NVLAP TESTING
NVLAP LAB CODE 200707-0

BACL Bay Area Compliance Labs Corp.

# FCC PART 27

# FCC PART 22H, PART 24E

# MEASUREMENT AND TEST REPORT

For

## Amgoo Telecom Co., Ltd.

3/F, Block R2-A(North), Gaoxin S. Ave. 4th, Hi-Tech Industrial Park, Nanshan District, Shenzhen, China

**FCC ID: UOSAM509B**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Smartphone |

| | |
|---|---|
| **Report Number:** | RSZ170818001-00D |
| **Report Date:** | 2017-08-30 |
| **Reviewed By:** | Rocky Kang<br>RF Engineer |
| **Prepared By:** | Bay Area Compliance Laboratories Corp. (Shenzhen)<br>6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China<br>Tel: +86-755-33320018<br>Fax: +86-755-33320008<br>www.baclcorp.com.cn |

# TABLE OF CONTENTS

# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

The *Amgoo Telecom Co., Ltd.'s* product, model number: *AM509 (FCC ID: UOSAM509B)* or the "EUT" in this report was a *Smartphone,* which was measured approximately: 145.6 mm (L) × 73.2 mm (W) × 10.2 mm (H), rated with input voltage: DC 3.7V battery or DC 5V from adapter.

Adapter Information:
Model: CH5
Input: AC 100-240V, 50/60Hz, 0.2A
Output: DC 5V, 1000 mA

**All measurement and test data in this report was gathered from production sample serial number: 1701949 (Assigned by BACL, Shenzhen) .The EUT supplied by the applicant was received on 2017-08-18.*

## Objective

This type approval report is prepared on behalf of *Amgoo Telecom Co., Ltd.* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

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

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

FCC Part 15B JBP, Part 15.247 DSS & DTS submissions with FCC ID: UOSAM509B.

## 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 emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter | | Uncertainty |
|---|---|---|
| Occupied Channel Bandwidth | | ±5% |
| RF output power, conducted | | ±1.5dB |
| Unwanted Emission, conducted | | ±1.5dB |
| Emissions, radiated | Below 1GHz | ±4.70dB |
| | Above 1GHz | ±4.80dB |
| Temperature | | ±1℃ |
| Supply voltages | | ±0.4% |

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L2408). And accredited to ISO/IEC 17025 by NVLAP(Lab code: 200707-0), the FCC Designation No. CN5001 under the KDB 974614 D01.

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

Bay Area Compliance Laboratories Corp. (Shenzhen) was registered with ISED Canada under ISED Canada Registration Number 3062B.

# SYSTEM TEST CONFIGURATION

## Justification

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

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

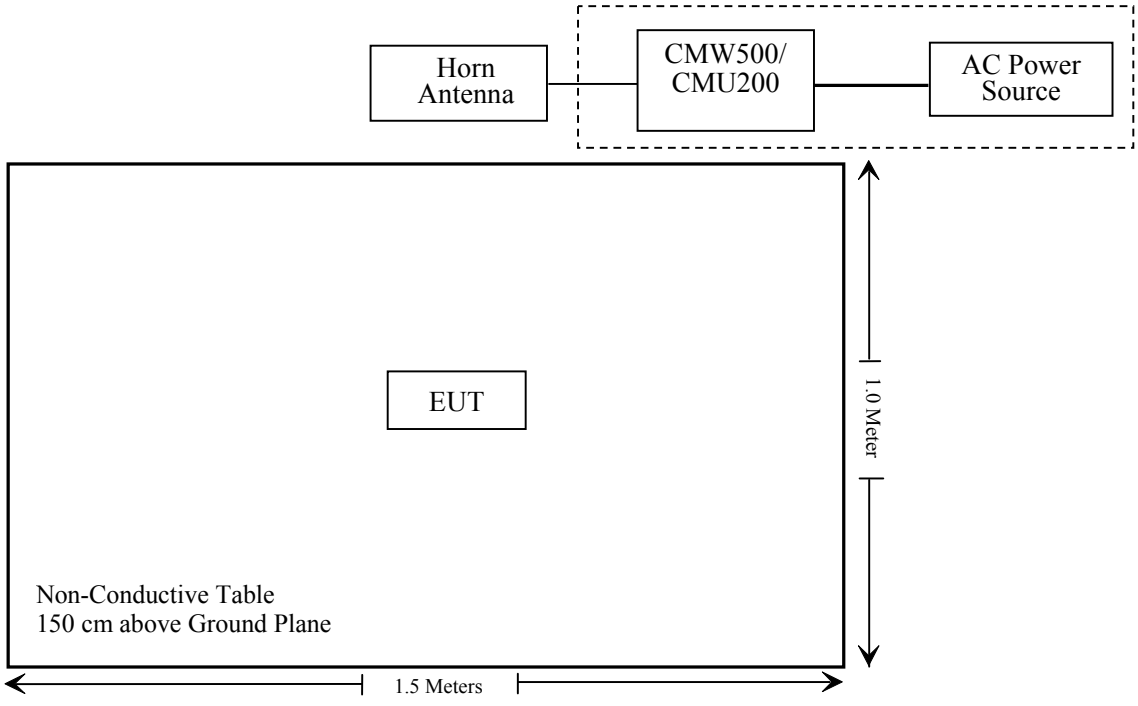
## Equipment Modifications

No modifications were made to the EUT.

## Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| Rohde & Schwarz | Wideband Radio Communication Tester | CMW500 | 1201.002K50-146520-wh |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200 | 106891 |

## Block Diagram of Test Setup



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| §1.1307 (b)(1), §2.1093 | RF Exposure Information | Compliance* |
| §2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h) | RF Output Power | Compliance |
| § 2.1047 | Modulation Characteristics | Not Applicable |
| § 2.1049; § 22.905; § 22.917; § 24.238; §27.53 | Occupied Bandwidth | Compliance |
| § 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h)(m) | Spurious Emissions at Antenna Terminal | Compliance |
| § 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m) | Spurious Radiated Emissions | Compliance |
| § 22.917 (a); § 24.238 (a); §27.53 (h)(m) | Band Edge | Compliance |
| § 2.1055; § 22.355; § 24.235; §27.54; | Frequency stability | Compliance |

Compliance*: Please refer to SAR report released by BACL, report number: RSZ170818001-20.

# TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| **Radiated Emission Test** | | | | | |
| Sunol Sciences | Horn Antenna | DRH-118 | A052604 | 2014-12-29 | 2017-12-28 |
| Rohde & Schwarz | Signal Generator | FSIQ26 | 8386001028 | 2017-04-24 | 2018-04-24 |
| Sunol Sciences | Bi-log Antenna | JB1 | A040904-2 | 2014-12-17 | 2017-12-16 |
| Mini | Pre-amplifier | ZVA-183-S+ | 5969001149 | 2017-02-14 | 2018-02-14 |
| HP | Amplifier | HP8447E | 1937A01046 | 2017-05-21 | 2017-11-19 |
| Anritsu | Signal Generator | 68369B | 004114 | 2016-12-05 | 2017-12-05 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 101120 | 2016-12-07 | 2017-12-07 |
| COM POWER | Dipole Antenna | AD-100 | 041000 | NCR | NCR |
| A.H. System | Horn Antenna | SAS-200/571 | 135 | 2015-08-18 | 2018-08-17 |
| R & S | Wideband Radio Communication Tester | CMW500 | 146520 | 2017-02-14 | 2018-02-14 |
| Ducommun technologies | RF Cable | UFA210A-1-4724-30050U | MFR64369 223410-001 | 2017-05-21 | 2017-11-19 |
| Ducommun technologies | RF Cable | 104PEA | 218124002 | 2017-05-21 | 2017-11-19 |
| Ducommun technologies | RF Cable | RG-214 | 1 | 2017-05-21 | 2017-11-19 |
| Ducommun technologies | RF Cable | RG-214 | 2 | 2017-05-22 | 2017-11-22 |
| Ducommun technologies | Horn Antenna | ARH-4223-02 | 1007726-04 | 2014-12-29 | 2017-12-28 |
| Ducommun technologies | Horn Antenna | ARH-4223-02 | 1007726-03 | 2014-12-29 | 2017-12-28 |
| Ducommun technologies | Pre-amplifier | ALN-22093530-01 | 991373-01 | 2017-08-03 | 2018-08-03 |

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 8386001028 | 2017-04-24 | 2018-04-24 |
| ESPEC | Temperature & Humidity Chamber | EL-10KA | 09107726 | 2016-11-22 | 2017-11-22 |
| Long Wei | DC Power Supply | TPR-6420D | 398363 | NCR | NCR |
| Aglient | ESG Vector Signal Generator | E4438C | MY42080875 | 2017-05-09 | 2018-05-09 |
| Rohde & Schwarz | Wideband Radio Communication Tester | CMW500 | 1201.002K50-146520-wh | 2017-04-24 | 2018-04-24 |
| Rohde & Schwarz | Wideband Radio Communication Tester | CMU200 | 106891 | 2016-10-18 | 2017-10-18 |
| Ducommun technologies | RF Cable | RG-214 | 3 | 2017-05-22 | 2017-11-22 |
| WEINSCHEL | 10dB Attenuator | 5324 | AU0709 | 2017-06-15 | 2018-06-15 |

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

# FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

## Applicable Standard

FCC§1.1307, §2.1093.

## Test Result

Compliance, please refer to the SAR report: RSZ170818001-20.

# FCC §2.1047 - MODULATION CHARACTERISTIC

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

# §2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h) - RF OUTPUT POWER

## Applicable Standards

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

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

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

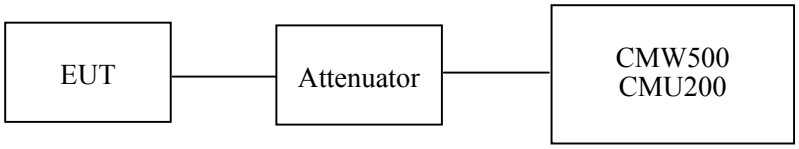
According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

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 CMW500/CMU200 through sufficient attenuation.




*Radiated method:*

TIA603-D section 2.2.17

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 26 ℃ |
| **Relative Humidity:** | 56 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Hill He on 2017-08-24.*

## Conducted Power

### Cellular Band (Part 22H)

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | Limit (dBm) |
|---|---|---|---|---|
| GSM | 128 | 824.2 | 31.88 | 38.45 |
| | 190 | 836.6 | 31.90 | 38.45 |
| | 251 | 848.8 | 31.86 | 38.45 |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots | |
| GPRS | 128 | 824.2 | 31.88 | 30.61 | 28.71 | 27.55 | 38.45 |
| | 190 | 836.6 | 31.90 | 30.62 | 28.68 | 27.53 | 38.45 |
| | 251 | 848.8 | 31.88 | 30.59 | 28.69 | 27.51 | 38.45 |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots | |
| EGPRS | 128 | 824.2 | 24.76 | 23.92 | 21.70 | 20.35 | 38.45 |
| | 190 | 836.6 | 25.04 | 23.94 | 21.66 | 20.33 | 38.45 |
| | 251 | 848.8 | 24.92 | 23.74 | 21.48 | 20.13 | 38.45 |

| Mode | Test Condition | Test Mode | 3GPP Sub Test | Average Output Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | Low Frequency | Middle Frequency | High Frequency |
| WCDMA (Band V) | Normal | RMC | | 22.69 | 22.67 | 22.65 |
| | | HSDPA | 1 | 21.44 | 20.71 | 20.49 |
| | | | 2 | 21.31 | 20.68 | 20.39 |
| | | | 3 | 21.27 | 20.79 | 20.32 |
| | | | 4 | 20.94 | 20.56 | 20.21 |
| | | HSUPA | 1 | 20.40 | 20.54 | 20.52 |
| | | | 2 | 20.30 | 20.46 | 20.47 |
| | | | 3 | 20.26 | 20.34 | 20.36 |
| | | | 4 | 20.19 | 20.28 | 20.24 |
| | | | 5 | 20.17 | 20.19 | 20.16 |

**PCS Band (Part 24E)**

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | Limit (dBm) |
|---|---|---|---|---|
| GSM | 512 | 1850.2 | 28.59 | 33 |
| | 661 | 1880.0 | 28.49 | 33 |
| | 810 | 1909.8 | 28.59 | 33 |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots | |
| GPRS | 512 | 1850.2 | 28.62 | 27.49 | 26.03 | 24.93 | 33 |
| | 661 | 1880.0 | 28.50 | 27.39 | 25.90 | 24.78 | 33 |
| | 810 | 1909.8 | 28.61 | 27.52 | 26.01 | 24.93 | 33 |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | | | | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| | | | 1 slot | 2 slots | 3 slots | 4 slots | |
| EGPRS | 512 | 1850.2 | 24.50 | 23.61 | 21.68 | 20.53 | 33 |
| | 661 | 1880.0 | 24.73 | 23.85 | 21.91 | 20.83 | 33 |
| | 810 | 1909.8 | 25.14 | 24.26 | 22.39 | 21.26 | 33 |

| Mode | Test Condition | Test Mode | 3GPP Sub Test | Average Output Power (dBm) | | |
|---|---|---|---|---|---|---|
| | | | | Low Frequency | Middle Frequency | High Frequency |
| WCDMA (Band I I) | Normal | RMC | | 22.21 | 22.22 | 22.68 |
| | | HSDPA | 1 | 21.06 | 21.32 | 20.94 |
| | | | 2 | 21.01 | 20.99 | 20.75 |
| | | | 3 | 21.12 | 20.93 | 20.86 |
| | | | 4 | 21.02 | 20.95 | 20.97 |
| | | HSUPA | 1 | 21.03 | 20.99 | 21.20 |
| | | | 2 | 21.01 | 20.93 | 21.08 |
| | | | 3 | 20.95 | 20.82 | 20.95 |
| | | | 4 | 20.94 | 20.74 | 20.86 |
| | | | 5 | 20.78 | 20.77 | 20.75 |

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

**Cellular Band**

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| GSM | Low | 0.25 | 13 |
| | Middle | 0.29 | 13 |
| | High | 0.19 | 13 |

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| EGPRS | Low | 0.21 | 13 |
| | Middle | 0.22 | 13 |
| | High | 0.16 | 13 |

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| RMC (BPSK) | Low | 3.35 | 13 |
| | Middle | 3.06 | 13 |
| | High | 3.19 | 13 |
| HSDPA (16QAM) | Low | 3.25 | 13 |
| | Middle | 3.04 | 13 |
| | High | 3.31 | 13 |
| HSUPA (BPSK) | Low | 2.17 | 13 |
| | Middle | 1.91 | 13 |
| | High | 2.15 | 13 |

**PCS Band**

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| GSM | Low | 0.15 | 13 |
| | Middle | 0.18 | 13 |
| | High | 0.33 | 13 |

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| EGPRS | Low | 0.34 | 13 |
| | Middle | 0.27 | 13 |
| | High | 0.18 | 13 |

| Mode | Channel | PAR (dB) | Limit (dB) |
|---|---|---|---|
| RMC (BPSK) | Low | 3.18 | 13 |
| | Middle | 3.25 | 13 |
| | High | 3.32 | 13 |
| HSDPA (16QAM) | Low | 3.24 | 13 |
| | Middle | 3.19 | 13 |
| | High | 3.27 | 13 |
| HSUPA (BPSK) | Low | 3.23 | 13 |
| | Middle | 3.27 | 13 |
| | High | 3.34 | 13 |

**Radiated Power**

**GSM Mode:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turntable Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable loss (dB) | Antenna Gain (dB) | | | |
| ERP, Cellular Band (Part 22H), Middle Channel | | | | | | | | | | |
| 836.60 | 75.27 | 177 | 1.2 | H | 15.3 | 0.6 | 0.0 | 14.50 | 38.45 | 23.95 |
| 836.60 | 90.44 | 95 | 2.3 | V | 30.4 | 0.6 | 0.0 | 29.60 | 38.45 | 8.85 |
| EIRP, PCS Band (Part 24E), Middle Channel | | | | | | | | | | |
| 1880.00 | 88.31 | 60 | 1.1 | H | 18.3 | 1.30 | 8.50 | 25.50 | 33 | 7.5 |
| 1880.00 | 91.37 | 320 | 1.6 | V | 21.1 | 1.30 | 8.50 | 28.30 | 33 | 4.7 |

**EDGE Mode:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turntable Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable loss (dB) | Antenna Gain (dB) | | | |
| ERP, Cellular Band (Part 22H), Middle Channel | | | | | | | | | | |
| 836.60 | 72.17 | 91 | 2.1 | H | 12.1 | 0.6 | 0.0 | 11.32 | 38.45 | 27.13 |
| 836.60 | 86.21 | 177 | 2.3 | V | 27.1 | 0.6 | 0.0 | 26.34 | 38.45 | 12.11 |
| EIRP, PCS Band (Part 24E), Middle Channel | | | | | | | | | | |
| 1880.00 | 83.59 | 165 | 1.4 | H | 13.5 | 1.30 | 8.50 | 20.70 | 33 | 12.3 |
| 1880.00 | 87.01 | 277 | 2.0 | V | 16.7 | 1.30 | 8.50 | 23.90 | 33 | 9.1 |

**WCDMA Mode:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turntable Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable loss (dB) | Antenna Gain (dB) | | | |
| ERP, WCDMA Band V (Part 22H), Middle Channel | | | | | | | | | | |
| 836.60 | 79.56 | 122 | 1.0 | H | 19.6 | 0.6 | 0.0 | 18.91 | 38.45 | 19.54 |
| 836.60 | 81.03 | 46 | 1.7 | V | 21.0 | 0.6 | 0.0 | 21.36 | 38.45 | 17.09 |
| EIRP, WCDMA Band II (Part 24E), Middle Channel | | | | | | | | | | |
| 1880.00 | 82.81 | 103 | 2.4 | H | 12.8 | 1.30 | 8.50 | 20.00 | 33 | 13.0 |
| 1880.00 | 85.49 | 219 | 2.0 | V | 15.2 | 1.30 | 8.50 | 22.40 | 33 | 10.6 |

**Note:**
All above data were tested with no amplifier.
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

**LTE Band 4:**

Maximum Output Power

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4 | QPSK | RB Size=1, RB Offset=0 | 21.85 | 22.25 | 21.96 |
| | | RB Size=1, RB Offset=2 | 21.78 | 22.14 | 21.91 |
| | | RB Size=1, RB Offset=5 | 21.91 | 22.34 | 22.04 |
| | | RB Size=3, RB Offset=0 | 21.35 | 21.74 | 21.47 |
| | | RB Size=3, RB Offset=1 | 21.32 | 21.63 | 21.40 |
| | | RB Size=3, RB Offset=2 | 21.41 | 21.83 | 21.53 |
| | | RB Size=6, RB Offset=0 | 20.86 | 21.24 | 20.76 |
| | 16QAM | RB Size=1, RB Offset=0 | 21.79 | 22.25 | 21.74 |
| | | RB Size=1, RB Offset=2 | 21.69 | 22.15 | 21.65 |
| | | RB Size=1, RB Offset=5 | 21.84 | 22.35 | 21.81 |
| | | RB Size=3, RB Offset=0 | 21.39 | 21.82 | 21.43 |
| | | RB Size=3, RB Offset=1 | 21.32 | 21.78 | 21.40 |
| | | RB Size=3, RB Offset=2 | 21.48 | 21.90 | 21.53 |
| | | RB Size=6, RB Offset=0 | 20.75 | 21.25 | 20.84 |
| 3.0 | QPSK | RB Size=1, RB Offset=0 | 21.73 | 22.24 | 21.64 |
| | | RB Size=1, RB Offset=7 | 21.64 | 22.16 | 21.58 |
| | | RB Size=1, RB Offset=14 | 21.84 | 22.32 | 21.71 |
| | | RB Size=8, RB Offset=0 | 21.31 | 21.65 | 21.24 |
| | | RB Size=8, RB Offset=4 | 21.26 | 21.54 | 21.12 |
| | | RB Size=8, RB Offset=7 | 21.44 | 21.77 | 21.28 |
| | | RB Size=15, RB Offset=0 | 21.12 | 21.35 | 21.07 |
| | 16QAM | RB Size=1, RB Offset=0 | 21.62 | 22.24 | 21.69 |
| | | RB Size=1, RB Offset=7 | 21.56 | 22.15 | 21.59 |
| | | RB Size=1, RB Offset=14 | 21.69 | 22.37 | 21.77 |
| | | RB Size=8, RB Offset=0 | 21.34 | 21.67 | 21.27 |
| | | RB Size=8, RB Offset=4 | 21.27 | 21.61 | 21.16 |
| | | RB Size=8, RB Offset=7 | 21.41 | 21.78 | 21.40 |
| | | RB Size=15, RB Offset=0 | 21.15 | 21.35 | 21.25 |

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 5.0 | QPSK | RB Size=1, RB Offset=0 | 21.87 | 22.37 | 21.94 |
| | | RB Size=1, RB Offset=12 | 21.77 | 22.27 | 21.85 |
| | | RB Size=1, RB Offset=24 | 21.91 | 22.44 | 21.98 |
| | | RB Size=12, RB Offset=0 | 21.37 | 21.78 | 21.25 |
| | | RB Size=12, RB Offset=6 | 21.26 | 21.70 | 21.20 |
| | | RB Size=12, RB Offset=11 | 21.50 | 21.91 | 21.33 |
| | | RB Size=25, RB Offset=0 | 21.17 | 21.34 | 22.13 |
| | 16QAM | RB Size=1, RB Offset=0 | 21.83 | 22.38 | 21.92 |
| | | RB Size=1, RB Offset=12 | 21.73 | 22.31 | 21.85 |
| | | RB Size=1, RB Offset=24 | 21.88 | 22.48 | 21.99 |
| | | RB Size=12, RB Offset=0 | 21.32 | 21.84 | 21.41 |
| | | RB Size=12, RB Offset=6 | 21.27 | 21.74 | 21.30 |
| | | RB Size=12, RB Offset=11 | 21.37 | 21.93 | 21.52 |
| | | RB Size=25, RB Offset=0 | 21.02 | 21.35 | 21.12 |
| 10.0 | QPSK | RB Size=1, RB Offset=0 | 22.56 | 22.41 | 22.34 |
| | | RB Size=1, RB Offset=24 | 22.35 | 22.17 | 22.27 |
| | | RB Size=1, RB Offset=49 | 22.05 | 22.51 | 22.18 |
| | | RB Size=25, RB Offset=0 | 22.15 | 22.17 | 22.31 |
| | | RB Size=25, RB Offset=12 | 22.13 | 22.24 | 22.03 |
| | | RB Size=25, RB Offset=24 | 22.51 | 22.42 | 22.38 |
| | | RB Size=50, RB Offset=0 | 22.14 | 21.39 | 22.25 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.26 | 22.41 | 22.87 |
| | | RB Size=1, RB Offset=24 | 22.44 | 22.53 | 22.78 |
| | | RB Size=1, RB Offset=49 | 22.46 | 22.50 | 22.91 |
| | | RB Size=25, RB Offset=0 | 22.47 | 22.54 | 22.46 |
| | | RB Size=25, RB Offset=12 | 22.01 | 22.57 | 22.34 |
| | | RB Size=25, RB Offset=24 | 22.08 | 22.03 | 22.19 |
| | | RB Size=50, RB Offset=0 | 21.55 | 21.40 | 21.72 |

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 15.0 | QPSK | RB Size=1, RB Offset=0 | 22.52 | 22.33 | 22.73 |
| | | RB Size=1, RB Offset=37 | 22.51 | 22.68 | 22.86 |
| | | RB Size=1, RB Offset=74 | 22.41 | 22.33 | 22.40 |
| | | RB Size=36, RB Offset=0 | 22.68 | 22.79 | 22.59 |
| | | RB Size=36, RB Offset=18 | 22.70 | 22.32 | 22.32 |
| | | RB Size=36, RB Offset=37 | 22.66 | 22.54 | 22.42 |
| | | RB Size=75, RB Offset=0 | 21.72 | 21.71 | 21.86 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.35 | 22.37 | 22.74 |
| | | RB Size=1, RB Offset=37 | 22.68 | 22.43 | 22.23 |
| | | RB Size=1, RB Offset=74 | 22.36 | 22.37 | 22.46 |
| | | RB Size=36, RB Offset=0 | 22.47 | 22.34 | 22.53 |
| | | RB Size=36, RB Offset=18 | 22.36 | 22.30 | 22.21 |
| | | RB Size=36, RB Offset=37 | 22.18 | 22.67 | 22.57 |
| | | RB Size=75, RB Offset=0 | 21.44 | 21.46 | 21.77 |
| 20.0 | QPSK | RB Size=1, RB Offset=0 | 22.39 | 22.50 | 22.44 |
| | | RB Size=1, RB Offset=49 | 22.50 | 22.41 | 22.38 |
| | | RB Size=1, RB Offset=99 | 22.32 | 22.56 | 22.32 |
| | | RB Size=50, RB Offset=0 | 22.13 | 22.45 | 22.32 |
| | | RB Size=50, RB Offset=24 | 22.55 | 22.50 | 22.02 |
| | | RB Size=50, RB Offset=49 | 22.09 | 22.37 | 22.24 |
| | | RB Size=100, RB Offset=0 | 22.07 | 21.81 | 21.73 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.49 | 22.52 | 22.55 |
| | | RB Size=1, RB Offset=49 | 22.66 | 22.29 | 22.41 |
| | | RB Size=1, RB Offset=99 | 22.45 | 22.43 | 22.79 |
| | | RB Size=50, RB Offset=0 | 22.51 | 22.33 | 22.38 |
| | | RB Size=50, RB Offset=24 | 22.65 | 22.68 | 22.19 |
| | | RB Size=50, RB Offset=49 | 22.49 | 22.53 | 22.28 |
| | | RB Size=100, RB Offset=0 | 21.83 | 21.58 | 22.02 |

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

| Modulation | Middle Channel (dB) | PAR Limit (dB) | Result |
|---|---|---|---|
| 16QAM (1RB Size) | 10.96 | 13 | Pass |
| 16QAM (100%RB Size) | 7.47 | 13 | Pass |

**QPSK:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 1.4 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 84.33 | 59 | 1.7 | H | 11.2 | 1.30 | 9.10 | 19.00 | 30 |
| 1732.50 | 84.86 | 65 | 2.0 | V | 12.3 | 1.30 | 9.10 | 20.10 | 30 |
| 3 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 83.50 | 98 | 1.9 | H | 10.3 | 1.30 | 9.10 | 18.10 | 30 |
| 1732.50 | 84.31 | 340 | 2.3 | V | 11.7 | 1.30 | 9.10 | 19.50 | 30 |
| 5 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 82.94 | 321 | 1.2 | H | 9.8 | 1.30 | 9.10 | 17.60 | 30 |
| 1732.50 | 83.67 | 309 | 2.1 | V | 11.1 | 1.30 | 9.10 | 18.90 | 30 |
| 10 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 84.67 | 63 | 2.3 | H | 11.5 | 1.30 | 9.10 | 19.30 | 30 |
| 1732.50 | 83.78 | 149 | 1.2 | V | 11.2 | 1.30 | 9.10 | 19.00 | 30 |
| 15 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 83.42 | 200 | 1.9 | H | 10.3 | 1.30 | 9.10 | 18.10 | 30 |
| 1732.50 | 84.37 | 278 | 2.0 | V | 11.8 | 1.30 | 9.10 | 19.60 | 30 |
| 20 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 83.13 | 186 | 2.3 | H | 10.0 | 1.30 | 9.10 | 17.80 | 30 |
| 1732.50 | 84.38 | 294 | 1.6 | V | 11.8 | 1.30 | 9.10 | 19.60 | 30 |

**16QAM:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 1.4 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 87.50 | 15 | 1.8 | H | 14.3 | 1.30 | 9.10 | 22.10 | 30 |
| 1732.50 | 84.69 | 261 | 1.3 | V | 12.1 | 1.30 | 9.10 | 19.90 | 30 |
| 3 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 86.64 | 159 | 1.0 | H | 13.5 | 1.30 | 9.10 | 21.30 | 30 |
| 1732.50 | 84.73 | 43 | 2.0 | V | 12.2 | 1.30 | 9.10 | 20.00 | 30 |
| 5 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 86.52 | 175 | 1.8 | H | 13.4 | 1.30 | 9.10 | 21.20 | 30 |
| 1732.50 | 83.34 | 88 | 1.3 | V | 10.8 | 1.30 | 9.10 | 18.60 | 30 |
| 10 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 85.91 | 100 | 1.9 | H | 12.7 | 1.30 | 9.10 | 20.50 | 30 |
| 1732.50 | 83.24 | 66 | 1.3 | V | 10.7 | 1.30 | 9.10 | 18.50 | 30 |
| 15 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 87.11 | 280 | 1.6 | H | 13.9 | 1.30 | 9.10 | 21.70 | 30 |
| 1732.50 | 84.29 | 94 | 1.5 | V | 11.7 | 1.30 | 9.10 | 19.50 | 30 |
| 20 MHz Bandwidth | | | | | | | | | |
| 1732.50 | 86.72 | 46 | 1.4 | H | 13.6 | 1.30 | 9.10 | 21.40 | 30 |
| 1732.50 | 84.36 | 128 | 2.0 | V | 11.8 | 1.30 | 9.10 | 19.60 | 30 |

**LTE Band 5:**

Maximum Output Power

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4 | QPSK | RB Size=1, RB Offset=0 | 22.84 | 22.89 | 22.92 |
| | | RB Size=1, RB Offset=2 | 22.54 | 22.19 | 22.52 |
| | | RB Size=1, RB Offset=5 | 22.63 | 23.17 | 22.54 |
| | | RB Size=3, RB Offset=0 | 22.33 | 22.69 | 22.67 |
| | | RB Size=3, RB Offset=1 | 22.25 | 22.38 | 22.01 |
| | | RB Size=3, RB Offset=2 | 22.37 | 22.78 | 22.56 |
| | | RB Size=6, RB Offset=0 | 21.86 | 21.90 | 21.95 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.71 | 22.89 | 22.79 |
| | | RB Size=1, RB Offset=2 | 22.70 | 23.03 | 22.73 |
| | | RB Size=1, RB Offset=5 | 22.68 | 22.10 | 22.38 |
| | | RB Size=3, RB Offset=0 | 22.39 | 22.31 | 22.36 |
| | | RB Size=3, RB Offset=1 | 22.59 | 22.56 | 22.51 |
| | | RB Size=3, RB Offset=2 | 22.46 | 22.57 | 22.91 |
| | | RB Size=6, RB Offset=0 | 22.01 | 21.91 | 21.87 |
| 3.0 | QPSK | RB Size=1, RB Offset=0 | 22.88 | 22.86 | 22.95 |
| | | RB Size=1, RB Offset=7 | 22.75 | 22.13 | 22.59 |
| | | RB Size=1, RB Offset=14 | 22.86 | 23.28 | 22.74 |
| | | RB Size=8, RB Offset=0 | 22.37 | 22.51 | 22.34 |
| | | RB Size=8, RB Offset=4 | 22.25 | 22.41 | 22.36 |
| | | RB Size=8, RB Offset=7 | 22.46 | 22.54 | 22.57 |
| | | RB Size=15, RB Offset=0 | 21.89 | 21.94 | 21.91 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.55 | 22.86 | 22.72 |
| | | RB Size=1, RB Offset=7 | 22.70 | 22.98 | 22.88 |
| | | RB Size=1, RB Offset=14 | 22.93 | 22.91 | 22.90 |
| | | RB Size=8, RB Offset=0 | 22.53 | 22.78 | 22.68 |
| | | RB Size=8, RB Offset=4 | 22.19 | 22.28 | 22.35 |
| | | RB Size=8, RB Offset=7 | 22.24 | 22.44 | 22.26 |
| | | RB Size=15, RB Offset=0 | 21.93 | 21.95 | 21.99 |

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 5.0 | QPSK | RB Size=1, RB Offset=0 | 22.98 | 23.00 | 22.96 |
| | | RB Size=1, RB Offset=12 | 22.75 | 22.79 | 22.88 |
| | | RB Size=1, RB Offset=24 | 22.26 | 22.51 | 22.76 |
| | | RB Size=12, RB Offset=0 | 22.18 | 22.46 | 22.35 |
| | | RB Size=12, RB Offset=6 | 22.19 | 22.27 | 22.13 |
| | | RB Size=12, RB Offset=11 | 22.16 | 22.03 | 22.09 |
| | | RB Size=25, RB Offset=0 | 21.88 | 21.94 | 21.80 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.97 | 23.01 | 22.96 |
| | | RB Size=1, RB Offset=12 | 22.87 | 23.02 | 22.78 |
| | | RB Size=1, RB Offset=24 | 22.75 | 22.55 | 22.68 |
| | | RB Size=12, RB Offset=0 | 22.32 | 22.42 | 22.28 |
| | | RB Size=12, RB Offset=6 | 22.36 | 22.26 | 22.39 |
| | | RB Size=12, RB Offset=11 | 22.35 | 22.59 | 22.51 |
| | | RB Size=25, RB Offset=0 | 21.99 | 21.95 | 21.94 |
| 10.0 | QPSK | RB Size=1, RB Offset=0 | 22.86 | 23.00 | 23.01 |
| | | RB Size=1, RB Offset=24 | 22.76 | 22.74 | 22.71 |
| | | RB Size=1, RB Offset=49 | 22.85 | 22.94 | 22.91 |
| | | RB Size=25, RB Offset=0 | 22.55 | 22.59 | 22.72 |
| | | RB Size=25, RB Offset=12 | 22.23 | 22.26 | 22.33 |
| | | RB Size=25, RB Offset=24 | 22.19 | 22.22 | 22.28 |
| | | RB Size=50, RB Offset=0 | 22.04 | 21.95 | 22.15 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.96 | 22.99 | 22.97 |
| | | RB Size=1, RB Offset=24 | 22.74 | 23.13 | 22.77 |
| | | RB Size=1, RB Offset=49 | 22.94 | 22.90 | 22.88 |
| | | RB Size=25, RB Offset=0 | 22.53 | 22.43 | 22.49 |
| | | RB Size=25, RB Offset=12 | 22.41 | 22.39 | 22.36 |
| | | RB Size=25, RB Offset=24 | 22.32 | 22.45 | 22.51 |
| | | RB Size=50, RB Offset=0 | 22.05 | 22.10 | 21.96 |

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

| Modulation | Middle Channel (dB) | PAR Limit (dB) | Result |
|---|---|---|---|
| 16QAM (1RB Size) | 3.89 | 13 | Pass |
| 16QAM (100%RB Size) | 6.58 | 13 | Pass |

**QPSK:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 1.4 MHz Bandwidth | | | | | | | | | |
| 836.5 | 76.45 | 200 | 1.9 | H | 16.5 | 0.6 | 0 | 15.9 | 38.45 |
| 836.5 | 83.37 | 218 | 1.5 | V | 23.3 | 0.6 | 0 | 22.7 | 38.45 |
| 3 MHz Bandwidth | | | | | | | | | |
| 836.5 | 76.25 | 326 | 1.9 | H | 16.3 | 0.6 | 0 | 15.7 | 38.45 |
| 836.5 | 83.17 | 118 | 1.5 | V | 23.1 | 0.6 | 0 | 22.5 | 38.45 |
| 5 MHz Bandwidth | | | | | | | | | |
| 836.6 | 75.95 | 116 | 1.9 | H | 16 | 0.6 | 0 | 15.4 | 38.45 |
| 836.6 | 82.77 | 279 | 1.5 | V | 22.7 | 0.6 | 0 | 22.1 | 38.45 |
| 10 MHz Bandwidth | | | | | | | | | |
| 836.5 | 75.15 | 92 | 1.9 | H | 15.2 | 0.6 | 0 | 14.6 | 38.45 |
| 836.5 | 83.17 | 235 | 1.5 | V | 23.1 | 0.6 | 0 | 22.5 | 38.45 |

**16QAM:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 1.4 MHz Bandwidth | | | | | | | | | |
| 836.5 | 77.75 | 28 | 1.9 | H | 17.8 | 0.6 | 0 | 17.2 | 38.45 |
| 836.5 | 84.17 | 91 | 1.5 | V | 24.1 | 0.6 | 0 | 23.5 | 38.45 |
| 3 MHz Bandwidth | | | | | | | | | |
| 836.5 | 77.55 | 163 | 1.9 | H | 17.6 | 0.6 | 0 | 17 | 38.45 |
| 836.5 | 83.77 | 207 | 1.5 | V | 23.7 | 0.6 | 0 | 23.1 | 38.45 |
| 5 MHz Bandwidth | | | | | | | | | |
| 836.5 | 75.95 | 141 | 1.9 | H | 16 | 0.6 | 0 | 15.4 | 38.45 |
| 836.5 | 83.17 | 144 | 1.5 | V | 23.1 | 0.6 | 0 | 22.5 | 38.45 |
| 10 MHz Bandwidth | | | | | | | | | |
| 836.5 | 76.15 | 37 | 1.9 | H | 16.2 | 0.6 | 0 | 15.6 | 38.45 |
| 836.5 | 82.47 | 230 | 1.5 | V | 22.4 | 0.6 | 0 | 21.8 | 38.45 |

**LTE Band 7**

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 5 | QPSK | RB Size=1, RB Offset=0 | 22.36 | 22.29 | 22.39 |
| | | RB Size=1, RB Offset=12 | 22.31 | 22.28 | 22.21 |
| | | RB Size=1, RB Offset=24 | 22.34 | 22.32 | 22.31 |
| | | RB Size=12, RB Offset=0 | 21.89 | 22.05 | 21.98 |
| | | RB Size=12, RB Offset=6 | 21.76 | 21.78 | 21.81 |
| | | RB Size=12, RB Offset=11 | 21.99 | 22.08 | 21.86 |
| | | RB Size=25, RB Offset=0 | 21.31 | 21.18 | 21.27 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.24 | 22.31 | 22.25 |
| | | RB Size=1, RB Offset=12 | 22.19 | 22.28 | 22.26 |
| | | RB Size=1, RB Offset=24 | 22.75 | 22.67 | 22.33 |
| | | RB Size=12, RB Offset=0 | 20.09 | 22.15 | 22.12 |
| | | RB Size=12, RB Offset=6 | 21.92 | 22.07 | 21.90 |
| | | RB Size=12, RB Offset=11 | 21.95 | 22.10 | 22.01 |
| | | RB Size=25, RB Offset=0 | 21.36 | 21.18 | 21.37 |
| 10 | QPSK | RB Size=1, RB Offset=0 | 22.25 | 22.30 | 22.28 |
| | | RB Size=1, RB Offset=24 | 22.09 | 22.28 | 22.29 |
| | | RB Size=1, RB Offset=49 | 22.41 | 22.38 | 22.19 |
| | | RB Size=25, RB Offset=0 | 21.92 | 22.09 | 21.97 |
| | | RB Size=25, RB Offset=12 | 21.96 | 22.10 | 21.92 |
| | | RB Size=25, RB Offset=24 | 21.99 | 22.05 | 21.92 |
| | | RB Size=50, RB Offset=0 | 21.34 | 21.24 | 21.27 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.26 | 22.31 | 22.23 |
| | | RB Size=1, RB Offset=24 | 22.18 | 22.37 | 22.26 |
| | | RB Size=1, RB Offset=49 | 22.36 | 22.56 | 22.31 |
| | | RB Size=25, RB Offset=0 | 21.91 | 21.75 | 21.82 |
| | | RB Size=25, RB Offset=12 | 21.73 | 21.62 | 21.55 |
| | | RB Size=25, RB Offset=24 | 21.54 | 21.73 | 21.41 |
| | | RB Size=50, RB Offset=0 | 21.34 | 21.32 | 20.92 |

| Bandwidth (MHz) | Modulation | RB size/RB Offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 15 | QPSK | RB Size=1, RB Offset=0 | 22.25 | 22.37 | 22.34 |
| | | RB Size=1, RB Offset=37 | 22.27 | 22.22 | 22.27 |
| | | RB Size=1, RB Offset=74 | 22.44 | 22.42 | 22.41 |
| | | RB Size=36, RB Offset=0 | 21.95 | 22.13 | 21.97 |
| | | RB Size=36, RB Offset=18 | 21.91 | 22.07 | 21.88 |
| | | RB Size=36, RB Offset=37 | 22.06 | 22.27 | 22.09 |
| | | RB Size=75, RB Offset=0 | 21.68 | 21.45 | 21.65 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.18 | 22.19 | 22.37 |
| | | RB Size=1, RB Offset=37 | 22.12 | 22.31 | 22.42 |
| | | RB Size=1, RB Offset=74 | 22.30 | 22.42 | 22.36 |
| | | RB Size=36, RB Offset=0 | 22.06 | 22.08 | 21.98 |
| | | RB Size=36, RB Offset=18 | 22.10 | 22.23 | 22.01 |
| | | RB Size=36, RB Offset=37 | 22.08 | 22.27 | 22.09 |
| | | RB Size=75, RB Offset=0 | 21.59 | 21.30 | 21.37 |
| 20 | QPSK | RB Size=1, RB Offset=0 | 22.34 | 22.41 | 22.32 |
| | | RB Size=1, RB Offset=49 | 22.44 | 22.67 | 22.35 |
| | | RB Size=1, RB Offset=99 | 22.49 | 22.63 | 22.58 |
| | | RB Size=50, RB Offset=0 | 22.32 | 22.26 | 22.15 |
| | | RB Size=50, RB Offset=24 | 22.04 | 22.29 | 22.35 |
| | | RB Size=50, RB Offset=49 | 22.14 | 22.08 | 22.33 |
| | | RB Size=100, RB Offset=0 | 21.96 | 21.90 | 21.93 |
| | 16QAM | RB Size=1, RB Offset=0 | 22.15 | 22.13 | 22.33 |
| | | RB Size=1, RB Offset=49 | 22.32 | 22.21 | 22.17 |
| | | RB Size=1, RB Offset=99 | 22.29 | 22.35 | 22.11 |
| | | RB Size=50, RB Offset=0 | 21.97 | 22.05 | 21.94 |
| | | RB Size=50, RB Offset=24 | 21.67 | 21.91 | 21.88 |
| | | RB Size=50, RB Offset=49 | 21.93 | 22.15 | 21.96 |
| | | RB Size=100, RB Offset=0 | 21.45 | 21.54 | 21.55 |

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

| Modulation | Middle Channel (dB) | PAR Limit (dB) | Result |
|---|---|---|---|
| 16QAM (1RB Size) | 10.80 | 13 | Pass |
| 16QAM (100%RB Size) | 8.04 | 13 | Pass |

**EIRP:**

**QPSK:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 5 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 78.67 | 279 | 1.2 | H | 9.2 | 2.60 | 9.30 | 15.90 | 33 |
| 2535.00 | 84.51 | 22 | 2.4 | V | 15.6 | 2.60 | 9.30 | 22.30 | 33 |
| 10 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 79.92 | 355 | 1.1 | H | 10.4 | 2.60 | 9.30 | 17.10 | 33 |
| 2535.00 | 85.38 | 340 | 2.1 | V | 16.5 | 2.60 | 9.30 | 23.20 | 33 |
| 15 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 79.62 | 85 | 1.3 | H | 10.1 | 2.60 | 9.30 | 16.80 | 33 |
| 2535.00 | 85.33 | 12 | 1.3 | V | 16.5 | 2.60 | 9.30 | 23.20 | 33 |
| 20 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 79.41 | 199 | 2.0 | H | 9.9 | 2.60 | 9.30 | 16.60 | 33 |
| 2535.00 | 86.34 | 110 | 1.5 | V | 17.5 | 2.60 | 9.30 | 24.20 | 33 |

**16QAM:**

| Frequency (MHz) | Receiver Reading (dBμV) | Turn table Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | |
| Middle Channel | | | | | | | | | |
| 5 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 80.16 | 218 | 2.1 | H | 10.7 | 2.60 | 9.30 | 17.40 | 33 |
| 2535.00 | 86.27 | 355 | 1.0 | V | 17.4 | 2.60 | 9.30 | 24.10 | 33 |
| 10 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 80.34 | 311 | 1.8 | H | 10.9 | 2.60 | 9.30 | 17.60 | 33 |
| 2535.00 | 86.81 | 182 | 1.6 | V | 17.9 | 2.60 | 9.30 | 24.60 | 33 |
| 15 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 79.66 | 16 | 1.4 | H | 10.2 | 2.60 | 9.30 | 16.90 | 33 |
| 2535.00 | 85.94 | 296 | 1.0 | V | 17.1 | 2.60 | 9.30 | 23.80 | 33 |
| 20 MHz Bandwidth | | | | | | | | | |
| 2535.00 | 79.45 | 97 | 1.7 | H | 10.0 | 2.60 | 9.30 | 16.70 | 33 |
| 2535.00 | 86.48 | 352 | 2.2 | V | 17.6 | 2.60 | 9.30 | 24.30 | 33 |

**Note:**
All above data were tested with no amplifier
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

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

## Applicable Standards

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

## Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.
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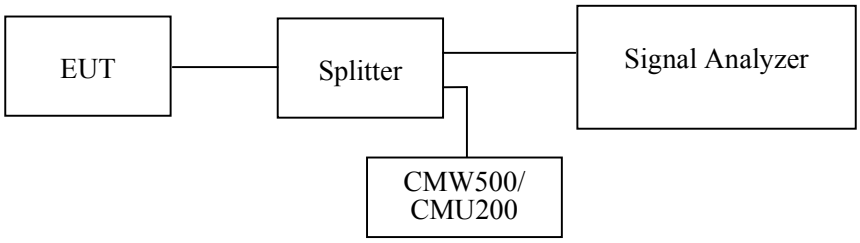



## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23~25 ℃ |
| **Relative Humidity:** | 53~55 % |
| **ATM Pressure:** | 100.0~101.0 kPa |

*The testing was performed by Hill He from 2017-08-24 to 2017-08-26.*

*EUT operation mode: Transmitting*

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

**Cellular Band (Part 22H)**

| Mode | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|---|---|---|---|
| GSM(GMSK) | 836.6 | 244.5 | 312.6 |
| EGPRS(8PSK) | 836.6 | 244.5 | 312.6 |

| Mode | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---|---|---|---|
| RMC (BPSK) | 836.6 | 4.188 | 4.870 |
| HSUPA (BPSK) | 836.6 | 4.188 | 4.890 |
| HSDPA (16QAM) | 836.6 | 4.188 | 4.890 |

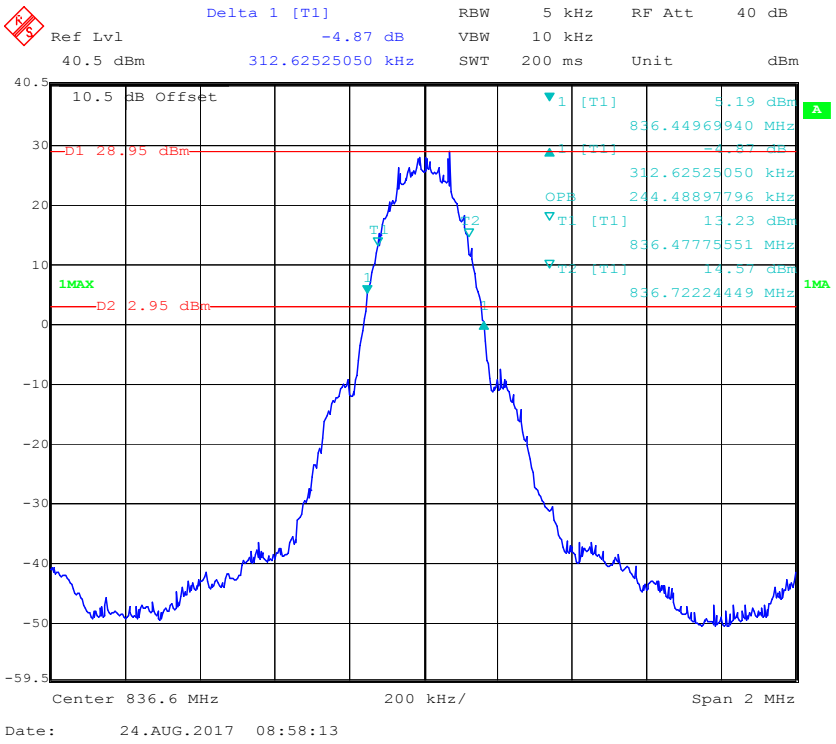
**PCS Band (Part 24E)**

| Mode | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|---|---|---|---|
| GSM(GMSK) | 1880.0 | 248.5 | 316.6 |
| EGPRS(8PSK) | 1880.0 | 256.5 | 324.6 |

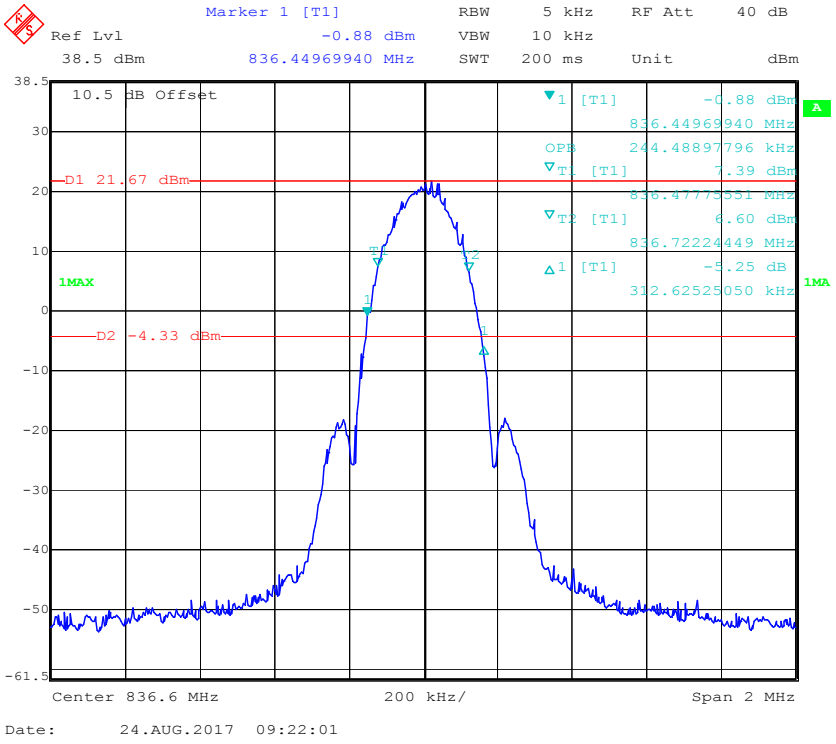
| Mode | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---|---|---|---|
| RMC (BPSK) | 1880.0 | 4.208 | 4.890 |
| HSUPA (BPSK) | 1880.0 | 4.188 | 4.870 |
| HSDPA (16QAM) | 1880.0 | 4.188 | 4.890 |

## Cellular Band (Part 22H)

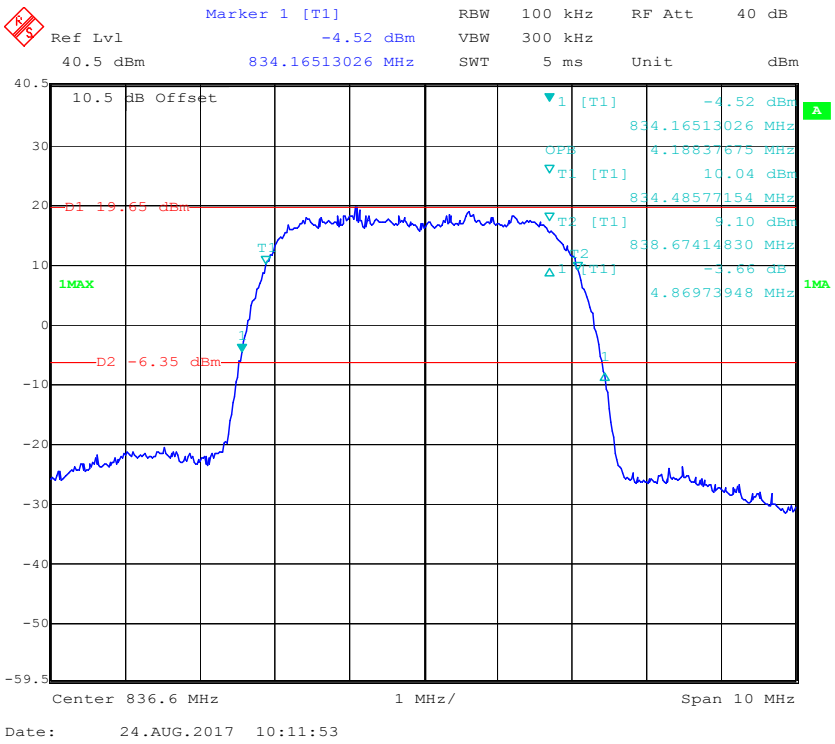
### 26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



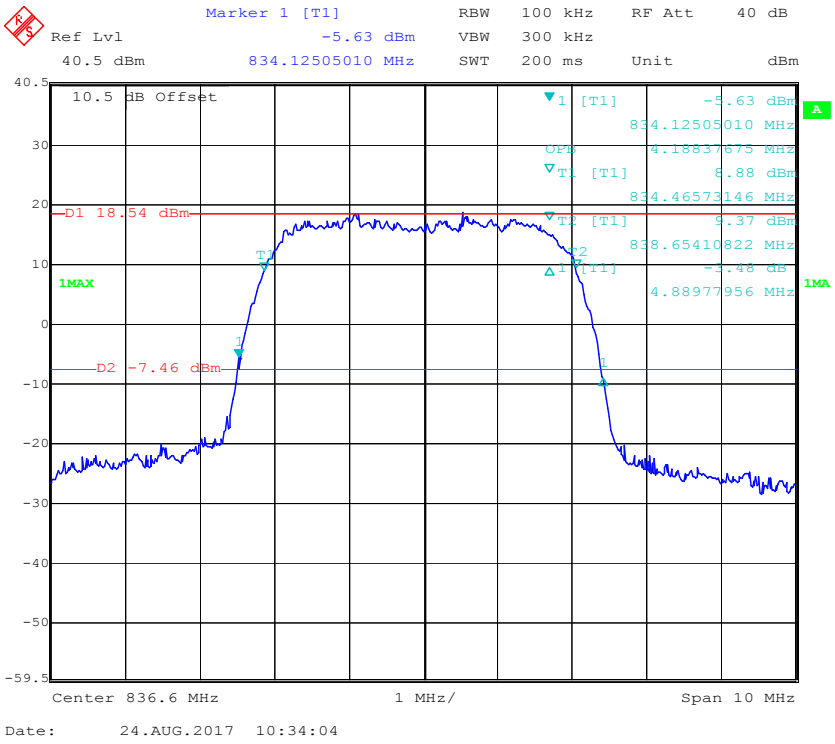

### 26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode



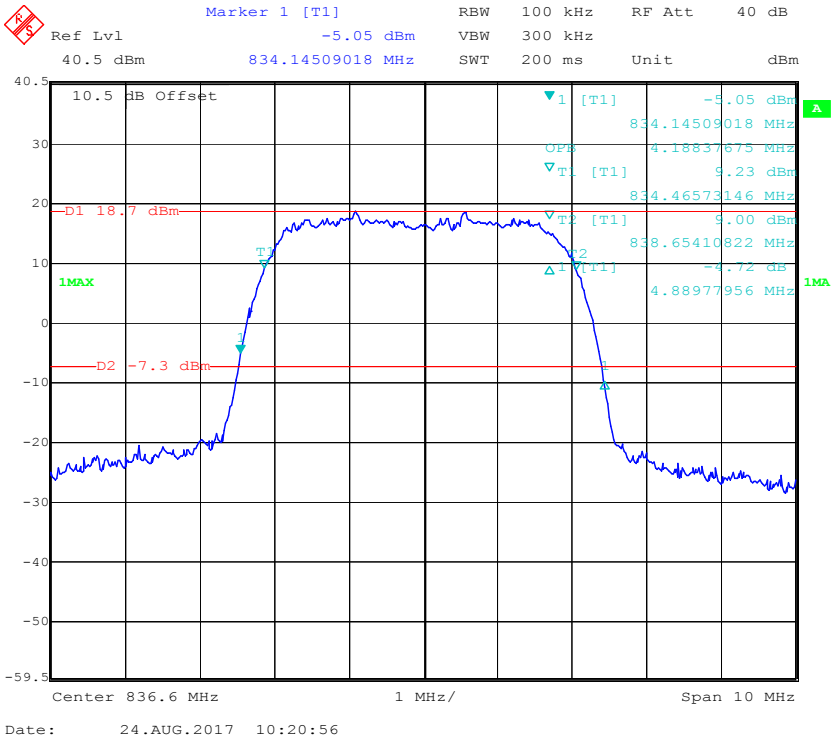
## 99% Occupied Bandwidth for RMC (BPSK) Mode




