# RF TEST REPORT

Report No.: 16071183-FCC-R5

Supersede Report No.: N/A

| | |
|---|---|
| Applicant | NEG TECHNOLOGY CO., LIMITED |
| Product Name | Mobile Phone |
| Model No. | SMART O2 |
| Serial No. | N/A |
| Test Standard | FCC Part 27: 2015; ANSI/TIA-603-D: 2010 |
| Test Date | September 23 to October 16, 2016 |
| Issue Date | October 17, 2016 |
| Test Result | ☑ Pass ☐ Fail |
| Equipment complied with the specification | ☑ |
| Equipment did not comply with the specification | ☐ |

| | | |
|---|---|---|
| Loren Luo | David Huang | |
| Loren Luo<br>Test Engineer | David Huang<br>Checked By | |

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Test result presented in this test report is applicable to the tested sample only


Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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# Laboratories Introduction

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## Accreditations for Conformity Assessment

| Country/Region | Scope |
| --- | --- |
| USA | EMC, RF/Wireless, SAR, Telecom |
| Canada | EMC, RF/Wireless, SAR, Telecom |
| Taiwan | EMC, RF, Telecom, SAR, Safety |
| Hong Kong | RF/Wireless, SAR, Telecom |
| Australia | EMC, RF, Telecom, SAR, Safety |
| Korea | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan | EMI, RF/Wireless, SAR, Telecom |
| Singapore | EMC, RF, SAR, Telecom |
| Europe | EMC, RF, SAR, Telecom, Safety |

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# 1. Report Revision History

| Report No. | Report Version | Description | Issue Date |
| --- | --- | --- | --- |
| 16071183-FCC-R5 | NONE | Original | October 17, 2016 |
| | | | |
| | | | |
| | | | |

# 2. Customer information

| | |
| --- | --- |
| Applicant Name | NEG TECHNOLOGY CO., LIMITED |
| Applicant Add | Rm 1406, Block B, Jinsejiari, Jingtian south road, Futian district, Shenzhen, China |
| Manufacturer | NEG TECHNOLOGY CO., LIMITED |
| Manufacturer Add | Rm 1406, Block B, Jinsejiari, Jingtian south road, Futian district, Shenzhen, China |

# 3. Test site information

| | |
| --- | --- |
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES |
| Lab Address | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park<br>South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108 |
| FCC Test Site No. | 718246 |
| IC Test Site No. | 4842E-1 |
| Test Software | Radiated Emission Program-To Shenzhen v2.0 |

# 4. Equipment under Test (EUT) Information

| | |
|---|---|
| Description of EUT: | Mobile Phone |
| Main Model: | SMART O2 |
| Serial Model: | N/A |
| Date EUT received: | September 22, 2016 |
| Test Date(s): | September 23 to October 16, 2016 |
| Equipment Category： | PCE |
| Antenna Gain: | GSM850: -0.45dBi<br>PCS1900: -0.53dBi<br>UMTS-FDD Band V: -0.46dBi<br>UMTS-FDD Band II:-0.51dBi<br>LTE Band IV: -0.51dBi<br>Bluetooth/BLE/WIFI: -1.1dBi<br>GPS: -1.5dBi |
| Antenna Type: | PIFA antenna |
| Type of Modulation: | GSM / GPRS: GMSK<br>EGPRS: GMSK,8PSK<br>UMTS-FDD: QPSK<br>LTE Band: QPSK, 16QAM<br>802.11b/g/n: DSSS, OFDM<br>Bluetooth: GFSK, π /4DQPSK, 8DPSK<br>BLE: GFSK<br>GPS:BPSK |

| | |
|---|---|
| RF Operating Frequency (ies): | GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz<br>PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz<br>UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz<br>UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;<br>RX: 1932.4 ~ 1987.6 MHz<br>LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX : 2110.7 ~ 2154.3 MHz<br>WIFI: 802.11b/g/n(20M): 2412-2462 MHz<br>WIFI: 802.11n(40M): 2422-2452 MHz<br>Bluetooth& BLE: 2402-2480 MHz<br>GPS: 1575.42 MHz |
| Number of Channels: | GSM 850: 124CH<br>PCS1900: 299CH<br>UMTS-FDD Band V: 102CH<br>UMTS-FDD Band II: 277CH<br>WIFI :802.11b/g/n(20M): 11CH<br>WIFI :802.11n(40M): 7CH<br>Bluetooth: 79CH<br>BLE: 40CH<br>GPS:1CH |
| Maximum Conducted AV Power to Antenna: | LTE Band IV: 24.34 dBm |
| ERP/EIRP: | LTE Band IV: 23.84 dBm / EIRP |
| Port: | Power Port, Earphone Port, USB Port |
| Input Power: | Adapter:<br>Model: SMART O2<br>Input: AC100-240V~50/60Hz,0.15A<br>Output: DC 5.0V,1000mA<br>Battery:<br>Model: SMART O2<br>Spec: 3.8V,2300mAh(8.74Wh)<br>Voltage limited of charging: 4.35V |
| Trade Name : | OWN |

GPRS/EGPRS Multi-slot class 8/10/12

FCC ID: 2AAZ8-SMARTO2

## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

| FCC Rules | Description of Test | Result |
|---|---|---|
| § 1.1307; § 2.1093 | RF Exposure (SAR) | Compliance |
| §2.1046;§ 27.50(c.10); § 27.50(d.4) | RF Output Power | Compliance |
| § 27.50(d) | Peak-Average Ratio | Compliance |
| § 2.1047 | Modulation Characteristics | N/A |
| § 2.1049; § 27.53(a.5) | 99% & -26 dB Occupied Bandwidth | Compliance |
| § 2.1051; § 27.53(h) | Spurious Emissions at Antenna Terminal | Compliance |
| § 2.1053;§ 27.53(h) | Field Strength of Spurious Radiation | Compliance |
| § 27.53(h) | Out of band emission, Band Edge | Compliance |
| § 27.53(m) | Band Edge 27.53(m) | N/A |
| § 2.1055; § 27.5(h); § 27.54 | Frequency stability vs. temperature<br>Frequency stability vs. voltage | Compliance |

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

**Measurement Uncertainty**

| Emissions | | |
|---|---|---|
| **Test Item** | **Description** | **Uncertainty** |
| Band Edge and Radiated Spurious Emissions | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | +5.6dB/-4.5dB |
| - | - | - |

# 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

## 6.1 RF Exposure (SAR)

Test Result: Pass

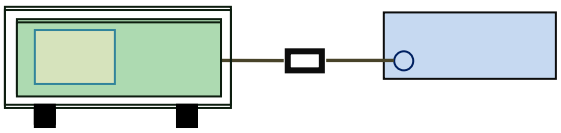
The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 16071183-FCC-H.

## 6.2 RF Output Power

| Temperature | 23℃ |
|---|---|
| Relative Humidity | 53% |
| Atmospheric Pressure | 1010mbar |
| Test date : | October 12, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §27.50 (c) | c) | EIRP: 30dBm | ☑ |
| Test Setup |  | | |
| Test Procedure | For Conducted Power:<br>- The transmitter output port was connected to base station.<br>- Set EUT at maximum power through base station.<br>- Select lowest, middle, and highest channels for each band and different test mode.<br>For ERP/EIRP:<br>- The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.<br>- The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.<br>- The frequency range up to tenth harmonic of the fundamental frequency was investigated.<br>- Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non- | | |

| | |
|---|---|
| | radiating cable. The absolute levels of the spurious emissions were measured by the substitution.<br>- Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level<br>- Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts. |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## Conducted Power

LTE Band IV:

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 20MHz | 20050 | 1720.0 | QPSK | 1 | 0 | 0 | 24.04 | 23.5±1 |
| | | | | 1 | 49 | 0 | 24.06 | 23.5±1 |
| | | | | 1 | 99 | 0 | 24.03 | 23.5±1 |
| | | | | 50 | 0 | 1 | 22.90 | 23.5±1 |
| | | | | 50 | 24 | 1 | 22.87 | 23.5±1 |
| | | | | 50 | 49 | 1 | 22.91 | 23.5±1 |
| | | | | 100 | 0 | 1 | 22.92 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.08 | 22.5±1 |
| | | | | 1 | 49 | 1 | 23.07 | 22.5±1 |
| | | | | 1 | 99 | 1 | 23.09 | 22.5±1 |
| | | | | 50 | 0 | 2 | 22.90 | 22.5±1 |
| | | | | 50 | 24 | 2 | 22.87 | 22.5±1 |
| | | | | 50 | 49 | 2 | 22.85 | 22.5±1 |
| | | | | 100 | 0 | 2 | 21.95 | 22.5±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 23.86 | 23±1 |
| | | | | 1 | 49 | 0 | 23.76 | 23±1 |
| | | | | 1 | 99 | 0 | 23.84 | 23±1 |
| | | | | 50 | 0 | 1 | 23.00 | 23±1 |
| | | | | 50 | 24 | 1 | 23.01 | 23±1 |
| | | | | 50 | 49 | 1 | 23.12 | 23±1 |
| | | | | 100 | 0 | 1 | 23.01 | 23±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.42 | 22.5±1 |
| | | | | 1 | 49 | 1 | 23.41 | 23±1 |
| | | | | 1 | 99 | 1 | 23.45 | 23±1 |
| | | | | 50 | 0 | 2 | 23.00 | 23±1 |
| | | | | 50 | 24 | 2 | 23.01 | 23±1 |
| | | | | 50 | 49 | 2 | 23.05 | 23±1 |
| | | | | 100 | 0 | 2 | 22.07 | 23±1 |
| | 20300 | 1745.0 | QPSK | 1 | 0 | 0 | 24.04 | 23.5±1 |
| | | | | 1 | 49 | 0 | 24.06 | 23.5±1 |
| | | | | 1 | 99 | 0 | 24.02 | 23.5±1 |
| | | | | 50 | 0 | 1 | 23.06 | 23.5±1 |
| | | | | 50 | 24 | 1 | 23.04 | 23.5±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 50 | 49 | 1 | 23.05 | 23.5±1 |
| | | | | 100 | 0 | 1 | 23.06 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.38 | 23±1 |
| | | | | 1 | 49 | 1 | 23.36 | 23±1 |
| | | | | 1 | 99 | 1 | 23.34 | 23±1 |
| | | | | 50 | 0 | 2 | 23.06 | 23±1 |
| | | | | 50 | 24 | 2 | 23.05 | 23±1 |
| | | | | 50 | 49 | 2 | 23.01 | 23±1 |
| | | | | 100 | 0 | 2 | 22.12 | 23±1 |

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 15MHz | 20025 | 1717.5 | QPSK | 1 | 0 | 0 | 23.99 | 23.5±1 |
| | | | | 1 | 37 | 0 | 23.67 | 23.5±1 |
| | | | | 1 | 74 | 0 | 23.78 | 23.5±1 |
| | | | | 36 | 0 | 1 | 23.00 | 23.5±1 |
| | | | | 36 | 16 | 1 | 23.12 | 23.5±1 |
| | | | | 36 | 35 | 1 | 23.31 | 23.5±1 |
| | | | | 75 | 0 | 1 | 23.02 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.32 | 22.7±1 |
| | | | | 1 | 37 | 1 | 23.23 | 22.7±1 |
| | | | | 1 | 74 | 1 | 23.13 | 22.7±1 |
| | | | | 36 | 0 | 2 | 23.01 | 22.7±1 |
| | | | | 36 | 16 | 2 | 23.12 | 22.7±1 |
| | | | | 36 | 35 | 2 | 23.31 | 22.7±1 |
| | | | | 75 | 0 | 2 | 22.01 | 22.7±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 23.86 | 23±1 |
| | | | | 1 | 37 | 0 | 23.75 | 23±1 |
| | | | | 1 | 74 | 0 | 23.68 | 23±1 |
| | | | | 36 | 0 | 1 | 23.07 | 23±1 |
| | | | | 36 | 16 | 1 | 23.02 | 23±1 |
| | | | | 36 | 35 | 1 | 23.06 | 23±1 |
| | | | | 75 | 0 | 1 | 23.11 | 23±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.12 | 22.5±1 |
| | | | | 1 | 37 | 1 | 23.14 | 22.5±1 |
| | | | | 1 | 74 | 1 | 23.13 | 22.5±1 |
| | | | | 36 | 0 | 2 | 23.07 | 22.5±1 |
| | | | | 36 | 16 | 2 | 23.06 | 22.5±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 36 | 35 | 2 | 23.12 | 22.5±1 |
| | | | | 75 | 0 | 2 | 22.14 | 22.5±1 |
| | 20325 | 1747.5 | QPSK | 1 | 0 | 0 | 24.05 | 23.5±1 |
| | | | | 1 | 37 | 0 | 24.12 | 23.5±1 |
| | | | | 1 | 74 | 0 | 23.08 | 23.5±1 |
| | | | | 36 | 0 | 1 | 23.35 | 23.5±1 |
| | | | | 36 | 16 | 1 | 23.31 | 23.5±1 |
| | | | | 36 | 35 | 1 | 23.36 | 23.5±1 |
| | | | | 75 | 0 | 1 | 23.15 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.17 | 23±1 |
| | | | | 1 | 37 | 1 | 23.15 | 23±1 |
| | | | | 1 | 74 | 1 | 23.24 | 23±1 |
| | | | | 36 | 0 | 2 | 23.35 | 23±1 |
| | | | | 36 | 16 | 2 | 23.36 | 23±1 |
| | | | | 36 | 35 | 2 | 23.24 | 23±1 |
| | | | | 75 | 0 | 2 | 22.15 | 23±1 |

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 10MHz | 20000 | 1715.0 | QPSK | 1 | 0 | 0 | 23.90 | 23.5±1 |
| | | | | 1 | 24 | 0 | 23.84 | 23.5±1 |
| | | | | 1 | 49 | 0 | 23.76 | 23.5±1 |
| | | | | 25 | 0 | 1 | 22.84 | 23.5±1 |
| | | | | 25 | 12 | 1 | 22.86 | 23.5±1 |
| | | | | 25 | 24 | 1 | 22.76 | 23.5±1 |
| | | | | 50 | 0 | 1 | 22.86 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.25 | 23±1 |
| | | | | 1 | 24 | 1 | 23.21 | 23±1 |
| | | | | 1 | 49 | 1 | 23.31 | 23±1 |
| | | | | 25 | 0 | 2 | 22.78 | 23±1 |
| | | | | 25 | 12 | 2 | 22.76 | 23±1 |
| | | | | 25 | 24 | 2 | 22.80 | 23±1 |
| | | | | 50 | 0 | 2 | 22.91 | 23±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 23.87 | 23±1 |
| | | | | 1 | 24 | 0 | 23.76 | 23±1 |
| | | | | 1 | 49 | 0 | 23.84 | 23±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 25 | 0 | 1 | 22.97 | 23±1 |
| | | | | 25 | 12 | 1 | 22.96 | 23±1 |
| | | | | 25 | 24 | 1 | 22.87 | 23±1 |
| | | | | 50 | 0 | 1 | 22.86 | 23±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.25 | 22.5±1 |
| | | | | 1 | 24 | 1 | 23.21 | 22.5±1 |
| | | | | 1 | 49 | 1 | 23.26 | 22.5±1 |
| | | | | 25 | 0 | 2 | 22.87 | 22.5±1 |
| | | | | 25 | 12 | 2 | 22.96 | 22.5±1 |
| | | | | 25 | 24 | 2 | 22.91 | 22.5±1 |
| | | | | 50 | 0 | 2 | 22.06 | 22.5±1 |
| | 20350 | 1750.0 | QPSK | 1 | 0 | 0 | 23.92 | 23.5±1 |
| | | | | 1 | 24 | 0 | 23.87 | 23.5±1 |
| | | | | 1 | 49 | 0 | 23.48 | 23.5±1 |
| | | | | 25 | 0 | 1 | 23.04 | 23.5±1 |
| | | | | 25 | 12 | 1 | 23.05 | 23.5±1 |
| | | | | 25 | 24 | 1 | 23.12 | 23.5±1 |
| | | | | 50 | 0 | 1 | 23.05 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.01 | 22.5±1 |
| | | | | 1 | 24 | 1 | 23.12 | 22.5±1 |
| | | | | 1 | 49 | 1 | 23.34 | 22.5±1 |
| | | | | 25 | 0 | 2 | 23.12 | 22.5±1 |
| | | | | 25 | 12 | 2 | 23.21 | 22.5±1 |
| | | | | 25 | 24 | 2 | 23.11 | 22.5±1 |
| | | | | 50 | 0 | 2 | 22.11 | 22.5±1 |

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 5MHz | 20000 | 1715.0 | QPSK | 1 | 0 | 0 | 23.88 | 23.5±1 |
| | | | | 1 | 12 | 0 | 23.77 | 23.5±1 |
| | | | | 1 | 24 | 0 | 23.76 | 23.5±1 |
| | | | | 12 | 0 | 1 | 23.12 | 23.5±1 |
| | | | | 12 | 6 | 1 | 23.21 | 23.5±1 |
| | | | | 12 | 11 | 1 | 23.13 | 23.5±1 |
| | | | | 25 | 0 | 1 | 23.06 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.16 | 22.5±1 |
| | | | | 1 | 12 | 1 | 23.26 | 22.5±1 |
| | | | | 1 | 24 | 1 | 23.43 | 22.5±1 |
| | | | | 12 | 0 | 2 | 23.11 | 22.5±1 |
| | | | | 12 | 6 | 2 | 23.13 | 22.5±1 |
| | | | | 12 | 11 | 2 | 23.43 | 22.5±1 |
| | | | | 25 | 0 | 2 | 21.91 | 22.5±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 24.08 | 23.5±1 |
| | | | | 1 | 12 | 0 | 24.06 | 23.5±1 |
| | | | | 1 | 24 | 0 | 24.32 | 23.5±1 |
| | | | | 12 | 0 | 1 | 23.02 | 23.5±1 |
| | | | | 12 | 6 | 1 | 23.15 | 23.5±1 |
| | | | | 12 | 11 | 1 | 23.31 | 23.5±1 |
| | | | | 25 | 0 | 1 | 22.97 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.25 | 22.5±1 |
| | | | | 1 | 12 | 1 | 23.21 | 22.5±1 |
| | | | | 1 | 24 | 1 | 23.24 | 22.5±1 |
| | | | | 12 | 0 | 2 | 23.02 | 22.5±1 |
| | | | | 12 | 6 | 2 | 23.01 | 22.5±1 |
| | | | | 12 | 11 | 2 | 23.13 | 22.5±1 |
| | | | | 25 | 0 | 2 | 21.99 | 22.5±1 |
| | 20350 | 1750.0 | QPSK | 1 | 0 | 0 | 24.12 | 23.5±1 |
| | | | | 1 | 12 | 0 | 24.13 | 23.5±1 |
| | | | | 1 | 24 | 0 | **24.34** | 23.5±1 |
| | | | | 12 | 0 | 1 | 23.12 | 23.5±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 12 | 6 | 1 | 23.13 | 23.5±1 |
| | | | | 12 | 11 | 1 | 23.21 | 23.5±1 |
| | | | | 25 | 0 | 1 | 23.06 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.16 | 23±1 |
| | | | | 1 | 12 | 1 | 23.21 | 23±1 |
| | | | | 1 | 24 | 1 | 23.31 | 23±1 |
| | | | | 12 | 0 | 2 | 23.16 | 23±1 |
| | | | | 12 | 6 | 2 | 23.17 | 23±1 |
| | | | | 12 | 11 | 2 | 23.23 | 23±1 |
| | | | | 25 | 0 | 2 | 22.09 | 23±1 |

