# FCC REPORT
## (GSM & WCDMA)

| | |
|---|---|
| **Applicant:** | Procesadores y Partes en Retail S de R.L. de C.V. |
| **Address of Applicant:** | Paseo de los Laureles # 458, Ed. A Int 401; Col. Bosques de las Lomas, Deleg: Cuajimalpa, Ciudad de México |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Smart Phone |
| Model No.: | M5 Plus |
| Trade mark: | TECH PAD |
| **FCC ID:** | 2AOC2-M5PLUS |
| **Applicable standards:** | FCC CFR Title 47 Part 2<br>FCC CFR Title 47 Part 22 Subpart H<br>FCC CFR Title 47 Part 24 Subpart E |
| **Date of sample receipt:** | 11 Nov., 2017 |
| **Date of Test:** | 11 Nov., to 30 Nov., 2017 |
| **Date of report issued:** | 30 Nov., 2017 |
| **Test Result:** | PASS* |

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

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 and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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## 2. Version

| Version No. | Date | Description |
|---|---|---|
| 00 | 30 Nov., 2017 | Original |
| | | |
| | | |
| | | |
| | | |

| | | | |
|---|---|---|---|
| ***Tested by:*** | Zora Lee | ***Date:*** | *30 Nov., 2017* |
| | ***Test Engineer*** | | |
| ***Reviewed by:*** | RYan.Lee | ***Date:*** | *30 Nov., 2017* |
| | ***Project Engineer*** | | |

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# 4. Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| RF Exposure (SAR) | Part 1.1307<br>Part 2.1093 | Pass<br>(Please refer to SAR Report) |
| RF Output Power | Part 2.1046<br>Part 22.913 (a)(2)<br>Part 24.232 (c) | Pass |
| Peak-to-Average Power Ratio | Part 24.232 (d) | Pass |
| Modulation Characteristics | Part 2.1047 | Pass |
| 99% & -26 dB Occupied Bandwidth | Part 2.1049<br>Part 22.917(b)<br>Part 24.238(b) | Pass |
| Spurious Emissions at Antenna Terminal | Part 2.1051<br>Part 22.917 (a)<br>Part 24.238 (a) | Pass |
| Field Strength of Spurious Radiation | Part 2.1053<br>Part 22.917 (a)<br>Part 24.238 (a) | Pass |
| Out of band emission, Band Edge | Part 22.917 (a)<br>Part 24.238 (a) | Pass |
| Frequency stability vs. temperature | Part 22.355<br>Part 24.235<br>Part 2.1055(a)(1)(b) | Pass |
| Frequency stability vs. voltage | Part 22.355<br>Part 24.235<br>Part 2.1055(d)(2) | Pass |
| Pass: The EUT complies with the essential requirements in the standard. | | |

# 5. General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Procesadores y Partes en Retail S de R.L. de C.V. |
| Address: | Paseo de los Laureles # 458, Ed. A Int 401; Col. Bosques de las Lomas, Deleg: Cuajimalpa, Ciudad de México |
| Manufacturer | Procesadores y Partes en Retail S de R.L. de C.V. |
| Address: | Paseo de los Laureles # 458, Ed. A Int 401; Col. Bosques de las Lomas, Deleg: Cuajimalpa, Ciudad de México |

## 5.2 General Description of E.U.T.

| | |
|---|---|
| Product Name: | Smart Phone |
| Model No.: | M5 Plus |
| Operation Frequency range: | GSM 850: 824.20MHz-848.80MHz<br>PCS1900: 1850.20MHz-1909.80MHz<br>WCDMA Band V: 826.4MHz-846.6MHz<br>WCDMA Band II: 1852.4 MHz -1907.6 MHz |
| Modulation type: | GSM/GPRS:GMSK, UMTS:QPSK |
| Antenna type: | Internal Antenna |
| Antenna gain: | GSM 850: -2.0 dBi<br>PCS 1900: 0.2 dBi<br>WCDMA Band V: -2.0 dBi<br>WCDMA Band II: 0.2 dBi |
| Power supply: | Rechargeable Li-ion Battery DC3.8V-3000mAh |
| AC adapter with two plugs : | Input: AC100-240V 50/60Hz 0.2A<br>Output: DC 5.0V, 1.0A |

**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 | | WCDMA Band II | |
| Channel: | Frequency (MHz) | Channel: | Frequency (MHz) |
| 4132 | 826.40 | 9262 | 1852.40 |
| 4133 | 826.60 | 9263 | 1852.60 |
| …. | …. | …. | …. |
| 4182 | 836.40 | 9399 | 1879.80 |
| 4183 | 836.60 | 9400 | 1880.00 |
| 4184 | 836.80 | 9401 | 1880.20 |
| … | … | … | … |
| 4232 | 846.40 | 9537 | 1907.40 |
| 4233 | 846.60 | 9538 | 1907.60 |

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 | | | WCDMA Band II | | |
| Channel | | Frequency(MHz) | Channel | | Frequency(MHz) |
| Lowest channel | 4132 | 826.40 | Lowest channel | 9262 | 1852.40 |
| Middle channel | 4183 | 836.60 | Middle channel | 9400 | 1880.00 |
| Highest channel | 4233 | 846.60 | Highest channel | 9538 | 1907.60 |

## 5.3 Test modes

| Operating Environment: | |
|---|---|
| Temperature: | Normal: 15℃ ~ 35℃, Extreme: -30℃ ~ +50℃ |
| Humidity: | 20 % ~ 75 % RH |
| Atmospheric Pressure: | 1008 mbar |
| Voltage: | Nominal: 3.8Vdc, Extreme: Low 3.5 Vdc, High 4.35 Vdc |
| **Test mode:** | |
| GSM mode | Keep the EUT communication with simulated station in GSM mode |
| GPRS mode | Keep the EUT communication with simulated station in GPRS mode |
| RMC mode | Keep the EUT communication with simulated station in RMC mode |
| HSDPA | Keep the EUT communication with simulated station in HSDPA mode |
| HSUPA | Keep the EUT communication with simulated station in HSUPA mode |
| Remark: The EUT has been tested under continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for these modes with power adaptor, earphone and Data cable. Just the worst case position (H mode) shown in report. | |

## 5.4 Description of Support Units

| Test Equipment | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Simulated Station | Anritsu | MT8820C | 6201026545 |

## 5.5 Measurement Uncertainty

| Parameters | Expanded Uncertainty |
|---|---|
| Radiated Emission (9kHz ~ 30MHz) | 4.24 dB (k=2) |
| Radiated Emission (30MHz ~ 1000MHz) | 4.35 dB (k=2) |
| Radiated Emission (1GHz ~ 18GHz) | 4.44 dB (k=2) |
| Radiated Emission (18GHz ~ 26.5GHz) | 4.56 dB (k=2) |
| Radiated Emission (18GHz ~ 26.5GHz) | 4.56 dB (k=2) |

## 5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

## 5.7 Laboratory Location

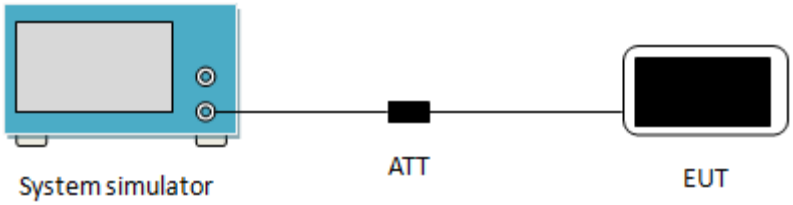
Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

## 5.8 Test Instruments list

| Test Equipment | Manufacturer | Model No. | Serial No. | Cal. Date (mm-dd-yy) | Cal. Due date (mm-dd-yy) |
|---|---|---|---|---|---|
| 3m SAC | SAEMC | 9m*6m*6m | 966 | 07-22-2017 | 07-21-2020 |
| BiConiLog Antenna | SCHWARZBECK | VULB9163 | 497 | 02-25-2017 | 02-24-2018 |
| Biconical Antenna | SCHWARZBECK | VUBA9117 | 359 | 06-22-2017 | 06-21-2018 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 916 | 02-25-2017 | 02-24-2018 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 1805 | 02-25-2017 | 02-24-2018 |
| EMI Test Software | AUDIX | E3 | 6.110919b | N/A | N/A |
| Pre-amplifier | HP | 8447D | 2944A09358 | 02-25-2017 | 02-24-2018 |
| Pre-amplifier | CD | PAP-1G18 | 11804 | 02-25-2017 | 02-24-2018 |
| Spectrum analyzer | Rohde & Schwarz | FSP30 | 101454 | 02-25-2017 | 02-24-2018 |
| EMI Test Receiver | Rohde & Schwarz | ESRP7 | 101070 | 02-25-2017 | 02-24-2018 |
| Spectrum Analyzer | Agilent | N9020A | MY50510123 | 10-29-2017 | 10-28- 2018 |
| Signal Generator | Rohde & Schwarz | SMX | 835454/016 | 02-25-2017 | 02-24- 2018 |
| Signal Generator | R&S | SMR20 | 1008100050 | 02-25-2017 | 02-24-2018 |
| RF Switch Unit | MWRFTEST | MW200 | N/A | N/A | N/A |
| Cable | ZDECL | Z108-NJ-NJ-81 | 1608458 | 02-25-2017 | 02-24-2018 |
| Cable | MICRO-COAX | MFR64639 | K10742-5 | 02-25-2017 | 02-24-2018 |
| Cable | SUHNER | SUCOFLEX100 | 58193/4PE | 02-25-2017 | 02-24-2018 |
| DC Power Supply | XinNuoEr | WYK-10020K | 1409050110020 | 10-31-2017 | 10-30-2018 |
| Temperature Humidity Chamber | HengPu | HPGDS-500 | 20140828008 | 09-24-2017 | 09-23-2018 |
| Simulated Station | Rohde & Schwarz | CMW500 | 140493 | 06-24-2017 | 06-23-2018 |