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

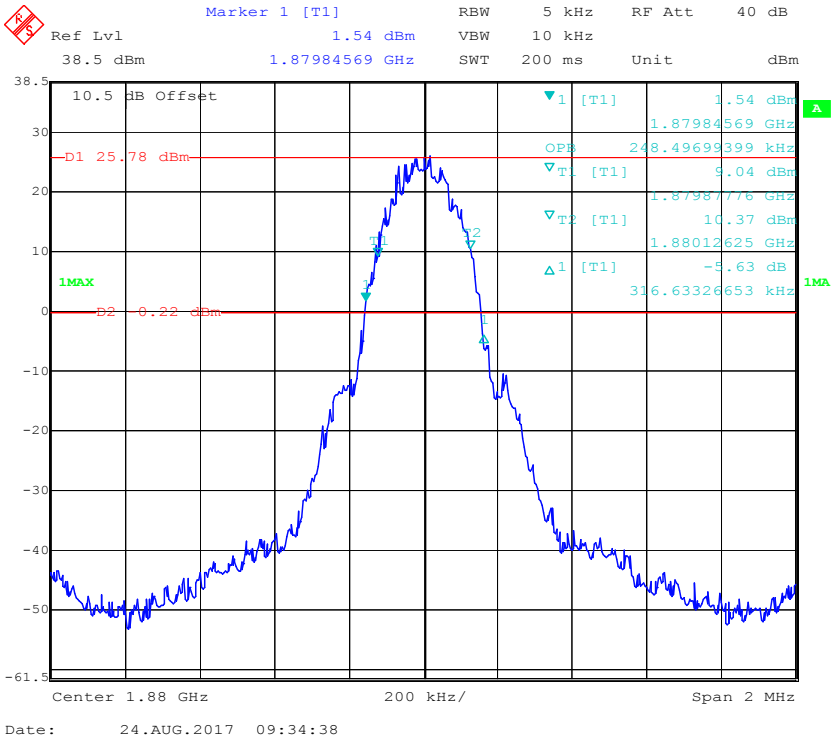


### 26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode

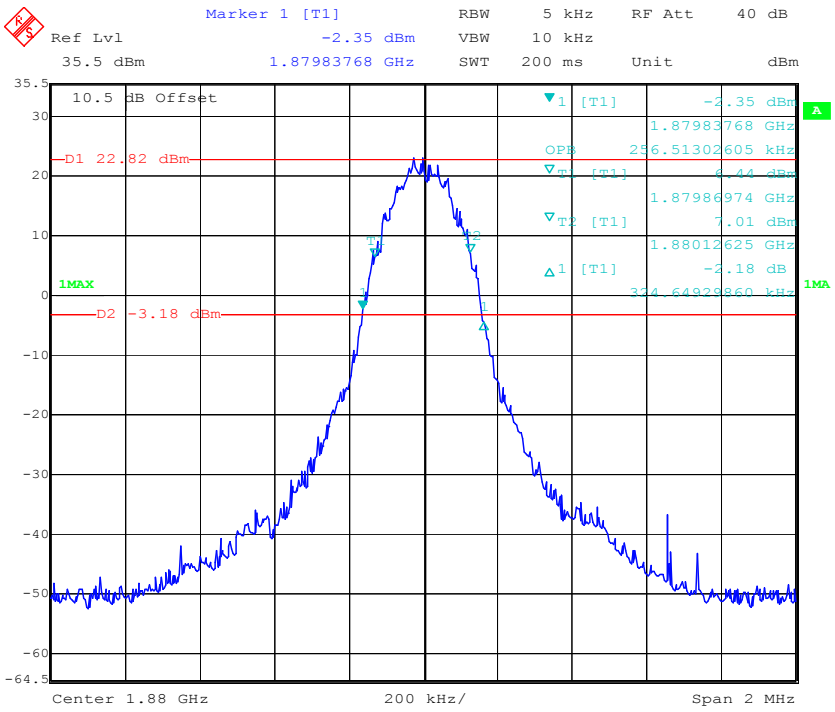



## PCS Band (Part 24E)

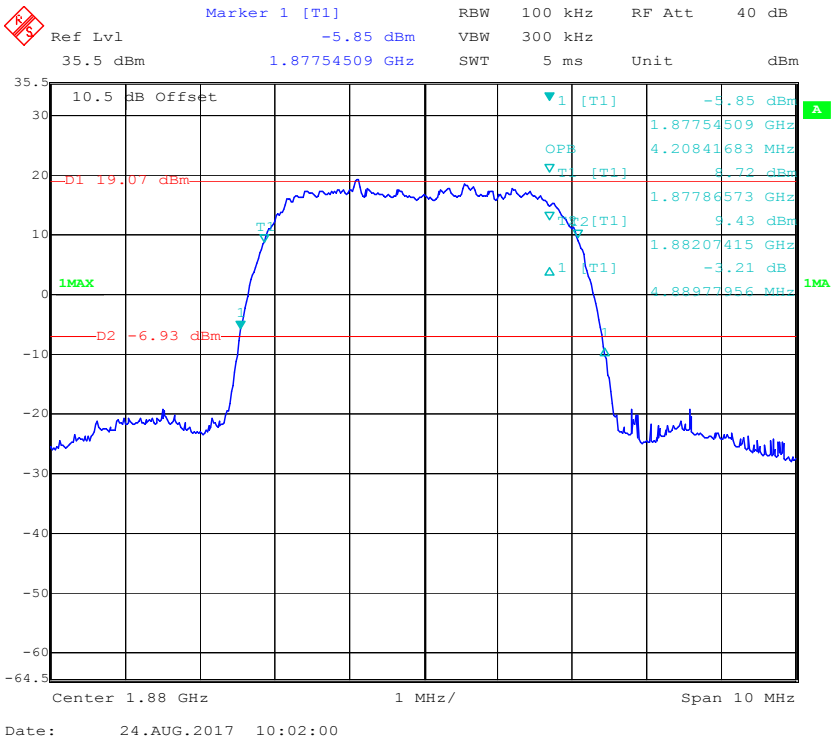
### 26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



## 26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode




## 26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode

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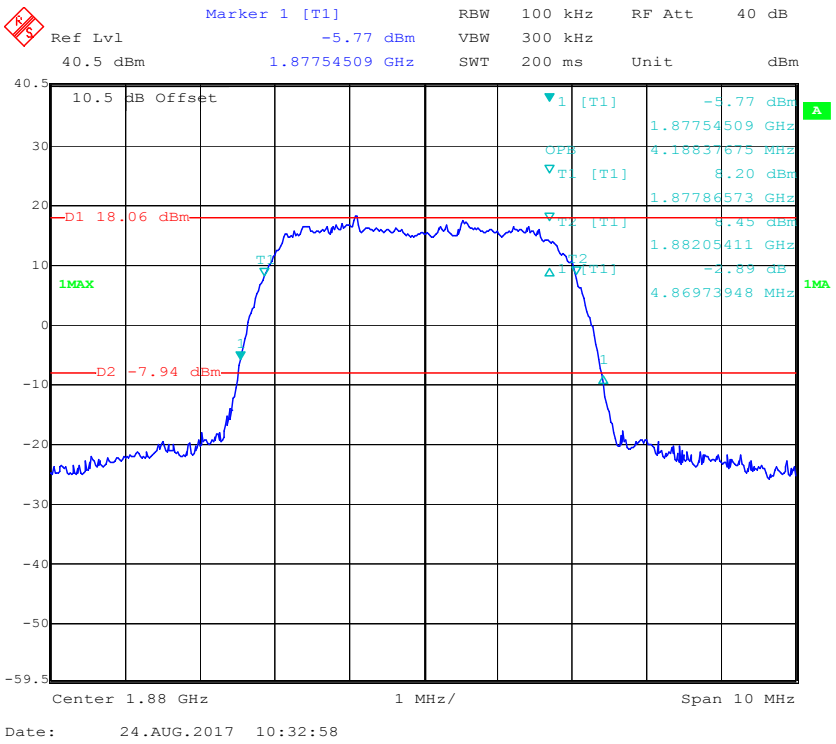
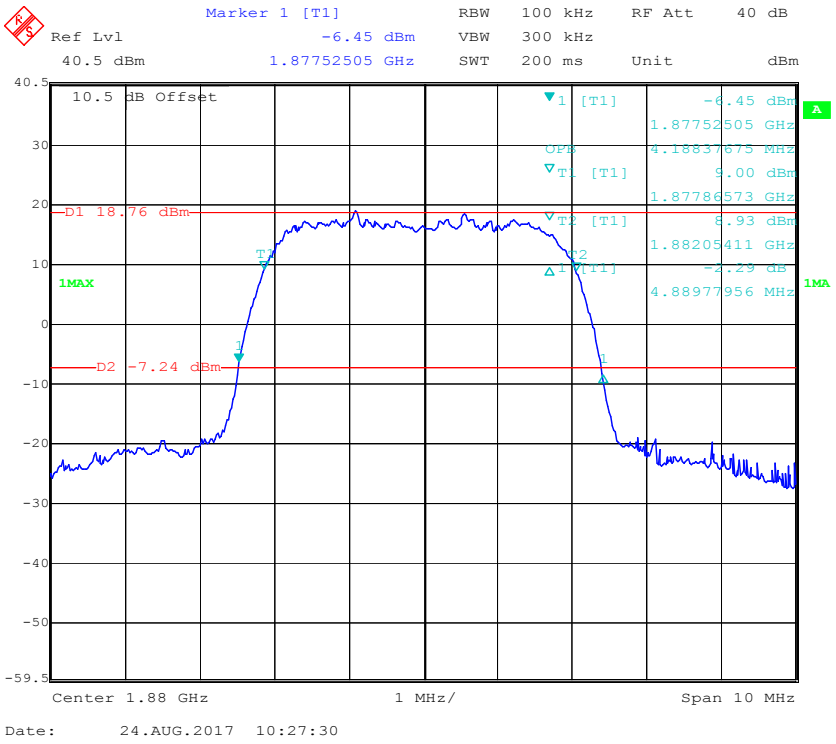
## 26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



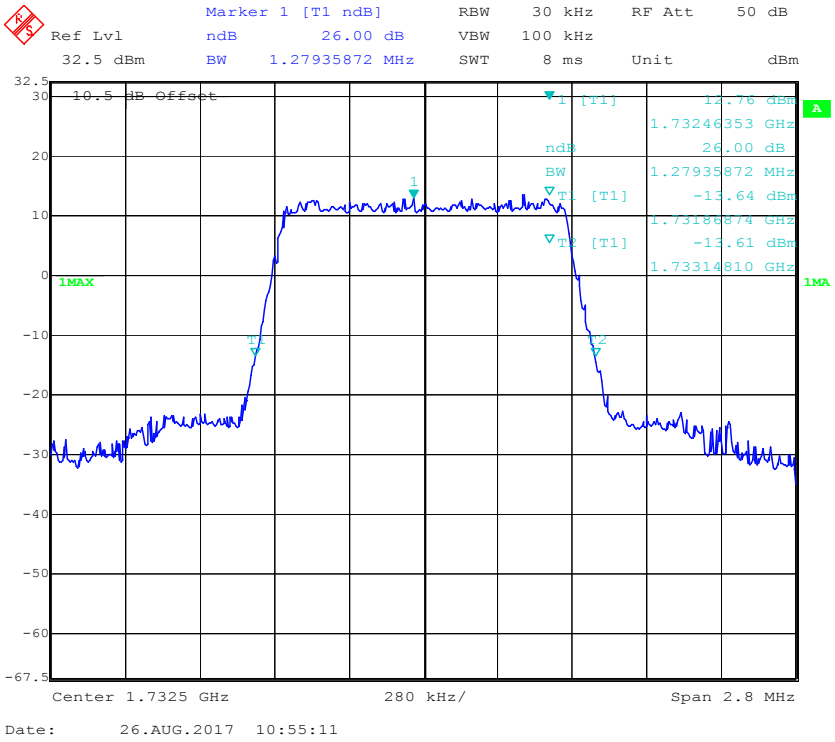

## 26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



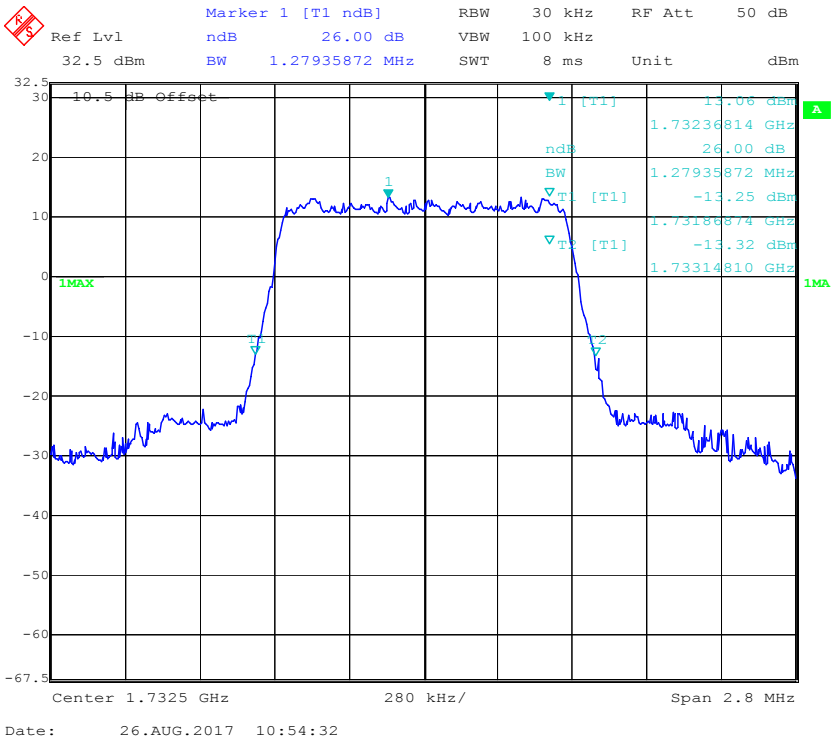
## LTE Band 4: (Middle Channel)

| Bandwidth (MHz) | Modulation | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---|---|---|---|
| 1.4 | QPSK | 1.105 | 1.279 |
| | 16QAM | 1.100 | 1.279 |
| 3.0 | QPSK | 2.693 | 2.934 |
| | 16QAM | 2.693 | 2.910 |
| 5.0 | QPSK | 4.549 | 5.010 |
| | 16QAM | 4.529 | 5.050 |
| 10.0 | QPSK | 8.978 | 9.739 |
| | 16QAM | 8.978 | 9.780 |
| 15.0 | QPSK | 13.527 | 14.910 |
| | 16QAM | 13.527 | 14.910 |
| 20.0 | QPSK | 18.036 | 19.479 |
| | 16QAM | 17.956 | 19.399 |

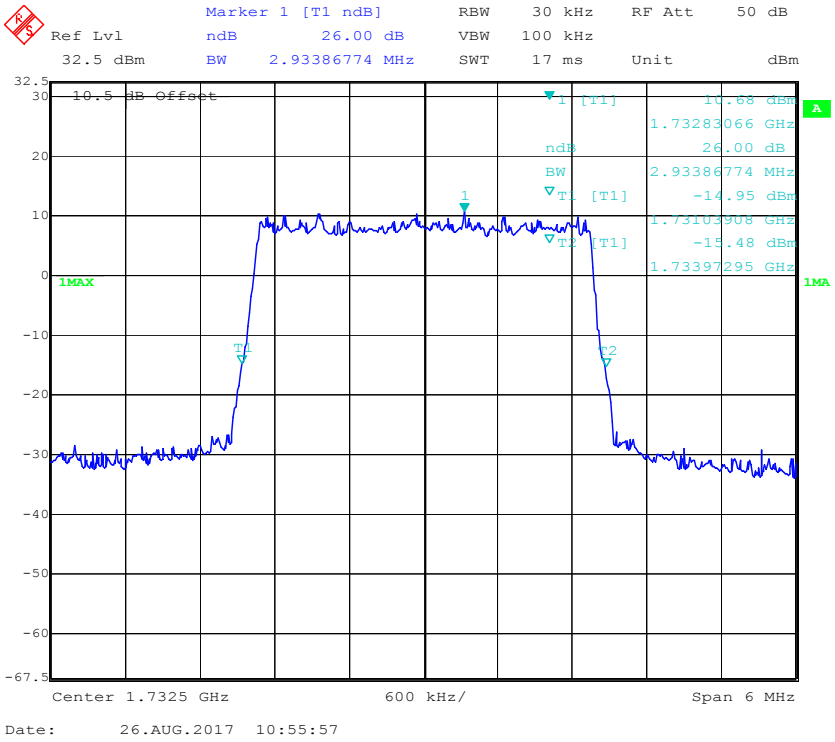
## QPSK (1.4 MHz) - 26 dB Emissions Bandwidth, Middle channel



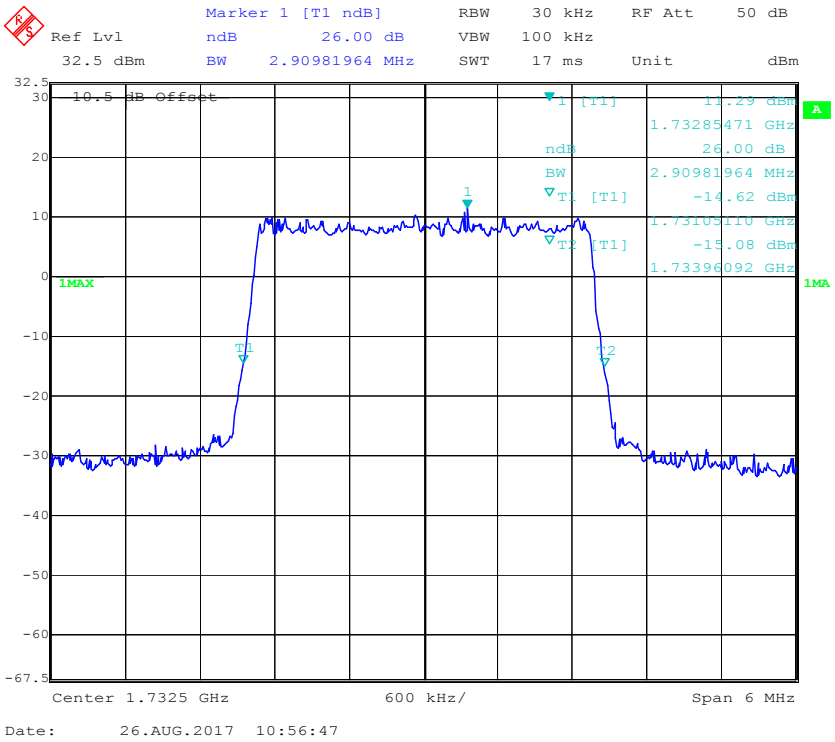

## 16-QAM (1.4 MHz) - 26 dB Emissions Bandwidth, Middle channel



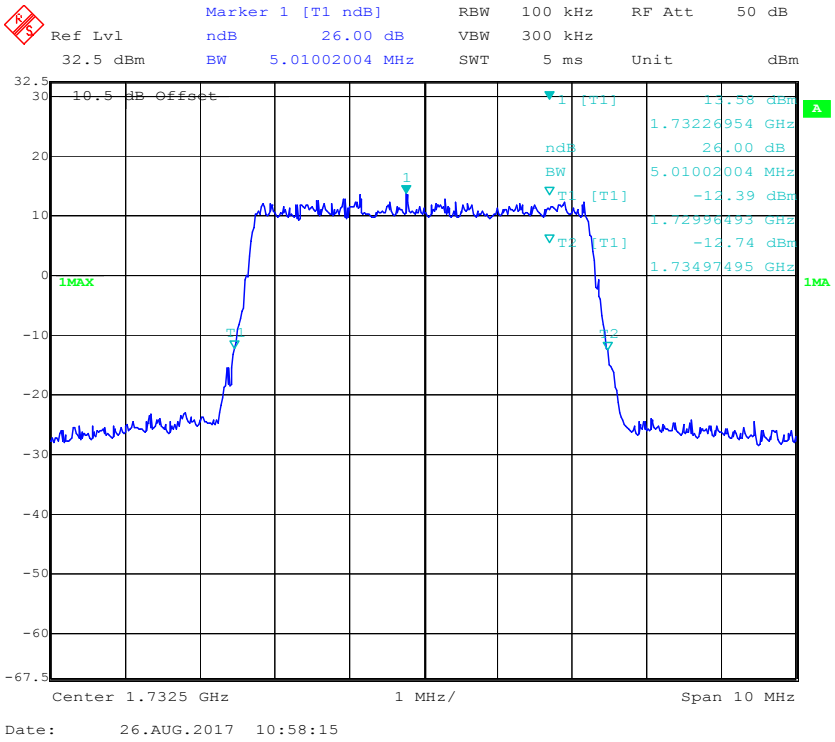
## QPSK (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



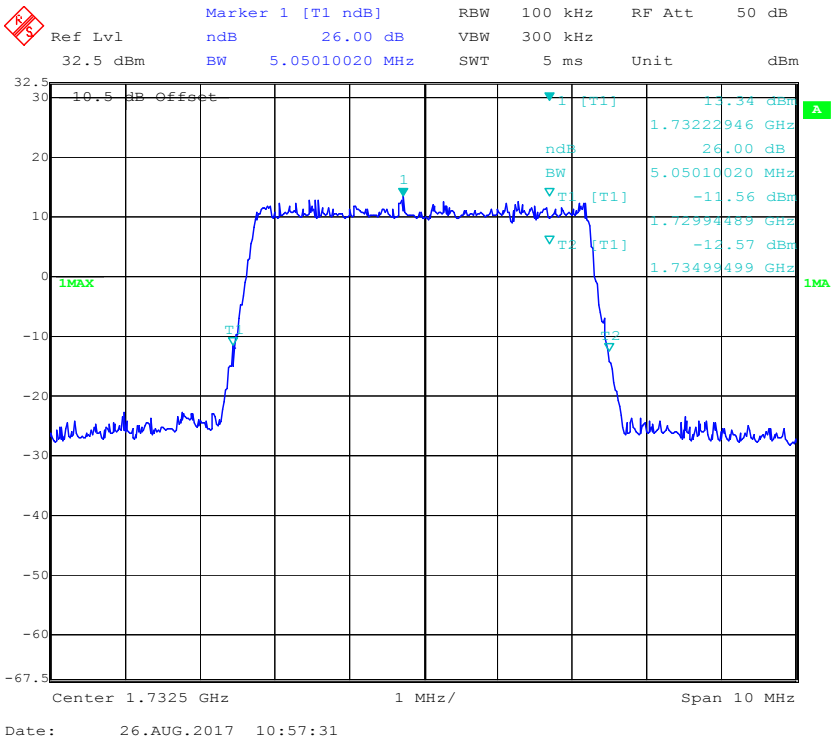

## 16-QAM (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



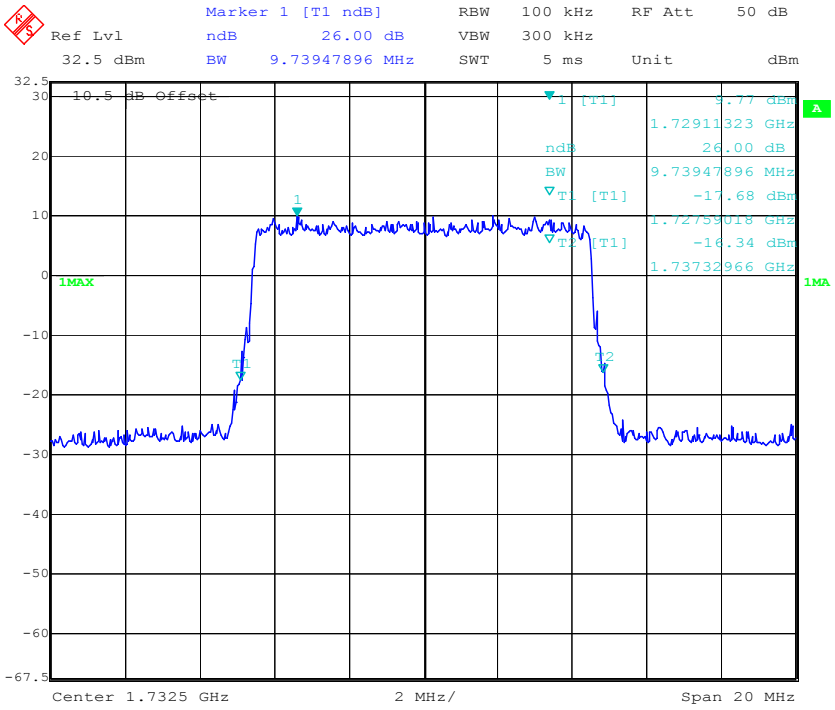
## QPSK (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



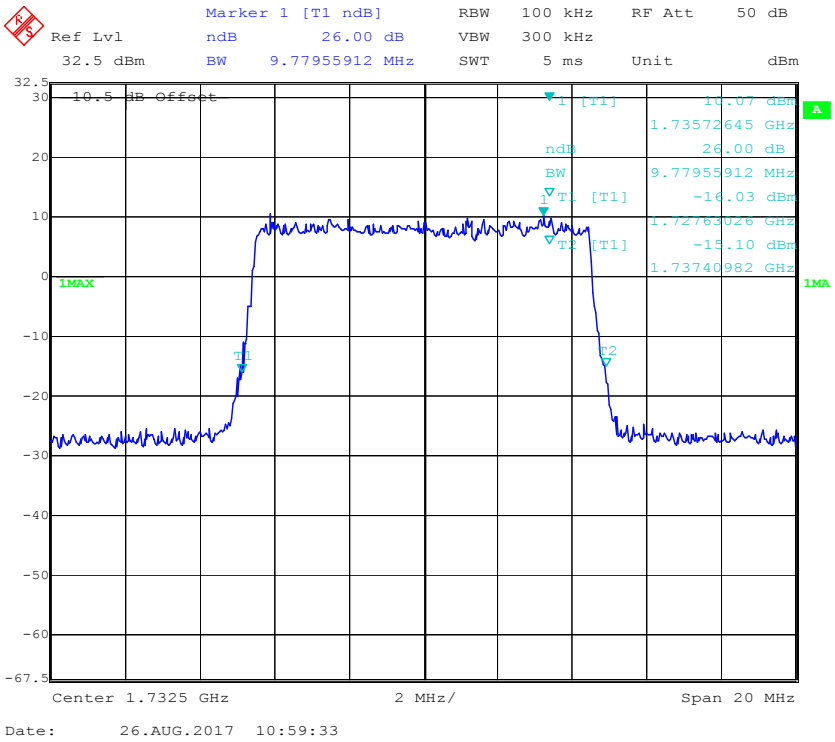

## 16-QAM (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



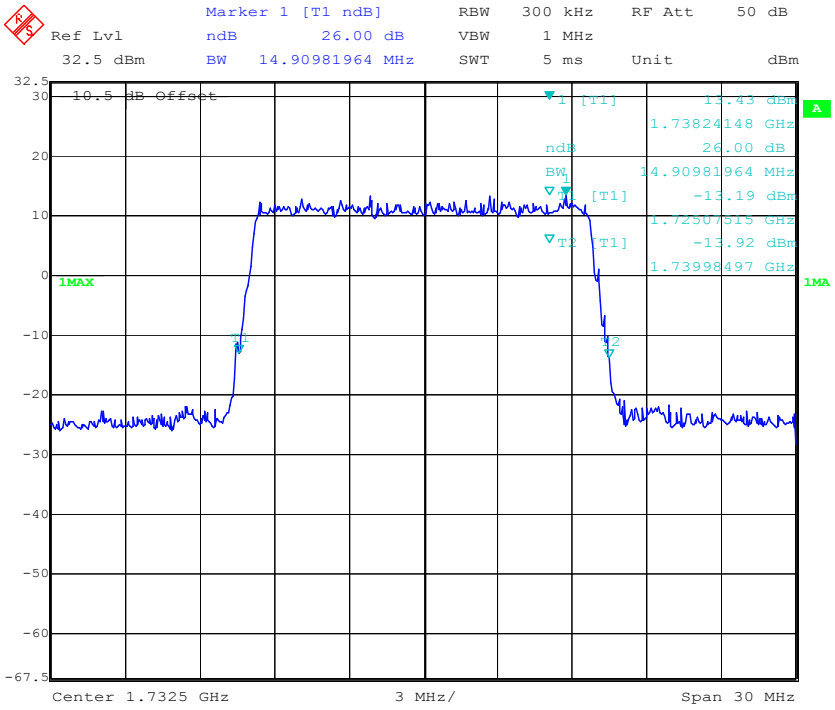
## QPSK (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



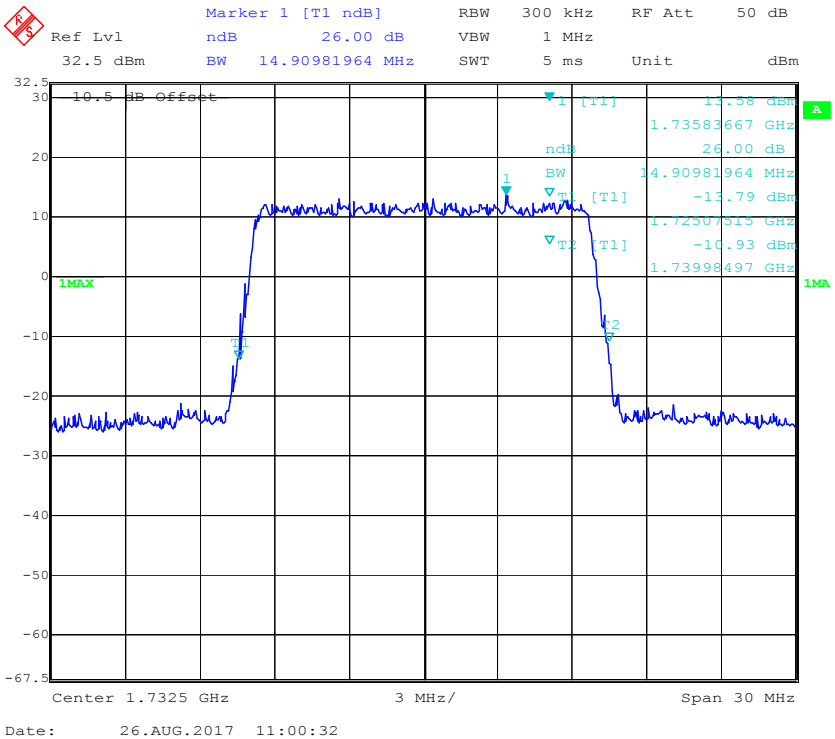

## 16-QAM (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



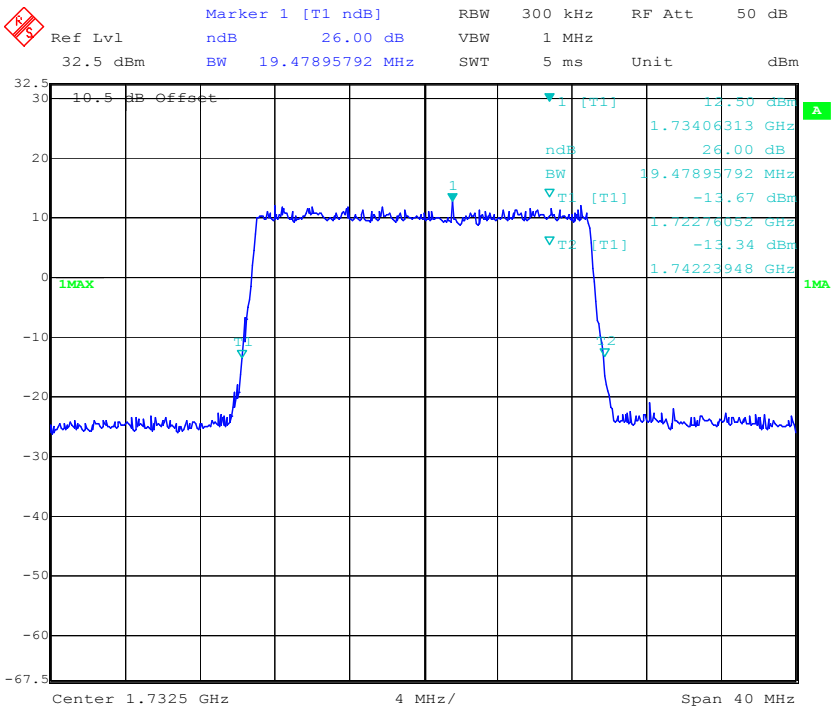
## QPSK (15.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



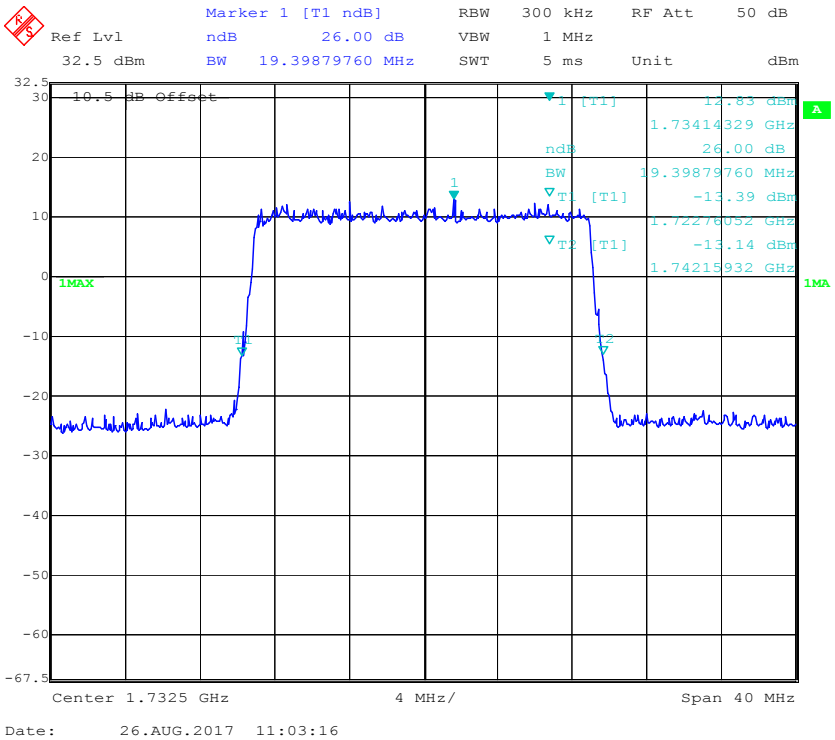

## 16-QAM (15.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



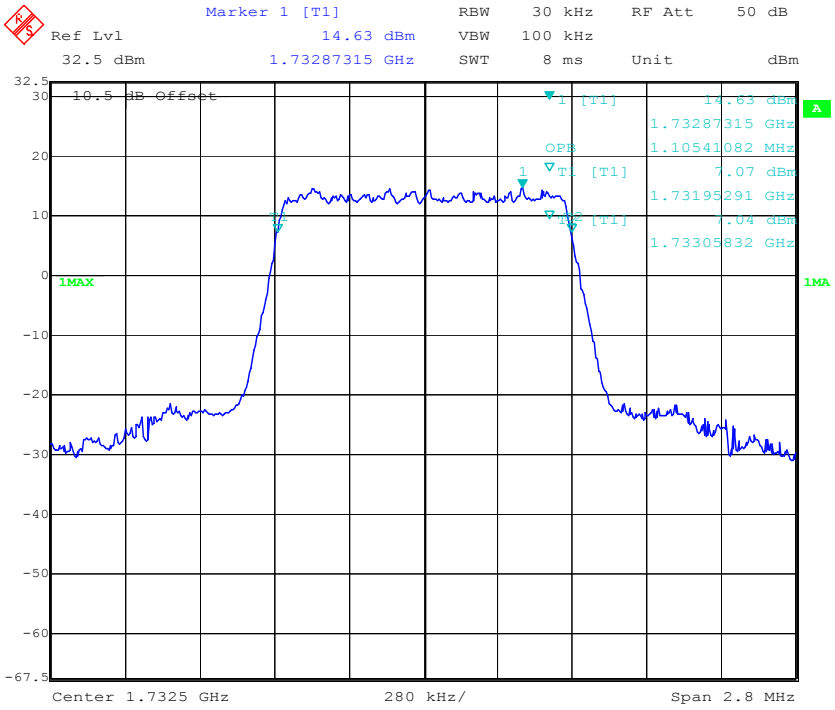
## QPSK (20.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



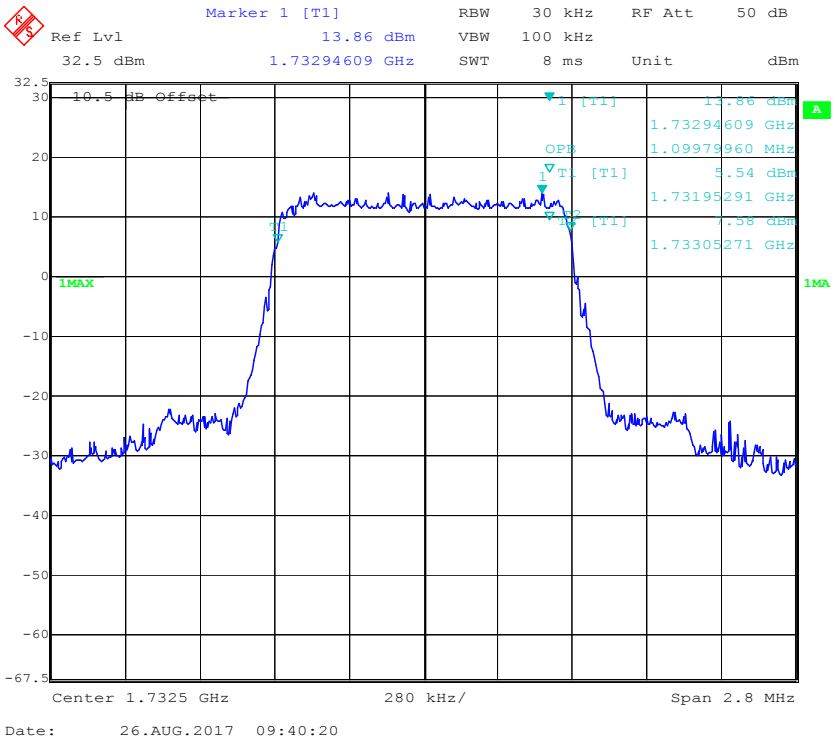

## 16-QAM (20.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



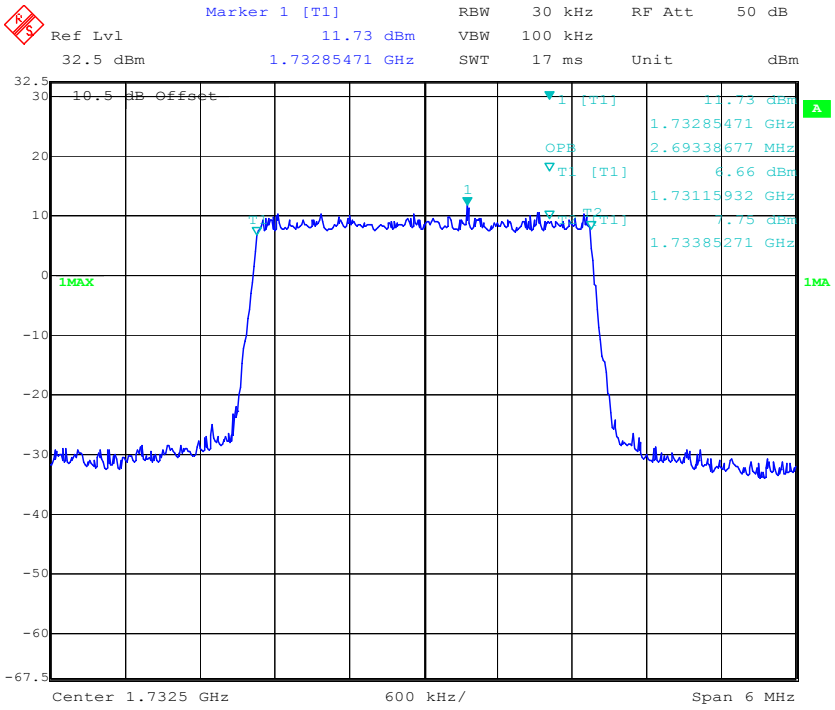
## QPSK (1.4 MHz) - 99% Occupied Bandwidth, Middle channel



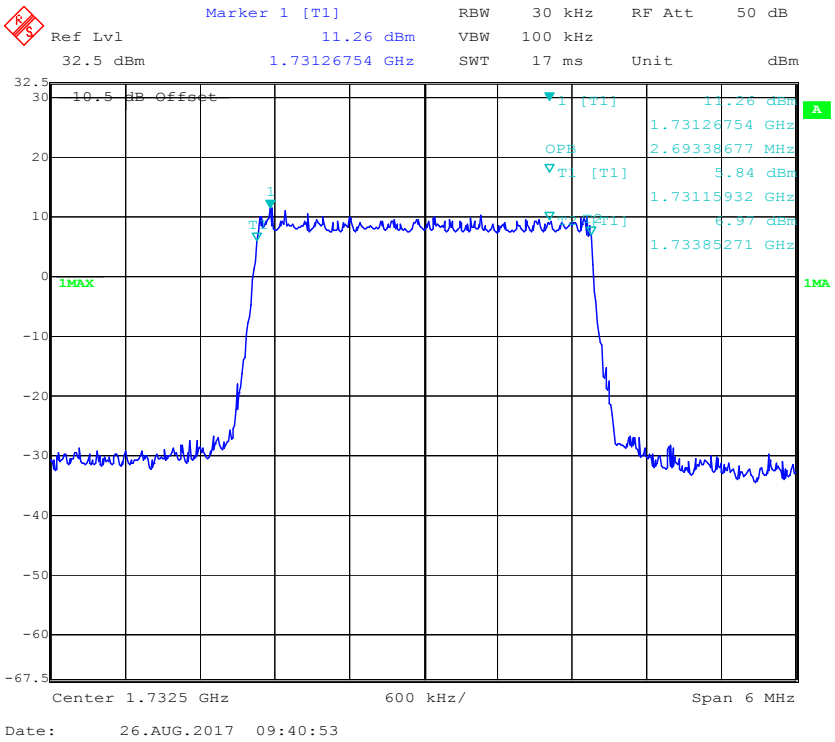

## 16-QAM (1.4 MHz) - 99% Occupied Bandwidth, Middle channel



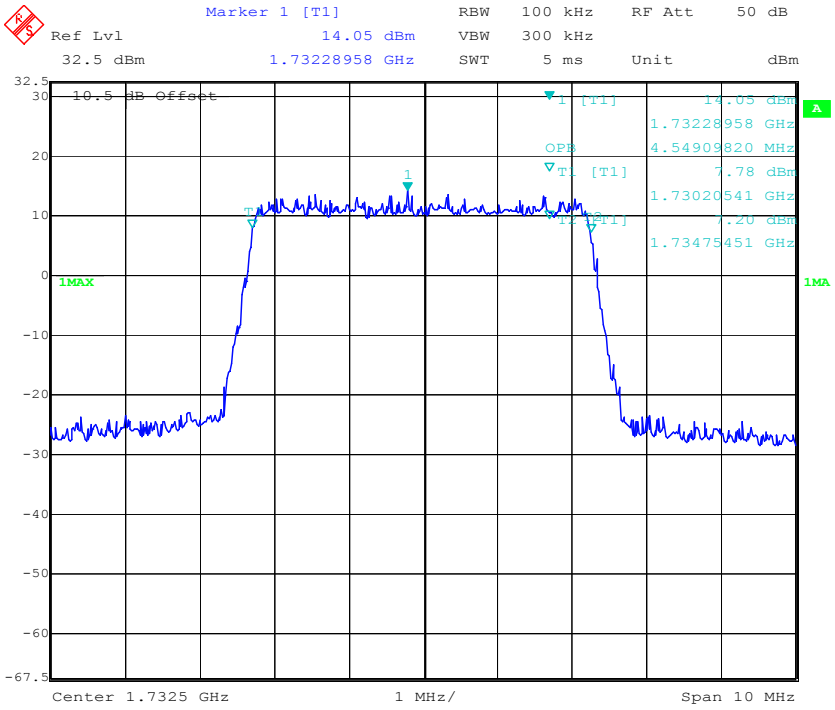
## QPSK (3.0 MHz) - 99% Occupied Bandwidth, Middle channel



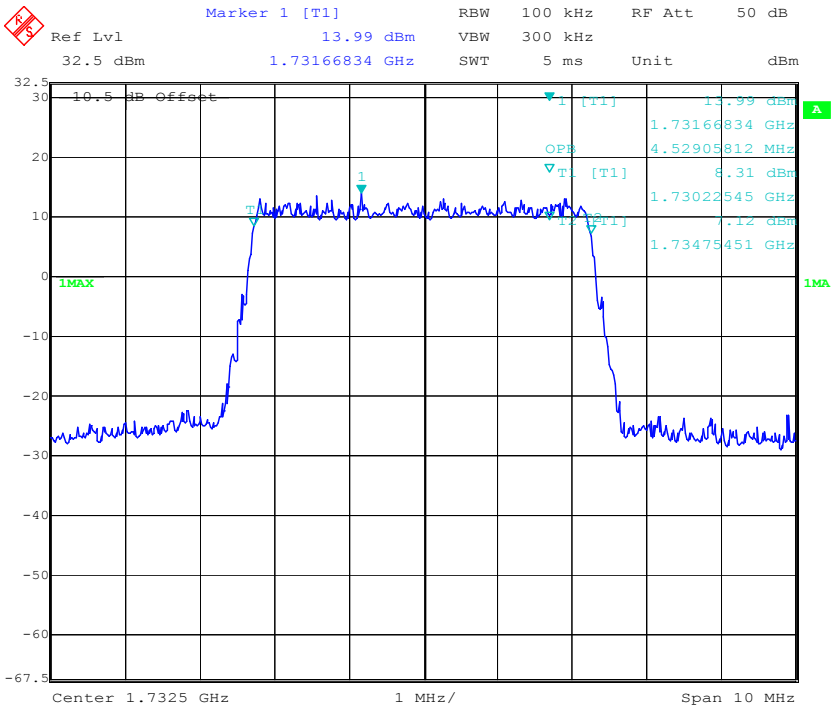

## 16-QAM (3.0 MHz) - 99% Occupied Bandwidth, Middle channel



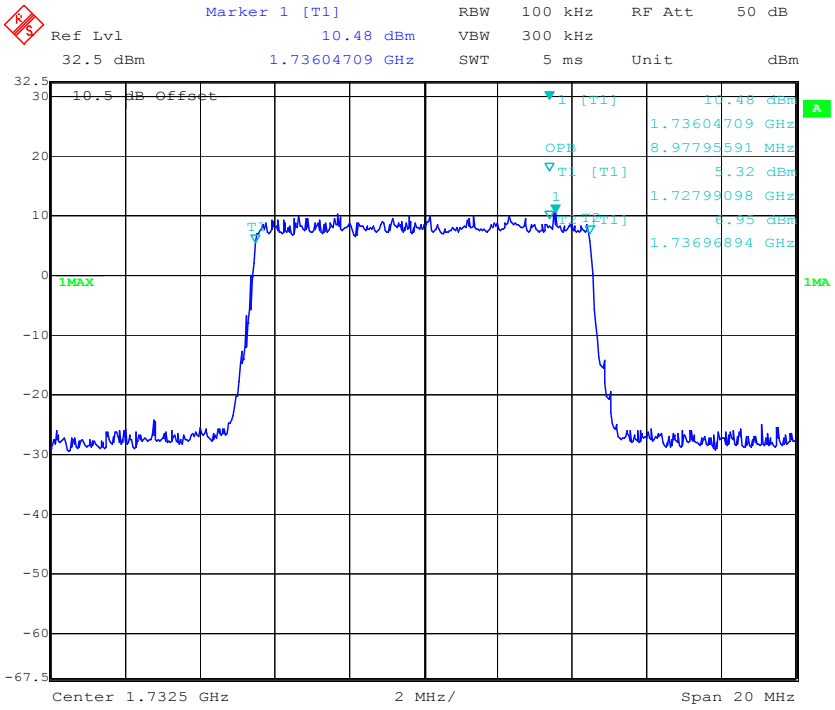
## QPSK (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



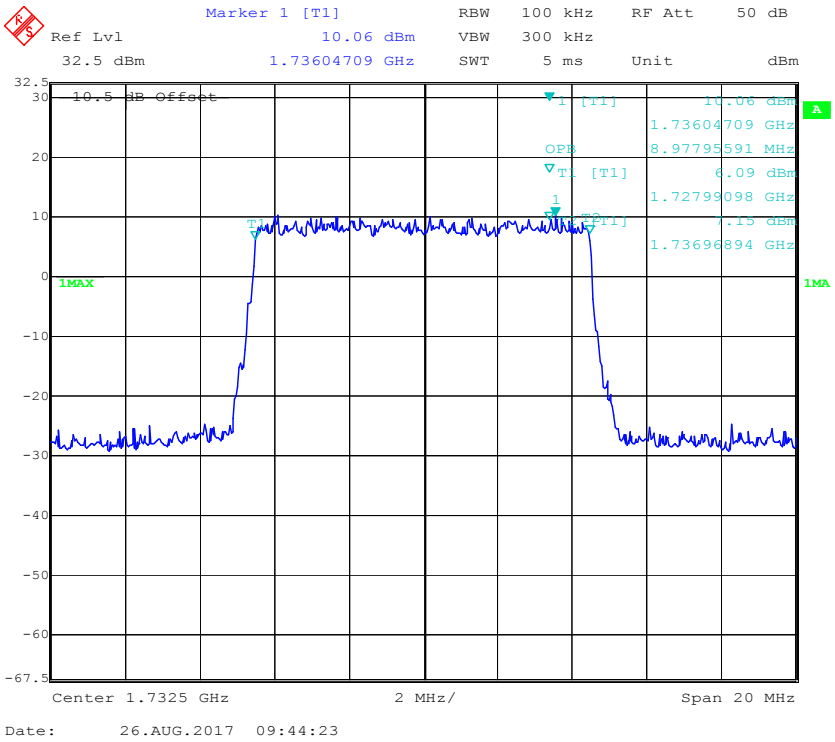

## 16-QAM (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



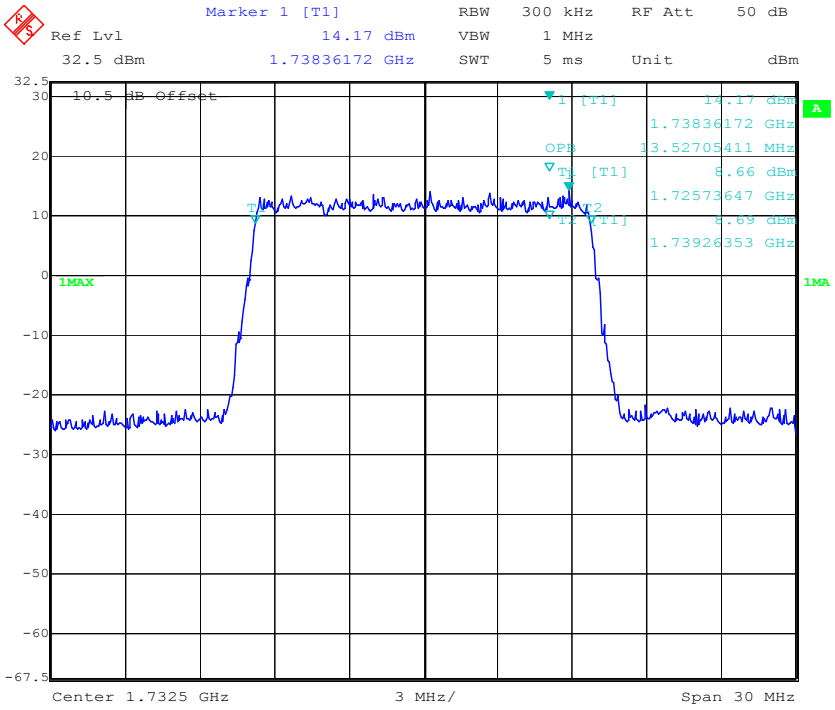
## QPSK (10.0 MHz) - 99% Occupied Bandwidth, Middle channel



