# FCC REPORT
## (GSM & WCDMA)

| | |
|---|---|
| **Applicant:** | Shenzhen Huafurui Technology Co., Ltd. |
| **Address of Applicant:** | Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street, Xili, Nan shan district Shenzhen China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Smartphone |
| Model No.: | KINGKONG MINI 2 |
| Trade mark: | CUBOT |
| **FCC ID:** | 2AHZ5KKMN2 |
| **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<br>FCC CFR Title 47 Part 27 Subpart L |
| **Date of sample receipt:** | 09 Sep., 2020 |
| **Date of Test:** | 10 Sep., to 09 Oct., 2020 |
| **Date of report issued:** | 02 Nov., 2020 |
| **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.

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## 2. Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *10 Oct., 2020* | *Original* |
| *01* | *02 Nov., 2020* | *Update Applicant, Address, Manufacturer Address, Factory Address.* |
| | | |
| | | |
| | | |

***Tested by:*** Mike.ou ***Date:*** *02 Nov., 2020*

***Test Engineer***

***Reviewed by:*** Winner Zhang ***Date:*** *02 Nov., 2020*

***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)(5)<br>Part 24.232 (c)<br>Part 27.50 (d)(4) | Pass |
| Peak-to-Average Power Ratio | Part 24.232 (d)<br>Part 27.50(d)(5) | 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)<br>Part 27.53(h) | Pass |
| Out of band emission at antenna terminals | Part 2.1053<br>Part 22.917 (a)<br>Part 24.238 (a)<br>Part 27.53 (h) | Pass |
| Field strength of spurious radiation | Part 22.917 (a)<br>Part 24.238 (a)<br>Part 27.53 (h) | Pass |
| Frequency stability vs. temperature | Part 22.355<br>Part 24.235<br>Part 27.54<br>Part 2.1055(a)(1)(b) | Pass |
| Frequency stability vs. voltage | Part 22.355<br>Part 24.235<br>Part 27.54<br>Part 2.1055(d)(2) | Pass |

***Remark:***

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB(Fundamental Frequency below1GHz)/1.0dB(Fundamental Frequency above 1GHz) (provided by the customer).*

| | |
|---|---|
| ***Test Method:*** | *ANSI/TIA-603-E-2016*<br>*ANSI C63.26-2015* |

# 5. General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Shenzhen Huafurui Technology Co., Ltd. |
| Address: | Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street, Xili, Nan shan district Shenzhen China |
| Manufacturer/ Factory: | Shenzhen Huafurui Technology Co., Ltd. |
| Address: | Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street, Xili, Nan shan district Shenzhen China |

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

| | | | | |
|---|---|---|---|---|
| Product Name: | Smartphone | | | |
| Model No.: | KINGKONG MINI 2 | | | |
| 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<br>WCDMA Band IV: 1712.4 MHz-1752.6 MHz | | | |
| Modulation type: | 2G | ☒Voice(GMSK) | ☒GPRS(GMSK) | ☒EGPRS(GMSK, 8PSK) |
| | 3G | ☒RCM(QPSK) | ☒HSUPA(QPSK) | ☒HSDPA(QPSK,16QAM) |
| Antenna type: | Internal Antenna | | | |
| Antenna gain: | GSM 850: 0.89 dBi(declare by Applicant)<br>PCS 1900: 1.23 dBi(declare by Applicant)<br>WCDMA Band V: 0.89 dBi(declare by Applicant)<br>WCDMA Band II: 1.23 dBi(declare by Applicant)<br>WCDMA Band IV: 1.15 dBi(declare by Applicant) | | | |
| Power supply: | Rechargeable Li-ion Battery DC3.85V-3000mAh | | | |
| AC adapter: | Model: HJ-0501000E1-US<br>Input: AC100-240V, 50/60Hz, 0.2A<br>Output: DC 5.0V, 1.0A | | | |
| Test Sample Condition: | The test samples were provided in good working order with no visible defects. | | | |

**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 |
| WCDMA Band IV | | | |
| Channel | Frequency (MHz) | | |
| 1312 | 1712.40 | | |
| 1313 | 1712.60 | | |
| …. | …. | | |
| 1412 | 1732.40 | | |
| 1413 | 1732.60 | | |
| 1414 | 1732.80 | | |
| … | … | | |
| 1512 | 1752.40 | | |
| 1513 | 1752.60 | | |

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 | 128 | 824.20 | Lowest | 512 | 1850.20 |
| Middle | 190 | 836.60 | Middle | 661 | 1880.00 |
| Highest | 251 | 848.80 | Highest | 810 | 1909.80 |
| WCDMA Band V | | | WCDMA Band II | | |
| Channel | | Frequency(MHz) | Channel | | Frequency(MHz) |
| Lowest | 4132 | 826.40 | Lowest | 9262 | 1852.40 |
| Middle | 4183 | 836.60 | Middle | 9400 | 1880.00 |
| Highest | 4233 | 846.60 | Highest | 9538 | 1907.60 |
| WCDMA Band IV | | | | | |
| Channel | | Frequency(MHz) | | | |
| Lowest | 1312 | 1712.40 | | | |
| Middle | 1413 | 1732.60 | | | |
| Highest | 1513 | 1752.60 | | | |

## 5.3 Test environment and mode

| | |
|---|---|
| **Operating Environment:** | |
| Temperature: | Normal: 15℃ ~ 35℃, Extreme: -30℃ ~ +50℃ |
| Humidity: | 20 % ~ 75 % RH |
| Atmospheric Pressure: | 1008 mbar |
| Voltage: | Nominal: 3.85Vdc, Extreme: Low 3.50 Vdc, High 4.40Vdc |
| **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 |
| EGPRS mode | Keep the EUT communication with simulated station in EGPRS 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. 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) | ±3.12 dB (k=2) |
| Radiated Emission (30MHz ~ 1000MHz) | ±4.32 dB (k=2) |
| Radiated Emission (1GHz ~ 18GHz) | ±5.16 dB (k=2) |
| Radiated Emission (18GHz ~ 40GHz) | ±3.20 dB (k=2) |

## 5.6 Additions to, deviations, or exclusions from the method

| |
|---|
| No |

## 5.7 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

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

- **ISED – CAB identifier.: CN0021**

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.

- **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

## 5.8 Laboratory Location

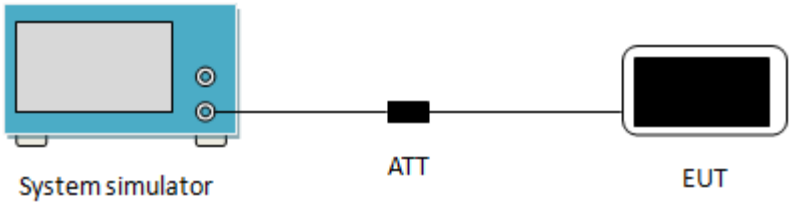
Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No.110~116, Building B, Jinyuan Business Building, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

## 5.9 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 | 07-22-2020 | 07-21-2021 |
| BiConiLog Antenna | SCHWARZBECK | VULB9163 | 497 | 03-07-2020 | 03-06-2021 |
| Biconical Antenna | SCHWARZBECK | VUBA9117 | 359 | 06-22-2020 | 06-21-2021 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 916 | 03-07-2020 | 03-06-2021 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 1805 | 06-22-2020 | 06-21-2021 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170582 | 11-18-2019 | 11-17-2020 |
| EMI Test Software | AUDIX | E3 | Version: 6.110919b | | |
| Pre-amplifier | HP | 8447D | 2944A09358 | 03-07-2020 | 03-06-2021 |
| Pre-amplifier | CD | PAP-1G18 | 11804 | 03-07-2020 | 03-06-2021 |
| Spectrum analyzer | Rohde & Schwarz | FSP30 | 101454 | 03-05-2020 | 03-04-2021 |
| Spectrum analyzer | Rohde & Schwarz | FSP40 | 100363 | 11-18-2019 | 11-17-2020 |
| EMI Test Receiver | Rohde & Schwarz | ESRP7 | 101070 | 03-05-2020 | 03-04-2021 |
| Spectrum Analyzer | Agilent | N9020A | MY50510123 | 11-18-2019 | 11-17-2020 |
| Signal Generator | Rohde & Schwarz | SMX | 835454/016 | 03-05-2020 | 03-04-2021 |
| Signal Generator | R&S | SMR20 | 1008100050 | 03-05-2020 | 03-04-2021 |
| RF Switch Unit | MWRFTEST | MW200 | N/A | N/A | N/A |
| Test Software | MWRFTEST | MTS8200 | Version: 2.0.0.0 | | |
| Cable | ZDECL | Z108-NJ-NJ-81 | 1608458 | 03-07-2020 | 03-06-2021 |
| Cable | MICRO-COAX | MFR64639 | K10742-5 | 03-07-2020 | 03-06-2021 |
| Cable | SUHNER | SUCOFLEX100 | 58193/4PE | 03-07-2020 | 03-06-2021 |
| DC Power Supply | XinNuoEr | WYK-10020K | 1409050110020 | 09-25-2019 | 09-24-2020 |
| | | | | 09-25-2020 | 09-24-2021 |
| Temperature Humidity Chamber | HengPu | HPGDS-500 | 20140828008 | 11-01-2019 | 11-31-2020 |
| Simulated Station | Rohde & Schwarz | CMW500 | 140493 | 07-22-2020 | 07-21-2021 |

# 6. Test results

## 6.1 Conducted Output Power, ERP and EIRP

| | |
|---|---|
| Test Requirement: | FCC part 22.913(a)(5), FCC part 24.232(c), FCC part 27.50(d)(4) |
| Limit: | GSM 850: 7W, PCS 1900: 2W<br>WCDMA Band V: 7W, WCDMA Band II: 2W, WCDMA Band IV: 1W |
| 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 5.9 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

| EUT Mode | Burst Average power (dBm) | | |
|---|---|---|---|
| | 128 | 190 | 251 |
| | 824.20 (MHz) | 836.60 (MHz) | 848.80 (MHz) |
| GSM 850 | 33.34 | 32.88 | 32.65 |
| GPRS 850 (1 Uplink slot) | 33.32 | 32.87 | 32.64 |
| GPRS 850 (2 Uplink slot) | 32.86 | 32.45 | 32.21 |
| GPRS 850 (3 Uplink slot) | 31.47 | 31.08 | 30.83 |
| GPRS 850 (4 Uplink slot) | 30.45 | 30.04 | 29.82 |
| Antenna Gain (dBi) | 0.89 | | |
| Max. ERP (dBm) | 32.08 | | |
| ERP Limit (dBm) | 38.45 | | |
| EGPRS 850 (1 Uplink slot) | 25.96 | 25.52 | 25.99 |
| EGPRS 850 (2 Uplink slot) | 25.41 | 25.17 | 24.61 |
| EGPRS 850 (3 Uplink slot) | 23.13 | 23.22 | 22.56 |
| EGPRS 850 (4 Uplink slot) | 21.88 | 21.65 | 21.05 |
| Antenna Gain (dBi) | 0.89 | | |
| Max. ERP (dBm) | 24.73 | | |
| ERP Limit (dBm) | 38.45 | | |

| EUT Mode | Burst Average power (dBm) | | |
|---|---|---|---|
| | 512 | 661 | 810 |
| | 1850.20 (MHz) | 1880.00 (MHz) | 1909.80 (MHz) |
| PCS 1900 | 30.42 | 30.51 | 30.53 |
| GPRS 1900 (1 Uplink slot) | 30.40 | 30.50 | 30.52 |
| GPRS 1900 (2 Uplink slot) | 29.93 | 30.02 | 30.08 |
| GPRS 1900 (3 Uplink slot) | 28.41 | 28.53 | 28.60 |
| GPRS 1900 (4 Uplink slot) | 27.37 | 27.48 | 27.59 |
| Antenna Gain (dBi) | 1.23 | | |
| Max. EIRP (dBm) | 31.76 | | |
| EIRP Limit (dBm) | 33.00 | | |
| EGPRS 1900 (1 Uplink slot) | 26.01 | 25.85 | 25.84 |
| EGPRS 1900 (2 Uplink slot) | 25.21 | 24.33 | 24.77 |
| EGPRS 1900 (3 Uplink slot) | 22.92 | 23.00 | 22.89 |
| EGPRS 1900 (4 Uplink slot) | 21.75 | 21.74 | 21.69 |
| Antenna Gain (dBi) | 1.23 | | |
| Max. EIRP (dBm) | 27.24 | | |
| EIRP Limit (dBm) | 33.00 | | |

*Note: EIRP (dBm) = Burst Average power (dBm) + Antenna Gain (dBi).*
*ERP (dBm) = EIRP (dBm) - 2.15 (dB).*

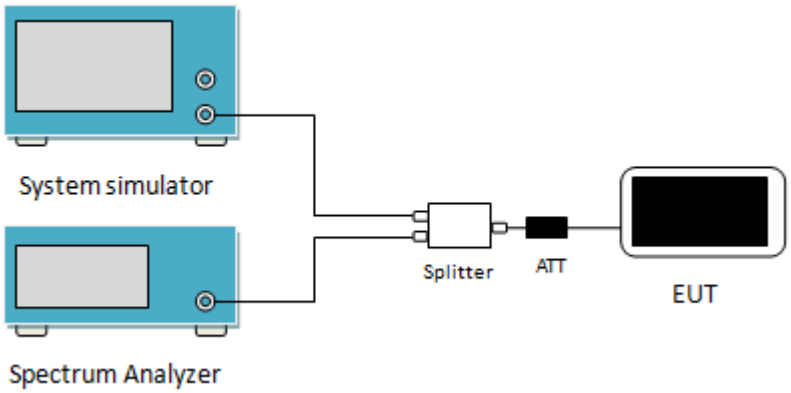
| EUT Mode | | Burst Average power (dBm) | | |
|---|---|---|---|---|
| | | 4132 | 4183 | 4233 |
| | | 826.40 (MHz) | 836.60 (MHz) | 846.60 (MHz) |
| UMTS 850 HSDPA | Subtest 1 | 21.81 | 21.78 | 21.68 |
| | Subtest 2 | 20.82 | 21.29 | 20.67 |
| | Subtest 3 | 20.08 | 20.21 | 20.04 |
| | Subtest 4 | 20.31 | 20.30 | 20.38 |
| UMTS 850 HSUPA | Subtest 1 | 20.22 | 20.86 | 20.77 |
| | Subtest 2 | 21.67 | 21.59 | 21.51 |
| | Subtest 3 | 20.03 | 20.54 | 20.36 |
| | Subtest 4 | 21.81 | 21.78 | 21.69 |
| | Subtest 5 | 20.23 | 20.84 | 21.02 |
| UMTS 850 RMC | 12.2kbps | 22.79 | 22.75 | 22.63 |
| UMTS 850 AMR | 12.2kbps | 22.78 | 22.74 | 22.62 |
| Antenna Gain (dBi) | | 0.89 | | |
| Max. ERP (dBm) | | 21.53 | | |
| ERP Limit (dBm) | | 38.45 | | |

| EUT Mode | | Burst Average power (dBm) | | |
|---|---|---|---|---|
| | | 9262 | 9400 | 9538 |
| | | 1852.40 (MHz) | 1880.00 (MHz) | 1907.60 (MHz) |
| UMTS 1900 HSDPA | Subtest 1 | 22.51 | 22.43 | 22.40 |
| | Subtest 2 | 21.47 | 21.83 | 21.97 |
| | Subtest 3 | 20.77 | 20.36 | 20.87 |
| | Subtest 4 | 21.17 | 21.20 | 20.73 |
| UMTS 1900 HSUPA | Subtest 1 | 20.84 | 22.18 | 21.59 |
| | Subtest 2 | 22.44 | 22.29 | 22.33 |
| | Subtest 3 | 20.65 | 20.93 | 21.01 |
| | Subtest 4 | 22.49 | 22.44 | 22.40 |
| | Subtest 5 | 21.26 | 21.78 | 21.81 |
| UMTS 1900 RMC | 12.2kbps | 23.46 | 23.36 | 23.39 |
| UMTS 1900 AMR | 12.2kbps | 23.29 | 23.28 | 23.38 |
| Antenna Gain (dBi) | | 1.23 | | |
| Max. EIRP (dBm) | | 24.69 | | |
| EIRP Limit (dBm) | | 33.00 | | |

