



# TEST REPORT

**Test Report No. :** UL-RPT-RP12207736JD01A V3.0

**Manufacturer** : Aviat Networks  
**Model No.** : Eclipse IRU600V4, 5.8GHz, ERM-ATT-400  
**FCC ID** : VK6-IRU600V4  
**Test Standard(s)** : FCC Parts 15.207, 15.209(a) & 15.407

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes all previous versions.

**Date of Issue:** 30 July 2018

**Checked by:**

Ben Mercer  
Senior Test Engineer, Radio Laboratory

**Company Signatory:**

Sarah Williams  
Senior Test Engineer, Radio Laboratory  
UL VS LTD



This laboratory is accredited by UKAS.  
The tests reported herein have been  
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accreditation.

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## UL VS LTD

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**1. Customer Information**

|                      |                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------|
| <b>Company Name:</b> | Aviat Networks                                                                                           |
| <b>Address:</b>      | 4 Bell Drive, Hamilton Intl Tech Park<br>Blantyre<br>Glasgow<br>Lanarkshire<br>G72 0FB<br>United Kingdom |

## 2. Summary of Testing

### 2.1. General Information

|                                 |                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Specification Reference:</b> | 47CFR15.407 and 47CFR15.403                                                                                                                                               |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) –<br>Sections 15.403 and 15.407 |
| <b>Specification Reference:</b> | 47CFR15.207 and 47CFR15.209                                                                                                                                               |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart C (Intentional Radiators) – Sections 15.207 and 15.209                                     |
| <b>Site Registration:</b>       | 209735                                                                                                                                                                    |
| <b>Location of Testing:</b>     | UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park,<br>Basingstoke, Hampshire, RG24 8AH, United Kingdom                                                        |
| <b>Test Dates:</b>              | 30 April 2018 to 20 July 2018                                                                                                                                             |

### 2.2. Summary of Test Results

| FCC Reference (47CFR)                                                                                                                                                                                                        | Measurement                                                          | Result                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Part 15.207                                                                                                                                                                                                                  | Transmitter AC Conducted Emissions                                   |    |
| Part 15.403(i)                                                                                                                                                                                                               | Transmitter 26 dB Emission Bandwidth                                 |   |
| Part 15.407(e)                                                                                                                                                                                                               | Transmitter Minimum 6 dB Bandwidth                                   |  |
| Part 15.35(c)                                                                                                                                                                                                                | Transmitter Duty Cycle                                               | Note 1                                                                                |
| Part 15.407(a)(3)                                                                                                                                                                                                            | Transmitter Maximum Conducted Output Power                           |  |
| Part 15.407(a)(3)                                                                                                                                                                                                            | Transmitter Peak Power Spectral Density                              |  |
| Part 15.407(b)/15.209(a)                                                                                                                                                                                                     | Transmitter Out of Band Cabinet Radiated Emissions                   |  |
| Part 15.407(b)                                                                                                                                                                                                               | Transmitter Out of Band Conducted Emissions                          |  |
| Part 15.407(b)                                                                                                                                                                                                               | Transmitter Band Edge Conducted Emissions                            |  |
| Part 15.407(g)                                                                                                                                                                                                               | Transmitter Frequency Stability<br>(Temperature & Voltage Variation) | Note 2                                                                                |
| Part 15.407(h)(1)                                                                                                                                                                                                            | Transmitter Power Control                                            | Note 3                                                                                |
| <b>Key to Results</b><br> = Complied  = Did not comply |                                                                      |                                                                                       |

#### Note(s):

1. Transmitter Duty Cycle was measured for all modulation schemes and found to be 100%. Therefore the results are not included in this report. Plots are archived on the Company server and available for inspection upon request.
2. Frequency stability is better than 20 ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.
3. Not applicable as the EUT operates in the 5.725-5.85 GHz band.

**2.3. Methods and Procedures**

|                   |                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Reference:</b> | ANSI C63.10-2013                                                                                                         |
| <b>Title:</b>     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                           |
| <b>Reference:</b> | KDB 789033 D02 General UNII Test Procedures New Rules v02r01 December 14, 2017                                           |
| <b>Title:</b>     | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E |
| <b>Reference:</b> | KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015                                                                    |
| <b>Title:</b>     | AC Power-Line Conducted Emissions Frequently Asked Questions                                                             |

**2.4. Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specifications identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

|                                   |                                        |
|-----------------------------------|----------------------------------------|
| <b>Brand Name:</b>                | Aviat Networks                         |
| <b>Model Name or Number:</b>      | Eclipse IRU600V4, 5.8 GHz, ERM-ATT-400 |
| <b>Test Sample Serial Number:</b> | MTL18050017                            |
| <b>Hardware Version</b>           | 001                                    |
| <b>Software Version:</b>          | 08.04.21                               |
| <b>FCC ID:</b>                    | VK6-IRU600V4                           |

#### **3.2. Description of EUT**

The equipment under test was a fixed point to point transceiver operating in U-NII Band 3. DC and IF were supplied to the EUT via a single coaxial connection from an INU containing either a RAC 60 or RAC 7X card.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

#### **3.4. Additional Information Related to Testing**

|                                        |                                                                              |                                |
|----------------------------------------|------------------------------------------------------------------------------|--------------------------------|
| <b>Technology Tested:</b>              | Unlicensed National Information Infrastructure Devices (U-NII)               |                                |
| <b>Type of Unit:</b>                   | Fixed Point to Point Transceiver                                             |                                |
| <b>Modulation:</b>                     | QPSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 512QAM, 1024QAM, 2048QAM, 4096QAM |                                |
| <b>Power Supply Requirement:</b>       | Nominal                                                                      | -48.0 VDC                      |
| <b>Maximum Conducted Output Power:</b> | 29.8 dBm                                                                     |                                |
| <b>Channel Spacing:</b>                | 3.75 MHz, 5 MHz, 10 MHz, 20 MHz, 30 MHz                                      |                                |
| <b>Transmit Frequency Range:</b>       | 5742.5 MHz to 5832.5 MHz                                                     |                                |
| <b>Transmit Channels Tested:</b>       | <b>Channel ID</b>                                                            | <b>Channel Frequency (MHz)</b> |
|                                        | Bottom                                                                       | 5742.5                         |
|                                        | Middle                                                                       | 5769.5                         |
|                                        | Top                                                                          | 5832.5                         |

#### **3.5. Description of Available Antennas**

The EUT supports two antenna types; parabolic and flat panel, with the following maximum gains:

| <b>Frequency Band (MHz)</b> | <b>G<sub>Antenna</sub> Parabolic (dBi)</b> | <b>G<sub>Antenna</sub> Flat Panel (dBi)</b> |
|-----------------------------|--------------------------------------------|---------------------------------------------|
| 5725 to 5850                | 43.0                                       | 28.0                                        |
| All other frequencies       | 10.0                                       | 10.0                                        |

### **3.6. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

|                              |             |
|------------------------------|-------------|
| <b>Description:</b>          | Laptop PC   |
| <b>Brand Name:</b>           | Dell        |
| <b>Model Name or Number:</b> | Latitude    |
| <b>Serial Number:</b>        | 17198129773 |

|                              |                      |
|------------------------------|----------------------|
| <b>Description:</b>          | Ethernet Cable.      |
| <b>Brand Name:</b>           | Not marked or stated |
| <b>Model Name or Number:</b> | Not marked or stated |
| <b>Serial Number:</b>        | Not marked or stated |

|                              |                     |
|------------------------------|---------------------|
| <b>Description:</b>          | Indoor Unit Chassis |
| <b>Brand Name:</b>           | Aviat Networks      |
| <b>Model Name or Number:</b> | Eclipse INU         |
| <b>Serial Number:</b>        | LEA05040537         |

|                                   |                  |
|-----------------------------------|------------------|
| <b>Description:</b>               | Indoor Unit Card |
| <b>Brand Name:</b>                | Aviat Networks   |
| <b>Model Name or Number:</b>      | RAC 60           |
| <b>Test Sample Serial Number:</b> | EBT1023D066      |

|                                   |                  |
|-----------------------------------|------------------|
| <b>Description:</b>               | Indoor Unit Card |
| <b>Brand Name:</b>                | Aviat Networks   |
| <b>Model Name or Number:</b>      | RAC 7X           |
| <b>Test Sample Serial Number:</b> | EBT1635B483      |

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Continuously transmitting with a modulated carrier at maximum power on the bottom, middle and top channels as required using the supported channel bandwidths and modulation types.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to select the test channels, data rates and modulation schemes as required.
- All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and widest bandwidth were:
  - o Highest power
    - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
    - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
    - o RAC 60 / 10 MHz - 256QAM / 56 Mbps
    - o RAC 60 / 20 MHz - 16QAM / 50 Mbps
    - o RAC 60 / 30 MHz - QPSK / 38 Mbps
    - o RAC 7X / 10 MHz - QPSK / 12 Mbps
    - o RAC 7X / 30 MHz - 512QAM / 200 Mbps
  - o Widest bandwidth
    - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
    - o RAC 60 / 5 MHz - QPSK / 5 Mbps
    - o RAC 60 / 10 MHz - QPSK / 14 Mbps
    - o RAC 60 / 20 MHz - QPSK / 30 Mbps
    - o RAC 60 / 30 MHz - QPSK / 38 Mbps
    - o RAC 7X / 10 MHz - 64QAM / 45 Mbps
    - o RAC 7X / 30 MHz - 4096QAM / 266 Mbps
- Transmitter out of band emissions were performed with the EUT transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
- For transmitter out of band cabinet radiated emissions, the INU and RAC 60 / 7X were placed outside the chamber. The EUT antenna port was terminated using a 50  $\Omega$  dummy load.
- AC conducted emissions were performed with the EUT transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6 Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## 5.2. Test Results

### 5.2.1. Transmitter AC Conducted Spurious Emissions

#### Test Summary:

|                            |               |            |              |
|----------------------------|---------------|------------|--------------|
| Test Engineer:             | Patrick Jones | Test Date: | 20 July 2018 |
| Test Sample Serial Number: | MTL18050017   |            |              |

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| FCC Reference:    | Part 15.207                                              |
| Test Method Used: | ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below |

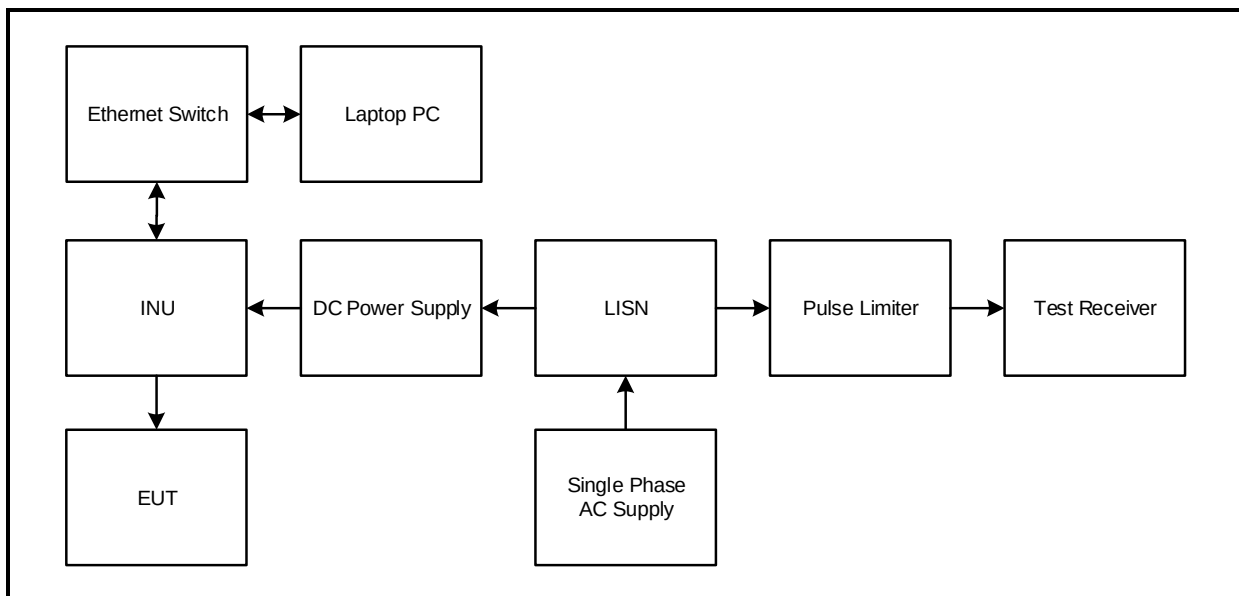
#### Environmental Conditions:

|                        |    |
|------------------------|----|
| Temperature (°C):      | 24 |
| Relative Humidity (%): | 45 |

#### Note(s):

- The EUT was transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - RAC 7X / 10 MHz - QPSK / 12 Mbps
- The EUT was connected to the DC power supply via the INU. The DC power supply was connected to a 120 VAC 60 Hz single phase supply via a LISN.
- A pulse limiter was fitted between the LISN and the test receiver.
- Pre-scans were performed and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
- A signal generator was used to substitute the levels measured by the test receiver.

#### Test Setup:



**Transmitter AC Conducted Spurious Emissions (continued)****Results: RAC 60 / Live / Quasi Peak / 120 VAC 60 Hz**

| Frequency (MHz) | Line | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.281           | Live | 39.7         | 60.8         | 21.1        | Complied |
| 0.281           | Live | 39.8         | 60.8         | 21.0        | Complied |
| 8.633           | Live | 35.7         | 60.0         | 24.3        | Complied |
| 11.139          | Live | 37.5         | 60.0         | 22.5        | Complied |
| 17.610          | Live | 47.7         | 60.0         | 12.3        | Complied |
| 21.156          | Live | 42.6         | 60.0         | 17.4        | Complied |

**Results: RAC 60 / Live / Average / 120 VAC 60 Hz**

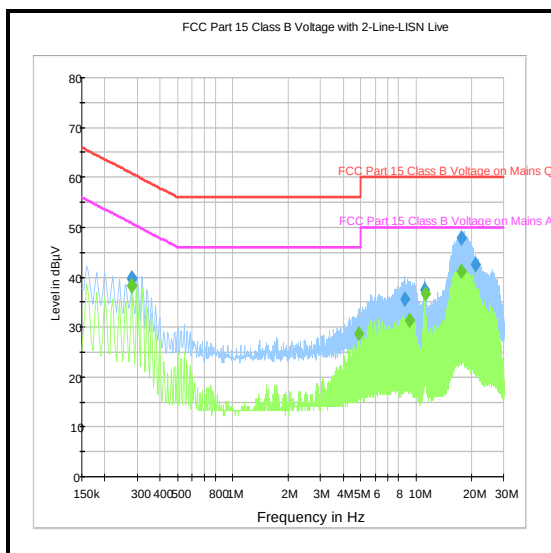
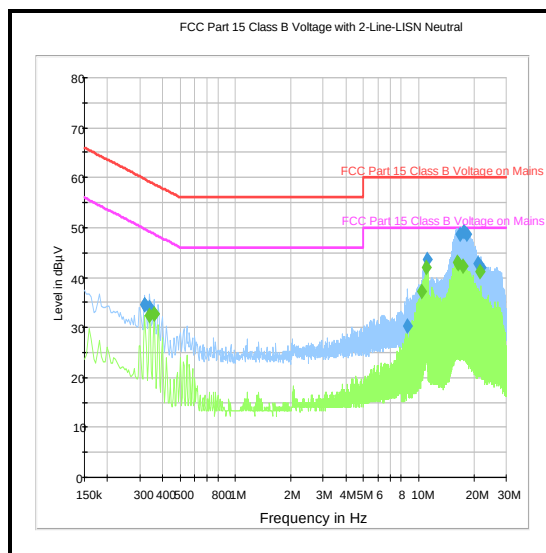
| Frequency (MHz) | Line | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.281           | Live | 38.4         | 50.8         | 12.4        | Complied |
| 0.281           | Live | 38.4         | 50.8         | 12.4        | Complied |
| 4.848           | Live | 28.7         | 46.0         | 17.3        | Complied |
| 9.236           | Live | 31.5         | 50.0         | 18.5        | Complied |
| 11.180          | Live | 36.6         | 50.0         | 13.4        | Complied |
| 17.570          | Live | 41.3         | 50.0         | 8.7         | Complied |

**Results: RAC 60 / Neutral / Quasi Peak / 120 VAC 60 Hz**

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.321           | Neutral | 34.5         | 59.7         | 25.2        | Complied |
| 0.339           | Neutral | 34.1         | 59.2         | 25.1        | Complied |
| 16.769          | Neutral | 48.8         | 60.0         | 11.2        | Complied |
| 17.570          | Neutral | 49.2         | 60.0         | 10.8        | Complied |
| 18.191          | Neutral | 48.6         | 60.0         | 11.4        | Complied |
| 21.075          | Neutral | 42.7         | 60.0         | 17.3        | Complied |

**Results: RAC 60 / Neutral / Average / 120 VAC 60 Hz**

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.362           | Neutral | 32.7         | 48.7         | 16.0        | Complied |
| 10.379          | Neutral | 37.3         | 50.0         | 12.7        | Complied |
| 10.959          | Neutral | 41.9         | 50.0         | 8.1         | Complied |
| 16.148          | Neutral | 43.0         | 50.0         | 7.0         | Complied |
| 16.368          | Neutral | 42.7         | 50.0         | 7.3         | Complied |
| 17.430          | Neutral | 42.3         | 50.0         | 7.7         | Complied |

**Transmitter AC Conducted Spurious Emissions (continued)****Results: RAC 60 / 120 VAC 60 Hz****Live****Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Transmitter AC Conducted Spurious Emissions (continued)****Results: RAC 7X / Live / Quasi Peak / 120 VAC 60 Hz**

| Frequency (MHz) | Line | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.281           | Live | 39.4         | 60.8         | 21.4        | Complied |
| 0.281           | Live | 39.8         | 60.8         | 21.0        | Complied |
| 0.299           | Live | 38.7         | 60.3         | 21.6        | Complied |
| 9.056           | Live | 37.4         | 60.0         | 22.6        | Complied |
| 17.570          | Live | 47.9         | 60.0         | 12.1        | Complied |
| 21.116          | Live | 42.8         | 60.0         | 17.2        | Complied |

**Results: RAC 7X / Live / Average / 120 VAC 60 Hz**

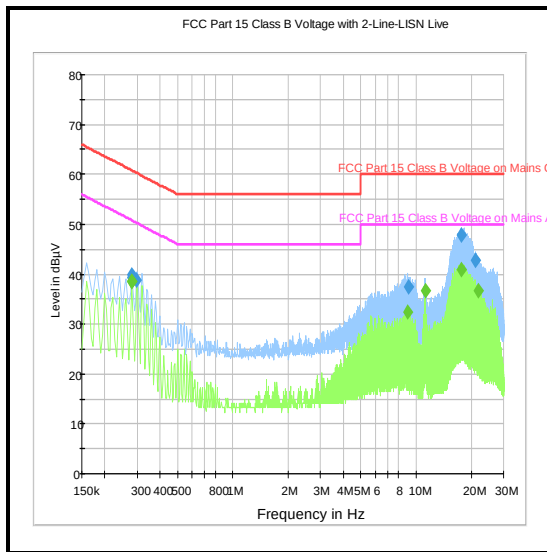
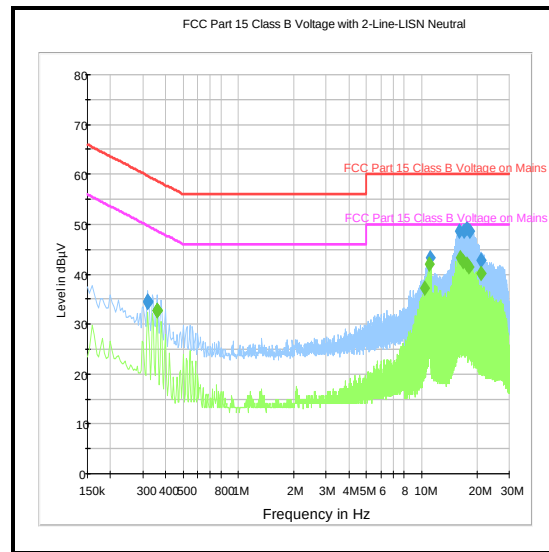
| Frequency (MHz) | Line | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|------|--------------|--------------|-------------|----------|
| 0.281           | Live | 38.4         | 50.8         | 12.4        | Complied |
| 0.281           | Live | 38.4         | 50.8         | 12.4        | Complied |
| 9.015           | Live | 32.3         | 50.0         | 17.7        | Complied |
| 11.180          | Live | 36.6         | 50.0         | 13.4        | Complied |
| 17.610          | Live | 40.9         | 50.0         | 9.1         | Complied |
| 21.899          | Live | 36.7         | 50.0         | 13.3        | Complied |

**Results: RAC 7X / Neutral / Quasi Peak / 120 VAC 60 Hz**

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.321           | Neutral | 34.5         | 59.7         | 25.2        | Complied |
| 11.099          | Neutral | 43.3         | 60.0         | 16.7        | Complied |
| 16.107          | Neutral | 48.6         | 60.0         | 11.4        | Complied |
| 16.989          | Neutral | 48.6         | 60.0         | 11.4        | Complied |
| 17.570          | Neutral | 49.2         | 60.0         | 10.8        | Complied |
| 18.191          | Neutral | 48.6         | 60.0         | 11.4        | Complied |

**Results: RAC 7X / Neutral / Average / 120 VAC 60 Hz**

| Frequency (MHz) | Line    | Level (dBμV) | Limit (dBμV) | Margin (dB) | Result   |
|-----------------|---------|--------------|--------------|-------------|----------|
| 0.362           | Neutral | 32.7         | 48.7         | 16.0        | Complied |
| 10.379          | Neutral | 37.2         | 50.0         | 12.8        | Complied |
| 10.959          | Neutral | 41.9         | 50.0         | 8.1         | Complied |
| 16.148          | Neutral | 43.3         | 50.0         | 6.7         | Complied |
| 16.769          | Neutral | 42.5         | 50.0         | 7.5         | Complied |
| 17.610          | Neutral | 42.1         | 50.0         | 7.9         | Complied |

**Transmitter AC Conducted Spurious Emissions (continued)****Results: RAC 7X / 120 VAC 60 Hz****Live****Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No. | Serial No. | Date Calibration Due  | Cal. Interval (Months) |
|-----------|------------------|-----------------|----------|------------|-----------------------|------------------------|
| M2038     | Thermohygrometer | Testo           | 608-H1   | 45124919   | 27 Mar 2019           | 12                     |
| A2086     | LISN             | Rohde & Schwarz | ENV216   | 101033     | 07 Feb 2019           | 12                     |
| A1830     | Pulse Limiter    | Rohde & Schwarz | ESH3-Z2  | 100668     | 06 Apr 2019           | 12                     |
| G0614     | Signal Generator | Rohde & Schwarz | SMB100A  | 177687     | 08 May 2020           | 36                     |
| M1273     | Test Receiver    | Rohde & Schwarz | ESIB 26  | 100275     | Calibrated Before Use | -                      |

**5.2.2. Transmitter 26 dB Emission Bandwidth****Test Summary:**

|                                   |               |                    |                                  |
|-----------------------------------|---------------|--------------------|----------------------------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Dates:</b> | 30 April 2018 to<br>16 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                    |                                  |

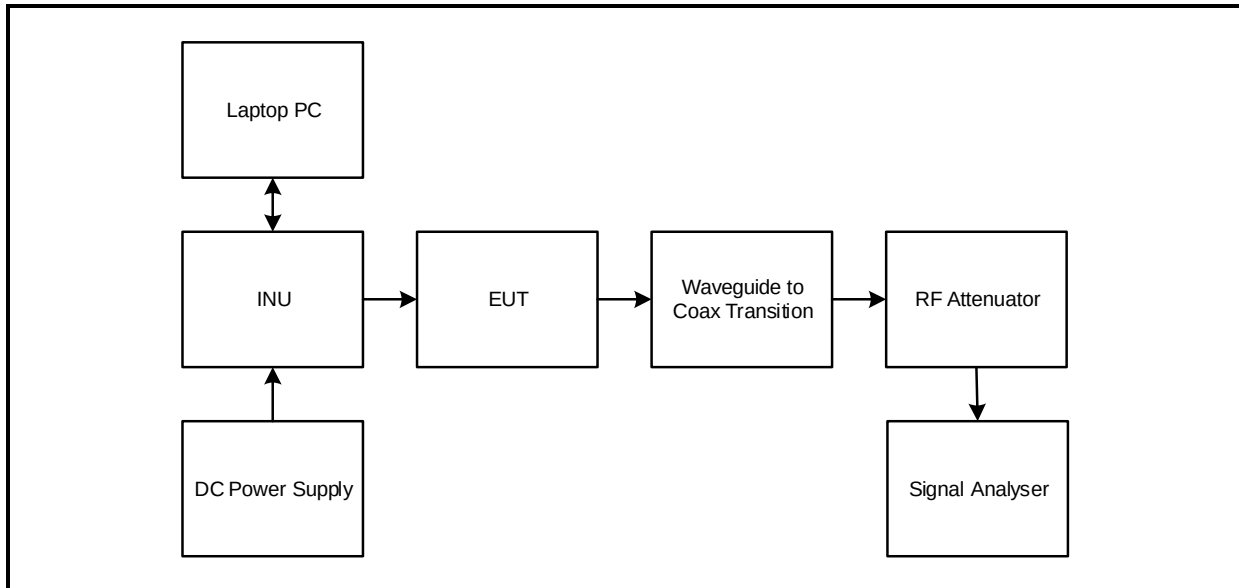
|                          |                                |
|--------------------------|--------------------------------|
| <b>FCC Reference:</b>    | Part 15.403(i)                 |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.C.1. |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperatures (°C):</b>     | 23 to 24 |
| <b>Relative Humidity (%):</b> | 42 to 46 |

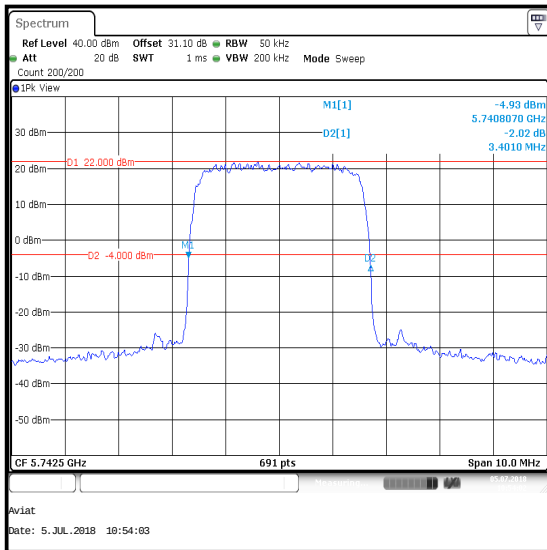
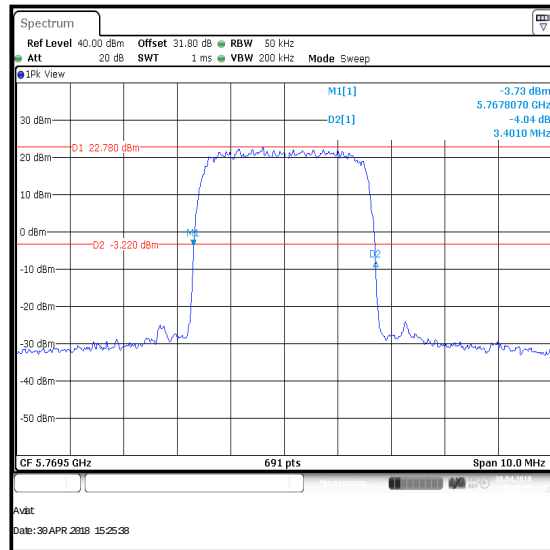
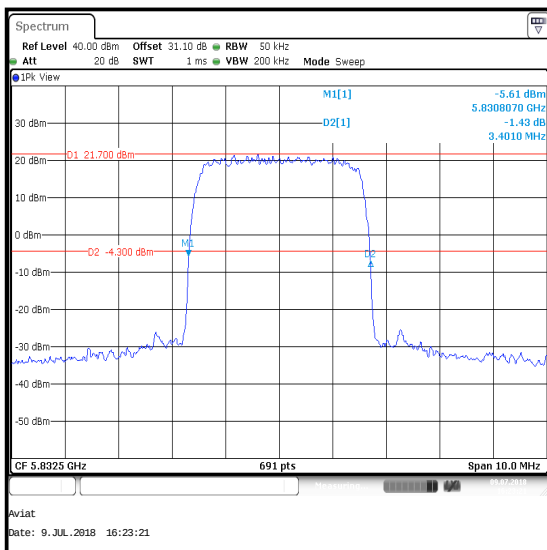
**Note(s):**

1. All modes supported by the EUT were investigated on one channel in accordance with KDB 789033 Section II.C.1. Emission Bandwidth (EBW) measurement procedure. The signal analyser resolution bandwidth was set to approximately 1% of the EBW, and the video bandwidth to  $\geq 3$  times the resolution bandwidth. A peak detector was used, sweep time was set to auto and the trace mode was set to max hold. The span was set to approximately 3 times the EBW. The modulation schemes that produced the widest bandwidth for each channel bandwidth and therefore deemed worst case for were:
  - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
  - o RAC 60 / 5 MHz - QPSK / 5 Mbps
  - o RAC 60 / 10 MHz - QPSK / 14 Mbps
  - o RAC 60 / 20 MHz - QPSK / 30 Mbps
  - o RAC 60 / 30 MHz - QPSK / 38 Mbps
  - o RAC 7X / 10 MHz - 64QAM / 45 Mbps
  - o RAC 7X / 30 MHz - 4096QAM / 266 Mbps
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. Plots for all modes are archived on the Company server and available for inspection upon request.
4. The signal analyser was connected to the RF port on the EUT using a coaxial cable and suitable attenuation.