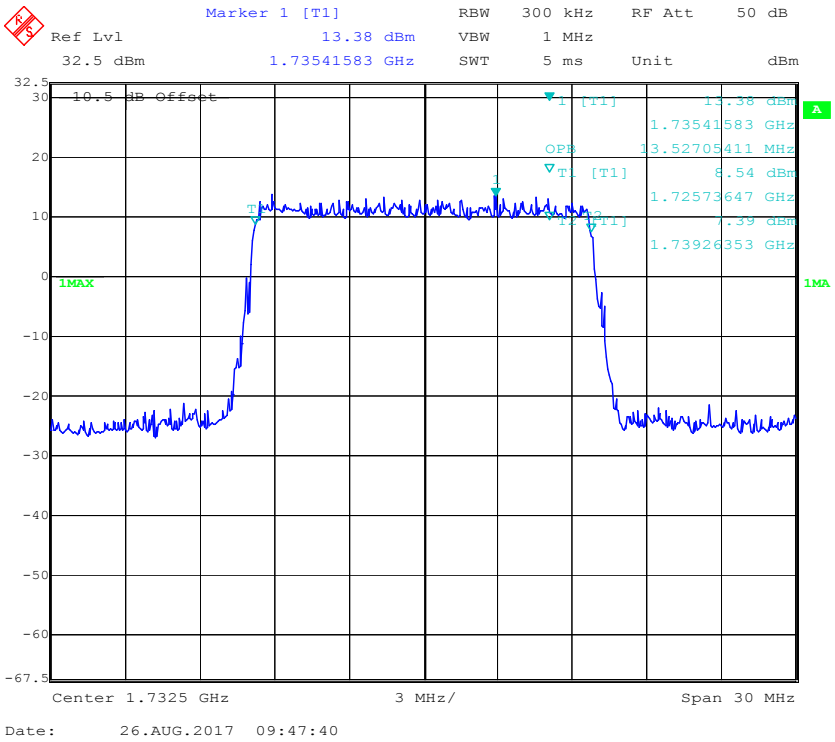

## 16-QAM (10.0 MHz) - 99% Occupied Bandwidth, Middle channel



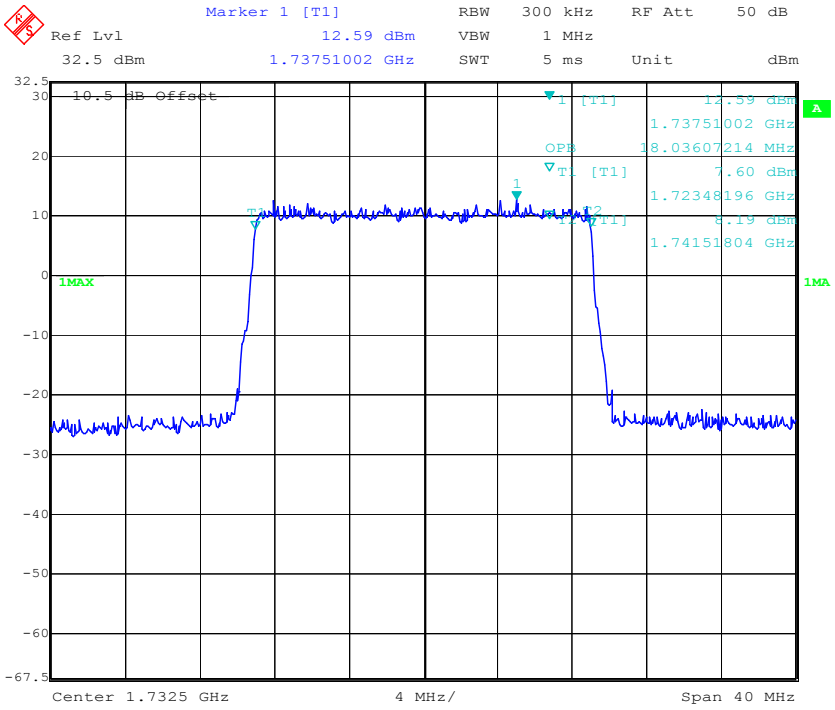
## QPSK (15.0 MHz) - 99% Occupied Bandwidth, Middle channel



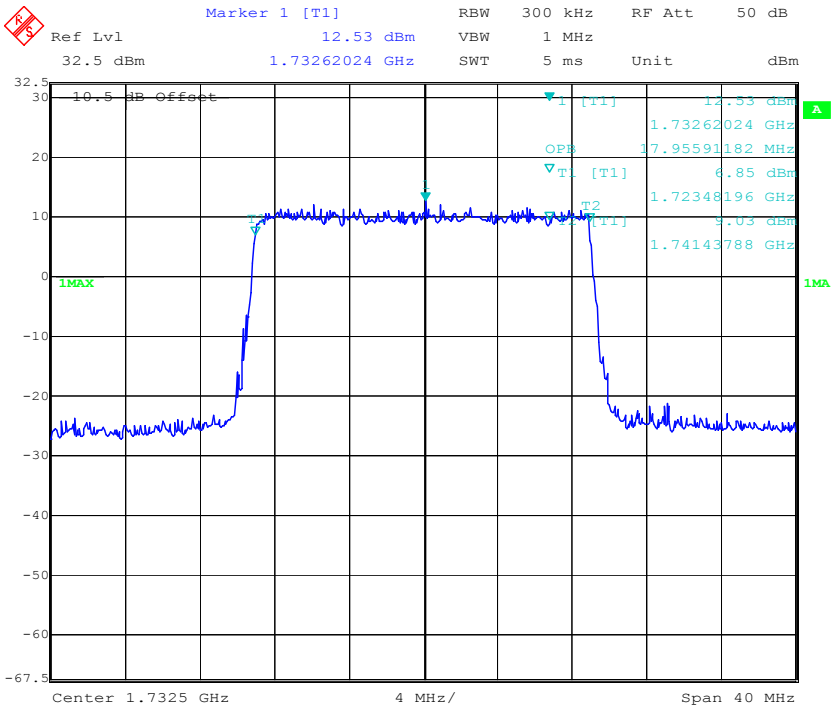

## 16-QAM (15.0 MHz) - 99% Occupied Bandwidth, Middle channel



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



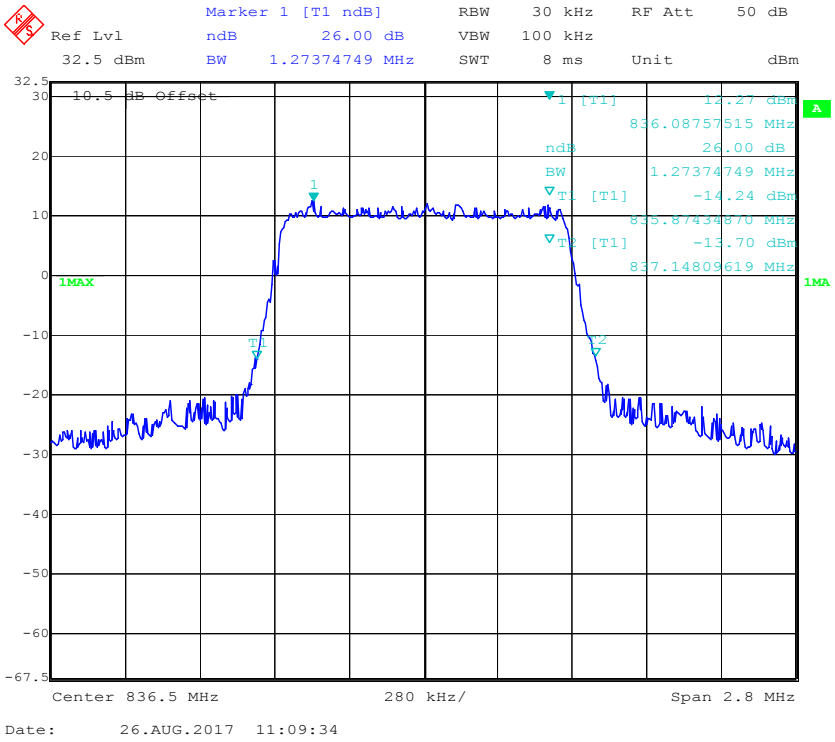

## 16-QAM (20.0 MHz) - 99% Occupied Bandwidth, Middle channel



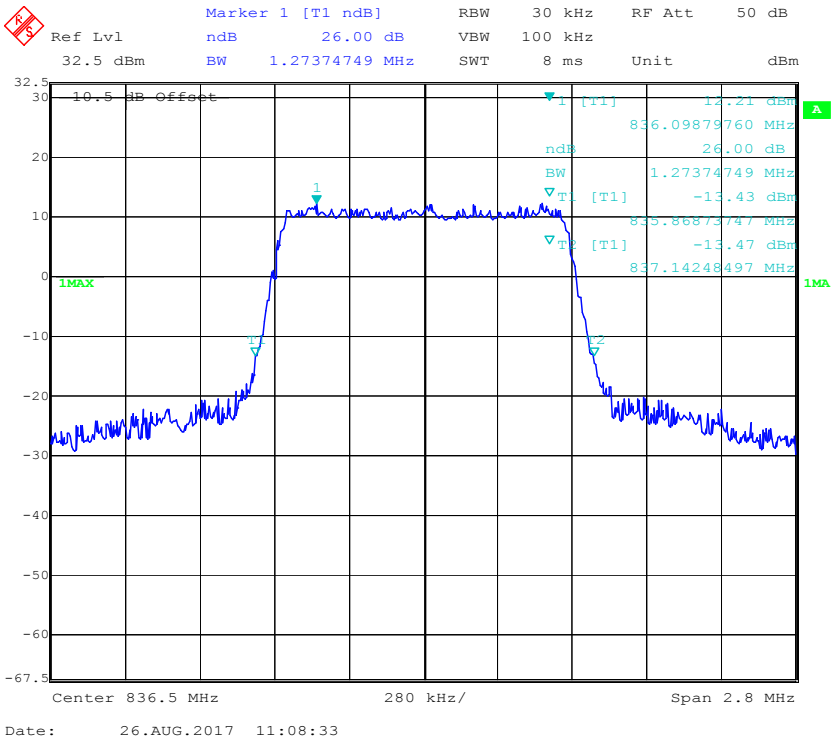
## LTE Band 5: (Middle Channel)

| Bandwidth (MHz) | Modulation | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---|---|---|---|
| 1.4 | QPSK | 1.089 | 1.274 |
| | 16QAM | 1.105 | 1.274 |
| 3.0 | QPSK | 2.681 | 2.910 |
| | 16QAM | 2.693 | 2.934 |
| 5.0 | QPSK | 4.529 | 4.990 |
| | 16QAM | 4.529 | 5.030 |
| 10.0 | QPSK | 8.978 | 9.820 |
| | 16QAM | 8.978 | 9.780 |

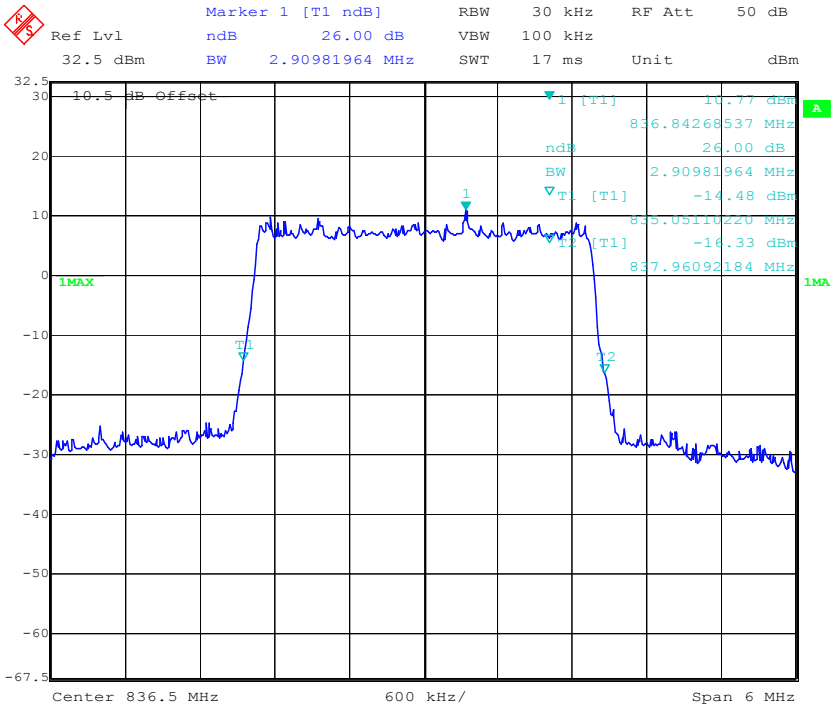
## QPSK (1.4 MHz) - 26 dB Emissions Bandwidth, Middle channel



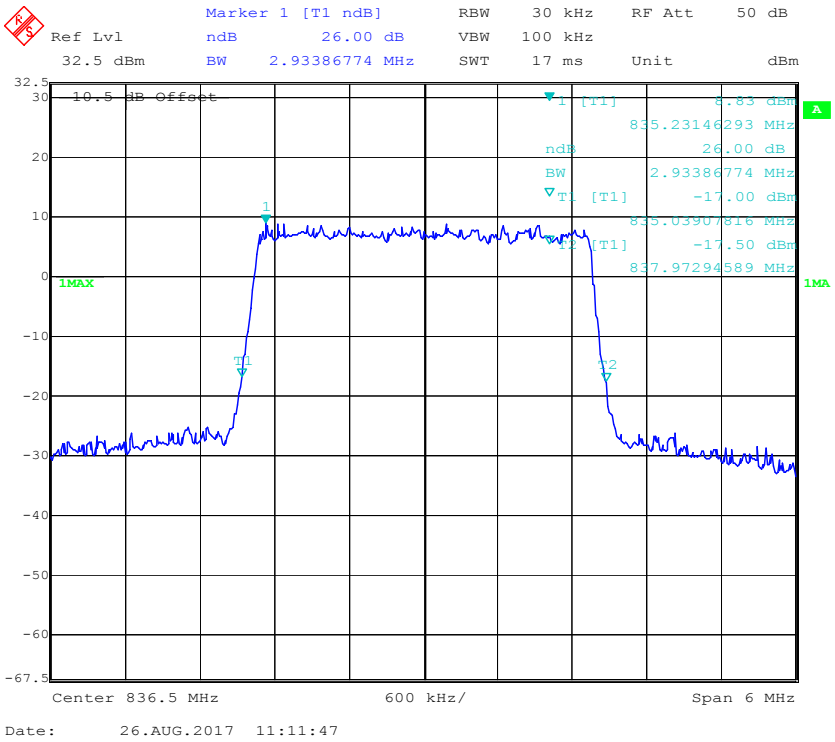

## 16-QAM (1.4 MHz) - 26 dB Emissions Bandwidth, Middle channel



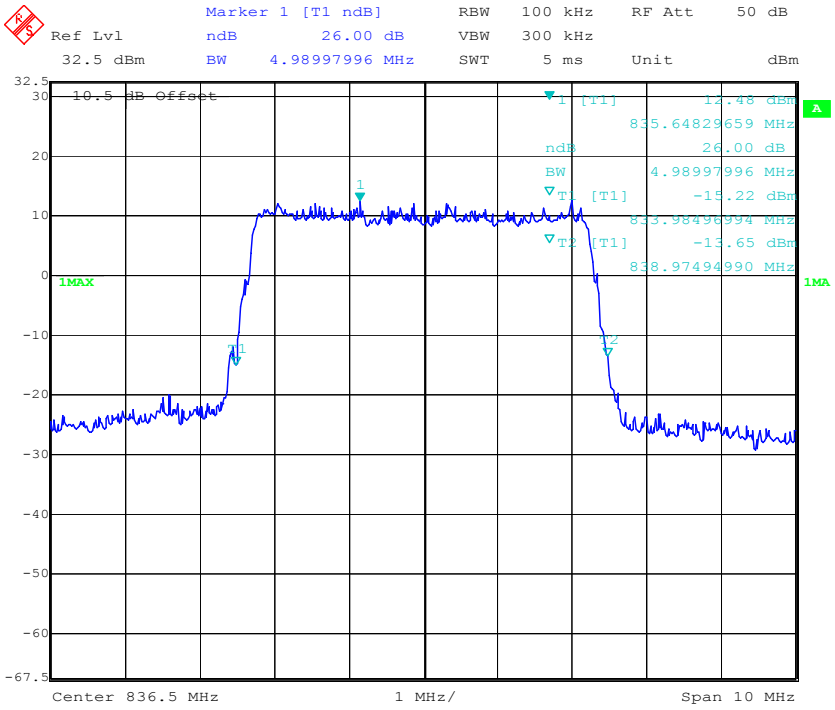
## QPSK (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



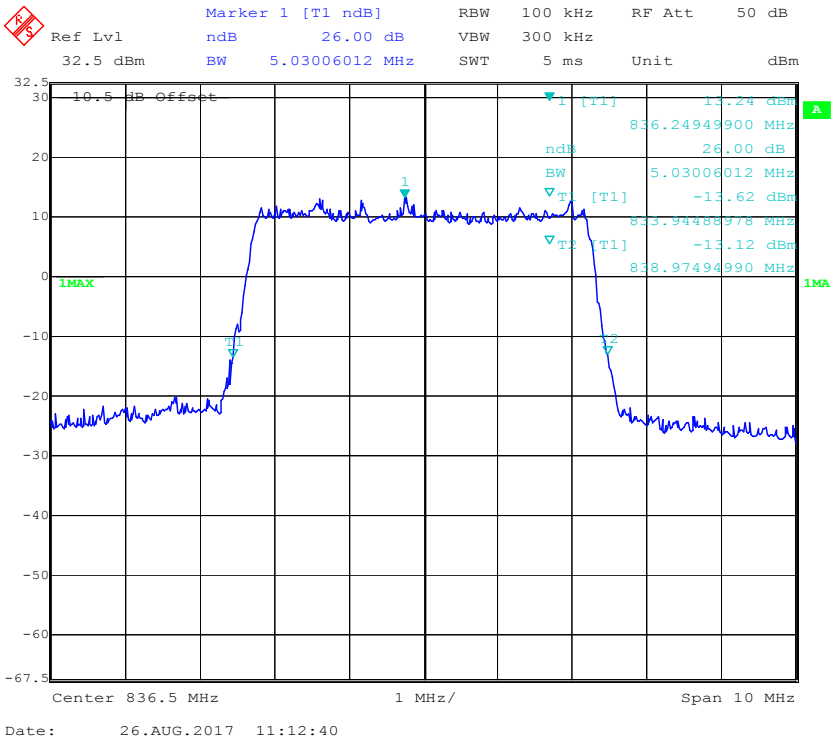

## 16-QAM (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



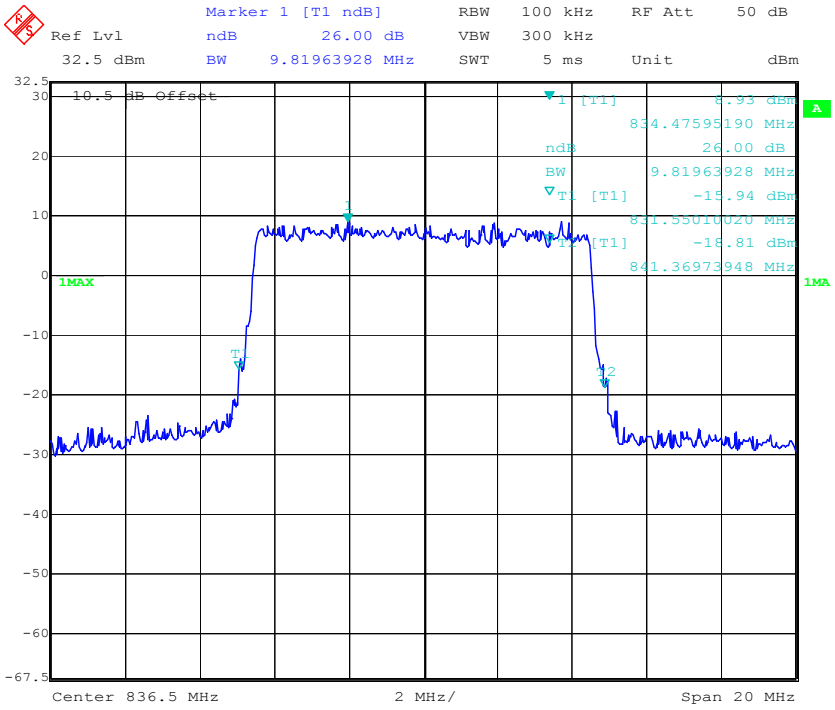
## QPSK (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



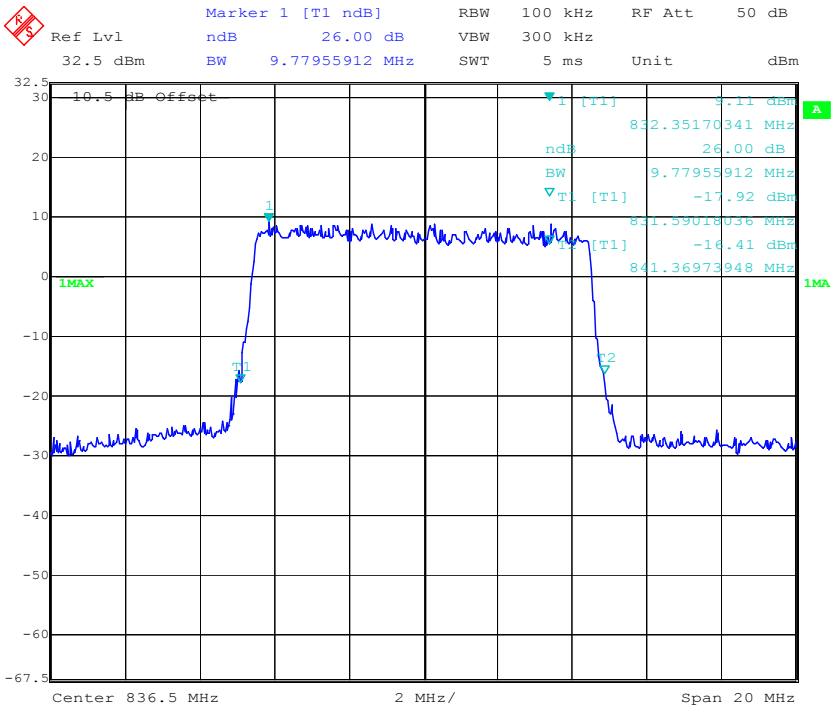

## 16-QAM (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



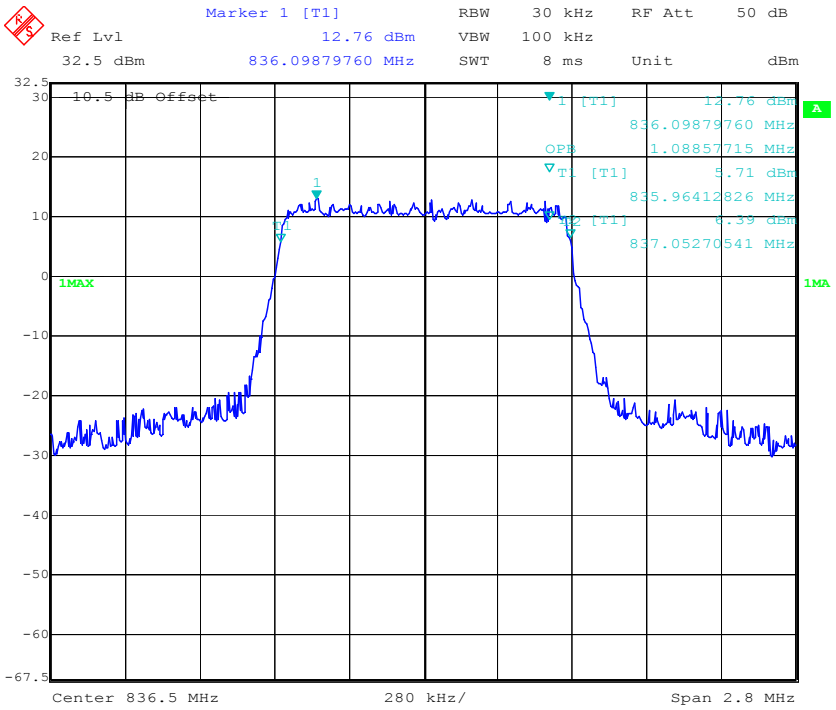
## QPSK (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



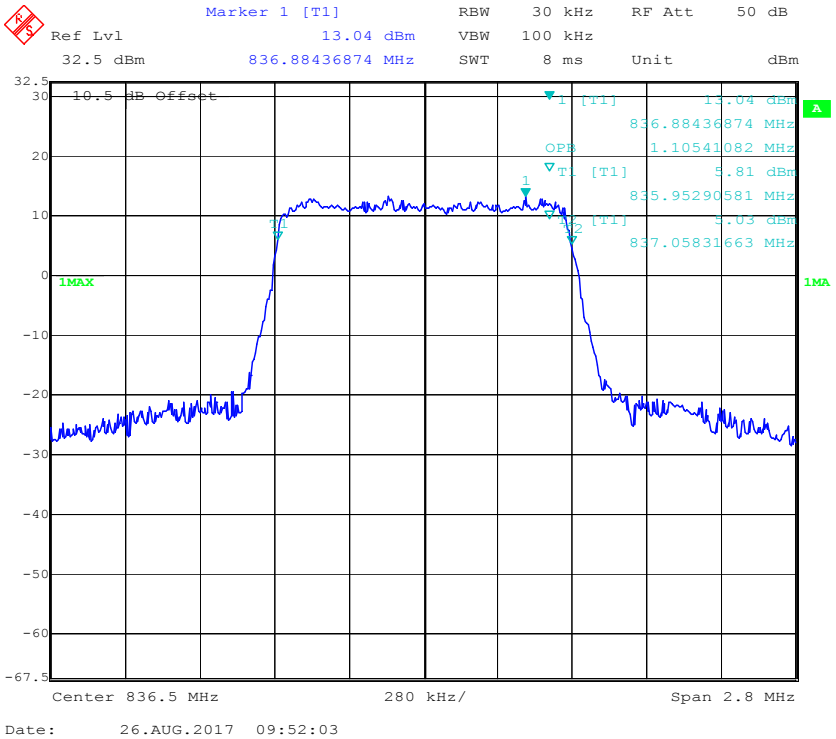

## 16-QAM (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



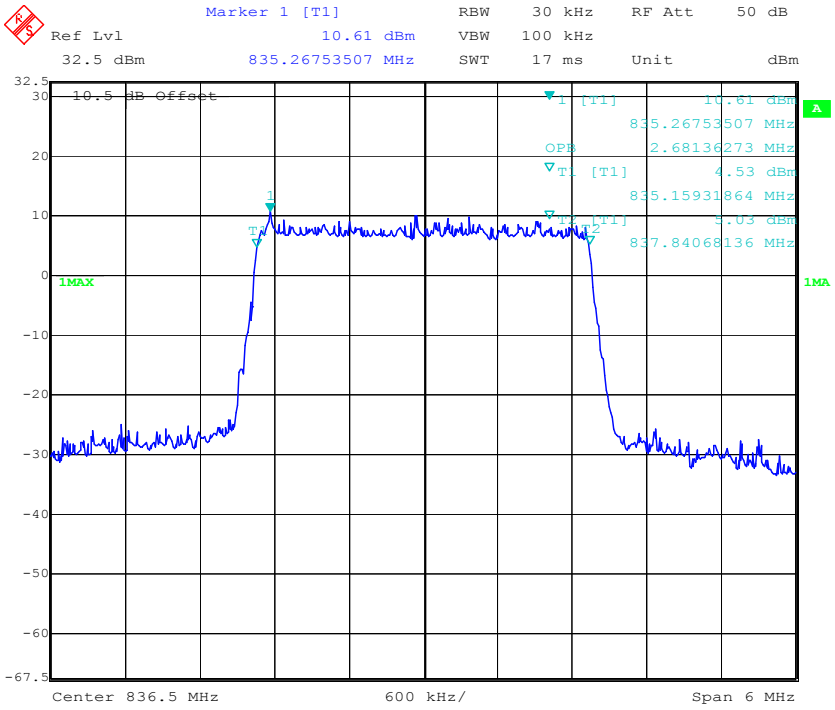
## QPSK (1.4 MHz) - 99% Occupied Bandwidth, Middle channel



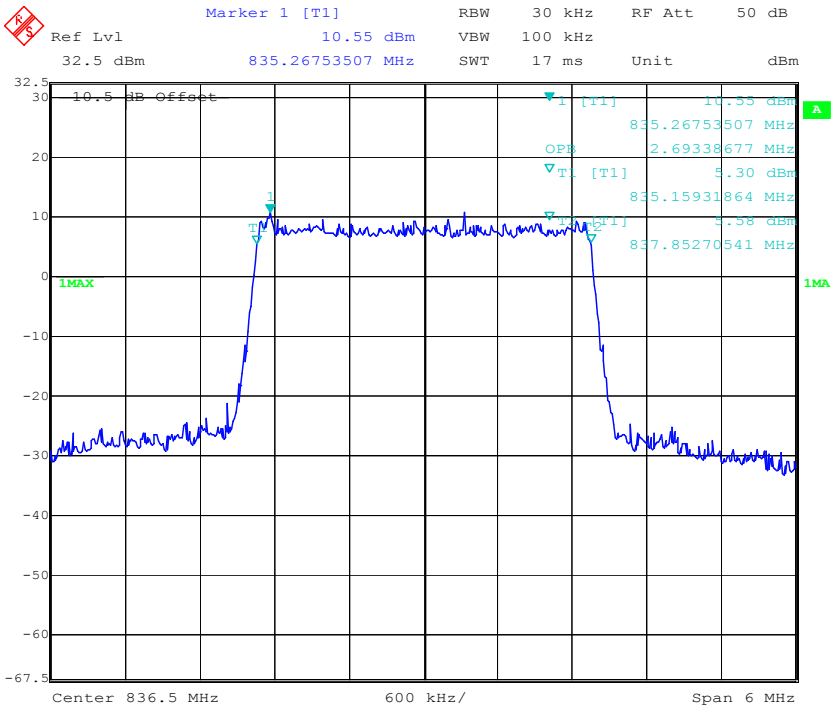

## 16-QAM (1.4 MHz) - 99% Occupied Bandwidth, Middle channel



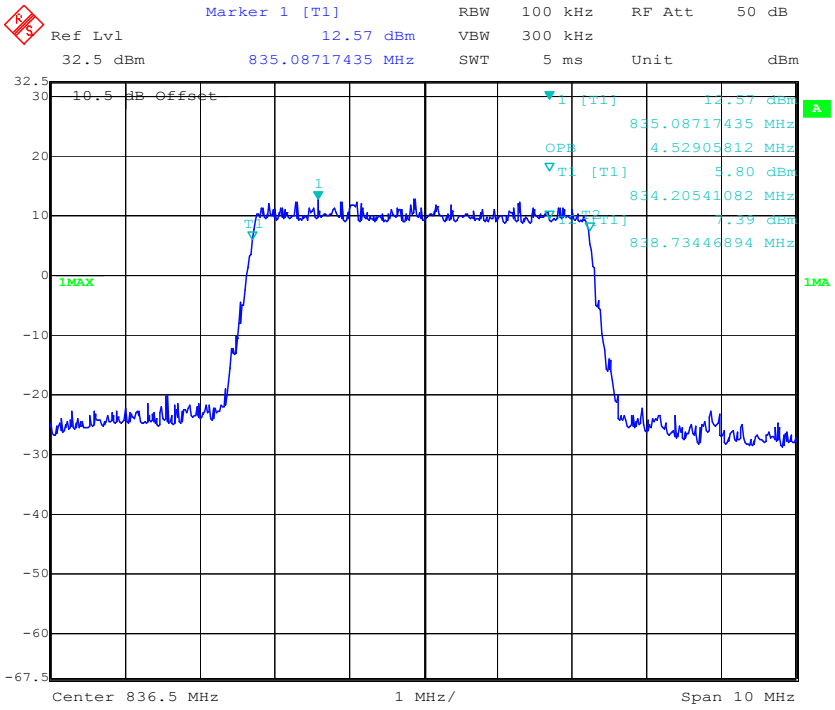
## QPSK (3.0 MHz) - 99% Occupied Bandwidth, Middle channel



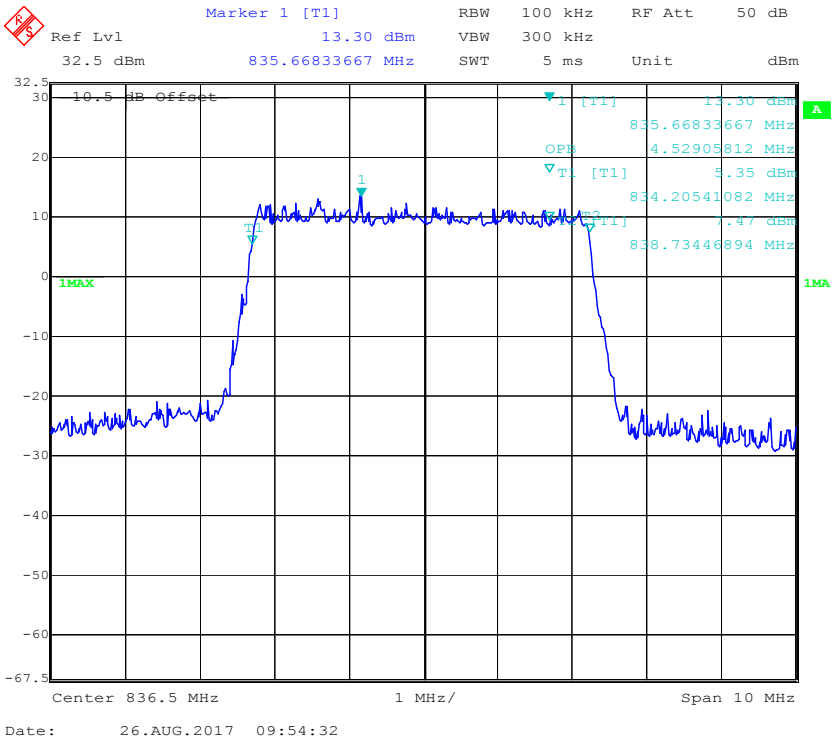

## 16-QAM (3.0 MHz) - 99% Occupied Bandwidth, Middle channel



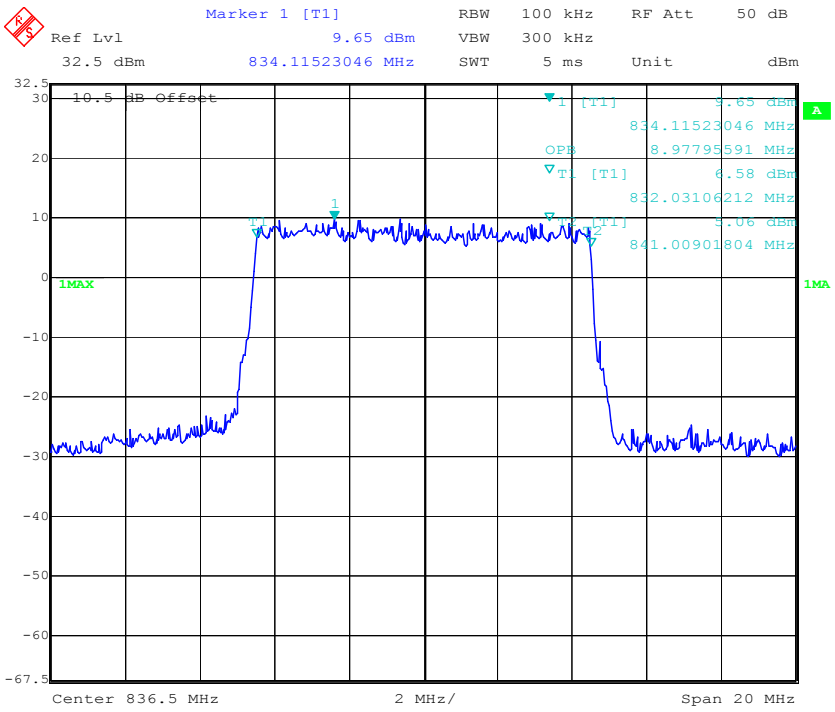
## QPSK (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



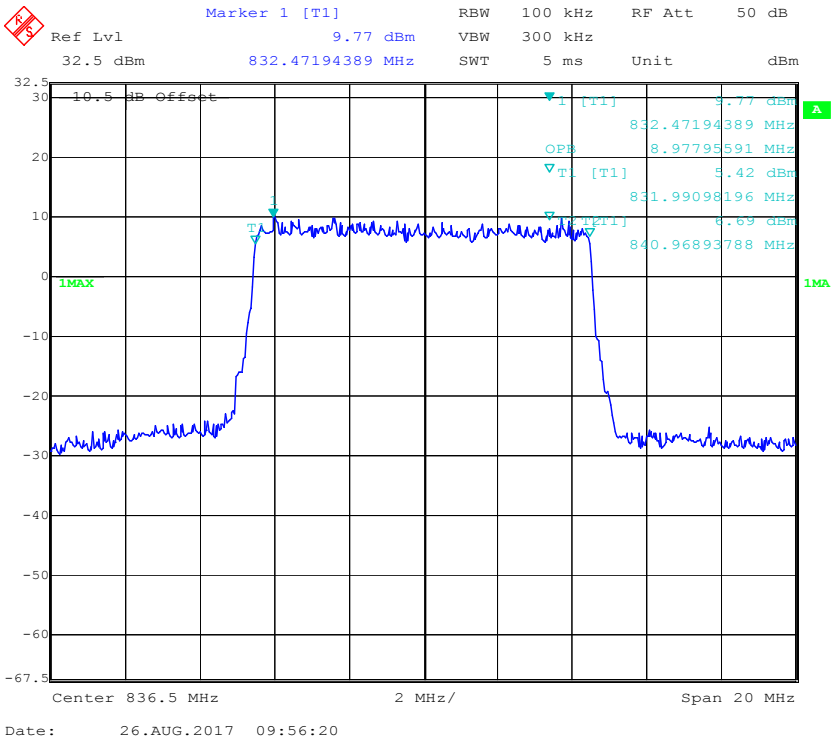

## 16-QAM (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



## QPSK (10.0 MHz) - 99% Occupied Bandwidth, Middle channel



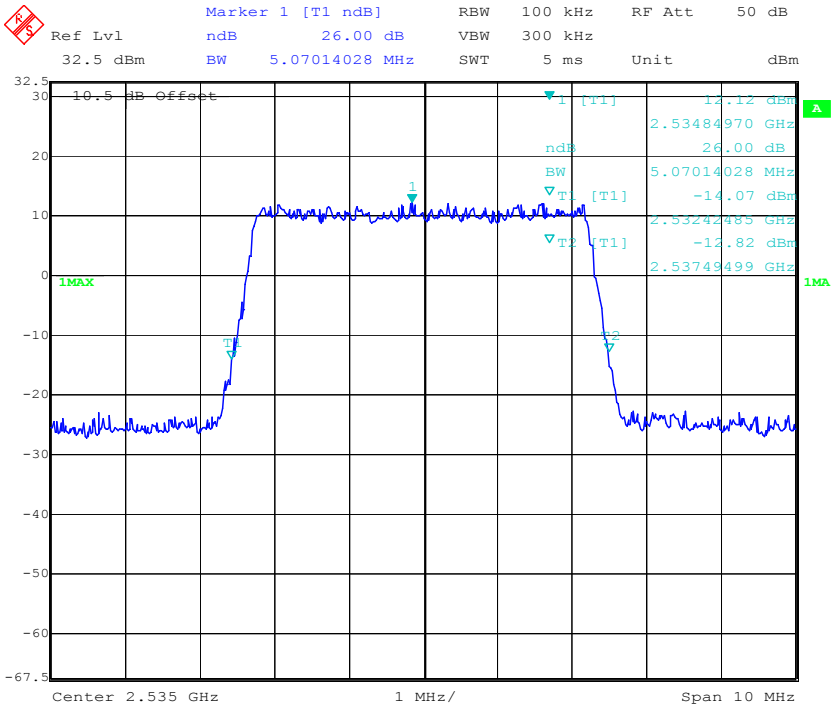

## 16-QAM (10.0 MHz) - 99% Occupied Bandwidth, Middle channel



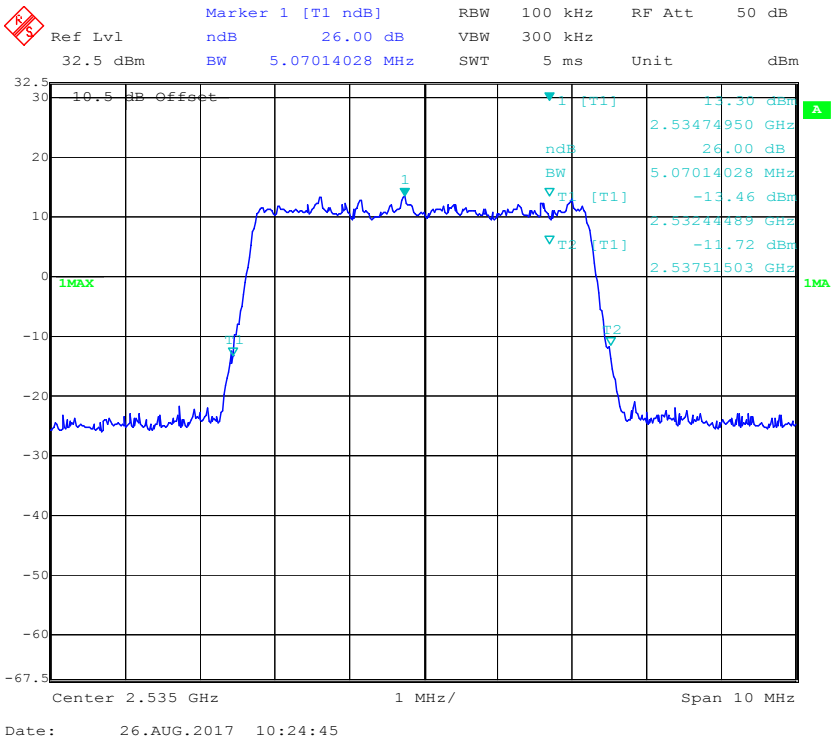
## LTE Band 7: (Middle Channel)

| Bandwidth (MHz) | Modulation | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---|---|---|---|
| 5 | QPSK | 4.529 | 5.070 |
| | 16QAM | 4.549 | 5.070 |
| 10 | QPSK | 8.978 | 9.900 |
| | 16QAM | 8.978 | 9.739 |
| 15 | QPSK | 13.527 | 14.910 |
| | 16QAM | 13.527 | 14.970 |
| 20 | QPSK | 18.036 | 19.479 |
| | 16QAM | 17.956 | 19.559 |

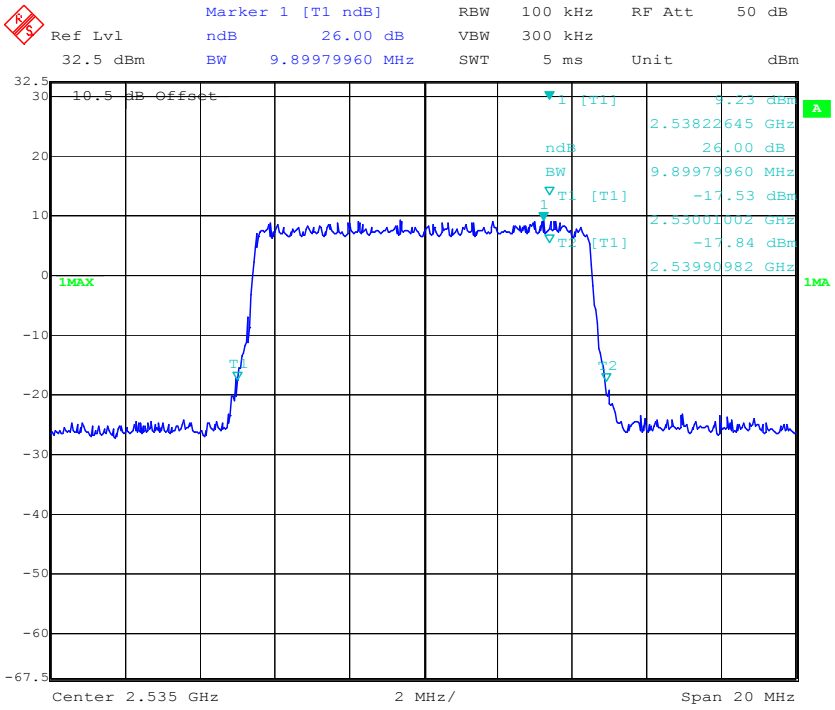
## QPSK (5 MHz) - 26 dB Emissions Bandwidth, Middle channel



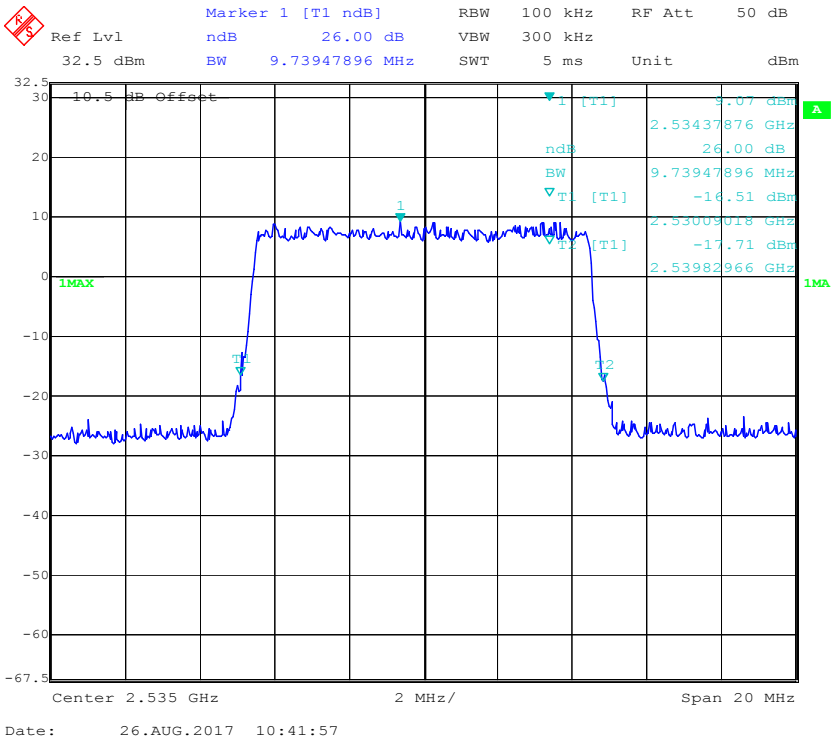

## 16-QAM (5 MHz) - 26 dB Emissions Bandwidth, Middle channel



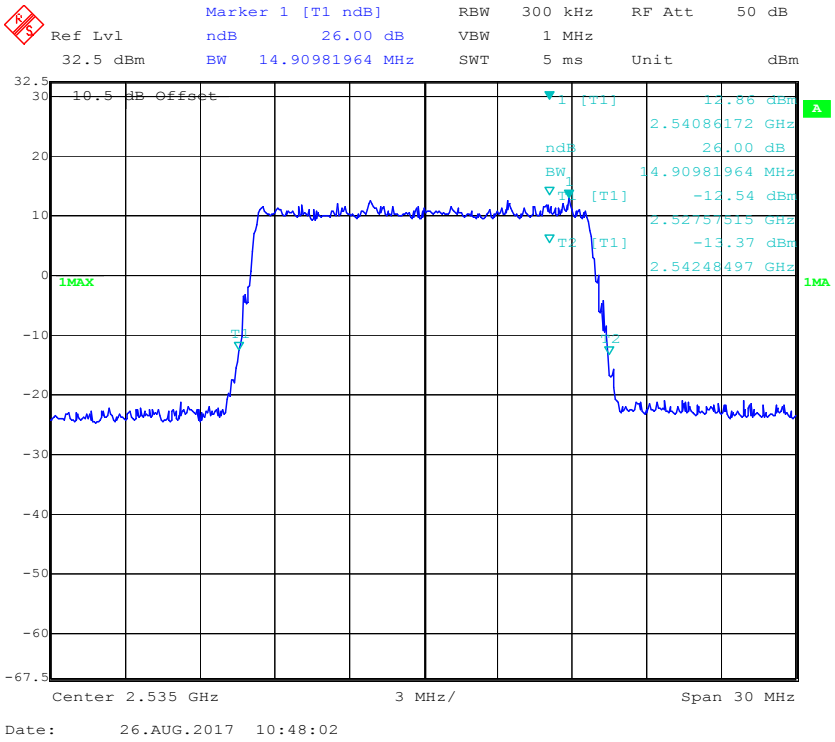
## QPSK (10 MHz) - 26 dB Emissions Bandwidth, Middle channel



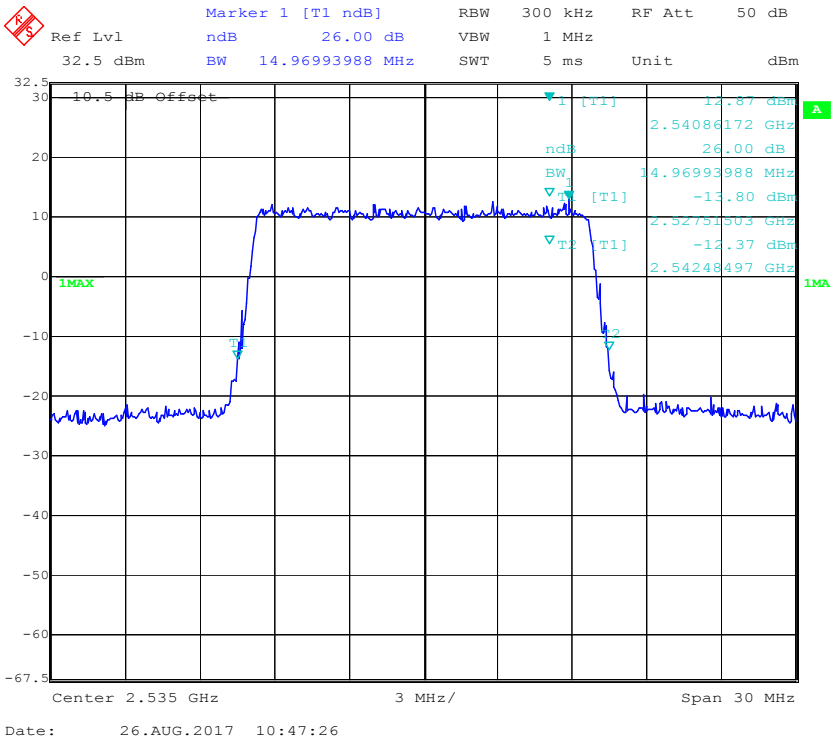

## 16-QAM (10MHz) - 26 dB Emissions Bandwidth, Middle channel



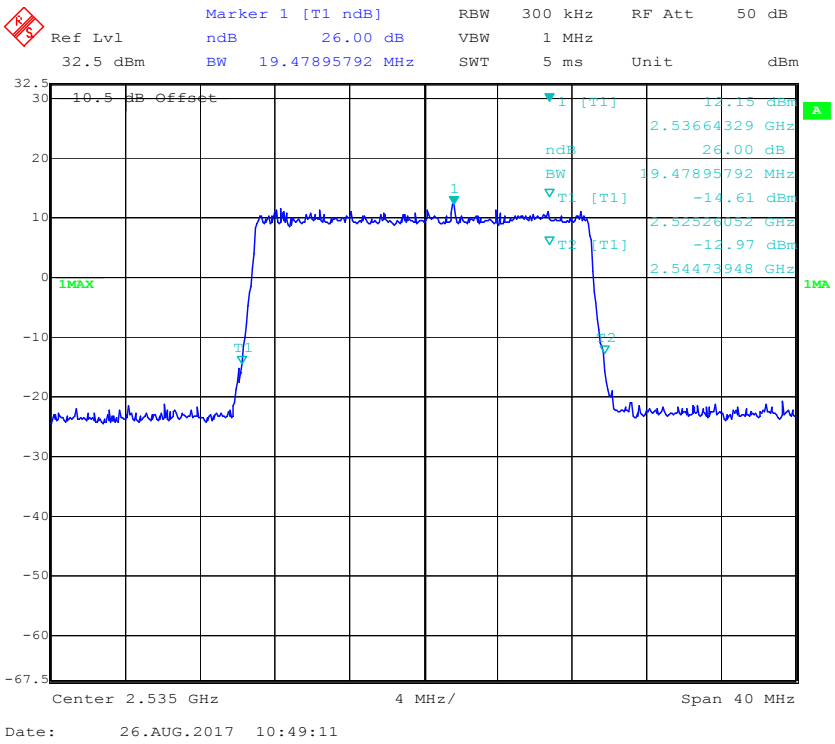
## QPSK (15 MHz) - 26 dB Emissions Bandwidth, Middle channel



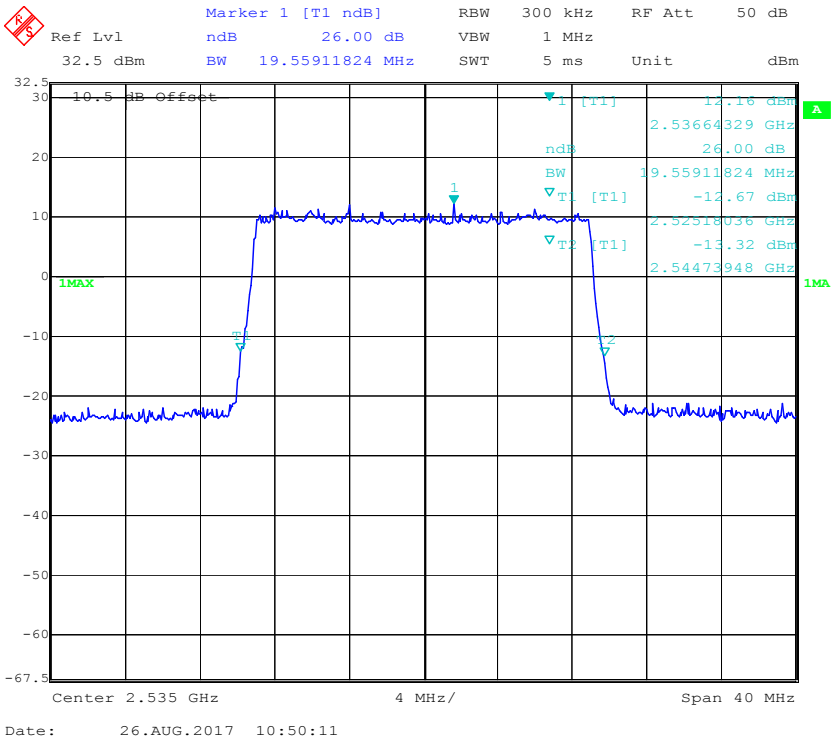

## 16-QAM (15 MHz) - 26 dB Emissions Bandwidth, Middle channel



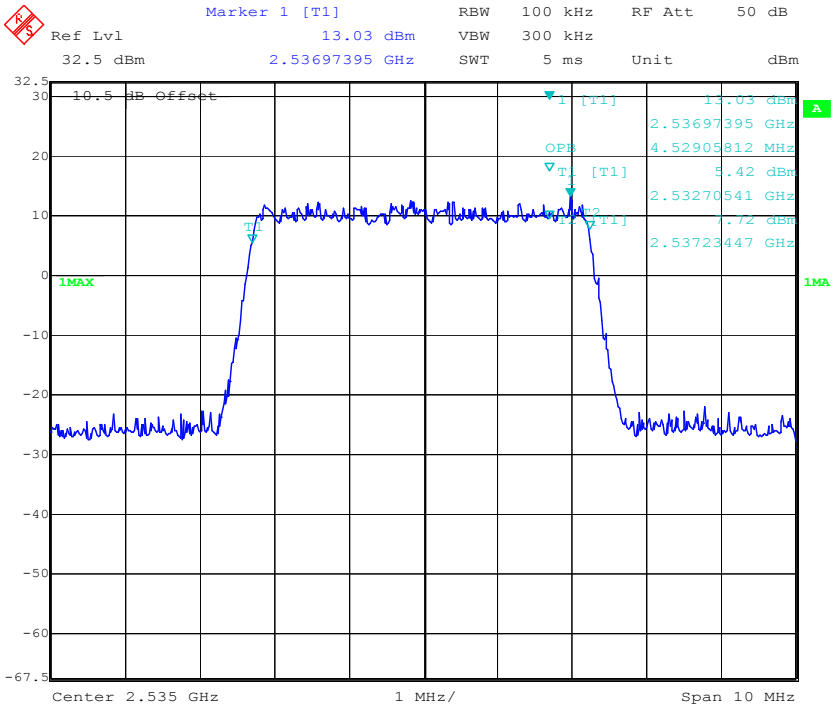
## QPSK (20 MHz) - 26 dB Emissions Bandwidth, Middle channel