*Note: EIRP (dBm) = Burst Average power (dBm) + Antenna Gain (dBi).*
*ERP (dBm) = EIRP (dBm) - 2.15 (dB).*

| EUT Mode | | Burst Average power (dBm) | | |
|---|---|---|---|---|
| | | 1312 | 1412 | 1513 |
| | | 1712.40 (MHz) | 1732.40 (MHz) | 1752.60 (MHz) |
| UMTS 1700 HSDPA | Subtest 1 | 22.42 | 22.54 | 22.46 |
| | Subtest 2 | 21.49 | 22.13 | 21.59 |
| | Subtest 3 | 21.07 | 20.78 | 20.57 |
| | Subtest 4 | 21.12 | 20.97 | 21.01 |
| UMTS 1700 HSUPA | Subtest 1 | 20.70 | 22.21 | 22.00 |
| | Subtest 2 | 22.31 | 22.51 | 22.42 |
| | Subtest 3 | 20.60 | 21.25 | 20.99 |
| | Subtest 4 | 22.41 | 22.55 | 22.47 |
| | Subtest 5 | 20.92 | 21.98 | 21.78 |
| UMTS 1700 RMC | 12.2kbps | 23.39 | 23.51 | 23.44 |
| UMTS 1700 AMR | 12.2kbps | 23.38 | 23.37 | 23.41 |
| Antenna Gain (dBi) | | 1.15 | | |
| Max. EIRP (dBm) | | 24.66 | | |
| EIRP Limit (dBm) | | 30.00 | | |
| *Note: EIRP (dBm) = Burst Average power (dBm) + Antenna Gain (dBi).* | | | | |

## 6.2 Peak-to-Average Power Ratio

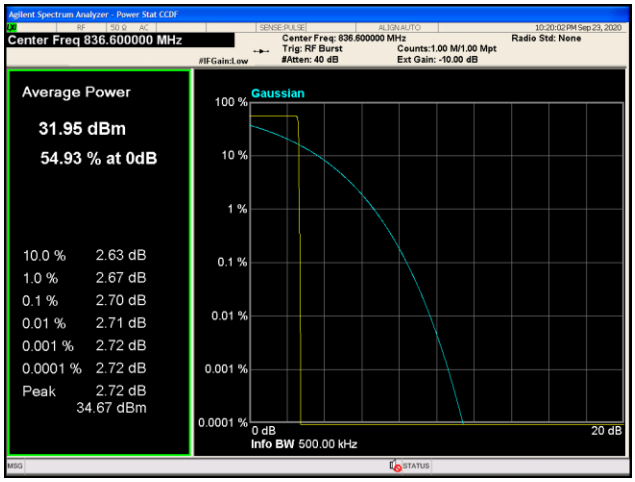
| | |
|---|---|
| Test Requirement: | FCC part 24.232(d), FCC part 27.50(d)(5) |
| Limit: | The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB. |
| Test setup: |  |
| Test Procedure: | 1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.<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 5.9 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

| Modulation | Test channel | PAPR |
|---|---|---|
| GSM 850 | 190 | 2.70 |
| EGPRS 850 | 190 | 9.02 |
| PCS 1900 | 661 | 2.69 |
| EGPRS 1900 | 661 | 6.99 |
| UMTS 850 RMC | 4183 | 2.79 |
| UMTS 1900 RMC | 9400 | 2.97 |
| UMTS1700 RMC | 1413 | 2.71 |

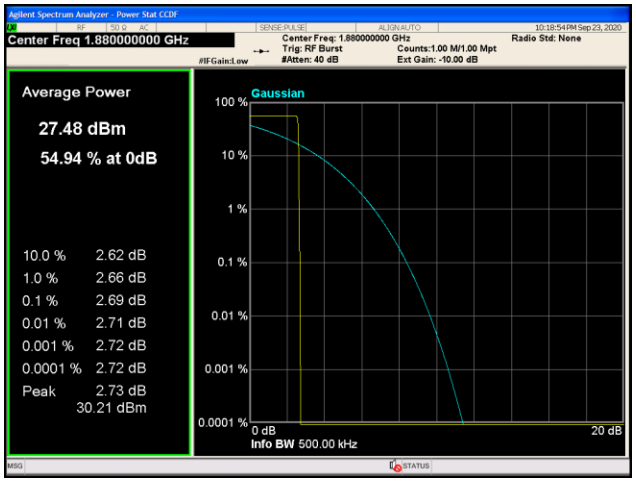
**Test plots as below:**

**GSM 850**



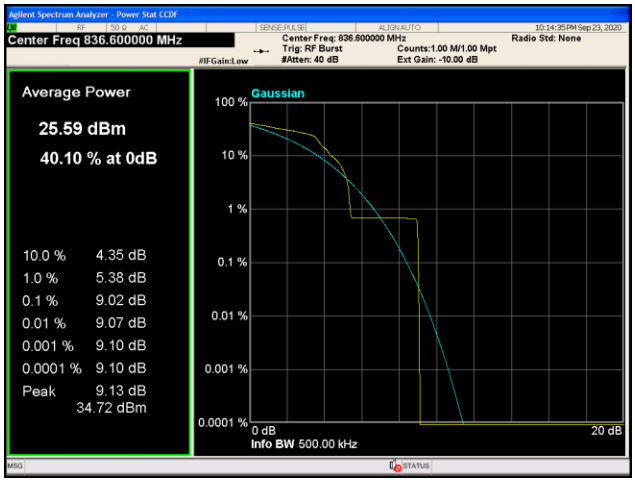

Middle channel

**PCS 1900**



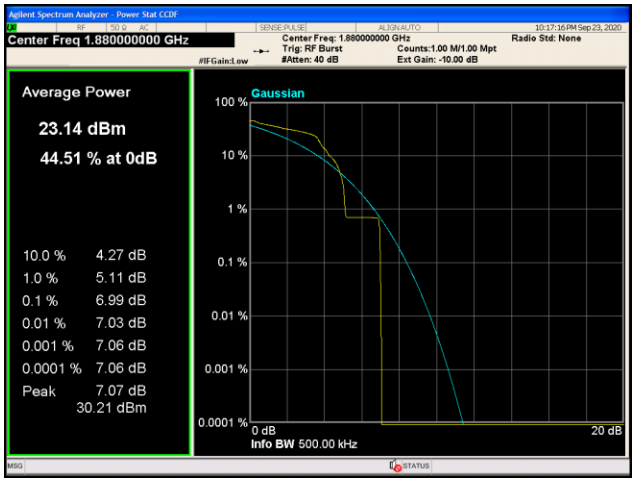

Middle channel

**EGPRS 850**



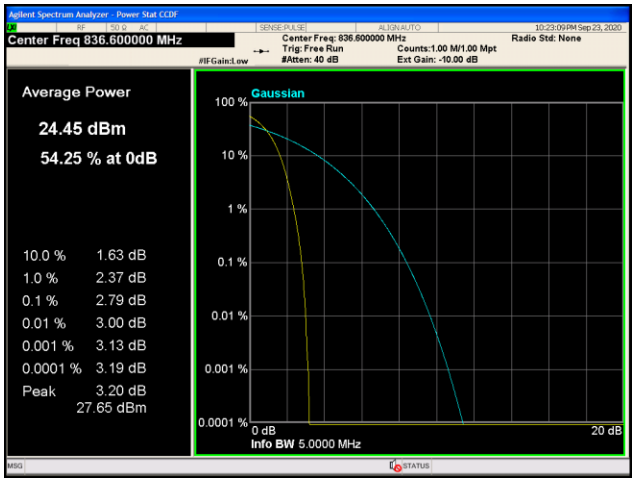

Middle channel

**EGPRS 1900**



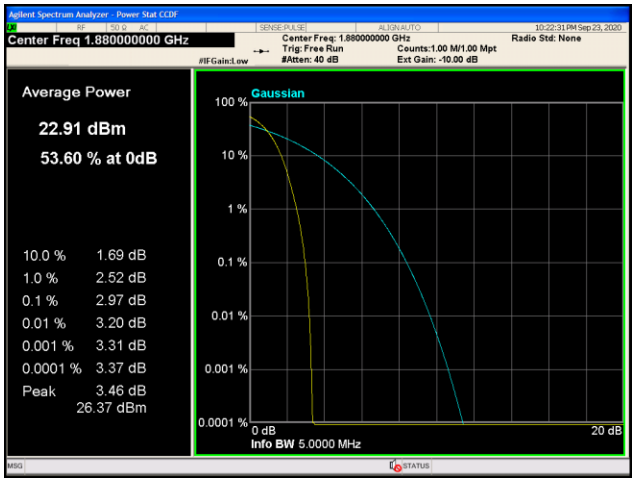

Middle channel

**UMTS 850 RMC**



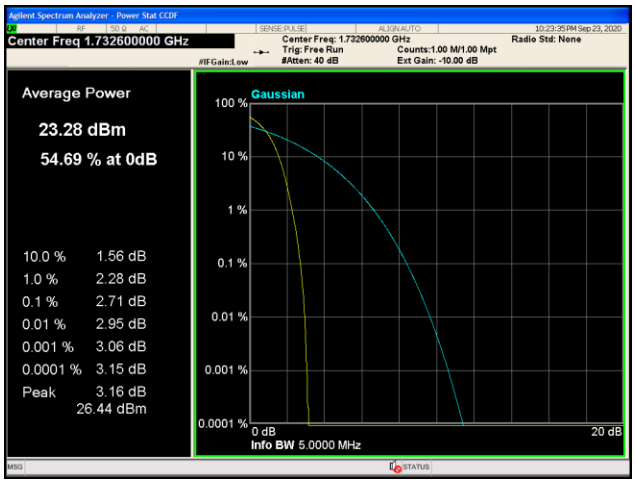

Middle channel

**UMTS 1900 RMC**



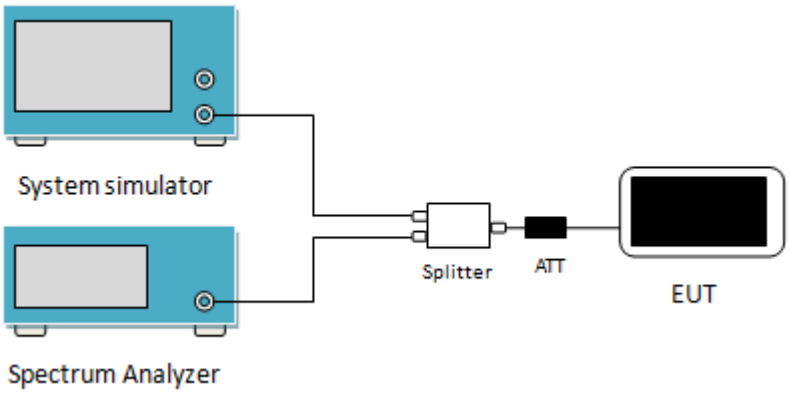

Middle channel

**UMTS1700 RMC**




Middle channel

## 6.3 Occupy Bandwidth

| | |
|---|---|
| Test Requirement: | FCC part 22.917(b), FCC part 24.238(b), FCC Part 27.53(h) |
| 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 5.9 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

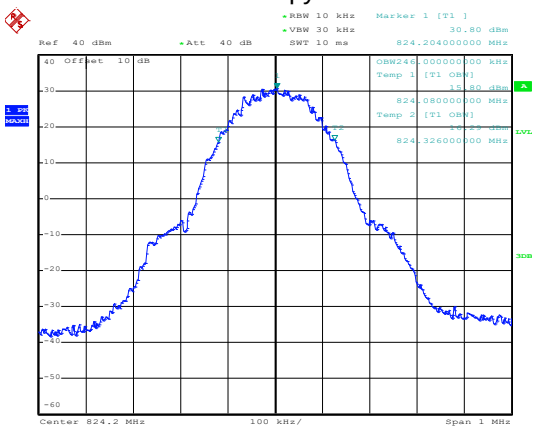
**Measurement Data:**

| EUT Mode | Channel | Frequency (MHz) | 99% Occupy bandwidth (kHz) | -26dB bandwidth (kHz) |
|---|---|---|---|---|
| GSM 850 | 128 | 824.2 | 246 | 322 |
| | 190 | 836.6 | 246 | 318 |
| | 251 | 848.8 | 246 | 318 |
| EGPRS850 | 128 | 824.2 | 244 | 318 |
| | 190 | 836.6 | 250 | 310 |
| | 251 | 848.8 | 246 | 318 |
| PCS 1900 | 512 | 1850.2 | 244 | 322 |
| | 661 | 1880.0 | 242 | 316 |
| | 810 | 1909.8 | 246 | 318 |
| EGPRS1900 | 512 | 1850.2 | 256 | 328 |
| | 661 | 1880.0 | 256 | 312 |
| | 810 | 1909.8 | 254 | 322 |
| UMTS 850 12.2k RMC | 4132 | 826.4 | 4200 | 4740 |
| | 4183 | 836.6 | 4220 | 4760 |
| | 4233 | 846.6 | 4220 | 4800 |
| UMTS 1900 12.2k RMC | 9262 | 1852.4 | 4200 | 4720 |
| | 9400 | 1880.0 | 4180 | 4780 |
| | 9538 | 1907.6 | 4200 | 4760 |
| UMTS 1700 12.2k RMC | 1312 | 1712.40 | 4180 | 4700 |
| | 1413 | 1732.60 | 4220 | 4740 |
| | 1513 | 1752.60 | 4200 | 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**