# 6. Test results

## 6.1 Conducted Output Power

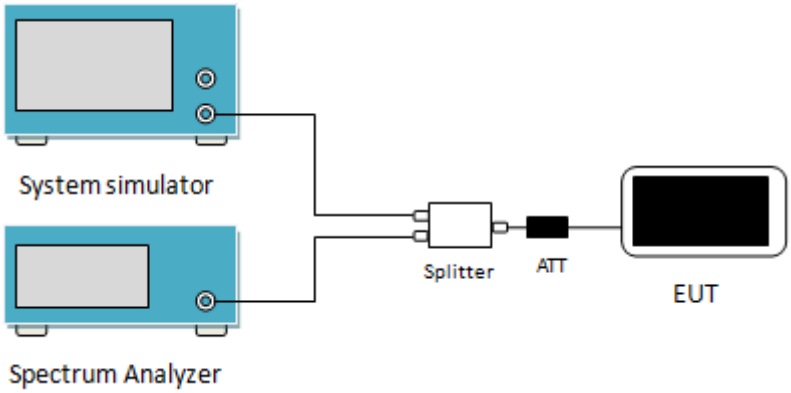
| | |
|---|---|
| Test Requirement: | FCC part 22.913(a)(2), FCC part 24.232(c) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Limit: | GSM 850: 7W, PCS 1900: 2W<br>WCDMA Band V: 7W, WCDMA Band II: 2W |
| Test setup: |  |
| Test Procedure: | The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated station. Transmitter output power was read off in dBm. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

| EUT Mode | Burst Average power (dBm) | | | Limit(dBm) |
|---|---|---|---|---|
| | 128 | 190 | 251 | |
| | 824.20MHz | 836.60MHz | 848.80MHz | |
| GSM 850 | 32.29 | 31.93 | 32.24 | 38.45 |
| GPRS 850 (1 Uplink slot) | 31.72 | 31.93 | 31.95 | |
| GPRS 850 (2 Uplink slot) | 31.04 | 30.95 | 30.97 | |
| GPRS 850 (3 Uplink slot) | 29.10 | 28.95 | 28.84 | |
| GPRS 850 (4 Uplink slot) | 28.22 | 28.01 | 27.97 | |
| EUT Mode | Burst Average power (dBm) | | | Limit(dBm) |
| | 512 | 661 | 810 | |
| | 1850.20MHz | 1880.00MHz | 1909.80MHz | |
| PCS 1900 | 28.84 | 29.12 | 29.63 | 33.00 |
| GPRS 1900 (1 Uplink slot) | 28.74 | 29.00 | 29.56 | |
| GPRS 1900 (2 Uplink slot) | 27.65 | 27.95 | 28.56 | |
| GPRS 1900 (3 Uplink slot) | 25.68 | 26.00 | 26.72 | |
| GPRS 1900 (4 Uplink slot) | 24.76 | 25.00 | 25.72 | |

| EUT Mode | | Burst Average power (dBm) | | | Limit(dBm) |
|---|---|---|---|---|---|
| | | 4132 | 4183 | 4233 | |
| | | 826.40MHz | 836.60MHz | 846.60MHz | |
| UMTS 850 HSDPA | Subtest 1 | 22.23 | 22.12 | 22.19 | 38.45 |
| | Subtest 2 | 21.91 | 21.74 | 21.64 | |
| | Subtest 3 | 20.41 | 20.27 | 20.18 | |
| | Subtest 4 | 20.40 | 20.14 | 20.37 | |
| UMTS 850 HSUPA | Subtest 1 | 22.19 | 22.08 | 22.16 | |
| | Subtest 2 | 22.15 | 22.06 | 22.14 | |
| | Subtest 3 | 20.16 | 20.19 | 20.20 | |
| | Subtest 4 | 22.22 | 22.12 | 22.16 | |
| | Subtest 5 | 21.19 | 21.17 | 21.18 | |
| UMTS 850 RMC | 12.2kbps | 23.24 | 23.11 | 23.12 | |
| UMTS 850 AMR | 12.2kbps | 23.10 | 23.06 | 22.98 | |
| EUT Mode | | Burst Average power (dBm) | | | Limit(dBm) |
| | | 9262 | 9400 | 9538 | |
| | | 1852.40MHz | 1880.00MHz | 1907.60MHz | |
| UMTS 1900 HSDPA | Subtest 1 | 22.57 | 22.69 | 22.50 | 33.00 |
| | Subtest 2 | 22.14 | 22.24 | 22.04 | |
| | Subtest 3 | 20.70 | 20.93 | 20.62 | |
| | Subtest 4 | 20.77 | 20.79 | 20.63 | |
| UMTS 1900 HSUPA | Subtest 1 | 22.45 | 22.54 | 22.38 | |
| | Subtest 2 | 22.49 | 22.61 | 22.36 | |
| | Subtest 3 | 20.63 | 20.69 | 20.66 | |
| | Subtest 4 | 22.54 | 22.63 | 22.42 | |
| | Subtest 5 | 21.58 | 21.61 | 21.43 | |
| UMTS 1900 RMC | 12.2kbps | 23.52 | 23.62 | 23.40 | |
| UMTS 1900 AMR | 12.2kbps | 23.43 | 23.46 | 23.32 | |

## 6.2 Occupy Bandwidth

| | |
|---|---|
| Test Requirement: | FCC part 22.917(b), FCC part 24.238(b) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Test setup: |  |
| Test Procedure: | 1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer<br>2. RBW was set to about 1% of emission BW, VBW= 3 times RBW.<br>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. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

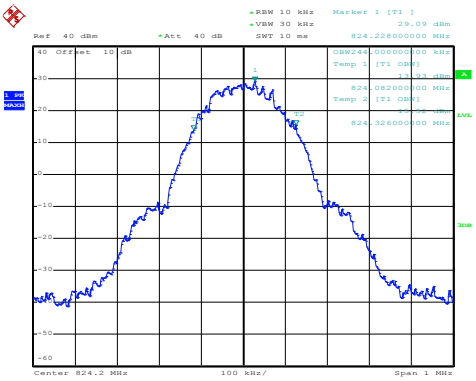
| EUT Mode | Channel | Frequency (MHz) | 99% Occupy bandwidth (kHz) | -26dB bandwidth (kHz) |
|---|---|---|---|---|
| GSM 850 | 128 | 824.2 | 244 | 308 |
| | 190 | 836.6 | 244 | 324 |
| | 251 | 848.8 | 248 | 326 |
| PCS 1900 | 512 | 1850.2 | 248 | 318 |
| | 661 | 1880.0 | 248 | 322 |
| | 810 | 1909.8 | 244 | 322 |
| UMTS 850 12.2k RMC | 4132 | 826.4 | 4160 | 4720 |
| | 4183 | 836.6 | 4160 | 4720 |
| | 4233 | 846.6 | 4160 | 4700 |
| UMTS 1900 12.2k RMC | 9262 | 1852.4 | 4180 | 4700 |
| | 9400 | 1880.0 | 4160 | 4720 |
| | 9538 | 1907.6 | 4140 | 4740 |

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:**

**GSM 850**

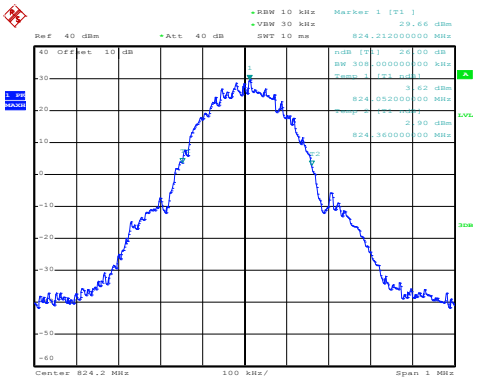
**99% Occupy bandwidth**




Date: 11.NOV.2017 15:49:01

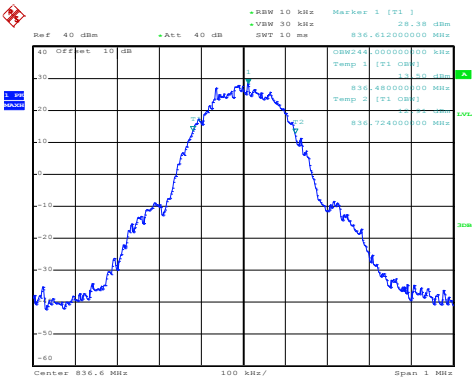
Lowest channel

**26dB Emission Bandwidth**



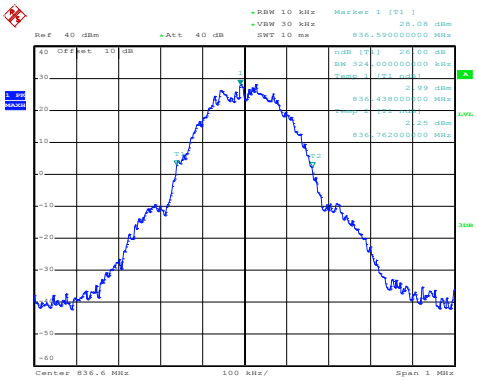

Date: 11.NOV.2017 15:49:12

Lowest channel




Date: 11.NOV.2017 15:49:37

Middle channel

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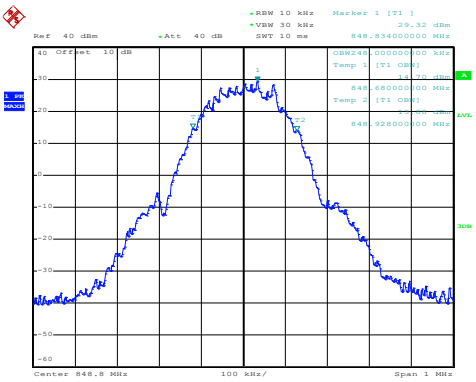
Middle channel

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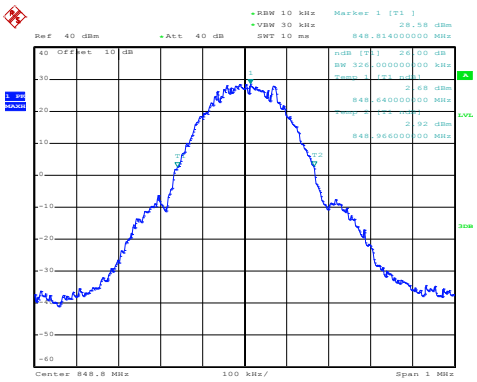
Highest channel

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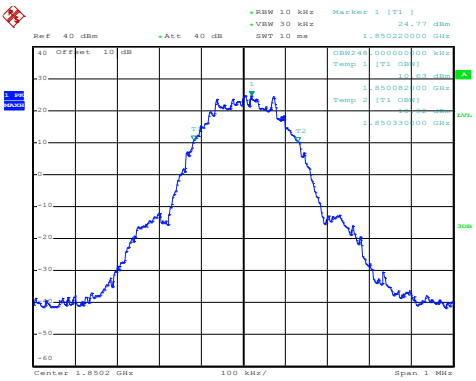
Highest channel