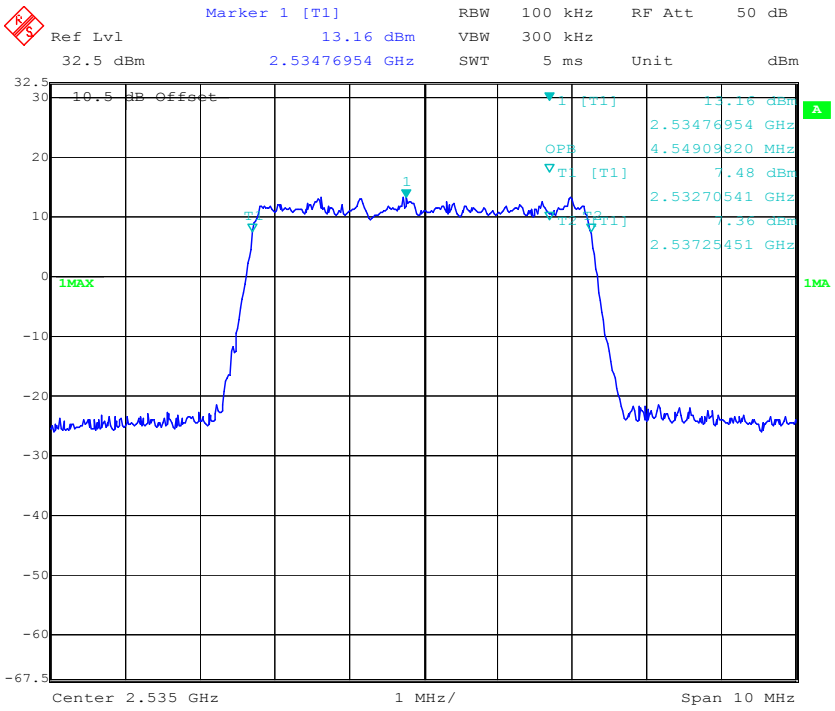

## 16-QAM (20 MHz) - 26 dB Emissions Bandwidth, Middle channel



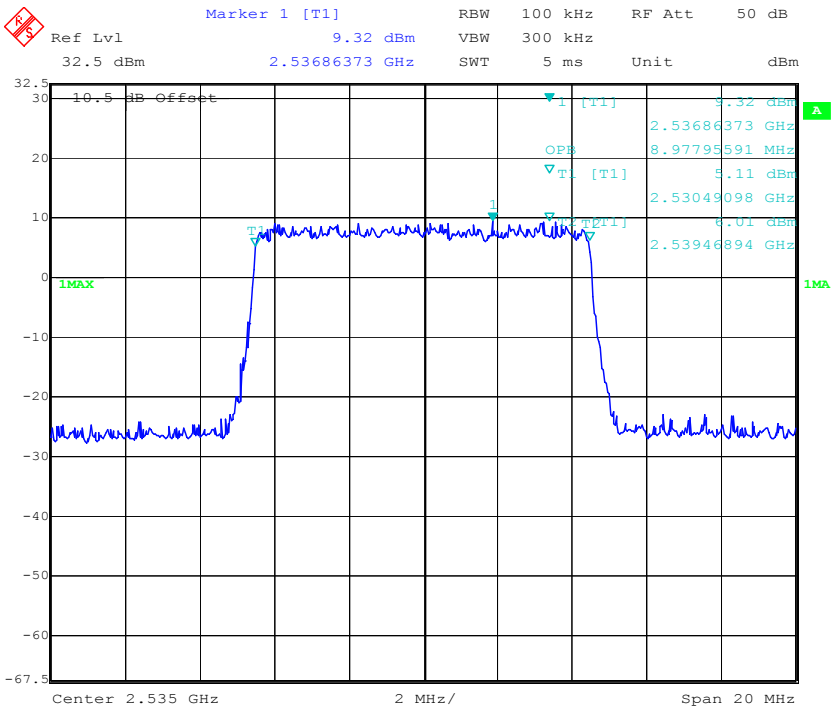
## QPSK (5 MHz) - 99% Occupied Bandwidth, Middle channel



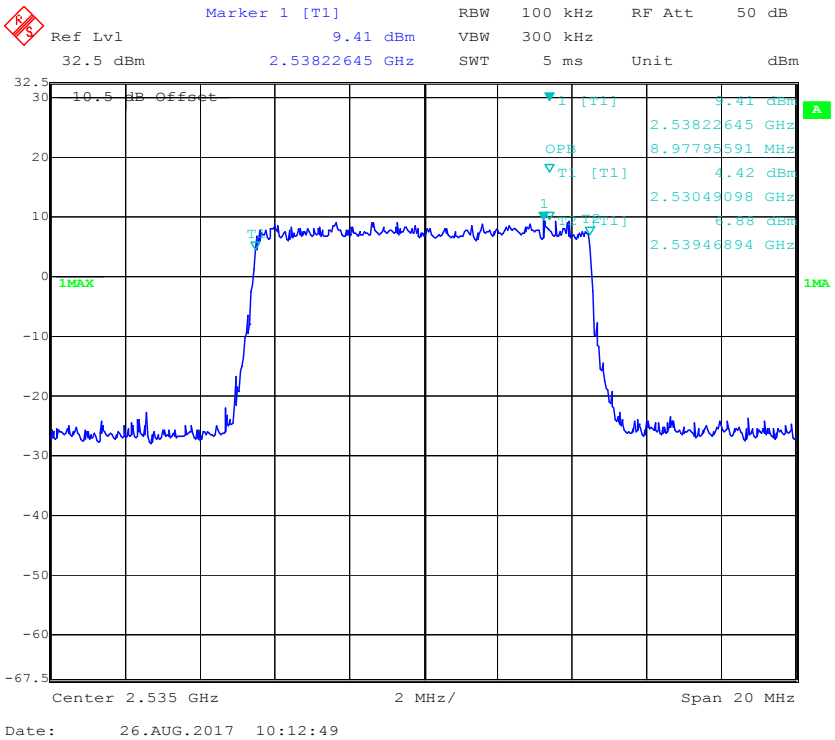

## 16-QAM (5 MHz) - 99% Occupied Bandwidth, Middle channel



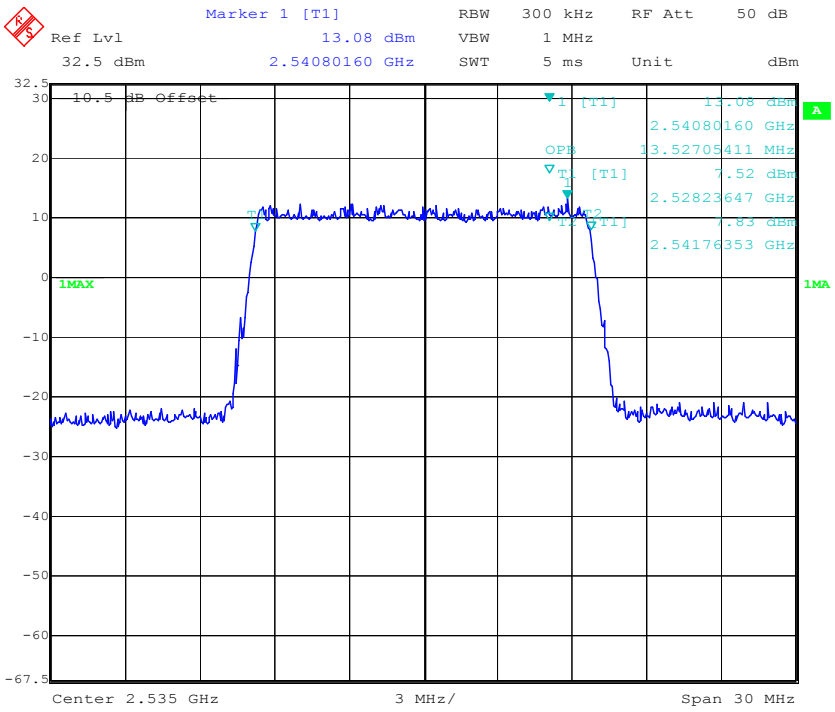
## QPSK (10 MHz) - 99% Occupied Bandwidth, Middle channel



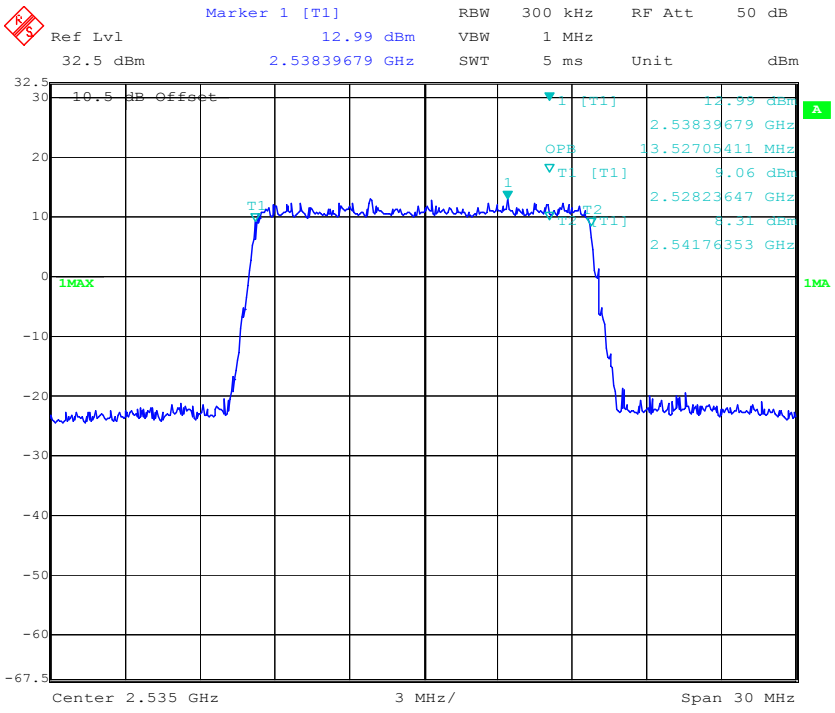

## 16-QAM (10MHz) - 99% Occupied Bandwidth, Middle channel



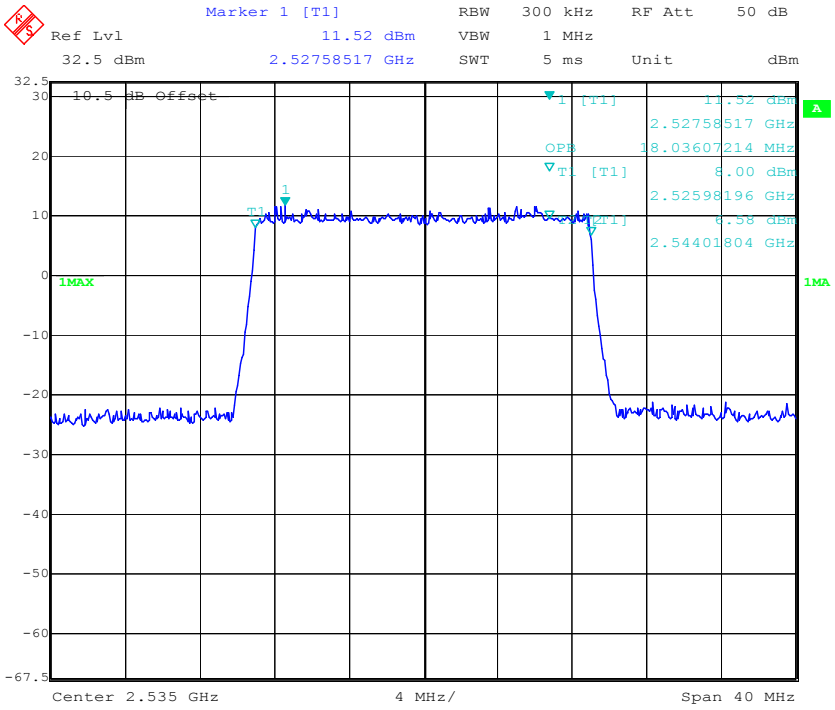
## QPSK (15 MHz) - 99% Occupied Bandwidth, Middle channel



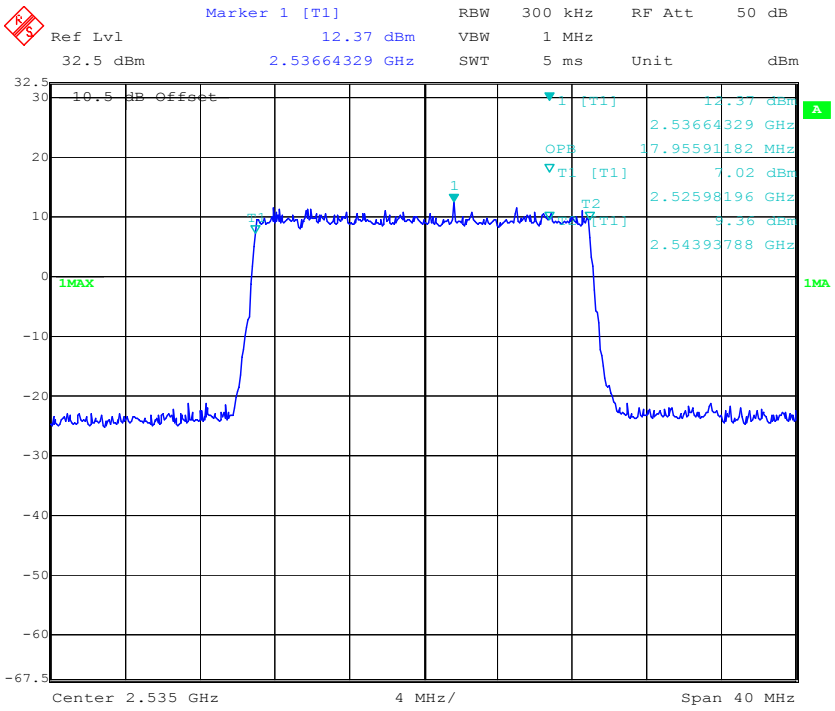

## 16-QAM (15 MHz) - 99% Occupied Bandwidth, Middle channel



## QPSK (20 MHz) - 99% Occupied Bandwidth, Middle channel




## 16-QAM (20 MHz) - 99% Occupied Bandwidth, Middle channel



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

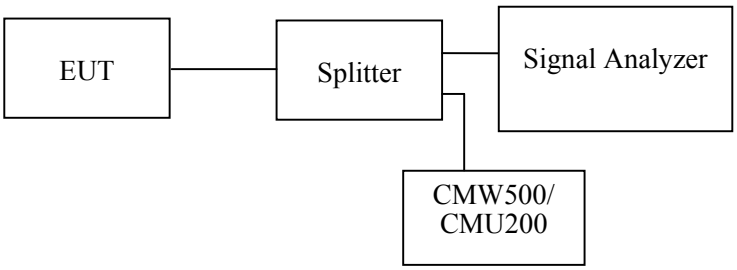
## Applicable Standards

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

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

## Test Procedure

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




## Test Data

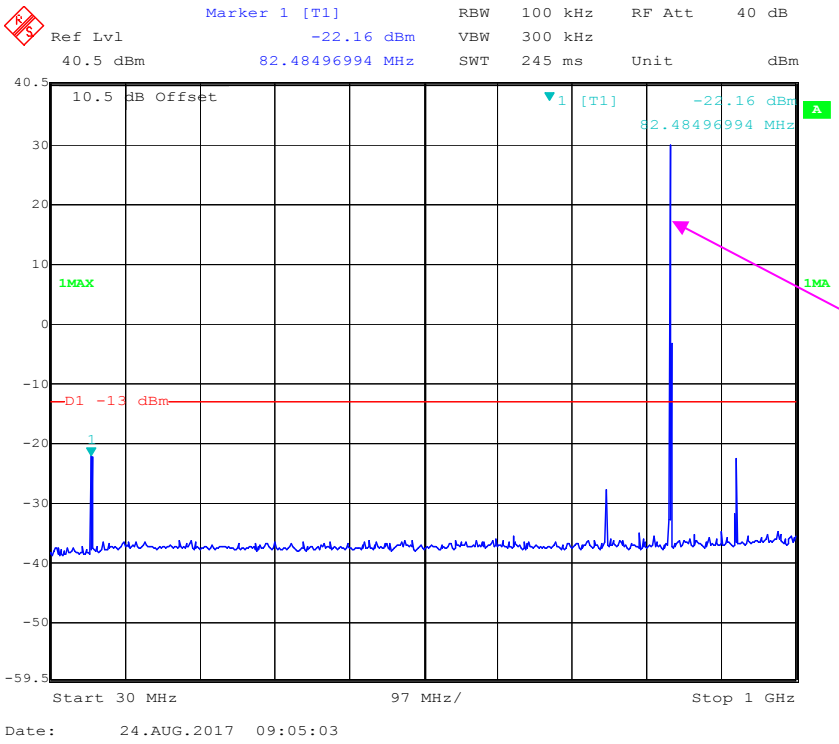
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23~25 ℃ |
| **Relative Humidity:** | 53~55 % |
| **ATM Pressure:** | 100.9~101.0 kPa |

*The testing was performed by Hill He from 2017-08-24 to 2017-08-26.*

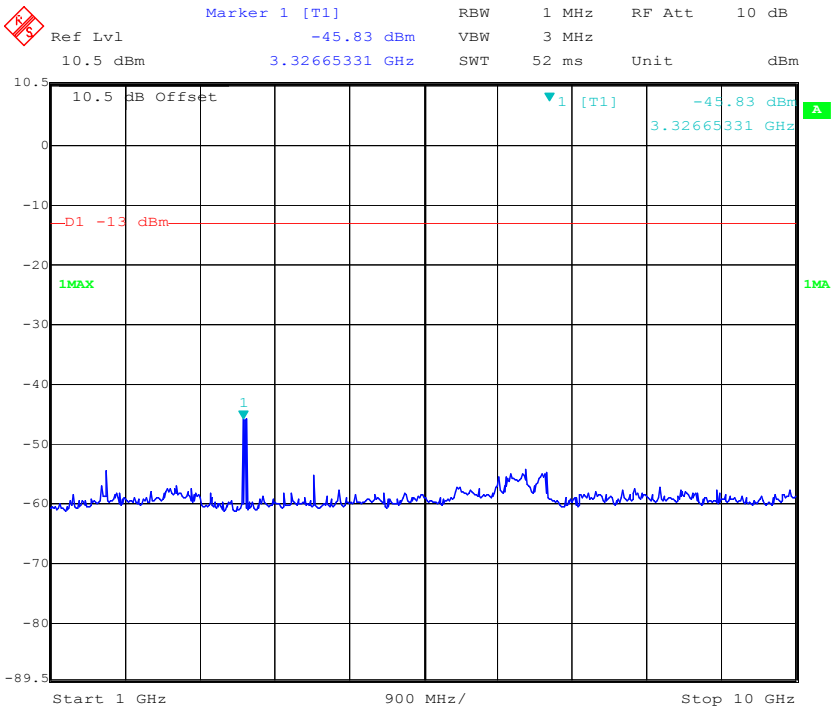
**Cellular Band (Part 22H)**

**30 MHz – 1 GHz (GSM Mode)**

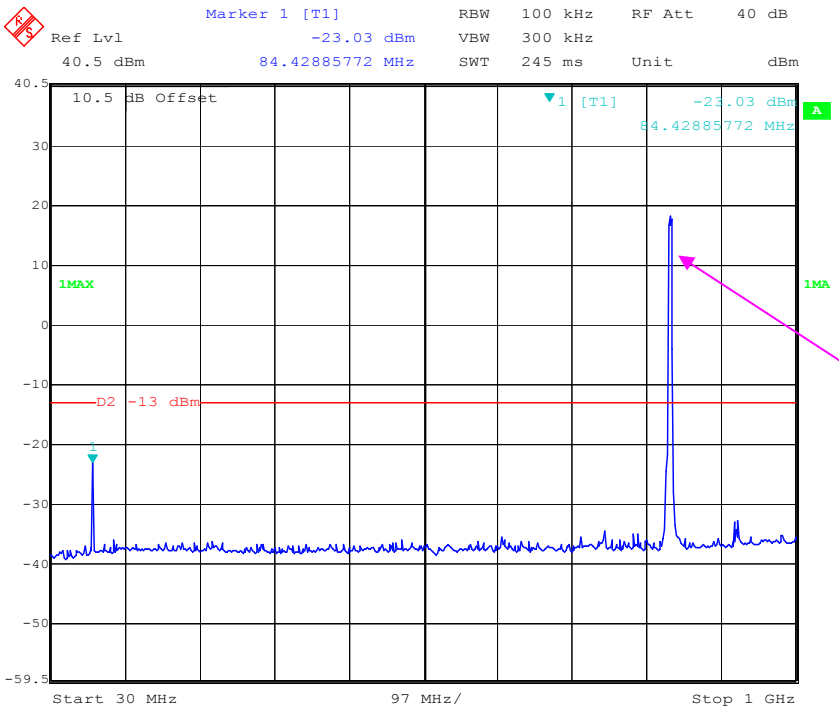



Fundamental test

**1 GHz – 10 GHz (GSM Mode)**

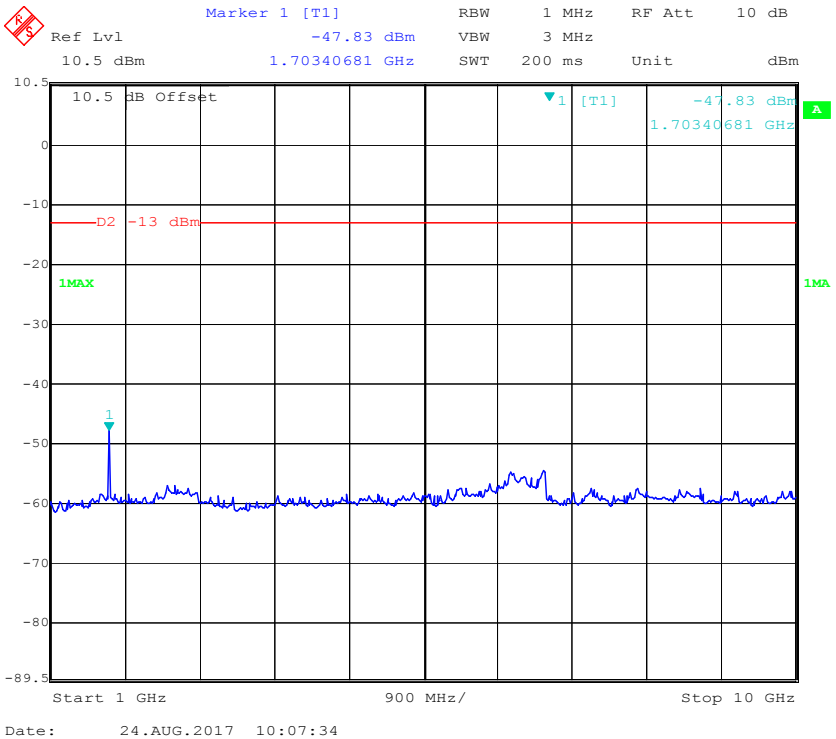


## 30 MHz – 1 GHz (WCDMA Mode)



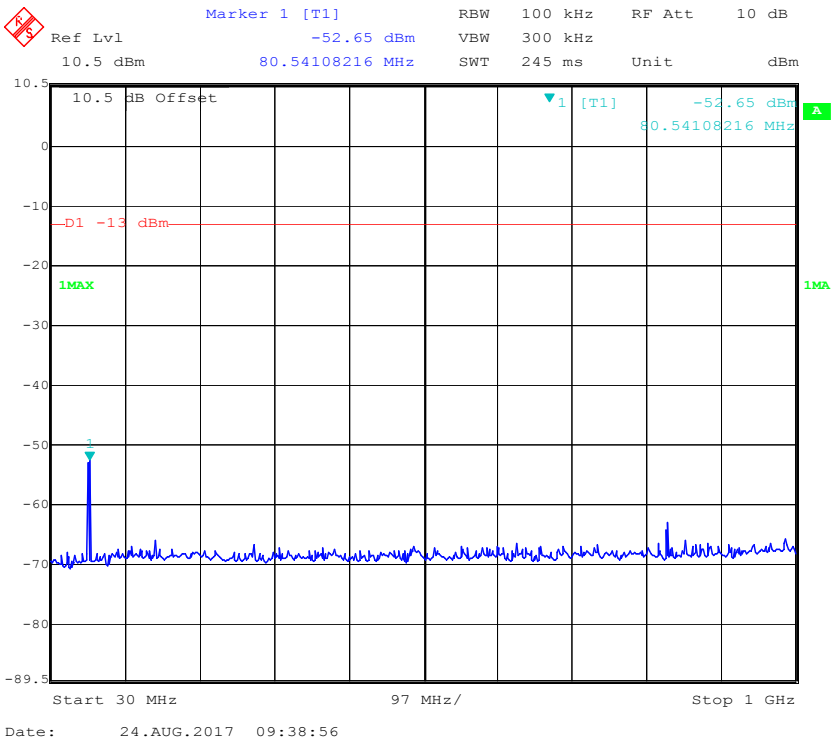

Fundamental test

## 1 GHz – 10 GHz (WCDMA Mode)

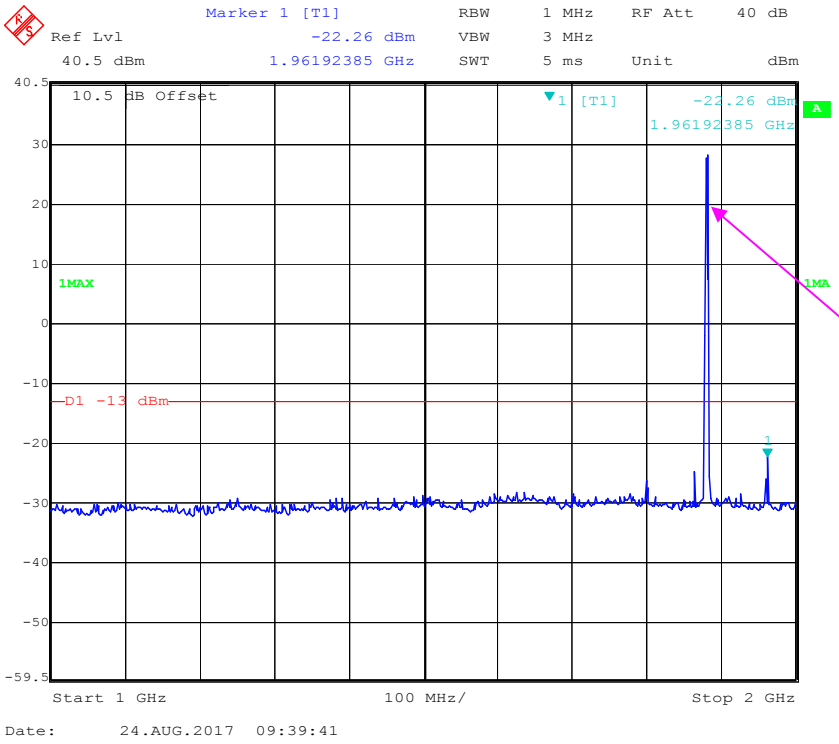


**PCS Band (Part 24E)**

**30 MHz – 1 GHz (GSM Mode)**

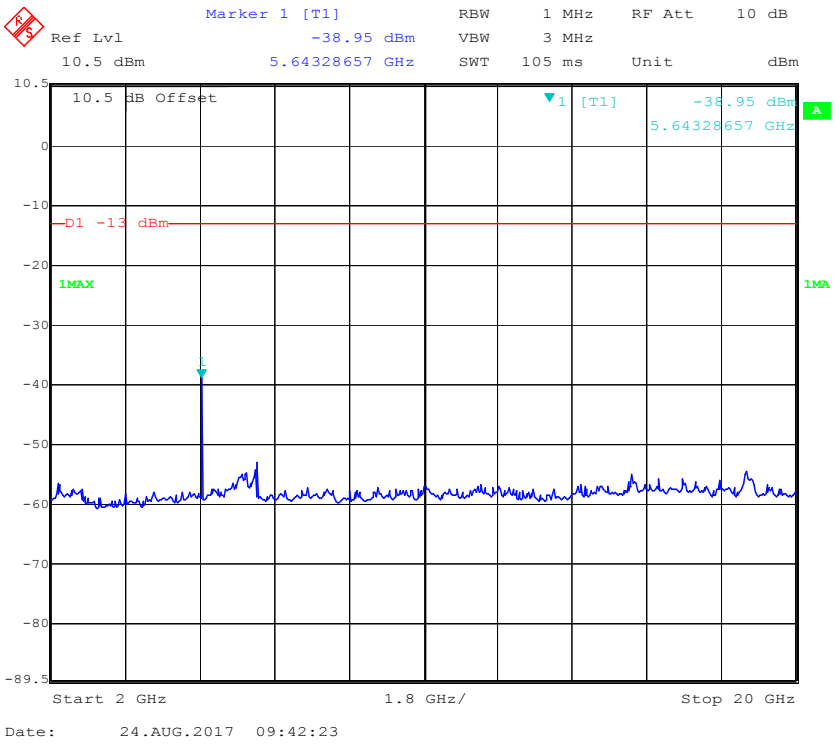



**1 GHz – 2 GHz (GSM Mode)**

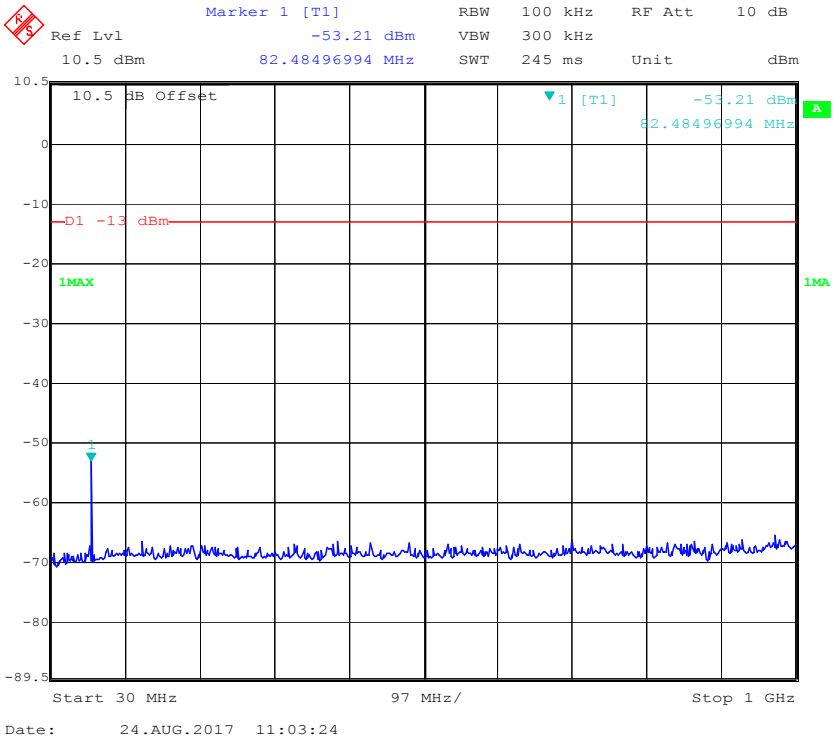



Fundamental test

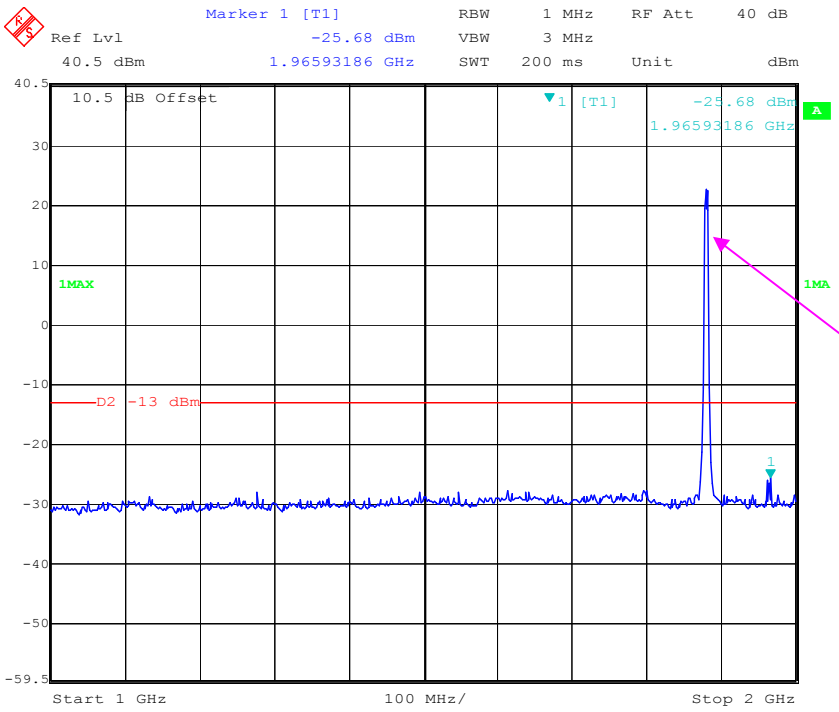
## 2 GHz – 20 GHz (GSM Mode)




## 30 MHz – 1 GHz (WCDMA Mode)

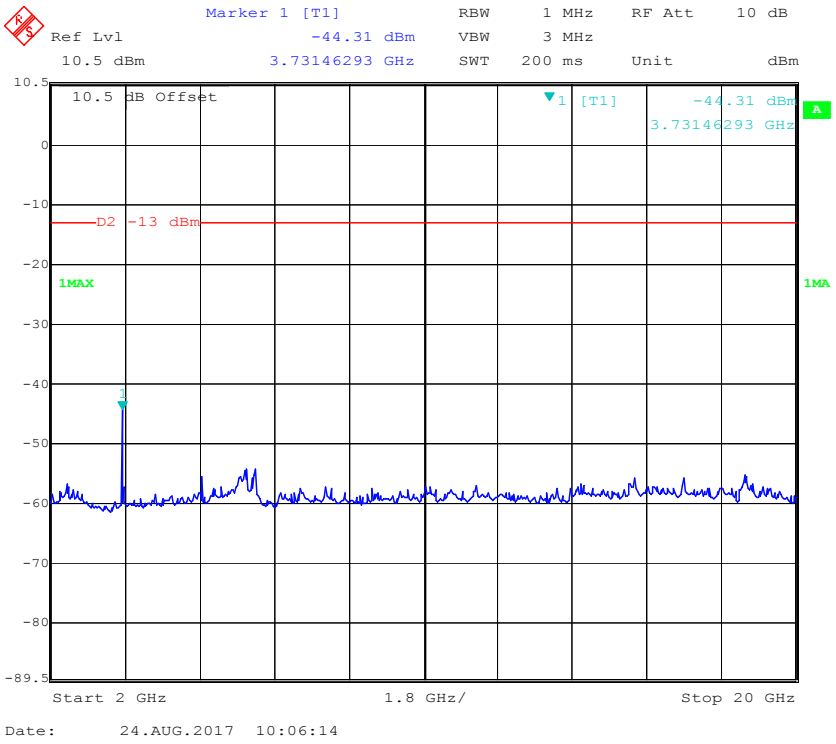


## 1 GHz – 2 GHz (WCDMA Mode)



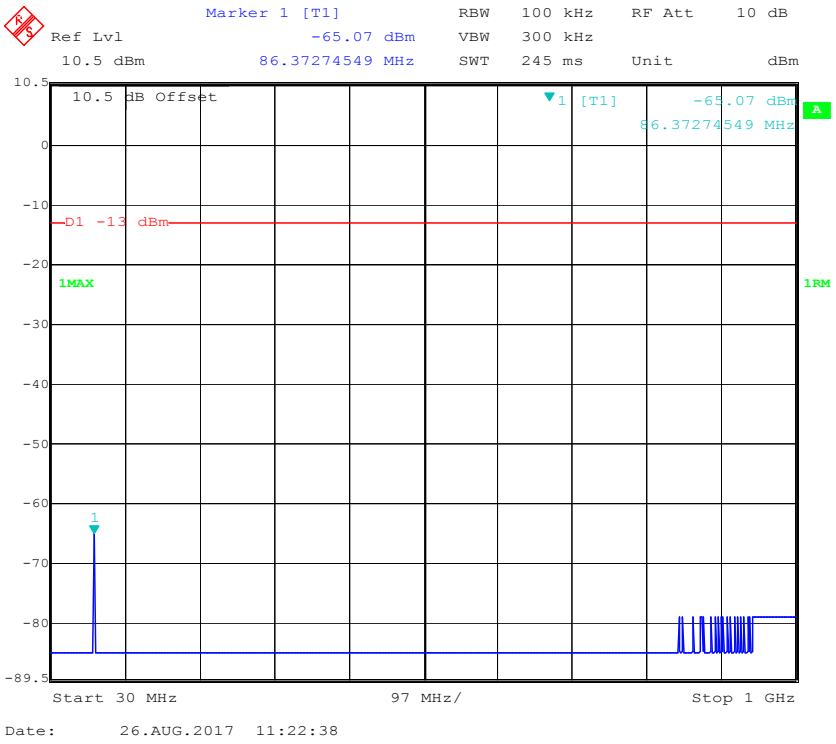

Fundamental test

## 2 GHz – 20 GHz (WCDMA Mode)

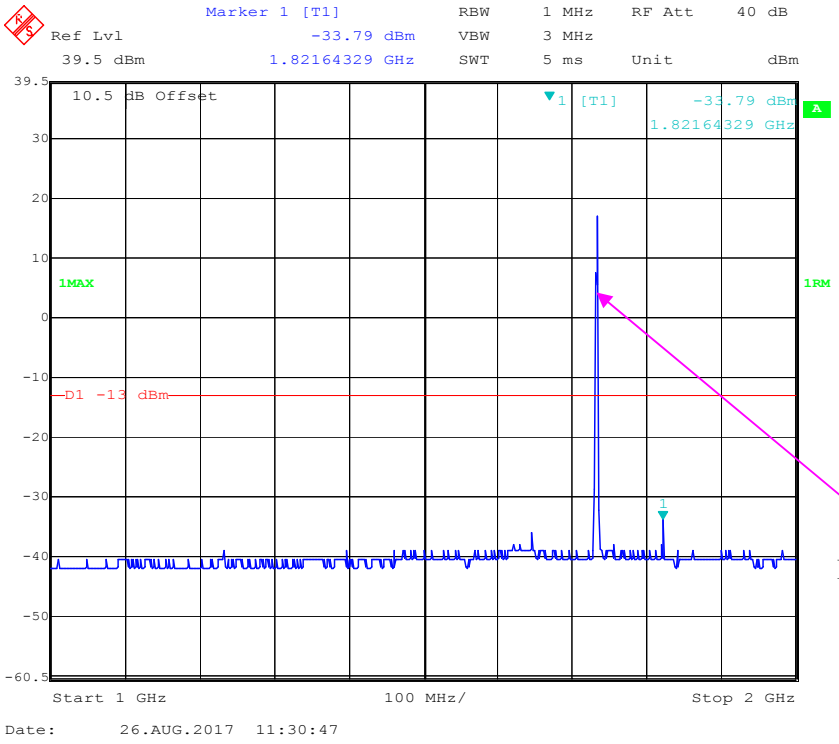


**LTE Band 4:**

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

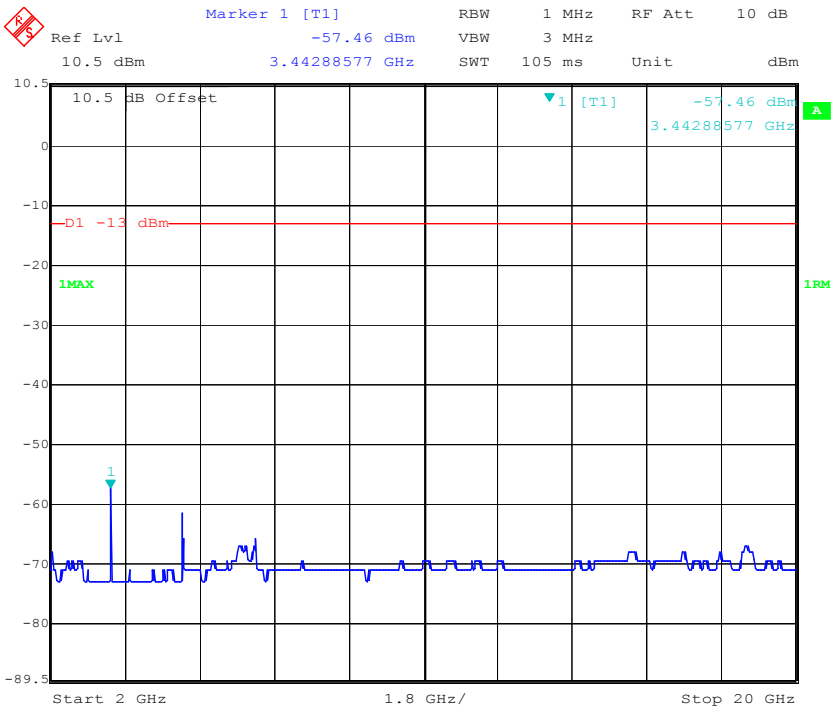



**1 GHz – 2 GHz (1.4 MHz, Middle Channel)**



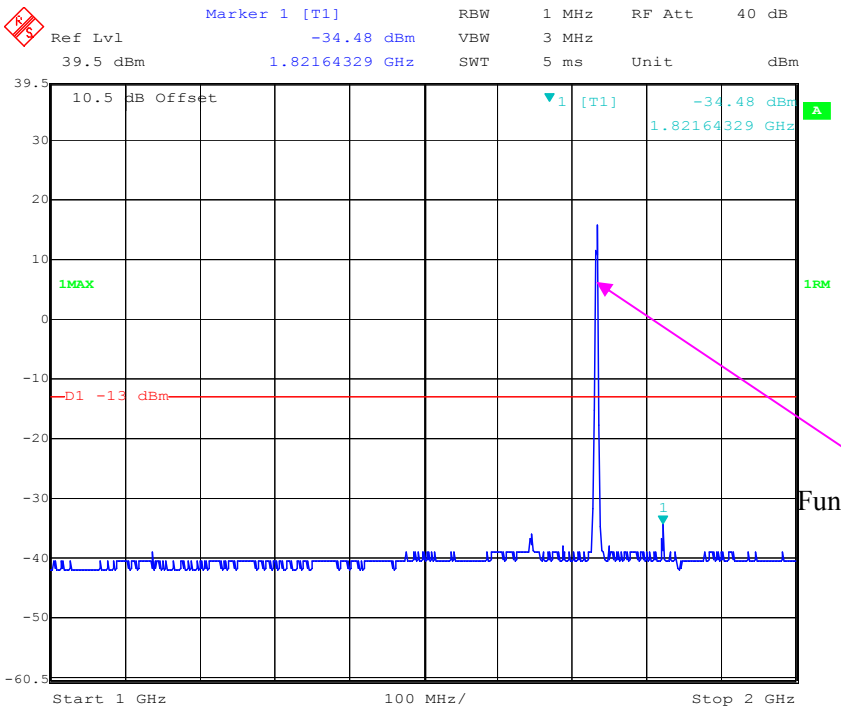

Fundamental test

## 2 GHz – 20 GHz (1.4 MHz, Middle Channel)



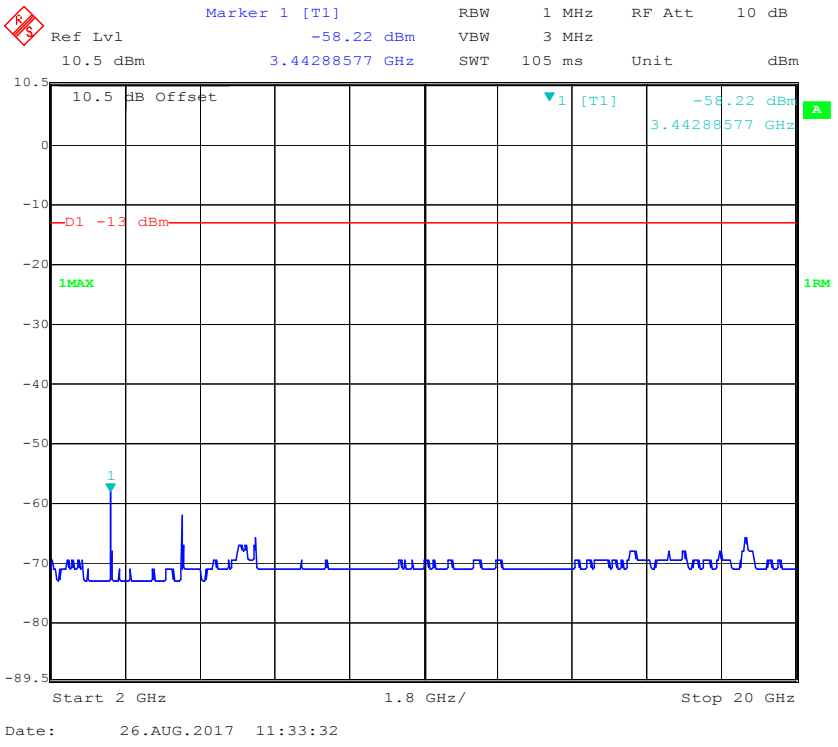

## 30 MHz - 1 GHz (3.0 MHz, Middle Channel)

## 1 GHz – 2 GHz (3.0 MHz, Middle Channel)

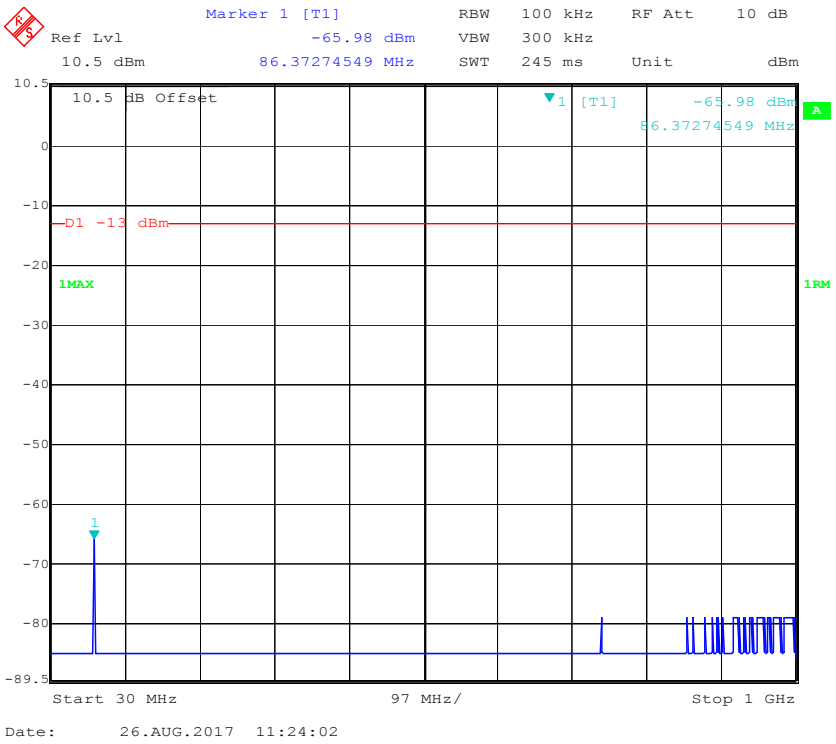



Fundamental test

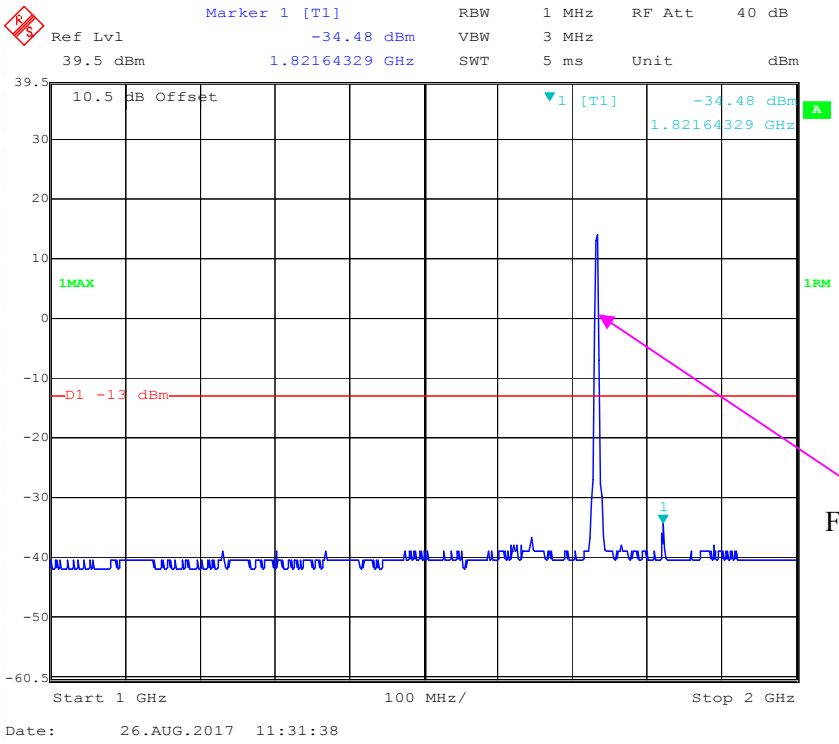
## 2 GHz – 20 GHz (3.0 MHz, Middle Channel)



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

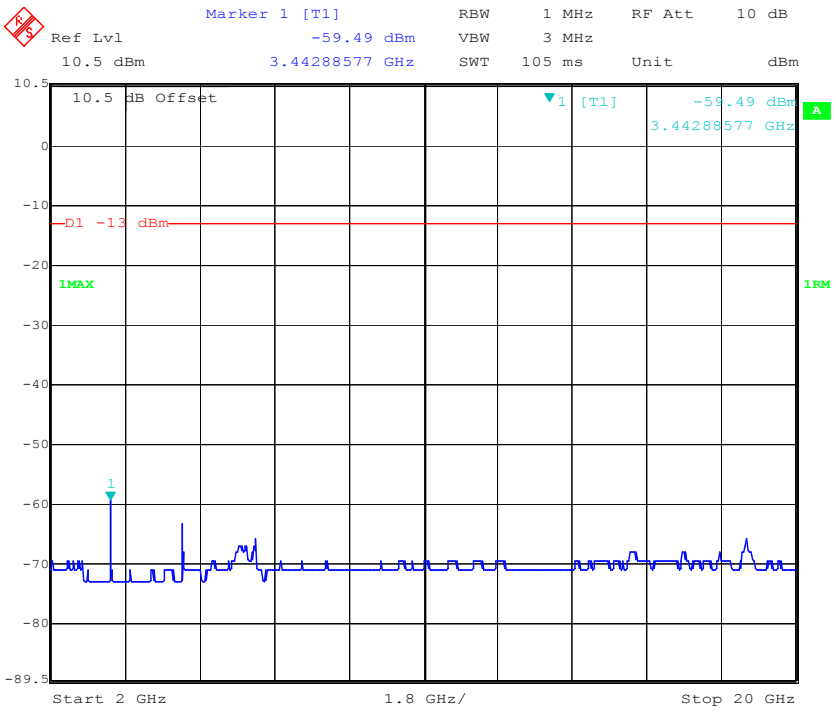



## 1 GHz – 2 GHz (5.0 MHz, Middle Channel)



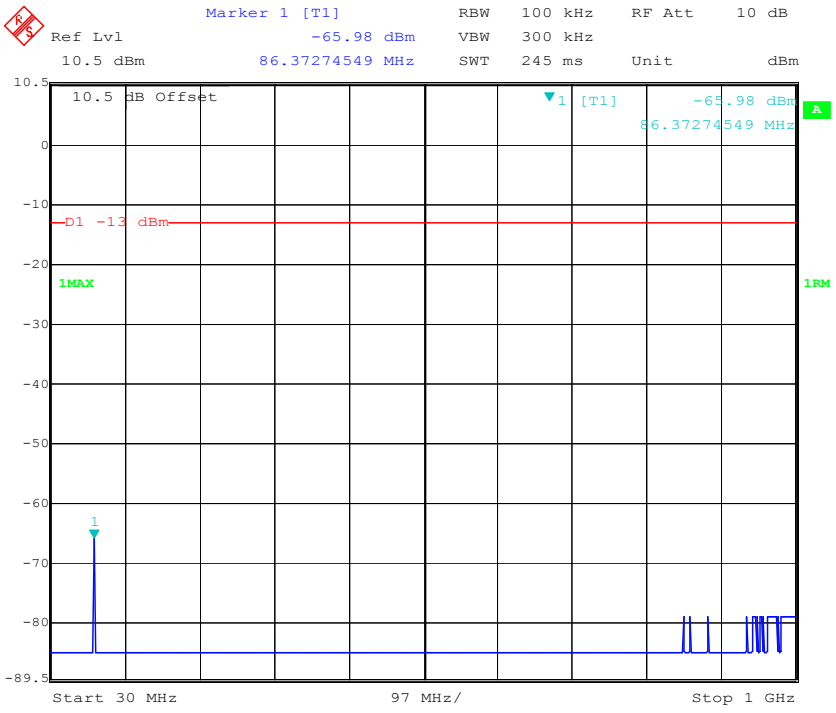

Fundamental test

## 2 GHz – 20 GHz (5.0 MHz, Middle Channel)



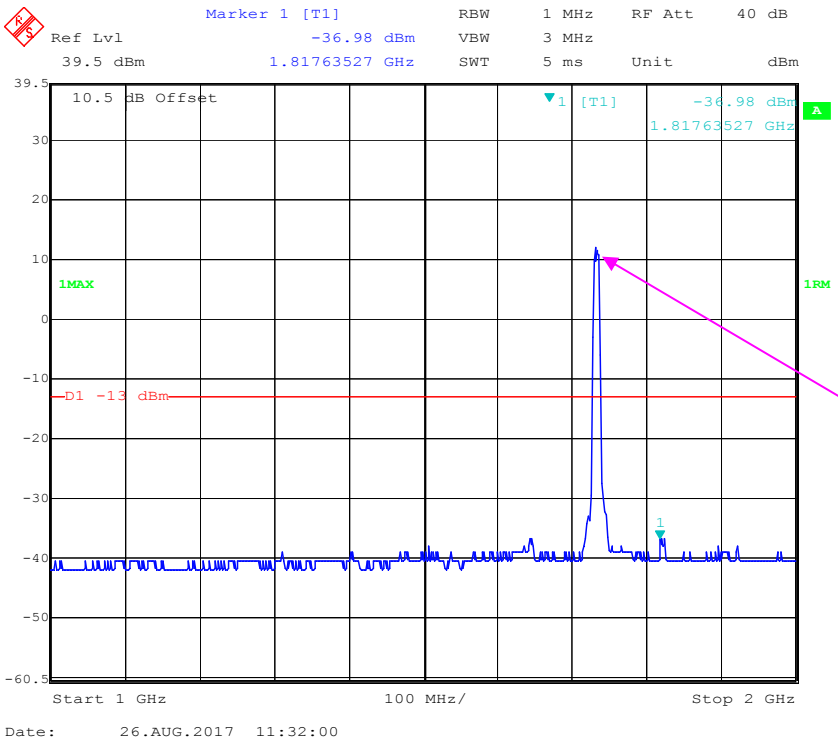

Date: 26.AUG.2017 11:33:50

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



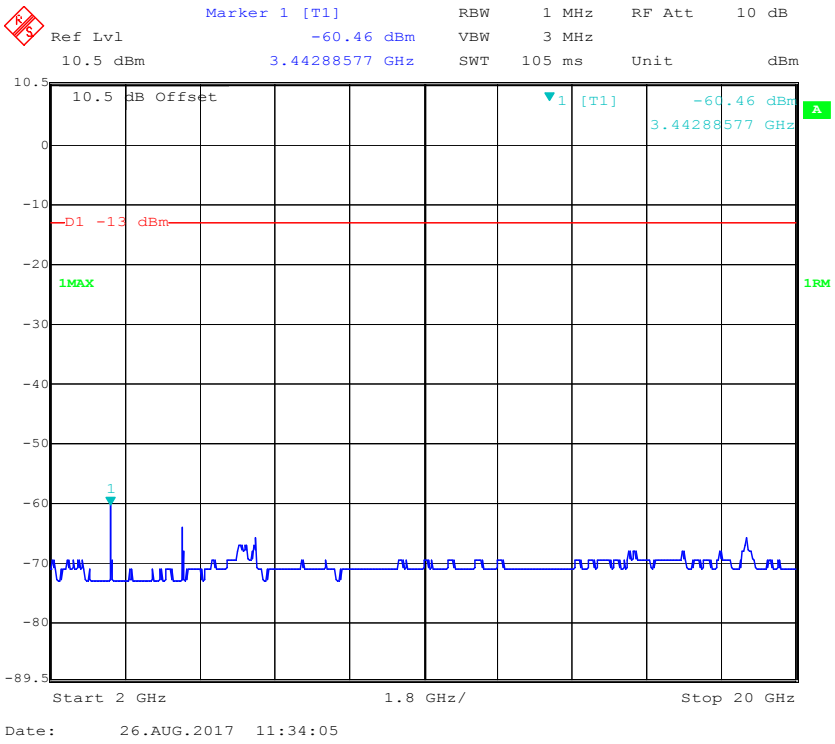

Date: 26.AUG.2017 11:24:18

## 1 GHz – 2 GHz (10.0 MHz, Middle Channel)

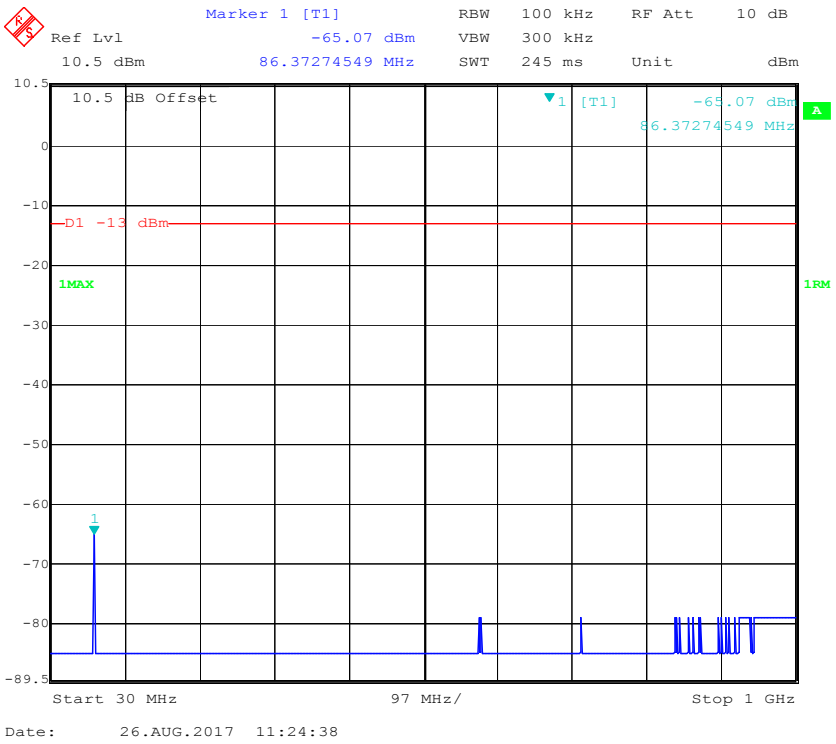



Fundamental test

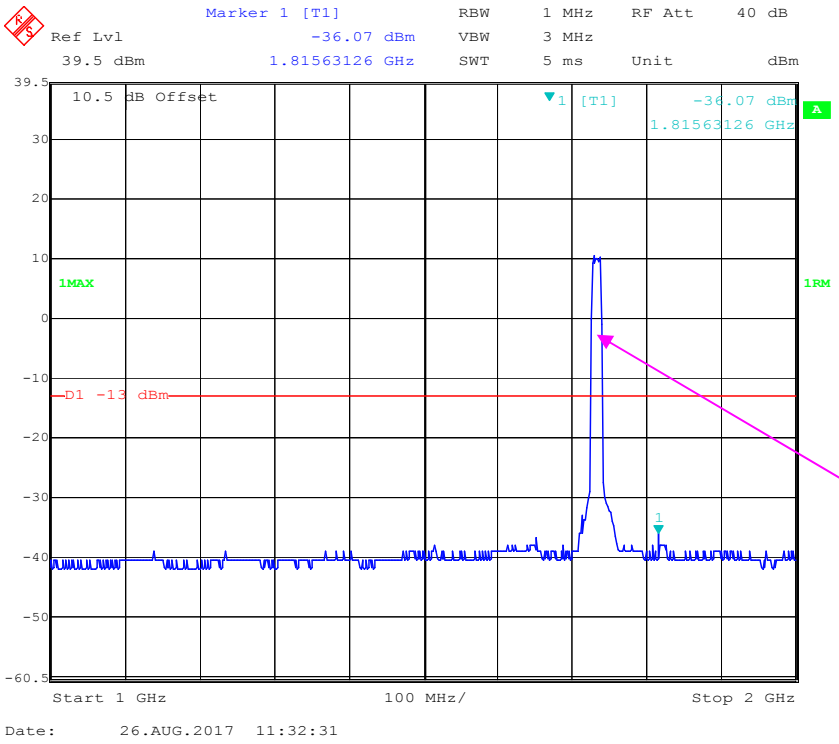
## 2 GHz – 20 GHz (10.0 MHz, Middle Channel)



