



FCC CFR47 PART 22 SUBPART H  
FCC CFR47 PART 24 SUBPART E  
FCC CFR47 PART 27 SUBPART F  
FCC CFR47 PART 27 SUBPART L

**CERTIFICATION TEST REPORT**

**FOR**

**GSM/WCDMA/LTE Tablet + Bluetooth/BLE and DTS/UNII a/b/g/n/ac and ANT+**

**MODEL NUMBER : SM-T715**

**FCC ID: A3LSMT715**

**REPORT NUMBER: 15K20515-E6**

**ISSUE DATE: MAY 18, 2015**

*Prepared for*  
**SAMSUNG ELECTRONICS CO., LTD.**  
**129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,**  
**GYEONGGI-DO, 443-742, KOREA**

*Prepared by*  
**UL Korea, Ltd. Suwon Laboratory**  
**218 Maeyeong-ro, Yeongtong-gu,**  
**Suwon-si, Gyeonggi-do, 443-823, Korea**  
**TEL: (031) 337-9902**  
**FAX: (031) 213-5433**



Revision History

| <u>Rev.</u> | <u>Issue<br/>Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-----------------------|------------------|-------------------|
| --          | 05/18/15              | Initial issue    | CY Choi           |

## TABLE OF CONTENTS

|                                                |           |
|------------------------------------------------|-----------|
| <b>1. ATTESTATION OF TEST RESULTS .....</b>    | <b>5</b>  |
| <b>2. TEST METHODOLOGY .....</b>               | <b>6</b>  |
| <b>3. FACILITIES AND ACCREDITATION .....</b>   | <b>6</b>  |
| <b>4. CALIBRATION AND UNCERTAINTY .....</b>    | <b>6</b>  |
| 4.1. MEASURING INSTRUMENT CALIBRATION .....    | 6         |
| 4.2. SAMPLE CALCULATION .....                  | 6         |
| 4.3. MEASUREMENT UNCERTAINTY.....              | 6         |
| <b>5. EQUIPMENT UNDER TEST .....</b>           | <b>7</b>  |
| 5.1. DESCRIPTION OF EUT .....                  | 7         |
| 5.2. MAXIMUM OUTPUT POWER (GSM) .....          | 7         |
| 5.3. MAXIMUM OUTPUT POWER (WCDMA) .....        | 7         |
| MAXIMUM OUTPUT POWER (LTE) .....               | 8         |
| 5.4. DESCRIPTION OF AVAILABLE ANTENNAS .....   | 10        |
| 5.5. DESCRIPTION OF TEST SETUP.....            | 10        |
| <b>6. TEST AND MEASUREMENT EQUIPMENT .....</b> | <b>12</b> |
| <b>7. Summary Table .....</b>                  | <b>13</b> |
| <b>8. RF POWER OUTPUT VERIFICATION .....</b>   | <b>14</b> |
| 8.1. GSM/GPRS/EDGE .....                       | 14        |
| 8.1.1. GSM OUTPUT POWER RESULT .....           | 15        |
| 8.2. UMTS REL 99.....                          | 17        |
| 8.2.1. WCDMA OUTPUT POWER RESULT .....         | 21        |
| 8.3. LTE OUTPUT VERIFICATION.....              | 23        |
| 8.3.1. LTE OUTPUT POWER RESULT .....           | 24        |
| <b>9. PEAK TO AVERAGE RATIO .....</b>          | <b>30</b> |
| 9.1. CONDUCTED PEAK TO AVERAGE RESULT.....     | 30        |
| 9.2. CONDUCTED PEAK TO AVERAGE PLOTS.....      | 32        |
| <b>10. LIMITS AND CONDUCTED RESULTS.....</b>   | <b>39</b> |
| 10.1. OCCUPIED BANDWIDTH.....                  | 39        |
| 10.1.1. OCCUPIED BANDWIDTH RESULTS.....        | 39        |
| 10.1.2. OCCUPIED BANDWIDTH PLOTS .....         | 44        |
| 10.2. BAND EDGE EMISSIONS .....                | 66        |
| 10.2.1. BAND EDGE PLOTS .....                  | 72        |

|            |                                            |            |
|------------|--------------------------------------------|------------|
| 10.3.      | OUT OF BAND EMISSIONS .....                | 92         |
| 10.3.1.    | OUT OF BAND EMISSIONS RESULT .....         | 92         |
| 10.3.2.    | OUT OF BAND EMISSIONS PLOTS.....           | 97         |
| 10.1.      | FREQUENCY STABILITY .....                  | 119        |
| 10.1.1.    | FREQUENCY STABILITY RESULTS.....           | 120        |
| <b>11.</b> | <b>RADIATED TEST RESULTS .....</b>         | <b>124</b> |
| 11.1.      | RADIATED POWER (ERP & EIRP).....           | 124        |
| 11.1.1.    | ERP/EIRP Results.....                      | 125        |
| 11.1.2.    | ERP/EIRP DATA.....                         | 129        |
| 11.2.      | FIELD STRENGTH OF SPURIOUS RADIATION ..... | 151        |
| 11.2.1.    | SPURIOUS RADIATION PLOTS.....              | 152        |
| <b>12.</b> | <b>SETUP PHOTOS .....</b>                  | <b>174</b> |

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Tablet+Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+  
**MODEL NUMBER:** SM-T715  
**SERIAL NUMBER:** R32G300YQRF (RADIATED); R32G300Y5RF (CONDUCTED)  
**DATE TESTED:** APRIL 16 - MAY 18, 2015

| APPLICABLE STANDARDS  |              |
|-----------------------|--------------|
| STANDARD              | TEST RESULTS |
| FCC PART 22H, 24E, 27 | Pass         |

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Korea, Ltd. By:

Tested By:



Ji Ho Choi  
Suwon Lab Manager  
UL Korea, Ltd.

CY Choi  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24 and FCC CFR Part 27.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 218 Maeyeong-ro                               |
|-----------------------------------------------|
| <input checked="" type="checkbox"/> Chamber 1 |
| <input type="checkbox"/> Chamber 2            |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$EIRP = PSA \text{ reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$

$ERP = PSA \text{ reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)}$   
(Path loss = Signal generator output – PSA reading with substitution antenna)

### 4.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 2.32 dB     |
| Radiated Disturbance, Below 1GHz      | 4.14 dB     |
| Radiated Disturbance, Above 1 GHz     | 5.97 dB     |

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+.

### 5.2. MAXIMUM OUTPUT POWER (GSM)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

| FCC Part 22/24 |                       |                 |           |          |           |          |
|----------------|-----------------------|-----------------|-----------|----------|-----------|----------|
| Band           | Frequency Range [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|                |                       |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| GSM850         | 824~849               | GMSK            | 33.23     | 2105.69  |           |          |
|                |                       | GPRS            | 33.31     | 2141.70  | 29.63     | 918.33   |
|                |                       | EGPRS           | 26.87     | 486.73   | 23.82     | 240.99   |
| GSM1900        | 1850~1910             | GMSK            | 29.78     | 951.19   |           |          |
|                |                       | GPRS            | 29.82     | 958.47   | 31.95     | 1566.75  |
|                |                       | EGPRS           | 26.40     | 436.25   | 29.87     | 970.51   |

### 5.3. MAXIMUM OUTPUT POWER (WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

| FCC Part 22/24 |                       |                 |           |          |           |          |
|----------------|-----------------------|-----------------|-----------|----------|-----------|----------|
| Band           | Frequency Range [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|                |                       |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| Band 5         | 824~849               | REL99           | 22.87     | 193.67   | 18.54     | 71.45    |
|                |                       | HSDPA           | 23.45     | 221.25   | 18.99     | 79.25    |
|                |                       | HSUPA           | 23.35     | 216.09   |           |          |
|                |                       | DC-HSDPA        | 23.42     | 219.62   |           |          |
| Band 2         | 1850~1910             | REL99           | 23.06     | 202.09   | 23.77     | 238.23   |
|                |                       | HSDPA           | 23.27     | 212.52   | 23.09     | 203.70   |
|                |                       | HSUPA           | 23.09     | 203.60   |           |          |
|                |                       | DC-HSDPA        | 23.22     | 210.00   |           |          |

## MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

### LTE Band 17

| FCC Part 27 |                       |                 |                 |           |          |           |          |
|-------------|-----------------------|-----------------|-----------------|-----------|----------|-----------|----------|
| Band        | Frequency Range [MHz] | BandWidth [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|             |                       |                 |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| Band 17     | 704 ~ 716             | 10              | QPSK            | 23.14     | 206.17   | 12.00     | 15.85    |
|             |                       |                 | 16QAM           | 22.31     | 170.15   | 11.12     | 12.94    |
|             |                       | 5               | QPSK            | 23.09     | 203.54   | 11.63     | 14.55    |
|             |                       |                 | 16QAM           | 22.06     | 160.79   | 11.18     | 13.12    |

### LTE Band 5

| FCC Part 22 |                       |                 |                 |           |          |           |          |
|-------------|-----------------------|-----------------|-----------------|-----------|----------|-----------|----------|
| Band        | Frequency Range [MHz] | BandWidth [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|             |                       |                 |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| Band 5      | 824 ~ 849             | 10              | QPSK            | 23.32     | 214.67   | 16.02     | 39.99    |
|             |                       |                 | 16QAM           | 22.41     | 174.22   | 14.92     | 31.05    |
|             |                       | 5               | QPSK            | 23.24     | 210.65   | 15.82     | 38.19    |
|             |                       |                 | 16QAM           | 22.28     | 168.89   | 16.06     | 40.36    |
|             |                       | 3               | QPSK            | 23.24     | 211.05   | 13.15     | 20.65    |
|             |                       |                 | 16QAM           | 22.22     | 166.92   | 12.24     | 16.75    |
|             |                       | 1.4             | QPSK            | 23.30     | 213.71   | 13.73     | 23.60    |
|             |                       |                 | 16QAM           | 22.45     | 175.69   | 11.77     | 15.03    |

#### LTE Band 4

| FCC Part 27 |                       |                 |                 |           |          |           |          |
|-------------|-----------------------|-----------------|-----------------|-----------|----------|-----------|----------|
| Band        | Frequency Range [MHz] | BandWidth [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|             |                       |                 |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| Band 4      | 1710 ~ 1755           | 20              | QPSK            | 23.07     | 202.83   | 23.17     | 207.49   |
|             |                       |                 | 16QAM           | 22.05     | 160.45   | 21.82     | 152.05   |
|             |                       | 15              | QPSK            | 23.07     | 202.63   | 23.42     | 219.79   |
|             |                       |                 | 16QAM           | 22.20     | 165.78   | 22.56     | 180.30   |
|             |                       | 10              | QPSK            | 23.06     | 202.42   | 23.30     | 213.80   |
|             |                       |                 | 16QAM           | 22.16     | 164.32   | 22.13     | 163.31   |
|             |                       | 5               | QPSK            | 23.13     | 205.51   | 22.72     | 187.07   |
|             |                       |                 | 16QAM           | 22.34     | 171.20   | 22.47     | 176.60   |
|             |                       | 3               | QPSK            | 23.15     | 206.31   | 22.80     | 190.55   |
|             |                       |                 | 16QAM           | 22.15     | 164.22   | 21.61     | 144.88   |
|             |                       | 1.4             | QPSK            | 23.11     | 204.42   | 21.20     | 131.83   |
|             |                       |                 | 16QAM           | 22.18     | 165.16   | 19.48     | 88.72    |

#### LTE Band 2

| FCC Part 24 |                       |                 |                 |           |          |           |          |
|-------------|-----------------------|-----------------|-----------------|-----------|----------|-----------|----------|
| Band        | Frequency Range [MHz] | BandWidth [MHz] | Modulation Peak | Conducted |          | Radiated  |          |
|             |                       |                 |                 | Avg [dBm] | Avg [mW] | Avg [dBm] | Avg [mW] |
| Band 5      | 1850 ~ 1910           | 20              | QPSK            | 22.80     | 190.34   | 22.59     | 181.55   |
|             |                       |                 | 16QAM           | 21.87     | 153.79   | 21.18     | 131.22   |
|             |                       | 15              | QPSK            | 22.92     | 196.05   | 23.34     | 215.77   |
|             |                       |                 | 16QAM           | 22.14     | 163.74   | 22.12     | 162.93   |
|             |                       | 10              | QPSK            | 22.96     | 197.52   | 22.87     | 193.64   |
|             |                       |                 | 16QAM           | 21.80     | 151.49   | 21.44     | 139.32   |
|             |                       | 5               | QPSK            | 23.08     | 203.26   | 22.22     | 166.72   |
|             |                       |                 | 16QAM           | 22.22     | 166.82   | 21.10     | 128.82   |
|             |                       | 3               | QPSK            | 23.05     | 201.62   | 20.97     | 125.03   |
|             |                       |                 | 16QAM           | 21.97     | 157.53   | 19.29     | 84.92    |
|             |                       | 1.4             | QPSK            | 22.86     | 193.37   | 22.07     | 161.06   |
|             |                       |                 | 16QAM           | 22.10     | 162.36   | 18.81     | 76.03    |

## 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a FPCB antenna for the [List the bands supported] with a maximum peak gain as follow:

| Frequency (MHz)                                         | Peak Gain (dBi) |
|---------------------------------------------------------|-----------------|
| LTE Band 17<br>704 ~ 716 MHz                            | -6.28           |
| GSM 850 / WCDMA Band 5 / LTE Band 5<br>824 ~ 849 MHz    | -3.82           |
| LTE Band 4<br>1710 ~ 1755 MHz                           | -0.70           |
| GSM 1900 / WCDMA Band 2 / LTE Band 2<br>1850 ~ 1910 MHz | -1.12           |

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |              |               |        |
|------------------------|--------------|--------------|---------------|--------|
| Description            | Manufacturer | Model        | Serial Number | FCC ID |
| Charger                | SAMSUNG      | EP-TA12EWE   | N/A           | N/A    |
| Data Cable             | SAMSUNG      | ECB-DG925UWE | N/A           | N/A    |
| Earphone               | SAMSUNG      | GH59-11129H  | N/A           | N/A    |

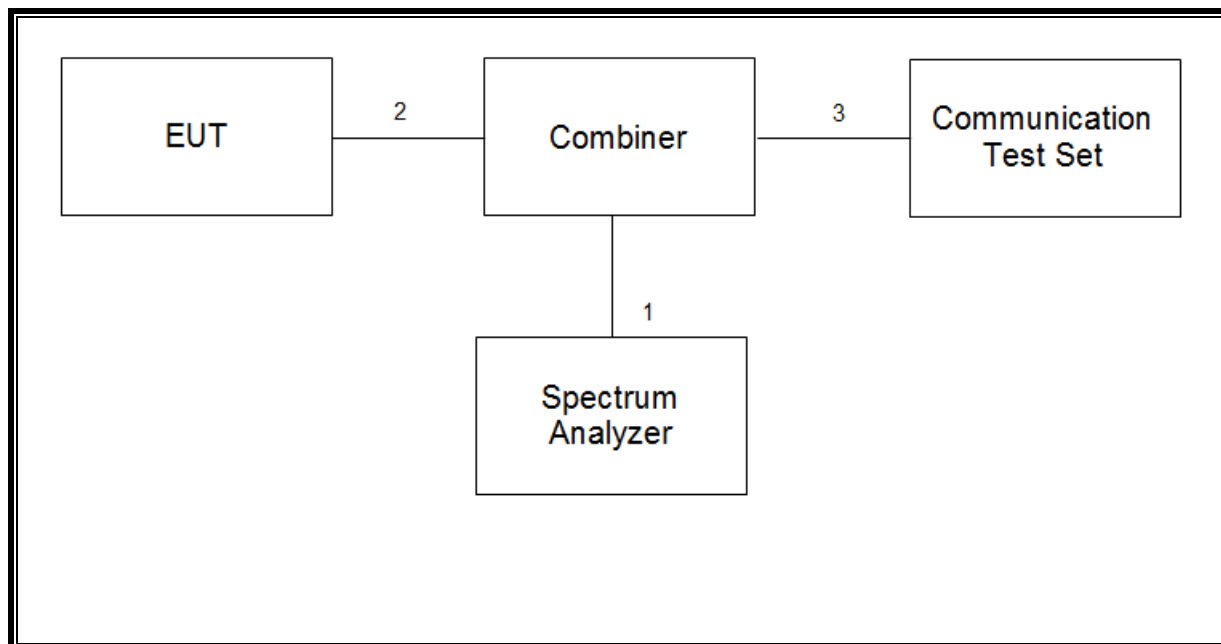
### I/O CABLES

| I/O Cable List |          |                      |                |            |                  |         |
|----------------|----------|----------------------|----------------|------------|------------------|---------|
| Cable No       | Port     | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1              | DC Power | 1                    | Mini-USB       | Shielded   | 0.8m             | N/A     |
| 2              | Audio    | 1                    | Mini-Jack      | Unshielded | 1.0m             | N/A     |

