

TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H,
Part 24 Subpart E and Part 27 Subpart C
IC RSS-Gen Issue 5, RSS-132 Issue 3, RSS-133 Issue 6
and RSS-139 Issue 3

FCC ID: BEJTFGMEIBBCD1
IC Certification: 2703H-TFGMEIBBCD1

Equipment Under Test : Telematics
Model Name : TFGMEIBBCD1
Variant Model Name(s) : Refer to the page 3
Applicant : FCC: LG Electronics USA
: IC: LG ELECTRONICS INC.
Manufacturer : LG Electronics Inc.
Date of Receipt : 2022.07.22
Date of Test(s) : 2022.07.25 ~ 2023.03.09
Date of Issue : 2023.03.13

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
- 3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
- 4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.

We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by:

Teo Kim

Technical
Manager:

Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory



INDEX

| <u>Table of Contents</u> | Page |
|--|------|
| 1. General Information ----- | 3 |
| 2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions ----- | 10 |
| 3. Conducted Output Power ----- | 24 |
| 4. Occupied Bandwidth ----- | 27 |
| 5. Peak-Average Ratio ----- | 31 |
| 6. Spurious Emissions at Antenna Terminal ----- | 37 |
| 7. Band Edge ----- | 42 |
| 8. Frequency Stability ----- | 47 |

1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

1.2. Details of Applicant

FCC Applicant : LG Electronics USA

FCC Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States, 07632

IC Applicant : LG ELECTRONICS INC.

IC Address : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea (Republic of), 451-713

Contact Person : Cho, Hee-jae

Phone No. : +1 201 470 2696

1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

1.4. Description of EUT

| | |
|-----------------------------|--|
| Kind of Product | Telematics |
| Model Name | TFGMEIBBCD1 |
| Variant Model Names | TFGMEIBBCD2, TFGMEIBBCD3 |
| Serial Number | Conducted: 351015130056680 Radiated: 351015130065751 |
| Power Supply | DC 13.5 V |
| Rated Power | WCDMA II, V: 24 dB m WCDMA IV: 23.5 dB m |
| Frequency Range | WCDMA II: 1 850 MHz ~ 1 910 MHz WCDMA IV: 1 710 MHz ~ 1 755 MHz WCDMA V: 824 MHz ~ 849 MHz |
| Modulation Technique | QPSK, 16QAM |
| Antenna Type | Internal: Planar Inverted F Antenna External: Metal Antenna |
| Antenna Gain* | Refer to the clause 1.15 |
| H/W Version | REV.D |
| S/W Version | SW168 |
| FVIN | N/A |

1.5. Test Equipment List

| Equipment | Manufacturer | Model | S/N | Cal. Date | Cal. Interval | Cal. Due |
|---------------------|-----------------------------|--------------------------------------|---------------------------|---------------|---------------|---------------|
| Signal Generator | R&S | SMA100B | 106887 | Oct. 13, 2022 | Annual | Oct. 13, 2023 |
| Signal Generator | R&S | SMBV100A | 255834 | May 25, 2022 | Annual | May 25, 2023 |
| Spectrum Analyzer | R&S | FSV30 | 103210 | Dec. 07, 2022 | Annual | Dec. 07, 2023 |
| Spectrum Analyzer | Agilent | N9020A | MY53421758 | Aug. 26, 2022 | Annual | Aug. 26, 2023 |
| Mobile Test Unit | R&S | CMW 500 | 144034 | Feb. 17, 2023 | Annual | Feb. 17, 2024 |
| Power Meter | Anritsu | ML2495A | 1223004 | Nov. 29, 2022 | Annual | Nov. 29, 2023 |
| Power Sensor | Anritsu | MA2411B | 1207272 | May 27, 2022 | Annual | May 27, 2023 |
| Temperature Chamber | ESPEC CORP. | SH-662 | 93000533 | Jun. 02, 2022 | Annual | Jun. 02, 2023 |
| Low Pass Filter | Mini-Circuits | NLP-1200+ | V 8979400903-1 | May 13, 2022 | Annual | May 13, 2023 |
| High Pass Filter | Wainwright Instrument GmbH | WHKX10-900-1000-18000-40SS | 7 | Mar. 02, 2023 | Annual | Mar. 02, 2024 |
| High Pass Filter | Wainwright Instrument GmbH | WHKX2.2/12.75G-10SS | 8 | Mar. 02, 2023 | Annual | Mar. 02, 2024 |
| High Pass Filter | Wainwright Instrument GmbH | WHKX3.0/18G-6SS | 21 | Jun. 09, 2022 | Annual | Jun. 09, 2023 |
| High Pass Filter | Wainwright Instrument GmbH | WHNX7.5/26.5G-6SS | 11 | Oct. 24, 2022 | Annual | Oct. 24, 2023 |
| BRIDGE COUPLER | MARKI MICROWAVE INC | CBR16-0012 | 1542 | May 06, 2022 | Annual | May 06, 2023 |
| Directional Coupler | KRYTAR | 152613 | 122660 | Jul. 06, 2022 | Annual | Jul. 06, 2023 |
| DC Power Supply | Agilent | U8002A | MY49030063 | Jan. 20, 2023 | Annual | Jan. 20, 2024 |
| Preamplifier | H.P. | 8447F | 2944A03909 | Aug. 04, 2022 | Annual | Aug. 04, 2023 |
| Preamplifier | R&S | SCU 18 | 10117 | Jun. 13, 2022 | Annual | Jun. 13, 2023 |
| Preamplifier | TESTEK | TK-PA1840H | 130016 | Jan. 11, 2023 | Annual | Jan. 11, 2024 |
| Test Receiver | R&S | ESCI 7 | 100911 | Feb. 24, 2023 | Annual | Feb. 24, 2024 |
| Loop Antenna | Schwarzbeck Mess-Elektronik | FMZB 1519 | 1519-039 | Aug. 23, 2021 | Biennial | Aug. 23, 2023 |
| Bilog Antenna | Schwarzbeck Mess-Elektronik | VULB9163 | 01126 | Feb. 09, 2023 | Annual | Feb. 09, 2024 |
| Horn Antenna | R&S | HF906 | 100326 | Feb. 28, 2023 | Annual | Feb. 28, 2024 |
| Horn Antenna | R&S | HF907 | 102270 | Mar. 09, 2023 | Annual | Mar. 09, 2024 |
| Horn Antenna | Schwarzbeck Mess-Elektronik | BBHA 9170 | 9170-540 | Nov. 30, 2022 | Annual | Nov. 30, 2023 |
| Antenna Master | Innco systems GmbH | MA4640-XP-ET | MA4640/536/383 30516/L | N.C.R. | N/A | N.C.R. |
| Turn Table | Innco systems GmbH | DS 1200S | N/A | N.C.R. | N/A | N.C.R. |
| Controller | Innco systems GmbH | CONTROLLER CO3000-4P | CO3000/963/383 30516/L | N.C.R. | N/A | N.C.R. |
| Anechoic Chamber | SY Corporation | L x W x H (9.6 m x 6.4 m x 6.6 m) | N/A | N.C.R. | N/A | N.C.R. |
| Coaxial Cable | RFONE | MWX221-NMSNMS (4 m) | J1023142 | Oct. 04, 2022 | Semi-Annual | Apr. 04, 2023 |
| Coaxial Cable | Qualwave Inc. | QA500-18-NN-10 (10 m) | 22200114 | Oct. 04, 2022 | Semi-Annual | Apr. 04, 2023 |
| Coaxial Cable | RADIALL | TESTPRO 3 | 182287 | Feb. 18, 2023 | Semi-Annual | Aug. 18, 2023 |
| Coaxial Cable | RADIALL | TESTPRO 3 | 182288 | Feb. 18, 2023 | Semi-Annual | Aug. 18, 2023 |
| Coaxial Cable | RADIALL | TESTPRO 3 | 182291 | Feb. 18, 2023 | Semi-Annual | Aug. 18, 2023 |

Note;

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 2, 22, 24 and 27 / IC RSS-Gen Issue 5, RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3 | | | |
|---|---|---------------------------------------|------------------------|
| Section(s) in FCC | Section(s) in IC | Test Item | Result |
| §2.1046 §22.913(a)(5) §24.232(c) §27.50(d)(4) | RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5 | E.R.P. / E.I.R.P. | Complied ¹⁾ |
| §2.1053 §22.917(a) §24.238(a) §27.53(h)(1) | RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 | Radiated Spurious Emissions | Complied ¹⁾ |
| §2.1046 | RSS-Gen Issue 5 6.12 | Conducted Output Power | Complied ²⁾ |
| §2.1049 | RSS-Gen Issue 5 6.7 | Occupied Bandwidth | Complied ²⁾ |
| §22.913(d) §24.232(d) §27.50(d)(5) | RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5 | Peak-Average Ratio | Complied ²⁾ |
| §2.1051 §22.917(a) §24.238(a) §27.53(h)(1) | RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 | Spurious Emission at Antenna Terminal | Complied ²⁾ |
| §22.917(a) §24.238(a) §27.53(h)(1) | RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 | Band Edge | Complied ²⁾ |
| §2.1055 §22.355 §24.235 §27.54 | RSS-Gen Issue 5 6.11 RSS-132 Issue 3 5.3 RSS-133 Issue 6 6.3 RSS-139 Issue 3 6.4 | Frequency Stability | Complied ²⁾ |

Note;

- 1) The EUT has two antennas (external, internal) and each antenna operated by one module.
- 2) The EUT uses same module with TM05FNNAGM0, so only spot check was performed for radiated spurious emissions and the rule was satisfied.

1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.7.1. Conducted Test

Offset value (dB) = Directional Coupler (dB) + Cable loss (dB)

1.7.2. Radiation Test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.8;
 where D is the measurement distance in meters.
- E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

1.8. Introduction of Test Data Reuse

This report referenced from the FCC ID: BEJTM05FNNAGM0 and IC Certification: 2703H-TM05FNNAGM0. The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID and IC Certification.

1.9. Difference

| Model name | Description |
|-------------|--|
| TM05FNNAGM0 | - Reference model - Single modular |
| TFGMEIBBCD1 | - Host equipment - Same to reference model except below - With external case - Internal antenna |

1.10. Spot Check Data

After confirming through preliminary radiated spurious emissions in the each below 1 GHz and above 1 GHz worst band that the performance of the FCC ID: BEJTM05FNNAGM0 and IC Certification: 2703H-TM05FNNAGM0 remains representative of FCC ID: BEJTFGMEIBBCD1 and IC Certification: 2703H-TFGMEIBBCD1.

The test data of FCC ID: BEJTM05FNNAGM0 and IC Certification: 2703H-TM05FNNAGM0 being submitted for this application to cover WCDMA features.

| Band | Test item | Frequency (MHz) | Limit | Original model | Spot check model | Deviation (dB) | Remark |
|----------|-----------------------------|-----------------|----------|---|---|----------------|-------------|
| | | | | TM05FNNAGM0 | TFGMEIBBCD1 | | |
| | | | | FCC ID: BEJTM05FNNAGM0 IC Certification: 2703H- TM05FNNAGM0 | FCC ID: BEJTFGMEIBBCD1 IC Certification: 2703H- TFGMEIBBCD1 | | |
| WCDMA IV | Radiated Spurious Emissions | 1 712.4 | -13 dB m | -21.07 dB m | -23.37 dB m | 2.30 | - |
| WCDMA V | Radiated Spurious Emissions | 836.6 | -13 dB m | -56.42 dB m | -56.38 dB m | 0.04 | Noise floor |

Note;

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC/IC technical limits.

1.11. Reference Detail

Reference applicant that contains the reused reference data in the individual test reports:

| Equipment class | Reference FCC ID and IC Certification | Application type | Reference test report number | Exhibit type | Variant test report number | Data reuse |
|-----------------|---|------------------|--|--------------|--------------------------------------|------------|
| PCB | FCC ID: BEJTM05FNNAGM0 IC Certification: 2703H-TM05FNNAGM0 | Original grant | F690501-RF-RTL003820-1 (LTE) | Test report | F690501-RF-RTL003895 (LTE) | All |
| | | | F690501-RF-RTL003821-1 (NR) | | F690501-RF-RTL003896 (NR) | |
| | | | F690501-RF-RTL003822-1 (Inter CA) | | F690501-RF-RTL003897 (Inter CA) | |
| | | | F690501-RF-RTL003823-1 (WCDMA) | | F690501-RF-RTL003898 (WCDMA) | |
| | | | F690501-RF-RTL003824-1 (intra CA) | | F690501-RF-RTL003899 (intra CA) | |
| | | | F690501-RF-RTL003825-1 (NR n41) | | F690501-RF-RTL003900 (NR n41) | |
| | | | F690501-RF-RTL003827-1 (FCC_NR n77/78) | | F690501-RF-RTL003902 (FCC_NR n77/78) | |
| | | | F690501-RF-RTL003828-1 (IC_NR n77/78) | | F690501-RF-RTL003903 (IC_NR n77/78) | |

1.12. Manufacturer Declaration

The EUT supports two ports and LTE, WCDMA and 5G NR FDD bands support only port 1.
 The 5G NR TDD (n41, n77, n78) band supports both port 1 and port 2.
 The EUT has two antennas (external, internal) and each antenna operated by one module.
 The EUT's internal and external antennas do not transmit simultaneously.