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 3MHz | 19965 | 1711.5 | QPSK | 1 | 0 | 0 | 23.90 | 23.5±1 |
| | | | | 1 | 7 | 0 | 23.91 | 23.5±1 |
| | | | | 1 | 14 | 0 | 23.87 | 23.5±1 |
| | | | | 8 | 0 | 1 | 22.88 | 23.5±1 |
| | | | | 8 | 4 | 1 | 22.76 | 23.5±1 |
| | | | | 8 | 7 | 1 | 22.79 | 23.5±1 |
| | | | | 15 | 0 | 1 | 22.86 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.21 | 22.5±1 |
| | | | | 1 | 7 | 1 | 23.12 | 22.5±1 |
| | | | | 1 | 14 | 1 | 23.31 | 22.5±1 |
| | | | | 8 | 0 | 2 | 21.88 | 22.5±1 |
| | | | | 8 | 4 | 2 | 21.67 | 22.5±1 |
| | | | | 8 | 7 | 2 | 21.74 | 22.5±1 |
| | | | | 15 | 0 | 2 | 21.95 | 22.5±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 23.96 | 23.5±1 |
| | | | | 1 | 7 | 0 | 23.87 | 23.5±1 |
| | | | | 1 | 14 | 0 | 23.86 | 23.5±1 |
| | | | | 8 | 0 | 1 | 22.94 | 23.5±1 |
| | | | | 8 | 4 | 1 | 22.86 | 23.5±1 |
| | | | | 8 | 7 | 1 | 22.69 | 23.5±1 |
| | | | | 15 | 0 | 1 | 22.97 | 23.5±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 16QAM | 1 | 0 | 1 | 23.06 | 22.5±1 |
| | | | | 1 | 7 | 1 | 23.02 | 22.5±1 |
| | | | | 1 | 14 | 1 | 23.12 | 22.5±1 |
| | | | | 8 | 0 | 2 | 22.01 | 22.5±1 |
| | | | | 8 | 4 | 2 | 22.05 | 22.5±1 |
| | | | | 8 | 7 | 2 | 22.12 | 22.5±1 |
| | | | | 15 | 0 | 2 | 21.95 | 22.5±1 |
| | 20385 | 1753.5 | QPSK | 1 | 0 | 0 | 24.14 | 23.5±1 |
| | | | | 1 | 7 | 0 | 24.15 | 23.5±1 |
| | | | | 1 | 14 | 0 | 24.31 | 23.5±1 |
| | | | | 8 | 0 | 1 | 23.06 | 23.5±1 |
| | | | | 8 | 4 | 1 | 23.12 | 23.5±1 |
| | | | | 8 | 7 | 1 | 23.31 | 23.5±1 |
| | | | | 15 | 0 | 1 | 23.07 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.05 | 22.5±1 |
| | | | | 1 | 7 | 1 | 23.12 | 22.5±1 |
| | | | | 1 | 14 | 1 | 23.06 | 22.5±1 |
| | | | | 8 | 0 | 2 | 21.96 | 22.5±1 |
| | | | | 8 | 4 | 2 | 21.91 | 22.5±1 |
| | | | | 8 | 7 | 2 | 21.87 | 22.5±1 |
| | | | | 15 | 0 | 2 | 22.12 | 22.5±1 |

| BW (MHz) | Ch | Freq. (MHz) | Mode | UL RB Allocation | UL RB Offset | MPR | Average power (dBm) | Tune up Power tolerant |
|---|---|---|---|---|---|---|---|---|
| 1.4MHz | 19957 | 1710.7 | QPSK | 1 | 0 | 0 | 23.71 | 23±1 |
| | | | | 1 | 2 | 0 | 23.76 | 23±1 |
| | | | | 1 | 5 | 0 | 23.48 | 23±1 |
| | | | | 3 | 0 | 0 | 23.60 | 23±1 |
| | | | | 3 | 1 | 0 | 23.64 | 23±1 |
| | | | | 3 | 2 | 0 | 23.58 | 23±1 |
| | | | | 6 | 0 | 1 | 22.66 | 23±1 |
| | | | 16QAM | 1 | 0 | 1 | 22.75 | 22.5±1 |
| | | | | 1 | 2 | 1 | 22.71 | 22.5±1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 5 | 1 | 22.68 | 22.5±1 |
| | | | | 3 | 0 | 1 | 23.62 | 22.5±1 |
| | | | | 3 | 1 | 1 | 23.61 | 22.5±1 |
| | | | | 3 | 2 | 1 | 23.67 | 22.5±1 |
| | | | | 6 | 0 | 2 | 21.60 | 22.5±1 |
| | 20175 | 1732.5 | QPSK | 1 | 0 | 0 | 22.78 | 23.5±1 |
| | | | | 1 | 2 | 0 | 22.71 | 23.5±1 |
| | | | | 1 | 5 | 0 | 22.69 | 23.5±1 |
| | | | | 3 | 0 | 0 | 23.76 | 23.5±1 |
| | | | | 3 | 1 | 0 | 23.81 | 23.5±1 |
| | | | | 3 | 2 | 0 | 23.82 | 23.5±1 |
| | | | | 6 | 0 | 1 | 22.68 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 22.78 | 23±1 |
| | | | | 1 | 2 | 1 | 22.71 | 23±1 |
| | | | | 1 | 5 | 1 | 22.69 | 23±1 |
| | | | | 3 | 0 | 1 | 23.71 | 23±1 |
| | | | | 3 | 1 | 1 | 23.68 | 23±1 |
| | | | | 3 | 2 | 1 | 23.96 | 23±1 |
| | | | | 6 | 0 | 2 | 22.68 | 23±1 |
| | 20393 | 1754.3 | QPSK | 1 | 0 | 0 | 24.16 | 23.5±1 |
| | | | | 1 | 2 | 0 | 24.12 | 23.5±1 |
| | | | | 1 | 5 | 0 | 24.23 | 23.5±1 |
| | | | | 3 | 0 | 0 | 24.05 | 23.5±1 |
| | | | | 3 | 1 | 0 | 24.01 | 23.5±1 |
| | | | | 3 | 2 | 0 | 24.21 | 23.5±1 |
| | | | | 6 | 0 | 1 | 23.07 | 23.5±1 |
| | | | 16QAM | 1 | 0 | 1 | 23.07 | 23.5±1 |
| | | | | 1 | 2 | 1 | 23.12 | 23.5±1 |
| | | | | 1 | 5 | 1 | 23.16 | 23.5±1 |
| | | | | 3 | 0 | 1 | 24.09 | 23.5±1 |
| | | | | 3 | 1 | 1 | 24.08 | 23.5±1 |
| | | | | 3 | 2 | 1 | 24.12 | 23.5±1 |
| | | | | 6 | 0 | 2 | 22.96 | 23.5±1 |

## ERP & EIRP

### EIRP for LTE Band IV (Part 27)

| Frequency (MHz) | BW (MHz) | Modulation | RB Size/Offset | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|---|---|
| 1710.7 | 1.4 | QPSK | 1/0 | 16.05 | V | 7.95 | 0.79 | 23.21 | 30 |
| 1732.5 | 1.4 | QPSK | 1/0 | 15.21 | V | 7.95 | 0.79 | 22.37 | 30 |
| 1754.3 | 1.4 | QPSK | 1/0 | 16.41 | V | 7.95 | 0.79 | 23.57 | 30 |
| 1710.7 | 1.4 | QPSK | 1/0 | 15.43 | H | 7.95 | 0.79 | 22.59 | 30 |
| 1732.5 | 1.4 | QPSK | 1/0 | 14.78 | H | 7.95 | 0.79 | 21.94 | 30 |
| 1754.3 | 1.4 | QPSK | 1/0 | 15.86 | H | 7.95 | 0.79 | 23.02 | 30 |
| 1710.7 | 1.4 | 16-QAM | 1/5 | 15.02 | V | 7.95 | 0.79 | 22.18 | 30 |
| 1732.5 | 1.4 | 16-QAM | 1/0 | 15.12 | V | 7.95 | 0.79 | 22.28 | 30 |
| 1754.3 | 1.4 | 16-QAM | 1/0 | 15.43 | V | 7.95 | 0.79 | 22.59 | 30 |
| 1710.7 | 1.4 | 16-QAM | 1/5 | 14.36 | H | 7.95 | 0.79 | 21.52 | 30 |
| 1732.5 | 1.4 | 16-QAM | 1/0 | 14.49 | H | 7.95 | 0.79 | 21.65 | 30 |
| 1754.3 | 1.4 | 16-QAM | 1/0 | 14.63 | H | 7.95 | 0.79 | 21.79 | 30 |
| 1711.5 | 3 | QPSK | 1/0 | 16.24 | V | 7.95 | 0.79 | 23.40 | 30 |
| 1732.5 | 3 | QPSK | 1/0 | 16.3 | V | 7.95 | 0.79 | 23.46 | 30 |
| 1753.5 | 3 | QPSK | 1/0 | 16.48 | V | 7.95 | 0.79 | 23.64 | 30 |
| 1711.5 | 3 | QPSK | 1/0 | 15.59 | H | 7.95 | 0.79 | 22.75 | 30 |
| 1732.5 | 3 | QPSK | 1/0 | 15.64 | H | 7.95 | 0.79 | 22.80 | 30 |
| 1753.5 | 3 | QPSK | 1/0 | 15.79 | H | 7.95 | 0.79 | 22.95 | 30 |
| 1711.5 | 3 | 16-QAM | 1/0 | 15.54 | V | 7.95 | 0.79 | 22.70 | 30 |
| 1732.5 | 3 | 16-QAM | 1/0 | 15.4 | V | 7.95 | 0.79 | 22.56 | 30 |
| 1753.5 | 3 | 16-QAM | 1/0 | 15.39 | V | 7.95 | 0.79 | 22.55 | 30 |
| 1711.5 | 3 | 16-QAM | 1/0 | 14.86 | H | 7.95 | 0.79 | 22.02 | 30 |
| 1732.5 | 3 | 16-QAM | 1/0 | 14.79 | H | 7.95 | 0.79 | 21.95 | 30 |
| 1753.5 | 3 | 16-QAM | 1/0 | 14.75 | H | 7.95 | 0.79 | 21.91 | 30 |
| 1712.5 | 5 | QPSK | 1/0 | 16.19 | V | 7.95 | 0.79 | 23.35 | 30 |
| 1732.5 | 5 | QPSK | 1/0 | 16.42 | V | 7.95 | 0.79 | 23.58 | 30 |
| 1752.5 | 5 | QPSK | 1/24 | 16.68 | V | 7.95 | 0.79 | **23.84** | 30 |
| 1712.5 | 5 | QPSK | 1/0 | 15.46 | H | 7.95 | 0.79 | 22.62 | 30 |
| 1732.5 | 5 | QPSK | 1/0 | 15.72 | H | 7.95 | 0.79 | 22.88 | 30 |

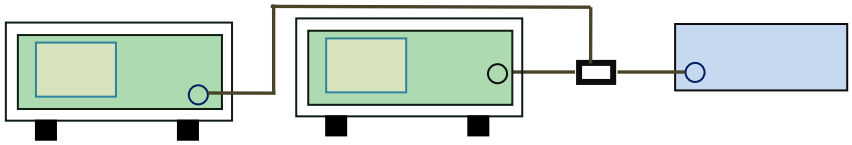
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1752.5 | 5 | QPSK | 1/24 | 15.87 | H | 7.95 | 0.79 | 23.03 | 30 |
| 1712.5 | 5 | 16-QAM | 1/0 | 15.5 | V | 7.95 | 0.79 | 22.66 | 30 |
| 1732.5 | 5 | 16-QAM | 1/0 | 15.59 | V | 7.95 | 0.79 | 22.75 | 30 |
| 1752.5 | 5 | 16-QAM | 1/24 | 15.64 | V | 7.95 | 0.79 | 22.80 | 30 |
| 1712.5 | 5 | 16-QAM | 1/0 | 14.68 | H | 7.95 | 0.79 | 21.84 | 30 |
| 1732.5 | 5 | 16-QAM | 1/0 | 14.79 | H | 7.95 | 0.79 | 21.95 | 30 |
| 1752.5 | 5 | 16-QAM | 1/24 | 14.95 | H | 7.95 | 0.79 | 22.11 | 30 |
| 1715 | 10 | QPSK | 1/0 | 16.15 | V | 7.95 | 0.79 | 23.31 | 30 |
| 1732.5 | 10 | QPSK | 1/49 | 16.11 | V | 7.95 | 0.79 | 23.27 | 30 |
| 1750 | 10 | QPSK | 1/0 | 16.23 | V | 7.95 | 0.79 | 23.39 | 30 |
| 1715 | 10 | QPSK | 1/0 | 15.62 | H | 7.95 | 0.79 | 22.78 | 30 |
| 1732.5 | 10 | QPSK | 1/49 | 15.59 | H | 7.95 | 0.79 | 22.75 | 30 |
| 1750 | 10 | QPSK | 1/0 | 15.67 | H | 7.95 | 0.79 | 22.83 | 30 |
| 1715 | 10 | 16-QAM | 1/0 | 15.57 | V | 7.95 | 0.79 | 22.73 | 30 |
| 1732.5 | 10 | 16-QAM | 1/49 | 15.63 | V | 7.95 | 0.79 | 22.79 | 30 |
| 1750 | 10 | 16-QAM | 1/0 | 15.35 | V | 7.95 | 0.79 | 22.51 | 30 |
| 1715 | 10 | 16-QAM | 1/0 | 14.89 | H | 7.95 | 0.79 | 22.05 | 30 |
| 1732.5 | 10 | 16-QAM | 1/49 | 14.95 | H | 7.95 | 0.79 | 22.11 | 30 |
| 1750 | 10 | 16-QAM | 1/0 | 14.68 | H | 7.95 | 0.79 | 21.84 | 30 |
| 1717.5 | 15 | QPSK | 1/0 | 16.28 | V | 7.95 | 0.79 | 23.44 | 30 |
| 1732.5 | 15 | QPSK | 1/74 | 15.97 | V | 7.95 | 0.79 | 23.13 | 30 |
| 1747.5 | 15 | QPSK | 1/0 | 16.37 | V | 7.95 | 0.79 | 23.53 | 30 |
| 1717.5 | 15 | QPSK | 1/0 | 15.56 | H | 7.95 | 0.79 | 22.72 | 30 |
| 1732.5 | 15 | QPSK | 1/74 | 15.03 | H | 7.95 | 0.79 | 22.19 | 30 |
| 1747.5 | 15 | QPSK | 1/0 | 15.61 | H | 7.95 | 0.79 | 22.77 | 30 |
| 1717.5 | 15 | 16-QAM | 1/0 | 15.72 | V | 7.95 | 0.79 | 22.88 | 30 |
| 1732.5 | 15 | 16-QAM | 1/74 | 15.64 | V | 7.95 | 0.79 | 22.80 | 30 |
| 1747.5 | 15 | 16-QAM | 1/0 | 15.69 | V | 7.95 | 0.79 | 22.85 | 30 |
| 1717.5 | 15 | 16-QAM | 1/0 | 14.95 | H | 7.95 | 0.79 | 22.11 | 30 |
| 1732.5 | 15 | 16-QAM | 1/74 | 14.86 | H | 7.95 | 0.79 | 22.02 | 30 |
| 1747.5 | 15 | 16-QAM | 1/0 | 14.91 | H | 7.95 | 0.79 | 22.07 | 30 |
| 1720 | 20 | QPSK | 1/99 | 16.41 | V | 7.95 | 0.79 | 23.57 | 30 |
| 1732.5 | 20 | QPSK | 1/99 | 16.12 | V | 7.95 | 0.79 | 23.28 | 30 |
| 1745 | 20 | QPSK | 1/0 | 16.39 | V | 7.95 | 0.79 | 23.55 | 30 |
| 1720 | 20 | QPSK | 1/99 | 15.65 | H | 7.95 | 0.79 | 22.81 | 30 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1732.5 | 20 | QPSK | 1/99 | 15.36 | H | 7.95 | 0.79 | 22.52 | 30 |
| 1745 | 20 | QPSK | 1/0 | 15.59 | H | 7.95 | 0.79 | 22.75 | 30 |
| 1720 | 20 | 16-QAM | 1/99 | 15.41 | V | 7.95 | 0.79 | 22.57 | 30 |
| 1732.5 | 20 | 16-QAM | 1/99 | 15.94 | V | 7.95 | 0.79 | 23.10 | 30 |
| 1745 | 20 | 16-QAM | 1/0 | 15.75 | V | 7.95 | 0.79 | 22.91 | 30 |
| 1720 | 20 | 16-QAM | 1/99 | 14.69 | H | 7.95 | 0.79 | 21.85 | 30 |
| 1732.5 | 20 | 16-QAM | 1/99 | 14.98 | H | 7.95 | 0.79 | 22.14 | 30 |
| 1745 | 20 | 16-QAM | 1/0 | 14.85 | H | 7.95 | 0.79 | 22.01 | 30 |

## 6.3 Peak-Average Ratio

| | |
|---|---|
| Temperature | 23℃ |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1010mbar |
| Test date : | October 12, 2016 |
| Tested By : | Loren Luo |

Requirement(s):

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| § 27.50(d) | a) | The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB. | ☑ |
| Test Setup |  | | |
| Test Procedure | According with KDB 971168 v02r02<br><br>5.7.2 Alternate procedure for PAPR<br><br>5.1.2 Peak power measurements with a peak power meter<br><br>The total peak output power may be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.<br><br>5.2.3 Average power measurement with average power meter<br><br>As an alternative to the use of a spectrum/signal analyzer or EMI receiver to perform a measurement of the total in-band average output power, a wideband RF average power meter with a thermocouple detector or equivalent can be used under certain conditions<br>If the EUT can be configured to transmit continuously (i.e., the burst duty | | |

| | |
|---|---|
| | cycle ≥ 98%) and at all times the EUT is transmitting at is maximum output power level, then a conventional wide-band RF power meter can be used.<br>If the EUT cannot be configured to transmit continuously (i.e., the burst duty cycle < 98%), then there are two options for the use of an average power meter. First, a gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only over active transmission bursts at maximum output power levels. A conventional average power meter can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to 10log(1/duty cycle) |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

