# FCC Part 22/24/27 Compliance Test Report

| | | | |
|---|---|---|---|
| **Test Report no.:** | FCC22&24&27_RM-927_06.docx | **Date of Report:** | 21-Aug-2013 |
| **Number of pages:** | 29 | **Customer's Contact person:** | Victoria Abadilla |
| **Testing laboratory:** | TCC Nokia San Diego Laboratory<br>16620 West Bernardo Drive<br>San Diego, CA 92127<br>USA<br>Tel. +1 858 831 5000<br>Fax. +1 858 831 6500 | **Customer:** | Nokia, Inc.<br>16620 West Bernardo Drive<br>San Diego, CA 92127<br>USA<br>Tel. +1 858 831 5000<br>Fax. +1 858 385 1598 |
| **FCC listing no.:**<br>**IC recognition no.:** | 586140<br>10162A-1 | | |
| **Tested devices/ accessories:** | **Phone RM-927 / Salcomp AC Charger AC-60 / Cable CA-190 / Headset WH-902** | | |
| **FCC ID:** | QMND | **IC:** | 661X-D |
| **Supplement reports:** | - | | |
| **Testing has been carried out in accordance with:** | **CFR 47, FCC rules Parts 22/24/27 , TIA-603-C-2004 and IC standards, RSS-GEN (Issue 3, December 2010), RSS-132 (Issue 2, September 2005), RSS-133 (Issue 5, February 2009). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".** | | |
| **Documentation:** | The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia. | | |
| **Test Results:** | **The EUT complies with the requirements in respect of all parameters subject to the test.**<br>The test results relate only to devices specified in this document | | |
| **Date and signature for the contents:** | Hawes Tyrone<br>2013.08.22 15:37:42 -07'00' | | |

**Tyrone Hawes, Specialist**




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

# 1. Summary for FCC Part 22/24/27 Compliance Test Report

| | |
|---|---|
| **Date of receipt** | 20-Jul-2013 |
| **Testing completed** | 21-Aug-2013 |
| **The customer's contact person** | Victoria Abadilla |
| **Test Plan referred to** | T:\Projects\RM-927\TestPlan\RS_testplan_RM-927.xlsm |
| **Notes** | - |
| **Document name** | T:\Projects\RM-927\EMC\FCC22&24&27_RM-927_06.docx |

## 1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:
GSM/CDMA/WCDMA/WLAN/Bluetooth
The EUT is tested with maximum rated TX power.

Devices under tests

| Product | Type | SN | HW | MV | SW | DUT |
|---|---|---|---|---|---|---|
| Phone | RM-927 | 355906050012284 | 0160 | - | 1028.0305.1329.2000 | 30743 |
| Salcomp AC Charger | AC-60 | 4090493152610300459 | - | - | - | 30744 |
| Cable | CA-190 | - | - | - | - | 30745 |
| Headset | WH-902 | - | - | - | - | 30746 |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |
| - | - | - | - | - | - | - |

## 1.2. Summary of Test Results

**GSM850:**

| Section in CFR 47 | Section in RSS-GEN or RSS-132 | Name of the test | Result |
|---|---|---|---|
| §2.1046(a), 22.913(a) | 4.4 | Conducted RF output power | NP |
| §22.913(a) | 4.4 | Radiated RF output power | PASSED |
| §2.1049(h) | 4.6.1 | 99 % occupied bandwidth | NP |
| §22.917(a) | 4.5 | Band edge compliance | PASSED |
| §22.917(a), §2.1051 | 4.5 | Spurious emissions at antenna terminals | NP |
| §22.917(a), §2.1053 | 4.5 | Spurious radiated emissions | PASSED |
| §2.1055(a) | 4.3 | Frequency stability, temperature variation | NP |
| §2.1055(d) | 4.3 | Frequency stability, voltage variation | NP |

**WCDMA 850 (Band V):**

| Section in CFR 47 | Section in RSS-GEN or RSS-132 | Name of the test | Result |
|---|---|---|---|
| §2.1046(a), 22.913(a) | 4.4 | Conducted RF output power | NP |
| §22.913(a) | 4.4 | Radiated RF output power | PASSED |
| §2.1049(h) | 4.6.1 | 99 % occupied bandwidth | NP |
| §22.917(a) | 4.5 | Band edge compliance | PASSED |
| §22.917(a), §2.1051 | 4.5 | Spurious emissions at antenna terminals | NP |
| §22.917(a), §2.1053 | 4.5 | Spurious radiated emissions | PASSED |
| §2.1055(a) | 4.3 | Frequency stability, temperature variation | NP |
| §2.1055(d) | 4.3 | Frequency stability, voltage variation | NP |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

**GSM1900:**

| Section in CFR 47 | Section in RSS-GEN or RSS-133 | Name of the test | Result |
|---|---|---|---|
| §2.1046(a) | 6.4 | Conducted RF output power | NP |
| §24.232(b) | 6.4 | Radiated RF output power | PASSED |
| §2.1049(h) | 4.6.1 | 99 % occupied bandwidth | NP |
| §24.238(a) | 6.5 | Band edge compliance | PASSED |
| §24.238(a), §2.1051 | 6.5 | Spurious emissions at antenna terminals | NP |
| §24.238(a), §2.1053 | 6.5 | Spurious radiated emissions | PASSED |
| §2.1055(a) | 6.3 | Frequency stability, temperature variation | NP |
| §2.1055(d) | 6.3 | Frequency stability, voltage variation | NP |

**WCDMA 1900 (Band II):**

| Section in CFR 47 | Section in RSS-GEN or RSS-133 | Name of the test | Result |
|---|---|---|---|
| §2.1046(a) | 6.4 | Conducted RF output power | NP |
| §24.232(b) | 6.4 | Radiated RF output power | PASSED |
| §2.1049(h) | 4.6.1 | 99 % occupied bandwidth | NP |
| §24.238(a) | 6.5 | Band edge compliance | PASSED |
| §24.238(a), §2.1051 | 6.5 | Spurious emissions at antenna terminals | NP |
| §24.238(a), §2.1053 | 6.5 | Spurious radiated emissions | PASSED |
| §2.1055(a) | 6.3 | Frequency stability, temperature variation | NP |
| §2.1055(d) | 6.3 | Frequency stability, voltage variation | NP |

**LTE1700 (Band 4):**

| Section in CFR 47 | Section in RSS-GEN or RSS-139 | Name of the test | Result |
|---|---|---|---|
| §2.1046(a) | 6.4 | Conducted RF output power | NP |
| §27.50(d)(4) | 6.4 | Radiated RF output power | PASSED |
| §2.1049(h) | 4.6.1 | 99 % occupied bandwidth | NP |
| §27.53(h) | 6.5 | Band edge compliance | PASSED |
| §27.53(h), §2.1051 | 6.5 | Spurious emissions at antenna terminals | NP |
| §27.53(h), §2.1053 | 6.5 | Spurious radiated emissions | PASSED |
| §2.1055(a) | 6.3 | Frequency stability, temperature variation | NP |
| §2.1055(d) | 6.3 | Frequency stability, voltage variation | NP |

**LTE700 Upper (Band 13):**

| Section in CFR 47 | Section in RSS-GEN or RSS-132 | Name of the test | Result |
|---|---|---|---|
| §2.1046 (a) | N/A | Conducted RF output power | NP |
| §27.50(b)(10) | N/A | Radiated RF output power | PASSED |
| §2.1049(h) | N/A | 99 % occupied bandwidth | NP |
| §27.53(c)(2)(4) | N/A | Band edge compliance | PASSED |
| §27.53(c)(2)(4),(f), §2.1051 | N/A | Spurious emissions at antenna terminals | NP |
| §27.53(c)(2)(4),(f), §2.1053 | N/A | Spurious radiated emissions | PASSED |
| §2.1055(a) | N/A | Frequency stability, temperature variation | NP |
| §2.1055(d) | N/A | Frequency stability, voltage variation | NP |

| | |
|---|---|
| PASSED | The EUT complies with the essential requirements in the standard. |
| FAILED | The EUT does not comply with the essential requirements in the standard. |
| NP | The test was not performed by the TCC Nokia Laboratory. |



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

# CONTENTS






TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

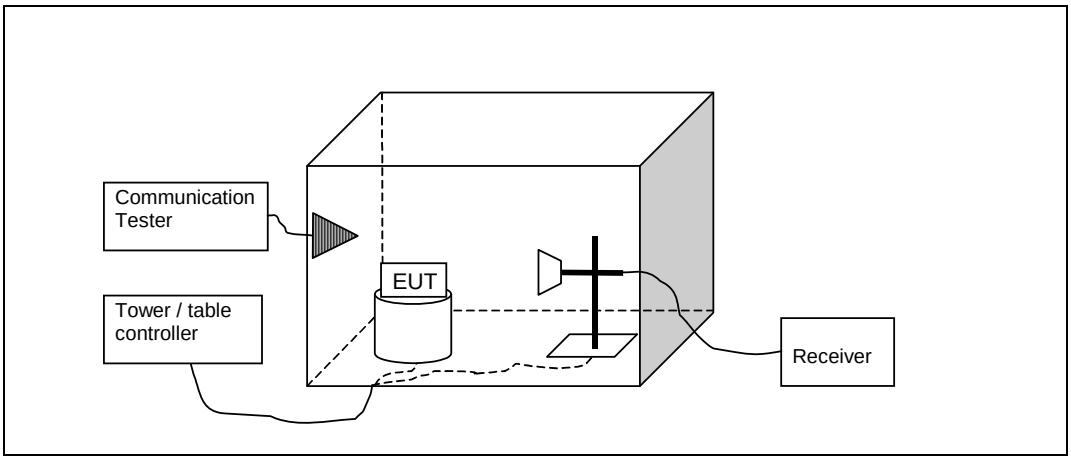
TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

# 2. Radiated RF output power

**(FCC §22.913(a), §24.232(b), §27.53(h), §27.53(c)(2)(4), RSS-132 4.4, RSS-133 6.4)**

| | |
|---|---|
| **EUT with DUT number** | RM-927, DUT 30743 |
| **Accessories with DUT numbers** | - |
| **Operation Voltage [V] / [Hz]** | 115V/60Hz |
| **Results** | PASSED |
| **Remarks** | |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 16/45/1050 |
| **Date of measurements** | 29-Jul-2013 |
| **Measured by** | Tyrone Hawes |

### 2.1.1 Test setup




## 2.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used.The measurement results are obtained as described below:

$P[dBm] = P_{SUBST\ TX} + P_{MEAS} - P_{SUBST\ RX} - L_{SUBST\ CABLES} + G_{SUBST\ TX\ ANT}$

Where $P_{SUBST\ TX}$ is signal generator level. $P_{MEAS}$ is measured power level from the EUT. $P_{SUBST\ RX}$ is measured power level in substitute measurement. $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna and $G_{SUBST\ TX\ ANT}$ is substitution antenna gain.

