        |
|                 | 50 RB |                | /                | 6.66                | /                 | 13        |

**LTE Band 17**

| Test Modulation |       | Test Bandwidth | Low Channel (dB) | Middle Channel (dB) | High Channel (dB) | Limit(dB) |
|-----------------|-------|----------------|------------------|---------------------|-------------------|-----------|
| QPSK            | 1 RB  | 10M            | 3.56             | 3.60                | 3.66              | 13        |
|                 | 50 RB |                | 5.55             | 5.65                | 5.72              | 13        |
| 16-QAM          | 1 RB  | 10M            | 4.22             | 4.61                | 4.56              | 13        |
|                 | 50 RB |                | 6.26             | 6.69                | 6.53              | 13        |

**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.

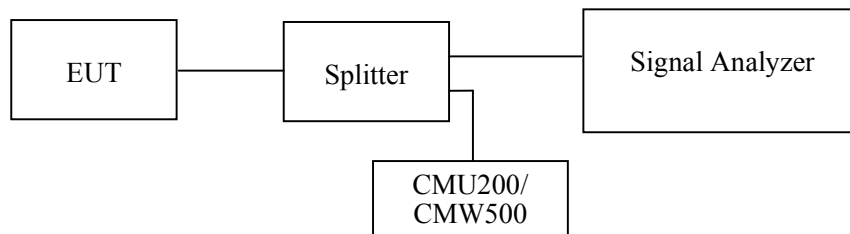
**Test Procedure**

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 as follow:

RBW=5 kHz For Cellular/PCS  
RBW=100 kHz For WCDMA  
RBW=20kHz For 1.4M LTE  
RBW=30kHz For 3.0M LTE  
RBW=50kHz For 5.0M LTE  
RBW=100kHz For 10M LTE  
RBW=200kHz For 15M LTE & 20M LTE

and the 26 dB & 99% bandwidth was recorded.

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

|                           |                   |
|---------------------------|-------------------|
| <b>Temperature:</b>       | 23.2°C-23.5°C     |
| <b>Relative Humidity:</b> | 51 %-53%          |
| <b>ATM Pressure:</b>      | 101.1kPa-103.3kPa |

The testing was performed by Max Min from 2019-07-15 to 2019-08-30.

EUT operation mode: Transmitting

Test Result: Compliant.

**WCDMA Band V**

| <b>Mode</b>    | <b>Frequency<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> |
|----------------|----------------------------|-----------------------------------------------|---------------------------------------------|
| WCDMA (Rel 99) | 836.6                      | 4.729                                         | 4.148                                       |
| WCDMA (HSDPA)  | 836.6                      | 4.749                                         | 4.168                                       |
| WCDMA (HSUPA)  | 836.6                      | 4.749                                         | 4.168                                       |
| WCDMA (HSPA+)  | 836.6                      | 4.749                                         | 4.188                                       |

**WCDMA Band II**

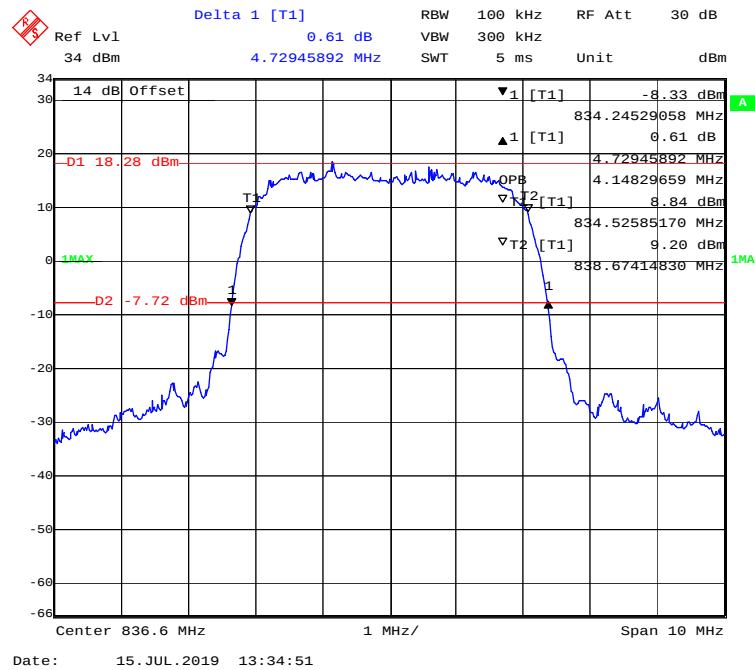
| <b>Mode</b>    | <b>Frequency<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> |
|----------------|----------------------------|-----------------------------------------------|---------------------------------------------|
| WCDMA (Rel 99) | 1880                       | 4.770                                         | 4.168                                       |
| WCDMA (HSDPA)  | 1880                       | 4.770                                         | 4.188                                       |
| WCDMA (HSUPA)  | 1880                       | 4.770                                         | 4.168                                       |
| WCDMA (HSPA+)  | 1880                       | 4.770                                         | 4.168                                       |

**WCDMA Band IV**

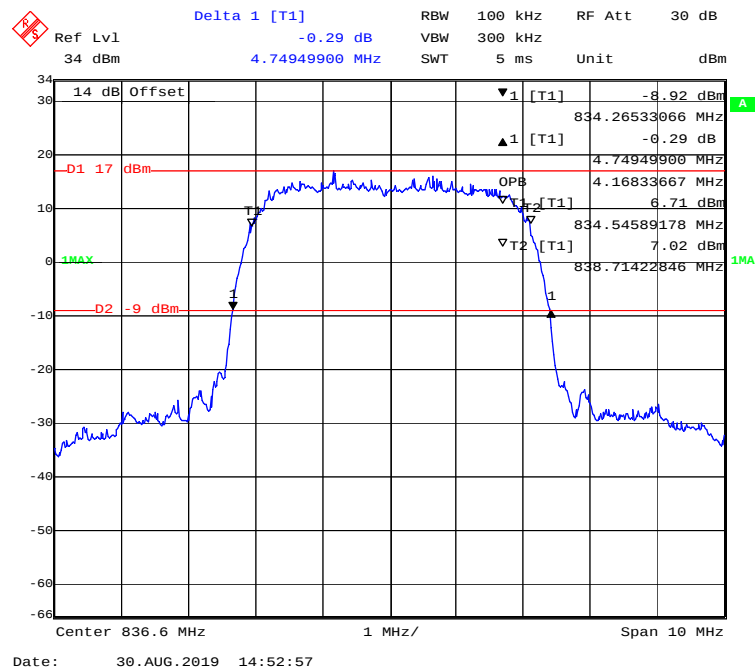
| <b>Mode</b>    | <b>Frequency<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> |
|----------------|----------------------------|-----------------------------------------------|---------------------------------------------|
| WCDMA (Rel 99) | 1732.6                     | 4.770                                         | 4.168                                       |
| WCDMA (HSDPA)  | 1732.6                     | 4.770                                         | 4.188                                       |
| WCDMA (HSUPA)  | 1732.6                     | 4.770                                         | 4.188                                       |
| WCDMA (HSPA+)  | 1732.6                     | 4.749                                         | 4.188                                       |

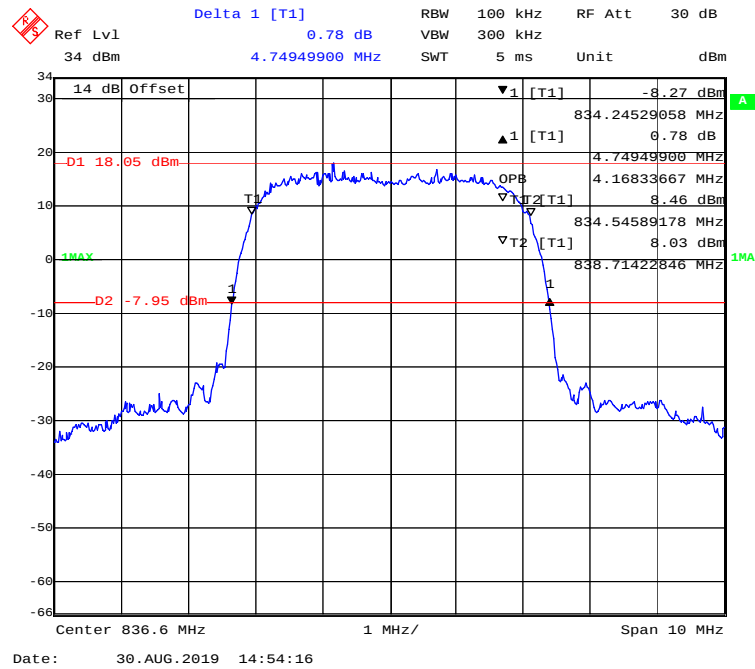
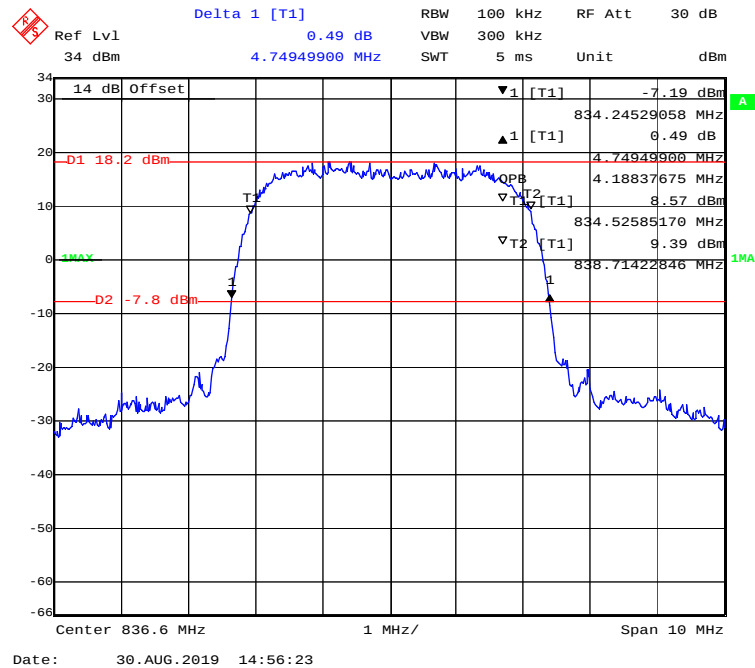
## WCDMA Band V

## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



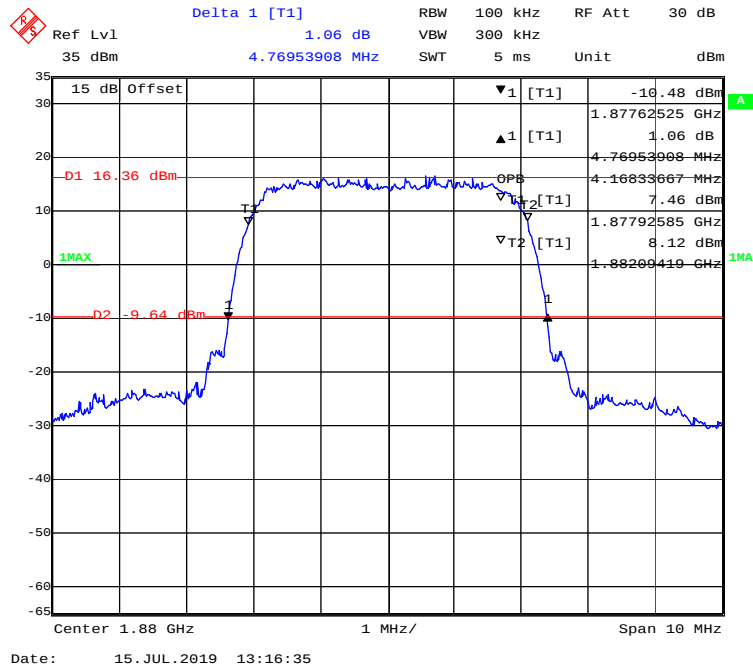
## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



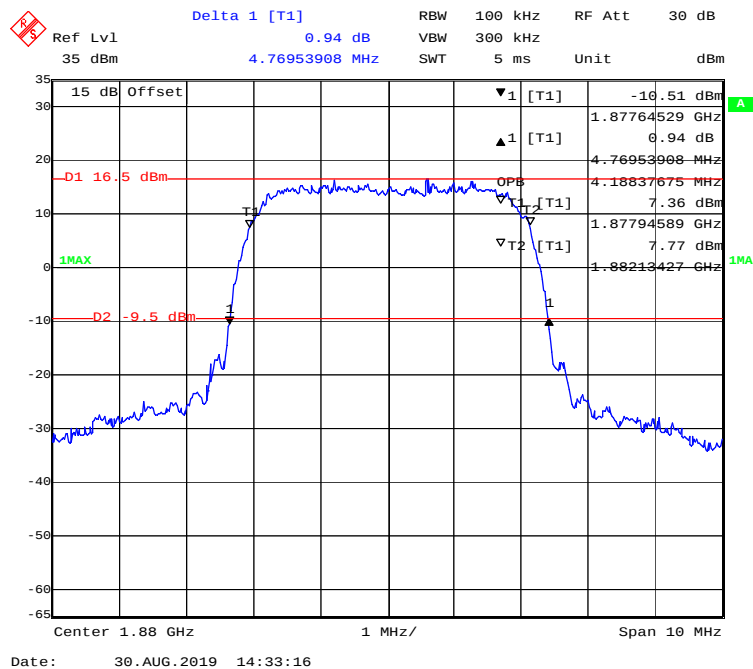
**99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode****99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode**

## WCDMA Band II

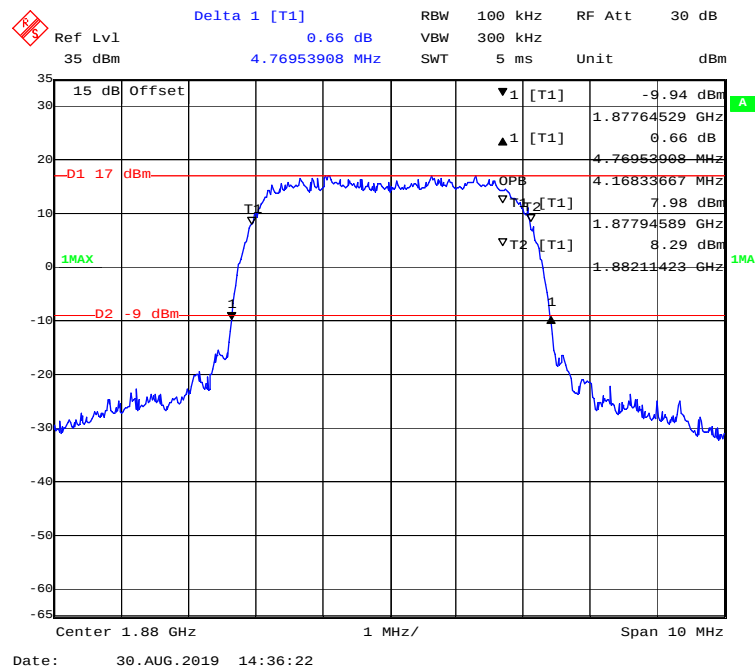
## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



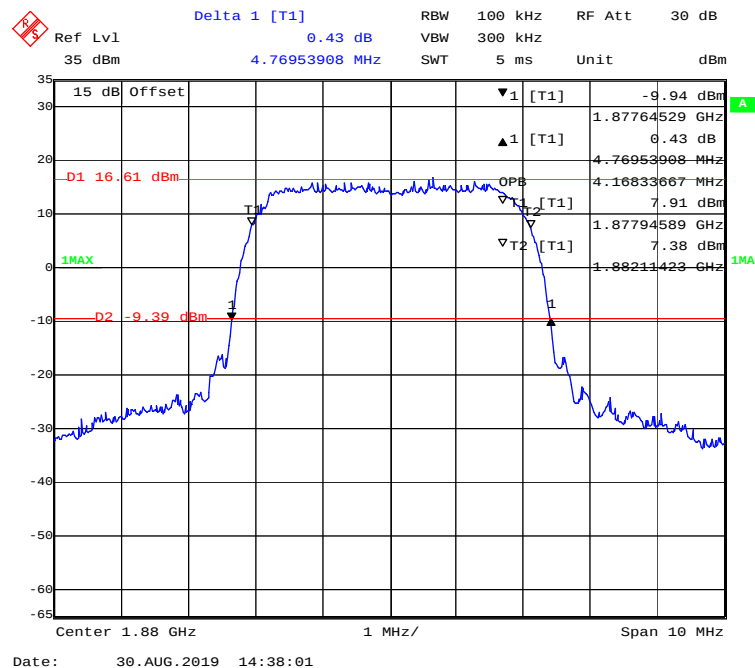
## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



### 99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode

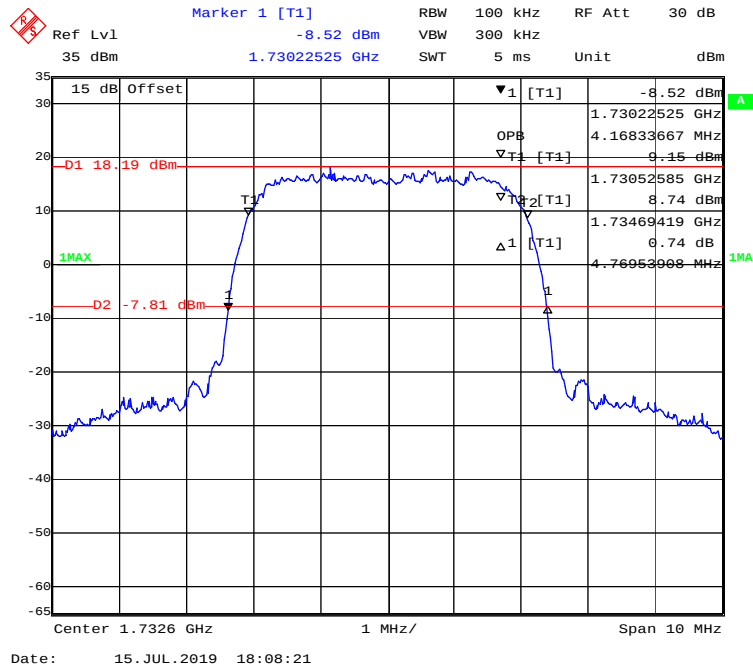


### 99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode

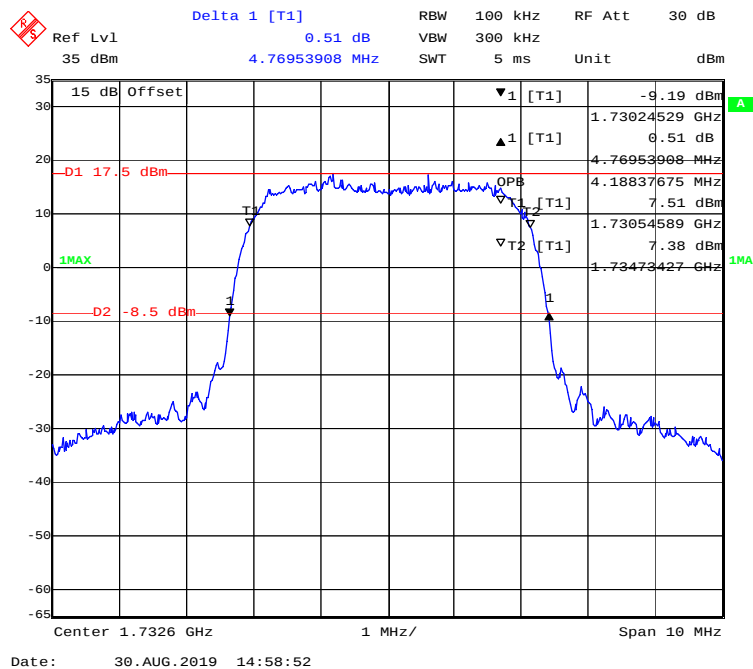


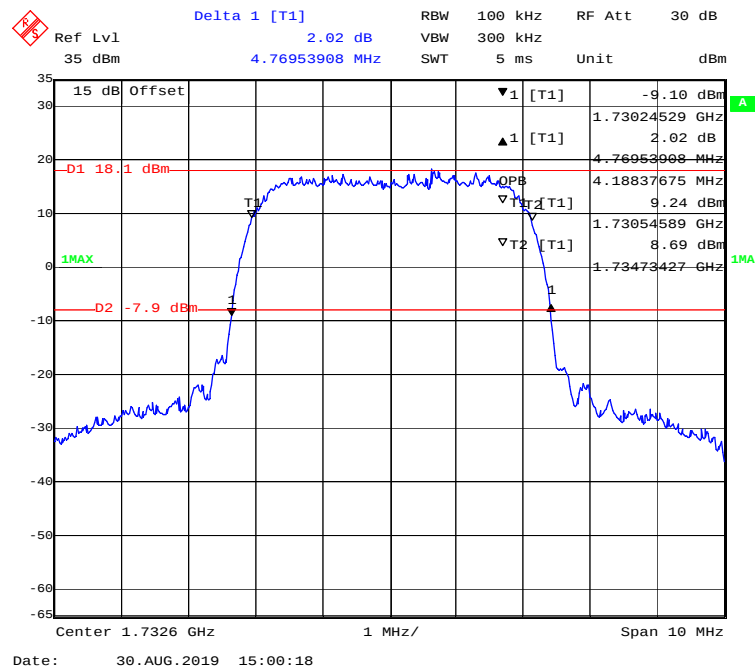
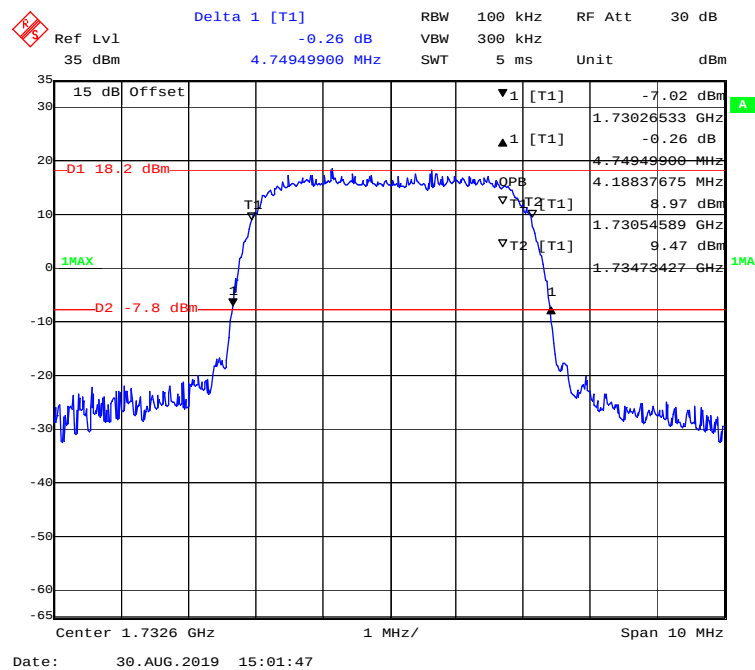
## WCDMA Band IV

## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (Rel 99) Mode



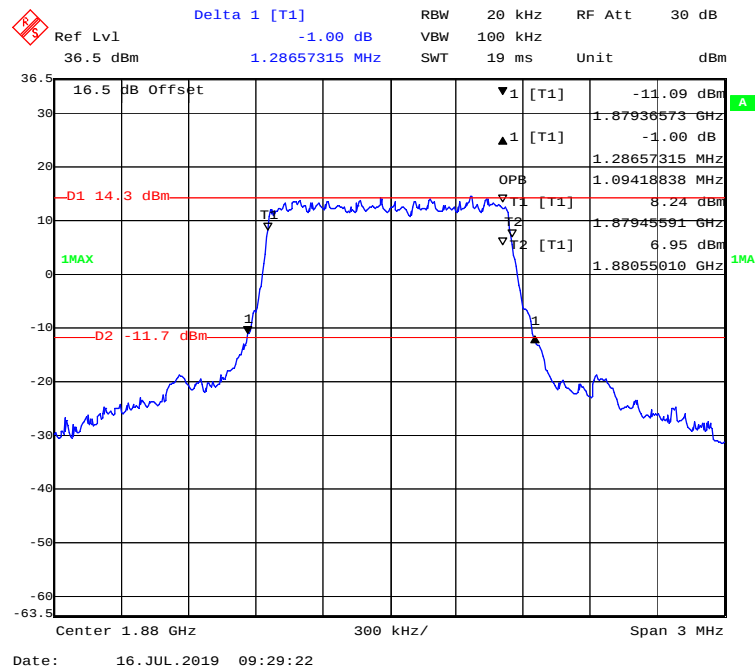
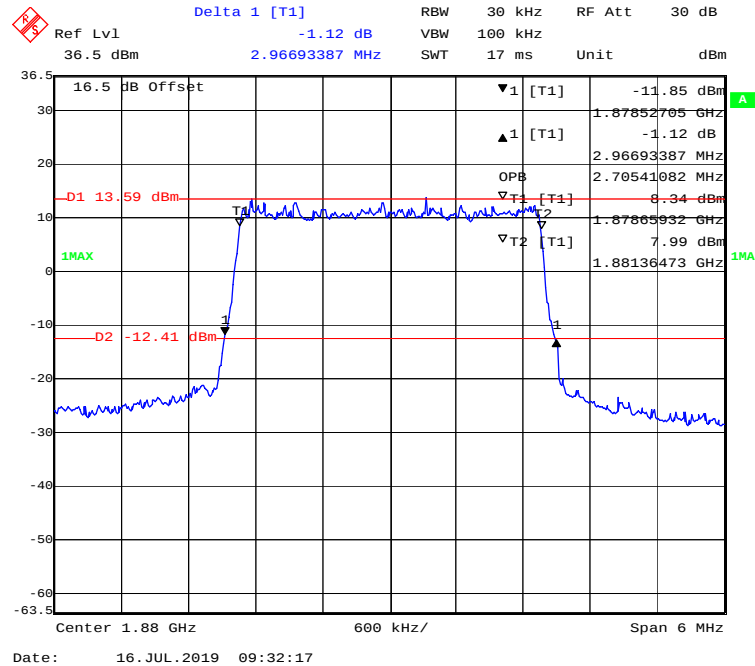
## 99% Occupied &amp; 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode

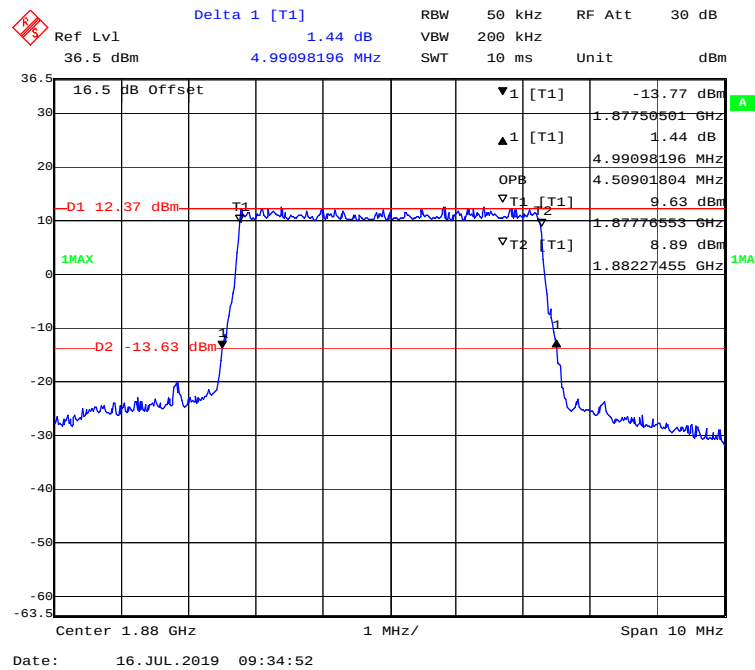
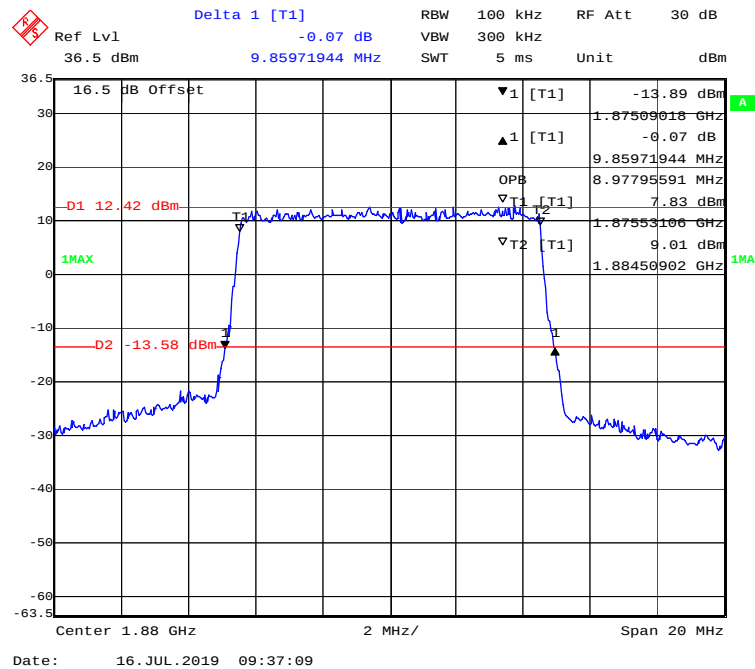


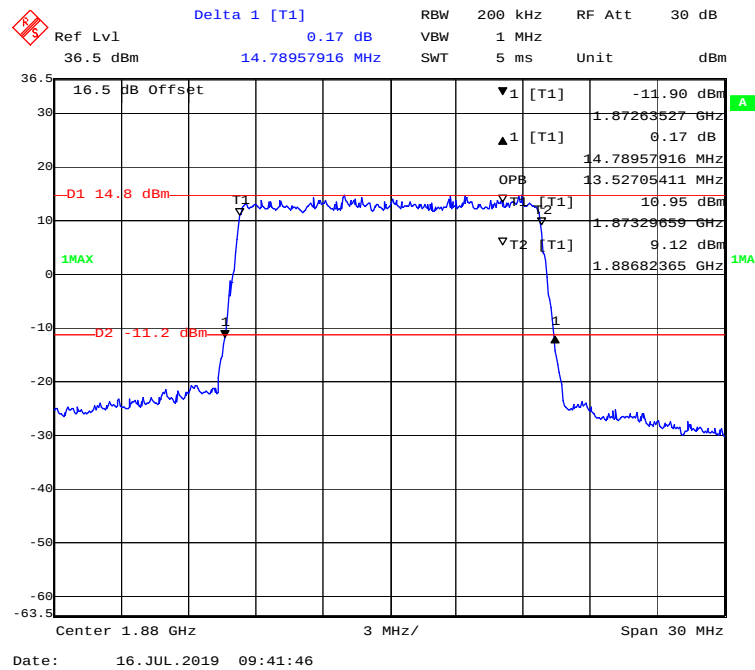
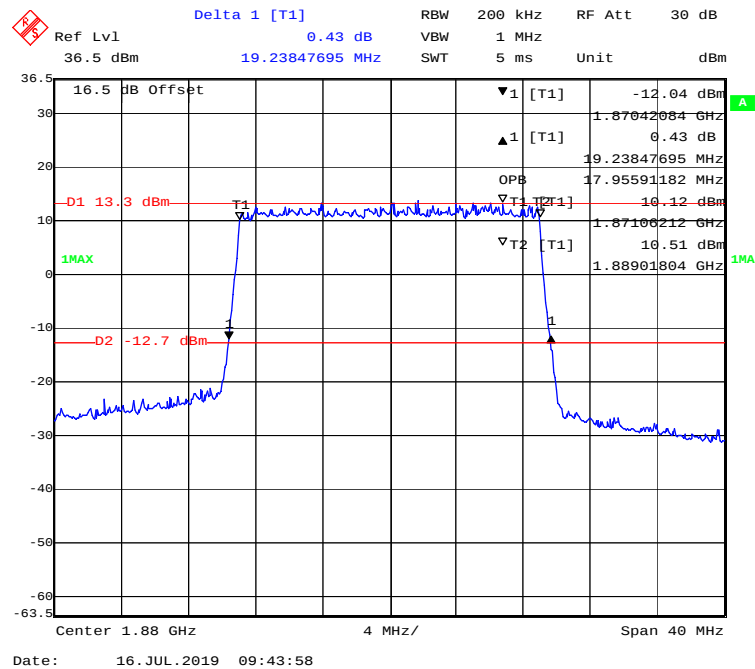
**99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode****99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSPA+) Mode**

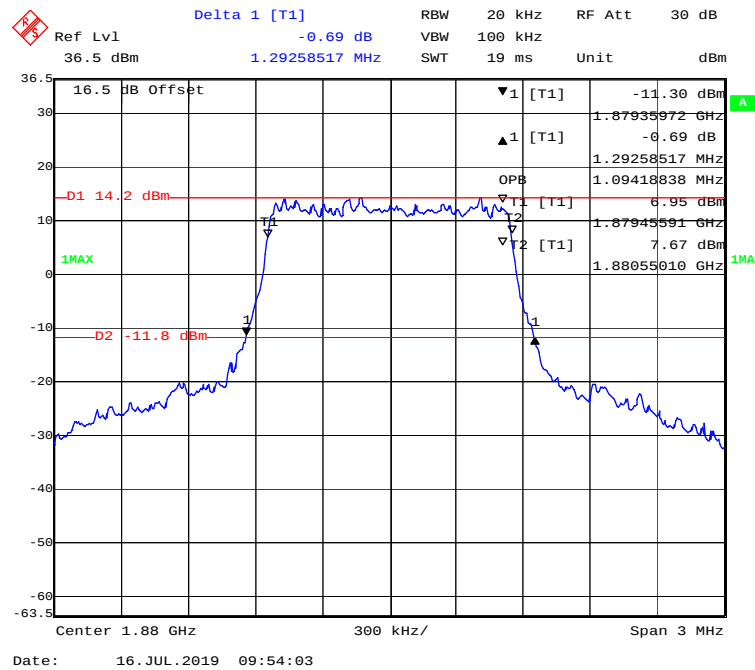
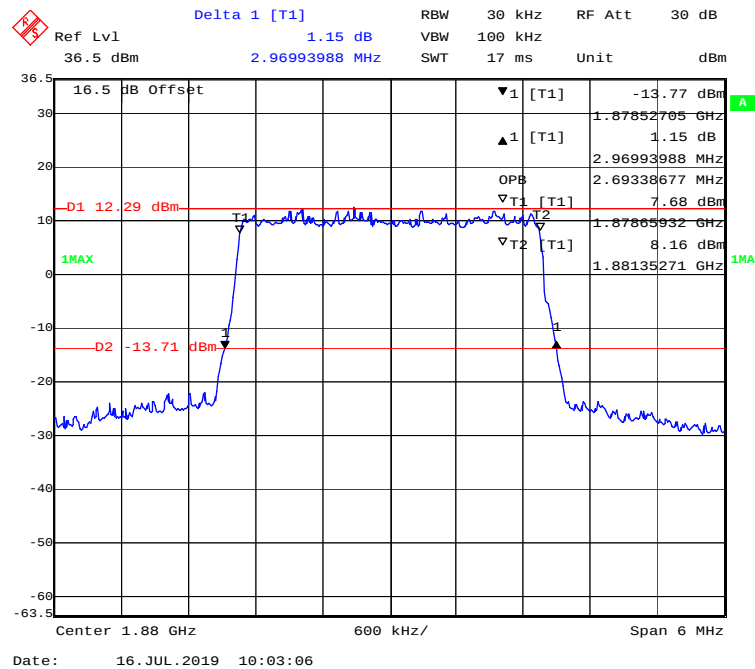
**LTE Band 2:**

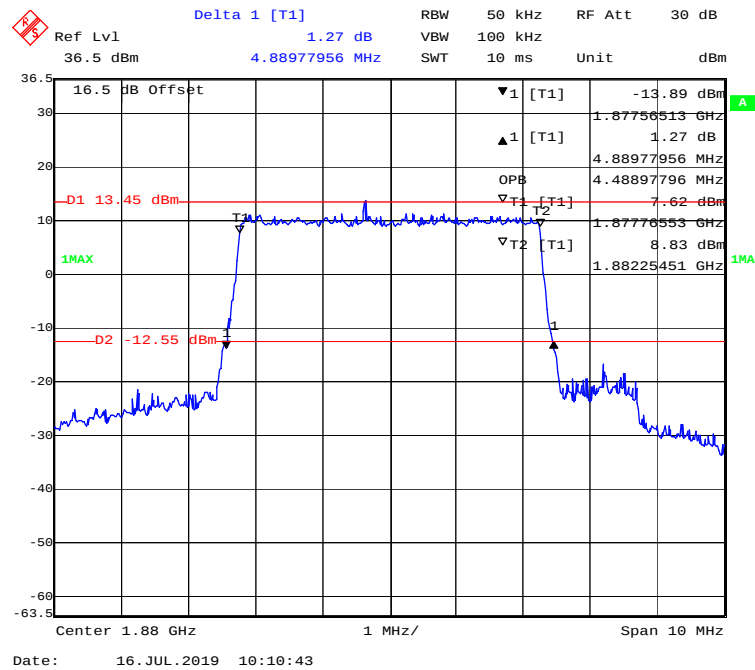
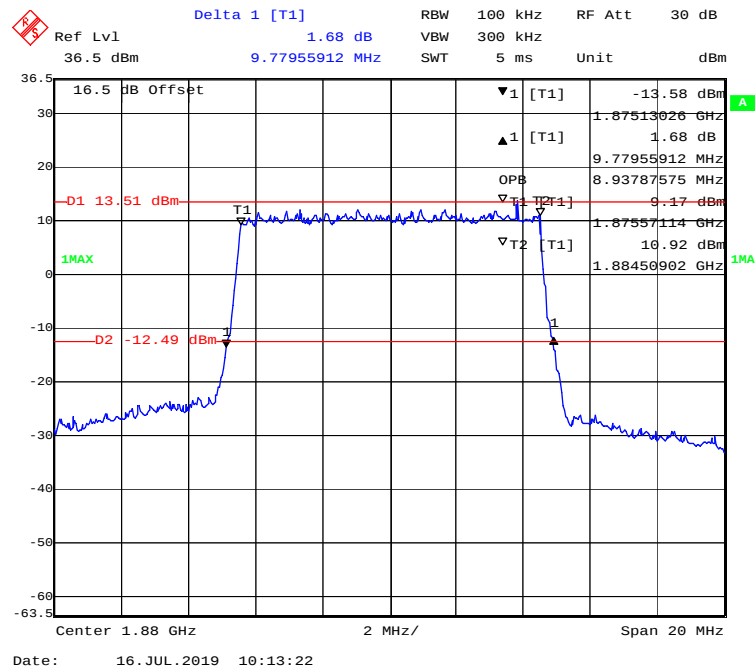
| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 1.4M           | Middle       | 1.287           | 1.094                  |
|                 | 3M             |              | 2.967           | 2.705                  |
|                 | 5M             |              | 4.991           | 4.509                  |
|                 | 10M            |              | 9.860           | 8.978                  |
|                 | 15M            |              | 14.790          | 13.527                 |
|                 | 20M            |              | 19.238          | 17.956                 |
| 16-QAM          | 1.4M           | Middle       | 1.293           | 1.094                  |
|                 | 3M             |              | 2.970           | 2.693                  |
|                 | 5M             |              | 4.890           | 4.489                  |
|                 | 10M            |              | 9.780           | 8.938                  |
|                 | 15M            |              | 14.929          | 13.467                 |
|                 | 20M            |              | 19.319          | 17.956                 |

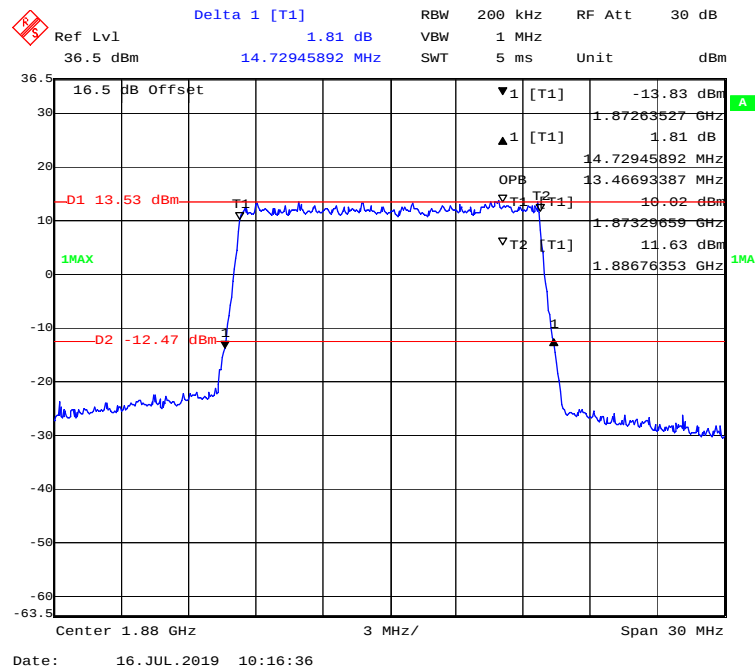
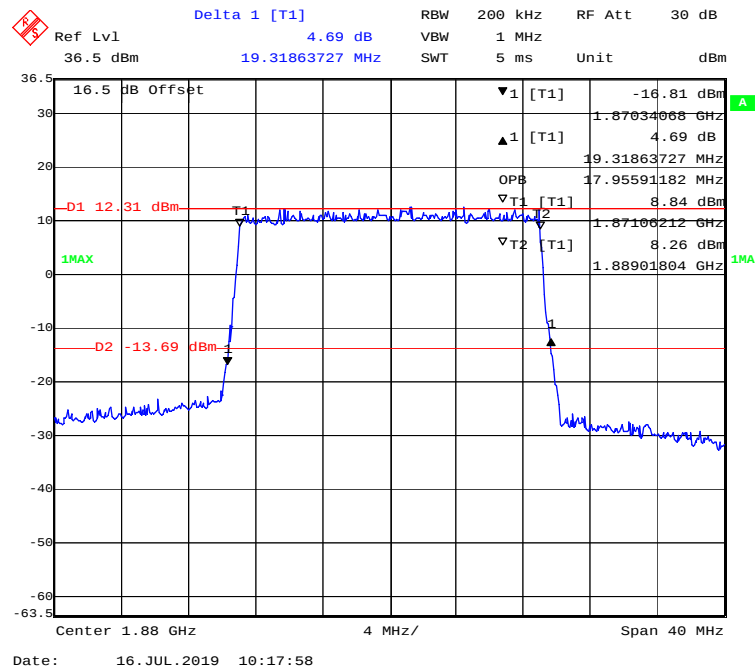
**QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**QPSK (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

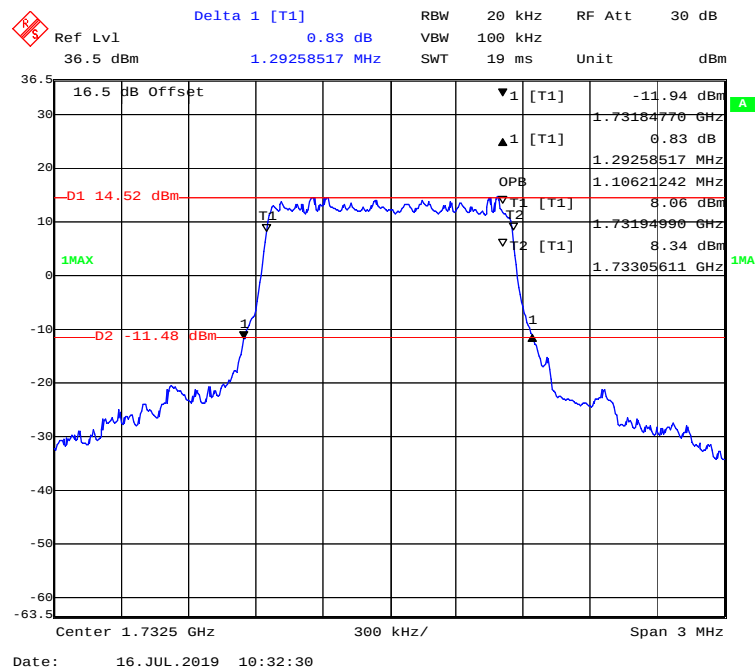
**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

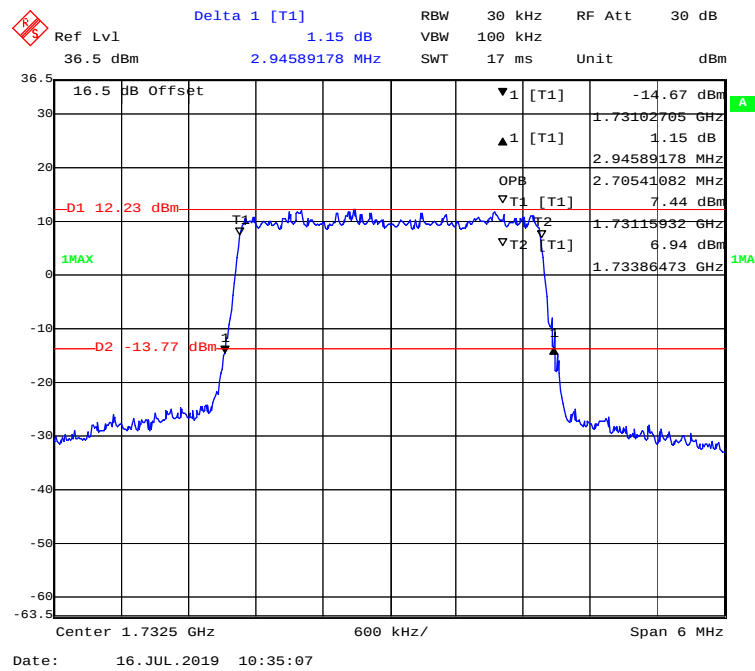
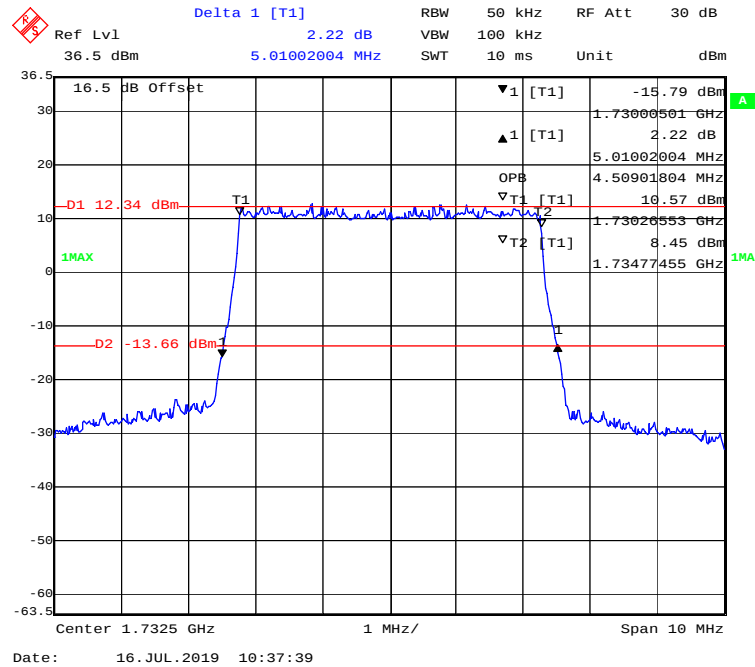
**16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

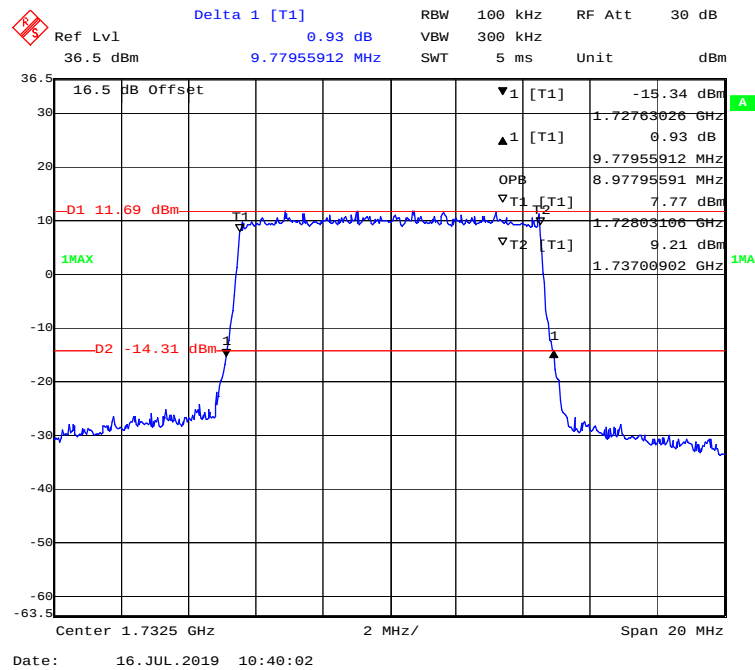
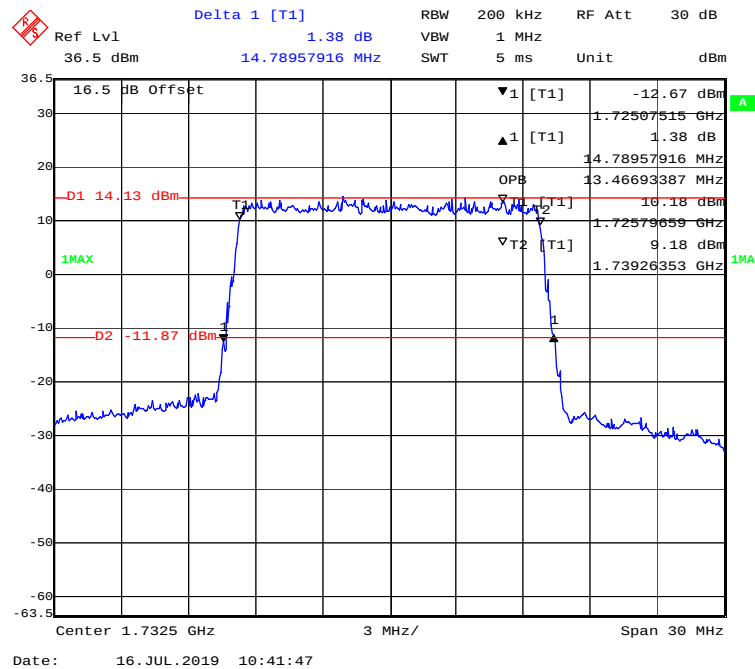
**16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**LTE Band 4:**

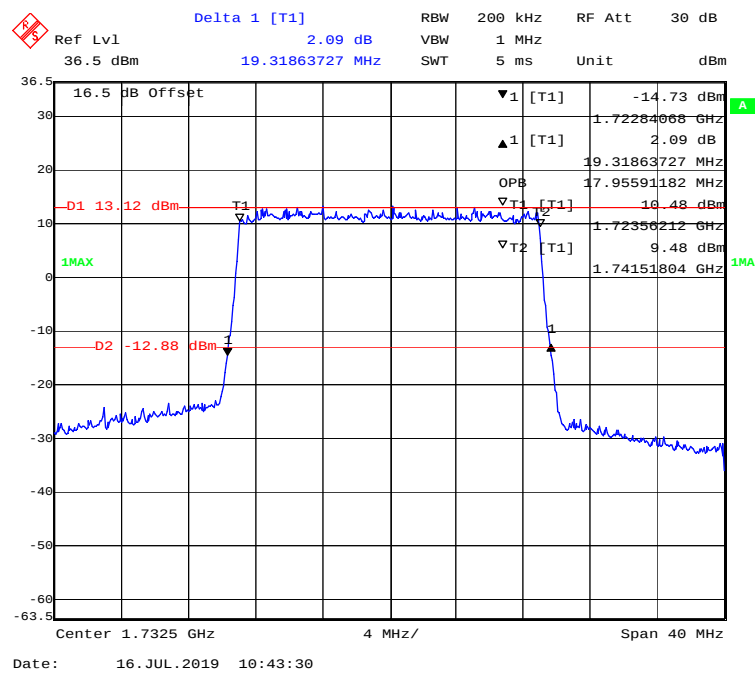
| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 1.4M           | Middle       | 1.293           | 1.106                  |
|                 | 3M             |              | 2.946           | 2.705                  |
|                 | 5M             |              | 5.010           | 4.509                  |
|                 | 10M            |              | 9.780           | 8.978                  |
|                 | 15M            |              | 14.790          | 13.467                 |
|                 | 20M            |              | 19.319          | 17.956                 |
| 16-QAM          | 1.4M           | Middle       | 1.293           | 1.094                  |
|                 | 3M             |              | 2.982           | 2.705                  |
|                 | 5M             |              | 4.950           | 4.489                  |
|                 | 10M            |              | 9.739           | 8.938                  |
|                 | 15M            |              | 14.729          | 13.467                 |
|                 | 20M            |              | 19.319          | 17.956                 |

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

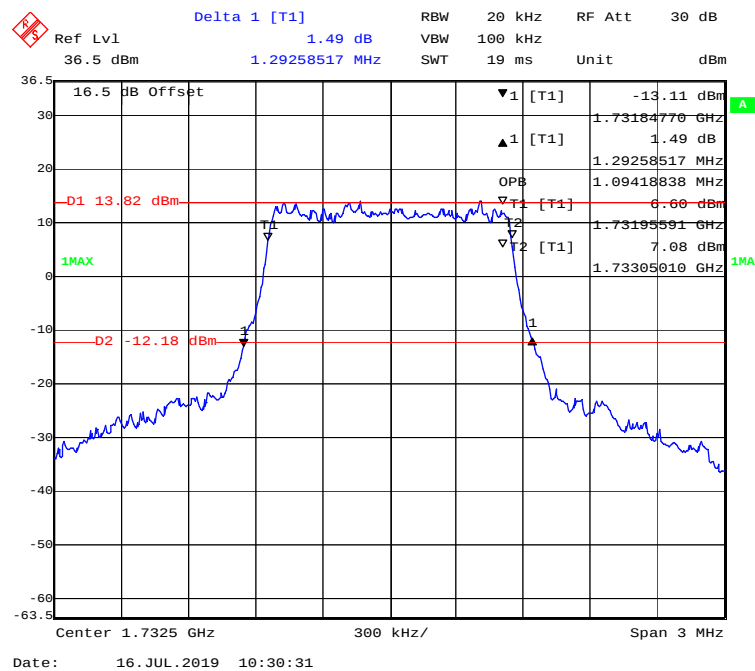
**QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (5MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

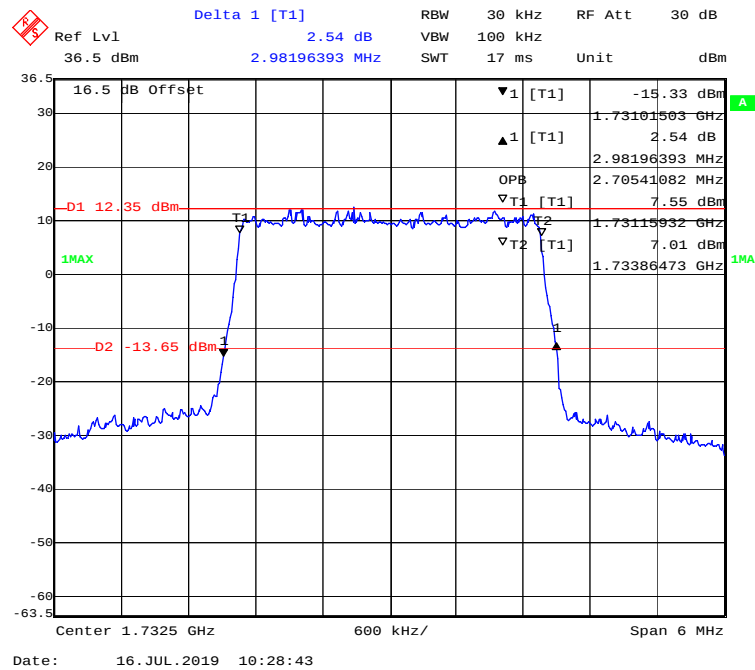
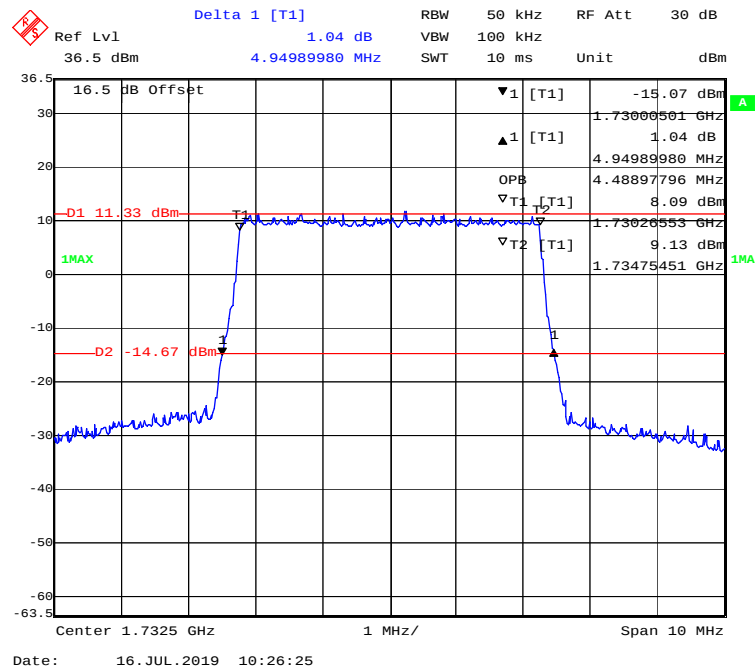
**QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

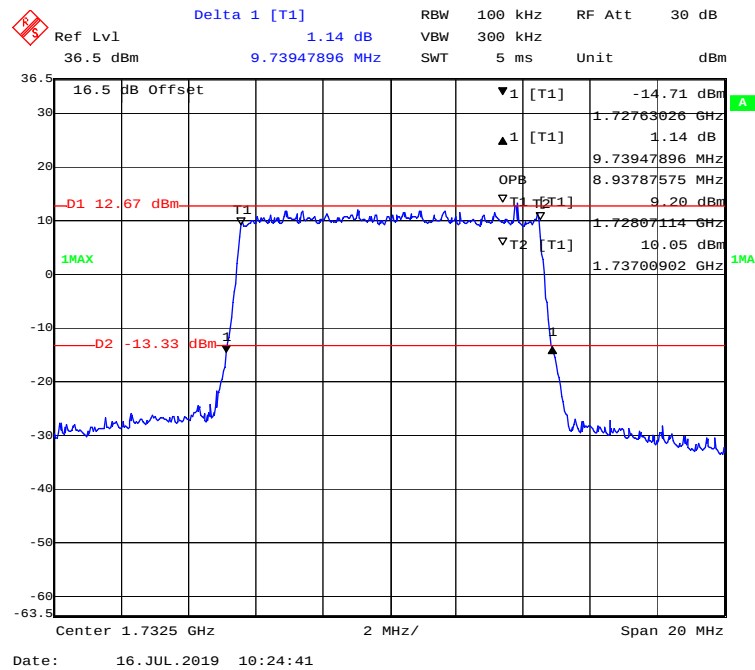
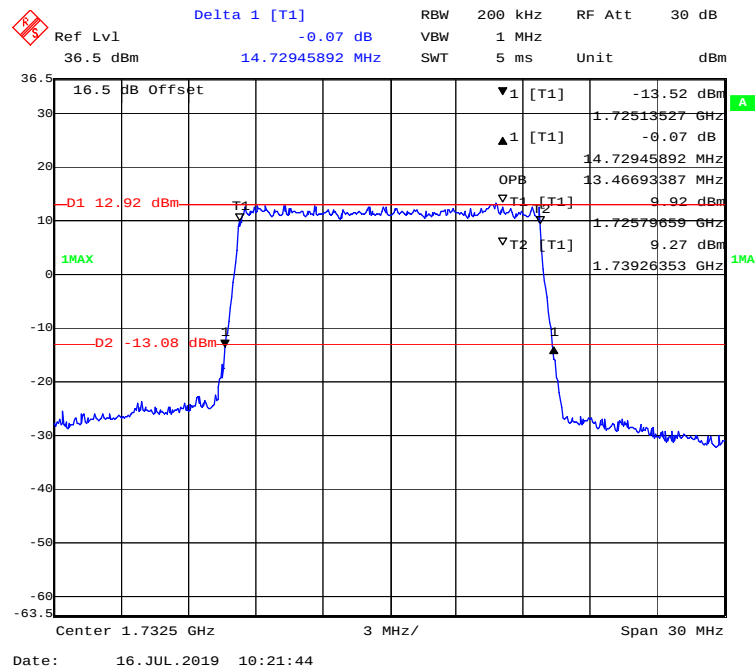
### QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



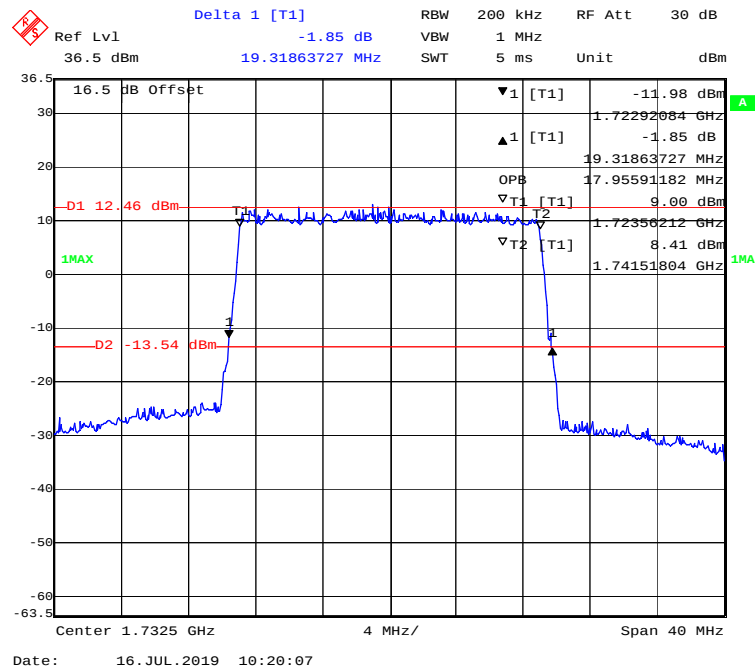
### 16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



**16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

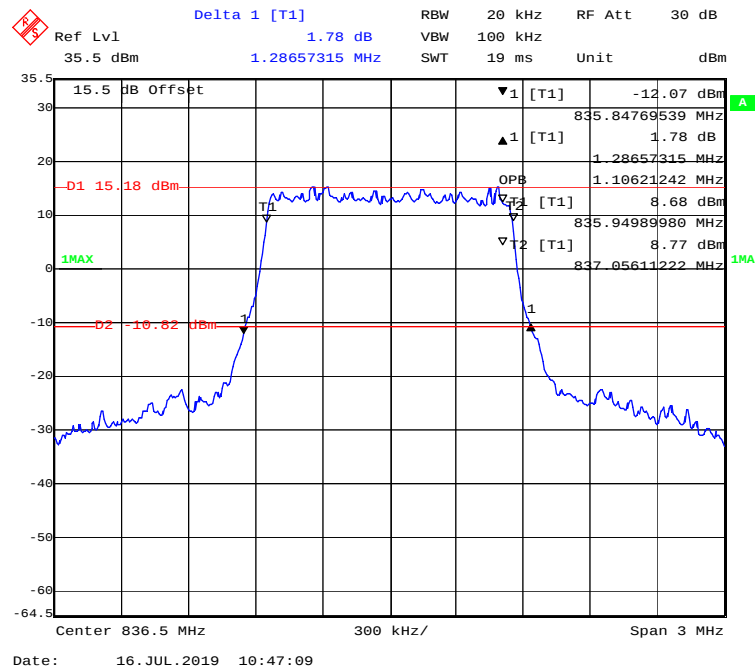
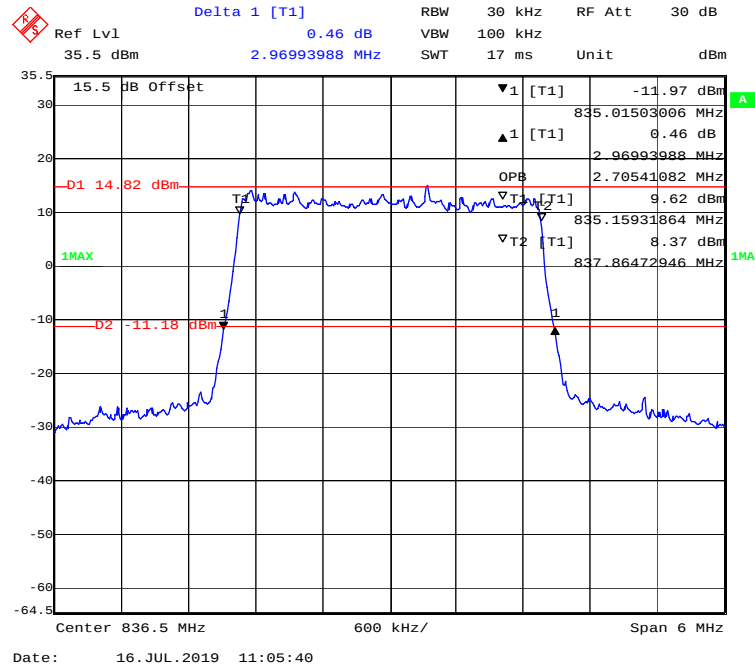
**16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

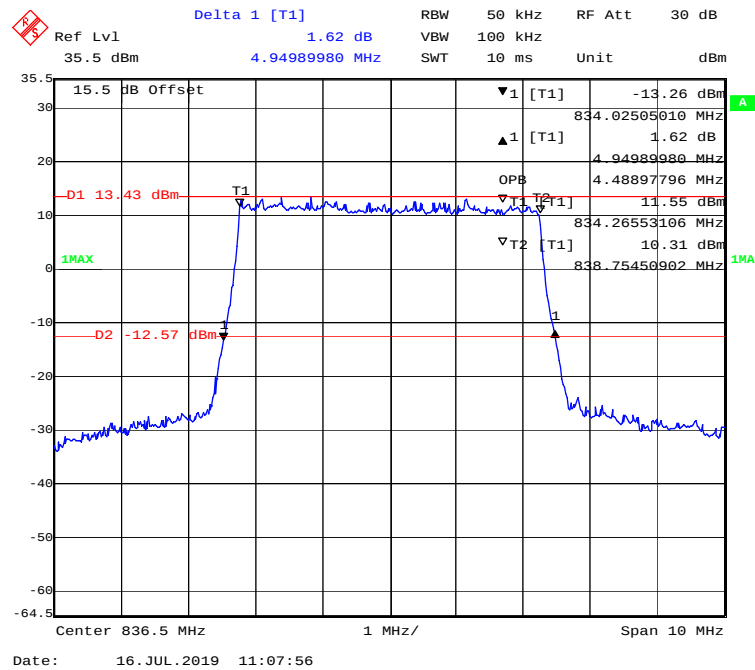
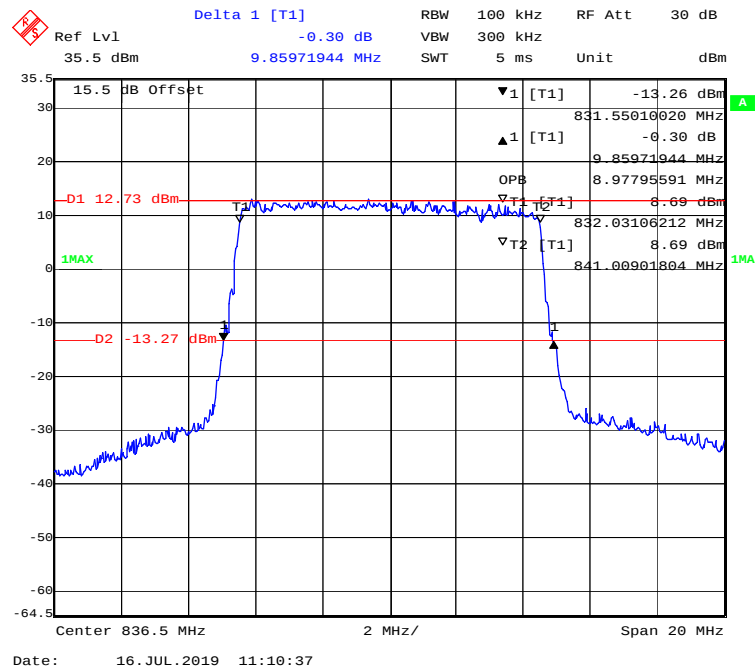
# 16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

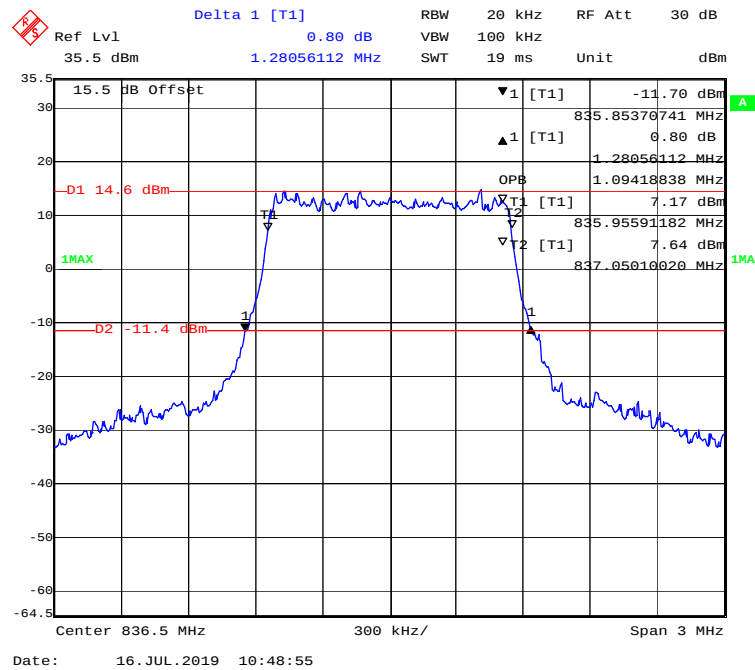
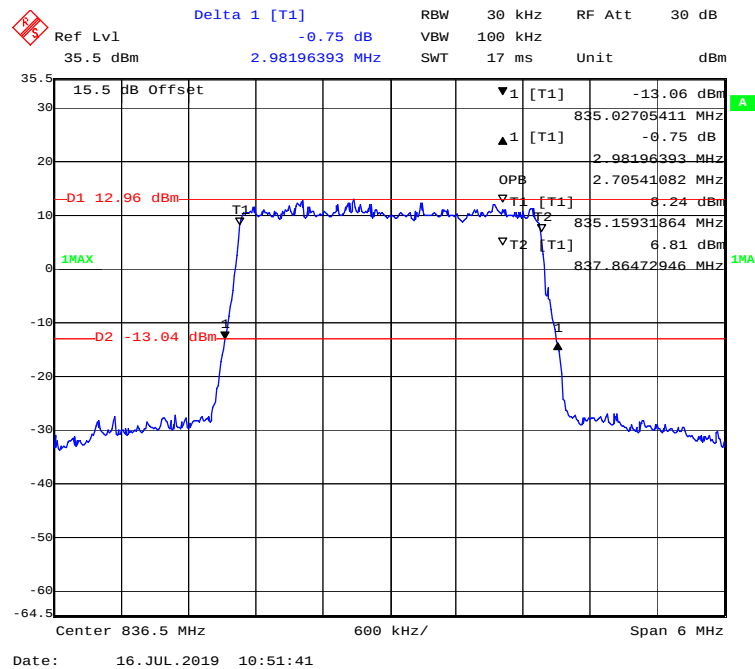


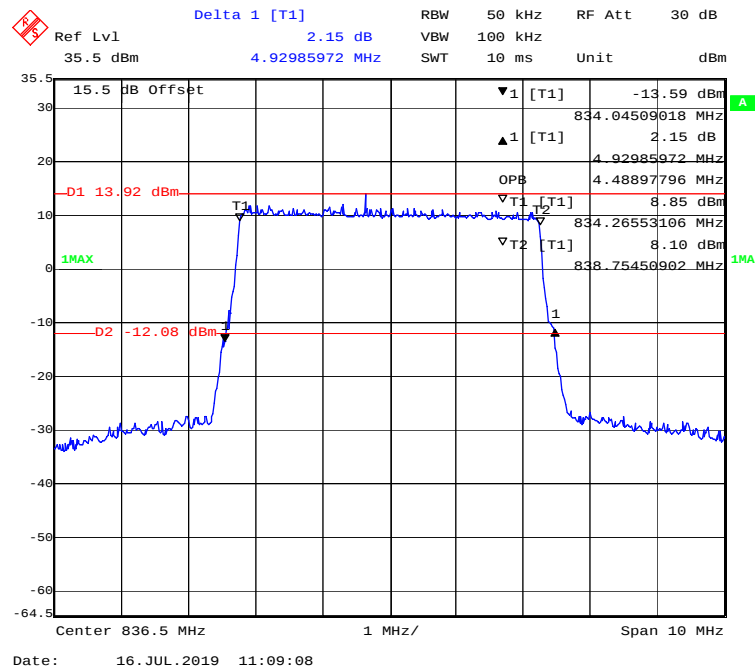
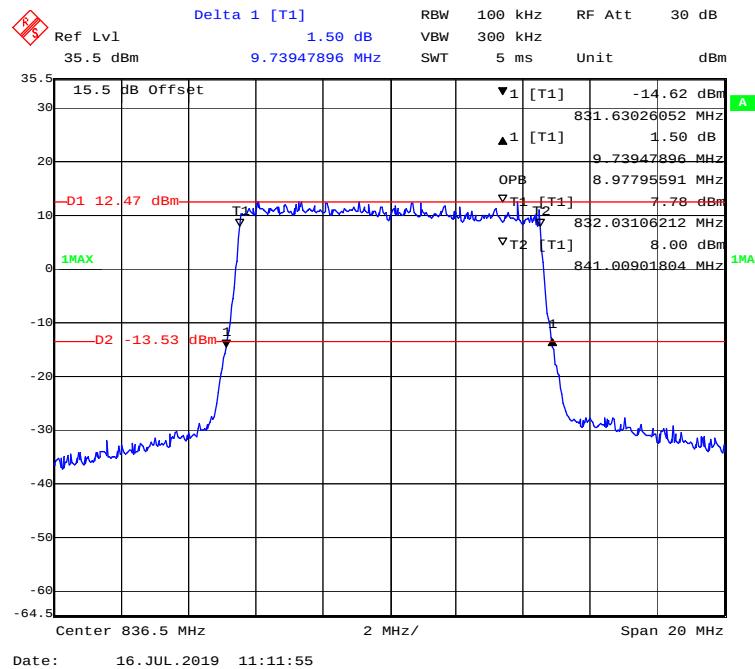
**LTE Band 5:**

| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 1.4M           | Middle       | 1.287           | 1.106                  |
|                 | 3M             |              | 2.970           | 2.705                  |
|                 | 5M             |              | 4.950           | 4.489                  |
|                 | 10M            |              | 9.860           | 8.978                  |
| 16-QAM          | 1.4M           | Middle       | 1.281           | 1.094                  |
|                 | 3M             |              | 2.982           | 2.705                  |
|                 | 5M             |              | 4.930           | 4.489                  |
|                 | 10M            |              | 9.739           | 8.978                  |

**QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

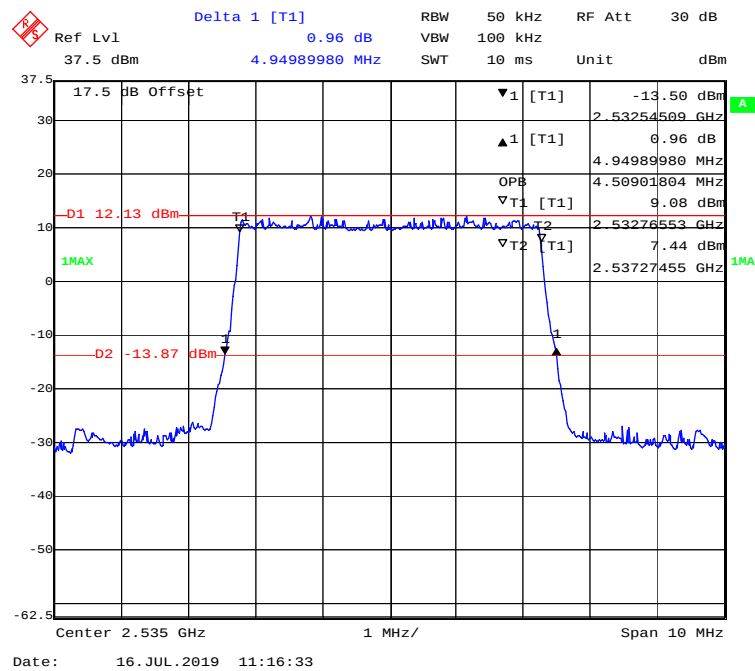
**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

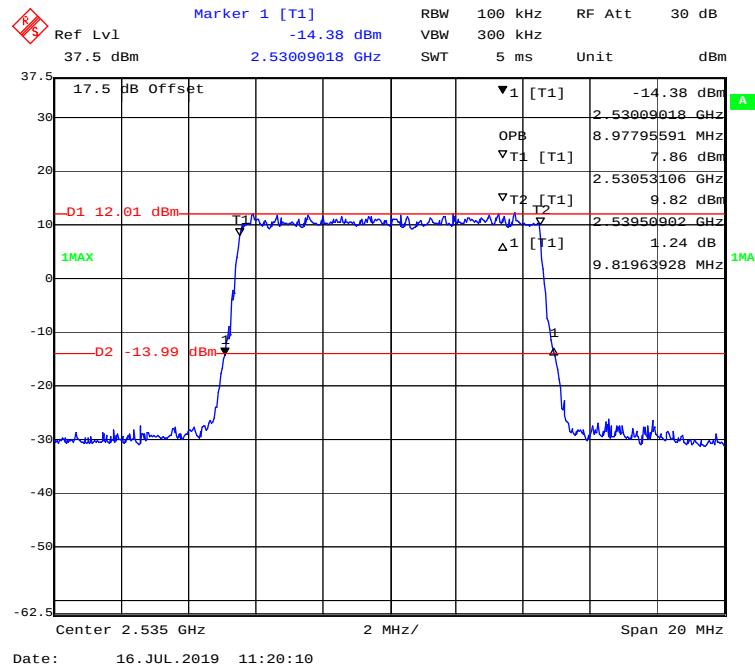
**16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**LTE Band 7:**

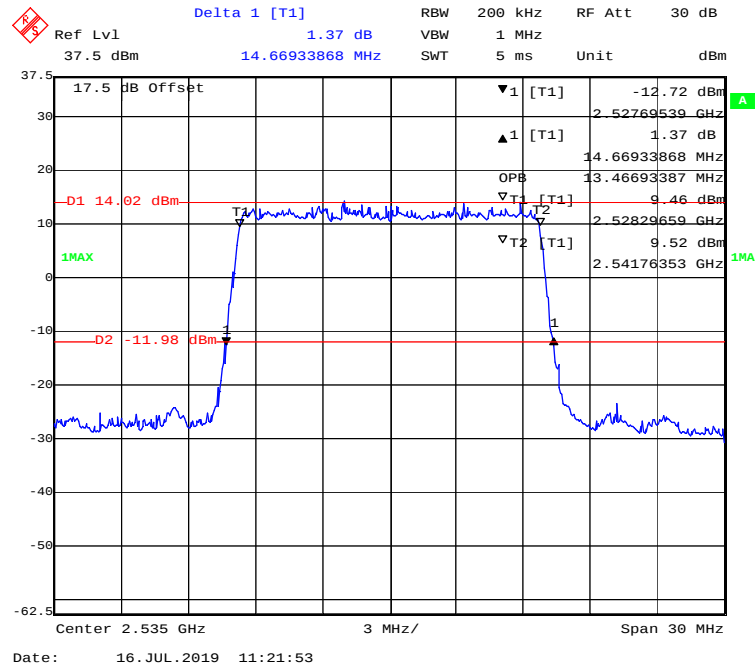
| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 5M             | Middle       | 4.950           | 4.509                  |
|                 | 10M            |              | 9.820           | 8.978                  |
|                 | 15M            |              | 14.669          | 13.467                 |
|                 | 20M            |              | 19.319          | 17.956                 |
| 16-QAM          | 5M             | Middle       | 4.930           | 4.509                  |
|                 | 10M            |              | 9.780           | 9.018                  |
|                 | 15M            |              | 14.729          | 13.467                 |
|                 | 20M            |              | 19.319          | 17.956                 |

