

# Radio Test report – Radio 2212 B66A

347873-1TRFWL-R1

Applicant:

Ericsson Canada

Product:

Radio 2212

Models:

Radio 2212 B66A

Part numbers:

KRC 161 630/1, KRC 161 630/3

FCC ID:

TA8BKRC161630

ISED Reg. Number

287AB-BS161630

HVIN:

BS161630

Requirements/Summary:

| Standard                       | Environmental phenomenon                                                                          | Compliance |
|--------------------------------|---------------------------------------------------------------------------------------------------|------------|
| FCC 47 CFR Part 27             | Miscellaneous wireless communications services                                                    | Yes        |
| RSS-139 Issue 3, July 16, 2015 | Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710–1780 MHz and 2110–2180 MHz | Yes        |

Tested by: Andrey Adelberg, Senior EMC/Wireless Specialist

Reviewed by: Kevin Rose, Wireless/EMC Specialist

Date of issue: February 21, 2018

Reviewer signature



#### Test location

|              |                                                                                    |                 |
|--------------|------------------------------------------------------------------------------------|-----------------|
| Company name | Nemko Canada Inc.                                                                  |                 |
| Address      | 303 River Road                                                                     | 349 Terry Fox   |
| City         | Ottawa                                                                             | Ottawa          |
| Province     | Ontario                                                                            | Ontario         |
| Postal code  | K1V 1H2                                                                            | K2K 2V6         |
| Country      | Canada                                                                             | Canada          |
| Telephone    | +1 613 737 9680                                                                    | +1 613 963 8000 |
| Facsimile    | +1 613 737 9691                                                                    |                 |
| Toll free    | +1 800 563 6336                                                                    |                 |
| Website      | www.nemko.com                                                                      |                 |
| Site number  | FCC test site registration number: CA2040, IC: 2040A-4 (3 m semi anechoic chamber) |                 |

#### Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Table of contents

|                                                                                      |           |
|--------------------------------------------------------------------------------------|-----------|
| <b>Table of contents .....</b>                                                       | <b>3</b>  |
| <b>Section 1. Report summary .....</b>                                               | <b>4</b>  |
| 1.1 Applicant and manufacturer .....                                                 | 4         |
| 1.2 Test specifications .....                                                        | 4         |
| 1.3 Statement of compliance .....                                                    | 4         |
| 1.4 Exclusions .....                                                                 | 4         |
| 1.5 Test report revision history .....                                               | 4         |
| <b>Section 2. Summary of test results .....</b>                                      | <b>5</b>  |
| 2.1 FCC Part 27 test results .....                                                   | 5         |
| 2.2 RSS-139 test results .....                                                       | 5         |
| <b>Section 3. Equipment under test (EUT) details .....</b>                           | <b>6</b>  |
| 3.1 Sample information .....                                                         | 6         |
| 3.2 EUT information .....                                                            | 6         |
| 3.3 Product description and theory of operation .....                                | 7         |
| 3.4 EUT test details .....                                                           | 8         |
| 3.5 EUT setup diagram .....                                                          | 10        |
| 3.6 Setup photographs .....                                                          | 11        |
| <b>Section 4. Engineering considerations .....</b>                                   | <b>14</b> |
| 4.1 Modifications incorporated in the EUT .....                                      | 14        |
| 4.2 Technical judgment .....                                                         | 14        |
| 4.3 Deviations from laboratory tests procedures .....                                | 14        |
| <b>Section 5. Test conditions .....</b>                                              | <b>15</b> |
| 5.1 Atmospheric conditions .....                                                     | 15        |
| 5.2 Power supply range .....                                                         | 15        |
| <b>Section 6. Measurement uncertainty .....</b>                                      | <b>16</b> |
| 6.1 Uncertainty of measurement .....                                                 | 16        |
| <b>Section 7. Test equipment .....</b>                                               | <b>17</b> |
| 7.1 Test equipment list .....                                                        | 17        |
| <b>Section 8. Testing data .....</b>                                                 | <b>18</b> |
| 8.1 FCC 27.50(d) and RSS-139, 4.1 Maximum output power at RF antenna connector ..... | 18        |
| 8.2 FCC 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector .....      | 46        |
| 8.3 FCC 27.53 and RSS-139, 4.2 Radiated spurious emissions .....                     | 71        |
| 8.4 FCC 27.54 and RSS-139, Section 6.4 Frequency stability .....                     | 77        |
| 8.5 FCC Part 2.1049 and RSS-Gen, 6.6 Occupied bandwidth .....                        | 78        |
| <b>Section 9. Block diagrams of test set-ups .....</b>                               | <b>95</b> |
| 9.1 Radiated emissions set-up for frequencies below 1 GHz .....                      | 95        |
| 9.2 Radiated emissions set-up for frequencies above 1 GHz .....                      | 95        |
| 9.3 Conducted emissions set-up .....                                                 | 96        |

## Section 1. Report summary

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### 1.1 Applicant and manufacturer

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|                 |                      |
|-----------------|----------------------|
| Company name    | Ericsson Canada Inc. |
| Address         | 349 Terry Fox Drive  |
| City            | Ottawa               |
| Province/State  | Ontario              |
| Postal/Zip code | K2K 2V6              |
| Country         | Canada               |

### 1.2 Test specifications

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|                                |                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------|
| FCC 47 CFR Part 27             | Miscellaneous wireless communications services                                                    |
| FCC 47 CFR Part 2              | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations                     |
| RSS-139 Issue 3, July 16, 2015 | Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710–1780 MHz and 2110–2180 MHz |
| RSS-Gen Issue 4, November 2014 | General Requirements for Compliance of Radio Apparatus                                            |

### 1.3 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested.

This report applies to the Radio 2212 B66A with model numbers KRC 161 630/1, KRC 161 630/3.

See “Summary of test results” for full details.

### 1.4 Exclusions

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None

### 1.5 Test report revision history

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| Revision # | Details of changes made to test report |
|------------|----------------------------------------|
| TRF        | Original report issued                 |

## Section 2. Summary of test results

### 2.1 FCC Part 27 test results

| Part      | Test description                             | Verdict |
|-----------|----------------------------------------------|---------|
| §27.50(b) | Maximum output power at RF antenna connector | Pass    |
| §27.53    | Spurious emissions at RF antenna connector   | Pass    |
| §27.53    | Radiated spurious emissions                  | Pass    |
| §27.54    | Frequency stability                          | Pass    |
| §2.1049   | Occupied bandwidth                           | Pass    |

Notes: None

### 2.2 RSS-139 test results

| Part           | Test description                                                            | Verdict |
|----------------|-----------------------------------------------------------------------------|---------|
| 4.1            | Transmitter output power and Equivalent Isotropic Radiated Power (e.i.r.p.) | Pass    |
| 4.2            | Spurious emissions at RF antenna connector                                  | Pass    |
| 4.2            | Radiated spurious emissions                                                 | Pass    |
| 6.4            | Transmitter frequency stability                                             | Pass    |
| RSS-Gen, 6.6   | Occupied bandwidth                                                          | Pass    |
| RSS-Gen, 7.1.3 | Receiver conducted limits                                                   | Pass    |

Notes: None

## Section 3. Equipment under test (EUT) details

### 3.1 Sample information

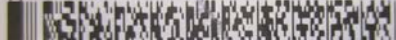
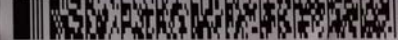
|                        |                  |
|------------------------|------------------|
| Receipt date           | January 31, 2018 |
| Nemko sample ID number | None             |

### 3.2 EUT information

|                                                         |                                                                                                                                                                                                             |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product name                                            | Radio 2212                                                                                                                                                                                                  |
| Model                                                   | Radio 2212 B66A                                                                                                                                                                                             |
| Part number                                             | KRC 161 630/3, (KRC 161 630/1)                                                                                                                                                                              |
| Revision                                                | R2B                                                                                                                                                                                                         |
| Serial number                                           | B440661742 (Conducted)<br>B440819706 (Radiated)                                                                                                                                                             |
| Antenna ports                                           | 2 TX/RX Ports                                                                                                                                                                                               |
| RF BW / IBW                                             | LTE RF BW: 70 MHz / IBW: 50, 60 and 70 MHz<br>WCDMA LTE RF BW: 45 MHz / IBW 45MHz                                                                                                                           |
| FDD                                                     | 400 MHz                                                                                                                                                                                                     |
| Frequency                                               | LTE: TX (DL): 2110–2180 MHz      LTE: RX (UL): 1710–1780 MHz<br>WCDMA: TX (DL): 2110–2155 MHz      WCDMA: RX (UL): 1710 - 1755 MHz                                                                          |
| Operating Frequencies:                                  | LTE: 2112.5–2177.5 MHz (5 MHz channel), 2115.0-2175.0 MHz (10 MHz channel)<br>LTE: 2117.5–2172.5 MHz (15 MHz channel), 2120.0-2170.0 MHz (20 MHz channel)<br>WCDMA: 2112.4-2152.6 MHz (5 MHz WCDMA channel) |
| Nominal O/P per antenna port<br>Up to 20 MHz Carrier BW | Single Carrier: 1 × 80 W (49 dBm)<br>Multi-Carrier: 2 × 40 W (49 dBm), Multi-Carrier: 3 × 26 W (49 dBm)                                                                                                     |
| Accuracy (nominal)                                      | ±0.1 ppm                                                                                                                                                                                                    |
| Nominal voltage                                         | –48 V <sub>DC</sub> @ 20 A                                                                                                                                                                                  |
| RAT                                                     | LTE: SC, MC, (NB IoT)      WCDMA: SC, MC      MRO: L+W                                                                                                                                                      |
| Modulation                                              | LTE: QPSK, 16 QAM, 64 QAM, 256QAM<br>WCDMA: QPSK, 16 QAM, 64 QAM                                                                                                                                            |
| Channel bandwidth                                       | LTE: 5, 10, 15, 20 MHz<br>WCDMA: 5 MHz                                                                                                                                                                      |
| Maximum combined OBW per port                           | 70 MHz                                                                                                                                                                                                      |
| CPRI                                                    | 10 Gbps                                                                                                                                                                                                     |
| Channel raster                                          | LTE: 100 kHz; WCDMA: 200 kHz                                                                                                                                                                                |
| Regulatory requirements                                 | Radio: FCC Part 2, 27, RSS-Gen, RSS-139<br>EMC: FCC Part 15, ICES-003                                                                                                                                       |
|                                                         | Safety: IEC/EN 62368-1, UL/CSA 62368-1<br>IEC/EN 60950-22, UL 50E                                                                                                                                           |
| Emission Designator:                                    | LTE: 5M00W7D, 10M0W7D, 15M0W7D, 20M0W7D<br>WCDMA: 5M00F9W                                                                                                                                                   |
| Multi-carrier                                           | Single Antenna, TX Diversity, MIMO, Carrier Aggregation                                                                                                                                                     |
| Operating temperature                                   | –40 °C to +55 °C                                                                                                                                                                                            |
| Total Power based on IBW                                | 2 × 80 W                                                                                                                                                                                                    |
| Supported carrier / port                                | LTE: (1-6); WCDMA: (1-6); MRO (6 max)                                                                                                                                                                       |
| Optional Fan Tray                                       | NTB: 101 879/1 (BVK 106 208/1, SKX 125 3359/1)                                                                                                                                                              |

### 3.3 Product description and theory of operation

#### EUT description of the methods used to exercise the EUT and all relevant ports:

| Description/theory of operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>The Radio 2212 B66A (KRC 161 630/1/1, KRC 161 630/3) is a multi-standard remote radio forming part of the Ericsson RBS (Radio Base Station) equipment. The Radio 2212 provides radio access for mobile and fixed devices and is designed for the outdoor environment. Radio unit installation is designed for pole, wall or mast mount options intended for co-location near the antenna. A fiber optic interface provides the RRU/RBS control and digital interface between the Radio and the RBS. The Radio 2212 product is convection cooled and shall be mounted vertically.</p> <p>The KRC 161 630/3 is physically and electrically identical to KRC 161 630/1. The KRC 161 630/3 product is subject to additional product integrity testing qualified against NEBS.</p> <p>Horizontal mounting is supported with forced air cooling with an optional fan tray assembly NTB 101 879/1 consisting of BKV 106 208/1 (Fan Assembly) and SXK 125 3359/1 (Cover Assembly).</p> <p>Output RF Power is rated at 2 × 80 W.</p> <p>Altitude during operation: Below 3000 m</p>                                                                                                                                                                    |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------|------------------------|---------------------------------|-----------------------|-----------------|----------|---------------------|---------|---------------------------------------------|----------------|--------------------------|----------------|--------------------------|----------|---------------------|-----|------------------------|-----|-----------------|-----|-----------------|-----|-----|-----------------|-----------------|---------------|-----|---------------|-----|----|--------------------|-----|--------------------|-----|---------------|-----|---------------|-----|-------|-------------------|-----|-------------------|-----|-----------------------|----------------|-------|----------------|-------|-----------|------------------|-----|------------------|-----|--|--|--|--|
| Ant Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <table><tr><th>Port</th><th>Description</th></tr><tr><td>ANT A</td><td>RF Out A</td></tr><tr><td>ANT B</td><td>RF Out B</td></tr><tr><td>RET</td><td>Antenna Line Device</td></tr><tr><td>Alarm</td><td>Alarm and DC for Optional Fan Tray</td></tr><tr><td>Data 1</td><td>Optical Interface Data 1</td></tr><tr><td>Data 2</td><td>Optical Interface Data 2</td></tr><tr><td>DC Input</td><td>−48 V<sub>DC</sub></td></tr><tr><td>MMI</td><td>Display - Radio Status</td></tr><tr><td>GND</td><td>Ground</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Port                   | Description                                                       | ANT A                  | RF Out A                        | ANT B                 | RF Out B        | RET      | Antenna Line Device | Alarm   | Alarm and DC for Optional Fan Tray          | Data 1         | Optical Interface Data 1 | Data 2         | Optical Interface Data 2 | DC Input | −48 V <sub>DC</sub> | MMI | Display - Radio Status | GND | Ground          |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Port                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ANT A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RF Out A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ANT B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RF Out B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| RET                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Antenna Line Device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Alarm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Alarm and DC for Optional Fan Tray                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Data 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Optical Interface Data 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Data 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Optical Interface Data 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| DC Input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | −48 V <sub>DC</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| MMI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Display - Radio Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| GND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ground                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Physical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <table><tr><td>Dimensions</td><td>420 × 342 × 149 mm (H × W × D) [420 × 342 × 160 mm with fan unit]</td></tr><tr><td>Weight</td><td>17.0 kg [18.5 kg with fan unit]</td></tr><tr><td>Operating Temperature</td><td>−40 to +55 °C</td></tr><tr><td>Mounting</td><td>Pole, Wall Mount</td></tr><tr><td>Cooling</td><td>Convection (optional fan tray - forced air)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Dimensions             | 420 × 342 × 149 mm (H × W × D) [420 × 342 × 160 mm with fan unit] | Weight                 | 17.0 kg [18.5 kg with fan unit] | Operating Temperature | −40 to +55 °C   | Mounting | Pole, Wall Mount    | Cooling | Convection (optional fan tray - forced air) |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Dimensions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 420 × 342 × 149 mm (H × W × D) [420 × 342 × 160 mm with fan unit]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Weight                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 17.0 kg [18.5 kg with fan unit]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Operating Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | −40 to +55 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Mounting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Pole, Wall Mount                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Cooling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Convection (optional fan tray - forced air)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Software details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CXP9017316/7-R68LU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Radio 2212 B66A (R2B)<br>Hardware Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <table><tr><th>Product: KRC 161 630/1</th><th>Revision</th><th>Product: KRC 161 630/3</th><th>Revision</th><th>Description</th></tr><tr><td>ROA 128 6281/03</td><td>R1C</td><td>ROA 128 6281/03</td><td>R1C</td><td>DRX</td></tr><tr><td>ROA 128 6021/2</td><td>R1B</td><td>ROA 128 6021/2</td><td>R1B</td><td rowspan="2">PSB</td></tr><tr><td>Alt: ROA 128 6021/1</td><td>R1C</td><td>Alt: ROA 128 6021/1</td><td>R1C</td></tr><tr><td>ROA 128 6290/66</td><td rowspan="2">R1B</td><td>ROA 128 6290/66</td><td rowspan="2">R1B</td><td rowspan="2">TPA</td></tr><tr><td>ROA 128 6290/01</td><td>ROA 128 6290/01</td></tr><tr><td>KRF 901 271/1</td><td>R1B</td><td>KRF 901 271/1</td><td>R1B</td><td rowspan="2">FU</td></tr><tr><td>Alt: KRF 901 271/2</td><td>R1B</td><td>Alt: KRF 901 271/2</td><td>R1B</td></tr><tr><td>NTB 101 495/1</td><td>R1E</td><td>NTB 101 495/1</td><td>R1E</td><td>Parts</td></tr><tr><td>...SDD 513 0968/3</td><td>R1C</td><td>...SDD 513 0968/3</td><td>R1C</td><td>FLT Cover (Enclosure)</td></tr><tr><td>SXK 125 2692/2</td><td>R1C/A</td><td>SXK 125 2692/2</td><td>R1C/A</td><td rowspan="2">Enclosure</td></tr><tr><td>...SEB 104 331/3</td><td>R1C</td><td>...SEB 104 331/3</td><td>R1C</td></tr></table> | Product: KRC 161 630/1 | Revision                                                          | Product: KRC 161 630/3 | Revision                        | Description           | ROA 128 6281/03 | R1C      | ROA 128 6281/03     | R1C     | DRX                                         | ROA 128 6021/2 | R1B                      | ROA 128 6021/2 | R1B                      | PSB      | Alt: ROA 128 6021/1 | R1C | Alt: ROA 128 6021/1    | R1C | ROA 128 6290/66 | R1B | ROA 128 6290/66 | R1B | TPA | ROA 128 6290/01 | ROA 128 6290/01 | KRF 901 271/1 | R1B | KRF 901 271/1 | R1B | FU | Alt: KRF 901 271/2 | R1B | Alt: KRF 901 271/2 | R1B | NTB 101 495/1 | R1E | NTB 101 495/1 | R1E | Parts | ...SDD 513 0968/3 | R1C | ...SDD 513 0968/3 | R1C | FLT Cover (Enclosure) | SXK 125 2692/2 | R1C/A | SXK 125 2692/2 | R1C/A | Enclosure | ...SEB 104 331/3 | R1C | ...SEB 104 331/3 | R1C |  |  |  |  |
| Product: KRC 161 630/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Revision                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Product: KRC 161 630/3 | Revision                                                          | Description            |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ROA 128 6281/03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | R1C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ROA 128 6281/03        | R1C                                                               | DRX                    |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ROA 128 6021/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | R1B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ROA 128 6021/2         | R1B                                                               | PSB                    |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Alt: ROA 128 6021/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | R1C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Alt: ROA 128 6021/1    | R1C                                                               |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ROA 128 6290/66                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | R1B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ROA 128 6290/66        | R1B                                                               | TPA                    |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ROA 128 6290/01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ROA 128 6290/01        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| KRF 901 271/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | R1B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | KRF 901 271/1          | R1B                                                               | FU                     |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Alt: KRF 901 271/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | R1B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Alt: KRF 901 271/2     | R1B                                                               |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| NTB 101 495/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | R1E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | NTB 101 495/1          | R1E                                                               | Parts                  |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ...SDD 513 0968/3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | R1C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ...SDD 513 0968/3      | R1C                                                               | FLT Cover (Enclosure)  |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| SXK 125 2692/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | R1C/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SXK 125 2692/2         | R1C/A                                                             | Enclosure              |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| ...SEB 104 331/3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | R1C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ...SEB 104 331/3       | R1C                                                               |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| Product Identification Label<br>KRC 161 630/1<br>KRC 161 630/3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div><div><p>(1P)KRC 161 630/3<br/>(S)B440861742</p></div><div><p>(21P)R2B<br/>20171103</p><p>Radio 2212 B66A<br/>Made in Estonia</p></div></div> <div><div><p>(1P)KRC 161 630/3<br/>(S)B440819708</p></div><div><p>(21P)R2B<br/>20171208</p><p>Radio 2212 B66A<br/>Made in Estonia</p></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |
| <div><div><p>ETL LISTED<br/>INFORMATION<br/>TECHNOLOGY<br/>EQUIPMENT<br/>Intertek<br/>Control number 113613</p></div><div><p>FCC ID: TA8BKRC161630<br/>IC: 287AB-BS161630<br/>BS161630</p><p>IP65 / Type 3 Enclosure</p><p>Ericsson AB, 164 80 Stockholm, Sweden<br/><a href="http://tracv.ericsson.net/contact/">http://tracv.ericsson.net/contact/</a></p></div><div><p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device accepts any interference received, including interference that may cause undesired operation. CAN ICES-3 (B)/NMB-3 (B).</p></div></div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                   |                        |                                 |                       |                 |          |                     |         |                                             |                |                          |                |                          |          |                     |     |                        |     |                 |     |                 |     |     |                 |                 |               |     |               |     |    |                    |     |                    |     |               |     |               |     |       |                   |     |                   |     |                       |                |       |                |       |           |                  |     |                  |     |  |  |  |  |

### 3.4 EUT test details

EUT setup/configuration rationale:

|           |     |            |                         |                            |                            |
|-----------|-----|------------|-------------------------|----------------------------|----------------------------|
| Down link | RAT | Modulation | Performance Requirement | Test Model / Configuration |                            |
|           | LTE | QPSK       | N/A                     | E-TM1.1                    |                            |
| Up link   | RAT | Modulation | Performance Requirement | Input Signal               | Test Model / Configuration |
|           | LTE | QPSK       | N/A                     |                            | E-UTRA-UL                  |

Carrier Configurations:

#### Single carrier

| Bandwidth, MHz | LTE Transmit / DL, MHz |        |        |        |        |        |
|----------------|------------------------|--------|--------|--------|--------|--------|
|                | B                      | EARFCN | M      | EARFCN | T      | EARFCN |
| 5              | 2112.5                 | 66461  | 2145.0 | 66786  | 2177.5 | 67111  |
| 10             | 2115.0                 | 66486  | 2145.0 | 66786  | 2175.0 | 67086  |
| 15             | 2117.5                 | 66511  | 2145.0 | 66786  | 2172.5 | 67061  |
| 20             | 2120.0                 | 66536  | 2145.0 | 66786  | 2170.0 | 67036  |

| Bandwidth, MHz | LTE Receive / UL, MHz |        |        |        |        |        |
|----------------|-----------------------|--------|--------|--------|--------|--------|
|                | B                     | EARFCN | M      | EARFCN | T      | EARFCN |
| 5              | 1712.5                | 131997 | 1745.0 | 132322 | 1777.5 | 132647 |
| 10             | 1715.0                | 132022 | 1745.0 | 132322 | 1775.0 | 132622 |
| 15             | 1717.5                | 132047 | 1745.0 | 132322 | 1772.5 | 132597 |
| 20             | 1720.0                | 132072 | 1745.0 | 132322 | 1770.0 | 132572 |

| Bandwidth, MHz | WCDMA Transmit / DL, MHz |        |        |        |        |        |
|----------------|--------------------------|--------|--------|--------|--------|--------|
|                | B                        | UARFCN | M      | UARFCN | T      | UARFCN |
| 5              | 2112.4                   | 1537   | 2132.6 | 1638   | 2152.6 | 1738   |

| Bandwidth, MHz | WCDMA Receive / UL, MHz |        |        |        |        |        |
|----------------|-------------------------|--------|--------|--------|--------|--------|
|                | B                       | UARFCN | M      | UARFCN | T      | UARFCN |
| 5              | 1712.4                  | 1312   | 1732.6 | 1413   | 1752.6 | 1513   |

LTE Multiple-Carriers for spurious emissions

IBW: 50 MHz

| Bandwidth, MHz | Transmit / DL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|----------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                | B1                 | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5              | 2112.5             | 66461  | 2157.5 | 66911  | 2122.5 | 66561  | 2167.5 | 67011  | 2132.5 | 66661  | 2177.5 | 67111  |
| 10             | 2115.0             | 66486  | 2155.0 | 66886  | 2125.0 | 66586  | 2165.0 | 66986  | 2135.0 | 66686  | 2175.0 | 67086  |
| 15             | 2117.5             | 66511  | 2152.5 | 66861  | 2127.5 | 66611  | 2162.5 | 66961  | 2137.5 | 66711  | 2172.5 | 67061  |
| 20             | 2120.0             | 66536  | 2150.0 | 66836  | 2130.0 | 66636  | 2160.0 | 66936  | 2140.0 | 66736  | 2170.0 | 67036  |

| Bandwidth, MHz | Receive / UL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|----------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                | B1                | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5              | 1712.5            | 131997 | 1757.5 | 132447 | 1722.5 | 132097 | 1767.5 | 132547 | 1732.5 | 132197 | 1777.5 | 132647 |
| 10             | 1715.0            | 132022 | 1755.0 | 132422 | 1725.0 | 132122 | 1765.0 | 132522 | 1735.0 | 132222 | 1775.0 | 132622 |
| 15             | 1717.5            | 132047 | 1752.5 | 132397 | 1727.5 | 132147 | 1762.5 | 132497 | 1737.5 | 132247 | 1772.5 | 132597 |
| 20             | 1720.0            | 132072 | 1750.0 | 132372 | 1730.0 | 132172 | 1760.0 | 132472 | 1740.0 | 132272 | 1770.0 | 132572 |

## LTE Multiple-Carriers for spurious emissions

IBW: 60 MHz

| Bandwidth,<br>MHz | Transmit / DL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                 | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5                 | 2112.5             | 66461  | 2167.5 | 67011  | 2117.5 | 66511  | 2172.5 | 67061  | 2122.5 | 66561  | 2177.5 | 67111  |
| 10                | 2115.0             | 66486  | 2165.0 | 66986  | 2120.0 | 66536  | 2170.0 | 67036  | 2125.0 | 66586  | 2175.0 | 67086  |
| 15                | 2117.5             | 66511  | 2162.5 | 66961  | 2122.5 | 66561  | 2167.5 | 67011  | 2127.5 | 66611  | 2172.5 | 67061  |
| 20                | 2120.0             | 66536  | 2160.0 | 66936  | 2125.0 | 66586  | 2165.0 | 66986  | 2130.0 | 66636  | 2170.0 | 67036  |

| Bandwidth,<br>MHz | Receive / UL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5                 | 1712.5            | 131997 | 1767.5 | 132547 | 1717.5 | 132047 | 1772.5 | 132597 | 1722.5 | 132097 | 1777.5 | 132647 |
| 10                | 1715.0            | 132022 | 1765.0 | 132522 | 1720.0 | 132072 | 1770.0 | 132572 | 1725.0 | 132122 | 1775.0 | 132622 |
| 15                | 1717.5            | 132047 | 1762.5 | 132497 | 1722.5 | 132097 | 1767.5 | 132547 | 1727.5 | 132147 | 1772.5 | 132597 |
| 20                | 1720.0            | 132072 | 1760.0 | 132472 | 1725.0 | 132122 | 1765.0 | 132522 | 1730.0 | 132172 | 1770.0 | 132572 |

## LTE Multiple-Carriers for spurious emissions

IBW: 70 MHz

| Bandwidth,<br>MHz | Transmit / DL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                 | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5                 | 2112.5             | 66461  | 2177.5 | 67111  | 2112.5 | 66461  | 2177.5 | 67111  | 2112.5 | 66461  | 2177.5 | 67111  |
| 10                | 2115.0             | 66486  | 2175.0 | 67086  | 2115.0 | 66486  | 2175.0 | 67086  | 2115.0 | 66486  | 2175.0 | 67086  |
| 15                | 2117.5             | 66511  | 2172.5 | 67061  | 2117.5 | 66511  | 2172.5 | 67061  | 2117.5 | 66511  | 2172.5 | 67061  |
| 20                | 2120.0             | 66536  | 2170.0 | 67036  | 2120.0 | 66536  | 2170.0 | 67036  | 2120.0 | 66536  | 2170.0 | 67036  |

| Bandwidth,<br>MHz | Receive / UL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                | EARFCN | B2     | EARFCN | M1     | EARFCN | M2     | EARFCN | T1     | EARFCN | T2     | EARFCN |
| 5                 | 1712.5            | 131997 | 1777.5 | 132647 | 1712.5 | 131997 | 1777.5 | 132647 | 1712.5 | 131997 | 1777.5 | 132647 |
| 10                | 1715.0            | 132022 | 1775.0 | 132622 | 1715.0 | 132022 | 1775.0 | 132622 | 1715.0 | 132022 | 1775.0 | 132622 |
| 15                | 1717.5            | 132047 | 1772.5 | 132597 | 1717.5 | 132047 | 1772.5 | 132597 | 1717.5 | 132047 | 1772.5 | 132597 |
| 20                | 1720.0            | 132072 | 1770.0 | 132572 | 1720.0 | 132072 | 1770.0 | 132572 | 1720.0 | 132072 | 1770.0 | 132572 |

