# FCC RADIO TEST REPORT

| | | |
|---|---|---|
| FCC ID | : | J9C-M2X72 |
| Equipment | : | Module |
| Brand Name | : | Qualcomm |
| Model Name | : | M2X72 |
| Applicant | : | Qualcomm Technologies, Inc.<br>5775 Morehouse Drive, San Diego, California 92121, United States |
| Manufacturer | : | Qualcomm Technologies, Inc.<br>5775 Morehouse Drive, San Diego, California 92121, United States |
| Standard | : | FCC 47 CFR Part 2, 22(H), 24(E), 27(L) |

**The product was received on Mar. 27, 2024 and testing was performed from May 14, 2024 to Jul. 26, 2024. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.**

Louis Wu

**Approved by: Louis Wu**

*Sporton International Inc. EMC & Wireless Communications Laboratory*
*No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)*
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FAX : 886-3-328-4978

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# History of this test report

| Report No. | Version | Description | Issue Date |
|---|---|---|---|
| FG3D2803-02A | 01 | Initial issue of report | Aug. 05, 2024 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 3.2 | §2.1046 | Conducted Output Power | Pass | - |
| | §22.913 (a)(5) | Effective Radiated Power (WCDMA Band V) | | |
| | §24.232 (c) | Equivalent Isotropic Radiated Power (WCDMA Band II) | | |
| | §27.50 (d)(4) | Equivalent Isotropic Radiated Power (WCDMA Band IV) | | |
| 3.3 | §24.232 (d) | Peak-to-Average Ratio | Pass | - |
| 3.4 | §2.1049<br>§22.917 (b)<br>§24.238 (b)<br>§27.53 (g) | Occupied Bandwidth<br>(WCDMA Band V)<br>(WCDMA Band II) (WCDMA Band IV) | Pass | - |
| 3.5 | §2.1051<br>§22.917 (a)<br>§24.238 (a)<br>§27.53 (g) | Band Edge Measurement<br>(WCDMA Band V)<br>(WCDMA Band II) (WCDMA Band IV) | Pass | - |
| 3.6 | §2.1051<br>§22.917 (a)<br>§24.238 (a)<br>§27.53 (g) | Conducted Emission<br>(WCDMA Band V)<br>(WCDMA Band II) (WCDMA Band IV) | Pass | - |
| 3.7 | §2.1055<br>§22.355<br>§24.235<br>§27.54 | Frequency Stability<br>Temperature & Voltage | Pass | - |
| 4.4 | §2.1053<br>§22.917 (a)<br>§24.238 (a)<br>§27.53 (h) | Field Strength of Spurious Radiation<br>(WCDMA Band V)<br>(WCDMA Band II) (WCDMA Band IV) | Pass | 36.20 dB<br>under the limit at<br>7010.00 MHz |

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Keven Cheng**

**Report Producer: Ming Chen**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

| Product Feature |
|---|
| **General Specs**<br>WCDMA/LTE/5G NR and GNSS. |

| Support band and evaluated information | |
|---|---|
| **Supported band** | Band II, Band IV, Band V |
| **Evaluated and Tested band** | Band II, Band IV, Band V |

| TDD band Power Class | | |
|---|---|---|
| | **PC3** | **PC2** |
| **Band II** | V | |
| **Band IV** | V | |
| **Band V** | V | |

| RF Exposure<br>Max Antenna Gain information(dBi) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Band** | **Ant 0** | | | | | | **Main Ant. #** |
| WCDMA B2 | **8** | | | | | | **0** |
| WCDMA B4 | **5.5** | | | | | | **0** |
| WCDMA B5 | **6.5** | | | | | | **0** |

**Remark:** The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

## 1.2 Modification of EUT

No modifications made to the EUT during the testing.

## 1.3 Testing Location

| | |
|---|---|
| **Test Site** | Sporton International Inc. EMC & Wireless Communications Laboratory |
| **Test Site Location** | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| **Test Site No.** | **Sporton Site No.** |
| | TH03-HY |
| **Test Engineer** | Eric Wu |
| **Temperature (℃)** | 20.8~22.8 |
| **Relative Humidity (%)** | 38.4~40.4 |

| | |
|---|---|
| **Test Site** | Sporton International Inc. Wensan Laboratory |
| **Test Site Location** | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,<br>Taoyuan City 333010, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| **Test Site No.** | **Sporton Site No.** |
| | 03CH11-HY (TAF Code: 3786) |
| **Test Engineer** | Yuan Lee, Sam Chou, Fu Chen and Troye Hsieh |
| **Temperature (℃)** | 19.2~21.8 |
| **Relative Humidity (%)** | 50.1~67.6 |
| **Remark** | The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory. |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786

## 1.4 Applicable Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26-2015
- FCC 47 CFR Part 2, 22(H), 24(E), 27(L)
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

**Remark:**

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.

# 2 Test Configuration of Equipment Under Test

## 2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and only the worst case emissions were reported in this report.

Radiated emissions were investigated as following frequency range:

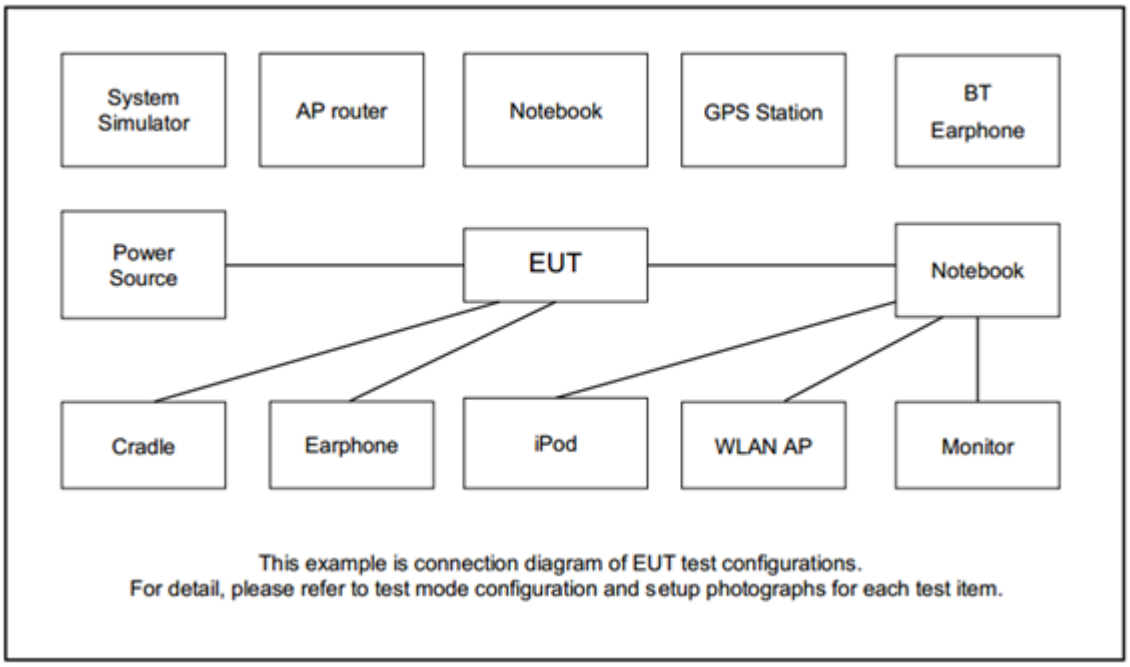
1. 30 MHz to 9000 MHz for WCDMA Band V
2. 30 MHz to 18000 MHz for WCDMA Band IV
3. 30 MHz to 19100 MHz for WCDMA Band II

All modes, data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test Modes | | |
|---|---|---|
| **Band** | **Radiated TCs** | **Conducted TCs** |
| **WCDMA Band V** | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |
| **WCDMA Band II** | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |
| **WCDMA Band IV** | ■ RMC 12.2Kbps Link | ■ RMC 12.2Kbps Link |

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration

| Item | Equipment | Brand Name | Model No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | System Simulator | R&S | CMU 200 | N/A | N/A | Unshielded, 1.8 m |
| 2. | Power Supply | GW Instek | GPE-2323 | N/A | N/A | N/A |
| 3. | Carrier board | **Qualcomm** | **30-35174-500** | **N/A** | **N/A** | N/A |

## 2.4 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10 dB attenuator.

Example:

*Offset(dB) = RF cable loss(dB) + attenuator factor(dB).*

= 4.2 + 10 = 14.2 (dB)

## 2.5 Frequency List of Low/Middle/High Channels

| Frequency List | | | | |
|---|---|---|---|---|
| **Band** | **Channel/Frequency(MHz)** | **Lowest** | **Middle** | **Highest** |
| WCDMA Band V | Channel | 4132 | 4182 | 4233 |
| | Frequency | 826.4 | 836.4 | 846.6 |
| WCDMA Band II | Channel | 9262 | 9400 | 9538 |
| | Frequency | 1852.4 | 1880.0 | 1907.6 |
| WCDMA Band IV | Channel | 1312 | 1413 | 1513 |
| | Frequency | 1712.4 | 1732.6 | 1752.6 |

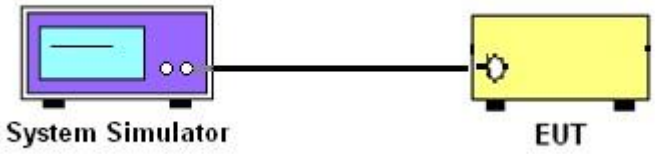
# 3 Conducted Test Result

## 3.1 Measuring Instruments

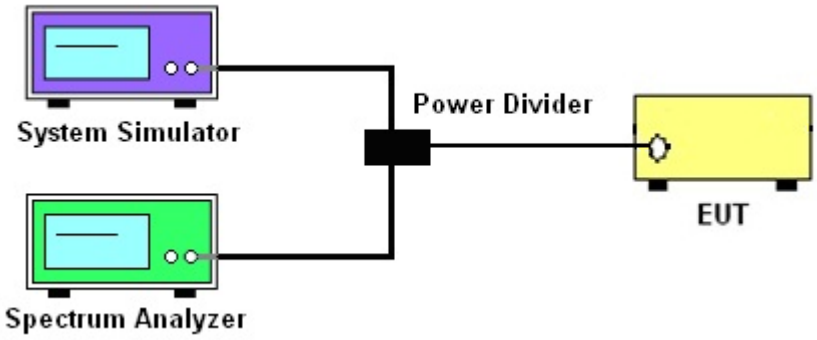
Please refer to the measuring equipment list in this test report.

### 3.1.1 Test Setup

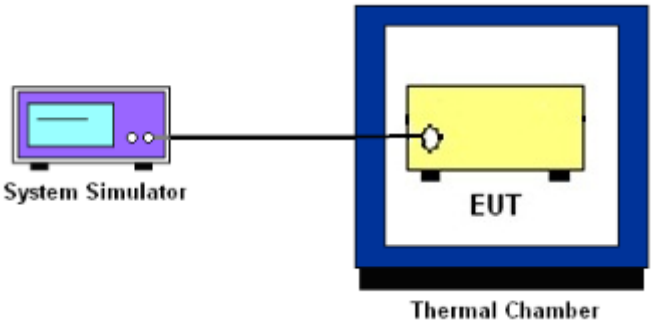
### 3.1.2 Conducted Output Power




### 3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission




### 3.1.4 Frequency Stability




### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

# 3.2 Conducted Output Power and ERP/EIRP

## 3.2.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

$P_T$ = transmitter output power in dBm

$G_T$ = gain of the transmitting antenna in dBi

$L_C$ = signal attenuation in the connecting cable between the transmitter and antenna in dB

## 3.2.2 Test Procedures

1. The transmitter output port is connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select the lowest, middle, and the highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

## 3.3 Peak-to-Average Ratio

### 3.3.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 3.3.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.2.6

1. The EUT is connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.
5. Record the maximum PAPR level associated with a probability of 0.1%.

# 3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

## 3.4.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

## 3.4.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.4.3 (26dB) and Section 5.4.4 (99OB)

1. The EUT is connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. 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.
4. Set the detection mode to peak, and the trace mode to max hold.
5. 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)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. 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 6. 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.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

# 3.5 Conducted Band Edge

## 3.5.1 Description of Conducted Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

## 3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT is connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT is connected to the spectrum analyzer by an RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers are measured.
4. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
5. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

# 3.6 Conducted Spurious Emission

## 3.6.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its $10^{th}$ harmonic.

## 3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT is connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT is connected to the spectrum analyzer by an RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency is measured.
4. The conducted spurious emission for the whole frequency range is taken.
5. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

# 3.7 Frequency Stability

## 3.7.1 Description of Frequency Stability Measurement

22.355

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

24.235 & 27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

## 3.7.2 Test Procedures for Temperature Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT is set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature is decreased to -30°C and the EUT is stabilized before testing. Power is applied and the maximum change in frequency is recorded within one minute.
3. With power OFF, the temperature is raised in 10°C steps up to 50°C. The EUT is stabilized at each step for at least half an hour. Power is applied and the maximum frequency change is recorded within one minute.

## 3.7.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT is placed in a temperature chamber at 20±5° C and connected with the system simulator.
2. The power supply voltage to the EUT is varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency is measured for the worst case.

