

# Test report

**316884-1TRFWL**

Date of issue: November 10, 2016

Applicant:

**Redline Communications**

Product:

**Broad-band wireless infrastructure product**

Model:

**RDL-3000-RMG**

FCC ID:

**QC8-RDL3000RMG**

IC Registration number:

**4310A-RDL3000RMG**

Specifications:

◆ **FCC 47 CFR Part 15 Subpart E, §15.407**

Unlicensed National Information Infrastructure Devices

◆ **RSS-247, Issue 1, Section 6, May 2015**

Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs)  
and Licence-Exempt Local Area Network (LE-LAN) Devices

#### Test location

|              |                                                      |
|--------------|------------------------------------------------------|
| Company name | Nemko Canada Inc.                                    |
| Address      | 303 River Road                                       |
| City         | Ottawa                                               |
| Province     | Ontario                                              |
| Postal code  | K1V 1H2                                              |
| Country      | Canada                                               |
| Telephone    | +1 613 737 9680                                      |
| Facsimile    | +1 613 737 9691                                      |
| Toll free    | +1 800 563 6336                                      |
| Website      | www.nemko.com                                        |
| Site number  | FCC: 176392; IC: 2040A-4 (3 m semi anechoic chamber) |

|                    |                                                                                     |
|--------------------|-------------------------------------------------------------------------------------|
| Tested by          | Andrey Adelberg, Senior Wireless/EMC Specialist                                     |
| Reviewed by        | Kevin Rose, Wireless/EMC Specialist                                                 |
| Review date        | November 10, 2016                                                                   |
| Reviewer signature |  |

#### 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.

#### Copyright notification

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.  
© Nemko Canada Inc.

## 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 Test methods                                                                                        | 4         |
| 1.4 Statement of compliance                                                                             | 4         |
| 1.5 Exclusions                                                                                          | 4         |
| 1.6 Test report revision history                                                                        | 4         |
| <b>Section 2. Summary of test results</b>                                                               | <b>5</b>  |
| 2.1 FCC Part 15 Subpart C, general requirements test results                                            | 5         |
| 2.2 FCC Part 15 Subpart E, test results                                                                 | 5         |
| 2.3 RSS-Gen, Issue 4, test results                                                                      | 5         |
| 2.4 IC RSS-247, Issue 1, test results                                                                   | 6         |
| <b>Section 3. Equipment under test (EUT) details</b>                                                    | <b>7</b>  |
| 3.1 Sample information                                                                                  | 7         |
| 3.2 EUT information                                                                                     | 7         |
| 3.3 Technical information                                                                               | 7         |
| 3.4 Product description and theory of operation                                                         | 7         |
| 3.5 EUT exercise details                                                                                | 7         |
| 3.6 EUT setup diagram                                                                                   | 8         |
| 3.7 EUT sub assemblies                                                                                  | 8         |
| <b>Section 4. Engineering considerations</b>                                                            | <b>9</b>  |
| 4.1 Modifications incorporated in the EUT                                                               | 9         |
| 4.2 Technical judgment                                                                                  | 9         |
| 4.3 Deviations from laboratory tests procedures                                                         | 9         |
| <b>Section 5. Test conditions</b>                                                                       | <b>10</b> |
| 5.1 Atmospheric conditions                                                                              | 10        |
| 5.2 Power supply range                                                                                  | 10        |
| <b>Section 6. Measurement uncertainty</b>                                                               | <b>11</b> |
| 6.1 Uncertainty of measurement                                                                          | 11        |
| <b>Section 7. Test equipment</b>                                                                        | <b>12</b> |
| 7.1 Test equipment list                                                                                 | 12        |
| <b>Section 8. Testing data</b>                                                                          | <b>13</b> |
| 8.1 FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits | 13        |
| 8.2 FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions                                | 23        |
| <b>Section 9. Block diagrams of test set-ups</b>                                                        | <b>39</b> |
| 9.1 Radiated emissions set-up for frequencies below 1 GHz                                               | 39        |
| 9.2 Radiated emissions set-up for frequencies above 1 GHz                                               | 40        |

## Section 1. Report summary

### 1.1 Applicant and manufacturer

|              |                                                     |
|--------------|-----------------------------------------------------|
| Company name | Redline Communications                              |
| Address      | 302 Town Center Blvd., Markham, ON, Canada, L3R 0E8 |

### 1.2 Test specifications

|                                              |                                                                                                                              |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| FCC 47 CFR Part 15, Subpart E, Clause 15.407 | Unlicensed National Information Infrastructure Devices                                                                       |
| RSS-247, Issue 1                             | Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |

### 1.3 Test methods

|                                                                            |                                                                                                                        |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedures New Rules v01r03 (August 22, 2016) | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E |
| FCC 16-24 (March 2, 2016)                                                  | Memorandum opinion and order for U-NII-3 (5.725–5.85 GHz) band                                                         |
| 662911 D01 Multiple Transmitter Output v02r01 (October 31, 2013)           | Emissions Testing of Transmitters with Multiple Outputs in the Same Band                                               |
| 662911 D02 MIMO with Cross Polarized Antenna v01 (October 25, 2011)        | Emissions testing of transmitters with multiple outputs in the same band (MIMO) with Cross Polarized Antenna           |
| ANSI C63.10 v2013                                                          | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                         |

### 1.4 Statement of compliance

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. The test results relate only to the items tested.

See “Summary of test results” for full details.

### 1.5 Exclusions

None

### 1.6 Test report revision history

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

## Section 2. Summary of test results

### 2.1 FCC Part 15 Subpart C, general requirements test results

| Part      | Test description          | Verdict           |
|-----------|---------------------------|-------------------|
| §15.31(e) | Variation of power source | Pass <sup>1</sup> |
| §15.203   | Antenna requirement       | Pass <sup>2</sup> |

Notes: <sup>1</sup> Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

<sup>2</sup> The EUT is a professionally installed equipment.

### 2.2 FCC Part 15 Subpart E, test results

| Part                       | Test description                                                       | Verdict        |
|----------------------------|------------------------------------------------------------------------|----------------|
| §15.403(i)                 | Emission bandwidth                                                     | Pass           |
| §15.407(a)(1)              | Power and density limits within 5.15–5.25 GHz band                     | Not applicable |
| §15.407(a)(2)              | Power and density limits within 5.25–5.35 GHz and 5.47–5.725 GHz bands | Not applicable |
| §15.407(a)(3)              | Power and density limits within 5.725–5.85 GHz band                    | Pass           |
| §15.407(b)(1)              | Undesirable emission limits for 5.15–5.25 GHz band                     | Not applicable |
| §15.407(b)(2)              | Undesirable emission limits for 5.25–5.35 GHz band                     | Not applicable |
| §15.407(b)(3)              | Undesirable emission limits for 5.47–5.725 GHz bands                   | Not applicable |
| §15.407(b)(4)              | Undesirable emission limits for 5.725–5.85 GHz band                    | Pass           |
| §15.407(b)(6)              | Conducted limits for U-NII devices using an AC power line              | Pass           |
| §15.407(e)                 | Minimum 6 dB bandwidth of U-NII devices within the 5.725-5.85 GHz band | Pass           |
| §15.407(g)                 | Frequency stability                                                    | Pass           |
| §15.407(h)(1) <sup>1</sup> | Transmit power control (TPC)                                           | Not applicable |
| §15.407(h)(2) <sup>1</sup> | Dynamic Frequency Selection (DFS)                                      | Not applicable |

Notes: <sup>1</sup> DFS and TPC requirements are only applicable to 5.25–5.35 GHz and 5.47–5.725 GHz bands

### 2.3 RSS-Gen, Issue 4, test results

| Part               | Test description                                                         | Verdict        |
|--------------------|--------------------------------------------------------------------------|----------------|
| 6.6                | Occupied Bandwidth                                                       | Pass           |
| 7.1.2 <sup>1</sup> | Receiver radiated emission limits                                        | Not applicable |
| 7.1.3 <sup>1</sup> | Receiver conducted emission limits                                       | Not applicable |
| 8.8                | Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus | Pass           |
| 8.11 <sup>2</sup>  | Frequency stability                                                      | Pass           |

Notes: <sup>1</sup> According to sections 5.2 and 5.3 of RSS-Gen, Issue 4: if EUT does not have a stand-alone receiver neither scanner receiver, then it exempt from receiver requirements.

<sup>2</sup> According to section 8.11 of RSS-Gen, Issue 4: if the frequency stability of the licence-exempt radio apparatus is not specified in the applicable standard (RSS), measurement of the frequency stability is not required

## 2.4 IC RSS-247, Issue 1, test results

| Section              | Test description                                                                                                    | Verdict        |
|----------------------|---------------------------------------------------------------------------------------------------------------------|----------------|
| 6.1 (1) <sup>1</sup> | Types of Modulation                                                                                                 | Pass           |
| 6.2.1 (1)            | Power limits for 5150–5250 MHz band                                                                                 | Not applicable |
| 6.2.2 (1)            | Power limits for 5250–5350 MHz band                                                                                 | Not applicable |
| 6.2.3 (1)            | Power limits for 5470–5600 MHz and 5650–5725 MHz bands                                                              | Not applicable |
| 6.2.4 (1)            | Power limits for 5725–5850 MHz band                                                                                 | Pass           |
| 6.2.4 (1)            | Minimum 6 dB bandwidth                                                                                              | Pass           |
| 6.2.1 (2)            | Unwanted emission limits for 5150–5250 MHz band                                                                     | Not applicable |
| 6.2.2 (2)            | Unwanted emission limits for 5250–5350 MHz band                                                                     | Not applicable |
| 6.2.2 (2)            | TPC requirements for devices with a maximum e.i.r.p. greater than 500 mW                                            | Not applicable |
| 6.2.2 (3)            | e.i.r.p. at different elevations restrictions for 5250–5350 MHz band                                                | Not applicable |
| 6.2.3 (2)            | Unwanted emission limits for 5470–5600 MHz and 5650–5725 MHz bands                                                  | Not applicable |
| 6.2.4 (2)            | Unwanted emission limits for 5725–5850 MHz band                                                                     | Pass           |
| 6.3                  | Dynamic Frequency Selection (DFS) for devices operating in the bands 5250–5350 MHz, 5470–5600 MHz and 5650–5725 MHz | Not applicable |

Notes: <sup>1</sup> The EUT employs digital modulations, such as: 802.11a, 802.11n HT20 and 802.11n HT40

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

### 3.1 Sample information

|                        |               |
|------------------------|---------------|
| Receipt date           | June 27, 2016 |
| Nemko sample ID number | 133-002686    |

### 3.2 EUT information

|               |                                            |
|---------------|--------------------------------------------|
| Product name  | Broad-band wireless infrastructure product |
| Model         | RDL-3000-RMG                               |
| Serial number | 149PC12480006                              |

### 3.3 Technical information

|                                         |                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant IC company number             | 4310A                                                                                                                                                                                                                                                                                                                            |
| IC UPN number                           | RDL3000RMG                                                                                                                                                                                                                                                                                                                       |
| All used IC test site(s) Reg. number    | 2040A-4                                                                                                                                                                                                                                                                                                                          |
| RSS number and Issue number             | RSS-247 Issue 1, Section 6, May 2015                                                                                                                                                                                                                                                                                             |
| Frequency band                          | 5725–5850 MHz                                                                                                                                                                                                                                                                                                                    |
| Frequency Min (MHz)                     | 5727.5 (5 MHz channel), 5730 (10 MHz channel), 5735 (20 MHz channel)                                                                                                                                                                                                                                                             |
| Frequency Max (MHz)                     | 5847.5 (5 MHz channel), 5845 (10 MHz channel), 5840 (20 MHz channel)                                                                                                                                                                                                                                                             |
| RF power Max (W), Conducted             | 0.242 (23.84 dBm for 5 MHz channel), 0.244 (23.87 dBm for 10 MHz channel), 0.284 (24.53 dBm for 20 MHz channel),                                                                                                                                                                                                                 |
| Field strength, Units @ distance        | N/A                                                                                                                                                                                                                                                                                                                              |
| Measured BW (kHz) (26 dB)               | 4690 (5 MHz channel), 9290 (10 MHz channel), 18750 (20 MHz channel)                                                                                                                                                                                                                                                              |
| Calculated BW (kHz), as per TRC-43      | N/A                                                                                                                                                                                                                                                                                                                              |
| Type of modulation                      | BPSK, QPSK, 16-QAM, 64-QAM, 128-QAM, 256-QAM                                                                                                                                                                                                                                                                                     |
| Emission classification (F1D, G1D, D1D) | W7D                                                                                                                                                                                                                                                                                                                              |
| Transmitter spurious, Units @ distance  | 45.08 dBμV/m (average) at 11.695 GHz @ 3 m                                                                                                                                                                                                                                                                                       |
| Power requirements                      | 48 V <sub>DC</sub> PoE via 120 V <sub>AC</sub> , 60 Hz                                                                                                                                                                                                                                                                           |
| Antenna information                     | 19 dBi Dual Polarization/ Dual Slant Subscriber Antenna 4.9–6.1 GHz, Redline 30-00328-50<br>10 dBi L-COM HG5158DP-10U, L-COM<br>24 dBi Dual Polarization Antenna 4.9–6.1 GHz, Redline 30-00362-00<br>32 dBi Redline A3FT3204LTPD Parabolic Antenna, 4.9–5.8 GHz, 4 degree, dual polarity<br>The EUT is professionally installed. |

### 3.4 Product description and theory of operation

The EUT is a 2×2 MIMO point-to-multipoint (PMP) and point-to-point (PTP) carrier grade broadband wireless infrastructure product, designed to operate in the 5725–5850 MHz band.

