



FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : LTE/WCDMA/GSM Tri-Mode Digital Mobile Phone
BRAND NAME : ZTE
MODEL NAME : Z818L
MARKETING NAME : Z818L
FCC ID : SRQ-Z818L
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(H)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Mar. 16, 2015 and completely tested on Apr. 07, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and the testing has shown the tested sample to be in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



TABLE OF CONTENTS

| | |
|--------------------------------------------------------------------------|-----------|
| REVISION HISTORY..... | 4 |
| SUMMARY OF TEST RESULT | 5 |
| 1 GENERAL DESCRIPTION | 7 |
| 1.1 Applicant..... | 7 |
| 1.2 Manufacturer..... | 7 |
| 1.3 Product Feature of Equipment Under Test..... | 7 |
| 1.4 Product Specification subjective to this standard | 8 |
| 1.5 Modification of EUT | 8 |
| 1.6 Emission Designator..... | 9 |
| 1.7 Testing Location | 10 |
| 1.8 Applicable Standards..... | 10 |
| 2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST..... | 11 |
| 2.1 Test Mode..... | 11 |
| 2.2 Connection Diagram of Test System..... | 13 |
| 2.3 Support Unit used in test configuration and system | 14 |
| 2.4 Measurement Results Explanation Example..... | 14 |
| 3 CONDUCTED TEST ITEMS | 15 |
| 3.1 Measuring Instruments | 15 |
| 3.2 Test Setup | 15 |
| 3.3 Test Result of Conducted Test | 15 |
| 3.4 Conducted Output Power | 16 |
| 3.5 Peak-to-Average Ratio | 17 |
| 3.6 Occupied Bandwidth..... | 18 |
| 3.7 Conducted Band Edge | 19 |
| 3.8 Conducted Spurious Emission | 21 |
| 3.9 Frequency Stability | 22 |
| 4 RADIATED TEST ITEMS | 23 |
| 4.1 Measuring Instruments | 23 |
| 4.2 Test Setup | 23 |
| 4.3 Test Result of Radiated Test..... | 23 |
| 4.4 Effective Radiated Power and Effective Isotropic Radiated Power..... | 24 |
| 4.5 Radiated Spurious Emission | 26 |
| 5 LIST OF MEASURING EQUIPMENT..... | 27 |
| 6 UNCERTAINTY OF EVALUATION..... | 28 |
| APPENDIX A. TEST RESULTS OF CONDUCTED TEST | |



APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. TEST SETUP PHOTOGRAPHS



SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|----------------|---------------------------------------------------------------|----------------------------------------------------------------------------|------------------------|--------|--------|
| 3.4 | §2.1046 | Conducted Output Power | Reporting Only | PASS | - |
| 3.5 | §24.232(d) | Peak-to-Average Ratio | <13 dB | PASS | - |
| 3.6 | §2.1049 | 99% Occupied Bandwidth and 26dB Bandwidth | Reporting Only | PASS | - |
| 3.7 | §2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) | Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 17) | < 43+10log10(P[Watts]) | PASS | - |
| 3.8 | §2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h) | Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 17) | < 43+10log10(P[Watts]) | PASS | - |
| 3.9 | §2.1055 §22.355 | Frequency Stability Temperature & Voltage | < 2.5 ppm | PASS | - |
| | §2.1055 §24.235 §27.54 | | within authorized band | | |



| | | | | | |
|-----|---------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------|------|--------------------------------------------|
| 4.4 | §22.913(a)(2) | Effective Radiated Power (Band 5) | ERP < 7 Watt | PASS | |
| | §27.50(c)(10) | Effective Radiated Power (Band 17) | ERP < 3 Watt | | |
| | §24.232(c) | Equivalent Isotropic Radiated Power (Band 2) | EIRP < 2Watt | | |
| | §27.50(d)(4) | Equivalent Isotropic Radiated Power (Band 4) | EIRP < 1Watt | | |
| 4.5 | §2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) | Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 17) | < 43+10log ₁₀ (P[Watts]) | PASS | Under limit 23.23 dB at 3742.000 MHz |



1 General Description

1.1 Applicant

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057,
P. R. China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057,
P. R. China

1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Equipment | LTE/WCDMA/GSM Tri-Mode Digital Mobile Phone |
| Brand Name | ZTE |
| Model Name | Z818L |
| Marketing Name | Z818L |
| FCC ID | SRQ-Z818L |
| EUT supports Radios application | GSM/GPRS/EGPRS/WCDMA/HSPA/ HSPA+(Downlink Only)/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE |
| IMEI Code | Conducted: 004401783323781 Radiated: 004401783324755 |
| HW Version | wtxA |
| SW Version | Z818LV1.0.0B01 |
| EUT Stage | Identical Prototype |



1.4 Product Specification subjective to this standard

| Product Specification subjective to this standard | |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tx Frequency | LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 17 : 706.5 MHz ~ 713.5 MHz |
| Rx Frequency | LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 17 : 736.5 MHz ~ 743.5 MHz |
| Bandwidth | LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 17 : 5MHz / 10MHz |
| Maximum Output Power to Antenna | LTE Band 2 : 23.11 dBm LTE Band 4 : 23.82 dBm LTE Band 5 : 23.80 dBm LTE Band 17 : 23.70 dBm |
| Antenna Type | PIFA Antenna |
| Type of Modulation | QPSK / 16QAM |

1.5 Modification of EUT

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



1.6 Emission Designator

| LTE Band 2 | | QPSK | | | 16QAM | | |
|-------------|------------------------------|---------------------------|-----------------|------------------------------|---------------------------|-----------------|--|
| BW(MHz) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum EIRP(W) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum EIRP(W) | |
| 1.4 | 1M10G7D | - | 0.1884 | 1M10W7D | - | 0.1841 | |
| 3 | 2M74G7D | - | 0.2234 | 2M73W7D | - | 0.1995 | |
| 5 | 4M51G7D | - | 0.2042 | 4M51W7D | - | 0.1959 | |
| 10 | 9M09G7D | 0.0079 | 0.2218 | 9M03W7D | - | 0.1875 | |
| 15 | 13M5G7D | - | 0.2183 | 13M5W7D | - | 0.1841 | |
| 20 | 18M4G7D | - | 0.2382 | 18M4W7D | - | 0.1950 | |
| LTE Band 4 | | QPSK | | | 16QAM | | |
| BW(MHz) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum EIRP(W) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum EIRP(W) | |
| 1.4 | 1M10G7D | - | 0.2153 | 1M10W7D | - | 0.1858 | |
| 3 | 2M73G7D | - | 0.2168 | 2M73W7D | - | 0.1888 | |
| 5 | 4M52G7D | - | 0.2183 | 4M51W7D | - | 0.1905 | |
| 10 | 9M09G7D | 0.0085 | 0.2291 | 9M03W7D | - | 0.1954 | |
| 15 | 13M5G7D | - | 0.2275 | 13M5W7D | - | 0.2037 | |
| 20 | 18M5G7D | - | 0.2234 | 18M5W7D | - | 0.1914 | |
| LTE Band 5 | | QPSK | | | 16QAM | | |
| BW(MHz) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum ERP(W) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum ERP(W) | |
| 1.4 | 1M10G7D | - | 0.1094 | 1M10W7D | - | 0.0895 | |
| 3 | 2M73G7D | - | 0.1019 | 2M73W7D | - | 0.0968 | |
| 5 | 4M51G7D | - | 0.0946 | 4M52W7D | - | 0.0935 | |
| 10 | 9M09G7D | 0.0160 | 0.0977 | 9M05W7D | - | 0.0944 | |
| LTE Band 17 | | QPSK | | | 16QAM | | |
| BW(MHz) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum ERP(W) | Emission Designator (99%OBW) | Frequency Tolerance (ppm) | Maximum ERP(W) | |
| 5 | 4M52G7D | - | 0.0805 | 4M51W7D | - | 0.0685 | |
| 10 | 9M09G7D | 0.0169 | 0.0665 | 9M05W7D | - | 0.0668 | |



1.7 Testing Location

| | | |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------|--|
| Test Site | SPORTON INTERNATIONAL (KUNSHAN) INC. | |
| Test Site Location | No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958 | |
| Test Site No. | Sporton Site No. | |
| | TH01-KS | |

| | | |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Test Site | SPORTON INTERNATIONAL INC. | |
| Test Site Location | No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978 | |
| Test Site No. | Sporton Site No. | FCC Registration No. |
| | 03CH07-HY | TW1022 |

Note: The test site complies with ANSI C63.4 2009 requirement.

1.8 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E), 27(L), 27(H)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

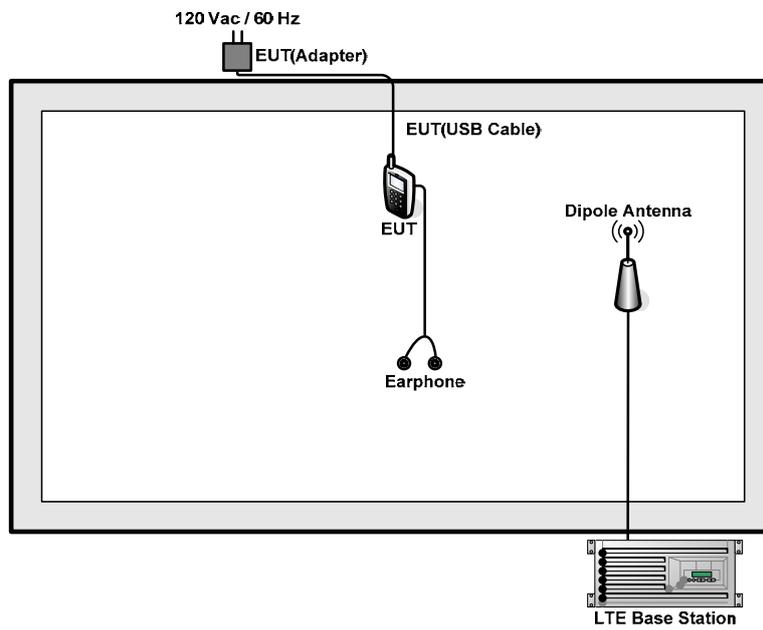
Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

| Test Items | Band | Bandwidth (MHz) | | | | | | Modulation | | RB # | | | Test Channel | | |
|------------------------|------|-----------------|---|---|----|----|----|------------|-------|------|------|------|--------------|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 1 | Half | Full | L | M | H |
| Max. Output Power | 2 | v | v | v | v | v | v | v | v | v | v | v | v | v | v |
| | 4 | v | v | v | v | v | v | v | v | v | v | v | v | v | v |
| | 5 | v | v | v | v | - | - | v | v | v | v | v | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | v | v | v | v | v |
| Peak-to-Average Ratio | 2 | | | | | | v | v | v | v | | v | v | v | v |
| | 4 | | | | | | v | v | v | v | | v | v | v | v |
| | 5 | | | | v | - | - | v | v | v | | v | v | v | v |
| | 17 | - | - | | v | - | - | v | v | v | | v | v | v | v |
| 26dB and 99% Bandwidth | 2 | v | v | v | v | v | v | v | v | | | v | v | v | v |
| | 4 | v | v | v | v | v | v | v | v | | | v | v | v | v |
| | 5 | v | v | v | v | - | - | v | v | | | v | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | | | v | v | v | v |
| Conducted Band Edge | 2 | v | v | v | v | v | v | v | v | v | | v | v | | v |
| | 4 | v | v | v | v | v | v | v | v | v | | v | v | | v |
| | 5 | v | v | v | v | - | - | v | v | v | | v | v | | v |
| | 17 | - | - | v | v | - | - | v | v | v | | v | v | | v |



| Test Items | Band | Bandwidth (MHz) | | | | | | Modulation | | RB # | | | Test Channel | | |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|----|----|----|------------|-------|------|------|------|--------------|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 1 | Half | Full | L | M | H |
| Conducted Spurious Emission | 2 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 4 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 5 | v | v | v | v | - | - | v | v | v | | | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| Frequency Stability | 2 | | | | v | | | v | | | | v | | v | |
| | 4 | | | | v | | | v | | | | v | | v | |
| | 5 | | | | v | - | - | v | | | | v | | v | |
| | 17 | - | - | | v | - | - | v | | | | v | | v | |
| E.R.P/ E.I.R.P. | 2 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 4 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 5 | v | v | v | v | - | - | v | v | v | | | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| Radiated Spurious Emission | 2 | v | v | v | v | v | v | v | | v | | | | v | |
| | 4 | v | v | v | v | v | v | v | | v | | | | v | |
| | 5 | v | v | v | v | - | - | v | | v | | | | v | |
| | 17 | - | - | v | v | - | - | v | | v | | | | v | |
| Note | <p>1. The mark "v " means that this configuration is chosen for testing</p> <p>2. The mark "- " means that this bandwidth is not supported.</p> <p>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</p> | | | | | | | | | | | | | | |

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. | DC Power Supply | GW INSTEK | GPS-3030D | N/A | N/A | Unshielded, 1.8 m |
| 2. | LTE Base Station | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 3. | Earphone | Lenovo | SH100 | N/A | N/A | N/A |

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 between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

$$\text{Offset} = \text{RF cable loss.}$$

Following shows an offset computation example with cable loss 5.0 dB.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.0 \text{ (dB)} \end{aligned}$$

3 Conducted Test Items

3.1 Measuring Instruments

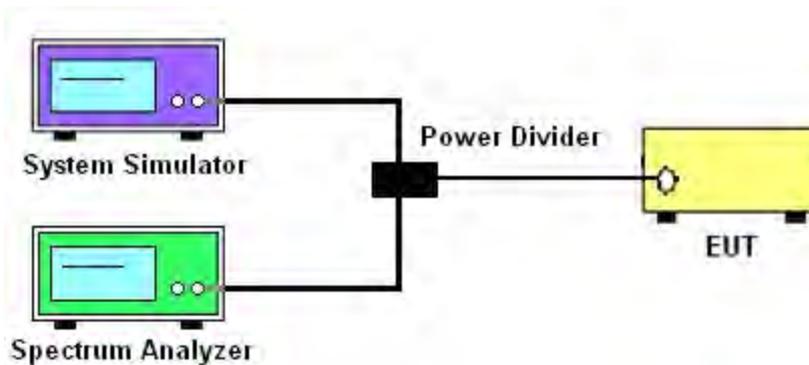
See list of measuring instruments of this test report.

3.2 Test Setup

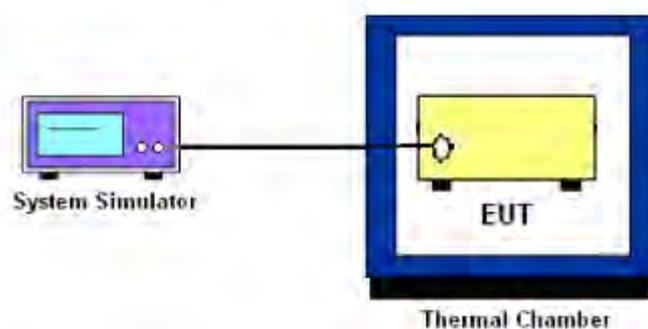
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.



3.4 Conducted Output Power

3.4.1 Description of the Conducted Output Power Measurement

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

3.4.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the 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.



3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.



3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

The 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 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.



3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

22.917(a) for Band 5

For operations in the 824 – 849 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

24.238 (a) for Band 2

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (g) for Band 17

For operations in the 698 -746 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53 (h) for Band 4

For operations in the 1710 – 1755 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.



3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW $\geq 1\%$ EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13$ dBm.



3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of 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.

3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. 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.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. 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)
= $P(W) - [43 + 10\log(P)]$ (dB)
= $[30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
= -13dBm.



3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. 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.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at $25\pm 5^{\circ}\text{C}$ and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

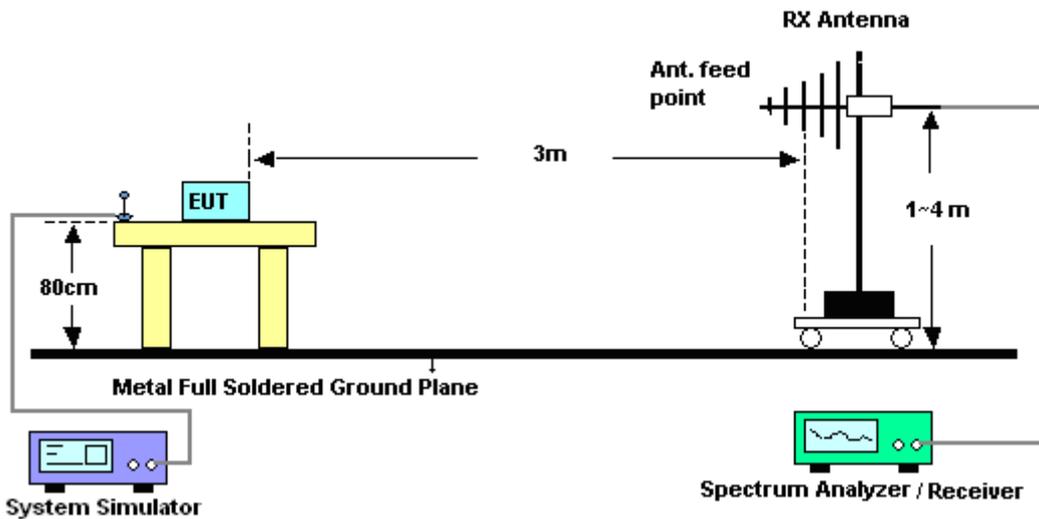
4 Radiated Test Items

4.1 Measuring Instruments

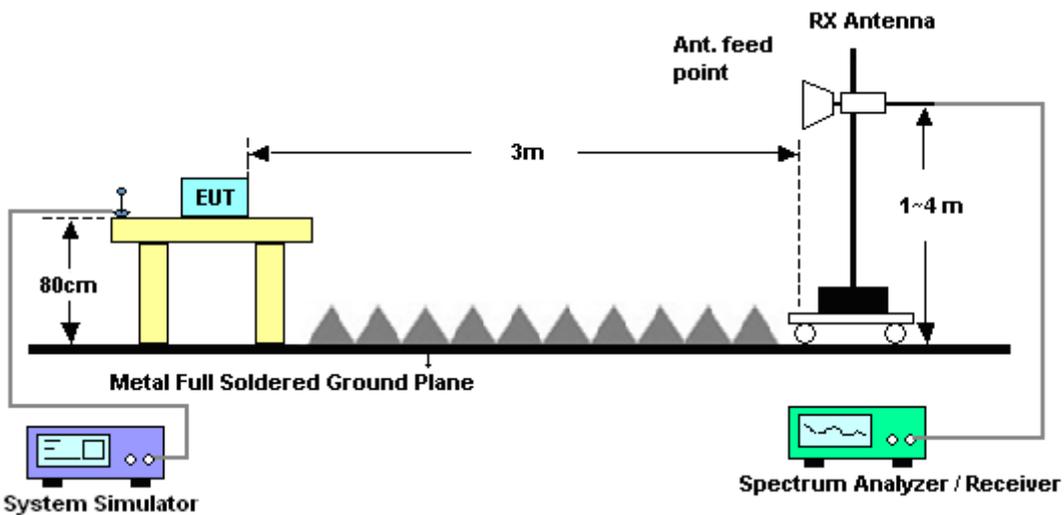
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.



4.4 Effective Radiated Power and Effective Isotropic Radiated Power

4.4.1 Description of the ERP/EIRP Measurement

Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average ERP of 7 watts with LTE band 5 and 3 watts with LTE band 17.

Equivalent isotropic radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average EIRP of 2 watts with LTE band 2 and 1 watt with LTE band 4.

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.2.1. and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by the substitution antenna at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.



| | LTE | | | | | |
|--------------|---------|---------|---------|---------|---------|---------|
| LTE BW | 1.4M | 3M | 5M | 10M | 15M | 20M |
| Span | 3MHz | 6MHz | 10MHz | 20MHz | 30MHz | 40MHz |
| RBW | 30kHz | 100kHz | 100kHz | 300kHz | 300kHz | 300kHz |
| VBW | 100kHz | 300kHz | 300kHz | 1MHz | 1MHz | 1MHz |
| Detector | RMS | RMS | RMS | RMS | RMS | RMS |
| Trace | Average | Average | Average | Average | Average | Average |
| Average Type | Power | Power | Power | Power | Power | Power |
| Sweep Count | 100 | 100 | 100 | 100 | 100 | 100 |



4.5 Radiated Spurious Emission

4.5.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. 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 $43 + 10 \log (P)$ dB.

For LTE Band 17

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.5.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. 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.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm.}$$

12. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
13. $\text{ERP (dBm)} = \text{EIRP} - 2.15$



5 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---------------------------|-----------------|---------------|---------------|------------------|------------------|---------------------------------|---------------|-----------------------|
| Spectrum Analyzer | R&S | FSV30 | 101338 | 9kHz~30GHz | May 04, 2014 | Mar. 29, 2015~ Mar. 30, 2015 | May 03, 2015 | Conducted (TH01-KS) |
| Thermal Chamber | Ten Billion | TTC-B3S | TBN-960502 | -40~+150°C | Oct. 25, 2014 | Mar. 29, 2015~ Mar. 30, 2015 | Oct. 24, 2015 | Conducted (TH01-KS) |
| Signal Analyzer | Rohde & Schwarz | FSV 30 | 101749 | 10Hz ~ 30GHz | Mar. 10, 2015 | Apr. 01, 2015~ Apr. 07, 2015 | Mar. 09, 2016 | Radiation (03CH07-HY) |
| Bilog Antenna | Schaffner | CBL6111C | 2726 | 30MHz ~ 1GHz | Sep. 27, 2014 | Apr. 01, 2015~ Apr. 07, 2015 | Sep. 26, 2015 | Radiation (03CH07-HY) |
| Double Ridge Horn Antenna | ESCO | 3117 | 75962 | 1GHz~18GHz | Aug. 19, 2014 | Apr. 01, 2015~ Apr. 07, 2015 | Aug. 18, 2015 | Radiation (03CH07-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170251 | 18GHz~40GHz | Oct. 02, 2014 | Apr. 01, 2015~ Apr. 07, 2015 | Oct. 01, 2015 | Radiation (03CH07-HY) |
| Preamplifier | COM-POWER | PA-103A | 161241 | 10 MHz ~ 1000MHz | Mar. 12, 2015 | Apr. 01, 2015~ Apr. 07, 2015 | Mar. 11, 2016 | Radiation (03CH07-HY) |
| Preamplifier | Agilent | 8449B | 3008A02362 | 1 GHz~26.5 GHz | Oct. 21, 2014 | Apr. 01, 2015~ Apr. 07, 2015 | Oct. 20, 2015 | Radiation (03CH07-HY) |
| Turn Table | ChainTek | ChainTek 3000 | N/A | 0 ~ 360 degree | N/A | Apr. 01, 2015~ Apr. 07, 2015 | N/A | Radiation (03CH07-HY) |
| Antenna Mast | ChainTek | M-400-0 | 114/8000604/L | N/A | N/A | Apr. 01, 2015~ Apr. 07, 2015 | N/A | Radiation (03CH07-HY) |



6 Uncertainty of Evaluation

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

| | |
|-------------------------------------------------------------------------|--------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 4.5 dB |
|-------------------------------------------------------------------------|--------|