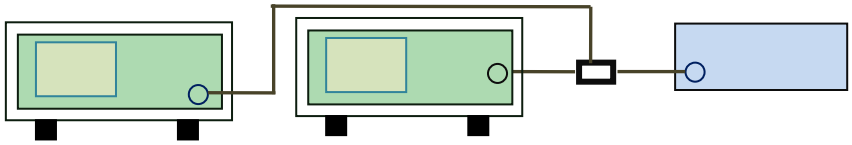
## LTE Band IV (part 27)

| BW(MHz) | Frequency (MHz) | Mode | Modulation | Conducted Power (dBm) | | Peak-Average Ratio (PAR) |
|---|---|---|---|---|---|---|
| | | | | Peak | Average | |
| 1.4 | 1732.5 | RB 1/0 | QPSK | 24.69 | 22.78 | 1.91 |
| | | | 16QAM | 25.69 | 22.78 | 2.91 |
| 3 | 1732.5 | RB 1/0 | QPSK | 25.32 | 23.23 | 2.09 |
| | | | 16QAM | 25.28 | 22.04 | 3.24 |
| 5 | 1732.5 | RB 1/0 | QPSK | 25.45 | 24.08 | 1.37 |
| | | | 16QAM | 25.61 | 23.25 | 2.36 |
| 10 | 1732.5 | RB 1/0 | QPSK | 25.68 | 23.87 | 1.81 |
| | | | 16QAM | 25.81 | 23.25 | 2.56 |
| 15 | 1732.5 | RB 1/0 | QPSK | 25.73 | 23.86 | 1.87 |
| | | | 16QAM | 25.34 | 23.15 | 2.19 |
| 20 | 1732.5 | RB 1/0 | QPSK | 25.77 | 23.08 | 2.69 |
| | | | 16QAM | 25.89 | 23.86 | 2.03 |

## 6.4 Occupied Bandwidth

| | |
|---|---|
| Temperature | 23℃ |
| Relative Humidity | 56% |
| Atmospheric Pressure | 1014mbar |
| Test date : | October 14, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1049, §27.53(a) | a) | 99% Occupied Bandwidth(kHz) | ☑ |
| | b) | 26 dB Bandwidth(kHz) | ☑ |
| Test Setup |  | | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

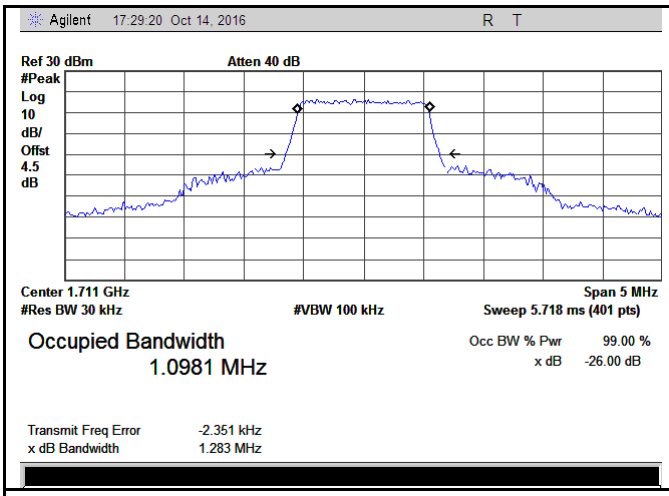
## LTE Band IV (Part 27)

| BW(MHz) | Channel | Frequency (MHz) | Modulation | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|---|---|
| 1.4 | 19957 | 1710.7 | 16QAM | 1.1031 | 1.285 |
| | | | QPSK | 1.0981 | 1.283 |
| 1.4 | 20175 | 1732.5 | 16QAM | 1.1034 | 1.284 |
| | | | QPSK | 1.0990 | 1.287 |
| 1.4 | 20393 | 1754.3 | 16QAM | 1.1115 | 1.311 |
| | | | QPSK | 1.1068 | 1.313 |
| 3 | 19965 | 1711.5 | 16QAM | 2.7431 | 3.094 |
| | | | QPSK | 2.7480 | 3.112 |
| 3 | 20175 | 1732.5 | 16QAM | 2.7458 | 3.107 |
| | | | QPSK | 2.7403 | 3.122 |
| 3 | 20385 | 1753.5 | 16QAM | 2.7727 | 3.154 |
| | | | QPSK | 2.7661 | 3.237 |
| 5 | 19975 | 1712.5 | 16QAM | 4.5511 | 5.092 |
| | | | QPSK | 4.5331 | 5.051 |
| 5 | 20175 | 1732.5 | 16QAM | 4.5497 | 5.148 |
| | | | QPSK | 4.5532 | 5.134 |
| 5 | 20375 | 1752.5 | 16QAM | 4.5499 | 5.080 |
| | | | QPSK | 4.5284 | 5.075 |
| 10 | 20000 | 1715 | 16QAM | 9.0828 | 10.363 |
| | | | QPSK | 9.0692 | 10.256 |
| 10 | 20175 | 1732.5 | 16QAM | 9.0959 | 10.337 |
| | | | QPSK | 9.0821 | 10.237 |
| 10 | 20350 | 1750 | 16QAM | 9.1256 | 10.296 |
| | | | QPSK | 9.0932 | 10.246 |
| 15 | 20025 | 1717.5 | 16QAM | 13.5221 | 15.087 |
| | | | QPSK | 13.5363 | 15.056 |
| 15 | 20175 | 1732.5 | 16QAM | 13.5263 | 15.005 |
| | | | QPSK | 13.4888 | 14.947 |
| 15 | 20325 | 1747.5 | 16QAM | 13.4768 | 15.045 |
| | | | QPSK | 13.4978 | 14.949 |

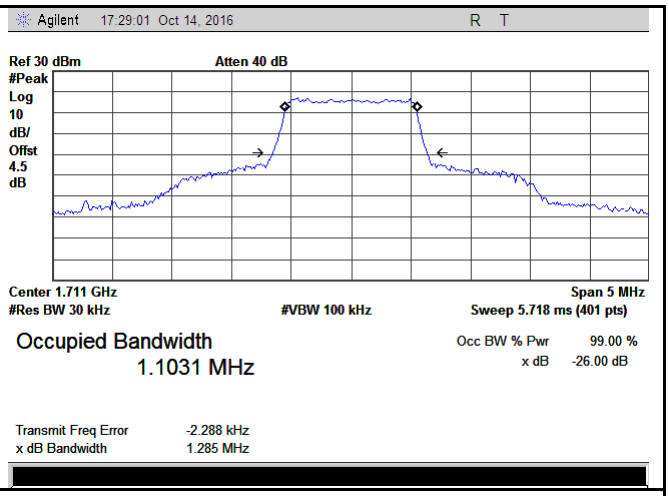
| | | | | | |
|---|---|---|---|---|---|
| 20 | 20050 | 1720 | 16QAM | 17.9211 | 19.561 |
| | | | QPSK | 17.9777 | 19.505 |
| 20 | 20175 | 1732.5 | 16QAM | 17.9881 | 19.804 |
| | | | QPSK | 17.9330 | 19.653 |
| 20 | 20300 | 1745 | 16QAM | 17.9060 | 19.307 |
| | | | QPSK | 17.9021 | 19.495 |

## Test Plots

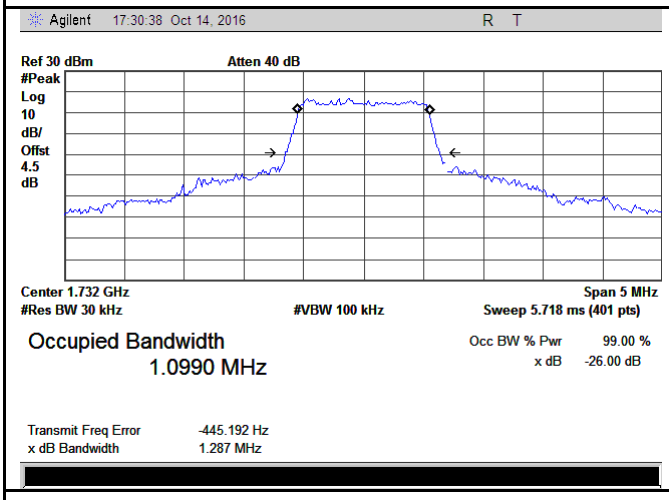
### LTE Band IV (Part 27)