Limits for radiated RF output power measurements

| Frequency range [MHz] | Limit [W] | Limit [dBm] |
|---|---|---|
| 777 - 787 | 3 ERP | 34.8 |
| 824 - 849 | 7 ERP | 38.5 |
| 1710 - 1755 | 1 EIRP | 30 |
| 1850 - 1910 | 2 EIRP | 33 |



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 2.3. GSM850TX test results

Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 128 / 824.2 | 28.05 | 0.638 | -6.39 | 34.44 | VERTICAL | PASSED |
| 190 / 836.6 | 29.18 | 0.828 | -5.4 | 34.58 | VERTICAL | PASSED |
| 251 / 848.8 | 29.17 | 0.826 | -4.77 | 33.94 | VERTICAL | PASSED |

RMS detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 128 / 824.2 | 27.78 | 0.599 | -6.66 | 34.44 | VERTICAL | PASSED |
| 190 / 836.6 | 28.93 | 0.782 | -5.65 | 34.58 | VERTICAL | PASSED |
| 251 / 848.8 | 28.91 | 0.777 | -5.03 | 33.94 | VERTICAL | PASSED |

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## 2.4. GSM1900TX test results

Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 512 / 1850.2 | 29.63 | 0.917 | -15.02 | 44.65 | VERTICAL | PASSED |
| 661 / 1880 | 29.04 | 0.802 | -15.09 | 44.13 | VERTICAL | PASSED |
| 810 / 1909.8 | 25.91 | 0.39 | -18.23 | 44.14 | VERTICAL | PASSED |

RMS detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 512 / 1850.2 | 29.81 | 0.957 | -14.84 | 44.65 | VERTICAL | PASSED |
| 661 / 1880 | 29.14 | 0.821 | -14.99 | 44.13 | VERTICAL | PASSED |
| 810 / 1909.8 | 26.09 | 0.407 | -18.05 | 44.14 | VERTICAL | PASSED |

## 2.5. LTE700 Upper (Band 13) test results

FDD, CBW 5MHz, QPSK, 1RB mid, Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 23205 / 779.5 | 21.03 | 0.127 | -11.65 | 32.68 | VERTICAL | PASSED |
| 23230 / 782 | 21.47 | 0.14 | -11.23 | 32.7 | VERTICAL | PASSED |
| 23255 / 784.5 | 21.04 | 0.127 | -11.1 | 32.14 | HORIZONTAL | PASSED |

FDD, CBW 5MHz, 16QAM, 1RB mid, Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 23205 / 779.5 | 20.62 | 0.115 | -12.06 | 32.68 | VERTICAL | PASSED |
| 23230 / 782 | 20.99 | 0.126 | -11.71 | 32.7 | VERTICAL | PASSED |
| 23255 / 784.5 | 20.02 | 0.1 | -12.12 | 32.14 | HORIZONTAL | PASSED |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 2.6. LTE 1700 (Band IV) test results

FDD, CBW 5MHz, QPSK, 1RB mid, Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 19975 / 1712.5 | 27.11 | 0.514 | -16.4 | 43.51 | VERTICAL | PASSED |
| 20175 / 1732.5 | 26.65 | 0.463 | -16.92 | 43.57 | VERTICAL | PASSED |
| 20375 / 1752.5 | 26.67 | 0.464 | -16.98 | 43.65 | VERTICAL | PASSED |

FDD, CBW 5MHz, 16QAM, 1RB mid, Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 19975 / 1712.5 | 26.85 | 0.485 | -16.66 | 43.51 | VERTICAL | PASSED |
| 20175 / 1732.5 | 26.65 | 0.463 | -16.92 | 43.57 | VERTICAL | PASSED |
| 20375 / 1752.5 | 26.17 | 0.414 | -17.48 | 43.65 | VERTICAL | PASSED |

## 2.7. WCDMA 1900 (Band II) test results

Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 9262 / 1852.4 | 28 | 0.631 | -17.35 | 45.35 | HORIZONTAL | PASSED |
| 9400 / 1880 | 27.01 | 0.502 | -17.26 | 44.27 | HORIZONTAL | PASSED |
| 9538 / 1907.6 | 24.48 | 0.28 | -19.49 | 43.97 | HORIZONTAL | PASSED |

RMS detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 9262 / 1852.4 | 24.28 | 0.268 | -21.07 | 45.35 | HORIZONTAL | PASSED |
| 9400 / 1880 | 22.65 | 0.184 | -21.62 | 44.27 | HORIZONTAL | PASSED |
| 9538 / 1907.6 | 21.39 | 0.138 | -22.58 | 43.97 | HORIZONTAL | PASSED |

## 2.8. WCDMA 850 (Band V) test results

Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 4132 / 826.4 | 22.22 | 0.167 | -12.42 | 34.64 | VERTICAL | PASSED |
| 4183 / 836.6 | 23 | 0.2 | -11.58 | 34.58 | VERTICAL | PASSED |
| 4233 / 846.6 | 23.45 | 0.221 | -10.73 | 34.18 | VERTICAL | PASSED |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

RMS detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 4132 / 826.4 | 18.27 | 0.067 | -16.37 | 34.64 | VERTICAL | PASSED |
| 4183 / 836.6 | 19.1 | 0.081 | -15.48 | 34.58 | VERTICAL | PASSED |
| 4233 / 846.6 | 19.35 | 0.086 | -14.83 | 34.18 | VERTICAL | PASSED |

## 2.9. GSM850-E1 TX test results

TX mode, channel 128 / 824.2 MHz

Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 128 / 824.2 | 21.92 | 0.156 | -12.52 | 34.44 | VERTICAL | PASSED |

TX mode, channel 128 / 824.2 MHz

RMS detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 128 / 824.2 | 24.06 | 0.255 | -10.38 | 34.44 | VERTICAL | PASSED |

TX mode, channel 190 / 836.6 MHz

Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 190 / 836.6 | 27.04 | 0.505 | -7.54 | 34.58 | VERTICAL | PASSED |

TX mode, channel 190 / 836.6 MHz

RMS detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 190 / 836.6 | 25.39 | 0.346 | -9.19 | 34.58 | VERTICAL | PASSED |

TX mode, channel 251 / 848.8 MHz

Peak detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 251 / 848.8 | 27.39 | 0.549 | -6.55 | 33.94 | VERTICAL | PASSED |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

TX mode, channel 251 / 848.8 MHz

RMS detector

| Channel / $f_C$ [MHz] | ERP [dBm] | ERP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 251 / 848.8 | 26.37 | 0.434 | -7.57 | 33.94 | VERTICAL | PASSED |

## 2.10. GSM1900-E1 TX test results

TX mode, channel 512 / 1850.2 MHz

Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 512 / 1850.2 | 27.63 | 0.579 | -17.02 | 44.65 | VERTICAL | PASSED |

TX mode, channel 512 / 1850.2 MHz

RMS detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 512 / 1850.2 | 25.68 | 0.369 | -18.97 | 44.65 | VERTICAL | PASSED |

TX mode, channel 661 / 1880.0 MHz

Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 661 / 1880 | 27.38 | 0.547 | -16.75 | 44.13 | VERTICAL | PASSED |

TX mode, channel 661 / 1880.0 MHz

RMS detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 661 / 1880 | 26.27 | 0.424 | -17.86 | 44.13 | VERTICAL | PASSED |

TX mode, channel 810 / 1909.8 MHz

Peak detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 810 / 1909.8 | 24.28 | 0.268 | -19.86 | 44.14 | VERTICAL | PASSED |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

TX mode, channel 810 / 1909.8 MHz

RMS detector

| Channel / $f_C$ [MHz] | EIRP [dBm] | EIRP [W] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarisation | Results |
|---|---|---|---|---|---|---|
| 810 / 1909.8 | 22.43 | 0.175 | -21.71 | 44.14 | VERTICAL | PASSED |



