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# TEST REPORT

| Eurofins KCTL Co.,Ltd.<br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 16677, Korea<br>TEL: 82-70-5008-1021 FAX: 82-505-299-8311<br>www.kctl.co.kr | Report No.:<br>KR24-SRF0086-A<br>Page(1) of (124) | eurofins KCTL |
|---|---|---|

**1. Client**

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2024-05-02

**2. Use of Report** : Certification

**3. Name of Product / Model** : Smart Wearable / SM-R866U

**4. Derivative Model** : SM-R866F

**5. Manufacturer / Country of Origin** : Samsung Electronics Co., Ltd. / Vietnam

**6. FCC ID** : A3LSMR866

**7. Date of Test** : 2024-05-03 to 2024-05-14

**8. Location of Test** : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

**9. Test method used** : FCC Part 2
FCC Part 27 Subpart C

**10. Test Result** : Refer to the test result in the test report

| | Tested by | Technical Manager |
|---|---|---|
| Affirmation | Name : Kwonse Kim (Signature) | Name : Harim Lee (Signature) |

2024-06-14

**Eurofins KCTL Co.,Ltd.**

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2024-05-17 | Originally issued | - |
| 2024-06-14 | Added the derivative model and updated the accessory information | 1,4 |
| | | |
| | | |
| | | |

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Note. The report No. KR24-SRF0086 is superseded by the report No. KR24-SRF0086-A.

## General remarks for test reports

**Statement concerning the uncertainty of the measurement systems used for the tests**

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

**Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

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# 1. General information

| | | |
|---|---|---|
| Client | : | Samsung Electronics Co., Ltd. |
| Address | : | 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea |
| Manufacturer | : | Samsung Electronics Co., Ltd. |
| Address | : | 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea |
| Factory 1 | : | AG TECH CO.,LTD |
| Address 1 | : | Lot G3, Que Vo Industrial Park(Expanded Area), Nam son Ward, Bac Ninh Province, Vietnam |
| Factory 2 | : | ALMUS VINA |
| Address 2 | : | Lot CN07A, Phu Ha Industrial Park, Ha Thach Commune, Phu Tho Town, Phu Tho Province, Vietnam |
| Laboratory | : | Eurofins KCTL Co.,Ltd. |
| Address | : | 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea |
| Accreditations | : | FCC Site Designation No: KR0040, FCC Site Registration No: 687132<br>VCCI Registration No. : R-20080, G-20078, C-20059, T-20056<br>CAB Identifier: KR0040<br>ISED Number: 8035A<br>KOLAS No.: KT231 |

# 2. Device information

| | | | | |
|---|---|---|---|---|
| Equipment under test | : | Smart Wearable | | |
| Model | : | SM-R866U | | |
| Derivative model | : | SM-R866F | | |
| Modulation technique | : | WCDMA | : | QPSK |
| | | LTE | : | QPSK, 16QAM |
| Power source | : | DC 3.88 V | | |
| Antenna specification | : | PIFA (Housing metal) Antenna | | |
| Antenna gain | : | WCDMA 1700, LTE B4/66 | : | -11.1 dBi |
| | | LTE B12/13 | : | -14.2 dBi |
| | | LTE B71 | : | -15.1 dBi |
| Frequency range | : | WCDMA 1700 | : | 1 712.4 MHz ~ 1 752.6 MHz |
| | | LTE B4 | : | 1 710.7 MHz ~ 1 754.3 MHz |
| | | LTE B12 | : | 699.7 MHz ~ 715.3 MHz |
| | | LTE B13 | : | 779.5 MHz ~ 784.5 MHz |
| | | LTE B66 | : | 1 710.7 MHz ~ 1 779.3 MHz |
| | | LTE B71 | : | 665.5 MHz ~ 695.5 MHz |
| Bandwidth | : | LTE B4 | : | 1.4/3/5/10/15/20 MHz |
| | | LTE B12 | : | 1.4/3/5/10 MHz |
| | | LTE B13 | : | 5/10 MHz |
| | | LTE B66 | : | 1.4/3/5/10/15/20 MHz |
| | | LTE B71 | : | 5/10/15/20 MHz |
| Software version | : | R866U.001 | | |
| Hardware version | : | REV1.0 | | |
| Test device serial No. | : | Conducted | : | R3AX400LVCR |
| | | Radiated | : | R3AX400M6VX, R3AX400M3RT, R3AX400M10T, R3AX400LWTM |
| Operation Temperature | : | -30 ℃ ~ 50 ℃ | | |

**Note.**

1. The product equality letter includes detailed information about the differences between SM-R866U and SM-R866F model.

## 2.1. Accessory information

| Equipment | Manufacturer | Model | Serial No. | Power source | FCC ID & IC |
|---|---|---|---|---|---|
| Wireless charger | SAMSUNG | EP-OR825 | - | 5.0 V, 1.0 A | FCC ID : A3LEPOR825<br>IC : 649E-EPOR825 |
| Wireless charger | SAMSUNG | EP-OR900 | - | 5.0 V, 2.0 A | FCC ID : A3LEP-OR900<br>IC : 649E-EPOR900 |

## 2.2. Frequency/channel operations

This device contains the following capabilities:
WCDMA 1700, LTE B4/12/13/66/71

**WCDMA 1700**

| Ch. | Frequency (MHz) |
|---|---|
| 1312 | 1 712.4 |
| 1412 | 1 732.4 |
| 1513 | 1 752.6 |

Table 2.2-1.
RMC/HSDPA/HSUPA/
DC-HSDPA

**LTE B4**

| Ch. | Frequency (MHz) |
|---|---|
| 19957 | 1 710.7 |
| 20175 | 1 732.5 |
| 20393 | 1 754.3 |

Table 2.2-2. 1.4M BW

| Ch. | Frequency (MHz) |
|---|---|
| 19965 | 1 711.5 |
| 20175 | 1 732.5 |
| 20385 | 1 753.5 |

Table 2.2-3. 3M BW

| Ch. | Frequency (MHz) |
|---|---|
| 19975 | 1 712.5 |
| 20175 | 1 732.5 |
| 20375 | 1 752.5 |

Table 2.2-4. 5M BW

| Ch. | Frequency (MHz) |
|---|---|
| 20000 | 1 715.0 |
| 20175 | 1 732.5 |
| 20350 | 1 750.0 |

Table 2.2-5. 10M BW

| Ch. | Frequency (MHz) |
|---|---|
| 20025 | 1 717.5 |
| 20175 | 1 732.5 |
| 20325 | 1 747.5 |

Table 2.2-6. 15M BW

| Ch. | Frequency (MHz) |
|---|---|
| 20050 | 1 720.0 |
| 20175 | 1 732.5 |
| 20300 | 1 745.0 |

Table 2.2-7. 20M BW

**LTE B12**

| Ch. | Frequency (MHz) |
|---|---|
| 23017 | 699.7 |
| 23095 | 707.5 |
| 23173 | 715.3 |

Table 2.2-8. 1.4M BW

| Ch. | Frequency (MHz) |
|---|---|
| 23025 | 700.5 |
| 23095 | 707.5 |
| 23165 | 714.5 |

Table 2.2-9. 3M BW

| Ch. | Frequency (MHz) |
|---|---|
| 23035 | 701.5 |
| 23095 | 707.5 |
| 23155 | 713.5 |

Table 2.2-10. 5M BW

| Ch. | Frequency (MHz) |
|---|---|
| 23060 | 704.0 |
| 23095 | 707.5 |
| 23130 | 711.0 |

Table 2.2-11. 10M BW

**LTE B13**

| Ch. | Frequency (MHz) |
|---|---|
| 23205 | 779.5 |
| 23230 | 782.0 |
| 23255 | 784.5 |

Table 2.2-12. 5M BW

| Ch. | Frequency (MHz) |
|---|---|
| - | - |
| 23230 | 782.0 |
| - | - |

Table 2.2-13. 10M BW

## LTE B66

| Ch. | Frequency (MHz) |
|---|---|
| 131979 | 1 710.7 |
| 132322 | 1 745.0 |
| 132665 | 1 779.3 |

Table 2.2-14. 1.4M BW

| Ch. | Frequency (MHz) |
|---|---|
| 131987 | 1 711.5 |
| 132322 | 1 745.0 |
| 132657 | 1 778.5 |

Table 2.2-15. 3M BW

| Ch. | Frequency (MHz) |
|---|---|
| 131997 | 1 712.5 |
| 132322 | 1 745.0 |
| 132647 | 1 777.5 |

Table 2.2-16. 5M BW

| Ch. | Frequency (MHz) |
|---|---|
| 132022 | 1 715.0 |
| 132322 | 1 745.0 |
| 132622 | 1 775.0 |

Table 2.2-17. 10M BW

| Ch. | Frequency (MHz) |
|---|---|
| 132047 | 1 717.5 |
| 132322 | 1 745.0 |
| 132597 | 1 772.5 |

Table 2.2-18. 15M BW

| Ch. | Frequency (MHz) |
|---|---|
| 132072 | 1 720.0 |
| 132322 | 1 745.0 |
| 132572 | 1 770.0 |

Table 2.2-19. 20M BW

## LTE B71

| Ch. | Frequency (MHz) |
|---|---|
| 133147 | 665.5 |
| 133297 | 680.5 |
| 133447 | 695.5 |

Table 2.2-20. 5M BW

| Ch. | Frequency (MHz) |
|---|---|
| 133172 | 668.0 |
| 133297 | 680.5 |
| 133422 | 693.0 |

Table 2.2-21. 10M BW

| Ch. | Frequency (MHz) |
|---|---|
| 133197 | 670.5 |
| 133297 | 680.5 |
| 133397 | 690.5 |

Table 2.2-22. 15M BW

| Ch. | Frequency (MHz) |
|---|---|
| 133222 | 673.0 |
| 133297 | 680.5 |
| 133372 | 688.0 |

Table 2.2-23. 20M BW

**Notes:**

1. LTE B4(1 710 – 1 755 MHz) overlaps the entire frequency range of LTE B66(1 710 – 1 780 MHz) and they have same maximum tune-up power. Therefore, B66 was tested as a representative and the test data provided in this report covers B66 as well as B4 subpart to Part 27.

# 3. Maximum ERP/EIRP power

**WCDMA 1700**

| Mode | Tx frequency (MHz) | Emission designator | EIRP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| WCDMA 1700 | 1 712.4 ~ 1 752.6 | 4M15F9W | 18.34 | 0.068 |

**LTE B12**

| Mode | Tx frequency (MHz) | Emission designator | ERP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE B12 | 699.7 ~ 715.3 | 1M10G7D | 14.91 | 0.031 |
| | | 1M10W7D | 13.59 | 0.023 |
| | 700.5 ~ 714.5 | 2M73G7D | 14.60 | 0.029 |
| | | 2M71W7D | 13.11 | 0.020 |
| | 701.5 ~ 713.5 | 4M55G7D | 14.19 | 0.026 |
| | | 4M55W7D | 12.62 | 0.018 |
| | 704.0 ~ 711.0 | 8M99G7D | 13.17 | 0.021 |
| | | 9M04W7D | 11.91 | 0.016 |

**LTE B13**

| Mode | Tx frequency (MHz) | Emission designator | ERP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE B13 | 779.5 ~ 784.5 | 4M53G7D | 12.97 | 0.020 |
| | | 4M56W7D | 12.04 | 0.016 |
| | 782 | 9M02G7D | 13.07 | 0.020 |
| | | 8M99W7D | 12.05 | 0.016 |

**LTE B66/4**

| Mode | Tx frequency (MHz) | Emission designator | EIRP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE B66/4 | 1 710.7 ~ 1 779.3 | 1M10G7D | 18.98 | 0.079 |
| | | 1M10W7D | 17.89 | 0.061 |
| | 1 711.5 ~ 1 778.5 | 2M71G7D | 18.99 | 0.079 |
| | | 2M71W7D | 17.81 | 0.060 |
| | 1 712.5 ~ 1 777.5 | 4M53G7D | 18.76 | 0.075 |
| | | 4M55W7D | 17.72 | 0.059 |
| | 1 715.0 ~ 1 775.0 | 8M99G7D | 18.71 | 0.074 |
| | | 8M99W7D | 17.79 | 0.060 |
| | 1 717.5 ~ 1 772.5 | 13M4G7D | 19.05 | 0.080 |
| | | 13M5W7D | 18.15 | 0.065 |
| | 1 720.0 ~ 1 770.0 | 18M0G7D | 19.46 | 0.088 |
| | | 18M1W7D | 18.38 | 0.069 |

**LTE B71**

| Mode | Tx frequency (MHz) | Emission designator | ERP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE B71 | 665.5 ~ 695.5 | 4M53G7D | 12.67 | 0.019 |
| | | 4M53W7D | 11.67 | 0.015 |
| | 668.0 ~ 693.0 | 9M02G7D | 12.04 | 0.016 |
| | | 9M02W7D | 10.97 | 0.013 |
| | 670.5 ~ 690.5 | 13M5G7D | 11.31 | 0.014 |
| | | 13M6W7D | 10.18 | 0.010 |
| | 673.0 ~ 688.0 | 18M0G7D | 12.01 | 0.016 |
| | | 18M0W7D | 11.05 | 0.013 |

# 4. Summary of tests

| FCC Part section(s) | Parameter | Test Limit | Test Condition | Test results |
|---|---|---|---|---|
| 2.1046 | Conducted Output Power | N/A | Conducted | Pass |
| 2.1049 | Occupied Bandwidth & 26 dB Bandwidth | N/A | | Pass |
| 2.1051<br>27.53(c)(2)<br>27.53(g)<br>27.53(h) | Band Edge Emissions at Antenna Terminal | <43 + 10Log$_{10}$(P) dB at Band Edge and for all out of band emissions, <65 + 10Log$_{10}$(P) dB for all frequencies between 763 ~ 775 MHz and 793 ~ 805 MHz | | Pass |
| | Spurious Emissions at Antenna Terminal | | | Pass |
| 27.50(d) | Peak to Average Power Ratio | <13 dB | | Pass |
| 2.1055<br>27.54 | Frequency stability | Emission must remain in band | | Pass |
| 27.50(d) | Equivalent Isotropic Radiated Power | <1 Watts max. EIRP | Radiated | Pass |
| 27.50(b)(10)<br>27.50(c)(10) | Equivalent Radiated Power | <3 Watts max. ERP | | Pass |
| 2.1053<br>27.53(c)(2)(f)<br>27.53(g)<br>27.53(h) | Radiated Spurious Emissions | <43 + 10Log$_{10}$(P) dB<br>for all out of band emissions,<br><-70 dBW/MHz EIRP - Wideband<br><-80 dBW/MHz EIRP- Narrowband | | Pass |

**Notes:**

1. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.26-2015
   - ANSI/TIA-603-E-2016
   - KDB 971168 D01 v03r01

## 4.1. Worst case orientation

1. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations in the test data.
2. In the case of radiated spurious emissions, only the worst case bandwidth results were reported.
3. Output power measurements were measured on all of modulation. All tests except output power was performed with below modulation with highest power.
   1) WCDMA: RMC
   2) LTE: QPSK, 16QAM
4. However, the PAPR was evaluated for all wave forms and modulations during pre-test, then all bandwidth was performed for the modulations with the highest result.
   1) LTE: QPSK, 16QAM
5. All configurations have been performed (Stand-alone, Stand-alone with TA and Strap).
6. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z and all of the radiated tests have been performed with the accessories as below. It was determined that below orientation was worst case orientation for each band.

| Band | Strap | With charger | Without charger | | |
|---|---|---|---|---|---|
| | | X-axis | X-axis | Y-axis | Z-axis |
| WCDMA 1700 | With strap | - | - | O | - |
| | Without strap | - | - | - | - |
| LTE B12 | With strap | O | - | - | - |
| | Without strap | - | - | - | - |
| LTE B13 | With strap | O | - | - | - |
| | Without strap | - | - | - | - |
| LTE B66/4 | With strap | - | - | O | - |
| | Without strap | - | - | - | - |
| LTE B71 | With strap | O | - | - | - |
| | Without strap | - | - | - | - |

7. Test Condition

- The measurement was performed with various configurations then worst results are reported.