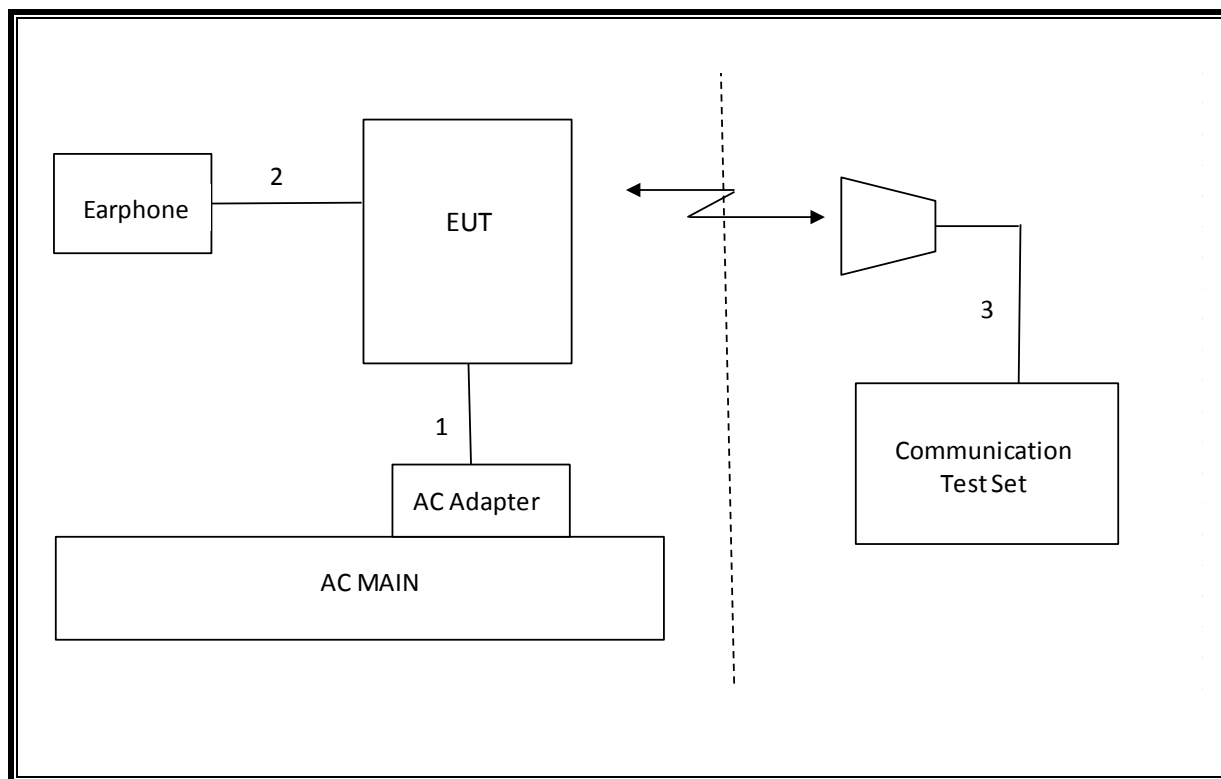
### TEST SETUP

The EUT is continuously communicated to the call box during the tests.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| Test Equipment List                |               |                        |            |          |
|------------------------------------|---------------|------------------------|------------|----------|
| Description                        | Manufacturer  | Model                  | S/N        | Cal Due  |
| Antenna, Tuned Dipole 400~1000 MHz | ETS           | 3121D DB4              | 00164753   | 07-29-15 |
| Antenna, Bilog, 30MHz-1GHz         | SCHWARZBECK   | VULB9163               | 950        | 11-17-15 |
| Antenna, Horn, 18 GHz              | ETS           | 3115                   | 00167211   | 09-20-15 |
| Antenna, Horn, 40 GHz              | ETS           | 3116C                  | 00166255   | 09-23-15 |
| Antenna, Horn, 40 GHz              | ETS           | 3116C-PA               | 00168841   | 09-29-15 |
| Preamplifier, 1000 MHz             | Sonoma        | 310N                   | 341282     | 11-17-15 |
| Preamplifier, 18 GHz               | Miteq         | AFS42-00101800-25-S-42 | 1876511    | 11-18-15 |
| Spectrum Analyzer, 44 GHz          | Agilent / HP  | N9030A                 | MY54170614 | 09-23-15 |
| Communications Test Set            | R&S           | CMW500                 | 150312     | 08-13-15 |
| Average Power Sensor               | R&S           | NRZ-Z91                | 102681     | 11-17-15 |
| Average Power Sensor               | Agilent / HP  | U2000                  | MY54270007 | 09-23-15 |
| EMI Test Receive, 40 GHz           | R&S           | ESU40                  | 100439     | 11-17-15 |
| EMI Test Receive, 3 GHz            | R&S           | ESR3                   | 101832     | 11-17-15 |
| Attenuator / Switch driver         | HP            | 11713A                 | 3748A04272 | N/A      |
| Low Pass Filter 3GHz               | Micro-Tronics | LPS17541               | 009        | 11-17-15 |
| High Pass Filter 5GHz              | Micro-Tronics | HPS17542               | 009        | 11-17-15 |
| High Pass Filter 6GHz              | Micro-Tronics | HPM17543               | 010        | 11-17-15 |
| Combiner                           | WEINSCHTEL    | 1575                   | 2153       | 11-17-15 |
| Temperature Chamber                | ESPEC         | SH-642                 | 93001109   | 11-13-15 |
| DC Power Supply                    | Agilent / HP  | E3640A                 | MY54226395 | 09-23-15 |

## 7. Summary Table

| FCC Part Section                   | Test Description                        | Test Limit | Test Condition | Test Result | Note       |
|------------------------------------|-----------------------------------------|------------|----------------|-------------|------------|
| 2.1049                             | Occupied Band width (99%)               | N/A        | Conducted      | Pass        | 17.941 MHz |
| 22.917(a)<br>24.238(a)<br>27.53(g) | Band Edge / Conducted Spurious Emission | -13dBm     |                | Pass        | -16.16 dBm |
| 2.1046                             | Conducted output power                  | N/A        |                | Pass        | 33.31 dBm  |
| 22.355<br>24.235<br>27.54          | Frequency Stability                     | 2.5PPM     |                | Pass        | 0.036PPM   |
| 22.913(a)(2)                       | Effective Radiated Power                | 38 dBm     | Radiated       | Pass        | 29.63 dBm  |
| 27.50(c)(10)                       |                                         | 34.77 dBm  |                | Pass        | 12.00 dBm  |
| 24.232(c)                          | Equivalent Isotropic Radiated Power     | 33dBm      |                | Pass        | 31.95 dBm  |
| 27.50(d)(4)                        |                                         | 30dBm      |                | Pass        | 23.42dBm   |
| 22.917(a)<br>24.238(a)<br>27.53(g) | Radiated Spurious Emission              | -13dBm     |                | Pass        | -23.8 dBm  |

| FCC Rule Part | Frequency Range [MHz] | Output Power [W] | Frequency Tolerance | Emission Designator | Emission Bandwidth [MHz] | Communication Type |
|---------------|-----------------------|------------------|---------------------|---------------------|--------------------------|--------------------|
| GSM           |                       |                  |                     |                     |                          |                    |
| 22H           | 824.2 - 848.8         | 0.918            | 2.5 ppm             | 241KGXW             |                          | GSM850             |
| 22H           | 824.2 - 848.8         | 0.241            | 2.5 ppm             | 245KG7W             |                          | EDGE850            |
| 24E           | 1850.2 - 1909.8       | 1.567            | 2.5 ppm             | 243KGXW             |                          | GSM1900            |
| 24E           | 1850.2 - 1909.8       | 0.971            | 2.5 ppm             | 242KG7W             |                          | EDGE1900           |
| WCDMA         |                       |                  |                     |                     |                          |                    |
| 22H           | 826.4 - 846.6         | 0.079            | 2.5 ppm             | 4M16F9W             |                          | WCDMA              |
| 24E           | 1852.4 - 1907.6       | 0.238            | 2.5 ppm             | 4M15F9W             |                          | WCDMA              |
| LTE Band 2    |                       |                  |                     |                     |                          |                    |
| 24E           | 1860.0 - 1900.0       | 0.182            | 2.5 ppm             | 17M9G7D             | 20                       | QPSK               |
| 24E           | 1860.0 - 1900.0       | 0.131            | 2.5 ppm             | 17M9D7W             | 20                       | 16QAM              |
| 24E           | 1857.5 - 1902.5       | 0.216            | 2.5 ppm             | 13M4G7D             | 15                       | QPSK               |
| 24E           | 1857.5 - 1902.5       | 0.163            | 2.5 ppm             | 13M4D7W             | 15                       | 16QAM              |
| 24E           | 1855.0 - 1905.0       | 0.194            | 2.5 ppm             | 8M97G7W             | 10                       | QPSK               |
| 24E           | 1855.0 - 1905.0       | 0.139            | 2.5 ppm             | 8M98D7W             | 10                       | 16QAM              |
| 24E           | 1852.5 - 1907.5       | 0.167            | 2.5 ppm             | 4M51G7W             | 5                        | QPSK               |
| 24E           | 1852.5 - 1907.5       | 0.129            | 2.5 ppm             | 4M50D7W             | 5                        | 16QAM              |
| 24E           | 1851.5 - 1908.5       | 0.125            | 2.5 ppm             | 2M70G7W             | 3                        | QPSK               |
| 24E           | 1851.5 - 1908.5       | 0.085            | 2.5 ppm             | 2M71D7W             | 3                        | 16QAM              |
| 24E           | 1850.7 - 1909.3       | 0.161            | 2.5 ppm             | 1M09G7W             | 1.4                      | QPSK               |
| 24E           | 1850.7 - 1909.3       | 0.076            | 2.5 ppm             | 1M10D7W             | 1.4                      | 16QAM              |
| LTE Band 4    |                       |                  |                     |                     |                          |                    |
| 27L           | 1720.0 - 1745.0       | 0.207            | 2.5 ppm             | 17M9G7D             | 20                       | QPSK               |
| 27L           | 1720.0 - 1745.0       | 0.152            | 2.5 ppm             | 17M9D7W             | 20                       | 16QAM              |
| 27L           | 1717.5 - 1747.5       | 0.220            | 2.5 ppm             | 13M4G7W             | 15                       | QPSK               |
| 27L           | 1717.5 - 1747.5       | 0.180            | 2.5 ppm             | 13M4D7W             | 15                       | 16QAM              |
| 27L           | 1715.0 - 1750.0       | 0.214            | 2.5 ppm             | 8M97G7W             | 10                       | QPSK               |
| 27L           | 1715.0 - 1750.0       | 0.163            | 2.5 ppm             | 8M99D7W             | 10                       | 16QAM              |
| 27L           | 1712.5 - 1752.5       | 0.187            | 2.5 ppm             | 4M50G7W             | 5                        | QPSK               |
| 27L           | 1712.5 - 1752.5       | 0.177            | 2.5 ppm             | 4M50D7W             | 5                        | 16QAM              |
| 27L           | 1711.5 - 1753.5       | 0.191            | 2.5 ppm             | 2M70G7W             | 3                        | QPSK               |
| 27L           | 1711.5 - 1753.5       | 0.145            | 2.5 ppm             | 2M71D7W             | 3                        | 16QAM              |
| 27L           | 1710.7 - 1754.3       | 0.132            | 2.5 ppm             | 1M10G7W             | 1.4                      | QPSK               |
| 27L           | 1710.7 - 1754.3       | 0.089            | 2.5 ppm             | 1M10D7W             | 1.4                      | 16QAM              |
| LTE Band 5    |                       |                  |                     |                     |                          |                    |
| 22H           | 829.0 - 844.0         | 0.040            | 2.5 ppm             | 8M99G7D             | 10                       | QPSK               |
| 22H           | 829.0 - 844.0         | 0.031            | 2.5 ppm             | 8M96D7W             | 10                       | 16QAM              |
| 22H           | 826.5 - 846.5         | 0.038            | 2.5 ppm             | 4M50G7W             | 5                        | QPSK               |
| 22H           | 826.5 - 846.5         | 0.040            | 2.5 ppm             | 4M51D7W             | 5                        | 16QAM              |
| 22H           | 825.5 - 847.5         | 0.021            | 2.5 ppm             | 2M71G7W             | 3                        | QPSK               |
| 22H           | 825.5 - 847.5         | 0.017            | 2.5 ppm             | 2M70D7W             | 3                        | 16QAM              |
| 22H           | 824.7 - 848.3         | 0.024            | 2.5 ppm             | 1M09G7W             | 1.4                      | QPSK               |
| 22H           | 824.7 - 848.3         | 0.015            | 2.5 ppm             | 1M09D7W             | 1.4                      | 16QAM              |
| LTE Band 17   |                       |                  |                     |                     |                          |                    |
| 27F           | 709.0 - 711.0         | 0.016            | 2.5 ppm             | 8M95G7D             | 10                       | QPSK               |
| 27F           | 709.0 - 711.0         | 0.013            | 2.5 ppm             | 8M97D7W             | 10                       | 16QAM              |
| 27F           | 706.5 - 713.5         | 0.015            | 2.5 ppm             | 4M51G7W             | 5                        | QPSK               |
| 27F           | 706.5 - 713.5         | 0.013            | 2.5 ppm             | 4M50D7W             | 5                        | 16QAM              |

## 8. RF POWER OUTPUT VERIFICATION

### 8.1. GSM/GPRS/EDGE

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900  
Press Connection control to choose the different menus  
Press RESET > choose all to reset all settings  
Connection Press Signal Off to turn off the signal and change settings  
Network Support > GSM+GPRS or GSM+EGPRS  
Main Service > Packet Data  
Service selection > Test Mode A – Auto Slot Config. off  
MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting  
    > Slot configuration > Uplink/Gamma  
    > 33 dBm for GPRS 850/900  
    > 30 dBm for GPRS1800/1900  
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel  
Frequency Offset > + 0 Hz  
Mode > BCCH and TCH  
BCCH Level > -85 dBm (May need to adjust if link is not stable)  
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]  
Channel Type > Off  
P0> 4 dB  
Slot Config > Unchanged (if already set under MS Signal)  
TCH > choose desired test channel  
Hopping > Off  
Main Timeslot > 3 (Default)  
Network Coding Scheme > CS4 (GPRS) and MCS5 ~ MCS9 (EGPRS)  
Bit Stream > 2E9-1PSR Bit Pattern  
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
Connection Press Signal On to turn on the signal and change settings