Appendix A. Test Results of Conducted Test



LTE Band 2

Conducted Output Power(Average power)

| LTE Band 2 Maximum Average Power [dBm] | | | | | | |
|----------------------------------------|---------|-----------|--------|--------|--------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 1.4 | 1 | 0 | QPSK | 22.47 | 22.63 | 22.55 |
| 1.4 | 1 | 2 | | 22.59 | 22.81 | 22.79 |
| 1.4 | 1 | 5 | | 22.47 | 22.83 | 22.63 |
| 1.4 | 3 | 0 | | 22.86 | 22.89 | 22.87 |
| 1.4 | 3 | 1 | | 22.61 | 22.99 | 22.94 |
| 1.4 | 3 | 2 | | 22.65 | 22.96 | 22.92 |
| 1.4 | 6 | 0 | | 21.68 | 21.83 | 21.91 |
| 1.4 | 1 | 0 | 16-QAM | 22.19 | 22.06 | 22.14 |
| 1.4 | 1 | 2 | | 22.16 | 22.32 | 22.24 |
| 1.4 | 1 | 5 | | 21.91 | 22.19 | 21.74 |
| 1.4 | 3 | 0 | | 21.76 | 22.02 | 22.09 |
| 1.4 | 3 | 1 | | 21.73 | 22.01 | 21.92 |
| 1.4 | 3 | 2 | | 21.77 | 22.05 | 21.96 |
| 1.4 | 6 | 0 | | 20.48 | 20.82 | 20.69 |
| 3 | 1 | 0 | QPSK | 22.63 | 23.05 | 22.78 |
| 3 | 1 | 7 | | 22.60 | 22.95 | 22.90 |
| 3 | 1 | 14 | | 22.71 | 23.10 | 22.56 |
| 3 | 8 | 0 | | 21.71 | 21.83 | 21.91 |
| 3 | 8 | 4 | | 21.69 | 21.98 | 21.90 |
| 3 | 8 | 7 | | 21.70 | 21.93 | 21.84 |
| 3 | 15 | 0 | | 21.70 | 21.85 | 21.81 |
| 3 | 1 | 0 | 16-QAM | 21.92 | 22.43 | 22.06 |
| 3 | 1 | 7 | | 21.90 | 22.25 | 21.72 |
| 3 | 1 | 14 | | 22.36 | 22.16 | 22.00 |
| 3 | 8 | 0 | | 20.82 | 20.98 | 21.01 |
| 3 | 8 | 4 | | 20.72 | 20.92 | 20.85 |
| 3 | 8 | 7 | | 20.80 | 20.99 | 20.97 |
| 3 | 15 | 0 | | 20.81 | 20.88 | 20.65 |



| LTE Band 2 Maximum Average Power [dBm] | | | | | | |
|----------------------------------------|---------|-----------|--------|--------|--------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 5 | 1 | 0 | QPSK | 22.87 | 22.75 | 23.09 |
| 5 | 1 | 12 | | 22.94 | 22.82 | 22.87 |
| 5 | 1 | 24 | | 22.60 | 22.78 | 22.40 |
| 5 | 12 | 0 | | 21.65 | 21.74 | 21.88 |
| 5 | 12 | 6 | | 21.59 | 21.72 | 21.80 |
| 5 | 12 | 11 | | 21.59 | 21.78 | 21.77 |
| 5 | 25 | 0 | | 21.69 | 21.78 | 21.79 |
| 5 | 1 | 0 | 16-QAM | 22.24 | 21.86 | 22.23 |
| 5 | 1 | 12 | | 22.19 | 21.98 | 22.19 |
| 5 | 1 | 24 | | 21.91 | 22.36 | 22.10 |
| 5 | 12 | 0 | | 20.58 | 20.62 | 20.87 |
| 5 | 12 | 6 | | 20.57 | 20.82 | 20.83 |
| 5 | 12 | 11 | | 20.57 | 20.91 | 20.74 |
| 5 | 25 | 0 | | 20.72 | 20.59 | 20.85 |
| 10 | 1 | 0 | QPSK | 23.04 | 23.06 | 22.78 |
| 10 | 1 | 24 | | 22.83 | 22.86 | 22.76 |
| 10 | 1 | 49 | | 22.91 | 23.07 | 22.74 |
| 10 | 25 | 0 | | 21.77 | 21.77 | 21.92 |
| 10 | 25 | 12 | | 21.68 | 21.82 | 21.87 |
| 10 | 25 | 24 | | 21.60 | 21.83 | 21.75 |
| 10 | 50 | 0 | | 21.71 | 21.80 | 21.81 |
| 10 | 1 | 0 | 16-QAM | 21.92 | 21.99 | 22.44 |
| 10 | 1 | 24 | | 22.10 | 22.02 | 22.11 |
| 10 | 1 | 49 | | 22.38 | 22.08 | 22.17 |
| 10 | 25 | 0 | | 20.49 | 20.61 | 20.71 |
| 10 | 25 | 12 | | 20.55 | 20.84 | 20.79 |
| 10 | 25 | 24 | | 20.57 | 20.87 | 20.83 |
| 10 | 50 | 0 | | 20.64 | 20.86 | 20.88 |



| LTE Band 2 Maximum Average Power [dBm] | | | | | | |
|----------------------------------------|---------|-----------|--------|--------|--------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest |
| 15 | 1 | 0 | QPSK | 22.98 | 22.94 | 22.95 |
| 15 | 1 | 37 | | 22.50 | 22.64 | 22.62 |
| 15 | 1 | 74 | | 22.90 | 22.79 | 22.72 |
| 15 | 36 | 0 | | 21.67 | 21.80 | 21.83 |
| 15 | 36 | 18 | | 21.70 | 21.87 | 21.81 |
| 15 | 36 | 37 | | 21.68 | 21.85 | 21.86 |
| 15 | 75 | 0 | | 21.66 | 21.88 | 21.74 |
| 15 | 1 | 0 | 16-QAM | 22.14 | 22.11 | 22.19 |
| 15 | 1 | 37 | | 21.96 | 22.03 | 21.94 |
| 15 | 1 | 74 | | 22.29 | 22.13 | 21.79 |
| 15 | 36 | 0 | | 20.75 | 20.84 | 20.70 |
| 15 | 36 | 18 | | 20.70 | 20.93 | 20.75 |
| 15 | 36 | 37 | | 20.61 | 20.70 | 20.86 |
| 15 | 75 | 0 | | 20.53 | 20.85 | 20.80 |
| 20 | 1 | 0 | QPSK | 23.02 | 22.99 | 23.11 |
| 20 | 1 | 49 | | 22.95 | 22.73 | 22.78 |
| 20 | 1 | 99 | | 22.78 | 22.88 | 22.89 |
| 20 | 50 | 0 | | 21.71 | 21.79 | 21.88 |
| 20 | 50 | 24 | | 21.62 | 21.72 | 21.78 |
| 20 | 50 | 49 | | 21.59 | 21.77 | 21.82 |
| 20 | 100 | 0 | | 21.72 | 21.84 | 21.85 |
| 20 | 1 | 0 | 16-QAM | 22.15 | 22.45 | 22.23 |
| 20 | 1 | 49 | | 21.85 | 22.33 | 22.19 |
| 20 | 1 | 99 | | 21.86 | 21.99 | 21.99 |
| 20 | 50 | 0 | | 20.55 | 20.66 | 20.71 |
| 20 | 50 | 24 | | 20.45 | 20.80 | 20.80 |
| 20 | 50 | 49 | | 20.41 | 20.80 | 20.76 |
| 20 | 100 | 0 | | 20.66 | 20.91 | 20.83 |



Peak-to-Average Ratio

| Mode | LTE Band 2 / 20MHz | | | | |
|------------|--------------------|---------|-------|---------|-------------|
| Mod. | QPSK | | 16QAM | | Limit: 13dB |
| RB Size | 1RB | Full RB | 1RB | Full RB | Result |
| Lowest CH | 2.93 | 4.23 | 3.74 | 5.22 | PASS |
| Middle CH | 3.42 | 4.43 | 4.26 | 5.39 | |
| Highest CH | 3.01 | 4.32 | 3.88 | 5.28 | |



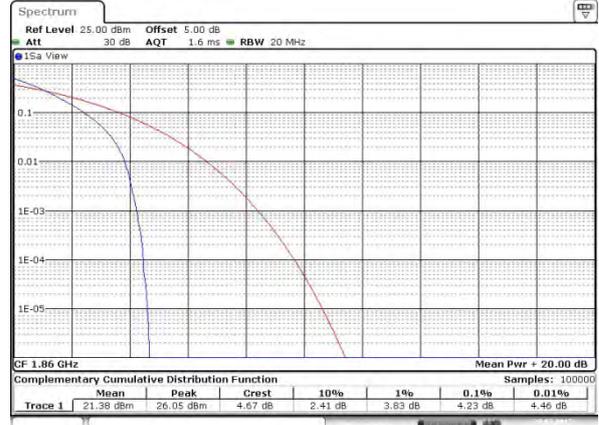
LTE Band 2 / 20MHz / QPSK

Lowest Channel / 1RB



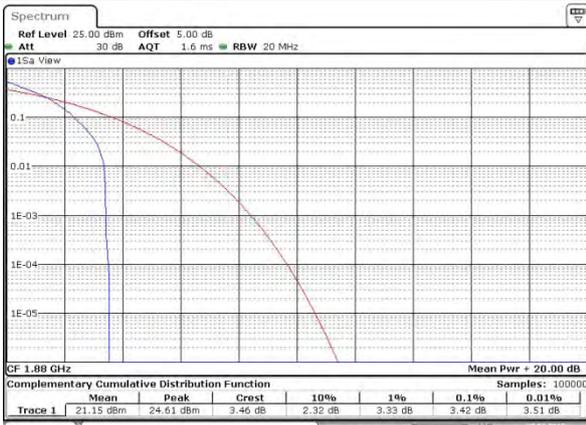
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Lowest Channel / Full RB



Date: 29 MAR 2015 11:47:45

Middle Channel / 1RB



Date: 29 MAR 2015 11:48:46

Middle Channel / Full RB



Date: 29 MAR 2015 11:48:32

Highest Channel / 1RB



Date: 29 MAR 2015 11:49:36

Highest Channel / Full RB

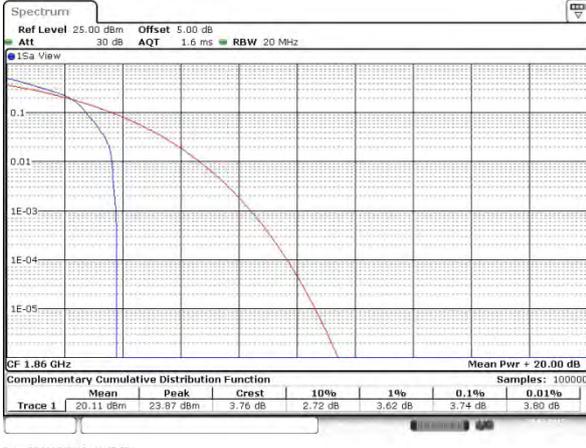


Date: 29 MAR 2015 11:49:25



LTE Band 2 / 20MHz / 16QAM

Lowest Channel / 1RB



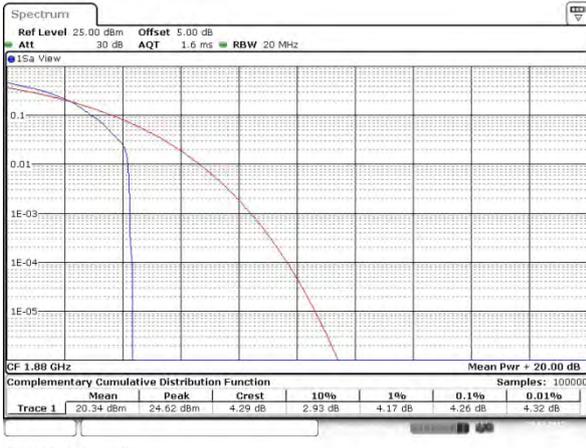
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Lowest Channel / Full RB



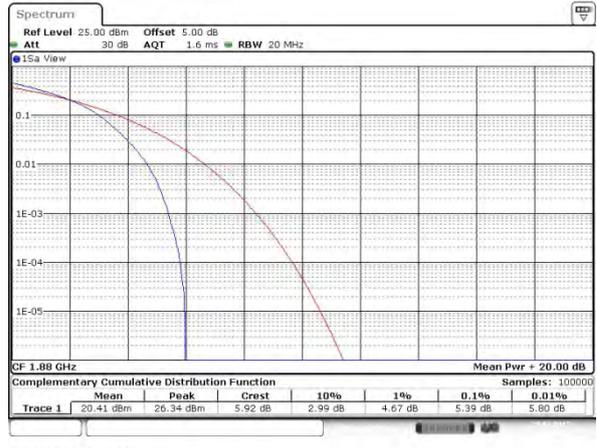
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Middle Channel / 1RB



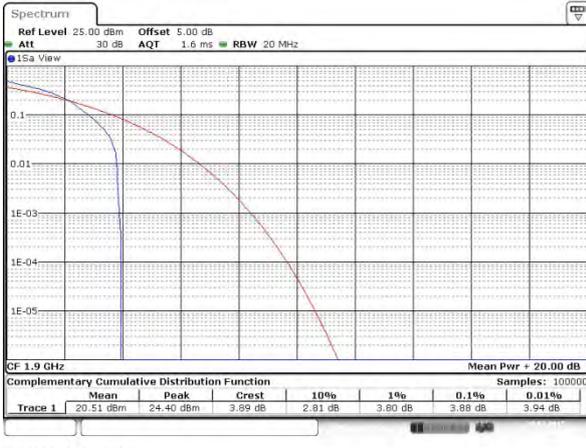
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Middle Channel / Full RB



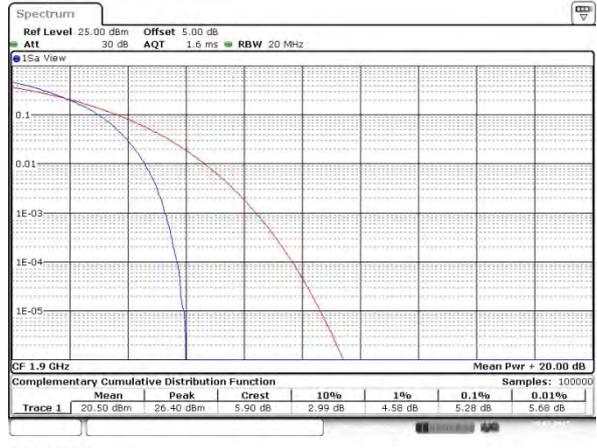
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Highest Channel / 1RB



Date: 29 MAR 2015 11:48:58

Highest Channel / Full RB



Date: 29 MAR 2015 11:49:09



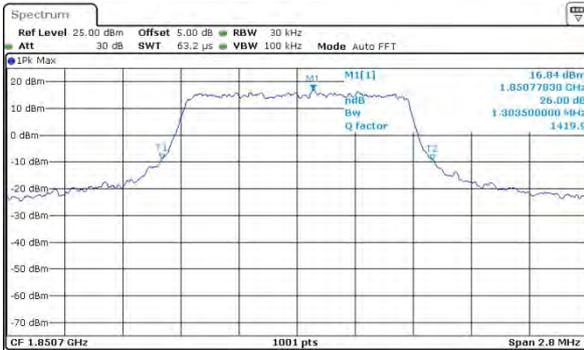
26dB Bandwidth

| Mode | LTE Band 2 : 26dB BW(MHz) | | | | | | | | | | | |
|------------|---------------------------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| BW | | | | | | | | | | | | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | 1.3 | 1.32 | 3.03 | 3.06 | 5.07 | 5.04 | 10.23 | 10.07 | 14.78 | 14.69 | 20.38 | 20.38 |
| Middle CH | 1.3 | 1.29 | 3.04 | 3.06 | 5.07 | 5.05 | 10.09 | 10.05 | 14.71 | 14.62 | 20.46 | 20.42 |
| Highest CH | 1.37 | 1.35 | 3.12 | 3.06 | 5.13 | 5.04 | 10.01 | 9.91 | 14.56 | 14.74 | 20.22 | 20.18 |



LTE Band 2

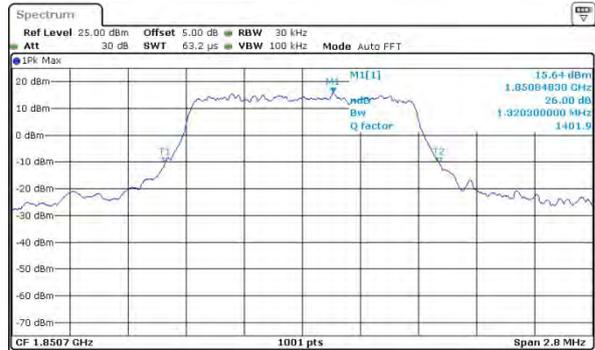
Lowest Channel / 1.4MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.8507783 GHz | 16.84 dBm | ndB down | 1.3035 MHz |
| T1 | 1 | | 1.8500483 GHz | -9.02 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8513517 GHz | -9.24 dBm | Q factor | 1419.9 |

Date: 29 MAR 2015 10:45:21

Lowest Channel / 1.4MHz / 16QAM



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|------------|----------|-----------------|
| M1 | 1 | | 1.8508483 GHz | 15.64 dBm | ndB down | 1.3203 MHz |
| T1 | 1 | | 1.8500371 GHz | -10.37 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8513573 GHz | -10.34 dBm | Q factor | 1401.9 |

Date: 29 MAR 2015 10:45:32

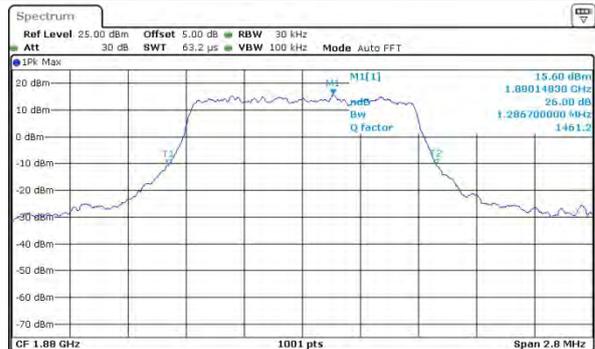
Middle Channel / 1.4MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.8800783 GHz | 16.92 dBm | ndB down | 1.3007 MHz |
| T1 | 1 | | 1.8793427 GHz | -9.23 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8806434 GHz | -9.04 dBm | Q factor | 1445.4 |

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Middle Channel / 1.4MHz / 16QAM



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|------------|----------|-----------------|
| M1 | 1 | | 1.8801483 GHz | 15.60 dBm | ndB down | 1.2857 MHz |
| T1 | 1 | | 1.8793566 GHz | -10.56 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8806434 GHz | -10.37 dBm | Q factor | 1461.2 |

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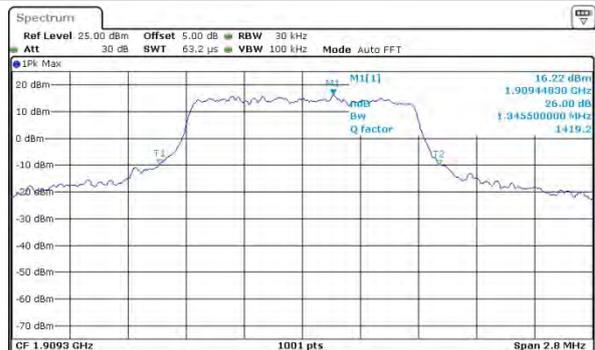
Highest Channel / 1.4MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.9093811 GHz | 16.85 dBm | ndB down | 1.3678 MHz |
| T1 | 1 | | 1.9085979 GHz | -9.12 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.9099557 GHz | -9.10 dBm | Q factor | 1395.9 |

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Highest Channel / 1.4MHz / 16QAM



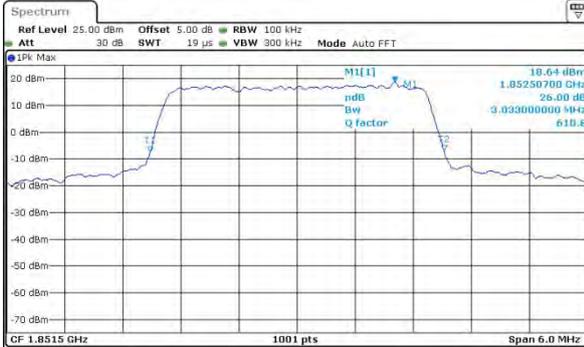
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|------------|----------|-----------------|
| M1 | 1 | | 1.9094483 GHz | 16.22 dBm | ndB down | 1.3455 MHz |
| T1 | 1 | | 1.9086119 GHz | -9.76 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.9099573 GHz | -10.02 dBm | Q factor | 1419.2 |

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LTE Band 2

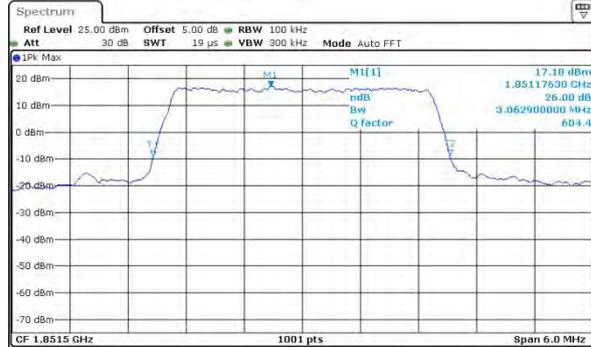
Lowest Channel / 3MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.852507 GHz | 18.64 dBm | ndB down | 3.033 MHz |
| T1 | 1 | | 1.8499835 GHz | -7.35 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8530165 GHz | -6.91 dBm | Q factor | 610.8 |

Date: 29 MAR 2015 10:55:32

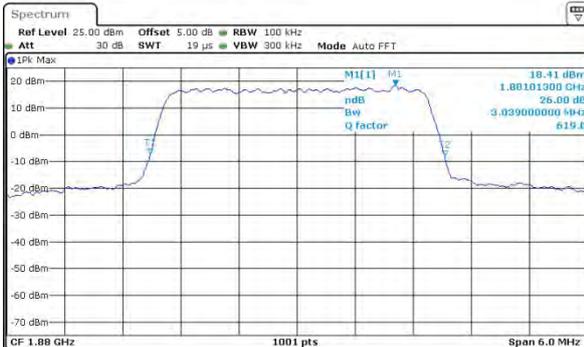
Lowest Channel / 3MHz / 16QAM



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.8511763 GHz | 17.18 dBm | ndB down | 3.0529 MHz |
| T1 | 1 | | 1.8495595 GHz | -9.13 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8530225 GHz | -8.44 dBm | Q factor | 604.4 |

Date: 29 MAR 2015 10:55:44

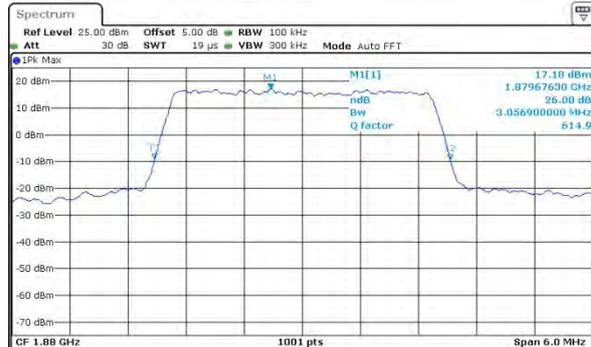
Middle Channel / 3MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.881013 GHz | 18.41 dBm | ndB down | 3.039 MHz |
| T1 | 1 | | 1.8784835 GHz | -7.25 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8815225 GHz | -7.67 dBm | Q factor | 619.0 |

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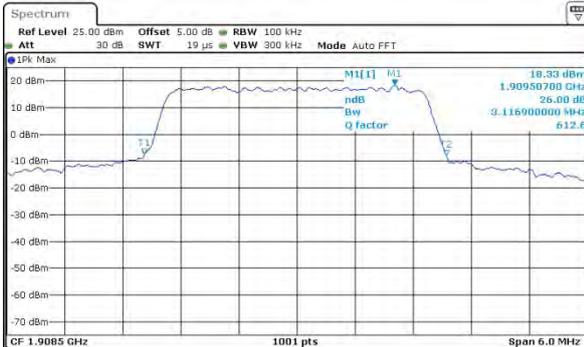
Middle Channel / 3MHz / 16QAM



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.8796763 GHz | 17.18 dBm | ndB down | 3.0569 MHz |
| T1 | 1 | | 1.8784715 GHz | -9.19 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.8815285 GHz | -9.21 dBm | Q factor | 614.9 |

Date: 29 MAR 2015 10:59:08

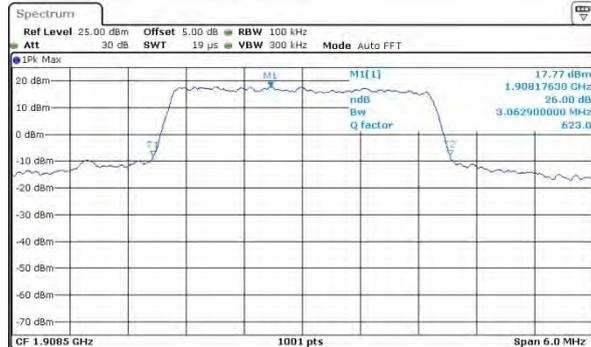
Highest Channel / 3MHz / QPSK



| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.909507 GHz | 18.33 dBm | ndB down | 3.1169 MHz |
| T1 | 1 | | 1.9059235 GHz | -7.49 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.9100495 GHz | -7.92 dBm | Q factor | 612.6 |