## WCDMA Multiple-Carriers for spurious emissions

IBW: 45 MHz

| Bandwidth,<br>MHz | Transmit / DL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                 | UARFCN | B2     | UARFCN | M1     | UARFCN | M2     | UARFCN | T1     | UARFCN | T2     | UARFCN |
| 5                 | 2112.4             | 1537   | 2117.4 | 1562   | 2122.4 | 1587   | 2142.6 | 1688   | 2147.6 | 1713   | 2152.6 | 1738   |

| Bandwidth,<br>MHz | Receive / UL, MHz |        |        |        |        |        |        |        |        |        |        |        |
|-------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | B1                | UARFCN | B2     | UARFCN | M1     | UARFCN | M2     | UARFCN | T1     | UARFCN | T2     | UARFCN |
| 5                 | 1712.4            | 1312   | 1717.4 | 1337   | 1722.4 | 1362   | 1742.6 | 1463   | 1747.6 | 1488   | 1752.6 | 1513   |

## EUT Monitoring Method / Equipment:

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Support equipment | <b>Node EMC Test System</b> <ul style="list-style-type: none"> <li>- Anritsu MS 2691 VSA/Sig Gen</li> <li>- HP Laptop</li> <li>- Timing and Synchronization box (GPS)</li> <li>- Ethernet Switch</li> <li>- Isolation Transformer</li> </ul> <b>RBS 6601, BFM 901 009/1:</b> <ul style="list-style-type: none"> <li>- DUS 4101 KDU 137 624/ 11, R4G, S/N: T48X68357</li> <li>- DUS SW: CXP102051/27-R18A179</li> <li>- Input Voltage: -48 V<sub>DC</sub></li> </ul> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

3.5 EUT setup diagram

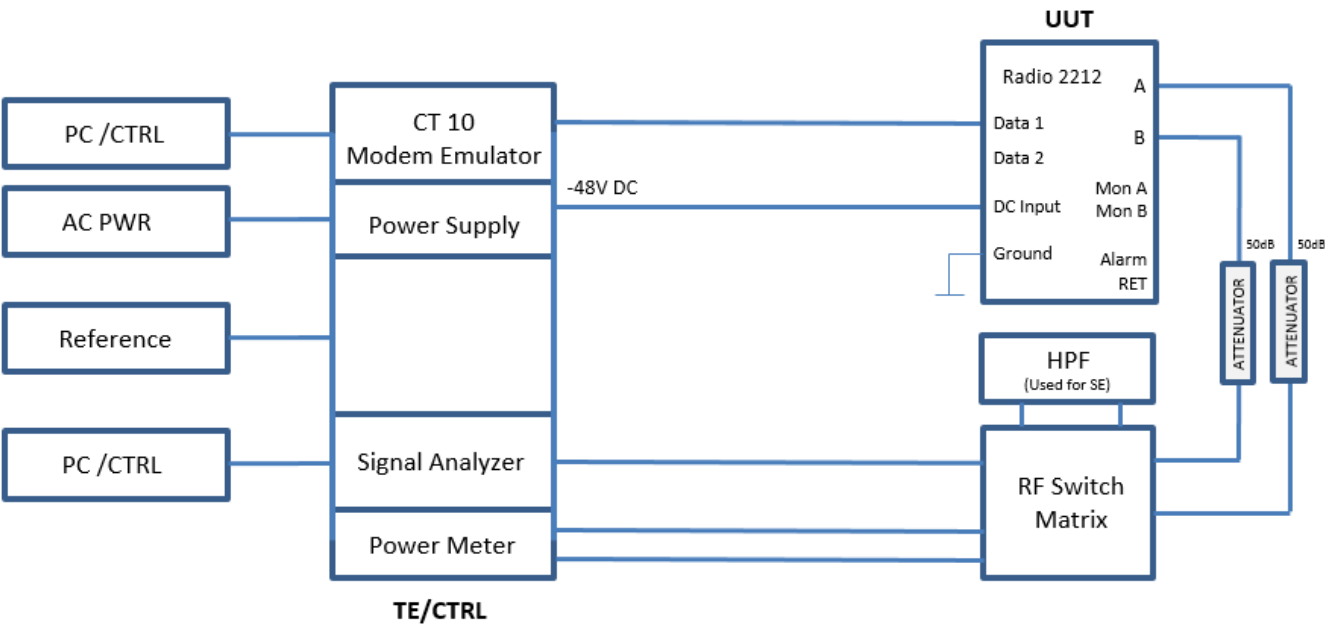
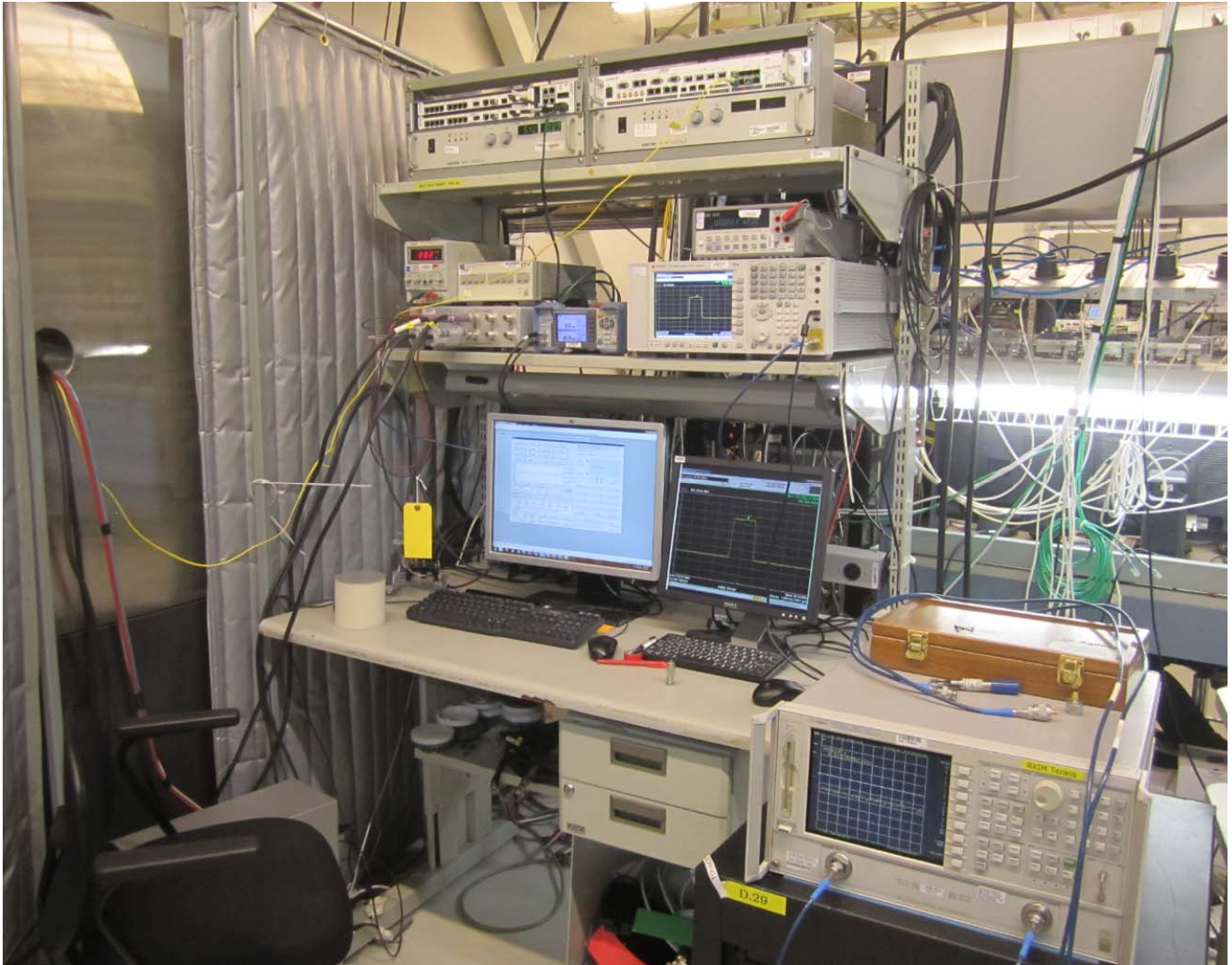


Figure 3.5-1: Setup diagram – Radio Compliance

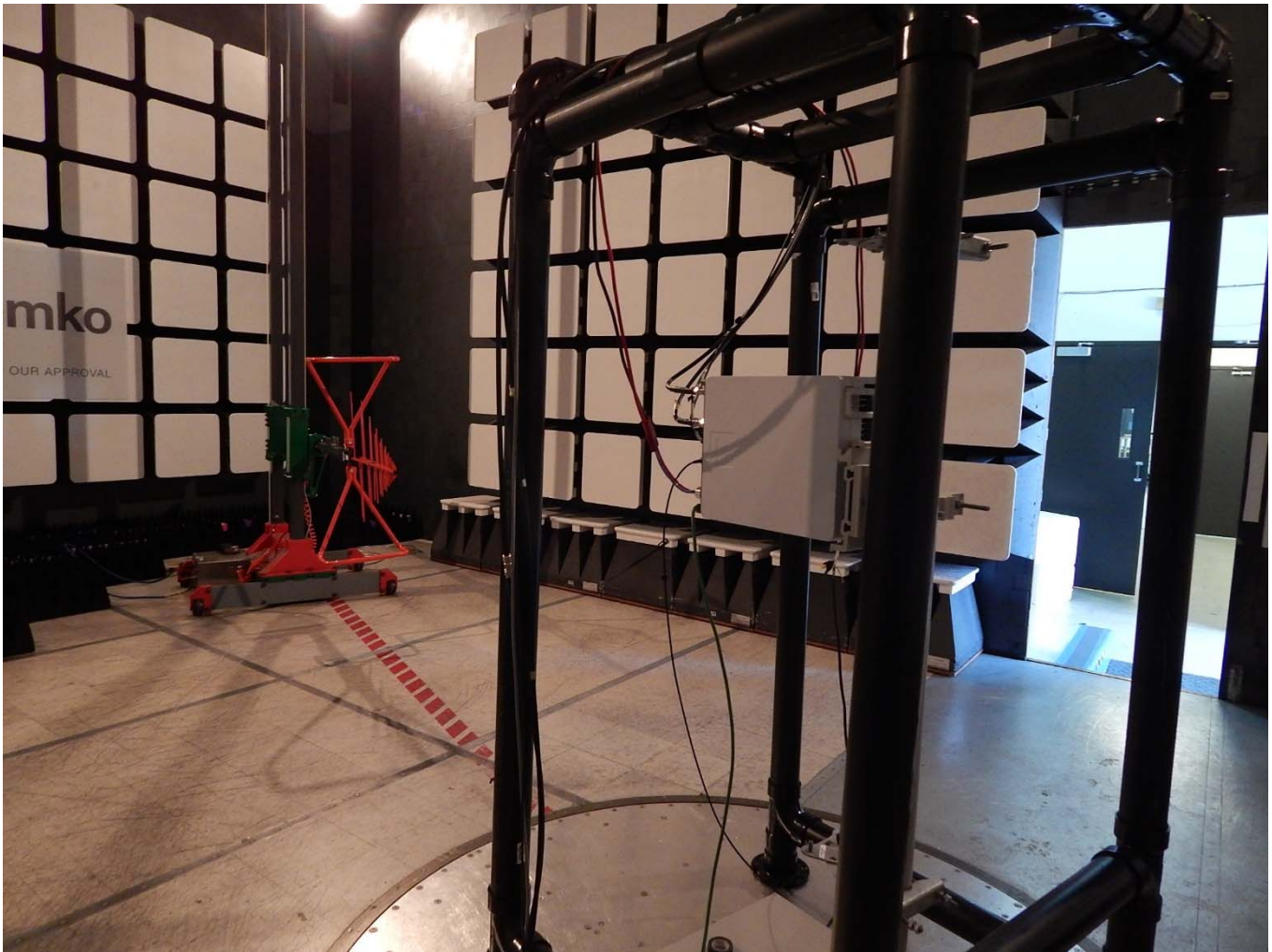
### 3.6 Setup photographs



**Figure 3.6-1:** Test / Measurement Equipment - Set up for Radio Compliance Testing



**Figure 3.6-2:** EUT Set-up for Radio Compliance Testing



**Figure 3.6-3:** EUT Set-up for Radiated Compliance Testing

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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The KRC 161 630/3 is physically and electrically identical to KRC 161 630/1. The KRC 161 630/3 product is subject to additional product integrity testing qualified against NEBS.

### 4.3 Deviations from laboratory tests procedures

---

No deviations were made from laboratory procedures.

## Section 5. Test conditions

---

### 5.1 Atmospheric conditions

---

|                   |               |
|-------------------|---------------|
| Temperature       | 15–30 °C      |
| Relative humidity | 20–75 %       |
| Air pressure      | 860–1060 mbar |

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

---

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of  $K = 2$  with 95% certainty.

| Test name                         | Measurement uncertainty, dB |
|-----------------------------------|-----------------------------|
| All antenna port measurements     | 0.55                        |
| Conducted spurious emissions      | 1.13                        |
| Radiated spurious emissions       | 3.78                        |
| AC power line conducted emissions | 3.55                        |

## Section 7. Test equipment

### 7.1 Test equipment list

*Table 7.1-1: Equipment list*

| Equipment                           | Manufacturer       | Model no.           | Asset no.              | Cal cycle | Next cal.  |
|-------------------------------------|--------------------|---------------------|------------------------|-----------|------------|
| DMM                                 | Digital Multimeter | 34401A              | US36048294             | 1 year    | NCR        |
| Spectrum Analyser                   | Keysight           | PXA N9030A          | MY55410202             | 1 year    | 31 May-18  |
| Network Analyser                    | Agilent            | 8722ES              | US39175389             | 1 year    | 31-May-18  |
| Power Meter                         | Rohde & Schwarz    | NRP2                | 1144.1374K02-101123-ea | NCR       | NCR        |
| Power Sensor                        | Rohde & Schwarz    | NRP-Z51             | 1138.0005.02-102838-bR | NCR       | NCR        |
| Power Sensor                        | Rohde & Schwarz    | NRP-Z51             | 1138.0005.02.102476-Fg | NCR       | NCR        |
| PSU (DC)                            | Xantrex            | XKW60-50            | 1001425551             | NCR       | NCR        |
| Attenuator (10dB)                   | Weinschel          | WA-48-10-43-LIM     | A1991                  | NCR       | NCR        |
| Attenuator (10dB)                   | Weinschel          | WA-48-10-43-LIM     | A1994                  | NCR       | NCR        |
| Attenuator (40db)                   | Weinschel          | 73-40-33            | LR715                  | NCR       | NCR        |
| Attenuator                          | MCE/Weinschel      | 57-40-43            | MX198                  | NCR       | NCR        |
| RF Swtich                           | Ericsson           | RARFSW4X1           | 1                      | NCR       | NCR        |
| Switch Driver                       | Hewlett Packard    | 11713A              | 3748A06076             | NCR       | NCR        |
| PSU (DC)                            | Leader             | 730-3D              | 9801135                | NCR       | NCR        |
| CT10                                | Ericsson           | Testing Equipment   | T01F311639             | NCR       | NCR        |
| Thermometer                         | Fluke              | 52 K/J Thermocouple | FA002289               | 1 year    | Sep. 8/18  |
| 3 m EMI test chamber                | TDK                | SAC-3               | FA002047               | 1 year    | Dec. 09/18 |
| Receiver/spectrum analyzer          | Rohde & Schwarz    | ESU 26              | FA002043               | 1 year    | March 1/18 |
| Biconical antenna (30–300 MHz)      | Sunol              | BC2                 | FA002078               | 1 year    | May. 8/18  |
| Log periodic antenna (200–5000 MHz) | Sunol              | LP5                 | FA002077               | 1 year    | May. 8/18  |
| Horn with Preamp (1–18 GHz)         | ETS-Lindgren       | 3117                | FA002840               | 1 year    | Dec. 07/18 |
| 50 Ω coax cable                     | C.C.A.             | None                | FA002555               | 1 year    | May 2/18   |
| 50 Ω coax cable                     | Huber + Suhner     | None                | FA002074               | 1 year    | May 12/18  |
| 50 Ω coax cable                     | Huber + Suhner     | None                | FA002830               | 1 year    | May 12/18  |

Note: NCR - no calibration required

## Section 8. Testing data

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### 8.1 FCC 27.50(d) and RSS-139, 4.1 Maximum output power at RF antenna connector

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#### 8.1.1 Definitions and limits

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##### **§ 27.50(d) Operation within the bands: 2110–2155 MHz and 2155–2180 MHz.**

(1) The power of each fixed or base station transmitting in the 1995–2000 MHz, 2110–2155 MHz, 2155–2180 MHz or 2180–2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:

- (i) An equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;
- (ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(2) The power of each fixed or base station transmitting in the 1995–2000 MHz, the 2110–2155 MHz 2155–2180 MHz band, or 2180–2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

- (i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;
- (ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(3) A licensee operating a base or fixed station in the 2110–2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025–2110 MHz band. A licensee operating a base or fixed station in the 2110–2180 MHz band utilizing power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: All Broadband Radio Service (BRS) licensees authorized under this part in the 2155–2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110–2180 MHz band.

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(6) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

#### RSS-139, Section 4.1

The transmitter power shall be measured in terms of a root-mean-square (RMS) average value.

#### RSS-139, Section 6.5

Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110–2180 MHz.

In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

#### SRSP-513, Section 5.1

##### 5.1.1 Fixed and base stations

5.1.1.1 For fixed and base stations operating within the frequency range 2110–2180 MHz with a channel bandwidth equal to or less than 1 MHz, the maximum permissible equivalent isotropically radiated power (e.i.r.p.) is 1640 watts with an antenna height above average terrain (HAAT) up to 300 metres.

5.1.1.2 For fixed and base stations operating within the frequency range 2110–2180 MHz with a channel bandwidth greater than 1 MHz, the maximum permissible e.i.r.p. is 1640 watts/MHz e.i.r.p. (i.e. no more than 1640 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres.

5.1.1.3 Fixed and base stations located in geographic areas at a distance greater than 26 km from large or medium population centres, and transmitting within the frequency range 2110–2180 MHz, may increase their e.i.r.p. up to a maximum of 3280 watts/MHz (i.e. no more than 3280 watts e.i.r.p. in any 1 MHz band segment), with an antenna HAAT up to 300 metres.

Within 26 km of any large or medium population centre, fixed and base stations may operate at increased e.i.r.p. if more than 50% of the population within a particular sector's coverage is located outside these large and medium population centres.

Fixed and base stations with increased e.i.r.p. must not be used to provide coverage to large and medium population centres. However, some incidental coverage of these large and medium population centres by stations with increased e.i.r.p. is permitted.

This provision also applies for fixed and base stations with a channel bandwidth equal to or less than 1 MHz (i.e. the e.i.r.p. may be increased up to a maximum of 3280 watts).

5.1.1.4 Fixed and base station antenna heights above average terrain may exceed 300 metres with a reduction in e.i.r.p. The maximum permissible e.i.r.p. for installations with antenna HAAT in excess of 300 metres is given in the following table:

**Table 8.1-1: Reduction to Maximum Allowable E.I.R.P. for HAAT > 300 m**

| HAAT (m)           | Maximum EIRP, W/MHz          |
|--------------------|------------------------------|
| HAAT ≤ 300         | 1640 (or 3280 <sup>1</sup> ) |
| 300 < HAAT ≤ 500   | 1070                         |
| 500 < HAAT ≤ 1000  | 490                          |
| 1000 < HAAT ≤ 1500 | 270                          |
| 1500 < HAAT ≤ 2000 | 160                          |

Note: <sup>1</sup>for fixed and base stations with a channel bandwidth equal to or less than 1 MHz

#### 8.1.2 Test summary

|               |                  |
|---------------|------------------|
| Test date     | January 31, 2018 |
| Test engineer | Andrey Adelberg  |

### 8.1.3 Observations, settings and special notes

Based on the RF margins noted in this report, considerations pertaining to the maximum allowed EIRP and antenna type should be considered for each installation.

Output power was measured with RMS power meter.

Test receiver settings for PSD measurements:

|                      |                               |
|----------------------|-------------------------------|
| Detector mode        | RMS                           |
| Resolution bandwidth | 1 MHz                         |
| Video bandwidth      | >RBW                          |
| Measurement mode     | Power over emission bandwidth |
| Trace mode           | Averaging                     |
| Measurement time     | Auto                          |

### 8.1.4 Test data

**Table 8.1-2:** Output power measurement results for SISO single carrier operation

| Remarks                          | Frequency, MHz | RF output power, W | RF output power, dBm | RF power density, dBm/MHz |
|----------------------------------|----------------|--------------------|----------------------|---------------------------|
| QPSK, 5 MHz, Ant A, Low channel  | 2112.4         | 77.804             | 48.91                | 43.83                     |
| 16QAM, 5 MHz, Ant A, Low channel | 2112.4         | 78.886             | 48.97                | 43.91                     |
| 64QAM, 5 MHz, Ant A, Low channel | 2112.4         | 79.250             | 48.99                | 43.84                     |
| QPSK, 5 MHz, Ant A, Mid channel  | 2132.5         | 81.096             | 49.09                | 44.11                     |
| QPSK, 5 MHz, Ant A, High channel | 2152.6         | 81.283             | 49.10                | 44.04                     |
| QPSK, 5 MHz, Ant B, Low channel  | 2112.4         | 78.886             | 48.97                | 43.81                     |
| 16QAM, 5 MHz, Ant B, Low channel | 2112.4         | 80.910             | 49.08                | 43.92                     |
| 64QAM, 5 MHz, Ant B, Low channel | 2112.4         | 81.096             | 49.09                | 43.94                     |
| QPSK, 5 MHz, Ant B, Mid channel  | 2132.5         | 84.723             | 49.28                | 44.13                     |
| QPSK, 5 MHz, Ant B, High channel | 2152.6         | 81.846             | 49.13                | 44.04                     |

**Table 8.1-3:** Output power measurement results for SISO two-carrier operation for IBW 50 MHz

| Remarks                                    | Frequency, MHz    | RF output power, W | RF output power, dBm | RF power density, dBm/MHz |
|--------------------------------------------|-------------------|--------------------|----------------------|---------------------------|
| Two carriers: one at bottom and top, Ant A | 2112.4 and 2152.6 | 80.168             | 49.04                | 41.08                     |
| Two carriers: one at bottom and top, Ant B | 2112.4 and 2152.6 | 80.910             | 49.08                | 41.45                     |

**Table 8.1-4:** Output power measurement results for MIMO single carrier operation

| Remarks                   | Frequency, MHz | RF output power Ant A, dBm | RF output power Ant B, dBm | Total RF output power dBm | PSD Ant A, dBm/MHz | PSD Ant B, dBm/MHz | Total PSD, dBm/MHz |
|---------------------------|----------------|----------------------------|----------------------------|---------------------------|--------------------|--------------------|--------------------|
| QPSK, 5 MHz, Low channel  | 2112.4         | 48.91                      | 48.97                      | 51.95                     | 43.83              | 43.81              | 46.83              |
| 16QAM, 5 MHz, Low channel | 2112.4         | 48.97                      | 49.08                      | 52.04                     | 43.91              | 43.92              | 46.93              |
| 64QAM, 5 MHz, Low channel | 2112.4         | 48.99                      | 49.09                      | 52.05                     | 43.84              | 43.94              | 46.90              |
| QPSK, 5 MHz, Mid channel  | 2132.5         | 49.09                      | 49.28                      | 52.20                     | 44.11              | 44.13              | 47.13              |
| QPSK, 5 MHz, High channel | 2152.6         | 49.10                      | 49.13                      | 52.13                     | 44.04              | 44.04              | 47.05              |

**Table 8.1-5:** Output power measurement results for MIMO two-carrier operation

| Remarks                   | Frequency, MHz    | RF output power Ant A, dBm | RF output power Ant B, dBm | Total RF output power dBm | PSD Ant A, dBm/MHz | PSD Ant B, dBm/MHz | Total PSD, dBm/MHz |
|---------------------------|-------------------|----------------------------|----------------------------|---------------------------|--------------------|--------------------|--------------------|
| QPSK, 5 MHz, High channel | 2112.4 and 2152.6 | 49.04                      | 49.08                      | 52.07                     | 41.08              | 41.45              | 44.28              |

**Table 8.1-6:** Output power measurement results for SISO multi-RAT operation

| Remarks                                             | RF output power, W | RF output power, dBm | RF power density, dBm/MHz |
|-----------------------------------------------------|--------------------|----------------------|---------------------------|
| WCDMA low channel + LTE 5 MHz (IBW = 60), Ant A     | 79.799             | 49.02                | 40.78                     |
| WCDMA low channel + LTE 10 MHz (IBW = 60), Ant A    | 80.168             | 49.04                | 40.70                     |
| WCDMA low channel + LTE 15 MHz (IBW = 60), Ant A    | 80.910             | 49.08                | 40.82                     |
| WCDMA low channel + LTE 20 MHz (IBW = 60), Ant A    | 81.470             | 49.11                | 40.81                     |
| WCDMA high channel + LTE 5 MHz high channel, Ant A  | 81.846             | 49.13                | 41.01                     |
| WCDMA high channel + LTE 10 MHz high channel, Ant A | 81.846             | 49.13                | 41.29                     |
| WCDMA high channel + LTE 15 MHz high channel, Ant A | 82.414             | 49.16                | 41.19                     |
| WCDMA high channel + LTE 20 MHz high channel, Ant A | 82.794             | 49.18                | 41.13                     |
| WCDMA low channel + LTE 5 MHz (IBW = 60), Ant B     | 81.470             | 49.11                | 40.75                     |
| WCDMA low channel + LTE 10 MHz (IBW = 60), Ant B    | 81.846             | 49.13                | 40.99                     |
| WCDMA low channel + LTE 15 MHz (IBW = 60), Ant B    | 82.224             | 49.15                | 40.88                     |
| WCDMA low channel + LTE 20 MHz (IBW = 60), Ant B    | 82.414             | 49.16                | 40.81                     |
| WCDMA high channel + LTE 5 MHz high channel, Ant B  | 82.224             | 49.15                | 41.21                     |
| WCDMA high channel + LTE 10 MHz high channel, Ant B | 83.368             | 49.21                | 41.39                     |
| WCDMA high channel + LTE 15 MHz high channel, Ant B | 82.985             | 49.19                | 41.06                     |
| WCDMA high channel + LTE 20 MHz high channel, Ant B | 83.946             | 49.24                | 41.38                     |

**Table 8.1-7:** Output power measurement results for MIMO multi-RAT operation

| Remarks                                      | RF output power Ant A, dBm | RF output power Ant B, dBm | Total RF output power, dBm | PSD Ant A, dBm/MHz | PSD Ant B, dBm/MHz | Total PSD, dBm/MHz |
|----------------------------------------------|----------------------------|----------------------------|----------------------------|--------------------|--------------------|--------------------|
| WCDMA low channel + LTE 5 MHz (IBW = 60)     | 49.02                      | 49.11                      | 52.08                      | 40.78              | 40.75              | 43.78              |
| WCDMA low channel + LTE 10 MHz (IBW = 60)    | 49.04                      | 49.13                      | 52.10                      | 40.7               | 40.99              | 43.86              |
| WCDMA low channel + LTE 15 MHz (IBW = 60)    | 49.08                      | 49.15                      | 52.13                      | 40.82              | 40.88              | 43.86              |
| WCDMA low channel + LTE 20 MHz (IBW = 60)    | 49.11                      | 49.16                      | 52.15                      | 40.81              | 40.81              | 43.82              |
| WCDMA high channel + LTE 5 MHz high channel  | 49.13                      | 49.15                      | 52.15                      | 41.01              | 41.21              | 44.12              |
| WCDMA high channel + LTE 10 MHz high channel | 49.13                      | 49.21                      | 52.18                      | 41.29              | 41.39              | 44.35              |
| WCDMA high channel + LTE 15 MHz high channel | 49.16                      | 49.19                      | 52.19                      | 41.19              | 41.06              | 44.14              |
| WCDMA high channel + LTE 20 MHz high channel | 49.18                      | 49.24                      | 52.22                      | 41.13              | 41.38              | 44.27              |