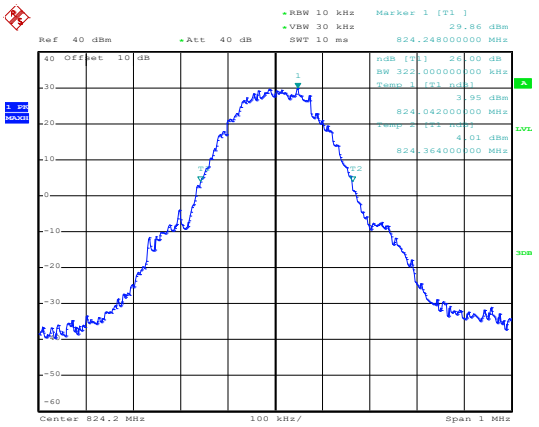
99% Occupy bandwidth




Date: 18.SEP.2020 09:10:03

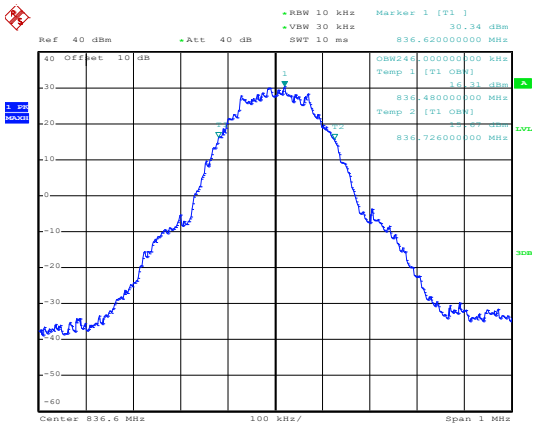
Lowest channel

26dB Emission Bandwidth



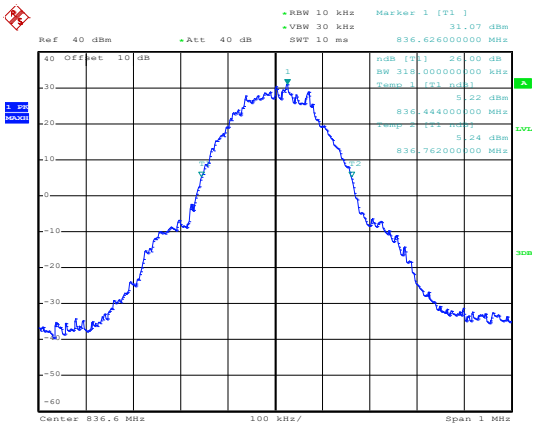

Date: 18.SEP.2020 09:10:22

Lowest channel



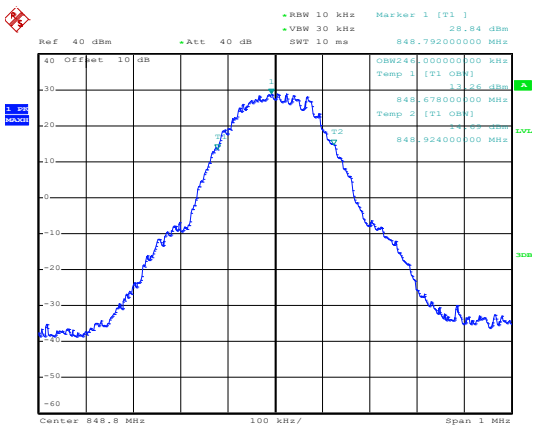

Date: 18.SEP.2020 09:11:15

Middle channel



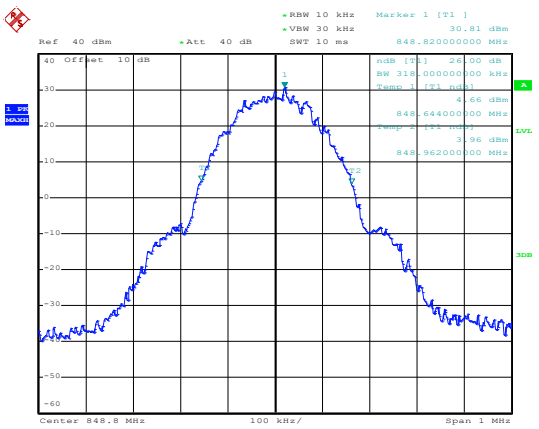

Date: 18.SEP.2020 09:10:45

Middle channel




Date: 18.SEP.2020 09:11:38

Highest channel

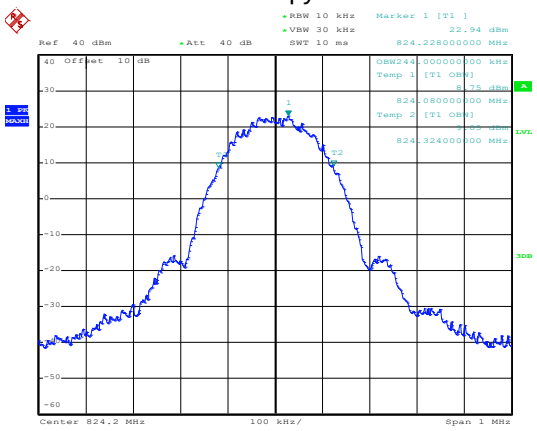



Date: 18.SEP.2020 09:11:52

Highest channel

## EGPRS 850

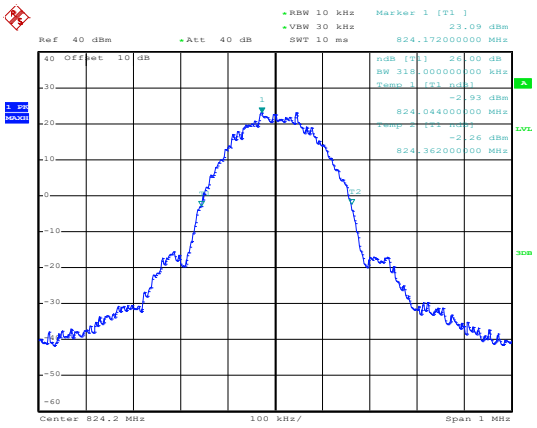
99% Occupy bandwidth




Date: 18.SEP.2020 09:24:15

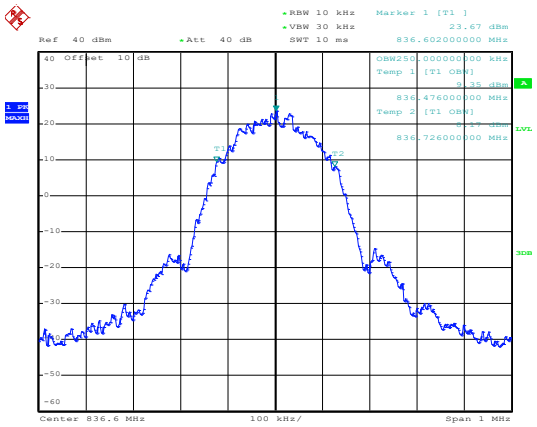
Lowest channel

26dB Emission Bandwidth



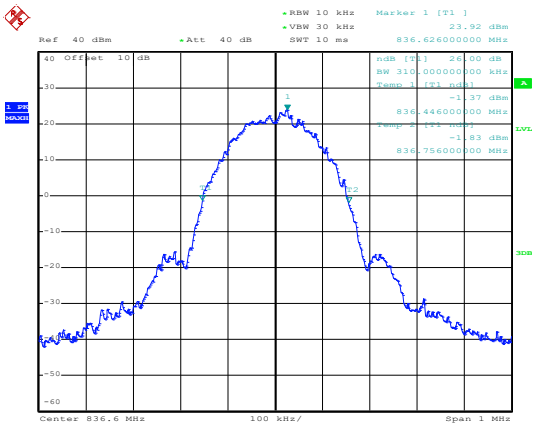

Date: 18.SEP.2020 09:23:46

Lowest channel



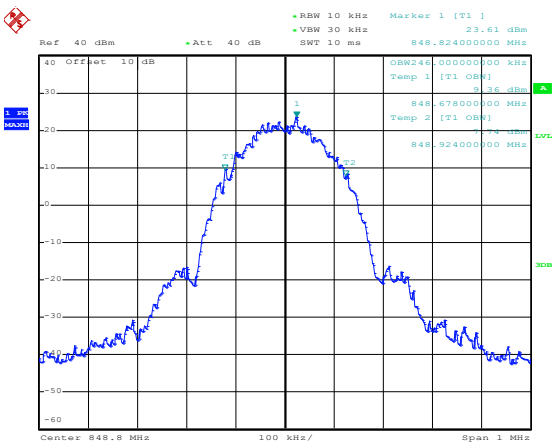

Date: 18.SEP.2020 09:24:32

Middle channel



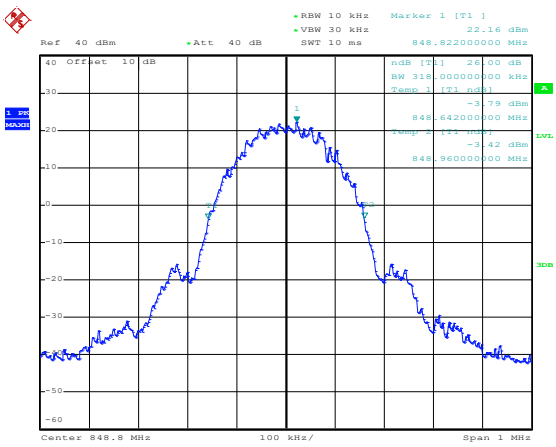

Date: 18.SEP.2020 09:24:54

Middle channel




Date: 18.SEP.2020 09:25:25

Highest channel

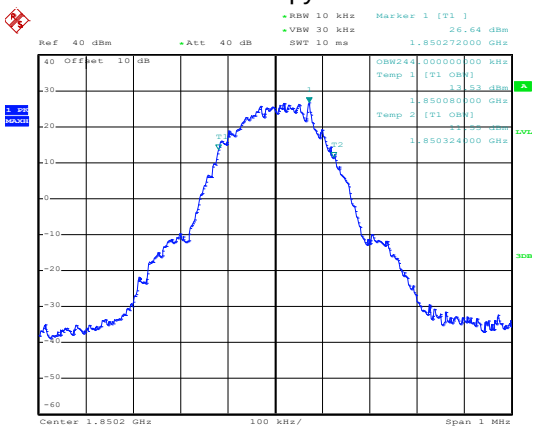



Date: 18.SEP.2020 09:25:12

Highest channel

## PCS 1900

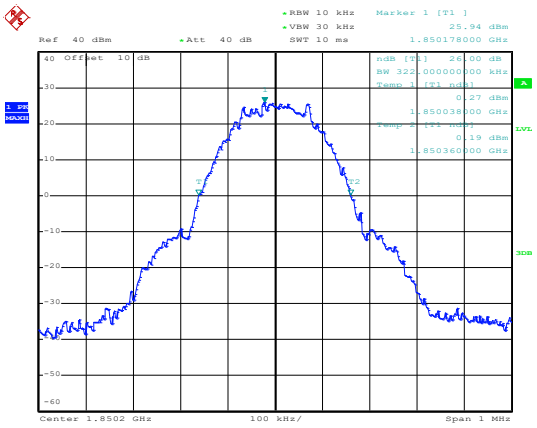
99% Occupy bandwidth




Date: 18.SEP.2020 09:19:03

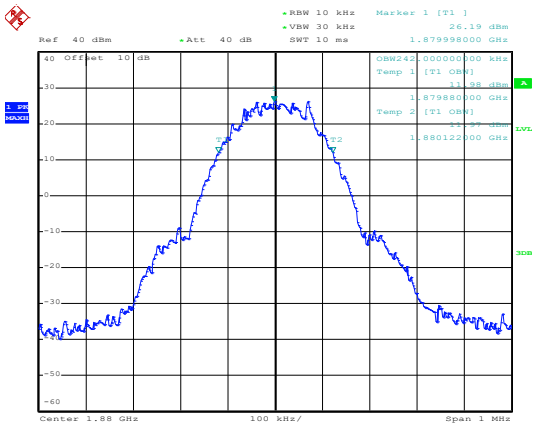
Lowest channel

26dB Emission Bandwidth



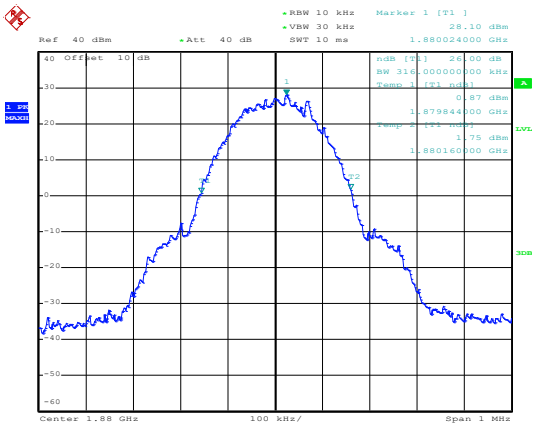

Date: 18.SEP.2020 09:19:32

Lowest channel



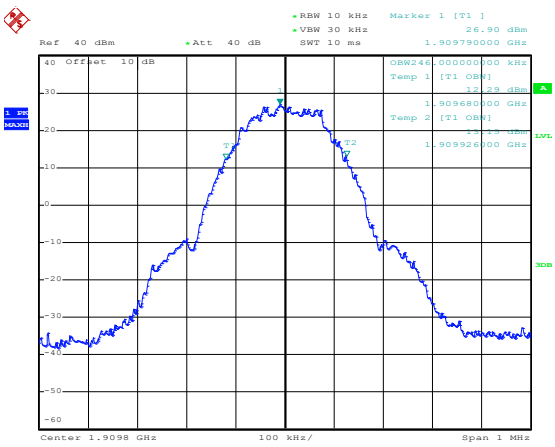

Date: 18.SEP.2020 09:20:48

Middle channel



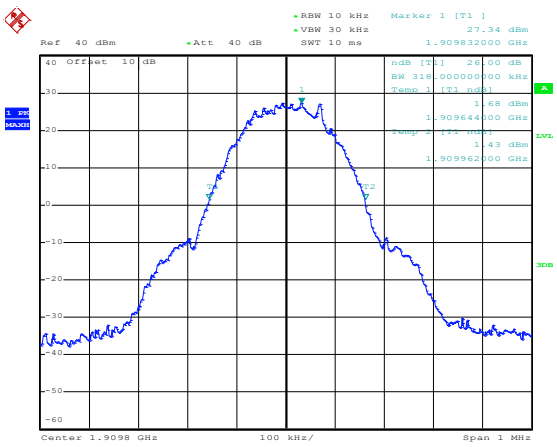

Date: 18.SEP.2020 09:20:32

Middle channel




Date: 18.SEP.2020 09:21:28

Highest channel

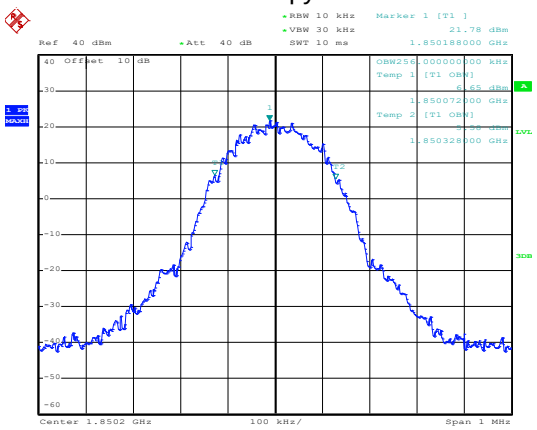



Date: 18.SEP.2020 09:22:22

Highest channel

## EGPRS 1900

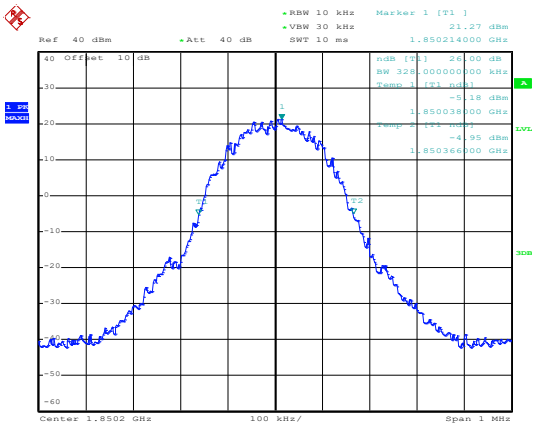
99% Occupy bandwidth




Date: 18.SEP.2020 09:29:36

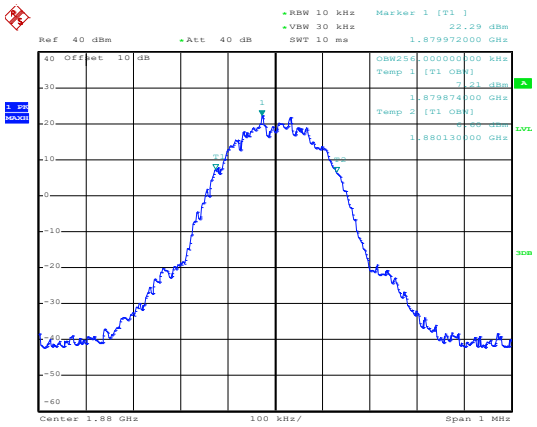
Lowest channel

26dB Emission Bandwidth



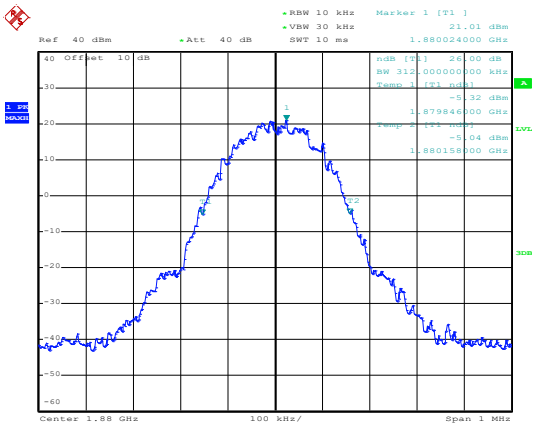

Date: 18.SEP.2020 09:29:48

Lowest channel



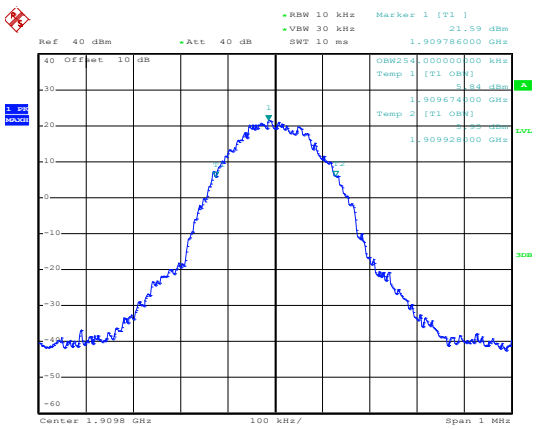

Date: 18.SEP.2020 09:29:22

Middle channel



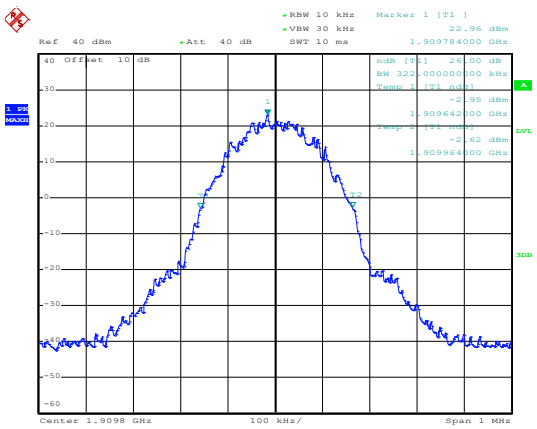

Date: 18.SEP.2020 09:29:11

Middle channel




Date: 18.SEP.2020 09:28:46

Highest channel

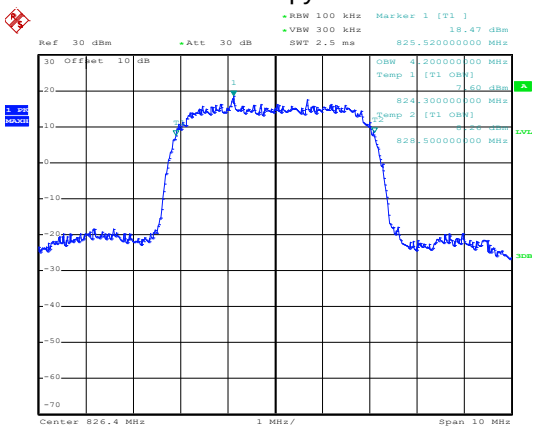



Date: 18.SEP.2020 09:29:00

Highest channel

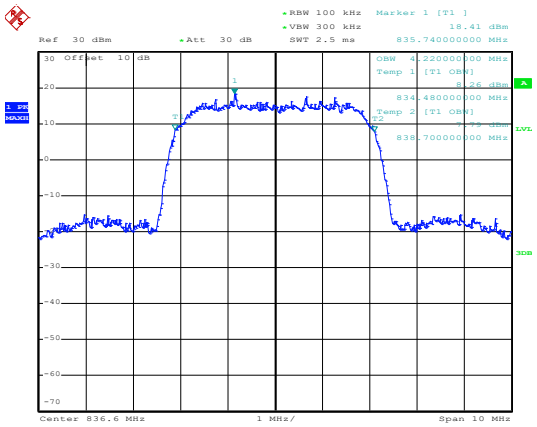
**UMTS 850 12.2k RMC**

99% Occupy bandwidth



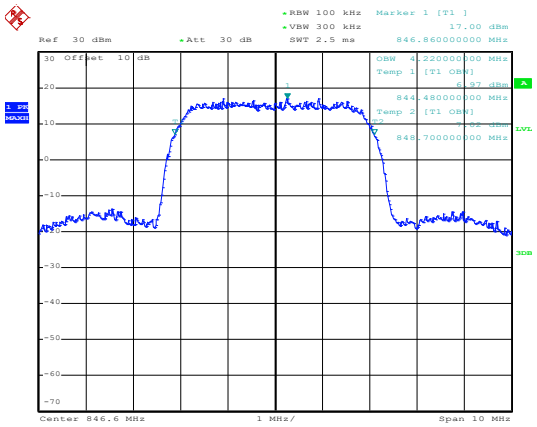

Date: 18.SEP.2020 09:55:28