Date: 29 MAR 2015 11:02:21

Highest Channel / 3MHz / 16QAM



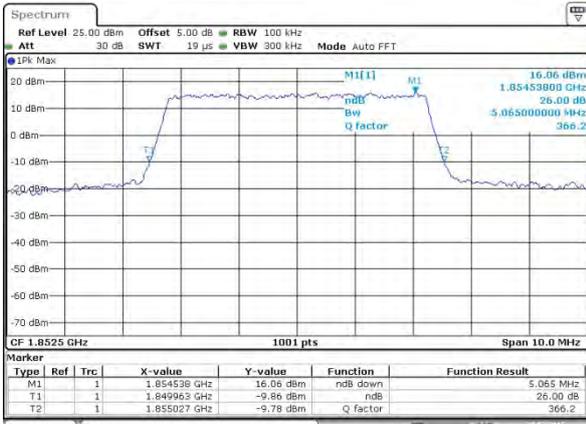
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|------|-----|-----|---------------|-----------|----------|-----------------|
| M1 | 1 | | 1.9081763 GHz | 17.77 dBm | ndB down | 3.0529 MHz |
| T1 | 1 | | 1.9059595 GHz | -8.32 dBm | ndB | 26.00 dB |
| T2 | 1 | | 1.9100225 GHz | -7.94 dBm | Q factor | 623.0 |

Date: 29 MAR 2015 13:27:32



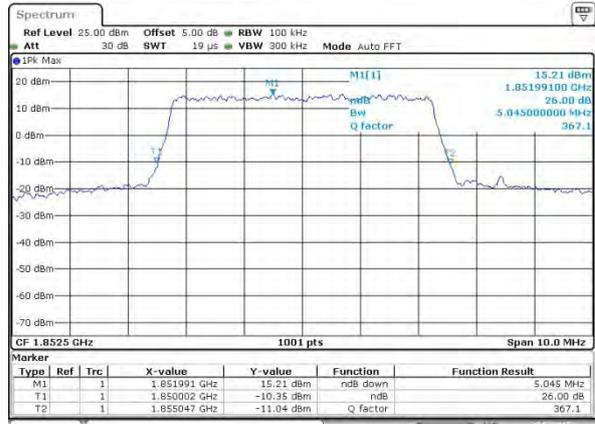
LTE Band 2

Lowest Channel / 5MHz / QPSK



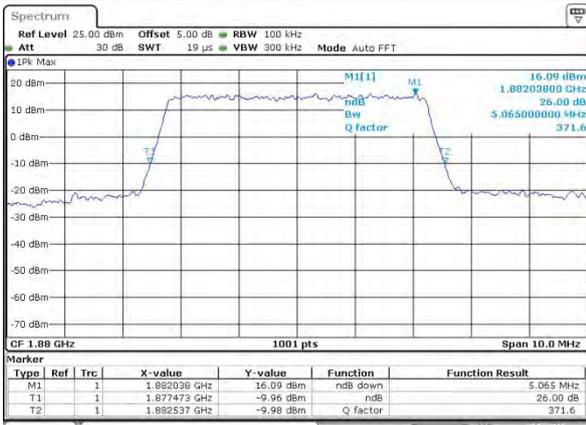
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Lowest Channel / 5MHz / 16QAM



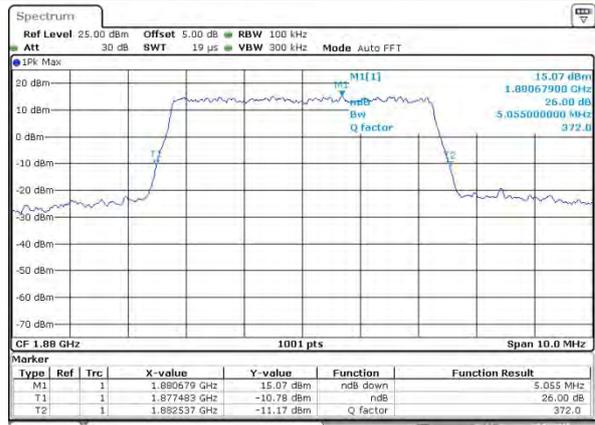
Date: 29 MAR 2015 11:05:56

Middle Channel / 5MHz / QPSK



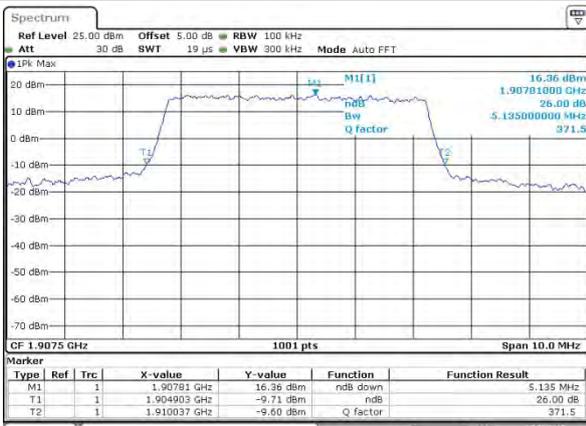
Date: 29 MAR 2015 11:09:08

Middle Channel / 5MHz / 16QAM



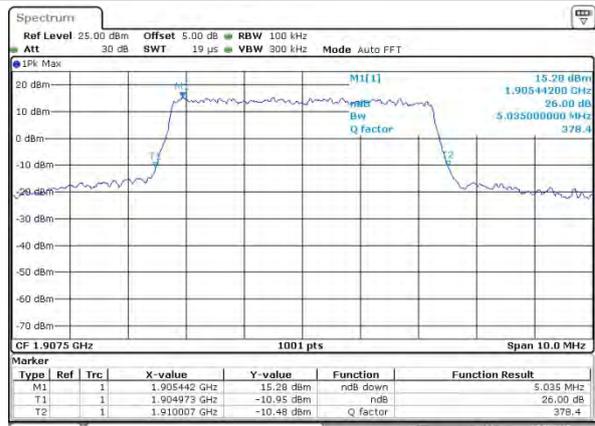
Date: 29 MAR 2015 11:09:20

Highest Channel / 5MHz / QPSK



Date: 29 MAR 2015 11:12:29

Highest Channel / 5MHz / 16QAM

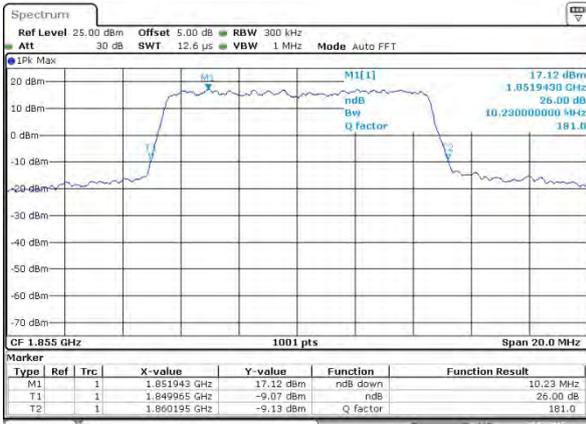


Date: 29 MAR 2015 11:12:41



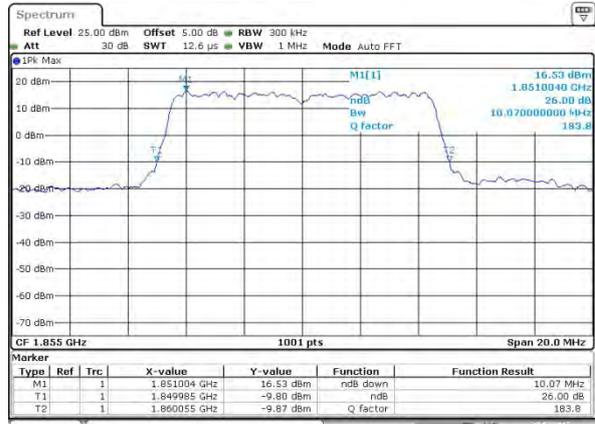
LTE Band 2

Lowest Channel / 10MHz / QPSK



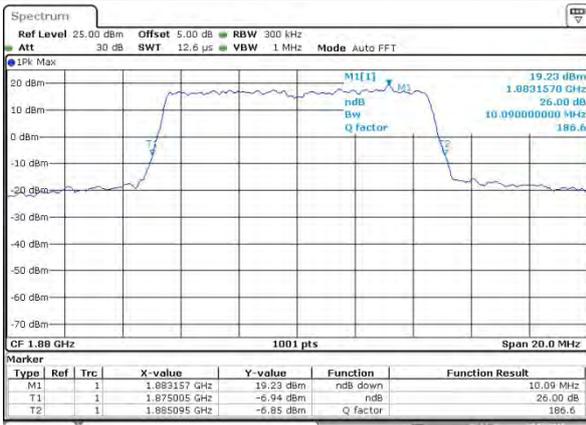
Date: 29 MAR 2015 11:15:52

Lowest Channel / 10MHz / 16QAM



Date: 29 MAR 2015 11:16:04

Middle Channel / 10MHz / QPSK



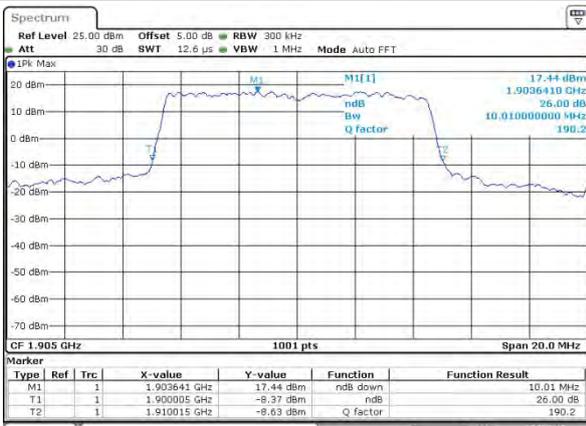
Date: 29 MAR 2015 12:55:42

Middle Channel / 10MHz / 16QAM



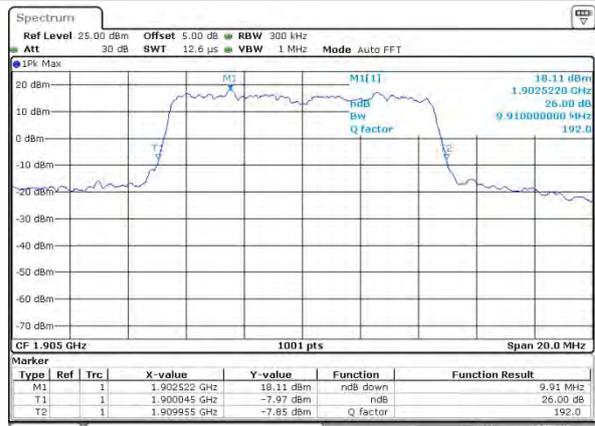
Date: 29 MAR 2015 11:19:27

Highest Channel / 10MHz / QPSK



Date: 29 MAR 2015 11:22:39

Highest Channel / 10MHz / 16QAM

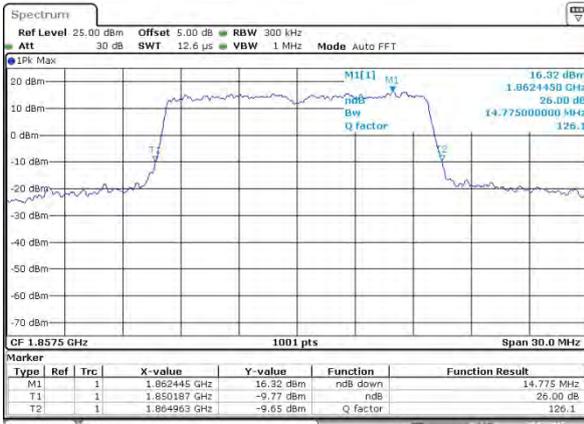


Date: 29 MAR 2015 11:22:51



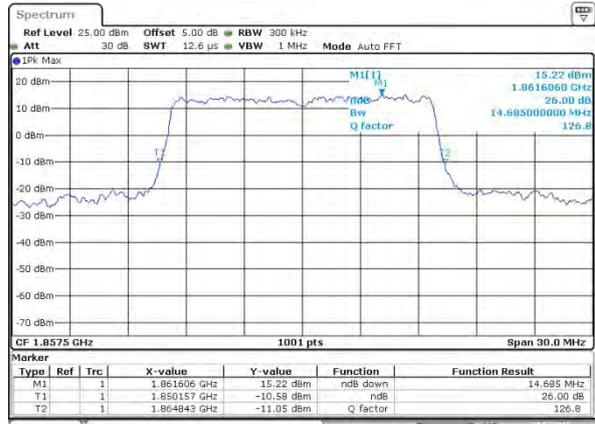
LTE Band 2

Lowest Channel / 15MHz / QPSK



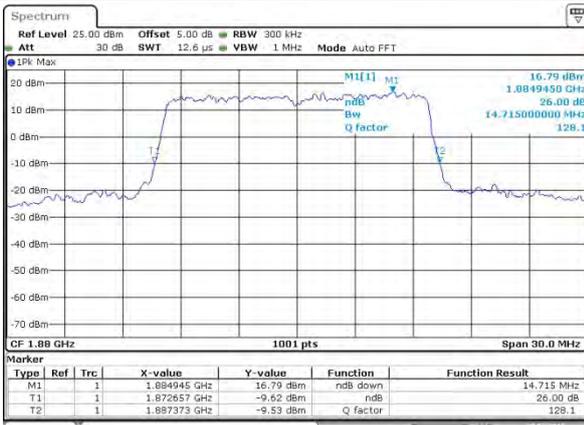
Date: 29 MAR 2015 11:29:03

Lowest Channel / 15MHz / 16QAM



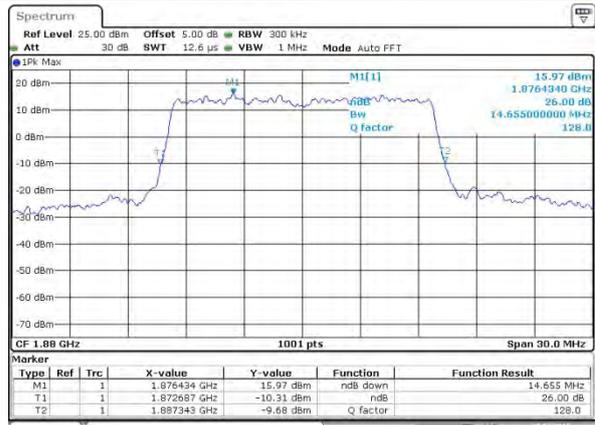
Date: 29 MAR 2015 11:29:15

Middle Channel / 15MHz / QPSK



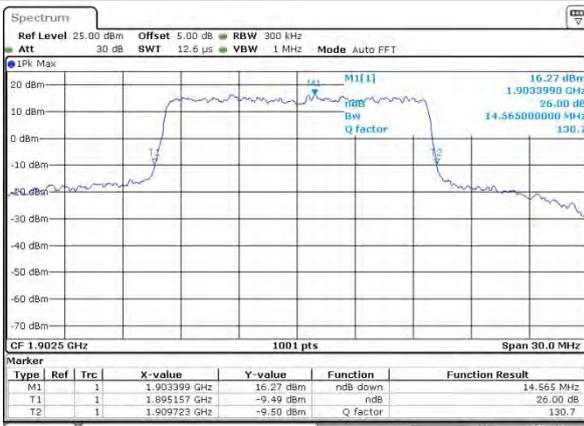
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Middle Channel / 15MHz / 16QAM



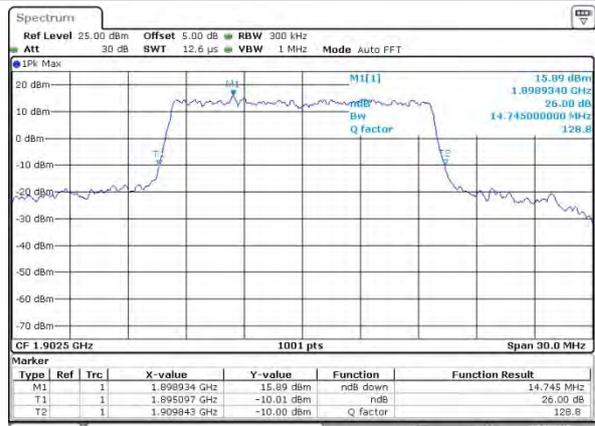
Date: 29 MAR 2015 11:29:42

Highest Channel / 15MHz / QPSK



Date: 29 MAR 2015 11:32:54

Highest Channel / 15MHz / 16QAM

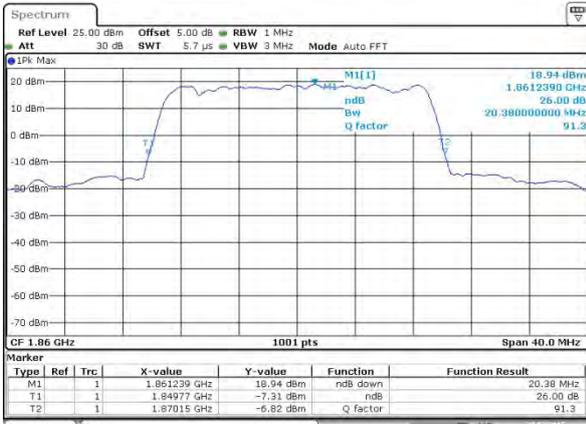


Date: 29 MAR 2015 11:33:06



LTE Band 2

Lowest Channel / 20MHz / QPSK



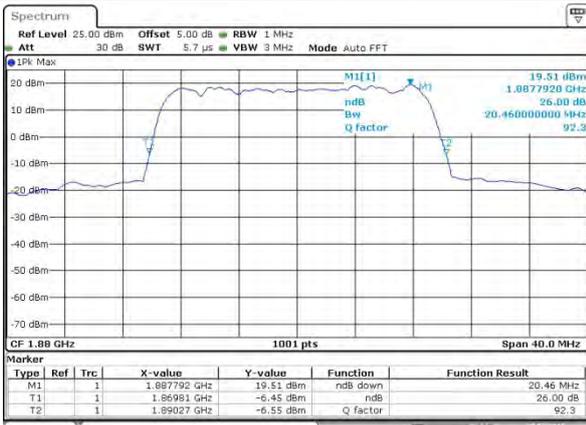
Date: 29 MAR 2015 11:39:20

Lowest Channel / 20MHz / 16QAM



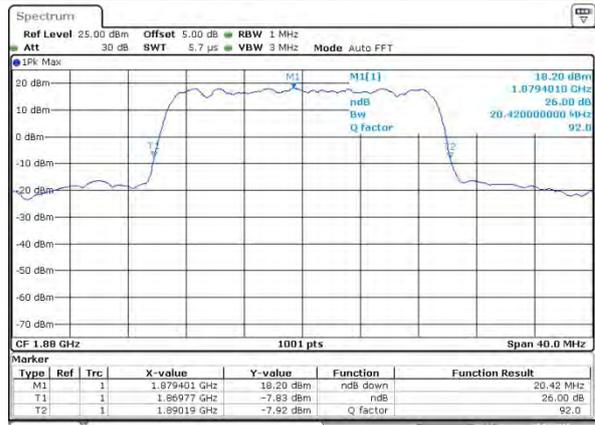
Date: 29 MAR 2015 11:39:32

Middle Channel / 20MHz / QPSK



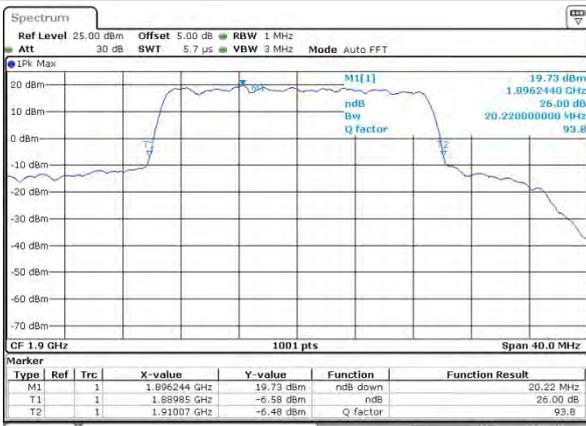
Date: 29 MAR 2015 11:39:43

Middle Channel / 20MHz / 16QAM



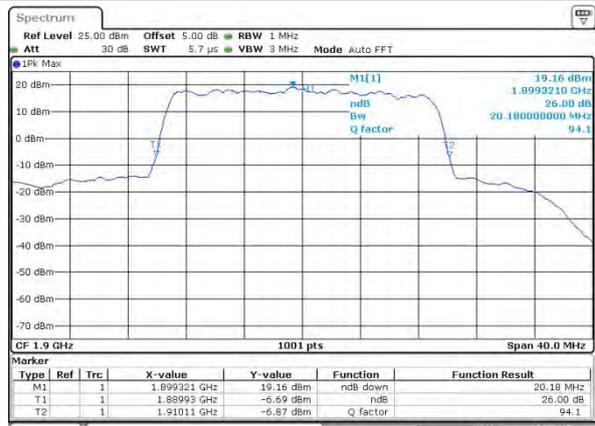
Date: 29 MAR 2015 11:39:55

Highest Channel / 20MHz / QPSK



Date: 29 MAR 2015 11:43:10

Highest Channel / 20MHz / 16QAM



Date: 29 MAR 2015 11:43:22



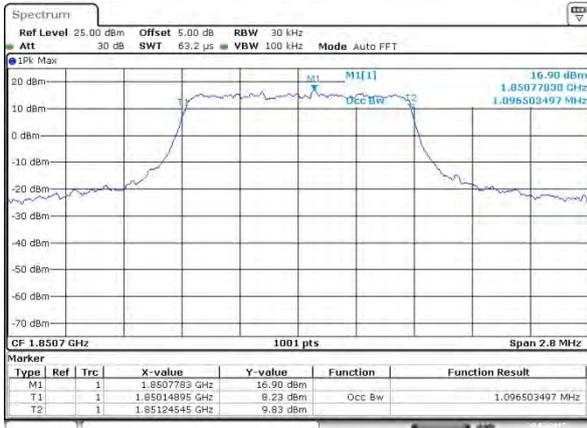
Occupied Bandwidth

| Mode | LTE Band 2 : 99%OBW(MHz) | | | | | | | | | | | |
|------------|--------------------------|-------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| | 1.4MHz | | 3MHz | | 5MHz | | 10MHz | | 15MHz | | 20MHz | |
| BW | | | | | | | | | | | | |
| Mod. | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM | QPSK | 16QAM |
| Lowest CH | 1.1 | 1.1 | 2.74 | 2.73 | 4.51 | 4.5 | 9.09 | 9.03 | 13.43 | 13.52 | 18.38 | 18.42 |
| Middle CH | 1.1 | 1.1 | 2.73 | 2.72 | 4.51 | 4.51 | 9.05 | 9.01 | 13.49 | 13.49 | 18.38 | 18.38 |
| Highest CH | 1.1 | 1.1 | 2.73 | 2.73 | 4.51 | 4.51 | 9.05 | 9.01 | 13.46 | 13.46 | 18.34 | 18.3 |