**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

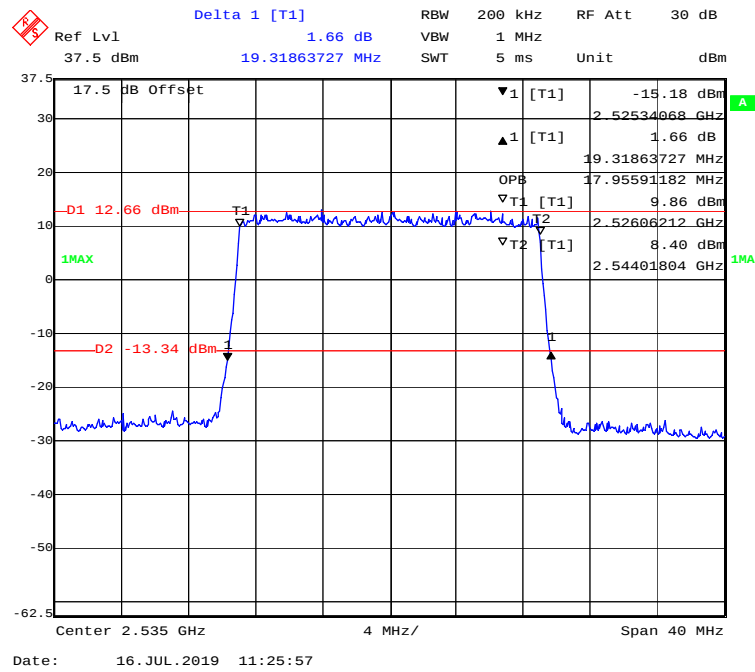
### QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

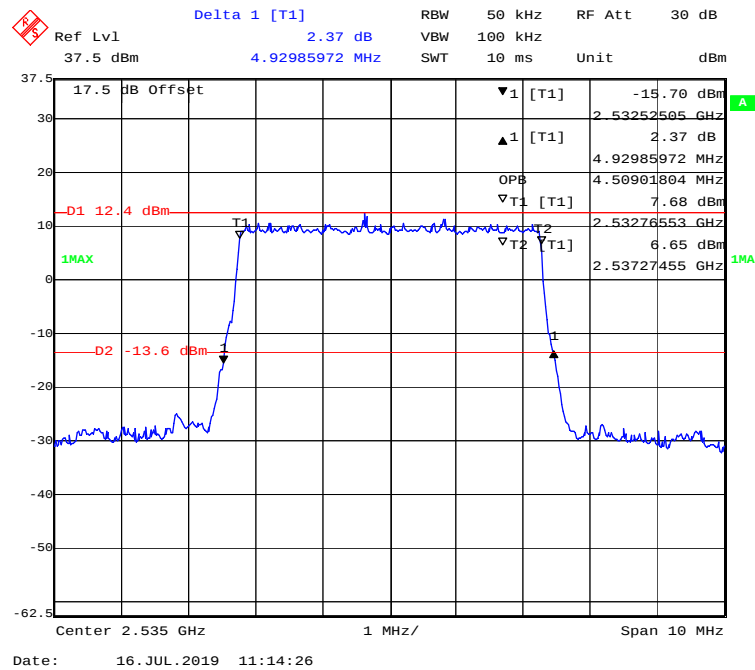
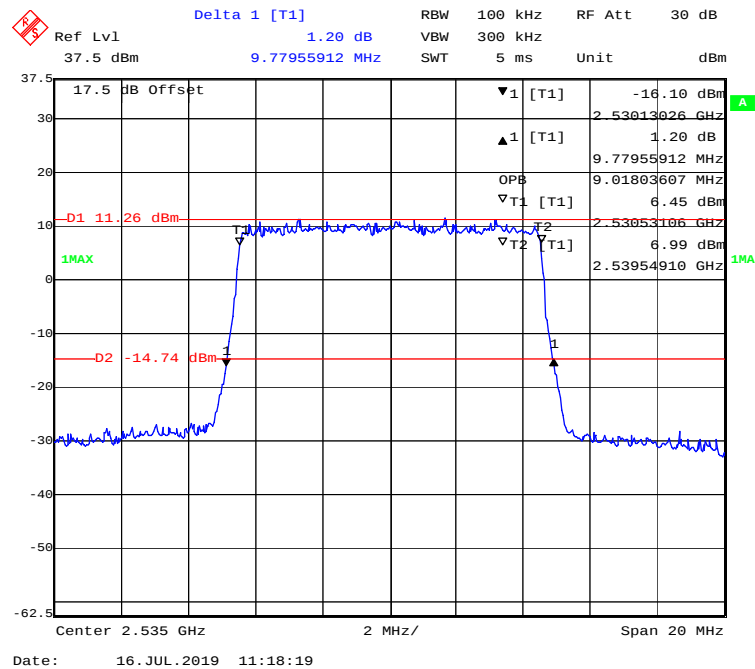


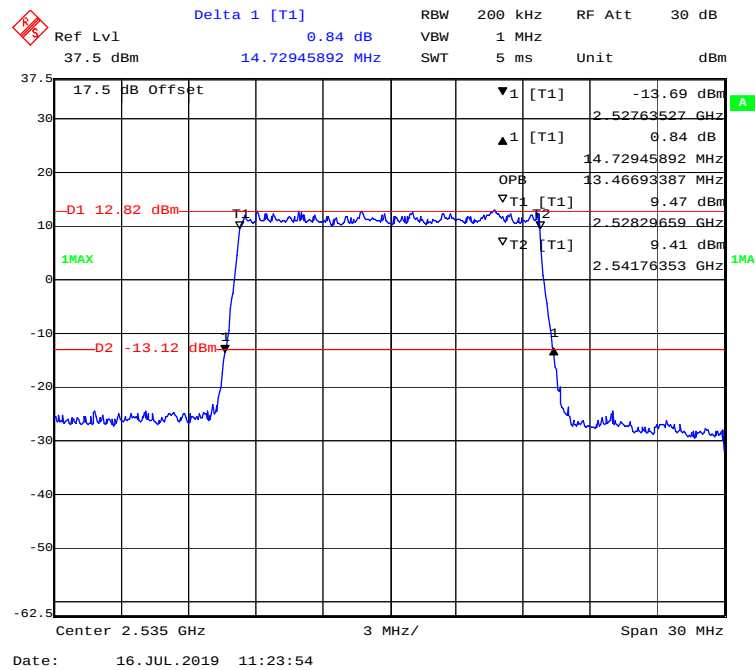
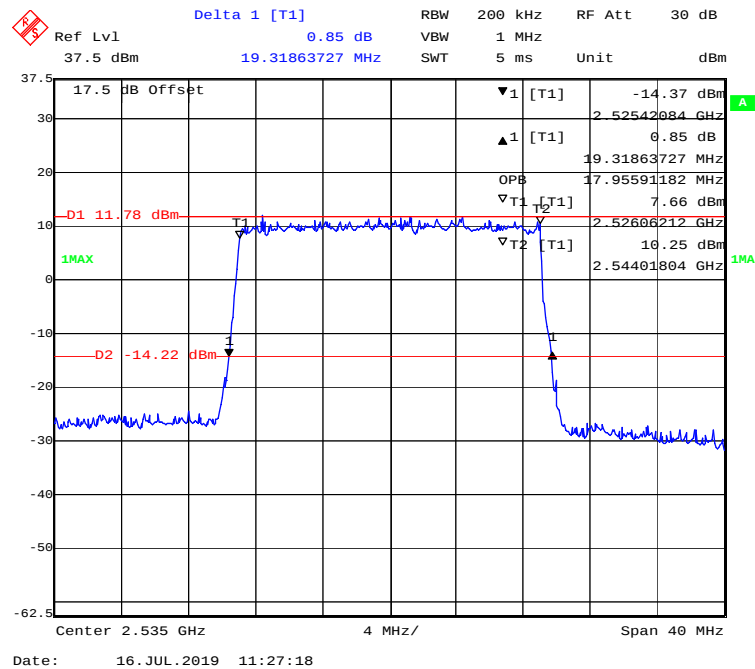
### QPSK (15MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



**QPSK (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

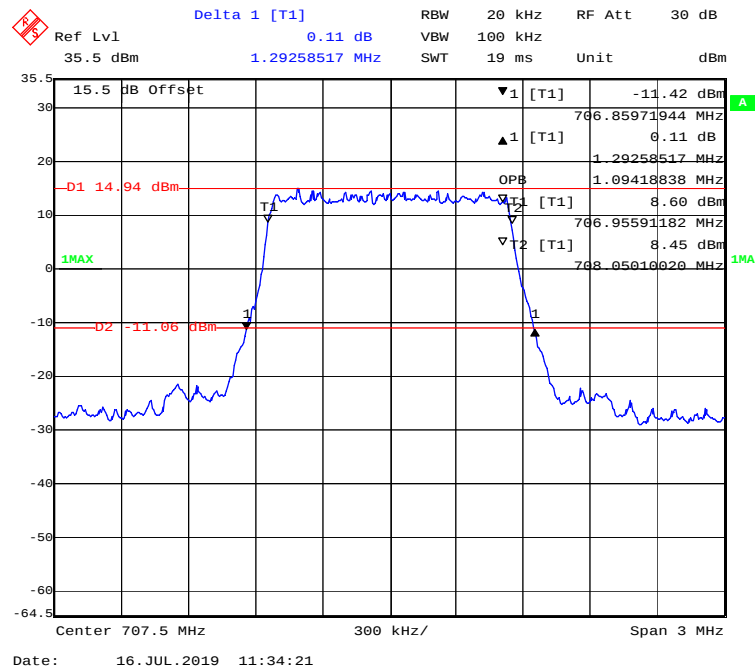
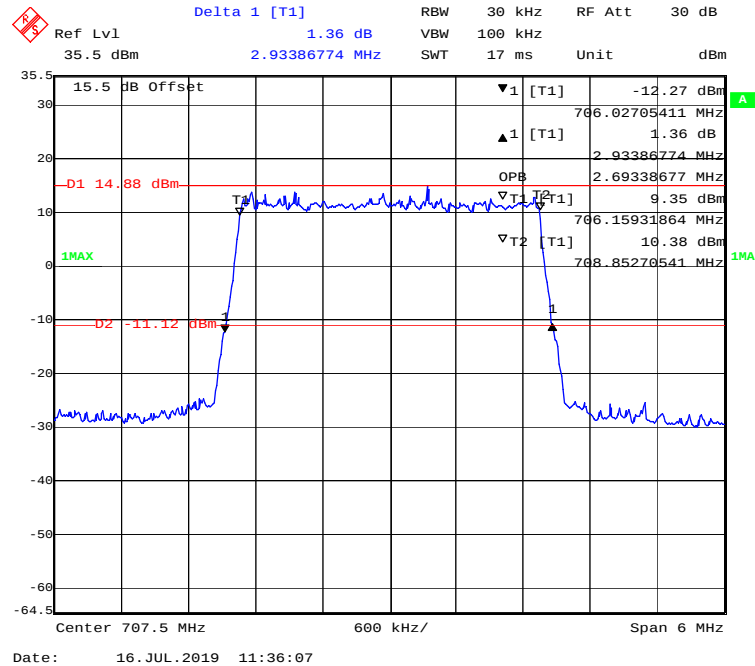


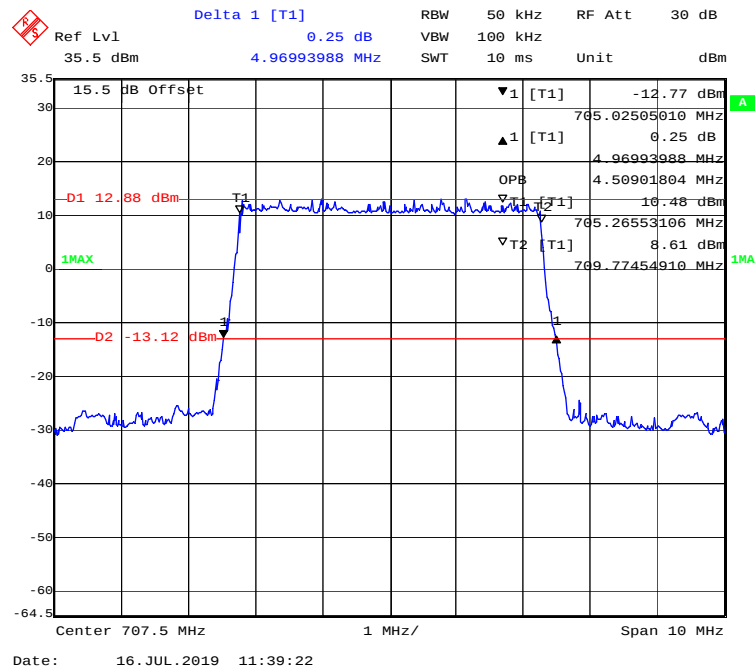
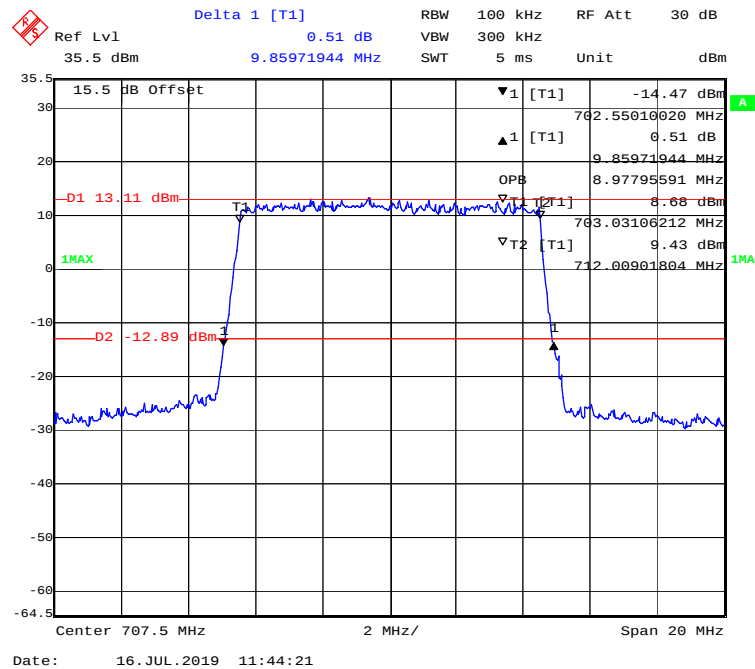
**16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

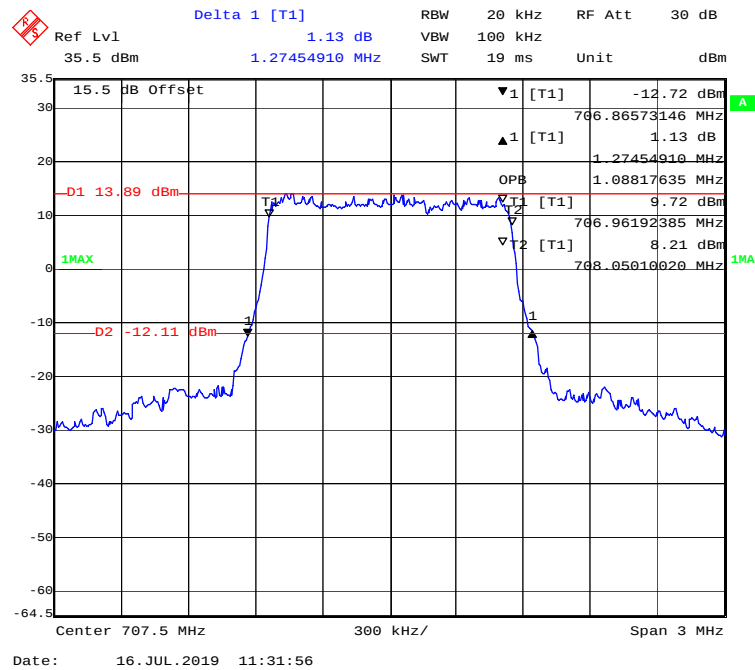
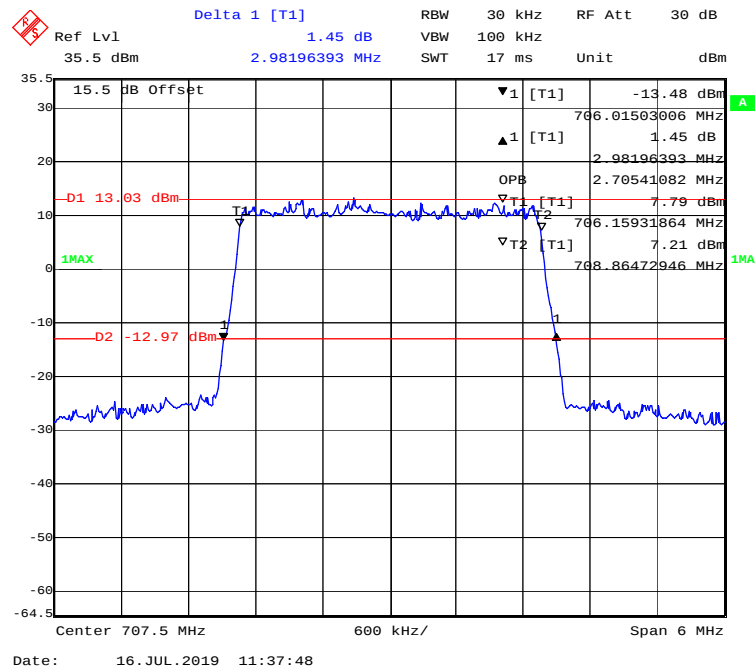
**16-QAM (15 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (20 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**LTE Band 12:**

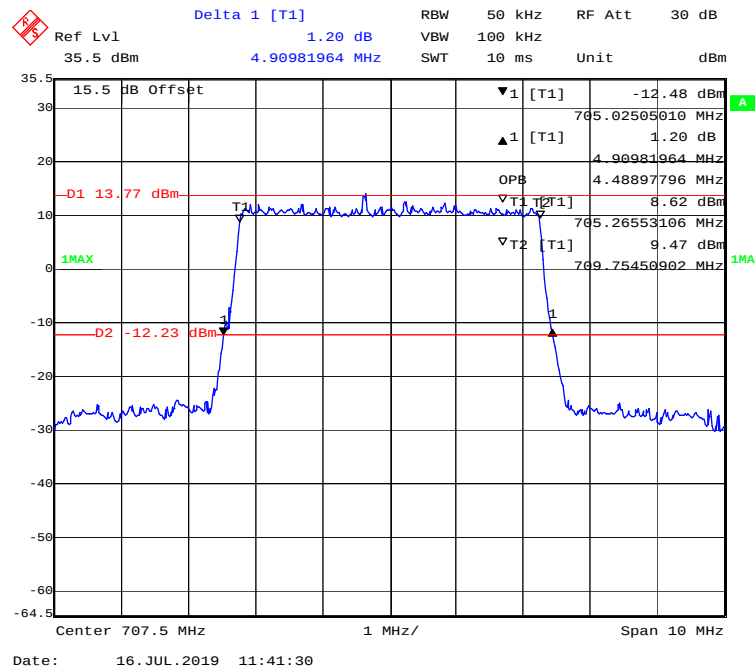
| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 1.4M           | Middle       | 1.293           | 1.094                  |
|                 | 3M             |              | 2.934           | 2.693                  |
|                 | 5M             |              | 4.970           | 4.509                  |
|                 | 10M            |              | 9.860           | 8.978                  |
| 16-QAM          | 1.4M           | Middle       | 1.275           | 1.088                  |
|                 | 3M             |              | 2.982           | 2.705                  |
|                 | 5M             |              | 4.910           | 4.489                  |
|                 | 10M            |              | 9.699           | 8.938                  |

**QPSK (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

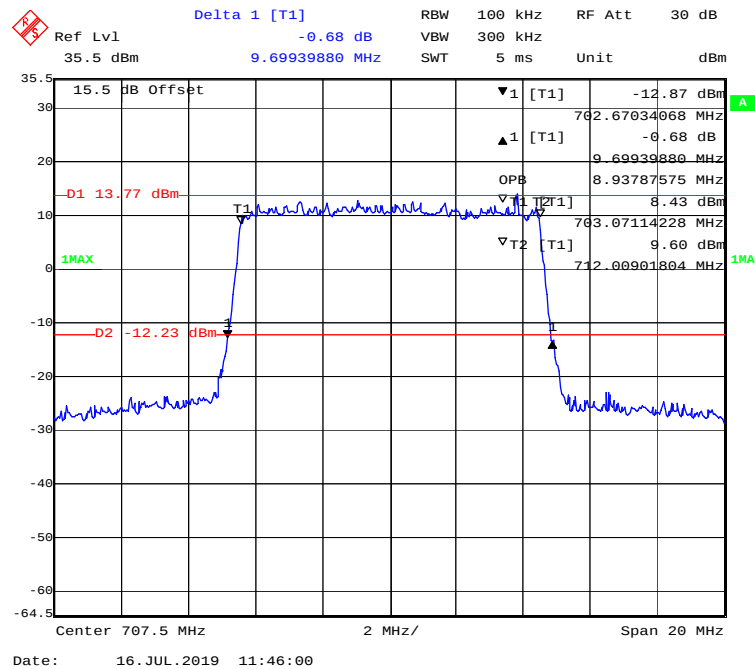
**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****QPSK (10MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**16-QAM (1.4 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (3 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

### 16-QAM (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel

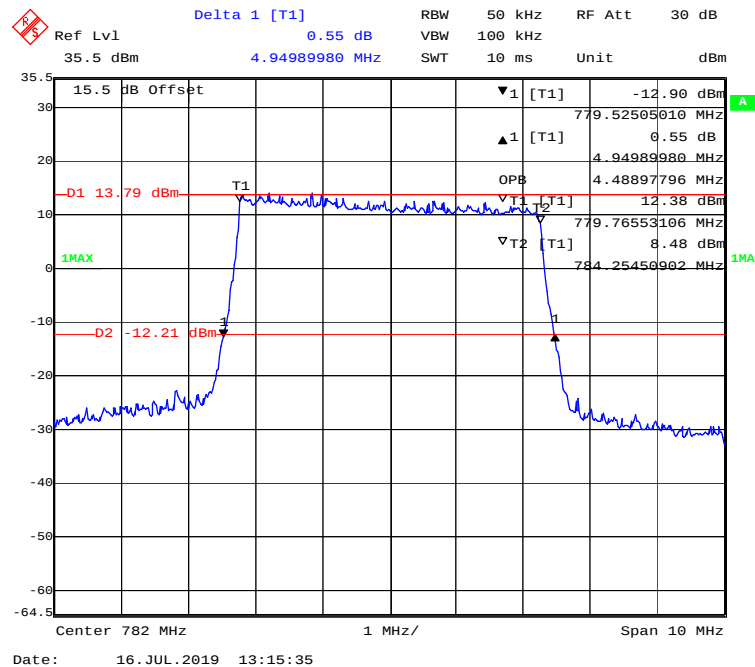


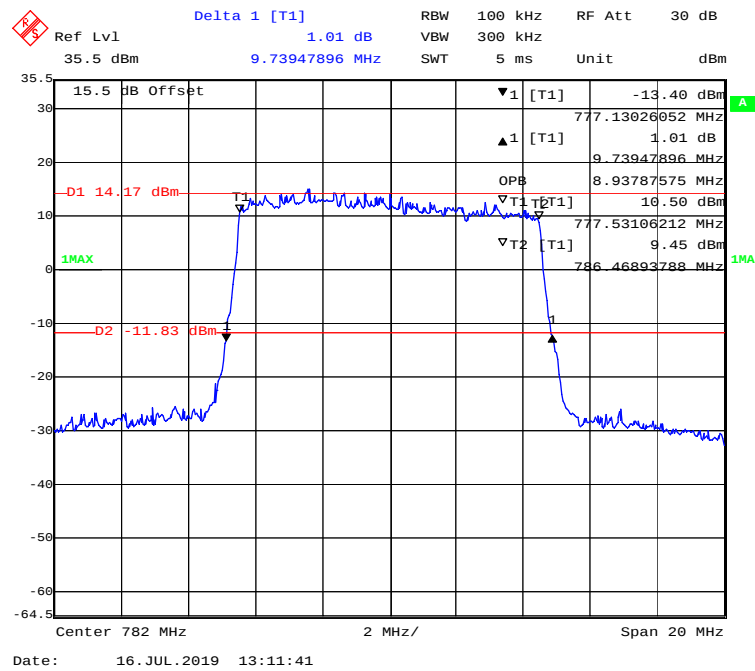
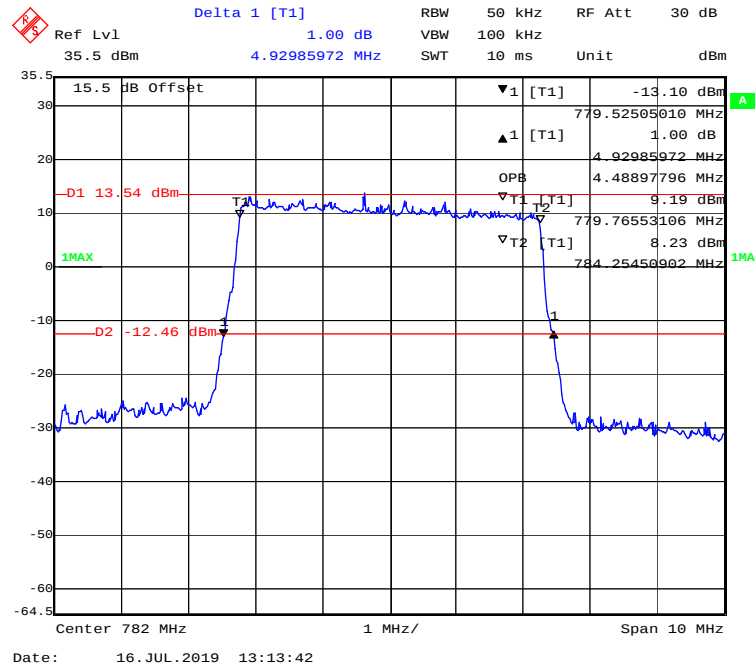
### 16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



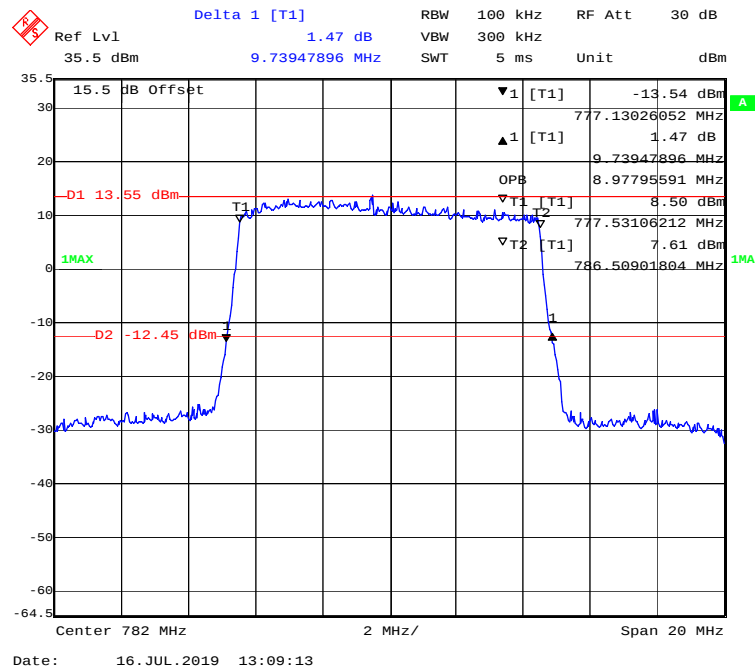
**LTE Band 13:**

| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 5M             | Middle       | 4.950           | 4.489                  |
|                 | 10M            |              | 9.739           | 8.938                  |
| 16-QAM          | 5M             | Middle       | 4.930           | 4.489                  |
|                 | 10M            |              | 9.739           | 8.978                  |

**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

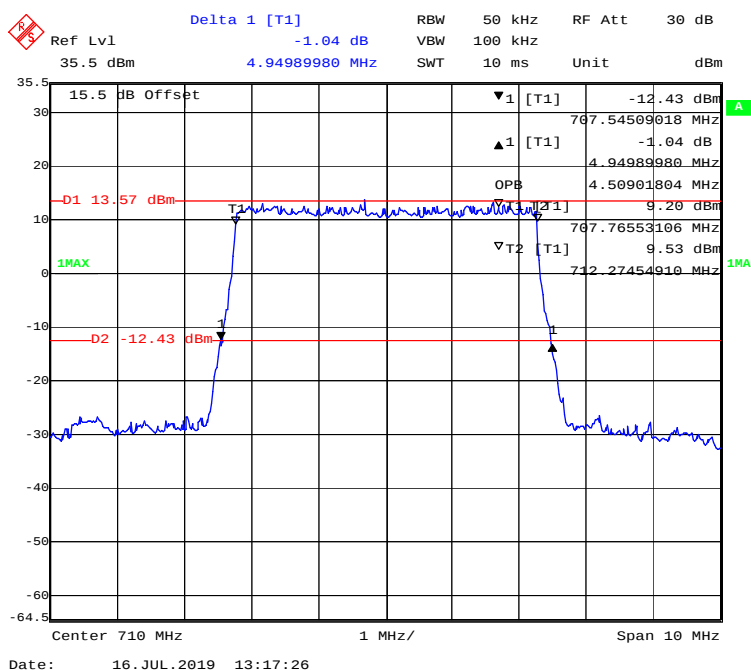
**QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (5MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

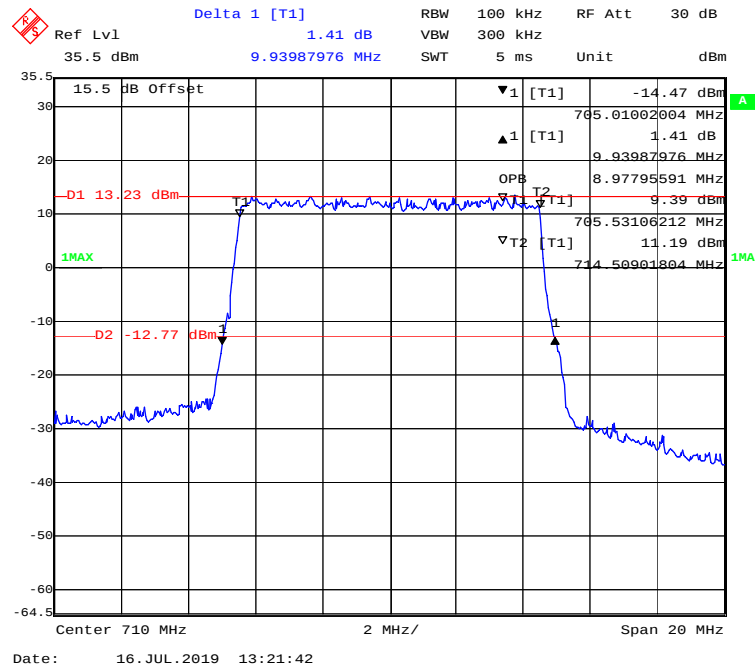
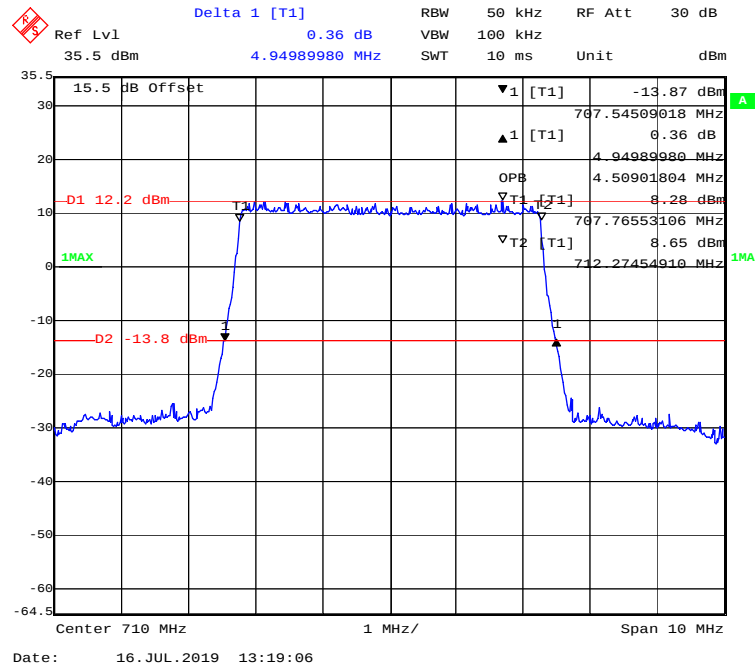
# 16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



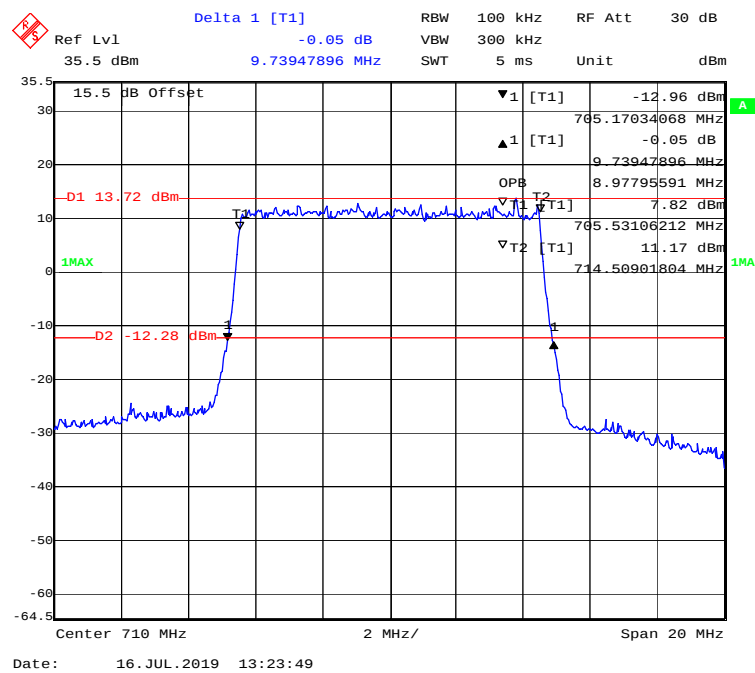
**LTE Band 17:**

| Test Modulation | Test Bandwidth | Test Channel | 26 dB Bandwidth | 99% Occupied Bandwidth |
|-----------------|----------------|--------------|-----------------|------------------------|
|                 |                |              | MHz             | MHz                    |
| QPSK            | 5M             | Middle       | 4.950           | 4.509                  |
|                 | 10M            |              | 9.940           | 8.978                  |
| 16-QAM          | 5M             | Middle       | 4.950           | 4.509                  |
|                 | 10M            |              | 9.739           | 8.978                  |

**QPSK (5 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

**QPSK (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel****16-QAM (5MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel**

# 16-QAM (10 MHz) - 99% Occupied & 26 dB Emissions Bandwidth, Middle channel



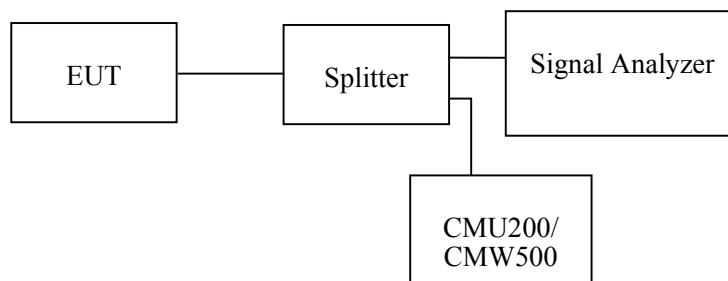
**FCC § 2.1051; § 22.917 (a); § 24.238 (a); §27.53(c) (f) (h) (m) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS****Applicable Standards**

FCC §2.1051, §22.917(a) and §24.238(a) and §27.53(c) (f) (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 100 kHz for below 1GHz & 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

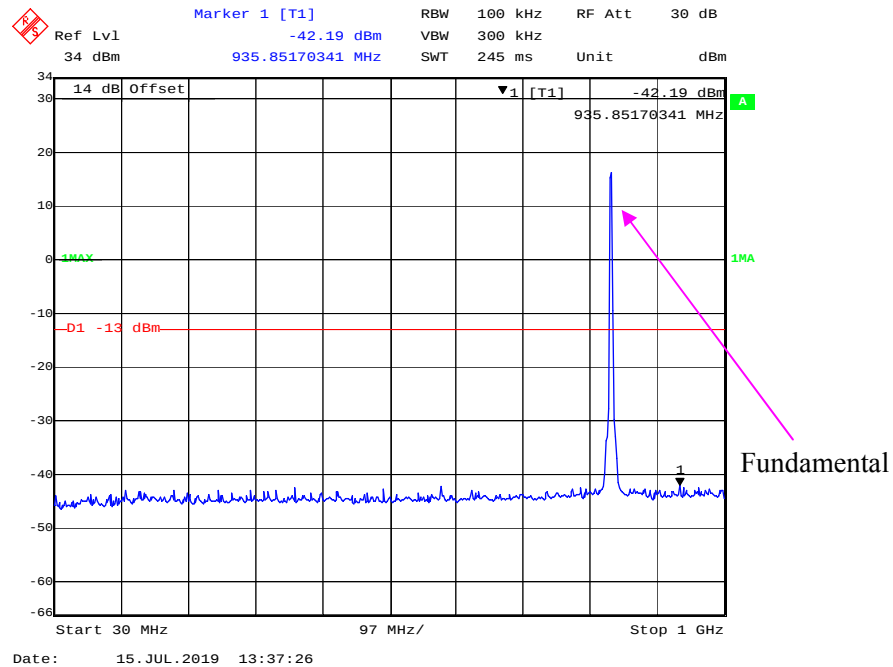
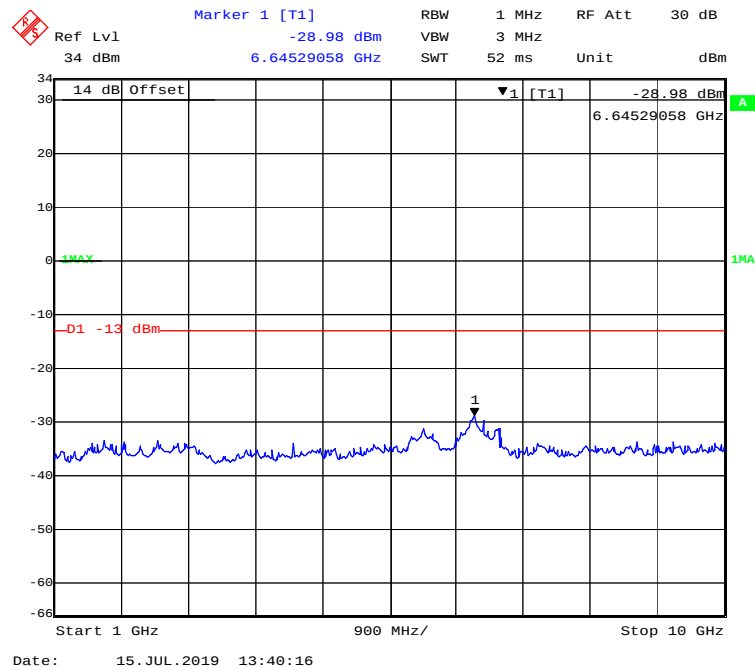
**Test Data****Environmental Conditions**

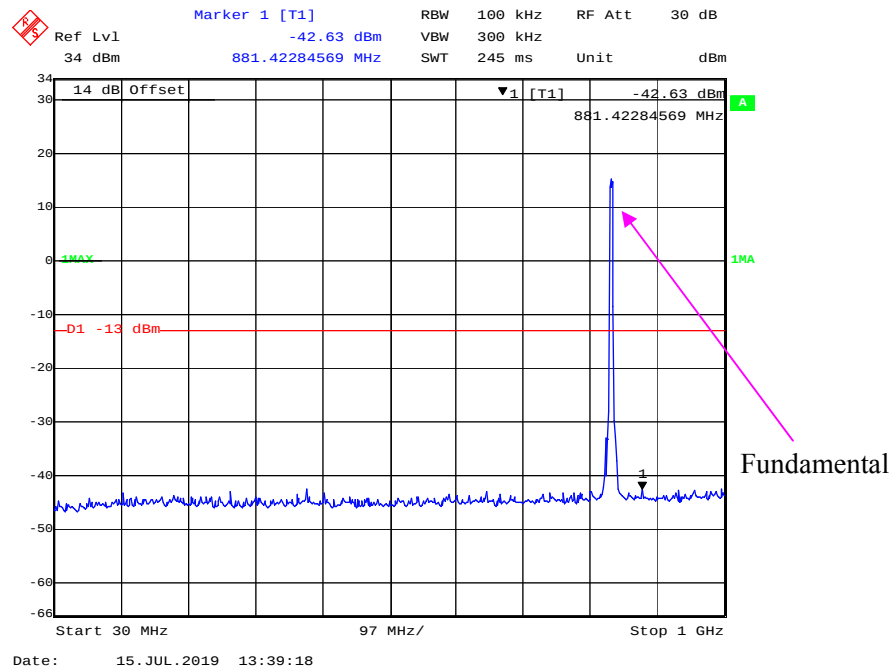
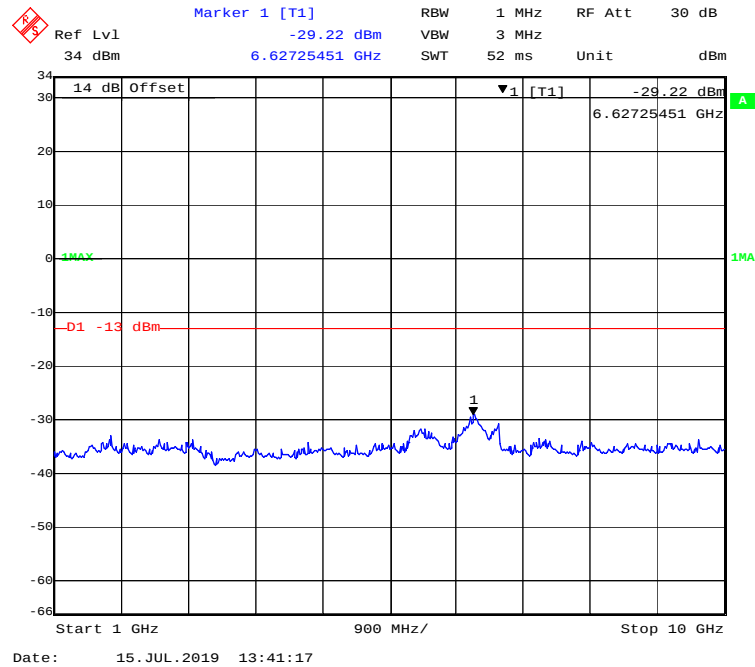
|                    |                   |
|--------------------|-------------------|
| Temperature:       | 23.2°C-23.5°C     |
| Relative Humidity: | 51 %-53%          |
| ATM Pressure:      | 101.1kPa-103.3kPa |

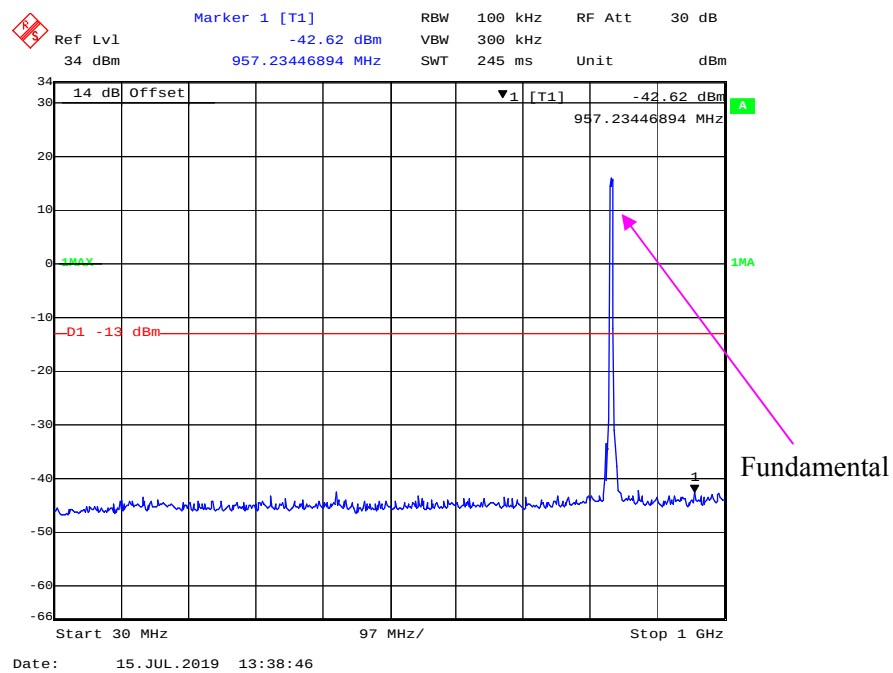
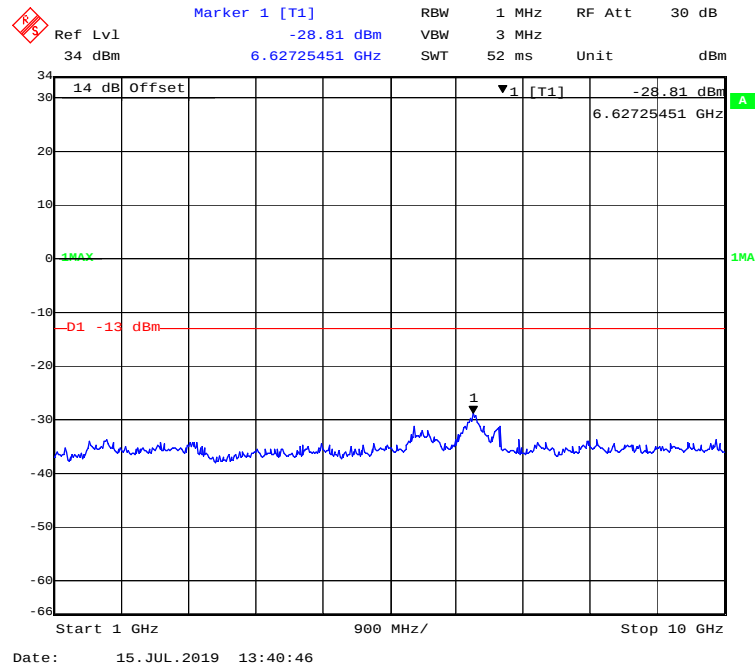
The testing was performed by Max Min from 2019-07-15 to 2019-08-01.

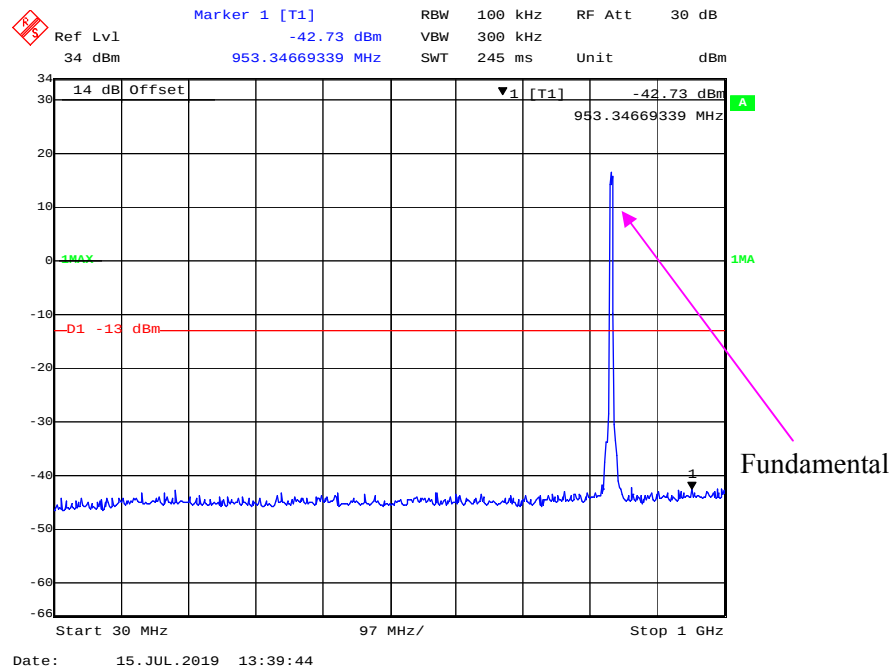
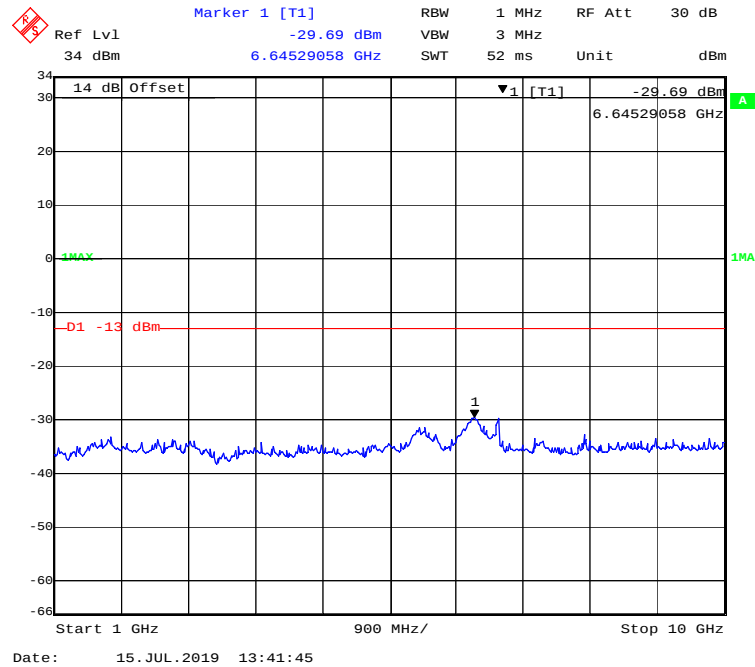
EUT operation mode: Transmitting

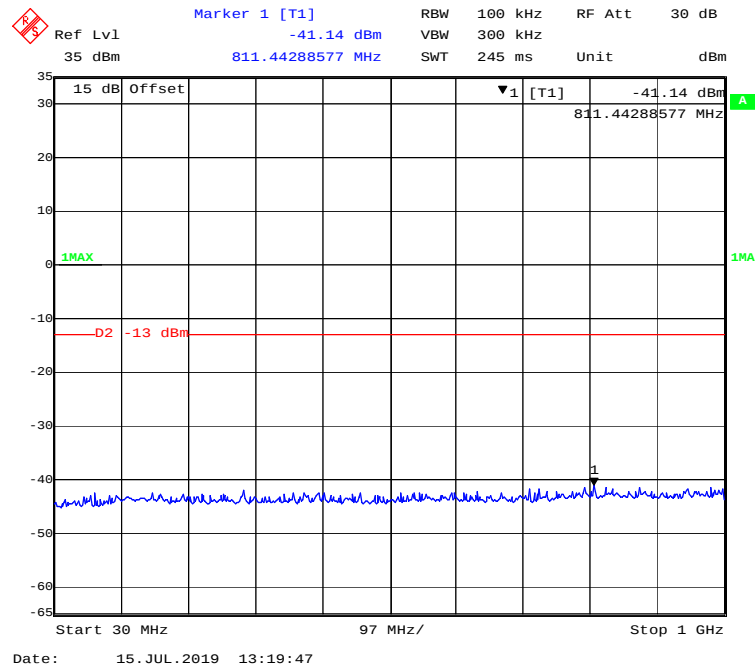
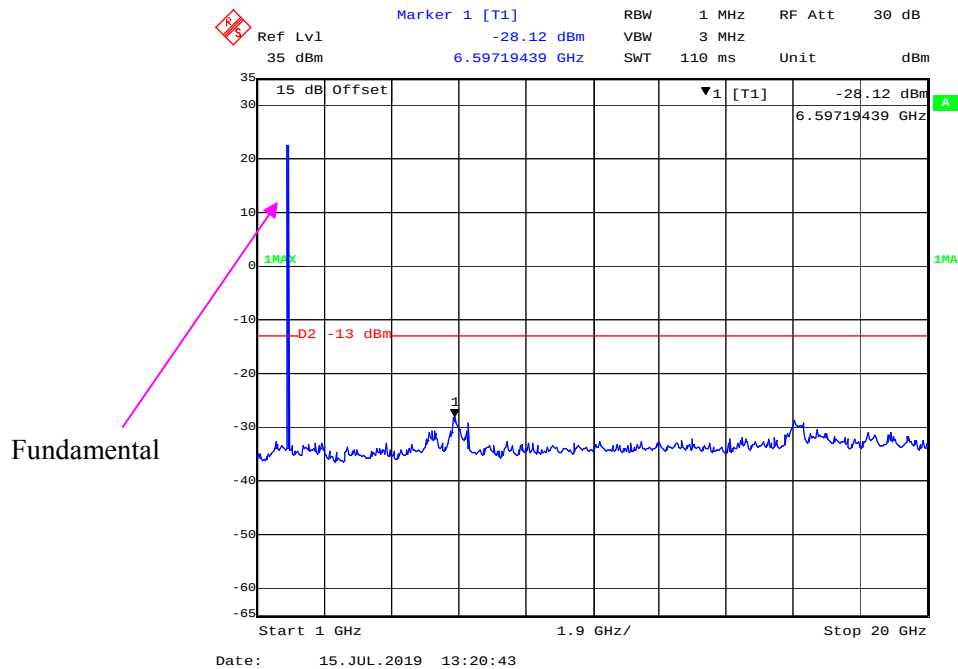
Test Result: Compliant.

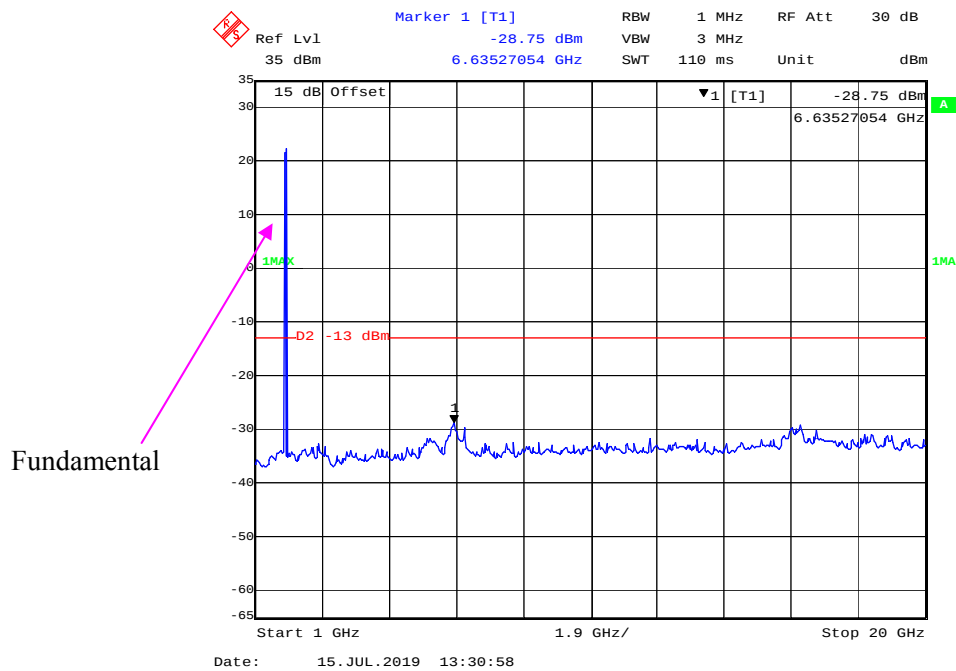
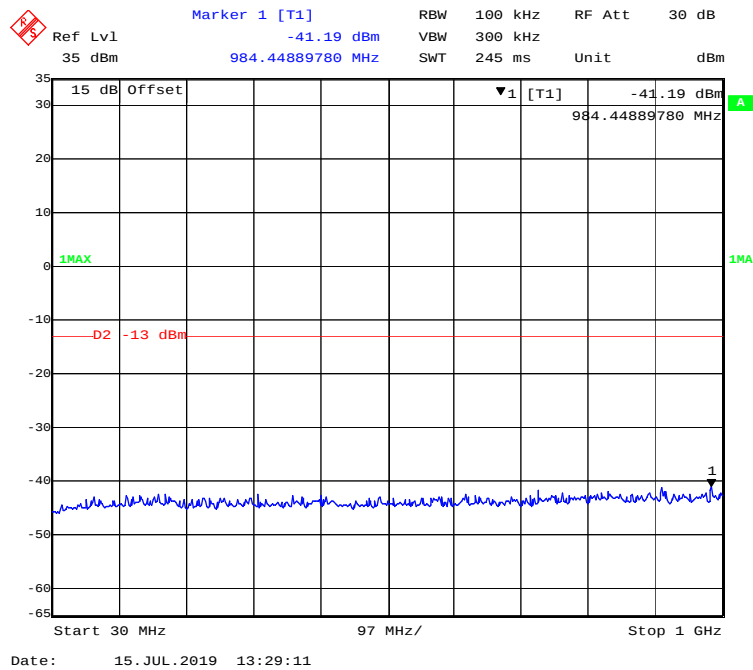
**WCDMA Band V:****30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 10 GHz WCDMA (Rel 99) Mode, Middle channel**

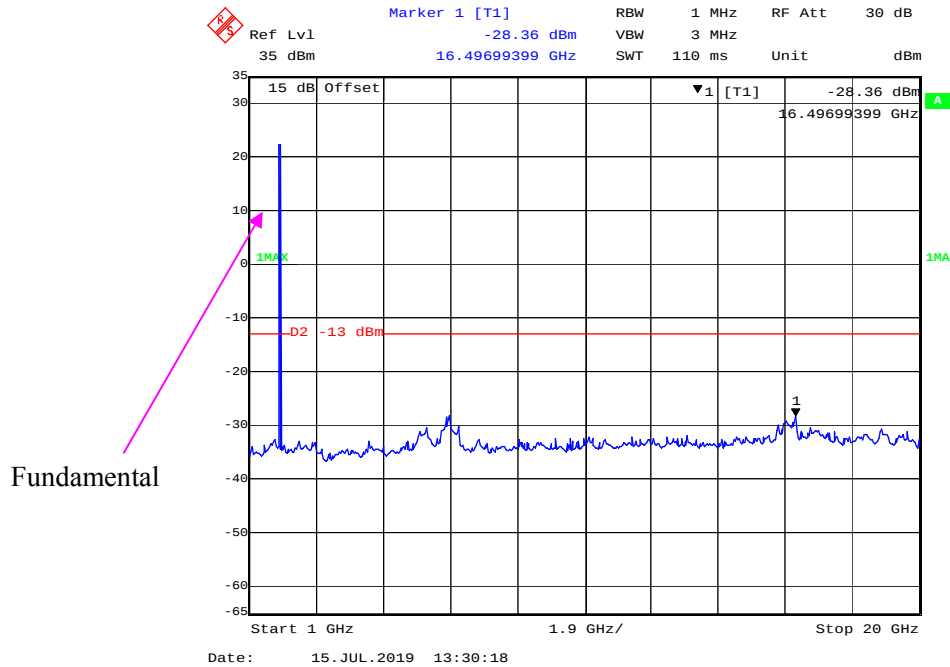
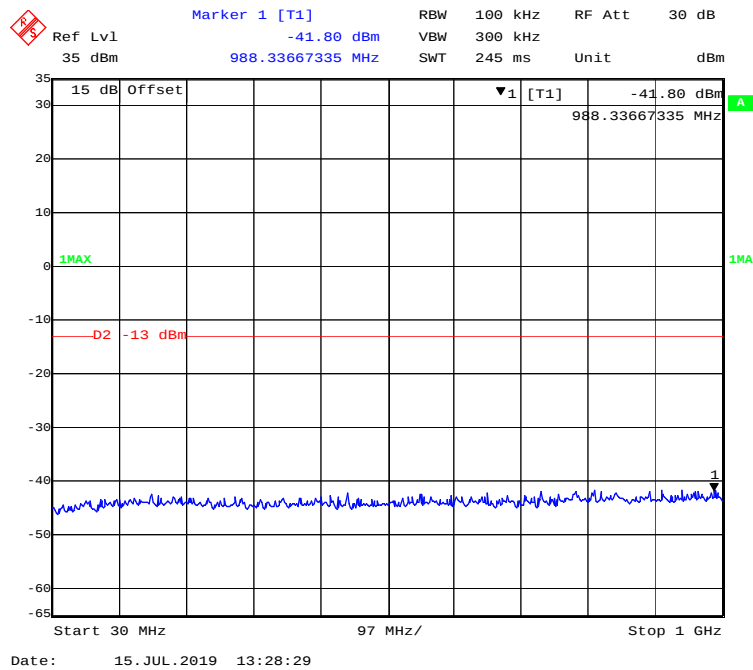
**30 MHz – 1GHz WCDMA (HSDPA) Mode, Middle channel****1 GHz – 10 GHz WCDMA (HSDPA) Mode, Middle channel**

**30 MHz – 1GHz WCDMA (HSUPA) Mode, Middle channel****1 GHz – 10 GHz WCDMA (HSUPA) Mode, Middle channel**

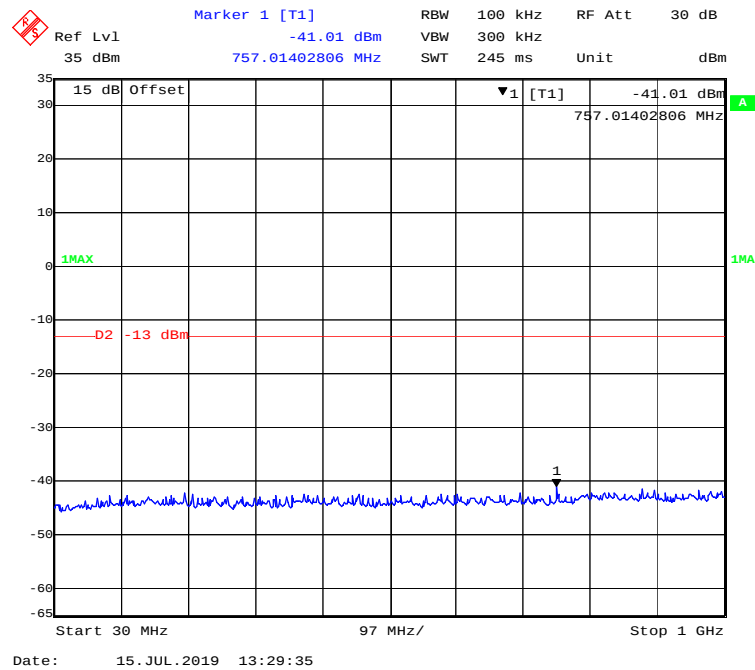
**30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel****1 GHz – 10 GHz WCDMA (HSPA+) Mode, Middle channel**

**WCDMA Band II:****30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 20 GHz WCDMA (Rel 99) Mode, Middle channel**

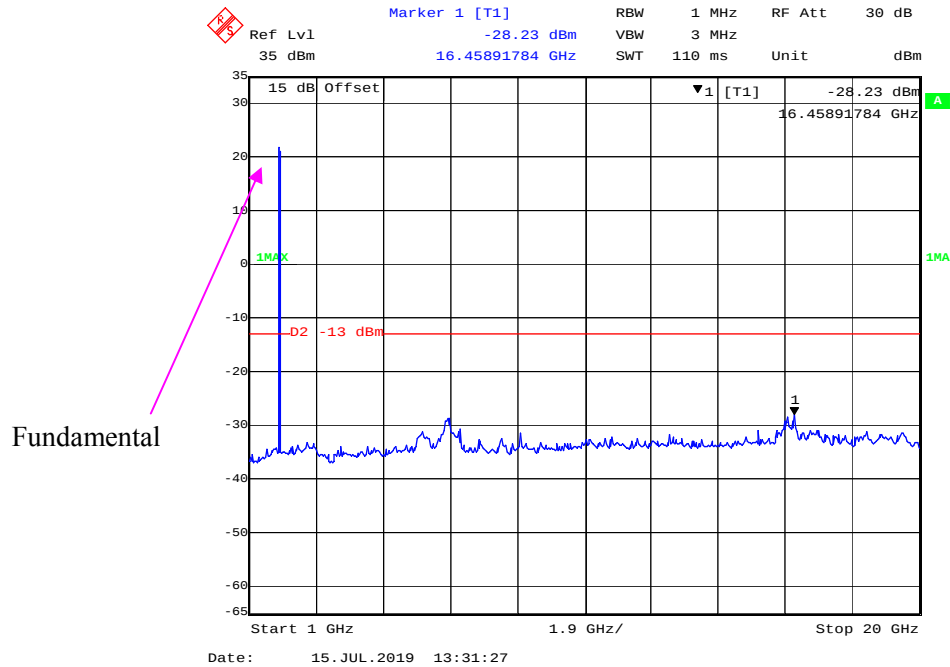


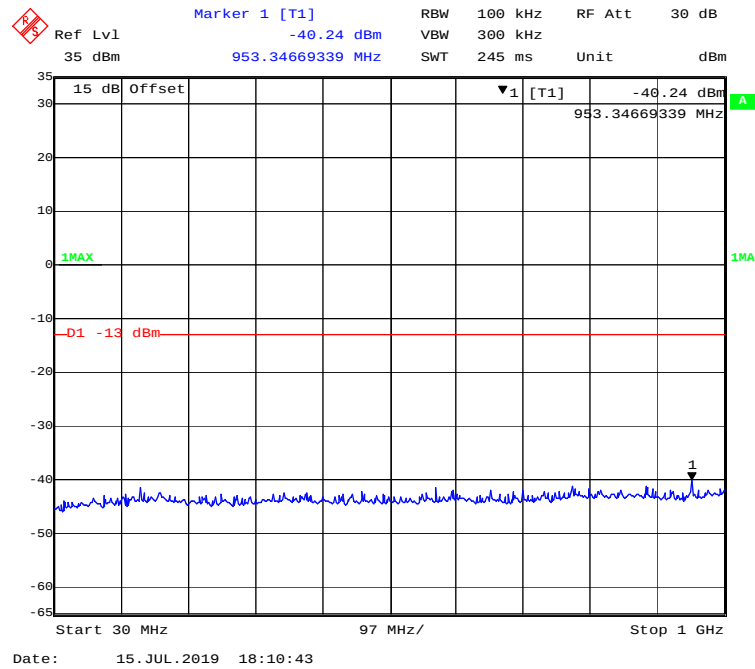
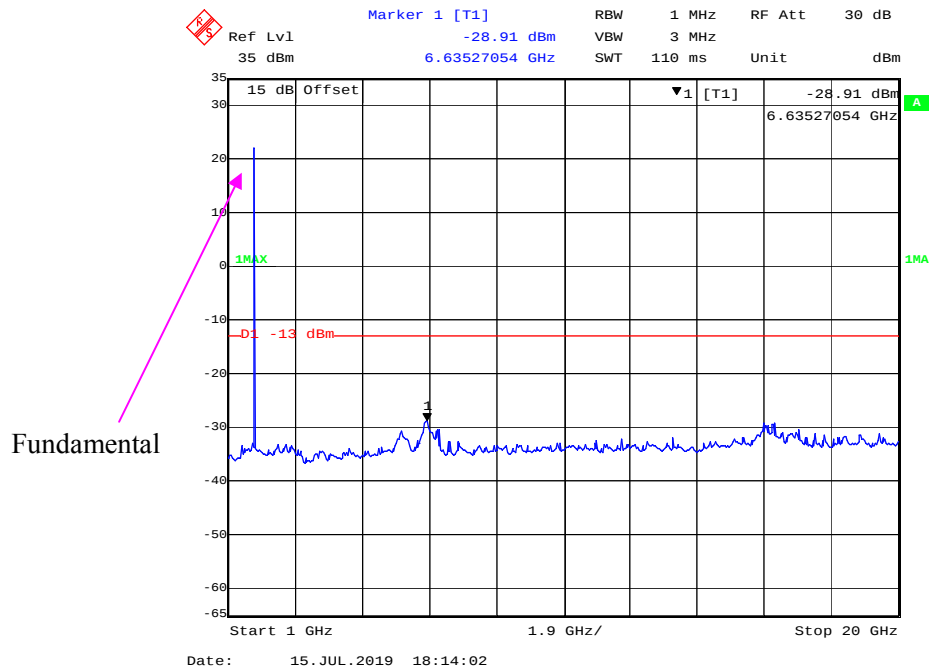


### 30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel



### 1 GHz – 20 GHz WCDMA (HSPA+) Mode, Middle channel



**WCDMA Band IV:****30 MHz – 1GHz WCDMA (Rel 99) Mode, Middle channel****1 GHz – 20 GHz WCDMA (Rel 99) Mode, Middle channel**

Ref Lvl 35 dBm  
 Marker 1 [T1] -46.81 dBm  
 RBW 100 kHz  
 VBW 300 kHz  
 Unit dBm  
 986.39278557 MHz  
 SWT 245 ms  
 15 dB Offset  
 1MAX  
 -13 dBm  
 Start 30 MHz 97 MHz/ Stop 1 GHz  
 Date: 15. JUL. 2019 18:12:24

Ref Lvl 35 dBm RBW 1 MHz RF Att 30 dB VBW 3 MHz SWT 110 ms Unit dBm

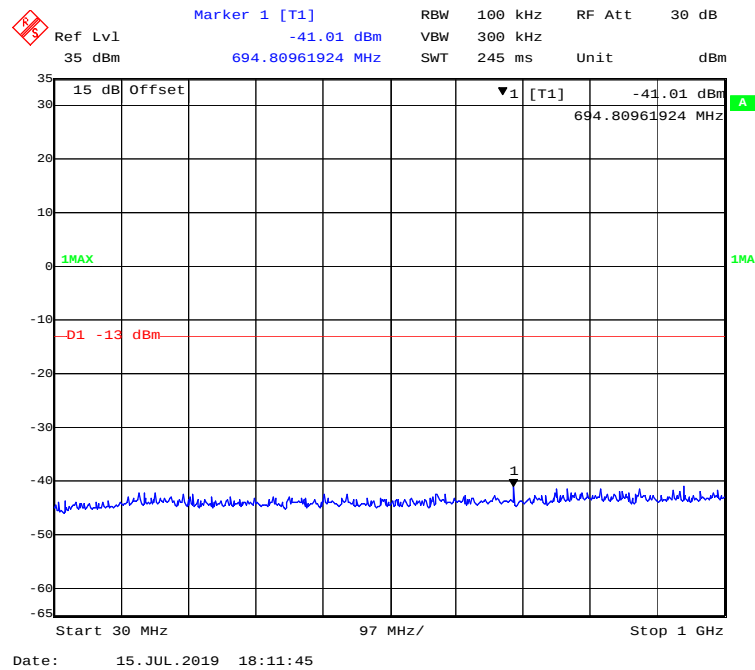
Marker 1 [T1] -28.60 dBm 6.67334669 GHz

Start 1 GHz 1.9 GHz/ Stop 20 GHz

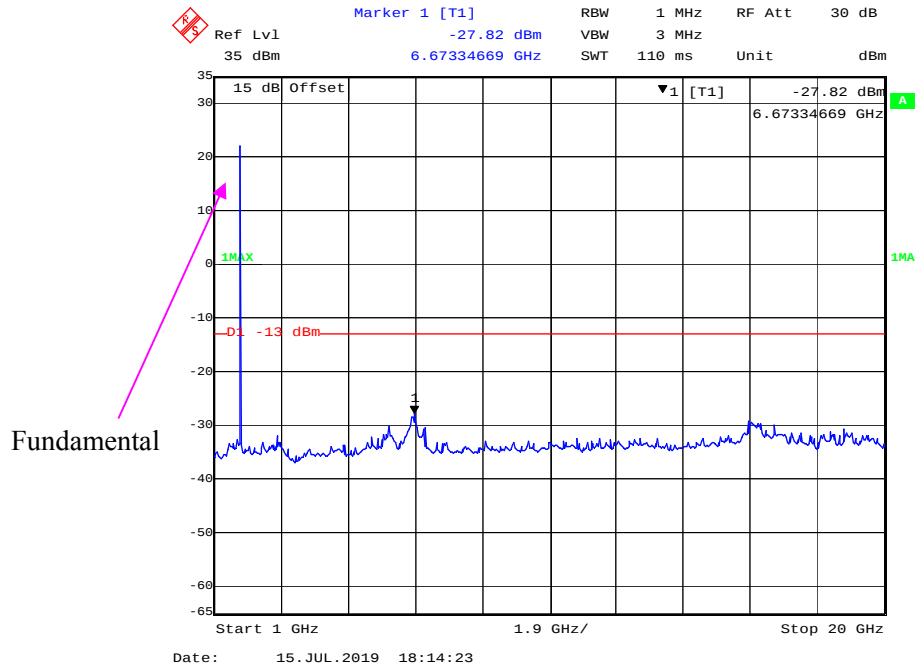
Date: 15. JUL. 2019 18:14:40

## Fundamental

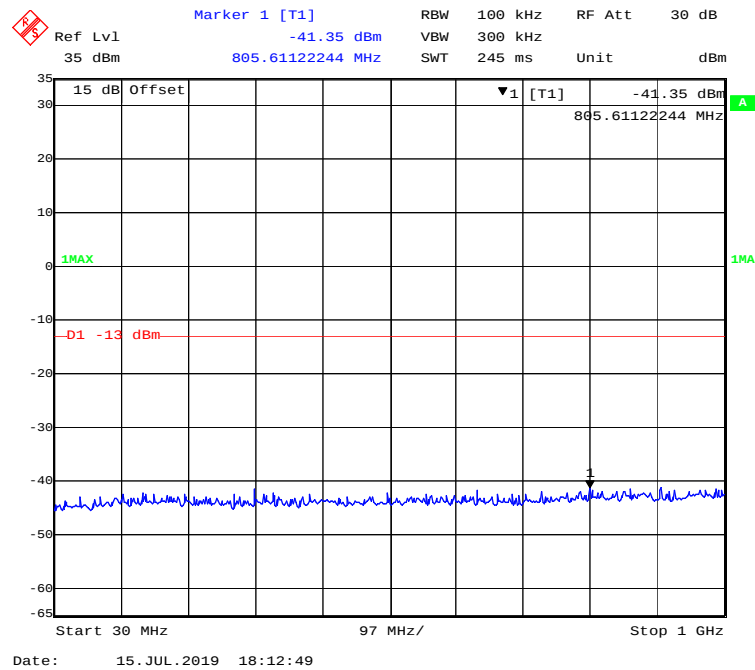
### 30 MHz – 1GHz WCDMA (HSUPA) Mode, Middle channel



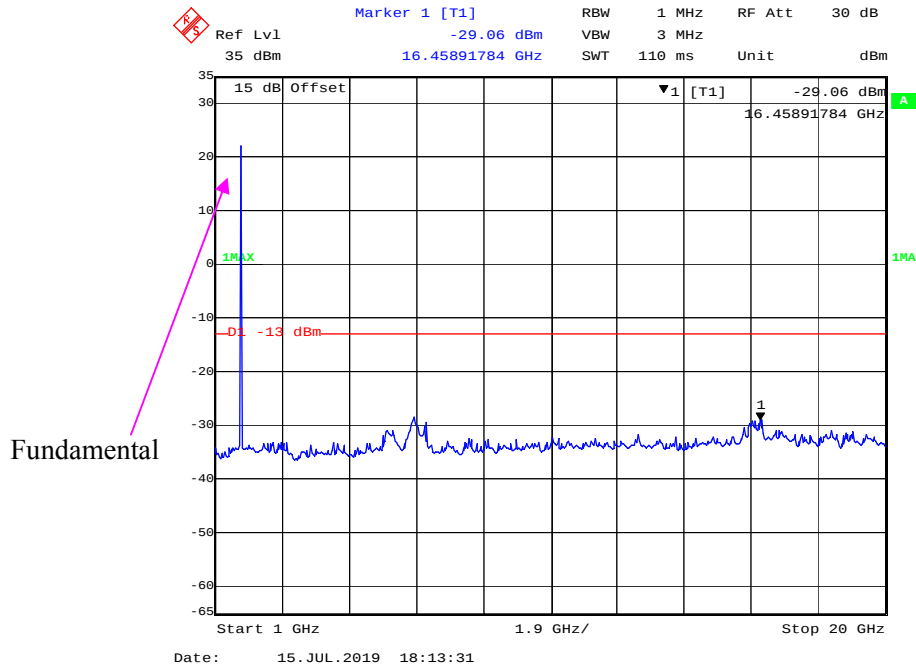
### 1 GHz – 20 GHz WCDMA (HSUPA) Mode, Middle channel



### 30 MHz – 1GHz WCDMA (HSPA+) Mode, Middle channel

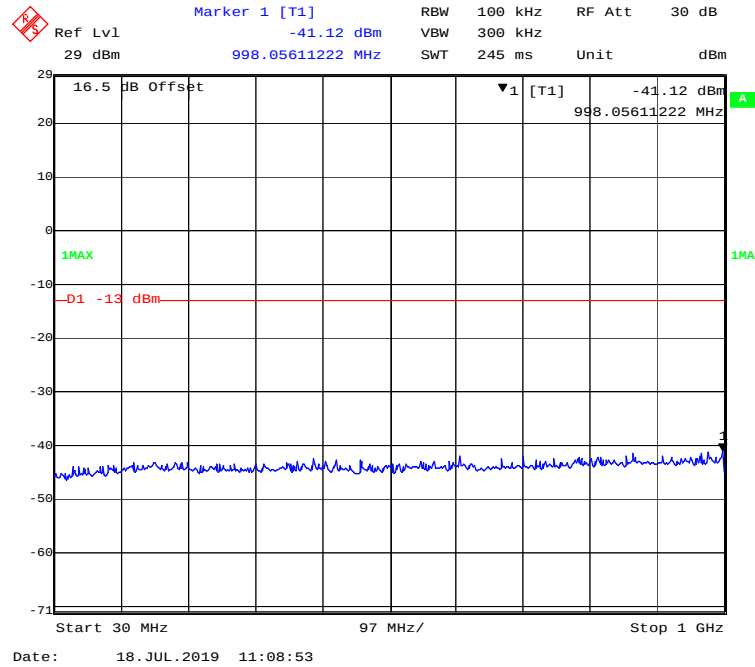


### 1 GHz – 20 GHz WCDMA (HSPA+) Mode, Middle channel

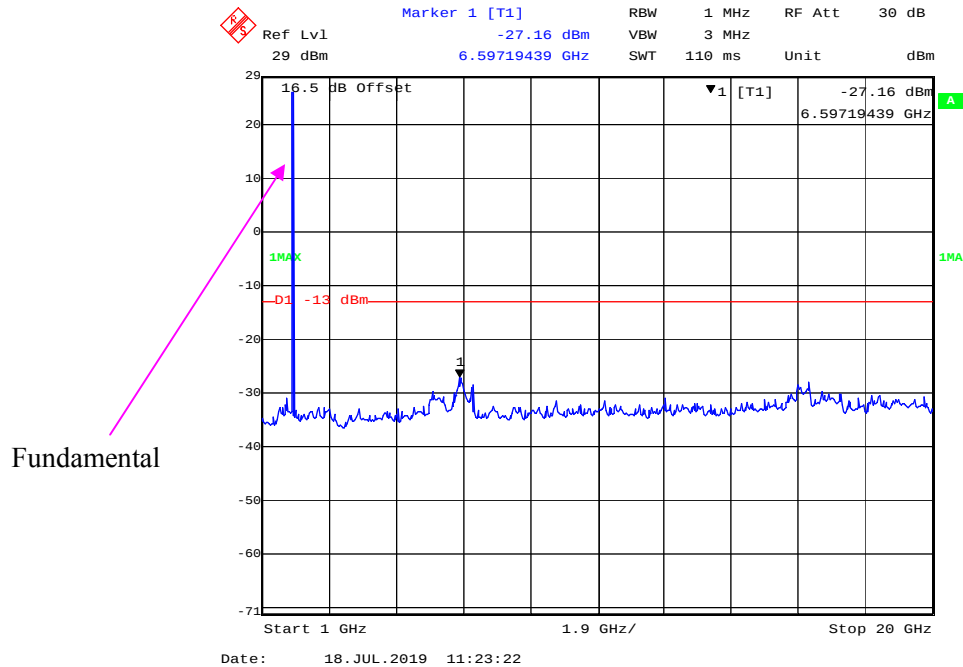


## LTE Band 2:

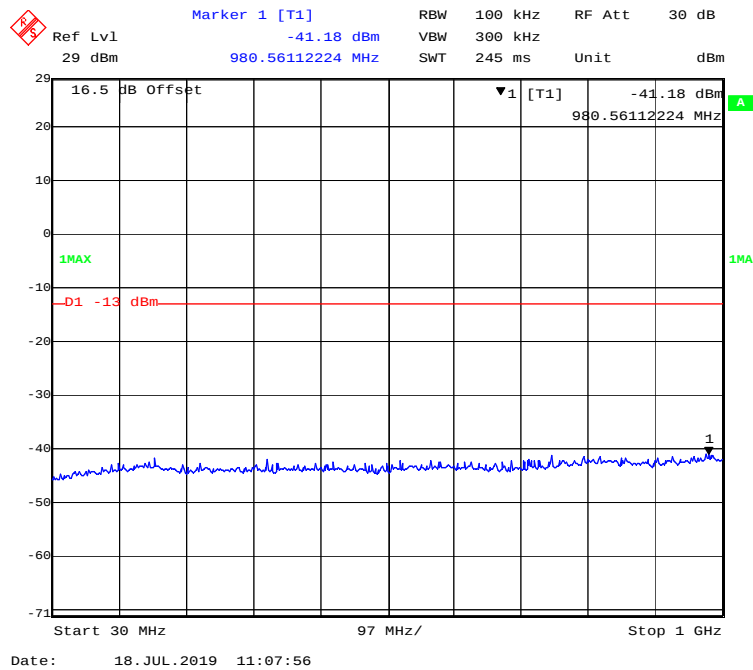
### 30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)



