

FCC PART 22/24 TEST REPORT

FCC Part 22 /Part 24

Report Reference No.....: MWR150600402

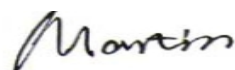
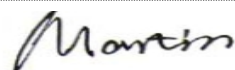
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Compiled by
(position+printed name+signature)..: File administrators Martin Ao

Supervised by
(position+printed name+signature)..: Test Engineer Martin Ao

Approved by
(position+printed name+signature)..: Manager Dixon Hao

Date of issue.....: Jul 09, 2015


Representative Laboratory Name.: Maxwell International Co., Ltd.

Address.....: Room 509,Hongfacenter building, Baoan District, Shenzhen,

Testing Laboratory Name.....: Shenzhen CTL Testing Technology Co., Ltd.

Address.....: Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road,
Nanshan,Shenzhen,China

Applicant's name.....: HGR HERMANOS GARCIA ROMERO S.A.S

Address.....: CARRERA 20 No. 13 - 39 off. 212 BOGOTA, COLOMBIA
DC 110111

Test specification.....:

Standard.....: **FCC Part 22: PUBLIC MOBILE SERVICES**

Standard.....: **FCC Part 24: PERSONAL COMMUNICATIONS SERVICES**

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Test item description.....: Mobile Phone

Trade Mark.....: Tigers

Manufacturer.....: WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.

Model/Type reference.....: TIS001

Listed Models: N/A

Ratings.....: DC 3.70V

Adapter information : Trademark: Tigers
INPUT:AC 100-240V 50/60Hz 0.15A
OUTPUT: DC 5.0V,1A

Modulation: QPSK

Hardware version.....: F1H-V1.1

Software version: bestsonny.f1h.w500c.V1.0.20140910

Frequency.....: WCDMA Band II & WCDMA Band V

Result.....: **PASS**

TEST REPORT

| | |
|----------------------------------------------|---------------|
| Test Report No. : MWR150600402 | Jul 09, 2015 |
| | Date of issue |

Equipment under Test : Mobile Phone

Model /Type : TIS001

Listed Models : N/A

Applicant : **HGR HERMANOS GARCIA ROMERO S.A.S**

Address : CARRERA 20 No. 13 - 39 off. 212 BOGOTA, COLOMBIA
DC 110111

Manufacturer : **WASAM TECHNOLOGY (SHEN ZHEN) CO.,LTD.**

Address : B,F Building, (Hengqiang Industrial Park), Bogang Taifeng
Industrial Zone, Shajing Town, Bao' an District,
Shenzhen, China

| | |
|---------------------|-------------|
| Test Result: | PASS |
|---------------------|-------------|

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

| | |
|---------------------------------------------------------------|-----------|
| 1. TEST STANDARDS | 4 |
| 2. SUMMARY | 5 |
| 2.1. General Remarks..... | 5 |
| 2.2. Product Description..... | 5 |
| 2.3. Equipment under Test..... | 6 |
| 2.4. Short description of the Equipment under Test (EUT)..... | 6 |
| 2.5. Internal Identification of AE used during the test..... | 7 |
| 2.6. Normal Accessory setting..... | 7 |
| 2.7. EUT configuration..... | 7 |
| 2.8. Related Submittal(s) / Grant (s)..... | 7 |
| 2.9. Modifications..... | 7 |
| 2.10. General Test Conditions/Configurations..... | 8 |
| 2.11. Note..... | 8 |
| 3. TEST ENVIRONMENT | 9 |
| 3.1. Address of the test laboratory..... | 9 |
| 3.2. Test Facility..... | 9 |
| 3.3. Environmental conditions..... | 9 |
| 3.4. Statement of the measurement uncertainty..... | 9 |
| 3.5. Test Description..... | 10 |
| 3.6. Equipments Used during the Test..... | 10 |
| 4. TEST CONDITIONS AND RESULTS | 13 |
| 4.1. Output Power..... | 13 |
| 4.2. Radiated Spurious Emssion..... | 16 |
| 4.3. Occupied Bandwidth and Emission Bandwith..... | 19 |
| 4.4. Band Edge Compliance..... | 22 |
| 4.5. Spurious Emssion on Antenna Port..... | 24 |
| 4.6. Frequency Stability Test..... | 31 |
| 5. TEST SETUP PHOTOS OF THE EUT | 33 |

1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 22 \(10-1-12 Edition\)](#): PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Part 24\(10-1-12 Edition\)](#): PUBLIC MOBILE SERVICES

[TIA/EIA 603 D June 2010](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[47 CFR FCC Part 15 Subpart B](#): - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

[ANSI C63.4:2009](#): Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

[FCCKDB971168D01](#) Power Meas License Digital Systems

2. SUMMARY

2.1. General Remarks

| | | |
|--------------------------------|---|--------------|
| Date of receipt of test sample | : | May 20, 2015 |
| | | |
| Testing commenced on | : | May 21, 2015 |
| | | |
| Testing concluded on | : | Jul 09, 2015 |

2.2. Product Description

The **HGR HERMANOS GARCIA ROMERO S.A.S** 's Model: TIS001 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

| | |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of EUT | Mobile Phone |
| Model Number | TIS001 |
| Modulation Type | GMSK for GSM/GPRS,8-PSK for EDGE,QPSK for UMTS |
| Antenna Type | Internal |
| UMTS Operation Frequency Band | Device supported UMTS FDD Band II and FDD Band V |
| WLAN FCC Operation frequency | IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz |
| BT FCC Operation frequency | 2402MHz-2480MHz |
| HSDPA Release Version | Release 7 |
| HSUPA Release Version | Release 6 |
| DC-HSUPA Release Version | Not Supported |
| WCDMA Release Version | R99 |
| WLAN FCC Modulation Type | IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) |
| BT Modulation Type | GFSK (BT4.0 BLE)/GFSK,8DPSK, $\pi/4$ DQPSK(BT 3.0+EDR) |
| Hardware version | F1H-V1.1 |
| Software version | bestsonny.f1h.w500c.V1.0.20140910 |
| GPS function | Supported |
| WLAN | Supported 802.11b/802.11g/802.11n |
| Bluetooth | Supported BT4.0 BLE /BT 3.0+EDR |
| GSM/EDGE/GPRS | Supported GSM/GPRS/EDGE |
| GSM/EDGE/GPRS Power Class | GSM850:Power Class 4/PCS1900:Power Class 1 |
| GSM/EDGE/GPRS Operation Frequency | GSM850 :824.2MHz-848.8MHz/PCS1900:1852.4MHz-1907.6MHz |
| GSM/EDGE/GPRS Operation Frequency Band | GSM850/PCS1900/GPRS850/ GPRS 1900/EDGE850/EDGE1900 |
| GSM Release Version | R99 |
| GPRS/EDGE Multislot Class | GPRS/EDGE: Multi-slot Class 12 |
| Extreme temp. Tolerance | -30°C to +50°C |
| Extreme vol. Limits | 3.40VDC to 4.20 VDC (nominal: 3.70 VDC) |
| GPRS operation mode | Class B |
| Ant Gain | GSM850:-2.92dBi,GSM1900:-0.07dBi WCDMA Band 850: -2.92dBi WCDMA1900: GSM1900:-0.07dBi WIFI/BT:-0.58 dBi |

Note:

- 1..The EUT is Dual SIM,But The two SIMs cannot use synchronization and only one can use for each time.
2. 3D and ALS+PS sensor used by this device and ,no power reduction during use.

2.3. Equipment under Test

Power supply system utilised

| | | | |
|----------------------|---|-------------------------------------------------------------------|-----------------------------------|
| Power supply voltage | : | <input type="radio"/> 120V / 60 Hz | <input type="radio"/> 115V / 60Hz |
| | | <input type="radio"/> 12 V DC | <input type="radio"/> 24 V DC |
| | | <input checked="" type="radio"/> Other (specified in blank below) | |

DC 3.70V

Test frequency list

| Test Mode | TX/RX | RF Channel | | |
|-----------|-------|--------------|--------------|--------------|
| | | Low(L) | Middle (M) | High (H) |
| GSM850 | TX | Channel 128 | Channel 190 | Channel 251 |
| | | 824.2 MHz | 836.6 MHz | 848.8 MHz |
| | RX | Channel 128 | Channel 190 | Channel 251 |
| | | 869.2 MHz | 881.6 MHz | 893.8 MHz |
| Test Mode | TX/RX | RF Channel | | |
| | | Low(L) | Middle (M) | High (H) |
| GSM1900 | TX | Channel 512 | Channel 661 | Channel 810 |
| | | 1850.2 MHz | 1880.0 MHz | 1909.8 MHz |
| | RX | Channel 512 | Channel 661 | Channel 810 |
| | | 1930.2 MHz | 1960.0 MHz | 1989.8 MHz |
| Test Mode | TX/RX | RF Channel | | |
| | | Low(L) | Middle (M) | High (H) |
| WCDMA850 | TX | Channel 4132 | Channel 4182 | Channel 4233 |
| | | 826.4 MHz | 836.4 MHz | 846.6 MHz |
| | RX | Channel 4357 | Channel 4407 | Channel 4458 |
| | | 871.4 MHz | 881.4 MHz | 891.6 MHz |
| Test Mode | TX/RX | RF Channel | | |
| | | Low(L) | Middle (M) | High (H) |
| WCDMA1900 | TX | Channel 9262 | Channel 9400 | Channel 9538 |
| | | 1852.4 MHz | 1880.0 MHz | 1907.6 MHz |
| | RX | Channel 9662 | Channel 9800 | Channel 9938 |
| | | 1932.4 MHz | 1960.0 MHz | 1987.6 MHz |

2.4. Short description of the Equipment under Test (EUT)

2.4.1 General Description

TIS001 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band V; The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.4.2 Technical Specification

| Characteristics | Description | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Radio System Type | <input checked="" type="checkbox"/> GSM/ <input checked="" type="checkbox"/> UMTS | |
| Supported Frequency Range | GSM850/WCDMA850 | Transmission(TX): 824 to 849MHz Receiving(RX): 869 to 894MHz |
| | GSM1900/WCDMA1900 | Transmission(TX): 1850 to 1910MHz Receiving(RX): 1930 to 1990MHz |
| TX and RX Antenna Ports | TX& RX port: | 1 |
| Supported Channel Bandwidth Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | GSM system: | 200 kHz |
| | UMTS system: | 5 MHz |
| | GSM850: | 250KGXW |
| | GSM1900: | 250KGXW |
| | UMTS 850: | 4M20F9W |
| | UMTS 1900: | 4M17F9W |

2.5. Internal Identification of AE used during the test

| | |
|--------|-------------|
| AE ID* | Description |
| AE1 | N/A |

*AE ID: is used to identify the test sample in the lab internally.

2.6. Normal Accessory setting

Fully charged battery was used during the test.

2.7. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

| | | |
|---------------|----------------|---|
| ○ Power Cable | Length (m) : | / |
| | Shield : | / |
| | Detachable : | / |
| ○ Multimeter | Manufacturer : | / |
| | Model No. : | / |

2.8. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AFAUTIS001** filing to comply with FCC Part 22 and Part 24 Rules

2.9. Modifications

No modifications were implemented to meet testing criteria.