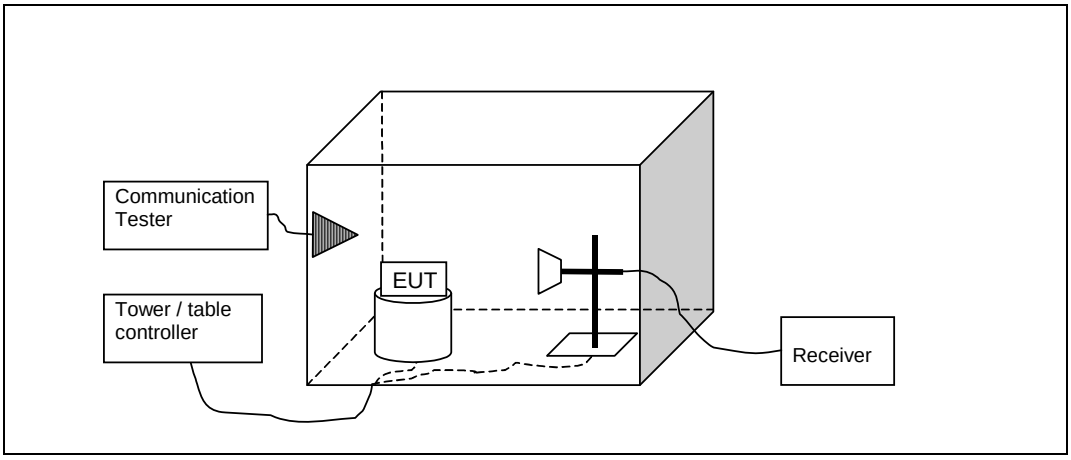

TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

# 3. Band edge compliance

**(FCC §22.917(a), §24.238(a), §27.53(h), §27.53(c)(2)(4), RSS-132 4.5, RSS-133 6.5)**

| | |
|---|---|
| **EUT with DUT number** | RM-927, DUT 30743 |
| **Accessories with DUT numbers** | - |
| **Operation Voltage [V] / [Hz]** | 115V/60Hz |
| **Results** | PASSED |
| **Remarks** | |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 16/45/1050 |
| **Date of measurements** | 08-Aug-2013 |
| **Measured by** | Tyrone Hawes |

### 3.1.1 Test setup




## 3.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24, 27 and IC standards , RSS-132, RSS-133.

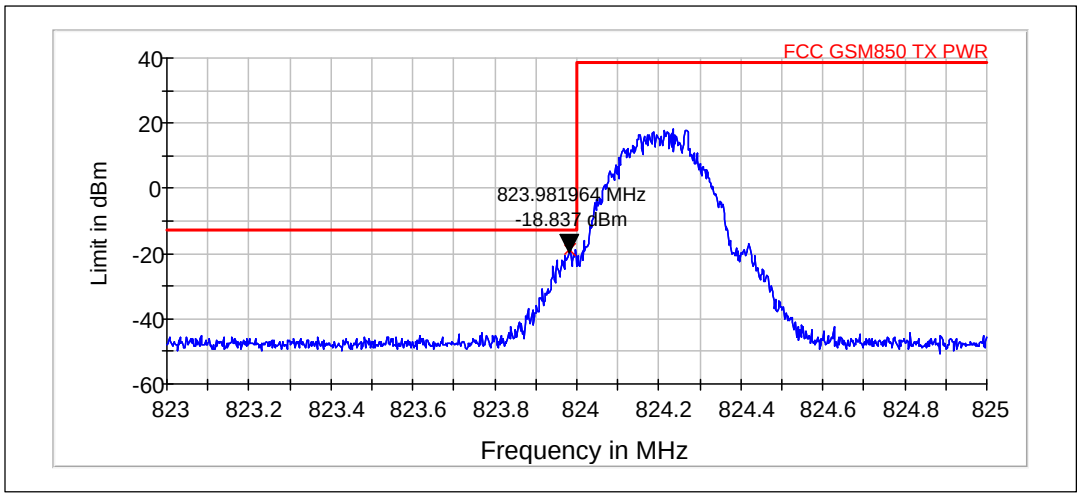
Limits for band edge compliance measurements

| Operation band | Frequency range [MHz] | Limit [dBm] |
|---|---|---|
| LTE 700 Upper | 776.9 -777 and 787 - 787.1<br>Below 776.9 and above 787.1<br>763-775 and 793-805 | -13 (RBW = 30 kHz, ERP)<br>-13 (RBW = 100 kHz, ERP)<br>-35 (RBW = 6.25 kHz, ERP) |
| GSM850 / WCDMA850 | Below 824 and above 849 | -13 |
| LTE1700 | Below 1710 and above 1755 | -13 |
| GSM1900 / / WCDMA1900 | Below 1850 and above 1910 | -13 |



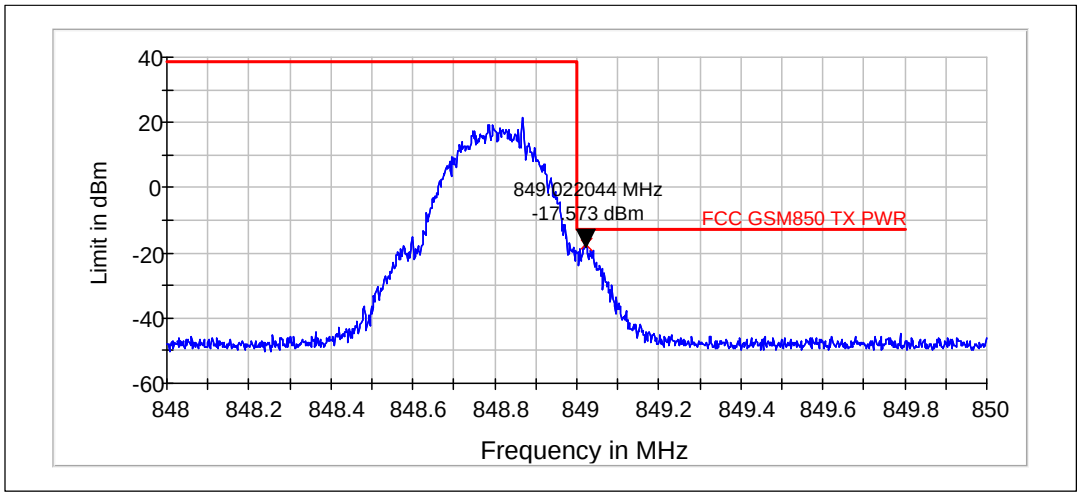
TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.3. GSM850 test results




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| GSM | 128 / 824.2 | -18.84 | PASSED |



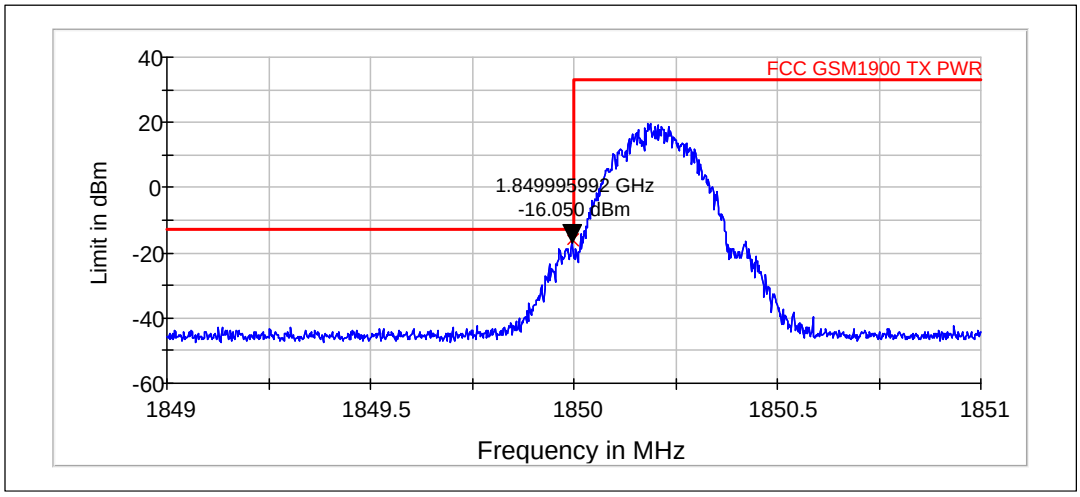

Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| GSM | 251 / 848.8 | -17.57 | PASSED |



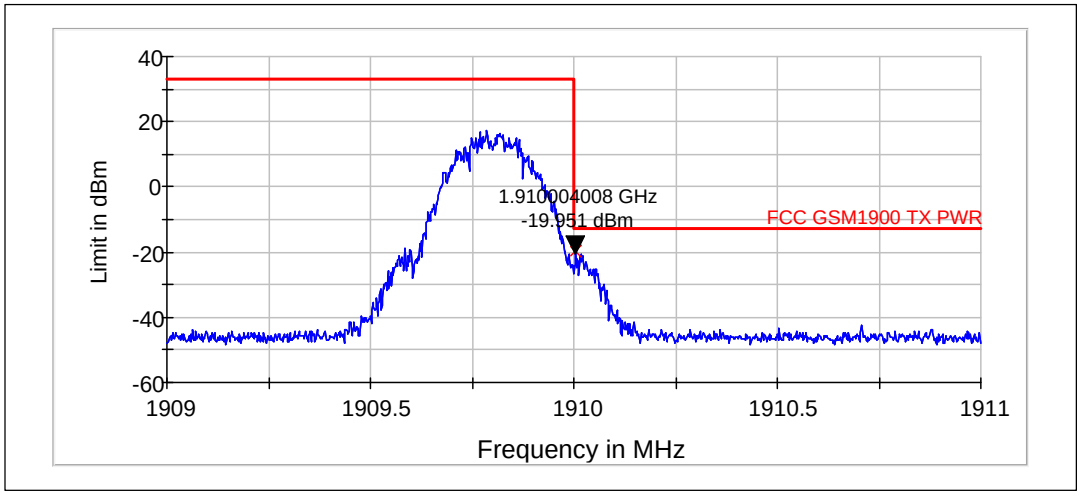

TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.4. GSM1900 test results




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| GSM | 512 / 1850.2 | -16.05 | PASSED |