1.13. Worst Case Configuration and Mode

WCDMA mode, Output power measurements were measured on RMC, HSDPA, HSUPA, HSPA+ and DC-HSDPA Modulation. All testing was performed using RMC and HSDPA modulations, except radiated spurious emission and emission at antenna terminal were tested only RMC modulation as worst case. The worst-case is based on the average conducted output power measurement investigation results.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

1.14. Measurement Configuration

| Test Items | Band | Test Channel | | | Modulation | | |
|---------------------------------------|---------|--------------|-----|------|------------|-------|-------|
| | | Low | Mid | High | RMC | HSUPA | HSDPA |
| Conducted Output Power | Band II | V | V | V | V | V | V |
| | Band IV | V | V | V | V | V | V |
| | Band V | V | V | V | V | V | V |
| Frequency Stability | Band II | - | V | - | V | - | - |
| | Band IV | - | V | - | V | - | - |
| | Band V | - | V | - | V | - | - |
| Occupied Bandwidth | Band II | - | V | - | V | - | V |
| | Band IV | - | V | - | V | - | V |
| | Band V | - | V | - | V | - | V |
| Peak to Average Ratio | Band II | V | V | V | V | - | V |
| | Band IV | V | V | V | V | - | V |
| | Band V | V | V | V | V | - | V |
| Band Edge | Band II | V | - | V | V | - | V |
| | Band IV | V | - | V | V | - | V |
| | Band V | V | - | V | V | - | V |
| Spurious Emission at Antenna Terminal | Band II | V | V | V | V | - | - |
| | Band IV | V | V | V | V | - | - |
| | Band V | V | V | V | V | - | - |
| Radiated Spurious Emissions | Band II | V | V | V | V | - | - |
| | Band IV | V | V | V | V | - | - |
| | Band V | V | V | V | V | - | - |

1.15. Antenna Information

| Band | Operating Frequency (MHz) | Antenna Peak Gain (dB i) | |
|----------|---------------------------|--------------------------|----------|
| | | External | Internal |
| WCDMA V | 824 ~ 849 | 0.37 | 0.75 |
| WCDMA IV | 1 710 ~ 1 755 | 5.19 | 3.15 |
| WCDMA II | 1 850 ~ 1 910 | 5.12 | 2.23 |

1.16. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter | Uncertainty | |
|------------------------------------|-------------|---------|
| RF Output Power | 0.32 dB | |
| Occupied Bandwidth | 3.90 kHz | |
| Conducted Spurious Emissions | 0.61 dB | |
| Peak to Average Ratio | 0.60 dB | |
| Frequency Stability | 5.97 kHz | |
| Radiated Emission, 9 kHz to 30 MHz | H | 3.40 dB |
| | V | 3.40 dB |
| Radiated Emission, below 1 GHz | H | 4.50 dB |
| | V | 5.10 dB |
| Radiated Emission, above 1 GHz | H | 3.70 dB |
| | V | 3.90 dB |

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

1.17. Test Report Revision

| Revision | Report Number | Date of Issue | Description |
|----------|----------------------|---------------|-------------|
| 0 | F690501-RF-RTL003898 | 2023.03.13 | Initial |

1.18. Emission Designator and Max Power

- Internal Antenna

| Band | Modulation | Low Freq. (MHz) | Upper Freq. (MHz) | Conducted Power (dB m) | Ant. Gain (dB i) | E.R.P. / E.I.R.P. Average (dB m) | E.R.P. / E.I.R.P. Average (W) | Emission Designator |
|----------|------------|-----------------|-------------------|------------------------|------------------|----------------------------------|-------------------------------|---------------------|
| WCDMA II | RMC | 1 852.4 | 1 907.6 | 23.47 | 2.23 | 25.70 | 0.372 | 4M14F9W |
| | HSDPA | | | 23.24 | | 25.47 | 0.352 | 4M14F9W |
| WCDMA IV | RMC | 1 712.4 | 1 752.6 | 23.87 | 3.15 | 27.02 | 0.504 | 4M15F9W |
| | HSDPA | | | 23.79 | | 26.94 | 0.494 | 4M14F9W |
| WCDMA V | RMC | 826.4 | 846.6 | 24.05 | 0.75 | 22.65 | 0.184 | 4M17F9W |
| | HSDPA | | | 24.02 | | 22.62 | 0.183 | 4M17F9W |

- External Antenna

| Band | Modulation | Low Freq. (MHz) | Upper Freq. (MHz) | Conducted Power (dB m) | Ant. Gain (dB i) | E.R.P. / E.I.R.P. Average (dB m) | E.R.P. / E.I.R.P. Average (W) | Emission Designator |
|----------|------------|-----------------|-------------------|------------------------|------------------|----------------------------------|-------------------------------|---------------------|
| WCDMA II | RMC | 1 852.4 | 1 907.6 | 23.47 | 5.12 | 28.59 | 0.723 | 4M14F9W |
| | HSDPA | | | 23.24 | | 28.36 | 0.685 | 4M14F9W |
| WCDMA IV | RMC | 1 712.4 | 1 752.6 | 23.87 | 5.19 | 29.06 | 0.805 | 4M15F9W |
| | HSDPA | | | 23.79 | | 28.98 | 0.791 | 4M14F9W |
| WCDMA V | RMC | 826.4 | 846.6 | 24.05 | 0.37 | 22.27 | 0.169 | 4M17F9W |
| | HSDPA | | | 24.02 | | 22.24 | 0.167 | 4M17F9W |

1.19. Information of Variant Model

| Model Name | | Description |
|----------------|-------------|--|
| Basic Model | TFGMEIBBCD1 | - Dual GNSS |
| Variant Models | TFGMEIBBCD2 | - Same to RF module with basic model except following function - Single GNSS and Ultra-super cruise service doesn't supported |
| | TFGMEIBBCD3 | - Same to RF module with basic model except following function - Single GNSS and Ultra-super cruise service doesn't supported - eUICC part is different with TFGMEIBBCD2 |

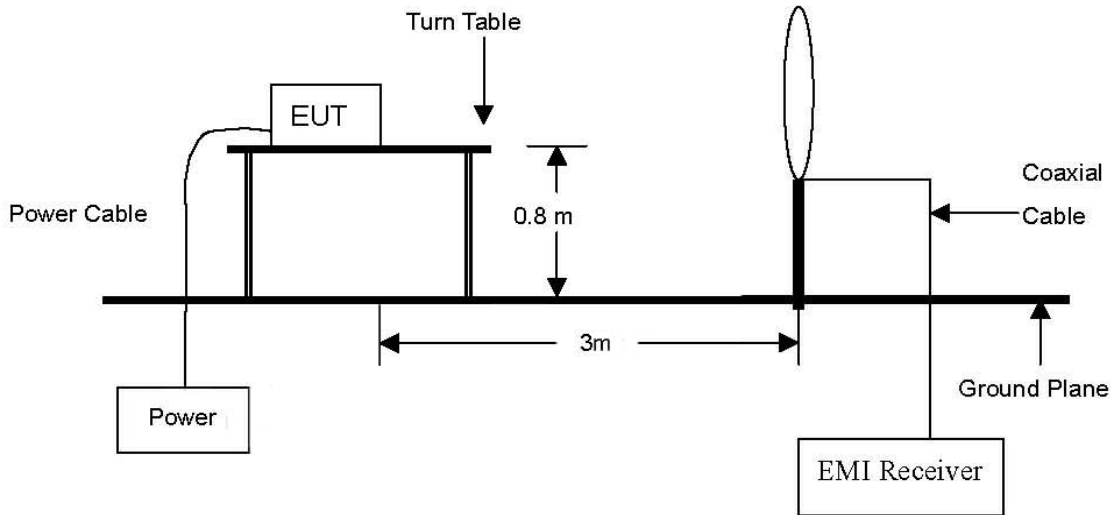
Note;

The all test items performed with basic model.

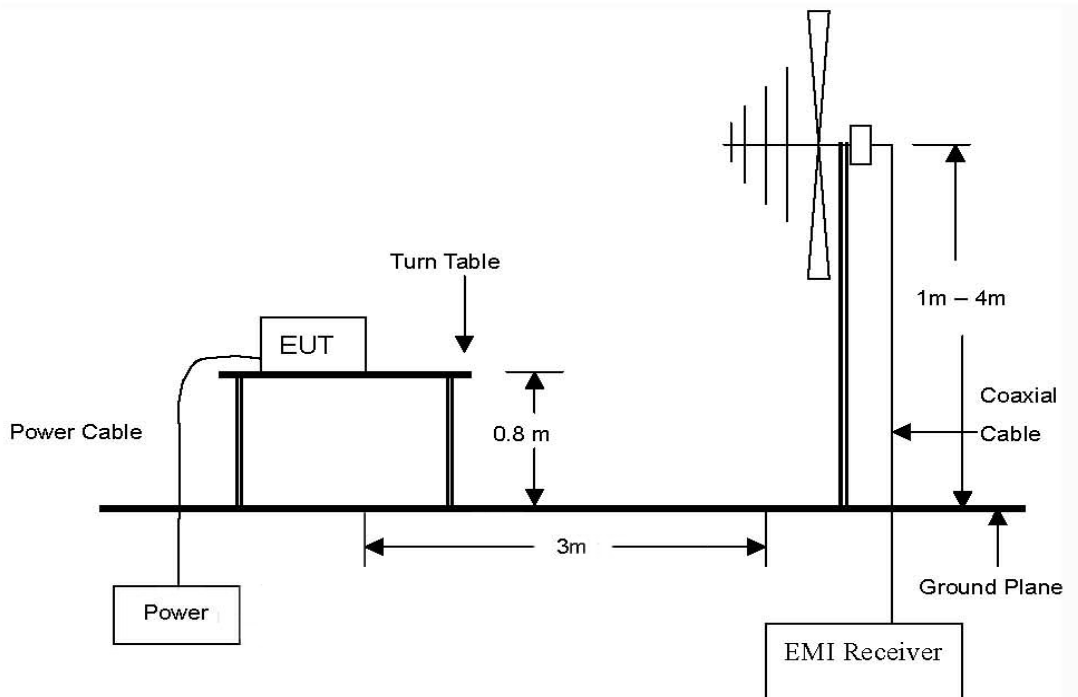
2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions

2.1. Test setup

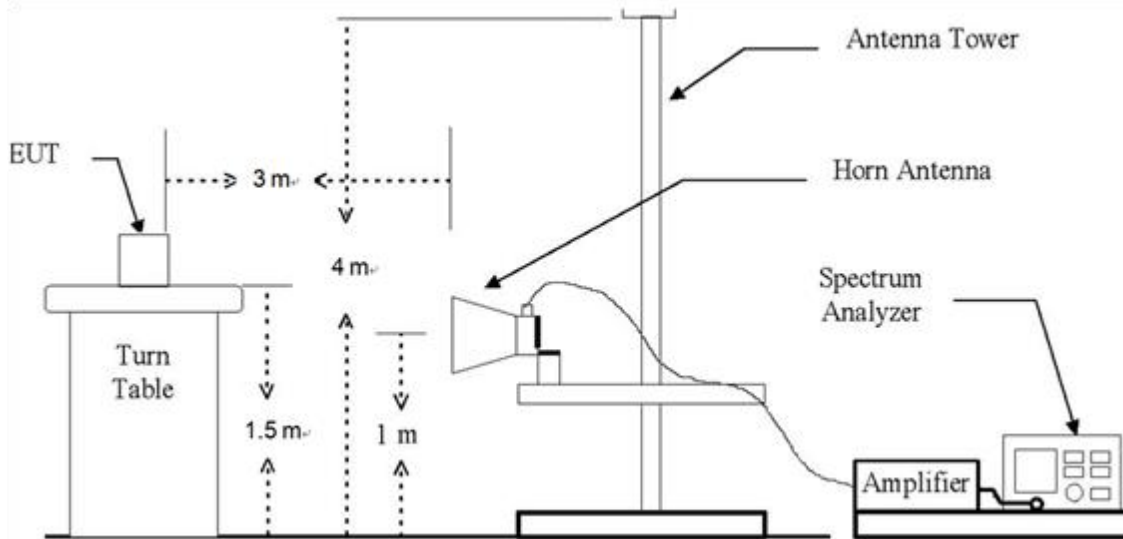
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 20 GHz Emissions.



2.2. Limit

2.2.1. Limit of E.R.P. / E.I.R.P.

FCC

- §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
- §24.232(c), 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.
- §27.50(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 MHz band and mobile and portable stations operating in the 1 695-1 710 MHz and 1 755-1 780 MHz bands are limited to 1 watt EIRP.

IC

- RSS-132 Issue 3

5.4, the transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p. limits.

- RSS-133 Issue 6

6.4, the equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

- RSS-139 Issue 3

6.5, the equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1 710-1 780 MHz shall not exceed one watt.

2.2.2. Limit of Radiated Spurious Emissions

FCC

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.
- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

IC

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kHz is required.

- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 MHz is required.

- RSS-139 Issue 3

6.6, (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015, KDB 971168 D01 Power Meas License Digital Systems v03r01.

1. On a test site, the EUT shall be placed at 0.8 m or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. Radiated spurious emissions measurement method was set as follows:
RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz, VBW \geq 3 x RBW,
Detector = RMS, trace mode = max hold, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
11. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
12. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

2.4.1. E.R.P. / E.I.R.P.

- Internal Antenna

| Band | Frequency (MHz) | Maximum Conducted Power (dB m) | Maximum Conducted Power (W) | Antenna Gain (dB i) | Maximum E.I.R.P. (dB m) | Maximum E.I.R.P. (W) | Maximum E.R.P. (dB m) | Maximum E.R.P. (W) | Limit |
|----------|-----------------|--------------------------------|-----------------------------|---------------------|-------------------------|----------------------|-----------------------|--------------------|--------------|
| WCDMA II | 1 850 ~ 1 910 | 23.47 | 0.222 | 2.23 | 25.70 | 0.372 | | | 2 W E.I.R.P. |
| WCDMA IV | 1 710 ~ 1 755 | 23.87 | 0.244 | 3.15 | 27.02 | 0.504 | | | 1 W E.I.R.P. |
| WCDMA V | 824 ~ 849 | 24.05 | 0.254 | 0.75 | 24.80 | 0.302 | 22.65 | 0.184 | 7 W E.R.P. |

- External Antenna

| Band | Frequency (MHz) | Maximum Conducted Power (dB m) | Maximum Conducted Power (W) | Antenna Gain (dB i) | Maximum E.I.R.P. (dB m) | Maximum E.I.R.P. (W) | Maximum E.R.P. (dB m) | Maximum E.R.P. (W) | Limit |
|----------|-----------------|--------------------------------|-----------------------------|---------------------|-------------------------|----------------------|-----------------------|--------------------|--------------|
| WCDMA II | 1 850 ~ 1 910 | 23.47 | 0.222 | 5.12 | 28.59 | 0.723 | | | 2 W E.I.R.P. |
| WCDMA IV | 1 710 ~ 1 755 | 23.87 | 0.244 | 5.19 | 29.06 | 0.805 | | | 1 W E.I.R.P. |
| WCDMA V | 824 ~ 849 | 24.05 | 0.254 | 0.37 | 24.42 | 0.277 | 22.27 | 0.169 | 7 W E.R.P. |

Remark;

1. E.I.R.P. (dB m) = Maximum Conducted Power (dB m) + Antenna Gain (dB i)
2. E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.