2.10. General Test Conditions/Configurations

2.10.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

| Test Mode | Test Modes Description |
|-----------|-----------------------------------|
| GSM/TM1 | GSM system, GSM, GMSK modulation |
| GSM/TM2 | GSM system, GPRS, GMSK modulation |
| GSM/TM3 | GSM system, EDGE, 8PSK modulation |
| UMTS/TM1 | WCDMA system, QPSK modulation |
| UMTS/TM2 | HSDPA system, QPSK modulation |
| UMTS/TM3 | HSUPA system, QPSK modulation |

Note:

1. This EUT owns two SIM cards, after we perform the pretest for these two SIM cards; we found the SIM 1 is the worst case, so its result is recorded in this report.
2. EDGE and GPRS use different modulation type, we test GPRS and EDGE according to 3GPP TS 151 010 requirement.

2.10.2 Test Environment

| Environment Parameter | Selected Values During Tests | |
|-----------------------|------------------------------|---------|
| Relative Humidity | Ambient | |
| Temperature | TN | Ambient |
| Voltage | VL | 3.40V |
| | VN | 3.70V |
| | VH | 4.20V |

NOTE: VL=lower extreme test voltage VN=nominal voltage
VH=upper extreme test voltage TN=normal temperature

2.11. Note

1. The EUT is a Mobile Phone with WCDMA/GSM/GPRS/EDGE, WiFi and Bluetooth function, The functions of the EUT listed as below:

| | Test Standards | Reference Report |
|---------------|-------------------------|------------------|
| GSM/GPRS/EDGE | FCC Part 22/FCC Part 24 | MWR150600401 |
| WCDMA | FCC Part 22/FCC Part 24 | MWR150600402 |
| Bluetooth | FCC Part 15 C 15.247 | MWR150600403 |
| BLE | FCC Part 15 C 15.247 | MWR150600404 |
| WiFi | FCC Part 15 C 15.247 | MWR150600405 |
| USB Port | FCC Part 15 B | MWR150600406 |
| SAR | FCC Part 2 §2.1093 | MWR150600407 |

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, Dec 19, 2013

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|-----------------------|--------------|
| Temperature: | 15-35 ° C |
| | |
| Humidity: | 30-60 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. National Digital Electronic Product Testing Center quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTL Testing Technology Co., Ltd. National Digital Electronic Product Testing Center is reported:

| Test | Range | Measurement Uncertainty | Notes |
|-------------------|------------|-------------------------|-------|
| Radiated Emission | 30~1000MHz | 4.24 dB | (1) |
| Radiated Emission | 1~18GHz | 5.16 dB | (1) |
| Radiated Emission | 18-40GHz | 5.54 dB | (1) |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Test Description

3.4.1 Cellular Band (824-849MHz paired with 869-894MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|-----------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------|---------|
| Effective(Isotropic) Radiated Output Power | §2.1046, §22.913 | FCC: ERP \leq 7W. | Pass |
| Modulation Characteristics | §2.1047 | Digital modulation | N/A |
| Bandwidth | §2.1049 | OBW: No limit. EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §22.917 | \leq -13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | FCC: \leq -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | FCC: \leq -13dBm/100kHz. | Pass |
| Frequency Stability | §2.1055, §22.355 | $\leq \pm 2.5$ ppm. | Pass |
| NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" de notes "not tested". | | | |

3.4.2 PCS Band (1850-1915MHz paired with 1930-1995MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|-----------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------|---------|
| Effective(Isotropic) Radiated Output Power | §2.1046, §24.232 | EIRP \leq 2W | Pass |
| Peak-Average Ratio | §2.1046, §24.232 | FCC: Limits \leq 13dB | N/A |
| Modulation Characteristics | §2.1047 | Digital modulation | N/A |
| Bandwidth | §2.1049 | OBW: No limit. EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §24.238 | \leq -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238 | \leq -13dBm/1MHz, from 9kHz to 10th harmonics but outside authorized Operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238 | \leq -13dBm/1MHz. | Pass |
| Frequency Stability | §2.1055, §24.235 | FCC: within authorized frequency block. | Pass |
| NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" de notes "not tested". | | | |

Remark:

1. The measurement uncertainty is not included in the test result.

3.6. Equipments Used during the Test

| Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission | | | | | | |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------|-----------|------------|--------------------------|--------------------------|
| No. | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal.Due |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2014/06/21 2015/05/22 | 2015/06/20 2016/05/21 |
| 2 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201148 | 2015/05/20 | 2016/05/19 |
| 3 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | 2015/05/20 | 2015/05/19 |

| | | | | | | |
|---|-------------------|---------|------------------------------|------------|------------|------------|
| 4 | Spectrum Analyzer | Agilent | E4407B | MY41440676 | 2015/05/21 | 2016/05/20 |
| 5 | RF cable 1 | MURATA | MXHS83QE3000 (9KHz-26.5G) | 1420355 | 2014/10/19 | 2015/10/18 |
| 6 | RF cable 2 | MURATA | MXHS83QE3000 (9KHz-26.5G) | 1420356 | 2014/10/19 | 2015/10/18 |

| Frequency Stability | | | | | | |
|---------------------|-------------------------------|---------------|------------------------------|------------|------------|------------|
| No. | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal.Due |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2014/06/21 | 2015/06/20 |
| | | | | | 2015/05/22 | 2016/05/21 |
| 2 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201148 | 2015/05/20 | 2016/05/19 |
| 3 | Climate Chamber | ESPEC | EL-10KA | 05107008 | 2015/05/20 | 2016/05/19 |
| 4 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | 2015/05/20 | 2016/05/19 |
| 5 | RF cable 1 | MURATA | MXHS83QE3000 (9KHz-26.5G) | 1420355 | 2015/05/20 | 2016/05/19 |

| Output Power (Radiated) & Radiated Spurious Emission | | | | | | |
|------------------------------------------------------|-------------------------------|------------------------------|-----------------------------------|------------|------------|------------|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal.Due |
| 1 | Bilog Antenna | Sunol Sciences Corp. | JB1 | A061713 | 2015/05/19 | 2016/05/18 |
| 2 | Bilog Antenna | Sunol Sciences Corp. | JB1 | A061714 | 2015/05/19 | 2016/05/18 |
| 3 | EMI TEST Receivcer | Rohde&Schwarz | ESCI3 | 103710 | 2014/07/02 | 2015/07/01 |
| | | | | | 2015/06/02 | 2016/06/01 |
| 4 | EMI TEST Software | Audix | E3 | N/A | N/A | N/A |
| 5 | EMI TEST Software | Rohde&Schwarz | ESK1 | N/A | N/A | N/A |
| 6 | HORN ANTENNA | Sunol Sciences Corp. | DRH-118 | A062013 | 2015/05/19 | 2016/05/18 |
| 7 | HORN ANTENNA | Sunol Sciences Corp. | DRH-118 | A062014 | 2015/05/19 | 2016/05/18 |
| 8 | Amplifer | HP | 8447D | 3113A07663 | 2015/05/19 | 2016/05/18 |
| 9 | Preamplifier | HP | 8349B | 3155A00882 | 2015/05/19 | 2016/05/18 |
| 10 | Amplifer | Compliance Direction systems | PAP1-4060 | 129 | 2015/05/19 | 2016/05/18 |
| 11 | Active Loop Antenna | Daze | ZN30900A | N/A | 2015/05/19 | 2016/05/18 |
| 12 | TURNTABLE | MATURO | TT2.0 | N/A | N/A | N/A |
| 13 | ANTENNA MAST | MATURO | TAM-4.0-P | N/A | N/A | N/A |
| 14 | Horn Antenna | SCHWARZBECK | BBHA9170 | 25849 | 2015/05/19 | 2016/05/18 |
| 15 | Horn Antenna | SCHWARZBECK | BBHA9170 | 25850 | 2015/05/19 | 2016/05/18 |
| 16 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201148 | 2015/05/20 | 2016/05/19 |
| 17 | Signal Generator | Rohde&Schwarz | SMF100A | 101932 | 2014/06/21 | 2015/06/20 |
| 18 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2014/06/21 | 2015/06/20 |
| | | | | | 2015/05/22 | 2016/05/21 |
| 19 | Splitter | Mini-Circuit | ZAPD-4 | 400062 | 2014/06/22 | |
| 20 | Coaxial Cables | HUBER+SUHNER | SUCOFLE X 104PEA-10M (9KHz-26.5G) | 10m | 2014/10/19 | 2015/10/18 |
| 21 | Coaxial Cables | HUBER+SUHNER | SUCOFLE X 104PEA-3M (9KHz-26.5G) | 3m | 2014/10/19 | 2015/10/18 |

The calibration interval was one year

4. TEST CONDITIONS AND RESULTS

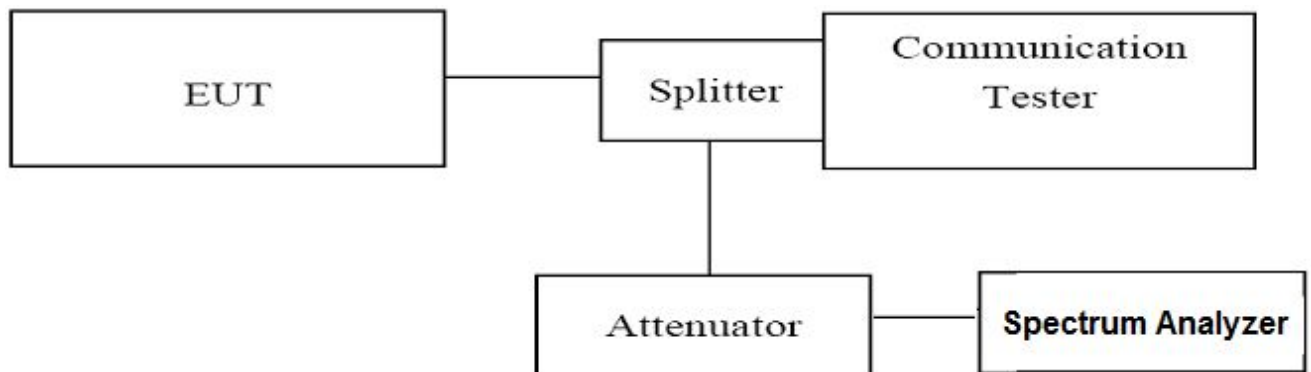
4.1. Output Power

TEST APPLICABLE

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (CMU200) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

4.1.1. Conducted Output Power

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation.
2. The power was measured with Spectrum Analyzer FSU26(peak)
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1907.60 MHz for WCDMA band II; 826.40 MHz, 836.60 MHz and 846.60 MHz for WCDMA band V. (low, middle and high of operational frequency range).