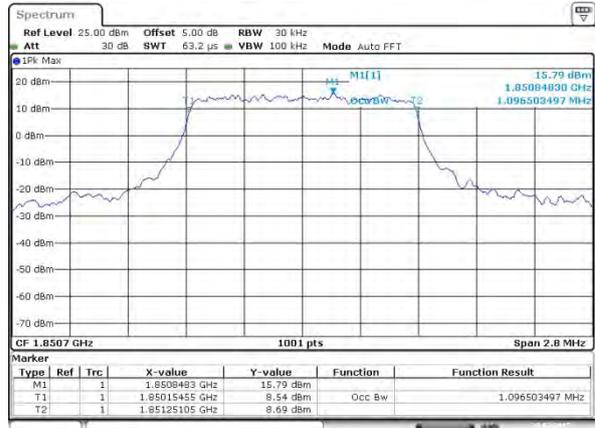
LTE Band 2

Lowest Channel / 1.4MHz / QPSK



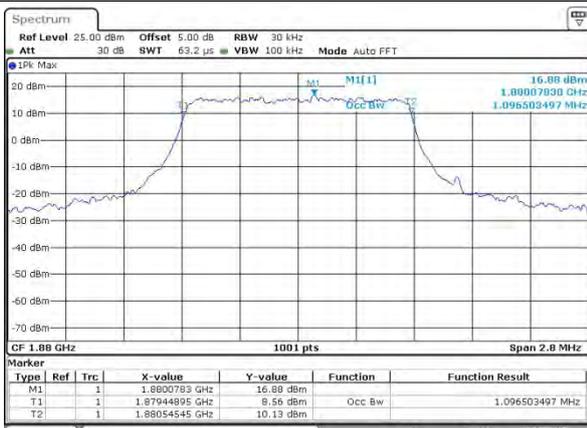
Date: 29 MAR 2015 10:44:59

Lowest Channel / 1.4MHz / 16QAM



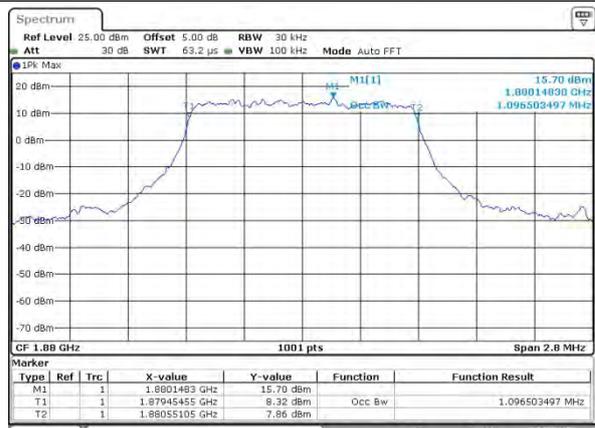
Date: 29 MAR 2015 10:45:09

Middle Channel / 1.4MHz / QPSK



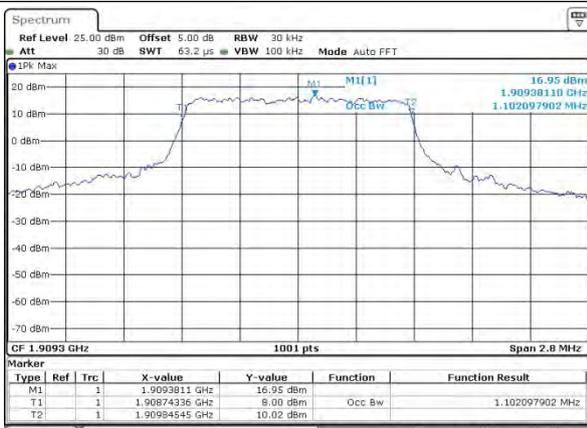
Date: 29 MAR 2015 10:48:25

Middle Channel / 1.4MHz / 16QAM



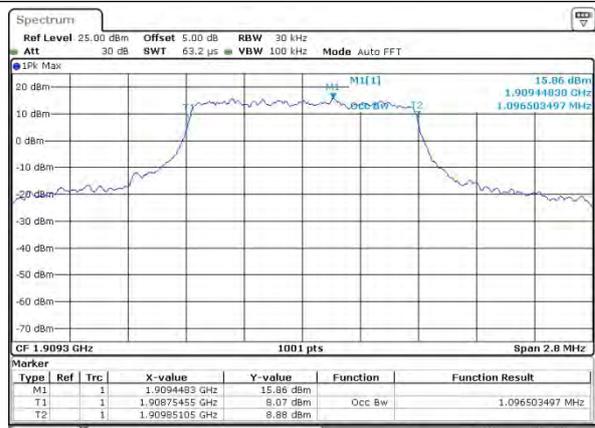
Date: 29 MAR 2015 10:48:35

Highest Channel / 1.4MHz / QPSK



Date: 29 MAR 2015 10:51:46

Highest Channel / 1.4MHz / 16QAM

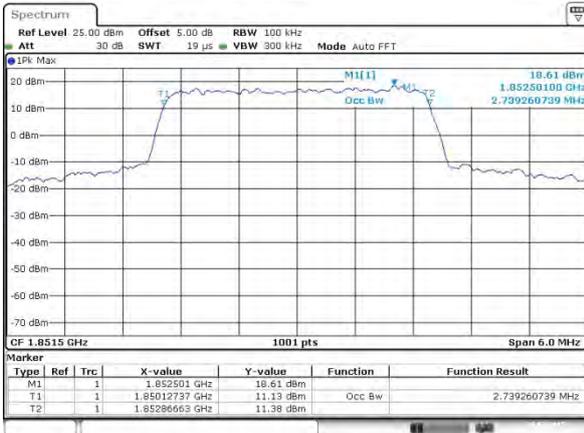


Date: 29 MAR 2015 10:51:56

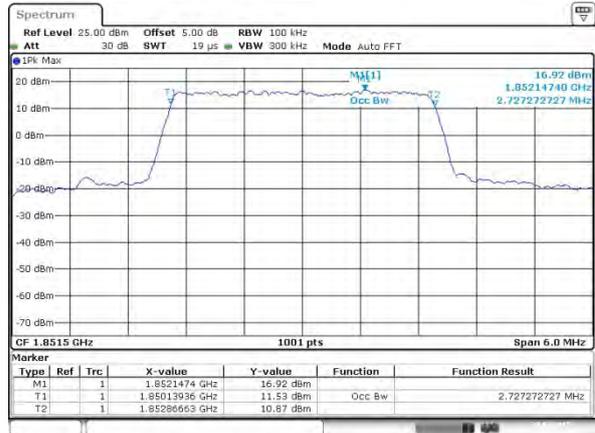


LTE Band 2

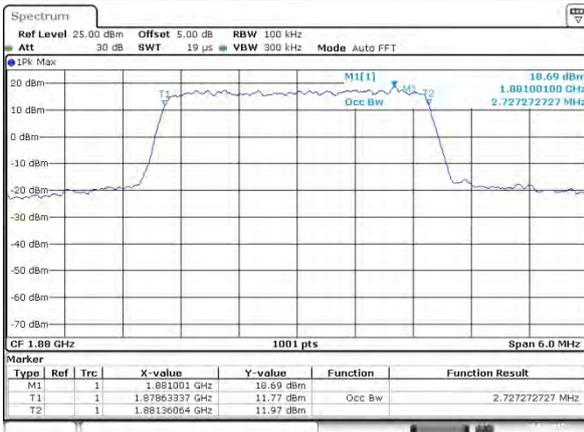
Lowest Channel / 3MHz / QPSK



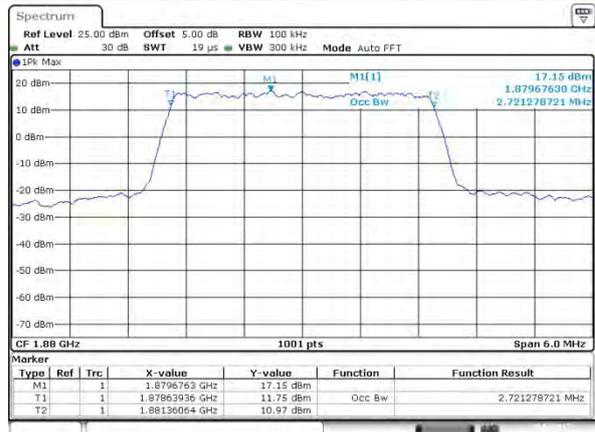
Lowest Channel / 3MHz / 16QAM



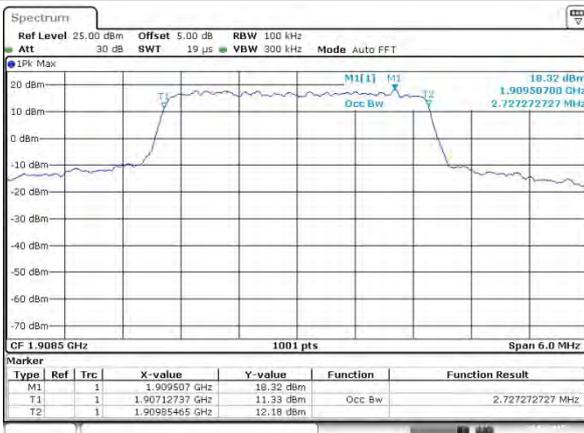
Middle Channel / 3MHz / QPSK



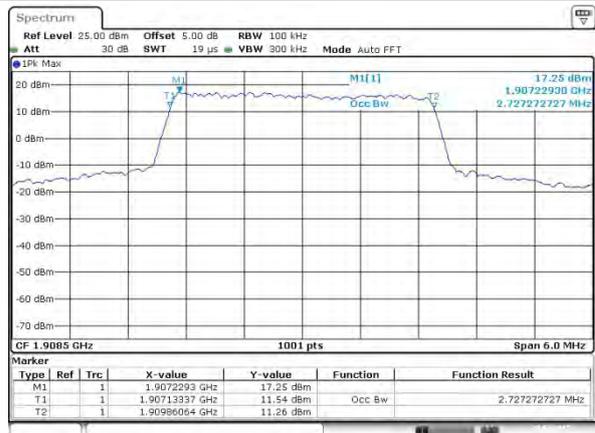
Middle Channel / 3MHz / 16QAM



Highest Channel / 3MHz / QPSK



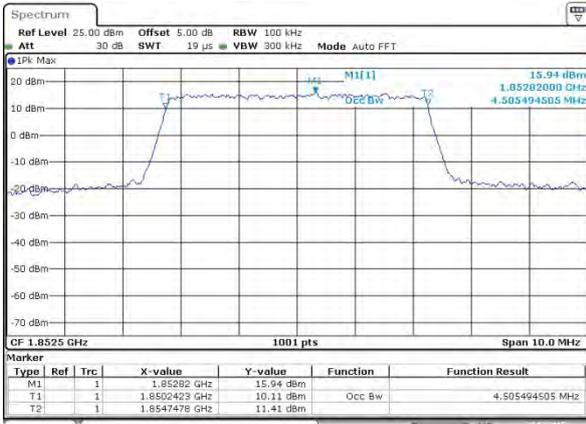
Highest Channel / 3MHz / 16QAM





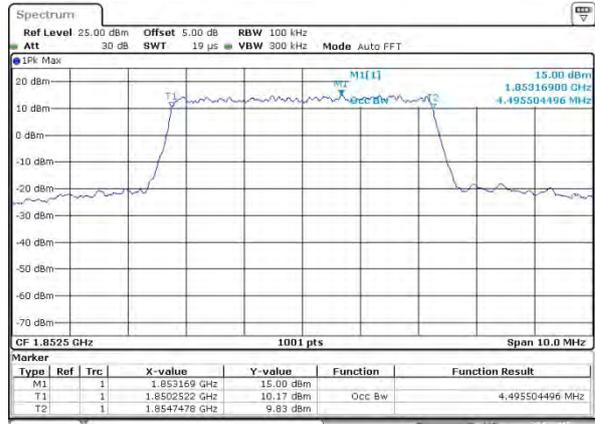
LTE Band 2

Lowest Channel / 5MHz / QPSK



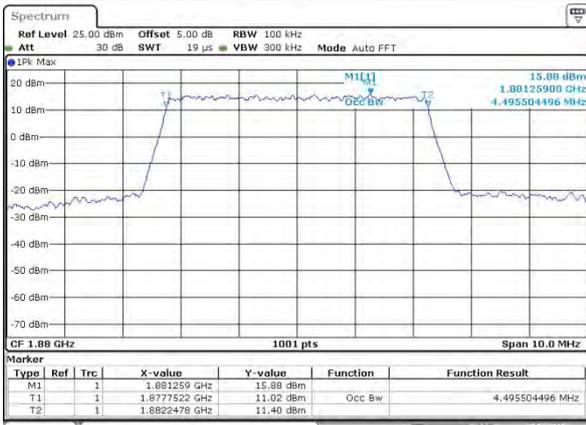
Date: 29 MAR 2015 11:05:23

Lowest Channel / 5MHz / 16QAM



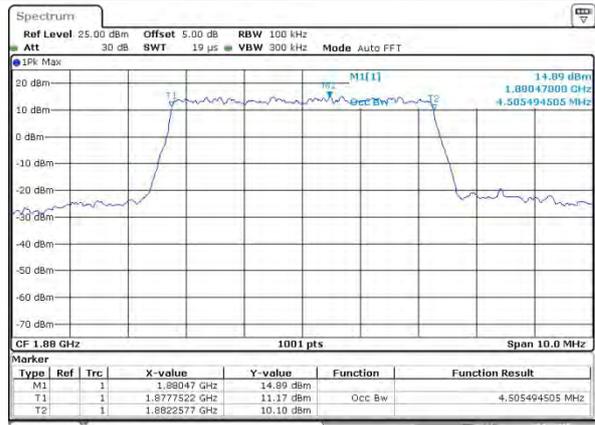
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Middle Channel / 5MHz / QPSK



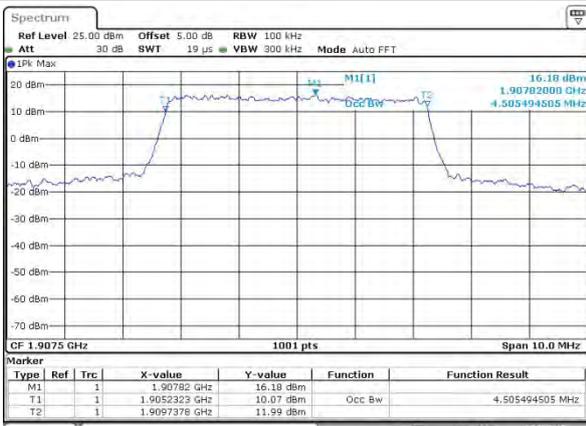
Date: 29 MAR 2015 11:08:46

Middle Channel / 5MHz / 16QAM



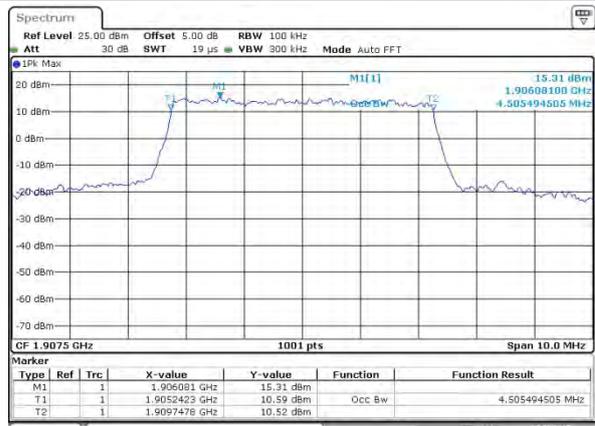
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Highest Channel / 5MHz / QPSK



Date: 29 MAR 2015 11:12:07

Highest Channel / 5MHz / 16QAM

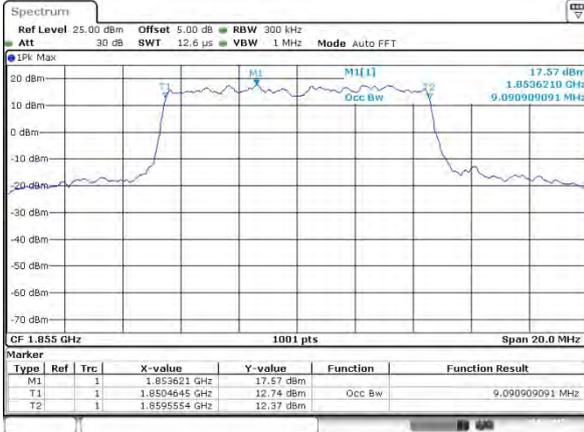


Date: 29 MAR 2015 11:12:17



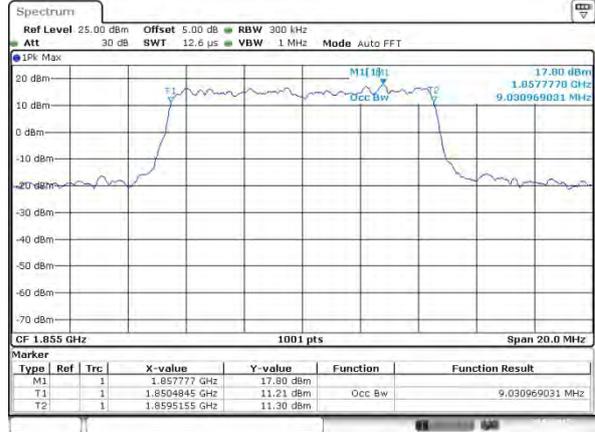
LTE Band 2

Lowest Channel / 10MHz / QPSK



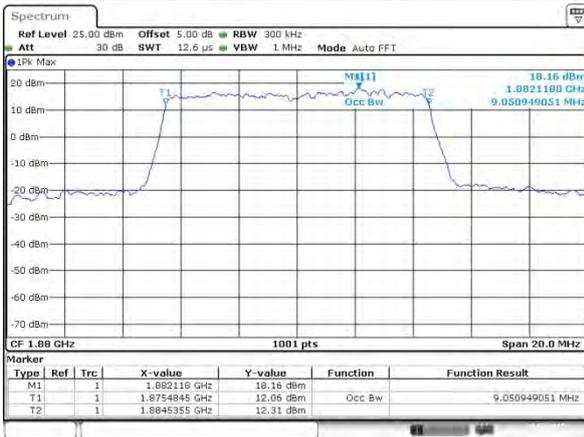
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Lowest Channel / 10MHz / 16QAM



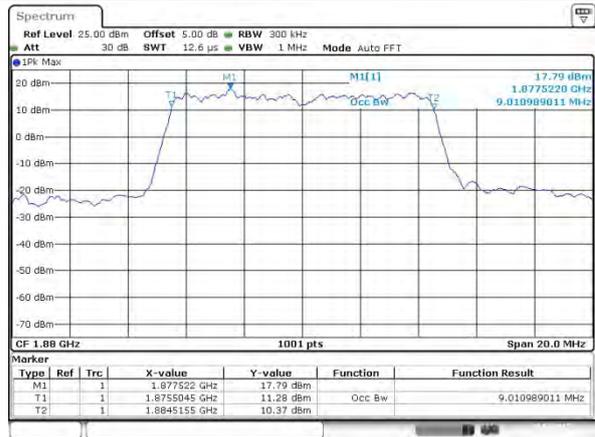
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Middle Channel / 10MHz / QPSK



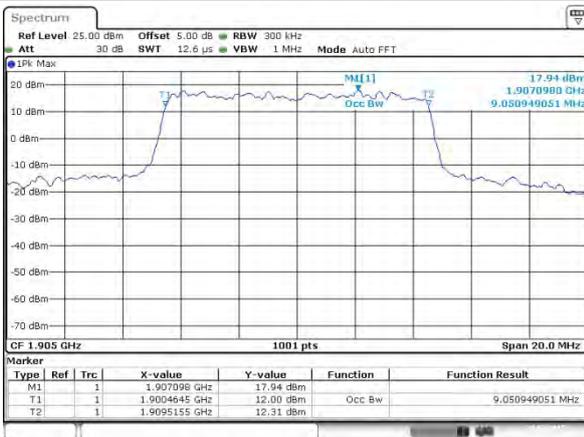
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Middle Channel / 10MHz / 16QAM



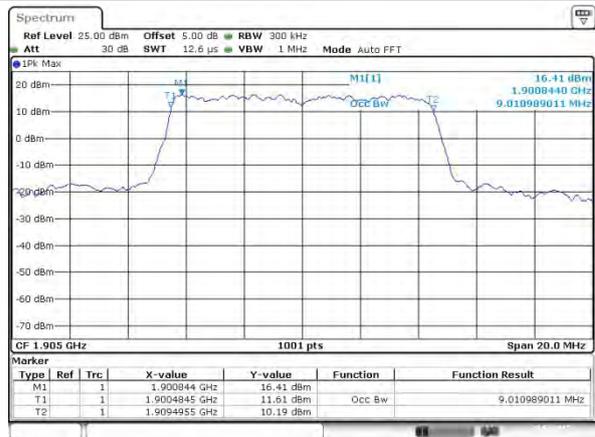
Date: 29 MAR 2015 11:19:04

Highest Channel / 10MHz / QPSK



Date: 29 MAR 2015 11:22:17

Highest Channel / 10MHz / 16QAM

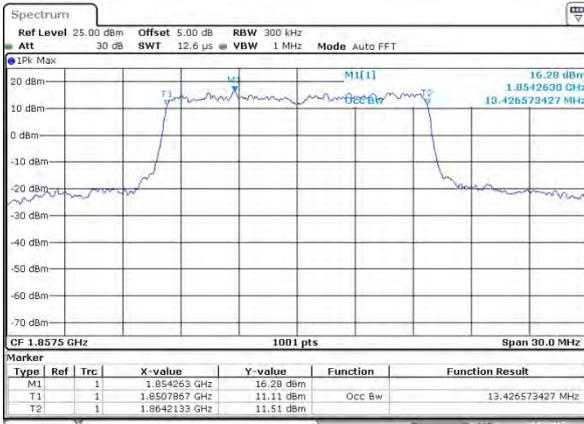


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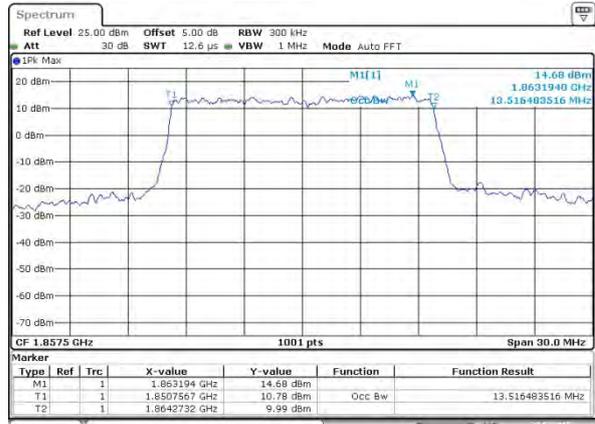
LTE Band 2

Lowest Channel / 15MHz / QPSK



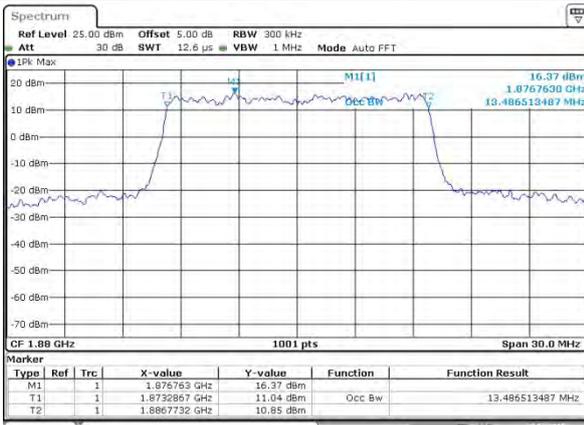
Date: 29 MAR 2015 11:25:41

Lowest Channel / 15MHz / 16QAM



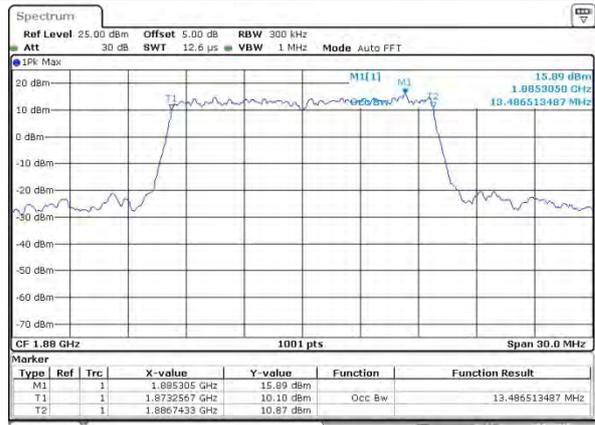
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Middle Channel / 15MHz / QPSK



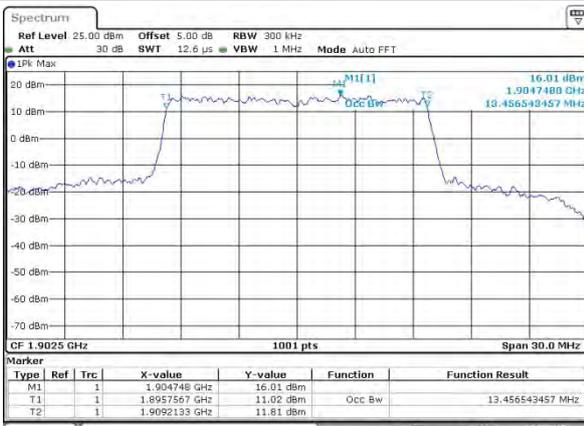
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Middle Channel / 15MHz / 16QAM



