# FCC Test Report

**(Part 22 Subpart H & Part 24 Subpart E)**

| | | |
|---|---|---|
| **FCC ID** | : | **2ACDNTMC-HERO** |
| **Applicant** | : | **CHINA TRADE GROUP S.A.S**<br>CALLE 13 NO 14-42-CENTRO CUNDINAMARQUES OFICINA 805-806-OCTAVO PISO, BOGOTA, COLOMBIA |
| **Sample Description** | | |
| Product Name | : | **MOBILE PHONE** |
| Model No. | : | TMC-HERO |
| Serial No. | : | N/A |
| Trademark | : | TMC |
| **Receipt Date** | : | 2014-04-25 |
| **Test Date** | : | 2014-04-25 to 2014-05-14 |
| **Issue Date** | : | 2014-05-14 |
| **Test Standard(s)** | : | **FCC CFR Title 47 Part 2**<br>**FCC CFR Title 47 Part 22 Subpart H**<br>**FCC CFR Title 47 Part 24 Subpart E** |
| **Conclusions** | : | **PASSED*** |

*In the configuration tested, the EUT complied with the standards specified above.

| | | |
|---|---|---|
| **Test/Witness Engineer** | : | Jason Deng |
| **Approved & Authorized** | : | Winkey Wang |

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

# Content

# 1. General Information

## 1.1. Client Information

| | | |
|---|---|---|
| Applicant | : | CHINA TRADE GROUP S.A.S |
| Address | : | CALLE 13 NO 14-42-CENTRO CUNDINAMARQUES OFICINA 805-806-OCTAVO PISO, BOGOTA, COLOMBIA |
| Manufacturer | : | SHENZHEN YILIWANDA ELECTRONIC TECHNOLOGY Co., LTD. |
| Address | : | 5 FL, TOWER 5A, XINFU INDUSTRIAL ZONE, CHONGQING ROAD, SHENZHEN, CHINA |

## 1.2. General Description of EUT (Equipment Under Test)

| | | |
|---|---|---|
| Product Name | : | MOBILE PHONE |
| Model No. | : | TMC-HERO |
| Serial No. | : | N/A |
| Trademark | : | TMC |
| Power Supply | : | Travel charger: Input 100-240V~ 50/60Hz, 0.15A, Output DC 5V, 500mA<br>Rechargeable Li-ion Battery DC 3.7V |
| Operation Frequency range: | : | GSM 850: 824.20MHz-848.80MHz<br>PCS1900: 1850.20MHz-1909.80MHz<br>WCDMA Band V:826.4MHz-846.6MHz |
| Modulation type | : | GSM/GPRS:GMSK, UMTS:QPSK, EGPRS: 8PSK |
| Antenna type | : | Integral Antenna |
| Antenna gain | : | GSM 850: -2.0 dBi<br>PCS 1900: -1.0 dBi<br>WCDMA 850 : -2.0 dBi |

**Note:**

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(2) Operation Frequency List:

| GSM 850 | | PCS1900 | |
|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 128 | 824.20 | 512 | 1850.20 |
| 129 | 824.40 | 513 | 1850.40 |
| …. | …. | …. | …. |
| 189 | 836.40 | 660 | 1879.80 |
| 190 | 836.60 | 661 | 1880.00 |
| 191 | 836.80 | 662 | 1880.20 |
| … | … | … | … |
| 250 | 848.60 | 809 | 1909.60 |
| 251 | 848.80 | 810 | 1909.80 |

| WCDMA Band V | |
|---|---|
| Channel | Frequency (MHz) |
| 4132 | 826.40 |
| 4133 | 826.60 |
| …. | …. |
| 4182 | 836.40 |
| 4183 | 836.60 |
| 4184 | 836.80 |
| … | … |
| 4232 | 846.40 |
| 4233 | 846.60 |

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| GSM850 | | | PCS1900 | | |
|---|---|---|---|---|---|
| | Channel | Frequency(MHz) | | Channel | Frequency(MHz) |
| Lowest channel | 128 | 824.20 | Lowest channel | 512 | 1850.20 |
| Middle channel | 190 | 836.60 | Middle channel | 661 | 1880.00 |
| Highest channel | 251 | 848.80 | Highest channel | 810 | 1909.80 |
| WCDMA Band V | | | | | |
| | Channel | Frequency(MHz) | | | |
| Lowest channel | 4132 | 826.40 | | | |
| Middle channel | 4183 | 836.60 | | | |
| Highest channel | 4233 | 846.60 | | | |

## 1.3. Description of Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Test Mode | Description |
|---|---|
| Communicate mode (GSM850) | Keep the EUT in communicating mode on GSM850 band. |
| Data mode (GPRS850) | Keep the EUT in data communicating mode on GPRS850 band. |

| | |
|---|---|
| Data mode (EGPRS850) | Keep the EUT in data communicating mode on EGPRS850 band. |
| Communicate mode (PCS1900) | Keep the EUT in communicating mode on PCS1900 band. |
| Data mode (GPRS1900) | Keep the EUT in data communicating mode on GPRS1900 band. |
| Data mode (EGPRS1900) | Keep the EUT in data communicating mode on EGPRS1900 band. |
| Communicate mode (UMTS 850) | Keep the EUT in communicating mode on UMTS 850 band. |
| Data mode (RMC UMTS850) | Keep the EUT in data communicating mode on RMC in UMTS850 (12.2 kbps) |
| Data mode (HSDPA UMTS850) | Keep the EUT in data communicating mode on HSDPA in UMTS 850 (Sub-test 1~Sub-test 4). |
| Data mode(HSUPA UMTS850) | Keep the EUT in data communicating mode on HSUPA in UMTS 850(Sub-test 1~Sub-test 5). |
| Remark : | Pre-test output power of all modes, and found GSM850, PCS1900 and UMTS 850 12.2 kbps RMC were the worst case. |

## 1.4. Laboratory Location:

Shenzhen Certification Technology Service Co., Ltd.

Address: 2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China

At the time of testing, the Laboratory is accredited. It is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 197647.

Tel:86-755-86375552 Fax: 86-755-26736857

# 2. Test Results Summary

| FCC Part15, Subpart B | | |
|---|---|---|
| **Section** | **Test Item** | **Judgment** |
| Part 1.1307<br>Part 2.1093 | RF Exposure (SAR) | PASSED<br>(refer to SAR report) |
| Part 2.1046<br>Part 22.913(a)(2)<br>Part 24.232 (c) | RF Output Power | PASSED |
| Part 2.1047 | Modulation Characteristics | PASSED |
| Part 2.1049<br>Part 22.917<br>Part 24.238 | 99% & -26 dB Occupied Bandwidth | PASSED |
| Part 2.1051<br>Part 22.917 (a)<br>Part 24.238 (a) | Spurious Emissions at Antenna Terminal | PASSED |
| Part 2.1053<br>Part 22.917 (a)<br>Part 24.238 (a) | Field Strength of Spurious Radiation | PASSED |
| Part 22.917 (a)<br>Part 24.238 (a) | Out of band emission<br>Band Edge | PASSED |
| Part 2.1055(a)(1)(b) | Frequency stability vs. temperature | PASSED |
| Part 2.1055(d)(1)(2) | Frequency stability vs. voltage | PASSED |
| **Note:** "PASSED" - The EUT complies with the essential requirements in the standard. | | |

# 3. Test Instruments List

| Item | Test Equipment | Manufacturer | Model No. | Cal. Date | Cal. Due date |
|---|---|---|---|---|---|
| 1 | Bilog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | Mar. 28, 2014 | Mar. 27, 2015 |
| 2 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA9120D | Mar. 28, 2014 | Mar. 27, 2015 |
| 3 | Coaxial Cable | N/A | N/A | Mar. 28, 2014 | Mar. 27, 2015 |
| 4 | Coaxial Cable | N/A | N/A | Mar. 28, 2014 | Mar. 27, 2015 |
| 5 | Coaxial cable | N/A | N/A | Mar. 28, 2014 | Mar. 27, 2015 |
| 6 | Coaxial Cable | N/A | N/A | Mar. 28, 2014 | Mar. 27, 2015 |
| 7 | Coaxial Cable | N/A | N/A | Mar. 28, 2014 | Mar. 27, 2015 |
| 8 | Amplifier (10kHz-1.3GHz) | HP | 8447D | Mar. 28, 2014 | Mar. 27, 2015 |
| 9 | Amplifier (1GHz-18GHz) | Compliance Direction Systems Inc. | PAP-1G18 | Mar. 28, 2014 | Mar. 27, 2015 |
| 10 | Pre-amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | Mar. 28, 2014 | Mar. 27, 2015 |
| 11 | Horn Antenna | ETS-LINDGREN | 3160 | Mar. 28, 2014 | Mar. 27, 2015 |
| 12 | Positioning Controller | UC | UC3000 | N/A | N/A |
| 13 | Spectrum analyzer 9kHz-30GHz | Rohde & Schwarz | FSP | Mar. 28, 2014 | Mar. 27, 2015 |
| 14 | EMI Test Receiver | Rohde & Schwarz | ESPI | Mar. 28, 2014 | Mar. 27, 2015 |
| 15 | Loop antenna | Laplace instrument | RF300 | Mar. 28, 2014 | Mar. 27, 2015 |
| 16 | Universal radio communication tester | Rhode & Schwarz | CMU200 | Mar. 28, 2014 | Mar. 27, 2015 |
| 17 | Signal Analyzer | Rohde & Schwarz | FSIQ3 | Mar. 28, 2014 | Mar. 27, 2015 |
| 18 | EMI Test Receiver | Rohde & Schwarz ESCI | ESCI | Mar. 28, 2014 | Mar. 27, 2015 |
| 19 | LISN | CHASE | MN2050D | Mar. 28, 2014 | Mar. 27, 2015 |

# 4. Conducted Output Power

## 4.1. Test Standard and Limit

4.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

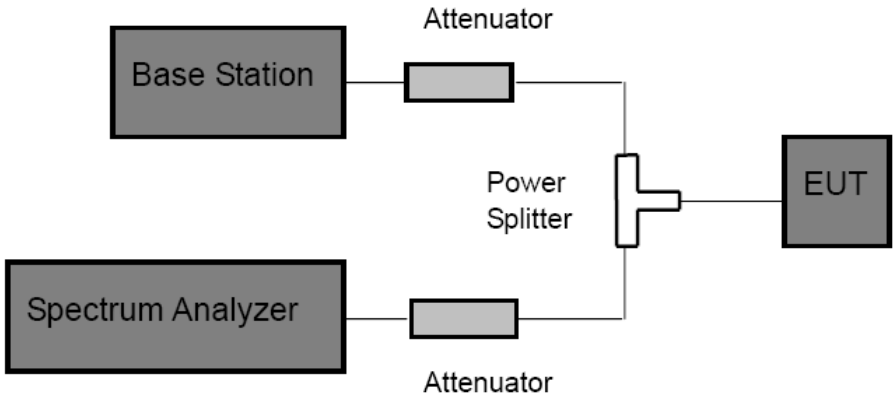
4.1.2. Test Method

FCC part 2.1046

4.1.3. Test Limit

| Frequency Band | Limit |
|---|---|
| GSM 850MHz | 38.5 dBm (ERP) |
| PCS 1900 MHz | 33 dBm (EIRP) |
| WCDMA Band V | 38.5 dBm (ERP) |

## 4.2. Test Setup




## 4.3. Test Procedure

(1) The EUT is coupled to the Spectrum Analyzer and the Base Station with the suitable Attenuators through the Power Splitter, the path loss is calibrated to correct the reading.
(2) A call is set up by the Base Station to the generic call set up procedure.
(3) Set EUT at maximum power level through base station by power level command.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.