## PCS 1900

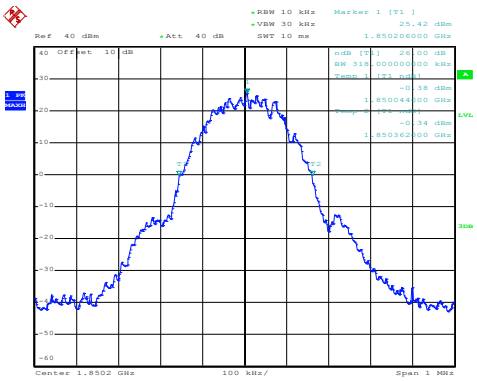
### 99% Occupy bandwidth




Date: 11.NOV.2017 15:51:28

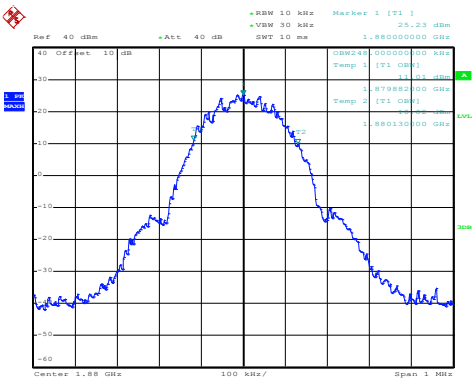
Lowest channel

### 26dB Emission Bandwidth



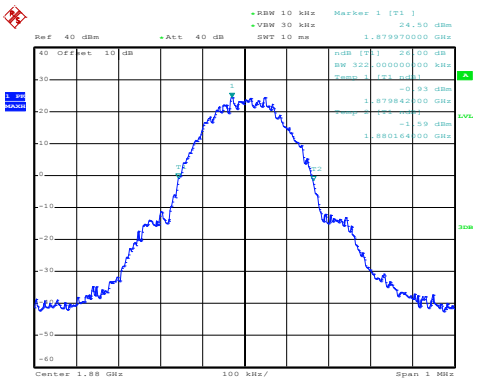

Date: 11.NOV.2017 15:51:40

Lowest channel



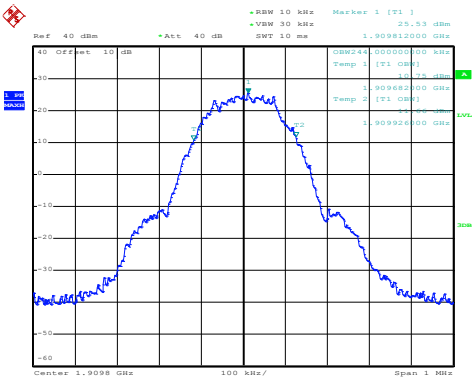

Date: 11.NOV.2017 15:52:24

Middle channel



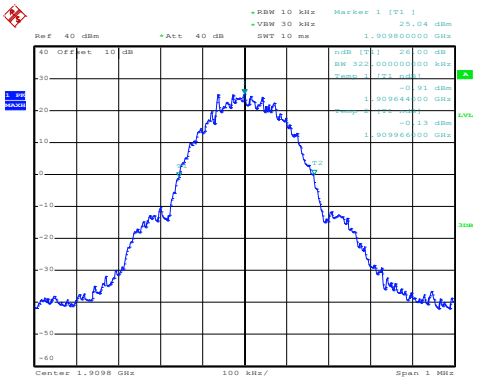

Date: 11.NOV.2017 15:52:09

Middle channel




Date: 11.NOV.2017 15:53:04

Highest channel

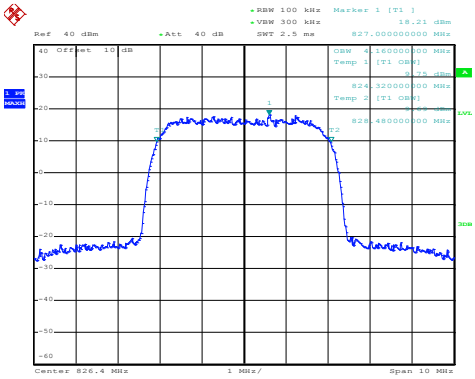



Date: 11.NOV.2017 15:53:23

Highest channel

UMTS 850 12.2k RMC

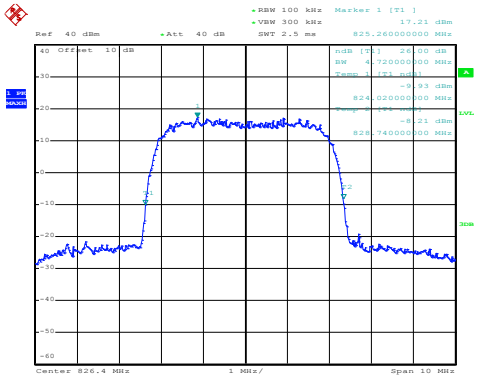
**99% Occupy bandwidth**




Date: 11.NOV.2017 15:55:39

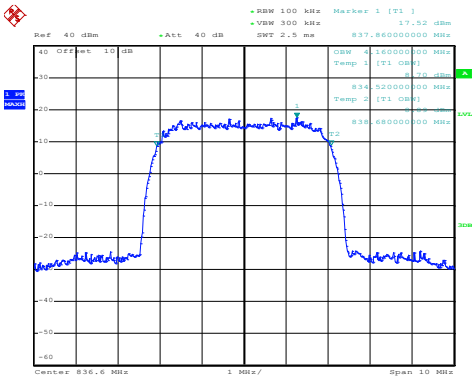
Lowest channel

**26dB Emission Bandwidth**



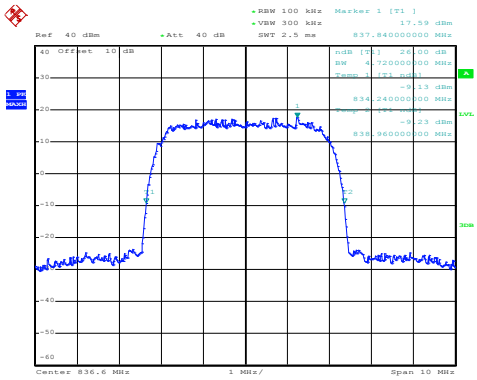

Date: 11.NOV.2017 15:55:50

Lowest channel



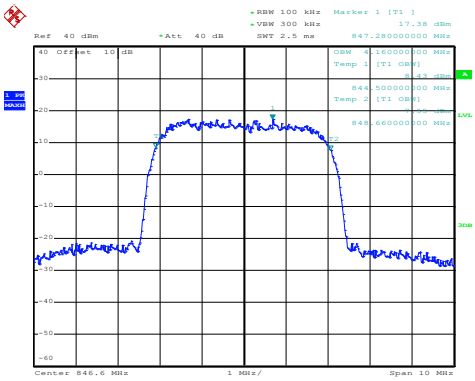

Date: 11.NOV.2017 15:56:32

Middle channel



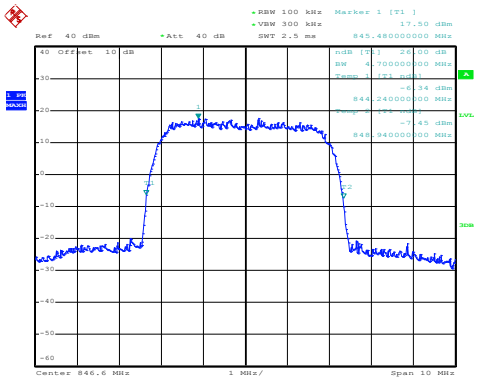

Date: 11.NOV.2017 15:56:22

Middle channel




Date: 11.NOV.2017 15:57:00

Highest channel

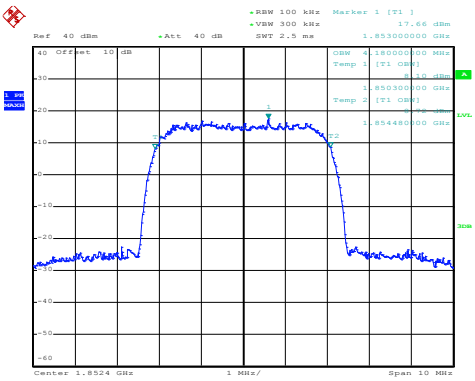



Date: 11.NOV.2017 15:57:11

Highest channel

UMTS 1900 12.2k RMC

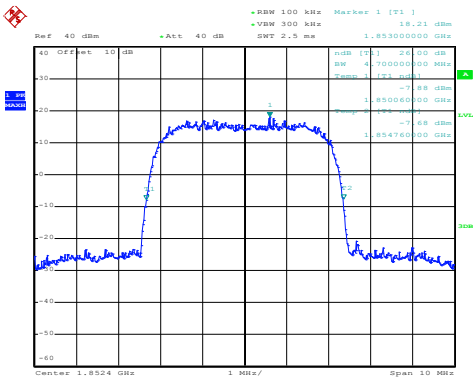
**99% Occupy bandwidth**




Date: 11.NOV.2017 15:57:45

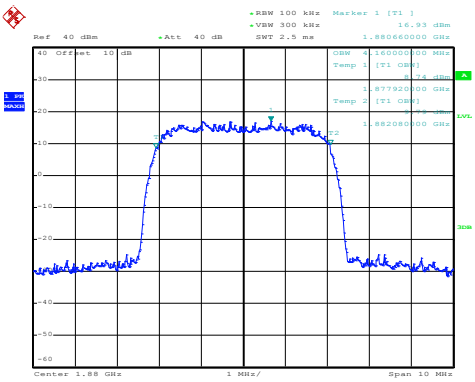
Lowest channel

**26dB Emission Bandwidth**



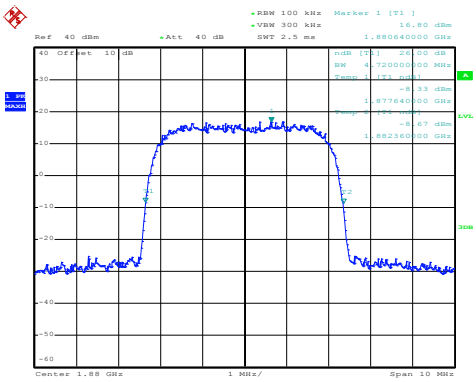

Date: 11.NOV.2017 15:57:57

Lowest channel



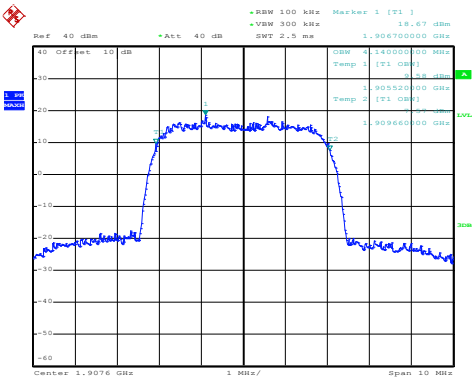

Date: 11.NOV.2017 16:01:38

Middle channel



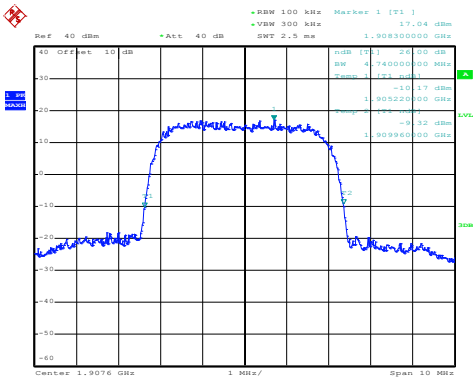

Date: 11.NOV.2017 16:01:28

Middle channel




Date: 11.NOV.2017 16:02:03

Highest channel




Date: 11.NOV.2017 16:02:15

Highest channel

## 6.3 Peak-to-Average Power Ratio

| | |
|---|---|
| Test Requirement: | FCC part 24.232(d) |
| Test Method | ANSI/TIA-603-D 2010 |
| Limit: | The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB. |
| Test setup: | |
| Test Procedure: | 1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.<br>2 Set the CCDF option in spectrum analyzer, RBW ≥ OBW,<br>3 Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level.<br>4 Repeat step 1~3 at other frequency and modulations. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

