

Report on the Radio Testing  
For  
Cambium Networks Ltd  
on  
3GHz PMP 450m  
Report no. TRA-041375-47-04A  
20 September 2018

Report Number: TRA-041375-47-04A  
Issue: A

REPORT ON THE RADIO TESTING OF A  
Cambium Networks Ltd  
3GHz PMP 450m  
WITH RESPECT TO SPECIFICATION  
FCC Part 90 Subpart Z

TEST DATE: 2018-08-06 to 2018-08-20

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Date: 20 September 2018

Disclaimers:

- [1] THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE  
[2] THE RESULTS CONTAINED IN THIS DOCUMENT RELATE ONLY TO THE ITEM(S) TESTED

1 Revision Record

| <i>Issue Number</i> | <i>Issue Date</i> | <i>Revision History</i> |
|---------------------|-------------------|-------------------------|
| A                   | 20 September 2018 | Original                |
|                     |                   |                         |

## 2 Summary

TEST REPORT NUMBER: TRA-041375-47-04A

WORKS ORDER NUMBER: TRA-041375-02

PURPOSE OF TEST: Testing of radio frequency equipment per the relevant authorization procedure of chapter 47 of CFR (code of federal regulations) Part 2, subpart J.

TEST SPECIFICATION(S): Part 90 Subpart Z

EQUIPMENT UNDER TEST (EUT): 3GHz PMP 450m

FCC IDENTIFIER: QWP-30450M

MAC ADDRESS: 0a-00-3e-60-47-a0

MANUFACTURER/AGENT: Cambium Networks Ltd

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ORDER NUMBER: NP82695747

TEST DATE: 2018-08-06 to 2018-08-20

TESTED BY: D Moncayola  
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Element

## 2.1 Test Summary

| <i>Test Method and Description</i>                                      | <i>Requirement Clause Part 90</i> | <i>Applicable to this equipment</i> | <i>Result / Note</i> |
|-------------------------------------------------------------------------|-----------------------------------|-------------------------------------|----------------------|
| Transmitter Unwanted Emissions                                          | 90.1323                           | <input checked="" type="checkbox"/> | Pass                 |
| Occupied bandwidth                                                      | 90.209                            | <input checked="" type="checkbox"/> | Pass                 |
| Emission Mask                                                           | 90.210                            | <input checked="" type="checkbox"/> | Pass                 |
| Frequency Stability                                                     | 90.213                            | <input checked="" type="checkbox"/> | Pass                 |
| Peak EIRP Density and Equivalent Isotropically Radiated Power (e.i.r.p) | 90.1321                           | <input checked="" type="checkbox"/> | Pass                 |

### Notes:

The results contained in this report relate only to the items tested, in the condition at time of test, and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. Any modifications made are identified in Section 8 of this report.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 5.2 of this test report (Deviations from Test Standards).

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## 4 Introduction

This report TRA-041375-47-04A presents the results of the Radio testing on a Cambium Networks Ltd, 3GHz PMP 450m to specification RSS-197 Wireless Broadband Access Equipment Operating in the Band 3650-3700 MHz.

The testing was carried out for Cambium Networks Ltd by Element, at the address(es) detailed below.

|   |                                                                                                               |   |                                                                                                    |
|---|---------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------|
| ☒ | 30 Meter Open Area Test Site<br>Pershore Airfield,<br>Long Lane,<br>Throckmorton,<br>Worcs,<br>WR10 2JH<br>UK | ☒ | Element Skelmersdale<br>Unit 1<br>Pendle Place<br>Skelmersdale<br>West Lancashire<br>WN8 9PN<br>UK |
|---|---------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------|

This report details the configuration of the equipment, the test methods used and any relevant modifications where appropriate.