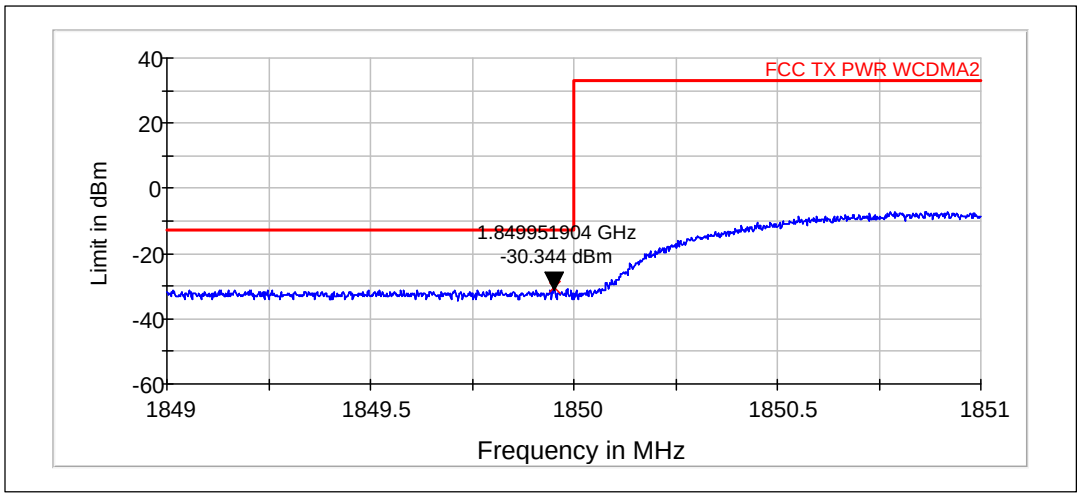

Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| GSM | 810 / 1909.8 | -19.95 | PASSED |



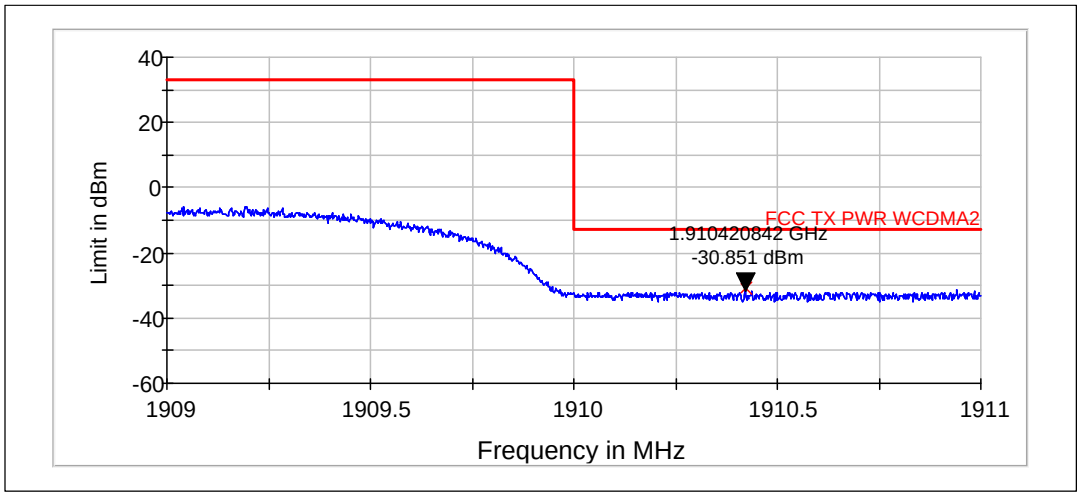

TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.5. WCDMA 1900 (Band II) test results




RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD | 9262 / 1852.4 | -30.34 | PASSED |




RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD | 9538 / 1907.6 | -30.85 | PASSED |

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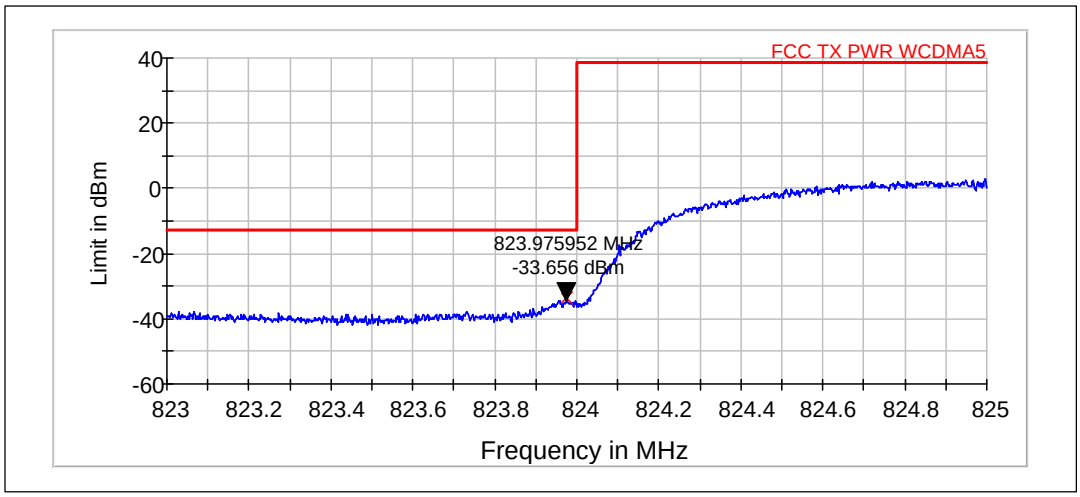
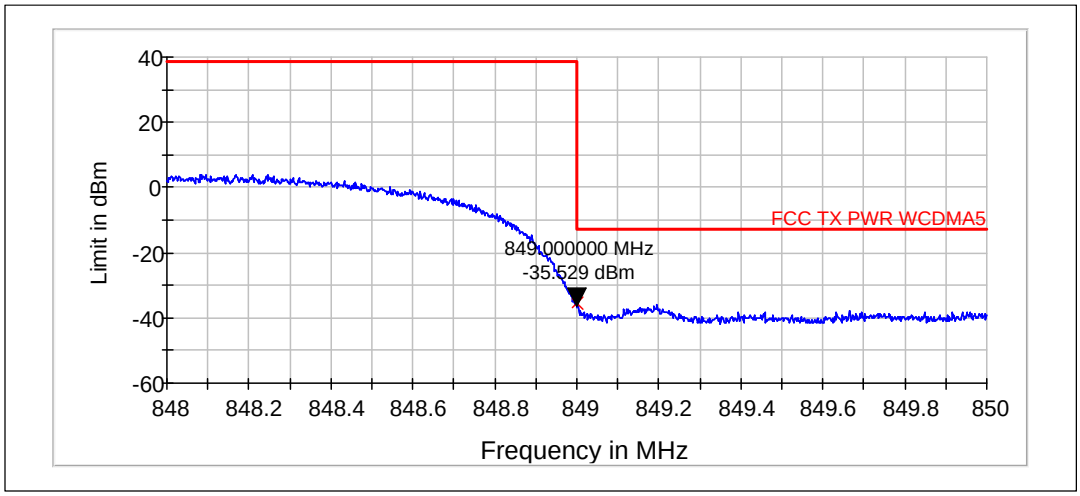
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.7. WCDMA 850 (Band V) test results




RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD | 4132 / 826.4 | -33.66 | PASSED |



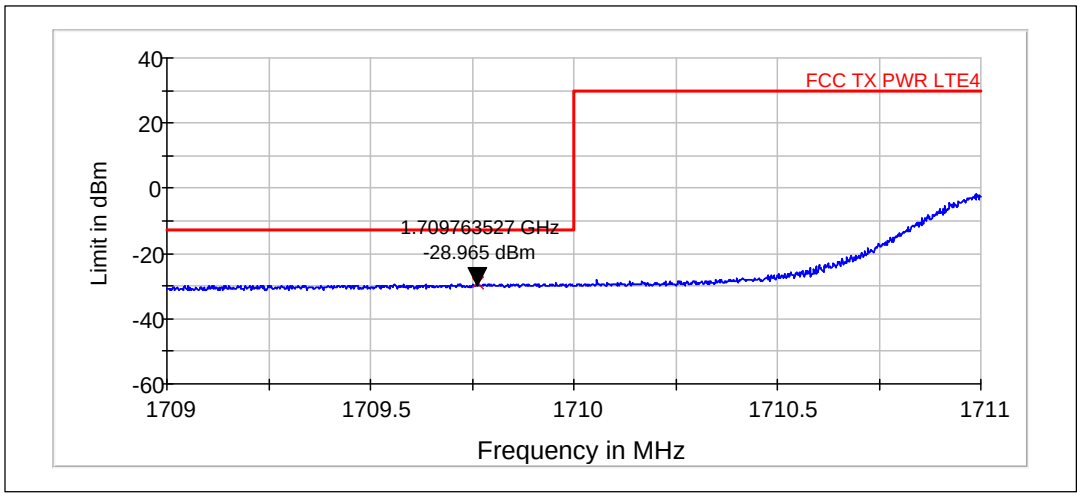

RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD | 4233 / 846.6 | -35.53 | PASSED |



