Certificate #5768.01

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# TEST REPORT

FCC ID: 2AEJATORO

Product: MOBILE PHONE

Model No.: TORO

Additional Model No.: N/A

Trade Mark: RAYO MOVIL

Report No.: WSCT-A2LA-R&E220900005A-RF

Issued Date: 13 October 2022

Issued for:

GSM GLOBE.COM INC

8180 NW 36 Street Suite 317 Doral FL 33166.

Issued By:

World Standardization Certification & Testing Group(Shenzhen) Co., Ltd.
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# 1. GENERAL INFORMATION

| | |
|---|---|
| Product: | MOBILE PHONE |
| Model No.: | TORO |
| Additional Model: | N/A |
| Applicant: | GSM GLOBE.COM INC |
| Address: | 8180 NW 36 Street Suite 317 Doral FL 33166. |
| Manufacturer: | GSM GLOBE.COM INC |
| Address: | 8180 NW 36 Street Suite 317 Doral FL 33166. |
| Date of Test: | 23 August 2022 to 13 October 2022 |
| Applicable Standards: | FCC Rules Part 22H and 24E |

*The above equipment has been tested by World Standardization Certification & Testing Group(Shenzhen) Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.*

**Tested By:** Wang Xiang (Wang Xiang)  **Check By:** Qin Shuiquan (Qin Shuiquan)

**Approved By:** Wang Fengbing (Wang Fengbing)  **Date:** 13 October 2022

## 2. GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **Product Name:** | MOBILE PHONE |
| **Model :** | TORO |
| **Additional Model:** | N/A |
| **Trade Mark:** | RAYO MOVIL |
| **Frequency Bands:** | ☒GSM 850 ☒PCS 1900 (U.S. Bands)<br>UTRA Bands:<br>☒UTRA Band 2 ☒UTRA Band 4 ☒UTRA Band 5 |
| **Antenna Type:** | PIFA Antenna |
| **Antenna gain:** | PCS1900: -0.9dBi<br>GSM850: -2.9dBi<br>UTRA Band 2: -0.9dBi<br>UTRA Band 5: -2.9dBi |
| **Rechargeable Li-ion Polymer Battery:** | Model: TORO<br>Type: 3.7V<br>Rated Capacity: 1000mAh/3.7Wh<br>Max Charge Voltage: 4.2V |
| **Adapter:** | Model: Rok2<br>Input: 100-240V~50/60Hz 0.15A<br>Output:5.0V⎓1A |
| **Card(S):** | Card 1: UTRA Card Slot<br>Card 2: GSM Card Slot |
| **Max power:** | See Table 2.1.2 |
| **Extreme Vol. Limits:** | DC 3.5V to 4.2V (Normal: DC 3.7V) |

**Table 2.1 The Basic Technical Specification for Working BAND(S).**

| OPERATION BAND(S) | Power Class | Mod. | Max Average (dBm) | Max Peak Power (dBm) |
|---|---|---|---|---|
| GSM850 | Class 4 | GMSK | 34.12 | 35.56 |
| DCS1900 | Class 1 | GMSK | 31.17 | 31.88 |
| UTRA BAND 2 | Class 3 | QPSK | 23.19 | 24.33 |
| UTRA BAND 5 | Class 3 | QPSK | 23.35 | 24.36 |

# 3. FACILITIES AND ACCREDITATIONS

## 3.1. Test Facility

All measurement facilities used to collect the measurement data are located at Building A-B, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China of the World Standardization Certification & Testing Group(Shenzhen) Co., Ltd.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 3.2. ACCREDITATIONS

**China National Accreditation Service for Conformity Assessment (CNAS)**
**Registration number NO: L3732**

**American Association for Laboratory Accreditation(A2LA)**

**Registration NO：5768.01**

Copies of granted accreditation certificates are available for downloading from our web site, **http://www.wsct-cert.com**

## 3.3. Description Of Test Channels And Test Modes

**Test channels:**

| GSM 850 | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 0.2 | 128 | 824.2 |
| Mid Range | 0.2 | 190 | 836.6 |
| High Range | 0.2 | 251 | 848.8 |

| PCS 1900 | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 0.2 | 512 | 1850.2 |
| Mid Range | 0.2 | 661 | 1880 |
| High Range | 0.2 | 810 | 1909.8 |

| URTA BAND 2 | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 5 | 9262 | 1852.4 |
| Mid Range | 5 | 9400 | 1880 |
| High Range | 5 | 9538 | 1907.6 |

| URTA BAND 5 | | | |
|---|---|---|---|
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) |
| Low Range | 5 | 4132 | 826.4 |
| Mid Range | 5 | 4182 | 836.4 |
| High Range | 5 | 4233 | 846.6 |

*Note 1: both QPSK&16QAM modulation has been measured;*
*Note 2: The worst condition was recorded in the test report if no other modes test data.*

## 3.4. Equipment Modifications

Not available for this EUT intended for grant.

# 4. SUMMARY OF TEST REQUIREMENTS AND RESULTS

## BAND 2(PCS 1900/UTRA Band 2):

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §24.232(c) | EIRP ≤ 2W(33dBm) | Pass |
| Bandwidth | §2.1049 §24.238(a) | OBW: No limit. EBW: No limit. | Pass |
| Band Edges | §2.1051, §24.238(a) | -13dBm | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238(a) | -13dBm | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238(a) | -13dBm | Pass |
| Frequency Stability | §2.1055, §24.235 | the fundamental emission stays within the authorized frequency block. | Pass |
| Peak to average ratio | §24.232(d) | <13dB | Pass |

## BAND 5(GSM850/ UTRA Band 5):

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §2.913(a) | EIRP ≤ 7W(38.5dBm) | Pass |
| Occupied Bandwidth | §2.1049 | OBW: No limit. | Pass |
| Emission Bandwidth | 22.917(b) | EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §22.917(a)(b) | KDB 971 168 D02 971168 D02 Misc OOBE License Digital Systems v01 &27.53(m) for detail the limit is upon different OBW | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | -13dBm | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | -13dBm | Pass |
| Frequency Stability | §2.1055, §22.355 | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass |

# 5. MEASUREMENT INSTRUMENTS

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | Calibration Date | Calibration Due. |
|---|---|---|---|---|---|
| Test software | -- | MT8200 | 2.0.0.0 | -- | -- |
| EMI Test Receiver | R&S | ESCI | 100005 | 2021-11-05 | 2022-11-04 |
| LISN | AFJ | LS16 | 16010222119 | 2021-11-05 | 2022-11-04 |
| LISN(EUT) | Mestec | AN3016 | 04/10040 | 2021-11-05 | 2022-11-04 |
| Universal Radio Communication Tester | R&S | CMU 200 | 1100.0008.02 | 2021-11-05 | 2022-11-04 |
| Coaxial cable | Megalon | LMR400 | N/A | 2021-11-05 | 2022-11-04 |
| GPIB cable | Megalon | GPIB | N/A | 2021-11-05 | 2022-11-04 |
| Spectrum Analyzer | R&S | FSU | 100114 | 2021-11-05 | 2022-11-04 |
| Pre Amplifier | H.P. | HP8447E | 2945A02715 | 2021-11-05 | 2022-11-04 |
| Pre-Amplifier | CDSI | PAP-1G18-38 | -- | 2021-11-05 | 2022-11-04 |
| Loop Antenna | R&S | HFH2-Z2 | 100296 | 2021-11-05 | 2022-11-04 |
| Bi-log Antenna | SUNOL Sciences | JB3 | A021907 | 2021-11-05 | 2022-11-04 |
| 9*6*6 Anechoic | -- | -- | -- | 2021-11-05 | 2022-11-04 |
| Horn Antenna | COMPLIANCE ENGINEERING | CE18000 | -- | 2021-11-05 | 2022-11-04 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-631 | 2021-11-05 | 2022-11-04 |
| Power meter | Anritsu | ML2487A | 6K00003613 | 2021-11-05 | 2022-11-04 |
| Power meter | Anritsu | MA2491A | 32263 | 2021-11-05 | 2022-11-04 |
| Cable | TIME MICROWAVE | LMR-400 | N-TYPE04 | 2021-11-05 | 2022-11-04 |
| System-Controller | CCS | N/A | N/A | N.C.R | N.C.R |
| Turn Table | CCS | N/A | N/A | N.C.R | N.C.R |
| Antenna Tower | CCS | N/A | N/A | N.C.R | N.C.R |
| RF cable | Murata | MXHQ87WA3000 | - | 2021-11-05 | 2022-11-04 |
| Loop Antenna | EMCO | 6502 | 00042960 | 2021-11-05 | 2022-11-04 |
| Wideband Radio Communication Tester | R&S | CMW 500 | 103974 | 2021-11-05 | 2022-11-04 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 1123 | 2021-11-05 | 2022-11-04 |
| H & T Chamber | Guangzhou gongwen | GDJS-500-40 | 0329 | 2021-11-05 | 2022-11-04 |

# 6. EFFECTIVE (ISOTROPIC) RADIATED POWER

## Test limit:

According to §22.913, The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
According to§24.232, Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
According to §27.50 (d), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications. According to §27.50 (h), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
See section 4.

## Test procedure:

1. The setup of EUT is according with per TIA/EIA Standard 603 D:2010 or KDB971168 D01 v02r02.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.
5. ERP/EIRP = PMeas + GT − LC
where:
ERP/EIRP = effective or equivalent radiated power
PMeas = measured transmitter output power from SG
GT = gain of the substitution antenna
LC = cable loss between SG and substitution antenna.

## GSM850 BAND:

| Mode | | Frequency (MHz) | Peak Power(dBm) | Avg.Burst Power(dBm) | PAP | Duty cycle Factor(dB) | Frame Power(dBm) |
|---|---|---|---|---|---|---|---|
| GSM850 | | 824.2 | **35.56** | **34.12** | 1.44 | -9 | 25.12 |
| | | 836.6 | 33.99 | 32.78 | 1.20 | -9 | 23.78 |
| | | 848.8 | 34.07 | 32.83 | 1.24 | -9 | 23.83 |
| GPRS850 | 1 Tx Slots | 824.2 | 30.83 | 29.78 | 1.05 | -9 | 20.78 |
| | | 836.6 | 31.92 | 30.35 | 1.56 | -9 | 21.35 |
| | | 848.8 | 31.40 | 30.38 | 1.02 | -9 | 21.38 |
| | 2 Tx Slots | 824.2 | 31.35 | 30.56 | 0.80 | -6 | 24.56 |
| | | 836.6 | 31.15 | 29.83 | 1.32 | -6 | 23.83 |
| | | 848.8 | 32.41 | 30.66 | 1.75 | -6 | 24.66 |
| | 3 Tx Slots | 824.2 | 31.48 | 30.42 | 1.06 | -4.26 | 26.16 |
| | | 836.6 | 31.33 | 30.68 | 0.65 | -4.26 | 26.42 |
| | | 848.8 | 30.59 | 29.98 | 0.61 | -4.26 | 25.72 |
| | 4 Tx Slots | 824.2 | 31.36 | 31.18 | 0.18 | -3 | 28.18 |
| | | 836.6 | 32.84 | 31.24 | 1.60 | -3 | 28.24 |
| | | 848.8 | 31.75 | 30.43 | 1.33 | -3 | 27.43 |
| EPRS850 | 1 Tx Slots | 824.2 | 28.39 | 27.47 | 0.92 | -9 | 18.47 |
| | | 836.6 | 28.39 | 27.03 | 1.36 | -9 | 18.03 |
| | | 848.8 | 27.37 | 26.69 | 0.68 | -9 | 17.69 |
| | 2 Tx Slots | 824.2 | 28.09 | 27.15 | 0.93 | -6 | 21.15 |
| | | 836.6 | 28.34 | 27.38 | 0.96 | -6 | 21.38 |
| | | 848.8 | 27.65 | 27.00 | 0.66 | -6 | 21.00 |
| | 3 Tx Slots | 824.2 | 28.70 | 26.93 | 1.77 | -4.26 | 22.67 |
| | | 836.6 | 27.09 | 26.75 | 0.34 | -4.26 | 22.49 |
| | | 848.8 | 28.76 | 27.39 | 1.37 | -4.26 | 23.13 |
| | 4 Tx Slots | 824.2 | 27.49 | 26.16 | 1.33 | -3 | 23.16 |
| | | 836.6 | 27.93 | 26.73 | 1.20 | -3 | 23.73 |
| | | 848.8 | 27.44 | 26.87 | 0.57 | -3 | 23.87 |

Duty cycle Factor = 1 Tx Slots, 10*log(1/8)= -9.03dB, 2 Tx Slots, 10*log(2/8)= -6.02dB,
3Tx Slots, 10*log(3/8)= -4.26dB, 4 Tx Slots, 10*log(4/8)= -3.01dB

## PCS1900 BAND:

| Mode | | Frequency (MHz) | Peak Power(dBm) | Avg.Burst Power(dBm) | PAP | Duty cycle Factor(dB) | Frame Power(dBm) |
|---|---|---|---|---|---|---|---|
| GSM1900 | | 1850.2 | **31.88** | **31.17** | 0.71 | -9 | 22.17 |
| | | 1880 | 31.70 | 30.80 | 0.90 | -9 | 21.80 |
| | | 1909.8 | 31.59 | 30.59 | 0.99 | -9 | 21.59 |
| GPRS1900 | 1 Tx Slots | 1850.2 | 30.30 | 28.91 | 1.39 | -9 | 19.91 |
| | | 1880 | 28.23 | 27.69 | 0.55 | -9 | 18.69 |
| | | 1909.8 | 29.35 | 28.62 | 0.73 | -9 | 19.62 |
| | 2 Tx Slots | 1850.2 | 30.19 | 29.27 | 0.92 | -6 | 23.27 |
| | | 1880 | 28.76 | 27.66 | 1.10 | -6 | 21.66 |
| | | 1909.8 | 29.95 | 28.87 | 1.08 | -6 | 22.87 |
| | 3 Tx Slots | 1850.2 | 29.60 | 28.40 | 1.19 | -4.26 | 24.14 |
| | | 1880 | 30.63 | 29.07 | 1.56 | -4.26 | 24.81 |
| | | 1909.8 | 29.67 | 28.56 | 1.11 | -4.26 | 24.30 |
| | 4 Tx Slots | 1850.2 | 29.51 | 28.71 | 0.80 | -3 | 25.71 |
| | | 1880 | 28.91 | 27.87 | 1.04 | -3 | 24.87 |
| | | 1909.8 | 28.68 | 27.94 | 0.74 | -3 | 24.94 |
| EGPRS1900 | 1 Tx Slots | 1850.2 | 26.22 | 24.98 | 1.24 | -9 | 15.98 |
| | | 1880 | 26.19 | 24.76 | 1.43 | -9 | 15.76 |
| | | 1909.8 | 24.89 | 24.66 | 0.23 | -9 | 15.66 |
| | 2 Tx Slots | 1850.2 | 26.05 | 25.58 | 0.46 | -6 | 19.58 |
| | | 1880 | 25.88 | 25.10 | 0.77 | -6 | 19.10 |
| | | 1909.8 | 26.66 | 25.67 | 0.99 | -6 | 19.67 |
| | 3 Tx Slots | 1850.2 | 26.53 | 24.84 | 1.69 | -4.26 | 20.58 |
| | | 1880 | 25.95 | 24.88 | 1.07 | -4.26 | 20.62 |
| | | 1909.8 | 25.98 | 24.97 | 1.02 | -4.26 | 20.71 |
| | 4 Tx Slots | 1850.2 | 26.76 | 25.27 | 1.49 | -3 | 22.27 |
| | | 1880 | 25.62 | 24.60 | 1.02 | -3 | 21.60 |
| | | 1909.8 | 26.15 | 25.26 | 0.89 | -3 | 22.26 |

Duty cycle Factor = 1 Tx Slots, 10*log(1/8)= -9.03dB, 2 Tx Slots, 10*log(2/8)= -6.02dB,
3Tx Slots, 10*log(3/8)= -4.26dB, 4 Tx Slots, 10*log(4/8)= -3.01dB

**UTRA BANDS:**

**BAND 2：**

| Mode | | Frequency (MHz) | Peak Power(dBm) | Avg.Burst Power(dBm) | PAPR (dB) |
|---|---|---|---|---|---|
| RMC 12.2K | | 1852.4 | 22.39 | 22.34 | 0.05 |
| | | 1880 | 23.90 | 22.50 | 1.41 |
| | | 1907.6 | 22.99 | 22.37 | 0.62 |
| HSDPA | 1 Tx Slots | 1852.4 | 23.21 | 22.42 | 0.79 |
| | | 1880 | 23.42 | 22.86 | 0.56 |
| | | 1907.6 | 22.76 | 22.04 | 0.72 |
| | 2 Tx Slots | 1852.4 | 24.23 | 22.72 | 1.50 |
| | | 1880 | 22.69 | 21.77 | 0.92 |
| | | 1907.6 | 24.13 | 22.90 | 1.22 |
| | 3 Tx Slots | 1852.4 | 23.76 | 22.46 | 1.30 |
| | | 1880 | 23.57 | 22.47 | 1.10 |
| | | 1907.6 | 23.04 | 21.97 | 1.07 |
| | 4 Tx Slots | 1852.4 | 23.10 | 21.81 | 1.29 |
| | | 1880 | 23.86 | 22.21 | 1.65 |
| | | 1907.6 | 23.73 | 23.00 | 0.72 |
| HSUPA | 1 Tx Slots | 1852.4 | 22.82 | 22.23 | 0.59 |
| | | 1880 | **24.33** | 22.53 | 1.80 |
| | | 1907.6 | 24.30 | 22.50 | 1.80 |
| | 2 Tx Slots | 1852.4 | 23.24 | 22.68 | 0.56 |
| | | 1880 | 23.73 | 21.98 | 1.75 |
| | | 1907.6 | 24.21 | 23.15 | 1.07 |
| | 3 Tx Slots | 1852.4 | 23.27 | 22.30 | 0.96 |
| | | 1880 | 22.77 | 22.45 | 0.33 |
| | | 1907.6 | 23.53 | **23.19** | 0.33 |
| | 4 Tx Slots | 1852.4 | 23.88 | 22.27 | 1.61 |
| | | 1880 | 22.91 | 22.49 | 0.42 |
| | | 1907.6 | 23.77 | 23.05 | 0.73 |
| | 5 Tx Slots | 1852.4 | 23.72 | 22.79 | 0.93 |
| | | 1880 | 22.75 | 22.11 | 0.64 |
| | | 1907.6 | 23.97 | 22.44 | 1.53 |

