



FCC RADIO TEST REPORT

FCC ID : UZ7ET56DE
Equipment : Tablet
Brand Name : ZEBRA
Model Name : ET56DE
Applicant : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Manufacturer : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Standard : FCC 47 CFR Part 2, and 90(S)

The product was received on Jan. 16, 2019 and testing was started from Jun. 27, 2019 and completed on Jul. 26, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Reviewed by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

| | |
|--|-----------|
| History of this test report..... | 3 |
| Summary of Test Result..... | 4 |
| 1 General Description | 5 |
| 1.1 Feature of Equipment Under Test..... | 5 |
| 1.2 Product Specification of Equipment Under Test | 5 |
| 1.3 Modification of EUT | 5 |
| 1.4 Emission Designator | 6 |
| 1.5 Testing Site..... | 6 |
| 1.6 Applied Standards | 7 |
| 2 Test Configuration of Equipment Under Test | 8 |
| 2.1 Test Mode..... | 8 |
| 2.2 Connection Diagram of Test System | 9 |
| 2.3 Support Unit used in test configuration and system..... | 9 |
| 2.4 Measurement Results Explanation Example | 9 |
| 2.5 Frequency List of Low/Middle/High Channels..... | 10 |
| 3 Conducted Test Items..... | 11 |
| 3.1 Measuring Instruments..... | 11 |
| 3.2 Conducted Output Power Measurement and ERP Measurement | 12 |
| 3.3 Peak-to-Average Ratio | 13 |
| 3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement..... | 14 |
| 3.5 Emissions Mask Measurement | 15 |
| 3.6 Emissions Mask – Out Of Band Emissions Measurement..... | 16 |
| 3.7 Frequency Stability Measurement..... | 17 |
| 3.8 Field Strength of Spurious Radiation Measurement | 18 |
| 4 List of Measuring Equipment..... | 20 |
| 5 Uncertainty of Evaluation..... | 22 |
| Appendix A. Test Results of Conducted Test | |
| Appendix B. Test Results of ERP and Radiated Test | |
| Appendix C. Test Setup Photographs | |



History of this test report

| Report No. | Version | Description | Issued Date |
|------------|---------|-------------------------|---------------|
| FG911635D | 01 | Initial issue of report | Aug. 08, 2019 |
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Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|--------------------|---|--------------------|--|
| 3.2 | §2.1046 §90.635 | Conducted Output Power and Effective Radiated Power | Pass | - |
| 3.3 | - | Peak-to-Average Ratio | Reporting only | - |
| 3.4 | §2.1049 §90.209 | Occupied Bandwidth and 26dB Bandwidth | Reporting only | - |
| 3.5 | §2.1051 §90.691 | Emission masks – In-band emissions | Pass | - |
| 3.6 | §2.1051 §90.691 | Emission masks – Out of band emissions | Pass | - |
| 3.7 | §2.1055 §90.213 | Frequency Stability for Temperature & Voltage | Pass | - |
| 3.8 | §2.1053 §90.691 | Field Strength of Spurious Radiation | Pass | Under limit 36.39 dB at 3296.000 MHz |

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Yimin Ho



1 General Description

1.1 Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|---|
| Equipment | Tablet |
| Brand Name | ZEBRA |
| Model Name | ET56DE |
| FCC ID | UZ7ET56DE |
| EUT supports Radios application | WCDMA/HSPA/LTE/NFC/GNSS WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE |
| HW Version | DV2 |
| SW Version | Android version 8.1.0 |
| FW Version | 01-20-03-00-OG-U00-PRD |
| MFD | 19Jun01 |
| EUT Stage | Identical Prototype |

Remark: The above EUT's information was declared by manufacturer.

| Specification of Accessories | | | | |
|--------------------------------|------------|-------|------------|-----------|
| Spare Standard Battery 24.13Wh | Brand Name | Zebra | Model Name | BT-000393 |

| Supported Unit Used in Test Configuration and System | | | | |
|--|------------|-------|-------------|------------------|
| Cradle (Dock) for EMC | Brand Name | Zebra | Part Number | CRD-ET5X-1SCG1 |
| Cradle (Dock) for RSE | Brand Name | Zebra | Part Number | CHG-ET5X-CBL1-01 |
| Adapter | Brand Name | Zebra | Part Number | PWRBGA12V50W0WW |
| DC Cable | Brand Name | Zebra | Part Number | CBL-DC-388A1-01 |

1.2 Product Specification of Equipment Under Test

| Product Specification subjective to this standard | |
|---|--------------------------------------|
| Tx Frequency | LTE Band 26 : 814.7 ~ 823.3 MHz |
| Rx Frequency | LTE Band 26 : 859.7 ~ 868.3 MHz |
| Bandwidth | 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz |
| Maximum Output Power to Antenna | 24.80 dBm |
| Antenna Type | PCB Antenna |
| Antenna Gain | 0.31 dBi |
| Type of Modulation | QPSK / 16QAM / 64QAM |

1.3 Modification of EUT

No modifications are made to the EUT during all test items.



1.4 Emission Designator

| LTE Band 26 | | QPSK | | 16QAM | | 64QAM | |
|-------------|-----------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
| BW (MHz) | Frequency Range (MHz) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) |
| 1.4 | 814.7 ~ 823.3 | 1M10G7D | - | 1M09W7D | - | 1M10W7D | - |
| 3 | 815.5 ~ 822.5 | 2M72G7D | - | 2M73W7D | - | 2M73W7D | - |
| 5 | 816.5 ~ 821.5 | 4M50G7D | - | 4M51W7D | - | 4M51W7D | - |
| 10 | 819.0 | 9M07G7D | 0.0150 | 8M91W7D | - | 9M03W7D | - |
| 15 | 821.5 | 13M4G7D | 0.0190 | 13M4W7D | - | 13M5W7D | - |

1.5 Testing Site

| | |
|---------------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978 |
| Test Site No. | Sporton Site No. TH05-HY |
| Test Engineer | Aking Chang |
| Temperature | 24~26°C |
| Relative Humidity | 54~56% |

Note: The test site complies with ANSI C63.4 2014 requirement.

| | |
|---------------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory |
| Test Site Location | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855 |
| Test Site No. | Sporton Site No. 03CH12-HY |
| Test Engineer | Jack Cheng, Lance Chiang, and Chuan Chu |
| Temperature | 19.3~26°C |
| Relative Humidity | 57.1~73.1% |

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW0007



1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC 47 CFR Part 2, 90
- ♦ ANSI / TIA-603-E
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ Interim Guidance for Equipment Authorization of Devices with Channel Bandwidths Combined Across Two Contiguous Service Rule Allocations OET/Lab/EACB, June 6, 2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Test Mode

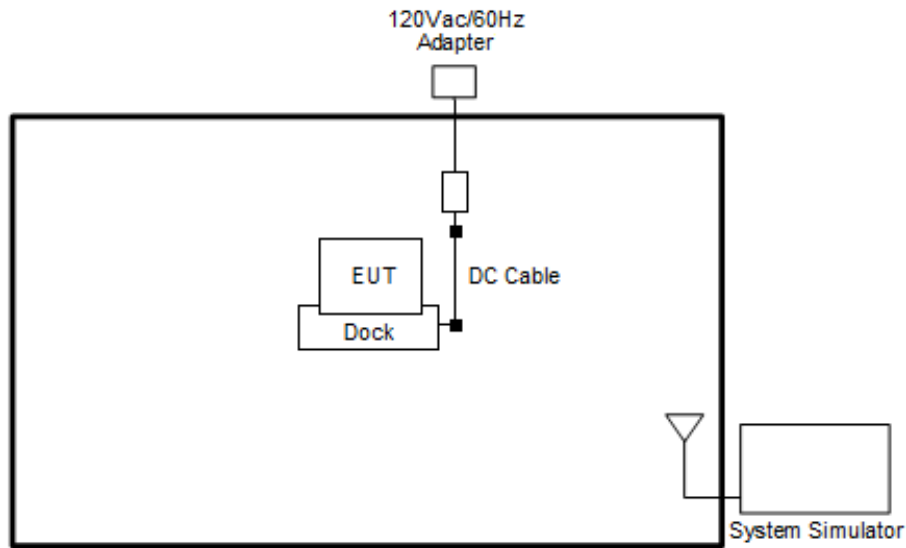
During all testing, EUT is in link mode with base station emulator at maximum power level.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane with Adapter) were recorded in this report.

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz.

| Conducted Test Cases | Band | Bandwidth (MHz) | | | | | | Modulation | | | RB # | | | Test Channel | | |
|--|--|-----------------|---|---|----|----|----|------------|-------|-------|------|------|------|--------------|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 64QAM | 1 | Half | Full | L | M | H |
| Max. Output Power | 26 | v | v | v | v | v | - | v | v | v | v | v | v | v | v | v |
| Peak-to-Average Ratio | 26 | | | | | v | - | v | v | v | v | | v | v | v | v |
| 26dB and 99% Bandwidth | 26 | v | v | v | v | v | - | v | v | v | | | v | v | v | v |
| Emission masks In-band emissions | 26 | v | v | v | v | v | - | v | v | v | v | | v | v | | v |
| Emission masks – Out of band emissions | 26 | v | v | v | v | v | - | v | v | v | v | | | v | v | v |
| Frequency Stability | 26 | - | - | | v | v | - | v | | | | | v | | v | |
| E.R.P. | 26 | | | | | v | - | v | v | v | v | | | v | | |
| Radiated Spurious Emission | 26 | Worst Case | | | | | | | | | | | v | v | v | |
| Remark | 1. The mark “v “ means that this configuration is chosen for testing 2. The mark “-“ means that this bandwidth is not supported. 3. LTE Band26 transmit frequency for part22 rule is 824MHz-849MHz, for part90 rule is 814MHz-824MHz. ERP over 15MHz bandwidth complies the ERP limit line of part22 rule, therefore ERP of the partial frequency spectrum which falls within part 22 also complies. | | | | | | | | | | | | | | | |

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model No. | FCC ID | Data Cable | Power Cord |
|------|------------------|------------|-----------|--------|------------|-------------------|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

$$= 4.2 + 10 = 14.2 \text{ (dB)}$$



2.5 Frequency List of Low/Middle/High Channels

| LTE Band 26 Channel and Frequency List | | | | |
|--|------------------------|--------|--------|---------|
| BW [MHz] | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| 15 | Channel | 26765 | - | - |
| | Frequency | 821.5 | - | - |
| 10 | Channel | - | 26740 | - |
| | Frequency | - | 819 | - |
| 5 | Channel | 26715 | 26740 | 26765 |
| | Frequency | 816.5 | 819 | 821.5 |
| 3 | Channel | 26705 | 26740 | 26775 |
| | Frequency | 815.5 | 819 | 822.5 |
| 1.4 | Channel | 26697 | 26740 | 26783 |
| | Frequency | 814.7 | 819 | 823.3 |

3 Conducted Test Items

3.1 Measuring Instruments

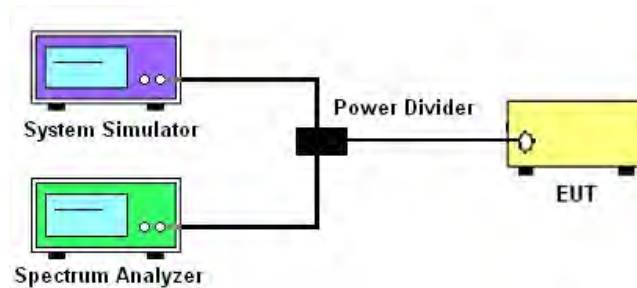
See list of measuring instruments of this test report.

3.1.1 Test Setup

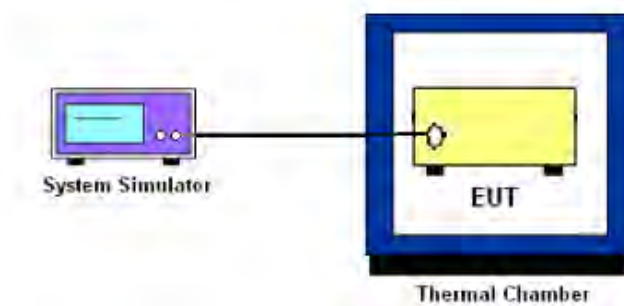
3.1.2 Conducted Output Power



3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, Emission Mask, Emissions Mask – Out Of Band Emissions, and Conducted Spurious Emission



3.1.4 Frequency Stability



3.1.5 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power Measurement and ERP Measurement

3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 26.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



3.3 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

Reporting only

3.3.2 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.



3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of (Occupied) Bandwidth Limitations Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.4.2 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.



3.5 Emissions Mask Measurement

3.5.1 Description of Emissions Mask Measurement

Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of FCC Part 90.691.(a)

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \text{ Log}_{10}(f/6.1)$ decibels or $50 + 10 \text{ Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \text{ Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

3.5.2 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The emissions mask of low and high channels for the highest RF powers were measured.
3. Set RBW and VBW 3 times of RBW to make the measurement with the spectrum analyzer's, and according to KDB 971168 D02 Misc Rev Approve License Devices v02r01 standards, set RBW = 300 Hz to make offsets less than 37.5 kHz from a channel edge , RBW = 100 kHz to make offsets greater than 37.5 kHz, that is allowed.
4. The test results were shown below plots with a correction offset factor including cable loss, insertion loss of power divider.



3.6 Emissions Mask – Out Of Band Emissions Measurement

3.6.1 Description of Conducted Emissions Out of band emissions measurement

The power of any emission FCC Part 90.691 (a)(2) on any frequency removed from the assigned frequency by out of the authorized bandwidth at least $43 + 10 \log (P)$ dB. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.6.2 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. For testing below 1GHz, make the measurement with the spectrum analyzer's RBW = 100 kHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. For testing above 1GHz, make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)



3.7 Frequency Stability Measurement

3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 20±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.



3.8 Field Strength of Spurious Radiation Measurement

3.8.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

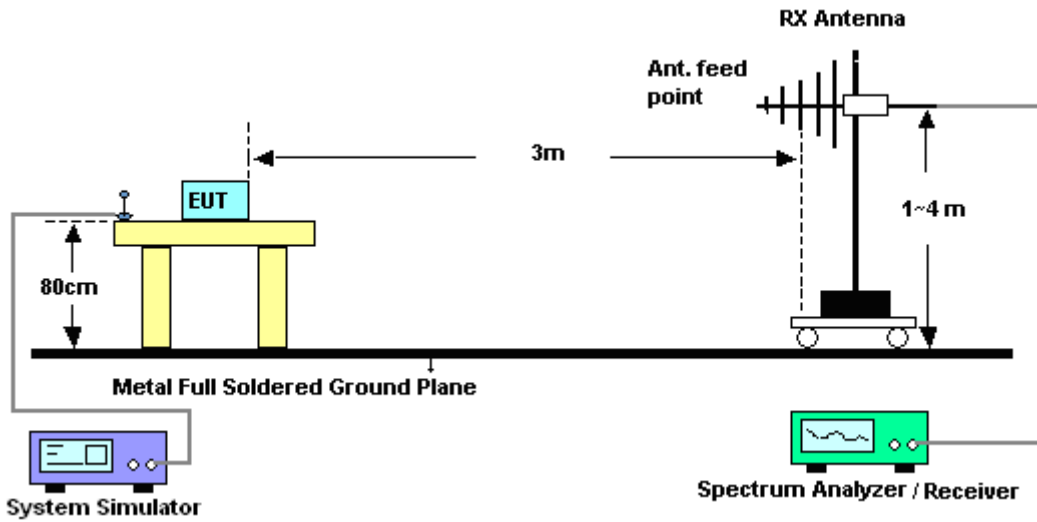
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43+10\log_{10}(P[\text{Watts}])$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

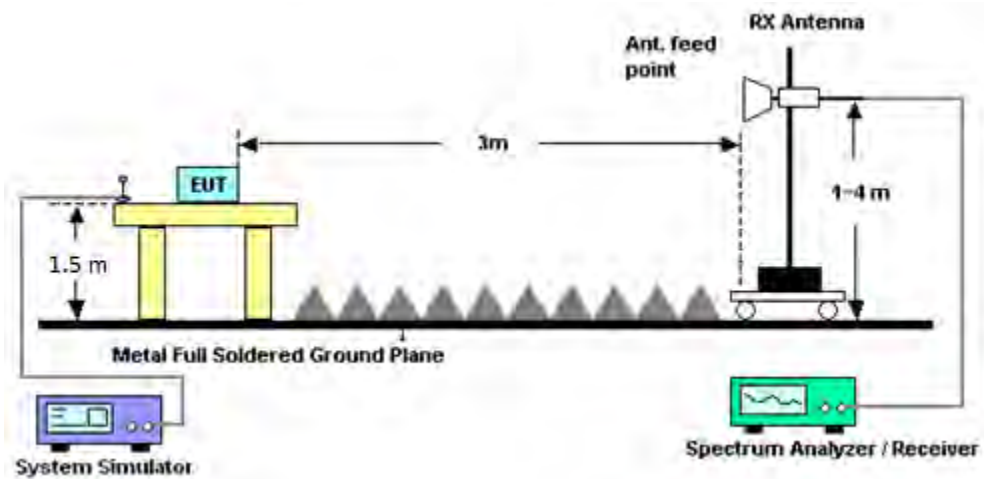
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. For testing below 1GHz, make the measurement with the spectrum analyzer's RBW = 100 kHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. For testing above 1GHz, make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
12. $\text{ERP (dBm)} = \text{EIRP} - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

3.8.3 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.8.4 Test Result of Field Strength of Spurious Radiated

Please refer to Appendix B.



4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|----------------------|-------------------|-------------------------------------|----------------------|--|------------------|---------------------------------|---------------|--------------------------|
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Jan. 07, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | Jan. 06, 2020 | Radiation (03CH12-HY) |
| Bilog Antenna | TESEQ | CBL 6111D&00802 N1D01N-06 | 47020&06 | 30MHz to 1GHz | Oct. 13, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 12, 2019 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBE CK | BBHA 9120D | 9120D-1212 | 1GHz ~ 18GHz | Oct. 19, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 18, 2019 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBE CK | BBHA 9120D | 9120D-1326 | 1GHz ~ 18GHz | Oct. 30, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 29, 2019 | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBE CK | BBHA 9170 | BBHA917058 4 | 18GHz ~ 40GHz | Dec. 05, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Dec. 04, 2019 | Radiation (03CH12-HY) |
| Preamplifier | COM-POWER | PA-103 | 161075 | 10MHz~1GHz | Mar. 25, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | Mar. 24, 2020 | Radiation (03CH12-HY) |
| Preamplifier | Agilent | 8449B | 3008A02375 | 1GHz~26.5Ghz | May 28, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | May 26, 2020 | Radiation (03CH12-HY) |
| Preamplifier | Jet-Power | JPA0118-55-30 3 | 17100018000 55007 | 1GHz~18GHz | Apr. 01, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | Mar. 31, 2020 | Radiation (03CH12-HY) |
| Preamplifier | EMEC | EM18G40G | 060715 | 18GHz ~ 40GHz | Dec. 06, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Dec. 05, 2019 | Radiation (03CH12-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | 100390 | 20Hz~26.5GHz | Dec. 26, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Dec. 25, 2019 | Radiation (03CH12-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz~44GHz | Dec. 19, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Dec. 18, 2019 | Radiation (03CH12-HY) |
| Signal Generator | Rohde & Schwarz | SMB100A | 175727 | 100kHz~40GHz | Dec. 23, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Dec. 23, 2019 | Radiation (03CH12-HY) |
| Base Station | Anritsu | MT8821C | 6201432816 | GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA | May 05, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | May 04, 2020 | Radiation (03CH12-HY) |
| Filter | Wainwright | WLK4-1000-15 30-6000-40SS | SN11 | 1 GHz Lowpass | Sep. 16, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Sep. 15, 2019 | Radiation (03CH12-HY) |
| Filter | Wainwright | WHKX12-1080 -1200-1500-60 SS | SN2 | 1.2G High Pass | Sep. 16, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Sep. 15, 2019 | Radiation (03CH12-HY) |
| Filter | Wainwright | WHKX12-2700 -3000-18000-6 OST | SN2 | 3GHz High Pass | Mar. 20, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | Mar. 19, 2020 | Radiation (03CH12-HY) |
| Notch Filter | EWT | EWT-14-0041 | D1 | DCS 1800 | Nov. 01, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 31, 2019 | Radiation (03CH12-HY) |
| Notch Filter | Wainwright | WRCT698/798 -10/40 8SSK | SN1 | AWS Band | Nov. 01, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 31, 2019 | Radiation (03CH12-HY) |
| Notch Filter | Wainwright | WRCG824/849 -40/8SS | SN35 | CDMA 850 | Nov. 07, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Nov. 06, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 126E | 0058/126E | 30M-18G | Mar. 13, 2019 | Jul. 05, 2019~ Jul. 23, 2019 | Mar. 12, 2020 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 505134/2 | 30M~40GHz | Oct. 16, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 15, 2019 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 800740/2 | 30M~40GHz | Oct. 16, 2018 | Jul. 05, 2019~ Jul. 23, 2019 | Oct. 15, 2019 | Radiation (03CH12-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1m~4m | N/A | Jul. 05, 2019~ Jul. 23, 2019 | N/A | Radiation (03CH12-HY) |
| Turn Table | EMEC | TT2000 | N/A | 0~360 Degree | N/A | Jul. 05, 2019~ Jul. 23, 2019 | N/A | Radiation (03CH12-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-000989 | N/A | N/A | Jul. 05, 2019~ Jul. 23, 2019 | N/A | Radiation (03CH12-HY) |



| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---------------------------|-----------------|---|------------|---------------------|------------------|---------------------------------|---------------|---------------------|
| LTE Base Station | Anritsu | MT8820C | 6201432821 | GSM/GPRS /WCDMA/LTE | Oct. 14, 2018 | Jun. 27, 2019~ Jul. 26, 2019 | Oct. 13, 2019 | Conducted (TH05-HY) |
| Spectrum Analyzer | Rohde & Schwarz | FSV40 | 101397 | 10Hz~40GHz | Nov. 13, 2018 | Jun. 27, 2019~ Jul. 26, 2019 | Nov. 12, 2019 | Conducted (TH05-HY) |
| Temperature Chamber | ESPEC | SH-641 | 92013720 | -40℃~90℃ | Aug. 29, 2018 | Jun. 27, 2019~ Jul. 26, 2019 | Aug. 28, 2019 | Conducted (TH05-HY) |
| Programmable Power Supply | GW Instek | PSS-2005 | EL890094 | 1V~20V 0.5A~5A | Oct. 02, 2018 | Jun. 27, 2019~ Jul. 26, 2019 | Oct. 01, 2019 | Conducted (TH05-HY) |
| Coupler | Warison | 20dB 25W SMA Directional Coupler | #A | 1-18GHz | Jan. 14, 2019 | Jun. 27, 2019~ Jul. 26, 2019 | Jan. 13, 2020 | Conducted (TH05-HY) |



