

# FCC TEST REPORT (PART 27)


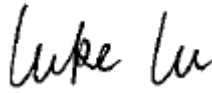
|            |   |
|------------|---|
| Applicant: | HMD Global Oy                               |
| Address:   | Bertel Jungin aukio 9, 02600 Espoo, Finland |

|                           |   |
|---------------------------|---|
| Manufacturer or Supplier: | HMD Global Oy                               |
| Address:                  | Bertel Jungin aukio 9, 02600 Espoo, Finland |
| Product:                  | GSM/WCDMA/LTE Mobile Phone                  |
| Brand Name:               | Nokia                                       |
| Model Name:               | TA-1280                                     |
| FCC ID:                   | 2AJOTTA-1280                                |
| Date of tests:            | Jul. 3, 2020 ~ Jul. 27, 2020                |

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

- FCC Part 27, Subpart C, M       ANSI/TIA/EIA-603-D  
 FCC Part 2                               ANSI/TIA/EIA-603-E     ANSI C63.26-2015

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

|  |  |
|--|--|
| Prepared by Alex Chen<br>Engineer / Mobile Department  | Approved by Luke Lu<br>Manager / Mobile Department   |
| <br>Date: Jul. 29, 2020 | <br>Date: Jul. 29, 2020 |

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Test Report No.: RF200701W006-6

## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE  | DATE ISSUED   |
|----------------|--|---------------|
| RF200629W001-6 | Original release   | Jul. 22, 2020 |
| RF200701W006-6 | Based on the original report RF200629W001-6 remove back camera and 2pcs keymat LED, change Keypad materials and FCC ID, HW version and model name. In this report verify power and RSE worst case. | Jul. 29, 2020 |

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 27 & Part 2 |                              |            |                                |
|--|------------------------------|------------|--------------------------------|
| STANDARD SECTION                       | TEST TYPE AND LIMIT          | RESULT     | REMARK                         |
| 2.1046<br>27.50(d)(4)                  | Maximum Peak Output Power    | Compliance | Meet the requirement of limit. |
| 2.1055<br>27.54                        | Frequency Stability          | N.A        | See note                       |
| 2.1049<br>27.53(h)                     | Occupied Bandwidth           | N.A        | See note                       |
| 27.50(d)(5)                            | Peak to average ratio        | N.A        | See note                       |
| 27.53(h)                               | Band Edge Measurements       | N.A        | See note                       |
| 2.1051<br>27.53(h)                     | Conducted Spurious Emissions | N.A        | See note                       |
| 2.1053<br>27.53(h)                     | Radiated Spurious Emissions  | Compliance | Meet the requirement of limit. |

\* Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

Note:

Per the change notice provide by manufactory, the difference is remove back camera and 2pcs keymat LED, change Keypad materials and FCC ID, HW version and model name., all the change no effect any RF parameter, Therefore only verify the radiated emission worse case, power and show the verify test data on this report.

Other test data re-use from test report RF200629W001-6, more details please refer test report RF200629W001-6 (FCC ID: 2AJOTTA-1282)

## 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  | UNCERTAINTY           |
|--|-----------------------|
| Frequency Stability                                | $\pm 76.97\text{Hz}$  |
| Radiated emissions & Radiated Power (30MHz~1GMHz)  | $\pm 4.98\text{dB}$   |
| Radiated emissions & Radiated Power (1GMHz ~6GMHz) | $\pm 4.70\text{dB}$   |
| Radiated emissions (6GMHz ~18GMHz)                 | $\pm 4.60\text{dB}$   |
| Radiated emissions (18GMHz ~40GMHz)                | $\pm 4.12\text{dB}$   |
| Conducted emissions                                | $\pm 4.01\text{dB}$   |
| Occupied Channel Bandwidth                         | $\pm 43.58\text{KHz}$ |
| Conducted Output power                             | $\pm 2.06\text{dB}$   |
| Band Edge Measurements                             | $\pm 4.70\text{dB}$   |

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                      | Apr. 27,20  | Apr. 26,21  |
| EXA Signal Analyzer                         | KEYSIGHT     | N9010A-526                          | MY54510322                      | Feb. 26,20  | Feb. 25,21  |
| Bilog Antenna                               | ETS-LINDGREN | 3143B                               | 00161965                        | Mar. 27,20  | Mar. 26,21  |
| Horn Antenna<br>(1GHz-18GHz)                | ETS-LINDGREN | 3117                                | 00168692                        | Mar. 27,20  | Mar. 26,21  |
| Horn Antenna<br>(18GHz-40GHz)               | N/A          | QWH-SL-18-40<br>-K-SG/QMS-00<br>361 | 15433                           | Nov. 24, 19 | Nov. 23, 20 |
| Radio<br>Communication<br>Analyzer          | ANRITSU      | MT8820C                             | 6201465426                      | Feb. 27,20  | Feb. 26,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 9135                            | 980249                          | Jun. 02,20  | Jun. 01,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 012645B                         | 980257                          | Jun. 02,20  | Jun. 01,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 184045B                         | 980259                          | Apr. 30,20  | Apr. 29,21  |
| 3m Semi-anechoic<br>Chamber                 | ETS-LINDGREN | 9m*6m*6m                            | Euroshieldpn-<br>CT0001143-1216 | May. 19,20  | May. 18,23  |
| Test Software                               | E3           | V 9.160323                          | N/A                             | N/A         | N/A         |
| Test Software                               | ADT          | ADT_Radiated<br>_V7.6.15.9.2        | N/A                             | N/A         | N/A         |
| 10dB Attenuator                             | JFW/USA      | 50HF-010-SM<br>A                    | 1505                            | Jun. 03,20  | Jun. 02,21  |
| Power Meter                                 | Anritsu      | ML2495A                             | 1506002                         | Feb. 26,20  | Feb. 25,21  |
| Power Sensor                                | Anritsu      | MA2411B                             | 1339352                         | Feb. 26,20  | Feb. 25,21  |
| Humid & Temp<br>Programmable Tester         | Juyi         | ITH-120-45-CP<br>-AR                | IAA1504-001                     | Jun. 02,20  | Jun. 01,21  |
| MXG Analog<br>Microvave<br>Signal Generator | KEYSIGHT     | N5183A                              | MY50143024                      | Mar. 11,20  | Mar. 10,21  |
| Power Divider                               | MCLI/USA     | PS2-15                              | 24880                           | N/A         | N/A         |

- NOTE:**
1. The calibration interval of the above test instruments is 12 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; The Designation No. is CN1171.

## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                              |   |                                 |
|------------------------------|---|---------------------------------|
| <b>PRODUCT</b>               | GSM/WCDMA/LTE Mobile Phone  |                                 |
| <b>BRAND NAME</b>            | Nokia   |                                 |
| <b>MODEL NAME</b>            | TA-1280   |                                 |
| <b>POWER SUPPLY</b>          | 5.0Vdc (adapter or host equipment)<br>3.7Vdc (Li-ion, battery)                              |                                 |
| <b>MODULATION TECHNOLOGY</b> | LTE   | QPSK, 16QAM                     |
| <b>FREQUENCY RANGE</b>       | LTE Band 7<br>Channel Bandwidth: 5MHz   | 2502.5MHz ~ 2567.5MHz           |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz  | 2505MHz ~ 2565MHz               |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz  | 2507.5MHz ~ 2562.5MHz           |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz  | 2510MHz ~ 2560MHz               |
| <b>EMISSION DESIGNATOR</b>   | LTE Band 7<br>Channel Bandwidth: 5MHz   | QPSK: 4M49G7D<br>16QAM: 4M48W7D |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz  | QPSK: 8M96G7D<br>16QAM: 8M96W7D |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz  | QPSK: 13M5G7D<br>16QAM: 13M4W7D |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz  | QPSK: 17M9G7D<br>16QAM: 17M9W7D |
| <b>MAX. EIRP POWER</b>       | LTE Band 7<br>Channel Bandwidth: 5MHz   | 85mW                            |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz  | 86mW                            |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz  | 87mW                            |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz  | 87mW                            |
| <b>ANTENNA TYPE</b>          | Fixed Internal Antenna with -2.71dBi gain   |                                 |
| <b>HW VERSION</b>            | 0144  |                                 |
| <b>SW VERSION</b>            | 0.2025.11.05  |                                 |
| <b>I/O PORTS</b>             | Refer to user's manual  |                                 |
| <b>CABLE SUPPLIED</b>        | USB cable: non-shielded, detachable, 1meter<br>Earphone: non-shielded, detachable, 1.5meter |                                 |



**BUREAU  
VERITAS**

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**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

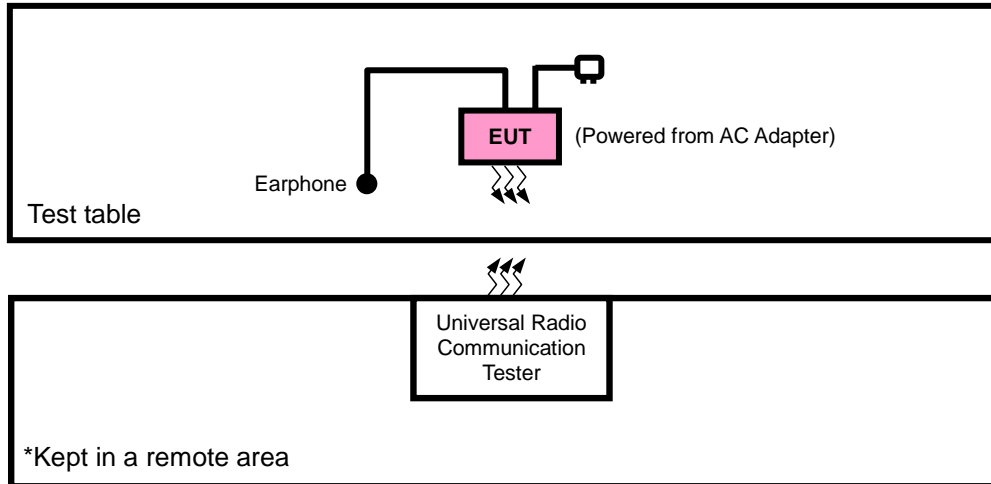
**List of Accessory:**

| <b>ACCESSORIES</b> | <b>BRAND</b> | <b>MODEL</b> | <b>MANUFACTURER</b> | <b>SPECIFICATION</b>                            |
|--------------------|--------------|--------------|---------------------|---|
| Battery 1          | Nokia        | BL-4WL       | TM                  | Power Rating:3.7 Vdc, 1150 mAh                  |
| AC Adapter 1       | Nokia        | AC-18U       | DVE                 | I/P: 100 - 240 Vac, 100mA,<br>O/P: 5Vdc, 550 mA |
| AC Adapter 2       | Nokia        | AC-18U       | Aohai               | I/P: 100 - 240 Vac, 100mA,<br>O/P: 5Vdc, 550 mA |
| Earphone 1         | Nokia        | WH-108       | RTF                 | 1.5m non-shielded cable w/ core                 |
| USB Cable 1        | Nokia        | CA-190CD     | RTF                 | 1m non-shielded cable w/ core                   |