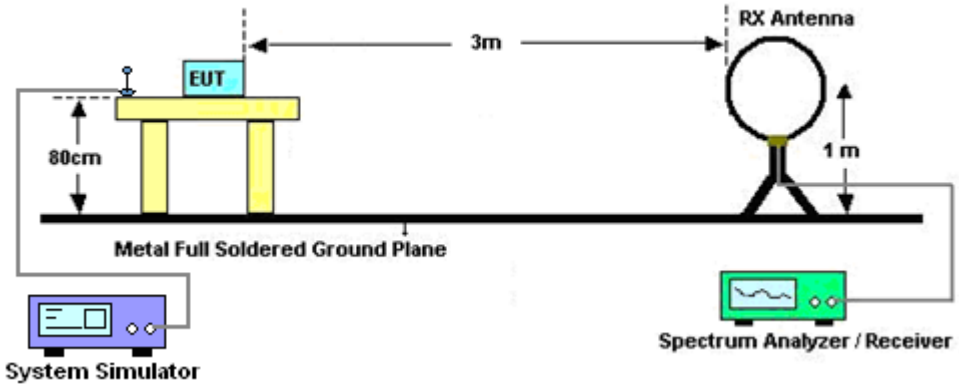
# 4 Radiated Test Items

## 4.1 Measuring Instruments

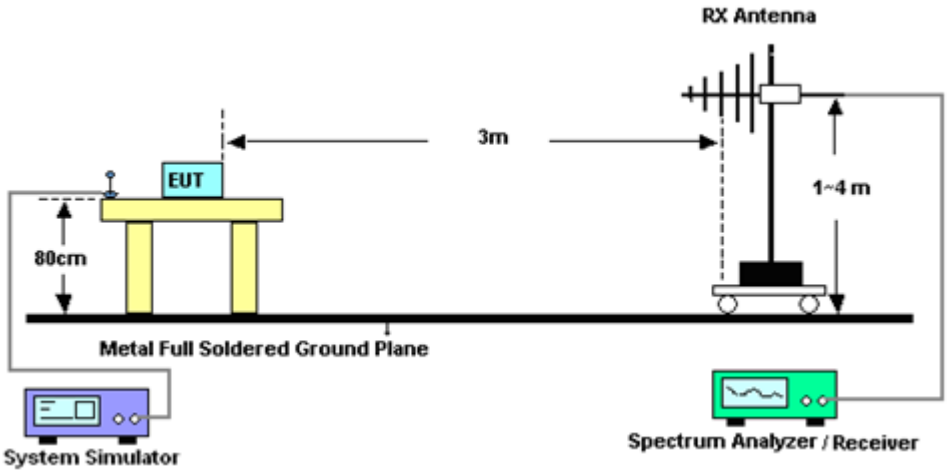
Please refer to the measuring equipment list in this test report.

## 4.2 Test Setup

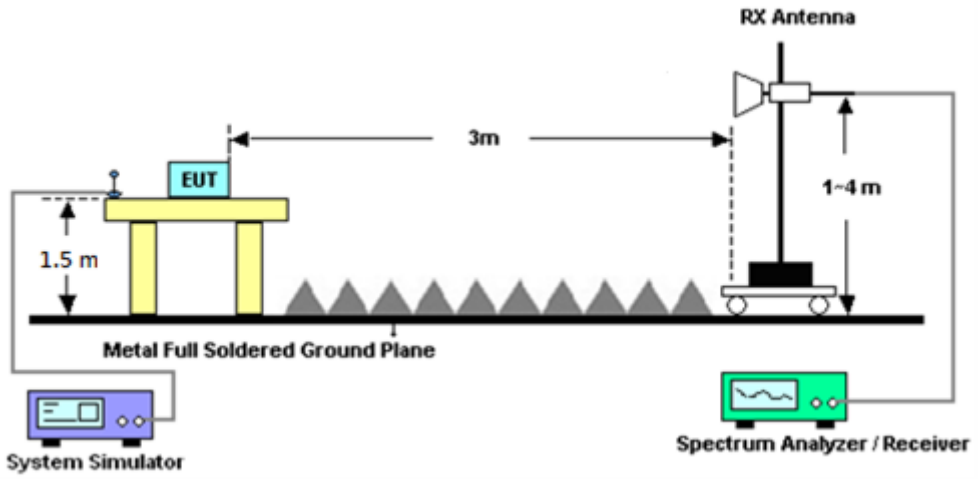
**For radiated test below 30MHz**



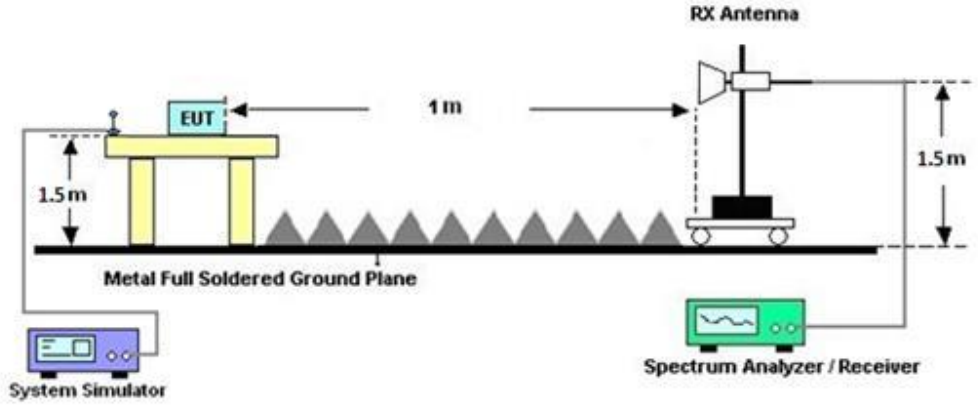

**For radiated test from 30MHz to 1GHz**



**For radiated test from 1GHz to 18GHz**




**For radiated test above 18GHz**




## 4.3 Test Result of Radiated Test

Please refer to Appendix B.

**Note:**

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

# 4.4 Field Strength of Spurious Radiation Measurement

## 4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

## 4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI C63.26-2015 section 5.5.4 Radiated measurement using the field strength method.

1. The EUT is placed on a rotatable wooden table 0.8 meters for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz above the ground.
2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the antenna tower.
3. The table is rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1 MHz, VBW = 3 MHz, taking record of maximum spurious emission.
6. To convert spectrum reading E(dBuV/m) to EIRP(dBm)
   EIRP(dBm) = Level (dBuV/m) + 20log(d) -104.77,
   where d is the distance at which filed strength limit is specified in the rules
7. Field Strength Level (dBm) = Spectrum Reading (dBm) + Antenna Factor + Cable Loss + Read Level - Preamp Factor.
8. ERP (dBm) = EIRP (dBm) - 2.15
9. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

# 5 List of Measuring Equipment

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Bilog Antenna | TESEQ | CBL 6111D & N-6-06 | 35414 & AT-N0602 | 30MHz~1GHz | Oct. 07, 2023 | May 14, 2024~ Jul. 26, 2024 | Oct. 06, 2024 | Radiation (03CH11-HY) |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Sep. 12, 2023 | May 14, 2024~ Jul. 26, 2024 | Sep. 11, 2024 | Radiation (03CH11-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-01620 | 1GHz~18GHz | Aug. 17, 2023 | May 14, 2024~ Jul. 26, 2024 | Aug. 16, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 00993 | 18GHz~40GHz | Nov. 24, 2023 | May 14, 2024~ Jul. 18, 2024 | Nov. 23, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1223 | 18GHz~40GHz | Jul. 10, 2023 | May 14, 2024~ Jun. 23, 2024 | Jul. 09, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1223 | 18GHz~40GHz | Jun. 24, 2024 | Jun. 24, 2024~ Jul. 26, 2024 | Jun. 23, 2025 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1224 | 18GHz~40GHz | Jul. 10, 2023 | May 14, 2024~ Jun. 23, 2024 | Jul. 09, 2024 | Radiation (03CH11-HY) |
| SHF-EHF Horn Antenna | SCHWARZBECK | BBHA 9170 | 1224 | 18GHz~40GHz | Jun. 24, 2024 | Jun. 24, 2024~ Jul. 26, 2024 | Jun. 23, 2025 | Radiation (03CH11-HY) |
| Amplifier | SONOMA | 310N | 187312 | 9kHz~1GHz | Dec. 08, 2023 | May 14, 2024~ Jul. 26, 2024 | Dec. 07, 2024 | Radiation (03CH11-HY) |
| Preamplifier | Keysight | 83017A | MY53270080 | 1GHz~26.5GHz | Mar. 25, 2024 | May 14, 2024~ Jul. 26, 2024 | Mar. 24, 2025 | Radiation (03CH11-HY) |
| Preamplifier | Jet-Power | JPA0118-55-303 | 1710001800055007 | 1GHz~18GHz | Jun. 14, 2023 | May 14, 2024~ Jun. 12, 2024 | Jun. 13, 2024 | Radiation (03CH11-HY) |
| Preamplifier | Jet-Power | JPA0118-55-303 | 1710001800055007 | 1GHz~18GHz | Jun. 13, 2024 | Jun. 13, 2024~ Jul. 18, 2024 | Jun. 12, 2025 | Radiation (03CH11-HY) |
| Preamplifier | EMEC | EM18G40G | 060801 | 18GHz~40GHz | Jun. 27, 2023 | May 14, 2024~ May 26, 2024 | Jun. 26, 2024 | Radiation (03CH11-HY) |
| Preamplifier | EMEC | EM18G40G | 060801 | 18GHz~40GHz | May 27, 2024 | May 27, 2024~ Jul. 26, 2024 | May 26, 2025 | Radiation (03CH11-HY) |
| Preamplifier | EMEC | EM18G40G | 060871 | 18GHz~40GHz | Aug. 30, 2023 | May 14, 2024~ Jul. 26, 2024 | Aug. 29, 2024 | Radiation (03CH11-HY) |
| Preamplifier | EMEC | EM18G40G | 060872 | 18GHz~40GHz | Sep. 06, 2023 | May 14, 2024~ Jul. 26, 2024 | Sep. 05, 2024 | Radiation (03CH11-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz~44GHz | Oct. 05, 2023 | May 14, 2024~ Jul. 26, 2024 | Oct. 04, 2024 | Radiation (03CH11-HY) |
| EMI Test Receiver | Keysight | N9038A(MXE) | MY55420170 | 20MHz~8.4GHz | Aug. 02, 2023 | May 14, 2024~ Jul. 26, 2024 | Aug. 01, 2024 | Radiation (03CH11-HY) |
| Controller | EMEC | EM 1000 | N/A | Control Turn table & Ant Mast | N/A | May 14, 2024~ Jul. 26, 2024 | N/A | Radiation (03CH11-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1~4m | N/A | May 14, 2024~ Jul. 26, 2024 | N/A | Radiation (03CH11-HY) |
| Turn Table | EMEC | TT 2000 | N/A | 0~360 Degree | N/A | May 14, 2024~ Jul. 26, 2024 | N/A | Radiation (03CH11-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-001053 | N/A | N/A | May 14, 2024~ Jul. 26, 2024 | N/A | Radiation (03CH11-HY) |
| Hygrometer | TECPEL | DTM-303B | TP140325 | N/A | Dec. 08, 2023 | May 14, 2024~ Jul. 26, 2024 | Dec. 07, 2024 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 801595/2 | 30M~40G | Mar. 06, 2024 | May 14, 2024~ May 22, 2024 | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 804013/2 | 30M~40G | May 23, 2024 | May 23, 2024~ Jul. 26, 2024 | May 22, 2025 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | MY2859/2 | 30MHz~40GHz | Mar. 06, 2024 | May 14, 2024~ Jul. 26, 2024 | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 803951/2 | 9K~30M | Mar. 06, 2024 | May 14, 2024~ Jul. 26, 2024 | Mar. 05, 2025 | Radiation (03CH11-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 803951/2 | 30M~40G | Mar. 06, 2024 | May 14, 2024~ Jul. 26, 2024 | Mar. 05, 2025 | Radiation (03CH11-HY) |

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Filter | Wainwright | WHKX12-900-1000-15000-60SS | SN12 | 1GHz High Pass Filter | Sep. 11, 2023 | May 14, 2024~ Jul. 26, 2024 | Sep. 10, 2024 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX12-2700-3000-18000-60SS | SN3 | 3GHz High Pass Filter | Sep. 11, 2023 | May 14, 2024~ Jul. 26, 2024 | Sep. 10, 2024 | Radiation (03CH11-HY) |
| Filter | Wainwright | WHKX8-5872.5-6750-18000-40SS | SN3 | 6.75GHz High Pass Filter | Sep. 11, 2023 | May 14, 2024~ Jul. 26, 2024 | Sep. 10, 2024 | Radiation (03CH11-HY) |
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | 101329 | 9kHz~30GHz | Sep. 20, 2023 | May 30, 2024~ Jun. 05, 2024 | Sep. 19, 2024 | Conducted (TH03-HY) |
| Programmable Power Supply | GW Instek | PSS-2005 | EL890001 | 1V~20V 0.5A~4A | Sep. 12, 2023 | May 30, 2024~ Jun. 05, 2024 | Sep. 11, 2024 | Conducted (TH03-HY) |
| Base Station (Measure) | Rohde & Schwarz | CMU200 | 117995 | GSM / GPRS / WCDMA / CDMA | Aug. 06, 2023 | May 30, 2024~ Jun. 05, 2024 | Aug. 05, 2024 | Conducted (TH03-HY) |
| Temperature & Humidity Cabinet Chamber | ESPEC | LHU-113 | 1012005860 | -20℃~85℃ | Dec 13, 2023 | May 30, 2024~ Jun. 05, 2024 | Dec 12, 2024 | Conducted (TH03-HY) |
| Hygrometer | TECPEL | DTM-303B | TP210073 | N/A | Jun. 26, 2023 | May 30, 2024~ Jun. 05, 2024 | Jun. 25, 2024 | Conducted (TH03-HY) |
| Power divider | Anritsu | K241C | 2143398 | 9KHz~40GHz | Jun. 13, 2023 | May 30, 2024~ Jun. 05, 2024 | Jun. 12, 2024 | Conducted (TH03-HY) |

# 6 Measurement Uncertainty

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.29 dB** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.53 dB** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **3.61 dB** |

# Appendix A. Test Results of Conducted Test

## Conducted Output Power(Average power) & ERP / EIRP

| WCDMA Band V Maximum Average Power [dBm] (GT - LC = 6.5 dB) | | | | | |
|---|---|---|---|---|---|
| Channel | 4132 | 4182 | 4233 | ERP (dBm) | ERP (W) |
| Frequency | 826.4 | 836.4 | 846.6 | | |
| RMC 12.2K | 24.06 | **24.11** | 24.07 | 28.46 | 0.7015 |
| HSDPA Subtest-1 | 23.12 | 23.14 | 23.10 | | |
| HSDPA Subtest-2 | 23.09 | 23.12 | 23.04 | | |
| HSDPA Subtest-3 | 22.62 | 22.60 | 22.63 | | |
| HSDPA Subtest-4 | 22.61 | 22.65 | 22.62 | | |
| HSUPA Subtest-1 | 22.13 | 22.23 | 22.09 | | |
| HSUPA Subtest-2 | 20.17 | 20.30 | 20.17 | | |
| HSUPA Subtest-3 | 21.17 | 21.23 | 21.13 | | |
| HSUPA Subtest-4 | 20.17 | 20.24 | 20.11 | | |
| HSUPA Subtest-5 | 22.16 | 22.25 | 22.21 | | |
| Limit | ERP < 7W | | | Result | Pass |