5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.36 |
|---|------|

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.70 |
|---|------|

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.98 |
|---|------|



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

| LTE Band 26 Maximum Average Power [dBm] | | | | | | |
|---|---------|-----------|--------|--------|--------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 15 | 1 | 0 | QPSK | 24.66 | - | - |
| 15 | 1 | 37 | | 24.72 | - | - |
| 15 | 1 | 74 | | 24.72 | - | - |
| 15 | 36 | 0 | | 23.84 | - | - |
| 15 | 36 | 20 | | 23.81 | - | - |
| 15 | 36 | 39 | | 23.79 | - | - |
| 15 | 75 | 0 | | 23.83 | - | - |
| 15 | 1 | 0 | 16-QAM | 23.97 | - | - |
| 15 | 1 | 37 | | 24.07 | - | - |
| 15 | 1 | 74 | | 23.99 | - | - |
| 15 | 36 | 0 | | 22.88 | - | - |
| 15 | 36 | 20 | | 23.00 | - | - |
| 15 | 36 | 39 | | 22.90 | - | - |
| 15 | 75 | 0 | | 22.97 | - | - |
| 15 | 1 | 0 | 64-QAM | 22.96 | - | - |
| 15 | 1 | 37 | | 22.98 | - | - |
| 15 | 1 | 74 | | 22.99 | - | - |
| 15 | 36 | 0 | | 21.95 | - | - |
| 15 | 36 | 20 | | 22.06 | - | - |
| 15 | 36 | 39 | | 21.98 | - | - |
| 15 | 75 | 0 | | 21.97 | - | - |
| 10 | 1 | 0 | QPSK | - | 24.75 | - |
| 10 | 1 | 25 | | - | 24.67 | - |
| 10 | 1 | 49 | | - | 24.71 | - |
| 10 | 25 | 0 | | - | 23.75 | - |
| 10 | 25 | 12 | | - | 23.81 | - |
| 10 | 25 | 25 | | - | 23.77 | - |
| 10 | 50 | 0 | | - | 23.71 | - |
| 10 | 1 | 0 | 16-QAM | - | 24.13 | - |
| 10 | 1 | 25 | | - | 23.96 | - |
| 10 | 1 | 49 | | - | 24.09 | - |
| 10 | 25 | 0 | | - | 22.88 | - |
| 10 | 25 | 12 | | - | 22.95 | - |
| 10 | 25 | 25 | | - | 22.87 | - |
| 10 | 50 | 0 | | - | 22.89 | - |
| 10 | 1 | 0 | 64-QAM | - | 22.96 | - |
| 10 | 1 | 25 | | - | 22.90 | - |
| 10 | 1 | 49 | | - | 23.04 | - |
| 10 | 25 | 0 | | - | 22.00 | - |
| 10 | 25 | 12 | | - | 21.99 | - |
| 10 | 25 | 25 | | - | 21.94 | - |
| 10 | 50 | 0 | | - | 21.87 | - |



| LTE Band 26 Maximum Average Power [dBm] | | | | | | |
|---|---------|-----------|--------|--------|--------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 5 | 1 | 0 | QPSK | 24.56 | 24.73 | 24.70 |
| 5 | 1 | 12 | | 24.69 | 24.74 | 24.68 |
| 5 | 1 | 24 | | 24.66 | 24.71 | 24.71 |
| 5 | 12 | 0 | | 23.78 | 23.72 | 23.84 |
| 5 | 12 | 7 | | 23.82 | 23.86 | 23.74 |
| 5 | 12 | 13 | | 23.70 | 23.79 | 23.83 |
| 5 | 25 | 0 | | 23.80 | 23.81 | 23.77 |
| 5 | 1 | 0 | 16-QAM | 23.89 | 24.09 | 24.01 |
| 5 | 1 | 12 | | 23.99 | 23.95 | 23.98 |
| 5 | 1 | 24 | | 23.90 | 24.05 | 24.00 |
| 5 | 12 | 0 | | 22.85 | 22.95 | 22.91 |
| 5 | 12 | 7 | | 22.96 | 22.94 | 22.88 |
| 5 | 12 | 13 | | 22.90 | 22.83 | 22.91 |
| 5 | 25 | 0 | | 22.95 | 22.85 | 22.91 |
| 5 | 1 | 0 | 64-QAM | 22.91 | 23.03 | 23.00 |
| 5 | 1 | 12 | | 22.91 | 22.98 | 23.06 |
| 5 | 1 | 24 | | 22.89 | 22.95 | 23.03 |
| 5 | 12 | 0 | | 21.91 | 21.92 | 21.97 |
| 5 | 12 | 7 | | 22.01 | 21.91 | 21.95 |
| 5 | 12 | 13 | | 21.91 | 21.89 | 21.95 |
| 5 | 25 | 0 | | 21.89 | 21.85 | 21.93 |
| 3 | 1 | 0 | QPSK | 24.56 | 24.78 | 24.71 |
| 3 | 1 | 8 | | 24.70 | 24.67 | 24.74 |
| 3 | 1 | 14 | | 24.70 | 24.69 | 24.71 |
| 3 | 8 | 0 | | 23.73 | 23.81 | 23.81 |
| 3 | 8 | 4 | | 23.89 | 23.83 | 23.79 |
| 3 | 8 | 7 | | 23.75 | 23.79 | 23.88 |
| 3 | 15 | 0 | | 23.74 | 23.76 | 23.77 |
| 3 | 1 | 0 | 16-QAM | 23.90 | 24.08 | 24.03 |
| 3 | 1 | 8 | | 24.04 | 23.94 | 23.97 |
| 3 | 1 | 14 | | 23.99 | 24.01 | 23.98 |
| 3 | 8 | 0 | | 22.87 | 22.94 | 22.86 |
| 3 | 8 | 4 | | 22.93 | 22.92 | 22.89 |
| 3 | 8 | 7 | | 22.82 | 22.81 | 22.96 |
| 3 | 15 | 0 | | 22.88 | 22.84 | 22.87 |
| 3 | 1 | 0 | 64-QAM | 22.94 | 23.05 | 23.00 |
| 3 | 1 | 8 | | 22.94 | 22.93 | 23.09 |
| 3 | 1 | 14 | | 22.96 | 23.01 | 22.97 |
| 3 | 8 | 0 | | 21.85 | 21.94 | 22.00 |
| 3 | 8 | 4 | | 21.98 | 22.01 | 21.89 |
| 3 | 8 | 7 | | 21.98 | 21.94 | 21.95 |
| 3 | 15 | 0 | | 21.97 | 21.92 | 21.88 |



| LTE Band 26 Maximum Average Power [dBm] | | | | | | |
|---|---------|-----------|--------|--------|--------|--------------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 1.4 | 1 | 0 | QPSK | 24.58 | 24.64 | 24.71 |
| 1.4 | 1 | 3 | | 24.66 | 24.70 | 24.51 |
| 1.4 | 1 | 5 | | 24.58 | 24.62 | 24.68 |
| 1.4 | 3 | 0 | | 24.64 | 24.69 | 24.64 |
| 1.4 | 3 | 1 | | 24.43 | 24.73 | 24.80 |
| 1.4 | 3 | 3 | | 24.61 | 24.69 | 24.76 |
| 1.4 | 6 | 0 | | 23.59 | 23.59 | 23.82 |
| 1.4 | 1 | 0 | 16-QAM | 23.86 | 23.87 | 23.99 |
| 1.4 | 1 | 3 | | 23.88 | 23.95 | 24.02 |
| 1.4 | 1 | 5 | | 23.72 | 23.89 | 23.95 |
| 1.4 | 3 | 0 | | 23.67 | 23.71 | 23.79 |
| 1.4 | 3 | 1 | | 23.69 | 23.73 | 23.80 |
| 1.4 | 3 | 3 | | 23.64 | 23.68 | 23.76 |
| 1.4 | 6 | 0 | | 22.78 | 22.85 | 22.93 |
| 1.4 | 1 | 0 | 64-QAM | 22.82 | 22.86 | 22.97 |
| 1.4 | 1 | 3 | | 22.83 | 22.90 | 22.98 |
| 1.4 | 1 | 5 | | 22.76 | 22.86 | 22.93 |
| 1.4 | 3 | 0 | | 22.80 | 22.85 | 22.96 |
| 1.4 | 3 | 1 | | 22.84 | 22.91 | 22.97 |
| 1.4 | 3 | 3 | | 22.77 | 22.84 | 22.94 |
| 1.4 | 6 | 0 | | 21.75 | 21.81 | 21.90 |



LTE Band 26_Part 90S

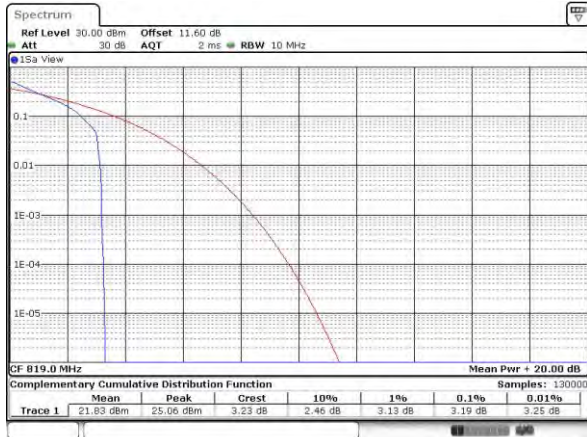
Peak-to-Average Ratio

| Mode | LTE Band 26 / 10MHz | | | | |
|------------|---------------------|---------|-------|---------|-------------|
| Mod. | QPSK | | 16QAM | | Limit: 13dB |
| RB Size | 1RB | Full RB | 1RB | Full RB | Result |
| Lowest CH | - | - | - | - | PASS |
| Middle CH | 3.19 | 4.52 | 4.38 | 5.77 | |
| Highest CH | - | - | - | - | |
| Mode | LTE Band 26 / 10MHz | | | | |
| Mod. | 64QAM | | | | Limit: 13dB |
| RB Size | 1RB | Full RB | | | Result |
| Lowest CH | - | - | - | - | PASS |
| Middle CH | 6.17 | 6.43 | - | - | |
| Highest CH | - | - | - | - | |



LTE Band 26 / 10MHz / QPSK

Middle Channel / 1RB



Date: 1.JUL.2019 00:08:28

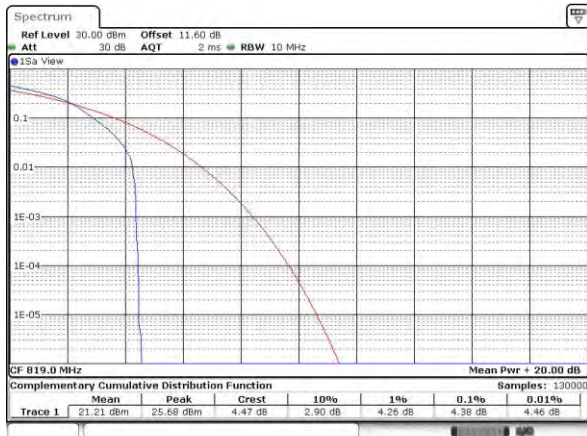
Middle Channel / Full RB



Date: 1.JUL.2019 00:08:58

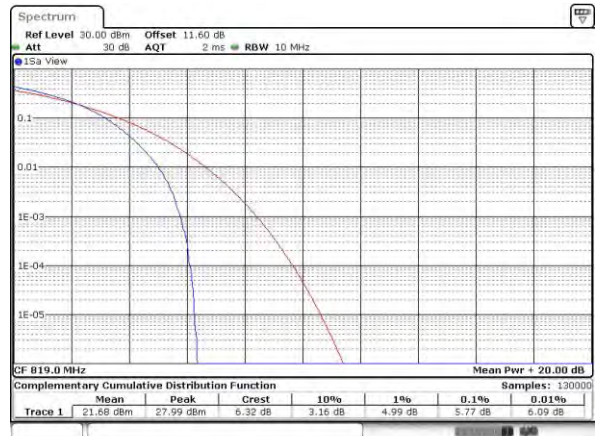
LTE Band 26 / 10MHz / 16QAM

Middle Channel / 1RB



Date: 1.JUL.2019 00:08:38

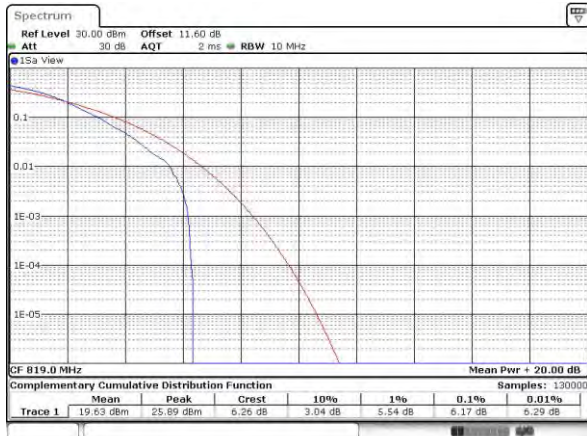
Middle Channel / Full RB



Date: 1.JUL.2019 00:08:48

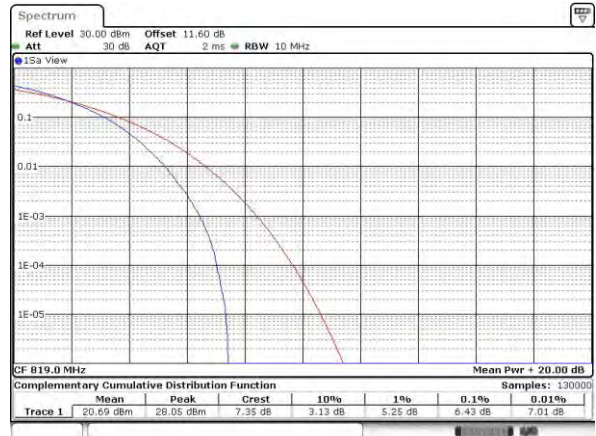
LTE Band 26 / 10MHz / 64QAM

Middle Channel / 1RB



Date: 1.JUL.2019 00:09:08

Middle Channel / Full RB



Date: 1.JUL.2019 00:09:18



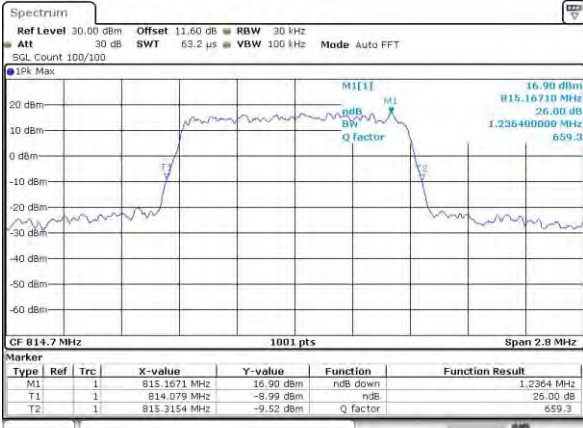
26dB Bandwidth

| Mode | LTE Band 26 : 26dB BW(MHz) | | | | | | | | | | | |
|------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | 1.24 | 1.22 | 2.97 | 3.00 | 4.93 | 4.86 | - | - | 14.33 | 14.57 | - | - |
| Middle CH | 1.24 | 1.22 | 3.02 | 3.02 | 4.89 | 4.91 | 9.75 | 9.77 | - | - | - | - |
| Highest CH | 1.24 | 1.22 | 3.05 | 3.02 | 4.97 | 4.88 | - | - | - | - | - | - |
| Mode | LTE Band 26 : 26dB BW(MHz) | | | | | | | | | | | |
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | 64QAM | | 64QAM | | 64QAM | | 64QAM | | 64QAM | | 64QAM | |
| Lowest CH | 1.22 | - | 2.97 | - | 4.94 | - | - | - | 14.30 | - | - | - |
| Middle CH | 1.23 | - | 3.03 | - | 4.91 | - | 9.87 | - | - | - | - | - |
| Highest CH | 1.25 | - | 3.02 | - | 4.84 | - | - | - | - | - | - | - |



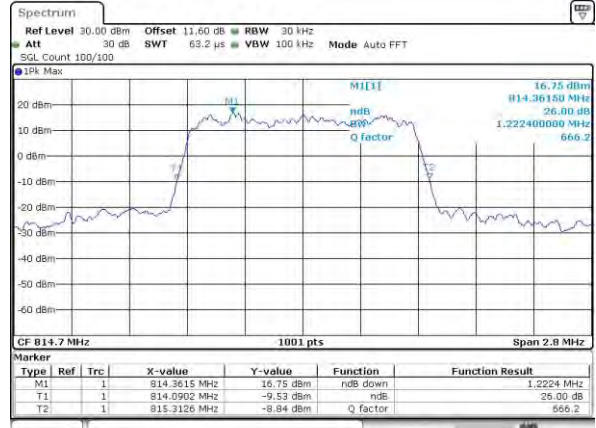
LTE Band 26

Lowest Channel / 1.4MHz / QPSK



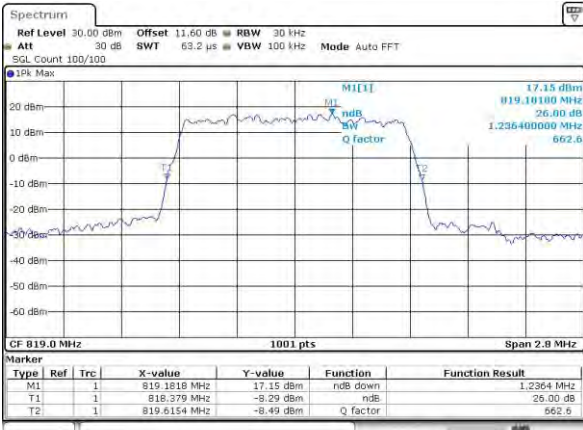
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Lowest Channel / 1.4MHz / 16QAM



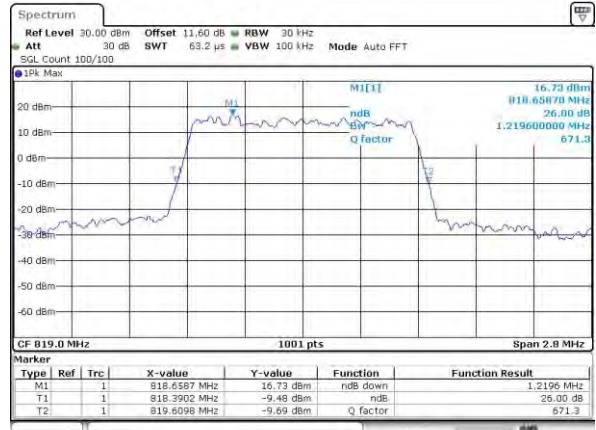
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Middle Channel / 1.4MHz / QPSK



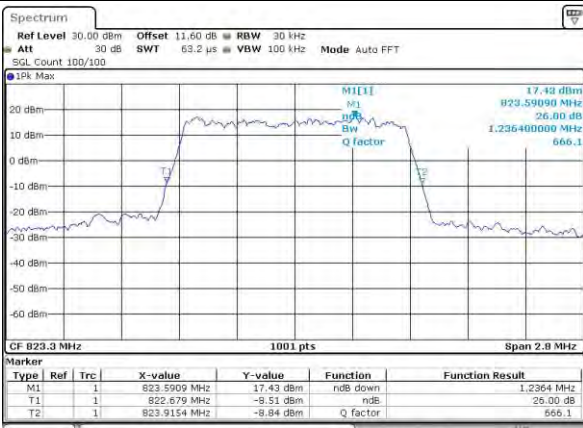
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Middle Channel / 1.4MHz / 16QAM



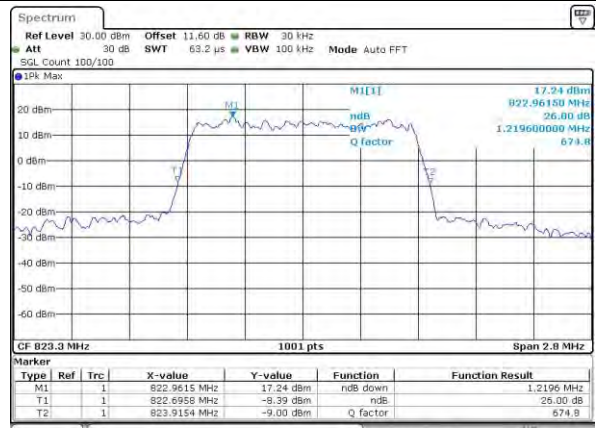
Date: 11/25/2019 00:00:14

Highest Channel / 1.4MHz / QPSK



Date: 11/25/2019 00:00:58

Highest Channel / 1.4MHz / 16QAM

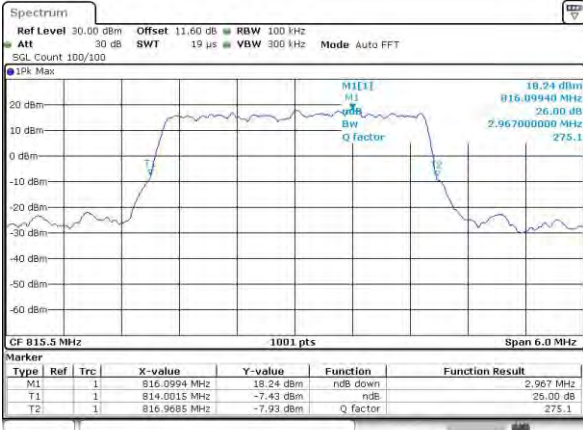


Date: 11/25/2019 00:00:08



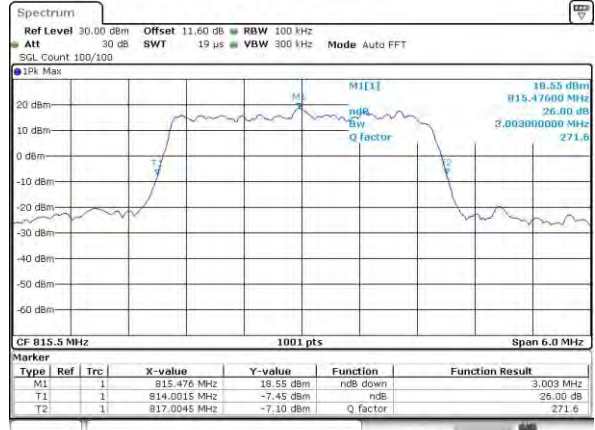
LTE Band 26

Lowest Channel / 3MHz / QPSK



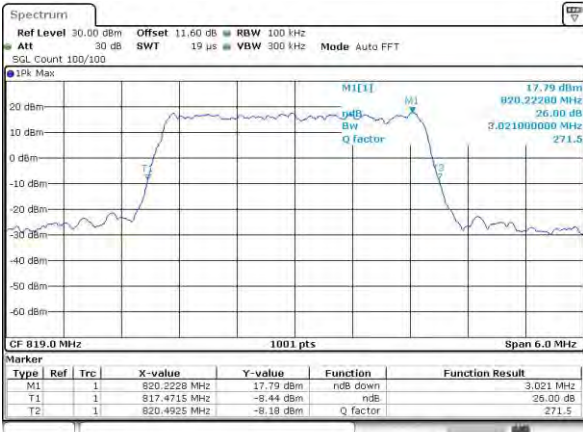
Date: 2013-08-20 23:29:18

Lowest Channel / 3MHz / 16QAM



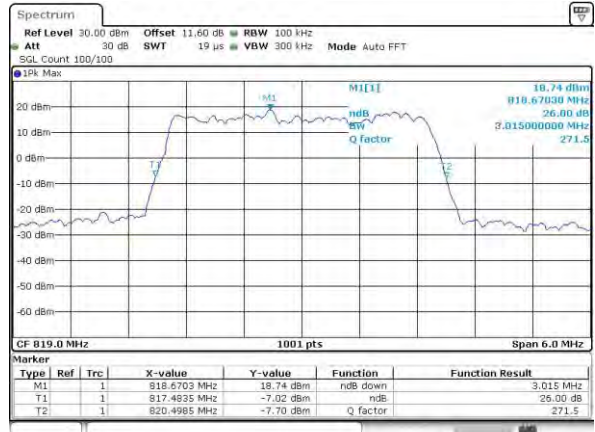
Date: 2013-08-20 23:29:30

Middle Channel / 3MHz / QPSK



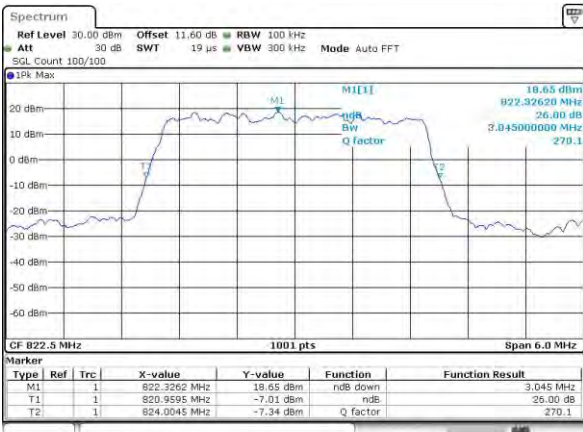
Date: 2013-08-20 23:35:13

Middle Channel / 3MHz / 16QAM



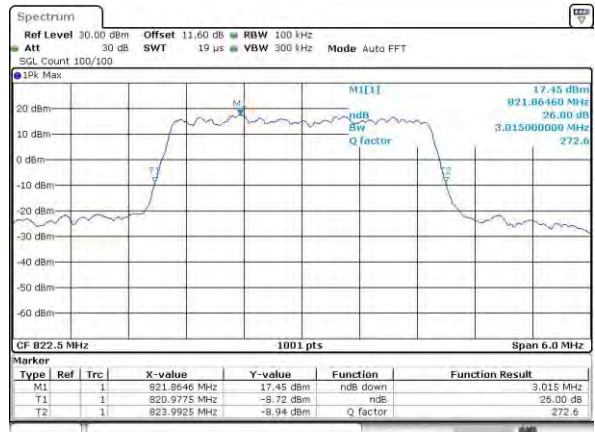
Date: 2013-08-20 23:35:25

Highest Channel / 3MHz / QPSK



Date: 2013-08-20 23:38:18

Highest Channel / 3MHz / 16QAM

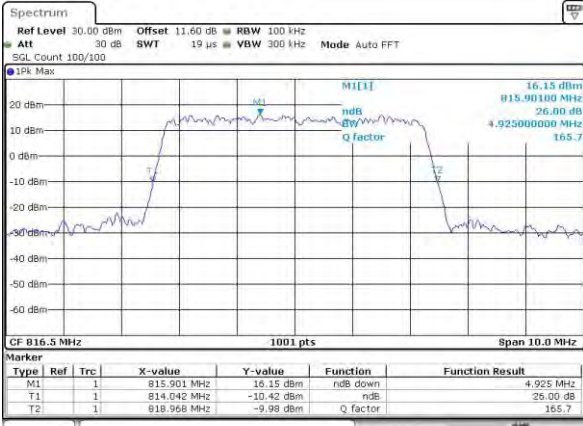


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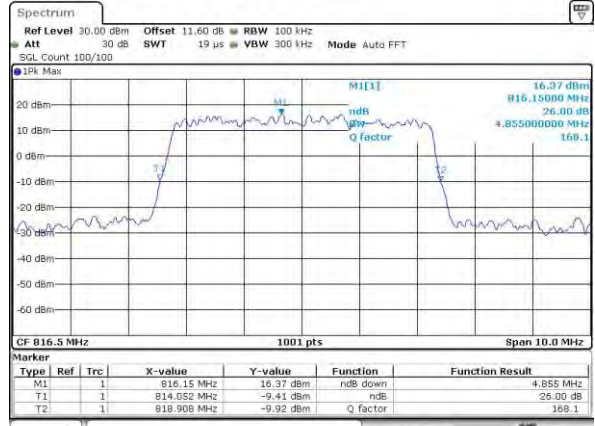
LTE Band 26