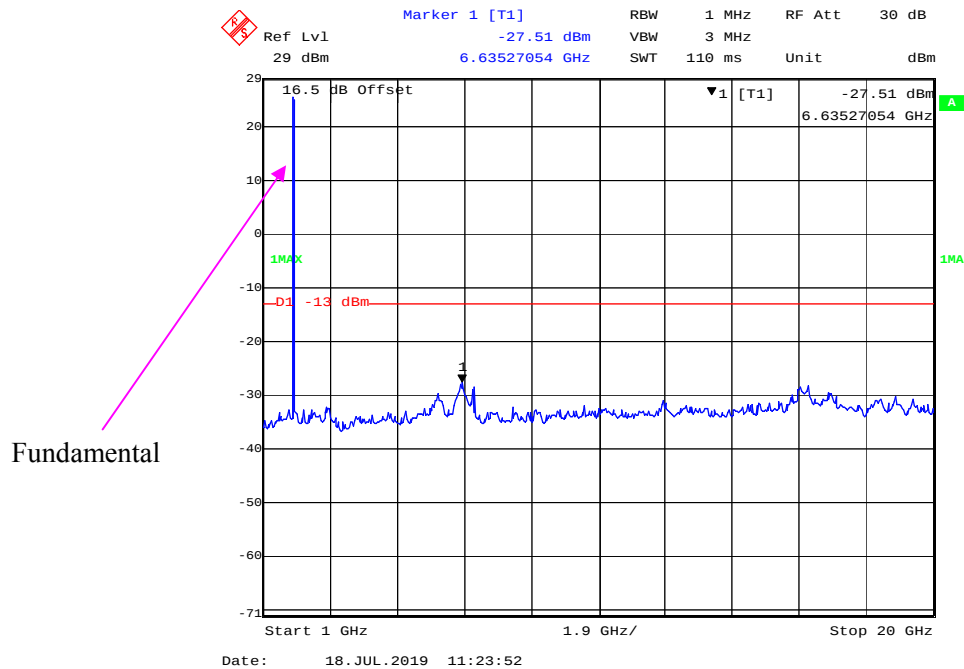
### 1 GHz – 20 GHz (1.4 MHz, QPSK, Middle Channel)



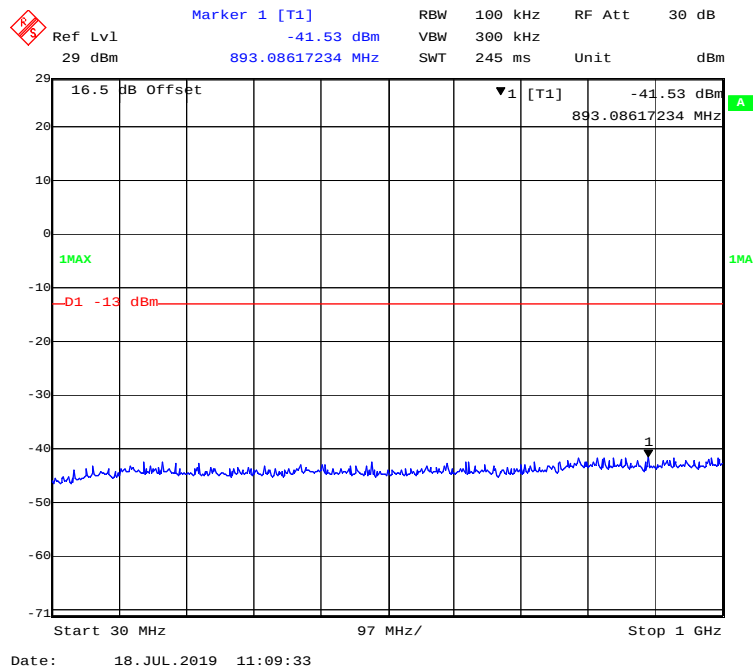
### 30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)



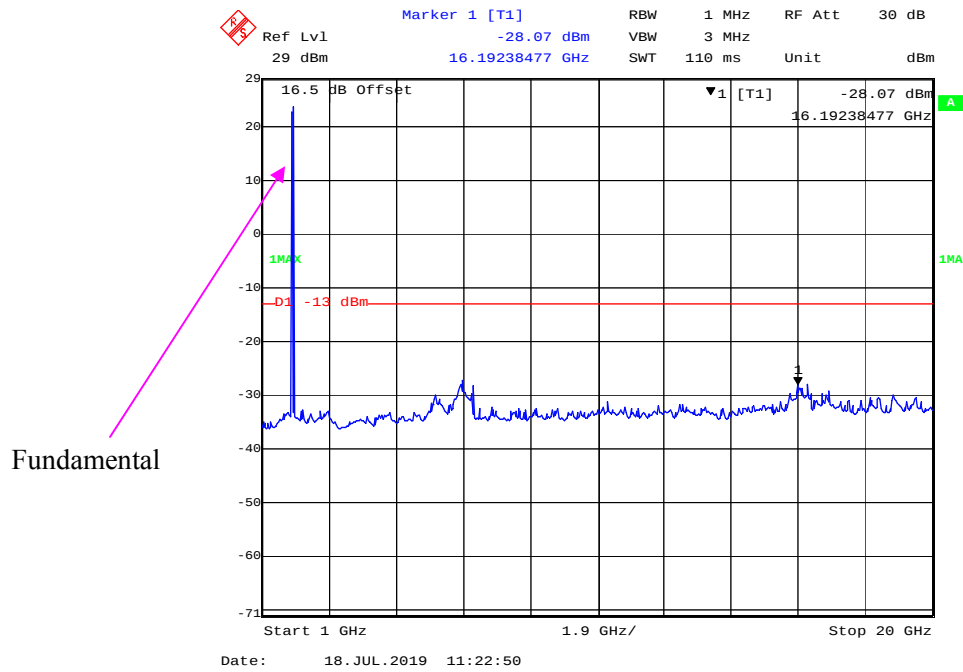
### 1 GHz – 20 GHz (1.4 MHz, 16-QAM, Middle Channel)



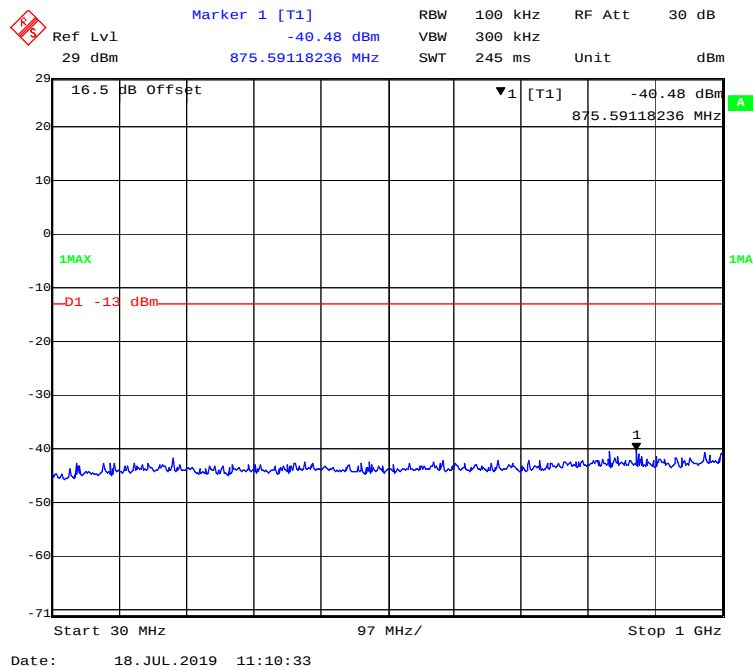
### 30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



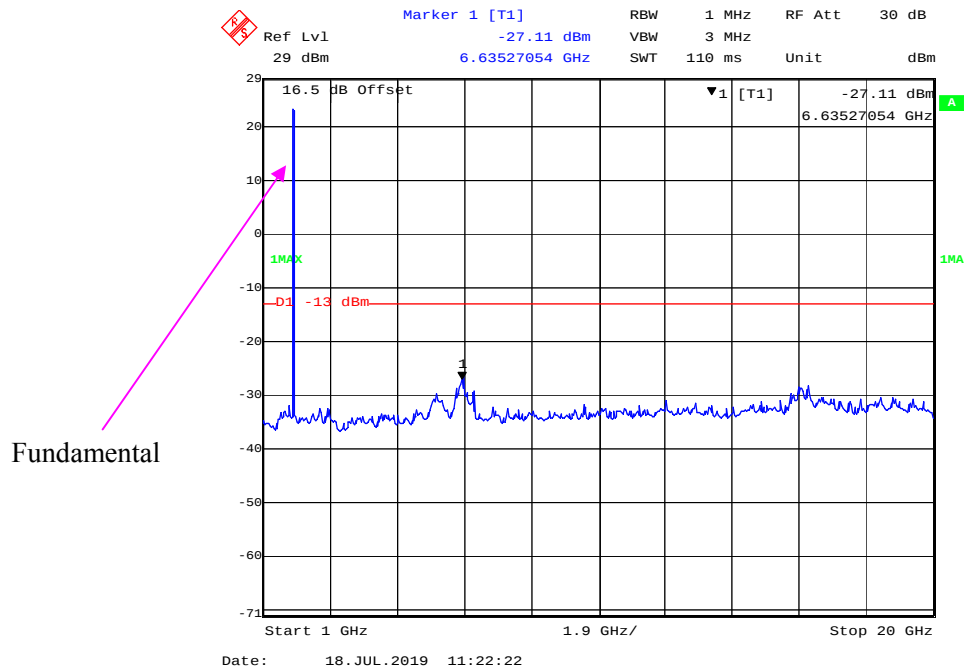
### 1 GHz – 20 GHz (3 MHz, QPSK, Middle Channel)



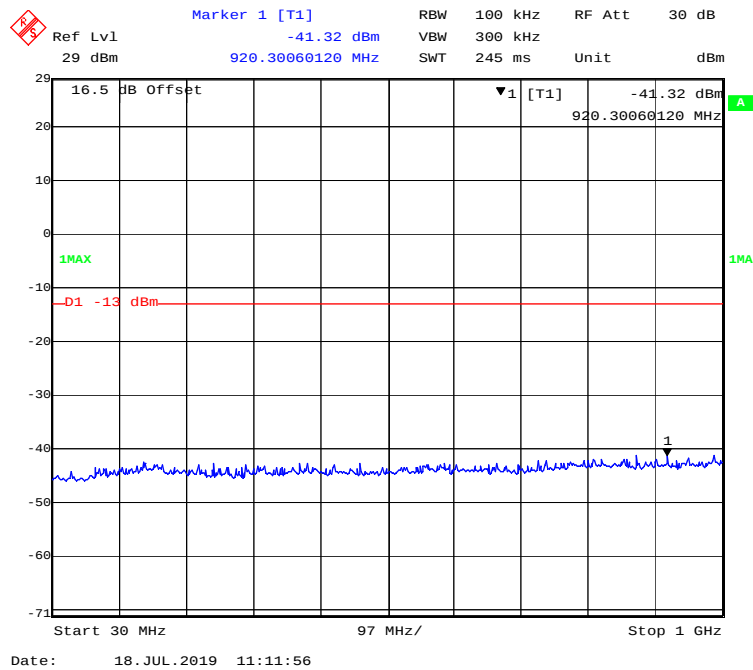
### 30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



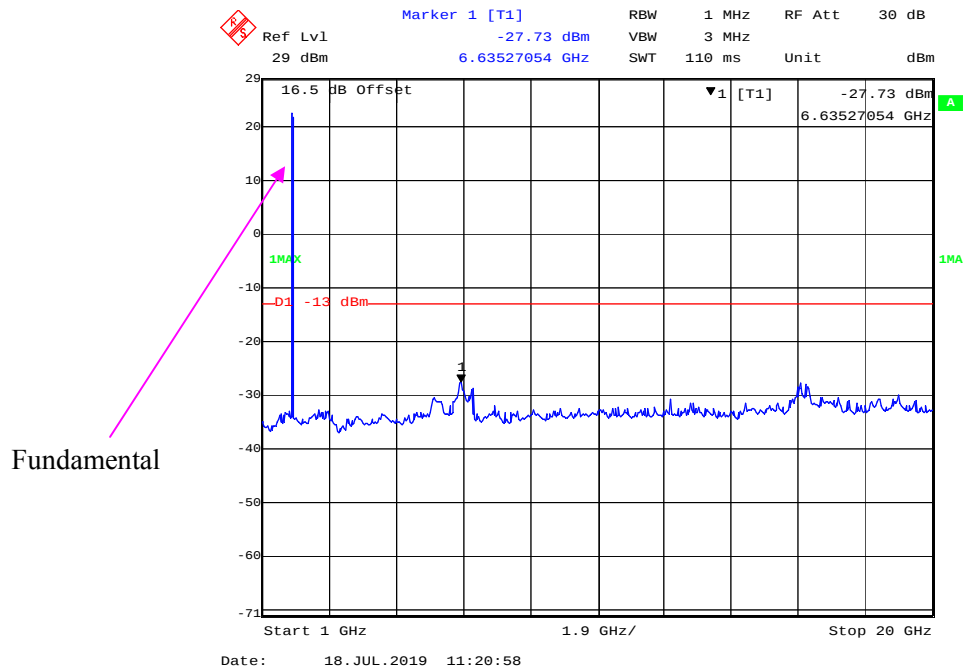
### 1 GHz – 20 GHz (3 MHz, 16-QAM, Middle Channel)



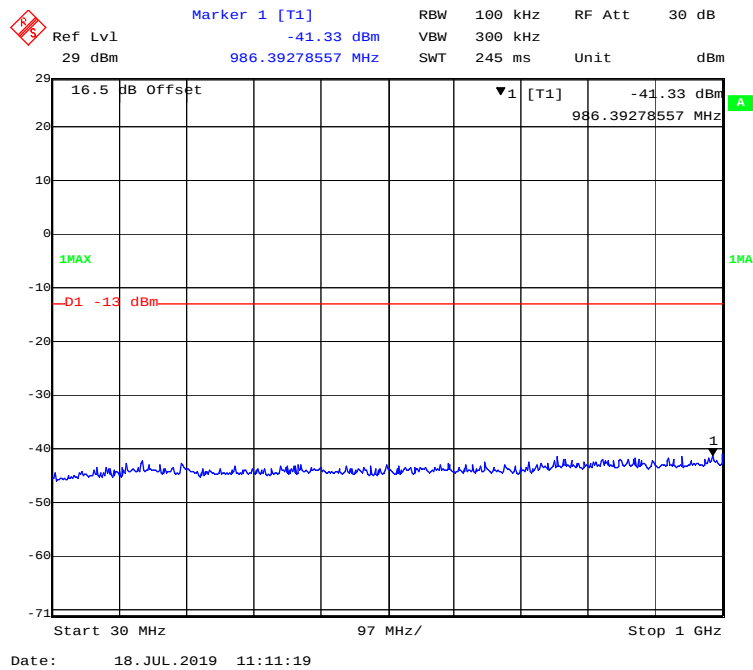
### 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



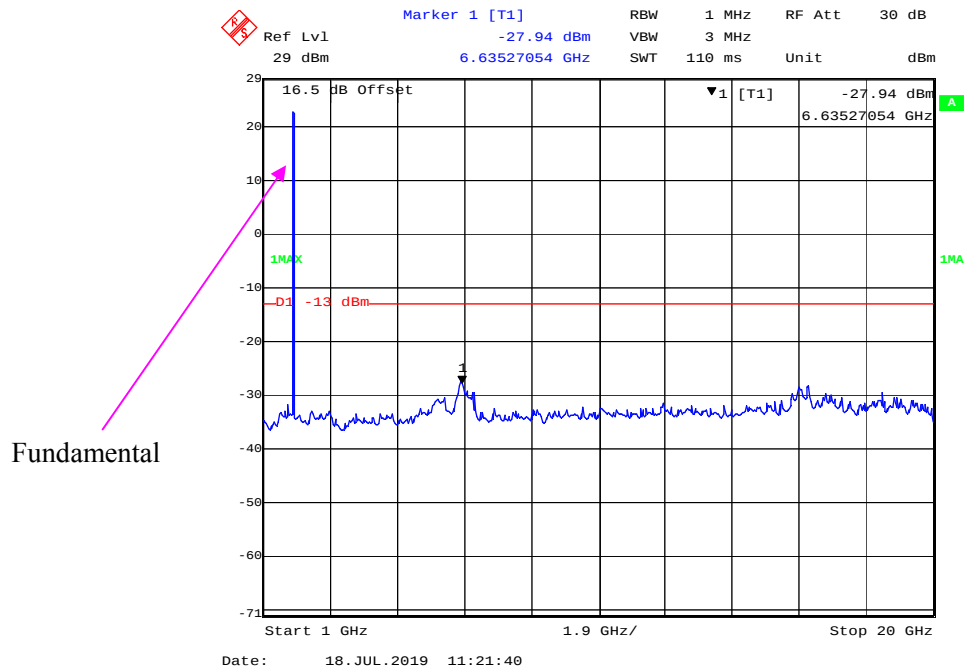
### 1 GHz – 20 GHz (5 MHz, QPSK, Middle Channel)



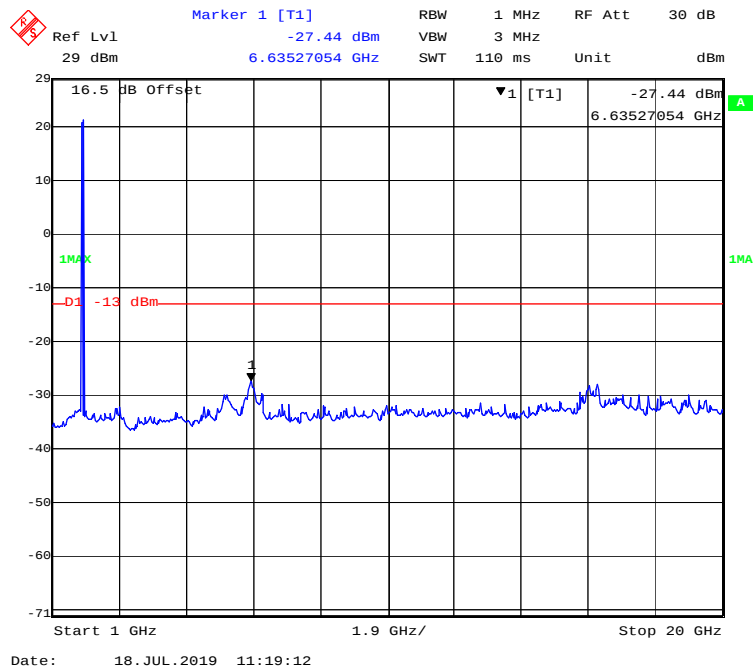
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



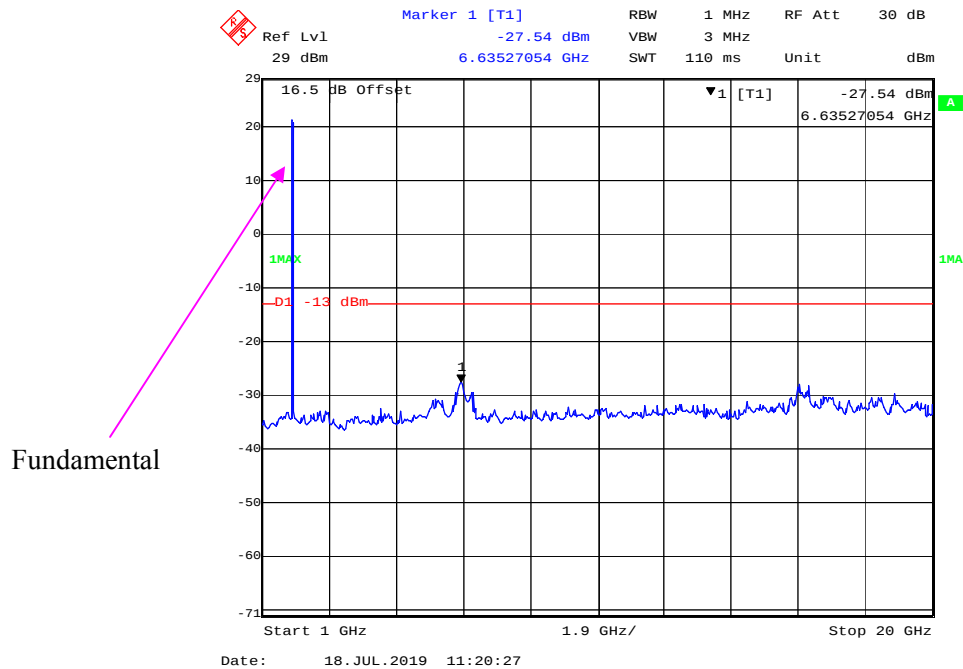
### 1 GHz – 20 GHz (5 MHz, 16-QAM, Middle Channel)



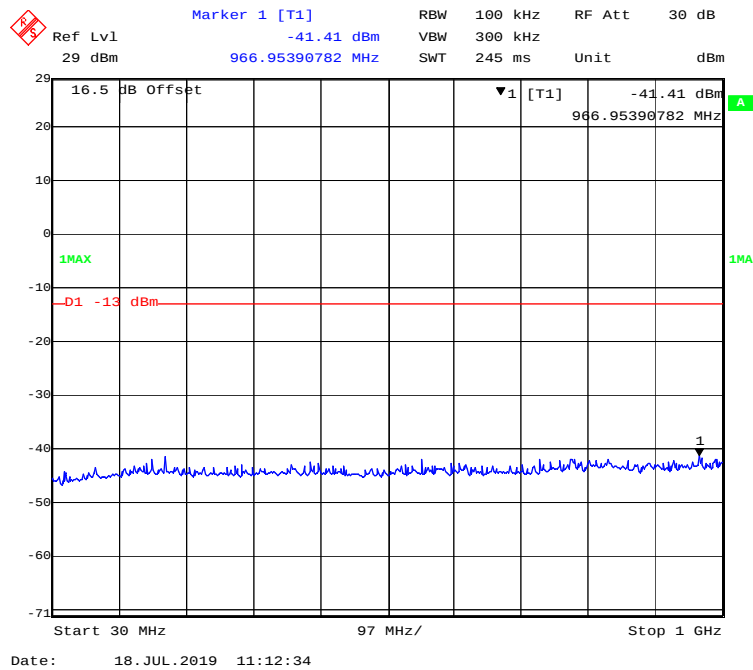
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



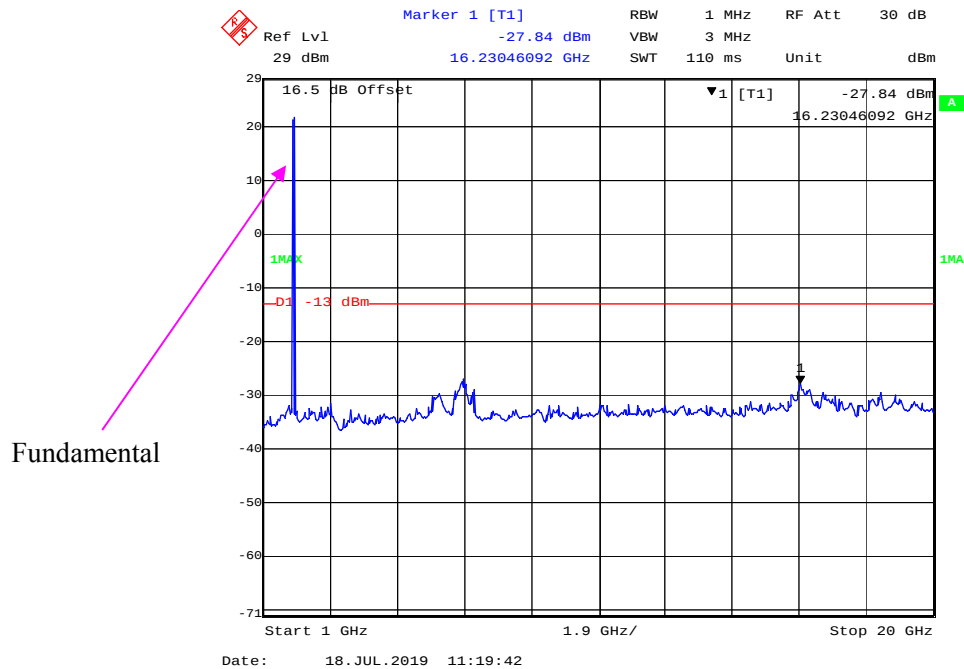
### 1 GHz – 20 GHz (10 MHz, QPSK, Middle Channel)



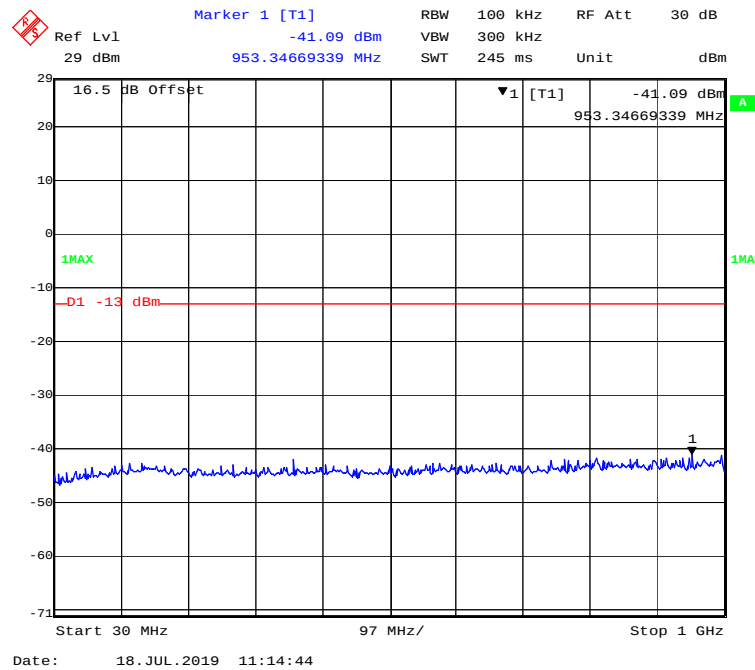
### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



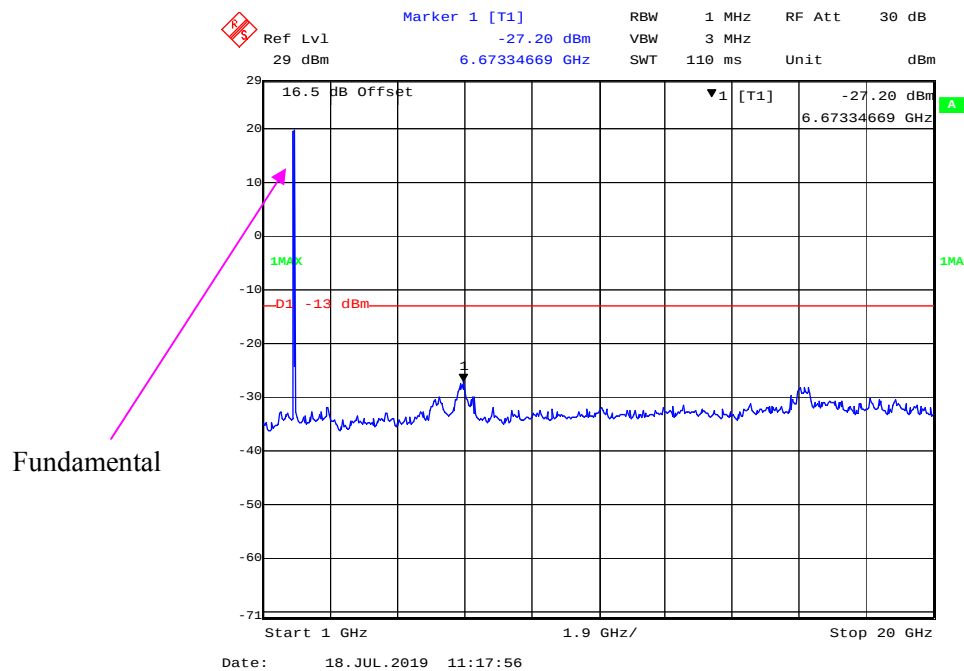
### 1 GHz – 20 GHz (10 MHz, 16-QAM, Middle Channel)



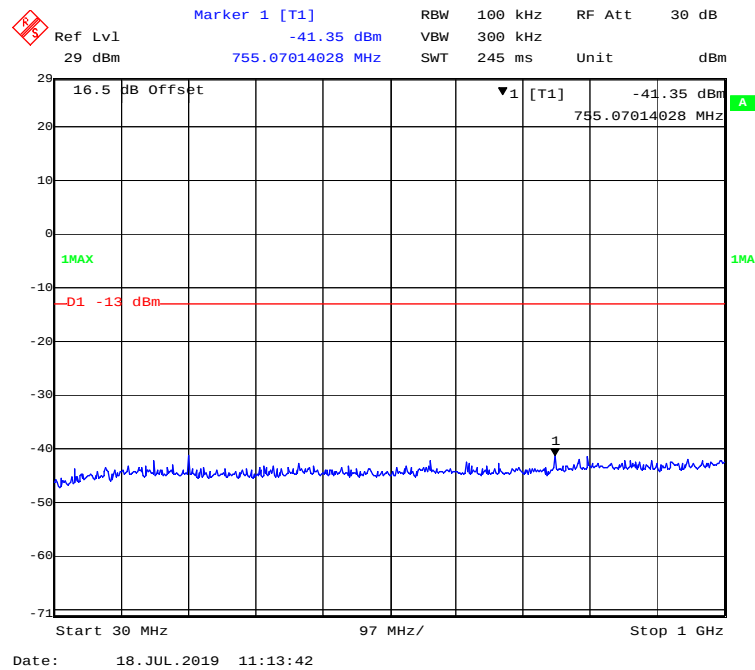
### 30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



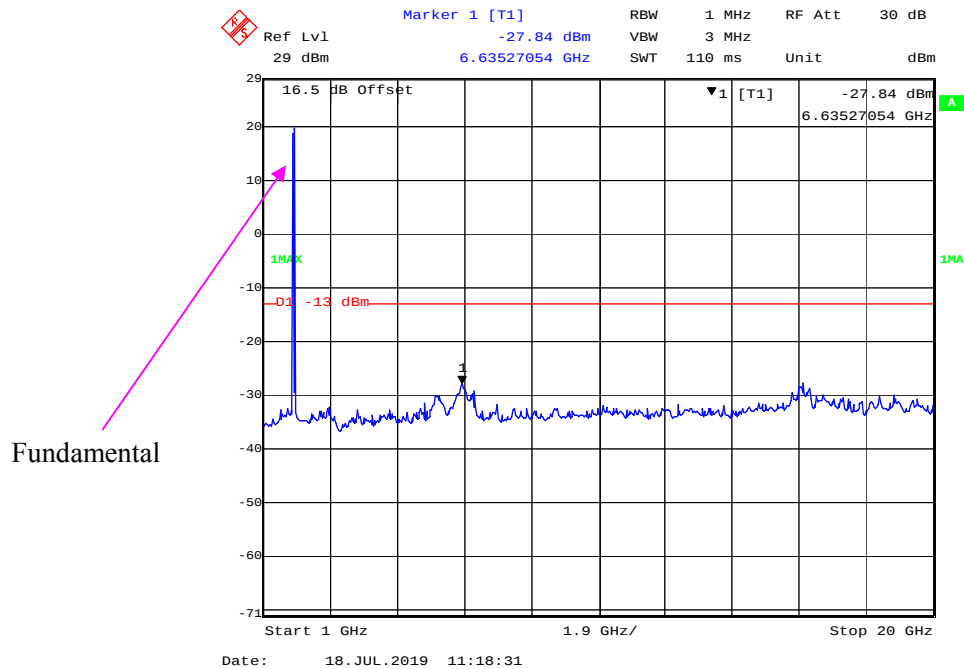
### 1 GHz – 20 GHz (15 MHz, QPSK, Middle Channel)



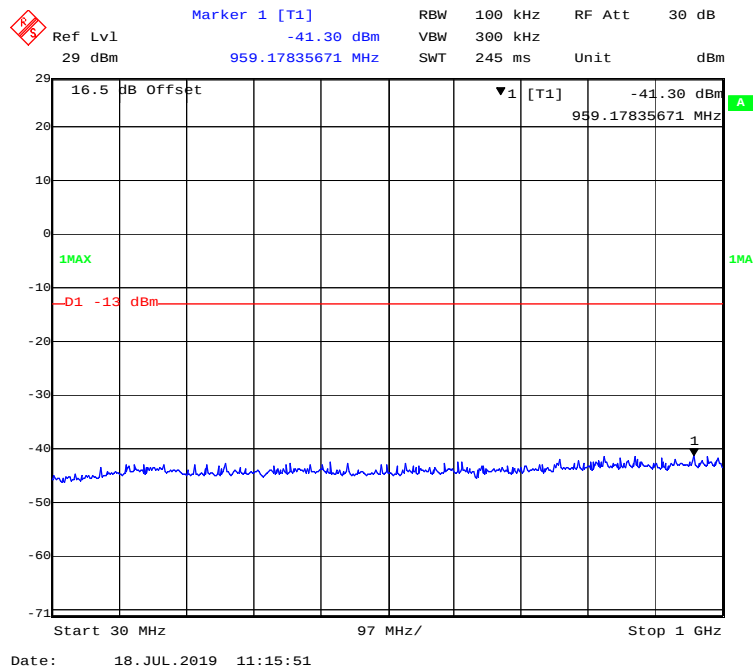
### 30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



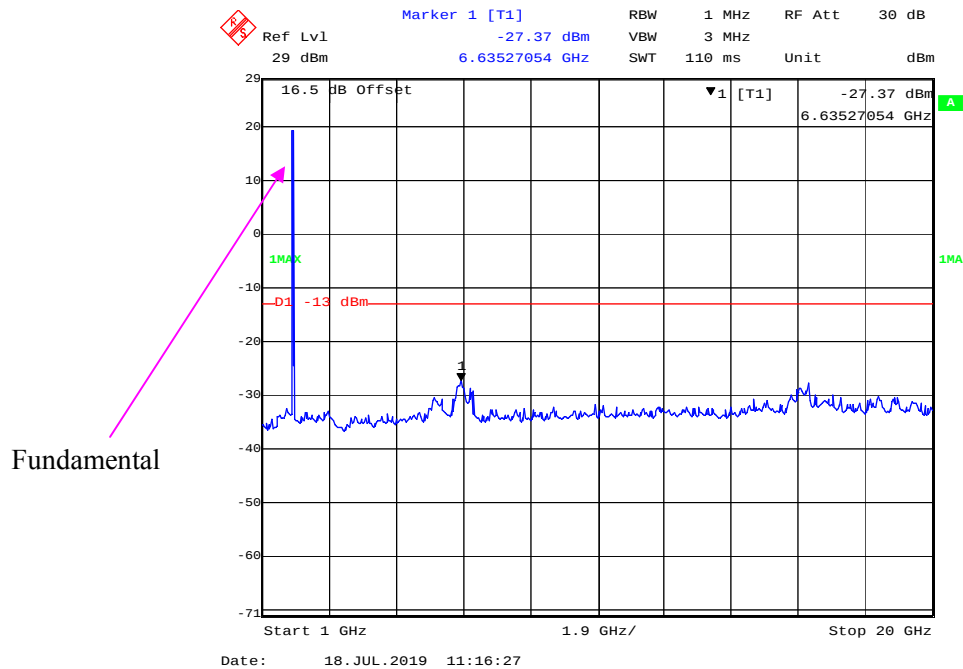
### 1 GHz – 20 GHz (15 MHz, 16-QAM, Middle Channel)



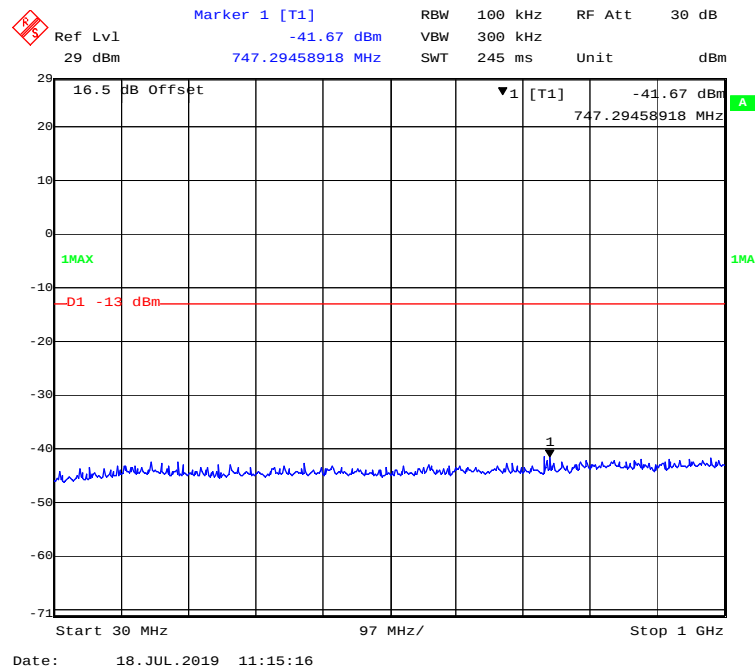
### 30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



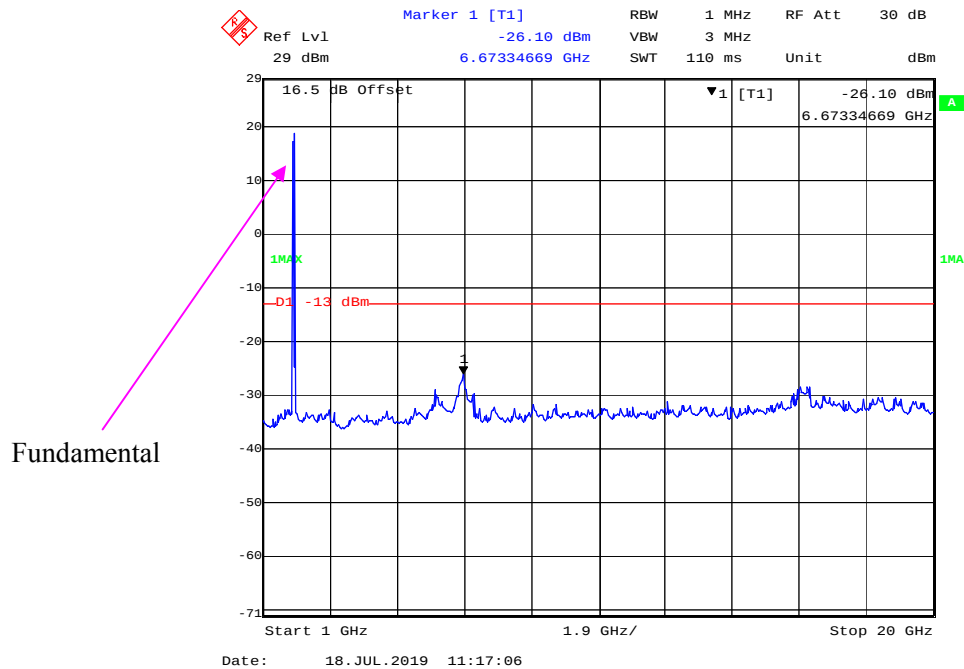
### 1 GHz – 20 GHz (20 MHz, QPSK, Middle Channel)

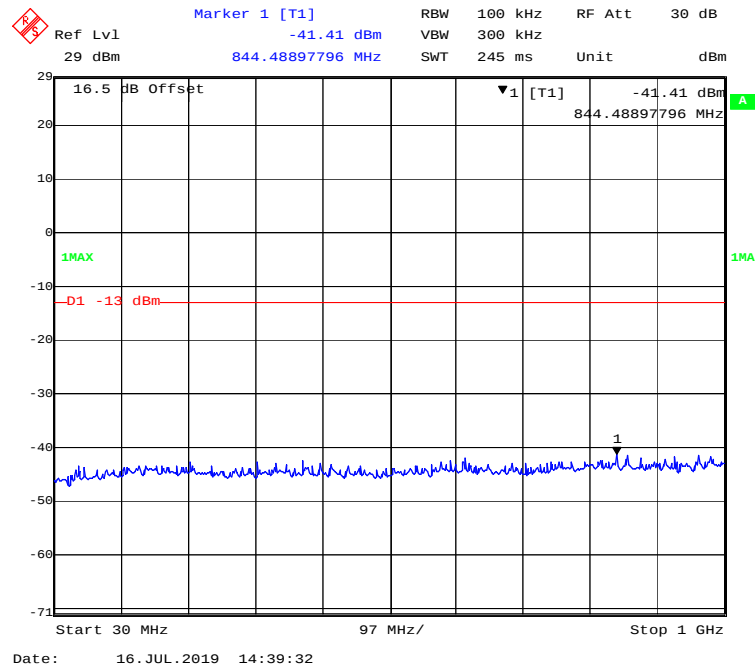
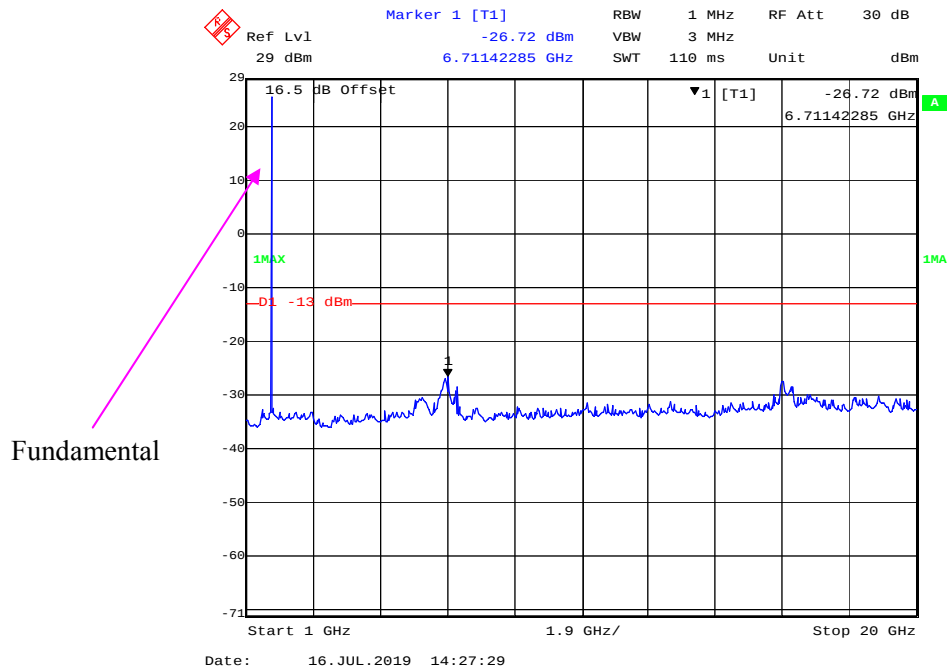


### 30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

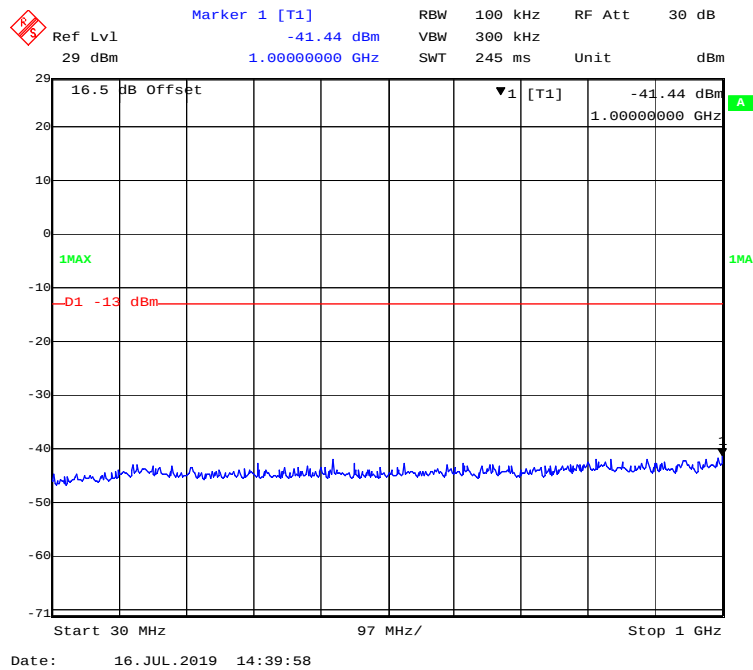


### 1 GHz – 20 GHz (20 MHz, 16-QAM, Middle Channel)

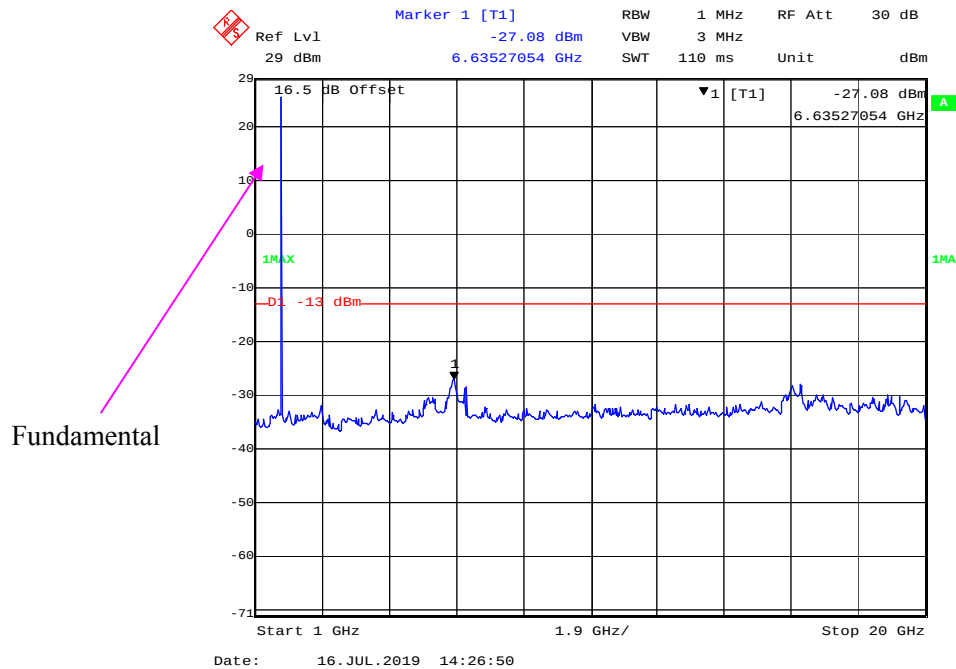


**LTE Band 4:****30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)****1 GHz – 20 GHz (1.4 MHz, QPSK, Middle Channel)**

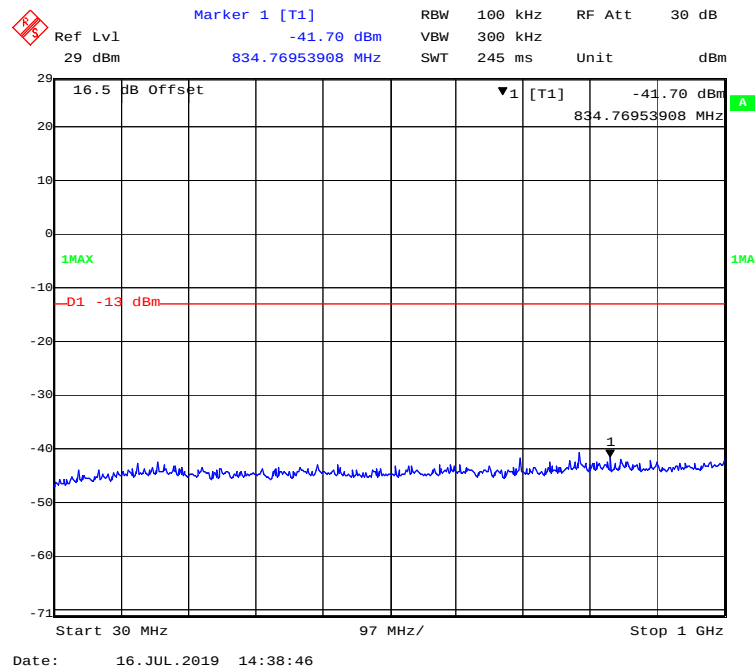
### 30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)



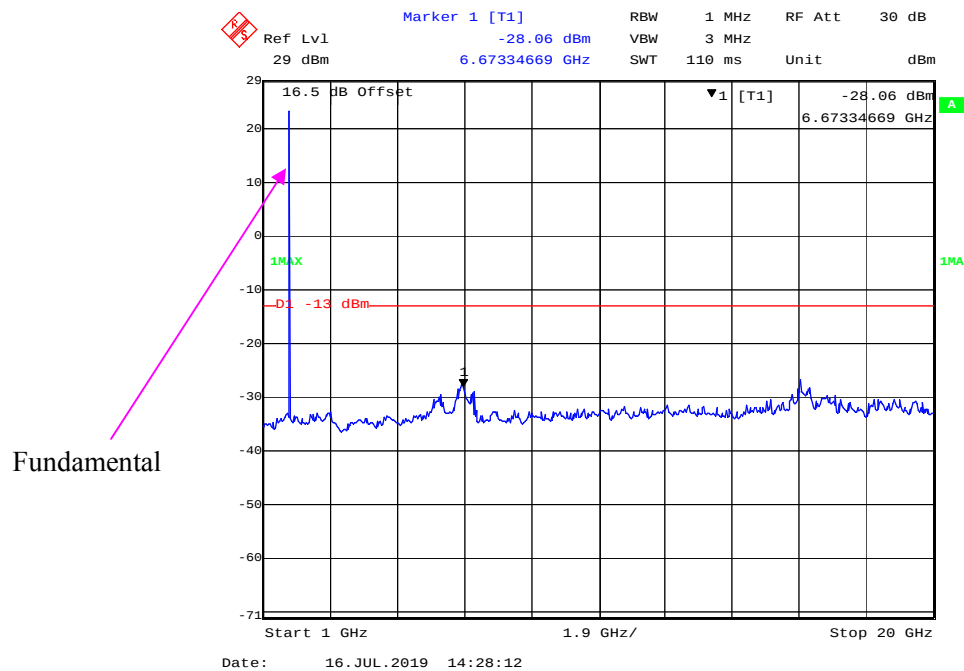
### 1 GHz – 20 GHz (1.4 MHz, 16-QAM, Middle Channel)



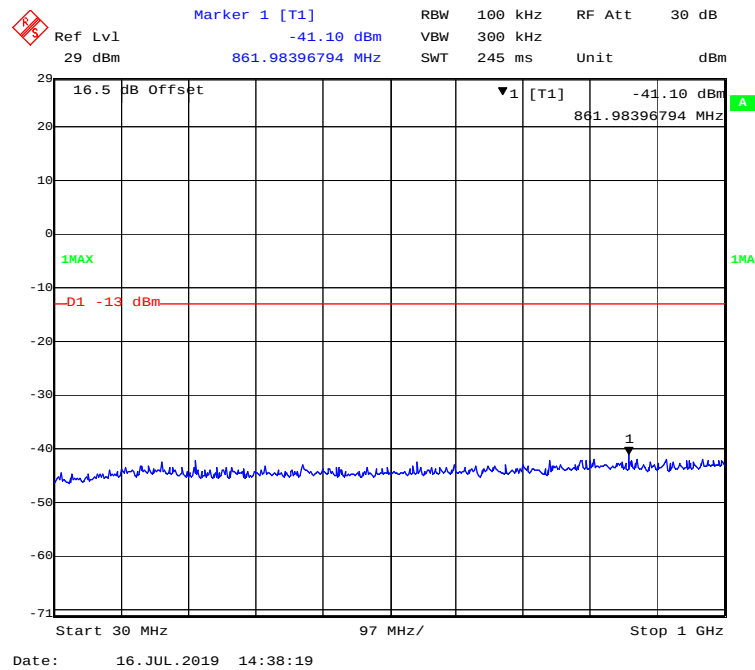
### 30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



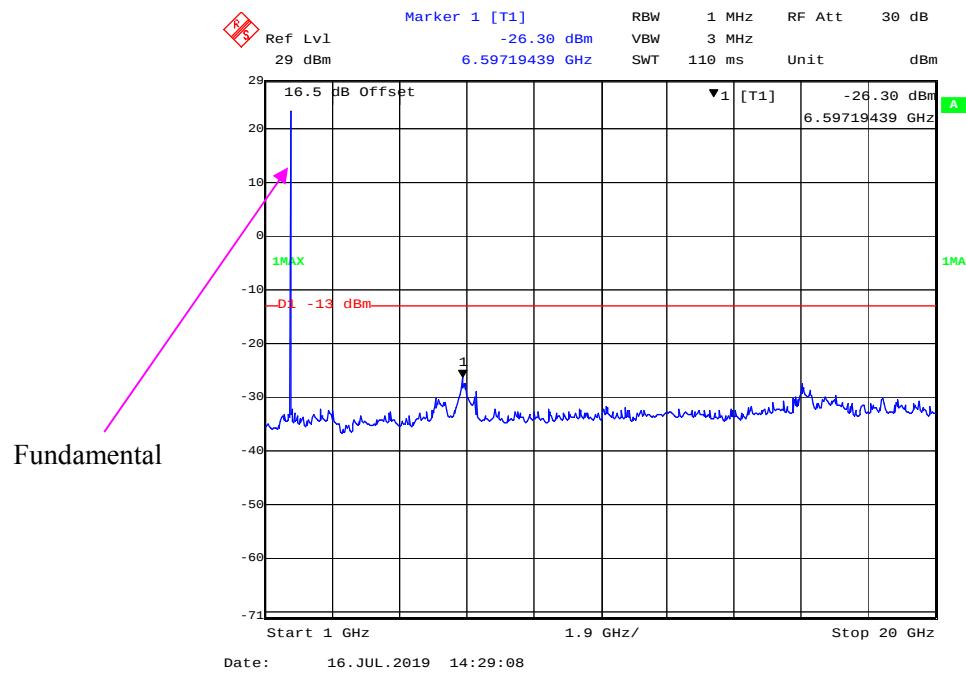
### 1 GHz – 20 GHz (3 MHz, QPSK, Middle Channel)



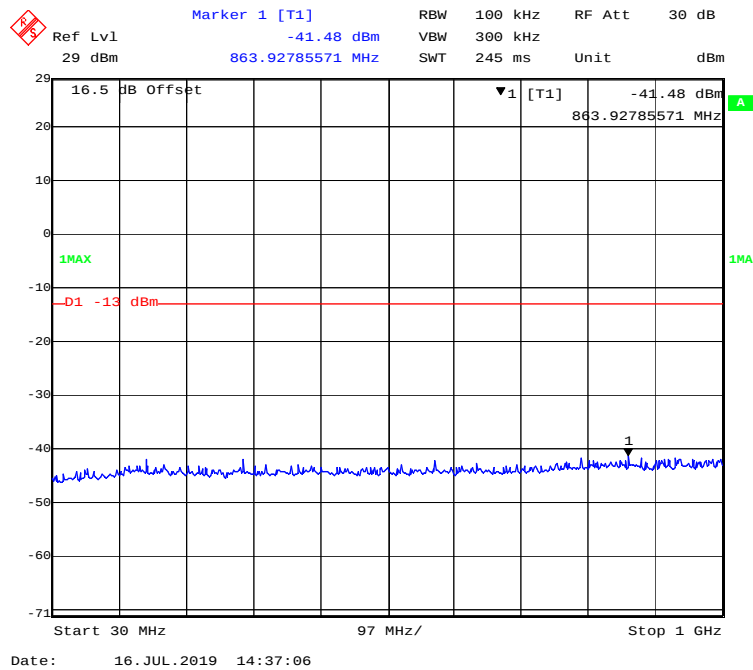
### 30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



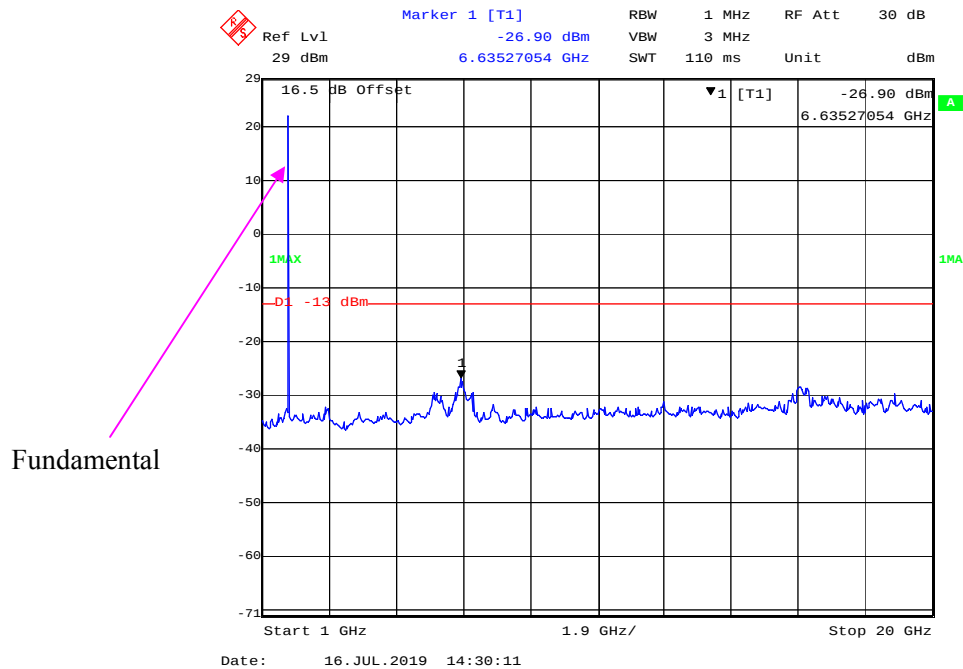
### 1 GHz – 20 GHz (3 MHz, 16-QAM, Middle Channel)



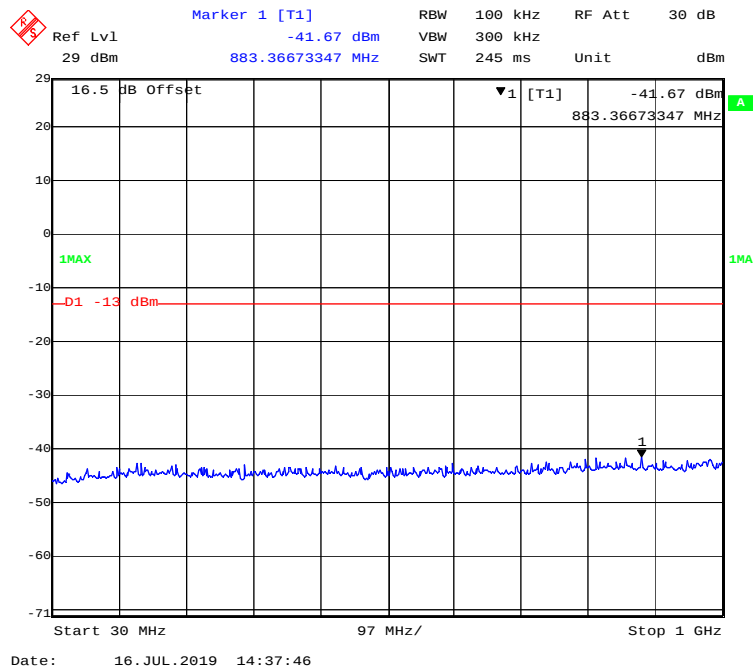
### 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



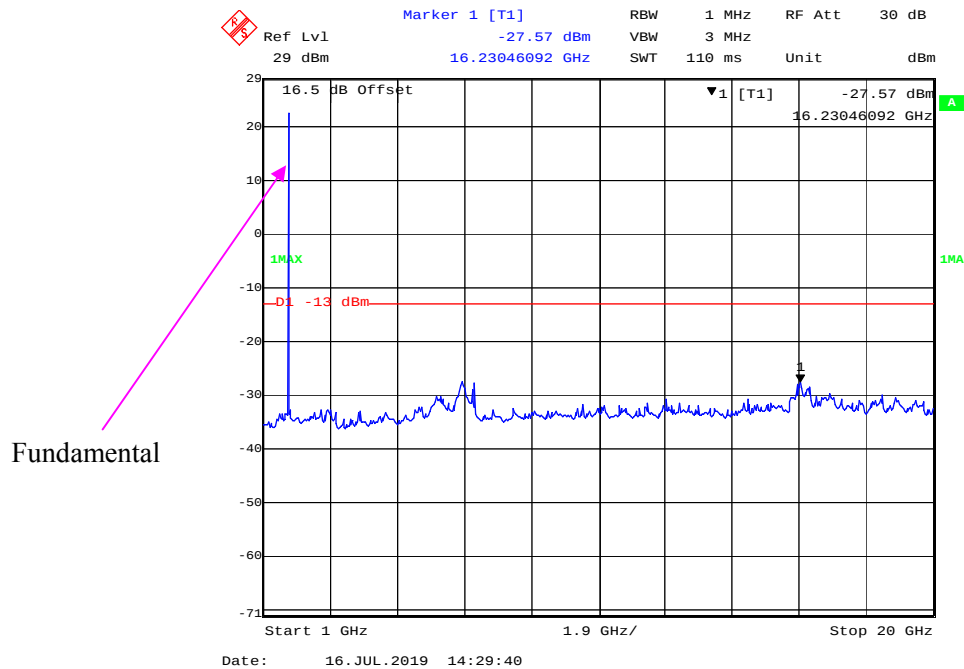
### 1 GHz – 20 GHz (5 MHz, QPSK, Middle Channel)



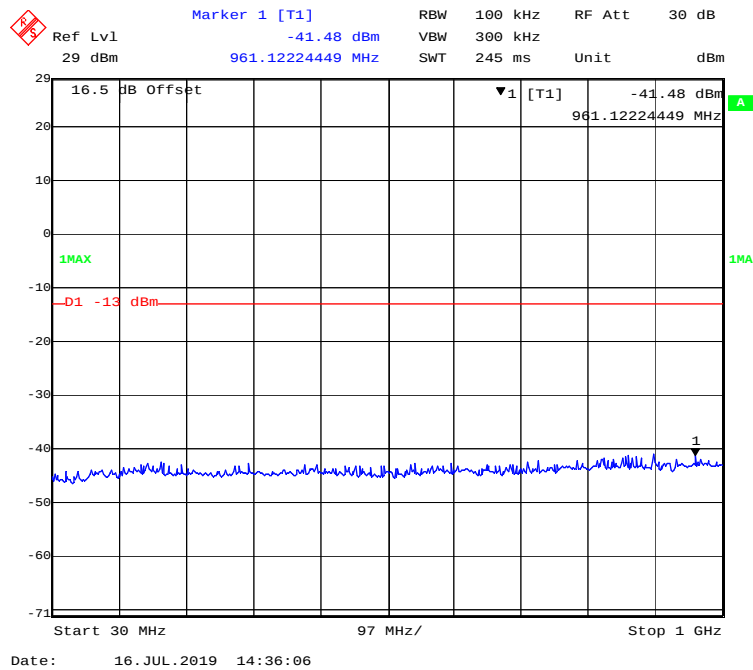
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



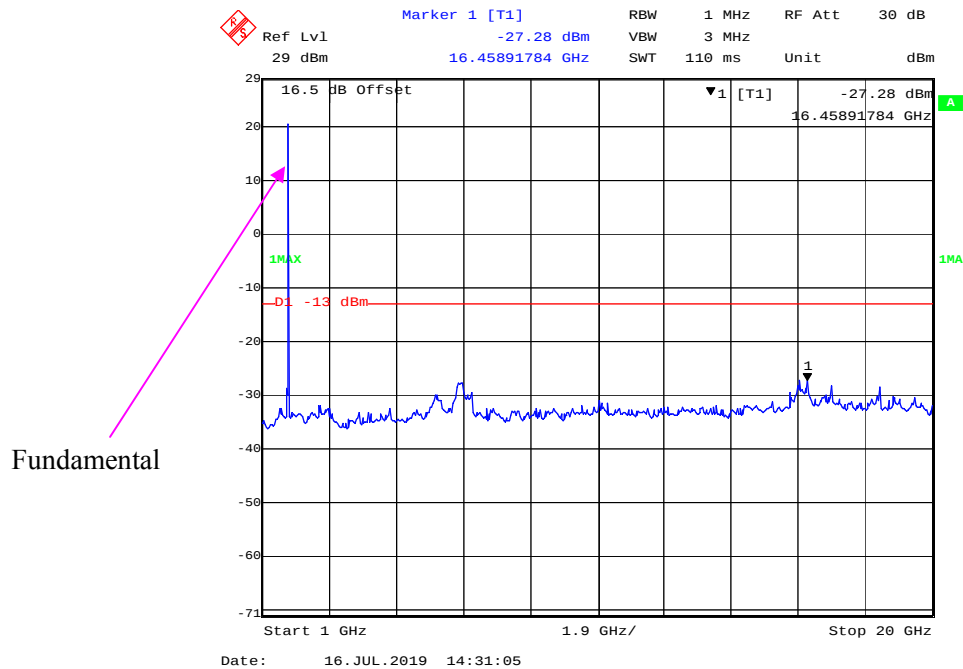
### 1 GHz – 20 GHz (5 MHz, 16-QAM, Middle Channel)



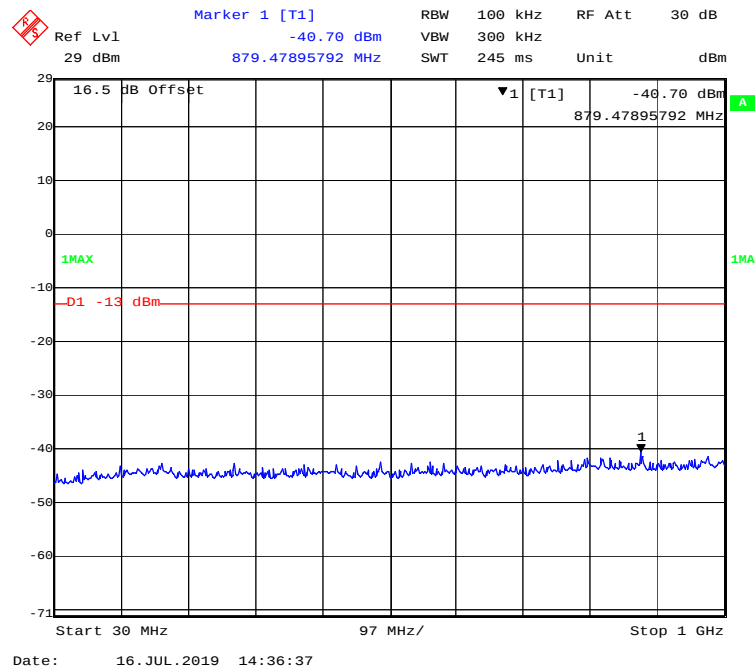
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



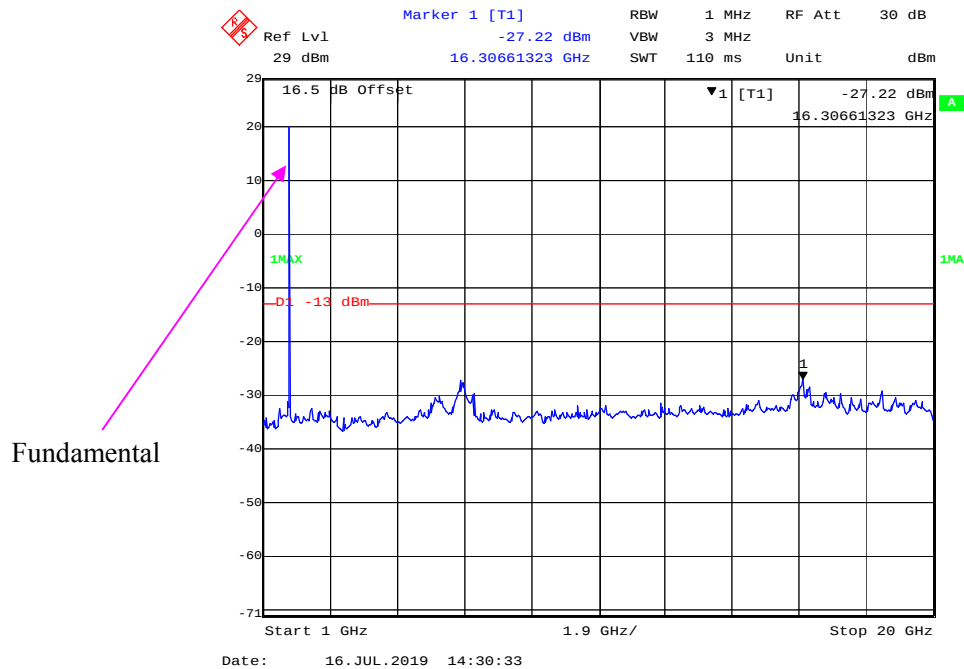
### 1 GHz – 20 GHz (10 MHz, QPSK, Middle Channel)



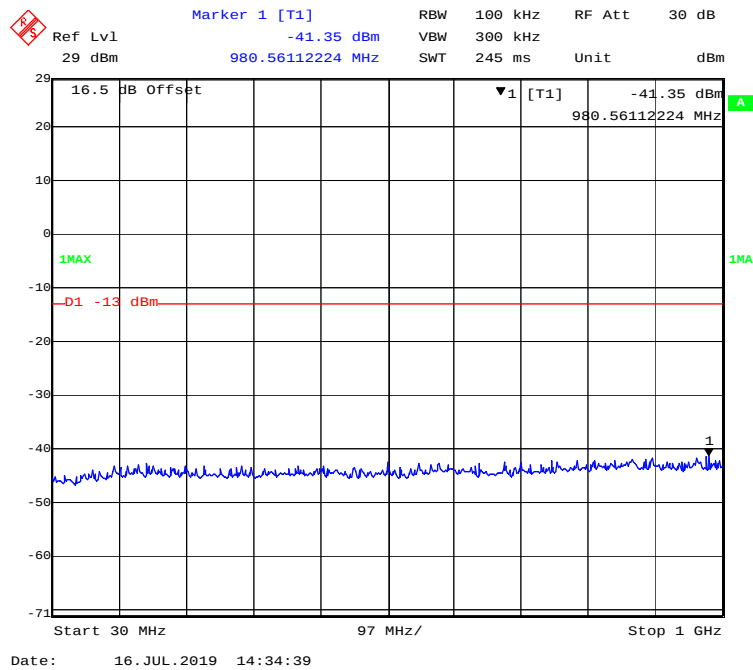
### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



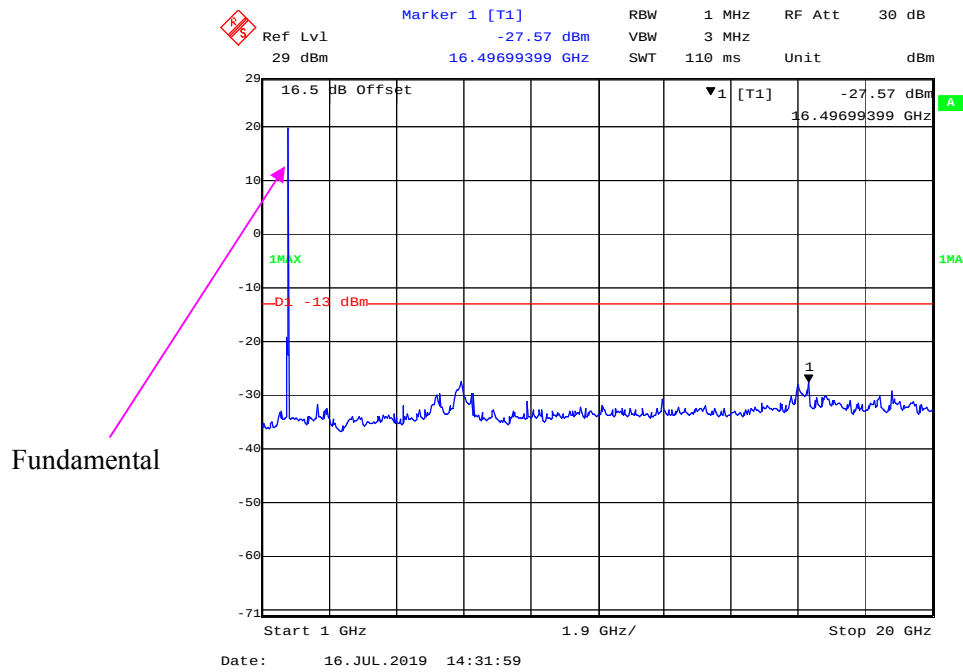
### 1 GHz – 20 GHz (10 MHz, 16-QAM, Middle Channel)



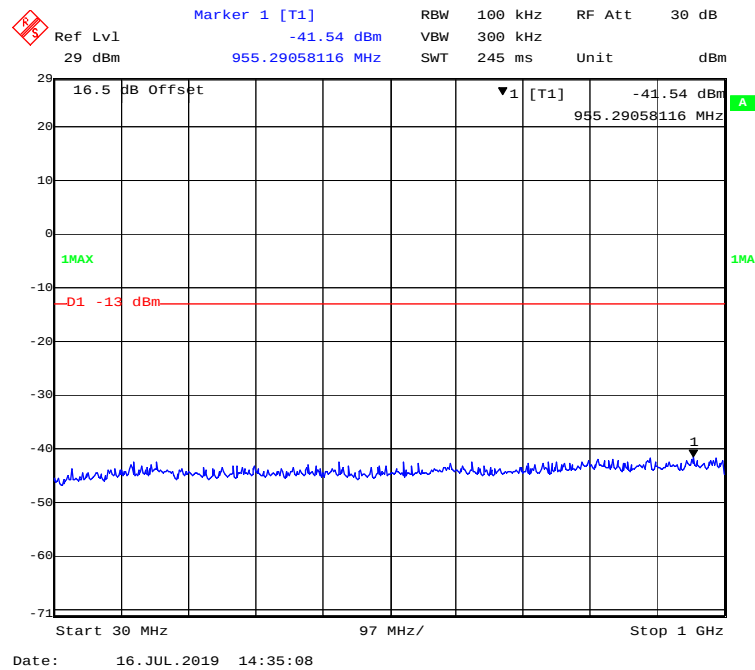
### 30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



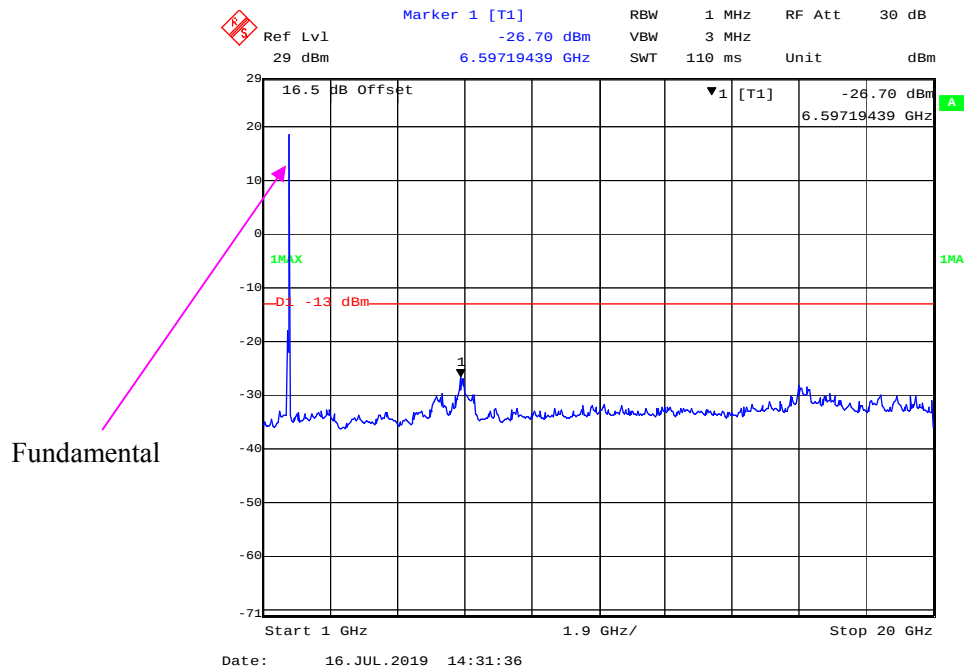
### 1 GHz – 20 GHz (15 MHz, QPSK, Middle Channel)



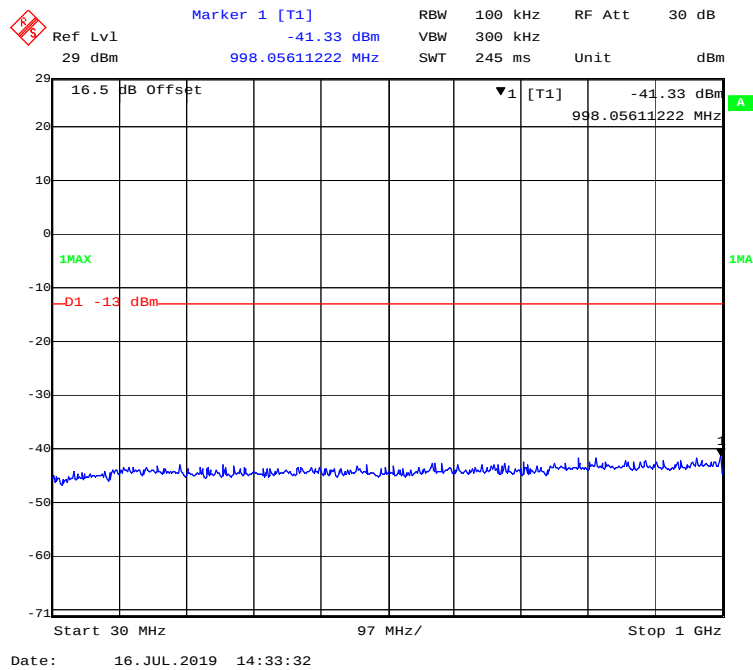
### 30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