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| Section 8     | Testing data                                                               |
| Test name     | FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector |
| Specification | FCC Part 27 and RSS-139, Issue 3                                           |

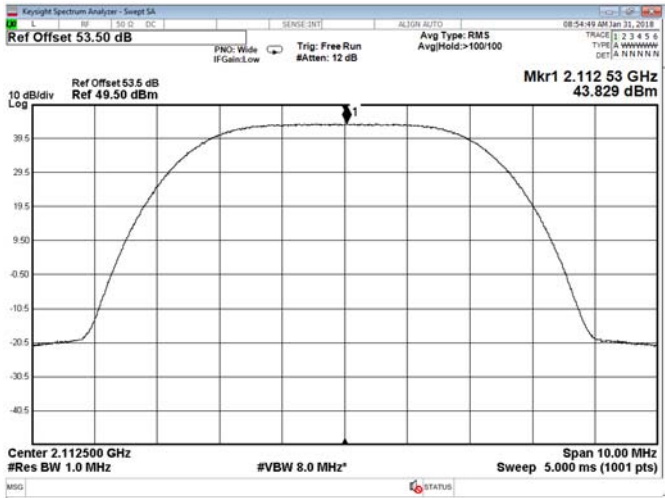


Figure 8.1-1: PSD at low channel, QPSK, Ant A

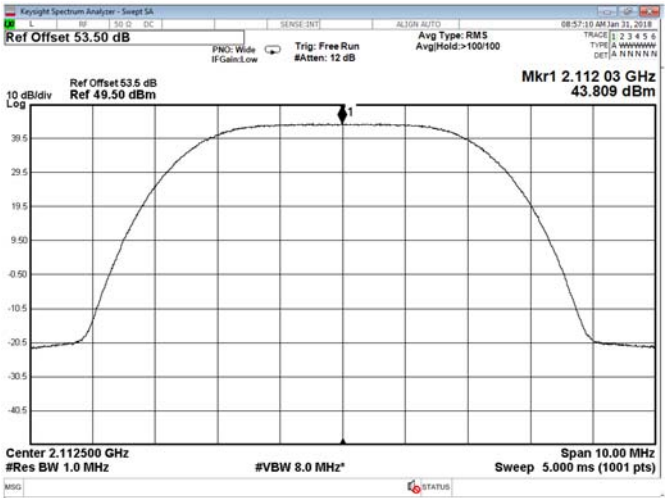


Figure 8.1-2: PSD at low channel, QPSK, Ant B

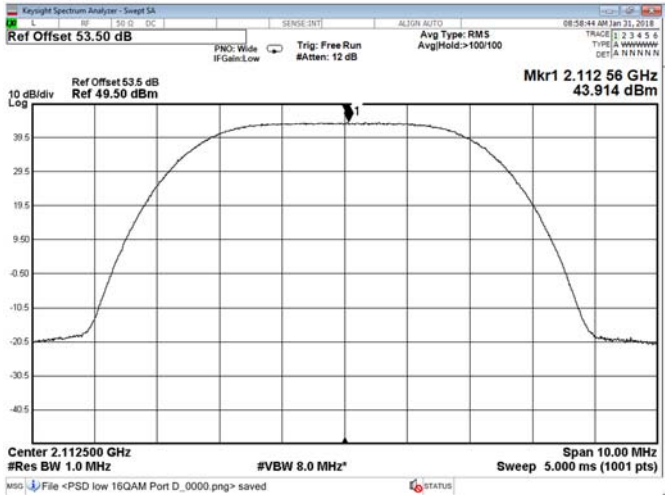


Figure 8.1-3: PSD at low channel, 16QAM, Ant A

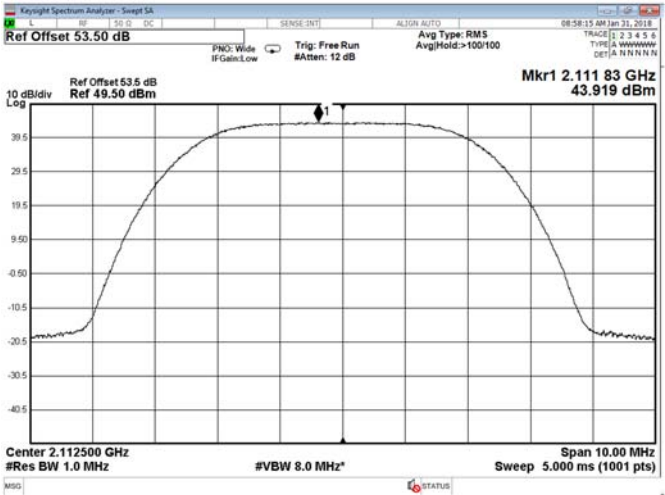


Figure 8.1-4: PSD at low channel, 16QAM, Ant B

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| Section 8     | Testing data                                                               |
| Test name     | FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector |
| Specification | FCC Part 27 and RSS-139, Issue 3                                           |

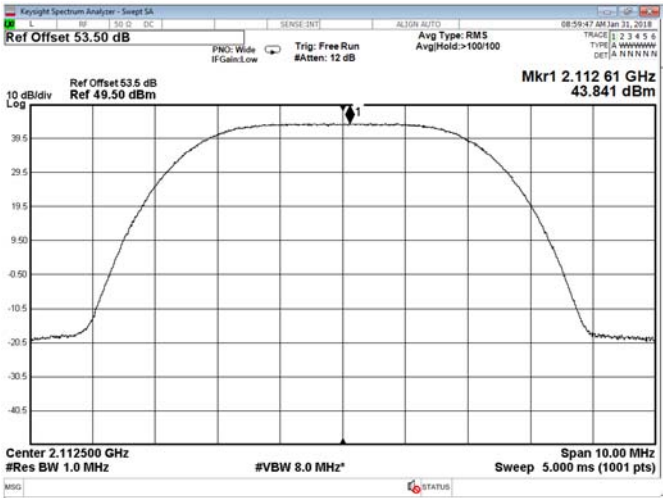


Figure 8.1-5: PSD at low channel, 64QAM, Ant A

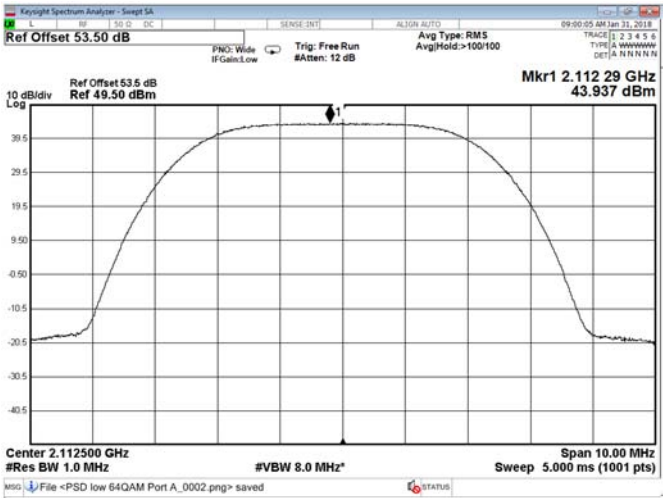


Figure 8.1-6: PSD at low channel, 64QAM, Ant B

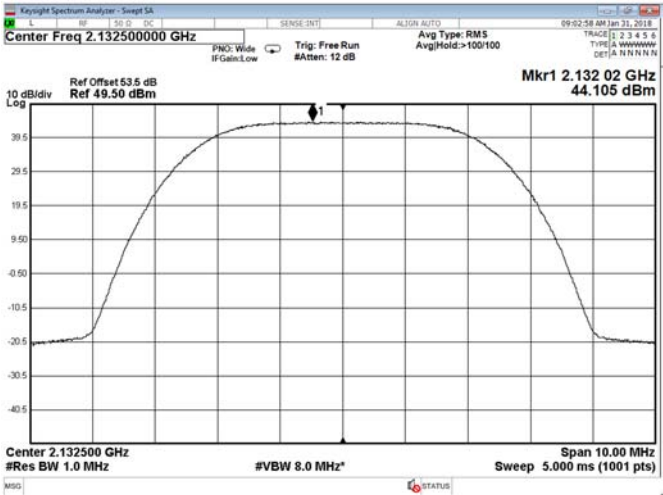


Figure 8.1-7: PSD at mid channel, QPSK, Ant A

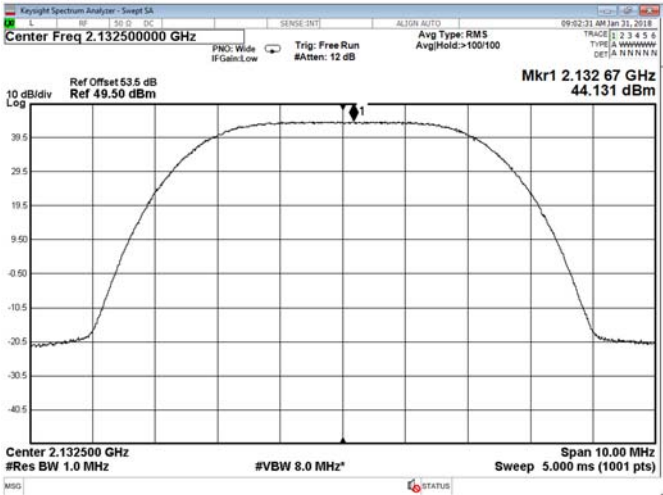


Figure 8.1-8: PSD at mid channel, QPSK, Ant B

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

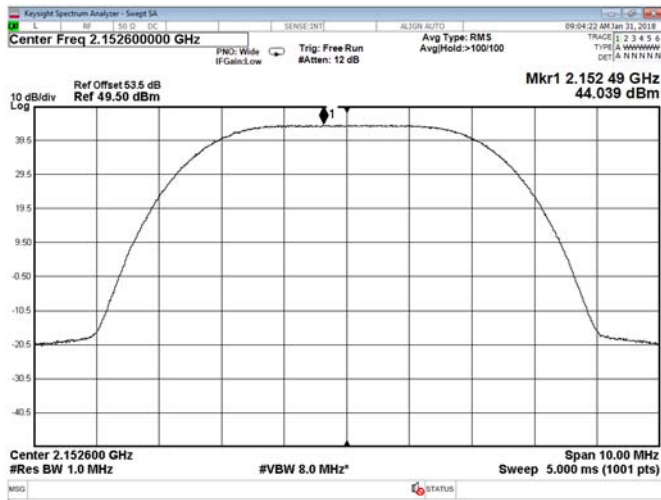


Figure 8.1-9: PSD at high channel, QPSK, Ant A

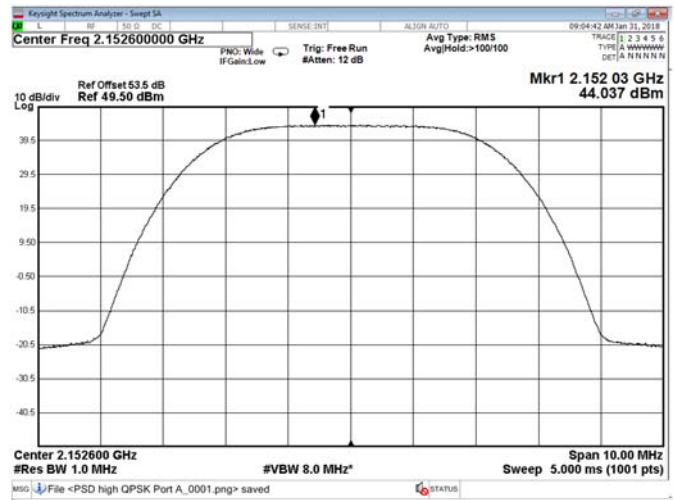


Figure 8.1-10: PSD at high channel, QPSK, Ant B

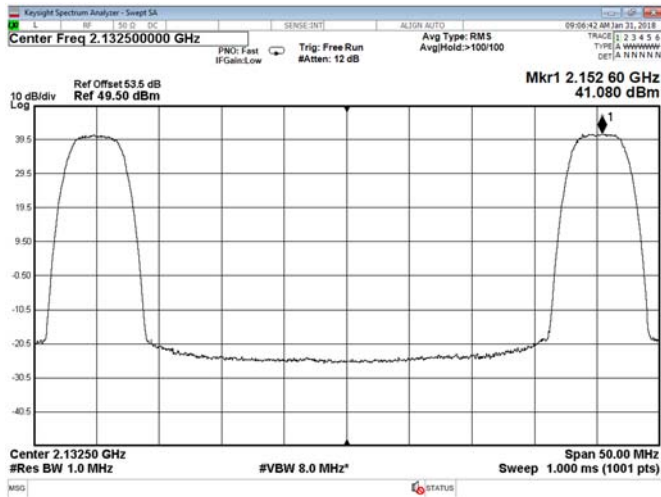


Figure 8.1-11: PSD 2-carrier operation, QPSK, Ant A

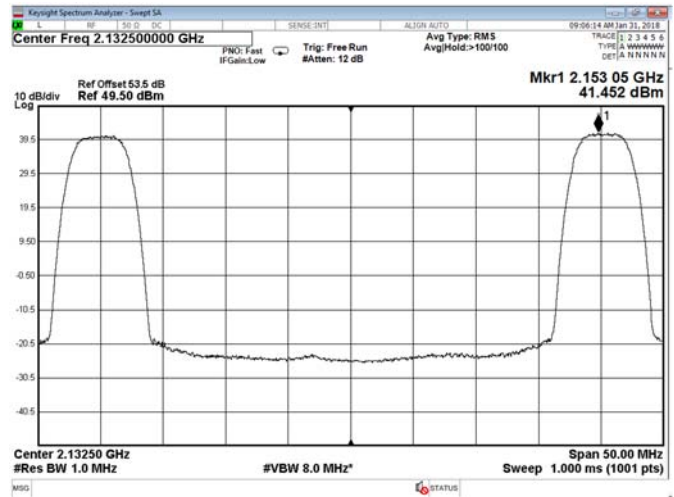
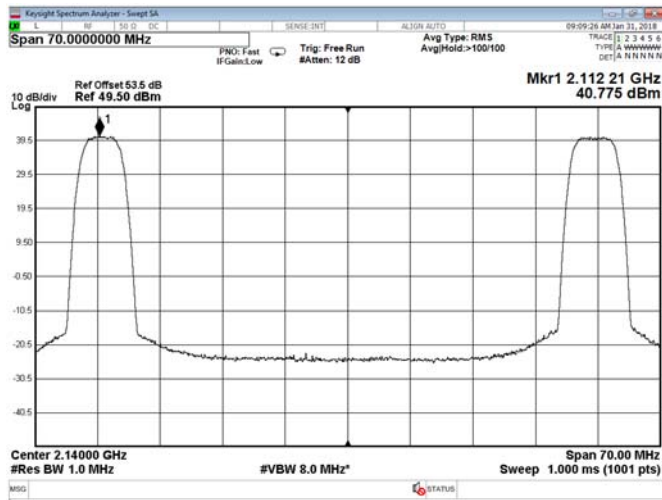


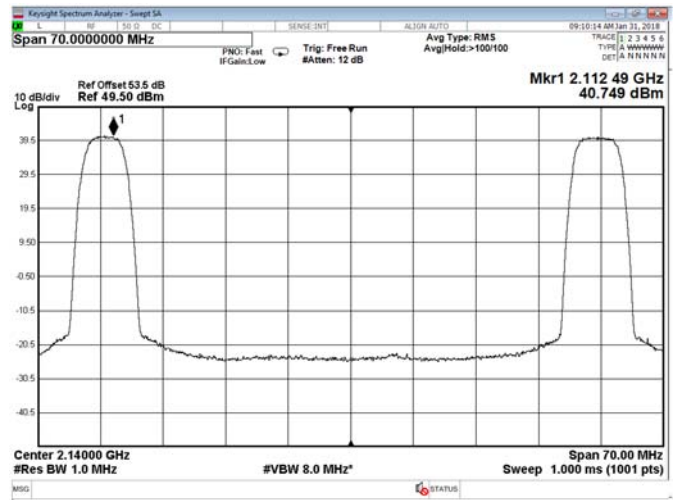
Figure 8.1-12: PSD 2-carrier operation, QPSK, Ant B

**Section 8**  
**Test name**  
**Specification**

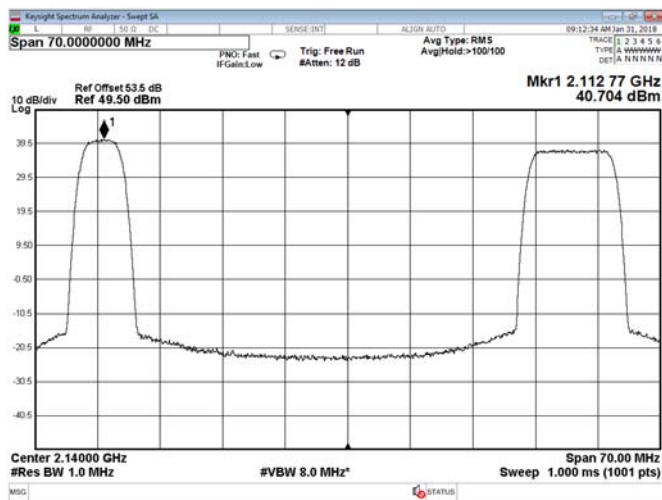
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 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3



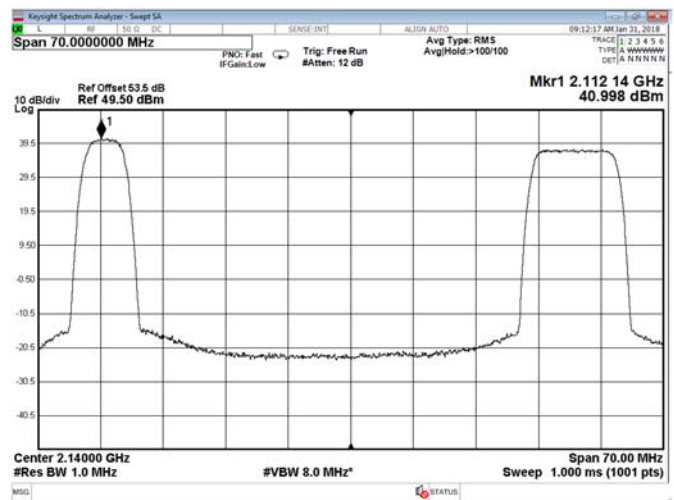
**Figure 8.1-13:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 5 MHz, Ant A



**Figure 8.1-14:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 5 MHz, Ant B



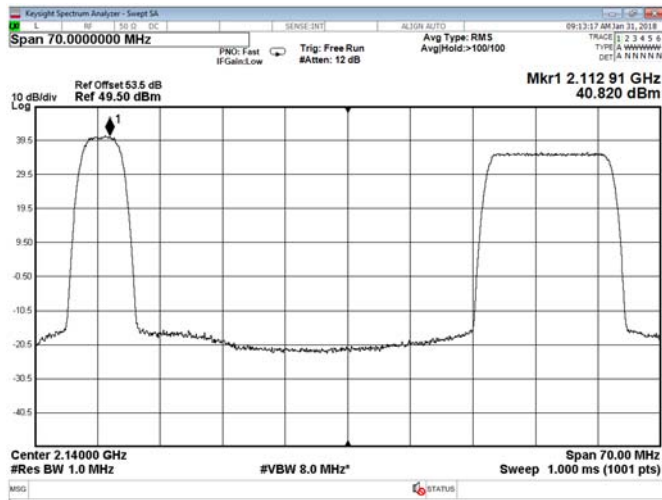
**Figure 8.1-15:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 10 MHz, Ant A



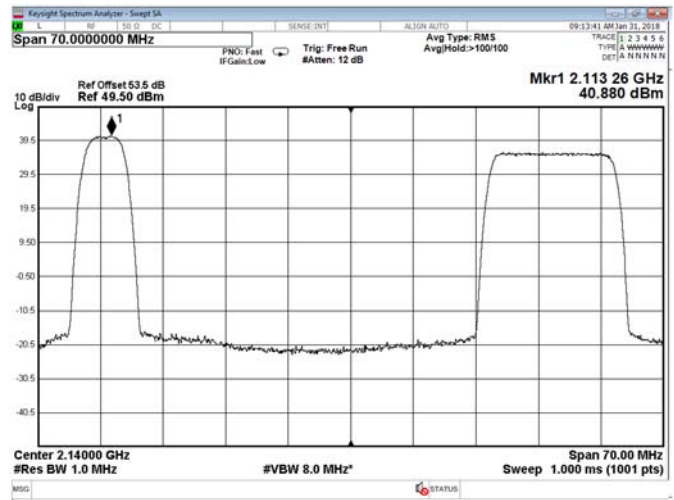
**Figure 8.1-16:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 10 MHz, Ant B

**Section 8**  
**Test name**  
**Specification**

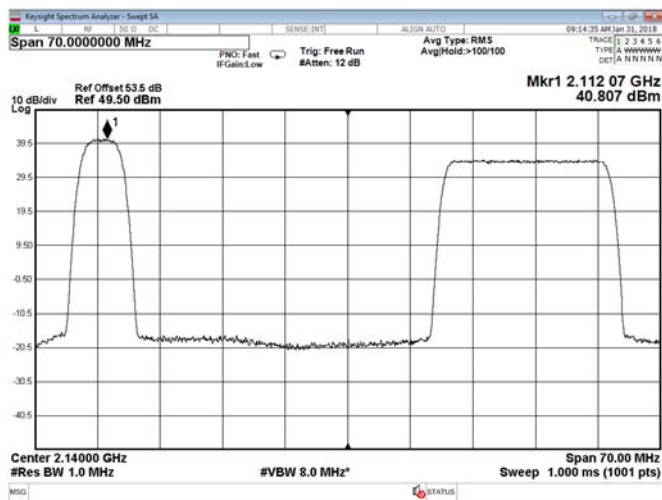
Testing data  
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 FCC Part 27 and RSS-139, Issue 3



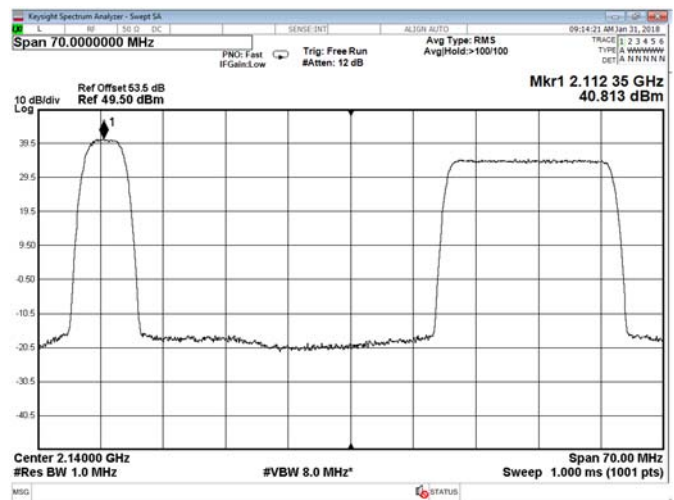
**Figure 8.1-17:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 15 MHz, Ant A



**Figure 8.1-18:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 15 MHz, Ant B



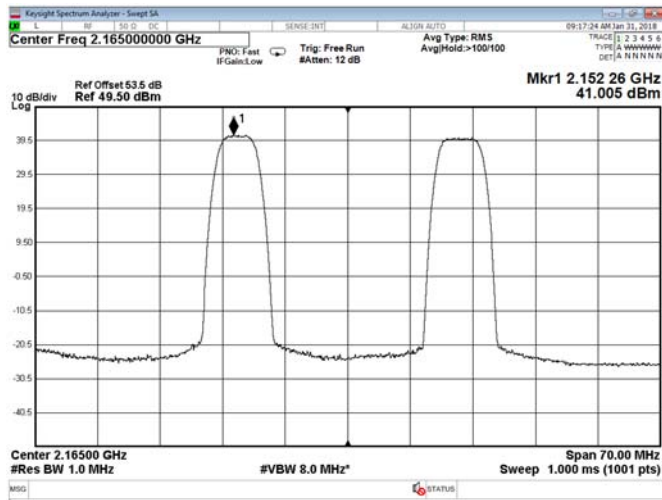
**Figure 8.1-19:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 20 MHz, Ant A



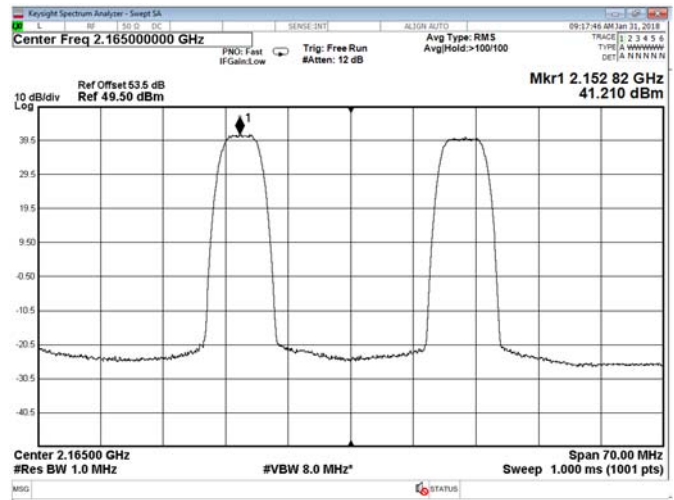
**Figure 8.1-20:** PSD multi-RAT operation, QPSK, WCDMA low channel + LTE 20 MHz, Ant B

**Section 8**  
**Test name**  
**Specification**

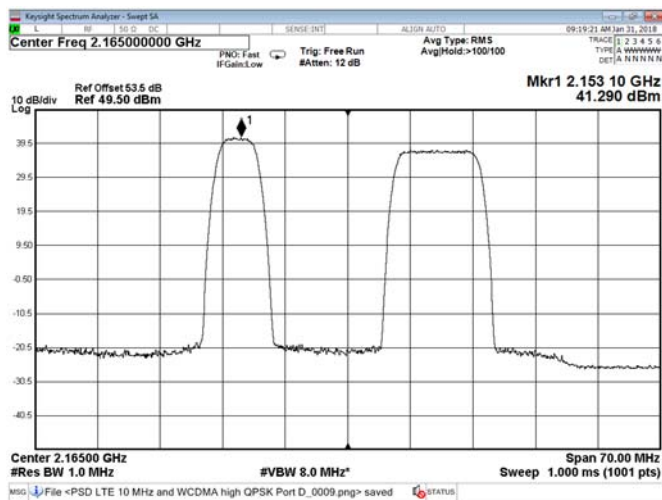
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 FCC Part 27 and RSS-139, Issue 3



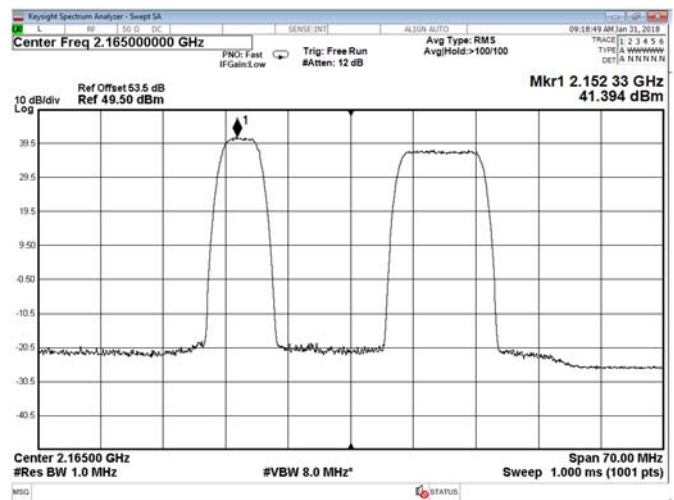
**Figure 8.1-21:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 5 MHz, Ant A