### 8.1.1. GSM OUTPUT POWER RESULT

#### GSM850 Measured Results

| Band | Mode         | Coding Scheme | Time Slots | Ch No. | Freq. [MHz] | Max. Power      |                 |
|------|--------------|---------------|------------|--------|-------------|-----------------|-----------------|
|      |              |               |            |        |             | Burst Pwr [dBm] | Frame Pwr [dBm] |
| 850  | GSM (Voice)  | CS1           | 1          | 128    | 824.2       | 33.1            | 24.1            |
|      |              |               |            | 190    | 836.6       | 33.2            | 24.2            |
|      |              |               |            | 251    | 848.8       | 33.2            | 24.2            |
|      | GPRS (GMSK)  | CS1           | 1          | 128    | 824.2       | 33.2            | 24.2            |
|      |              |               |            | 190    | 836.6       | 33.3            | 24.2            |
|      |              |               |            | 251    | 848.8       | 33.3            | 24.3            |
|      |              |               | 2          | 128    | 824.2       | 32.0            | 26.0            |
|      |              |               |            | 190    | 836.6       | 32.0            | 25.9            |
|      |              |               |            | 251    | 848.8       | 32.0            | 26.0            |
|      |              |               | 3          | 128    | 824.2       | 29.7            | 25.5            |
|      |              |               |            | 190    | 836.6       | 29.7            | 25.5            |
|      |              |               |            | 251    | 848.8       | 29.7            | 25.5            |
|      |              |               | 4          | 128    | 824.2       | 28.5            | 25.5            |
|      |              |               |            | 190    | 836.6       | 28.3            | 25.3            |
|      |              |               |            | 251    | 848.8       | 28.5            | 25.5            |
|      | EGPRS (8PSK) | MCS5          | 1          | 128    | 824.2       | 26.8            | 17.8            |
|      |              |               |            | 190    | 836.6       | 26.6            | 17.6            |
|      |              |               |            | 251    | 848.8       | 26.9            | 17.8            |
|      |              |               | 2          | 128    | 824.2       | 25.2            | 19.2            |
|      |              |               |            | 190    | 836.6       | 25.2            | 19.2            |
|      |              |               |            | 251    | 848.8       | 25.3            | 19.2            |
|      |              |               | 3          | 128    | 824.2       | 24.3            | 20.0            |
|      |              |               |            | 190    | 836.6       | 24.0            | 19.7            |
|      |              |               |            | 251    | 848.8       | 24.0            | 19.8            |
|      |              |               | 4          | 128    | 824.2       | 22.7            | 19.7            |
|      |              |               |            | 190    | 836.6       | 22.3            | 19.3            |
|      |              |               |            | 251    | 848.8       | 22.7            | 19.7            |

**GSM1900 Measured Results**

| Band | Mode         | Coding Scheme | Time Slots | Ch No. | Freq. [MHz] | Max. Power      |                 |
|------|--------------|---------------|------------|--------|-------------|-----------------|-----------------|
|      |              |               |            |        |             | Burst Pwr [dBm] | Frame Pwr [dBm] |
| 850  | GSM (Voice)  | CS1           | 1          | 512    | 1850.2      | 29.5            | 20.5            |
|      |              |               |            | 661    | 1880.0      | 29.6            | 20.6            |
|      |              |               |            | 810    | 1909.8      | 29.8            | 20.8            |
|      | GPRS (GMSK)  | CS1           | 1          | 512    | 1850.2      | 29.6            | 20.5            |
|      |              |               |            | 661    | 1880.0      | 29.7            | 20.6            |
|      |              |               |            | 810    | 1909.8      | 29.8            | 20.8            |
|      |              |               | 2          | 512    | 1850.2      | 28.3            | 22.3            |
|      |              |               |            | 661    | 1880.0      | 28.4            | 22.4            |
|      |              |               |            | 810    | 1909.8      | 28.7            | 22.7            |
|      |              |               | 3          | 512    | 1850.2      | 27.1            | 22.8            |
|      |              |               |            | 661    | 1880.0      | 27.1            | 22.9            |
|      |              |               |            | 810    | 1909.8      | 27.2            | 22.9            |
|      |              |               | 4          | 512    | 1850.2      | 25.4            | 22.4            |
|      |              |               |            | 661    | 1880.0      | 25.5            | 22.5            |
|      |              |               |            | 810    | 1909.8      | 25.5            | 22.5            |
|      | EGPRS (8PSK) | MCS5          | 1          | 512    | 1850.2      | 26.4            | 17.4            |
|      |              |               |            | 661    | 1880.0      | 26.2            | 17.2            |
|      |              |               |            | 810    | 1909.8      | 26.0            | 17.0            |
|      |              |               | 2          | 512    | 1850.2      | 24.9            | 18.9            |
|      |              |               |            | 661    | 1880.0      | 24.7            | 18.7            |
|      |              |               |            | 810    | 1909.8      | 24.8            | 18.7            |
|      |              |               | 3          | 512    | 1850.2      | 23.3            | 19.0            |
|      |              |               |            | 661    | 1880.0      | 23.1            | 18.8            |
|      |              |               |            | 810    | 1909.8      | 23.1            | 18.8            |
|      |              |               | 4          | 512    | 1850.2      | 21.9            | 18.9            |
|      |              |               |            | 661    | 1880.0      | 21.7            | 18.6            |
|      |              |               |            | 810    | 1909.8      | 21.4            | 18.4            |

## 8.2. UMTS REL 99

### Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

| Mode                   | Subtest                 | Rel99        |
|------------------------|-------------------------|--------------|
| WCDMA General Settings | Loopback Mode           | Test Mode 2  |
|                        | Rel99 RMC               | 12.2kbps RMC |
|                        | Power Control Algorithm | Algorithm2   |
|                        | $\beta_c/\beta_d$       | 8/15         |

### HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 7 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

|                         | Mode                                 | HSDPA        | HSDPA | HSDPA | HSDPA |
|-------------------------|--------------------------------------|--------------|-------|-------|-------|
|                         | Subtest                              | 1            | 2     | 3     | 4     |
| W-CDMA General Settings | Loopback Mode                        | Test Mode 1  |       |       |       |
|                         | Rel99 RMC                            | 12.2kbps RMC |       |       |       |
|                         | HSDPA FRC                            | H-Set 1      |       |       |       |
|                         | Power Control Algorithm              | Algorithm 2  |       |       |       |
|                         | $\beta_c$                            | 2/15         | 11/15 | 15/15 | 15/15 |
|                         | $\beta_d$                            | 15/15        | 15/15 | 8/15  | 4/15  |
|                         | Bd (SF)                              | 64           |       |       |       |
|                         | $\beta_c/\beta_d$                    | 2/15         | 12/15 | 15/8  | 15/4  |
|                         | $\beta_{hs}$                         | 4/15         | 24/15 | 30/15 | 30/15 |
| HSDPA Specific Settings | MPR (dB)                             | 0            | 0     | 0.5   | 0.5   |
|                         | $D_{ACK}$                            | 8            |       |       |       |
|                         | $D_{NAK}$                            | 8            |       |       |       |
|                         | DCQI                                 | 8            |       |       |       |
|                         | Ack-Nack repetition factor           | 3            |       |       |       |
|                         | CQI Feedback (Table 5.2B.4)          | 4ms          |       |       |       |
|                         | CQI Repetition Factor (Table 5.2B.4) | 2            |       |       |       |
|                         | $A_{hs}=\beta_{hs}/\beta_c$          | 30/15        |       |       |       |

### **HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals**

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

|                               | Mode                                 | HSPA          |       |       |       |             |
|-------------------------------|--------------------------------------|---------------|-------|-------|-------|-------------|
|                               | Subtest                              | 1             | 2     | 3     | 4     | 5           |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1   |       |       |       |             |
|                               | Rel99 RMC                            | 12.2 kbps RMC |       |       |       |             |
|                               | HSDPA FRC                            | H-Set 1       |       |       |       |             |
|                               | HSUPA Test                           | HSPA          |       |       |       |             |
|                               | Power Control Algorithm              | Algorithm 2   |       |       |       | Algorithm 1 |
|                               | $\beta_c$                            | 11/15         | 6/15  | 15/15 | 2/15  | 15/15       |
|                               | $\beta_d$                            | 15/15         | 15/15 | 9/15  | 15/15 | 0           |
|                               | $\beta_{ec}$                         | 209/225       | 12/15 | 30/15 | 2/15  | 5/15        |
|                               | $\beta_c/\beta_d$                    | 11/15         | 6/15  | 15/9  | 2/15  | 15/1        |
|                               | $\beta_{hs}$                         | 22/15         | 12/15 | 30/15 | 4/15  | 5/15        |
|                               | $\beta_{ed}$                         | 1309/225      | 94/75 | 47/15 | 56/75 | 47/15       |
| HSDPA<br>Specific<br>Settings | CM (dB)                              | 1             | 3     | 2     | 3     | 1           |
|                               | MPR (dB)                             | 0             | 2     | 1     | 2     | 0           |
|                               | DACK                                 | 8             |       |       |       | 0           |
|                               | DNAK                                 | 8             |       |       |       | 0           |
|                               | DCQI                                 | 8             |       |       |       | 0           |
|                               | Ack-Nack repetition factor           | 3             |       |       |       |             |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms           |       |       |       |             |
| HSUPA<br>Specific<br>Settings | CQI Repetition Factor (Table 5.2B.4) | 2             |       |       |       |             |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15         |       |       |       |             |
|                               | E-DPDCCH                             | 6             | 8     | 8     | 5     | 7           |
|                               | DHARQ                                | 0             | 0     | 0     | 0     | 0           |
|                               | AG Index                             | 20            | 12    | 15    | 17    | 21          |
|                               | ETFCI (from 34.121 Table C.11.1.3)   | 75            | 67    | 92    | 71    | 81          |
|                               | Associated Max UL Data Rate kbps     | 242.1         | 174.9 | 482.8 | 205.8 | 308.9       |
|                               | Reference E-TFCIs                    | 5             | 5     | 2     | 5     | 1           |
|                               | Reference E-TFCI                     | 11            | 11    | 11    | 11    | 67          |
|                               | Reference E-TFCI PO                  | 4             | 4     | 4     | 4     | 18          |
|                               | Reference E-TFCI                     | 67            | 67    | 92    | 67    | 67          |
|                               | Reference E-TFCI PO                  | 18            | 18    | 18    | 18    | 18          |
|                               | Reference E-TFCI                     | 71            | 71    | 71    | 71    | 71          |
|                               | Reference E-TFCI PO                  | 23            | 23    | 23    | 23    | 23          |
|                               | Reference E-TFCI                     | 75            | 75    | 75    | 75    | 75          |
|                               | Reference E-TFCI PO                  | 26            | 26    | 26    | 26    | 26          |
|                               | Reference E-TFCI                     | 81            | 81    | 81    | 81    | 81          |
|                               | Reference E-TFCI PO                  | 27            | 27    | 27    | 27    | 27          |
|                               | Maximum Channelisation Codes         | 2xSF2         |       |       |       | SF4         |

### DC-HSDPA Setup Procedures used to establish the test signals

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

| Parameter<br>During Connection setup | Unit | Value |
|--------------------------------------|------|-------|
| P-CPICH_Ec/Ior                       | dB   | -10   |
| P-CCPCH and SCH_Ec/Ior               | dB   | -12   |
| PICH_Ec/Ior                          | dB   | -15   |
| HS-PDSCH                             | dB   | off   |
| HS-SCCH_1                            | dB   | off   |
| DPCH_Ec/Ior                          | dB   | -5    |
| OCNS_Ec/Ior                          | dB   | -3.1  |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter                                                                                                                                              | Unit      | Value |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|
| Nominal Avg. Inf. Bit Rate                                                                                                                             | kbps      | 60    |
| Inter-TTI Distance                                                                                                                                     | TTI's     | 1     |
| Number of HARQ Processes                                                                                                                               | Processes | 6     |
| Information Bit Payload ( $N_{INF}$ )                                                                                                                  | Bits      | 120   |
| Number Code Blocks                                                                                                                                     | Blocks    | 1     |
| Binary Channel Bits Per TTI                                                                                                                            | Bits      | 960   |
| Total Available SML's in UE                                                                                                                            | SML's     | 19200 |
| Number of SML's per HARQ Proc.                                                                                                                         | SML's     | 3200  |
| Coding Rate                                                                                                                                            |           | 0.15  |
| Number of Physical Channel Codes                                                                                                                       | Codes     | 1     |
| Modulation                                                                                                                                             |           | QPSK  |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.               |           |       |
| Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. |           |       |

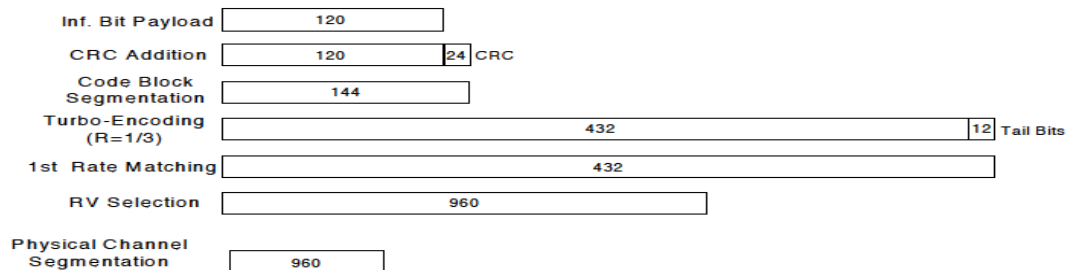


**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

|                               | Mode                            | HSDPA        | HSDPA | HSDPA | HSDPA |
|-------------------------------|---------------------------------|--------------|-------|-------|-------|
|                               | Subtest                         | 1            | 2     | 3     | 4     |
| WCDMA<br>General<br>Settings  | Loopback Mode                   | Test Mode 1  |       |       |       |
|                               | Rel99 RMC                       | 12.2kbps RMC |       |       |       |
|                               | HSDPA FRC                       | H-Set 1      |       |       |       |
|                               | Power Control Algorithm         | Algorithm2   |       |       |       |
|                               | $\beta_c$                       | 2/15         | 11/15 | 15/15 | 15/15 |
|                               | $\beta_d$                       | 15/15        | 15/15 | 8/15  | 4/15  |
|                               | $\beta_d$ (SF)                  | 64           |       |       |       |
|                               | $\beta_c/\beta_d$               | 2/15         | 11/15 | 15/8  | 15/4  |
|                               | $\beta_{hs}$                    | 4/15         | 24/15 | 30/15 | 30/15 |
| HSDPA<br>Specific<br>Settings | MPR (dB)                        | 0            | 0     | 0.5   | 0.5   |
|                               | DACK                            | 8            |       |       |       |
|                               | DNAK                            | 8            |       |       |       |
|                               | DCQI                            | 8            |       |       |       |
|                               | Ack-Nack Repetition factor      | 3            |       |       |       |
|                               | CQI Feedback                    | 4ms          |       |       |       |
|                               | CQI Repetition Factor           | 2            |       |       |       |
|                               | $A_{hs} = \beta_{hs} / \beta_c$ | 30/15        |       |       |       |