## BAND 5:

| Mode | | Frequency (MHz) | Peak Power(dBm) | Avg.Burst Power(dBm) | PAPR (dB) |
|---|---|---|---|---|---|
| RMC 12.2K | | 826.4 | 23.24 | 22.29 | 0.94 |
| | | 836.4 | 24.33 | **23.35** | 0.98 |
| | | 846.6 | 23.80 | 22.13 | 1.68 |
| HSDPA | 1 Tx Slots | 826.4 | 23.10 | 22.51 | 0.59 |
| | | 836.4 | 23.00 | 22.27 | 0.73 |
| | | 846.6 | 23.13 | 22.12 | 1.01 |
| | 2 Tx Slots | 826.4 | 22.89 | 22.00 | 0.89 |
| | | 836.4 | 23.75 | 22.66 | 1.09 |
| | | 846.6 | 23.20 | 21.80 | 1.40 |
| | 3 Tx Slots | 826.4 | 23.71 | 22.50 | 1.21 |
| | | 836.4 | 22.78 | 21.89 | 0.89 |
| | | 846.6 | 22.41 | 21.90 | 0.50 |
| | 4 Tx Slots | 826.4 | 23.27 | 22.14 | 1.14 |
| | | 836.4 | 22.53 | 21.88 | 0.66 |
| | | 846.6 | 24.11 | 22.36 | 1.74 |
| HSUPA | 1 Tx Slots | 826.4 | 24.03 | 22.54 | 1.49 |
| | | 836.4 | 23.91 | 22.51 | 1.41 |
| | | 846.6 | 23.20 | 22.55 | 0.65 |
| | 2 Tx Slots | 826.4 | 23.26 | 22.45 | 0.81 |
| | | 836.4 | 23.91 | 22.47 | 1.45 |
| | | 846.6 | 23.94 | 22.91 | 1.03 |
| | 3 Tx Slots | 826.4 | 23.53 | 22.80 | 0.73 |
| | | 836.4 | 23.08 | 21.68 | 1.40 |
| | | 846.6 | 22.81 | 22.21 | 0.60 |
| | 4 Tx Slots | 826.4 | 23.70 | 22.69 | 1.00 |
| | | 836.4 | 24.03 | 22.58 | 1.45 |
| | | 846.6 | 23.84 | 22.87 | 0.98 |
| | 5 Tx Slots | 826.4 | 23.68 | 22.44 | 1.24 |
| | | 836.4 | **24.36** | 22.89 | 1.47 |
| | | 846.6 | 23.68 | 22.38 | 1.31 |

# Radiation power test

*Note: Record the condition when max power has been detector for radiated method.(X axis)*

**Radiated Power (ERP) for GSM 850 MHZ**

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss | Antenna Gain | Correction (dB) | ERP (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| GSM850 | 824.2 | 7.51 | 31.23 | 1.02 | -2.9 | 2.15 | 32.67 | H |
| | 836.6 | 6.96 | 31.23 | 1.02 | -2.9 | 2.15 | 32.12 | H |
| | 848.8 | 7.61 | 31.23 | 1.02 | -2.9 | 2.15 | **32.77** | H |

**Radiated Power (ERP) for EGPRS850 MHZ**

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss | Antenna Gain | Correction (dB) | ERP (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| EGPRS 850 | 824.2 | -0.22 | 31.23 | 1.02 | -2.9 | 2.15 | 24.94 | H |
| | 836.6 | -0.67 | 31.23 | 1.02 | -2.9 | 2.15 | 24.49 | H |
| | 848.8 | -0.25 | 31.23 | 1.02 | -2.9 | 2.15 | 24.91 | H |

**Radiated Power (E.I.R.P) for PCS 1900 MHZ**

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss (dB) | Antenna Gain (dB) | Correction (dB) | E.I.R.P. (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| GSM 1900 | 1850.2 | -0.54 | 31.23 | 1.02 | -0.9 | 2.15 | 26.62 | H |
| | 1880.0 | -0.97 | 31.23 | 1.02 | -0.9 | 2.15 | 26.19 | H |
| | 1909.8 | -0.68 | 31.23 | 1.02 | -0.9 | 2.15 | 26.48 | H |

**Radiated Power (E.I.R.P) for EGPRS 1900 MHZ**

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss (dB) | Antenna Gain (dB) | Correction (dB) | E.I.R.P. (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| EGPRS 1900 | 1850.2 | -2.19 | 31.23 | 1.02 | -0.9 | 2.15 | 24.97 | H |
| | 1880.0 | -2.78 | 31.23 | 1.02 | -0.9 | 2.15 | 24.38 | H |
| | 1909.8 | -2.38 | 31.23 | 1.02 | -0.9 | 2.15 | 24.78 | H |

ERP or E.I.R.P = PMea + Amplifier Gain – Path Loss + Antenna Gain –Correction Factor

Note: Each channel is scanned 10 times, and the peak value of each channel is recorded.

## Radiated Power (E.I.R.P) for UTRA Band 2

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss (dB) | Antenna Gain (dB) | Correction (dB) | E.I.R.P. (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| UTRA Band 2 | 1852.4 | -2.97 | 31.23 | 0.9 | -5.69 | 0 | **21.67** | H |
| | 1880 | -3.16 | 31.23 | 0.9 | -5.69 | 0 | 21.48 | H |
| | 1907.6 | -3.24 | 31.23 | 0.9 | -5.69 | 0 | 21.40 | H |

## Radiated Power (ERP) for UTRA Band 5

| Mode | Frequency (MHz) | $P_{Mea}$ (dBm) | Amplifier Gain (dBi) | Path Loss | Antenna Gain | Correction (dB) | ERP (Peak) (dBm) | Polarization |
|---|---|---|---|---|---|---|---|---|
| UTRA Band 5 | 826.4 | -6.89 | 31.23 | -2.9 | -5.69 | 0 | 21.55 | H |
| | 836.4 | -6.75 | 31.23 | -2.9 | -5.69 | 0 | 21.69 | H |
| | 846.6 | -6.41 | 31.23 | -2.9 | -5.69 | 0 | **22.03** | H |

ERP or E.I.R.P = PMea + Amplifier Gain – Path Loss + Antenna Gain –Correction Factor

Note: Each channel is scanned 10 times, and the peak value of each channel is recorded.

# 7. SPURIOUS EMISSION (Conducted and Radiated)

## 7.1. Measurement Result (Pre-measurement)

**GSM850:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 128 | 824.2 | Pass |
| Middle Range | 0.2 | 190 | 836.6 | Pass |
| High Range | 0.2 | 251 | 848.8 | Pass |

**PCS 1900：**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 512 | 1850.2 | Pass |
| Middle Range | 0.2 | 661 | 1880.0 | Pass |
| High Range | 0.2 | 810 | 1909.8 | Pass |

**UTRA BANDS**

**BAND 2:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 5 | 9262 | 1852.4 | Pass |
| Middle Range | 5 | 9400 | 1880.0 | Pass |
| High Range | 5 | 9538 | 1907.6 | Pass |

**BAND 5:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 5 | 4132 | 826.4 | Pass |
| Middle Range | 5 | 4182 | 836.4 | Pass |
| High Range | 5 | 4233 | 846.6 | Pass |

## Test Plot(s)
## Conducted method

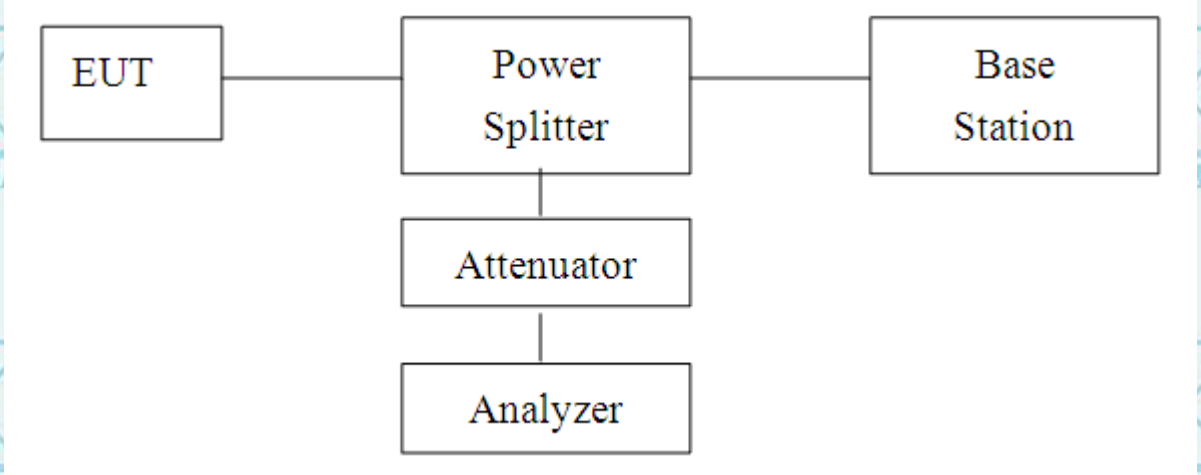
### Test limit:

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

### Test procedure:

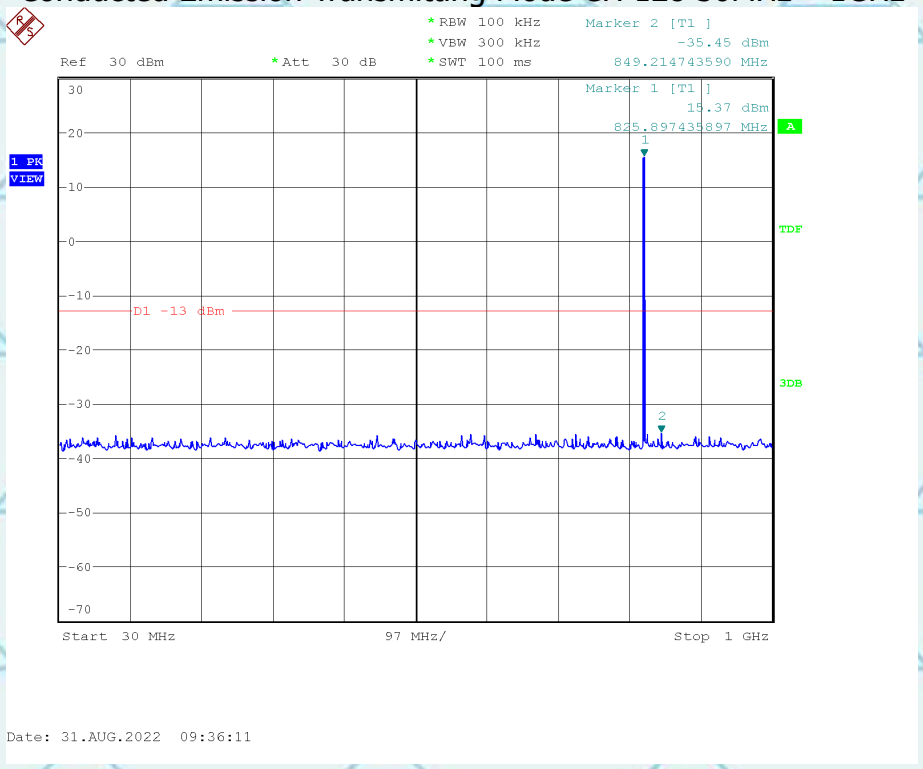
The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

### Conducted Emission Test-Up:

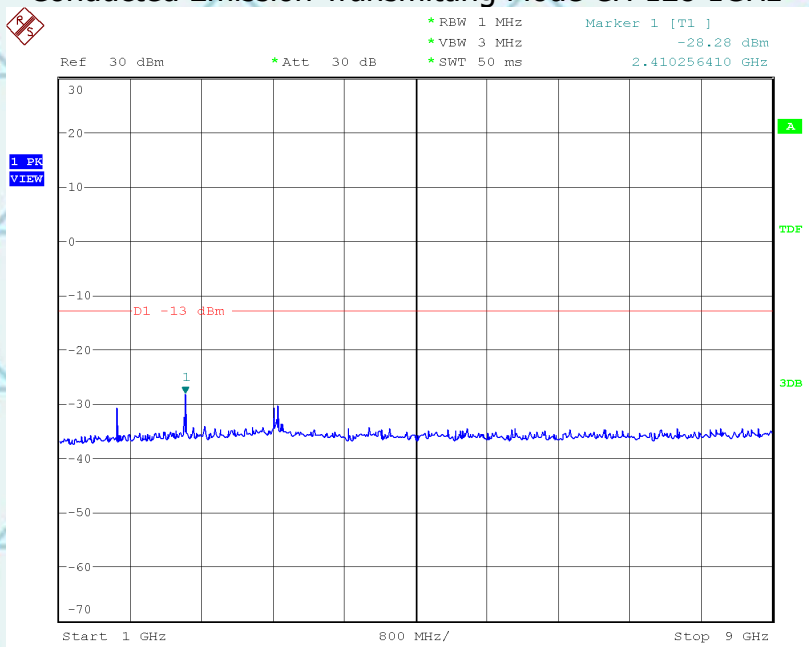


# CONDUCTED EMISSION IN GSM850 BAND

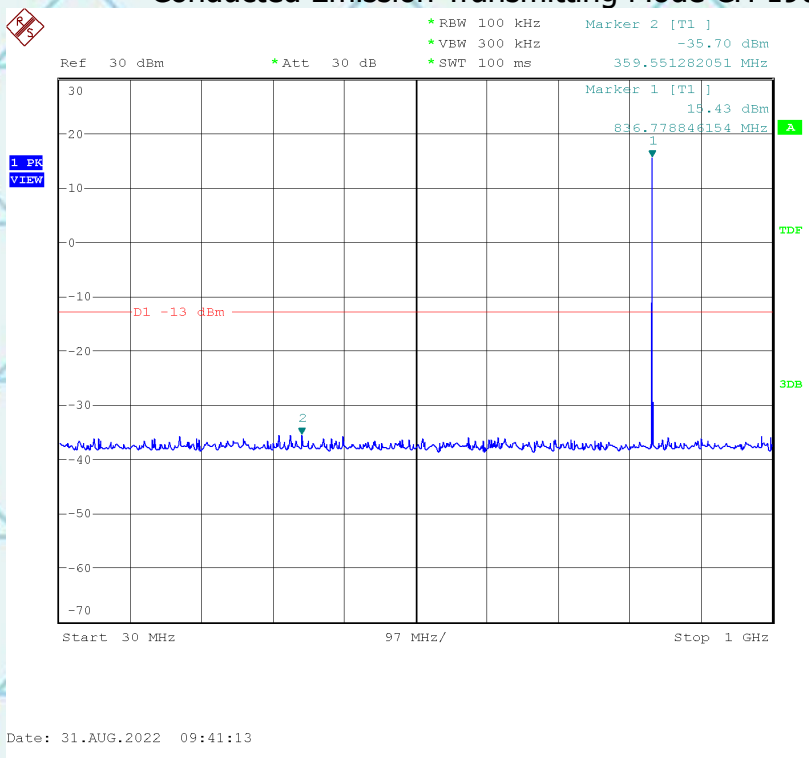
## Conducted Emission Transmitting Mode CH 128 30MHz – 1GHz



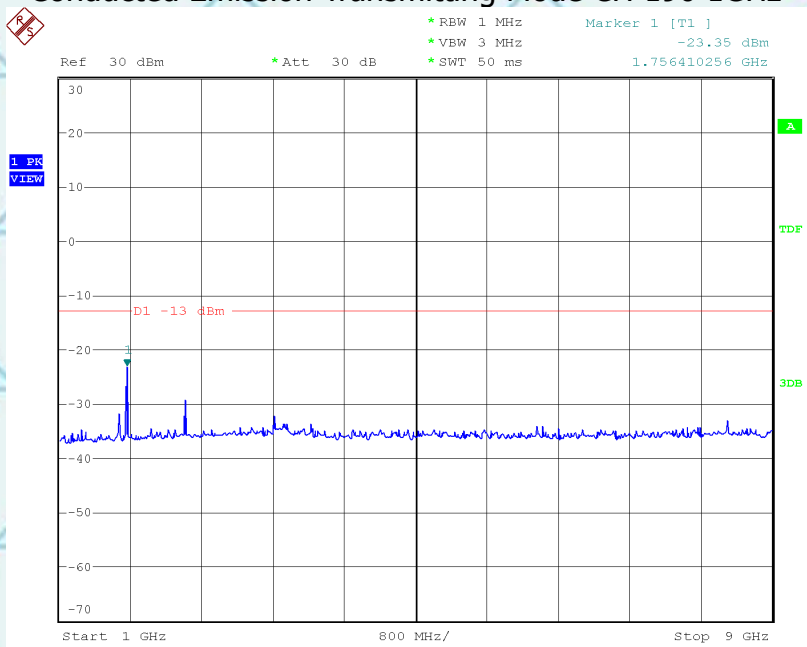
## Conducted Emission Transmitting Mode CH 128 1GHz – 9GHz