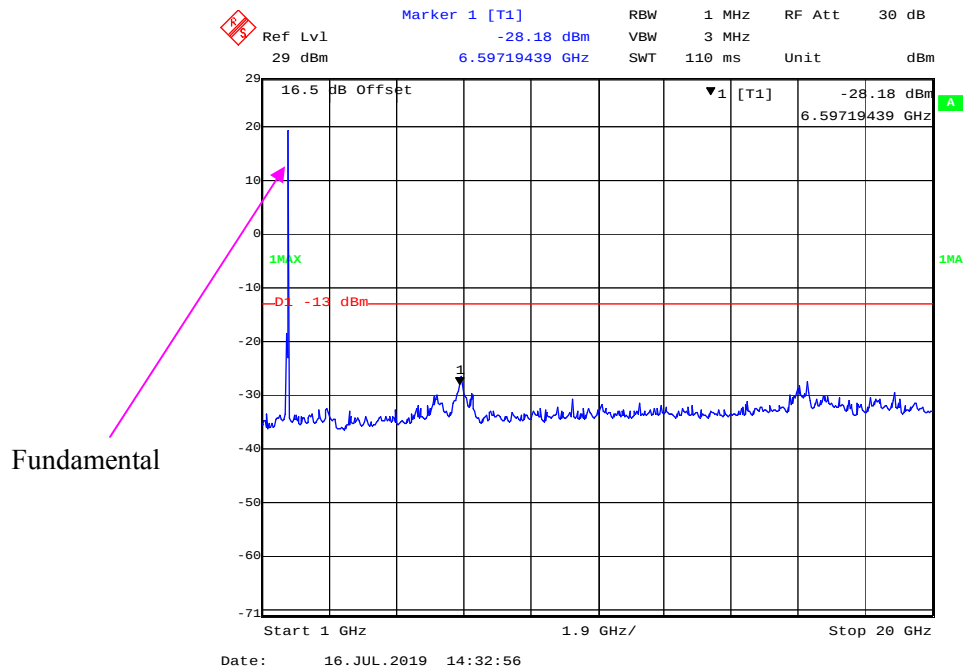
### 1 GHz – 20 GHz (15 MHz, 16-QAM, Middle Channel)



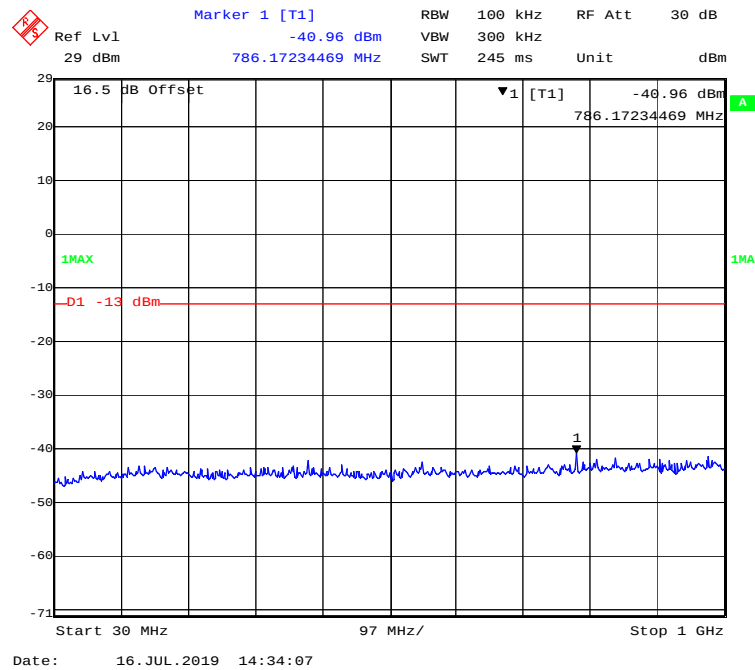
### 30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



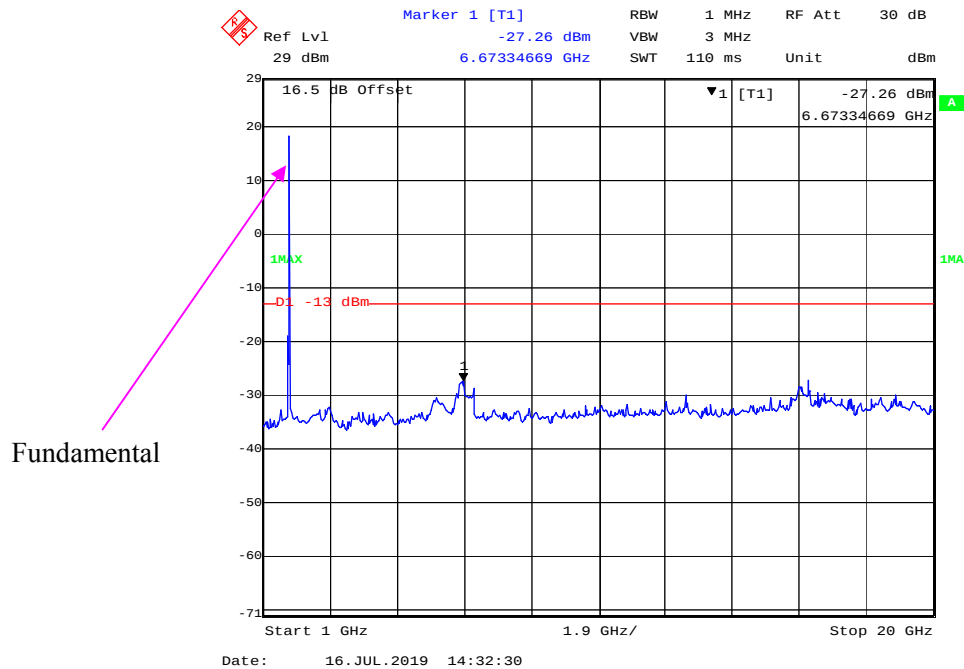
### 1 GHz – 20 GHz (20 MHz, QPSK, Middle Channel)



### 30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

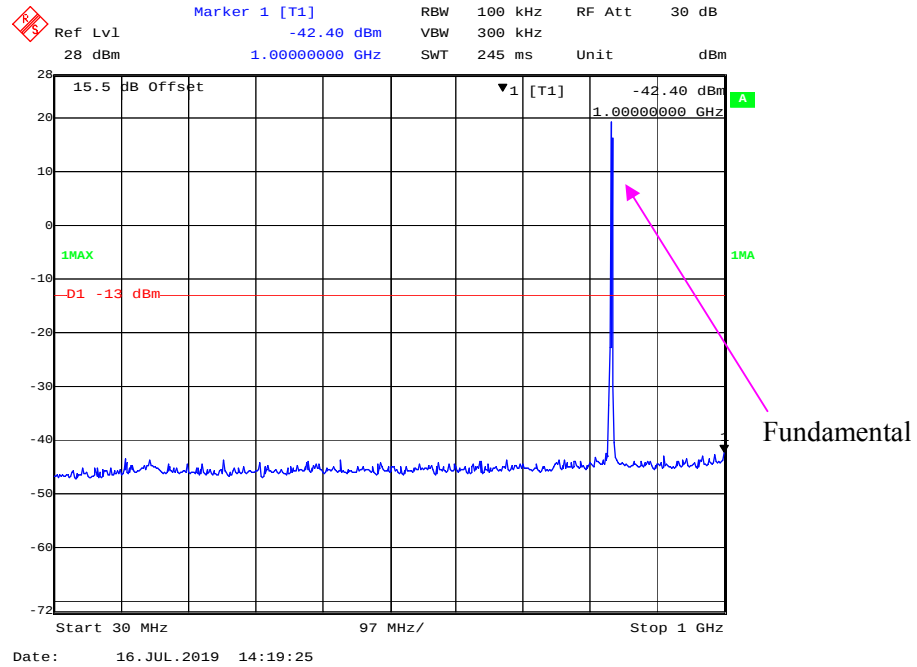


### 1 GHz – 20 GHz (20 MHz, 16-QAM, Middle Channel)

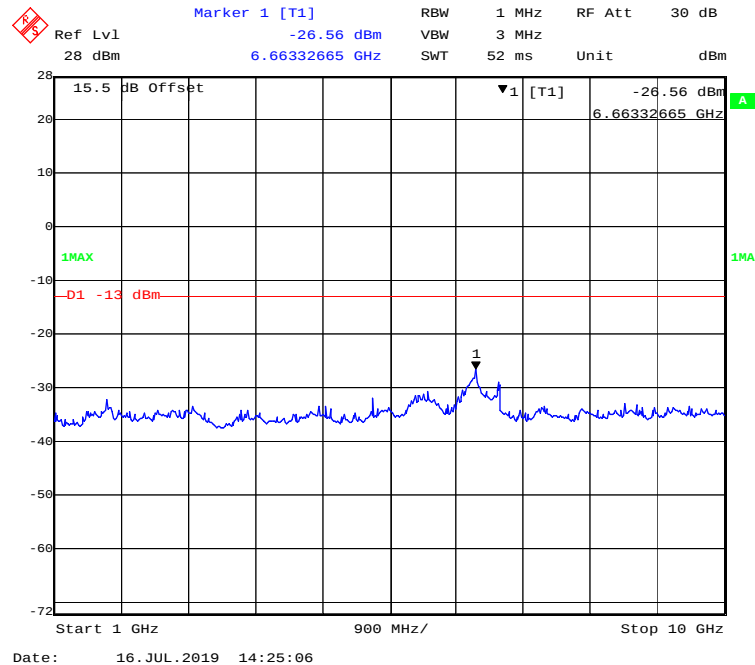


# LTE Band 5:

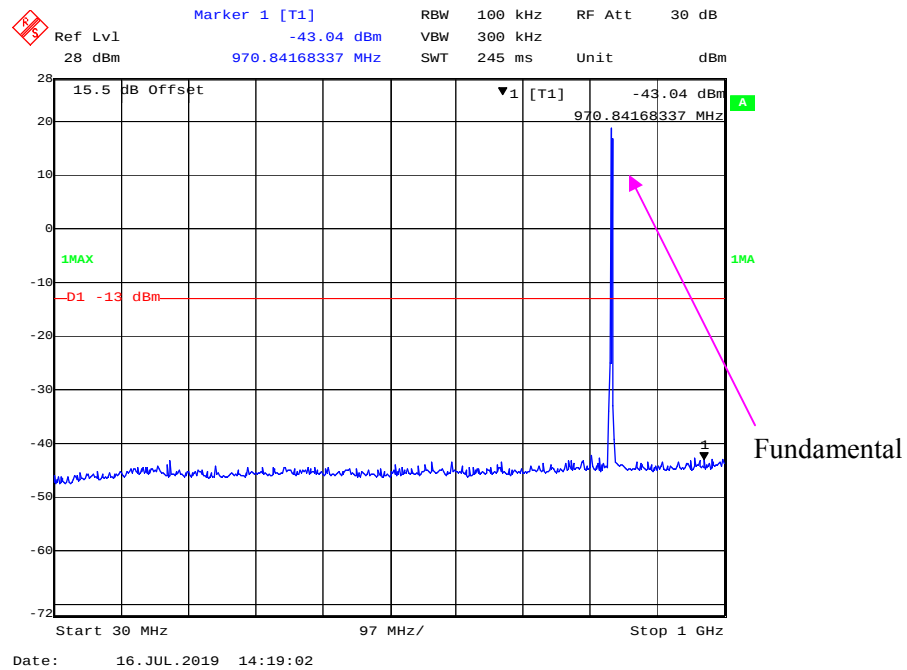
## 30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)



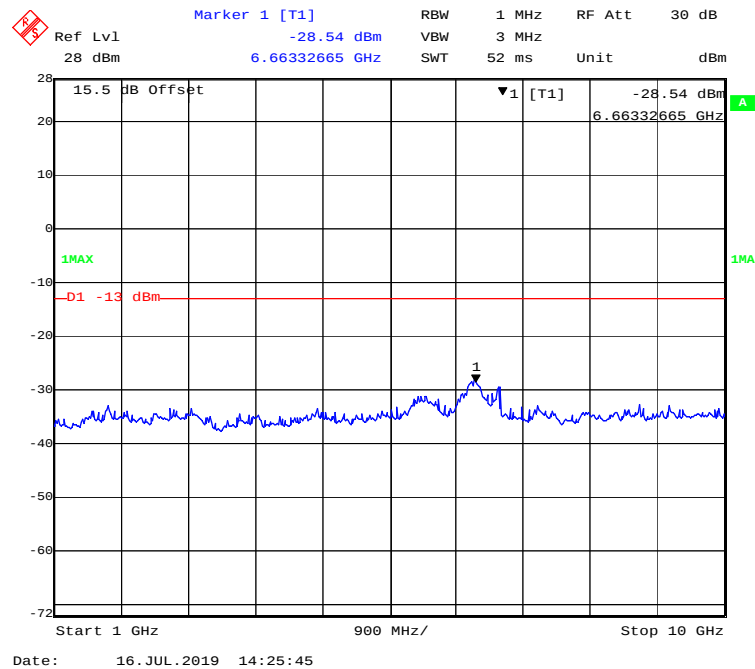
## 1 GHz – 10 GHz (1.4 MHz, QPSK, Middle Channel)



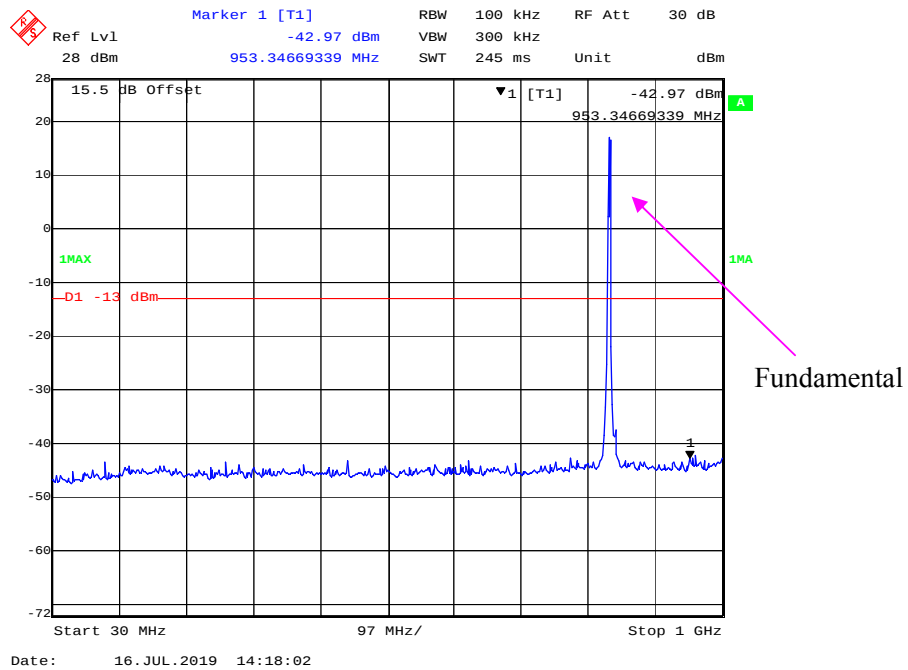
### 30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)



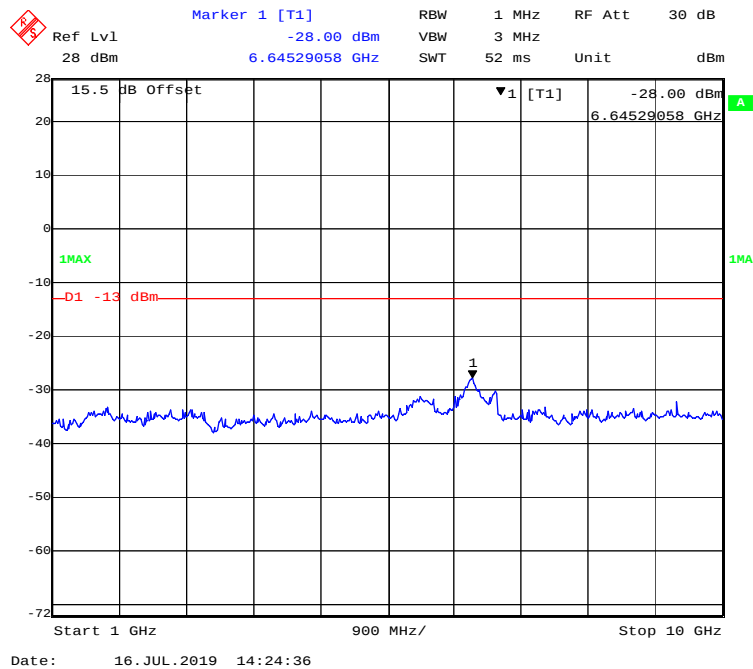
### 1 GHz – 10 GHz (1.4 MHz, 16-QAM, Middle Channel)



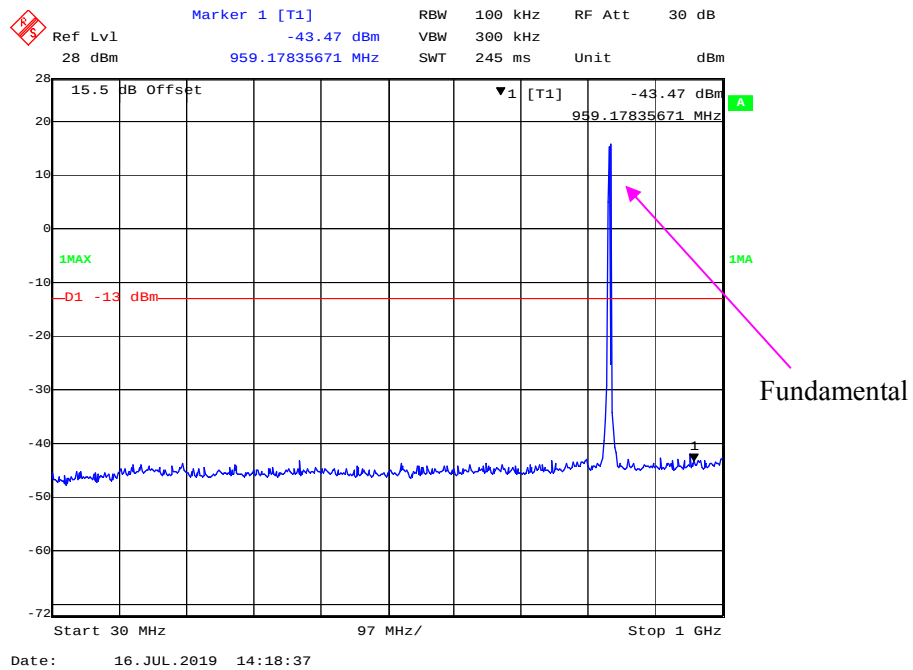
### 30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)



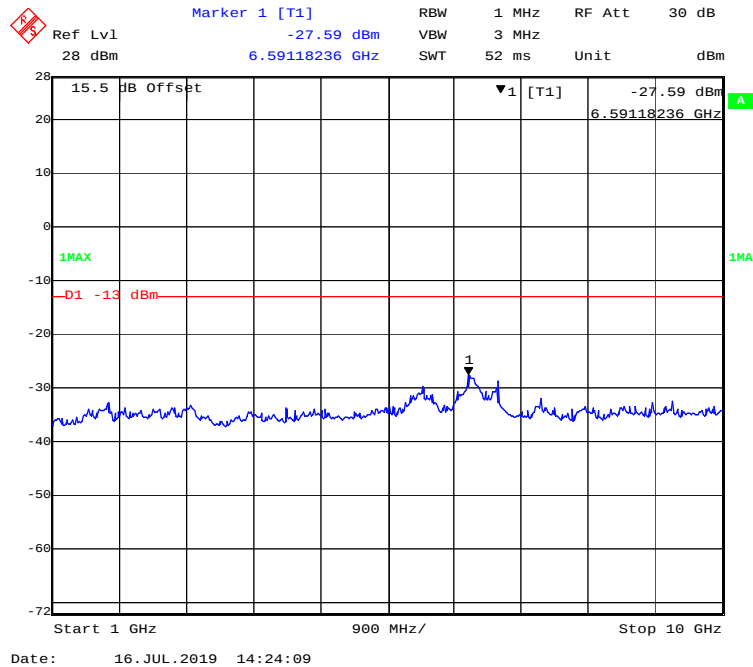
### 1 GHz – 10 GHz (3 MHz, QPSK, Middle Channel)



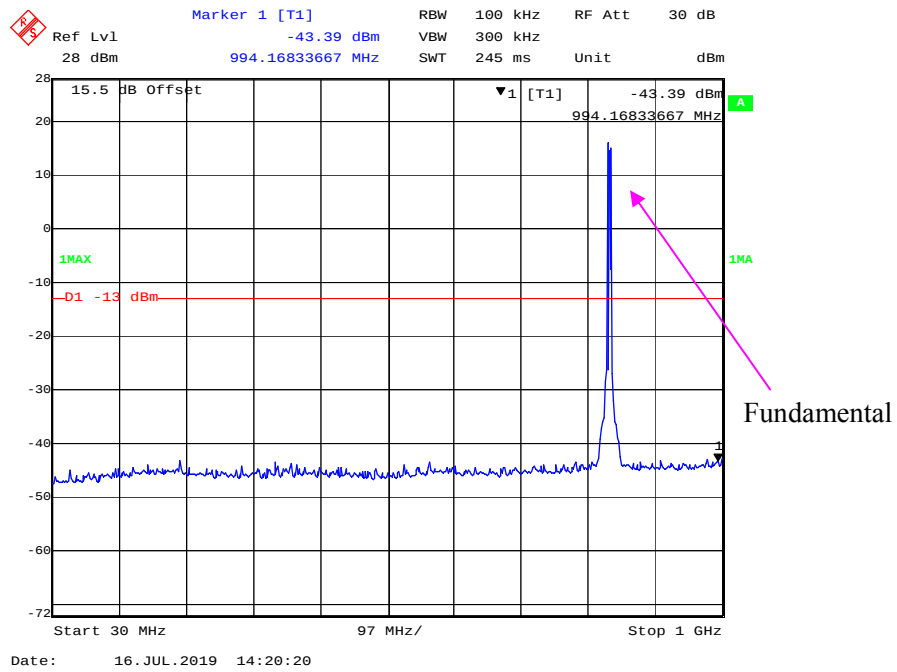
### 30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



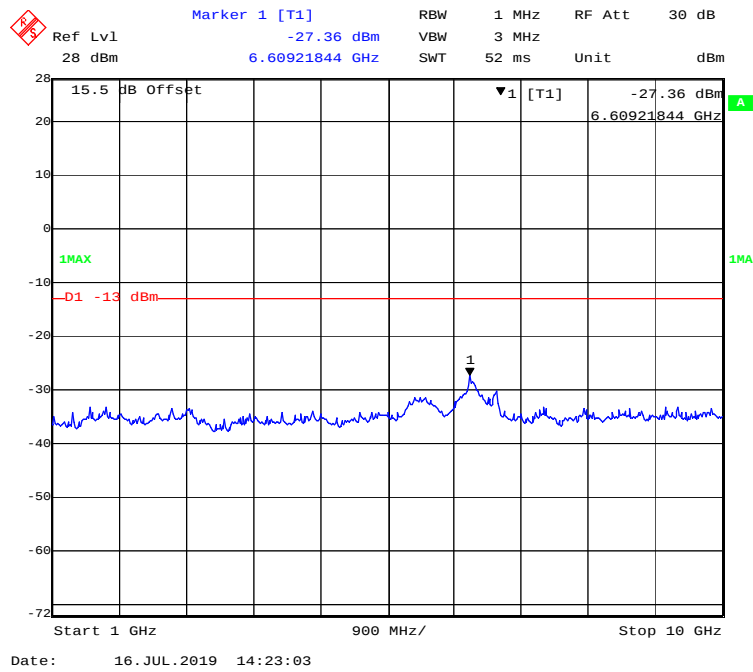
### 1 GHz – 10 GHz (3 MHz, 16-QAM, Middle Channel)



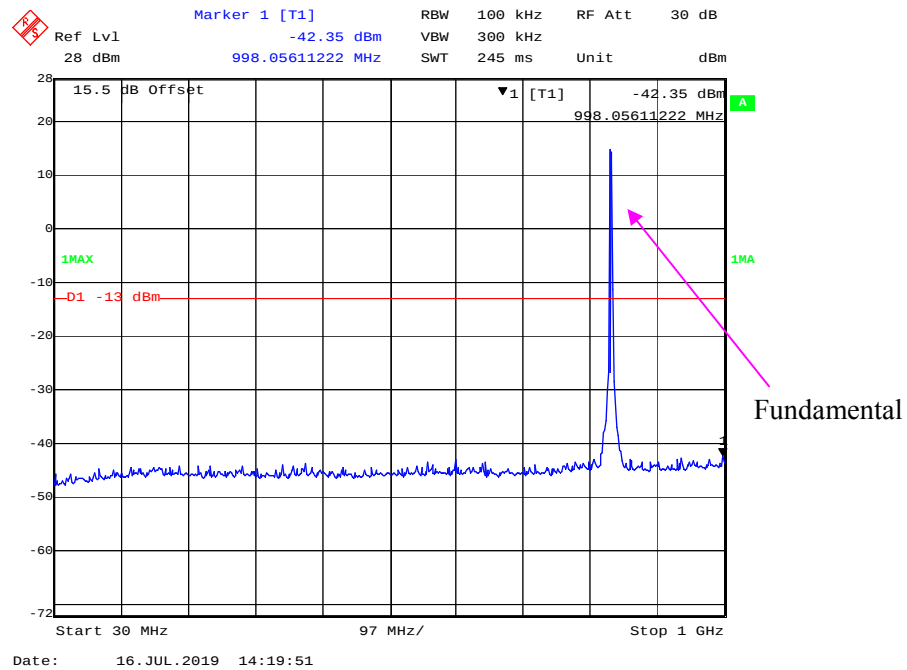
### 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



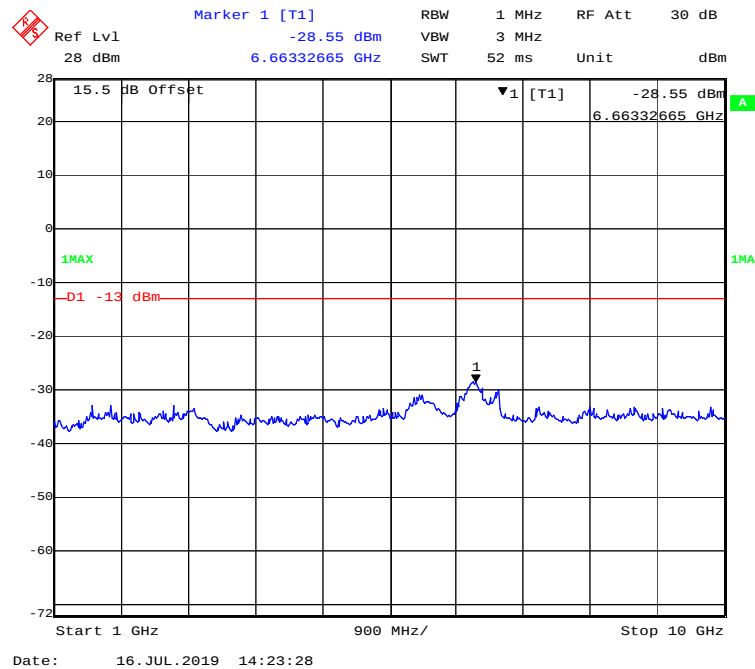
### 1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



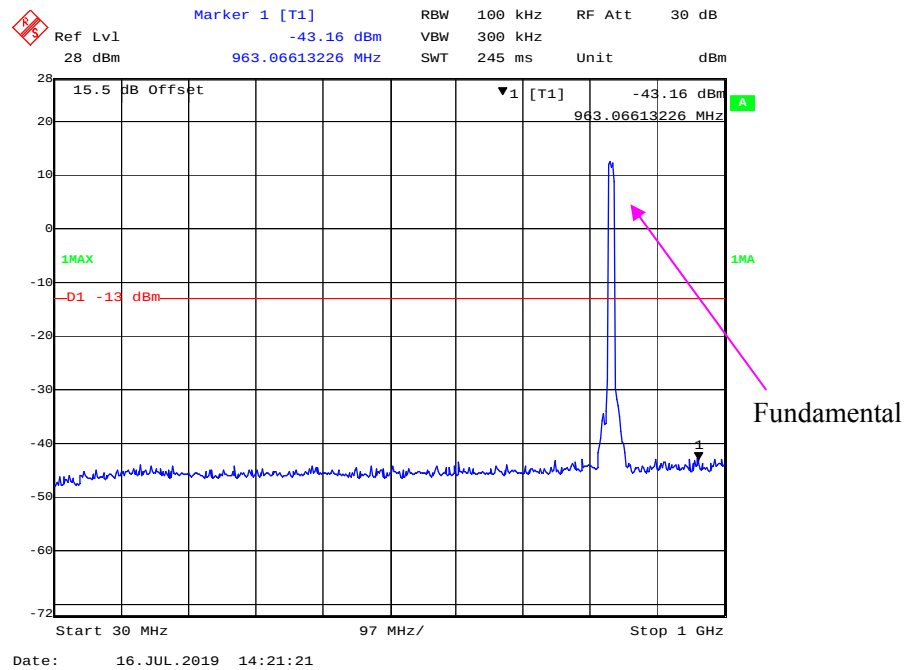
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



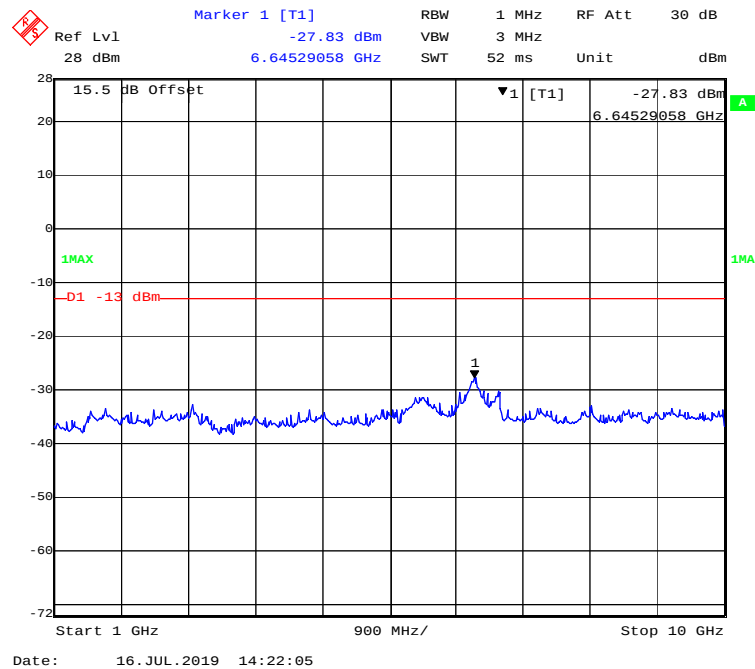
### 1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



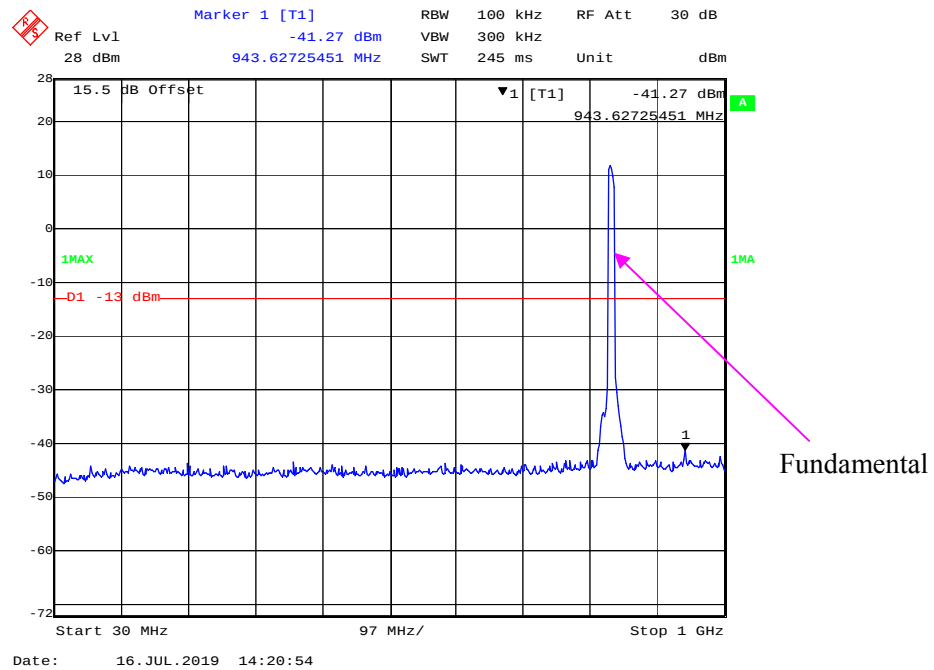
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



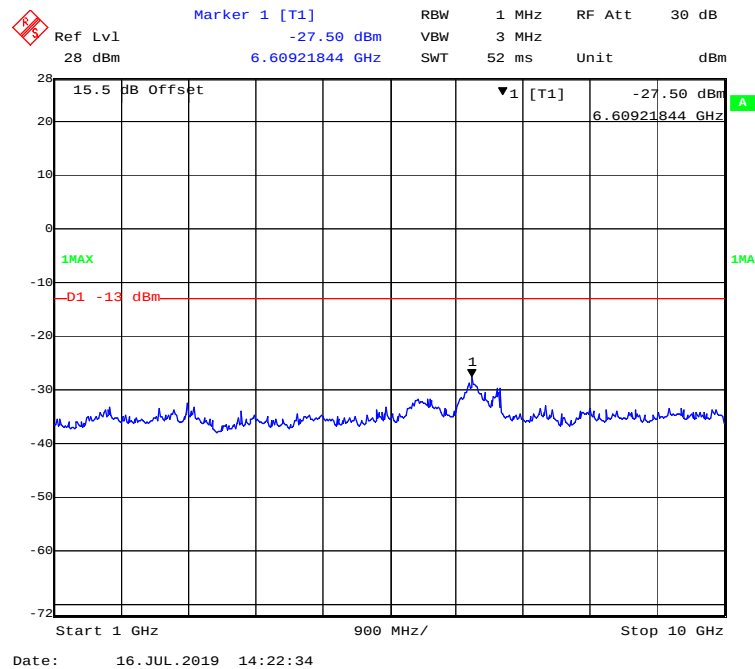
### 1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)



### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)

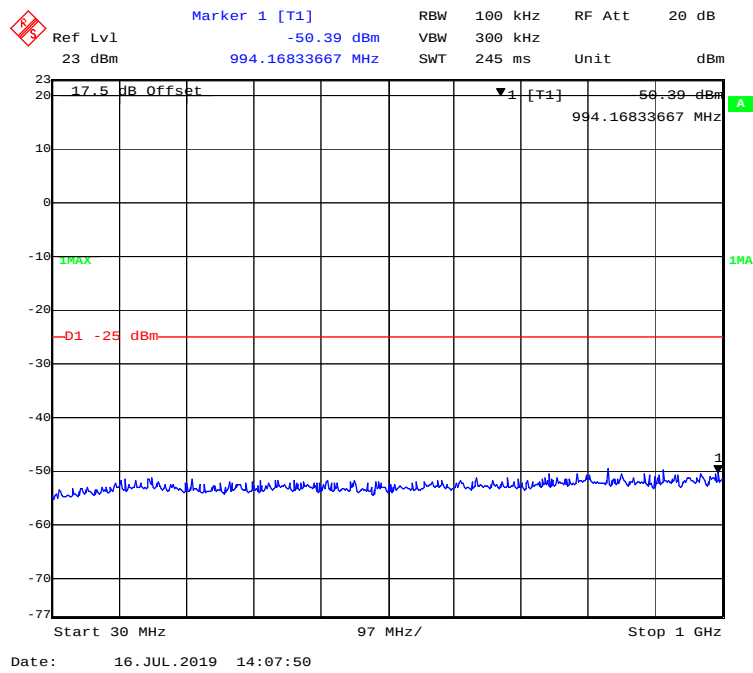


### 1 GHz – 10 GHz (10 MHz, 16-QAM, Middle Channel)

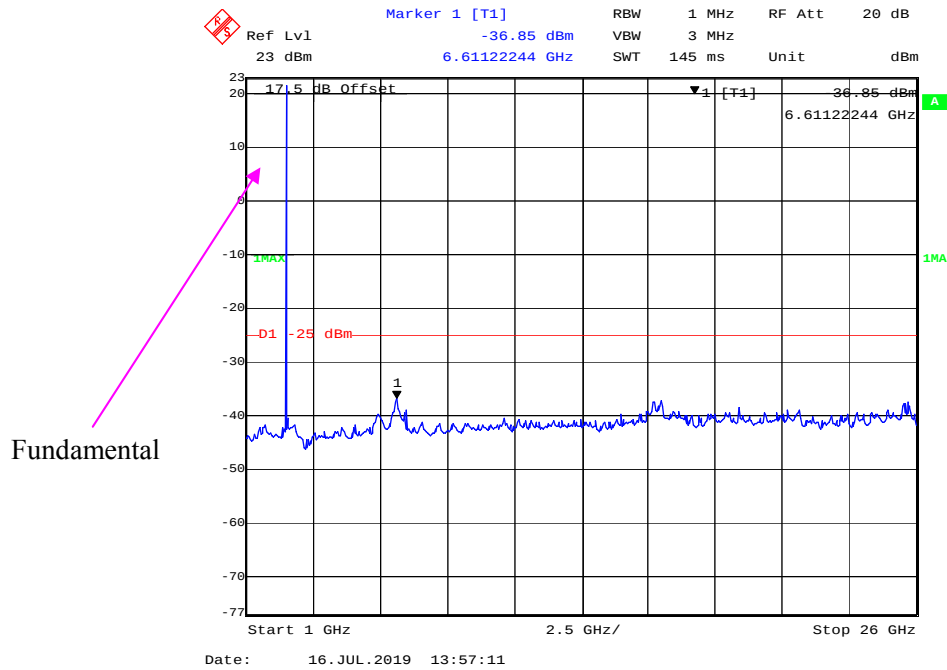


# LTE Band 7:

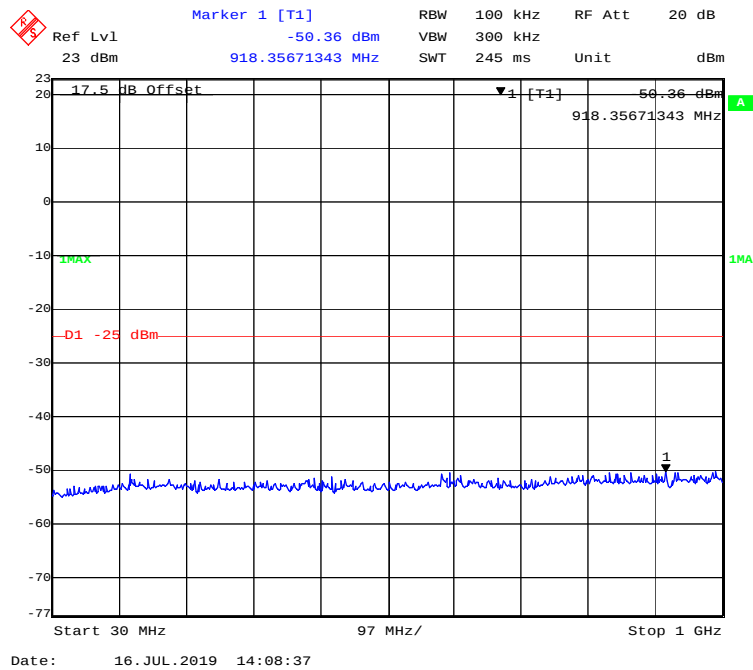
## 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



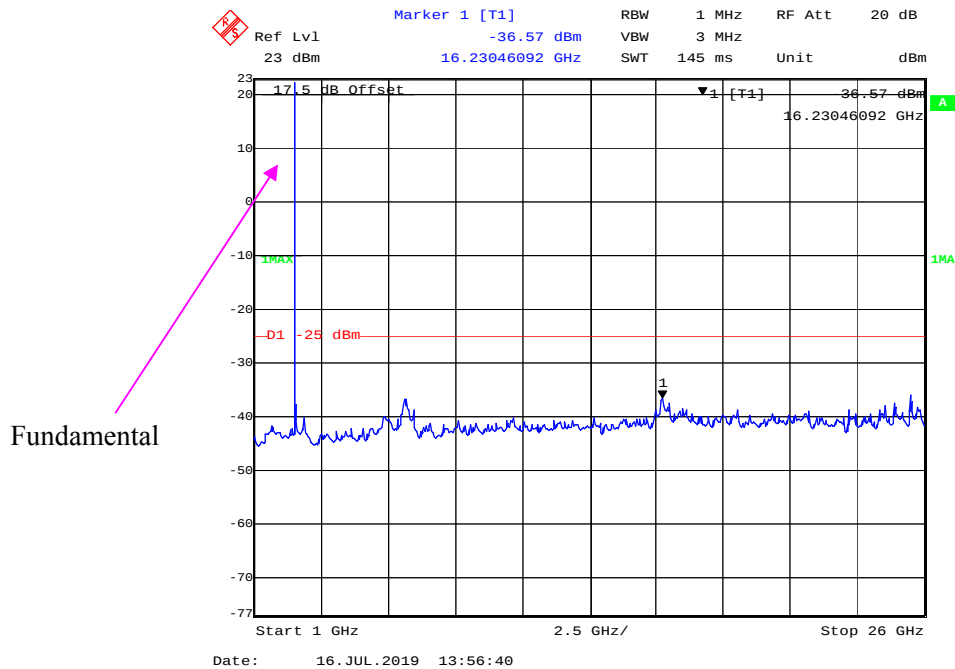
## 1 GHz – 26 GHz (5 MHz, QPSK, Middle Channel)



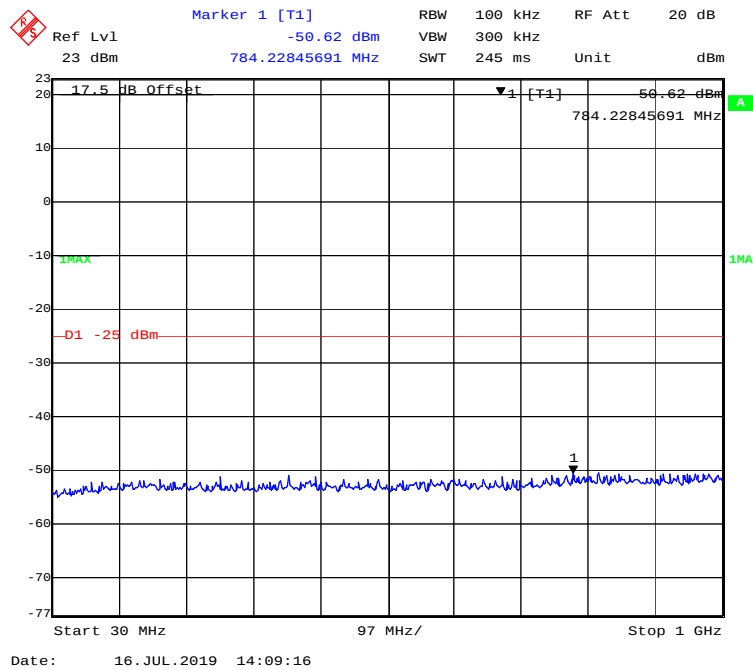
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



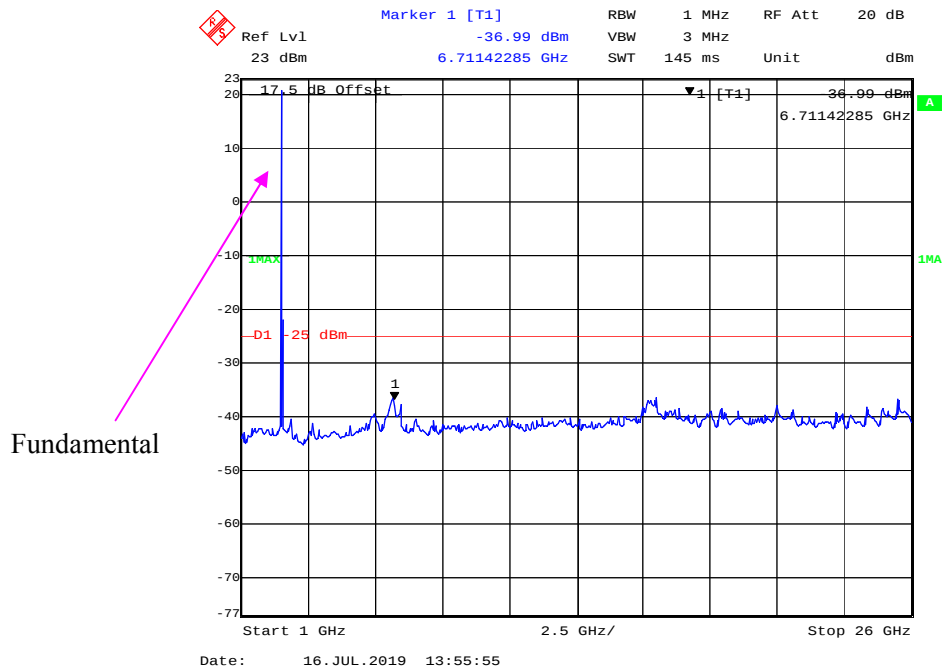
### 1 GHz – 26 GHz (5 MHz, 16-QAM, Middle Channel)



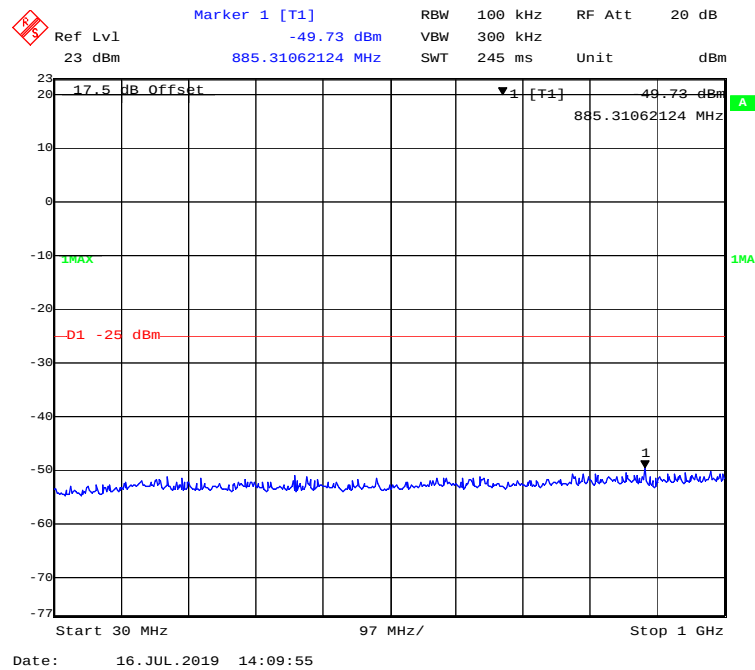
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



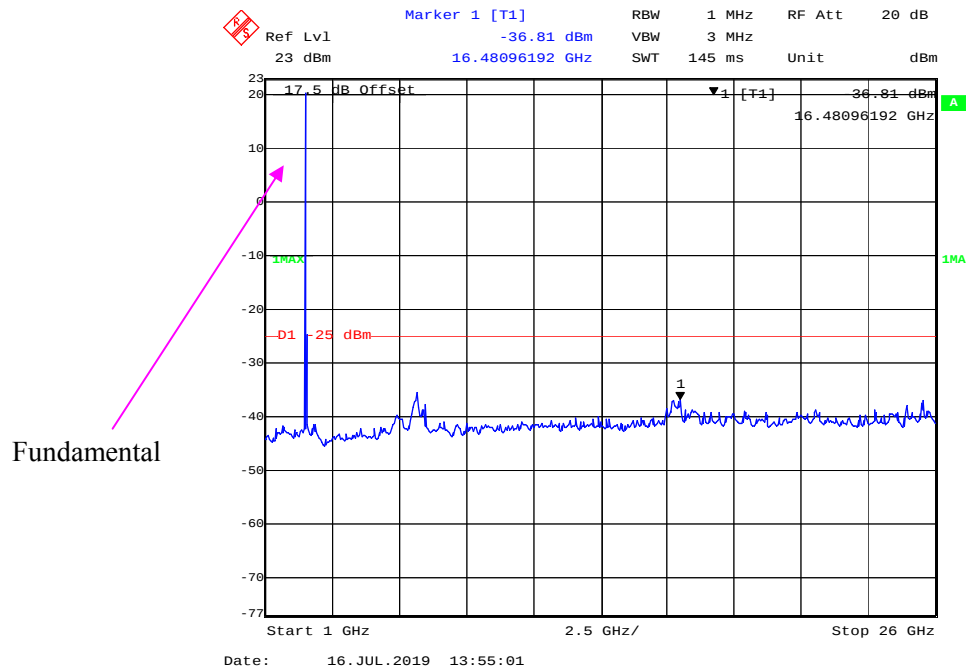
### 1 GHz – 26GHz (10MHz, QPSK, Middle Channel)



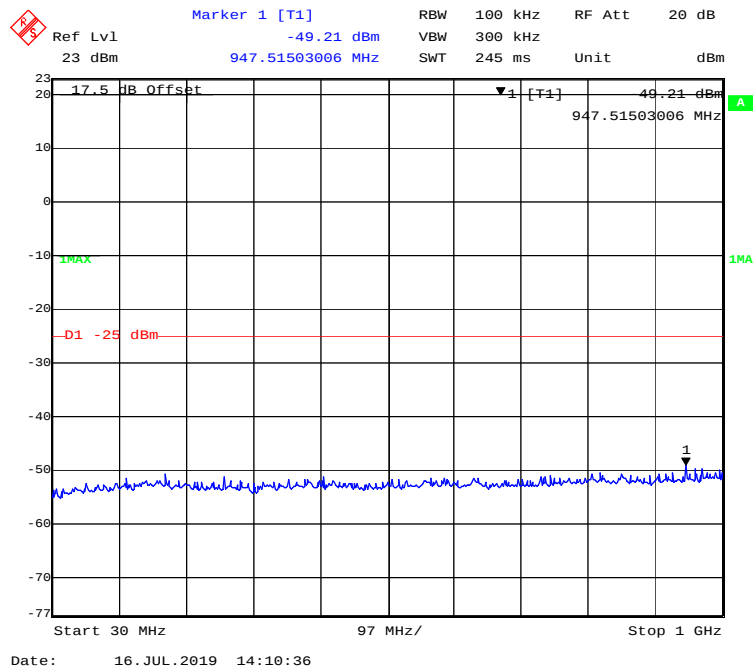
### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



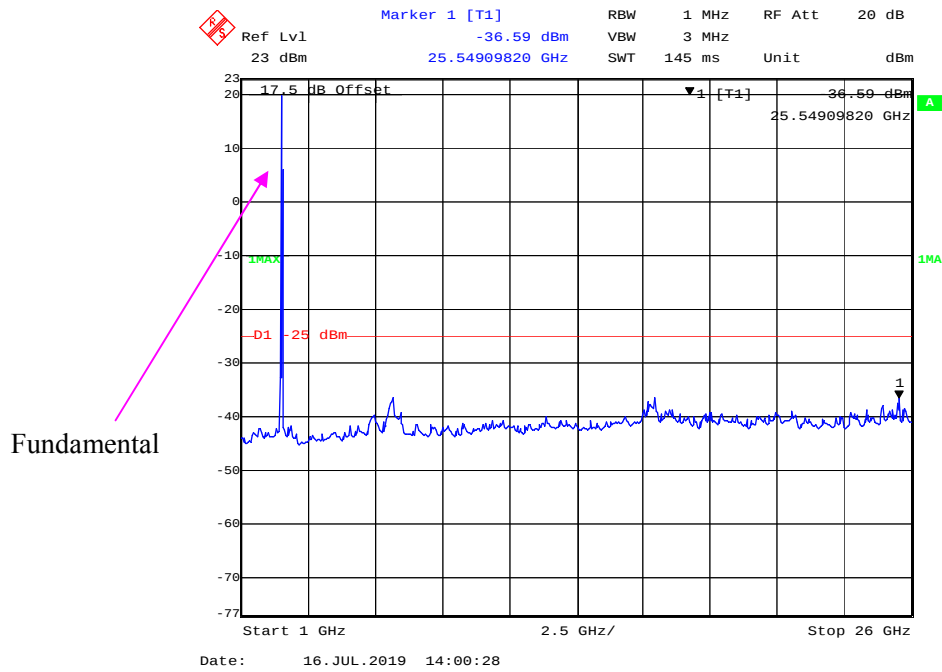
### 1 GHz – 26 GHz (10 MHz, 16-QAM, Middle Channel)



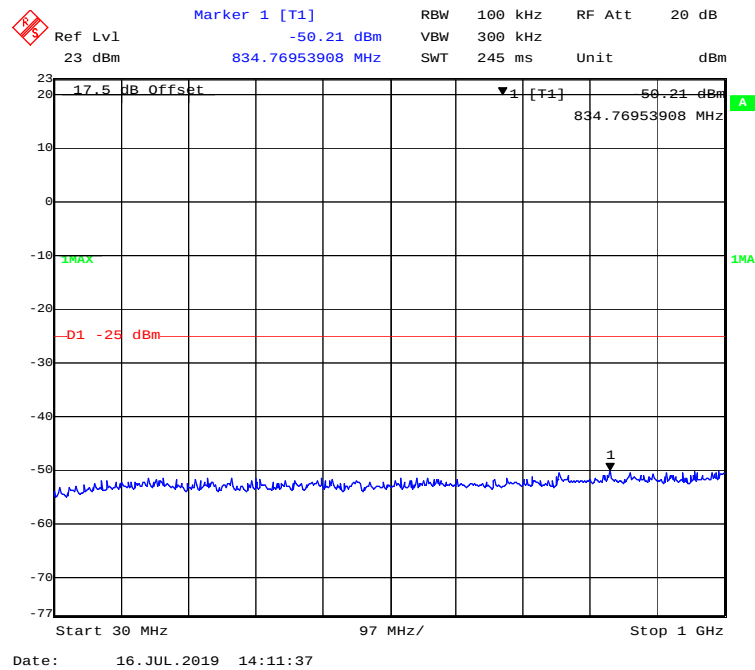
### 30 MHz - 1 GHz (15 MHz, QPSK, Middle Channel)



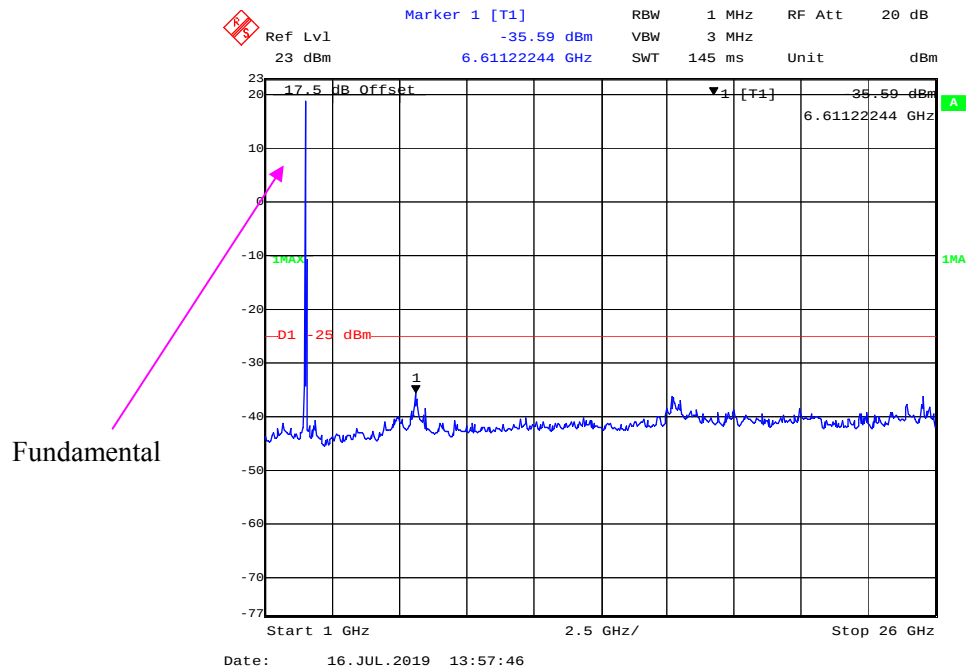
### 1 GHz – 26 GHz (15MHz, QPSK, Middle Channel)



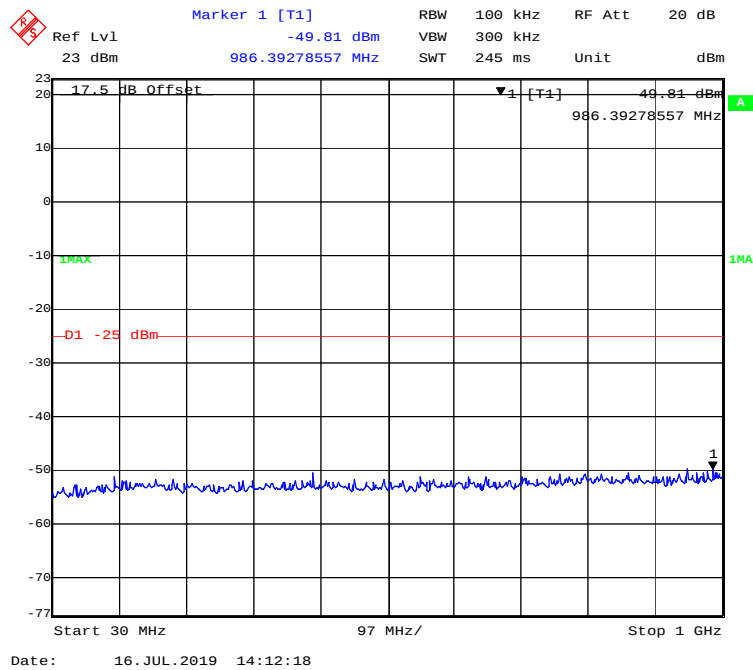
### 30 MHz - 1 GHz (15 MHz, 16-QAM, Middle Channel)



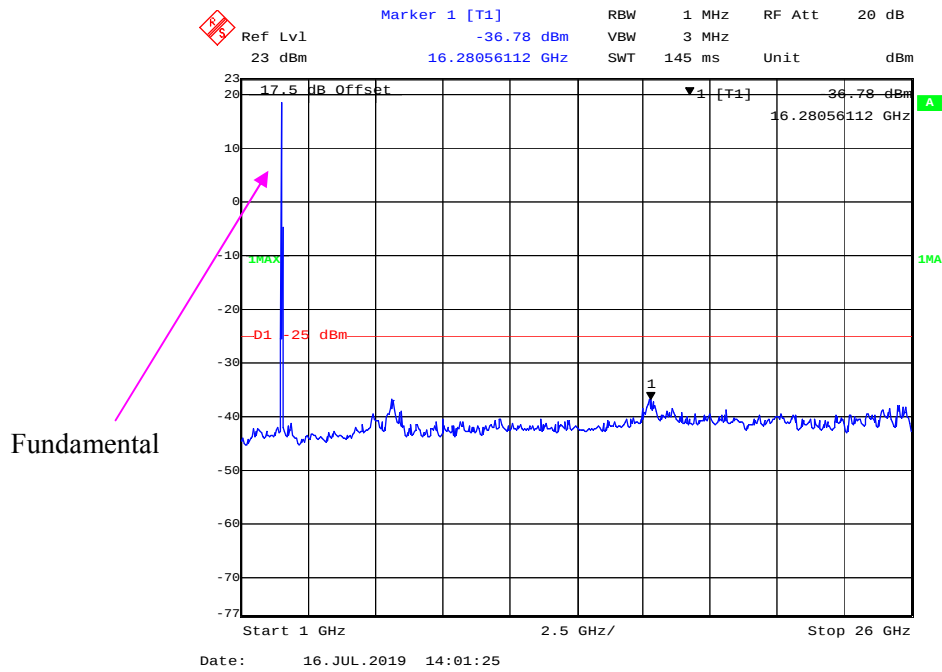
### 1 GHz – 26 GHz (15 MHz, 16-QAM, Middle Channel)



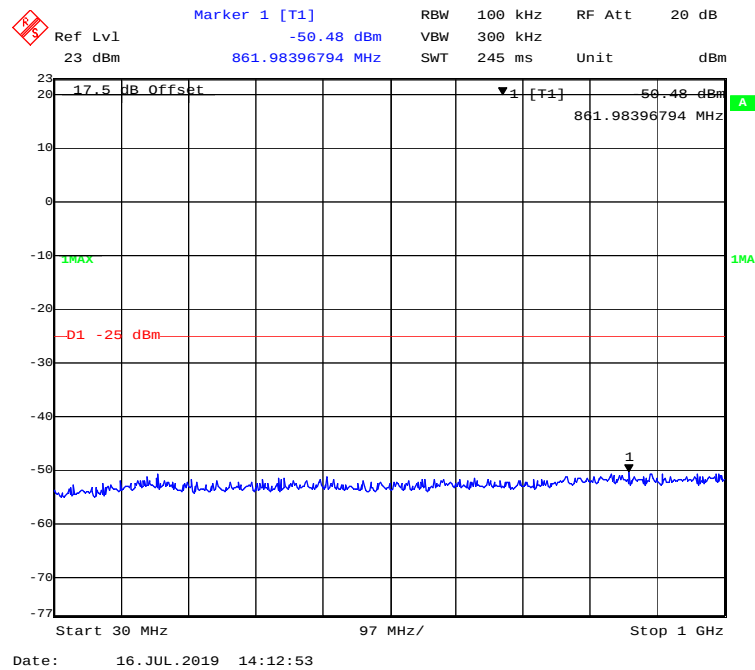
### 30 MHz - 1 GHz (20 MHz, QPSK, Middle Channel)



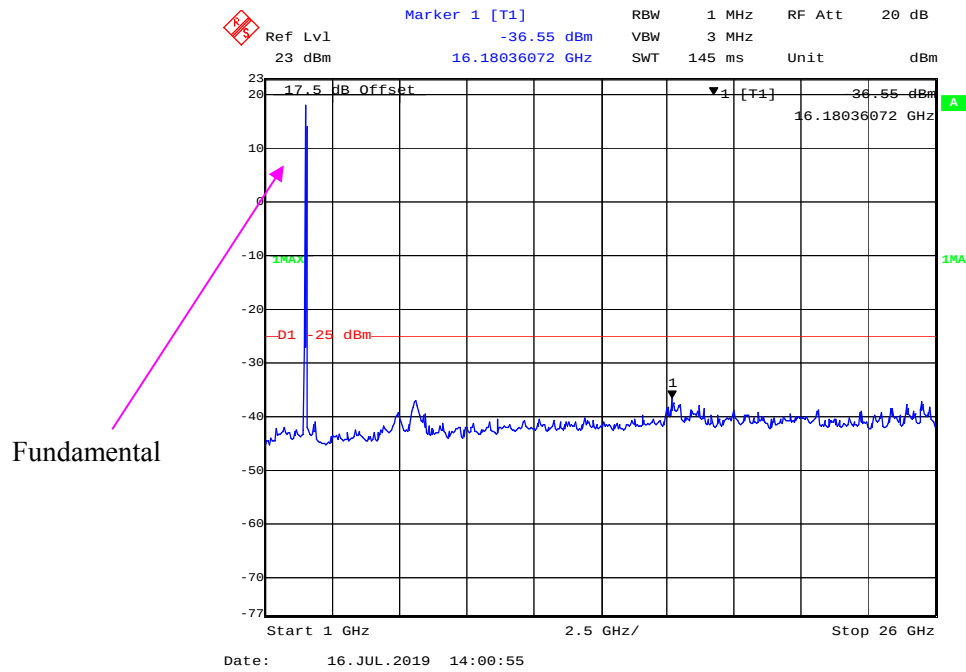
### 1 GHz – 26 GHz (20MHz, QPSK, Middle Channel)



### 30 MHz - 1 GHz (20 MHz, 16-QAM, Middle Channel)

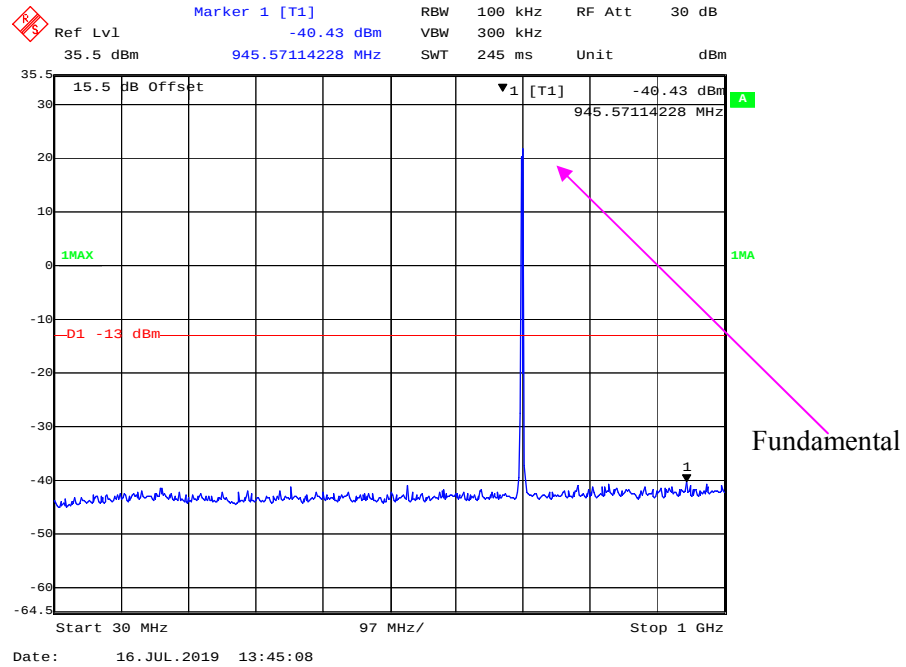


### 1 GHz – 26 GHz (20 MHz, 16-QAM, Middle Channel)

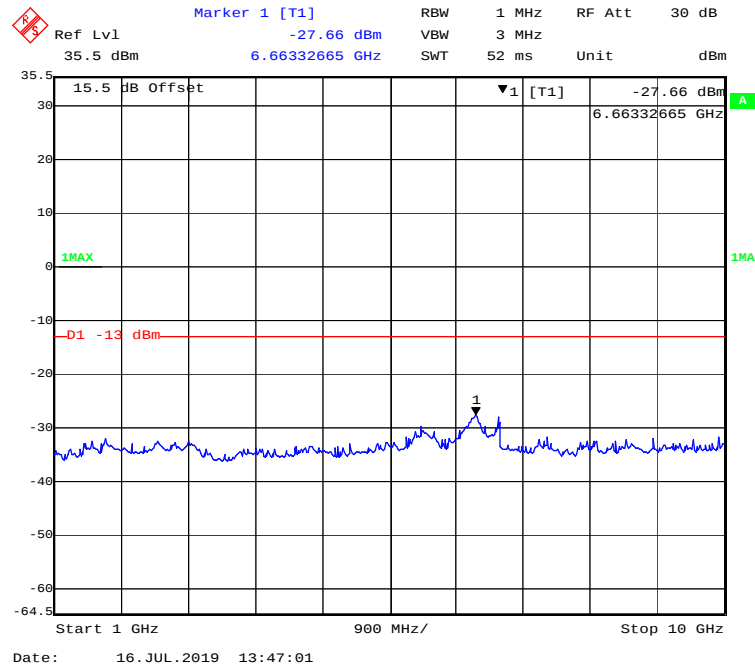


# LTE Band 12:

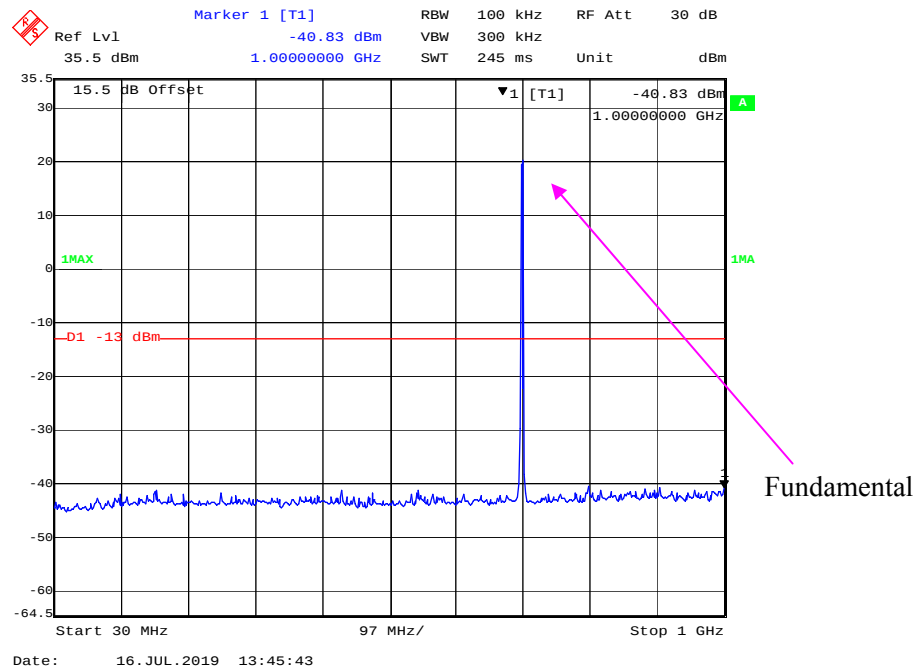
## 30 MHz - 1 GHz (1.4 MHz, QPSK, Middle Channel)



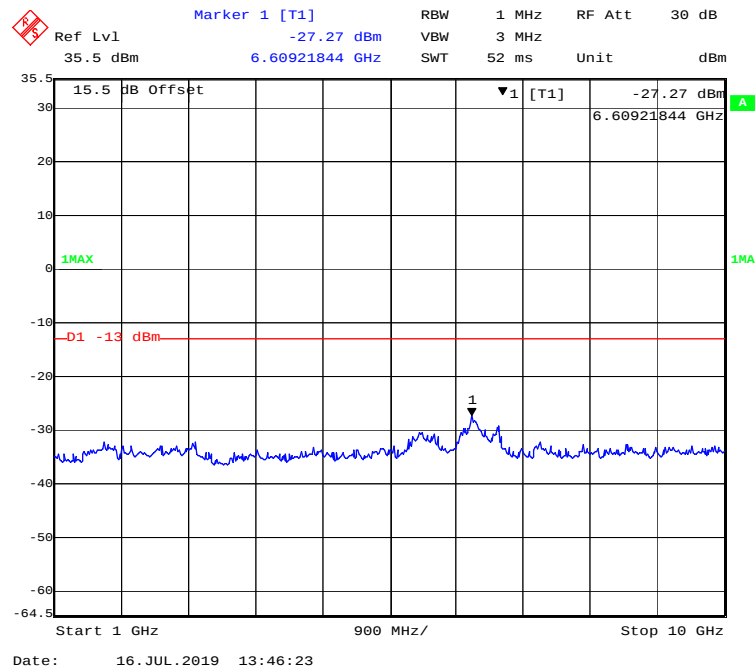
## 1 GHz – 10 GHz (1.4 MHz, QPSK, Middle Channel)

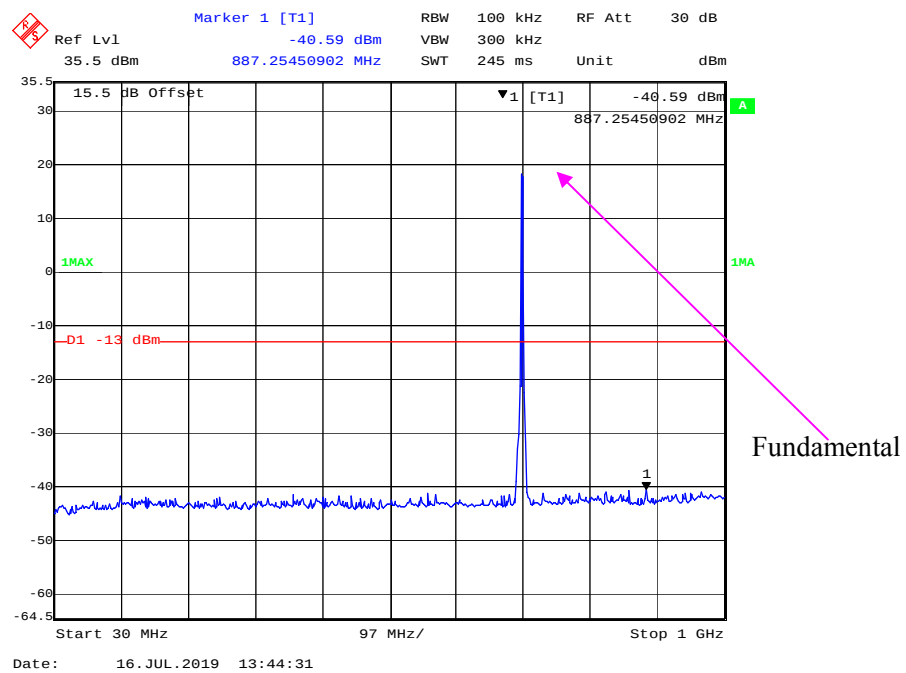
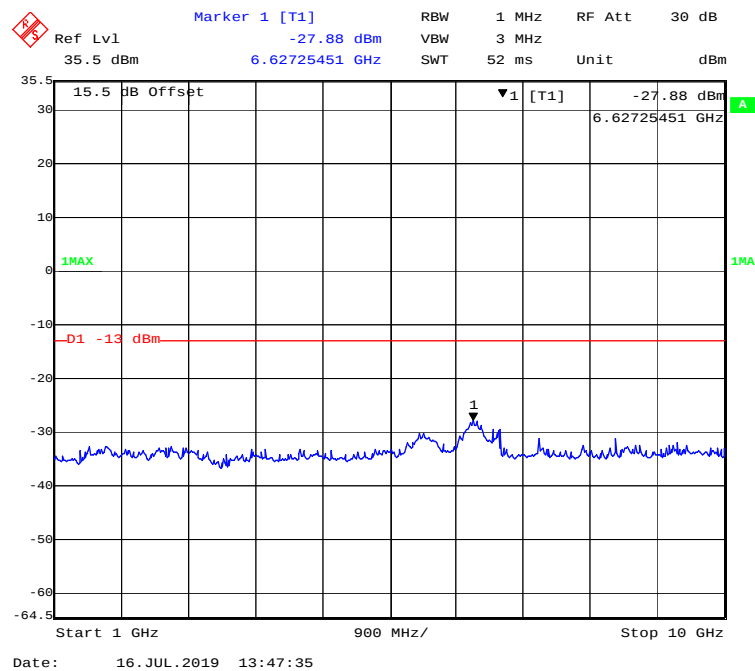


### 30 MHz - 1 GHz (1.4 MHz, 16-QAM, Middle Channel)

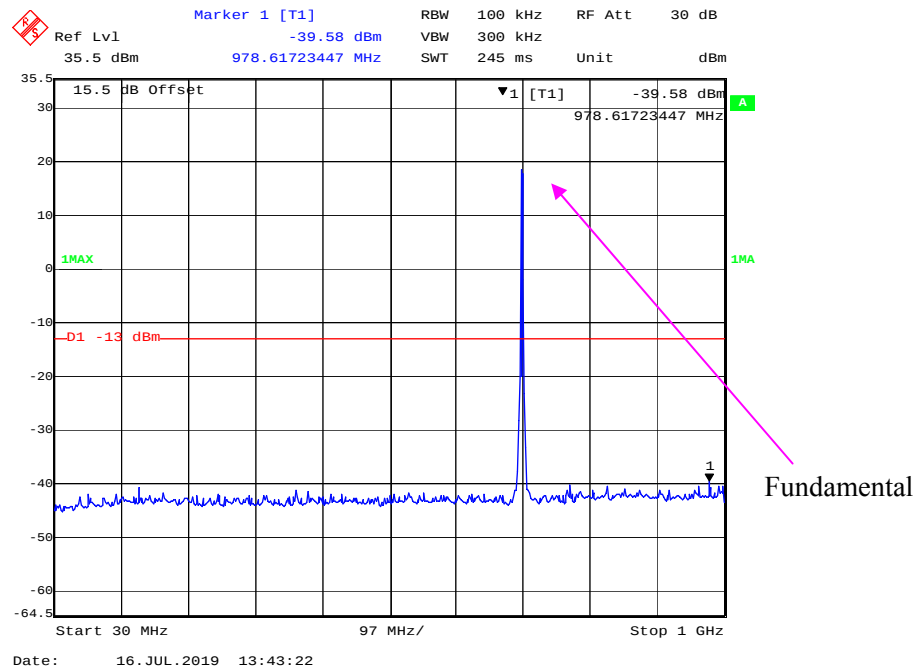


### 1 GHz – 10 GHz (1.4 MHz, 16-QAM, Middle Channel)

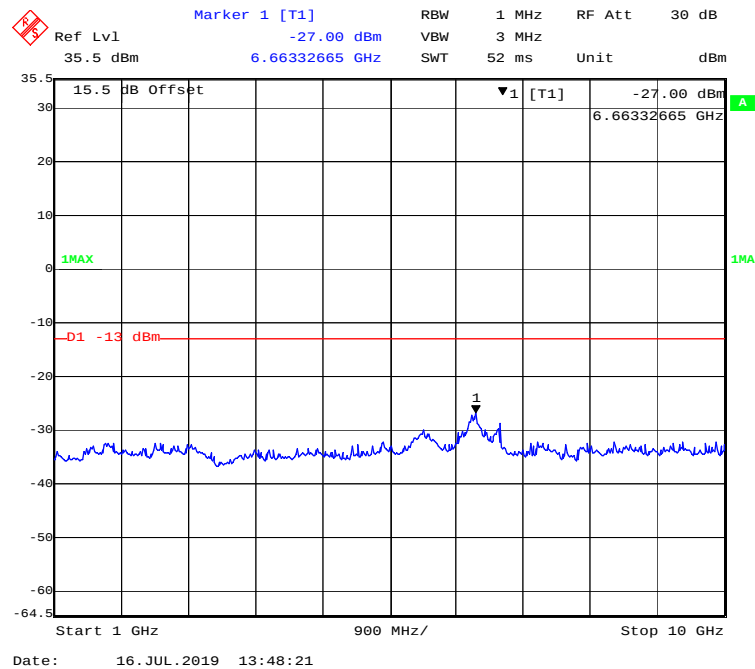


**30 MHz - 1 GHz (3 MHz, QPSK, Middle Channel)****1 GHz – 10 GHz (3 MHz, QPSK, Middle Channel)**

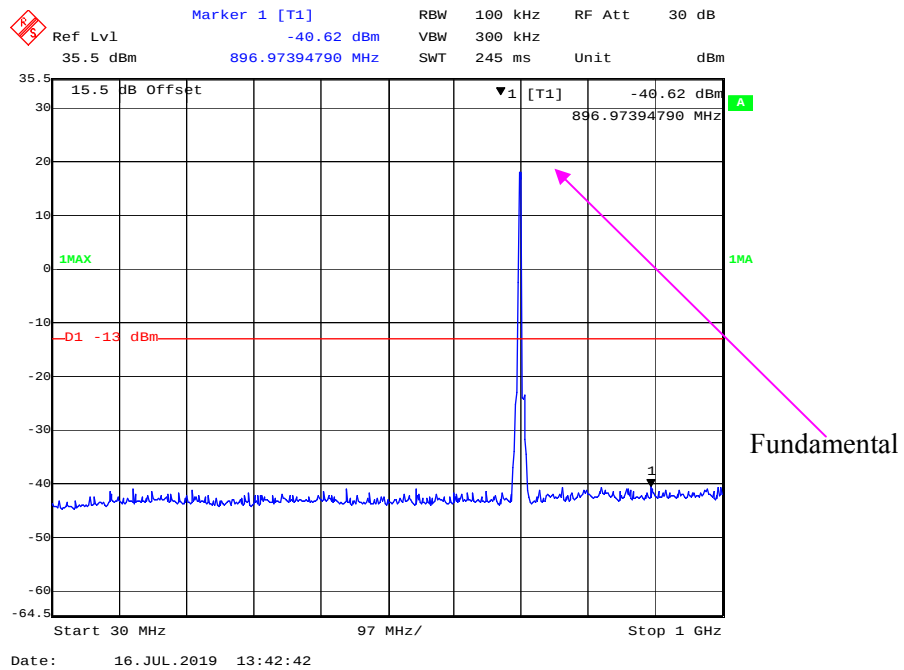
### 30 MHz - 1 GHz (3 MHz, 16-QAM, Middle Channel)