1) Radiated measurement

| Test Description | Mode | Condition | | Test Channel |
|---|---|---|---|---|
| Effective Radiated power | WCDMA | RMC (12.2 kbps) | | Low, Middle, High |
| | LTE | QPSK, 16QAM | RB Size: 1 | |
| Radiated Spurious Emissions | WCDMA | RMC (12.2 kbps) | | Low, Middle, High |
| | LTE | QPSK | RB Size: 1 | |

| Band | Bandwidth (㎒) | RB size | RB offset |
|---|---|---|---|
| LTE B12 | 1.4, 3, 5, 10 | 1 | Low, Middle, High |
| LTE B13 | 5, 10 | | |
| LTE B66/4 | 1.4, 3, 5, 10, 15, 20 | | |
| LTE B71 | 5, 10, 15, 20 | | |

2) Conducted measurement

| Test Description | Mode | Condition | | Test Channel |
|---|---|---|---|---|
| OBW & 26 ㏈ BW | WCDMA | RMC (12.2 kbps) | | Low, Middle, High |
| | LTE | QPSK, 16QAM | RB Size: Full | |
| PAPR | WCDMA | RMC (12.2 kbps) | | Middle |
| | LTE | QPSK, 16QAM | RB Size: Full | |
| Band Edge | WCDMA | RMC (12.2 kbps) | | Low, High |
| | LTE | QPSK | RB Size: 1, Full | |
| Spurious Emissions | WCDMA | RMC (12.2 kbps) | | Low, Middle, High |
| | LTE | QPSK | RB Size: 1 | |

| Band | Bandwidth (㎒) | RB size | RB offset |
|---|---|---|---|
| LTE B12 | 1.4, 3, 5, 10 | 1 | 0, 5, 14, 24, 49 |
| | | Full | 0 |
| LTE B13 | 5, 10 | 1 | 0, 24, 49 |
| | | Full | 0 |
| LTE B66/4 | 1.4, 3, 5, 10, 15, 20 | 1 | 0, 5, 14, 24, 49, 74, 99 |
| | | Full | 0 |
| LTE B71 | 5, 10, 15, 20 | 1 | 0, 24, 49, 74, 99 |
| | | Full | 0 |

# 5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of $k$=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded uncertainty (±) | |
|---|---|---|
| Conducted RF power | 0.9 dB | |
| Conducted spurious emissions | 1.9 dB | |
| Radiated spurious emissions | Below 1 000 MHz | 2.5 dB |
| | 1 000 MHz ~ 18 000 MHz | 2.5 dB |
| | Above 1 8000 MHz | 2.6 dB |

# 6. Measurement results explanation example

| Frequency (㎒) | Factor(㏈) | Frequency (㎒) | Factor(㏈) |
|---|---|---|---|
| 30 | 5.82 | 16000 | 9.29 |
| 50 | 6.09 | 17000 | 9.50 |
| 100 | 6.15 | 18000 | 9.55 |
| 200 | 6.09 | 19000 | 9.31 |
| 300 | 6.28 | 20000 | 8.51 |
| 400 | 6.51 | 21000 | 9.00 |
| 500 | 6.57 | 22000 | 9.52 |
| 600 | 6.62 | 23000 | 9.53 |
| 700 | 6.67 | 24000 | 9.95 |
| 800 | 6.70 | 25000 | 10.82 |
| 900 | 6.74 | 26000 | 10.60 |
| 1000 | 6.76 | 26500 | 10.73 |
| 2000 | 7.06 | 27000 | 10.59 |
| 3000 | 7.25 | 28000 | 11.48 |
| 4000 | 7.39 | 29000 | 10.38 |
| 5000 | 7.54 | 30000 | 10.69 |
| 6000 | 7.94 | 31000 | 11.57 |
| 7000 | 8.10 | 32000 | 11.70 |
| 8000 | 8.21 | 33000 | 12.00 |
| 9000 | 8.26 | 34000 | 11.88 |
| 10000 | 7.36 | 35000 | 11.65 |
| 11000 | 8.35 | 36000 | 11.80 |
| 12000 | 8.40 | 37000 | 11.51 |
| 13000 | 8.62 | 38000 | 10.82 |
| 14000 | 8.71 | 39000 | 11.00 |
| 15000 | 9.02 | 40000 | 11.30 |

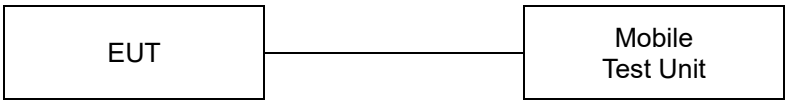
**Note.**

1. Offset(㏈) = RF cable loss(㏈) + Divider (㏈)

# 7. Test results

## 7.1. Conducted output power

**Test setup**




**Test procedure**

971168 D01 v03r01 – Section 5.2
ANSI C63.26-2015 – Section 5.2.4.2
CFR 47 - Section §2.1046

**Test settings**

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ± 2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

**Note:**

1. Offset(dB) = RF cable loss(dB)

## Test results

| Test Band | Test mode | Maximum Average Power (dBm) | | |
|---|---|---|---|---|
| | | Channel | | |
| | | Low | Middle | High |
| WCDMA 1700 | RMC | 22.22 | 22.25 | 21.74 |
| | HSDPA-Subtest 1 | 22.10 | 22.10 | 21.56 |
| | HSDPA-Subtest 2 | 21.42 | 21.24 | 20.80 |
| | HSDPA-Subtest 3 | 20.28 | 20.12 | 20.05 |
| | HSDPA-Subtest 4 | 20.33 | 20.10 | 20.02 |
| | HSUPA-Subtest 1 | 19.40 | 19.24 | 18.94 |
| | HSUPA-Subtest 2 | 18.21 | 18.01 | 17.92 |
| | HSUPA-Subtest 3 | 20.01 | 20.21 | 19.96 |
| | HSUPA-Subtest 4 | 18.30 | 18.04 | 17.98 |
| | HSUPA-Subtest 5 | 20.82 | 20.76 | 20.51 |
| | DC-HSDPA-Subtest 1 | 22.15 | 22.08 | 21.36 |
| | DC-HSDPA-Subtest 2 | 21.30 | 21.45 | 20.88 |
| | DC-HSDPA-Subtest 3 | 20.40 | 20.45 | 20.05 |
| | DC-HSDPA-Subtest 4 | 20.37 | 20.51 | 20.08 |

| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈㎥) Channel | | |
|---|---|---|---|---|---|---|---|
| | | | | | Low | Middle | High |
| LTE B4 | 1.4 | QPSK | 1 | 0 | 22.56 | 22.41 | 22.30 |
| | | | 1 | 3 | 22.53 | 22.38 | 22.41 |
| | | | 1 | 5 | 22.61 | 22.38 | 22.40 |
| | | | 3 | 0 | 22.58 | 22.47 | 22.38 |
| | | | 3 | 1 | 22.58 | 22.45 | 22.40 |
| | | | 3 | 3 | 22.60 | 22.35 | 22.35 |
| | | | 6 | 0 | 21.53 | 21.36 | 21.37 |
| | | 16QAM | 1 | 0 | 21.30 | 21.15 | 21.35 |
| | | | 1 | 3 | 21.46 | 21.28 | 21.26 |
| | | | 1 | 5 | 21.32 | 21.27 | 21.28 |
| | | | 3 | 0 | 21.57 | 21.32 | 21.27 |
| | | | 3 | 1 | 21.55 | 21.30 | 21.32 |
| | | | 3 | 3 | 21.49 | 21.33 | 21.35 |
| | | | 6 | 0 | 20.66 | 20.43 | 20.42 |
| | 3 | QPSK | 1 | 0 | 22.52 | 22.46 | 22.42 |
| | | | 1 | 8 | 22.57 | 22.45 | 22.43 |
| | | | 1 | 14 | 22.63 | 22.49 | 22.36 |
| | | | 8 | 0 | 21.58 | 21.39 | 21.36 |
| | | | 8 | 4 | 21.61 | 21.38 | 21.33 |
| | | | 8 | 7 | 21.54 | 21.39 | 21.27 |
| | | | 15 | 0 | 21.56 | 21.38 | 21.38 |
| | | 16QAM | 1 | 0 | 21.61 | 21.31 | 21.40 |
| | | | 1 | 8 | 21.73 | 21.37 | 21.28 |
| | | | 1 | 14 | 21.47 | 21.42 | 21.57 |
| | | | 8 | 0 | 20.58 | 20.41 | 20.33 |
| | | | 8 | 4 | 20.60 | 20.31 | 20.36 |
| | | | 8 | 7 | 20.50 | 20.31 | 20.29 |
| | | | 15 | 0 | 20.55 | 20.36 | 20.38 |
| | 5 | QPSK | 1 | 0 | 22.58 | 22.50 | 22.48 |
| | | | 1 | 12 | 22.52 | 22.51 | 22.38 |
| | | | 1 | 24 | 22.60 | 22.48 | 22.47 |
| | | | 12 | 0 | 21.56 | 21.46 | 21.38 |
| | | | 12 | 7 | 21.65 | 21.39 | 21.36 |
| | | | 12 | 13 | 21.60 | 21.40 | 21.41 |
| | | | 25 | 0 | 21.58 | 21.38 | 21.38 |
| | | 16QAM | 1 | 0 | 21.54 | 21.37 | 21.43 |
| | | | 1 | 12 | 21.61 | 21.39 | 21.41 |
| | | | 1 | 24 | 21.50 | 21.47 | 21.34 |
| | | | 12 | 0 | 20.61 | 20.45 | 20.41 |
| | | | 12 | 7 | 20.69 | 20.42 | 20.38 |
| | | | 12 | 13 | 20.65 | 20.46 | 20.41 |
| | | | 25 | 0 | 20.58 | 20.38 | 20.33 |
| | 10 | QPSK | 1 | 0 | 22.58 | 22.42 | 22.50 |
| | | | 1 | 25 | 22.57 | 22.49 | 22.41 |
| | | | 1 | 49 | 22.53 | 22.52 | 22.18 |
| | | | 25 | 0 | 21.64 | 21.46 | 21.42 |
| | | | 25 | 12 | 21.59 | 21.48 | 21.44 |
| | | | 25 | 25 | 21.57 | 21.47 | 21.28 |
| | | | 50 | 0 | 21.60 | 21.49 | 21.33 |
| | | 16QAM | 1 | 0 | 21.63 | 21.40 | 21.45 |
| | | | 1 | 25 | 21.69 | 21.36 | 21.32 |
| | | | 1 | 49 | 21.59 | 21.43 | 21.35 |
| | | | 25 | 0 | 20.57 | 20.40 | 20.30 |
| | | | 25 | 12 | 20.56 | 20.42 | 20.30 |
| | | | 25 | 25 | 20.60 | 20.35 | 20.33 |
| | | | 50 | 0 | 20.58 | 20.38 | 20.31 |

| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈m) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Channel | | |
| | | | | | Low | Middle | High |
| LTE B4 | 15 | QPSK | 1 | 0 | 22.40 | 22.31 | 22.43 |
| | | | 1 | 36 | 22.52 | 22.43 | 22.41 |
| | | | 1 | 74 | 22.44 | 22.51 | 22.07 |
| | | | 36 | 0 | 21.49 | 21.43 | 21.34 |
| | | | 36 | 18 | 21.57 | 21.53 | 21.41 |
| | | | 36 | 37 | 21.50 | 21.47 | 21.40 |
| | | | 75 | 0 | 21.51 | 21.50 | 21.40 |
| | | 16QAM | 1 | 0 | 21.44 | 21.50 | 21.42 |
| | | | 1 | 36 | 21.62 | 21.42 | 21.34 |
| | | | 1 | 74 | 21.36 | 21.39 | 21.31 |
| | | | 36 | 0 | 20.47 | 20.39 | 20.29 |
| | | | 36 | 18 | 20.42 | 20.39 | 20.31 |
| | | | 36 | 37 | 20.47 | 20.35 | 20.31 |
| | | | 75 | 0 | 20.51 | 20.47 | 20.31 |
| | 20 | QPSK | 1 | 0 | 22.47 | 22.33 | 22.35 |
| | | | 1 | 49 | 22.51 | 22.47 | 22.43 |
| | | | 1 | 99 | 22.44 | 22.39 | 21.68 |
| | | | 50 | 0 | 21.51 | 21.40 | 21.43 |
| | | | 50 | 24 | 21.56 | 21.46 | 21.42 |
| | | | 50 | 50 | 21.53 | 21.44 | 21.44 |
| | | | 100 | 0 | 21.52 | 21.44 | 21.38 |
| | | 16QAM | 1 | 0 | 21.41 | 21.43 | 21.29 |
| | | | 1 | 49 | 21.44 | 21.37 | 21.27 |
| | | | 1 | 99 | 21.43 | 21.27 | 20.98 |
| | | | 50 | 0 | 20.64 | 20.43 | 20.38 |
| | | | 50 | 24 | 20.59 | 20.44 | 20.39 |
| | | | 50 | 50 | 20.59 | 20.44 | 20.35 |
| | | | 100 | 0 | 20.53 | 20.38 | 20.40 |

| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈㎥) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Channel | | |
| | | | | | Low | Middle | High |
| LTE B12 | 1.4 | QPSK | 1 | 0 | 23.53 | 23.48 | 23.27 |
| | | | 1 | 3 | 23.50 | 23.48 | 23.29 |
| | | | 1 | 5 | 23.40 | 23.35 | 23.27 |
| | | | 3 | 0 | 23.40 | 23.36 | 23.27 |
| | | | 3 | 1 | 23.38 | 23.37 | 23.29 |
| | | | 3 | 3 | 23.38 | 23.36 | 23.30 |
| | | | 6 | 0 | 22.40 | 22.43 | 22.28 |
| | | 16QAM | 1 | 0 | 22.33 | 22.39 | 22.30 |
| | | | 1 | 3 | 22.37 | 22.33 | 22.24 |
| | | | 1 | 5 | 22.39 | 22.38 | 22.23 |
| | | | 3 | 0 | 22.27 | 22.42 | 22.30 |
| | | | 3 | 1 | 22.29 | 22.33 | 22.25 |
| | | | 3 | 3 | 22.34 | 22.38 | 22.21 |
| | | | 6 | 0 | 21.31 | 21.43 | 21.20 |
| | 3 | QPSK | 1 | 0 | 23.49 | 23.49 | 23.35 |
| | | | 1 | 8 | 23.42 | 23.43 | 23.30 |
| | | | 1 | 14 | 23.45 | 23.44 | 23.31 |
| | | | 8 | 0 | 22.44 | 22.40 | 22.30 |
| | | | 8 | 4 | 22.34 | 22.40 | 22.21 |
| | | | 8 | 7 | 22.23 | 22.36 | 22.32 |
| | | | 15 | 0 | 22.27 | 22.38 | 22.32 |
| | | 16QAM | 1 | 0 | 22.30 | 22.28 | 22.31 |
| | | | 1 | 8 | 22.31 | 22.27 | 21.80 |
| | | | 1 | 14 | 22.20 | 22.33 | 22.16 |
| | | | 8 | 0 | 21.26 | 21.38 | 21.12 |
| | | | 8 | 4 | 21.24 | 21.23 | 20.93 |
| | | | 8 | 7 | 21.21 | 21.26 | 21.13 |
| | | | 15 | 0 | 21.16 | 21.32 | 21.15 |
| | 5 | QPSK | 1 | 0 | 23.64 | 23.47 | 23.45 |
| | | | 1 | 12 | 23.38 | 23.41 | 23.35 |
| | | | 1 | 24 | 23.36 | 23.28 | 23.36 |
| | | | 12 | 0 | 22.34 | 22.40 | 22.34 |
| | | | 12 | 7 | 22.27 | 22.36 | 22.27 |
| | | | 12 | 13 | 22.28 | 22.34 | 22.31 |
| | | | 25 | 0 | 22.25 | 22.40 | 22.27 |
| | | 16QAM | 1 | 0 | 22.33 | 22.29 | 22.20 |
| | | | 1 | 12 | 22.46 | 22.24 | 22.17 |
| | | | 1 | 24 | 22.25 | 22.32 | 22.31 |
| | | | 12 | 0 | 21.25 | 21.34 | 21.21 |
| | | | 12 | 7 | 21.15 | 21.29 | 21.15 |
| | | | 12 | 13 | 21.21 | 21.32 | 21.20 |
| | | | 25 | 0 | 21.16 | 21.22 | 21.26 |
| | 10 | QPSK | 1 | 0 | 23.46 | 23.56 | 23.48 |
| | | | 1 | 25 | 23.40 | 23.43 | 23.28 |
| | | | 1 | 49 | 23.24 | 23.35 | 23.23 |
| | | | 25 | 0 | 22.38 | 22.50 | 22.34 |
| | | | 25 | 12 | 22.32 | 22.37 | 22.30 |
| | | | 25 | 25 | 22.30 | 22.35 | 22.28 |
| | | | 50 | 0 | 22.29 | 22.38 | 22.33 |
| | | 16QAM | 1 | 0 | 22.47 | 22.42 | 22.35 |
| | | | 1 | 25 | 22.24 | 22.37 | 22.22 |
| | | | 1 | 49 | 22.15 | 22.19 | 22.12 |
| | | | 25 | 0 | 21.23 | 21.30 | 21.34 |
| | | | 25 | 12 | 21.22 | 21.19 | 21.23 |
| | | | 25 | 25 | 21.11 | 21.19 | 21.17 |
| | | | 50 | 0 | 21.24 | 21.30 | 21.24 |

| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈㎥) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Channel | | |
| | | | | | Low | Middle | High |
| LTE B13 | 5 | QPSK | 1 | 0 | 23.86 | 23.95 | 23.95 |
| | | | 1 | 12 | 23.88 | 23.94 | 23.93 |
| | | | 1 | 24 | 23.88 | 23.82 | 23.78 |
| | | | 12 | 0 | 22.32 | 22.33 | 22.18 |
| | | | 12 | 7 | 22.35 | 22.37 | 22.23 |
| | | | 12 | 13 | 22.28 | 22.32 | 22.20 |
| | | | 25 | 0 | 22.26 | 22.37 | 22.19 |
| | | 16QAM | 1 | 0 | 22.39 | 22.30 | 22.19 |
| | | | 1 | 12 | 22.22 | 22.30 | 22.08 |
| | | | 1 | 24 | 22.27 | 22.27 | 22.12 |
| | | | 12 | 0 | 21.38 | 21.44 | 21.28 |
| | | | 12 | 7 | 21.36 | 21.38 | 21.30 |
| | | | 12 | 13 | 21.34 | 21.37 | 21.08 |
| | | | 25 | 0 | 21.30 | 21.40 | 21.23 |
| | 10 | QPSK | 1 | 0 | - | 23.94 | - |
| | | | 1 | 25 | - | 23.89 | - |
| | | | 1 | 49 | - | 23.79 | - |
| | | | 25 | 0 | - | 22.40 | - |
| | | | 25 | 12 | - | 22.36 | - |
| | | | 25 | 25 | - | 22.27 | - |
| | | | 50 | 0 | - | 22.37 | - |
| | | 16QAM | 1 | 0 | - | 22.39 | - |
| | | | 1 | 25 | - | 22.25 | - |
| | | | 1 | 49 | - | 22.17 | - |
| | | | 25 | 0 | - | 21.40 | - |
| | | | 25 | 12 | - | 21.40 | - |
| | | | 25 | 25 | - | 21.33 | - |
| | | | 50 | 0 | - | 21.45 | - |

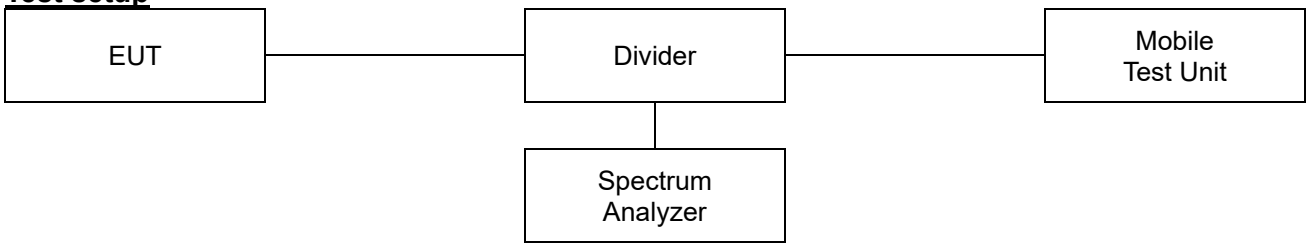
| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈m) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Channel | | |
| | | | | | Low | Middle | High |
| LTE B66 | 1.4 | QPSK | 1 | 0 | 22.49 | 22.78 | 22.79 |
| | | | 1 | 3 | 22.91 | 22.80 | 22.83 |
| | | | 1 | 5 | 22.84 | 22.77 | 22.80 |
| | | | 3 | 0 | 22.88 | 22.79 | 22.84 |
| | | | 3 | 1 | 22.91 | 22.83 | 22.79 |
| | | | 3 | 3 | 22.89 | 22.80 | 22.74 |
| | | | 6 | 0 | 21.90 | 21.77 | 21.76 |
| | | 16QAM | 1 | 0 | 21.78 | 21.58 | 21.78 |
| | | | 1 | 3 | 21.86 | 21.52 | 21.71 |
| | | | 1 | 5 | 21.79 | 21.49 | 21.68 |
| | | | 3 | 0 | 21.75 | 21.79 | 21.40 |
| | | | 3 | 1 | 21.86 | 21.73 | 21.74 |
| | | | 3 | 3 | 21.80 | 21.64 | 21.79 |
| | | | 6 | 0 | 20.89 | 20.81 | 20.87 |
| | 3 | QPSK | 1 | 0 | 22.94 | 22.83 | 22.77 |
| | | | 1 | 8 | 22.98 | 22.81 | 22.79 |
| | | | 1 | 14 | 22.90 | 22.87 | 22.80 |
| | | | 8 | 0 | 21.86 | 21.75 | 21.81 |
| | | | 8 | 4 | 21.81 | 21.82 | 21.80 |
| | | | 8 | 7 | 21.91 | 21.79 | 21.73 |
| | | | 15 | 0 | 21.92 | 21.84 | 21.81 |
| | | 16QAM | 1 | 0 | 22.02 | 21.71 | 21.89 |
| | | | 1 | 8 | 22.11 | 21.81 | 21.70 |
| | | | 1 | 14 | 21.96 | 21.81 | 21.73 |
| | | | 8 | 0 | 20.97 | 20.81 | 20.76 |
| | | | 8 | 4 | 21.03 | 20.79 | 20.77 |
| | | | 8 | 7 | 20.91 | 20.75 | 20.73 |
| | | | 15 | 0 | 20.90 | 20.76 | 20.79 |
| | 5 | QPSK | 1 | 0 | 22.90 | 22.87 | 22.88 |
| | | | 1 | 12 | 22.95 | 22.82 | 22.76 |
| | | | 1 | 24 | 22.87 | 22.78 | 22.58 |
| | | | 12 | 0 | 21.80 | 21.79 | 21.84 |
| | | | 12 | 7 | 21.88 | 21.81 | 21.78 |
| | | | 12 | 13 | 21.84 | 21.72 | 21.70 |
| | | | 25 | 0 | 21.95 | 21.74 | 21.78 |
| | | 16QAM | 1 | 0 | 21.85 | 21.86 | 21.79 |
| | | | 1 | 12 | 21.91 | 21.81 | 21.82 |
| | | | 1 | 24 | 21.98 | 21.81 | 21.79 |
| | | | 12 | 0 | 20.98 | 20.84 | 20.78 |
| | | | 12 | 7 | 20.95 | 20.82 | 20.86 |
| | | | 12 | 13 | 20.91 | 20.82 | 20.81 |
| | | | 25 | 0 | 20.96 | 20.82 | 20.81 |
| | 10 | QPSK | 1 | 0 | 22.79 | 22.85 | 22.98 |
| | | | 1 | 25 | 22.72 | 22.84 | 22.83 |
| | | | 1 | 49 | 22.84 | 22.30 | 21.97 |
| | | | 25 | 0 | 21.78 | 21.83 | 21.90 |
| | | | 25 | 12 | 21.81 | 21.81 | 21.92 |
| | | | 25 | 25 | 21.83 | 21.82 | 21.51 |
| | | | 50 | 0 | 21.85 | 21.85 | 21.82 |
| | | 16QAM | 1 | 0 | 21.52 | 21.82 | 21.93 |
| | | | 1 | 25 | 21.80 | 21.61 | 21.77 |
| | | | 1 | 49 | 21.70 | 21.52 | 21.28 |
| | | | 25 | 0 | 20.85 | 20.75 | 20.79 |
| | | | 25 | 12 | 20.83 | 20.82 | 20.74 |
| | | | 25 | 25 | 20.83 | 20.81 | 20.80 |
| | | | 50 | 0 | 20.90 | 20.78 | 20.73 |

| Test Band | Bandwidth (MHz) | Test mode | RB size | RB offset | Maximum Average Power (dBm) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Channel | | |
| | | | | | Low | Middle | High |
| LTE B66 | 15 | QPSK | 1 | 0 | 22.76 | 22.76 | 22.58 |
| | | | 1 | 36 | 22.81 | 22.85 | 22.84 |
| | | | 1 | 74 | 22.81 | 22.18 | 21.72 |
| | | | 36 | 0 | 21.84 | 21.78 | 21.80 |
| | | | 36 | 18 | 21.86 | 21.81 | 21.81 |
| | | | 36 | 37 | 21.81 | 21.81 | 21.42 |
| | | | 75 | 0 | 21.87 | 21.81 | 21.66 |
| | | 16QAM | 1 | 0 | 21.69 | 21.75 | 21.66 |
| | | | 1 | 36 | 21.86 | 21.84 | 21.68 |
| | | | 1 | 74 | 21.79 | 21.34 | 20.88 |
| | | | 36 | 0 | 20.88 | 20.76 | 20.76 |
| | | | 36 | 18 | 20.82 | 20.78 | 20.72 |
| | | | 36 | 37 | 20.89 | 20.76 | 20.64 |
| | | | 75 | 0 | 20.89 | 20.82 | 20.73 |
| | 20 | QPSK | 1 | 0 | 22.95 | 22.82 | 21.89 |
| | | | 1 | 49 | 22.91 | 22.80 | 22.66 |
| | | | 1 | 99 | 22.92 | 21.93 | 21.60 |
| | | | 50 | 0 | 22.00 | 21.85 | 21.33 |
| | | | 50 | 24 | 21.96 | 21.83 | 21.69 |
| | | | 50 | 50 | 21.95 | 21.54 | 21.22 |
| | | | 100 | 0 | 21.98 | 21.74 | 21.25 |
| | | 16QAM | 1 | 0 | 21.73 | 21.87 | 20.80 |
| | | | 1 | 49 | 21.85 | 21.68 | 21.74 |
| | | | 1 | 99 | 21.82 | 20.81 | 20.54 |
| | | | 50 | 0 | 21.04 | 20.76 | 20.53 |
| | | | 50 | 24 | 20.98 | 20.80 | 20.81 |
| | | | 50 | 50 | 20.99 | 20.78 | 20.46 |
| | | | 100 | 0 | 21.01 | 20.81 | 20.51 |