Lowest channel




Date: 18.SEP.2020 09:55:16

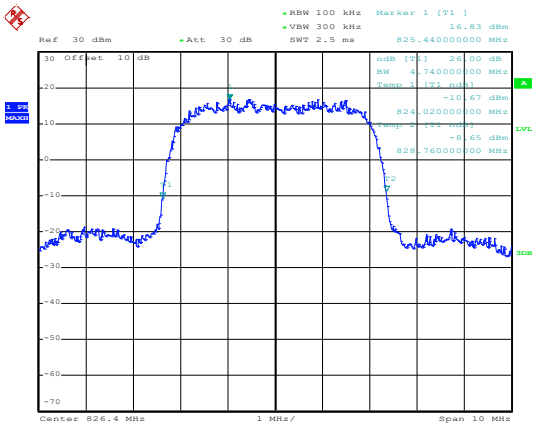
Middle channel




Date: 18.SEP.2020 09:54:51

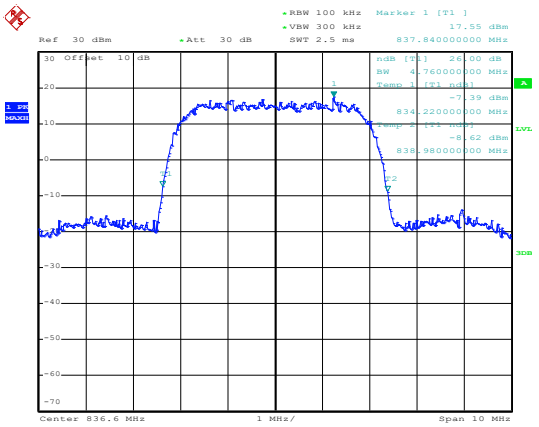
Highest channel

26dB Emission Bandwidth



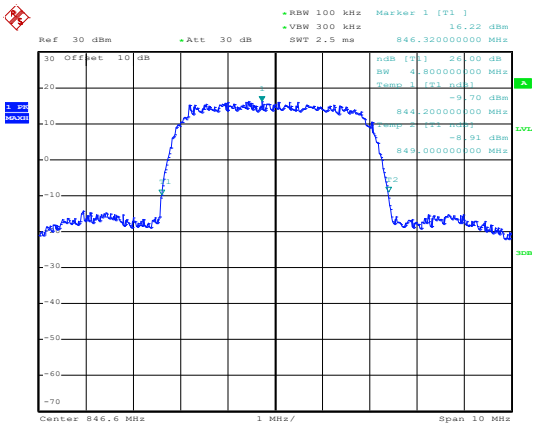

Date: 18.SEP.2020 09:55:33

Lowest channel




Date: 18.SEP.2020 09:55:10

Middle channel

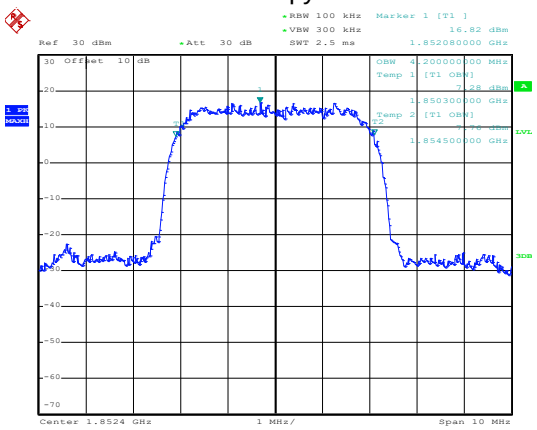



Date: 18.SEP.2020 09:54:58

Highest channel

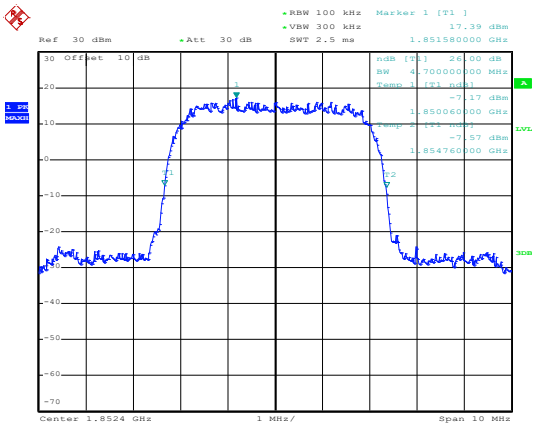
**UMTS 1900 12.2k RMC**

99% Occupy bandwidth




Date: 18.SEP.2020 09:41:45

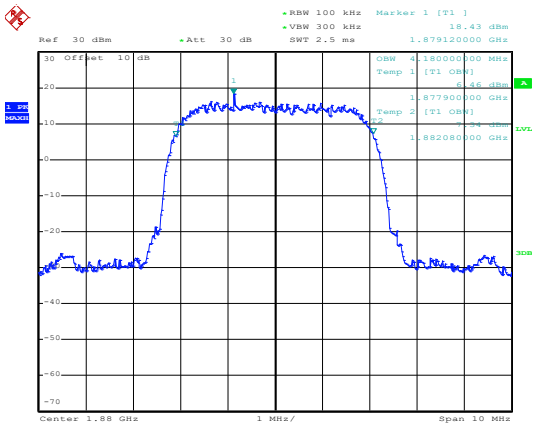
26dB Emission Bandwidth



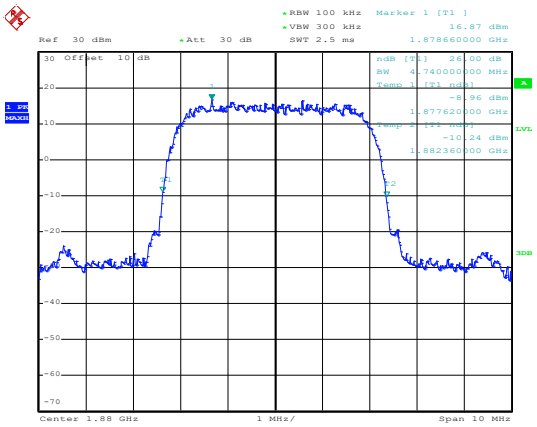

Date: 18.SEP.2020 09:41:39

Lowest channel

Lowest channel



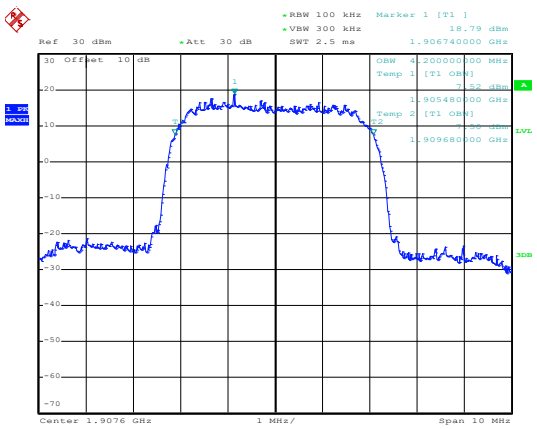

Date: 18.SEP.2020 09:41:24



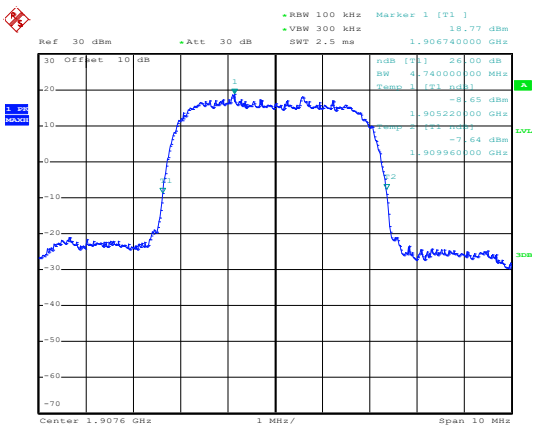

Date: 18.SEP.2020 09:41:30

Middle channel

Middle channel




Date: 18.SEP.2020 09:41:12



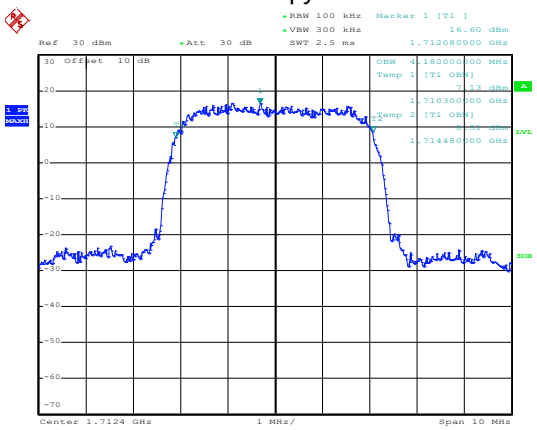

Date: 18.SEP.2020 09:41:04

Highest channel

Highest channel

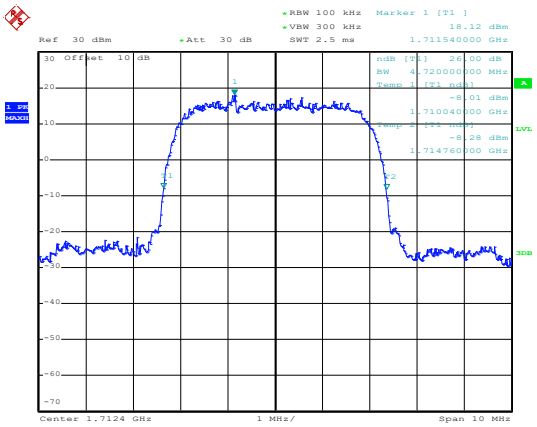
## UMTS 1700 12.2k RMC

### 99% Occupy bandwidth




Date: 18.SEP.2020 09:42:27

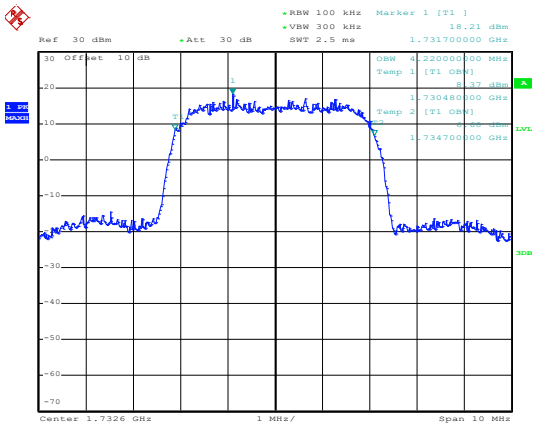
### 26dB Emission Bandwidth



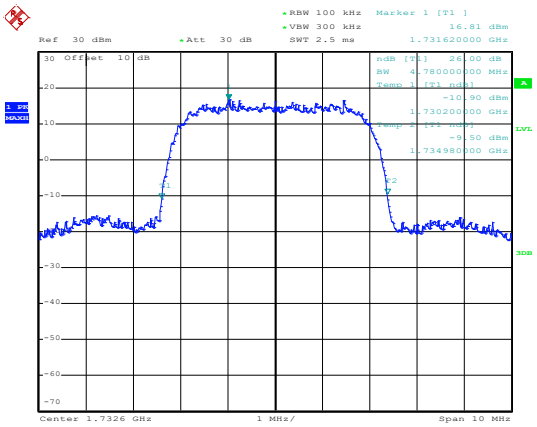

Date: 18.SEP.2020 09:42:21

### Lowest channel

### Lowest channel



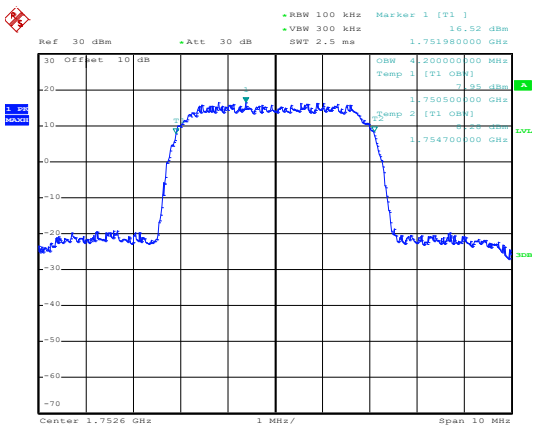

Date: 18.SEP.2020 09:42:36



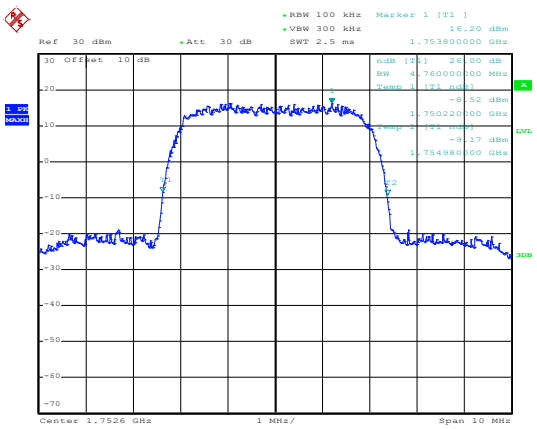

Date: 18.SEP.2020 09:42:42

### Middle channel

### Middle channel




Date: 18.SEP.2020 09:43:02




Date: 18.SEP.2020 09:42:54

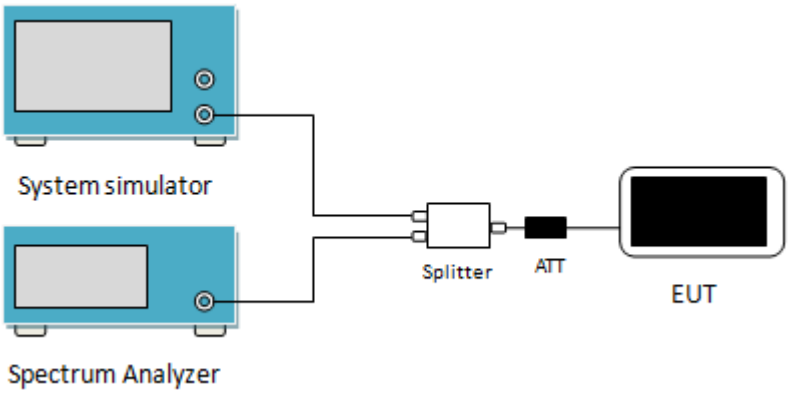
### Highest channel

### Highest channel

## 6.4 Modulation Characteristic

According to FCC § 2.1047(d), Part 22H & 24E & 27L there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

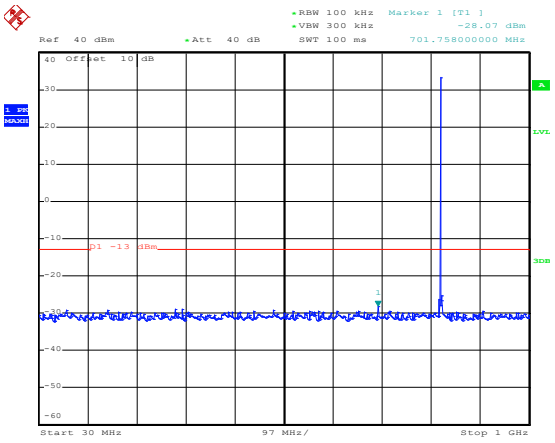
## 6.5 Out of band emission at antenna terminals

| | |
|---|---|
| Test Requirement: | FCC part 22.917(a), FCC part 24.238(a), FCC Part 27.53 (h) |
| Limit: | -13dBm |
| Test setup: |  |
| Test Procedure: | 1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.<br>2 For the out of band: For GSM850&WCDMA850 set the RBW=100 kHz, VBW=300 kHz and for PCS1900 & WCDMA1900 set the RBW=1MHz, VBW=3MHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic.<br>3 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 5.9 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

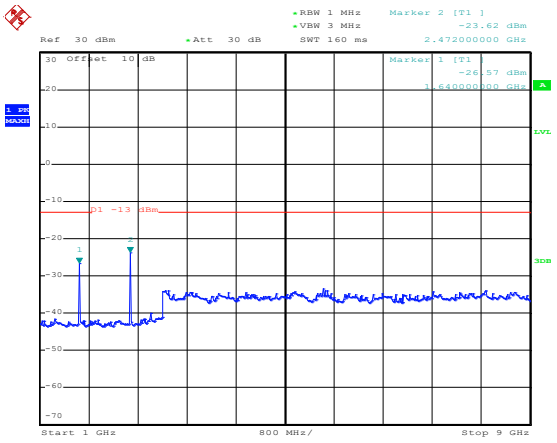
**Test plots as follows (Spurious emission):**