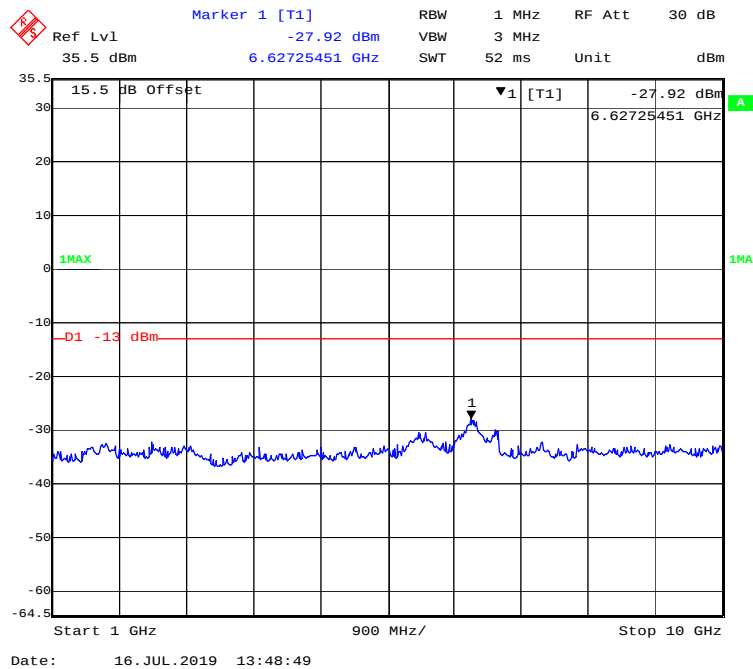
### 1 GHz – 10 GHz (3 MHz, 16-QAM, Middle Channel)



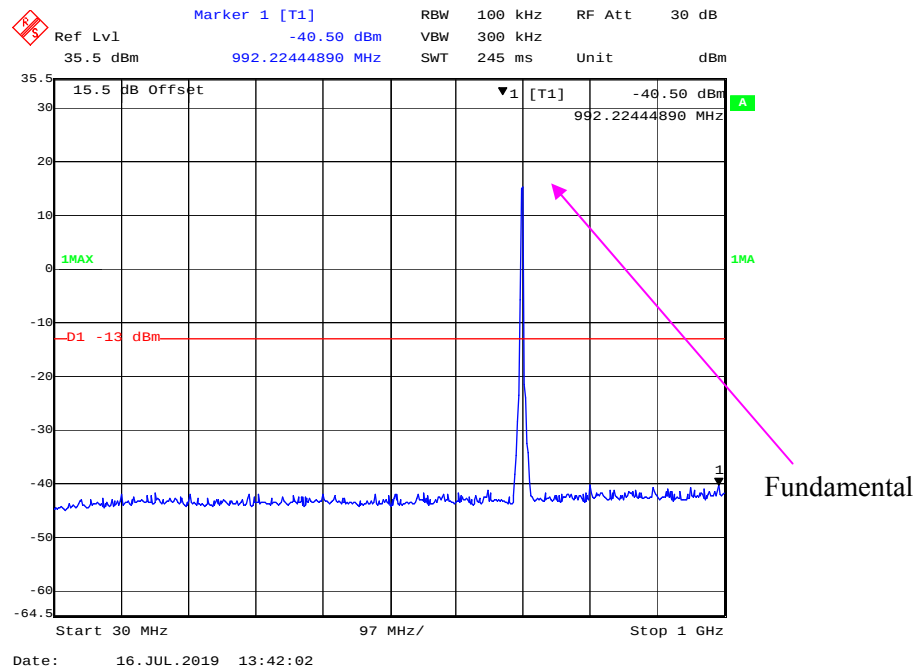
### 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



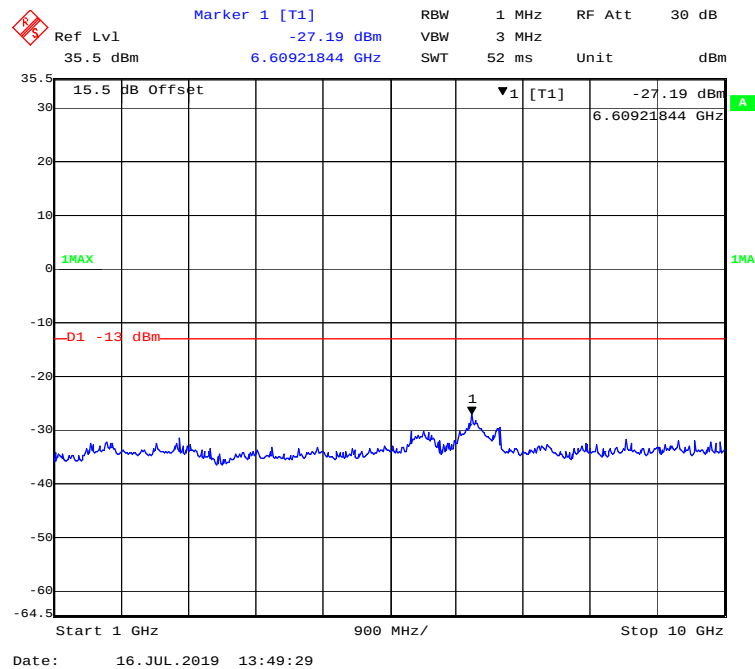
### 1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



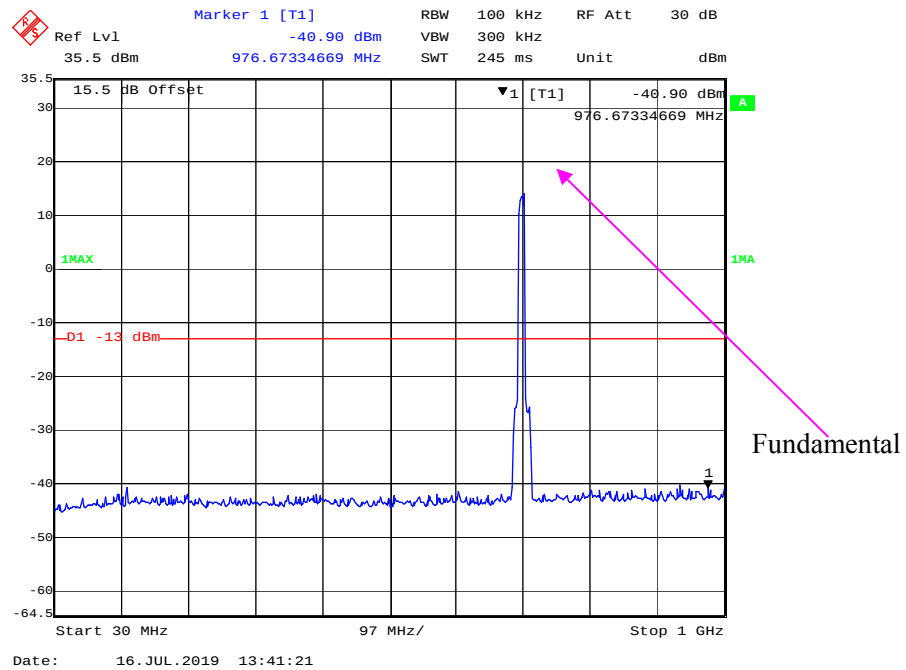
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



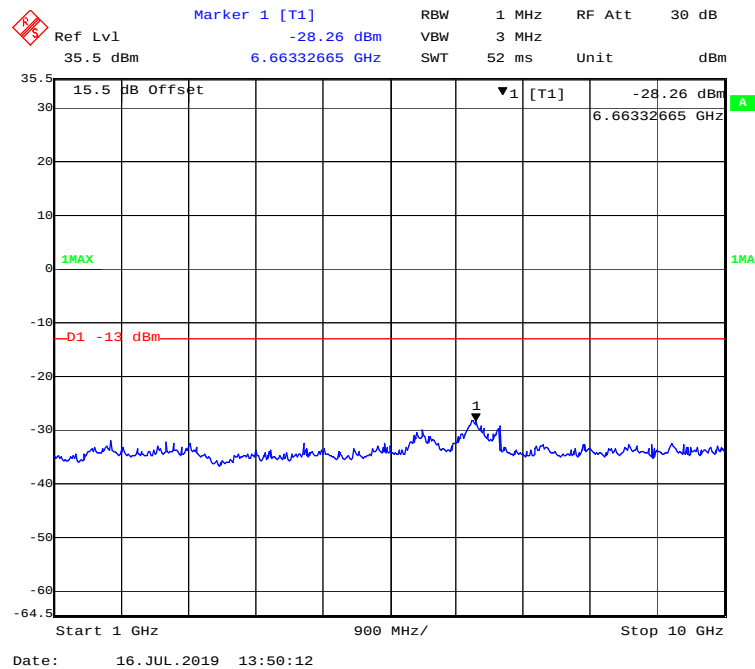
### 1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



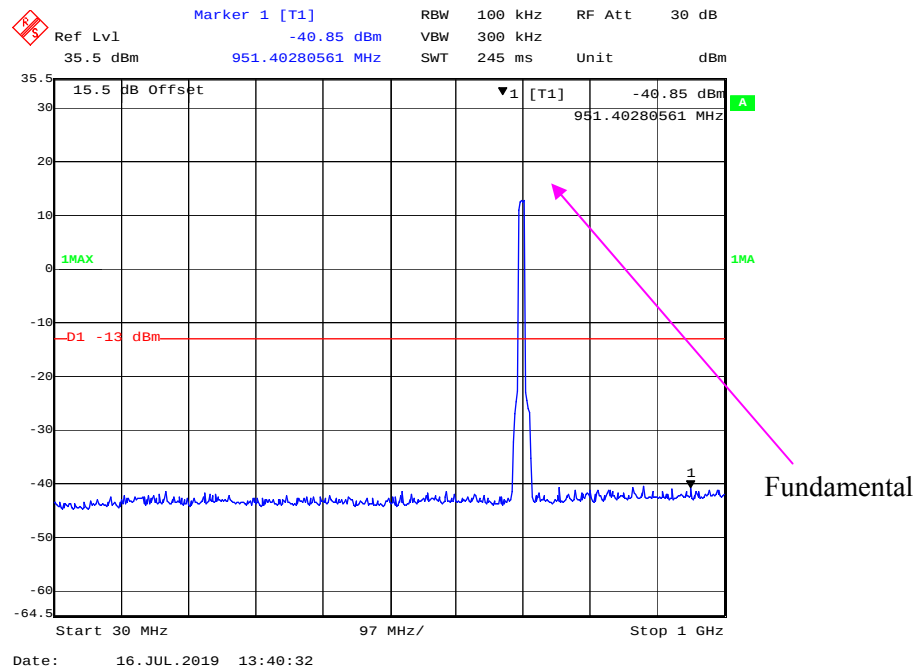
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



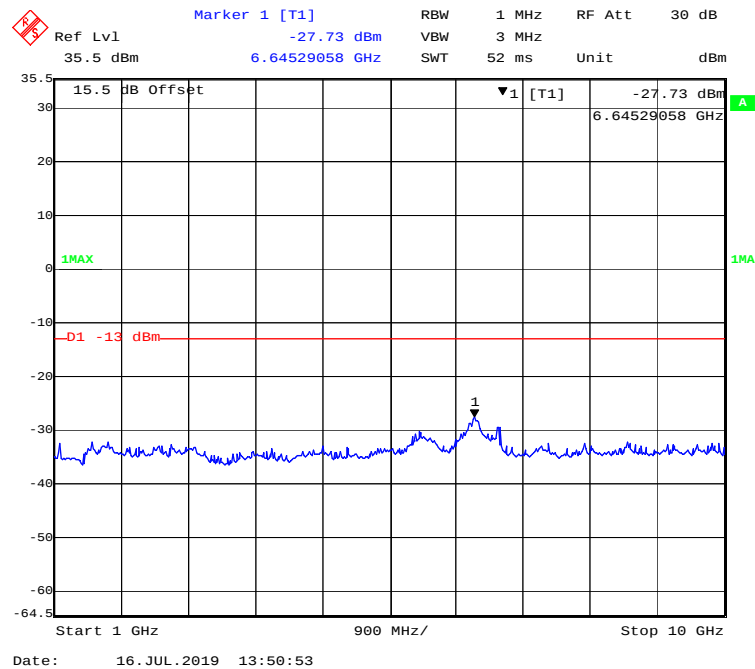
### 1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)

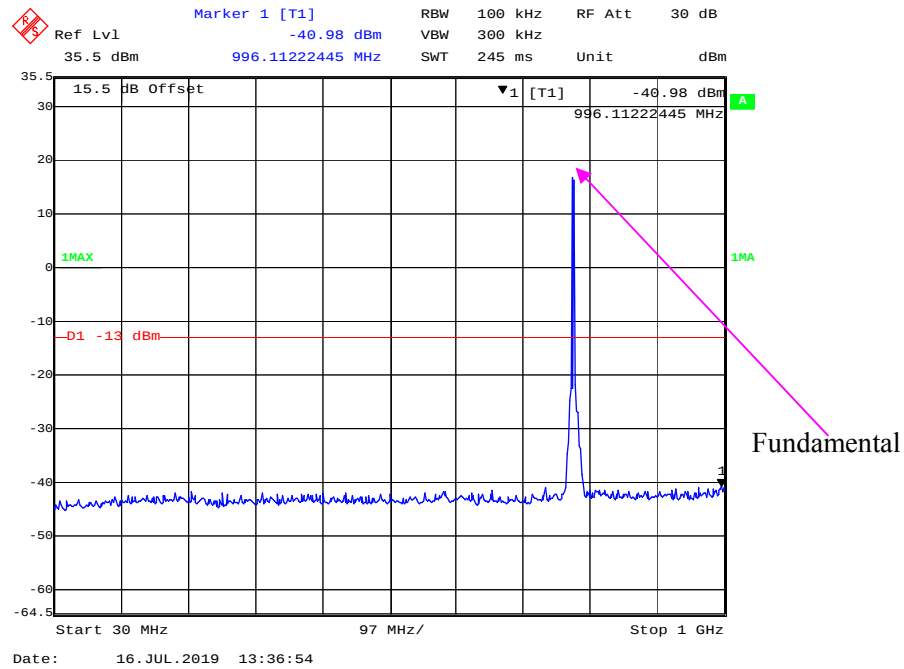
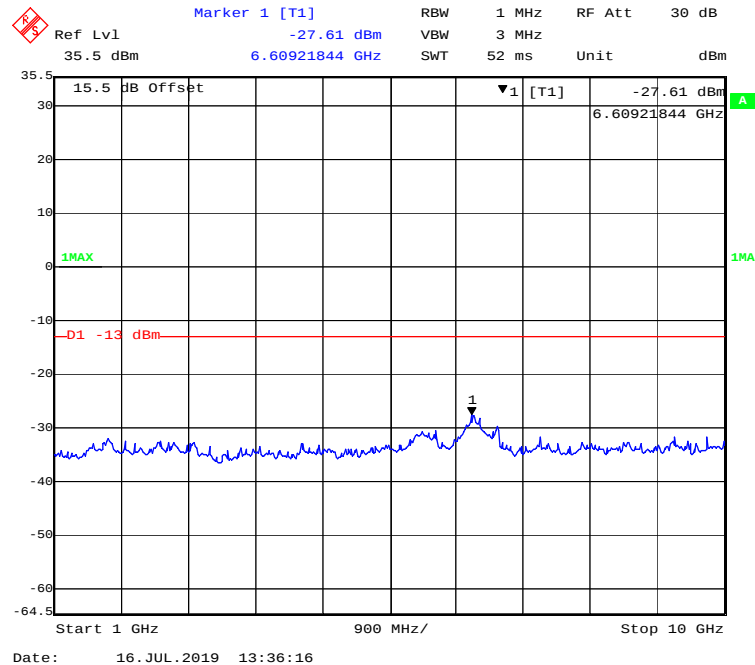


### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)

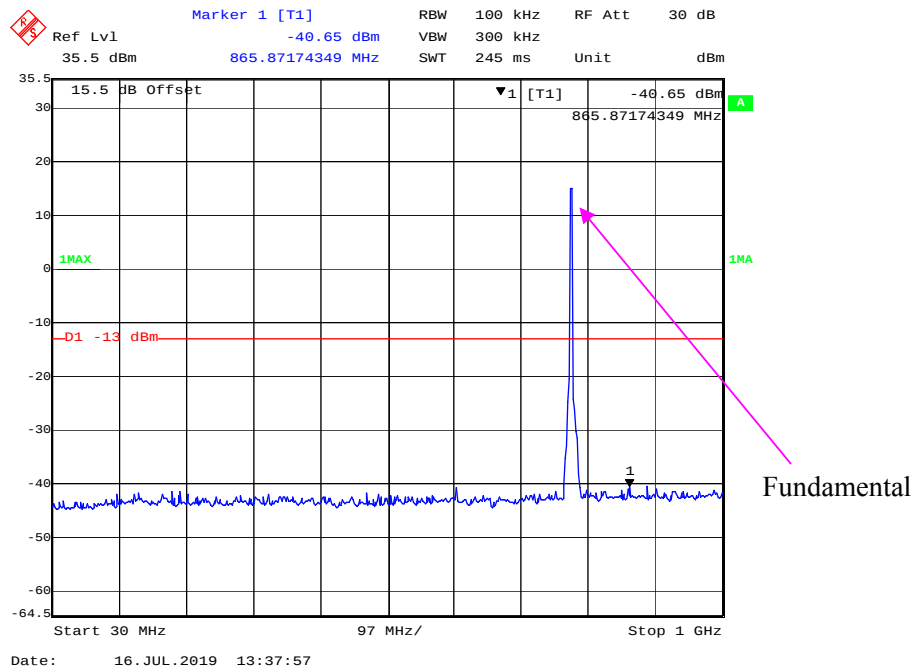


### 1 GHz – 10 GHz (10 MHz, 16-QAM, Middle Channel)

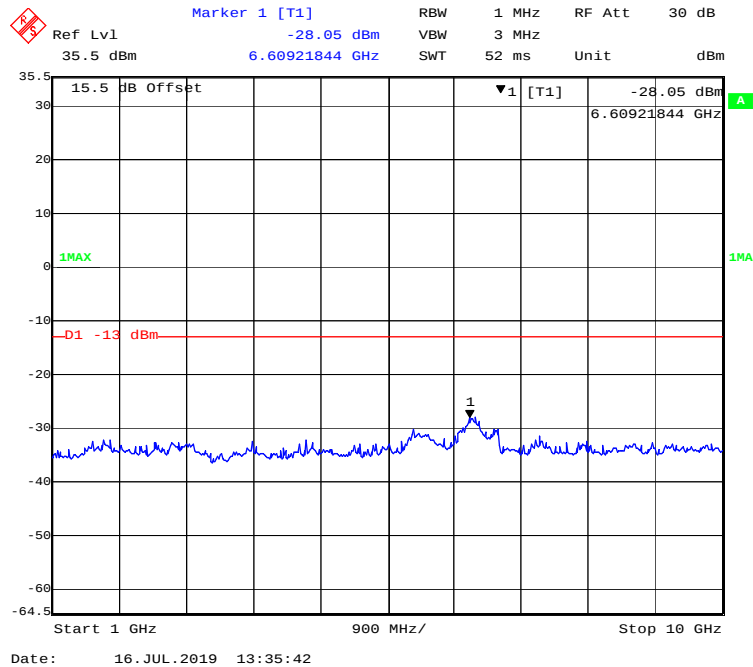


**LTE Band 13:****30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)****1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)**

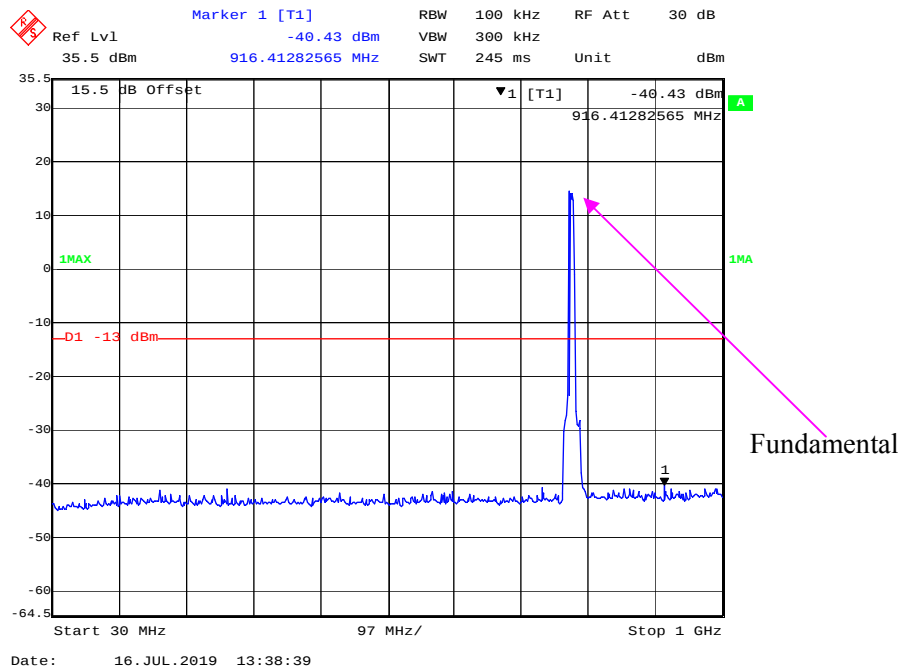
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



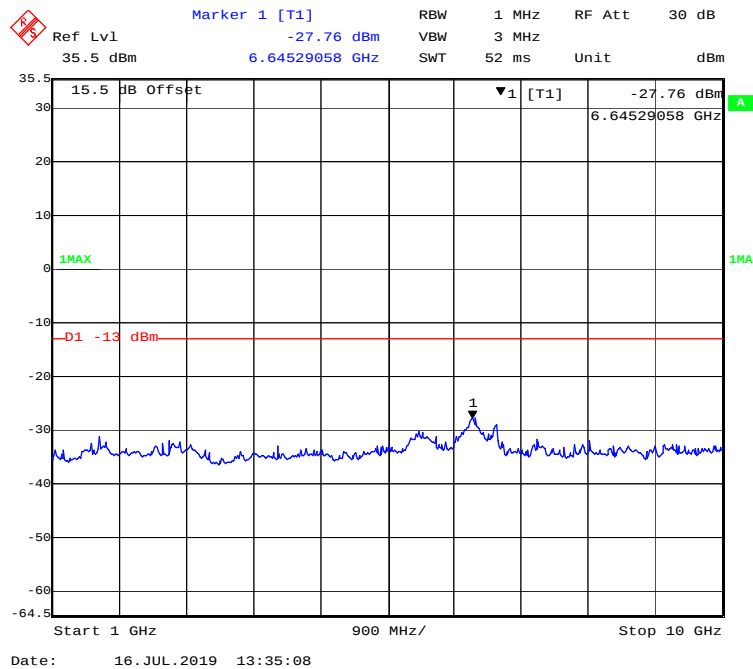
### 1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



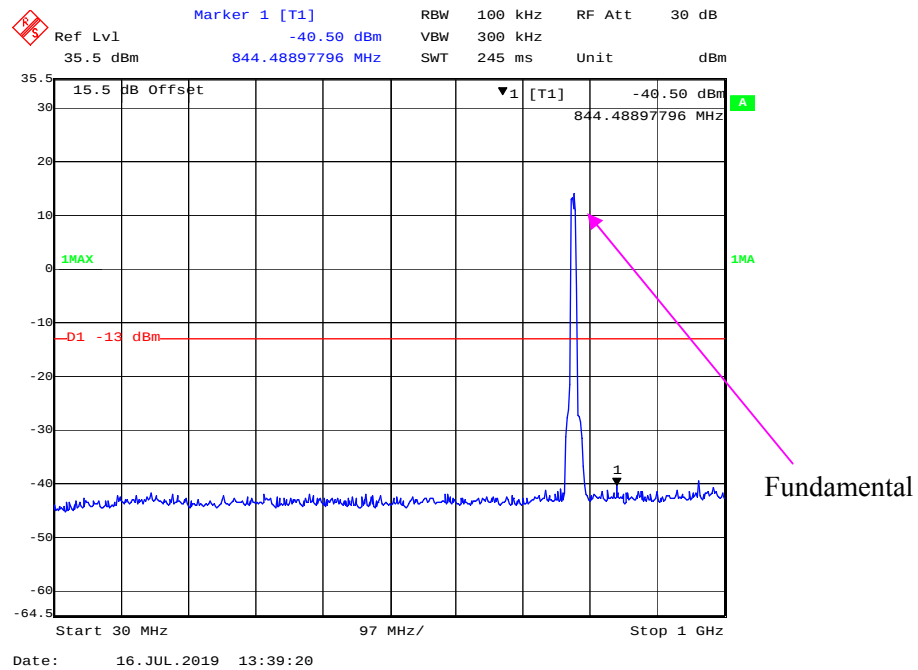
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



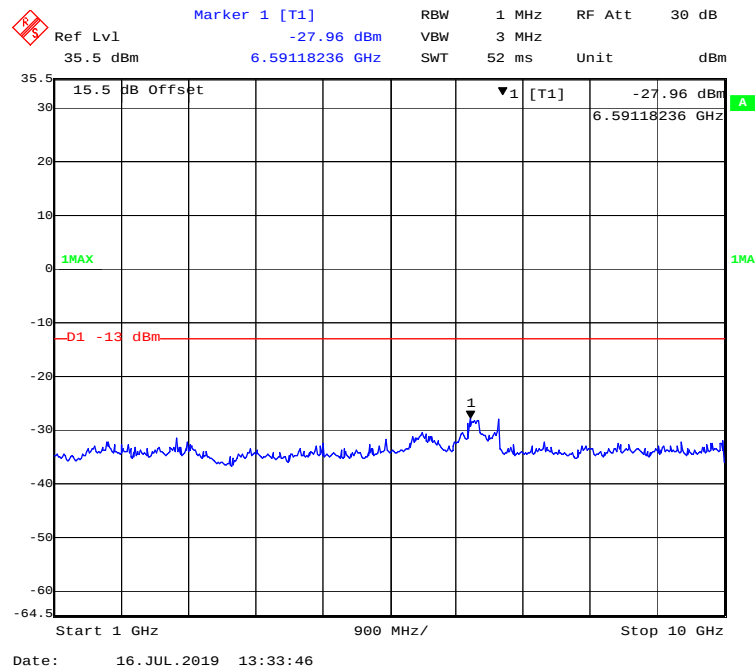
### 1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)



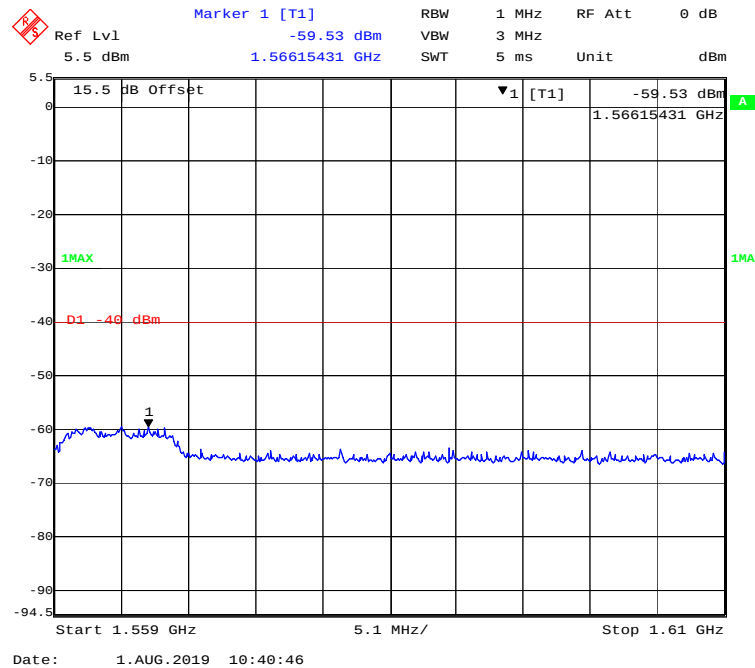
### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



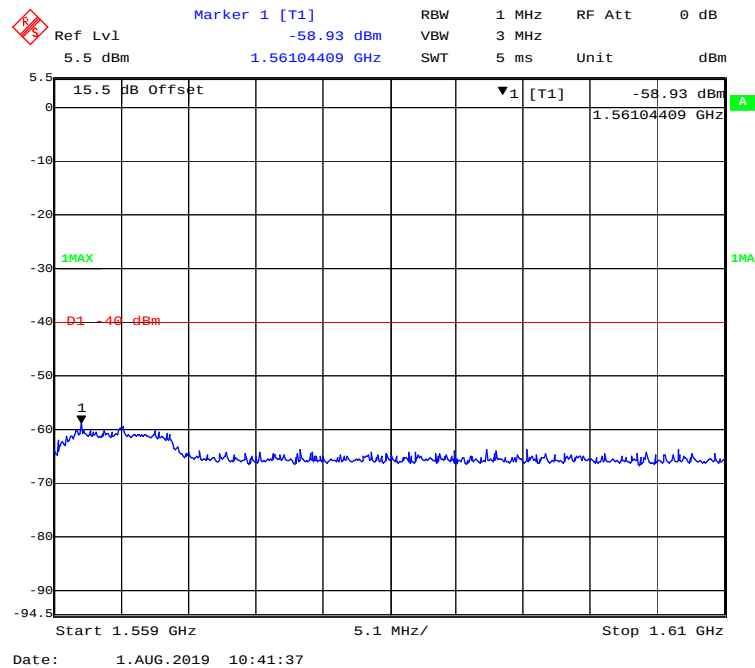
### 1 GHz – 10 GHz (10 MHz, 16-QAM, Middle Channel)



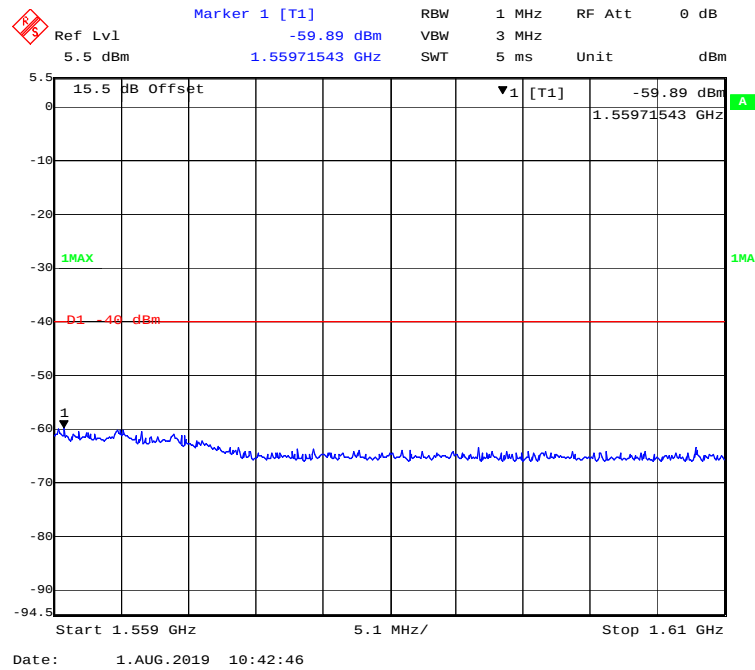
**Additional Conducted Spurious Emissions Evaluations in accordance with FCC §27.53 (f)**  
**1.559 GHz – 1.610 GHz (5 MHz, QPSK, Middle Channel)**



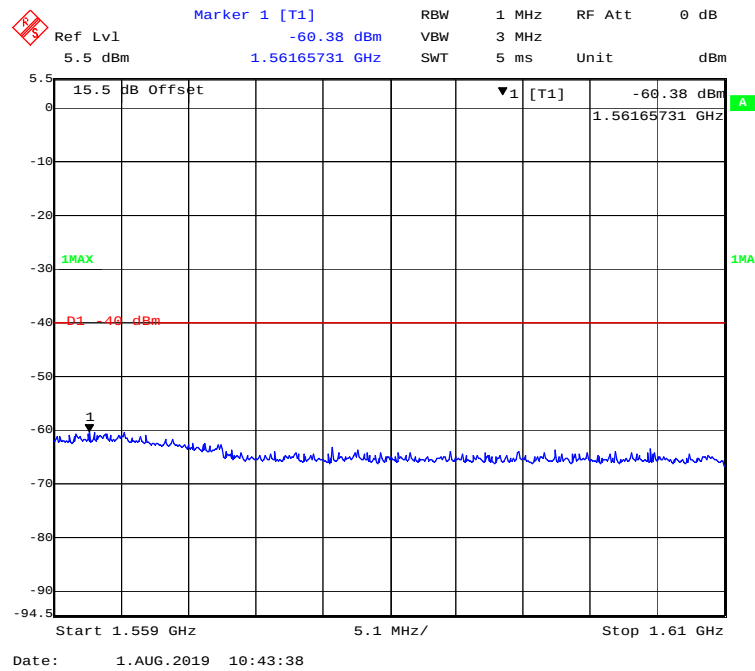
**1.559 GHz – 1.610 GHz (5 MHz, 16-QAM, Middle Channel)**



### 1.559 GHz – 1.610 GHz (10 MHz, QPSK, Middle Channel)



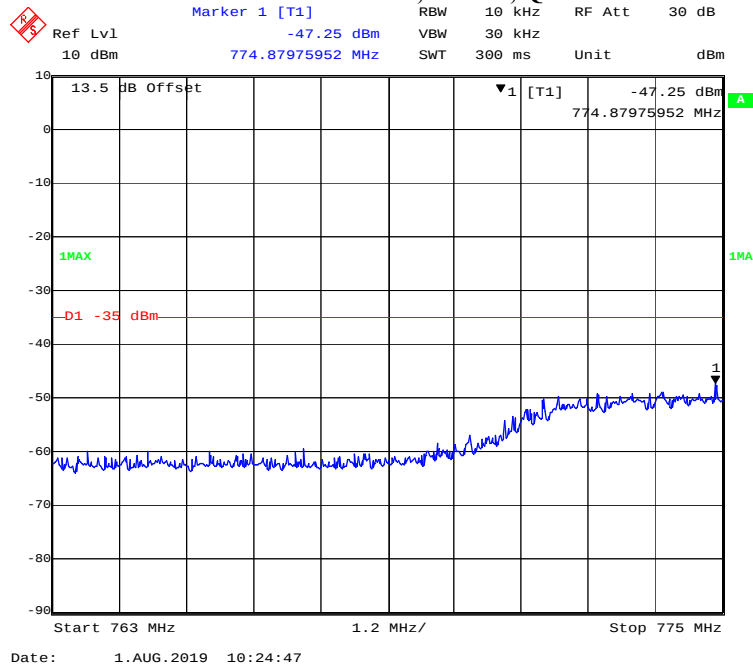
### 1.559 GHz – 1.610 GHz (10 MHz, 16-QAM, Middle Channel)



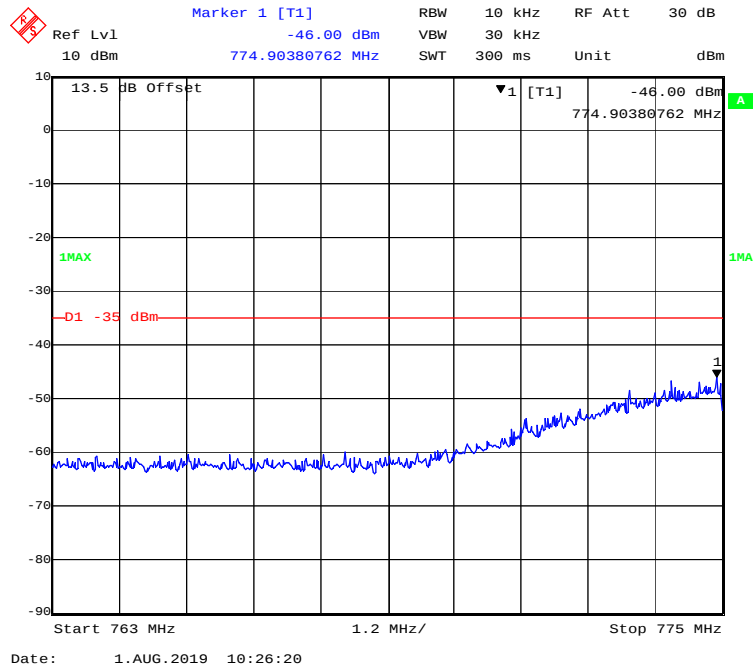
# Additional Conducted Spurious Emissions Evaluations in accordance with FCC §27.53 (c)

Note: because of RBW 10kHz convert to 6.25kHz,  $10\lg(10/6.25) = 2$ , offset reduced with more 2dB.

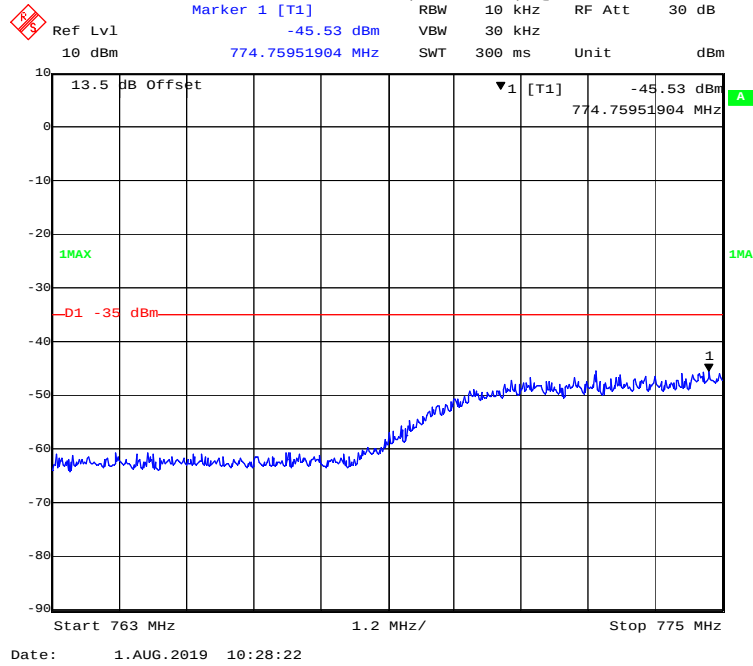
## 763 MHz – 775 MHz, 5 MHz, QPSK



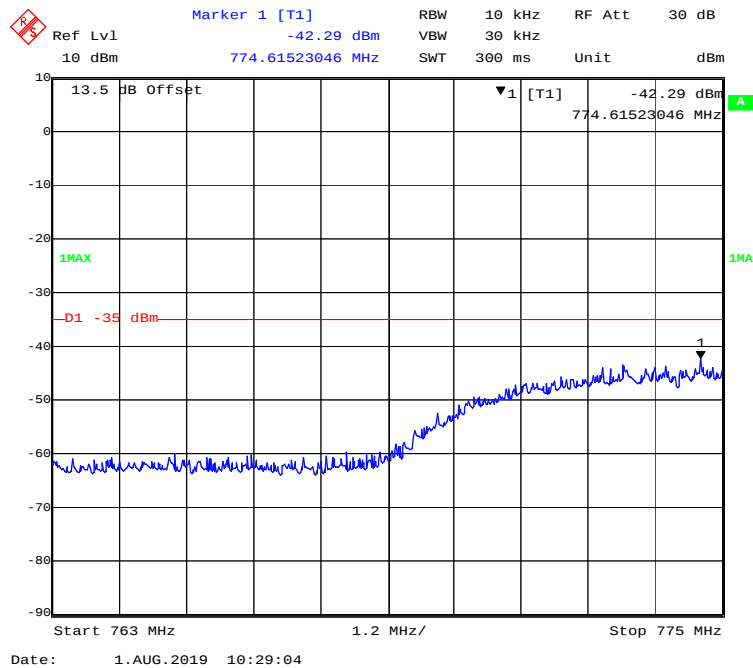
## 763 MHz – 775 MHz, 5 MHz, 16-QAM



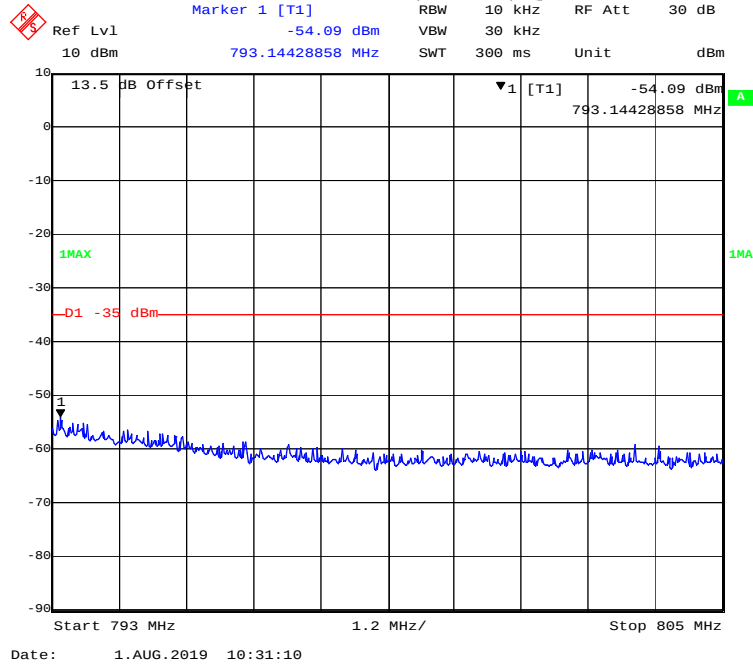
### 763 MHz – 775 MHz, 10 MHz, QPSK



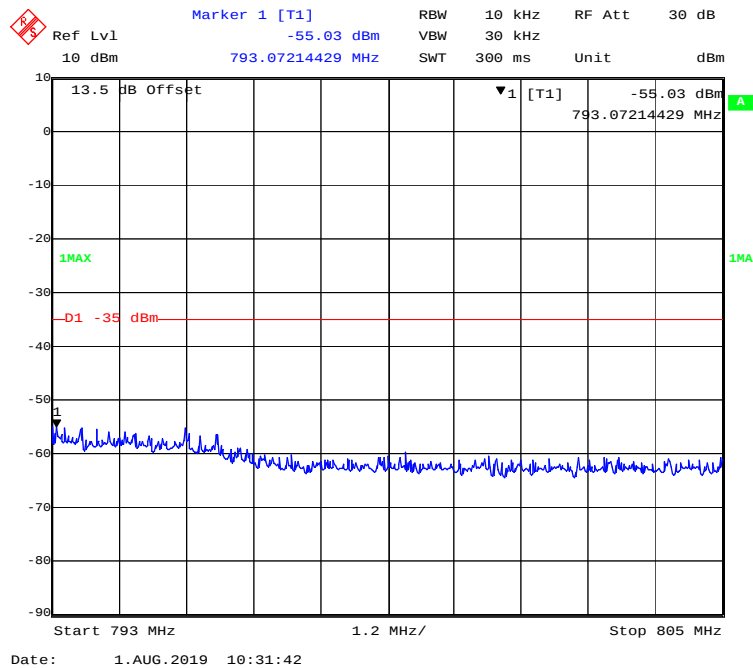
### 763 MHz – 775 MHz, 10 MHz, 16-QAM



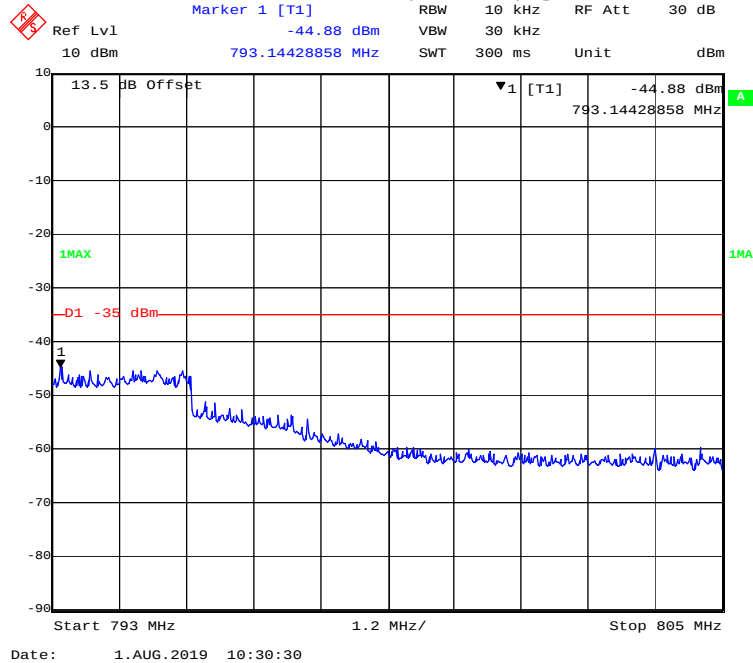
### 793 MHz – 805 MHz, 5 MHz, QPSK



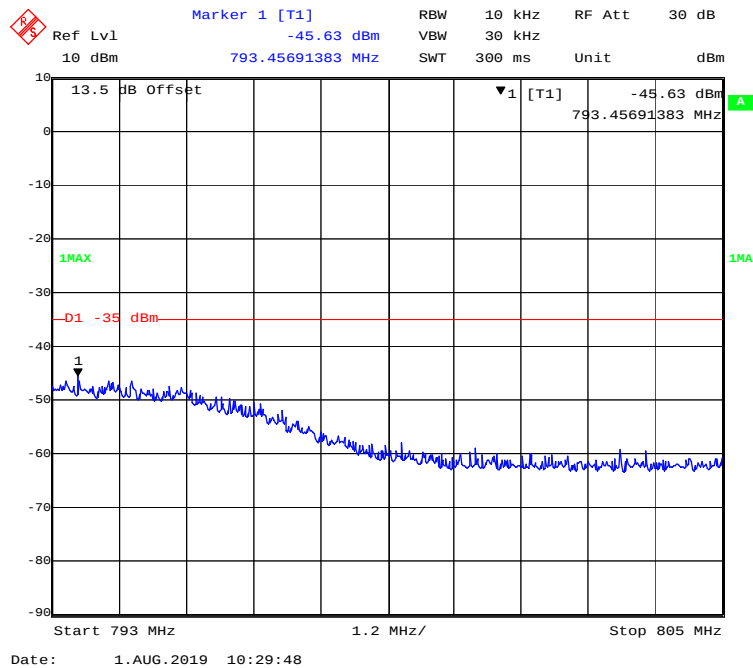
### 793 MHz – 805 MHz, 5 MHz, 16-QAM



## 793 MHz – 805 MHz, 10 MHz, QPSK

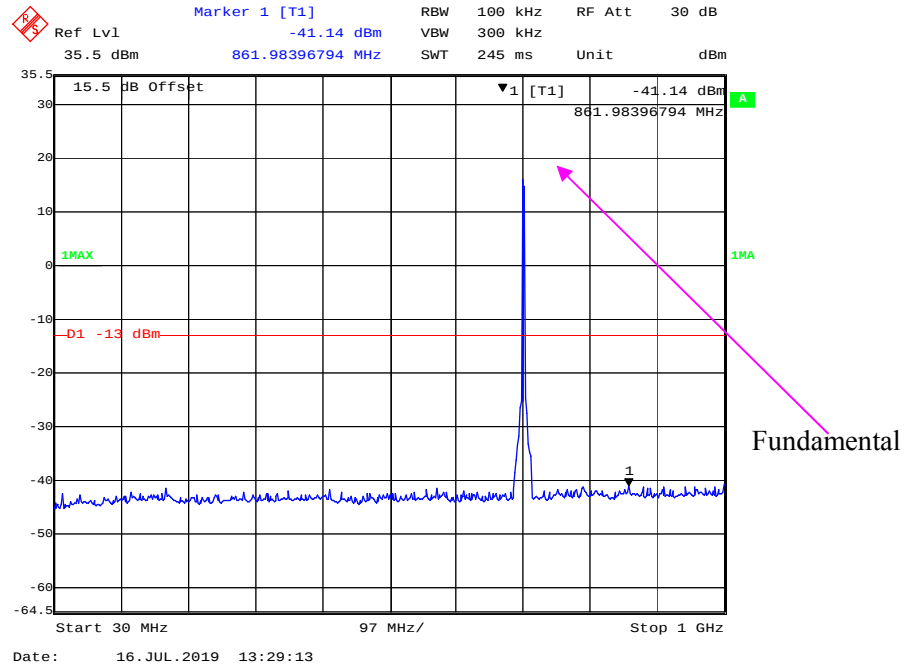


## 793 MHz – 805 MHz, 10 MHz, 16-QAM

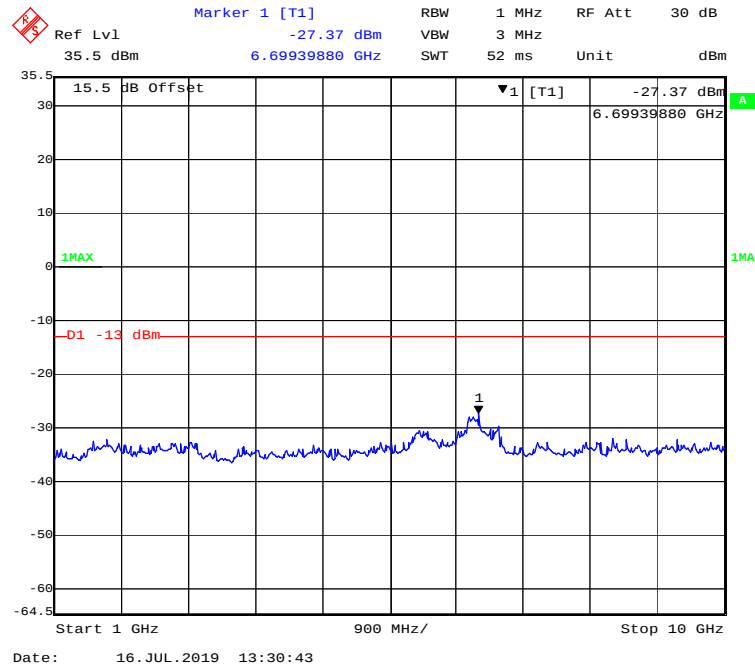


# LTE Band 17:

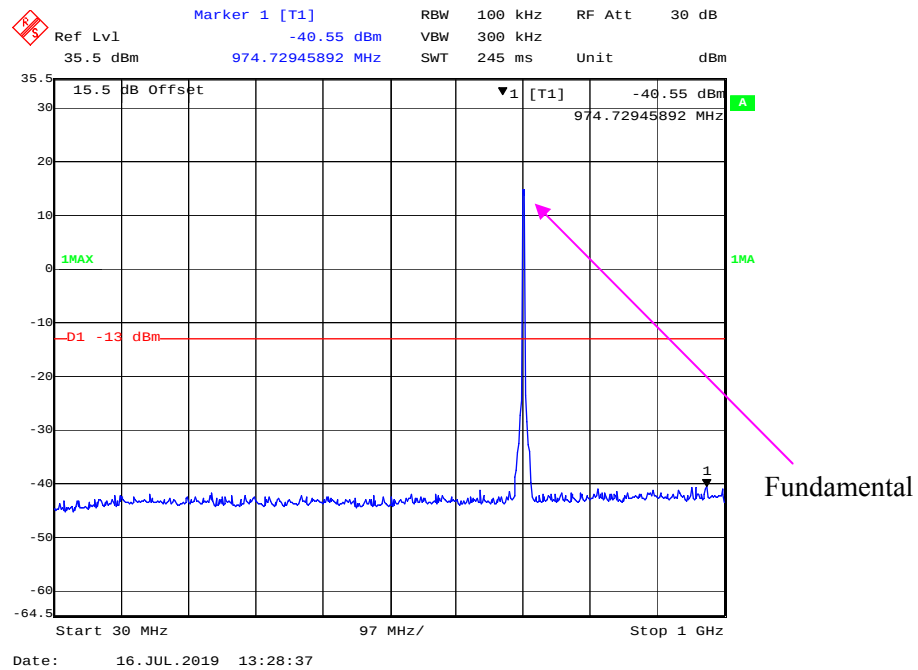
## 30 MHz - 1 GHz (5 MHz, QPSK, Middle Channel)



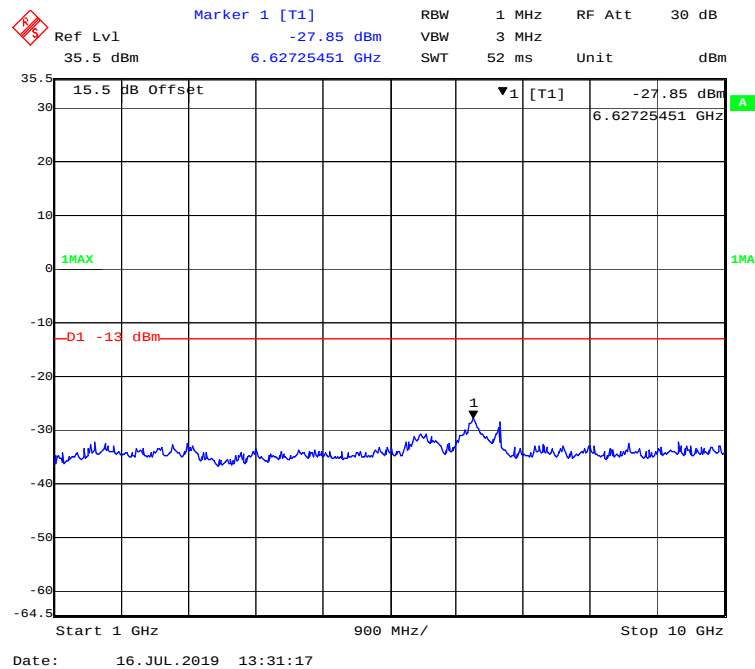
## 1 GHz – 10 GHz (5 MHz, QPSK, Middle Channel)



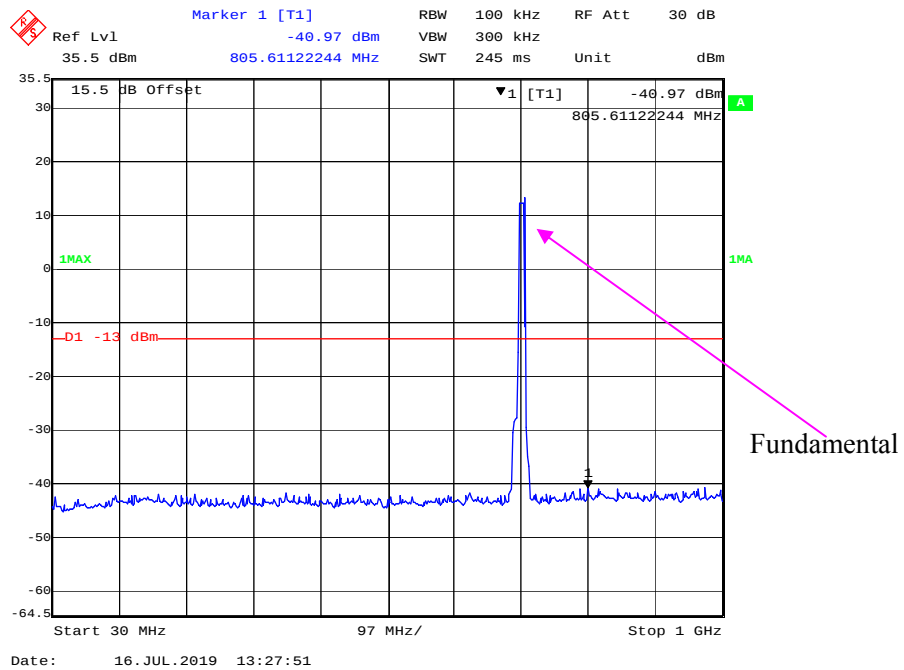
### 30 MHz - 1 GHz (5 MHz, 16-QAM, Middle Channel)



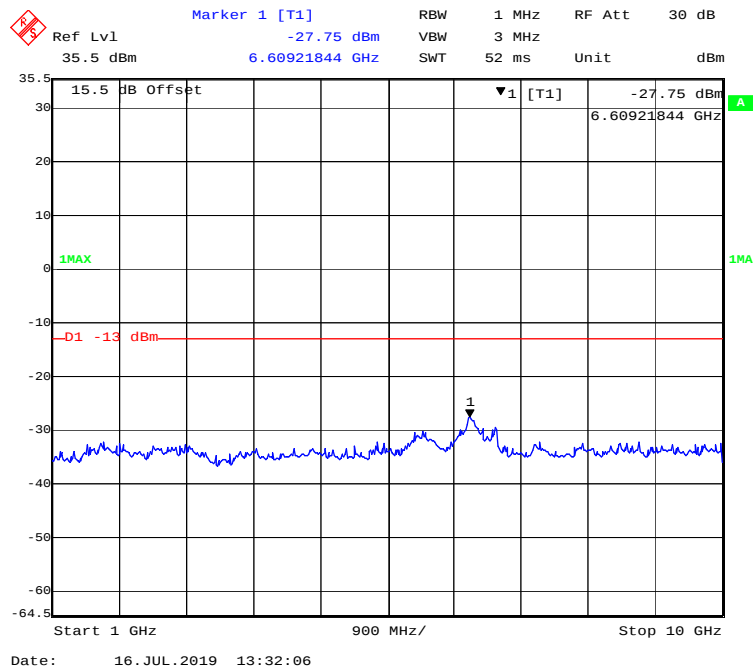
### 1 GHz – 10 GHz (5 MHz, 16-QAM, Middle Channel)



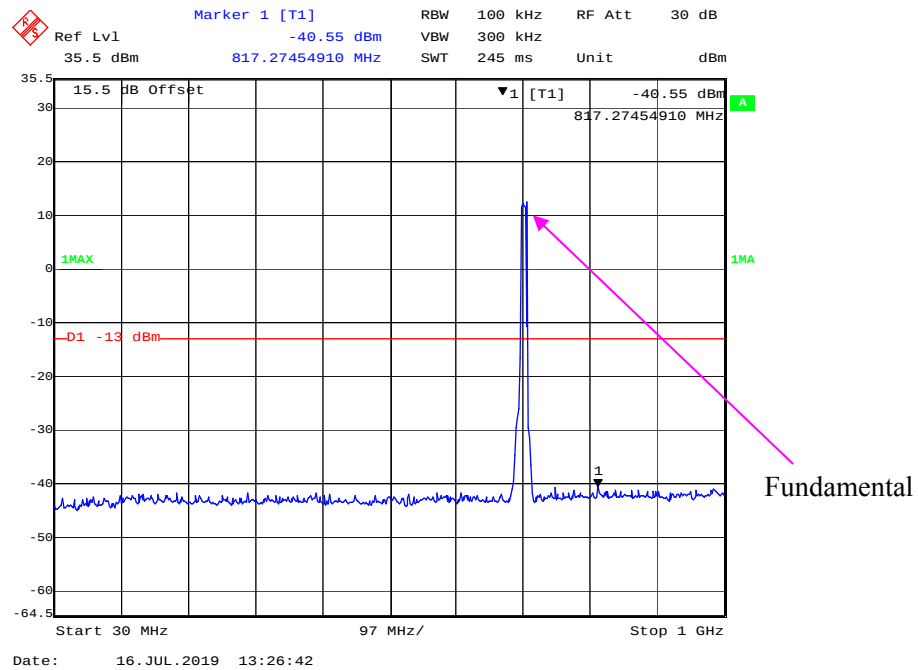
### 30 MHz - 1 GHz (10 MHz, QPSK, Middle Channel)



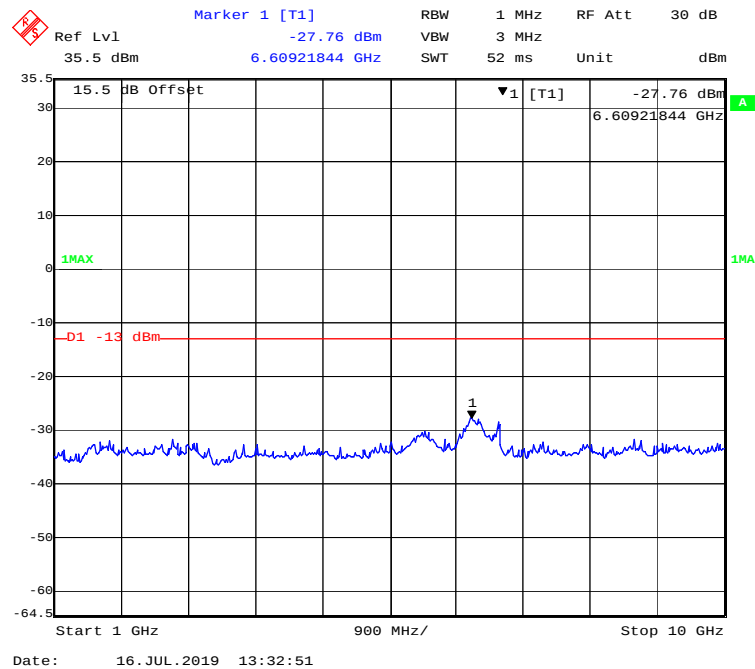
### 1 GHz – 10 GHz (10 MHz, QPSK, Middle Channel)



### 30 MHz - 1 GHz (10 MHz, 16-QAM, Middle Channel)



### 1 GHz – 10 GHz (10 MHz, 16-QAM, 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)

22.917 (a) Out of band emissions. 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.

24.238 (a) Out of band emissions. 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.

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 =  $43 + 10 \log_{10} (\text{power out in Watts})$

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

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 23.2℃    |
| <b>Relative Humidity:</b> | 51 %     |
| <b>ATM Pressure:</b>      | 101.3kPa |

The testing was performed by Max Min on 2019-08-27.

Test mode: Transmitting (Pre-scan with low, middle and high channels, and the worse case data as below)

**30 MHz ~ 10 GHz:**

**WCDMA Band V**

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| WCDMA Mode, Middle channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 134.52                     | 52                            | 275                          | 250            | H              | -53.63                      | 0.36                  | -6.12                        | -60.11                     | -13            | 47.11          |
| 134.52                     | 49.06                         | 94                           | 100            | V              | -50.89                      | 0.36                  | -6.12                        | -57.37                     | -13            | 44.37          |
| 1673.2                     | 50.2                          | 114                          | 150            | H              | -60.75                      | 0.84                  | 8.48                         | -53.11                     | -13            | 40.11          |
| 1673.2                     | 49.8                          | 246                          | 200            | V              | -60.4                       | 0.84                  | 8.48                         | -52.76                     | -13            | 39.76          |
| 2509.8                     | 54.45                         | 142                          | 100            | H              | -54.17                      | 0.89                  | 10.09                        | -44.97                     | -13            | 31.97          |
| 2509.8                     | 54.93                         | 228                          | 250            | V              | -53.76                      | 0.89                  | 10.09                        | -44.56                     | -13            | 31.56          |

30 MHz ~ 20 GHz:

## WCDMA Band II

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| WCDMA Mode, Middle channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 134.58                     | 52.47                         | 89                           | 150            | H              | -53.16                      | 0.36                  | -6.12                        | -59.64                     | -13            | 46.64          |
| 134.58                     | 48.97                         | 2                            | 200            | V              | -50.98                      | 0.35                  | -6.12                        | -57.45                     | -13            | 44.45          |
| 3760.00                    | 44.89                         | 221                          | 100            | H              | -58.8                       | 0.95                  | 9.74                         | -50.01                     | -13            | 37.01          |
| 3760.00                    | 45.67                         | 169                          | 100            | V              | -58.34                      | 0.95                  | 9.74                         | -49.55                     | -13            | 36.55          |
| 5640.00                    | 41.52                         | 209                          | 200            | H              | -58.99                      | 1.15                  | 10.47                        | -49.67                     | -13            | 36.67          |
| 5640.00                    | 42.38                         | 166                          | 200            | V              | -58.43                      | 1.15                  | 10.47                        | -49.11                     | -13            | 36.11          |

## WCDMA Band IV

| Frequency<br>(MHz)         | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                            |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| WCDMA Mode, Middle channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 133.95                     | 52.03                         | 89                           | 150            | H              | -53.63                      | 0.36                  | -6.12                        | -60.11                     | -13            | 47.11          |
| 133.95                     | 48.26                         | 2                            | 100            | V              | -51.66                      | 0.35                  | -6.12                        | -58.13                     | -13            | 45.13          |
| 3465.20                    | 43.18                         | 56                           | 100            | H              | -61.61                      | 0.93                  | 9.87                         | -52.67                     | -13            | 39.67          |
| 3465.20                    | 44.24                         | 193                          | 150            | V              | -60.98                      | 0.93                  | 9.87                         | -52.04                     | -13            | 39.04          |
| 5197.80                    | 44.02                         | 298                          | 200            | H              | -58.06                      | 1.1                   | 10.3                         | -48.86                     | -13            | 35.86          |
| 5197.80                    | 44.74                         | 93                           | 150            | V              | -57.54                      | 1.1                   | 10.3                         | -48.34                     | -13            | 35.34          |

## Note:

- 1) Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)
- 2) Margin (dB) = Limit (dBm) - Absolute Level (dBm)

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

**30 MHz ~ 20 GHz:**

**LTE Band 2:**

| Frequency<br>(MHz)                     | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                        |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 136.87                                 | 52.34                         | 89                           | 150            | H              | -53.16                      | 0.36                  | -6.12                        | -59.64                     | -13            | 46.64          |
| 136.87                                 | 48.69                         | 2                            | 250            | V              | -51.37                      | 0.35                  | -6.12                        | -57.84                     | -13            | 44.84          |
| 3760.00                                | 42.69                         | 144                          | 250            | H              | -61                         | 0.95                  | 9.74                         | -52.21                     | -13            | 39.21          |
| 3760.00                                | 42.25                         | 235                          | 250            | V              | -61.76                      | 0.95                  | 9.74                         | -52.97                     | -13            | 39.97          |
| 5640.00                                | 42.88                         | 94                           | 250            | H              | -57.63                      | 1.15                  | 10.47                        | -48.31                     | -13            | 35.31          |
| 5640.00                                | 42.57                         | 253                          | 250            | V              | -58.24                      | 1.15                  | 10.47                        | -48.92                     | -13            | 35.92          |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 136.87                                 | 52.34                         | 89                           | 200            | H              | -53.16                      | 0.36                  | -6.12                        | -59.64                     | -13            | 46.64          |
| 136.87                                 | 49.48                         | 2                            | 200            | V              | -50.58                      | 0.35                  | -6.12                        | -57.05                     | -13            | 44.05          |
| 3760.00                                | 40.79                         | 194                          | 150            | H              | -62.9                       | 0.95                  | 9.74                         | -54.11                     | -13            | 41.11          |
| 3760.00                                | 41.53                         | 214                          | 100            | V              | -62.48                      | 0.95                  | 9.74                         | -53.69                     | -13            | 40.69          |
| 5640.00                                | 42.85                         | 276                          | 150            | H              | -57.66                      | 1.15                  | 10.47                        | -48.34                     | -13            | 35.34          |
| 5640.00                                | 43.63                         | 11                           | 100            | V              | -57.18                      | 1.15                  | 10.47                        | -47.86                     | -13            | 34.86          |

**30 MHz ~ 20 GHz:**

**LTE Band 4:**

| Frequency<br>(MHz)                     | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                        |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 135.95                                 | 52.69                         | 89                           | 250            | H              | -52.86                      | 0.36                  | -6.12                        | -59.34                     | -13            | 46.34          |
| 135.95                                 | 49.22                         | 2                            | 150            | V              | -50.79                      | 0.35                  | -6.12                        | -57.26                     | -13            | 44.26          |
| 3465.00                                | 42.16                         | 173                          | 150            | H              | -62.63                      | 0.93                  | 9.87                         | -53.69                     | -13            | 40.69          |
| 3465.00                                | 43.27                         | 108                          | 250            | V              | -61.95                      | 0.93                  | 9.87                         | -53.01                     | -13            | 40.01          |
| 5197.50                                | 44.21                         | 17                           | 250            | H              | -57.87                      | 1.1                   | 10.3                         | -48.67                     | -13            | 35.67          |
| 5197.50                                | 45.08                         | 124                          | 250            | V              | -57.21                      | 1.1                   | 10.3                         | -48.01                     | -13            | 35.01          |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 135.95                                 | 53.36                         | 89                           | 250            | H              | -52.19                      | 0.36                  | -6.12                        | -58.67                     | -13            | 45.67          |
| 135.95                                 | 49.37                         | 2                            | 200            | V              | -50.64                      | 0.35                  | -6.12                        | -57.11                     | -13            | 44.11          |
| 3465.00                                | 41.99                         | 183                          | 150            | H              | -62.8                       | 0.93                  | 9.87                         | -53.86                     | -13            | 40.86          |
| 3465.00                                | 43.04                         | 209                          | 100            | V              | -62.18                      | 0.93                  | 9.87                         | -53.24                     | -13            | 40.24          |
| 5197.50                                | 44.2                          | 23                           | 100            | H              | -57.88                      | 1.1                   | 10.3                         | -48.68                     | -13            | 35.68          |
| 5197.50                                | 44.93                         | 215                          | 100            | V              | -57.36                      | 1.1                   | 10.3                         | -48.16                     | -13            | 35.16          |

**30 MHz ~ 10 GHz:****LTE Band 5:**

| Frequency<br>(MHz)                     | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                        |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 134.58                                 | 51.86                         | 89                           | 250            | H              | -53.77                      | 0.36                  | -6.12                        | -60.25                     | -13            | 47.25          |
| 134.58                                 | 49.44                         | 2                            | 150            | V              | -50.51                      | 0.35                  | -6.12                        | -56.98                     | -13            | 43.98          |
| 1673.00                                | 47.68                         | 304                          | 150            | H              | -63.27                      | 0.84                  | 8.48                         | -55.63                     | -13            | 42.63          |
| 1673.00                                | 47.52                         | 87                           | 100            | V              | -62.68                      | 0.84                  | 8.48                         | -55.04                     | -13            | 42.04          |
| 2509.50                                | 53.53                         | 335                          | 150            | H              | -55.09                      | 0.89                  | 10.09                        | -45.89                     | -13            | 32.89          |
| 2509.50                                | 54.14                         | 147                          | 250            | V              | -54.55                      | 0.89                  | 10.09                        | -45.35                     | -13            | 32.35          |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 134.58                                 | 52.44                         | 89                           | 100            | H              | -53.19                      | 0.36                  | -6.12                        | -59.67                     | -13            | 46.67          |
| 134.58                                 | 49.26                         | 2                            | 100            | V              | -50.69                      | 0.35                  | -6.12                        | -57.16                     | -13            | 44.16          |
| 1673.00                                | 47.53                         | 343                          | 150            | H              | -63.42                      | 0.84                  | 8.48                         | -55.78                     | -13            | 42.78          |
| 1673.00                                | 47.22                         | 43                           | 100            | V              | -62.98                      | 0.84                  | 8.48                         | -55.34                     | -13            | 42.34          |
| 2509.50                                | 53.61                         | 17                           | 150            | H              | -55.01                      | 0.89                  | 10.09                        | -45.81                     | -13            | 32.81          |
| 2509.50                                | 53.82                         | 360                          | 150            | V              | -54.87                      | 0.89                  | 10.09                        | -45.67                     | -13            | 32.67          |

**30 MHz ~ 26 GHz:****LTE Band 7:**

| Frequency<br>(MHz)                   | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                      |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 5MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 133.89                               | 51.61                         | 89                           | 150            | H              | -54.06                      | 0.36                  | -6.12                        | -60.54                     | -25            | 47.54          |
| 133.89                               | 48.72                         | 2                            | 150            | V              | -51.2                       | 0.35                  | -6.12                        | -57.67                     | -25            | 44.67          |
| 5070.00                              | 41.55                         | 141                          | 100            | H              | -61.07                      | 1.09                  | 10.3                         | -51.86                     | -25            | 26.86          |
| 5070.00                              | 41.39                         | 146                          | 250            | V              | -61.4                       | 1.09                  | 10.3                         | -52.19                     | -25            | 27.19          |
| 7605.00                              | 42.88                         | 187                          | 100            | H              | -53.18                      | 1.78                  | 10.08                        | -44.88                     | -25            | 19.88          |
| 7605.00                              | 43.52                         | 159                          | 200            | V              | -52.68                      | 1.78                  | 10.08                        | -44.38                     | -25            | 19.38          |
| 16-QAM 5MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 133.89                               | 52.04                         | 89                           | 150            | H              | -53.63                      | 0.36                  | -6.12                        | -60.11                     | -25            | 47.11          |
| 133.89                               | 49.05                         | 2                            | 250            | V              | -50.87                      | 0.35                  | -6.12                        | -57.34                     | -25            | 44.34          |
| 5070.00                              | 41.48                         | 306                          | 150            | H              | -61.14                      | 1.09                  | 10.3                         | -51.93                     | -25            | 26.93          |
| 5070.00                              | 41.21                         | 145                          | 150            | V              | -61.58                      | 1.09                  | 10.3                         | -52.37                     | -25            | 27.37          |
| 7605.00                              | 42.8                          | 9                            | 250            | H              | -53.26                      | 1.78                  | 10.08                        | -44.96                     | -25            | 19.96          |
| 7605.00                              | 43.23                         | 112                          | 100            | V              | -52.97                      | 1.78                  | 10.08                        | -44.67                     | -25            | 19.67          |

**30 MHz ~ 10 GHz:****LTE Band 12:**

| Frequency<br>(MHz)                     | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|----------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                        |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 1.4MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 136.55                                 | 53.02                         | 89                           | 150            | H              | -52.49                      | 0.36                  | -6.12                        | -58.97                     | -13            | 45.97          |
| 136.55                                 | 50.17                         | 2                            | 100            | V              | -49.87                      | 0.35                  | -6.12                        | -56.34                     | -13            | 43.34          |
| 1415.00                                | 55.28                         | 82                           | 200            | H              | -56.77                      | 0.82                  | 7.96                         | -49.63                     | -13            | 36.63          |
| 1415.00                                | 56.1                          | 320                          | 250            | V              | -56.25                      | 0.82                  | 7.96                         | -49.11                     | -13            | 36.11          |
| 2122.50                                | 45.36                         | 64                           | 150            | H              | -63.28                      | 0.86                  | 9.27                         | -54.87                     | -13            | 41.87          |
| 2122.50                                | 45.83                         | 223                          | 200            | V              | -63.09                      | 0.86                  | 9.27                         | -54.68                     | -13            | 41.68          |
| 16-QAM 1.4MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 136.55                                 | 52.32                         | 89                           | 250            | H              | -53.19                      | 0.36                  | -6.12                        | -59.67                     | -13            | 46.67          |
| 136.55                                 | 50.09                         | 2                            | 100            | V              | -49.95                      | 0.35                  | -6.12                        | -56.42                     | -13            | 43.42          |
| 1415.00                                | 54.97                         | 90                           | 250            | H              | -57.08                      | 0.82                  | 7.96                         | -49.94                     | -13            | 36.94          |
| 1415.00                                | 56.7                          | 197                          | 150            | V              | -55.65                      | 0.82                  | 7.96                         | -48.51                     | -13            | 35.51          |
| 2122.50                                | 45.02                         | 8                            | 250            | H              | -63.62                      | 0.86                  | 9.27                         | -55.21                     | -13            | 42.21          |
| 2122.50                                | 45.09                         | 89                           | 300            | V              | -63.83                      | 0.86                  | 9.27                         | -55.42                     | -13            | 42.42          |

**30 MHz ~ 10 GHz:****LTE Band 13:**

| Frequency<br>(MHz)                   | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                      |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 5MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 137.54                               | 52.26                         | 89                           | 150            | H              | -53.2                       | 0.36                  | -6.13                        | -59.69                     | -13            | 46.69          |
| 137.54                               | 49.42                         | 2                            | 250            | V              | -50.67                      | 0.35                  | -6.13                        | -57.15                     | -13            | 44.15          |
| 1564.00                              | 45.61                         | 194                          | 200            | H              | -66.11                      | 0.83                  | 8.3                          | -58.64                     | -13            | 45.64          |
| 1564.00                              | 46.36                         | 224                          | 250            | V              | -65.58                      | 0.83                  | 8.3                          | -58.11                     | -13            | 45.11          |
| 2346.00                              | 42.81                         | 78                           | 200            | H              | -65.84                      | 0.88                  | 9.76                         | -56.96                     | -13            | 43.96          |
| 2346.00                              | 43.31                         | 203                          | 250            | V              | -65.49                      | 0.88                  | 9.76                         | -56.61                     | -13            | 43.61          |
| 16-QAM 5MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 137.54                               | 52.31                         | 89                           | 200            | H              | -53.15                      | 0.36                  | -6.13                        | -59.64                     | -13            | 46.64          |
| 137.54                               | 49.54                         | 2                            | 200            | V              | -50.55                      | 0.35                  | -6.13                        | -57.03                     | -13            | 44.03          |
| 1564.00                              | 45.41                         | 210                          | 250            | H              | -66.31                      | 0.83                  | 8.3                          | -58.84                     | -13            | 45.84          |
| 1564.00                              | 45.94                         | 35                           | 150            | V              | -66                         | 0.83                  | 8.3                          | -58.53                     | -13            | 45.53          |
| 2346.00                              | 42.73                         | 20                           | 250            | H              | -65.92                      | 0.88                  | 9.76                         | -57.04                     | -13            | 44.04          |
| 2346.00                              | 43.11                         | 161                          | 150            | V              | -65.69                      | 0.88                  | 9.76                         | -56.81                     | -13            | 43.81          |

**30 MHz ~ 10 GHz:****LTE Band 17:**

| Frequency<br>(MHz)                   | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                              | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|------------------------------|----------------------------|----------------|----------------|
|                                      |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dBd/dBi) |                            |                |                |
| QPSK 5MHz Bandwidth Middle Channel   |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 135.25                               | 52.61                         | 89                           | 250            | H              | -52.98                      | 0.36                  | -6.12                        | -59.46                     | -13            | 46.46          |
| 135.25                               | 49.49                         | 2                            | 200            | V              | -50.49                      | 0.35                  | -6.12                        | -56.96                     | -13            | 43.96          |
| 1420.00                              | 50.05                         | 72                           | 100            | H              | -62.01                      | 0.82                  | 7.98                         | -54.85                     | -13            | 41.85          |
| 1420.00                              | 50.73                         | 292                          | 250            | V              | -61.63                      | 0.82                  | 7.98                         | -54.47                     | -13            | 41.47          |
| 2130.00                              | 44.34                         | 339                          | 100            | H              | -64.3                       | 0.86                  | 9.29                         | -55.87                     | -13            | 42.87          |
| 2130.00                              | 44.81                         | 282                          | 250            | V              | -64.1                       | 0.86                  | 9.29                         | -55.67                     | -13            | 42.67          |
| 16-QAM 5MHz Bandwidth Middle Channel |                               |                              |                |                |                             |                       |                              |                            |                |                |
| 135.25                               | 52.76                         | 89                           | 250            | H              | -52.83                      | 0.36                  | -6.12                        | -59.31                     | -13            | 46.31          |
| 135.25                               | 49.78                         | 2                            | 100            | V              | -50.2                       | 0.35                  | -6.12                        | -56.67                     | -13            | 43.67          |
| 1420.00                              | 49.63                         | 84                           | 250            | H              | -62.43                      | 0.83                  | 8.30                         | -54.96                     | -13            | 41.96          |
| 1420.00                              | 50.2                          | 332                          | 150            | V              | -62.16                      | 0.83                  | 8.30                         | -54.69                     | -13            | 41.69          |
| 2130.00                              | 43.65                         | 39                           | 100            | H              | -64.99                      | 0.88                  | 9.76                         | -56.11                     | -13            | 43.11          |
| 2130.00                              | 44.12                         | 263                          | 150            | V              | -64.79                      | 0.88                  | 9.76                         | -55.91                     | -13            | 42.91          |

**Note:**

1) Absolute Level (dBm) = Submitted Level (dBm) - Cable loss (dB) + Antenna Gain (dBd/dBi)

2) Margin (dB) = Limit (dBm) - Absolute Level (dBm)

## 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.

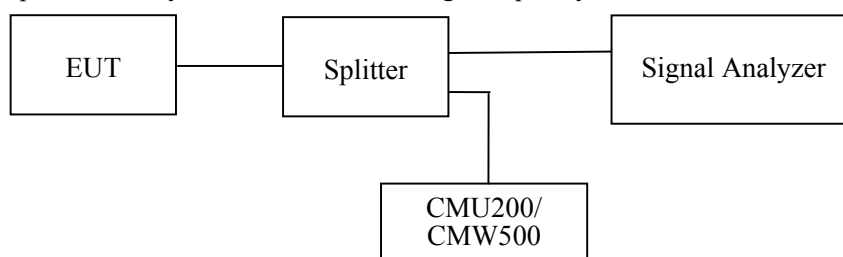
For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  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.