### **HSPA+**

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

## 8.2.1. WCDMA OUTPUT POWER RESULT

### WCDMA Band 5 Measured Results

| Band          | Mode     |                | UL Ch No. | Freq. [MHz] | MPR [dB] | Avg Pwr [dBm] |
|---------------|----------|----------------|-----------|-------------|----------|---------------|
| W-CDMA Band V | Rel 99   | RMC, 12.2 kbps | 4132      | 826.4       | 0        | 22.9          |
|               |          |                | 4183      | 836.6       | 0        | 22.8          |
|               |          |                | 4233      | 846.6       | 0        | 22.7          |
|               | HSDPA    | Subtest 1      | 4132      | 826.4       | 0        | 23.4          |
|               |          |                | 4183      | 836.6       | 0        | 23.4          |
|               |          |                | 4233      | 846.6       | 0        | 23.2          |
|               |          | Subtest 2      | 4132      | 826.4       | 0        | 23.4          |
|               |          |                | 4183      | 836.6       | 0        | 23.4          |
|               |          |                | 4233      | 846.6       | 0        | 23.2          |
|               |          | Subtest 3      | 4132      | 826.4       | 0.5      | 22.6          |
|               |          |                | 4183      | 836.6       | 0.5      | 23.0          |
|               |          |                | 4233      | 846.6       | 0.5      | 22.8          |
|               |          | Subtest 4      | 4132      | 826.4       | 0.5      | 22.5          |
|               |          |                | 4183      | 836.6       | 0.5      | 22.5          |
|               |          |                | 4233      | 846.6       | 0.5      | 22.3          |
|               | HSUPA    | Subtest 1      | 4132      | 826.4       | 0        | 22.4          |
|               |          |                | 4183      | 836.6       | 0        | 22.5          |
|               |          |                | 4233      | 846.6       | 0        | 22.3          |
|               |          | Subtest 2      | 4132      | 826.4       | 2        | 21.5          |
|               |          |                | 4183      | 836.6       | 2        | 21.5          |
|               |          |                | 4233      | 846.6       | 2        | 21.4          |
|               |          | Subtest 3      | 4132      | 826.4       | 1        | 22.4          |
|               |          |                | 4183      | 836.6       | 1        | 22.4          |
|               |          |                | 4233      | 846.6       | 1        | 22.2          |
|               |          | Subtest 4      | 4132      | 826.4       | 2        | 21.5          |
|               |          |                | 4183      | 836.6       | 2        | 21.5          |
|               |          |                | 4233      | 846.6       | 2        | 21.3          |
|               |          | Subtest 5      | 4132      | 826.4       | 0        | 23.3          |
|               |          |                | 4183      | 836.6       | 0        | 23.3          |
|               |          |                | 4233      | 846.6       | 0        | 23.1          |
|               | DC-HSDPA | Subtest 1      | 4132      | 826.4       | 0        | 23.2          |
|               |          |                | 4183      | 836.6       | 0        | 23.3          |
|               |          |                | 4233      | 846.6       | 0        | 23.0          |
|               |          | Subtest 2      | 4132      | 826.4       | 0        | 23.4          |
|               |          |                | 4183      | 836.6       | 0        | 23.4          |
|               |          |                | 4233      | 846.6       | 0        | 23.2          |
|               |          | Subtest 3      | 4132      | 826.4       | 0.5      | 22.5          |
|               |          |                | 4183      | 836.6       | 0.5      | 23.0          |
|               |          |                | 4233      | 846.6       | 0.5      | 22.7          |
|               |          | Subtest 4      | 4132      | 826.4       | 0.5      | 22.5          |
|               |          |                | 4183      | 836.6       | 0.5      | 22.5          |
|               |          |                | 4233      | 846.6       | 0.5      | 22.3          |

**WCDMA Band 2 Measured Results**

| Band           | Mode     |                | UL Ch No. | Freq. [MHz] | MPR [dB] | Avg Pwr [dBm] |
|----------------|----------|----------------|-----------|-------------|----------|---------------|
| W-CDMA Band II | Rel 99   | RMC, 12.2 kbps | 9262      | 1852.4      | 0        | 22.6          |
|                |          |                | 9400      | 1880.0      | 0        | 22.8          |
|                |          |                | 9538      | 1907.6      | 0        | 23.1          |
|                | HSDPA    | Subtest 1      | 9262      | 1852.4      | 0        | 22.8          |
|                |          |                | 9400      | 1880.0      | 0        | 23.3          |
|                |          |                | 9538      | 1907.6      | 0        | 22.7          |
|                |          | Subtest 2      | 9262      | 1852.4      | 0        | 22.8          |
|                |          |                | 9400      | 1880.0      | 0        | 23.3          |
|                |          |                | 9538      | 1907.6      | 0        | 22.8          |
|                |          | Subtest 3      | 9262      | 1852.4      | 0.5      | 22.1          |
|                |          |                | 9400      | 1880.0      | 0.5      | 23.0          |
|                |          |                | 9538      | 1907.6      | 0.5      | 22.8          |
|                |          | Subtest 4      | 9262      | 1852.4      | 0.5      | 22.0          |
|                |          |                | 9400      | 1880.0      | 0.5      | 22.4          |
|                |          |                | 9538      | 1907.6      | 0.5      | 22.1          |
|                | HSUPA    | Subtest 1      | 9262      | 1852.4      | 0        | 22.0          |
|                |          |                | 9400      | 1880.0      | 0        | 22.3          |
|                |          |                | 9538      | 1907.6      | 0        | 22.0          |
|                |          | Subtest 2      | 9262      | 1852.4      | 2        | 21.1          |
|                |          |                | 9400      | 1880.0      | 2        | 21.3          |
|                |          |                | 9538      | 1907.6      | 2        | 21.2          |
|                |          | Subtest 3      | 9262      | 1852.4      | 1        | 21.9          |
|                |          |                | 9400      | 1880.0      | 1        | 22.3          |
|                |          |                | 9538      | 1907.6      | 1        | 21.9          |
|                |          | Subtest 4      | 9262      | 1852.4      | 2        | 21.0          |
|                |          |                | 9400      | 1880.0      | 2        | 21.3          |
|                |          |                | 9538      | 1907.6      | 2        | 21.0          |
|                |          | Subtest 5      | 9262      | 1852.4      | 0        | 22.7          |
|                |          |                | 9400      | 1880.0      | 0        | 23.1          |
|                |          |                | 9538      | 1907.6      | 0        | 22.6          |
|                | DC-HSDPA | Subtest 1      | 9262      | 1852.4      | 0        | 22.8          |
|                |          |                | 9400      | 1880.0      | 0        | 23.1          |
|                |          |                | 9538      | 1907.6      | 0        | 22.7          |
|                |          | Subtest 2      | 9262      | 1852.4      | 0        | 22.8          |
|                |          |                | 9400      | 1880.0      | 0        | 23.2          |
|                |          |                | 9538      | 1907.6      | 0        | 22.7          |
|                |          | Subtest 3      | 9262      | 1852.4      | 0.5      | 22.0          |
|                |          |                | 9400      | 1880.0      | 0.5      | 23.0          |
|                |          |                | 9538      | 1907.6      | 0.5      | 22.6          |
|                |          | Subtest 4      | 9262      | 1852.4      | 0.5      | 21.9          |
|                |          |                | 9400      | 1880.0      | 0.5      | 22.1          |
|                |          |                | 9538      | 1907.6      | 0.5      | 21.7          |

### 8.3. LTE OUTPUT VERIFICATION

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

| Modulation | Channel bandwidth / Transmission bandwidth (RB) |         |       |        |        |        | MPR (dB) |
|------------|-------------------------------------------------|---------|-------|--------|--------|--------|----------|
|            | 1.4 MHz                                         | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |          |
| QPSK       | > 5                                             | > 4     | > 8   | > 12   | > 16   | > 18   | ≤ 1      |
| 16 QAM     | ≤ 5                                             | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | ≤ 1      |
| 16 QAM     | > 5                                             | > 4     | > 8   | > 12   | > 16   | > 18   | ≤ 2      |

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS\_01".

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band              | Channel bandwidth (MHz) | Resources Blocks ( $N_{RB}$ ) | A-MPR (dB)    |
|--------------------------|---------------------------|--------------------------|-------------------------|-------------------------------|---------------|
| NS_01                    | 6.6.2.1.1                 | Table 5.5-1              | 1.4, 3, 5, 10, 15, 20   | Table 5.6-1                   | NA            |
| NS_03                    | 6.6.2.2.1                 | 2, 4, 10, 23, 25, 35, 36 | 3                       | >5                            | ≤ 1           |
|                          |                           |                          | 5                       | >6                            | ≤ 1           |
|                          |                           |                          | 10                      | >6                            | ≤ 1           |
|                          |                           |                          | 15                      | >8                            | ≤ 1           |
|                          |                           |                          | 20                      | >10                           | ≤ 1           |
| NS_04                    | 6.6.2.2.2                 | 41                       | 5                       | >6                            | ≤ 1           |
|                          |                           |                          | 10, 15, 20              | See Table 6.2.4-4             |               |
| NS_05                    | 6.6.3.3.1                 | 1                        | 10, 15, 20              | ≥ 50                          | ≤ 1           |
| NS_06                    | 6.6.2.2.3                 | 12, 13, 14, 17           | 1.4, 3, 5, 10           | Table 5.6-1                   | n/a           |
| NS_07                    | 6.6.2.2.3                 | 13                       | 10                      | Table 6.2.4-2                 | Table 6.2.4-2 |
|                          | 6.6.3.3.2                 |                          |                         |                               |               |
| NS_08                    | 6.6.3.3.3                 | 19                       | 10, 15                  | > 44                          | ≤ 3           |
| NS_09                    | 6.6.3.3.4                 | 21                       | 10, 15                  | > 40                          | ≤ 1           |
|                          |                           |                          |                         | > 55                          | ≤ 2           |
| NS_10                    |                           | 20                       | 15, 20                  | Table 6.2.4-3                 | Table 6.2.4-3 |
| NS_11                    | 6.6.2.2.1                 | 23 <sup>1</sup>          | 1.4, 3, 5, 10           | Table 6.2.4-5                 | Table 6.2.4-5 |
| ..                       |                           |                          |                         |                               |               |
| NS_32                    | -                         | -                        | -                       | -                             | -             |

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

### 8.3.1. LTE OUTPUT POWER RESULT

#### LTE Band 17 Measured Results

| Band           | BW<br>(MHz) | Mode  | RB Allocation | RB<br>offset | Target<br>MPR | Avg Pwr (dBm) |
|----------------|-------------|-------|---------------|--------------|---------------|---------------|
|                |             |       |               |              |               | 23790         |
|                |             |       |               |              |               | 710 MHz       |
| LTE<br>Band 17 | 10          | QPSK  | 1             | 0            | 0             | 23.14         |
|                |             |       | 1             | 25           | 0             | 23.11         |
|                |             |       | 1             | 49           | 0             | 23.09         |
|                |             |       | 25            | 0            | 1             | 21.88         |
|                |             |       | 25            | 12           | 1             | 21.89         |
|                |             |       | 25            | 25           | 1             | 21.78         |
|                |             |       | 50            | 0            | 1             | 21.83         |
|                |             | 16QAM | 1             | 0            | 1             | 22.31         |
|                |             |       | 1             | 25           | 1             | 22.21         |
|                |             |       | 1             | 49           | 1             | 22.10         |
|                |             |       | 25            | 0            | 2             | 20.81         |
|                |             |       | 25            | 12           | 2             | 20.66         |
|                |             |       | 25            | 25           | 2             | 20.76         |
|                |             |       | 50            | 0            | 2             | 20.82         |
| Band           | BW<br>(MHz) | Mode  | RB Allocation | RB<br>offset | Target<br>MPR | Avg Pwr (dBm) |
|                |             |       |               |              |               | 23790         |
|                |             |       |               |              |               | 710 MHz       |
| LTE<br>Band 17 | 5           | QPSK  | 1             | 0            | 0             | 23.04         |
|                |             |       | 1             | 12           | 0             | 23.07         |
|                |             |       | 1             | 24           | 0             | 23.09         |
|                |             |       | 12            | 0            | 1             | 21.81         |
|                |             |       | 12            | 6            | 1             | 21.74         |
|                |             |       | 12            | 11           | 1             | 21.69         |
|                |             |       | 25            | 0            | 1             | 21.86         |
|                |             | 16QAM | 1             | 0            | 1             | 22.06         |
|                |             |       | 1             | 12           | 1             | 21.93         |
|                |             |       | 1             | 24           | 1             | 21.98         |
|                |             |       | 12            | 0            | 2             | 20.69         |
|                |             |       | 12            | 6            | 2             | 20.65         |
|                |             |       | 12            | 11           | 2             | 20.72         |
|                |             |       | 25            | 0            | 2             | 20.77         |

**LTE Band 5 Measured Results**

| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |           |           |
|------------|----------|-------|---------------|-----------|------------|---------------|-----------|-----------|
|            |          |       |               |           |            | Max. Power    |           |           |
|            |          |       |               |           |            | 829 MHz       | 836.5 MHz | 844 MHz   |
| LTE Band 5 | 10       | QPSK  | 1             | 0         | 0          | 23.32         | 23.15     | 23.06     |
|            |          |       | 1             | 25        | 0          | 23.21         | 23.26     | 23.04     |
|            |          |       | 1             | 49        | 0          | 23.19         | 23.13     | 22.98     |
|            |          |       | 25            | 0         | 1          | 21.90         | 21.82     | 21.69     |
|            |          |       | 25            | 12        | 1          | 21.81         | 21.87     | 21.63     |
|            |          |       | 25            | 25        | 1          | 21.71         | 21.93     | 21.64     |
|            |          | 16QAM | 50            | 0         | 1          | 21.86         | 21.79     | 21.68     |
|            |          |       | 1             | 0         | 1          | 22.23         | 22.41     | 22.20     |
|            |          |       | 1             | 25        | 1          | 22.17         | 22.39     | 22.25     |
|            |          |       | 1             | 49        | 1          | 22.11         | 22.34     | 22.11     |
|            |          |       | 25            | 0         | 2          | 20.80         | 20.83     | 20.70     |
|            |          |       | 25            | 12        | 2          | 20.75         | 20.82     | 20.66     |
|            |          |       | 25            | 25        | 2          | 20.65         | 20.85     | 20.58     |
|            |          |       | 50            | 0         | 2          | 20.74         | 20.70     | 20.58     |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |           |           |
|            |          |       |               |           |            | Max. Power    |           |           |
|            |          |       |               |           |            | 826.5 MHz     | 836.5 MHz | 846.5 MHz |
| LTE Band 5 | 5        | QPSK  | 1             | 0         | 0          | 23.04         | 23.16     | 22.86     |
|            |          |       | 1             | 12        | 0          | 23.01         | 23.17     | 22.86     |
|            |          |       | 1             | 24        | 0          | 23.04         | 23.24     | 22.88     |
|            |          |       | 12            | 0         | 1          | 21.84         | 21.77     | 21.72     |
|            |          |       | 12            | 7         | 1          | 21.73         | 21.85     | 21.58     |
|            |          |       | 12            | 13        | 1          | 21.64         | 21.82     | 21.64     |
|            |          | 16QAM | 25            | 0         | 1          | 21.76         | 21.73     | 21.72     |
|            |          |       | 1             | 0         | 1          | 22.00         | 21.99     | 22.28     |
|            |          |       | 1             | 12        | 1          | 21.96         | 21.97     | 22.20     |
|            |          |       | 1             | 24        | 1          | 21.94         | 22.10     | 22.19     |
|            |          |       | 12            | 0         | 2          | 20.72         | 20.70     | 20.59     |
|            |          |       | 12            | 7         | 2          | 20.68         | 20.68     | 20.57     |
|            |          |       | 12            | 13        | 2          | 20.62         | 20.72     | 20.53     |
|            |          |       | 25            | 0         | 2          | 20.65         | 20.71     | 20.68     |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |           |           |
|            |          |       |               |           |            | Max. Power    |           |           |
|            |          |       |               |           |            | 825.5 MHz     | 836.5 MHz | 847.5 MHz |
| LTE Band 5 | 3        | QPSK  | 1             | 0         | 0          | 23.07         | 23.06     | 23.07     |
|            |          |       | 1             | 8         | 0          | 23.02         | 23.16     | 22.87     |
|            |          |       | 1             | 14        | 0          | 23.10         | 23.24     | 22.96     |
|            |          |       | 8             | 0         | 1          | 21.76         | 21.83     | 21.66     |
|            |          |       | 8             | 4         | 1          | 21.74         | 21.86     | 21.59     |
|            |          |       | 8             | 7         | 1          | 21.71         | 21.89     | 21.60     |
|            |          | 16QAM | 15            | 0         | 1          | 21.68         | 21.87     | 21.60     |
|            |          |       | 1             | 0         | 1          | 22.11         | 22.15     | 22.17     |
|            |          |       | 1             | 8         | 1          | 22.05         | 22.17     | 22.14     |
|            |          |       | 1             | 14        | 1          | 22.08         | 22.22     | 22.21     |
|            |          |       | 8             | 0         | 2          | 20.60         | 20.57     | 20.58     |
|            |          |       | 8             | 4         | 2          | 20.59         | 20.53     | 20.54     |
|            |          |       | 8             | 7         | 2          | 20.55         | 20.54     | 20.48     |
|            |          |       | 15            | 0         | 2          | 20.63         | 20.73     | 20.58     |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |           |           |
|            |          |       |               |           |            | Max. Power    |           |           |
|            |          |       |               |           |            | 824.7 MHz     | 836.5 MHz | 848.3 MHz |
| LTE Band 5 | 1.4      | QPSK  | 1             | 0         | 0          | 23.02         | 23.30     | 22.92     |
|            |          |       | 1             | 3         | 0          | 23.02         | 23.25     | 22.97     |
|            |          |       | 1             | 5         | 0          | 23.02         | 23.27     | 23.00     |
|            |          |       | 3             | 0         | 0          | 22.85         | 23.05     | 22.86     |
|            |          |       | 3             | 1         | 0          | 22.81         | 22.98     | 22.82     |
|            |          |       | 3             | 3         | 0          | 22.78         | 23.00     | 22.74     |
|            |          | 16QAM | 6             | 0         | 1          | 21.63         | 21.88     | 21.68     |
|            |          |       | 1             | 0         | 1          | 22.05         | 22.38     | 22.12     |
|            |          |       | 1             | 3         | 1          | 22.06         | 22.31     | 22.06     |
|            |          |       | 1             | 5         | 1          | 22.09         | 22.45     | 22.10     |
|            |          |       | 3             | 0         | 1          | 21.59         | 21.84     | 21.68     |
|            |          |       | 3             | 1         | 1          | 21.60         | 21.89     | 21.75     |
|            |          |       | 3             | 3         | 1          | 21.62         | 21.90     | 21.68     |
|            |          |       | 6             | 0         | 2          | 20.68         | 20.69     | 20.66     |