## 2.2 CONFIGURATION OF SYSTEM UNDER TEST

### FOR RADIATION EMISSION 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    |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1   | DC Line: Unshielded, Detachable 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 was found when positioned on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | DESCRIPTION                             |
|--------------------|---|
| A                  | EUT + Adapter + USB Cable with LTE link |
| B                  | EUT + Battery with LTE link             |

### LTE BAND 7 MODE

| EUT CONFIGURE MODE | TEST ITEM         | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION  | MODE               |
|--------------------|-------------------|-------------------|---------------------|-------------------|-------------|--------------------|
| A                  | RADIATED EMISSION | 20825 to 21375    | 21100               | 15MHz             | QPSK        | 1 RB / 0 RB Offset |
| B                  | EIRP              | 20775 to 21425    | 20775, 21100, 21425 | 5MHz              | QPSK, 16QAM | 1 RB / 0 RB Offset |
|                    |                   | 20800 to 21400    | 20800, 21100, 21400 | 10MHz             | QPSK, 16QAM | 1 RB / 0RB Offset  |
|                    |                   | 20825 to 21375    | 20825, 21100, 21375 | 15MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset |
|                    |                   | 20850 to 21350    | 20850, 21100, 21350 | 20MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.



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**TEST CONDITION:**

| TEST ITEM         | ENVIRONMENTAL CONDITIONS | INPUT POWER      | TESTED BY |
|-------------------|--------------------------|------------------|-----------|
| RADIATED EMISSION | 23deg. C, 70%RH          | DC 5V By Adapter | Star Le   |
| EIRP              | 23deg. C, 70%RH          | DC 5V By Adapter | Star Le   |



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## 2.5 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 27**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**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

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

#### 3.1.2 TEST PROCEDURES

##### EIRP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{c}}$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as  $P_{\text{Meas}}$ , typically dBW or dBm);

$P_{\text{Meas}}$  = measured transmitter output power or PSD, in dBm or dBW;

$G_{\text{T}}$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

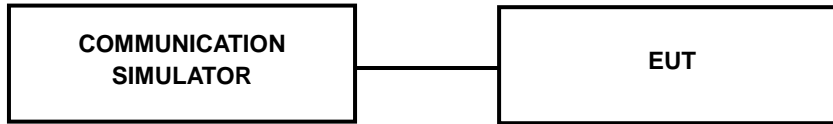
$L_{\text{c}}$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