Lowest Channel / 5MHz / QPSK



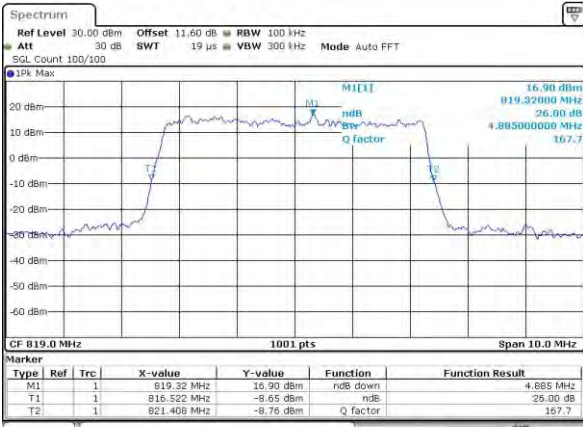
Date: 2019-08-23 23:41:13

Lowest Channel / 5MHz / 16QAM



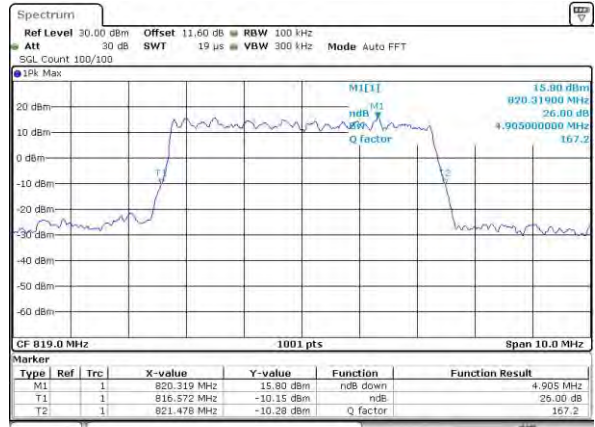
Date: 2019-08-23 23:41:25

Middle Channel / 5MHz / QPSK



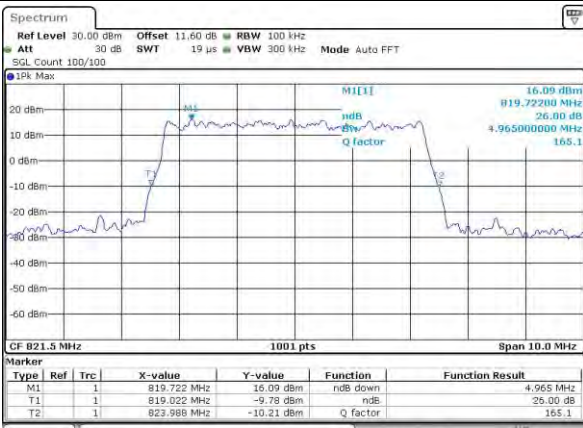
Date: 2019-08-23 23:44:08

Middle Channel / 5MHz / 16QAM



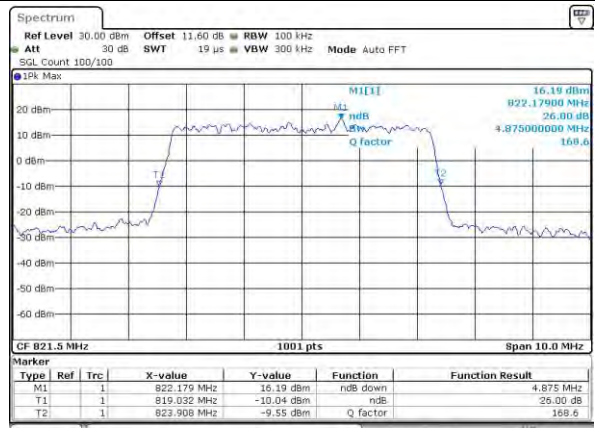
Date: 2019-08-23 23:44:20

Highest Channel / 5MHz / QPSK



Date: 2019-08-23 23:47:03

Highest Channel / 5MHz / 16QAM

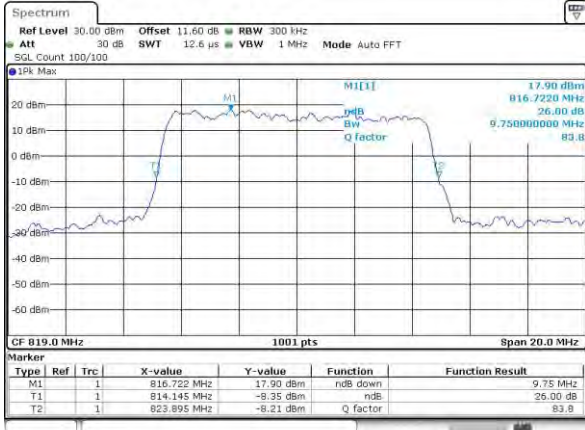


Date: 2019-08-23 23:47:15



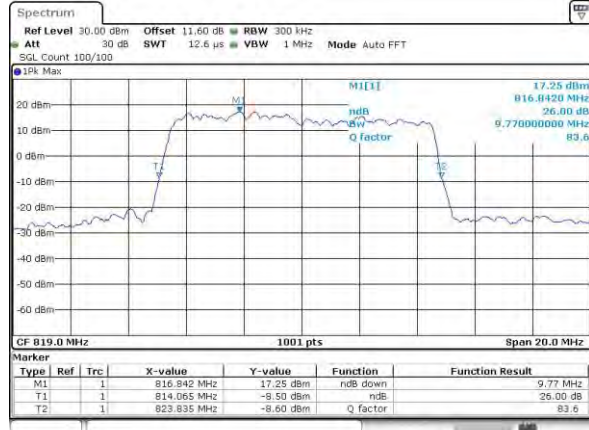
LTE Band 26

Middle Channel / 10MHz / QPSK



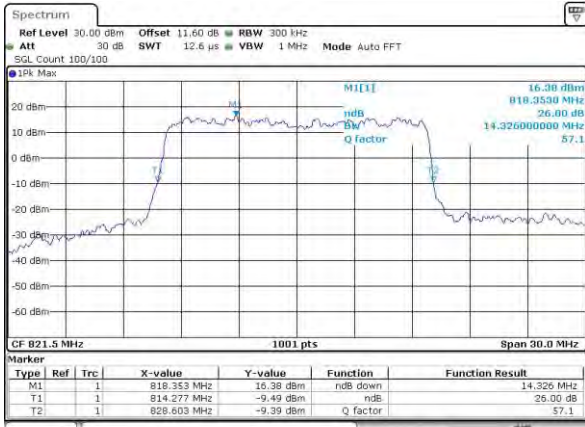
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Middle Channel / 10MHz / 16QAM



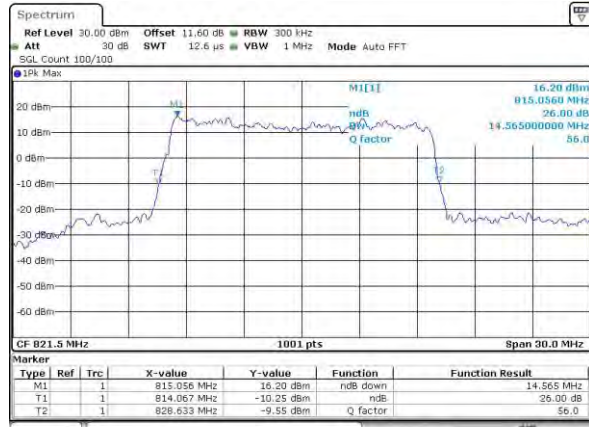
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Lowest Channel / 15MHz / QPSK



Date: 2013-08-20 23:02:54

Lowest Channel / 15MHz / 16QAM

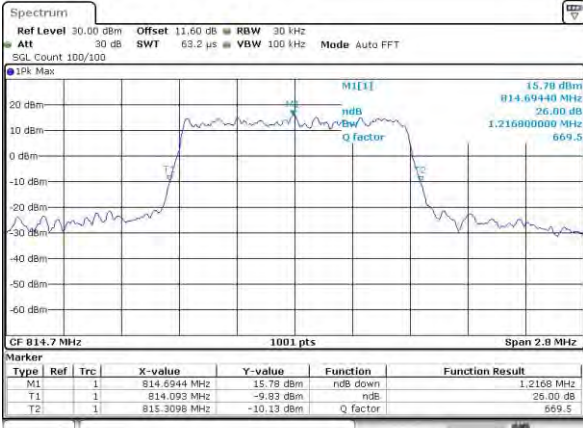


Date: 2013-08-20 23:03:06



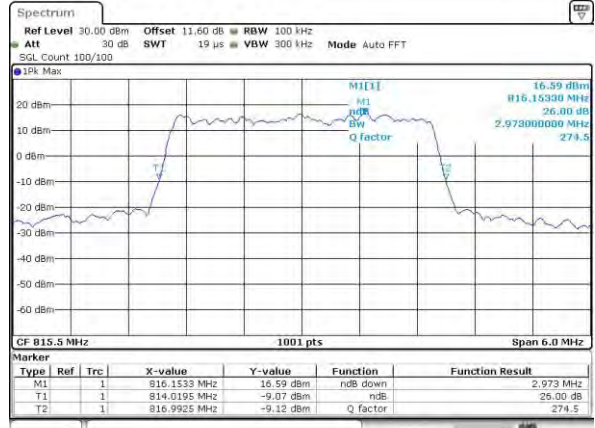
LTE Band 26

Lowest Channel / 1.4MHz / 64QAM



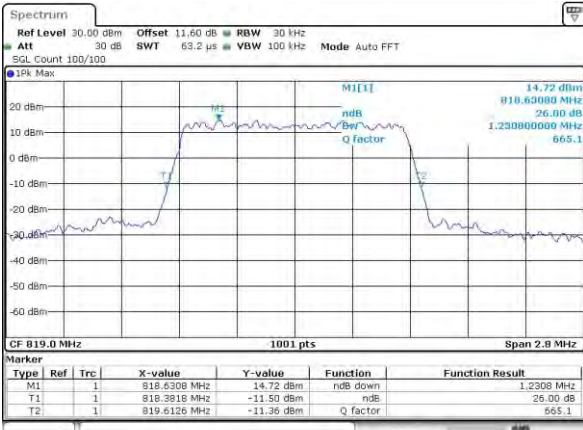
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Lowest Channel / 3MHz / 64QAM



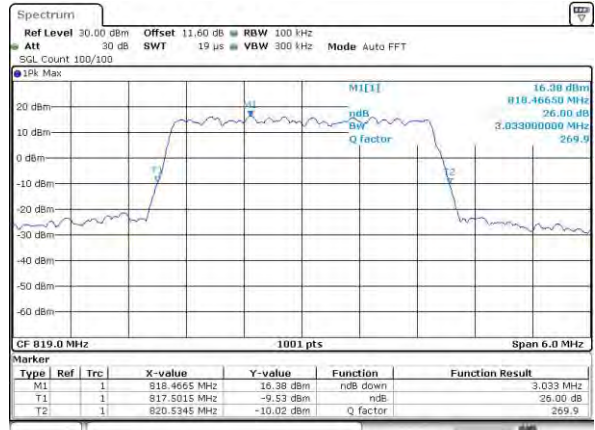
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Middle Channel / 1.4MHz / 64QAM



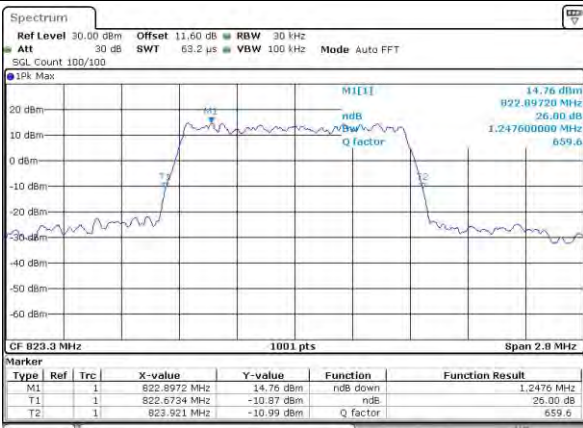
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Middle Channel / 3MHz / 64QAM



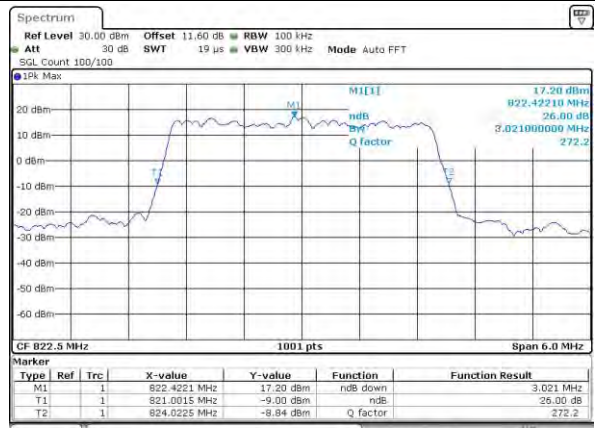
Date: 2013/08/20 23:12:18

Highest Channel / 1.4MHz / 64QAM



Date: 2013/08/20 23:27:39

Highest Channel / 3MHz / 64QAM

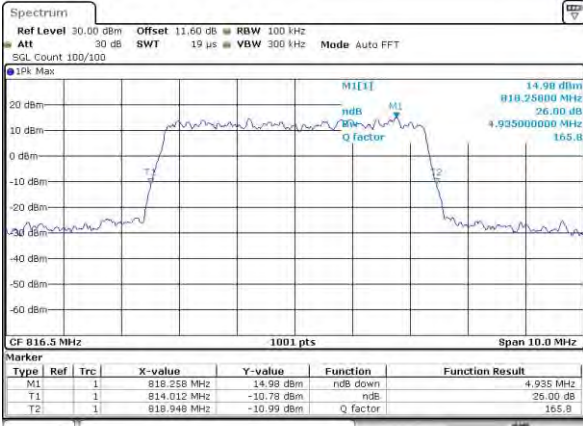


Date: 2013/08/20 23:13:46



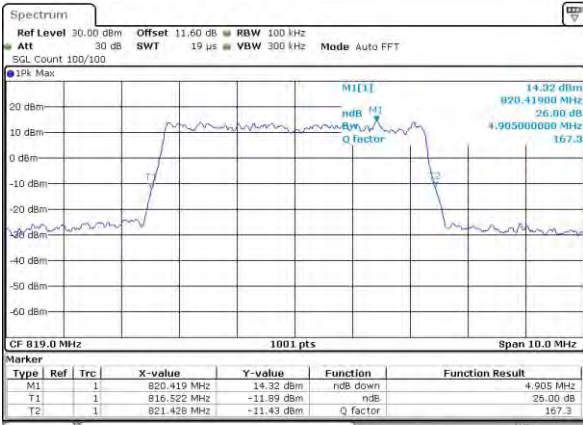
LTE Band 26

Lowest Channel / 5MHz / 64QAM



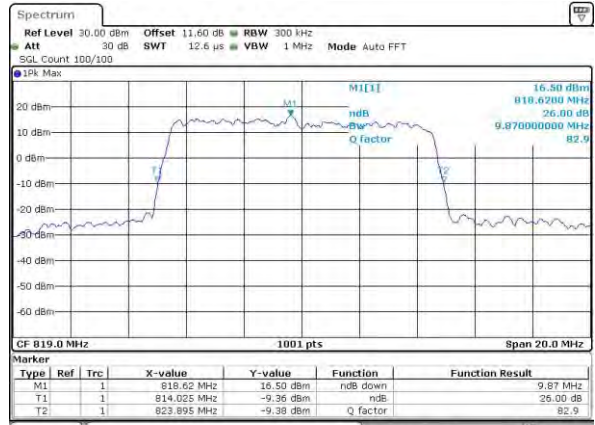
Date: 2019-08-23 23:15:14

Middle Channel / 5MHz / 64QAM



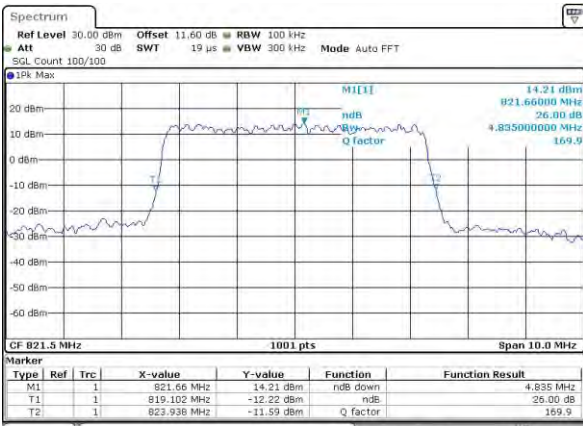
Date: 2019-08-23 23:16:41

Middle Channel / 10MHz / 64QAM



Date: 2019-08-23 23:19:37

Highest Channel / 5MHz / 64QAM

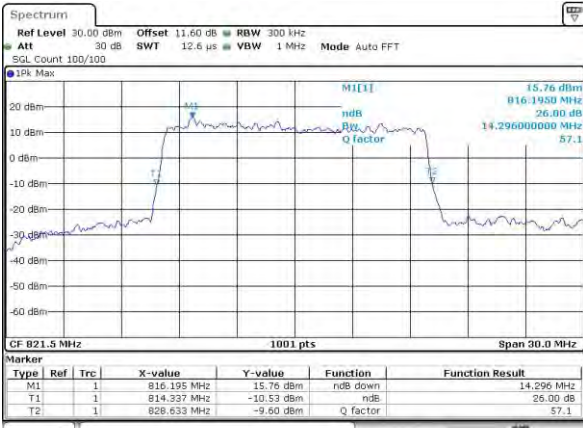


Date: 2019-08-23 23:18:09



LTE Band 26

Lowest Channel / 15MHz / 64QAM



Date: 8/23/2018 23:21:09



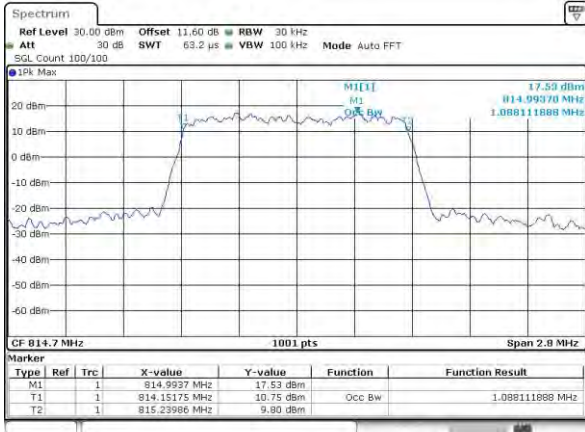
Occupied Bandwidth

| Mode | LTE Band 26 : 99%OBW(MHz) | | | | | | | | | | | |
|------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | 1.09 | 1.08 | 2.72 | 2.71 | 4.50 | 4.49 | - | - | 13.43 | 13.43 | - | - |
| Middle CH | 1.09 | 1.09 | 2.71 | 2.73 | 4.50 | 4.50 | 9.07 | 8.91 | - | - | - | - |
| Highest CH | 1.10 | 1.09 | 2.72 | 2.73 | 4.50 | 4.51 | - | - | - | - | - | - |
| Mode | LTE Band 26 : 99%OBW(MHz) | | | | | | | | | | | |
| BW | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| Mod. | 64QAM | | 64QAM | | 64QAM | | 64QAM | | 64QAM | | 64QAM | |
| Lowest CH | 1.10 | - | 2.73 | - | 4.48 | - | - | - | 13.46 | - | - | - |
| Middle CH | 1.09 | - | 2.72 | - | 4.51 | - | 9.03 | - | - | - | - | - |
| Highest CH | 1.09 | - | 2.73 | - | 4.48 | - | - | - | - | - | - | - |

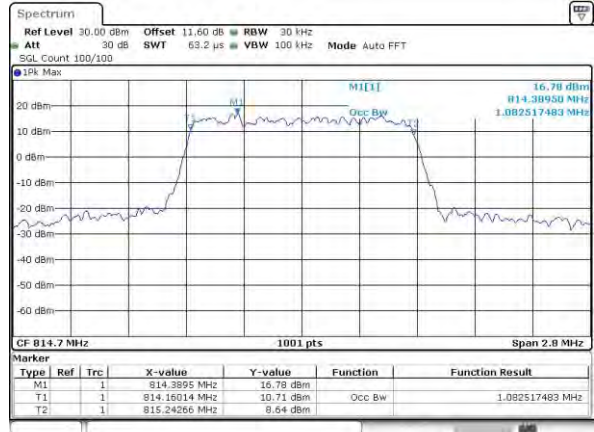


LTE Band 26

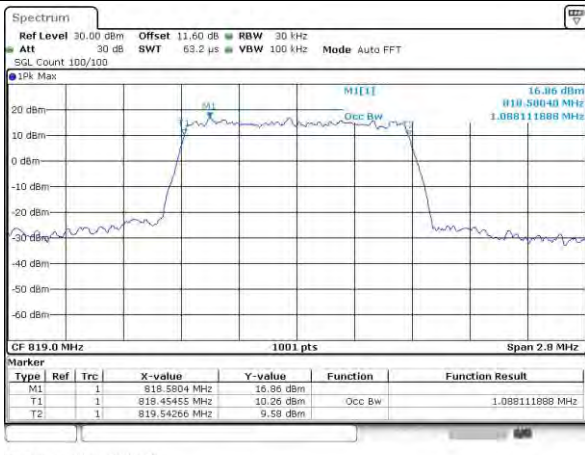
Lowest Channel / 1.4MHz / QPSK



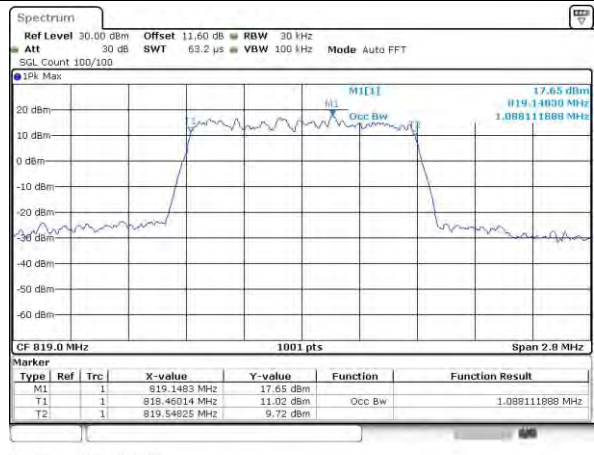
Lowest Channel / 1.4MHz / 16QAM



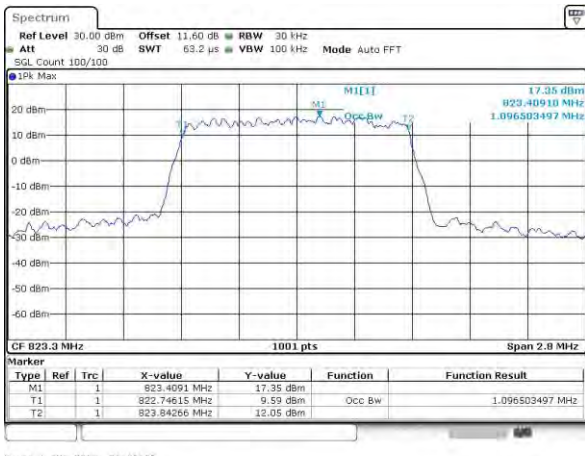
Middle Channel / 1.4MHz / QPSK



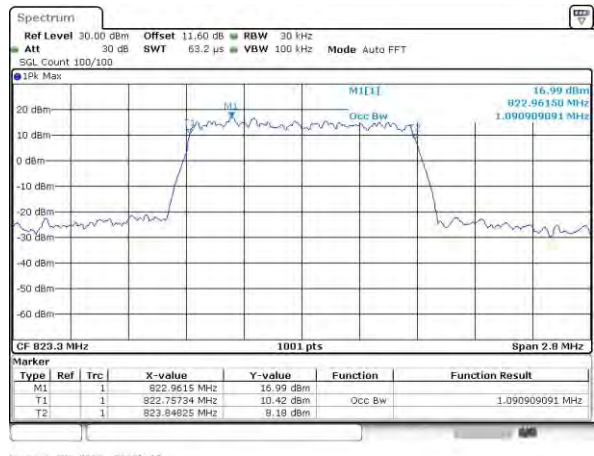
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK



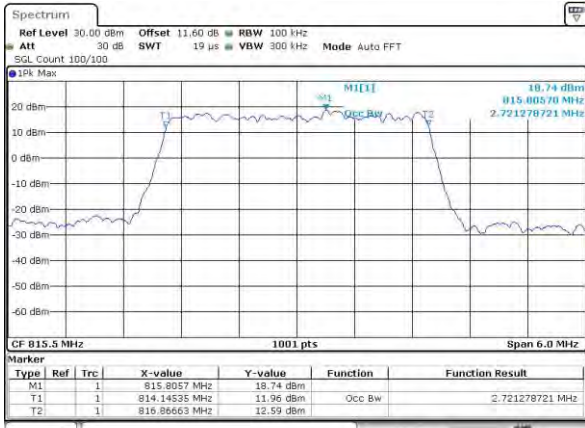
Highest Channel / 1.4MHz / 16QAM





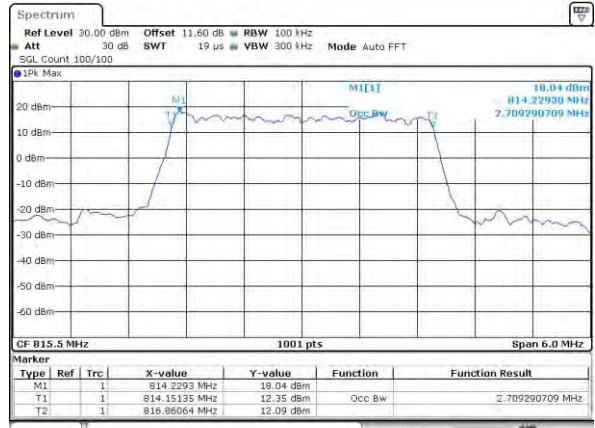
LTE Band 26

Lowest Channel / 3MHz / QPSK



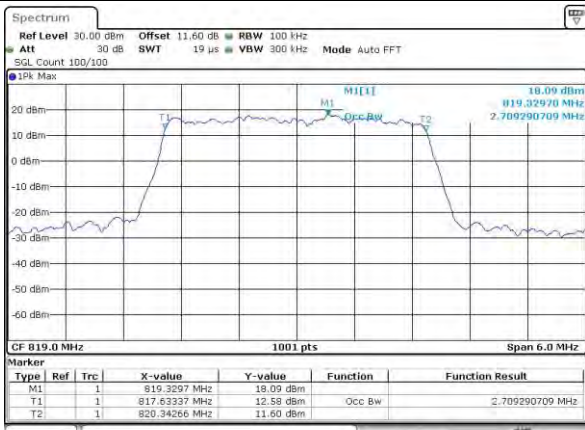
Date: 2019-03-28 23:28:55

Lowest Channel / 3MHz / 16QAM



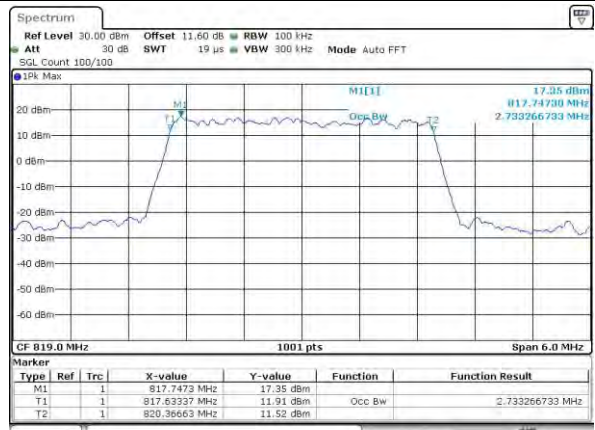
Date: 2019-03-28 23:29:07

Middle Channel / 3MHz / QPSK



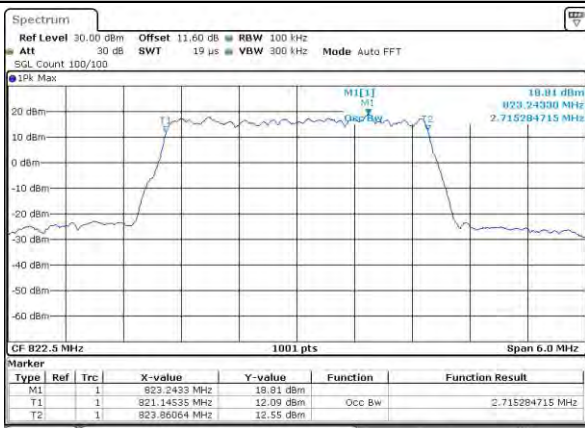
Date: 2019-03-28 23:29:45

Middle Channel / 3MHz / 16QAM



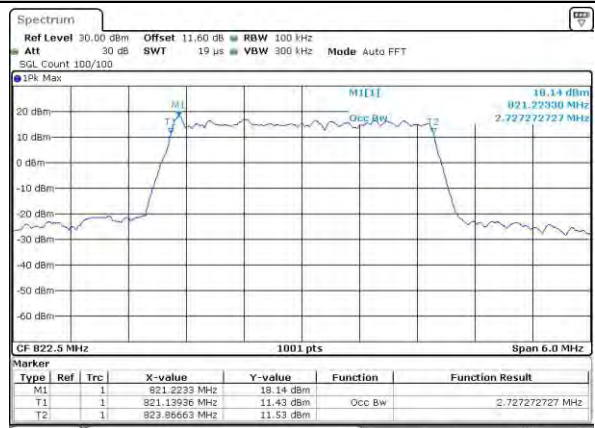
Date: 2019-03-28 23:29:12

Highest Channel / 3MHz / QPSK



Date: 2019-03-28 23:29:55

Highest Channel / 3MHz / 16QAM

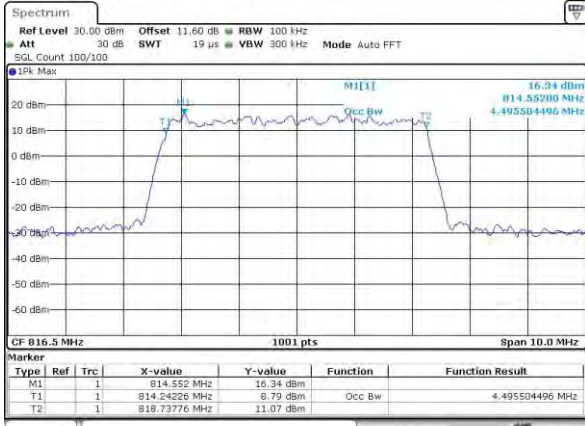


Date: 2019-03-28 23:30:06



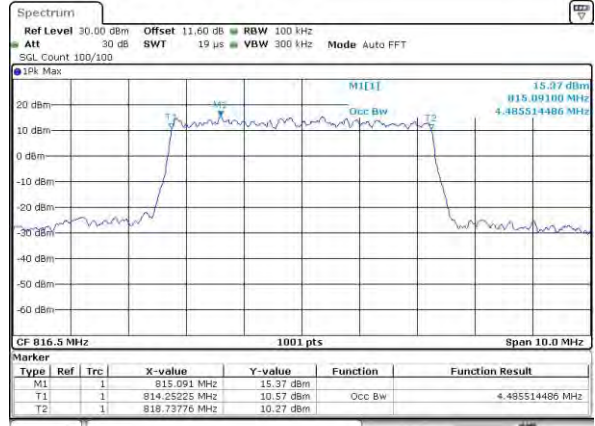
LTE Band 26

Lowest Channel / 5MHz / QPSK



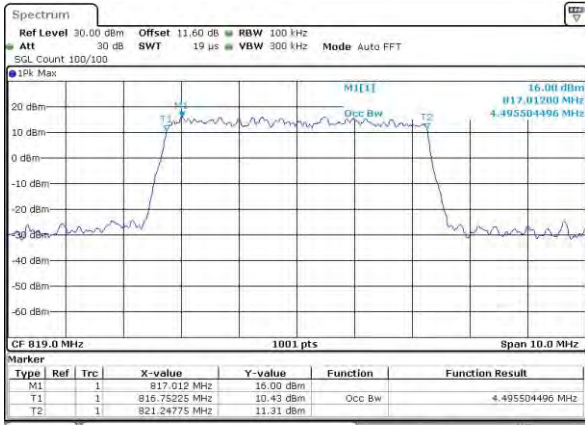
Date: 2019-03-14 10:50

Lowest Channel / 5MHz / 16QAM



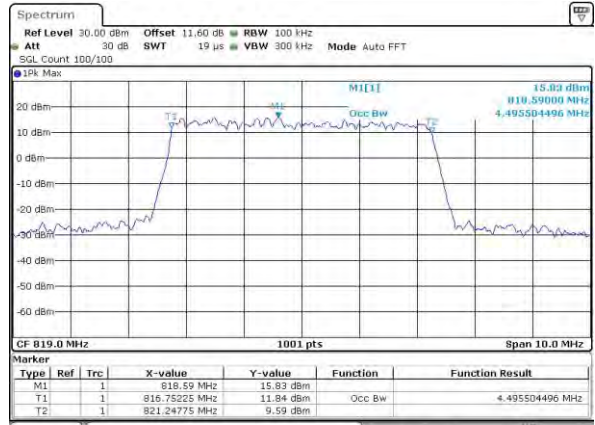
Date: 2019-03-14 11:02

Middle Channel / 5MHz / QPSK



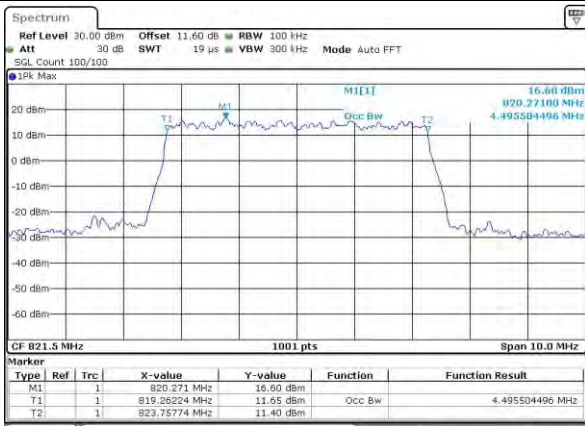
Date: 2019-03-14 11:45

Middle Channel / 5MHz / 16QAM



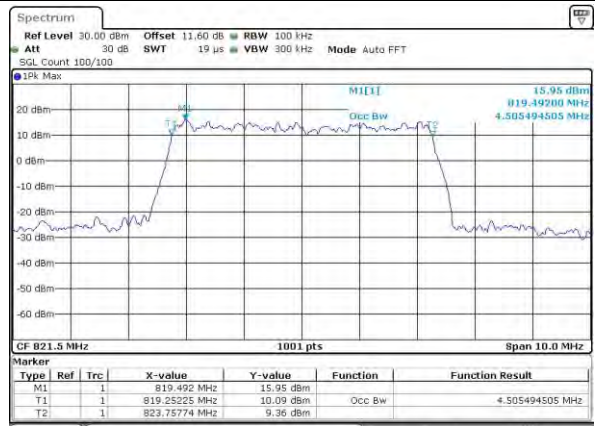
Date: 2019-03-14 11:57

Highest Channel / 5MHz / QPSK



Date: 2019-03-14 11:40

Highest Channel / 5MHz / 16QAM

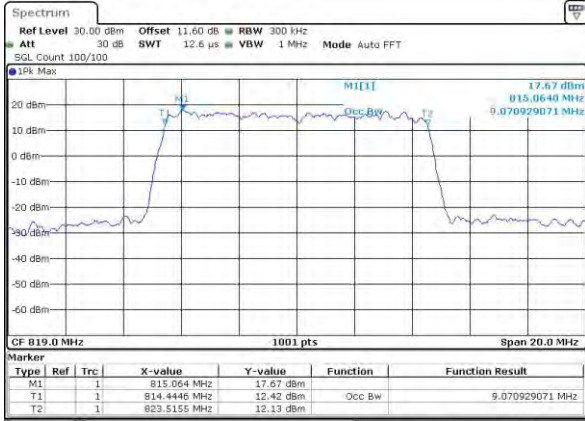


Date: 2019-03-14 11:52



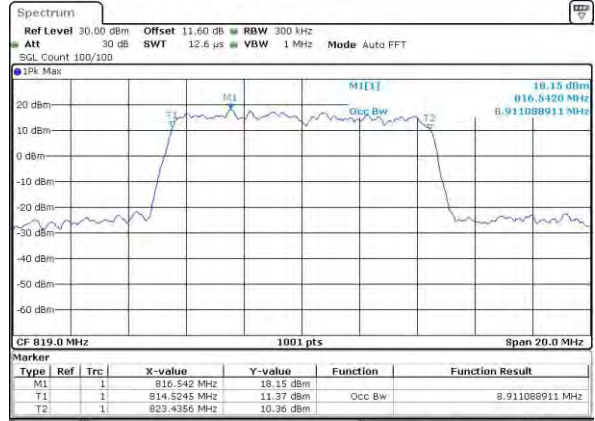
LTE Band 26

Middle Channel / 10MHz / QPSK



Date: 2019-08-23 23:49:36

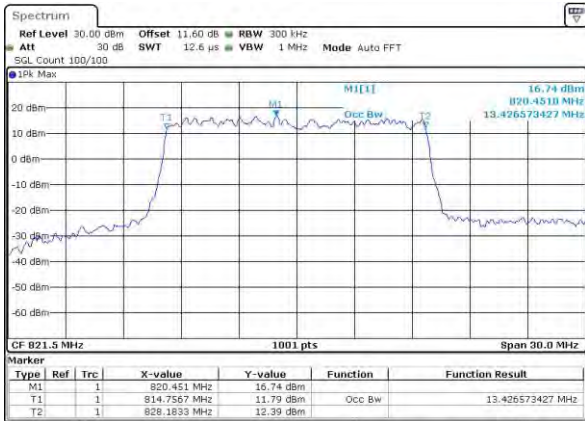
Middle Channel / 10MHz / 16QAM



Date: 2019-08-23 23:49:47

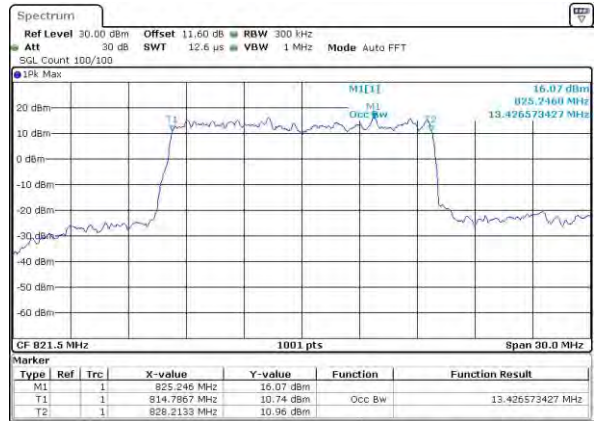
LTE Band 26

Lowest Channel / 15MHz / QPSK



Date: 2019-08-23 23:52:33

Lowest Channel / 15MHz / 16QAM

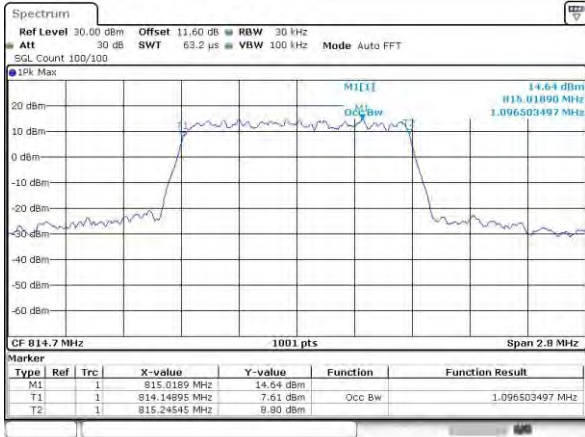


Date: 2019-08-23 23:52:43



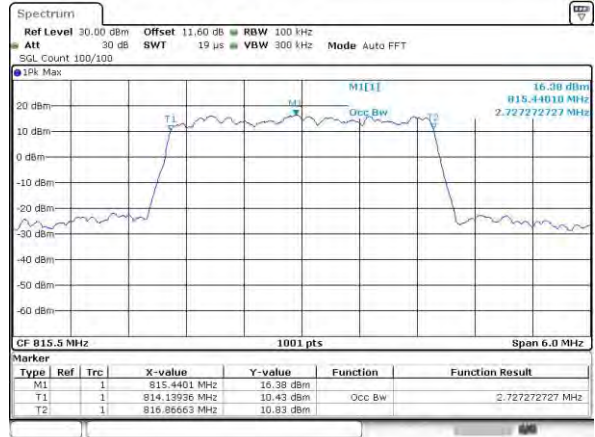
LTE Band 26

Lowest Channel / 1.4MHz / 64QAM



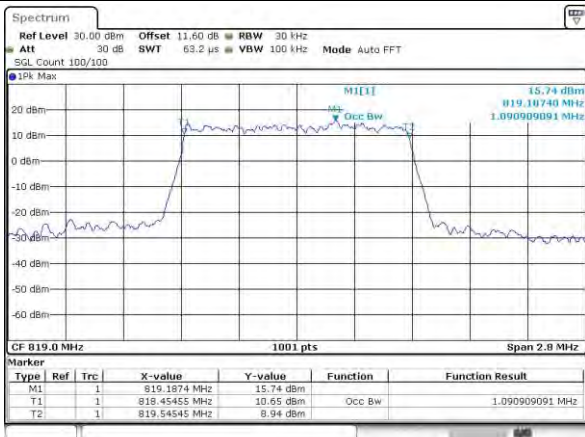
Date: 2019-03-23 22:41:31

Lowest Channel / 3MHz / 64QAM



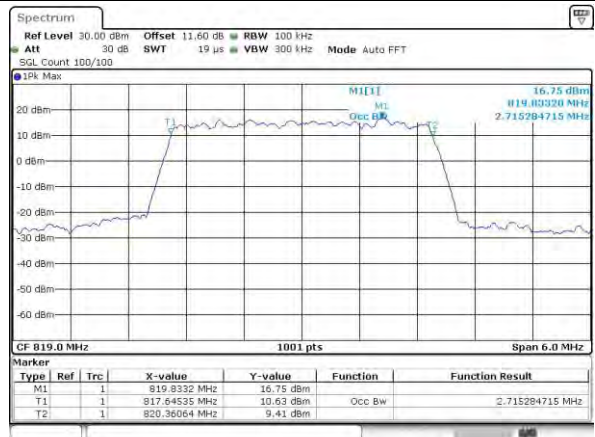
Date: 2019-03-23 10:23:08

Middle Channel / 1.4MHz / 64QAM



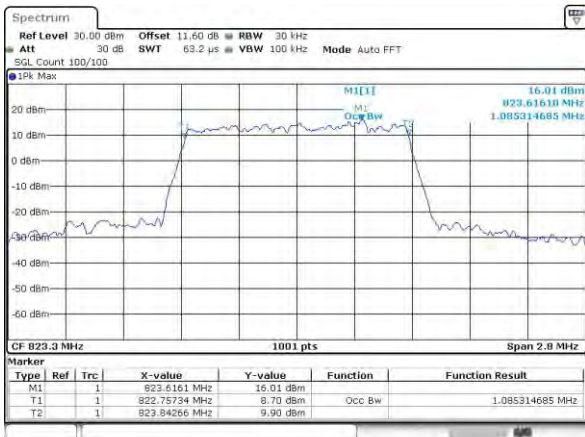
Date: 2019-03-23 23:19:19

Middle Channel / 3MHz / 64QAM



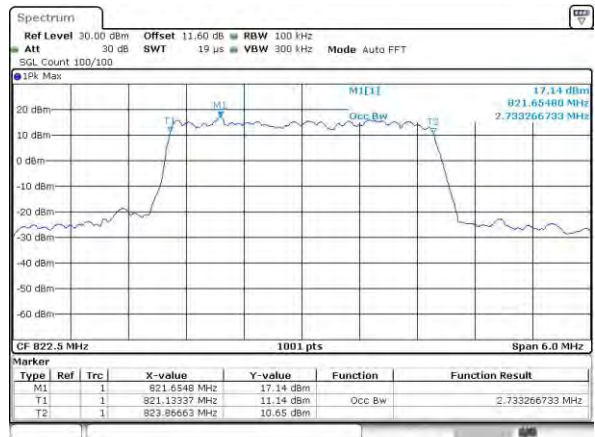
Date: 2019-03-23 11:12:06

Highest Channel / 1.4MHz / 64QAM



Date: 2019-03-23 21:27

Highest Channel / 3MHz / 64QAM

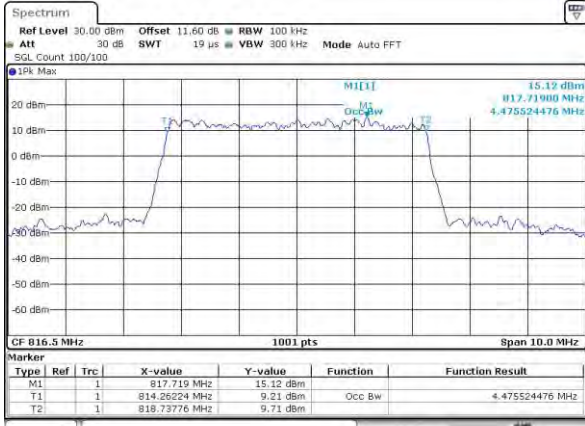


Date: 2019-03-23 13:34



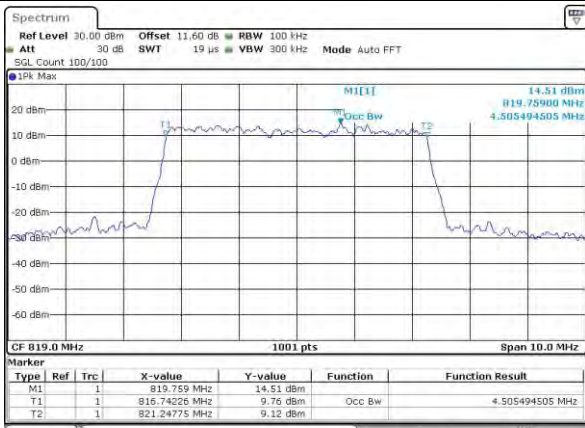
LTE Band 26

Lowest Channel / 5MHz / 64QAM



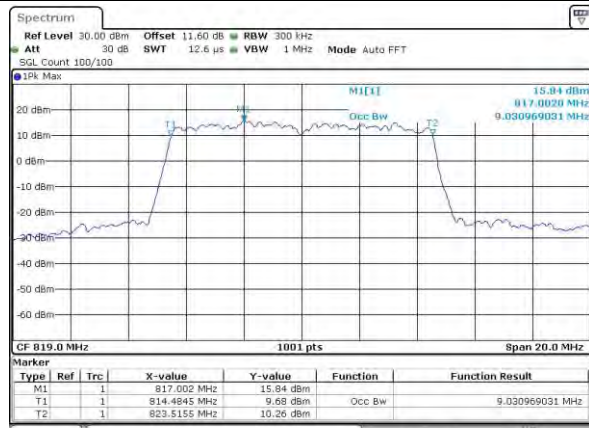
Date: 2019-08-23 15:02

Middle Channel / 5MHz / 64QAM



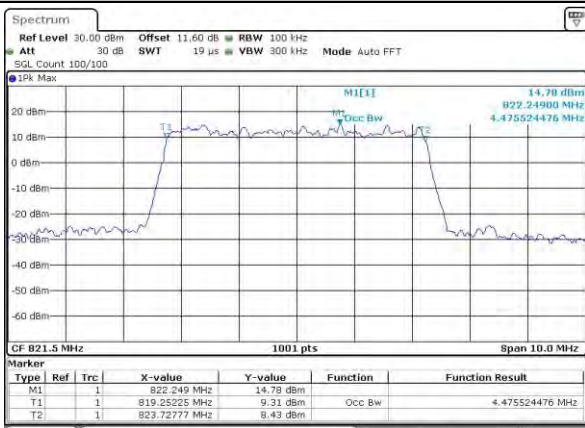