**Figure 8.1-22:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 5 MHz, Ant B



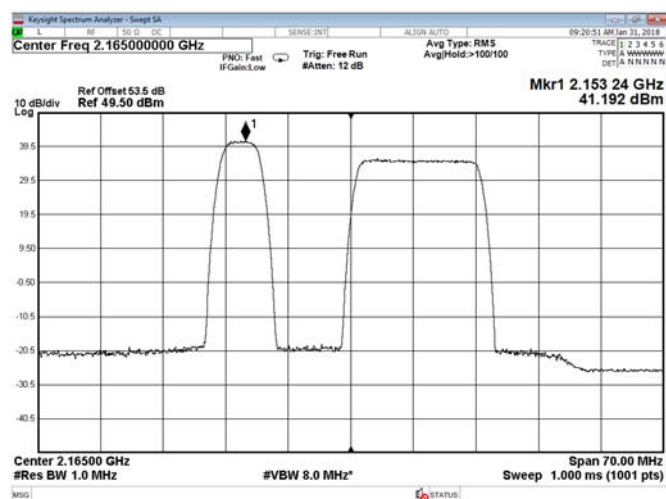
**Figure 8.1-23:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 10 MHz, Ant A



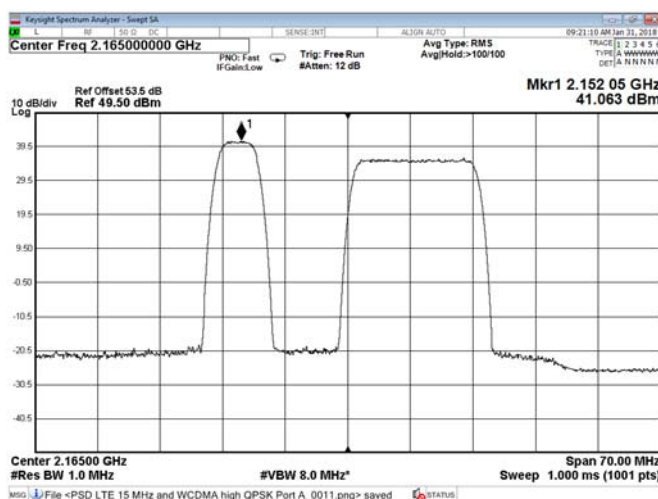
**Figure 8.1-24:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 10 MHz, Ant B

**Section 8**  
**Test name**  
**Specification**

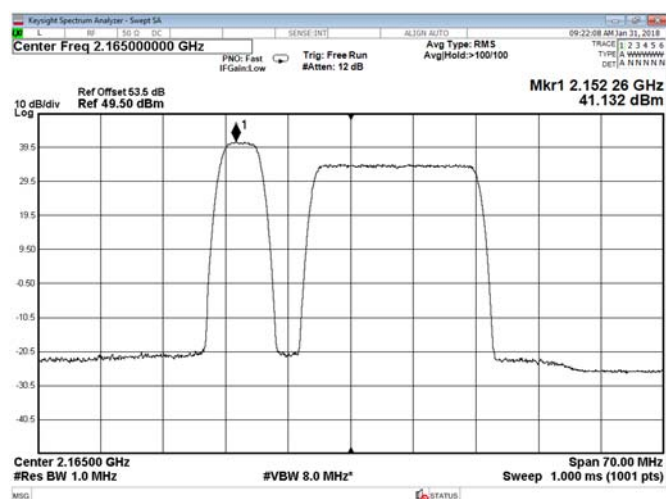
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 FCC Part 27 and RSS-139, Issue 3



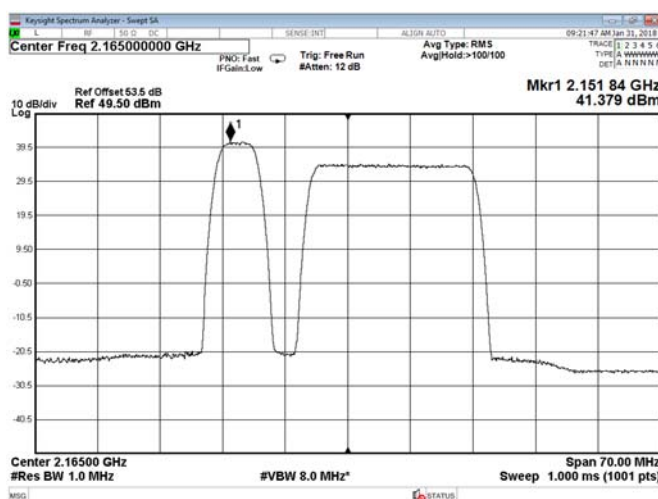
**Figure 8.1-25:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 15 MHz, Ant A



**Figure 8.1-26:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 15 MHz, Ant B



**Figure 8.1-27:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 20 MHz, Ant A



**Figure 8.1-28:** PSD multi-RAT operation, QPSK, WCDMA high channel + LTE 20 MHz, Ant B

**Table 8.1-8:** Output power measurement results for SISO NB IoT single carrier operation

| Remarks                         | Frequency, MHz | RF output power, W | RF output power, dBm |
|---------------------------------|----------------|--------------------|----------------------|
| LTE 5 MHz, Ant A, Low channel   | 2112.5         | 81.846             | 49.13                |
| LTE 5 MHz, Ant A, Mid channel   | 2145.0         | 79.068             | 48.98                |
| LTE 5 MHz, Ant A, High channel  | 2177.5         | 77.804             | 48.91                |
| LTE 5 MHz, Ant B, Low channel   | 2112.5         | 85.114             | 49.30                |
| LTE 5 MHz, Ant B, Mid channel   | 2145.0         | 83.753             | 49.23                |
| LTE 5 MHz, Ant B, High channel  | 2177.5         | 82.414             | 49.16                |
| LTE 10 MHz, Ant A, Low channel  | 2115.0         | 81.658             | 49.12                |
| LTE 10 MHz, Ant A, Mid channel  | 2145.0         | 79.799             | 49.02                |
| LTE 10 MHz, Ant A, High channel | 2175.0         | 79.068             | 48.98                |
| LTE 10 MHz, Ant B, Low channel  | 2115.0         | 85.507             | 49.32                |
| LTE 10 MHz, Ant B, Mid channel  | 2145.0         | 84.140             | 49.25                |
| LTE 10 MHz, Ant B, High channel | 2175.0         | 82.604             | 49.17                |
| LTE 15 MHz, Ant A, Low channel  | 2117.5         | 80.538             | 49.06                |
| LTE 15 MHz, Ant A, Mid channel  | 2145.0         | 79.616             | 49.01                |
| LTE 15 MHz, Ant A, High channel | 2172.5         | 78.886             | 48.97                |
| LTE 15 MHz, Ant B, Low channel  | 2117.5         | 85.310             | 49.31                |
| LTE 15 MHz, Ant B, Mid channel  | 2145.0         | 84.723             | 49.28                |
| LTE 15 MHz, Ant B, High channel | 2172.5         | 83.176             | 49.20                |
| LTE 20 MHz, Ant A, Low channel  | 2120.0         | 78.886             | 48.97                |
| LTE 20 MHz, Ant A, Mid channel  | 2145.0         | 79.983             | 49.03                |
| LTE 20 MHz, Ant A, High channel | 2170.0         | 80.353             | 49.05                |
| LTE 20 MHz, Ant B, Low channel  | 2120.0         | 84.723             | 49.28                |
| LTE 20 MHz, Ant B, Mid channel  | 2145.0         | 83.946             | 49.24                |
| LTE 20 MHz, Ant B, High channel | 2170.0         | 82.414             | 49.16                |

**Table 8.1-9:** Output power measurement results for MIMO NB IoT single carrier operation

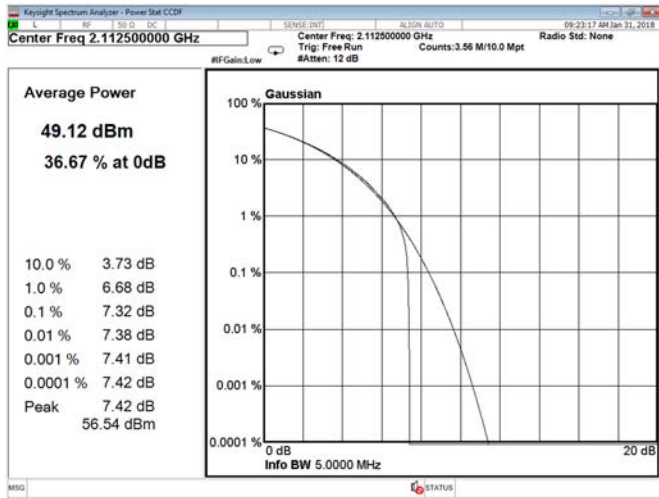
| Remarks                  | Frequency, MHz | RF output power at Ant A, dBm | RF output power at Ant B, dBm | Total RF output power, dBm |
|--------------------------|----------------|-------------------------------|-------------------------------|----------------------------|
| LTE 5 MHz, Low channel   | 2112.5         | 49.13                         | 49.30                         | 52.23                      |
| LTE 5 MHz, Mid channel   | 2145.0         | 48.98                         | 49.23                         | 52.12                      |
| LTE 5 MHz, High channel  | 2177.5         | 48.91                         | 49.16                         | 52.05                      |
| LTE 10 MHz, Low channel  | 2115.0         | 49.12                         | 49.32                         | 52.23                      |
| LTE 10 MHz, Mid channel  | 2145.0         | 49.02                         | 49.25                         | 52.15                      |
| LTE 10 MHz, High channel | 2175.0         | 48.98                         | 49.17                         | 52.09                      |
| LTE 15 MHz, Low channel  | 2117.5         | 49.06                         | 49.31                         | 52.20                      |
| LTE 15 MHz, Mid channel  | 2145.0         | 49.01                         | 49.28                         | 52.16                      |
| LTE 15 MHz, High channel | 2172.5         | 48.97                         | 49.20                         | 52.10                      |
| LTE 20 MHz, Low channel  | 2120.0         | 48.97                         | 49.28                         | 52.14                      |
| LTE 20 MHz, Mid channel  | 2145.0         | 49.03                         | 49.24                         | 52.15                      |
| LTE 20 MHz, High channel | 2170.0         | 49.05                         | 49.16                         | 52.12                      |

**Section 8**  
**Test name**  
**Specification**

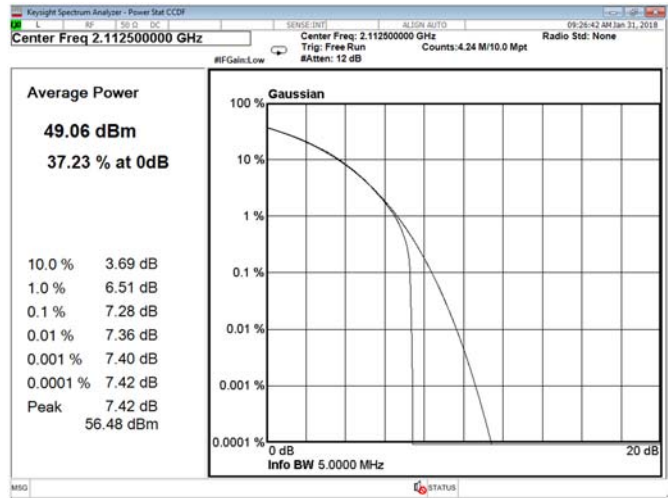
Testing data  
FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
FCC Part 27 and RSS-139, Issue 3

**Table 8.1-10:** Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results

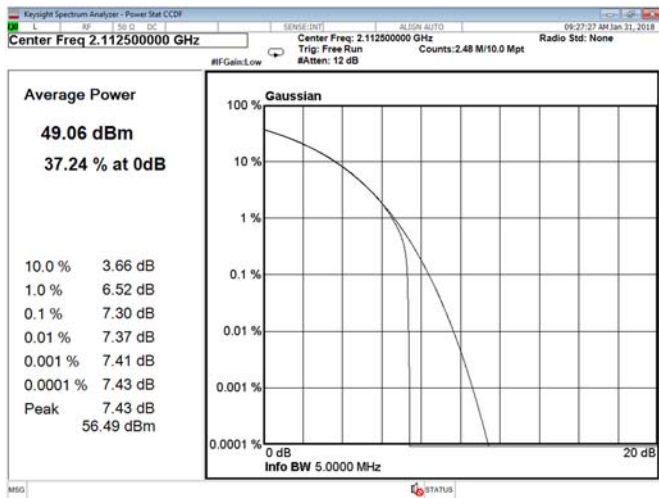
| Remarks                   | Frequency, MHz | 0.1% CCDF, dB | PAPR reduction limit, dB | Margin, dB |
|---------------------------|----------------|---------------|--------------------------|------------|
| QPSK, low channel, Ant A  | 2112.4         | 7.32          | 13.00                    | 5.68       |
| 16QAM, low channel, Ant A | 2112.4         | 7.28          | 13.00                    | 5.72       |
| 64QAM, low channel, Ant A | 2112.4         | 7.30          | 13.00                    | 5.70       |
| QPSK, mid channel, Ant A  | 2132.5         | 7.59          | 13.00                    | 5.41       |
| QPSK, high channel, Ant A | 2152.6         | 7.57          | 13.00                    | 5.43       |
| QPSK, low channel, Ant B  | 2112.4         | 7.32          | 13.00                    | 5.68       |
| 16QAM, low channel, Ant B | 2112.4         | 7.29          | 13.00                    | 5.71       |
| 64QAM, low channel, Ant B | 2112.4         | 7.30          | 13.00                    | 5.70       |
| QPSK, mid channel, Ant B  | 2132.5         | 7.58          | 13.00                    | 5.42       |
| QPSK, high channel, Ant B | 2152.6         | 7.57          | 13.00                    | 5.43       |



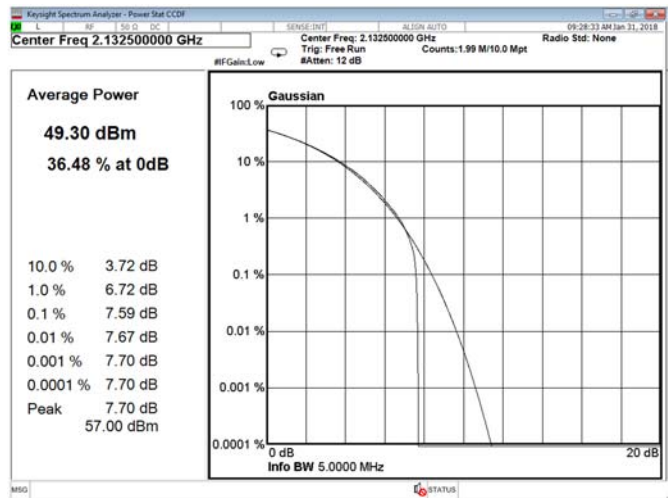
**Figure 8.1-29:** CCDF, QPSK, Ant A, Low channel



**Figure 8.1-30:** CCDF, 16QAM, Ant A, Low channel



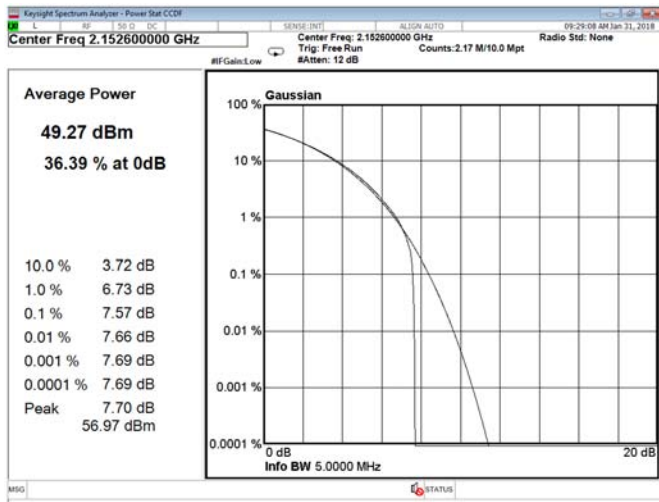
**Figure 8.1-31:** CCDF, 64QAM, Ant A, Low channel



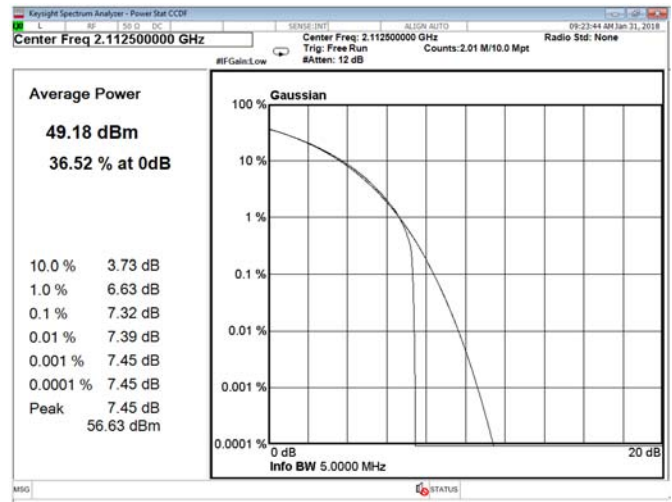
**Figure 8.1-32:** CCDF, QPSK, Ant A, Mid channel

**Section 8**  
**Test name**  
**Specification**

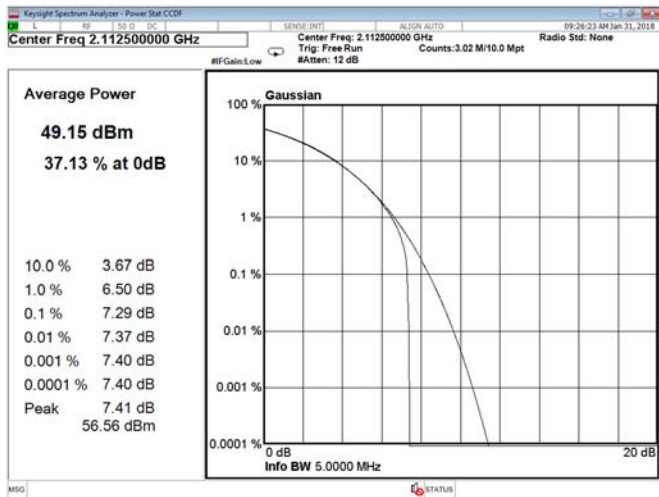
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 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3



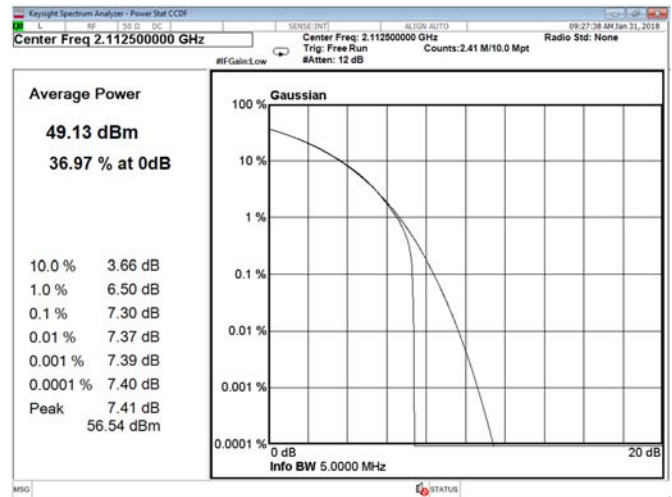
**Figure 8.1-33: CCDF, QPSK, Ant A, High channel**



**Figure 8.1-34: CCDF, QPSK, Ant B, Low channel**



**Figure 8.1-35: CCDF, 16QAM, Ant B, Low channel**



**Figure 8.1-36: CCDF, 64QAM, Ant B, Low channel**

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| Section 8     | Testing data                                                               |
| Test name     | FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector |
| Specification | FCC Part 27 and RSS-139, Issue 3                                           |

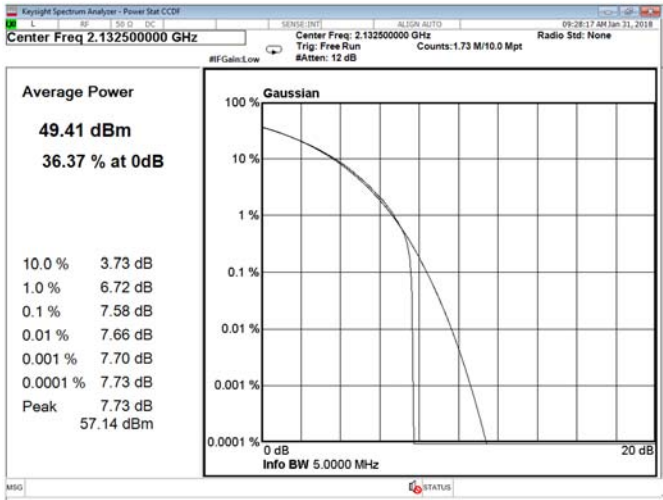


Figure 8.1-37: CCDF, QPSK, Ant B, Mid channel

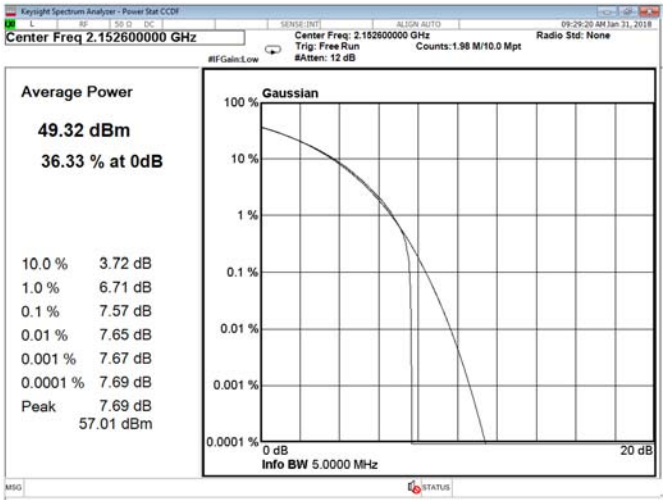


Figure 8.1-38: CCDF, QPSK, Ant B, High channel

**Table 8.1-11: Complementary Cumulative Distribution Function (CCDF) of the PAPR reduction measurement results for NB IoT**

| Remarks                                | Frequency, MHz | 0.1% CCDF, dB | PAPR reduction limit, dB | Margin, dB |
|----------------------------------------|----------------|---------------|--------------------------|------------|
| LTE 5 MHz, Ant A, QPSK, Low channel    | 2112.5         | 7.58          | 13.00                    | 5.42       |
| LTE 5 MHz, Ant A, 16QAM, Low channel   | 2112.5         | 7.60          | 13.00                    | 5.40       |
| LTE 5 MHz, Ant A, 64QAM, Low channel   | 2112.5         | 7.61          | 13.00                    | 5.39       |
| LTE 5 MHz, Ant A, 256QAM, Low channel  | 2112.5         | 7.63          | 13.00                    | 5.37       |
| LTE 5 MHz, Ant A, QPSK, Mid channel    | 2145.0         | 7.60          | 13.00                    | 5.40       |
| LTE 5 MHz, Ant A, QPSK, High channel   | 2177.5         | 7.62          | 13.00                    | 5.38       |
| LTE 5 MHz, Ant B, QPSK, Low channel    | 2112.5         | 7.64          | 13.00                    | 5.36       |
| LTE 5 MHz, Ant B, 16QAM, Low channel   | 2112.5         | 7.62          | 13.00                    | 5.38       |
| LTE 5 MHz, Ant B, 64QAM, Low channel   | 2112.5         | 7.60          | 13.00                    | 5.40       |
| LTE 5 MHz, Ant B, 256QAM, Low channel  | 2112.5         | 7.61          | 13.00                    | 5.39       |
| LTE 5 MHz, Ant B, QPSK, Mid channel    | 2145.0         | 7.59          | 13.00                    | 5.41       |
| LTE 5 MHz, Ant B, QPSK, High channel   | 2177.5         | 7.60          | 13.00                    | 5.40       |
| LTE 10 MHz, Ant A, QPSK, Low channel   | 2115.0         | 7.60          | 13.00                    | 5.40       |
| LTE 10 MHz, Ant A, 16QAM, Low channel  | 2115.0         | 7.58          | 13.00                    | 5.42       |
| LTE 10 MHz, Ant A, 64QAM, Low channel  | 2115.0         | 7.61          | 13.00                    | 5.39       |
| LTE 10 MHz, Ant A, 256QAM, Low channel | 2115.0         | 7.61          | 13.00                    | 5.39       |
| LTE 10 MHz, Ant A, QPSK, Mid channel   | 2145.0         | 7.58          | 13.00                    | 5.42       |
| LTE 10 MHz, Ant A, QPSK, High channel  | 2175.0         | 7.61          | 13.00                    | 5.39       |
| LTE 10 MHz, Ant B, QPSK, Low channel   | 2115.0         | 7.58          | 13.00                    | 5.42       |
| LTE 10 MHz, Ant B, 16QAM, Low channel  | 2115.0         | 7.58          | 13.00                    | 5.42       |
| LTE 10 MHz, Ant B, 64QAM, Low channel  | 2115.0         | 7.58          | 13.00                    | 5.42       |
| LTE 10 MHz, Ant B, 256QAM, Low channel | 2115.0         | 7.57          | 13.00                    | 5.43       |
| LTE 10 MHz, Ant B, QPSK, Mid channel   | 2145.0         | 7.57          | 13.00                    | 5.43       |
| LTE 10 MHz, Ant B, QPSK, High channel  | 2175.0         | 7.60          | 13.00                    | 5.40       |
| LTE 15 MHz, Ant A, QPSK, Low channel   | 2117.5         | 7.58          | 13.00                    | 5.42       |
| LTE 15 MHz, Ant A, 16QAM, Low channel  | 2117.5         | 7.60          | 13.00                    | 5.40       |
| LTE 15 MHz, Ant A, 64QAM, Low channel  | 2117.5         | 7.59          | 13.00                    | 5.41       |
| LTE 15 MHz, Ant A, 256QAM, Low channel | 2117.5         | 7.60          | 13.00                    | 5.40       |
| LTE 15 MHz, Ant A, QPSK, Mid channel   | 2145.0         | 7.59          | 13.00                    | 5.41       |
| LTE 15 MHz, Ant A, QPSK, High channel  | 2172.5         | 7.64          | 13.00                    | 5.36       |
| LTE 15 MHz, Ant B, QPSK, Low channel   | 2117.5         | 7.65          | 13.00                    | 5.35       |
| LTE 15 MHz, Ant B, 16QAM, Low channel  | 2117.5         | 7.64          | 13.00                    | 5.36       |
| LTE 15 MHz, Ant B, 64QAM, Low channel  | 2117.5         | 7.59          | 13.00                    | 5.41       |
| LTE 15 MHz, Ant B, 256QAM, Low channel | 2117.5         | 7.59          | 13.00                    | 5.41       |
| LTE 15 MHz, Ant B, QPSK, Mid channel   | 2145.0         | 7.59          | 13.00                    | 5.41       |
| LTE 15 MHz, Ant B, QPSK, High channel  | 2172.5         | 7.58          | 13.00                    | 5.42       |
| LTE 20 MHz, Ant A, QPSK, Low channel   | 2120.0         | 7.59          | 13.00                    | 5.41       |
| LTE 20 MHz, Ant A, 16QAM, Low channel  | 2120.0         | 7.59          | 13.00                    | 5.41       |
| LTE 20 MHz, Ant A, 64QAM, Low channel  | 2120.0         | 7.61          | 13.00                    | 5.39       |
| LTE 20 MHz, Ant A, 256QAM, Low channel | 2120.0         | 7.60          | 13.00                    | 5.40       |
| LTE 20 MHz, Ant A, QPSK, Mid channel   | 2145.0         | 7.57          | 13.00                    | 5.43       |
| LTE 20 MHz, Ant A, QPSK, High channel  | 2170.0         | 7.57          | 13.00                    | 5.43       |
| LTE 20 MHz, Ant B, QPSK, Low channel   | 2120.0         | 7.59          | 13.00                    | 5.41       |
| LTE 20 MHz, Ant B, 16QAM, Low channel  | 2120.0         | 7.60          | 13.00                    | 5.40       |
| LTE 20 MHz, Ant B, 64QAM, Low channel  | 2120.0         | 7.58          | 13.00                    | 5.42       |
| LTE 20 MHz, Ant B, 256QAM, Low channel | 2120.0         | 7.59          | 13.00                    | 5.41       |
| LTE 20 MHz, Ant B, QPSK, Mid channel   | 2145.0         | 7.57          | 13.00                    | 5.43       |
| LTE 20 MHz, Ant B, QPSK, High channel  | 2170.0         | 7.61          | 13.00                    | 5.39       |