All test and measurement equipment under the control of the laboratory and requiring calibration is subject to an established programme and procedures to control and maintain measurement standards. The quality management system meets the principles of ISO 9001, and has quality control procedures for monitoring the validity of tests undertaken. Records and sufficient detail are retained to establish an audit trail of calibration records relating to its test results for a defined period. Under control of the established calibration programme, key quantities or values of the test & measurement instrumentation are within specification and comply with the relevant traceable internationally recognised and appropriate standard specifications, which are UKAS calibrated as such where these properties have a significant effect on results. Participation in inter-laboratory comparisons and proficiency testing ensures satisfactory correlation of results conform to Elements own procedures, as well as statistical techniques for analysis of test data providing the appropriate confidence in measurements.

Throughout this report EUT denotes equipment under test.

FCC Site Listing:

Element is accredited for the above sites under the US-EU MRA, Designation number UK0009.

IC Registration Number(s):

Element Hull 3483A

Element North West 3930B

The test site requirements of ANSI C63.4-2014 are met up to 1GHz.

The test site SVSWR requirements of CISPR 16-1-4:2010 are met over the frequency range 1 GHz to 18 GHz.

## 5 Test Specifications

### 5.1 Normative References

- FCC 47 CFR Ch. I – Part 90 – Private Land Mobile Radio Services
- ANSI C63.26-2015 – American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
- ANSI C63.4-2014 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

### 5.2 Deviations from Test Standards

Maximum conducted output power

Due to the nature of the equipment it is not possible to measure the power conducted so a radiated measurement was performed. This measurement was performed at 30m to ensure the measurement was made in the antenna far field.

Spectral Power Density

Due to the nature of the equipment it is not possible to measure the power conducted so a radiated measurement was performed. This measurement was performed at 30m to ensure the measurement was made in the antenna far field.

### 5.3 Minimisation of reflections

Due to the use of a 30 meter open area test site with no RF absorbing material for the measurement of the fundamental attempts were made to minimise the influence of reflections.

To minimise the reflections the following precautions were taken.

Test performed over a grassed area to try and ensure no sub surface artefacts produce reflections.

The EUT was raised to a height of 4 meters above the ground plane to help reduce the effects of any reflected paths at 30 meters

The EUTs antennas are set with a 2 degree down tilt, and an 8 degree beam width, to negate this down tilt the EUT was rotated 180 degrees though the vertical plane (ie turned upside down to normal operation) and the EUT was angled so the bore sight was parallel to the grassed area.

Due to the increased height of the EUT the measurement antenna was varied between 1 and 6 meters to encompass the height of the EUT and its potential bandwidth



## 6 Glossary of Terms

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| <b>§</b>      | denotes a section reference from the standard, not this document |
| <b>AC</b>     | Alternating Current                                              |
| <b>ANSI</b>   | American National Standards Institute                            |
| <b>BW</b>     | bandwidth                                                        |
| <b>C</b>      | Celsius                                                          |
| <b>CFR</b>    | Code of Federal Regulations                                      |
| <b>CW</b>     | Continuous Wave                                                  |
| <b>dB</b>     | decibel                                                          |
| <b>dBm</b>    | dB relative to 1 milliwatt                                       |
| <b>DC</b>     | Direct Current                                                   |
| <b>DSSS</b>   | Direct Sequence Spread Spectrum                                  |
| <b>EIRP</b>   | Equivalent Isotropically Radiated Power                          |
| <b>ERP</b>    | Effective Radiated Power                                         |
| <b>EUT</b>    | Equipment Under Test                                             |
| <b>FCC</b>    | Federal Communications Commission                                |
| <b>FHSS</b>   | Frequency Hopping Spread Spectrum                                |
| <b>Hz</b>     | hertz                                                            |
| <b>IC</b>     | Industry Canada                                                  |
| <b>ITU</b>    | International Telecommunication Union                            |
| <b>LBT</b>    | Listen Before Talk                                               |
| <b>m</b>      | metre                                                            |
| <b>max</b>    | maximum                                                          |
| <b>MIMO</b>   | Multiple Input and Multiple Output                               |
| <b>min</b>    | minimum                                                          |
| <b>MRA</b>    | Mutual Recognition Agreement                                     |
| <b>N/A</b>    | Not Applicable                                                   |
| <b>PCB</b>    | Printed Circuit Board                                            |
| <b>PDF</b>    | Portable Document Format                                         |
| <b>Pt-mpt</b> | Point-to-multipoint                                              |
| <b>Pt-pt</b>  | Point-to-point                                                   |
| <b>RF</b>     | Radio Frequency                                                  |
| <b>RH</b>     | Relative Humidity                                                |
| <b>RMS</b>    | Root Mean Square                                                 |
| <b>Rx</b>     | receiver                                                         |
| <b>s</b>      | second                                                           |
| <b>SVSWR</b>  | Site Voltage Standing Wave Ratio                                 |
| <b>Tx</b>     | transmitter                                                      |
| <b>UKAS</b>   | United Kingdom Accreditation Service                             |
| <b>V</b>      | volt                                                             |
| <b>W</b>      | watt                                                             |
| <b>Ω</b>      | ohm                                                              |