Date: 2019-08-23 16:20

Middle Channel / 10MHz / 64QAM



Date: 2019-08-23 16:25

Highest Channel / 5MHz / 64QAM

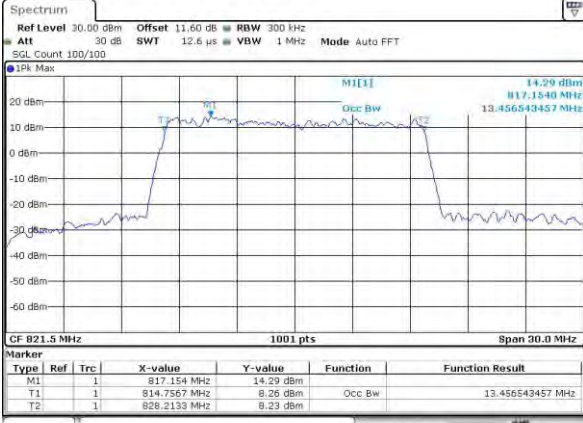


Date: 2019-08-23 17:58



LTE Band 26

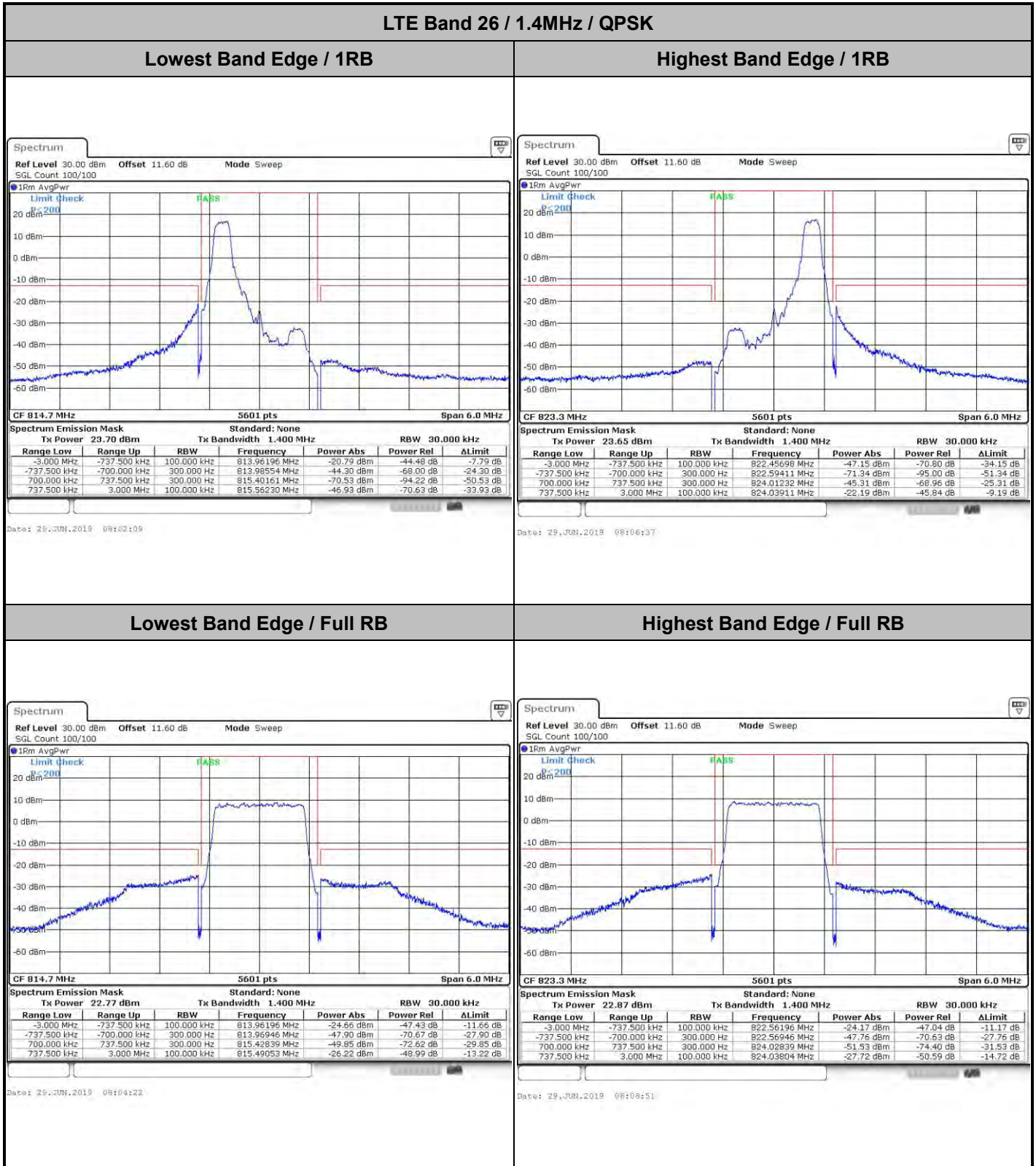
Lowest Channel / 15MHz / 64QAM



Date: 8/23/2018 23:20:53



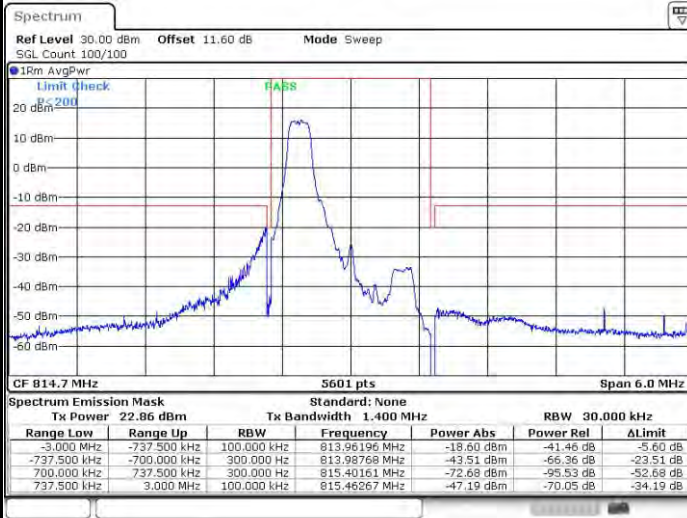
Emission masks – In-band emissions





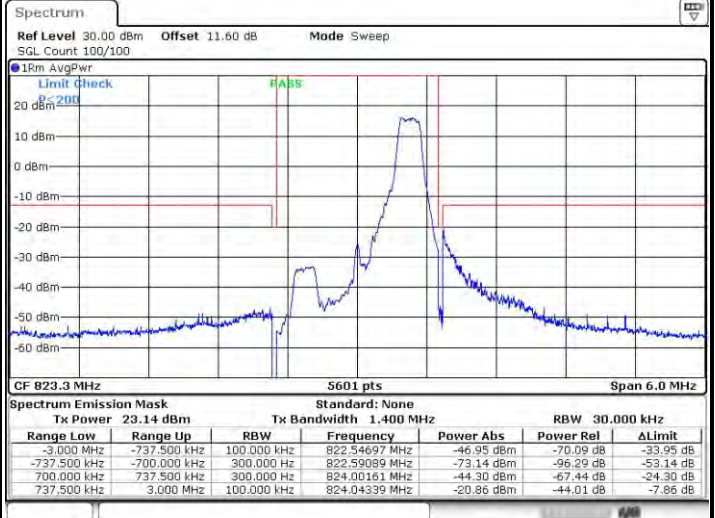
LTE Band 26 / 1.4MHz / 16QAM

Lowest Band Edge / 1 RB



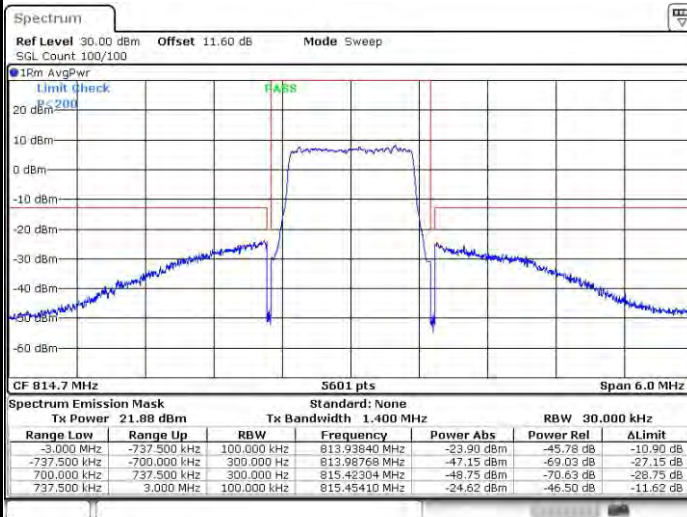
Date: 29 JUN 2019 08:03:16

Highest Band Edge / 1 RB



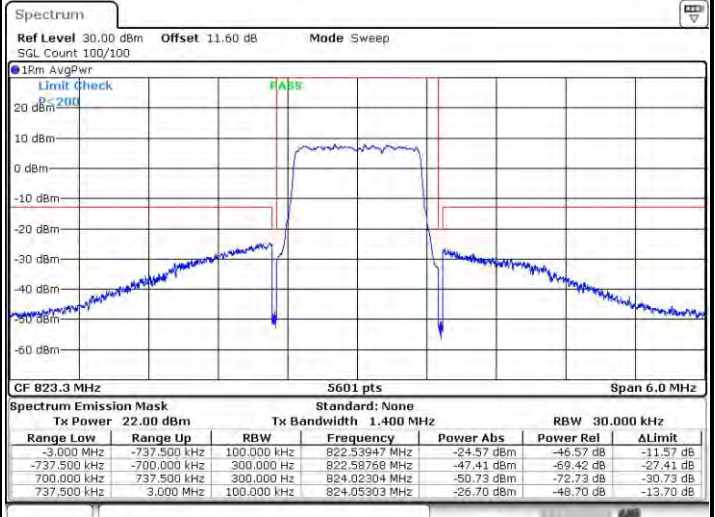
Date: 29 JUN 2019 08:07:44

Lowest Band Edge / Full RB



Date: 29 JUN 2019 08:09:29

Highest Band Edge / Full RB

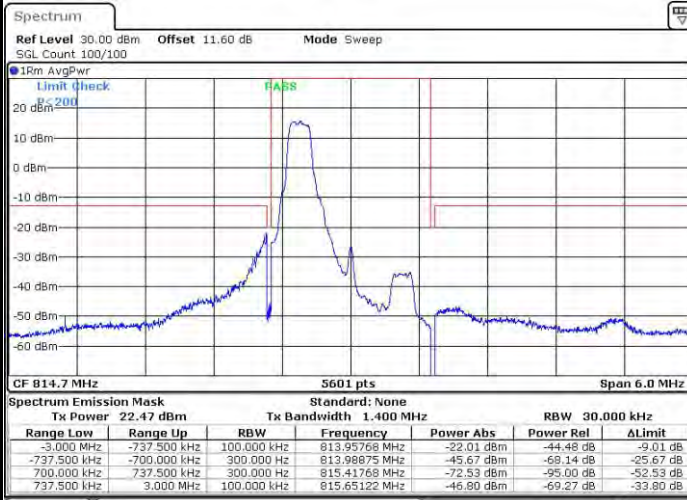


Date: 29 JUN 2019 08:09:57



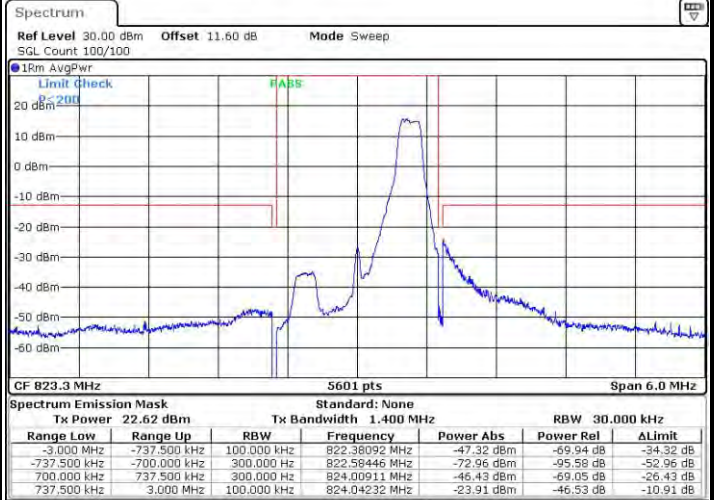
LTE Band 26 / 1.4MHz / 64QAM

Lowest Band Edge / 1 RB



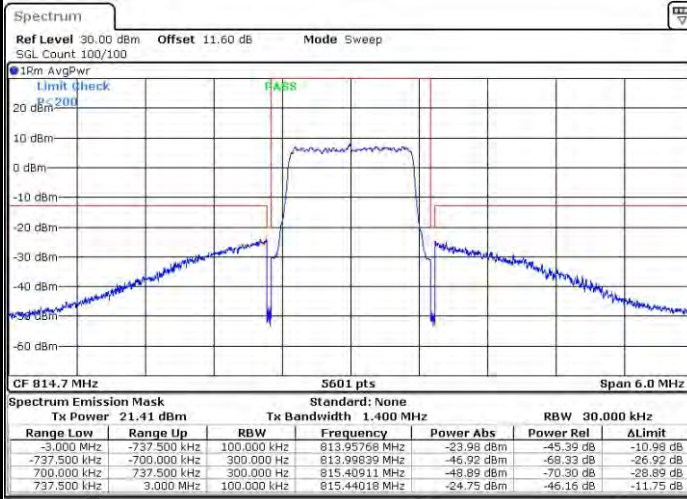
Date: 30 JUN 2019 22:51:17

Highest Band Edge / 1 RB



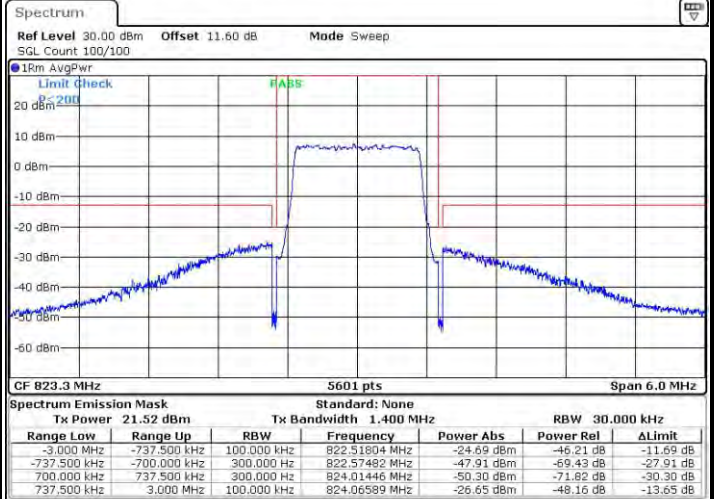
Date: 30 JUN 2019 22:53:31

Lowest Band Edge / Full RB



Date: 30 JUN 2019 22:52:24

Highest Band Edge / Full RB

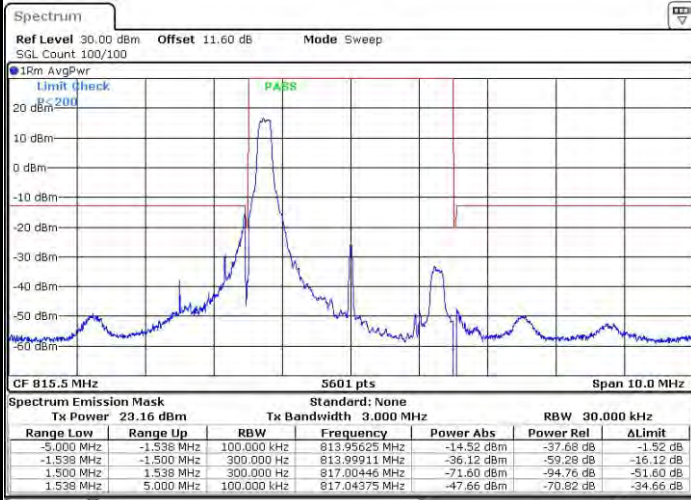


Date: 30 JUN 2019 22:54:37



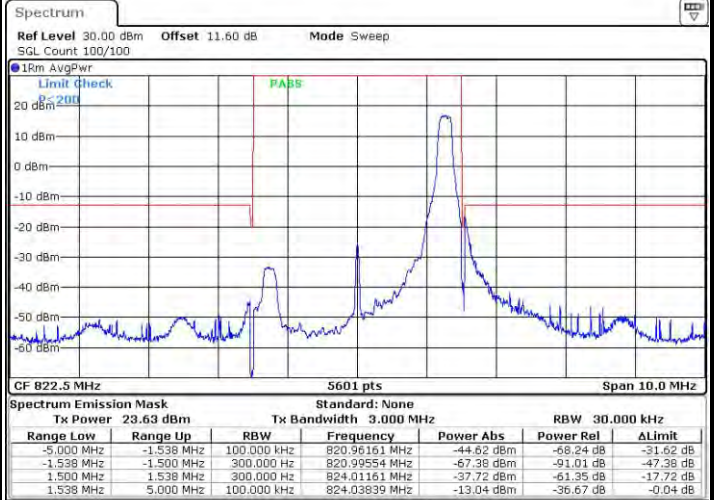
LTE Band 26 / 3MHz / QPSK

Lowest Band Edge / 1RB



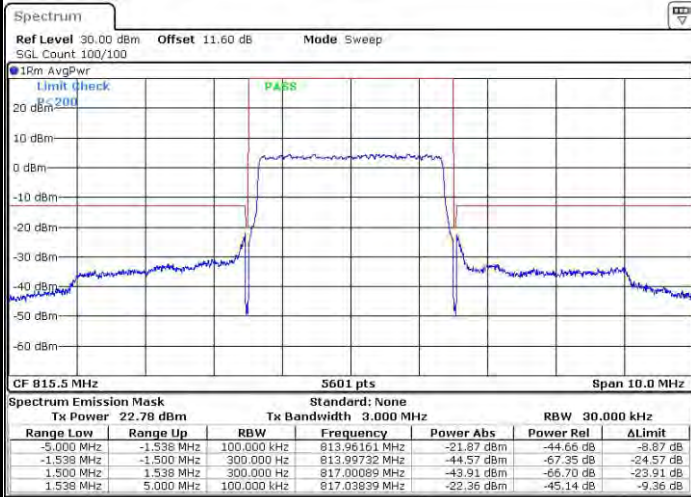
Date: 29 JUN 2019 08:11:06

Highest Band Edge / 1 RB



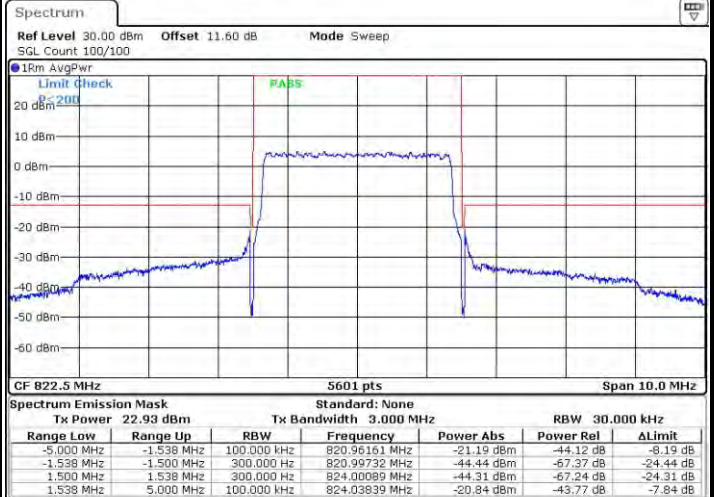
Date: 29 JUN 2019 08:15:42

Lowest Band Edge / Full RB



Date: 29 JUN 2019 08:13:24

Highest Band Edge / Full RB

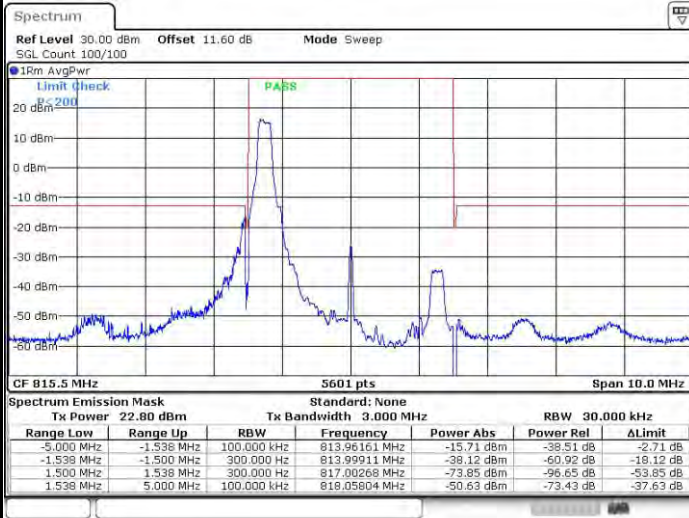


Date: 29 JUN 2019 08:17:59



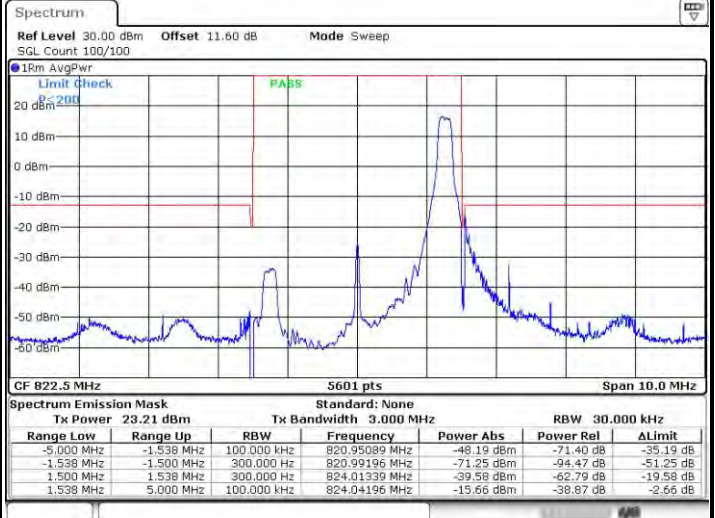
LTE Band 26 / 3MHz / 16QAM

Lowest Band Edge / 1 RB



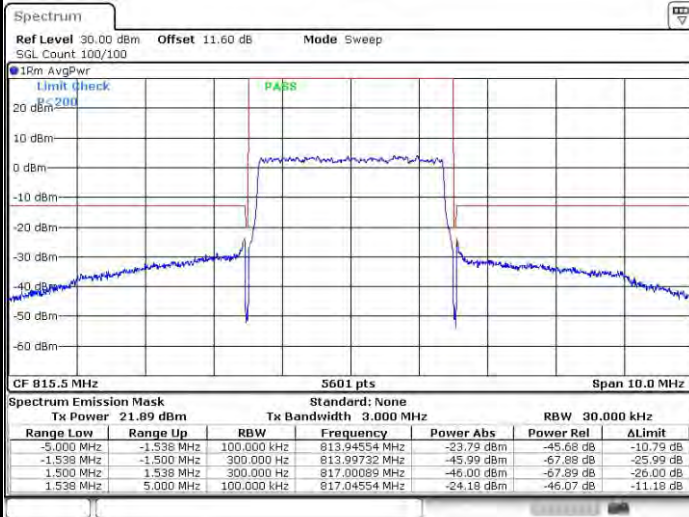
Date: 29 JUN 2019 08:12:15

Highest Band Edge / 1 RB



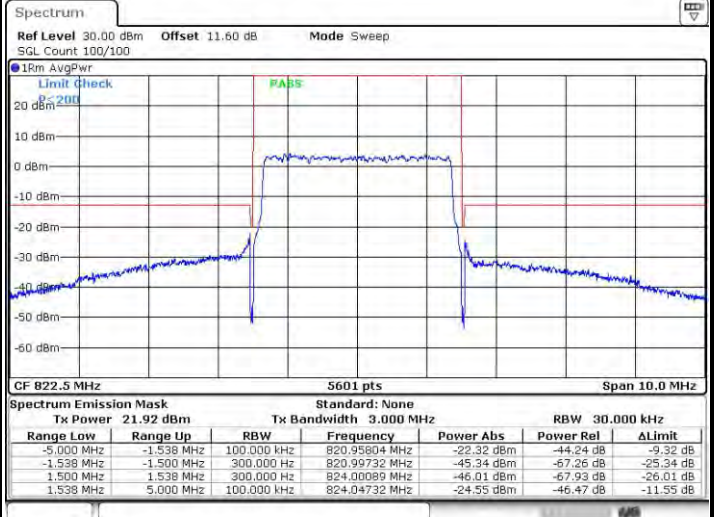
Date: 29 JUN 2019 08:16:51

Lowest Band Edge / Full RB



Date: 29 JUN 2019 08:14:33

Highest Band Edge / Full RB

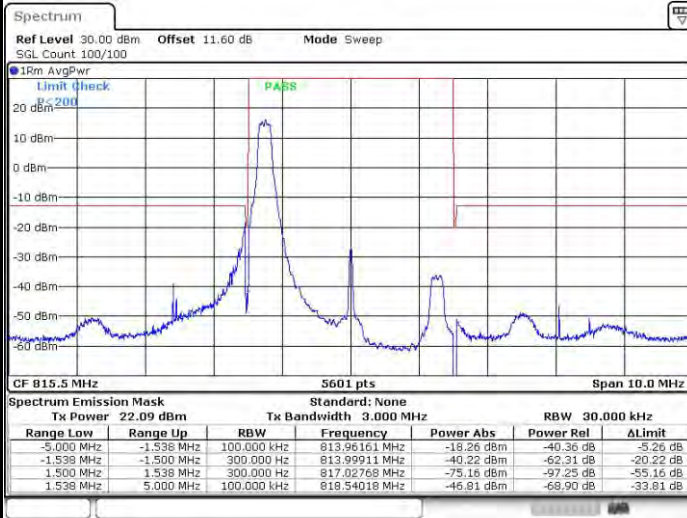


Date: 29 JUN 2019 08:19:07



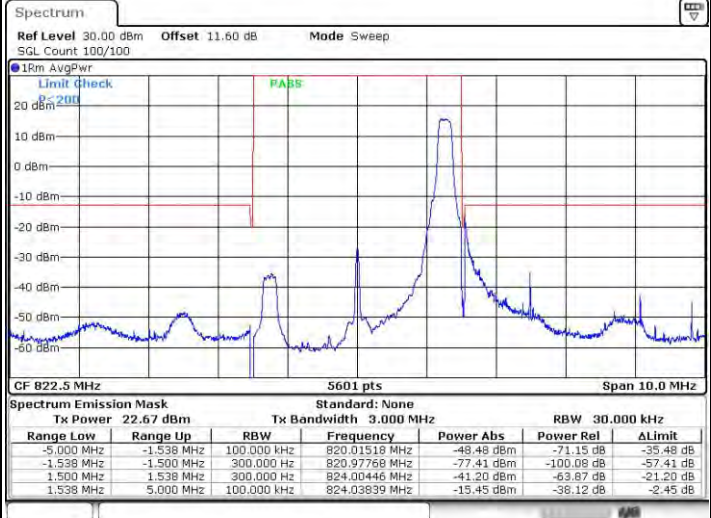
LTE Band 26 / 3MHz / 64QAM

Lowest Band Edge / 1 RB



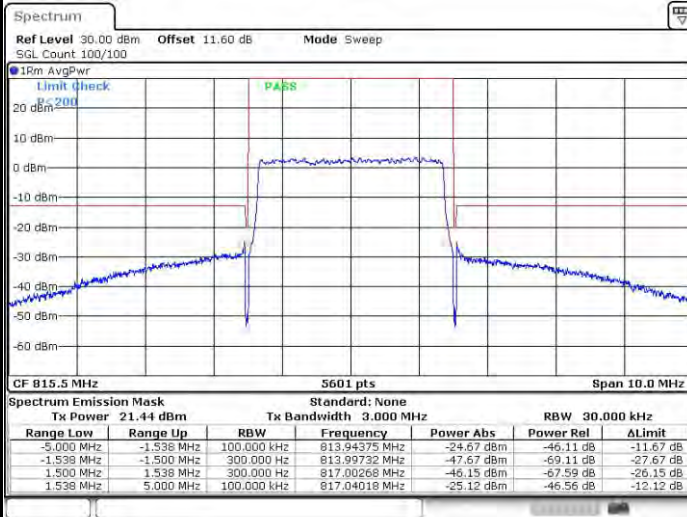
Date: 30 JUN 2019 22:59:45

Highest Band Edge / 1 RB



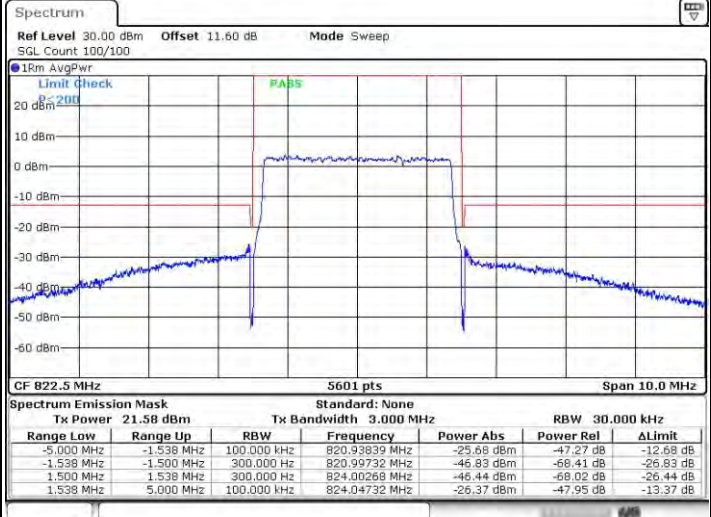
Date: 30 JUN 2019 22:58:00

Lowest Band Edge / Full RB



Date: 30 JUN 2019 22:56:52

Highest Band Edge / Full RB



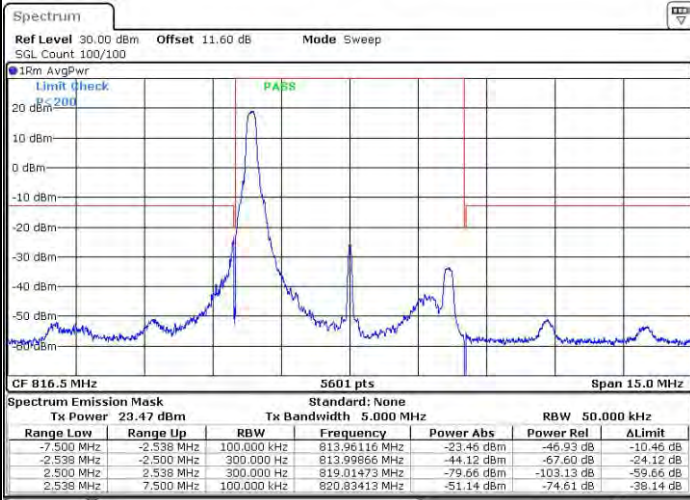
Date: 30 JUN 2019 22:59:21



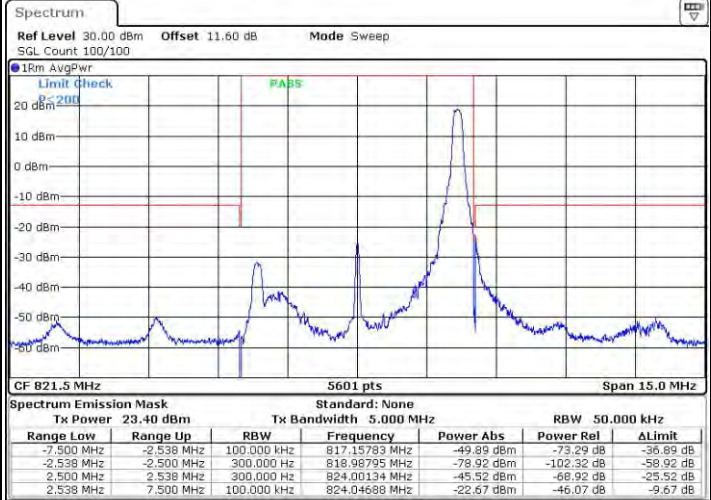
LTE Band 26 / 5MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