**GSM 850**

Lowest Channel

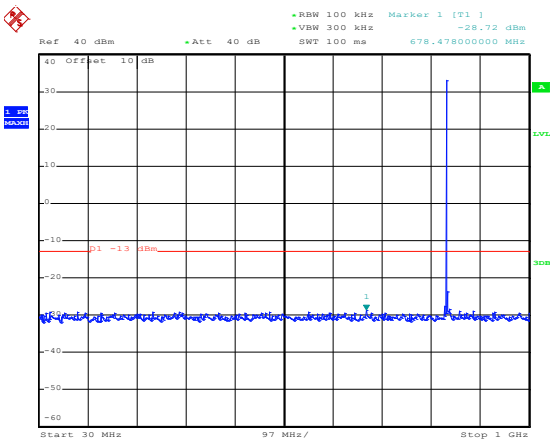



Date: 18.SEP.2020 09:13:54

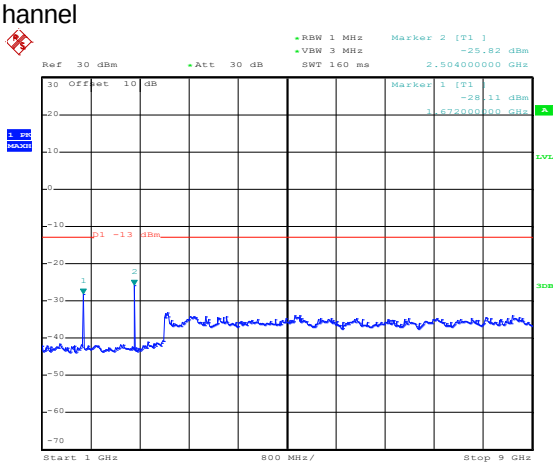



Date: 18.SEP.2020 09:14:26

Middle channel

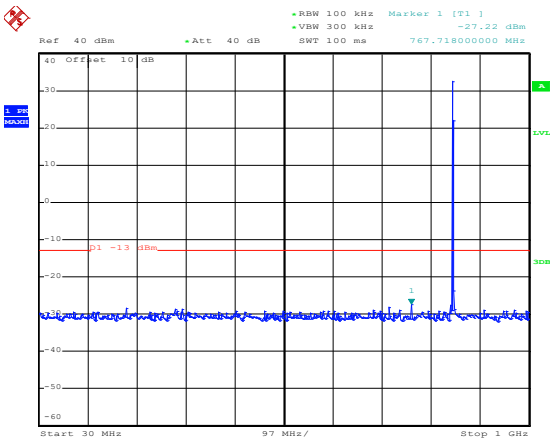



Date: 18.SEP.2020 09:13:40

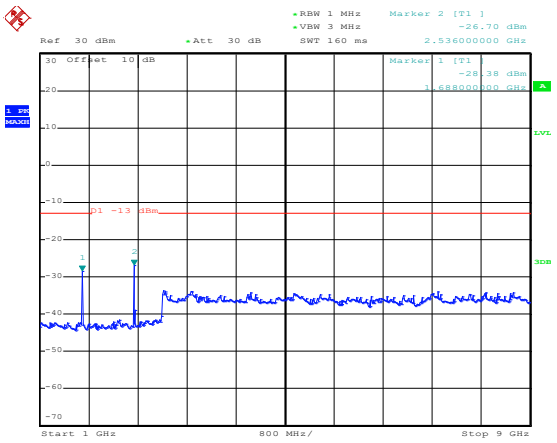



Date: 18.SEP.2020 09:14:51

Highest Channel



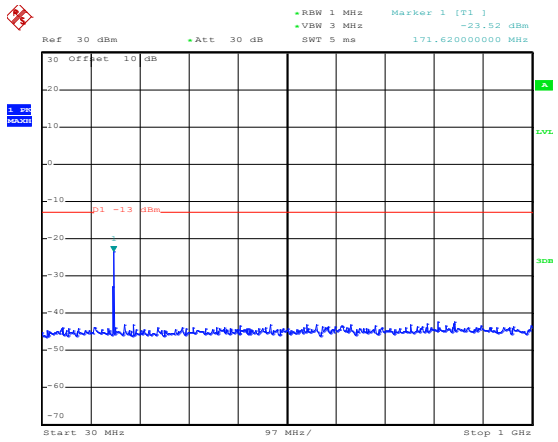

Date: 18.SEP.2020 09:13:18



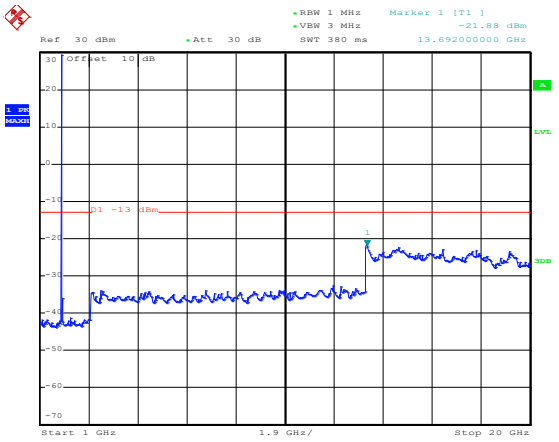

Date: 18.SEP.2020 09:15:06

## PCS 1900

### Lowest Channel

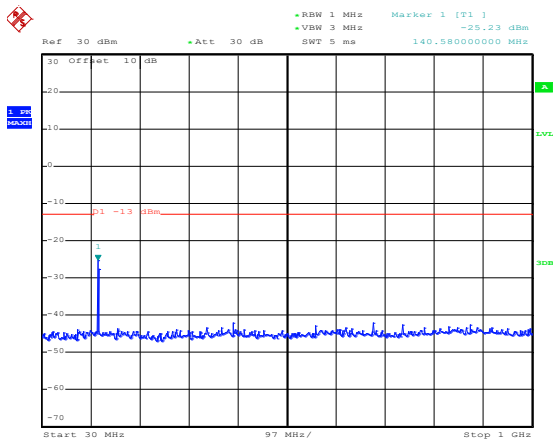



Date: 18.SEP.2020 09:17:05

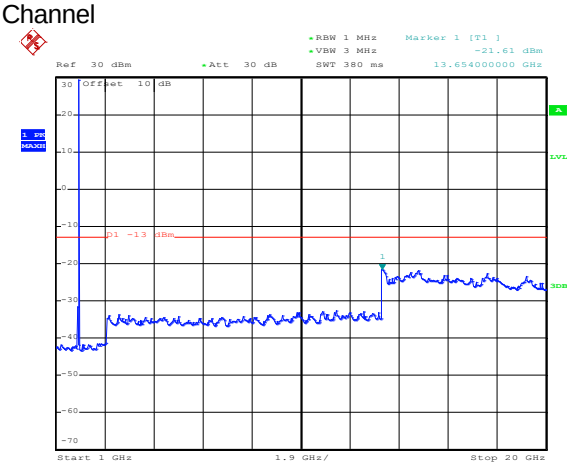



Date: 18.SEP.2020 09:15:48

### Middle Channel

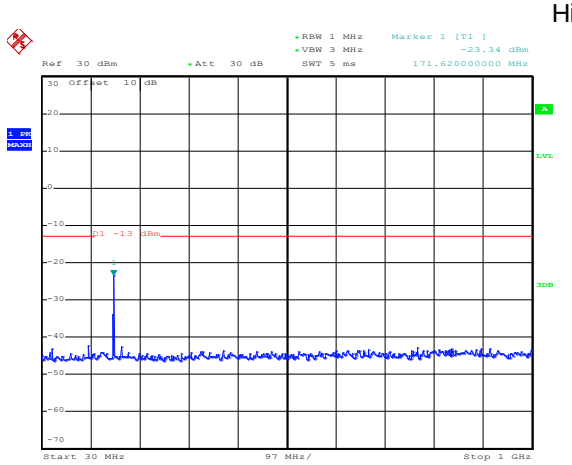



Date: 18.SEP.2020 09:16:54

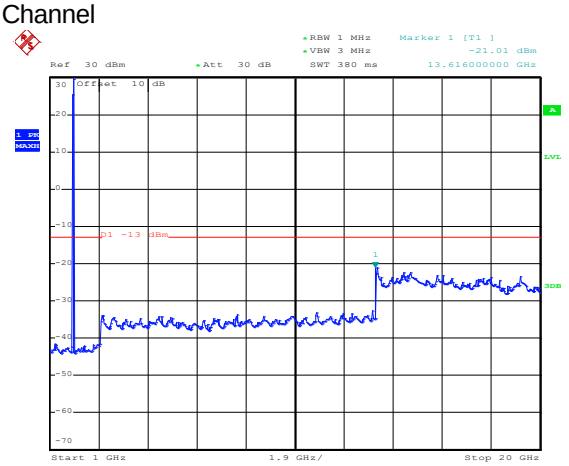



Date: 18.SEP.2020 09:16:24

### Highest Channel



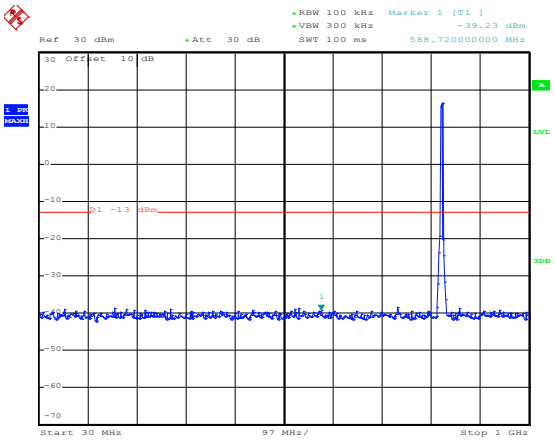

Date: 18.SEP.2020 09:16:45



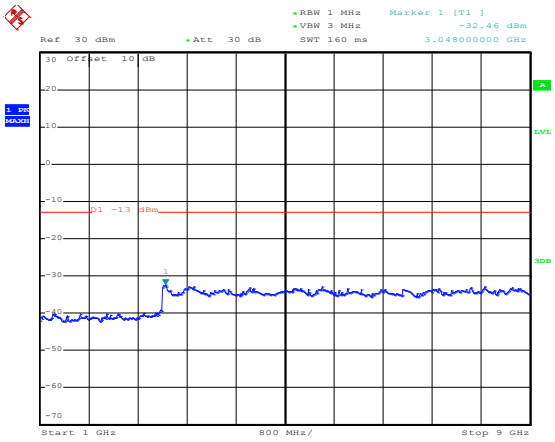

Date: 18.SEP.2020 09:16:35

## UMTS 850 12.2k RMC

### Lowest Channel

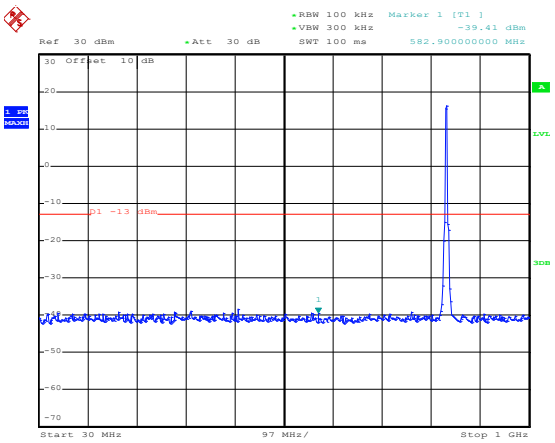



Date: 18.SEP.2020 10:00:57

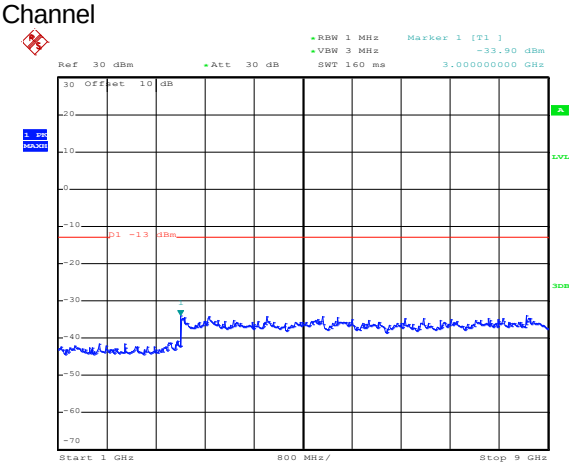



Date: 18.SEP.2020 10:41:14

### Middle Channel

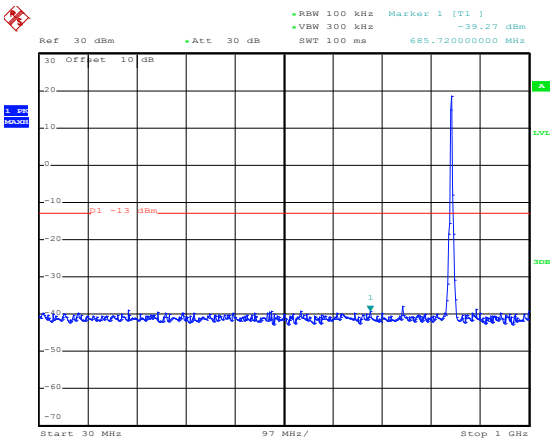



Date: 18.SEP.2020 10:01:10

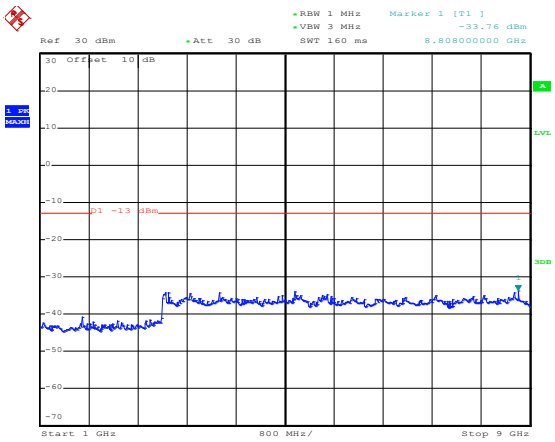



Date: 18.SEP.2020 10:01:42

### Highest Channel



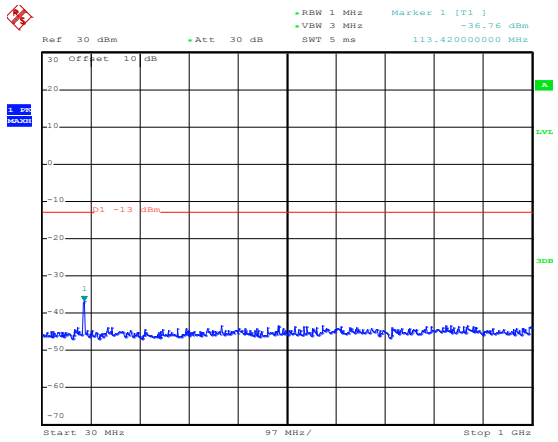

Date: 18.SEP.2020 10:01:19



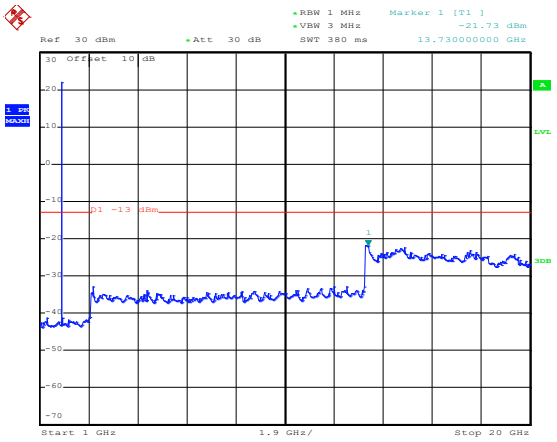

Date: 18.SEP.2020 10:01:32

## UMTS 1900 12.2k RMC

### Lowest Channel

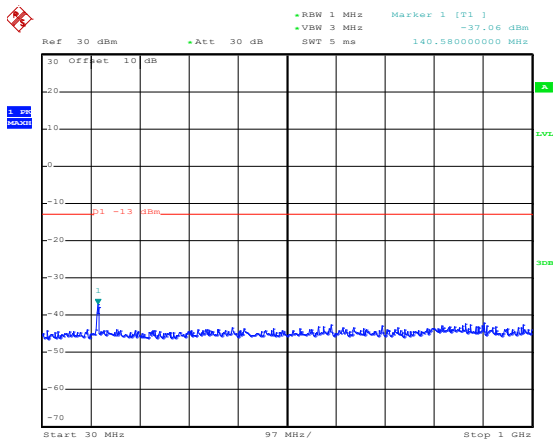



Date: 18.SEP.2020 09:58:19

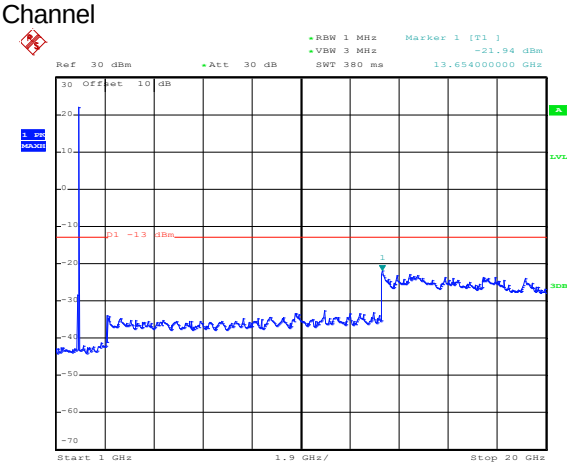



Date: 18.SEP.2020 09:58:42

### Middle Channel

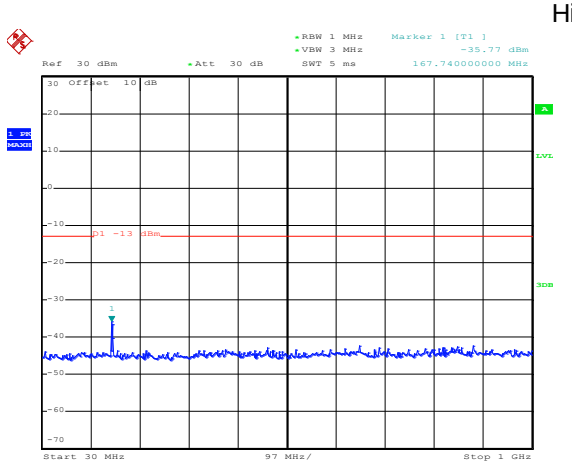



Date: 18.SEP.2020 09:58:11

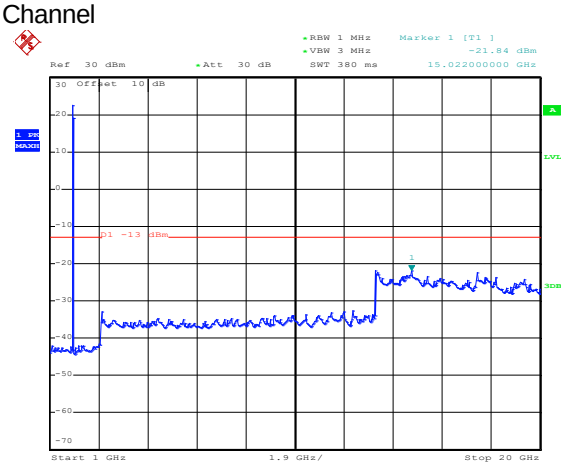



Date: 18.SEP.2020 09:58:58

### Highest Channel



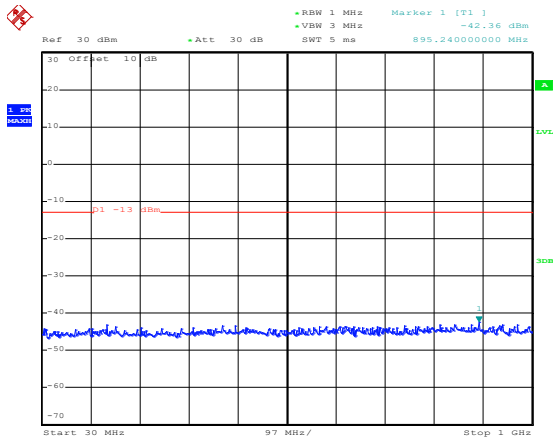

Date: 18.SEP.2020 09:57:55



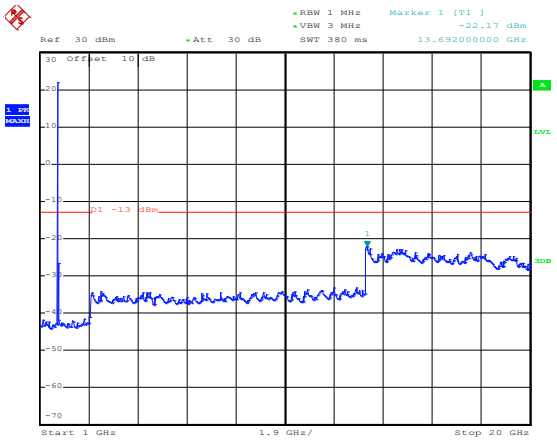

Date: 18.SEP.2020 09:59:13

## UMTS 1700 12.2k RMC

### Lowest Channel

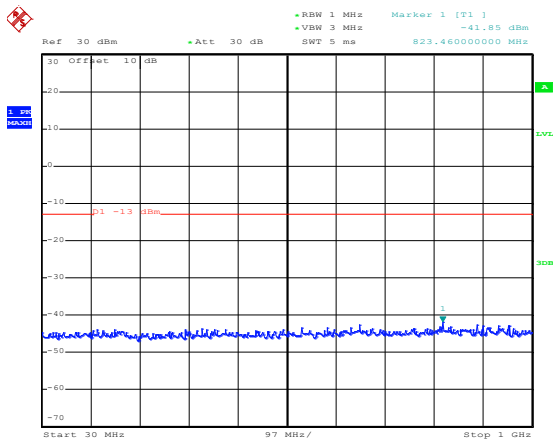



Date: 18.SEP.2020 10:00:33

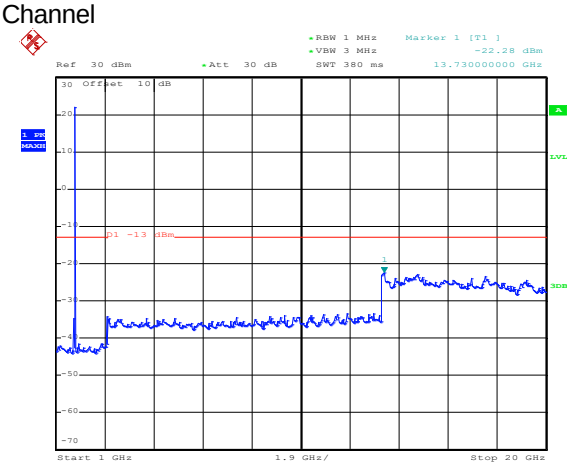



Date: 18.SEP.2020 09:59:32

### Middle Channel

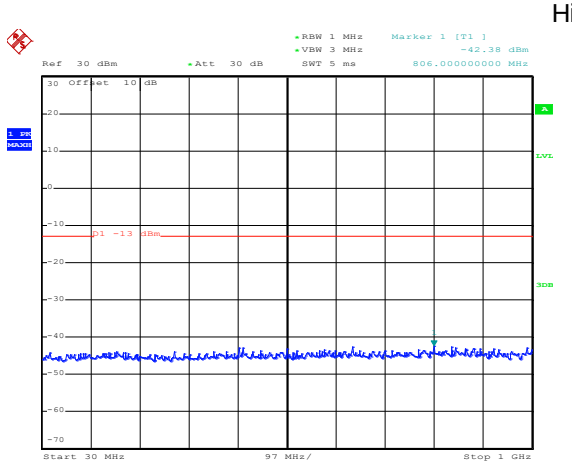



Date: 18.SEP.2020 10:00:23

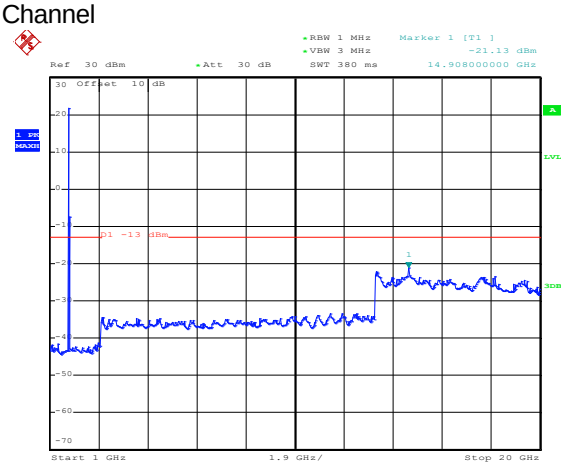



Date: 18.SEP.2020 09:59:43