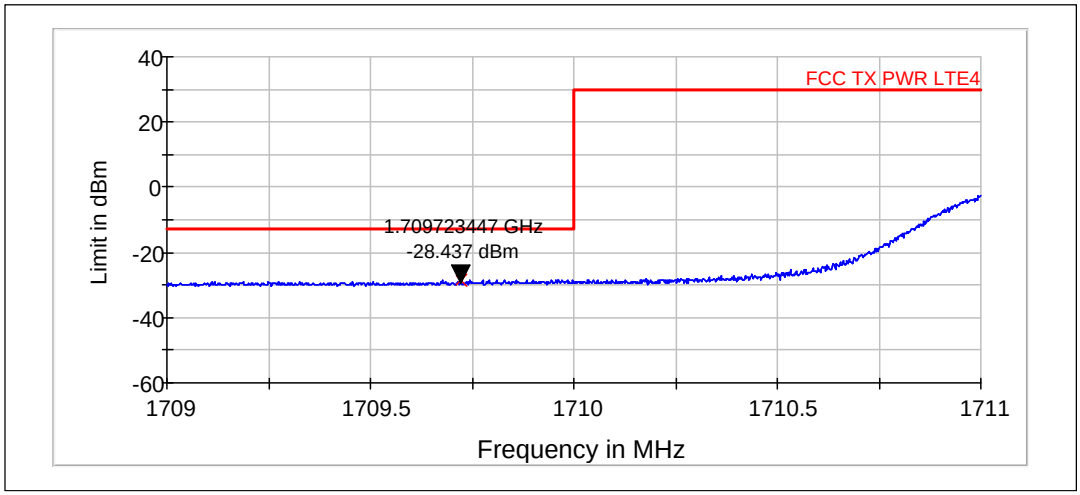

TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.8. LTE 1700 (Band IV) test results




RMS (RBW: 200 kHz, VBW: 200 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 20MHz, QPSK, 100 RB | 20050 / 1720 | -28.97 | PASSED |




RMS (RBW: 200 kHz, VBW: 200 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 20MHz, 16QAM, 100 RB | 20050 / 1720 | -28.44 | PASSED |

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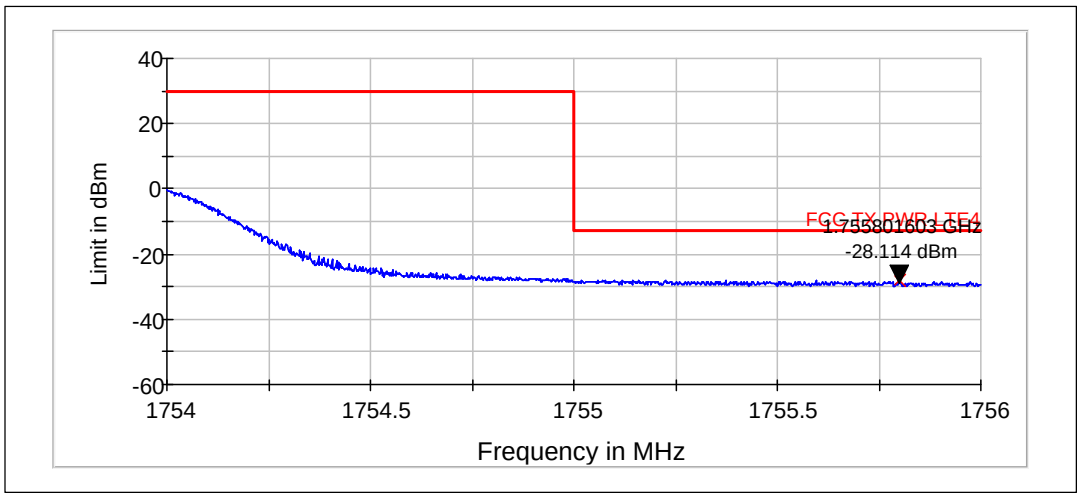
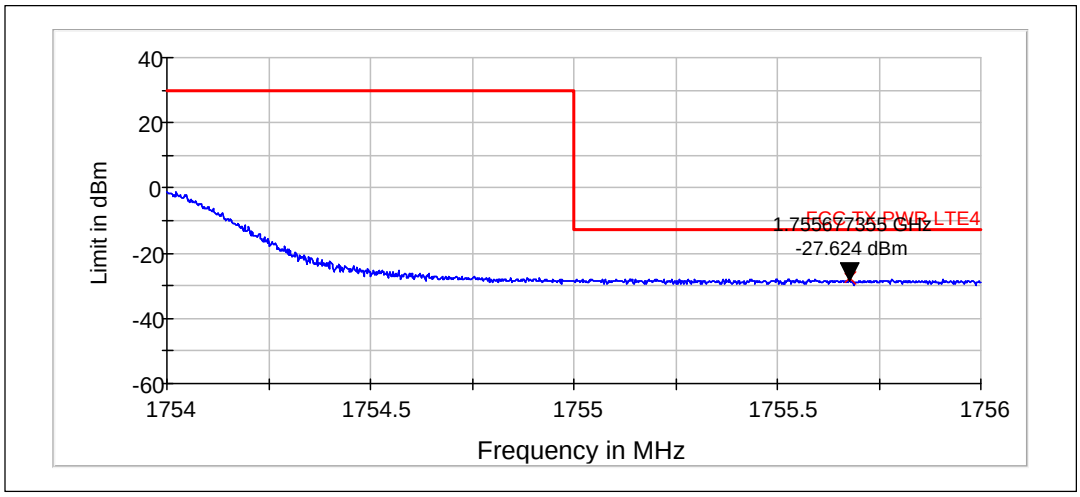
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500




RMS (RBW: 200 kHz, VBW: 200 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 20MHz, QPSK, 100 RB | 20300 / 1745 | -28.11 | PASSED |



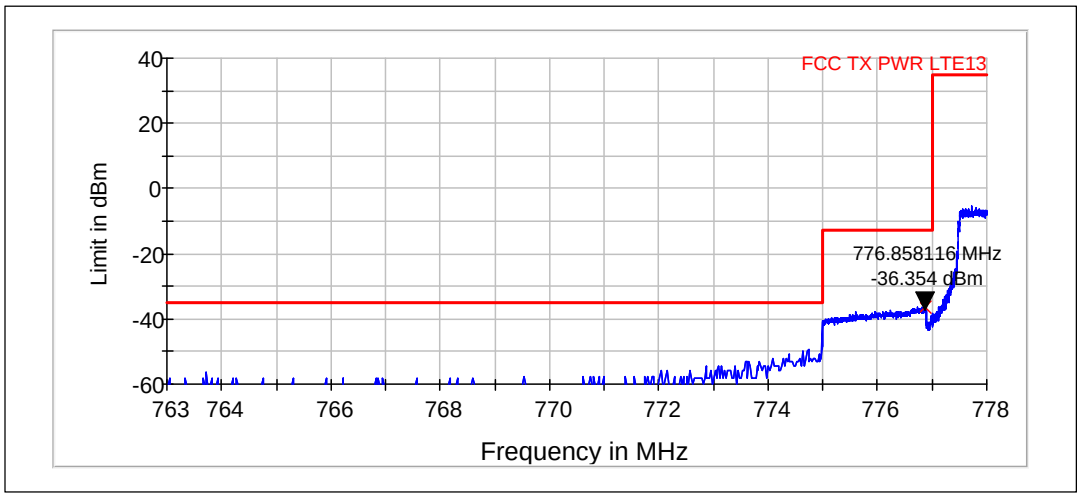

RMS (RBW: 200 kHz, VBW: 200 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 20MHz, 16QAM, 100 RB | 20300 / 1745 | -27.62 | PASSED |

## 3.10. LTE700 Upper (Band 13) test results

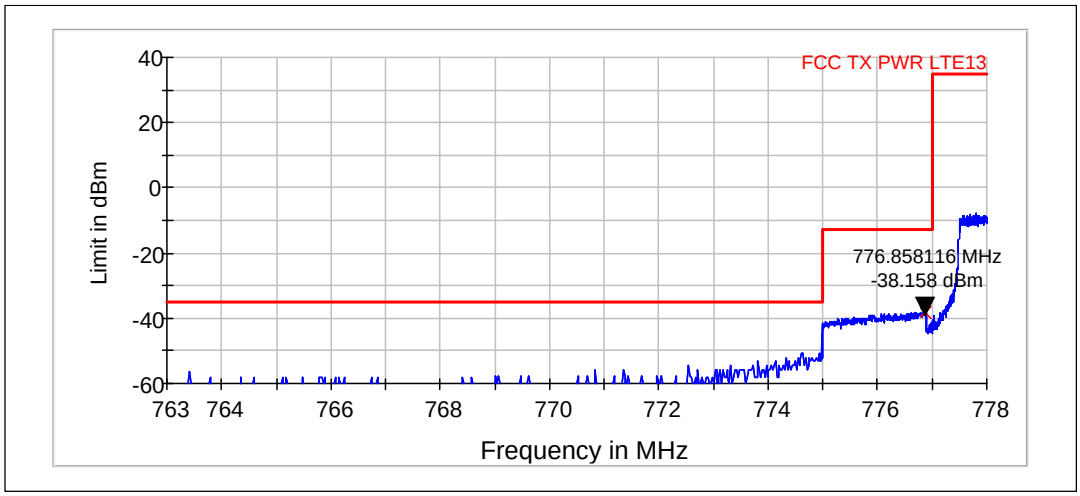



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500




RMS detector

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 10MHz, QPSK, 50 RB | 23230 / 782 | -36.35 | PASSED |




RMS detector

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 10MHz, 16QAM, 50 RB | 23230 / 782 | -38.16 | PASSED |