## 4.4. Test Data

| Mode | Channel | Frequency (MHz) | Burst Average power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|
| GSM 850 | 128 | 824.20 | 32.58 | 38.45 | PASSED |
| | 190 | 836.60 | 32.79 | | PASSED |
| | 251 | 848.80 | **32.85** | | PASSED |
| GPRS 850 (1 Uplink slot) | 128 | 824.20 | 32.57 | | PASSED |
| | 190 | 836.60 | 32.78 | | PASSED |
| | 251 | 848.80 | **32.84** | | PASSED |
| GPRS 850 (2 Uplink slots) | 128 | 824.20 | 31.82 | | PASSED |
| | 190 | 836.60 | 32.05 | | PASSED |
| | 251 | 848.80 | 32.12 | | PASSED |
| GPRS 850 (3 Uplink slots) | 128 | 824.20 | 30.05 | | PASSED |
| | 190 | 836.60 | 30.25 | | PASSED |
| | 251 | 848.80 | 30.44 | | PASSED |
| GPRS 850 (4 Uplink slots) | 128 | 824.20 | 28.97 | | PASSED |
| | 190 | 836.60 | 29.20 | | PASSED |
| | 251 | 848.80 | 29.40 | | PASSED |
| EGPRS 850 (1 Uplink slot) | 128 | 824.20 | 26.51 | | PASSED |
| | 190 | 836.60 | 26.73 | | PASSED |
| | 251 | 848.80 | **26.81** | | PASSED |
| EGPRS 850 (2 Uplink slots) | 128 | 824.20 | 25.27 | | PASSED |
| | 190 | 836.60 | 25.41 | | PASSED |
| | 251 | 848.80 | 25.56 | | PASSED |
| EGPRS 850 (3 Uplink slots) | 128 | 824.20 | 23.67 | | PASSED |
| | 190 | 836.60 | 23.84 | | PASSED |
| | 251 | 848.80 | 23.95 | | PASSED |
| EGPRS 850 (4 Uplink slots) | 128 | 824.20 | 22.52 | | PASSED |
| | 190 | 836.60 | 22.61 | | PASSED |
| | 251 | 848.80 | 22.88 | | PASSED |

| Mode | Channel | Frequency (MHz) | Burst Average power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|
| PCS 1900 | 512 | 1850.20 | 29.81 | 33.00 | PASSED |
| | 661 | 1880.00 | 29.97 | | PASSED |
| | 810 | 1909.80 | **30.16** | | PASSED |
| GPRS 1900 (1 Uplink slot) | 512 | 1850.20 | 29.79 | | PASSED |
| | 661 | 1880.00 | 29.95 | | PASSED |
| | 810 | 1909.80 | **30.15** | | PASSED |
| GPRS 1900 (2 Uplink slots) | 512 | 1850.20 | 29.02 | | PASSED |
| | 661 | 1880.00 | 29.23 | | PASSED |
| | 810 | 1909.80 | 29.46 | | PASSED |
| GPRS 1900 (3 Uplink slots) | 512 | 1850.20 | 27.12 | | PASSED |
| | 661 | 1880.00 | 27.34 | | PASSED |
| | 810 | 1909.80 | 27.61 | | PASSED |
| GPRS 1900 (4 Uplink slots) | 512 | 1850.20 | 26.03 | | PASSED |
| | 661 | 1880.00 | 26.25 | | PASSED |
| | 810 | 1909.80 | 26.57 | | PASSED |
| EGPRS 1900 (1 Uplink slot) | 512 | 1850.20 | 25.75 | | PASSED |
| | 661 | 1880.00 | 25.97 | | PASSED |
| | 810 | 1909.80 | **26.14** | | PASSED |
| EGPRS 1900 (2 Uplink slots) | 512 | 1850.20 | 24.77 | | PASSED |
| | 661 | 1880.00 | 24.92 | | PASSED |
| | 810 | 1909.80 | 25.01 | | PASSED |
| EGPRS 1900 (3 Uplink slots) | 512 | 1850.20 | 22.89 | | PASSED |
| | 661 | 1880.00 | 22.96 | | PASSED |
| | 810 | 1909.80 | 23.11 | | PASSED |
| EGPRS 1900 (4 Uplink slots) | 512 | 1850.20 | 21.93 | | PASSED |
| | 661 | 1880.00 | 22.06 | | PASSED |
| | 810 | 1909.80 | 22.27 | | PASSED |

| Mode | | Channel | Frequency (MHz) | Burst Average power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| UMTS 850 HSDPA | Subtest 1 | 4132 | 826.40 | 21.64 | 38.45 | PASSED |
| | | 4183 | 836.00 | **21.84** | | PASSED |
| | | 4233 | 846.60 | 21.46 | | PASSED |
| | Subtest 2 | 4132 | 826.40 | 21.31 | | PASSED |
| | | 4183 | 836.00 | 21.48 | | PASSED |
| | | 4233 | 846.60. | 21.29 | | PASSED |
| | Subtest 3 | 4132 | 826.40 | 21.38 | | PASSED |
| | | 4183 | 836.00 | 21.46 | | PASSED |
| | | 4233 | 846.60 | 21.32 | | PASSED |
| | Subtest 4 | 4132 | 826.40 | 21.36 | | PASSED |
| | | 4183 | 836.00 | 21.41 | | PASSED |
| | | 4233 | 846.60 | 21.32 | | PASSED |
| UMTS 850 RMC | 12.2kbps | 4132 | 826.40 | 22.66 | | PASSED |
| | | 4183 | 836.00 | **22.89** | | PASSED |
| | | 4233 | 846.60 | 22.50 | | PASSED |
| UMTS 850 AMR | 12.2kbps | 4132 | 826.40 | 22.65 | | PASSED |
| | | 4183 | 836.00 | 22.87 | | PASSED |
| | | 4233 | 846.60 | 22.50 | | PASSED |
| UMTS 850 HSUPA | Subtest 1 | 4132 | 826.40 | **21.87** | | PASSED |
| | | 4183 | 836.00 | 21.87 | | PASSED |
| | | 4233 | 846.60 | 21.43 | | PASSED |
| | Subtest 2 | 4132 | 826.40 | 20.16 | | PASSED |
| | | 4183 | 836.00 | 20.13 | | PASSED |
| | | 4233 | 846.60 | 19.89 | | PASSED |
| | Subtest 3 | 4132 | 826.40 | 20.21 | | PASSED |
| | | 4183 | 836.00 | 20.19 | | PASSED |
| | | 4233 | 846.60 | 20.16 | | PASSED |
| | Subtest 4 | 4132 | 826.40 | 20.15 | | PASSED |
| | | 4183 | 836.00 | 20.19 | | PASSED |
| | | 4233 | 846.60 | 20.03 | | PASSED |
| | Subtest 5 | 4132 | 826.40 | 21.12 | | PASSED |
| | | 4183 | 836.00 | 21.15 | | PASSED |
| | | 4233 | 846.60 | 21.01 | | PASSED |

# 5. Modulation Characteristics

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

# 6. Occupied Bandwidth Test

## 6.1. Test Standard and Limit

6.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

6.1.2. Test Method

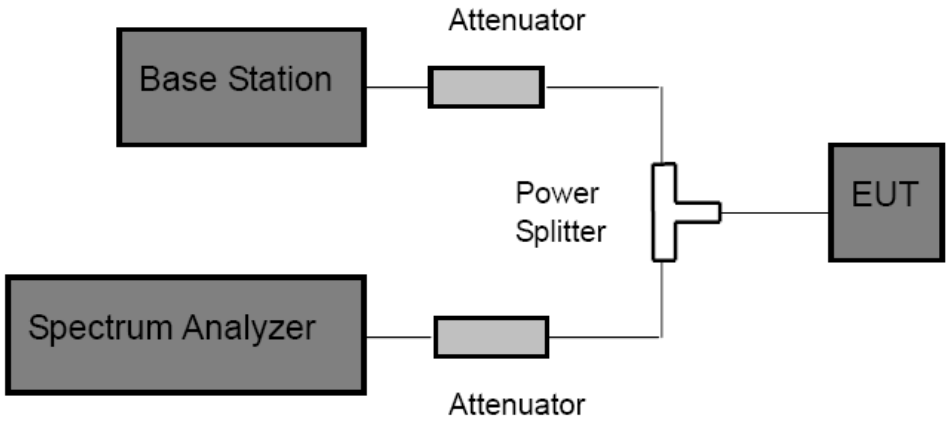
FCC part 2.1049

6.1.3. Test Limit

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as 99% power and -26dBc occupied bandwidths.

## 6.2. Test Setup




## 6.3. Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

(2) RBW was set to about 1% of emission BW, VBW= 3 times RBW.

(3) -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

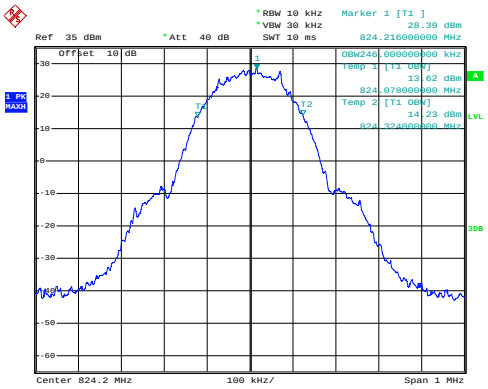
## 6.4. Test Data

| Mode | Channel | Frequency (MHz) | 99% Occupy bandwidth (KHz) | -26dB bandwidth (KHz) |
|---|---|---|---|---|
| GSM 850 | 128 | 824.2 | 246 | 320 |
| | 190 | 836.6 | 246 | 324 |
| | 251 | 848.8 | 246 | 318 |
| EGPRS 850 | 128 | 824.2 | 240 | 310 |
| | 190 | 836.6 | 242 | 310 |
| | 251 | 848.8 | 240 | 302 |
| PCS 1900 | 512 | 1850.2 | 246 | 320 |
| | 661 | 1880.0 | 244 | 318 |
| | 810 | 1909.8 | 244 | 322 |
| EGPRS 1900 | 512 | 1850.2 | 242 | 310 |
| | 661 | 1880.0 | 242 | 308 |
| | 810 | 1909.8 | 244 | 316 |
| UMTS850 12.2k RMC | 4132 | 824.40 | 4160 | 4700 |
| | 4183 | 836.00 | 4180 | 4720 |
| | 4233 | 846.60 | 4160 | 4720 |
| UMTS850 HSDPA | 4132 | 824.40 | 4160 | 4720 |
| | 4183 | 836.00 | 4180 | 4720 |
| | 4233 | 846.60 | 4180 | 4720 |
| UMTS850 HSUPA | 4132 | 824.40 | 4160 | 4720 |
| | 4183 | 836.00 | 4180 | 4680 |
| | 4233 | 846.60 | 4160 | 4700 |
| **Note:** GSM & GPRS use the same modulation technical (GMSK), and with the same channels, so the 99% OBW and the -26dB of GPRS not performed. | | | | |

**Test plot as follows:**

| Test Item | 99% Occupy bandwidth | Test Mode | GSM850 |
|---|---|---|---|

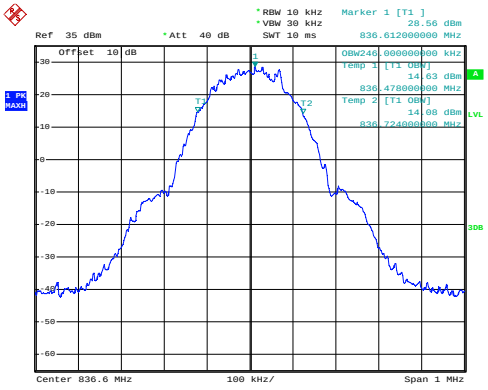
Lowest




REMOTE HIGH

Date: 13.MAY.2014 19:30:44

Middle

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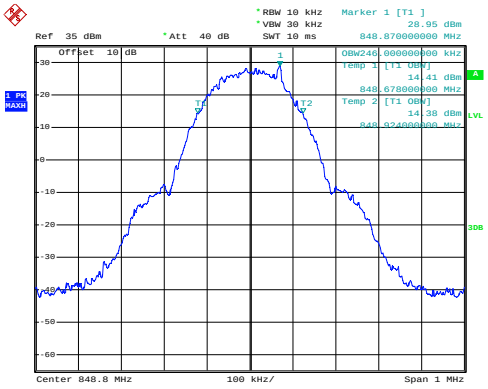
Date: 13.MAY.2014 19:35:52