### Highest Channel



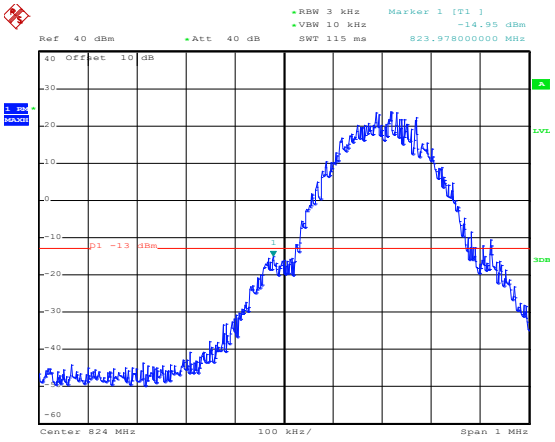

Date: 18.SEP.2020 10:00:12



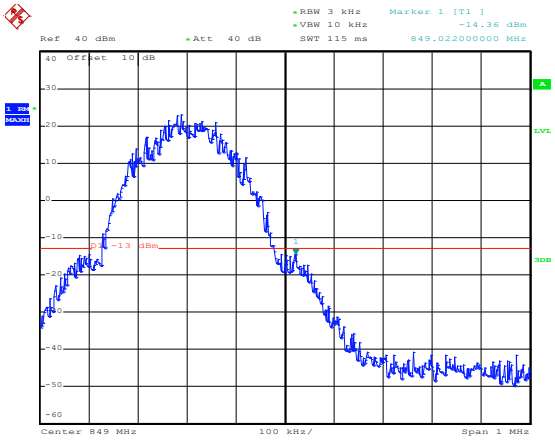

Date: 18.SEP.2020 09:59:58

**Band edge emission:**

**GSM850**

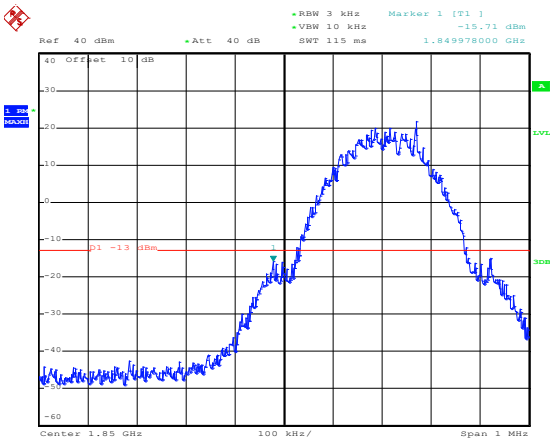



Lowest channel

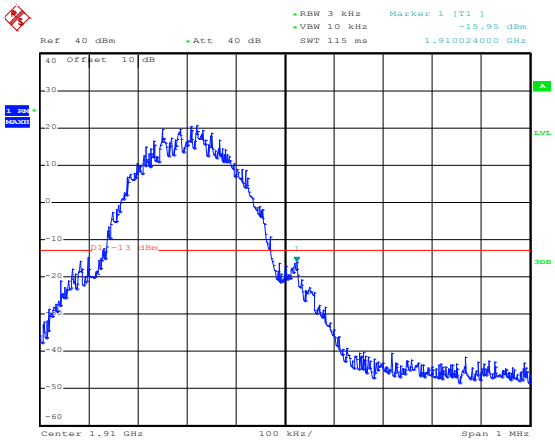



Highest channel

**PCS1900**

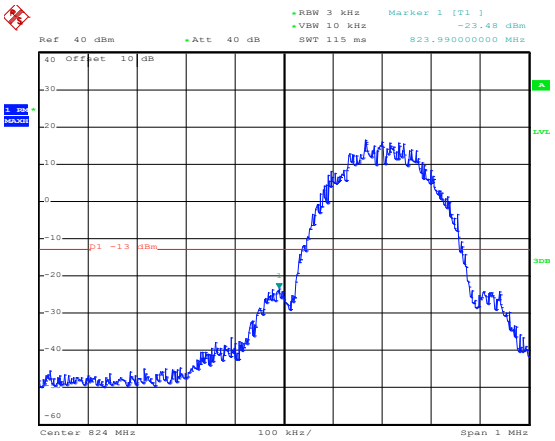



Lowest channel



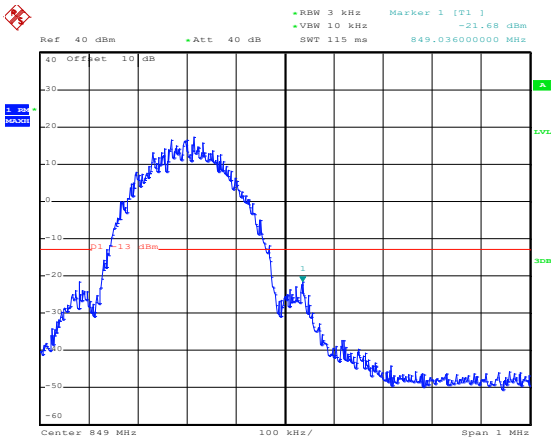

Highest channel

**EGPRS850**




Date: 18.SEP.2020 09:26:31

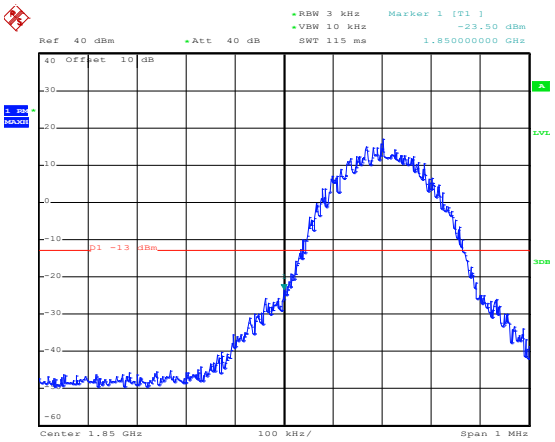
Lowest channel




Date: 18.SEP.2020 09:25:57

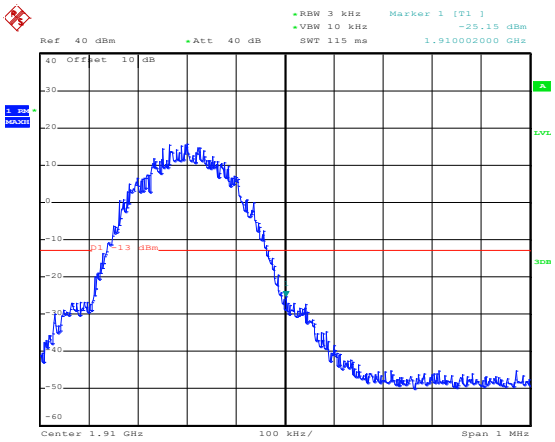
Highest channel

**EGPRS1900**




Date: 18.SEP.2020 09:27:55

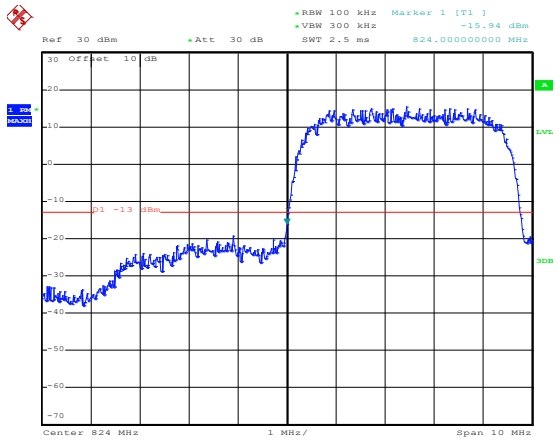
Lowest channel




Date: 18.SEP.2020 09:28:17

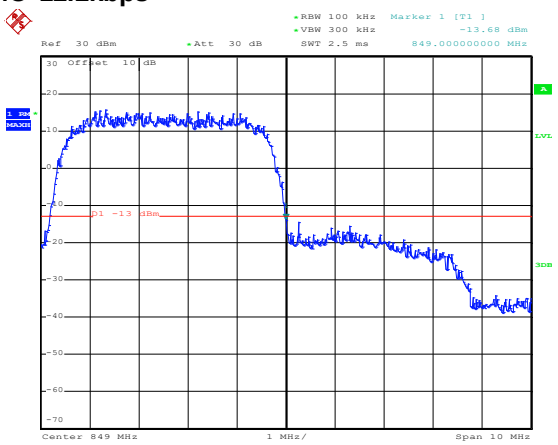
Highest channel

**UMTS 850 RMC 12.2kbps**




Date: 18.SEP.2020 09:56:03

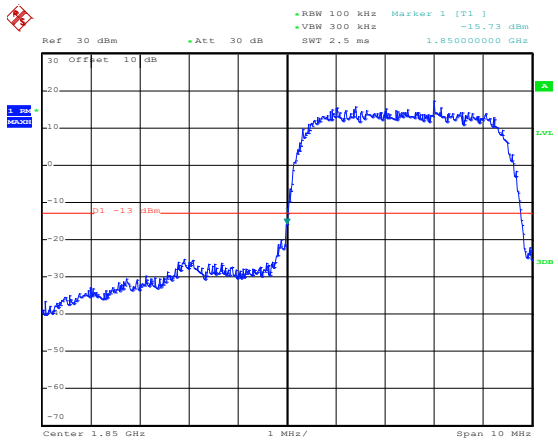
Lowest channel




Date: 18.SEP.2020 09:56:28

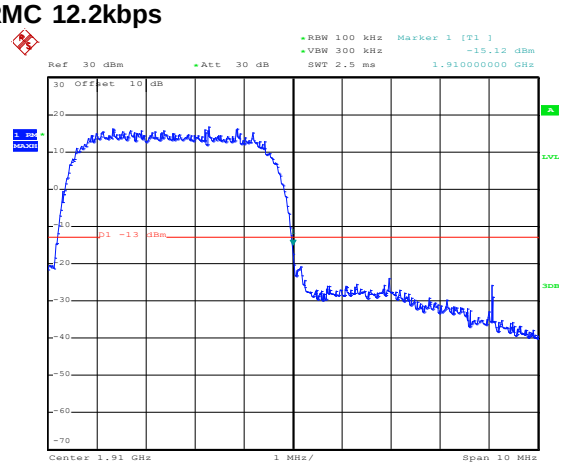
Highest channel

**UMTS 1900 RMC 12.2kbps**




Date: 18.SEP.2020 09:57:20

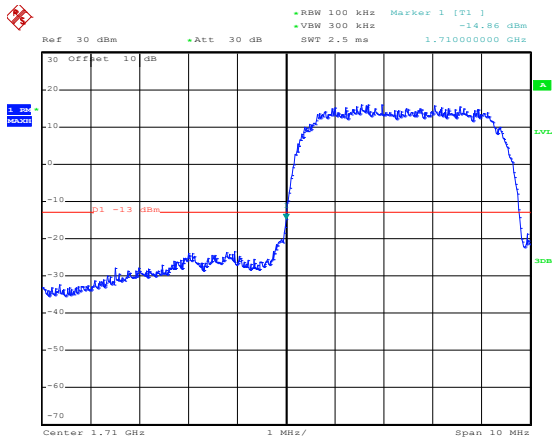
Lowest channel




Date: 18.SEP.2020 09:57:35

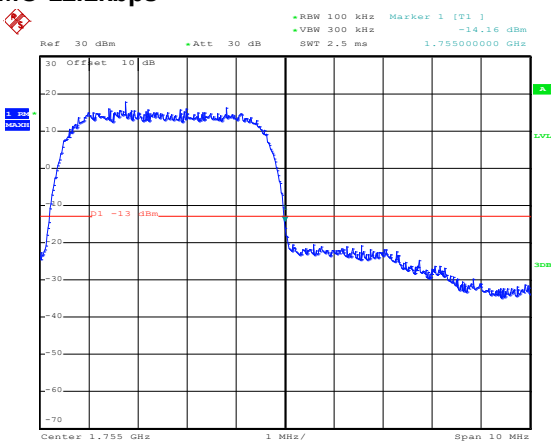
Highest channel

**UMTS 1700 RMC 12.2kbps**




Date: 18.SEP.2020 09:57:00

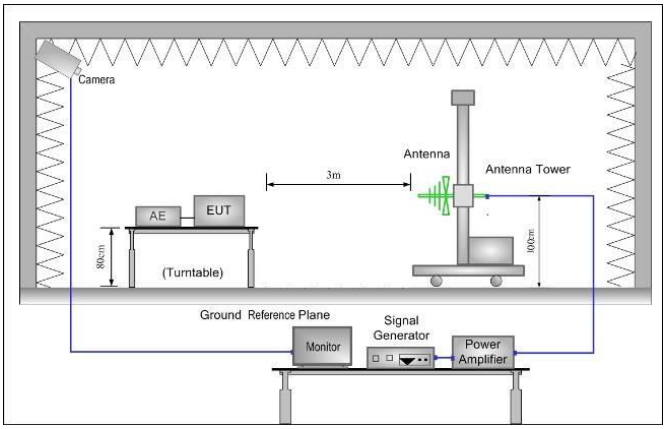
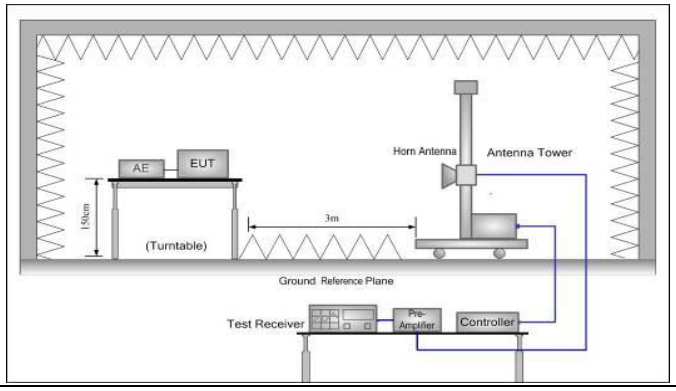
Lowest channel




Date: 18.SEP.2020 09:56:51

Highest channel

## 6.6 Field strength of spurious radiation measurement

| | |
|---|---|
| Test Requirement: | FCC part 22.917(a), FCC part 24.238(a), FCC part 27.53(h) |
| Limit: | -13dBm |
| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
| Test Procedure: | 1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. 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 5.9 for details |
| Test mode: | Refer to section 5.3 for details. |
| Test results: | Passed |

**Measurement Data (worst case):**

| GSM850 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lowest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1648.40 | -61.82 | 9.57 | 0.19 | -52.44 | -13.00 | -39.44 | Vertical |
| 2472.60 | -54.45 | 10.86 | 0.42 | -44.01 | -13.00 | -31.01 | Vertical |
| 3296.80 | -53.15 | 10.49 | 0.64 | -43.30 | -13.00 | -30.30 | Vertical |
| 1648.40 | -60.76 | 9.57 | 0.19 | -51.38 | -13.00 | -38.38 | Horizontal |
| 2472.60 | -56.61 | 10.86 | 0.42 | -46.17 | -13.00 | -33.17 | Horizontal |