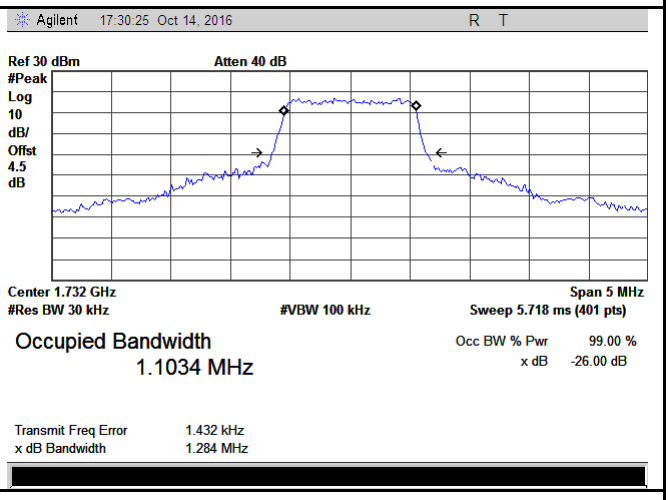

LTE band IV - Low CH QPSK-1.4



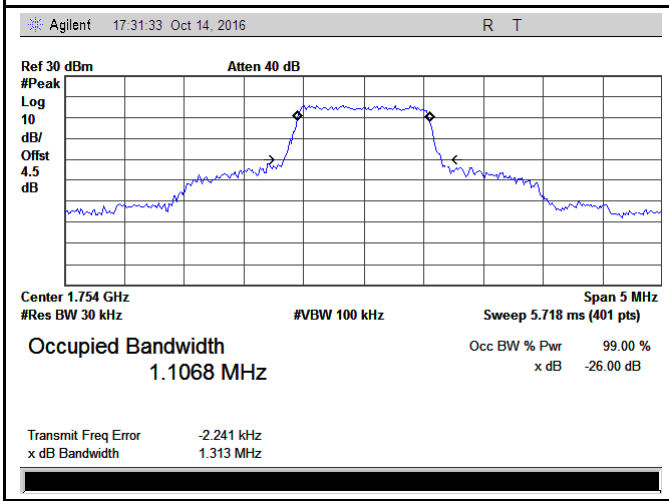

LTE band IV - Low CH 16QAM-1.4



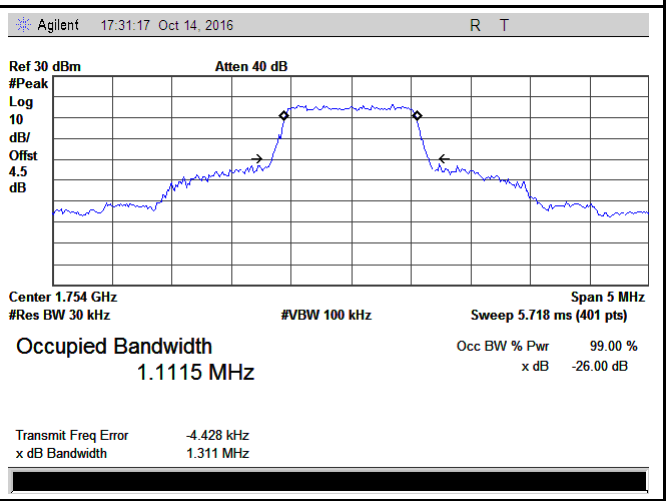

LTE band IV - Middle CH QPSK-1.4



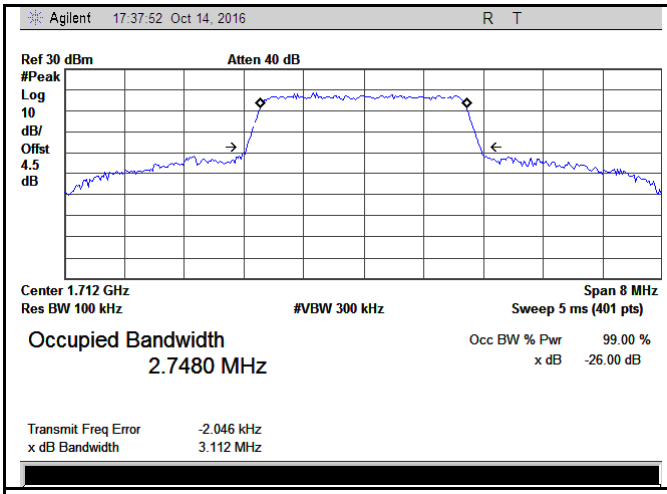

LTE band IV - Middle CH 16QAM-1.4



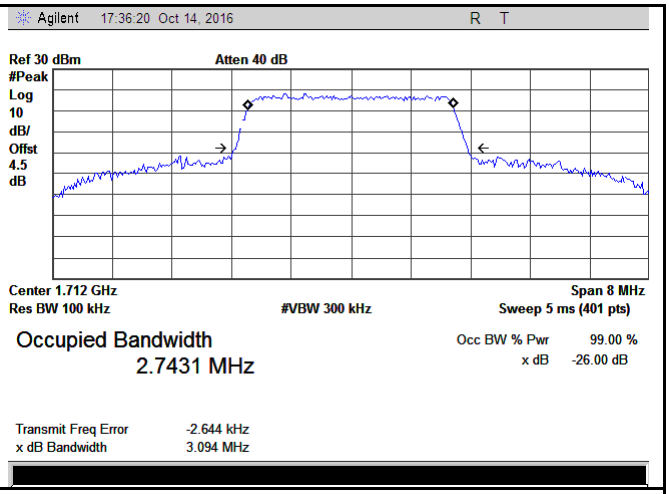

LTE band IV - High CH QPSK-1.4



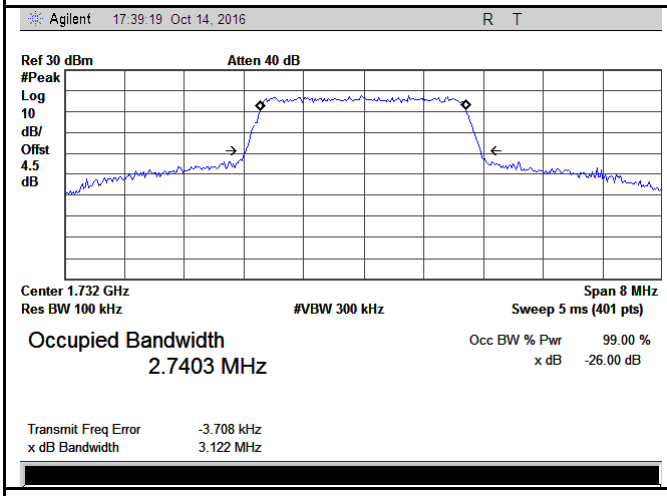

LTE band IV - High CH 16QAM-1.4



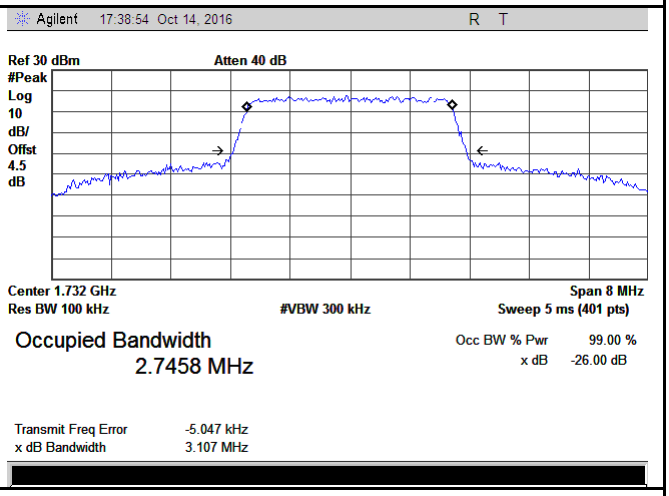

LTE band IV - Low CH QPSK-3



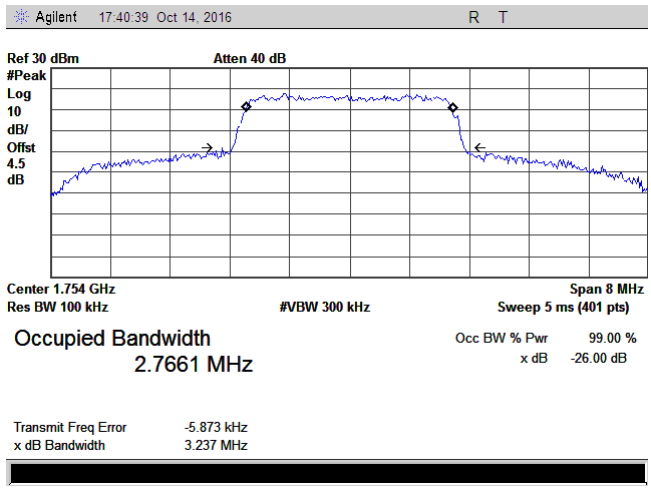

LTE band IV - Low CH 16QAM-3



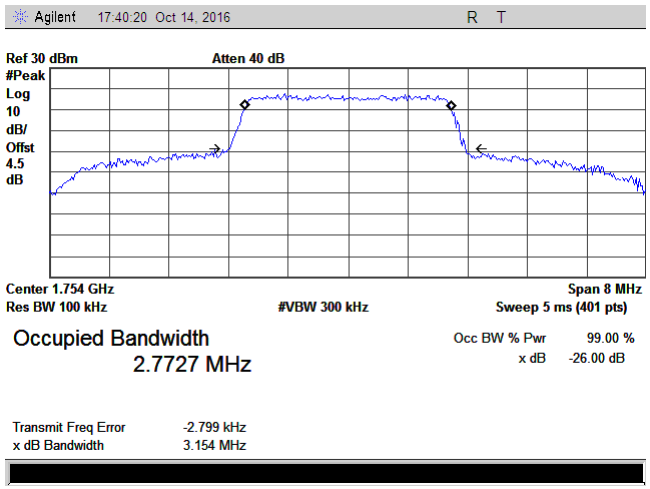

LTE band IV - Middle CH QPSK-3



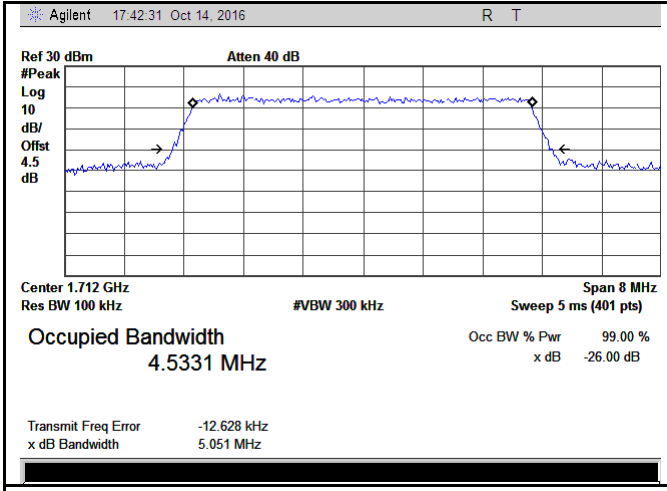

LTE band IV - Middle CH 16QAM-3



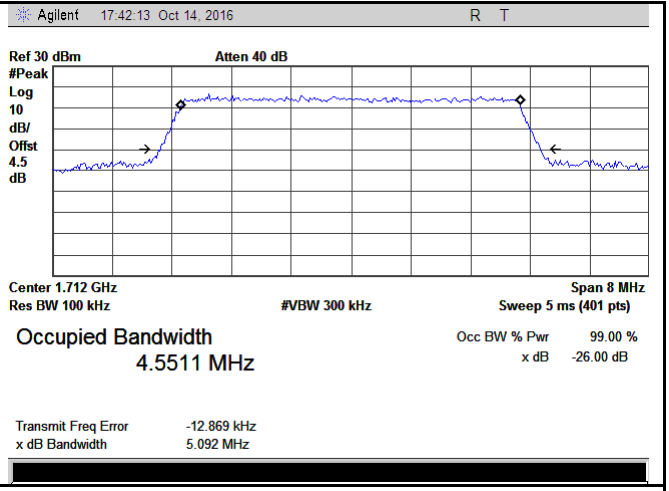

LTE band IV - High CH QPSK-3



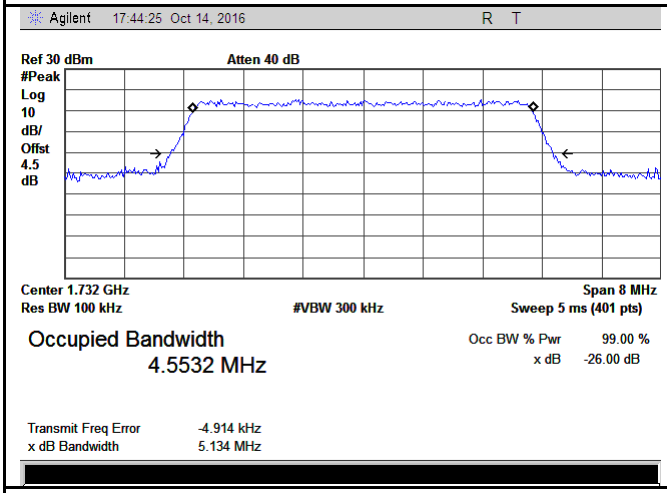

LTE band IV - High CH 16QAM-3



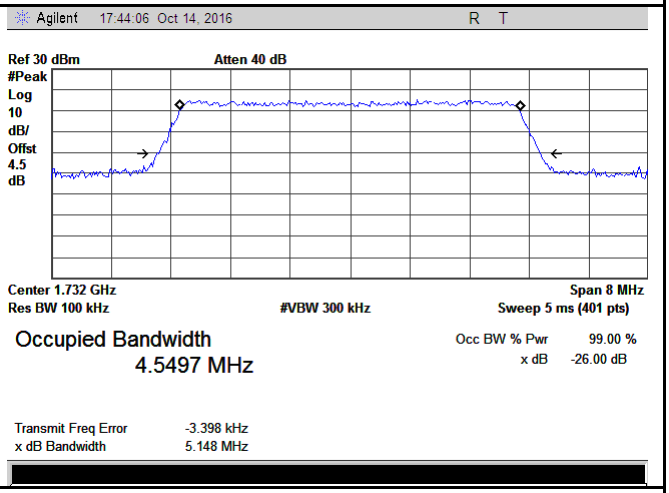

LTE band IV - Low CH QPSK-5



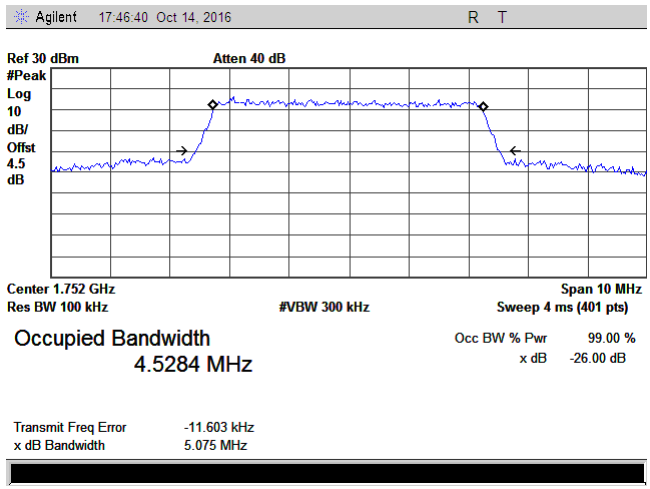

LTE band IV - Low CH 16QAM-5



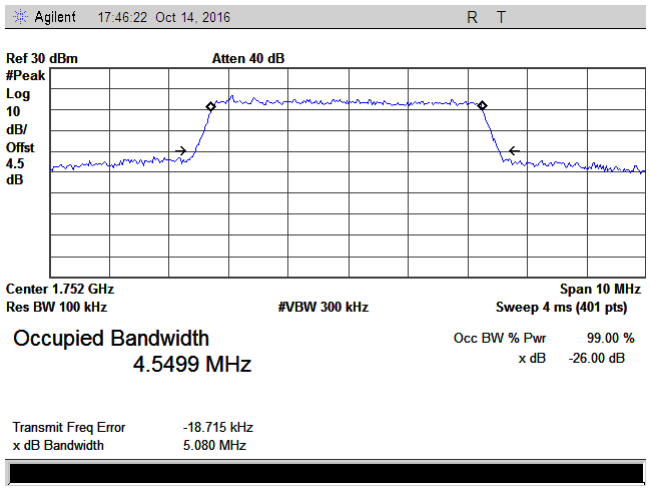

LTE band IV - Middle CH QPSK-5



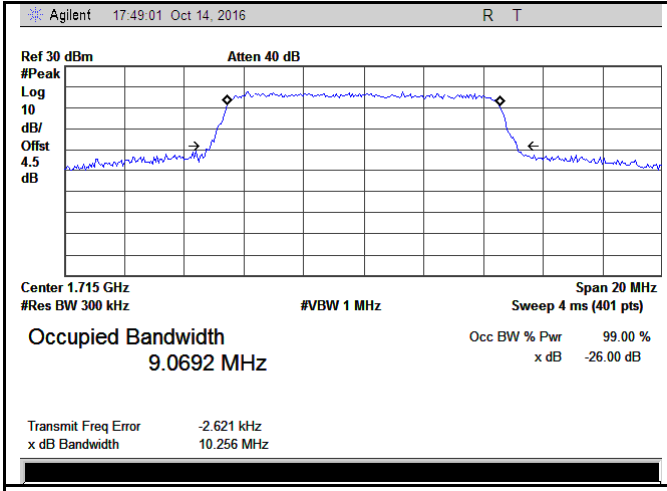

LTE band IV - Middle CH 16QAM-5



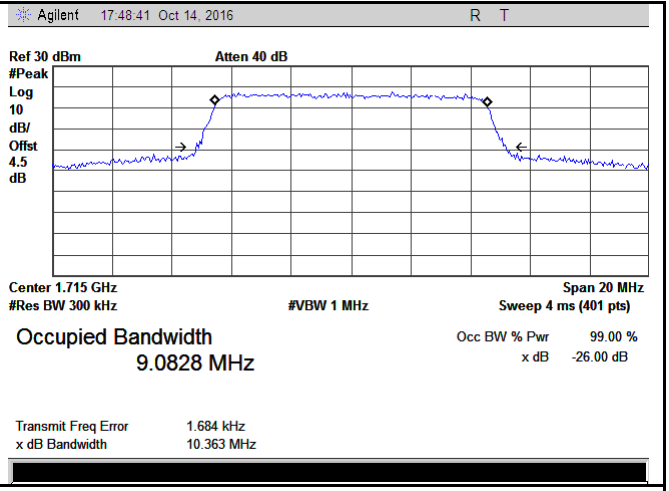

LTE band IV - High CH QPSK-5



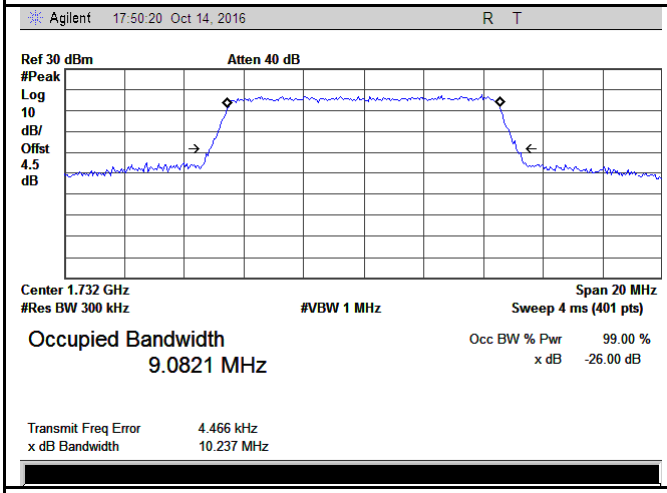

LTE band IV - High CH 16QAM-5



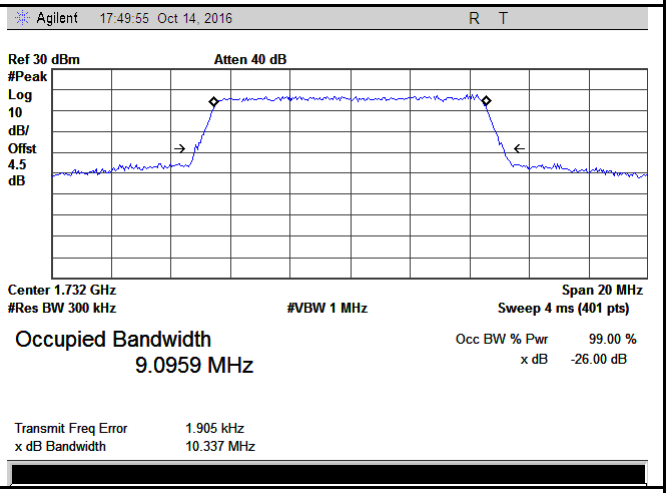

LTE band IV - Low CH QPSK-10



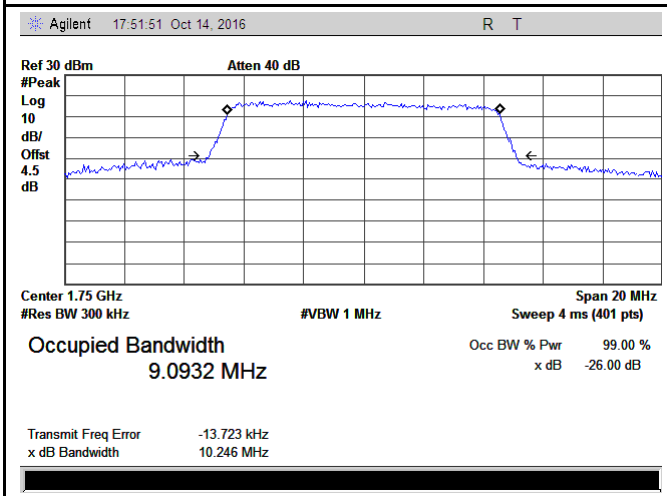

LTE band IV - Low CH 16QAM-10



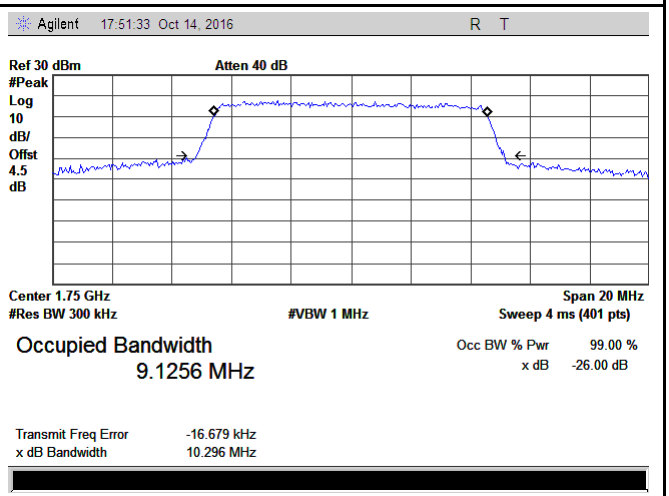

LTE band IV - Middle CH QPSK-10



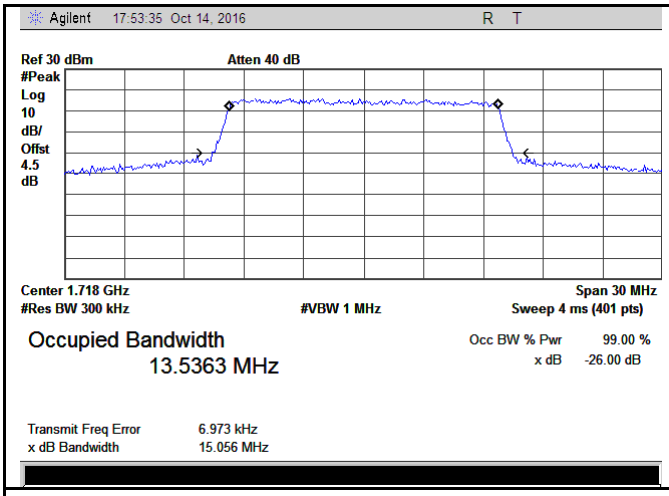

LTE band IV - Middle CH 16QAM-10



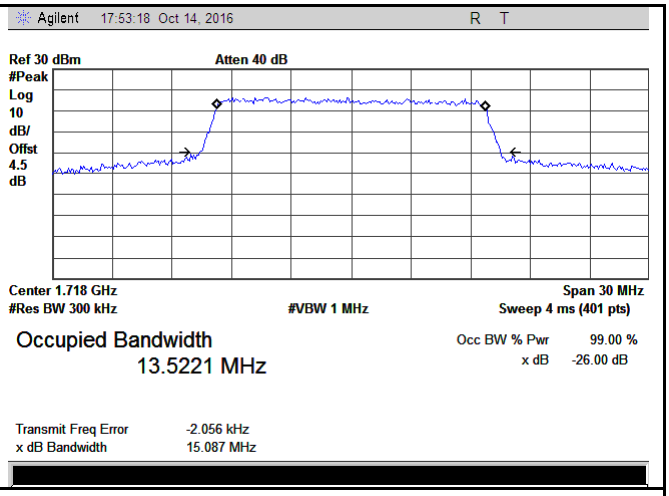

LTE band IV - High CH QPSK-10



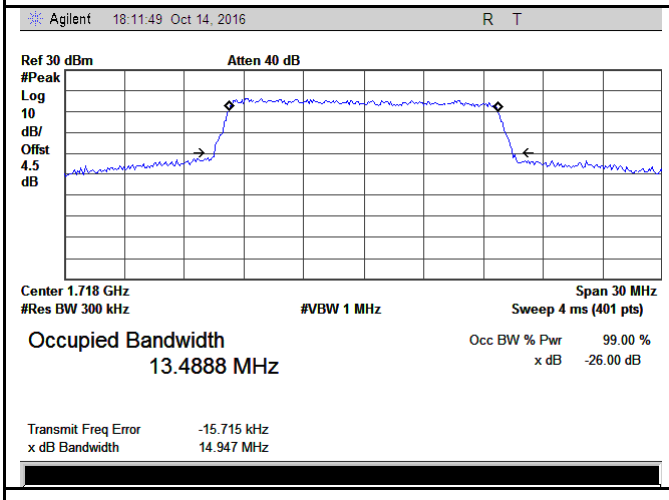

LTE band IV - High CH 16QAM-10



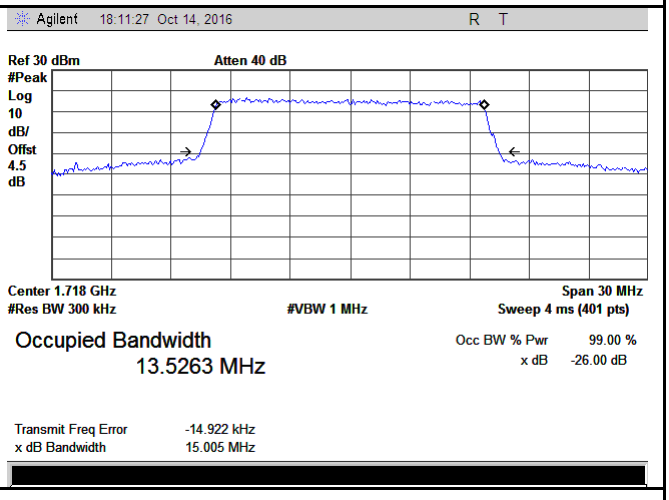

LTE band IV - Low CH QPSK-15



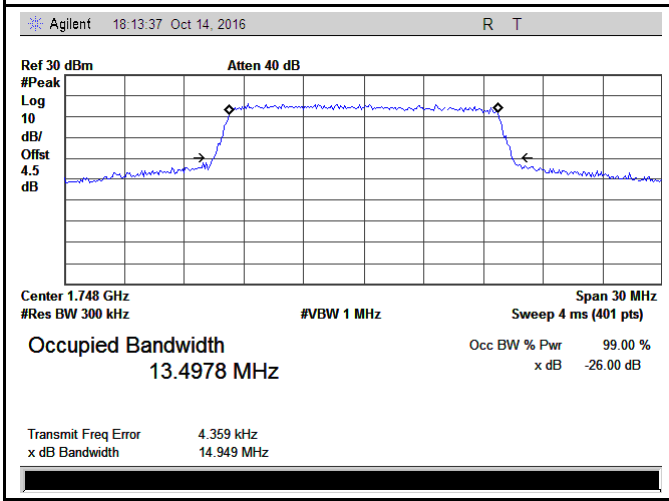

LTE band IV - Low CH 16QAM-15



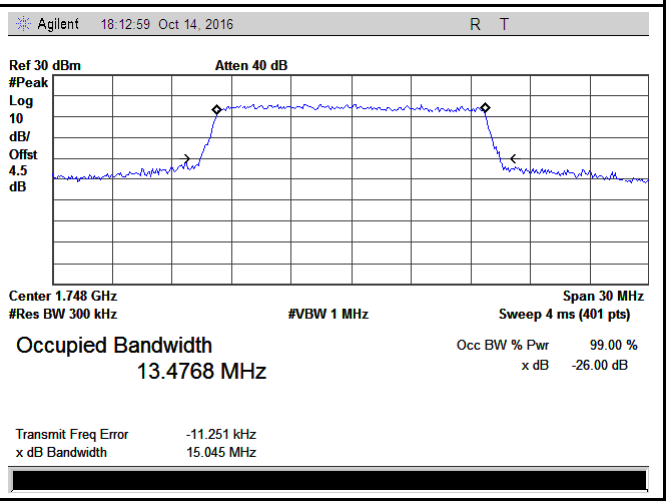

LTE band IV - Middle CH QPSK-15



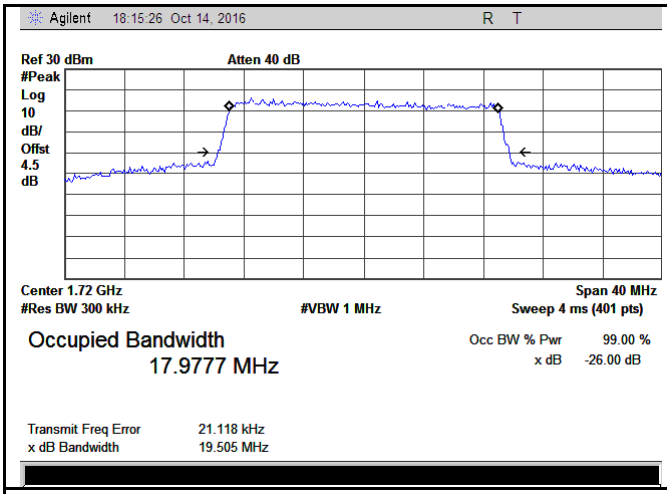

LTE band IV - Middle CH 16QAM-15



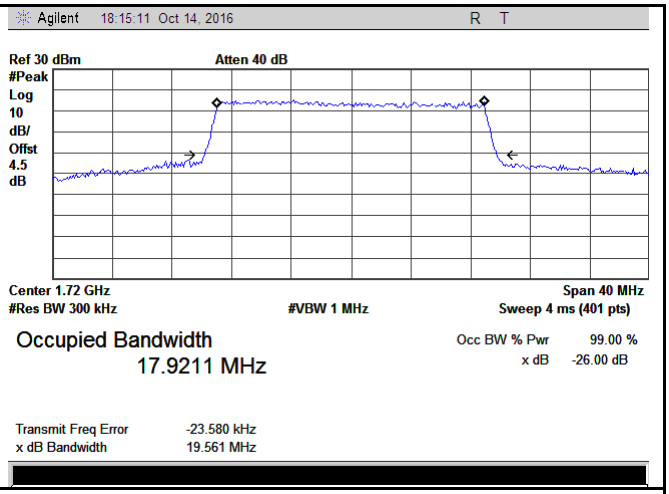

LTE band IV - High CH QPSK-15



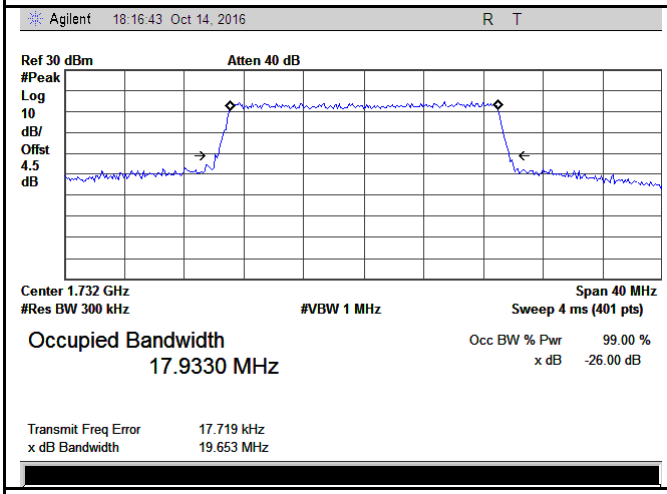

LTE band IV - High CH 16QAM-15



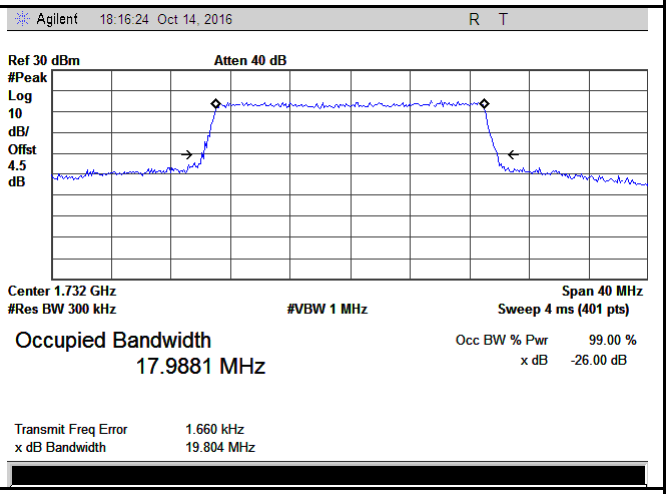

LTE band IV - Low CH QPSK-20



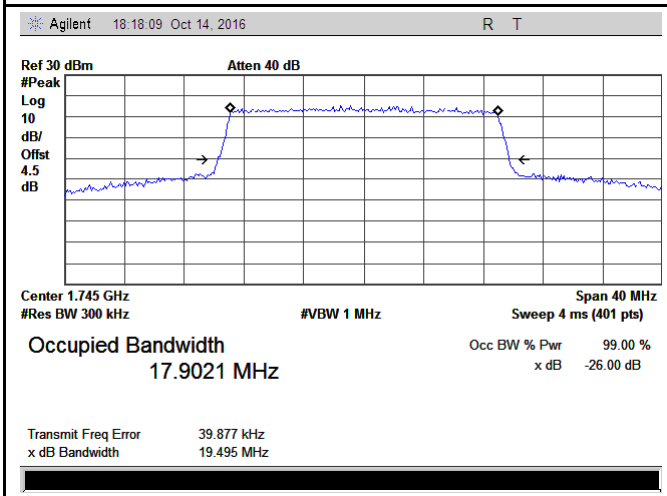

LTE band IV - Low CH 16QAM-20



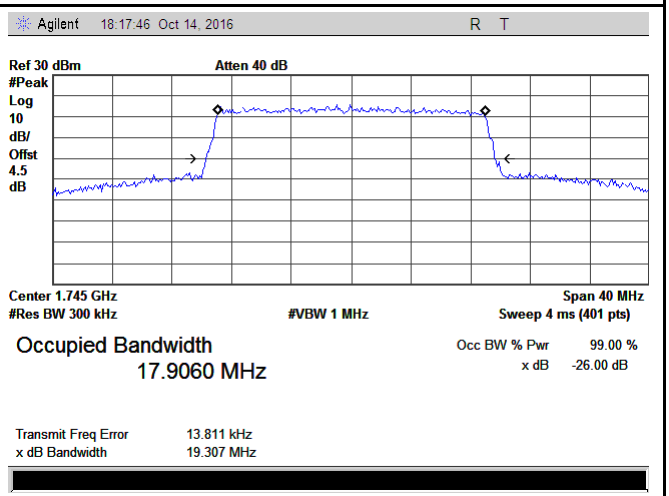

LTE band IV - Middle CH QPSK-20




LTE band IV - Middle CH 16QAM-20




LTE band IV - High CH QPSK-20

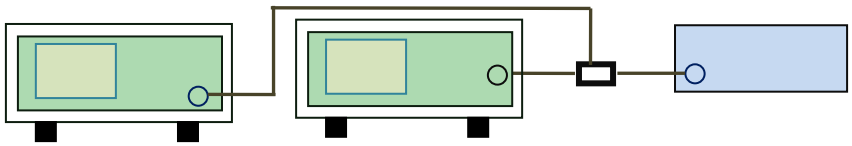



LTE band IV - High CH 16QAM-20

## 6.5 Spurious Emissions at Antenna Terminals

| | |