Highest

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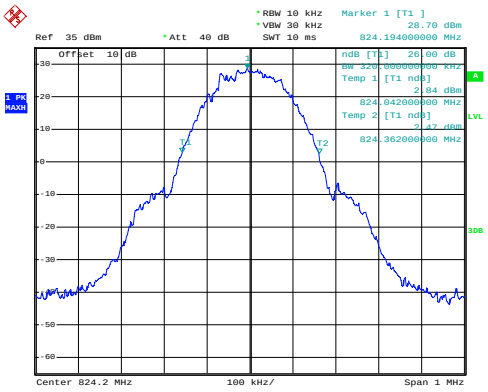
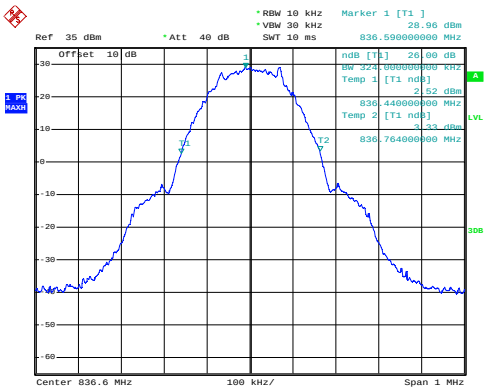
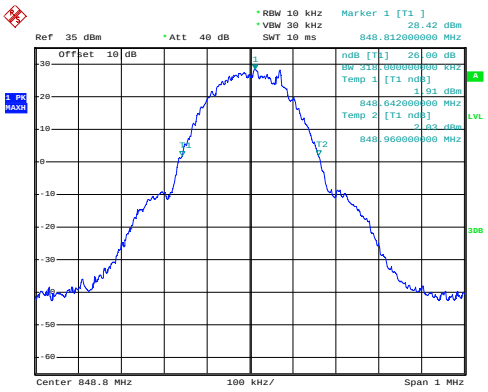
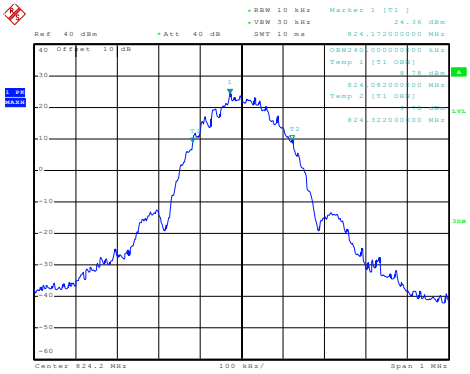
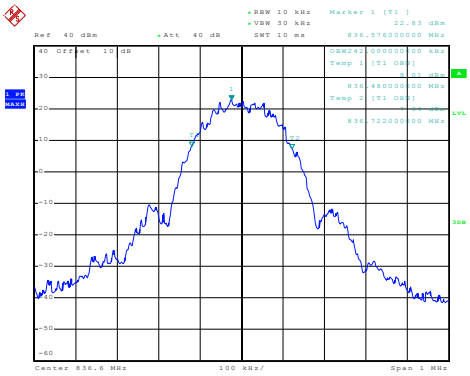
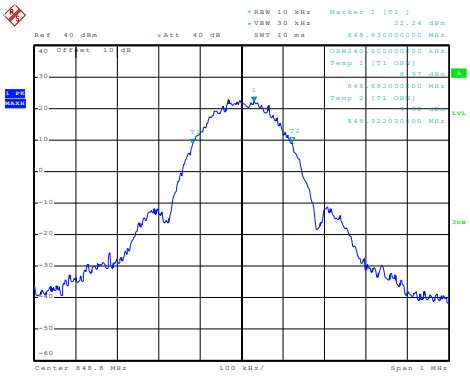
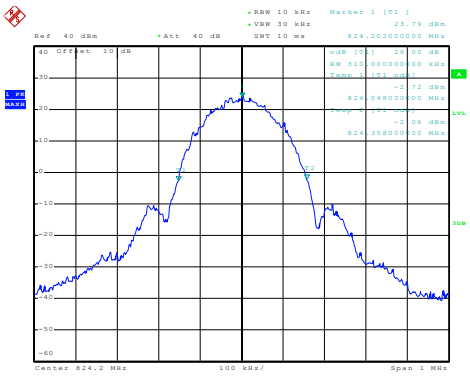
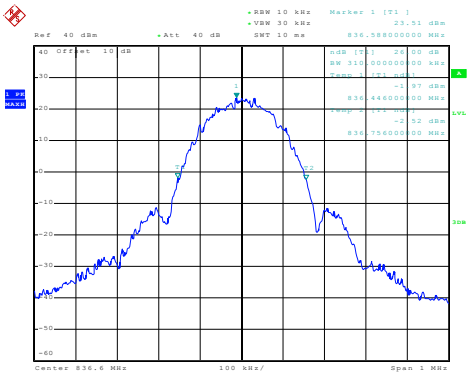
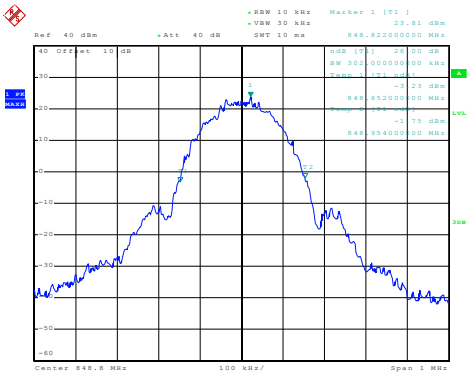
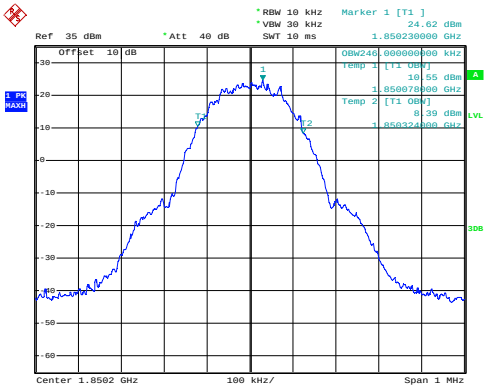
| Test Item | -26dB bandwidth | Test Mode | GSM850 |
|---|---|---|---|
| Lowest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 19:57:25 | | |
| Middle |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 19:55:52 | | |
| Highest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 19:41:41 | | |

| Test Item | 99% Occupy bandwidth | Test Mode | EGPRS 850 |
|---|---|---|---|
| Lowest |  REMOTE HIGH Date: 13.MAY.2014 21:31:18 | | |
| Middle |  REMOTE HIGH Date: 13.MAY.2014 21:34:25 | | |
| Highest |  REMOTE HIGH Date: 13.MAY.2014 21:37:05 | | |

| Test Item | -26dB bandwidth | Test Mode | EGPRS 850 |
|---|---|---|---|
| Lowest |  REMOTE HIGH Date: 13.MAY.2014 21:41:29 | | |
| Middle |  REMOTE HIGH Date: 13.MAY.2014 21:46:23 | | |
| Highest |  REMOTE HIGH Date: 13.MAY.2014 21:50:17 | | |

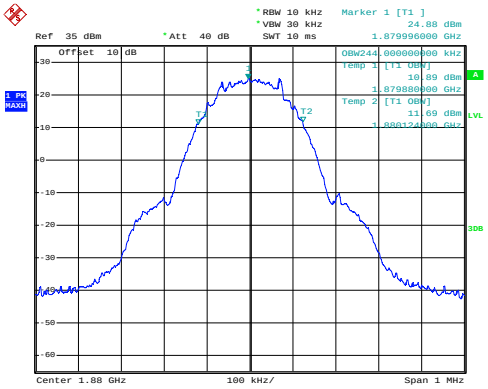
| Test Item | 99% Occupy bandwidth | Test Mode | PCS1900 |
|---|---|---|---|

Lowest



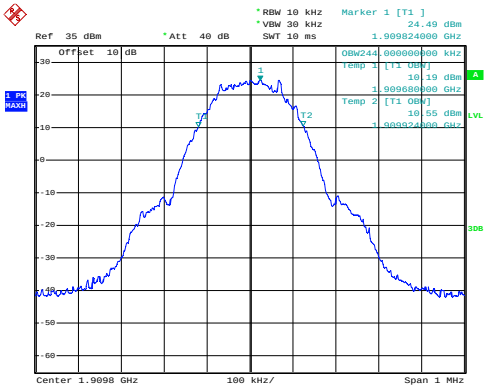

REMOTE HIGH
Date: 13.MAY.2014 20:21:15

Middle

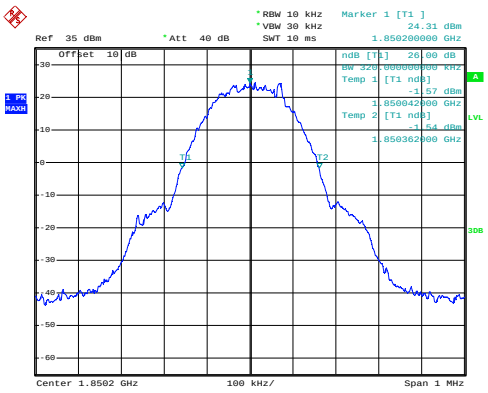
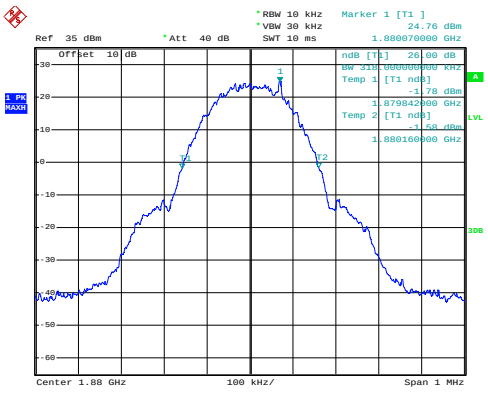
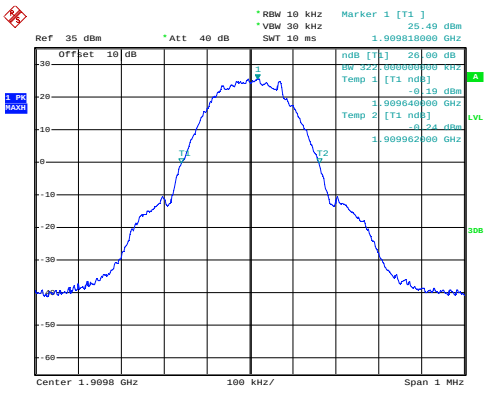


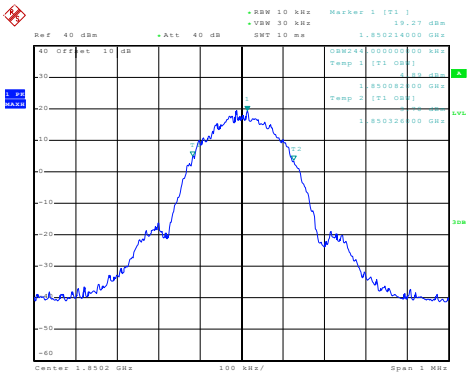
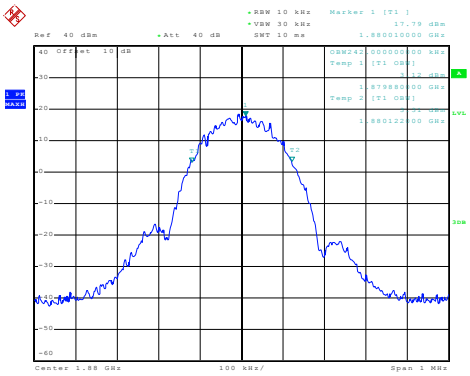
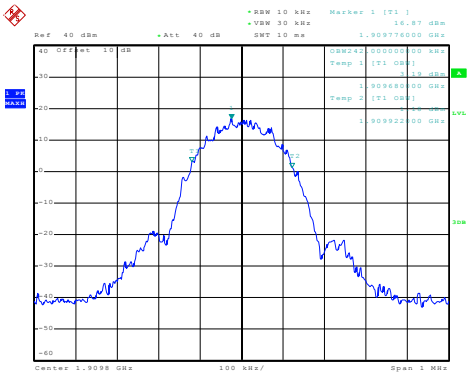

REMOTE HIGH
Date: 13.MAY.2014 20:26:18

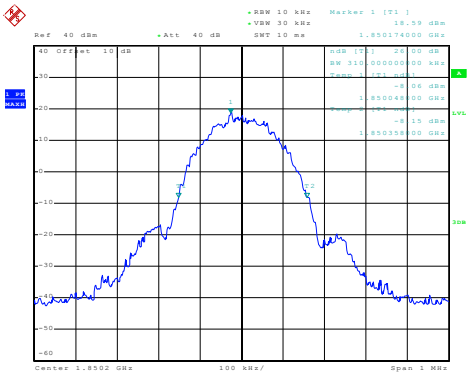
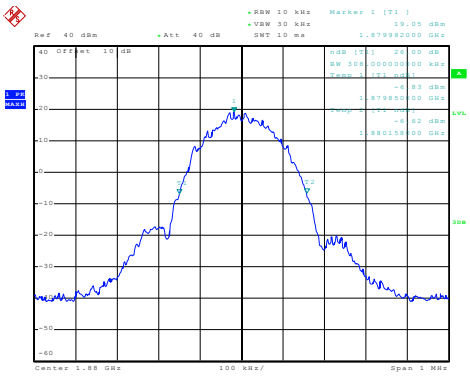
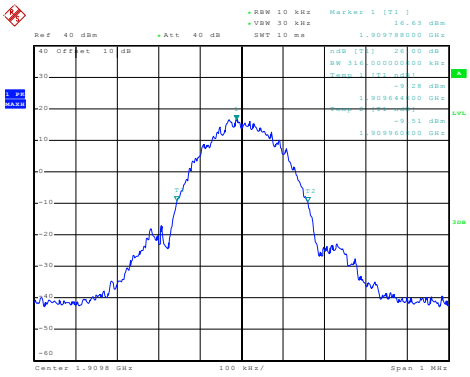
Highest




REMOTE HIGH
Date: 13.MAY.2014 20:29:08

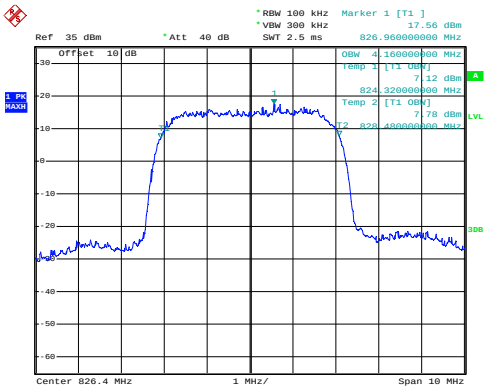
| Test Item | -26dB bandwidth | Test Mode | PCS 1900 |
|---|---|---|---|
| Lowest |  | | |
| Middle |  | | |
| Highest |  | | |

| Test Item | 99% Occupy bandwidth | Test Mode | EGPRS 1900 |
|---|---|---|---|
| Lowest |  REMOTE HIGH Date: 13.MAY.2014 21:55:06 | | |
| Middle |  REMOTE HIGH Date: 13.MAY.2014 21:58:47 | | |
| Highest |  REMOTE HIGH Date: 13.MAY.2014 22:03:21 | | |

| Test Item | -26dB bandwidth | Test Mode | EGPRS 1900 |
|---|---|---|---|
| Lowest |  REMOTE HIGH Date: 13.MAY.2014 22:07:32 | | |
| Middle |  REMOTE HIGH Date: 13.MAY.2014 22:10:52 | | |
| Highest |  REMOTE HIGH Date: 13.MAY.2014 22:13:48 | | |