**Transmitter 26 dB Emission Bandwidth (continued)****Test Setup:**

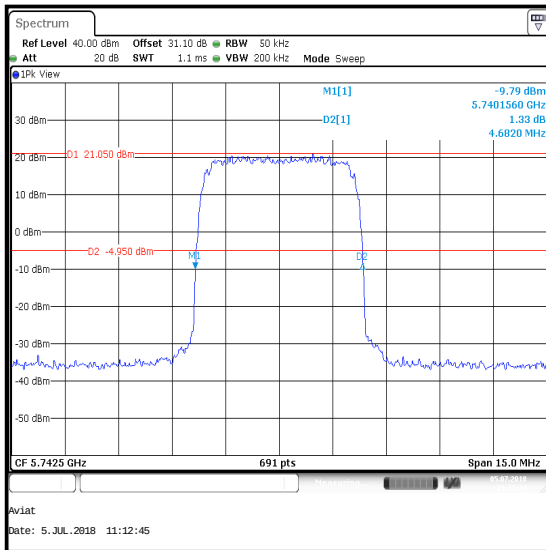
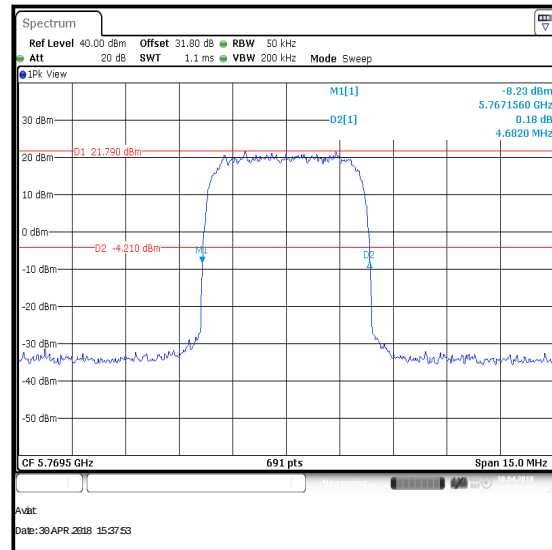
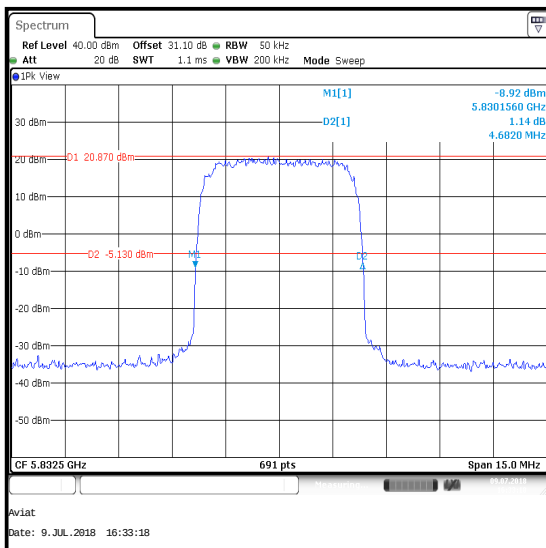
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 60 / 32QAM / 3.75 MHz / 12 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | 32QAM             | 12             | 3.401                          |
| Middle  | 5769.5          | 32QAM             | 12             | 3.401                          |
| Top     | 5832.5          | 32QAM             | 12             | 3.401                          |

**Bottom Channel****Middle Channel****Top Channel**

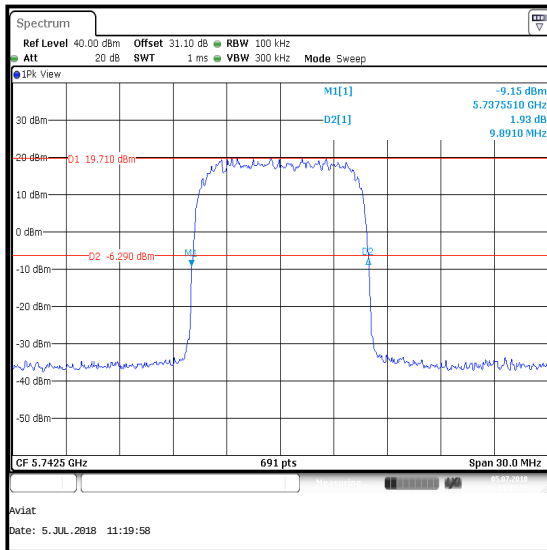
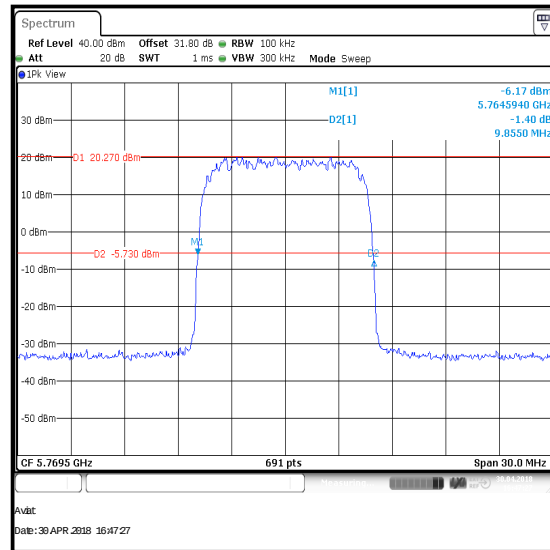
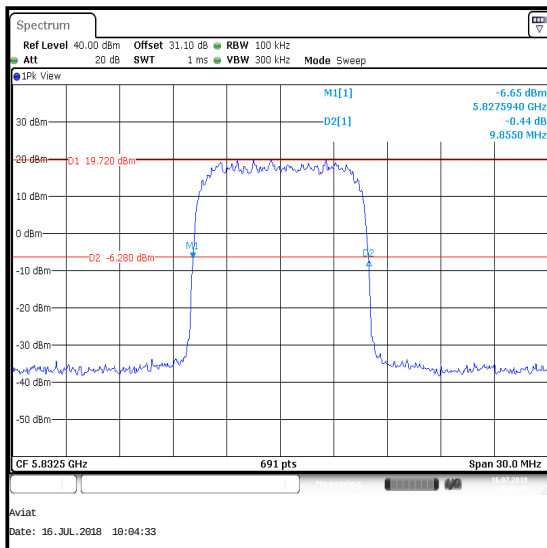
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 60 / 5 MHz / QPSK / 5 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | QPSK              | 5              | 4.682                          |
| Middle  | 5769.5          | QPSK              | 5              | 4.682                          |
| Top     | 5832.5          | QPSK              | 5              | 4.682                          |

**Bottom Channel****Middle Channel****Top Channel**

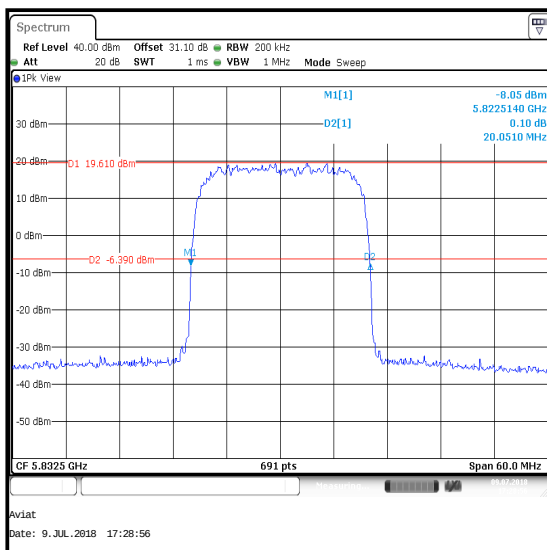
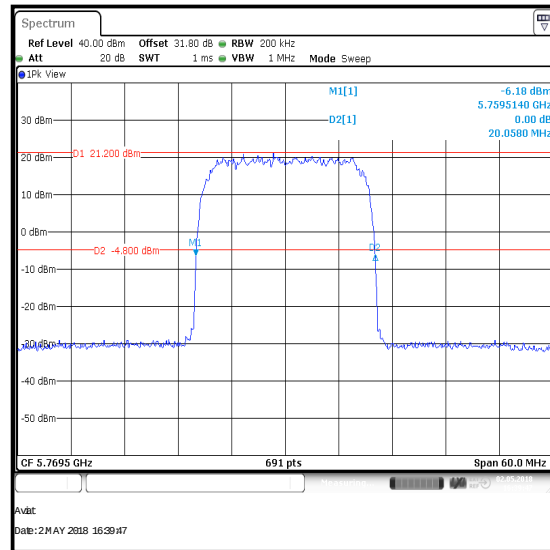
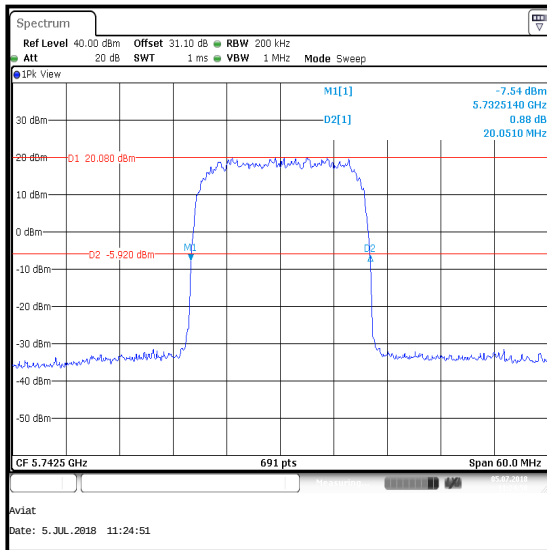
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 60 / 10 MHz / QPSK / 14 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | QPSK              | 14             | 9.891                          |
| Middle  | 5769.5          | QPSK              | 14             | 9.855                          |
| Top     | 5832.5          | QPSK              | 14             | 9.855                          |

**Bottom Channel****Middle Channel****Top Channel**

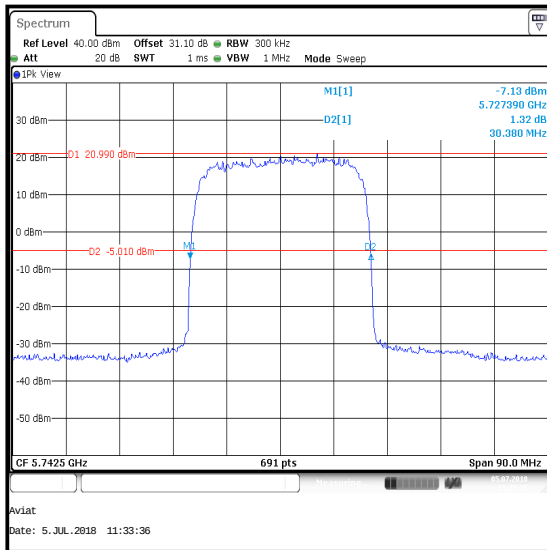
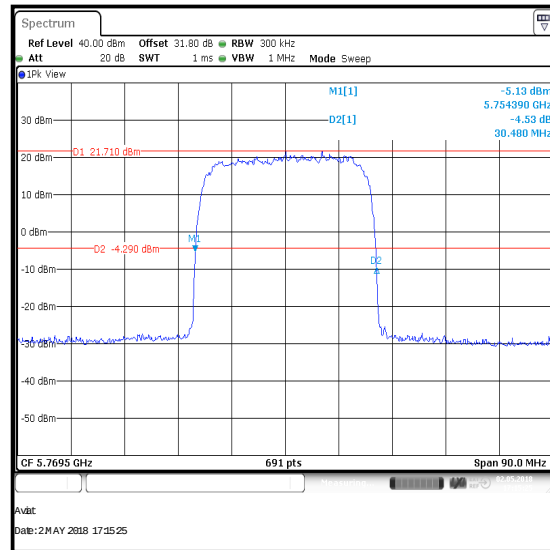
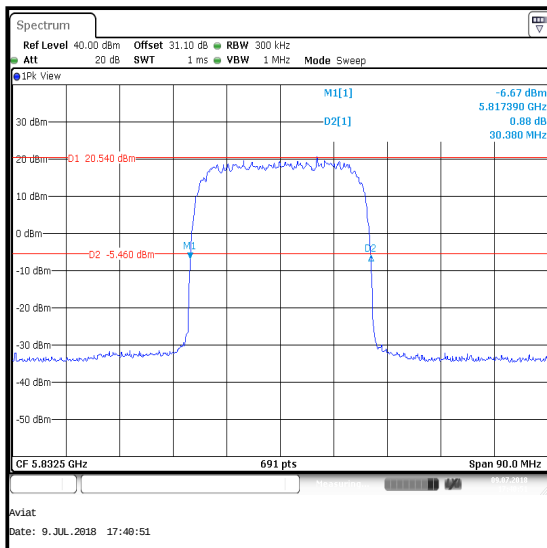
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 60 / 20 MHz / QPSK / 30 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | QPSK              | 30             | 20.051                         |
| Middle  | 5769.5          | QPSK              | 30             | 20.058                         |
| Top     | 5832.5          | QPSK              | 30             | 20.051                         |



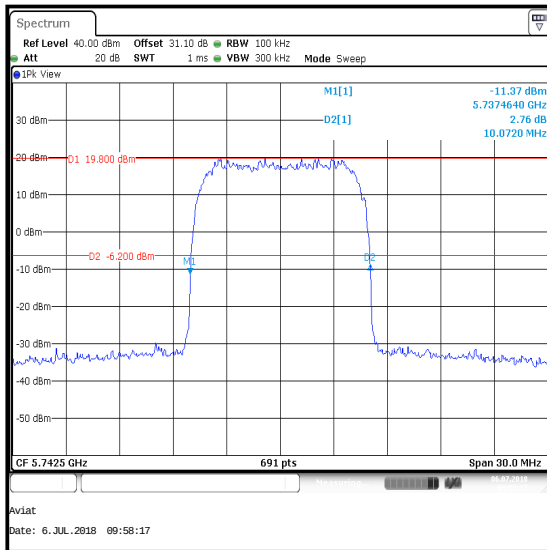
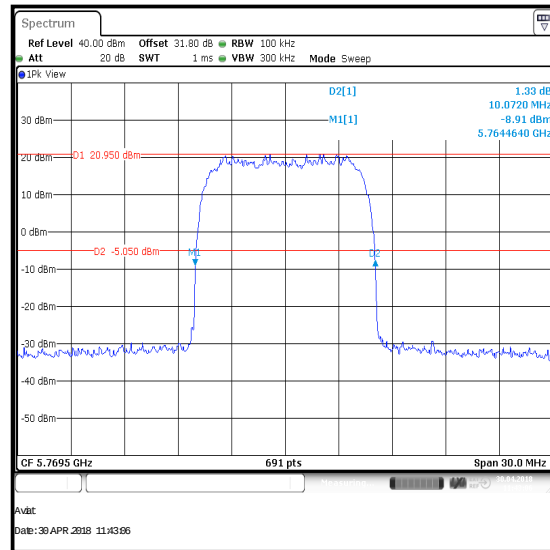
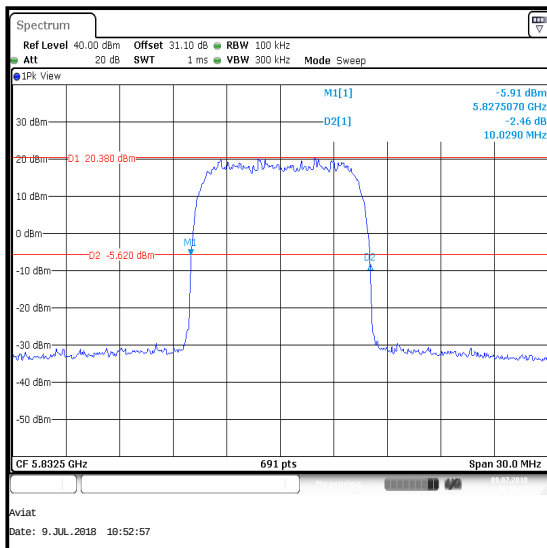
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 60 / 30 MHz / QPSK / 38 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | QPSK              | 38             | 30.380                         |
| Middle  | 5769.5          | QPSK              | 38             | 30.480                         |
| Top     | 5832.5          | QPSK              | 38             | 30.380                         |

**Bottom Channel****Middle Channel****Top Channel**

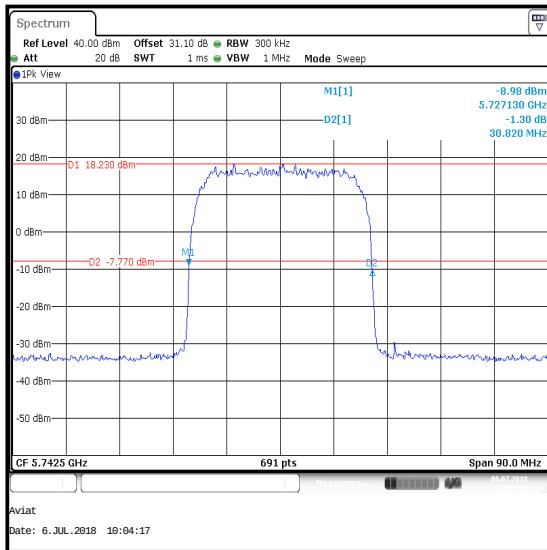
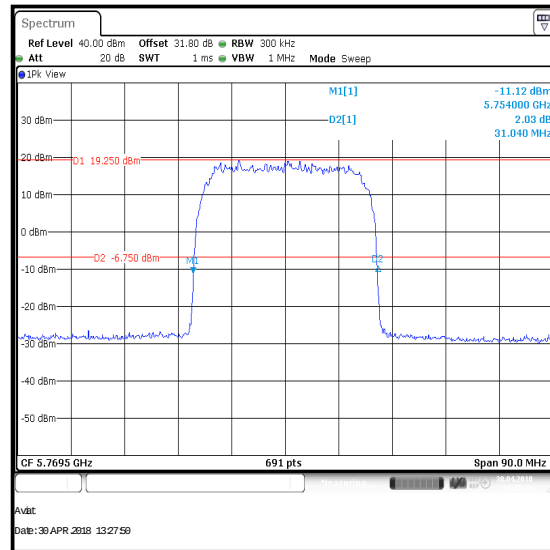
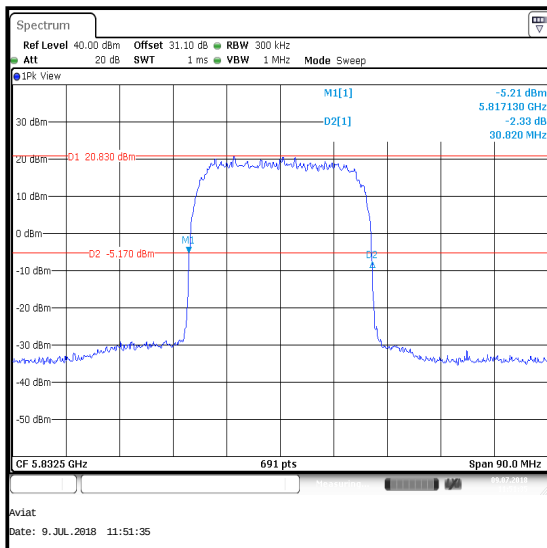
**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 7X / 10 MHz / 64QAM / 45 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | 64QAM             | 45             | 10.072                         |
| Middle  | 5769.5          | 64QAM             | 45             | 10.072                         |
| Top     | 5832.5          | 64QAM             | 45             | 10.029                         |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: RAC 7X / 30 MHz / 4096QAM / 266 Mbps**

| Channel | Frequency (MHz) | Modulation scheme | Data Rate Mbps | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|-------------------|----------------|--------------------------------|
| Bottom  | 5742.5          | 4096QAM           | 266            | 30.820                         |
| Middle  | 5769.5          | 4096QAM           | 266            | 31.040                         |
| Top     | 5832.5          | 4096QAM           | 266            | 30.820                         |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter 26 dB Emission Bandwidth (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.  | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|------------------|-----------------|-----------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer | Testo           | 608-H1    | 45124919      | 27 Mar 2019           | 12                     |
| M2018     | Signal Analyser  | Rode & Schwarz  | FSV7      | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator       | AtanTecRF       | AN18W5-30 | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter      | Hewlett Packard | E4418A    | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor     | Hewlett Packard | 8487A     | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator | Hewlett Packard | 83650L    | 3614A00104    | 08 Nov 2018           | 24                     |

**5.2.3. Transmitter Minimum 6 dB Bandwidth****Test Summary:**

|                                   |               |                    |                                |
|-----------------------------------|---------------|--------------------|--------------------------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Dates:</b> | 10 May 2018 to<br>12 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                    |                                |

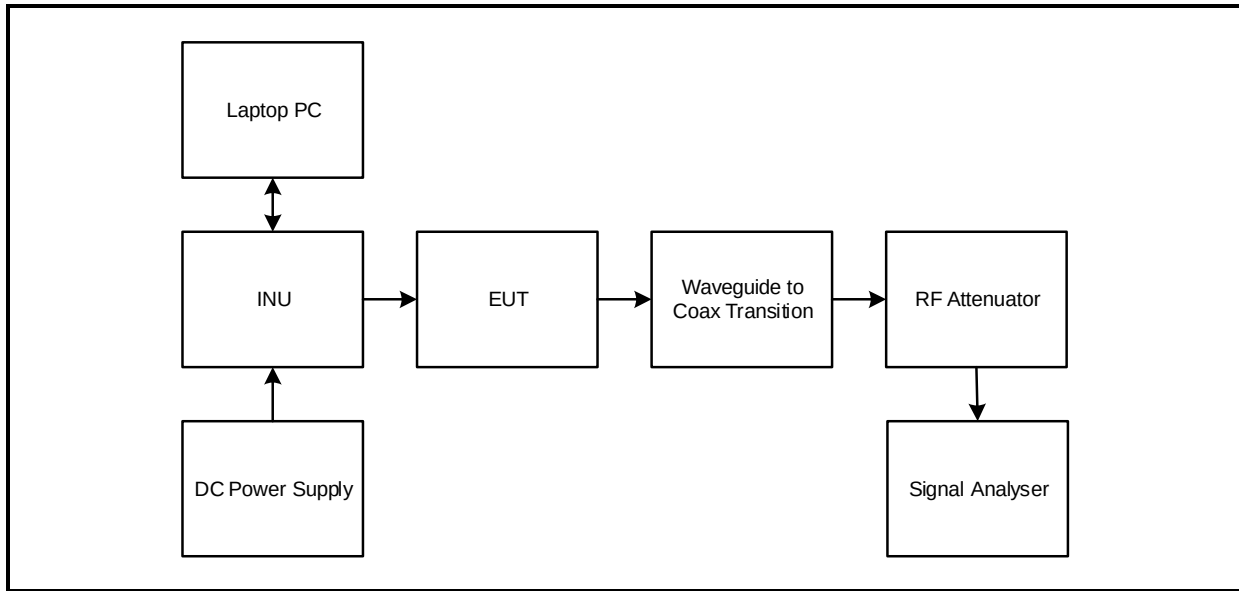
|                          |                                |
|--------------------------|--------------------------------|
| <b>FCC Reference:</b>    | Part 15.407(e)                 |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.C.2. |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 23 to 25 |
| <b>Relative Humidity (%):</b> | 42 to 54 |

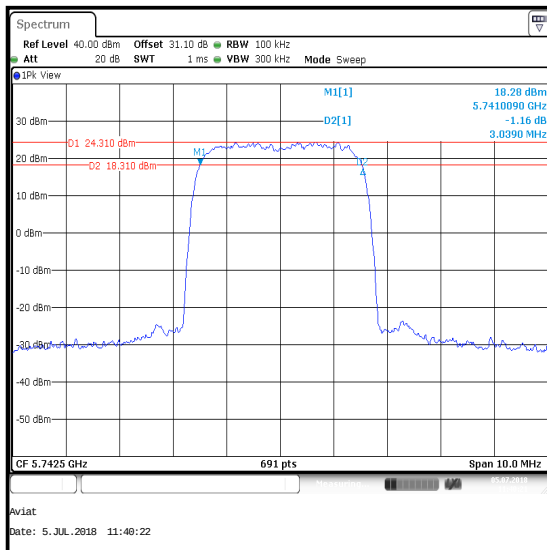
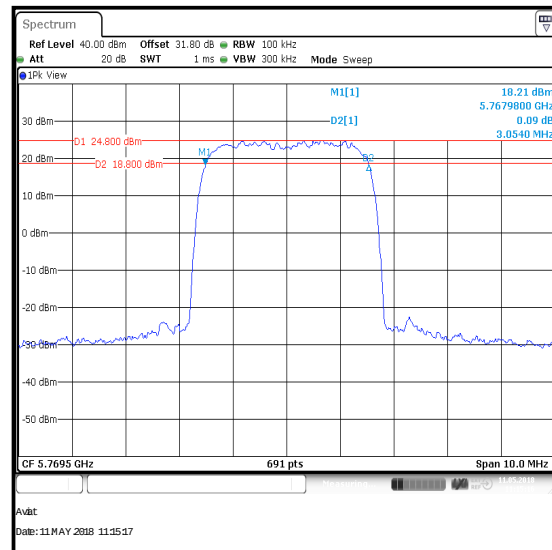
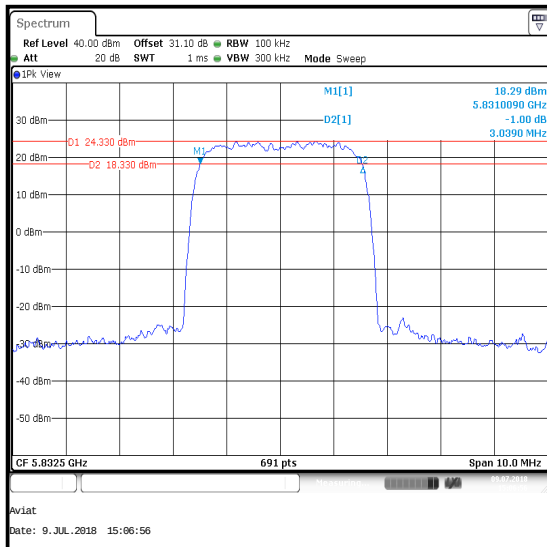
**Note(s):**

1. All modes supported by the EUT were investigated on one channel in accordance with KDB 789033 Section II.C.2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz measurement procedure. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The bandwidth was measured at 6 dB down from the peak of the signal. The settings that produced the narrowest bandwidth and therefore deemed worst case were:
  - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
  - o RAC 60 / 5 MHz - 128QAM / 24 Mbps
  - o RAC 60 / 10 MHz - 128QAM / 50 Mbps
  - o RAC 60 / 20 MHz - 16QAM / 50 Mbps
  - o RAC 60 / 30 MHz - 64QAM / 135 Mbps
  - o RAC 7X / 10 MHz - 2048QAM / 79 Mbps
  - o RAC 7X / 30 MHz - 16QAM / 90 Mbps
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. Plots for all modes are archived on the Company server and available for inspection upon request.
4. The signal analyser was connected to the RF port on the EUT using a coaxial cable and suitable attenuation.