2.4.2. Radiated Spurious Emissions

- Internal Antenna

WCDMA II

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|----------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|-----------------|--------------|-------------|
| Low Channel (1 852.4 MHz) | | | | | | | | | |
| 3 702.85 | 45.79 | H | 32.11 | -36.61 | 41.29 | -95.26 | -53.97 | -13 | 40.97 |
| 3 707.10 | 43.70 | V | 32.11 | -36.61 | 39.20 | -95.26 | -56.06 | -13 | 43.06 |
| 6 383.90 | 50.47 | H | 34.60 | -33.51 | 51.56 | -95.26 | -43.70 | -13 | 30.70 |
| 6 383.90 | 47.37 | V | 34.60 | -33.51 | 48.46 | -95.26 | -46.80 | -13 | 33.80 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| Middle Channel (1 880 MHz) | | | | | | | | | |
| 3 761.45 | 46.78 | H | 32.15 | -36.89 | 42.04 | -95.26 | -53.22 | -13 | 40.22 |
| 3 758.65 | 46.21 | V | 32.17 | -36.88 | 41.50 | -95.26 | -53.76 | -13 | 40.76 |
| 6 384.36 | 49.85 | H | 34.60 | -33.51 | 50.94 | -95.26 | -44.32 | -13 | 31.32 |
| 6 384.20 | 47.94 | V | 34.60 | -33.51 | 49.03 | -95.26 | -46.23 | -13 | 33.23 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| High Channel (1 907.6 MHz) | | | | | | | | | |
| 3 817.80 | 45.64 | H | 32.04 | -36.46 | 41.22 | -95.26 | -54.04 | -13 | 41.04 |
| 3 816.50 | 46.23 | V | 32.03 | -36.47 | 41.79 | -95.26 | -53.47 | -13 | 40.47 |
| 6 383.88 | 47.38 | H | 34.60 | -33.51 | 48.47 | -95.26 | -46.79 | -13 | 33.79 |
| 6 383.60 | 47.74 | V | 34.60 | -33.50 | 48.84 | -95.26 | -46.42 | -13 | 33.42 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |

WCDMA IV

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|------------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|----------------------|--------------|-------------|
| Low Channel (1 712.4 MHz) | | | | | | | | | |
| 6 384.75 | 46.67 | H | 34.60 | -33.51 | 47.76 | -95.26 | -47.50 | -13 | 34.50 |
| 6 383.90 | 48.14 | V | 34.60 | -33.51 | 49.23 | -95.26 | -46.03 | -13 | 33.03 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| Middle Channel (1 732.6 MHz) | | | | | | | | | |
| 6 383.55 | 47.78 | H | 34.60 | -33.50 | 48.88 | -95.26 | -46.38 | -13 | 33.38 |
| 6 384.00 | 50.35 | V | 34.60 | -33.51 | 51.44 | -95.26 | -43.82 | -13 | 30.82 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| High Channel (1 752.6 MHz) | | | | | | | | | |
| 6 384.05 | 54.11 | H | 34.60 | -33.51 | 55.20 | -95.26 | <u>-40.06</u> | -13 | 27.06 |
| 6 383.70 | 48.19 | V | 34.60 | -33.50 | 49.29 | -95.26 | -45.97 | -13 | 32.97 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |

WCDMA V

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|----------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|---------------|--------------|-------------|
| Low Channel (826.4 MHz) | | | | | | | | | |
| 1 650.70 | 58.55 | V | 25.61 | -38.67 | 45.49 | -97.41 | -51.92 | -13 | 38.92 |
| 6 383.75 | 55.84 | H | 34.60 | -33.51 | 56.93 | -97.41 | -40.48 | -13 | 27.48 |
| 6 383.90 | 51.82 | V | 34.60 | -33.51 | 52.91 | -97.41 | -44.50 | -13 | 31.50 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| Middle Channel (836.6 MHz) | | | | | | | | | |
| 1 670.50 | 56.09 | V | 25.85 | -38.66 | 43.28 | -97.41 | -54.13 | -13 | 41.13 |
| 6 384.10 | 54.61 | H | 34.60 | -33.51 | 55.70 | -97.41 | -41.71 | -13 | 28.71 |
| 6 383.75 | 56.15 | V | 34.60 | -33.51 | 57.24 | -97.41 | -40.17 | -13 | 27.17 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |
| High Channel (846.6 MHz) | | | | | | | | | |
| 1 691.55 | 52.10 | V | 26.10 | -38.74 | 39.46 | -97.41 | -57.95 | -13 | 44.95 |
| 6 384.05 | 56.50 | H | 34.60 | -33.51 | 57.59 | -97.41 | -39.82 | -13 | 26.82 |
| 6 384.15 | 57.54 | V | 34.60 | -33.51 | 58.63 | -97.41 | -38.78 | -13 | 25.78 |
| Above 6 400.00 | Not detected | - | - | - | - | - | - | - | - |

- External Antenna

WCDMA II

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|----------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|----------------------|--------------|-------------|
| Low Channel (1 852.4 MHz) | | | | | | | | | |
| 3 702.48 | 50.04 | V | 32.10 | -36.61 | 45.53 | -95.26 | -49.73 | -13 | 36.73 |
| 5 554.68 | 45.37 | V | 33.90 | -34.18 | 45.09 | -95.26 | -50.17 | -13 | 37.17 |
| Above 5 600.00 | Not detected | - | - | - | - | - | - | - | - |
| Middle Channel (1 880 MHz) | | | | | | | | | |
| 5 636.72 | 41.93 | V | 33.90 | -33.48 | 42.35 | -95.26 | -52.91 | -13 | 39.91 |
| Above 5 700.00 | Not detected | - | - | - | - | - | - | - | - |
| High Channel (1 907.6 MHz) | | | | | | | | | |
| 5 719.20 | 42.42 | V | 33.94 | -33.54 | 42.82 | -95.26 | <u>-52.44</u> | -13 | 39.44 |
| Above 5 800.00 | Not detected | - | - | - | - | - | - | - | - |

WCDMA IV

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|---------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|----------------------|--------------|-------------|
| Low Channel (1 712.4 MHz) | | | | | | | | | |
| 3 423.23 | 64.91 | H | 30.89 | -36.92 | 58.88 | -95.26 | -36.38 | -13 | 23.38 |
| 3 427.33 | 72.28 | V | 30.92 | -36.89 | 66.31 | -95.26 | -28.95 | -13 | 15.95 |
| 5 134.20 | 54.98 | H | 33.27 | -35.46 | 52.79 | -95.26 | -42.47 | -13 | 29.47 |
| 5 134.20 | 60.74 | V | 33.27 | -35.46 | 58.55 | -95.26 | -36.71 | -13 | 23.71 |
| 6 854.25 | 66.38 | H | 35.30 | -33.85 | 67.83 | -95.26 | -27.43 | -13 | 14.43 |
| 6 854.50 | 72.74 | V | 35.30 | -33.85 | 74.19 | -95.26 | <u>-21.07</u> | -13 | 8.07 |
| 8 567.50 | 64.36 | H | 36.54 | -33.50 | 67.40 | -95.26 | -27.86 | -13 | 14.86 |
| 8 564.75 | 66.07 | V | 36.53 | -33.50 | 69.10 | -95.26 | -26.16 | -13 | 13.16 |
| 10 268.00 | 48.03 | H | 37.80 | -31.26 | 54.57 | -95.26 | -40.69 | -13 | 27.69 |
| 10 271.85 | 51.21 | V | 37.80 | -31.26 | 57.75 | -95.26 | -37.51 | -13 | 24.51 |
| 11 982.85 | 54.50 | H | 38.50 | -30.67 | 62.33 | -95.26 | -32.93 | -13 | 19.93 |
| 11 993.30 | 56.22 | V | 38.50 | -31.12 | 63.60 | -95.26 | -31.66 | -13 | 18.66 |
| 13 693.80 | 42.26 | H | 40.40 | -27.89 | 54.77 | -95.26 | -40.49 | -13 | 27.49 |
| 13 702.90 | 45.31 | V | 40.41 | -27.95 | 57.77 | -95.26 | -37.49 | -13 | 24.49 |
| 15 408.95 | 44.01 | H | 40.00 | -25.95 | 58.06 | -95.26 | -37.20 | -13 | 24.20 |
| 15 409.15 | 45.21 | V | 40.00 | -25.96 | 59.25 | -95.26 | -36.01 | -13 | 23.01 |
| 17 121.10 | 37.55 | H | 42.24 | -22.61 | 57.18 | -95.26 | -38.08 | -13 | 25.08 |
| 17 133.30 | 39.91 | V | 42.27 | -22.79 | 59.39 | -95.26 | -35.87 | -13 | 22.87 |
| Above 17 200.00 | Not detected | - | - | - | - | - | - | - | - |

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|------------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|-----------------|--------------|-------------|
| Middle Channel (1 732.6 MHz) | | | | | | | | | |
| 3 463.78 | 59.04 | H | 31.10 | -36.77 | 53.37 | -95.26 | -41.89 | -13 | 28.89 |
| 3 462.83 | 64.91 | V | 31.10 | -36.77 | 59.24 | -95.26 | -36.02 | -13 | 23.02 |
| 5 201.65 | 51.60 | H | 33.50 | -35.17 | 49.93 | -95.26 | -45.33 | -13 | 32.33 |
| 5 200.75 | 56.77 | V | 33.50 | -35.17 | 55.10 | -95.26 | -40.16 | -13 | 27.16 |
| 6 925.75 | 57.32 | H | 35.35 | -33.43 | 59.24 | -95.26 | -36.02 | -13 | 23.02 |
| 6 927.55 | 63.03 | V | 35.36 | -33.41 | 64.98 | -95.26 | -30.28 | -13 | 17.28 |
| 8 656.60 | 49.57 | H | 36.73 | -34.15 | 52.15 | -95.26 | -43.11 | -13 | 30.11 |
| 8 665.60 | 53.04 | V | 36.76 | -34.33 | 55.47 | -95.26 | -39.79 | -13 | 26.79 |
| 10 397.80 | 47.57 | H | 37.80 | -30.95 | 54.42 | -95.26 | -40.84 | -13 | 27.84 |
| 10 403.20 | 53.66 | V | 37.80 | -30.98 | 60.48 | -95.26 | -34.78 | -13 | 21.78 |
| 12 124.25 | 41.76 | H | 38.45 | -29.12 | 51.09 | -95.26 | -44.17 | -13 | 31.17 |
| 12 120.30 | 42.68 | V | 38.46 | -29.13 | 52.01 | -95.26 | -43.25 | -13 | 30.25 |
| 13 865.95 | 33.72 | H | 40.60 | -26.32 | 48.00 | -95.26 | -47.26 | -13 | 34.26 |
| 13 852.60 | 35.21 | V | 40.60 | -27.27 | 48.54 | -95.26 | -46.72 | -13 | 33.72 |
| 15 574.20 | 33.59 | H | 40.10 | -25.50 | 48.19 | -95.26 | -47.07 | -13 | 34.07 |
| 15 586.35 | 33.77 | V | 40.10 | -25.65 | 48.22 | -95.26 | -47.04 | -13 | 34.04 |
| 17 323.25 | 33.93 | H | 42.75 | -24.10 | 52.58 | -95.26 | -42.68 | -13 | 29.68 |
| 17 308.85 | 35.39 | V | 42.72 | -23.81 | 54.30 | -95.26 | -40.96 | -13 | 27.96 |
| Above 17 400.00 | Not detected | - | - | - | - | - | - | - | - |

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.I.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|----------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|-----------------|--------------|-------------|
| High Channel (1 752.6 MHz) | | | | | | | | | |
| 3 506.53 | 52.15 | H | 31.09 | -36.70 | 46.54 | -95.26 | -48.72 | -13 | 35.72 |
| 3 506.78 | 58.69 | V | 31.09 | -36.70 | 53.08 | -95.26 | -42.18 | -13 | 29.18 |
| 5 255.35 | 50.08 | H | 33.62 | -35.06 | 48.64 | -95.26 | -46.62 | -13 | 33.62 |
| 5 254.60 | 56.80 | V | 33.62 | -35.07 | 55.35 | -95.26 | -39.91 | -13 | 26.91 |
| 7 009.65 | 45.29 | H | 35.50 | -33.09 | 47.70 | -95.26 | -47.56 | -13 | 34.56 |
| 7 005.85 | 51.22 | V | 35.50 | -33.08 | 53.64 | -95.26 | -41.62 | -13 | 28.62 |
| 8 757.40 | 39.36 | H | 37.01 | -33.63 | 42.74 | -95.26 | -52.52 | -13 | 39.52 |
| 8 756.80 | 41.96 | V | 37.01 | -33.64 | 45.33 | -95.26 | -49.93 | -13 | 36.93 |
| 10 537.15 | 36.55 | H | 37.70 | -31.00 | 43.25 | -95.26 | -52.01 | -13 | 39.01 |
| 10 512.90 | 37.92 | V | 37.70 | -31.04 | 44.58 | -95.26 | -50.68 | -13 | 37.68 |
| 12 189.20 | 34.42 | H | 38.40 | -28.98 | 43.84 | -95.26 | -51.42 | -13 | 38.42 |
| 12 361.20 | 35.34 | V | 38.40 | -28.84 | 44.90 | -95.26 | -50.36 | -13 | 37.36 |
| 14 012.45 | 34.13 | H | 40.82 | -28.09 | 46.86 | -95.26 | -48.40 | -13 | 35.40 |
| 14 005.25 | 33.20 | V | 40.81 | -28.02 | 45.99 | -95.26 | -49.27 | -13 | 36.27 |
| 15 751.55 | 33.97 | H | 40.20 | -23.41 | 50.76 | -95.26 | -44.50 | -13 | 31.50 |
| 15 763.15 | 33.69 | V | 40.20 | -23.49 | 50.40 | -95.26 | -44.86 | -13 | 31.86 |
| 17 537.50 | 33.14 | H | 43.35 | -23.19 | 53.30 | -95.26 | -41.96 | -13 | 28.96 |
| 17 512.70 | 33.26 | V | 43.25 | -23.29 | 53.22 | -95.26 | -42.04 | -13 | 29.04 |
| Above 17 600.00 | Not detected | - | - | - | - | - | - | - | - |

WCDMA V

| Frequency (MHz) | Measured Level (dB μ V) | Ant. Pol. | AF (dB/m) | AMP+CL (dB) | E (dB μ V/m) | CF (dB) | E.R.P. (dB m) | Limit (dB m) | Margin (dB) |
|----------------------------|-----------------------------|-----------|-----------|-------------|------------------|---------|---------------|--------------|-------------|
| Low Channel (826.4 MHz) | | | | | | | | | |
| Below 1 000.00 | Not detected | - | - | - | - | - | - | - | - |
| Above 1 000.00 | Not detected | - | - | - | - | - | - | - | - |
| Middle Channel (836.6 MHz) | | | | | | | | | |
| Below 1 000.00 | Not detected | - | - | - | - | - | - | - | - |
| Above 1 000.00 | Not detected | - | - | - | - | - | - | - | - |
| High Channel (846.6 MHz) | | | | | | | | | |
| Below 1 000.00 | Not detected | - | - | - | - | - | - | - | - |
| Above 1 000.00 | Not detected | - | - | - | - | - | - | - | - |