|---|---|
| Temperature | 23℃ |
| Relative Humidity | 56% |
| Atmospheric Pressure | 1014mbar |
| Test date : | October 14, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

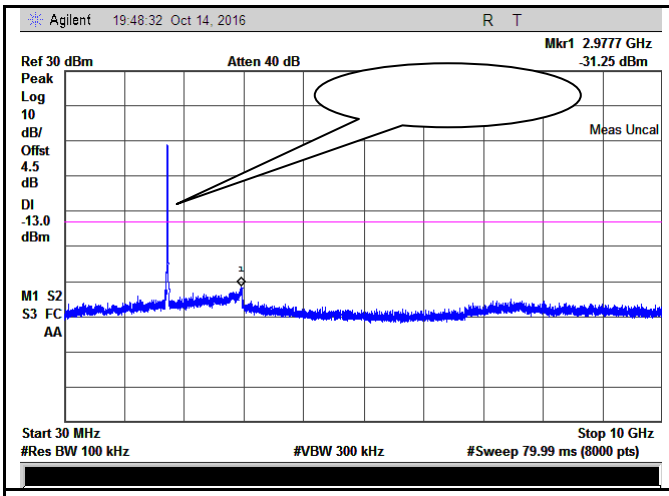
| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1051, § 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB | ☑ |
| Test Setup |  | | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The Band Edges of low and high channels for the highest RF powers were measured.<br>- Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

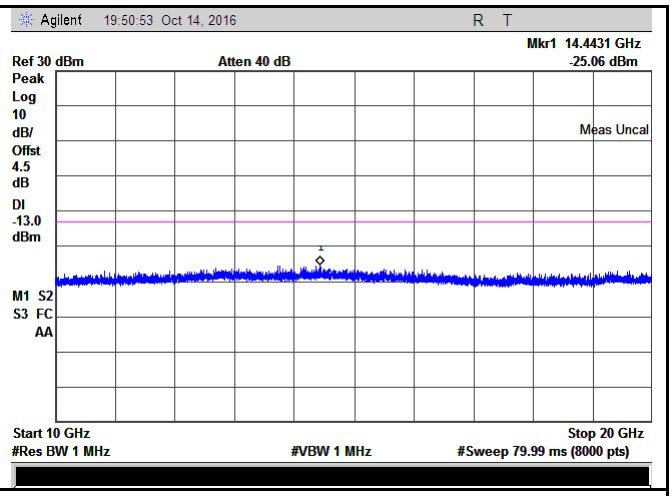
**Test Plot** ☑ Yes (See below) ☐ N/A

## Test Plots 30MHz-20GHz

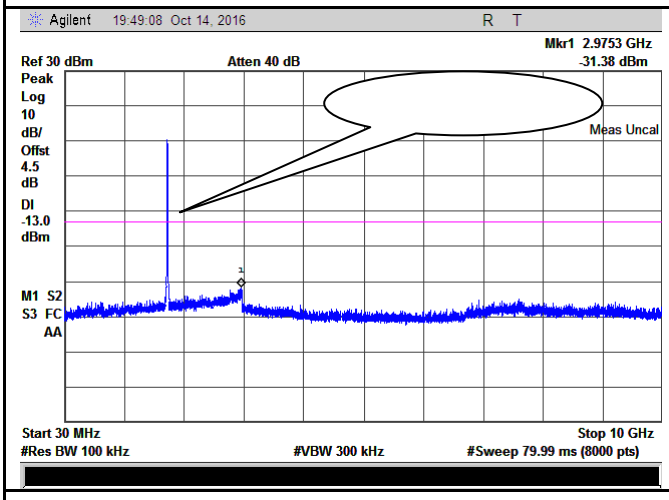
### LTE Band IV (Part27) result



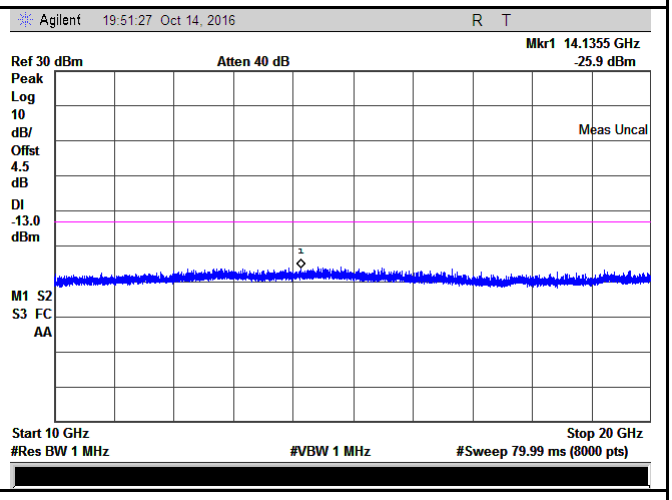

LTE Band IV - Low Channel-1



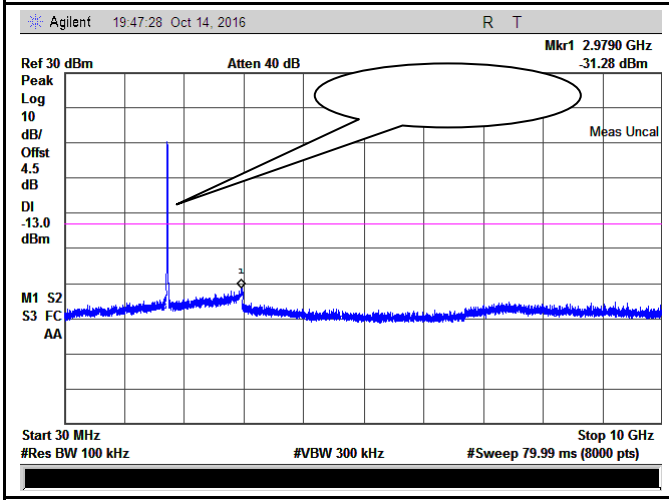

LTE Band IV - Low Channel-2



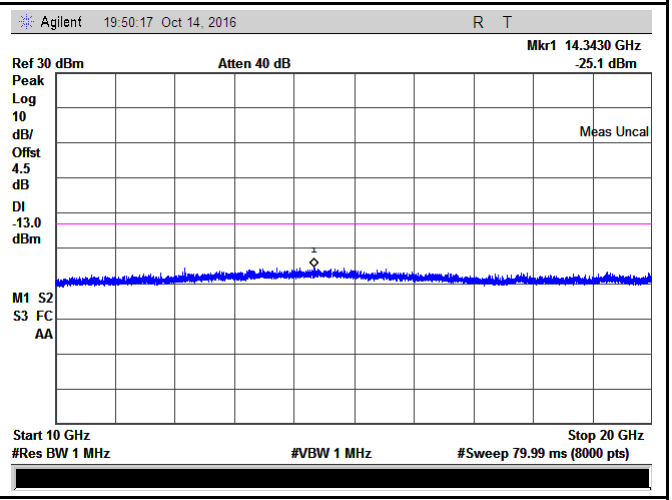

LTE Band IV - Middle Channel-1




LTE Band IV - Middle Channel-2




LTE Band IV - High Channel-1

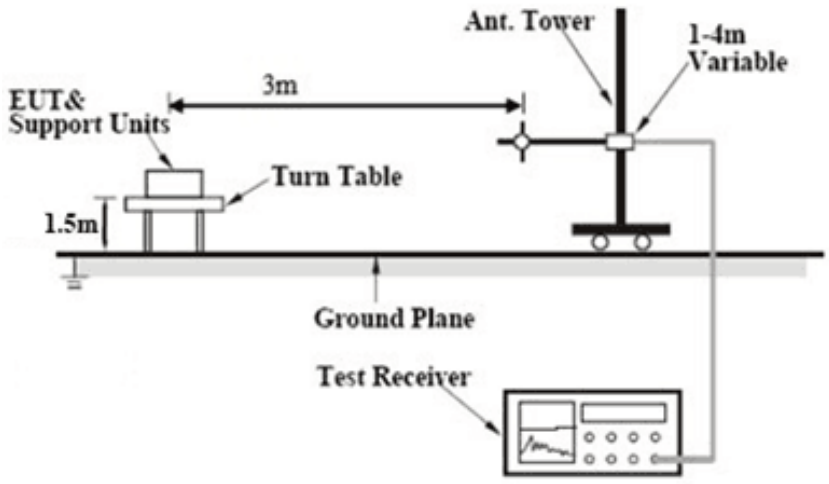



LTE Band IV - High Channel-2

## 6.6 Spurious Radiated Emissions

| | |
|---|---|
| Temperature | 23℃ |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1010mbar |
| Test date : | October 12, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1053, § 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic. | ☑ |
| Test setup |  | | |
| Test Procedure | 1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.<br>2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.<br>3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.<br>Sample Calculation:<br>EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used) | | |

| Remark | |
|---|---|
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## LTE Band IV (Part27) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3440 | -46.58 | V | 10.06 | 2.52 | -39.04 | -13 | -26.04 |
| 3440 | -46.93 | H | 10.06 | 2.52 | -39.39 | -13 | -26.39 |
| 574.1 | -56.54 | V | 6.5 | 0.36 | -50.4 | -13 | -37.40 |
| 842.9 | -49.95 | H | 6.8 | 0.44 | -43.59 | -13 | -30.59 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3465 | -47.22 | V | 10.09 | 2.52 | -39.65 | -13 | -26.65 |
| 3465 | -47.73 | H | 10.09 | 2.52 | -40.16 | -13 | -27.16 |
| 571.3 | -57.05 | V | 6.5 | 0.36 | -50.91 | -13 | -37.91 |
| 843.7 | -50.21 | H | 6.8 | 0.44 | -43.85 | -13 | -30.85 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3490 | -46.83 | V | 10.09 | 2.52 | -39.26 | -13 | -26.26 |
| 3490 | -46.67 | H | 10.09 | 2.52 | -39.1 | -13 | -26.10 |
| 573.6 | -57.13 | V | 6.5 | 0.36 | -50.99 | -13 | -37.99 |
| 844.3 | -50.24 | H | 6.8 | 0.44 | -43.88 | -13 | -30.88 |