| Test Band | Bandwidth (㎒) | Test mode | RB size | RB offset | Maximum Average Power (㏈㎥) Channel | | |
|---|---|---|---|---|---|---|---|
| | | | | | Low | Middle | High |
| LTE B71 | 5 | QPSK | 1 | 0 | 23.44 | 23.25 | 23.04 |
| | | | 1 | 12 | 23.29 | 23.10 | 23.03 |
| | | | 1 | 24 | 23.24 | 23.07 | 23.06 |
| | | | 12 | 0 | 22.34 | 22.13 | 21.98 |
| | | | 12 | 7 | 22.29 | 22.13 | 21.99 |
| | | | 12 | 13 | 22.16 | 22.08 | 22.02 |
| | | | 25 | 0 | 22.26 | 22.12 | 21.98 |
| | | 16QAM | 1 | 0 | 22.18 | 22.27 | 22.17 |
| | | | 1 | 12 | 22.13 | 22.16 | 21.80 |
| | | | 1 | 24 | 22.16 | 21.97 | 21.91 |
| | | | 12 | 0 | 21.21 | 21.12 | 21.00 |
| | | | 12 | 7 | 21.17 | 21.06 | 20.96 |
| | | | 12 | 13 | 21.16 | 21.06 | 20.89 |
| | | | 25 | 0 | 21.11 | 21.12 | 20.88 |
| | 10 | QPSK | 1 | 0 | 23.28 | 23.18 | 23.13 |
| | | | 1 | 25 | 23.14 | 23.10 | 22.98 |
| | | | 1 | 49 | 23.10 | 23.00 | 22.97 |
| | | | 25 | 0 | 22.23 | 22.13 | 22.04 |
| | | | 25 | 12 | 22.15 | 22.08 | 21.92 |
| | | | 25 | 25 | 22.12 | 21.96 | 21.93 |
| | | | 50 | 0 | 22.13 | 22.13 | 21.86 |
| | | 16QAM | 1 | 0 | 22.25 | 22.17 | 21.91 |
| | | | 1 | 25 | 22.12 | 21.95 | 21.84 |
| | | | 1 | 49 | 22.08 | 21.92 | 21.84 |
| | | | 25 | 0 | 21.09 | 21.01 | 20.92 |
| | | | 25 | 12 | 21.13 | 21.00 | 20.91 |
| | | | 25 | 25 | 21.10 | 20.97 | 20.83 |
| | | | 50 | 0 | 21.17 | 21.06 | 20.99 |
| | 15 | QPSK | 1 | 0 | 23.42 | 23.14 | 23.09 |
| | | | 1 | 36 | 23.23 | 23.09 | 22.93 |
| | | | 1 | 74 | 23.17 | 22.98 | 22.80 |
| | | | 36 | 0 | 22.22 | 22.11 | 21.99 |
| | | | 36 | 18 | 22.20 | 22.05 | 21.94 |
| | | | 36 | 37 | 22.17 | 22.00 | 21.86 |
| | | | 75 | 0 | 22.18 | 22.10 | 21.93 |
| | | 16QAM | 1 | 0 | 22.20 | 22.07 | 21.84 |
| | | | 1 | 36 | 22.00 | 21.92 | 21.81 |
| | | | 1 | 74 | 22.03 | 21.94 | 21.69 |
| | | | 36 | 0 | 21.15 | 21.03 | 20.99 |
| | | | 36 | 18 | 21.05 | 21.08 | 20.83 |
| | | | 36 | 37 | 20.99 | 20.95 | 20.78 |
| | | | 75 | 0 | 21.16 | 20.99 | 20.95 |
| | 20 | QPSK | 1 | 0 | 23.27 | 23.25 | 23.15 |
| | | | 1 | 49 | 23.20 | 23.08 | 22.90 |
| | | | 1 | 99 | 23.07 | 22.90 | 22.82 |
| | | | 50 | 0 | 22.25 | 22.08 | 22.07 |
| | | | 50 | 24 | 22.18 | 22.11 | 22.01 |
| | | | 50 | 50 | 22.11 | 22.02 | 21.93 |
| | | | 100 | 0 | 22.08 | 22.06 | 21.99 |
| | | 16QAM | 1 | 0 | 22.09 | 22.22 | 22.00 |
| | | | 1 | 49 | 21.80 | 21.96 | 21.86 |
| | | | 1 | 99 | 21.75 | 21.67 | 21.78 |
| | | | 50 | 0 | 21.11 | 21.08 | 21.02 |
| | | | 50 | 24 | 21.09 | 20.46 | 20.92 |
| | | | 50 | 50 | 21.03 | 21.04 | 20.94 |
| | | | 100 | 0 | 21.07 | 21.02 | 20.97 |

## 7.2. 99% Occupied Bandwidth & 26dB Bandwidth

**Test setup**




**Limit**

**According to §2.1049,**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

**Test procedure**

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

**Test settings**

◆ **26dB Bandwidth**

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize.
   Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

k) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

### ◆ 99% Occupied Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

**Notes:**

1. The EUT was setup to maximum output power with all bandwidth and modulation.

## Test results

| Test mode | | Channel | 26 dB Bandwidth (MHz) | 99 % Bandwidth (MHz) |
|---|---|---|---|---|
| WCDMA1700 | RMC | Low | 4.75 | 4.15 |
| | | Middle | 4.75 | 4.14 |
| | | High | 4.74 | 4.15 |

| Test Band | Bandwidth (MHz) | Channel | Test mode | 26dB Bandwidth (MHz) | 99 % Bandwidth (MHz) |
|---|---|---|---|---|---|
| LTE B12 | 1.4 | Low | QPSK | 1.34 | 1.09 |
| | | | 16QAM | 1.35 | 1.10 |
| | | Middle | QPSK | 1.33 | 1.09 |
| | | | 16QAM | 1.35 | 1.09 |
| | | High | QPSK | 1.37 | 1.10 |
| | | | 16QAM | 1.35 | 1.10 |
| | 3 | Low | QPSK | 3.13 | 2.73 |
| | | | 16QAM | 3.15 | 2.71 |
| | | Middle | QPSK | 3.11 | 2.70 |
| | | | 16QAM | 3.12 | 2.71 |
| | | High | QPSK | 3.14 | 2.72 |
| | | | 16QAM | 3.18 | 2.71 |
| | 5 | Low | QPSK | 5.38 | 4.53 |
| | | | 16QAM | 5.33 | 4.52 |
| | | Middle | QPSK | 5.41 | 4.51 |
| | | | 16QAM | 5.37 | 4.55 |
| | | High | QPSK | 5.43 | 4.55 |
| | | | 16QAM | 5.45 | 4.53 |
| | 10 | Low | QPSK | 10.32 | 8.97 |
| | | | 16QAM | 10.34 | 9.04 |
| | | Middle | QPSK | 10.19 | 8.97 |
| | | | 16QAM | 10.24 | 9.02 |
| | | High | QPSK | 10.14 | 8.99 |
| | | | 16QAM | 10.29 | 8.99 |

| Test Band | Bandwidth (㎒) | Channel | Test mode | 26㏈ Bandwidth (㎒) | 99 % Bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE B13 | 5 | Low | QPSK | 5.35 | 4.52 |
| | | | 16QAM | 5.27 | 4.52 |
| | | Middle | QPSK | 5.37 | 4.53 |
| | | | 16QAM | 5.35 | 4.53 |
| | | High | QPSK | 5.37 | 4.52 |
| | | | 16QAM | 5.37 | 4.56 |
| | 10 | Middle | QPSK | 10.09 | 9.02 |
| | | | 16QAM | 10.09 | 8.99 |

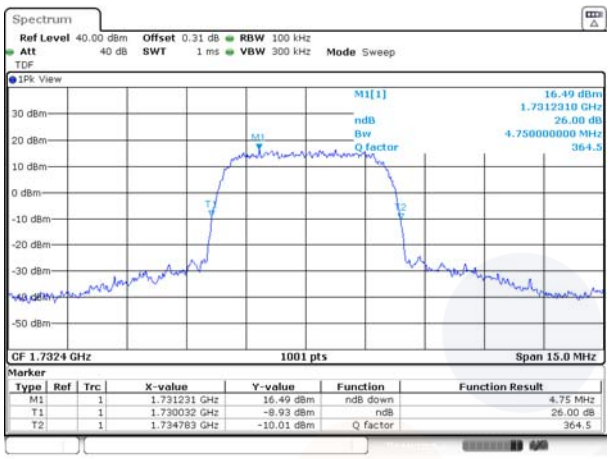
| Test Band | Bandwidth (㎒) | Channel | Test mode | 26㏈ Bandwidth (㎒) | 99 % Bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE B66/4 | 1.4 | Low | QPSK | 1.32 | 1.10 |
| | | | 16QAM | 1.34 | 1.10 |
| | | Middle | QPSK | 1.35 | 1.09 |
| | | | 16QAM | 1.35 | 1.10 |
| | | High | QPSK | 1.33 | 1.10 |
| | | | 16QAM | 1.34 | 1.09 |
| | 3 | Low | QPSK | 3.11 | 2.70 |
| | | | 16QAM | 3.07 | 2.70 |
| | | Middle | QPSK | 3.08 | 2.71 |
| | | | 16QAM | 3.10 | 2.70 |
| | | High | QPSK | 3.12 | 2.71 |
| | | | 16QAM | 3.12 | 2.71 |
| | 5 | Low | QPSK | 5.45 | 4.52 |
| | | | 16QAM | 5.37 | 4.53 |
| | | Middle | QPSK | 5.36 | 4.51 |
| | | | 16QAM | 5.32 | 4.55 |
| | | High | QPSK | 5.32 | 4.53 |
| | | | 16QAM | 5.40 | 4.55 |
| | 10 | Low | QPSK | 10.24 | 8.99 |
| | | | 16QAM | 10.09 | 8.97 |
| | | Middle | QPSK | 10.24 | 8.97 |
| | | | 16QAM | 10.24 | 8.97 |
| | | High | QPSK | 10.24 | 8.99 |
| | | | 16QAM | 10.22 | 8.99 |
| | 15 | Low | QPSK | 15.14 | 13.41 |
| | | | 16QAM | 15.06 | 13.45 |
| | | Middle | QPSK | 14.99 | 13.41 |
| | | | 16QAM | 15.02 | 13.41 |
| | | High | QPSK | 15.47 | 13.41 |
| | | | 16QAM | 15.06 | 13.45 |
| | 20 | Low | QPSK | 19.63 | 17.93 |
| | | | 16QAM | 19.63 | 18.08 |
| | | Middle | QPSK | 19.93 | 17.98 |
| | | | 16QAM | 19.78 | 17.93 |
| | | High | QPSK | 19.78 | 17.93 |
| | | | 16QAM | 19.73 | 17.88 |

| Test Band | Bandwidth (㎒) | Channel | Test mode | 26㏈ Bandwidth (㎒) | 99 % Bandwidth (㎒) |
|---|---|---|---|---|---|
| LTE B71 | 5 | Low | QPSK | 5.38 | 4.51 |
| | | | 16QAM | 5.33 | 4.53 |
| | | Middle | QPSK | 5.36 | 4.52 |
| | | | 16QAM | 5.50 | 4.53 |
| | | High | QPSK | 5.40 | 4.53 |
| | | | 16QAM | 5.41 | 4.53 |
| | 10 | Low | QPSK | 10.22 | 8.99 |
| | | | 16QAM | 10.44 | 8.99 |
| | | Middle | QPSK | 10.14 | 9.02 |
| | | | 16QAM | 10.29 | 9.02 |
| | | High | QPSK | 10.14 | 9.02 |
| | | | 16QAM | 10.44 | 9.02 |
| | 15 | Low | QPSK | 15.40 | 13.49 |
| | | | 16QAM | 15.21 | 13.49 |
| | | Middle | QPSK | 15.14 | 13.49 |
| | | | 16QAM | 15.02 | 13.45 |
| | | High | QPSK | 15.21 | 13.49 |
| | | | 16QAM | 15.47 | 13.60 |
| | 20 | Low | QPSK | 20.28 | 17.98 |
| | | | 16QAM | 19.68 | 17.98 |
| | | Middle | QPSK | 19.93 | 17.93 |
| | | | 16QAM | 19.88 | 17.93 |
| | | High | QPSK | 19.98 | 18.03 |
| | | | 16QAM | 19.73 | 18.03 |

**In order to simplify the report, only Middle channel test plots are attached**

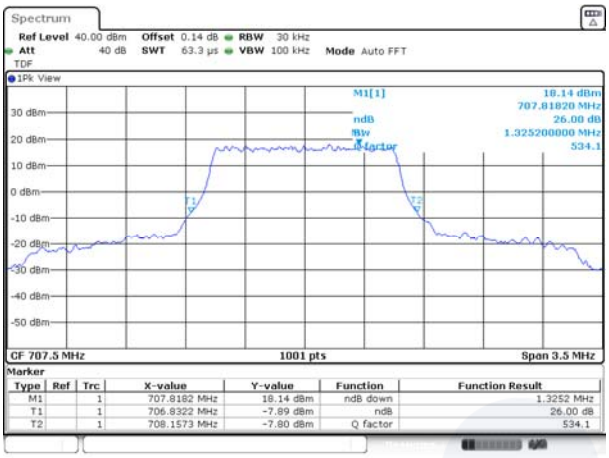
## 26dB Bandwidth

**Test mode: WCDMA 1700**

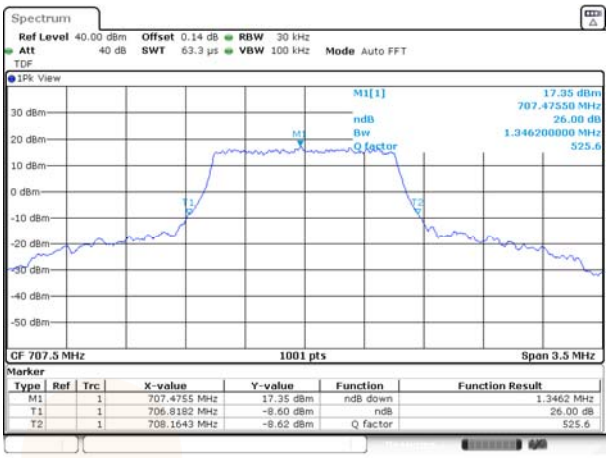
| RMC Middle channel | - |
|---|---|
|  | Blank |