FCC §2.1051. The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

### 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 Data

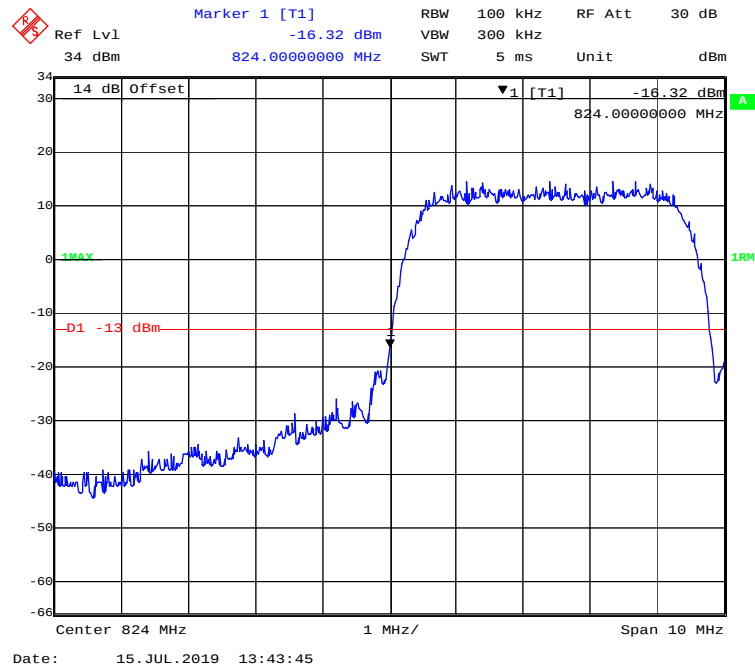
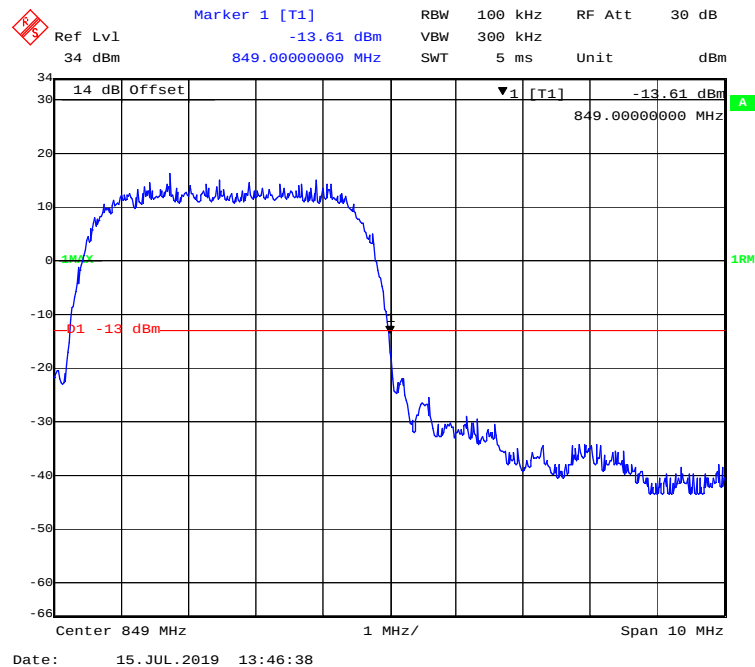
#### Environmental Conditions

|                    |                   |
|--------------------|-------------------|
| Temperature:       | 23.2°C-23.5°C     |
| Relative Humidity: | 51 %-53%          |
| ATM Pressure:      | 101.1kPa-103.3kPa |

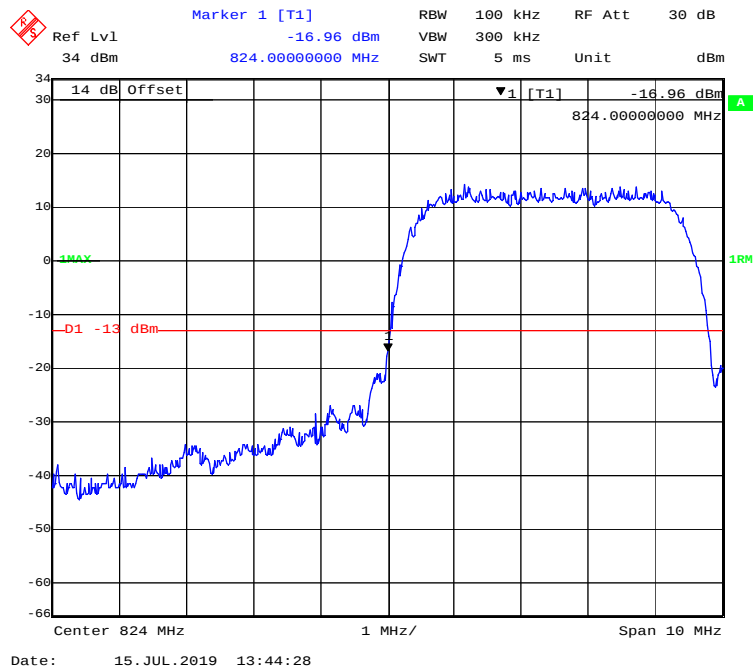
The testing was performed by Max Min from 2019-07-15 to 2019-07-23.

EUT operation mode: Transmitting

Test Result: Compliant.

**WCDMA Band V****WCDMA (Rel 99) Mode, Left Band Edge****WCDMA (Rel 99) Mode, Right Band Edge**

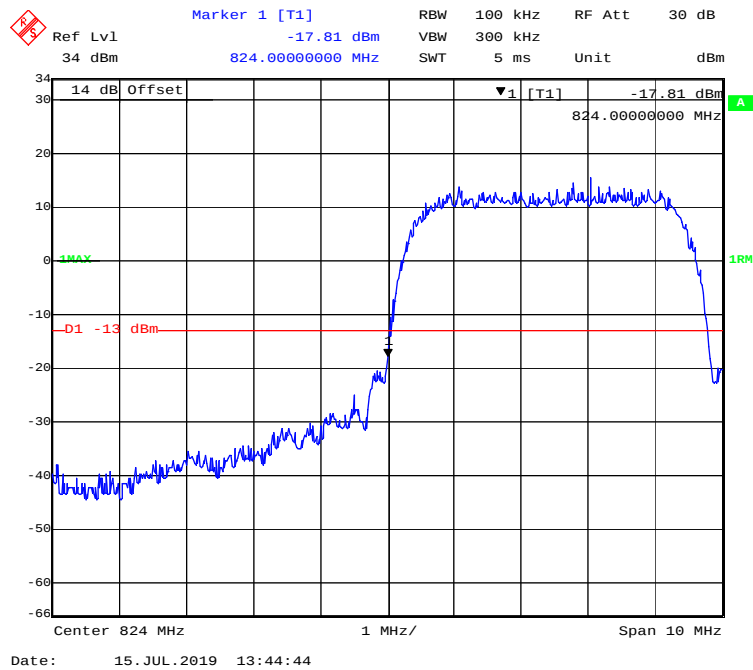
### WCDMA (HSDPA) Mode, Left Band Edge



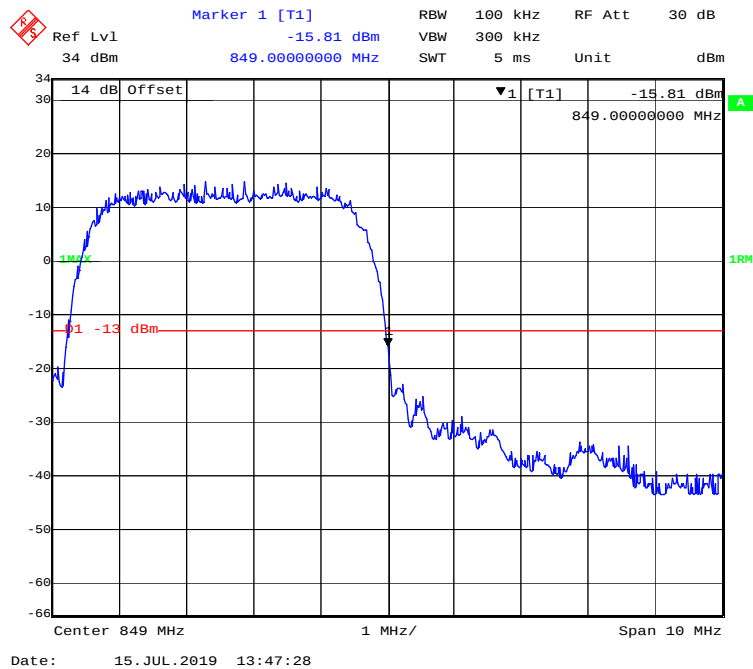
### WCDMA (HSDPA) Mode, Right Band Edge



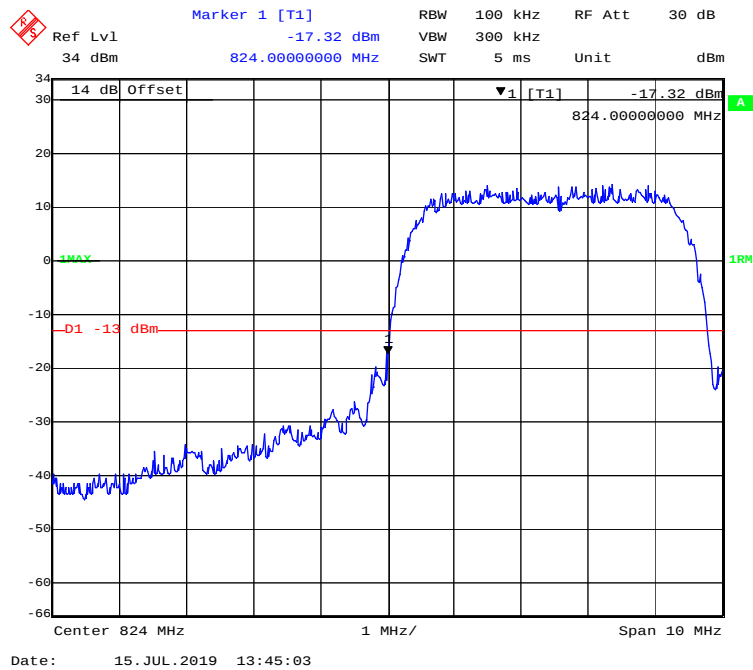
### WCDMA (HSUPA) Mode, Left Band Edge



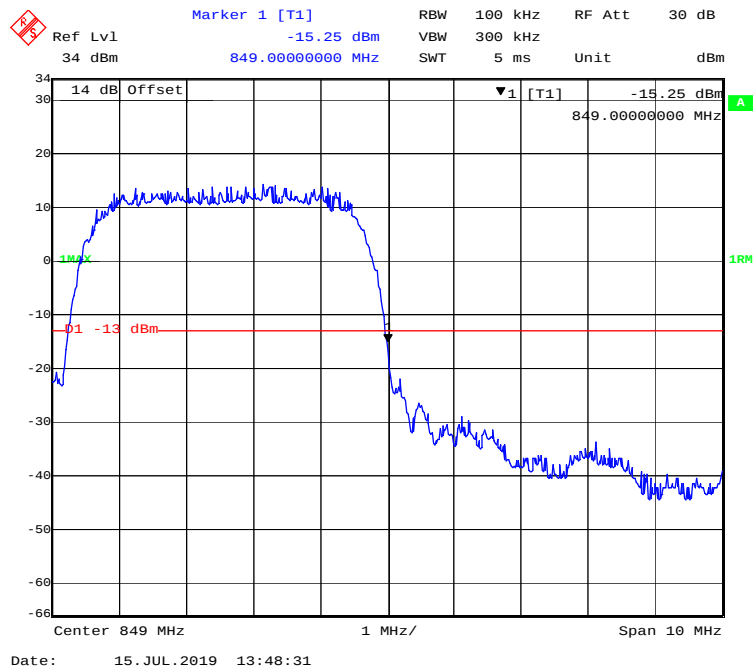
### WCDMA (HSUPA) Mode, Right Band Edge



### WCDMA (HSPA+) Mode, Left Band Edge

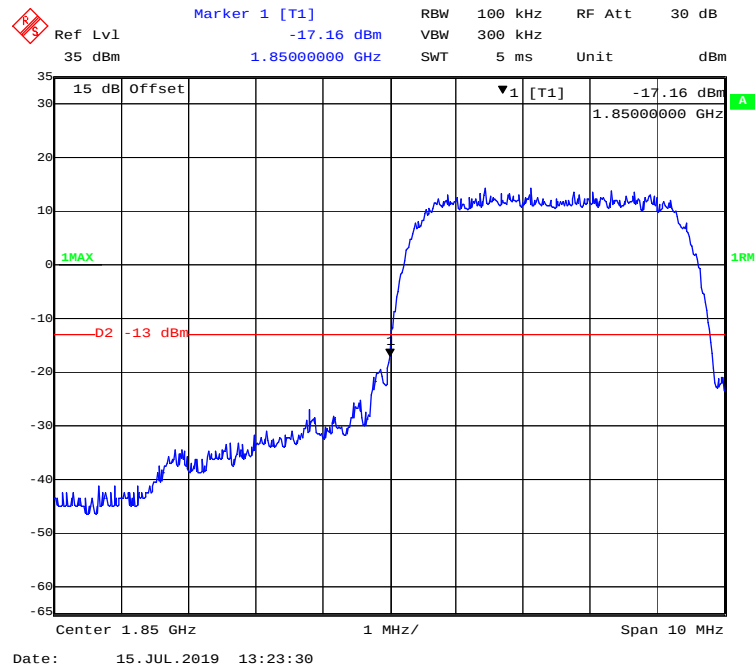


### WCDMA (HSPA+) Mode, Right Band Edge

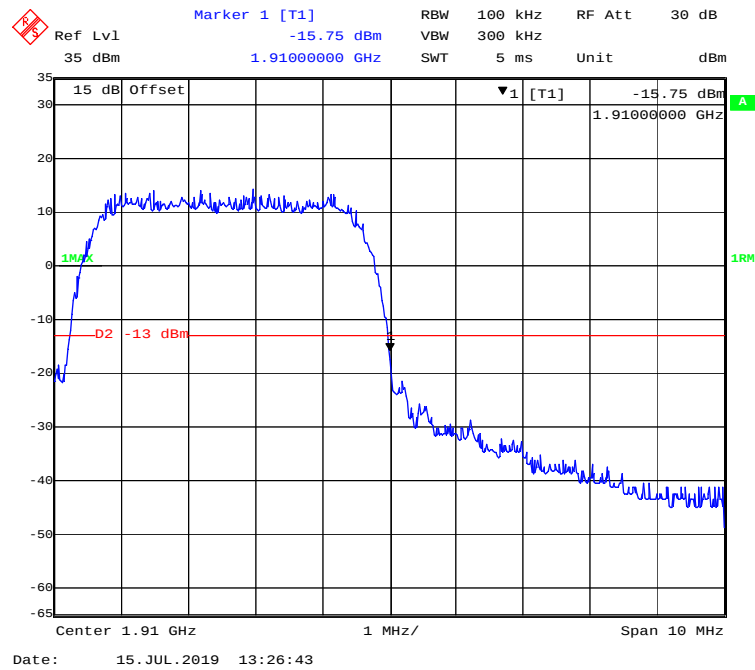


## WCDMA Band II

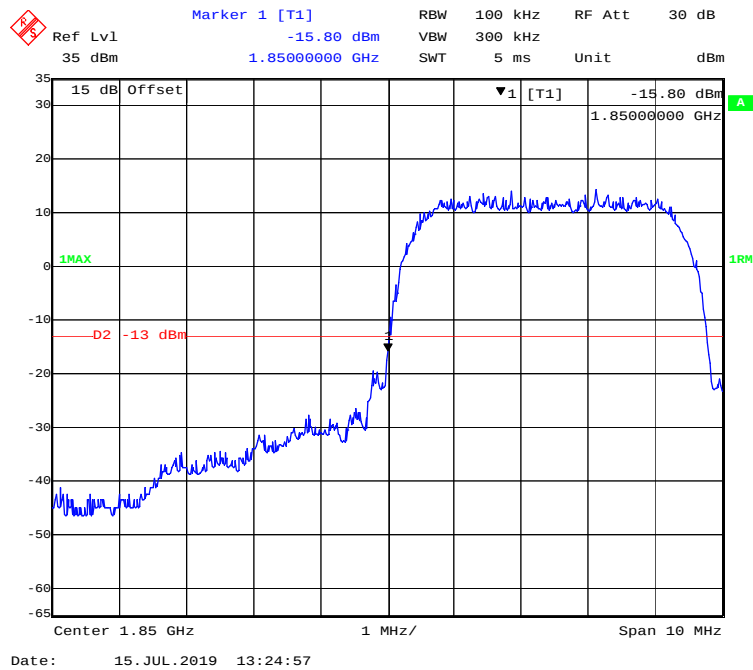
### WCDMA (Rel99) Mode, Left Band Edge



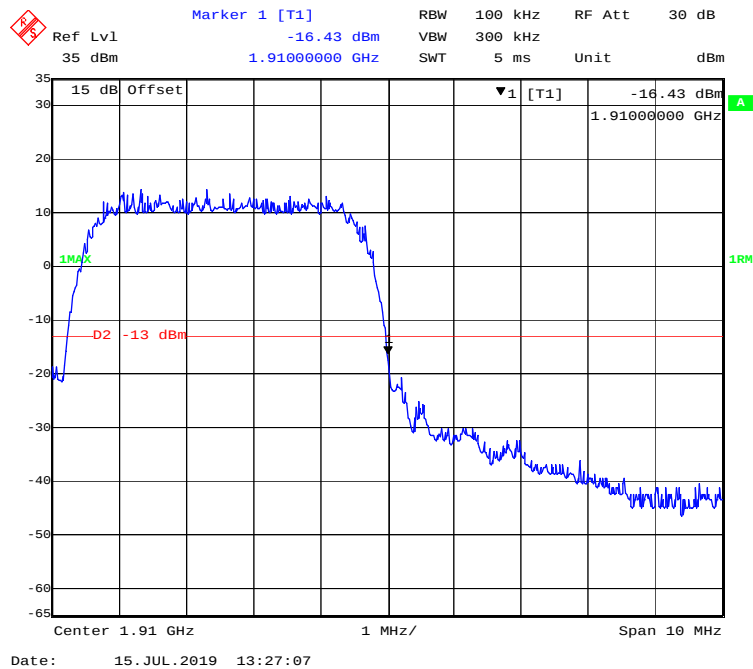
### WCDMA (Rel99) Mode, Right Band Edge

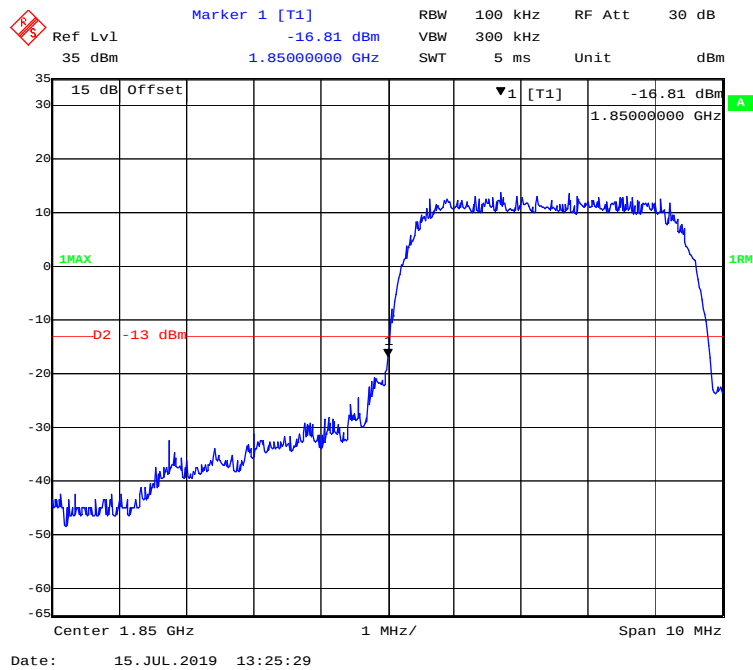
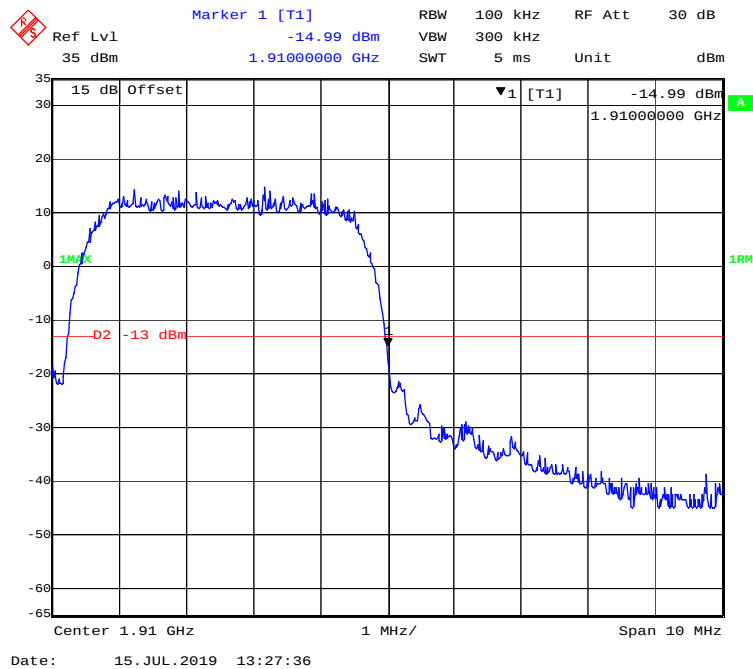


### WCDMA (HSDPA) Mode, Left Band Edge

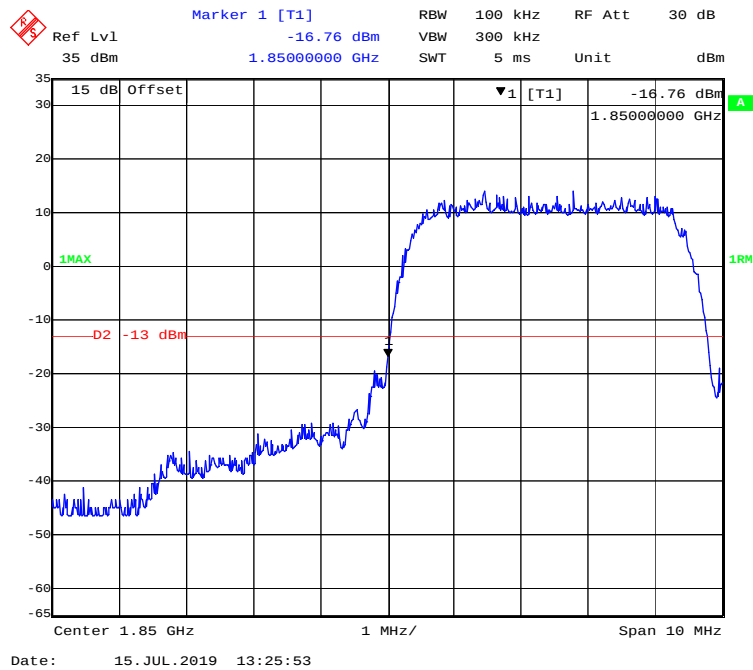


### WCDMA (HSDPA) Mode, Right Band Edge

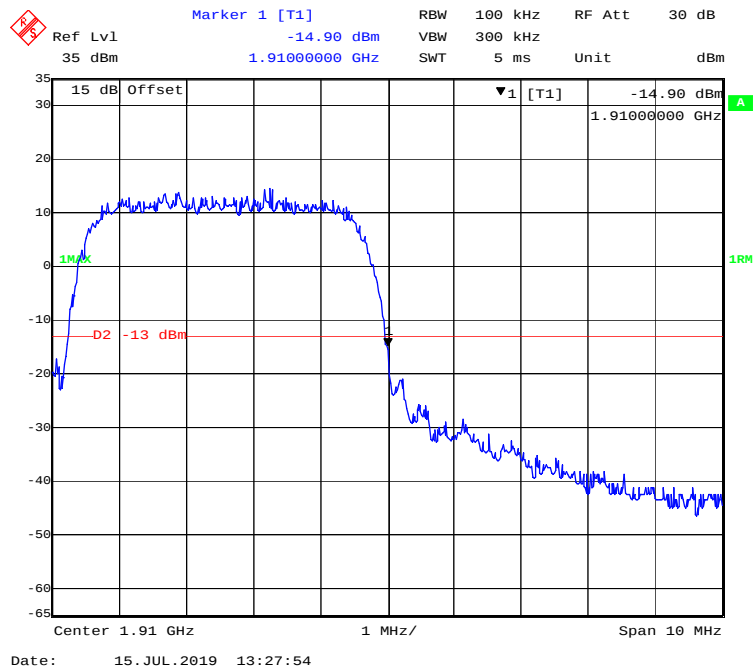


**WCDMA (HSUPA) Mode, Left Band Edge****WCDMA (HSUPA) Mode, Right Band Edge**

### WCDMA (HSPA+) Mode, Left Band Edge

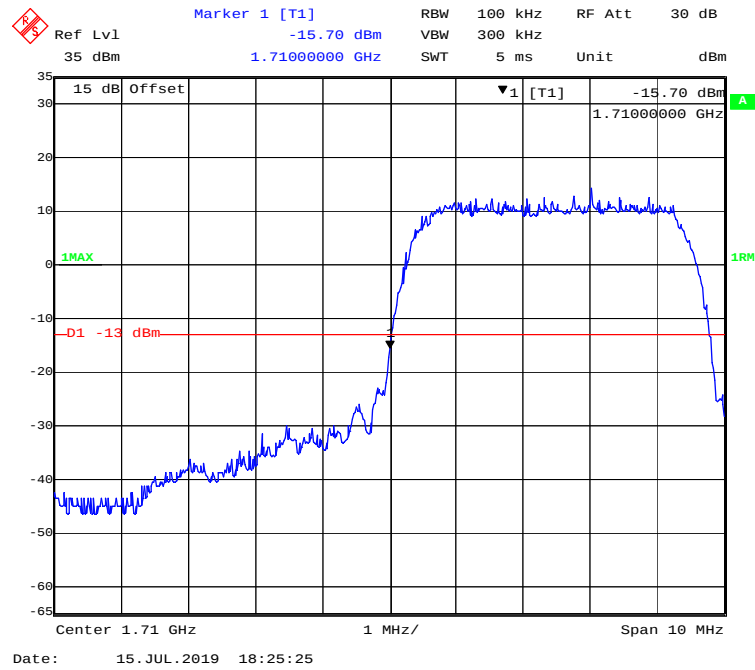


### WCDMA (HSPA+) Mode, Right Band Edge

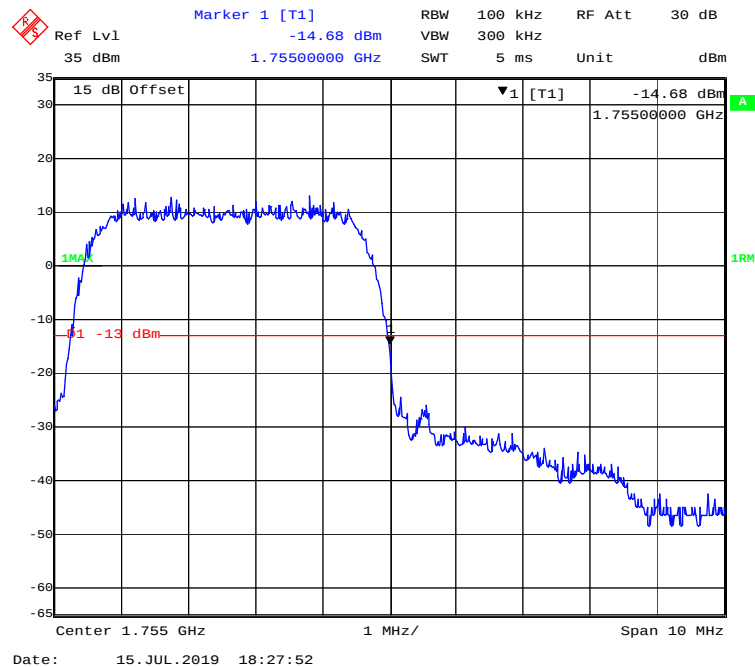


# WCDMA Band IV

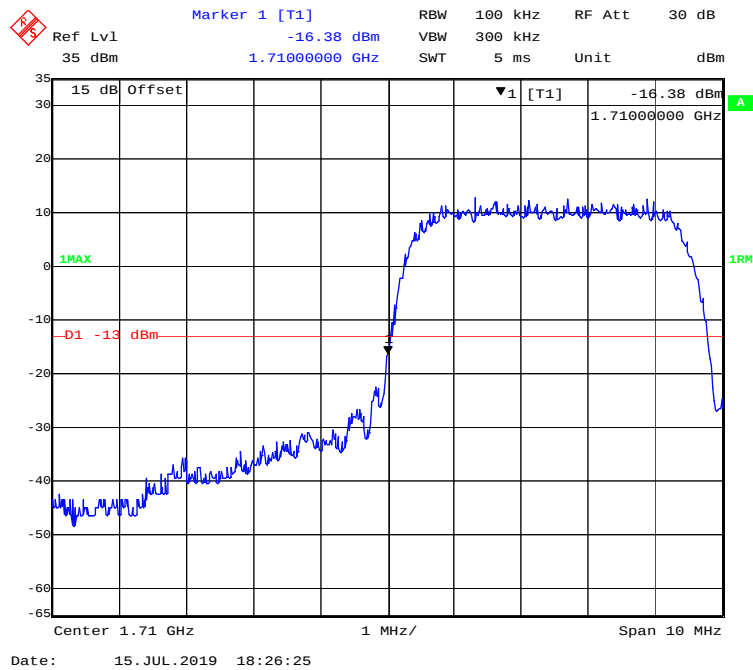
## WCDMA (Rel99) Mode, Left Band Edge



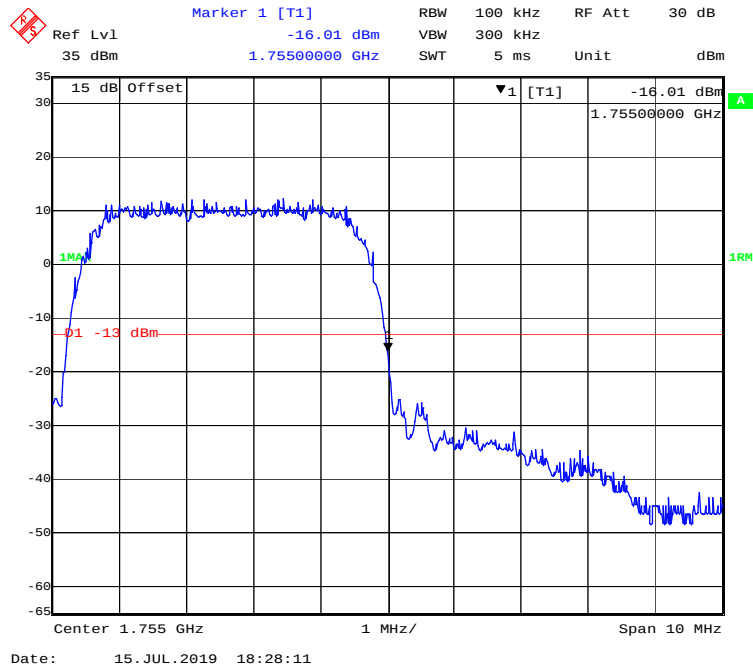
## WCDMA (Rel99) Mode, Right Band Edge



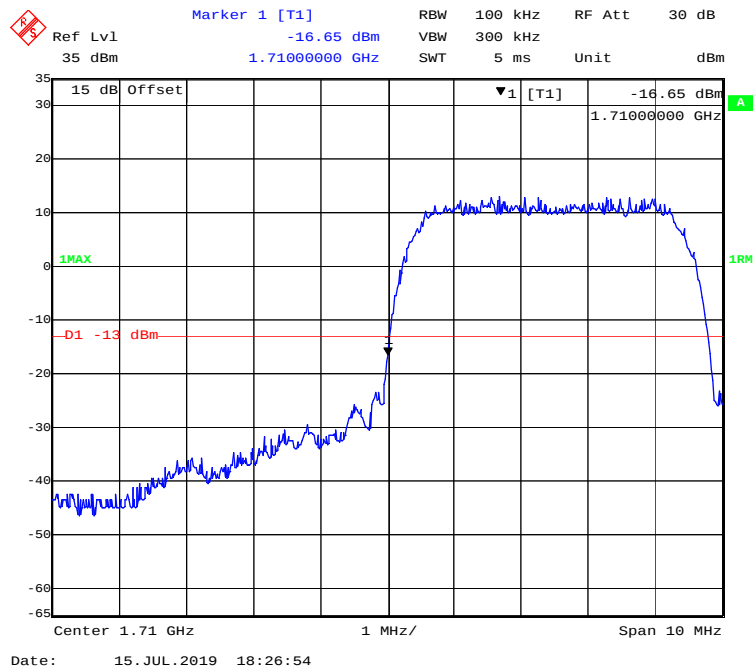
### WCDMA (HSDPA) Mode, Left Band Edge



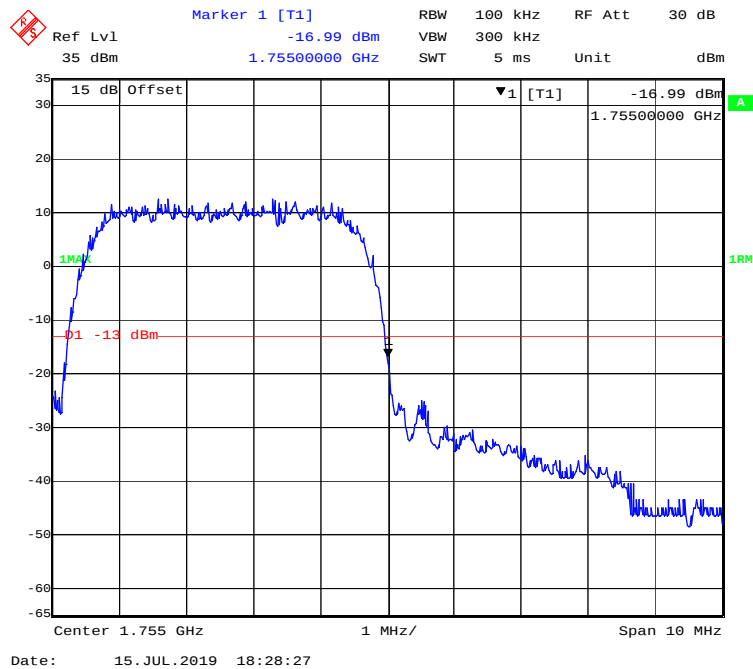
### WCDMA (HSDPA) Mode, Right Band Edge

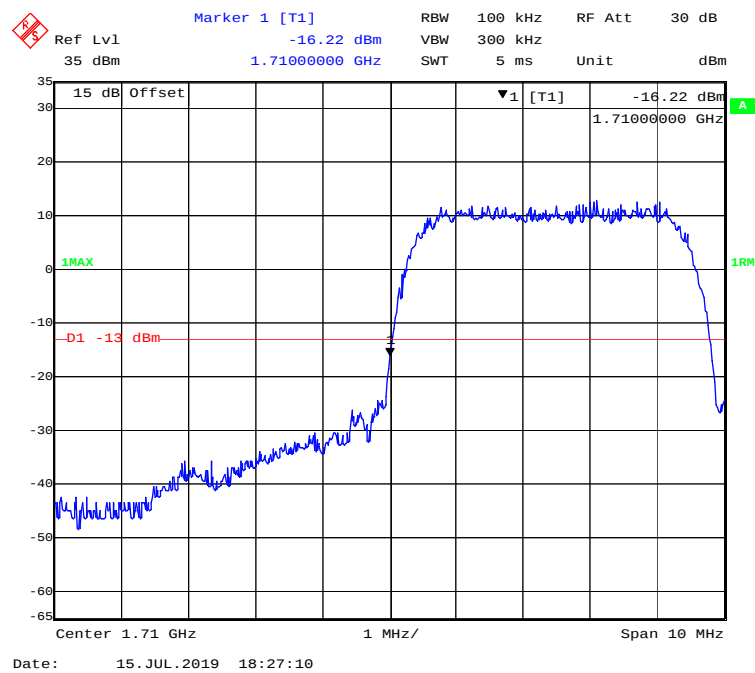
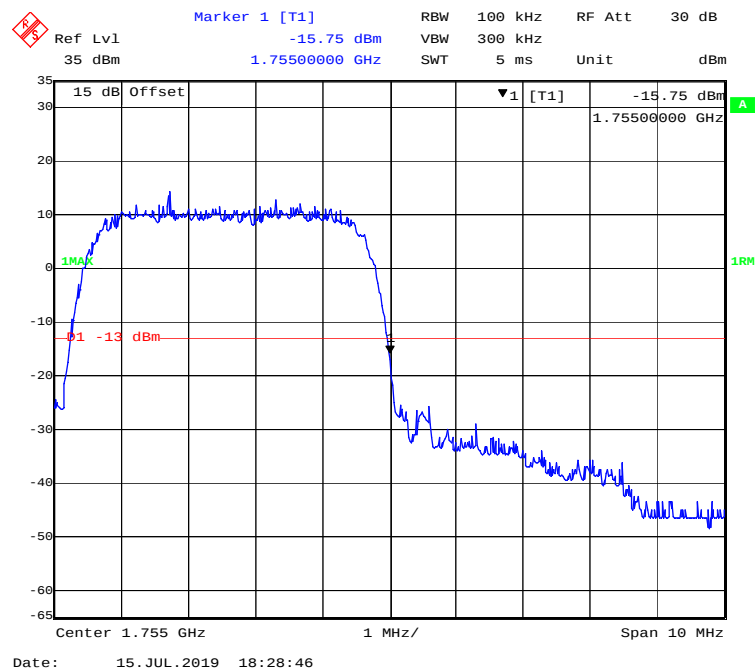


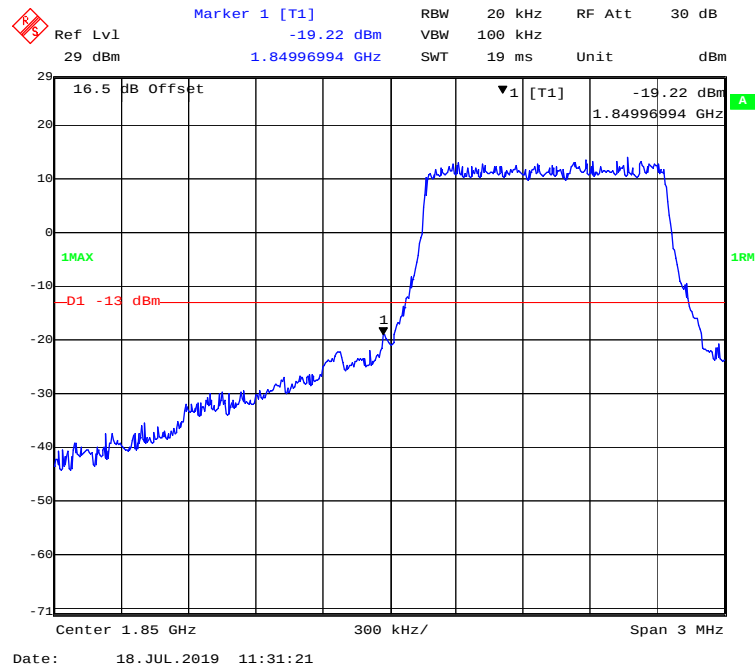
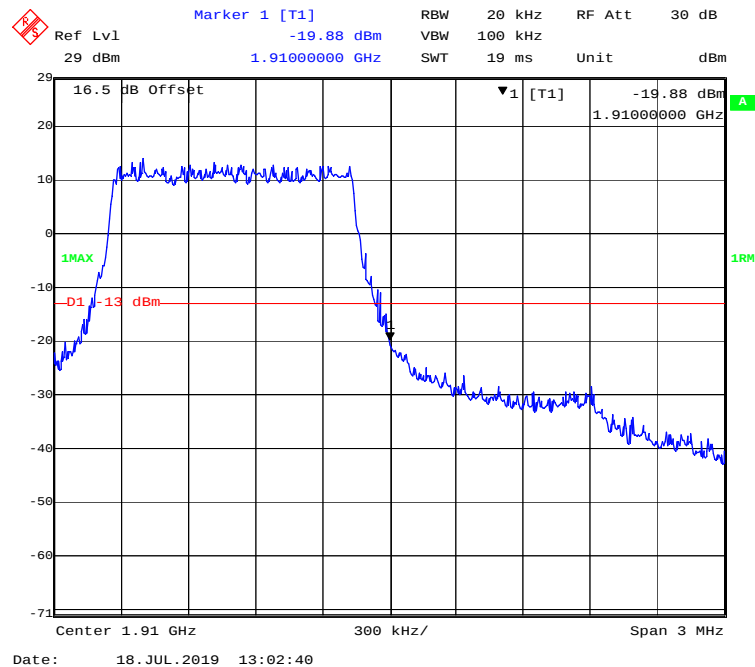
### WCDMA (HSUPA) Mode, Left Band Edge



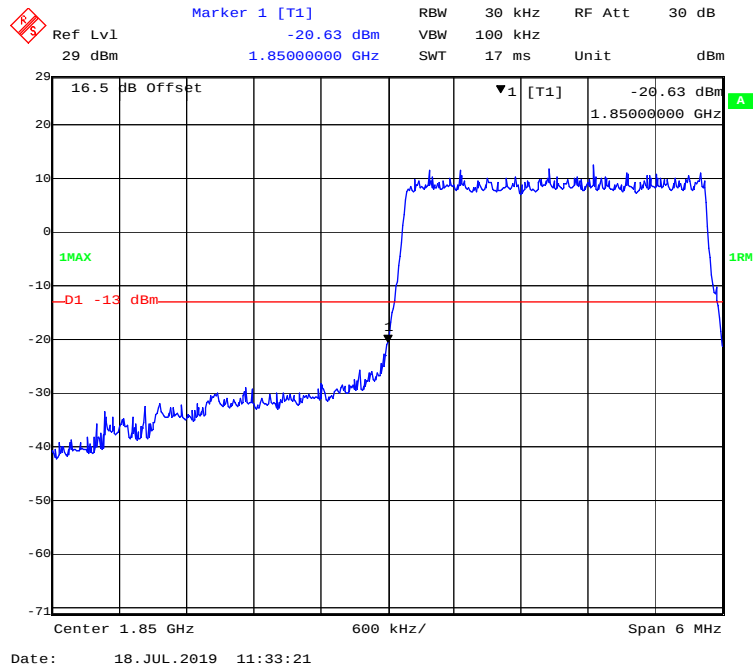
### WCDMA (HSUPA) Mode, Right Band Edge



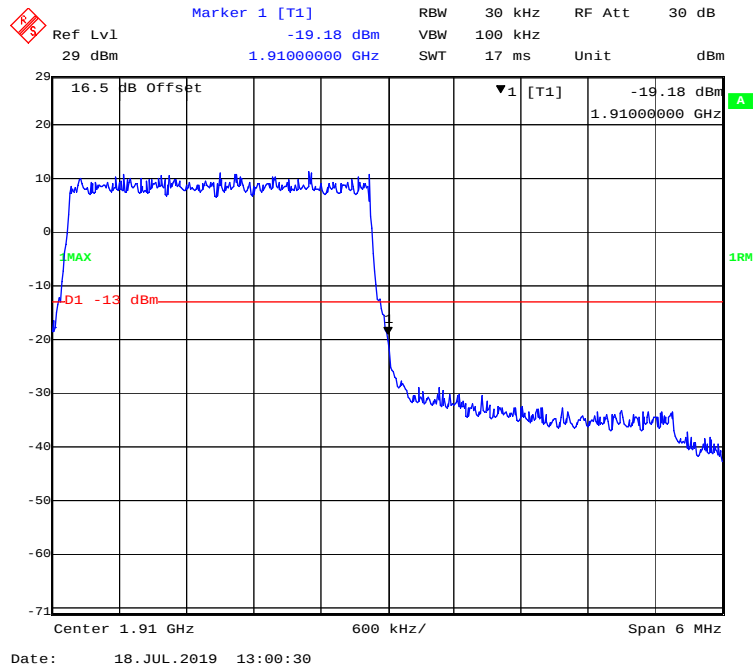
**WCDMA (HSPA+) Mode, Left Band Edge****WCDMA (HSPA+) Mode, Right Band Edge**

**LTE Band 2:****QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

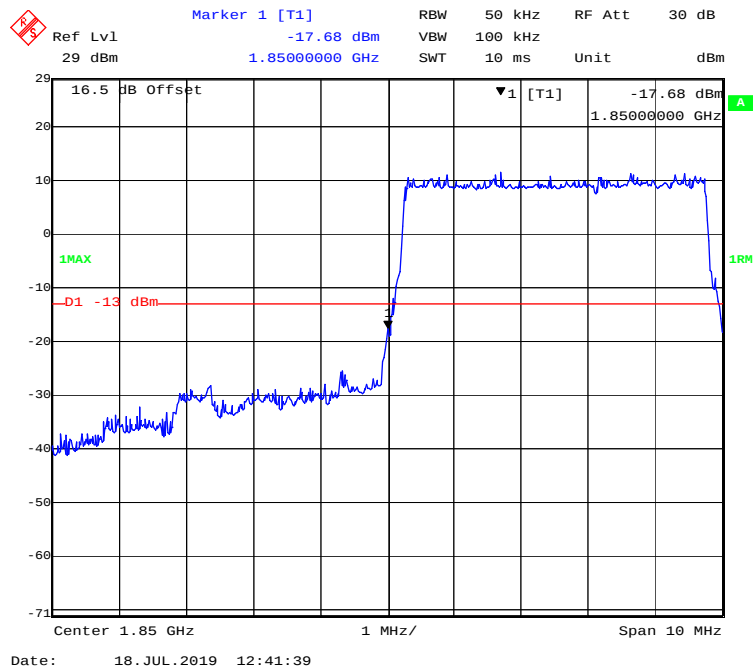
### QPSK (3 MHz, FULL RB) - Left Band Edge



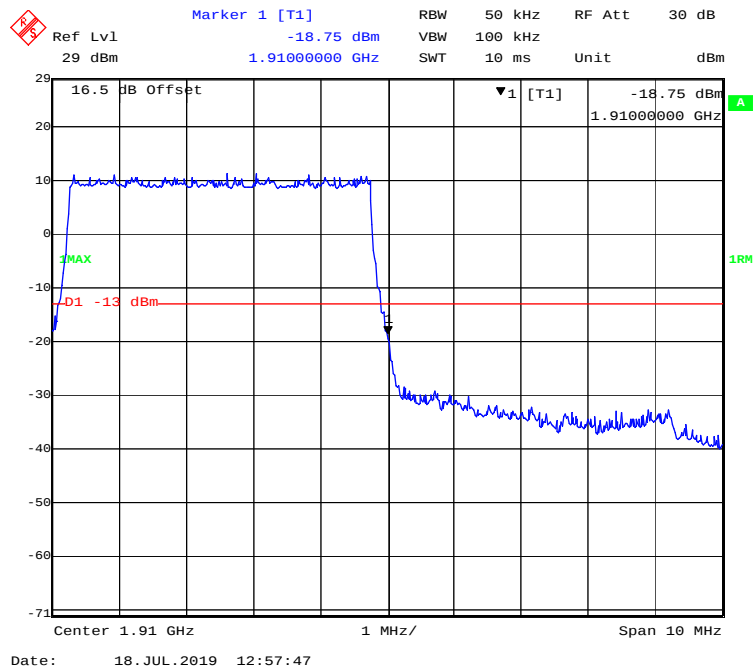
### QPSK (3 MHz, FULL RB) - Right Band Edge



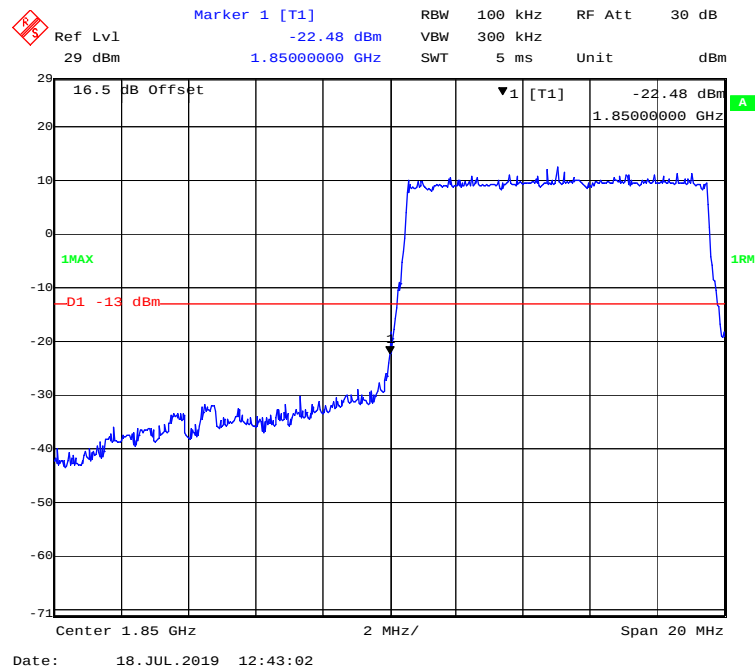
### QPSK (5 MHz, FULL RB) - Left Band Edge



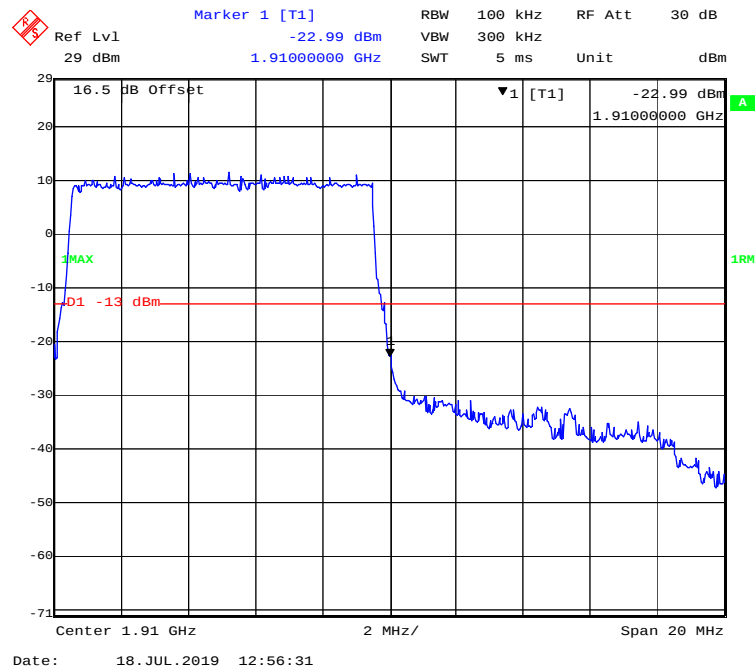
### QPSK (5 MHz, FULL RB) - Right Band Edge



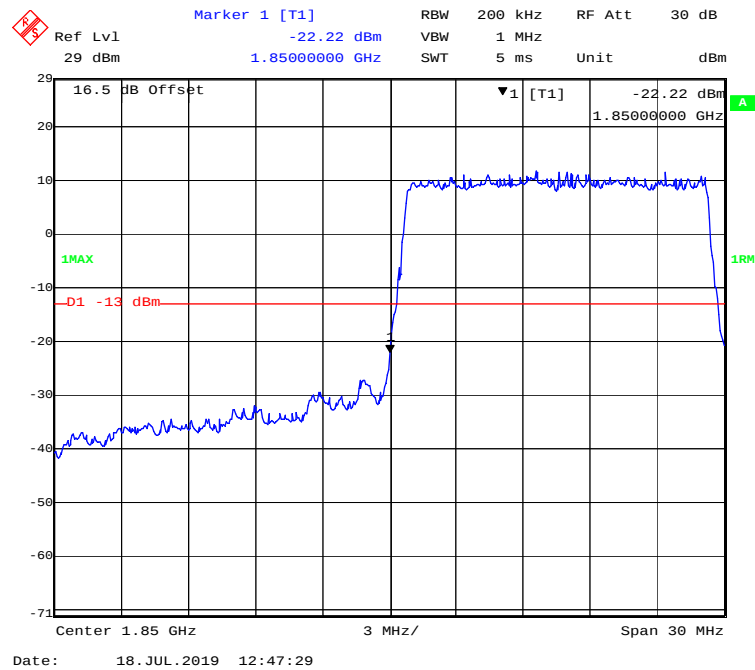
### QPSK (10 MHz, FULL RB) - Left Band Edge



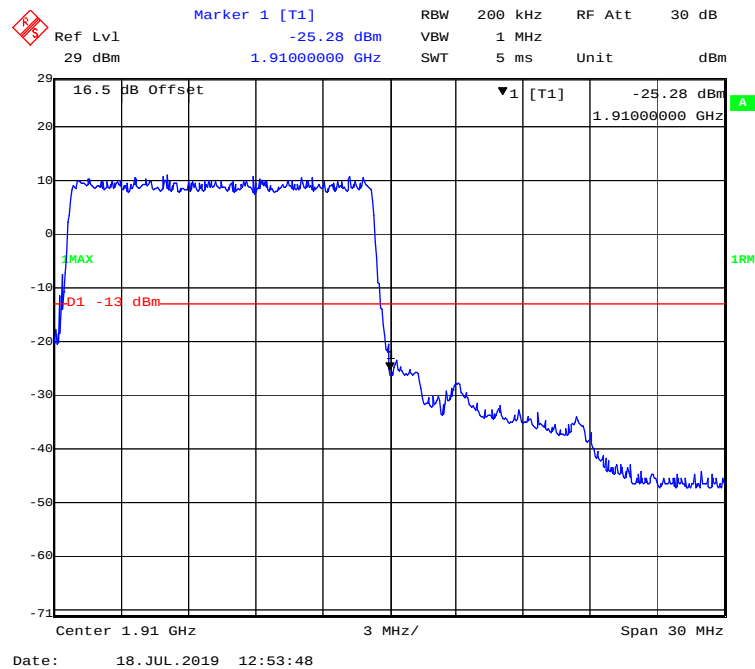
### QPSK (10 MHz, FULL RB) - Right Band Edge



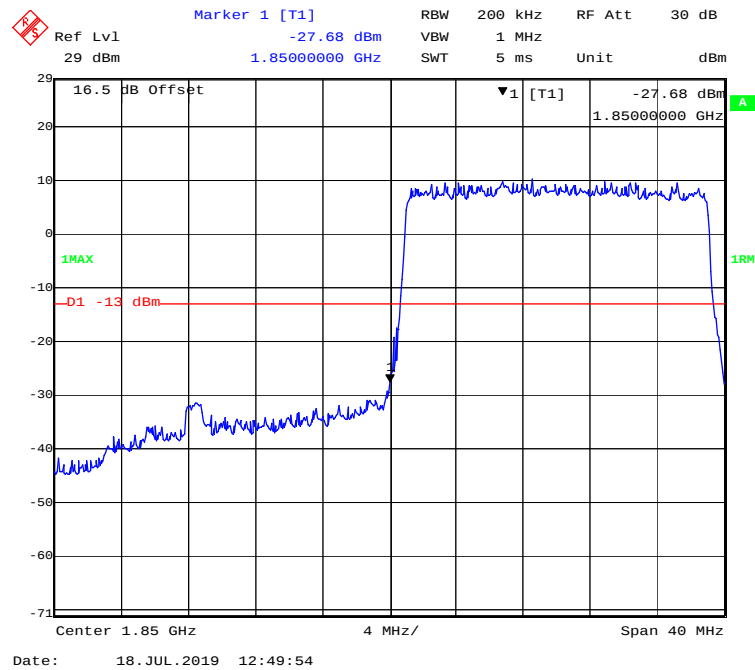
### QPSK (15 MHz, FULL RB) - Left Band Edge



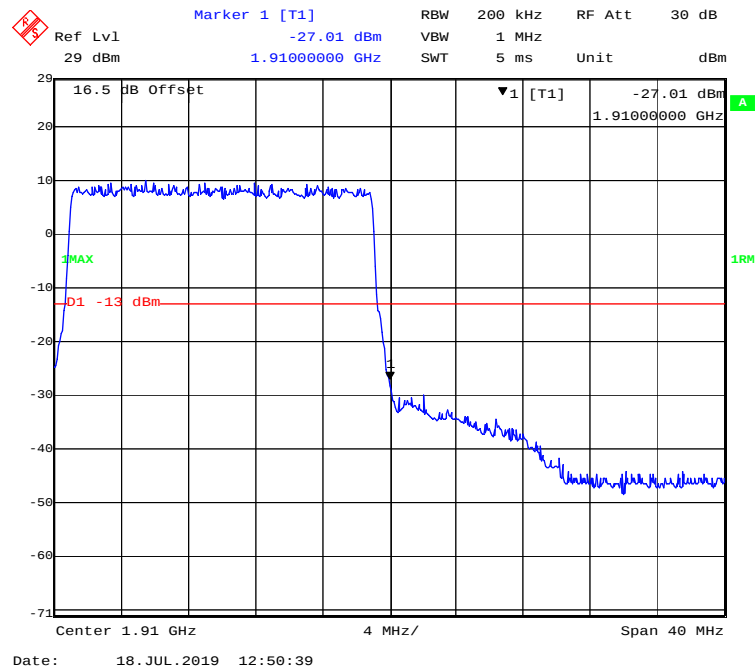
### QPSK (15 MHz, FULL RB) - Right Band Edge



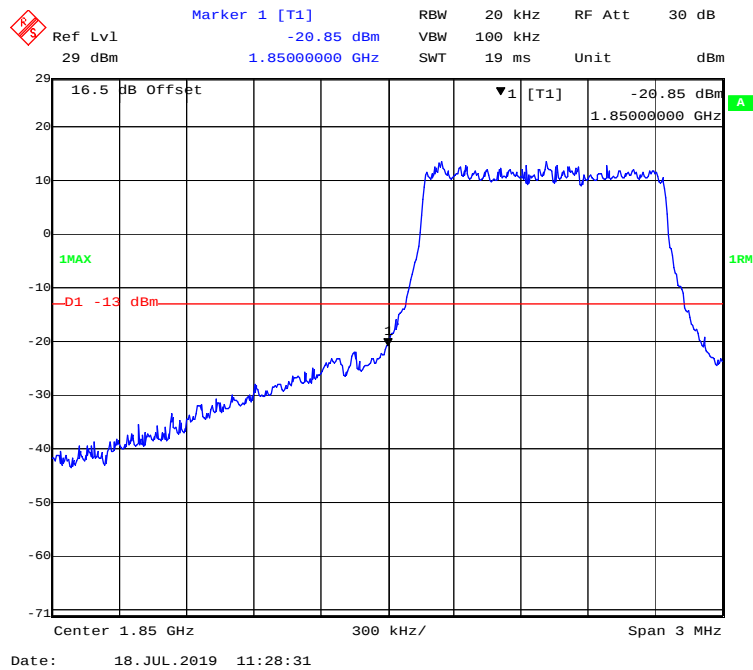
### QPSK (20 MHz, FULL RB) - Left Band Edge



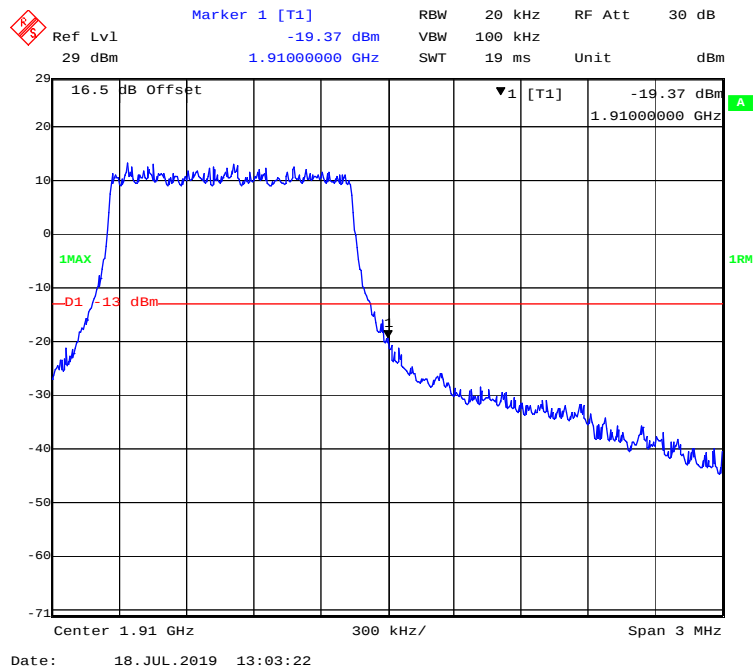
### QPSK (20 MHz, FULL RB) - Right Band Edge



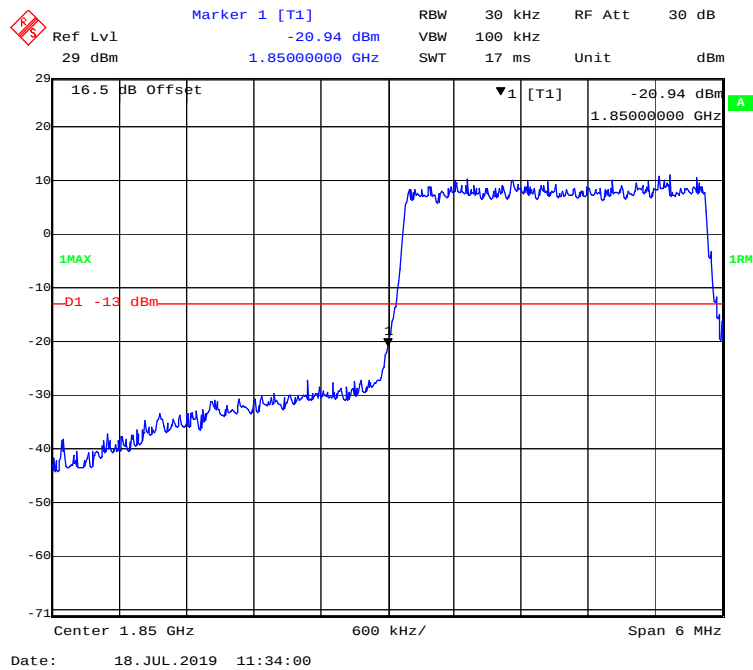
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



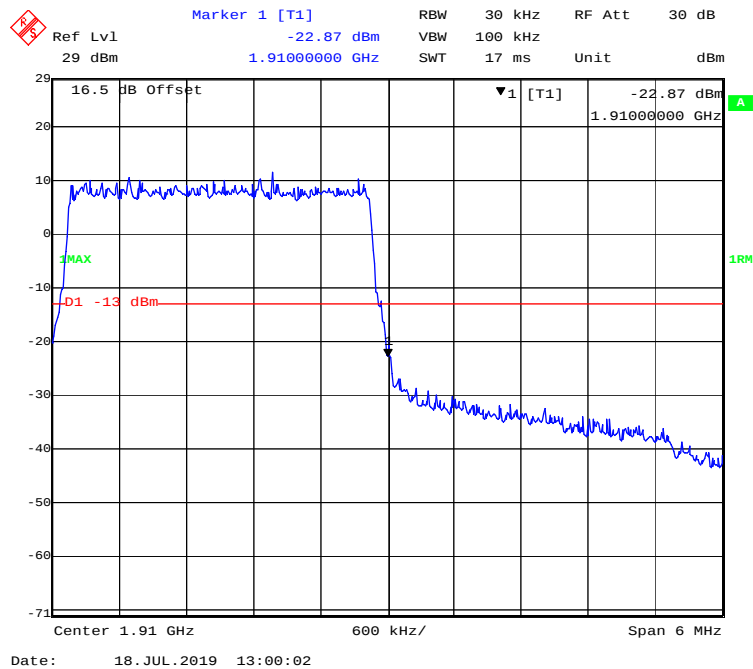
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge

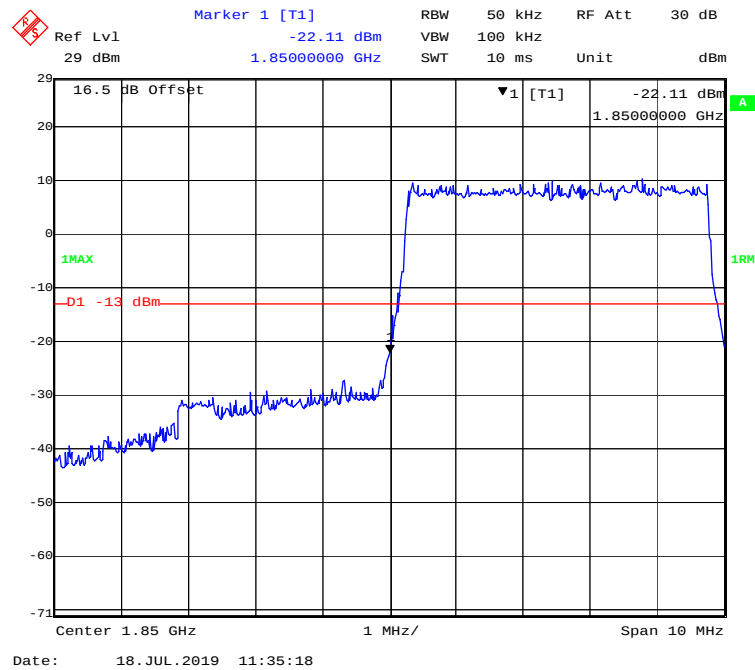
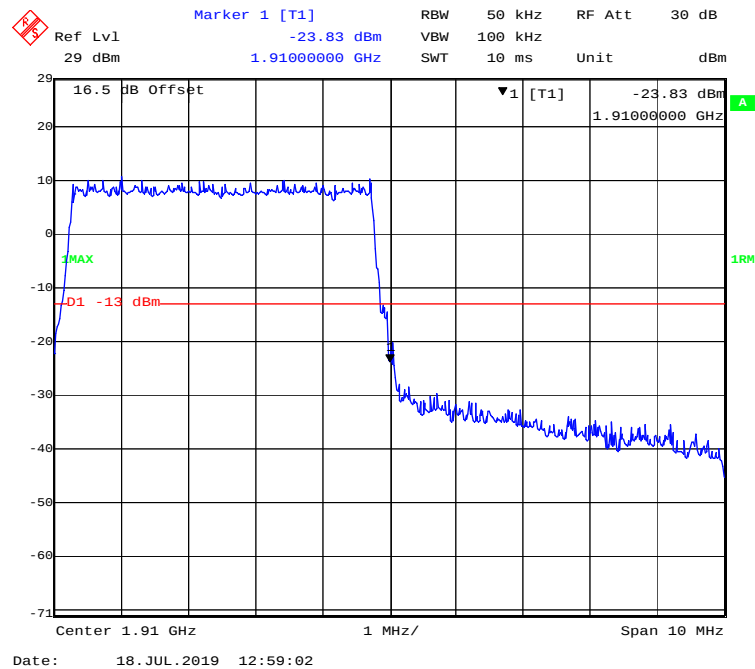


### 16-QAM (3 MHz, FULL RB) - Left Band Edge

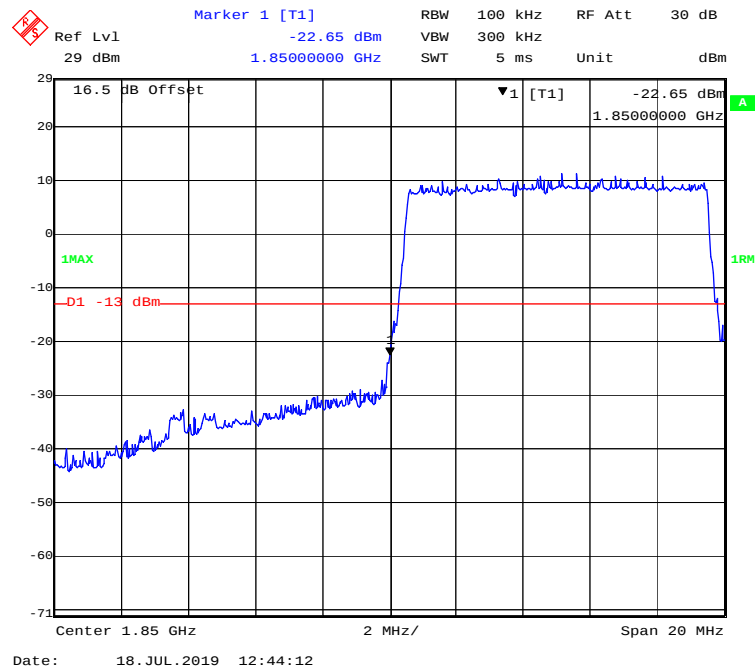


### 16-QAM (3 MHz, FULL RB) - Right Band Edge

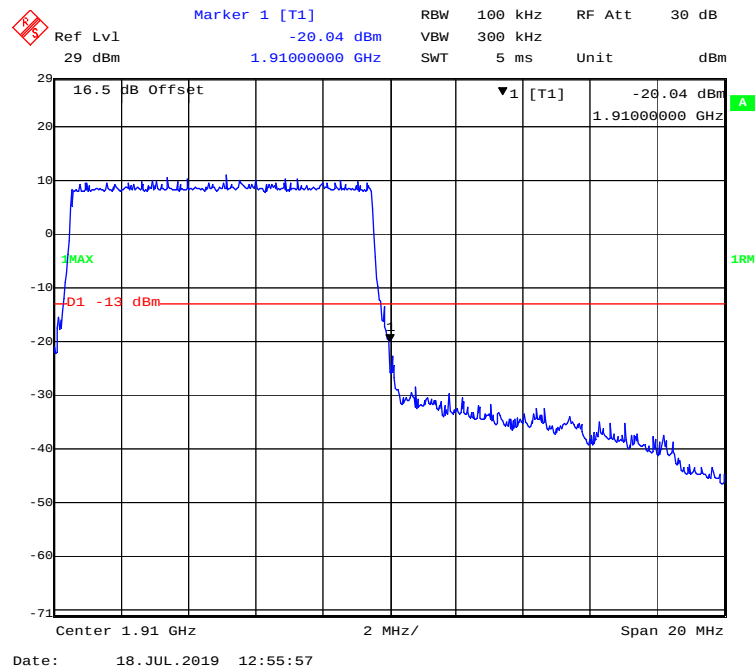


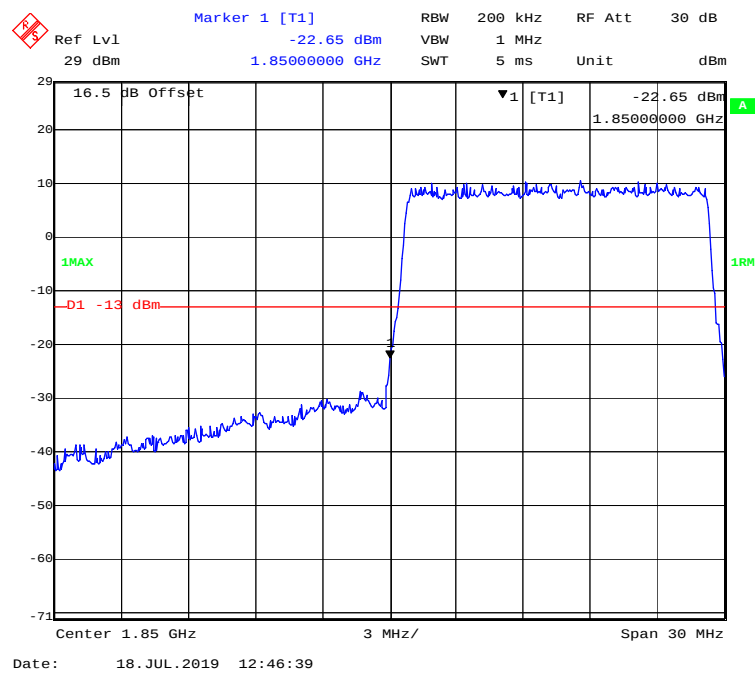
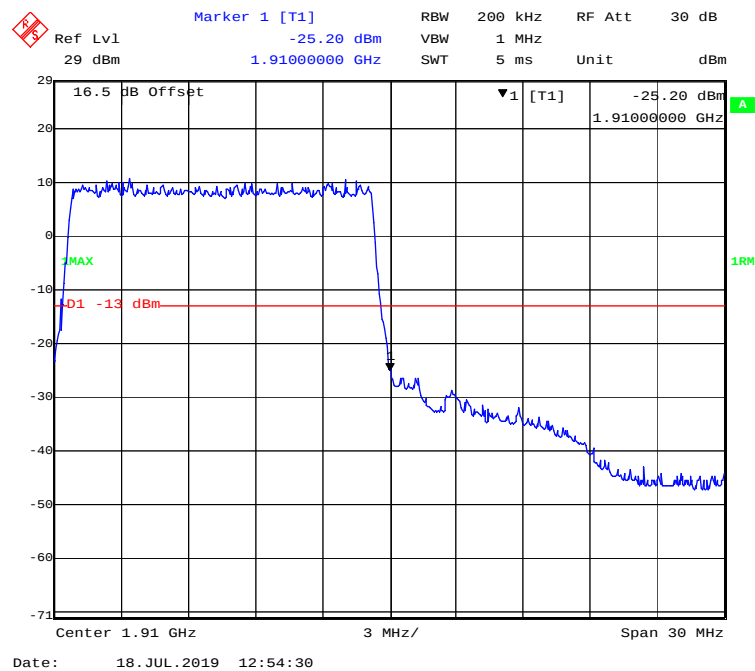
**16-QAM (5 MHz, FULL RB) - Left Band Edge****16-QAM (5 MHz, FULL RB) - Right Band Edge**

### 16-QAM (10 MHz, FULL RB) - Left Band Edge

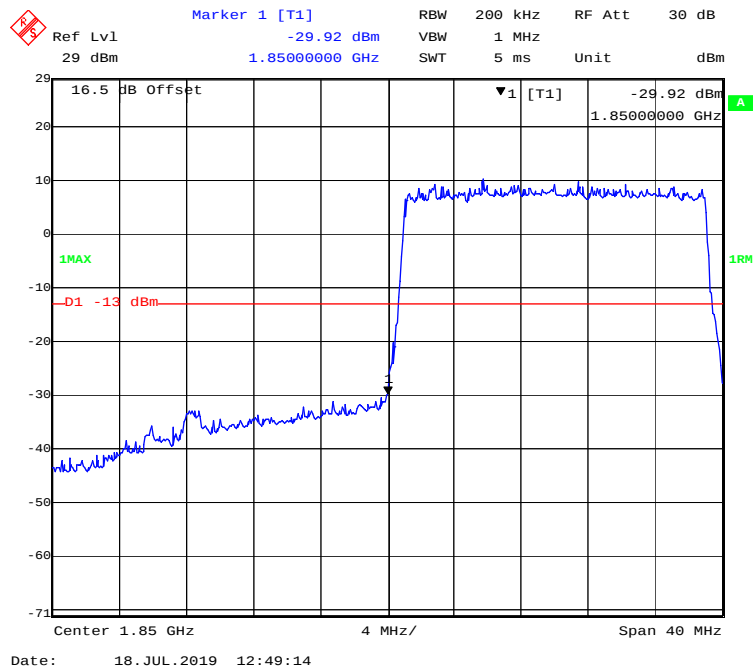


### 16-QAM (10 MHz, FULL RB) - Right Band Edge

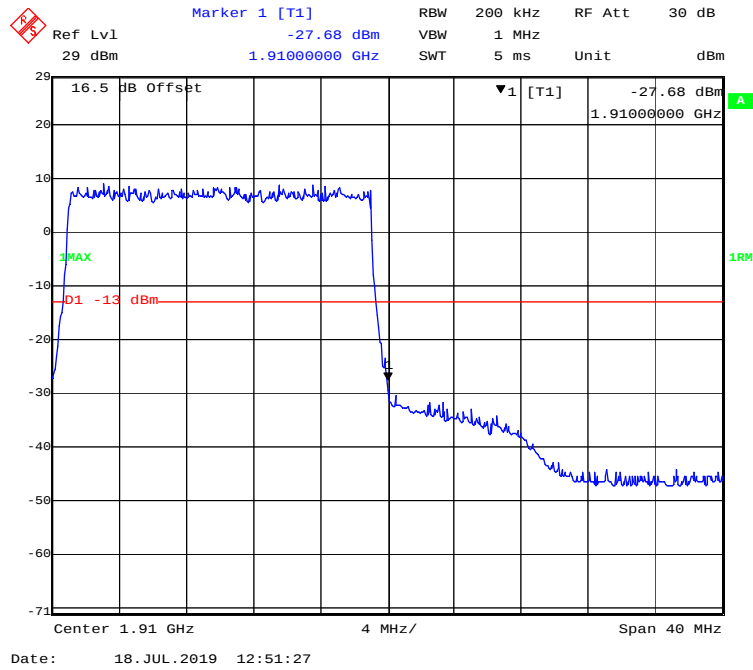


**16-QAM (15 MHz, FULL RB) - Left Band Edge****16-QAM (15 MHz, FULL RB) - Right Band Edge**

### 16-QAM (20 MHz, FULL RB) - Left Band Edge

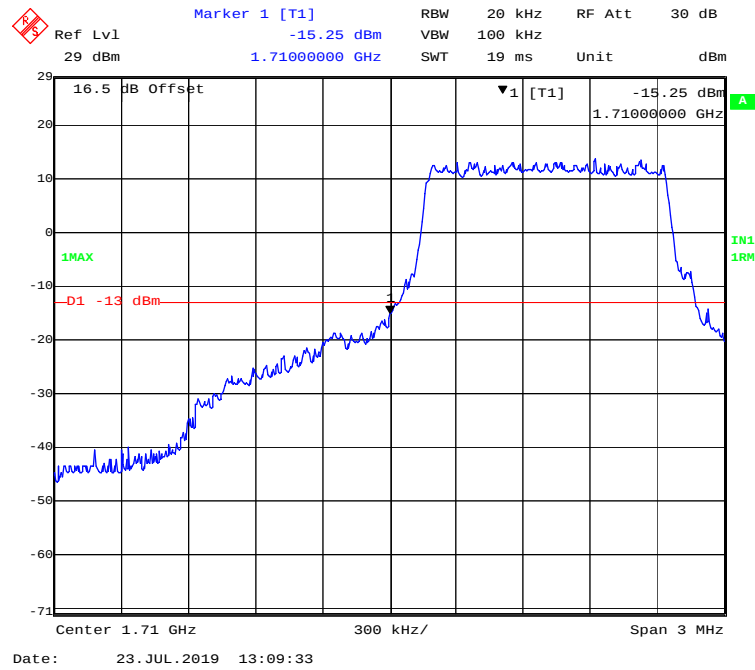


### 16-QAM (20 MHz, FULL RB) - Right Band Edge

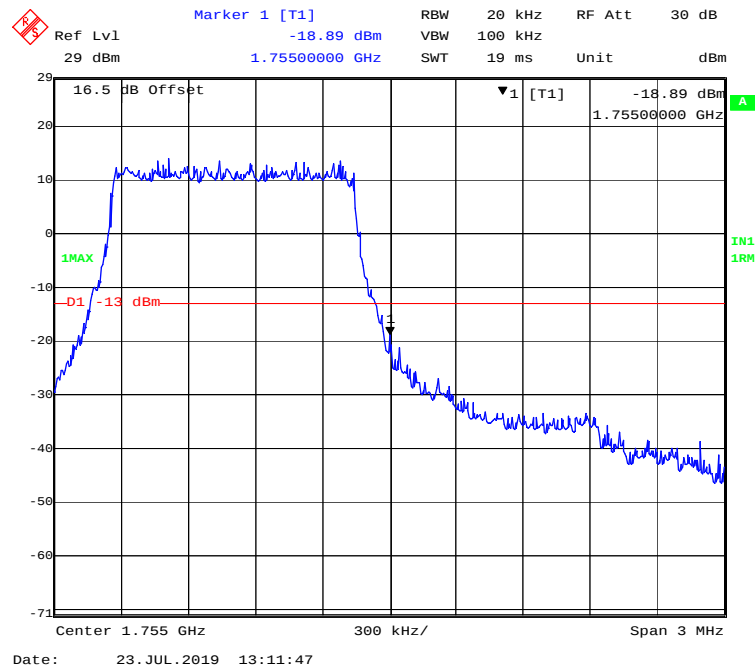


# LTE Band 4:

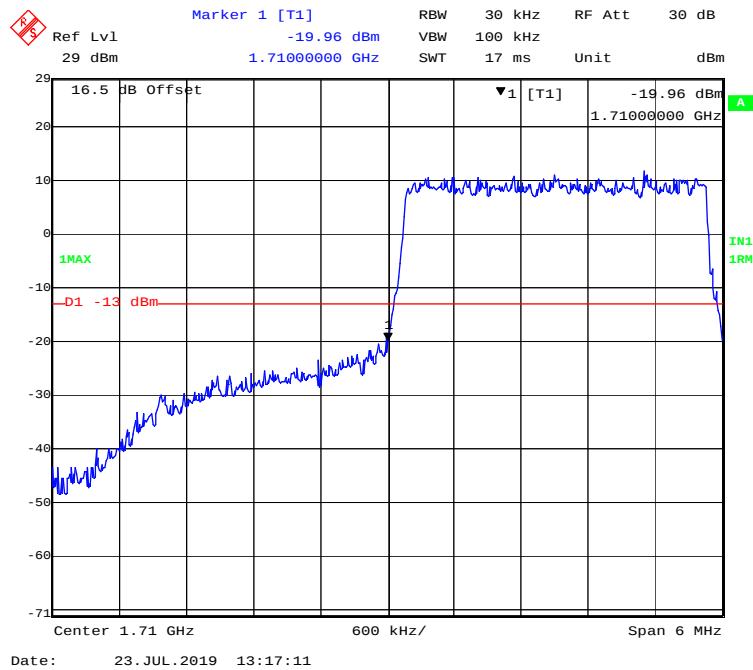
## QPSK (1.4 MHz, FULL RB) - Left Band Edge