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dB μ V/m) = Measured Level (dB μ V) + Antenna Factor (dB/m) + AMP (dB) + Cable Loss (dB).
3. E.I.R.P. (dB m) = E (dB μ V/m) + CF (dB).
4. E.R.P. (dB m) = E (dB μ V/m) + CF (dB) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.
5. CF (dB) = 20 log D - 104.8; where D is the measurement distance in meters, According to ANSI C63.26-2015 5.2.7 and KDB 971168 D01 v03r01 5.8.4.
6. The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

3. Conducted Output Power

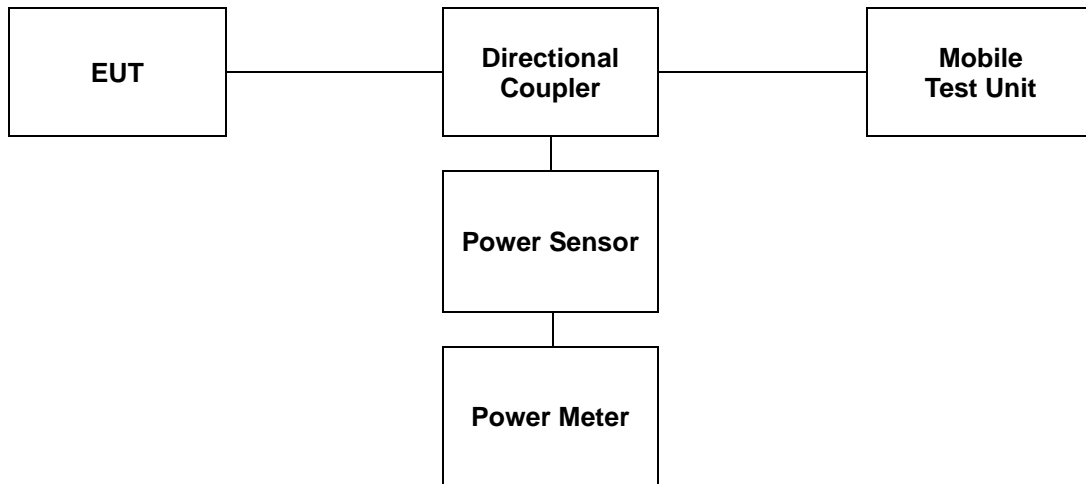
3.1. Limit

CFR 47, Section FCC §2.1046 and IC RSS-Gen Issue 5 6.12.

3.2. Test Procedure

Output power shall be measured at the RF output terminals for all configurations.

1. The RF output of the transmitter was connected to the input of the mobile test unit in order to establish communication with the EUT.
2. The EUT was set up for the max. output power with pseudo random data modulation by using mobile test unit parameters.
3. The measurement performed using a wideband RF power meter.
4. This EUT was tested under all configurations and the highest power was investigated and reported.



3.3. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

| WCDMA II | | | | | | | |
|------------|---------------------|------------------------|-------|-----------------------|--------------|-----------------------|-------|
| Mode | 3GPP 34.121 Subtest | Conducted Output Power | | | | | |
| | | 9262 (1 852.4 MHz) | | 9400 (1 880.0 MHz) | | 9538 (1 907.6 MHz) | |
| | | (dB m) | (W) | (dB m) | (W) | (dB m) | (W) |
| Release 99 | 12.2 Kbps RMC | 23.37 | 0.217 | 23.47 | 0.222 | 23.26 | 0.212 |
| HSDPA | Subtest 1 | 23.22 | 0.210 | 23.24 | 0.211 | 23.12 | 0.205 |
| | Subtest 2 | 22.10 | 0.162 | 22.22 | 0.167 | 22.22 | 0.167 |
| | Subtest 3 | 21.64 | 0.146 | 21.74 | 0.149 | 21.68 | 0.147 |
| | Subtest 4 | 21.67 | 0.147 | 21.65 | 0.146 | 21.62 | 0.145 |
| HSUPA | Subtest 1 | 22.15 | 0.164 | 22.16 | 0.164 | 22.08 | 0.161 |
| | Subtest 2 | 21.72 | 0.149 | 21.69 | 0.148 | 21.60 | 0.145 |
| | Subtest 3 | 22.22 | 0.167 | 22.18 | 0.165 | 22.16 | 0.164 |
| | Subtest 4 | 22.24 | 0.167 | 22.13 | 0.163 | 22.13 | 0.163 |
| | Subtest 5 | 22.13 | 0.163 | 22.17 | 0.165 | 22.10 | 0.162 |
| DC-HSDPA | Subtest 1 | 22.76 | 0.189 | 22.81 | 0.191 | 22.69 | 0.186 |
| | Subtest 2 | 22.79 | 0.190 | 22.82 | 0.191 | 22.74 | 0.188 |
| | Subtest 3 | 21.97 | 0.157 | 22.07 | 0.161 | 21.94 | 0.156 |
| | Subtest 4 | 22.06 | 0.161 | 22.05 | 0.160 | 21.99 | 0.158 |
| HSPA+ | | 21.89 | 0.155 | 21.89 | 0.155 | 21.72 | 0.149 |

| WCDMA IV | | | | | | | |
|------------|---------------------|------------------------|---------------------|-----------------------|---------------------|-----------------------|-------|
| Mode | 3GPP 34.121 Subtest | Conducted Output Power | | | | | |
| | | 1312 (1 712.4 MHz) | | 1413 (1 732.6 MHz) | | 1513 (1 752.6 MHz) | |
| | | (dB m) | (W) | (dB m) | (W) | (dB m) | (W) |
| Release 99 | 12.2 Kbps RMC | 23.83 | 0.242 | <u>23.87</u> | <u>0.244</u> | 23.74 | 0.237 |
| HSDPA | Subtest 1 | <u>23.79</u> | <u>0.239</u> | 22.26 | 0.168 | 23.20 | 0.209 |
| | Subtest 2 | 22.13 | 0.163 | 21.14 | 0.130 | 22.39 | 0.173 |
| | Subtest 3 | 21.78 | 0.151 | 20.74 | 0.119 | 21.69 | 0.148 |
| | Subtest 4 | 21.73 | 0.149 | 20.76 | 0.119 | 21.62 | 0.145 |
| HSUPA | Subtest 1 | 22.17 | 0.165 | 22.07 | 0.161 | 22.13 | 0.163 |
| | Subtest 2 | 21.38 | 0.137 | 21.76 | 0.150 | 21.75 | 0.150 |
| | Subtest 3 | 22.30 | 0.170 | 22.24 | 0.167 | 22.19 | 0.166 |
| | Subtest 4 | 22.30 | 0.170 | 22.22 | 0.167 | 22.18 | 0.165 |
| | Subtest 5 | 22.29 | 0.169 | 22.22 | 0.167 | 22.16 | 0.164 |
| DC-HSDPA | Subtest 1 | 23.13 | 0.206 | 23.11 | 0.205 | 23.02 | 0.200 |
| | Subtest 2 | 23.14 | 0.206 | 23.13 | 0.206 | 23.10 | 0.204 |
| | Subtest 3 | 22.40 | 0.174 | 22.30 | 0.170 | 22.21 | 0.166 |
| | Subtest 4 | 22.34 | 0.171 | 22.25 | 0.168 | 22.13 | 0.163 |
| HSPA+ | | 20.96 | 0.125 | 21.84 | 0.153 | 21.87 | 0.154 |

| WCDMA V | | | | | | | |
|------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|-------|
| Mode | 3GPP 34.121 Subtest | Conducted Output Power | | | | | |
| | | 4132 (826.4 MHz) | | 4183 (836.6 MHz) | | 4233 (846.6 MHz) | |
| | | (dB m) | (W) | (dB m) | (W) | (dB m) | (W) |
| Release 99 | 12.2 Kbps RMC | 24.00 | 0.251 | <u>24.05</u> | <u>0.254</u> | 24.03 | 0.253 |
| HSDPA | Subtest 1 | <u>24.02</u> | <u>0.252</u> | 23.95 | 0.248 | 24.01 | 0.252 |
| | Subtest 2 | 22.89 | 0.195 | 23.03 | 0.201 | 23.02 | 0.200 |
| | Subtest 3 | 22.39 | 0.173 | 22.43 | 0.175 | 22.49 | 0.177 |
| | Subtest 4 | 22.51 | 0.178 | 22.54 | 0.179 | 22.49 | 0.177 |
| HSUPA | Subtest 1 | 22.85 | 0.193 | 22.93 | 0.196 | 22.94 | 0.197 |
| | Subtest 2 | 22.33 | 0.171 | 22.49 | 0.177 | 22.38 | 0.173 |
| | Subtest 3 | 22.89 | 0.195 | 22.98 | 0.199 | 22.99 | 0.199 |
| | Subtest 4 | 22.95 | 0.197 | 23.00 | 0.200 | 22.86 | 0.193 |
| | Subtest 5 | 22.85 | 0.193 | 22.91 | 0.195 | 22.91 | 0.195 |
| DC-HSDPA | Subtest 1 | 23.10 | 0.204 | 23.17 | 0.207 | 23.14 | 0.206 |
| | Subtest 2 | 23.20 | 0.209 | 23.14 | 0.206 | 23.11 | 0.205 |
| | Subtest 3 | 22.64 | 0.184 | 22.65 | 0.184 | 22.64 | 0.184 |
| | Subtest 4 | 22.62 | 0.183 | 22.60 | 0.182 | 22.63 | 0.183 |
| HSPA+ | | 22.95 | 0.197 | 22.92 | 0.196 | 22.94 | 0.197 |

4. Occupied Bandwidth

4.1. Limit

CFR 47, Section FCC §2.1049 and IC RSS-Gen Issue 5 6.7.

4.2. Test Procedure

FCC

The test follows section 5.4.4 of ANSI C63.26-2015.

- 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 (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- b. The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. Set the detection mode to peak, and the trace mode to max-hold.
- e. If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
- f. The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

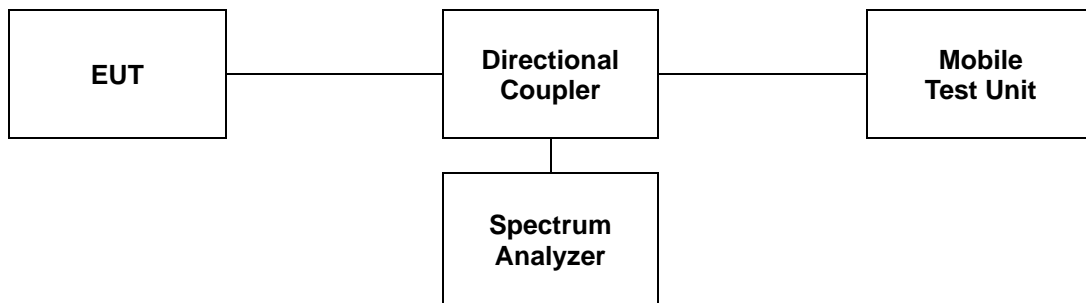
IC

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level 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, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).

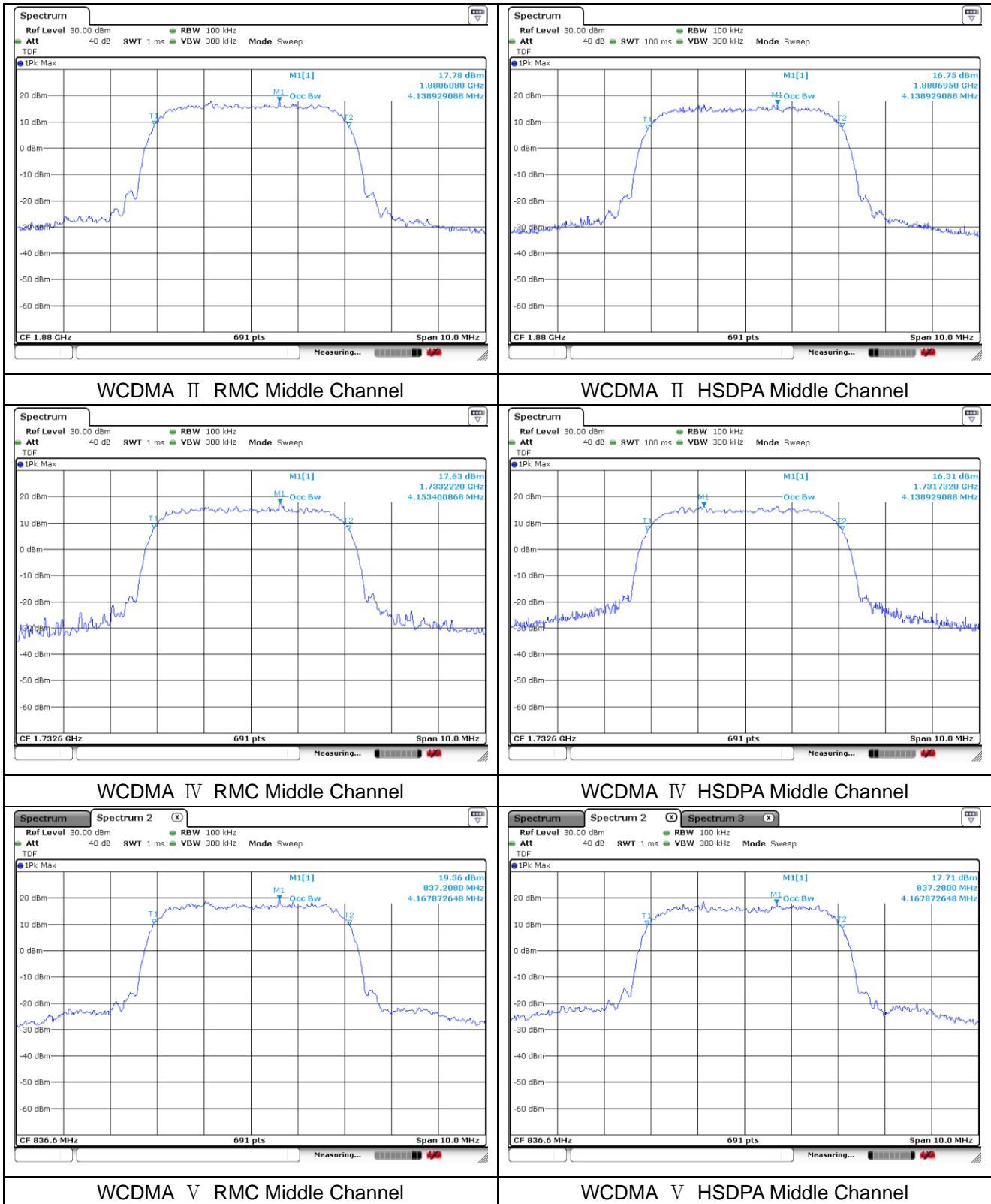


4.3 Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

| Band | Mode | Frequency (MHz) | Occupied Bandwidth (MHz) |
|----------|-------|-----------------|--------------------------|
| WCDMA II | RMC | 1 880.0 | 4.139 |
| | HSDPA | | 4.139 |
| WCDMA IV | RMC | 1 732.6 | 4.153 |
| | HSDPA | | 4.139 |
| WCDMA V | RMC | 836.6 | 4.168 |
| | HSDPA | | 4.168 |