| 3296.80 | -53.16 | 10.49 | 0.64 | -43.31 | -13.00 | -30.31 | Horizontal |
| **Middle channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1673.20 | -61.46 | 9.66 | 0.21 | -52.01 | -13.00 | -39.01 | Vertical |
| 2509.80 | -54.42 | 10.91 | 0.46 | -43.97 | -13.00 | -30.97 | Vertical |
| 3346.40 | -54.96 | 12.09 | 0.66 | -43.53 | -13.00 | -30.53 | Vertical |
| 1673.20 | -60.61 | 9.66 | 0.21 | -51.16 | -13.00 | -38.16 | Horizontal |
| 2509.80 | -56.63 | 10.91 | 0.46 | -46.18 | -13.00 | -33.18 | Horizontal |
| 3346.40 | -54.96 | 12.09 | 0.66 | -43.53 | -13.00 | -30.53 | Horizontal |
| **Highest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1697.60 | -62.19 | 9.74 | 0.24 | -52.69 | -13.00 | -39.69 | Vertical |
| 2546.40 | -54.03 | 10.95 | 0.50 | -43.58 | -13.00 | -30.58 | Vertical |
| 3395.20 | -54.76 | 12.19 | 0.68 | -43.25 | -13.00 | -30.25 | Vertical |
| 1697.60 | -60.78 | 9.74 | 0.24 | -51.28 | -13.00 | -38.28 | Horizontal |
| 2546.40 | -56.81 | 10.95 | 0.50 | -46.36 | -13.00 | -33.36 | Horizontal |
| 3395.20 | -54.59 | 12.19 | 0.68 | -43.08 | -13.00 | -30.08 | Horizontal |
| *Remark:* | | | | | | | |
| *1. The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.* | | | | | | | |

| PCS1900 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lowest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3700.40 | -56.14 | 12.64 | 0.74 | -44.24 | -13.00 | -31.24 | Vertical |
| 5550.60 | -56.30 | 12.76 | 1.12 | -44.66 | -13.00 | -31.66 | Vertical |
| 3700.40 | -58.36 | 12.64 | 0.74 | -46.46 | -13.00 | -33.46 | Horizontal |
| 5550.60 | -54.37 | 12.76 | 1.12 | -42.73 | -13.00 | -29.73 | Horizontal |
| **Middle channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3760.00 | -55.70 | 12.71 | 0.77 | -43.76 | -13.00 | -30.76 | Vertical |
| 5640.00 | -56.52 | 12.87 | 1.15 | -44.80 | -13.00 | -31.80 | Vertical |
| 3760.00 | -58.28 | 12.71 | 0.77 | -46.34 | -13.00 | -33.34 | Horizontal |
| 5640.00 | -54.37 | 12.87 | 1.15 | -42.65 | -13.00 | -29.65 | Horizontal |
| **Highest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3819.60 | -55.90 | 12.78 | 0.81 | -43.93 | -13.00 | -30.93 | Vertical |
| 5729.40 | -56.97 | 12.98 | 1.20 | -45.19 | -13.00 | -32.19 | Vertical |
| 3819.60 | -57.96 | 12.78 | 0.81 | -45.99 | -13.00 | -32.99 | Horizontal |
| 5729.40 | -54.05 | 12.98 | 1.20 | -42.27 | -13.00 | -29.27 | Horizontal |