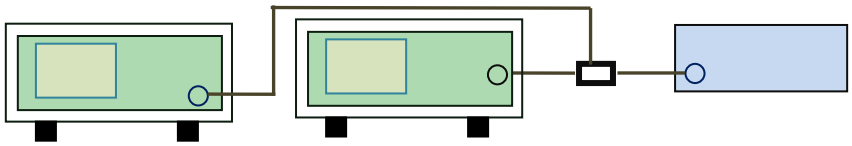
**Note:**

*1, The testing has been conformed to 10*1752.5MHz=17,525MHz*
*2, All other emissions more than 30 dB below the limit*
*3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.*

## 6.7 Band Edge

| | |
|---|---|
| Temperature | 24℃ |
| Relative Humidity | 57% |
| Atmospheric Pressure | 1015mbar |
| Test date : | October 15, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| § 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. | ☑ |
| Test setup |  | | |
| Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

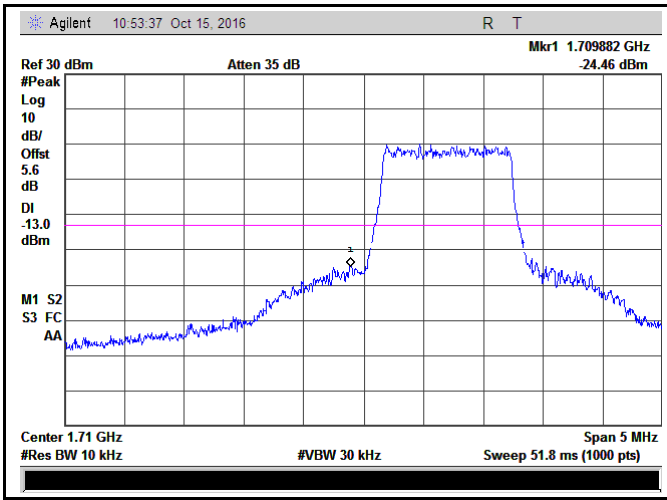
**Test Plot** ☑ Yes (See below) ☐ N/A

## LTE Band IV (Part 27) result

| BW(MHz) | Channel | Frequency (MHz) | Mode | Emission (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 1.4 | 19957 | 1709 | QPSK | -24.46 | -13 |
| | | | 16QAM | -24.31 | -13 |
| 1.4 | 20393 | 1755 | QPSK | -25.10 | -13 |
| | | | 16QAM | -25.62 | -13 |
| 3 | 19965 | 1709 | QPSK | -21.73 | -13 |
| | | | 16QAM | -21.08 | -13 |
| 3 | 20385 | 1755 | QPSK | -24.14 | -13 |
| | | | 16QAM | -24.24 | -13 |
| 5 | 19975 | 1709 | QPSK | -17.66 | -13 |
| | | | 16QAM | -17.31 | -13 |
| 5 | 20375 | 1755 | QPSK | -21.30 | -13 |
| | | | 16QAM | -21.10 | -13 |
| 10 | 20000 | 1709 | QPSK | -18.00 | -13 |
| | | | 16QAM | -19.74 | -13 |
| 10 | 20350 | 1755 | QPSK | -23.06 | -13 |
| | | | 16QAM | -23.16 | -13 |
| 15 | 20025 | 1709 | QPSK | -19.05 | -13 |
| | | | 16QAM | -18.90 | -13 |
| 15 | 20325 | 1755 | QPSK | -25.58 | -13 |
| | | | 16QAM | -25.31 | -13 |
| 20 | 20050 | 1709 | QPSK | -16.15 | -13 |
| | | | 16QAM | -16.36 | -13 |
| 20 | 20300 | 1755 | QPSK | -25.26 | -13 |
| | | | 16QAM | -24.67 | -13 |

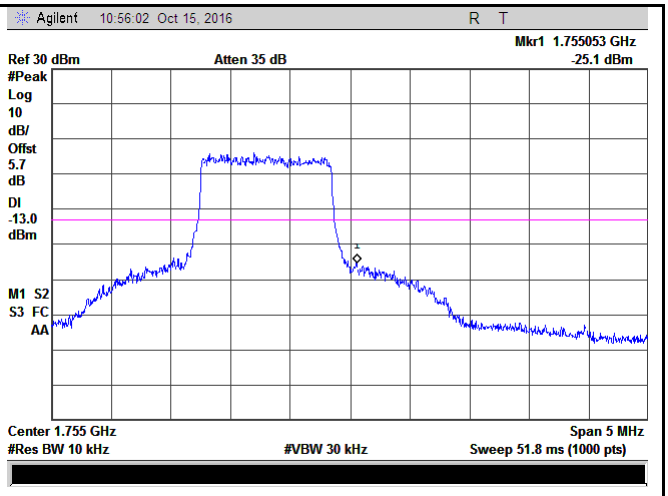
## Test Plots

### LTE Band IV (Part 27)



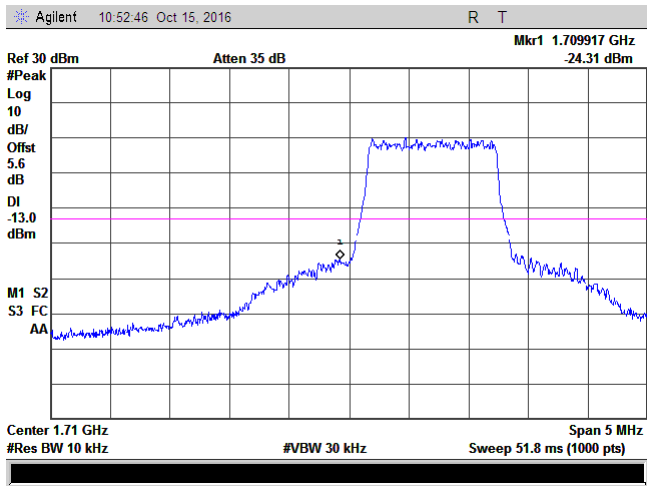

LTE Band IV - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.83/10)=4.5+1.1=5.6 dB



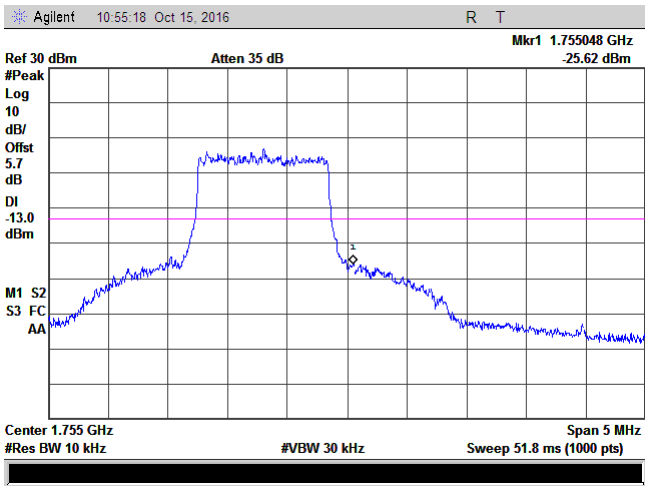

LTE Band IV - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.13/10)=4.5+1.2=5.7 dB



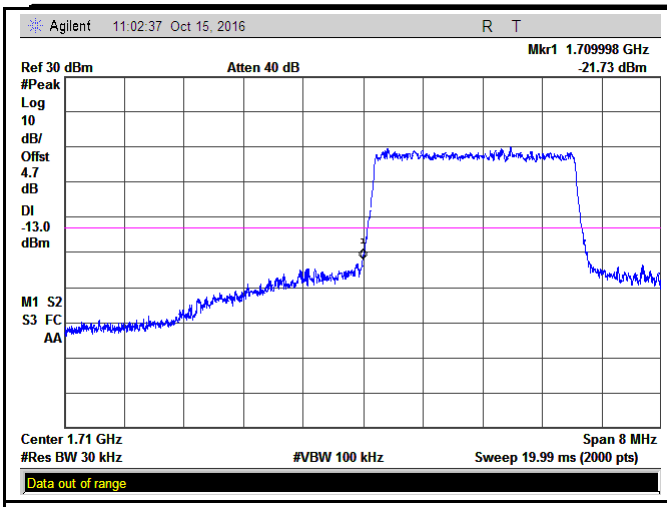

LTE Band IV - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.85/10)=4.5+1.1=5.6 dB



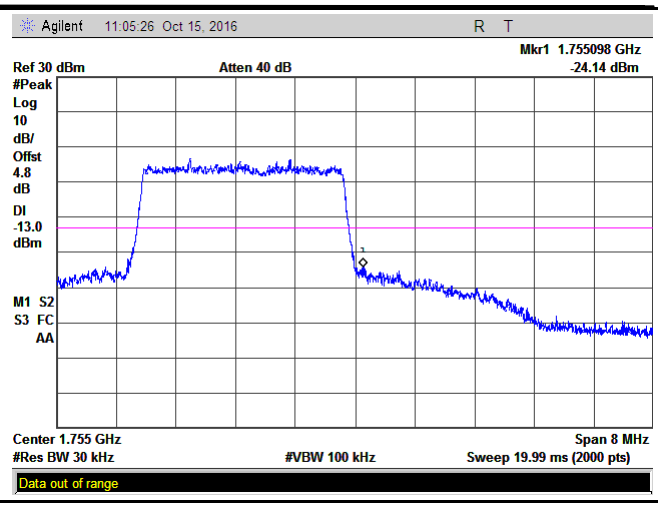

LTE Band IV - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.11/10)=4.5+1.2=5.7 dB



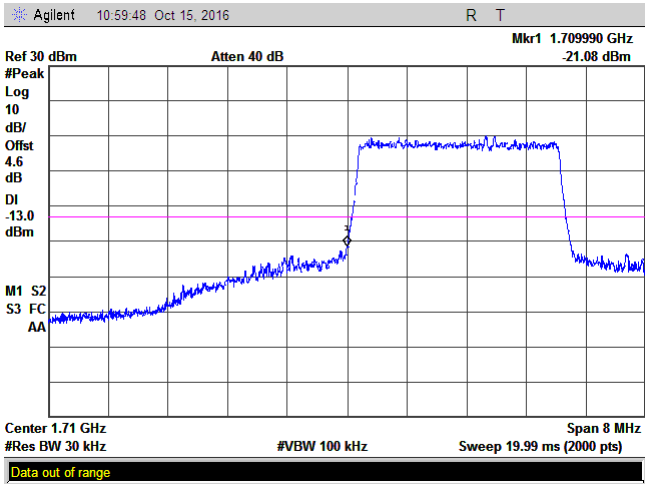

LTE Band IV - Low Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (31.12/30)=4.5+0.2=4.7 dB



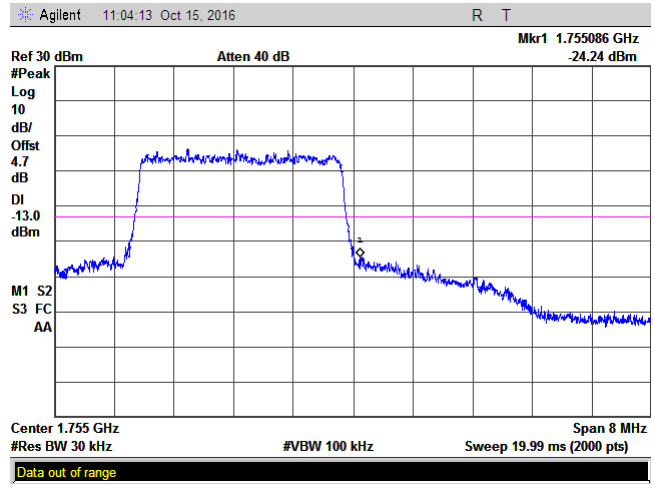

LTE Band IV - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (32.37/30)=4.5+0.3=4.8 dB



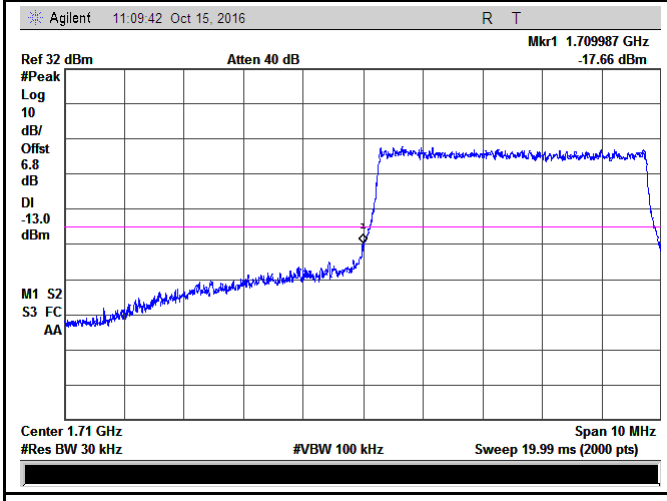

LTE Band IV - Low Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (30.94/30)=4.5+0.1=4.6 dB

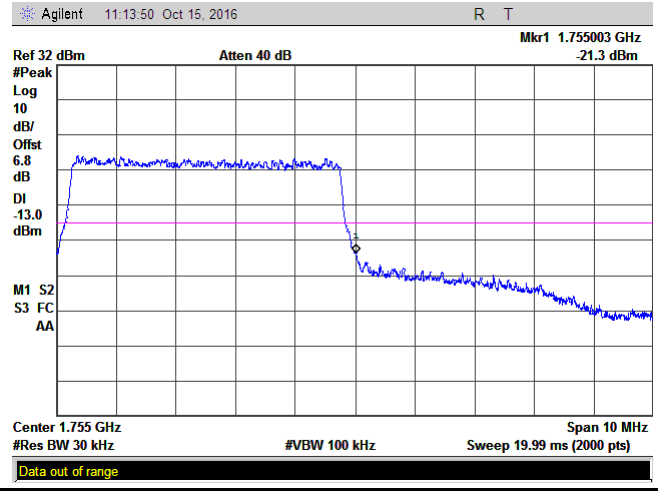



LTE Band IV - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (31.54/30)=4.5+0.2=4.7 dB

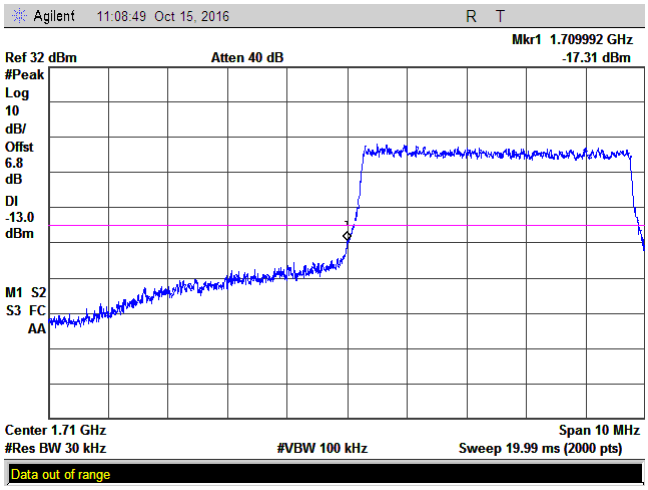



LTE Band IV - Low Channel QPSK-5



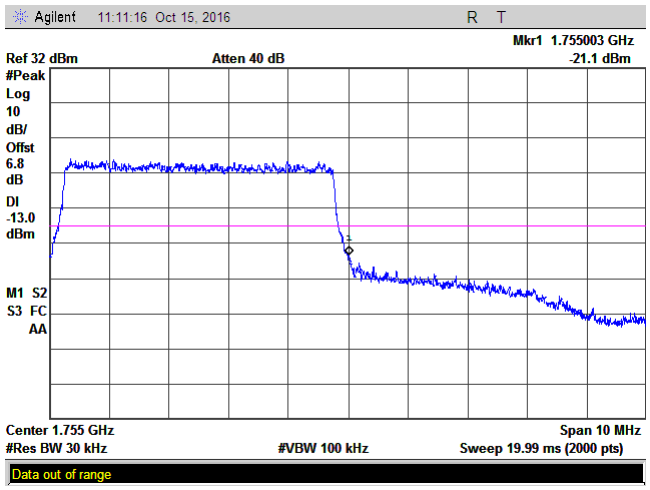

LTE Band IV - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (50.51/30)=4.5+2.3=6.8 dB



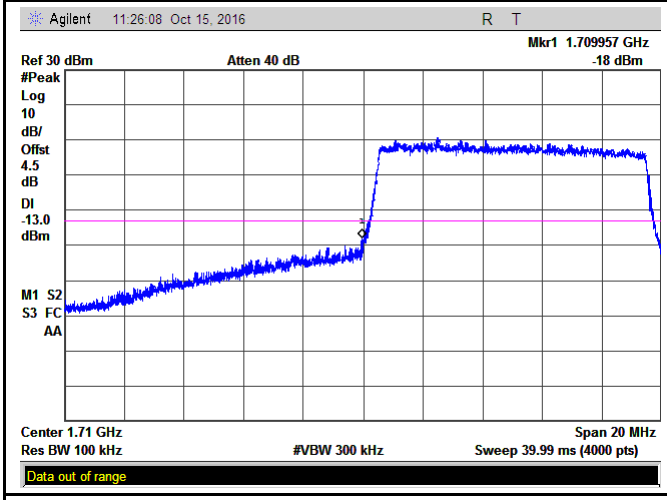

LTE Band IV - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.75/30)=4.5+2.3=6.8 dB



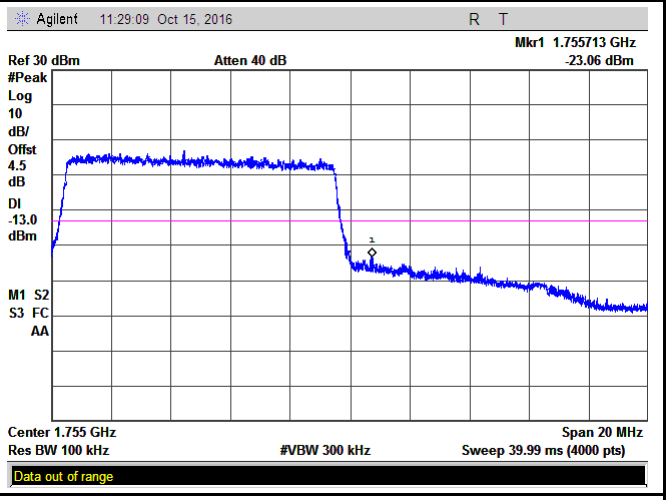

LTE Band IV - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.92/30)=4.5+2.3=6.8 dB