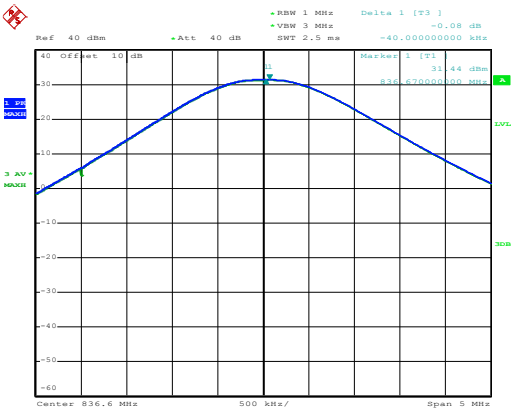
**Measurement Data:**

| Modulation | Test channel | PAPR |
|---|---|---|
| GSM 850 | 190 | 0.08 |
| PCS 1900 | 661 | 0.06 |
| UMTS 850 RMC | 4183 | 2.92 |
| UMTS 1900 RMC | 9400 | 2.80 |

**Test plots as below:**

Middle channel

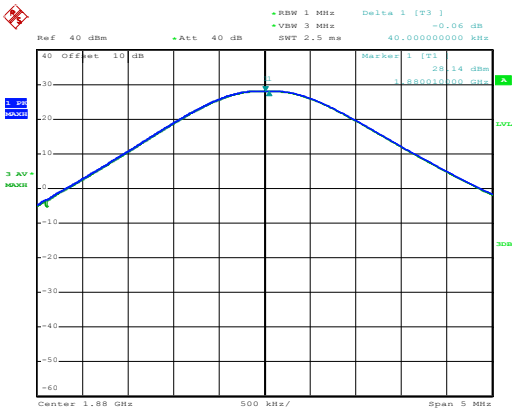
GSM 850




Date: 11.NOV.2017 15:46:21

Middle channel

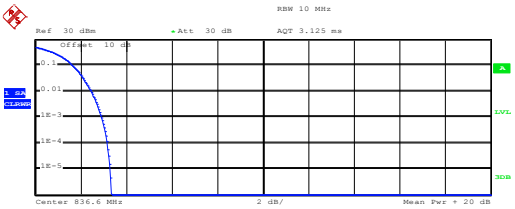
PCS 1900




Date: 11.NOV.2017 15:45:18

Middle channel

UMTS 850 RMC



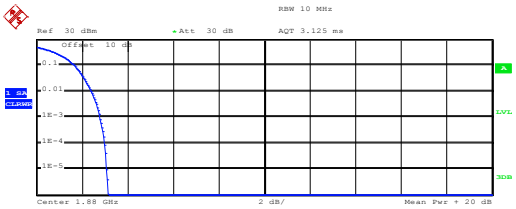

Complementary Cumulative Distribution Function (100000 samples)

| | Trace 1 |
|---|---|
| Mean | 22.72 dBm |
| Peak | 26.05 dBm |
| Crest | 3.33 dB |
| 10 % | 1.64 dB |
| 1 % | 2.48 dB |
| .1 % | 2.92 dB |
| .01 % | 3.16 dB |

Date: 11.NOV.2017 16:06:31

Middle channel

UMTS 1900 RMC




Complementary Cumulative Distribution Function (100000 samples)

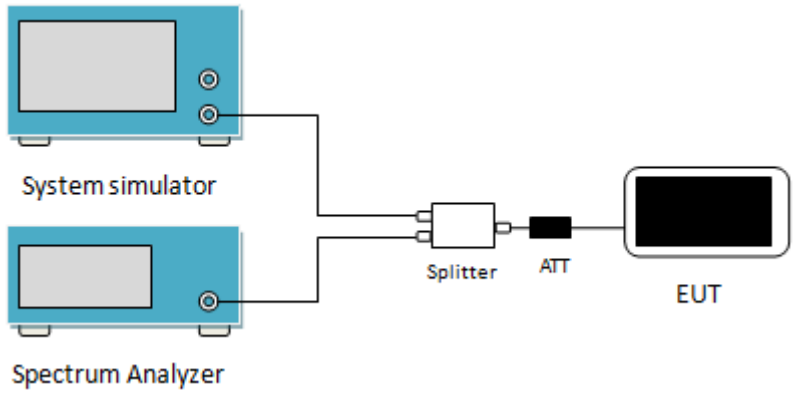
| | Trace 1 |
|---|---|
| Mean | 22.27 dBm |
| Peak | 25.41 dBm |
| Crest | 3.14 dB |
| 10 % | 1.68 dB |
| 1 % | 2.40 dB |
| .1 % | 2.80 dB |
| .01 % | 3.00 dB |

Date: 11.NOV.2017 16:06:00

## 6.4 Modulation Characteristic

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

## 6.5 Out of band emission at antenna terminals

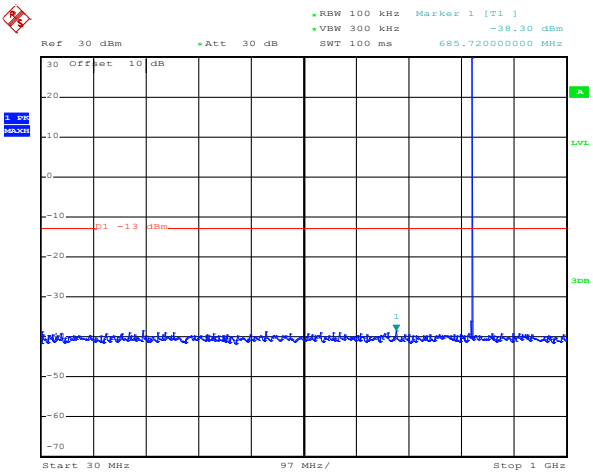
| | |
|---|---|
| Test Requirement: | FCC part 22.917(a), FCC part 24.238(a) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Limit: | -13dBm |
| Test setup: |  |
| Test Procedure: | 1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.<br>2 The resolution 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.<br>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.<br>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. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Test plots as follows:**