TEST CONDITION

| RBW | VBW | Sweep Time | Span |
|-------|-------|------------|-------|
| 10MHz | 10MHz | 800ms | 50MHz |

TEST RESULTS

| UMTS/TM1/WCDMA V | | |
|------------------|-----------------|------------------------|
| Channel | Frequency (MHz) | Output Power Peak(dBm) |
| 4132 | 826.40 | 22.15 |
| 4183 | 836.60 | 22.40 |
| 4233 | 846.60 | 22.09 |

| UMTS/TM1/WCDMA II | | |
|-------------------|-----------------|------------------------|
| Channel | Frequency (MHz) | Output Power Peak(dBm) |
| 9262 | 1852.40 | 23.02 |
| 9400 | 1880.00 | 23.55 |
| 9538 | 1907.60 | 23.37 |

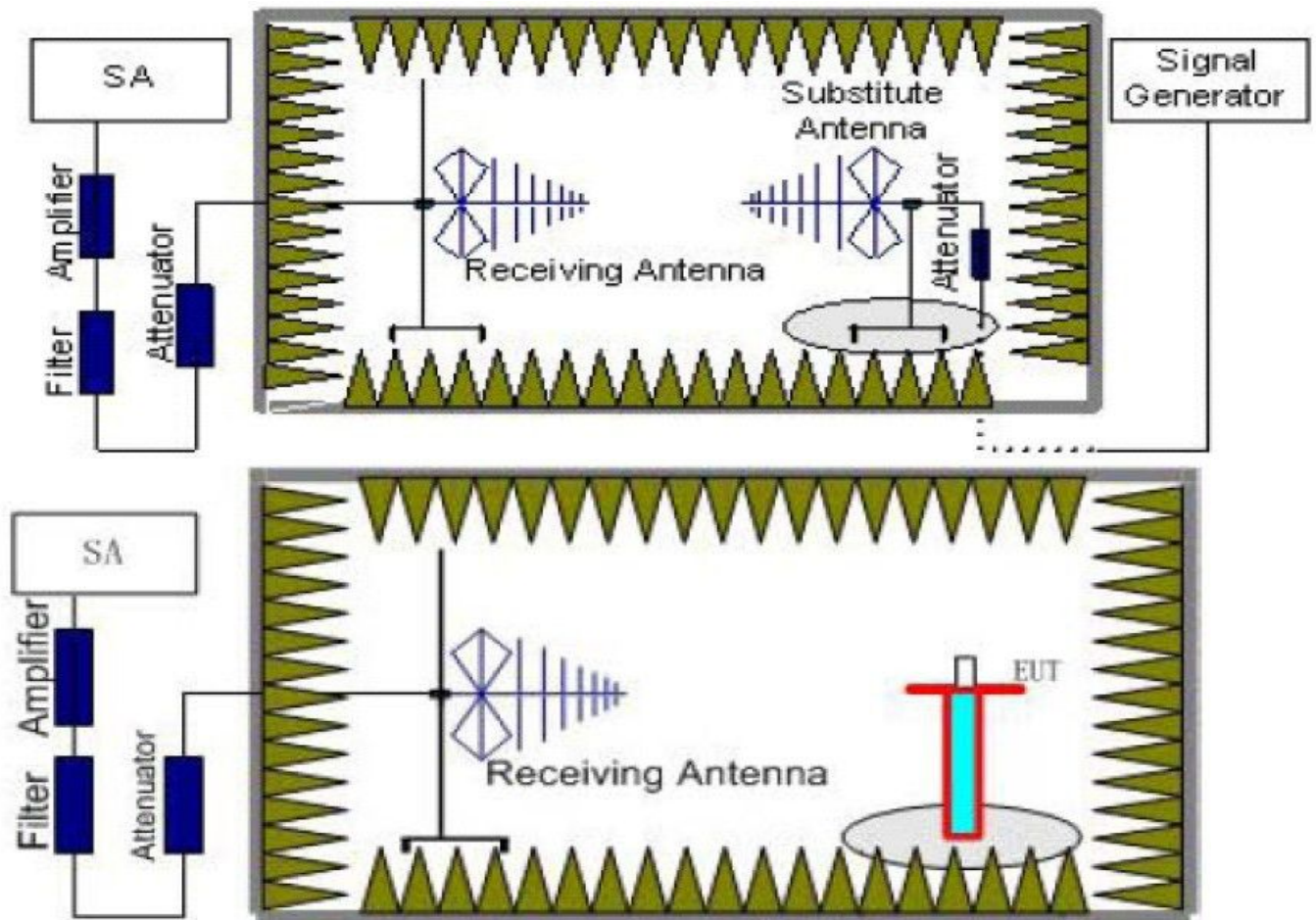
4.1.2. Radiated Output Power

TEST DESCRIPTION

This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=10MHz, VBW=10MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{Ag} - P_{cl} + G_a$$

We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{cl} + G_a$$

6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

TEST LIMIT

Note: We test the H direction and V direction and V direction is worse.

According to 22.913(a) and 24.232(c), the ERP should be not exceeding following table limits:

| | Burst Peak EIRP |
|---------------|------------------------|
| WCDMA Band II | 33dBm (2W) |

| | Burst Peak ERP |
|--------------|-----------------------|
| WCDMA Band V | 38.45dBm (7W) |

TEST RESULTS

| UMTS/TM1/WCDMA Band II | | |
|-------------------------------|-------------------|---------------------|
| Frequency (MHz) | EIRP (dBm) | Polarization |
| 1852.4 | 18.37 | V |
| 1880.0 | 18.41 | V |
| 1907.6 | 18.29 | V |

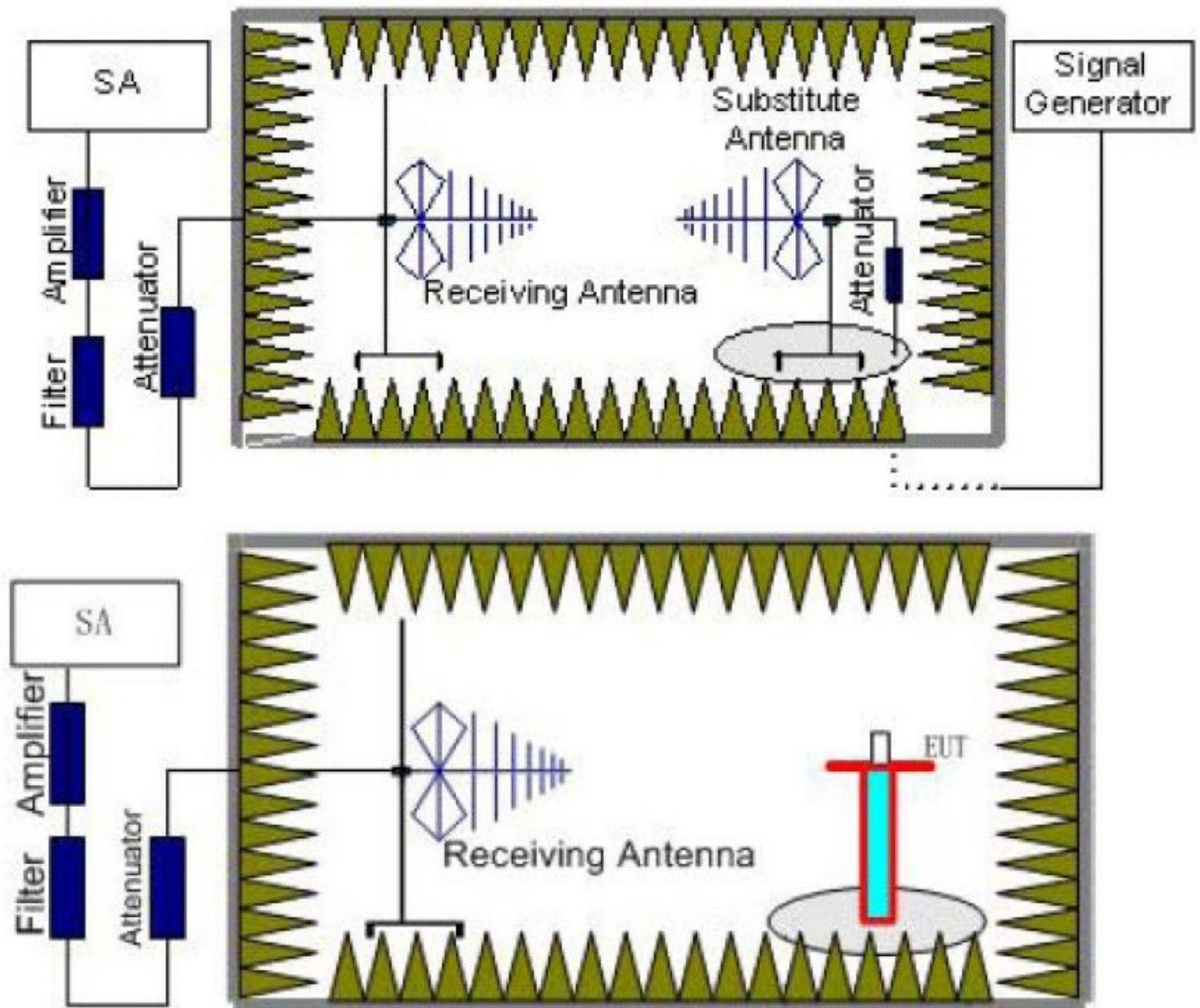
| UMTS/TM1/ WCDMA Band V | | |
|-------------------------------|------------------|---------------------|
| Frequency (MHz) | ERP (dBm) | Polarization |
| 826.40 | 19.27 | V |
| 836.60 | 19.29 | V |
| 846.60 | 19.47 | V |

4.2. Radiated Spurious Emission

TEST APPLICABLE

According to the TIA/EIA 603D:2010 test method, The Receiver or Spectrum was scanned from 9 KHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II and WCDMA Band V.

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
The measurement results are obtained as described below:
 $Power(EIRP) = P_{Mea} - P_{Ag} - P_{cl} + G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi$.
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|-------------------------|----------------|--------|--------|----------------|
| UMTS/TM1/ WCDMA Band V | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~10 | 1 MHz | 3 MHz | 3 |
| UMTS/TM1/ WCDMA Band II | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~11 | 1 MHz | 3 MHz | 3 |
| | 11~14 | 1 MHz | 3 MHz | 3 |
| | 14~18 | 1 MHz | 3 MHz | 3 |
| | 18~20 | 1 MHz | 3 MHz | 2 |

TEST LIMITS

According to 24.238 and 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

| Frequency | Channel | Frequency Range | Verdict |
|-------------------------|---------|-----------------|---------|
| UMTS/TM1/ WCDMA Band V | Low | 9KHz-10GHz | PASS |
| | Middle | 9KHz -10GHz | PASS |
| | High | 9KHz -10GHz | PASS |
| UMTS/TM1/ WCDMA Band II | Low | 9KHz -20GHz | PASS |
| | Middle | 9KHz -20GHz | PASS |
| | High | 9KHz -20GHz | PASS |

| UMTS/TM1/ WCDMA Band V | | | | | | | |
|------------------------|------------------------|-----------|--------------|----------------------------|----------------|-------------|--------------|
| Channel Number: 4132 | | | | Test Frequency: 826.40 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 1652.80 | -43.64 | 4.32 | 6.77 | 2.15 | -41.19 | -13.00 | H |
| 2479.20 | --- | | | 2.15 | --- | -13.00 | H |
| 1652.80 | -37.05 | 4.32 | 6.77 | 2.15 | -34.6 | -13.00 | V |
| 2479.20 | --- | | | 2.15 | --- | -13.00 | V |

| UMTS/TM1/ WCDMA Band V | | | | | | | |
|------------------------|------------------------|-----------|--------------|----------------------------|----------------|-------------|--------------|
| Channel Number: 4183 | | | | Test Frequency: 836.60 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 1673.20 | -41.89 | 4.55 | 6.77 | 2.15 | -39.67 | -13.00 | H |
| 2509.80 | --- | | | 2.15 | --- | -13.00 | H |
| 1673.20 | -36.47 | 4.55 | 6.77 | 2.15 | -34.25 | -13.00 | V |
| 2509.80 | --- | | | 2.15 | --- | -13.00 | V |