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

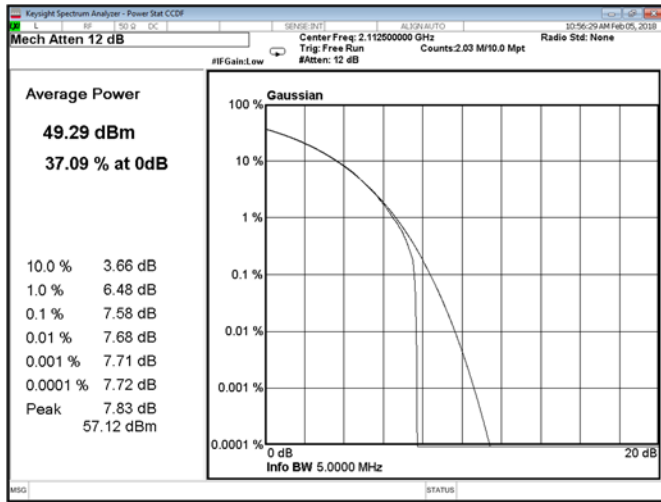


Figure 8.1-39: CCDF, QPSK, Ant A, LTE 5 MHz, Low channel

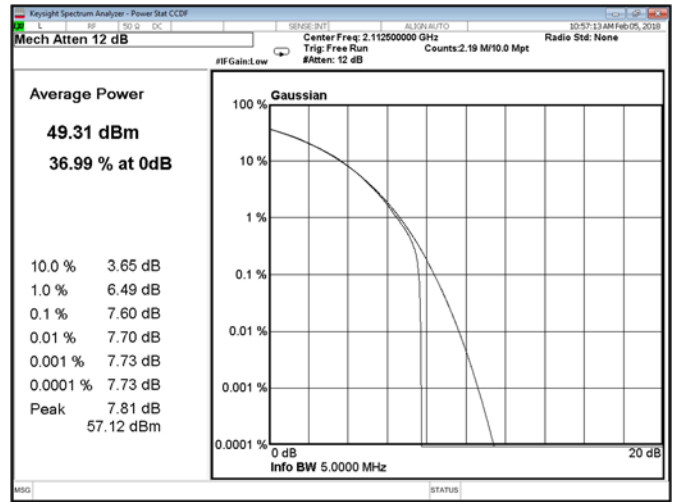


Figure 8.1-40: CCDF, 16QAM, Ant A, LTE 5 MHz, Low channel

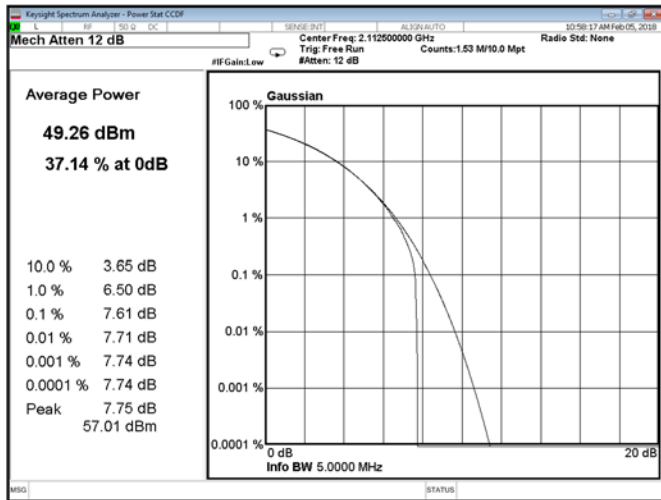


Figure 8.1-41: CCDF, 64QAM, Ant A, LTE 5 MHz, Low channel

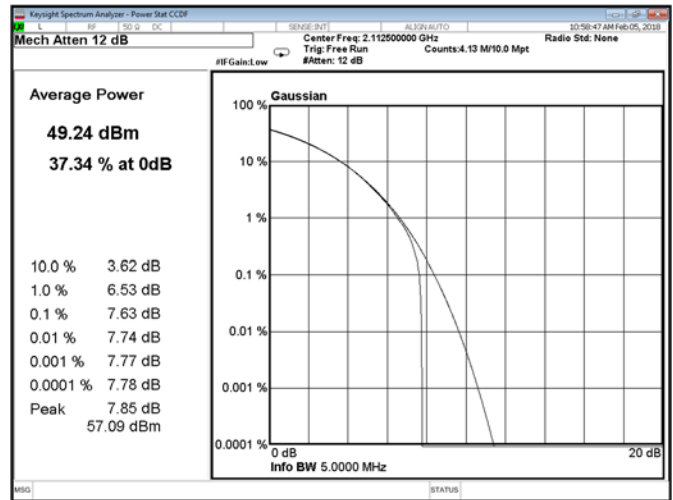


Figure 8.1-42: CCDF, 256QAM, Ant A, LTE 5 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

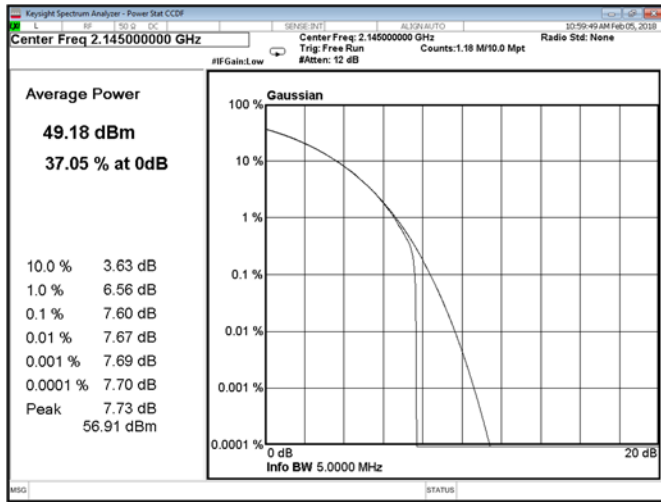


Figure 8.1-43: CCDF, QPSK, Ant A, LTE 5 MHz, Mid channel

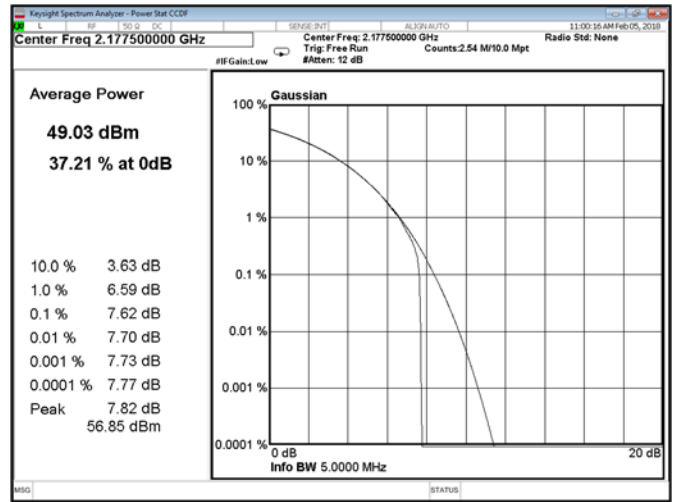


Figure 8.1-44: CCDF, QPSK, Ant A, LTE 5 MHz, High channel

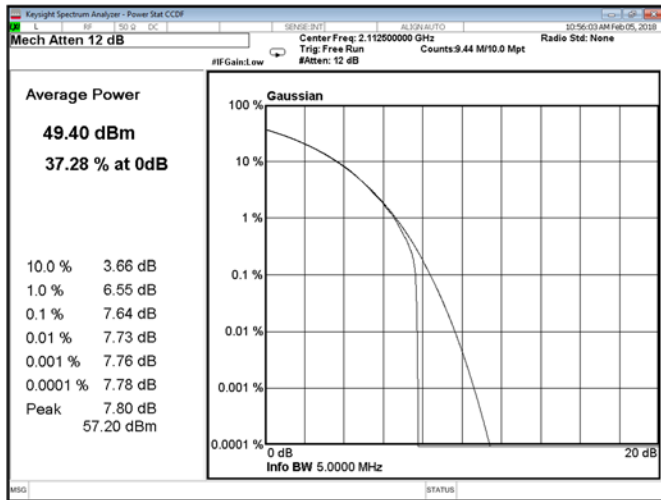


Figure 8.1-45: CCDF, QPSK, Ant B, LTE 5 MHz, Low channel

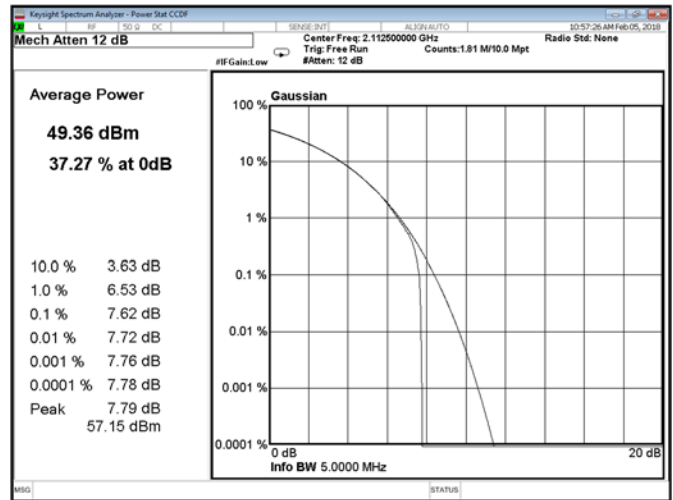


Figure 8.1-46: CCDF, 16QAM, Ant B, LTE 5 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

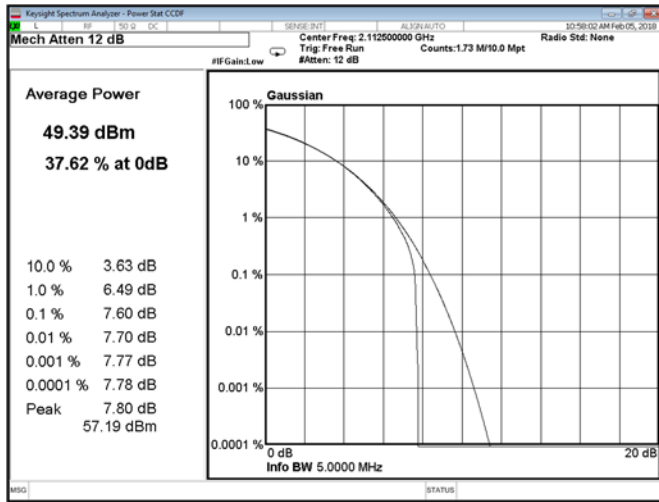


Figure 8.1-47: CCDF, 64QAM, Ant B, LTE 5 MHz, Low channel

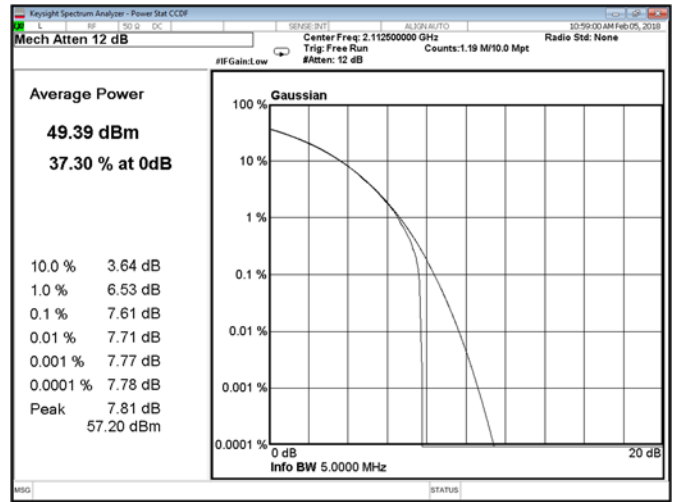


Figure 8.1-48: CCDF, 256QAM, Ant B, LTE 5 MHz, Low channel

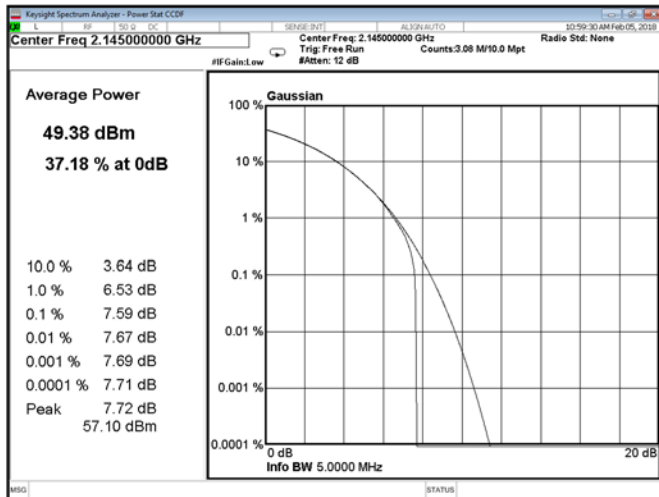


Figure 8.1-49: CCDF, QPSK, Ant B, LTE 5 MHz, Mid channel

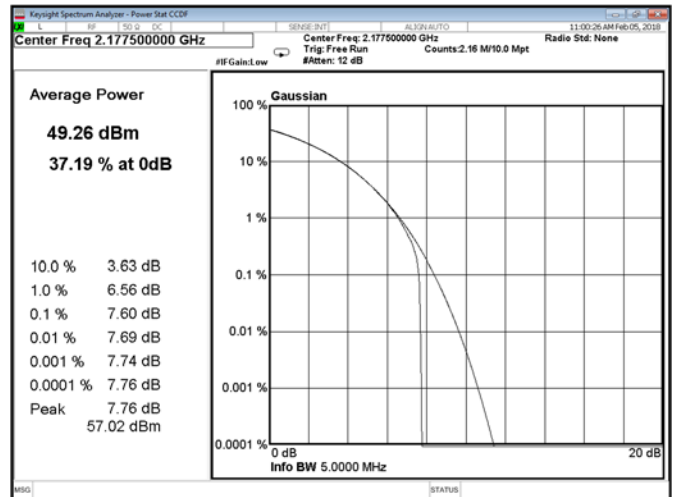


Figure 8.1-50: CCDF, QPSK, Ant B, LTE 5 MHz, High channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

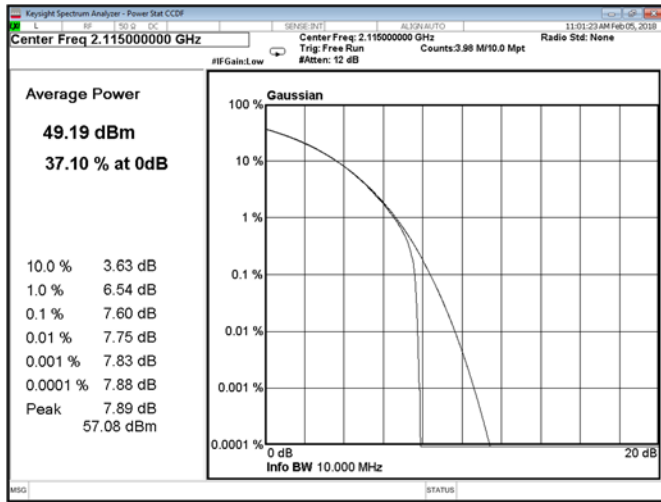


Figure 8.1-51: CCDF, QPSK, Ant A, LTE 10 MHz, Low channel

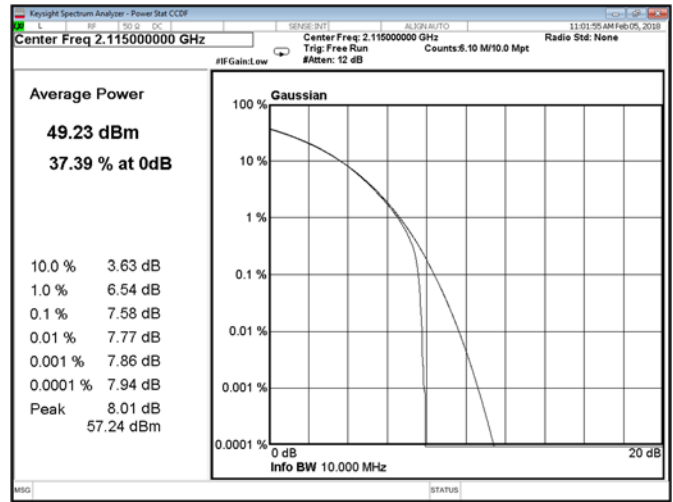


Figure 8.1-52: CCDF, 16QAM, Ant A, LTE 10 MHz, Low channel

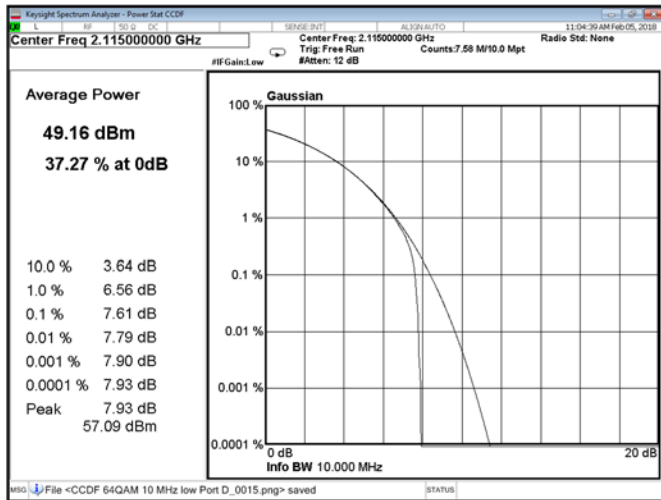


Figure 8.1-53: CCDF, 64QAM, Ant A, LTE 10 MHz, Low channel

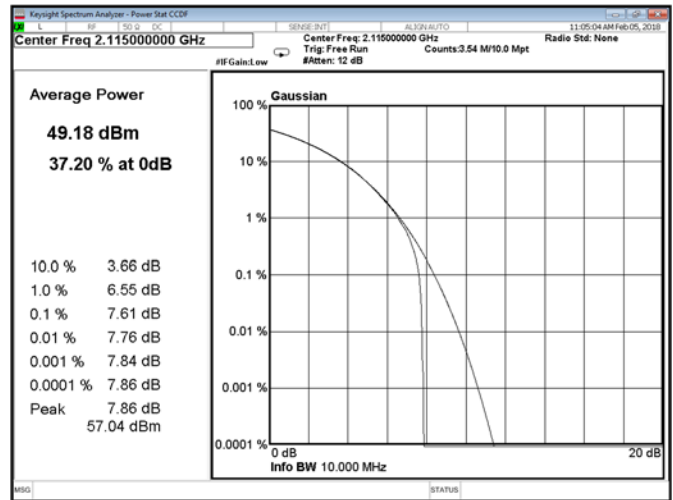


Figure 8.1-54: CCDF, 256QAM, Ant A, LTE 10 MHz, Low channel

|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| Section 8     | Testing data                                                               |
| Test name     | FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector |
| Specification | FCC Part 27 and RSS-139, Issue 3                                           |

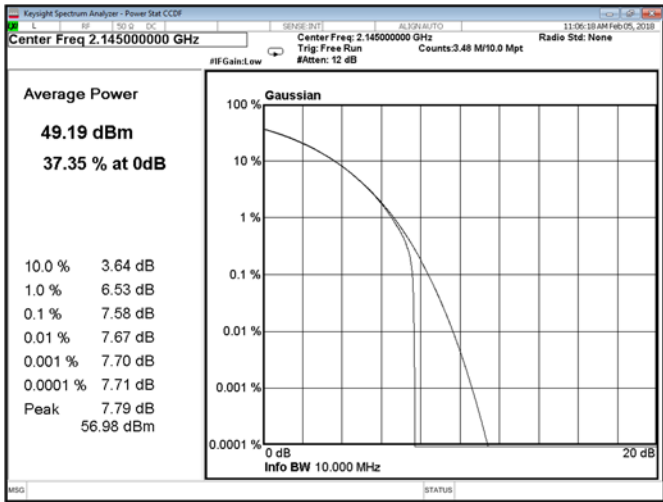


Figure 8.1-55: CCDF, QPSK, Ant A, LTE 10 MHz, Mid channel

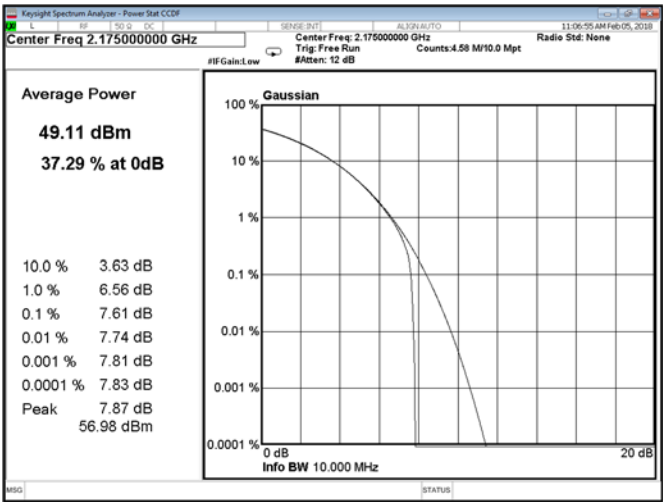


Figure 8.1-56: CCDF, QPSK, Ant A, LTE 10 MHz, High channel

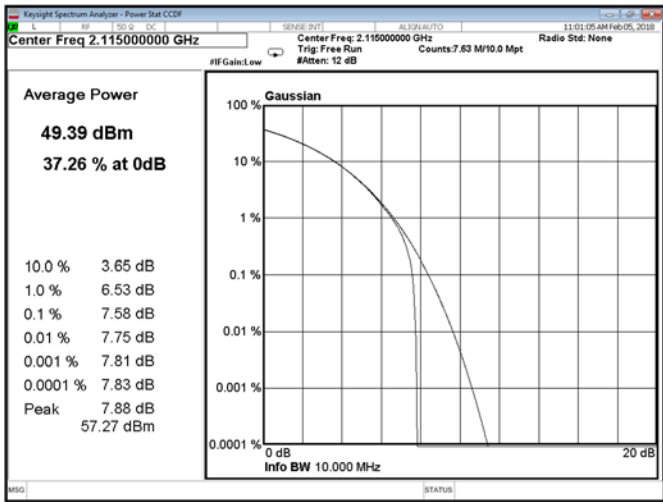


Figure 8.1-57: CCDF, QPSK, Ant B, LTE 10 MHz, Low channel

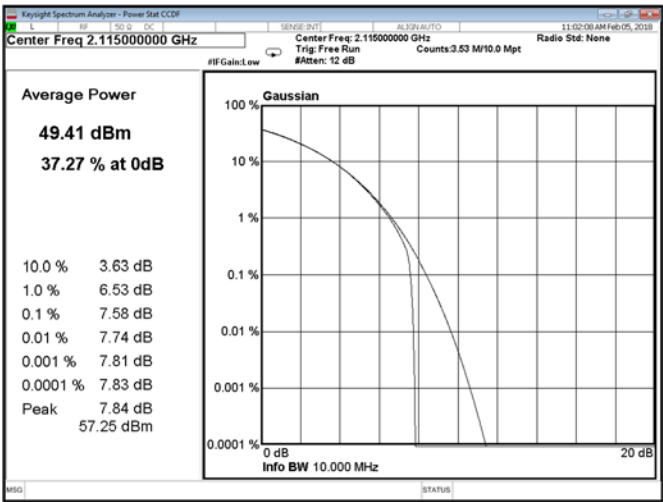


Figure 8.1-58: CCDF, 16QAM, Ant B, LTE 10 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

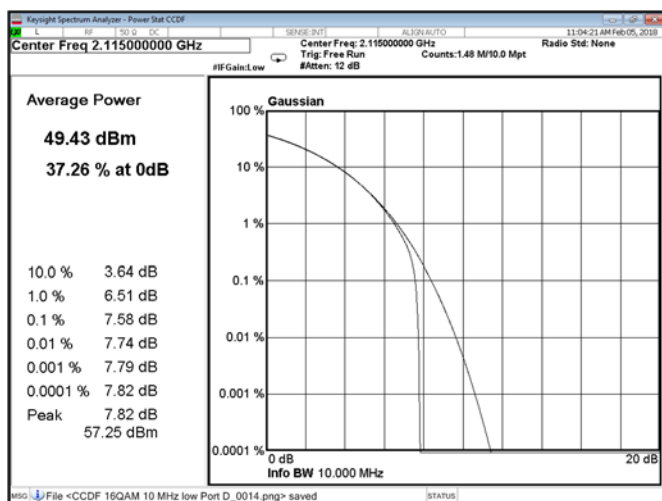


Figure 8.1-59: CCDF, 64QAM, Ant B, LTE 10 MHz, Low channel

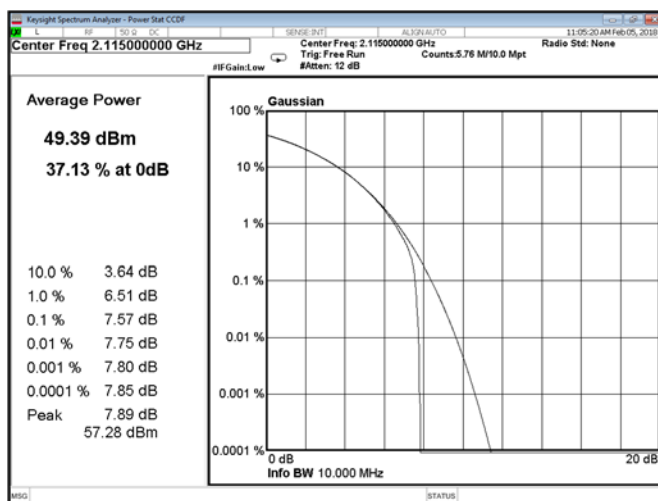


Figure 8.1-60: CCDF, 256QAM, Ant B, LTE 10 MHz, Low channel

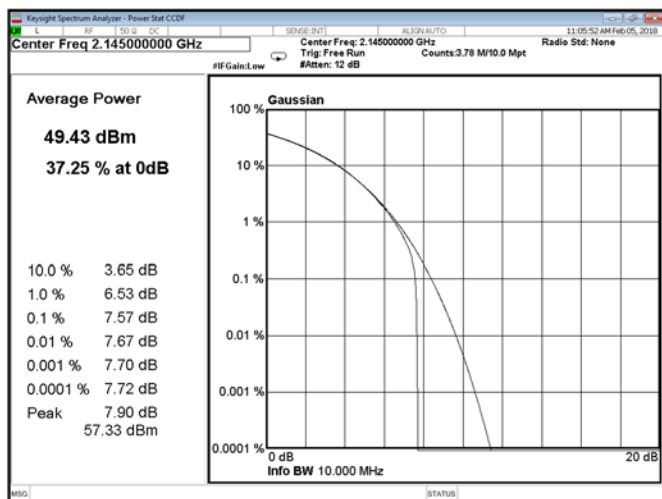


Figure 8.1-61: CCDF, QPSK, Ant B, LTE 10 MHz, Mid channel

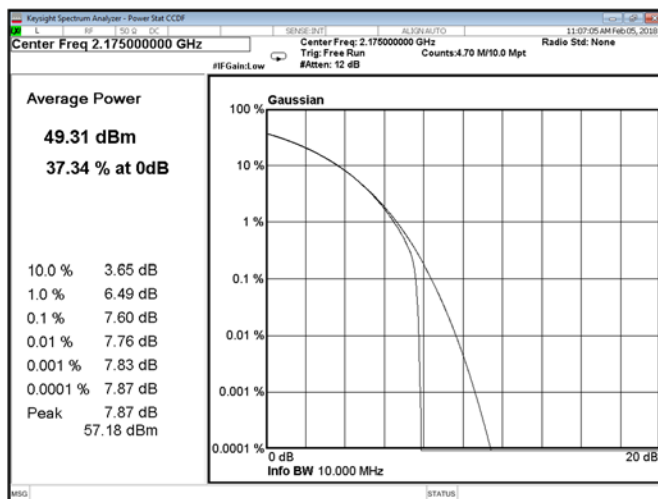


Figure 8.1-62: CCDF, QPSK, Ant B, LTE 10 MHz, High channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
FCC Part 27 and RSS-139, Issue 3