**Transmitter Minimum 6 dB Bandwidth (continued)****Test Setup:**

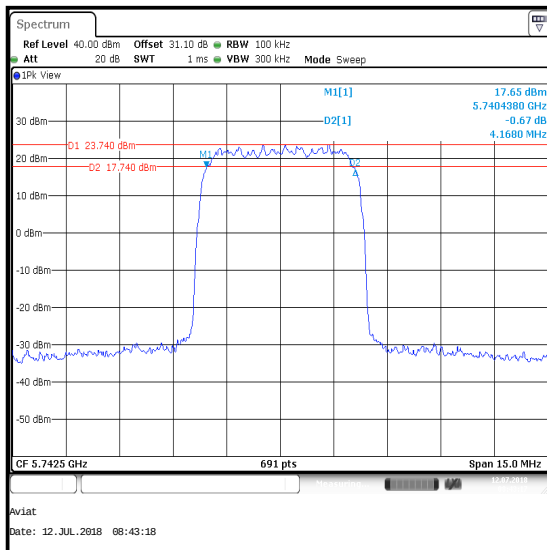
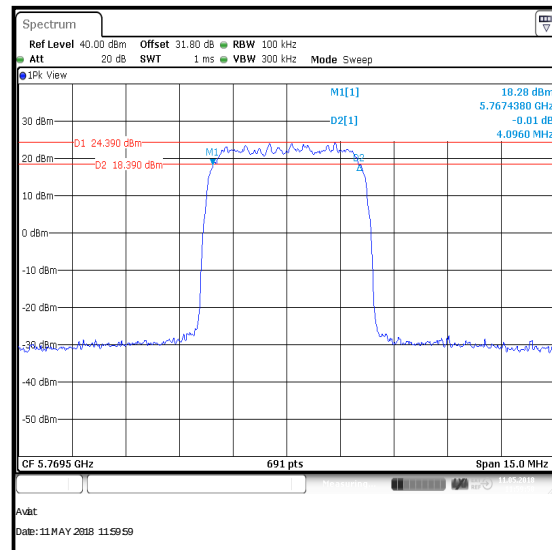
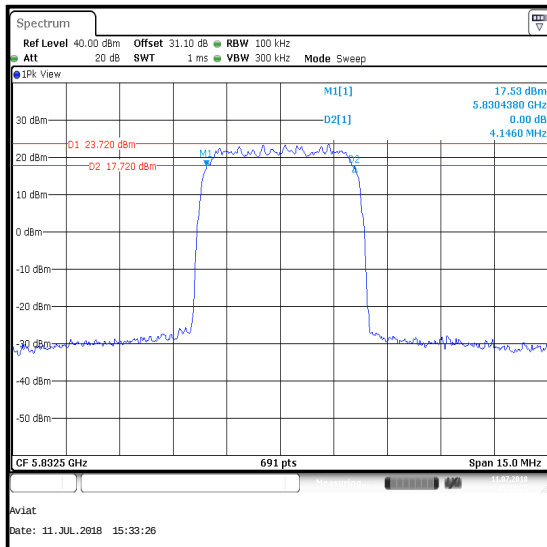
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 60 / 32QAM / 3.75 MHz / 12 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 3039.000             | ≥500        | 2539.000     | Complied |
| Middle  | 3054.000             | ≥500        | 2554.000     | Complied |
| Top     | 3039.000             | ≥500        | 2539.000     | Complied |

**Bottom Channel****Middle Channel****Top Channel**

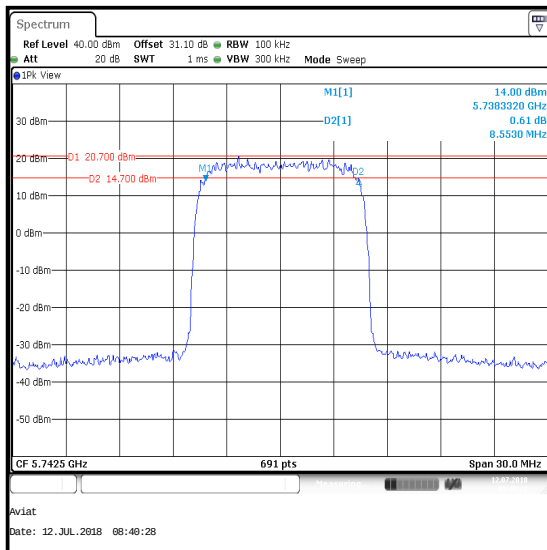
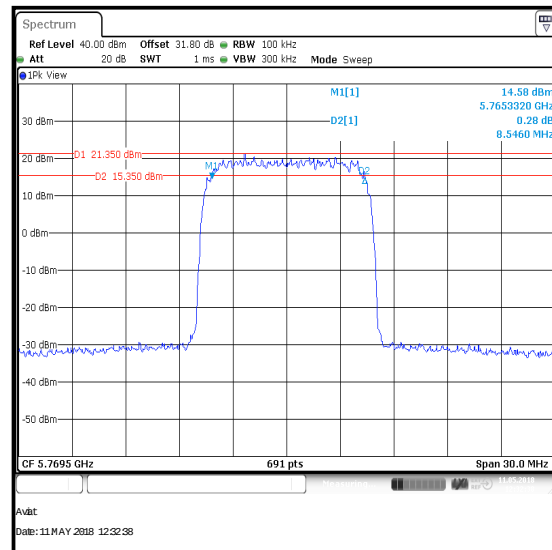
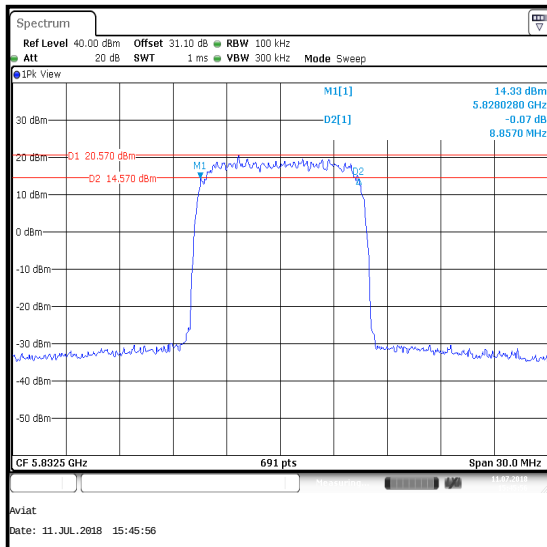
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 60 / 128QAM / 5 MHz / 24 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 4168.000             | ≥500        | 3668.000     | Complied |
| Middle  | 4096.000             | ≥500        | 3596.000     | Complied |
| Top     | 4146.000             | ≥500        | 3646.000     | Complied |

**Bottom Channel****Middle Channel****Top Channel**

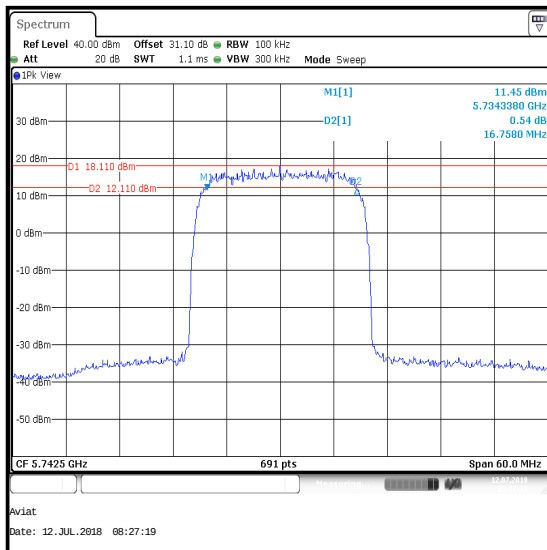
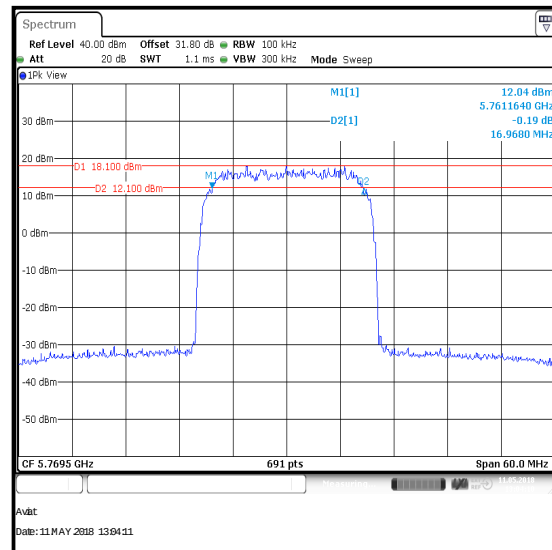
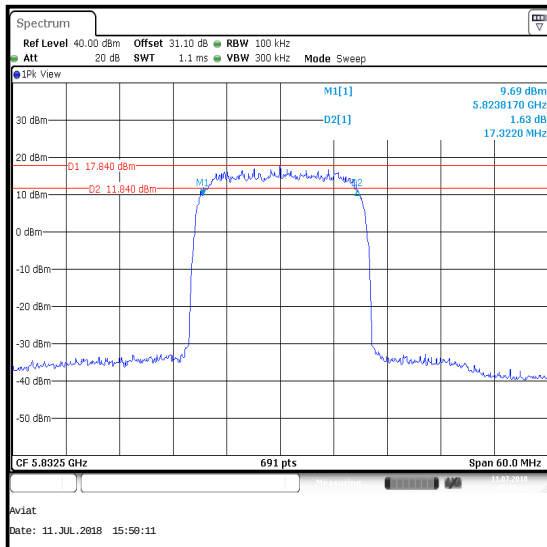
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 60 / 128QAM / 10 MHz / 50 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 8553.000             | ≥500        | 8053.000     | Complied |
| Middle  | 8546.000             | ≥500        | 8046.000     | Complied |
| Top     | 8857.000             | ≥500        | 8357.000     | Complied |

**Bottom Channel****Middle Channel****Top Channel**

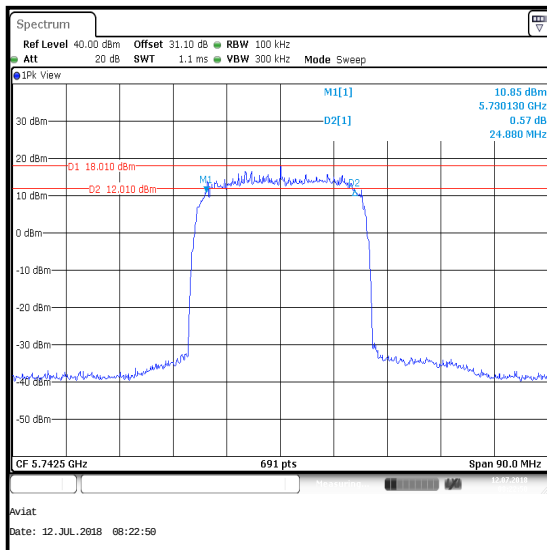
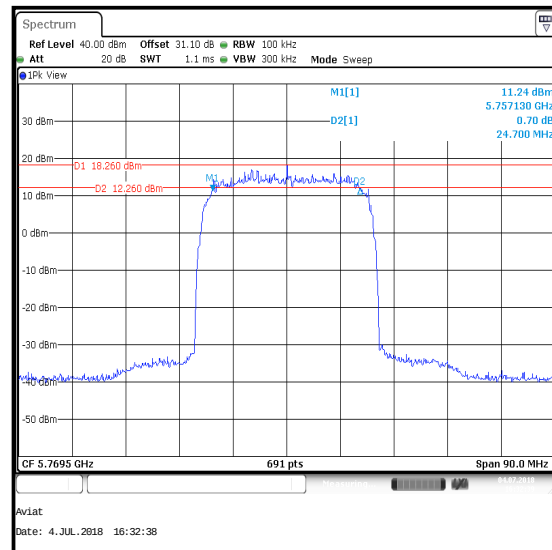
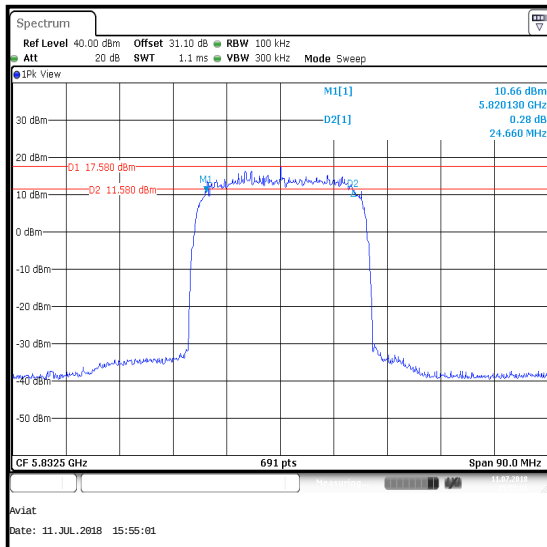
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 60 / 16QAM / 20 MHz / 50 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 16758.000            | ≥500        | 16258.000    | Complied |
| Middle  | 16968.000            | ≥500        | 16468.000    | Complied |
| Top     | 17322.000            | ≥500        | 16822.000    | Complied |

**Bottom Channel****Middle Channel****Top Channel**

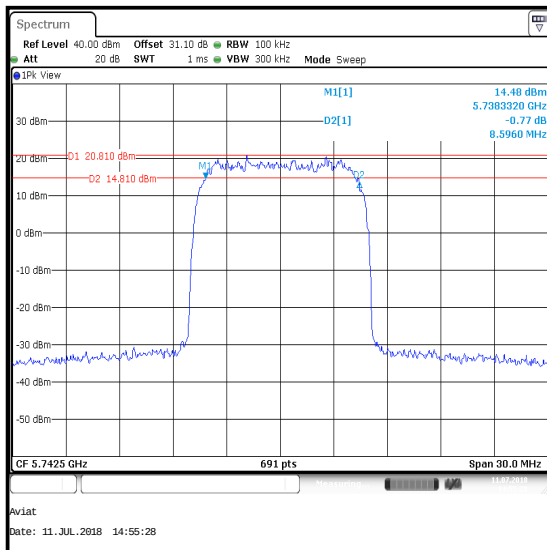
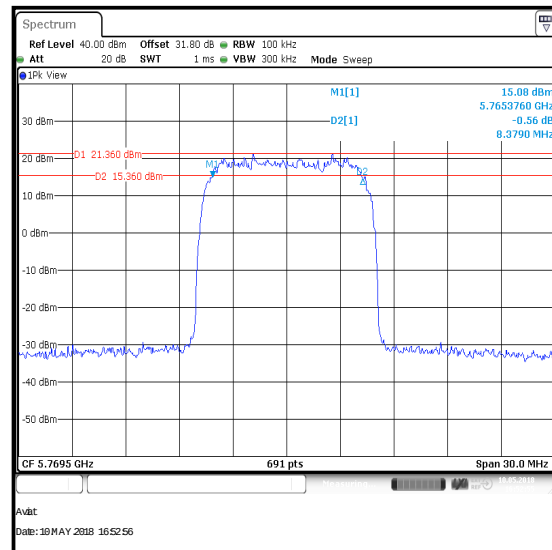
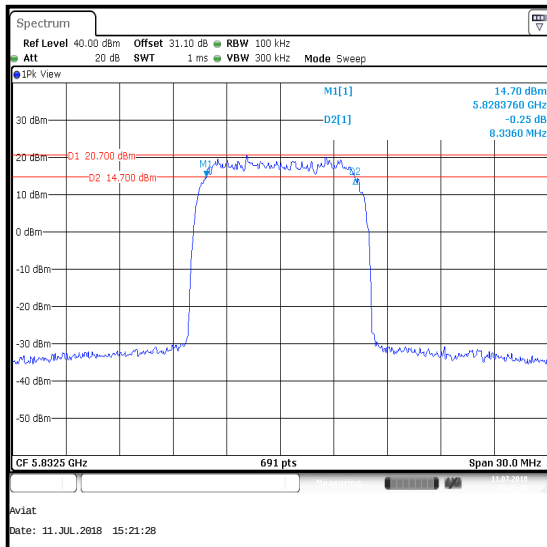
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 60 / 64QAM / 30 MHz / 135 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 24880.000            | ≥500        | 24380.000    | Complied |
| Middle  | 24700.000            | ≥500        | 24200.000    | Complied |
| Top     | 24660.000            | ≥500        | 24160.000    | Complied |

**Bottom Channel****Middle Channel****Top Channel**

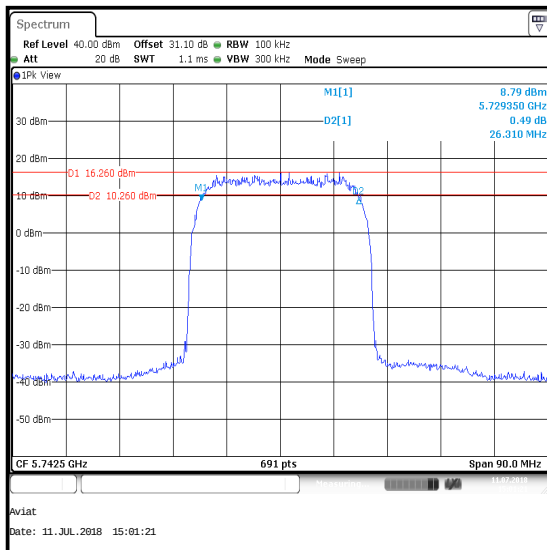
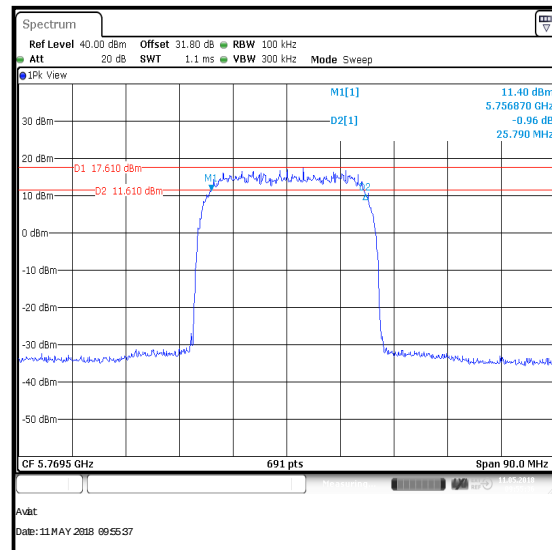
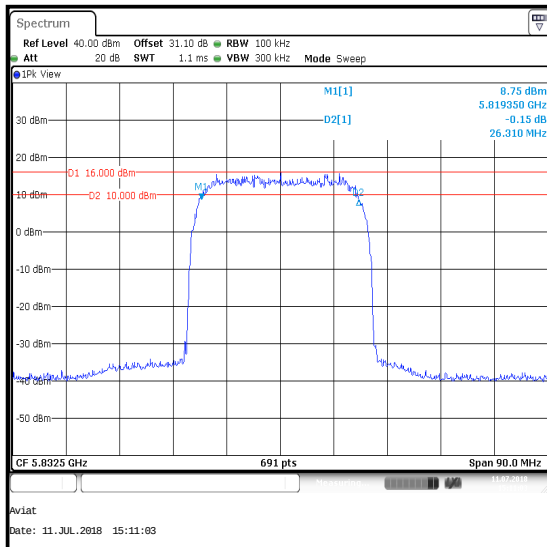
**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 7X / 2048QAM / 10 MHz / 79 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 8596.000             | ≥500        | 8096.000     | Complied |
| Middle  | 8379.000             | ≥500        | 7879.000     | Complied |
| Top     | 8336.000             | ≥500        | 7836.000     | Complied |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Minimum 6 dB Bandwidth (continued)****Results: RAC 7X / 16QAM / 30 MHz / 90 Mbps**

| Channel | 6 dB Bandwidth (kHz) | Limit (kHz) | Margin (kHz) | Result   |
|---------|----------------------|-------------|--------------|----------|
| Bottom  | 26310.000            | ≥500        | 25810.000    | Complied |
| Middle  | 25790.000            | ≥500        | 25290.000    | Complied |
| Top     | 26310.000            | ≥500        | 25810.000    | Complied |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Minimum 6 dB Bandwidth (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.  | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|------------------|-----------------|-----------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer | Testo           | 608-H1    | 45124919      | 27 Mar 2019           | 12                     |
| M2018     | Signal Analyser  | Rode & Schwarz  | FSV7      | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator       | AtanTecRF       | AN18W5-30 | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter      | Hewlett Packard | E4418A    | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor     | Hewlett Packard | 8487A     | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator | Hewlett Packard | 83650L    | 3614A00104    | 08 Nov 2018           | 24                     |

**5.2.4. Transmitter Maximum Conducted Output Power****Test Summary:**

|                                   |               |                    |                                |
|-----------------------------------|---------------|--------------------|--------------------------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Dates:</b> | 02 May 2018 to<br>09 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                    |                                |

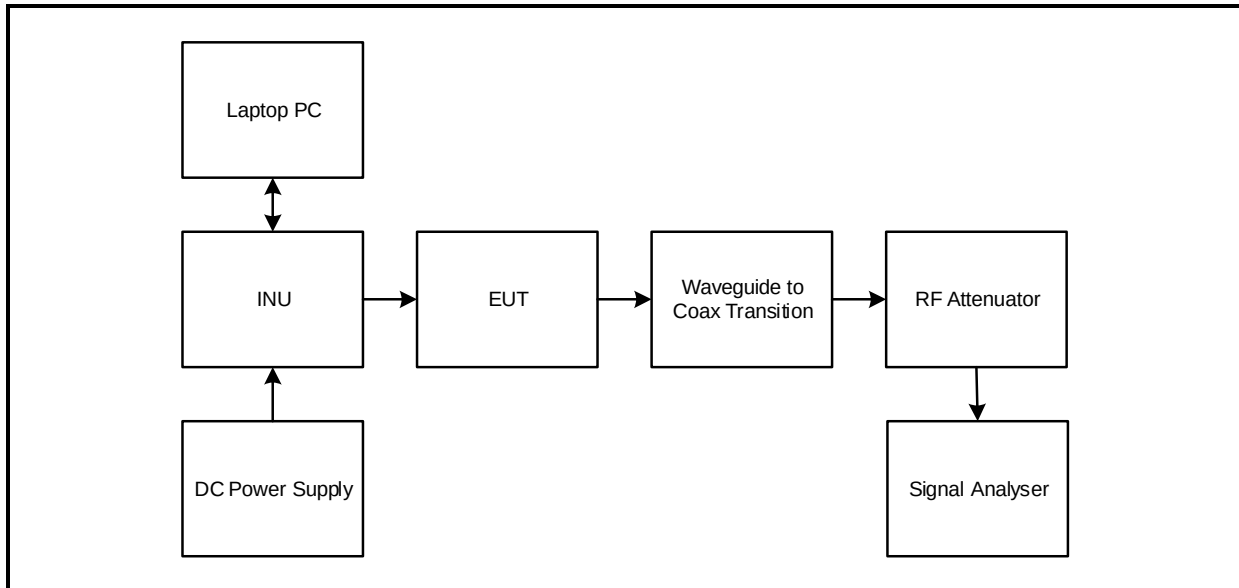
|                          |                                  |
|--------------------------|----------------------------------|
| <b>FCC Reference:</b>    | Part 15.407(a)(3)                |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.E.2.b) |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 22 to 25 |
| <b>Relative Humidity (%):</b> | 36 to 51 |

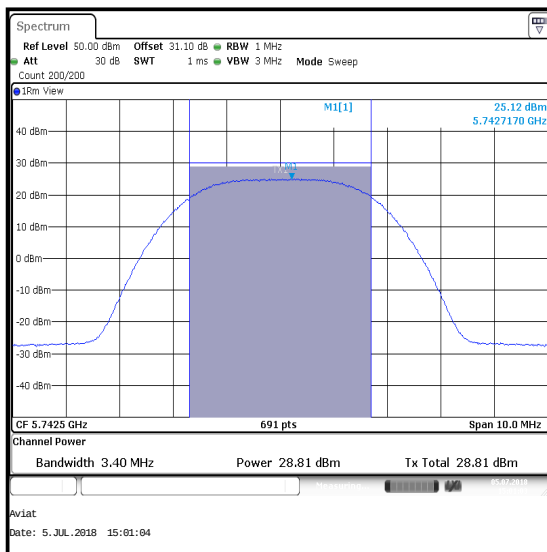
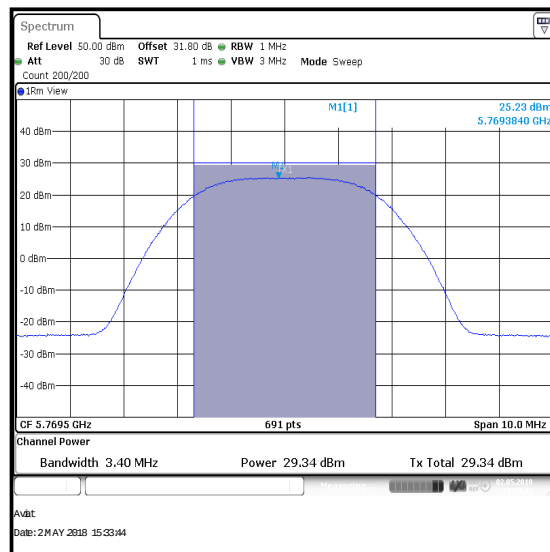
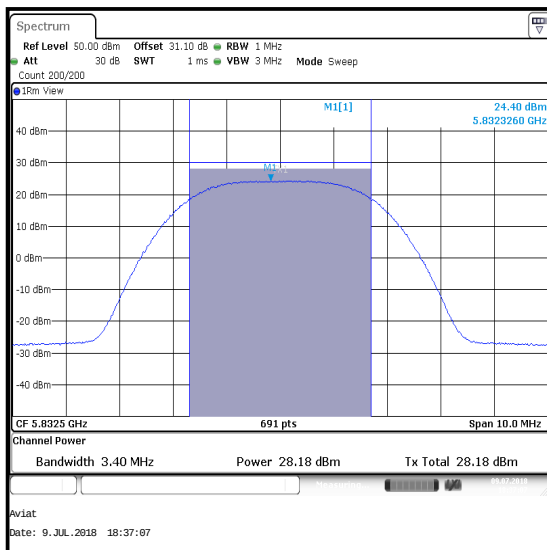
**Note(s):**

1. All supported modes and channel widths were initially investigated on one channel. The signal analyser resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The span was set to approximately 3 times the EBW. An RMS detector was used, sweep time was set to auto and trace averaging was used over 200 traces. The modes that produced the highest power and therefore deemed worst case were:
  - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 60 / 10 MHz - 256QAM / 56 Mbps
  - o RAC 60 / 20 MHz - 16QAM / 50 Mbps
  - o RAC 60 / 30 MHz - QPSK / 38 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
  - o RAC 7X / 30 MHz - 512QAM / 200 Mbps
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. Plots for all modes are archived on the Company server and available for inspection upon request.
4. The power has been integrated over the 26 dB emission bandwidth measured in section 5.2.2 of this report.
5. The signal analyser was connected to the RF port on the EUT using a coaxial cable and suitable attenuation. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.
6. The EUT supports two antenna types; parabolic and flat panel, with 43 dBi and 28 dBi gain respectively. Part 15.407(a)(3) does not limit the EIRP of fixed point-to-point equipment operating in this band, however EIRP values have been included in the tables below for information.