## Conducted Emission Transmitting Mode CH 190 30MHz – 1GHz

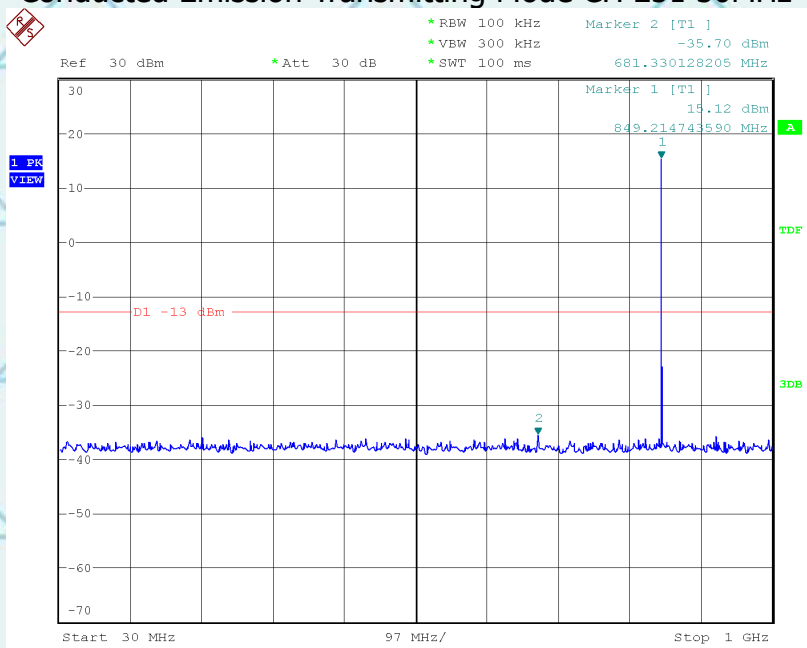


## Conducted Emission Transmitting Mode CH 190 1GHz – 9GHz



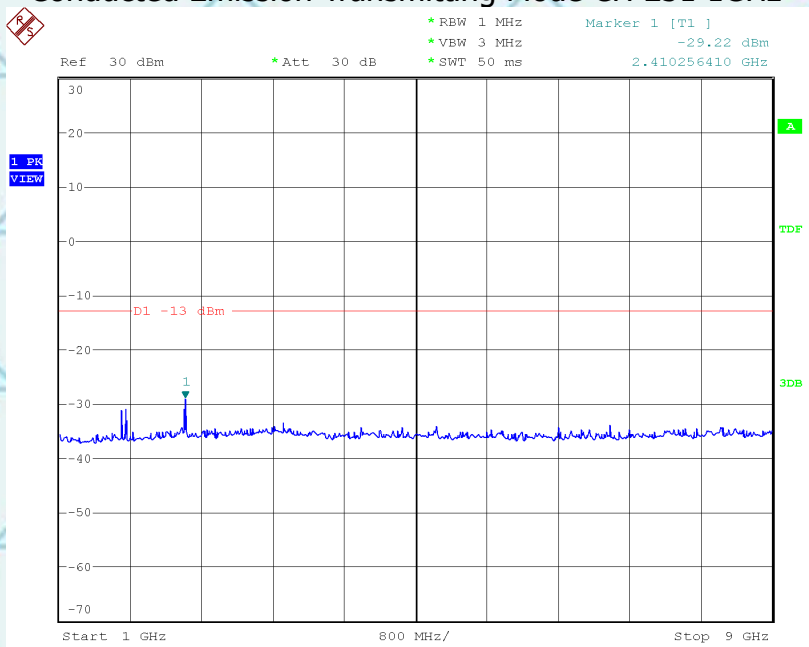

Date: 31.AUG.2022 09:39:21

## Conducted Emission Transmitting Mode CH 251 30MHz – 1GHz

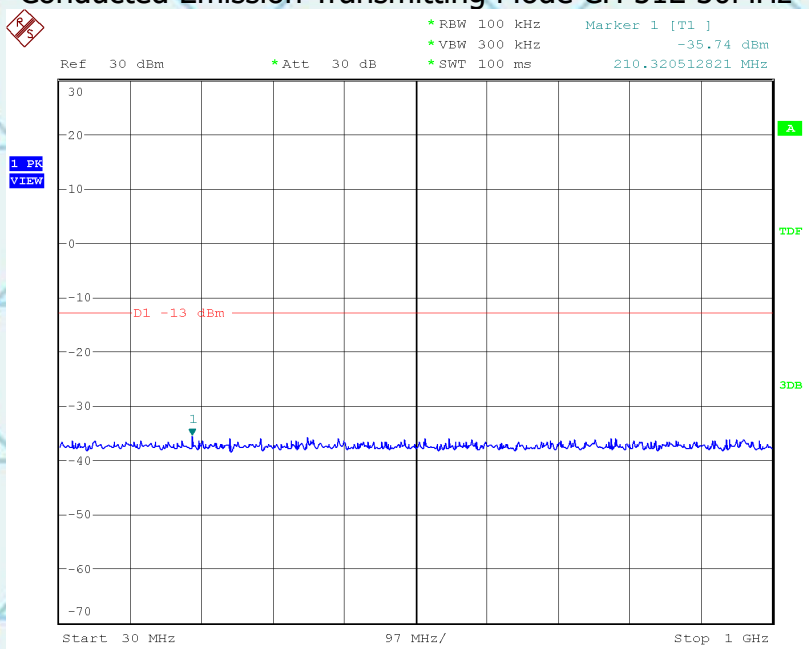



Date: 31.AUG.2022 09:42:15

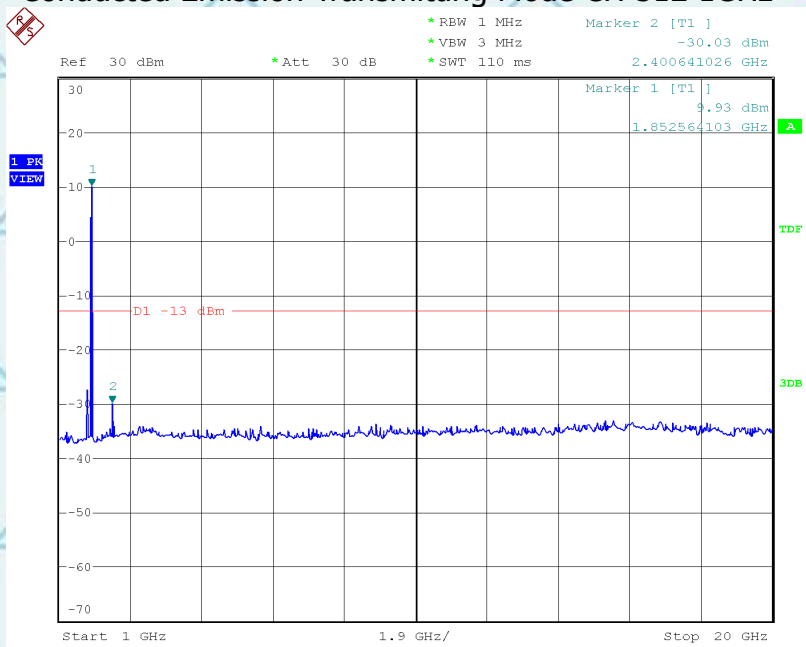
## Conducted Emission Transmitting Mode CH 251 1GHz – 9GHz