**LTE Band 4 Measured Results**

| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|------------|----------|-------|---------------|-----------|------------|---------------|------------|------------|
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1720 MHz      | 1732.5 MHz | 1745 MHz   |
| LTE Band 4 | 20       | QPSK  | 1             | 0         | 0          | 22.83         | 22.95      | 22.75      |
|            |          |       | 1             | 49        | 0          | 22.97         | 23.07      | 22.88      |
|            |          |       | 1             | 99        | 0          | 22.94         | 23.05      | 22.95      |
|            |          |       | 50            | 0         | 1          | 21.68         | 21.61      | 21.59      |
|            |          |       | 50            | 24        | 1          | 21.76         | 21.70      | 21.61      |
|            |          |       | 50            | 50        | 1          | 21.74         | 21.75      | 21.70      |
|            |          |       | 100           | 0         | 1          | 21.75         | 21.64      | 21.71      |
|            |          | 16QAM | 1             | 0         | 1          | 21.93         | 21.90      | 21.85      |
|            |          |       | 1             | 49        | 1          | 21.98         | 21.96      | 21.93      |
|            |          |       | 1             | 99        | 1          | 22.04         | 22.05      | 21.98      |
|            |          |       | 50            | 0         | 2          | 20.67         | 20.55      | 20.52      |
|            |          |       | 50            | 24        | 2          | 20.75         | 20.56      | 20.57      |
|            |          |       | 50            | 50        | 2          | 20.61         | 20.53      | 20.58      |
|            |          |       | 100           | 0         | 2          | 20.62         | 20.50      | 20.70      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1717.5 MHz    | 1732.5 MHz | 1747.5 MHz |
| LTE Band 4 | 15       | QPSK  | 1             | 0         | 0          | 22.96         | 22.87      | 22.79      |
|            |          |       | 1             | 37        | 0          | 23.07         | 22.99      | 22.84      |
|            |          |       | 1             | 74        | 0          | 23.01         | 22.92      | 22.98      |
|            |          |       | 36            | 0         | 1          | 21.76         | 21.58      | 21.61      |
|            |          |       | 36            | 20        | 1          | 21.78         | 21.68      | 21.63      |
|            |          |       | 36            | 39        | 1          | 21.74         | 21.68      | 21.64      |
|            |          |       | 75            | 0         | 1          | 21.74         | 21.60      | 21.71      |
|            |          | 16QAM | 1             | 0         | 1          | 21.99         | 22.04      | 22.01      |
|            |          |       | 1             | 37        | 1          | 22.05         | 22.06      | 21.91      |
|            |          |       | 1             | 74        | 1          | 21.96         | 22.20      | 21.99      |
|            |          |       | 36            | 0         | 2          | 20.75         | 20.51      | 20.56      |
|            |          |       | 36            | 20        | 2          | 20.68         | 20.62      | 20.50      |
|            |          |       | 36            | 39        | 2          | 20.76         | 20.67      | 20.52      |
|            |          |       | 75            | 0         | 2          | 20.66         | 20.48      | 20.56      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1715 MHz      | 1732.5 MHz | 1750 MHz   |
| LTE Band 4 | 10       | QPSK  | 1             | 0         | 0          | 23.00         | 22.90      | 22.91      |
|            |          |       | 1             | 25        | 0          | 23.06         | 23.04      | 22.96      |
|            |          |       | 1             | 49        | 0          | 23.02         | 23.01      | 22.87      |
|            |          |       | 25            | 0         | 1          | 21.78         | 21.57      | 21.65      |
|            |          |       | 25            | 12        | 1          | 21.76         | 21.73      | 21.55      |
|            |          |       | 25            | 25        | 1          | 21.68         | 21.75      | 21.64      |
|            |          |       | 50            | 0         | 1          | 21.75         | 21.62      | 21.64      |
|            |          | 16QAM | 1             | 0         | 1          | 22.06         | 22.16      | 21.97      |
|            |          |       | 1             | 25        | 1          | 22.11         | 22.15      | 21.98      |
|            |          |       | 1             | 49        | 1          | 22.10         | 22.11      | 22.01      |
|            |          |       | 25            | 0         | 2          | 20.74         | 20.56      | 20.61      |
|            |          |       | 25            | 12        | 2          | 20.74         | 20.63      | 20.56      |
|            |          |       | 25            | 25        | 2          | 20.67         | 20.65      | 20.56      |
|            |          |       | 50            | 0         | 2          | 20.66         | 20.49      | 20.62      |

**LTE Band 4 Measured Results (continued)**

| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|------------|----------|-------|---------------|-----------|------------|---------------|------------|------------|
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1712.5 MHz    | 1732.5 MHz | 1752.5 MHz |
| LTE Band 4 | 5        | QPSK  | 1             | 0         | 0          | 23.02         | 23.01      | 22.81      |
|            |          |       | 1             | 12        | 0          | 23.13         | 23.08      | 22.73      |
|            |          |       | 1             | 24        | 0          | 23.12         | 23.03      | 22.76      |
|            |          |       | 12            | 0         | 1          | 21.79         | 21.67      | 21.61      |
|            |          |       | 12            | 7         | 1          | 21.72         | 21.64      | 21.54      |
|            |          |       | 12            | 13        | 1          | 21.73         | 21.65      | 21.54      |
|            |          |       | 25            | 0         | 1          | 21.67         | 21.61      | 21.59      |
|            |          | 16QAM | 1             | 0         | 1          | 22.28         | 21.94      | 21.85      |
|            |          |       | 1             | 12        | 1          | 22.33         | 21.97      | 21.84      |
|            |          |       | 1             | 24        | 1          | 22.34         | 21.95      | 21.93      |
|            |          |       | 12            | 0         | 2          | 20.65         | 20.40      | 20.47      |
|            |          |       | 12            | 7         | 2          | 20.64         | 20.43      | 20.40      |
|            |          |       | 12            | 13        | 2          | 20.70         | 20.45      | 20.43      |
|            |          |       | 25            | 0         | 2          | 20.67         | 20.39      | 20.41      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1711.5 MHz    | 1732.5 MHz | 1753.5 MHz |
| LTE Band 4 | 3        | QPSK  | 1             | 0         | 0          | 23.12         | 22.96      | 22.90      |
|            |          |       | 1             | 8         | 0          | 23.15         | 23.06      | 22.91      |
|            |          |       | 1             | 14        | 0          | 23.09         | 23.02      | 22.99      |
|            |          |       | 8             | 0         | 1          | 21.78         | 21.69      | 21.69      |
|            |          |       | 8             | 4         | 1          | 21.79         | 21.69      | 21.57      |
|            |          |       | 8             | 7         | 1          | 21.78         | 21.70      | 21.64      |
|            |          |       | 15            | 0         | 1          | 21.76         | 21.69      | 21.64      |
|            |          | 16QAM | 1             | 0         | 1          | 22.10         | 22.15      | 22.08      |
|            |          |       | 1             | 8         | 1          | 22.07         | 22.11      | 22.01      |
|            |          |       | 1             | 14        | 1          | 22.13         | 22.09      | 22.07      |
|            |          |       | 8             | 0         | 2          | 20.58         | 20.51      | 20.56      |
|            |          |       | 8             | 4         | 2          | 20.59         | 20.41      | 20.55      |
|            |          |       | 8             | 7         | 2          | 20.61         | 20.38      | 20.52      |
|            |          |       | 15            | 0         | 2          | 20.62         | 20.48      | 20.43      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |            |            |
|            |          |       |               |           |            | Max. Power    |            |            |
|            |          |       |               |           |            | 1710.7 MHz    | 1732.5 MHz | 1754.3 MHz |
| LTE Band 4 | 1.4      | QPSK  | 1             | 0         | 0          | 23.11         | 23.09      | 22.90      |
|            |          |       | 1             | 3         | 0          | 23.09         | 23.00      | 22.85      |
|            |          |       | 1             | 5         | 0          | 23.09         | 22.96      | 22.87      |
|            |          |       | 3             | 0         | 0          | 22.93         | 22.77      | 22.80      |
|            |          |       | 3             | 1         | 0          | 22.86         | 22.80      | 22.81      |
|            |          |       | 3             | 3         | 0          | 22.86         | 22.80      | 22.78      |
|            |          |       | 6             | 0         | 1          | 21.75         | 21.69      | 21.63      |
|            |          | 16QAM | 1             | 0         | 1          | 22.14         | 22.14      | 22.03      |
|            |          |       | 1             | 3         | 1          | 22.16         | 22.18      | 22.03      |
|            |          |       | 1             | 5         | 1          | 22.15         | 22.17      | 22.06      |
|            |          |       | 3             | 0         | 1          | 21.74         | 21.64      | 21.80      |
|            |          |       | 3             | 1         | 1          | 21.80         | 21.64      | 21.77      |
|            |          |       | 3             | 3         | 1          | 21.83         | 21.55      | 21.79      |
|            |          |       | 6             | 0         | 2          | 20.66         | 20.40      | 20.57      |

**LTE Band 2 Measured Results**

| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|------------|----------|-------|---------------|-----------|------------|---------------|----------|------------|
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1860 MHz      | 1880 MHz | 1900 MHz   |
| LTE Band 2 | 20       | QPSK  | 1             | 0         | 0          | 22.65         | 22.57    | 22.32      |
|            |          |       | 1             | 49        | 0          | 22.76         | 22.70    | 22.47      |
|            |          |       | 1             | 99        | 0          | 22.76         | 22.80    | 22.48      |
|            |          |       | 50            | 0         | 1          | 21.46         | 21.33    | 21.20      |
|            |          |       | 50            | 24        | 1          | 21.58         | 21.30    | 21.30      |
|            |          |       | 50            | 50        | 1          | 21.61         | 21.33    | 21.25      |
|            |          |       | 100           | 0         | 1          | 21.52         | 21.46    | 21.25      |
|            |          | 16QAM | 1             | 0         | 1          | 21.70         | 21.50    | 21.34      |
|            |          |       | 1             | 49        | 1          | 21.70         | 21.44    | 21.49      |
|            |          |       | 1             | 99        | 1          | 21.87         | 21.60    | 21.51      |
|            |          |       | 50            | 0         | 2          | 20.36         | 20.29    | 20.11      |
|            |          |       | 50            | 24        | 2          | 20.54         | 20.23    | 20.19      |
|            |          |       | 50            | 50        | 2          | 20.47         | 20.29    | 20.20      |
|            |          |       | 100           | 0         | 2          | 20.53         | 20.37    | 20.23      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1857.5 MHz    | 1880 MHz | 1902.5 MHz |
| LTE Band 2 | 15       | QPSK  | 1             | 0         | 0          | 22.73         | 22.57    | 22.40      |
|            |          |       | 1             | 37        | 0          | 22.92         | 22.56    | 22.51      |
|            |          |       | 1             | 74        | 0          | 22.91         | 22.68    | 22.52      |
|            |          |       | 36            | 0         | 1          | 21.58         | 21.36    | 21.31      |
|            |          |       | 36            | 20        | 1          | 21.55         | 21.31    | 21.32      |
|            |          |       | 36            | 39        | 1          | 21.63         | 21.39    | 21.28      |
|            |          |       | 75            | 0         | 1          | 21.55         | 21.36    | 21.33      |
|            |          | 16QAM | 1             | 0         | 1          | 22.03         | 21.69    | 21.30      |
|            |          |       | 1             | 37        | 1          | 22.12         | 21.74    | 21.23      |
|            |          |       | 1             | 74        | 1          | 22.14         | 21.77    | 21.34      |
|            |          |       | 36            | 0         | 2          | 20.44         | 20.35    | 20.18      |
|            |          |       | 36            | 20        | 2          | 20.60         | 20.30    | 20.28      |
|            |          |       | 36            | 39        | 2          | 20.59         | 20.28    | 20.18      |
|            |          |       | 75            | 0         | 2          | 20.51         | 20.33    | 20.29      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1855 MHz      | 1880 MHz | 1905 MHz   |
| LTE Band 2 | 10       | QPSK  | 1             | 0         | 0          | 22.86         | 22.51    | 22.56      |
|            |          |       | 1             | 25        | 0          | 22.95         | 22.52    | 22.48      |
|            |          |       | 1             | 49        | 0          | 22.96         | 22.64    | 22.53      |
|            |          |       | 25            | 0         | 1          | 21.50         | 21.36    | 21.34      |
|            |          |       | 25            | 12        | 1          | 21.71         | 21.30    | 21.27      |
|            |          |       | 25            | 25        | 1          | 21.74         | 21.36    | 21.34      |
|            |          |       | 50            | 0         | 1          | 21.55         | 21.43    | 21.43      |
|            |          | 16QAM | 1             | 0         | 1          | 21.75         | 21.51    | 21.76      |
|            |          |       | 1             | 25        | 1          | 21.62         | 21.47    | 21.67      |
|            |          |       | 1             | 49        | 1          | 21.80         | 21.50    | 21.70      |
|            |          |       | 25            | 0         | 2          | 20.54         | 20.22    | 20.33      |
|            |          |       | 25            | 12        | 2          | 20.57         | 20.18    | 20.30      |
|            |          |       | 25            | 25        | 2          | 20.60         | 20.25    | 20.29      |
|            |          |       | 50            | 0         | 2          | 20.54         | 20.29    | 20.32      |