## 7 Equipment Under Test

### 7.1 EUT Identification

- Name: 3GHz PMP 450m
- MAC Address: 0a-00-3e-60-47-a0
- Model Number: 3083HH
- Software Revision: CANOPY 15.2.100 (W)
- Build Level / Revision Number: R4.2

### 7.2 System Equipment

Equipment listed below forms part of the overall test setup and is required for equipment functionality and/or monitoring during testing. The compliance levels achieved in this report relate only to the EUT and not items given in the following list.

- Name: Netgear 5 port 10/100/1000M switch
- Serial Number: 2N211B3D00F3C
- Model Number: GS605 v4
- Name: Dell Latitude Laptop PC
- Serial Number:
- Model Number: E6440

### 7.3 EUT Mode of Operation

#### 7.3.1 Transmission

The mode of operation for Transmit tests was as follows:

The unit was transmitting modulated or unmodulated signals with 100 % duty cycle.

#### Operating Frequencies

Operating frequency band tested 3650-3700 MHz.

#### Operating modes

There are three unique operating modes. These only affect the antenna radiation pattern.

#### Sector Mode

This mode produces a broad antenna radiation beam.

#### Beamforming Mode

This produces a narrow, focused antenna beam.

#### MU-MIMO mode

This produces several narrow, focused antenna beams.

#### Modulation Modes

Supported modulation modes are QPSK, 16QAM, 64QAM and 256QAM. Each of these four modulation mode can be configured to be MIMO A or MIMO B. The differences between these MIMO modes are described below.

#### MIMO A

The data streams transmitted in both horizontal and vertical antenna polarisations are identical.

#### MIMO B

The data streams transmitted in the horizontal and vertical polarisations are independent.

## 7.4 EUT Radio Parameters

### 7.4.1 General

|                                                                          |                                |
|--------------------------------------------------------------------------|--------------------------------|
| <b>Frequency of operation:</b>                                           | 3.65 GHz – 3.70 GHz band       |
| <b>Modulation type(s):</b>                                               | QPSK; 16QAM; 64QAM and 256QAM  |
| <b>Occupied channel bandwidth(s):</b>                                    | 5 MHz; 20 MHz and 40 MHz       |
| <b>Channel spacing:</b>                                                  | 5 MHz; 20 MHz and 40 MHz       |
| <b>Declared output power(s):</b>                                         | 40W/40MHz (e.i.r.p)            |
| <b>Nominal Supply Voltage:</b>                                           | 48 V dc                        |
| <b>Location of notice for license exempt use:</b>                        | Not applicable, license device |
| <b>Method of prevention of use on non-US / non-Canadian frequencies:</b> | Not stated                     |
| <b>Duty cycle:</b>                                                       | 100 % for testing only         |

### 7.4.2 Antennas

|                         |                                  |
|-------------------------|----------------------------------|
| <b>Type:</b>            | Integral antenna                 |
| <b>Frequency range:</b> | 3.65 GHz – 3.70 GHz              |
| <b>Impedance:</b>       | 50 $\Omega$                      |
| <b>Gain:</b>            | 16 dBi                           |
| <b>Connector type:</b>  | Not applicable, integral antenna |
| <b>Length:</b>          | 500 × 650 × 120                  |
| <b>Weight:</b>          | 20 kg                            |
| <b>Mounting:</b>        | Professionally installed         |