| UMTS/TM1/ WCDMA Band V | | | | | | | |
|------------------------|------------------------|-----------|--------------|----------------------------|----------------|-------------|--------------|
| Channel Number: 4233 | | | | Test Frequency: 846.60 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 1693.20 | -45.65 | 4.29 | 6.83 | 2.15 | -43.11 | -13.00 | H |
| 2539.80 | --- | | | 2.15 | --- | -13.00 | H |
| 1693.20 | -40.81 | 4.29 | 6.83 | 2.15 | -38.27 | -13.00 | V |
| 2539.80 | --- | | | 2.15 | --- | -13.00 | V |

| UMTS/TM1/ WCDMA Band II | | | | | | | |
|-------------------------|------------------------|-----------|--------------|-----------------------------|----------------|-------------|--------------|
| Channel Number: 9262 | | | | Test Frequency: 1852.40 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 3704.80 | -47.07 | 4.55 | 12.34 | 2.15 | -39.28 | -13.00 | H |
| 5557.20 | --- | | | 2.15 | --- | -13.00 | H |
| 3704.80 | -48.17 | 4.55 | 12.34 | 2.15 | -40.38 | -13.00 | V |
| 5557.20 | --- | | | 2.15 | --- | -13.00 | V |

| UMTS/TM1/ WCDMA Band II | | | | | | | |
|-------------------------|------------------------|-----------|--------------|-----------------------------|----------------|-------------|--------------|
| Channel Number: 9400 | | | | Test Frequency: 1880.00 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 3760.00 | -45.74 | 4.55 | 12.40 | 2.15 | -37.89 | -13.00 | H |
| 5640.00 | --- | | | 2.15 | --- | -13.00 | H |
| 3760.00 | -47.85 | 4.55 | 12.40 | 2.15 | -40.00 | -13.00 | V |
| 5640.00 | --- | | | 2.15 | --- | -13.00 | V |

| UMTS/TM1/ WCDMA Band II | | | | | | | |
|-------------------------|------------------------|-----------|--------------|-----------------------------|----------------|-------------|--------------|
| Channel Number: 9538 | | | | Test Frequency: 1907.60 MHz | | | |
| Frequency (MHz) | P _{Mea} (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak EIRP(dBm) | Limit (dBm) | Polarization |
| 3815.20 | -46.95 | 4.51 | 12.43 | 2.15 | -39.03 | -13.00 | H |
| 5722.80 | --- | | | 2.15 | --- | -13.00 | H |
| 3815.20 | -49.26 | 4.51 | 12.43 | 2.15 | -41.34 | -13.00 | V |
| 5722.80 | --- | | | 2.15 | --- | -13.00 | V |

Note:

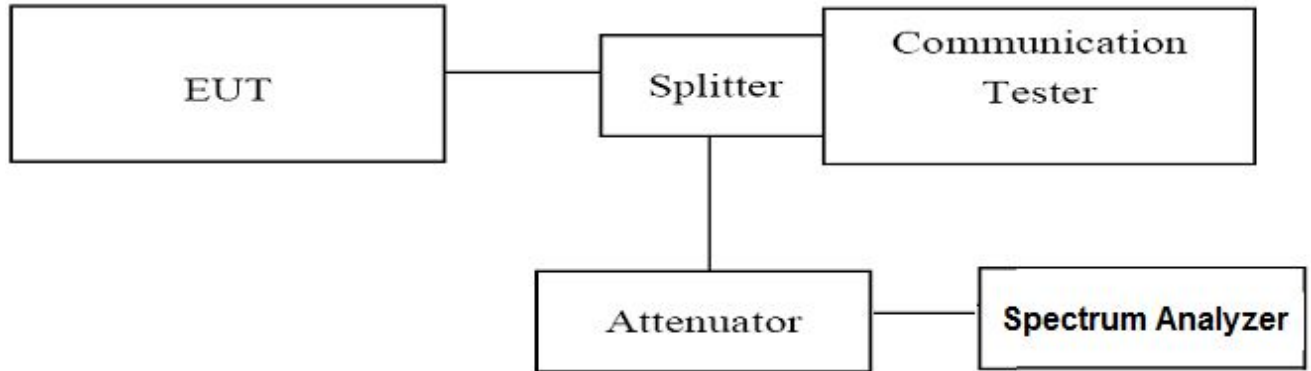
1. In general, the worse case attenuation requirement shown above was applied.
2. *** means that the emission level is too low to be measured or at least 20 dB down than the limit.

4.3. Occupied Bandwidth and Emission Bandwidth

TEST APPLICABLE

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band II and WCDMA band V. The table below lists the measured 99% Bandwidth and -26dBc Bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth and Emission Bandwidth were measured with Spectrum Analyzer FSU26 (peak);
3. Set RBW=50KHz,VBW=100KHz,Span=10MHz;
4. Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth
5. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1709.80 MHz for WCDMA band II; 826.40 MHz, 836.60 MHz and 846.60 MHz for WCDMA band V. (low, middle and high of operational frequency range).

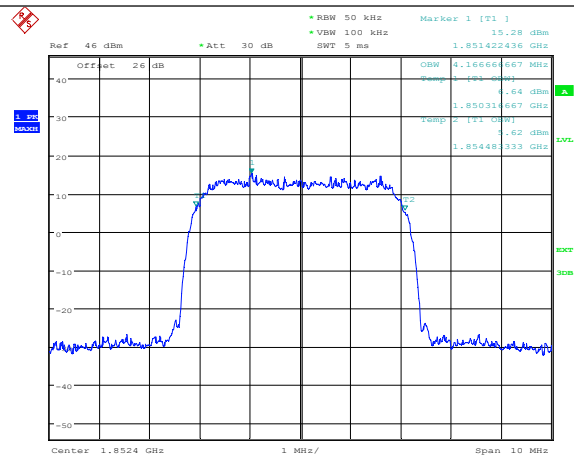
TEST RESULTS

| UMTS/TM1/ WCDMA Band II | | | | |
|-------------------------|-----------------|------------------------------------|---------------------------------------|---------|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) (kHz) | Emission Bandwidth (26 dBc BW) (kHz) | Verdict |
| 9262 | 1852.4 | 4166.7 | 4679.5 | PASS |
| 9400 | 1880.0 | 4150.6 | 4679.5 | PASS |
| 9538 | 1907.6 | 4166.7 | 4679.5 | PASS |

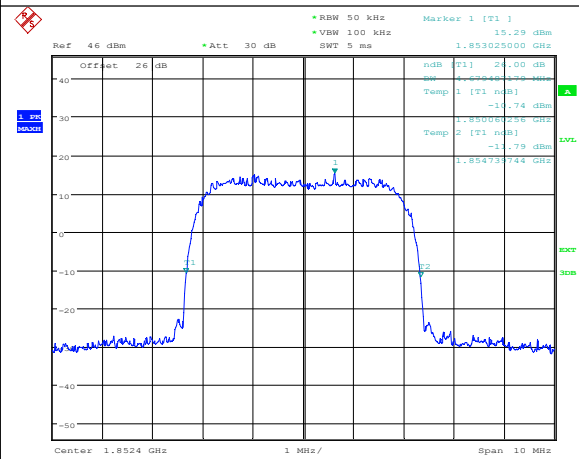
| UMTS/TM1/ WCDMA Band V | | | | |
|------------------------|-----------------|------------------------------------|---------------------------------------|---------|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) (kHz) | Emission Bandwidth (26 dBc BW) (kHz) | Verdict |
| 4132 | 826.40 | 4198.7 | 4679.5 | PASS |
| 4183 | 836.60 | 4166.7 | 4695.5 | PASS |
| 4233 | 846.60 | 4182.7 | 4663.5 | PASS |

WCDMA Band II

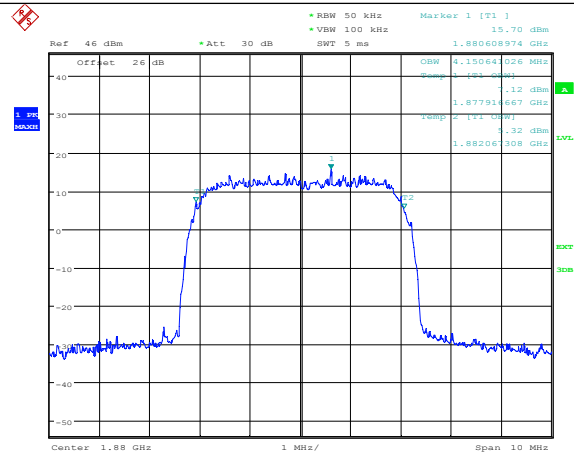
Occupied Bandwidth(99% BW)



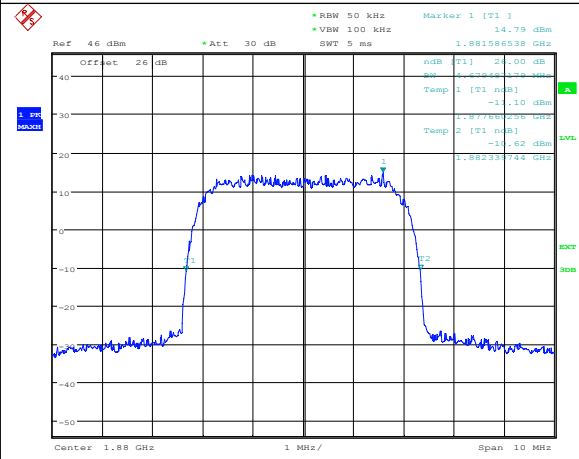
Emission Bandwidth (26 dBc BW)



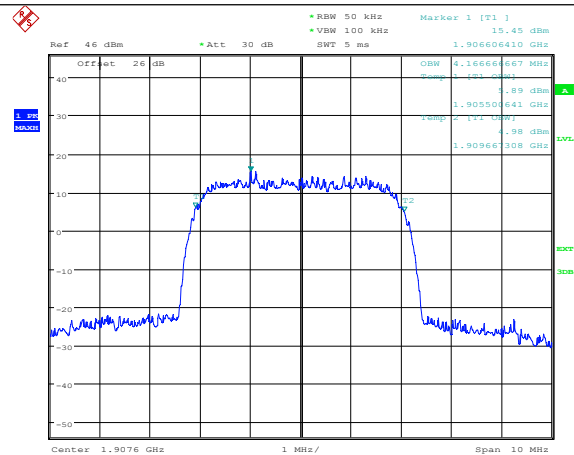
Channel 9262



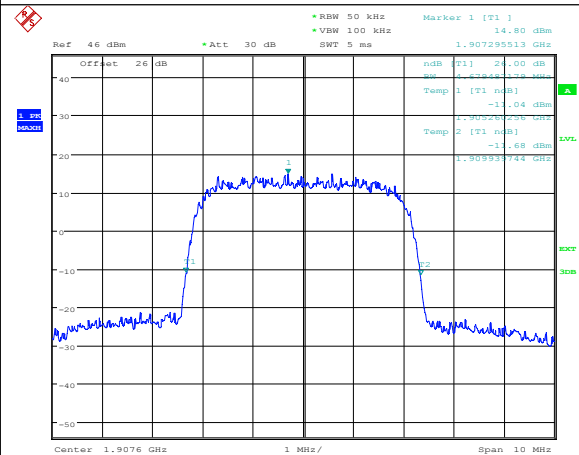
Channel 9262



Channel 9400



Channel 4183

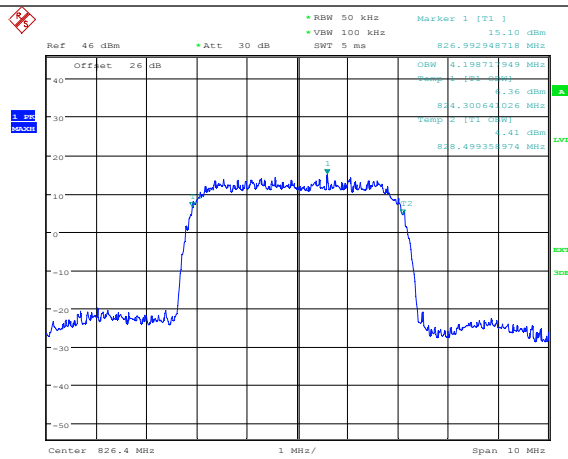


Channel 9538

Channel 4233

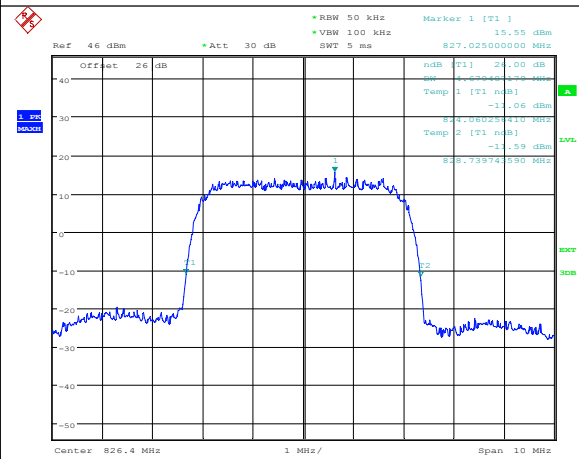
WCDMA Band V

Occupied Bandwidth(99% BW)