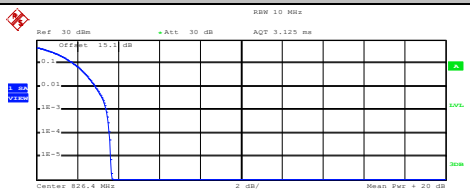
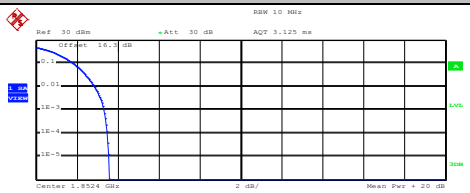
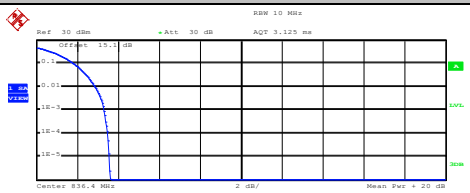
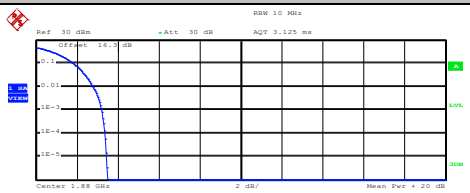
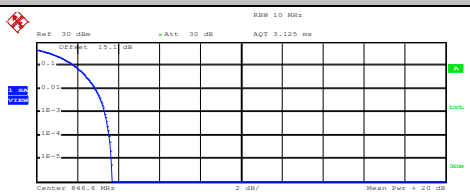
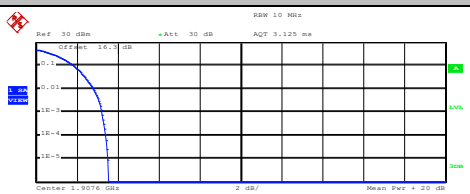
| WCDMA Band II Maximum Average Power [dBm] (GT - LC = 8 dB) | | | | | |
|---|---|---|---|---|---|
| Channel | 9262 | 9400 | 9538 | EIRP (dBm) | EIRP (W) |
| Frequency | 1852.4 | 1880 | 1907.6 | | |
| RMC 12.2K | **24.00** | 23.95 | 23.92 | 32.00 | 1.5849 |
| HSDPA Subtest-1 | 23.03 | 22.99 | 22.82 | | |
| HSDPA Subtest-2 | 23.01 | 22.98 | 22.97 | | |
| HSDPA Subtest-3 | 22.55 | 22.48 | 22.47 | | |
| HSDPA Subtest-4 | 22.53 | 22.57 | 22.53 | | |
| HSUPA Subtest-1 | 23.07 | 23.02 | 23.03 | | |
| HSUPA Subtest-2 | 21.06 | 21.01 | 20.97 | | |
| HSUPA Subtest-3 | 22.00 | 22.01 | 22.02 | | |
| HSUPA Subtest-4 | 21.04 | 21.00 | 20.99 | | |
| HSUPA Subtest-5 | 23.04 | 23.02 | 23.07 | | |
| Limit | EIRP < 2W | | | Result | Pass |

| WCDMA Band IV Maximum Average Power [dBm] (GT - LC = 5.5 dB) | | | | | |
|---|---|---|---|---|---|
| Channel | 1312 | 1413 | 1513 | EIRP (dBm) | EIRP (W) |
| Frequency | 1712.4 | 1732.6 | 1752.6 | | |
| RMC 12.2K | 24.13 | **24.21** | 24.17 | 29.71 | 0.9354 |
| HSDPA Subtest-1 | 23.18 | 23.20 | 23.15 | | |
| HSDPA Subtest-2 | 23.17 | 23.18 | 23.17 | | |
| HSDPA Subtest-3 | 22.64 | 22.73 | 22.69 | | |
| HSDPA Subtest-4 | 22.71 | 22.76 | 22.73 | | |
| HSUPA Subtest-1 | 22.55 | 22.65 | 22.57 | | |
| HSUPA Subtest-2 | 20.52 | 20.59 | 20.55 | | |
| HSUPA Subtest-3 | 21.53 | 21.60 | 21.52 | | |
| HSUPA Subtest-4 | 20.57 | 20.57 | 20.58 | | |
| HSUPA Subtest-5 | 22.58 | 22.61 | 22.51 | | |
| Limit | EIRP < 1W | | | Result | Pass |

# A2. WCDMA

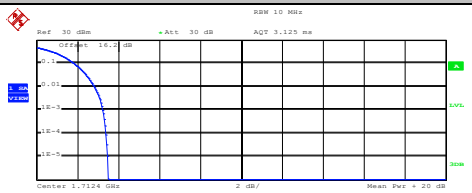
## Peak-to-Average Ratio

| Mode | WCDMA Band V | WCDMA Band II | WCDMA Band IV | Limit: 13dB |
|---|---|---|---|---|
| Mod. | RMC 12.2Kbps | RMC 12.2Kbps | RMC 12.2Kbps | Result |
| Lowest CH | 3.44 | 3.32 | 3.24 | PASS |
| Middle CH | 3.32 | 3.24 | 3.28 | |
| Highest CH | 3.36 | 3.24 | 3.24 | |

| WCDMA Band V (RMC 12.2Kbps) | WCDMA Band II (RMC 12.2Kbps) |
|---|---|
| **Lowest Channel** | **Lowest Channel** |
|  |  |
| Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 23.08 dBm<br>Peak 26.77 dBm<br>Crest 3.69 dB<br>10 % 1.84 dB<br>1 % 2.88 dB<br>.1 % 3.44 dB<br>.01 % 3.56 dB | Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 22.91 dBm<br>Peak 26.49 dBm<br>Crest 3.57 dB<br>10 % 1.84 dB<br>1 % 2.84 dB<br>.1 % 3.32 dB<br>.01 % 3.48 dB |
| Date: 30.MAY.2024 17:19:37 | Date: 30.MAY.2024 16:10:26 |
| **Middle Channel** | **Middle Channel** |
|  |  |
| Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 23.24 dBm<br>Peak 26.84 dBm<br>Crest 3.60 dB<br>10 % 1.84 dB<br>1 % 2.88 dB<br>.1 % 3.32 dB<br>.01 % 3.48 dB | Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 22.93 dBm<br>Peak 26.41 dBm<br>Crest 3.49 dB<br>10 % 1.84 dB<br>1 % 2.80 dB<br>.1 % 3.24 dB<br>.01 % 3.36 dB |
| Date: 30.MAY.2024 17:19:55 | Date: 30.MAY.2024 16:10:44 |
| **Highest Channel** | **Highest Channel** |
|  |  |
| Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 23.08 dBm<br>Peak 26.77 dBm<br>Crest 3.69 dB<br>10 % 1.88 dB<br>1 % 2.88 dB<br>.1 % 3.36 dB<br>.01 % 3.56 dB | Complementary Cumulative Distribution Function (100000 samples)<br>Trace 1<br>Mean 22.88 dBm<br>Peak 26.41 dBm<br>Crest 3.53 dB<br>10 % 1.84 dB<br>1 % 2.80 dB<br>.1 % 3.24 dB<br>.01 % 3.40 dB |
| Date: 30.MAY.2024 17:20:12 | Date: 30.MAY.2024 16:11:02 |

## WCDMA Band IV (RMC 12.2Kbps)

### Lowest Channel



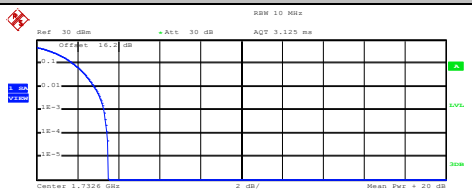

Complementary Cumulative Distribution Function (100000 samples)

Trace 1

| | |
|---|---|
| Mean | 23.11 dBm |
| Peak | 26.63 dBm |
| Crest | 3.51 dB |
| 10 % | 1.84 dB |
| 1 % | 2.84 dB |
| .1 % | 3.24 dB |
| .01 % | 3.40 dB |

Date: 30.MAY.2024 16:57:55

### Middle Channel



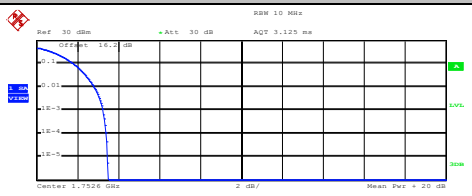

Complementary Cumulative Distribution Function (100000 samples)

Trace 1

| | |
|---|---|
| Mean | 23.13 dBm |
| Peak | 26.63 dBm |
| Crest | 3.50 dB |
| 10 % | 1.80 dB |
| 1 % | 2.84 dB |
| .1 % | 3.28 dB |
| .01 % | 3.44 dB |

Date: 30.MAY.2024 16:58:11

### Highest Channel




Complementary Cumulative Distribution Function (100000 samples)

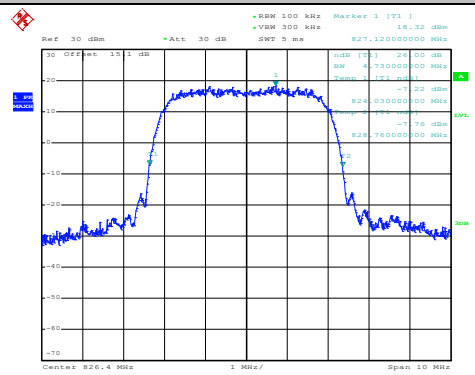
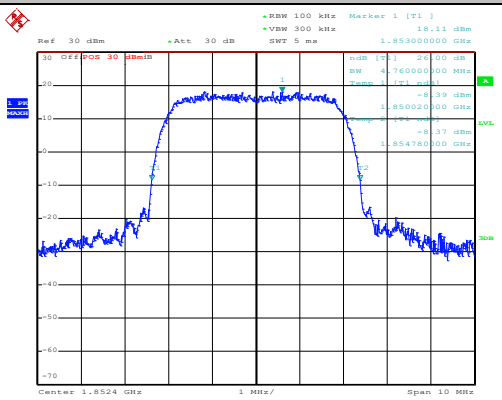
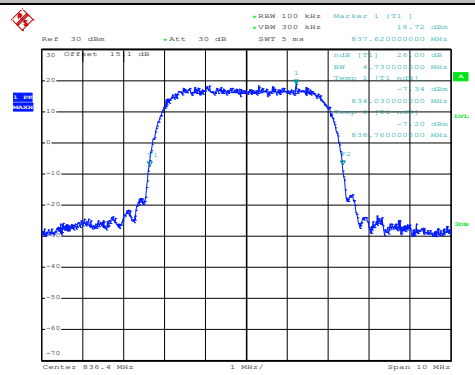
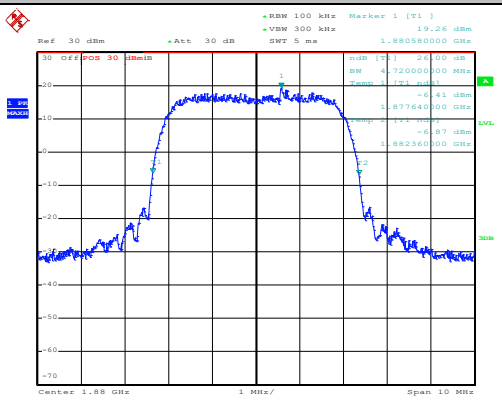
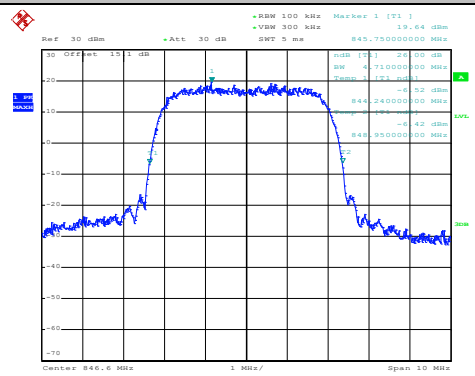
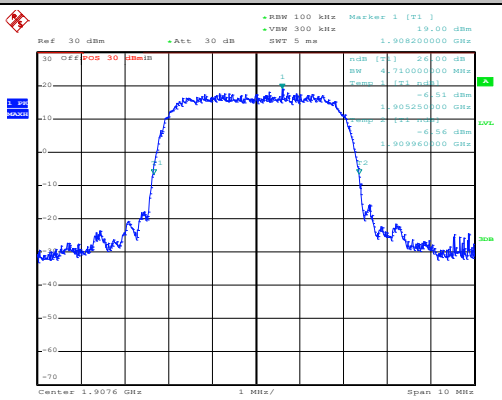
Trace 1

| | |
|---|---|
| Mean | 23.15 dBm |
| Peak | 26.63 dBm |
| Crest | 3.48 dB |
| 10 % | 1.80 dB |
| 1 % | 2.80 dB |
| .1 % | 3.24 dB |
| .01 % | 3.40 dB |

Date: 30.MAY.2024 16:58:29

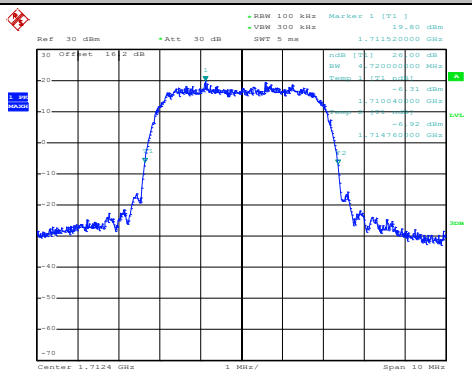
# 26dB Bandwidth

| Mode | WCDMA Band V 26dB BW(MHz) | WCDMA Band II 26dB BW(MHz) | WCDMA Band IV 26dB BW(MHz) |
|---|---|---|---|
| Mod. | RMC 12.2Kbps | RMC 12.2Kbps | RMC 12.2Kbps |
| Lowest CH | 4.73 | 4.76 | 4.72 |
| Middle CH | 4.73 | 4.72 | 4.72 |
| Highest CH | 4.71 | 4.71 | 4.72 |

| WCDMA Band V (RMC 12.2Kbps) | WCDMA Band II (RMC 12.2Kbps) |
|---|---|
| **Lowest Channel** | **Lowest Channel** |
|  |  |
| Date: 30.MAY.2024 17:01:49 | Date: 30.MAY.2024 15:40:13 |
| **Middle Channel** | **Middle Channel** |
|  |  |
| Date: 30.MAY.2024 17:02:56 | Date: 30.MAY.2024 15:40:53 |
| **Highest Channel** | **Highest Channel** |
|  |  |
| Date: 30.MAY.2024 17:03:47 | Date: 30.MAY.2024 15:41:43 |