**LTE Band 2 Measured Results (continued)**

| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|------------|----------|-------|---------------|-----------|------------|---------------|----------|------------|
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1852.5 MHz    | 1880 MHz | 1907.5 MHz |
| LTE Band 2 | 5        | QPSK  | 1             | 0         | 0          | 22.91         | 22.64    | 22.38      |
|            |          |       | 1             | 12        | 0          | 22.95         | 22.60    | 22.43      |
|            |          |       | 1             | 24        | 0          | 23.08         | 22.67    | 22.48      |
|            |          |       | 12            | 0         | 1          | 21.59         | 21.39    | 21.31      |
|            |          |       | 12            | 7         | 1          | 21.70         | 21.32    | 21.20      |
|            |          |       | 12            | 13        | 1          | 21.67         | 21.31    | 21.26      |
|            |          |       | 25            | 0         | 1          | 21.58         | 21.37    | 21.33      |
|            |          | 16QAM | 1             | 0         | 1          | 22.17         | 21.83    | 21.53      |
|            |          |       | 1             | 12        | 1          | 22.15         | 21.71    | 21.55      |
|            |          |       | 1             | 24        | 1          | 22.22         | 21.82    | 21.58      |
|            |          |       | 12            | 0         | 2          | 20.42         | 20.27    | 20.04      |
|            |          |       | 12            | 7         | 2          | 20.54         | 20.19    | 20.07      |
|            |          |       | 12            | 13        | 2          | 20.51         | 20.20    | 20.07      |
|            |          |       | 25            | 0         | 2          | 20.55         | 20.26    | 20.23      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1851.5 MHz    | 1880 MHz | 1908.5 MHz |
| LTE Band 2 | 3        | QPSK  | 1             | 0         | 0          | 23.00         | 22.67    | 22.52      |
|            |          |       | 1             | 8         | 0          | 23.02         | 22.66    | 22.46      |
|            |          |       | 1             | 14        | 0          | 23.05         | 22.74    | 22.50      |
|            |          |       | 8             | 0         | 1          | 21.64         | 21.43    | 21.31      |
|            |          |       | 8             | 4         | 1          | 21.71         | 21.31    | 21.21      |
|            |          |       | 8             | 7         | 1          | 21.73         | 21.28    | 21.15      |
|            |          |       | 15            | 0         | 1          | 21.71         | 21.27    | 21.23      |
|            |          | 16QAM | 1             | 0         | 1          | 21.97         | 21.81    | 21.84      |
|            |          |       | 1             | 8         | 1          | 21.95         | 21.73    | 21.72      |
|            |          |       | 1             | 14        | 1          | 21.93         | 21.81    | 21.78      |
|            |          |       | 8             | 0         | 2          | 20.52         | 20.19    | 20.19      |
|            |          |       | 8             | 4         | 2          | 20.59         | 20.18    | 20.14      |
|            |          |       | 8             | 7         | 2          | 20.62         | 20.14    | 20.06      |
|            |          |       | 15            | 0         | 2          | 20.63         | 20.20    | 20.12      |
| Band       | BW (MHz) | Mode  | RB Allocation | RB offset | Target MPR | Avg Pwr [dBm] |          |            |
|            |          |       |               |           |            | Max. Power    |          |            |
|            |          |       |               |           |            | 1850.7 MHz    | 1880 MHz | 1909.3 MHz |
| LTE Band 2 | 1.4      | QPSK  | 1             | 0         | 0          | 22.84         | 22.61    | 22.56      |
|            |          |       | 1             | 3         | 0          | 22.86         | 22.55    | 22.51      |
|            |          |       | 1             | 5         | 0          | 22.86         | 22.62    | 22.58      |
|            |          |       | 3             | 0         | 0          | 22.75         | 22.47    | 22.46      |
|            |          |       | 3             | 1         | 0          | 22.77         | 22.46    | 22.41      |
|            |          |       | 3             | 3         | 0          | 22.78         | 22.44    | 22.37      |
|            |          |       | 6             | 0         | 1          | 21.68         | 21.30    | 21.32      |
|            |          | 16QAM | 1             | 0         | 1          | 22.00         | 21.77    | 21.81      |
|            |          |       | 1             | 3         | 1          | 22.06         | 21.75    | 21.76      |
|            |          |       | 1             | 5         | 1          | 22.10         | 21.76    | 21.74      |
|            |          |       | 3             | 0         | 1          | 21.64         | 21.47    | 21.31      |
|            |          |       | 3             | 1         | 1          | 21.71         | 21.39    | 21.31      |
|            |          |       | 3             | 3         | 1          | 21.67         | 21.39    | 21.23      |
|            |          |       | 6             | 0         | 2          | 20.69         | 20.34    | 20.08      |

## 9. PEAK TO AVERAGE RATIO

### Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r02;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

### Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

### 9.1. CONDUCTED PEAK TO AVERAGE RESULT

#### GSM

| Band    | Channel | f [MHz] | Mode  | Ratio [dB] | Limit [dB] |
|---------|---------|---------|-------|------------|------------|
| GSM850  | 190     | 836.6   | GPRS  | 2.83       | 13.00      |
|         |         |         | EGPRS | 5.66       |            |
| GSM1900 | 661     | 1880.0  | GPRS  | 2.71       |            |
|         |         |         | EGPRS | 6.94       |            |

#### WCDMA

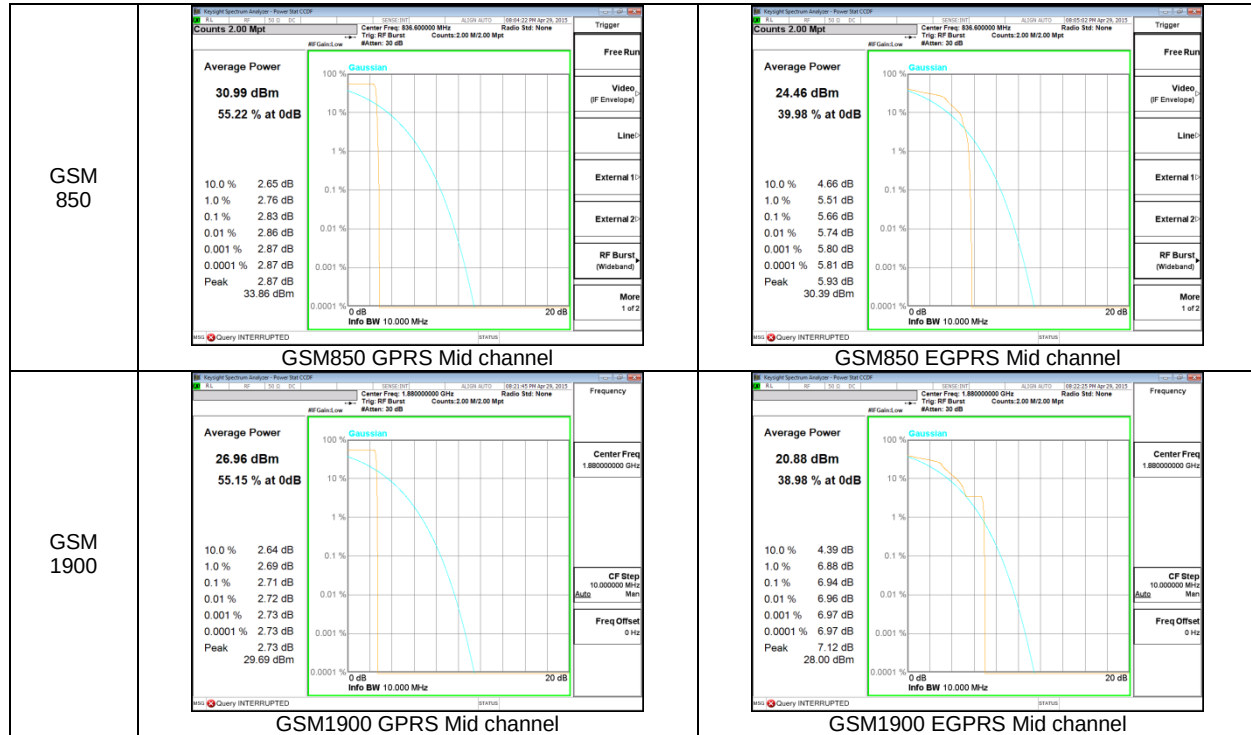
| Band   | Channel | f [MHz] | Mode  | Ratio [dB] | Limit [dB] |
|--------|---------|---------|-------|------------|------------|
| Band 5 | 4183    | 836.6   | REL99 | 2.96       | 13.00      |
|        |         |         | HSDPA | 3.10       |            |
| Band 2 | 9400    | 1880.0  | REL99 | 2.95       |            |
|        |         |         | HSDPA | 2.97       |            |

**LTE**

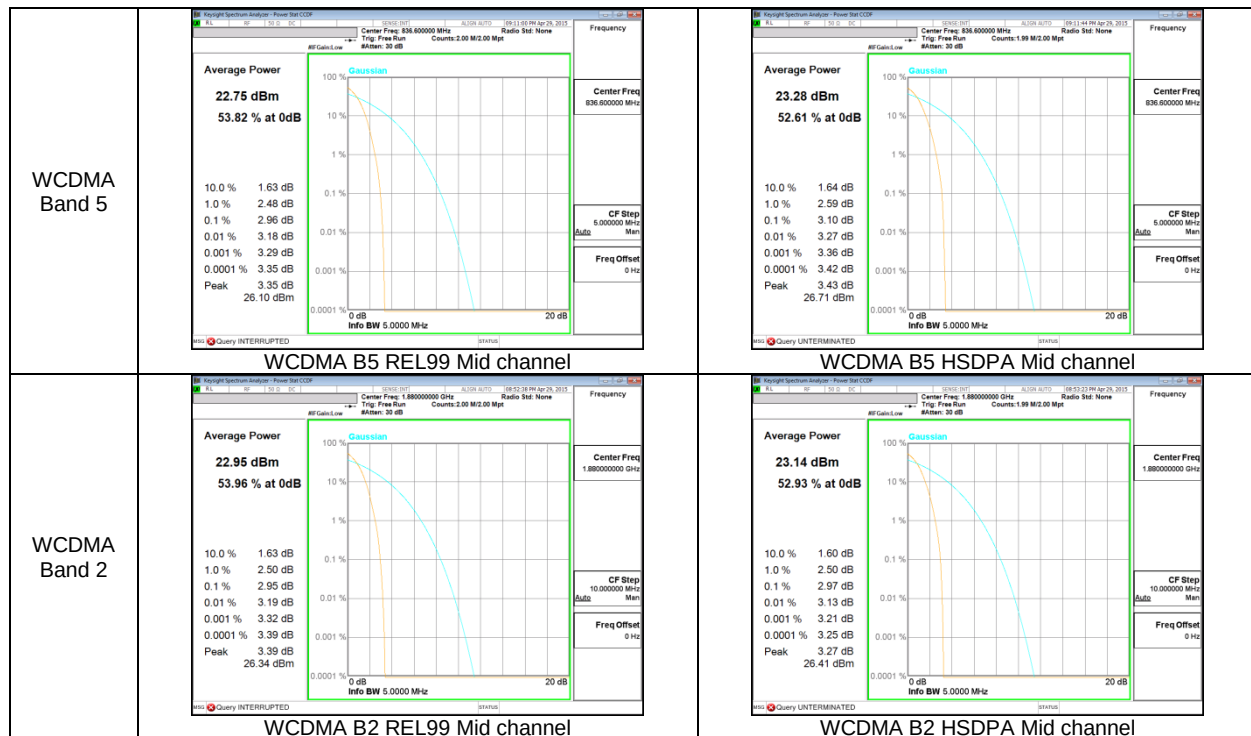
| Band    | BW [MHz] | Channel | f [MHz] | Mode  | Ratio [dB] | Limit [dB] |
|---------|----------|---------|---------|-------|------------|------------|
| Band 17 | 10       | 23790   | 710     | QPSK  | 5.20       | 13.00      |
|         |          |         |         | 16QAM | 5.84       |            |
|         | 5        |         |         | QPSK  | 5.55       |            |
|         |          |         |         | 16QAM | 5.90       |            |
| Band 5  | 10       | 20525   | 836.5   | QPSK  | 4.64       |            |
|         |          |         |         | 16QAM | 5.40       |            |
|         | 5        |         |         | QPSK  | 4.87       |            |
|         |          |         |         | 16QAM | 5.17       |            |
|         | 3        |         |         | QPSK  | 4.79       |            |
|         |          |         |         | 16QAM | 5.52       |            |
|         | 1.4      |         |         | QPSK  | 4.89       |            |
|         |          |         |         | 16QAM | 5.23       |            |
| Band 4  | 20       | 20174   | 1732.5  | QPSK  | 4.47       |            |
|         |          |         |         | 16QAM | 5.35       |            |
|         | 15       |         |         | QPSK  | 4.76       |            |
|         |          |         |         | 16QAM | 5.51       |            |
|         | 10       |         |         | QPSK  | 4.78       |            |
|         |          |         |         | 16QAM | 5.54       |            |
|         | 5        |         |         | QPSK  | 4.92       |            |
|         |          |         |         | 16QAM | 5.34       |            |
|         | 3        |         |         | QPSK  | 4.88       |            |
|         |          |         |         | 16QAM | 5.57       |            |
|         | 1.4      |         |         | QPSK  | 4.93       |            |
|         |          |         |         | 16QAM | 5.39       |            |
| Band 2  | 20       | 18900   | 1880.0  | QPSK  | 4.18       |            |
|         |          |         |         | 16QAM | 5.14       |            |
|         | 15       |         |         | QPSK  | 4.25       |            |
|         |          |         |         | 16QAM | 5.45       |            |
|         | 10       |         |         | QPSK  | 4.23       |            |
|         |          |         |         | 16QAM | 5.12       |            |
|         | 5        |         |         | QPSK  | 4.26       |            |
|         |          |         |         | 16QAM | 4.87       |            |
|         | 3        |         |         | QPSK  | 4.15       |            |
|         |          |         |         | 16QAM | 5.14       |            |
|         | 1.4      |         |         | QPSK  | 4.26       |            |
|         |          |         |         | 16QAM | 5.14       |            |