### 7.4.3 Product specific declarations

|                                                                               |                                 |
|-------------------------------------------------------------------------------|---------------------------------|
| <b>Multiple antenna configuration(s), e.g. MIMO:</b>                          | Sector, Beamforming and MU-MIMO |
| <b>Fixed pt-pt operations (yes/no):</b>                                       | Yes                             |
| <b>Installation manual advice on pt-pt operational restrictions (yes/no):</b> | N/A Professionally installed    |
| <b>Fixed pt-mpt operations (yes/no):</b>                                      | Yes                             |
| <b>Simultaneous tx (yes/no):</b>                                              | Yes                             |

## 7.5 EUT Description

The EUT is a point-to-multipoint (PMP) wireless broadband platform working in the band 3.65 GHz – 3.70 GHz.

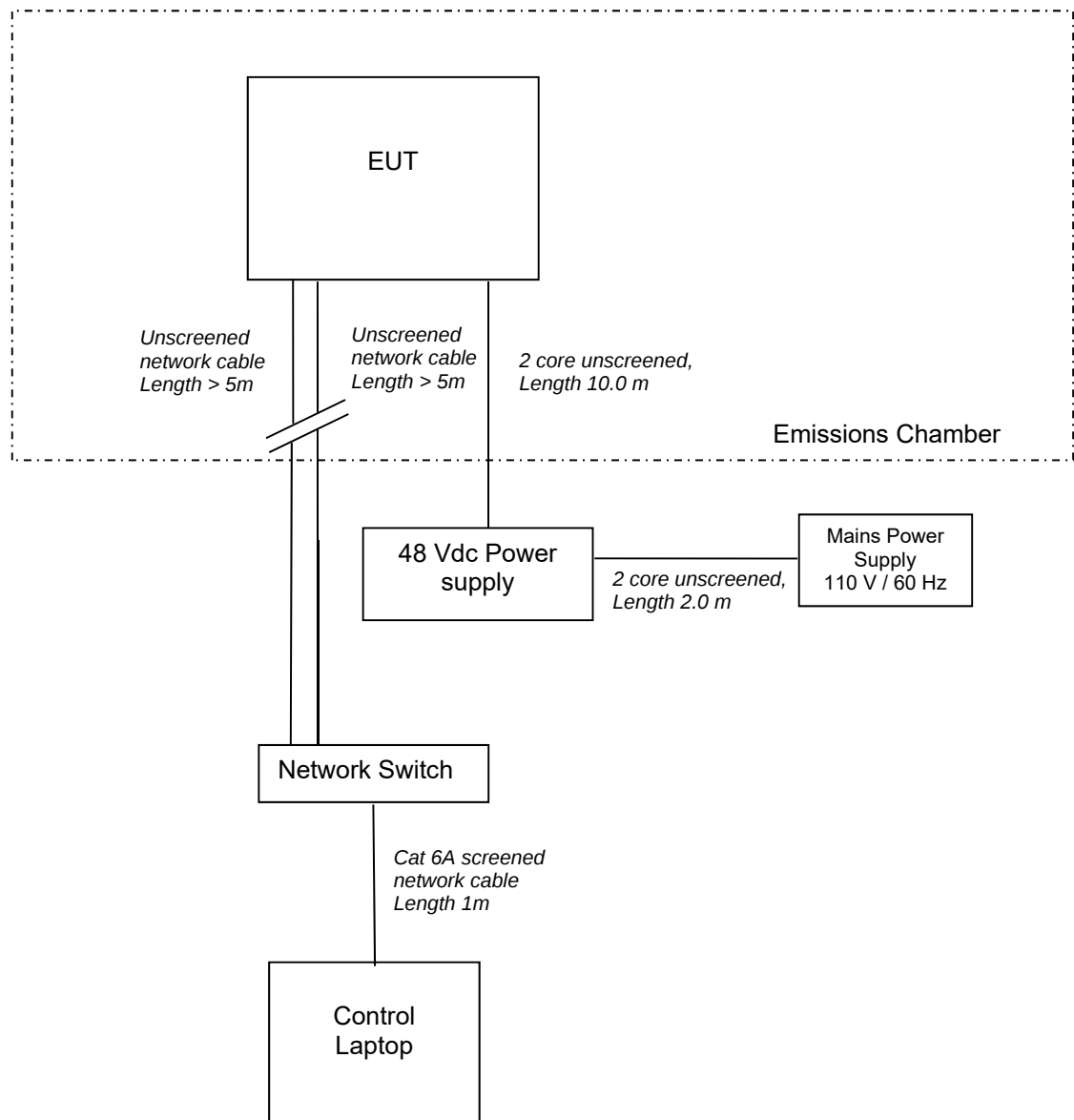
## 8 Modifications

No modifications were performed during this assessment.

## 9 EUT Test Setup

### 9.1 Block Diagram

The following diagram shows basic EUT interconnections with cable type and cable lengths identified:



## 9.2 General Set-up Photograph

The following photograph shows basic EUT set-up:



## 10 General Technical Parameters

### 10.1 Normal Conditions

The E U T was tested under the normal environmental conditions of the test laboratory, except where otherwise stated. The normal power source applied was 48 V dc from the adaptor.

### 10.2 Varying Test Conditions

There are no specific frequency stability requirements for the type of device. The results contained in this report demonstrate that the occupied bandwidth is contained within the authorised band and the manufacturer has declared sufficient frequency stability (refer to section 7.4).

Variation of supply voltage is required to ensure stability of the declared output power. During carrier power testing the following variations were made:

|                                     | <b>Category</b> | <b>Nominal</b>  | <b>Variation</b> |
|-------------------------------------|-----------------|-----------------|------------------|
| <input type="checkbox"/>            | Mains           | 110 V ac +/-2 % | 85 % and 115 %   |