**Transmitter Maximum Conducted Output Power (continued)****Test Setup:**

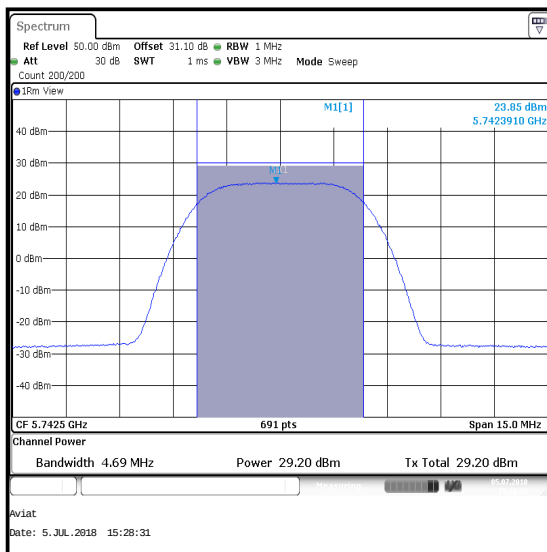
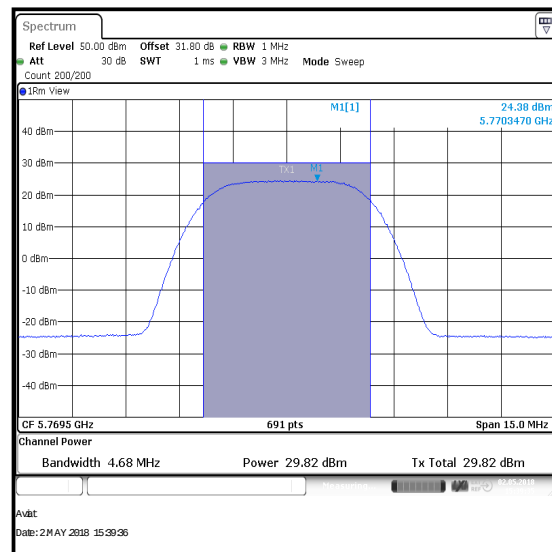
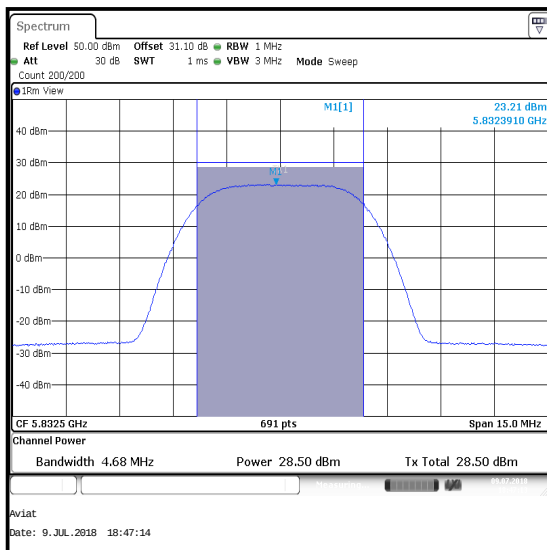
**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 60 / 32QAM / 3.75 MHz / 12 Mbps**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Conducted Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-----------------------|-------------|------------------|-------------------|----------|
|         |                 |                       |                       |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.8                  | 30.0                  | 1.2         | 71.8             | 56.8              | Complied |
| Middle  | 5769.5          | 29.3                  | 30.0                  | 0.7         | 72.3             | 57.3              | Complied |
| Top     | 5832.5          | 28.2                  | 30.0                  | 1.8         | 71.2             | 56.2              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

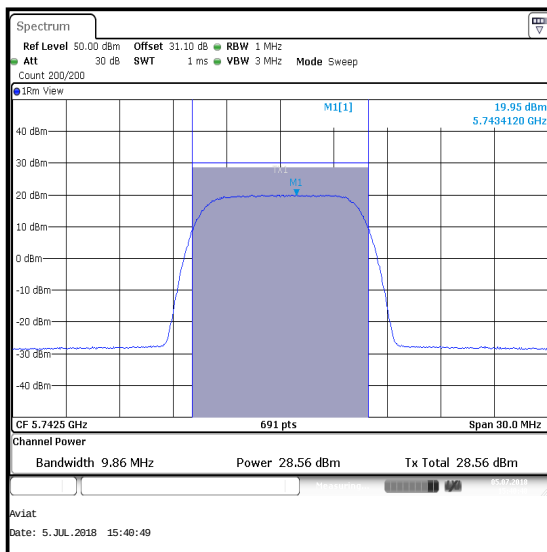
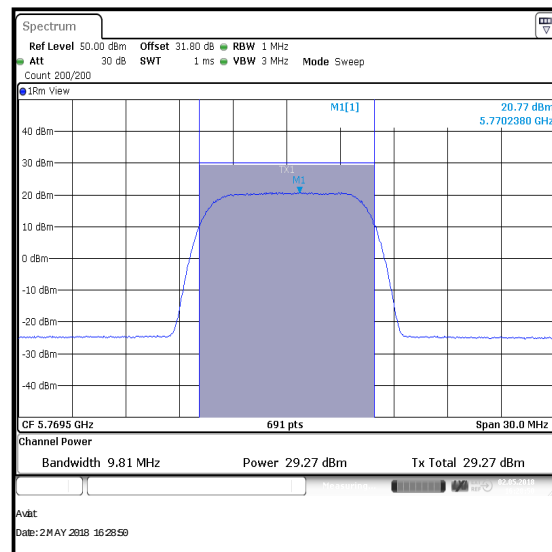
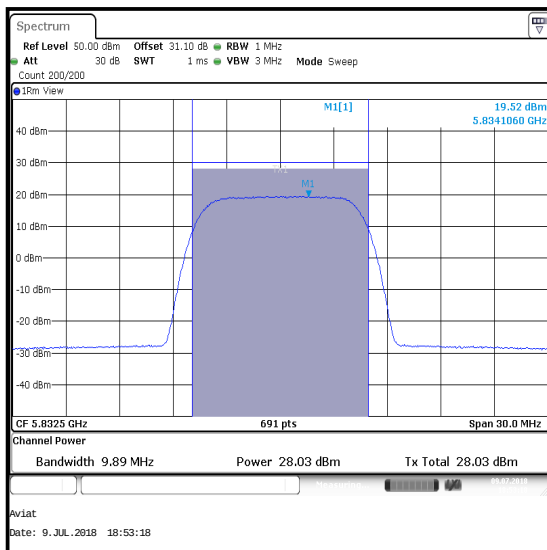
**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 60 / 16QAM / 5 MHz / 10 Mbps**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 29.2                  | 30.0        | 0.8         | 72.2             | 57.2              | Complied |
| Middle  | 5769.5          | 29.8                  | 30.0        | 0.2         | 72.8             | 57.8              | Complied |
| Top     | 5832.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

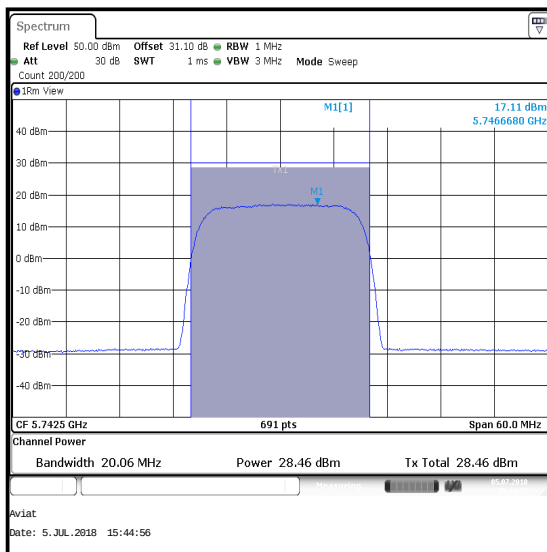
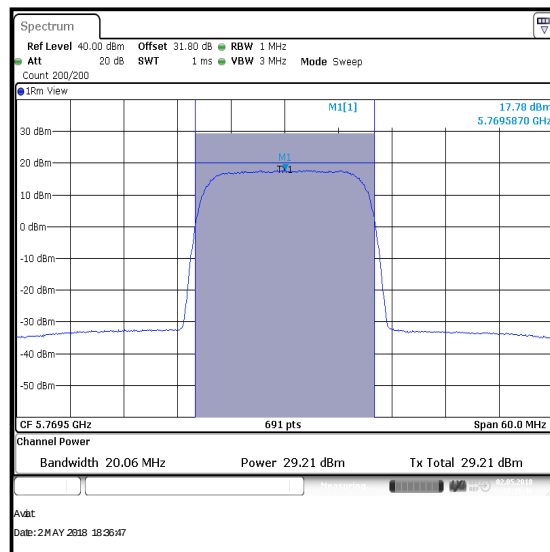
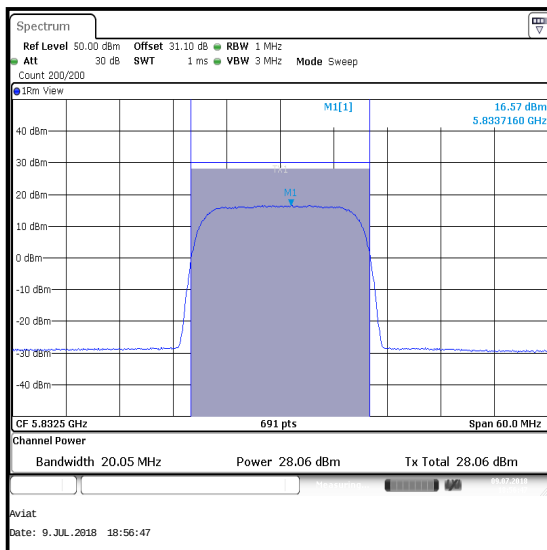
**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 60 / 256QAM / 10 MHz / 56 Mbps**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.6                  | 30.0        | 1.4         | 71.6             | 56.6              | Complied |
| Middle  | 5769.5          | 29.3                  | 30.0        | 0.7         | 72.3             | 57.3              | Complied |
| Top     | 5832.5          | 28.0                  | 30.0        | 2.0         | 71.0             | 56.0              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

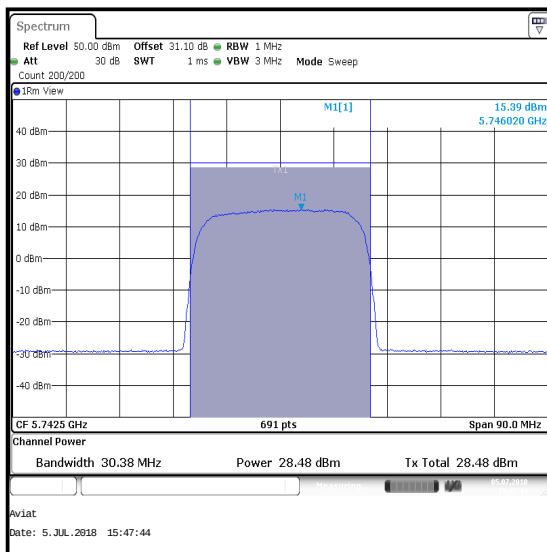
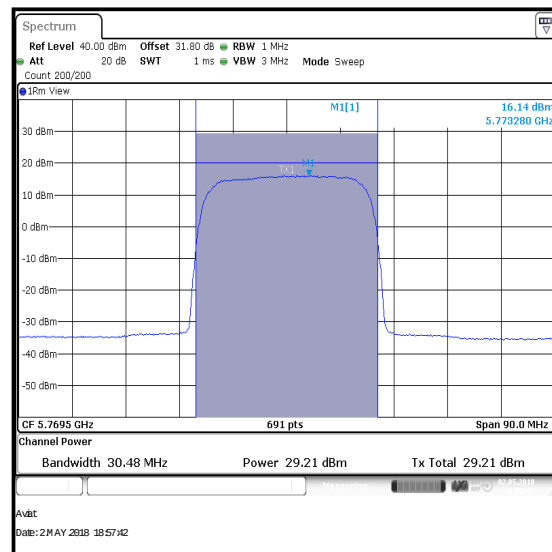
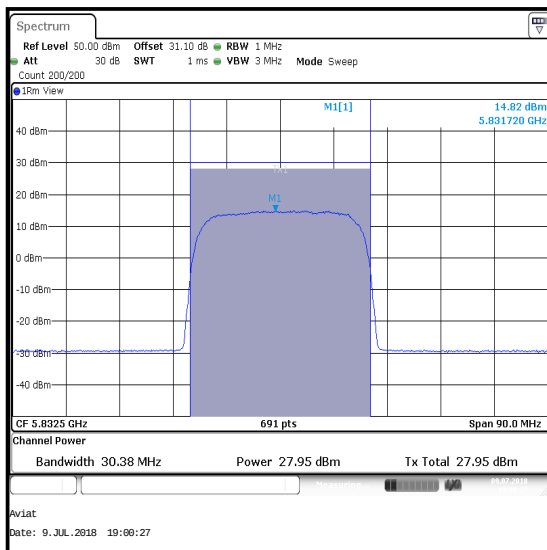
**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 60 / 16QAM / 20 MHz / 50 Mbps**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |
| Middle  | 5769.5          | 29.2                  | 30.0        | 0.8         | 72.2             | 57.2              | Complied |
| Top     | 5832.5          | 28.1                  | 30.0        | 1.9         | 71.1             | 56.1              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 60 / QPSK / 30 MHz / 38 Mbps**

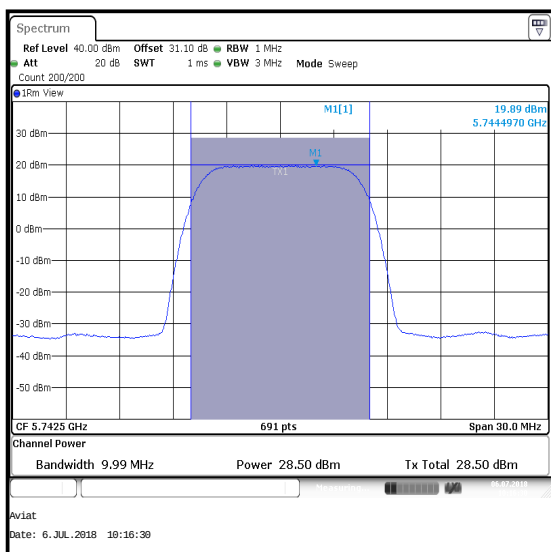
| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |
| Middle  | 5769.5          | 29.2                  | 30.0        | 0.8         | 72.2             | 57.2              | Complied |
| Top     | 5832.5          | 28.0                  | 30.0        | 2.0         | 71.0             | 56.0              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

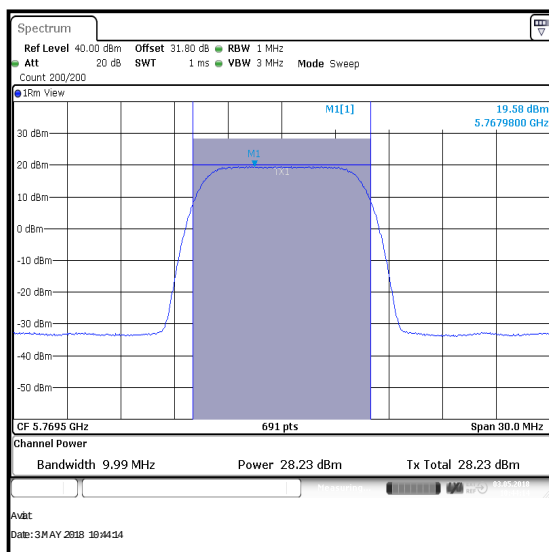
### Transmitter Maximum Conducted Output Power (continued)

**Results: RAC 7X / QPSK / 10 MHz / 12 Mbps**

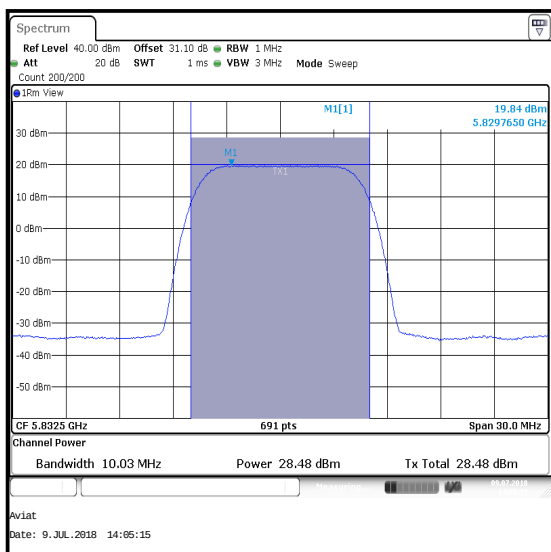
| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |
| Middle  | 5769.5          | 28.2                  | 30.0        | 1.8         | 71.2             | 56.2              | Complied |
| Top     | 5832.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |



### Bottom Channel



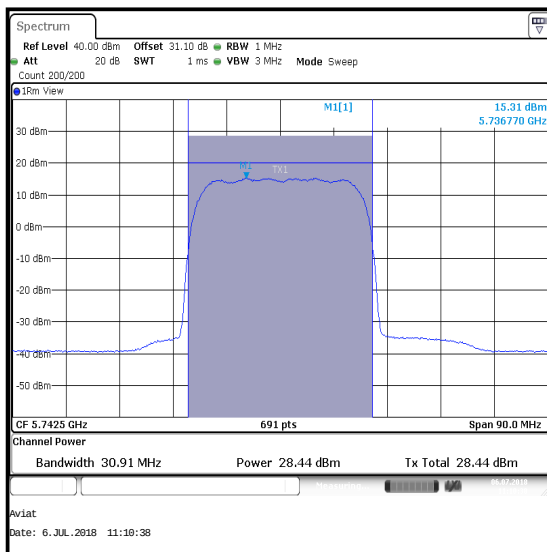
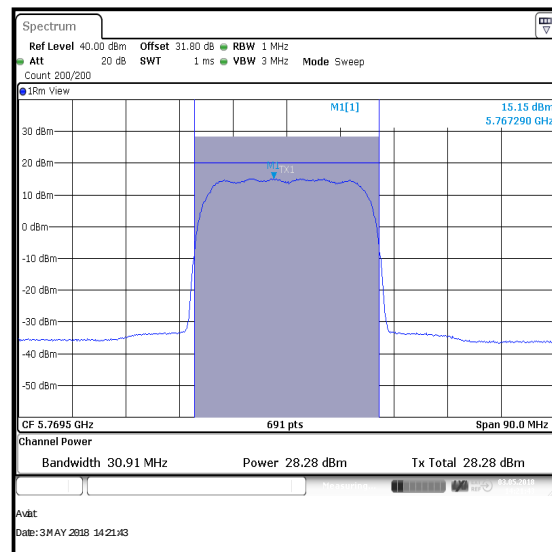
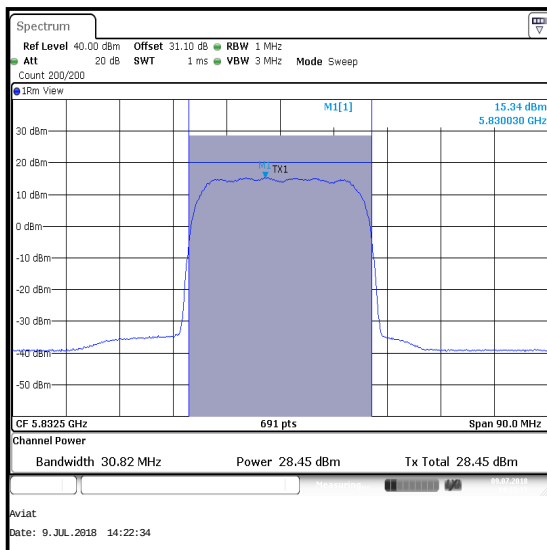
## Middle Channel



### Top Channel

**Transmitter Maximum Conducted Output Power (continued)****Results: RAC 7X / 512QAM / 30 MHz / 200 Mbps**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Margin (dB) | EIRP (dBm)       |                   | Result   |
|---------|-----------------|-----------------------|-------------|-------------|------------------|-------------------|----------|
|         |                 |                       |             |             | 43 dBi Parabolic | 28 dBi Flat Panel |          |
| Bottom  | 5742.5          | 28.4                  | 30.0        | 1.6         | 71.4             | 56.4              | Complied |
| Middle  | 5769.5          | 28.3                  | 30.0        | 1.7         | 71.3             | 56.3              | Complied |
| Top     | 5832.5          | 28.5                  | 30.0        | 1.5         | 71.5             | 56.5              | Complied |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.  | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|------------------|-----------------|-----------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer | Testo           | 608-H1    | 45124919      | 27 Mar 2019           | 12                     |
| M2018     | Signal Analyser  | Rode & Schwarz  | FSV7      | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator       | AtanTecRF       | AN18W5-30 | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter      | Hewlett Packard | E4418A    | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor     | Hewlett Packard | 8487A     | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator | Hewlett Packard | 83650L    | 3614A00104    | 08 Nov 2018           | 24                     |

**5.2.5. Transmitter Maximum Power Spectral Density****Test Summary:**

|                                   |               |                    |                                |
|-----------------------------------|---------------|--------------------|--------------------------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Dates:</b> | 02 May 2018 to<br>09 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                    |                                |

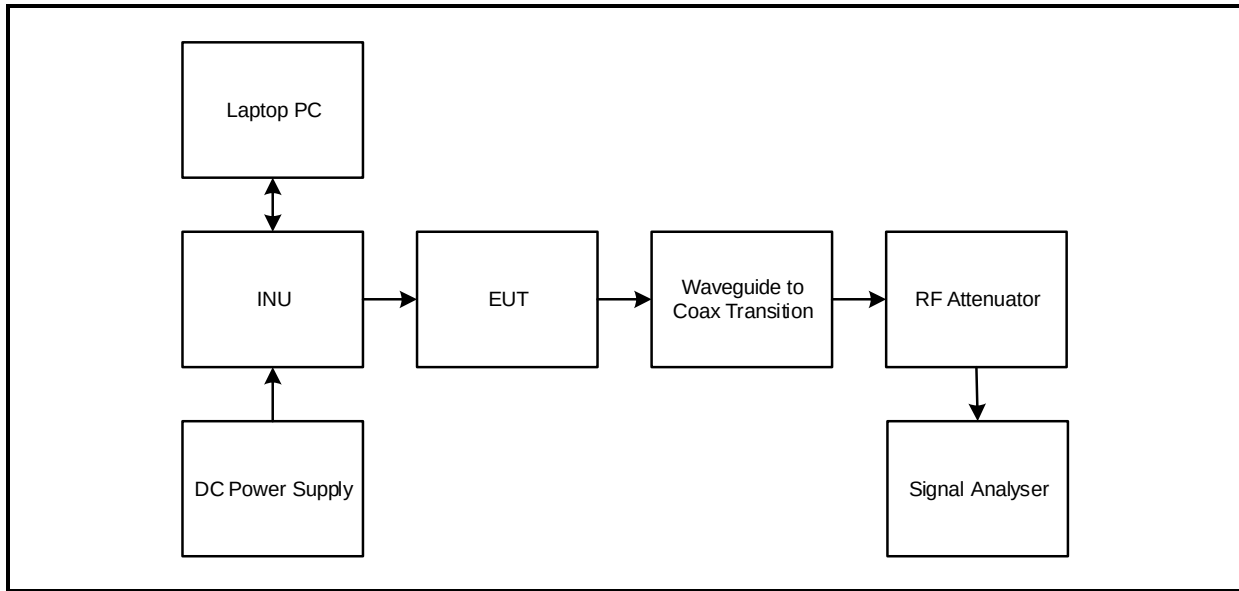
|                          |                                                    |
|--------------------------|----------------------------------------------------|
| <b>FCC Reference:</b>    | Part 15.407(a)(3)                                  |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.F. referencing II.E.2.b) |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 22 to 25 |
| <b>Relative Humidity (%):</b> | 36 to 51 |

**Note(s):**

1. Transmitter Maximum Power Spectral Density tests were performed using a signal analyser in accordance with KDB 789033 II.F referencing II.E.2.b) Method SA-1. As the test method is the same as for output power measurements, only the results are shown in the tables below. The plots for this test can be found in the Maximum Conducted Output Power section of this report.
2. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and therefore deemed worst case were:
  - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 60 / 10 MHz - 256QAM / 56 Mbps
  - o RAC 60 / 20 MHz - 16QAM / 50 Mbps
  - o RAC 60 / 30 MHz - QPSK / 38 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
  - o RAC 7X / 30 MHz - 512QAM / 200 Mbps
3. Final measurements were performed using the above configurations on the bottom, middle and top channels.
4. Plots for all modes are archived on the Company server and available for inspection upon request.
5. The signal analyser was connected to the RF port on the EUT using a coaxial cable and suitable attenuation. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

**Transmitter Maximum Power Spectral Density (continued)****Test Setup:**

**Transmitter Maximum Power Spectral Density (continued)****Results: RAC 60 / 32QAM / 3.75 MHz / 12 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 25.1                 | 30.0                  | 4.9         | Complied |
| Middle  | 5769.5          | 25.2                 | 30.0                  | 4.8         | Complied |
| Top     | 5832.5          | 24.4                 | 30.0                  | 5.6         | Complied |

**Results: RAC 60 / 16QAM / 5 MHz / 10 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 23.9                 | 30.0                  | 6.1         | Complied |
| Middle  | 5769.5          | 24.4                 | 30.0                  | 5.6         | Complied |
| Top     | 5832.5          | 23.2                 | 30.0                  | 6.8         | Complied |

**Results: RAC 60 / 256QAM / 10 MHz / 56 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 20.0                 | 30.0                  | 10.0        | Complied |
| Middle  | 5769.5          | 20.8                 | 30.0                  | 9.2         | Complied |
| Top     | 5832.5          | 19.5                 | 30.0                  | 10.5        | Complied |

**Results: RAC 60 / 16QAM / 20 MHz / 50 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 17.1                 | 30.0                  | 12.9        | Complied |
| Middle  | 5769.5          | 17.8                 | 30.0                  | 12.2        | Complied |
| Top     | 5832.5          | 16.6                 | 30.0                  | 13.4        | Complied |

**Results: RAC 60 / QPSK / 30 MHz / 38 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 15.4                 | 30.0                  | 14.6        | Complied |
| Middle  | 5769.5          | 16.1                 | 30.0                  | 13.9        | Complied |
| Top     | 5832.5          | 14.8                 | 30.0                  | 15.2        | Complied |

**Transmitter Maximum Power Spectral Density (continued)****Results: RAC 7X / QPSK / 10 MHz / 12 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 19.9                 | 30.0                  | 10.1        | Complied |
| Middle  | 5769.5          | 19.6                 | 30.0                  | 10.4        | Complied |
| Top     | 5832.5          | 19.8                 | 30.0                  | 10.2        | Complied |

**Results: RAC 7X / 512QAM / 30 MHz / 200 Mbps**

| Channel | Frequency (MHz) | PPSD (dBm / 500 kHz) | Limit (dBm / 500 kHz) | Margin (dB) | Result   |
|---------|-----------------|----------------------|-----------------------|-------------|----------|
| Bottom  | 5742.5          | 15.3                 | 30.0                  | 14.7        | Complied |
| Middle  | 5769.5          | 15.2                 | 30.0                  | 14.8        | Complied |
| Top     | 5832.5          | 15.3                 | 30.0                  | 14.7        | Complied |

**Transmitter Maximum Power Spectral Density (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.  | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|------------------|-----------------|-----------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer | Testo           | 608-H1    | 45124919      | 27 Mar 2019           | 12                     |
| M2018     | Signal Analyser  | Rode & Schwarz  | FSV7      | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator       | AtanTecRF       | AN18W5-30 | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter      | Hewlett Packard | E4418A    | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor     | Hewlett Packard | 8487A     | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator | Hewlett Packard | 83650L    | 3614A00104    | 08 Nov 2018           | 24                     |

**5.2.6. Transmitter Out of Band Cabinet Radiated Emissions****Test Summary:**

|                                   |                                      |                   |              |
|-----------------------------------|--------------------------------------|-------------------|--------------|
| <b>Test Engineers:</b>            | Mohamed Toubella &<br>Andrew Edwards | <b>Test Date:</b> | 13 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017                          |                   |              |