##### CONDUCTED POWER MEASUREMENT:

- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

### 3.1.3 TEST SETUP

#### CONDUCTED POWER MEASUREMENT:



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

### 3.1.4 TEST RESULTS

#### AVERAGE CONDUCTED OUTPUT POWER (dBm)

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20775         | Mid CH<br>21100       | High CH<br>21425        | MPR |
|---------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|-----|
|         |            |         |           | Frequency<br>2502.5 MHz | Frequency 2535<br>MHz | Frequency<br>2567.5 MHz |     |
| 7/5     | QPSK       | 1       | 0         | 21.55                   | 21.73                 | 21.60                   | 0   |
|         |            | 1       | 12        | 21.73                   | 21.87                 | 21.78                   | 0   |
|         |            | 1       | 24        | 21.84                   | 22.01                 | 21.93                   | 0   |
|         |            | 12      | 0         | 20.70                   | 20.89                 | 20.74                   | 1   |
|         |            | 12      | 6         | 20.79                   | 21.06                 | 20.87                   | 1   |
|         |            | 12      | 13        | 20.88                   | 21.07                 | 20.96                   | 1   |
|         |            | 25      | 0         | 20.67                   | 20.91                 | 20.73                   | 1   |
|         | 16QAM      | 1       | 0         | 20.93                   | 21.15                 | 21.03                   | 1   |
|         |            | 1       | 12        | 20.97                   | 21.23                 | 21.05                   | 1   |
|         |            | 1       | 24        | 21.08                   | 21.22                 | 21.13                   | 1   |
|         |            | 12      | 0         | 19.81                   | 20.03                 | 19.86                   | 2   |
|         |            | 12      | 6         | 19.86                   | 20.10                 | 19.91                   | 2   |
|         |            | 12      | 13        | 19.91                   | 20.13                 | 20.01                   | 2   |
|         |            | 25      | 0         | 19.91                   | 20.10                 | 19.97                   | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20800       | Mid CH<br>21100       | High CH<br>21400      | MPR |
|---------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|-----|
|         |            |         |           | Frequency 2505<br>MHz | Frequency 2535<br>MHz | Frequency 2565<br>MHz |     |
| 7/10    | QPSK       | 1       | 0         | 21.52                 | 21.76                 | 21.60                 | 0   |
|         |            | 1       | 24        | 21.73                 | 21.87                 | 21.79                 | 0   |
|         |            | 1       | 49        | 21.81                 | 22.05                 | 21.89                 | 0   |
|         |            | 25      | 0         | 20.71                 | 20.88                 | 20.77                 | 1   |
|         |            | 25      | 12        | 20.85                 | 21.00                 | 20.87                 | 1   |
|         |            | 25      | 25        | 20.86                 | 21.04                 | 20.95                 | 1   |
|         |            | 50      | 0         | 20.72                 | 20.91                 | 20.70                 | 1   |
|         | 16QAM      | 1       | 0         | 20.93                 | 21.12                 | 20.99                 | 1   |
|         |            | 1       | 24        | 21.02                 | 21.19                 | 21.08                 | 1   |
|         |            | 1       | 49        | 21.08                 | 21.23                 | 21.10                 | 1   |
|         |            | 25      | 0         | 19.83                 | 20.01                 | 19.92                 | 2   |
|         |            | 25      | 12        | 19.90                 | 20.04                 | 19.96                 | 2   |
|         |            | 25      | 25        | 19.90                 | 20.14                 | 19.98                 | 2   |
|         |            | 50      | 0         | 19.95                 | 20.09                 | 20.01                 | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20825         | Mid CH<br>21100       | High CH<br>21375        | MPR |
|---------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|-----|
|         |            |         |           | Frequency<br>2507.5 MHz | Frequency 2535<br>MHz | Frequency<br>2562.5 MHz |     |
| 7/ 15   | QPSK       | 1       | 0         | 21.59                   | 21.76                 | 21.57                   | 0   |
|         |            | 1       | 37        | 21.71                   | 21.92                 | 21.74                   | 0   |
|         |            | 1       | 74        | 21.87                   | 22.08                 | 21.90                   | 0   |
|         |            | 36      | 0         | 20.68                   | 20.89                 | 20.78                   | 1   |
|         |            | 36      | 19        | 20.86                   | 21.05                 | 20.87                   | 1   |
|         |            | 36      | 39        | 20.84                   | 21.05                 | 20.95                   | 1   |
|         |            | 75      | 0         | 20.72                   | 20.89                 | 20.75                   | 1   |
|         | 16QAM      | 1       | 0         | 20.97                   | 21.19                 | 20.99                   | 1   |
|         |            | 1       | 37        | 21.01                   | 21.20                 | 21.08                   | 1   |
|         |            | 1       | 74        | 21.04                   | 21.28                 | 21.12                   | 1   |
|         |            | 36      | 0         | 19.87                   | 20.01                 | 19.93                   | 2   |
|         |            | 36      | 19        | 19.84                   | 20.08                 | 19.92                   | 2   |
|         |            | 36      | 39        | 19.95                   | 20.12                 | 20.01                   | 2   |
|         |            | 75      | 0         | 19.96                   | 20.12                 | 19.94                   | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20850       | Mid CH<br>21100       | High CH<br>21350      | MPR |
|---------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|-----|
|         |            |         |           | Frequency 2510<br>MHz | Frequency 2535<br>MHz | Frequency 2560<br>MHz |     |
| 7/ 20   | QPSK       | 1       | 0         | 21.60                 | 21.80                 | 21.65                 | 0   |
|         |            | 1       | 50        | 21.75                 | 21.95                 | 21.80                 | 0   |
|         |            | 1       | 99        | 21.89                 | 22.09                 | 21.94                 | 0   |
|         |            | 50      | 0         | 20.74                 | 20.94                 | 20.79                 | 1   |
|         |            | 50      | 25        | 20.87                 | 21.07                 | 20.92                 | 1   |
|         |            | 50      | 50        | 20.92                 | 21.12                 | 20.97                 | 1   |
|         |            | 100     | 0         | 20.73                 | 20.93                 | 20.78                 | 1   |
|         | 16QAM      | 1       | 0         | 21.00                 | 21.20                 | 21.05                 | 1   |
|         |            | 1       | 50        | 21.05                 | 21.25                 | 21.10                 | 1   |
|         |            | 1       | 99        | 21.10                 | 21.30                 | 21.15                 | 1   |
|         |            | 50      | 0         | 19.89                 | 20.09                 | 19.94                 | 2   |
|         |            | 50      | 25        | 19.92                 | 20.12                 | 19.97                 | 2   |
|         |            | 50      | 50        | 19.98                 | 20.18                 | 20.03                 | 2   |
|         |            | 100     | 0         | 19.97                 | 20.17                 | 20.02                 | 2   |



**EIRP**

**LTE BAND 7**

**CHANNEL BANDWIDTH: 5MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 20775   | 2502.5          | 21.84                 | -2.71                               | 19.13      | 81.85     | 2         |
| 21100   | 2535.0          | 22.01                 | -2.71                               | 19.30      | 85.11     | 2         |
| 21425   | 2567.5          | 21.93                 | -2.71                               | 19.22      | 83.56     | 2         |

**CHANNEL BANDWIDTH: 5MHz 16QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 20775   | 2502.5          | 21.08                 | -2.71                               | 18.37      | 68.71     | 2         |
| 21100   | 2535.0          | 21.23                 | -2.71                               | 18.52      | 71.12     | 2         |
| 21425   | 2567.5          | 21.13                 | -2.71                               | 18.42      | 69.50     | 2         |

**CHANNEL BANDWIDTH: 10MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 20800   | 2505.0          | 21.81                 | -2.71                               | 19.10      | 81.28     | 2         |
| 21100   | 2535.0          | 22.05                 | -2.71                               | 19.34      | 85.90     | 2         |
| 21400   | 2565.0          | 21.89                 | -2.71                               | 19.18      | 82.79     | 2         |

**CHANNEL BANDWIDTH: 10MHz 16QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 20800   | 2505.0          | 21.08                 | -2.71                               | 18.37      | 68.71     | 2         |
| 21100   | 2535.0          | 21.23                 | -2.71                               | 18.52      | 71.12     | 2         |
| 21400   | 2565.0          | 21.10                 | -2.71                               | 18.39      | 69.02     | 2         |

**CHANNEL BANDWIDTH: 15MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_{T-LC}$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-----------------|------------|-----------|-----------|
| 20825   | 2507.5          | 21.87                 | -2.71           | 19.16      | 82.41     | 2         |
| 21100   | 2535.0          | 22.08                 | -2.71           | 19.37      | 86.50     | 2         |
| 21375   | 2562.5          | 21.90                 | -2.71           | 19.19      | 82.99     | 2         |

**CHANNEL BANDWIDTH: 15MHz 16QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_{T-LC}$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-----------------|------------|-----------|-----------|
| 20825   | 2507.5          | 21.04                 | -2.71           | 18.33      | 68.08     | 2         |
| 21100   | 2535.0          | 21.28                 | -2.71           | 18.57      | 71.94     | 2         |
| 21375   | 2562.5          | 21.12                 | -2.71           | 18.41      | 69.34     | 2         |