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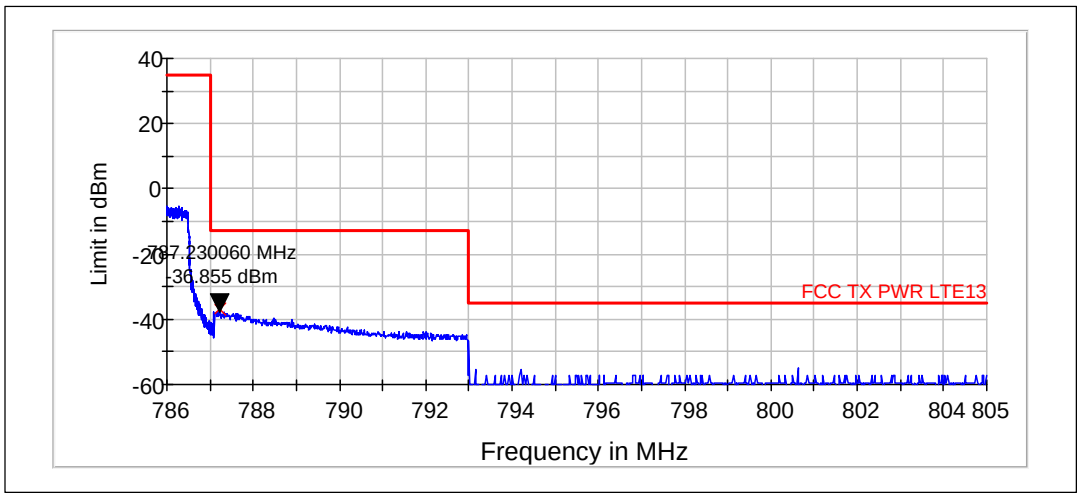
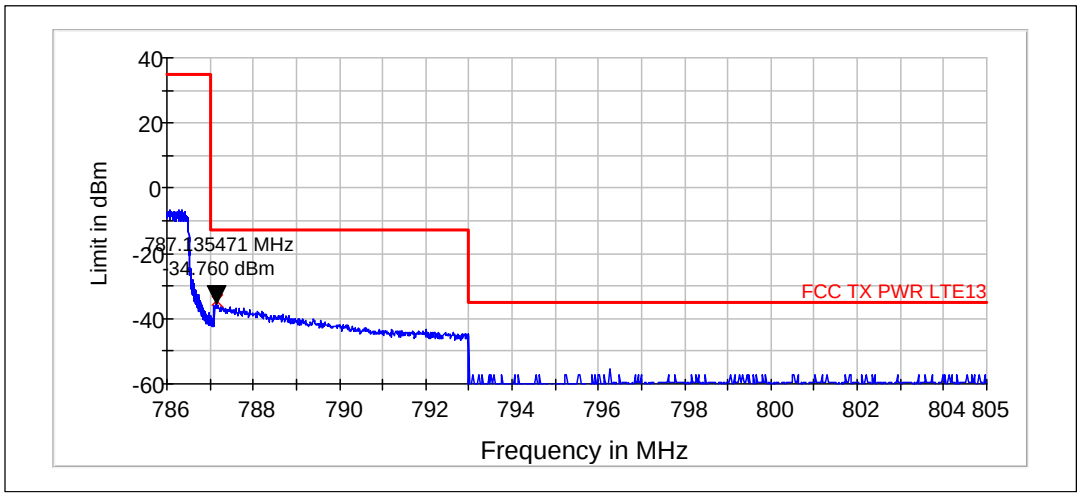
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500




RMS detector

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 10MHz, QPSK, 50 RB | 23230 / 782 | -36.86 | PASSED |




RMS detector

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| FDD, CBW 10MHz, 16QAM, 50 RB | 23230 / 782 | -34.76 | PASSED |

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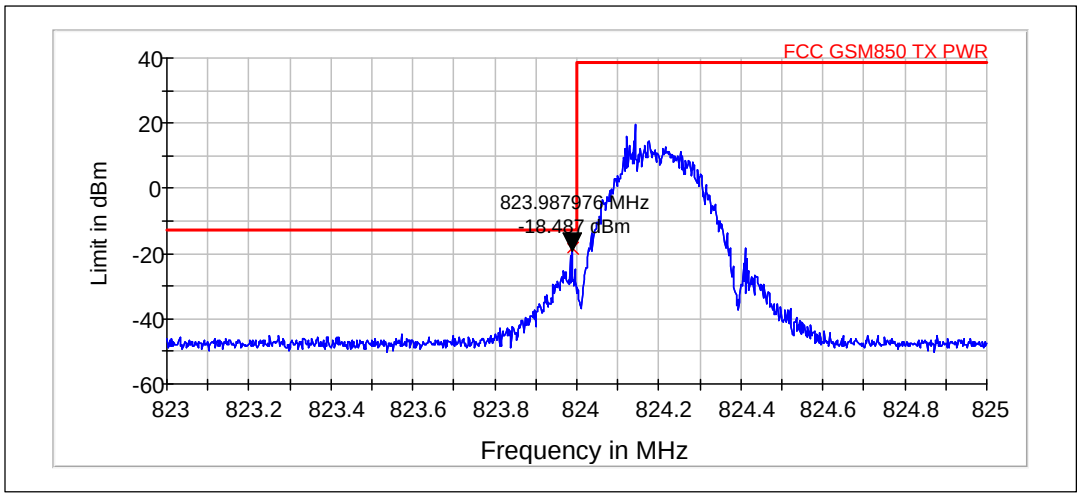
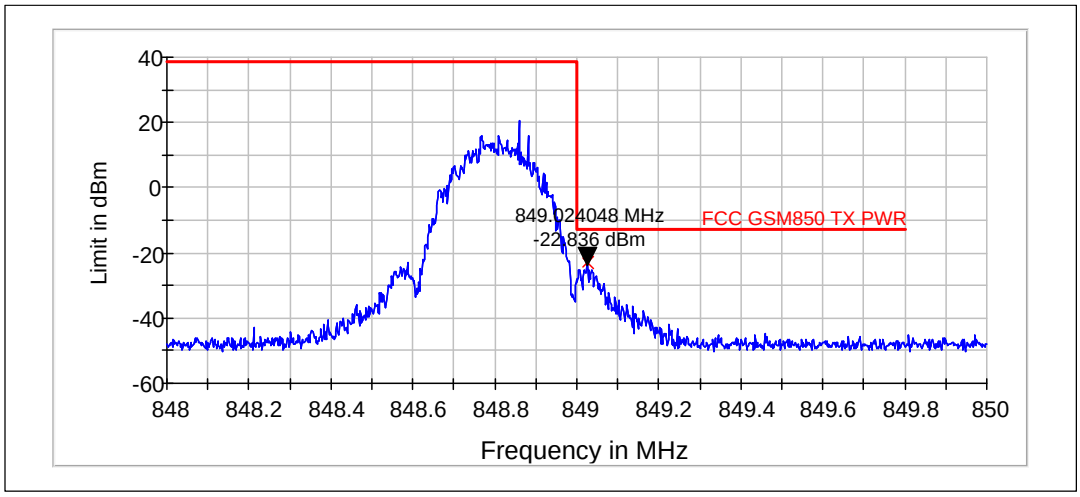
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.11. GSM850-E1 test results




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| E-GPRS (MSC9) | 128 / 824.2 | -18.49 | PASSED |




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| E-GPRS (MSC9) | 251 / 848.8 | -22.84 | PASSED |

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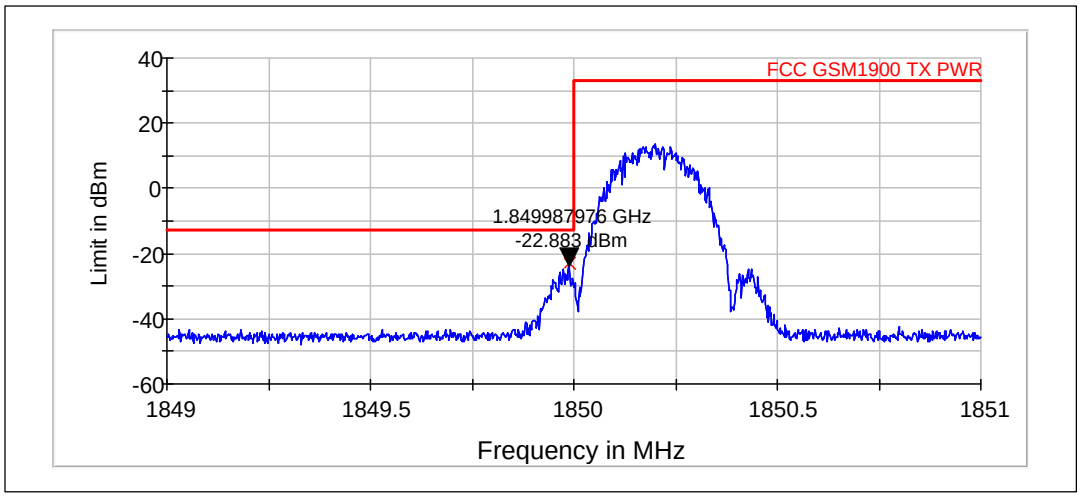
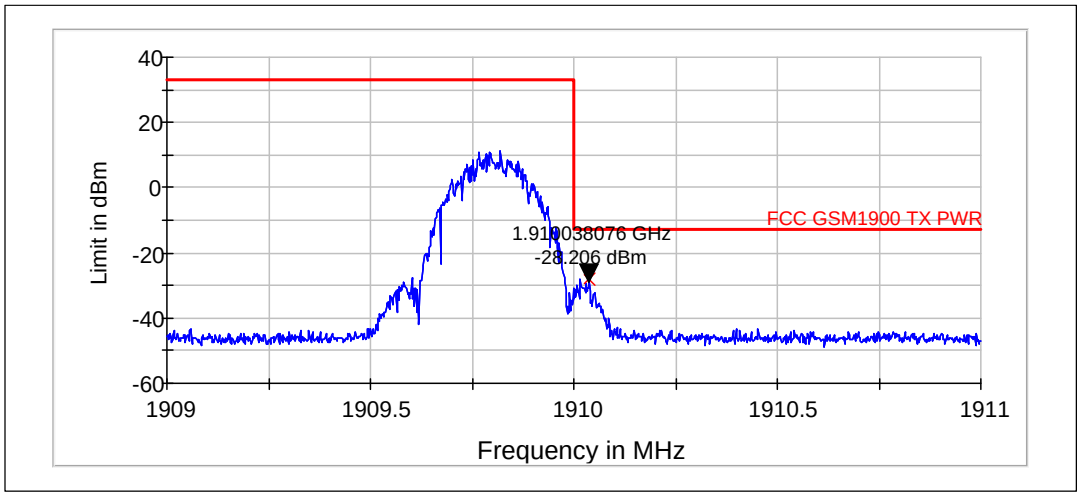
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 3.12. GSM1900-E1 test results




