



BUREAU VERITAS

Test Report No.: RF180604W006-4



ACCREDITED

Certificate # 3939.01

VARIANT FCC TEST REPORT (PART 24)

| | |
|------------|--|
| Applicant: | FIH International Co., Ltd. |
| Address: | No.18, Tongji zhonglu, Beijing Economic & Technological Development Area |

| | |
|---------------------------|----------------------------------|
| Manufacturer or Supplier: | HMD Global Oy |
| Address: | Karaportti 2 02610 Espoo FINLAND |
| Product: | GSM/WCDMA/LTE Mobile Phone |
| Brand Name: | Nokia |
| Model Name: | TA-1049 |
| FCC ID: | 2AJOTTA-1049 |
| Date of tests: | Jun. 05, 2018 ~ Jun. 25, 2018 |

The tests have been carried out according to the requirements of the following standard:

- FCC PART 24, Subpart E
- ANSI C63.26-2015
- ANSI/TIA/EIA-603-D
- ANSI/TIA/EIA-603-E

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

| | |
|--|---|
| Prepared by Roger Li Engineer / Mobile Department | Approved by Sam Tung Manager / Mobile Department |
| | |
| Date: Jul. 02, 2018 | Date: Jul. 02, 2018 |

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TABLE OF CONTENTS

| | |
|--|-----------|
| RELEASE CONTROL RECORD | 3 |
| 1 SUMMARY OF TEST RESULTS..... | 4 |
| 1.1 MEASUREMENT UNCERTAINTY | 4 |
| 1.2 TEST SITE AND INSTRUMENTS | 5 |
| 2 GENERAL INFORMATION..... | 6 |
| 2.1 GENERAL DESCRIPTION OF EUT..... | 6 |
| 2.2 CONFIGURATION OF SYSTEM UNDER TEST | 8 |
| 2.3 DESCRIPTION OF SUPPORT UNITS..... | 9 |
| 2.4 TEST ITEM AND TEST CONFIGURATION | 9 |
| 2.5 EUT OPERATING CONDITIONS | 11 |
| 2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS | 11 |
| 3 TEST TYPES AND RESULTS..... | 12 |
| 3.1 OUTPUT POWER MEASUREMENT | 12 |
| 3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT | 12 |
| 3.1.2 TEST PROCEDURES | 12 |
| 3.1.3 TEST SETUP..... | 13 |
| 3.1.4 TEST RESULTS..... | 14 |
| 3.2 RADIATED EMISSION MEASUREMENT | 20 |
| 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT | 20 |
| 3.2.2 TEST PROCEDURES | 20 |
| 3.2.3 DEVIATION FROM TEST STANDARD | 20 |
| 3.2.4 TEST SETUP..... | 21 |
| 3.2.5 TEST RESULTS | 23 |
| 4 INFORMATION ON THE TESTING LABORATORIES..... | 33 |
| 5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB..... | 34 |



BUREAU
VERITAS

Test Report No.: RF180604W006-4

RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|----------------|-------------------|---------------|
| RF180604W006-4 | Original release | Jul. 02, 2018 |



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 24 & Part 2 | | | |
|--|-------------------------------------|--------|--|
| STANDARD SECTION | TEST TYPE | RESULT | REMARK |
| 2.1046 24.232 | Equivalent Isotropic Radiated Power | PASS | Meet the requirement of limit. |
| 2.1055 24.235 | Frequency Stability | N/A | N/A |
| 2.1049 24.238(b) | Occupied Bandwidth | N/A | N/A |
| 24.232(d) | Peak to average ratio | N/A | N/A |
| 24.238(b) | Band Edge Measurements | N/A | N/A |
| 2.1051 24.238 | Conducted Spurious Emissions | N/A | N/A |
| 2.1053 24.238 | Radiated Spurious Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -18.33dB at 36.00MHz. |

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|---------------------|---------------|-------------|
| Conducted emissions | 9kHz~30MHz | 2.66dB |
| Radiated emissions | 9KHz ~ 30MHz | 2.68dB |
| | 30MHz ~ 1GHz | 3.26dB |
| | 1GHz ~ 18GHz | 4.48dB |
| | 18GHz ~ 40GHz | 4.12dB |

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



1.2 TEST SITE AND INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---------------------------------------|--------------|-----------------------------|-----------------------------|------------|------------|
| MXE EMI Receiver | KEYSIGHT | N9038A-544 | MY54450026 | Mar. 16,18 | Mar. 15,19 |
| EXA Signal Analyzer | KEYSIGHT | N9010A-526 | MY54510322 | Jun. 28,17 | Jun. 27,18 |
| Bilog Antenna 1 | ETS-LINDGREN | 3143B | 00161964 | Nov. 26,16 | Nov. 25,18 |
| Bilog Antenna 2 | ETS-LINDGREN | 3143B | 00161965 | Nov. 26,16 | Nov. 25,18 |
| Horn Antenna 1 | ETS-LINDGREN | 3117 | 00168728 | Nov. 26,16 | Nov. 25,18 |
| Horn Antenna 2 | ETS-LINDGREN | 3117 | 00168692 | Nov. 26,16 | Nov. 25,18 |
| Loop antenna | Daze | ZN30900A | 0708 | Nov. 20,17 | Nov. 19,18 |
| Horn Antenna (18GHz-40GHz) | N/A | QWH-SL-18-40-K-SG/QMS-00361 | 15433 | Dec. 16,16 | Dec. 15,18 |
| Radio Communication Analyzer | ANRITSU | MT8820C | 6201465426 | Mar. 02,18 | Mar. 01,19 |
| Signal Pre-Amplifier | EMSI | EMC 9135 | 980249 | Jul. 24,17 | Jul. 23,18 |
| Signal Pre-Amplifier | EMSI | EMC 012645B | 980257 | Jul. 24,17 | Jul. 23,18 |
| Signal Pre-Amplifier | EMSI | EMC 184045B | 980259 | Jul. 24,17 | Jul. 23,18 |
| 3m Semi-anechoic Chamber | ETS-LINDGREN | 9m*6m*6m | Euroshieldpn-CT0001143-1216 | Apr. 21,18 | Apr. 20,19 |
| Test Software | E3 | V 9.160323 | N/A | N/A | N/A |
| Test Software | ADT | ADT_Radiated_V7.6.15.9.2 | N/A | N/A | N/A |
| 10dB Attenuator | JFW/USA | 50HF-010-SM A | 1505 | Jul. 24,17 | Jul. 23,18 |
| Power Meter | Anritsu | ML2495A | 1506002 | Mar. 02,18 | Mar. 01,19 |
| Power Sensor | Anritsu | MA2411B | 1339352 | Mar. 16,18 | Mar. 15,19 |
| Humid & Temp Programmable Tester | Juyi | ITH-120-45-CP-AR | IAA1504-001 | Jul. 18,17 | Jul. 17,18 |
| MXG Analog Microvave Signal Generator | KEYSIGHT | N5183A | MY50143024 | Mar. 13,18 | Mar. 12,19 |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
 3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 525120.