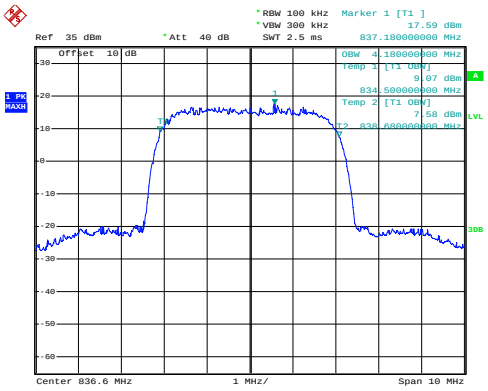
| Test Item | 99% Occupy bandwidth | Test Mode | UMTS850 12.2k RMC |
|---|---|---|---|

Lowest



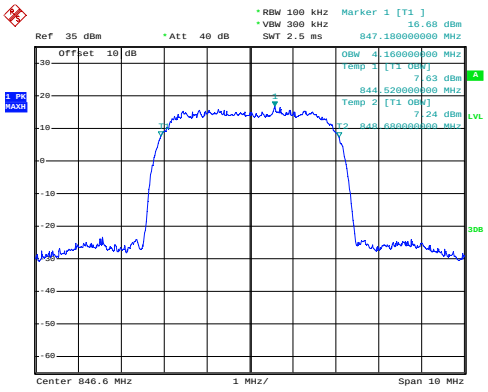

REMOTE HIGH
Date: 13.MAY.2014 22:55:40

Middle

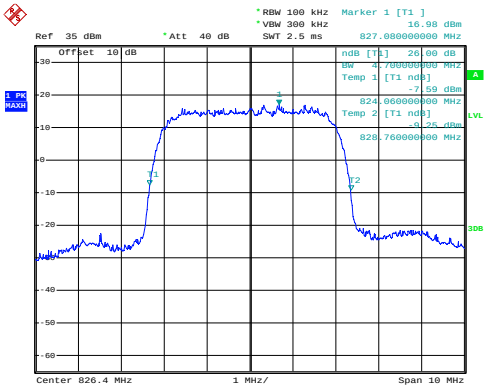
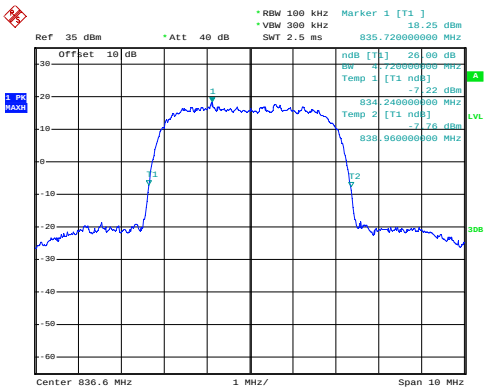
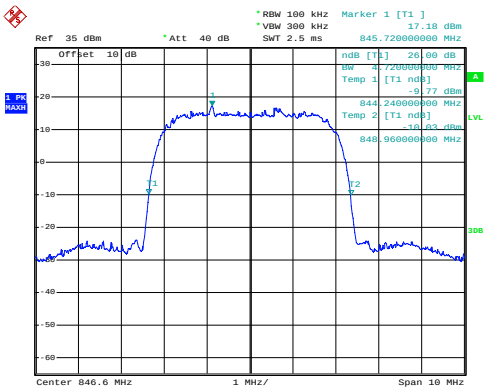



REMOTE HIGH
Date: 13.MAY.2014 22:58:12

Highest

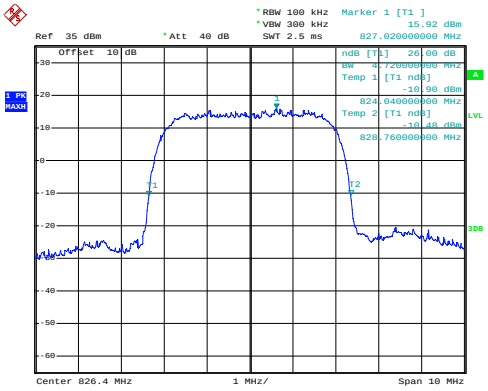



REMOTE HIGH
Date: 13.MAY.2014 23:00:29

| Test Item | -26dB bandwidth | Test Mode | UMTS850 12.2k RMC |
|---|---|---|---|
| Lowest |  | | |
| Middle |  | | |
| Highest |  | | |

| Test Item | -26dB bandwidth | Test Mode | UMTS850 HSDPA |
|---|---|---|---|

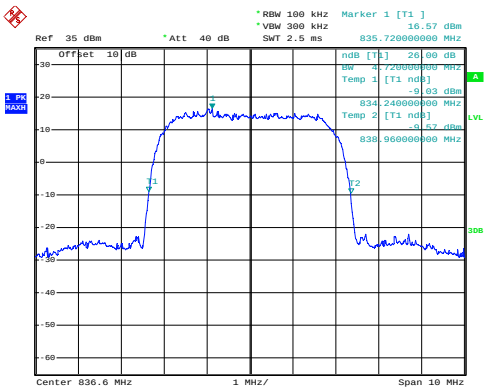
Lowest




REMOTE HIGH

Date: 13.MAY.2014 23:36:04

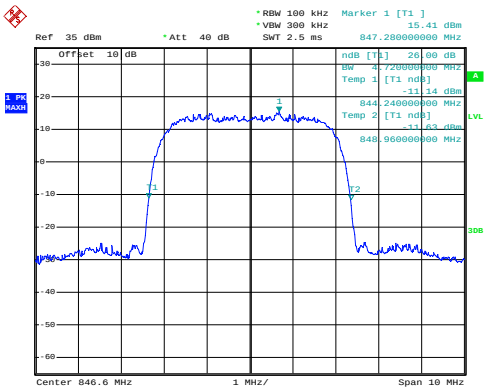
Middle




REMOTE HIGH

Date: 13.MAY.2014 23:37:24

Highest

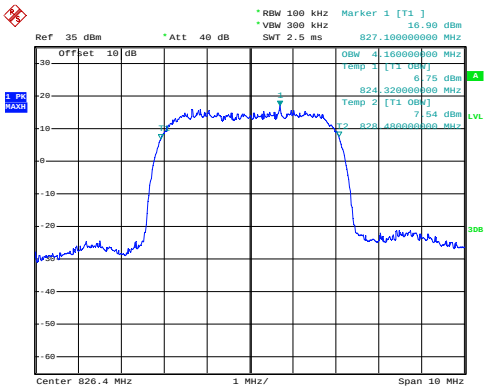



REMOTE HIGH

Date: 13.MAY.2014 23:38:27

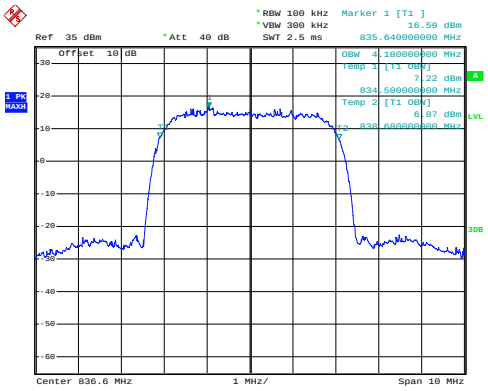
| Test Item | 99% Occupy bandwidth | Test Mode | UMTS850 HSDPA |
|---|---|---|---|

Lowest



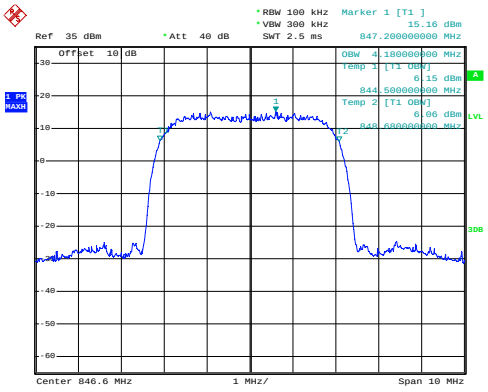

REMOTE HIGH
Date: 14.MAY.2014 00:02:08

Middle




REMOTE HIGH
Date: 13.MAY.2014 23:23:49

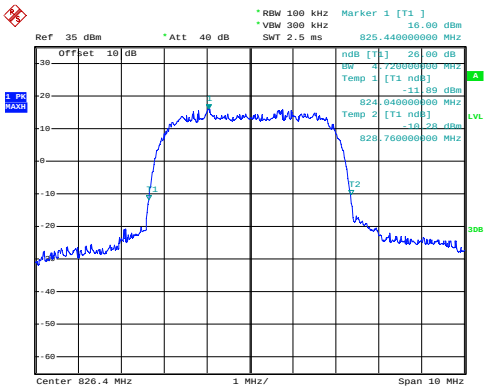
Highest




REMOTE HIGH
Date: 13.MAY.2014 23:22:26

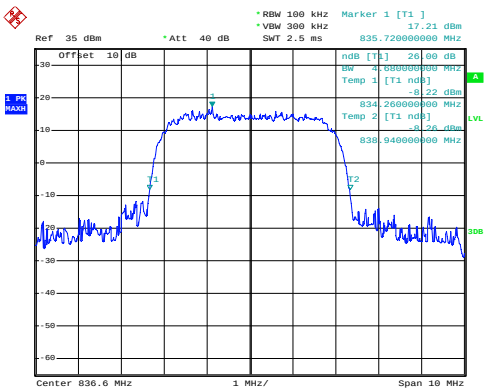
| Test Item | -26dB bandwidth | Test Mode | UMTS 850 HSUPA |
|---|---|---|---|

Lowest



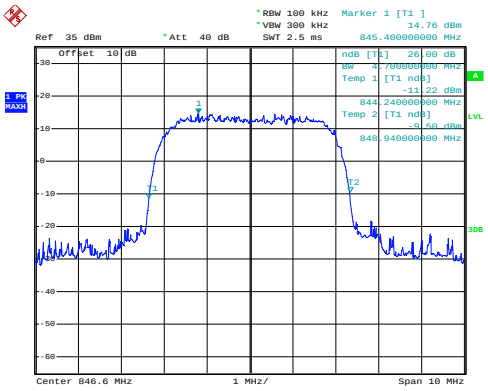

REMOTE HIGH
Date: 13.MAY.2014 23:51:59

Middle




REMOTE HIGH
Date: 13.MAY.2014 23:53:23

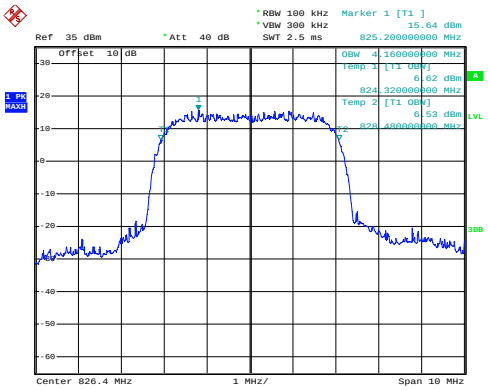
Highest




REMOTE HIGH
Date: 13.MAY.2014 23:54:17

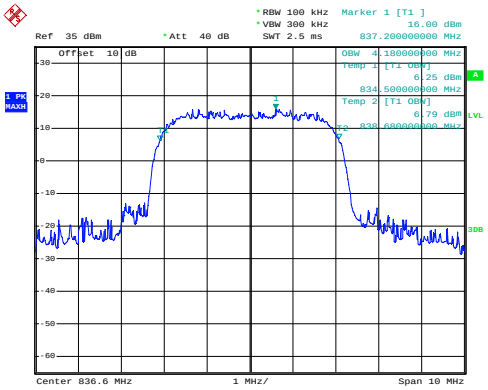
| Test Item | 99% Occupy bandwidth | Test Mode | UMTS 850 HSUPA |
|---|---|---|---|

Lowest



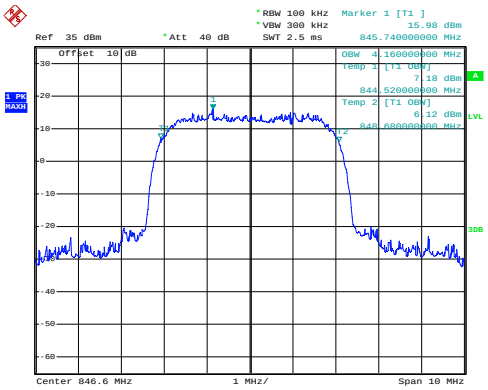

REMOTE HIGH
Date: 13.MAY.2014 23:50:12

Middle




REMOTE HIGH
Date: 13.MAY.2014 23:49:18

Highest




REMOTE HIGH
Date: 13.MAY.2014 23:48:10

# 7. Out of Band Emission at Antenna Terminals

## 7.1. Test Standard and Limit

7.1.1. Test Standard

FCC part 22.917(a) and FCC part 24.238(a)