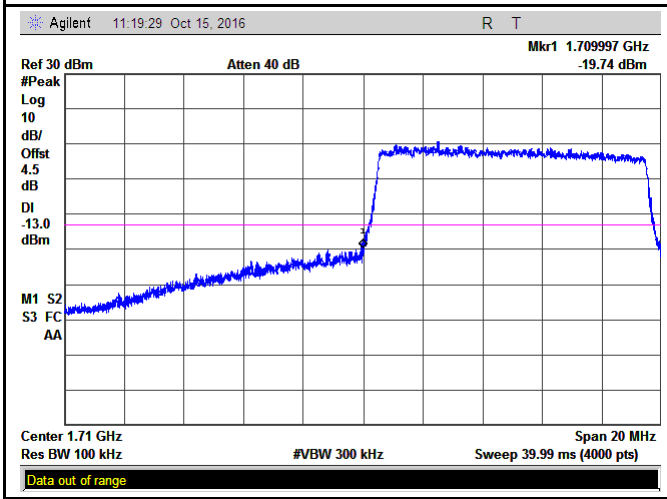



LTE Band IV - Low Channel QPSK-10

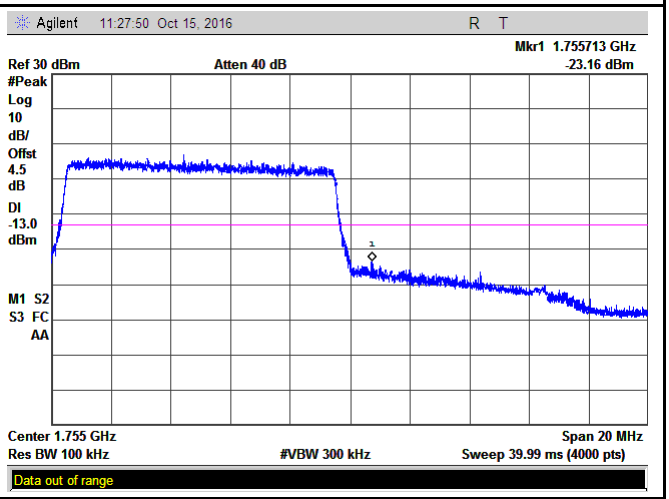
Note: Offset=Cable loss (4.5) + 10log (50.8/30)=4.5+2.3=6.8 dB



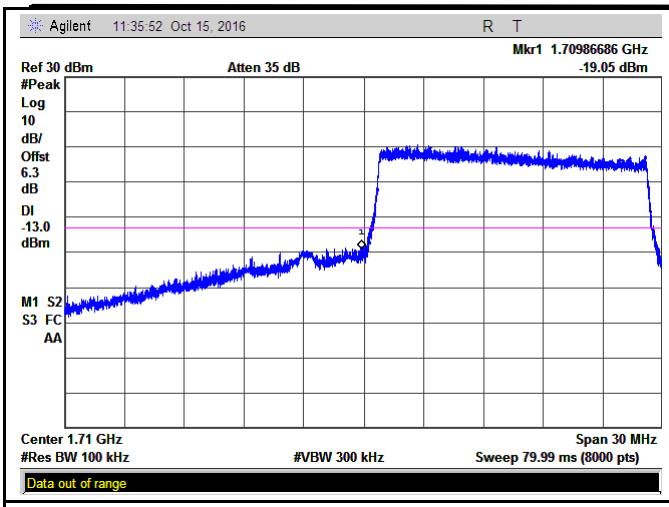

LTE Band IV - High Channel QPSK-10




LTE Band IV - Low Channel 16QAM-10

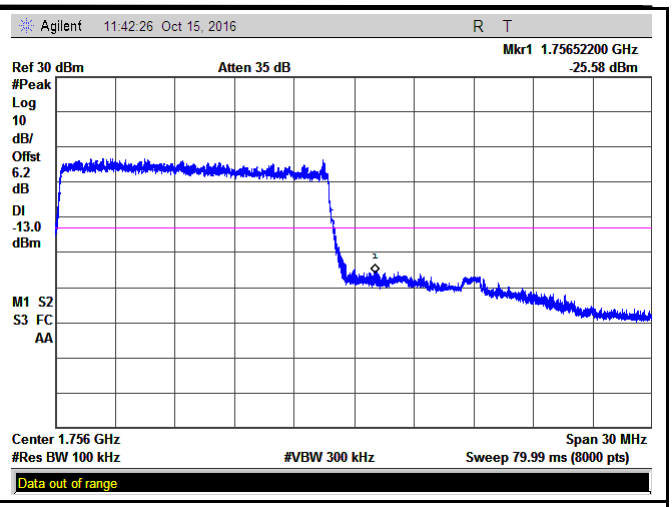



LTE Band IV - High Channel 16QAM-10



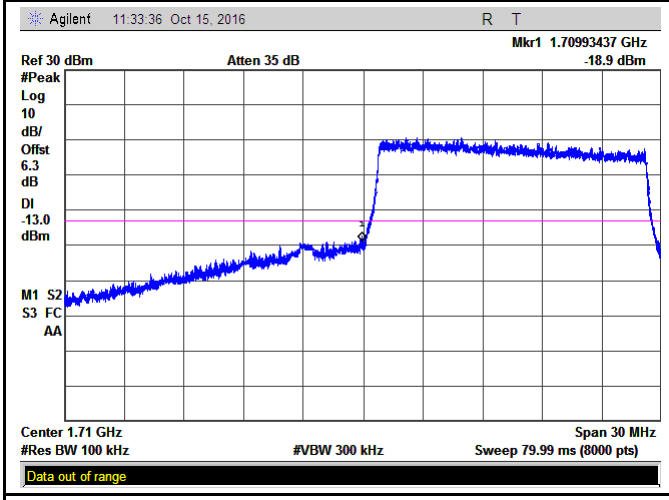

LTE Band IV - Low Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (150.6/100)=4.5+1.8=6.3 dB



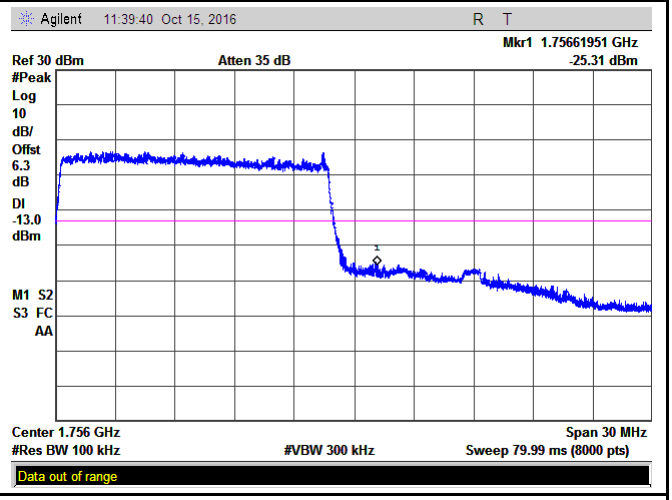

LTE Band IV - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (149.5/100)=4.5+1.7=6.2 dB



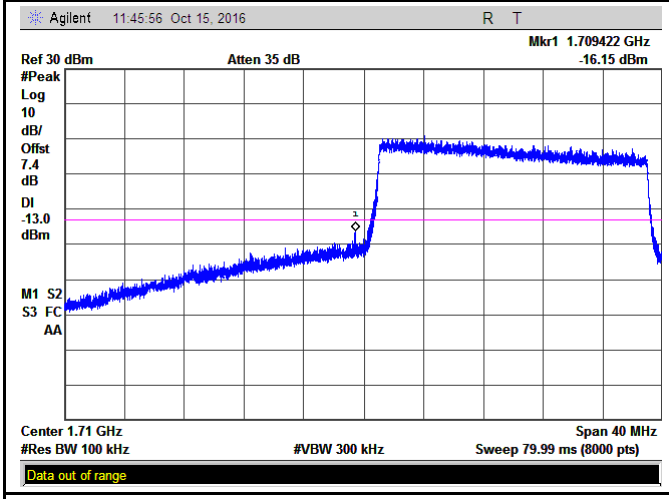

LTE Band IV - Low Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (150.9/100)=4.5+1.8=6.3 dB

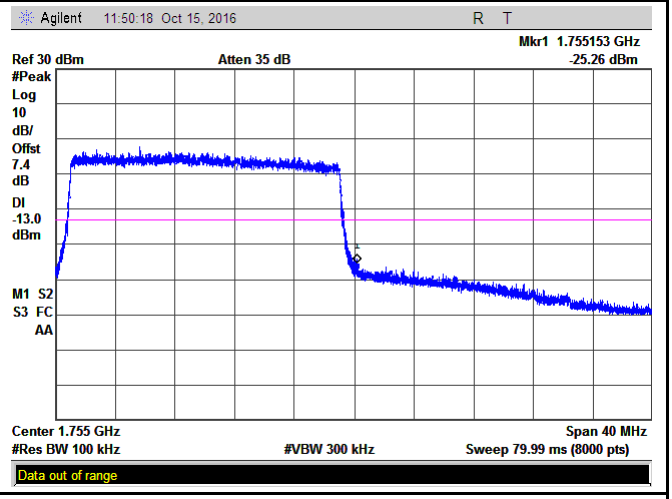



LTE Band IV - High Channel 16QAM-15

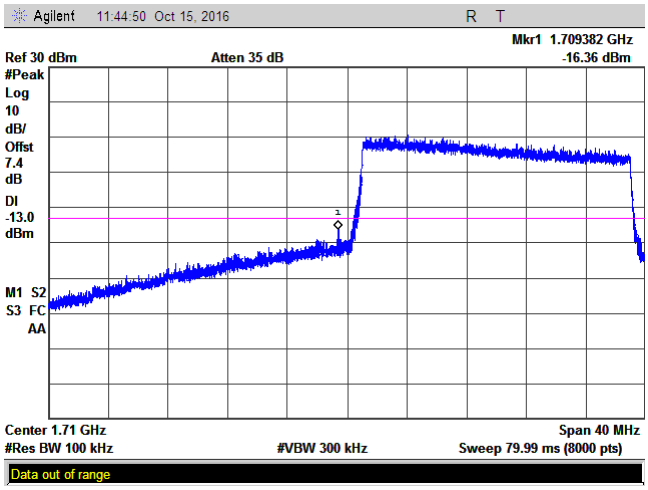
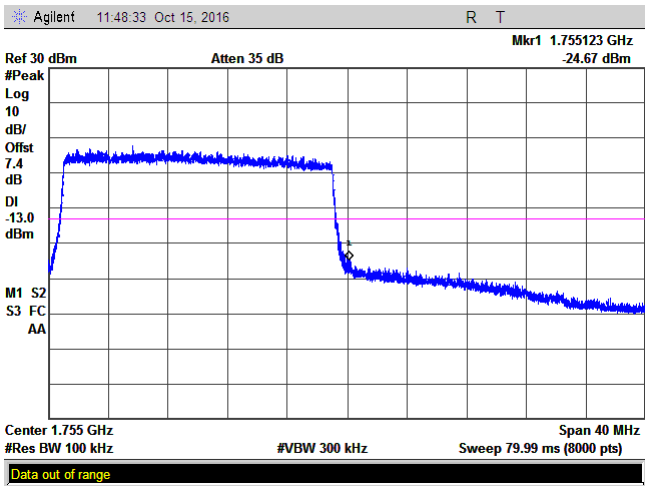
Note: Offset=Cable loss (4.5) + 10log (150.5/100)=4.5+1.8=6.3 dB




LTE Band IV - Low Channel QPSK-20



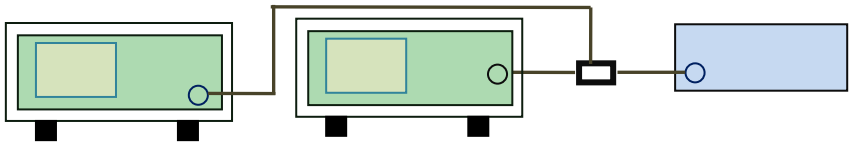

LTE Band IV - High Channel QPSK-20

| | |
|---|---|
| Note: Offset=Cable loss (4.5) + 10log (195.1/100)=4.5+2.9=7.4 dB | Note: Offset=Cable loss (4.5) + 10log (195.1/100)=4.5+2.9=7.4 dB |
|  |  |
| LTE Band IV - Low Channel 16QAM-20 | LTE Band IV - High Channel 16QAM-20 |
| Note: Offset=Cable loss (4.5) + 10log (195.6/100)=4.5+2.9=7.4dB | Note: Offset=Cable loss (4.5) + 10log (193.1/100)=4.5+2.9=7.4 dB |

## 6.8 Band Edge 27.53(m)

| Temperature | 23℃ |
|---|---|
| Relative Humidity | 58% |
| Atmospheric Pressure | 1006mbar |
| Test date : | ---------- |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Requirement | Applicable |
|---|---|---|
| §27.53(m) | According to FCC 27.53(m)(4) specified that power of any emmission ouutside of the channel edge must be attenuated below the transmitting power(P) by a factor shall be not less than 43+10log (P)dB at the channel edge, the limit of emission equal to -13dBm. And 55+10log (P)dB at 5.5MHz from the channel edges, the limit of emission equal to -25dBm. In the 1MHz bands immediately outside and adjacent to the frenqency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. | ☐ |
| Test Setup |  | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers. | |
| Remark | | |
| Result | ☐ Pass ☐ Fail ☑ N/A | |

**Test Data** ☐ Yes ☑ N/A

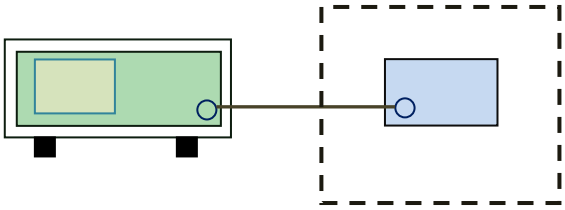
**Test Plot** ☐ Yes (See below) ☑ N/A

## 6.9 Frequency Stability

| | |
|---|---|
| Temperature | 23℃ |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1010mbar |
| Test date : | October 12, 2016 |
| Tested By : | Loren Luo |

**Requirement(s):**

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055,<br>§ 27.5(h);<br>§ 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:<br>Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5 0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to 929.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.<br>According to §27.54, The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</td><td>☑</td></tr>
</table>

| | |
|---|---|
| Test setup |  |
| Procedure | A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.<br>Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. |
| Remark | Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within 2.5ppm of the operating frequency over a temperature variation of -10ºC to +55ºC at normal supply voltage. |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## LTE Band IV (Part 27) result

| Middle Channel, $f_o$ = 1732.5 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | -10 | 0.0058 | 2.5 |
| 0 | | -15 | 0.0087 | 2.5 |
| 10 | | -11 | 0.0063 | 2.5 |
| 20 | | -12 | 0.0069 | 2.5 |
| 30 | | -10 | 0.0058 | 2.5 |
| 40 | | -8 | 0.0046 | 2.5 |
| 50 | | -9 | 0.0052 | 2.5 |
| 55 | | -10 | 0.0058 | 2.5 |
| 25 | 4.2 | -14 | 0.0081 | 2.5 |
| | 3.5 | -16 | 0.0092 | 2.5 |

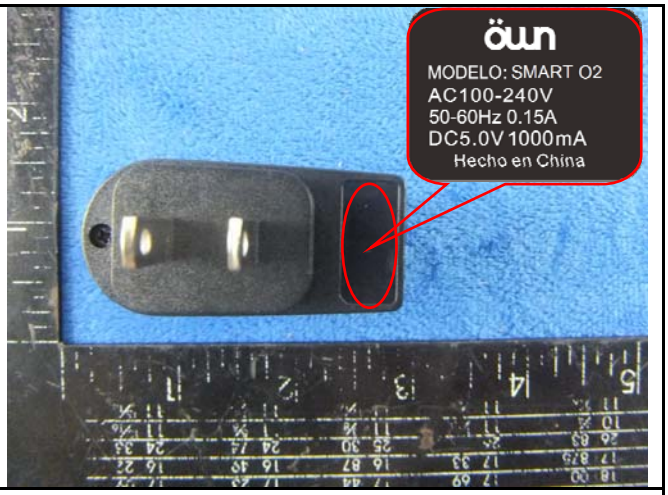
# Annex A. TEST INSTRUMENT

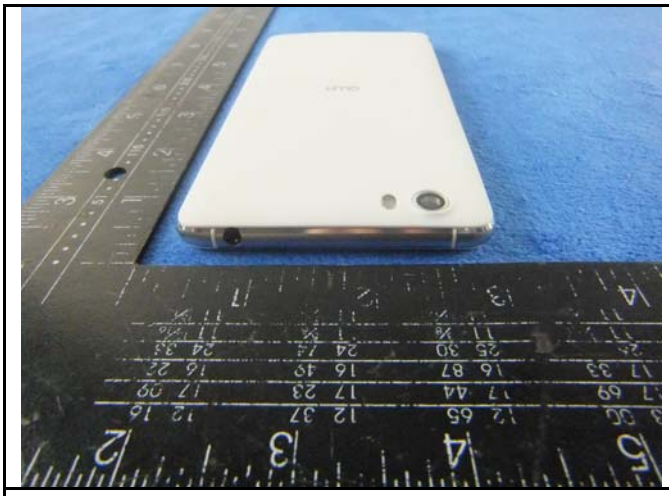
| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Agilent ESA-E SERIES SPECTRUM ANALYZER | E4407B | MY45108319 | 09/15/2016 | 09/14/2017 | ☑ |
| Power Splitter | 1# | 1# | 08/31/2016 | 08/30/2017 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/24/2016 | 09/23/2017 | ☑ |
| Wideband Radio Communication Tester | CMW500 | 120906 | 03/27/2016 | 03/26/2017 | ☑ |
| Temperature/Humidity Chamber | UHL-270 | 001 | 10/08/2016 | 10/07/2017 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/16/2016 | 09/15/2017 | ☑ |
| RF Power Sensor | Dare RPR3006C/P/W | AY554013 | 09/16/2016 | 09/15/2017 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/16/2016 | 09/15/2017 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 08/31/2016 | 08/30/2017 | ☑ |
| Microwave Preamplifier (0.5 ~ 18GHz) | PAM-118 | 443008 | 08/31/2016 | 08/30/2017 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/20/2016 | 09/19/2017 | ☑ |
| Bilog Antenna (30MHz~2GHz) | JB1 | A112017 | 09/20/2016 | 09/19/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71259 | 09/23/2016 | 09/22/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/23/2016 | 09/22/2017 | ☑ |
| SYNTHESIZED SIGNAL GENERATOR | 8665B | 3744A01293 | 09/16/2016 | 09/15/2017 | ☑ |
| Tunable Notch Filter | 3NF-800/1000-S | AA4 | 08/31/2016 | 08/30/2017 | ☑ |

| | | | | | |
| --- | --- | --- | --- | --- | --- |
| Tunable Notch Filter | 3NF-1000/2000-S | AM 4 | 08/31/2016 | 08/30/2017 | ☑ |