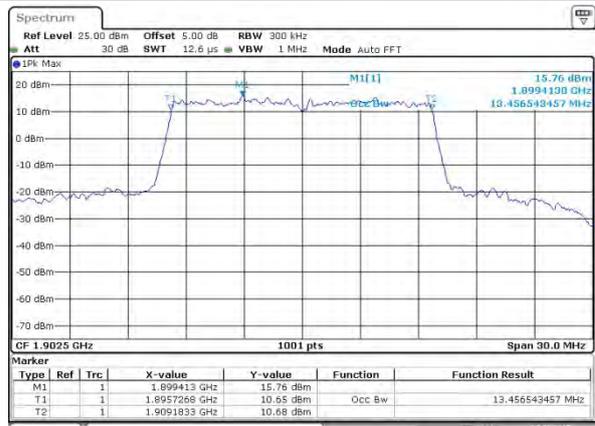
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Highest Channel / 15MHz / QPSK



Date: 29 MAR 2015 11:32:32

Highest Channel / 15MHz / 16QAM

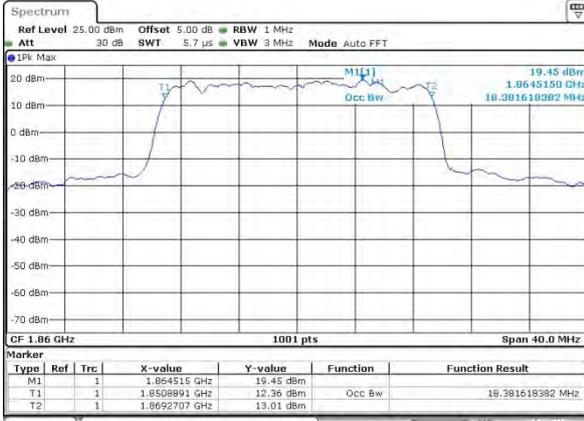


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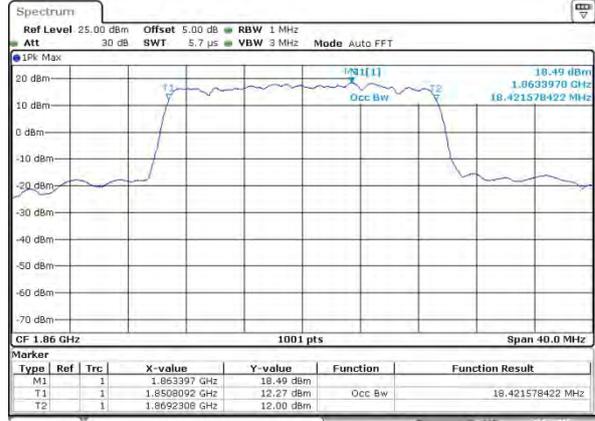
LTE Band 2

Lowest Channel / 20MHz / QPSK



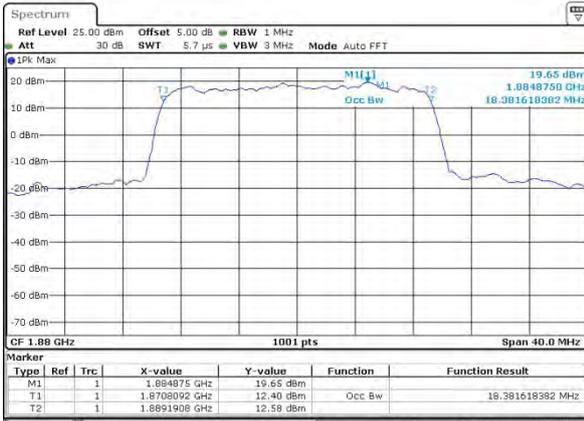
Date: 29 MAR 2015 11:35:58

Lowest Channel / 20MHz / 16QAM



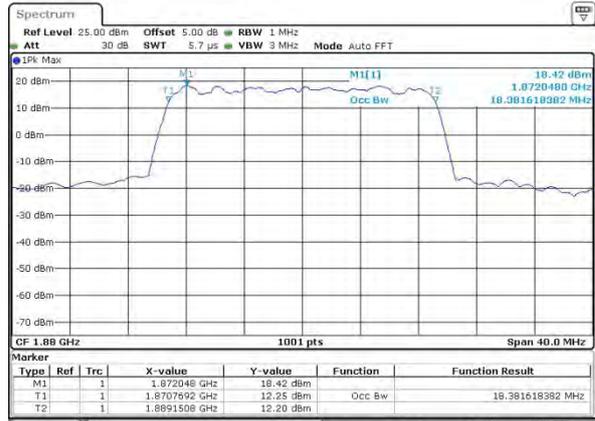
Date: 29 MAR 2015 11:38:08

Middle Channel / 20MHz / QPSK



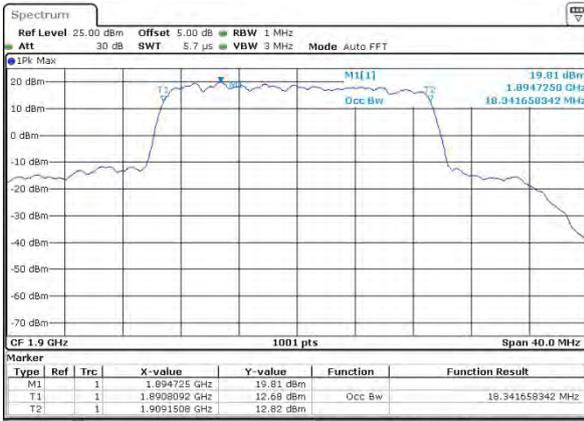
Date: 29 MAR 2015 11:39:22

Middle Channel / 20MHz / 16QAM



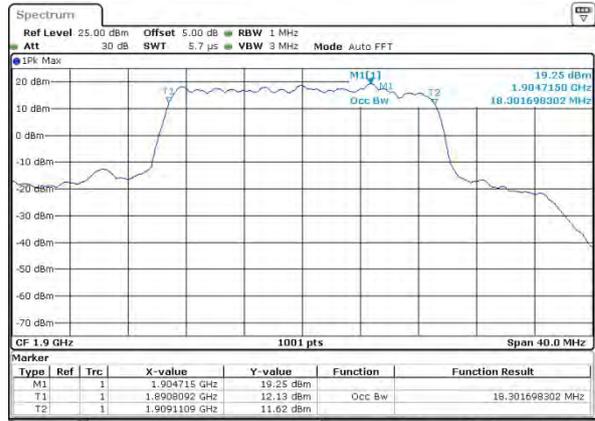
Date: 29 MAR 2015 11:39:32

Highest Channel / 20MHz / QPSK



Date: 29 MAR 2015 11:42:48

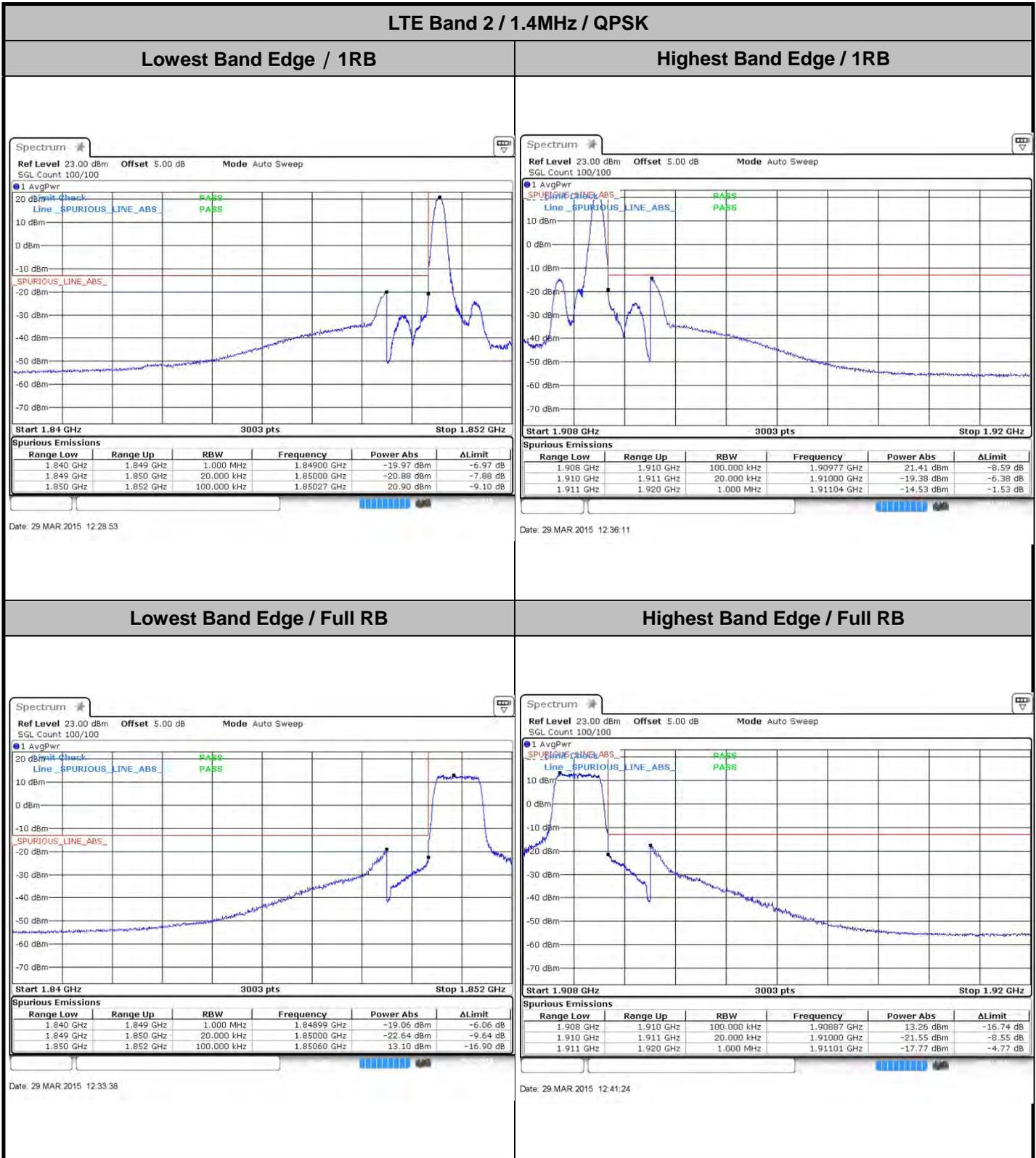
Highest Channel / 20MHz / 16QAM



Date: 29 MAR 2015 11:42:58

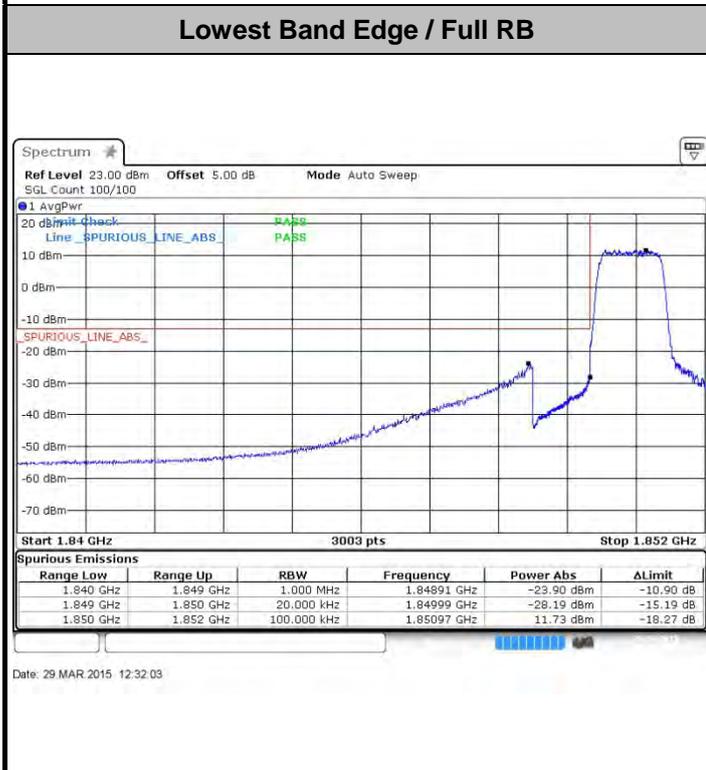
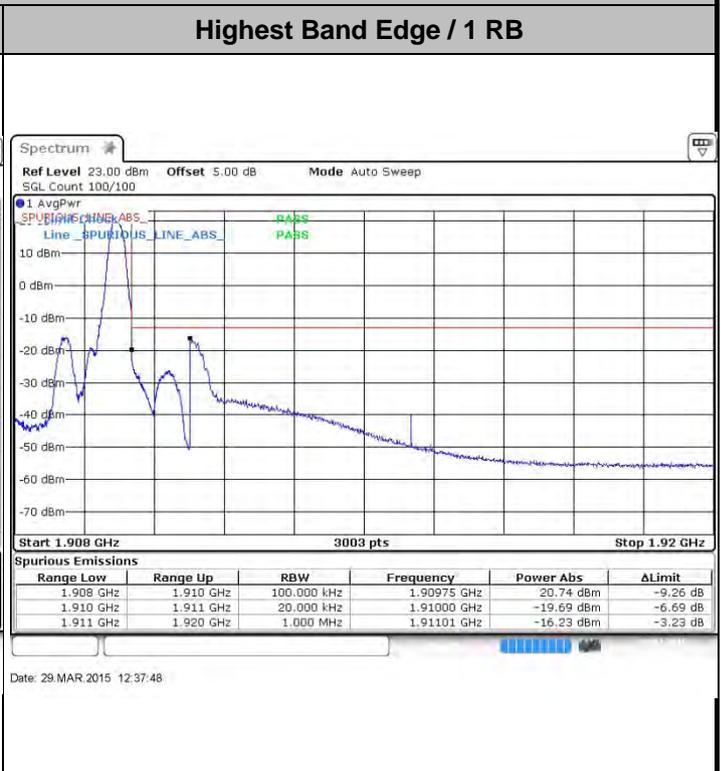
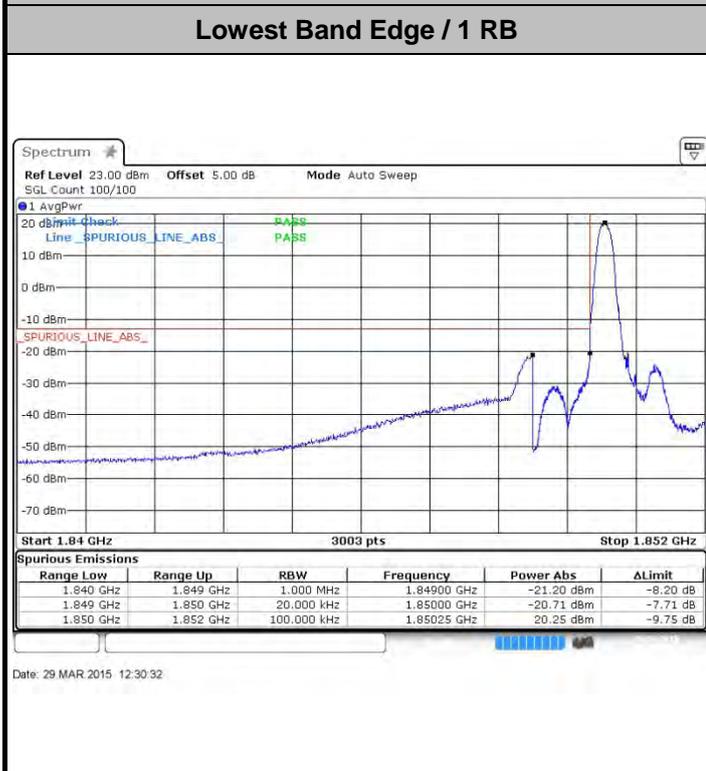


Conducted Band Edge





LTE Band 2 / 1.4MHz / 16QAM

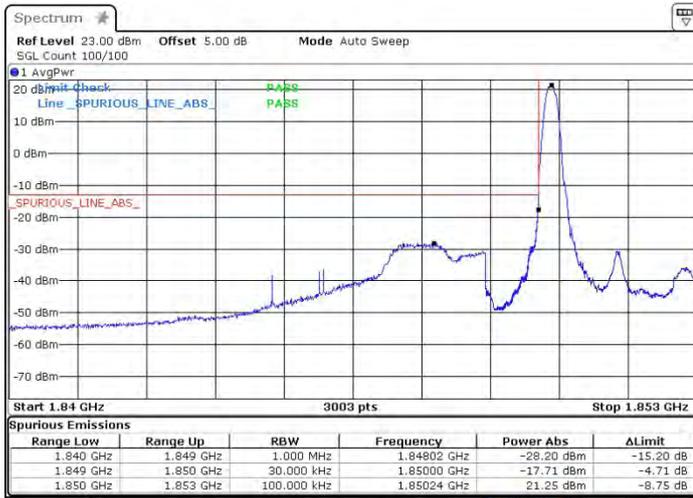




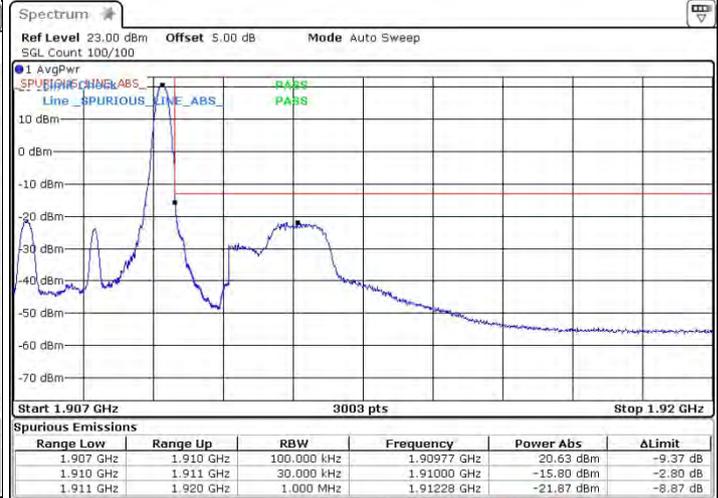
LTE Band 2 / 3MHz / QPSK

Lowest Band Edge / 1RB

Highest Band Edge / 1 RB



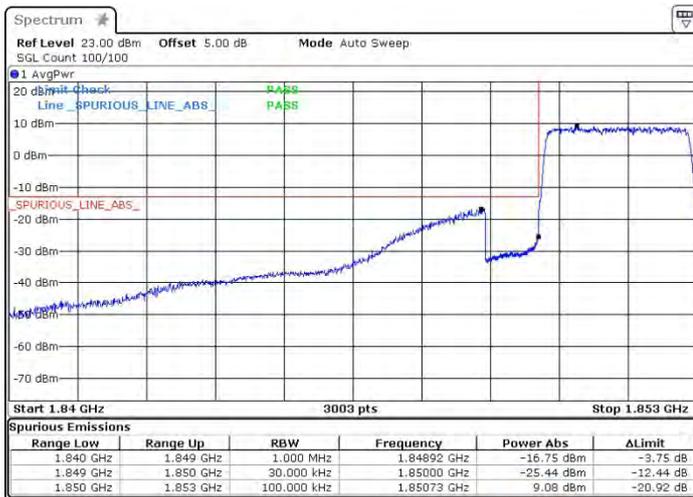
Date: 29 MAR 2015 12:19:08



Date: 29.MAR 2015 12:23:18

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:21:58



Date: 29.MAR 2015 12:26:23



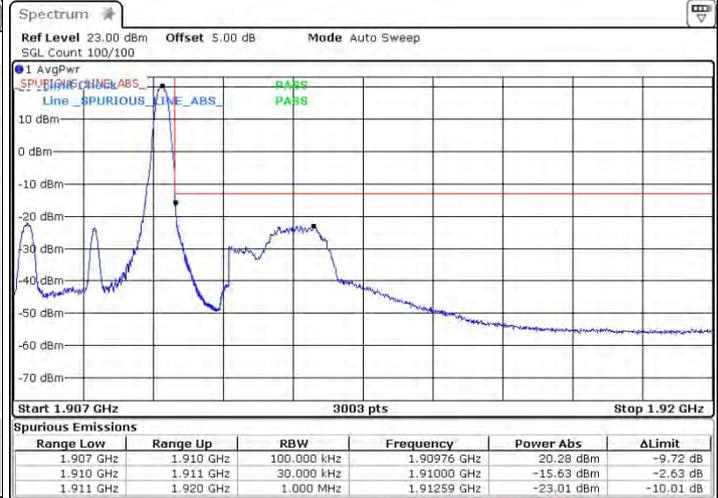
LTE Band 2 / 3MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



Date: 29 MAR 2015 12:20:03



Date: 29.MAR 2015 12:24:33

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:21:00



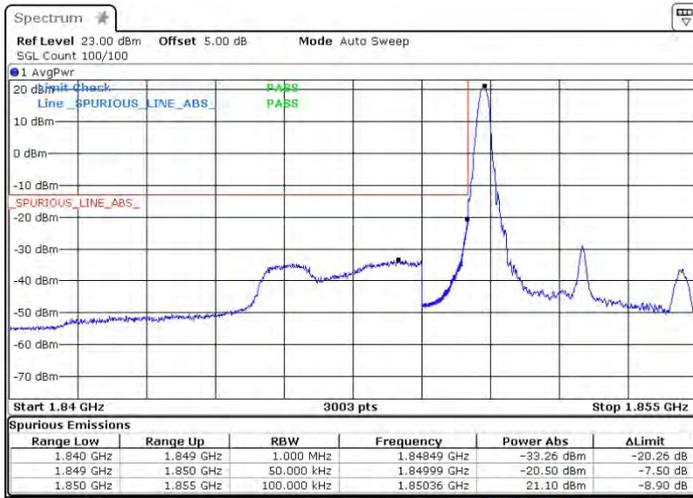
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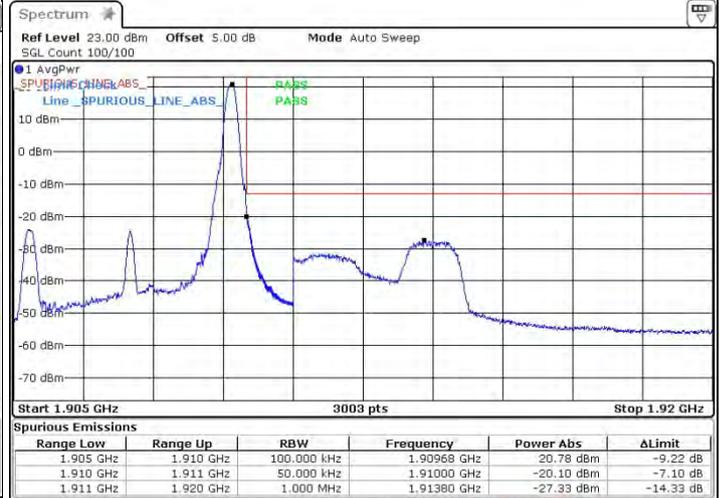
LTE Band 2 / 5MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