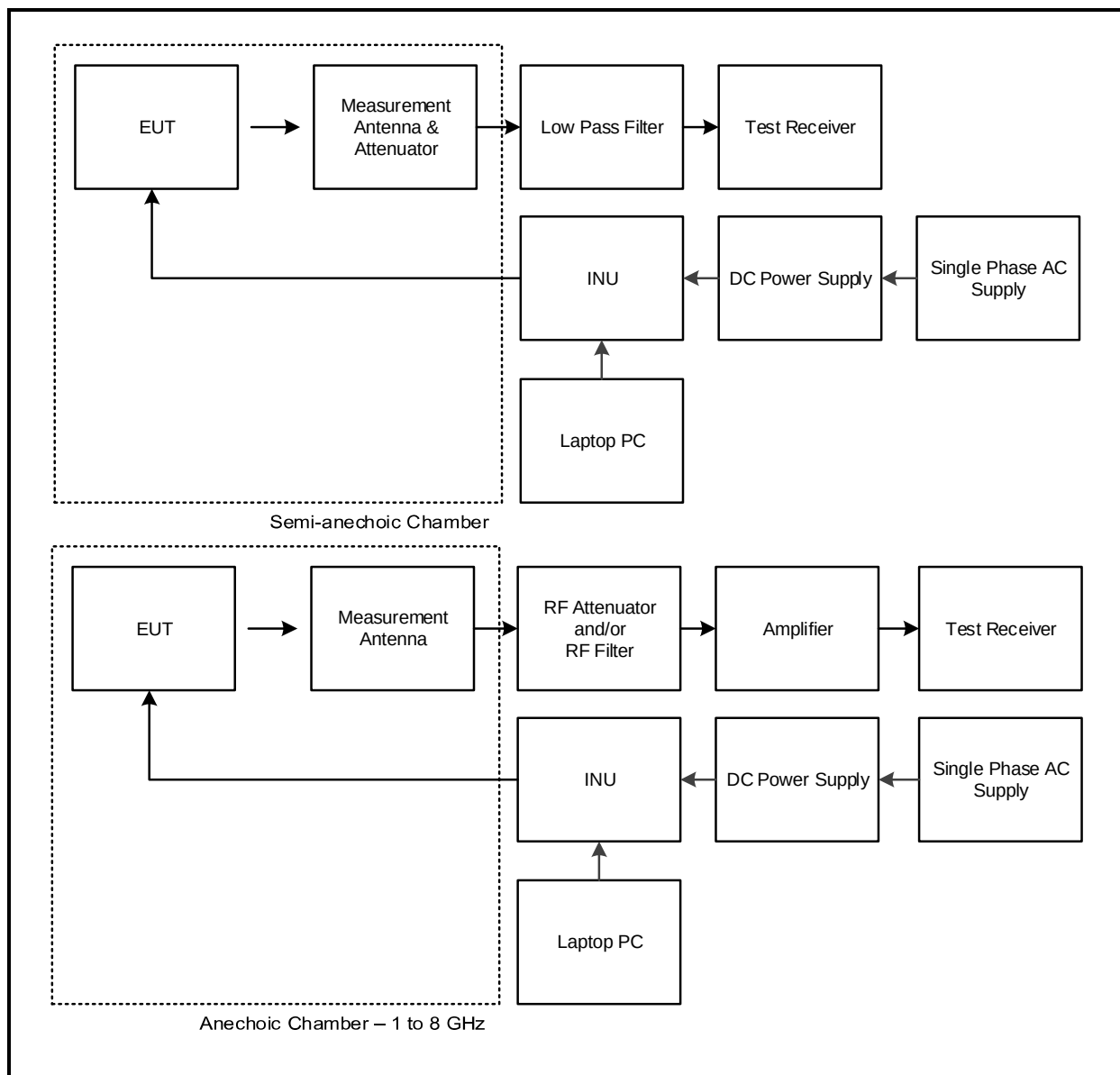
|                          |                                                      |
|--------------------------|------------------------------------------------------|
| <b>FCC Reference:</b>    | Parts 15.407(b)(4)(i),(6),(7) & 15.209(a)            |
| <b>Test Method Used:</b> | KDB 789033 II.G.4 & ANSI C63.10 Sections 6.3 and 6.5 |
| <b>Frequency Range:</b>  | 30 MHz to 1000 MHz                                   |

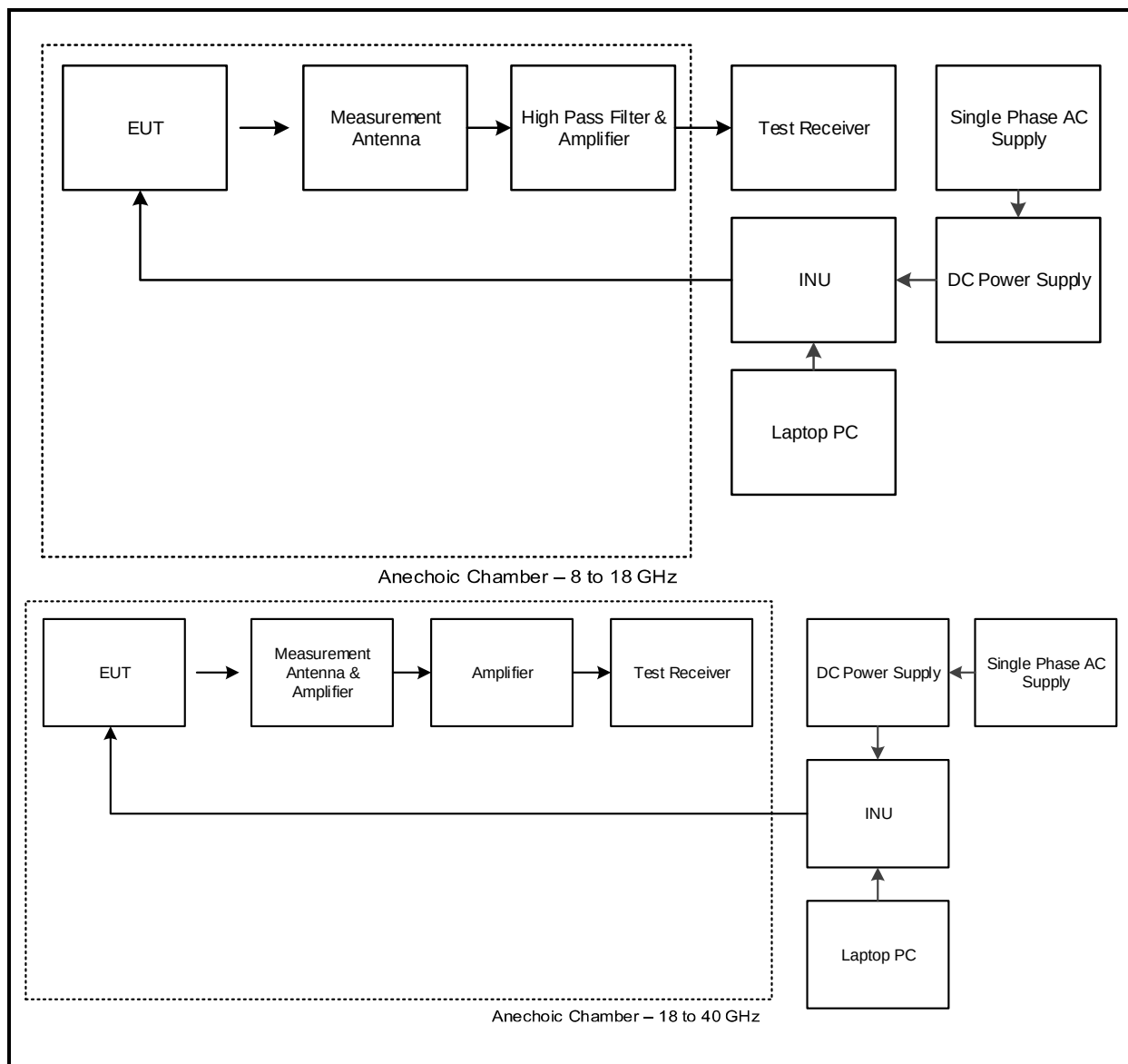
**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 53 |

**Note(s):**

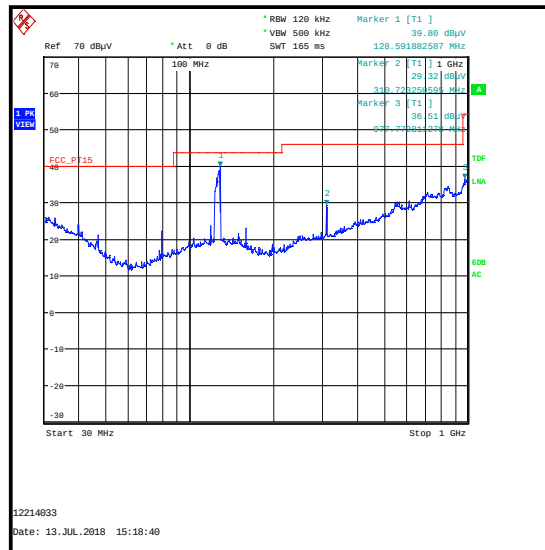
1. The EUT was transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
2. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
3. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
4. All other emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
7. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span wide enough to see the whole emission.
8. The job number was changed during testing, therefore the plots in this section do not reflect the final job number.

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Test Setup for radiated measurements:**

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Test Setup for radiated measurements:**

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Results: RAC 60 / 5 MHz / 16QAM / 10 Mbps / Middle Channel**

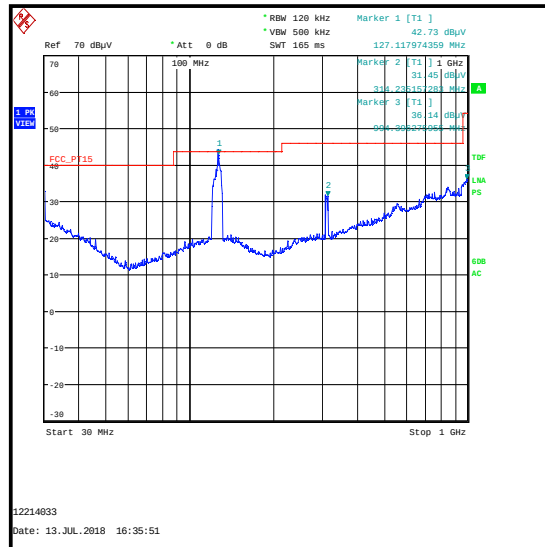
| Frequency (MHz) | Antenna Polarity | Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|----------------------|----------------------|-------------|----------|
| 128.303         | Horizontal       | 34.0                 | 43.5                 | 9.5         | Complied |



*Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.*

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Results: RAC 7X / 10 MHz / QPSK / 12 Mbps / Middle Channel**

| Frequency (MHz) | Antenna Polarity | Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|----------------------|----------------------|-------------|----------|
| 127.117         | Horizontal       | 36.1                 | 43.5                 | 7.4         | Complied |



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

**Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.  | Serial No.  | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|-----------|-------------|----------------------|------------------------|
| M2003     | Thermohygrometer | Testo           | 608-H1    | 45046641    | 27 Feb 2019          | 12                     |
| K0017     | 3m RSE Chamber   | Rainford        | N/A       | N/A         | 20 Feb 2019          | 12                     |
| M1874     | Test Receiver    | Rohde & Schwarz | ESU26     | 100553      | 28 Nov 2018          | 12                     |
| A490      | Antenna          | Chase           | CBL6111A  | 1590        | 03 Apr 2019          | 12                     |
| A2148     | Attenuator       | AtlanTecRF      | AN18-06   | 090202-06   | 03 Apr 2019          | 12                     |
| A2131     | Low Pass Filter  | AtlanTecRF      | AFL-02000 | JFB1004-002 | 22 Feb 2019          | 12                     |

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Test Summary:**

|                                   |                                   |                   |              |
|-----------------------------------|-----------------------------------|-------------------|--------------|
| <b>Test Engineers:</b>            | Mohamed Toubella & Andrew Edwards | <b>Test Date:</b> | 13 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017                       |                   |              |

|                          |                                               |
|--------------------------|-----------------------------------------------|
| <b>FCC Reference:</b>    | Parts 15.407(b)(4)(i),(7), 15.205 & 15.209(a) |
| <b>Test Method Used:</b> | ANSI C63.10 Section 6.10 & KDB 789033 II.G.5. |
| <b>Frequency Range:</b>  | 1 GHz to 40 GHz                               |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 53 |

**Note(s):**

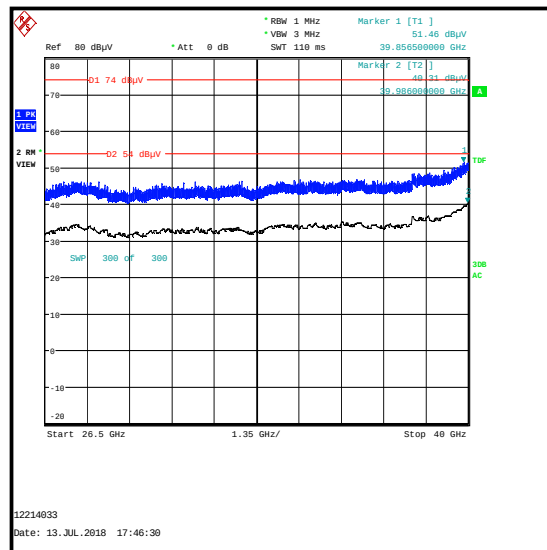
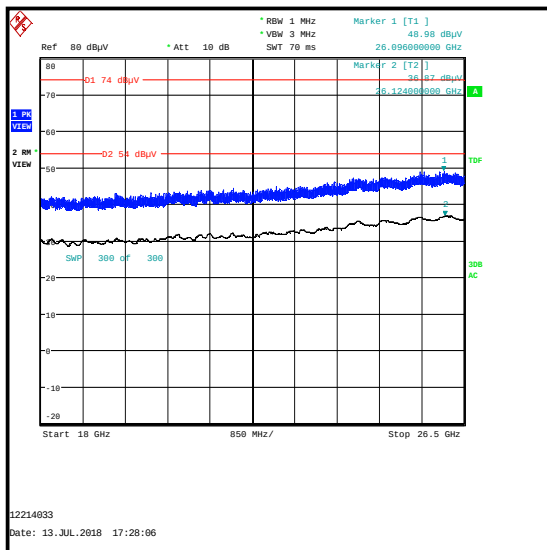
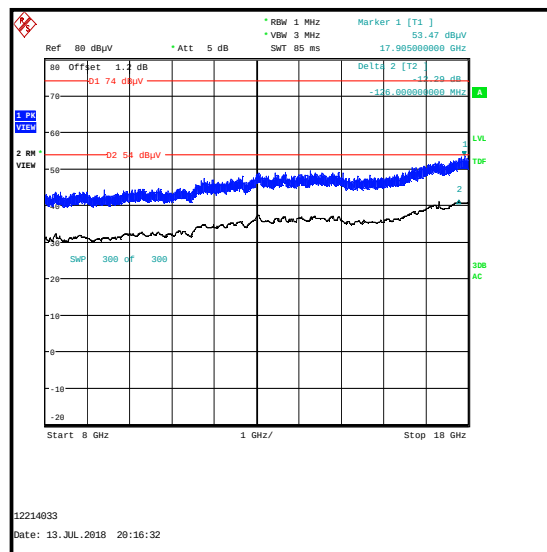
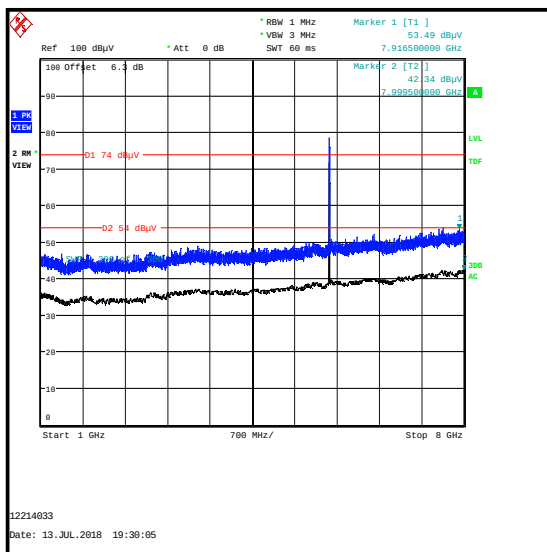
1. The EUT was transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
2. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
3. Appropriate RF filters and attenuators were used during pre-scans. Insertion losses were entered on the spectrum analyser as RF levels offsets.
4. The emission shown on the 1 GHz to 8 GHz plot is the EUT fundamental.
5. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak and average noise floor readings of the measuring receiver were recorded as shown in the tables below.
6. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT.
7. The job number was changed during testing, therefore the plots in this section do not reflect the final job number.

**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Results: RAC 60 / 5 MHz / 16QAM / 10 Mbps / Middle Channel / Peak**

| Frequency (MHz) | Antenna Polarity | Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|---------------------------|---------------------------|-------------|----------|
| 7916.500        | Vertical         | 53.5                      | 74.0                      | 20.5        | Complied |

**Results: RAC 60 / 5 MHz / 16QAM / 10 Mbps / Middle Channel / Average**

| Frequency (MHz) | Antenna Polarity | Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|------------------------------|------------------------------|-------------|----------|
| 7995.000        | Vertical         | 42.3                         | 54.0                         | 11.7        | Complied |

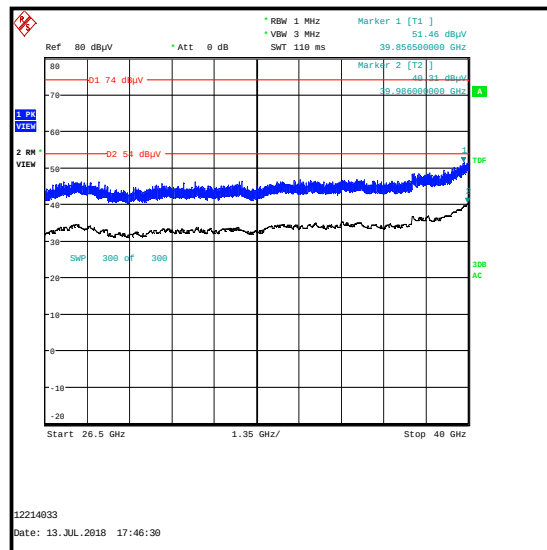
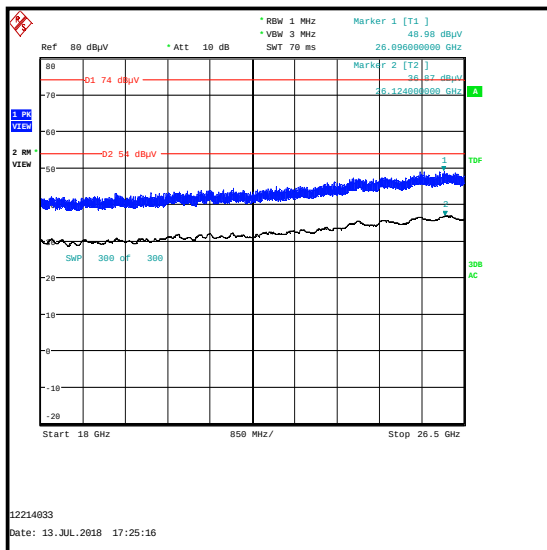
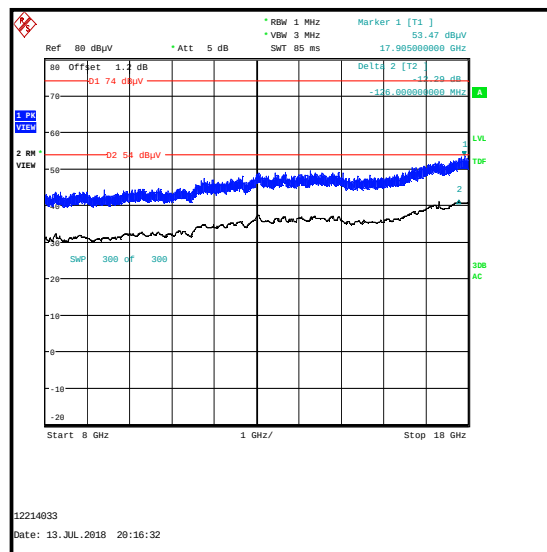
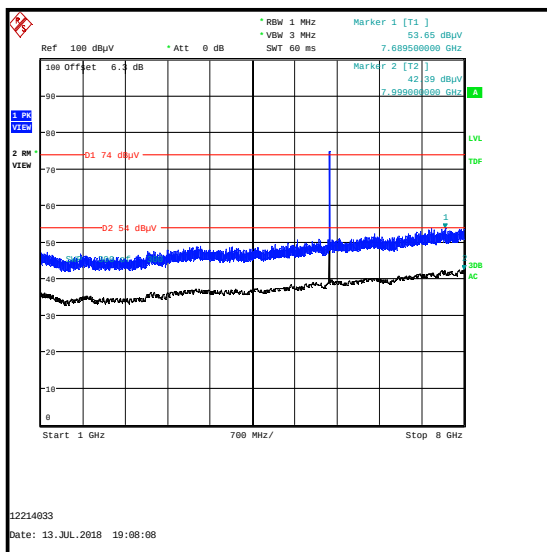


**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Results: RAC 7X / 10 MHz / QPSK / 12 Mbps / Middle Channel / Peak**

| Frequency (MHz) | Antenna Polarity | Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|---------------------------|---------------------------|-------------|----------|
| 7689.500        | Vertical         | 53.7                      | 74.0                      | 20.3        | Complied |

**Results: RAC 7X / 10 MHz / QPSK / 12 Mbps / Middle Channel / Average**

| Frequency (MHz) | Antenna Polarity | Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|------------------|------------------------------|------------------------------|-------------|----------|
| 7999.000        | Vertical         | 42.4                         | 54.0                         | 11.6        | Complied |



**Transmitter Out of Band Cabinet Radiated Emissions (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.    | Serial No.      | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|-------------|-----------------|----------------------|------------------------|
| M2003     | Thermohygrometer | Testo           | 608-H1      | 45046641        | 27 Feb 2019          | 12                     |
| K0017     | 3m RSE Chamber   | Rainford        | N/A         | N/A             | 20 Feb 2019          | 12                     |
| M1630     | Test Receiver    | Rohde & Schwarz | ESU40       | 100233          | 03 Aug 2018          | 12                     |
| A2863     | Pre Amplifier    | Agilent         | 8449B       | 3008A02100      | 19 Feb 2019          | 12                     |
| A2891     | Pre Amplifier    | Schwarzbeck     | BBV 9718    | 9718-306        | 20 Feb 2019          | 12                     |
| A2893     | Pre Amplifier    | Schwarzbeck     | BBV 9721    | 9721-021        | 26 Apr 2019          | 12                     |
| A2889     | Antenna          | Schwarzbeck     | BBHA 9120 B | BBHA 9120 B 653 | 19 Feb 2019          | 12                     |
| A2890     | Antenna          | Schwarzbeck     | HWRD 750    | 014             | 19 Feb 2019          | 12                     |
| A2892     | Antenna          | Schwarzbeck     | BBHA 9170   | 9170-727        | 21 Feb 2019          | 12                     |
| A2943     | Attenuator       | AtlanTecRF      | AN18W5-06   | 208147#2        | 22 Feb 2019          | 12                     |
| A2947     | High Pass Filter | AtlanTecRF      | AFH-07000   | 1601900001      | 22 Feb 2019          | 12                     |

**5.2.7. Transmitter Out of Band Conducted Emissions****Test Summary:**

|                                   |               |                   |              |
|-----------------------------------|---------------|-------------------|--------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Date:</b> | 10 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                   |              |

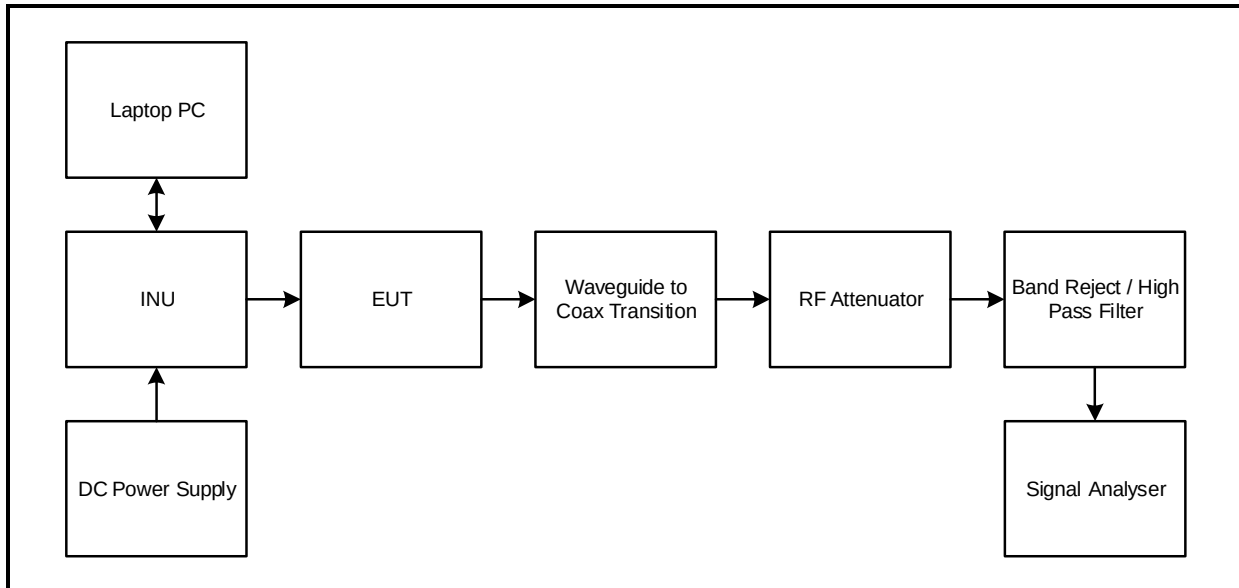
|                          |                      |
|--------------------------|----------------------|
| <b>FCC Reference:</b>    | Part 15.407(b)(4)(i) |
| <b>Test Method Used:</b> | KDB 789033 II.G.     |
| <b>Frequency Range:</b>  | 9 kHz to 40 GHz      |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 50 |

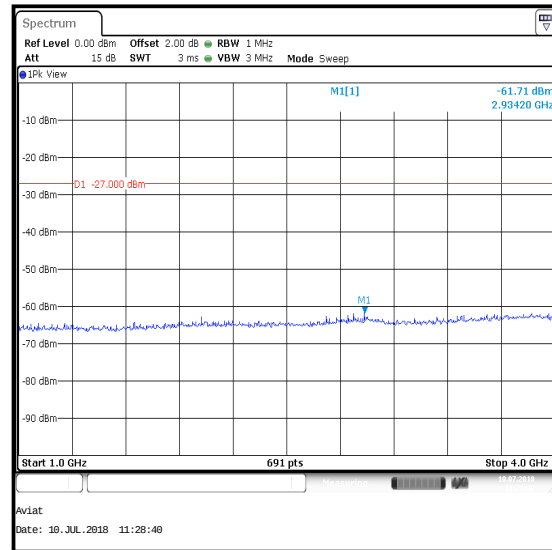
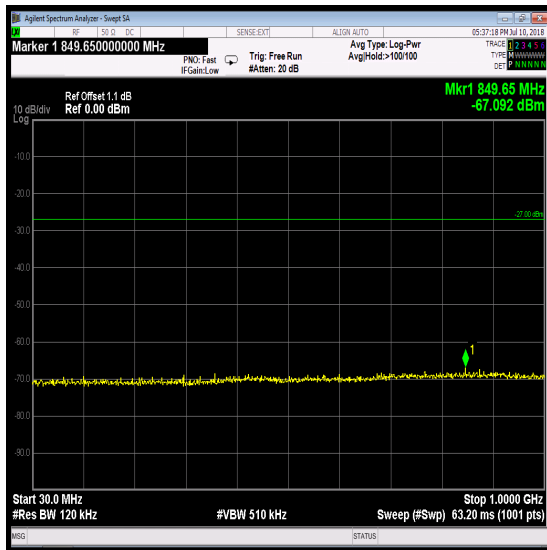
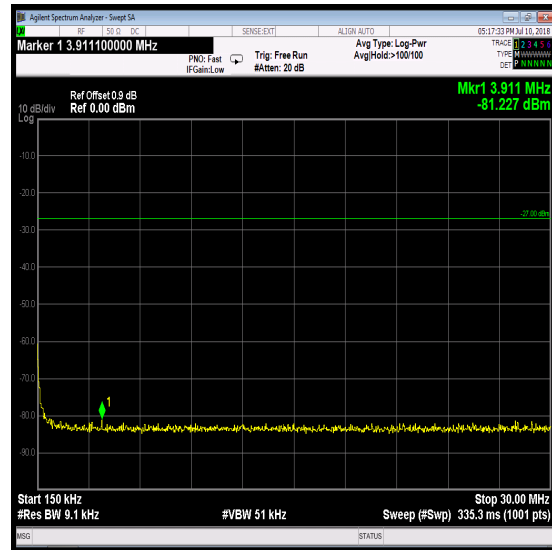
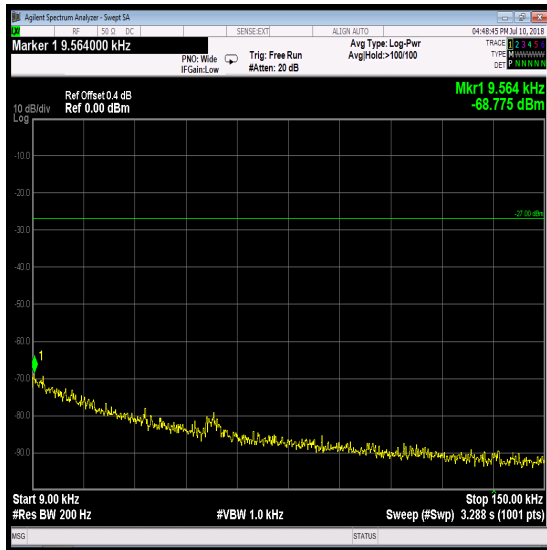
**Note(s):**