### 3.5 EUT exercise details

The EUT was controlled to transmit at desired frequency and modulation from laptop using web interface at IP address: 192.168.25.2

3.6 EUT setup diagram

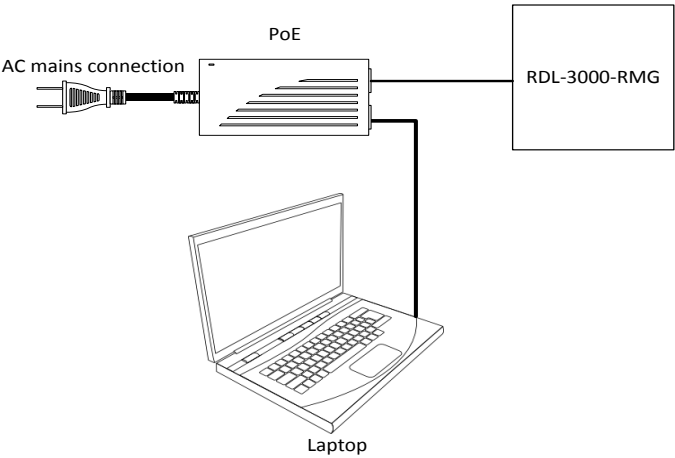


Figure 3.6-1: Setup diagram

3.7 EUT sub assemblies

Table 3.7-1: EUT sub assemblies

| Description | Brand name             | Model/Part number | Serial number |
|-------------|------------------------|-------------------|---------------|
| PoE         | Cincon Electronics Co. | TRG60A-POE-L      | 1127          |

## Section 4. Engineering considerations

---

### 4.1 Modifications incorporated in the EUT

---

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

### 4.2 Technical judgment

---

None

### 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

---

### 6.1 Uncertainty of measurement

---

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.   |
|-----------------------------|-----------------|--------------|-----------|-----------|-------------|
| 3 m EMI test chamber        | TDK             | SAC-3        | FA002047  | 1 year    | Dec. 01/16  |
| Flush mount turntable       | Sunol           | FM2022       | FA002082  | —         | NCR         |
| Controller                  | Sunol           | SC104V       | FA002060  | —         | NCR         |
| Antenna mast                | Sunol           | TLT2         | FA002061  | —         | NCR         |
| AC Power source             | Chenwa          | 2700M-10k    | FA002716  | —         | VOU         |
| Receiver/spectrum analyzer  | Rohde & Schwarz | ESU 26       | FA002043  | 1 year    | Jan. 07/17  |
| Spectrum analyzer           | Rohde & Schwarz | FSU          | FA001877  | 1 year    | Apr. 15/17  |
| Bilog antenna (20–3000 MHz) | Sunol           | JB3          | FA002108  | 1 year    | Apr. 28/17  |
| Horn antenna (1–18 GHz)     | EMCO            | 3115         | FA000825  | 1 year    | Apr. 26/17  |
| Horn antenna 18–40 GHz      | EMCO            | 3116         | FA001847  | 1 year    | Apr. 15/17  |
| Pre-amplifier (1–18 GHz)    | JCA             | JCA118-503   | FA002091  | 1 year    | April 26/17 |
| Pre-amplifier (18–26 GHz)   | Narda           | BBS-1826N612 | FA001550  | —         | VOU         |
| Pre-amplifier (26–40 GHz)   | Narda           | DBL-2640N610 | FA001556  | —         | VOU         |
| LISN                        | Rohde & Schwarz | ENV216       | FA002023  | 1 year    | Mar. 08/17  |
| Temperature chamber         | Espec           | EPX-4H       | FA002735  | 1 year    | Jan 26/17   |

Note: NCR - no calibration required, VOU - verify on use

## Section 8. Testing data

### 8.1 FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

#### 8.1.1 Definitions and limits

##### FCC:

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

##### IC:

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

#### 8.1.2 Test summary

|                |                 |                    |           |
|----------------|-----------------|--------------------|-----------|
| Test date:     | June 28, 2016   | Temperature:       | 21 °C     |
| Test engineer: | Andrey Adelberg | Air pressure:      | 1010 mbar |
| Verdict:       | Pass            | Relative humidity: | 31 %      |

#### 8.1.3 Observations, settings and special notes

The test was performed according to guidelines section E.2.b Method SA-1: power averaging (rms) detection with slow sweep and EUT transmitting continuously at full power.

EBW (26 dB BW) for 5 MHz channel is 4.78 MHz, for 10 MHz channel is 9.39 MHz and for 20 MHz channel is 18.59 MHz.

For the channel power measurements, span was set to 150 % of EBW: for 5 MHz channel the span was 7.2 MHz, for 10 MHz channel the span was 14 MHz and for 20 MHz channel the span was set to 28 MHz.

Output power calculation for 10 dBi antenna: 30 dBm – (10 dBi – 6 dBi) = 26 dBm; for 19 dBi antenna: 30 dBm – (19 dBi – 6 dBi) = 17 dBm and for 32 dBi antenna: 30 dBm – (32 dBi – 6 dBi) = 4 dBm.

Combined average output power was calculated as follows:

$$P_{combined} = 10 \times \log_{10} \left( (10^{P_{ch0}/10}) + (10^{P_{ch1}/10}) \right)$$

EIRP was calculated as follows:

$$EIRP = P_{combined} + \text{antenna gain}$$

For antennas with the directional gain greater than 6 dBi, the maximum power spectral density limit was calculated as follows:

For 10 dBi antenna: 30 dBm/500 kHz – (10 dBi – 6 dBi) = 26 dBm/500 kHz; for 19 dBi antenna: 30 dBm/500 kHz – (19 dBi – 6 dBi) = 17 dBm/500 kHz and for 32 dBi antenna: 30 dBm/500 kHz – (32 dBi – 6 dBi) = 4 dBm/500 kHz.

#### 8.1.4 Test data

**Table 8.1-1:** Output power measurements and EIRP calculations results for 5 MHz channel and PMP 10 dBi (and PTP 19 and 24 dBi) antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5727.5         | 17.63                     | 17.39                     | 20.52                       | 26.00                   | 5.48                    | 10.00             | 30.52     | 36.00           | 5.48            |
|            | 5790.0         | 20.72                     | 20.84                     | 23.79                       | 26.00                   | 2.21                    | 10.00             | 33.79     | 36.00           | 2.21            |
|            | 5847.5         | 18.77                     | 19.31                     | 22.06                       | 26.00                   | 3.94                    | 10.00             | 32.06     | 36.00           | 3.94            |
| 256-QAM    | 5727.5         | 17.64                     | 17.14                     | 20.41                       | 26.00                   | 5.59                    | 10.00             | 30.41     | 36.00           | 5.59            |
|            | 5790.0         | 20.77                     | 20.89                     | 23.84                       | 26.00                   | 2.16                    | 10.00             | 33.84     | 36.00           | 2.16            |
|            | 5847.5         | 18.82                     | 18.99                     | 21.92                       | 26.00                   | 4.08                    | 10.00             | 31.92     | 36.00           | 4.08            |

**Table 8.1-2:** Output power measurements and EIRP calculations results for 5 MHz channel and PMP 19 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5727.5         | 12.67                     | 12.45                     | 15.57                       | 17.00                   | 1.43                    | 19.00             | 34.57     | 36.00           | 1.43            |
|            | 5790.0         | 12.42                     | 12.07                     | 15.26                       | 17.00                   | 1.74                    | 19.00             | 34.26     | 36.00           | 1.74            |
|            | 5847.5         | 12.08                     | 13.47                     | 15.84                       | 17.00                   | 1.16                    | 19.00             | 34.84     | 36.00           | 1.16            |
| 256-QAM    | 5727.5         | 12.84                     | 12.13                     | 15.51                       | 17.00                   | 1.49                    | 19.00             | 34.51     | 36.00           | 1.49            |
|            | 5790.0         | 12.41                     | 12.22                     | 15.33                       | 17.00                   | 1.67                    | 19.00             | 34.33     | 36.00           | 1.67            |
|            | 5847.5         | 12.19                     | 13.00                     | 15.62                       | 17.00                   | 1.38                    | 19.00             | 34.62     | 36.00           | 1.38            |

**Table 8.1-3:** Output power measurements and EIRP calculations results for 5 MHz channel and PMP 32 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5727.5         | 0.04                      | 0.21                      | 3.14                        | 4.00                    | 0.86                    | 32.00             | 35.14     | 36.00           | 0.86            |
|            | 5790.0         | -0.71                     | 0.06                      | 2.70                        | 4.00                    | 1.30                    | 32.00             | 34.70     | 36.00           | 1.30            |
|            | 5847.5         | -0.78                     | 0.38                      | 2.85                        | 4.00                    | 1.15                    | 32.00             | 34.85     | 36.00           | 1.15            |
| 256-QAM    | 5727.5         | -0.25                     | 0.47                      | 3.14                        | 4.00                    | 0.86                    | 32.00             | 35.14     | 36.00           | 0.86            |
|            | 5790.0         | -0.64                     | -0.16                     | 2.62                        | 4.00                    | 1.38                    | 32.00             | 34.62     | 36.00           | 1.38            |
|            | 5847.5         | -0.61                     | -0.18                     | 2.62                        | 4.00                    | 1.38                    | 32.00             | 34.62     | 36.00           | 1.38            |

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

Testing data

FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

FCC Part 15 Subpart E and RSS-247 Issue 1


**Table 8.1-4:** Output power measurements and EIRP calculations results for 10 MHz channel and PMP 10 dBi (and PTP 19 and 24 dBi) antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5730.0         | 19.49                     | 19.40                     | 22.46                       | 26.00                   | 3.54                    | 10.00             | 32.46     | 36.00           | 3.54            |
|            | 5790.0         | 20.82                     | 20.83                     | 23.84                       | 26.00                   | 2.16                    | 10.00             | 33.84     | 36.00           | 2.16            |
|            | 5845.0         | 18.85                     | 19.98                     | 22.46                       | 26.00                   | 3.54                    | 10.00             | 32.46     | 36.00           | 3.54            |
| 256-QAM    | 5730.0         | 19.31                     | 19.34                     | 22.34                       | 26.00                   | 3.66                    | 10.00             | 32.34     | 36.00           | 3.66            |
|            | 5790.0         | 20.71                     | 20.84                     | 23.79                       | 26.00                   | 2.21                    | 10.00             | 33.79     | 36.00           | 2.21            |
|            | 5845.0         | 18.94                     | 18.84                     | 21.90                       | 26.00                   | 4.10                    | 10.00             | 31.90     | 36.00           | 4.10            |

**Table 8.1-5:** Output power measurements and EIRP calculations results for 10 MHz channel and PMP 19 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5730.0         | 12.63                     | 12.33                     | 15.49                       | 17.00                   | 1.51                    | 19.00             | 34.49     | 36.00           | 1.51            |
|            | 5790.0         | 12.45                     | 12.09                     | 15.28                       | 17.00                   | 1.72                    | 19.00             | 34.28     | 36.00           | 1.72            |
|            | 5845.0         | 12.10                     | 12.49                     | 15.31                       | 17.00                   | 1.69                    | 19.00             | 34.31     | 36.00           | 1.69            |
| 256-QAM    | 5730.0         | 12.69                     | 12.30                     | 15.51                       | 17.00                   | 1.49                    | 19.00             | 34.51     | 36.00           | 1.49            |
|            | 5790.0         | 12.56                     | 11.91                     | 15.26                       | 17.00                   | 1.74                    | 19.00             | 34.26     | 36.00           | 1.74            |
|            | 5845.0         | 12.30                     | 12.04                     | 15.18                       | 17.00                   | 1.82                    | 19.00             | 34.18     | 36.00           | 1.82            |

**Table 8.1-6:** Output power measurements and EIRP calculations results for 10 MHz channel and PMP 32 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5730.0         | -0.52                     | -0.81                     | 2.35                        | 4.00                    | 1.65                    | 32.00             | 34.35     | 36.00           | 1.65            |
|            | 5790.0         | -0.45                     | 0.35                      | 2.98                        | 4.00                    | 1.02                    | 32.00             | 34.98     | 36.00           | 1.02            |
|            | 5845.0         | -0.69                     | 0.06                      | 2.71                        | 4.00                    | 1.29                    | 32.00             | 34.71     | 36.00           | 1.29            |
| 256-QAM    | 5730.0         | -0.56                     | -0.51                     | 2.48                        | 4.00                    | 1.52                    | 32.00             | 34.48     | 36.00           | 1.52            |
|            | 5790.0         | -0.63                     | -0.04                     | 2.69                        | 4.00                    | 1.31                    | 32.00             | 34.69     | 36.00           | 1.31            |
|            | 5845.0         | -0.63                     | -0.06                     | 2.67                        | 4.00                    | 1.33                    | 32.00             | 34.67     | 36.00           | 1.33            |

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

Testing data

FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

FCC Part 15 Subpart E and RSS-247 Issue 1


**Table 8.1-7:** Output power measurements and EIRP calculations results for 20 MHz channel and PMP 10 dBi (and PTP 19 and 24 dBi) antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5735.0         | 20.80                     | 21.69                     | 24.28                       | 26.00                   | 1.72                    | 10.00             | 34.28     | 36.00           | 1.72            |
|            | 5790.0         | 21.47                     | 21.56                     | 24.53                       | 26.00                   | 1.47                    | 10.00             | 34.53     | 36.00           | 1.47            |
|            | 5840.0         | 20.30                     | 20.73                     | 23.53                       | 26.00                   | 2.47                    | 10.00             | 33.53     | 36.00           | 2.47            |
| 256-QAM    | 5735.0         | 21.03                     | 21.80                     | 24.44                       | 26.00                   | 1.56                    | 10.00             | 34.44     | 36.00           | 1.56            |
|            | 5790.0         | 21.44                     | 21.49                     | 24.48                       | 26.00                   | 1.52                    | 10.00             | 34.48     | 36.00           | 1.52            |
|            | 5840.0         | 20.54                     | 20.77                     | 23.67                       | 26.00                   | 2.33                    | 10.00             | 33.67     | 36.00           | 2.33            |

**Table 8.1-8:** Output power measurements and EIRP calculations results for 20 MHz channel and PMP 19 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5735.0         | 12.05                     | 12.90                     | 15.51                       | 17.00                   | 1.49                    | 19.00             | 34.51     | 36.00           | 1.49            |
|            | 5790.0         | 13.11                     | 12.73                     | 15.93                       | 17.00                   | 1.07                    | 19.00             | 34.93     | 36.00           | 1.07            |
|            | 5840.0         | 12.93                     | 12.77                     | 15.86                       | 17.00                   | 1.14                    | 19.00             | 34.86     | 36.00           | 1.14            |
| 256-QAM    | 5735.0         | 12.26                     | 12.95                     | 15.63                       | 17.00                   | 1.37                    | 19.00             | 34.63     | 36.00           | 1.37            |
|            | 5790.0         | 13.00                     | 12.71                     | 15.87                       | 17.00                   | 1.13                    | 19.00             | 34.87     | 36.00           | 1.13            |
|            | 5840.0         | 12.90                     | 12.74                     | 15.83                       | 17.00                   | 1.17                    | 19.00             | 34.83     | 36.00           | 1.17            |