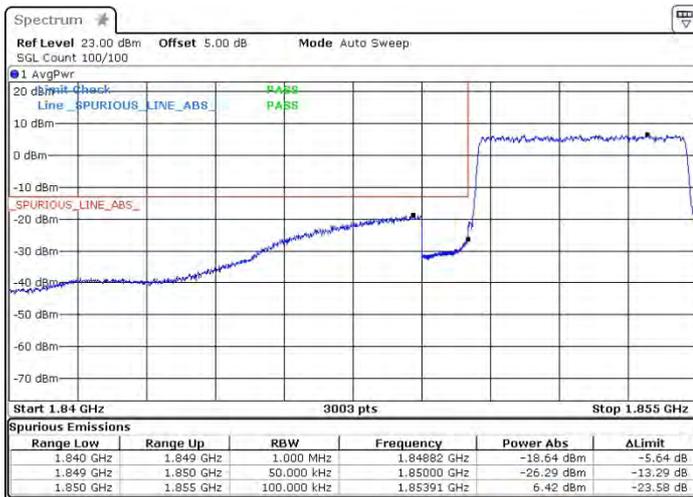
Date: 29 MAR 2015 12:11:02



Date: 29.MAR 2015 12:16:15

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:12:42



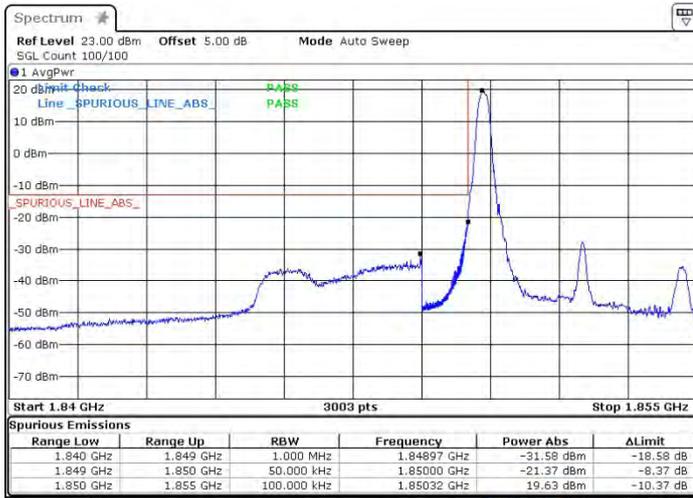
Date: 29.MAR 2015 12:13:35



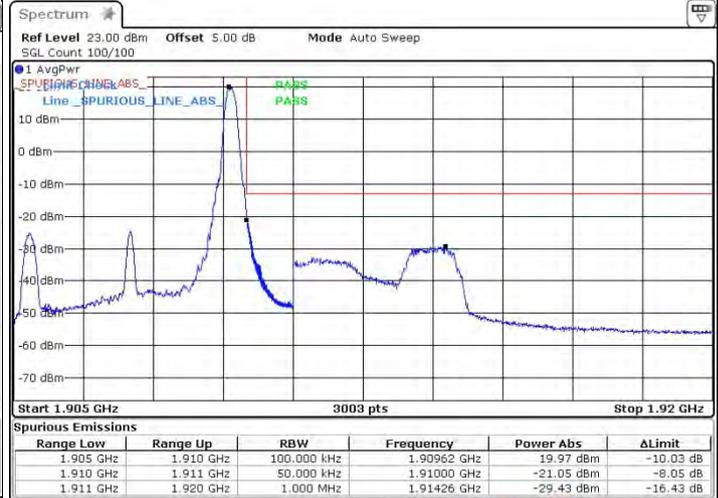
LTE Band 2 / 5MHz / 16QAM

Lowest Band Edge / 1RB

Highest Band Edge / 1 RB



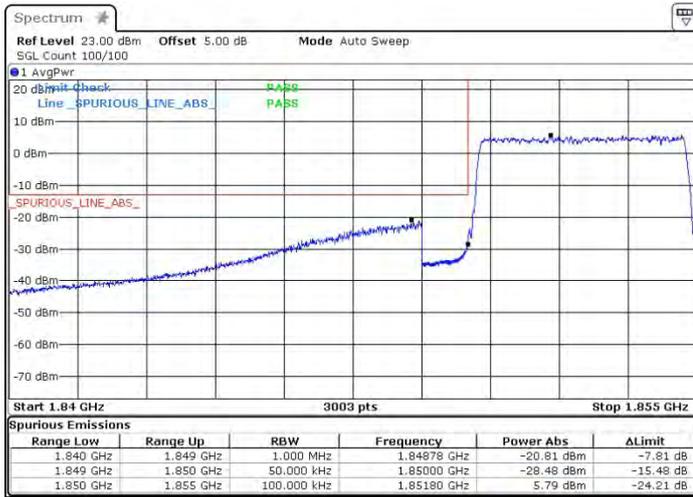
Date: 29 MAR 2015 12:11:34



Date: 29.MAR 2015 12:15:06

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:12:12



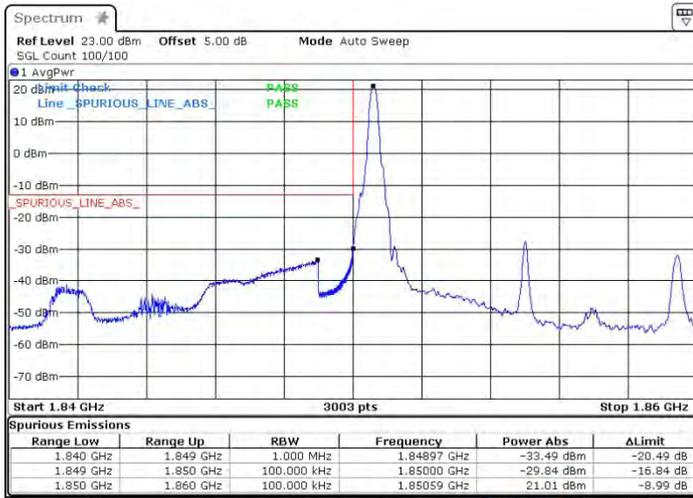
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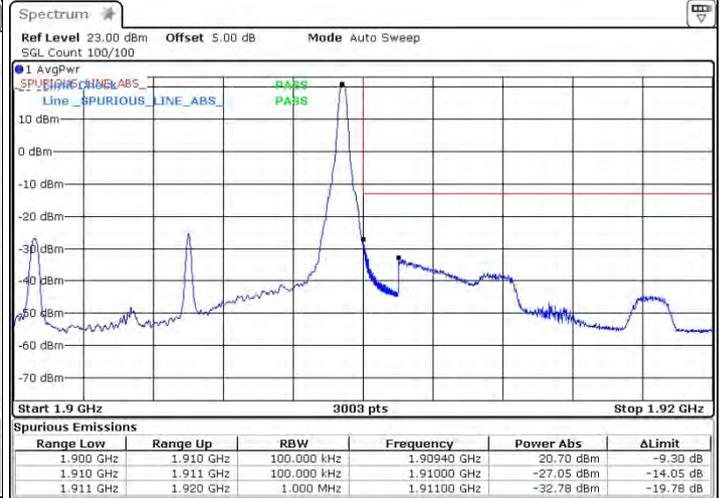
LTE Band 2 / 10MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



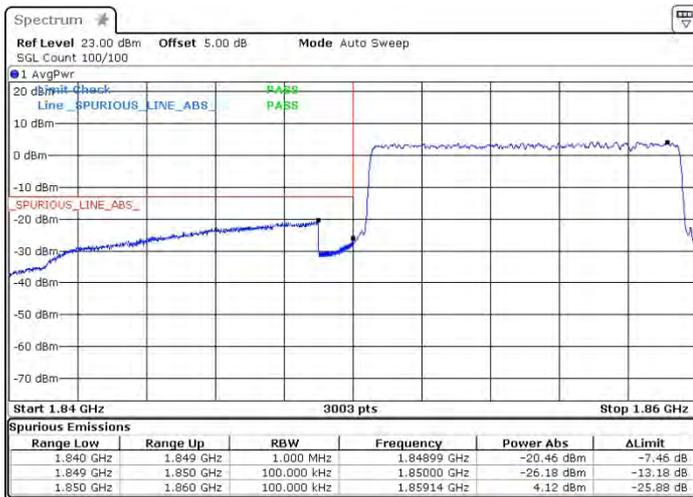
Date: 29.MAR.2015 12:03:59



Date: 29.MAR.2015 12:09:37

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29.MAR.2015 12:07:13



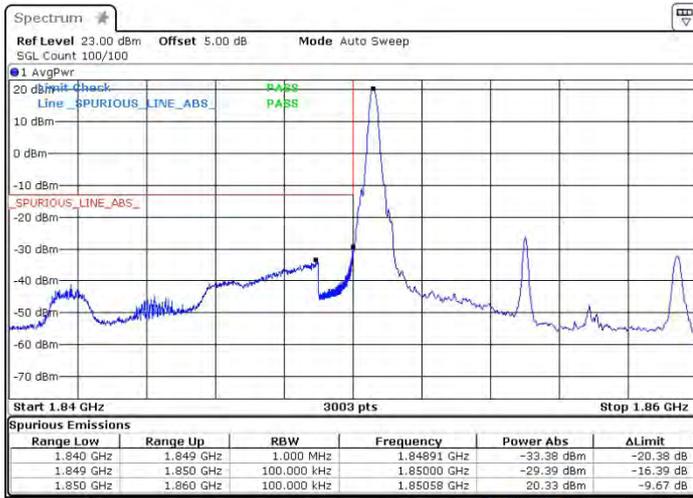
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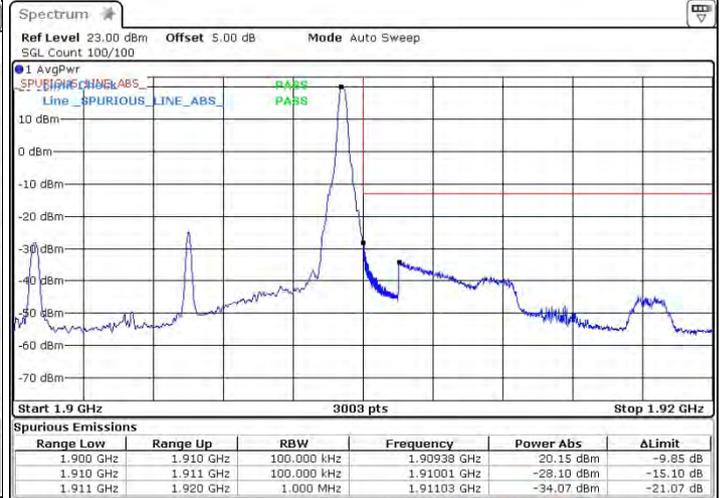
LTE Band 2 / 10MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



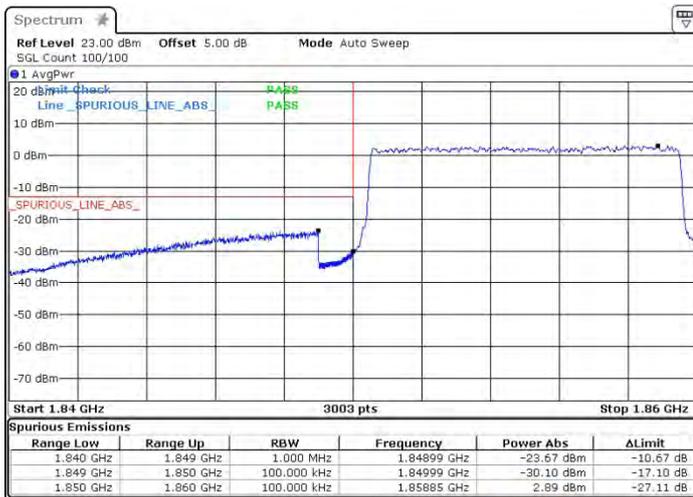
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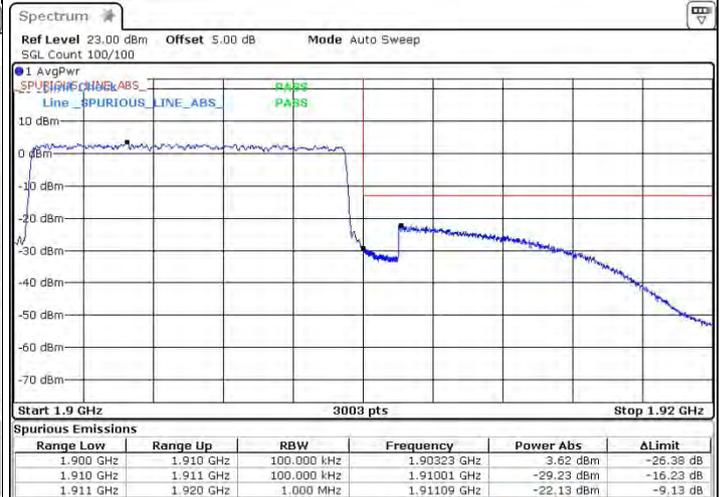
Date: 29.MAR 2015 12:08:59

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:06:30



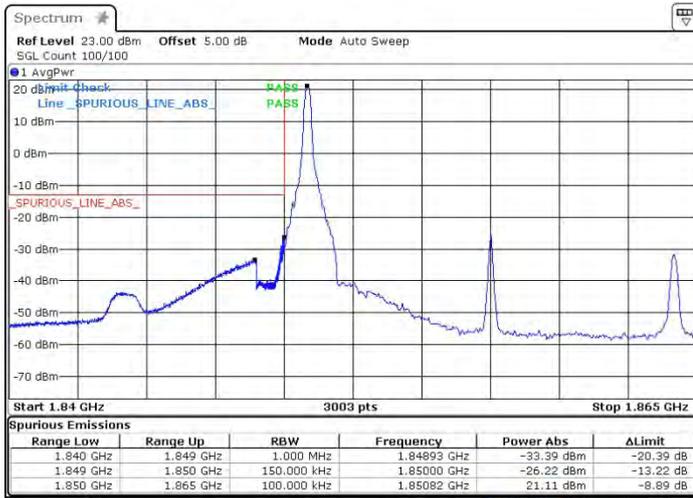
Date: 29.MAR 2015 12:08:31



LTE Band 2 / 15MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



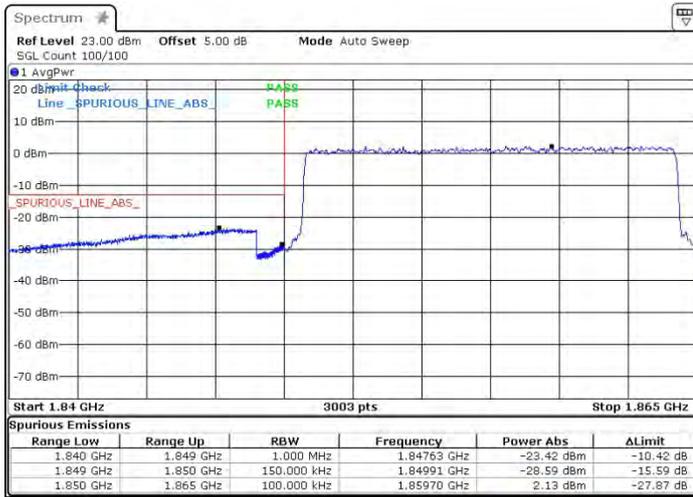
Date: 29 MAR 2015 11:58:17



Date: 29.MAR 2015 12:01:03

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 12:00:08



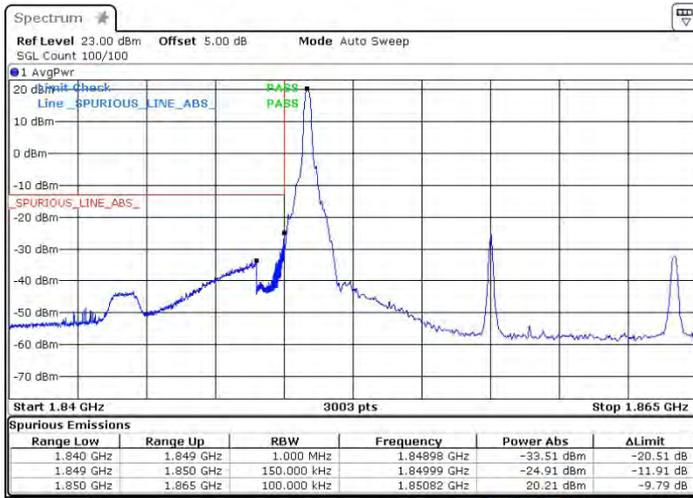
Date: 29.MAR 2015 12:02:33



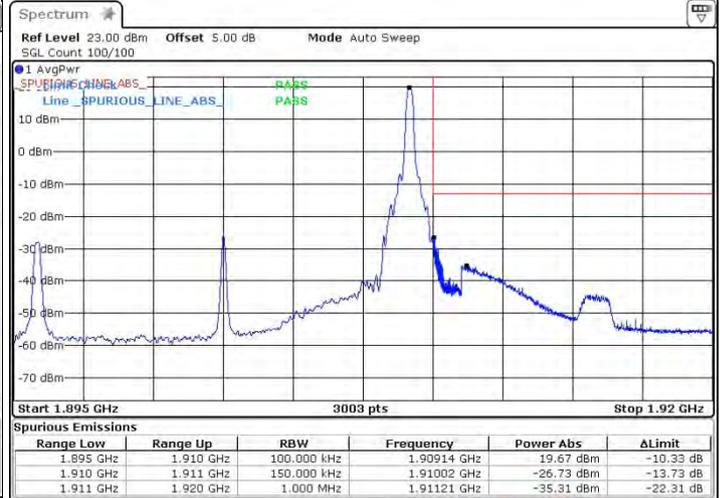
LTE Band 2 / 15MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



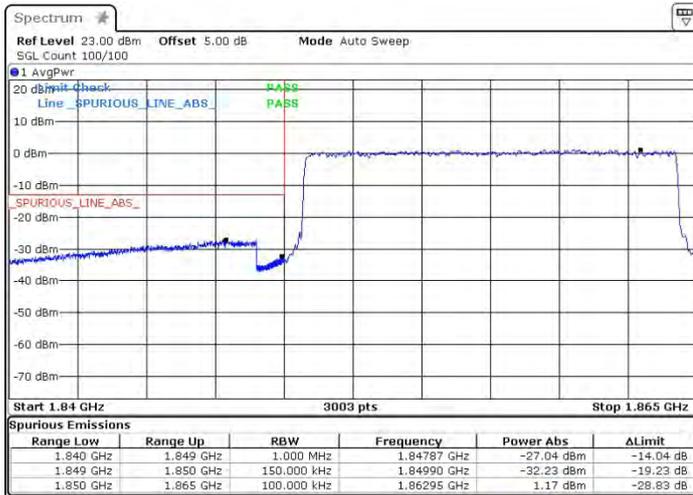
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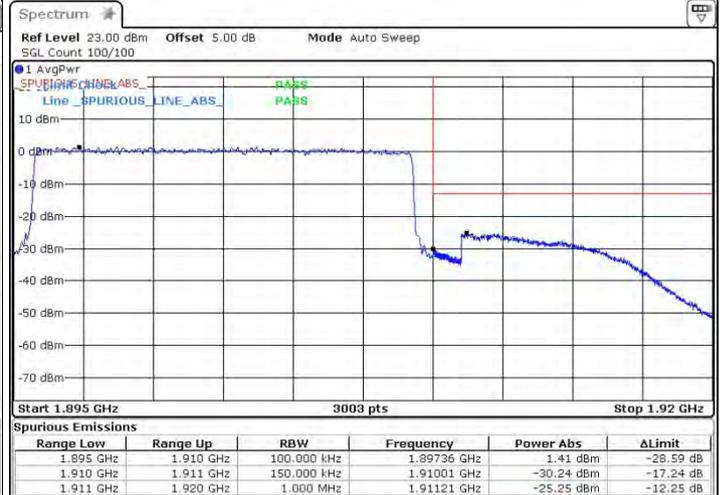
Date: 29.MAR 2015 12:01:38

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 11:59:30



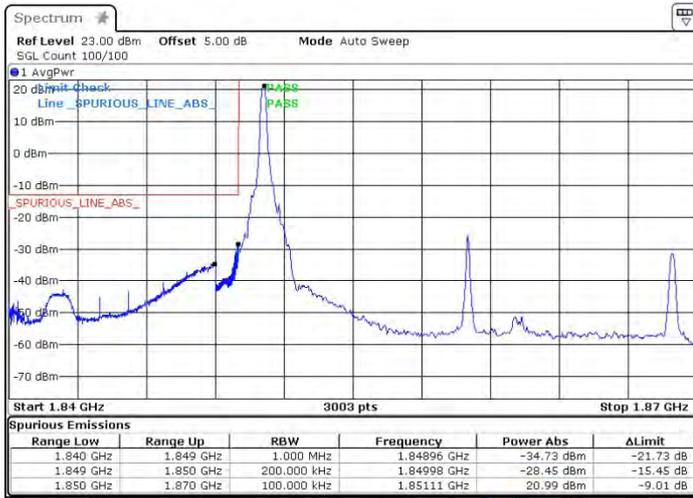
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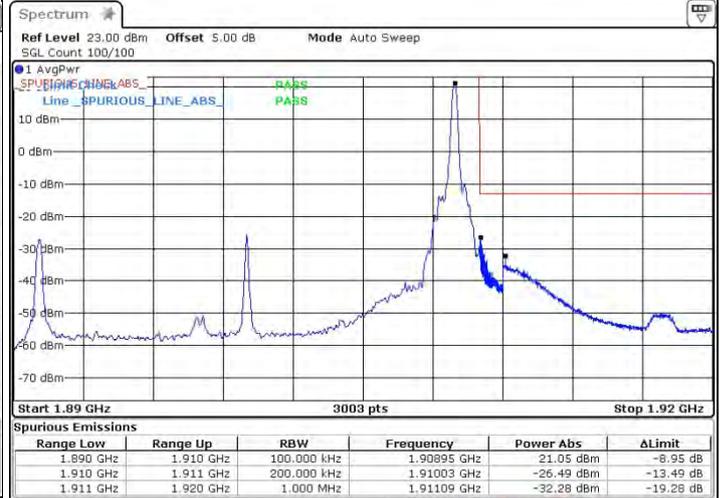
LTE Band 2 / 20MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



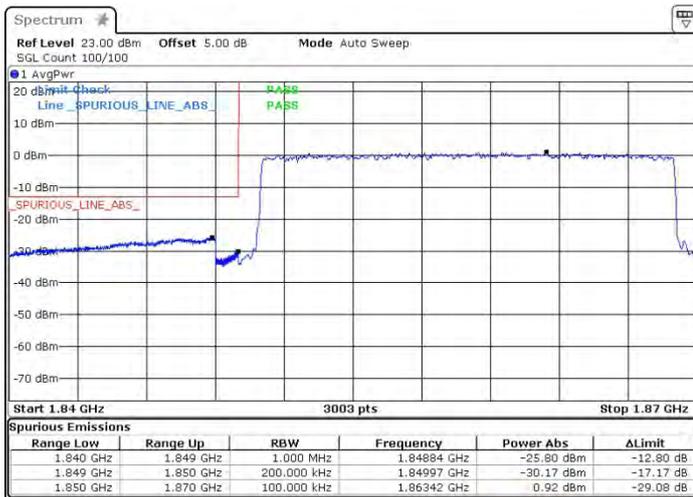
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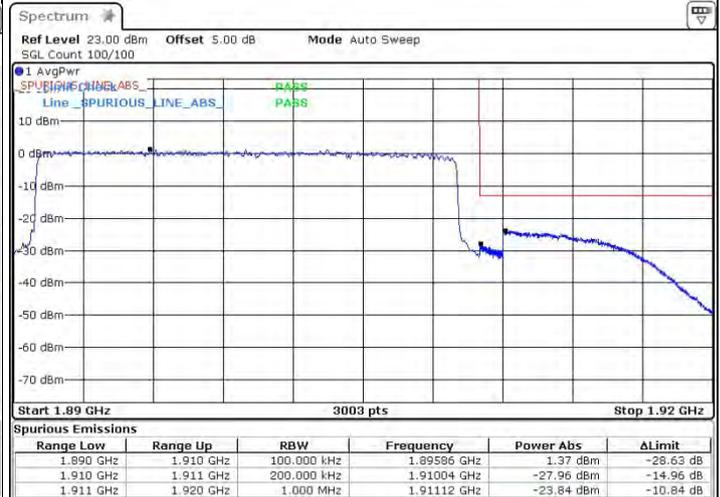
Date: 29.MAR 2015 11:54:40