**Spurious emission:**

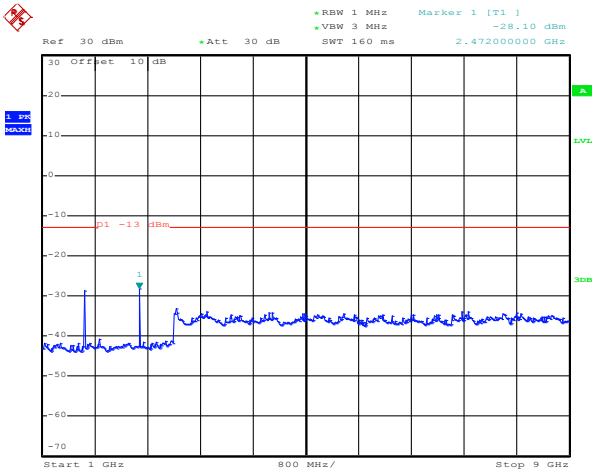
**GSM 850**

Lowest Channel




Date: 11.NOV.2017 15:09:21

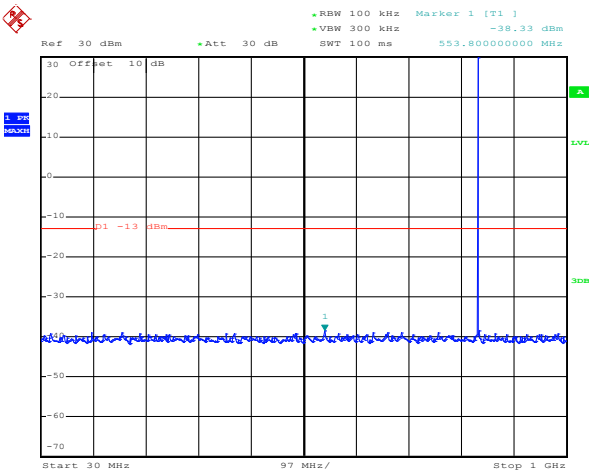
30MHz~1GHz




Date: 11.NOV.2017 15:13:02

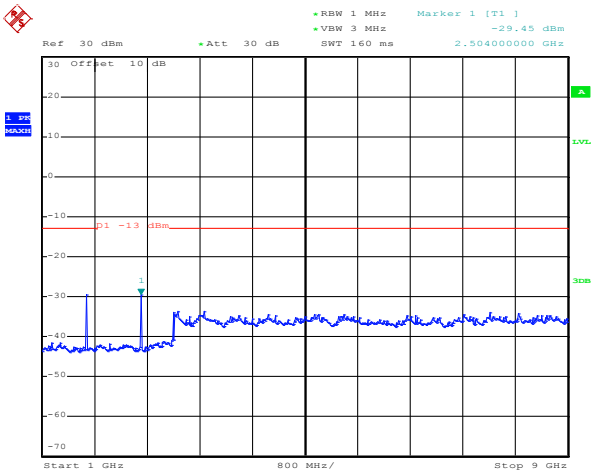
1GHz~9GHz

Middle channel




Date: 11.NOV.2017 15:09:55

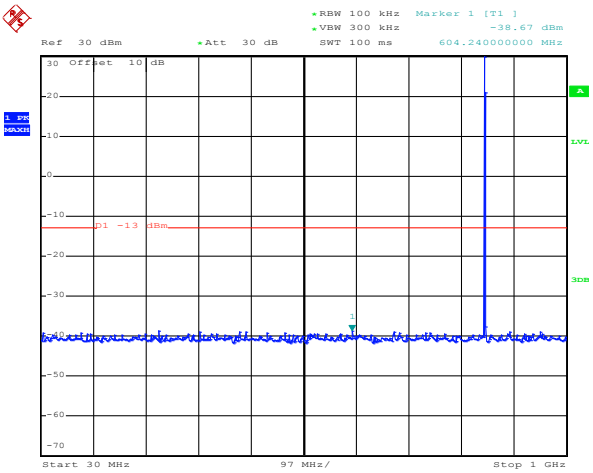
30MHz~1GHz




Date: 11.NOV.2017 15:12:26

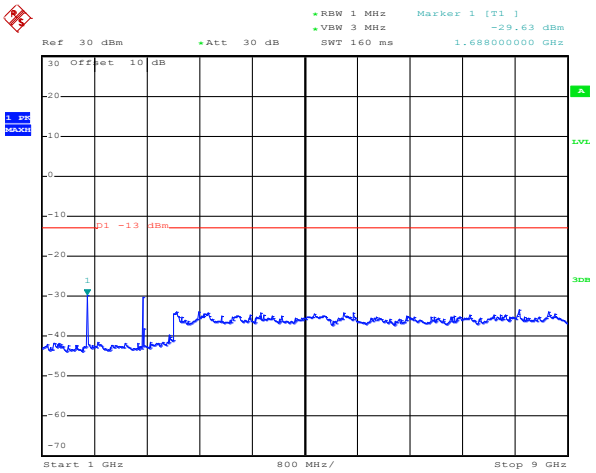
1GHz~9GHz

Highest Channel




Date: 11.NOV.2017 15:11:06

30MHz~1GHz

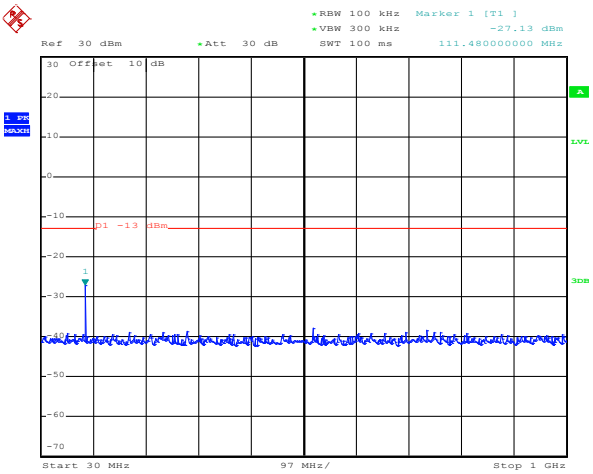



Date: 11.NOV.2017 15:12:03

1GHz~9GHz

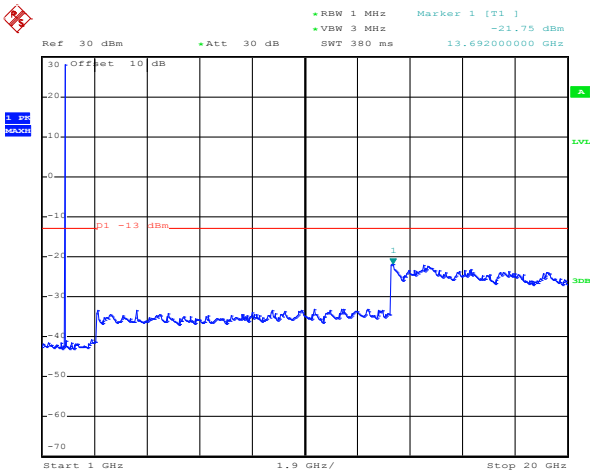
**PCS 1900**

Lowest Channel




Date: 11.NOV.2017 15:16:39

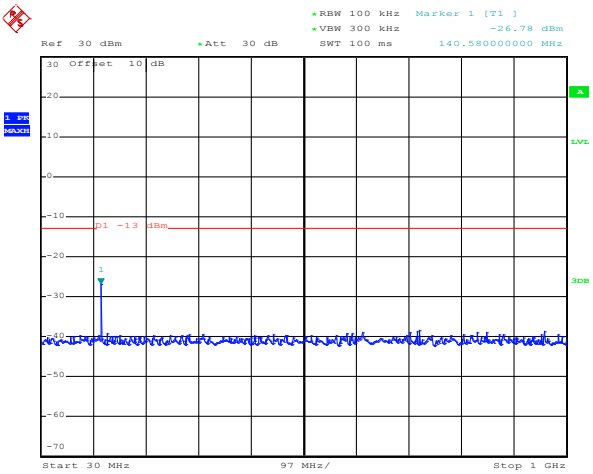
30MHz~1GHz




Date: 11.NOV.2017 15:14:42

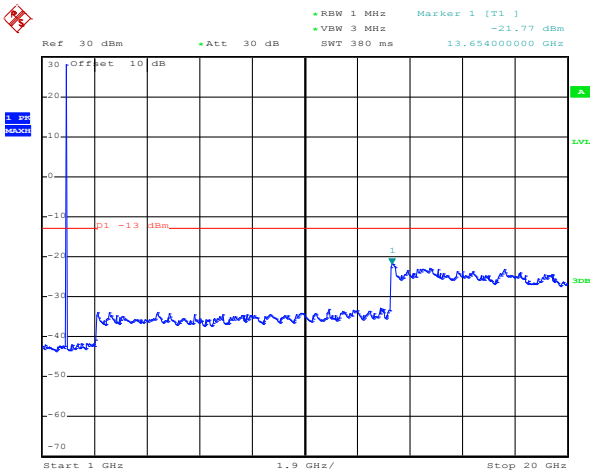
1GHz~20GHz

Middle Channel




Date: 11.NOV.2017 15:16:26

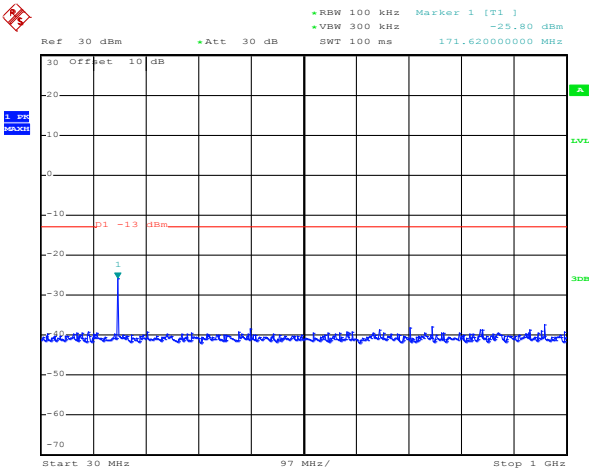
30MHz~1GHz




Date: 11.NOV.2017 15:15:17

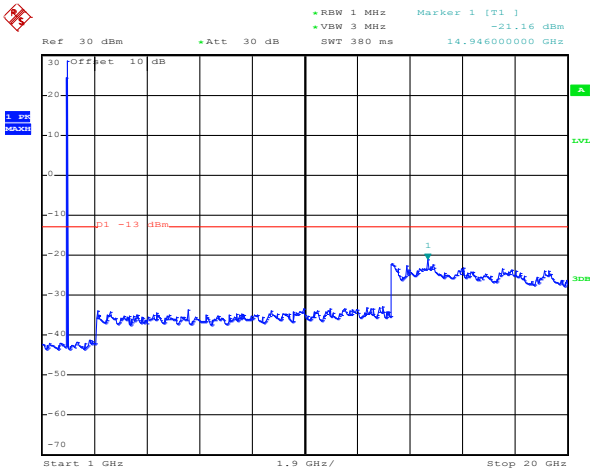
1GHz~20GHz

Highest Channel




Date: 11.NOV.2017 15:16:13

30MHz~1GHz

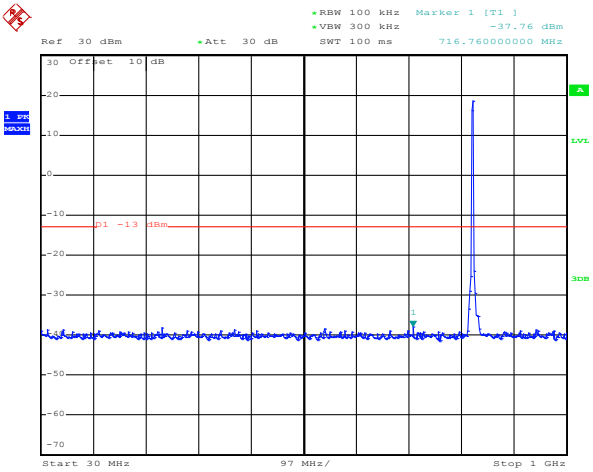



Date: 11.NOV.2017 15:15:42

1GHz~20GHz

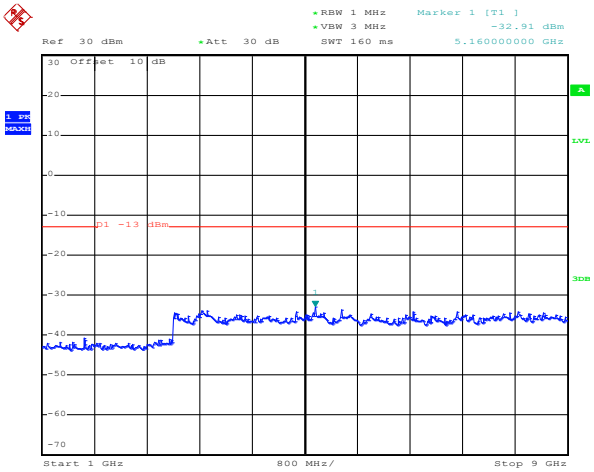
## UMTS 850 12.2k RMC

Lowest Channel




Date: 11.NOV.2017 14:56:29

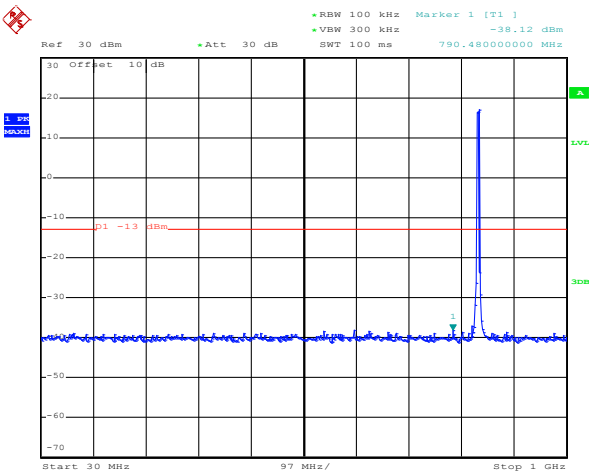
30MHz~1GHz




Date: 11.NOV.2017 15:00:04

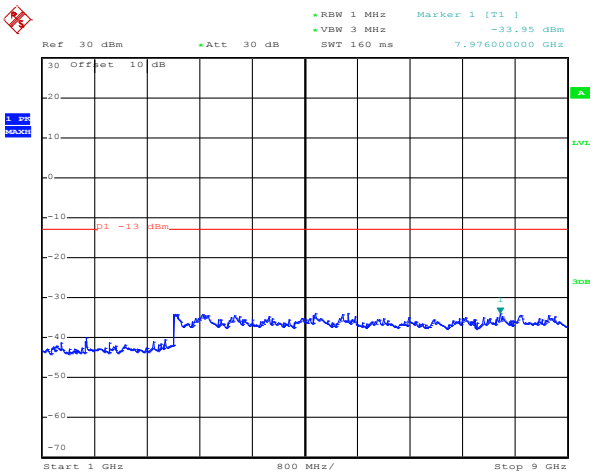
1GHz~9GHz

Middle Channel




Date: 11.NOV.2017 14:57:28

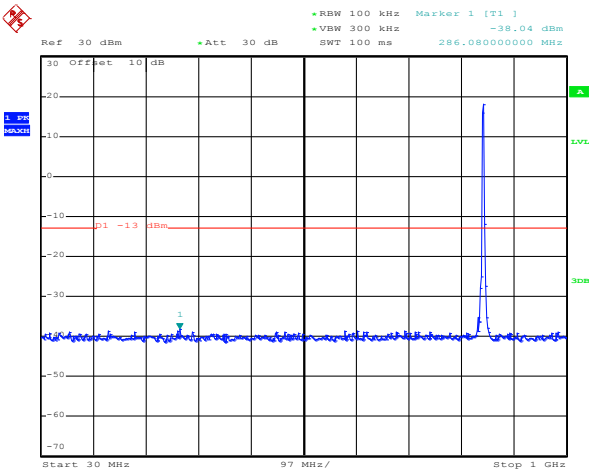
30MHz~1GHz




Date: 11.NOV.2017 15:00:22

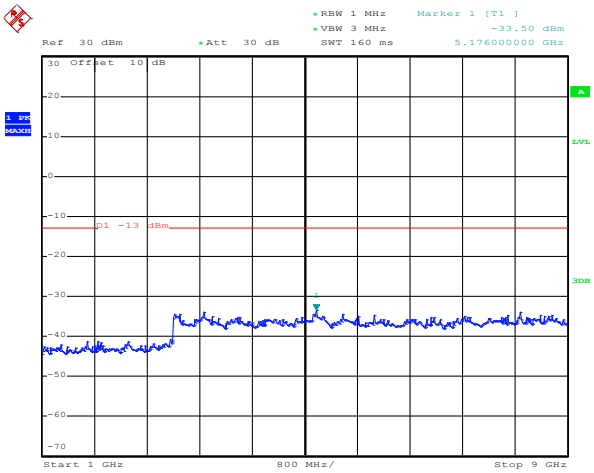
1GHz~9GHz

Highest Channel




Date: 11.NOV.2017 14:58:22

30MHz~1GHz

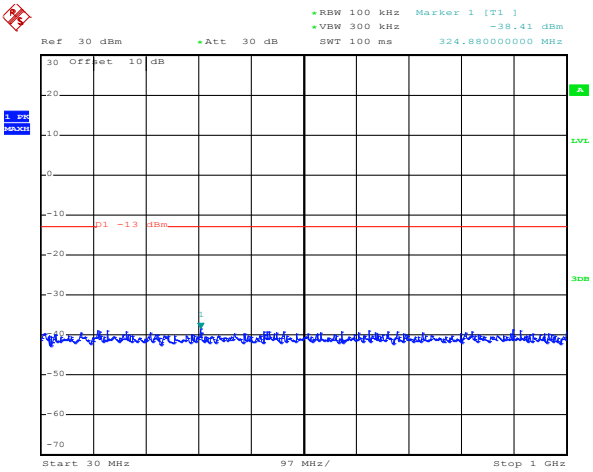



Date: 11.NOV.2017 15:00:40

1GHz~9GHz