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

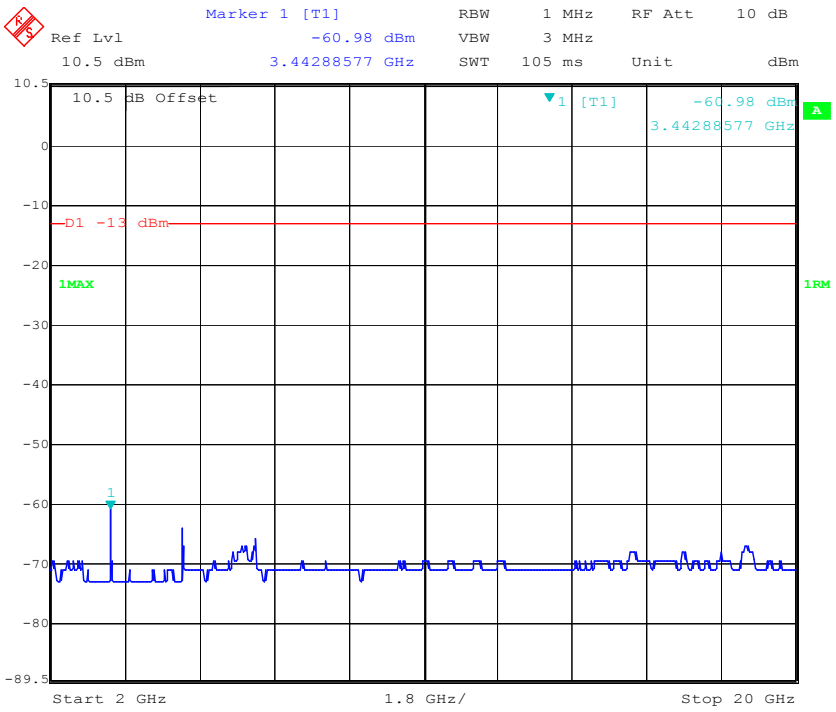



## 1 GHz – 2 GHz (15.0 MHz, Middle Channel)

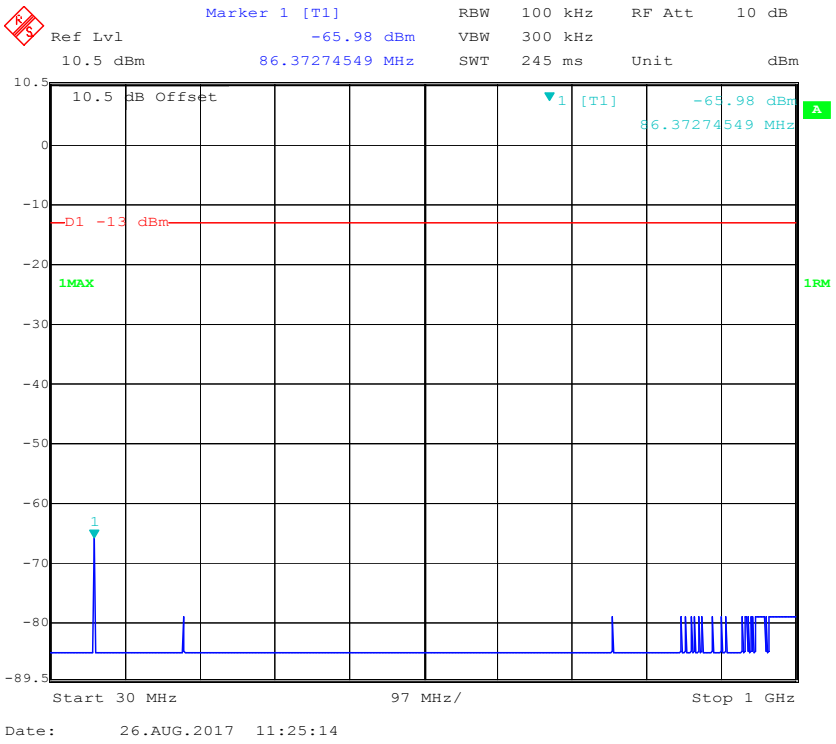



Fundamental test

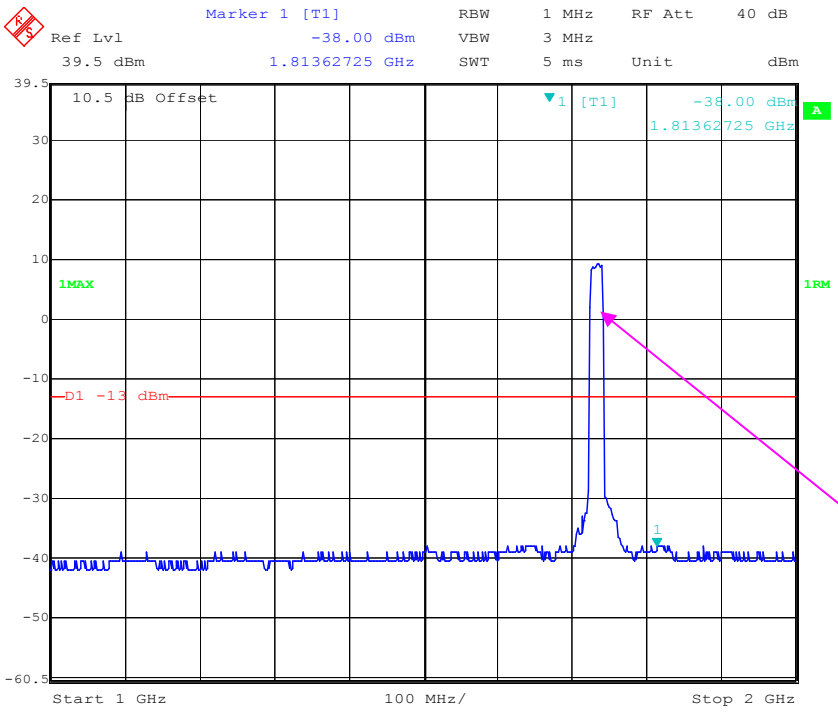
## 2 GHz – 20 GHz (15.0 MHz, Middle Channel)




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

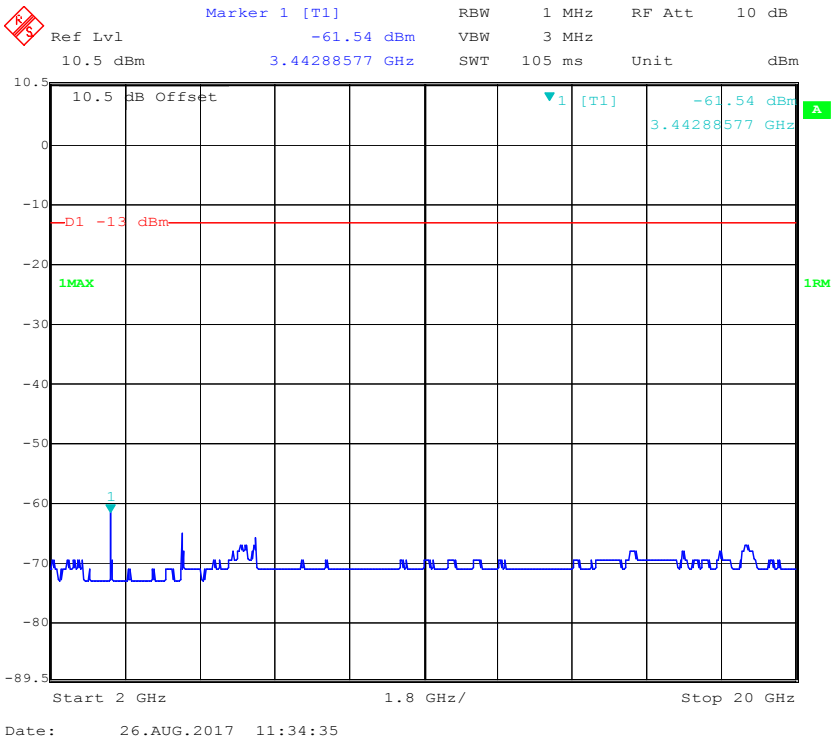


## 1 GHz – 2 GHz (20.0 MHz, Middle Channel)



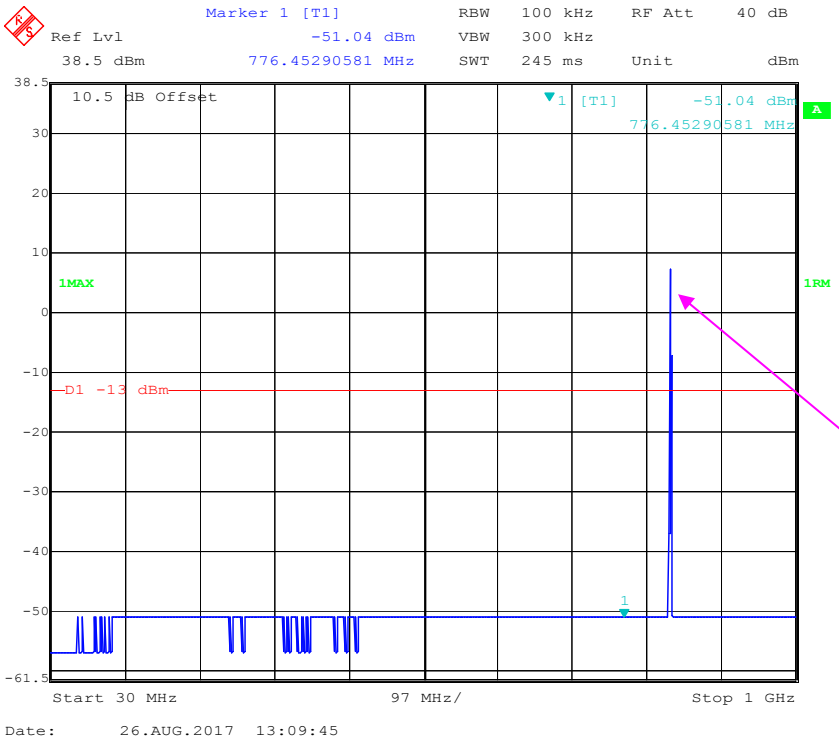

Fundamental test

## 2 GHz – 20 GHz (20.0 MHz, Middle Channel)



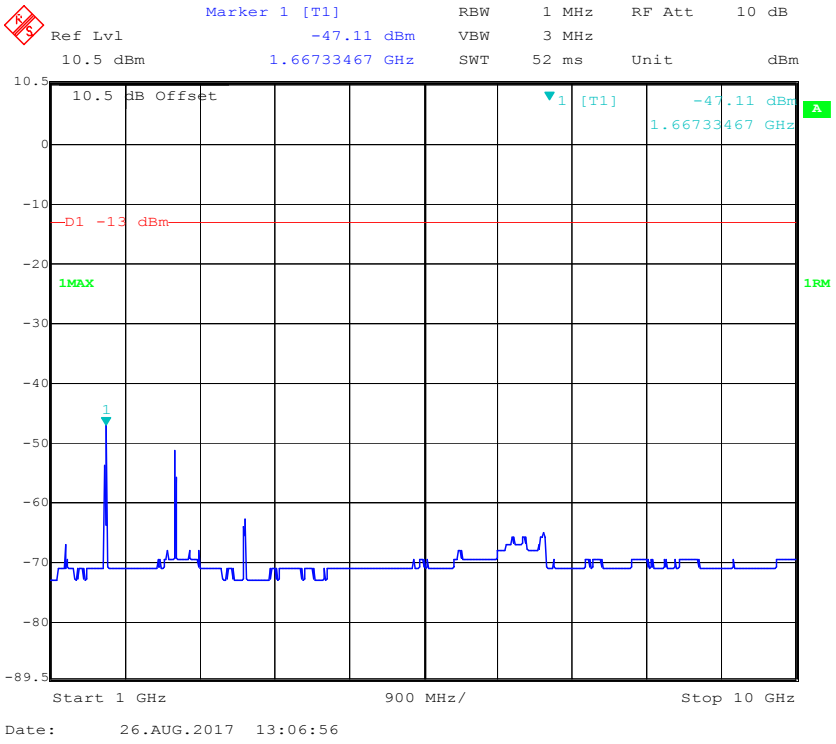
**LTE Band 5:**

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

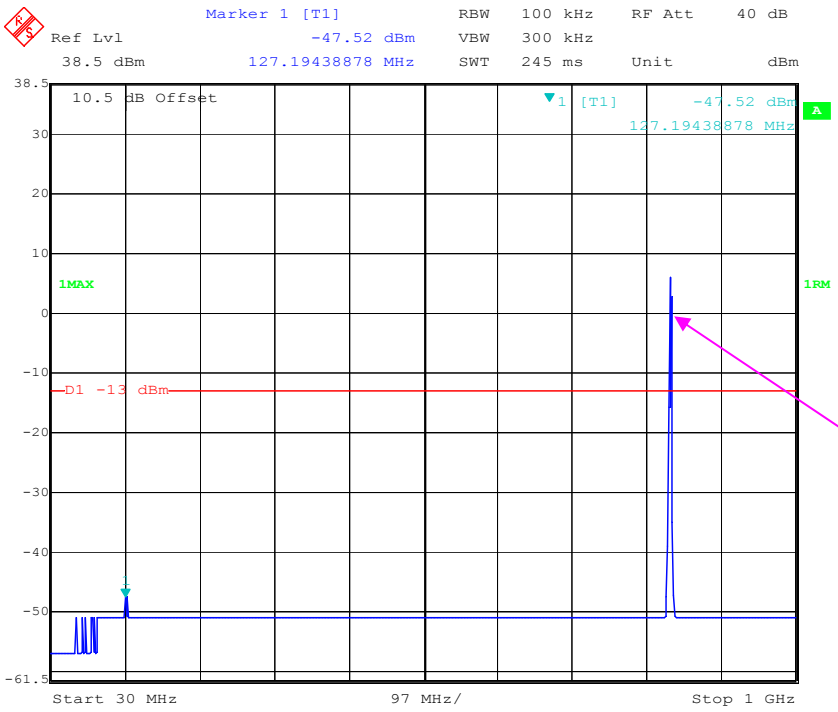



Fundamental test

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

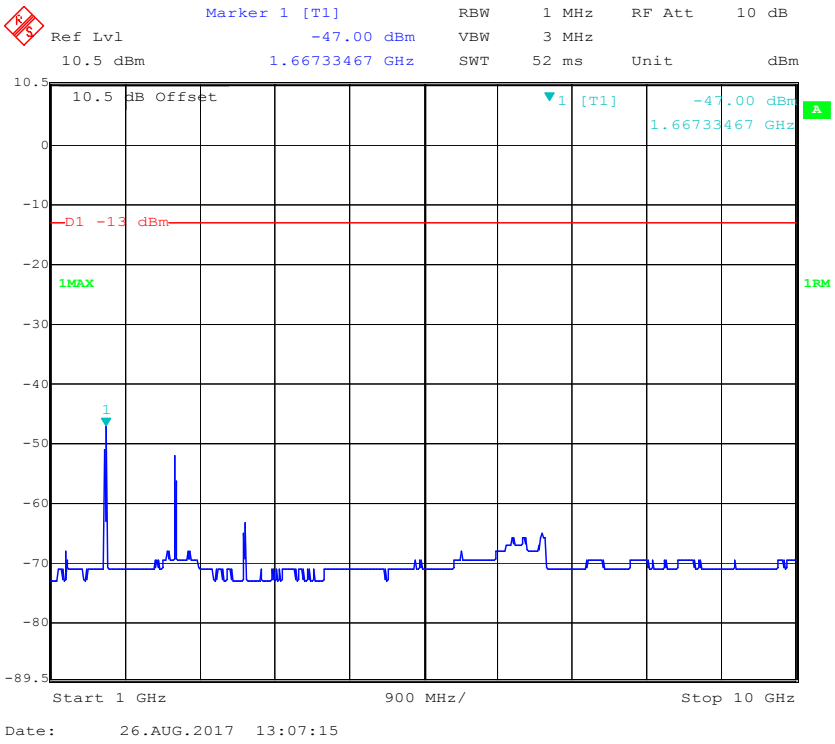


## 30 MHz - 1 GHz (3.0 MHz, Middle Channel)

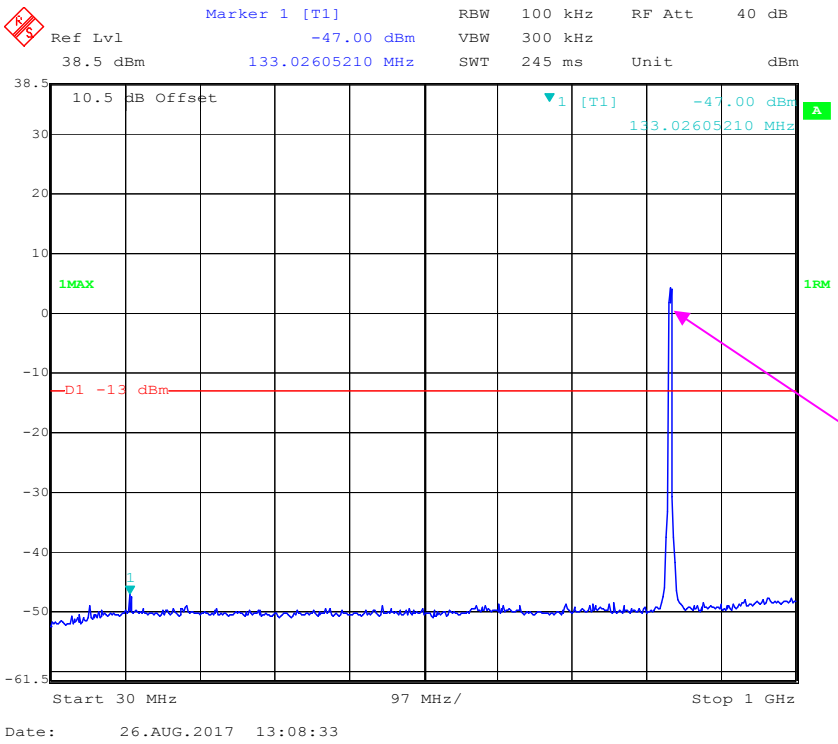



Fundamental test

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

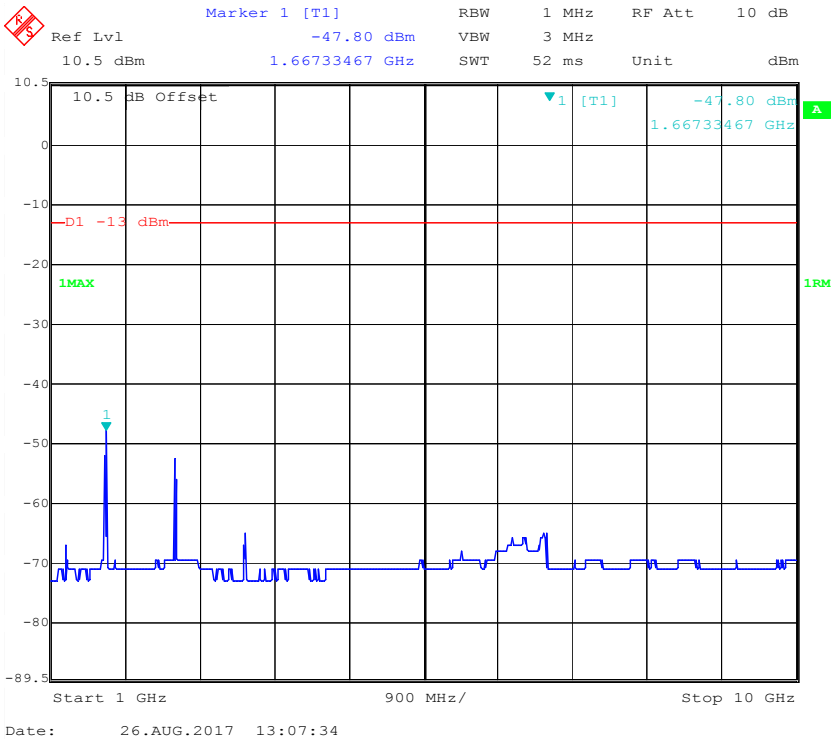


## 30 MHz - 1 GHz (5.0 MHz, Middle Channel)




Fundamental test

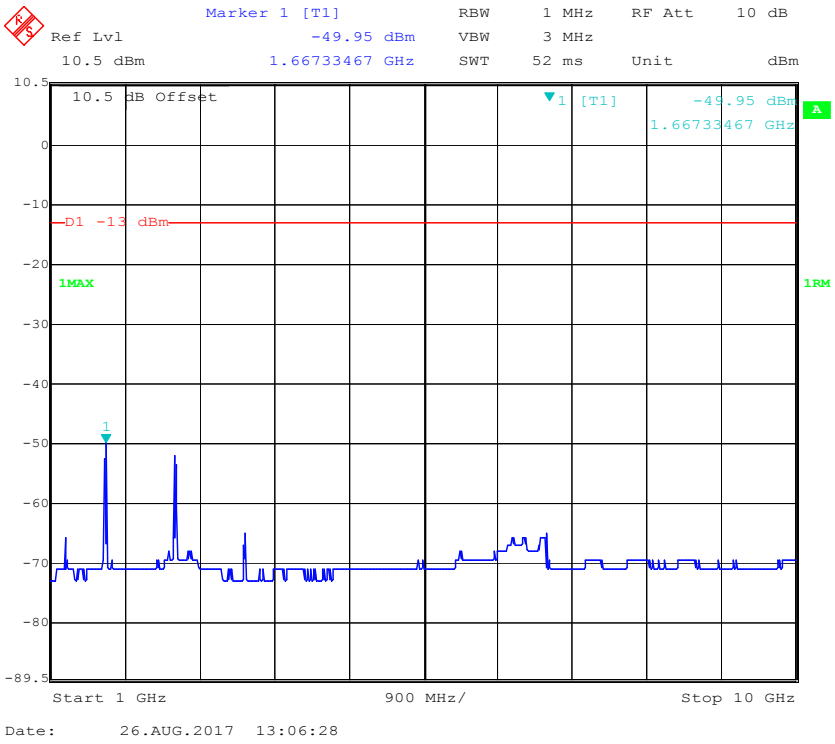
## 1 GHz – 10 GHz (5.0 MHz, Middle Channel)



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

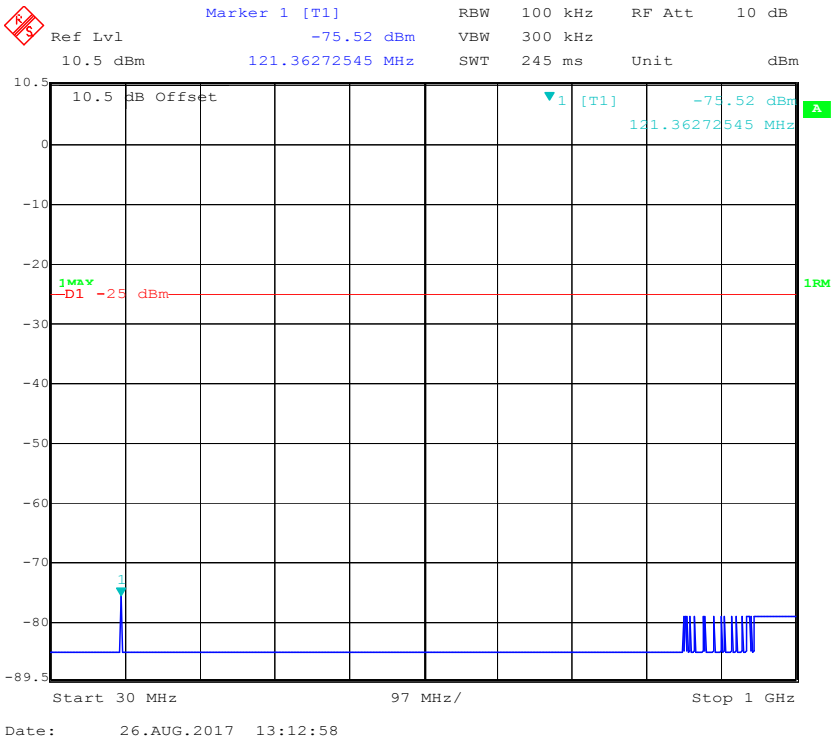

Fundamental test

## 1 GHz – 10 GHz (10.0 MHz, Middle Channel)

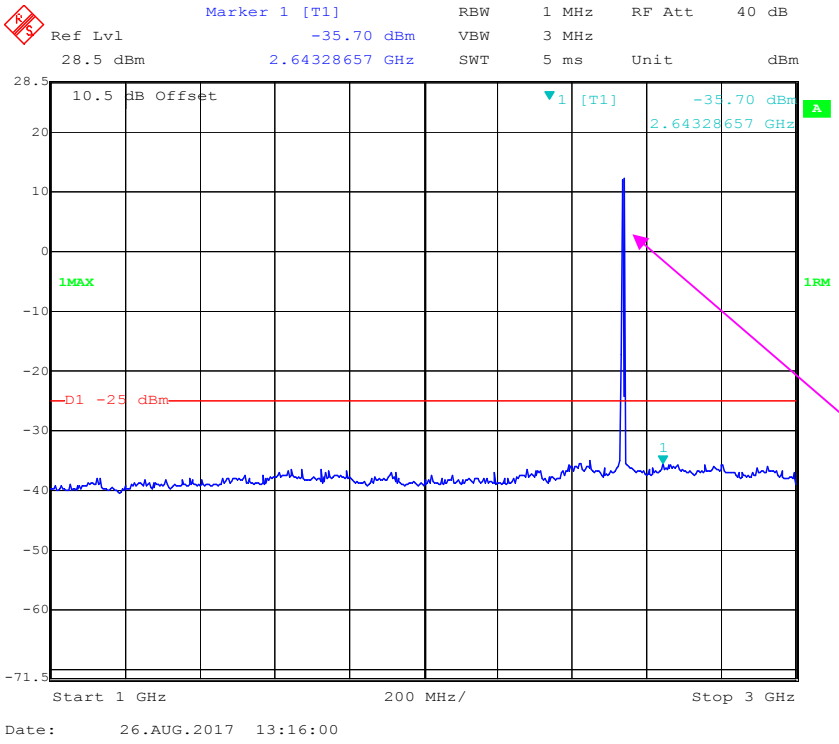


**LTE Band 7:**

**30 MHz – 1 GHz (5.0 MHz, Middle Channel)**

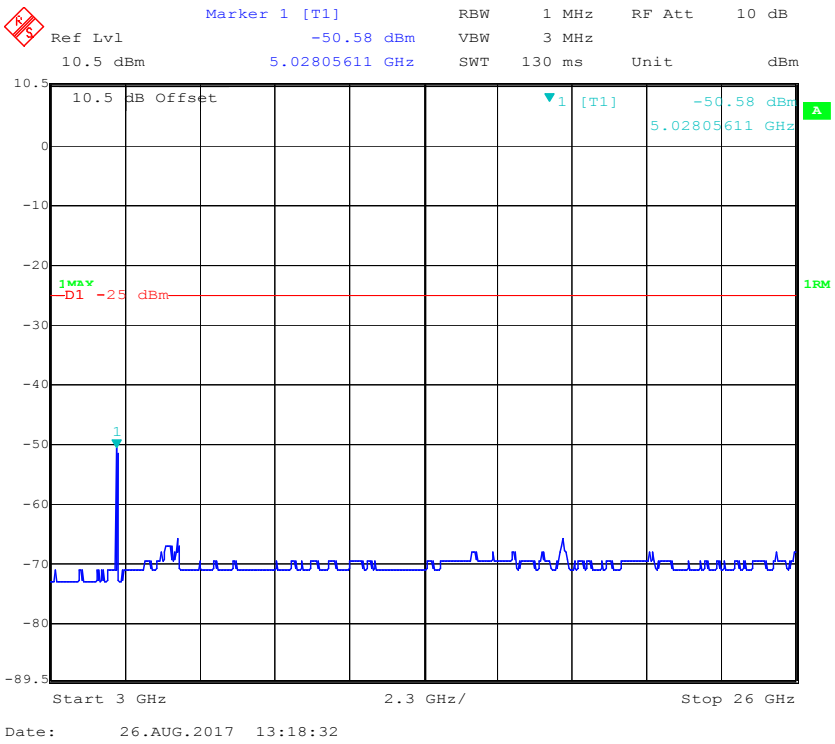



**1 GHz – 3.0 GHz (5.0 MHz, Middle Channel)**

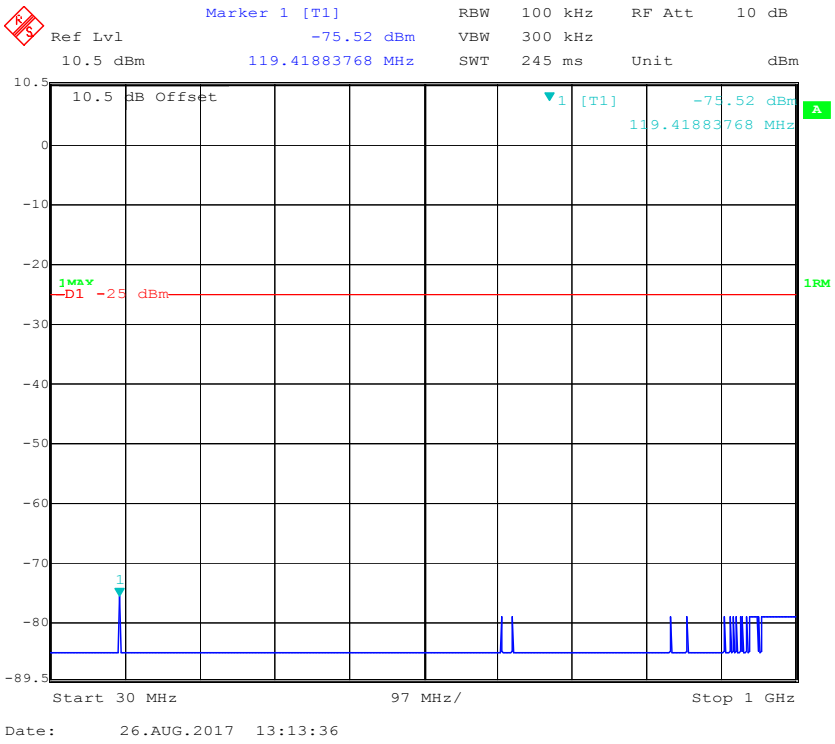



Fundamental test

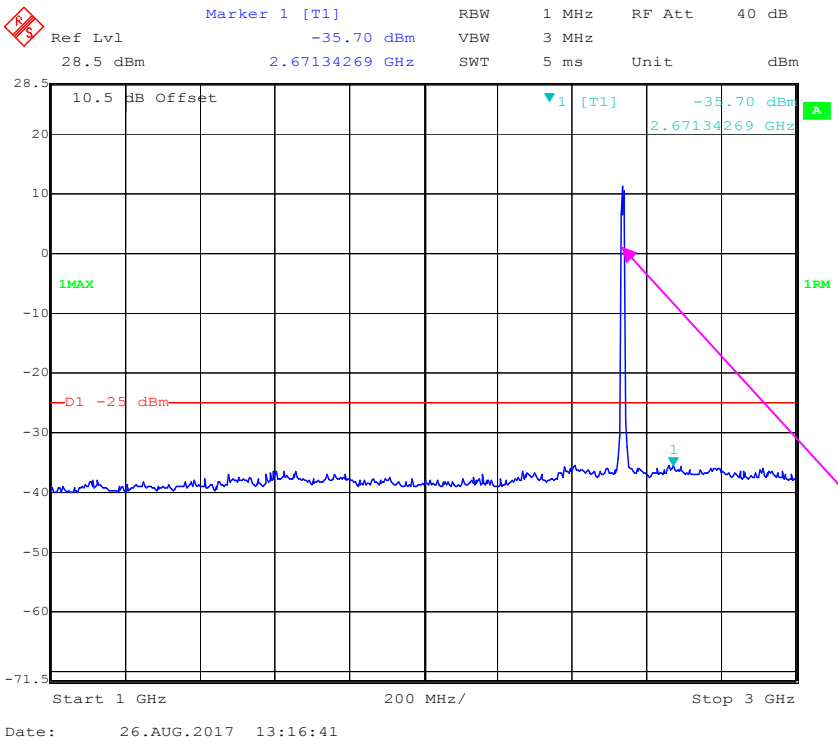
## 3.0 GHz – 26 GHz (5.0 MHz, Middle Channel)




## 30 MHz – 1.0 GHz (10.0 MHz, Middle Channel)

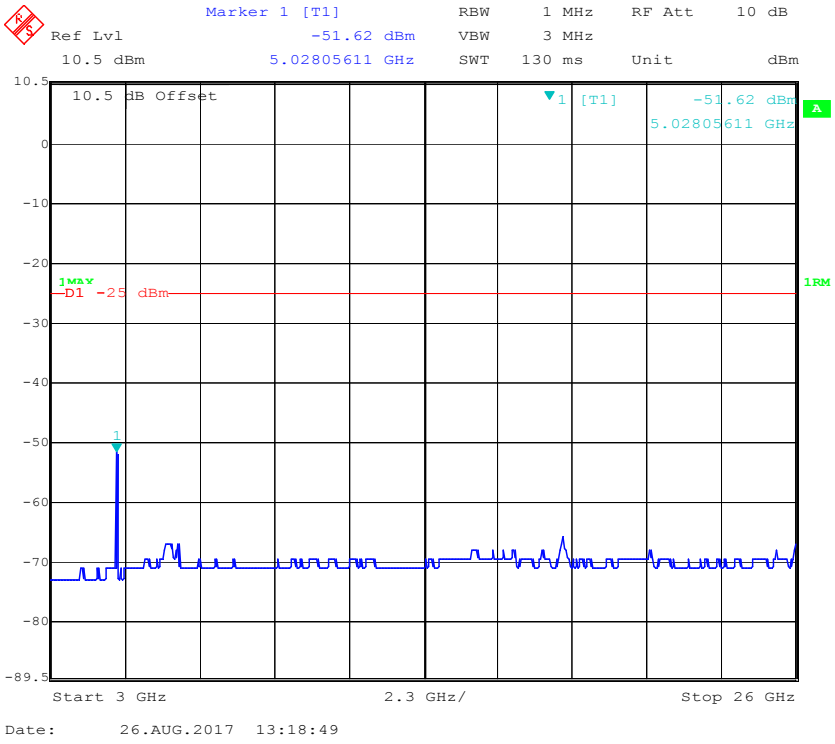


## 1 GHz – 3 GHz (10.0 MHz, Middle Channel)

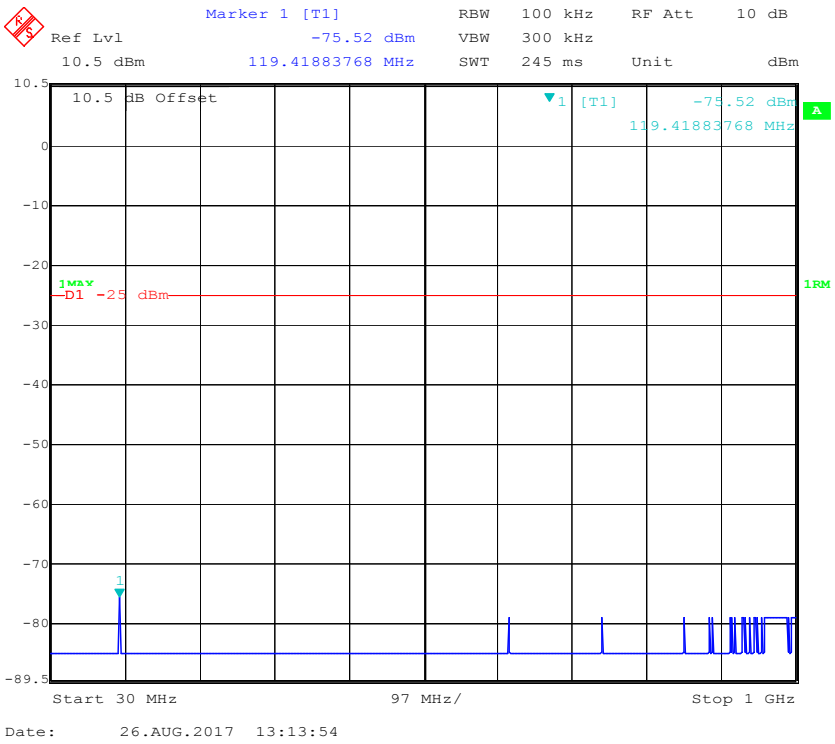



Fundamental test

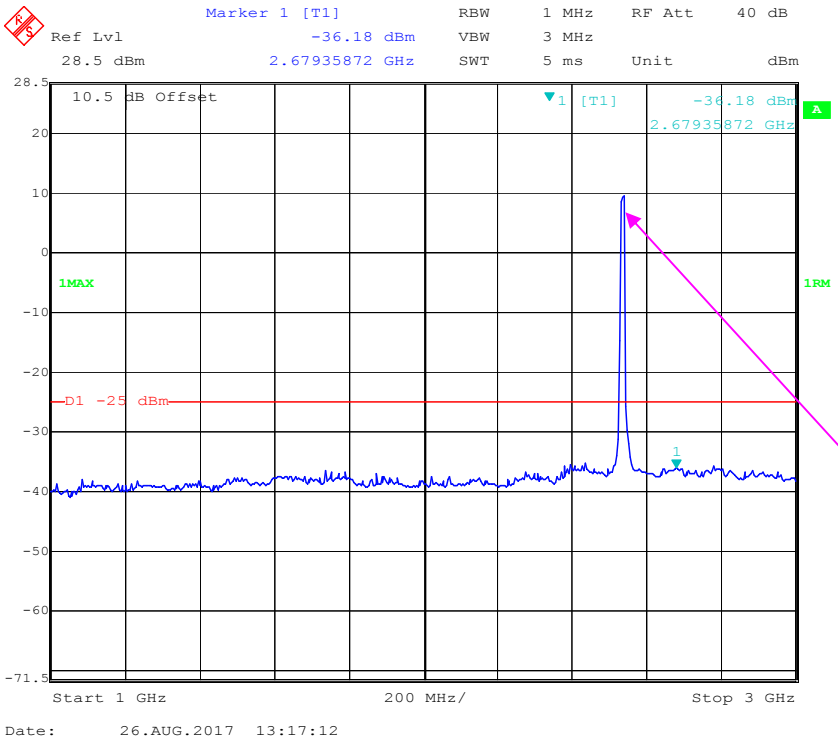
## 3 GHz – 26 GHz (10.0 MHz, Middle Channel)



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

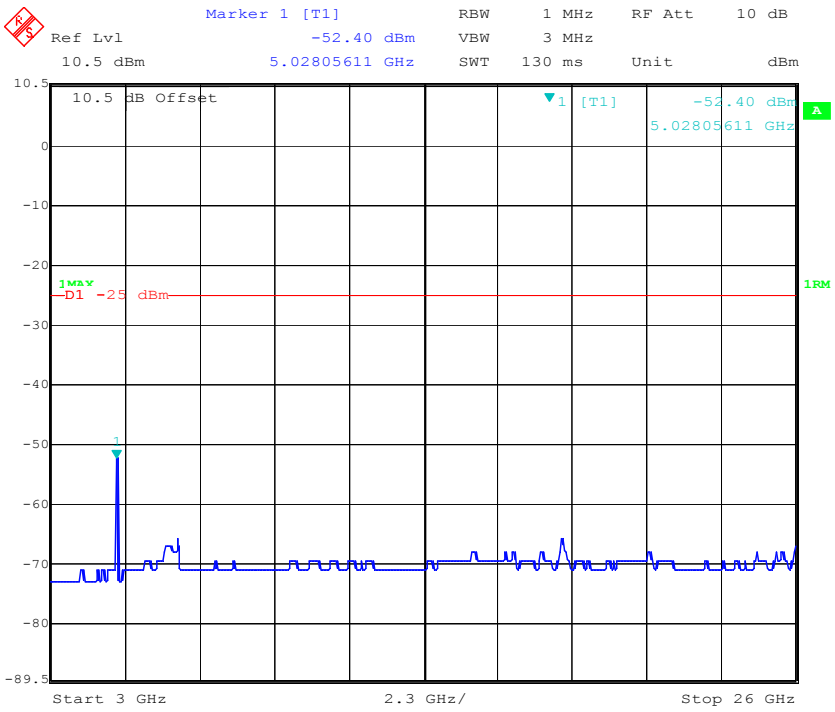



## 1 GHz – 3 GHz (15.0 MHz, Middle Channel)

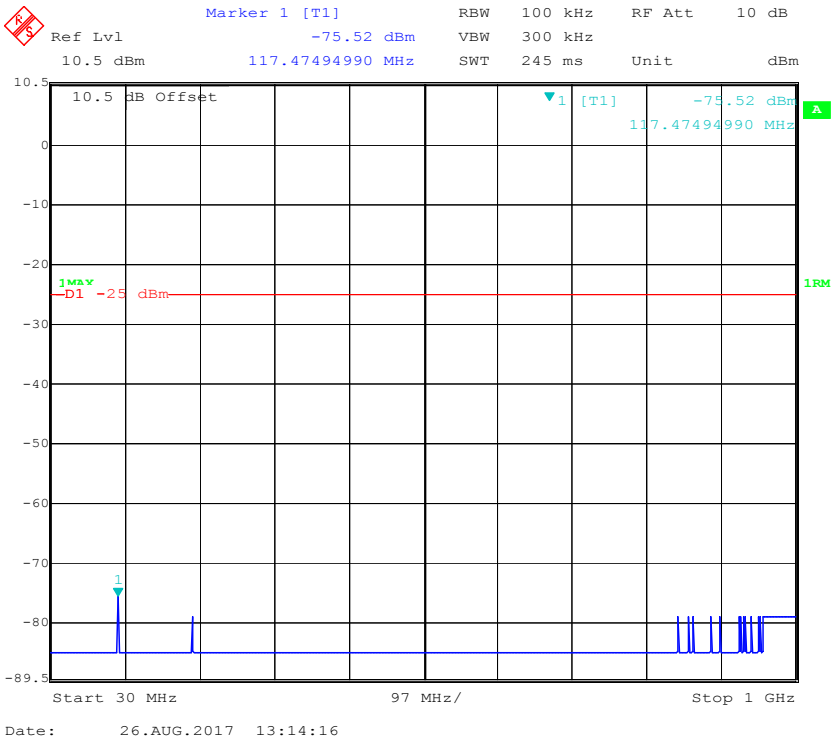



Fundamental test

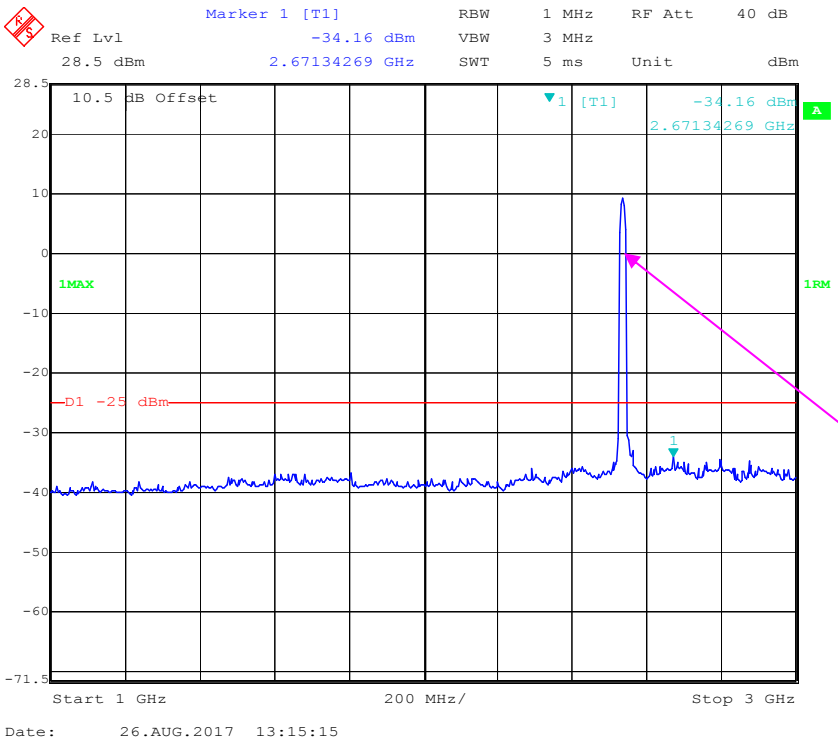
## 3 GHz – 26 GHz (15.0 MHz, Middle Channel)




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

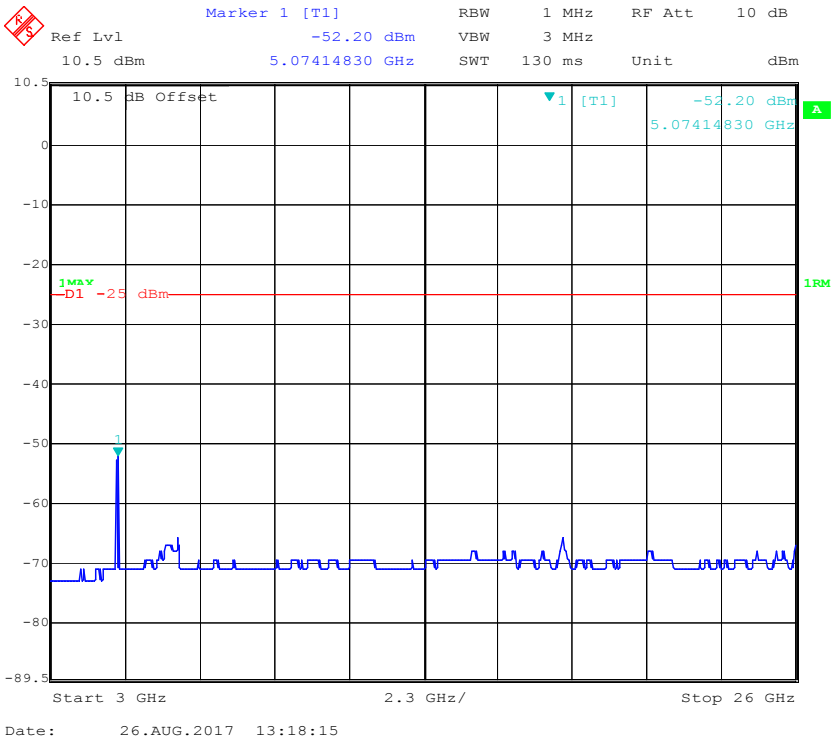


## 1 GHz – 3 GHz (20.0 MHz, Middle Channel)




Fundamental test

## 3 GHz – 26 GHz (20.0 MHz, Middle Channel)



# FCC § 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h) (m) SPURIOUS RADIATED EMISSIONS

## Applicable Standards

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

## Test Procedure

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

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

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

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

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

Spurious attenuation limit in dB = 43 + 10 $Log_{10}$ (power out in Watts) or,

Spurious attenuation limit in dB = 55 + 10 $Log_{10}$ (power out in Watts)

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 26 ℃ |
| **Relative Humidity:** | 56 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Hill He on 2017-08-24.*

*Test mode: Transmitting*

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

**30 MHz ~ 10 GHz:**

**Cellular Band (Part 22H)**

| Frequency (MHz) | Receiver Reading (dBμV) | Turntable Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | | |
| GSM 850 Mode | | | | | | | | | | |
| 189.78 | 39.06 | 217 | 1.9 | H | -57.90 | 0.29 | 0 | -58.19 | -13 | 45.19 |
| 189.78 | 38.56 | 214 | 1.3 | V | -58.40 | 0.29 | 0 | -58.69 | -13 | 45.69 |
| 1673.20 | 58.92 | 11 | 1.8 | H | -48.2 | 1.30 | 9.10 | -40.40 | -13 | 27.40 |
| 1673.20 | 55.02 | 149 | 1.1 | V | -51.5 | 1.30 | 9.10 | -43.70 | -13 | 30.70 |
| 2509.80 | 54.95 | 3 | 1.0 | H | -48.6 | 2.60 | 9.30 | -41.90 | -13 | 28.90 |
| 2509.80 | 55.53 | 313 | 1.3 | V | -47.4 | 2.60 | 9.30 | -40.70 | -13 | 27.70 |
| 3346.40 | 48.9 | 347 | 2.1 | H | -51.4 | 1.50 | 9.60 | -43.30 | -13 | 30.30 |
| 3346.40 | 45.33 | 169 | 1.6 | V | -55.0 | 1.50 | 9.60 | -46.90 | -13 | 33.90 |
| WCDMA 850 Mode | | | | | | | | | | |
| 203.55 | 39.18 | 195 | 1.4 | H | -57.80 | 0.30 | 0 | -58.10 | -13 | 45.10 |
| 203.55 | 38.16 | 236 | 1.7 | V | -58.80 | 0.30 | 0 | -59.10 | -13 | 46.10 |
| 1673.20 | 52.45 | 158 | 2.2 | H | -54.6 | 1.30 | 9.10 | -46.80 | -13 | 33.80 |
| 1673.20 | 52.27 | 133 | 2.3 | V | -54.2 | 1.30 | 9.10 | -46.40 | -13 | 33.40 |
| 2509.80 | 61.16 | 322 | 2.0 | H | -42.4 | 2.60 | 9.30 | -35.70 | -13 | 22.70 |
| 2509.80 | 59.86 | 289 | 2.0 | V | -43.1 | 2.60 | 9.30 | -36.40 | -13 | 23.40 |
| 3346.40 | 43.99 | 220 | 1.1 | H | -56.4 | 1.50 | 9.60 | -48.30 | -13 | 35.30 |
| 3346.40 | 44.46 | 144 | 1.3 | V | -55.9 | 1.50 | 9.60 | -47.80 | -13 | 34.80 |