**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_{T-LC}$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-----------------|------------|-----------|-----------|
| 20850   | 2510.0          | 21.89                 | -2.71           | 19.18      | 82.79     | 2         |
| 21100   | 2535.0          | 22.09                 | -2.71           | 19.38      | 86.70     | 2         |
| 21350   | 2560.0          | 21.94                 | -2.71           | 19.23      | 83.75     | 2         |

**CHANNEL BANDWIDTH: 20MHz 16QAM**

| Channel | Frequency (MHz) | Conducted Power (dBm) | $G_{T-LC}$ (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-----------------|------------|-----------|-----------|
| 20850   | 2510.0          | 21.10                 | -2.71           | 18.39      | 69.02     | 2         |
| 21100   | 2535.0          | 21.30                 | -2.71           | 18.59      | 72.28     | 2         |
| 21350   | 2560.0          | 21.15                 | -2.71           | 18.44      | 69.82     | 2         |

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

## 3.2 FREQUENCY STABILITY MEASUREMENT

### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

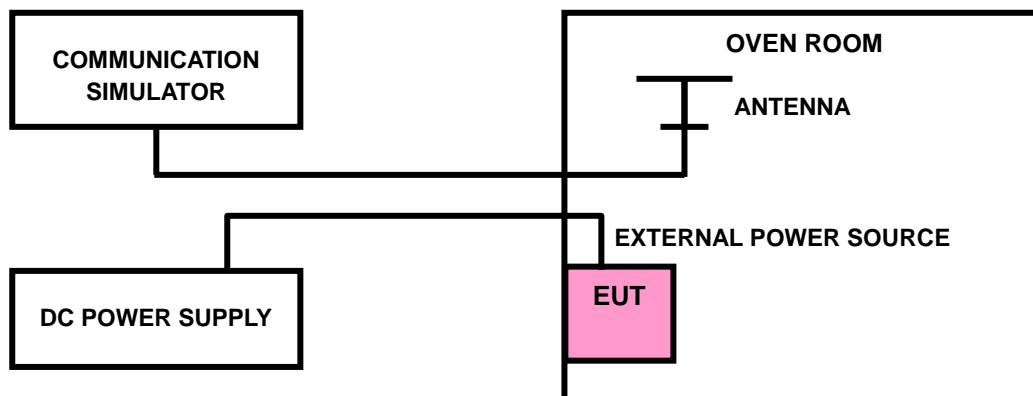
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 3.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

### 3.2.3 TEST SETUP





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### 3.2.4 TEST RESULTS

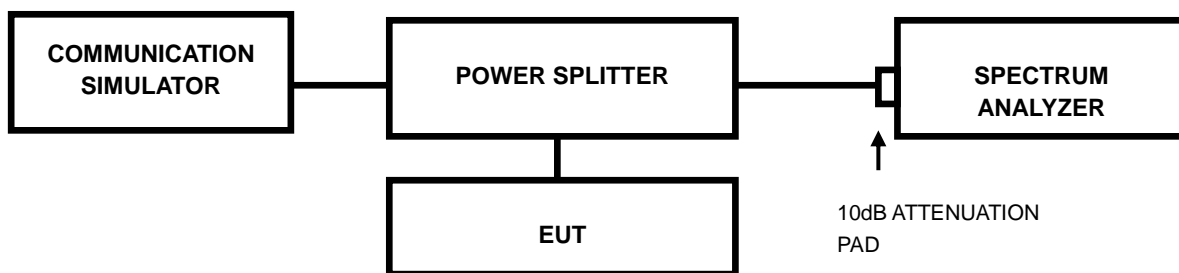
N/A

### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

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

#### 3.3.2 TEST SETUP



#### 3.3.3 TEST PROCEDURES

- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.



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### 3.3.4 TEST RESULTS

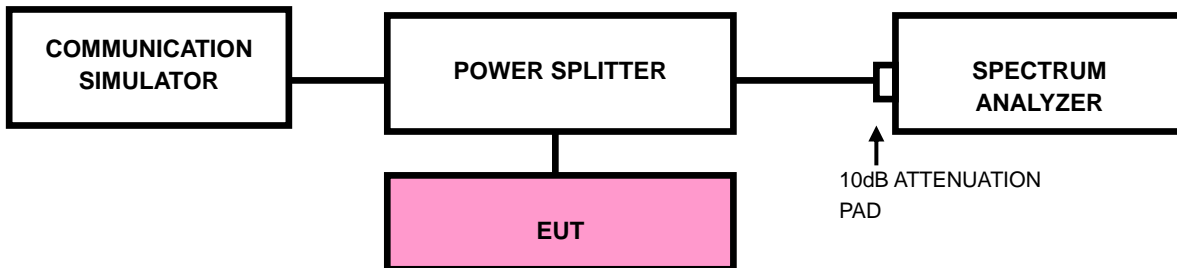
N/A

### 3.4 BAND EDGE MEASUREMENT

#### 2.4.1 LIMITS OF BAND EDGE MEASUREMENT

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

#### 2.4.2 TEST SETUP



### 2.4.3 TEST PROCEDURES

- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 35MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (Channel bandwidth 5MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 50MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz (Channel bandwidth 10MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 60MHz. RBW of the spectrum is 300kHz and VBW of the spectrum is 1MHz (Channel bandwidth 15MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 80MHz. RBW of the spectrum is 500kHz and VBW of the spectrum is 2MHz (Channel bandwidth 20MHz).
- g. Record the max trace plot into the test report.