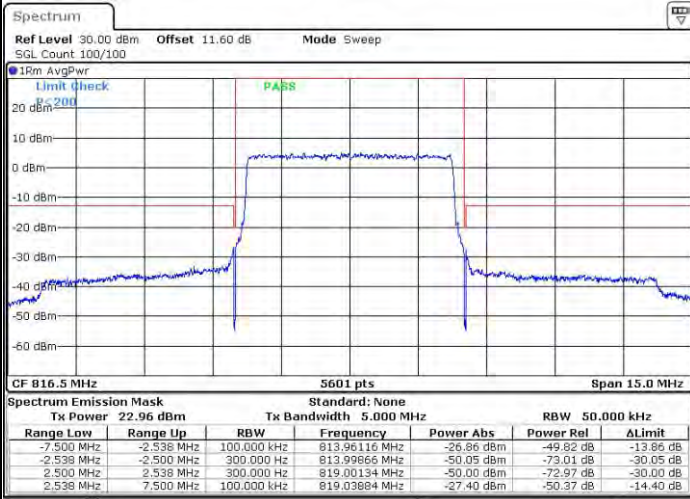
Date: 29 JUN 2019 08:20:14



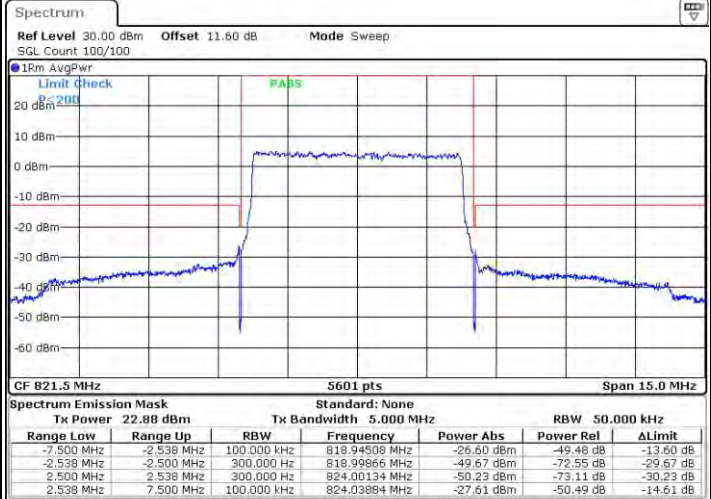
Date: 29 JUN 2019 08:24:41

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 JUN 2019 08:22:28

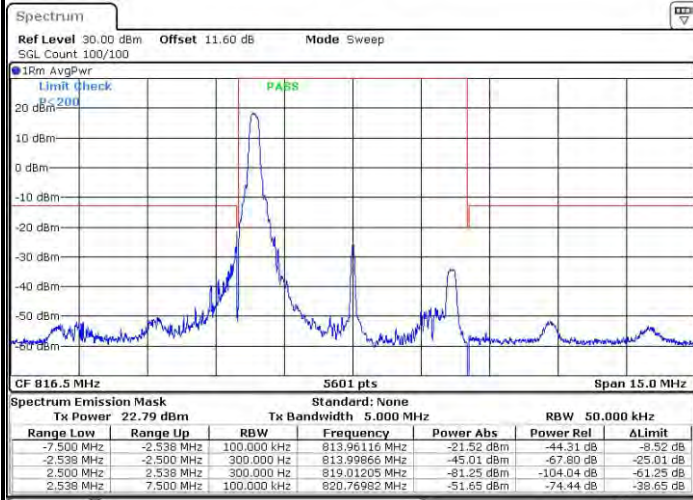


Date: 29 JUN 2019 08:26:55



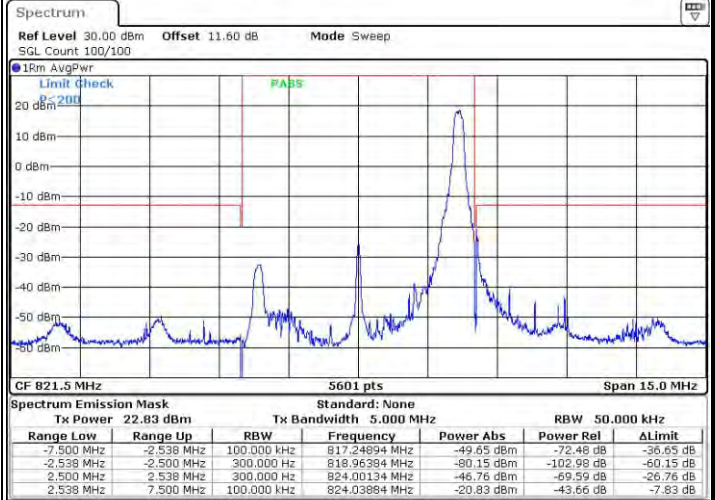
LTE Band 26 / 5MHz / 16QAM

Lowest Band Edge / 1RB



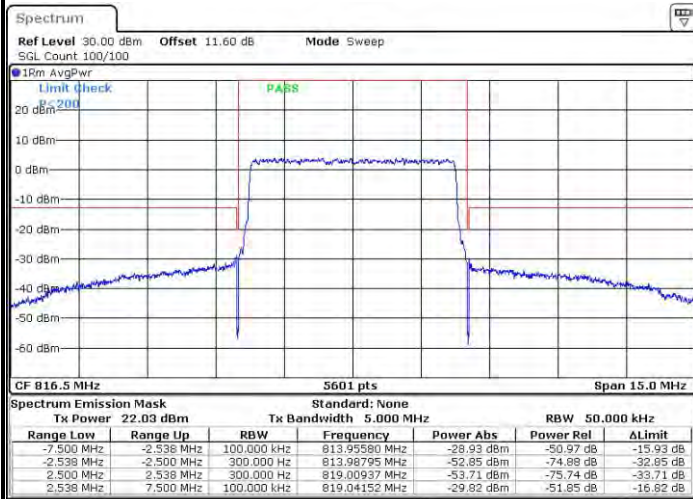
Date: 29 JUN 2019 08:21:21

Highest Band Edge / 1 RB



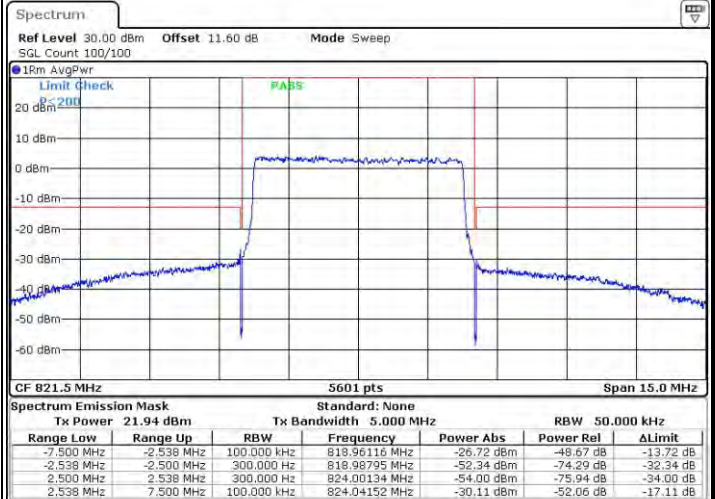
Date: 29 JUN 2019 08:25:48

Lowest Band Edge / Full RB



Date: 29 JUN 2019 08:23:15

Highest Band Edge / Full RB

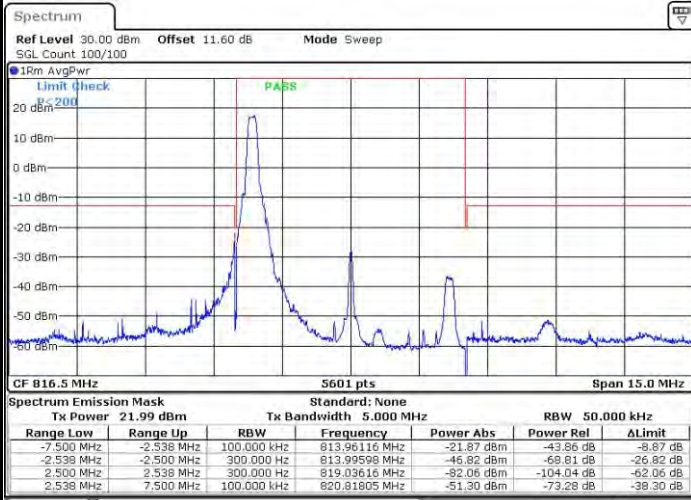


Date: 29 JUN 2019 08:28:02



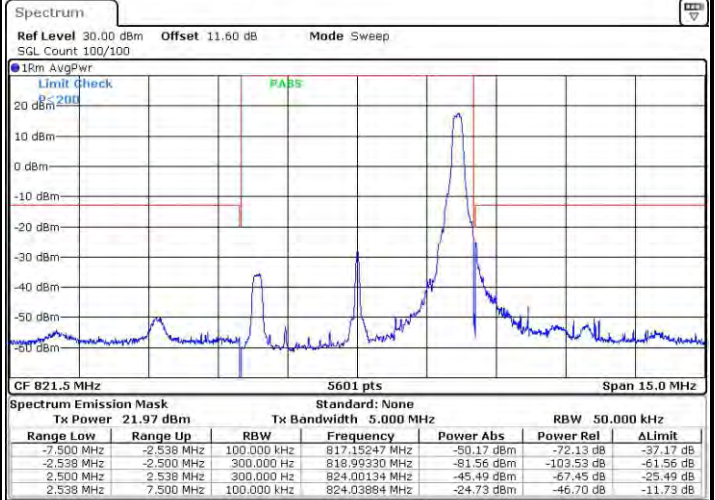
LTE Band 26 / 5MHz / 64QAM

Lowest Band Edge / 1RB



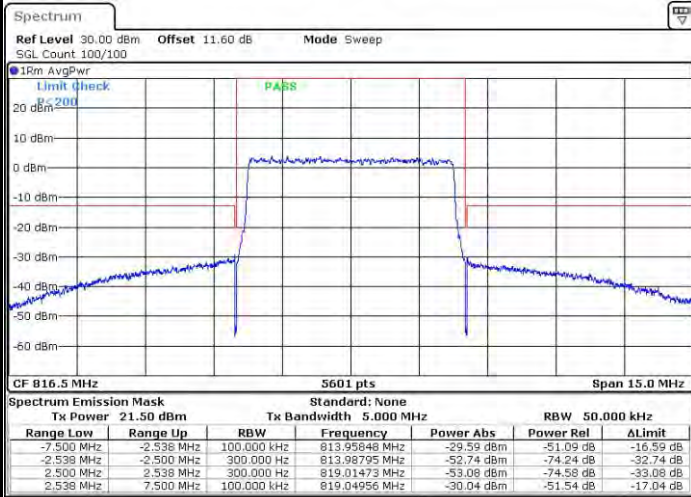
Date: 30 JUN 2019 23:00:28

Highest Band Edge / 1 RB



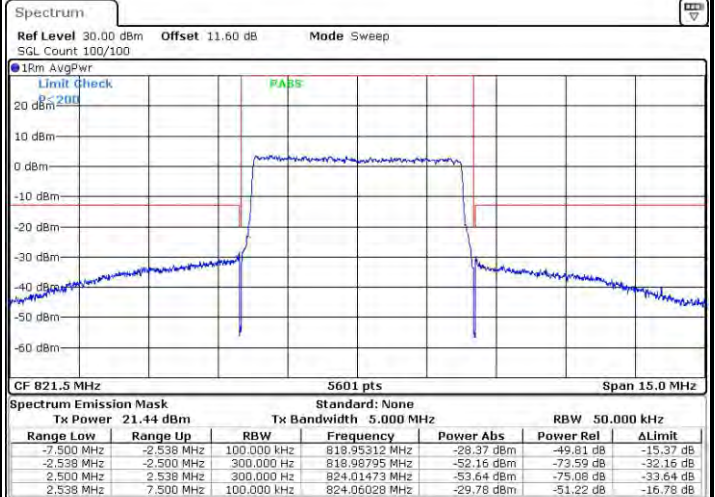
Date: 30 JUN 2019 23:02:41

Lowest Band Edge / Full RB



Date: 30 JUN 2019 23:01:35

Highest Band Edge / Full RB

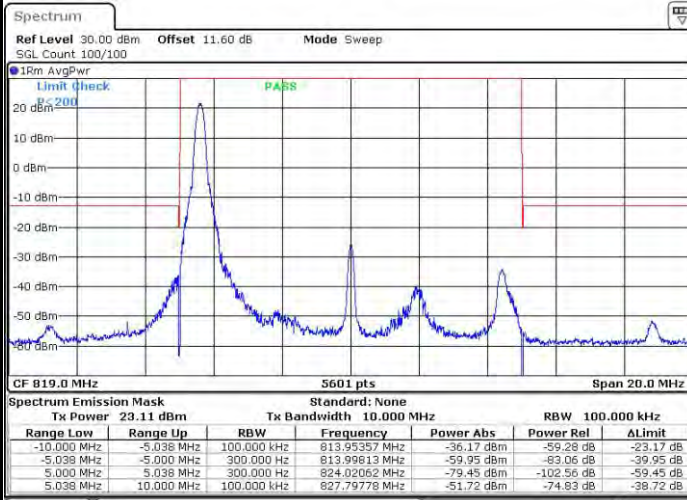


Date: 30 JUN 2019 23:03:46



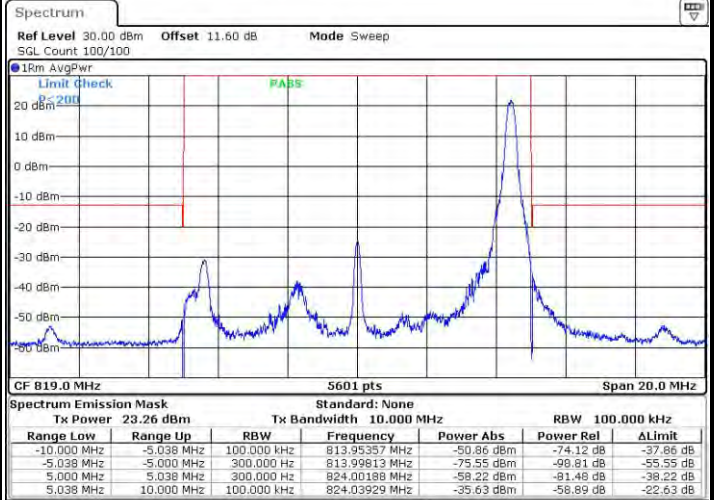
LTE Band 26 / 10MHz / QPSK

Lowest Band Edge / 1 RB



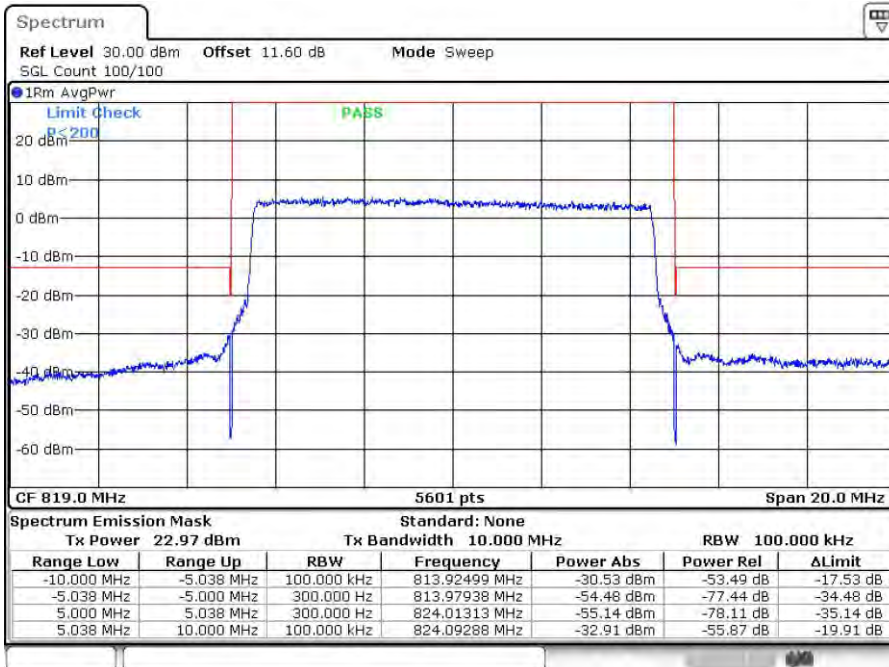
Date: 29.JUN.2019 08:29:08

Highest Band Edge / 1 RB



Date: 29.JUN.2019 08:31:22

Band Edge / Full RB



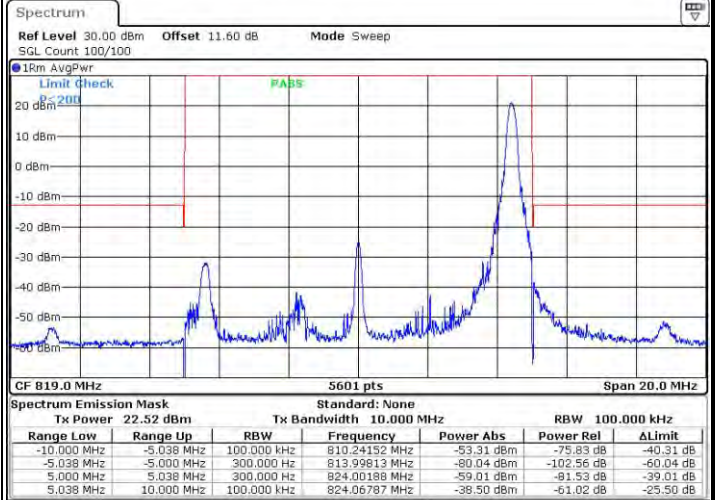
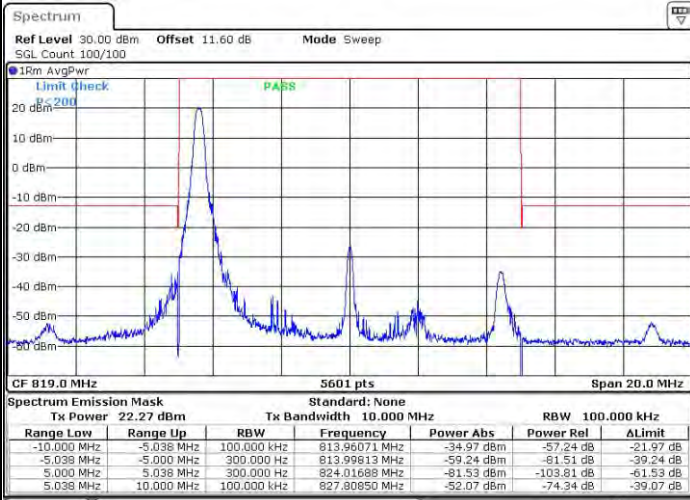
Date: 29.JUN.2019 08:33:35