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

| | | |
|------------------------|--|-----------------------|
| PRODUCT | GSM/WCDMA/LTE Mobile Phone | |
| BRAND NAME | Nokia | |
| MODEL NAME | TA-1049 | |
| POWER SUPPLY | 5.0Vdc (adapter or host equipment) 3.9Vdc (Li-ion, battery) | |
| MODULATION TYPE | GSM, GPRS: GMSK EDGE: GMSK, 8PSK WCDMA : BPSK LTE Band 2: QPSK, 16QAM | |
| FREQUENCY RANGE | GSM, GPRS, EDGE | 1850.2MHz ~ 1909.8MHz |
| | WCDMA | 1852.4MHz ~ 1907.6MHz |
| | LTE Band 2 Channel Bandwidth: 1.4MHz | 1850.7MHz ~ 1909.3MHz |
| | LTE Band 2 Channel Bandwidth: 3MHz | 1851.5MHz ~ 1908.5MHz |
| | LTE Band 2 Channel Bandwidth: 5MHz | 1852.5MHz ~ 1907.5MHz |
| | LTE Band 2 Channel Bandwidth: 10MHz | 1855.0MHz ~ 1905.0MHz |
| | LTE Band 2 Channel Bandwidth: 15MHz | 1857.5MHz ~ 1902.5MHz |
| | LTE Band 2 Channel Bandwidth: 20MHz | 1860.0MHz ~ 1900.0MHz |
| MAX. EIRP POWER | GSM | 1202mW |
| | EDGE | 514mW |
| | WCDMA | 389mW |
| | LTE Band 2 Channel Bandwidth: 3MHz | 280mW |
| ANTENNA TYPE | Fixed Internal Antenna with 3.17dBi gain | |
| HW VERSION | HW0309 | |
| SW VERSION | 000C_0_34A | |
| I/O PORTS | Refer to user's manual | |
| CABLE SUPPLIED | USB cable: non-shielded, detachable, 1.0m Earphone cable: non-shielded, detachable, 1.5m | |

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. This report is issued as a supplementary report to the original report RF180131W003-4. The differences compared with original report are updated HW and adding 2nd Manufacturer of components and antenna.



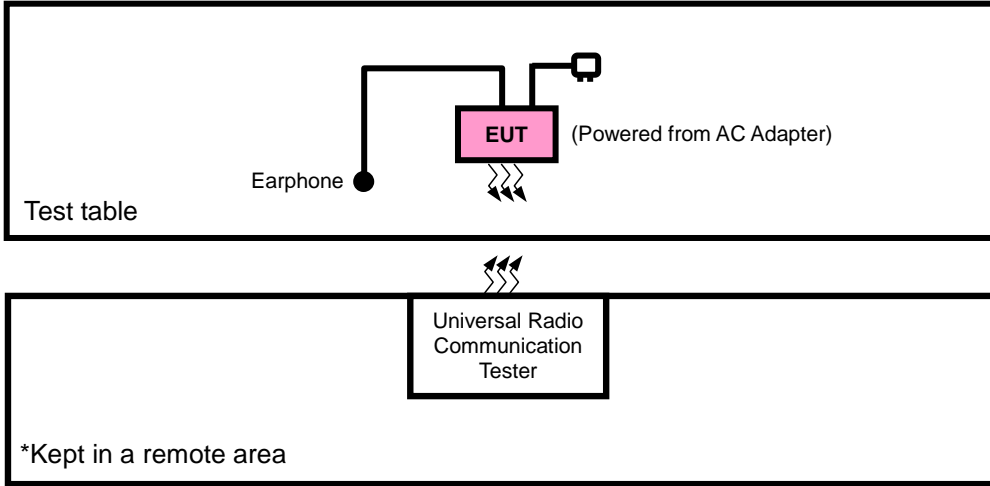
List of Accessories:

| ACCESSORIES | BRAND | MANUFACTURER | MODEL | SPECIFICATION |
|--------------------|--------------|--|--------------|---|
| Adapter 1 | Salcomp | Salcomp (Shenzhen) Co., Ltd. | FC0202 | I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA |
| Adapter 2 | Aohai | DONGGUAN AOHA TECHNOLOGY CO., LTD. | AD-5WU | I/P: 100-240Vac, 150mA O/P: 5Vdc, 1000mA |
| Battery | SCUD | SCUD (Fujian) Electronics CO., Ltd. | HE336 | Rating: 3.85Vdc, 2900mAh |
| Earphone 1 | Nokia | FIT | WH-108 | 1.5m non-shielded cable w/o core |
| Earphone 2 | Nokia | OBO | WH-108 | 1.5m non-shielded cable w/o core |
| USB Cable | Nokia | FIH | CA-190CD | 1.0m non-shielded cable w/o core |

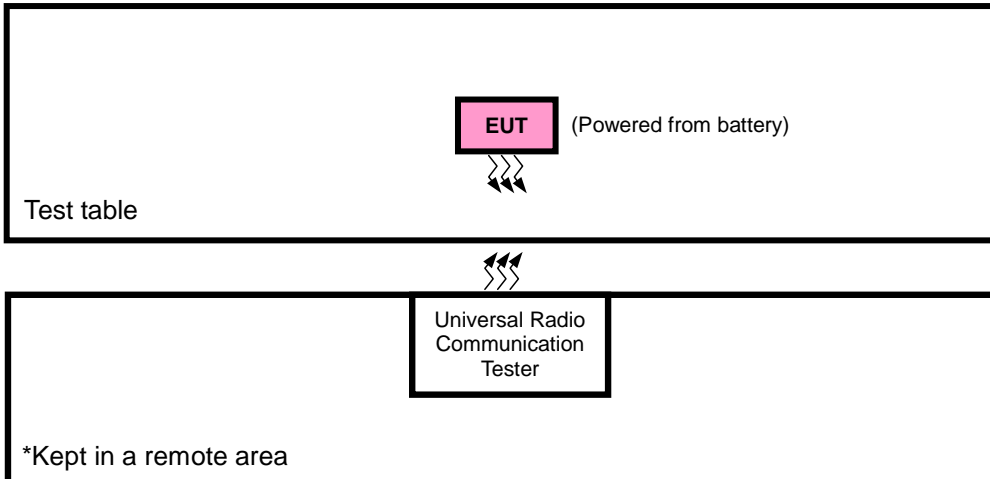


2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



FOR CONDUCTED & E.I.R.P. TEST





2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|-----------|----------|-----------|------------|--------|
| 1 | DC source | LONG WEI | PS-6403D | 010934269 | N/A |
| 2 | PC | HP | A6608CN | 3CR83825X3 | N/A |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1 | DC Line: Unshielded, Detachable 1.0m |
| 2 | AC Line: Unshielded, Detachable 1.5m |

NOTE:

1. All power cords of the above support units are non shielded (1.8m).

2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports

The worst case in EIRP and radiated emission was found when positioned on X-plane for GSM/EDGE/WCDMA/ LTE. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | DESCRIPTION |
|--------------------|--|
| A | EUT + Adapter + USB Cable + Earphone with GSM ,WCDMA or LTE link |
| B | EUT + Battery with GSM ,WCDMA or LTE link |

GSM MODE

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | MODE |
|--------------------|-------------------|-------------------|----------------|-----------|
| B | EIRP | 512 to 810 | 512, 661, 810 | GSM, EDGE |
| A | RADIATED EMISSION | 512 to 810 | 512, 661, 810 | GSM, EDGE |



WCDMA MODE

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | MODE |
|--------------------|-------------------|-------------------|------------------|-------|
| B | EIRP | 9262 to 9538 | 9262, 9400, 9538 | WCDMA |
| A | RADIATED EMISSION | 9262 to 9538 | 9262, 9400, 9538 | WCDMA |

LTE BAND 2

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | CHANNEL BANDWIDTH | MODULATION | MODE |
|--------------------|-------------------|-------------------|---------------------|-------------------|------------|--------------------|
| B | EIRP | 18607 to 19193 | 18607, 18900, 19193 | 1.4MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| | | 18615 to 19185 | 18615, 18900, 19185 | 3MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| | | 18625 to 19175 | 18625, 18900, 19175 | 5MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| | | 18650 to 19150 | 18650, 18900, 19150 | 10MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| | | 18675 to 19125 | 18675, 18900, 19125 | 15MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| | | 18700 to 19100 | 18700, 18900, 19100 | 20MHz | QPSK,16QAM | 1 RB / 0 RB Offset |
| A | RADIATED EMISSION | 18607 to 19193 | 18900 | 1.4MHz | QPSK | 1 RB / 0 RB Offset |
| | | 18615 to 19185 | 18900 | 3MHz | QPSK | 1 RB / 0 RB Offset |
| | | 18625 to 19175 | 18900 | 5MHz | QPSK | 1 RB / 0 RB Offset |
| | | 18650 to 19150 | 18650, 18900, 19150 | 10MHz | QPSK | 1 RB / 0 RB Offset |
| | | 18675 to 19125 | 18900 | 15MHz | QPSK | 1 RB / 0 RB Offset |
| | | 18700 to 19100 | 18900 | 20MHz | QPSK | 1 RB / 0 RB Offset |

TEST CONDITION:

| TEST ITEM | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|-------------------|--------------------------|---------------------|-----------|
| EIRP | 25deg. C, 57%RH | 3.9Vdc from Battery | Vincent |
| RADIATED EMISSION | 23deg. C, 70%RH | 5Vdc from adapter | Vincent |



2.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

KDB 971168 D01 Power Meas License Digital Systems v03

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.