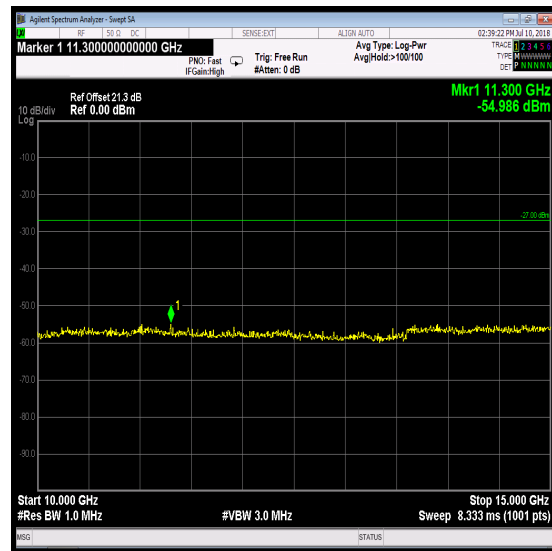
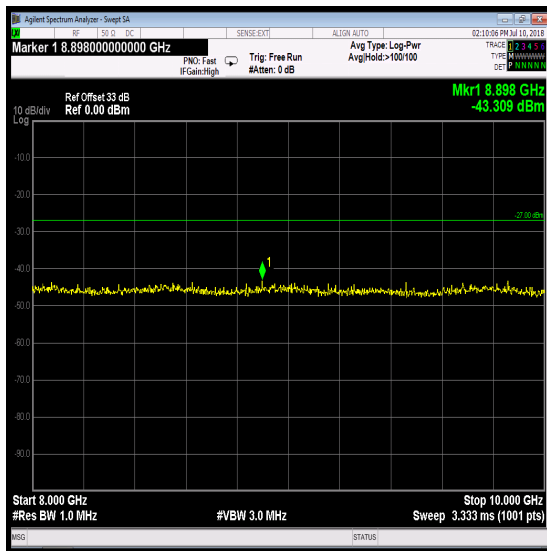
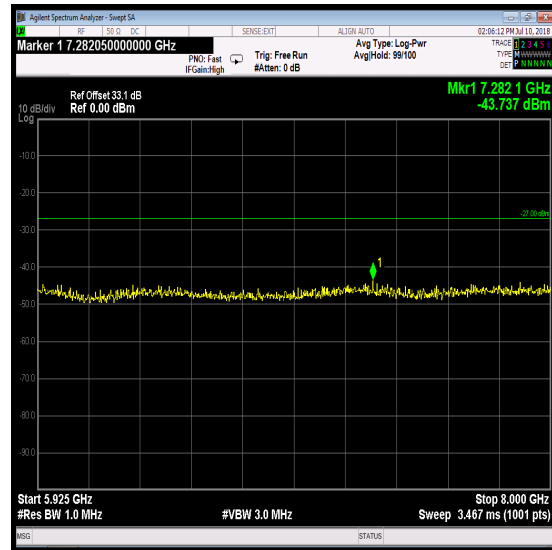
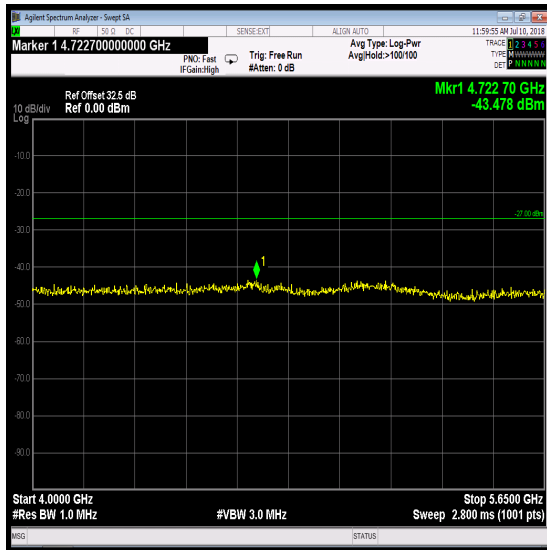
1. The EUT was transmitting in the following modes, as these were found to produce the highest power and therefore deemed worst case:
  - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
  - o RAC 7X / 10 MHz - QPSK / 12 Mbps
2. No spurious emissions were detected above the measurement system noise floor therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
3. Where a band reject filter has been used to attenuate the carrier emission, the filter was characterised across the spectrum being measured. Plots are archived on the Company server and available for inspection upon request.
4. For measurements above 30 GHz, two waveguide to coaxial transitions were used as a high pass filter.
5. The declared representative out of band antenna gain of 10 dBi has been added to the values measured below to compute the EIRP within the specified measurement bandwidth.

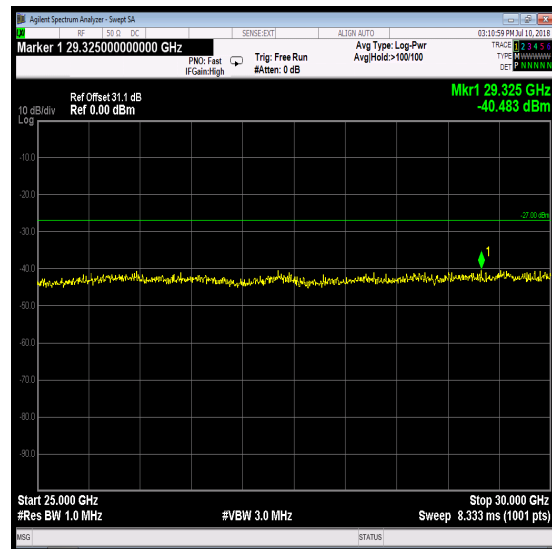
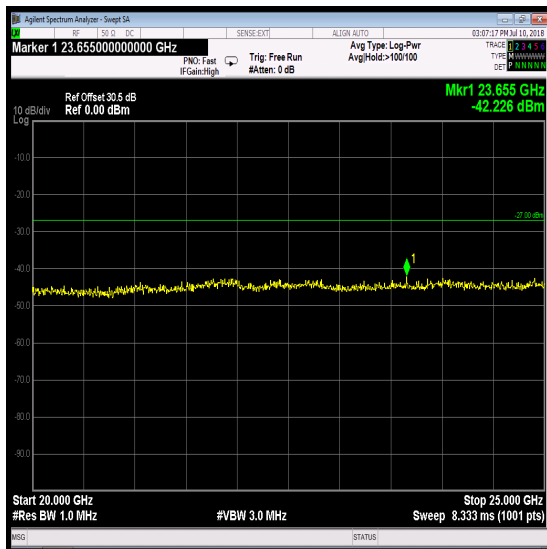
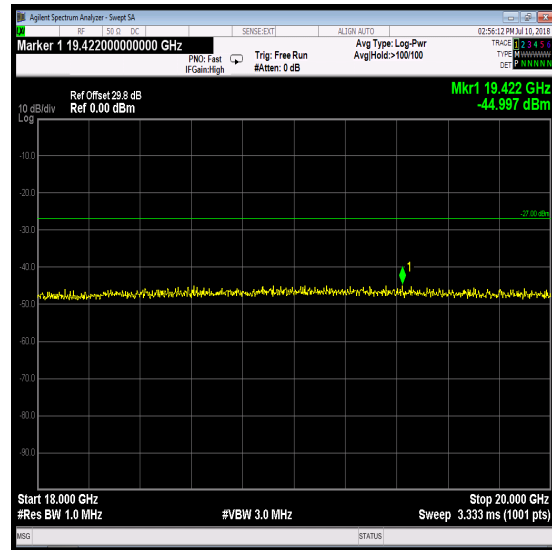
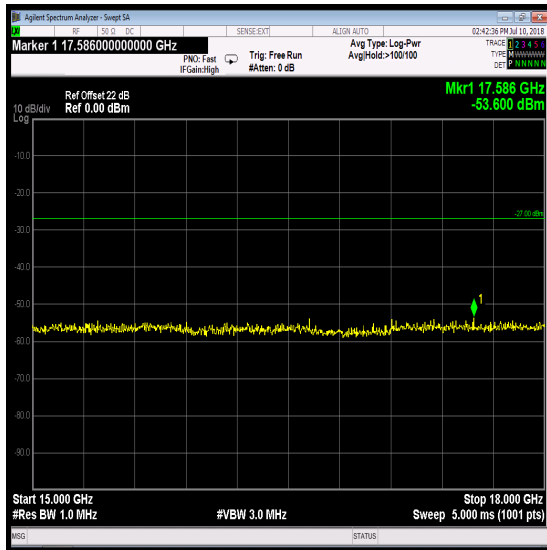
**Transmitter Out of Band Conducted Emissions (continued)****Test Setup:**

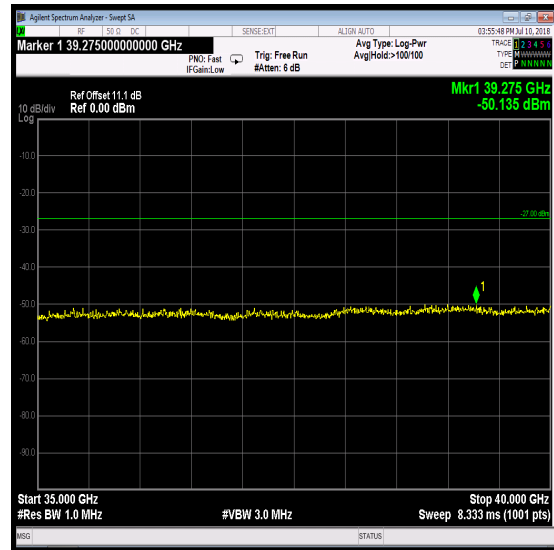
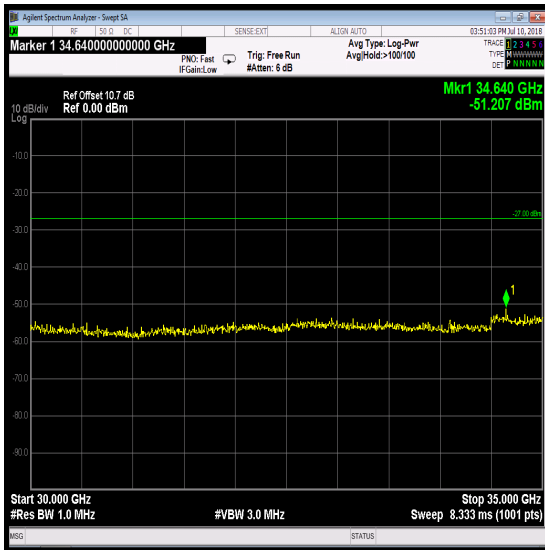
**Transmitter Out of Band Conducted Emissions (continued)****Results: RAC 60 / 5 MHz / 16QAM / 10 Mbps / Middle Channel**

| Frequency (MHz) | Peak Level (dBm) | Out of Band Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------------|--------------------------------|------------|-------------|-------------|----------|
| 29325.000       | -40.5            | 10.0                           | -30.5      | -27.0       | 3.5         | Complied |



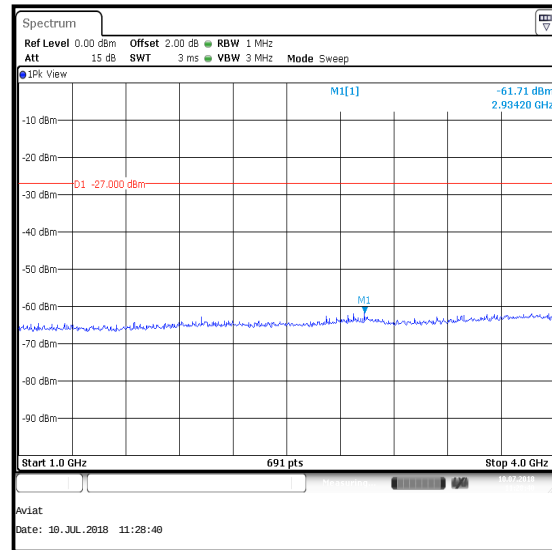
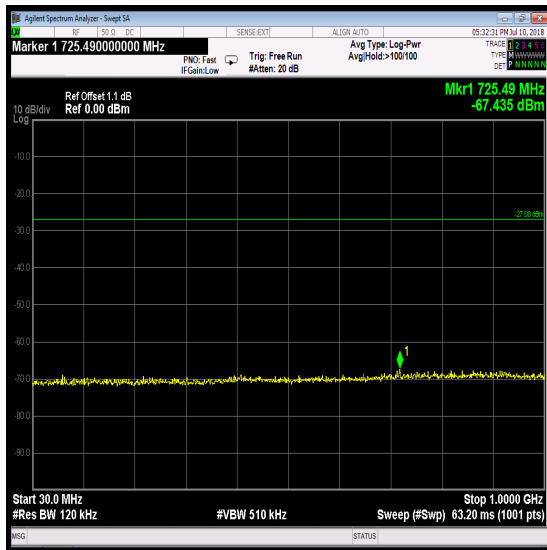
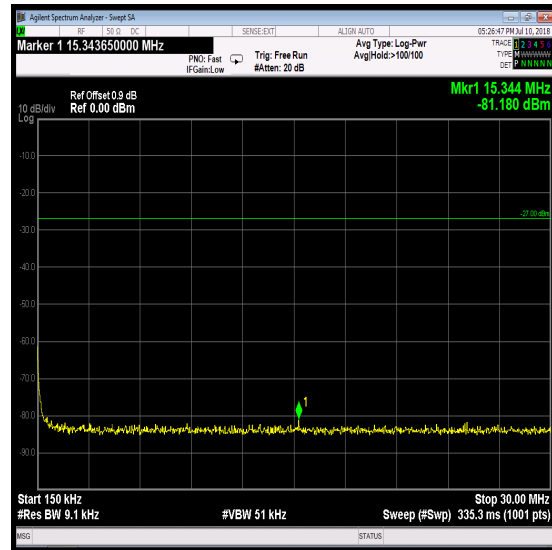
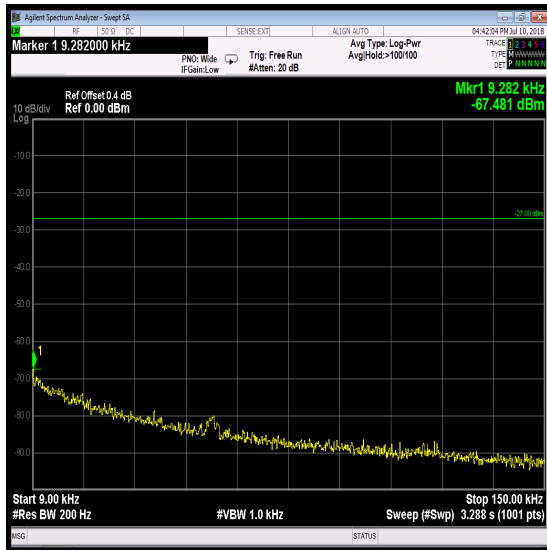
**Transmitter Out of Band Conducted Emissions (continued)**

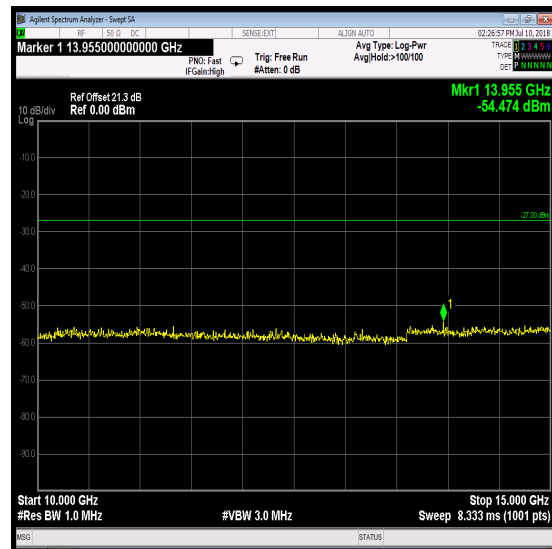
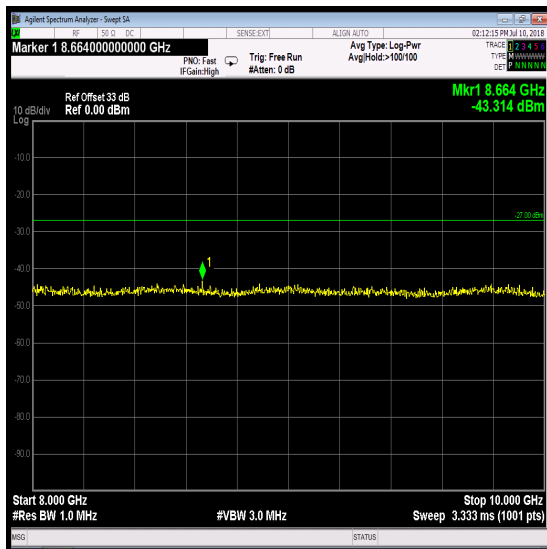
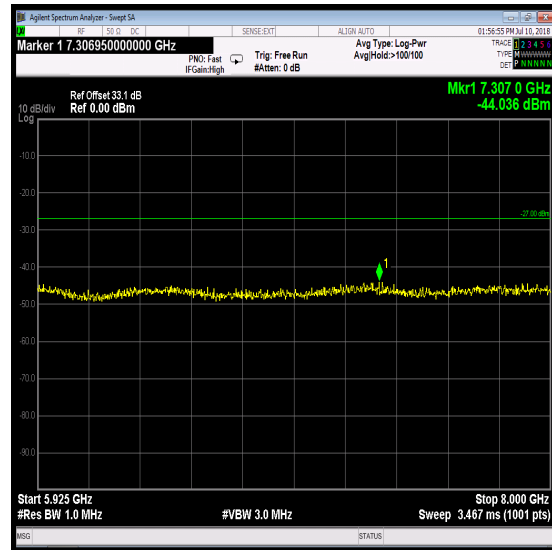
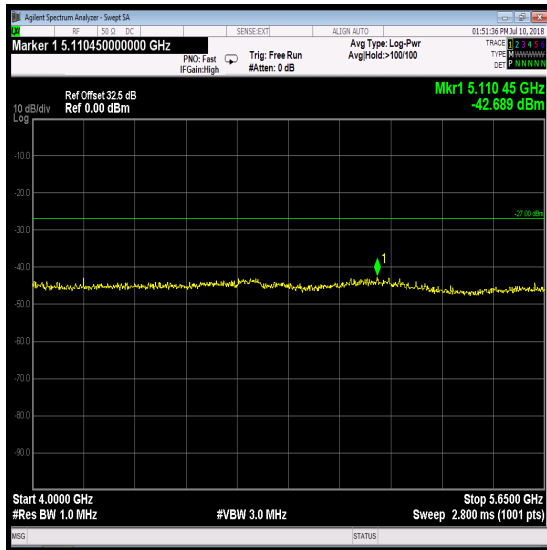
**Transmitter Out of Band Conducted Emissions (continued)**

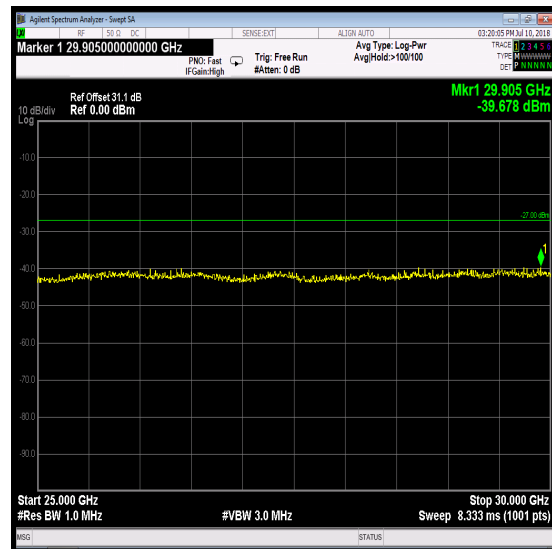
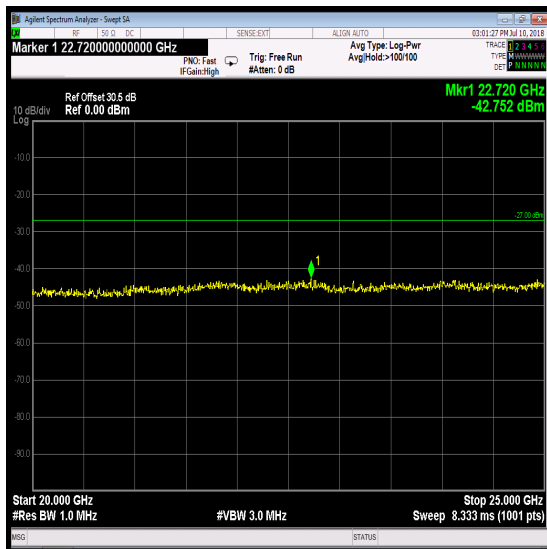
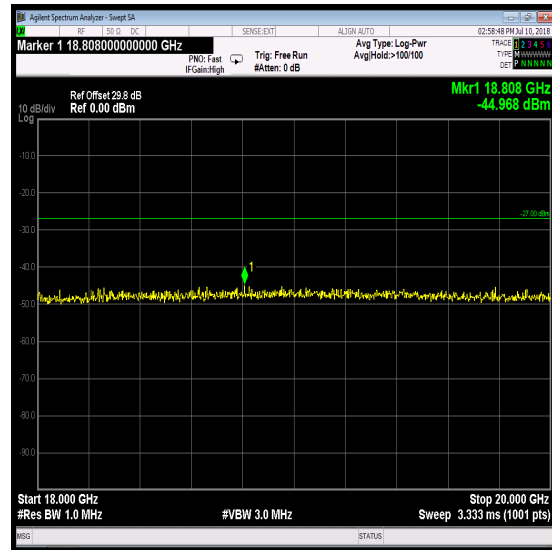
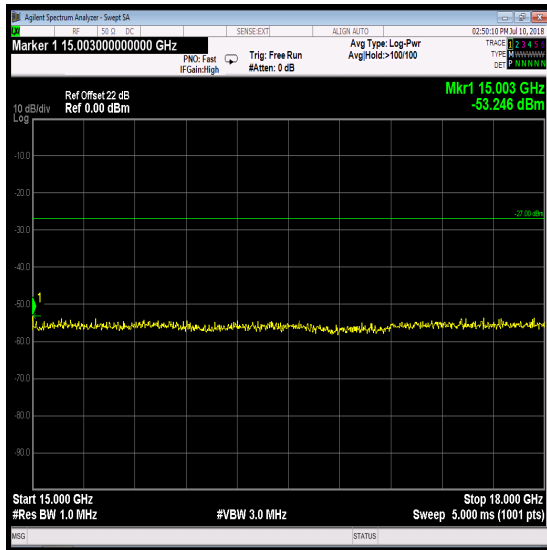
**Transmitter Out of Band Conducted Emissions (continued)**

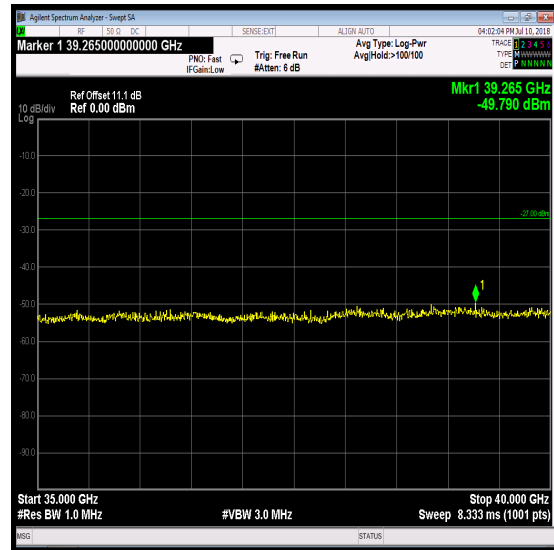
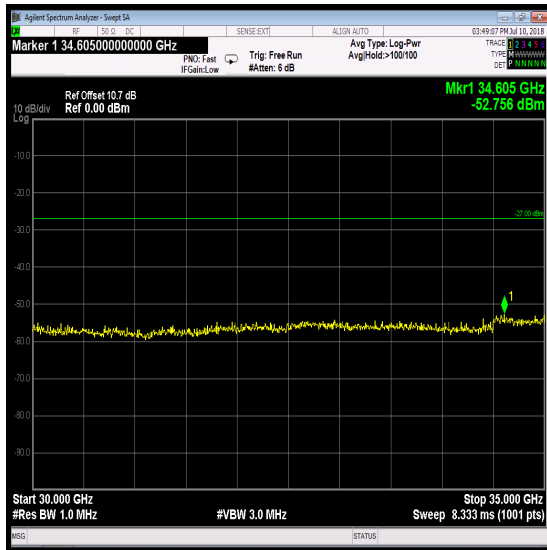
**Transmitter Out of Band Conducted Emissions (continued)****Results: RAC 7X / 10 MHz / QPSK / 12 Mbps / Middle Channel**

| Frequency (MHz) | Peak Level (dBm) | Out of Band Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------------|--------------------------------|------------|-------------|-------------|----------|
| 29905.000       | -39.7            | 10.0                           | -29.7      | -27.0       | 2.7         | Complied |



**Transmitter Out of Band Conducted Emissions (continued)**

**Transmitter Out of Band Conducted Emissions (continued)**

**Transmitter Out of Band Conducted Emissions (continued)**

**Transmitter Out of Band Conducted Emissions (continued)****Test Equipment Used:**

| Asset No. | Instrument          | Manufacturer                | Type No.   | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|---------------------|-----------------------------|------------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer    | Testo                       | 608-H1     | 45124919      | 27 Mar 2019           | 12                     |
| A2632     | Attenuator          | Weinschel Associates        | WA75-10-12 | A301          | Calibrated before use | -                      |
| A2633     | Attenuator          | Weinschel Associates        | WA75-10-12 | A302          | Calibrated before use | -                      |
| A2482     | Band Reject Filter  | Wainwright Instruments GmbH | WRCJV8     | 2             | Calibrated before use | -                      |
| A1191     | WG22 Transition     | Flann Microwave             | 22094-KF20 | 3174          | Calibrated before use | -                      |
| A360      | WG22 Transition     | Flann Microwave             | 22093-KF20 | 778           | Calibrated before use | -                      |
| M1832     | EXA Signal Analyser | Agilent                     | N9010A     | MY53470303    | 28 Mar 2020           | 24                     |
| M2018     | Signal Analyser     | Rode & Schwarz              | FSV7       | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator          | AtanTecRF                   | AN18W5-30  | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter         | Hewlett Packard             | E4418A     | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor        | Hewlett Packard             | 8487A      | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator    | Hewlett Packard             | 83650L     | 3614A00104    | 08 Nov 2018           | 24                     |

**5.2.8. Transmitter Band Edge Conducted Emissions****Test Summary:**

|                                   |               |                   |                                |
|-----------------------------------|---------------|-------------------|--------------------------------|
| <b>Test Engineer:</b>             | Patrick Jones | <b>Test Date:</b> | 03 July 2018 &<br>04 July 2018 |
| <b>Test Sample Serial Number:</b> | MTL18050017   |                   |                                |