**30 MHz ~ 20 GHz:**

**PCS Band (Part 24E)**

| Frequency (MHz) | Receiver Reading (dBμV) | Turntable Angle Degree | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | | |
| GSM 1900 Mode | | | | | | | | | | |
| 189.78 | 38.71 | 149 | 1.0 | H | -58.3 | 0.29 | 0 | -58.59 | -13 | 45.59 |
| 189.78 | 38.06 | 312 | 2.4 | V | -58.9 | 0.29 | 0 | -59.19 | -13 | 46.19 |
| 3760.00 | 46.02 | 279 | 1.1 | H | -55.2 | 1.50 | 9.70 | -47.00 | -13 | 34.00 |
| 3760.00 | 46.14 | 208 | 2.4 | V | -54.6 | 1.50 | 9.70 | -46.40 | -13 | 33.40 |
| WCDMA 1900 Mode | | | | | | | | | | |
| 203.55 | 39.25 | 327 | 1.1 | H | -57.7 | 0.30 | 0 | -58.00 | -13 | 45.00 |
| 203.55 | 39.73 | 166 | 1.3 | V | -57.3 | 0.30 | 0 | -57.60 | -13 | 44.60 |
| 3760.00 | 47.38 | 239 | 1.5 | H | -53.8 | 1.50 | 9.70 | -45.60 | -13 | 32.60 |
| 3760.00 | 49.15 | 246 | 1.8 | V | -51.6 | 1.50 | 9.70 | -43.40 | -13 | 30.40 |

**LTE Band:**

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

| Frequency | Receiver | Turntable | Rx Antenna | | Substituted | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| (MHz) | Reading (dBμV) | Angle Degree | Height (m) | Polar (H/V) | Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) | | | |
| **Band 4** | | | | | | | | | | |
| **Test frequency range:30 MHz ~ 18 GHz** | | | | | | | | | | |
| 230.78 | 39.33 | 129 | 1.7 | H | -57.70 | 0.31 | 0 | -58.01 | -13 | 45.01 |
| 230.78 | 38.56 | 57 | 2.0 | V | -58.40 | 0.31 | 0 | -58.71 | -13 | 45.71 |
| 3465.00 | 44.51 | 307 | 2.1 | H | -55.9 | 1.50 | 9.70 | -47.70 | -13 | 34.70 |
| 3465.00 | 45.68 | 298 | 1.5 | V | -55.5 | 1.50 | 9.70 | -47.30 | -13 | 34.30 |
| **Band 5** | | | | | | | | | | |
| **Test frequency range:30 MHz ~ 10 GHz** | | | | | | | | | | |
| 230.78 | 40.15 | 261 | 1.0 | H | -56.80 | 0.31 | 0 | -57.11 | -13 | 44.11 |
| 230.78 | 39.99 | 136 | 2.5 | V | -57.00 | 0.31 | 0 | -57.31 | -13 | 44.31 |
| 1673.00 | 47.09 | 350 | 1.8 | H | -60.0 | 1.30 | 9.10 | -52.20 | -13 | 39.20 |
| 1673.00 | 46.16 | 175 | 1.6 | V | -60.3 | 1.30 | 9.10 | -52.50 | -13 | 39.50 |
| 2509.50 | 44.37 | 138 | 1.8 | H | -59.2 | 2.60 | 9.30 | -52.50 | -13 | 39.50 |
| 2509.50 | 45.09 | 149 | 2.4 | V | -57.8 | 2.60 | 9.30 | -51.10 | -13 | 38.10 |
| **Band 7** | | | | | | | | | | |
| **Test frequency range: 30 MHz ~ 26 GHz** | | | | | | | | | | |
| 230.78 | 39.16 | 126 | 2.4 | H | -57.80 | 0.31 | 0 | -58.11 | -25 | 33.11 |
| 230.78 | 38.29 | 24 | 2.2 | V | -58.70 | 0.31 | 0 | -59.01 | -25 | 34.01 |
| 5070.00 | 45.31 | 126 | 2.1 | H | -52.6 | 1.60 | 11.20 | -43.00 | -25 | 18.00 |
| 5070.00 | 46.01 | 319 | 2.0 | V | -51.9 | 1.60 | 11.20 | -42.30 | -25 | 17.30 |

**Note:**
1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
2) Margin = Limit- Absolute Level

# FCC § 22.917 (a);§ 24.238 (a); §27.53 (h)(m) - BAND EDGES

## Applicable Standards

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

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

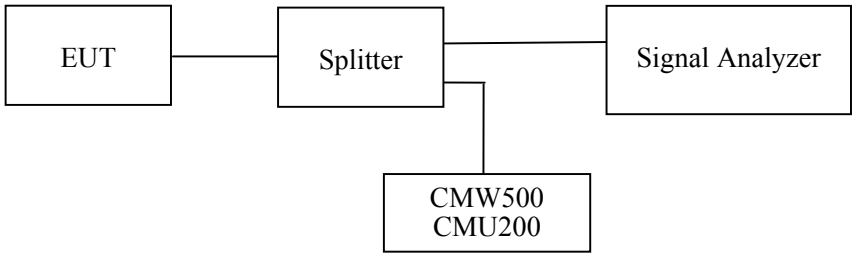
According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

## Test Procedure

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

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




## Test Data

### Environmental Conditions

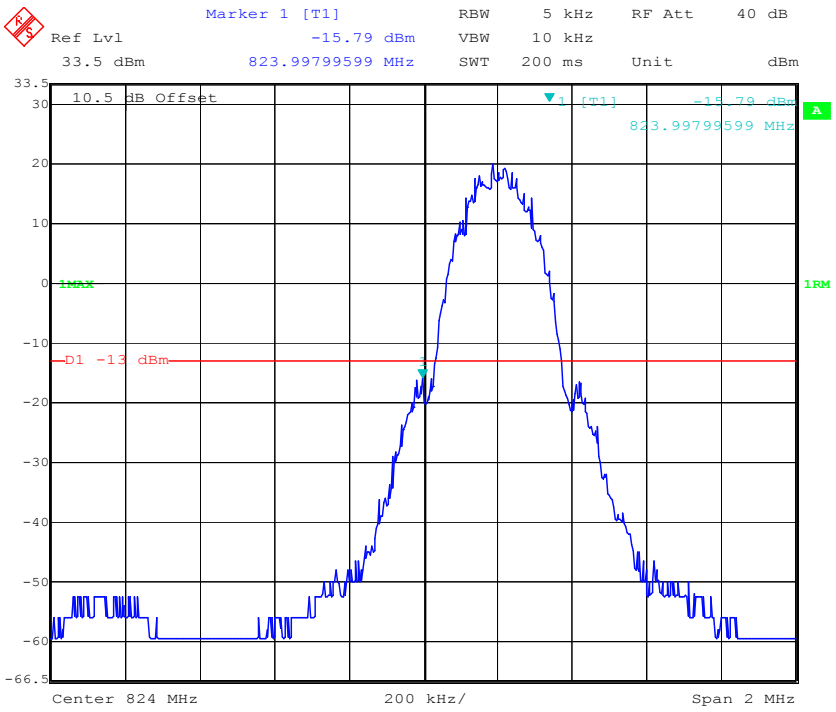
| | |
|---|---|
| **Temperature:** | 23~25 ℃ |
| **Relative Humidity:** | 53~55 % |
| **ATM Pressure:** | 100.0~101.0 kPa |

*The testing was performed by Hill He from 2017-08-24 to2017-08-26.*

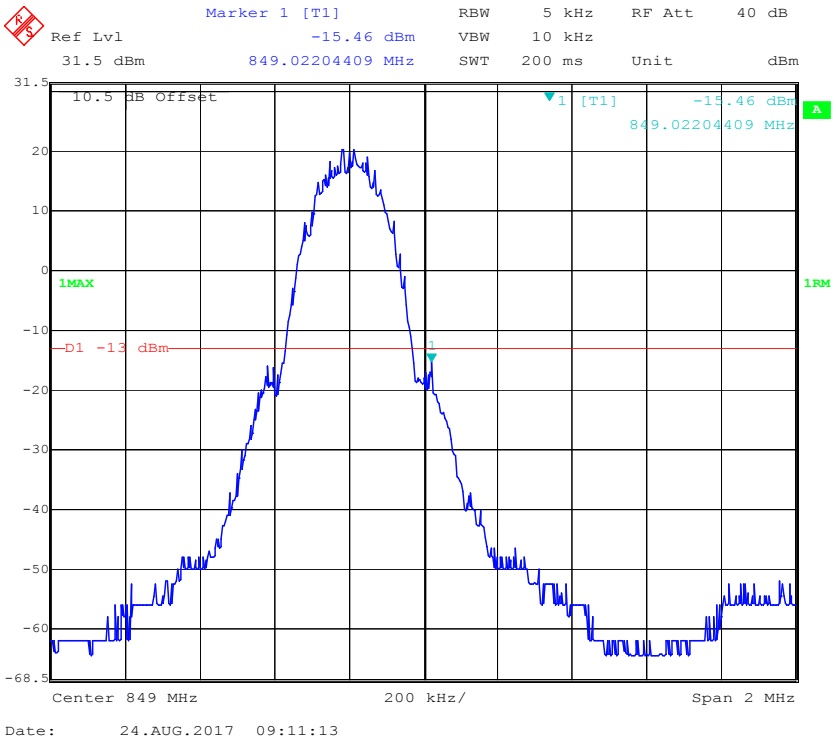
*EUT operation mode: Transmitting*

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

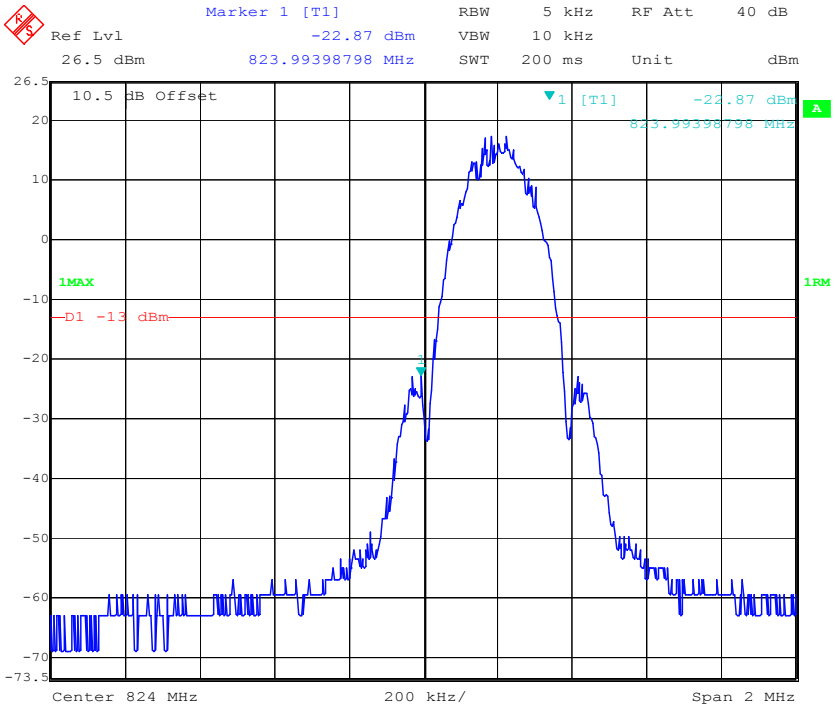
## Cellular Band, Left Band Edge for GSM (GMSK) Mode



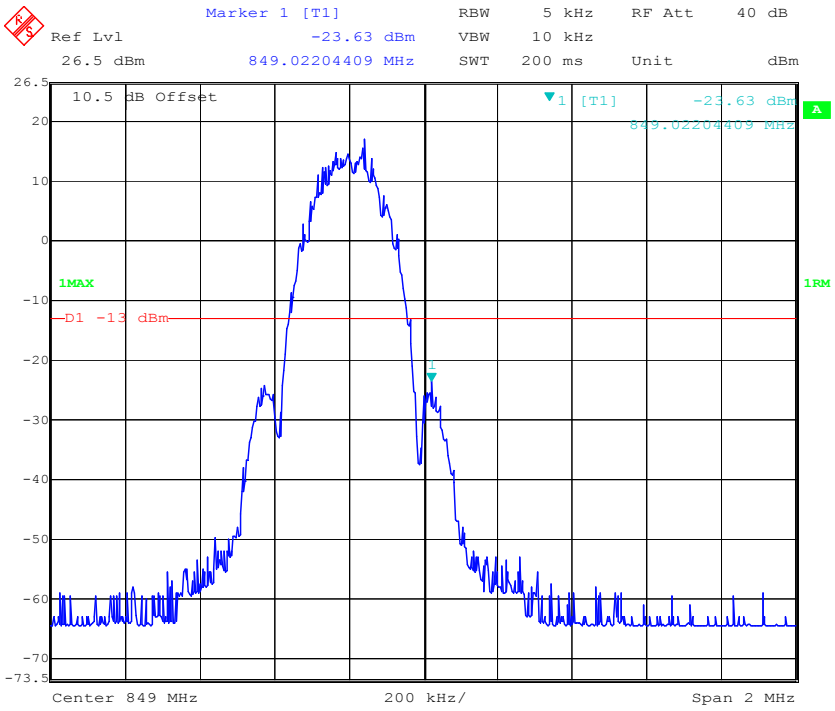

## Cellular Band, Right Band Edge for GSM (GMSK) Mode



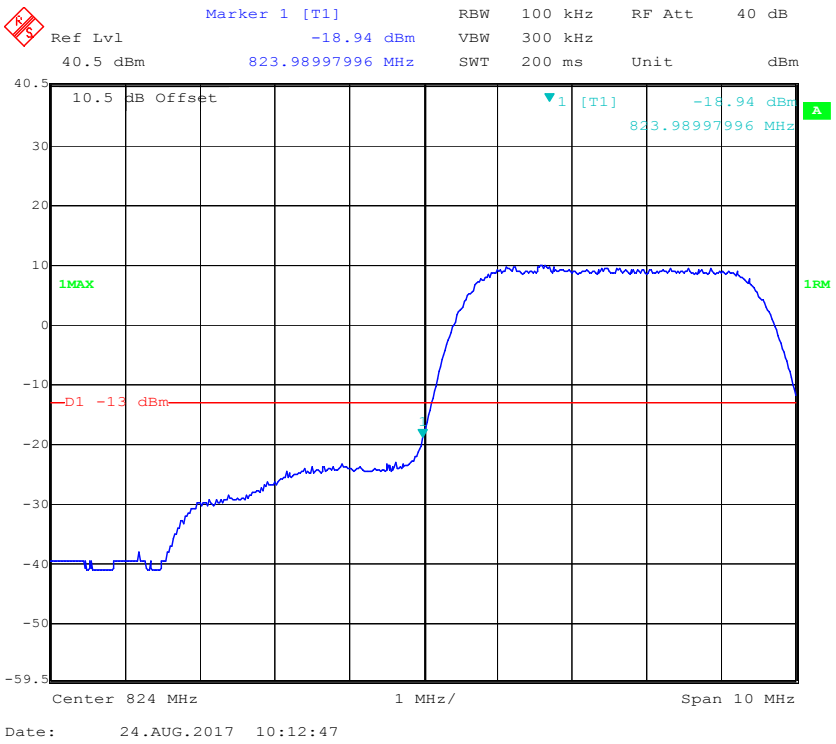
## Cellular Band, Left Band Edge for EGPRS Mode



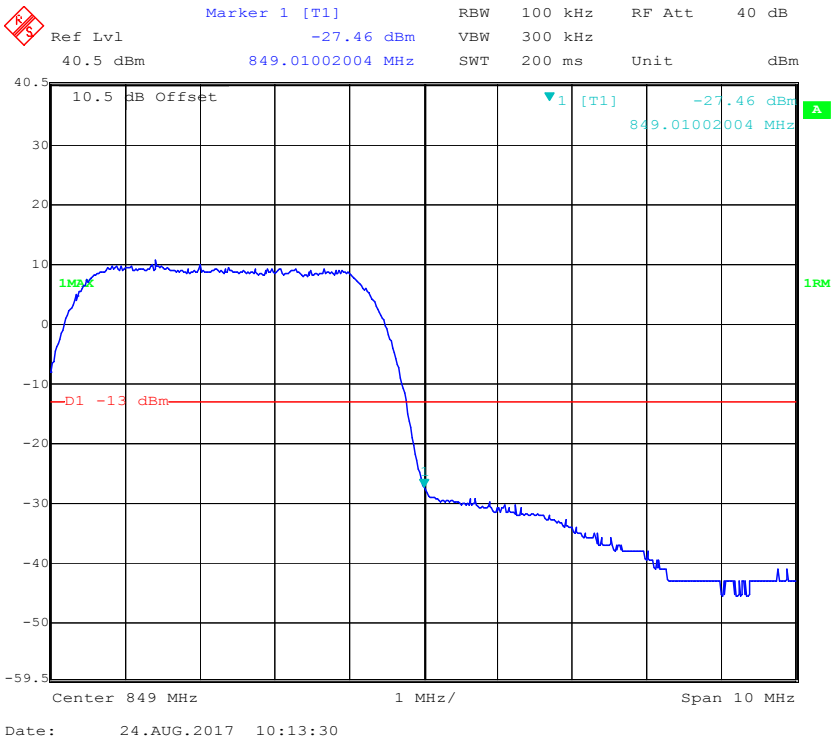

## Cellular Band, Right Band Edge for EGPRS Mode



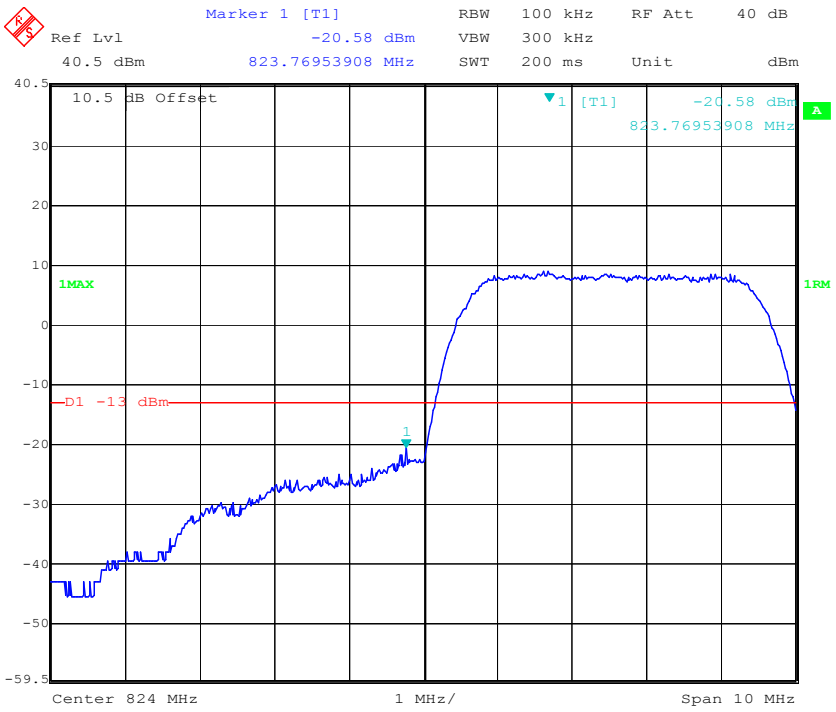
## Cellular Band, Left Band Edge for RMC (BPSK) Mode



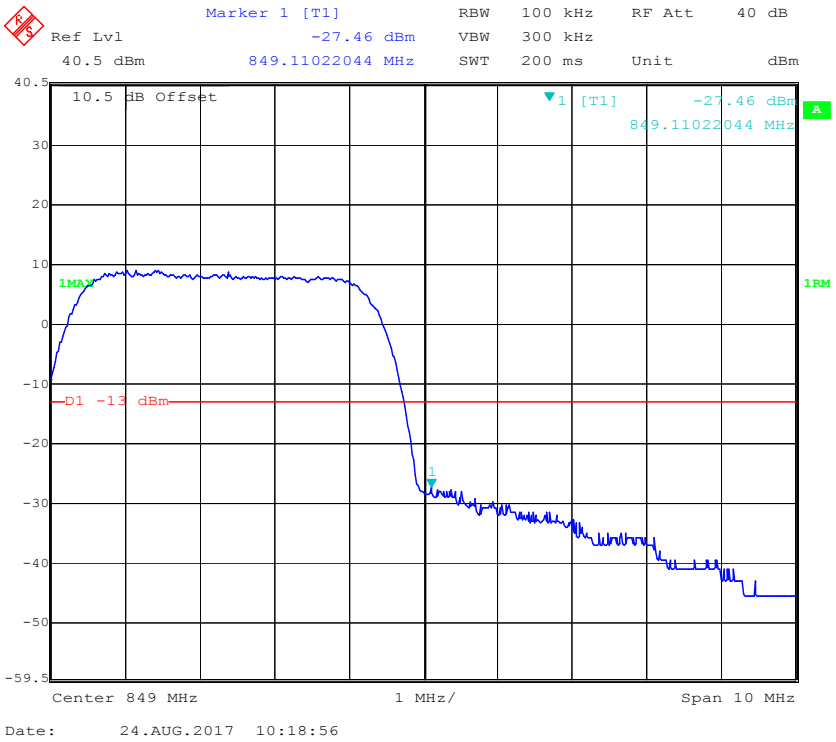

## Cellular Band, Right Band Edge for RMC (BPSK) Mode



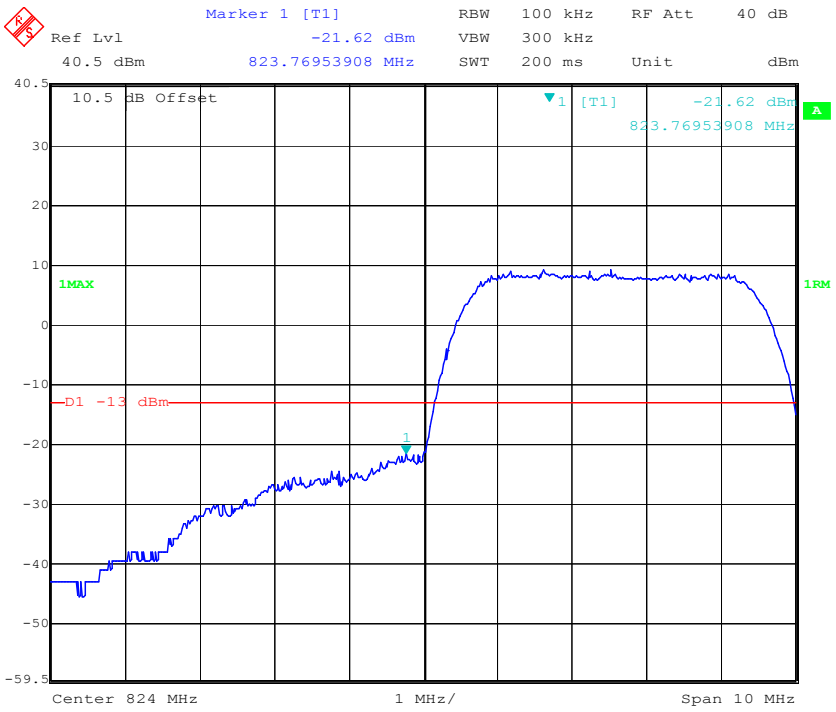
## Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



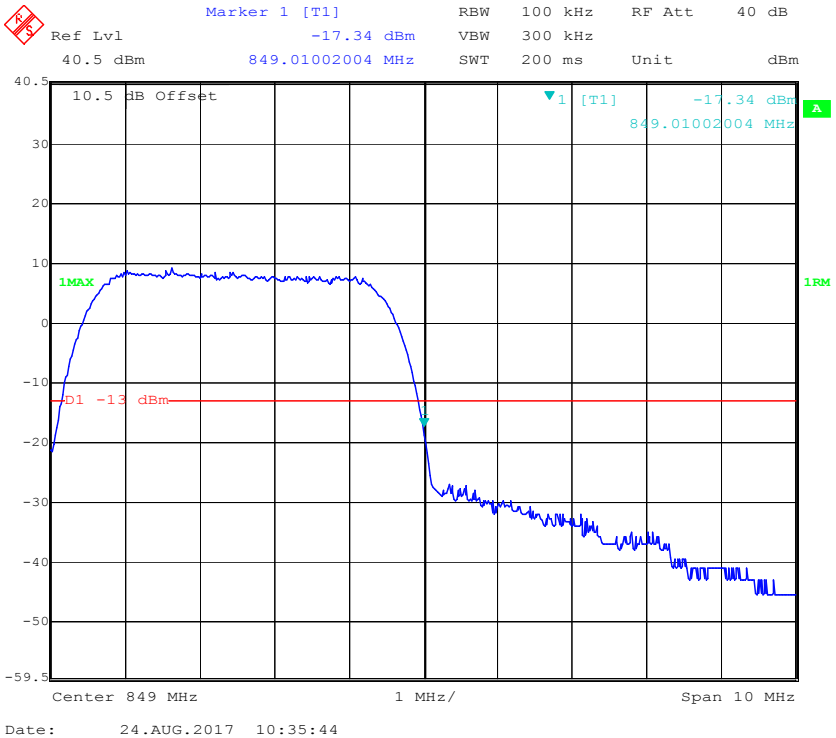

## Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



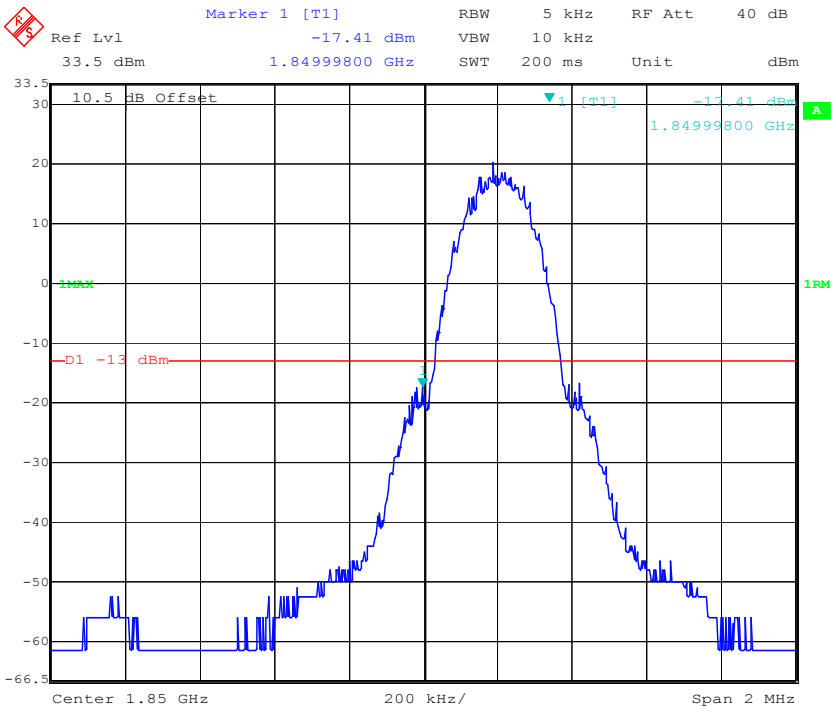
## Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



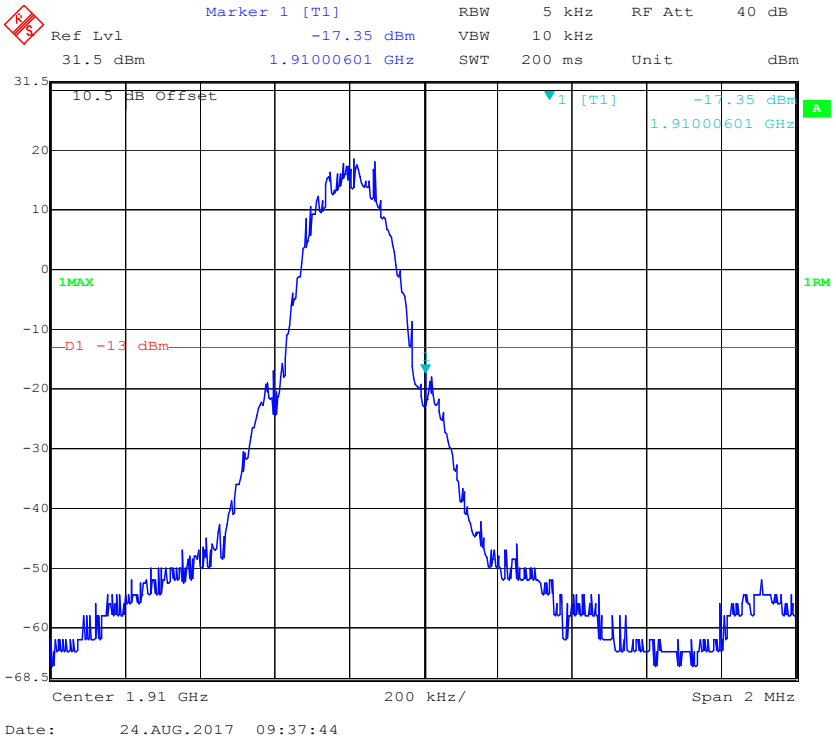

## Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



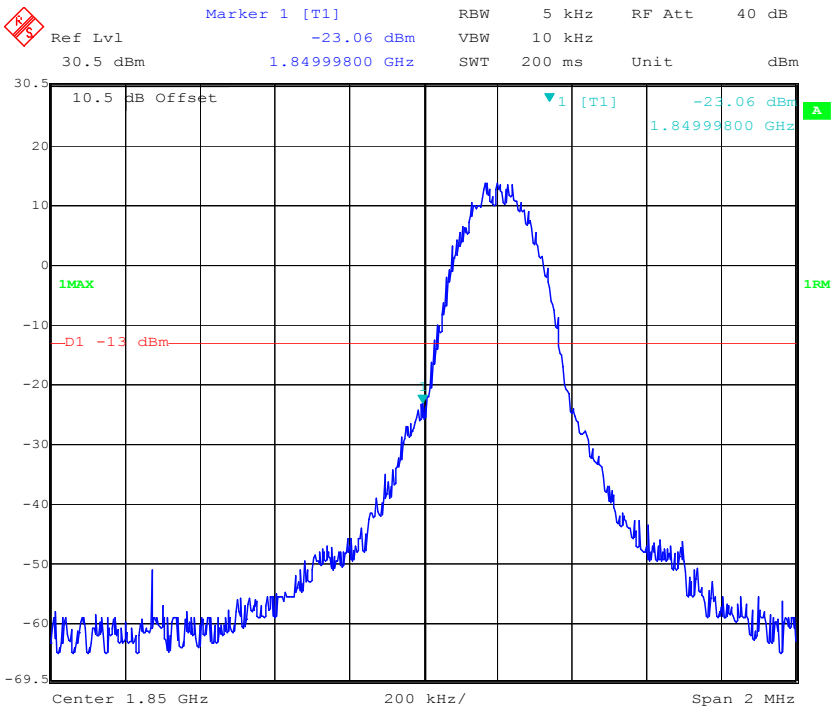
## PCS Band, Left Band Edge for GSM (GMSK) Mode



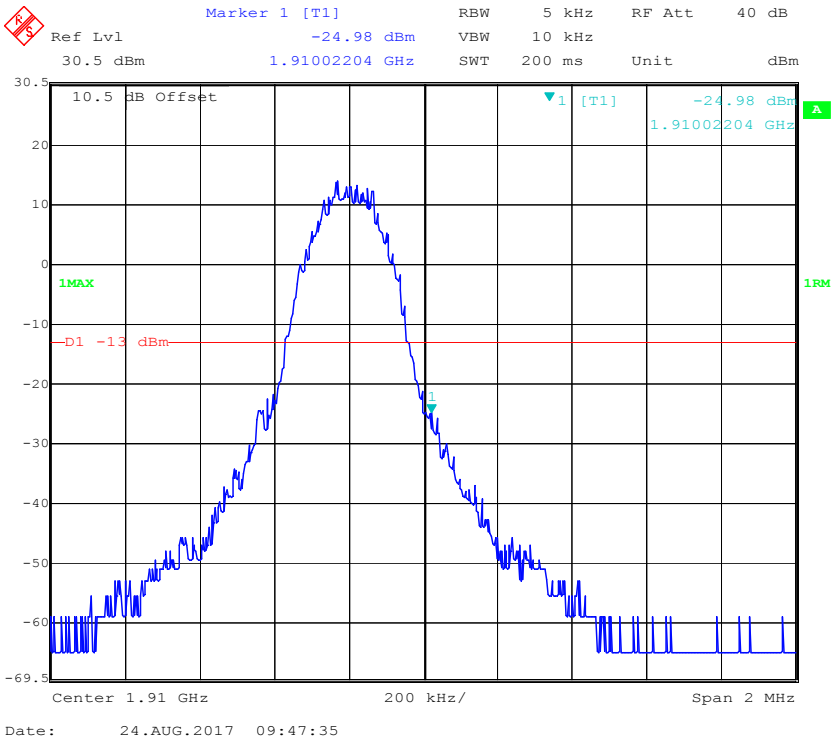

## PCS Band, Right Band Edge for GSM (GMSK) Mode



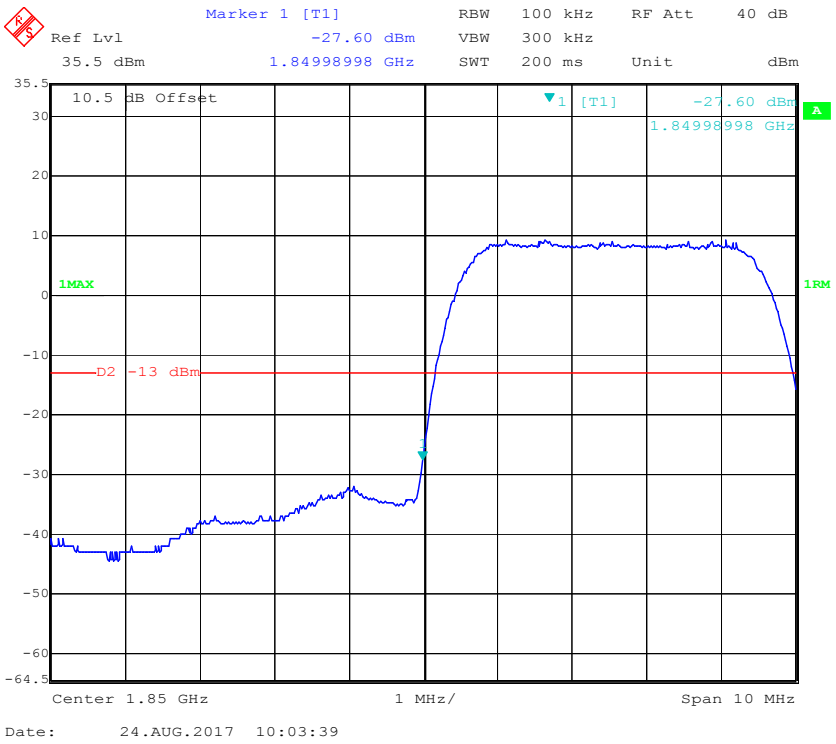
## PCS Band, Left Band Edge for EGPRS Mode



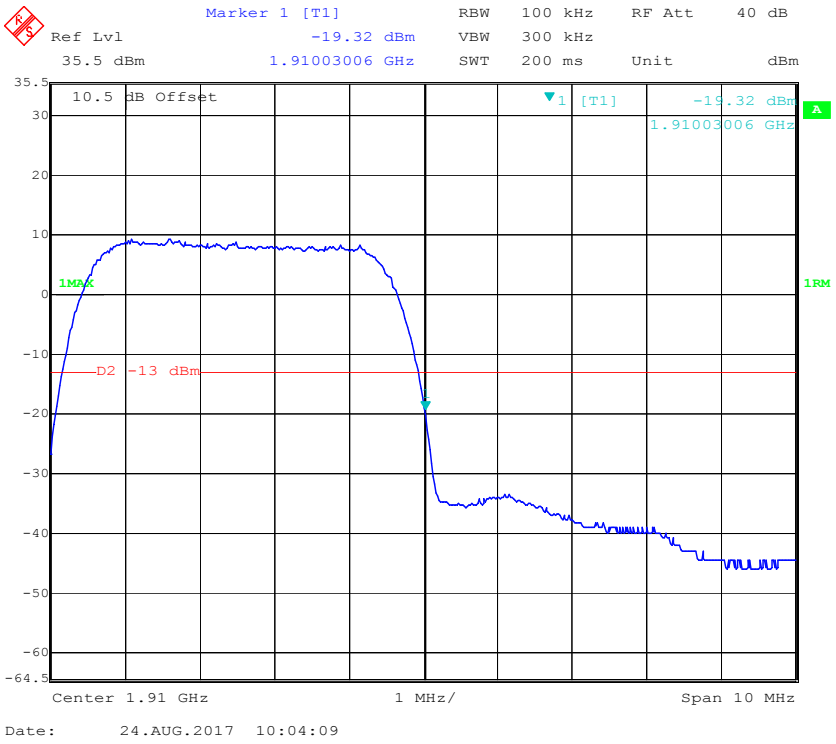

## PCS Band, Right Band Edge for EGPRS Mode



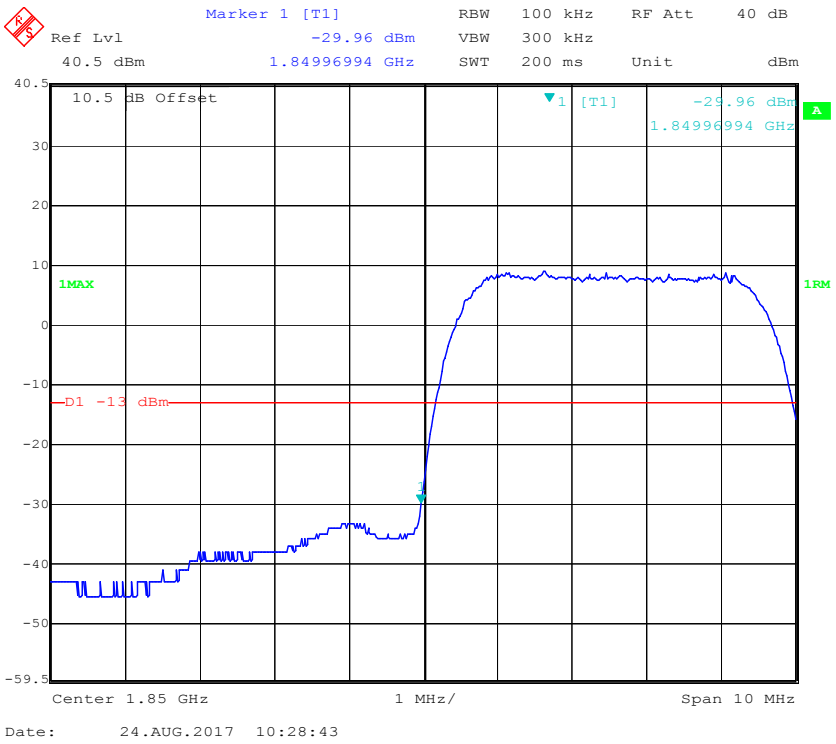
## PCS Band, Left Band Edge for RMC (BPSK) Mode



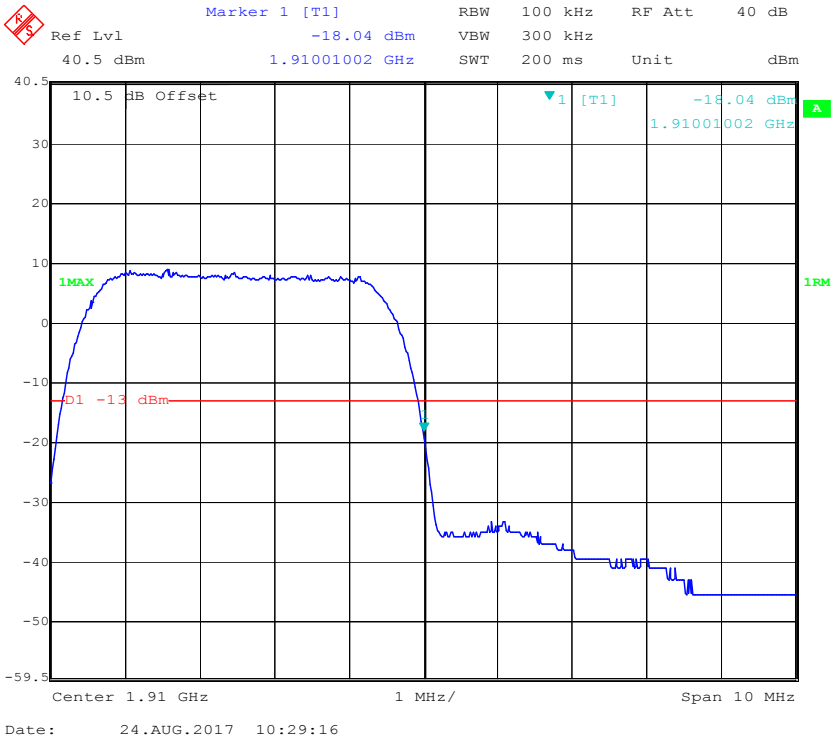

## PCS Band, Right Band Edge for RMC (BPSK) Mode



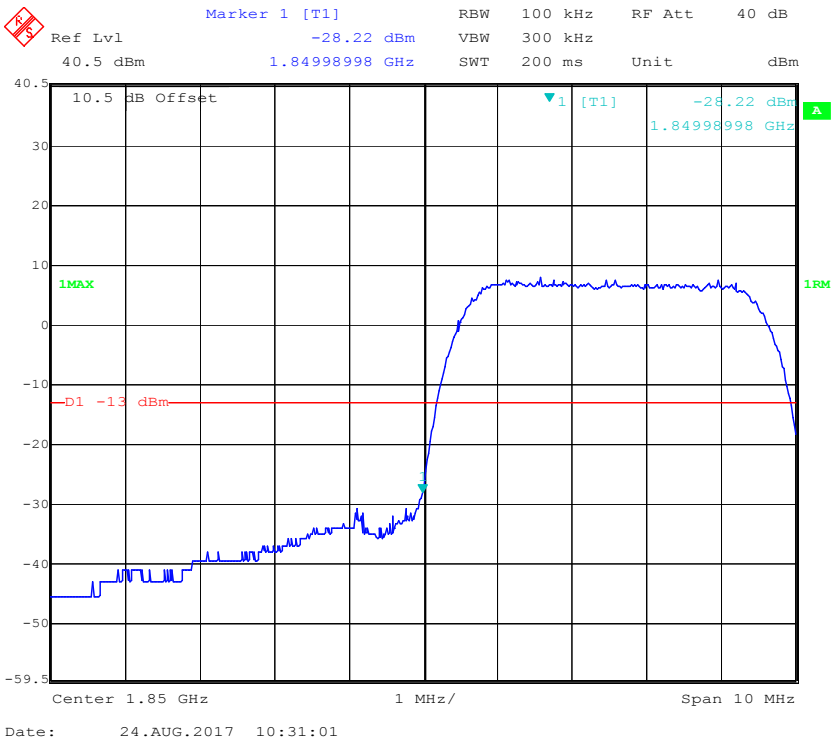
## PCS Band, Left Band Edge for HSDPA (16QAM) Mode



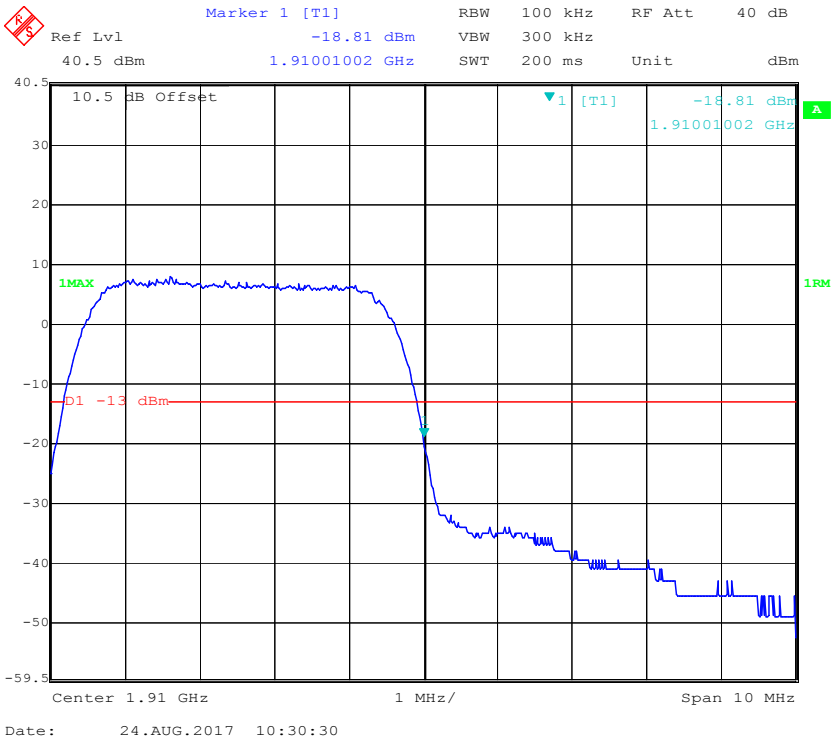

## PCS Band, Right Band Edge for HSDPA (16QAM) Mode



## PCS Band, Left Band Edge for HSUPA (BPSK) Mode

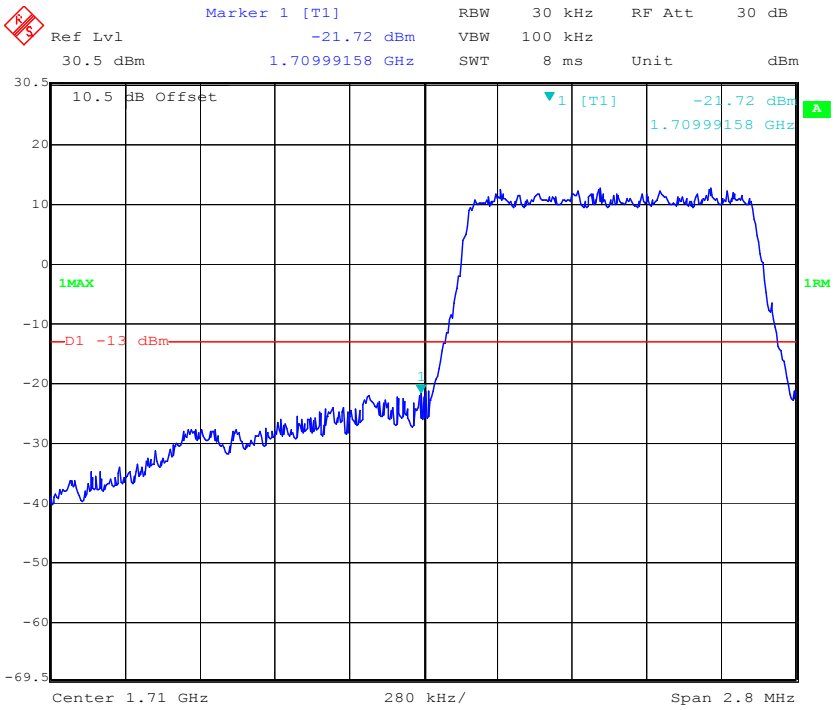



## PCS Band, Right Band Edge for HSUPA (BPSK) Mode

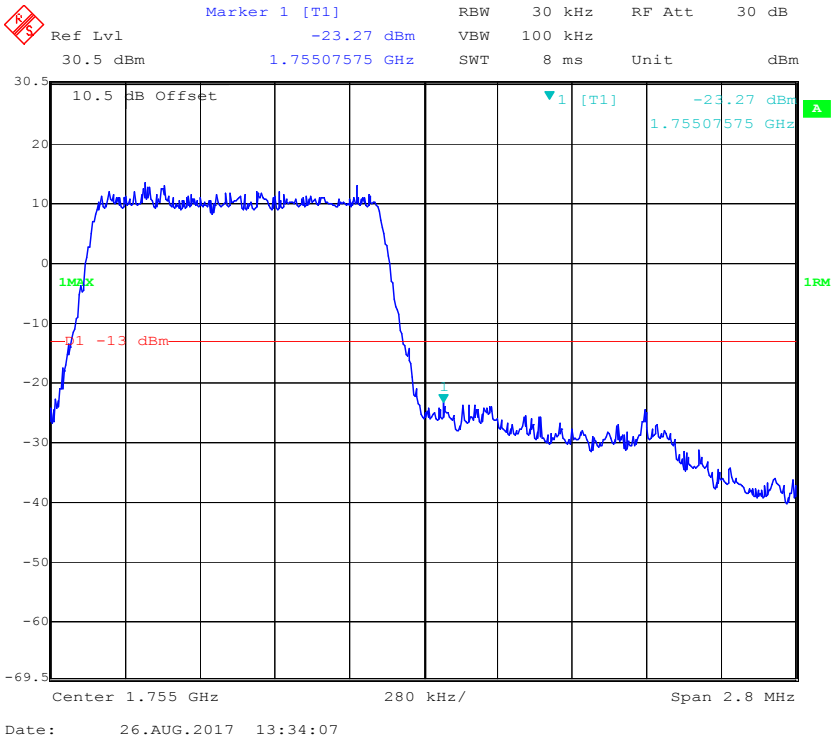


**Band 4:**

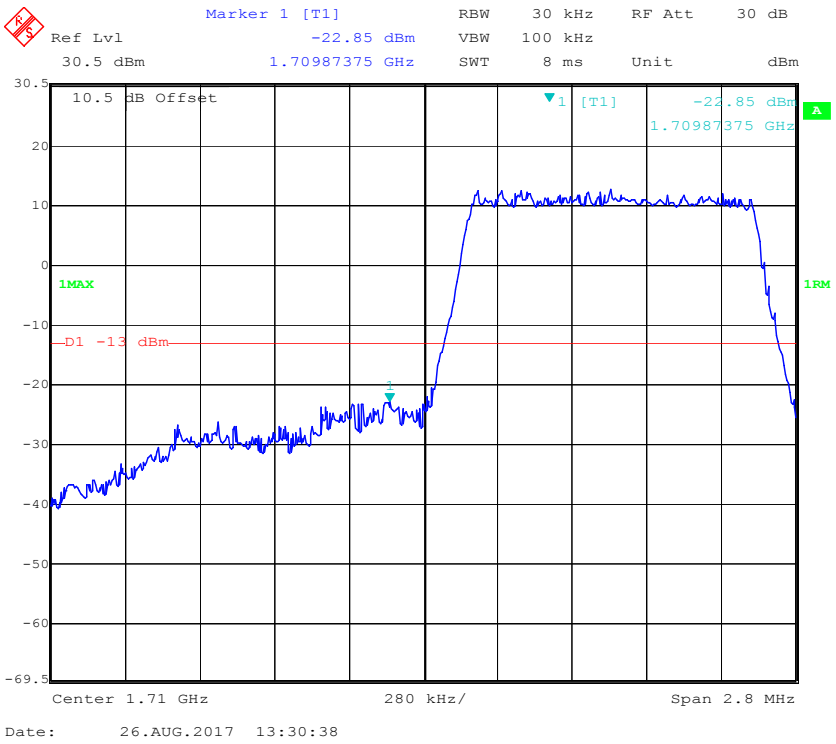
## QPSK (1.4 MHz, FULL RB) - Left Band Edge



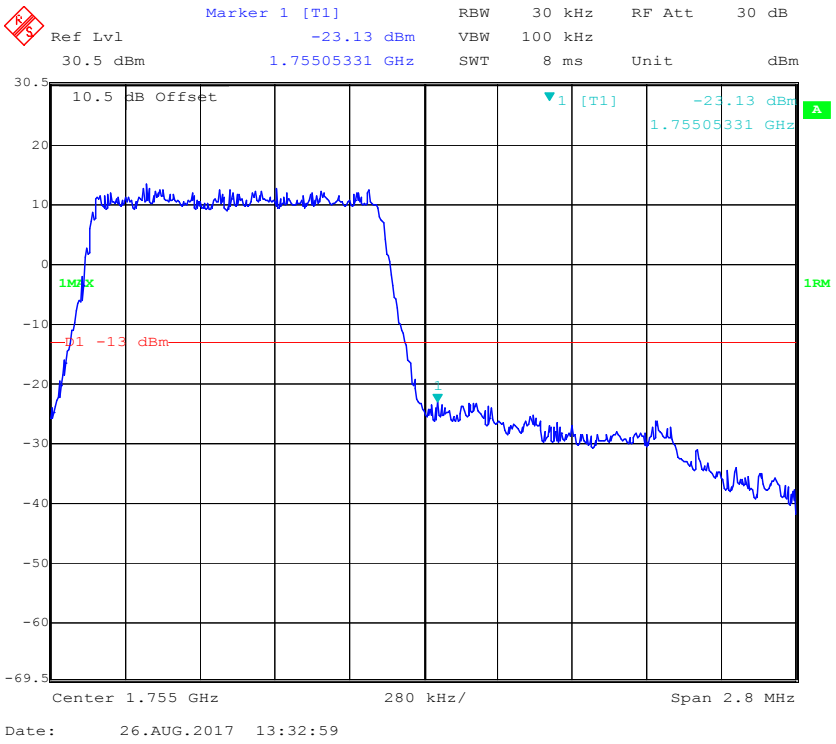

## QPSK (1.4 MHz, FULL RB) - Right Band Edge



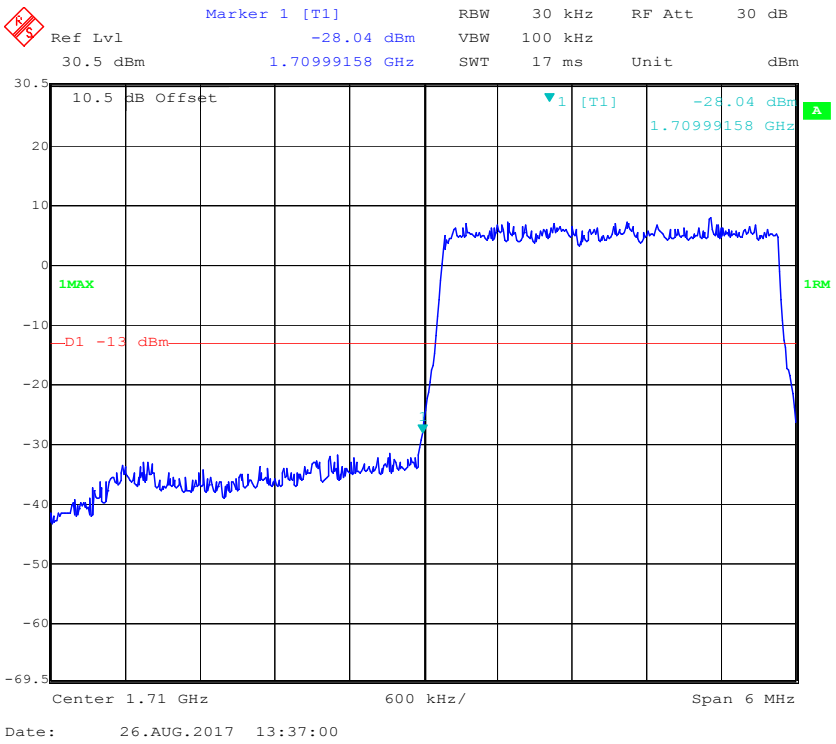
## 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