*Remark:*

*1. The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.*

| WCDMA BAND V 12.2k RMC | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lowest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1652.80 | -64.27 | 9.58 | 0.20 | -54.89 | -13.00 | -41.89 | Vertical |
| 2479.20 | -65.10 | 10.87 | 0.44 | -54.67 | -13.00 | -41.67 | Vertical |
| 3305.60 | -63.00 | 12.01 | 0.65 | -51.64 | -13.00 | -38.64 | Vertical |
| 1652.80 | -65.27 | 9.58 | 0.20 | -55.89 | -13.00 | -42.89 | Horizontal |
| 2479.20 | -65.51 | 10.87 | 0.44 | -55.08 | -13.00 | -42.08 | Horizontal |
| 3305.60 | -63.50 | 12.01 | 0.65 | -52.14 | -13.00 | -39.14 | Horizontal |
| **Middle channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1673.20 | -64.80 | 9.66 | 0.21 | -55.35 | -13.00 | -42.35 | Vertical |
| 2509.80 | -65.36 | 10.91 | 0.46 | -54.91 | -13.00 | -41.91 | Vertical |
| 3346.40 | -62.98 | 12.09 | 0.66 | -51.55 | -13.00 | -38.55 | Vertical |
| 1673.20 | -65.39 | 9.66 | 0.21 | -55.94 | -13.00 | -42.94 | Horizontal |
| 2509.80 | -65.22 | 10.91 | 0.46 | -54.77 | -13.00 | -41.77 | Horizontal |
| 3346.40 | -63.39 | 12.09 | 0.66 | -51.96 | -13.00 | -38.96 | Horizontal |
| **Highest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 1697.60 | -65.09 | 9.74 | 0.24 | -55.59 | -13.00 | -42.59 | Vertical |
| 2546.40 | -66.50 | 12.09 | 0.50 | -54.91 | -13.00 | -41.91 | Vertical |
| 3395.20 | -63.08 | 12.19 | 0.68 | -51.57 | -13.00 | -38.57 | Vertical |
| 1697.60 | -65.77 | 9.74 | 0.24 | -56.27 | -13.00 | -43.27 | Horizontal |
| 2546.40 | -66.62 | 12.09 | 0.50 | -55.03 | -13.00 | -42.03 | Horizontal |
| 3395.20 | -63.95 | 12.19 | 0.68 | -52.44 | -13.00 | -39.44 | Horizontal |
| *Remark:* | | | | | | | |
| *1. The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.* | | | | | | | |

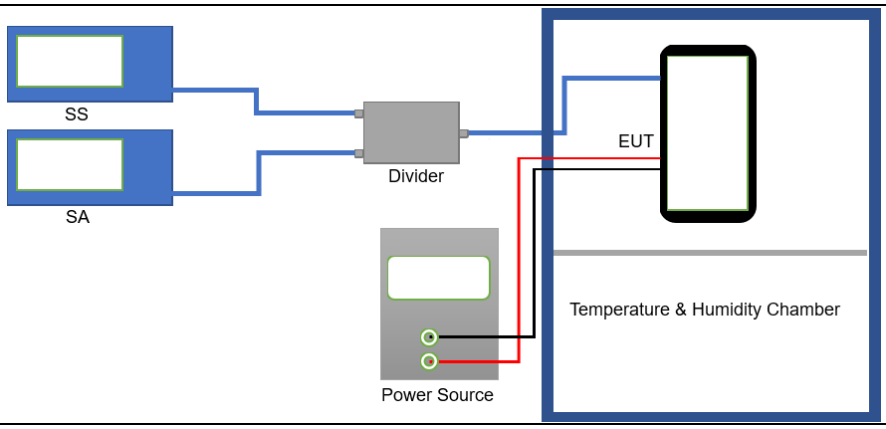
| WCDMA Band II 12.2k RMC | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lowest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3704.80 | -59.12 | 12.65 | 0.76 | -47.23 | -13.00 | -34.23 | Vertical |
| 5557.20 | -56.15 | 12.77 | 1.14 | -44.52 | -13.00 | -31.52 | Vertical |
| 3704.80 | -58.64 | 12.65 | 0.76 | -46.75 | -13.00 | -33.75 | Horizontal |
| 5557.20 | -56.63 | 12.77 | 1.14 | -45.00 | -13.00 | -32.00 | Horizontal |
| **Middle channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3760.00 | -58.86 | 12.71 | 0.77 | -46.92 | -13.00 | -33.92 | Vertical |
| 5640.00 | -55.96 | 12.87 | 1.15 | -44.24 | -13.00 | -31.24 | Vertical |
| 3760.00 | -59.15 | 12.71 | 0.77 | -47.21 | -13.00 | -34.21 | Horizontal |
| 5640.00 | -56.86 | 12.87 | 1.15 | -45.14 | -13.00 | -32.14 | Horizontal |
| **Highest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3815.20 | -58.83 | 12.78 | 0.80 | -46.85 | -13.00 | -33.85 | Vertical |
| 5722.80 | -56.30 | 12.97 | 1.19 | -44.52 | -13.00 | -31.52 | Vertical |
| 3815.20 | -58.73 | 12.78 | 0.80 | -46.75 | -13.00 | -33.75 | Horizontal |
| 5722.80 | -57.31 | 12.97 | 1.19 | -45.53 | -13.00 | -32.53 | Horizontal |

*Remark:*

*1. The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.*

| WCDMA Band IV 12.2k RMC | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lowest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3424.40 | -60.34 | 12.25 | 0.44 | -48.52 | -13.00 | -35.52 | Vertical |
| 5136.60 | -57.96 | 12.92 | 0.71 | -45.74 | -13.00 | -32.74 | Vertical |
| 3424.40 | -58.57 | 12.25 | 0.44 | -46.75 | -13.00 | -33.75 | Horizontal |
| 5136.60 | -58.12 | 12.92 | 0.71 | -45.90 | -13.00 | -32.90 | Horizontal |
| **Middle channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3464.80 | -60.30 | 12.33 | 0.45 | -48.42 | -13.00 | -35.42 | Vertical |
| 5197.20 | -57.98 | 12.88 | 0.72 | -45.82 | -13.00 | -32.82 | Vertical |
| 3464.80 | -58.75 | 12.33 | 0.45 | -46.87 | -13.00 | -33.87 | Horizontal |
| 5197.20 | -57.99 | 12.88 | 0.72 | -45.83 | -13.00 | -32.83 | Horizontal |
| **Highest channel** | | | | | | | |
| Frequency (MHz) | Level at antenna terminals (dBm) | Substitute antenna gain (dBi) | Cable Loss (dBi) | Spurous Emission level (dBm) | Limit Line (dBm) | Over Limit (dBm) | Polarization |
| 3505.20 | -60.07 | 12.41 | 0.47 | -48.12 | -13.00 | -35.12 | Vertical |
| 5257.80 | -57.98 | 12.85 | 0.74 | -45.86 | -13.00 | -32.86 | Vertical |
| 3505.20 | -58.93 | 12.41 | 0.47 | -46.98 | -13.00 | -33.98 | Horizontal |
| 5257.80 | -57.52 | 12.85 | 0.74 | -45.40 | -13.00 | -32.40 | Horizontal |
| *Remark:* | | | | | | | |
| *2. The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.* | | | | | | | |

## 6.7 Frequency stability V.S. Temperature measurement

| | |
|---|---|
| Test Requirement: | FCC Part 22.355, FCC Part 24.235, FCC Part 27.54<br>FCC Part 2.1055(a)(1)(b) |
| Limit: | ±2.5 ppm for GSM 850 and WCDMA 850<br>Within authorized band for PCS 1900 and WCDMA 1900 and WCDMA 1700 |
| 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 5.9 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

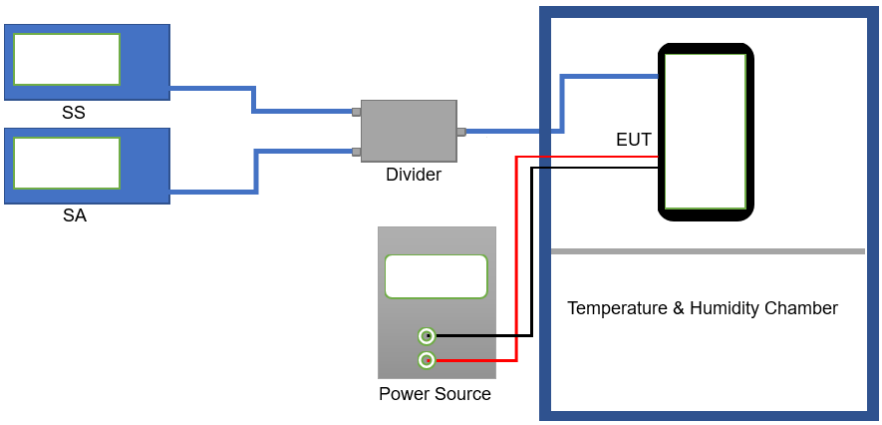
**Measurement Data (the worst channel):**

| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 179 | 0.213961 | ±2.5 | Pass |
| | -20 | 163 | 0.194836 | | |
| | -10 | 158 | 0.188860 | | |
| | 0 | 143 | 0.170930 | | |
| | 10 | 136 | 0.162563 | | |
| | 20 | 127 | 0.151805 | | |
| | 30 | 170 | 0.203203 | | |
| | 40 | 119 | 0.142242 | | |
| | 50 | 150 | 0.179297 | | |
| **Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz** | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 180 | 0.095745 | Within authorized band for PCS 1900 | Pass |
| | -20 | 176 | 0.093617 | | |
| | -10 | 168 | 0.089362 | | |
| | 0 | 152 | 0.080851 | | |
| | 10 | 146 | 0.077660 | | |
| | 20 | 139 | 0.073936 | | |
| | 30 | 122 | 0.064894 | | |
| | 40 | 160 | 0.085106 | | |
| | 50 | 130 | 0.069149 | | |
| *Note: Only the worst case shown in the report.* | | | | | |

| Reference Frequency: EGPRS850 Middle channel=190 channel=836.6MHz | | | | | |
|---|---|---|---|---|---|
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 175 | 0.209180 | ±2.5 | Pass |
| | -20 | 166 | 0.198422 | | |
| | -10 | 159 | 0.190055 | | |
| | 0 | 146 | 0.174516 | | |
| | 10 | 138 | 0.164953 | | |
| | 20 | 126 | 0.150610 | | |
| | 30 | 114 | 0.136266 | | |
| | 40 | 152 | 0.181688 | | |
| | 50 | 131 | 0.156586 | | |
| **Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz** | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 176 | 0.093617 | Within authorized band for PCS 1900 | Pass |
| | -20 | 169 | 0.089894 | | |
| | -10 | 146 | 0.077660 | | |
| | 0 | 135 | 0.071809 | | |
| | 10 | 128 | 0.068085 | | |
| | 20 | 112 | 0.059574 | | |
| | 30 | 160 | 0.085106 | | |
| | 40 | 153 | 0.081383 | | |
| | 50 | 121 | 0.064362 | | |
| *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 | | |
| 3.85 | -30 | 173 | 0.206789 | ±2.5 | Pass |
| | -20 | 166 | 0.198422 | | |
| | -10 | 158 | 0.188860 | | |
| | 0 | 143 | 0.170930 | | |
| | 10 | 136 | 0.162563 | | |
| | 20 | 150 | 0.179297 | | |
| | 30 | 124 | 0.148219 | | |
| | 40 | 117 | 0.139852 | | |
| | 50 | 110 | 0.131485 | | |
| **Reference Frequency: WCDMA BAND II 12.2k RMC Middle channel=9400 channel=1880MHz** | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 172 | 0.091489 | Within authorized band for WCDMA 1900 | Pass |
| | -20 | 164 | 0.087234 | | |
| | -10 | 157 | 0.083511 | | |
| | 0 | 146 | 0.077660 | | |
| | 10 | 137 | 0.072872 | | |
| | 20 | 152 | 0.080851 | | |
| | 30 | 122 | 0.064894 | | |
| | 40 | 130 | 0.069149 | | |
| | 50 | 113 | 0.060106 | | |
| **Reference Frequency: UMTS1700 12.2k RMC Middle channel=1413 channel=1732.6MHz** | | | | | |
| Power supplied (Vdc) | Temperature (℃) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.85 | -30 | 175 | 0.101004 | Within authorized band for WCDMA 1700 | Pass |
| | -20 | 167 | 0.096387 | | |
| | -10 | 153 | 0.088307 | | |
| | 0 | 146 | 0.084266 | | |
| | 10 | 127 | 0.073300 | | |
| | 20 | 135 | 0.077918 | | |
| | 30 | 120 | 0.069260 | | |
| | 40 | 112 | 0.064643 | | |
| | 50 | 161 | 0.092924 | | |
| *Note: Only the worst case shown in the report.* | | | | | |

## 6.8 Frequency stability V.S. Voltage measurement

| | |
|---|---|
| Test Requirement: | FCC Part 22.355, FCC Part 24.235, FCC Part 27.54<br>FCC Part 2.1055(d)(2) |
| Limit: | ±2.5 ppm for GSM 850 and WCDMA 850<br>Within authorized band for PCS 1900 and WCDMA 1900 and WCDMA 1700 |
| 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 5.9 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 | 4.40 | 90 | 0.107578 | ±2.5 | Pass |
| | 3.85 | 80 | 0.095625 | | |
| | 3.50 | 70 | 0.083672 | | |
| **Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz** | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.40 | 93 | 0.049468 | Within authorized band for PCS 1900 | Pass |
| | 3.85 | 80 | 0.042553 | | |
| | 3.50 | 72 | 0.038298 | | |
| **Reference Frequency: EGPRS 850 Middle channel= 190 channel=836.6MHz** | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.40 | 83 | 0.099211 | ±2.5 | Pass |
| | 3.85 | 72 | 0.086063 | | |
| | 3.50 | 68 | 0.081281 | | |
| **Reference Frequency: EGPRS 1900 Middle channel= 661 channel=1880MHz** | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.40 | 88 | 0.046809 | Within authorized band for PCS 1900 | Pass |
| | 3.85 | 79 | 0.042021 | | |
| | 3.50 | 67 | 0.035638 | | |
| *Note: Only the worst case shown in the report.* | | | | | |

| 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 | 4.40 | 89 | 0.106383 | ±2.5 | Pass |
| | 3.85 | 76 | 0.090844 | | |
| | 3.50 | 69 | 0.082477 | | |
| **Reference Frequency: UMTS 1900 12.2k RMC Middle channel=9400 channel=1880MHz** | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.40 | 86 | 0.045745 | Within authorized band for WCDMA 1900 | Pass |
| | 3.85 | 75 | 0.039894 | | |
| | 3.50 | 64 | 0.034043 | | |
| **Reference Frequency: UMTS1700 12.2k RMC Middle channel=1413 channel=1732.6MHz** | | | | | |
| Temperature (℃) | Power supplied (Vdc) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 25 | 4.40 | 84 | 0.048482 | Within authorized band for WCDMA 1700 | Pass |
| | 3.85 | 73 | 0.042133 | | |
| | 3.50 | 52 | 0.030013 | | |
| *Note: Only the worst case shown in the report.* | | | | | |