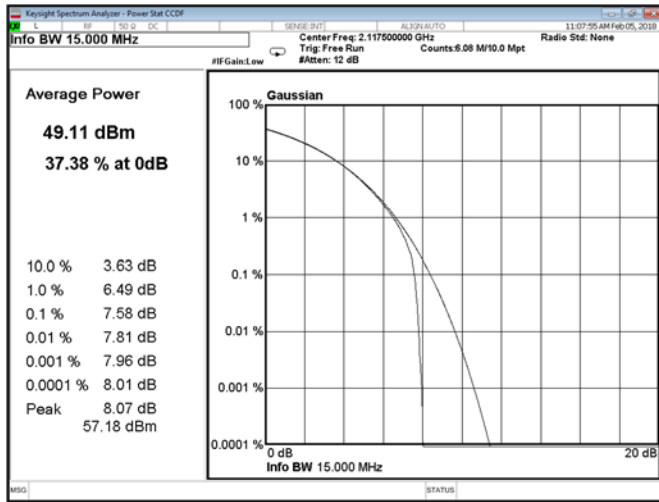


Figure 8.1-63: CCDF, QPSK, Ant A, LTE 15 MHz, Low channel

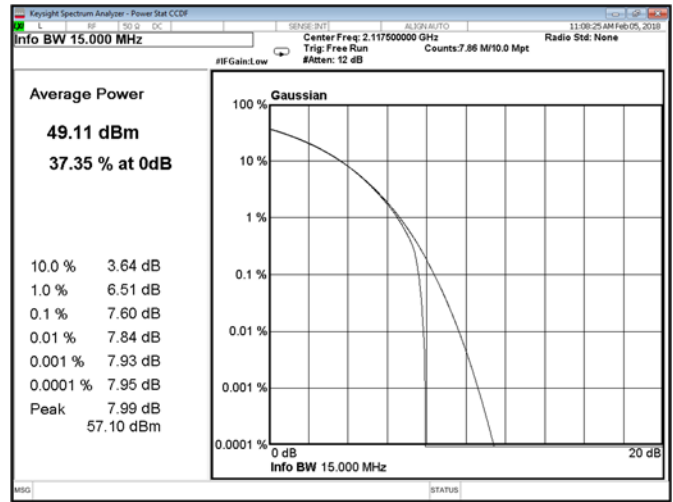


Figure 8.1-64: CCDF, 16QAM, Ant A, LTE 15 MHz, Low channel

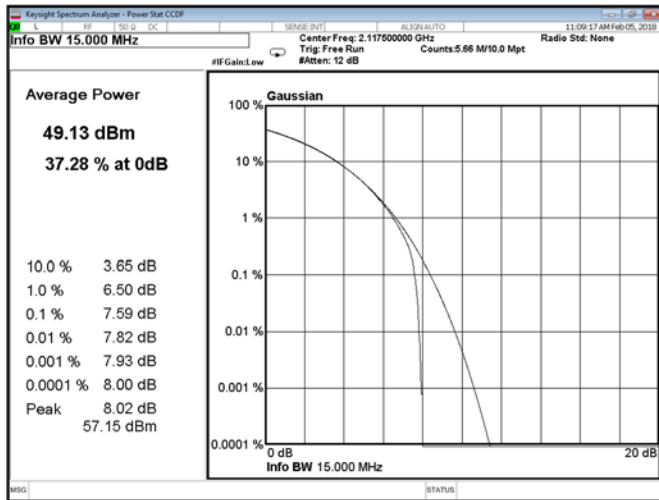


Figure 8.1-65: CCDF, 64QAM, Ant A, LTE 15 MHz, Low channel

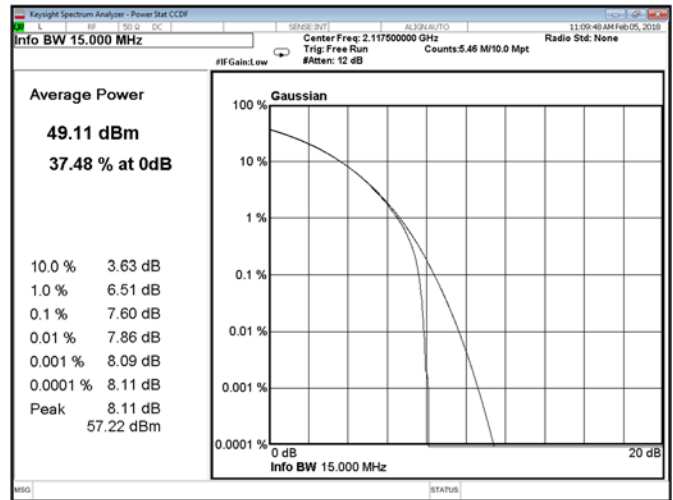


Figure 8.1-66: CCDF, 256QAM, Ant A, LTE 15 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

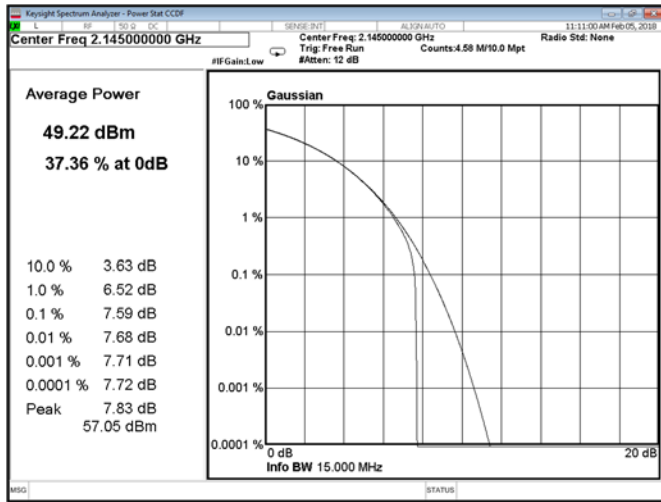


Figure 8.1-67: CCDF, QPSK, Ant A, LTE 15 MHz, Mid channel

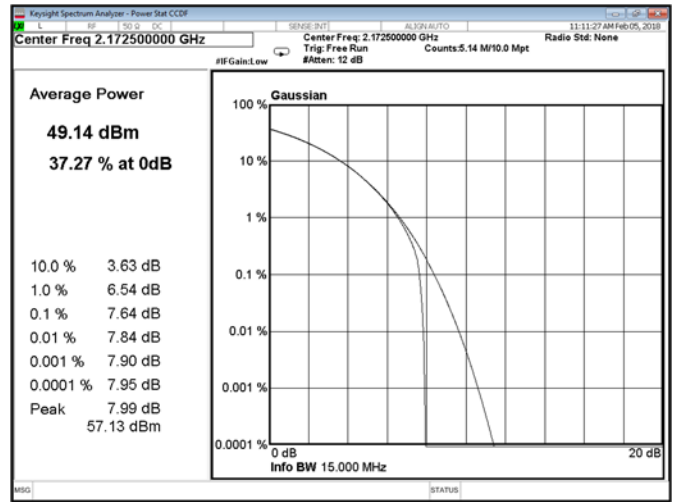


Figure 8.1-68: CCDF, QPSK, Ant A, LTE 15 MHz, High channel

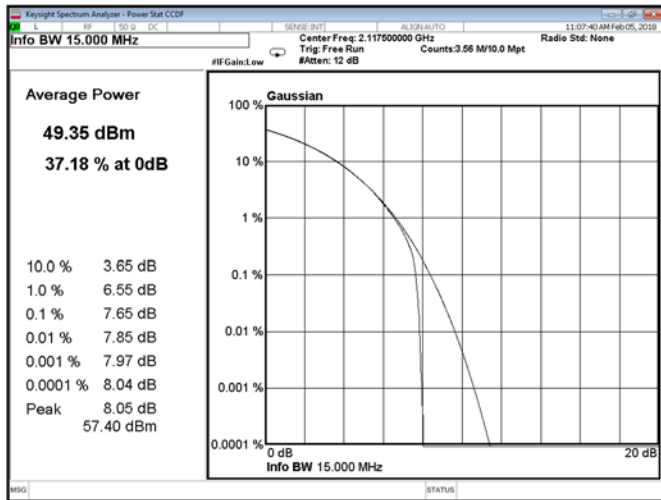


Figure 8.1-69: CCDF, QPSK, Ant B, LTE 15 MHz, Low channel

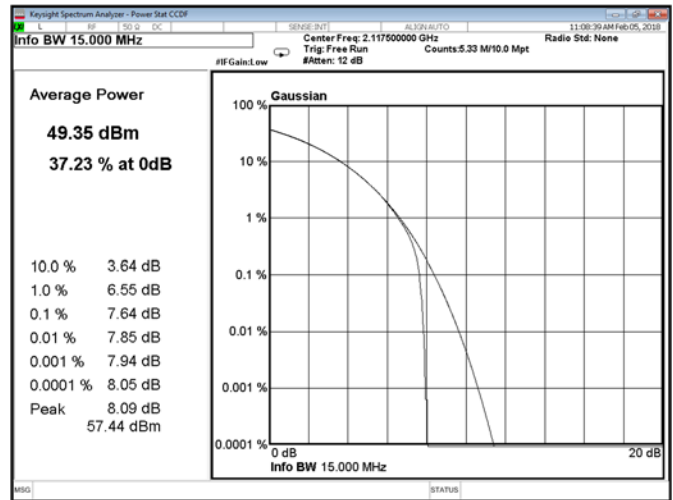


Figure 8.1-70: CCDF, 16QAM, Ant B, LTE 15 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

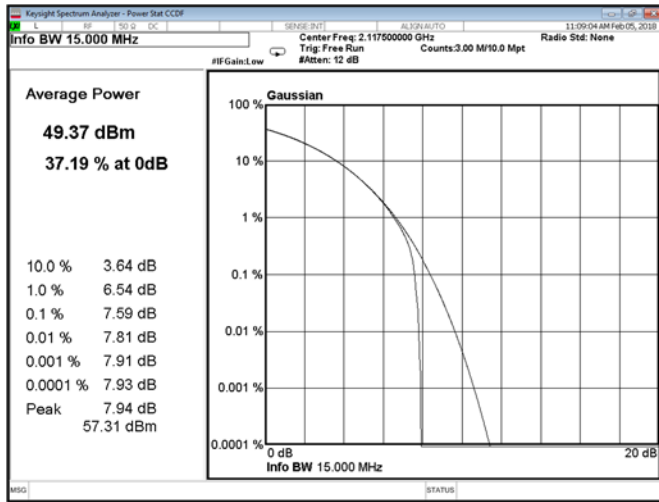


Figure 8.1-71: CCDF, 64QAM, Ant B, LTE 15 MHz, Low channel

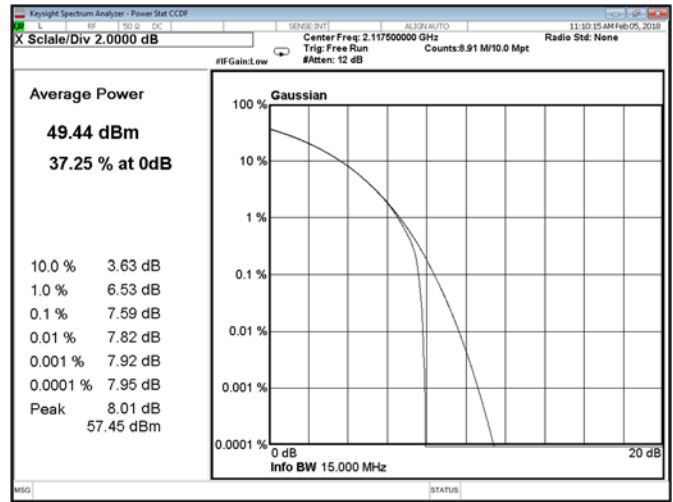


Figure 8.1-72: CCDF, 256QAM, Ant B, LTE 15 MHz, Low channel

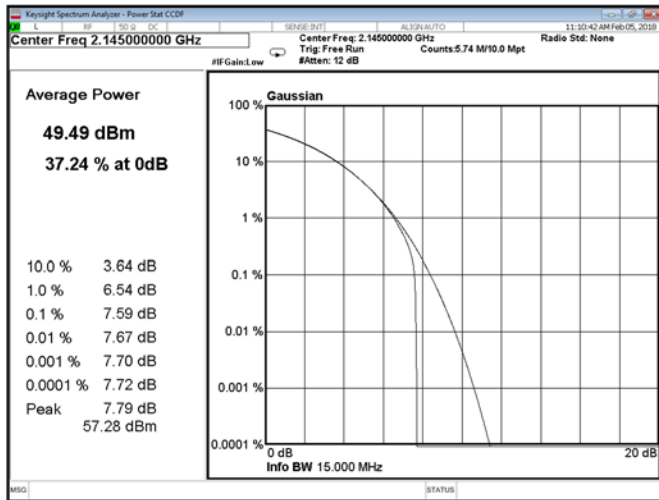


Figure 8.1-73: CCDF, QPSK, Ant B, LTE 15 MHz, Mid channel

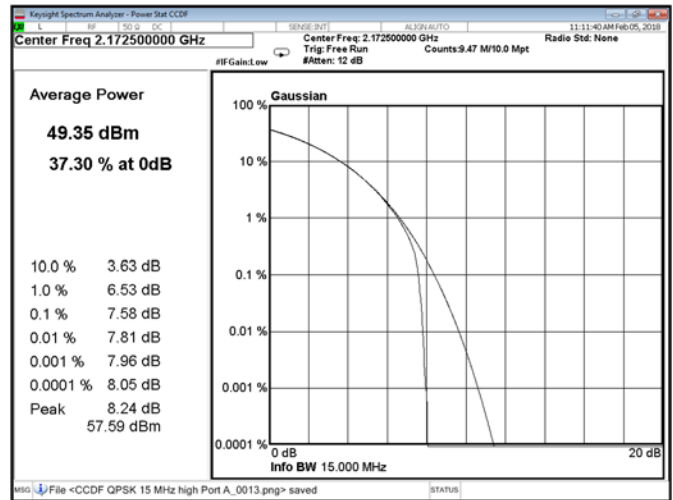


Figure 8.1-74: CCDF, QPSK, Ant B, LTE 15 MHz, High channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

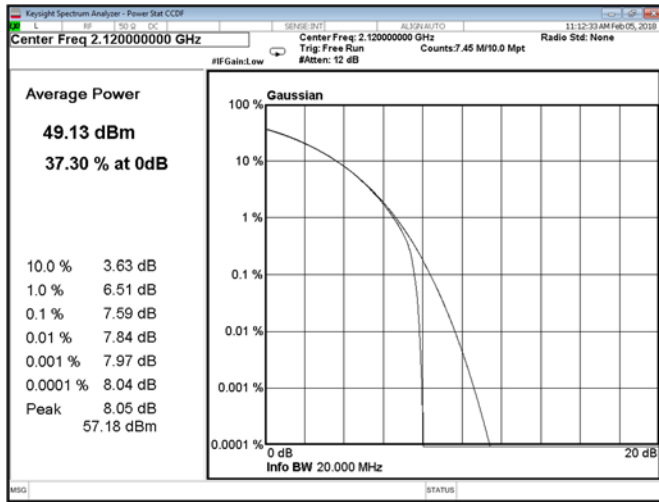


Figure 8.1-75: CCDF, QPSK, Ant A, LTE 20 MHz, Low channel

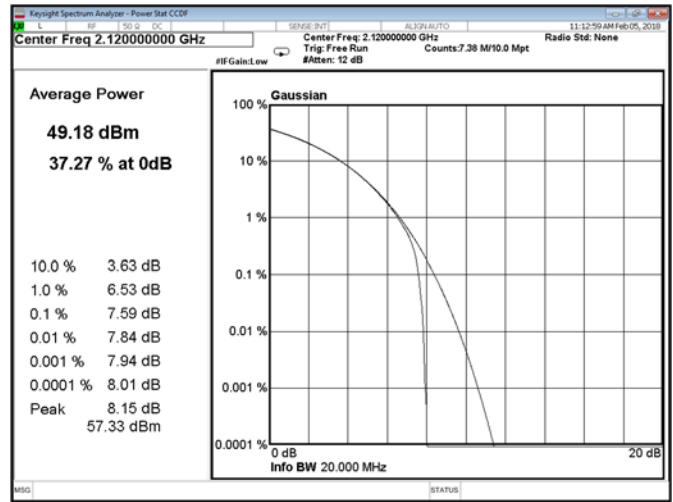


Figure 8.1-76: CCDF, 16QAM, Ant A, LTE 20 MHz, Low channel

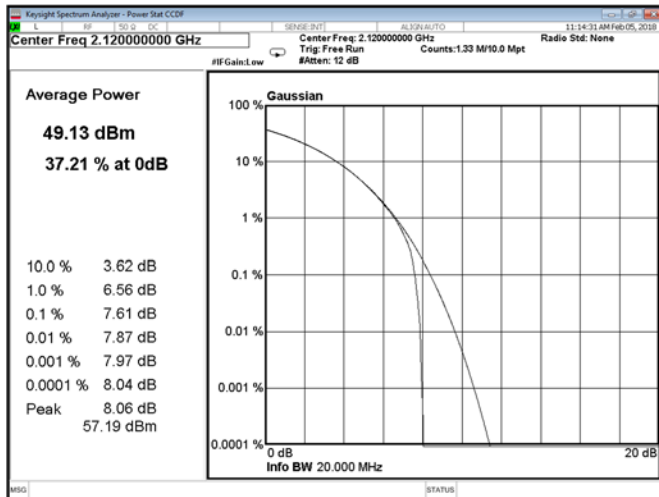


Figure 8.1-77: CCDF, 64QAM, Ant A, LTE 20 MHz, Low channel

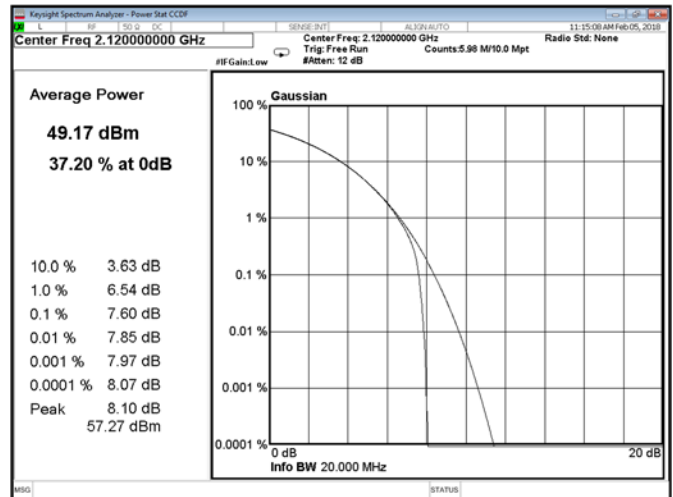


Figure 8.1-78: CCDF, 256QAM, Ant A, LTE 20 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
 FCC Part 27 and RSS-139, Issue 3

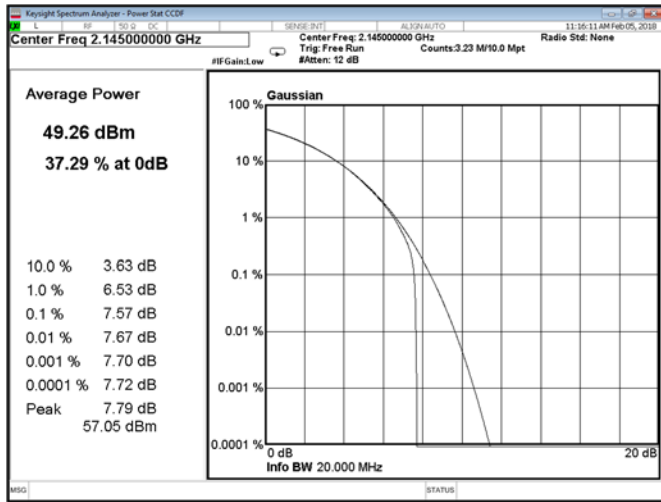


Figure 8.1-79: CCDF, QPSK, Ant A, LTE 20 MHz, Mid channel

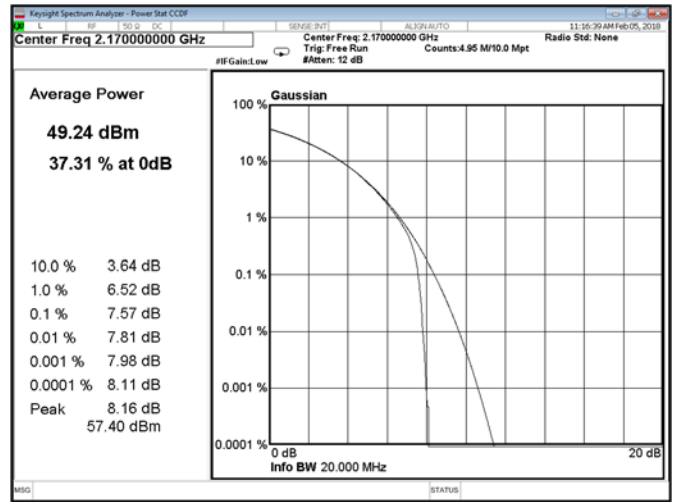


Figure 8.1-80: CCDF, QPSK, Ant A, LTE 20 MHz, High channel

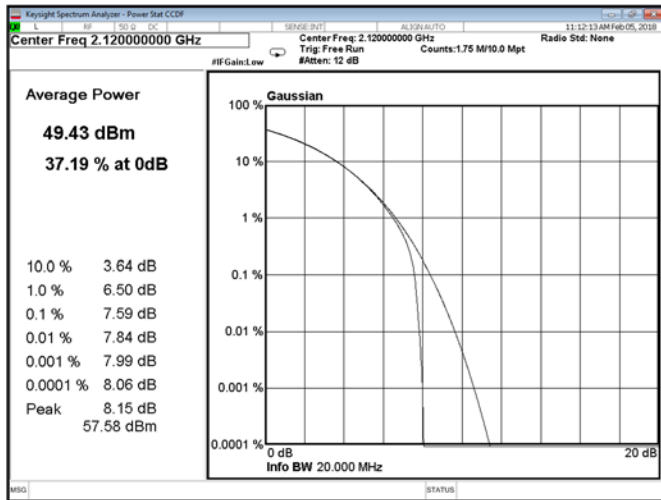


Figure 8.1-81: CCDF, QPSK, Ant B, LTE 20 MHz, Low channel

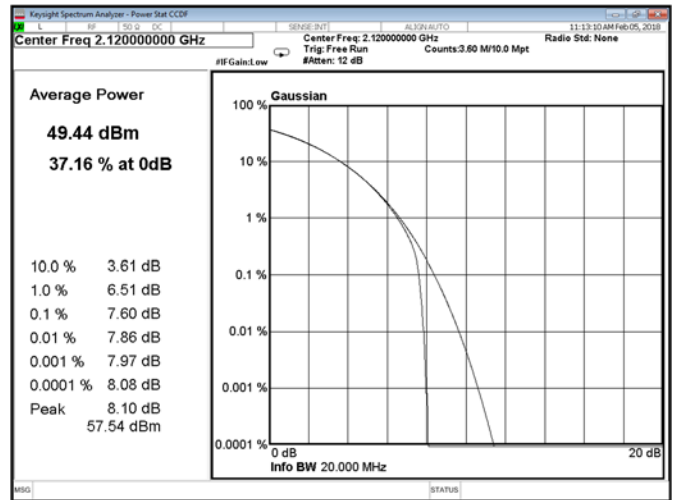
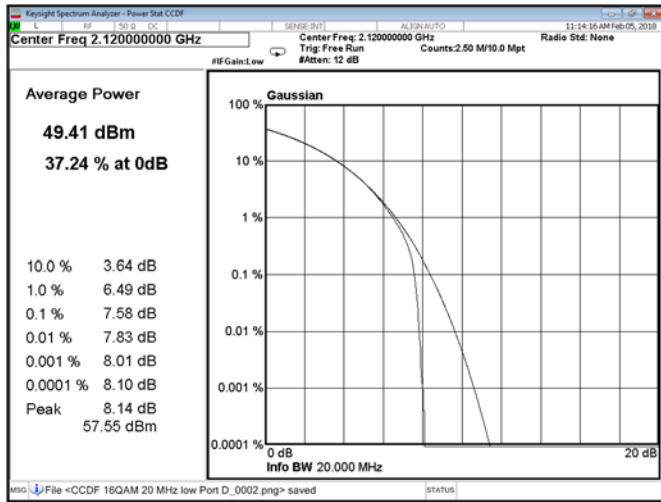


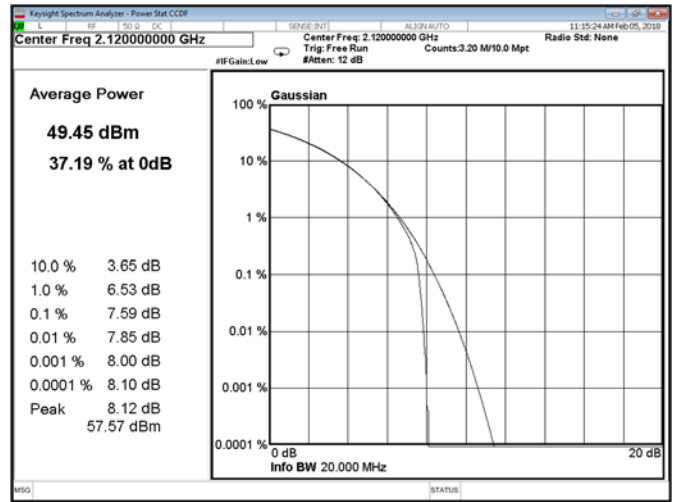
Figure 8.1-82: CCDF, 16QAM, Ant B, LTE 20 MHz, Low channel

**Section 8**  
**Test name**  
**Specification**

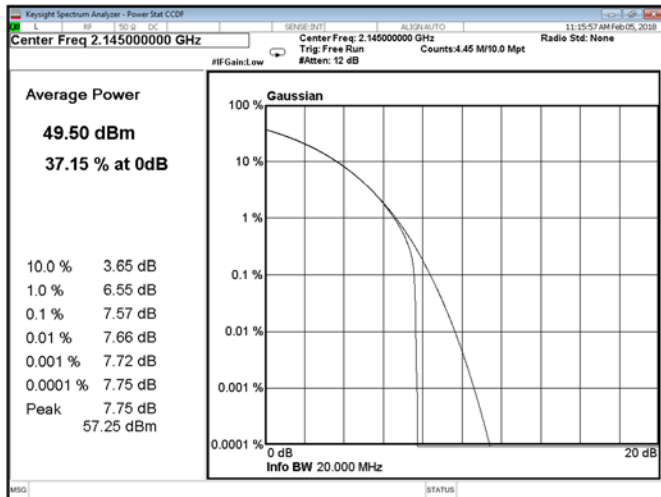
Testing data  
FCC 27.50(b) and RSS-139, 4.1 Maximum output power at RF antenna connector  
FCC Part 27 and RSS-139, Issue 3



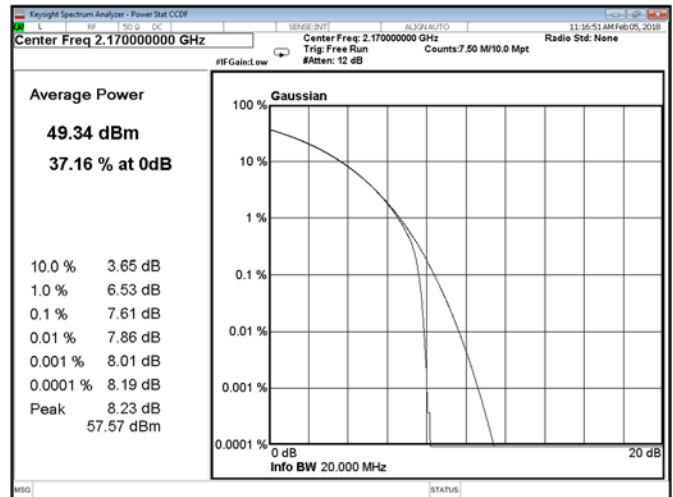
**Figure 8.1-83:** CCDF, 64QAM, Ant B, LTE 20 MHz, Low channel



**Figure 8.1-84:** CCDF, 256QAM, Ant B, LTE 20 MHz, Low channel



**Figure 8.1-85:** CCDF, QPSK, Ant B, LTE 20 MHz, Mid channel



**Figure 8.1-86:** CCDF, QPSK, Ant B, LTE 20 MHz, High channel

## 8.2 FCC 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector

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### 8.2.1 Definitions and limits

---

**FCC:**

(h) AWS emission limits

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

(3) Measurement procedure.