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## 2.4.4 TEST RESULTS

N/A

### 3.5 CONDUCTED SPURIOUS EMISSIONS

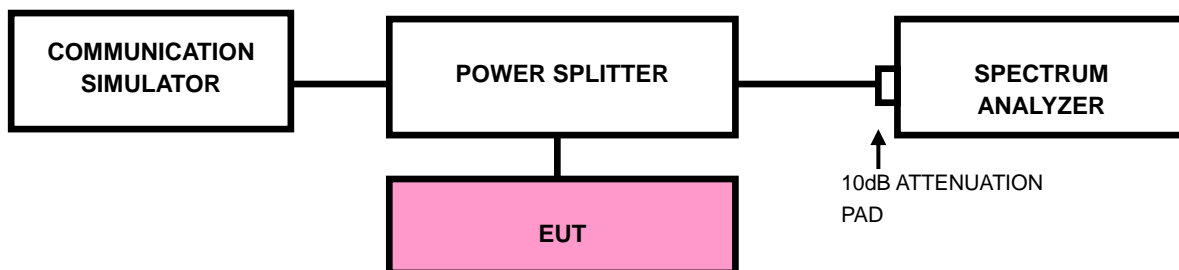
#### 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25dBm.

#### 3.5.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30MHz~25.7GHz for LTE Band 7. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

#### 3.5.3 TEST SETUP





**BUREAU  
VERITAS**

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### 3.5.4 TEST RESULTS

N/A

### 3.6 RADIATED EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25dBm.

#### 3.6.2 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.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  
 $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}$ .

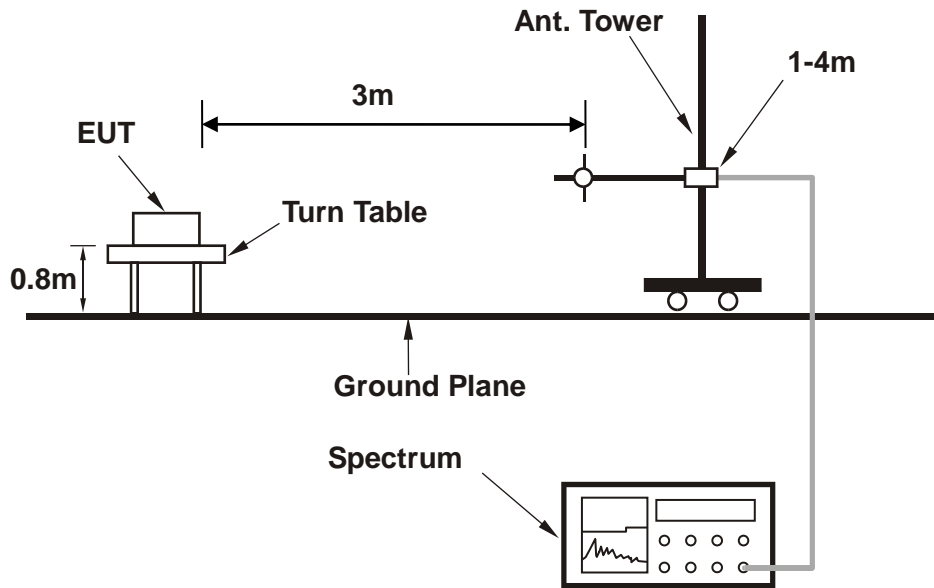
**NOTE:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

#### 3.6.3 DEVIATION FROM TEST STANDARD

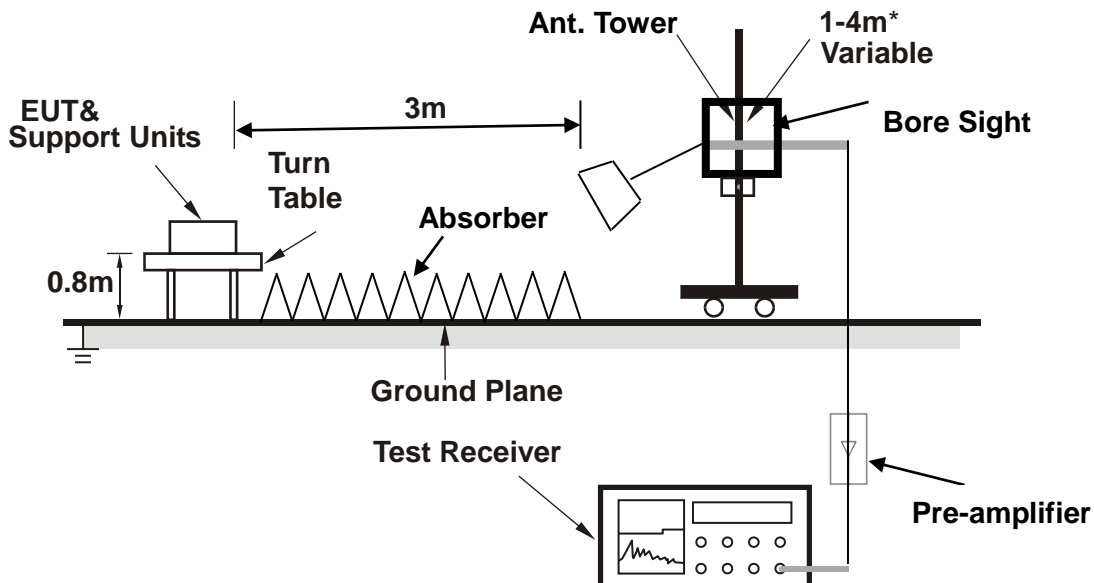
No deviation

### 3.6.4 TEST SETUP

#### < Frequency Range 30MHz~1GHz >



#### <Frequency Range above 1GHz>



**Note:** Above 1G is a directional antenna depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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