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| E-GPRS (MSC9) | 512 / 1850.2 | -22.88 | PASSED |




Peak (RBW: 3 kHz, VBW: 3 kHz, Max hold)

| Operation mode (TX on) | Channel fc [MHz] | Level [dBm] | Results |
|---|---|---|---|
| E-GPRS (MSC9) | 810 / 1909.8 | -28.21 | PASSED |



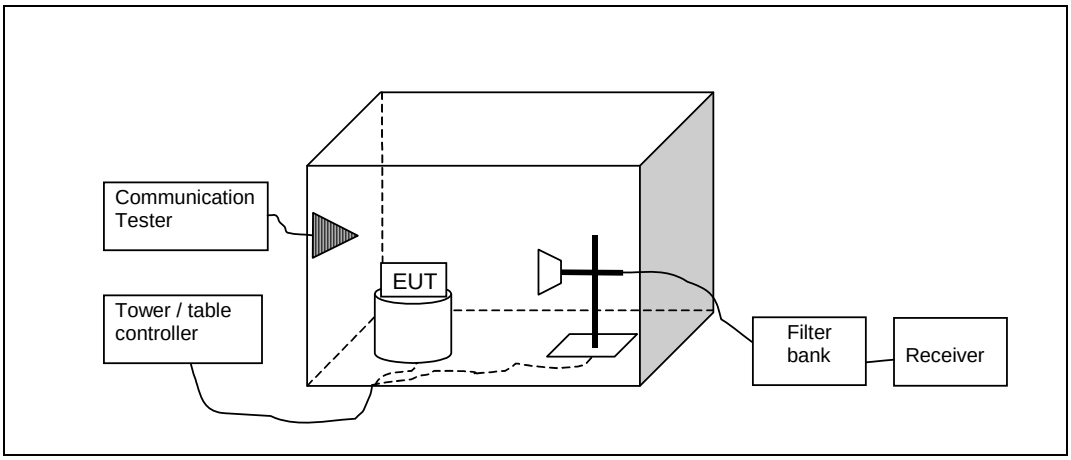

TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

# 4. Spurious radiated emissions

**(FCC §22.917(a), §2.1053, §24.238(a), §2.1053, §27.53(h), §27.53(c)(2)(4), RSS-132 4.5, RSS-133 6.5)**

| | |
|---|---|
| **EUT with DUT number** | RM-927, DUT 30743 |
| **Accessories with DUT numbers** | AC-60, DUT 30744 ; CA-190, DUT 30745 ; WH-902, DUT 30746 |
| **Operation Voltage [V] / [Hz]** | 115V/60Hz |
| **Results** | PASSED |
| **Remarks** | - |
| **Temp [°C] / Humidity [%RH] / Air Pressure [kPa]** | 15.8/46/1050 |
| **Date of measurements** | 26-Jul-2013 |
| **Measured by** | Tyrone Hawes |

### 4.1.1 Test setup




## 4.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:
The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

The substitution method is used.

The measurement results are obtained as described below:

$P\ [dBm] = P_{SUBST\ TX} + G_{SUBST\ TX\ ANT} - L_{SUBST\ CABLE}$

Where $P_{SUBST\ TX}$ is signal generator level, which produces the same receiver reading $P_{MEAS}$ in dBm as EUT. $G_{SUBST\ TX\ ANT}$ is substitution antenna gain and $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna.

Limits for spurious radiated emissions measurements

| Operation band | Frequency range [MHz] | Limit [dBm] |
|---|---|---|
| LTE 700 Upper | 30 – 8000<br>763-775 and 793-805<br>1559 – 1610<br>1559 – 1610 | -13 (RBW = 100 kHz, ERP)<br>-35 (RBW = 6.25 kHz, ERP)<br>-40 (RBW = 1 MHz)<br>-50 (RBW = 700 Hz) |
| GSM850 / WCDMA850 | 30 - 8500 | -13 |
| LTE1700 / / GSM1900 / WCDMA1900 | 30 - 18000 | -13 |

## 4.3. LTE 1700 (Band IV) test results

Channel 20175 / 1732.5 MHz

FDD, CBW 5MHz, QPSK, 1 RB, RMS detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 2131.242 | -22.85 | 5.19398 | -41.46 | 18.61 | HORIZONTAL | PASSED |
| 3465.381 | -58.07 | 0.00156 | -65.91 | 7.84 | HORIZONTAL | PASSED |
| 5198.001 | -49.95 | 0.01012 | -62.92 | 12.97 | HORIZONTAL | PASSED |
| 6930.822 | -51.64 | 0.00686 | -66.18 | 14.54 | HORIZONTAL | PASSED |
| 8663.482 | -56.2 | 0.0024 | -71.94 | 15.74 | VERTICAL | PASSED |
| 10385.04 | -54.78 | 0.00333 | -73.94 | 19.16 | HORIZONTAL | PASSED |

Channel 20175 / 1732.5 MHz

FDD, CBW 5MHz, 16QAM, 1 RB, RMS detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 2131.533 | -23.28 | 4.69786 | -41.9 | 18.62 | HORIZONTAL | PASSED |
| 3465.421 | -58.6 | 0.00138 | -66.45 | 7.85 | HORIZONTAL | PASSED |
| 5198.001 | -50.32 | 0.00929 | -63.29 | 12.97 | HORIZONTAL | PASSED |
| 6930.782 | -52.04 | 0.00625 | -66.58 | 14.54 | HORIZONTAL | PASSED |
| 8663.482 | -57.15 | 0.00193 | -73.03 | 15.88 | HORIZONTAL | PASSED |
| 10397.745 | -55.06 | 0.00312 | -73.94 | 18.88 | VERTICAL | PASSED |

## 4.4. LTE700 Upper (Band 13) test results

Channel 23230 / 782 MHz



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

FDD, CBW 5MHz, QPSK, 1 RB, RMS detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 749.259 | -42.39 | 0.05762 | -73.93 | 31.54 | HORIZONTAL | PASSED |
| 769.5 | -74.34 | 4E-05 | -107 | 32.66 | VERTICAL | PASSED |
| 804.776 | -73.48 | 4E-05 | -107 | 33.52 | VERTICAL | PASSED |
| 1564.621 | -64.59 | 0.00035 | -76.99 | 12.4 | VERTICAL | PASSED |
| 1609.038 | -64.41 | 0.00036 | -77.96 | 13.55 | VERTICAL | PASSED |
| 2354.717 | -65.77 | 0.00026 | -84.5 | 18.73 | VERTICAL | PASSED |
| 2910 | -63.94 | 0.0004 | -85.67 | 21.73 | HORIZONTAL | PASSED |
| 3137.519 | -72.16 | 6E-05 | -78.49 | 6.33 | HORIZONTAL | PASSED |
| 6995.198 | -63.54 | 0.00044 | -76.99 | 13.45 | VERTICAL | PASSED |

Channel 23230 / 782 MHz

FDD, CBW 5MHz, 16QAM, 1 RB, RMS detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 749.259 | -42.39 | 0.05762 | -73.93 | 31.54 | HORIZONTAL | PASSED |
| 767.316 | -74.52 | 4E-05 | -107 | 32.48 | VERTICAL | PASSED |
| 801.276 | -73.49 | 4E-05 | -107 | 33.51 | VERTICAL | PASSED |
| 1564.581 | -65.06 | 0.00031 | -77.46 | 12.4 | VERTICAL | PASSED |
| 1596.253 | -63.92 | 0.00041 | -77.46 | 13.54 | VERTICAL | PASSED |
| 2354.758 | -65.77 | 0.00026 | -84.51 | 18.74 | VERTICAL | PASSED |
| 2909.92 | -64.01 | 0.0004 | -85.66 | 21.65 | VERTICAL | PASSED |
| 3138 | -72.68 | 5E-05 | -79.04 | 6.36 | HORIZONTAL | PASSED |
| 6995.162 | -63.54 | 0.00044 | -76.99 | 13.45 | VERTICAL | PASSED |

## 4.5. WCDMA 1900 (Band II) test results

Channel 9400 / 1880.0 MHz

FDD mode, Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 1961.172 | -34.07 | 0.39156 | -51.47 | 17.4 | HORIZONTAL | PASSED |
| 2900.944 | -43.93 | 0.04046 | -67.69 | 23.76 | HORIZONTAL | PASSED |
| 5636.413 | -35.46 | 0.28464 | -48.78 | 13.32 | HORIZONTAL | PASSED |
| 8321.623 | -46.53 | 0.02222 | -62.73 | 16.2 | VERTICAL | PASSED |
| 9918.096 | -44.99 | 0.03171 | -63.85 | 18.86 | VERTICAL | PASSED |
| 9984.533 | -44.71 | 0.03385 | -63.42 | 18.71 | VERTICAL | PASSED |