(i) Compliance with this provision 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 licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter 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 dB below the transmitter power.

(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

**RSS-139, Section 6.6:**

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

### 8.2.2 Test summary

---

|               |                  |
|---------------|------------------|
| Test date     | February 5, 2018 |
| Test engineer | Andrey Adelberg  |

### 8.2.3 Observations, settings and special notes

---

The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.

All measurements were performed using an average (RMS) detector.

Limit line was adjusted for MIMO 2x2 operation by 3 dB (for 2 ports:  $10 \times \log_{10}(2)$ ):  $-13 \text{ dBm} - 3 \text{ dB} = -16 \text{ dBm}$

RBW 1 MHz, VBW was wider than RBW.

|                      |                                                                          |
|----------------------|--------------------------------------------------------------------------|
| <b>Section 8</b>     | Testing data                                                             |
| <b>Test name</b>     | Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector |
| <b>Specification</b> | FCC Part 27, RSS-139, Issue 3                                            |

## 8.2.4 Test data

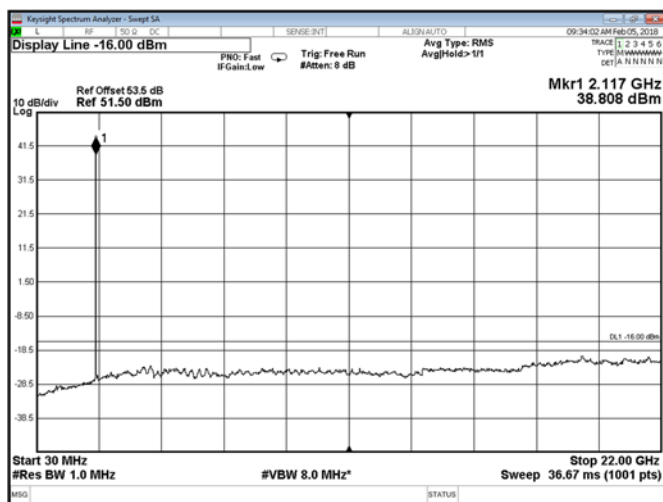


Figure 8.2-1: Conducted spurious emissions,  
Ant A, QPSK, low channel

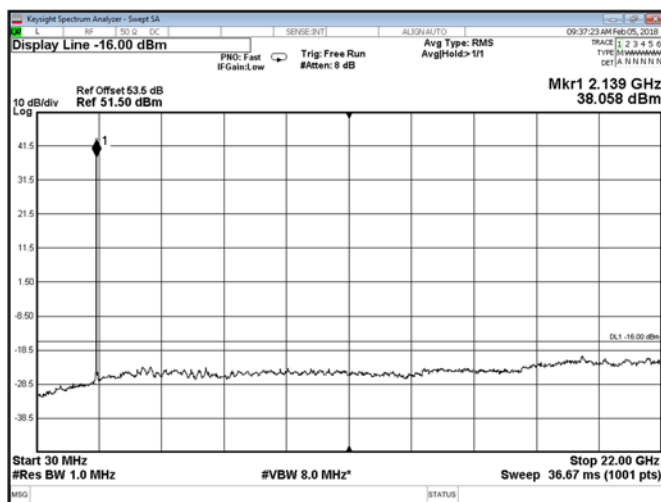


Figure 8.2-2: Conducted spurious emissions,  
Ant A, QPSK, mid channel

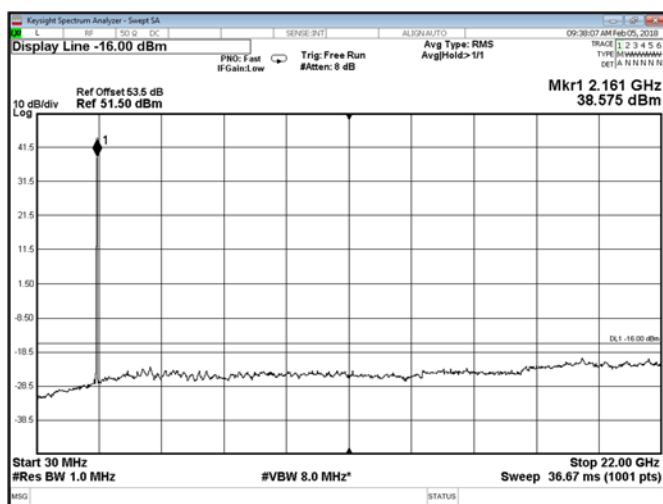


Figure 8.2-3: Conducted spurious emissions,  
Ant A, QPSK, high channel

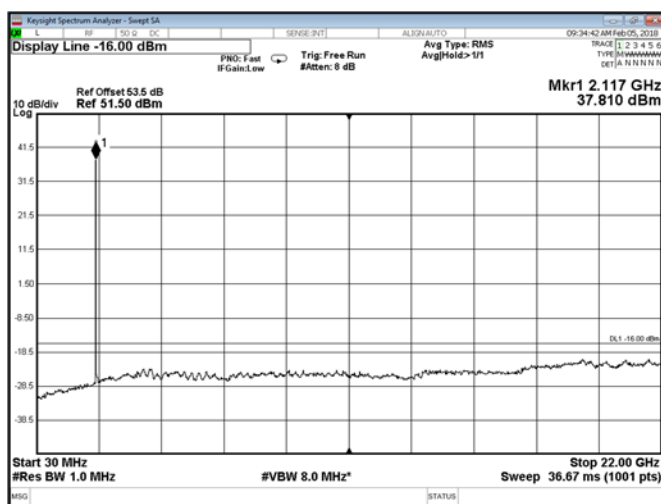
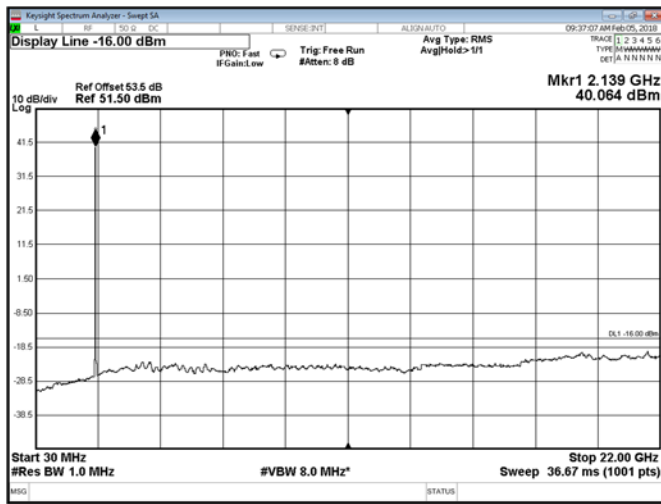


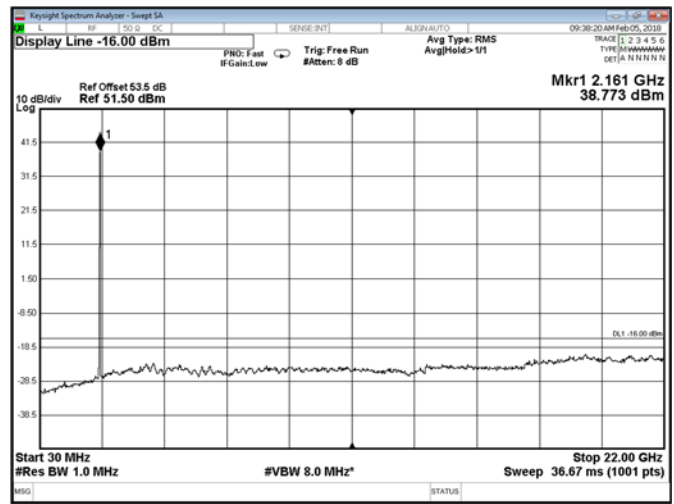
Figure 8.2-4: Conducted spurious emissions,  
Ant B, QPSK, low channel

**Section 8**  
**Test name**  
**Specification**

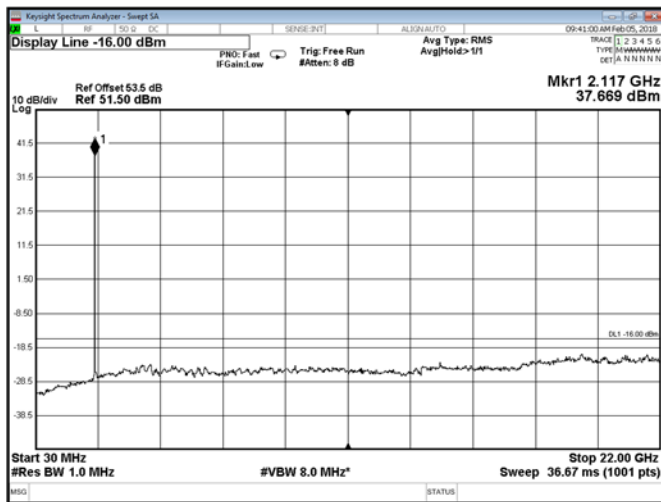
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



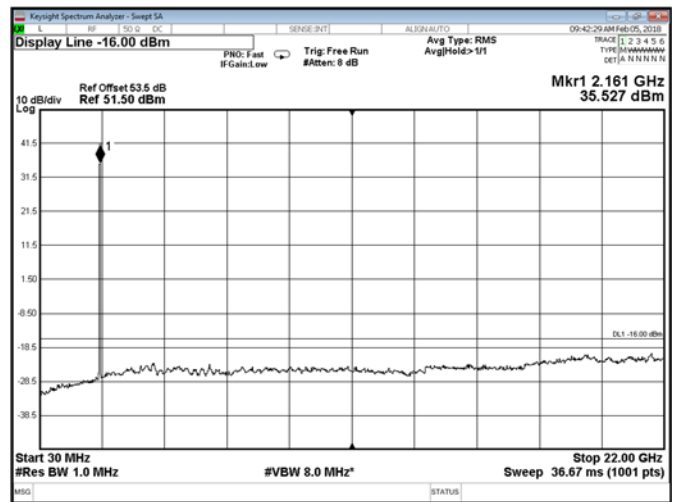
*Figure 8.2-5: Conducted spurious emissions, Ant B, QPSK, mid channel*



*Figure 8.2-6: Conducted spurious emissions, Ant B, QPSK, high channel*



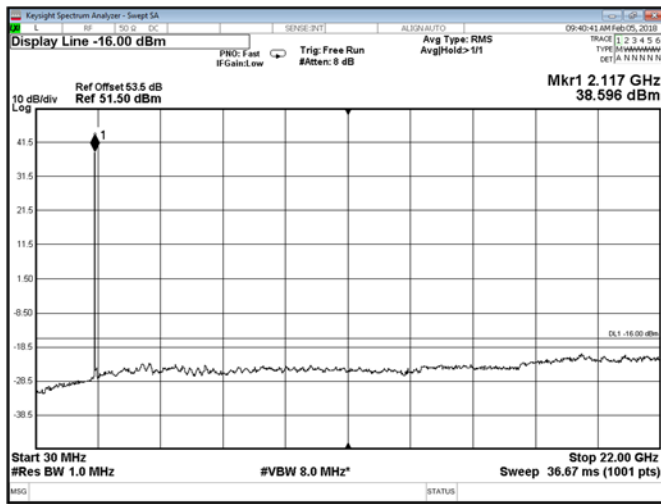
*Figure 8.2-7: Conducted spurious emissions, Ant A, QPSK, 2-carrier operation, bottom of the band*



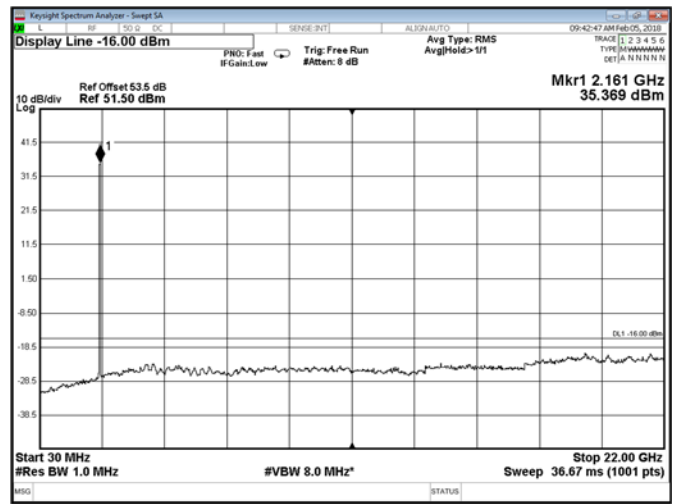
*Figure 8.2-8: Conducted spurious emissions, Ant A, QPSK, 2-carrier operation, top of the band*

**Section 8**  
**Test name**  
**Specification**

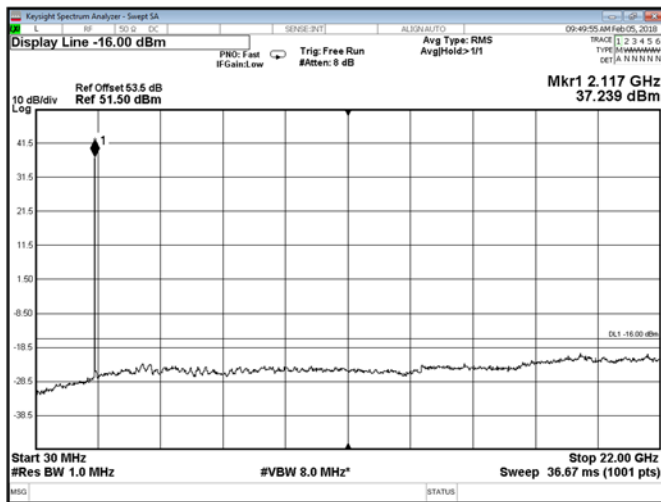
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



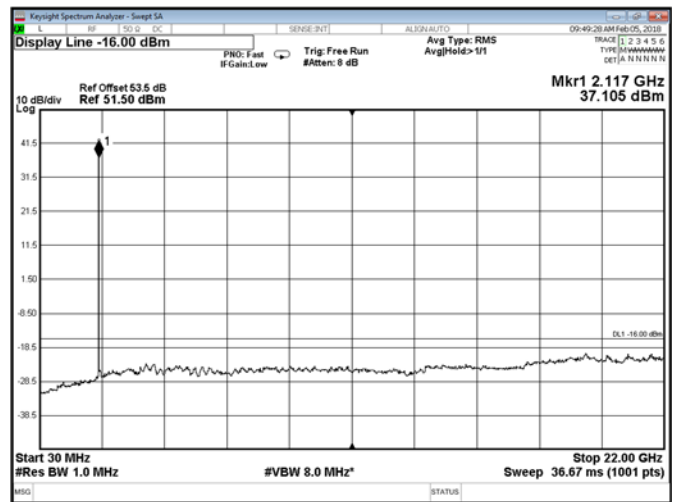
**Figure 8.2-9:** Conducted spurious emissions, Ant B, QPSK, 2-carrier operation, bottom of the band



**Figure 8.2-10:** Conducted spurious emissions, Ant B, QPSK, 2-carrier operation, top of the band



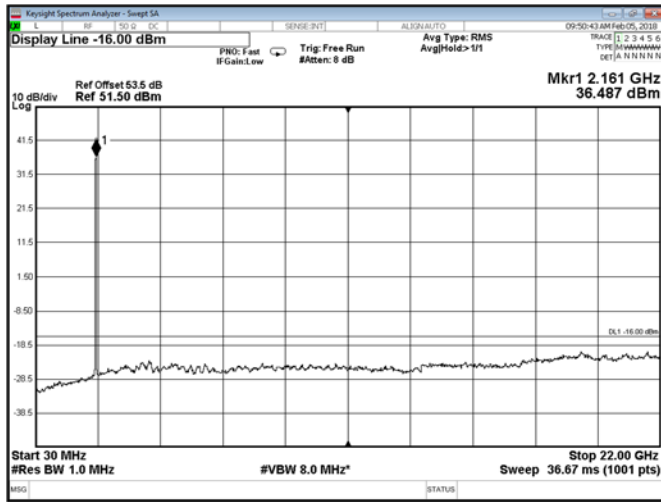
**Figure 8.2-11:** Conducted spurious emissions, Ant A, QPSK, multi-RAT operation, WCDMA and LTE at bottom of the band



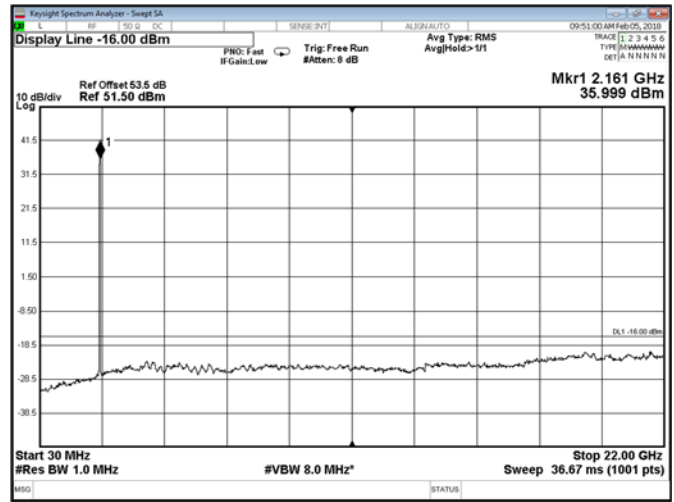
**Figure 8.2-12:** Conducted spurious emissions, Ant B, QPSK, multi-RAT operation, WCDMA and LTE at bottom of the band

**Section 8**  
**Test name**  
**Specification**

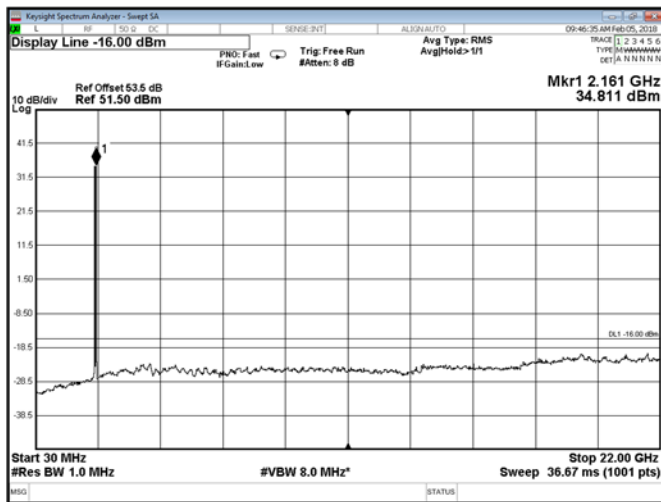
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



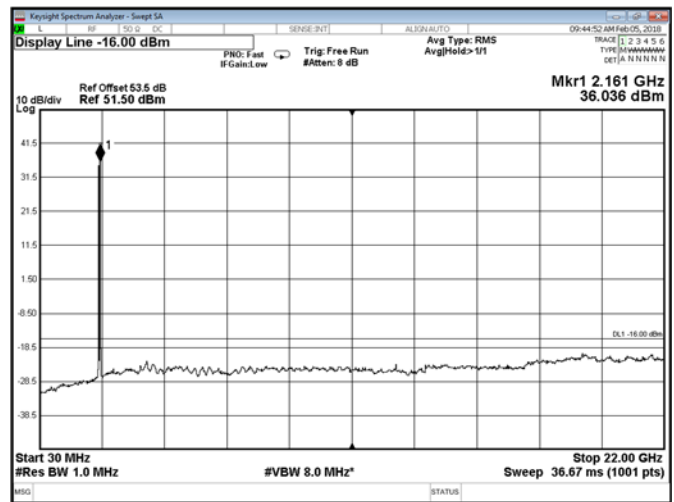
**Figure 8.2-13:** Conducted spurious emissions, Ant A, QPSK, multi-RAT operation, WCDMA and LTE at top of the band



**Figure 8.2-14:** Conducted spurious emissions, Ant B, QPSK, multi-RAT operation, WCDMA and LTE at top of the band



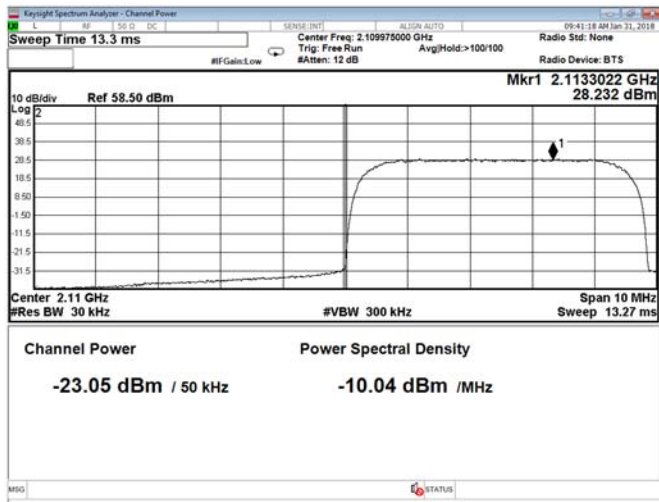
**Figure 8.2-15:** Conducted spurious emissions, Ant A, QPSK, multi-RAT operation, WCDMA and LTE at IBW = 60 MHz



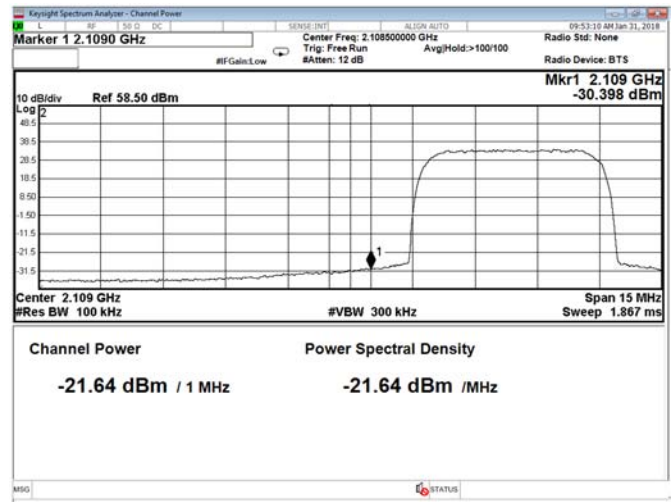
**Figure 8.2-16:** Conducted spurious emissions, Ant B, QPSK, multi-RAT operation, WCDMA and LTE at IBW = 60 MHz

**Section 8**  
**Test name**  
**Specification**

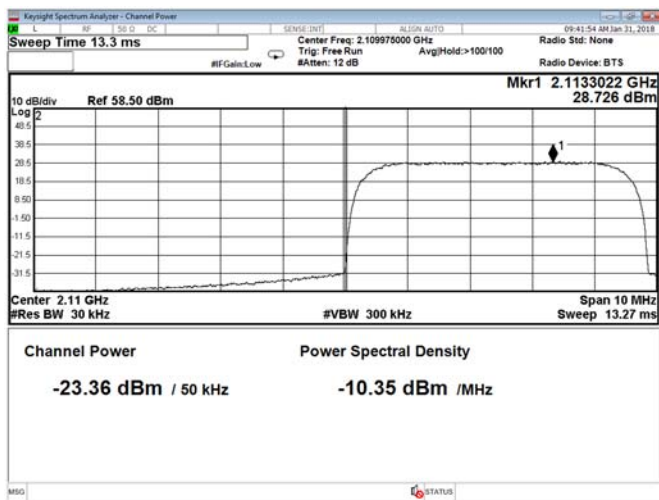
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



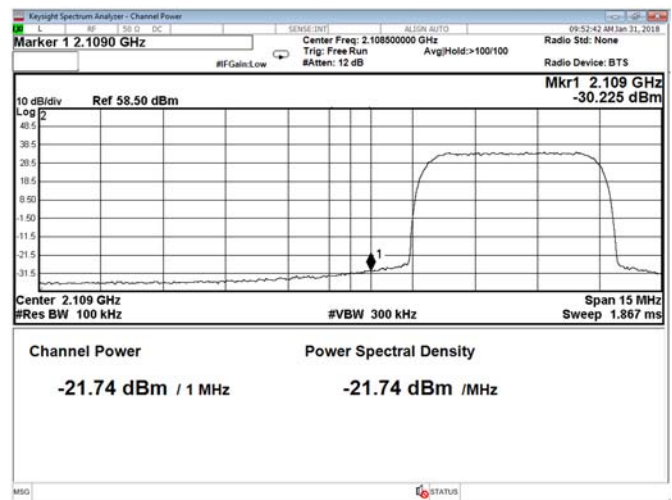
**Figure 8.2-17:** Conducted band edge emission at 2110 MHz,  
 Ant A, QPSK (RBW = 1% of EBW)



**Figure 8.2-18:** Conducted band edge emission at 2109 MHz,  
 Ant A, QPSK (RBW = 1 MHz)



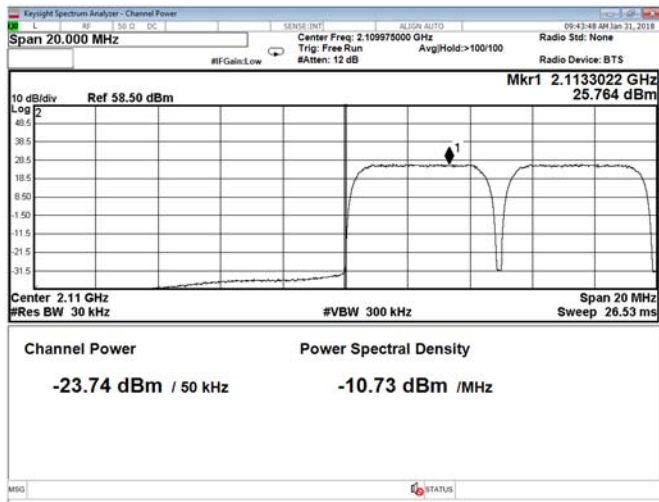
**Figure 8.2-19:** Conducted band edge emission at 2110 MHz,  
 Ant B, QPSK (RBW = 1% of EBW)



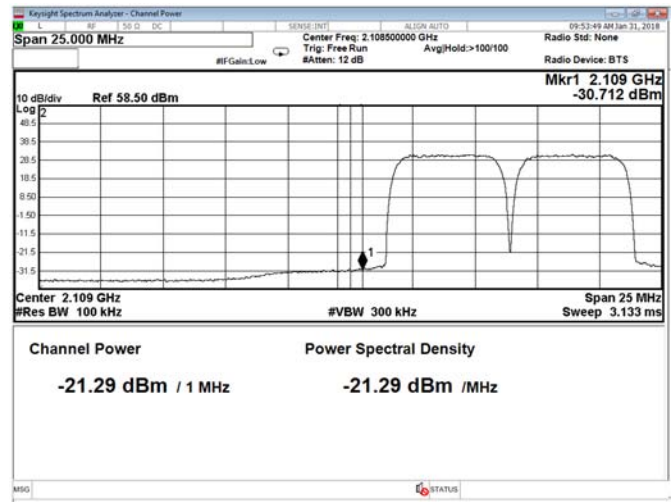
**Figure 8.2-20:** Conducted band edge emission at 2109 MHz,  
 Ant B, QPSK (RBW = 1 MHz)