## Test mode: LTE B12

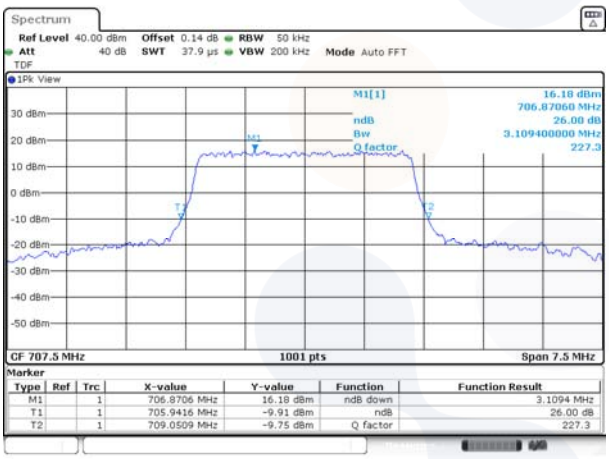
### 1.4M BW QPSK Middle channel



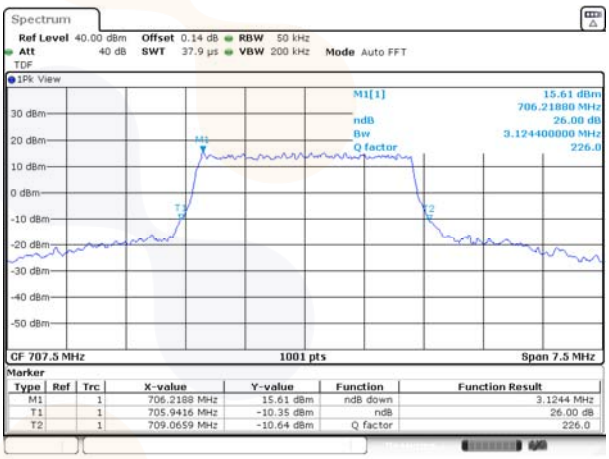

### 1.4M BW 16QAM Middle channel



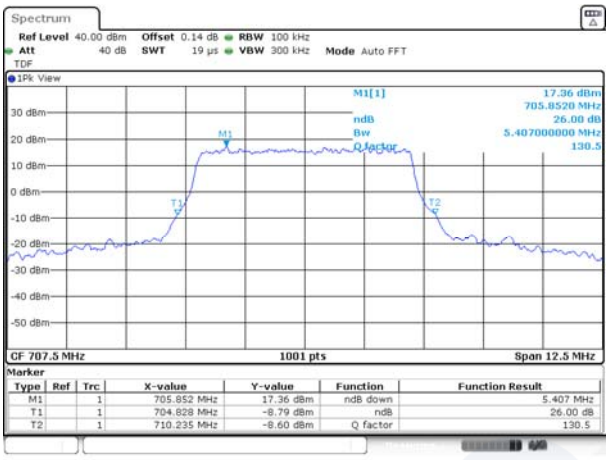

### 3M BW QPSK Middle channel



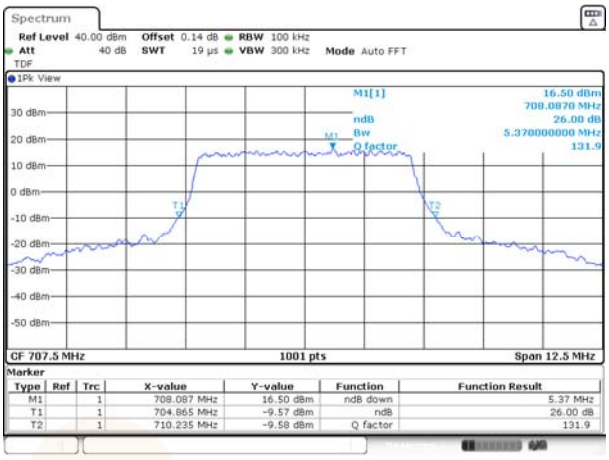

### 3M BW 16QAM Middle channel



## 5M BW QPSK Middle channel

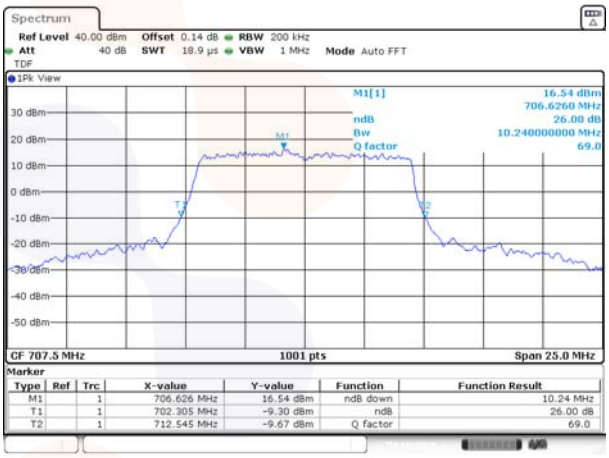



## 5M BW 16QAM Middle channel



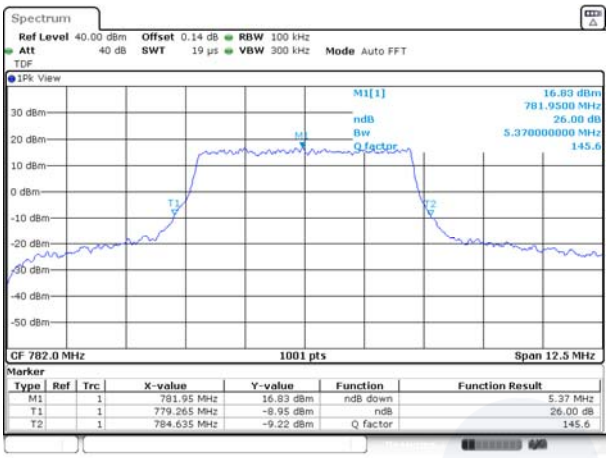

## 10M BW QPSK Middle channel

## 10M BW 16QAM Middle channel

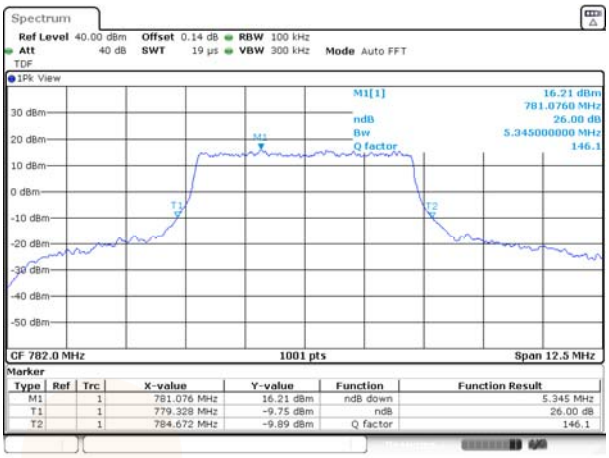


## Test mode: LTE B13

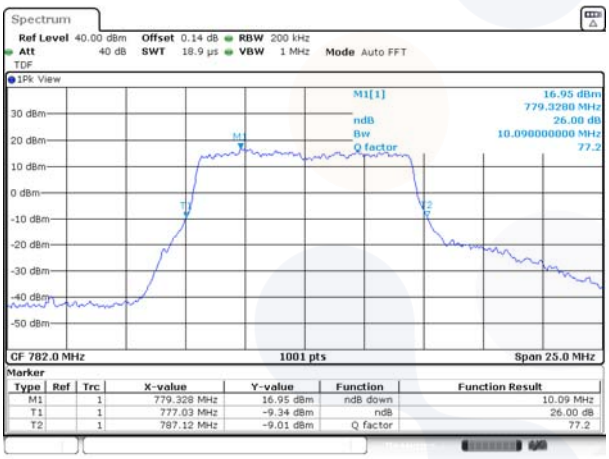
### 5M BW QPSK Middle channel




### 5M BW 16QAM Middle channel



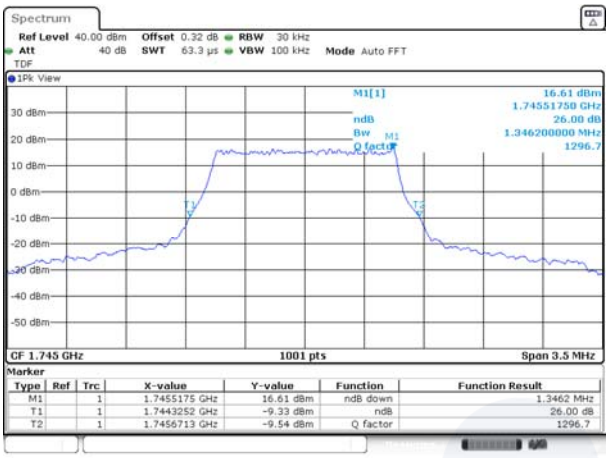

### 10M BW QPSK Middle channel



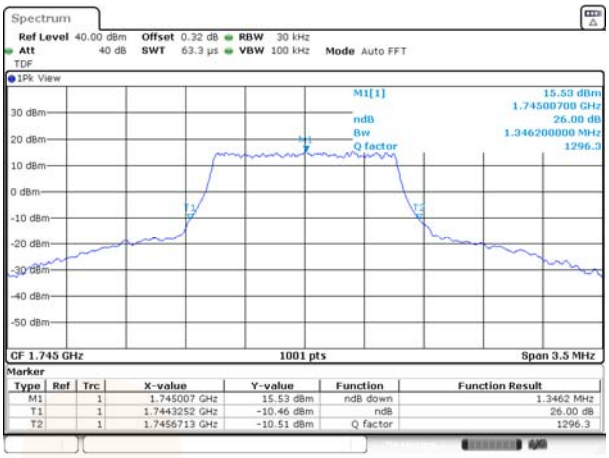

### 10M BW 16QAM Middle channel

## Test mode: LTE B66/4

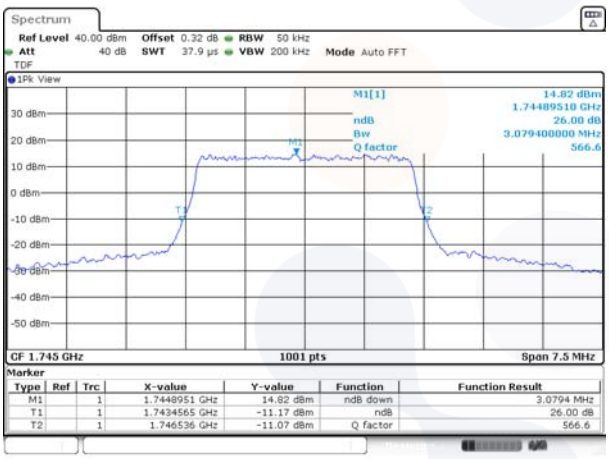
### 1.4M BW QPSK Middle channel



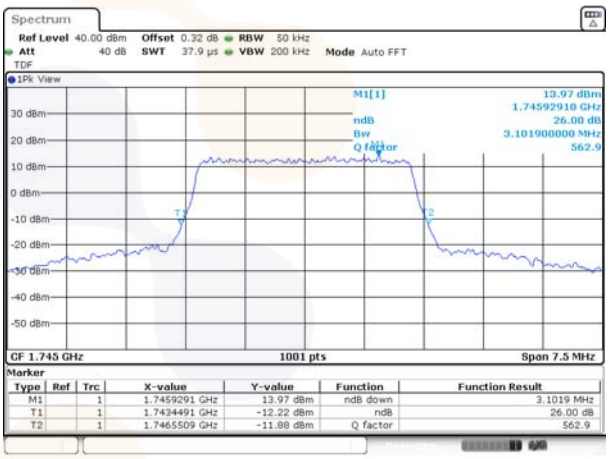

### 1.4M BW 16QAM Middle channel



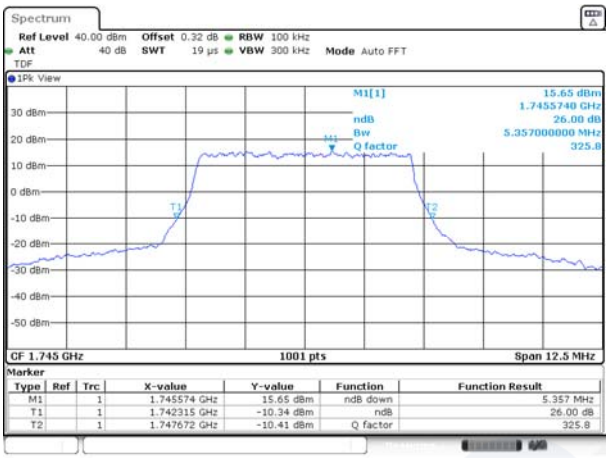

### 3M BW QPSK Middle channel



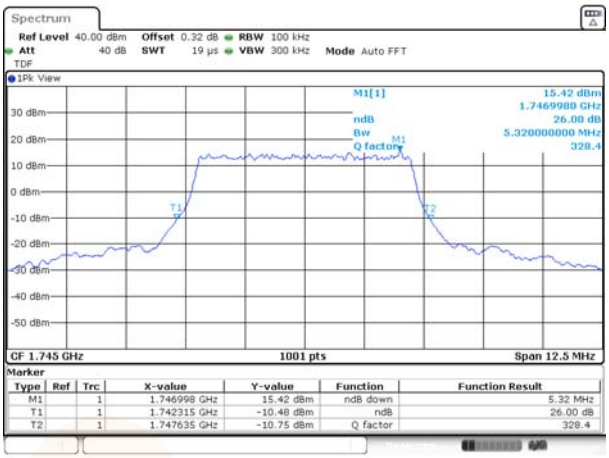

### 3M BW 16QAM Middle channel



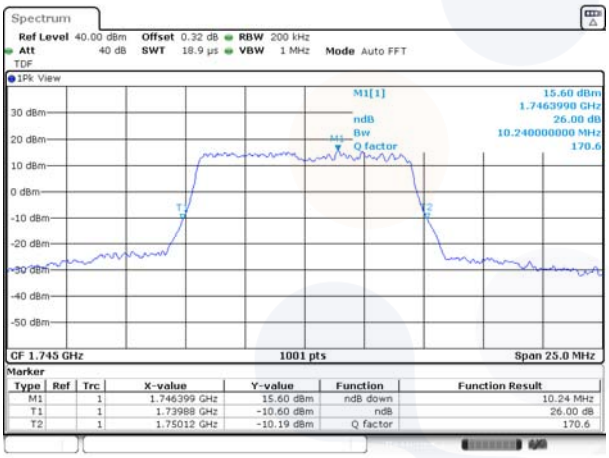
## 5M BW QPSK Middle channel



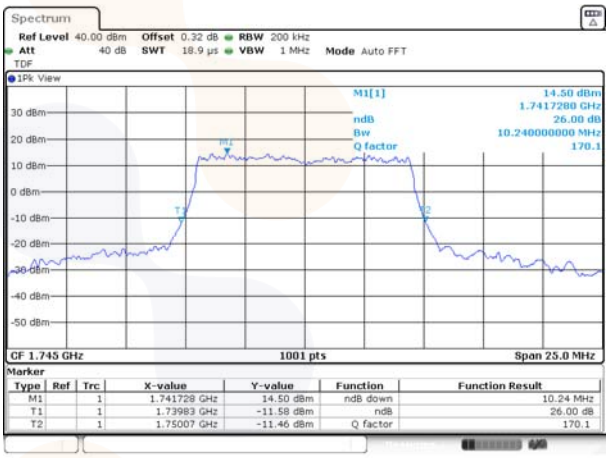