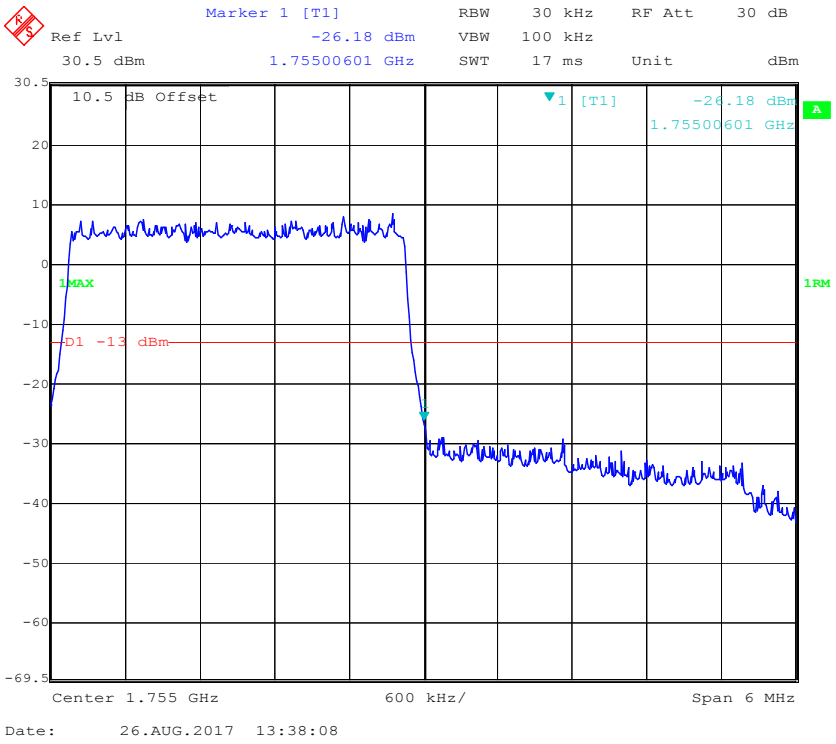

## 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



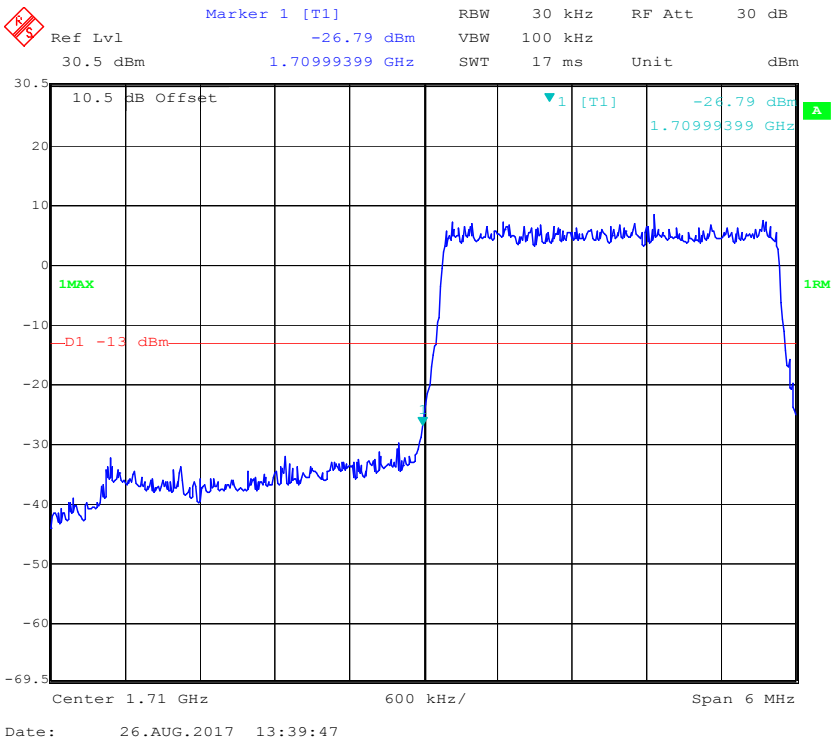
## QPSK (3.0 MHz, FULL RB) - Left Band Edge



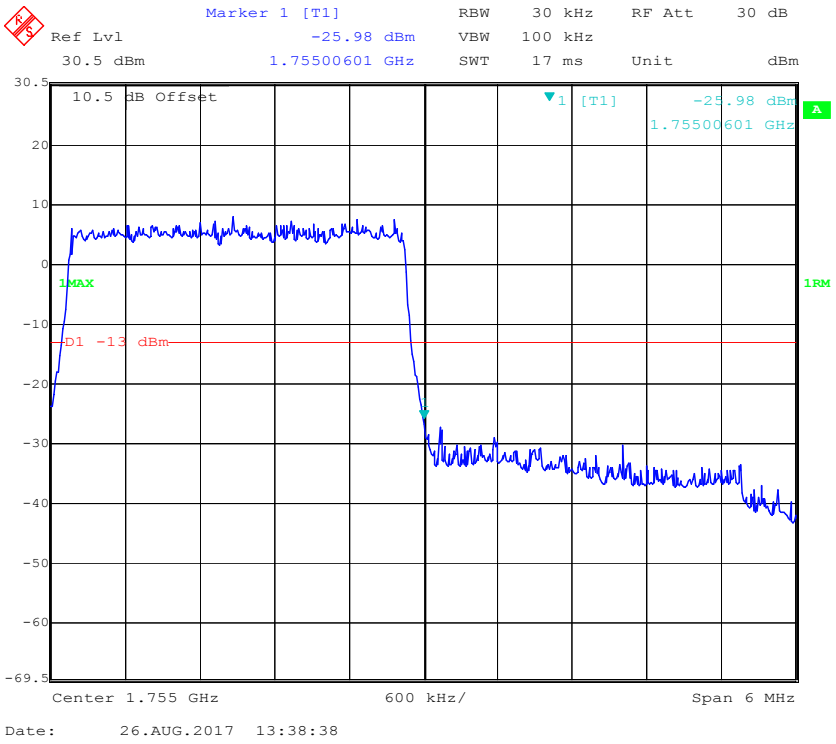

## QPSK (3.0 MHz, FULL RB) - Right Band Edge



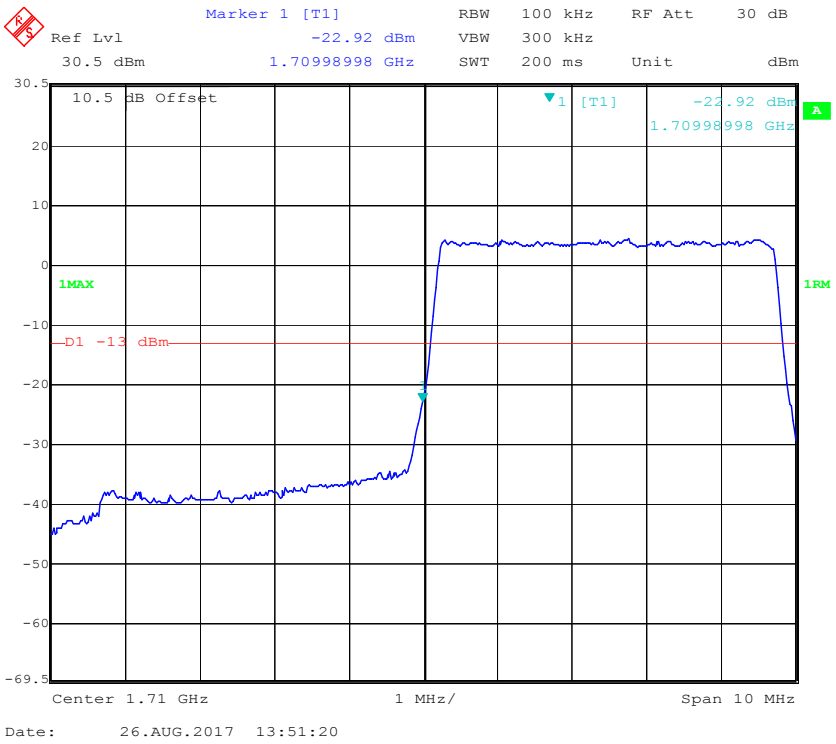
## 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



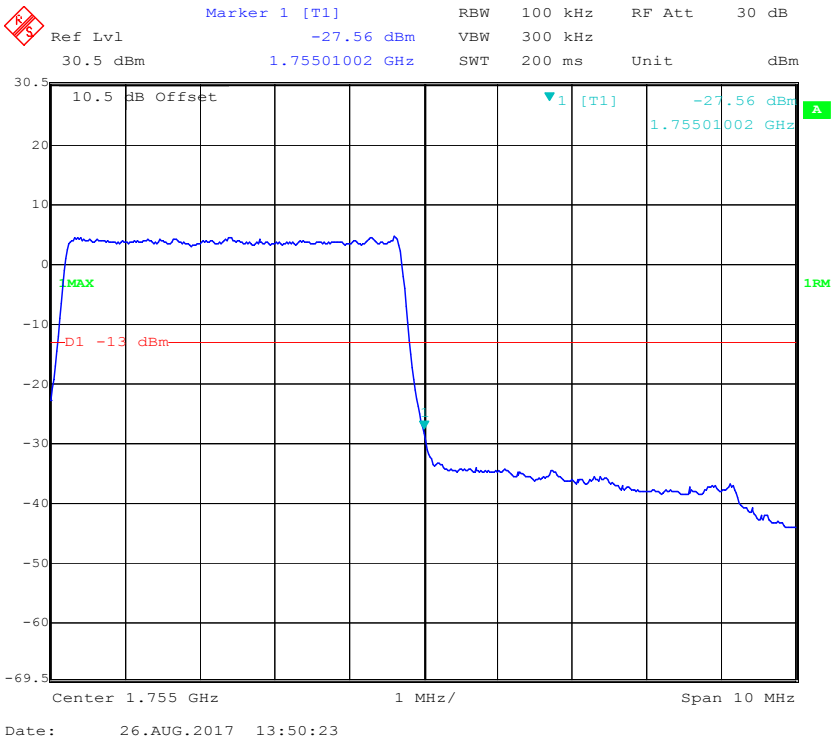

## 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



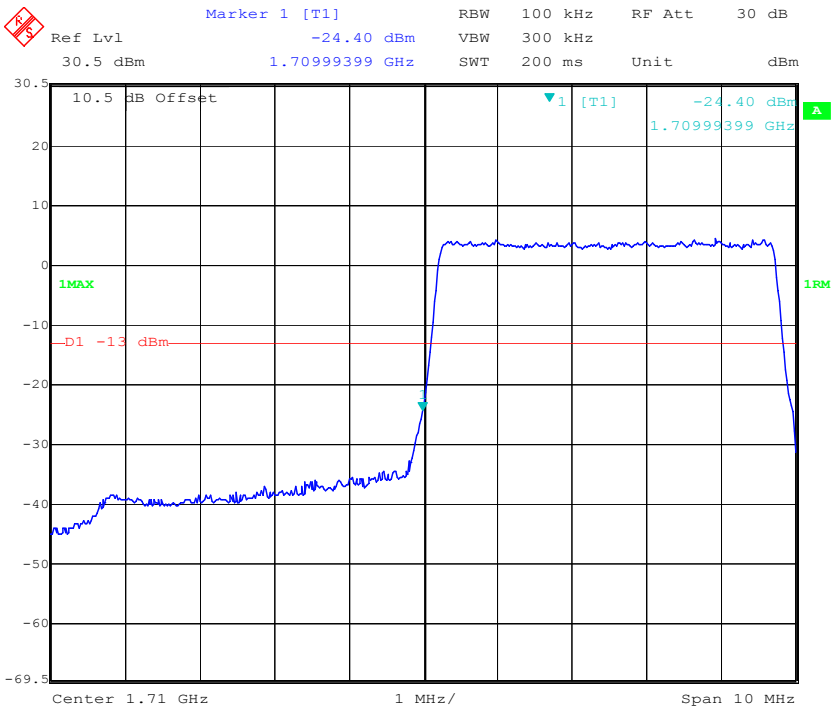
## QPSK (5.0 MHz, FULL RB) - Left Band Edge



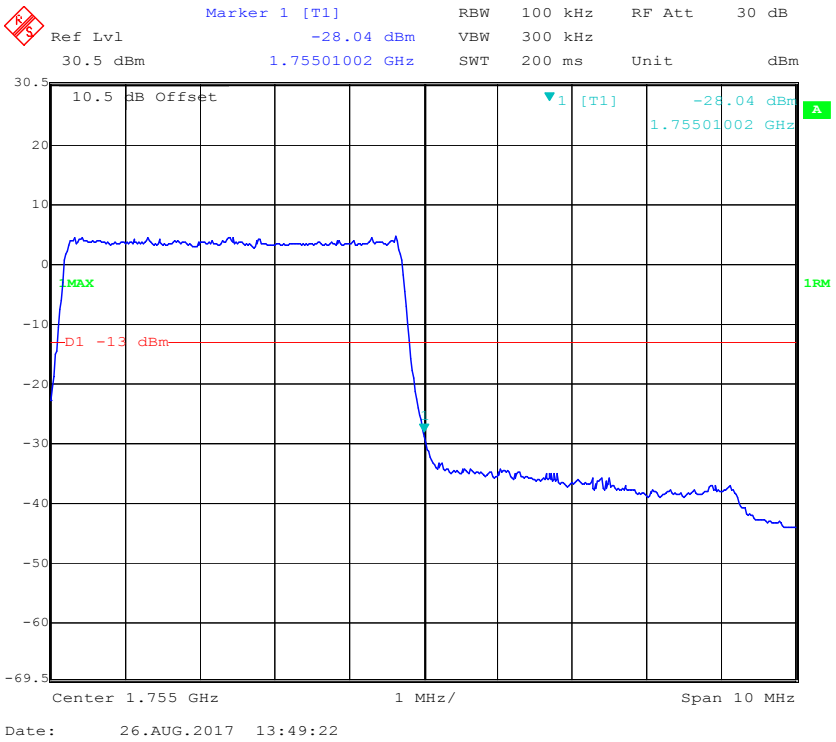

## QPSK (5.0 MHz, FULL RB) - Right Band Edge



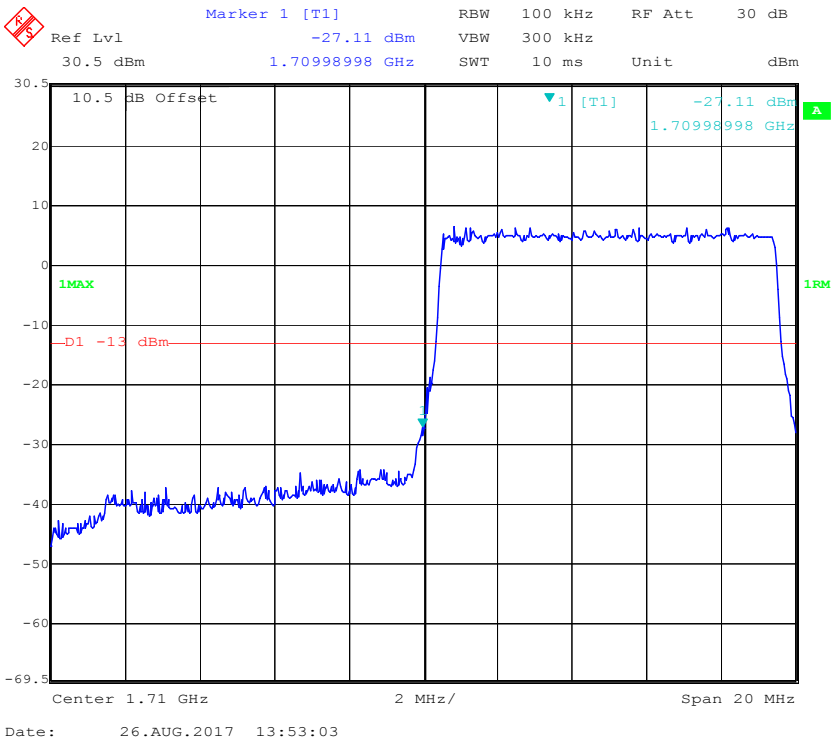
## 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



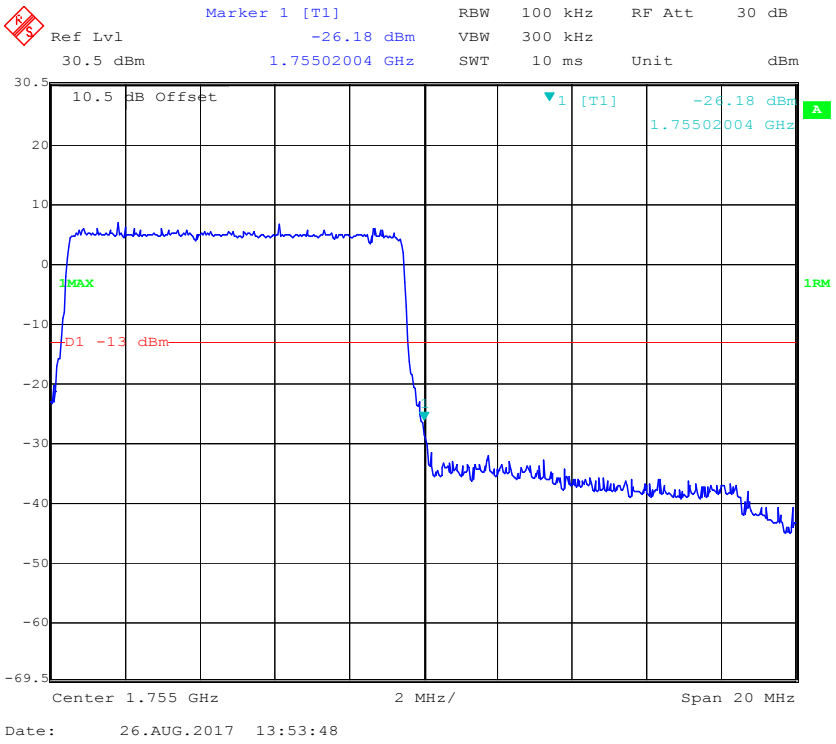

## 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



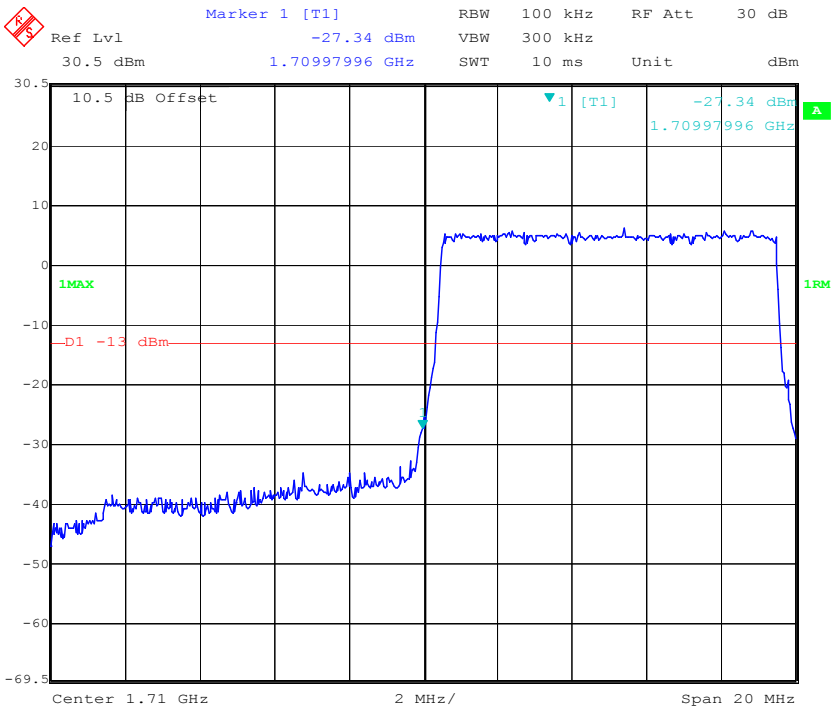
## QPSK (10.0 MHz, FULL RB) - Left Band Edge



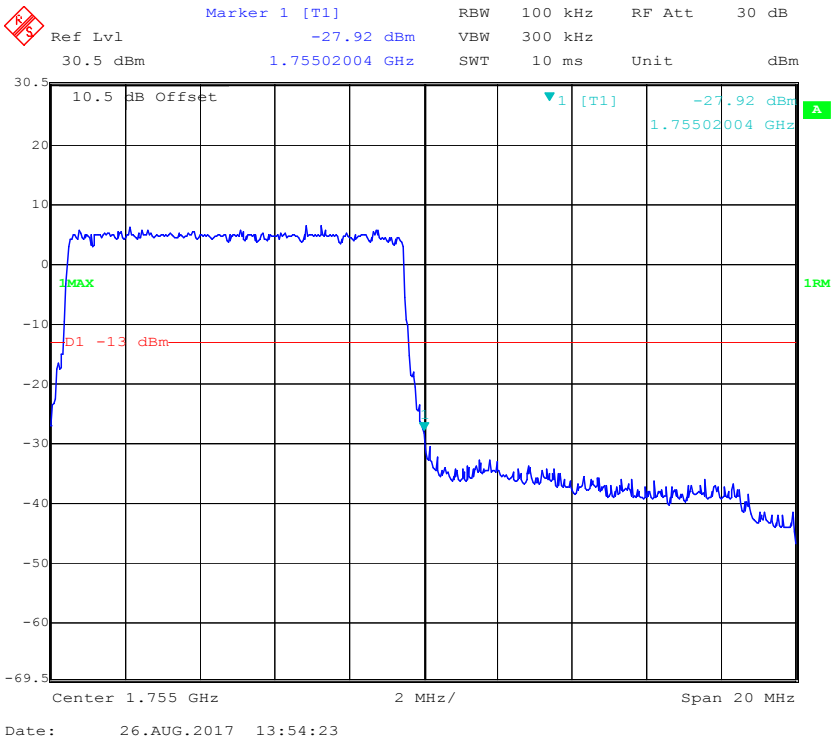

## QPSK (10.0 MHz, FULL RB) - Right Band Edge



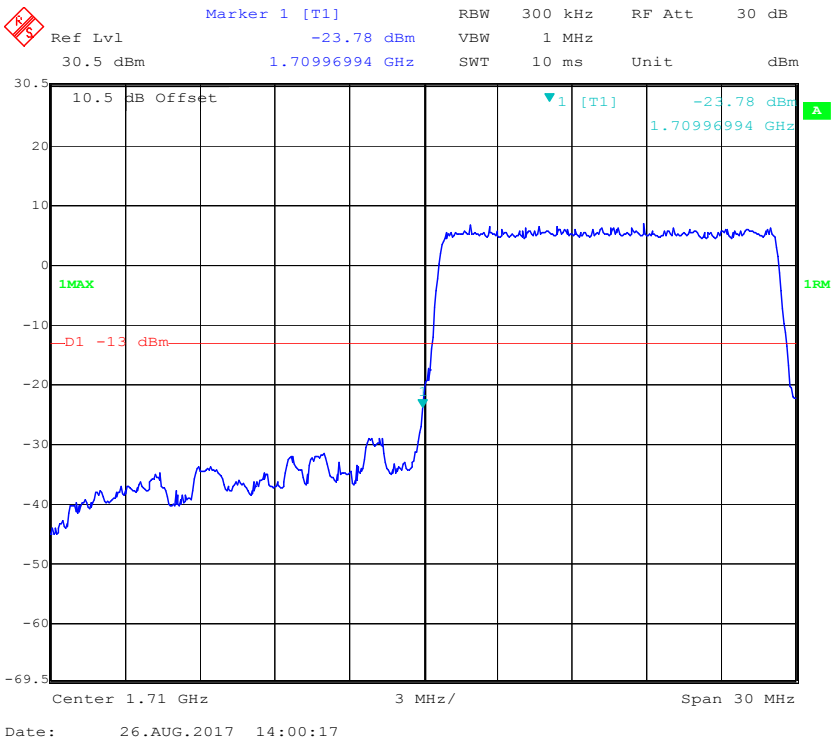
## 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



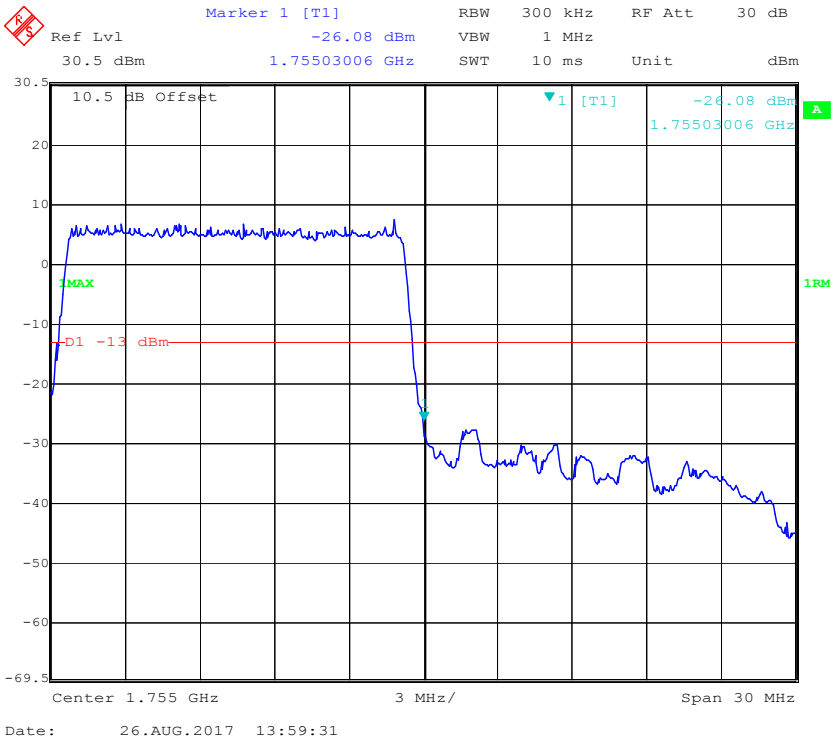

## 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



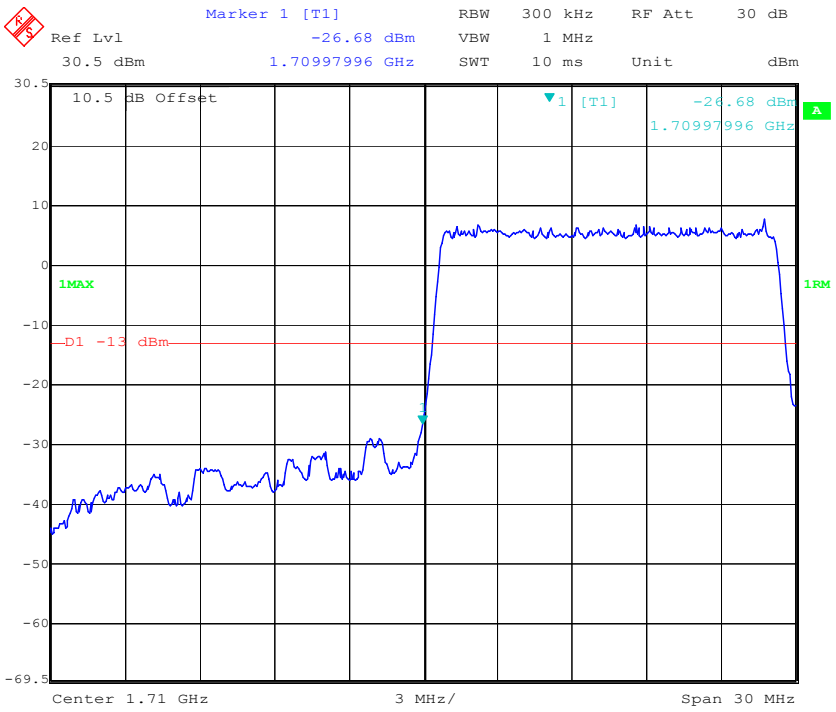
## QPSK (15.0 MHz, FULL RB) - Left Band Edge



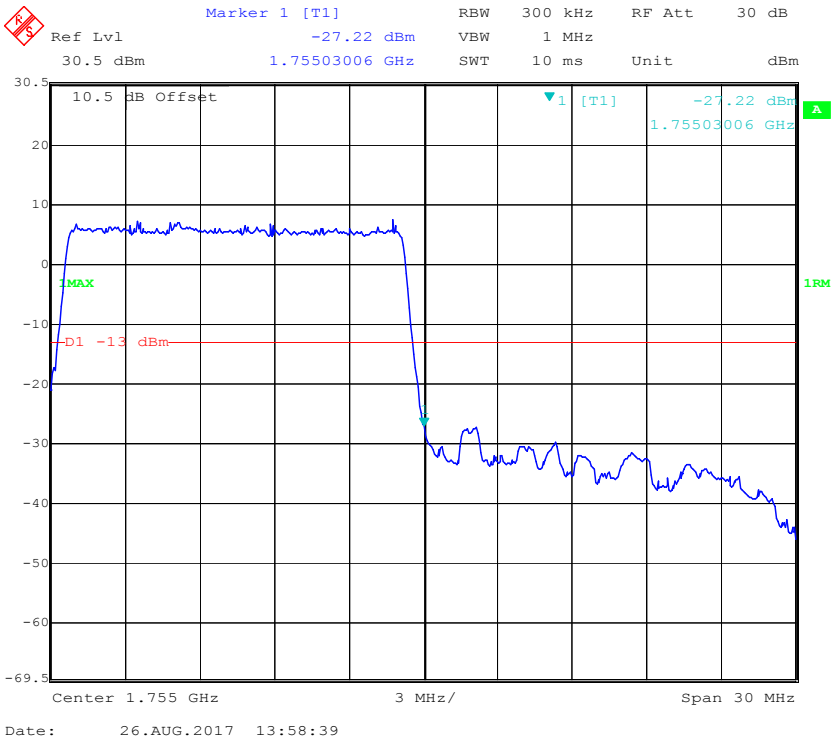

## QPSK (15.0 MHz, FULL RB) - Right Band Edge



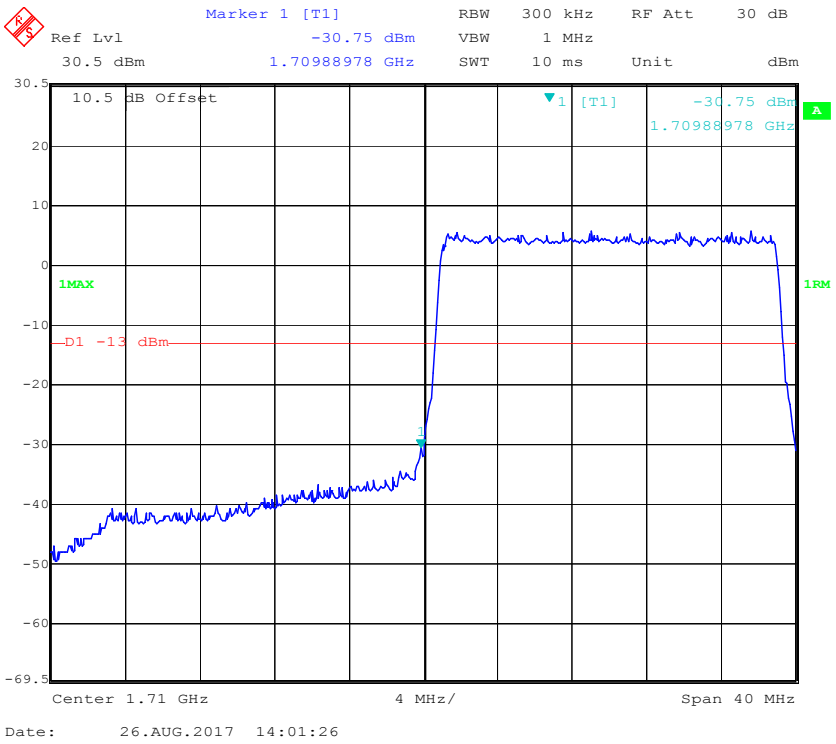
## 16-QAM (15.0 MHz, FULL RB) - Left Band Edge



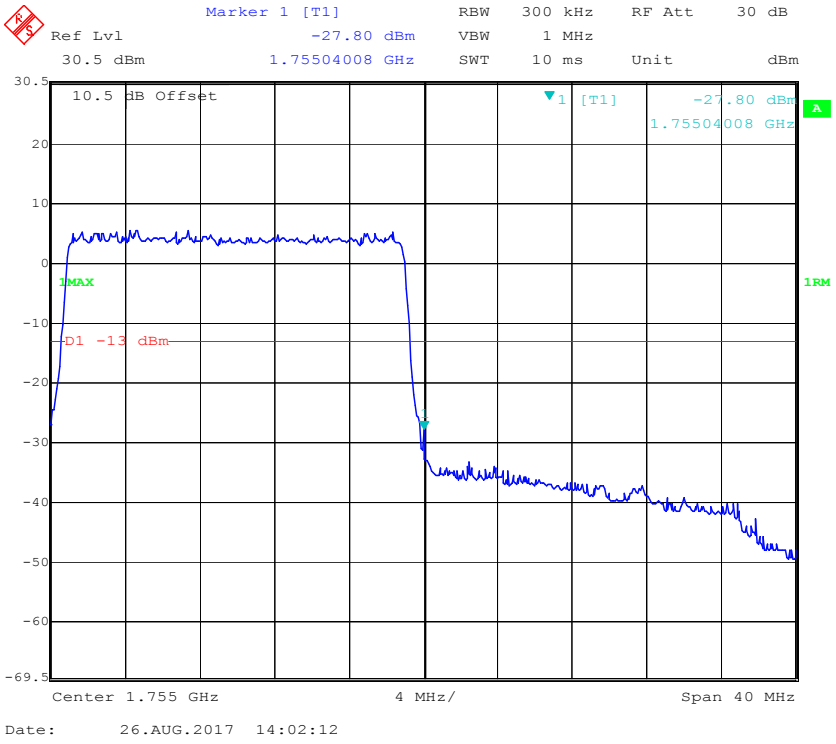

## 16-QAM (15.0 MHz, FULL RB) - Right Band Edge



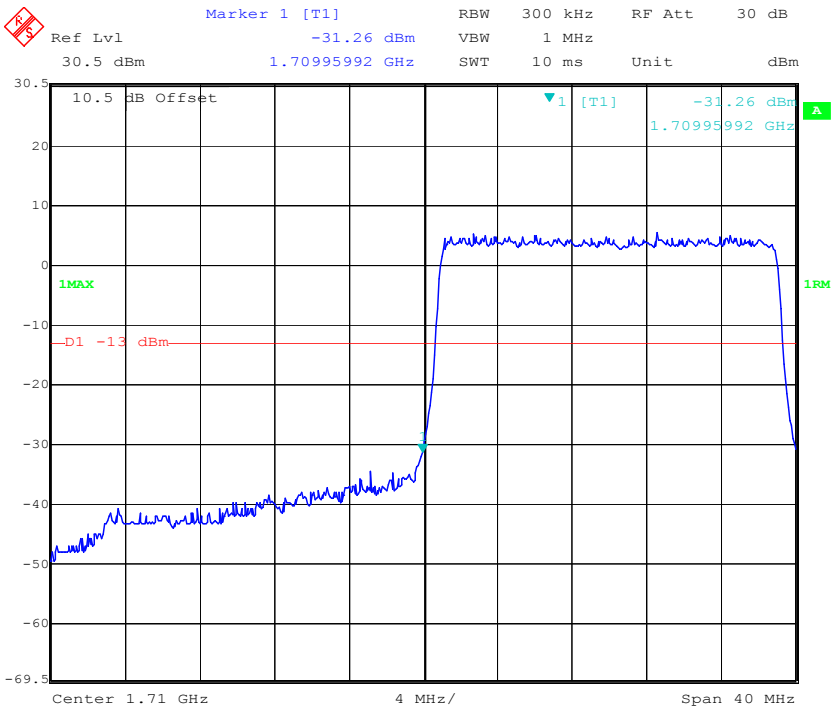
## QPSK (20.0 MHz, FULL RB) - Left Band Edge



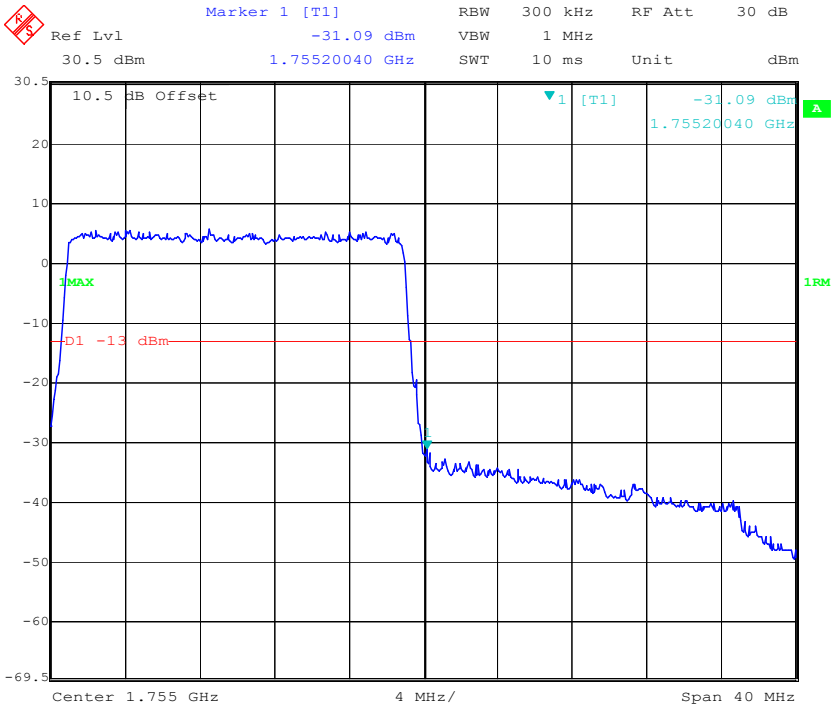

## QPSK (20.0 MHz, FULL RB) - Right Band Edge



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

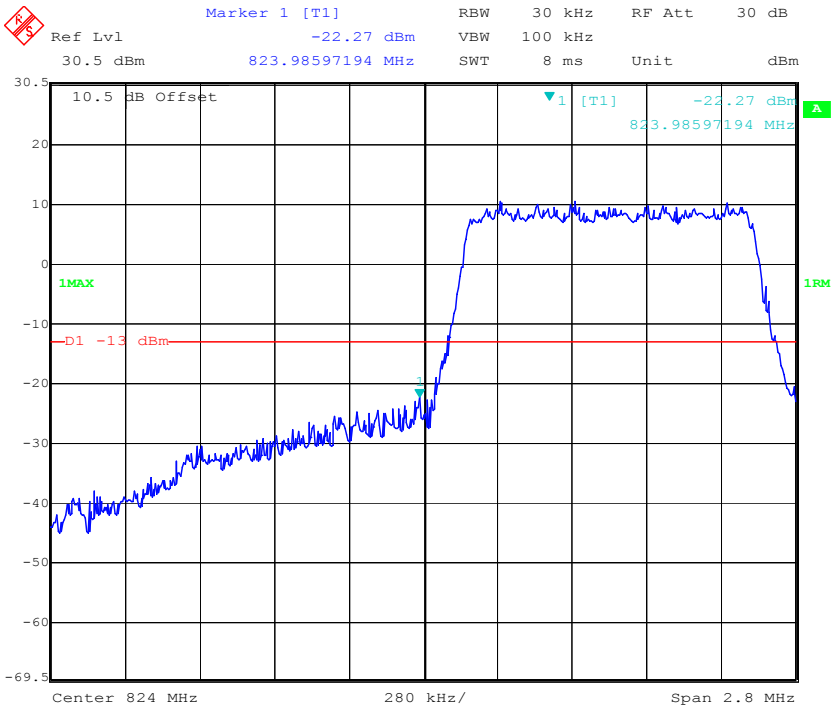



## 16-QAM (20.0 MHz, FULL RB) - Right Band Edge

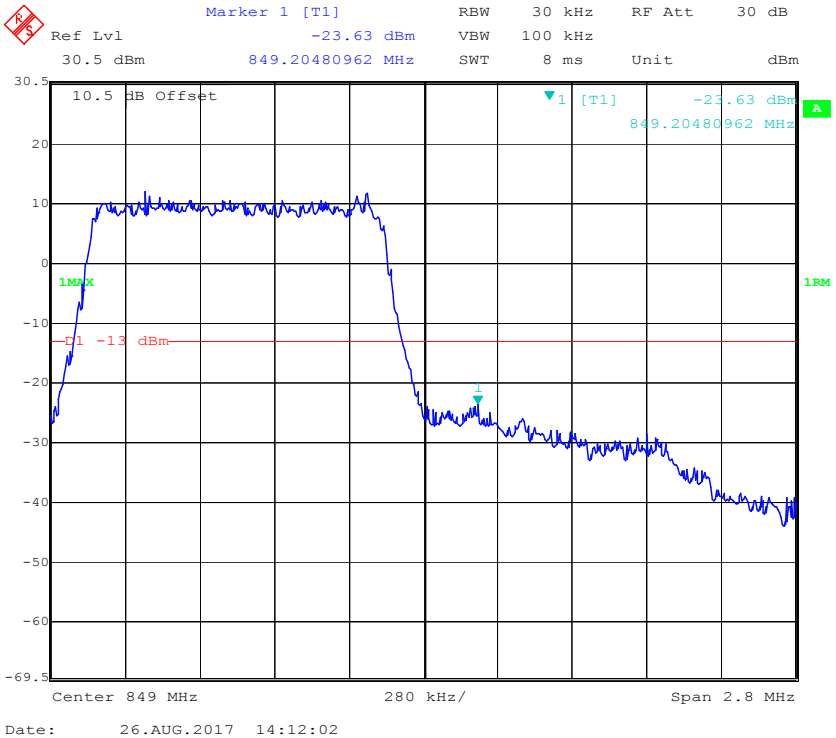


**Band 5:**

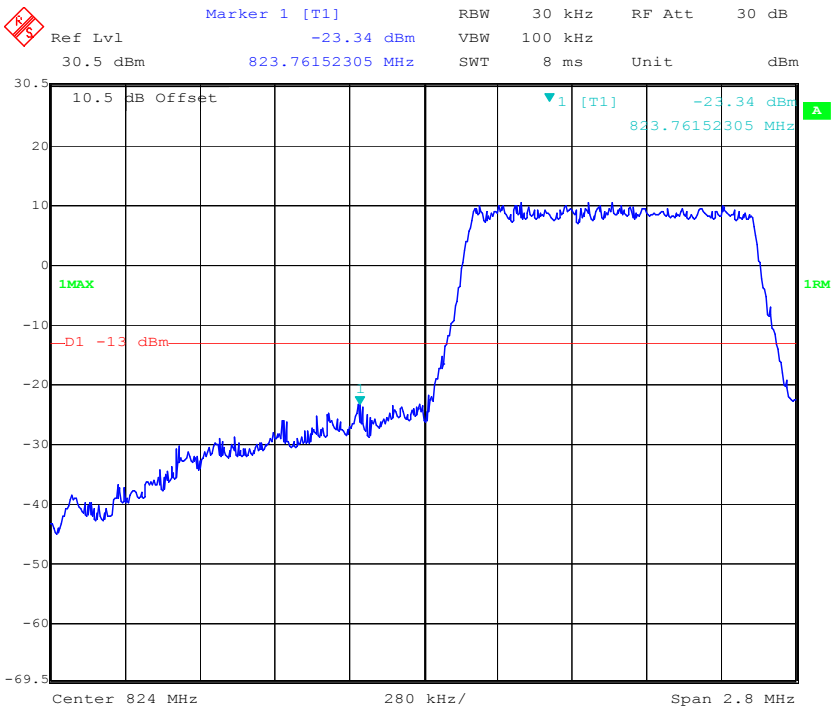
**QPSK (1.4 MHz, FULL RB) - Left Band Edge**



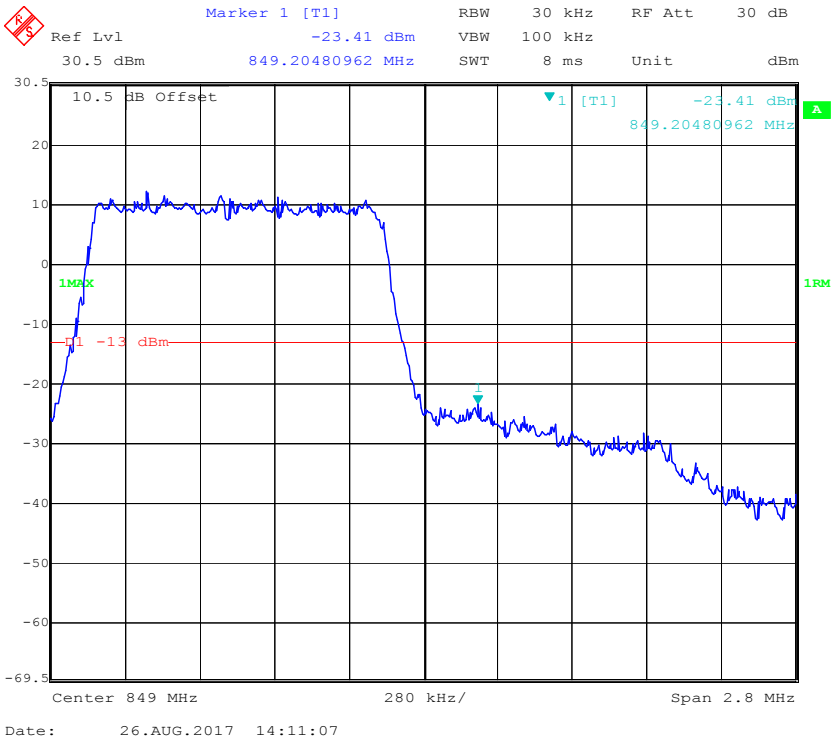

**QPSK (1.4 MHz, FULL RB) - Right Band Edge**



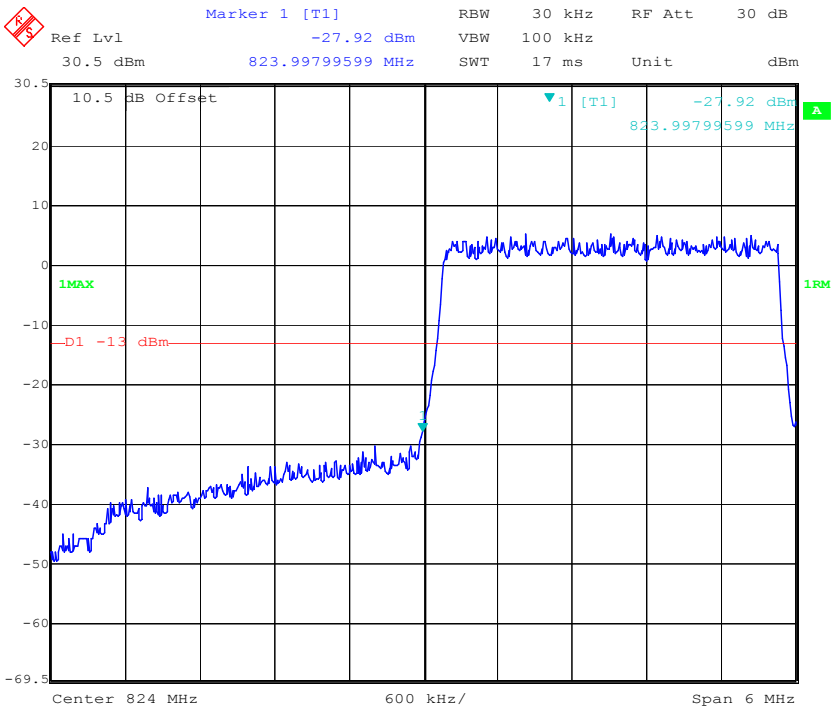
## 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



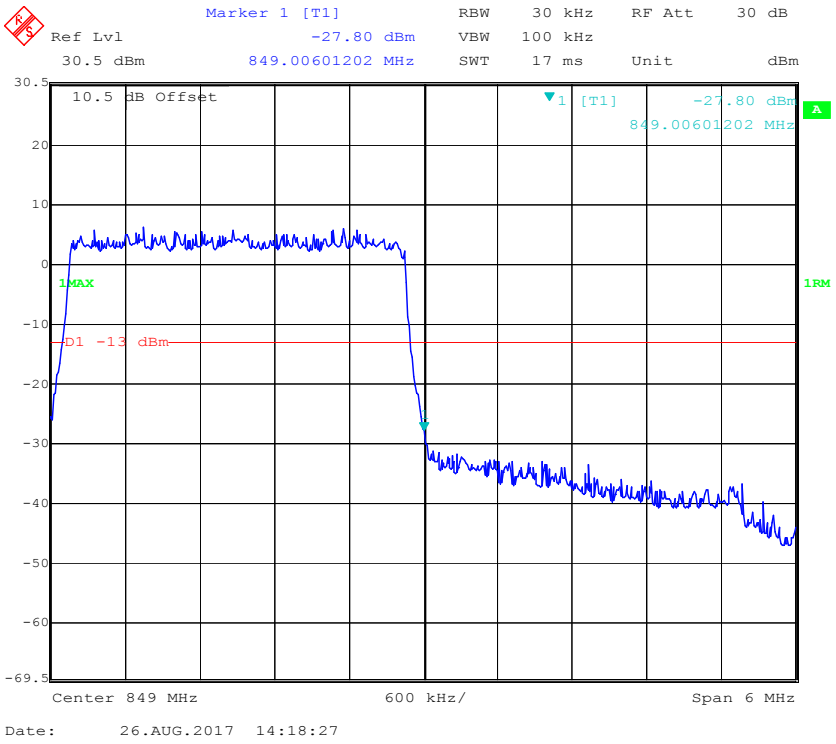

## 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



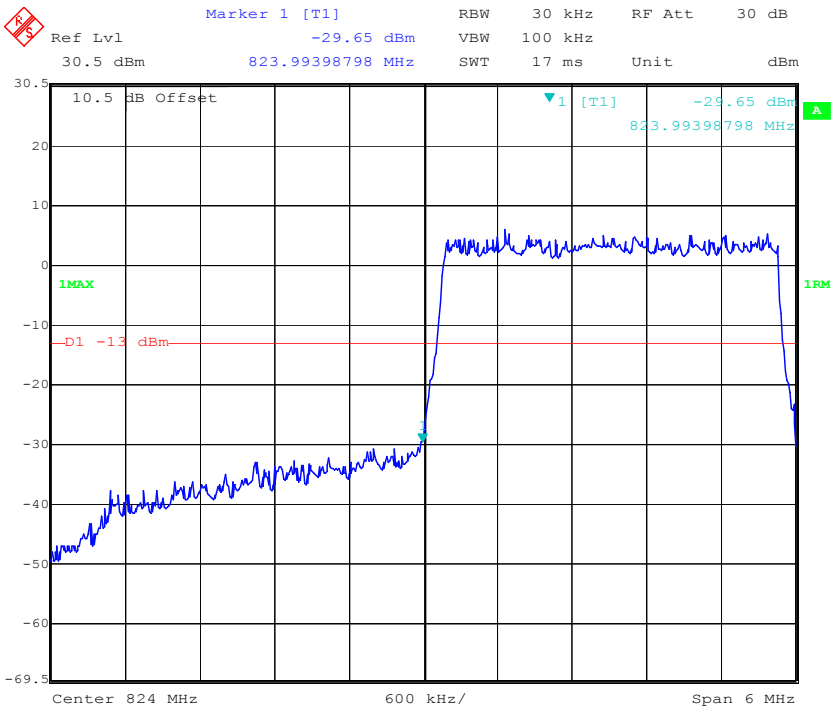
## QPSK (3.0 MHz, FULL RB) - Left Band Edge



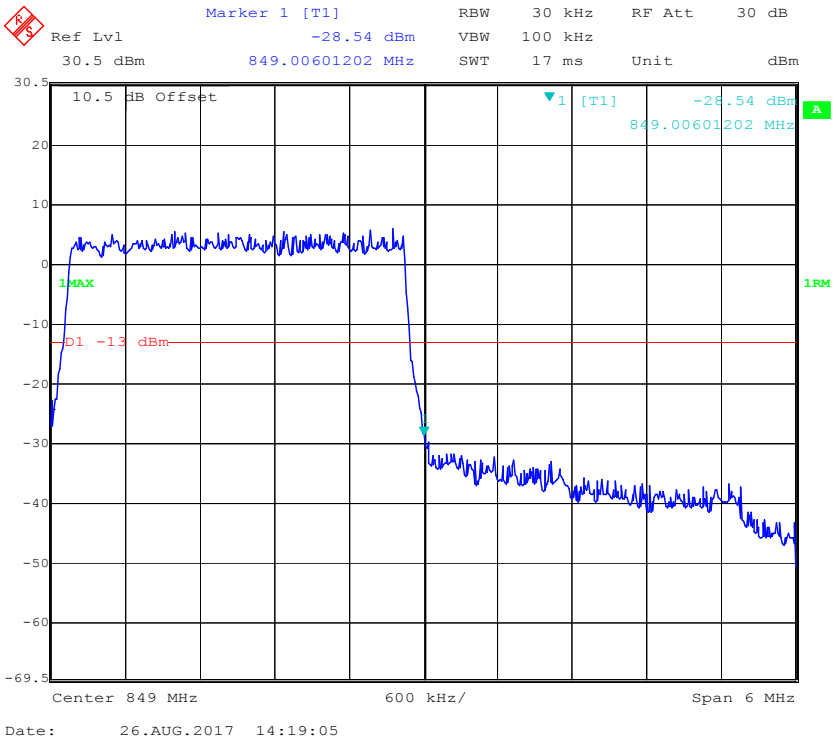

## QPSK (3.0 MHz, FULL RB) - Right Band Edge



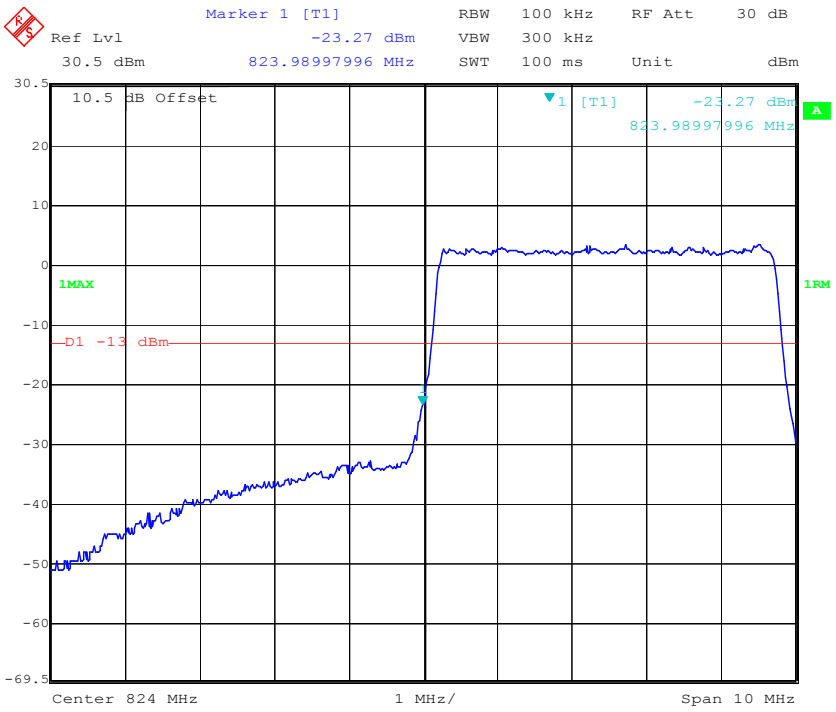
## 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