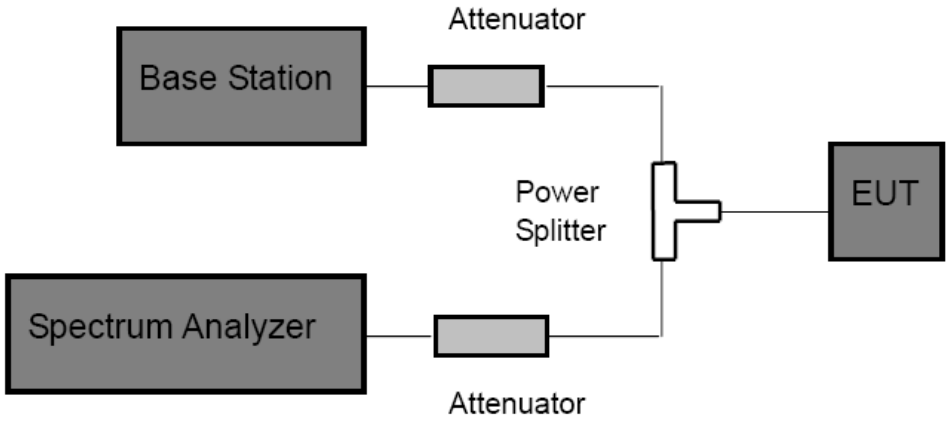
7.1.2. Test Method

FCC part 2.1051

7.1.3. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

## 7.2. Test Setup




## 7.3. Test Procedure

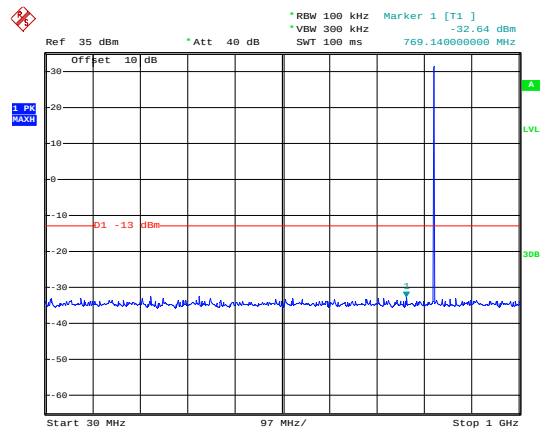
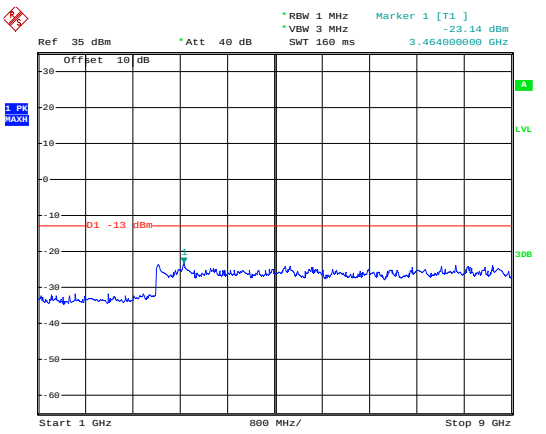
(1) The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

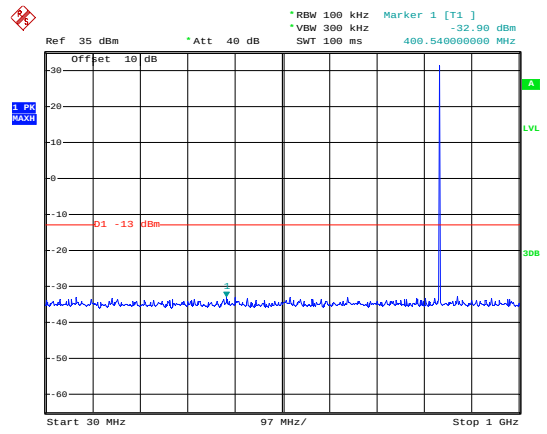
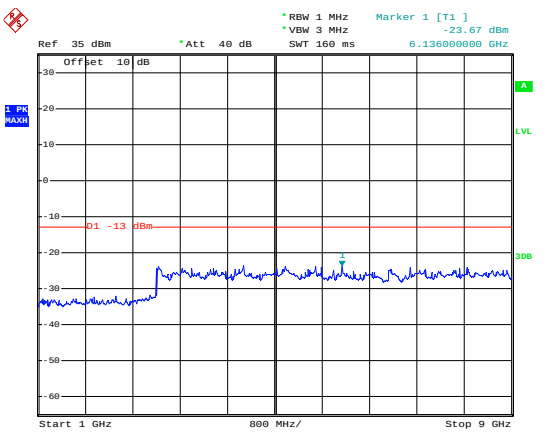
(2) The resolution bandwidth of the spectrum analyzer was set at 100 kHz when below 1GHz, 1MHz when above 1 GHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

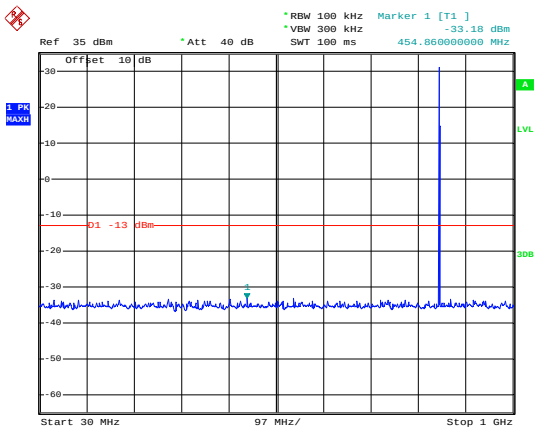
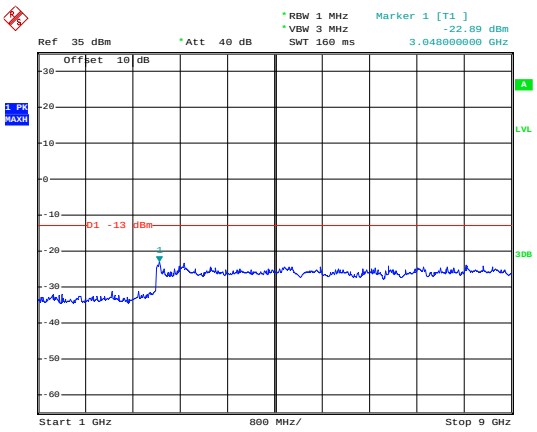
(3) For the out of band: Set the RBW=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic.

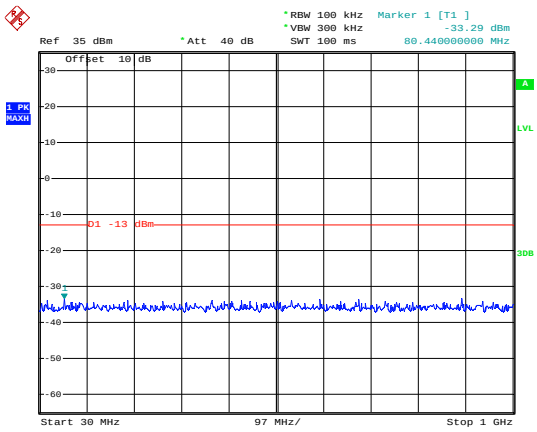
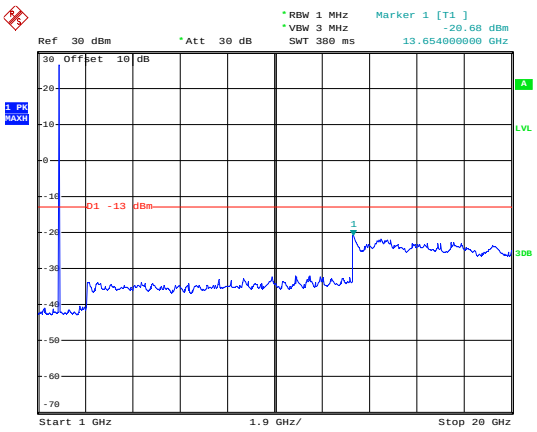
(4) Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

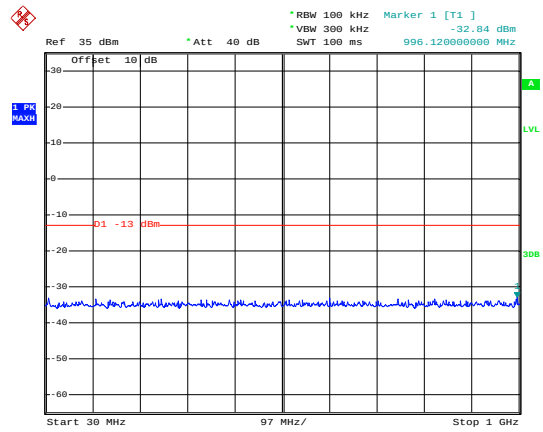
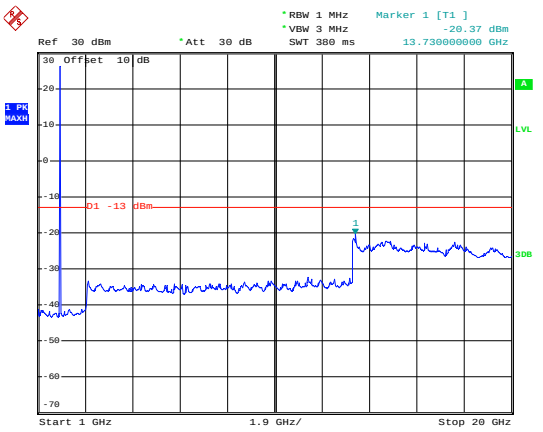
## 7.4. Test Data

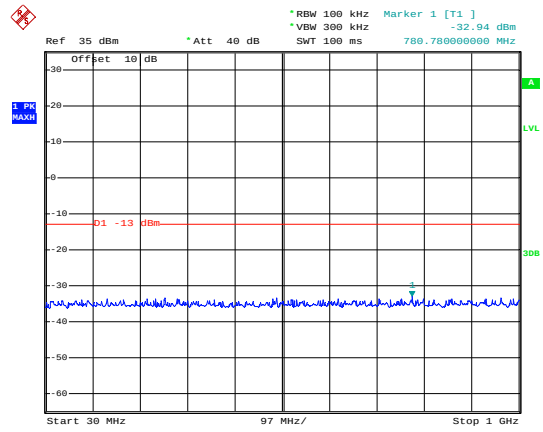
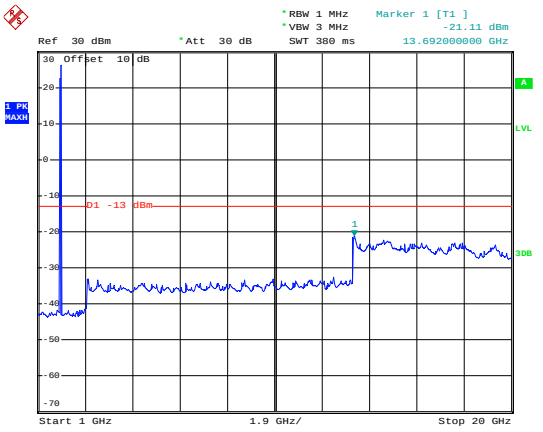
| Test Mode | GSM850 | Test Channel | Lowest channel |
|---|---|---|---|
|  | |  | |
| 30MHz~1GHz | | 1GHz~9GHz | |

| Test Mode | GSM850 | Test Channel | Middle channel |
|---|---|---|---|
|  | |  | |
| 30MHz~1GHz | | 1GHz~9GHz | |

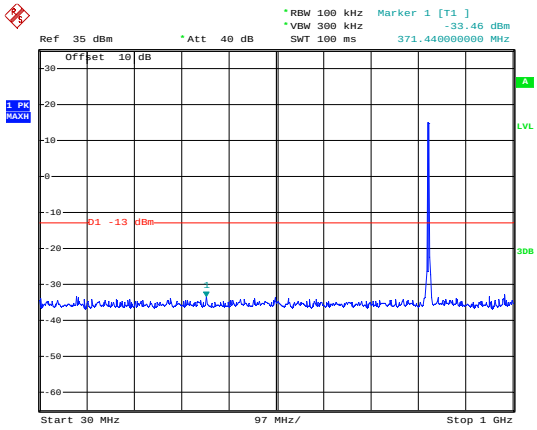
| Test Mode | GSM850 | Test Channel | Highest channel |
|---|---|---|---|
|  REMOTE HIGH<br>Date: 13.MAY.2014 20:02:23 | |  REMOTE HIGH<br>Date: 13.MAY.2014 20:03:54 | |
| 30MHz~1GHz | | 1GHz~9GHz | |

| Test Mode | PCS1900 | Test Channel | Lowest channel |
|---|---|---|---|
|  REMOTE HIGH<br>Date: 13.MAY.2014 20:49:52 | |  REMOTE HIGH<br>Date: 13.MAY.2014 20:55:35 | |
| 30MHz~1GHz | | 1GHz~20GHz | |