## 5M BW 16QAM Middle channel




## 10M BW QPSK Middle channel

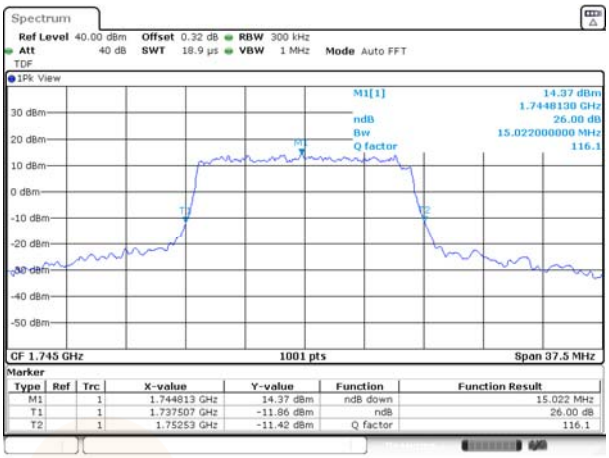



## 10M BW 16QAM Middle channel

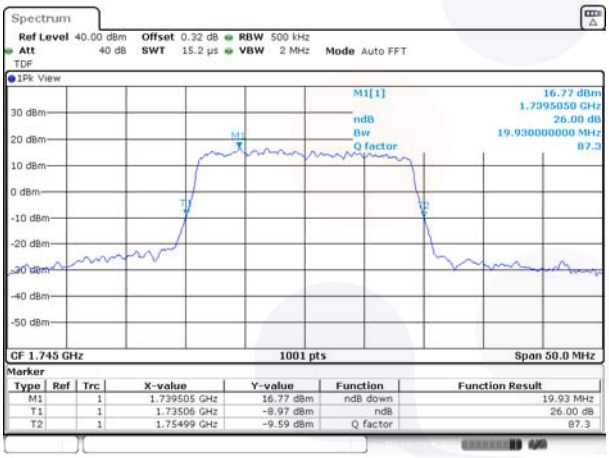


## 15M BW QPSK Middle channel

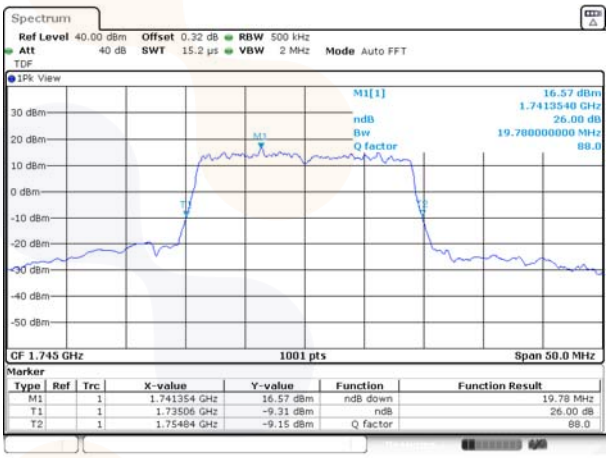
## 15M BW 16QAM Middle channel




## 20M BW QPSK Middle channel

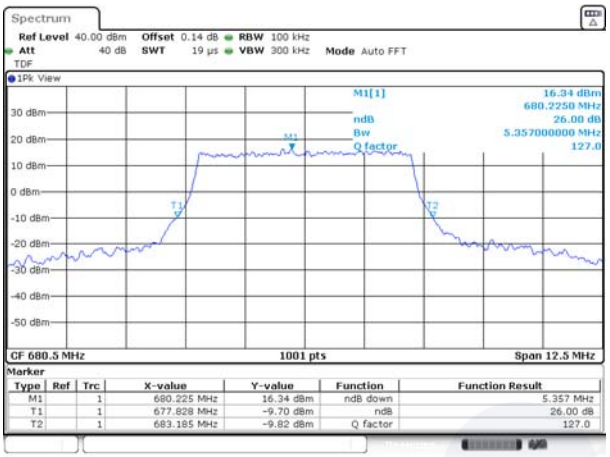



## 20M BW 16QAM Middle channel



## Test mode: LTE B71

### 5M BW QPSK Middle channel

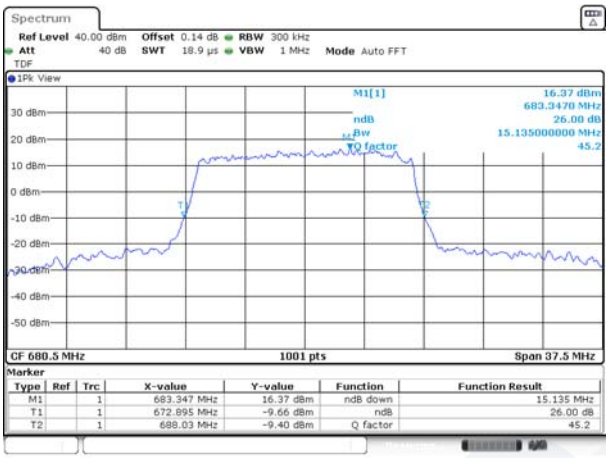



### 5M BW 16QAM Middle channel

### 10M BW QPSK Middle channel

### 10M BW 16QAM Middle channel

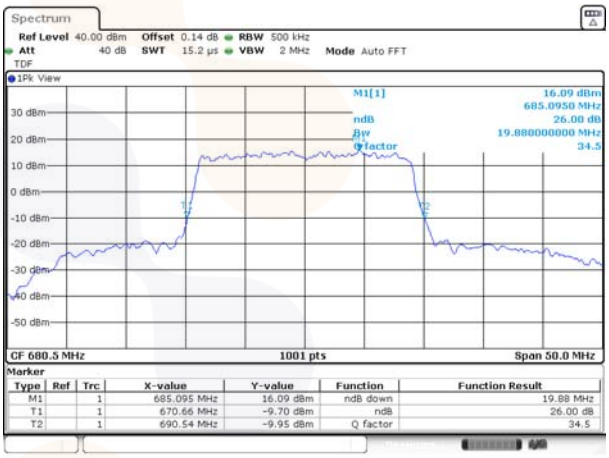
## 15M BW QPSK Middle channel




## 15M BW 16QAM Middle channel

## 20M BW QPSK Middle channel

## 20M BW 16QAM Middle channel

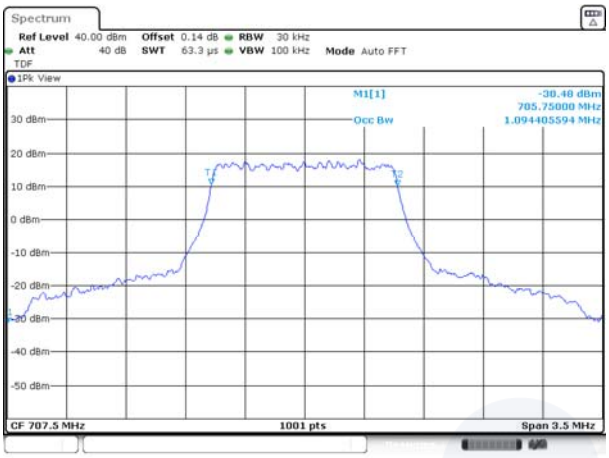
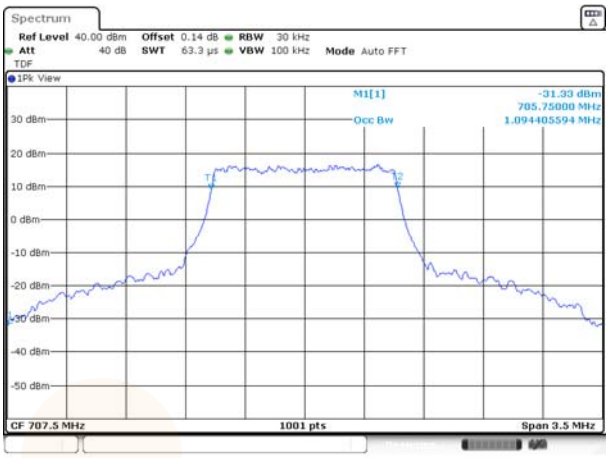
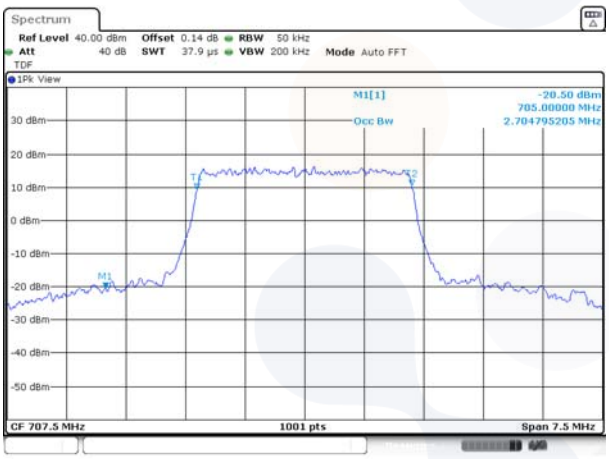
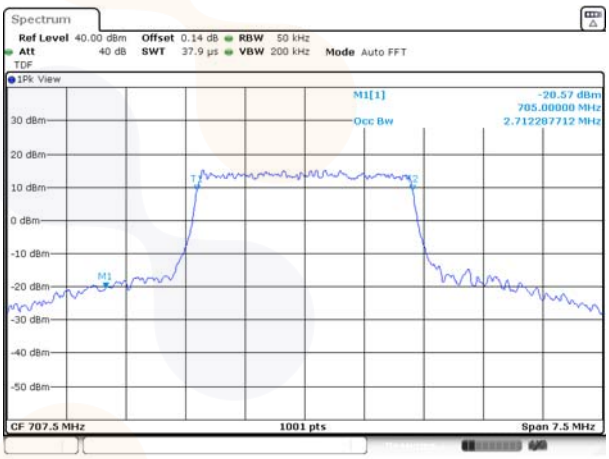


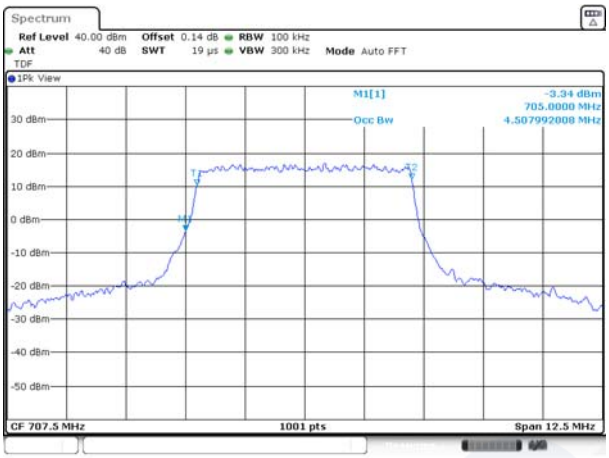
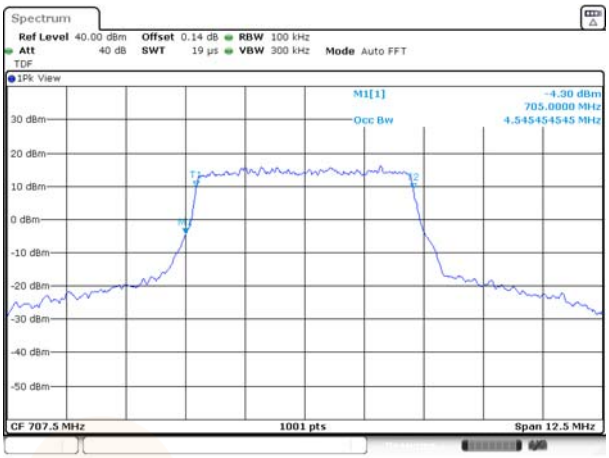
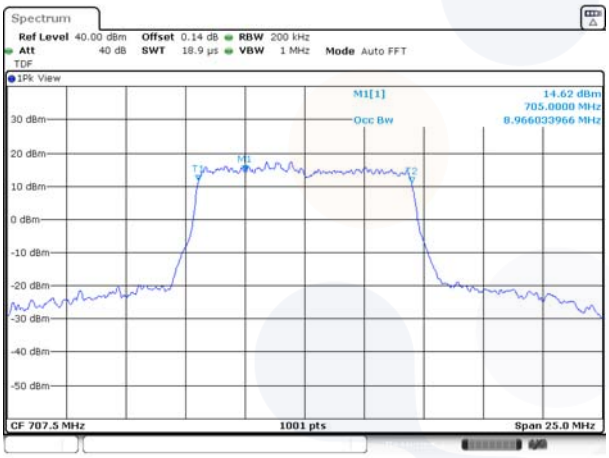
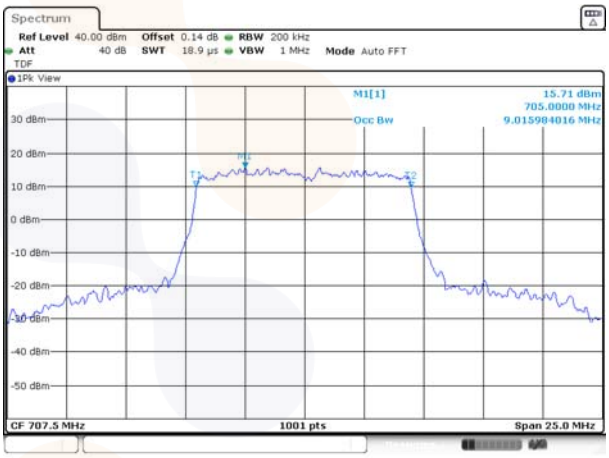
## 99% Occupied Bandwidth

### Test mode: WCDMA 1700

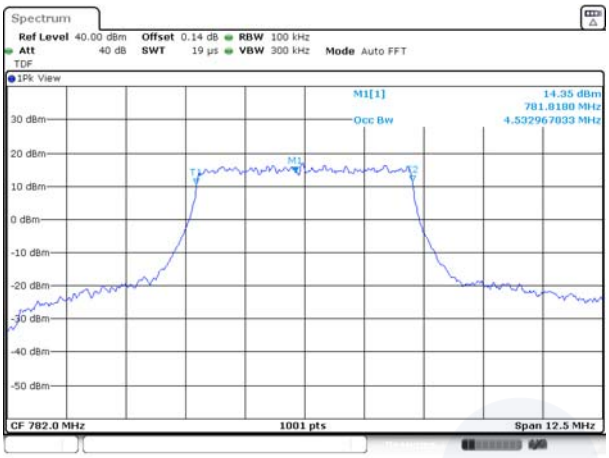
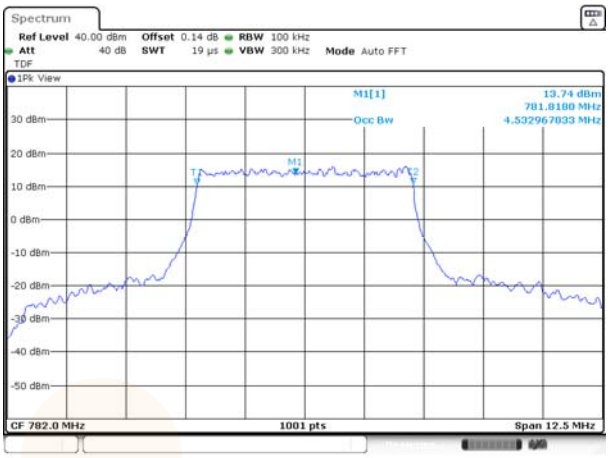
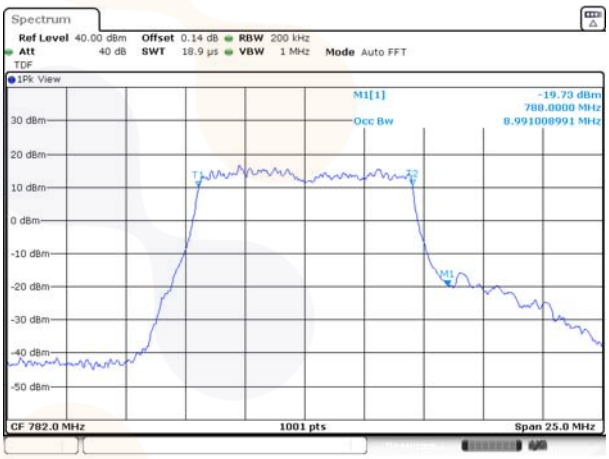
| RMC / Middle channel | - |
|---|---|
| | Blank |