3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile and portable stations are limited to 2 watts EIRP.

3.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM & GPRS, 5MHz for WCDMA mode and 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step b. Record the power level of S.G
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$

CONDUCTED POWER MEASUREMENT:

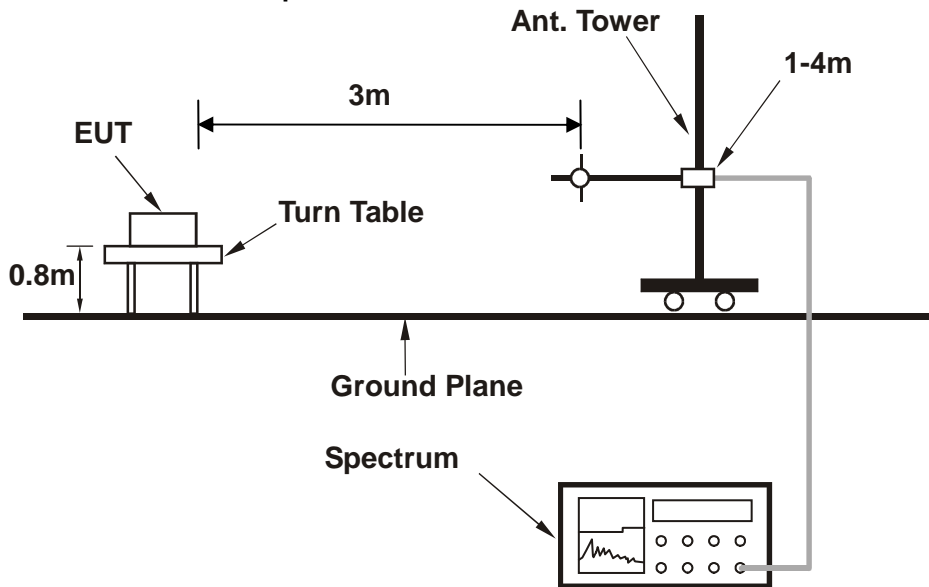
The EUT was set up for the maximum power with GSM, GPRS, EDGE & WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.



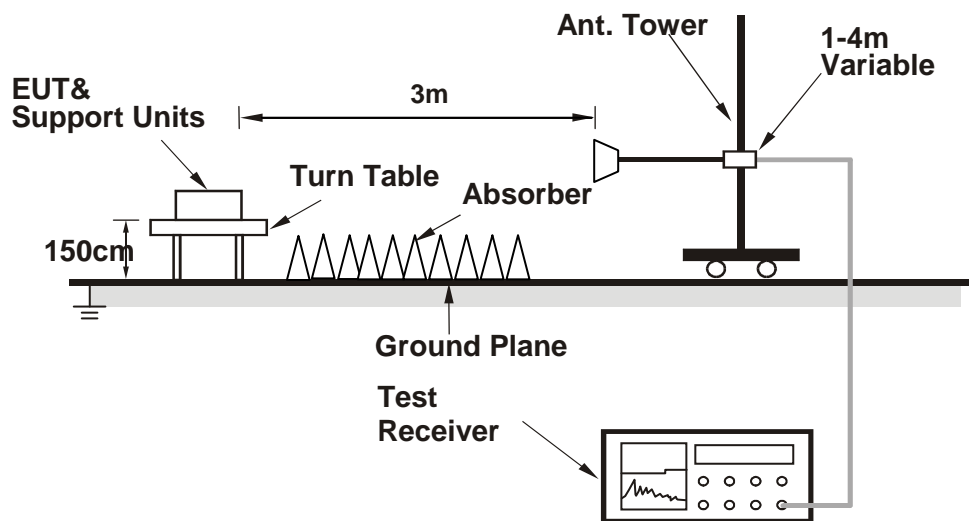
3.1.3 TEST SETUP

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

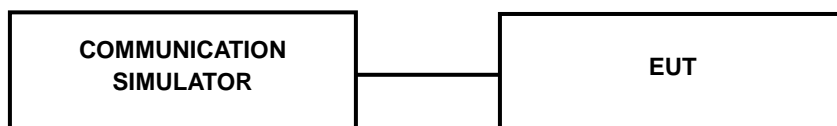


<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:





3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

| Band | GSM1900 | | |
|-----------------|---------|--------|--------|
| Channel | 512 | 661 | 810 |
| Frequency (MHz) | 1850.2 | 1880.0 | 1909.8 |
| GSM | 29.21 | 29.07 | 28.88 |
| GPRS 8 | 29.20 | 29.06 | 28.87 |
| GPRS 10 | 26.42 | 26.28 | 26.09 |
| GPRS 11 | 24.96 | 24.82 | 24.63 |
| GPRS 12 | 23.67 | 23.53 | 23.34 |
| EDGE 8 (MCS9) | 24.46 | 24.32 | 24.13 |
| EDGE 10 (MCS9) | 21.64 | 21.50 | 21.31 |
| EDGE 11 (MCS9) | 20.52 | 20.38 | 20.19 |
| EDGE 12 (MCS9) | 19.28 | 19.14 | 18.95 |

| Band | WCDMA II | | |
|-----------------|----------|--------|--------|
| Channel | 9262 | 9400 | 9538 |
| Frequency (MHz) | 1852.4 | 1880.0 | 1907.6 |
| RMC 12.2K | 23.30 | 23.23 | 23.34 |
| HSPA | | | |
| HSDPA Subtest-1 | 22.33 | 22.26 | 22.37 |
| HSDPA Subtest-2 | 22.21 | 22.14 | 22.25 |
| HSDPA Subtest-3 | 21.72 | 21.65 | 21.76 |
| HSDPA Subtest-4 | 21.64 | 21.57 | 21.68 |
| HSUPA Subtest-1 | 22.26 | 22.19 | 22.30 |
| HSUPA Subtest-2 | 20.27 | 20.20 | 20.31 |
| HSUPA Subtest-3 | 21.26 | 21.19 | 21.30 |
| HSUPA Subtest-4 | 20.32 | 20.25 | 20.36 |
| HSUPA Subtest-5 | 22.23 | 22.16 | 22.27 |