- Test plots



5. Peak-Average Ratio

5.1. Limit

FCC

- §22.913(d) Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

- §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

IC

- RSS-132 Issue 3

5.4, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1 % of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

- RSS-133 Issue 6

6.4, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1 % of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

- RSS-139 Issue 3

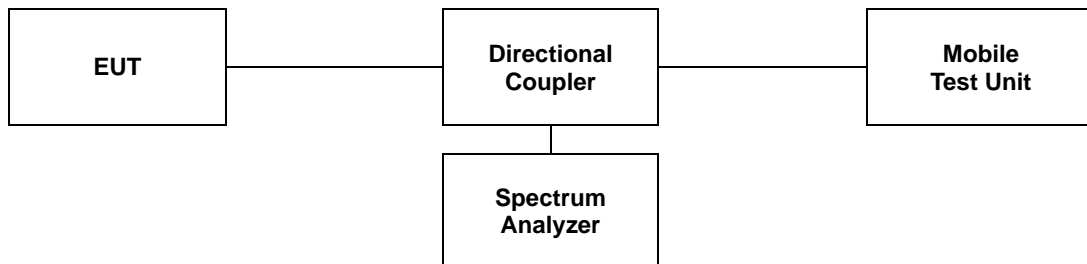
6.5, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1 % of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

5.2. Test Procedure

The test follows section 5.2.3.4 of ANSI C63.26-2015.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

- a. Set resolution/measurement bandwidth \geq OBW or specified reference bandwidth.
- b. Set the number of counts to a value that stabilizes the measured CCDF curve.
- c. Set the measurement interval as follows:
 - 1) For continuous transmissions, set to greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d. Record the maximum PAPR level associated with a probability of 0.1 %.
- e. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.



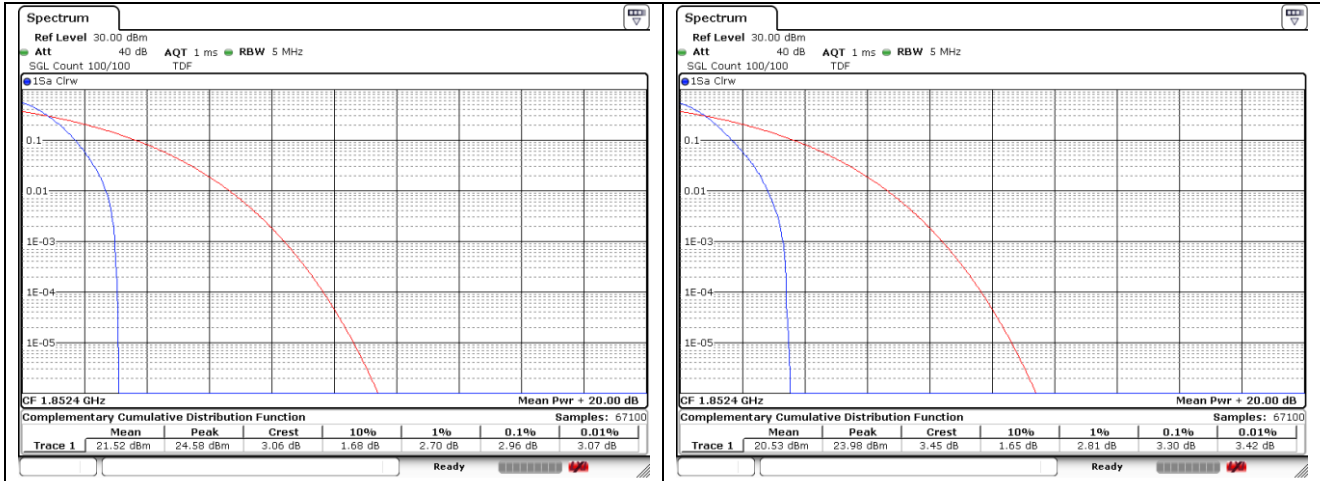
5.3 Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

| Band | Mode | Frequency (MHz) | PAR (dB) |
|----------|-------|-----------------|----------|
| WCDMA II | RMC | 1 852.4 | 2.96 |
| | | 1 880.0 | 3.01 |
| | | 1 907.6 | 2.96 |
| | HSDPA | 1 852.4 | 3.30 |
| | | 1 880.0 | 3.30 |
| | | 1 907.6 | 3.25 |
| WCDMA IV | RMC | 1 712.4 | 2.96 |
| | | 1 732.6 | 2.93 |
| | | 1 752.6 | 2.96 |
| | HSDPA | 1 712.4 | 3.28 |
| | | 1 732.6 | 3.25 |
| | | 1 752.6 | 3.28 |
| WCDMA V | RMC | 826.4 | 3.10 |
| | | 836.6 | 2.96 |
| | | 846.6 | 2.93 |
| | HSDPA | 826.4 | 3.39 |
| | | 836.6 | 3.33 |
| | | 846.6 | 3.28 |

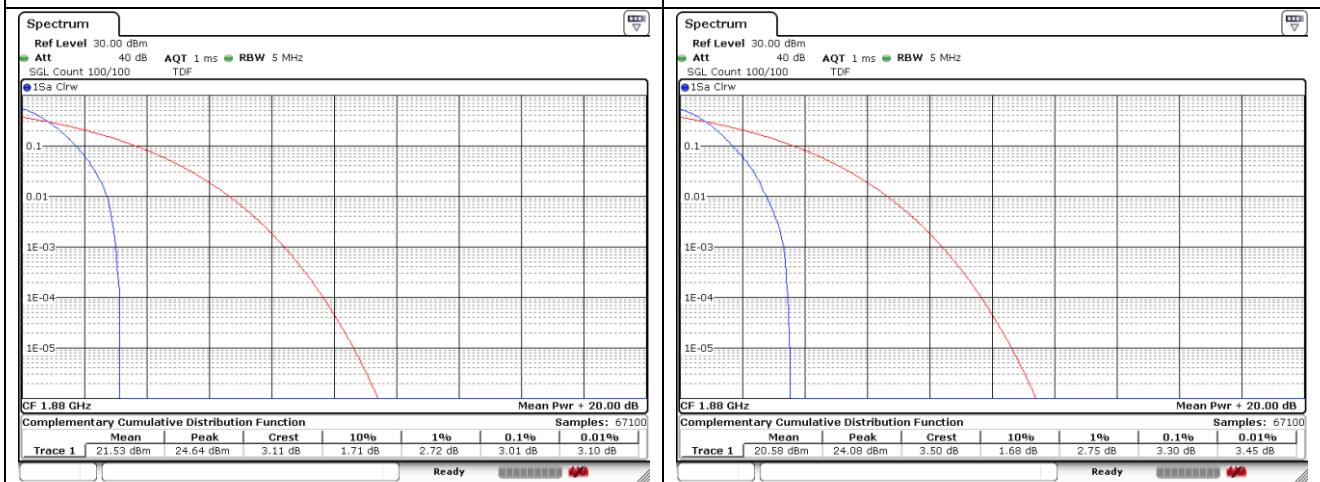
- Test plots

WCDMA II



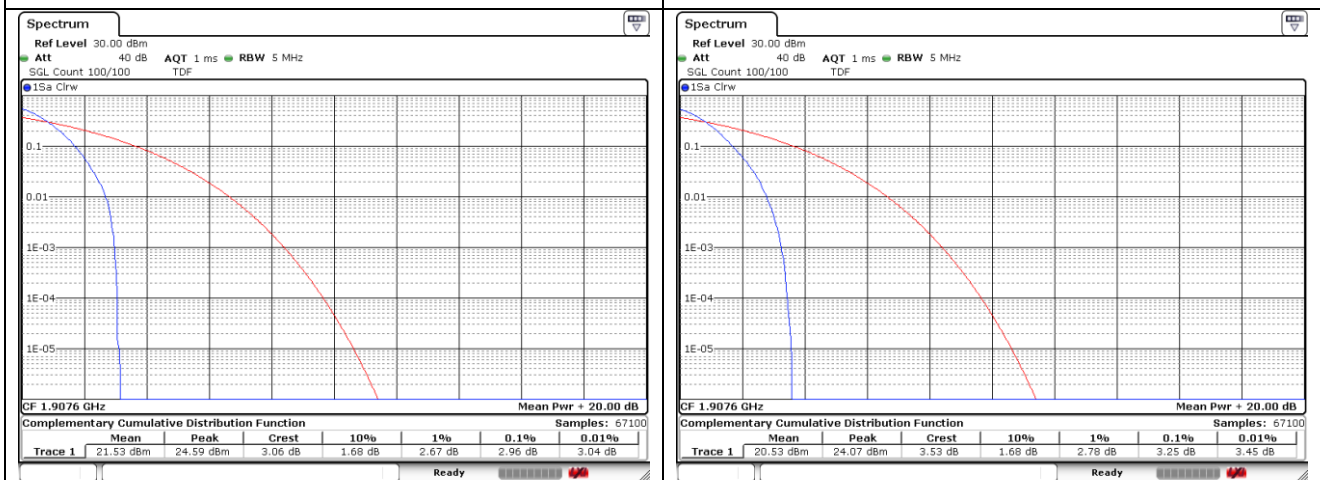
WCDMA II RMC Low Channel

WCDMA II HSDPA Low Channel



WCDMA II RMC Middle Channel

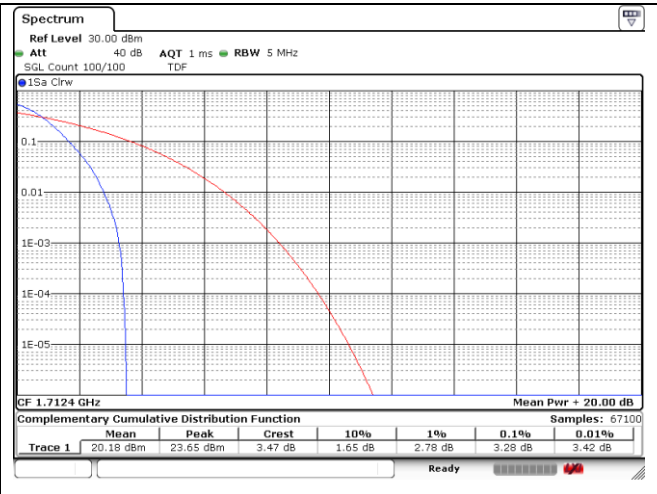
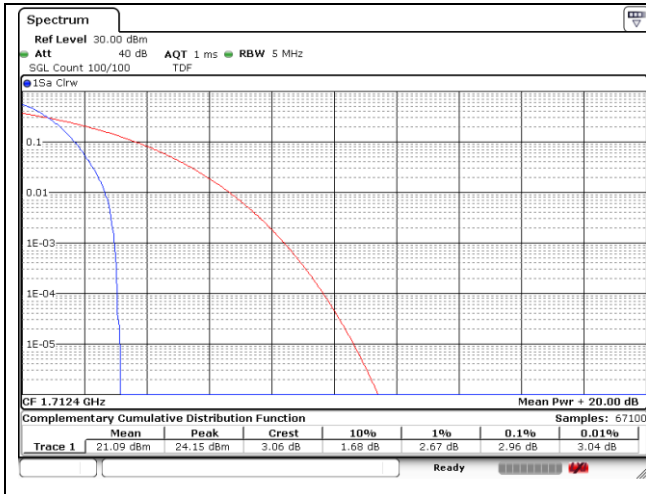
WCDMA II HSDPA Middle Channel



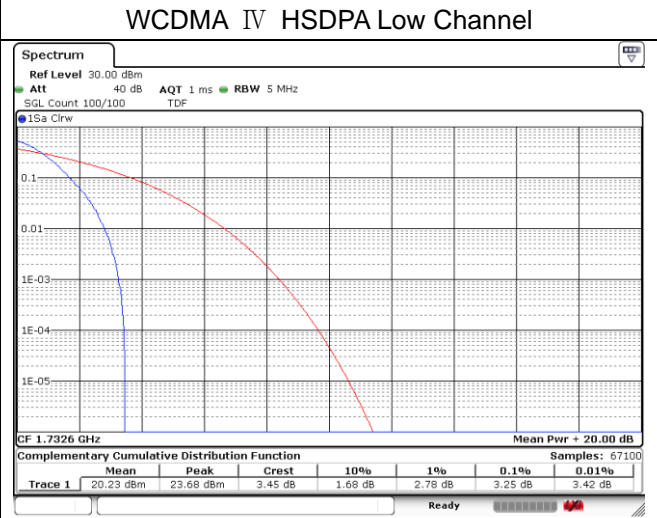
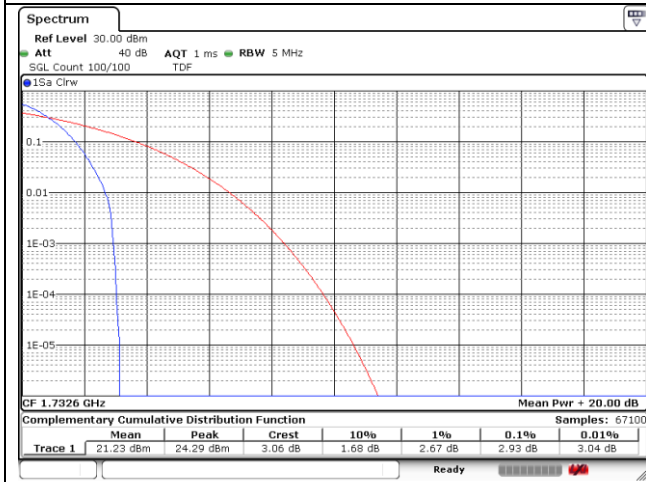
WCDMA II RMC High Channel