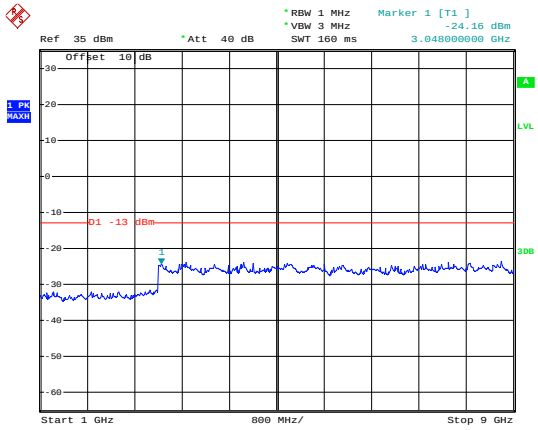
| Test Mode | PCS1900 | Test Channel | Middle channel |
|---|---|---|---|
|  REMOTE HIGH<br>Date: 13.MAY.2014 20:50:52 | |  REMOTE HIGH<br>Date: 13.MAY.2014 20:53:58 | |
| 30MHz~1GHz | | 1GHz~20GHz | |

| Test Mode | PCS1900 | Test Channel | Highest channel |
|---|---|---|---|
|  REMOTE HIGH<br>Date: 13.MAY.2014 20:51:41 | |  REMOTE HIGH<br>Date: 13.MAY.2014 20:52:52 | |
| 30MHz~1GHz | | 1GHz~20GHz | |

| Test Mode | UMTS 850 12.2k RMC | Test Channel | Lowest channel |
|---|---|---|---|

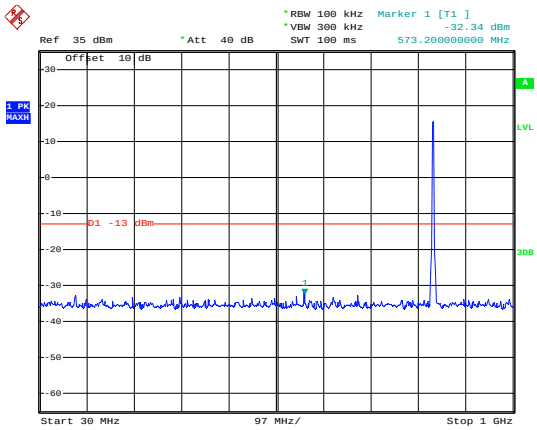



30MHz~1GHz

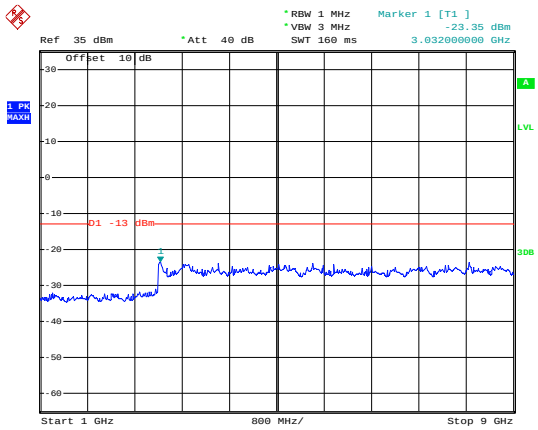



1GHz~9GHz

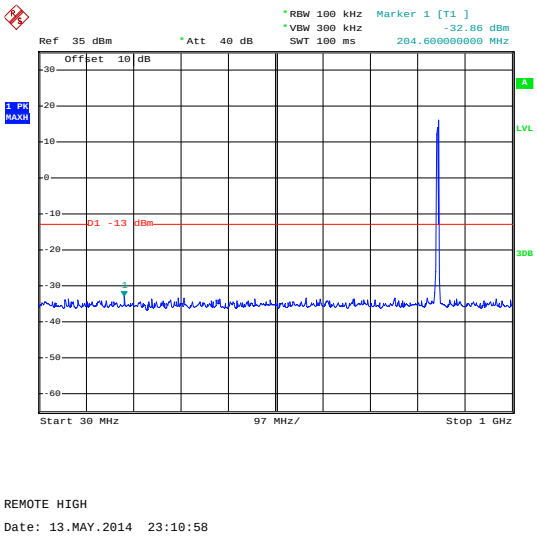
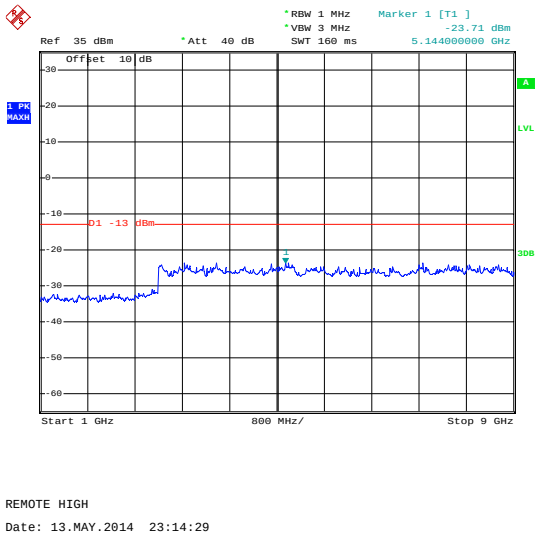
| Test Mode | UMTS 850 12.2k RMC | Test Channel | Middle channel |
|---|---|---|---|



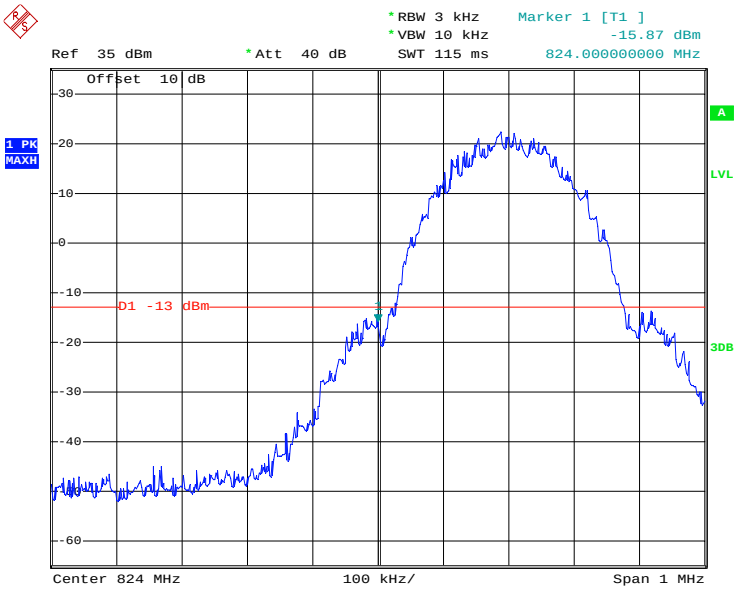
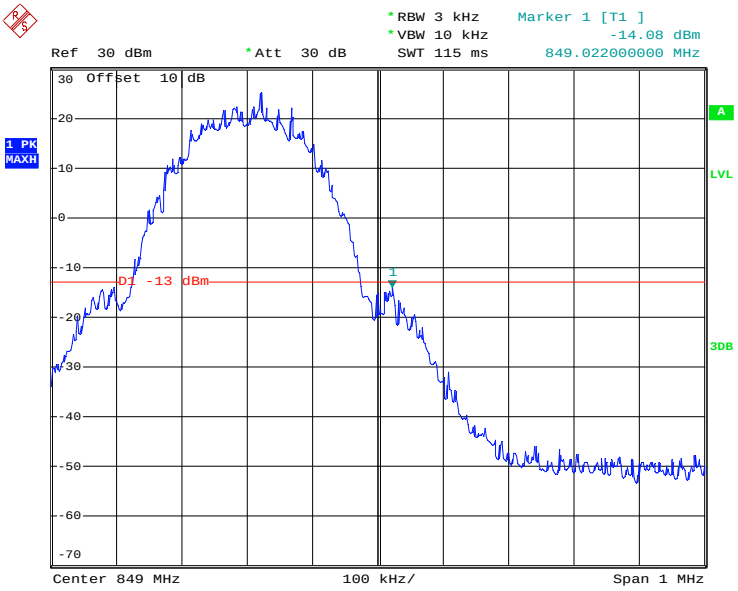

30MHz~1GHz




1GHz~9GHz

| Test Mode | UMTS 850 12.2k RMC | Test Channel | Highest channel |
|---|---|---|---|
|  | |  | |
| 30MHz~1GHz | | 1GHz~9GHz | |

## Band Edge Emission

| Test Mode | GSM850 |
|---|---|
| Lowest |  |
| Highest |  |



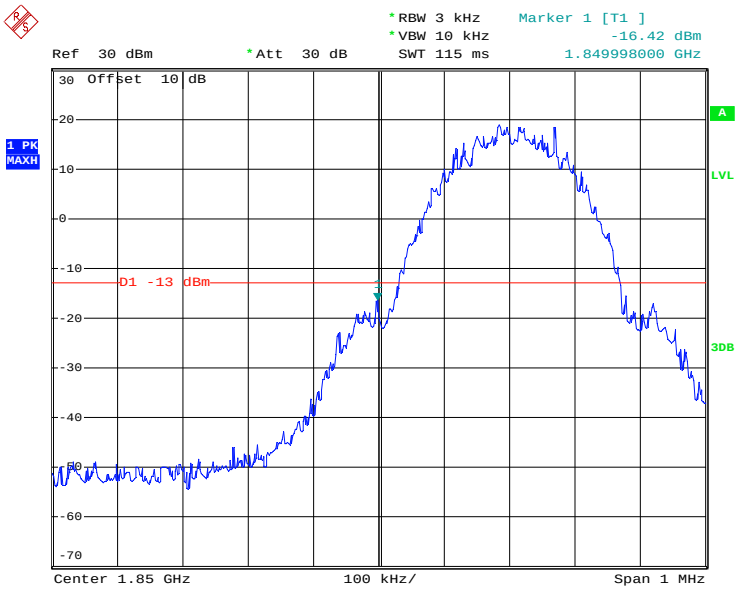
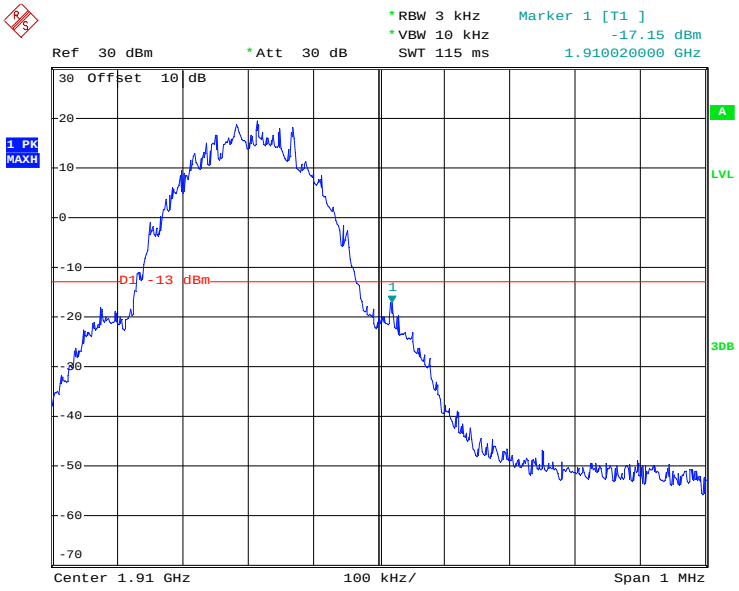
REMOTE HIGH

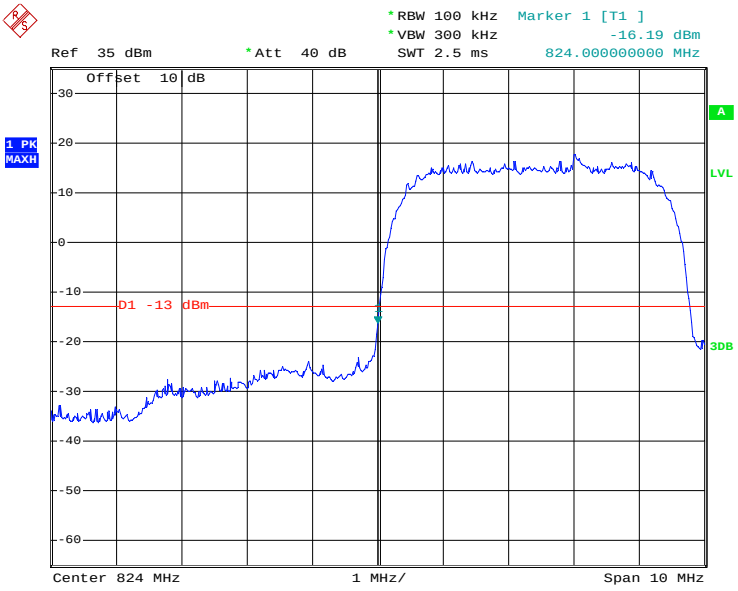
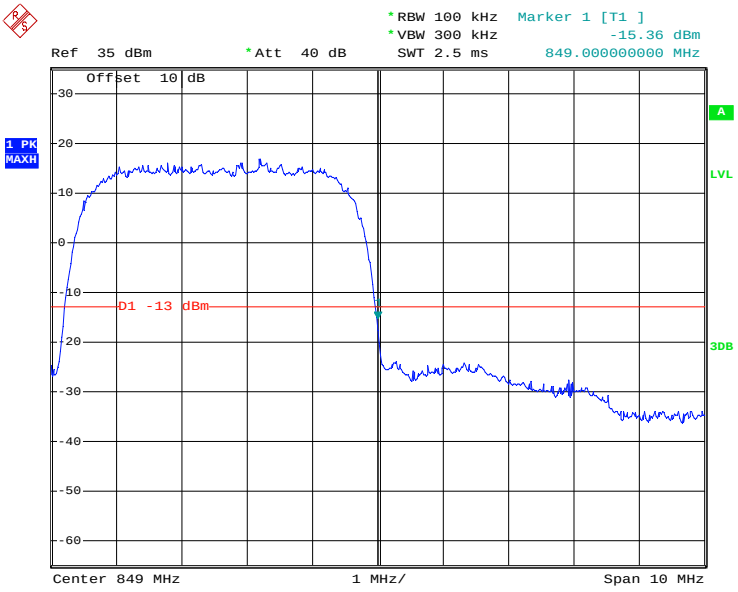
Date: 13.MAY.2014 20:07:29