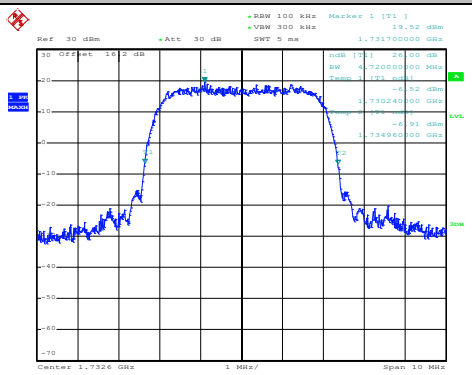
## WCDMA Band IV (RMC 12.2Kbps)

### Lowest Channel



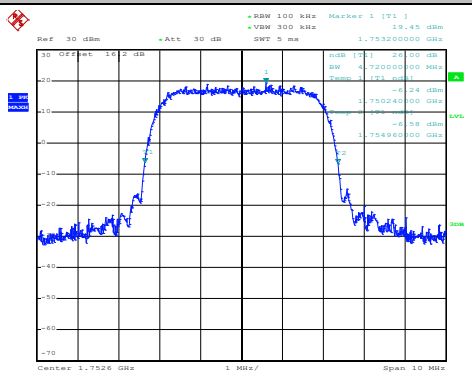

Date: 30.MAY.2024 16:37:18

### Middle Channel




Date: 30.MAY.2024 16:38:06

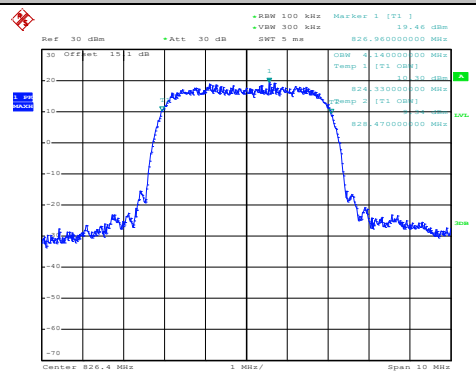
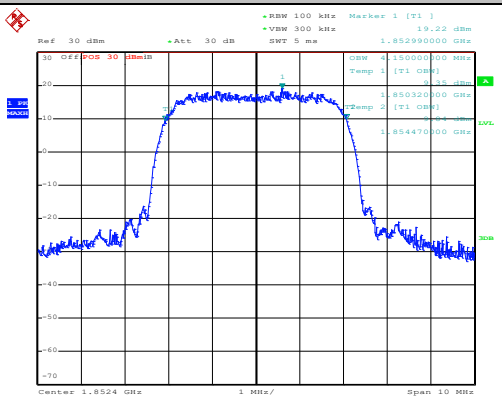
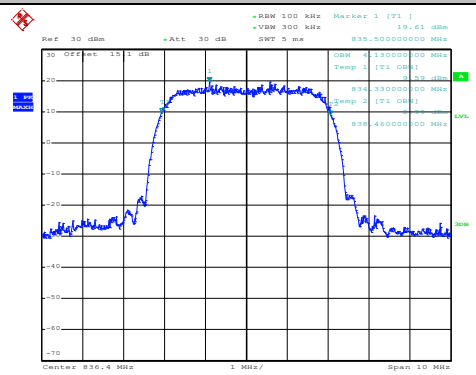
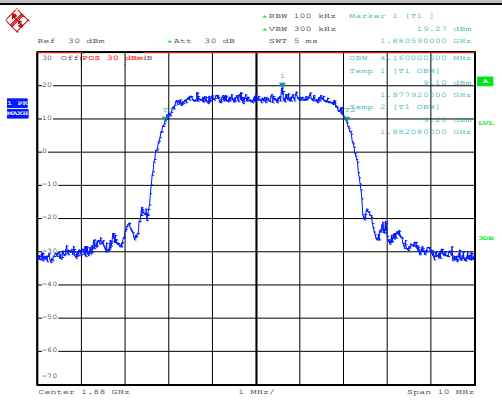
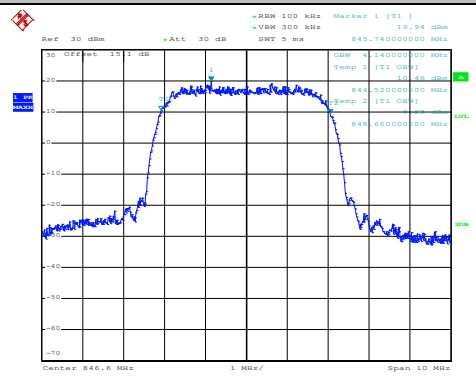
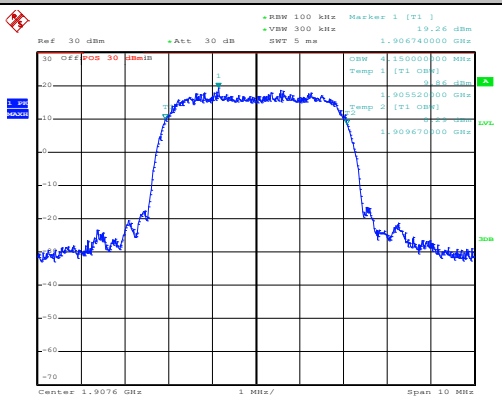
### Highest Channel




Date: 30.MAY.2024 16:38:56

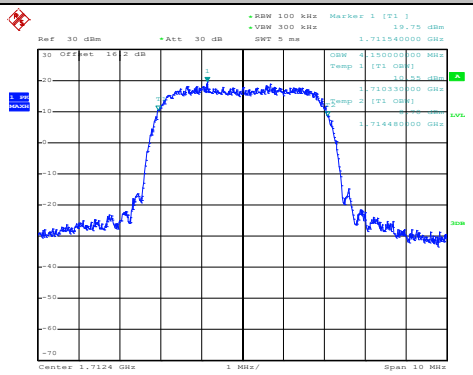
# Occupied Bandwidth

| Mode | WCDMA Band V 99%OBW(MHz) | WCDMA Band II 99%OBW(MHz) | WCDMA Band IV 99%OBW(MHz) |
|---|---|---|---|
| Mod. | RMC 12.2Kbps | RMC 12.2Kbps | RMC 12.2Kbps |
| Lowest CH | 4.14 | 4.15 | 4.15 |
| Middle CH | 4.13 | 4.16 | 4.15 |
| Highest CH | 4.14 | 4.15 | 4.16 |

| WCDMA Band V (RMC 12.2Kbps) | WCDMA Band II (RMC 12.2Kbps) |
|---|---|
| **Lowest Channel** | **Lowest Channel** |
|  |  |
| Date: 30.MAY.2024 17:05:21 | Date: 30.MAY.2024 15:46:21 |
| **Middle Channel** | **Middle Channel** |
|  |  |
| Date: 30.MAY.2024 17:05:59 | Date: 30.MAY.2024 15:48:48 |
| **Highest Channel** | **Highest Channel** |
|  |  |
| Date: 30.MAY.2024 17:06:38 | Date: 30.MAY.2024 15:49:26 |

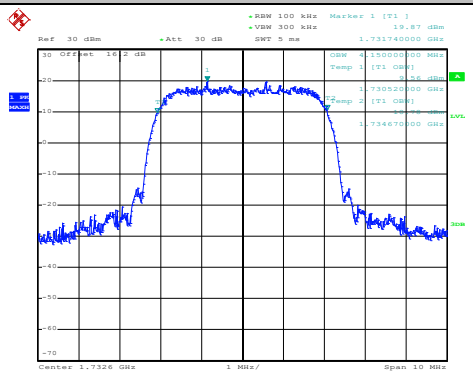
## WCDMA Band IV (RMC 12.2Kbps)

### Lowest Channel



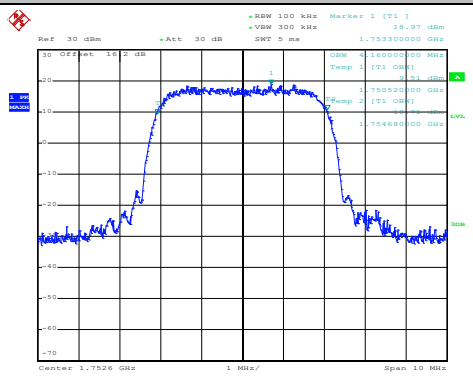

Date: 30.MAY.2024 16:40:22

### Middle Channel




Date: 30.MAY.2024 16:41:21

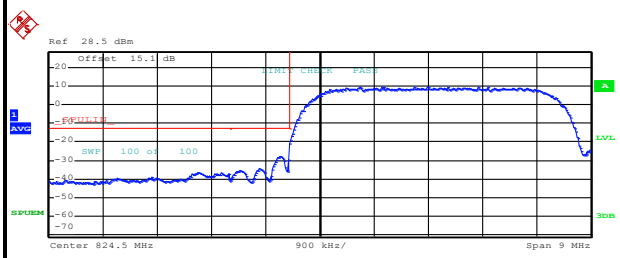
### Highest Channel




Date: 30.MAY.2024 16:42:04

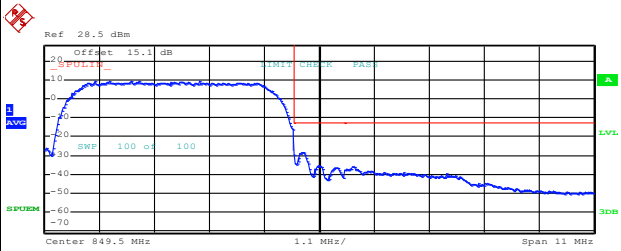
# Conducted Band Edge

| WCDMA Band V (RMC 12.2Kbps) | |
|---|---|
| **Lowest Band Edge** | **Highest Band Edge** |




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 820.000 M | 823.000 M | 100.00 k | 822.460000 M | -36.50 | -23.50 |
| 823.000 M | 824.000 M | 50.00 k | 823.836000 M | -28.04 | -15.04 |
| 824.000 M | 829.000 M | 100.00 k | 826.280000 M | 9.73 | -25.27 |

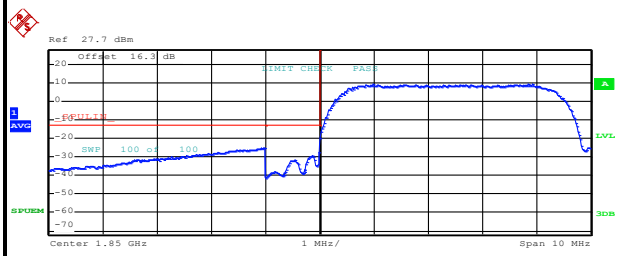
Date: 30.MAY.2024 17:10:34




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 844.000 M | 849.000 M | 100.00 k | 847.105000 M | 9.46 | -25.54 |
| 849.000 M | 850.000 M | 50.00 k | 849.148000 M | -28.32 | -15.32 |
| 850.000 M | 855.000 M | 100.00 k | 850.150000 M | -36.10 | -23.10 |

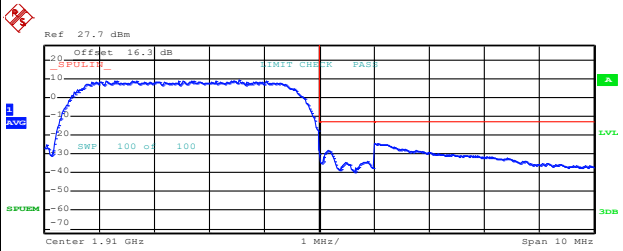
Date: 30.MAY.2024 17:14:00

| WCDMA Band II (RMC 12.2Kbps) | |
|---|---|
| **Lowest Band Edge** | **Highest Band Edge** |




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 1.845 G | 1.849 G | 1.00 M | 1.849000 G | -24.97 | -11.97 |
| 1.849 G | 1.850 G | 50.00 k | 1.849996 G | -28.77 | -15.77 |
| 1.850 G | 1.855 G | 100.00 k | 1.853835 G | 9.21 | -25.79 |

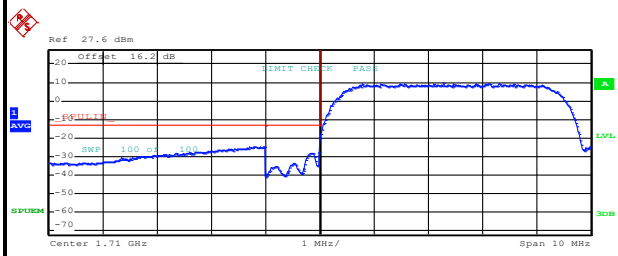
Date: 30.MAY.2024 15:53:12




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 1.905 G | 1.910 G | 100.00 k | 1.908535 G | 9.07 | -25.93 |
| 1.910 G | 1.911 G | 50.00 k | 1.910152 G | -28.03 | -15.03 |
| 1.911 G | 1.915 G | 1.00 M | 1.911004 G | -24.62 | -11.62 |

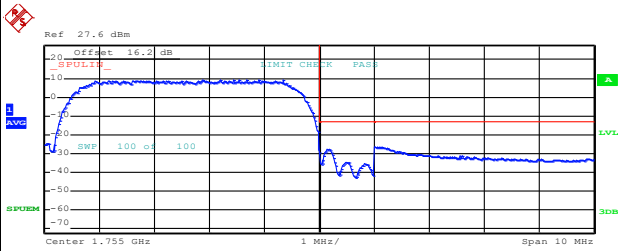
Date: 30.MAY.2024 15:57:57

| WCDMA Band IV (RMC 12.2Kbps) | |
|---|---|
| **Lowest Band Edge** | **Highest Band Edge** |




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 1.705 G | 1.709 G | 1.00 M | 1.708964 G | -24.57 | -11.57 |
| 1.709 G | 1.710 G | 50.00 k | 1.709848 G | -28.14 | -15.14 |
| 1.710 G | 1.715 G | 100.00 k | 1.712280 G | 9.64 | -25.36 |