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 29 MAR 2015 11:53:41



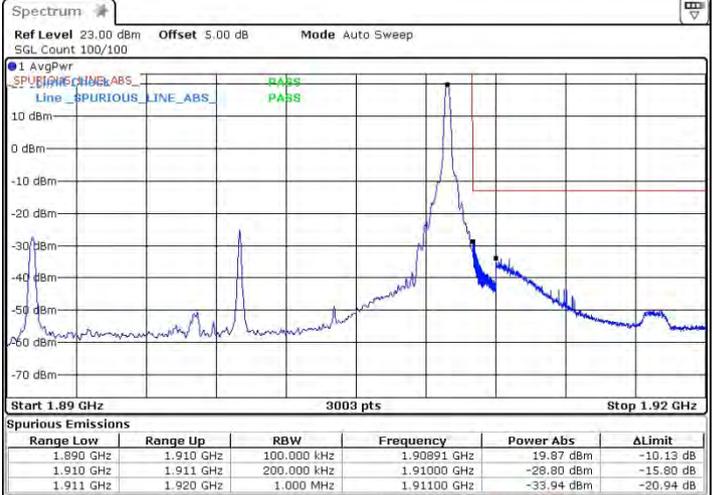
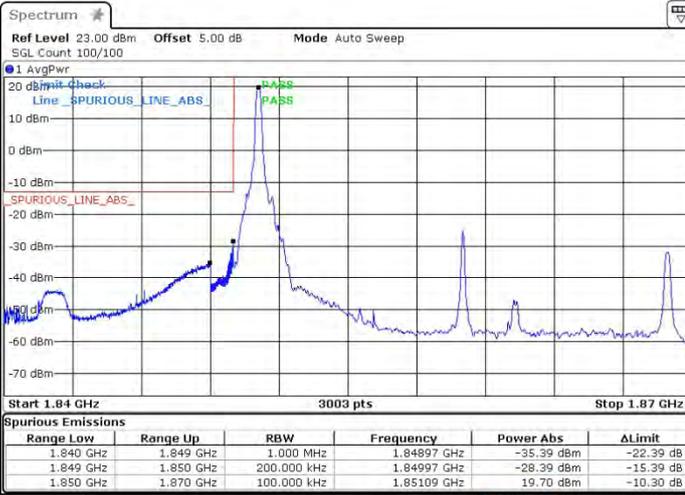
Date: 29.MAR 2015 11:58:57



LTE Band 2 / 20MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB

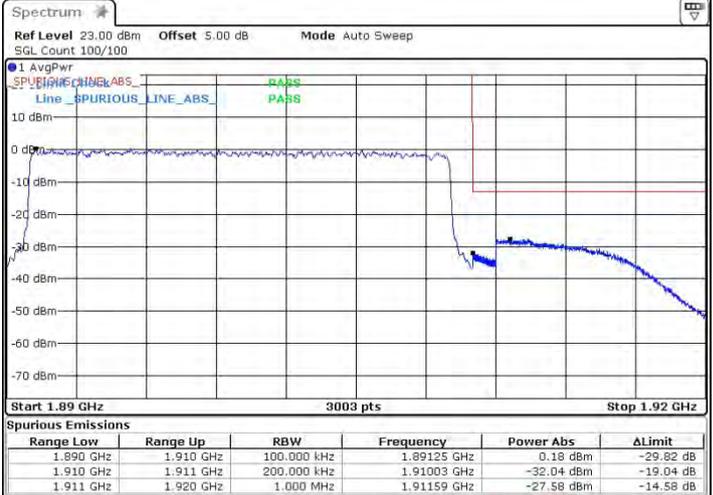
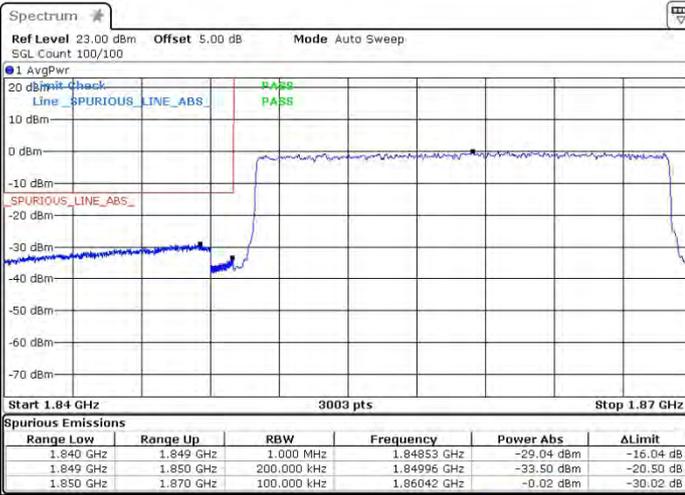


Date: 29 MAR 2015 11:52:31

Date: 29.MAR 2015 11:55:11

Lowest Band Edge / Full RB

Highest Band Edge / Full RB

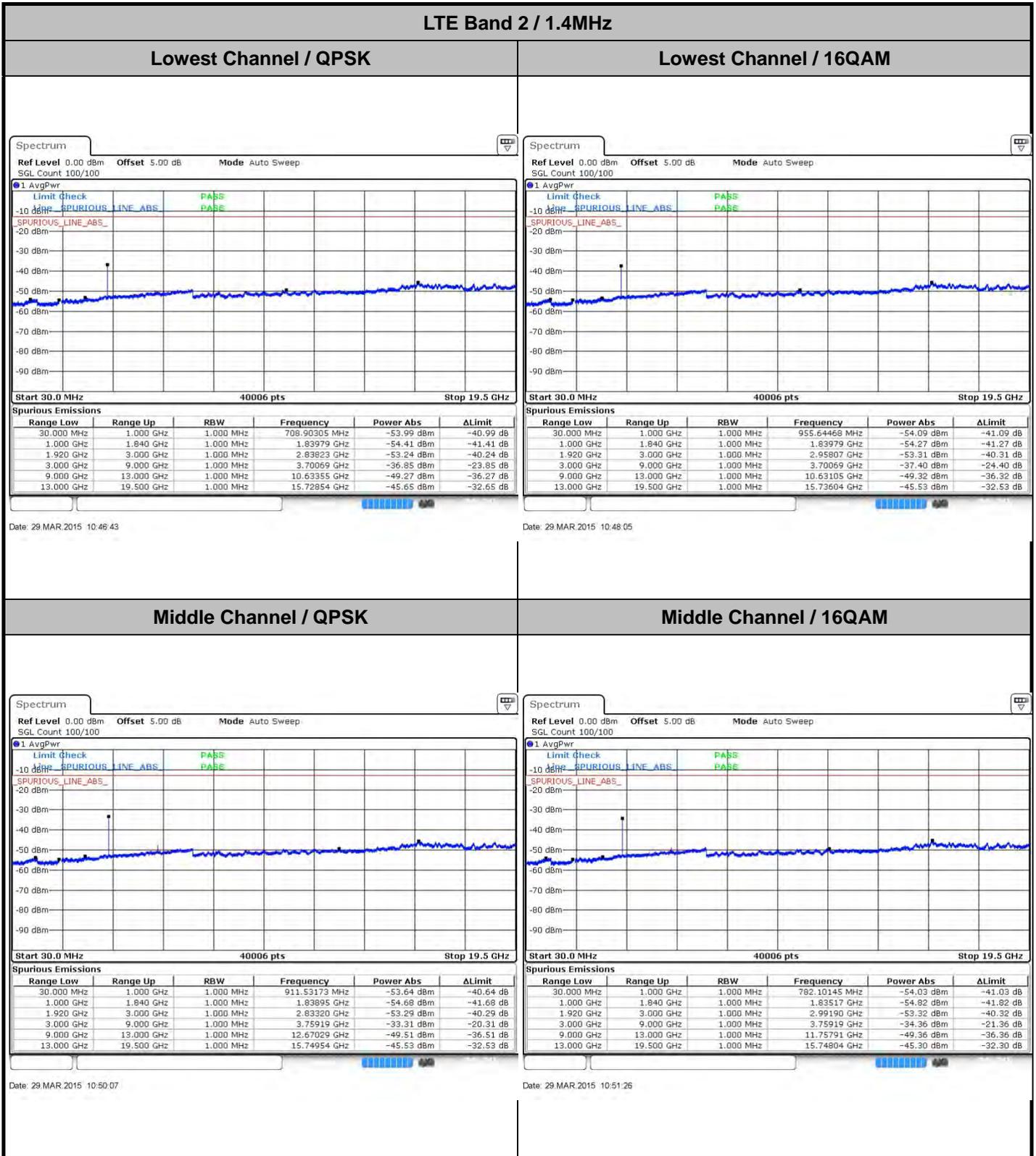


Date: 29 MAR 2015 11:53:07

Date: 29.MAR 2015 11:55:51



Conducted Spurious Emission

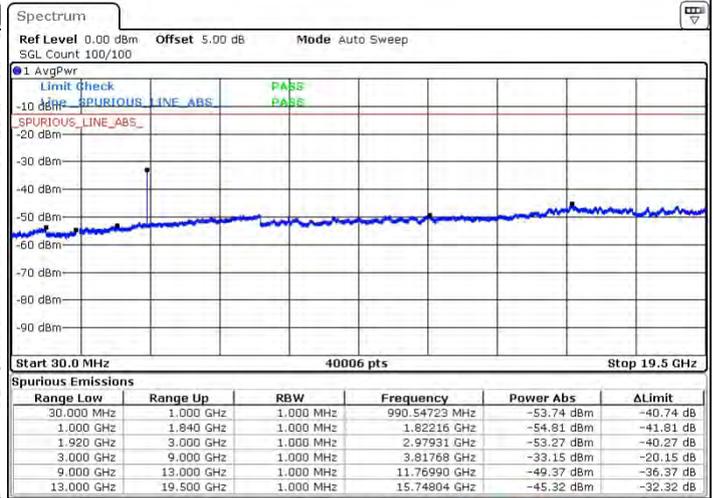
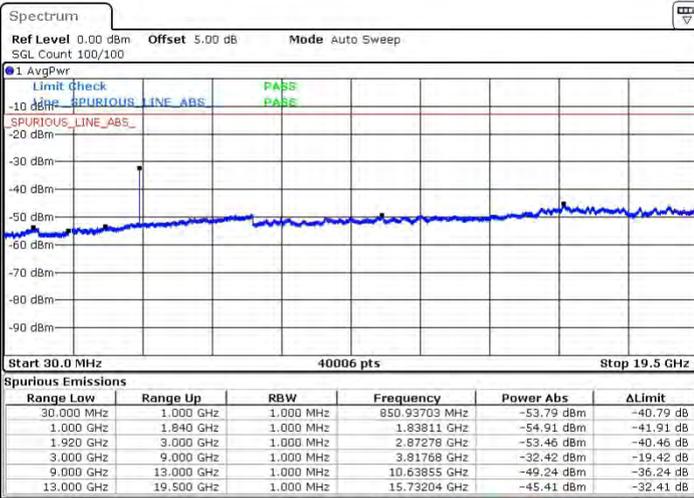




LTE Band 2 / 1.4MHz

Highest Channel / QPSK

Highest Channel / 16QAM



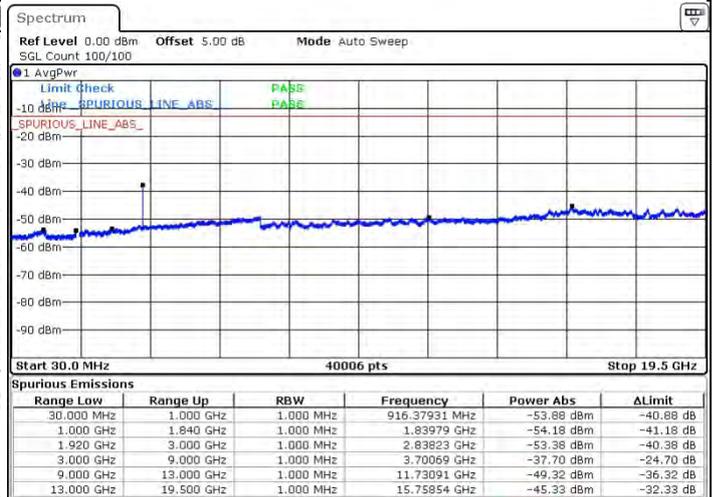
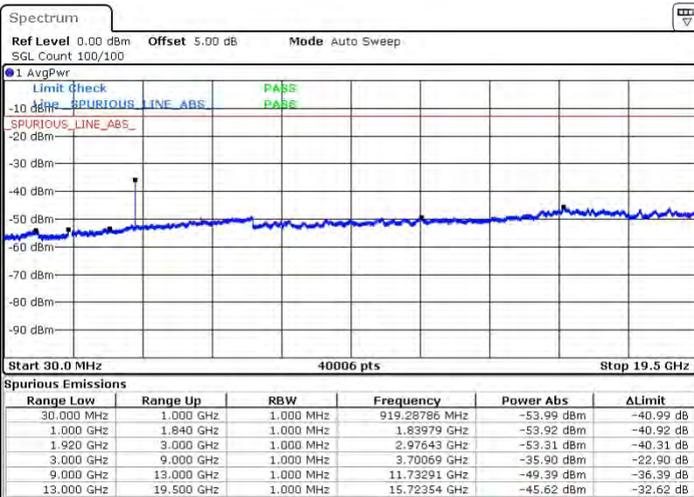
Date: 29 MAR 2015 10:53:32

Date: 29 MAR 2015 10:54:50

LTE Band 2 / 3MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM



Date: 29 MAR 2015 10:56:53

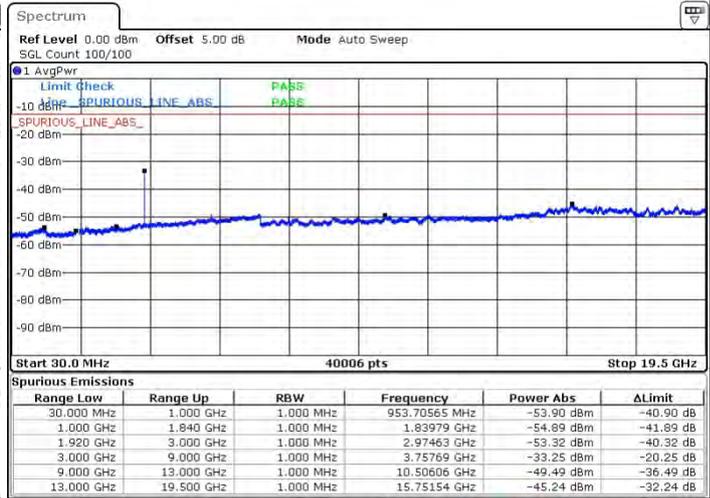
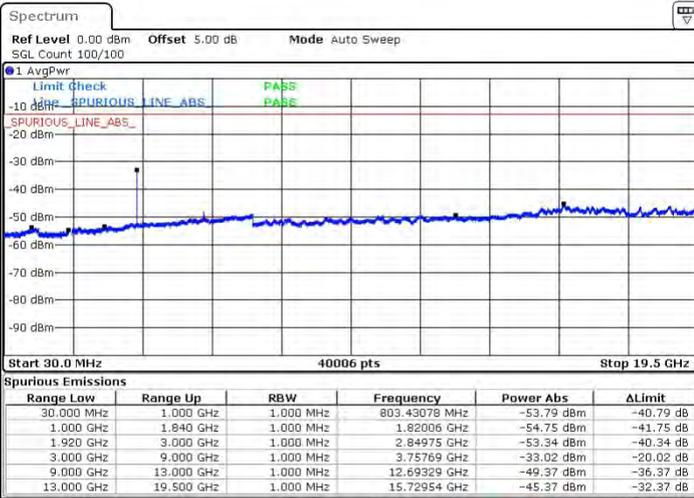
Date: 29 MAR 2015 10:58:14



LTE Band 2 / 3MHz

Middle Channel / QPSK

Middle Channel / 16QAM

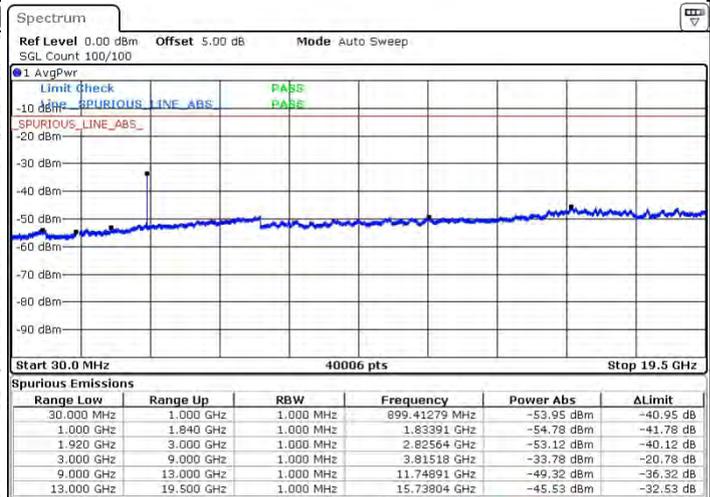
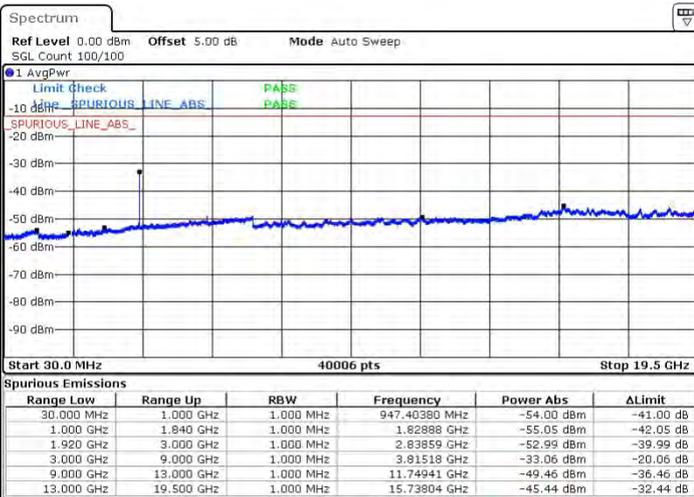


Date: 29 MAR 2015 11:00:17

Date: 29 MAR 2015 11:01:39

Highest Channel / QPSK

Highest Channel / 16QAM



Date: 29 MAR 2015 11:03:41

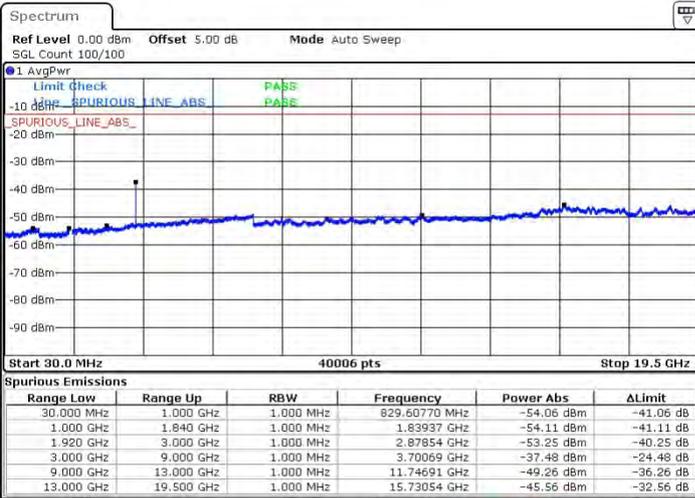
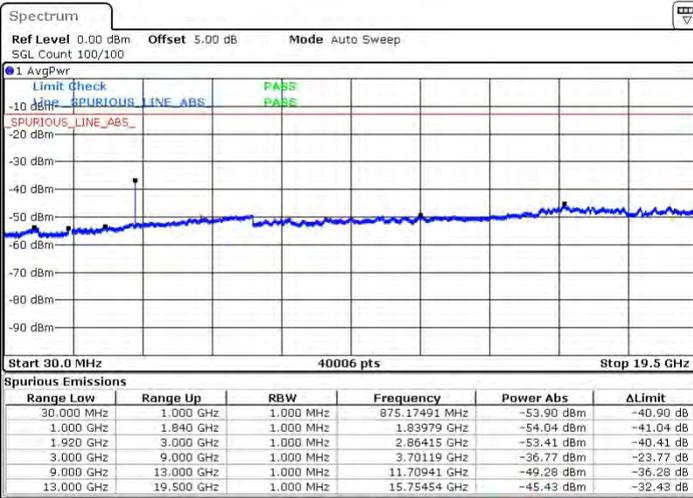
Date: 29 MAR 2015 11:05:02



LTE Band 2 / 5MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM

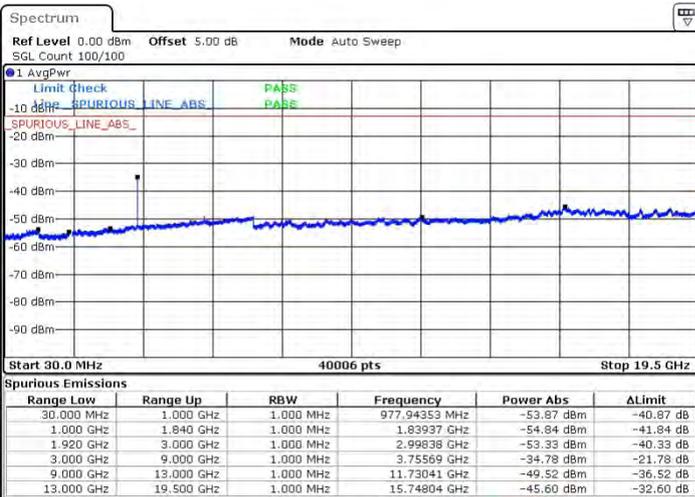
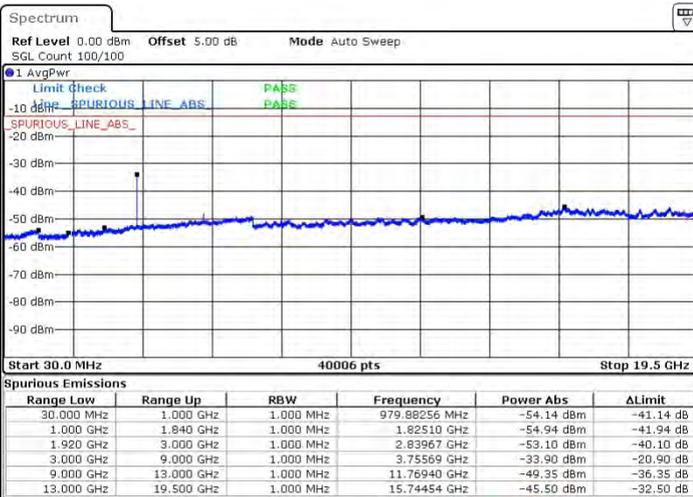


Date: 29 MAR 2015 11:07:05

Date: 29 MAR 2015 11:08:26

Middle Channel / QPSK

Middle Channel / 16QAM



Date: 29 MAR 2015 11:10:28

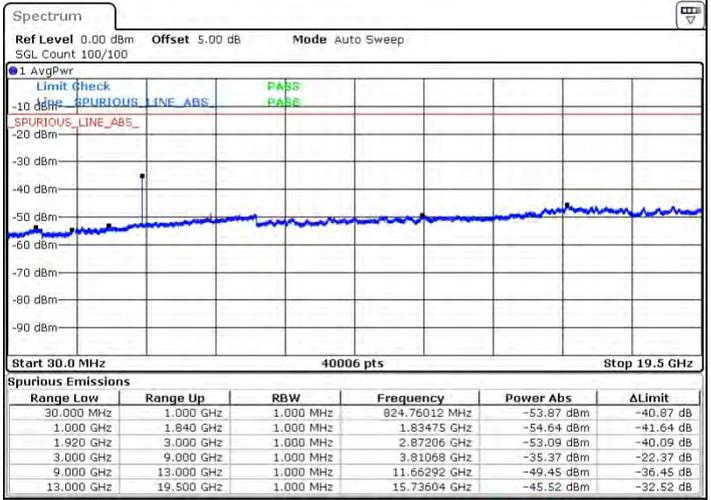
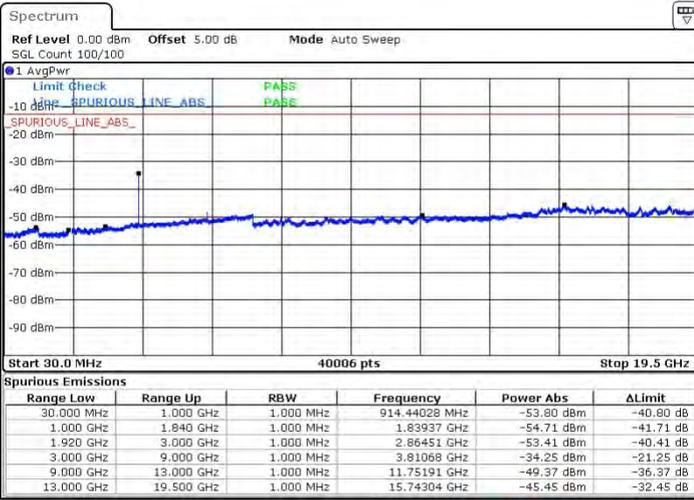
Date: 29 MAR 2015 11:11:47