### 3.6.5 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA

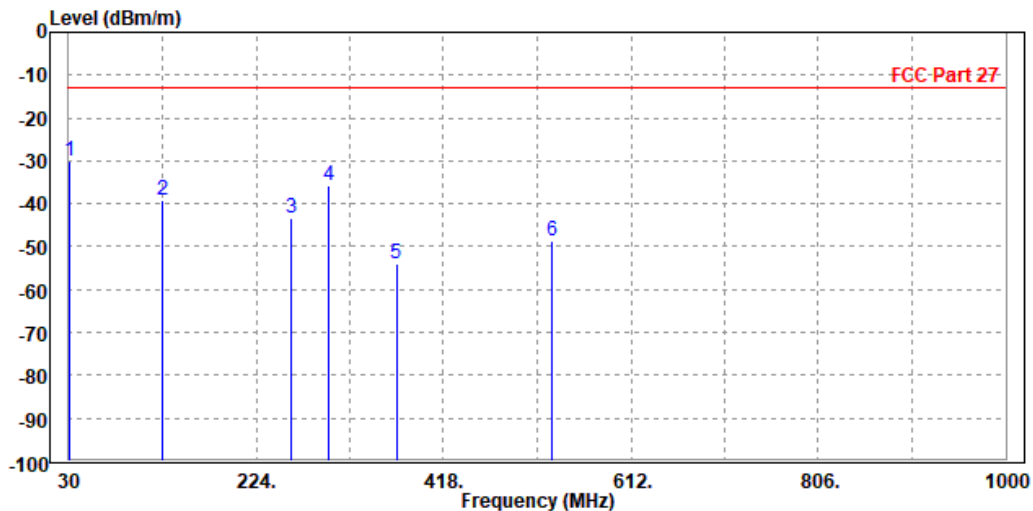
30 MHz – 1GHz data:

LTE Band 7

CHANNEL BANDWIDTH: 20MHz / QPSK

|  |                  |                        |                   |
|--|------------------|------------------------|-------------------|
| <b>MODE</b>  | TX channel 21100 | <b>FREQUENCY RANGE</b> | Below 1000MHz     |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 5Vfrom adapter |
| <b>TESTED BY</b>   | Star Le          |                        |                   |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                   |

|   | Freq | Level   | Read Level | Limit Line | Over Limit | Factor | Remark     | Pol/Phase  |
|---|------|---------|------------|------------|------------|--------|------------|------------|
|   | MHz  | dBm/m   | dBm        | dBm/m      | dB         | dB/m   |            |            |
| 1 | PP   | 31.020  | -29.86     | -50.25     | -13.00     | -16.86 | 20.39 Peak | Horizontal |
| 2 |      | 127.360 | -39.28     | -46.59     | -13.00     | -26.28 | 7.31 Peak  | Horizontal |
| 3 |      | 260.210 | -43.22     | -56.74     | -13.00     | -30.22 | 13.52 Peak | Horizontal |
| 4 |      | 298.470 | -35.65     | -49.25     | -13.00     | -22.65 | 13.60 Peak | Horizontal |
| 5 |      | 369.150 | -53.94     | -69.75     | -13.00     | -40.94 | 15.81 Peak | Horizontal |
| 6 |      | 530.440 | -48.84     | -68.25     | -13.00     | -35.84 | 19.41 Peak | Horizontal |

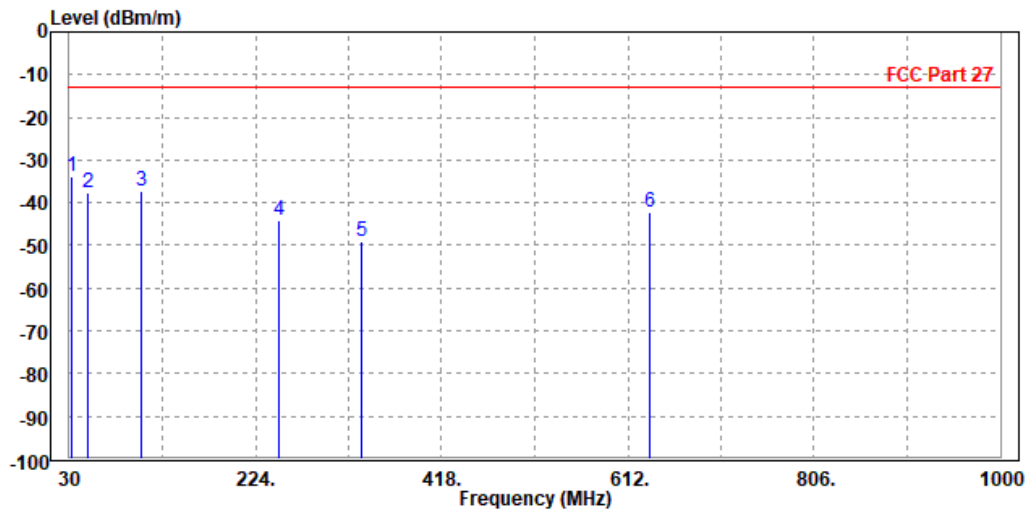




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|  |                  |                        |                   |
|--|------------------|------------------------|-------------------|
| <b>MODE</b>  | TX channel 21100 | <b>FREQUENCY RANGE</b> | Below 1000MHz     |
| <b>ENVIRONMENTAL CONDITIONS</b>                              | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 5Vfrom adapter |
| <b>TESTED BY</b>   | Star Le          |                        |                   |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                        |                   |

|      | Read    | Limit  | Over   |        |        |            |           |
|------|---------|--------|--------|--------|--------|------------|-----------|
| Freq | Level   | Level  | Line   | Limit  | Factor | Remark     | Pol/Phase |
| MHz  | dBm/m   | dBm    | dBm/m  | dB     | dB/m   |            |           |
| 1 PP | 33.140  | -33.93 | -53.26 | -13.00 | -20.93 | 19.33 Peak | Vertical  |
| 2    | 49.560  | -37.76 | -46.21 | -13.00 | -24.76 | 8.45 Peak  | Vertical  |
| 3    | 105.110 | -37.27 | -45.99 | -13.00 | -24.27 | 8.72 Peak  | Vertical  |
| 4    | 248.250 | -44.14 | -57.52 | -13.00 | -31.14 | 13.38 Peak | Vertical  |
| 5    | 334.120 | -48.89 | -63.58 | -13.00 | -35.89 | 14.69 Peak | Vertical  |
| 6    | 634.740 | -42.24 | -63.15 | -13.00 | -29.24 | 20.91 Peak | Vertical  |