## 9.2. CONDUCTED PEAK TO AVERAGE PLOTS

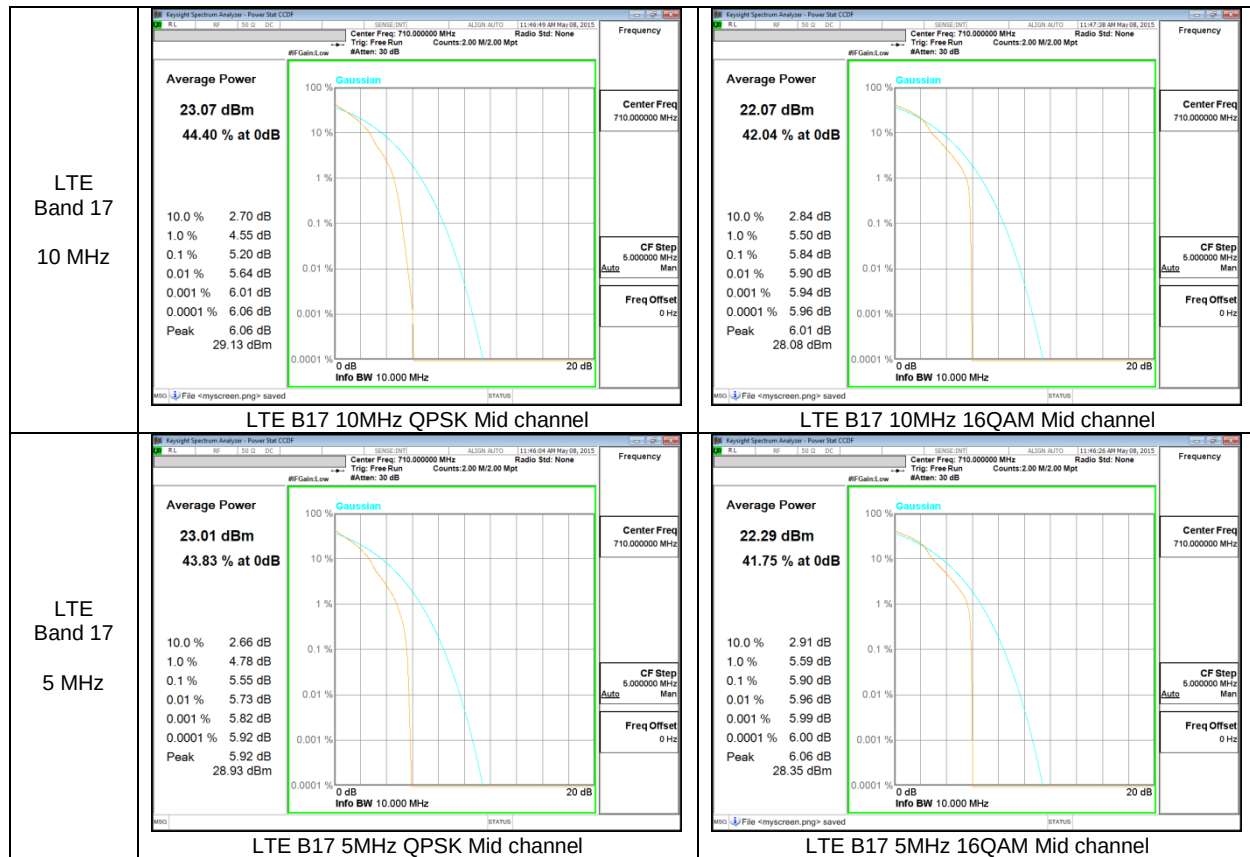
### GSM



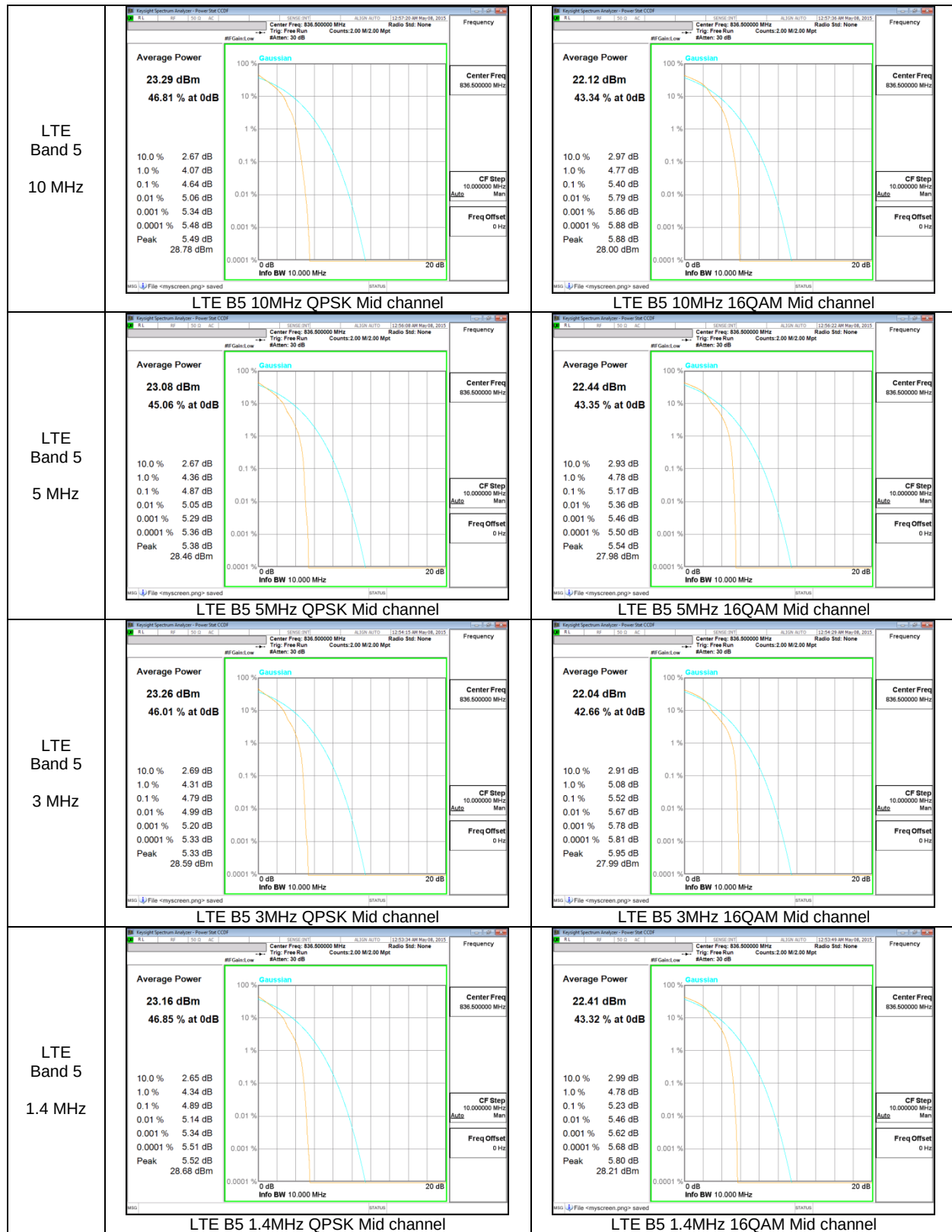
### WCDMA



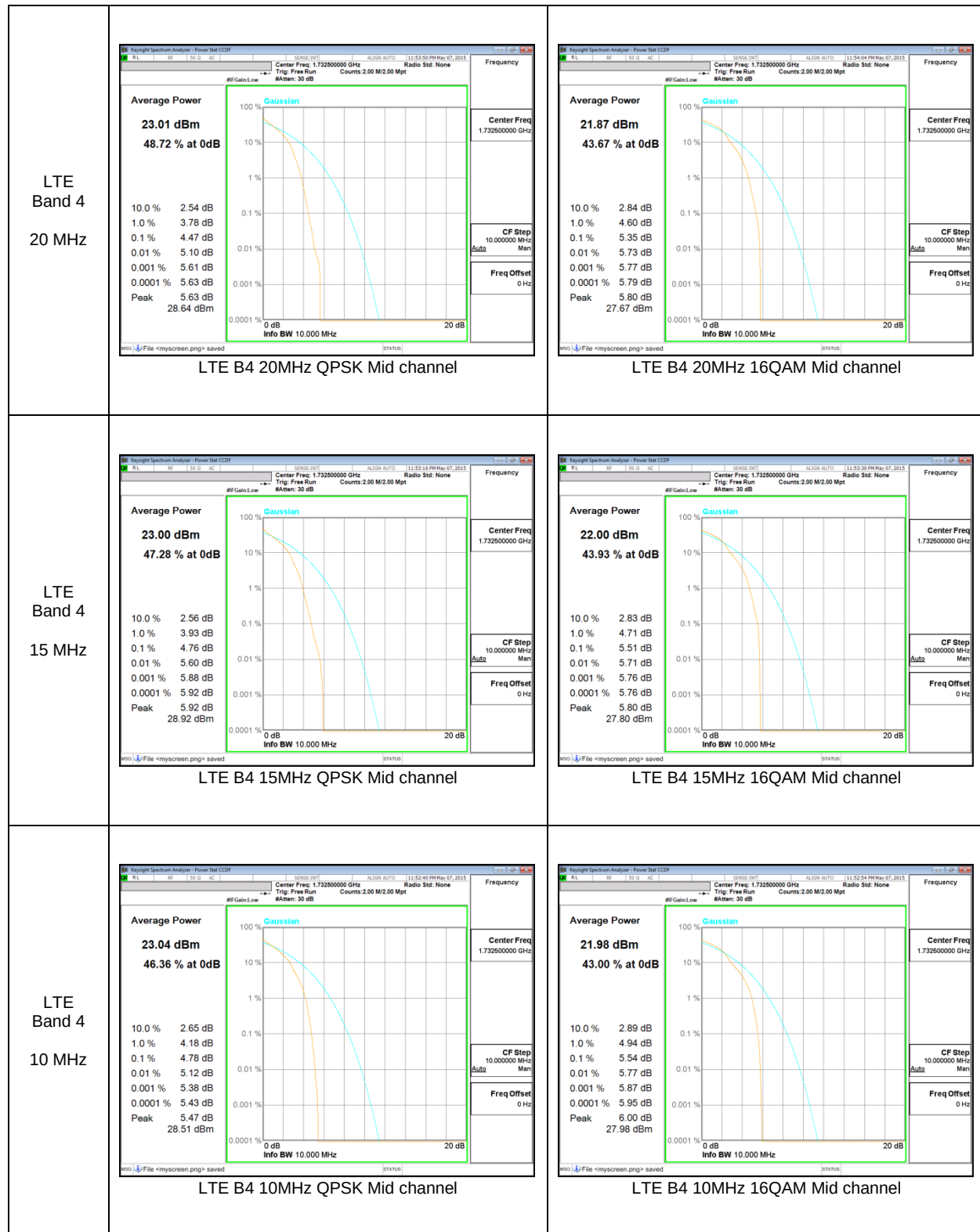
# **LTE Band 17**

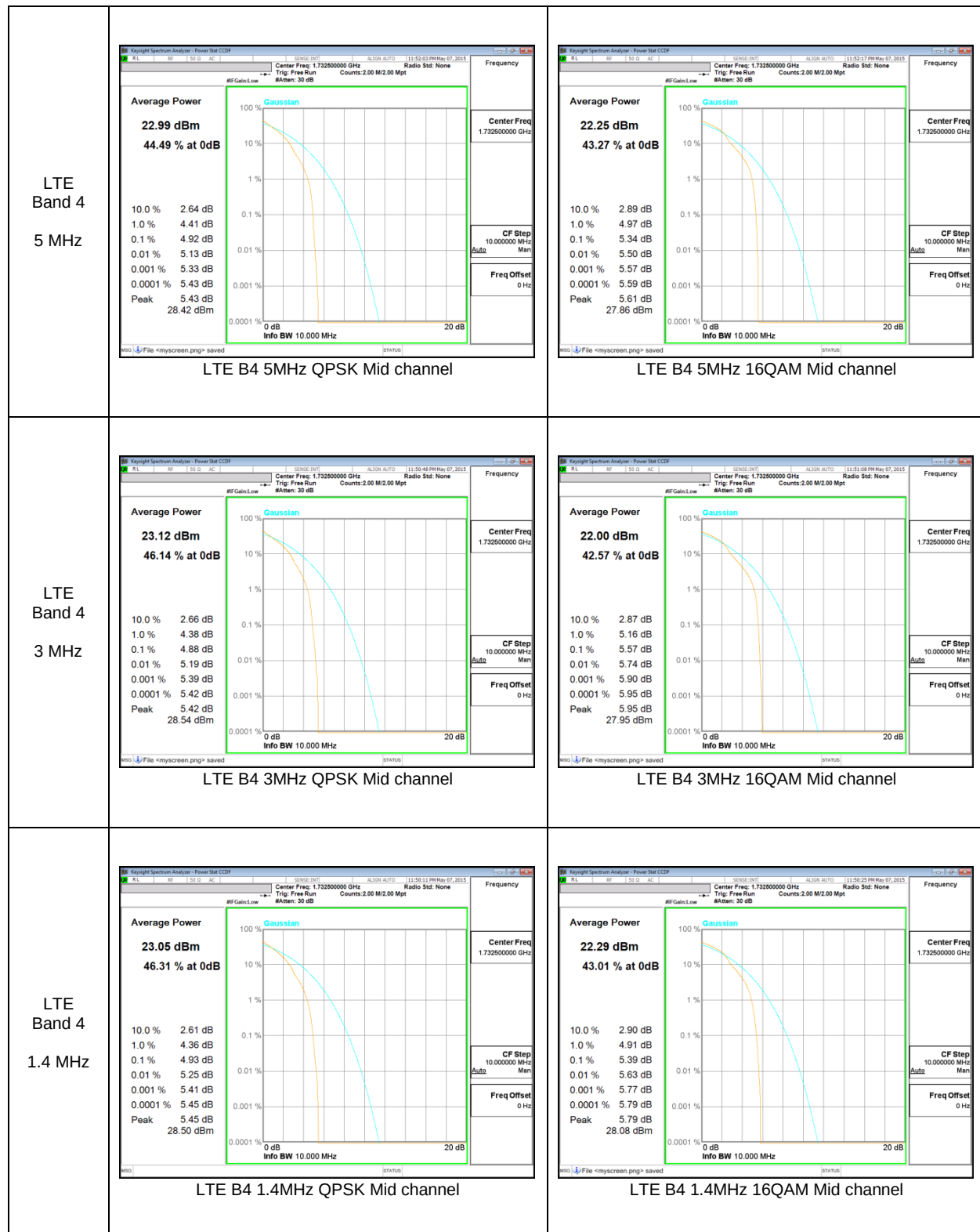


# **LTE Band 5**

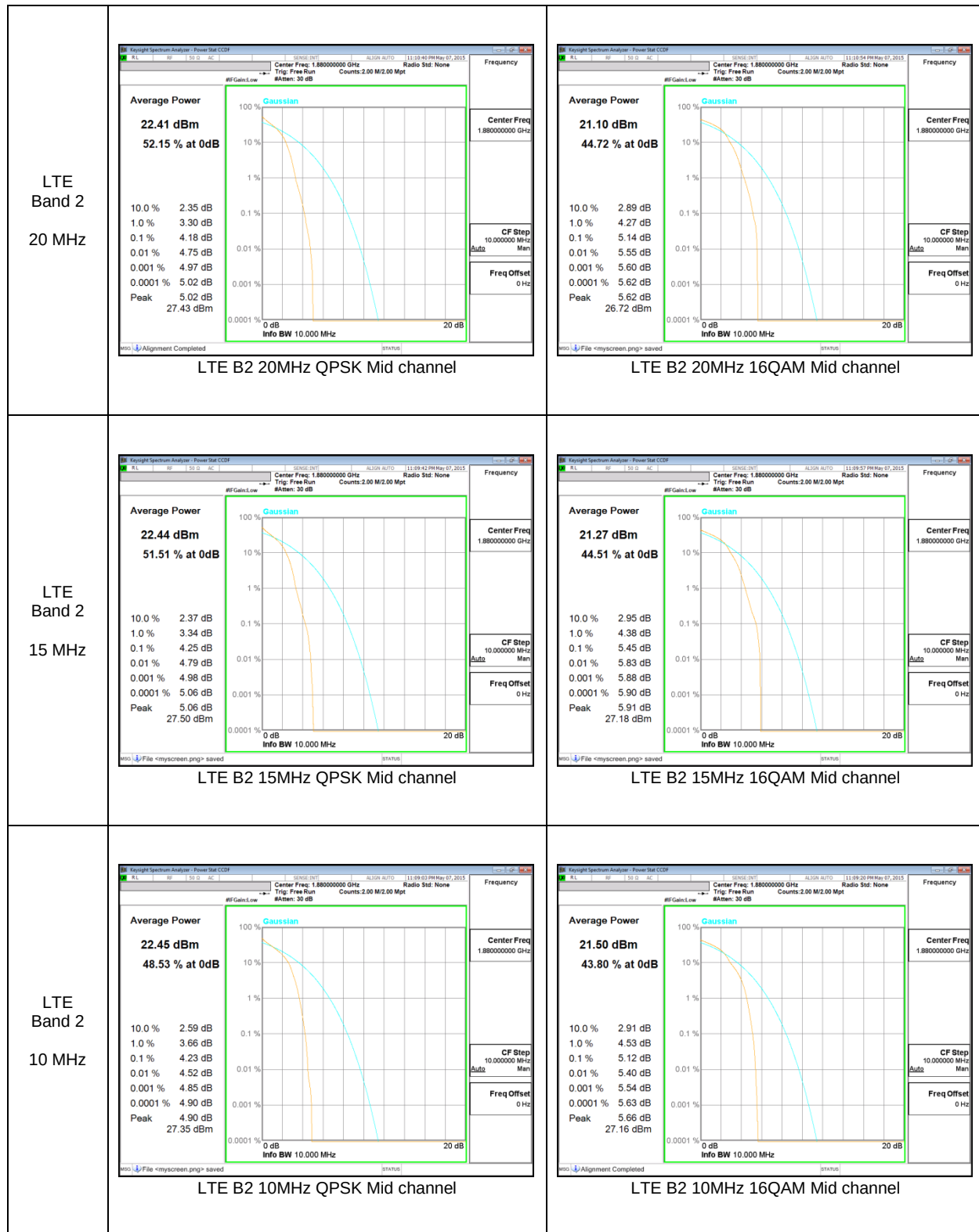


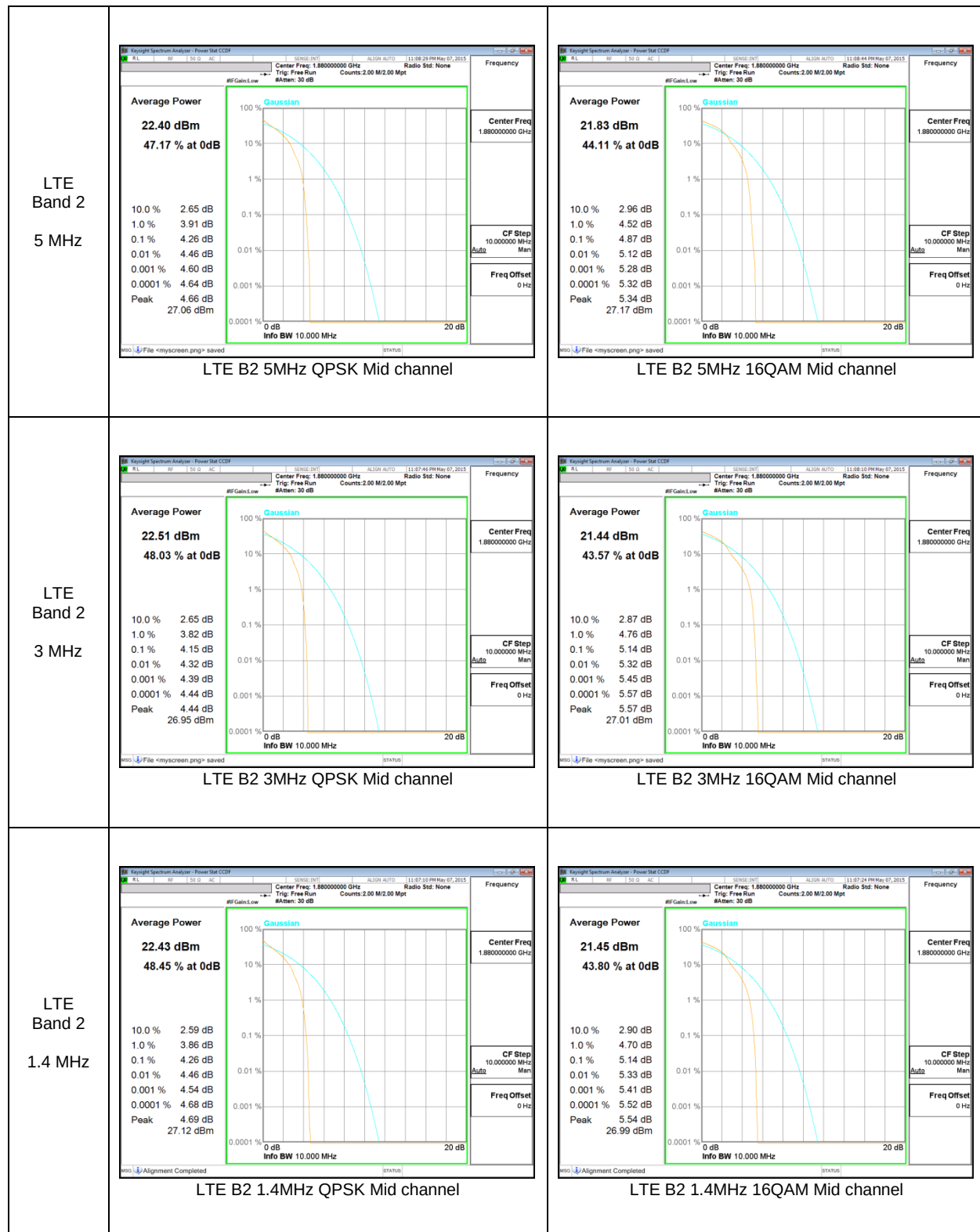
# LTE Band 4





## LTE Band 2





## 10. LIMITS AND CONDUCTED RESULTS

### 10.1. OCCUPIED BANDWIDTH

#### RULE PART(S)

FCC: §2.1049

#### LIMITS

For reporting purposes only

#### TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v02r02)

#### 10.1.1. OCCUPIED BANDWIDTH RESULTS

#### GSM

| Band    | Mode  | Channel | f [MHz] | 99% BW [KHz] | 26dB BW [KHz] |
|---------|-------|---------|---------|--------------|---------------|
| GSM850  | GPRS  | 128     | 824.2   | 240.8        | 314.5         |
|         |       | 190     | 836.6   | 241.0        | 310.0         |
|         |       | 251     | 848.8   | 240.9        | 307.7         |
|         | EGPRS | 128     | 824.2   | 243.2        | 314.1         |
|         |       | 190     | 836.6   | 242.5        | 308.7         |
|         |       | 251     | 848.8   | 245.2        | 315.1         |
| GSM1900 | GPRS  | 512     | 1850.2  | 243.0        | 310.8         |
|         |       | 661     | 1880.0  | 241.4        | 311.6         |
|         |       | 810     | 1909.8  | 242.3        | 314.1         |
|         | EGPRS | 512     | 1850.2  | 237.9        | 312.1         |
|         |       | 661     | 1880.0  | 235.0        | 287.5         |
|         |       | 810     | 1909.8  | 241.6        | 292.4         |

**WCDMA**

| Band   | Mode  | Channel | f [MHz] | 99% BW [MHz] | 26dB BW [MHz] |
|--------|-------|---------|---------|--------------|---------------|
| Band 5 | REL99 | 4132    | 826.4   | 4.134        | 4.735         |
|        |       | 4183    | 836.6   | 4.136        | 4.715         |
|        |       | 4233    | 846.6   | 4.123        | 4.711         |
|        | HSDPA | 4132    | 826.4   | 4.158        | 4.732         |
|        |       | 4183    | 836.6   | 4.143        | 4.725         |
|        |       | 4233    | 846.6   | 4.136        | 4.696         |
| Band 2 | REL99 | 9262    | 1852.4  | 4.146        | 4.746         |
|        |       | 9400    | 1880.0  | 4.137        | 4.720         |
|        |       | 9538    | 1907.6  | 4.133        | 4.731         |
|        | HSDPA | 9262    | 1852.4  | 4.152        | 4.725         |
|        |       | 9400    | 1880.0  | 4.143        | 4.703         |
|        |       | 9538    | 1907.6  | 4.137        | 4.702         |

**LTE Band 17**

| Band    | BW [MHz] | Channel | f [MHz] | Mode  | 99% BW [MHz] | 26dB BW [MHz] |
|---------|----------|---------|---------|-------|--------------|---------------|
| Band 17 | 10       | 23780   | 709.0   | QPSK  | 8.943        | 10.170        |
|         |          |         |         | 16QAM | 8.952        | 10.130        |
|         |          | 23790   | 710.0   | QPSK  | 8.934        | 10.120        |
|         |          |         |         | 16QAM | 8.942        | 9.995         |
|         |          | 23799   | 711.0   | QPSK  | 8.950        | 10.160        |
|         |          |         |         | 16QAM | 8.965        | 10.190        |
|         | 5        | 23755   | 706.5   | QPSK  | 4.507        | 5.326         |
|         |          |         |         | 16QAM | 4.499        | 5.178         |
|         |          | 23790   | 710.0   | QPSK  | 4.491        | 5.234         |
|         |          |         |         | 16QAM | 4.504        | 5.279         |
|         |          | 23824   | 713.5   | QPSK  | 4.510        | 5.355         |
|         |          |         |         | 16QAM | 4.499        | 5.324         |

**LTE Band 5**

| Band   | BW [MHz] | Channel | f [MHz] | Mode  | 99% BW [MHz] | 26dB BW [MHz] |
|--------|----------|---------|---------|-------|--------------|---------------|
| Band 5 | 10       | 20450   | 829.0   | QPSK  | 8.989        | 10.250        |
|        |          |         |         | 16QAM | 8.946        | 10.140        |
|        |          | 20524   | 836.5   | QPSK  | 8.975        | 10.220        |
|        |          |         |         | 16QAM | 8.955        | 10.180        |
|        |          | 20599   | 844.0   | QPSK  | 8.960        | 9.978         |
|        |          |         |         | 16QAM | 8.937        | 10.260        |
|        | 5        | 20425   | 826.5   | QPSK  | 4.503        | 5.259         |
|        |          |         |         | 16QAM | 4.504        | 5.274         |
|        |          | 20524   | 836.5   | QPSK  | 4.489        | 5.141         |
|        |          |         |         | 16QAM | 4.505        | 5.337         |
|        |          | 20624   | 846.5   | QPSK  | 4.504        | 5.229         |
|        |          |         |         | 16QAM | 4.502        | 5.245         |
|        | 3        | 20415   | 825.5   | QPSK  | 2.701        | 3.103         |
|        |          |         |         | 16QAM | 2.698        | 3.058         |
|        |          | 20524   | 836.5   | QPSK  | 2.705        | 3.055         |
|        |          |         |         | 16QAM | 2.705        | 3.101         |
|        |          | 20634   | 847.5   | QPSK  | 2.703        | 3.084         |
|        |          |         |         | 16QAM | 2.703        | 3.076         |
|        | 1.4      | 20407   | 824.7   | QPSK  | 1.088        | 1.382         |
|        |          |         |         | 16QAM | 1.094        | 1.359         |
|        |          | 20524   | 836.5   | QPSK  | 1.091        | 1.358         |
|        |          |         |         | 16QAM | 1.091        | 1.378         |
|        |          | 20624   | 848.3   | QPSK  | 1.090        | 1.356         |
|        |          |         |         | 16QAM | 1.093        | 1.420         |

**LTE Band 4**

| Band   | BW [MHz] | Channel | f [MHz] | Mode  | 99% BW [MHz] | 26dB BW [MHz] |
|--------|----------|---------|---------|-------|--------------|---------------|