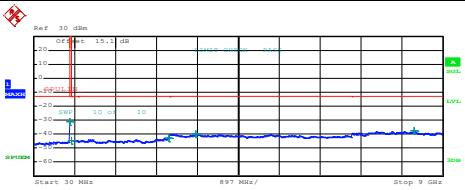
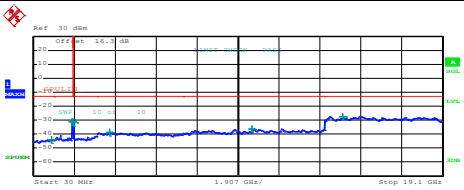
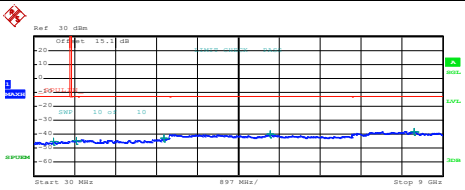
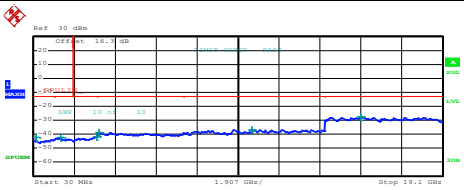
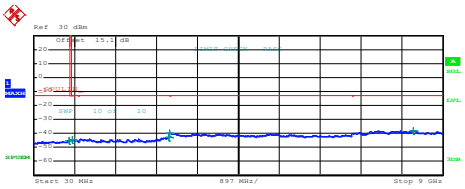
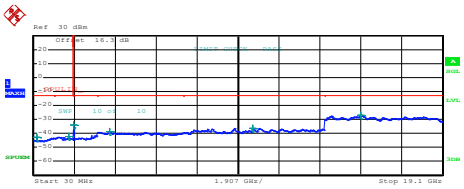
Date: 30.MAY.2024 16:45:55




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 1.750 G | 1.755 G | 100.00 k | 1.753905 G | 9.28 | -25.72 |
| 1.755 G | 1.756 G | 50.00 k | 1.755128 G | -27.71 | -14.71 |
| 1.756 G | 1.760 G | 1.00 M | 1.756004 G | -26.52 | -13.52 |

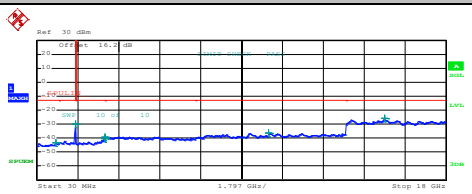
Date: 30.MAY.2024 16:49:21

# Conducted Spurious Emission

| WCDMA Band V (RMC 12.2Kbps) | WCDMA Band II (RMC 12.2Kbps) |
|---|---|
| **Lowest Channel** | **Lowest Channel** |
|  |  |
| Date: 30.MAY.2024 17:15:26 | Date: 30.MAY.2024 16:04:57 |
| **Middle Channel** | **Middle Channel** |
|  |  |
| Date: 30.MAY.2024 17:17:01 | Date: 30.MAY.2024 16:07:08 |
| **Highest Channel** | **Highest Channel** |
|  |  |
| Date: 30.MAY.2024 17:17:56 | Date: 30.MAY.2024 16:09:06 |

## WCDMA Band IV (RMC 12.2Kbps)

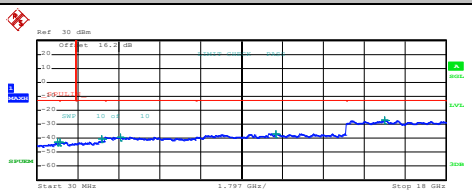
### Lowest Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 1.000 G | 1.00 M | 872.445000 M | -43.63 | -30.63 |
| 1.000 G | 1.705 G | 1.00 M | 1.702356 G | -30.22 | -17.22 |
| 1.760 G | 3.000 G | 1.00 M | 2.995350 G | -40.64 | -27.64 |
| 3.000 G | 7.000 G | 1.00 M | 3.000000 G | -39.04 | -26.04 |
| 7.000 G | 13.600 G | 1.00 M | 10.215025 G | -36.65 | -23.65 |
| 13.600 G | 18.000 G | 1.00 M | 15.319850 G | -26.01 | -13.01 |

Date: 30.MAY.2024 16:52:00

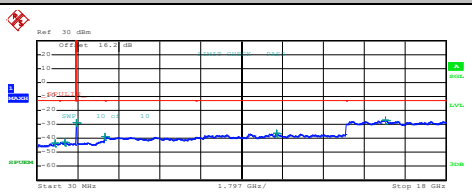
### Middle Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 1.000 G | 1.00 M | 927.977500 M | -42.95 | -29.95 |
| 1.000 G | 1.705 G | 1.00 M | 1.044768 G | -42.64 | -29.64 |
| 1.760 G | 3.000 G | 1.00 M | 2.874140 G | -40.65 | -27.65 |
| 3.000 G | 7.000 G | 1.00 M | 3.685000 G | -39.17 | -26.17 |
| 7.000 G | 13.600 G | 1.00 M | 10.516150 G | -36.81 | -23.81 |
| 13.600 G | 18.000 G | 1.00 M | 15.301150 G | -26.90 | -13.90 |

Date: 30.MAY.2024 16:53:32

### Highest Channel




| Start [Hz] | Stop [Hz] | RBW [Hz] | Freq [Hz] | PwrAbs [dBm] | ΔLimit [dB] |
|---|---|---|---|---|---|
| 30.000 M | 1.000 G | 1.00 M | 821.762500 M | -43.38 | -30.38 |
| 1.000 G | 1.705 G | 1.00 M | 1.240934 G | -42.80 | -29.80 |
| 1.760 G | 3.000 G | 1.00 M | 1.762480 G | -28.90 | -15.90 |
| 3.000 G | 7.000 G | 1.00 M | 3.015000 G | -38.90 | -25.90 |
| 7.000 G | 13.600 G | 1.00 M | 10.545025 G | -36.57 | -23.57 |
| 13.600 G | 18.000 G | 1.00 M | 15.351750 G | -27.05 | -14.05 |

Date: 30.MAY.2024 16:54:54

# Frequency Stability

| Test Conditions | Middle Channel | WCDMA Band V (RMC 12.2Kbps) | Limit 2.5ppm |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0120 | PASS |
| 40 | Normal Voltage | 0.0132 | |
| 30 | Normal Voltage | 0.0024 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0024 | |
| 0 | Normal Voltage | 0.0167 | |
| -10 | Normal Voltage | 0.0036 | |
| -20 | Normal Voltage | 0.0108 | |
| -30 | Normal Voltage | 0.0048 | |
| 20 | Maximum Voltage | 0.0024 | |
| 20 | Normal Voltage | 0.0072 | |
| 20 | Battery End Point | 0.0012 | |

| Test Conditions | Middle Channel | WCDMA Band II (RMC 12.2Kbps) | Limit Note 2. |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0032 | PASS |
| 40 | Normal Voltage | 0.0005 | |
| 30 | Normal Voltage | 0.0032 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0080 | |
| 0 | Normal Voltage | 0.0059 | |
| -10 | Normal Voltage | 0.0074 | |
| -20 | Normal Voltage | 0.0138 | |
| -30 | Normal Voltage | 0.0048 | |
| 20 | Maximum Voltage | 0.0043 | |
| 20 | Normal Voltage | 0.0048 | |
| 20 | Battery End Point | 0.0064 | |

| Test Conditions | Middle Channel | WCDMA Band IV (RMC 12.2Kbps) | Limit Note 2. |
|---|---|---|---|
| Temperature (°C) | Voltage (Volt) | Deviation (ppm) | Result |
| 50 | Normal Voltage | 0.0087 | PASS |
| 40 | Normal Voltage | 0.0098 | |
| 30 | Normal Voltage | 0.0081 | |
| 20(Ref.) | Normal Voltage | 0.0000 | |
| 10 | Normal Voltage | 0.0040 | |
| 0 | Normal Voltage | 0.0069 | |
| -10 | Normal Voltage | 0.0081 | |
| -20 | Normal Voltage | 0.0063 | |
| -30 | Normal Voltage | 0.0040 | |
| 20 | Maximum Voltage | 0.0017 | |
| 20 | Normal Voltage | 0.0063 | |
| 20 | Battery End Point | 0.0006 | |

**Note:**

**1.** Normal Voltage = 3.3V. ；Battery End Point (BEP) = 3.135 V.；Maximum Voltage =3.465 V

**2.** The frequency fundamental emissions stay within the authorized frequency block.

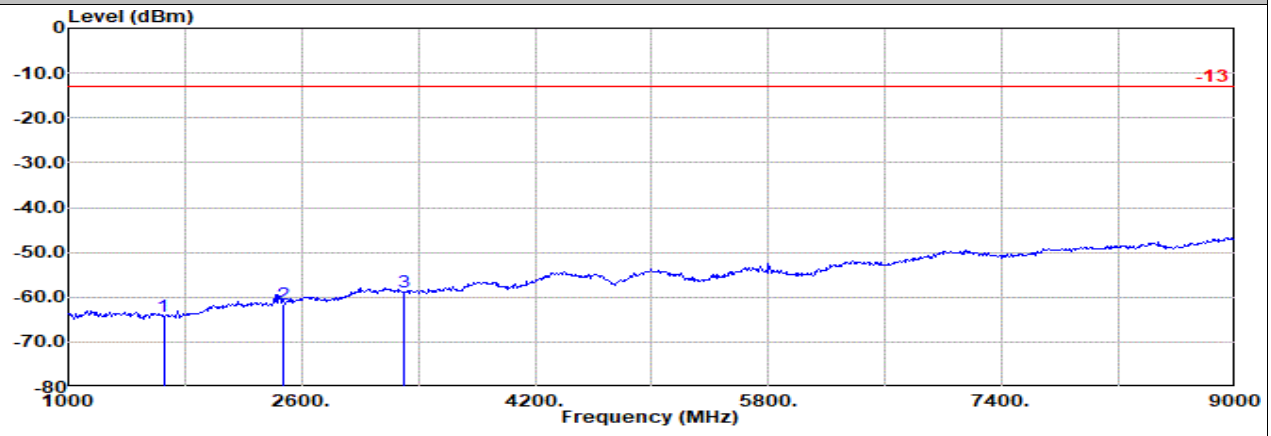
# Appendix B. Test Results of Radiated Test

## B1. Summary of each worse mode

| Mode | Part | Band | Ch | Freq (MHz) | Level (dBm) | Det | Ant Factor (dB) | Amp\Cbl (dB) | Filter (dB) | EIRPCF (dB) | Reading (dBuV) | Limit (dBm) | Margin (dB) | Pol | Ant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Part 22H | WCDMA B5 | H | 3386 | -58.72 | RMS | 29.53 | -24.96 | 0.23 | -95.23 | 31.71 | -13.00 | -45.72 | H | 0 |
| 5 | Part 24E | WCDMA B2 | M | 7520 | -49.55 | RMS | 36.12 | -20.71 | 0.58 | -95.23 | 29.69 | -13.00 | -36.55 | V | 0 |
| 30 | Part 27L | WCDMA B4 | H | 7010 | -49.20 | RMS | 35.94 | -20.63 | 0.48 | -95.23 | 30.24 | -13.00 | -36.20 | H | 0 |

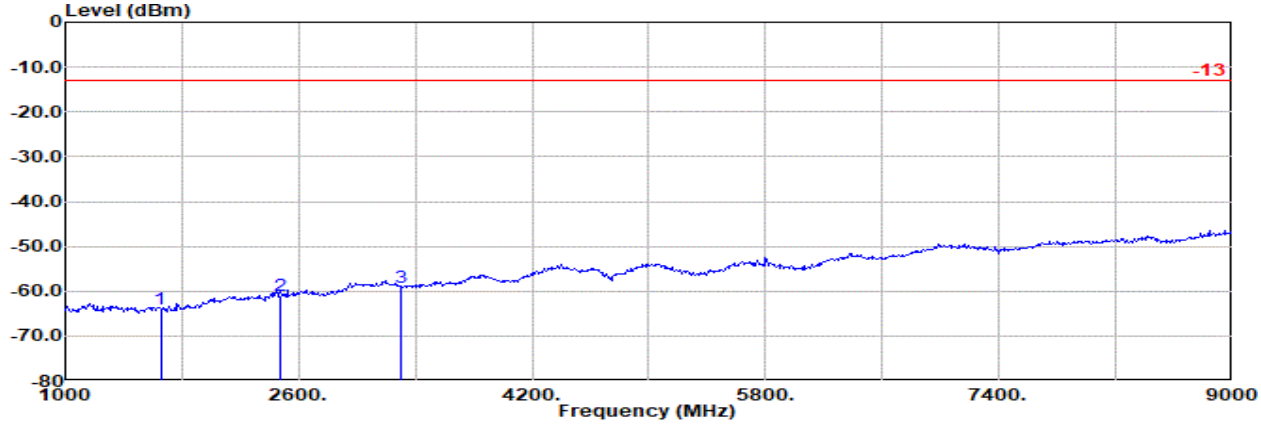
**Ant.0**

| Part 22H Mode 1 |
|---|
| WCDMA B5 CH4132 |
| L |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 850 CH4132

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1652.80 | -64.41 | RMS | 25.20 | -28.41 | 0.35 | -95.23 | 33.68 | -13.00 | -51.41 | Horizontal |
| 2 | 2479.20 | -61.50 | RMS | 27.69 | -26.38 | 0.22 | -95.23 | 32.20 | -13.00 | -48.50 | Horizontal |
| 3 | 3305.60 | -58.80 | RMS | 29.60 | -25.09 | 0.25 | -95.23 | 31.67 | -13.00 | -45.80 | Horizontal |