| LTE Band 2 | | | | | | | |
|------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
| BW | Modulation | RB Size | RB Offset | Low CH 18607 | Mid CH 18900 | High CH 19193 | 3GPP MPR (dB) |
| | | | | Frequency 1850.7 MHz | Frequency 1880 MHz | Frequency 1909.3 MHz | |
| 1.4MHz | QPSK | 1 | 0 | 22.10 | 22.08 | 22.04 | 0 |
| | | 1 | 2 | 21.94 | 21.92 | 21.88 | 0 |
| | | 1 | 5 | 21.90 | 21.88 | 21.84 | 0 |
| | | 3 | 0 | 22.09 | 22.07 | 22.03 | 0 |
| | | 3 | 1 | 21.93 | 21.91 | 21.87 | 0 |
| | | 3 | 3 | 21.89 | 21.87 | 21.83 | 0 |
| | | 6 | 0 | 21.00 | 20.98 | 20.94 | 1 |
| | 16QAM | 1 | 0 | 20.88 | 20.86 | 20.82 | 1 |
| | | 1 | 2 | 20.86 | 20.84 | 20.80 | 1 |
| | | 1 | 5 | 20.85 | 20.83 | 20.79 | 1 |
| | | 3 | 0 | 20.86 | 20.84 | 20.80 | 1 |
| | | 3 | 1 | 20.84 | 20.82 | 20.78 | 1 |
| | | 3 | 3 | 20.83 | 20.81 | 20.77 | 1 |
| | | 6 | 0 | 19.95 | 19.93 | 19.89 | 2 |
| BW | Modulation | RB Size | RB Offset | Low CH 18615 | Mid CH 18900 | High CH 19185 | 3GPP MPR (dB) |
| | | | | Frequency 1851.5 MHz | Frequency 1880 MHz | Frequency 1908.5 MHz | |
| 3 MHz | QPSK | 1 | 0 | 22.13 | 22.11 | 22.07 | 0 |
| | | 1 | 7 | 21.97 | 21.95 | 21.91 | 0 |
| | | 1 | 14 | 21.93 | 21.91 | 21.87 | 0 |
| | | 8 | 0 | 21.10 | 21.08 | 21.04 | 1 |
| | | 8 | 3 | 20.96 | 20.94 | 20.90 | 1 |
| | | 8 | 7 | 20.92 | 20.90 | 20.86 | 1 |
| | | 15 | 0 | 21.03 | 21.01 | 20.97 | 1 |
| | 16QAM | 1 | 0 | 20.91 | 20.89 | 20.85 | 1 |
| | | 1 | 7 | 20.89 | 20.87 | 20.83 | 1 |
| | | 1 | 14 | 20.88 | 20.86 | 20.82 | 1 |
| | | 8 | 0 | 20.08 | 20.06 | 20.02 | 2 |
| | | 8 | 3 | 20.04 | 20.02 | 19.98 | 2 |
| | | 8 | 7 | 20.03 | 20.01 | 19.97 | 2 |
| | | 15 | 0 | 19.98 | 19.96 | 19.92 | 2 |



| LTE Band 2 | | | | | | | |
|------------|------------|---------|-----------|----------------------|--------------------|----------------------|---------------|
| BW | Modulation | RB Size | RB Offset | Low CH 18625 | Mid CH 18900 | High CH 19175 | 3GPP MPR (dB) |
| | | | | Frequency 1852.5 MHz | Frequency 1880 MHz | Frequency 1907.5 MHz | |
| 5 MHz | QPSK | 1 | 0 | 22.16 | 22.14 | 22.10 | 0 |
| | | 1 | 12 | 22.00 | 21.98 | 21.94 | 0 |
| | | 1 | 24 | 21.96 | 21.94 | 21.90 | 0 |
| | | 12 | 0 | 21.13 | 21.11 | 21.07 | 1 |
| | | 12 | 6 | 20.99 | 20.97 | 20.93 | 1 |
| | | 12 | 13 | 20.95 | 20.93 | 20.89 | 1 |
| | | 25 | 0 | 21.06 | 21.04 | 21.00 | 1 |
| | 16QAM | 1 | 0 | 20.94 | 20.92 | 20.88 | 1 |
| | | 1 | 12 | 20.92 | 20.90 | 20.86 | 1 |
| | | 1 | 24 | 20.91 | 20.89 | 20.85 | 1 |
| | | 12 | 0 | 20.11 | 20.09 | 20.05 | 2 |
| | | 12 | 6 | 20.07 | 20.05 | 20.01 | 2 |
| | | 12 | 13 | 20.06 | 20.04 | 20.00 | 2 |
| | | 25 | 0 | 20.01 | 19.99 | 19.95 | 2 |
| BW | Modulation | RB Size | RB Offset | Low CH 18650 | Mid CH 18900 | High CH 19150 | 3GPP MPR (dB) |
| | | | | Frequency 1855 MHz | Frequency 1880 MHz | Frequency 1905 MHz | |
| 10 MHz | QPSK | 1 | 0 | 22.18 | 22.16 | 22.12 | 0 |
| | | 1 | 24 | 22.02 | 22.00 | 21.96 | 0 |
| | | 1 | 49 | 21.98 | 21.96 | 21.92 | 0 |
| | | 25 | 0 | 21.15 | 21.13 | 21.09 | 1 |
| | | 25 | 12 | 21.01 | 20.99 | 20.95 | 1 |
| | | 25 | 25 | 20.97 | 20.95 | 20.91 | 1 |
| | | 50 | 0 | 21.08 | 21.06 | 21.02 | 1 |
| | 16QAM | 1 | 0 | 20.96 | 20.94 | 20.90 | 1 |
| | | 1 | 24 | 20.94 | 20.92 | 20.88 | 1 |
| | | 1 | 49 | 20.93 | 20.91 | 20.87 | 1 |
| | | 25 | 0 | 20.13 | 20.11 | 20.07 | 2 |
| | | 25 | 12 | 20.09 | 20.07 | 20.03 | 2 |
| | | 25 | 25 | 20.08 | 20.06 | 20.02 | 2 |
| | | 50 | 0 | 20.03 | 20.01 | 19.97 | 2 |



| LTE Band 2 | | | | | | | |
|------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
| BW | Modulation | RB Size | RB Offset | Low CH 18675 | Mid CH 18900 | High CH 19125 | 3GPP MPR (dB) |
| | | | | Frequency 1857.5 MHz | Frequency 1880 MHz | Frequency 1902.5 MHz | |
| 15 MHz | QPSK | 1 | 0 | 22.21 | 22.19 | 22.15 | 0 |
| | | 1 | 37 | 22.05 | 22.03 | 21.99 | 0 |
| | | 1 | 74 | 22.01 | 21.99 | 21.95 | 0 |
| | | 36 | 0 | 21.18 | 21.16 | 21.12 | 1 |
| | | 36 | 19 | 21.04 | 21.02 | 20.98 | 1 |
| | | 36 | 39 | 21.00 | 20.98 | 20.94 | 1 |
| | | 75 | 0 | 21.11 | 21.09 | 21.05 | 1 |
| | 16QAM | 1 | 0 | 20.99 | 20.97 | 20.93 | 1 |
| | | 1 | 37 | 20.97 | 20.95 | 20.91 | 1 |
| | | 1 | 74 | 20.96 | 20.94 | 20.90 | 1 |
| | | 36 | 0 | 20.16 | 20.14 | 20.10 | 2 |
| | | 36 | 19 | 20.12 | 20.10 | 20.06 | 2 |
| | | 36 | 39 | 20.11 | 20.09 | 20.05 | 2 |
| | | 75 | 0 | 20.06 | 20.04 | 20.00 | 2 |
| BW | Modulation | RB Size | RB Offset | Low CH 18700 | Mid CH 18900 | High CH 19100 | 3GPP MPR (dB) |
| | | | | Frequency 1860 MHz | Frequency 1880 MHz | Frequency 1900 MHz | |
| 20MHz | QPSK | 1 | 0 | 22.26 | 22.24 | 22.20 | 0 |
| | | 1 | 50 | 22.10 | 22.08 | 22.04 | 0 |
| | | 1 | 99 | 22.06 | 22.04 | 22.00 | 0 |
| | | 50 | 0 | 21.23 | 21.21 | 21.17 | 1 |
| | | 50 | 25 | 21.09 | 21.07 | 21.03 | 1 |
| | | 50 | 50 | 21.05 | 21.03 | 20.99 | 1 |
| | | 100 | 0 | 21.16 | 21.14 | 21.10 | 1 |
| | 16QAM | 1 | 0 | 21.04 | 21.02 | 20.98 | 1 |
| | | 1 | 50 | 21.02 | 21.00 | 20.96 | 1 |
| | | 1 | 99 | 21.01 | 20.99 | 20.95 | 1 |
| | | 50 | 0 | 20.21 | 20.19 | 20.15 | 2 |
| | | 50 | 25 | 20.17 | 20.15 | 20.11 | 2 |
| | | 50 | 50 | 20.16 | 20.14 | 20.10 | 2 |
| | | 100 | 0 | 20.11 | 20.09 | 20.05 | 2 |



EIRP POWER (dBm)