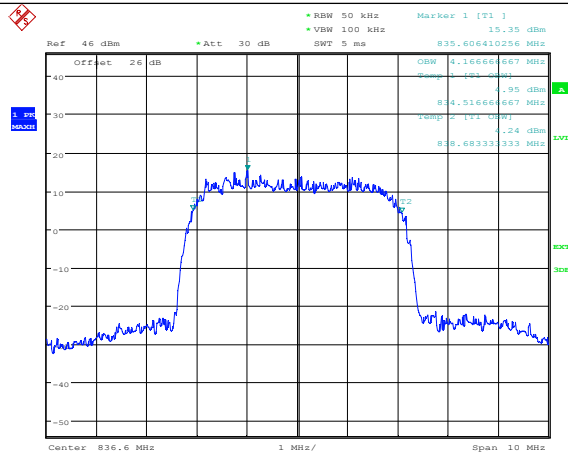
Date: 28.JUN.2015 17:16:52

Emission Bandwidth (26 dBc BW)



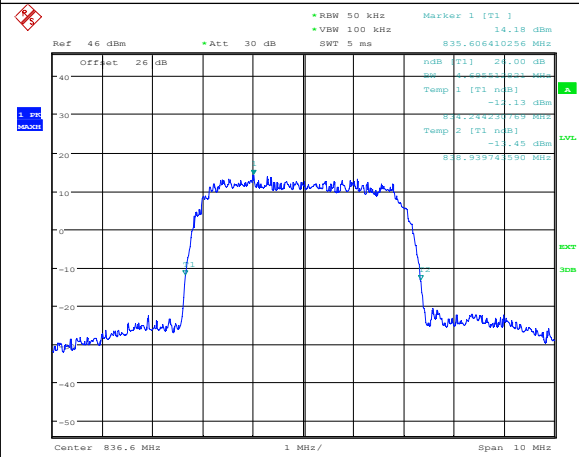
Date: 28.JUN.2015 17:16:38

Channel 4132



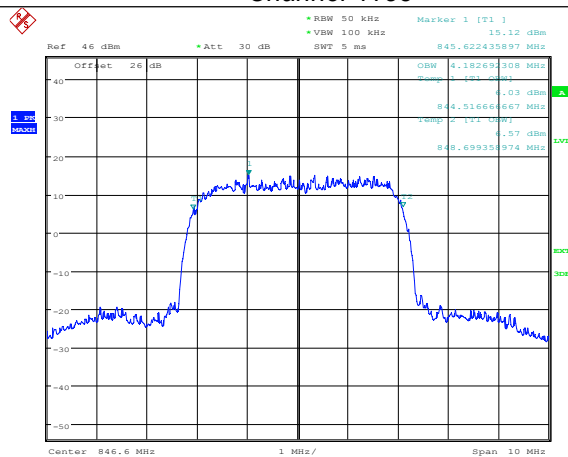
Date: 28.JUN.2015 17:17:22

Channel 4132



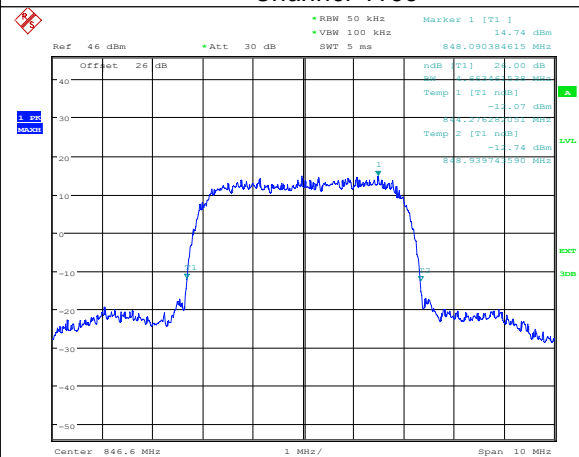
Date: 28.JUN.2015 17:17:36

Channel 4183



Date: 28.JUN.2015 17:15:23

Channel 4183



Date: 28.JUN.2015 17:15:52

Channel 4233

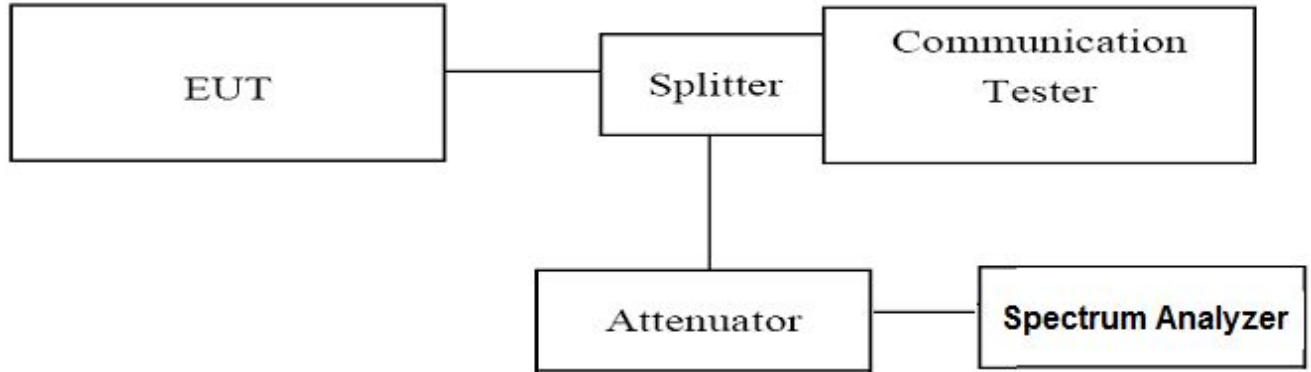
Channel 4233

4.4. Band Edge Compliance

TEST APPLICABLE

During the process of testing, the EUT was controlled by Digital Radio Communication tester (CUM200) to ensure max power transmission and proper modulation.