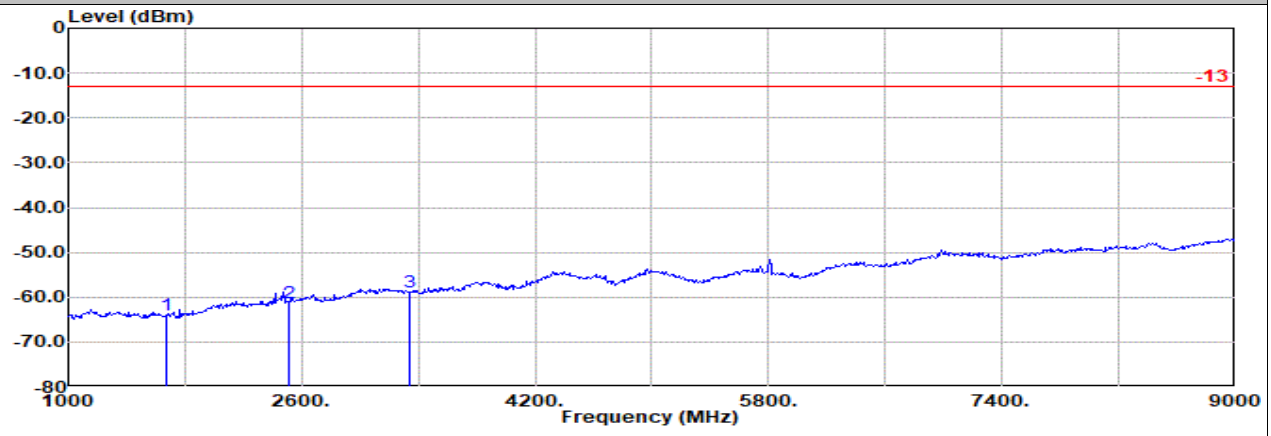



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 850 CH4132

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1652.80 | -64.11 | RMS | 25.20 | -28.41 | 0.35 | -95.23 | 33.98 | -13.00 | -51.11 | Vertical |
| 2 | 2479.20 | -61.10 | RMS | 27.69 | -26.38 | 0.22 | -95.23 | 32.60 | -13.00 | -48.10 | Vertical |
| 3 | 3305.60 | -59.15 | RMS | 29.60 | -25.09 | 0.25 | -95.23 | 31.32 | -13.00 | -46.15 | Vertical |

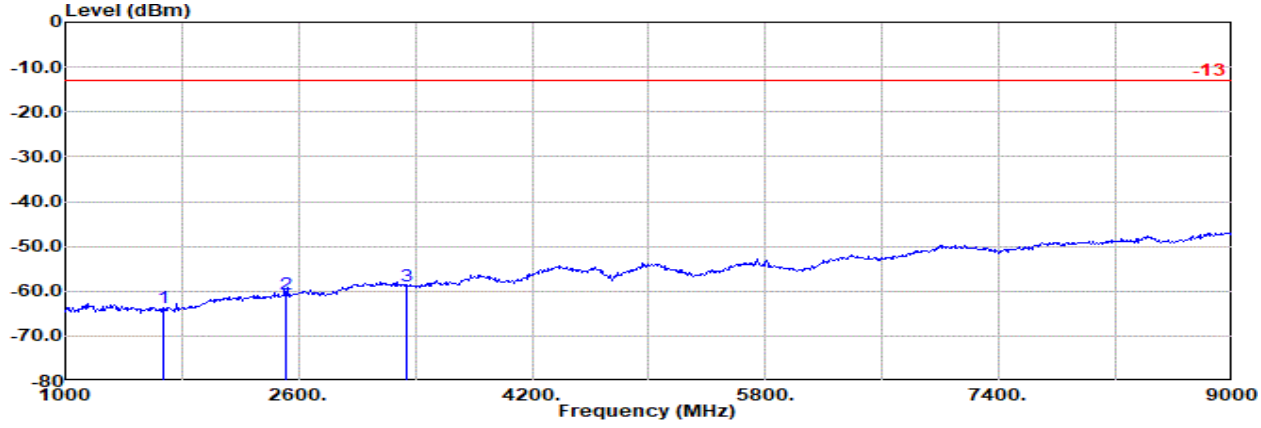
**Ant.0**

| Part 22H Mode 1 |
|---|
| WCDMA B5 CH4182 |
| M |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 850 CH4182

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1672.80 | -63.88 | RMS | 25.30 | -28.35 | 0.33 | -95.23 | 34.07 | -13.00 | -50.88 | Horizontal |
| 2 | 2509.20 | -61.17 | RMS | 27.79 | -26.32 | 0.21 | -95.23 | 32.38 | -13.00 | -48.17 | Horizontal |
| 3 | 3345.60 | -58.75 | RMS | 29.60 | -25.03 | 0.24 | -95.23 | 31.67 | -13.00 | -45.75 | Horizontal |

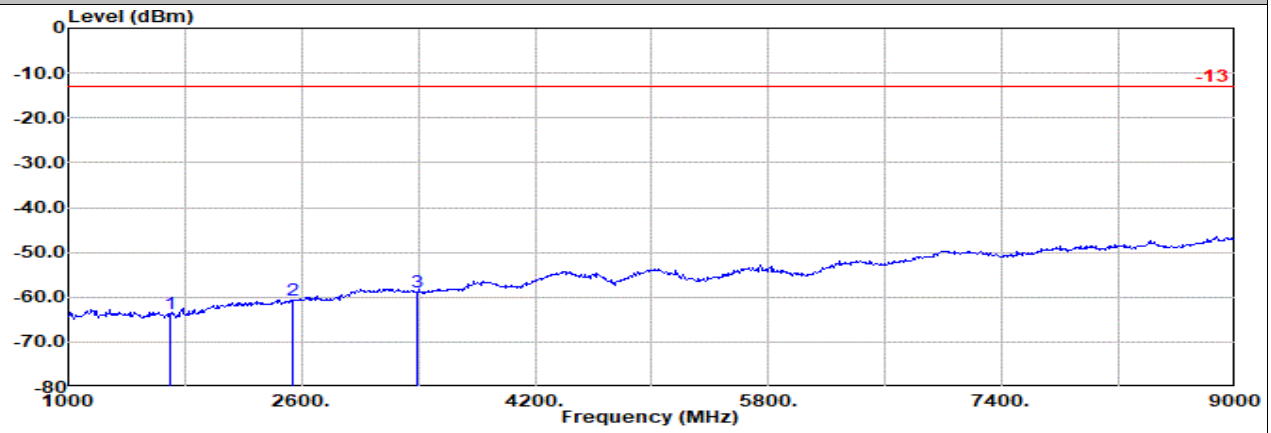



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 850 CH4182

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1672.80 | -63.74 | RMS | 25.30 | -28.35 | 0.33 | -95.23 | 34.21 | -13.00 | -50.74 | Vertical |
| 2 | 2509.20 | -60.65 | RMS | 27.79 | -26.32 | 0.21 | -95.23 | 32.90 | -13.00 | -47.65 | Vertical |
| 3 | 3345.60 | -58.89 | RMS | 29.60 | -25.03 | 0.24 | -95.23 | 31.53 | -13.00 | -45.89 | Vertical |

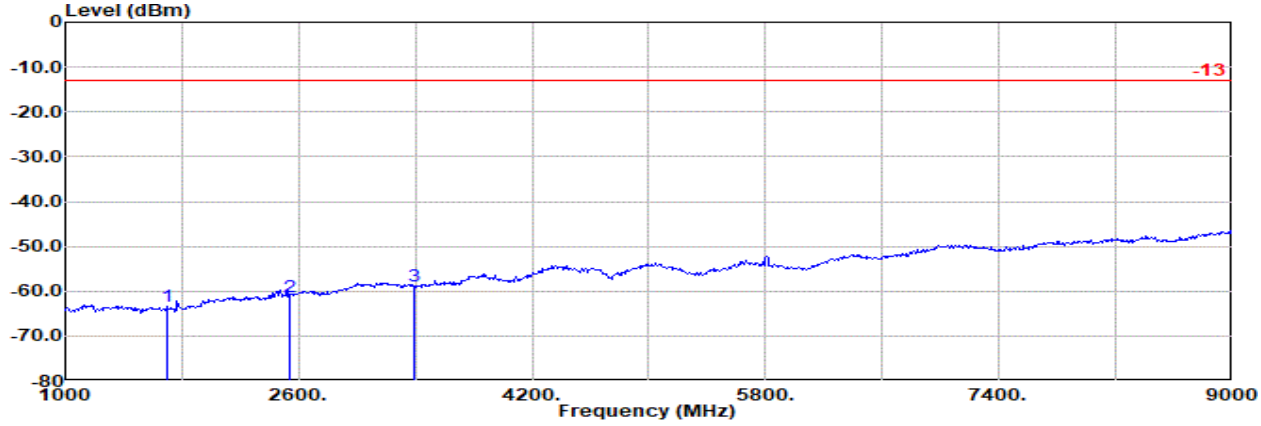
**Ant.0**

| Part 22H Mode 1 |
|---|
| WCDMA B5 CH4233 |
| H |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 850 CH4233

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1693.20 | -63.78 | RMS | 25.17 | -28.29 | 0.31 | -95.23 | 34.26 | -13.00 | -50.78 | Horizontal |
| 2 | 2539.80 | -60.75 | RMS | 28.00 | -26.28 | 0.21 | -95.23 | 32.55 | -13.00 | -47.75 | Horizontal |
| 3 | 3386.40 | -58.72 | RMS | 29.53 | -24.96 | 0.23 | -95.23 | 31.71 | -13.00 | -45.72 | Horizontal |

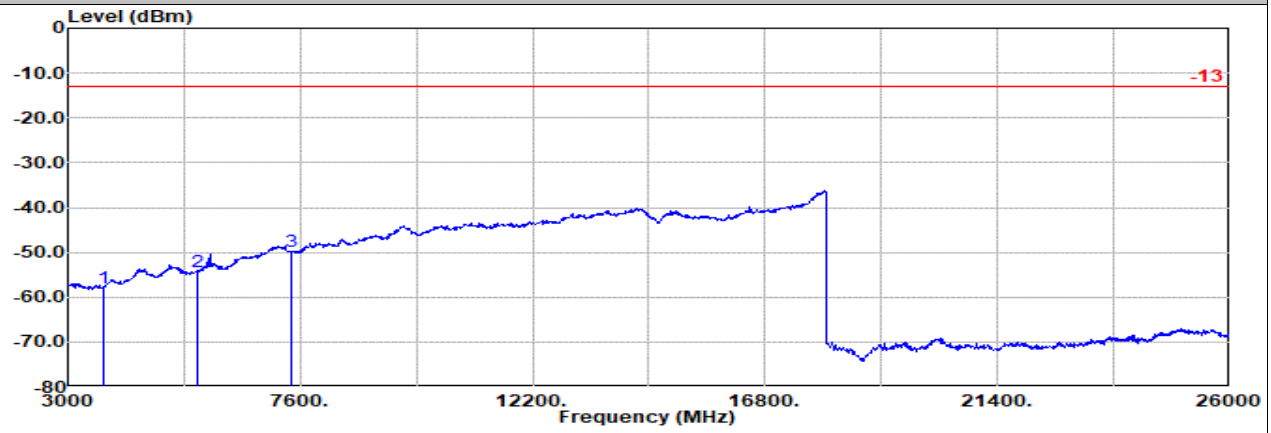



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 850 CH4233

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1693.20 | -63.47 | RMS | 25.17 | -28.29 | 0.31 | -95.23 | 34.57 | -13.00 | -50.47 | Vertical |
| 2 | 2539.80 | -61.26 | RMS | 28.00 | -26.28 | 0.21 | -95.23 | 32.04 | -13.00 | -48.26 | Vertical |
| 3 | 3386.40 | -58.96 | RMS | 29.53 | -24.96 | 0.23 | -95.23 | 31.47 | -13.00 | -45.96 | Vertical |

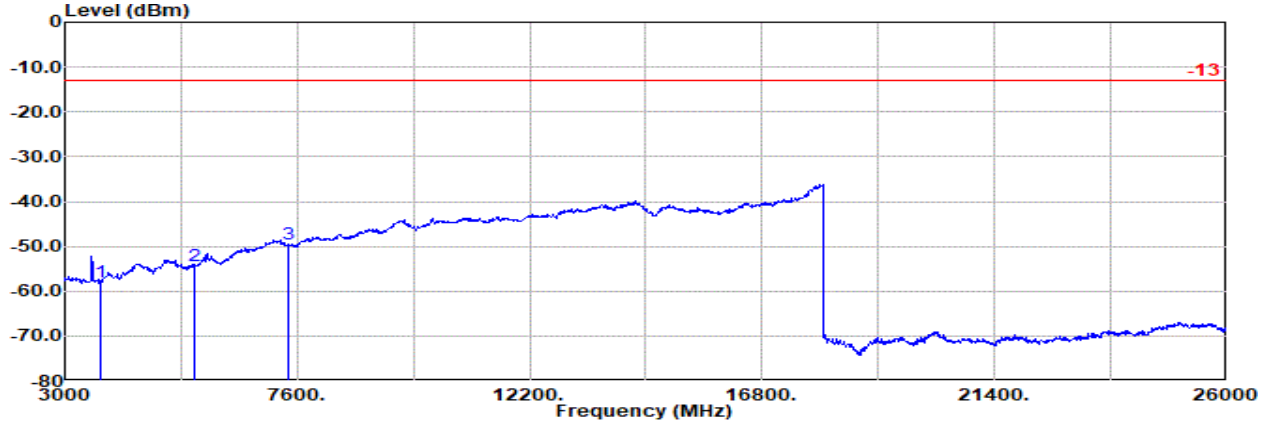
**Ant.0**

| Part 24E Mode 5 |
|---|
| WCDMA B2 CH9262 |
| L |




Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Horizontal
: WCDMA 1900 Ch9262

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3704.80 | -58.08 | RMS | 29.64 | -24.41 | 0.75 | -95.23 | 31.17 | -13.00 | -45.08 | Horizontal |
| 2 | 5557.20 | -54.34 | RMS | 32.91 | -22.15 | 0.51 | -95.23 | 29.62 | -13.00 | -41.34 | Horizontal |
| 3 | 7409.60 | -49.93 | RMS | 36.38 | -20.91 | 0.64 | -95.23 | 29.19 | -13.00 | -36.93 | Horizontal |