**Table 8.1-9:** Output power measurements and EIRP calculations results for 20 MHz channel and PMP 32 dBi antenna gain

| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB | Antenna gain, dBi | EIRP, dBm | EIRP limit, dBm | EIRP margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|-------------------|-----------|-----------------|-----------------|
| BPSK       | 5735.0         | -0.03                     | -0.29                     | 2.85                        | 4.00                    | 1.15                    | 32.00             | 34.85     | 36.00           | 1.15            |
|            | 5790.0         | 0.16                      | -0.54                     | 2.83                        | 4.00                    | 1.17                    | 32.00             | 34.83     | 36.00           | 1.17            |
|            | 5840.0         | 0.00                      | -0.50                     | 2.77                        | 4.00                    | 1.23                    | 32.00             | 34.77     | 36.00           | 1.23            |
| 256-QAM    | 5735.0         | -0.03                     | -0.24                     | 2.88                        | 4.00                    | 1.12                    | 32.00             | 34.88     | 36.00           | 1.12            |
|            | 5790.0         | -0.07                     | -0.42                     | 2.77                        | 4.00                    | 1.23                    | 32.00             | 34.77     | 36.00           | 1.23            |
|            | 5840.0         | -0.01                     | -0.51                     | 2.76                        | 4.00                    | 1.24                    | 32.00             | 34.76     | 36.00           | 1.24            |

# Section 8

## Test name

## Specification

Testing data

FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

FCC Part 15 Subpart E and RSS-247 Issue 1



**Table 8.1-10:** Output power measurements for 5 MHz channel and PTP 32 dBi antenna gain

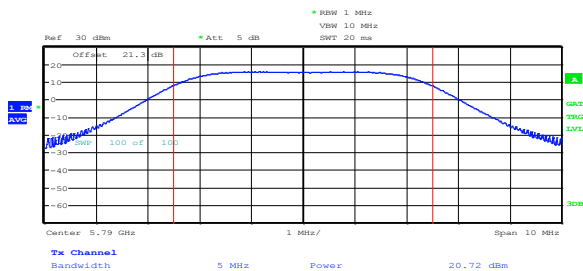
| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|
| BPSK       | 5727.5         | 17.63                     | 17.39                     | 20.52                       | 30.00                   | 9.48                    |
|            | 5790.0         | 18.72                     | 18.84                     | 21.79                       | 30.00                   | 8.21                    |
|            | 5847.5         | 18.77                     | 19.31                     | 22.06                       | 30.00                   | 7.94                    |
| 256-QAM    | 5727.5         | 17.64                     | 17.14                     | 20.41                       | 30.00                   | 9.59                    |
|            | 5790.0         | 18.77                     | 18.89                     | 21.84                       | 30.00                   | 8.16                    |
|            | 5847.5         | 18.82                     | 18.99                     | 21.92                       | 30.00                   | 8.08                    |

**Table 8.1-11:** Output power measurements for 10 MHz channel and PTP 32 dBi antenna gain

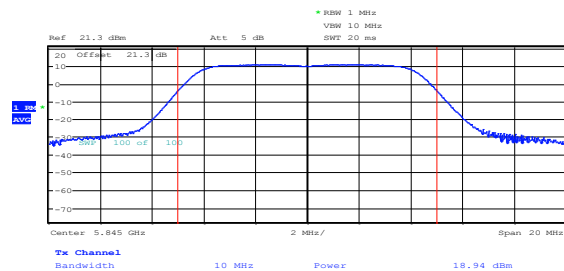
| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|
| BPSK       | 5730.0         | 19.49                     | 19.40                     | 22.46                       | 30.00                   | 7.54                    |
|            | 5790.0         | 18.82                     | 18.83                     | 21.84                       | 30.00                   | 8.16                    |
|            | 5845.0         | 18.85                     | 19.98                     | 22.46                       | 30.00                   | 7.54                    |
| 256-QAM    | 5730.0         | 19.31                     | 19.34                     | 22.34                       | 30.00                   | 7.66                    |
|            | 5790.0         | 18.71                     | 18.84                     | 21.79                       | 30.00                   | 8.21                    |
|            | 5845.0         | 18.94                     | 18.84                     | 21.90                       | 30.00                   | 8.10                    |

**Table 8.1-12:** Output power measurements for 20 MHz channel and PTP 32 dBi antenna gain

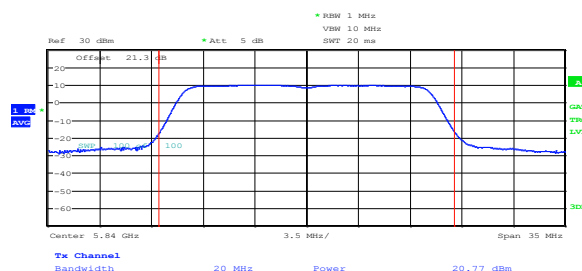
| Modulation | Frequency, MHz | Average power on ch0, dBm | Average power on ch1, dBm | Combined average power, dBm | Output power limit, dBm | Output power margin, dB |
|------------|----------------|---------------------------|---------------------------|-----------------------------|-------------------------|-------------------------|
| BPSK       | 5735.0         | 20.80                     | 21.69                     | 24.28                       | 30.00                   | 5.72                    |
|            | 5790.0         | 19.47                     | 19.56                     | 22.53                       | 30.00                   | 7.47                    |
|            | 5840.0         | 20.30                     | 20.73                     | 23.53                       | 30.00                   | 6.47                    |
| 256-QAM    | 5735.0         | 21.03                     | 21.80                     | 24.44                       | 30.00                   | 5.56                    |
|            | 5790.0         | 19.44                     | 19.49                     | 22.48                       | 30.00                   | 7.52                    |
|            | 5840.0         | 20.54                     | 20.77                     | 23.67                       | 30.00                   | 6.33                    |



**Figure 8.1-1:** Sample plot for Power on 5 MHz



**Figure 8.1-2:** Sample plot for Power on 10 MHz



|                      |                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------|
| <b>Section 8</b>     | Testing data                                                                                        |
| <b>Test name</b>     | FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits |
| <b>Specification</b> | FCC Part 15 Subpart E and RSS-247 Issue 1                                                           |



**Figure 8.1-3:** Sample plot for Power on 20 MHz

**Table 8.1-13:** PSD measurements results for 5 MHz channel and PMP 10 dBi (and PTP 10, 19 and 24 dBi) antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5727.5         | 9.82                    | 12.04                   | 14.08                     | 26.00                  | 11.92      |
|            | 5790.0         | 13.12                   | 13.07                   | 16.11                     | 26.00                  | 9.89       |
|            | 5847.5         | 10.79                   | 11.01                   | 13.91                     | 26.00                  | 12.09      |
| 256-QAM    | 5727.5         | 10.12                   | 9.86                    | 13.00                     | 26.00                  | 13.00      |
|            | 5790.0         | 13.23                   | 13.05                   | 16.15                     | 26.00                  | 9.85       |
|            | 5847.5         | 10.85                   | 11.09                   | 13.98                     | 26.00                  | 12.02      |

**Table 8.1-14:** PSD measurements results for 5 MHz channel and PMP 19 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5727.5         | 5.06                    | 4.86                    | 7.97                      | 17.00                  | 9.03       |
|            | 5790.0         | 4.69                    | 4.18                    | 7.45                      | 17.00                  | 9.55       |
|            | 5847.5         | 4.06                    | 5.06                    | 7.60                      | 17.00                  | 9.40       |
| 256-QAM    | 5727.5         | 5.12                    | 4.82                    | 7.98                      | 17.00                  | 9.02       |
|            | 5790.0         | 4.74                    | 4.10                    | 7.44                      | 17.00                  | 9.56       |
|            | 5847.5         | 4.12                    | 5.16                    | 7.68                      | 17.00                  | 9.32       |

**Table 8.1-15:** PSD measurements results for 5 MHz channel and PMP 24 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5727.5         | -8.02                   | -7.41                   | -4.69                     | 12.00                  | 16.69      |
|            | 5790.0         | -8.35                   | -7.87                   | -5.09                     | 12.00                  | 17.09      |
|            | 5847.5         | -8.72                   | -8.13                   | -5.40                     | 12.00                  | 17.40      |
| 256-QAM    | 5727.5         | -8.08                   | -7.44                   | -4.74                     | 12.00                  | 16.74      |
|            | 5790.0         | -8.25                   | -8.06                   | -5.14                     | 12.00                  | 17.14      |
|            | 5847.5         | -8.72                   | -7.93                   | -5.30                     | 12.00                  | 17.30      |

**Table 8.1-16:** PSD measurements results for 5 MHz channel and PMP 32 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5727.5         | -8.02                   | -7.41                   | -4.69                     | 4.00                   | 8.69       |
|            | 5790.0         | -8.35                   | -7.87                   | -5.09                     | 4.00                   | 9.09       |
|            | 5847.5         | -8.72                   | -8.13                   | -5.40                     | 4.00                   | 9.40       |
| 256-QAM    | 5727.5         | -8.08                   | -7.44                   | -4.74                     | 4.00                   | 8.74       |
|            | 5790.0         | -8.25                   | -8.06                   | -5.14                     | 4.00                   | 9.14       |
|            | 5847.5         | -8.72                   | -7.93                   | -5.30                     | 4.00                   | 9.30       |

**Table 8.1-17:** PSD measurements results for 10 MHz channel and PMP 10 dBi (and PTP 10, 19 and 24 dBi) antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5730.0         | 8.61                    | 8.87                    | 11.75                     | 26.00                  | 14.25      |
|            | 5790.0         | 10.08                   | 10.15                   | 13.13                     | 26.00                  | 12.87      |
|            | 5845.0         | 8.14                    | 8.50                    | 11.33                     | 26.00                  | 14.67      |
| 256-QAM    | 5730.0         | 8.73                    | 8.36                    | 11.56                     | 26.00                  | 14.44      |
|            | 5790.0         | 10.12                   | 10.11                   | 13.13                     | 26.00                  | 12.87      |
|            | 5845.0         | 8.17                    | 8.28                    | 11.24                     | 26.00                  | 14.76      |

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

Testing data

FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

FCC Part 15 Subpart E and RSS-247 Issue 1


**Table 8.1-18: PSD measurements results for 10 MHz channel and PMP 19 dBi antenna gain**

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5730.0         | 1.96                    | 1.60                    | 4.79                      | 17.00                  | 12.21      |
|            | 5790.0         | 1.70                    | 1.25                    | 4.49                      | 17.00                  | 12.51      |
|            | 5845.0         | 1.45                    | 1.33                    | 4.40                      | 17.00                  | 12.60      |
| 256-QAM    | 5730.0         | 1.95                    | 1.40                    | 4.69                      | 17.00                  | 12.31      |
|            | 5790.0         | 1.68                    | 1.18                    | 4.45                      | 17.00                  | 12.55      |
|            | 5845.0         | 1.45                    | 1.31                    | 4.39                      | 17.00                  | 12.61      |

**Table 8.1-19: PSD measurements results for 10 MHz channel and PMP 24 dBi antenna gain**

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5730.0         | -11.05                  | -11.59                  | -8.30                     | 12.00                  | 20.30      |
|            | 5790.0         | -11.38                  | -10.90                  | -8.12                     | 12.00                  | 20.12      |
|            | 5845.0         | -11.38                  | -10.88                  | -8.11                     | 12.00                  | 20.11      |
| 256-QAM    | 5730.0         | -11.20                  | -11.51                  | -8.34                     | 12.00                  | 20.34      |
|            | 5790.0         | -11.54                  | -11.16                  | -8.34                     | 12.00                  | 20.34      |
|            | 5845.0         | -11.39                  | -10.82                  | -8.09                     | 12.00                  | 20.09      |

**Table 8.1-20: PSD measurements results for 10 MHz channel and PMP 32 dBi antenna gain**

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5730.0         | -11.05                  | -11.59                  | -8.30                     | 4.00                   | 12.30      |
|            | 5790.0         | -11.38                  | -10.90                  | -8.12                     | 4.00                   | 12.12      |
|            | 5845.0         | -11.38                  | -10.88                  | -8.11                     | 4.00                   | 12.11      |
| 256-QAM    | 5730.0         | -11.20                  | -11.51                  | -8.34                     | 4.00                   | 12.34      |
|            | 5790.0         | -11.54                  | -11.16                  | -8.34                     | 4.00                   | 12.34      |
|            | 5845.0         | -11.39                  | -10.82                  | -8.09                     | 4.00                   | 12.09      |

**Table 8.1-21: PSD measurements results for 20 MHz channel and PMP 10 dBi (and PTP 10, 19 and 24 dBi) antenna gain**

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5735.0         | 7.32                    | 7.92                    | 10.64                     | 26.00                  | 15.36      |
|            | 5790.0         | 7.68                    | 7.73                    | 10.72                     | 26.00                  | 15.28      |
|            | 5840.0         | 6.78                    | 6.83                    | 9.82                      | 26.00                  | 16.18      |
| 256-QAM    | 5735.0         | 7.35                    | 7.84                    | 10.61                     | 26.00                  | 15.39      |
|            | 5790.0         | 7.79                    | 7.62                    | 10.72                     | 26.00                  | 15.28      |
|            | 5840.0         | 6.67                    | 6.94                    | 9.82                      | 26.00                  | 16.18      |

**Table 8.1-22: PSD measurements results for 20 MHz channel and PMP 19 dBi antenna gain**

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5735.0         | -1.58                   | -1.00                   | 1.73                      | 17.00                  | 15.27      |
|            | 5790.0         | -0.66                   | -1.12                   | 2.13                      | 17.00                  | 14.87      |
|            | 5840.0         | -1.03                   | -1.17                   | 1.91                      | 17.00                  | 15.09      |
| 256-QAM    | 5735.0         | -1.42                   | -1.03                   | 1.79                      | 17.00                  | 15.21      |
|            | 5790.0         | -0.75                   | -1.16                   | 2.06                      | 17.00                  | 14.94      |
|            | 5840.0         | -0.98                   | -1.10                   | 1.97                      | 17.00                  | 15.03      |