LTE Band 26 / 10MHz / 16QAM

Lowest Band Edge / 1 RB

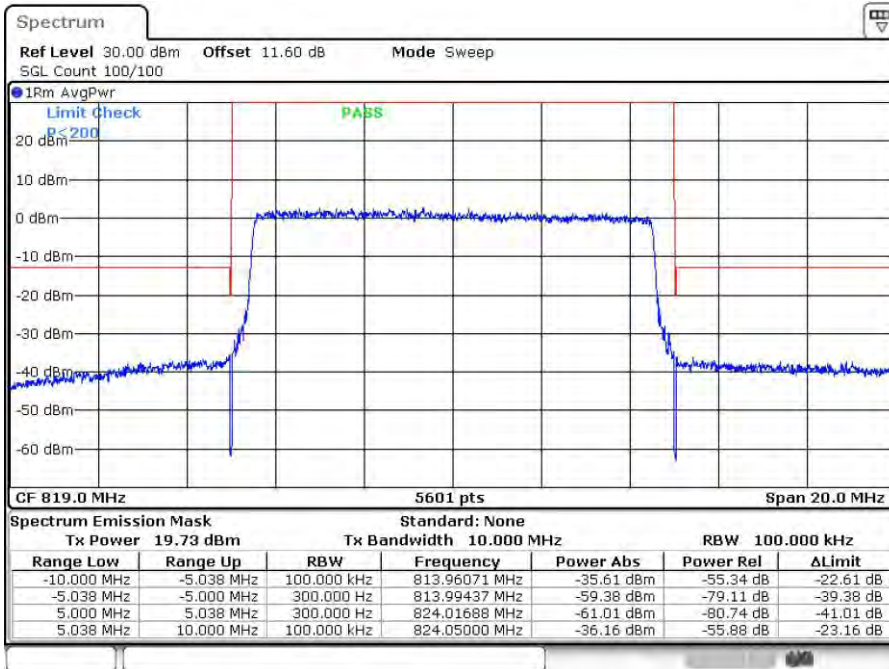
Highest Band Edge / 1 RB



Date: 29 JUN 2019 08:30:15

Date: 29 JUN 2019 08:32:26

Band Edge / Full RB

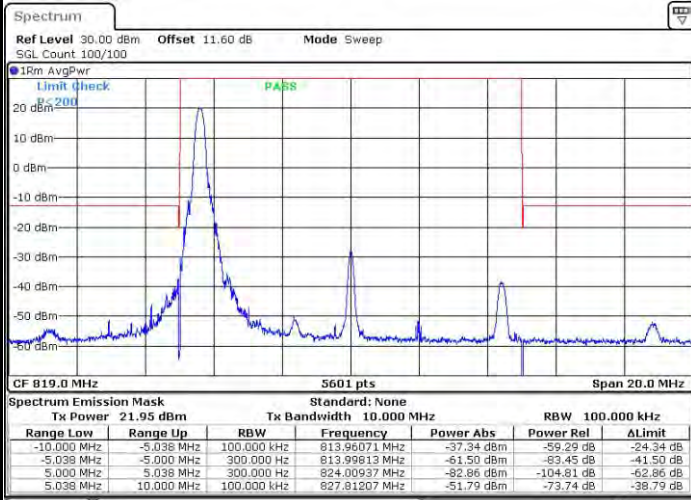


Date: 29 JUN 2019 08:34:42



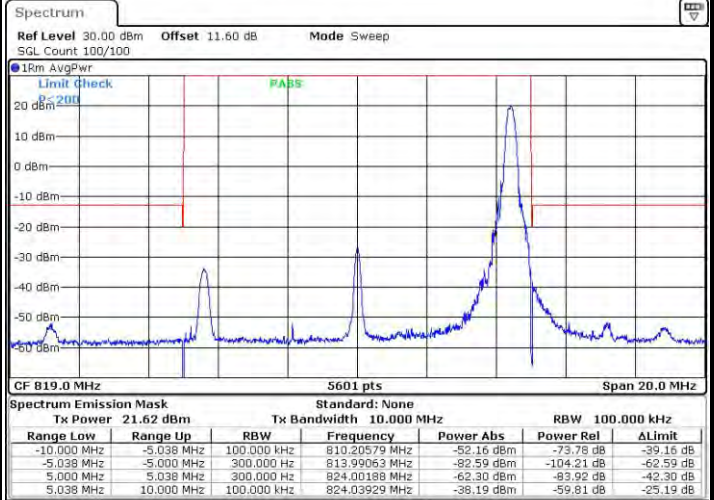
LTE Band 26 / 10MHz / 64QAM

Lowest Band Edge / 1 RB



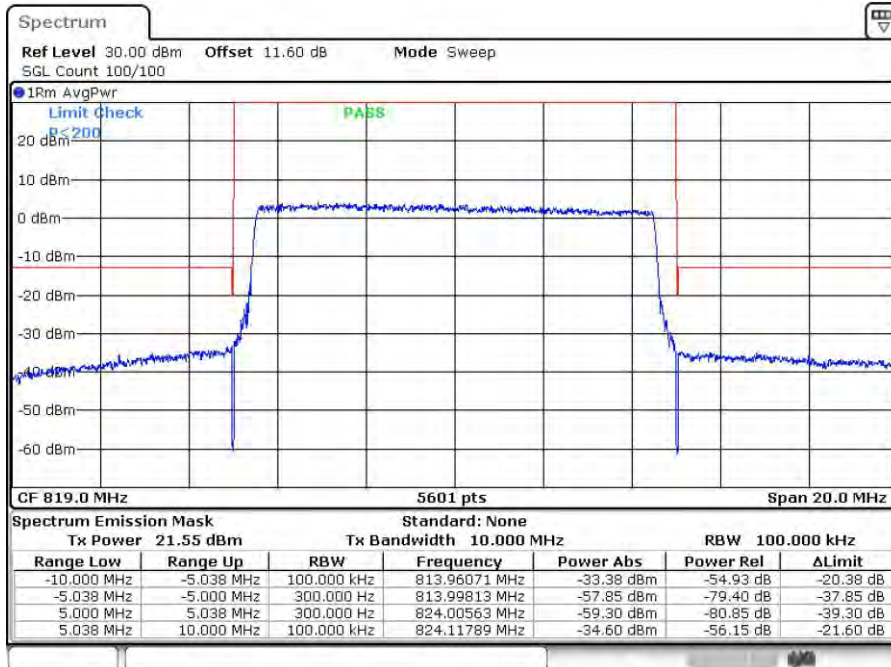
Date: 30 JUN 2019 23:04:54

Highest Band Edge / 1 RB



Date: 30 JUN 2019 23:06:01

Band Edge / Full RB

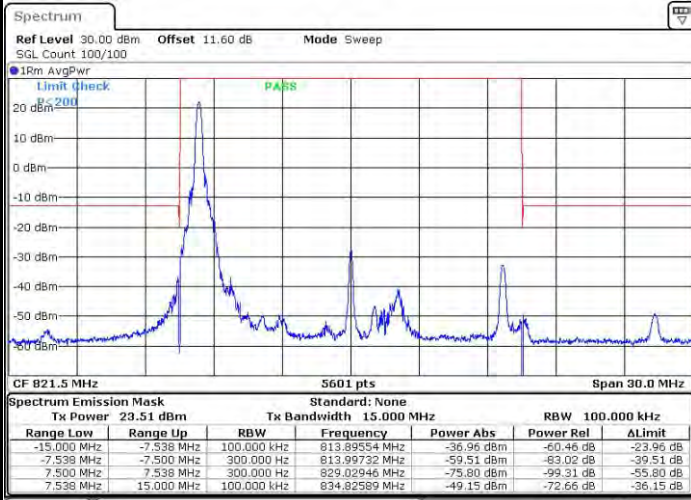


Date: 30 JUN 2019 23:07:07



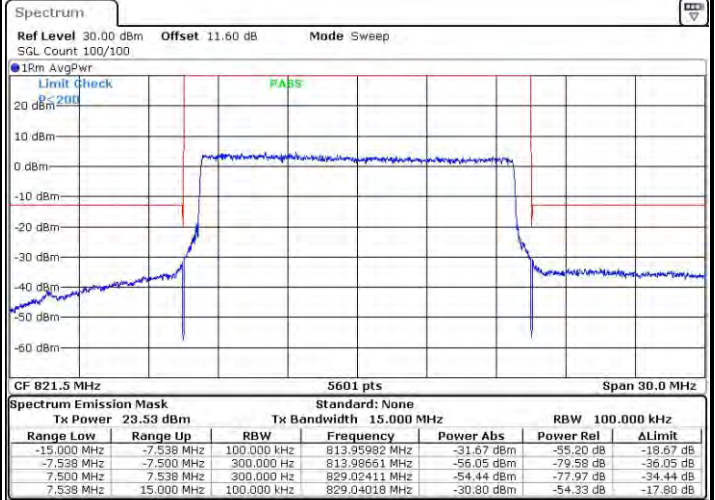
LTE Band 26 / 15MHz QPSK

Lowest Band Edge / 1 RB



Date: 30 JUN 2019 22:44:38

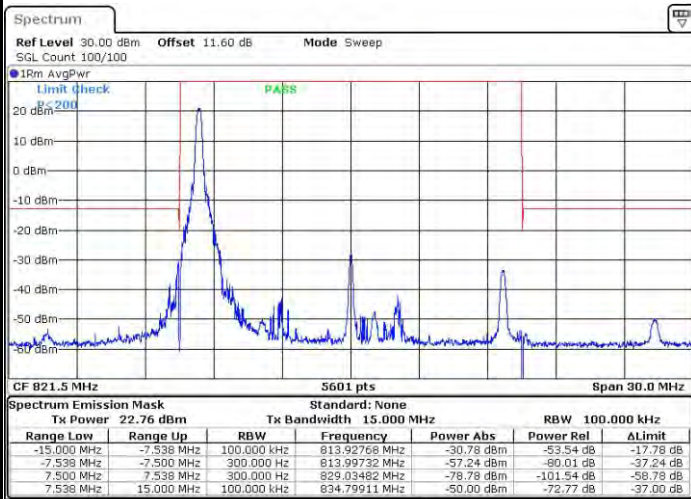
Lowest Band Edge / Full RB



Date: 30 JUN 2019 22:49:04

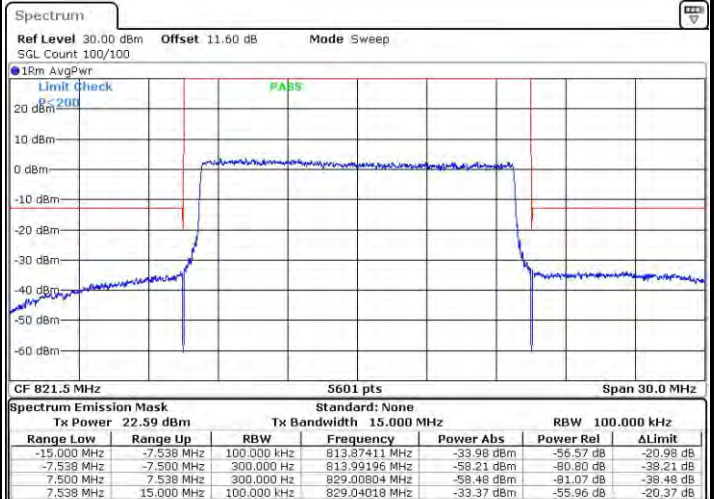
LTE Band 26 / 15MHz 16QAM

Lowest Band Edge / 1 RB



Date: 30 JUN 2019 22:43:44

Lowest Band Edge / Full RB

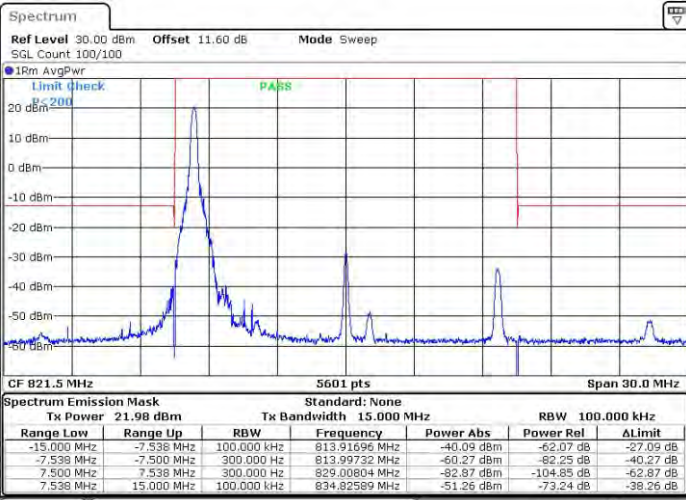


Date: 30 JUN 2019 22:50:10



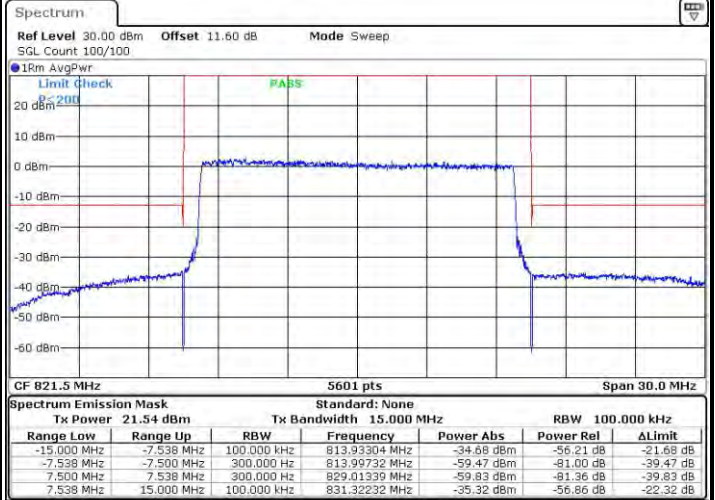
LTE Band 26 / 15MHz / 64QAM

Lowest Band Edge / 1 RB



Date: 30 JUN 2019 23:08:13

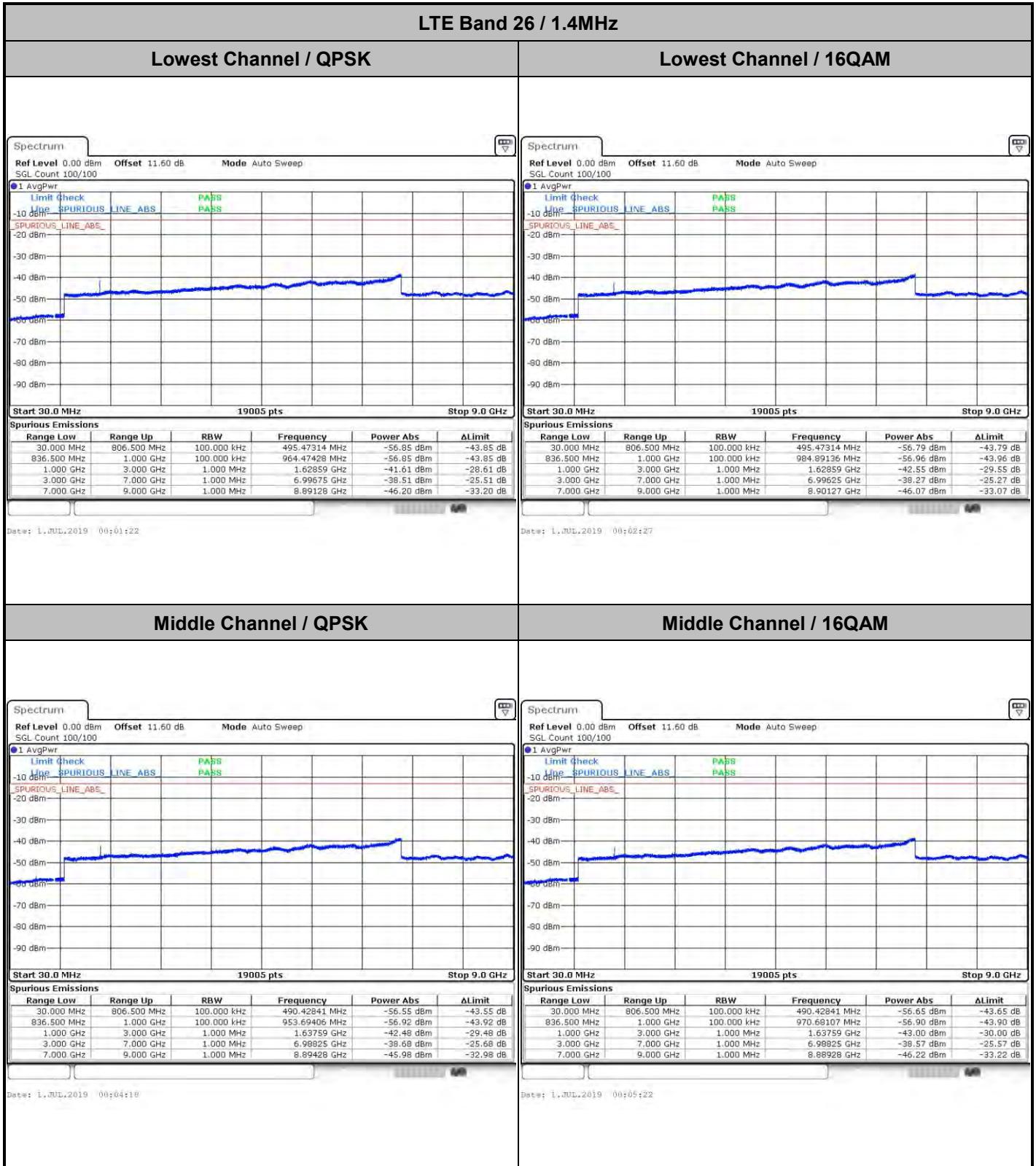
Lowest Band Edge / Full RB



Date: 30 JUN 2019 23:10:26



Emission masks – Out of band emissions

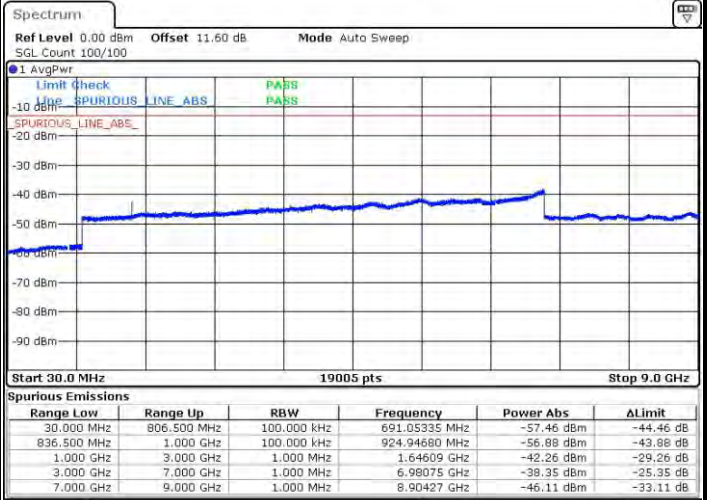
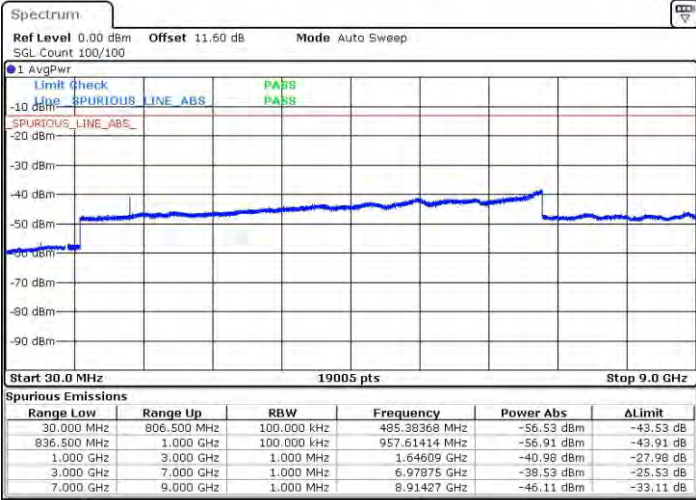




LTE Band 26 / 1.4MHz

Highest Channel / QPSK

Highest Channel / 16QAM



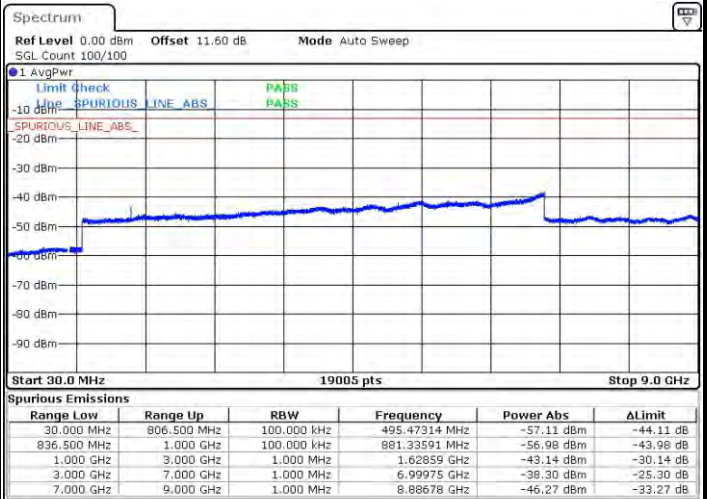
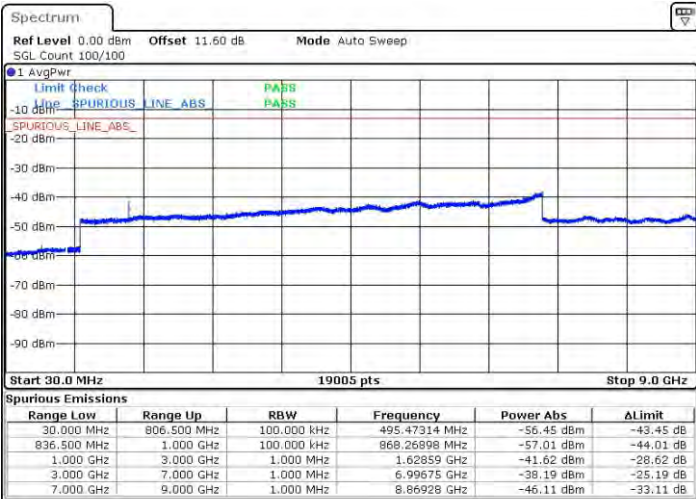
Date: 1.JUL.2019 00:07:13

Date: 1.JUL.2019 00:08:18

LTE Band 26 / 3MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM



Date: 30.JUN.2019 23:33:33

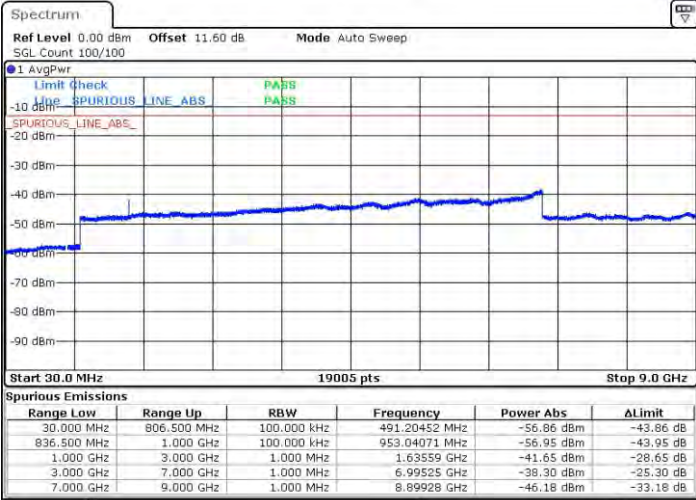
Date: 30.JUN.2019 23:34:38



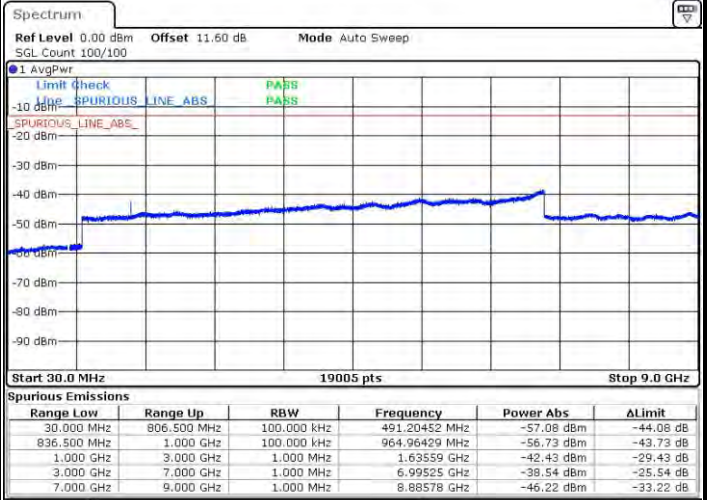
LTE Band 26 / 3MHz

Middle Channel / QPSK

Middle Channel / 16QAM



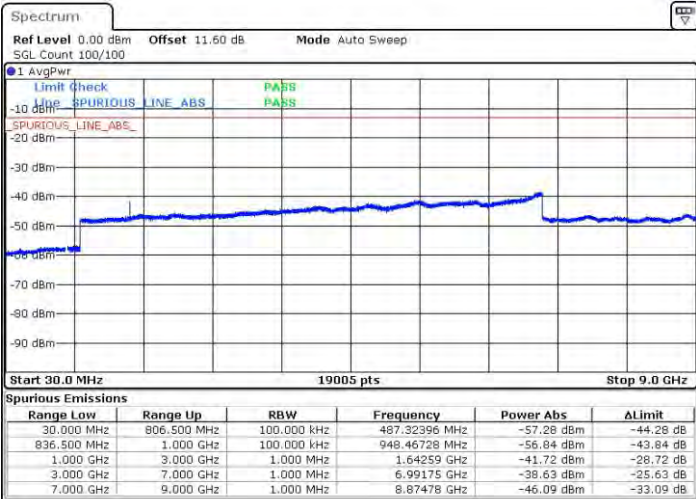
Date: 30 JUN 2019 23:36:38



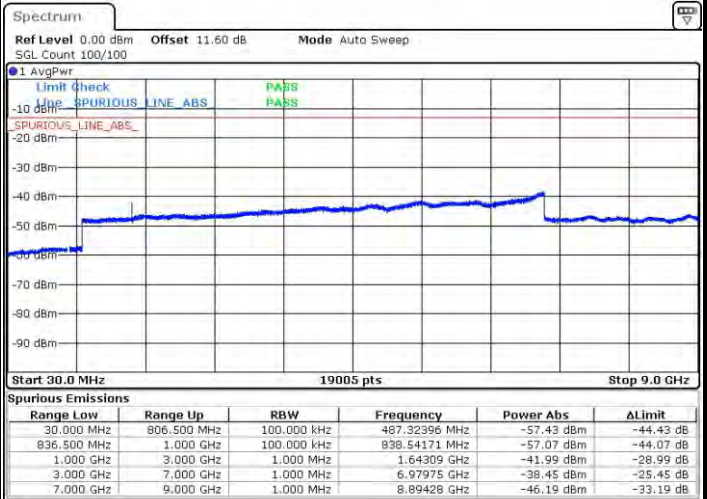
Date: 30 JUN 2019 23:37:42

Highest Channel / QPSK

Highest Channel / 16QAM



Date: 30 JUN 2019 23:39:33



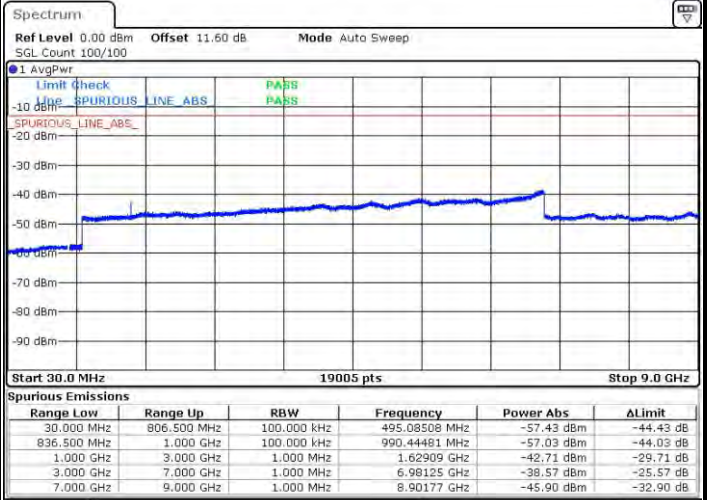
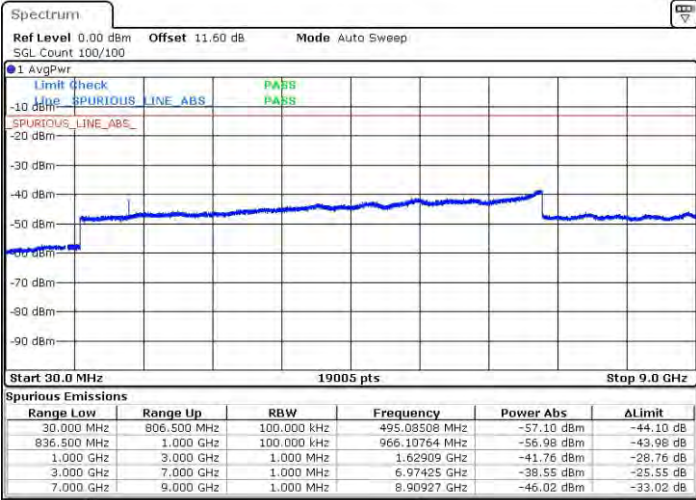
Date: 30 JUN 2019 23:40:38



LTE Band 26 / 5MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM

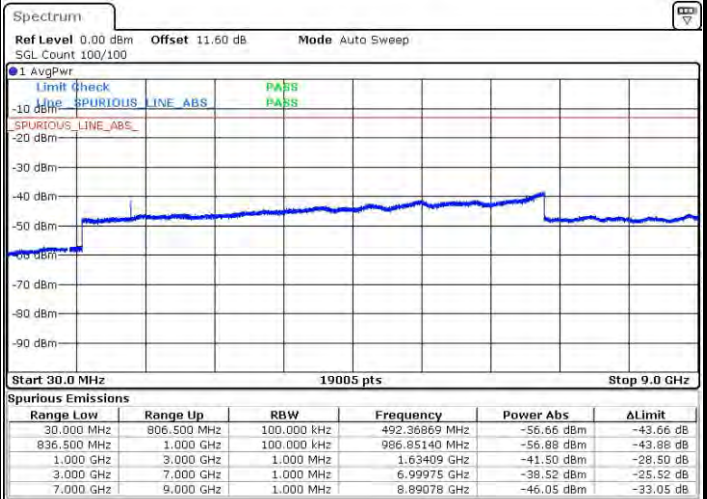
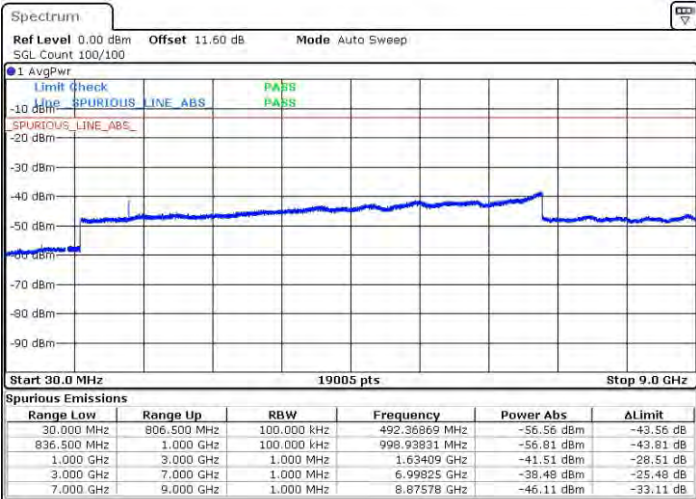