GSM

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) |
|---------|-----------------|---------------|-----------------------|-----------|----------------|--------------------|
| 512 | 1850.2 | -13.98 | 43.83 | 29.85 | 966.05 | H |
| 661 | 1880.0 | -12.86 | 43.57 | 30.71 | 1177.61 | H |
| 810 | 1909.8 | -13.77 | 44.57 | 30.80 | 1202.26 | H |
| 512 | 1850.2 | -26.74 | 46.39 | 19.65 | 92.26 | V |
| 661 | 1880.0 | -26.89 | 47.10 | 20.21 | 104.91 | V |
| 810 | 1909.8 | -25.23 | 45.98 | 20.75 | 118.74 | V |

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

EDGE

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|
| 512 | 1850.2 | -16.72 | 43.83 | 27.11 | 514.04 | H |
| 661 | 1880.0 | -16.54 | 43.57 | 27.03 | 504.66 | H |
| 810 | 1909.8 | -17.88 | 44.57 | 26.69 | 466.66 | H |
| 512 | 1850.2 | -28.45 | 46.39 | 17.94 | 62.20 | V |
| 661 | 1880.0 | -27.93 | 47.10 | 19.17 | 82.53 | V |
| 810 | 1909.8 | -27.65 | 45.98 | 18.32 | 67.97 | V |

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

WCDMA

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|
| 9262 | 1852.4 | -18.63 | 43.83 | 25.20 | 331.13 | H |
| 9400 | 1880.0 | -17.67 | 43.57 | 25.90 | 389.05 | H |
| 9538 | 1907.6 | -18.70 | 44.57 | 25.87 | 386.37 | H |
| 9262 | 1852.4 | -26.75 | 46.39 | 19.64 | 91.98 | V |
| 9400 | 1880.0 | -26.63 | 47.10 | 20.47 | 111.33 | V |
| 9538 | 1907.6 | -27.53 | 45.98 | 18.44 | 69.89 | V |

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss



LTE BAND 2

CHANNEL BANDWIDTH: 3MHz QPSK

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | LIMIT (W) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|-----------|
| 18615 | 1851.5 | -20.12 | 43.82 | 23.70 | 234.53 | H | 2 |
| 18900 | 1880.0 | -20.03 | 43.57 | 23.54 | 225.94 | H | 2 |
| 19185 | 1908.5 | -19.90 | 44.38 | 24.48 | 280.29 | H | 2 |
| 18615 | 1851.5 | -26.61 | 46.45 | 19.84 | 96.41 | V | 2 |
| 18900 | 1880.0 | -27.48 | 47.07 | 19.59 | 90.99 | V | 2 |
| 19185 | 1908.5 | -25.80 | 45.88 | 20.08 | 101.86 | V | 2 |

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).

2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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 emission limit equal to -13dBm .

3.2.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

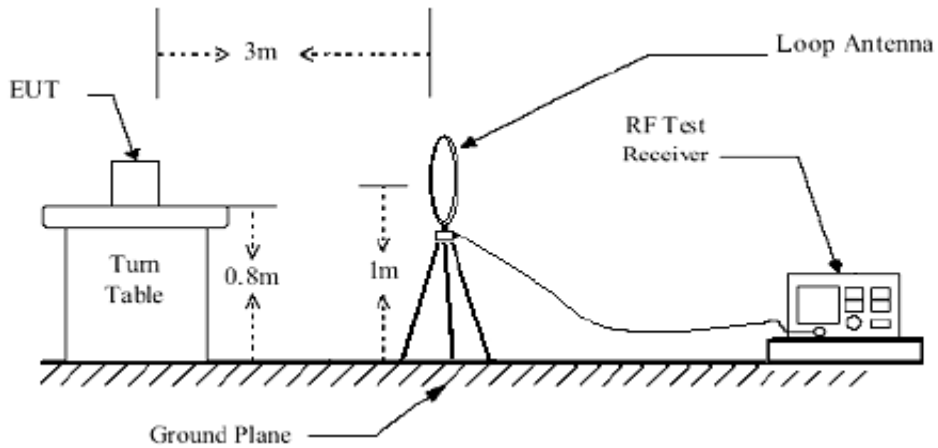
3.2.3 DEVIATION FROM TEST STANDARD

No deviation

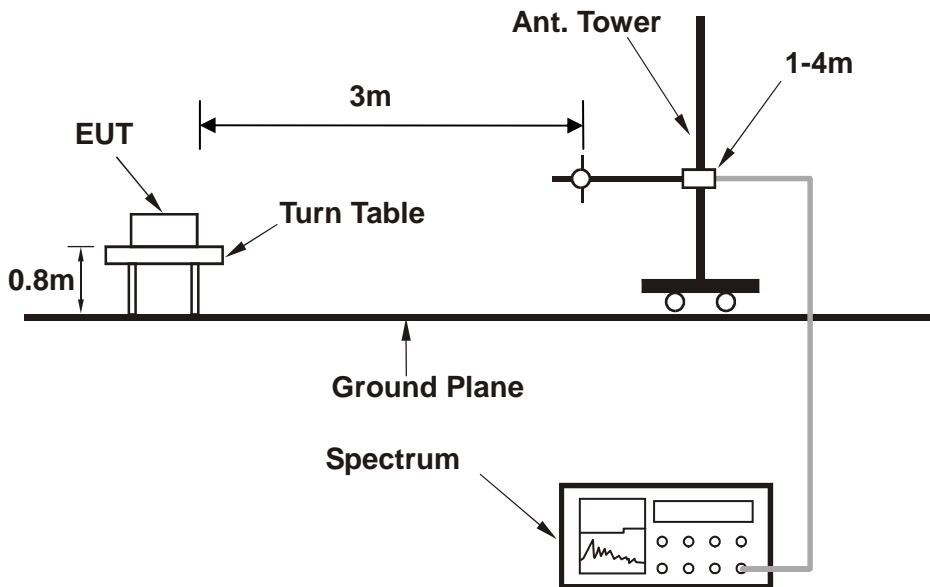


3.2.4 TEST SETUP

<Below 30MHz>

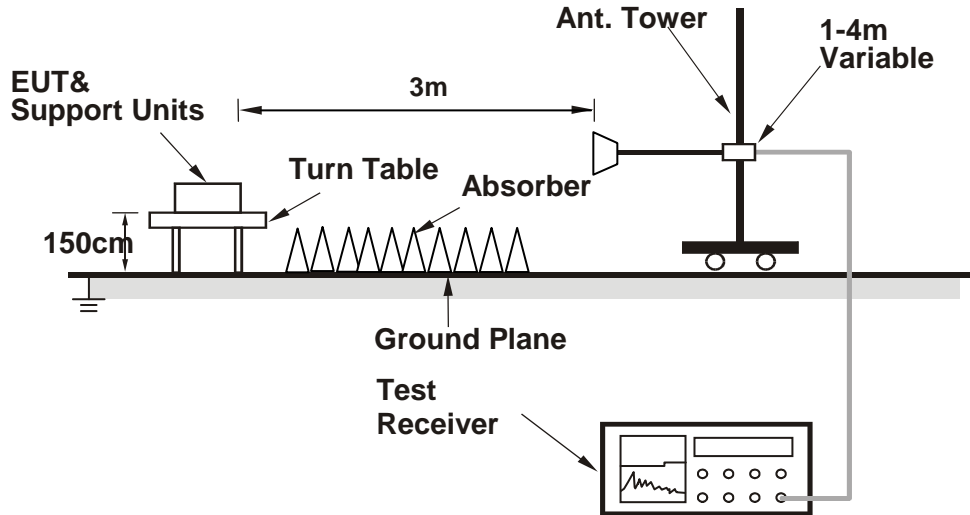


< Frequency Range 30MHz~1GHz >





< Frequency Range above 1GHz >



For the actual test configuration, please refer to the attached file (Test Setup Photo).