**Section 8**  
**Test name**  
**Specification**

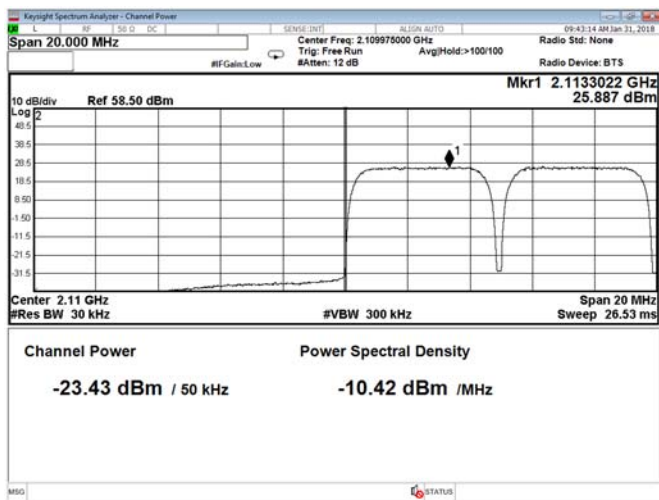
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



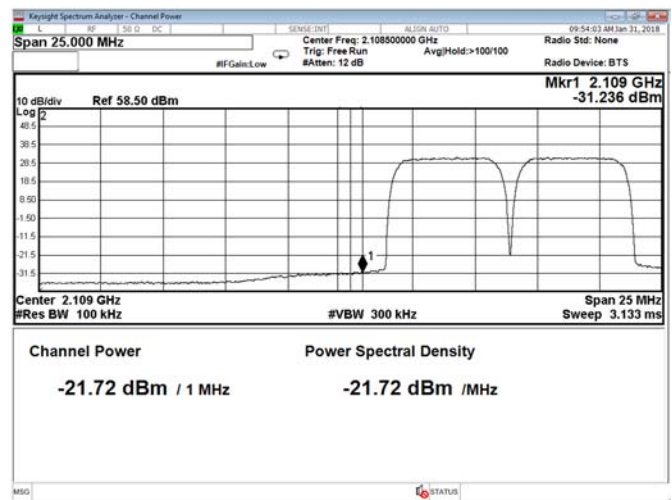
**Figure 8.2-21:** Conducted band edge emission at 2110 MHz,  
 Ant A, QPSK, 2-carrier operation (RBW = 1% of EBW)



**Figure 8.2-22:** Conducted band edge emission at 2109 MHz,  
 Ant A, QPSK 2-carrier operation (RBW = 1 MHz)



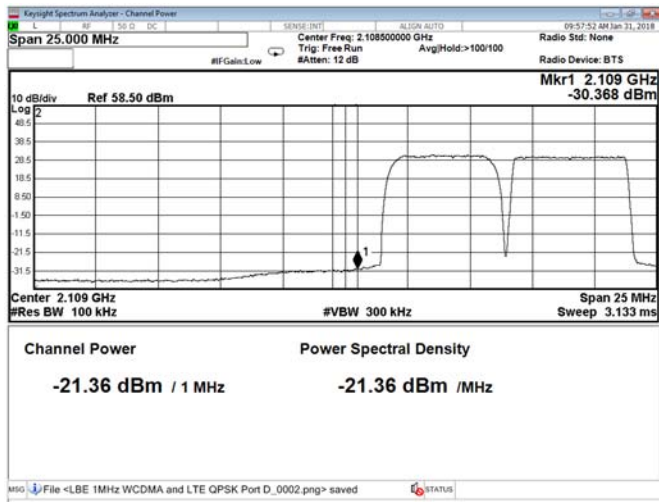
**Figure 8.2-23:** Conducted band edge emission at 2110 MHz,  
 Ant B, QPSK, 2-carrier operation (RBW = 1% of EBW)



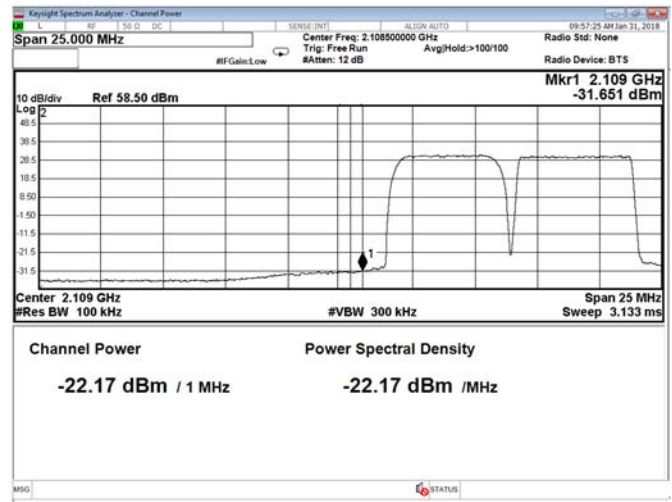
**Figure 8.2-24:** Conducted band edge emission at 2109 MHz,  
 Ant B, QPSK 2-carrier operation (RBW = 1 MHz)

**Section 8**  
**Test name**  
**Specification**

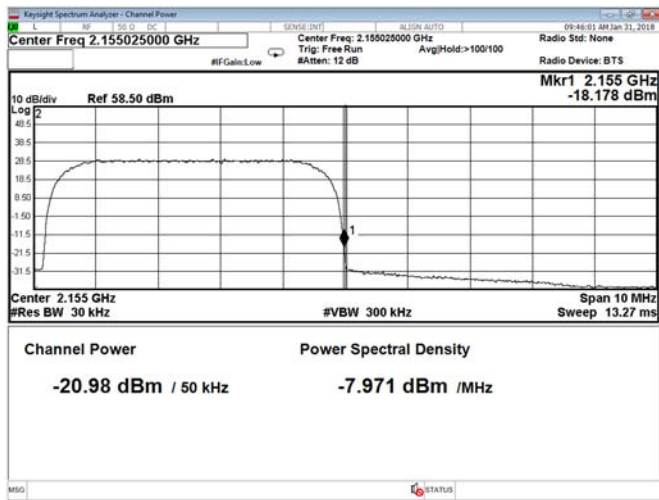
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



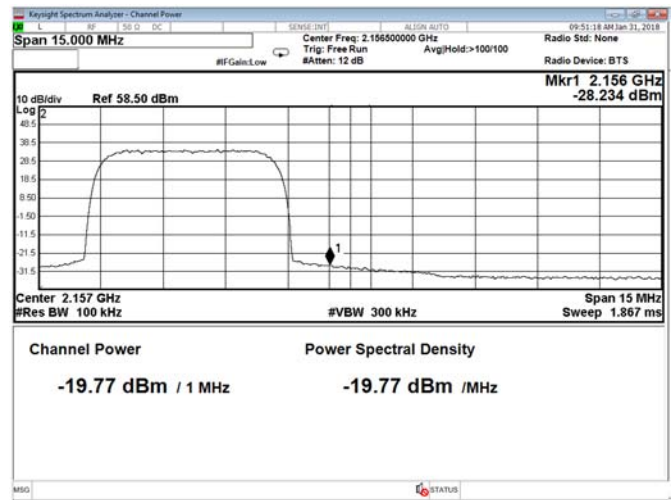
**Figure 8.2-25:** Conducted band edge emission at 2110 MHz, Ant A, QPSK, multi-RAT operation WCDMA and LTE (RBW = 1% of EBW)



**Figure 8.2-26:** Conducted band edge emission at 2109 MHz, Ant A, QPSK multi-RAT operation WCDMA and LTE (RBW = 1 MHz)



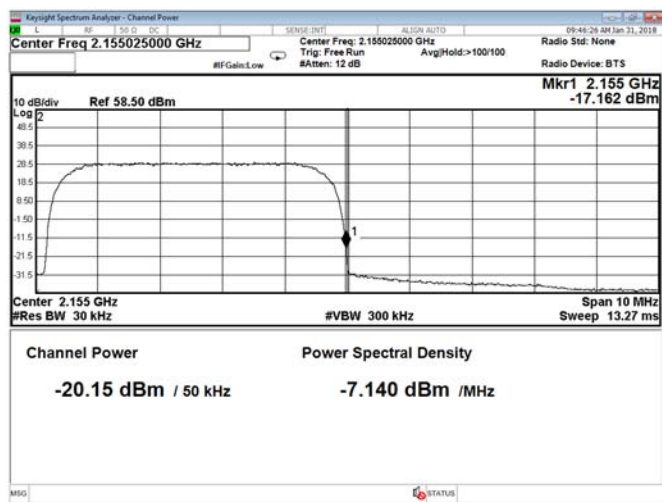
**Figure 8.2-27:** Conducted band edge emission at 2180 MHz, Ant A, QPSK (RBW = 1% of EBW)



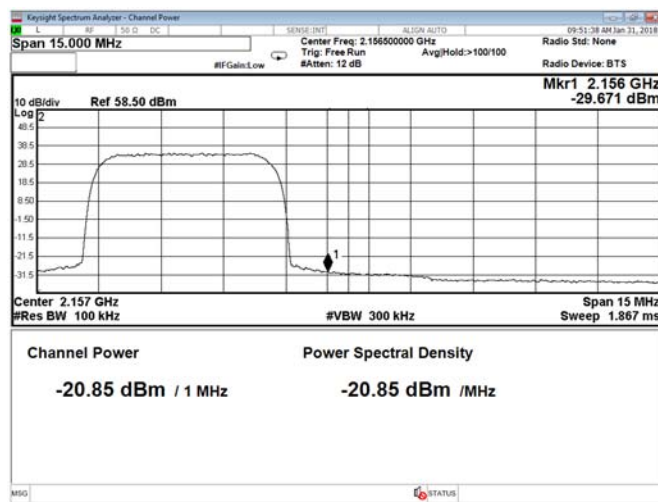
**Figure 8.2-28:** Conducted band edge emission at 2181 MHz, Ant A, QPSK (RBW = 1 MHz)

**Section 8**  
**Test name**  
**Specification**

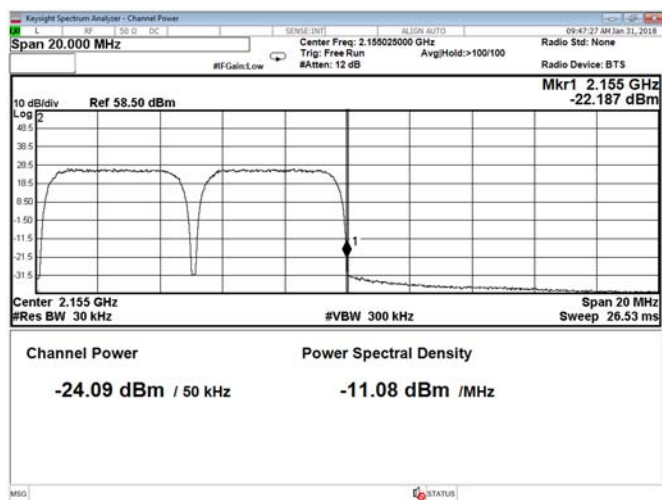
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



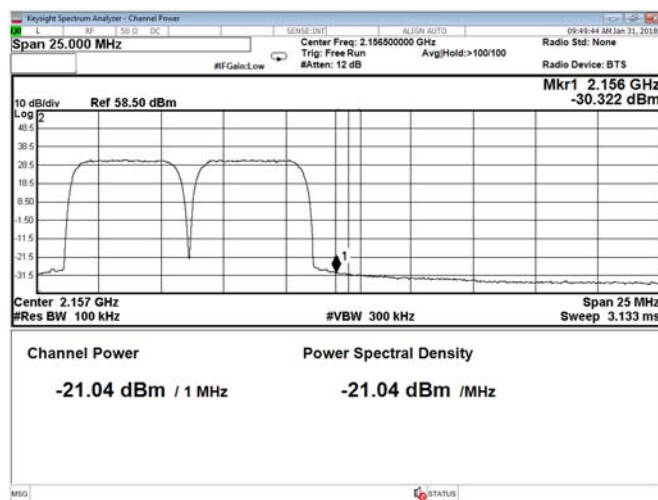
**Figure 8.2-29:** Conducted band edge emission at 2180 MHz,  
 Ant B, QPSK (RBW = 1% of EBW)



**Figure 8.2-30:** Conducted band edge emission at 2181 MHz,  
 Ant B, QPSK (RBW = 1 MHz)



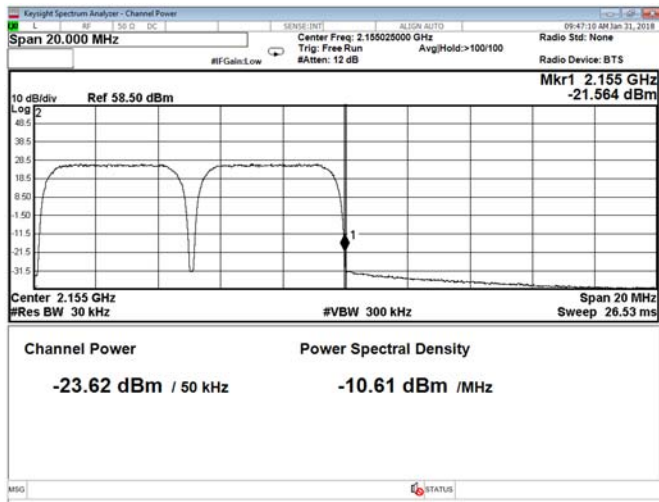
**Figure 8.2-31:** Conducted band edge emission at 2180 MHz,  
 Ant A, QPSK, 2-carrier operation (RBW = 1% of EBW)



**Figure 8.2-32:** Conducted band edge emission at 2181 MHz,  
 Ant A, QPSK, 2-carrier operation (RBW = 1 MHz)

**Section 8**  
**Test name**  
**Specification**

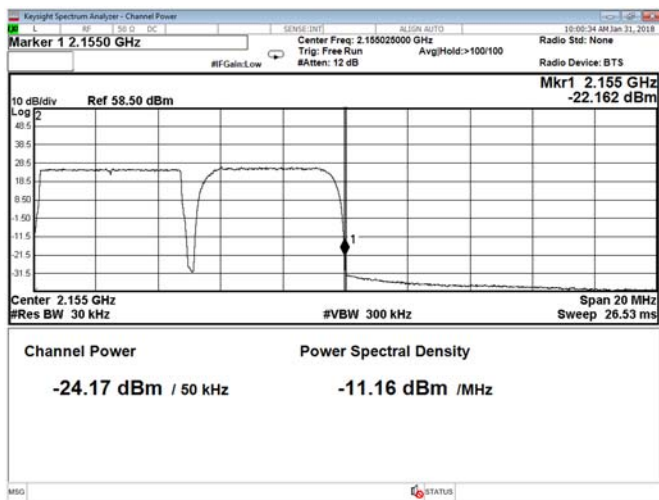
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



**Figure 8.2-33:** Conducted band edge emission at 2180 MHz,  
 Ant B, QPSK, 2-carrier operation (RBW = 1% of EBW)



**Figure 8.2-34:** Conducted band edge emission at 2181 MHz,  
 Ant B, QPSK, 2-carrier operation (RBW = 1 MHz)



**Figure 8.2-35:** Conducted band edge emission at 2180 MHz,  
 Ant A, QPSK, multi-RAT operation LTE and WCDMA (RBW = 1% of EBW)



**Figure 8.2-36:** Conducted band edge emission at 2181 MHz,  
 Ant A, QPSK, multi-RAT operation LTE and WCDMA (RBW = 1 MHz)

|               |                                                                          |
|---------------|--------------------------------------------------------------------------|
| Section 8     | Testing data                                                             |
| Test name     | Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector |
| Specification | FCC Part 27, RSS-139, Issue 3                                            |

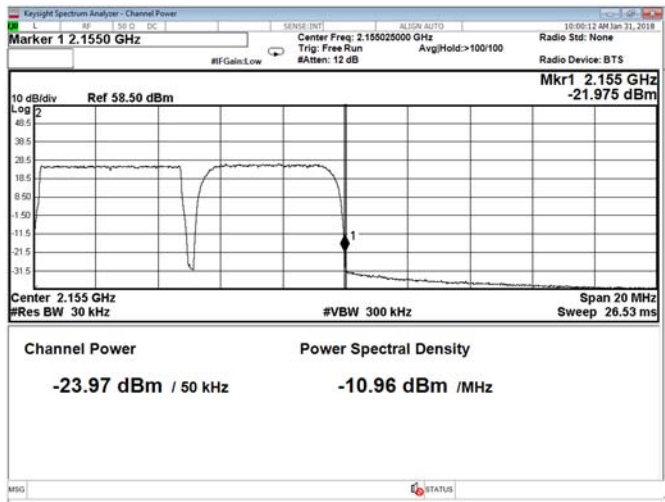


Figure 8.2-37: Conducted band edge emission at 2180 MHz, Ant B, QPSK, multi-RAT operation LTE and WCDMA (RBW = 1% of EBW)

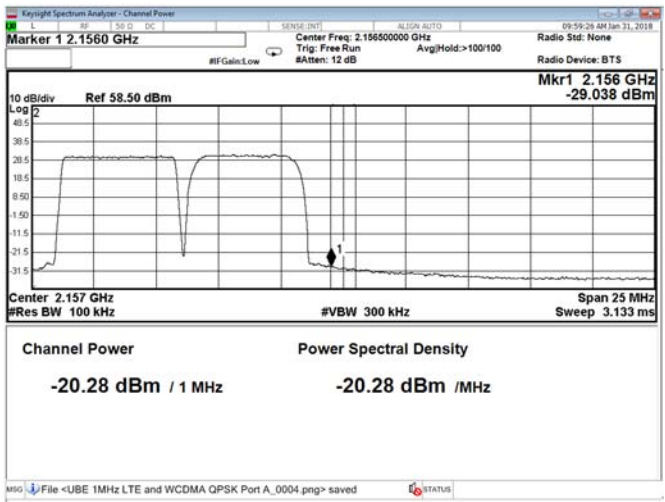
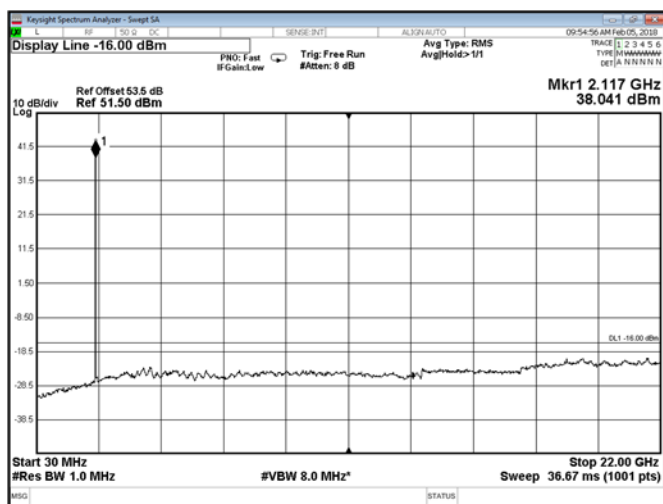


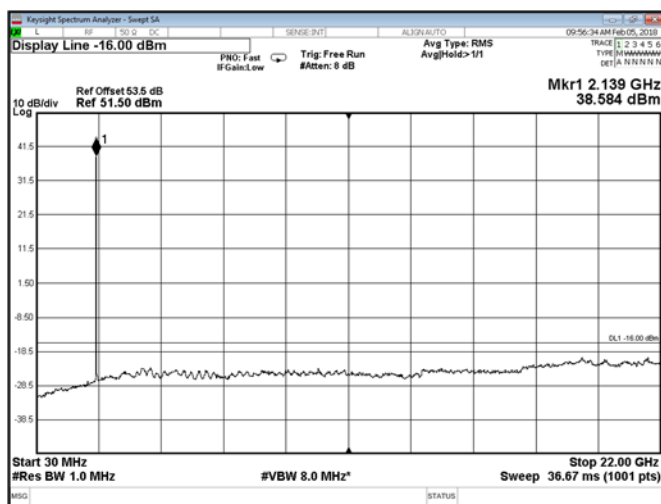
Figure 8.2-38: Conducted band edge emission at 2181 MHz, Ant B, QPSK, multi-RAT operation LTE and WCDMA (RBW = 1 MHz)

**Section 8**  
**Test name**  
**Specification**

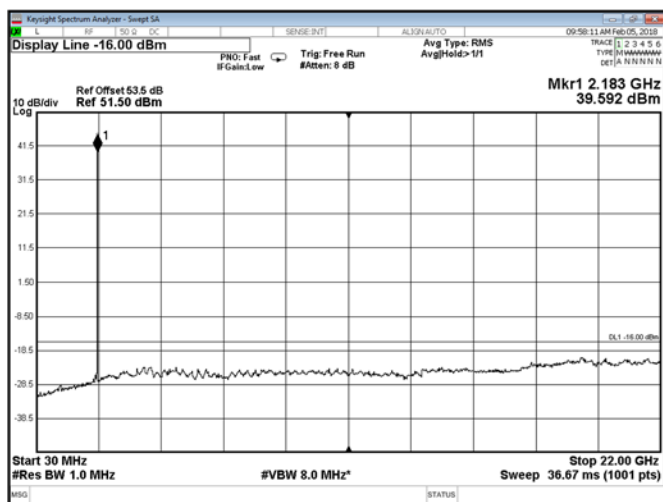
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



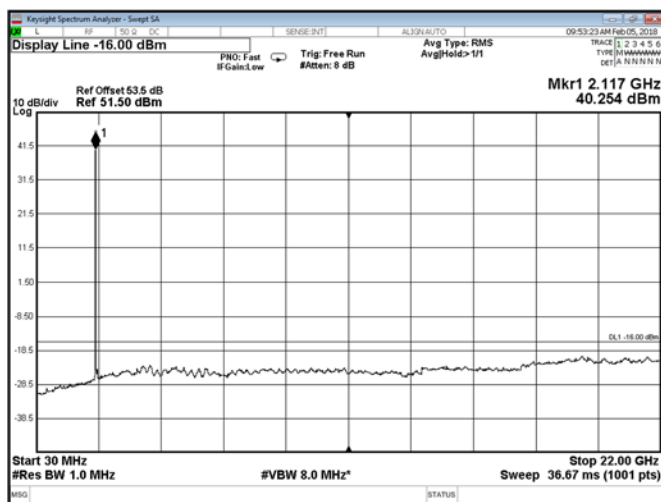
**Figure 8.2-39:** Conducted spurious emissions, Ant A, NB IoT, QPSK, LTE 5 MHz, low channel



**Figure 8.2-40:** Conducted spurious emissions, Ant A, NB IoT, QPSK, LTE 5 MHz, mid channel



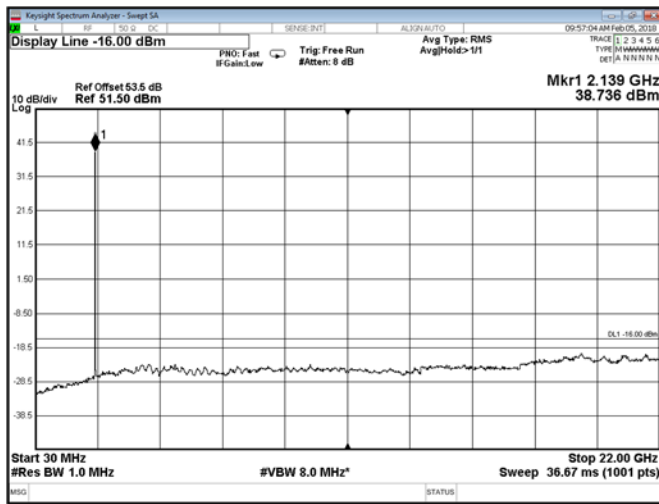
**Figure 8.2-41:** Conducted spurious emissions, Ant A, NB IoT, QPSK, LTE 5 MHz, high channel



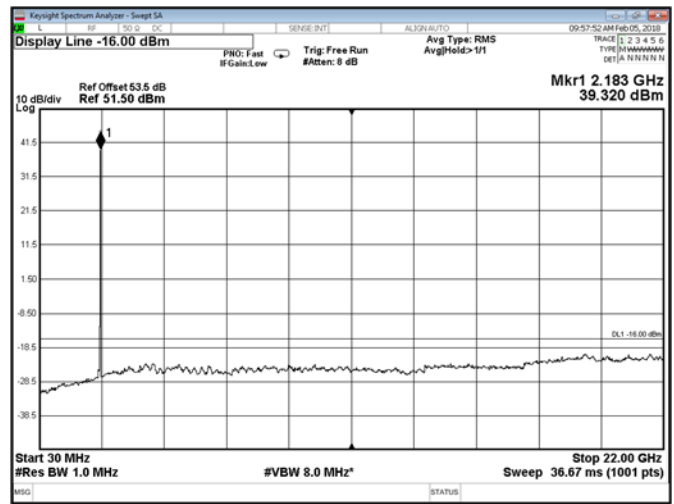
**Figure 8.2-42:** Conducted spurious emissions, Ant B, NB IoT, QPSK, LTE 5 MHz, low channel

**Section 8**  
**Test name**  
**Specification**

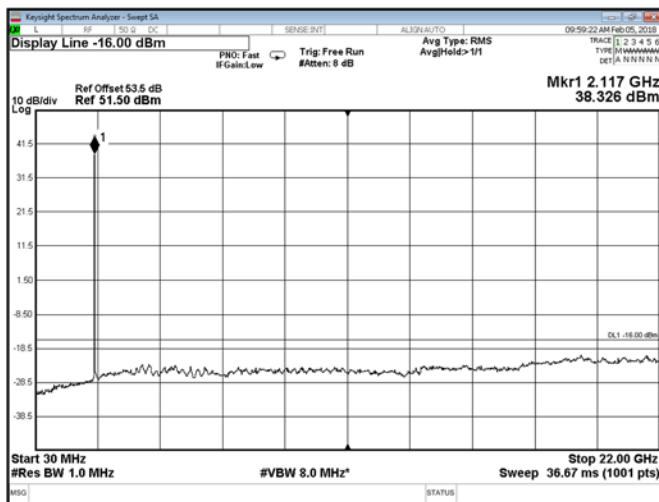
Testing data  
 Clause 27.53 and RSS-139, 4.2 Spurious emissions at RF antenna connector  
 FCC Part 27, RSS-139, Issue 3



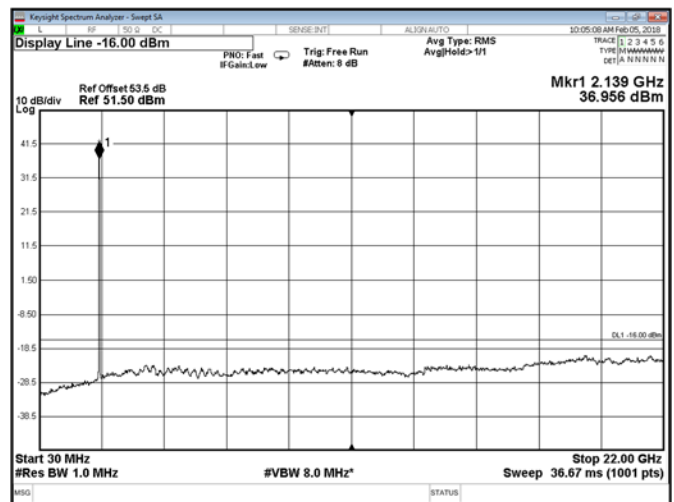
**Figure 8.2-43:** Conducted spurious emissions, Ant B, NB IoT, QPSK, LTE 5 MHz, mid channel



**Figure 8.2-44:** Conducted spurious emissions, Ant B, NB IoT, QPSK, LTE 5 MHz, high channel



**Figure 8.2-45:** Conducted spurious emissions, Ant A, NB IoT, QPSK, LTE 10 MHz, low channel



**Figure 8.2-46:** Conducted spurious emissions, Ant A, NB IoT, QPSK, LTE 10 MHz, mid channel