## CONDUCTED EMISSION IN PCS1900 BAND
## Conducted Emission Transmitting Mode CH 512 30MHz – 1GHz

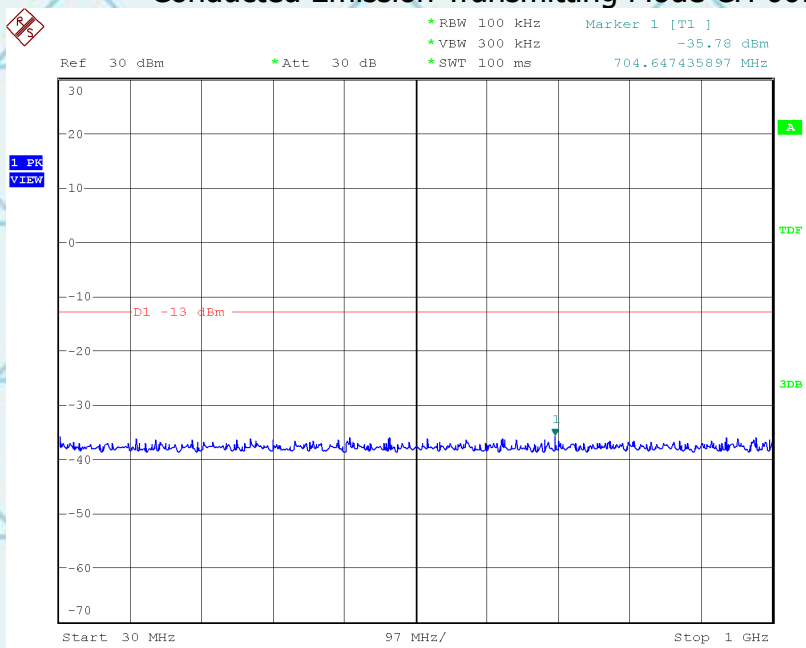


## Conducted Emission Transmitting Mode CH 512 1GHz – 20GHz



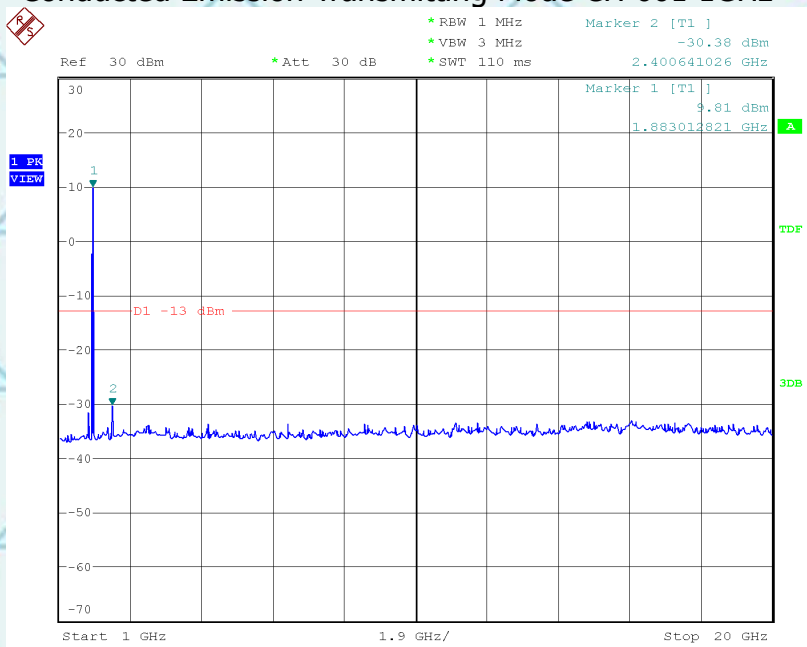

Date: 31.AUG.2022 10:25:35

## Conducted Emission Transmitting Mode CH 661 30MHz – 1GHz



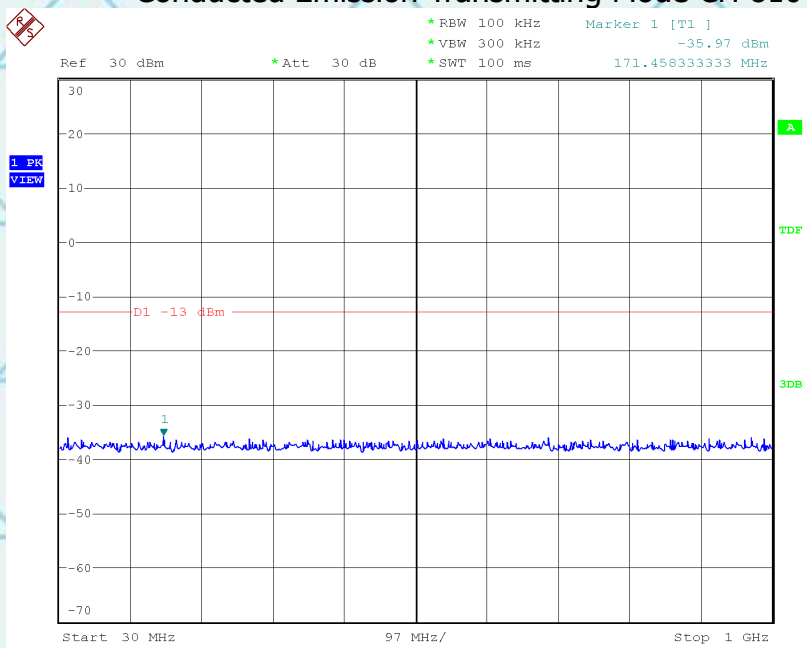

Date: 31.AUG.2022 10:27:59

## Conducted Emission Transmitting Mode CH 661 1GHz – 20GHz



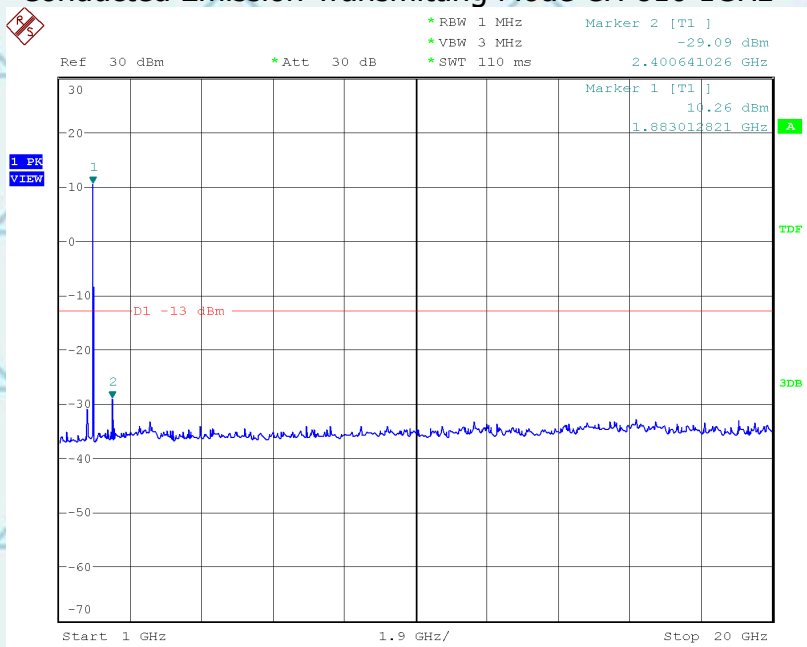

Date: 31.AUG.2022 10:26:43

## Conducted Emission Transmitting Mode CH 810 30MHz – 1GHz



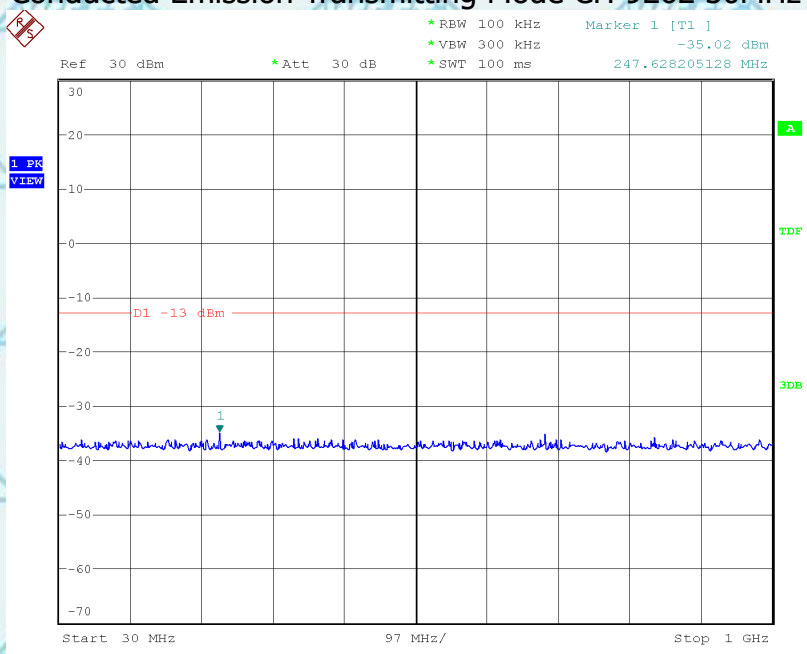

Date: 31.AUG.2022 10:29:07

## Conducted Emission Transmitting Mode CH 810 1GHz – 20GHz

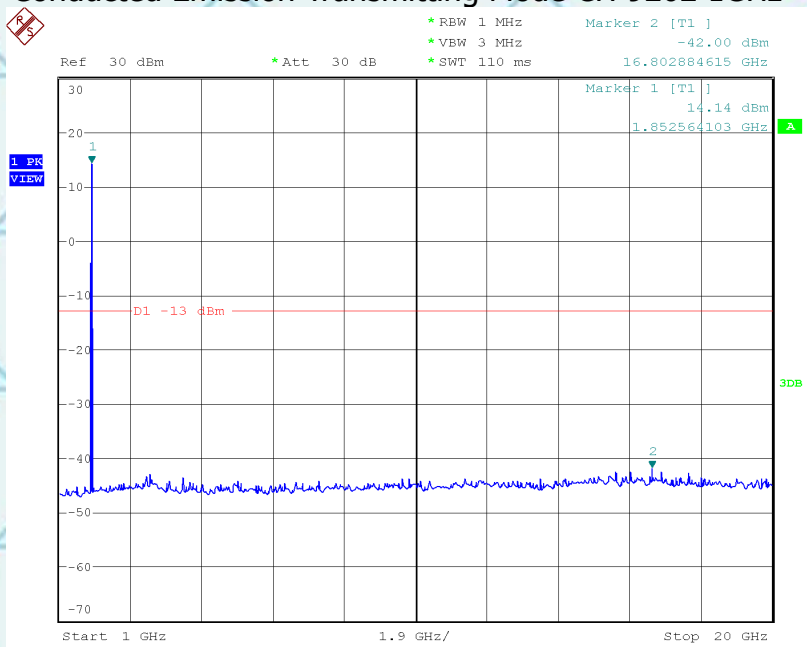



## CONDUCTED EMISSION IN WCDMA Band II

## Conducted Emission Transmitting Mode CH 9262 30MHz – 1GHz

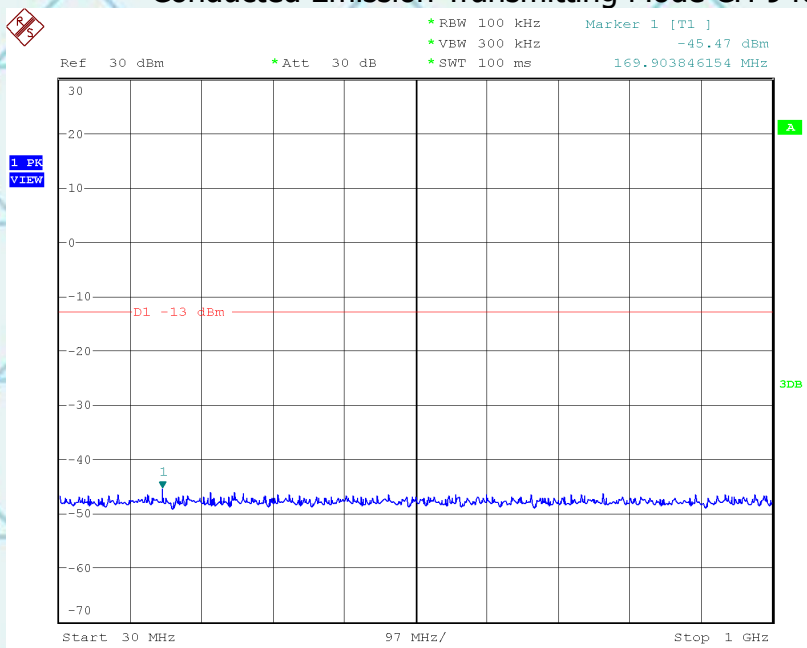


## Conducted Emission Transmitting Mode CH 9262 1GHz – 20GHz



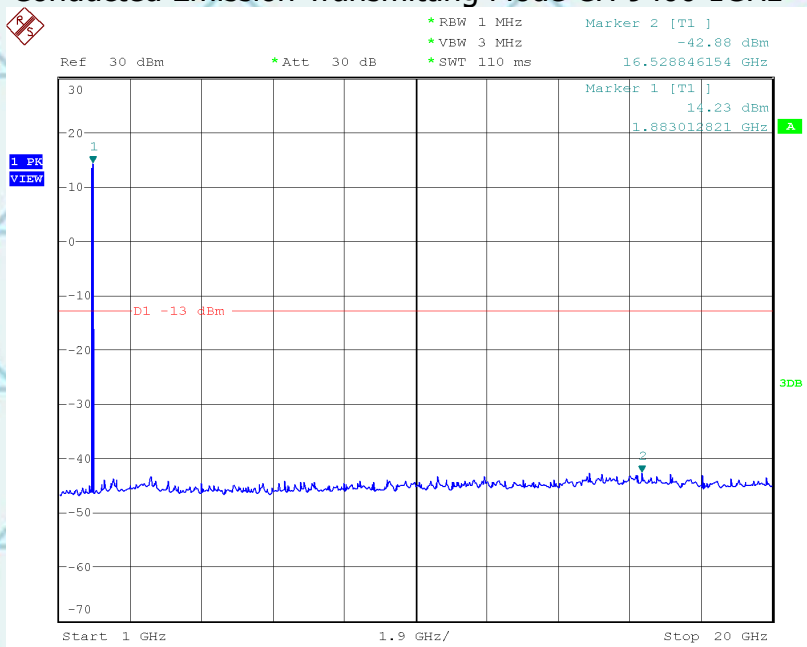

Date: 30.AUG.2022 16:51:08

## Conducted Emission Transmitting Mode CH 9400 30MHz – 1GHz



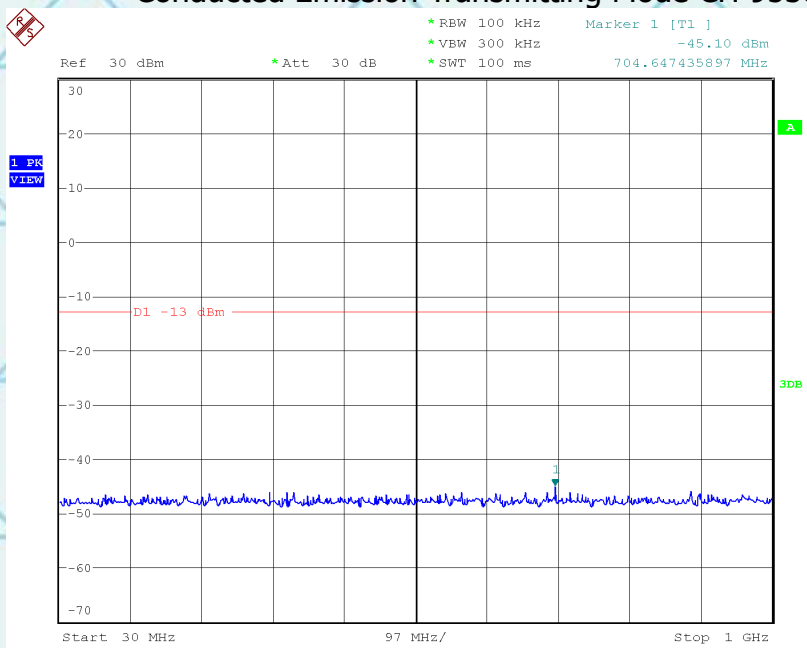

Date: 30.AUG.2022 16:54:22

## Conducted Emission Transmitting Mode CH 9400 1GHz – 20GHz



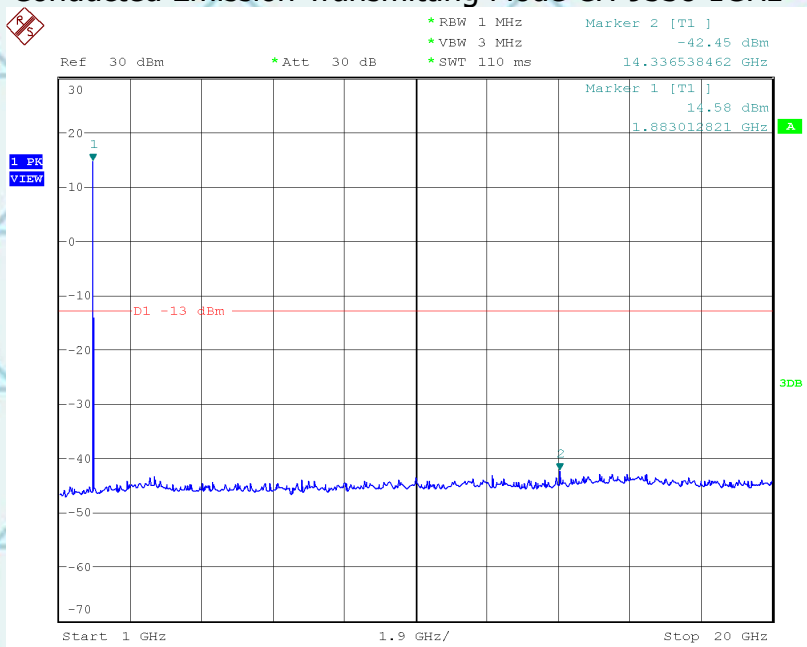

Date: 30.AUG.2022 16:52:40

## Conducted Emission Transmitting Mode CH 9538 30MHz – 1GHz




Date: 30.AUG.2022 16:56:22

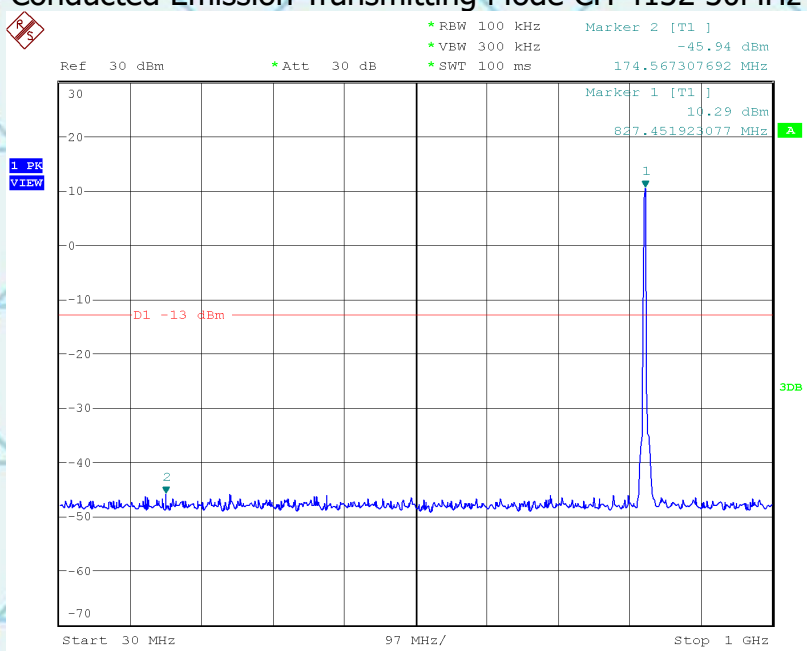
## Conducted Emission Transmitting Mode CH 9538 1GHz – 20GHz




Date: 30.AUG.2022 16:57:38

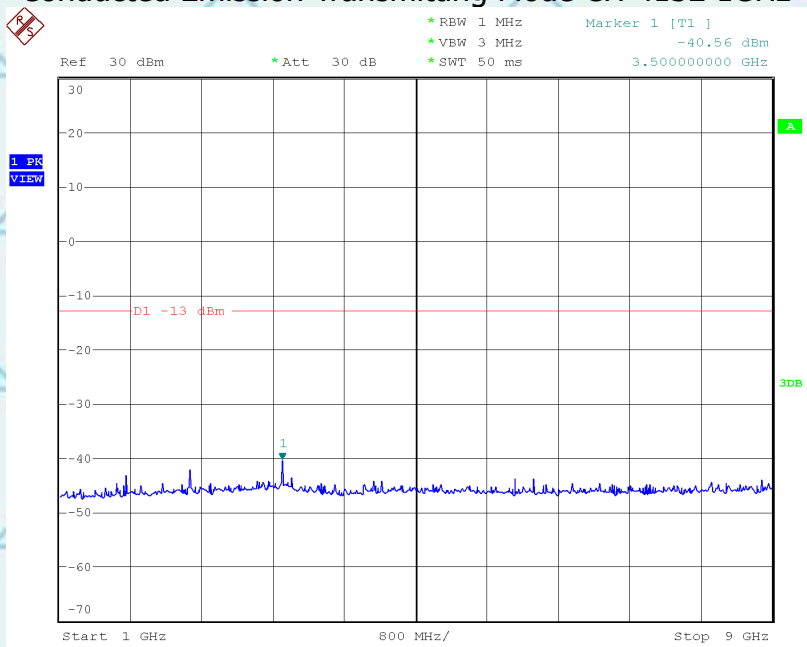
## CONDUCTED EMISSION IN WCDMA Band V

## Conducted Emission Transmitting Mode CH 4132 30MHz – 1GHz



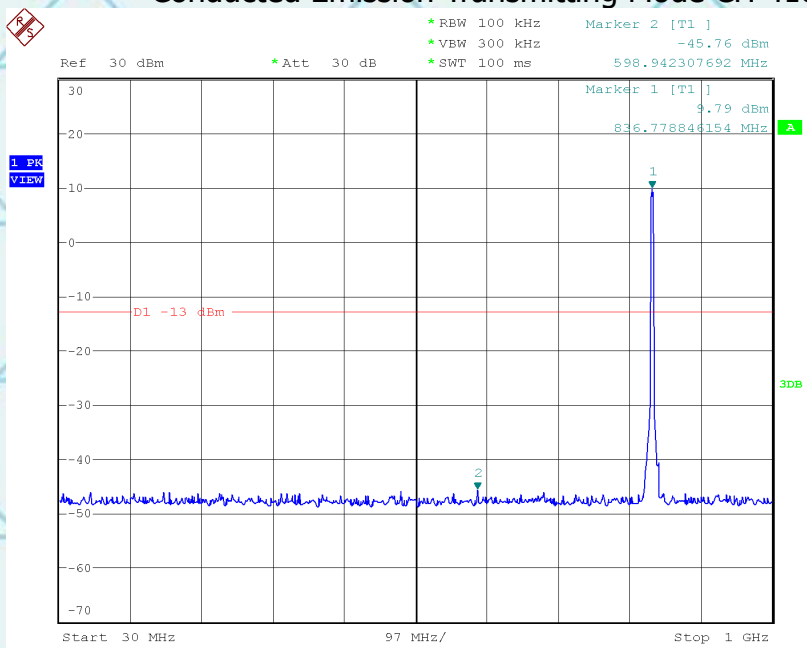

Date: 30.AUG.2022 17:00:28

## Conducted Emission Transmitting Mode CH 4132 1GHz – 9GHz



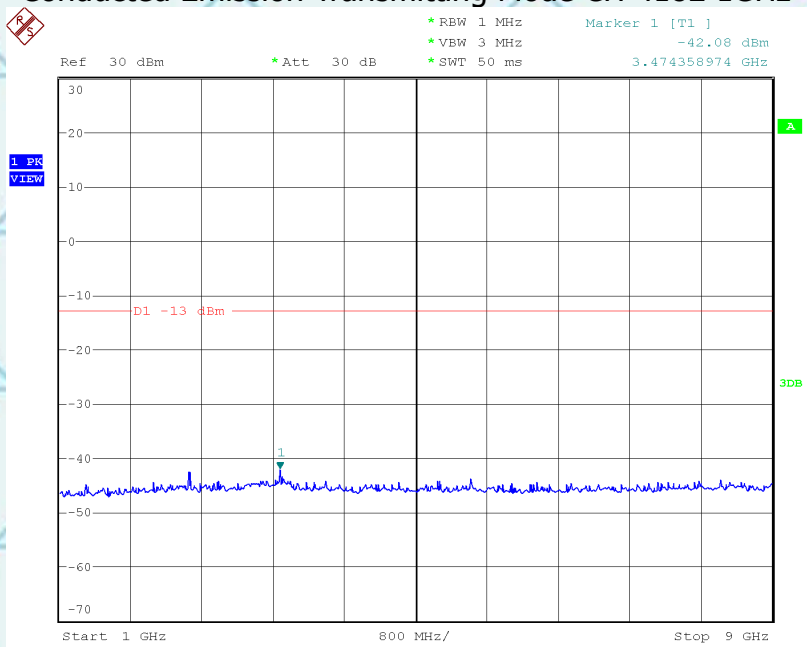

Date: 30.AUG.2022 17:01:30

## Conducted Emission Transmitting Mode CH 4182 30MHz – 1GHz



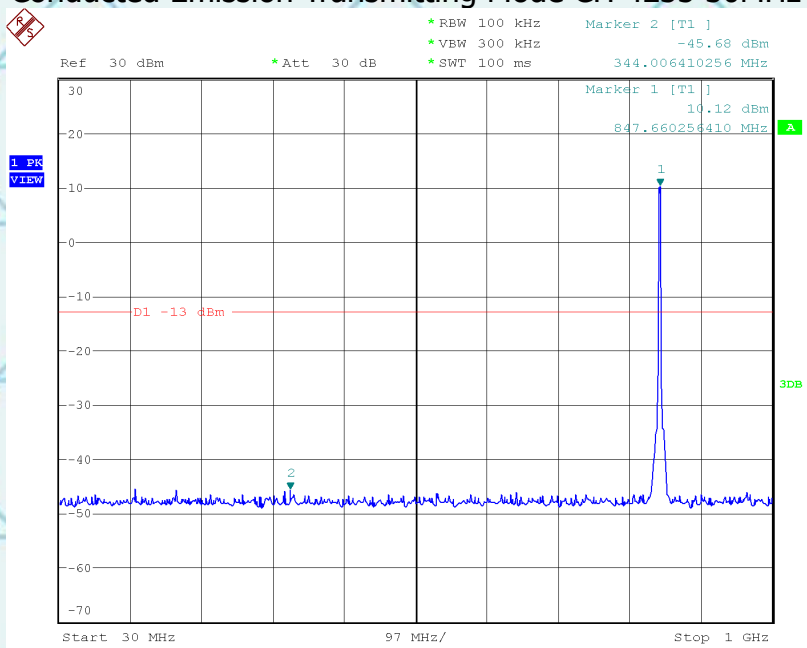

Date: 30.AUG.2022 17:04:53

## Conducted Emission Transmitting Mode CH 4182 1GHz – 9GHz



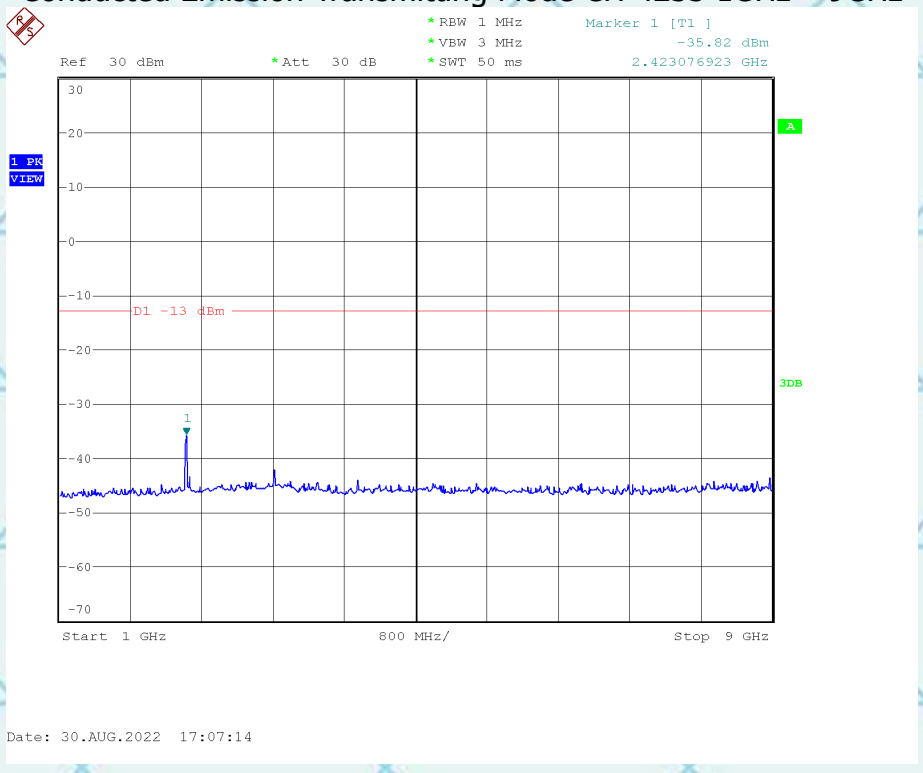

Date: 30.AUG.2022 17:03:15

## Conducted Emission Transmitting Mode CH 4233 30MHz – 1GHz




Date: 30.AUG.2022 17:06:02

## Conducted Emission Transmitting Mode CH 4233 1GHz – 9GHz



## Radiated method

Test limit:

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.

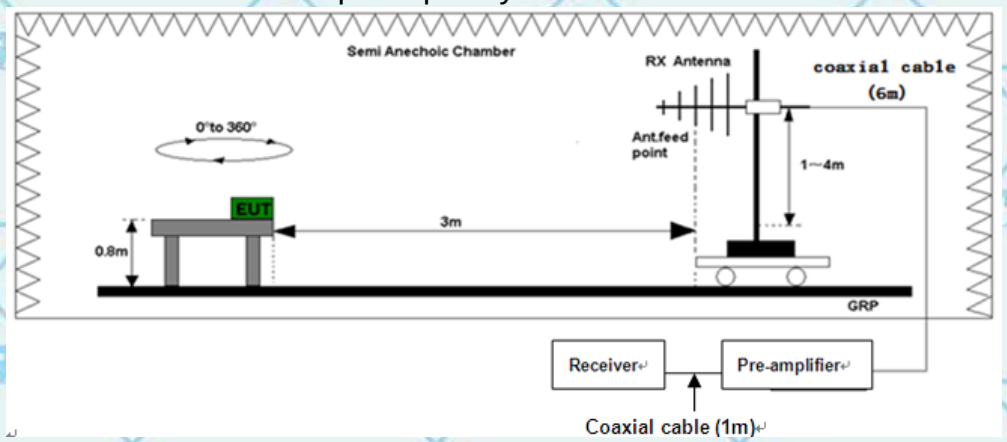
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

Test procedure:

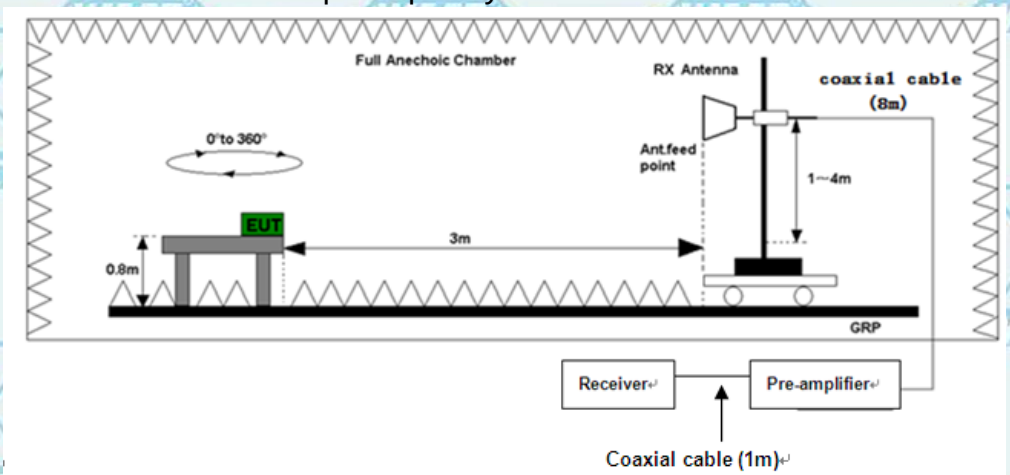
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

Test setup:

（A）Radiated Emission Test-Up Frequency 30MHz~1GHz




（B）Radiated Emission Test-Up Frequency Above 1GHz




**Note:**

***1**, Below 30MHz no Spurious found.*

*2, UE is positioned at 3 axis at the pre-scan stage, and only the measurement of the worst case(bandwidth:20MHz /Full RB /QPSK) is reported in this part.*

**List of final test modes:**
**GSM850:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 128 | 824.2 | Pass |
| 2 | 190 | 836.6 | Pass |
| 3 | 251 | 848.8 | Pass |

**PCS1900**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 512 | 1850.2 | Pass |
| 2 | 661 | 1880 | Pass |
| 3 | 810 | 1909.8 | Pass |

**UTRA BANDS**
**BAND 2:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 9262 | 1852.4 | Pass |
| 2 | 9400 | 1880 | Pass |
| 3 | 9538 | 1907.6 | Pass |

**BAND 5:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 4132 | 826.4 | Pass |
| 2 | 4182 | 836.4 | Pass |
| 3 | 4233 | 846.6 | Pass |

Test record:

Note:

1. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below:
   Power=$P_{Mea}$+$A_{Rpl}$
2. ARpl =Cable loss + Antenna gain

**GSM850:**

| Mode 1 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1648.4 | -48.34 | 0.5 | -48.84 | -13 | Horizontal |
| 1648.4 | -48.32 | 0.5 | -48.82 | -13 | Vertical |
| 2472.6 | -57.68 | 0.5 | -58.18 | -13 | Horizontal |
| 2472.6 | -50.49 | 0.5 | -50.99 | -13 | Vertical |

| Mode 2 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1673.2 | -54.28 | 0.5 | -54.78 | -13 | Horizontal |
| 1673.2 | -55.50 | 0.5 | -56.00 | -13 | Vertical |
| 2509.8 | -50.62 | 0.5 | -51.12 | -13 | Horizontal |
| 2509.8 | -49.86 | 0.5 | -50.36 | -13 | Vertical |

| Mode 3 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1697.6 | -48.28 | 0.5 | -48.78 | -13 | Horizontal |
| 1697.6 | -55.67 | 0.5 | -56.17 | -13 | Vertical |
| 2546.4 | -55.34 | 0.5 | -55.84 | -13 | Horizontal |
| 2546.4 | -49.49 | 0.5 | -49.99 | -13 | Vertical |