3.2.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

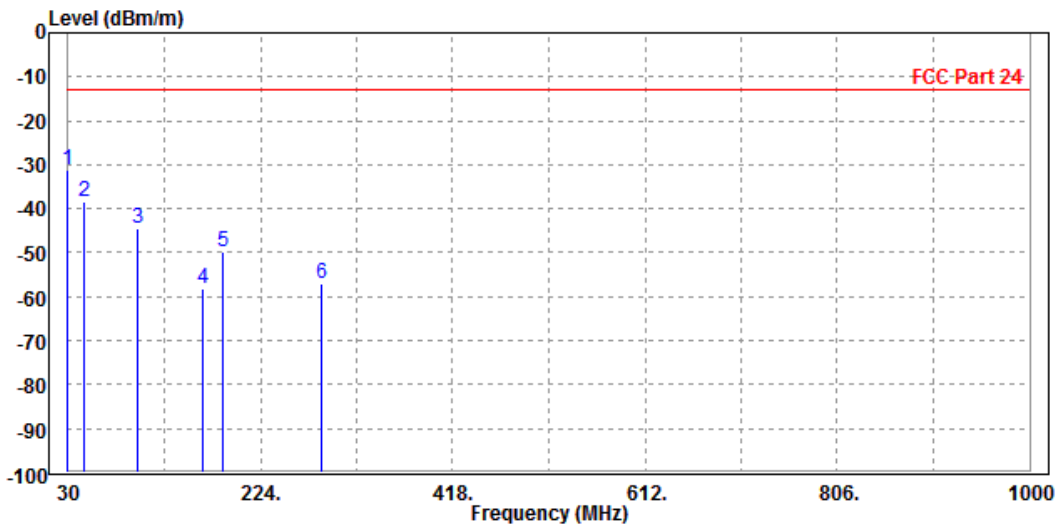
9 KHz – 30 MHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1GHz data:

PCS 1900:

| | | | |
|--|-----------------|------------------------|--------------------|
| MODE | TX channel 661 | FREQUENCY RANGE | Below 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

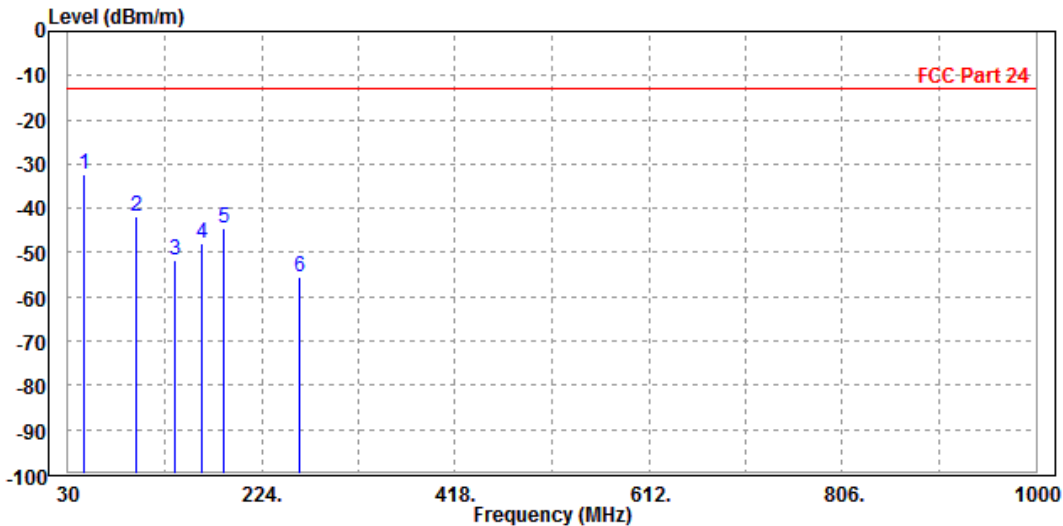
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase | |
|---|------|---------|------------|------------|------------|--------|--------|-----------|------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | | |
| 1 | PP | 30.000 | -31.33 | -50.67 | -13.00 | -18.33 | 19.34 | Peak | Horizontal |
| 2 | | 46.490 | -38.27 | -44.61 | -13.00 | -25.27 | 6.34 | Peak | Horizontal |
| 3 | | 100.810 | -44.57 | -33.25 | -13.00 | -31.57 | -11.32 | Peak | Horizontal |
| 4 | | 165.800 | -58.15 | -39.89 | -13.00 | -45.15 | -18.26 | Peak | Horizontal |
| 5 | | 186.170 | -49.90 | -32.30 | -13.00 | -36.90 | -17.60 | Peak | Horizontal |
| 6 | | 285.110 | -57.11 | -42.57 | -13.00 | -44.11 | -14.54 | Peak | Horizontal |





| | | | |
|--|-----------------|------------------------|--------------------|
| MODE | TX channel 661 | FREQUENCY RANGE | Below 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|------|---------|------------|------------|------------|--------|-------------|-----------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | PP | 46.490 | -32.21 | -28.57 | -13.00 | -19.21 | -3.64 Peak | Vertical |
| 2 | | 97.900 | -41.89 | -31.25 | -13.00 | -28.89 | -10.64 Peak | Vertical |
| 3 | | 137.670 | -51.77 | -36.95 | -13.00 | -38.77 | -14.82 Peak | Vertical |
| 4 | | 164.830 | -47.77 | -33.01 | -13.00 | -34.77 | -14.76 Peak | Vertical |
| 5 | | 186.170 | -44.57 | -32.18 | -13.00 | -31.57 | -12.39 Peak | Vertical |
| 6 | | 261.830 | -55.56 | -44.09 | -13.00 | -42.56 | -11.47 Peak | Vertical |





ABOVE 1GHz DATA

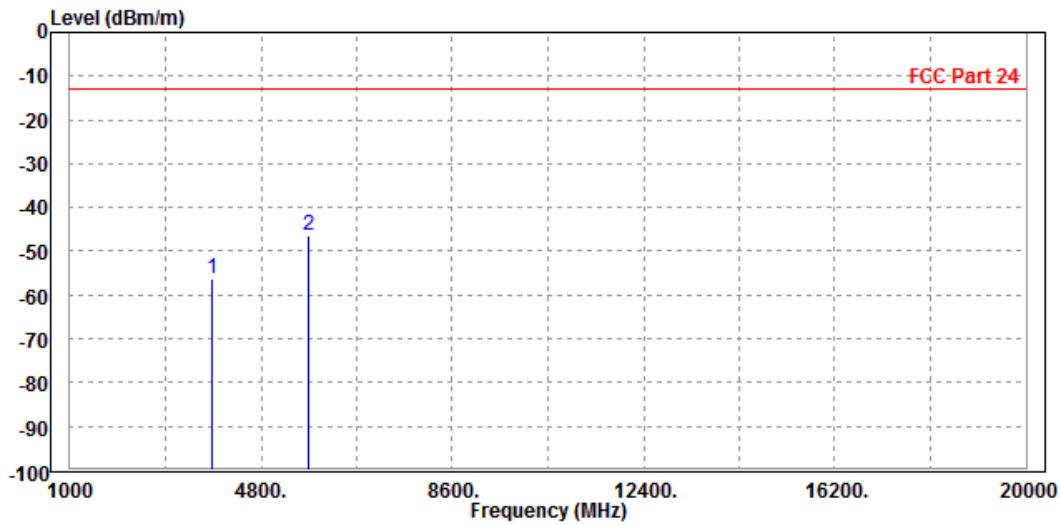
Note: For higher frequency, the emission is too low to be detected.