| Band 4 | 20       | 20050   | 1720.0  | QPSK  | 17.904       | 19.760        |
|        |          |         |         | 16QAM | 17.926       | 19.790        |
|        |          | 20174   | 1732.5  | QPSK  | 17.869       | 19.720        |
|        |          |         |         | 16QAM | 17.896       | 19.750        |
|        |          | 20299   | 1745.0  | QPSK  | 17.897       | 19.540        |
|        |          |         |         | 16QAM | 17.915       | 19.590        |
|        | 15       | 20025   | 1717.5  | QPSK  | 13.417       | 15.220        |
|        |          |         |         | 16QAM | 13.435       | 15.130        |
|        |          | 20174   | 1732.5  | QPSK  | 13.426       | 15.310        |
|        |          |         |         | 16QAM | 13.433       | 14.980        |
|        |          | 20324   | 1747.5  | QPSK  | 13.447       | 15.080        |
|        |          |         |         | 16QAM | 13.435       | 15.060        |
|        | 10       | 20000   | 1715.0  | QPSK  | 8.971        | 10.160        |
|        |          |         |         | 16QAM | 8.980        | 10.350        |
|        |          | 20174   | 1732.5  | QPSK  | 8.953        | 10.230        |
|        |          |         |         | 16QAM | 8.974        | 10.270        |
|        |          | 20349   | 1750.0  | QPSK  | 8.967        | 10.200        |
|        |          |         |         | 16QAM | 8.985        | 10.260        |
|        | 5        | 19975   | 1712.5  | QPSK  | 4.504        | 5.286         |
|        |          |         |         | 16QAM | 4.500        | 5.258         |
|        |          | 20174   | 1732.5  | QPSK  | 4.496        | 5.350         |
|        |          |         |         | 16QAM | 4.502        | 5.327         |
|        |          | 20374   | 1752.5  | QPSK  | 4.501        | 5.330         |
|        |          |         |         | 16QAM | 4.494        | 5.238         |
|        | 3        | 19965   | 1711.5  | QPSK  | 2.697        | 3.109         |
|        |          |         |         | 16QAM | 2.704        | 3.079         |
|        |          | 20174   | 1732.5  | QPSK  | 2.700        | 3.067         |
|        |          |         |         | 16QAM | 2.707        | 3.101         |
|        |          | 20384   | 1753.5  | QPSK  | 2.696        | 3.084         |
|        |          |         |         | 16QAM | 2.706        | 3.109         |
|        | 1.4      | 19957   | 1710.7  | QPSK  | 1.091        | 1.355         |
|        |          |         |         | 16QAM | 1.093        | 1.375         |
|        |          | 20174   | 1732.5  | QPSK  | 1.090        | 1.363         |
|        |          |         |         | 16QAM | 1.093        | 1.400         |
|        |          | 20392   | 1754.3  | QPSK  | 1.095        | 1.360         |
|        |          |         |         | 16QAM | 1.095        | 1.394         |

**LTE Band 2**

| Band   | BW [MHz] | Channel | f [MHz] | Mode  | 99% BW [MHz] | 26dB BW [MHz] |
|--------|----------|---------|---------|-------|--------------|---------------|
| Band 2 | 20       | 18700   | 1860.0  | QPSK  | 17.874       | 19.520        |
|        |          |         |         | 16QAM | 17.880       | 19.590        |
|        |          | 18900   | 1880.0  | QPSK  | 17.918       | 19.920        |
|        |          |         |         | 16QAM | 17.941       | 19.640        |
|        |          | 19099   | 1900.0  | QPSK  | 17.829       | 19.510        |
|        |          |         |         | 16QAM | 17.814       | 19.690        |
|        | 15       | 18675   | 1857.5  | QPSK  | 13.439       | 14.950        |
|        |          |         |         | 16QAM | 13.426       | 15.240        |
|        |          | 18900   | 1880.0  | QPSK  | 13.437       | 15.130        |
|        |          |         |         | 16QAM | 13.444       | 15.180        |
|        |          | 19124   | 1902.5  | QPSK  | 13.414       | 14.920        |
|        |          |         |         | 16QAM | 13.408       | 15.040        |
|        | 10       | 18650   | 1955.0  | QPSK  | 8.957        | 10.240        |
|        |          |         |         | 16QAM | 8.955        | 10.100        |
|        |          | 18900   | 1880.0  | QPSK  | 8.973        | 10.230        |
|        |          |         |         | 16QAM | 8.984        | 10.330        |
|        |          | 19149   | 1905.0  | QPSK  | 8.968        | 10.200        |
|        |          |         |         | 16QAM | 8.977        | 10.430        |
|        | 5        | 18625   | 1852.5  | QPSK  | 4.505        | 5.233         |
|        |          |         |         | 16QAM | 4.501        | 5.320         |
|        |          | 18900   | 1880.0  | QPSK  | 4.502        | 5.307         |
|        |          |         |         | 16QAM | 4.500        | 5.308         |
|        |          | 18175   | 1907.5  | QPSK  | 4.505        | 5.266         |
|        |          |         |         | 16QAM | 4.502        | 5.315         |
|        | 3        | 18615   | 1815.5  | QPSK  | 2.696        | 3.087         |
|        |          |         |         | 16QAM | 2.699        | 3.142         |
|        |          | 18900   | 1880.0  | QPSK  | 2.700        | 3.084         |
|        |          |         |         | 16QAM | 2.708        | 3.150         |
|        |          | 19184   | 1908.5  | QPSK  | 2.699        | 3.062         |
|        |          |         |         | 16QAM | 2.704        | 3.082         |
|        | 1.4      | 18607   | 1850.7  | QPSK  | 1.093        | 1.357         |
|        |          |         |         | 16QAM | 1.091        | 1.391         |
|        |          | 18900   | 1880.0  | QPSK  | 1.092        | 1.375         |
|        |          |         |         | 16QAM | 1.093        | 1.389         |
|        |          | 19192   | 1909.3  | QPSK  | 1.091        | 1.372         |
|        |          |         |         | 16QAM | 1.096        | 1.395         |

## 10.1.2. OCCUPIED BANDWIDTH PLOTS

### GSM 850



# GSM 1900