**PCS1900:**

| Mode 1 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3700.4 | -55.63 | 1.48 | -57.11 | -13 | Horizontal |
| 3700.4 | -54.33 | 1.48 | -55.81 | -13 | Vertical |
| 5550.6 | -54.60 | 1.48 | -56.08 | -13 | Horizontal |
| 5550.6 | -54.28 | 1.48 | -55.76 | -13 | Vertical |

| Mode 2 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3760 | -54.65 | 1.48 | -56.13 | -13 | Horizontal |
| 3760 | -53.25 | 1.48 | -54.73 | -13 | Vertical |
| 5640 | -49.24 | 1.48 | -50.72 | -13 | Horizontal |
| 5640 | -56.22 | 1.48 | -57.70 | -13 | Vertical |

| Mode 3 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3819.6 | -48.58 | 1.48 | -50.06 | -13 | Horizontal |
| 3819.6 | -51.47 | 1.48 | -52.95 | -13 | Vertical |
| 5729.4 | -51.89 | 1.48 | -53.37 | -13 | Horizontal |
| 5729.4 | -55.85 | 1.48 | -57.33 | -13 | Vertical |

**UTRA BANDS**

**BAND 2:**

| Mode 1 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3704.8 | -57.87 | 1.48 | -59.35 | -13 | Horizontal |
| 3704.8 | -58.00 | 1.48 | -59.48 | -13 | Vertical |
| 5557.2 | -55.04 | 1.48 | -56.52 | -13 | Horizontal |
| 5557.2 | -53.02 | 1.48 | -54.50 | -13 | Vertical |

| Mode 2 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3760 | -49.75 | 1.48 | -51.23 | -13 | Horizontal |
| 3760 | -48.90 | 1.48 | -50.38 | -13 | Vertical |
| 5640 | -54.12 | 1.48 | -55.60 | -13 | Horizontal |
| 5640 | -52.94 | 1.48 | -54.42 | -13 | Vertical |

| Mode 3 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 3815.2 | -57.52 | 1.48 | -59.00 | -13 | Horizontal |
| 3815.2 | -53.37 | 1.48 | -54.85 | -13 | Vertical |
| 5722.8 | -51.20 | 1.48 | -52.68 | -13 | Horizontal |
| 5722.8 | -55.93 | 1.48 | -57.41 | -13 | Vertical |

**BAND 5:**

| Mode 1 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1652.8 | -57.41 | 0.5 | -57.91 | -13 | Horizontal |
| 1652.8 | -48.78 | 0.5 | -49.28 | -13 | Vertical |
| 2479.2 | -53.60 | 0.5 | -54.10 | -13 | Horizontal |
| 2479.2 | -48.66 | 0.5 | -49.16 | -13 | Vertical |

| Mode 2 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1672.8 | -55.45 | 0.5 | -55.95 | -13 | Horizontal |
| 1672.8 | -49.38 | 0.5 | -49.88 | -13 | Vertical |
| 2509.2 | -57.26 | 0.5 | -57.76 | -13 | Horizontal |
| 2509.2 | -49.40 | 0.5 | -49.90 | -13 | Vertical |

| Mode 3 | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | ARpl (dBm) | PMea(dBm) | Limit（dBm） | Polarity |
| 1693.2 | -50.11 | 0.5 | -50.61 | -13 | Horizontal |
| 1693.2 | -48.38 | 0.5 | -48.88 | -13 | Vertical |
| 2539.8 | -53.19 | 0.5 | -53.69 | -13 | Horizontal |
| 2539.8 | -57.53 | 0.5 | -58.03 | -13 | Vertical |

# 8. OCCUPIED BANDWIDTH& Emission Bandwidth

Test limit:

The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission, shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user. [¡ì2.1049(h)]

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

The relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The test report shall specify which OBW is reported.

A spectrum/signal analyzer or other instrument providing a spectral display is recommended for these measurements and the video bandwidth shall be set to a value at least three times greater than the IF/resolution bandwidth to avoid any amplitude smoothing. Video filtering shall not be used during occupied bandwidth tests.

The OBW shall be measured for all operating conditions that will affect the bandwidth results (e.g. variable modulations, coding, or channel bandwidth settings). See section 4.

Test procedure:

Occupied bandwidth – relative measurement procedure

The reference value is the highest level of the spectral envelope of the modulated signal.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.

b) The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target “-X dB down” requirement (i.e., if the requirement calls for measuring the –26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference value).

f) Set the detection mode to peak, and the trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “-X dB down amplitude” as equal to (Reference Value – X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

i) Place two markers, one at the lowest and the other at the highest frequency of the

envelope of the spectral display such that each marker is at or slightly below the "–X dB down amplitude" determined in step g). If a marker is below this "-X dB down amplitude" value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Occupied bandwidth – power bandwidth (99%) measurement procedure

The following procedure shall be used for measuring (99 %) power bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

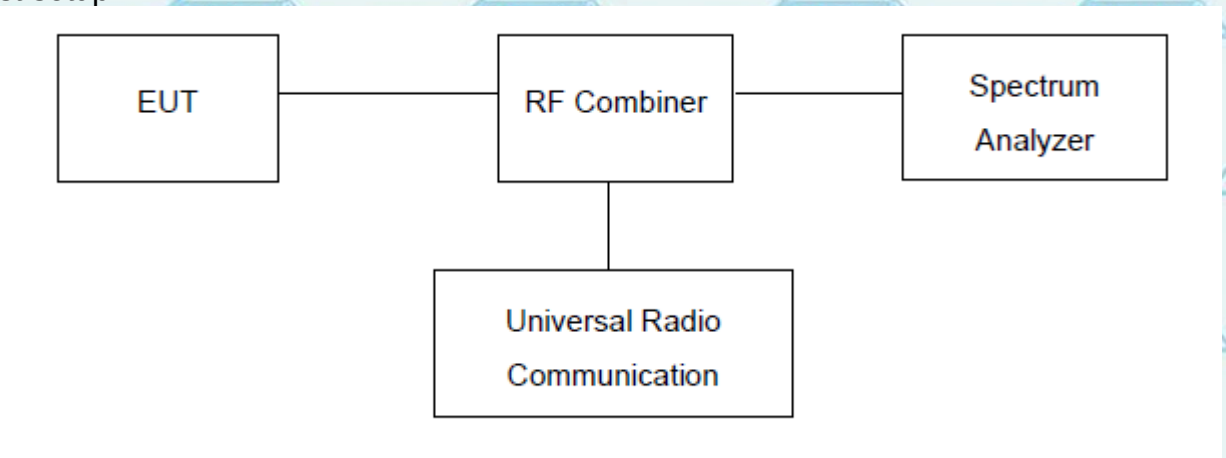
e) Set the detection mode to peak, and the trace mode to max hold..

f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test setup:



## Measurement Result

GSM850:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 824.2 | 245.192KHz | 312.500KHz |
| 836.6 | 246.795KHz | 312.500KHz |
| 848.8 | 245.192KHz | 310.897KHz |

PCS1900:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 1850.2 | 245.192KHz | 310.897KHz |
| 1880 | 243.590KHz | 318.910KHz |
| 1909.8 | 246.795KHz | 314.103KHz |

GPRS850:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 824.2 | 246.795KHz | 310.897KHz |
| 836.6 | 243.590KHz | 312.500KHz |
| 848.8 | 246.795KHz | 317.308KHz |

GPRS 1900:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 1850.2 | 246.795KHz | 314.103KHz |
| 1880 | 246.795KHz | 314.103KHz |
| 1909.8 | 248.397KHz | 307.692KHz |

EGPRS 850:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 824.2 | 243.590KHz | 314.103KHz |
| 836.6 | 248.397KHz | 317.308KHz |
| 848.8 | 245.192KHz | 312.500KHz |

EGPRS 1900:

| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 1850.2 | 245.192KHz | 304.487KHz |
| 1880 | 243.590KHz | 317.308KHz |
| 1909.8 | 245.192KHz | 317.308KHz |

UTRA BANDS
BAND 2:

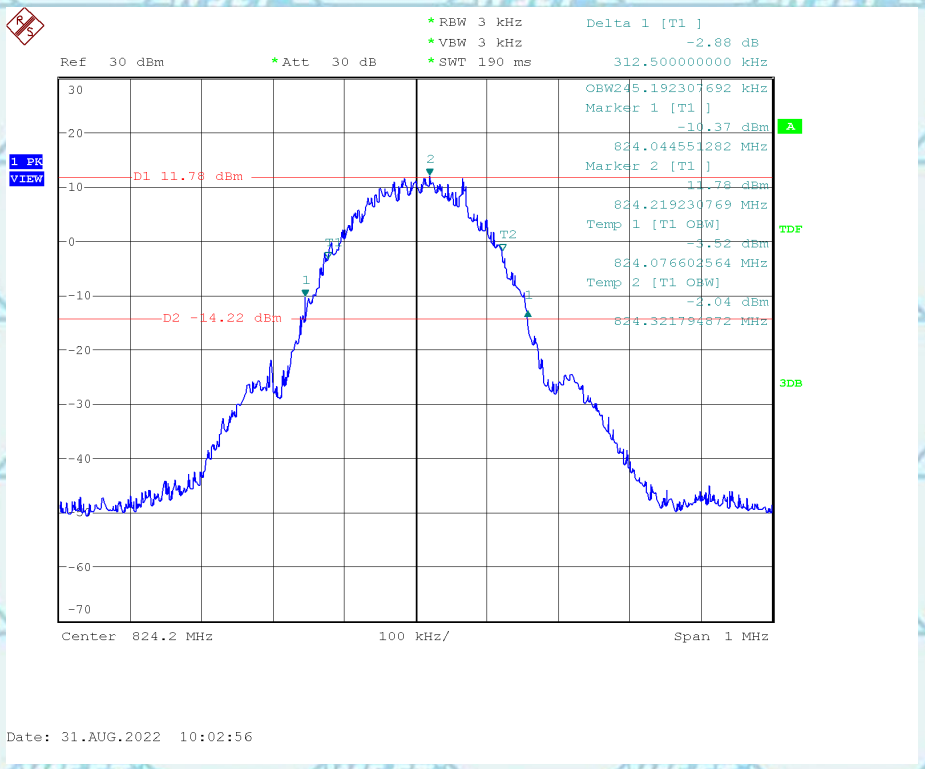
| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 1852.4 | 4.103MHz | 4.663MHz |
| 1880 | 4.103MHz | 4.647MHz |
| 1907.6 | 4.103MHz | 4.631MHz |

BAND 5:

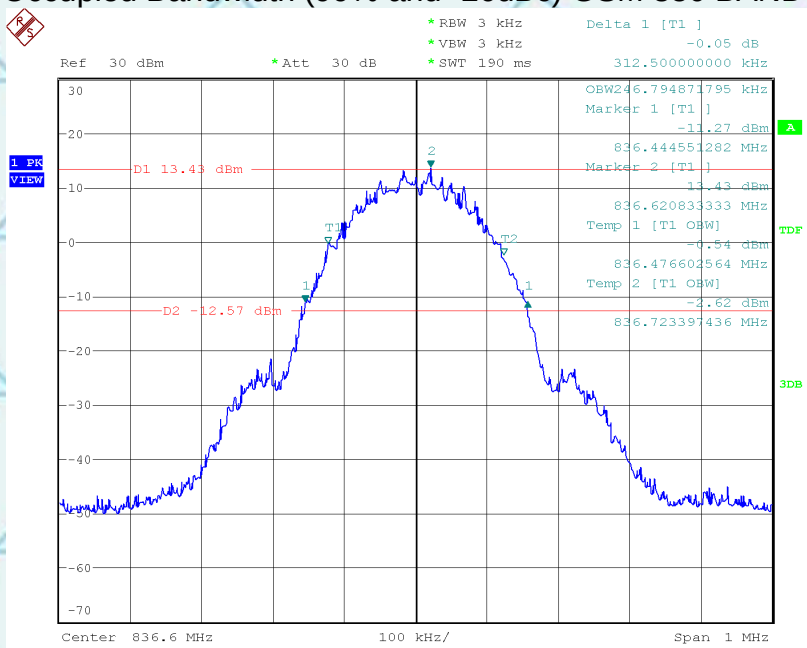
| Frequency | OBW(99%) | 26dB BW |
|---|---|---|
| 826.4 | 4.103MHz | 4.647MHz |
| 836.4 | 4.103MHz | 4.631MHz |
| 846.6 | 4.103MHz | 4.663 MHz |