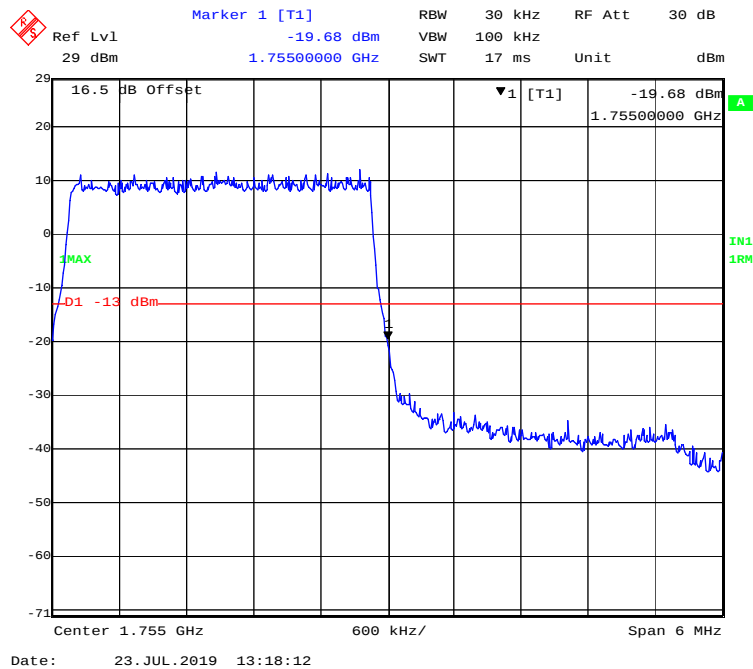
## QPSK (1.4 MHz, FULL RB) - Right Band Edge



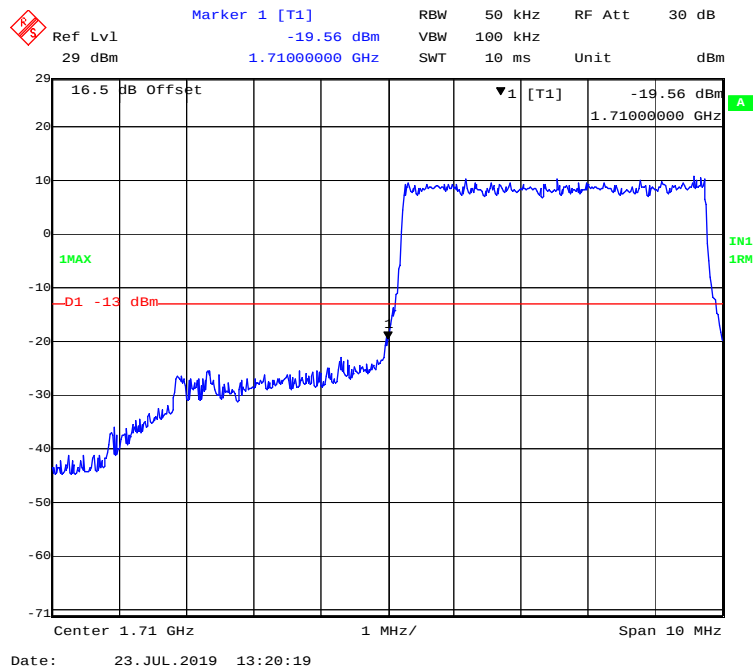
### QPSK (3 MHz, FULL RB) - Left Band Edge



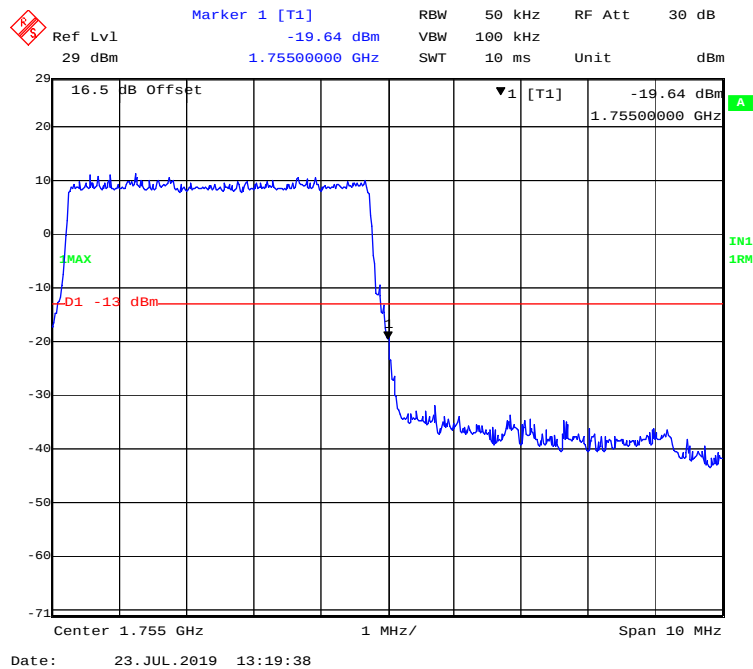
### QPSK (3 MHz, FULL RB) - Right Band Edge



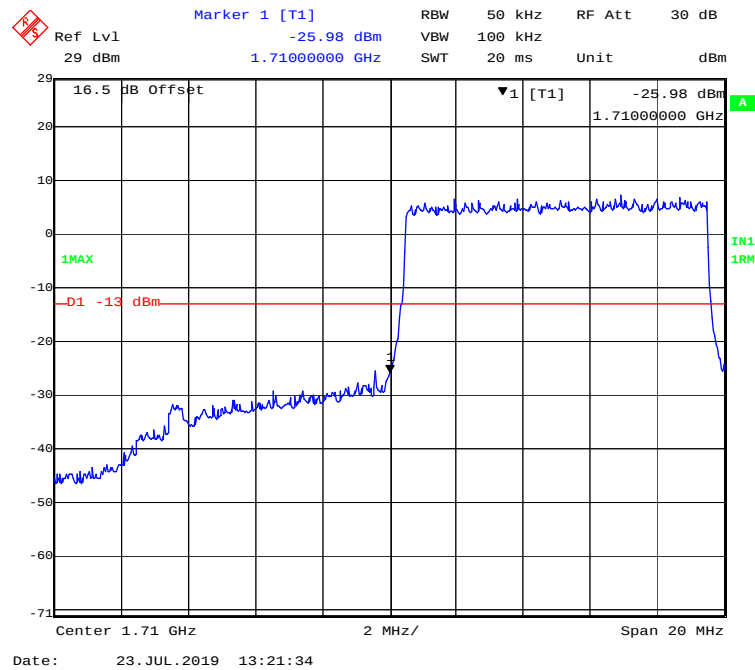
### QPSK (5 MHz, FULL RB) - Left Band Edge



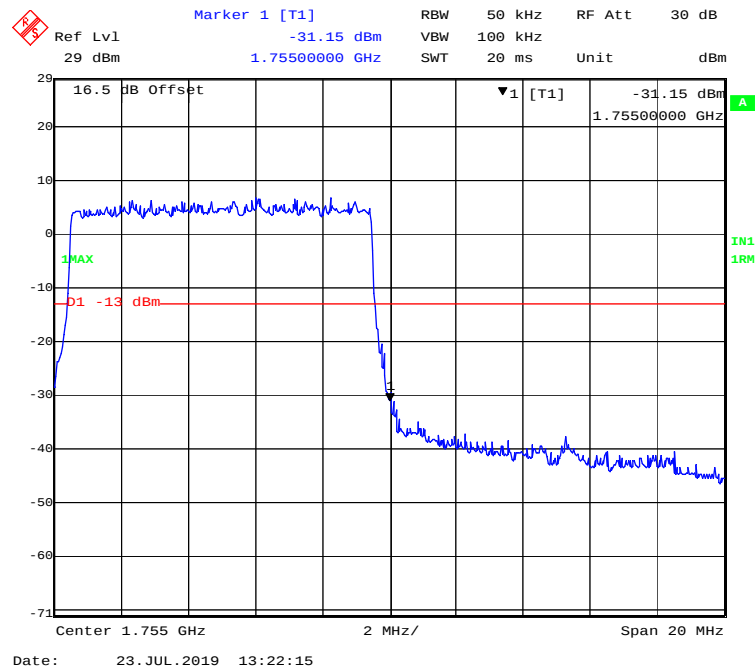
### QPSK (5 MHz, FULL RB) - Right Band Edge



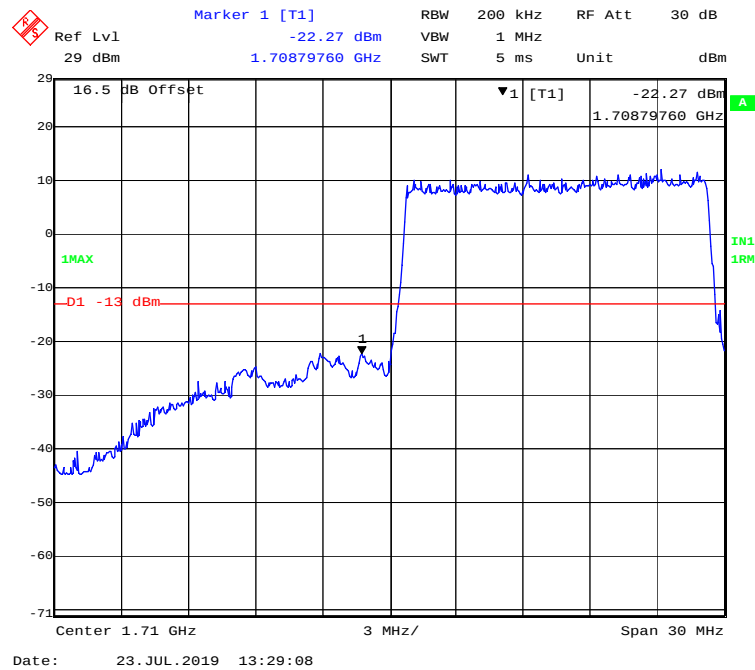
### QPSK (10 MHz, FULL RB) - Left Band Edge



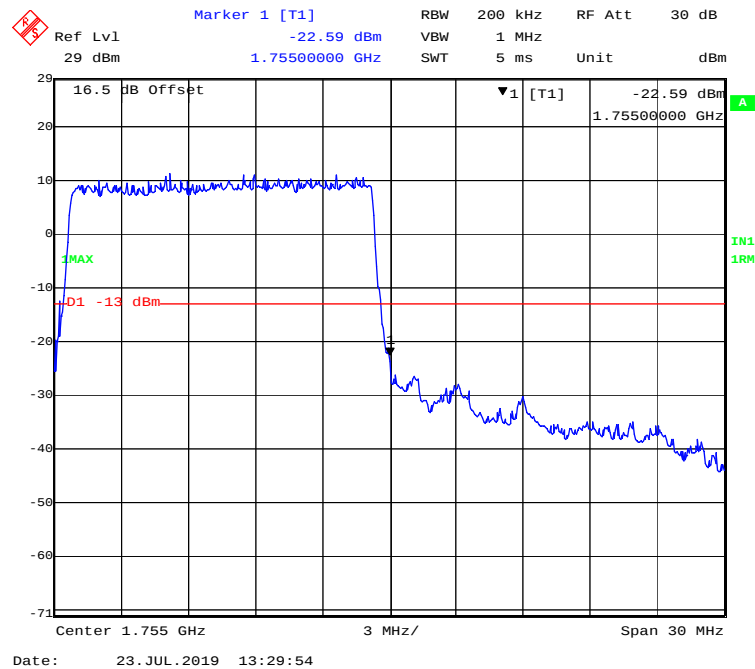
### QPSK (10 MHz, FULL RB) - Right Band Edge



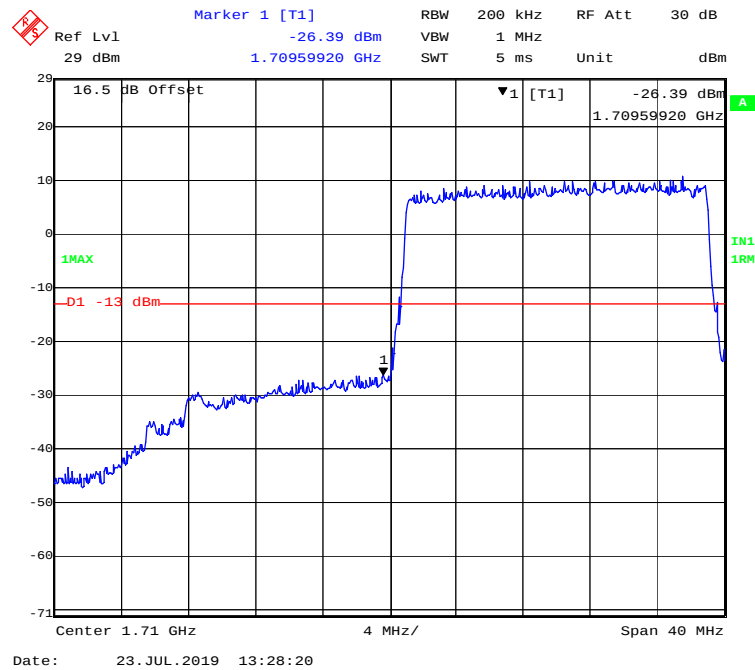
### QPSK (15 MHz, FULL RB) - Left Band Edge



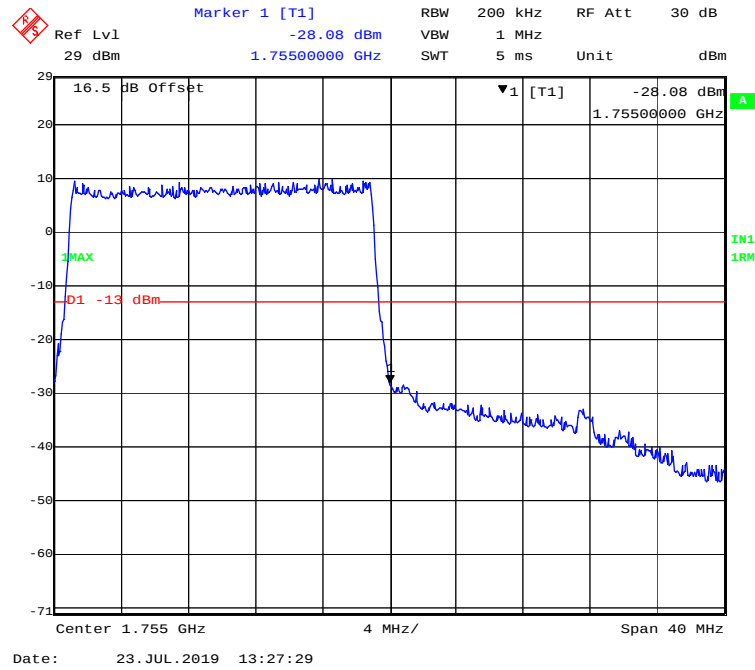
### QPSK (15 MHz, FULL RB) - Right Band Edge



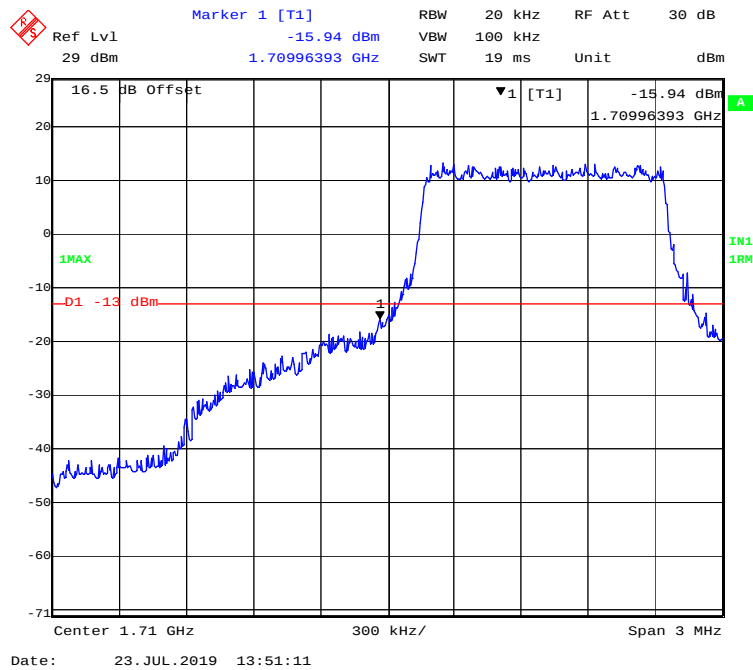
### QPSK (20 MHz, FULL RB) - Left Band Edge



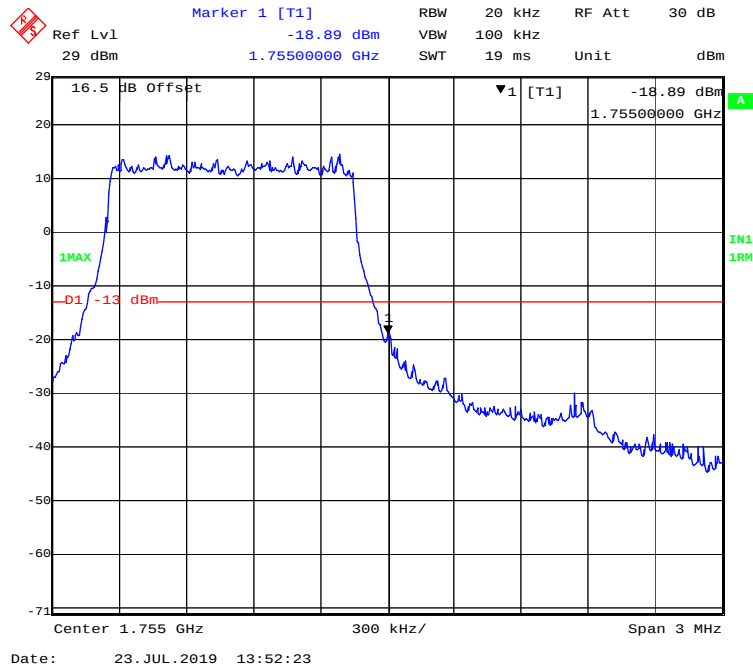
### QPSK (20 MHz, FULL RB) - Right Band Edge



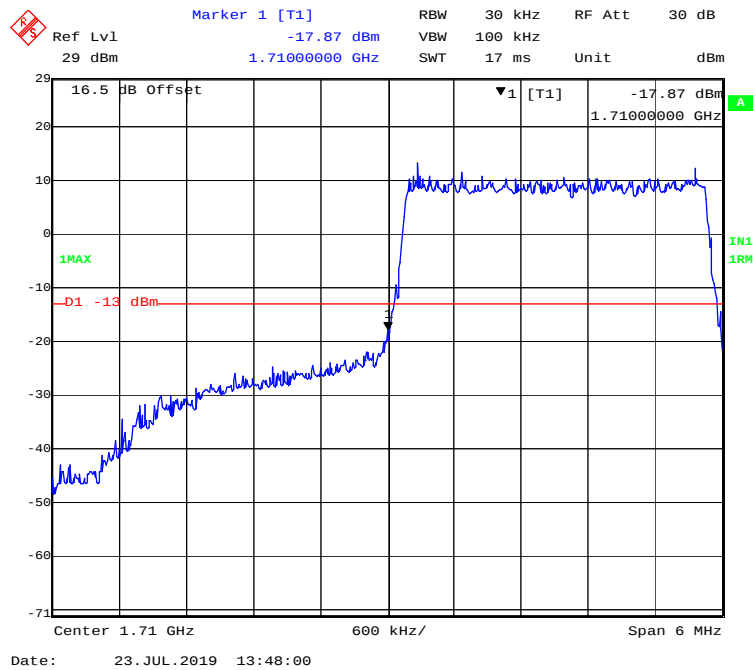
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



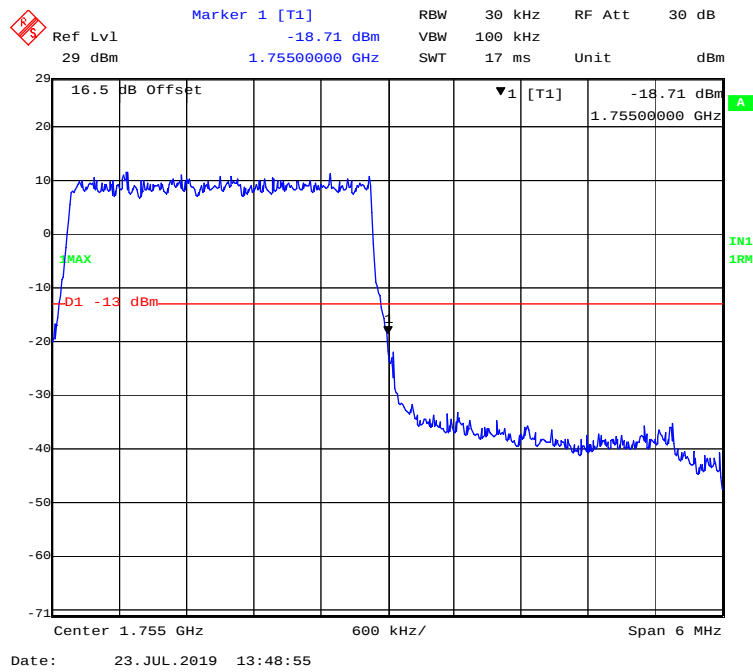
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



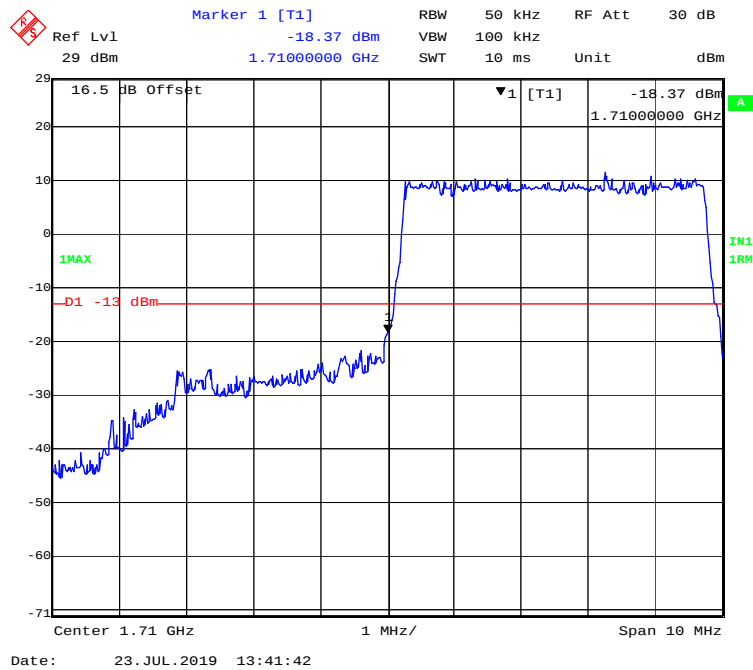
### 16-QAM (3 MHz, FULL RB) - Left Band Edge



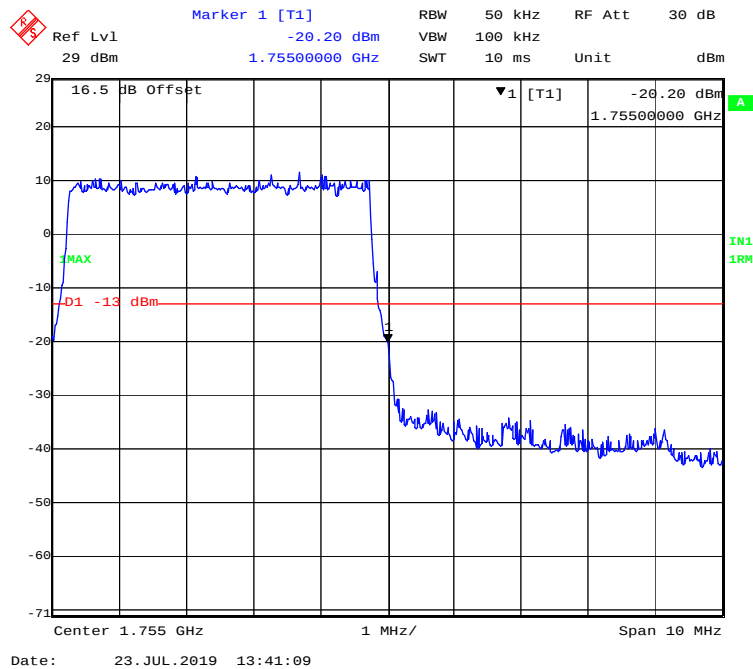
### 16-QAM (3 MHz, FULL RB) - Right Band Edge



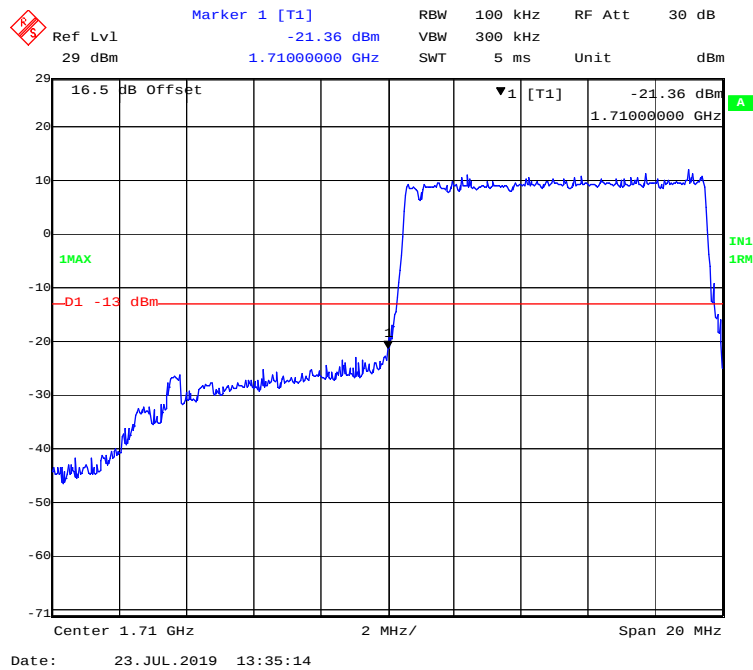
### 16-QAM (5 MHz, FULL RB) - Left Band Edge



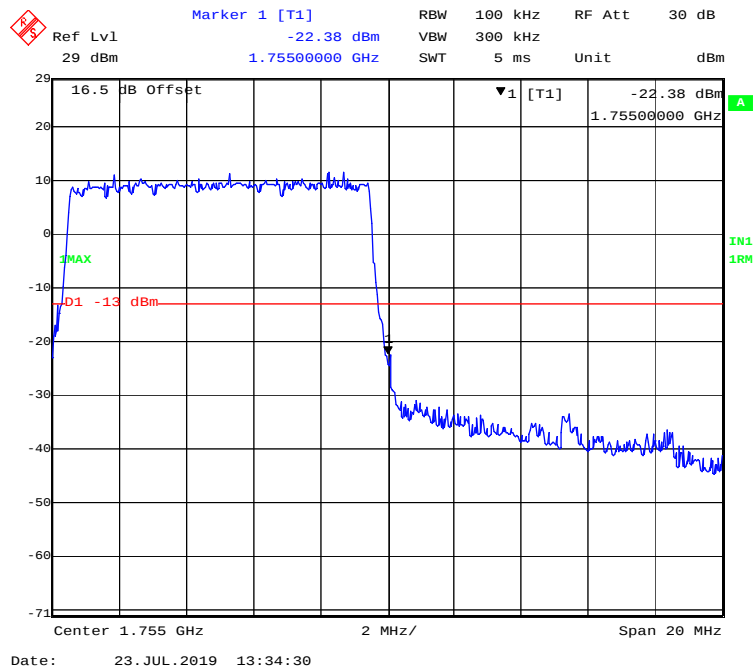
### 16-QAM (5 MHz, FULL RB) - Right Band Edge



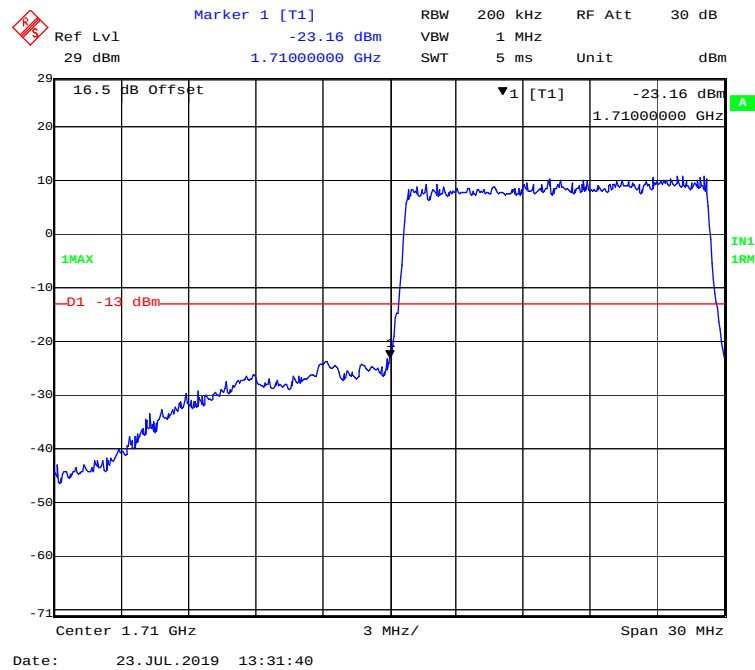
### 16-QAM (10 MHz, FULL RB) - Left Band Edge



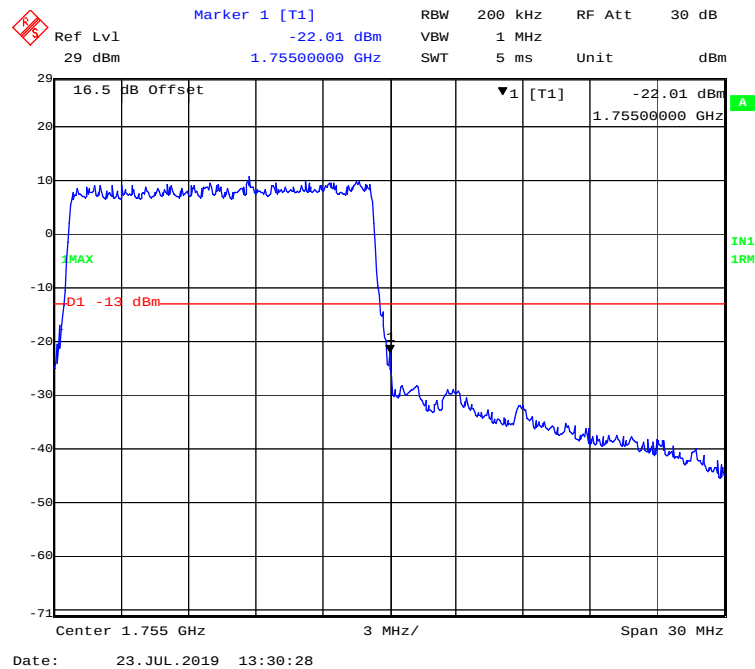
### 16-QAM (10 MHz, FULL RB) - Right Band Edge



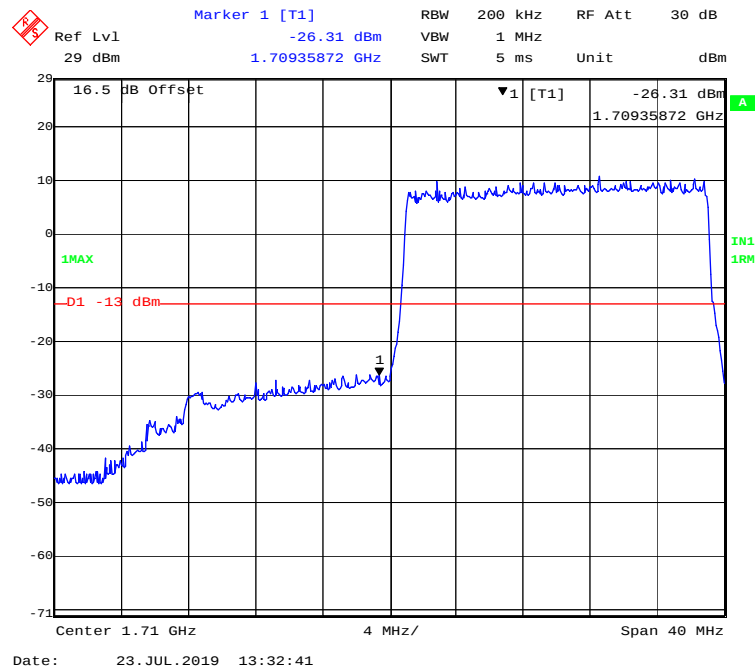
### 16-QAM (15 MHz, FULL RB) - Left Band Edge



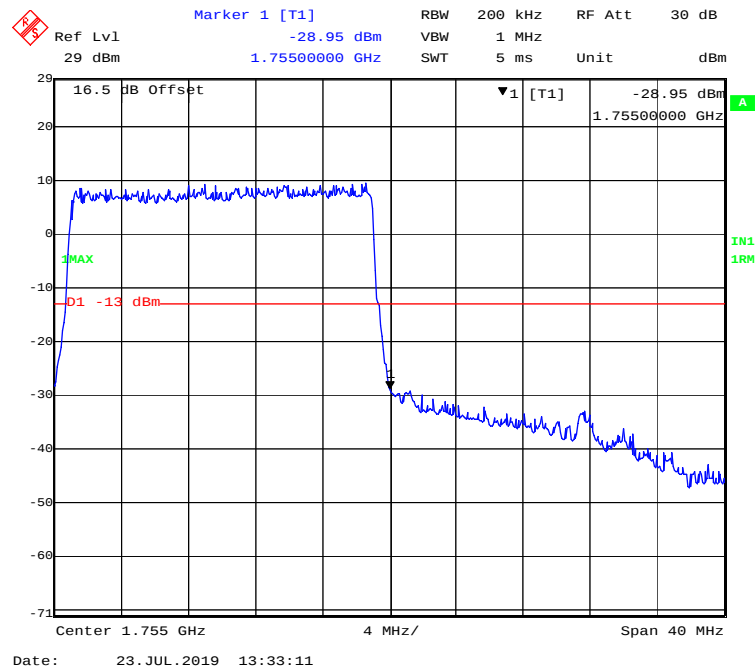
### 16-QAM (15 MHz, FULL RB) - Right Band Edge

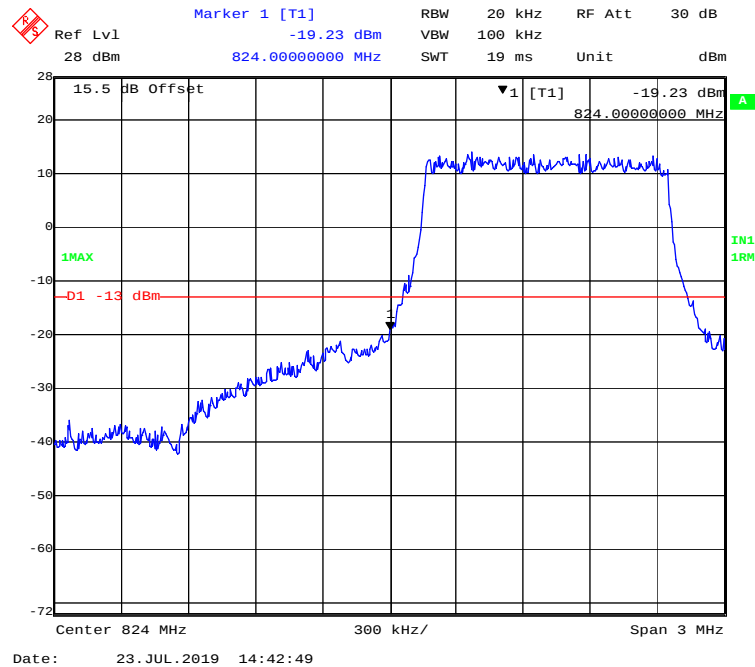
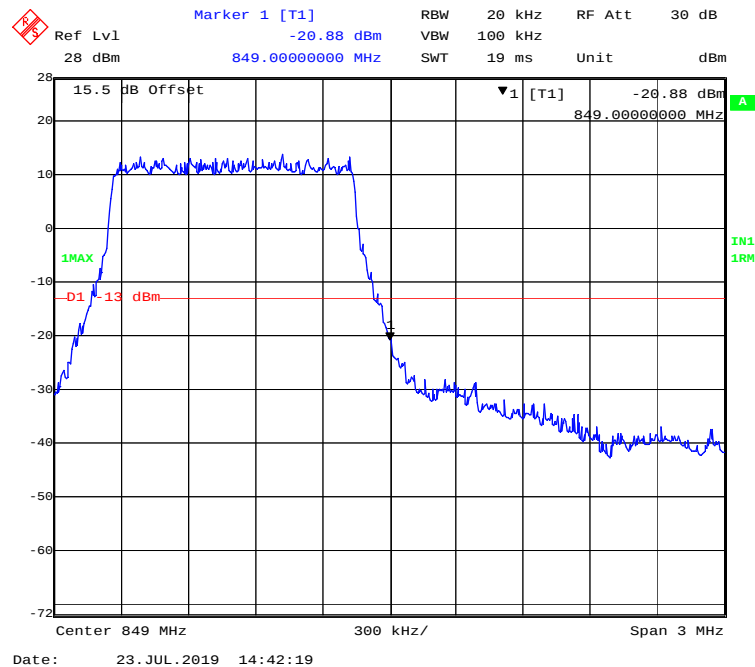


### 16-QAM (20 MHz, FULL RB) - Left Band Edge

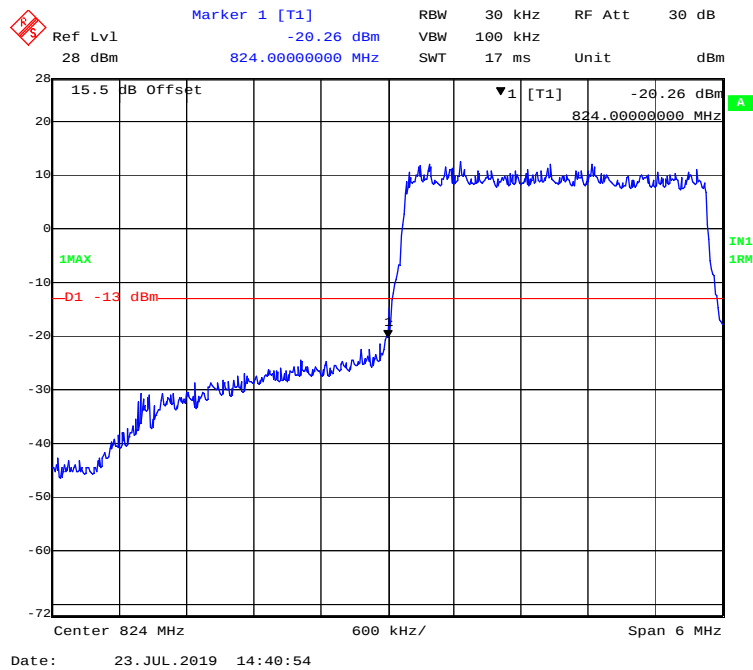


### 16-QAM (20 MHz, FULL RB) - Right Band Edge

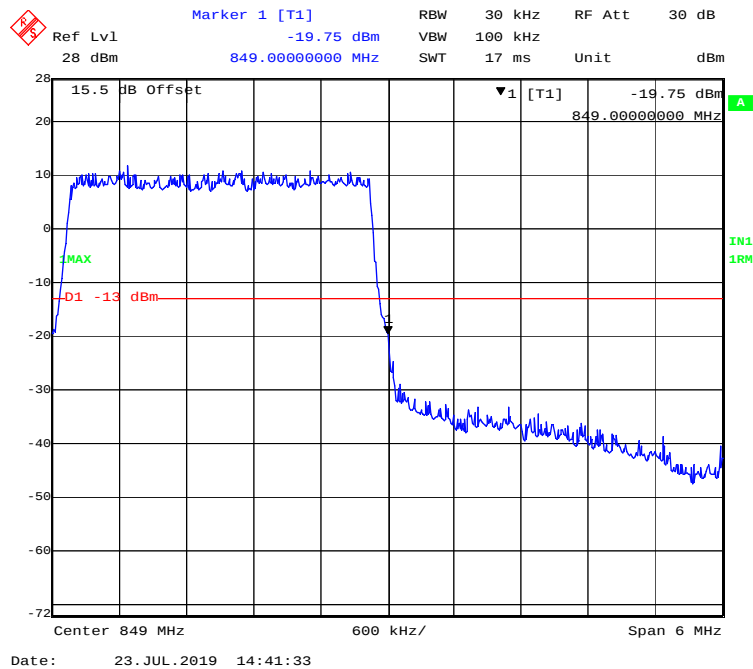


**LTE Band 5:****QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

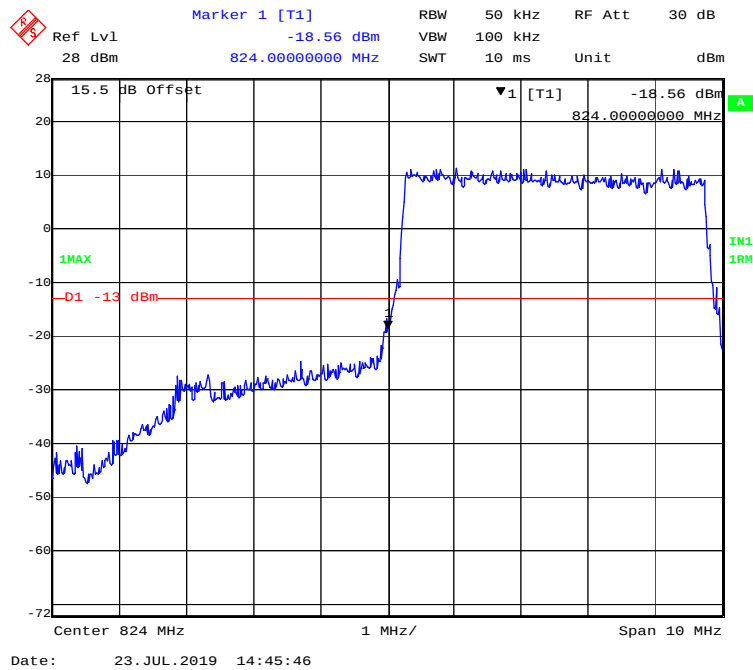
### QPSK (3 MHz, FULL RB) - Left Band Edge



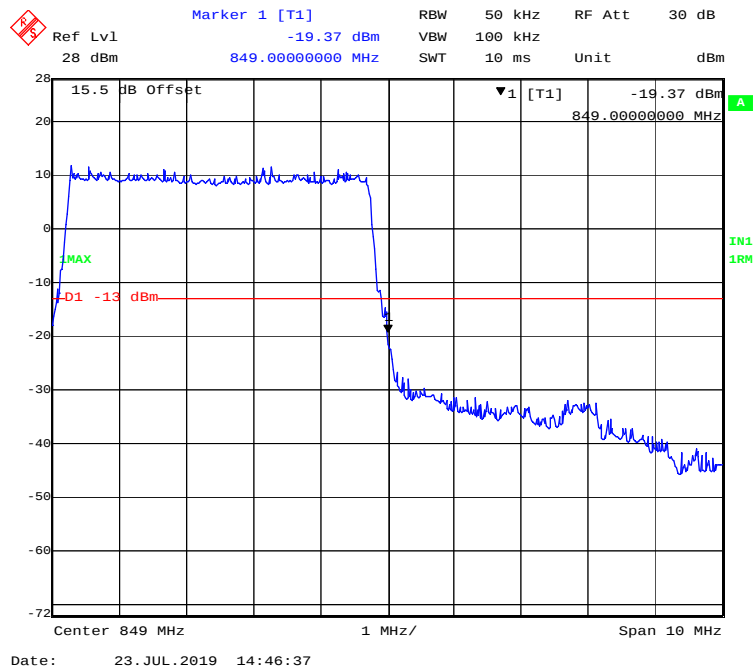
### QPSK (3 MHz, FULL RB) - Right Band Edge



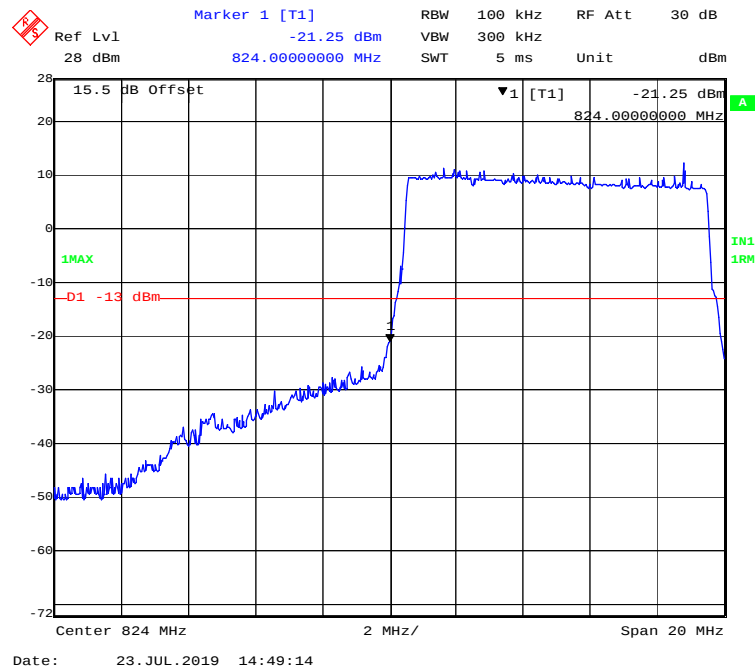
### QPSK (5 MHz, FULL RB) - Left Band Edge



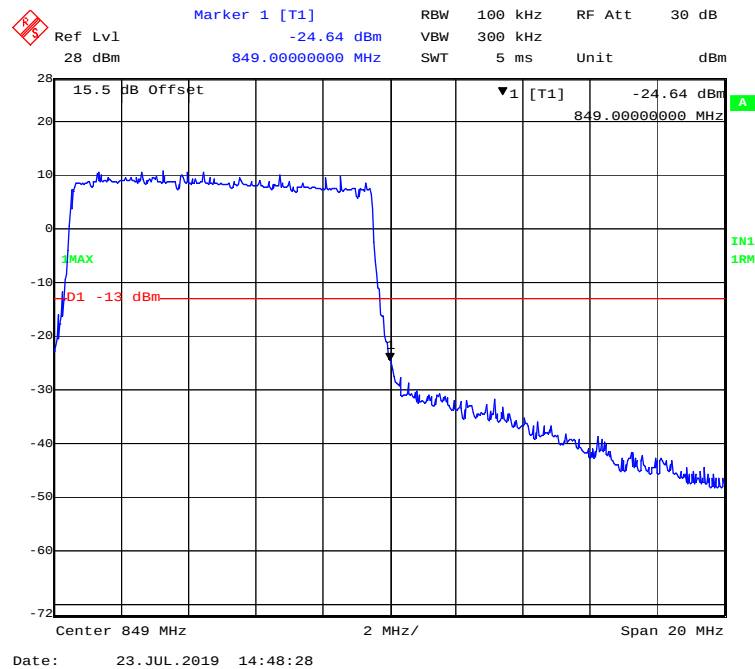
### QPSK (5 MHz, FULL RB) - Right Band Edge



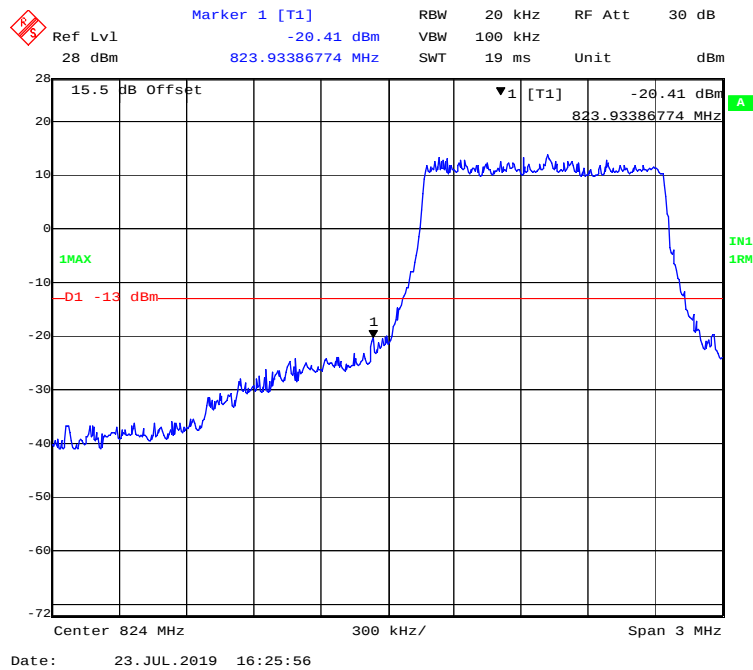
### QPSK (10 MHz, FULL RB) - Left Band Edge



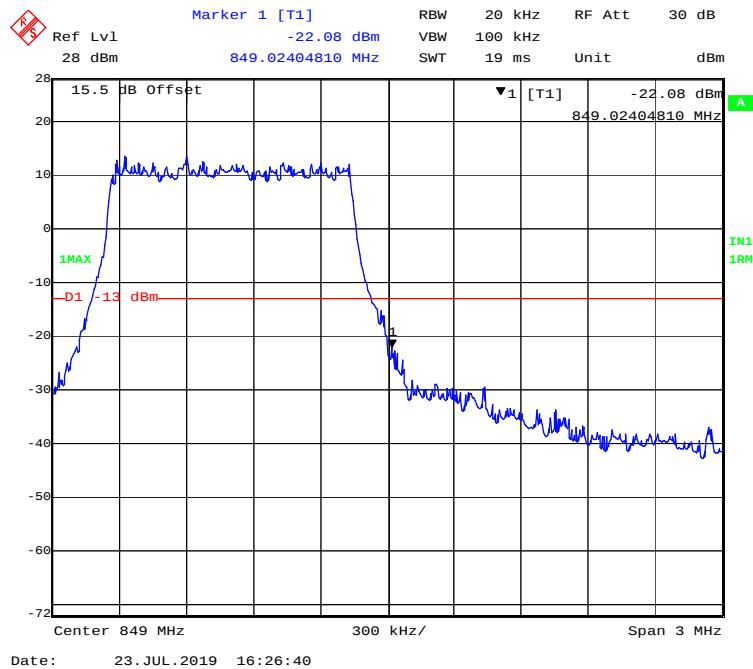
### QPSK (10 MHz, FULL RB) - Right Band Edge



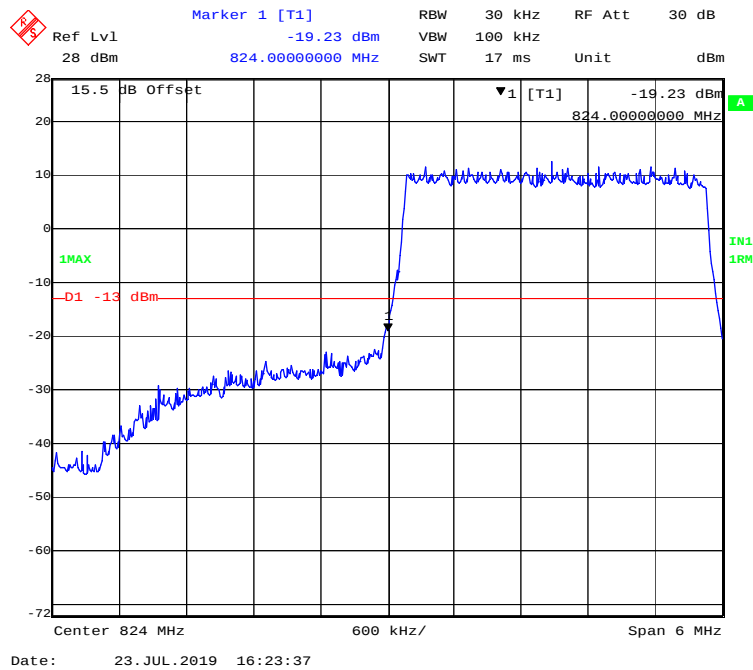
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



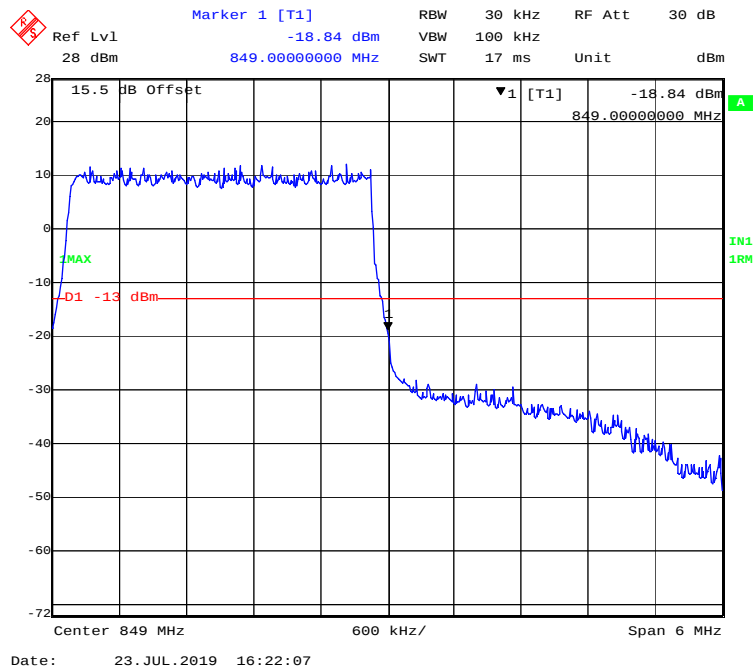
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



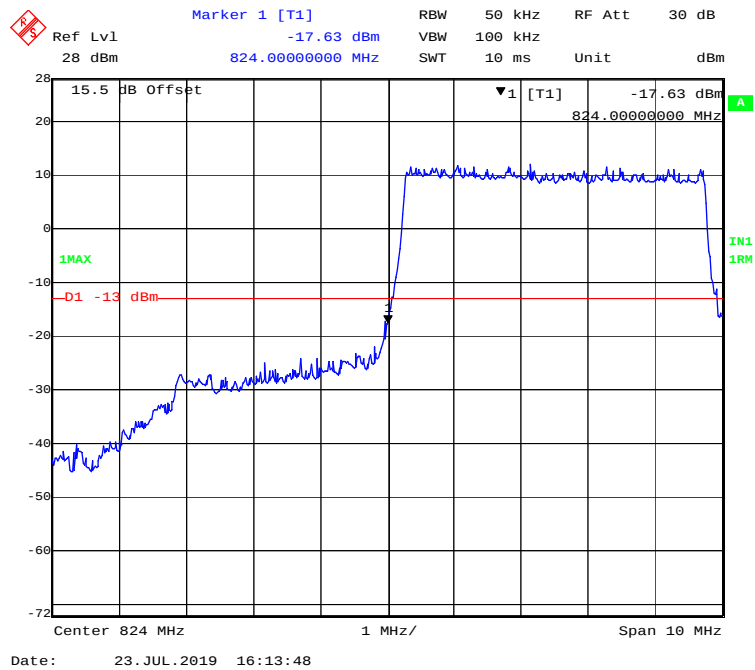
### 16-QAM (3 MHz, FULL RB) - Left Band Edge



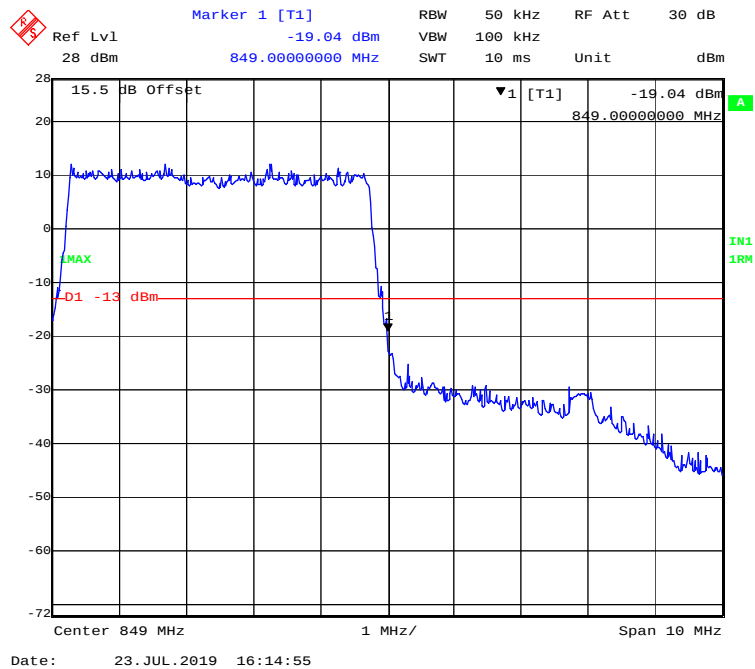
### 16-QAM (3 MHz, FULL RB) - Right Band Edge



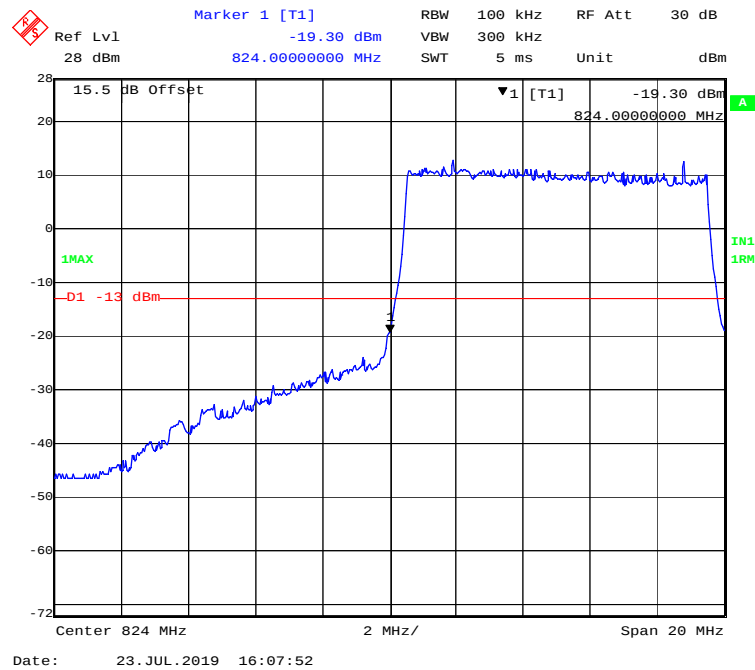
### 16-QAM (5 MHz, FULL RB) - Left Band Edge



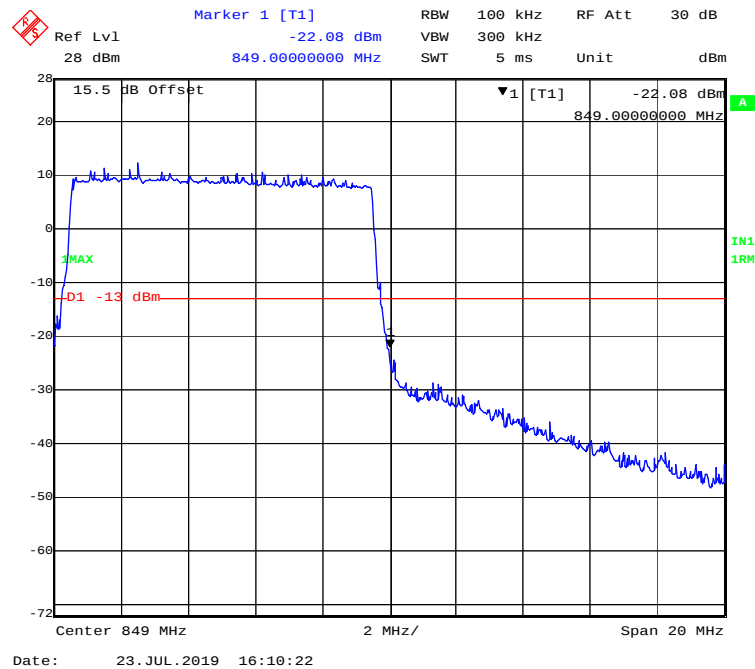
### 16-QAM (5 MHz, FULL RB) - Right Band Edge

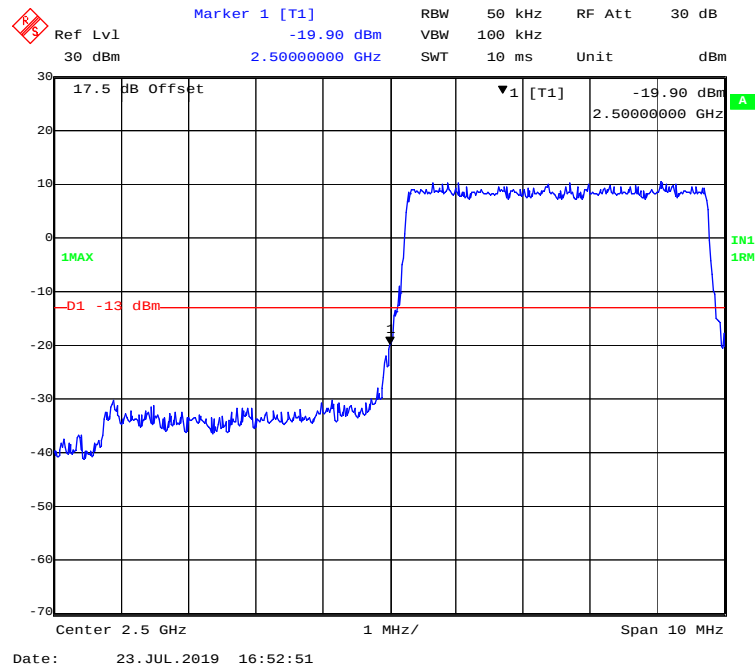
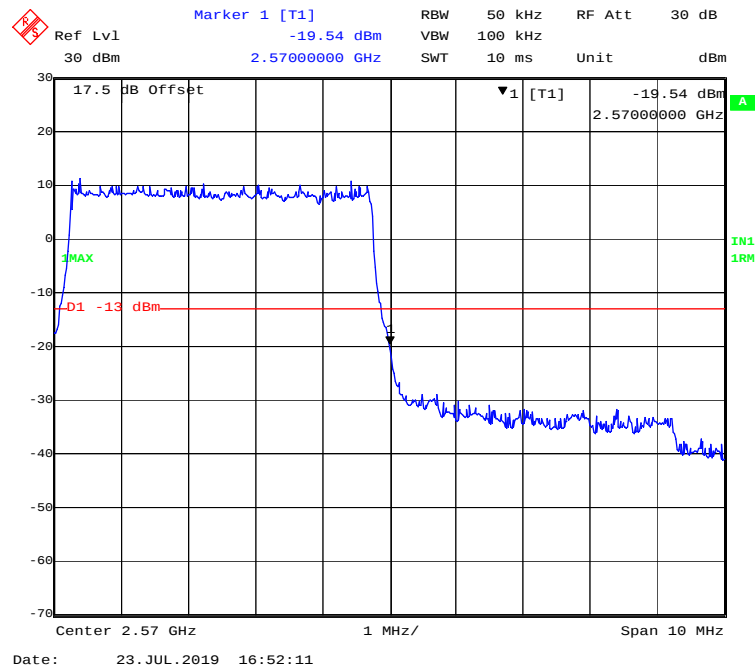


### 16-QAM (10 MHz, FULL RB) - Left Band Edge

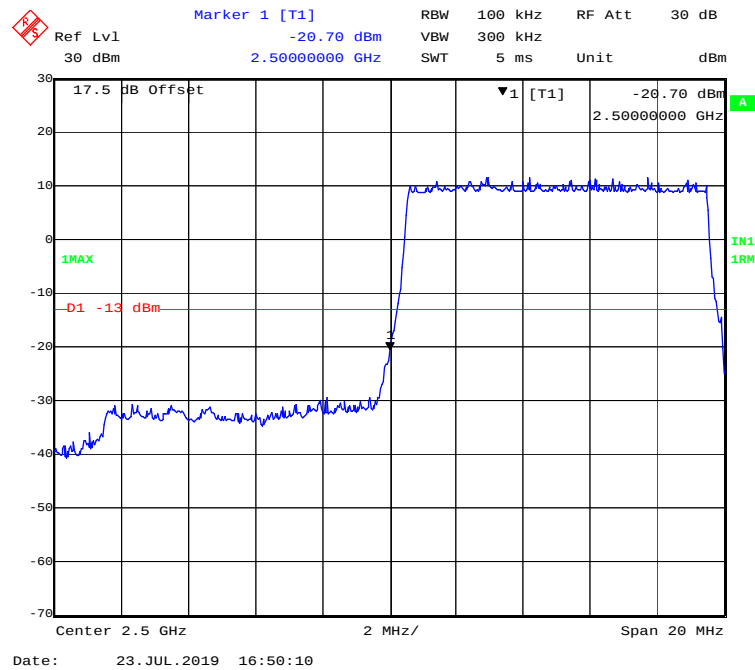


### 16-QAM (10 MHz, FULL RB) - Right Band Edge

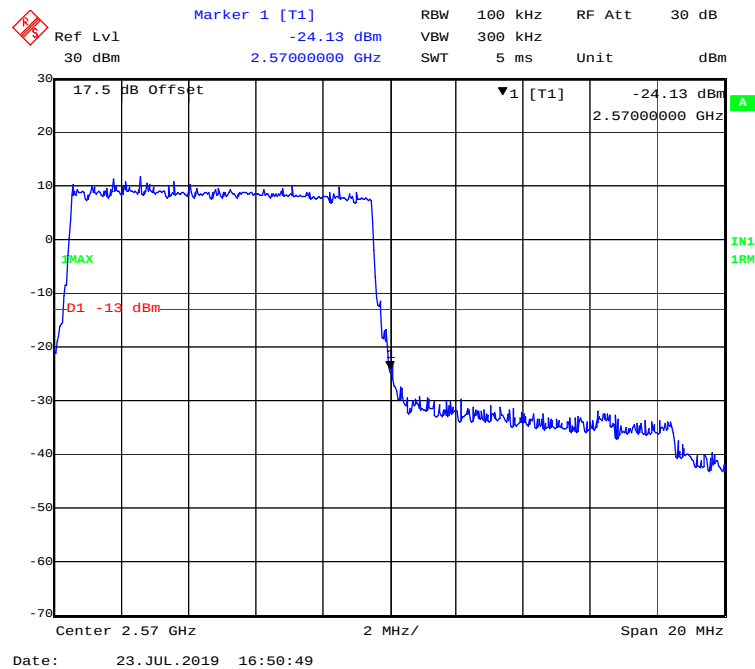


**LTE Band 7:****QPSK (5 MHz, FULL RB) - Left Band Edge****QPSK (5 MHz, FULL RB) - Right Band Edge**

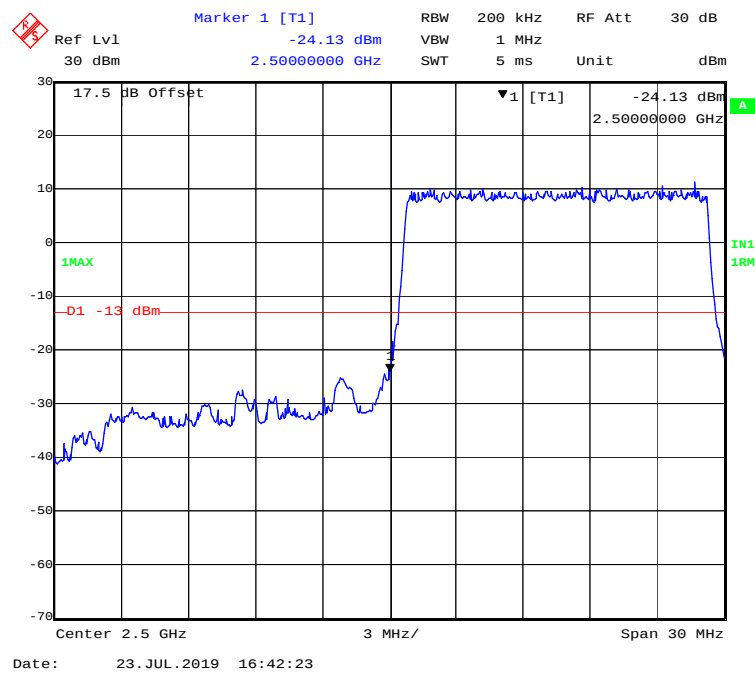
### QPSK (10 MHz, FULL RB) - Left Band Edge



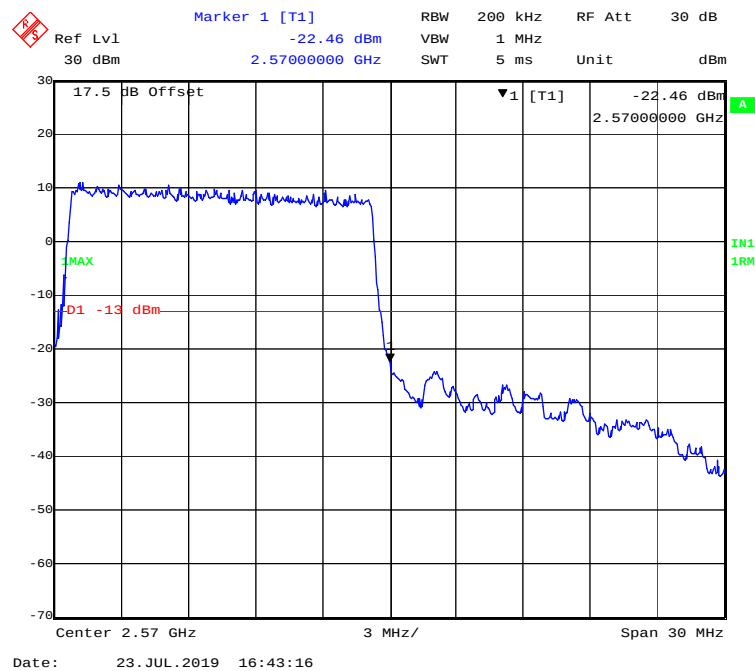
### QPSK (10 MHz, FULL RB) - Right Band Edge



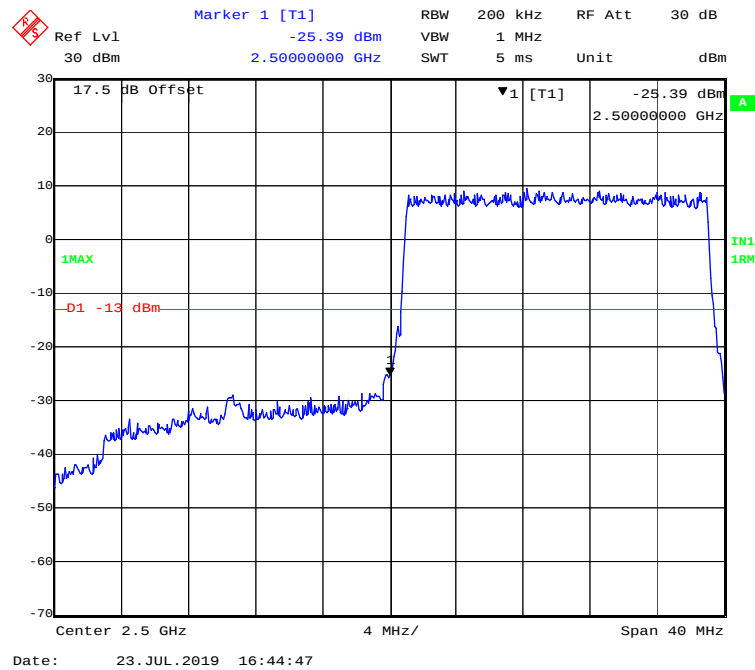
### QPSK (15 MHz, FULL RB) - Left Band Edge



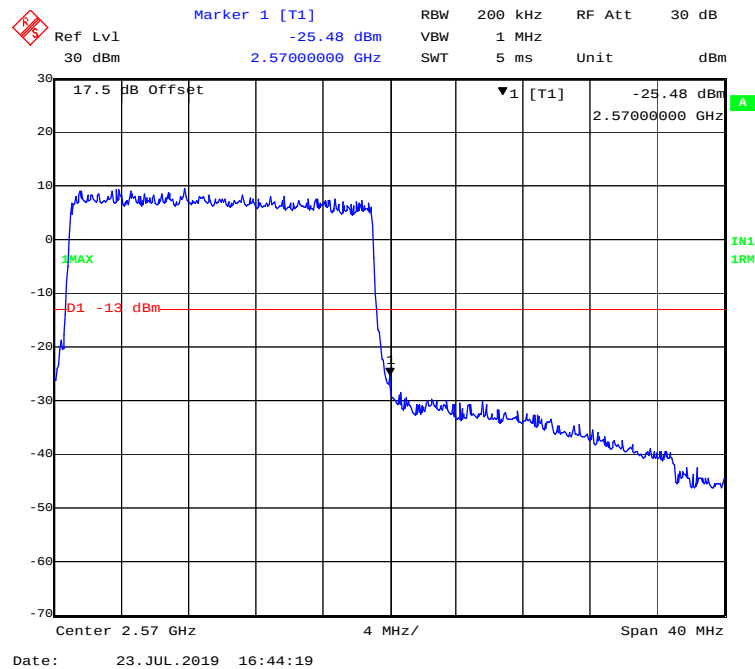
### QPSK (15 MHz, FULL RB) - Right Band Edge



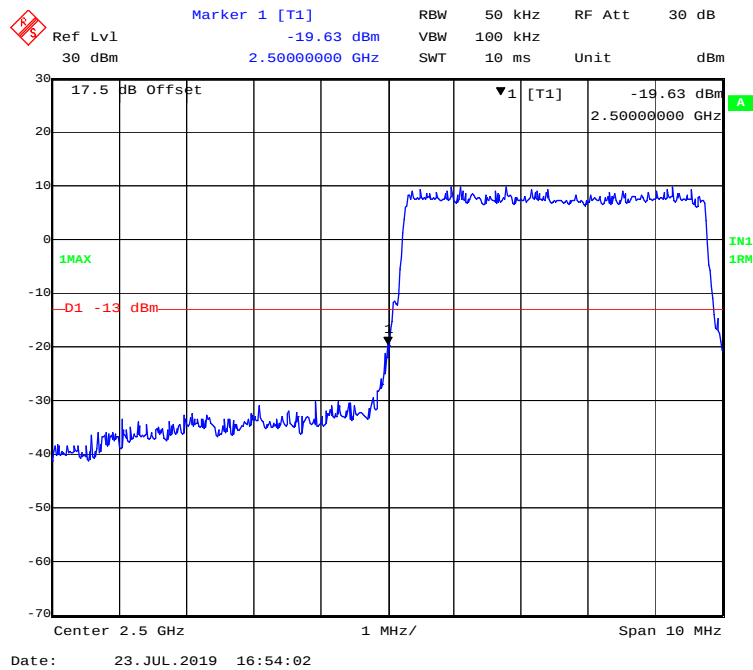
### QPSK (20 MHz, FULL RB) - Left Band Edge



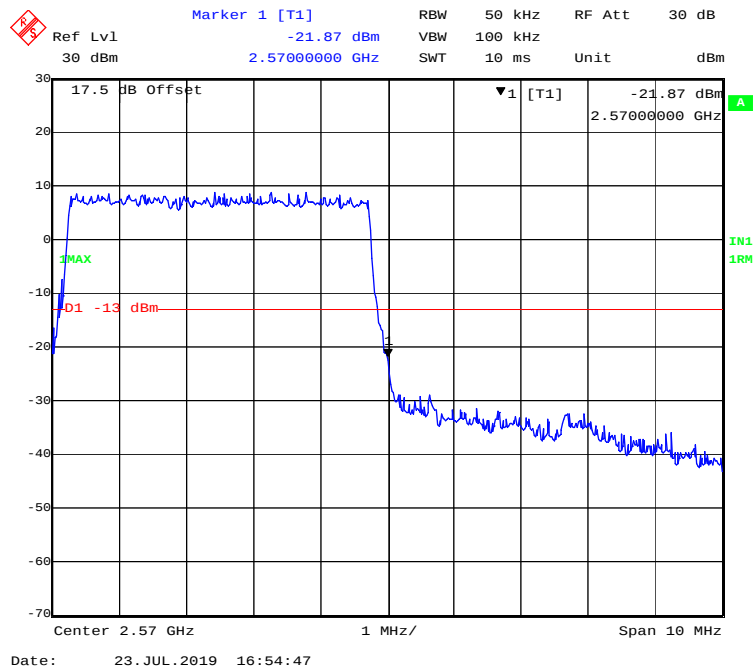
### QPSK (20 MHz, FULL RB) - Right Band Edge



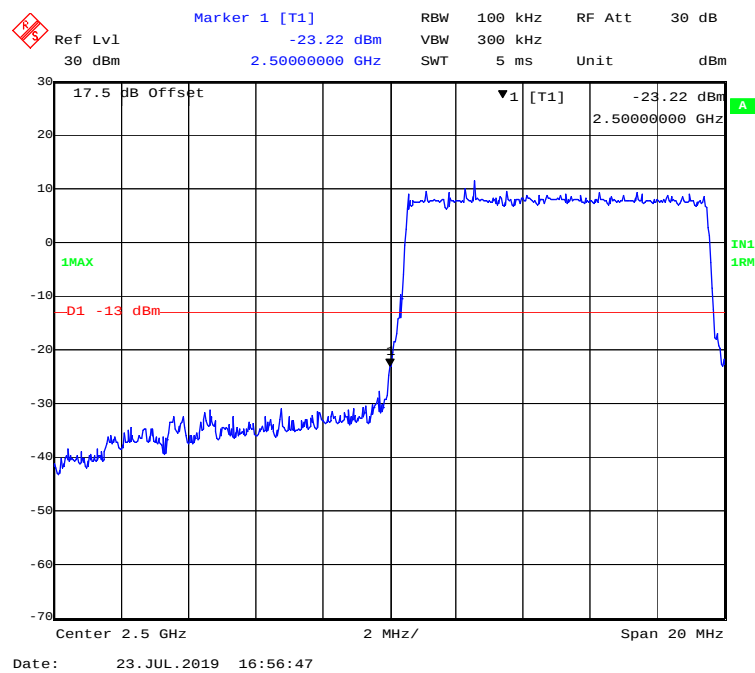
### 16-QAM (5 MHz, FULL RB) - Left Band Edge