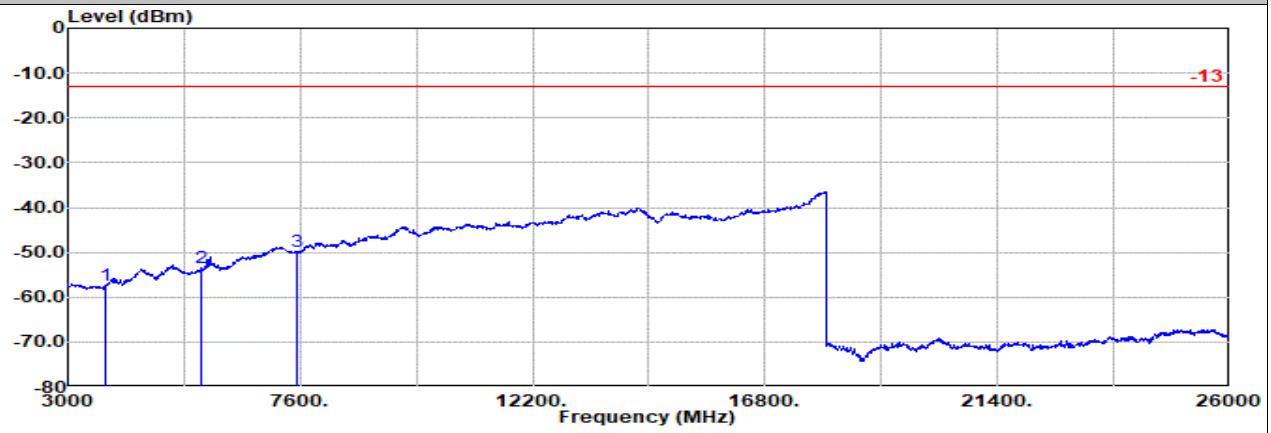



Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Vertical
: WCDMA 1900 Ch9262

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3704.80 | -58.09 | RMS | 29.64 | -24.41 | 0.75 | -95.23 | 31.16 | -13.00 | -45.09 | Vertical |
| 2 | 5557.20 | -54.42 | RMS | 32.91 | -22.15 | 0.51 | -95.23 | 29.54 | -13.00 | -41.42 | Vertical |
| 3 | 7409.60 | -49.58 | RMS | 36.38 | -20.91 | 0.64 | -95.23 | 29.54 | -13.00 | -36.58 | Vertical |

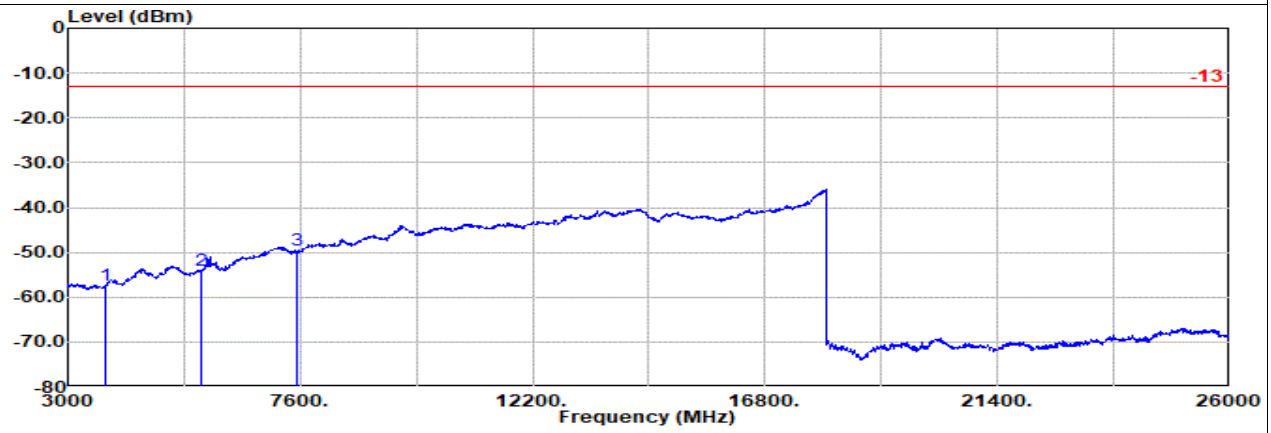
**Ant.0**

| Part 24E Mode 5 |
|---|
| WCDMA B2 CH9400 |
| M |




Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Horizontal
: WCDMA 1900 Ch9400

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3760.00 | -57.26 | RMS | 30.10 | -24.25 | 0.69 | -95.23 | 31.43 | -13.00 | -44.26 | Horizontal |
| 2 | 5640.00 | -53.42 | RMS | 33.08 | -22.11 | 0.49 | -95.23 | 30.35 | -13.00 | -40.42 | Horizontal |
| 3 | 7520.00 | -49.81 | RMS | 36.12 | -20.71 | 0.58 | -95.23 | 29.43 | -13.00 | -36.81 | Horizontal |

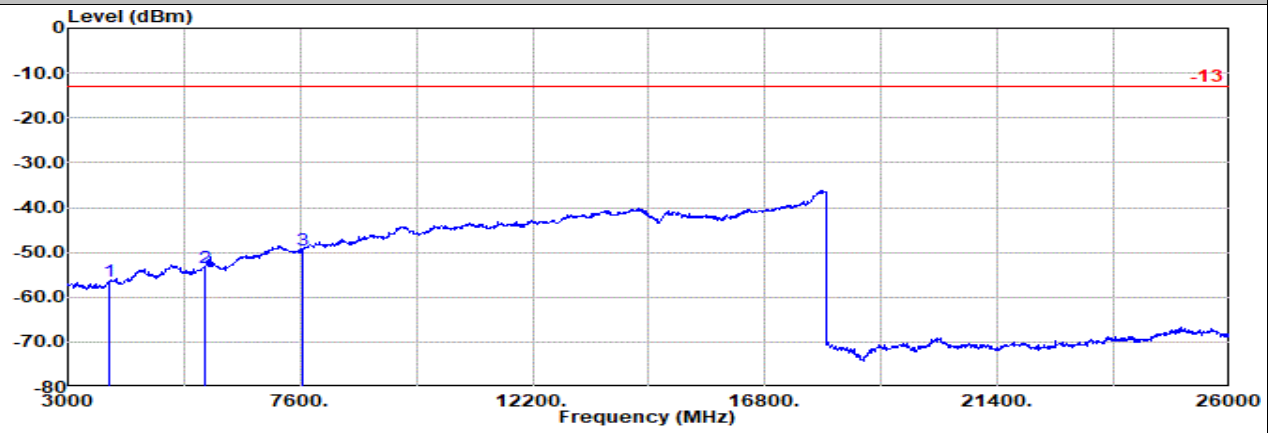



Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Vertical
: WCDMA 1900 Ch9400

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3760.00 | -57.39 | RMS | 30.10 | -24.25 | 0.69 | -95.23 | 31.30 | -13.00 | -44.39 | Vertical |
| 2 | 5640.00 | -54.01 | RMS | 33.08 | -22.11 | 0.49 | -95.23 | 29.76 | -13.00 | -41.01 | Vertical |
| 3 | 7520.00 | -49.55 | RMS | 36.12 | -20.71 | 0.58 | -95.23 | 29.69 | -13.00 | -36.55 | Vertical |

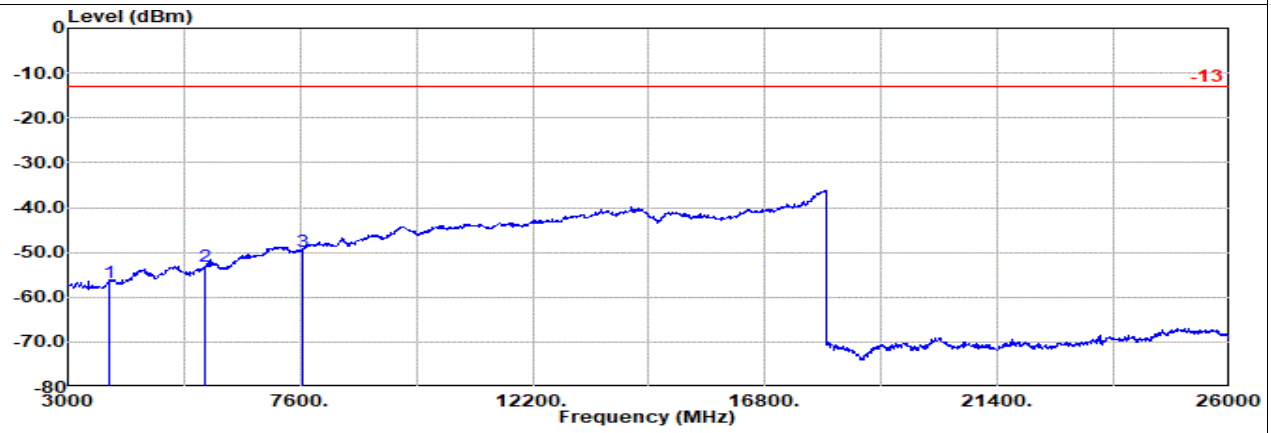
**Ant.0**

| Part 24E Mode 5 |
|---|
| WCDMA B2 CH9538 |
| H |




Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Horizontal
: WCDMA 1900 Ch9538

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3815.20 | -56.59 | RMS | 30.62 | -24.13 | 0.66 | -95.23 | 31.49 | -13.00 | -43.59 | Horizontal |
| 2 | 5722.80 | -53.42 | RMS | 33.59 | -22.10 | 0.50 | -95.23 | 29.82 | -13.00 | -40.42 | Horizontal |
| 3 | 7630.40 | -49.63 | RMS | 36.22 | -20.57 | 0.54 | -95.23 | 29.41 | -13.00 | -36.63 | Horizontal |

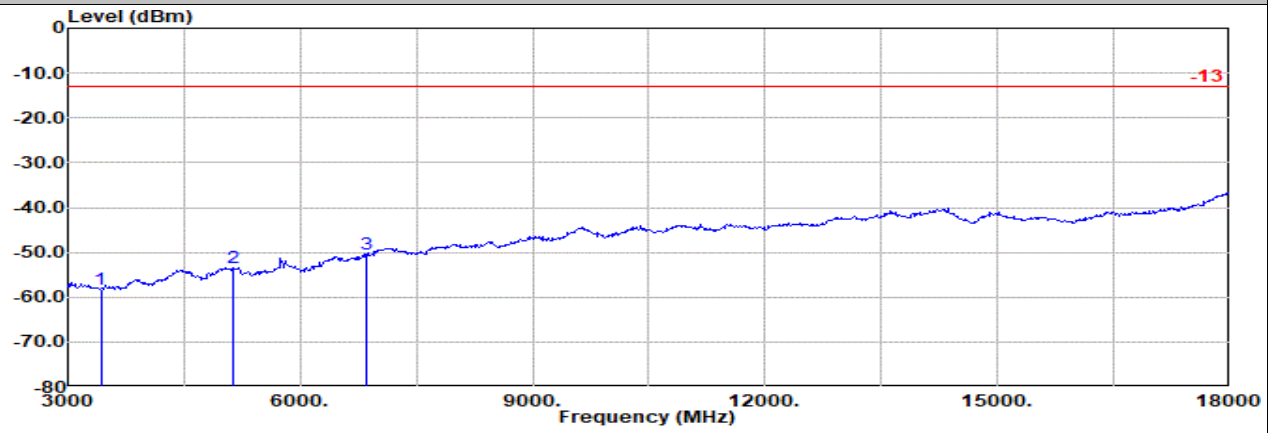



Site : 03CH11-HY
Condition: -13 1m SHF_1223_230710 Vertical
: WCDMA 1900 Ch9538

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3815.20 | -56.79 | RMS | 30.62 | -24.13 | 0.66 | -95.23 | 31.29 | -13.00 | -43.79 | Vertical |
| 2 | 5722.80 | -53.25 | RMS | 33.59 | -22.10 | 0.50 | -95.23 | 29.99 | -13.00 | -40.25 | Vertical |
| 3 | 7630.40 | -49.76 | RMS | 36.22 | -20.57 | 0.54 | -95.23 | 29.28 | -13.00 | -36.76 | Vertical |

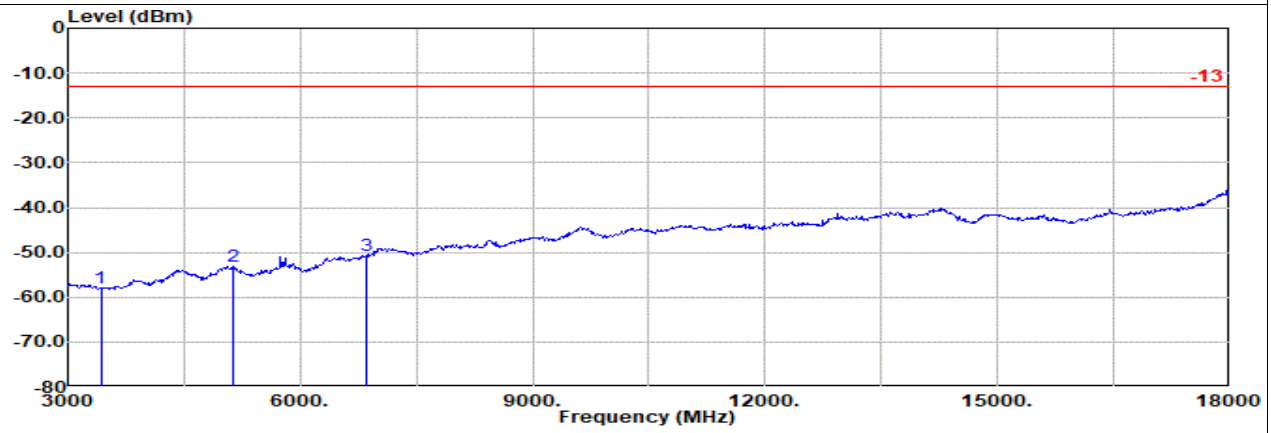
**Ant.0**

| Part 27L Mode 30 |
|---|
| WCDMA B4 CH1312 |
| L |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 1700 Ch1312

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3424.80 | -58.17 | RMS | 29.50 | -24.91 | 0.91 | -95.23 | 31.56 | -13.00 | -45.17 | Horizontal |
| 2 | 5137.20 | -53.51 | RMS | 33.20 | -22.51 | 0.51 | -95.23 | 30.52 | -13.00 | -40.51 | Horizontal |
| 3 | 6849.60 | -50.48 | RMS | 35.80 | -20.62 | 0.45 | -95.23 | 29.12 | -13.00 | -37.48 | Horizontal |