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

Testing data

FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

FCC Part 15 Subpart E and RSS-247 Issue 1


**Table 8.1-23:** PSD measurements results for 20 MHz channel and PMP 24 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5735.0         | -13.65                  | -14.12                  | -10.87                    | 12.00                  | 22.87      |
|            | 5790.0         | -13.67                  | -14.40                  | -11.01                    | 12.00                  | 23.01      |
|            | 5840.0         | -13.95                  | -14.39                  | -11.15                    | 12.00                  | 23.15      |
| 256-QAM    | 5735.0         | -13.47                  | -14.28                  | -10.85                    | 12.00                  | 22.85      |
|            | 5790.0         | -13.89                  | -14.34                  | -11.10                    | 12.00                  | 23.10      |
|            | 5840.0         | -13.98                  | -14.42                  | -11.18                    | 12.00                  | 23.18      |

**Table 8.1-24:** PSD measurements results for 20 MHz channel and PMP 32 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5735.0         | -13.65                  | -14.12                  | -10.87                    | 4.00                   | 14.87      |
|            | 5790.0         | -13.67                  | -14.40                  | -11.01                    | 4.00                   | 15.01      |
|            | 5840.0         | -13.95                  | -14.39                  | -11.15                    | 4.00                   | 15.15      |
| 256-QAM    | 5735.0         | -13.47                  | -14.28                  | -10.85                    | 4.00                   | 14.85      |
|            | 5790.0         | -13.89                  | -14.34                  | -11.10                    | 4.00                   | 15.10      |
|            | 5840.0         | -13.98                  | -14.42                  | -11.18                    | 4.00                   | 15.18      |

**Table 8.1-25:** PSD measurements results for 5 MHz channel and PTP 32 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5727.5         | 9.82                    | 12.04                   | 14.08                     | 30.00                  | 15.92      |
|            | 5790.0         | 11.12                   | 11.07                   | 14.11                     | 30.00                  | 15.89      |
|            | 5847.5         | 10.79                   | 11.01                   | 13.91                     | 30.00                  | 16.09      |
| 256-QAM    | 5727.5         | 10.12                   | 9.86                    | 13.00                     | 30.00                  | 17.00      |
|            | 5790.0         | 11.23                   | 11.05                   | 14.15                     | 30.00                  | 15.85      |
|            | 5847.5         | 10.85                   | 11.09                   | 13.98                     | 30.00                  | 16.02      |

**Table 8.1-26:** PSD measurements results for 10 MHz channel and PTP 32 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5730.0         | 8.61                    | 8.87                    | 11.75                     | 30.00                  | 18.25      |
|            | 5790.0         | 8.08                    | 8.15                    | 11.13                     | 30.00                  | 18.87      |
|            | 5845.0         | 8.14                    | 8.50                    | 11.33                     | 30.00                  | 18.67      |
| 256-QAM    | 5730.0         | 8.73                    | 8.36                    | 11.56                     | 30.00                  | 18.44      |
|            | 5790.0         | 8.12                    | 8.11                    | 11.13                     | 30.00                  | 18.87      |
|            | 5845.0         | 8.17                    | 8.28                    | 11.24                     | 30.00                  | 18.76      |

**Table 8.1-27:** PSD measurements results for 20 MHz channel and PTP 32 dBi antenna gain

| Modulation | Frequency, MHz | PSD on ch0, dBm/0.5 MHz | PSD on ch1, dBm/0.5 MHz | Combined PSD, dBm/0.5 MHz | PSD limit, dBm/0.5 MHz | Margin, dB |
|------------|----------------|-------------------------|-------------------------|---------------------------|------------------------|------------|
| BPSK       | 5735.0         | 7.32                    | 7.92                    | 10.64                     | 30.00                  | 19.36      |
|            | 5790.0         | 5.68                    | 5.73                    | 8.72                      | 30.00                  | 21.28      |
|            | 5840.0         | 6.78                    | 6.83                    | 9.82                      | 30.00                  | 20.18      |
| 256-QAM    | 5735.0         | 7.35                    | 7.84                    | 10.61                     | 30.00                  | 19.39      |
|            | 5790.0         | 5.79                    | 5.72                    | 8.77                      | 30.00                  | 21.23      |
|            | 5840.0         | 6.67                    | 6.94                    | 9.82                      | 30.00                  | 20.18      |

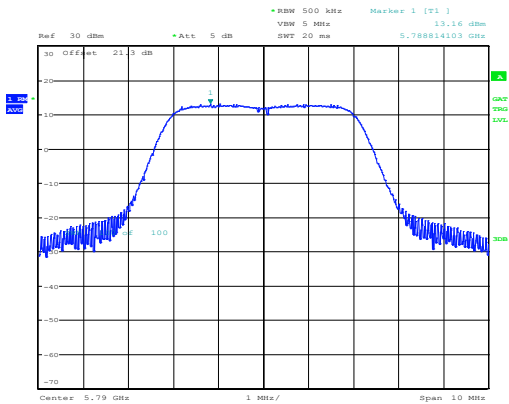


Figure 8.1-4: Sample plot for PSD on 5 MHz

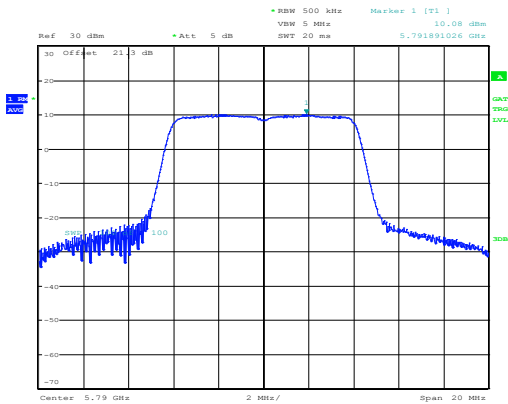


Figure 8.1-5: Sample plot for PSD on 10 MHz

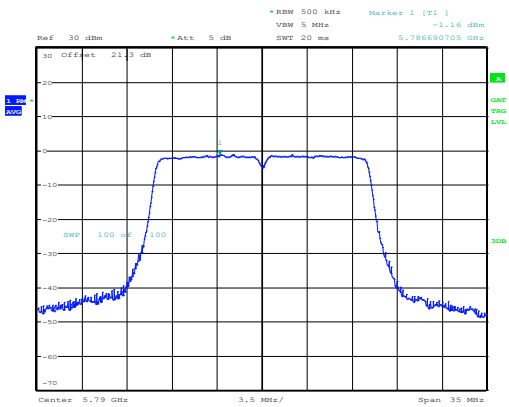


Figure 8.1-6: Sample plot for PSD on 20 MHz

## 8.2 FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions

### 8.2.1 Definitions and limits

**FCC:**

(4) For transmitters operating in the 5.725–5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of –27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(7) The provisions of § 15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

**IC:**

For the band 5725–5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed –17 dBm/MHz e.i.r.p.

For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed –27 dBm/MHz.

**RSS-Gen 8.10 Emissions falling within restricted frequency bands**

Restricted bands, identified in Table 8.2-2, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

- (a) fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of below;
- (b) unwanted emissions falling into restricted bands of below shall comply with the limits specified in RSS-Gen;
- (c) unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

**FCC 16-24, Memorandum opinion and order, March 2, 2016**

(i) All emissions shall be limited to a level of –27 dBm/MHz EIRP at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz EIRP at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz EIRP at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz EIRP at the band edge.

**Table 8.2-1: FCC §15.209 and RSS-Gen – Radiated emission limits**

| Frequency,<br>MHz | Field strength of emissions |                                                       | Measurement distance,<br>m |
|-------------------|-----------------------------|-------------------------------------------------------|----------------------------|
|                   | μV/m                        | dBμV/m                                                |                            |
| 0.009–0.490       | 2400/F ( <i>F in kHz</i> )  | 67.6 – 20 × log <sub>10</sub> (F) ( <i>F in kHz</i> ) | 300                        |
| 0.490–1.705       | 24000/F ( <i>F in kHz</i> ) | 87.6 – 20 × log <sub>10</sub> (F) ( <i>F in kHz</i> ) | 30                         |
| 1.705–30.0        | 30                          | 29.5                                                  | 30                         |
| 30–88             | 100                         | 40.0                                                  | 3                          |
| 88–216            | 150                         | 43.5                                                  | 3                          |
| 216–960           | 200                         | 46.0                                                  | 3                          |
| above 960         | 500                         | 54.0                                                  | 3                          |

Notes: In the emission table above, the tighter limit applies at the band edges.

For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

**Table 8.2-2: IC restricted frequency bands**

| MHz             | MHz                 | MHz           | GHz         |
|-----------------|---------------------|---------------|-------------|
| 0.090–0.110     | 12.51975–12.52025   | 399.9–410     | 5.35–5.46   |
| 2.1735–2.1905   | 12.57675–12.57725   | 608–614       | 7.25–7.75   |
| 3.020–3.026     | 13.36–13.41         | 960–1427      | 8.025–8.5   |
| 4.125–4.128     | 16.42–16.423        | 1435–1626.5   | 9.0–9.2     |
| 4.17725–4.17775 | 16.69475–16.69525   | 1645.5–1646.5 | 9.3–9.5     |
| 4.20725–4.20775 | 16.80425–16.80475   | 1660–1710     | 10.6–12.7   |
| 5.677–5.683     | 25.5–25.67          | 1718.8–1722.2 | 13.25–13.4  |
| 6.215–6.218     | 37.5–38.25          | 2200–2300     | 14.47–14.5  |
| 6.26775–6.26825 | 73–74.6             | 2310–2390     | 15.35–16.2  |
| 6.31175–6.31225 | 74.8–75.2           | 2655–2900     | 17.7–21.4   |
| 8.291–8.294     | 108–138             | 3260–3267     | 22.01–23.12 |
| 8.362–8.366     | 156.52475–156.52525 | 3332–3339     | 23.6–24.0   |
| 8.37625–8.38675 | 156.7–156.9         | 3345.8–3358   | 31.2–31.8   |
| 8.41425–8.41475 | 240–285             | 3500–4400     | 36.43–36.5  |
| 12.29–12.293    | 322–335.4           | 4500–5150     | Above 38.6  |

Note: Certain frequency bands listed in Table 8.2-2 and above 38.6 GHz are designated for low-power license-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

**Table 8.2-3: FCC restricted frequency bands**

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090–0.110       | 16.42–16.423        | 399.9–410     | 4.5–5.15    |
| 0.495–0.505       | 16.69475–16.69525   | 608–614       | 5.35–5.46   |
| 2.1735–2.1905     | 16.80425–16.80475   | 960–1240      | 7.25–7.75   |
| 4.125–4.128       | 25.5–25.67          | 1300–1427     | 8.025–8.5   |
| 4.17725–4.17775   | 37.5–38.25          | 1435–1626.5   | 9.0–9.2     |
| 4.20725–4.20775   | 73–74.6             | 1645.5–1646.5 | 9.3–9.5     |
| 6.215–6.218       | 74.8–75.2           | 1660–1710     | 10.6–12.7   |
| 6.26775–6.26825   | 108–121.94          | 1718.8–1722.2 | 13.25–13.4  |
| 6.31175–6.31225   | 123–138             | 2200–2300     | 14.47–14.5  |
| 8.291–8.294       | 149.9–150.05        | 2310–2390     | 15.35–16.2  |
| 8.362–8.366       | 156.52475–156.52525 | 2483.5–2500   | 17.7–21.4   |
| 8.37625–8.38675   | 156.7–156.9         | 2690–2900     | 22.01–23.12 |
| 8.41425–8.41475   | 162.0125–167.17     | 3260–3267     | 23.6–24.0   |
| 12.29–12.293      | 167.72–173.2        | 3332–3339     | 31.2–31.8   |
| 12.51975–12.52025 | 240–285             | 3345.8–3358   | 36.43–36.5  |
| 12.57675–12.57725 | 322–335.4           | 3600–4400     | Above 38.6  |
| 13.36–13.41       |                     |               |             |

## 8.2.2 Test summary

|                |                 |                    |           |
|----------------|-----------------|--------------------|-----------|
| Test date:     | June 29, 2016   | Temperature:       | 22 °C     |
| Test engineer: | Andrey Adelberg | Air pressure:      | 1007 mbar |
| Verdict:       | Pass            | Relative humidity: | 31 %      |

### 8.2.3 Observations, settings and special notes

---

The spectrum was searched from 30 MHz to 40 GHz.

Radiated measurements were performed at a distance of 3 m, the EUT was transmitting on both MIMO chains simultaneously. Cabinet radiation was performed while both antenna connectors were terminated with 50  $\Omega$  load.