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 4.6. WCDMA 850 (Band V) test results

Channel 4175 / 835.0 MHz

FDD mode, Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 821.558 | -44.02 | 0.03964 | -78.23 | 34.21 | VERTICAL | PASSED |
| 848.054 | -45.13 | 0.03066 | -79.14 | 34.01 | VERTICAL | PASSED |
| 848.422 | -45.61 | 0.02747 | -79.59 | 33.98 | VERTICAL | PASSED |
| 1004.85 | -57.91 | 0.00162 | -66.56 | 8.65 | HORIZONTAL | PASSED |
| 2511.764 | -47.22 | 0.01897 | -67.19 | 19.97 | VERTICAL | PASSED |
| 2514.088 | -47.91 | 0.01617 | -68.07 | 20.16 | VERTICAL | PASSED |

## 4.7. GSM850 TX test results

Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 848.772 | -66.18 | 0.00024 | -71.78 | 5.6 | VERTICAL | PASSED |
| 1673.026 | -48.29 | 0.01482 | -62.07 | 13.78 | HORIZONTAL | PASSED |
| 1673.226 | -42.85 | 0.05188 | -56.62 | 13.77 | VERTICAL | PASSED |
| 2509.539 | -43.98 | 0.04001 | -63.86 | 19.88 | HORIZONTAL | PASSED |
| 2509.579 | -43.5 | 0.04469 | -63.35 | 19.85 | VERTICAL | PASSED |
| 3368.577 | -53.3 | 0.00468 | -59.79 | 6.49 | HORIZONTAL | PASSED |

## 4.8. GSM1900 TX test results

Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 1960.03 | -30.92 | 0.80891 | -48.06 | 17.14 | HORIZONTAL | PASSED |
| 2510.784 | -46.31 | 0.02341 | -68.25 | 21.94 | HORIZONTAL | PASSED |
| 2926.093 | -44.64 | 0.03437 | -68.4 | 23.76 | HORIZONTAL | PASSED |
| 9770.14 | -45.99 | 0.02515 | -63.94 | 17.95 | HORIZONTAL | PASSED |
| 9935.23 | -45.56 | 0.02778 | -64.3 | 18.74 | VERTICAL | PASSED |
| 12388.076 | -43 | 0.05011 | -64.13 | 21.13 | VERTICAL | PASSED |




TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

### 4.10. GSM850-E1 TX test results

Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 849.001 | -71.61 | 7E-05 | -77.25 | 5.64 | VERTICAL | PASSED |
| 1673.126 | -51.14 | 0.0077 | -64.93 | 13.79 | HORIZONTAL | PASSED |
| 1673.367 | -47.74 | 0.01685 | -61.51 | 13.77 | VERTICAL | PASSED |
| 2509.078 | -48.88 | 0.01295 | -68.71 | 19.83 | VERTICAL | PASSED |
| 2517.455 | -48.48 | 0.01421 | -68.28 | 19.8 | HORIZONTAL | PASSED |
| 3341.663 | -53.43 | 0.00454 | -60.24 | 6.81 | HORIZONTAL | PASSED |

### 4.11. GSM1900-E1 TX test results

Peak detector

| Frequency [MHz] | P [dBm] | P [µW] | $P_{MEAS}$ [dBm] | $A_{TOT}$ [dB] | Polarization | Results |
|---|---|---|---|---|---|---|
| 1960.07 | -33.35 | 0.46206 | -50.49 | 17.14 | HORIZONTAL | PASSED |
| 2795.013 | -44.76 | 0.03344 | -68.02 | 23.26 | VERTICAL | PASSED |
| 9749.599 | -44.71 | 0.03378 | -62.75 | 18.04 | VERTICAL | PASSED |
| 9901.222 | -45.25 | 0.02987 | -64.08 | 18.83 | VERTICAL | PASSED |
| 11179.679 | -44.35 | 0.03675 | -63.9 | 19.55 | VERTICAL | PASSED |
| 12754.83 | -49.11 | 0.01228 | -67.63 | 18.52 | HORIZONTAL | PASSED |

## 5. Test Equipment

### 5.1. Conducted measurements

| Eq. No | Equipment | Type | Manufacturer | Used in |
|---|---|---|---|---|
| 4406 | Communication Tester | CMU200 | R&S | 22/24/27, 15C, 15B |
| 7602 | Communication Tester | CMW500 | R&S | 22/24/27, 15C, 15B |
| 7151 | Bluetooth Tester | CBT | R&S | 15B |
| - | GPS RX Antenna w/AMP | L1A-PM-NF | GPS Source | 15C |
| - | GPS Inline amplifier | A11M-V-NF-NM | GPS Source | 15C |
| - | GPS signal Splitter | S12-P110/5-NF | GPS Source | 15C |
| - | GPS TX Antenna | L1P-PV-NF | GPS Source | 15C |
| 7912 | Spectrum Analyzer | FSV-30 | R&S | 22/24/27, 15C |
| - | Thermal Chamber | VT-4002 | Vötsch | 22/24/27, 15C |
| - | Power splitter | 11667B | Agilent | 22/24/27, 15C |
| 3396 | EMC Analyzer | E7405A | HP | - |
| 7451 | EMI Receiver | ESU-26 | R&S | 22/24/27, 15C, 15B |
| 4188 | LISN 50 µH | ESH3-Z5 | R&S | 15C, 15B |
| 6981 | LISN 50 µH | ESH3-Z5 | R&S | 15C, 15B |
| - | Pulse Limiter | ESH3-Z2 | R&S | 15C, 15B |
| 7582 | Signal Generator | SMB100A | R&S | 15C, 15B |



TCC Nokia San Diego Laboratory
16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

## 5.2. Radiated measurements

| Eq. No | Equipment | Type | Manufacturer | Used in |
|---|---|---|---|---|
| 7591 | Antenna | HL562 | R&S | 22/24/27, 15C, 15B |
| 7572 | Double Ridge Horn Antenna | 3117 | ETS-Lindgren | 22/24/27, 15C |
| 7607 | Standard Gain HornAntenna | SAS 586 | A.H. System | 22/24/27, 15C |
| 7624 | Standard Gain HornAntenna | SAS 587 | A.H. System | 22/24/27, 15C |
| 7561 | Antenna | HFH2-Z2 | R&S | 15C, 15B |
| 5715 | Antenna | MBA-3030 | EMC Automation | 22/24/27, 15C |
| 5712 | Antenna | PLP3003 | EMC Automation | 22/24/27, 15C |
| 7457 | Relay Switch Unit | TS-RSP | R&S | 22/24/27, 15C, 15B |
| 7459 | Relay Switch Unit | TS-RSP | R&S | 22/24/27, 15C, 15B |
| 5729 | Relay Switch Unit | TS-RSP | R&S | 22/24/27, 15C, 15B |
| 5728 | EMI Receiver | ESIB26 | R&S | 22/24/27, 15C, 15B |
| 4406 | Communication Tester | CMU200 | R&S | 22/24/27, 15C, 15B |
| 7602 | Communication Tester | CMW500 | R&S | 22/24/27, 15C, 15B |
| 7151 | Bluetooth Tester | CBT | R&S | 15B |
| 3406 | Controller | Sc99V | Sunol | 22/24/27, 15C, 15B |
| - | Controller | G-1000DXC | Yaesu | 22/24/27, 15C, 15B |
| - | Computer Controller | GS-232B | Yaesu | 22/24/27, 15C, 15B |
| 7040 | Preamplifier | TS-PR3 | R&S | 22/24/27, 15C, 15B |
| - | Preamplifier | AMF-6D-020180-29-20P | Miteq | 22/24/27, 15C, 15B |
| - | Preamplifier | AMF-4D-01000800-30-29P | Miteq | 22/24/27, 15C, 15B |
| - | Preamplifier | AMF-5F-18002650-25-10P | Miteq | 22/24/27, 15C, 15B |
| - | High Pass Filter | 4HC1700-1-KK | R&S | 22 |
| - | High Pass Filter | F-15041 | RLC | 22/24/27, 15C |
| - | Band Reject Filter | WRCA824/849-0,2-6SS | Wainwright | 22 |
| - | Band Reject Filter | WRCC1800/2000-0.2-10SS | Wainwright | 24 |
| - | Band Reject Filter | WRCG2400/2483-2390/2493-35/10SS | Wainwright | 15C |
| - | Band Reject Filter | WRCG832/838-825/845-40/5SS | Wainwright | 22 |
| - | Band Reject Filter | WRCG1729.4/1735.4-1722.4/1742.4-40/6SS | Wainwright | 27 |
| - | Band Reject Filter | WRCG1877/1883 - 1870/1890-40/6SS | Wainwright | 24 |
| - | Notch Filter | WRCD1880-1.1.25/50-10SS | Wainwright | 22/24/27 |
| - | Notch Filter | WRCT902.4-0.4/40-8SS | Wainwright | - |
| Planned | Notch Filter | WRCJV2531/2539-2523/2547-60/12SS | Wainwright | 22/24/27 |
| - | GPS RX Antenna w/AMP | L1A-PM-NF | GPS Source | 15C |
| - | GPS Inline amplifier | A11M-V-NF-NM | GPS Source | 15C |
| - | GPS signal Splitter | S12-P110/5-NF | GPS Source | 15C |
| - | GPS TX Antenna | L1P-PV-NF | GPS Source | 15C |



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16620 West Bernardo Drive
San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500

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San Diego, CA 92127
USA
Tel. +1 858 831 5000
Fax. +1 858 831 6500