WCDMA II HSDPA High Channel

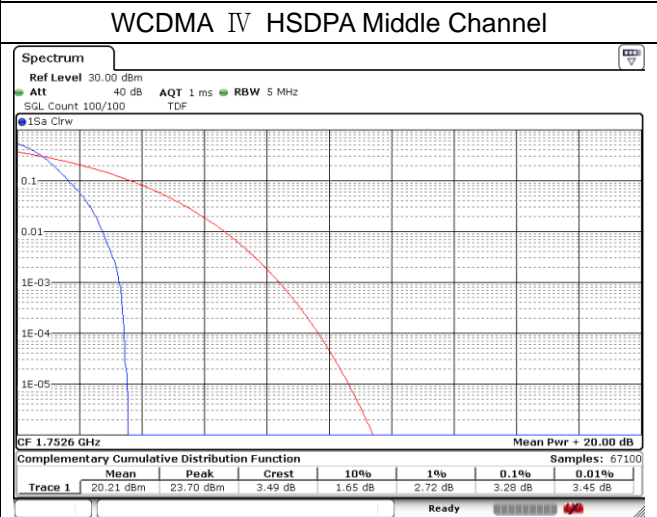
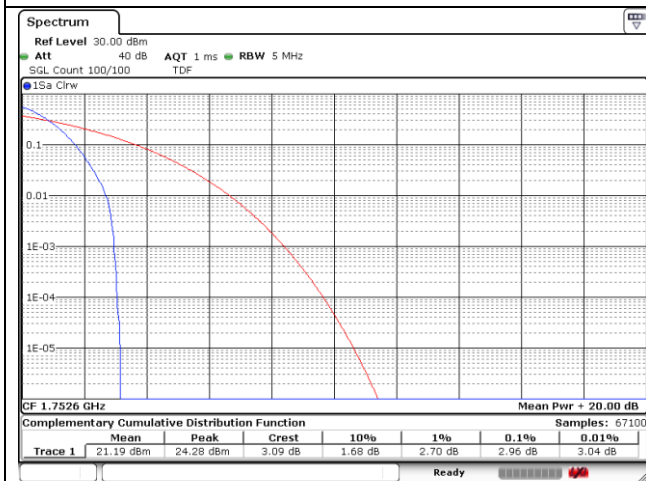
WCDMA IV



WCDMA IV RMC Low Channel



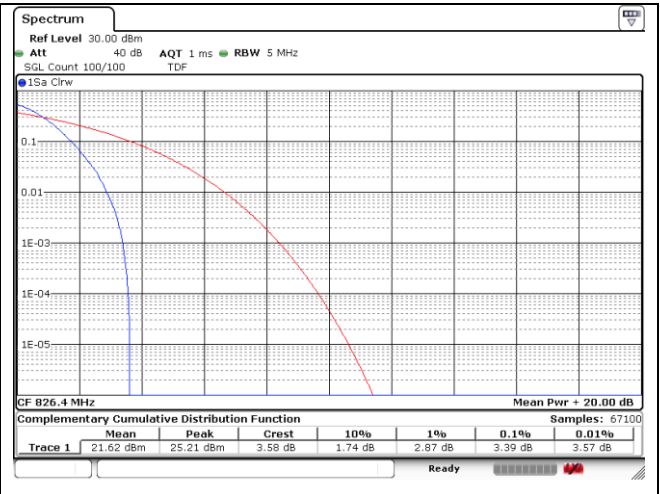
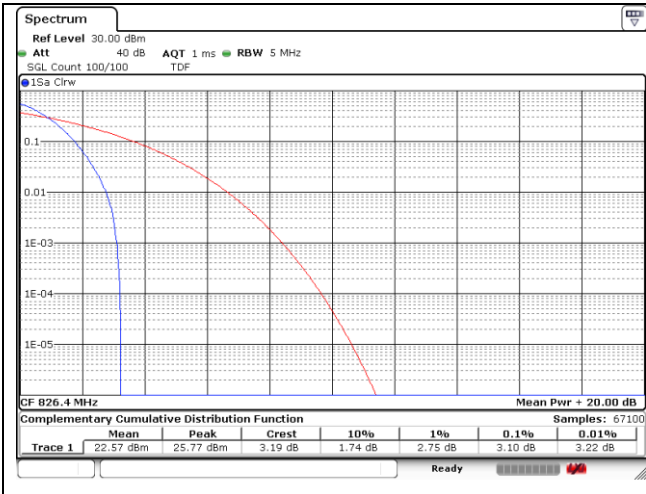
WCDMA IV RMC Middle Channel



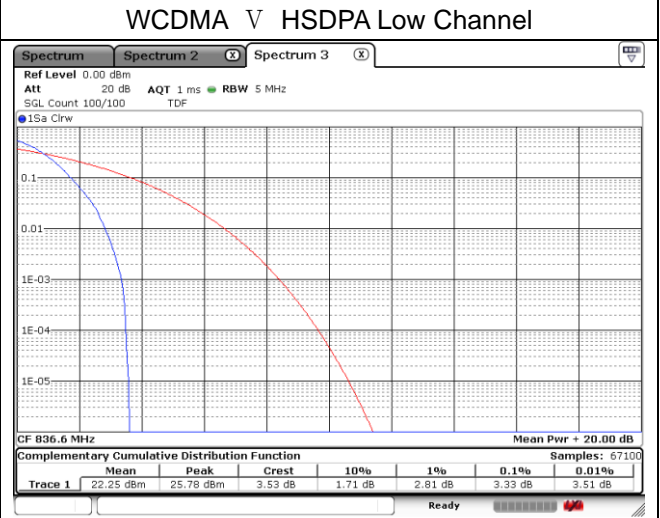
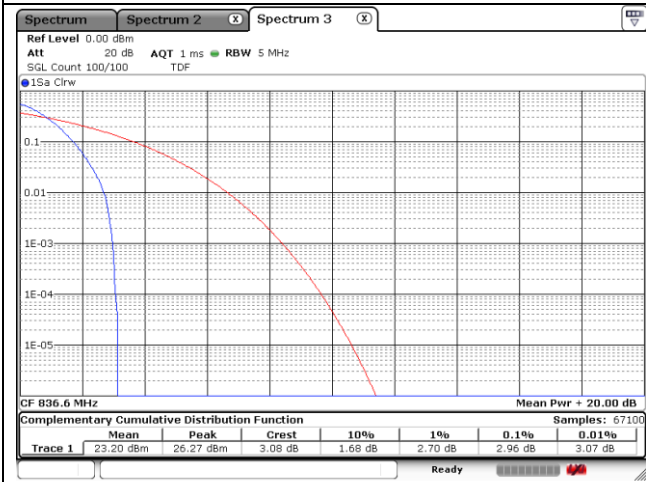
WCDMA IV RMC High Channel

WCDMA IV HSDPA High Channel

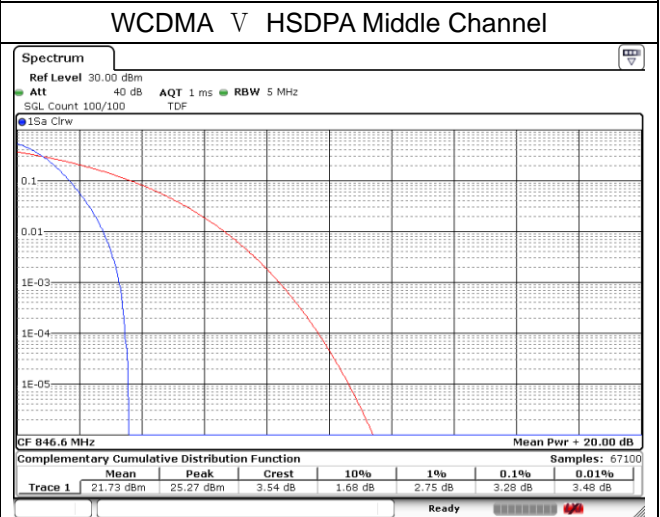
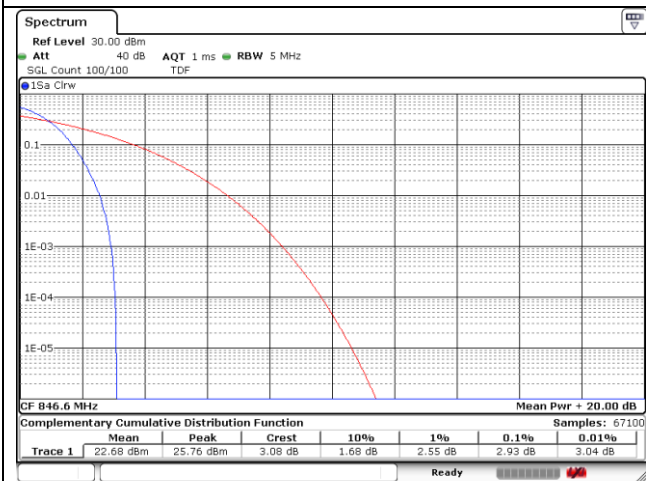
WCDMA V



WCDMA V RMC Low Channel



WCDMA V RMC Middle Channel



WCDMA V RMC High Channel

WCDMA V HSDPA High Channel

6. Spurious Emissions at Antenna Terminal

6.1. Limit

FCC

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

IC

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kHz is required.

- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 MHz is required.

- RSS-139 Issue 3

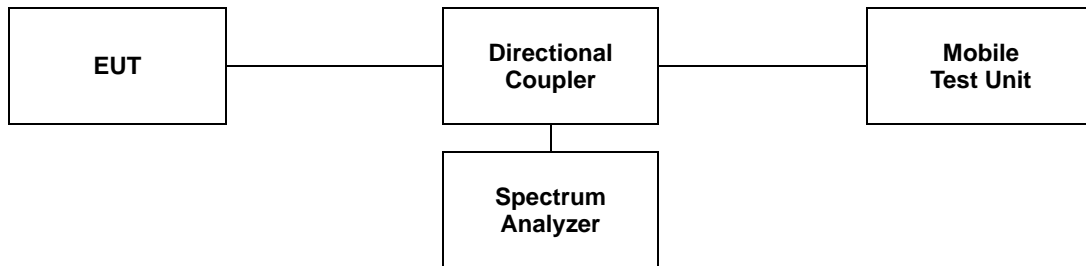
6.6, (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

6.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

1. Start frequency was set to 9 kHz and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = RMS.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 kHz to 20 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



Note;

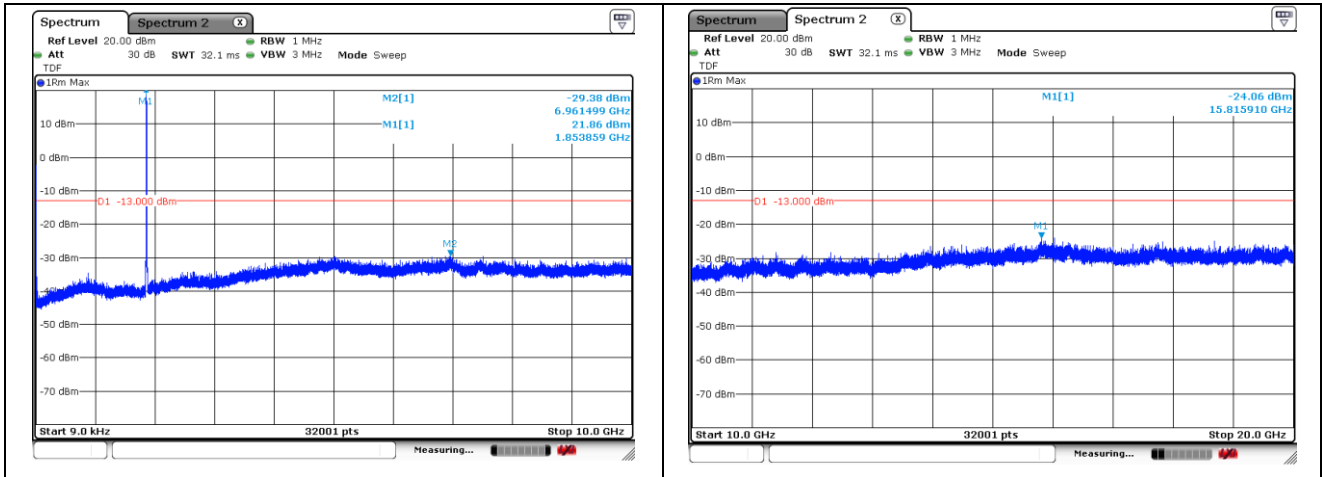
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

6.3. Test Results

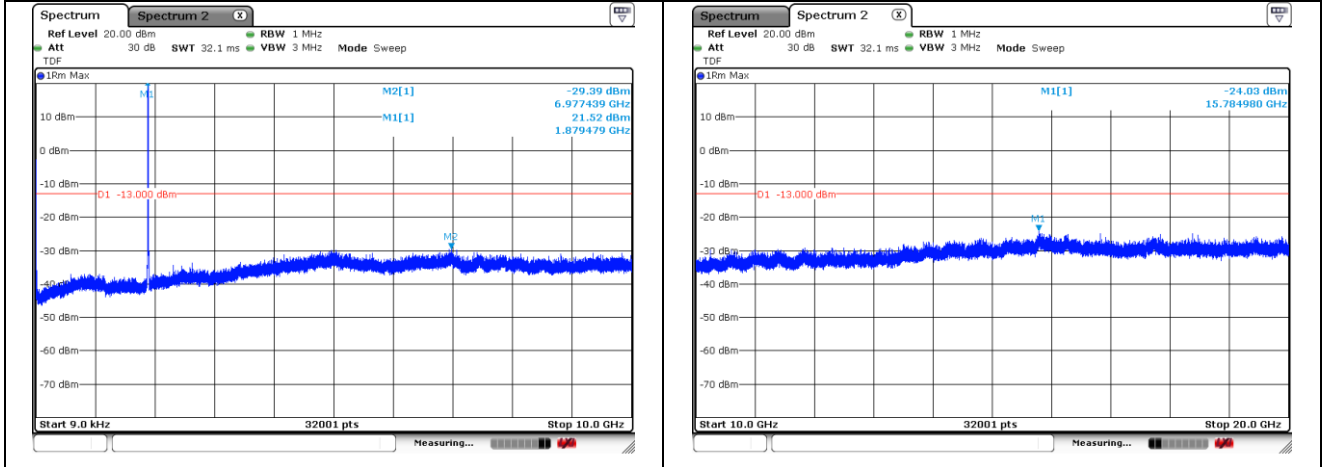
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