PCS 1900:

CH 512

| | | | |
|--|-----------------|------------------------|--------------------|
| MODE | TX channel 512 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

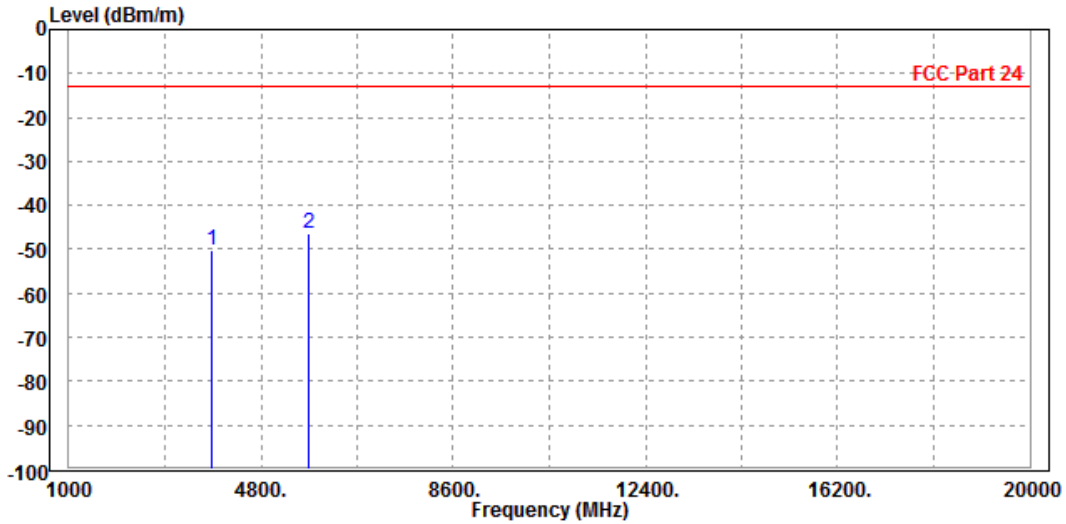
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3819.000 | -56.17 | -59.87 | -13.00 | -43.17 | 3.70 | Peak | Horizontal |
| 2 PP | 5729.000 | -46.22 | -55.44 | -13.00 | -33.22 | 9.22 | Peak | Horizontal |





| | | | |
|--|-----------------|-----------------|--------------------|
| MODE | TX channel 512 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3812.000 | -50.20 | -54.34 | -13.00 | -37.20 | 4.14 | Peak | Vertical |
| 2 PP | 5729.000 | -46.27 | -54.71 | -13.00 | -33.27 | 8.44 | Peak | Vertical |





BUREAU VERITAS

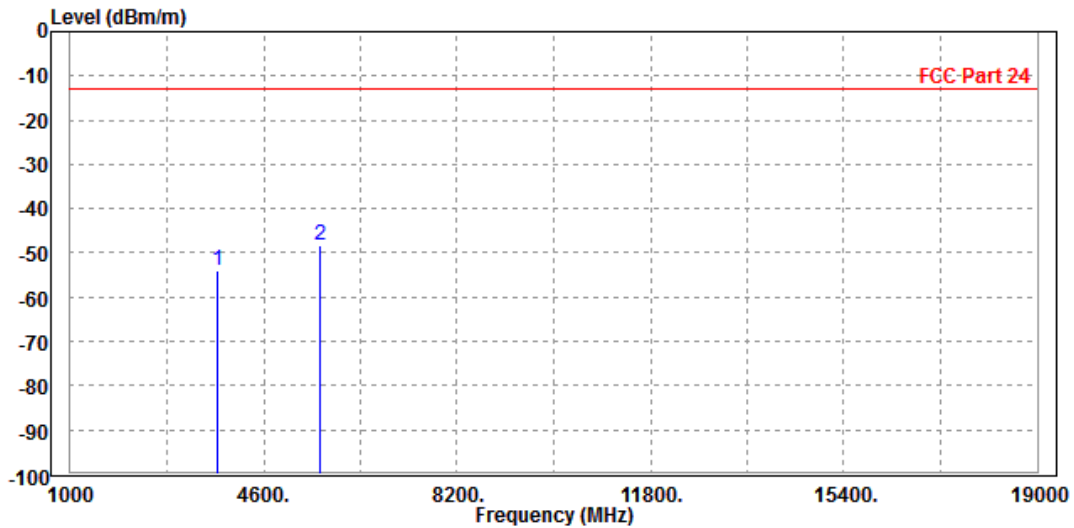
Test Report No.: RF180604W006-4

EDGE 1900:

CH 661

| | | | |
|--|-----------------|-----------------|--------------------|
| MODE | TX channel 661 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

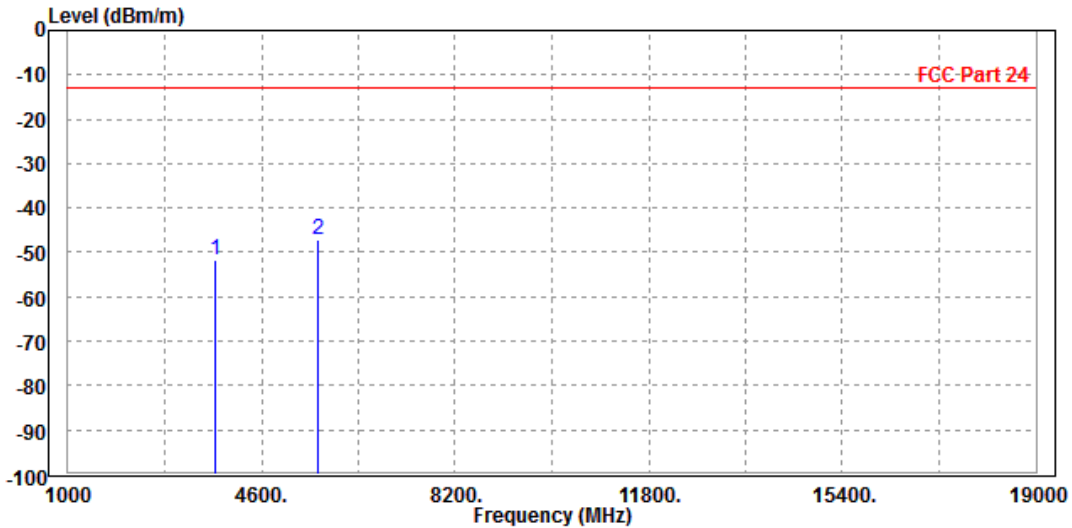
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3754.000 | -54.13 | -57.51 | -13.00 | -41.13 | 3.38 | Peak | Horizontal |
| 2 | PP 5640.000 | -48.20 | -57.32 | -13.00 | -35.20 | 9.12 | Peak | Horizontal |





| | | | |
|--|-----------------|-----------------|--------------------|
| MODE | TX channel 661 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|--------|------------|--------|--------|-----------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3754.000 | -51.70 | -55.55 | -13.00 | -38.70 | 3.85 | Peak | Vertical |
| 2 PP | 5640.000 | -47.10 | -55.36 | -13.00 | -34.10 | 8.26 | Peak | Vertical |



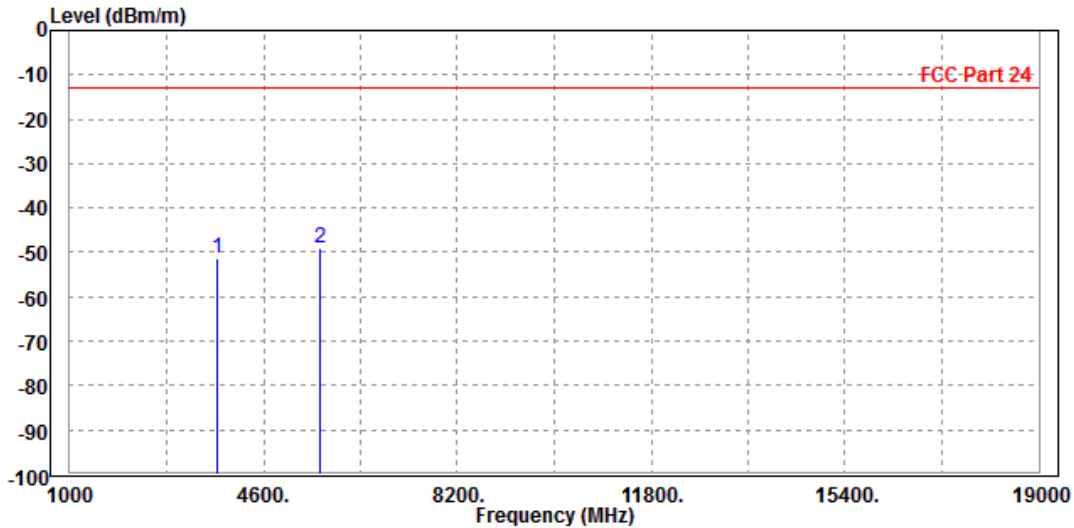


WCDMA Band II

CH 9400

| | | | |
|--|-----------------|-----------------|--------------------|
| MODE | TX channel 9400 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