Date: 30 JUN 2019 23:42:28

Date: 30 JUN 2019 23:43:33

Middle Channel / QPSK

Middle Channel / 16QAM



Date: 30 JUN 2019 23:45:23

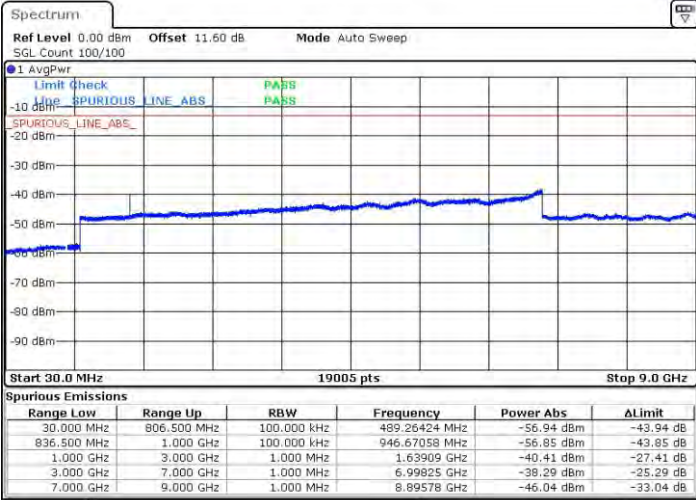
Date: 30 JUN 2019 23:46:28



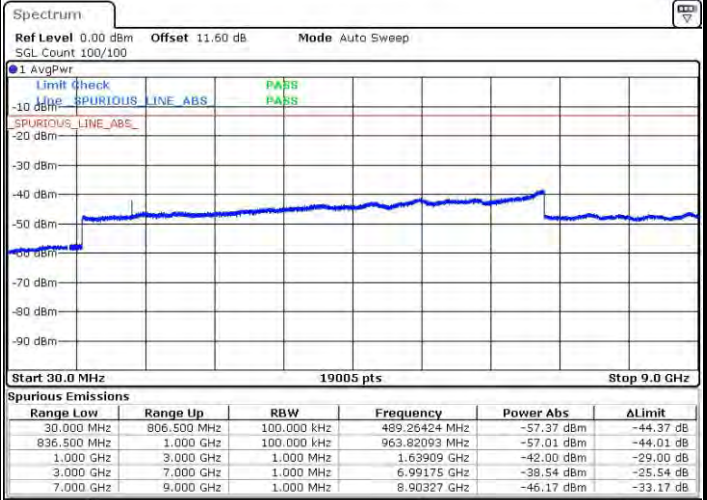
LTE Band 26 / 5MHz

Highest Channel / QPSK

Highest Channel / 16QAM



Date: 30 JUN 2019 23:48:19

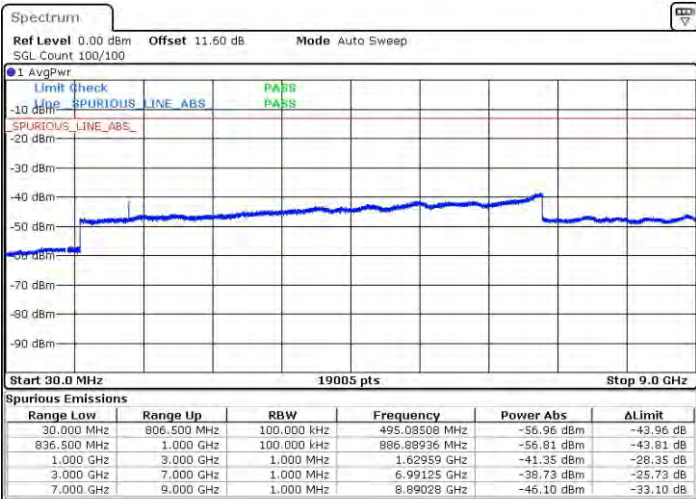


Date: 30 JUN 2019 23:49:23

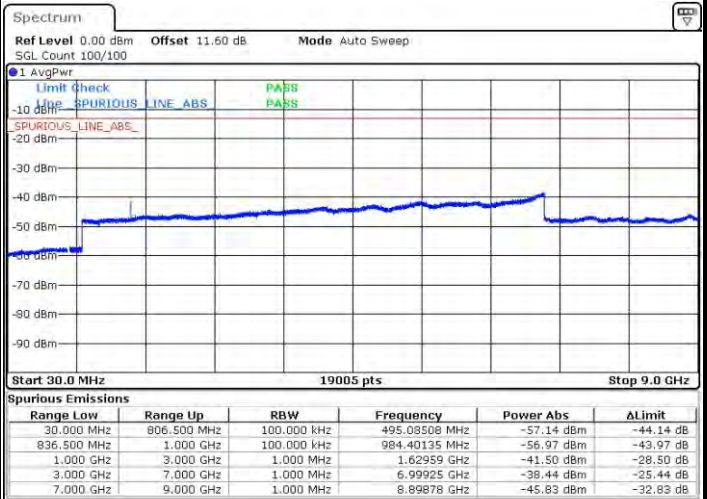
LTE Band 26 / 10MHz

Middle Channel / QPSK

Middle Channel / 16QAM



Date: 30 JUN 2019 23:51:14



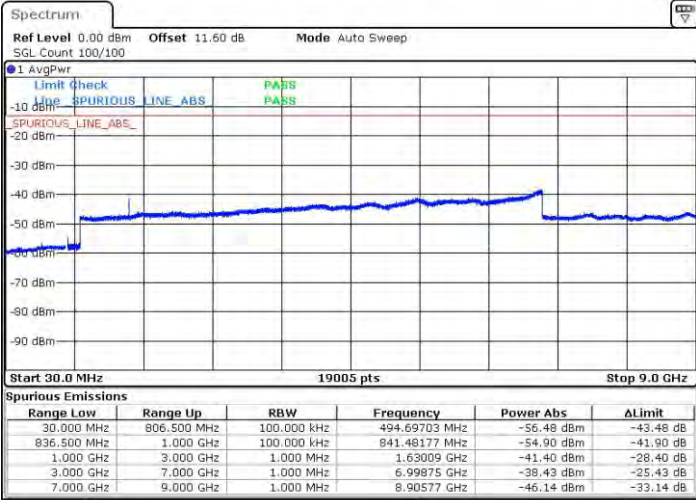
Date: 30 JUN 2019 23:52:19



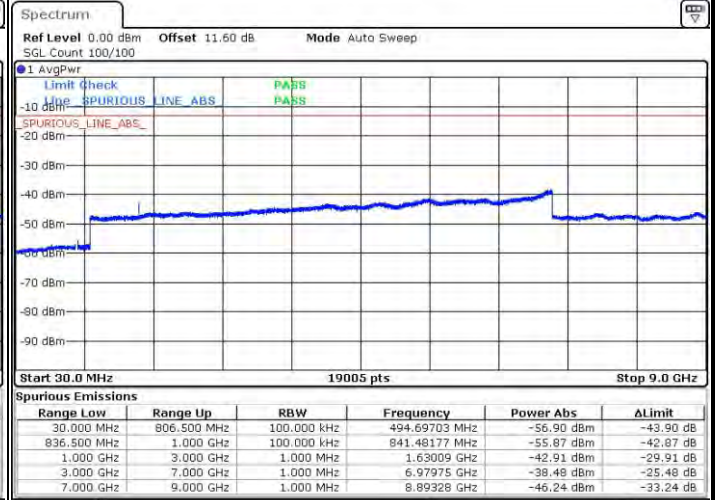
LTE Band 26 / 15MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM



Date: 30.JUN.2016 23:54:10



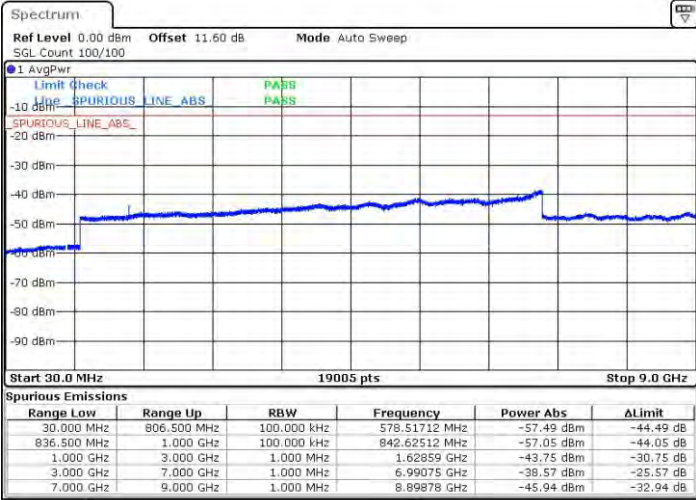
Date: 30.JUN.2016 23:55:14



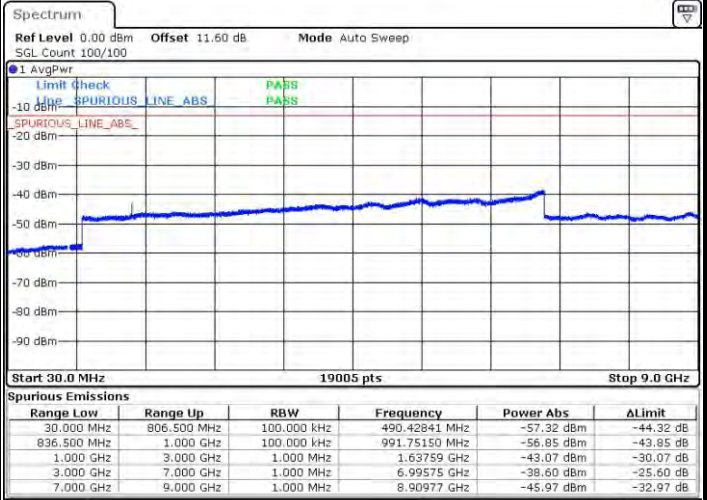
LTE Band 26 / 1.4MHz

Lowest Channel / 64QAM

Middle Channel / 64QAM

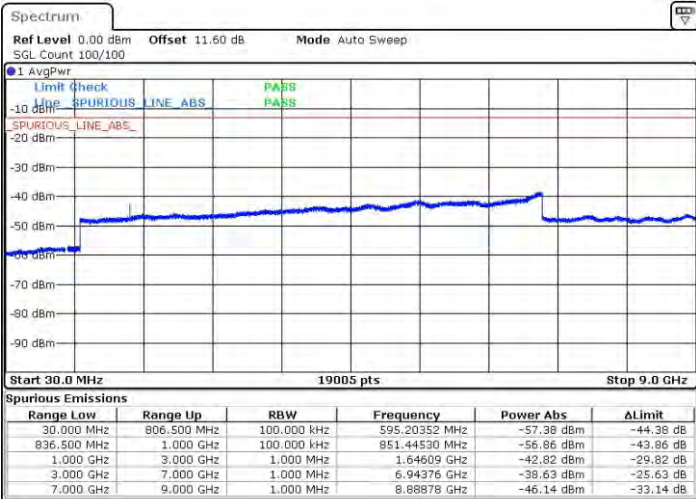


Date: 30.JUN.2019 23:25:47



Date: 30.JUN.2019 23:27:14

Highest Channel / 64QAM



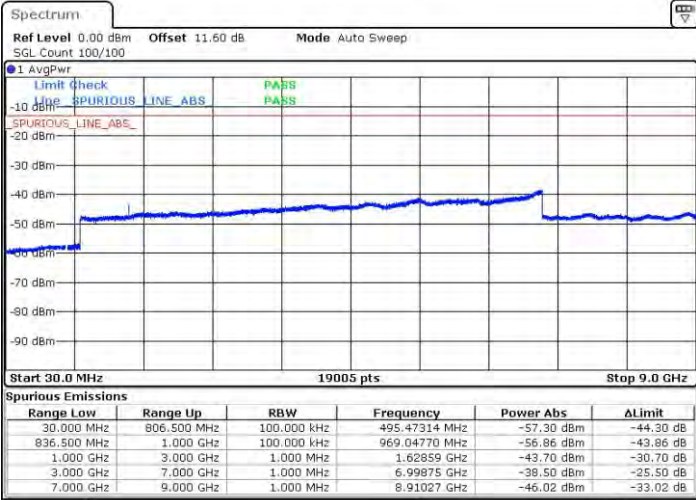
Date: 30.JUN.2019 23:28:43



LTE Band 26 / 3MHz

Lowest Channel / 64QAM

Middle Channel / 64QAM

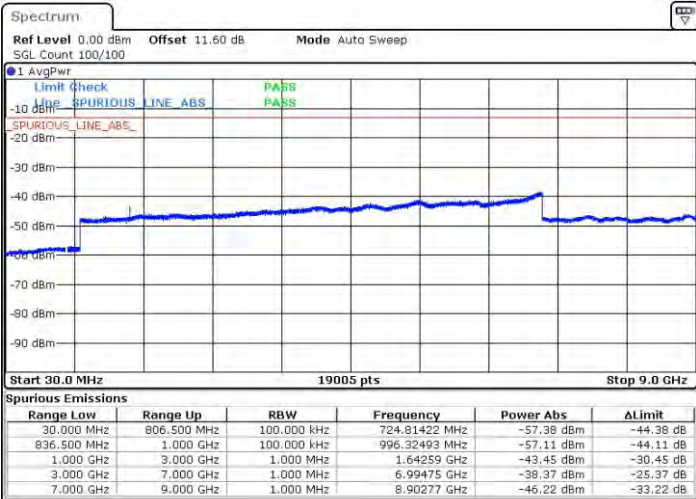


Date: 30.JUN.2019 23:11:54



Date: 30.JUN.2019 23:13:22

Highest Channel / 64QAM



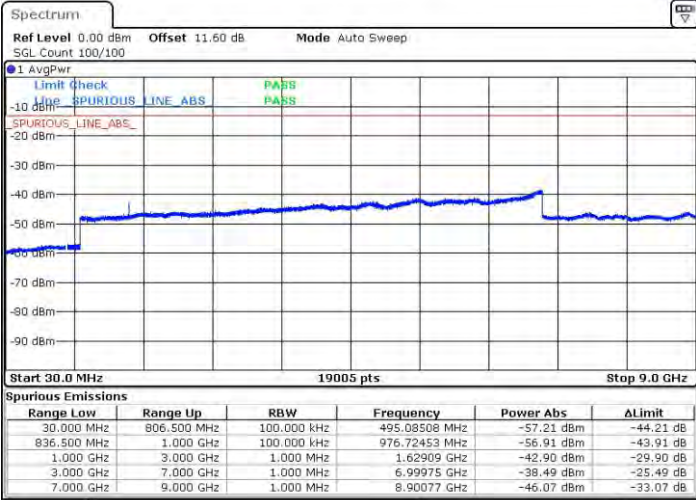
Date: 30.JUN.2019 23:14:30



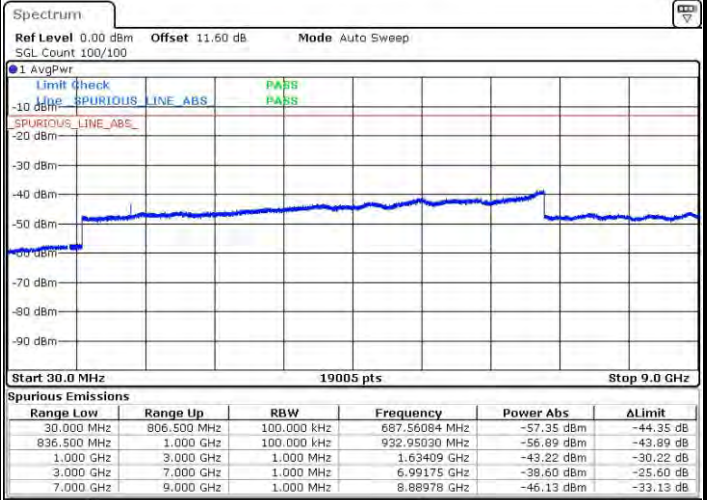
LTE Band 26 / 5MHz

Lowest Channel / 64QAM

Middle Channel / 64QAM

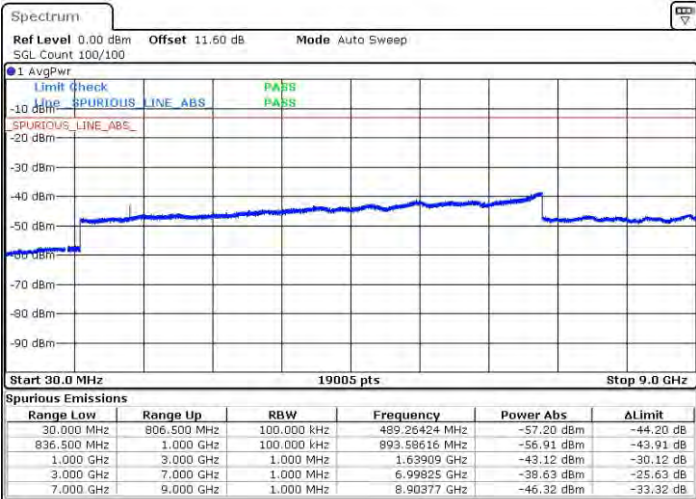


Date: 30.JUN.2019 23:16:17

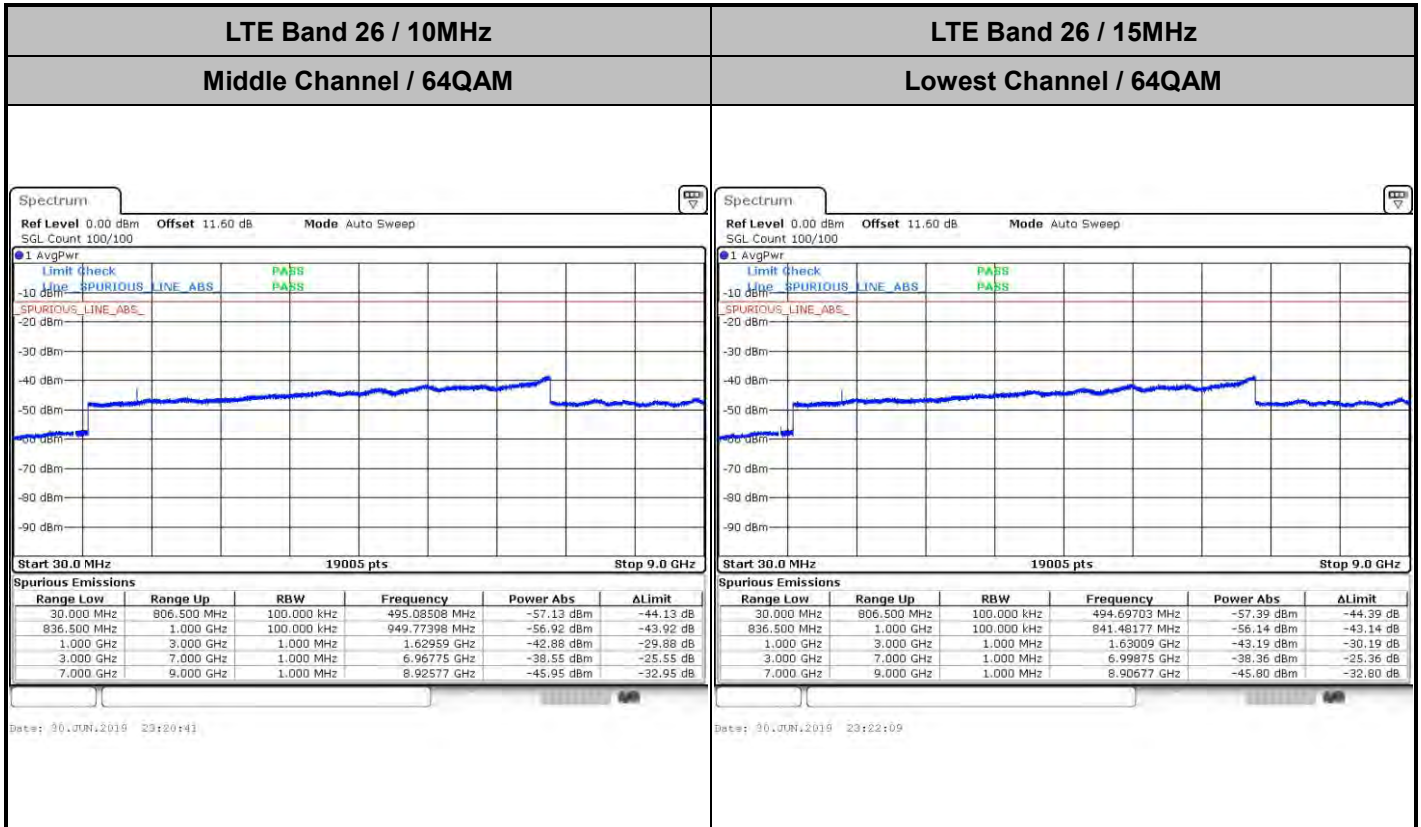


Date: 30.JUN.2019 23:17:45

Highest Channel / 64QAM



Date: 30.JUN.2019 23:19:13





Frequency Stability

| Test Conditions | | LTE Band 26 (QPSK) / Middle Channel | Limit |
|------------------|-------------------|-------------------------------------|---------|
| Temperature (°C) | Voltage (Volt) | BW 10MHz | Note 2. |
| | | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0050 | PASS |
| 40 | Normal Voltage | 0.0018 | |
| 30 | Normal Voltage | 0.0150 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0050 | |
| 0 | Normal Voltage | 0.0095 | |
| -10 | Normal Voltage | 0.0114 | |
| -20 | Normal Voltage | 0.0132 | |
| -30 | Normal Voltage | 0.0107 | |
| 20 | Maximum Voltage | 0.0033 | |
| 20 | Normal Voltage | 0.0000 | |
| 20 | Battery End Point | 0.0062 | |

Note:

- 1. Normal Voltage =3.8 V. ; Battery End Point (BEP) =3.5 V. ; Maximum Voltage =4.4 V.
- 2. The frequency fundamental emissions stay within the authorized frequency block.



| Test Conditions | | LTE Band 26 (QPSK) / Low Channel | Limit |
|------------------|-------------------|----------------------------------|---------|
| Temperature (°C) | Voltage (Volt) | BW 15MHz | Note 2. |
| | | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0022 | PASS |
| 40 | Normal Voltage | 0.0037 | |
| 30 | Normal Voltage | 0.0019 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0026 | |
| 0 | Normal Voltage | 0.0009 | |
| -10 | Normal Voltage | 0.0030 | |
| -20 | Normal Voltage | 0.0037 | |
| -30 | Normal Voltage | 0.0072 | |
| 20 | Maximum Voltage | 0.0010 | |
| 20 | Normal Voltage | 0.0000 | |
| 20 | Battery End Point | 0.0190 | |

Note:

- 1. Normal Voltage =3.8 V. ; Battery End Point (BEP) =3.5 V. ; Maximum Voltage =4.4 V.
- 2. The frequency fundamental emissions stay within the authorized frequency block.



Appendix B. Test Results of ERP and Radiated Test

ERP

<Reporting Only>

| LTE Band 26 / 15MHz (Channel 26765) (GT - LC = 0.31 dB) | | | | | | | |
|---|----------|------|--------|-------------|---------------|----------|--------|
| Channel | Mode | RB | | Conducted | | ERP | |
| | | Size | Offset | Power (dBm) | Power (Watts) | ERP(dBm) | ERP(W) |
| Lowest | QPSK | 1 | 37 | 24.72 | 0.30 | 22.88 | 0.19 |
| Middle | | - | - | - | - | - | - |
| Highest | | - | - | - | - | - | - |
| Lowest | 16QAM | 1 | 37 | 24.07 | 0.26 | 22.23 | 0.17 |
| Middle | | - | - | - | - | - | - |
| Highest | | - | - | - | - | - | - |
| Lowest | 64QAM | 1 | 74 | 22.99 | 0.20 | 21.15 | 0.13 |
| Middle | | - | - | - | - | - | - |
| Highest | | - | - | - | - | - | - |
| Limit | ERP < 7W | | | Result | | PASS | |



Radiated Spurious Emission

LTE Band 26 (Part 90S)

| LTE Band 26 / 1.4MHz / QPSK | | | | | | | | | |
|-----------------------------|-------------------|--------------|---------------|-------------------|-------------------|--------------------|----------------------|-----------------------|--------------------|
| Channel | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | SPA Reading (dBm) | S.G. Power (dBm) | TX Cable loss (dB) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 1632 | -54.29 | -13 | -41.29 | -64.33 | -59.83 | 0.91 | 8.60 | H |
| | 2440 | -52.99 | -13 | -39.99 | -67.32 | -60.32 | 1.14 | 10.62 | H |
| | 3256 | -49.59 | -13 | -36.59 | -65.33 | -58.04 | 1.32 | 11.91 | H |
| | 4072 | -51.12 | -13 | -38.12 | -69.83 | -60.28 | 1.48 | 12.79 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 1632 | -57.61 | -13 | -44.61 | -67.18 | -63.15 | 0.91 | 8.60 | V |
| | 2440 | -53.77 | -13 | -40.77 | -68.2 | -61.10 | 1.14 | 10.62 | V |
| | 3256 | -54.62 | -13 | -41.62 | -70.84 | -63.07 | 1.32 | 11.91 | V |
| | 4072 | -53.11 | -13 | -40.11 | -71.82 | -62.27 | 1.48 | 12.79 | V |
| | | | | | | | | V | |
| | | | | | | | | V | |
| Middle | 1640 | -55.35 | -13 | -42.35 | -65.44 | -60.91 | 0.92 | 8.63 | H |
| | 2456 | -53.28 | -13 | -40.28 | -67.61 | -60.63 | 1.14 | 10.64 | H |
| | 3272 | -52.26 | -13 | -39.26 | -67.96 | -60.74 | 1.32 | 11.95 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 1640 | -57.62 | -13 | -44.62 | -67.17 | -63.18 | 0.92 | 8.63 | V |
| | 2456 | -53.41 | -13 | -40.41 | -67.87 | -60.76 | 1.14 | 10.64 | V |
| | 3272 | -54.68 | -13 | -41.68 | -70.85 | -63.16 | 1.32 | 11.95 | V |
| | | | | | | | | | V |
| | | | | | | | | V | |
| | | | | | | | | V | |
| Highest | 1648 | -51.66 | -13 | -38.66 | -61.76 | -57.25 | 0.92 | 8.66 | H |
| | 2472 | -54.16 | -13 | -41.16 | -68.48 | -61.53 | 1.14 | 10.66 | H |
| | 3296 | -49.39 | -13 | -36.39 | -65.06 | -57.93 | 1.32 | 12.01 | H |
| | 4120 | -50.97 | -13 | -37.97 | -69.71 | -60.13 | 1.47 | 12.78 | H |
| | | | | | | | | | H |
| | | | | | | | | | H |
| | 1648 | -56.06 | -13 | -43.06 | -65.62 | -61.65 | 0.92 | 8.66 | V |
| | 2472 | -52.92 | -13 | -39.92 | -67.42 | -60.29 | 1.14 | 10.66 | V |
| | 3296 | -54.78 | -13 | -41.78 | -70.91 | -63.32 | 1.32 | 12.01 | V |
| | 4120 | -53.21 | -13 | -40.21 | -72.02 | -62.37 | 1.47 | 12.78 | V |
| | | | | | | | | V | |
| | | | | | | | | V | |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.