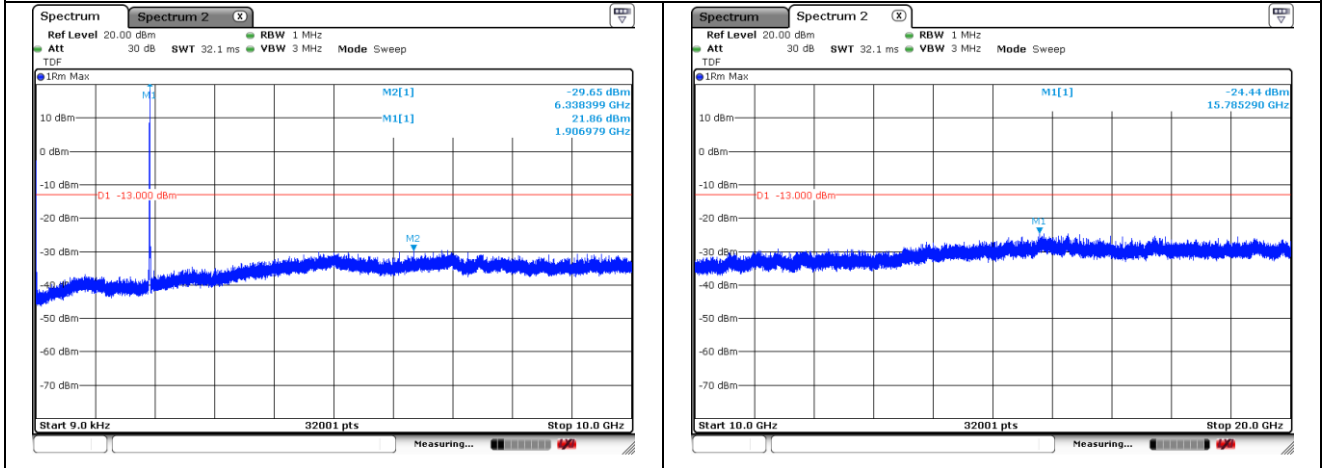
WCDMA II



WCDMA II RMC Low Channel

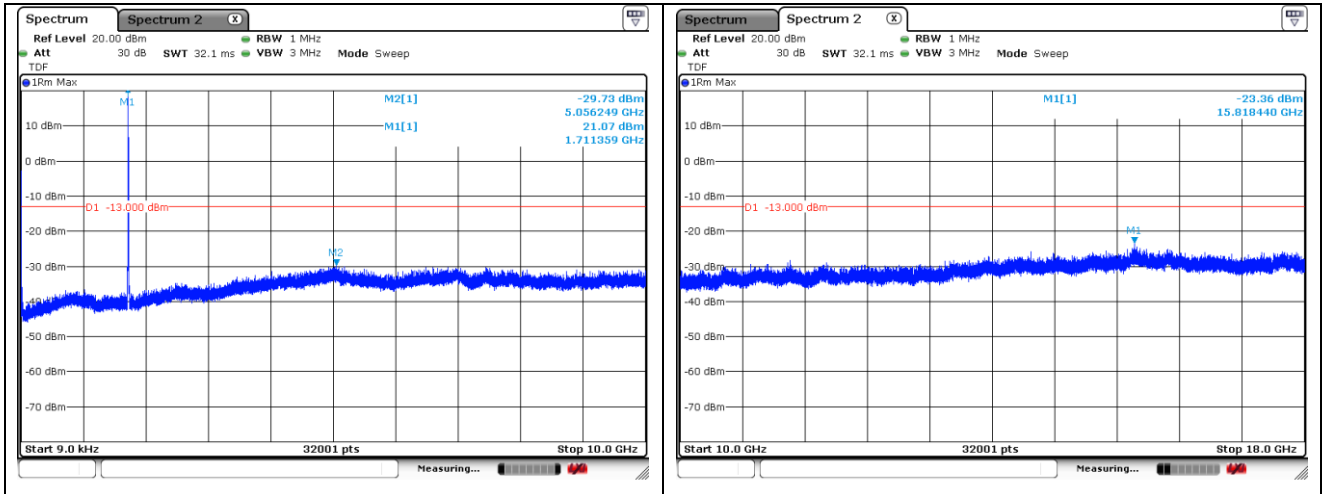


WCDMA II RMC Middle Channel

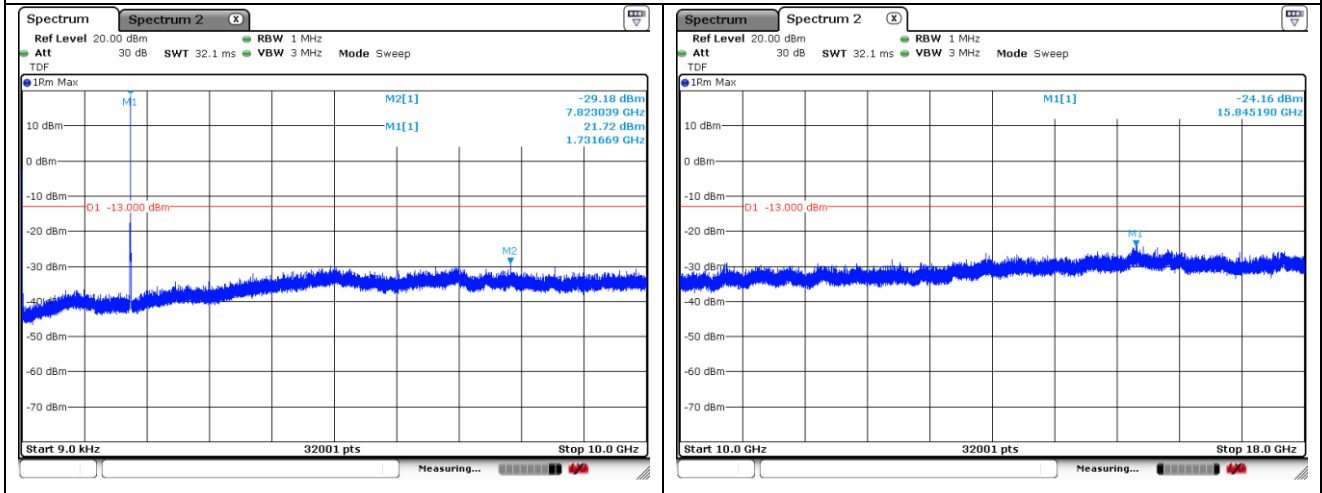


WCDMA II RMC High Channel

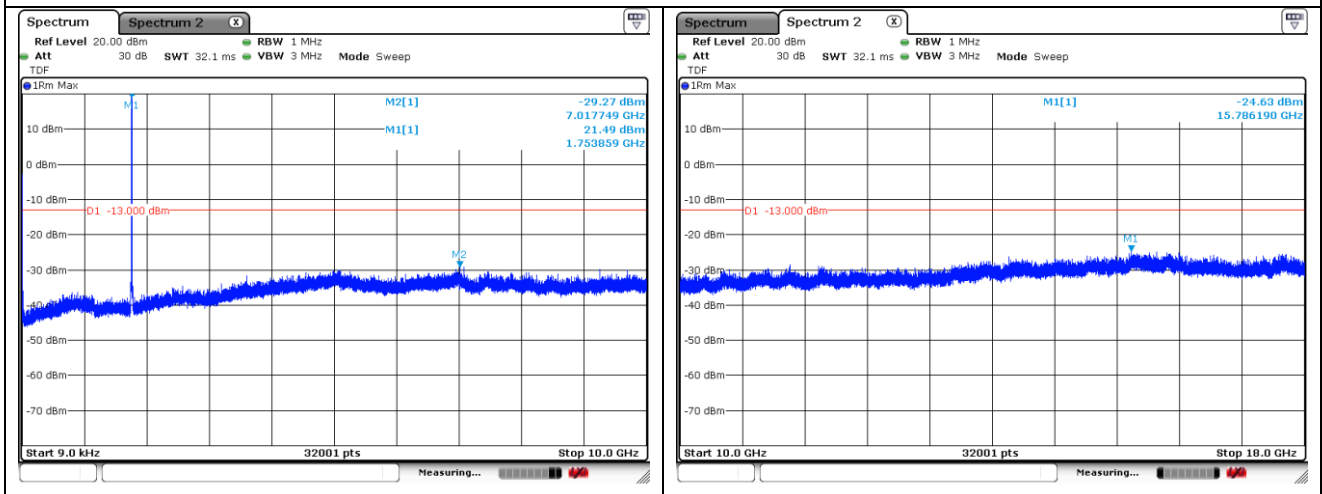
WCDMA IV



WCDMA IV RMC Low Channel

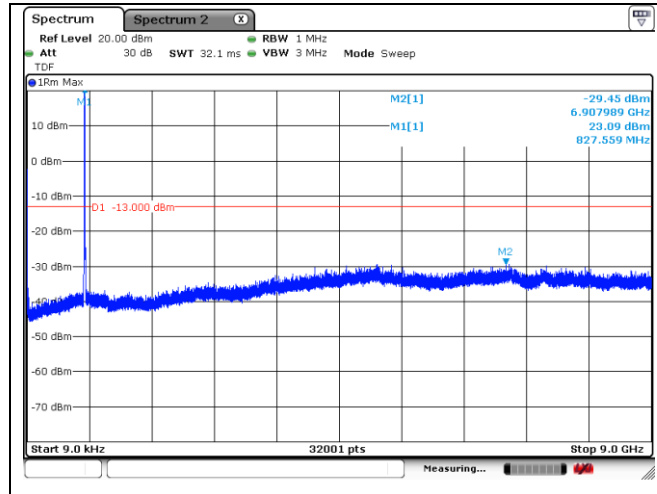


WCDMA IV RMC Middle Channel

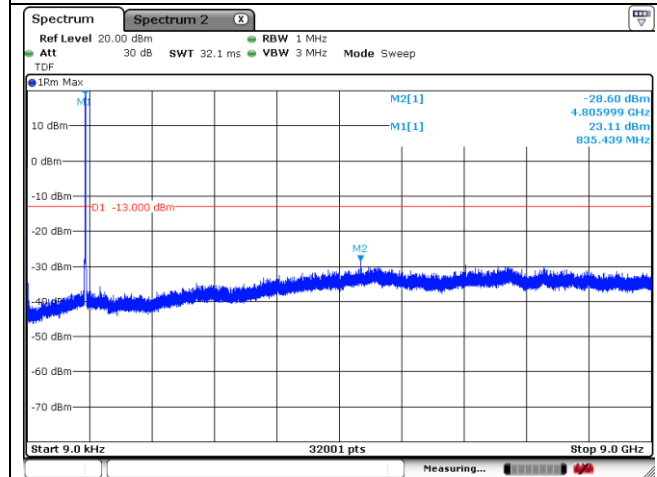


WCDMA IV RMC High Channel

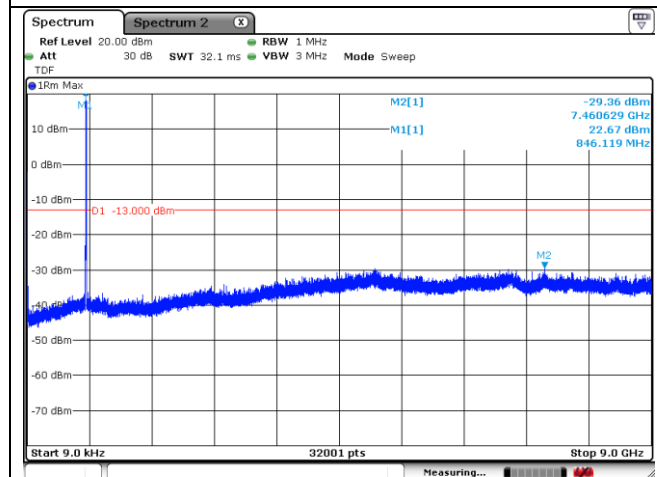
WCDMA V



WCDMA V RMC Low channel



WCDMA V RMC Middle channel



WCDMA V RMC High channel

7. Band Edge

7.1. Limit

FCC

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

IC

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kHz is required.

- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 MHz is required.

- RSS-139 Issue 3

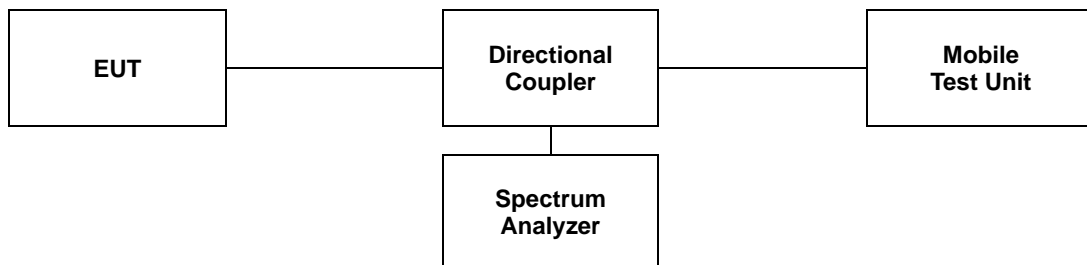
6.6, (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

7.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

- a. Span was set large enough so as to capture all out of band emissions near the band edge.
- b. RBW ≥ 1 % of OBW
- c. VBW $\geq 3 \times$ RBW.
- d. Detector = RMS.
- e. Trace mode = Average.
- f. Sweep time = Auto.
- g. The trace was allowed to stabilize.
- h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.