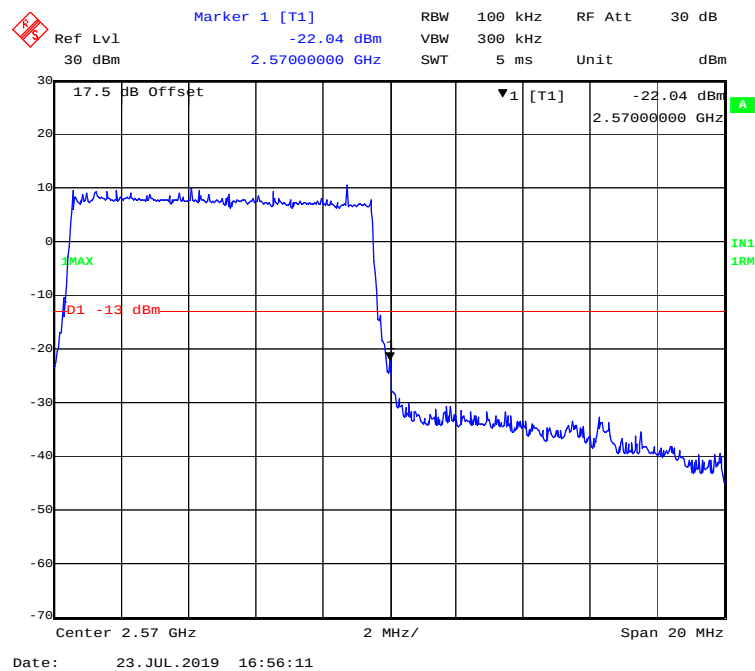
### 16-QAM (5 MHz, FULL RB) - Right Band Edge



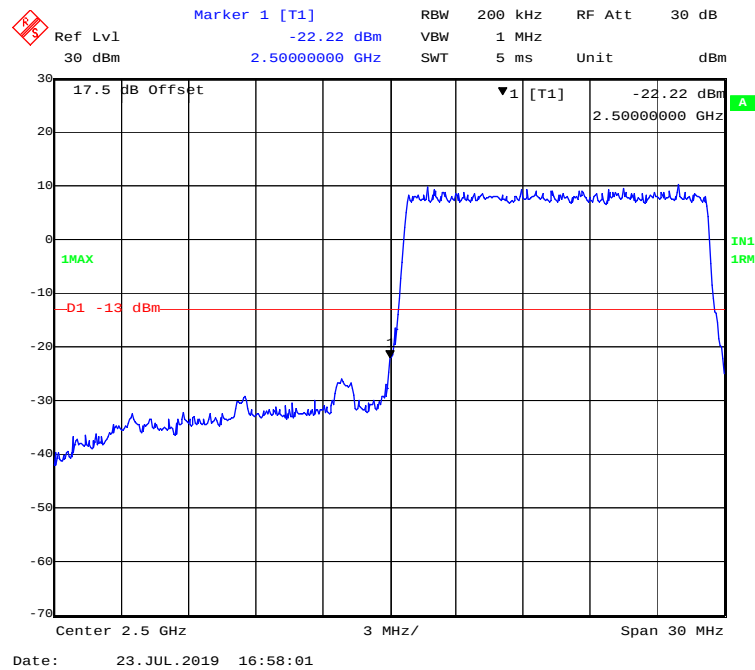
### 16-QAM (10 MHz, FULL RB) - Left Band Edge



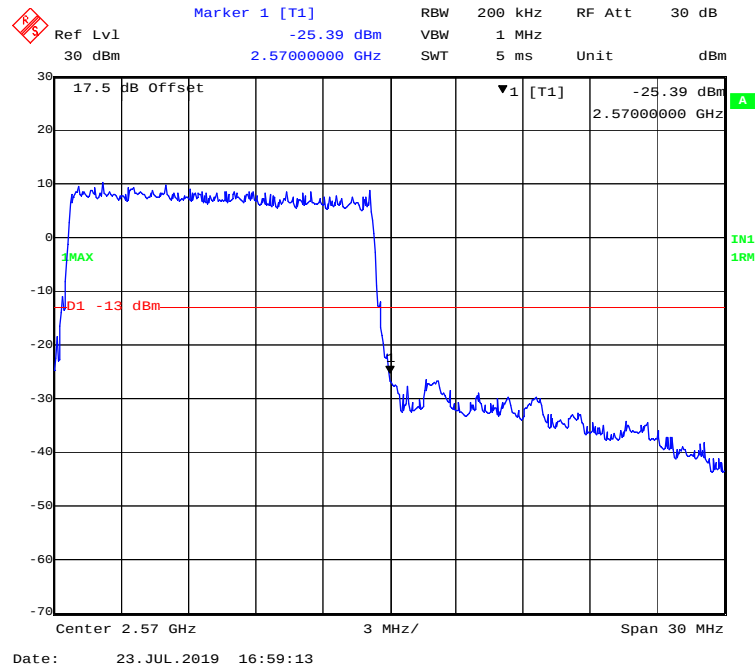
### 16-QAM (10 MHz, FULL RB) - Right Band Edge



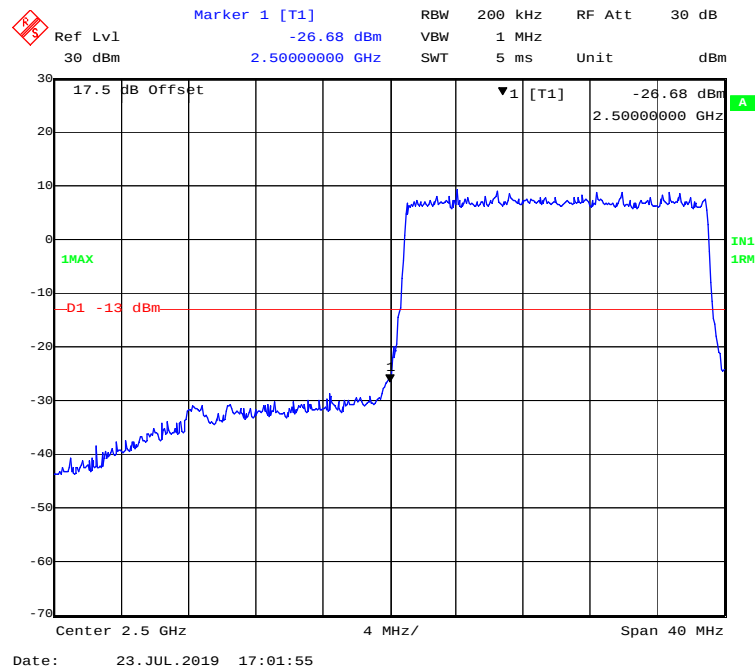
### 16-QAM (15 MHz, FULL RB) - Left Band Edge



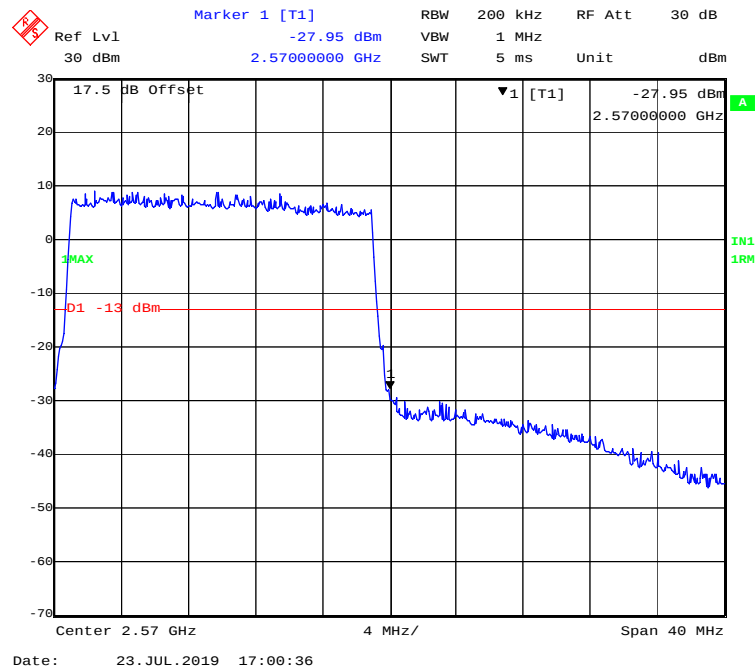
### 16-QAM (15 MHz, FULL RB) - Right Band Edge

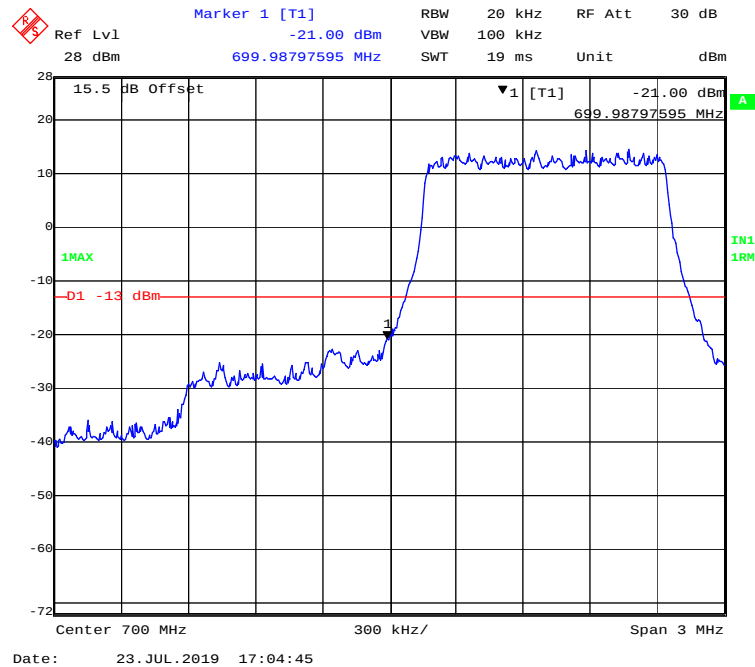
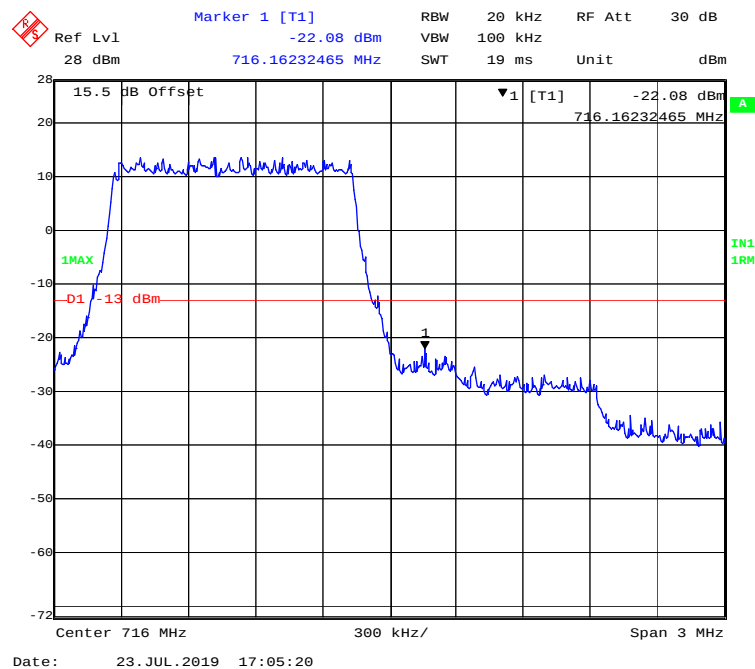


### 16-QAM (20 MHz, FULL RB) - Left Band Edge

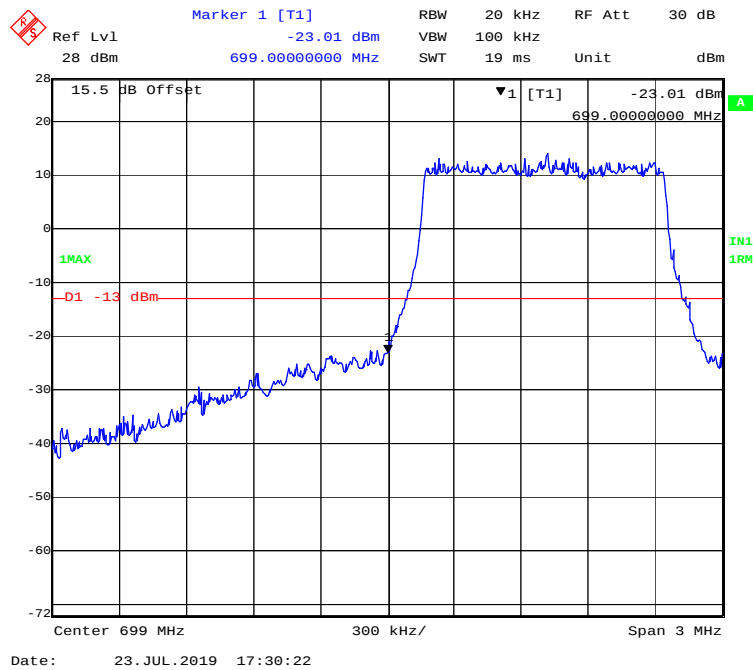


### 16-QAM (20 MHz, FULL RB) - Right Band Edge

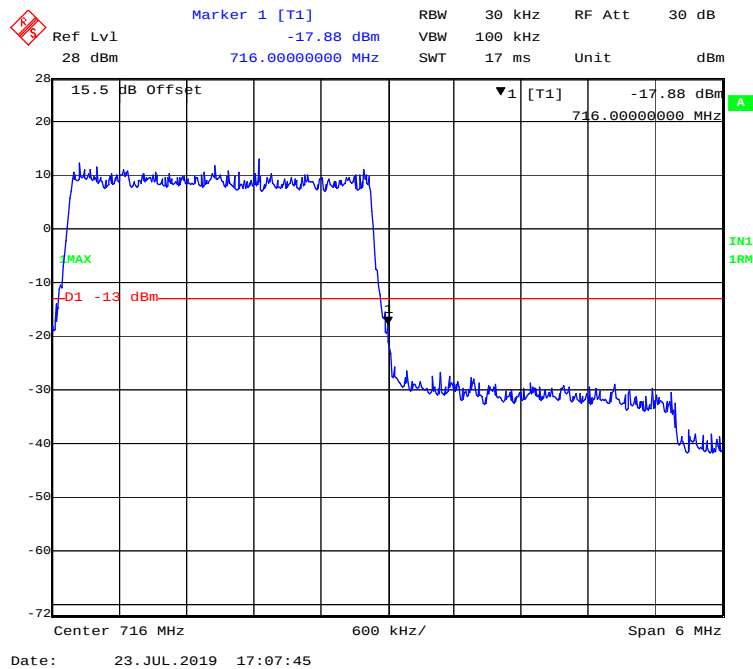


**LTE Band 12:****QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

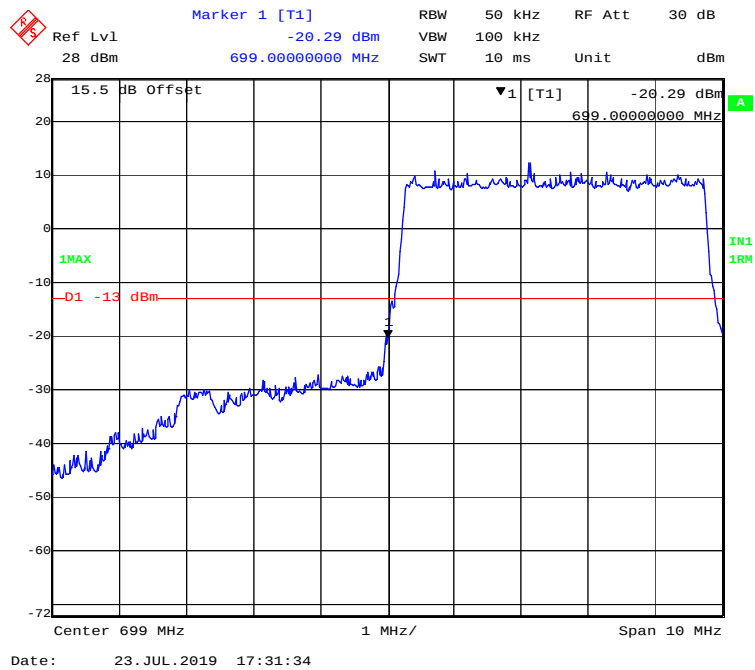
### QPSK (3 MHz, FULL RB) - Left Band Edge



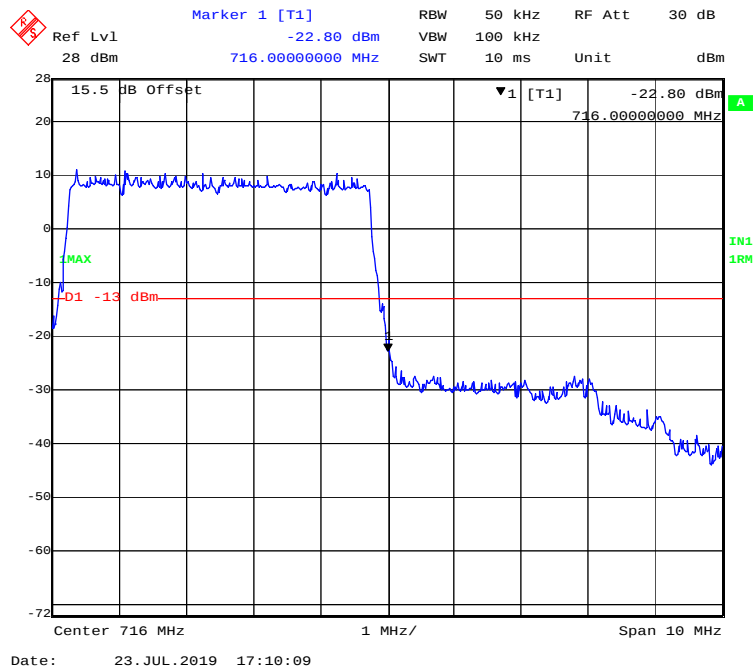
### QPSK (3 MHz, FULL RB) - Right Band Edge



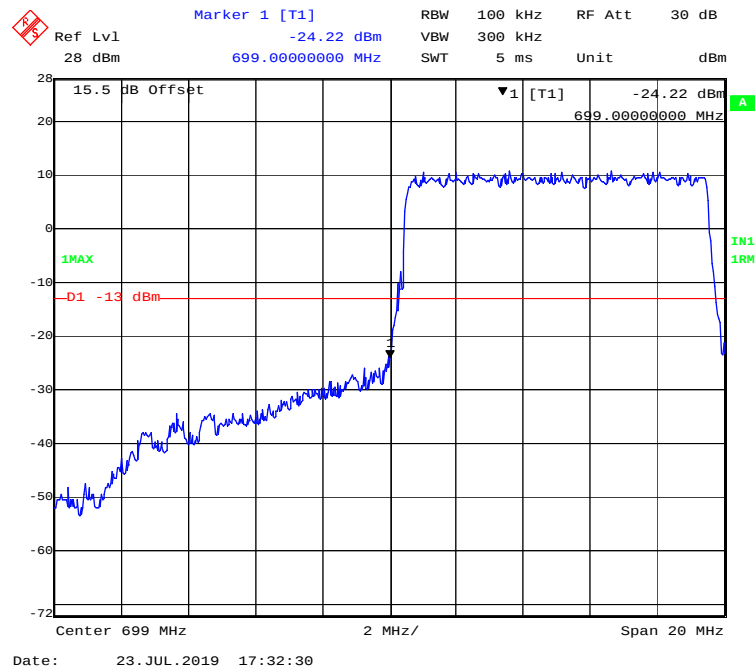
### QPSK (5 MHz, FULL RB) - Left Band Edge



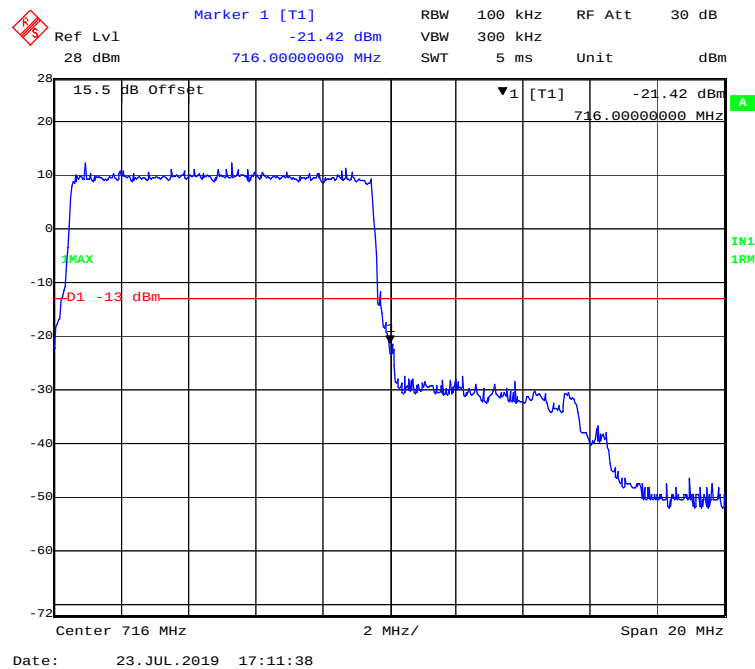
### QPSK (5 MHz, FULL RB) - Right Band Edge



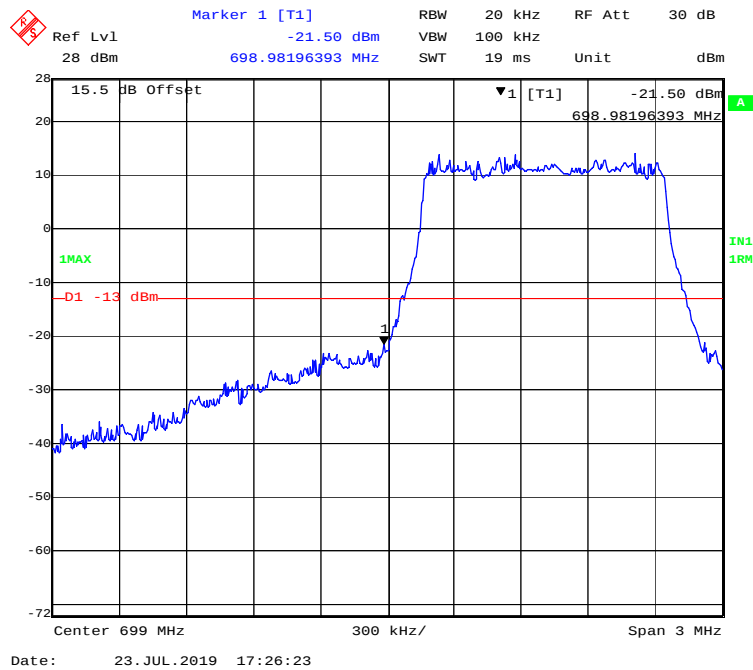
### QPSK (10 MHz, FULL RB) - Left Band Edge



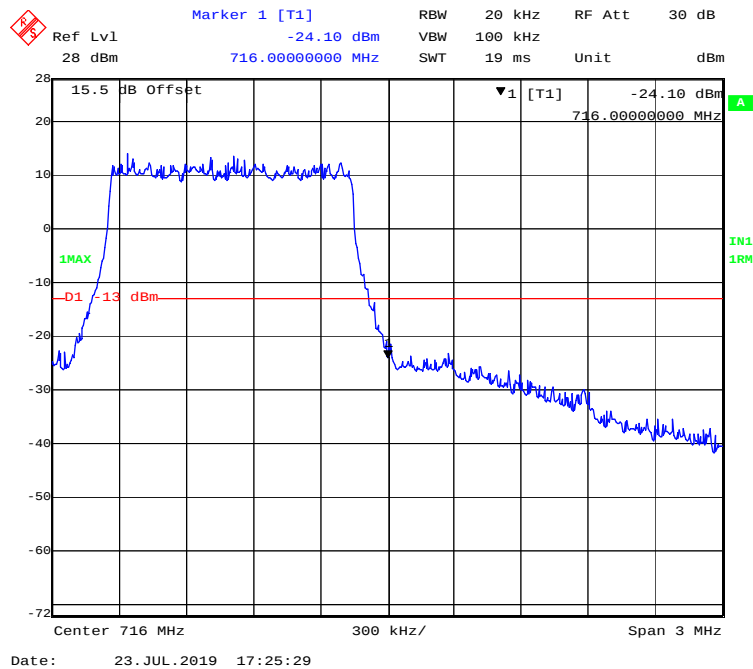
### QPSK (10 MHz, FULL RB) - Right Band Edge



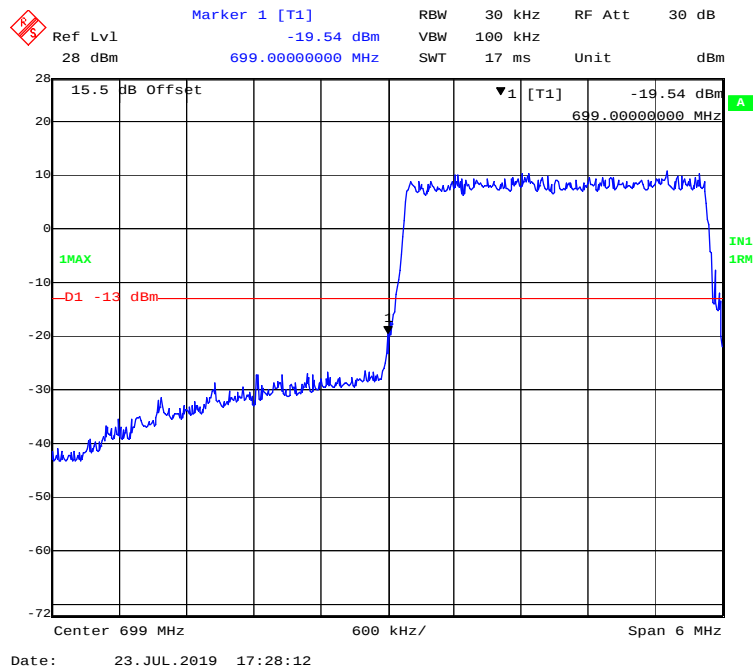
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



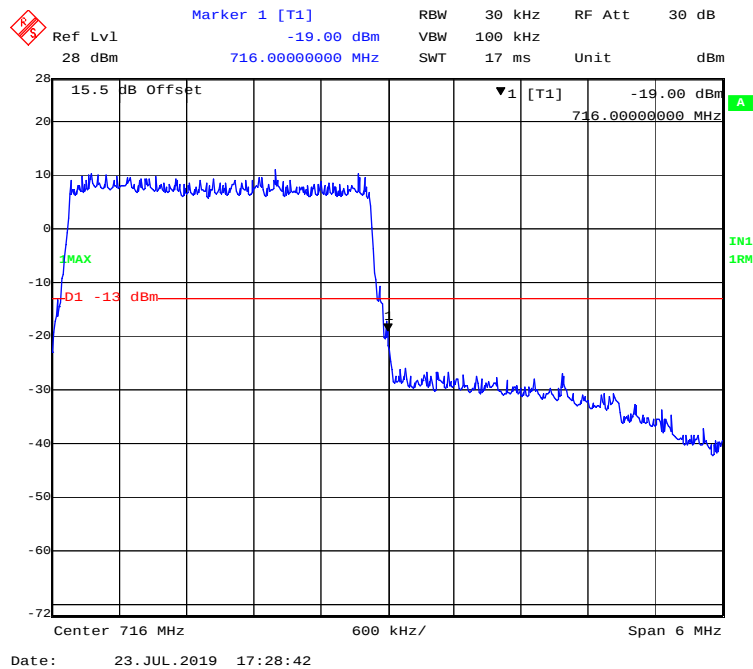
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



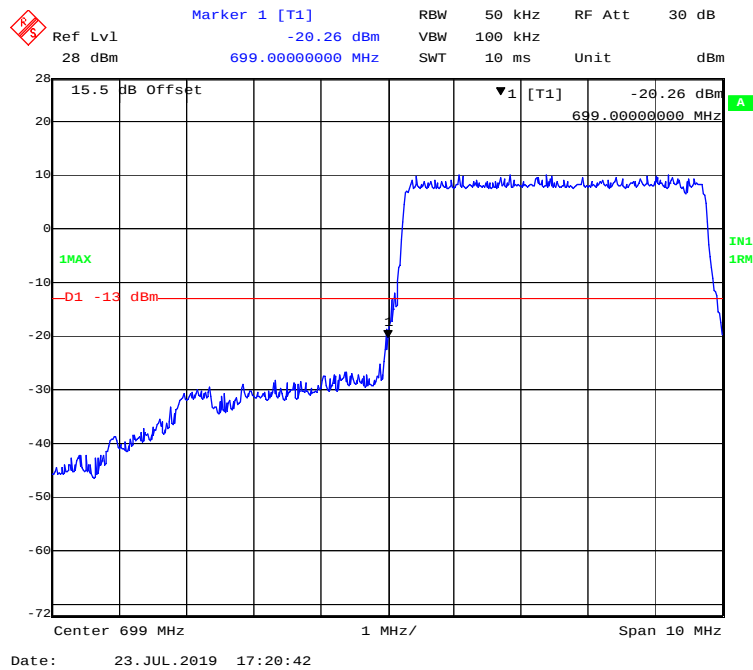
### 16-QAM (3 MHz, FULL RB) - Left Band Edge



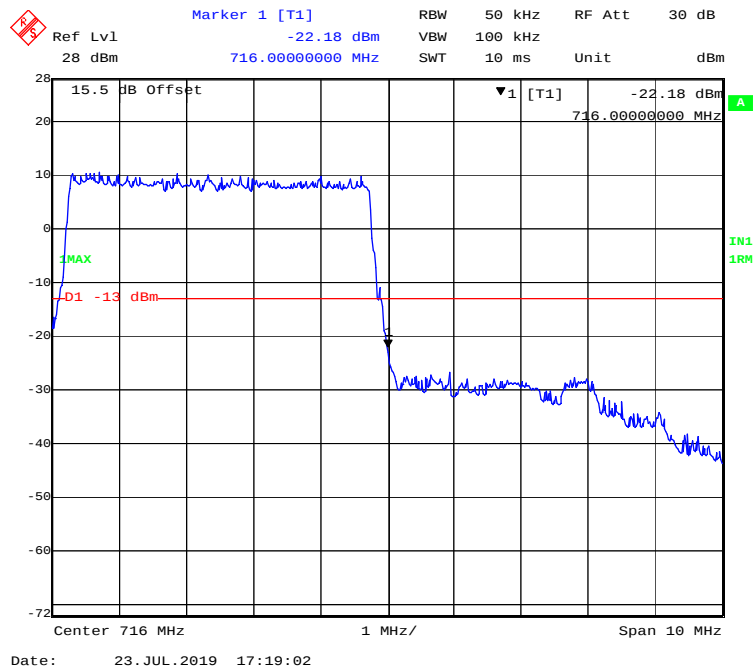
### 16-QAM (3 MHz, FULL RB) - Right Band Edge



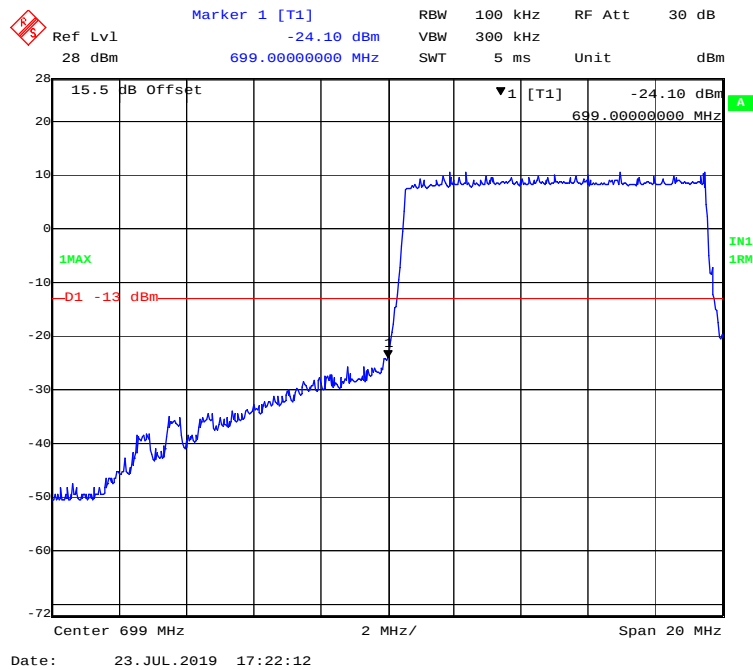
### 16-QAM (5 MHz, FULL RB) - Left Band Edge



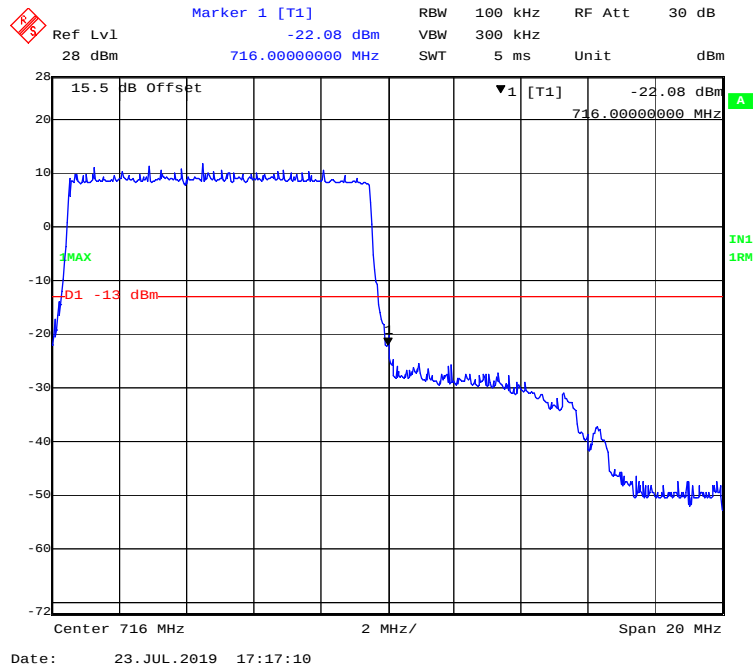
### 16-QAM (5 MHz, FULL RB) - Right Band Edge



### 16-QAM (10 MHz, FULL RB) - Left Band Edge

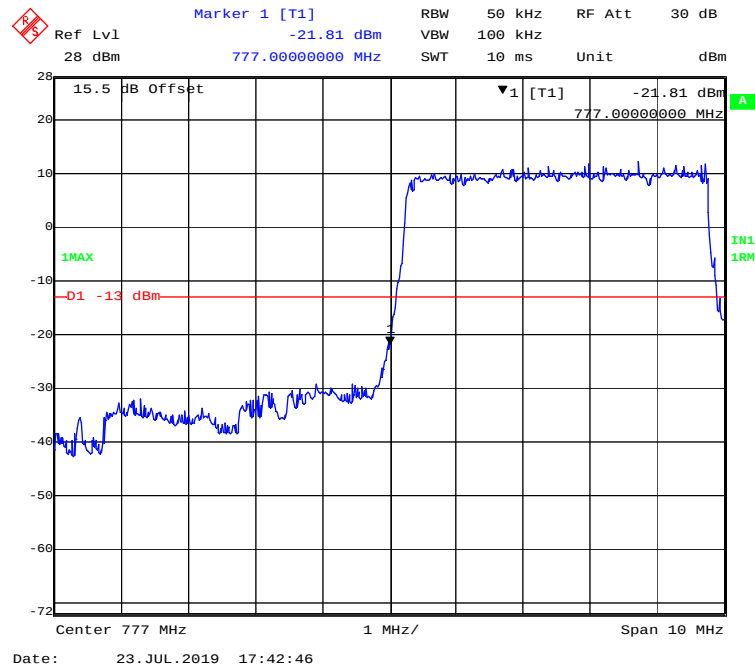


### 16-QAM (10 MHz, FULL RB) - Right Band Edge

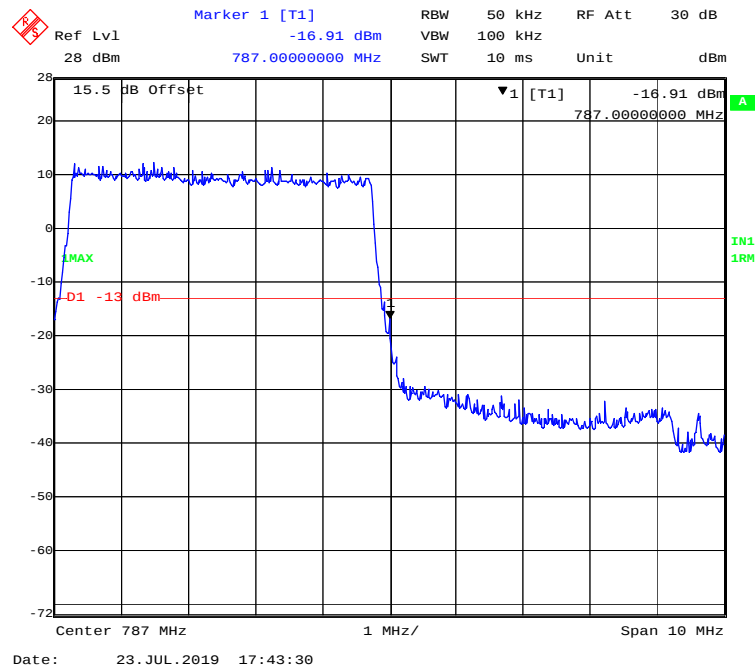


# LTE Band 13:

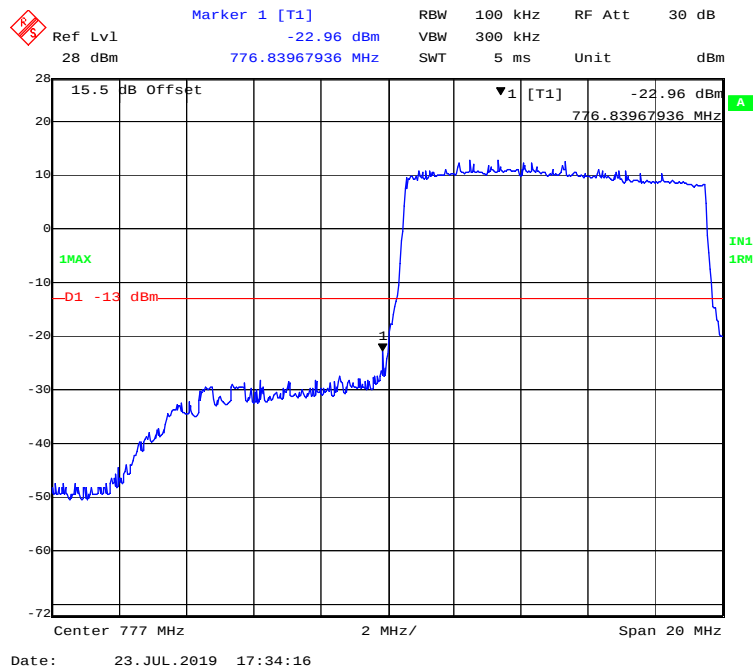
## QPSK (5 MHz, FULL RB) - Left Band Edge



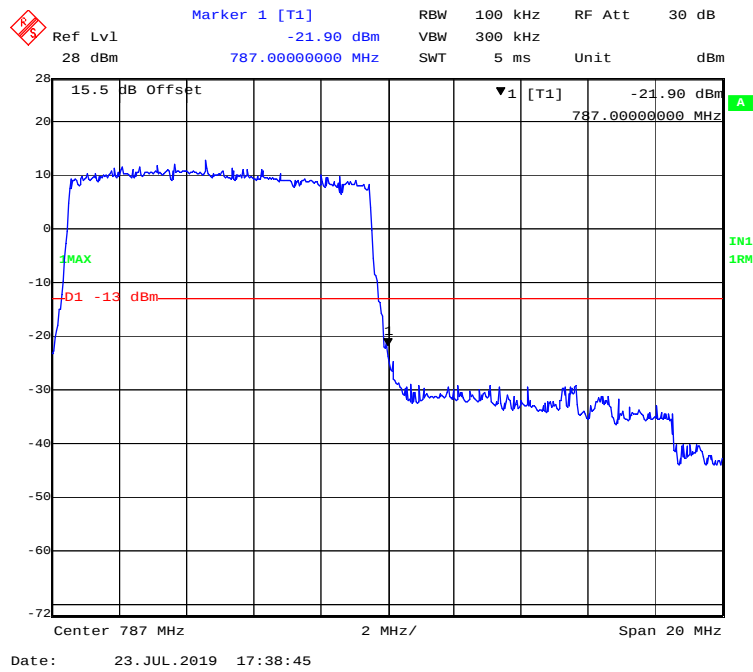
## QPSK (5 MHz, FULL RB) - Right Band Edge

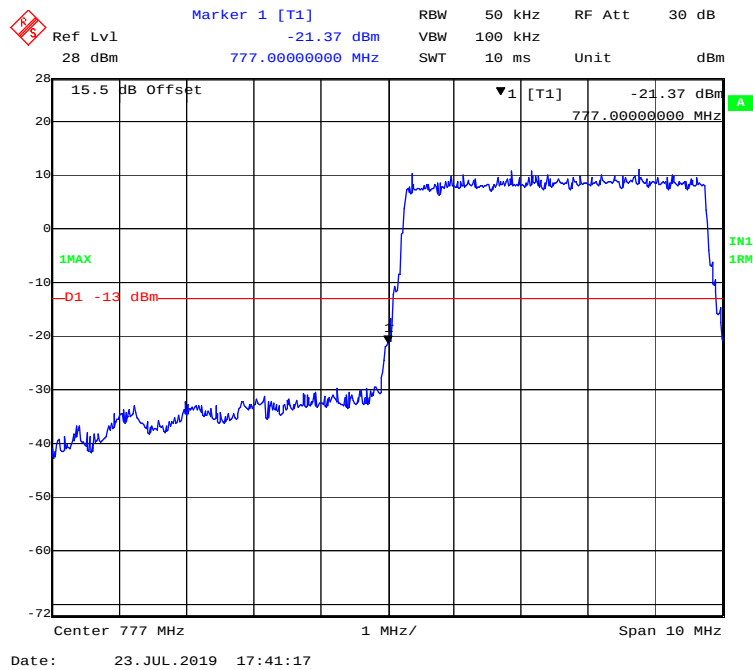
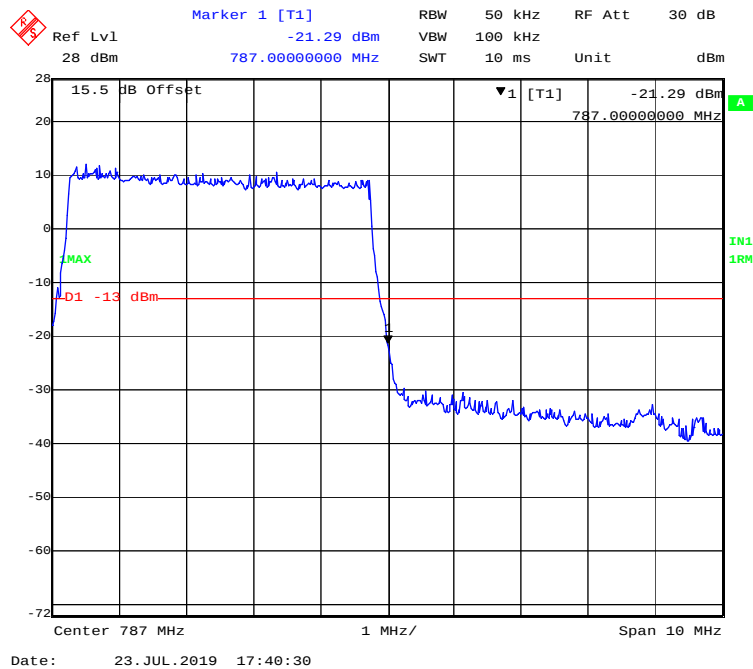


### QPSK (10 MHz, FULL RB) - Left Band Edge

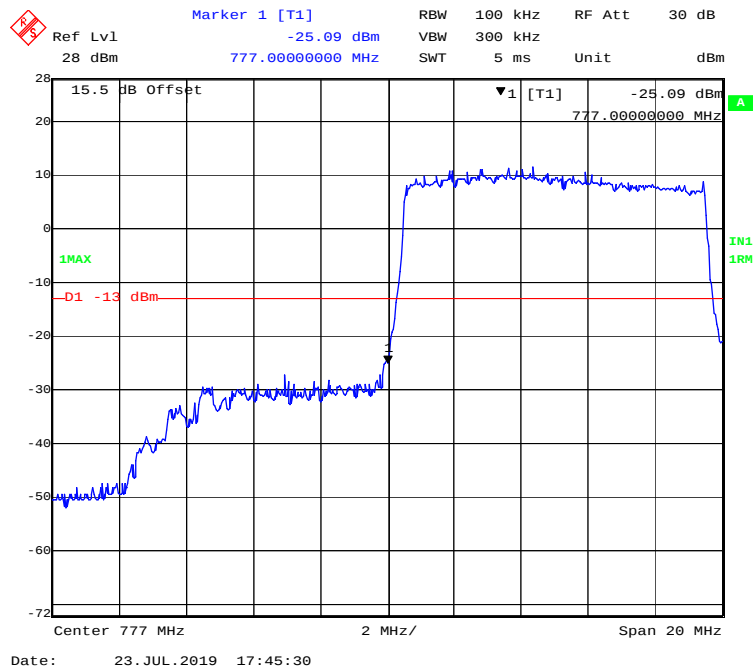


### QPSK (10 MHz, FULL RB) - Right Band Edge

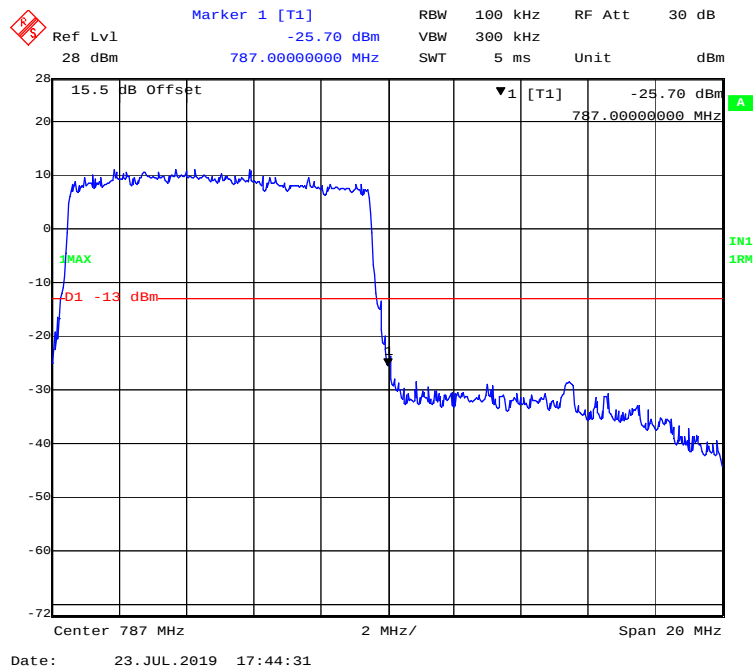


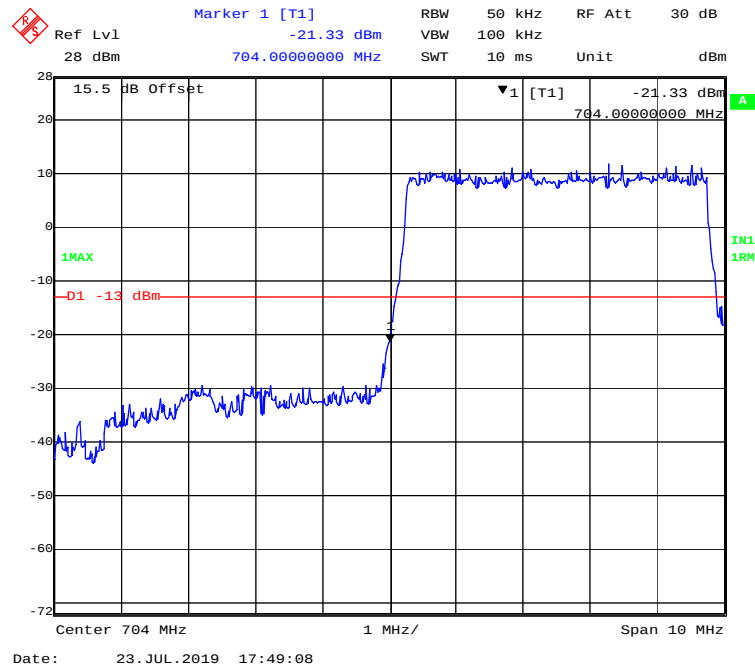
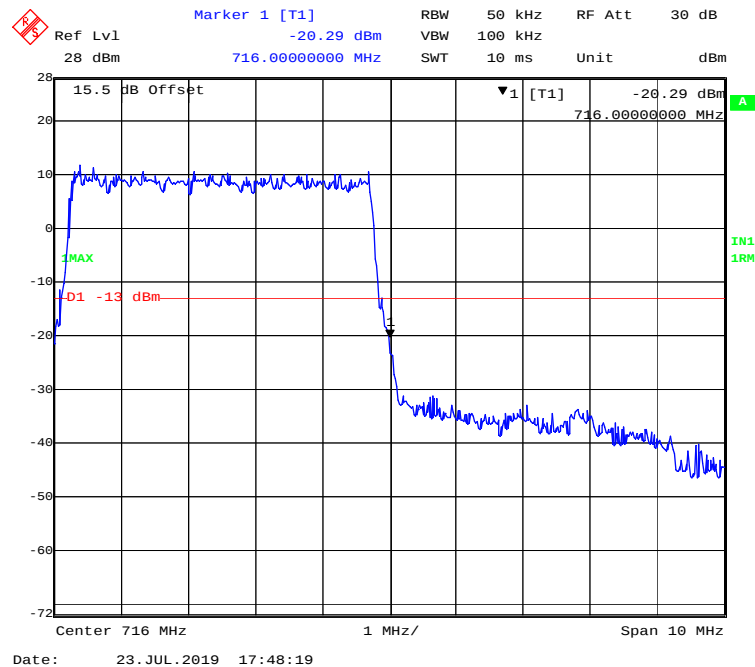
**16-QAM (5 MHz, FULL RB) - Left Band Edge****16-QAM (5 MHz, FULL RB) - Right Band Edge**

### 16-QAM (10 MHz, FULL RB) - Left Band Edge

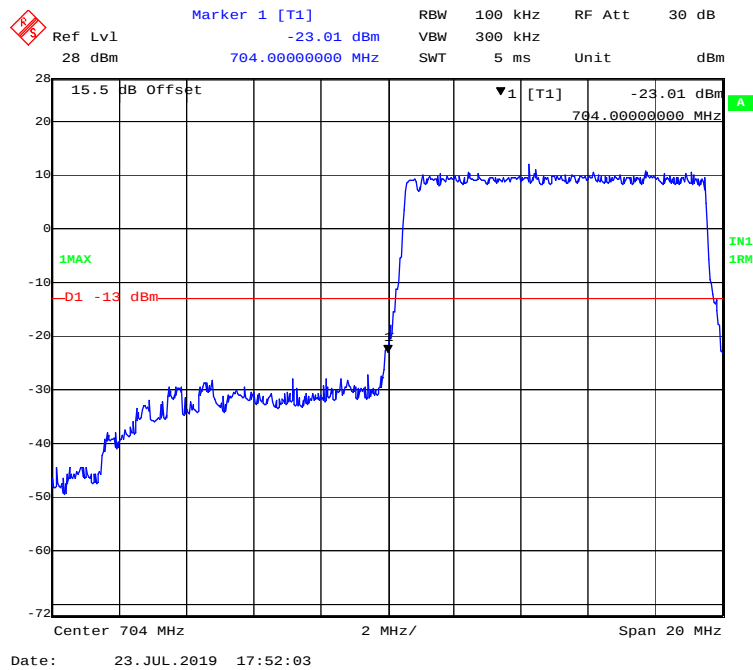


### 16-QAM (10 MHz, FULL RB) - Right Band Edge

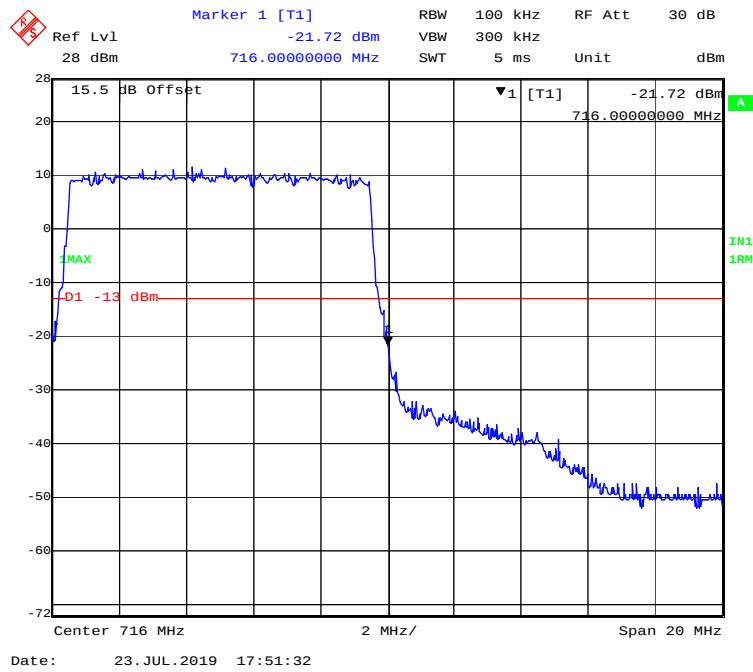


**LTE Band 17:****QPSK (5 MHz, FULL RB) - Left Band Edge****QPSK (5 MHz, FULL RB) - Right Band Edge**

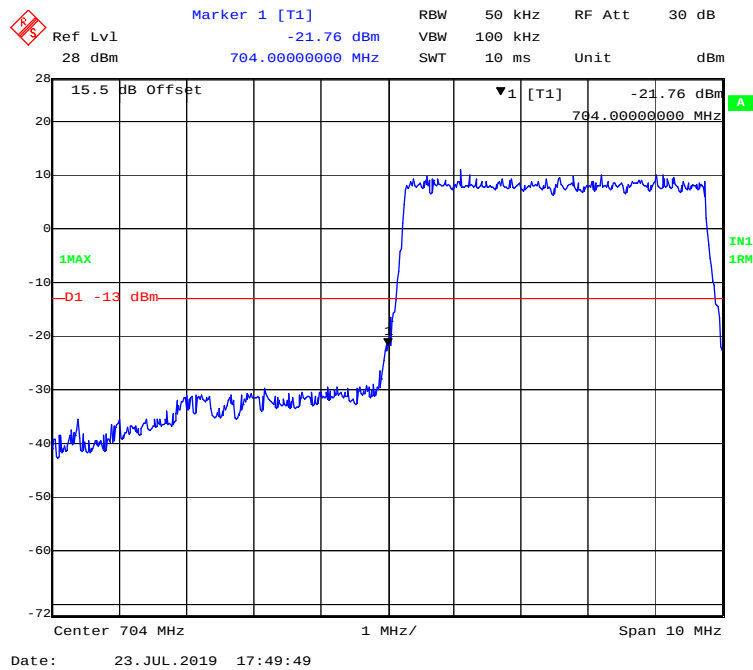
### QPSK (10 MHz, FULL RB) - Left Band Edge



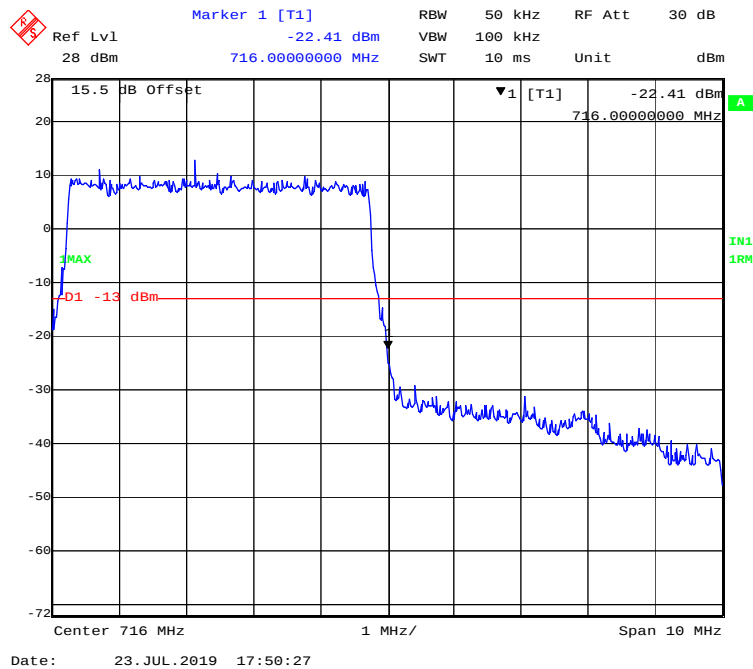
### QPSK (10 MHz, FULL RB) - Right Band Edge



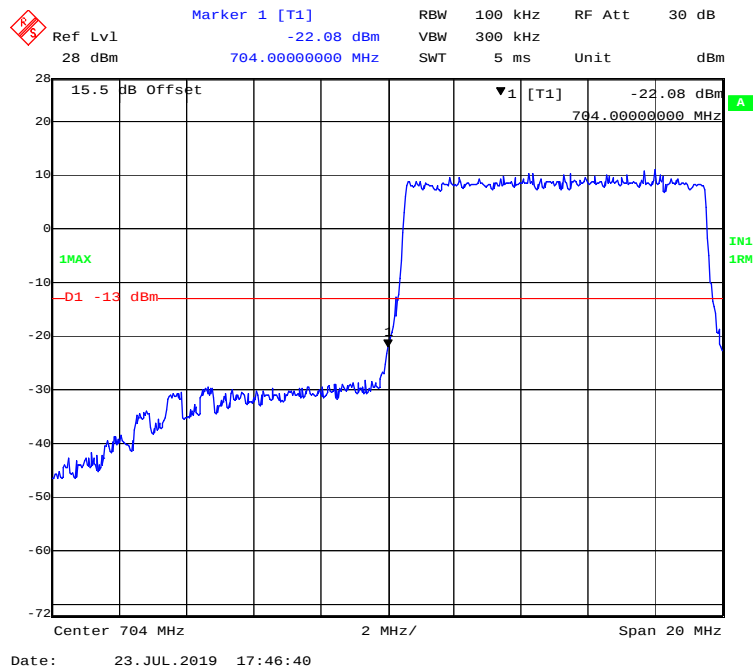
### 16-QAM (5 MHz, FULL RB) - Left Band Edge



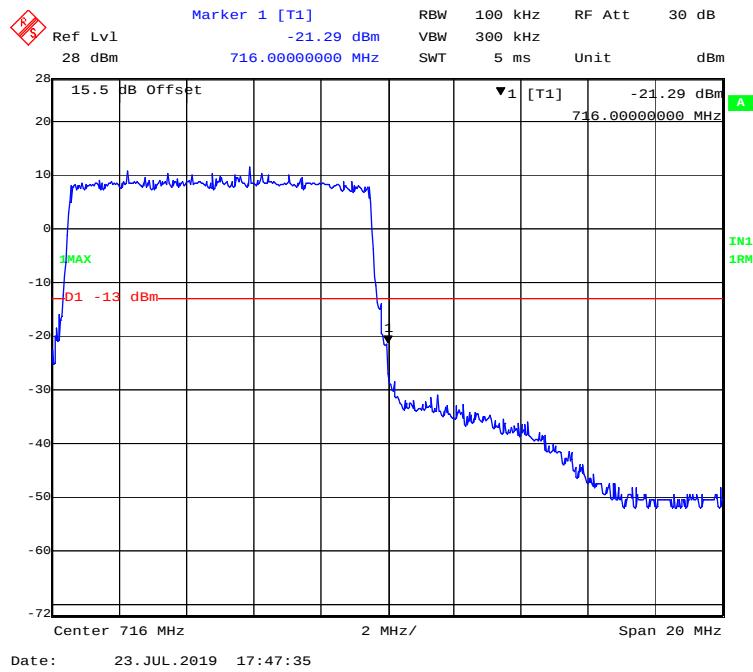
### 16-QAM (5 MHz, FULL RB) - Right Band Edge



### 16-QAM (10 MHz, FULL RB) - Left Band Edge



### 16-QAM (10 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<br/>(MHz)</b> | <b>Base, fixed<br/>(ppm)</b> | <b>Mobile &gt; 3 watts<br/>(ppm)</b> | <b>Mobile ≤ 3 watts<br/>(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                               |

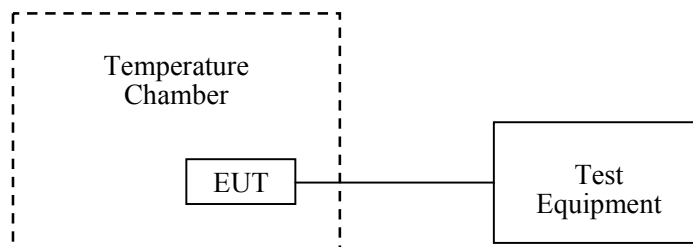
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **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 Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 23.2°C   |
| <b>Relative Humidity:</b> | 51 %     |
| <b>ATM Pressure:</b>      | 101.3kPa |

The testing was performed by Max Min on 2019-08-27.

EUT operation mode: Transmitting

Test Result: Compliant.

**WCDMA Band V:**

| Middle Channel, $f_o = 836.6$ MHz |                                   |                      |                       |             |
|-----------------------------------|-----------------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                  | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                               | 3.8                               | 12                   | 0.0143                | 2.5         |
| -20                               |                                   | 11                   | 0.0131                | 2.5         |
| -10                               |                                   | 15                   | 0.0179                | 2.5         |
| 0                                 |                                   | 9                    | 0.0108                | 2.5         |
| 10                                |                                   | 7                    | 0.0084                | 2.5         |
| 20                                |                                   | 7                    | 0.0084                | 2.5         |
| 30                                |                                   | 5                    | 0.0060                | 2.5         |
| 40                                |                                   | 4                    | 0.0048                | 2.5         |
| 50                                |                                   | 6                    | 0.0072                | 2.5         |
| 25                                | V min.= 3.5                       | 8                    | 0.0096                | 2.5         |
| 25                                | V max.= 4.2                       | 7                    | 0.0084                | 2.5         |

**WCDMA Band II:**

| <b>WCDMA Mode, Middle Channel, <math>f_o=1880.0</math> MHz</b> |                                            |                                     |                                      |               |
|----------------------------------------------------------------|--------------------------------------------|-------------------------------------|--------------------------------------|---------------|
| <b>Temperature<br/>(°C)</b>                                    | <b>Power Supplied<br/>(V<sub>DC</sub>)</b> | <b>Frequency<br/>Error<br/>(Hz)</b> | <b>Frequency<br/>Error<br/>(ppm)</b> | <b>Result</b> |
| -30                                                            | 3.8                                        | 13                                  | 0.0069                               | Pass          |
| -20                                                            |                                            | 9                                   | 0.0048                               | Pass          |
| -10                                                            |                                            | 14                                  | 0.0074                               | Pass          |
| 0                                                              |                                            | 9                                   | 0.0048                               | Pass          |
| 10                                                             |                                            | 6                                   | 0.0032                               | Pass          |
| 20                                                             |                                            | 7                                   | 0.0037                               | Pass          |
| 30                                                             |                                            | 7                                   | 0.0037                               | Pass          |
| 40                                                             |                                            | 8                                   | 0.0043                               | Pass          |
| 50                                                             |                                            | 5                                   | 0.0027                               | Pass          |
| 25                                                             | V min.= 3.5                                | 8                                   | 0.0043                               | Pass          |
| 25                                                             | V max.= 4.2                                | 7                                   | 0.0037                               | Pass          |

**WCDMA Band IV:**

| <b>Temperature<br/>(°C)</b> | <b>Power<br/>Supplied<br/>(V<sub>DC</sub>)</b> | <b>F<sub>L</sub><br/>(MHz)</b> | <b>F<sub>H</sub><br/>(MHz)</b> | <b>F<sub>L</sub> Limit<br/>(MHz)</b> | <b>F<sub>H</sub> Limit<br/>(MHz)</b> |
|-----------------------------|------------------------------------------------|--------------------------------|--------------------------------|--------------------------------------|--------------------------------------|
| -30                         | 3.8                                            | 1710.3263                      | 1754.6744                      | 1710                                 | 1755                                 |
| -20                         |                                                | 1710.3282                      | 1754.6747                      | 1710                                 | 1755                                 |
| -10                         |                                                | 1710.3253                      | 1754.6783                      | 1710                                 | 1755                                 |
| 0                           |                                                | 1710.3297                      | 1754.6785                      | 1710                                 | 1755                                 |
| 10                          |                                                | 1710.3203                      | 1754.6752                      | 1710                                 | 1755                                 |
| 20                          |                                                | 1710.3227                      | 1754.6741                      | 1710                                 | 1755                                 |
| 30                          |                                                | 1710.3235                      | 1754.6780                      | 1710                                 | 1755                                 |
| 40                          |                                                | 1710.3272                      | 1754.6702                      | 1710                                 | 1755                                 |
| 50                          |                                                | 1710.3210                      | 1754.6796                      | 1710                                 | 1755                                 |
| 25                          | V min.= 3.5                                    | 1710.3228                      | 1754.6761                      | 1710                                 | 1755                                 |
| 25                          | V max.= 4.2                                    | 1710.3267                      | 1754.6734                      | 1710                                 | 1755                                 |

**LTE Band 2:**

| 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                               | 16                   | 0.0085                | Pass   |
| -20                                     |                                   | 11                   | 0.0059                | Pass   |
| -10                                     |                                   | 15                   | 0.0080                | Pass   |
| 0                                       |                                   | 10                   | 0.0053                | Pass   |
| 10                                      |                                   | 12                   | 0.0064                | Pass   |
| 20                                      |                                   | 6                    | 0.0032                | Pass   |
| 30                                      |                                   | 5                    | 0.0027                | Pass   |
| 40                                      |                                   | 13                   | 0.0069                | Pass   |
| 50                                      |                                   | 8                    | 0.0043                | Pass   |
| 25                                      | V min.= 3.5                       | 9                    | 0.0048                | Pass   |
| 25                                      | V max.= 4.2                       | 11                   | 0.0059                | Pass   |

| Middle Channel, $f_o=1880.0$ MHz (16-QAM) |                                   |                      |                       |        |
|-------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                          | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                       | 3.8                               | 12                   | 0.0064                | Pass   |
| -20                                       |                                   | 9                    | 0.0048                | Pass   |
| -10                                       |                                   | 11                   | 0.0059                | Pass   |
| 0                                         |                                   | 10                   | 0.0053                | Pass   |
| 10                                        |                                   | 12                   | 0.0064                | Pass   |
| 20                                        |                                   | 5                    | 0.0027                | Pass   |
| 30                                        |                                   | 6                    | 0.0032                | Pass   |
| 40                                        |                                   | 3                    | 0.0016                | Pass   |
| 50                                        |                                   | 6                    | 0.0032                | Pass   |
| 25                                        | V min.= 3.5                       | 7                    | 0.0037                | Pass   |
| 25                                        | V max.= 4.2                       | 8                    | 0.0043                | Pass   |

**LTE Band 4:**

| Low Channel & High Channel (QPSK) |                    |                |                |                      |                      |
|-----------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                       | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                              | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                               | 3.8                | 1710.0403      | 1754.9473      | 1710                 | 1755                 |
| -20                               |                    | 1710.0420      | 1754.9410      | 1710                 | 1755                 |
| -10                               |                    | 1710.0438      | 1754.9481      | 1710                 | 1755                 |
| 0                                 |                    | 1710.0499      | 1754.9430      | 1710                 | 1755                 |
| 10                                |                    | 1710.0439      | 1754.9497      | 1710                 | 1755                 |
| 20                                |                    | 1710.0402      | 1754.9472      | 1710                 | 1755                 |
| 30                                |                    | 1710.0401      | 1754.9403      | 1710                 | 1755                 |
| 40                                |                    | 1710.0474      | 1754.9483      | 1710                 | 1755                 |
| 50                                |                    | 1710.0418      | 1754.9460      | 1710                 | 1755                 |
| 25                                | V min.= 3.5        | 1710.0485      | 1754.9455      | 1710                 | 1755                 |
| 25                                | V max.= 4.2        | 1710.0451      | 1754.9461      | 1710                 | 1755                 |

| Low Channel & High Channel (16-QAM) |                    |                |                |                      |                      |
|-------------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                         | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                                | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                                 | 3.8                | 1710.0418      | 1754.9457      | 1710                 | 1755                 |
| -20                                 |                    | 1710.0444      | 1754.9489      | 1710                 | 1755                 |
| -10                                 |                    | 1710.0476      | 1754.9493      | 1710                 | 1755                 |
| 0                                   |                    | 1710.0436      | 1754.9446      | 1710                 | 1755                 |
| 10                                  |                    | 1710.0403      | 1754.9461      | 1710                 | 1755                 |
| 20                                  |                    | 1710.0423      | 1754.9493      | 1710                 | 1755                 |
| 30                                  |                    | 1710.0454      | 1754.9466      | 1710                 | 1755                 |
| 40                                  |                    | 1710.0462      | 1754.9422      | 1710                 | 1755                 |
| 50                                  |                    | 1710.0424      | 1754.9488      | 1710                 | 1755                 |
| 25                                  | V min.= 3.5        | 1710.0434      | 1754.9428      | 1710                 | 1755                 |
| 25                                  | V max.= 4.2        | 1710.0499      | 1754.9410      | 1710                 | 1755                 |

**LTE Band 5:**

| Middle Channel, $f_0$ =836.5 MHz (QPSK) |                                   |                      |                       |             |
|-----------------------------------------|-----------------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                        | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                                     | 3.8                               | 13                   | 0.0155                | 2.5         |
| -20                                     |                                   | 11                   | 0.0132                | 2.5         |
| -10                                     |                                   | 9                    | 0.0108                | 2.5         |
| 0                                       |                                   | 12                   | 0.0143                | 2.5         |
| 10                                      |                                   | 11                   | 0.0132                | 2.5         |
| 20                                      |                                   | 6                    | 0.0072                | 2.5         |
| 30                                      |                                   | 5                    | 0.0060                | 2.5         |
| 40                                      |                                   | 9                    | 0.0108                | 2.5         |
| 50                                      |                                   | 8                    | 0.0096                | 2.5         |
| 25                                      | V min.= 3.5                       | 10                   | 0.0120                | 2.5         |
| 25                                      | V max.= 4.2                       | 9                    | 0.0108                | 2.5         |

| Middle Channel, $f_0$ =836.5 MHz(16-QAM) |                                   |                      |                       |             |
|------------------------------------------|-----------------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                         | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                                      | 3.8                               | 9                    | 0.0108                | 2.5         |
| -20                                      |                                   | 12                   | 0.0143                | 2.5         |
| -10                                      |                                   | 11                   | 0.0132                | 2.5         |
| 0                                        |                                   | 9                    | 0.0108                | 2.5         |
| 10                                       |                                   | 8                    | 0.0096                | 2.5         |
| 20                                       |                                   | 13                   | 0.0155                | 2.5         |
| 30                                       |                                   | 11                   | 0.0132                | 2.5         |
| 40                                       |                                   | 7                    | 0.0084                | 2.5         |
| 50                                       |                                   | 6                    | 0.0072                | 2.5         |
| 25                                       | V min.= 3.5                       | 10                   | 0.0120                | 2.5         |
| 25                                       | V max.= 4.2                       | 12                   | 0.0143                | 2.5         |

**LTE Band 7:**

| Low Channel & High Channel (QPSK) |                    |                |                |                      |                      |
|-----------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                       | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                              | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                               | 3.8                | 2500.0463      | 2569.9493      | 2500                 | 2570                 |
| -20                               |                    | 2500.0492      | 2569.9481      | 2500                 | 2570                 |
| -10                               |                    | 2500.0423      | 2569.9424      | 2500                 | 2570                 |
| 0                                 |                    | 2500.0406      | 2569.9410      | 2500                 | 2570                 |
| 10                                |                    | 2500.0497      | 2569.9483      | 2500                 | 2570                 |
| 20                                |                    | 2500.0448      | 2569.9407      | 2500                 | 2570                 |
| 30                                |                    | 2500.0439      | 2569.9409      | 2500                 | 2570                 |
| 40                                |                    | 2500.0405      | 2569.9486      | 2500                 | 2570                 |
| 50                                |                    | 2500.0473      | 2569.9439      | 2500                 | 2570                 |
| 25                                | V min.= 3.5        | 2500.0455      | 2569.9427      | 2500                 | 2570                 |
| 25                                | V max.= 4.2        | 2500.0489      | 2569.9416      | 2500                 | 2570                 |

| Low Channel & High Channel (16-QAM) |                    |                |                |                      |                      |
|-------------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                         | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                                | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                                 | 3.8                | 2500.0437      | 2569.9413      | 2500                 | 2570                 |
| -20                                 |                    | 2500.0472      | 2569.9409      | 2500                 | 2570                 |
| -10                                 |                    | 2500.0409      | 2569.9439      | 2500                 | 2570                 |
| 0                                   |                    | 2500.0432      | 2569.9419      | 2500                 | 2570                 |
| 10                                  |                    | 2500.0430      | 2569.9403      | 2500                 | 2570                 |
| 20                                  |                    | 2500.0458      | 2569.9454      | 2500                 | 2570                 |
| 30                                  |                    | 2500.0452      | 2569.9450      | 2500                 | 2570                 |
| 40                                  |                    | 2500.0473      | 2569.9465      | 2500                 | 2570                 |
| 50                                  |                    | 2500.0428      | 2569.9441      | 2500                 | 2570                 |
| 25                                  | V min.= 3.5        | 2500.0463      | 2569.9487      | 2500                 | 2570                 |
| 25                                  | V max.= 4.2        | 2500.0434      | 2569.9441      | 2500                 | 2570                 |

**LTE Band 12:**

| Low Channel & High Channel (QPSK) |                    |                |                |                      |                      |
|-----------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                       | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                              | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                               | 3.8                | 699.0158       | 715.9752       | 699                  | 716                  |
| -20                               |                    | 699.0157       | 715.9816       | 699                  | 716                  |
| -10                               |                    | 699.0113       | 715.9743       | 699                  | 716                  |
| 0                                 |                    | 699.0277       | 715.9714       | 699                  | 716                  |
| 10                                |                    | 699.0101       | 715.9768       | 699                  | 716                  |
| 20                                |                    | 699.0110       | 715.9782       | 699                  | 716                  |
| 30                                |                    | 699.0276       | 715.9786       | 699                  | 716                  |
| 40                                |                    | 699.0140       | 715.9776       | 699                  | 716                  |
| 50                                |                    | 699.0175       | 715.9734       | 699                  | 716                  |
| 25                                | V min.= 3.5        | 699.0117       | 715.9871       | 699                  | 716                  |
| 25                                | V max.= 4.2        | 699.0160       | 715.9777       | 699                  | 716                  |

| Low Channel & High Channel (16-QAM) |                    |                |                |                      |                      |
|-------------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                         | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                                | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                                 | 3.8                | 699.0180       | 715.9748       | 699                  | 716                  |
| -20                                 |                    | 699.0167       | 715.9882       | 699                  | 716                  |
| -10                                 |                    | 699.0210       | 715.9779       | 699                  | 716                  |
| 0                                   |                    | 699.0102       | 715.9883       | 699                  | 716                  |
| 10                                  |                    | 699.0109       | 715.9800       | 699                  | 716                  |
| 20                                  |                    | 699.0161       | 715.9743       | 699                  | 716                  |
| 30                                  |                    | 699.0140       | 715.9811       | 699                  | 716                  |
| 40                                  |                    | 699.0258       | 715.9712       | 699                  | 716                  |
| 50                                  |                    | 699.0255       | 715.9782       | 699                  | 716                  |
| 25                                  | V min.= 3.5        | 699.0117       | 715.9718       | 699                  | 716                  |
| 25                                  | V max.= 4.2        | 699.0118       | 715.9735       | 699                  | 716                  |

**LTE Band 13:**

| Low Channel & High Channel (QPSK) |                    |                |                |                      |                      |
|-----------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                       | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                              | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                               | 3.8                | 777.0204       | 786.9755       | 777                  | 787                  |
| -20                               |                    | 777.0204       | 786.9768       | 777                  | 787                  |
| -10                               |                    | 777.0213       | 786.9828       | 777                  | 787                  |
| 0                                 |                    | 777.0218       | 786.9746       | 777                  | 787                  |
| 10                                |                    | 777.0162       | 786.9798       | 777                  | 787                  |
| 20                                |                    | 777.0221       | 786.9758       | 777                  | 787                  |
| 30                                |                    | 777.0293       | 786.9753       | 777                  | 787                  |
| 40                                |                    | 777.0164       | 786.9701       | 777                  | 787                  |
| 50                                |                    | 777.0270       | 786.9786       | 777                  | 787                  |
| 25                                | V min.= 3.5        | 777.0231       | 786.9892       | 777                  | 787                  |
| 25                                | V max.= 4.2        | 777.0251       | 786.9703       | 777                  | 787                  |

| Low Channel & High Channel (16-QAM) |                    |                |                |                      |                      |
|-------------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                         | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                                | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                                 | 3.8                | 777.0272       | 786.9755       | 777                  | 787                  |
| -20                                 |                    | 777.0291       | 786.9800       | 777                  | 787                  |
| -10                                 |                    | 777.0123       | 786.9731       | 777                  | 787                  |
| 0                                   |                    | 777.0281       | 786.9752       | 777                  | 787                  |
| 10                                  |                    | 777.0206       | 786.9778       | 777                  | 787                  |
| 20                                  |                    | 777.0298       | 786.9724       | 777                  | 787                  |
| 30                                  |                    | 777.0242       | 786.9702       | 777                  | 787                  |
| 40                                  |                    | 777.0195       | 786.9782       | 777                  | 787                  |
| 50                                  |                    | 777.0217       | 786.9713       | 777                  | 787                  |
| 25                                  | V min.= 3.5        | 777.0292       | 786.9720       | 777                  | 787                  |
| 25                                  | V max.= 4.2        | 777.0264       | 786.9766       | 777                  | 787                  |

**LTE Band 17:**

| Low Channel & High Channel (QPSK) |                    |                |                |                      |                      |
|-----------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                       | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                              | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                               | 3.8                | 704.0188       | 715.9885       | 704                  | 716                  |
| -20                               |                    | 704.0154       | 715.9710       | 704                  | 716                  |
| -10                               |                    | 704.0297       | 715.9706       | 704                  | 716                  |
| 0                                 |                    | 704.0175       | 715.9705       | 704                  | 716                  |
| 10                                |                    | 704.0148       | 715.9799       | 704                  | 716                  |
| 20                                |                    | 704.0183       | 715.9880       | 704                  | 716                  |
| 30                                |                    | 704.0119       | 715.9782       | 704                  | 716                  |
| 40                                |                    | 704.0175       | 715.9776       | 704                  | 716                  |
| 50                                |                    | 704.0245       | 715.9732       | 704                  | 716                  |
| 25                                | V min.= 3.5        | 704.0110       | 715.9705       | 704                  | 716                  |
| 25                                | V max.= 4.2        | 704.0119       | 715.9768       | 704                  | 716                  |

| Low Channel & High Channel (16-QAM) |                    |                |                |                      |                      |
|-------------------------------------|--------------------|----------------|----------------|----------------------|----------------------|
| Temperature                         | Power Supplied     | F <sub>L</sub> | F <sub>H</sub> | F <sub>L</sub> Limit | F <sub>H</sub> Limit |
| (°C)                                | (V <sub>DC</sub> ) | (MHz)          | (MHz)          | (MHz)                | (MHz)                |
| -30                                 | 3.8                | 704.0121       | 715.9798       | 704                  | 716                  |
| -20                                 |                    | 704.0317       | 715.9895       | 704                  | 716                  |
| -10                                 |                    | 704.0180       | 715.9801       | 704                  | 716                  |
| 0                                   |                    | 704.0160       | 715.9890       | 704                  | 716                  |
| 10                                  |                    | 704.0115       | 715.9882       | 704                  | 716                  |
| 20                                  |                    | 704.0256       | 715.9803       | 704                  | 716                  |
| 30                                  |                    | 704.0162       | 715.9737       | 704                  | 716                  |
| 40                                  |                    | 704.0160       | 715.9884       | 704                  | 716                  |
| 50                                  |                    | 704.0114       | 715.9804       | 704                  | 716                  |
| 25                                  | V min.= 3.5        | 704.0259       | 715.9832       | 704                  | 716                  |
| 25                                  | V max.= 4.2        | 704.0121       | 715.9885       | 704                  | 716                  |

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