# Annex B. EUT And Test Setup Photographs

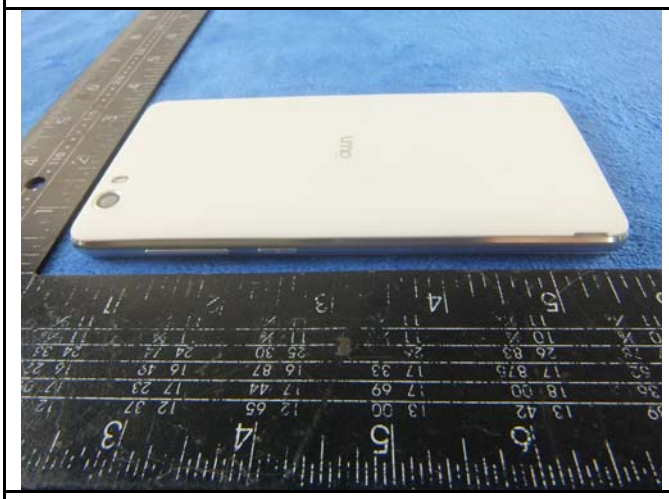
## Annex B.i. Photograph: EUT External Photo

| | |
|---|---|
|  |  |
| Whole Package View | Adapter - Front View |
|  |  |
| EUT - Front View | EUT - Rear View |

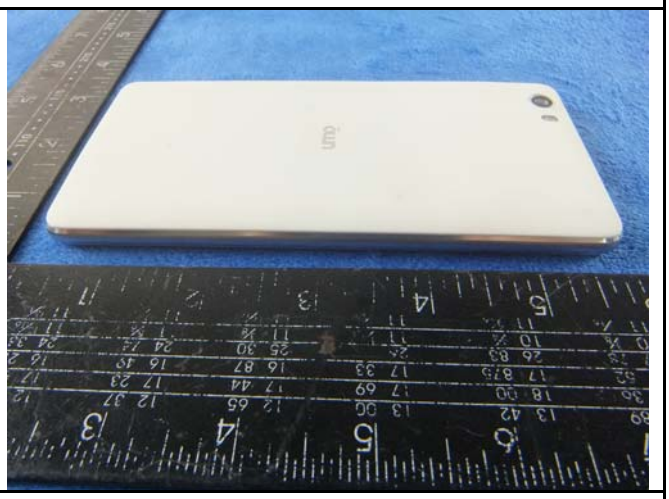


EUT - Top View

EUT - Bottom View



EUT - Left View



EUT - Right View

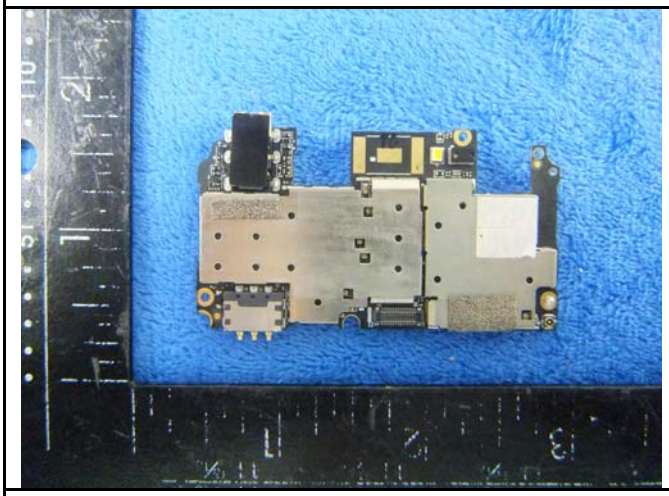
## Annex B.ii. Photograph: EUT Internal Photo


Cover Off - Top View 1

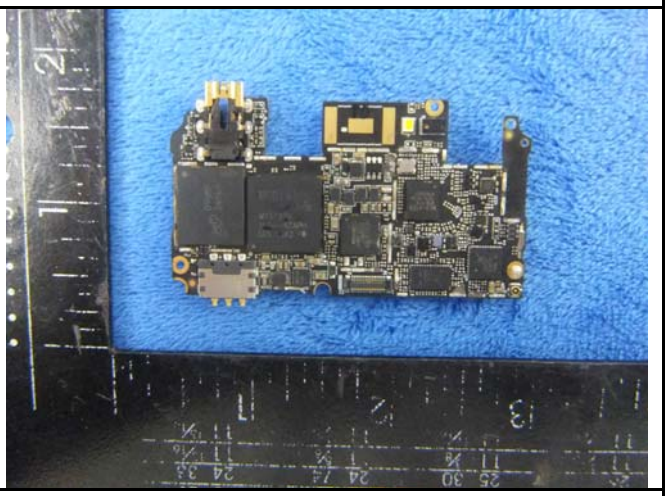
Cover Off - Top View 2


Battery - Front View

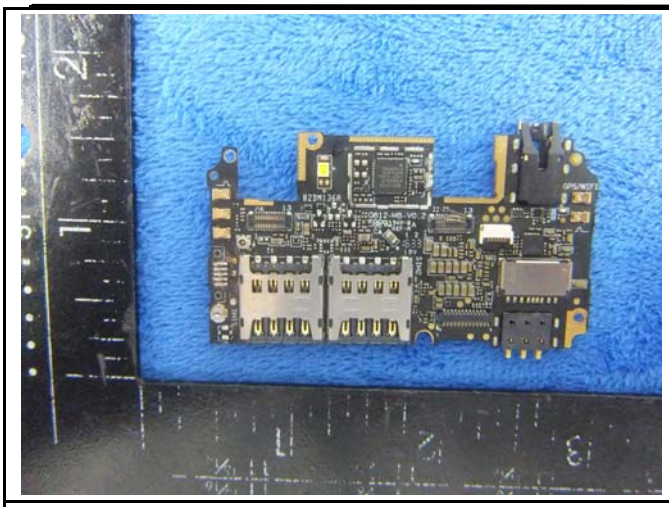

Battery - Rear View



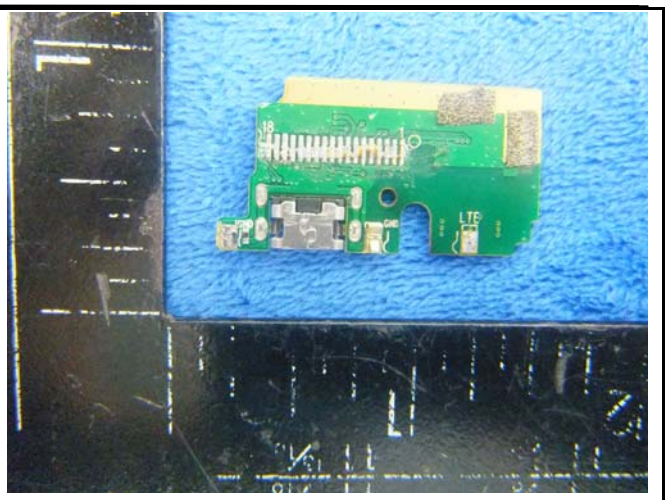
Mainboard with Shielding - Front View



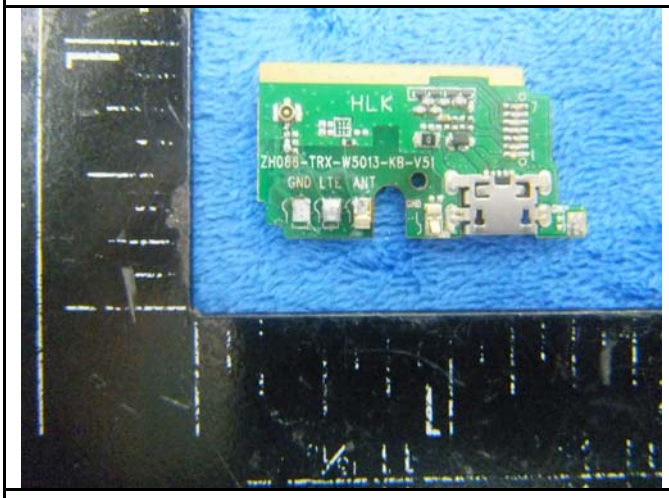
Mainboard without Shielding - Front View



Mainboard - Rear View

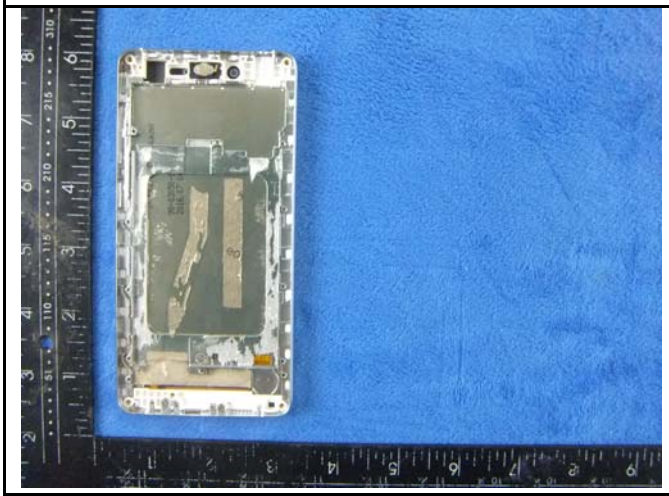


USB board – Front View

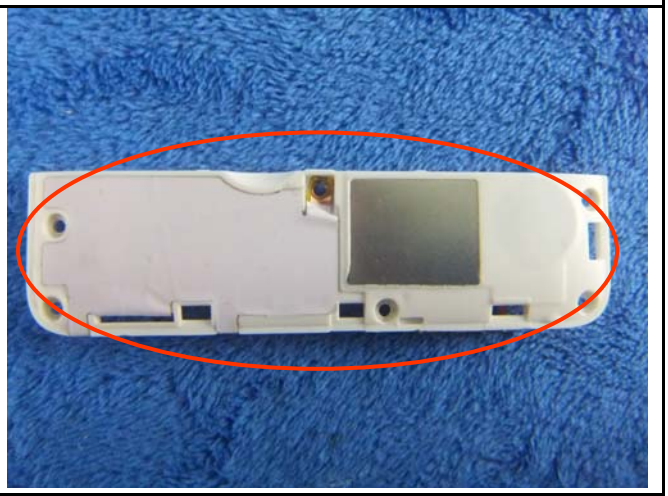



USB board - Rear View

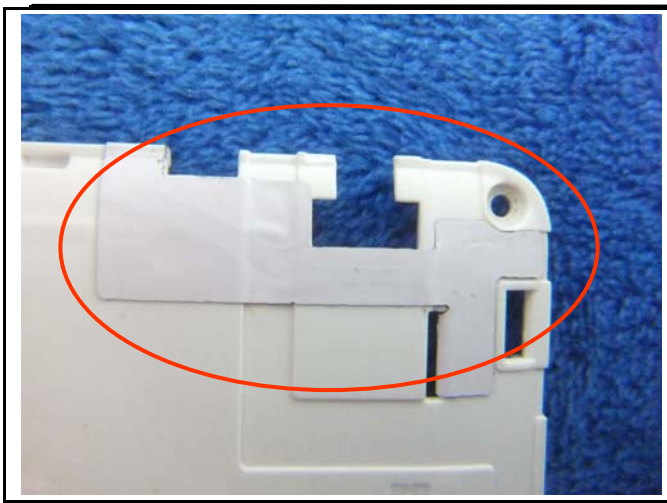
LCD – Front View



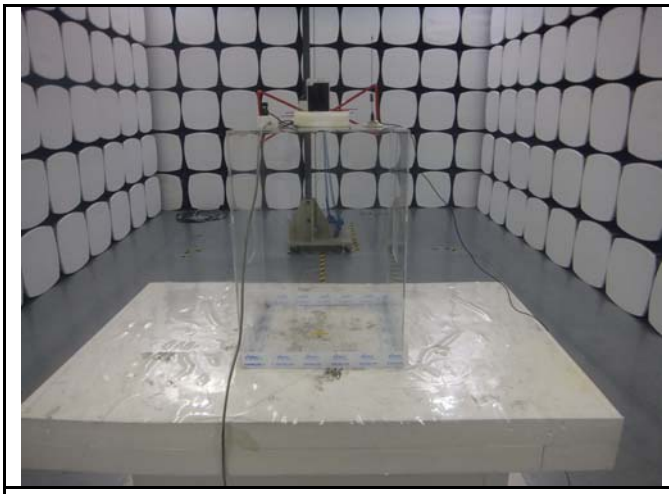
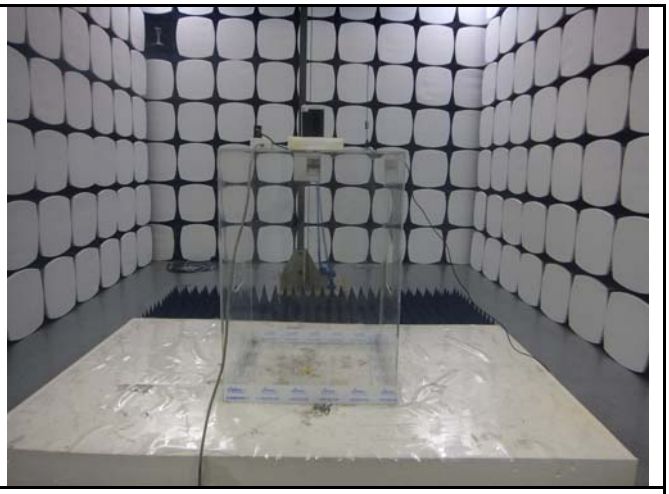
LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View

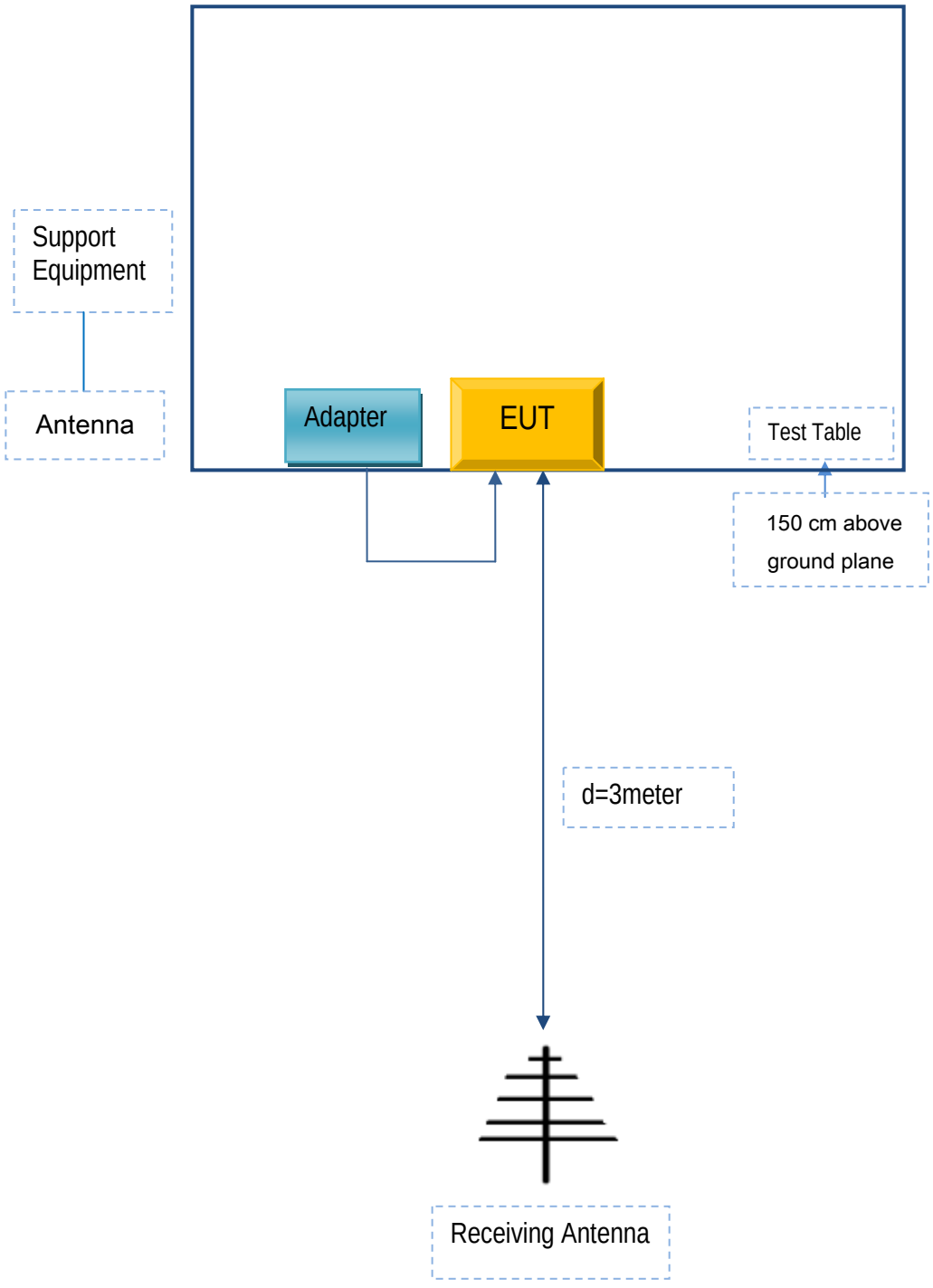
| | |
| --- | --- |
|  |  |
| WIFI/BT/BLE/GPS - Antenna View | LTE Antenna View |

## Annex B.iii. Photograph: Test Setup Photo

| | |
| --- | --- |
|  |  |
| Radiated Spurious Emissions Test Setup Below 1GHz | Radiated Spurious Emissions Test Setup Above 1GHz |

# Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

## Annex C.ii. TEST SET UP BLOCK



## Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

**Supporting Equipment:**

| Manufacturer | Equipment Description | Model | Serial No |
|---|---|---|---|
| NEG TECHNOLOGY CO., LIMITED | Adapter | SMART O2 | S025469 |

**Supporting Cable:**

| Cable type | Shield Type | Ferrite Core | Length | Serial No |
|---|---|---|---|---|
| USB Cable | Un-shielding | No | 0.8m | S025469 |

# Annex C.ii. EUT OPERATING CONKITIONS

N/A

# Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see the attachment

# Annex E. DECLARATION OF SIMILARITY

N/A