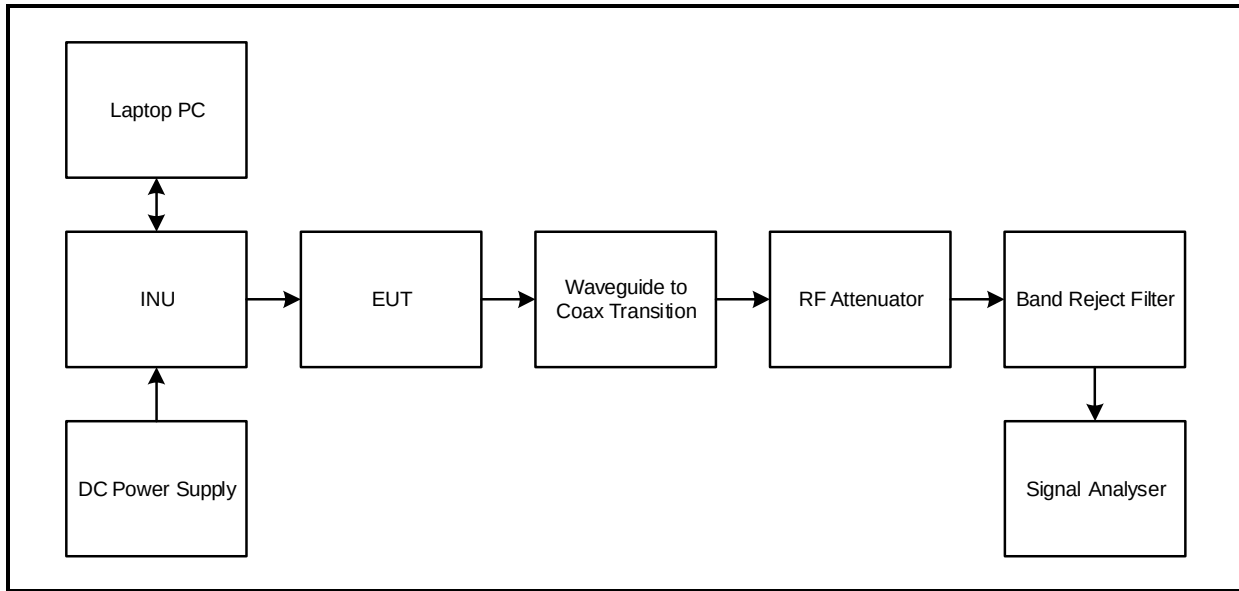
|                          |                                               |
|--------------------------|-----------------------------------------------|
| <b>FCC Reference:</b>    | Parts 15.407(b)(4)(i),(7), 15.205 & 15.209    |
| <b>Test Method Used:</b> | ANSI C63.10 Section 6.10 & KDB 789033 II.G.5. |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 24 to 25 |
| <b>Relative Humidity (%):</b> | 37 to 43 |

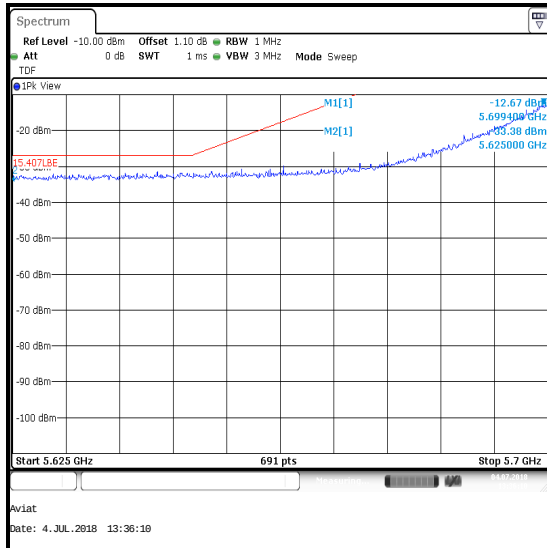
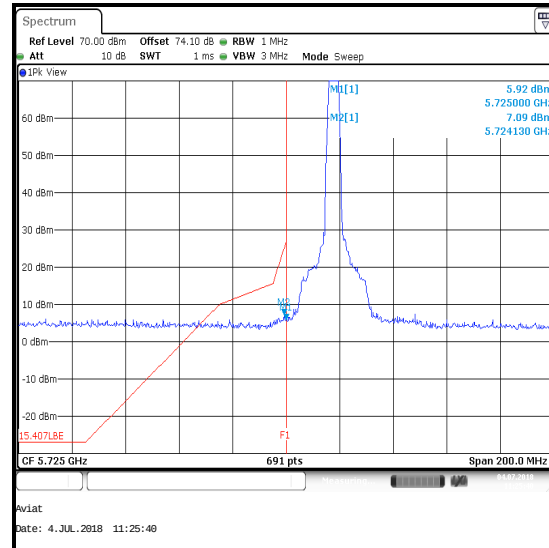
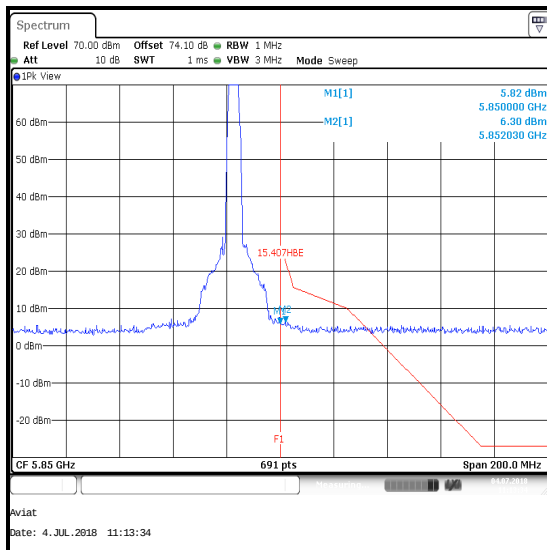
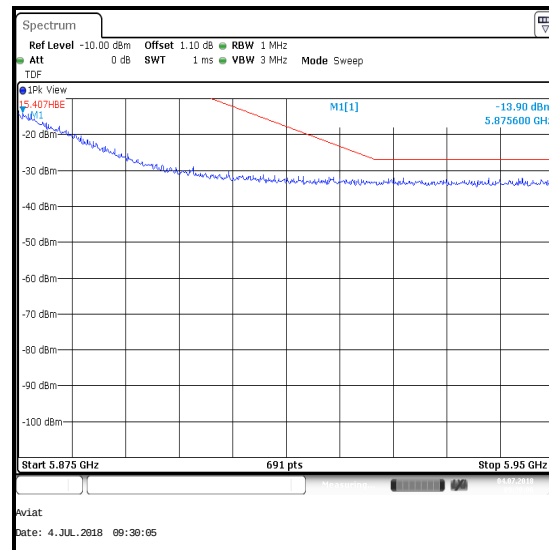
**Note(s):**

1. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and widest bandwidth for all bands were:
  - o Highest power
    - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
    - o RAC 60 / 5 MHz - 16QAM / 10 Mbps
    - o RAC 60 / 10 MHz - 256QAM / 56 Mbps
    - o RAC 60 / 20 MHz - 16QAM / 50 Mbps
    - o RAC 60 / 30 MHz - QPSK / 38 Mbps
    - o RAC 7X / 10 MHz - QPSK / 12 Mbps
    - o RAC 7X / 30 MHz - 512QAM / 200 Mbps
  - o Widest bandwidth
    - o RAC 60 / 3.75 MHz - 32QAM / 12 Mbps
    - o RAC 60 / 5 MHz - QPSK / 5 Mbps
    - o RAC 60 / 10 MHz - QPSK / 14 Mbps
    - o RAC 60 / 20 MHz - QPSK / 30 Mbps
    - o RAC 60 / 30 MHz - QPSK / 38 Mbps
    - o RAC 7X / 10 MHz - 64QAM / 45 Mbps
    - o RAC 7X / 30 MHz - 4096QAM / 266 Mbps
2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
3. The calibrated cable and attenuator loss was entered as an RF level offset on the signal analyser. The 43 dBi antenna gain was also included in the RF level offset to obtain the EIRP value. Due to the large offset, the measurement system noise floor exceeds the limit mask. A second plot was taken for each measurement using a U-NII 3 band reject filter to attenuate the carrier. This filter was characterised and the resulting data entered as a transducer factor on the signal analyser, allowing the RF level offset to be decreased demonstrating compliance with the limit mask. Plots and data of the filter characterisation are archived on the company server and are available for inspection upon request.
4. Due to the large RF level offset required, the headroom requirement in KDB 789033 section II.A.2 could not be met.

**Transmitter Band Edge Conducted Emissions (continued)****Test Setup:**

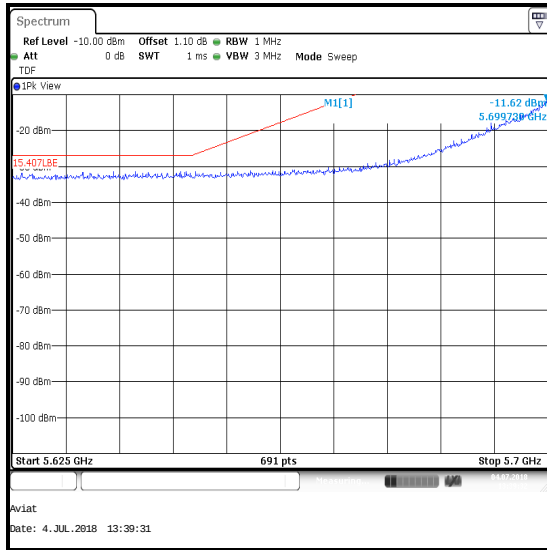
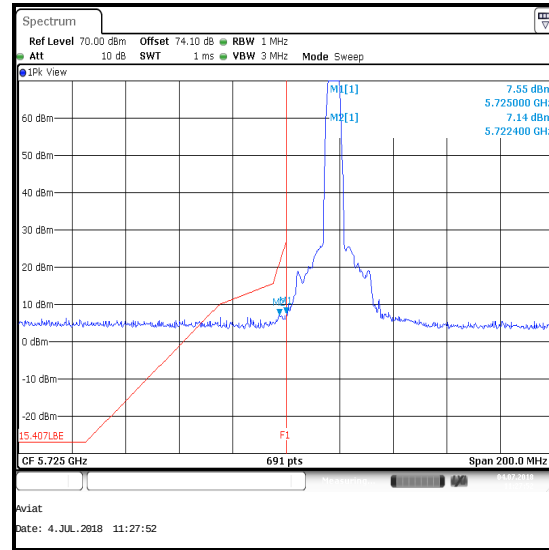
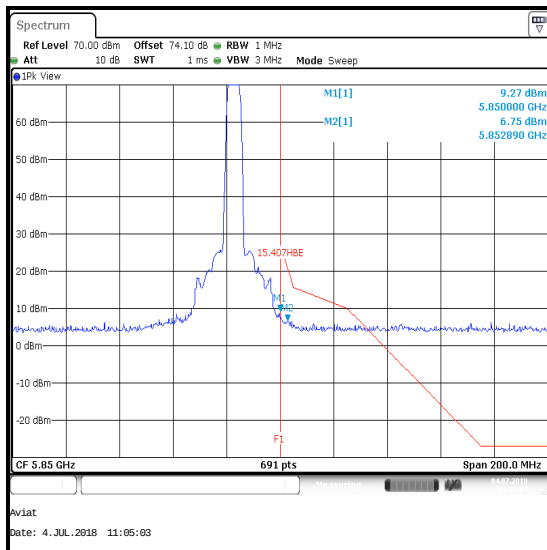
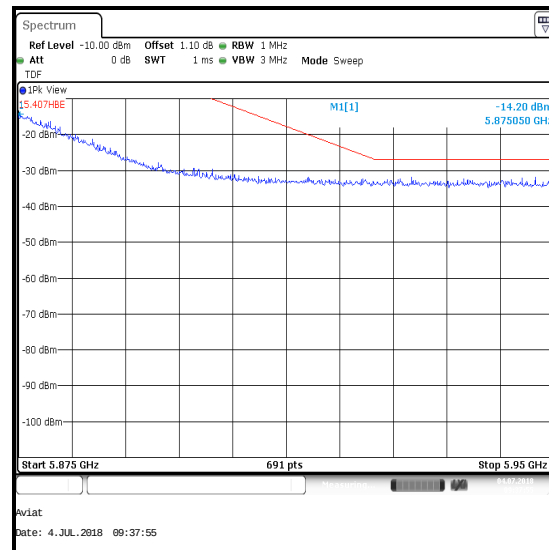
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 3.75 MHz / 32QAM / 12 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 5.9         | 27.0            | 21.1        | Complied |
| 5850            | 5.8         | 27.0            | 21.2        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

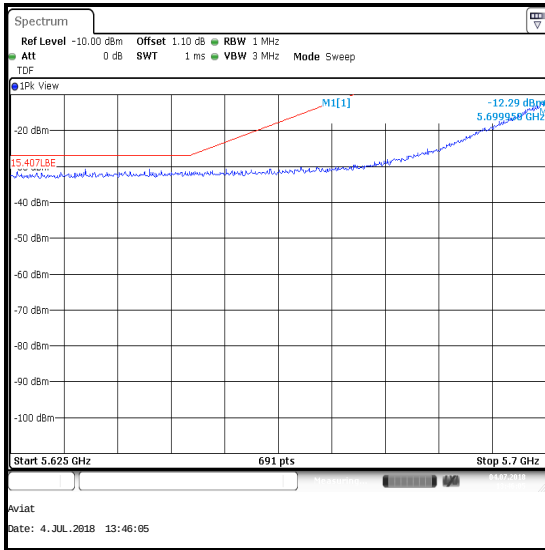
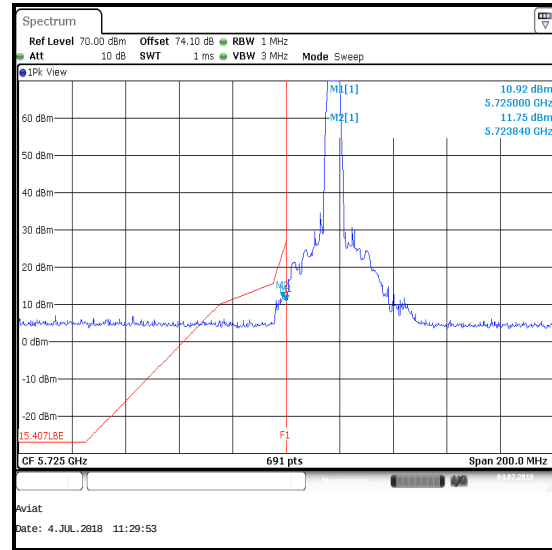
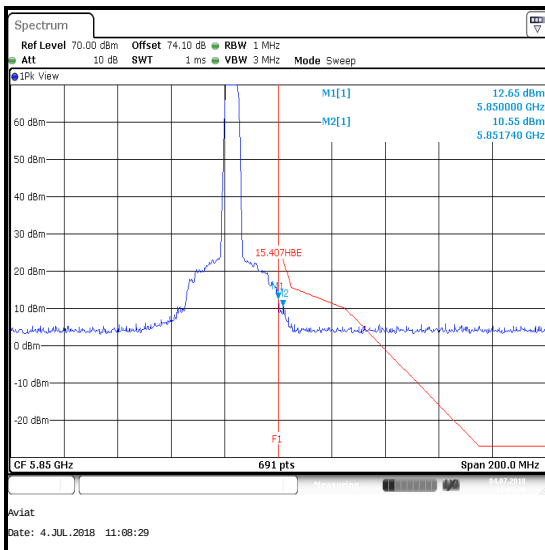
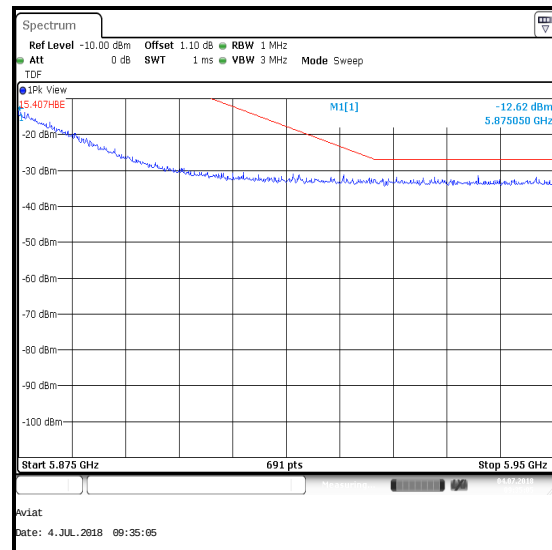
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 5 MHz / QPSK / 5 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 7.6         | 27.0            | 19.4        | Complied |
| 5850            | 9.3         | 27.0            | 17.7        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

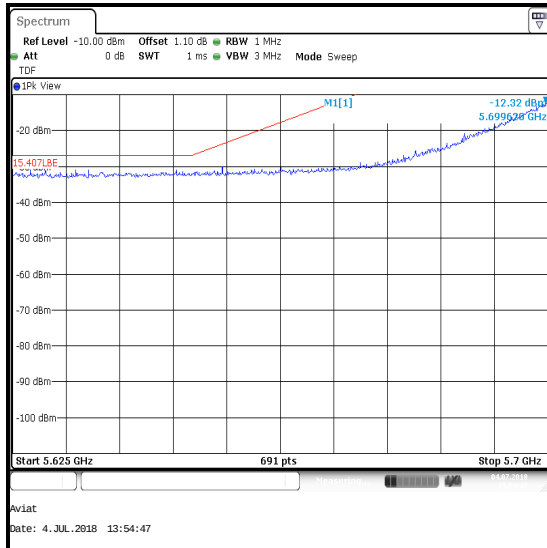
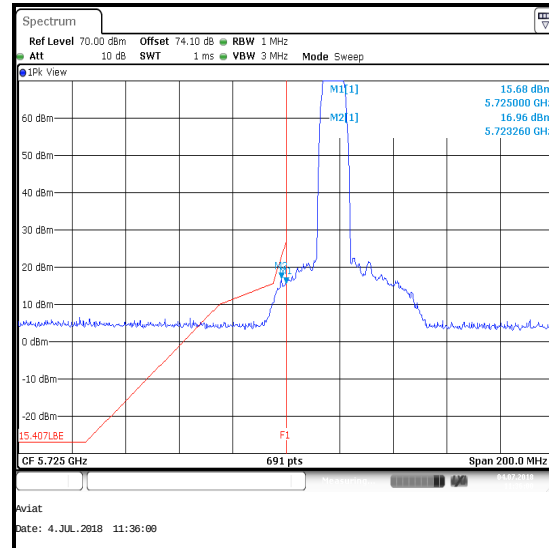
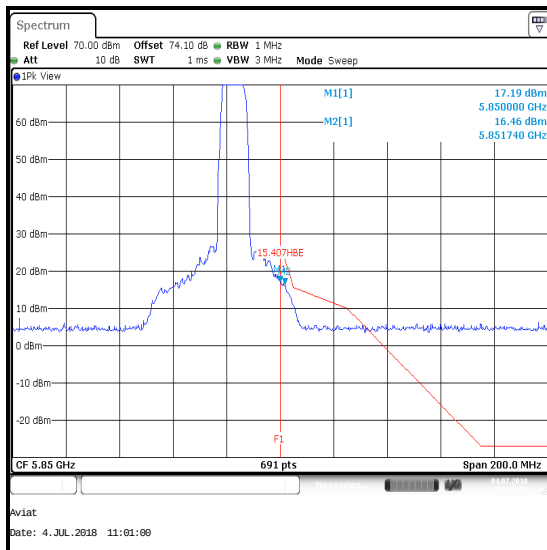
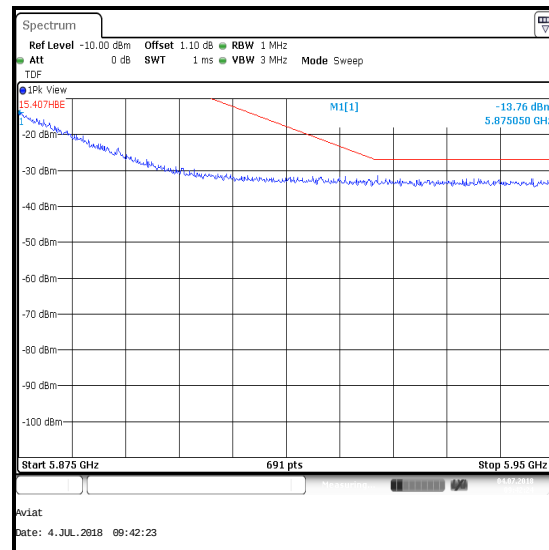
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 5 MHz / 16QAM / 10 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 10.9        | 27.0            | 16.1        | Complied |
| 5850            | 12.7        | 27.0            | 14.3        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

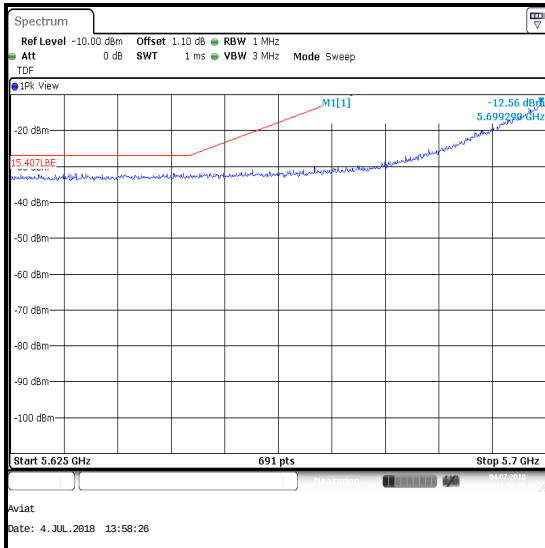
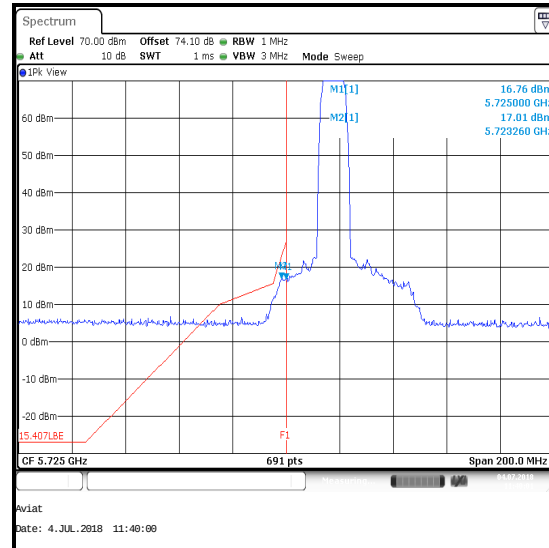
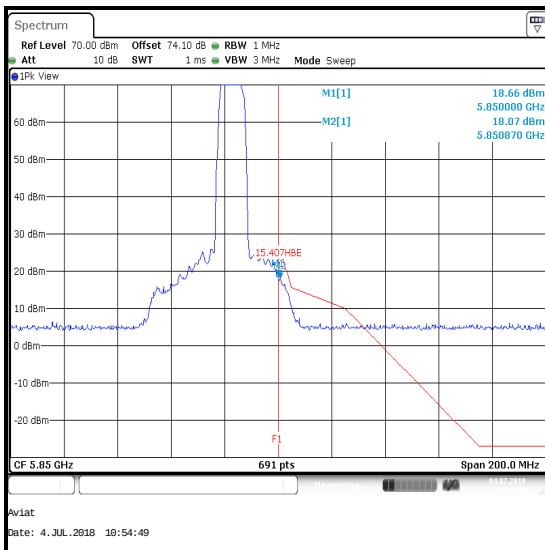
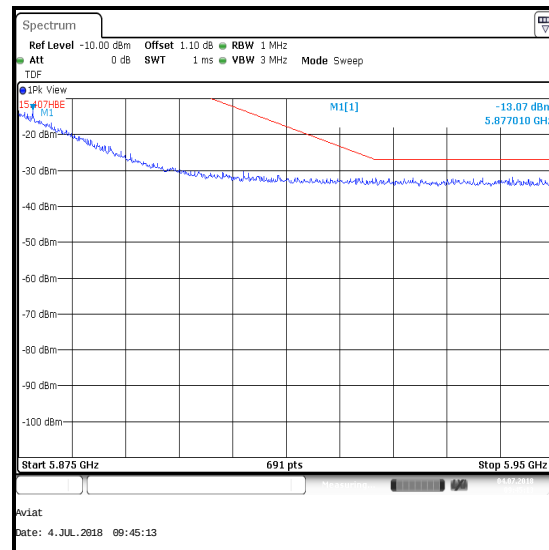
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 10 MHz / QPSK / 14 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 15.7        | 27.0            | 11.3        | Complied |
| 5850            | 17.2        | 27.0            | 9.8         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

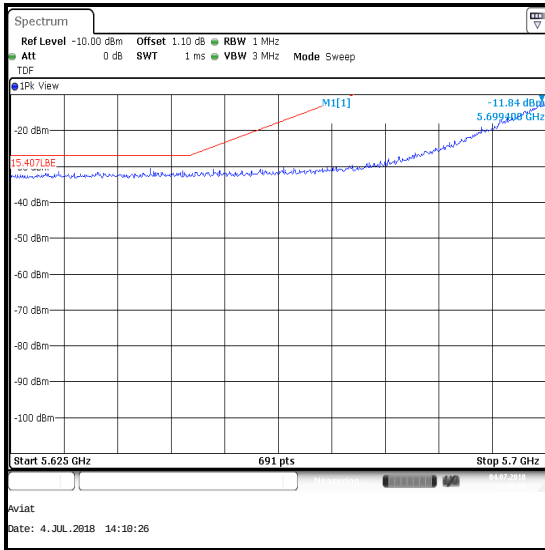
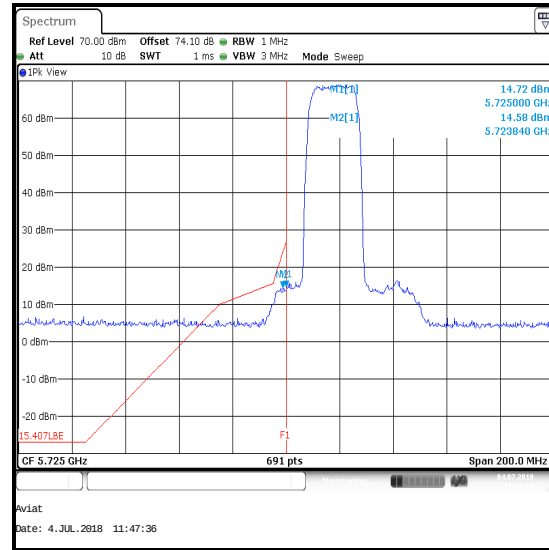
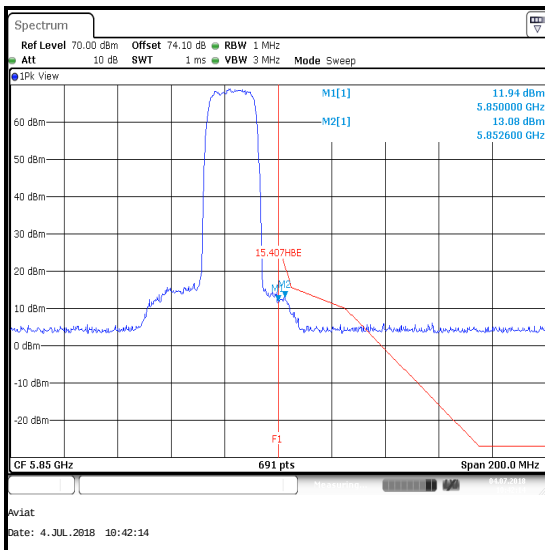
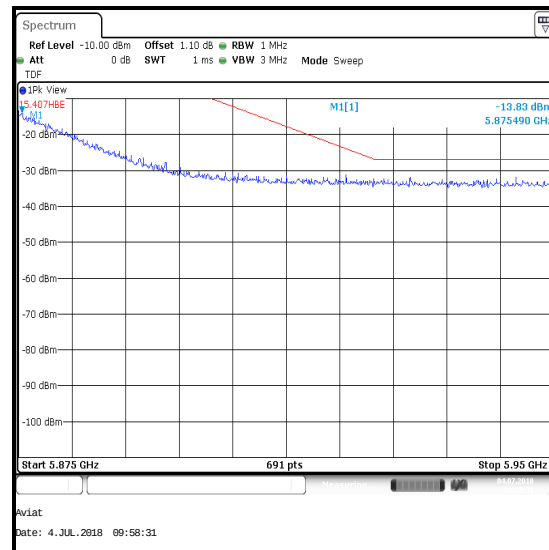
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 10 MHz / 256QAM / 56 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 16.8        | 27.0            | 10.2        | Complied |
| 5850            | 18.7        | 27.0            | 8.3         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