**Test mode: LTE B12**

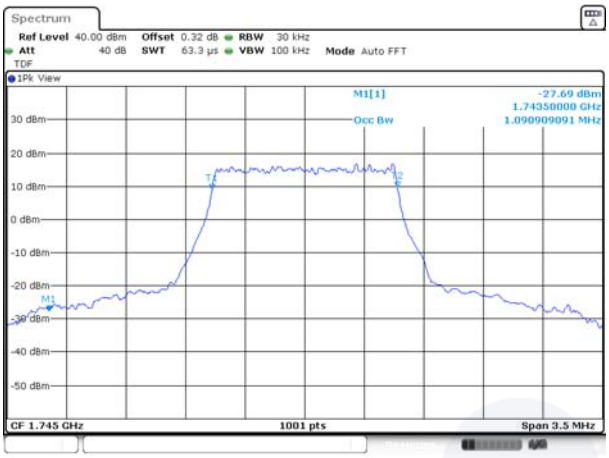
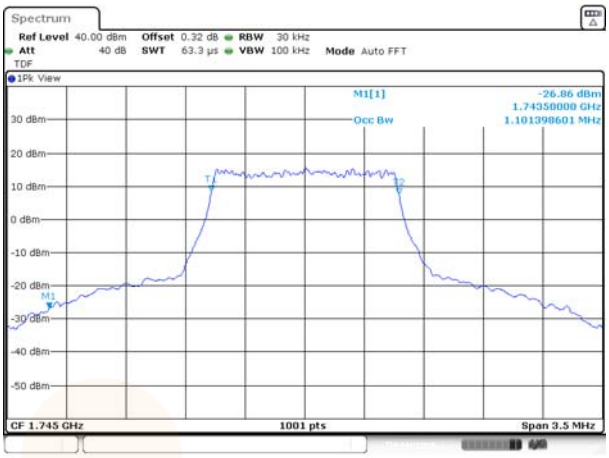
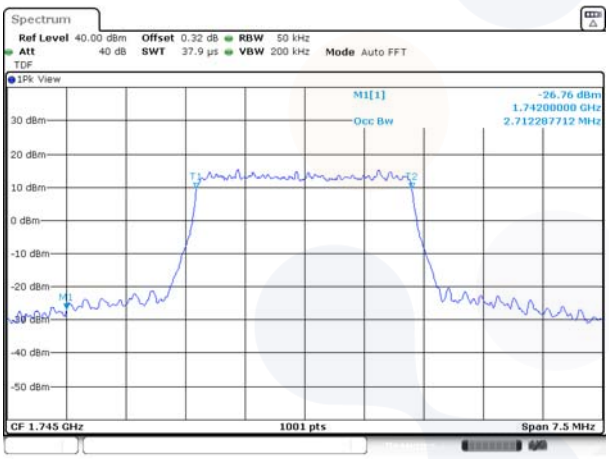
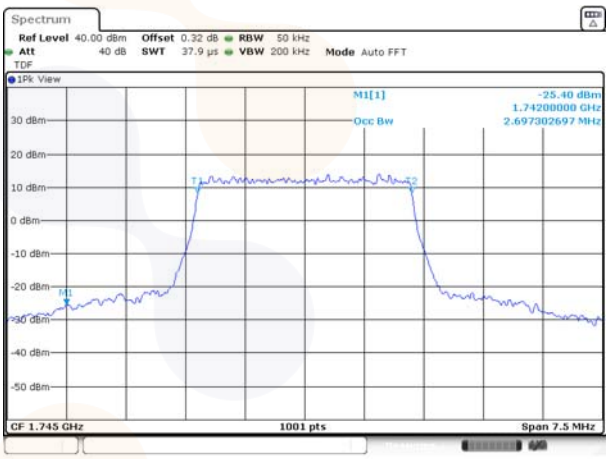
| 1.4M BW QPSK Middle channel | 1.4M BW 16QAM Middle channel |
|---|---|
|  |  |
| **3M BW QPSK Middle channel** | **3M BW 16QAM Middle channel** |
|  |  |

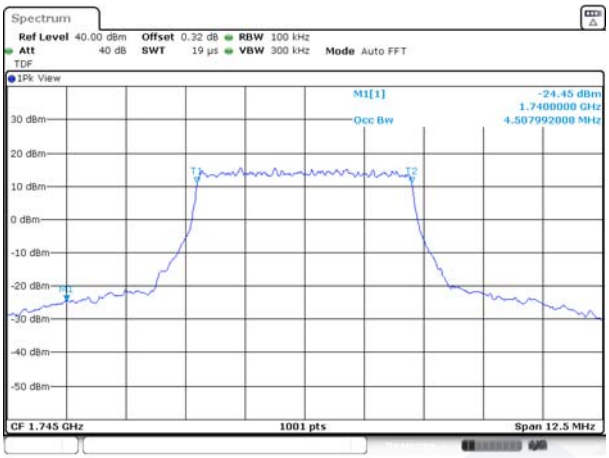
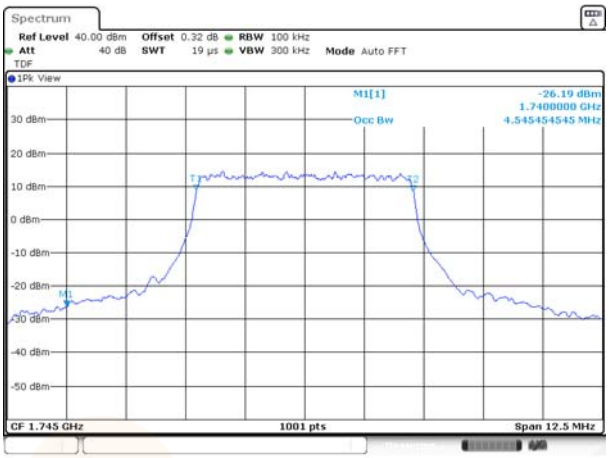
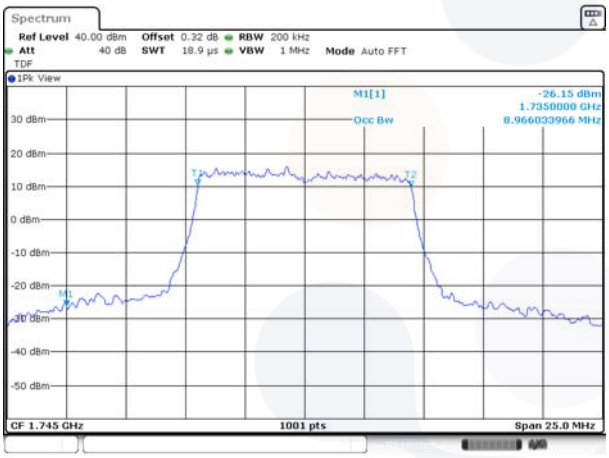
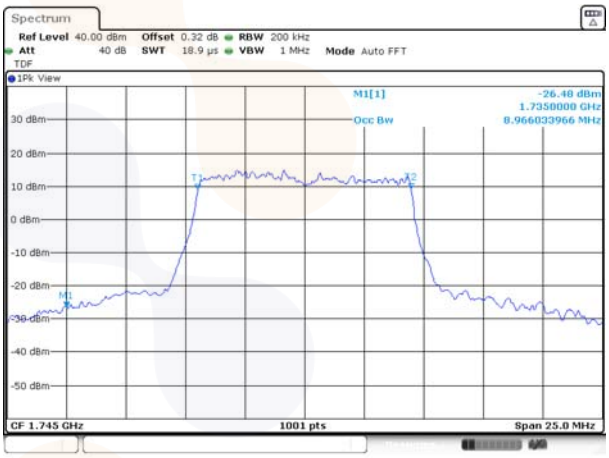
| 5M BW QPSK Middle channel | 5M BW 16QAM Middle channel |
|---|---|
|  |  |
| **10M BW QPSK Middle channel** | **10M BW 16QAM Middle channel** |
|  |  |

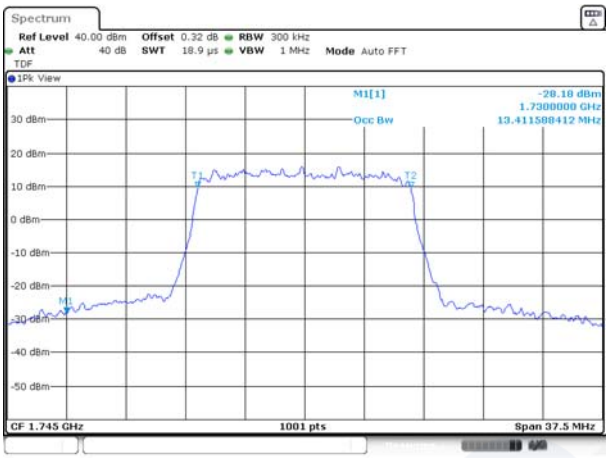
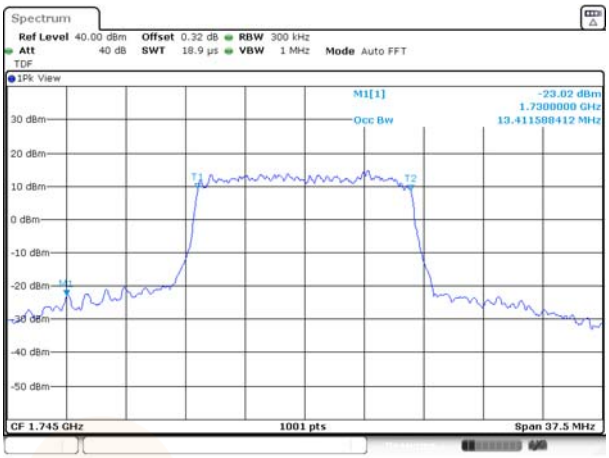
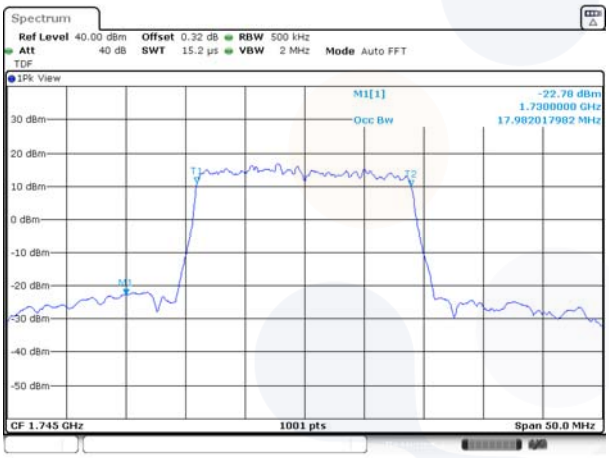
**Test mode: LTE B13**

| 5M BW QPSK Middle channel | 5M BW 16QAM Middle channel |
|---|---|
|  |  |
| **10M BW QPSK Middle channel** | **10M BW 16QAM Middle channel** |
| |  |

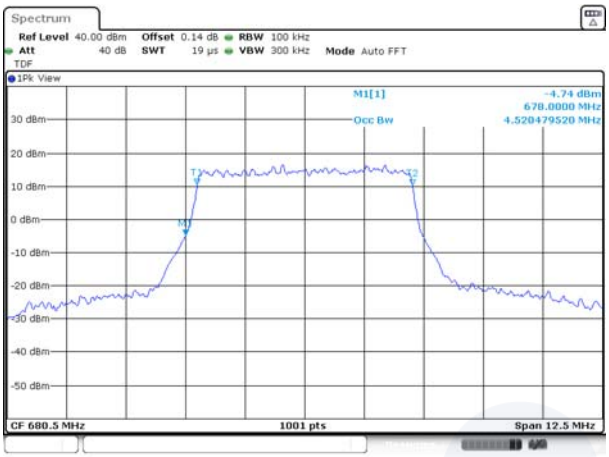
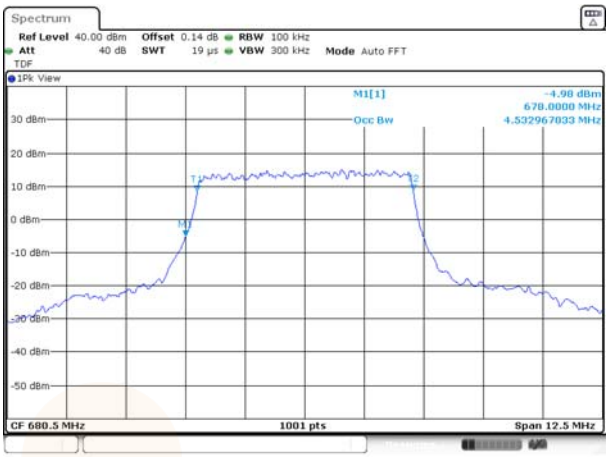
**Test mode: LTE B66/4**