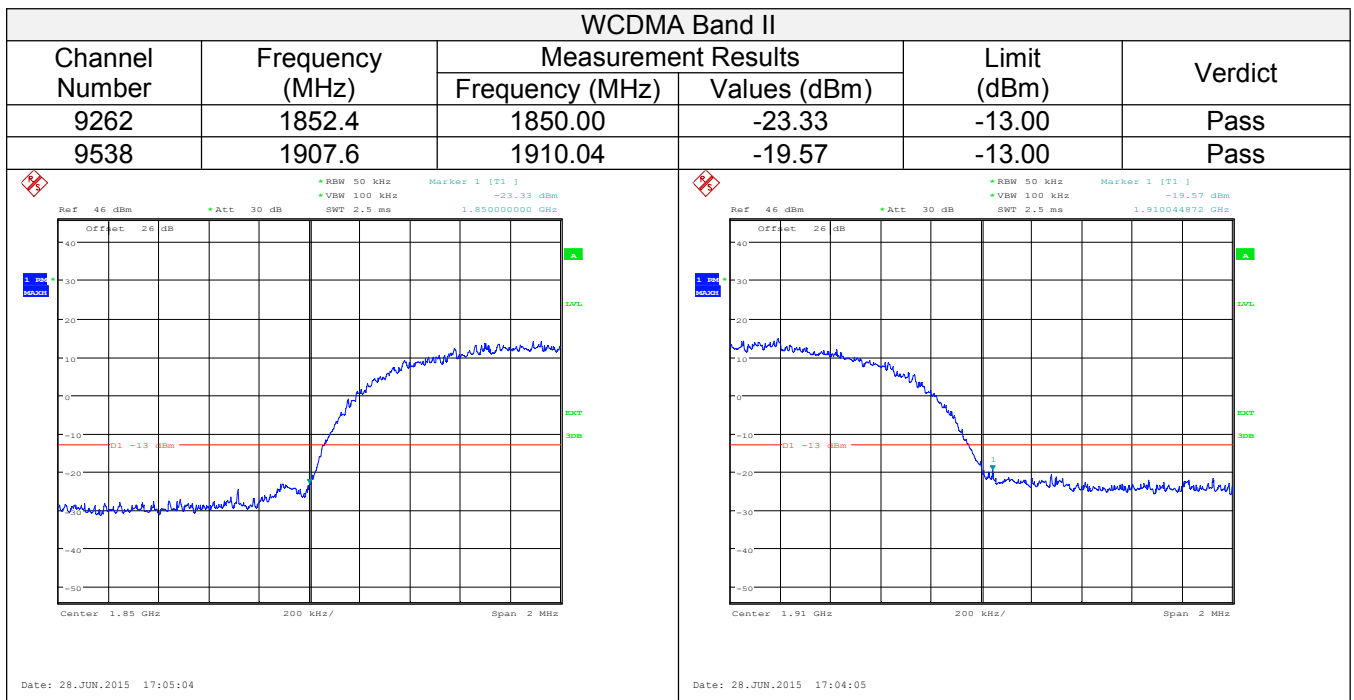
TEST CONFIGURATION

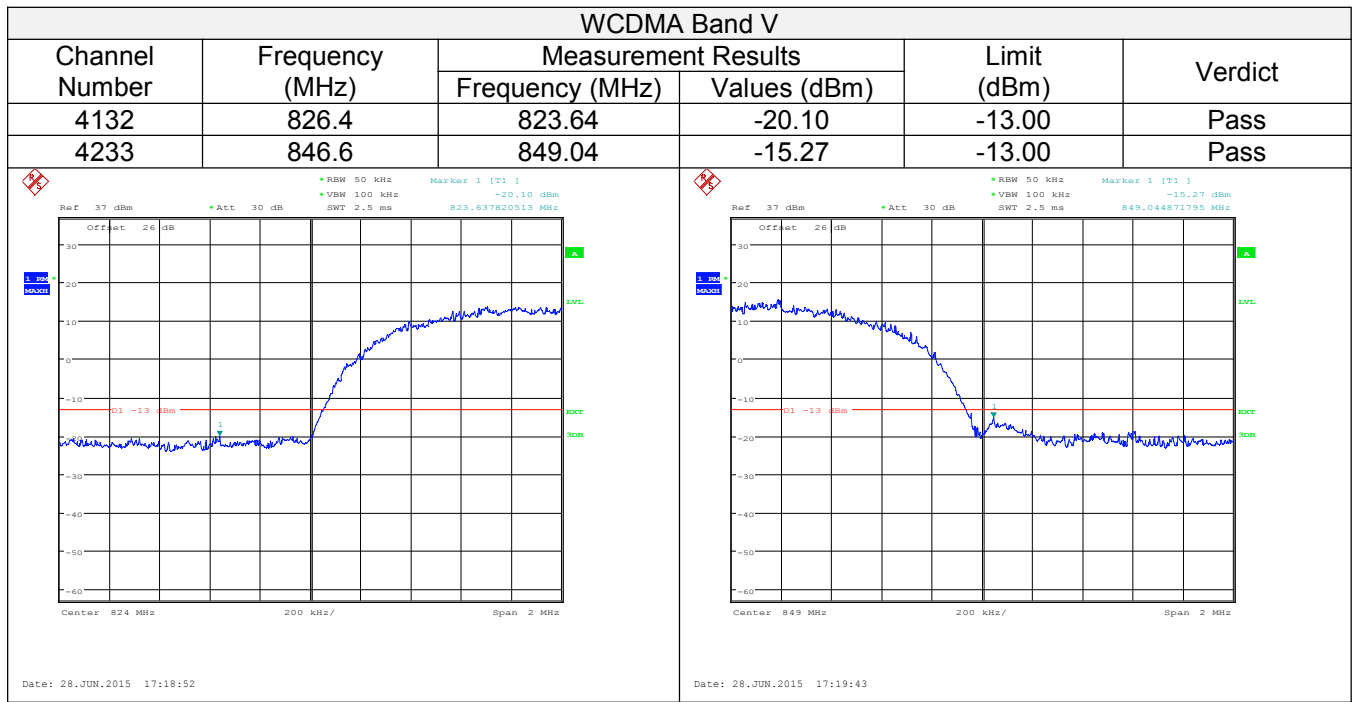


TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Spectrum Analyzer FUS200;
3. Set RBW=50KHz,VBW=100KHz,Span=2MHz ,Dector: Peak;
4. These measurements were done at 2 frequencies, 1850.20 MHz and 1709.80 MHz for WCDMA band II; 826.40 MHz and 846.60 MHz for WCDMA band V. (low and high of operational frequency range).

TEST RESULTS





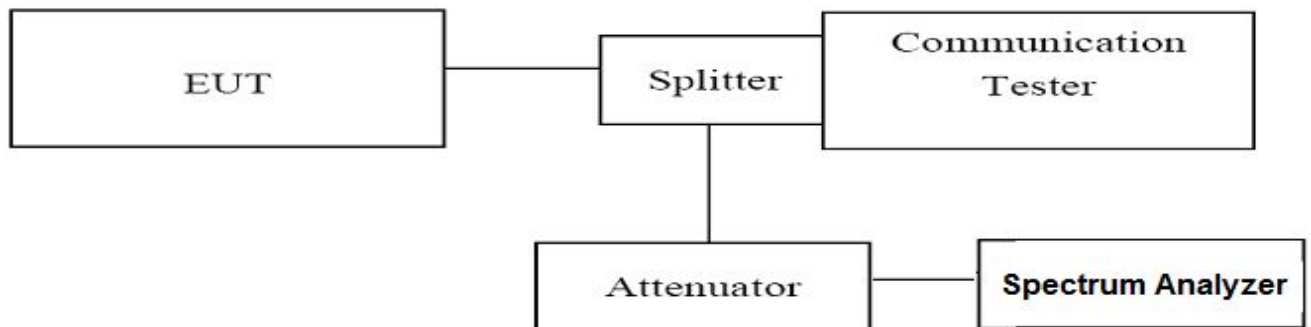
4.5. Spurious Emssion on Antenna Port

TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA band II, this equates to a frequency range of 9 KHz to 20GHz, data taken from 9 KHz to 25 GHz. For WCDMA Band V, data taken from 9 KHz to 13.6 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds;
Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Rhode & Schwarz Spectrum Analyzer FSU (peak)
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1709.80 MHz for WCDMA band II; 826.40 MHz, 836.60 MHz and 846.60 MHz for WCDMA band V. (low, middle and high of operational frequency range).

TEST LIMIT

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST RESULTS

4.6.1 For UMTS/TM1/WCDMA Band II Test Results

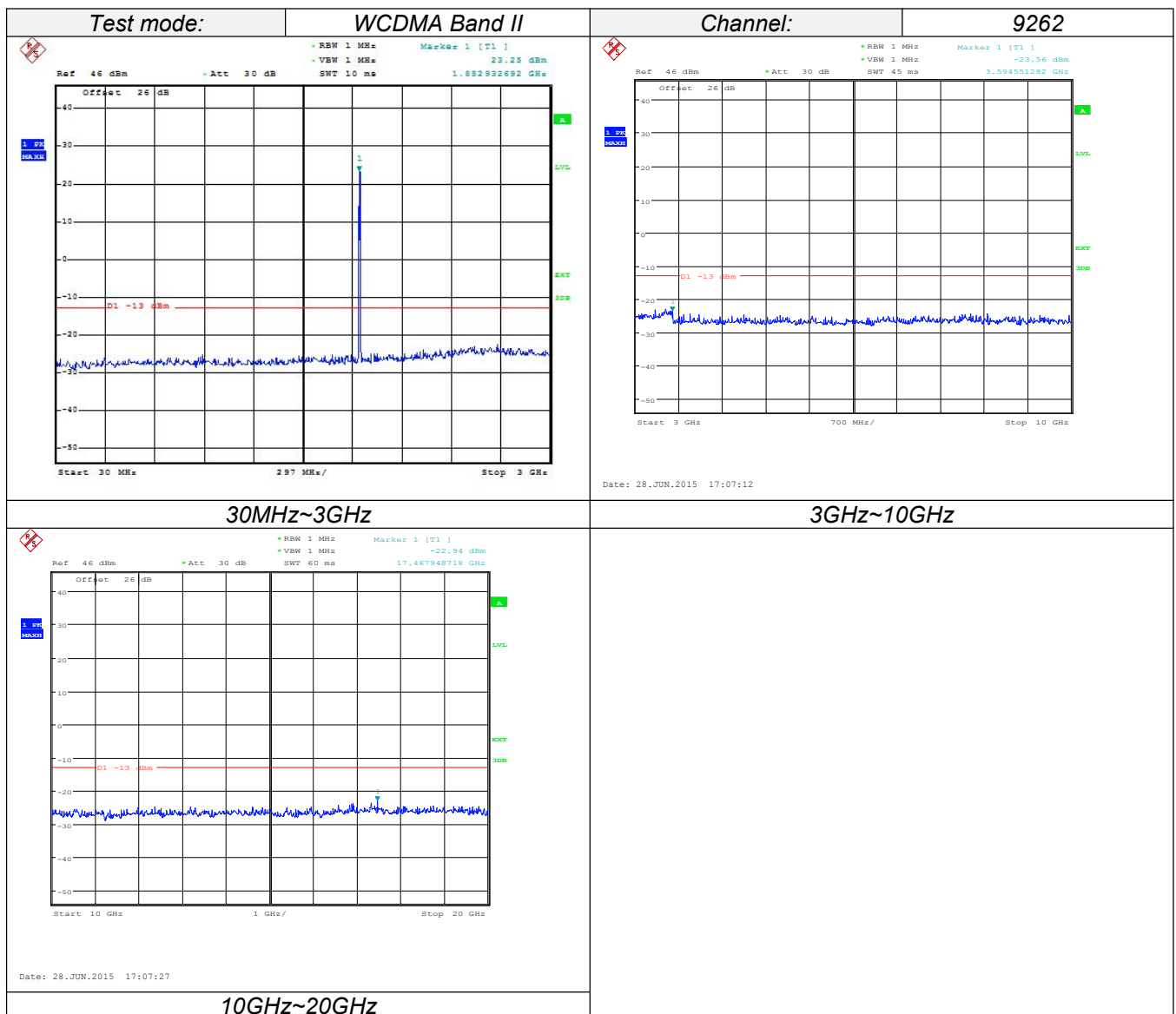
A. Test Verdict

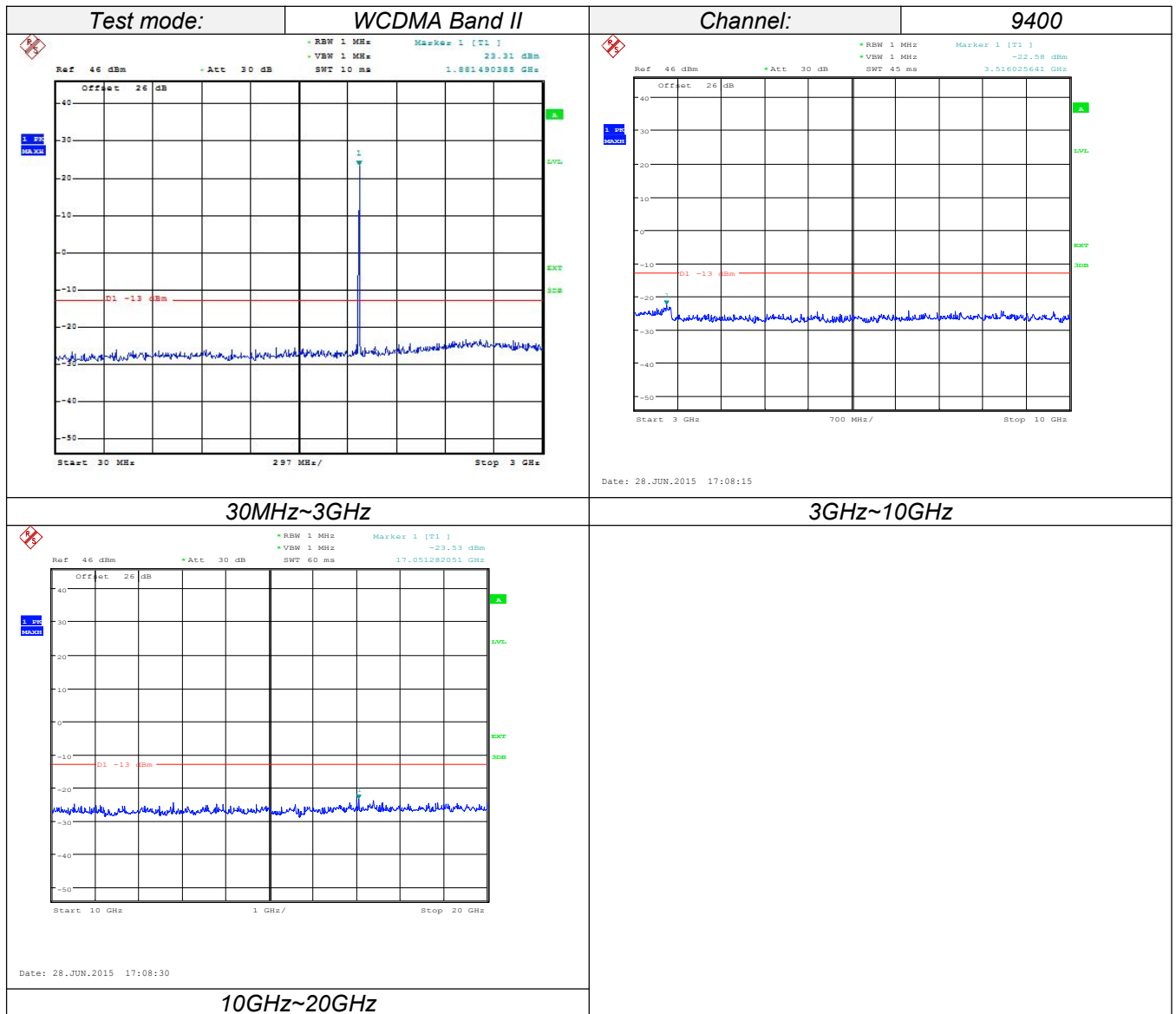
| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Limit (dBm) | Verdict |
|--------------------------------|--------------------|-----------------|----------------|---------|
| UMTS/TM1/WCDMA Band II/9262 | 1852.40 | 30MHz-3GHz | -13.00 | PASS |
| | | 3GHz-10GHz | -13.00 | PASS |
| | | 10GHz-20GHz | -13.00 | PASS |
| UMTS/TM1/WCDMA Band II/9400 | 1880.00 | 30MHz-3GHz | -13.00 | PASS |
| | | 3GHz-10GHz | -13.00 | PASS |
| | | 10GHz-20GHz | -13.00 | PASS |
| UMTS/TM1/WCDMA Band II/9538 | 1907.60 | 30MHz-3GHz | -13.00 | PASS |
| | | 3GHz-10GHz | -13.00 | PASS |
| | | 10GHz-20GHz | -13.00 | PASS |