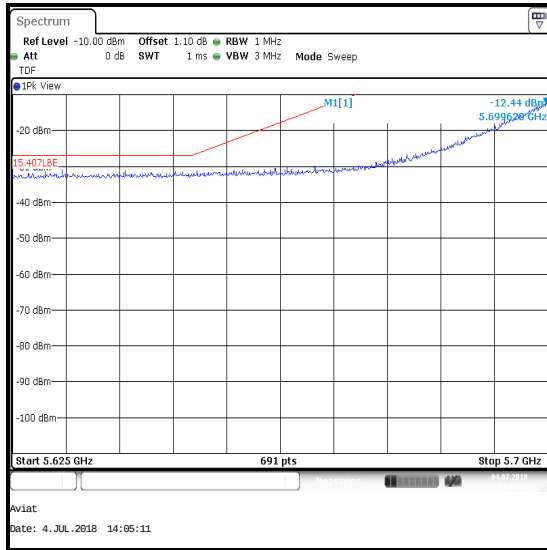
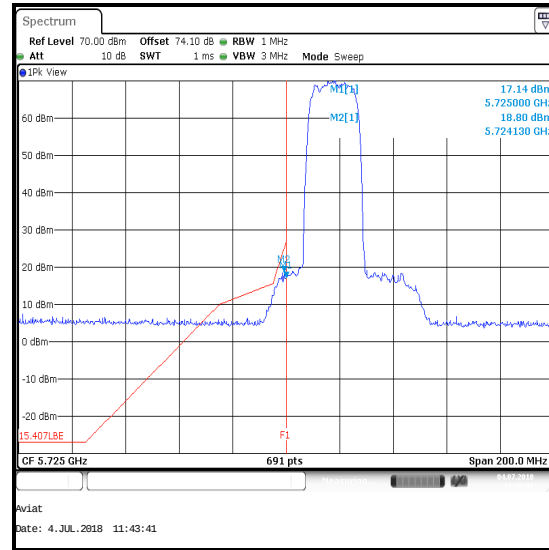
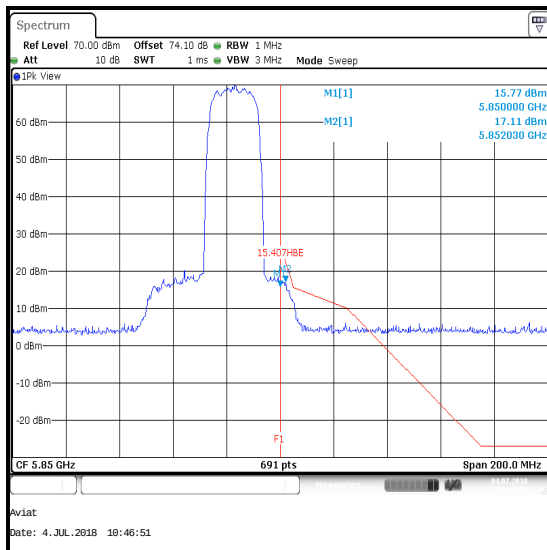
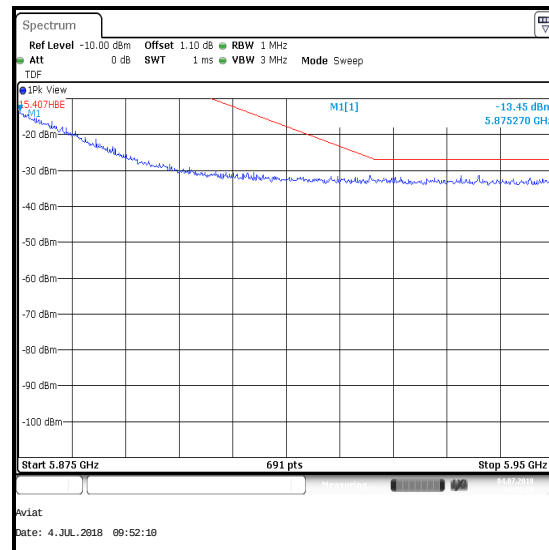
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 20 MHz / QPSK / 30 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 14.7        | 27.0            | 12.3        | Complied |
| 5850            | 11.9        | 27.0            | 15.1        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

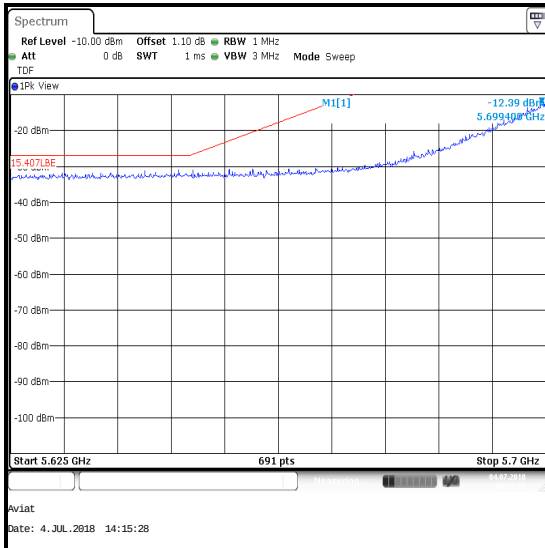
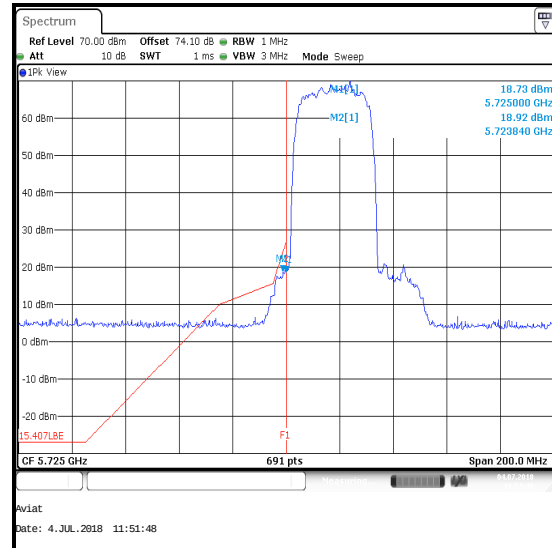
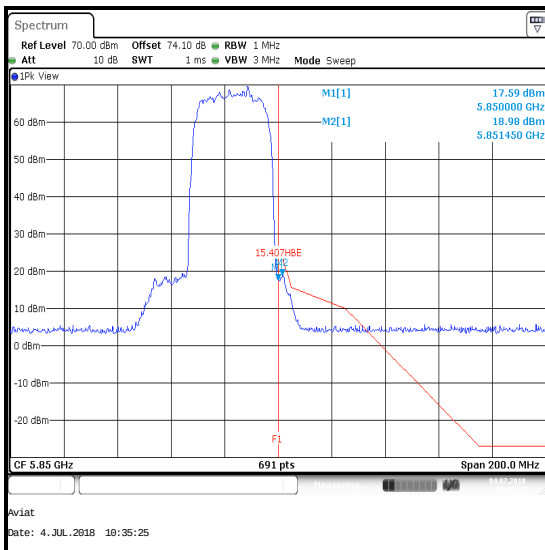
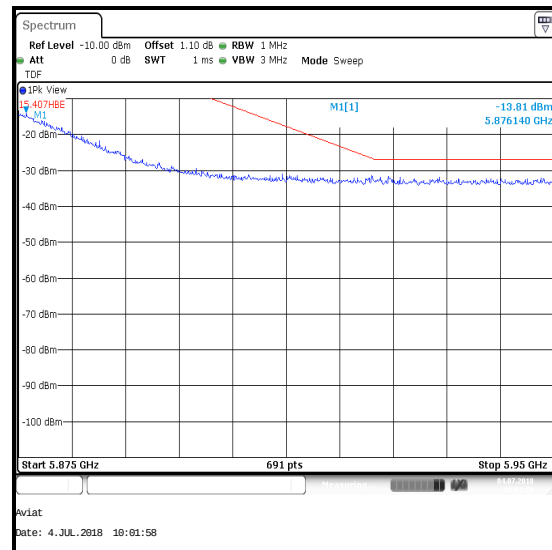
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 20 MHz / 16QAM / 50 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 17.1        | 27.0            | 9.9         | Complied |
| 5850            | 15.8        | 27.0            | 11.2        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

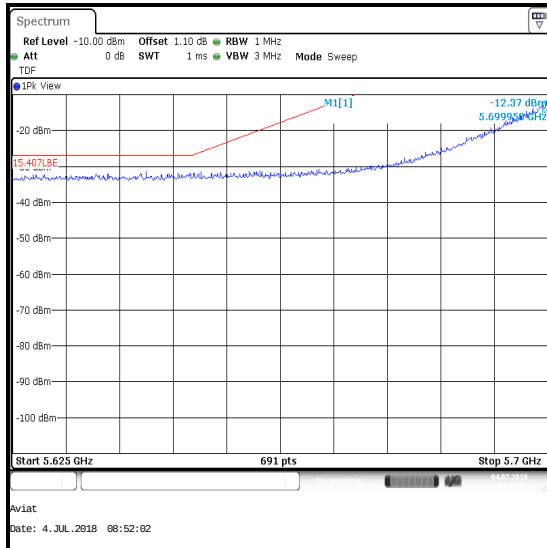
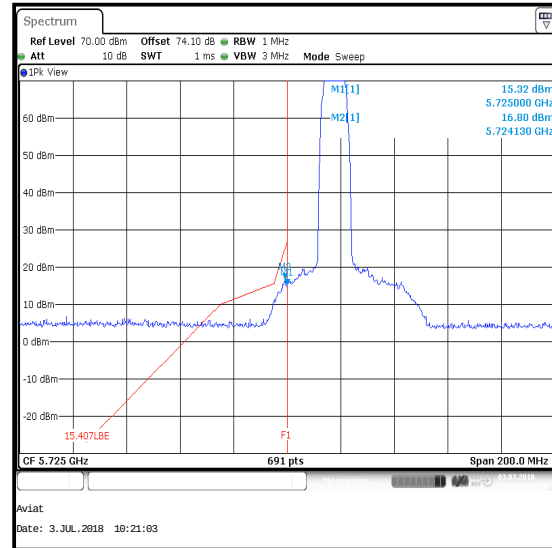
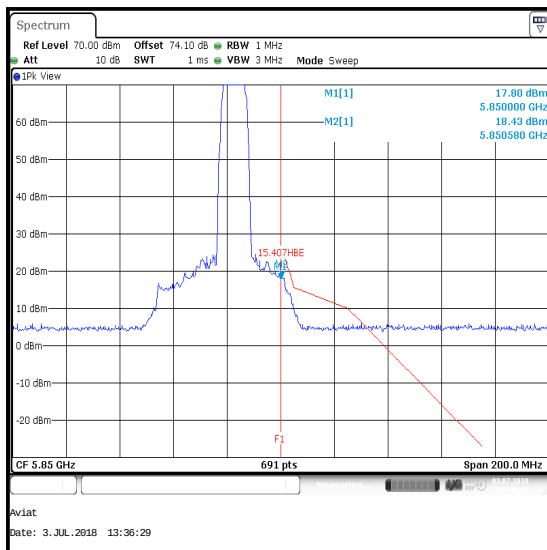
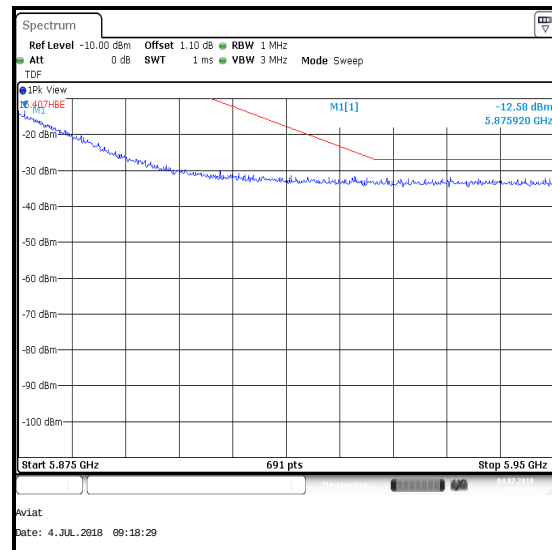
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 60 / 30 MHz / QPSK / 38 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 18.7        | 27.0            | 8.3         | Complied |
| 5850            | 17.6        | 27.0            | 9.4         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

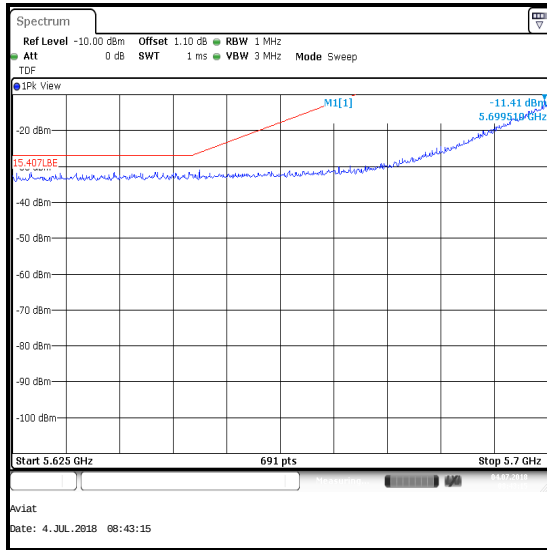
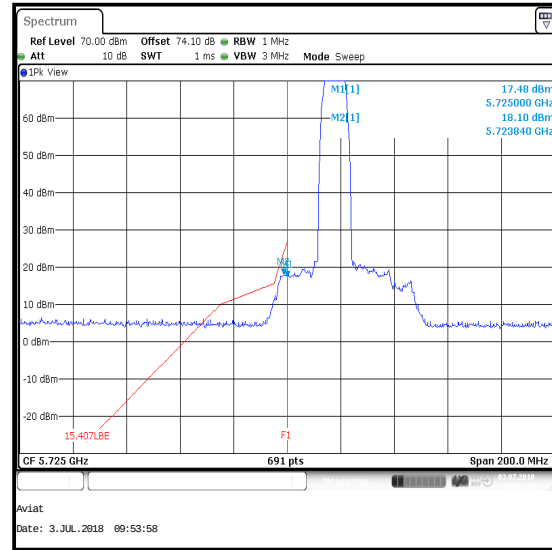
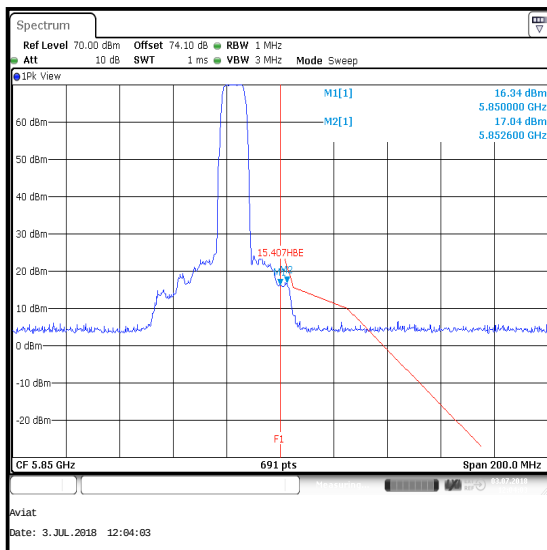
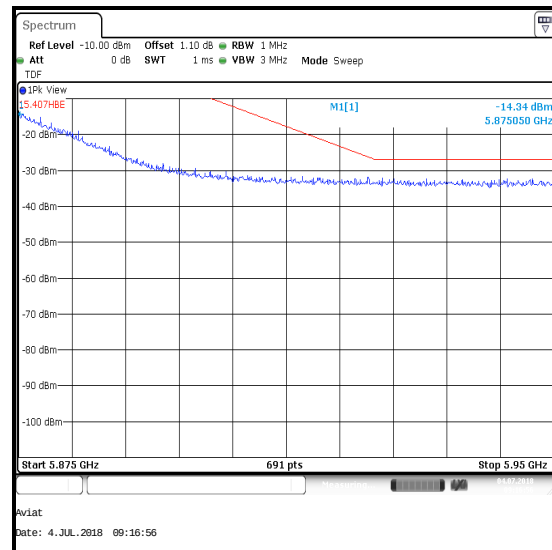
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 7X / 10 MHz / 64QAM / 45 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 15.3        | 27.0            | 11.7        | Complied |
| 5850            | 17.8        | 27.0            | 9.2         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

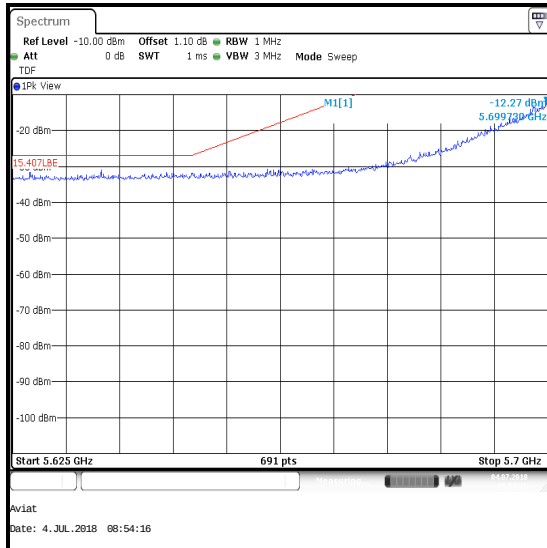
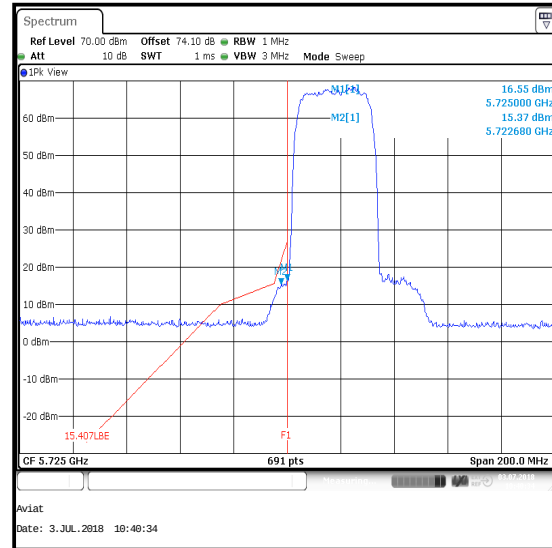
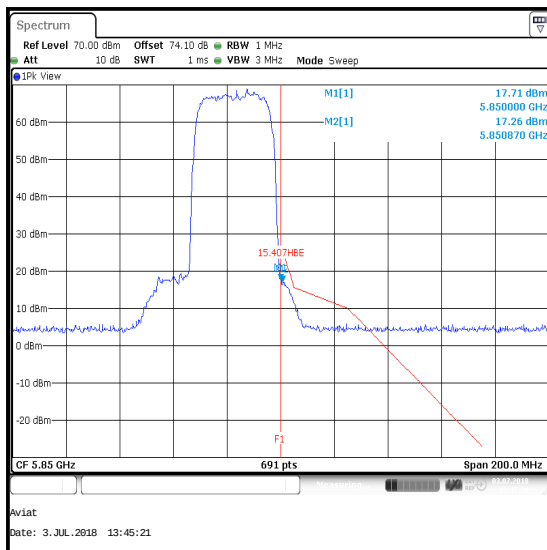
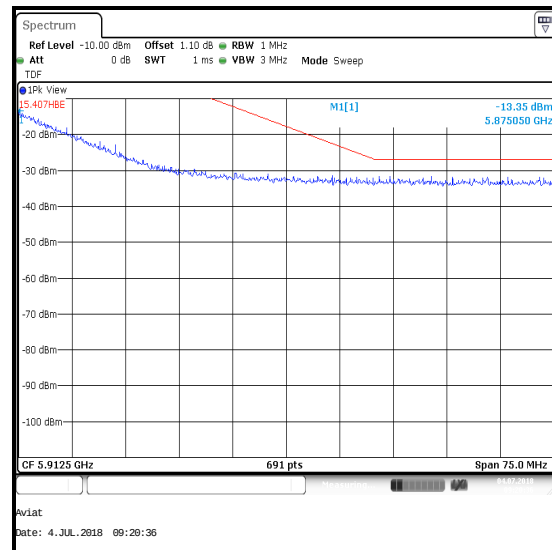
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 7X / 10 MHz / QPSK / 12 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 17.5        | 27.0            | 9.5         | Complied |
| 5850            | 16.3        | 27.0            | 10.7        | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

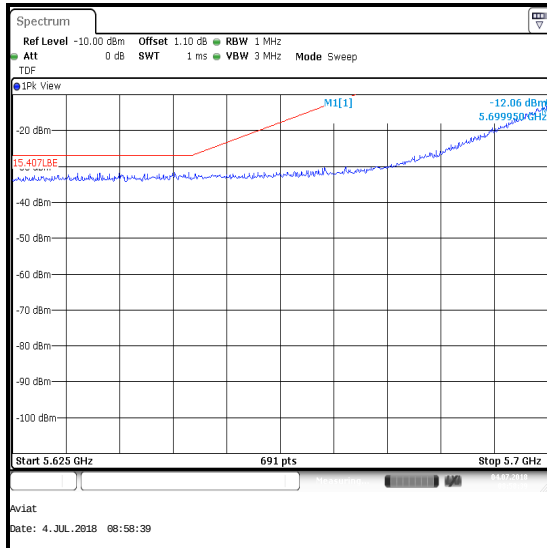
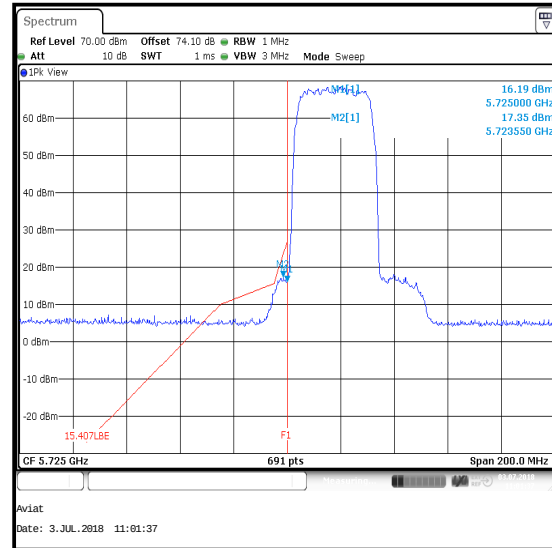
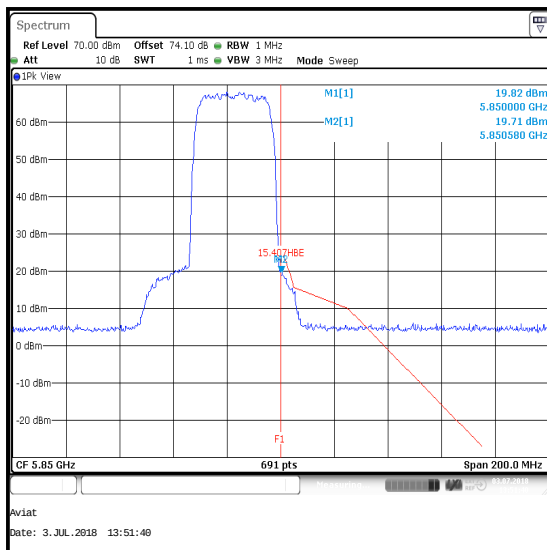
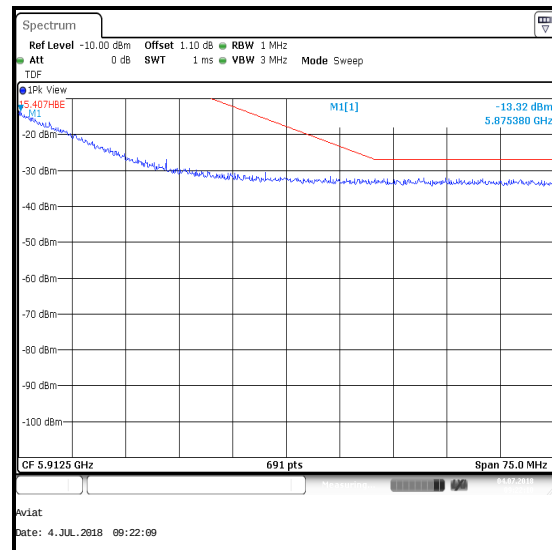
**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 7X / 30 MHz / 4096QAM / 266 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 16.6        | 27.0            | 10.4        | Complied |
| 5850            | 17.7        | 27.0            | 9.3         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

**Transmitter Band Edge Conducted Emissions (continued)****Results: RAC 7X / 30 MHz / 512QAM / 200 Mbps**

| Frequency (MHz) | Level (dBm) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-----------------|-------------|-----------------|-------------|----------|
| 5725            | 16.2        | 27.0            | 10.8        | Complied |
| 5850            | 19.8        | 27.0            | 7.2         | Complied |

**Lower Band Edge Measurement (filtered)****Lower Band Edge Measurement****Upper Band Edge Measurement****Upper Band Edge Measurement (filtered)**

**Transmitter Band Edge Conducted Emissions (continued)****Test Equipment Used:**

| Asset No. | Instrument         | Manufacturer                | Type No.  | Serial No.    | Date Calibration Due  | Cal. Interval (Months) |
|-----------|--------------------|-----------------------------|-----------|---------------|-----------------------|------------------------|
| M2038     | Thermohygrometer   | Testo                       | 608-H1    | 45124919      | 27 Mar 2019           | 12                     |
| A2482     | Band Reject Filter | Wainwright Instruments GmbH | WRCJV8    | 2             | Calibrated before use | -                      |
| M2018     | Signal Analyser    | Rode & Schwarz              | FSV7      | 102699        | 22 Jun 2019           | 12                     |
| A2925     | Attenuator         | AtanTecRF                   | AN18W5-30 | 858580#1      | Calibrated before use | -                      |
| M281      | Power Meter        | Hewlett Packard             | E4418A    | GB37170210-01 | 06 Feb 2019           | 12                     |
| M1592     | Power Sensor       | Hewlett Packard             | 8487A     | 3318A02094    | 24 Oct 2018           | 12                     |
| G085      | Signal Generator   | Hewlett Packard             | 83650L    | 3614A00104    | 08 Nov 2018           | 24                     |

## 6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

| Measurement Type                | Range                 | Confidence Level (%) | Calculated Uncertainty |
|---------------------------------|-----------------------|----------------------|------------------------|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz    | 95%                  | ±2.40 dB               |
| Maximum Conducted Output Power  | 5.15 GHz to 5.850 GHz | 95%                  | ±1.13 dB               |
| Maximum Power Spectral Density  | 5.15 GHz to 5.850 GHz | 95%                  | ±1.13 dB               |
| Minimum 6 dB Emission Bandwidth | 5.15 GHz to 5.850 GHz | 95%                  | ±4.59 %                |
| 26 dB Emission Bandwidth        | 5.15 GHz to 5.850 GHz | 95%                  | ±4.59 %                |
| Conducted Spurious Emissions    | 9 kHz to 40 GHz       | 95 %                 | ±2.62 dB               |
| Radiated Spurious Emissions     | 30 MHz to 1 GHz       | 95%                  | ±5.65 dB               |
| Radiated Spurious Emissions     | 1 GHz to 40 GHz       | 95%                  | ±2.94 dB               |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## **7. Report Revision History**

| Version Number | Revision Details |        |                                                                                    |
|----------------|------------------|--------|------------------------------------------------------------------------------------|
|                | Page No(s)       | Clause | Details                                                                            |
| 1.0            | -                | -      | Initial Version                                                                    |
| 2.0            | 1                | -      | Reference to Part 15.207 added                                                     |
|                | 1 & 7            | 3.1    | FCC ID updated                                                                     |
|                | 7                | 3.5    | Section detailing available antennas added                                         |
|                | 36               | 5.2.4  | Note added stating available antenna types and gain                                |
|                | 60, 62, 66       | 5.2.7  | Note added stating out of band antenna gain and EIRP values added to result tables |
| 3.0            | 38-44            | 5.2.4  | EIRP values added to result tables                                                 |

--- END OF REPORT ---