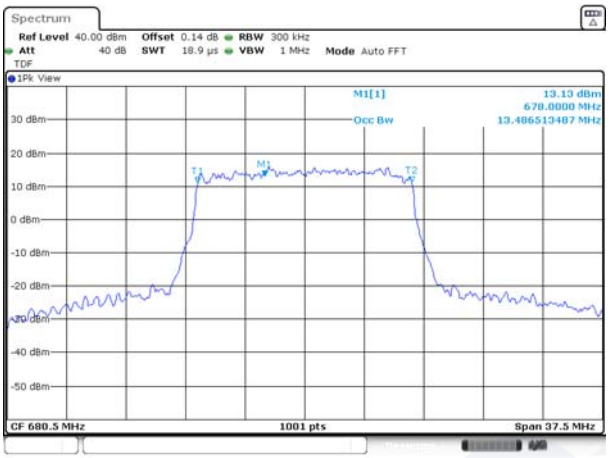
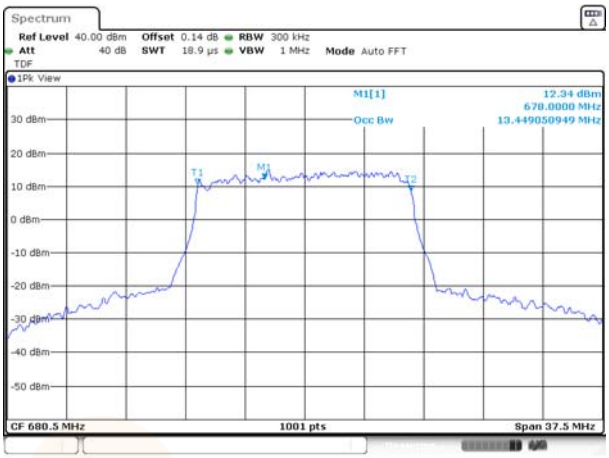
| 1.4M BW QPSK Middle channel | 1.4M BW 16QAM Middle channel |
|---|---|
|  |  |
| **3M BW QPSK Middle channel** | **3M BW 16QAM Middle channel** |
|  |  |

| 5M BW QPSK Middle channel | 5M BW 16QAM Middle channel |
|---|---|
|  |  |
| **10M BW QPSK Middle channel** | **10M BW 16QAM Middle channel** |
|  |  |

| 15M BW QPSK Middle channel | 15M BW 16QAM Middle channel |
|---|---|
|  |  |
| **20M BW QPSK Middle channel** | **20M BW 16QAM Middle channel** |
|  | |

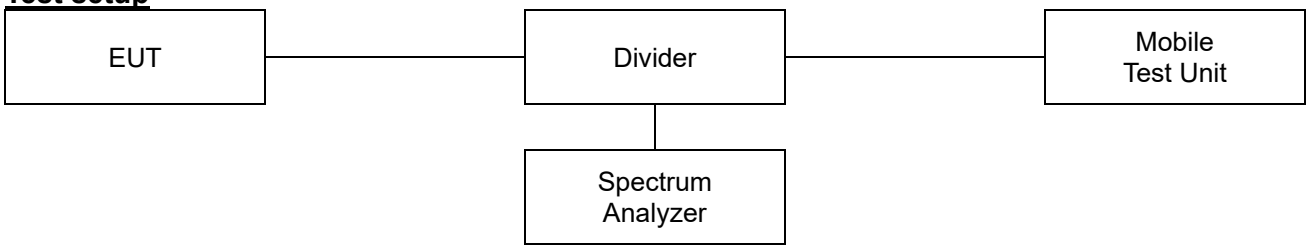
**Test mode: LTE B71**

| 5M BW QPSK Middle channel | 5M BW 16QAM Middle channel |
|---|---|
|  |  |
| **10M BW QPSK Middle channel** | **10M BW 16QAM Middle channel** |
| | |

| 15M BW QPSK Middle channel | 15M BW 16QAM Middle channel |
|---|---|
|  |  |
| **20M BW QPSK Middle channel** | **20M BW 16QAM Middle channel** |
| | |

## 7.3. Band Edge Emissions at Antenna Terminal

**Test setup**




**Limit**

**According to §27.53(c)(2),**

For operations in the 746–758 ㎒ band and the 776–788 ㎒ band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 ㎒ band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) ㏈;

(2) On any frequency outside the 776–788 ㎒ band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) ㏈;

(3) On all frequencies between 763–775 ㎒ and 793–805 ㎒, by a factor not less than 76 + 10 log (P) ㏈ in a 6.25 ㎑ band segment, for base and fixed stations;

(4) On all frequencies between 763–775 ㎒ and 793–805 ㎒, by a factor not less than 65 + 10 log (P) ㏈ in a 6.25 ㎑ band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater. However, in the 100 ㎑ bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 ㎑ may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 ㎑ segment

**According to §27.53(g),**

For operations in the 600 ㎒ band and the 698-746 ㎒ band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10log($P_{[Watts]}$) ㏈.

**According to §27.53(h),**

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10log($P_{[Watts]}$) ㏈.

**Test procedure**

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**Test settings**

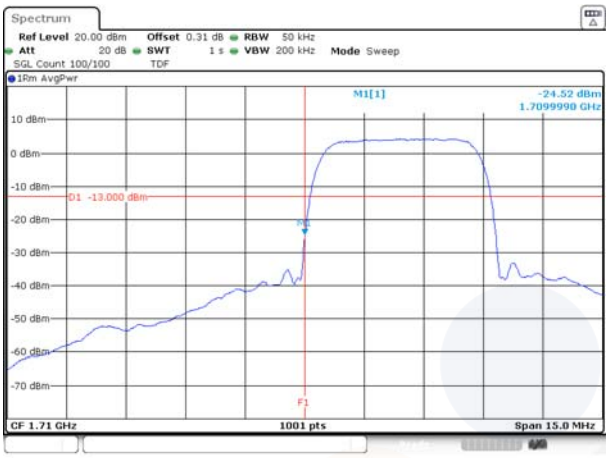
1) Start and stop frequency were set such that the band edge would be placed in the center of the plot
2) Span was set large enough so as to capture all out of band emissions near the band edge.
3) Set the RBW > 1% of the emission bandwidth.
4) Set the VBW ≥ 3 x RBW.
5) Set the number of sweep points ≥ 2 x Span/RBW
6) Detector = RMS
7) Trace mode = trace average
8) Sweep time should be auto for peak detection. For RMS detection the sweep time should be set as follows:
    a) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) x (symbol period) (e.g., by a factor of 10 x symbol period x number of points)
    Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols.
    b) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) x (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time
    c) If the device cannot be configured to transmit continuously (duty cycle > 98%), and a free-running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).
    d) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold art necessary to ensure that the maximum power is measured.
9) Allow trace to fully stabilize.

**Notes:**

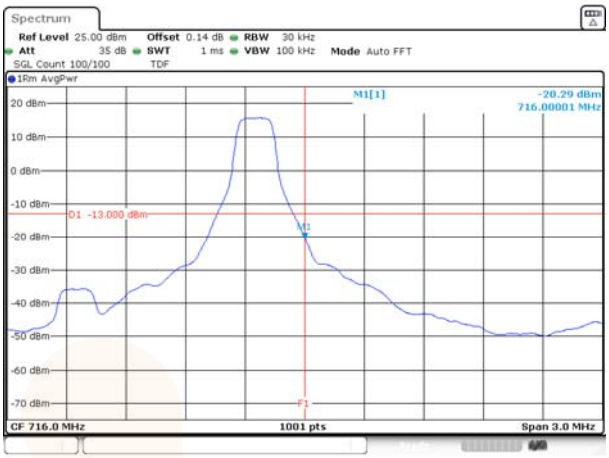
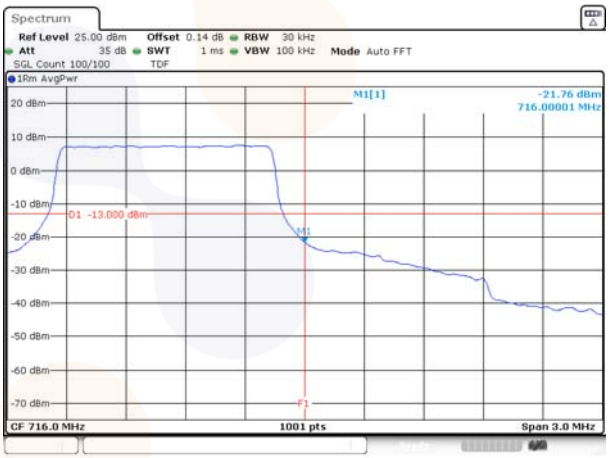
1. Per 27.53(c)(5), for operations in the 776-768 ㎒ band, in the 100 ㎑ bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 ㎑ may be employed.
2. Per 27.53(c)(6), for operation in the 763-775 ㎒ and 793-805 ㎒, the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 ㎑ segment.
3. Per 27.53(g), compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 ㎑ may be employed.
4. Per 27.53(h)(3), compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
5. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.

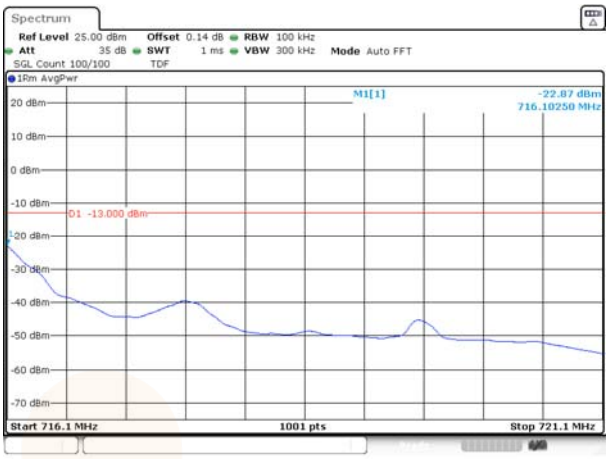
## Test results

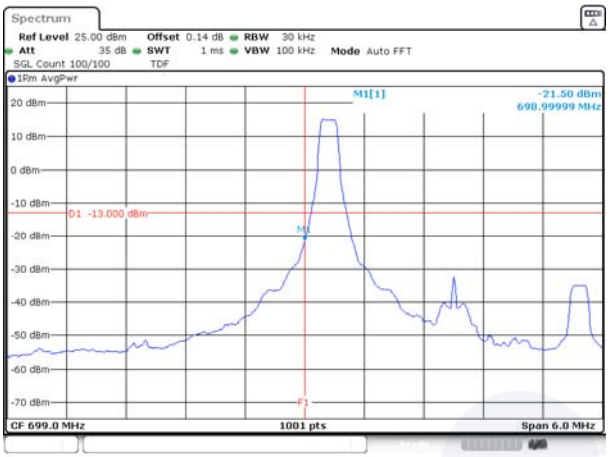
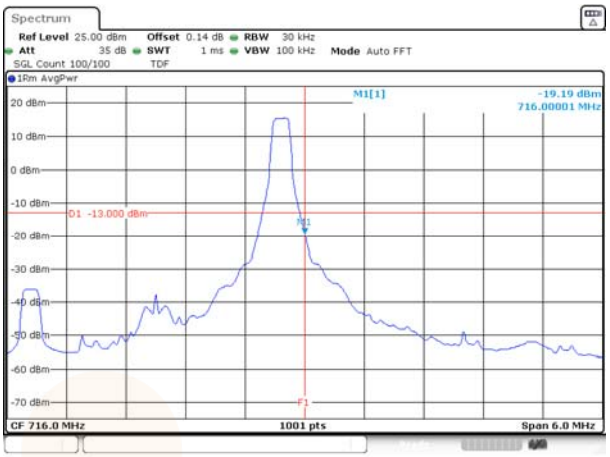
### Test mode: WCDMA 1700

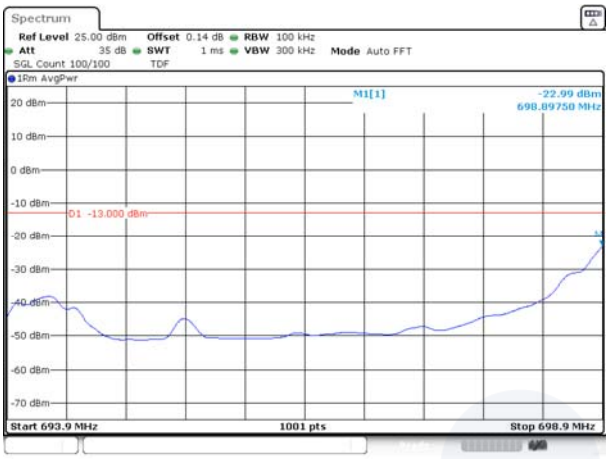
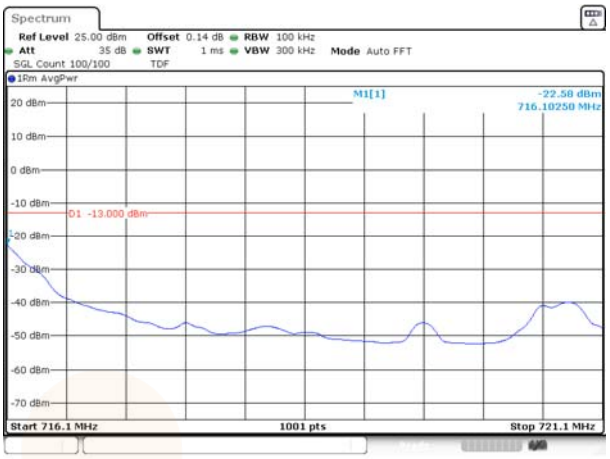
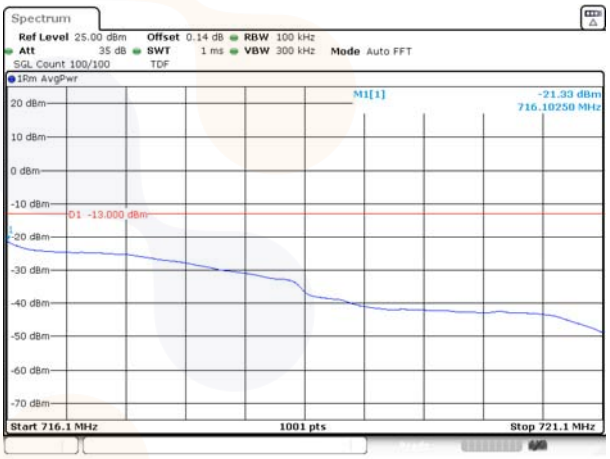
| RMC | |
|---|---|
| **Low channel** | **High channel** |
|  | |

**Test mode: LTE B12**

| 1.4M BW QPSK | |
|---|---|
| **Low channel 1RB** | **High channel 1RB** |
| |  |
| **Low channel FRB** | **High channel FRB** |
| |  |

| 1.4M BW QPSK | |
|---|---|
| **Lower extended 1RB** | **Upper extended 1RB** |
| |  |
| **Lower extended FRB** | **Upper extended FRB** |
| | |

| 3M BW QPSK | |
|---|---|
| **Low channel 1RB** | **High channel 1RB** |
|  |  |
| **Low channel FRB** | **High channel FRB** |
| | |

| 3M BW QPSK | |
|---|---|
| **Lower extended 1RB** | **Upper extended 1RB** |
|  |  |
| **Lower extended FRB** | **Upper extended FRB** |
| |  |