LTE Band 2 / 5MHz

Highest Channel / QPSK

Highest Channel / 16QAM



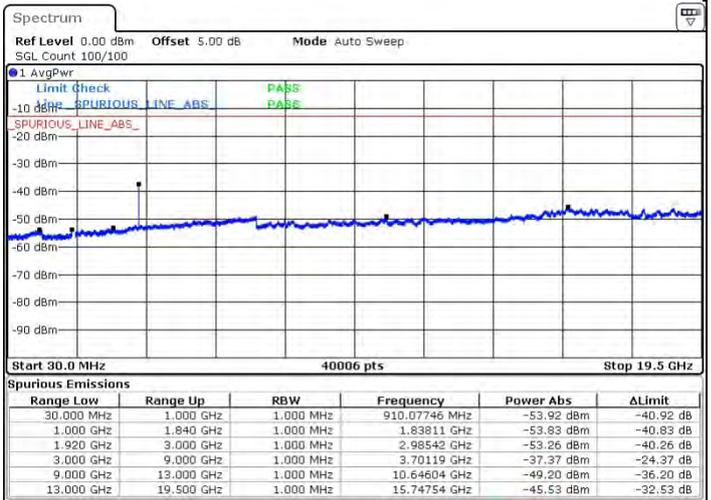
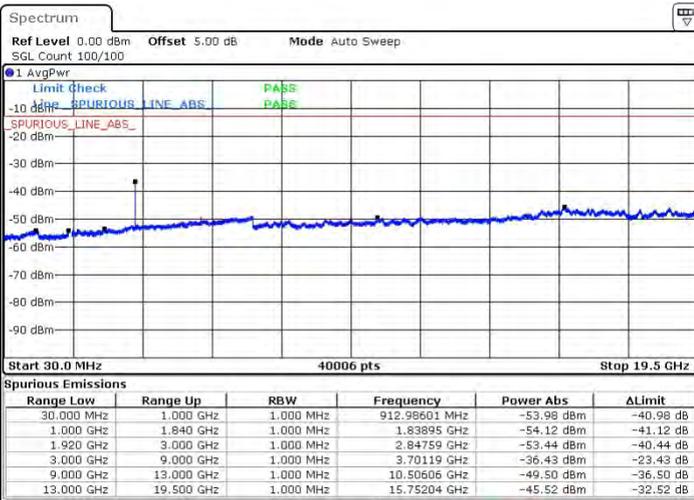
Date: 29.MAR.2015 11:15:52

Date: 29.MAR.2015 11:15:10

LTE Band 2 / 10MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM



Date: 29.MAR.2015 11:17:12

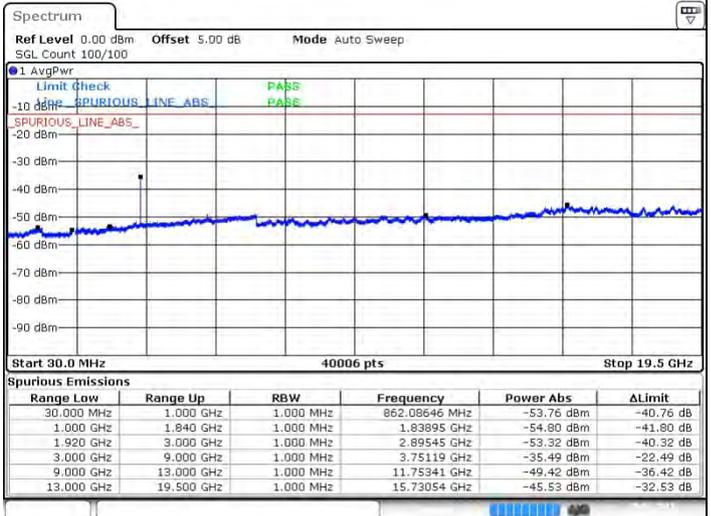
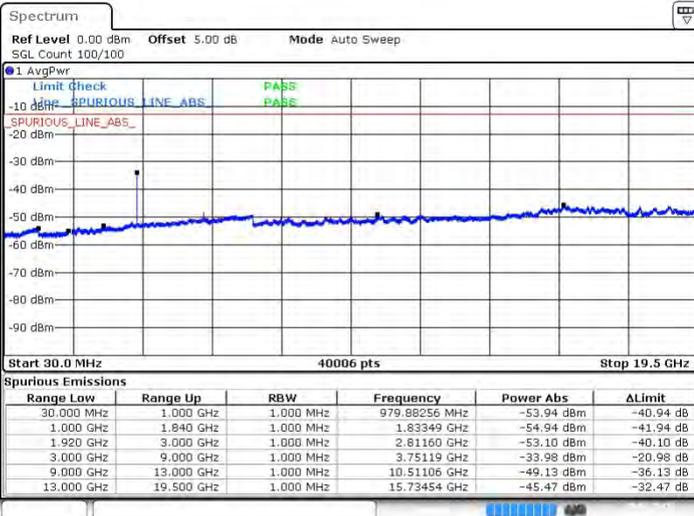
Date: 29.MAR.2015 11:18:33



LTE Band 2 / 10MHz

Middle Channel / QPSK

Middle Channel / 16QAM

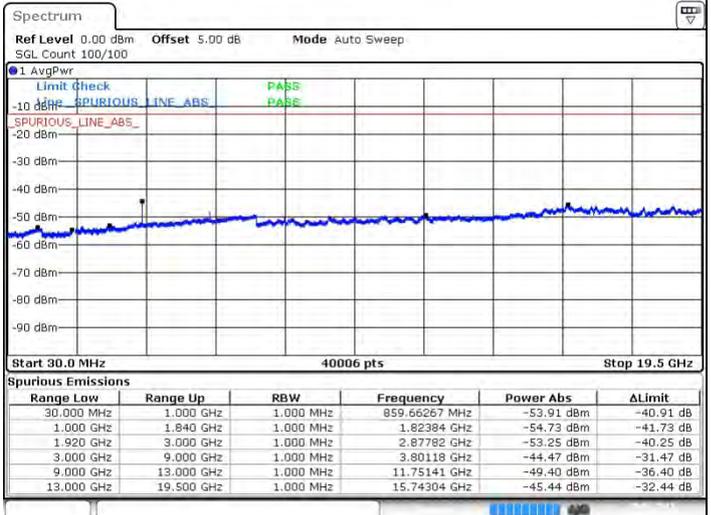
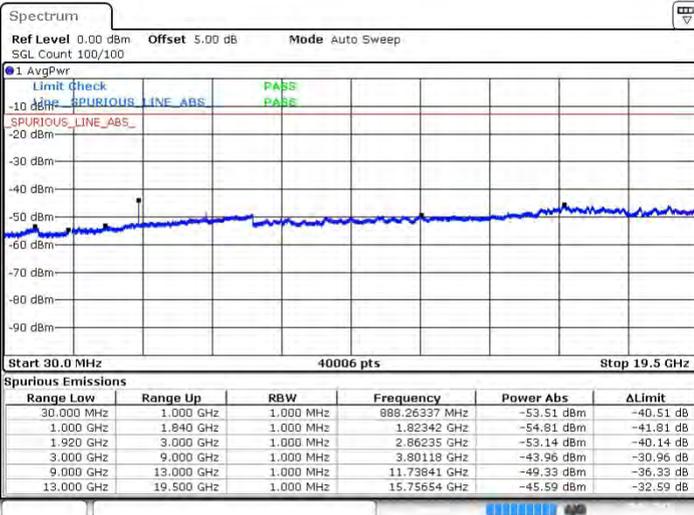


Date: 29 MAR 2015 11:20:35

Date: 29 MAR 2015 11:21:57

Highest Channel / QPSK

Highest Channel / 16QAM



Date: 29 MAR 2015 11:24:02

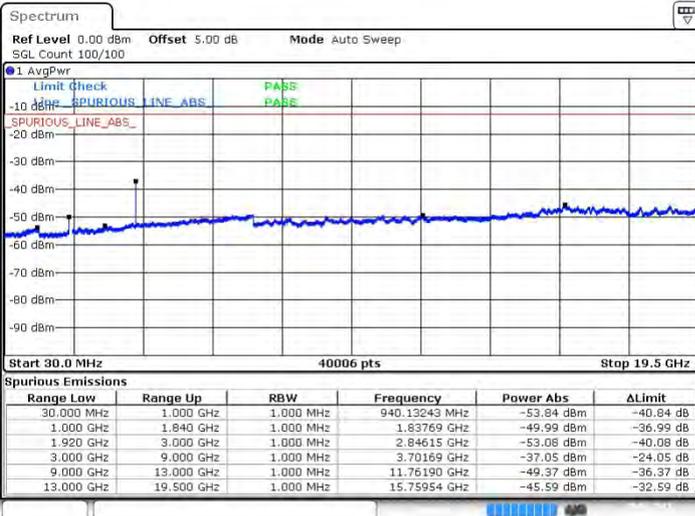
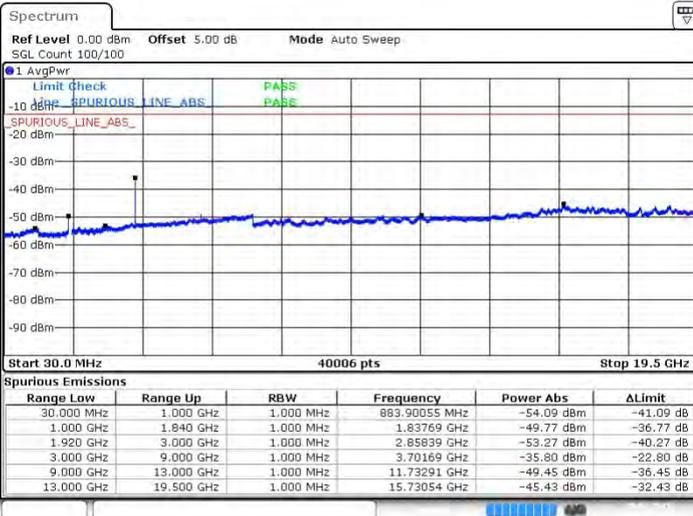
Date: 29 MAR 2015 11:25:21



LTE Band 2 / 15MHz

Lowest Channel / QPSK

Lowest Channel / 16QAM

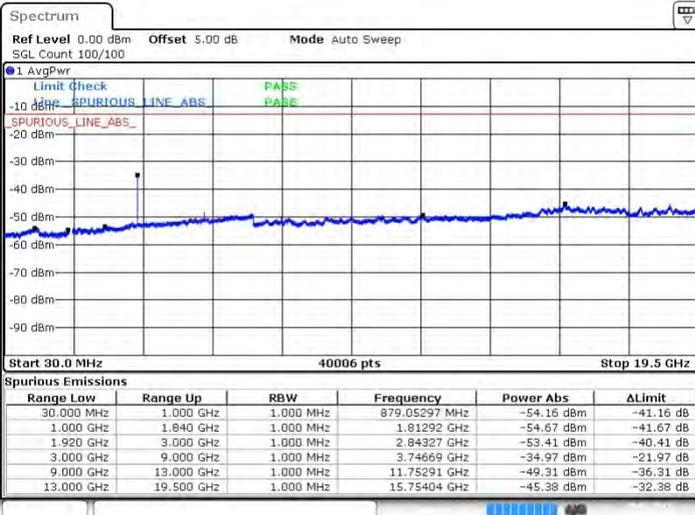
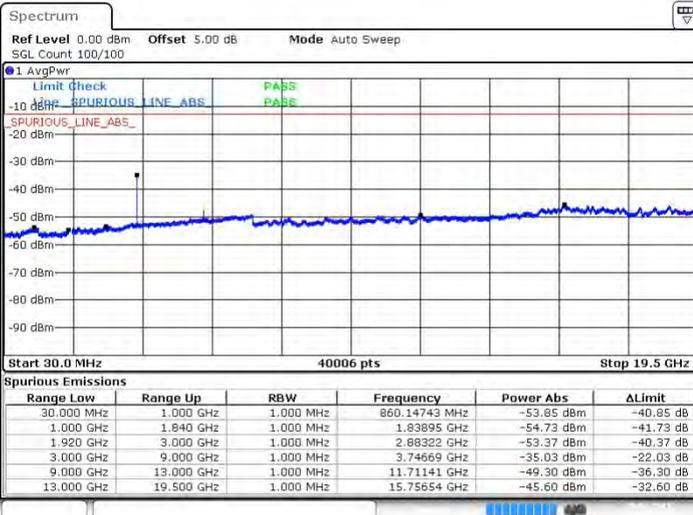


Date: 29 MAR 2015 11:27:26

Date: 29 MAR 2015 11:28:48

Middle Channel / QPSK

Middle Channel / 16QAM



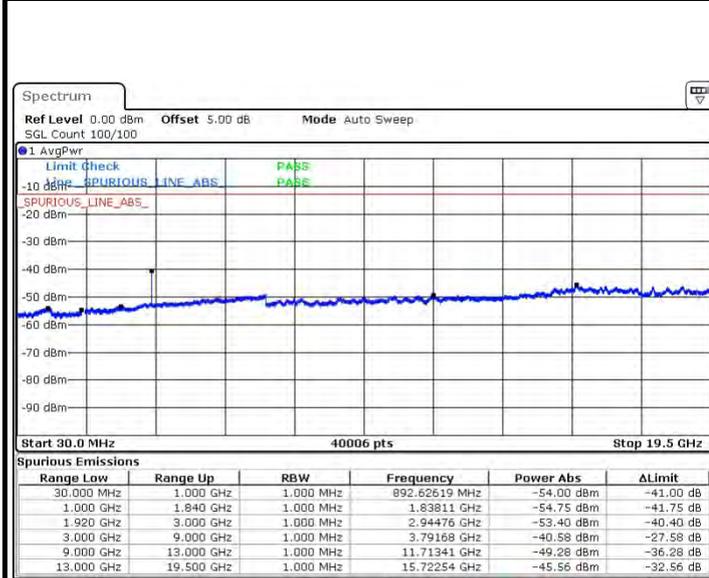
Date: 29 MAR 2015 11:30:53

Date: 29 MAR 2015 11:32:11



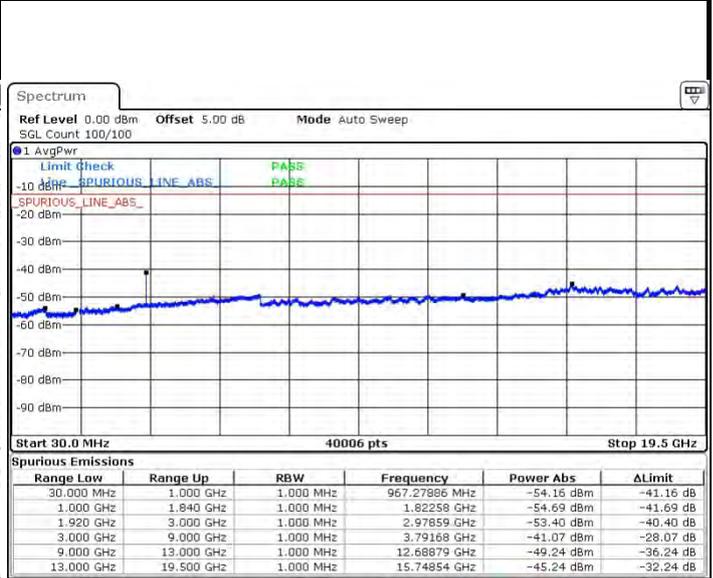
LTE Band 2 / 15MHz

Highest Channel / QPSK



Date: 29.MAR.2015 11:34:16

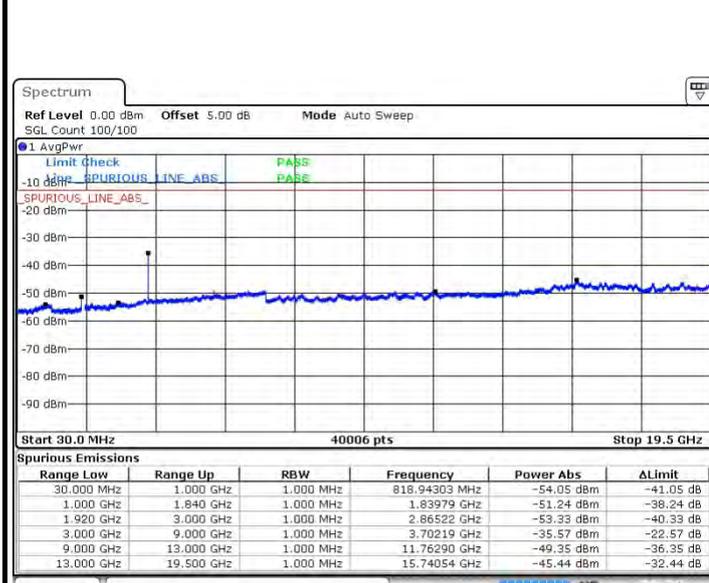
Highest Channel / 16QAM



Date: 29.MAR.2015 11:35:37

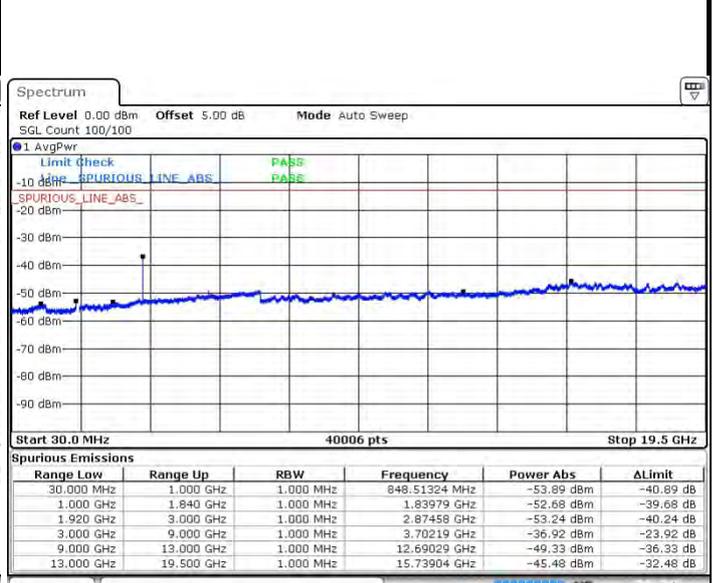
LTE Band 2 / 20MHz

Lowest Channel / QPSK



Date: 29.MAR.2015 11:37:42

Lowest Channel / 16QAM



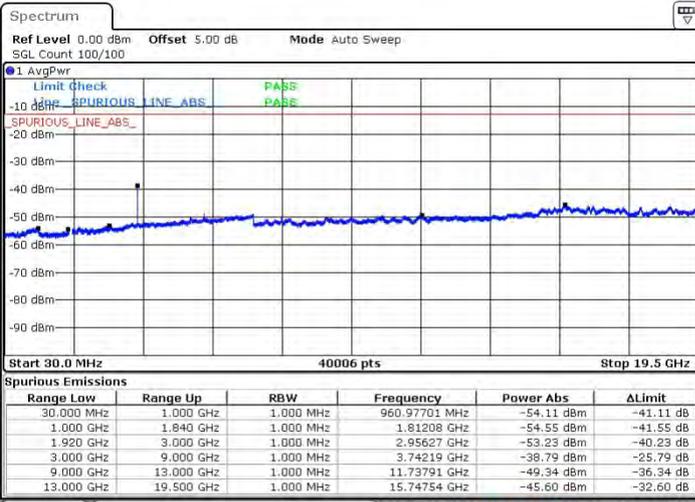
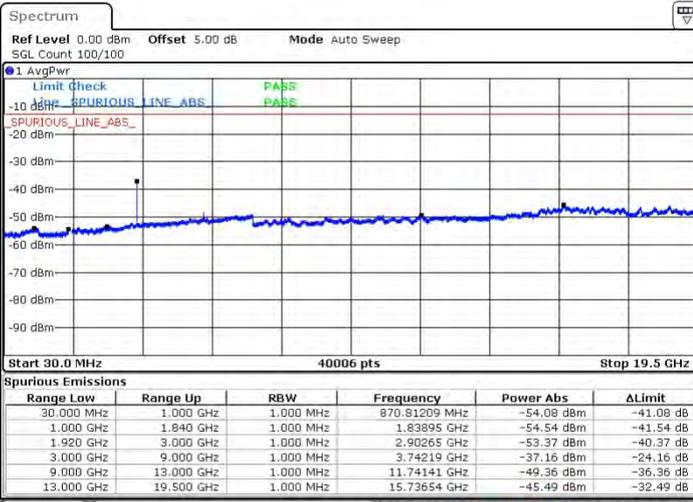
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LTE Band 2 / 20MHz

Middle Channel / QPSK

Middle Channel / 16QAM

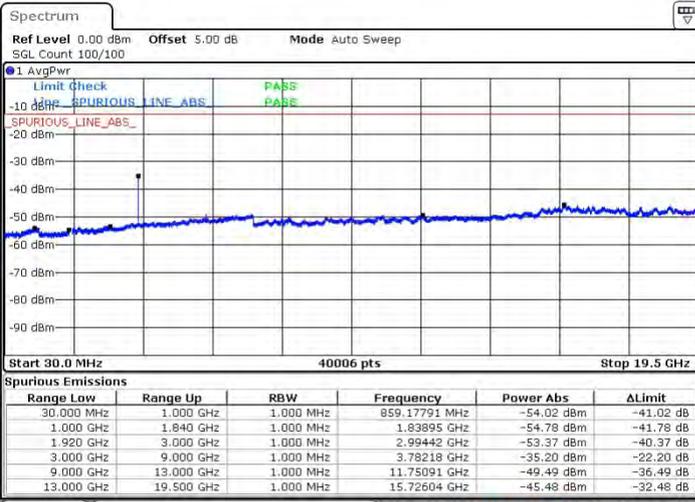
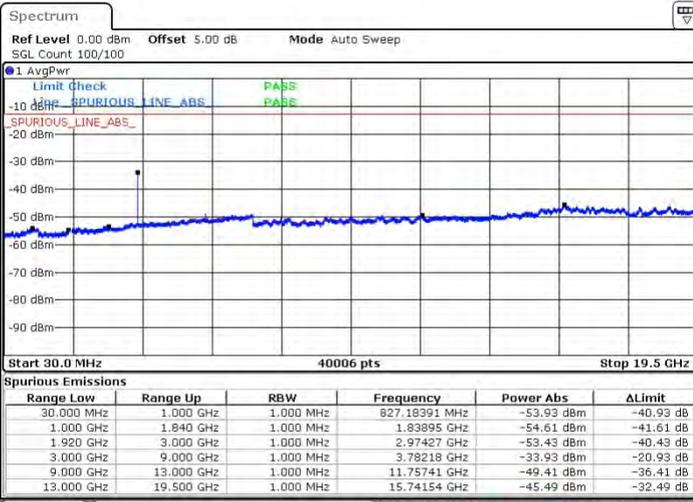


Date: 29 MAR 2015 11:41:06

Date: 29 MAR 2015 11:42:28

Highest Channel / QPSK

Highest Channel / 16QAM



Date: 29 MAR 2015 11:44:31

Date: 29 MAR 2015 11:45:52



Frequency Stability

| Test Conditions | | LTE Band 2 (QPSK) / Middle Channel | Limit |
|------------------|-------------------|------------------------------------|---------|
| Temperature (°C) | Voltage (Volt) | BW 10MHz | Note 2. |
| | | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0006 | PASS |
| 40 | Normal Voltage | 0.0075 | |
| 30 | Normal Voltage | 0.0004 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0013 | |
| 0 | Normal Voltage | 0.0055 | |
| -10 | Normal Voltage | 0.0064 | |
| -20 | Normal Voltage | 0.0005 | |
| -30 | Normal Voltage | 0.0079 | |
| 20 | Maximum Voltage | 0.0017 | |
| 20 | Normal Voltage | 0.0076 | |
| 20 | Battery End Point | 0.0070 | |

Note:

1. Normal Voltage = 3.8V. ; Battery End Point (BEP) = 3.6 V. ; Maximum Voltage =4.35 V
2. Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.