## Test Plot(s)

Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 128

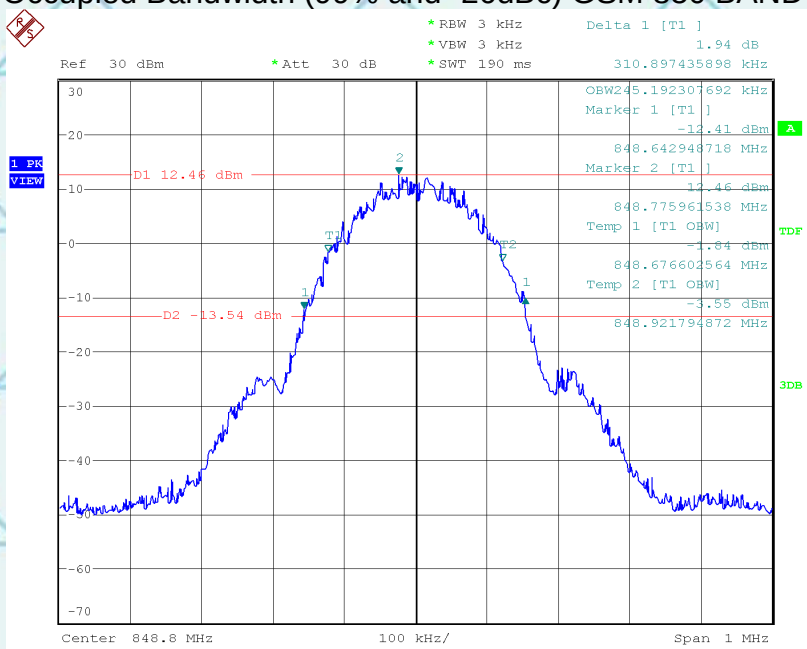


## Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 190



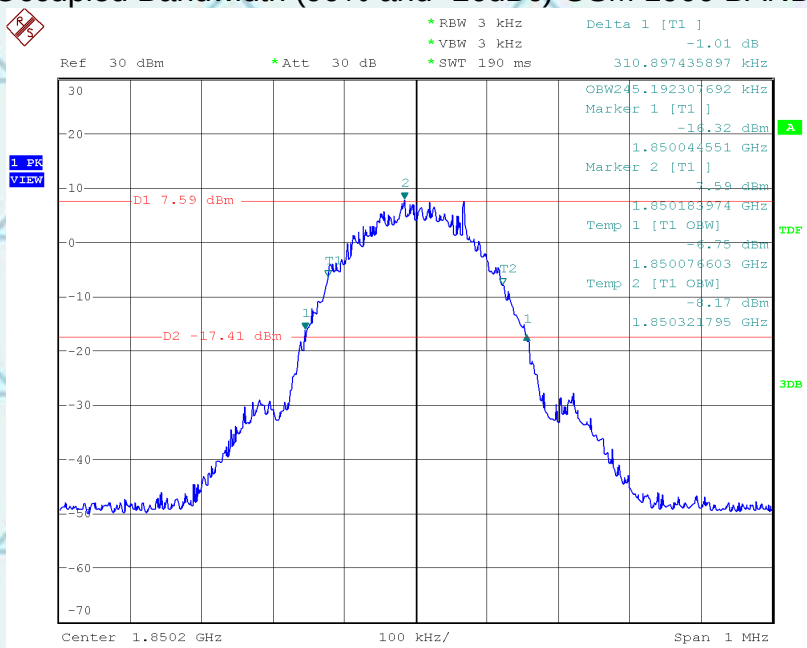

Date: 31.AUG.2022 10:06:42

## Occupied Bandwidth (99% and -26dBc) GSM 850 BAND CH 251



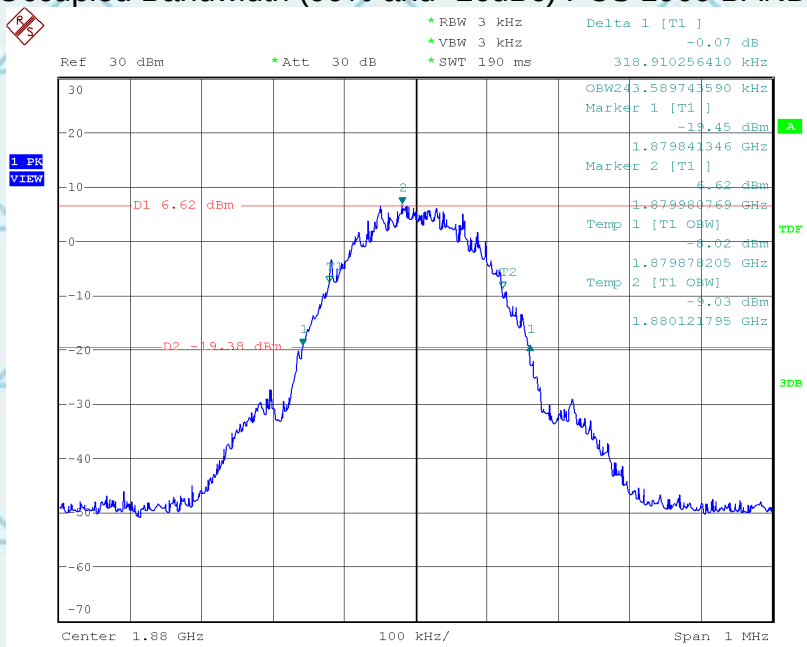

Date: 31.AUG.2022 09:52:27

## Occupied Bandwidth (99% and -26dBc) GSM 1900 BAND CH 512



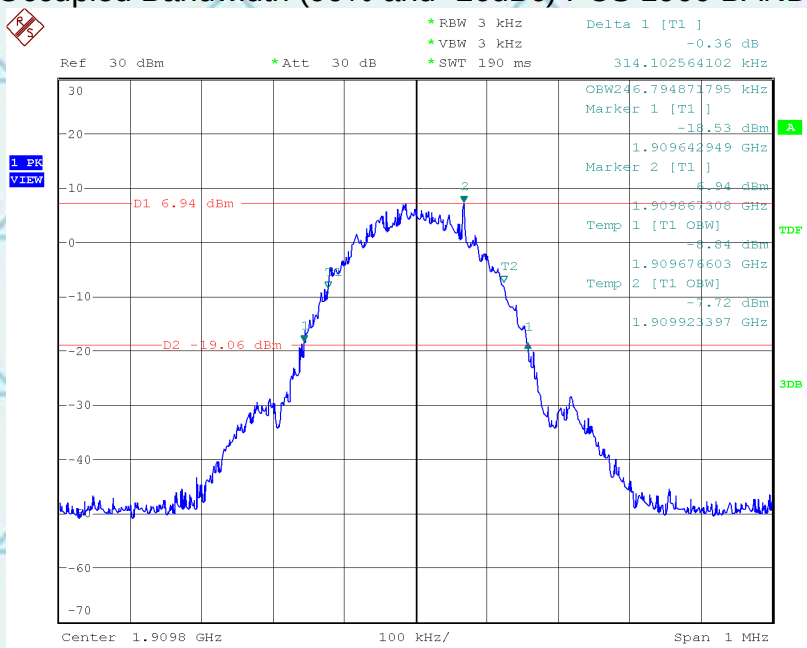

Date: 31.AUG.2022 10:10:48

## Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 661



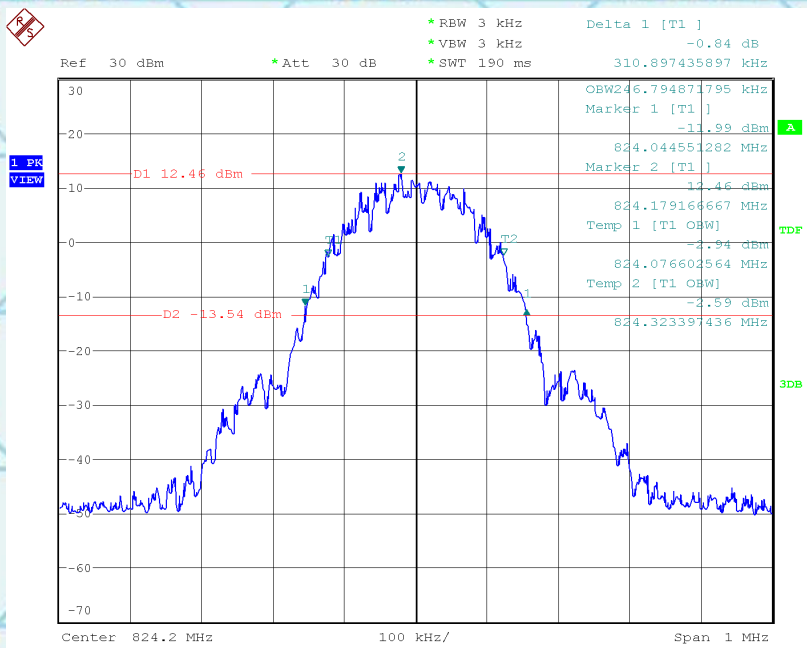

Date: 31.AUG.2022 10:13:04

## Occupied Bandwidth (99% and -26dBc) PCS 1900 BAND CH 810



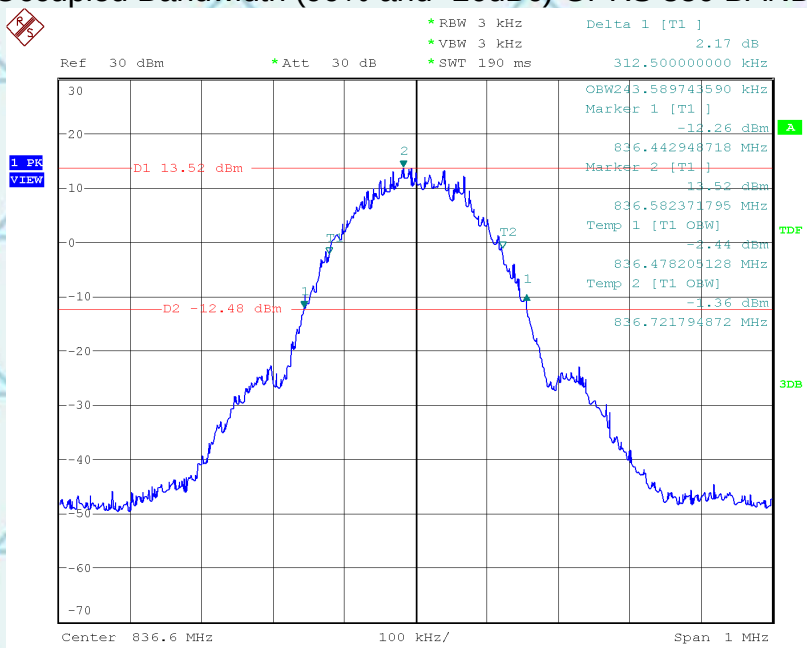

Date: 31.AUG.2022 10:15:15

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 128



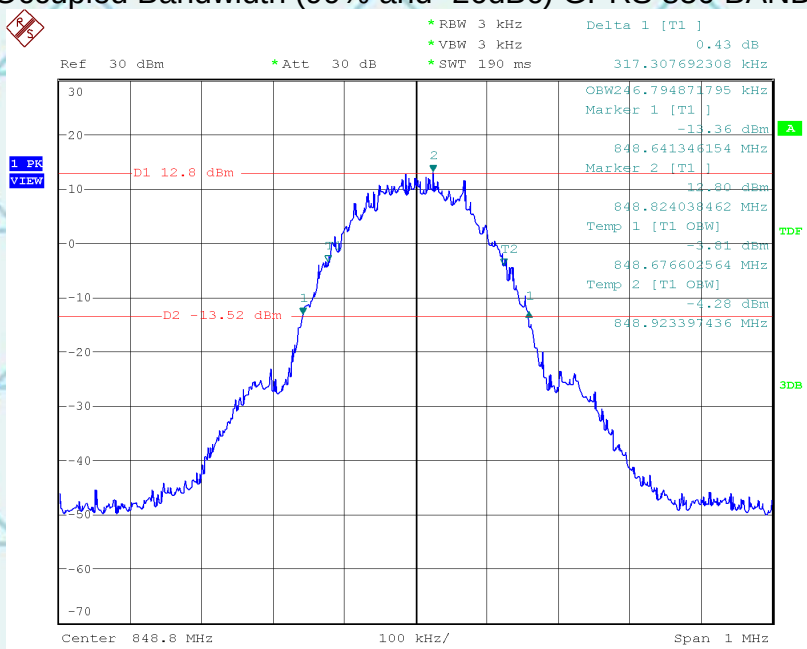

Date: 31.AUG.2022 10:38:31

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 190



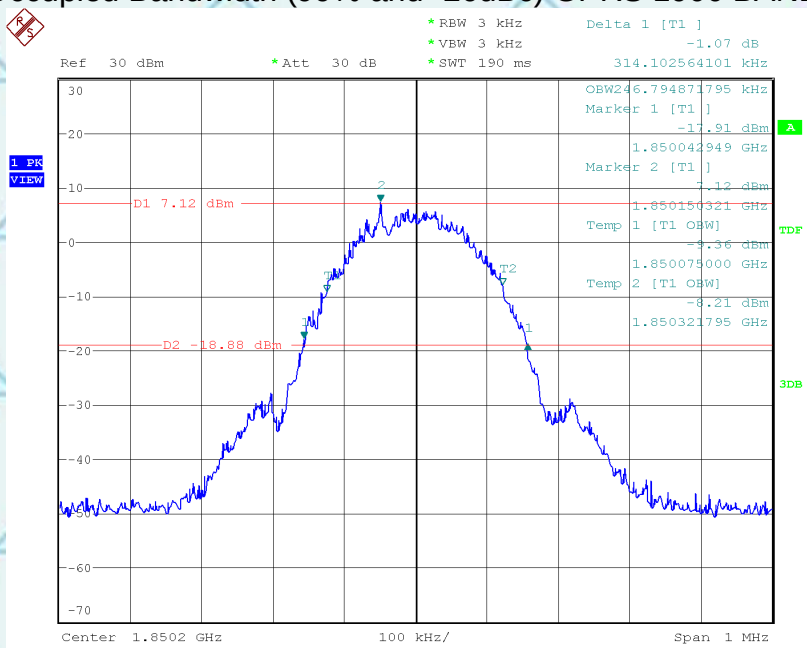

Date: 31.AUG.2022 10:42:54

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 251

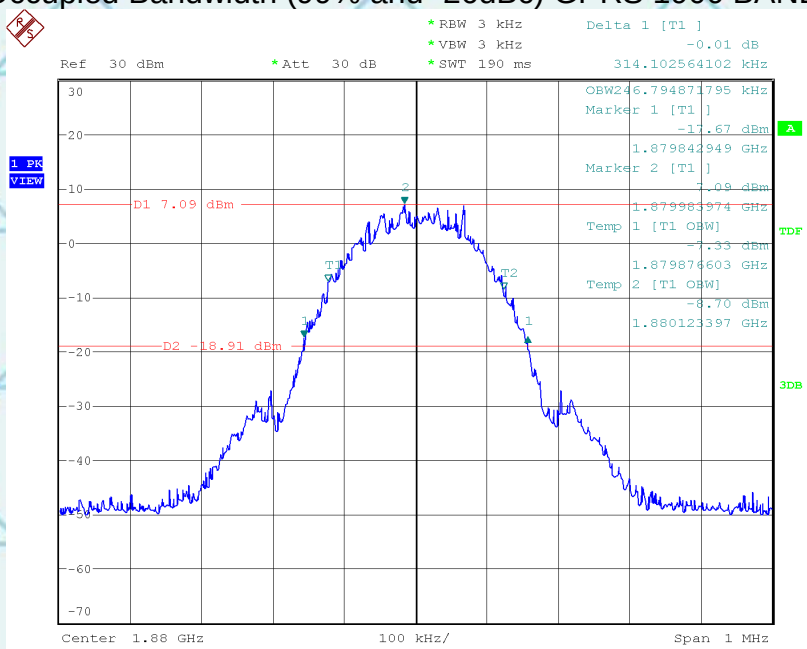



Date: 31.AUG.2022 10:45:32

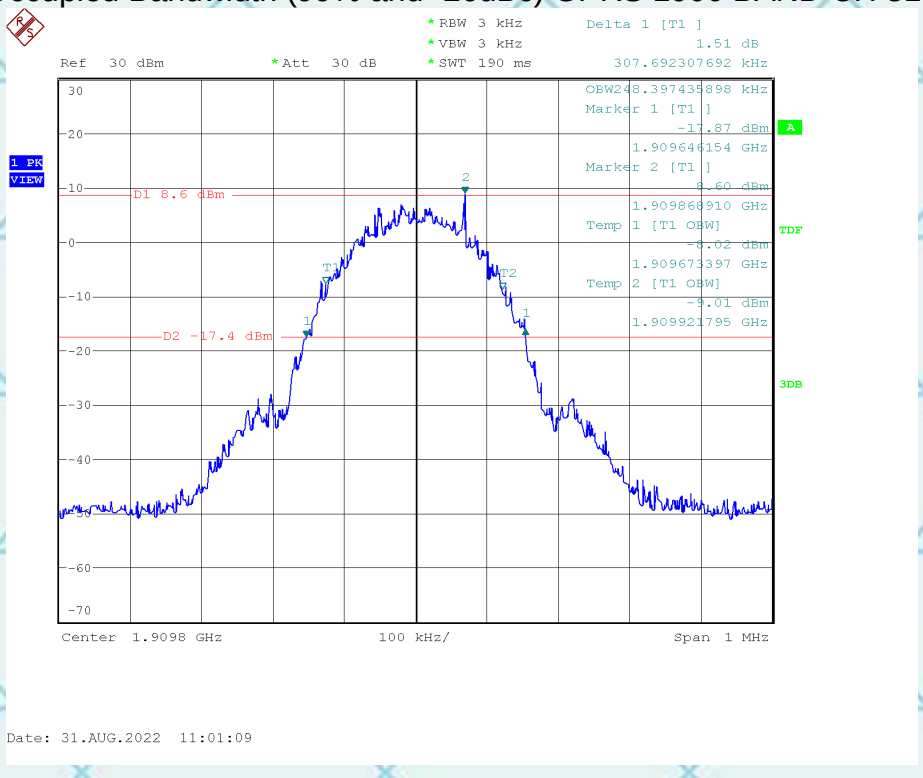
## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 512



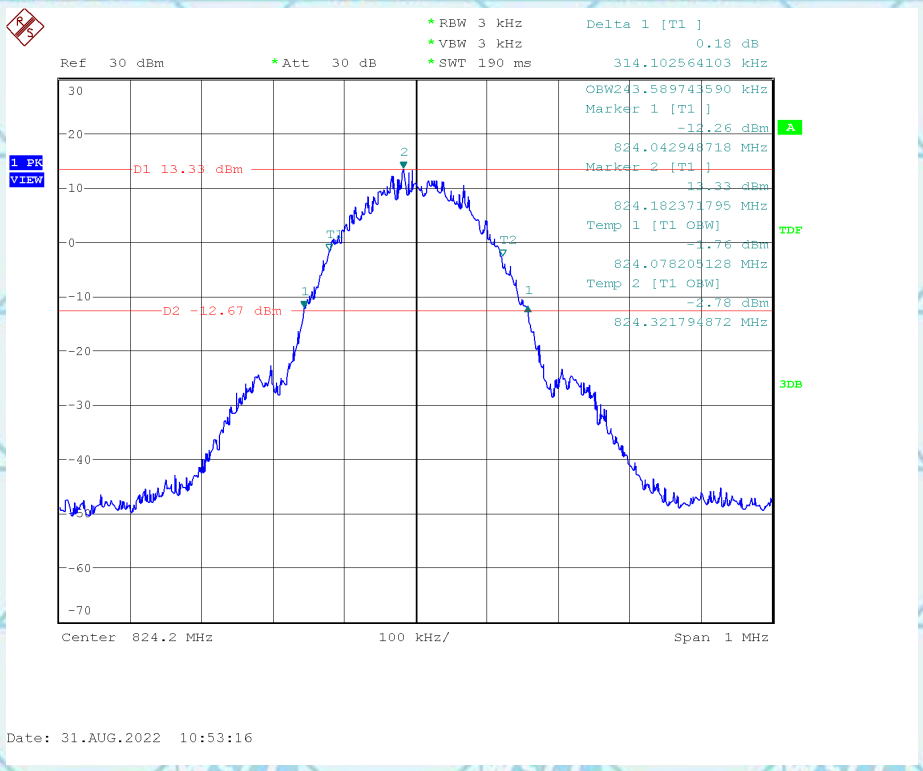

## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 661



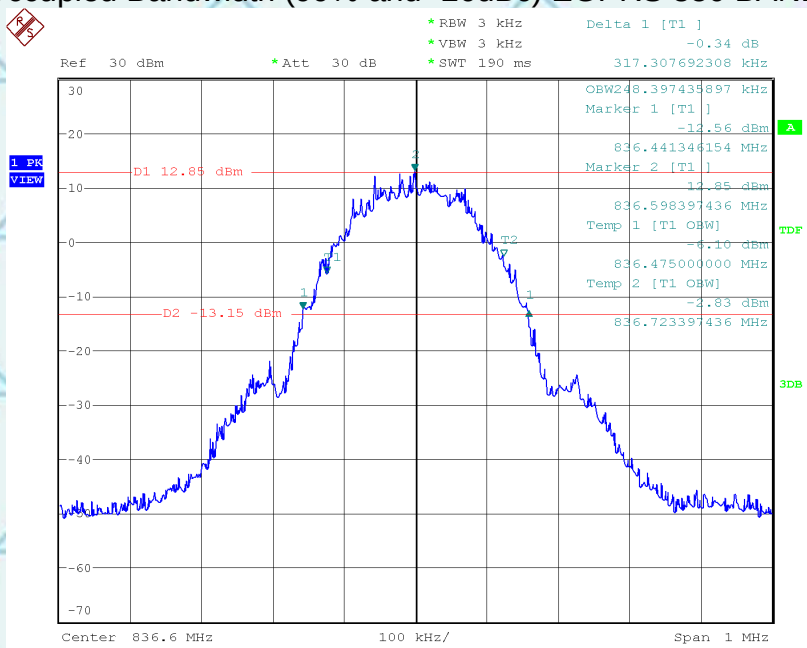
## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 810




## Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 128

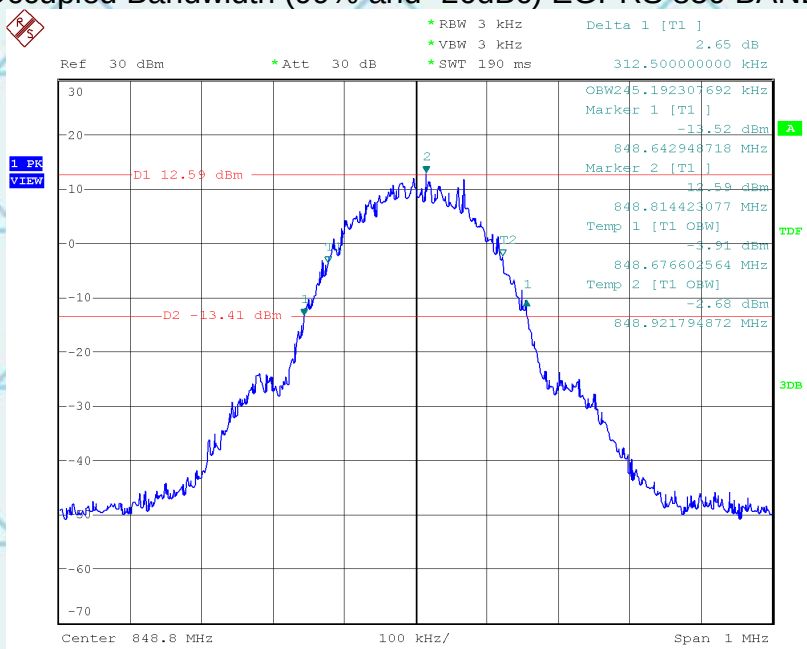


## Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 190



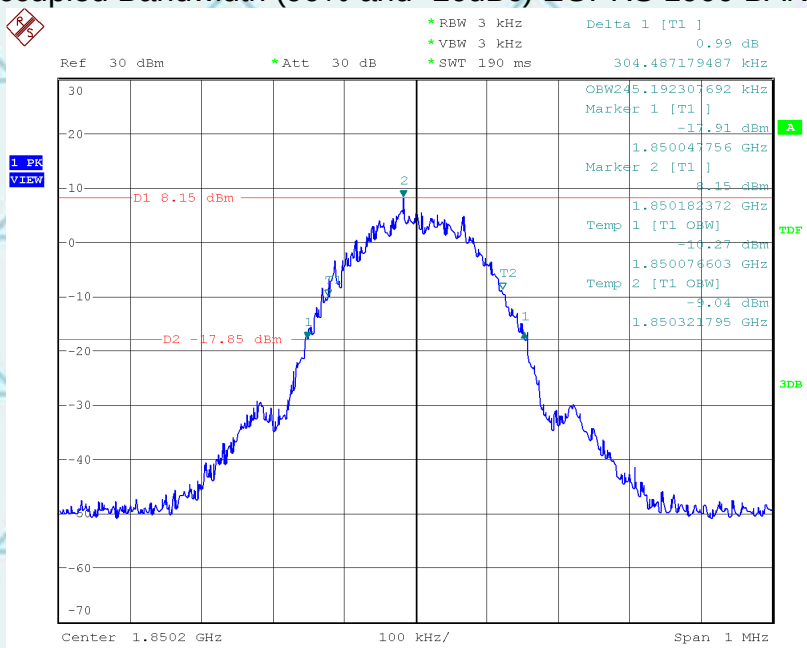

Date: 31.AUG.2022 10:50:23

## Occupied Bandwidth (99% and -26dBc) EGPRS 850 BAND CH 251



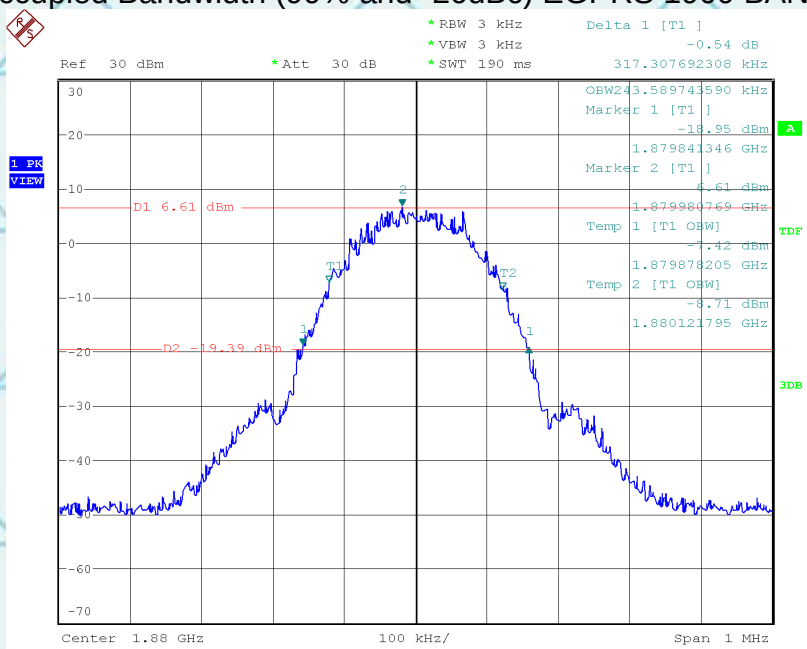

Date: 31.AUG.2022 10:48:26

## Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 512



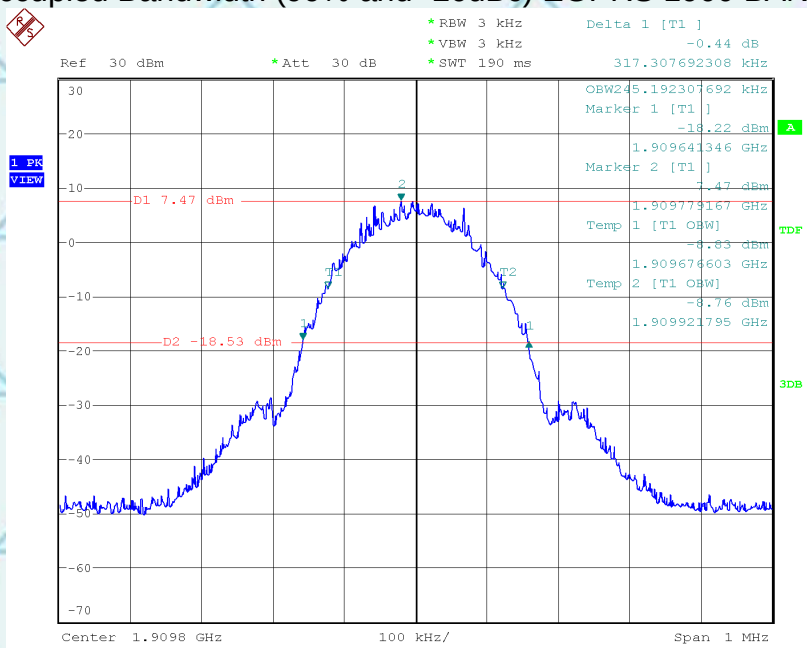

Date: 31.AUG.2022 11:12:56

## Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 661



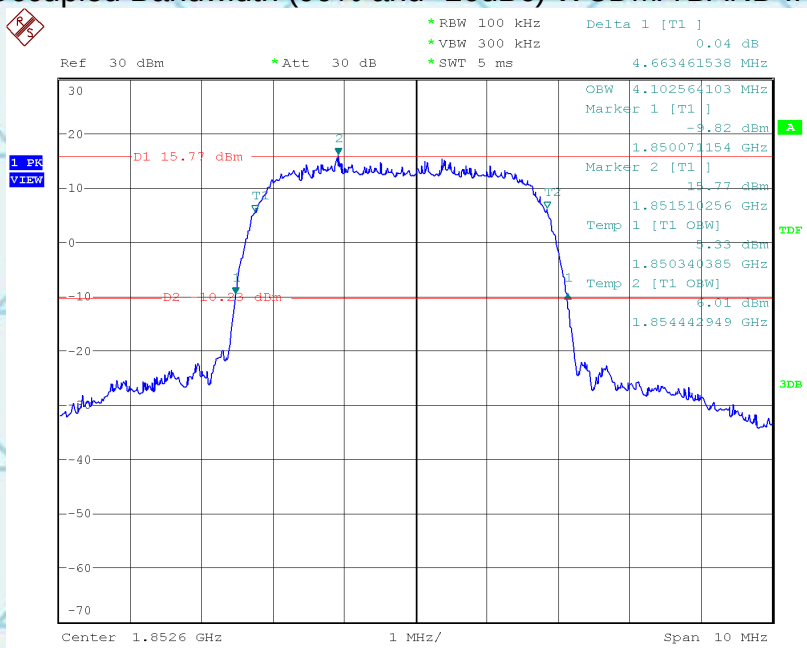

Date: 31.AUG.2022 11:10:26

## Occupied Bandwidth (99% and -26dBc) EGPRS 1900 BAND CH 810

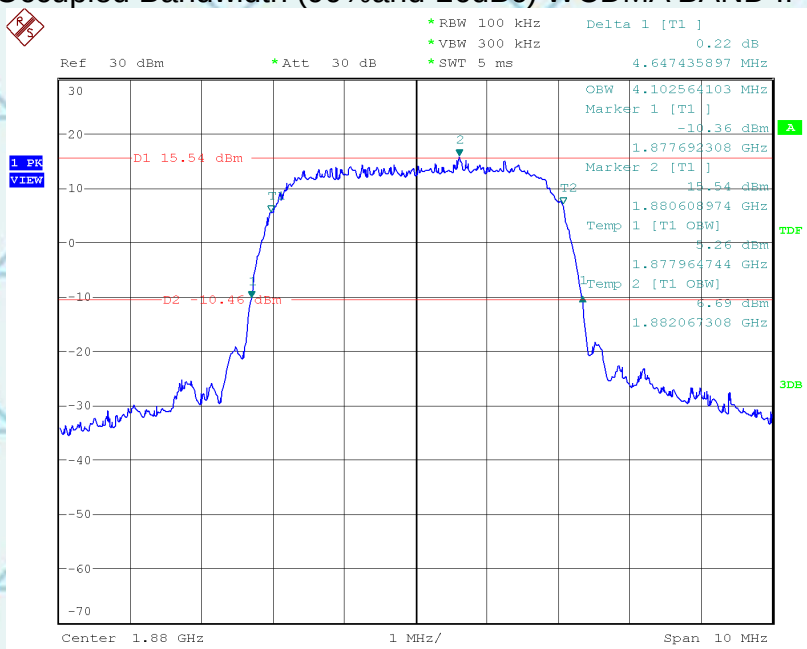



## UTRA BANDS

## Occupied Bandwidth (99% and -26dBc) WCDMA BAND II CH 9262

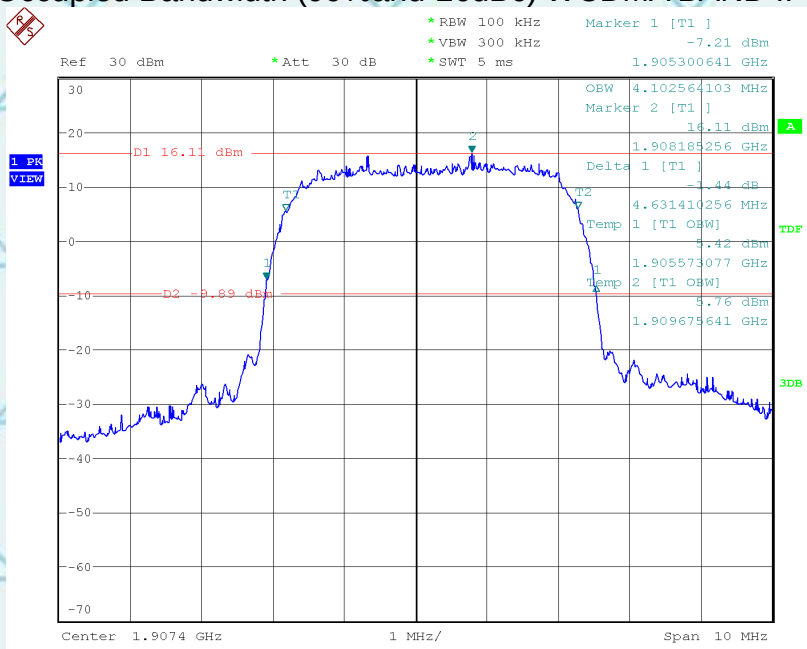


## Occupied Bandwidth (99%and-26dBc) WCDMA BAND II CH 9400



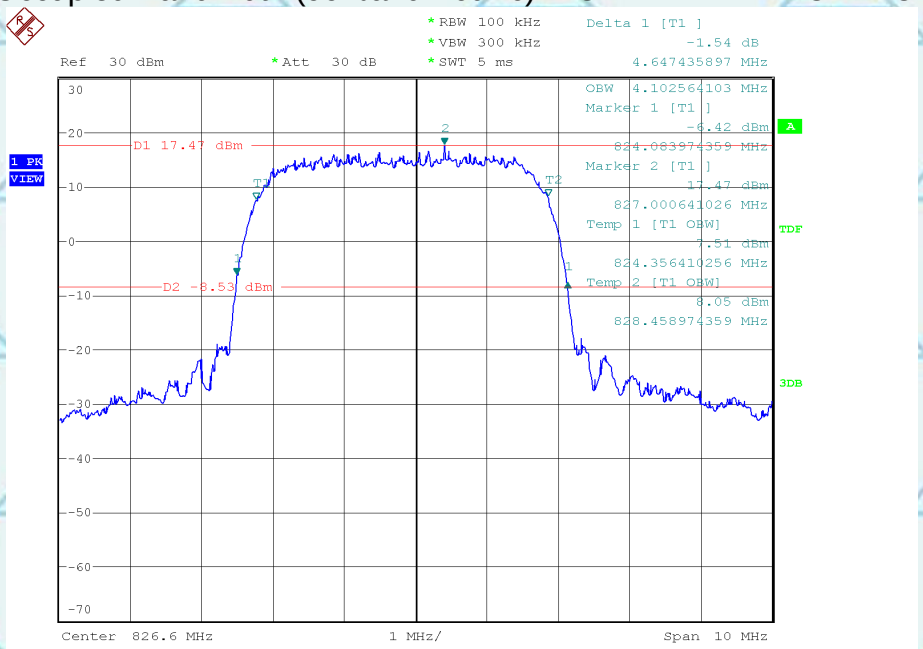

Date: 30.AUG.2022 14:57:36

## Occupied Bandwidth (99%and-26dBc) WCDMA BAND II CH 9538



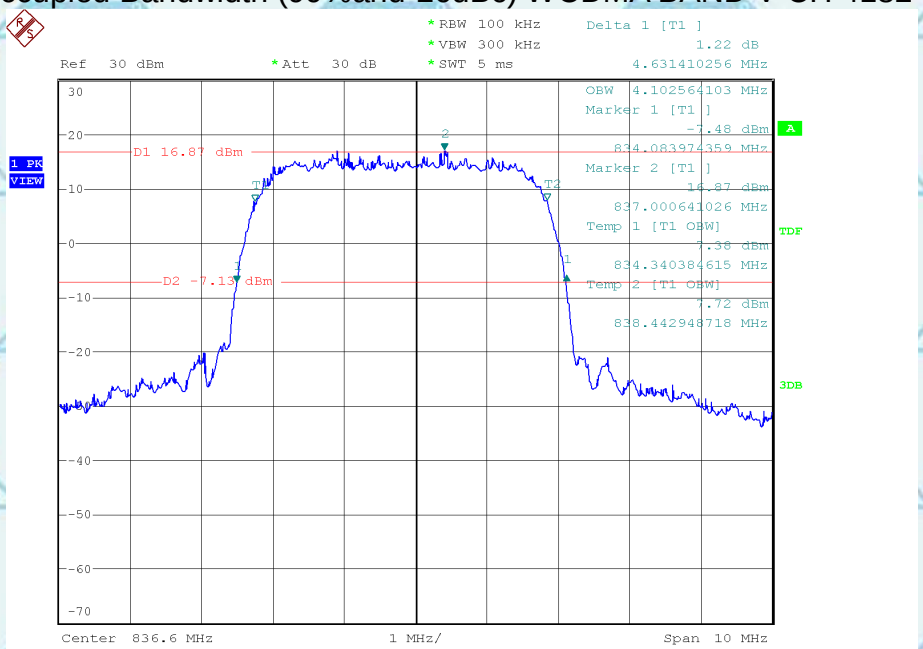

Date: 30.AUG.2022 14:59:55

## Occupied Bandwidth (99%and-26dBc) WCDMA BAND V CH 4132



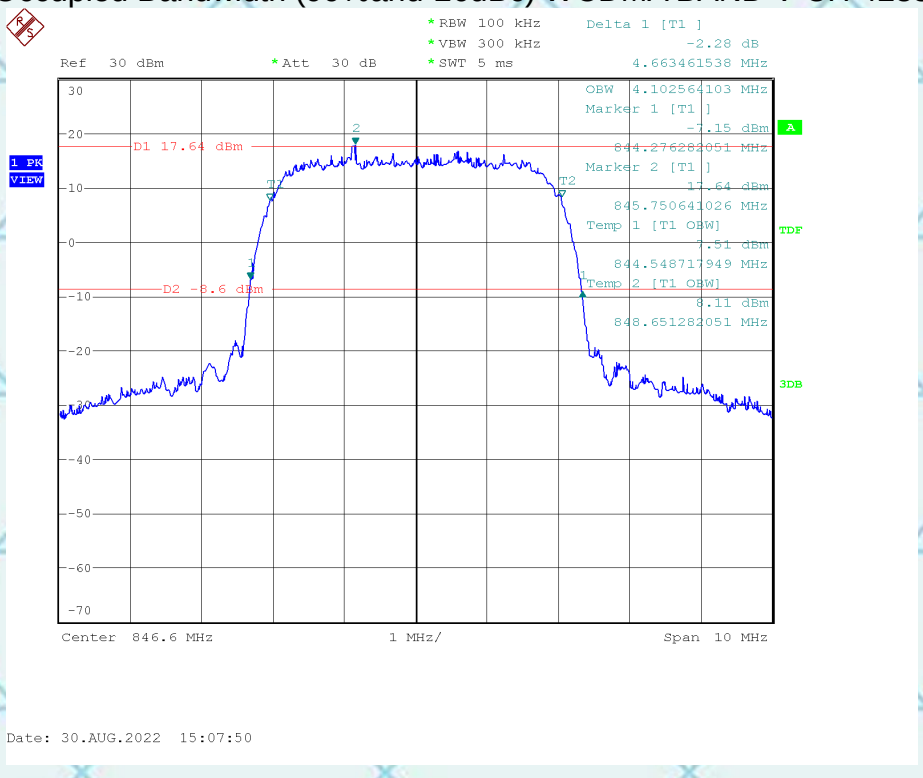

Date: 30.AUG.2022 15:03:05

## Occupied Bandwidth (99%and-26dBc) WCDMA BAND V CH 4182




Date: 30.AUG.2022 15:05:35

# Occupied Bandwidth (99%and-26dBc) WCDMA BAND V CH 4233



# 9. BAND EDGE

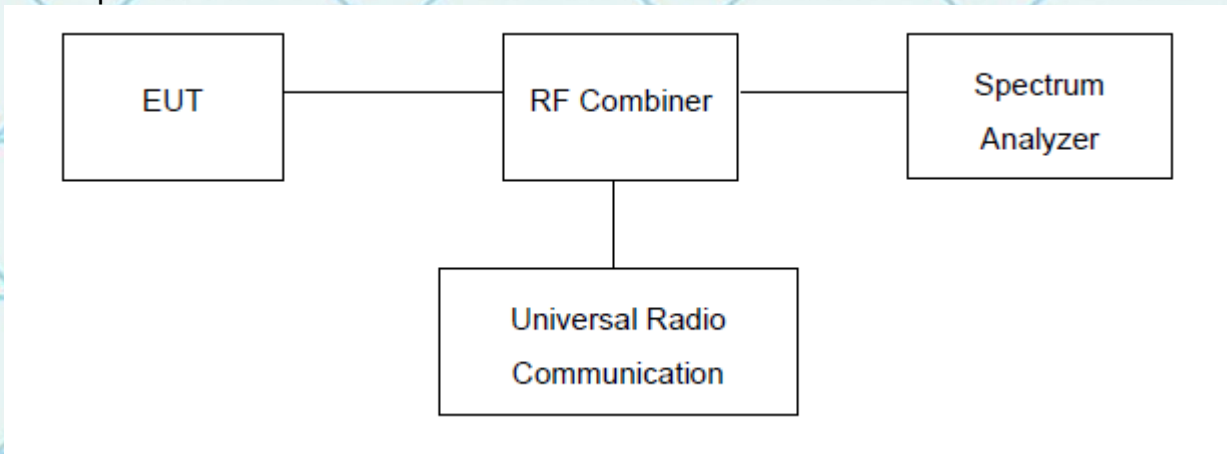
Test Limit:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified. See section 4.

Test procedure:

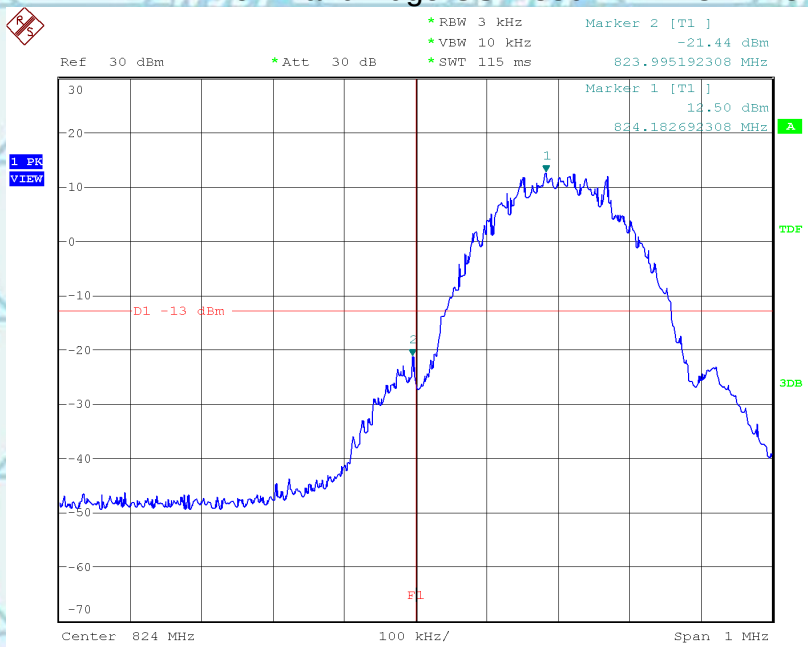
The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test setup:



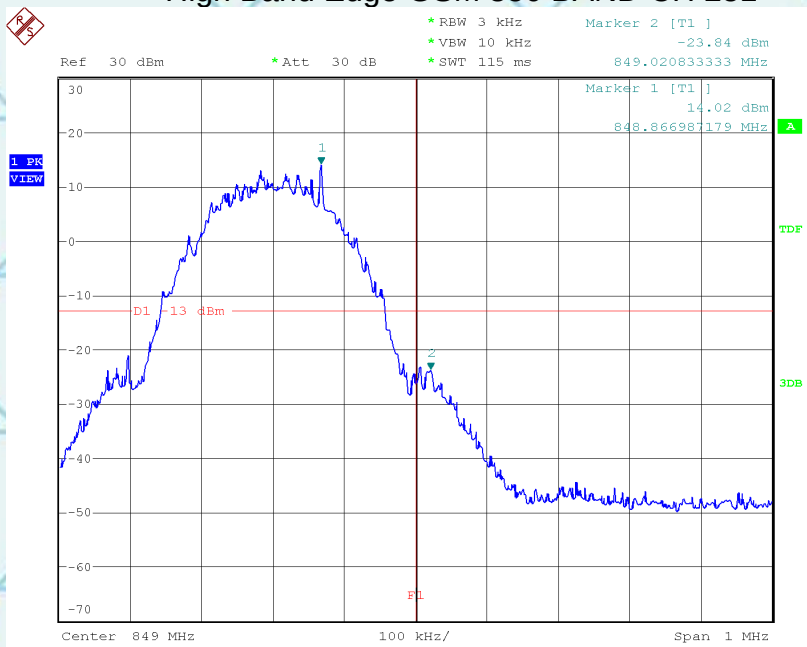
## Measurement Result
## Test Plot(s)