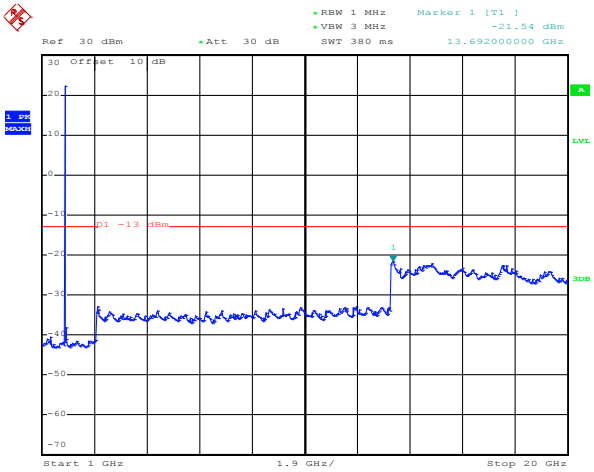
**UMTS 1900 12.2k RMC**

Lowest Channel




Date: 11.NOV.2017 15:07:44

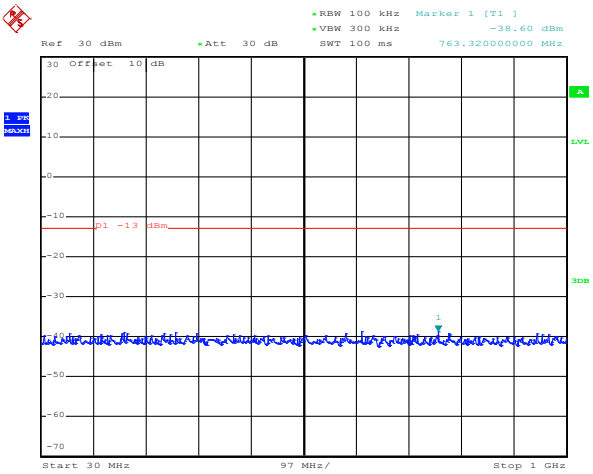
30MHz~1GHz




Date: 11.NOV.2017 15:05:17

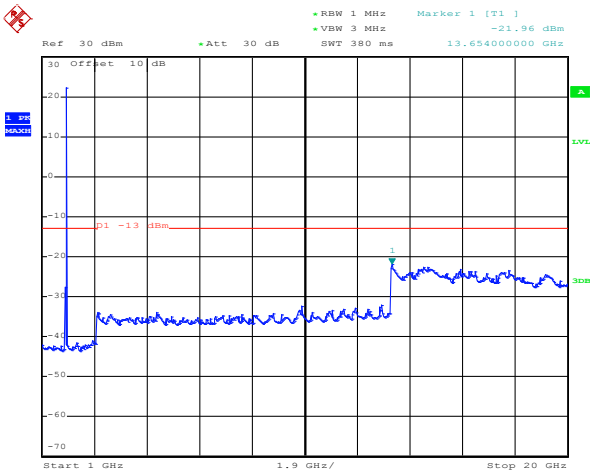
1GHz~20GHz

Middle Channel




Date: 11.NOV.2017 15:07:29

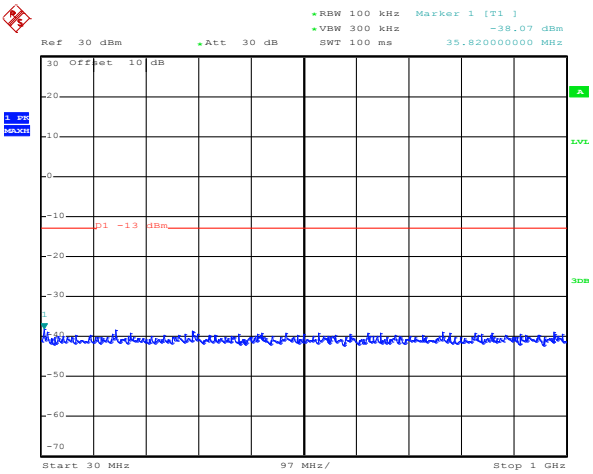
30MHz~1GHz




Date: 11.NOV.2017 15:06:23

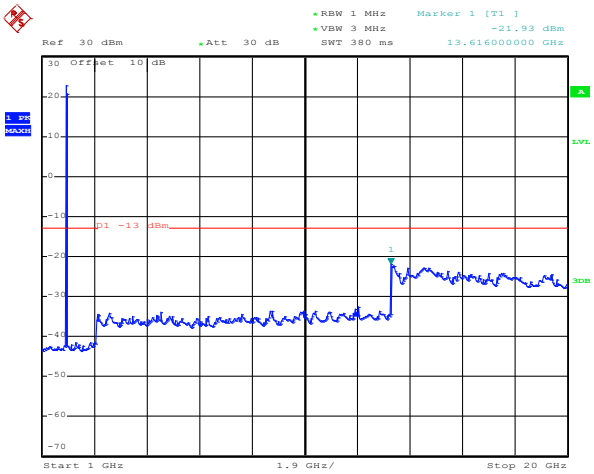
1GHz~20GHz

Highest Channel




Date: 11.NOV.2017 15:07:13

30MHz~1GHz

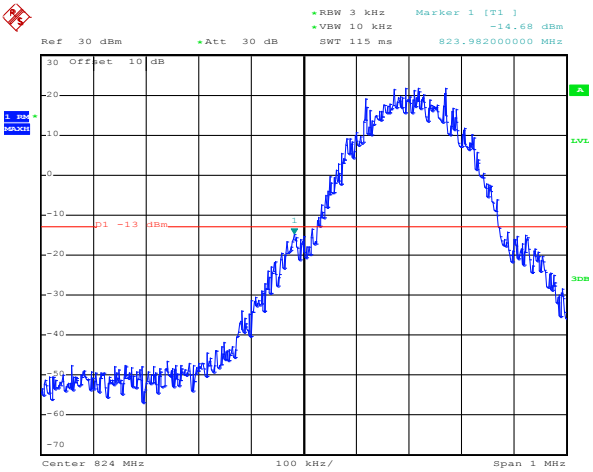



Date: 11.NOV.2017 15:06:43

1GHz~20GHz

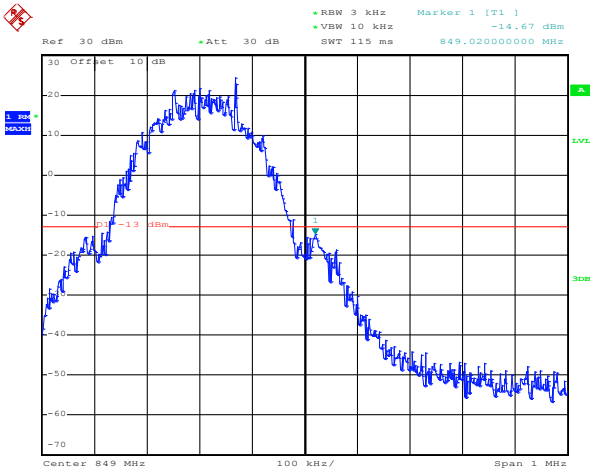
**Band edge emission:**

**GSM850**




Date: 11.NOV.2017 15:26:21

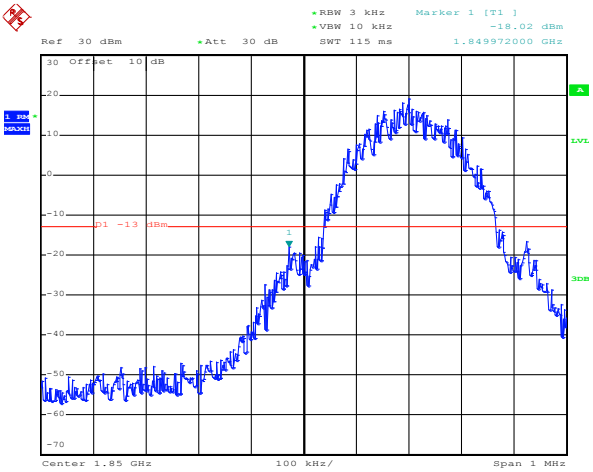
Lowest channel




Date: 11.NOV.2017 15:26:44

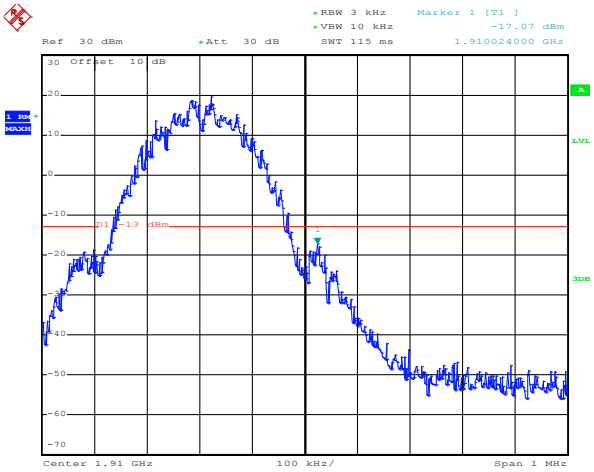
Highest channel

**PCS1900**




Date: 11.NOV.2017 15:23:25

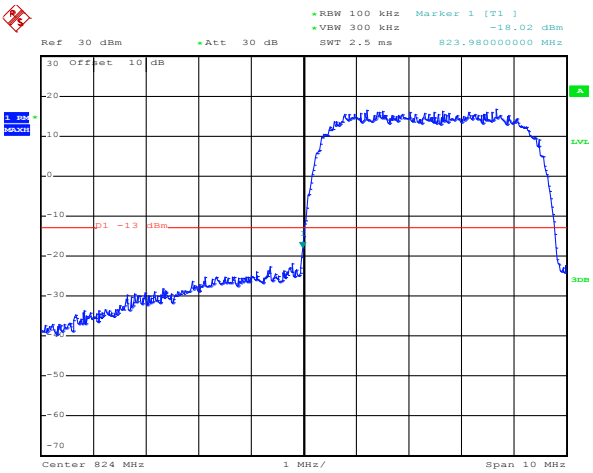
Lowest channel




Date: 11.NOV.2017 15:24:46

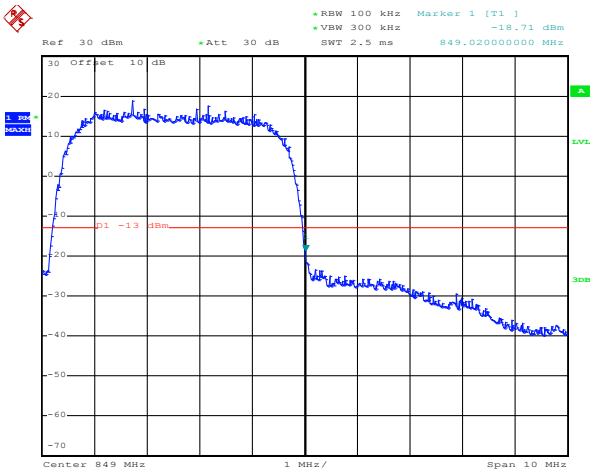
Highest channel

## UMTS 850 RMC 12.2kbps




Date: 11.NOV.2017 15:30:28

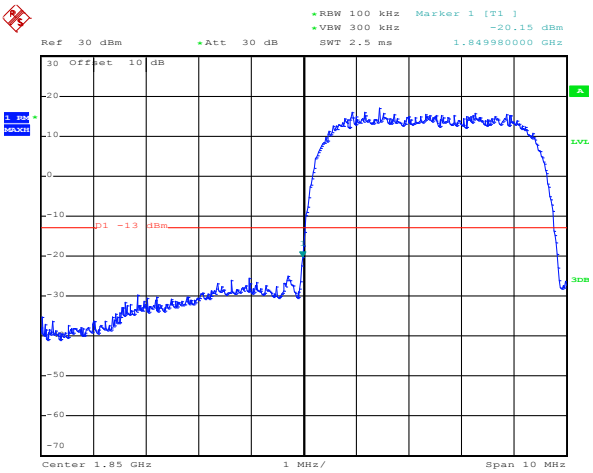
Lowest channel




Date: 11.NOV.2017 15:30:51

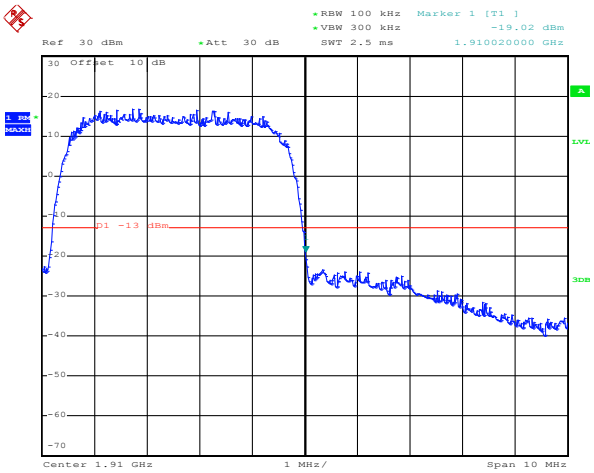
Highest channel

## UMTS 1900 RMC 12.2kbps




Date: 11.NOV.2017 15:29:01

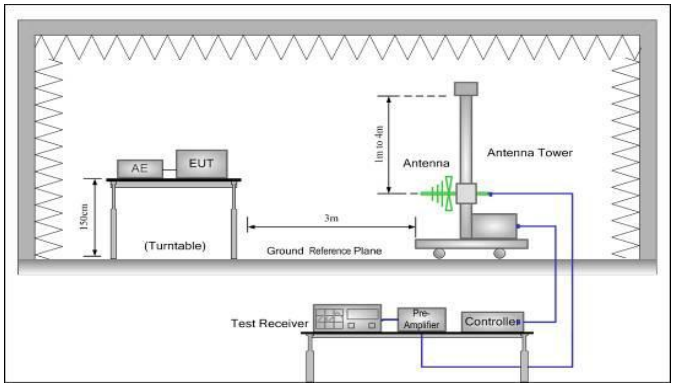
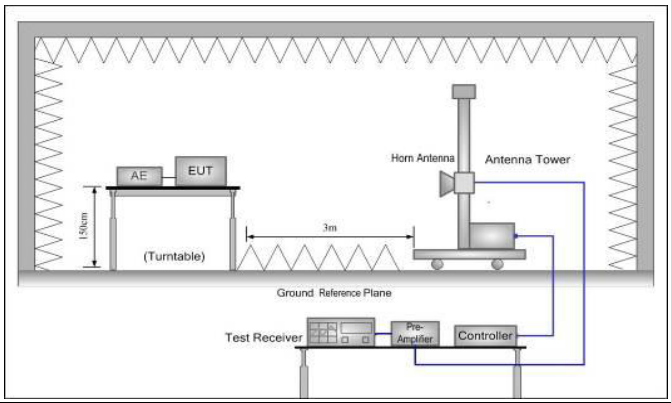
Lowest channel




Date: 11.NOV.2017 15:29:32

Highest channel

## 6.6 ERP, EIRP Measurement

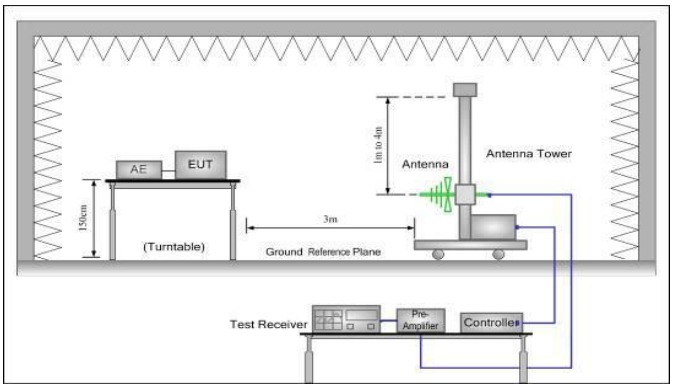
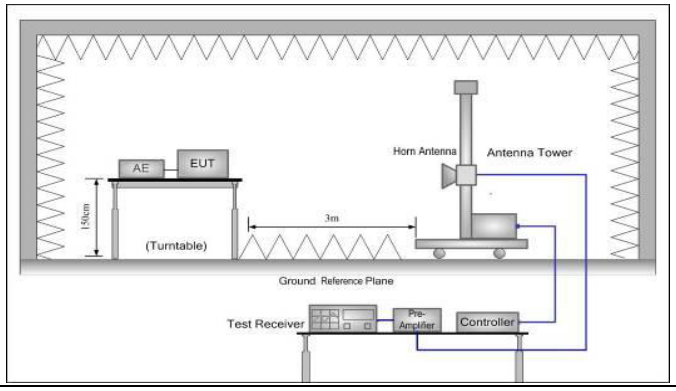
| | |
|---|---|
| Test Requirement: | FCC part 22.913(a)(2), FCC part 24.232(c) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Limit: | GSM850 7W: ERP, PCS1900 2W: EIRP<br>UMTS 850: 7W ERP, UMTS1900: 2W EIRP |
| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
| Test Procedure: | 1. The EUT was 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.<br>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.<br>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:<br>ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)<br>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:<br>EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)<br>5. The worse case was relating to the conducted output power. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data (worst case)**:

| EUT mode | Channel | EUT Pol. | Antenna Pol. | ERP(dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| GSM850 | 128 | H | V | 26.63 | 38.45 | Pass |
| | | | H | 26.94 | | |
| UMTS 850 12.2k RMC | 4183 | H | V | 22.60 | | |
| | | | H | 20.47 | | |

| EUT mode | Channel | EUT Pol. | Antenna Pol. | EIRP(dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| PCS1900 | 810 | H | V | 25.27 | 33 | Pass |
| | | | H | 21.42 | | |
| UMTS 1900 12.2k RMC | 9262 | H | V | 21.36 | | |
| | | | H | 19.03 | | |

## 6.7 Field strength of spurious radiation measurement

| | |
|---|---|
| Test Requirement: | FCC part 22.917(a), FCC part 24.238(a) and FCC part 27.53(h) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Limit: | -13dBm |
| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
| 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.<br>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.<br>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.<br>4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.<br>ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB) |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details. |
| Test results: | Passed |