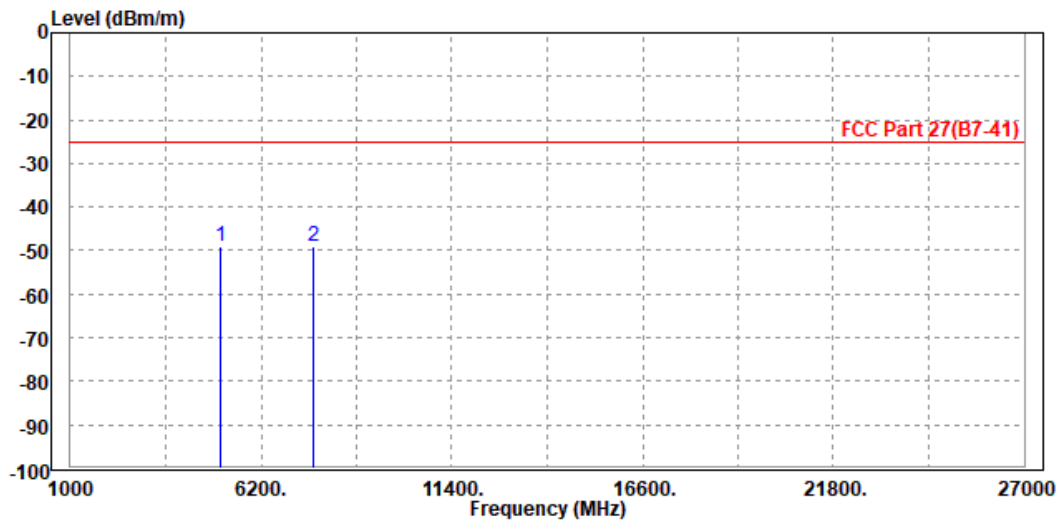
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ABOVE 1GHz WORST-CASE DATA

LTE Band 7  
CHANNEL BANDWIDTH: 15MHz / QPSK

|   |                  |                 |                   |
|---|------------------|-----------------|-------------------|
| MODE  | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz     |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5Vfrom adapter |
| TESTED BY   | Star Le          |                 |                   |
| 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 5082.000 | -48.92 | -57.69     | -25.00     | -23.92     | 8.77   | Peak   | Horizontal |
| 2 | 7605.000    | -48.93 | -60.33     | -25.00     | -23.93     | 11.40  | Peak   | Horizontal |



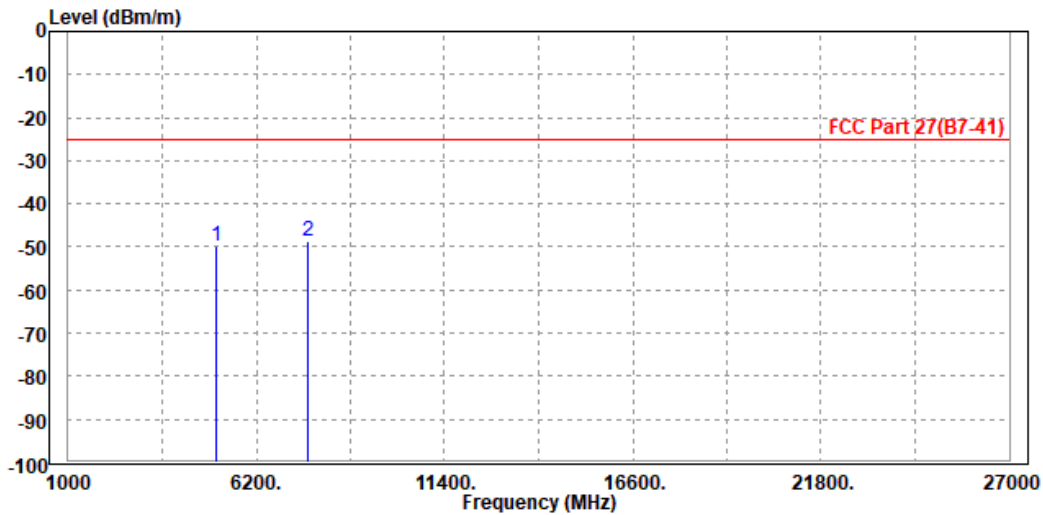




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|  |                  |                        |                   |
|--|------------------|------------------------|-------------------|
| <b>MODE</b>  | TX channel 21100 | <b>FREQUENCY RANGE</b> | Above 1000MHz     |
| <b>ENVIRONMENTAL CONDITIONS</b>                              | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 5Vfrom adapter |
| <b>TESTED BY</b>   | Star Le          |                        |                   |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                        |                   |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | 5082.000    | -49.76 | -59.63     | -25.00     | -24.76     | 9.87   | Peak   | Vertical  |
| 2 | PP 7605.000 | -48.77 | -61.55     | -25.00     | -23.77     | 12.78  | Peak   | Vertical  |





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#### 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:

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**Email:** [customerservice.dg@cn.bureauveritas.com](mailto:customerservice.dg@cn.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



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## 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---