### Low Band Edge GSM 850 BAND CH 128



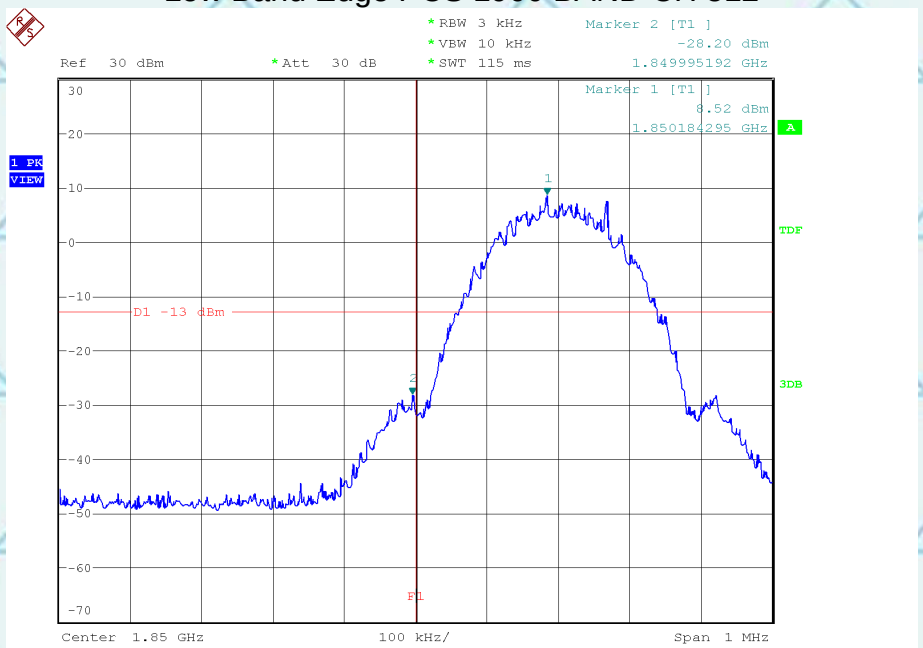

Date: 31.AUG.2022 09:57:58

### High Band Edge GSM 850 BAND CH 251

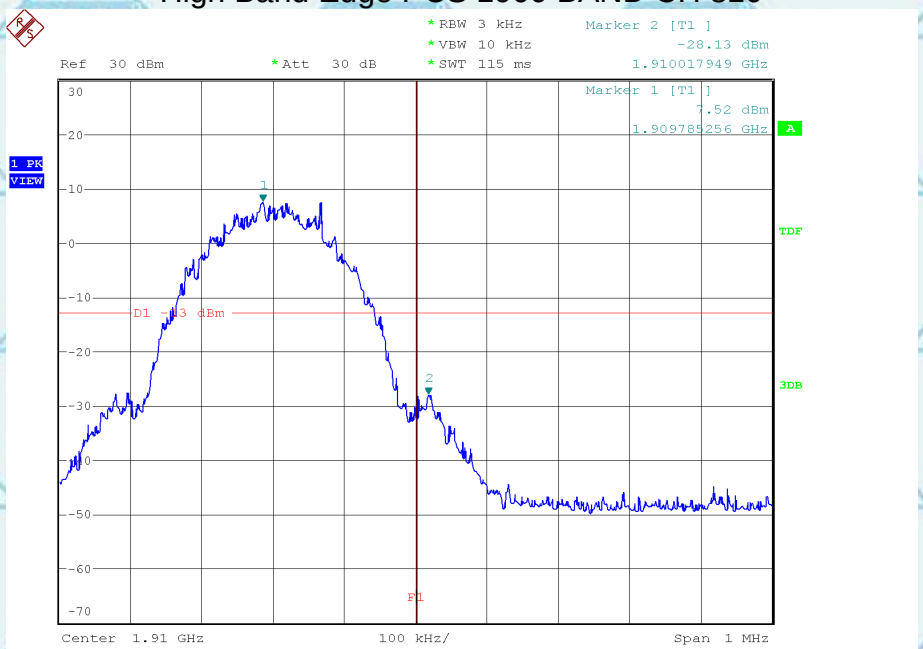



Date: 31.AUG.2022 09:59:42

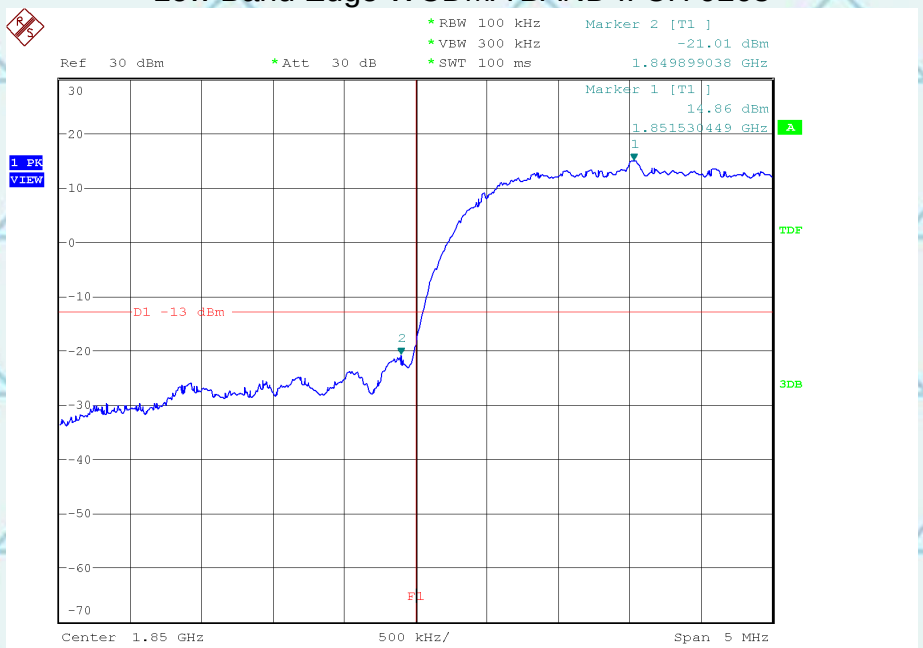
## Low Band Edge PCS 1900 BAND CH 512




## High Band Edge PCS 1900 BAND CH 810

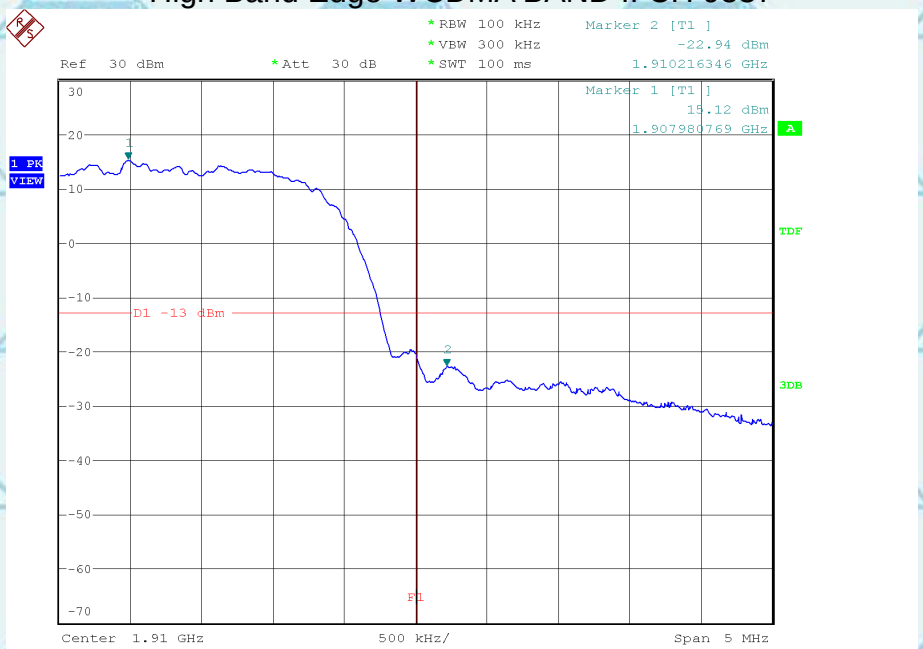


## Low Band Edge WCDMA BAND II CH 9263



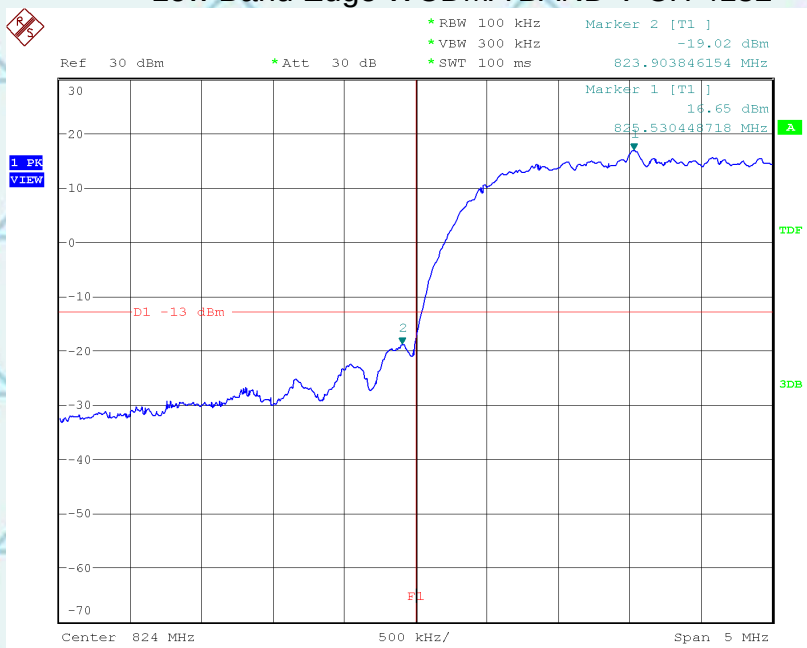

Date: 30.AUG.2022 15:46:10

## High Band Edge WCDMA BAND II CH 9537



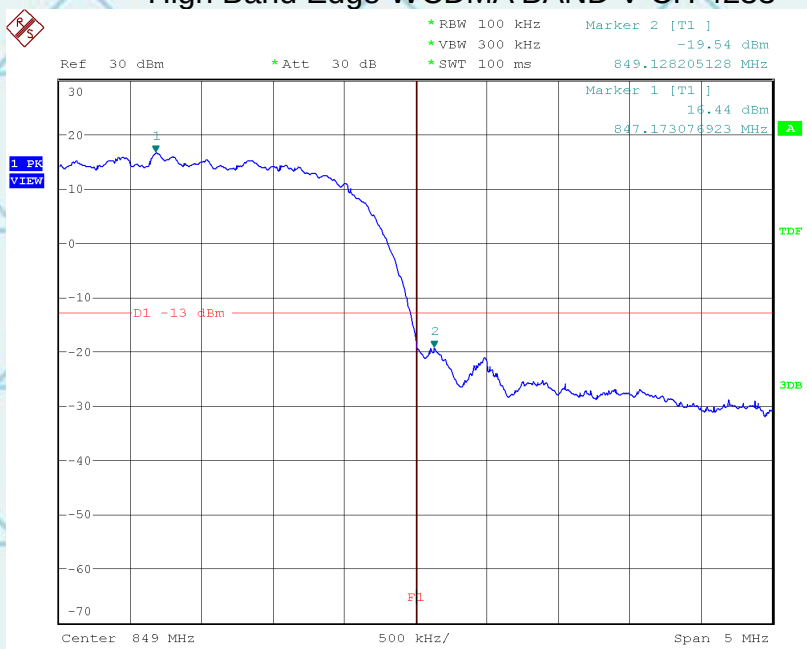

Date: 30.AUG.2022 15:48:56

## Low Band Edge WCDMA BAND V CH 4132




Date: 30.AUG.2022 15:53:11

## High Band Edge WCDMA BAND V CH 4233




Date: 30.AUG.2022 15:54:46

# 10. FREQUENCY STABILITY

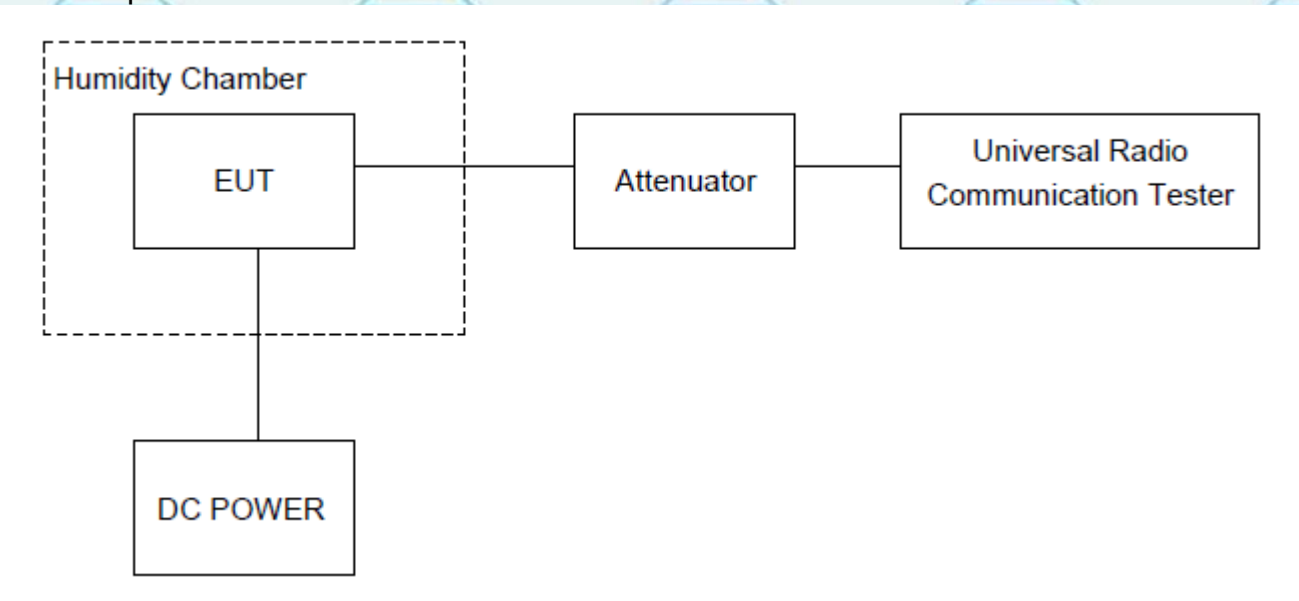
## Test limit:

The frequency stability of the transmitter shall be measured while varying the ambient temperatures and supply voltages over the ranges specified in §2.1055. The specific frequency stability limits are provided in the relevant rules section(s). see section 4.

## Test procedure:

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

## Test setup:



## 10.1. Measurement Result (Worst)

**Frequency Error against Voltage for GSM 850 band (836.6MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error (ppm) |
|---|---|---|
| 3.5 | 35 | 0.041 |
| 3.7 | 39 | 0.046 |
| 4.2 | 40 | 0.048 |

**Frequency Error against Temperature for GSM 850 band (836.6MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 29 | 0.035 |
| 0 | 35 | 0.041 |
| 10 | 31 | 0.037 |
| 20 | 37 | 0.044 |
| 30 | 33 | 0.039 |
| 40 | 28 | 0.034 |
| 50 | 30 | 0.036 |

**Frequency Error against Voltage for PCS 1900 band (1880MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 3.5 | 29 | 0.016 |
| 3.7 | 29 | 0.015 |
| 4.2 | 32 | 0.017 |

**Frequency Error against Temperature for PCS 1900 band (1880MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 29 | 0.016 |
| 0 | 41 | 0.022 |
| 10 | 34 | 0.018 |
| 20 | 35 | 0.019 |
| 30 | 36 | 0.019 |
| 40 | 35 | 0.019 |
| 50 | 36 | 0.019 |

**Frequency Error against Voltage for GPRS 850 band (836.6MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error (ppm) |
|---|---|---|
| 3.5 | 39 | 0.047 |
| 3.7 | 35 | 0.042 |
| 4.2 | 29 | 0.035 |

**Frequency Error against Temperature for GPRS 850 band (836.6MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 31 | 0.037 |
| 0 | 39 | 0.046 |
| 10 | 38 | 0.045 |
| 20 | 31 | 0.037 |
| 30 | 39 | 0.047 |
| 40 | 29 | 0.034 |
| 50 | 33 | 0.039 |

**Frequency Error against Voltage for GPRS 1900 band (1880MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 3.5 | 37 | 0.020 |
| 3.7 | 28 | 0.015 |
| 4.2 | 31 | 0.017 |

**Frequency Error against Temperature for GPRS 1900 band (1880MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 32 | 0.017 |
| 0 | 31 | 0.017 |
| 10 | 34 | 0.018 |
| 20 | 39 | 0.021 |
| 30 | 29 | 0.015 |
| 40 | 40 | 0.021 |
| 50 | 39 | 0.021 |

**Frequency Error against Voltage for EGPRS 850 band (836.6MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error (ppm) |
|---|---|---|
| 3.5 | 40 | 0.047 |
| 3.7 | 39 | 0.046 |
| 4.2 | 37 | 0.044 |

**Frequency Error against Temperature for EGPRS 850 band (836.6MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 29 | 0.034 |
| 0 | 28 | 0.034 |
| 10 | 39 | 0.047 |
| 20 | 34 | 0.041 |
| 30 | 28 | 0.034 |
| 40 | 30 | 0.036 |
| 50 | 33 | 0.040 |

**Frequency Error against Voltage for EGPRS 1900 band (1880MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 3.5 | 36 | 0.019 |
| 3.7 | 31 | 0.017 |
| 4.2 | 35 | 0.018 |

**Frequency Error against Temperature for EGPRS 1900 band (1880MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 30 | 0.016 |
| 0 | 39 | 0.021 |
| 10 | 29 | 0.016 |
| 20 | 37 | 0.020 |
| 30 | 29 | 0.015 |
| 40 | 35 | 0.019 |
| 50 | 40 | 0.021 |

## UTRA BANDS

**Frequency Error against Voltage for WCDMA BAND 2 (1880MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error (ppm) |
|---|---|---|
| 3.5 | 28 | 0.015 |
| 3.7 | 37 | 0.020 |
| 4.2 | 30 | 0.016 |

**Frequency Error against Temperature for WCDMA BAND 2 (1880MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 31 | 0.016 |
| 0 | 35 | 0.019 |
| 10 | 35 | 0.019 |
| 20 | 35 | 0.018 |
| 30 | 36 | 0.019 |
| 40 | 34 | 0.018 |
| 50 | 36 | 0.019 |

**Frequency Error against Voltage for WCDMA BAND 5 (836.4MHz)**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 3.5 | 38 | 0.046 |
| 3.7 | 30 | 0.036 |
| 4.2 | 40 | 0.047 |

**Frequency Error against Temperature for WCDMA BAND 5 (836.4MHz)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 37 | 0.044 |
| 0 | 33 | 0.039 |
| 10 | 28 | 0.034 |
| 20 | 32 | 0.039 |
| 30 | 33 | 0.039 |
| 40 | 35 | 0.042 |
| 50 | 30 | 0.036 |

**---END OF REPORT---**