Spectrum analyser for peak conducted measurements within restricted bands below 1 GHz:

|                       |          |
|-----------------------|----------|
| Resolution bandwidth: | 100 kHz  |
| Video bandwidth:      | 300 kHz  |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

Spectrum analyser for peak conducted measurements within restricted bands above 1 GHz:

|                       |          |
|-----------------------|----------|
| Resolution bandwidth: | 1 MHz    |
| Video bandwidth:      | 3 MHz    |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

Spectrum analyser for average conducted measurements within restricted bands above 1 GHz for frequencies where peak results were above the average limit:

|                             |               |
|-----------------------------|---------------|
| Resolution bandwidth:       | 1 MHz         |
| Video bandwidth:            | 10 MHz        |
| Detector mode:              | RMS           |
| Trace mode:                 | Power average |
| Number of averaging traces: | 100           |

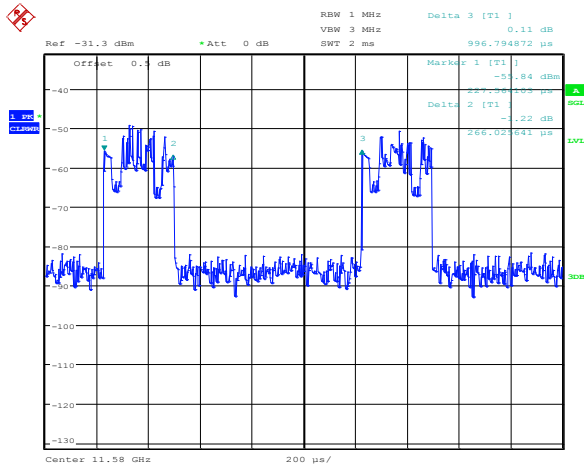
Spectrum analyser for peak conducted measurements outside restricted bands:

|                       |          |
|-----------------------|----------|
| Resolution bandwidth: | 1 MHz    |
| Video bandwidth:      | 3 MHz    |
| Detector mode:        | Peak     |
| Trace mode:           | Max Hold |

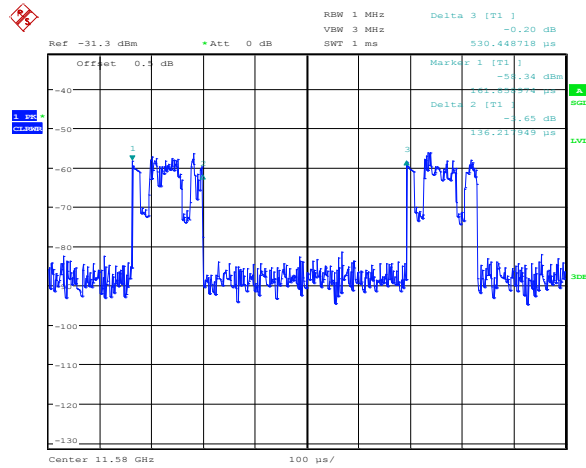
Conducted emissions measurements outside restricted bands were performed on each individual MIMO chain. The reference level offset was adjusted to include antenna directional gain and a compensation of two antenna ports (3 dB):

For 10 dBi antenna reference level was offset by 13 dB, for 19 dBi antenna reference level was offset by 22 dB and for 32 dBi antenna reference level was offset by 35 dB, for 24 dBi antenna reference level was offset by 27 dB

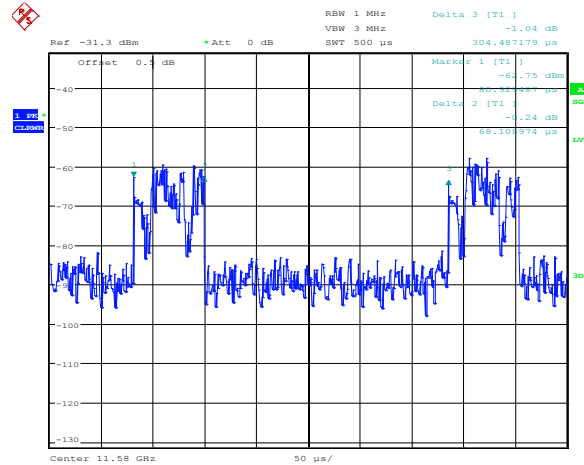
## 8.2.4 Test data



**Diagram 8.2-1: Duty cycle for 5 MHz channel**



**Diagram 8.2-2: Duty cycle for 10 MHz channel**



**Diagram 8.2-3: Duty cycle for 20 MHz channel**

### Duty cycle correction factor calculations:

#### For 5 MHz channel

$T_{XON}$  is 266.03 μs;  $T_{XPERIOD}$  is 996.80 μs; Duty cycle = 27%; Correction Factor =  $20 \times \log_{10}(0.27) = -11.47$  dB

#### For 10 MHz channel

$T_{XON}$  is 136.20 μs;  $T_{XPERIOD}$  is 530.45 μs; Duty cycle = 26%; Correction Factor =  $20 \times \log_{10}(0.26) = -11.81$  dB

#### For 20 MHz channel

$T_{XON}$  is 68.11 μs;  $T_{XPERIOD}$  is 304.49 μs; Duty cycle = 22%; Correction Factor =  $20 \times \log_{10}(0.22) = -13.01$  dB

**Table 8.2-4:** Conducted spurious emissions measurements within restricted bands, 24 dBi PTP antenna results

| Channel bandwidth, MHz | Channel | Frequency, MHz | Peak level, dBm | Peak limit, dBm | Peak margin, dB | RMS level, dBm | Duty cycle CF, dB | Corrected RMS, dBm | Average limit, dBm | Average margin, dB |
|------------------------|---------|----------------|-----------------|-----------------|-----------------|----------------|-------------------|--------------------|--------------------|--------------------|
| 5                      | Mid     | 11.580         | -32.40          | -21.23          | 11.17           | -48.14         | 5.68              | -42.46             | -41.23             | 1.23               |
| 10                     | Mid     | 11.580         | -30.83          | -21.23          | 9.60            | -49.38         | 5.85              | -43.53             | -41.23             | 2.30               |
| 20                     | Mid     | 11.580         | -32.79          | -21.23          | 11.56           | -50.54         | 6.57              | -43.97             | -41.23             | 2.74               |

Note: Peak and RMS levels are based on sum of power level, multiple antenna ports factor (3 dB) and antenna gain of 24 dBi.

Duty cycle RMS correction factor for 5 MHz channel =  $10 \times \log_{10}(1/0.27) = 5.68$  dB

Duty cycle RMS correction factor for 10 MHz channel =  $10 \times \log_{10}(1/0.26) = 5.85$  dB

Duty cycle RMS correction factor for 20 MHz channel =  $10 \times \log_{10}(1/0.22) = 6.57$  dB

Same power settings that were used for 24 dBi PTP antenna apply also to the 19 dBi PTP antenna, hence compliance with restricted bands conducted-to-radiated emissions was achieved as well.

**Table 8.2-5:** Conducted spurious emissions measurements outside restricted bands, 32 dBi PTP antenna results for cho

| Channel bandwidth, MHz | Channel | Frequency, MHz | EIRP level, dBm/MHz | EIRP limit, dBm/MHz | Margin, dB |
|------------------------|---------|----------------|---------------------|---------------------|------------|
| 5                      | Low     | 5537           | -28.42              | -27.00              | 1.42       |
| 10                     | Low     | 5331           | -27.31              | -27.00              | 0.31       |
| 20                     | Low     | 5512           | -27.12              | -27.00              | 0.12       |
| 5                      | High    | 5533           | -27.63              | -27.00              | 0.63       |

Note: EIRP level measurement result includes correction factor for multiple antenna ports (3 dB) and antenna gain of 32 dBi.

**Table 8.2-6:** Conducted spurious emissions measurements outside restricted bands, 32 dBi PTP antenna results for ch1

| Channel bandwidth, MHz | Channel | Frequency, MHz | EIRP level, dBm/MHz | EIRP limit, dBm/MHz | Margin, dB |
|------------------------|---------|----------------|---------------------|---------------------|------------|
| 5                      | Low     | 5232           | -27.64              | -27.00              | 0.64       |
| 10                     | Low     | 5204           | -27.14              | -27.00              | 0.14       |
| 20                     | Low     | 5259           | -27.27              | -27.00              | 0.27       |

Note: EIRP level measurement result includes correction factor for multiple antenna ports (3 dB) and antenna gain of 32 dBi.

**Table 8.2-7:** Conducted spurious emissions measurements within restricted bands, 32 dBi PTP antenna results for cho

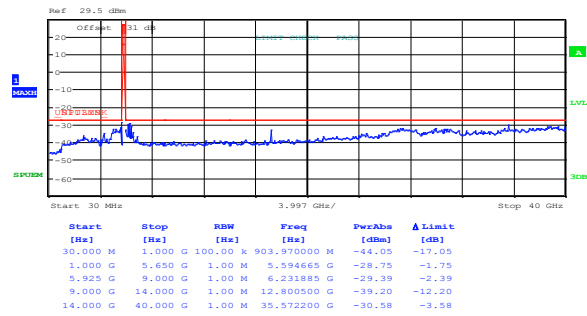
| Channel bandwidth, MHz | Channel | Frequency, MHz | Peak level, dBm | Peak limit, dBm | Peak margin, dB | RMS level, dBm | Duty cycle CF, dB | Corrected RMS, dBm | Average limit, dBm | Average margin, dB |
|------------------------|---------|----------------|-----------------|-----------------|-----------------|----------------|-------------------|--------------------|--------------------|--------------------|
| 10                     | High    | 5448           | -32.81          | -21.23          | 11.58           | -54.16         | 5.85              | -48.31             | -41.23             | 7.08               |
| 20                     | High    | 5385           | -27.25          | -21.23          | 6.02            | -49.57         | 6.57              | -43.00             | -41.23             | 1.77               |

**Table 8.2-8:** Conducted spurious emissions measurements within restricted bands, 32 dBi PTP antenna results for ch1

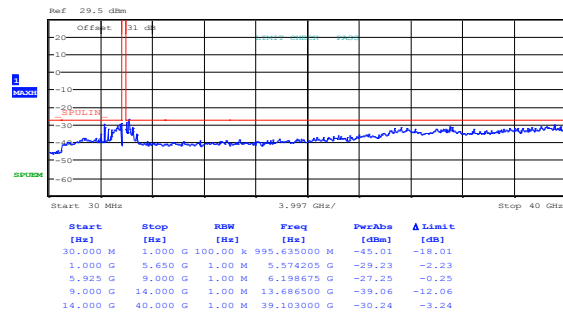
| Channel bandwidth, MHz | Channel | Frequency, MHz | Peak level, dBm | Peak limit, dBm | Peak margin, dB | RMS level, dBm | Duty cycle CF, dB | Corrected RMS, dBm | Average limit, dBm | Average margin, dB |
|------------------------|---------|----------------|-----------------|-----------------|-----------------|----------------|-------------------|--------------------|--------------------|--------------------|
| 5                      | High    | 5427           | -28.01          | -21.23          | 6.78            | -49.18         | 5.85              | -43.33             | -41.23             | 2.10               |
| 10                     | High    | 5451           | -28.12          | -21.23          | 6.89            | -48.81         | 5.85              | -42.96             | -41.23             | 1.73               |
| 20                     | High    | 5366           | -27.34          | -21.23          | 6.11            | -49.29         | 6.57              | -42.72             | -41.23             | 1.49               |

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

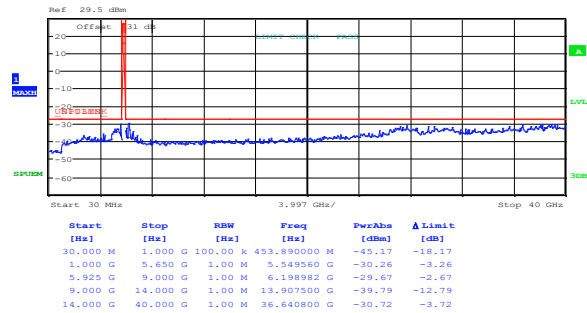
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



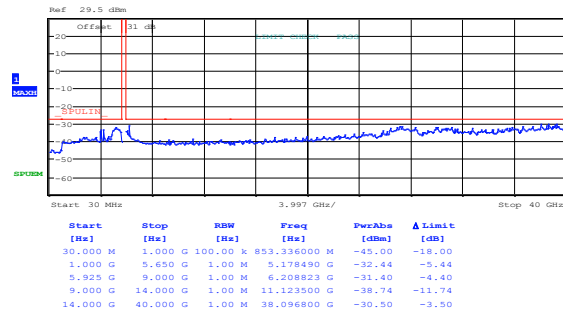
**Figure 8.2-4:** Conducted spurious emissions outside restricted bands, 5 MHz low channel, for 24 dBi antenna, cho, PTP application



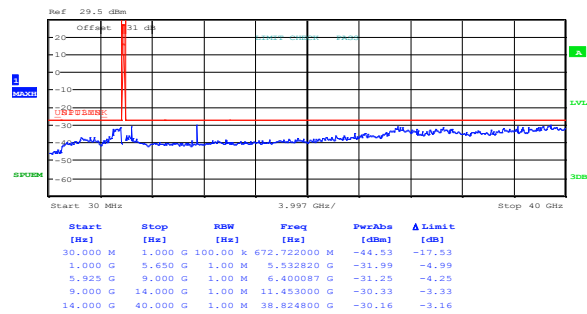
**Figure 8.2-5:** Conducted spurious emissions outside restricted bands, 5 MHz high channel, for 24 dBi antenna, cho, PTP application



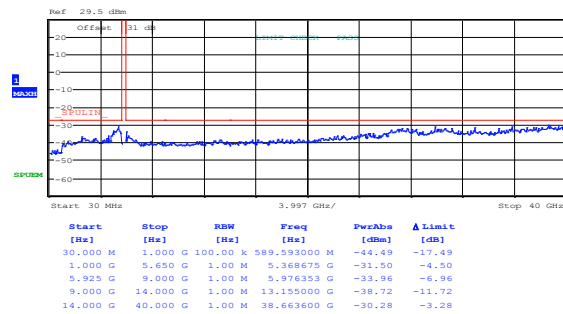
**Figure 8.2-6:** Conducted spurious emissions outside restricted bands, 5 MHz low channel, for 24 dBi antenna, ch1, PTP application



**Figure 8.2-7:** Conducted spurious emissions outside restricted bands, 5 MHz high channel, for 24 dBi antenna, ch1, PTP application



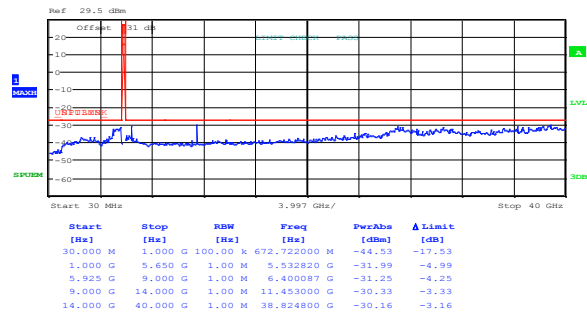
**Figure 8.2-8:** Conducted spurious emissions outside restricted bands, 10 MHz low channel, for 24 dBi antenna, cho, PTP application



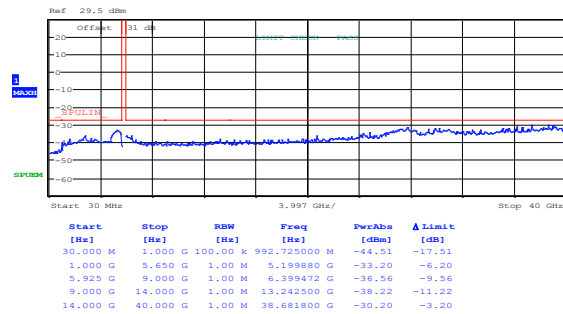
**Figure 8.2-9:** Conducted spurious emissions outside restricted bands, 10 MHz high channel, for 24 dBi antenna, cho, PTP application