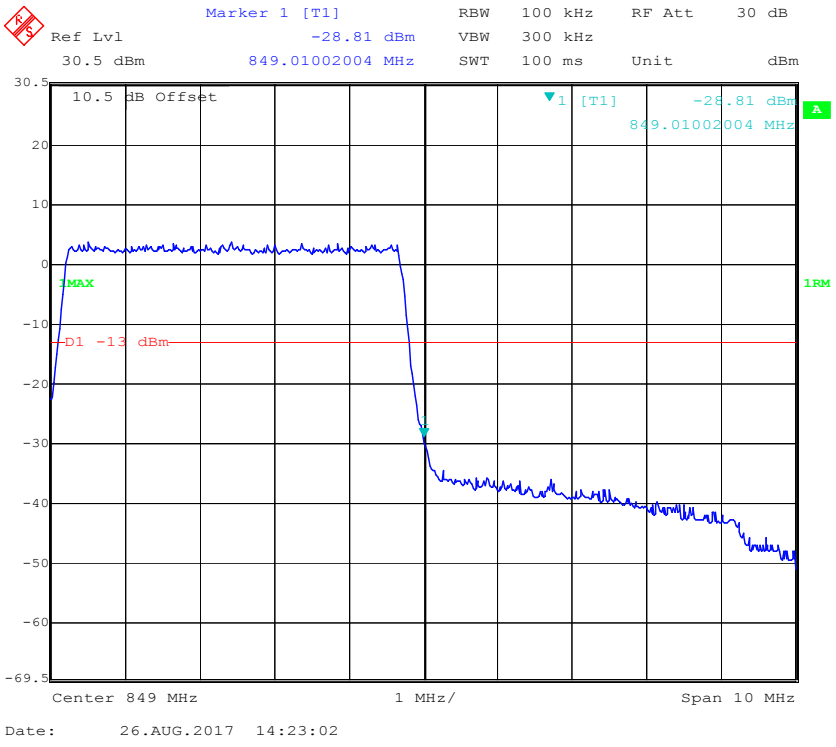

## 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



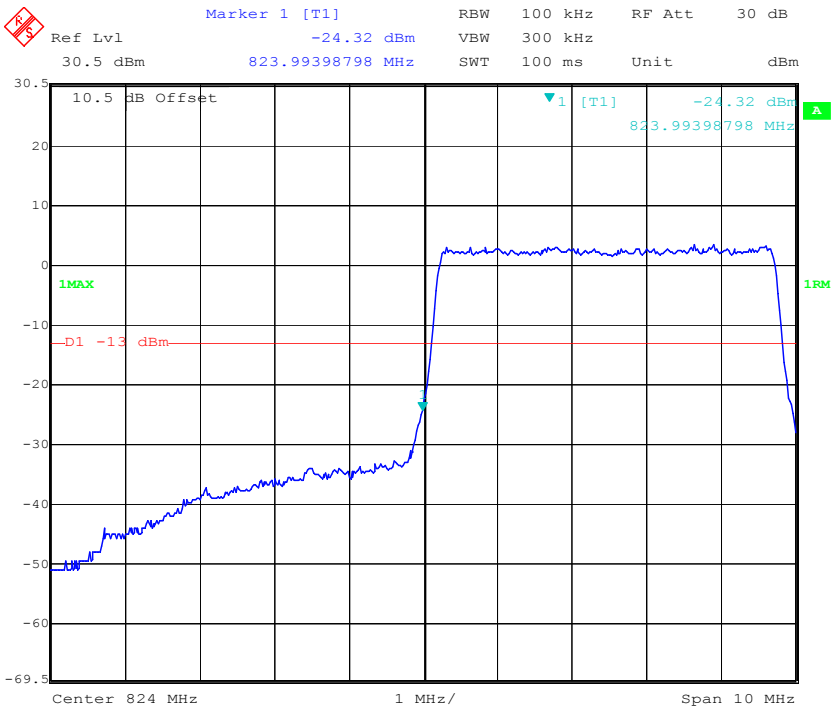
## QPSK (5.0 MHz, FULL RB) - Left Band Edge



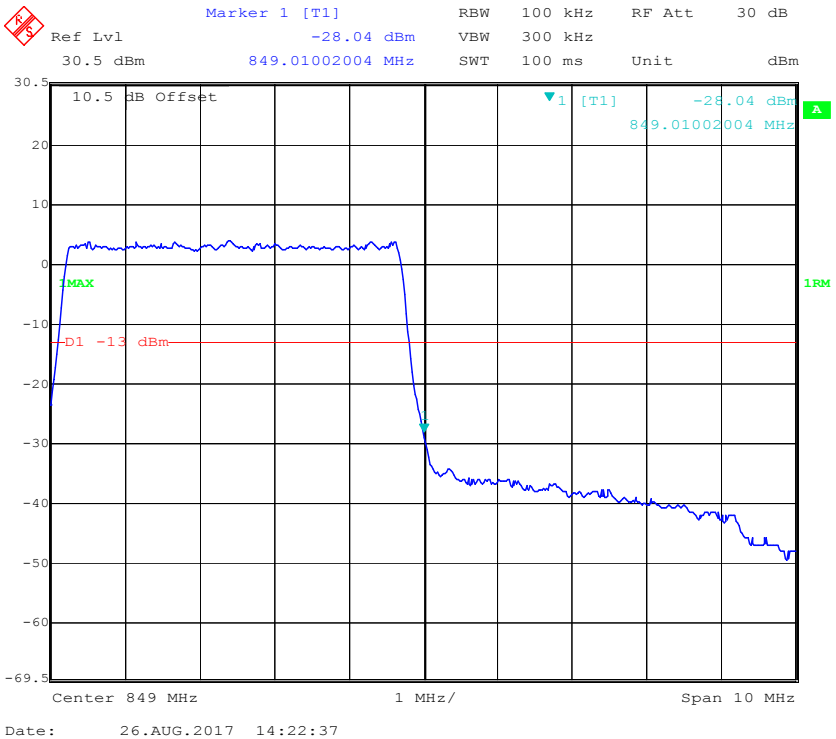

## QPSK (5.0 MHz, FULL RB) - Right Band Edge



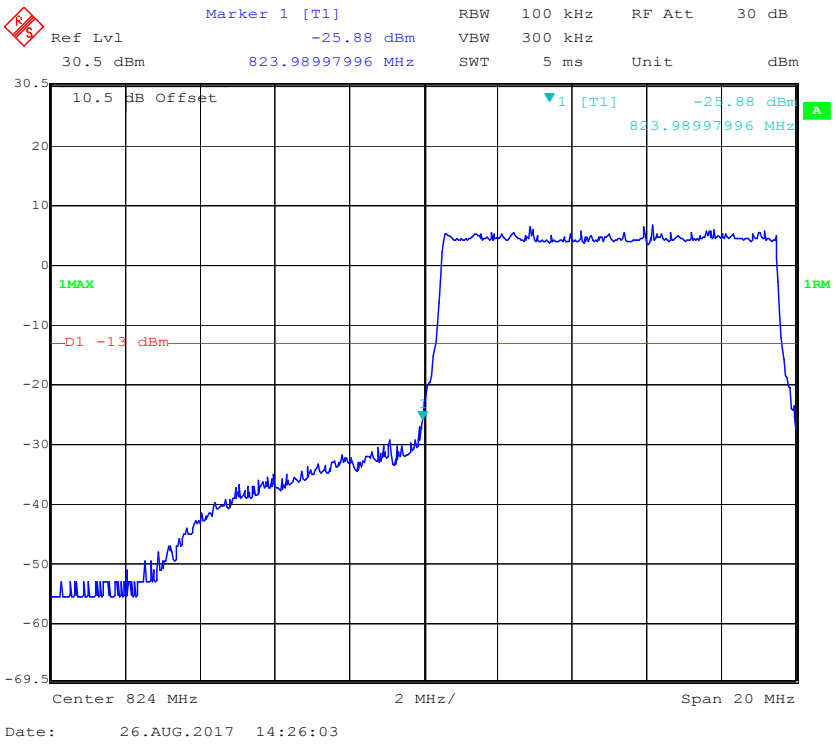
## 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



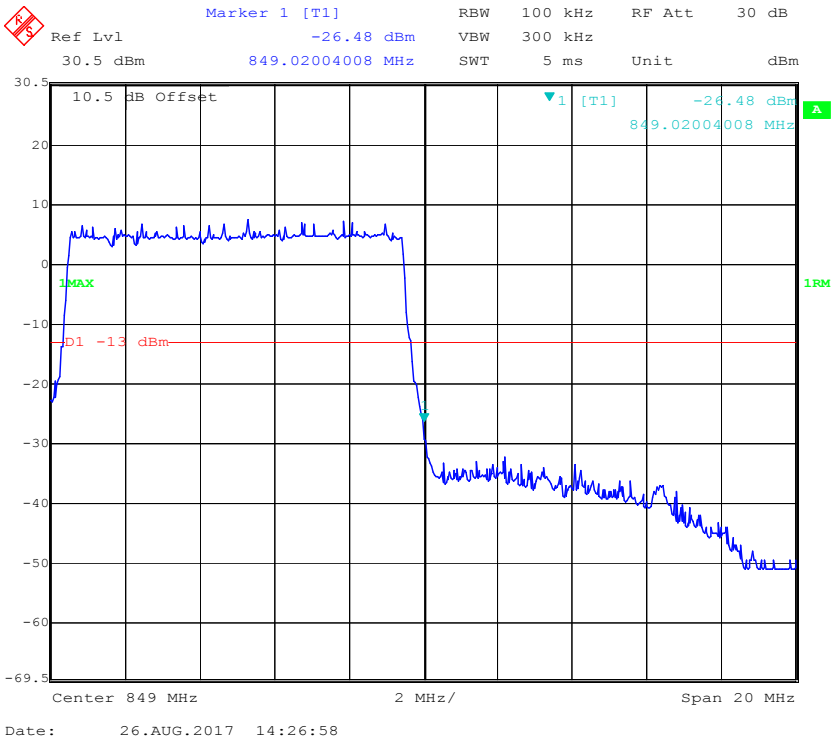

## 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



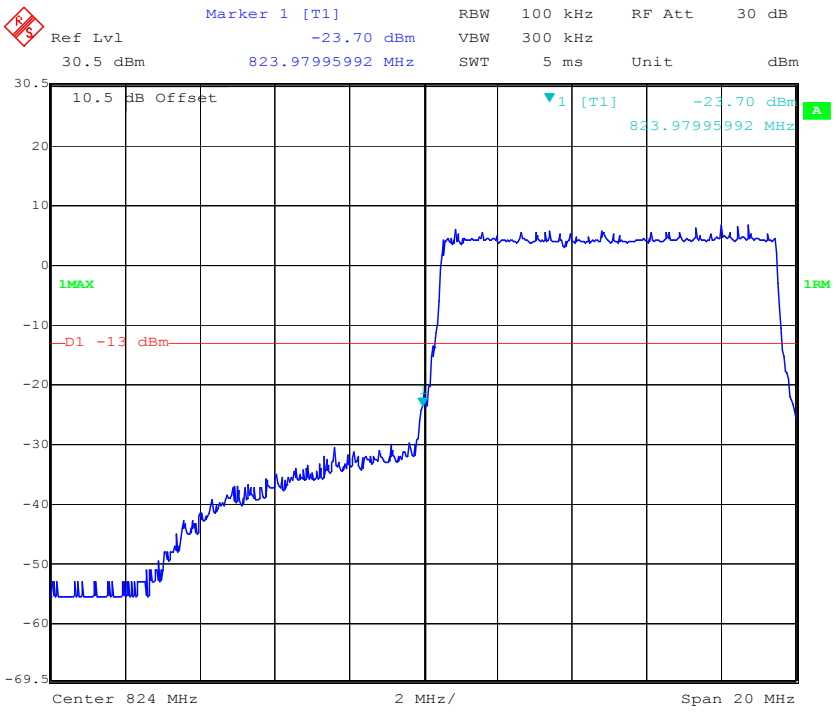
## QPSK (10.0 MHz, FULL RB) - Left Band Edge



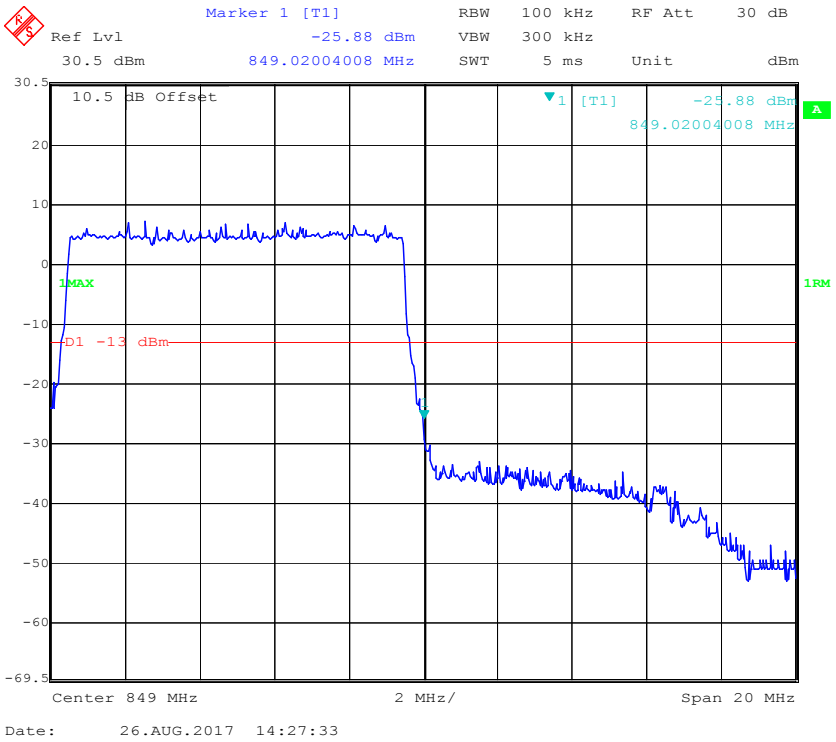

## QPSK (10.0 MHz, FULL RB) - Right Band Edge



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

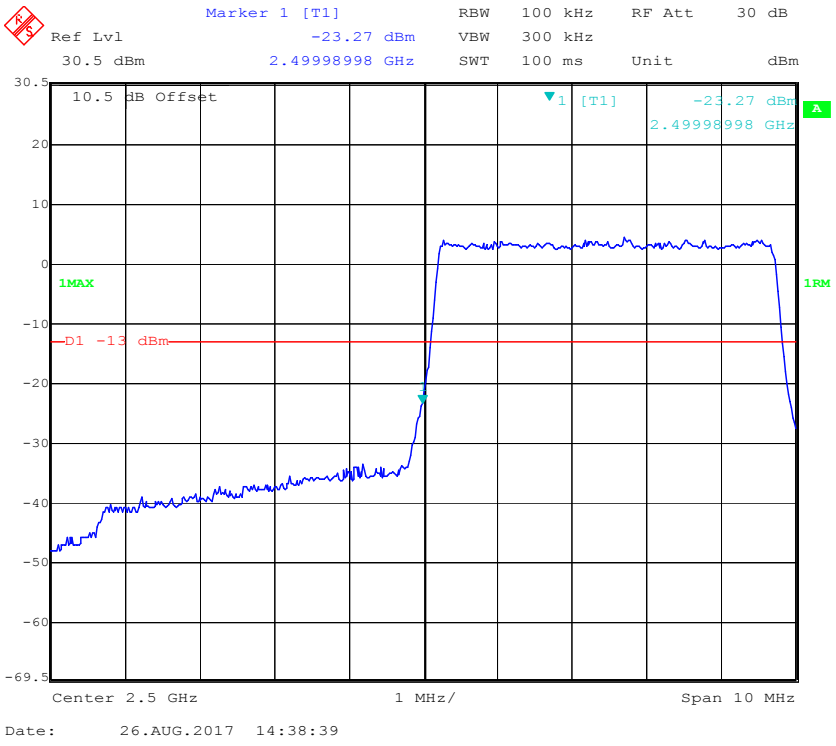



## 16-QAM (10.0 MHz, FULL RB) - Right Band Edge

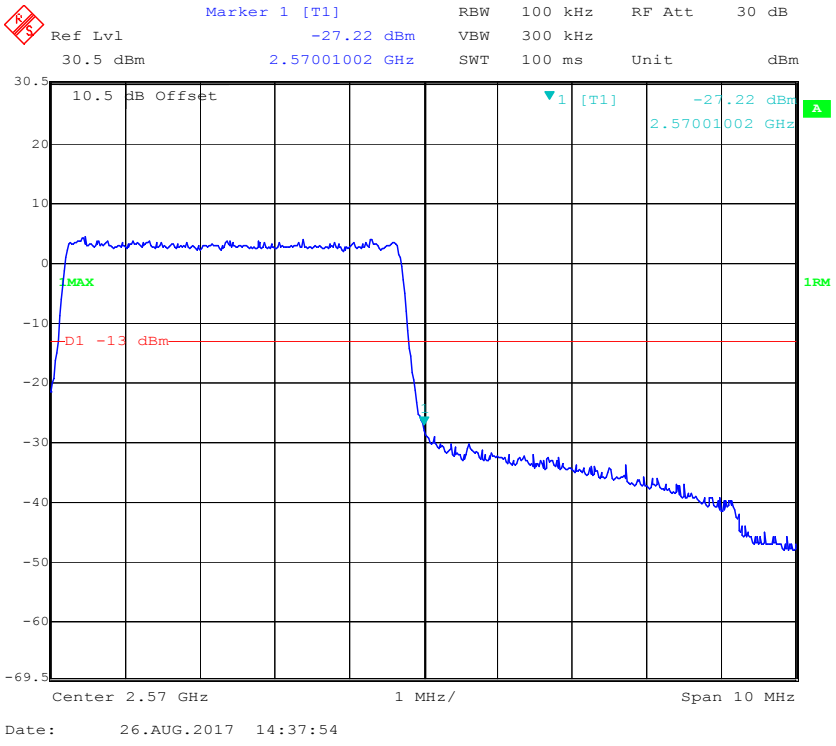


**Band 7:**

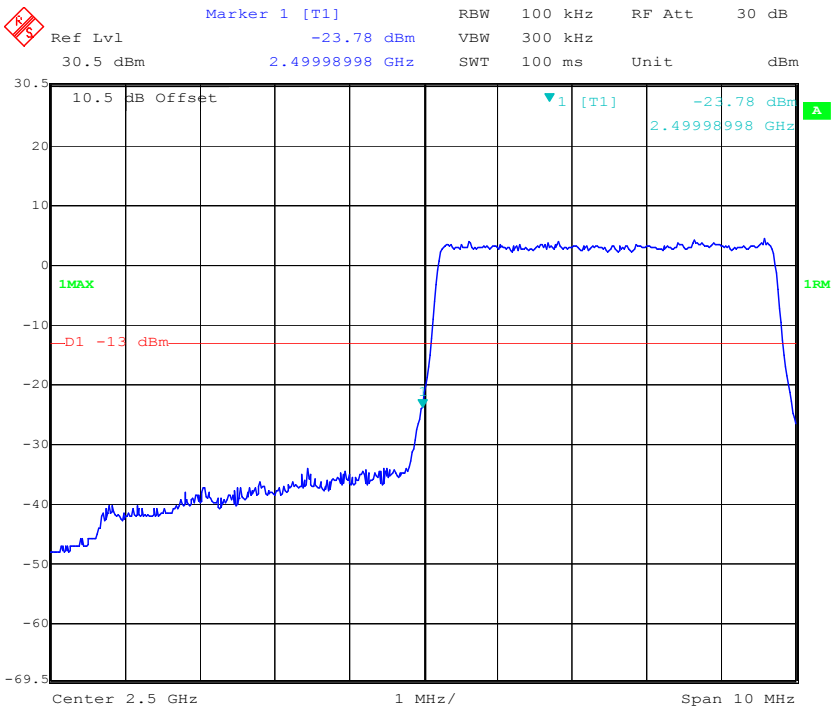
## QPSK (5.0 MHz, FULL RB) - Left Band Edge



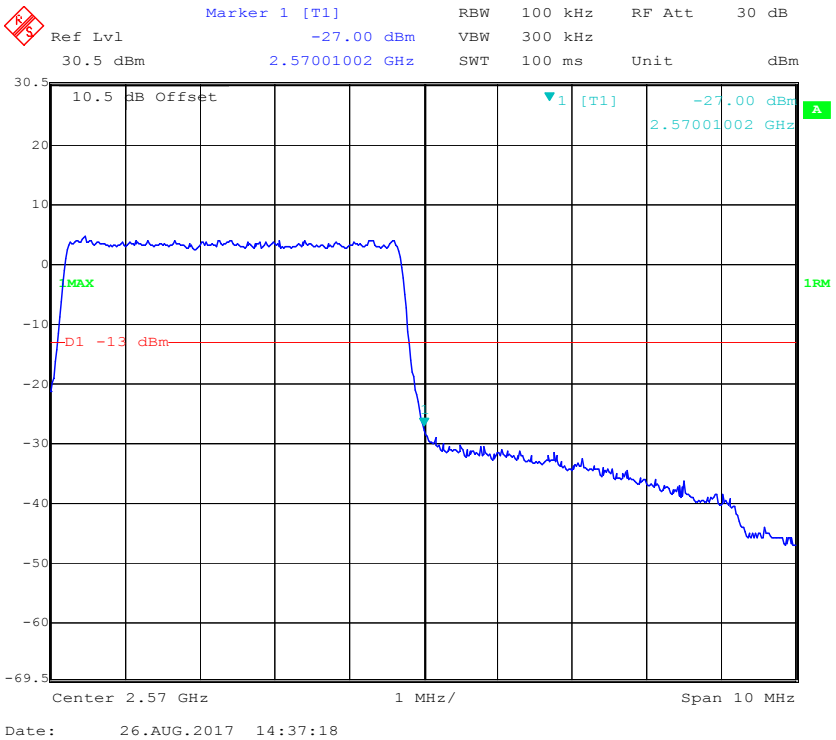

## QPSK (5.0 MHz, FULL RB) - Right Band Edge



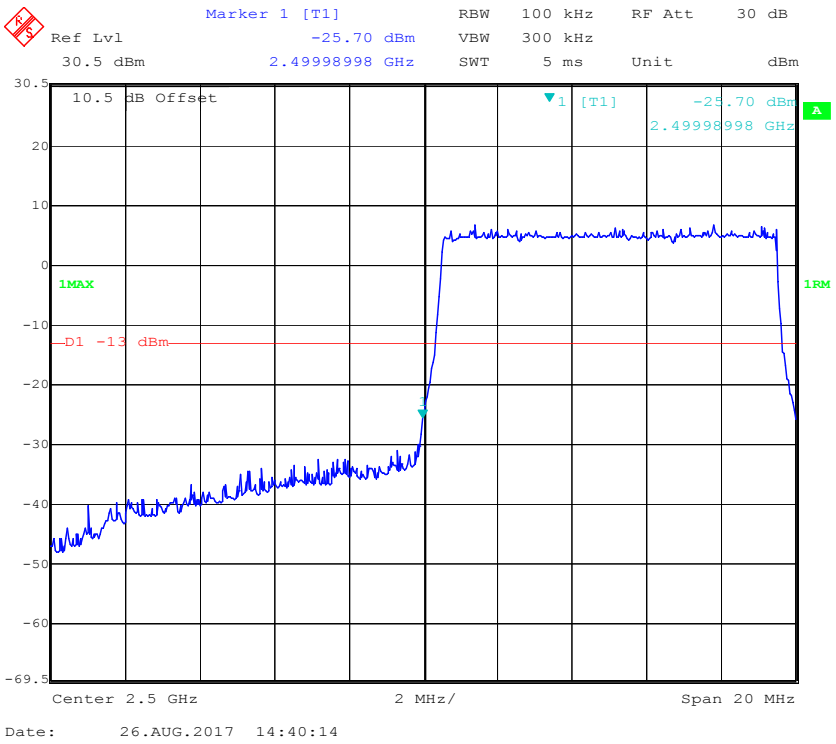
## 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



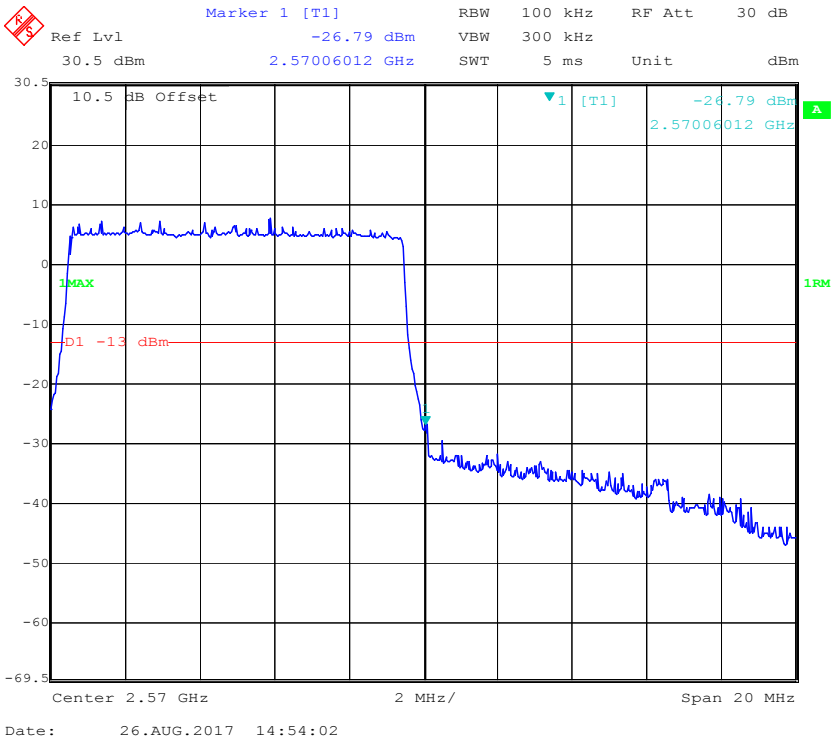

## 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



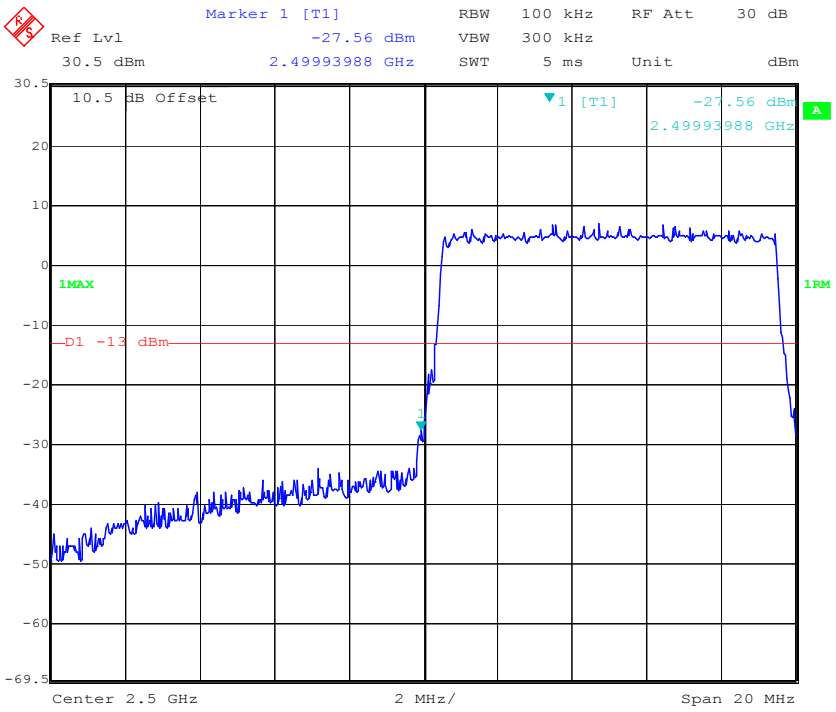
## QPSK (10.0 MHz, FULL RB) - Left Band Edge



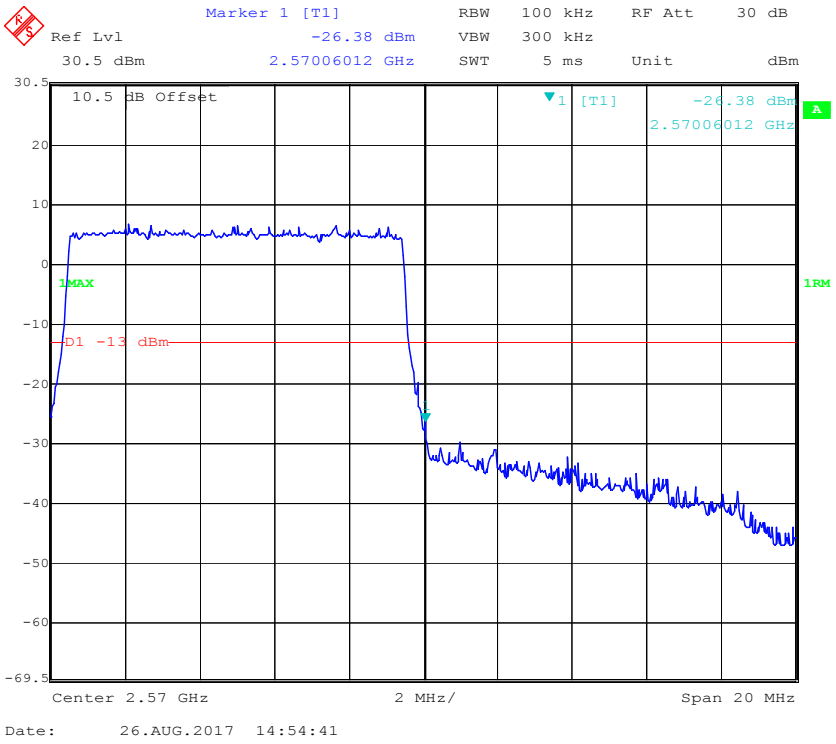

## QPSK (10.0 MHz, FULL RB) - Right Band Edge



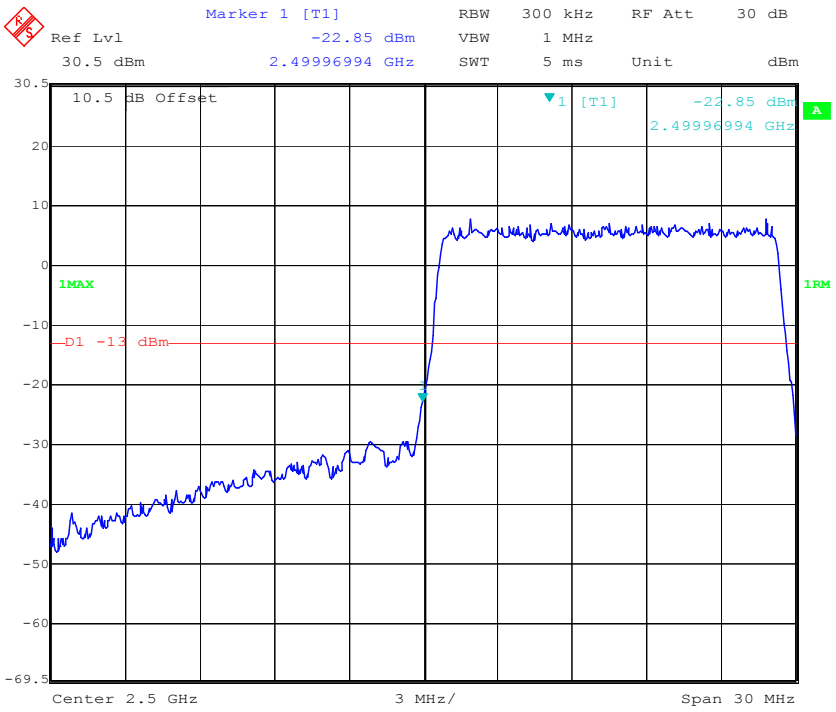
## 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



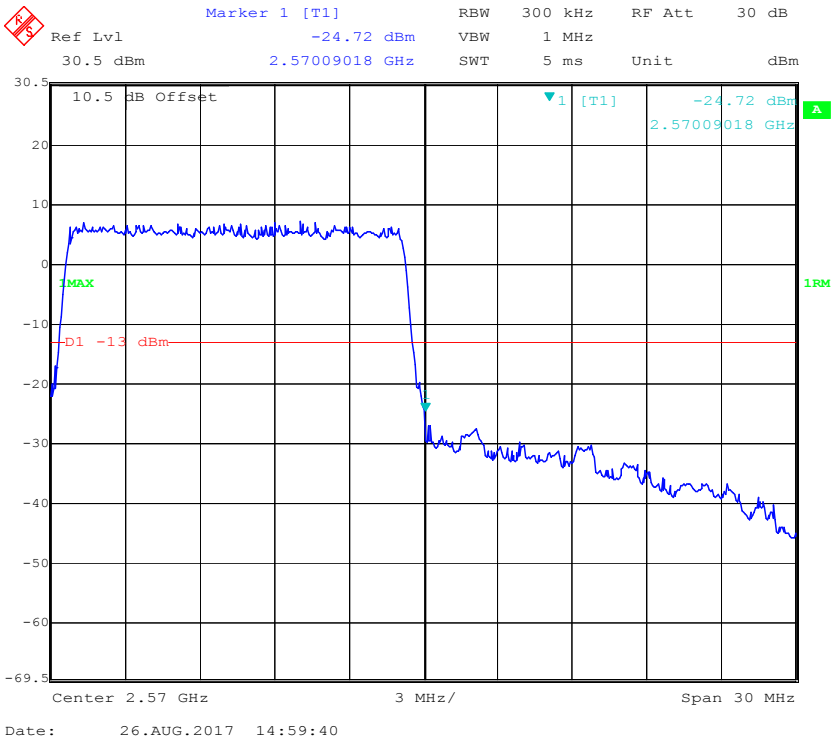

## 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



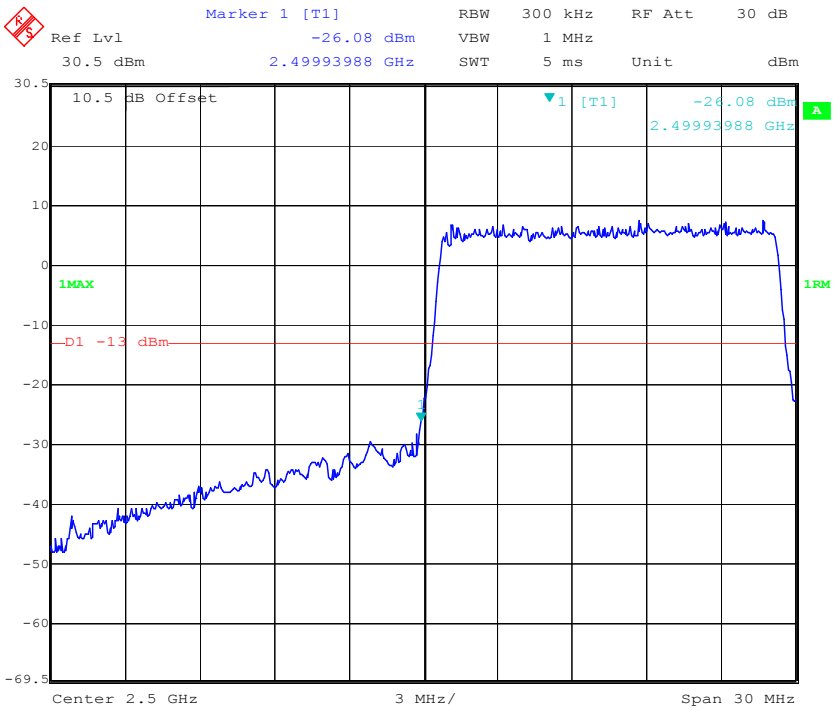
## QPSK (15 MHz, FULL RB) - Left Band Edge



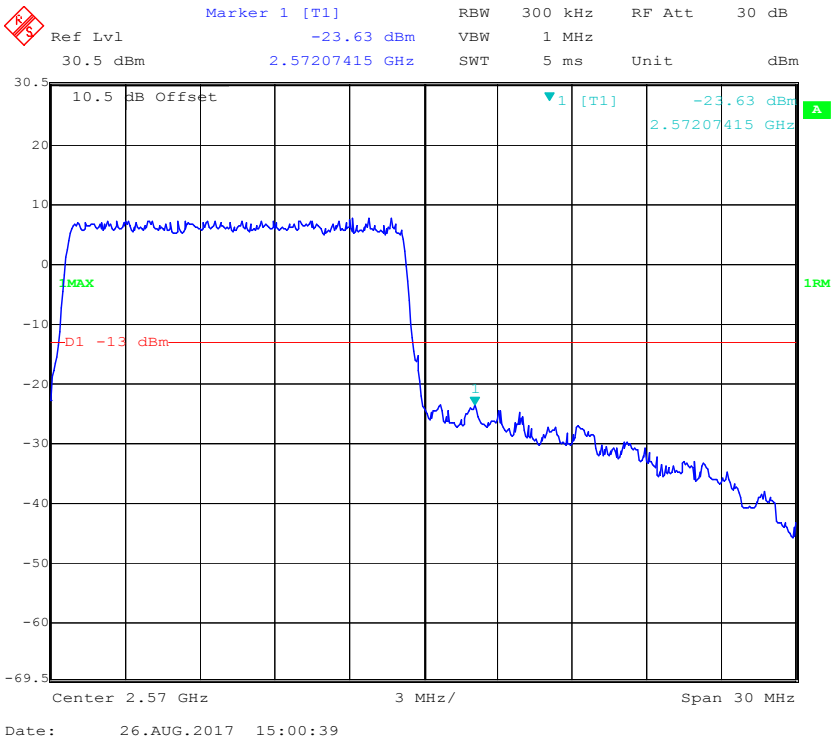

## QPSK (15 MHz, FULL RB) - Right Band Edge



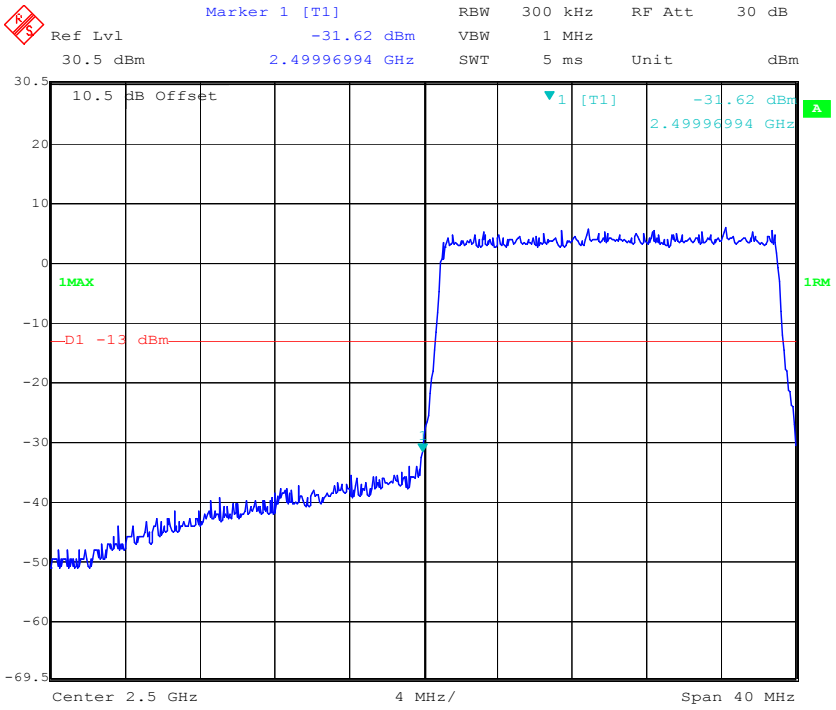
## 16-QAM (15 MHz, FULL RB) - Left Band Edge



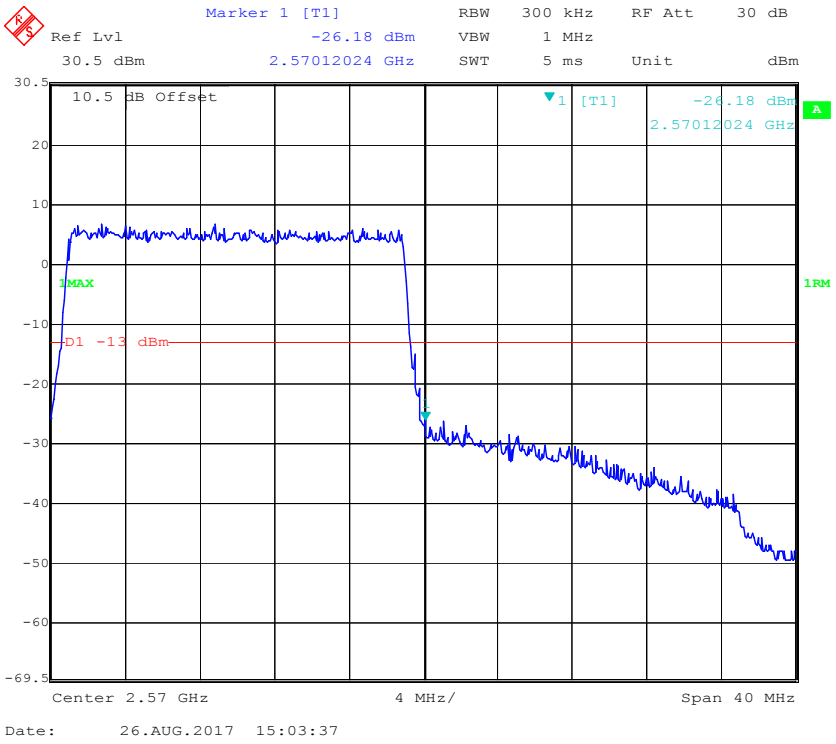

## 16-QAM (15 MHz, FULL RB) - Right Band Edge



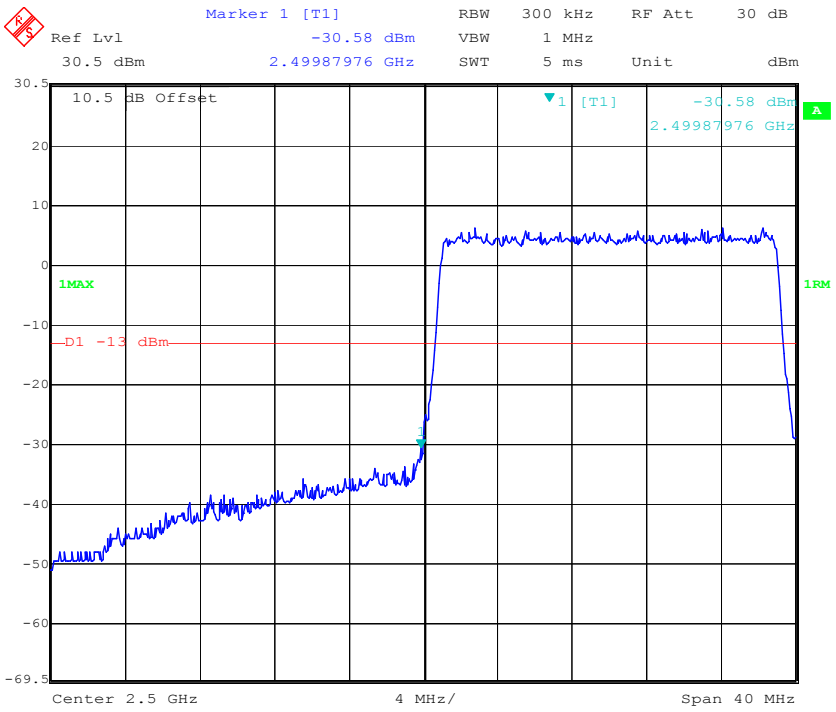
## QPSK (20 MHz, FULL RB) - Left Band Edge



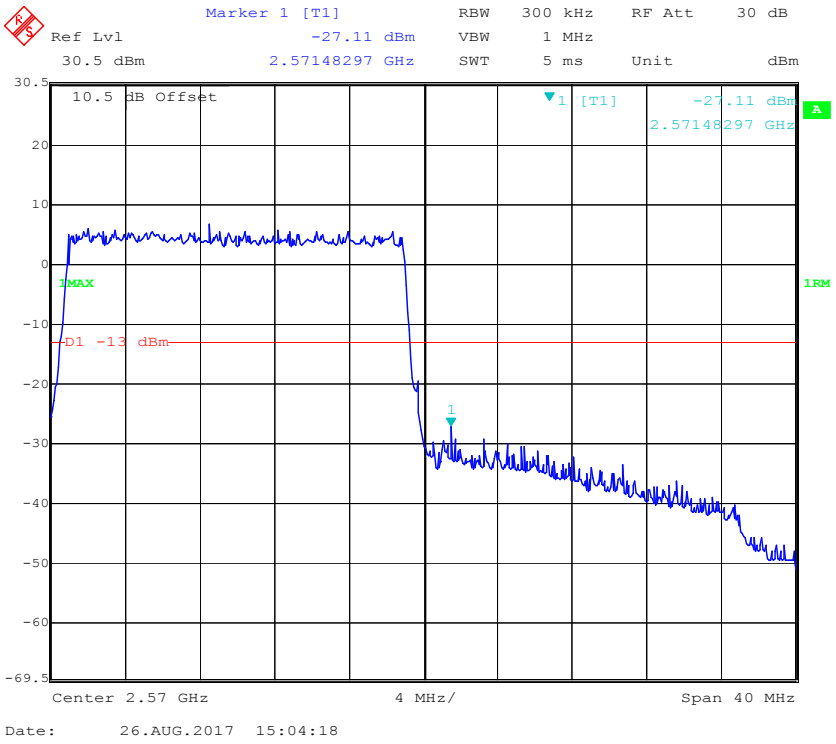

## QPSK (20 MHz, FULL RB) - Right Band Edge



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




## 16-QAM (20 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**

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile > 3 watts (ppm) | Mobile ≤ 3 watts (ppm) |
|---|---|---|---|
| 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 |

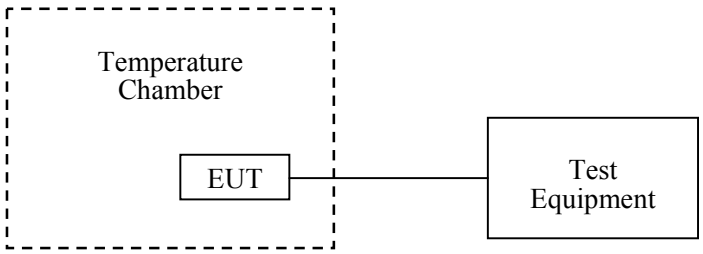
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

## 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

| | |
|---|---|
| **Temperature:** | 26 ℃ |
| **Relative Humidity:** | 56 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Hill He on 2017-08-26.*

*EUT operation mode: Transmitting*

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

## Cellular Band (Part 22H)

### GSM Mode

| Middle Channel, $f_o$ =836.6 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30 | 3.7 | 9 | 0.010758 | 2.5 |
| -20 | | 9 | 0.010758 | 2.5 |
| -10 | | 6 | 0.007172 | 2.5 |
| 0 | | 6 | 0.007172 | 2.5 |
| 10 | | 6 | 0.007172 | 2.5 |
| 20 | | 5 | 0.005977 | 2.5 |
| 30 | | 6 | 0.007172 | 2.5 |
| 40 | | 6 | 0.007172 | 2.5 |
| 50 | | 8 | 0.009563 | 2.5 |
| 20 | V min.= 3.5 | 10 | 0.011953 | 2.5 |
| | V max.= 4.2 | 13 | 0.015539 | 2.5 |

### EDGE Mode

| Middle Channel, $f_o$ =836.6 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30 | 3.7 | 9 | 0.010758 | 2.5 |
| -20 | | 9 | 0.010758 | 2.5 |
| -10 | | 9 | 0.010758 | 2.5 |
| 0 | | 5 | 0.005977 | 2.5 |
| 10 | | 5 | 0.005977 | 2.5 |
| 20 | | 4 | 0.004781 | 2.5 |
| 30 | | 5 | 0.005977 | 2.5 |
| 40 | | 6 | 0.007172 | 2.5 |
| 50 | | 8 | 0.009563 | 2.5 |
| 20 | V min.= 3.5 | 13 | 0.015539 | 2.5 |
| | V max.= 4.2 | 16 | 0.019125 | 2.5 |

**WCDMA Mode**

| Middle Channel, $f_o$=836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Limit (ppm)** |
| -30 | 3.7 | 4 | 0.004781 | 2.5 |
| -20 | | 4 | 0.004781 | 2.5 |
| -10 | | 2 | 0.002391 | 2.5 |
| 0 | | 2 | 0.002391 | 2.5 |
| 10 | | 2 | 0.002391 | 2.5 |
| 20 | | 1 | 0.001195 | 2.5 |
| 30 | | 2 | 0.002391 | 2.5 |
| 40 | | 3 | 0.003586 | 2.5 |
| 50 | | 4 | 0.004781 | 2.5 |
| 20 | V min.= 3.5 | 5 | 0.005977 | 2.5 |
| | V max.= 4.2 | 6 | 0.007172 | 2.5 |

**PCS Band (Part 24E)**

**GSM Mode**

| Middle Channel, $f_o$=1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 11 | 0.005851 | pass |
| -20 | | 11 | 0.005851 | pass |
| -10 | | 11 | 0.0005851 | pass |
| 0 | | 10 | 0.005319 | pass |
| 10 | | 10 | 0.005319 | pass |
| 20 | | 8 | 0.004255 | pass |
| 30 | | 9 | 0.004787 | pass |
| 40 | | 13 | 0.006915 | pass |
| 50 | | 16 | 0.008511 | pass |
| 20 | V min.= 3.5 | 18 | 0.009574 | pass |
| | V max.= 4.2 | 21 | 0.011170 | pass |

**EDGE Mode**

| Middle Channel, $f_o$ =1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 8 | 0.004255 | pass |
| -20 | | 8 | 0.004255 | pass |
| -10 | | 8 | 0.004255 | pass |
| 0 | | 5 | 0.002660 | pass |
| 10 | | 5 | 0.002660 | pass |
| 20 | | 4 | 0.002128 | pass |
| 30 | | 7 | 0.003723 | pass |
| 40 | | 9 | 0.004787 | pass |
| 50 | | 11 | 0.005851 | pass |
| 20 | V min.= 3.5 | 13 | 0.006915 | pass |
| | V max.= 4.2 | 15 | 0.007979 | pass |

**WCDMA Mode**

| Middle Channel, $f_o$ =1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 5 | 0.002660 | pass |
| -20 | | 5 | 0.002660 | pass |
| -10 | | 2 | 0.001064 | pass |
| 0 | | 2 | 0.001064 | pass |
| 10 | | 2 | 0.002128 | pass |
| 20 | | 1 | 0.000532 | pass |
| 30 | | 3 | 0.001596 | pass |
| 40 | | 5 | 0.002660 | pass |
| 50 | | 6 | 0.003191 | pass |
| 20 | V min.= 3.5 | 7 | 0.003723 | pass |
| | V max.= 4.2 | 8 | 0.004255 | pass |

**QPSK:**

**LTE Band 4:**

| 20.0 MHz Middle Channel, $f_o$ =1732.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 6 | 0.003463 | pass |
| -20 | | 6 | 0.003463 | pass |
| -10 | | 6 | 0.003463 | pass |
| 0 | | 4 | 0.002309 | pass |
| 10 | | 4 | 0.002309 | pass |
| 20 | | 2 | 0.001154 | pass |
| 30 | | 4 | 0.002309 | pass |
| 40 | | 6 | 0.003463 | pass |
| 50 | | 8 | 0.004618 | pass |
| 20 | V min.= 3.5 | 12 | 0.006926 | pass |
| | V max.= 4.2 | 12 | 0.006926 | pass |

**LTE Band 5:**

| 10.0 MHz Middle Channel, $f_o$ =836.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | -4 | -0.004782 | pass |
| -20 | | -4 | -0.004782 | pass |
| -10 | | -4 | -0.004782 | pass |
| 0 | | -2 | 0.002391 | pass |
| 10 | | -2 | -0.002391 | pass |
| 20 | | -1 | -0.001195 | pass |
| 30 | | -2 | -0.002391 | pass |
| 40 | | -3 | -0.003586 | pass |
| 50 | | -4 | -0.004782 | pass |
| 20 | V min.= 3.5 | -7 | -0.008368 | pass |
| | V max.= 4.2 | -8 | -0.009564 | pass |

**LTE Band 7:**

| 20.0 MHz Middle Channel, $f_o$=2535 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 6 | 0.002367 | pass |
| -20 | | 6 | 0.002367 | pass |
| -10 | | 6 | 0.002367 | pass |
| 0 | | 4 | 0.001578 | pass |
| 10 | | 4 | 0.001578 | pass |
| 20 | | 3 | 0.001183 | pass |
| 30 | | 4 | 0.001578 | pass |
| 40 | | 5 | 0.001972 | pass |
| 50 | | 7 | 0.002761 | pass |
| 20 | V min.= 3.5 | 9 | 0.003550 | pass |
| | V max.= 4.2 | 11 | 0.004339 | pass |

**16-QAM:**

**LTE Band 4:**

| 20.0 MHz Middle Channel, $f_o$ =1732.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 5 | 0.002886 | pass |
| -20 | | 5 | 0.002886 | pass |
| -10 | | 5 | 0.002886 | pass |
| 0 | | 3 | 0.001732 | pass |
| 10 | | 3 | 0.001732 | pass |
| 20 | | 2 | 0.001154 | pass |
| 30 | | 3 | 0.001732 | pass |
| 40 | | 4 | 0.002309 | pass |
| 50 | | 5 | 0.002886 | pass |
| 20 | V min.= 3.5 | 9 | 0.005195 | pass |
| | V max.= 4.2 | 10 | 0.005772 | pass |

**LTE Band 5:**

| 10.0 MHz Middle Channel, $f_o$ =836.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 5 | 0.019127 | pass |
| -20 | | 5 | 0.013150 | pass |
| -10 | | 5 | 0.010759 | pass |
| 0 | | 3 | 0.008368 | pass |
| 10 | | 3 | 0.004782 | pass |
| 20 | | 2 | 0.002390 | pass |
| 30 | | 3 | 0.003586 | pass |
| 40 | | 4 | 0.004782 | pass |
| 50 | | 5 | 0.005977 | pass |
| 20 | V min.= 3.5 | 12 | 0.014345 | pass |
| | V max.= 4.2 | 13 | 0.015541 | pass |

**LTE Band 7:**

| 20.0 MHz Middle Channel, $f_o$=2535 MHz | | | | |
|---|---|---|---|---|
| **Temperature (℃)** | **Power Supplied ($V_{DC}$)** | **Frequency Error (Hz)** | **Frequency Error (ppm)** | **Result** |
| -30 | 3.7 | 6 | 0.002367 | pass |
| -20 | | 6 | 0.002367 | pass |
| -10 | | 6 | 0.002367 | pass |
| 0 | | 4 | 0.001578 | pass |
| 10 | | 4 | 0.001578 | pass |
| 20 | | 3 | 0.001183 | pass |
| 30 | | 4 | 0.001578 | pass |
| 40 | | 5 | 0.001972 | pass |
| 50 | | 6 | 0.002367 | pass |
| 20 | V min.= 3.5 | 8 | 0.003156 | pass |
| | V max.= 4.2 | 10 | 0.003945 | pass |

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