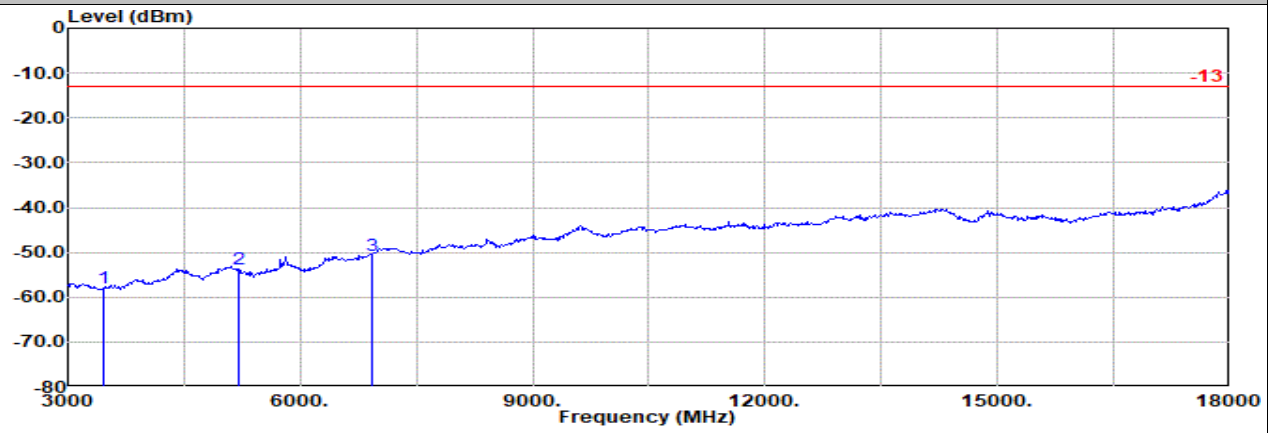



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 1700 Ch1312

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3424.80 | -58.05 | RMS | 29.50 | -24.91 | 0.91 | -95.23 | 31.68 | -13.00 | -45.05 | Vertical |
| 2 | 5137.20 | -53.19 | RMS | 33.20 | -22.51 | 0.51 | -95.23 | 30.84 | -13.00 | -40.19 | Vertical |
| 3 | 6849.60 | -50.62 | RMS | 35.80 | -20.62 | 0.45 | -95.23 | 28.98 | -13.00 | -37.62 | Vertical |

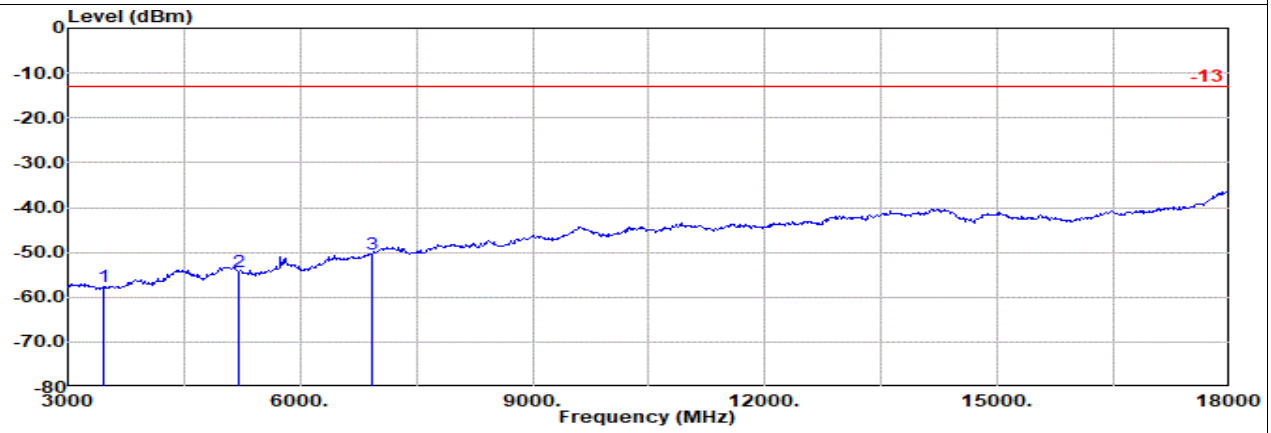
**Ant.0**

| Part 27L Mode 30 |
|---|
| WCDMA B4 CH1413 |
| M |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 1700 Ch1413

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3465.20 | -57.86 | RMS | 29.53 | -24.87 | 0.90 | -95.23 | 31.81 | -13.00 | -44.86 | Horizontal |
| 2 | 5197.80 | -53.75 | RMS | 33.10 | -22.46 | 0.51 | -95.23 | 30.33 | -13.00 | -40.75 | Horizontal |
| 3 | 6930.40 | -50.67 | RMS | 35.80 | -20.62 | 0.46 | -95.23 | 28.92 | -13.00 | -37.67 | Horizontal |

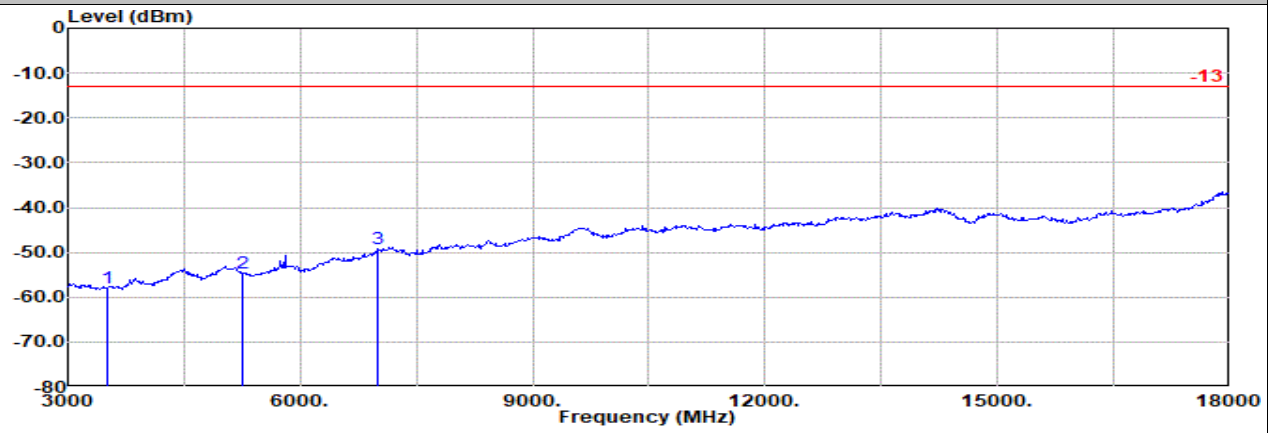



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 1700 Ch1413

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3465.20 | -57.79 | RMS | 29.53 | -24.87 | 0.90 | -95.23 | 31.88 | -13.00 | -44.79 | Vertical |
| 2 | 5197.80 | -54.22 | RMS | 33.10 | -22.46 | 0.51 | -95.23 | 29.86 | -13.00 | -41.22 | Vertical |
| 3 | 6930.40 | -50.54 | RMS | 35.80 | -20.62 | 0.46 | -95.23 | 29.05 | -13.00 | -37.54 | Vertical |

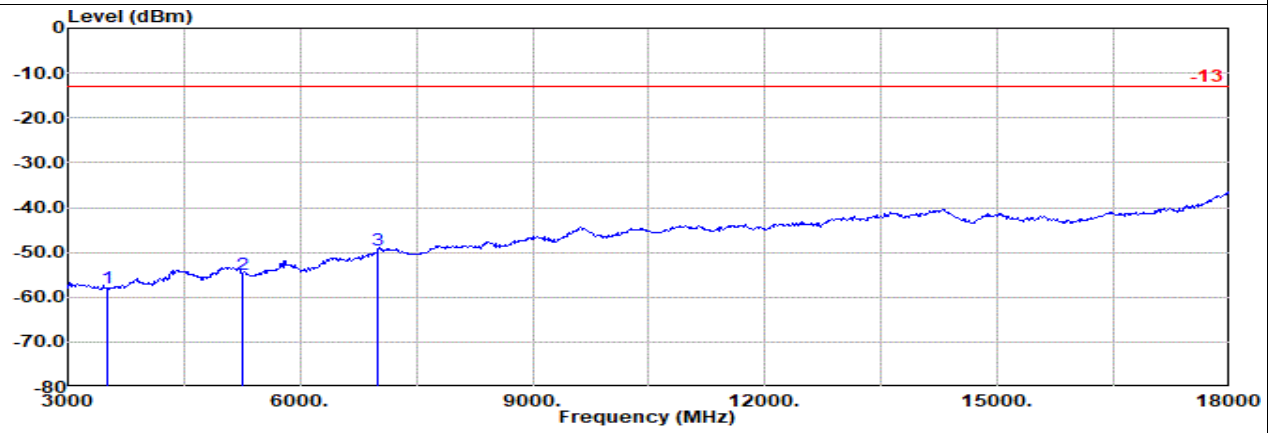
**Ant.0**

| Part 27L Mode 30 |
|---|
| WCDMA B4 CH1513 |
| H |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 1700 Ch1513

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3505.20 | -57.99 | RMS | 29.61 | -24.82 | 0.89 | -95.23 | 31.56 | -13.00 | -44.99 | Horizontal |
| 2 | 5257.80 | -54.70 | RMS | 32.98 | -22.41 | 0.53 | -95.23 | 29.43 | -13.00 | -41.70 | Horizontal |
| 3 | 7010.40 | -49.20 | RMS | 35.94 | -20.63 | 0.48 | -95.23 | 30.24 | -13.00 | -36.20 | Horizontal |

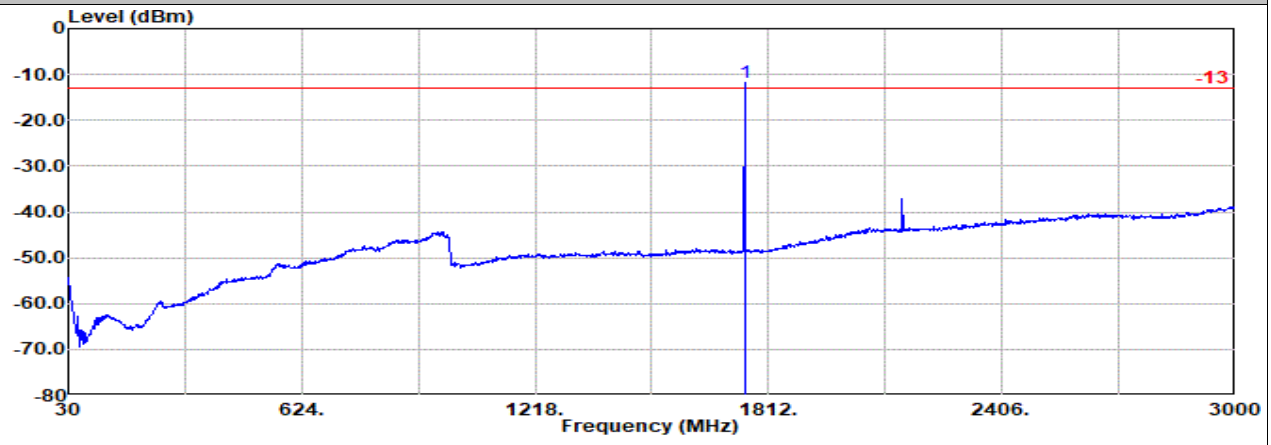



Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 1700 Ch1513

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 3505.20 | -57.90 | RMS | 29.61 | -24.82 | 0.89 | -95.23 | 31.65 | -13.00 | -44.90 | Vertical |
| 2 | 5257.80 | -54.84 | RMS | 32.98 | -22.41 | 0.53 | -95.23 | 29.29 | -13.00 | -41.84 | Vertical |
| 3 | 7010.40 | -49.60 | RMS | 35.94 | -20.63 | 0.48 | -95.23 | 29.84 | -13.00 | -36.60 | Vertical |

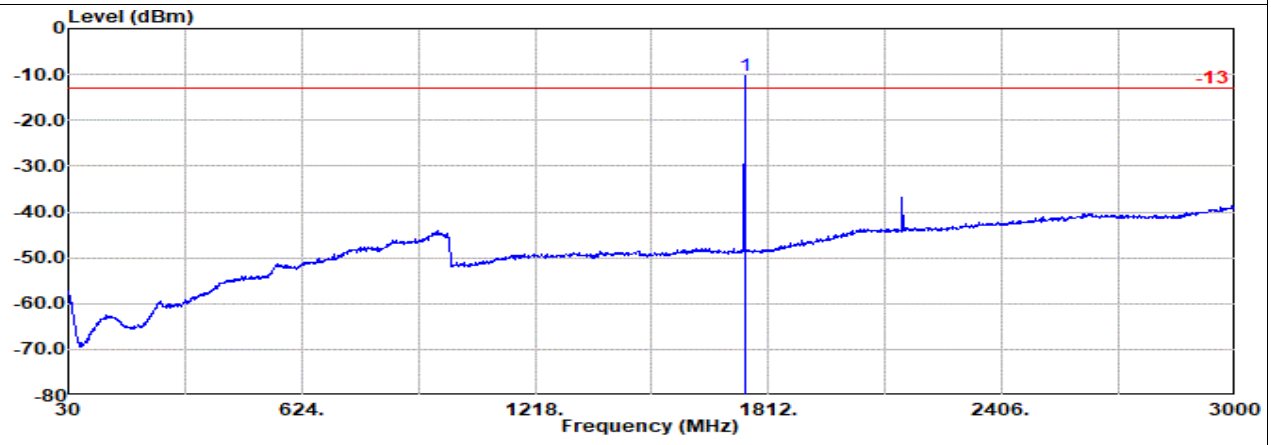
**Ant.0**

| Part 27L Mode 30 |
|---|
| WCDMA B4 CH1513 |
| H |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Horizontal
: WCDMA 1700 Ch1513
: #1 is fundamental signal which can be ignored.

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1752.60 | -11.73 | RMS | 25.17 | 5.75 | 0.00 | -95.23 | 52.58 | -13.00 | 1.27 | Horizontal |




Site : 03CH11-HY
Condition: -13 3m 9120D_01620_230817 Vertical
: WCDMA 1700 Ch1513
: #1 is fundamental signal which can be ignored.

| | Freq | Level | Detector | Ant Factor | Amp\Cbl | Filter | EIRPCF | Reading | Limit | Margin | Pol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBm | | dB/m | dB | dB | dB | dBuV | dBm | dB | |
| 1 | 1752.60 | -10.34 | RMS | 25.17 | 5.75 | 0.00 | -95.23 | 53.97 | -13.00 | 2.66 | Vertical |

**Remark:** #1 is fundamental signal which can be ignored.