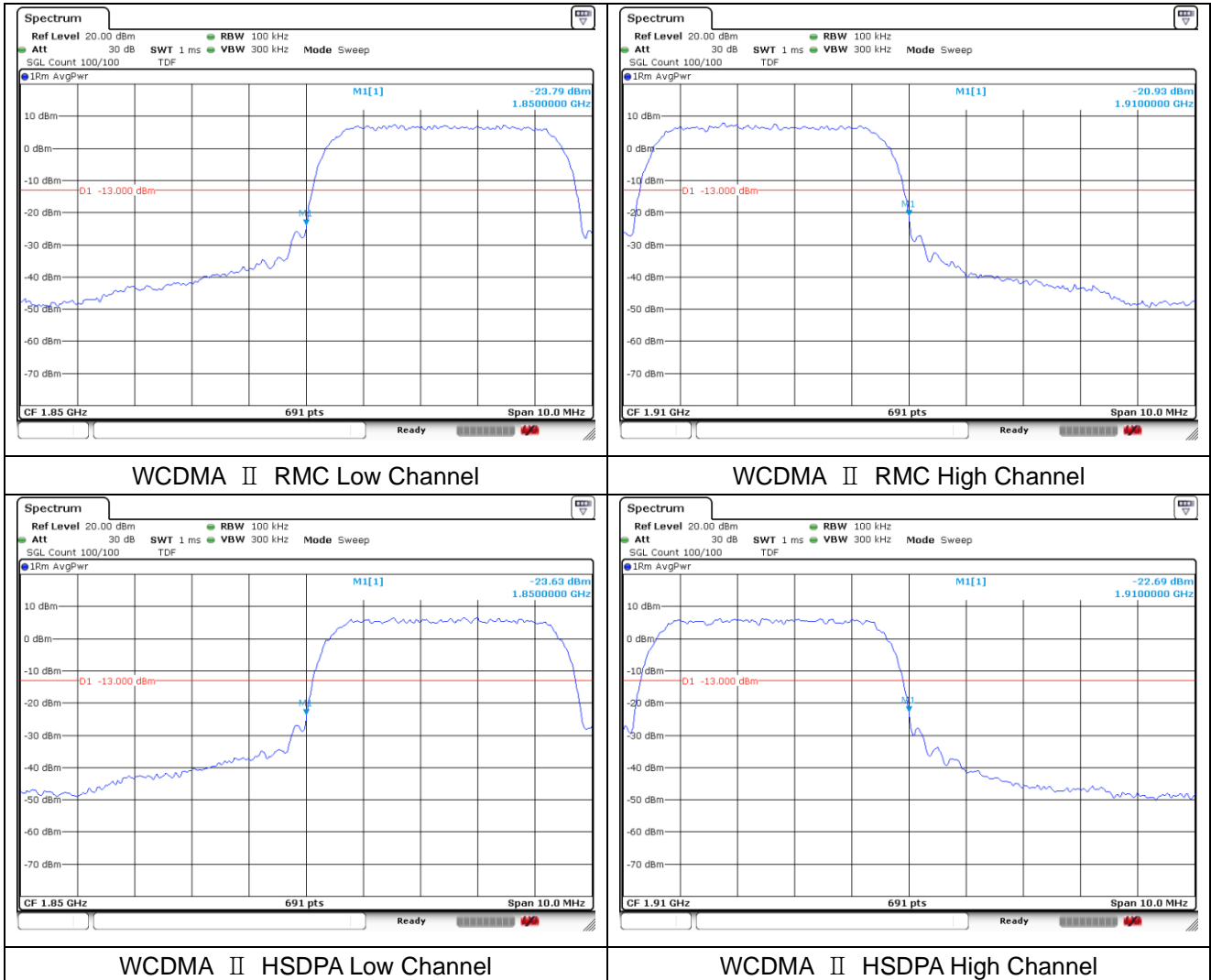


7.3. Test Results

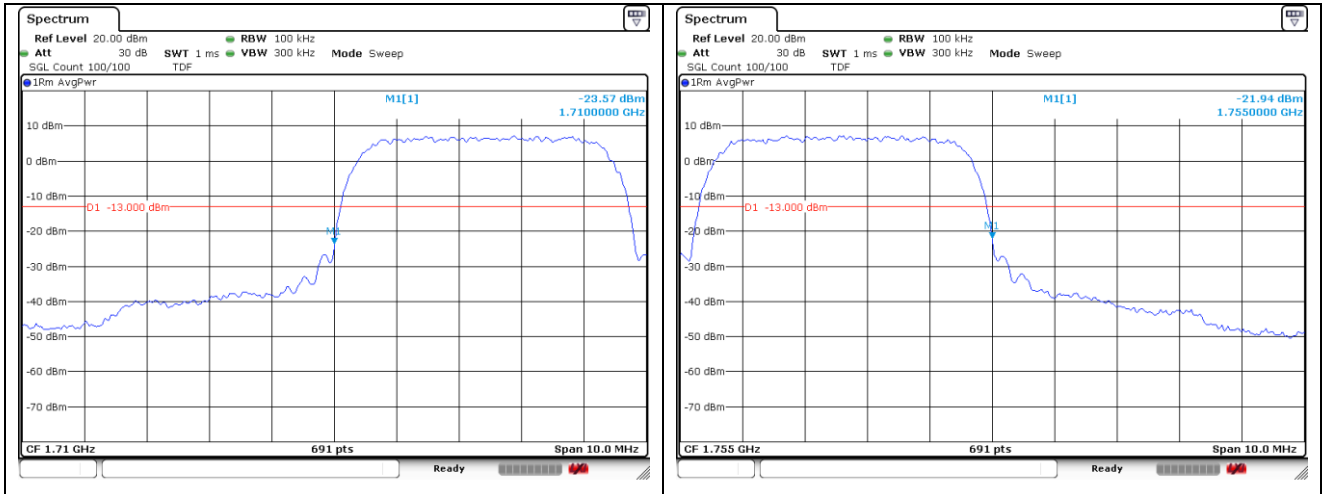
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

WCDMA II

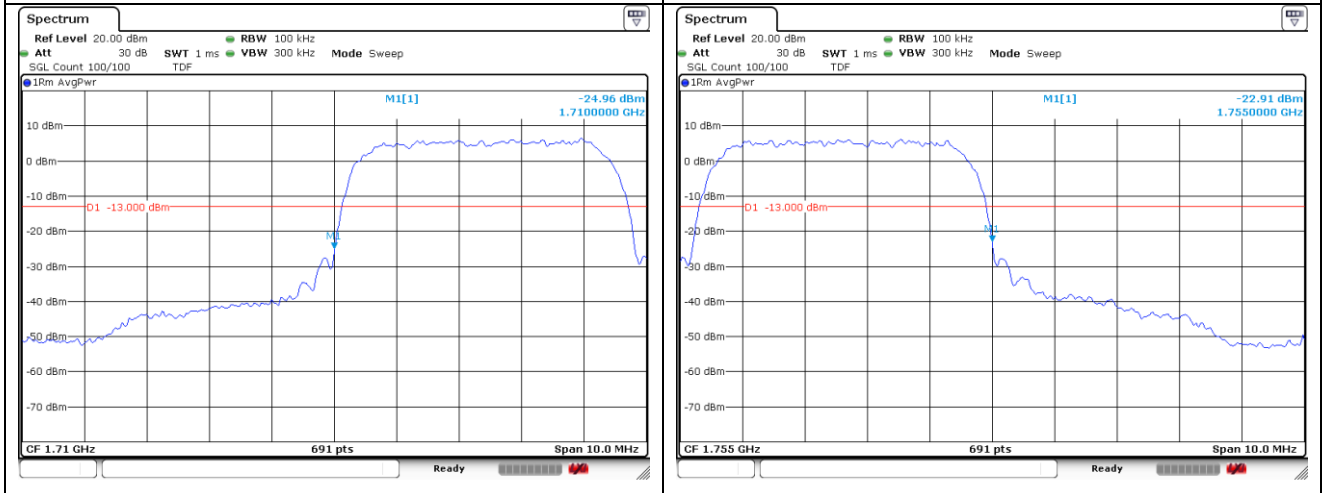


WCDMA IV



WCDMA IV RMC Low Channel

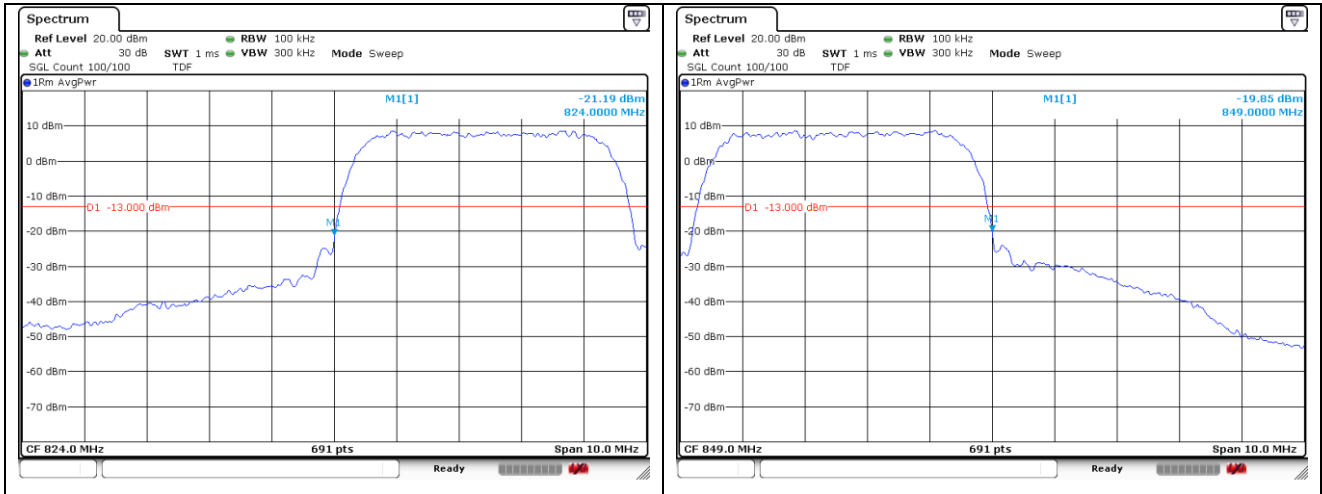
WCDMA IV RMC High Channel



WCDMA IV HSDPA Low Channel

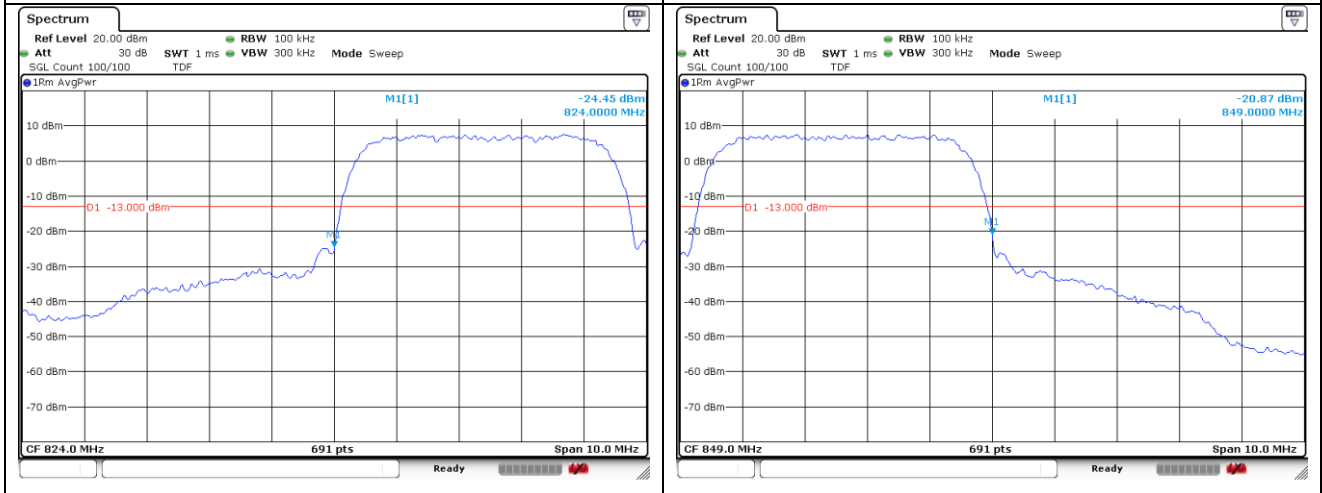
WCDMA IV HSDPA High Channel

WCDMA ▾



WCDMA ▾ RMC Low Channel

WCDMA ▾ RMC High Channel



WCDMA ▾ HSDPA Low Channel

WCDMA ▾ HSDPA High Channel

8. Frequency Stability

8.1. Limit

FCC

- § 2.1055 (a), § 2.1055 (d) & following:

- §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

- §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

- §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

IC

- RSS-Gen Issue 5

6.11, for licensed devices, the following measurement conditions apply:

a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage

- RSS-132 Issue 3

5.3, The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.

- RSS-133 Issue 6

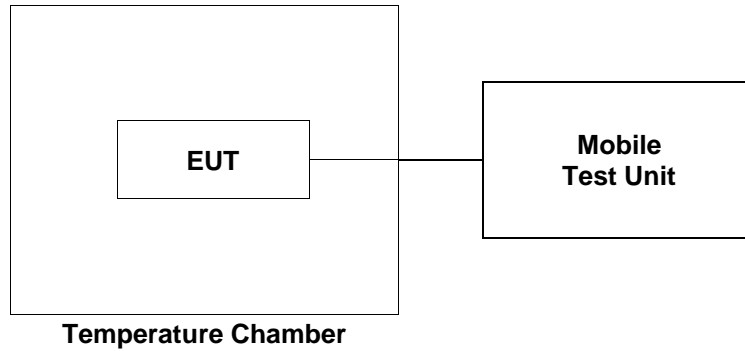
6.3, the carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

- RSS-139 Issue 3

6.4, the frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.



8.3. Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

WCDMA II mode at middle channel

| Reference Frequency: 1 880.0 MHz | | | |
|---|--------------------|------------------------------------|----------|
| Frequency Stability versus Temperature | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 50 | 13.50 | 190 | 0.025 00 |
| 40 | | 156 | 0.006 91 |
| 30 | | 191 | 0.025 53 |
| 20(Ref.) | | 143 | - |
| 10 | | 189 | 0.024 47 |
| 0 | | 177 | 0.018 09 |
| -10 | | 190 | 0.025 00 |
| -20 | | 177 | 0.018 09 |
| -30 | | 144 | 0.000 53 |
| Frequency Stability versus Power Supply | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 20 | 11.475 (85%) | 160 | 0.009 04 |
| | 15.525 (115%) | 176 | 0.017 55 |

WCDMA IV mode at middle channel

| Reference Frequency: 1 732.6 MHz | | | |
|---|--------------------|------------------------------------|-----------|
| Frequency Stability versus Temperature | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 50 | 13.50 | 180 | 0.136 79 |
| 40 | | 146 | 0.117 16 |
| 30 | | 120 | 0.102 16 |
| 20(Ref.) | | -57 | - |
| 10 | | -99 | -0.024 24 |
| 0 | | -95 | -0.021 93 |
| -10 | | -92 | -0.020 20 |
| -20 | | -95 | -0.021 93 |
| -30 | | 12 | 0.039 82 |
| Frequency Stability versus Power Supply | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 20 | 11.475 (85%) | -47 | 0.005 77 |
| | 15.525 (115%) | -27 | 0.017 32 |

WCDMA V mode at middle channel

| Reference Frequency: 836.6 MHz | | | |
|---|--------------------|------------------------------------|-----------|
| Frequency Stability versus Temperature | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 50 | 13.50 | -4 | 0.037 05 |
| 40 | | -3 | 0.038 25 |
| 30 | | 28 | 0.075 30 |
| 20(Ref.) | | -35 | - |
| 10 | | -27 | 0.009 56 |
| 0 | | -23 | 0.014 34 |
| -10 | | -37 | -0.002 39 |
| -20 | | -3 | 0.038 25 |
| -30 | | 3 | 0.045 42 |
| Frequency Stability versus Power Supply | | | |
| Environment Temperature (°C) | Power Supplied (V) | Frequency Measure with Time Elapse | |
| | | Frequency Error (Hz) | ppm |
| 20 | 11.475 (85%) | -25 | 0.011 95 |
| | 15.525 (115%) | -29 | 0.007 17 |

- End of the Test Report -