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

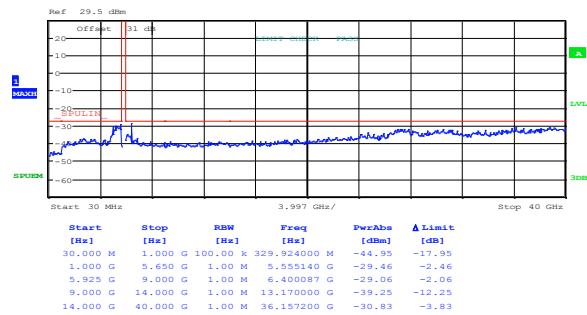
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



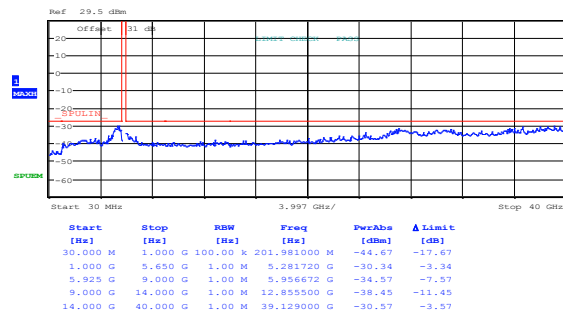
**Figure 8.2-10:** Conducted spurious emissions outside restricted bands, 10 MHz low channel, for 24 dBi antenna, ch1, PTP application



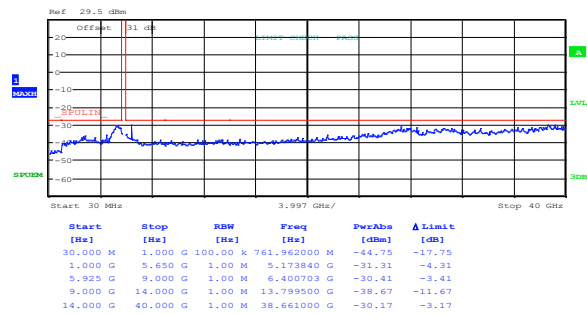
**Figure 8.2-11:** Conducted spurious emissions outside restricted bands, 10 MHz high channel, for 24 dBi antenna, ch1, PTP application



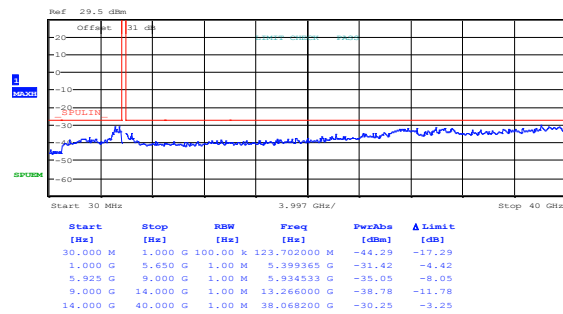
**Figure 8.2-12:** Conducted spurious emissions outside restricted bands, 20 MHz low channel, for 24 dBi antenna, cho, PTP application



**Figure 8.2-13:** Conducted spurious emissions outside restricted bands, 20 MHz high channel, for 24 dBi antenna, cho, PTP application



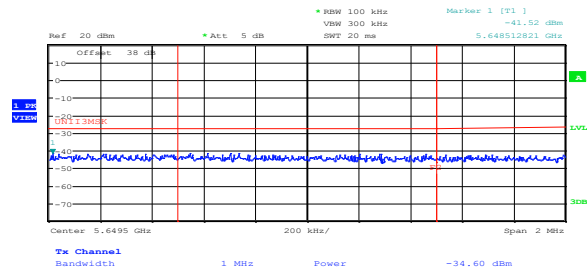
**Figure 8.2-14:** Conducted spurious emissions outside restricted bands, 20 MHz low channel, for 24 dBi antenna, ch1, PTP application



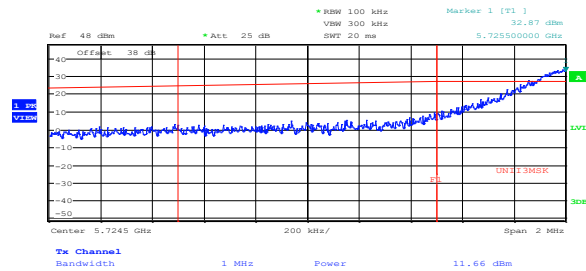
**Figure 8.2-15:** Conducted spurious emissions outside restricted bands, 20 MHz high channel, for 24 dBi antenna, ch1, PTP application

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

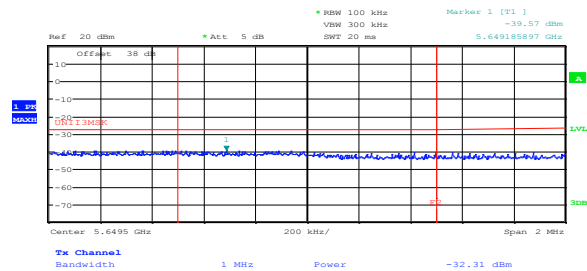
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



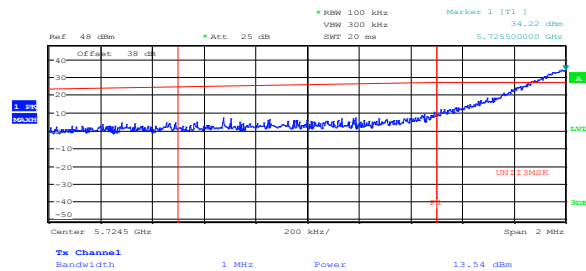
**Figure 8.2-16:** Conducted spurious emissions at the lower band edge at 5650 MHz, 5 MHz low channel, for 24 dBi antenna, cho, PTP application



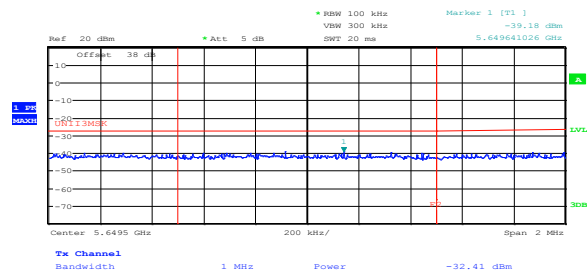
**Figure 8.2-17:** Conducted spurious emissions at the lower band edge at 5725 MHz, 5 MHz low channel, for 24 dBi antenna, cho, PTP application



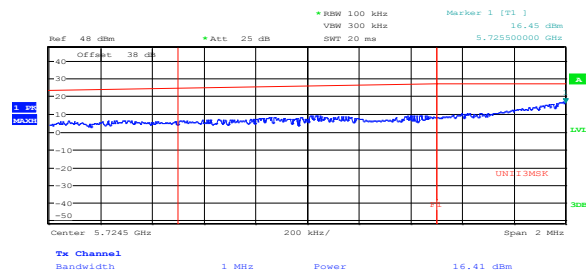
**Figure 8.2-18:** Conducted spurious emissions at the lower band edge at 5650 MHz, 5 MHz low channel, for 24 dBi antenna, ch1, PTP application



**Figure 8.2-19:** Conducted spurious emissions at the lower band edge at 5725 MHz, 5 MHz low channel, for 24 dBi antenna, ch1, PTP application



**Figure 8.2-20:** Conducted spurious emissions at the lower band edge at 5650 MHz, 10 MHz low channel, for 24 dBi antenna, cho, PTP application



**Figure 8.2-21:** Conducted spurious emissions at the lower band edge at 5725 MHz, 10 MHz low channel, for 24 dBi antenna, cho, PTP application

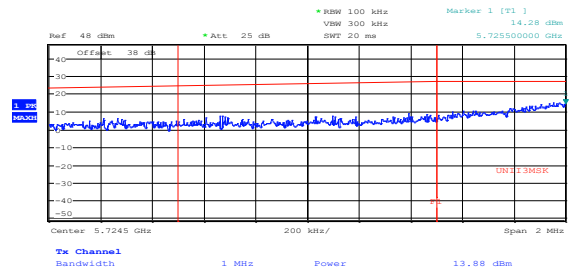
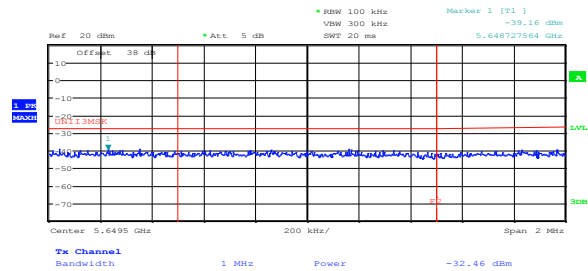


Figure 8.2-22: Conducted spurious emissions at the lower band edge at 5650 MHz, 10 MHz low channel, for 24 dBi antenna, ch1, PTP application

Figure 8.2-23: Conducted spurious emissions at the lower band edge at 5725 MHz, 10 MHz low channel, for 24 dBi antenna, ch1, PTP application

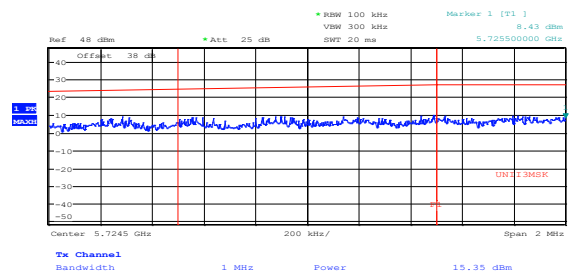
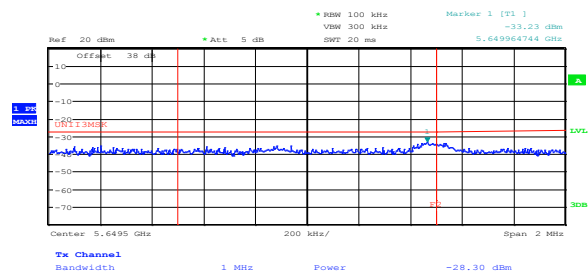


Figure 8.2-24: Conducted spurious emissions at the lower band edge at 5650 MHz, 20 MHz low channel, for 24 dBi antenna, cho, PTP application

Figure 8.2-25: Conducted spurious emissions at the lower band edge at 5725 MHz, 20 MHz low channel, for 24 dBi antenna, cho, PTP application

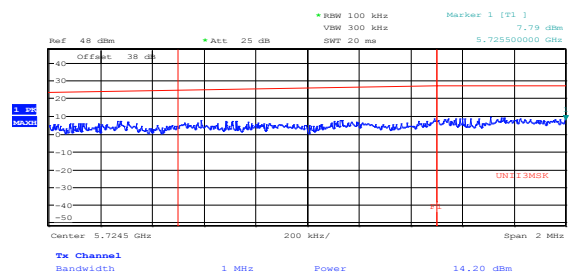
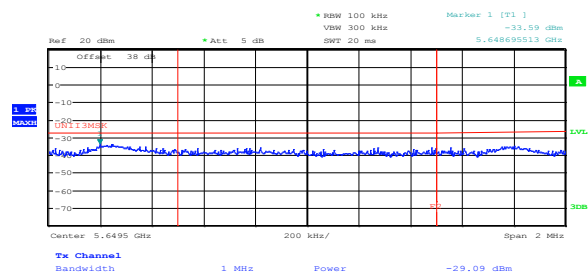
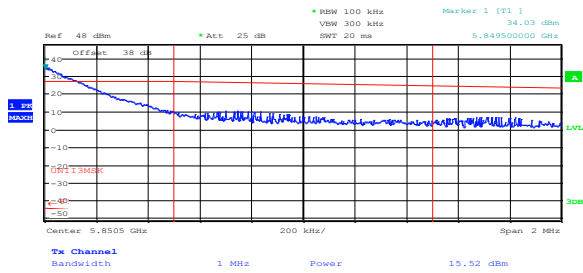


Figure 8.2-26: Conducted spurious emissions at the lower band edge at 5650 MHz, 20 MHz low channel, for 24 dBi antenna, ch1, PTP application

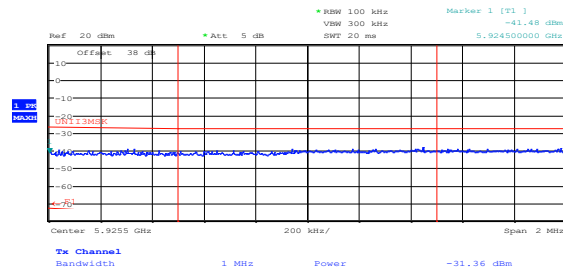
Figure 8.2-27: Conducted spurious emissions at the lower band edge at 5725 MHz, 20 MHz low channel, for 24 dBi antenna, ch1, PTP application

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

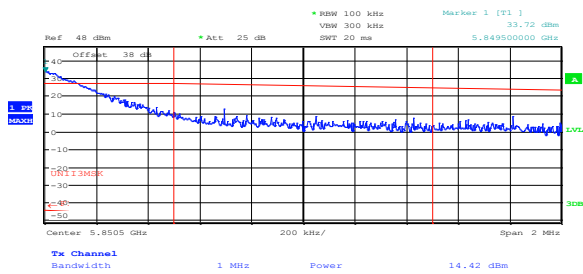
Testing data  
 FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
 FCC Part 15 Subpart E and RSS-247 Issue 1



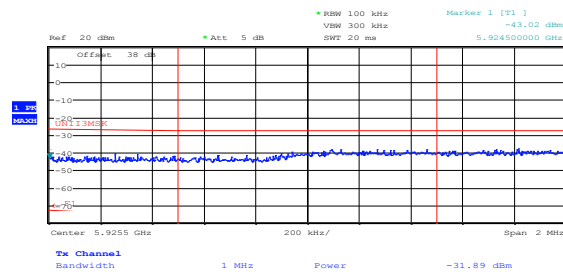
**Figure 8.2-28:** Conducted spurious emissions at the upper band edge at 5850 MHz, 5 MHz high channel, for 24 dBi antenna, cho, PTP application