**Measurement Data (worst case):**

| Test mode: | GSM850 | | Test channel: | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1648.40 | Vertical | -39.41 | -13.00 | Pass |
| 2472.60 | V | -37.21 | | |
| 3296.80 | V | -50.92 | | |
| 1648.40 | Horizontal | -38.71 | -13.00 | Pass |
| 2472.60 | H | -36.25 | | |
| 3296.80 | H | -51.48 | | |
| **Test mode:** | **GSM850** | | **Test channel:** | **Middle** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1673.20 | Vertical | -41.53 | -13.00 | Pass |
| 2509.80 | V | -39.46 | | |
| 3346.40 | V | -51.30 | | |
| 1673.20 | Horizontal | -38.93 | -13.00 | Pass |
| 2509.80 | H | -36.01 | | |
| 3346.40 | H | -50.38 | | |
| **Test mode:** | **GSM850** | | **Test channel:** | **Highest** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1697.60 | Vertical | -44.83 | -13.00 | Pass |
| 2546.40 | V | -41.26 | | |
| 3395.20 | V | -50.22 | | |
| 1697.60 | Horizontal | -40.14 | -13.00 | Pass |
| 2546.40 | H | -40.18 | | |
| 3395.20 | H | -51.72 | | |

Remark:

1. 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 | -45.06 | -13.00 | Pass |
| 5550.60 | V | -43.37 | | |
| 3700.40 | Horizontal | -45.53 | -13.00 | Pass |
| 5550.60 | H | -41.83 | | |
| **Test mode:** | **PCS1900** | | **Test channel:** | **Middle** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3760.00 | Vertical | -45.53 | -13.00 | Pass |
| 5640.00 | V | -41.01 | | |
| 3760.00 | Horizontal | -45.96 | -13.00 | Pass |
| 5640.00 | H | -40.61 | | |
| **Test mode:** | **PCS1900** | | **Test channel:** | **Highest** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3819.60 | Vertical | -46.28 | -13.00 | Pass |
| 5729.40 | V | -39.29 | | |
| 3819.60 | Horizontal | -45.09 | -13.00 | Pass |
| 5729.40 | H | -37.53 | | |

Remark:
1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

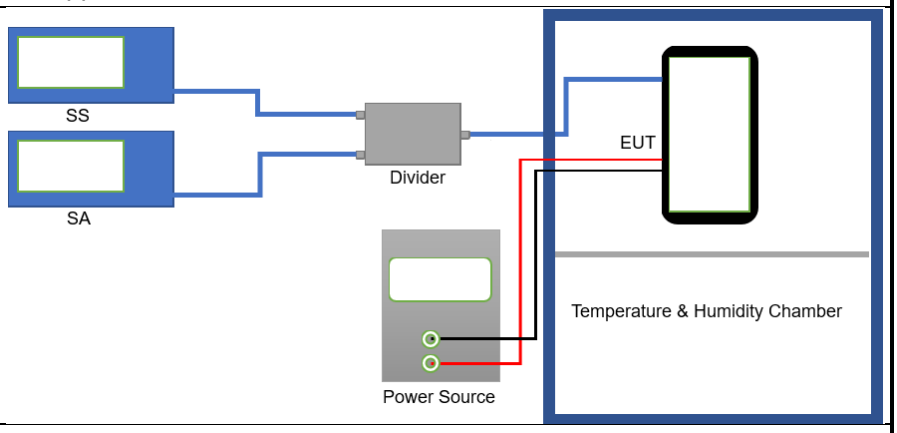
| Test mode: | WCDMA BAND V 12.2k RMC | | Test channel: | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1652.80 | Vertical | -56.42 | -13.00 | Pass |
| 2479.20 | V | -51.73 | | |
| 3305.60 | V | -51.48 | | |
| 1652.80 | Horizontal | -42.99 | -13.00 | Pass |
| 2479.20 | H | -54.77 | | |
| 3305.60 | H | -49.80 | | |
| **Test mode:** | **WCDMA BAND V 12.2k RMC** | | **Test channel:** | **Middle** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1673.20 | Vertical | -55.47 | -13.00 | Pass |
| 2509.80 | V | -46.59 | | |
| 3346.40 | V | -49.85 | | |
| 1673.20 | Horizontal | -54.20 | -13.00 | Pass |
| 2509.80 | H | -50.17 | | |
| 3346.40 | H | -50.26 | | |
| **Test mode:** | **WCDMA BAND V 12.2k RMC** | | **Test channel:** | **Highest** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 1693.20 | Vertical | -54.75 | -13.00 | Pass |
| 2539.80 | V | -46.48 | | |
| 3386.40 | V | -51.20 | | |
| 1693.20 | Horizontal | -55.32 | -13.00 | Pass |
| 2539.80 | H | -49.07 | | |
| 3386.40 | H | -51.68 | | |

Remark:
1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

| Test mode: | WCDMA Band II 12.2k RMC | | Test channel: | Lowest |
|---|---|---|---|---|
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3704.80 | Vertical | -45.90 | -13.00 | Pass |
| 5557.20 | V | -32.87 | | |
| 3704.80 | Horizontal | -46.85 | | |
| 5557.20 | H | -32.11 | | |
| **Test mode:** | **WCDMA Band II 12.2k RMC** | | **Test channel:** | **Middle** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3760.00 | Vertical | -47.49 | -13.00 | Pass |
| 5640.00 | V | -32.90 | | |
| 3760.00 | Horizontal | -46.31 | | |
| 5640.00 | H | -29.17 | | |
| **Test mode:** | **WCDMA Band II 12.2k RMC** | | **Test channel:** | **Highest** |
| Frequency (MHz) | Spurious Emission | | Limit (dBm) | Result |
| | Polarization | Level (dBm) | | |
| 3815.20 | Vertical | -47.21 | -13.00 | Pass |
| 5722.80 | V | -32.75 | | |
| 3815.20 | Horizontal | -48.09 | | |
| 5722.80 | H | -27.10 | | |

Remark:
1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

## 6.8 Frequency stability V.S. Temperature measurement

| | |
|---|---|
| Test Requirement: | FCC Part 22.355, FCC Part 24.235, FCC Part 2.1055(a)(1)(b) |
| Test Method: | ANSI/TIA-6-3-D 2010 |
| Limit: | ±2.5 ppm |
| Test setup: |  |
| Test procedure: | 1. The equipment under test was connected to an external DC power supply and input rated voltage.<br>2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.<br>3. The EUT was placed inside the temperature chamber.<br>4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.<br>5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.<br>6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data (the worst channel):**

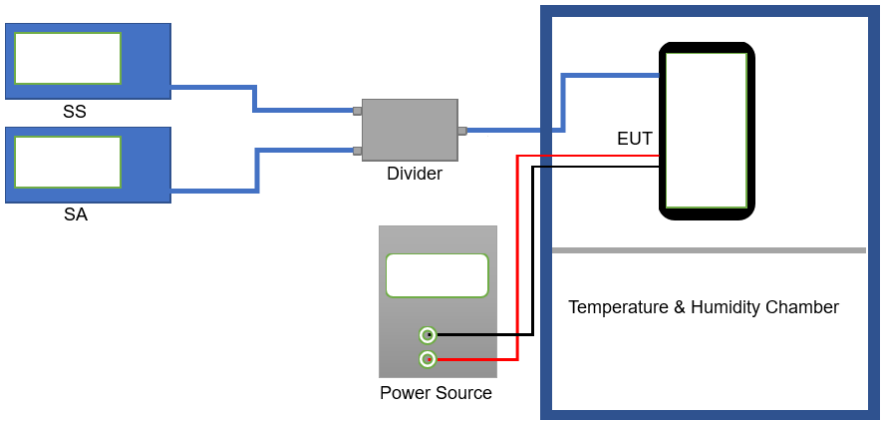
| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.80 | -30 | 199 | 0.237868 | ±2.5 | Pass |
| | -20 | 180 | 0.215157 | | |
| | -10 | 165 | 0.197227 | | |
| | 0 | 132 | 0.157781 | | |
| | 10 | 144 | 0.172125 | | |
| | 20 | 171 | 0.204399 | | |
| | 30 | 180 | 0.215157 | | |
| | 40 | 140 | 0.167344 | | |
| | 50 | 125 | 0.149414 | | |
| Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.80 | -30 | 196 | 0.104255 | ±2.5 | Pass |
| | -20 | 181 | 0.096277 | | |
| | -10 | 123 | 0.065426 | | |
| | 0 | 136 | 0.072340 | | |
| | 10 | 125 | 0.066489 | | |
| | 20 | 141 | 0.075000 | | |
| | 30 | 170 | 0.090426 | | |
| | 40 | 150 | 0.079787 | | |
| | 50 | 177 | 0.094149 | | |

Note: Only the worst case shown in the report.

| Reference Frequency: WCDMA BAND V 12.2k RMC Middle channel=4183 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.80 | -30 | 199 | 0.237868 | ±2.5 | Pass |
| | -20 | 126 | 0.150610 | | |
| | -10 | 181 | 0.216352 | | |
| | 0 | 174 | 0.207985 | | |
| | 10 | 180 | 0.215157 | | |
| | 20 | 146 | 0.174516 | | |
| | 30 | 132 | 0.157781 | | |
| | 40 | 138 | 0.164953 | | |
| | 50 | 108 | 0.129094 | | |
| Reference Frequency: WCDMA BAND II 12.2k RMC Middle channel=9400 channel=1880MHz | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.80 | -30 | 191 | 0.101596 | ±2.5 | Pass |
| | -20 | 124 | 0.065957 | | |
| | -10 | 171 | 0.090957 | | |
| | 0 | 180 | 0.095745 | | |
| | 10 | 165 | 0.087766 | | |
| | 20 | 132 | 0.070213 | | |
| | 30 | 138 | 0.073404 | | |
| | 40 | 108 | 0.057447 | | |
| | 50 | 118 | 0.062766 | | |

Note: Only the worst case shown in the report.

## 6.9 Frequency stability V.S. Voltage measurement

| | |
|---|---|
| Test Requirement: | FCC Part 22.355, FCC Part 24.235, FCC Part 2.1055(d)(2) |
| Test Method: | ANSI/TIA-603-D 2010 |
| Limit: | ±2.5ppm |
| Test setup: |  |
| 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.<br>2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.<br>3. Reduce the input voltage to specify extreme voltage variation (+/-15%) and endpoint, record the maximum frequency change. |
| Test Instruments: | Refer to section 5.8 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data (the worst channel):**

| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.35 | 96 | 0.114750 | ±2.5 | Pass |
| | 3.80 | 80 | 0.095625 | | |
| | 3.55 | 91 | 0.108774 | | |
| Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.35 | 85 | 0.045213 | ±2.5 | Pass |
| | 3.80 | 90 | 0.047872 | | |
| | 3.55 | 69 | 0.036702 | | |

| 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 | 4.35 | 77 | 0.092039 | ±2.5 | Pass |
| | 3.80 | 80 | 0.095625 | | |
| | 3.55 | 96 | 0.114750 | | |
| Reference Frequency: UMTS 1900 12.2k RMC Middle channel=9400 channel=1880MHz | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.35 | 68 | 0.036170 | ±2.5 | Pass |
| | 3.80 | 90 | 0.047872 | | |
| | 3.55 | 74 | 0.039362 | | |

Note: Only the worst case shown in the report.