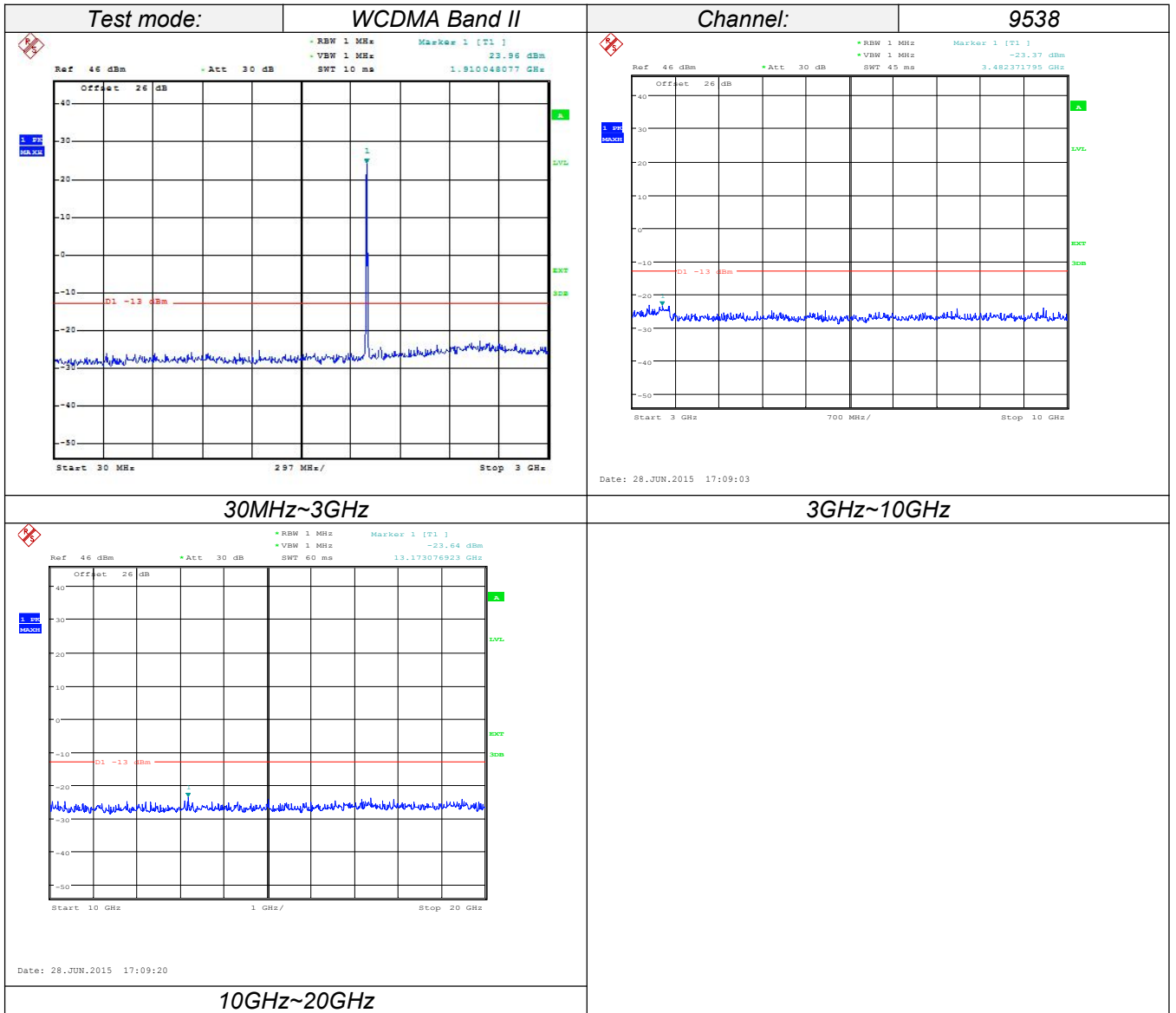
Note:

1. In general, the worse case attenuation requirement shown above was applied.
2. *** means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots







4.6.2 For UMTS/TM1/WCDMA Band V Test Results

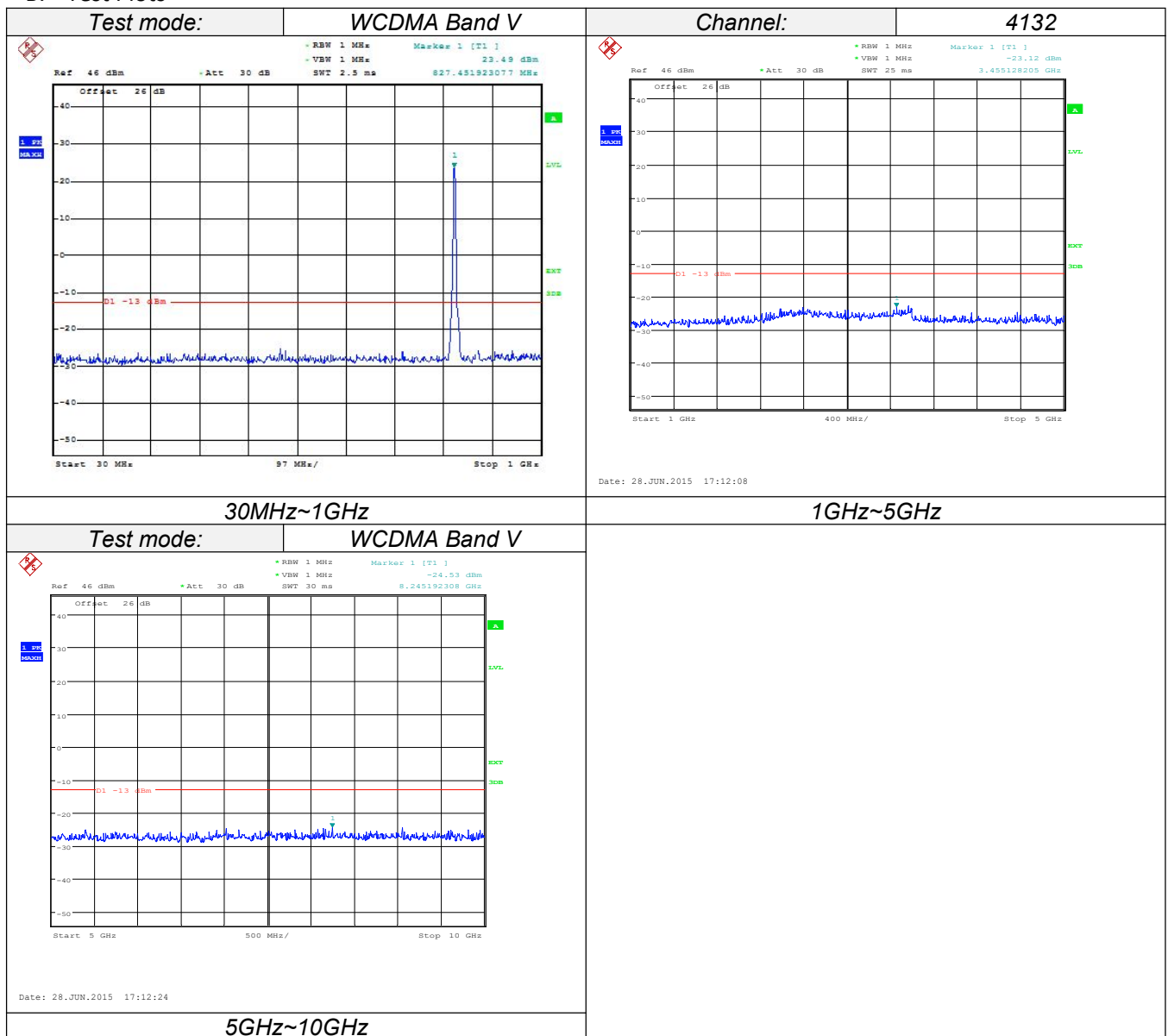
A. Test Verdict

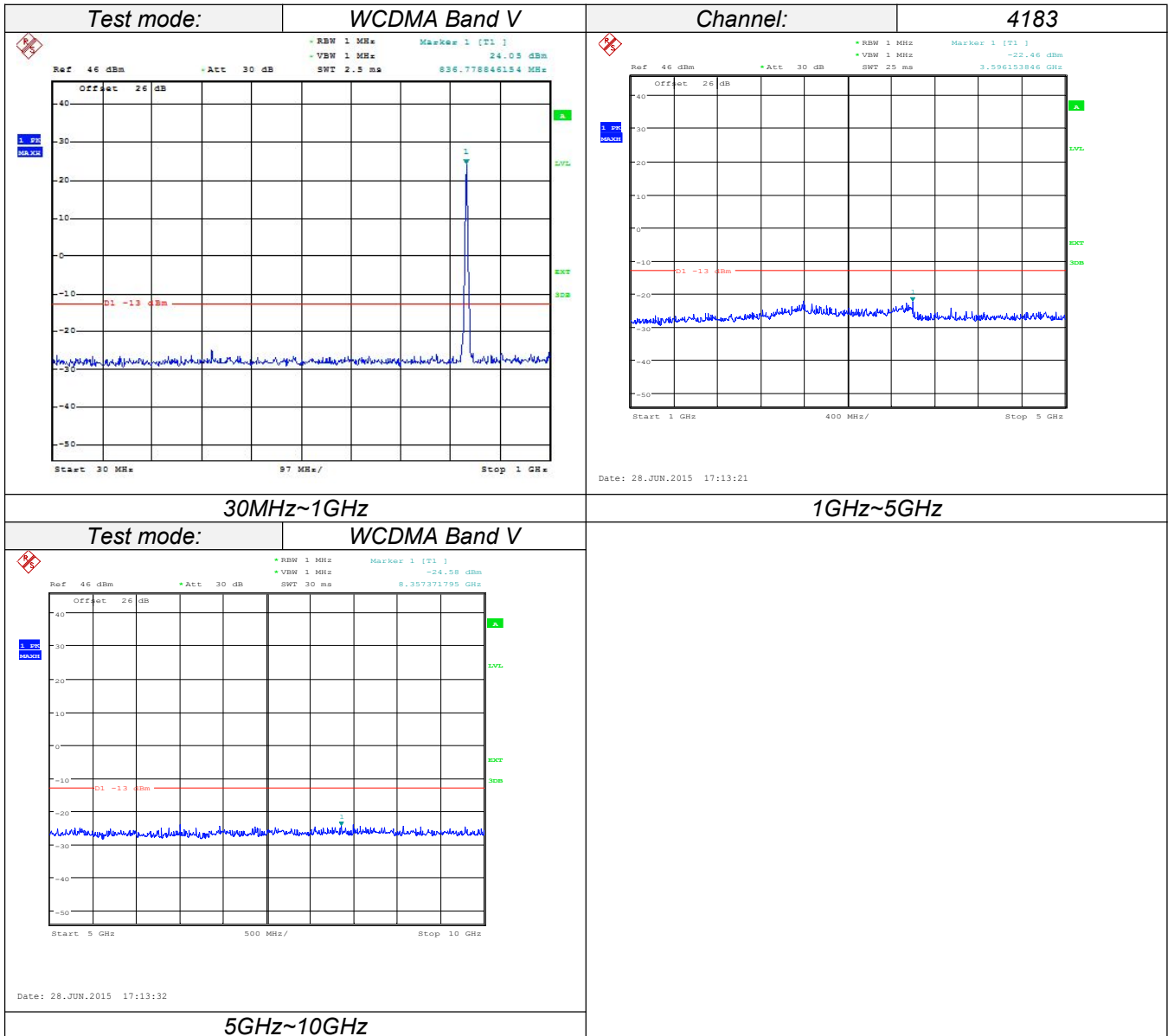
| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Limit (dBm) | Verdict |
|-------------------------------|--------------------|-----------------|----------------|---------|
| UMTS/TM1/WCDMA Band V/4132 | 826.40 | 30MHz-1GHz | -13.00 | PASS |
| | | 1GHz-5GHz | -13.00 | PASS |
| | | 5GHz-10GHz | -13.00 | PASS |
| UMTS/TM1/WCDMA Band V/4183 | 836.60 | 30MHz-1GHz | -13.00 | PASS |
| | | 1GHz-5GHz | -13.00 | PASS |
| | | 5GHz-10GHz | -13.00 | PASS |
| UMTS/TM1/WCDMA Band V/4233 | 846.60 | 30MHz-1GHz | -13.00 | PASS |
| | | 1GHz-5GHz | -13.00 | PASS |
| | | 5GHz-10GHz | -13.00 | PASS |

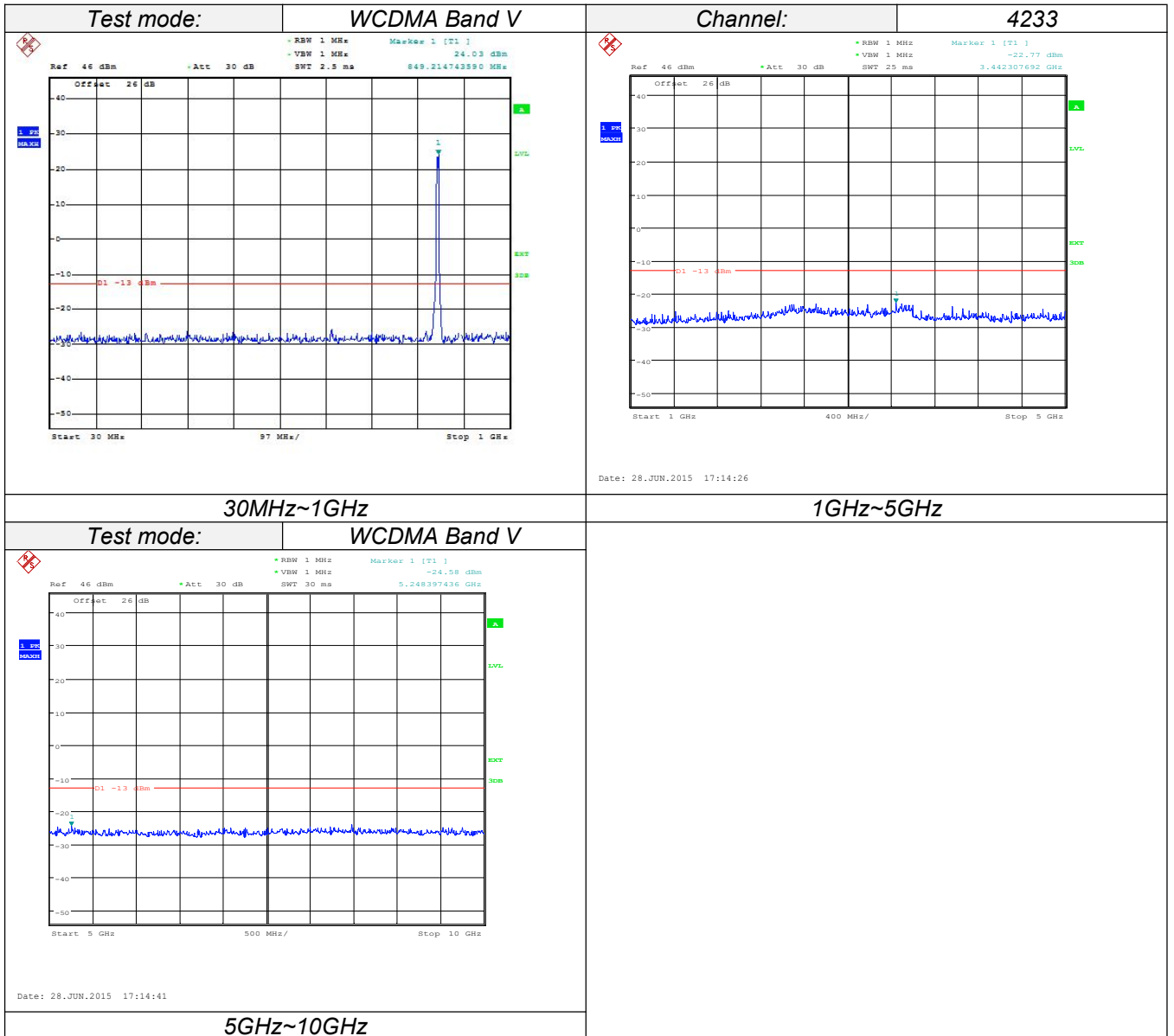
Note:

1. In general, the worse case attenuation requirement shown above was applied.
2. "----" means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots







4.6. Frequency Stability Test

TEST APPLICABLE

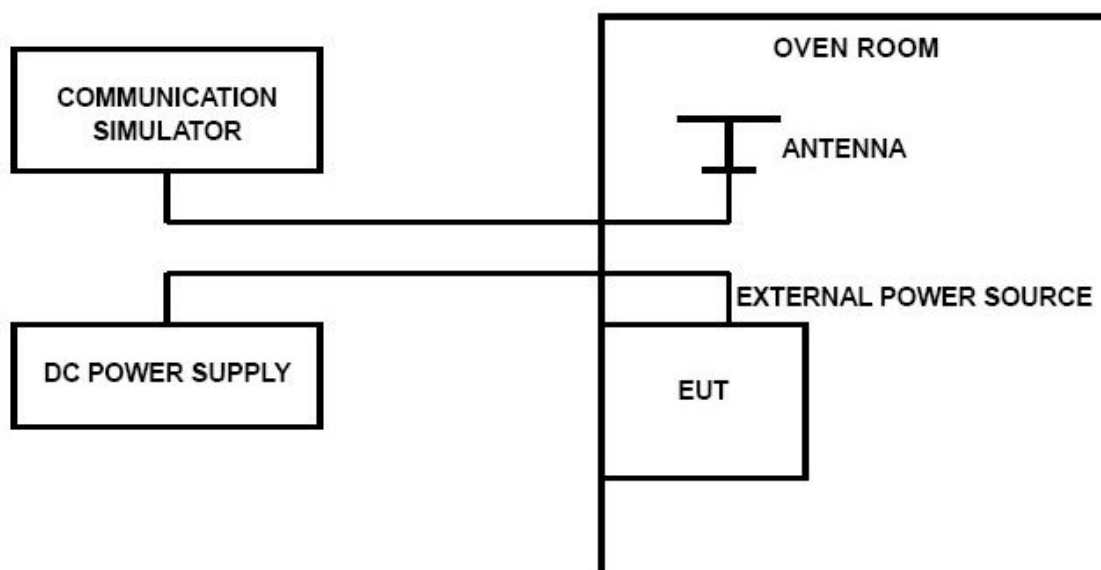
1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
2. According to FCC Part 2 Section 2.1055 (E) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 3.40V.

TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature;
2. Subject the EUT to overnight soak at -30°C;
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
6. Subject the EUT to overnight soak at +50°C;
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
8. Repeat the above measurements at 10°C increments from +50°C to -30°C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure;

TEST CONFIGURATION



TEST LIMITS

For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.20VDC, with a nominal voltage of 3.70DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST RESULTS

| UMTS/TM1/WCDMA Band II | | | | | |
|------------------------|------------------|---------------------|----------------------|-------------|---------|
| DC Power | Temperature (°C) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.40 | 25 | 40.06 | 0.02 | 2.50 | PASS |
| 3.70 | 25 | 32.96 | 0.02 | 2.50 | PASS |
| 4.20 | 25 | 37.54 | 0.02 | 2.50 | PASS |
| 3.70 | -30 | 35.02 | 0.02 | 2.50 | PASS |
| 3.70 | -20 | 35.94 | 0.02 | 2.50 | PASS |
| 3.70 | -10 | 41.89 | 0.02 | 2.50 | PASS |
| 3.70 | 0 | 32.05 | 0.02 | 2.50 | PASS |
| 3.70 | 10 | 34.33 | 0.02 | 2.50 | PASS |
| 3.70 | 20 | 36.62 | 0.02 | 2.50 | PASS |
| 3.70 | 30 | 41.66 | 0.02 | 2.50 | PASS |
| 3.70 | 40 | 35.02 | 0.02 | 2.50 | PASS |
| 3.70 | 50 | 40.01 | 0.02 | 2.50 | PASS |

| UMTS/TM1/WCDMA Band V | | | | | |
|-----------------------|------------------|---------------------|----------------------|-------------|---------|
| DC Power | Temperature (°C) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.40 | 20 | 18.66 | 0.02 | 2.50 | PASS |
| 3.70 | 20 | 15.45 | 0.02 | 2.50 | PASS |
| 4.20 | 20 | 21.63 | 0.03 | 2.50 | PASS |
| 3.70 | -30 | 15.68 | 0.02 | 2.50 | PASS |
| 3.70 | -20 | 19.80 | 0.02 | 2.50 | PASS |
| 3.70 | -10 | 19.57 | 0.02 | 2.50 | PASS |
| 3.70 | 0 | 24.38 | 0.03 | 2.50 | PASS |
| 3.70 | 10 | 14.76 | 0.02 | 2.50 | PASS |
| 3.70 | 20 | 15.45 | 0.02 | 2.50 | PASS |
| 3.70 | 30 | 20.26 | 0.02 | 2.50 | PASS |
| 3.70 | 40 | 13.85 | 0.02 | 2.50 | PASS |
| 3.70 | 50 | 18.65 | 0.02 | 2.50 | PASS |

5. Test Setup Photos of the EUT



.....End of Report.....