REMOTE HIGH

Date: 13.MAY.2014 21:03:02

| Test Mode | PCS1900 |
|---|---|
| Lowest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 20:58:00 |
| Highest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 20:59:13 |

| Test Mode | UMTS850 12.2k RMC |
|---|---|
| Lowest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 23:17:20 |
| Highest |  <br>REMOTE HIGH<br>Date: 13.MAY.2014 23:16:06 |

# 8. ERP, EIRP Measurement

## 8.1. Test Standard and Limit

8.1.1. Test Standard

FCC part 22.913(a) and FCC part 24.232(b)

8.1.2. Test Method

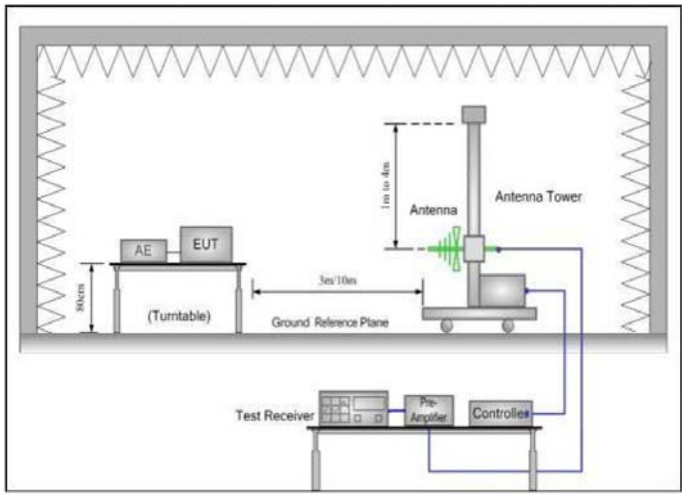
FCC part 2.1046

8.1.3. Test Limit

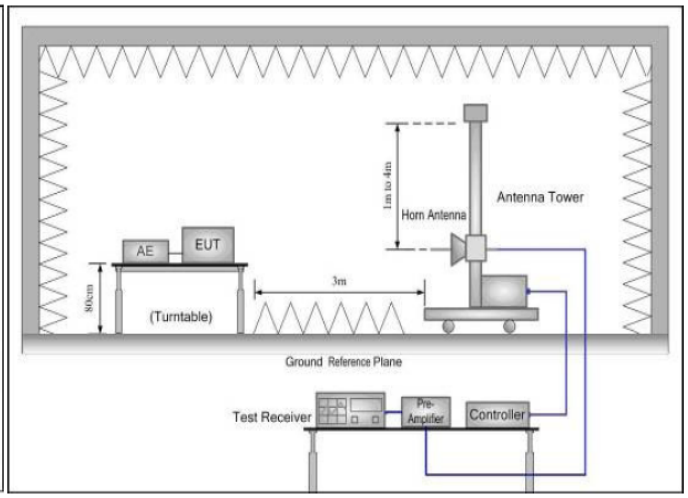
| Frequency Band | Limit |
|---|---|
| GSM 850MHz | 38.5 dBm (ERP) |
| PCS 1900 MHz | 33 dBm (EIRP) |
| WCDMA Band V | 38.5 dBm (ERP) |

## 8.2. Test Setup

**Below 1GHz**




**Above 1GHz**




## 8.3. Test Procedure

(1) The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

(2) During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

(3) ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

(4) EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB) Test Data

(5) The worse case was relating to the conducted output power.

## 8.4. Test Data

**Measurement Data (worst case)**

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| GSM850 | 251 | H | V | 31.21 | 38.45 | PASSED |
| | | | H | 25.12 | | PASSED |
| | | E1 | V | 30.94 | | PASSED |
| | | | H | 25.04 | | PASSED |
| | | E2 | V | 31.09 | | PASSED |
| | | | H | 25.07 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| PCS1900 | 810 | H | V | 27.83 | 33.00 | PASSED |
| | | | H | 19.92 | | PASSED |
| | | E1 | V | 27.16 | | PASSED |
| | | | H | 19.72 | | PASSED |
| | | E2 | V | 26.54 | | PASSED |
| | | | H | 19.36 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| UMTS 850 12.2k RMC | 4183 | H | V | 20.26 | 38.45 | PASSED |
| | | | H | 13.91 | | PASSED |
| | | E1 | V | 20.15 | | PASSED |
| | | | H | 13.58 | | PASSED |
| | | E2 | V | 20.12 | | PASSED |
| | | | H | 13.63 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| GPRS 850 | 251 | H | V | 29.65 | 38.45 | PASSED |
| | | | H | 23.07 | | PASSED |
| | | E1 | V | 29.41 | | PASSED |
| | | | H | 23.03 | | PASSED |
| | | E2 | V | 29.38 | | PASSED |
| | | | H | 22.85 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| GPRS 1900 | 810 | H | V | 27.04 | 33.00 | PASSED |
| | | | H | 16.78 | | PASSED |
| | | E1 | V | 26.21 | | PASSED |
| | | | H | 16.63 | | PASSED |
| | | E2 | V | 26.15 | | PASSED |
| | | | H | 16.32 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| EGPRS 850 | 251 | H | V | 25.32 | 38.45 | PASSED |
| | | | H | 21.46 | | PASSED |
| | | E1 | V | 25.16 | | PASSED |
| | | | H | 21.33 | | PASSED |
| | | E2 | V | 25.14 | | PASSED |
| | | | H | 21.31 | | PASSED |

| Mode | Channel | EUT Pol. | Antenna Pol. | ERP (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| EGPRS 1900 | 810 | H | V | 24.11 | 33.00 | PASSED |
| | | | H | 15.73 | | PASSED |
| | | E1 | V | 23.52 | | PASSED |
| | | | H | 15.61 | | PASSED |
| | | E2 | V | 23.45 | | PASSED |
| | | | H | 15.36 | | PASSED |

# 9. Field Strength of Spurious Radiation Measurement

## 9.1. Test Standard and Limit

9.1.1. Test Standard

FCC part 22.917(a) and FCC part 24.238(a)

9.1.2. Test Method

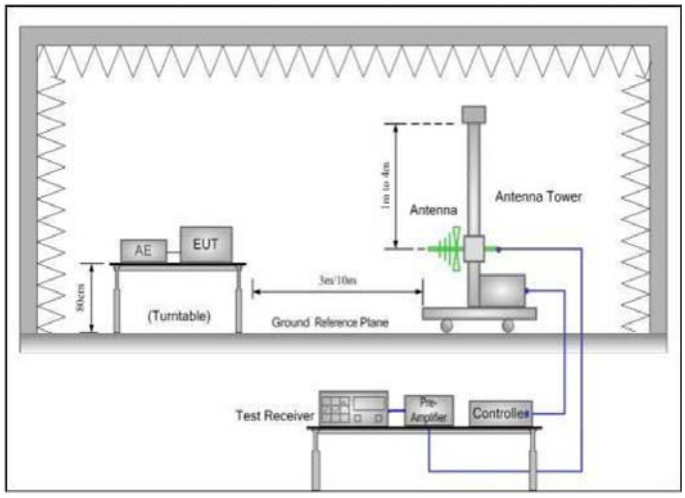
FCC part 2.1053

9.1.3. Test Limit

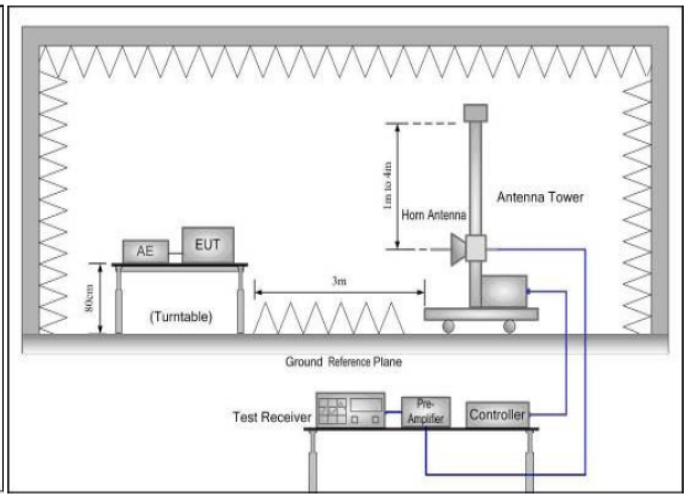
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

## 9.2. Test Setup

**Below 1GHz**




**Above 1GHz**




## 9.3. Test Procedure

(1) The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

(2) During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

(3) The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

(4) The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.
ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) –Cable Loss (dB)

## 9.4. Test Data

Measurement Data (worst case)

| Test mode | GSM850 | | Test channel | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1648.40 | Vertical | -46.52 | -13.00 | Passed |
| 2472.60 | V | -45.60 | | Passed |
| 3296.80 | V | -49.65 | | Passed |
| 4121.00 | V | -42.98 | | Passed |
| 4945.20 | V | --- | | Passed |
| 5769.40 | V | --- | | Passed |
| 1648.40 | Horizontal | -45.38 | -13.00 | Passed |
| 2472.60 | H | -49.30 | | Passed |
| 3296.80 | H | -50.50 | | Passed |
| 4121.00 | H | -42.63 | | Passed |
| 4945.20 | H | --- | | Passed |
| 5769.40 | H | --- | | Passed |

| Test mode | GSM850 | | Test channel | Middle |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1673.20 | Vertical | -45.49 | -13.00 | Passed |
| 2509.80 | V | -51.14 | | Passed |
| 3346.40 | V | -50.36 | | Passed |
| 4183.00 | V | -42.73 | | Passed |
| 5019.60 | V | --- | | Passed |
| 5856.20 | V | --- | | Passed |
| 1673.20 | Horizontal | -52.14 | -13.00 | Passed |
| 2509.80 | H | -49.88 | | Passed |
| 3346.40 | H | -49.72 | | Passed |
| 4183.00 | H | -37.72 | | Passed |
| 5019.60 | H | --- | | Passed |
| 5856.20 | H | --- | | Passed |

| Test mode | GSM850 | | Test channel | Highest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1697.60 | Vertical | -44.29 | -13.00 | Passed |
| 2546.40 | V | -51.74 | | Passed |
| 3395.20 | V | -48.00 | | Passed |
| 4244.00 | V | -43.63 | | Passed |
| 5092.80 | V | --- | | Passed |
| 5941.60 | V | --- | | Passed |
| 1697.60 | Horizontal | -53.78 | -13.00 | Passed |
| 2546.40 | H | -44.58 | | Passed |
| 3395.20 | H | -49.54 | | Passed |
| 4244.00 | H | -44.05 | | Passed |
| 5092.80 | H | --- | | Passed |
| 5941.60 | H | --- | | Passed |