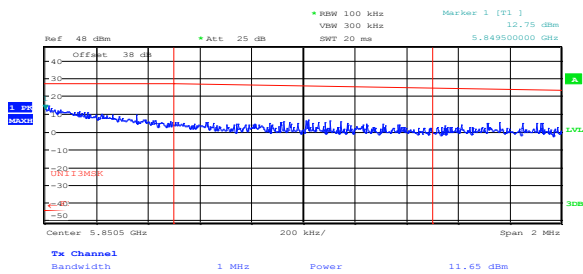
**Figure 8.2-29:** Conducted spurious emissions at the upper band edge at 5925 MHz, 5 MHz high channel, for 24 dBi antenna, cho, PTP application



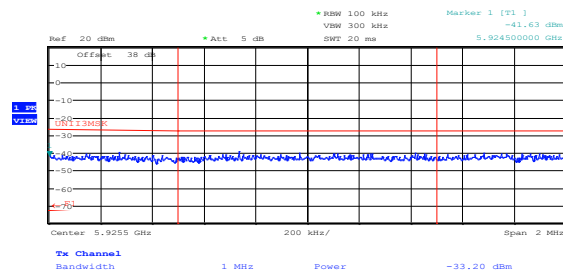
**Figure 8.2-30:** Conducted spurious emissions at the upper band edge at 5850 MHz, 5 MHz high channel, for 24 dBi antenna, ch1, PTP application



**Figure 8.2-31:** Conducted spurious emissions at the upper band edge at 5925 MHz, 5 MHz high channel, for 24 dBi antenna, ch1, PTP application



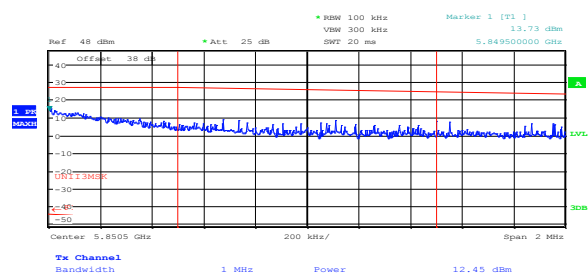
**Figure 8.2-32:** Conducted spurious emissions at the upper band edge at 5850 MHz, 10 MHz high channel, for 24 dBi antenna, cho, PTP application



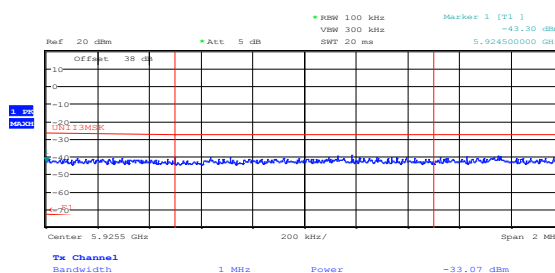
**Figure 8.2-33:** Conducted spurious emissions at the upper band edge at 5925 MHz, 10 MHz high channel, for 24 dBi antenna, cho, PTP application

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

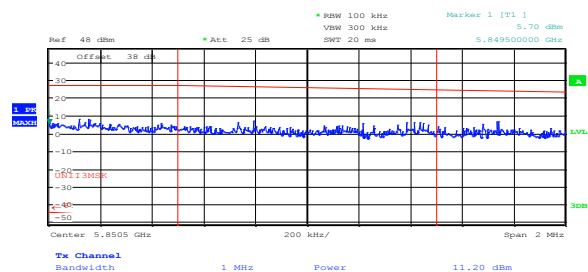
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



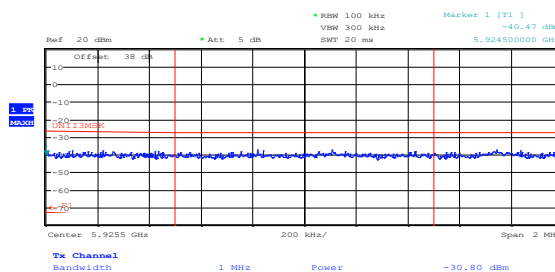
**Figure 8.2-34:** Conducted spurious emissions at the upper band edge at 5850 MHz, 10 MHz high channel, for 24 dBi antenna, ch1, PTP application



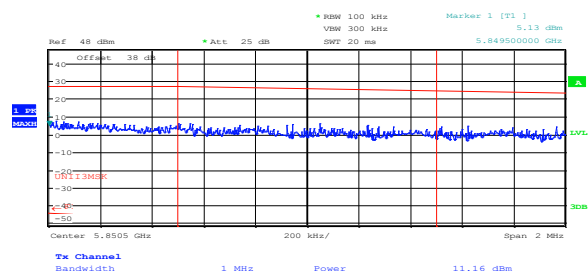
**Figure 8.2-35:** Conducted spurious emissions at the upper band edge at 5925 MHz, 10 MHz high channel, for 24 dBi antenna, ch1, PTP application



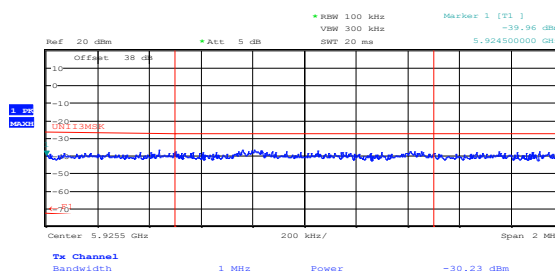
**Figure 8.2-36:** Conducted spurious emissions at the upper band edge at 5850 MHz, 20 MHz high channel, for 24 dBi antenna, cho, PTP application



**Figure 8.2-37:** Conducted spurious emissions at the upper band edge at 5925 MHz, 20 MHz high channel, for 24 dBi antenna, cho, PTP application



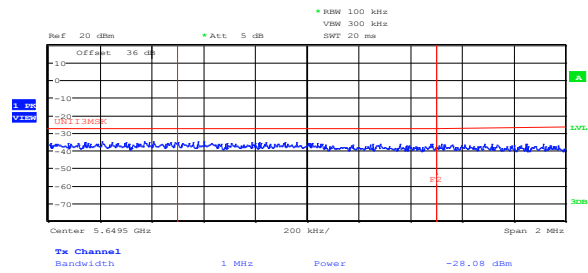
**Figure 8.2-38:** Conducted spurious emissions at the upper band edge at 5850 MHz, 20 MHz high channel, for 24 dBi antenna, ch1, PTP application



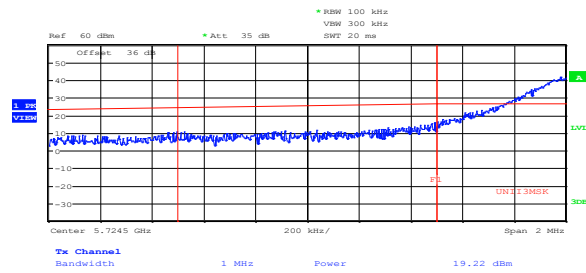
**Figure 8.2-39:** Conducted spurious emissions at the upper band edge at 5925 MHz, 20 MHz high channel, for 24 dBi antenna, ch1, PTP application

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

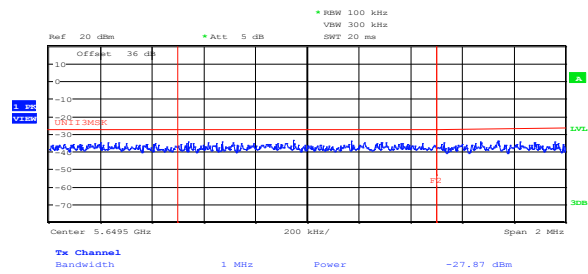
Testing data  
 FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
 FCC Part 15 Subpart E and RSS-247 Issue 1



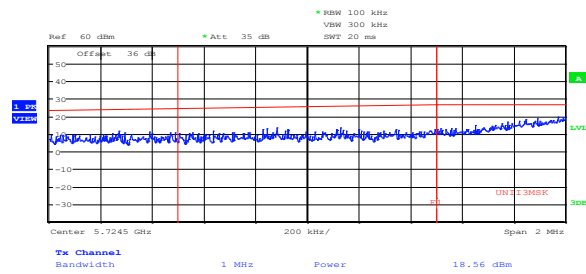
**Figure 8.2-40:** Conducted spurious emissions at the lower band edge at 5650 MHz, 5 MHz low channel, for 32 dBi antenna, cho, PTP application



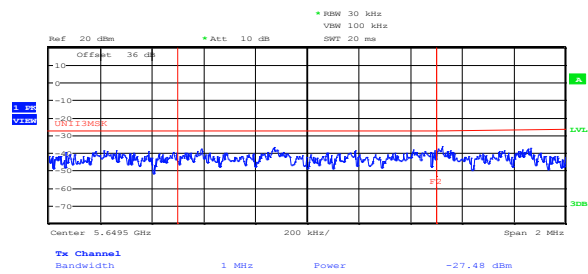
**Figure 8.2-41:** Conducted spurious emissions at the lower band edge at 5725 MHz, 5 MHz low channel, for 32 dBi antenna, cho, PTP application



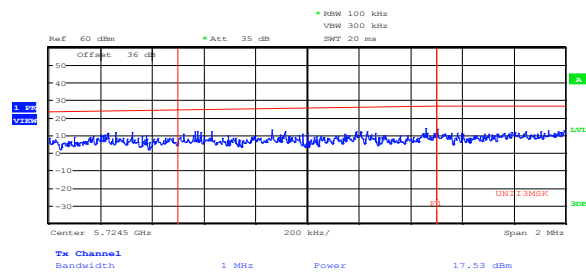
**Figure 8.2-42:** Conducted spurious emissions at the lower band edge at 5650 MHz, 10 MHz low channel, for 32 dBi antenna, cho, PTP application



**Figure 8.2-43:** Conducted spurious emissions at the lower band edge at 5725 MHz, 10 MHz low channel, for 32 dBi antenna, cho, PTP application



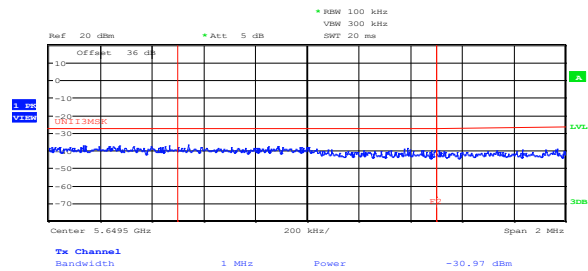
**Figure 8.2-44:** Conducted spurious emissions at the lower band edge at 5650 MHz, 20 MHz low channel, for 32 dBi antenna, cho, PTP application



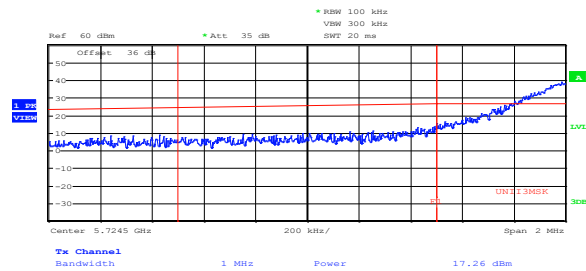
**Figure 8.2-45:** Conducted spurious emissions at the lower band edge at 5725 MHz, 20 MHz low channel, for 32 dBi antenna, cho, PTP application

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

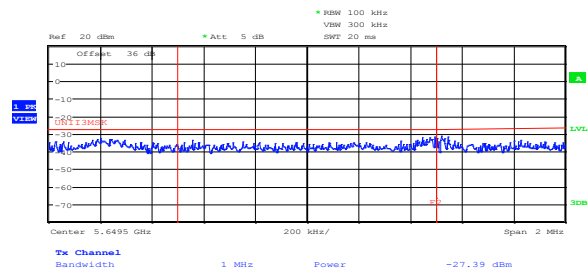
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



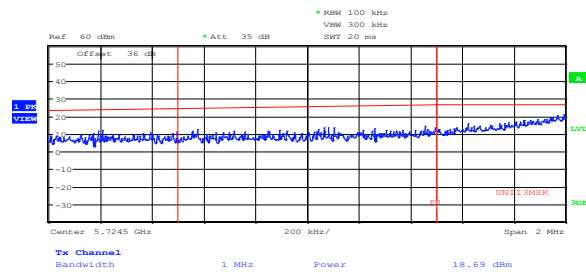
**Figure 8.2-46:** Conducted spurious emissions at the lower band edge at 5650 MHz, 5 MHz low channel, for 32 dBi antenna, ch1, PTP application



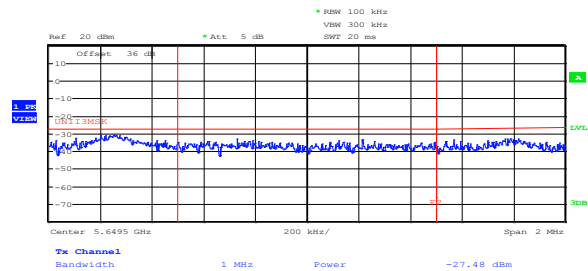
**Figure 8.2-47:** Conducted spurious emissions at the lower band edge at 5725 MHz, 5 MHz low channel, for 32 dBi antenna, ch1, PTP application



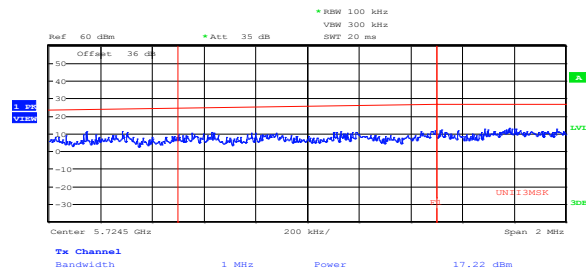
**Figure 8.2-48:** Conducted spurious emissions at the lower band edge at 5650 MHz, 10 MHz low channel, for 32 dBi antenna, ch1, PTP application



**Figure 8.2-49:** Conducted spurious emissions at the lower band edge at 5725 MHz, 10 MHz low channel, for 32 dBi antenna, ch1, PTP application



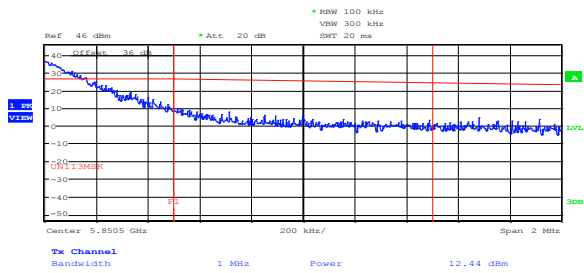
**Figure 8.2-50:** Conducted spurious emissions at the lower band edge at 5650 MHz, 20 MHz low channel, for 32 dBi antenna, ch1, PTP application