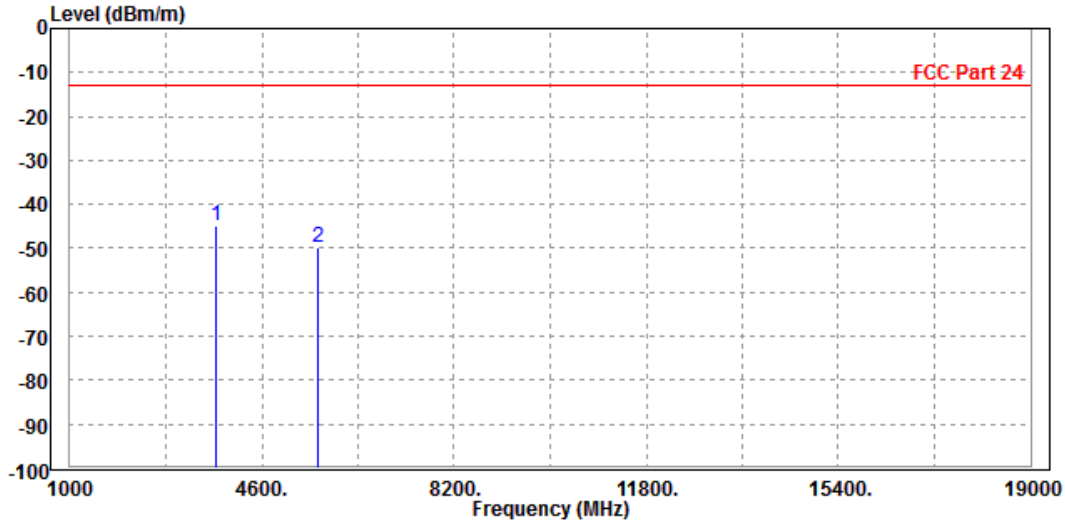
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3754.000 | -51.35 | -54.73 | -13.00 | -38.35 | 3.38 | Peak | Horizontal |
| 2 PP | 5640.000 | -49.10 | -58.22 | -13.00 | -36.10 | 9.12 | Peak | Horizontal |





| | | | |
|--|-----------------|-----------------|--------------------|
| MODE | TX channel 9400 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | | Read Level | Limit Level | Over Limit | | Factor | Remark | Pol/Phase |
|---|-------------|------------|-------------|------------|--------|--------|--------|-----------|
| | Freq MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | PP 3754.000 | -45.03 | -48.88 | -13.00 | -32.03 | 3.85 | Peak | Vertical |
| 2 | 5640.000 | -49.67 | -57.93 | -13.00 | -36.67 | 8.26 | Peak | Vertical |





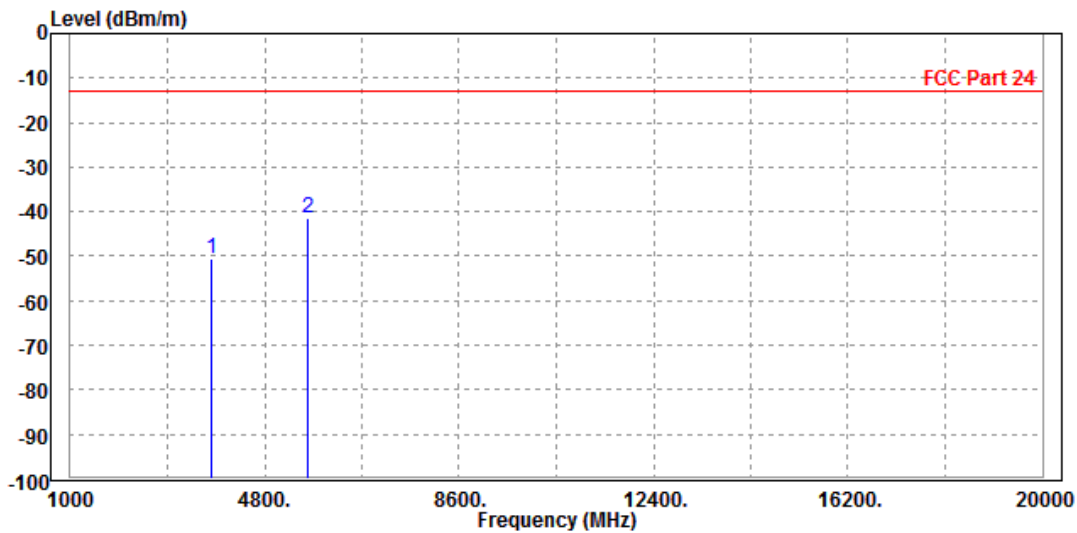
LTE Band 2

CHANNEL BANDWIDTH: 10MHz / QPSK

CH 18900

| | | | |
|--|------------------|------------------------|--------------------|
| MODE | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | |

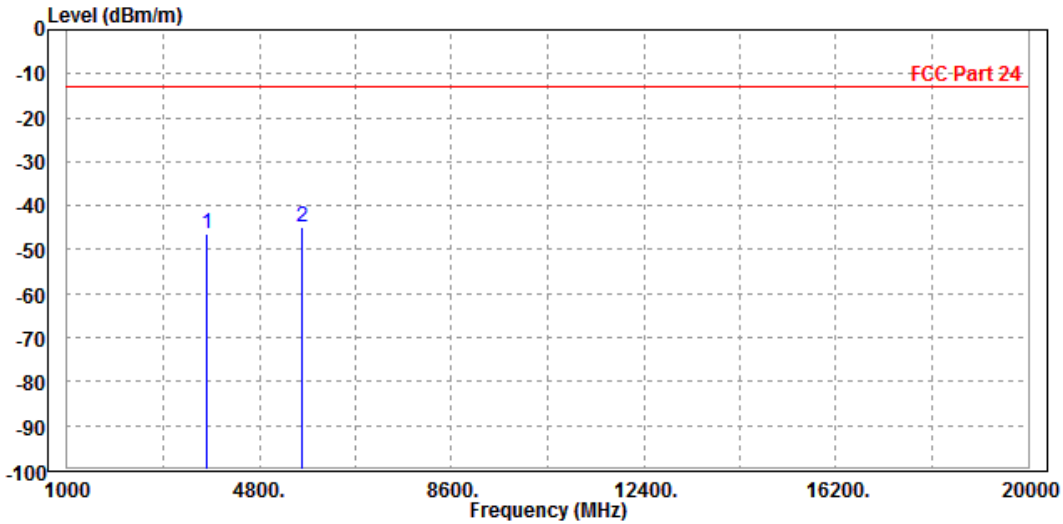
| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3755.000 | -50.70 | -54.09 | -13.00 | -37.70 | 3.39 | Peak | Horizontal |
| 2 PP | 5640.000 | -41.46 | -50.58 | -13.00 | -28.46 | 9.12 | Peak | Horizontal |





| | | | |
|---|------------------|-----------------|--------------------|
| MODE | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 70%RH | INPUT POWER | DC 5V from adapter |
| TESTED BY | Vincent | | |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | |

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 3755.000 | -46.45 | -50.30 | -13.00 | -33.45 | 3.85 | Peak | Vertical |
| 2 | PP 5640.000 | -44.77 | -53.03 | -13.00 | -31.77 | 8.26 | Peak | Vertical |





BUREAU Test Report No.: RF180604W006-4
VERITAS

4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Shenzhen EMC/RF Lab:

Tel: +86-755-88696566

Fax: +86-755-88696577

Email: customerservice.dg@cn.bureauveritas.com

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.



BUREAU Test Report No.: RF180604W006-4
VERITAS

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---