Remark：

1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

| Test mode | PCS1900 | | Test channel | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3700.40 | Vertical | -39.86 | -13.00 | Passed |
| 5550.60 | V | -42.63 | | Passed |
| 7400.80 | V | -40.58 | | Passed |
| 9251.00 | V | -35.27 | | Passed |
| 11101.20 | V | --- | | Passed |
| 12951.40 | V | --- | | Passed |
| 3700.40 | Horizontal | -43.65 | -13.00 | Passed |
| 5550.60 | H | -42.36 | | Passed |
| 7400.80 | H | -36.92 | | Passed |
| 9251.00 | H | -35.44 | | Passed |
| 11101.20 | H | --- | | Passed |
| 12951.40 | H | --- | | Passed |

| Test mode | PCS1900 | | Test channel | Middle |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3760.00 | Vertical | -48.55 | -13.00 | Passed |
| 5640.00 | V | -42.82 | | Passed |
| 7520.00 | V | -38.19 | | Passed |
| 9400.00 | V | -37.24 | | Passed |
| 11280.00 | V | --- | | Passed |
| 13160.00 | V | --- | | Passed |
| 3760.00 | Horizontal | -46.13 | -13.00 | Passed |
| 5640.00 | H | -45.49 | | Passed |
| 7520.00 | H | -35.68 | | Passed |
| 9400.00 | H | -34.69 | | Passed |
| 11280.00 | H | --- | | Passed |
| 13160.00 | H | --- | | Passed |

| Test mode | PCS1900 | | Test channel | Highest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3819.60 | Vertical | -35.69 | -13.00 | Passed |
| 5729.40 | V | -41.28 | | Passed |
| 7639.20 | V | -41.63 | | Passed |
| 9549.00 | V | -38.98 | | Passed |
| 11458.80 | V | --- | | Passed |
| 13368.60 | V | --- | | Passed |
| 3819.60 | Horizontal | -47.08 | -13.00 | Passed |
| 5729.40 | H | -40.11 | | Passed |
| 7639.20 | H | -38.65 | | Passed |
| 9549.00 | H | -37.54 | | Passed |
| 11458.80 | H | --- | | Passed |
| 13368.60 | H | --- | | Passed |

Remark：

1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

| Test mode | UMTS850 12.2k RMC | | Test channel | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1652.80 | Vertical | -56.71 | -13.00 | Passed |
| 2479.20 | V | -41.85 | | Passed |
| 3305.60 | V | -50.88 | | Passed |
| 4132.00 | V | -45.89 | | Passed |
| 4958.40 | V | --- | | Passed |
| 5784.80 | V | --- | | Passed |
| 1652.80 | Horizontal | -58.70 | -13.00 | Passed |
| 2479.20 | H | -51.38 | | Passed |
| 3305.60 | H | -48.53 | | Passed |
| 4132.00 | H | -46.54 | | Passed |
| 4958.40 | H | --- | | Passed |
| 5784.80 | H | --- | | Passed |

| Test mode | UMTS850 12.2k RMC | | Test channel | Middle |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1672.00 | Vertical | -55.95 | -13.00 | Passed |
| 2508.00 | V | -43.20 | | Passed |
| 3344.00 | V | -50.77 | | Passed |
| 4180.00 | V | -46.04 | | Passed |
| 5016.00 | V | --- | | Passed |
| 5852.00 | V | --- | | Passed |
| 1672.00 | Horizontal | -56.85 | -13.00 | Passed |
| 2508.00 | H | -45.63 | | Passed |
| 3344.00 | H | -52.34 | | Passed |
| 4180.00 | H | -49.63 | | Passed |
| 5016.00 | H | --- | | Passed |
| 5852.00 | H | --- | | Passed |

| Test mode | UMTS850 12.2k RMC | | Test channel | Highest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1693.20 | Vertical | -56.45 | -13.00 | Passed |
| 2539.80 | V | -42.96 | | Passed |
| 3386.40 | V | -50.22 | | Passed |
| 4233.00 | V | -48.63 | | Passed |
| 5079.60 | V | --- | | Passed |
| 5926.20 | V | --- | | Passed |
| 1693.20 | Horizontal | -58.77 | -13.00 | Passed |
| 2539.80 | H | -50.12 | | Passed |
| 3386.40 | H | -50.33 | | Passed |
| 4233.00 | H | -47.14 | | Passed |
| 5079.60 | H | --- | | Passed |
| 5926.20 | H | --- | | Passed |

Remark：

1. The emission behavior belongs to narrowband spurious emission.
2. Remark”---“ means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

# 10. Frequency stability V.S. Temperature Measurement

## 10.1. Test Standard and Limit

10.1.1. Test Standard

FCC part 2.1055(a)(1)(b)

10.1.2. Test Method

FCC part 2.1055(a)(1)(b)

10.1.3. Test Limit

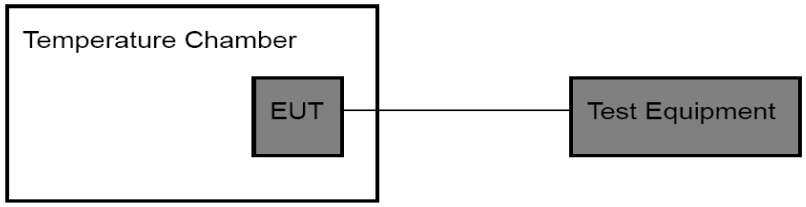
According to FCC section 22.355 the carrier frequency of each transmitter in the Public Mobile Services must be maintained within tolerances given in the table below:

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile≤3 watts (ppm) | Mobile≤3 watts (ppm) |
|---|---|---|---|
| 25 ~ 50 | 20.0 | 20.0 | 50.0 |
| 50 ~ 450 | 5.0 | 5.0 | 50.0 |
| 450~ 512 | 2.5 | 5.0 | 5.0 |
| 812 ~896 | 1.5 | 2.5 | 2.5 |
| 928 ~929 | 5.0 | N/A | N/A |
| 929~ 960 | 1.5 | N/A | N/A |
| 2110 ~ 2220 | 10.0 | N/A | N/A |

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

## 10.2. Test Setup

**For Temperature Test:**




## 10.3. Test Procedure

(1) The equipment under test was connected to an external DC power supply and input rated voltage.
(2) RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
(3) The EUT was placed inside the temperature chamber.
(4) Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
(5) Turn EUT off and set the chamber temperature to －30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
(6) Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached

## 10.4. Test Data

**Measurement Data:**

| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 48 | 0.057375 | 2.5 | Passed |
| | -20 | 56 | 0.066938 | | |
| | -10 | 35 | 0.041836 | | |
| | 0 | 45 | 0.053789 | | |
| | 10 | 36 | 0.043031 | | |
| | 20 | 39 | 0.046617 | | |
| | 30 | 37 | 0.044227 | | |
| | 40 | 45 | 0.053789 | | |
| | 50 | 46 | 0.054984 | | |

| Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 48 | 0.025532 | 2.5 | Passed |
| | -20 | 55 | 0.029255 | | |
| | -10 | 46 | 0.024468 | | |
| | 0 | 37 | 0.019681 | | |
| | 10 | 35 | 0.018617 | | |
| | 20 | 39 | 0.020745 | | |
| | 30 | 45 | 0.023936 | | |
| | 40 | 30 | 0.015957 | | |
| | 50 | 39 | 0.020745 | | |

| Reference Frequency: GPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 44 | 0.052594 | 2.5 | Passed |
| | -20 | 52 | 0.062156 | | |
| | -10 | 36 | 0.043031 | | |
| | 0 | 41 | 0.049008 | | |
| | 10 | 38 | 0.045422 | | |
| | 20 | 36 | 0.043031 | | |
| | 30 | 33 | 0.039445 | | |
| | 40 | 42 | 0.050203 | | |
| | 50 | 43 | 0.051399 | | |

| Reference Frequency: GPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 46 | 0.024468 | 2.5 | Passed |
| | -20 | 53 | 0.028191 | | |
| | -10 | 41 | 0.021809 | | |
| | 0 | 39 | 0.020745 | | |
| | 10 | 36 | 0.019149 | | |
| | 20 | 38 | 0.020213 | | |
| | 30 | 43 | 0.022872 | | |
| | 40 | 32 | 0.017021 | | |
| | 50 | 37 | 0.019681 | | |

| Reference Frequency: EGPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 41 | 0.049008 | 2.5 | Passed |
| | -20 | 45 | 0.053789 | | |
| | -10 | 38 | 0.045422 | | |
| | 0 | 42 | 0.050203 | | |
| | 10 | 32 | 0.038250 | | |
| | 20 | 35 | 0.041836 | | |
| | 30 | 41 | 0.049008 | | |
| | 40 | 42 | 0.050203 | | |
| | 50 | 47 | 0.056180 | | |

| Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 38 | 0.020213 | 2.5 | Passed |
| | -20 | 42 | 0.022340 | | |
| | -10 | 35 | 0.018617 | | |
| | 0 | 37 | 0.019681 | | |
| | 10 | 31 | 0.016489 | | |
| | 20 | 38 | 0.020213 | | |
| | 30 | 41 | 0.021809 | | |
| | 40 | 25 | 0.013298 | | |
| | 50 | 43 | 0.022872 | | |

| Reference Frequency: UMTS850 12.2k RMC Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 43 | 0.051399 | 2.5 | Passed |
| | -20 | 40 | 0.047813 | | |
| | -10 | 37 | 0.044227 | | |
| | 0 | 39 | 0.046617 | | |
| | 10 | 45 | 0.053789 | | |
| | 20 | 43 | 0.051399 | | |
| | 30 | 38 | 0.045422 | | |
| | 40 | 49 | 0.058570 | | |
| | 50 | 37 | 0.044227 | | |

| Reference Frequency: UMTS850 HSDPA Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 38 | 0.045422 | 2.5 | Passed |
| | -20 | 32 | 0.038250 | | |
| | -10 | 46 | 0.054984 | | |
| | 0 | 45 | 0.053789 | | |
| | 10 | 47 | 0.056180 | | |
| | 20 | 39 | 0.046617 | | |
| | 30 | 46 | 0.054984 | | |
| | 40 | 30 | 0.035859 | | |
| | 50 | 33 | 0.039445 | | |

| Reference Frequency: UMTS850 HSUPA Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| **Power supplied (Vdc)** | **Temperature (℃)** | **Frequency error** | | **Limit (ppm)** | **Result** |
| | | **Hz** | **ppm** | | |
| 3.70 | -30 | 49 | 0.058570 | 2.5 | Passed |
| | -20 | 45 | 0.053789 | | |
| | -10 | 53 | 0.063352 | | |
| | 0 | 47 | 0.056180 | | |
| | 10 | 40 | 0.047813 | | |
| | 20 | 52 | 0.062156 | | |
| | 30 | 46 | 0.054984 | | |
| | 40 | 42 | 0.050203 | | |
| | 50 | 51 | 0.060961 | | |

# 11. Frequency stability V.S. Voltage Measurement

## 11.1. Test Standard and Limit

11.1.1. Test Standard

FCC part 2.1055(d)(1)(2)

11.1.2. Test Method

FCC part 2.1055(d)(1)(2)

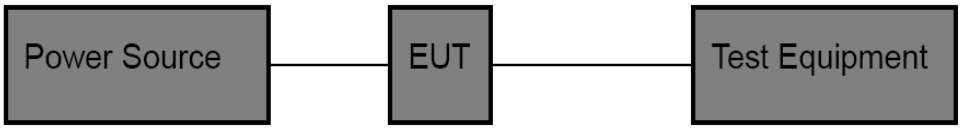
11.1.3. Test Limit

According to FCC section 22.355 the carrier frequency of each transmitter in the Public Mobile Services must be maintained within tolerances given in the table below:

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile≤3 watts (ppm) | Mobile≤3 watts (ppm) |
|---|---|---|---|
| 25 ~ 50 | 20.0 | 20.0 | 50.0 |
| 50 ~ 450 | 5.0 | 5.0 | 50.0 |
| 450~ 512 | 2.5 | 5.0 | 5.0 |
| 812 ~896 | 1.5 | 2.5 | 2.5 |
| 928 ~929 | 5.0 | N/A | N/A |
| 929~ 960 | 1.5 | N/A | N/A |
| 2110 ~ 2220 | 10.0 | N/A | N/A |

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

## 11.2. Test Setup




## 11.3. Test Procedure

(1) Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage.

(2) Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

(3) Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

## 11.4. Test Data

| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 40 | 0.047813 | 2.5 | Passed |
| | 3.70 | 50 | 0.059766 | | |
| | 3.40 | 43 | 0.051399 | | |

| Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 46 | 0.024468 | 2.5 | Passed |
| | 3.70 | 55 | 0.029255 | | |
| | 3.40 | 34 | 0.018085 | | |

| Reference Frequency: GPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 43 | 0.051399 | 2.5 | Passed |
| | 3.70 | 39 | 0.046617 | | |
| | 3.40 | 45 | 0.053789 | | |

| Reference Frequency: GPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 39 | 0.020745 | 2.5 | Passed |
| | 3.70 | 46 | 0.024468 | | |
| | 3.40 | 37 | 0.019681 | | |

| Reference Frequency: EGPRS 850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 38 | 0.045422 | 2.5 | Passed |
| | 3.70 | 47 | 0.056180 | | |
| | 3.40 | 41 | 0.049008 | | |

| Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 45 | 0.023936 | 2.5 | Passed |
| | 3.70 | 53 | 0.028191 | | |
| | 3.40 | 34 | 0.018085 | | |

| Reference Frequency: UMTS 850 12.2k RMC Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 43 | 0.051399 | 2.5 | Passed |
| | 3.70 | 45 | 0.053789 | | |
| | 3.40 | 42 | 0.050203 | | |

| Reference Frequency: UMTS 850 HSDPA Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 47 | 0.056180 | 2.5 | Passed |
| | 3.70 | 40 | 0.047813 | | |
| | 3.40 | 45 | 0.053789 | | |

| Reference Frequency: UMTS 850 HSUPA Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.25 | 43 | 0.051399 | 2.5 | Passed |
| | 3.70 | 36 | 0.043031 | | |
| | 3.40 | 45 | 0.053789 | | |