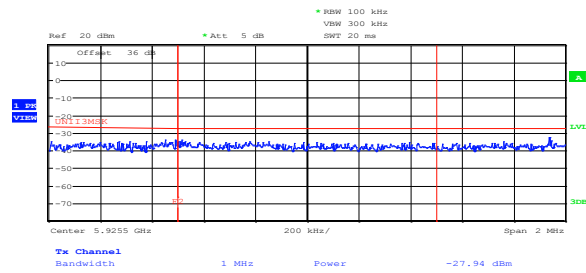
**Figure 8.2-51:** Conducted spurious emissions at the lower band edge at 5725 MHz, 20 MHz low channel, for 32 dBi antenna, ch1, PTP application

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

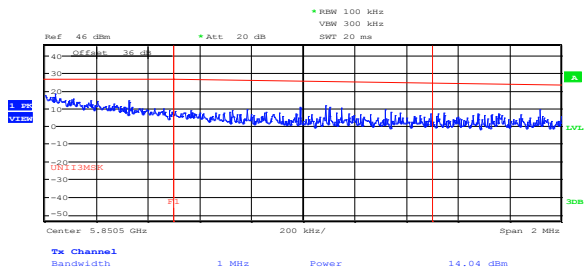
Testing data  
 FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
 FCC Part 15 Subpart E and RSS-247 Issue 1



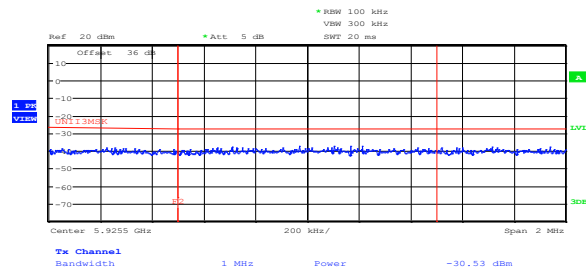
**Figure 8.2-52:** Conducted spurious emissions at the upper band edge at 5850 MHz, 5 MHz high channel, for 32 dBi antenna, cho, PTP application



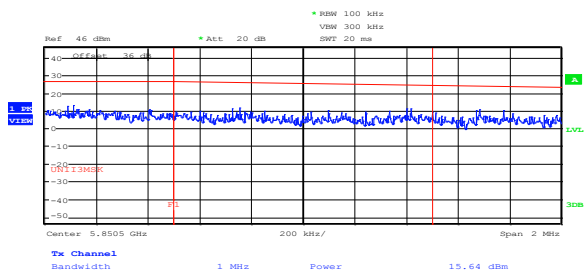
**Figure 8.2-53:** Conducted spurious emissions at the upper band edge at 5925 MHz, 5 MHz high channel, for 32 dBi antenna, cho, PTP application



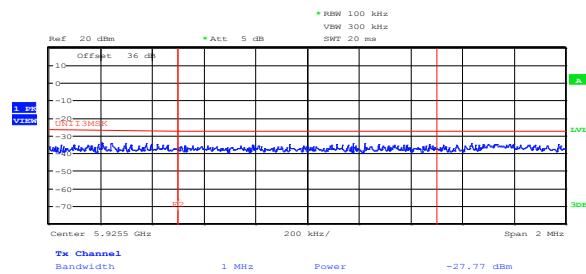
**Figure 8.2-54:** Conducted spurious emissions at the upper band edge at 5850 MHz, 10 MHz high channel, for 32 dBi antenna, cho, PTP application



**Figure 8.2-55:** Conducted spurious emissions at the upper band edge at 5925 MHz, 10 MHz high channel, for 32 dBi antenna, cho, PTP application



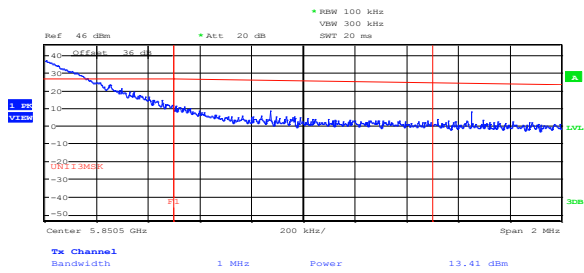
**Figure 8.2-56:** Conducted spurious emissions at the upper band edge at 5850 MHz, 20 MHz high channel, for 32 dBi antenna, cho, PTP application



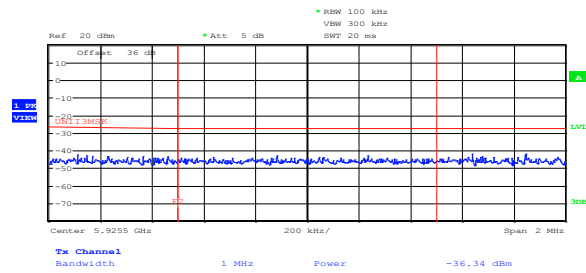
**Figure 8.2-57:** Conducted spurious emissions at the upper band edge at 5925 MHz, 20 MHz high channel, for 32 dBi antenna, cho, PTP application

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

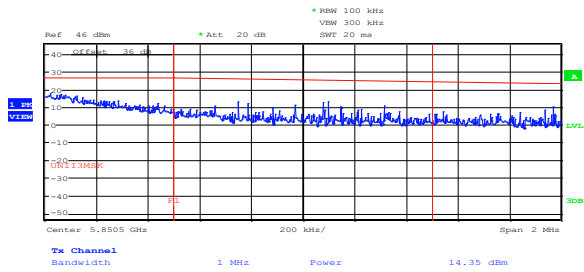
Testing data  
FCC 15.407(b) and RSS-247 6.2.4 (2) Spurious (out-of-band) emissions  
FCC Part 15 Subpart E and RSS-247 Issue 1



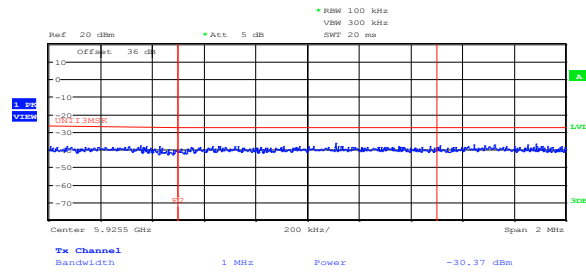
**Figure 8.2-58:** Conducted spurious emissions at the upper band edge at 5850 MHz, 5 MHz high channel, for 32 dBi antenna, ch1, PTP application



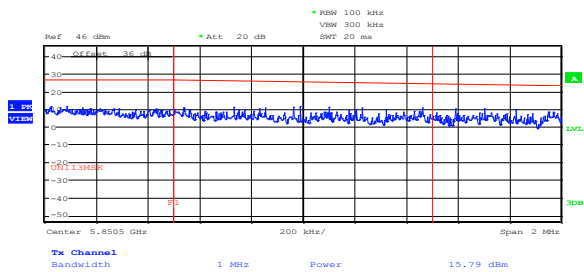
**Figure 8.2-59:** Conducted spurious emissions at the upper band edge at 5925 MHz, 5 MHz high channel, for 32 dBi antenna, ch1, PTP application



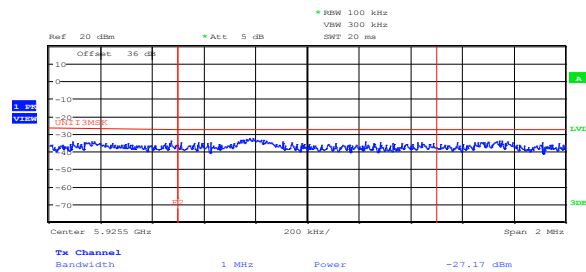
**Figure 8.2-60:** Conducted spurious emissions at the upper band edge at 5850 MHz, 10 MHz high channel, for 32 dBi antenna, ch1, PTP application



**Figure 8.2-61:** Conducted spurious emissions at the upper band edge at 5925 MHz, 10 MHz high channel, for 32 dBi antenna, ch1, PTP application



**Figure 8.2-62:** Conducted spurious emissions at the upper band edge at 5850 MHz, 20 MHz high channel, for 32 dBi antenna, ch1, PTP application



**Figure 8.2-63:** Conducted spurious emissions at the upper band edge at 5925 MHz, 20 MHz high channel, for 32 dBi antenna, ch1, PTP application

Radiated spurious emissions with attached 32 dBi antenna (for PTP application) were performed at the frequencies that exceeded limits for conducted spurious emissions at the antenna port.

**Table 8.2-9:** Radiated field strength measurement results within restricted bands for PTP 32 dBi antenna

| Channel bandwidth | Frequency, GHz | Peak Field strength, dBμV/m | Peak limit, dBμV/m | Peak margin, dB | Average Field strength, dBμV/m | Average limit, dBμV/m | Average margin, dB |
|-------------------|----------------|-----------------------------|--------------------|-----------------|--------------------------------|-----------------------|--------------------|
| 5 MHz             | 11.580         | 71.77                       | 74.00              | 2.23            | 53.95                          | 54.00                 | 0.05               |
| 10 MHz            | 11.580         | 72.04                       | 74.00              | 1.96            | 53.70                          | 54.00                 | 0.30               |
| 20 MHz            | 11.580         | 73.60                       | 74.00              | 0.40            | 53.64                          | 54.00                 | 0.36               |

Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable. Average field strength result in the table above is already corrected to compensate the duty cycle.

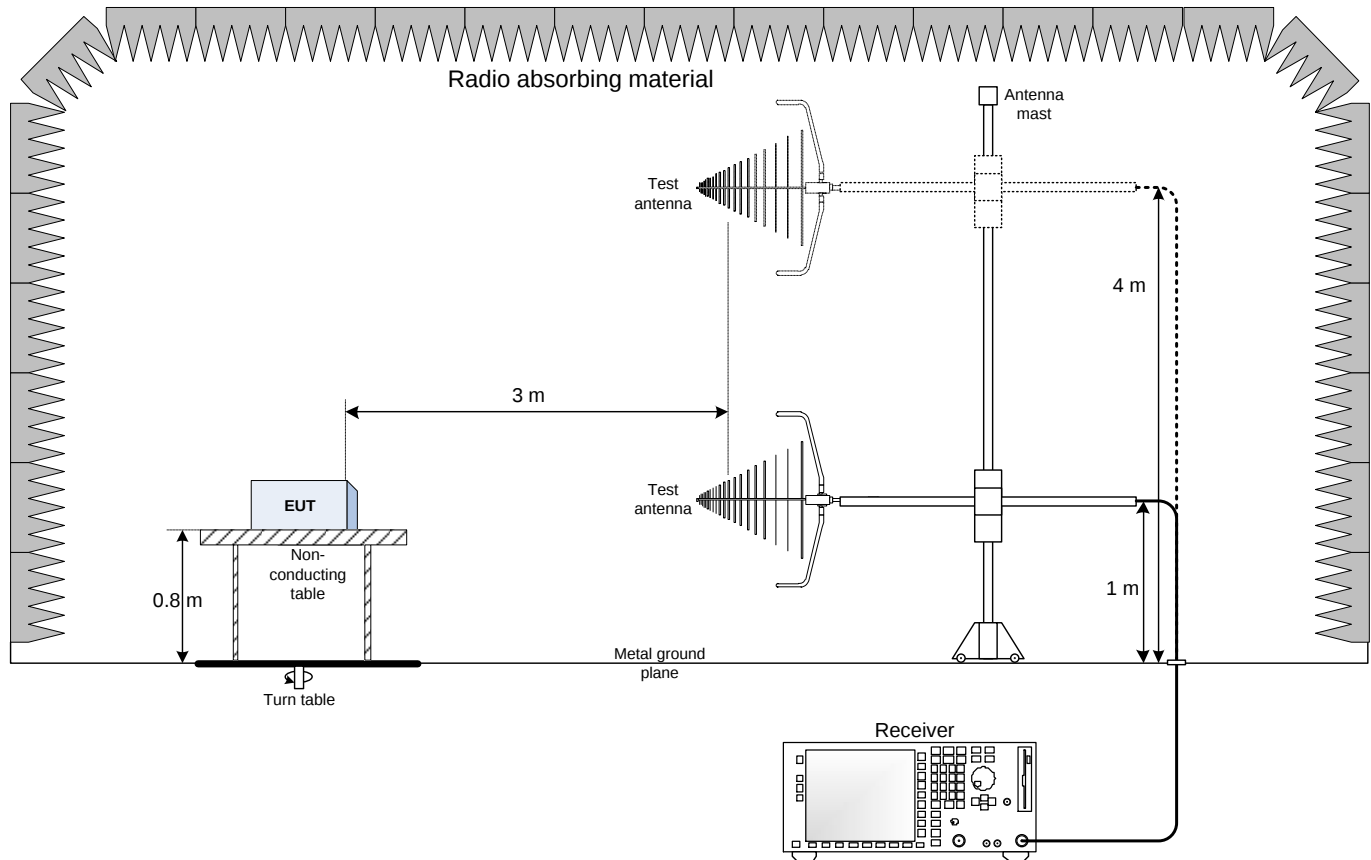
**Table 8.2-10:** Radiated field strength measurement results outside restricted bands for PTP 32 dBi antenna

| Channel bandwidth    | Frequency, MHz | Field strength, dBμV/m/MHz | Limit, dBμV/m/MHz | Margin, dB |
|----------------------|----------------|----------------------------|-------------------|------------|
| 5 MHz, low channel   | 6400           | 61.28                      | 68.23             | 6.95       |
| 5 MHz, high channel  | 6400           | 62.32                      | 68.23             | 5.91       |
| 10 MHz, low channel  | 6400           | 61.84                      | 68.23             | 6.39       |
| 10 MHz, high channel | 6400           | 62.93                      | 68.23             | 5.30       |
| 20 MHz, low channel  | 6400           | 62.54                      | 68.23             | 5.69       |
| 20 MHz, high channel | 6400           | 63.89                      | 68.23             | 4.34       |

Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

## Section 9. Block diagrams of test set-ups

### 9.1 Radiated emissions set-up for frequencies below 1 GHz



## 9.2 Radiated emissions set-up for frequencies above 1 GHz