| <input type="checkbox"/>            | Battery         | New battery     | N/A              |
| <input checked="" type="checkbox"/> | Power supply    | 48 V dc         | 85 % and 115 %   |

## 11 Transmitter Unwanted Emissions

### 11.1 Definitions

#### *Spurious emissions*

Emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

### 11.2 Test Parameters

|                           |                                                |
|---------------------------|------------------------------------------------|
| Test Location:            | Element Skelmersdale                           |
| Test Chamber:             | Radio Chamber                                  |
| Test Standard and Clause: | Part 90.1323                                   |
| EUT Frequencies Measured: | 3652.5 MHz, 3675 MHz and 3697.5 MHz            |
| EUT Channel Bandwidths:   | 5 MHz                                          |
| Deviations From Standard: | None                                           |
| Measurement BW:           | 30 MHz to 1 GHz: 120 kHz<br>Above 1 GHz: 1 MHz |
| Measurement Detector:     | Up to 1 GHz: Peak<br>Above 1 GHz: Peak         |

### Environmental Conditions (Normal Environment)

|                    |                                  |
|--------------------|----------------------------------|
| Temperature: 24 °C | +15 °C to +35 °C (as declared)   |
| Humidity: 60 % RH  | 20 % RH to 75 % RH (as declared) |
| Supply: 48 V dc    | 48 V dc (as declared)            |

### 11.3 Test Limit

| <b>Frequency<br/>(MHz)</b> | <b>Field Strength<br/>(<math>\mu</math>V/m at 3 m)</b> |
|----------------------------|--------------------------------------------------------|
| 30 to 40000                | 12968                                                  |

## 11.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure i, the emissions from the EUT were measured on a spectrum analyzer / EMI receiver.

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst-case determined for function, operation, orientation, etc. for both vertical and horizontal polarisations. Pre-scan plots are shown with a peak detector and 100 kHz RBW.

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.26 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360 degrees in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Power values measured on the test receiver / analyzer are converted to field strength, FS, in dBμV/m at the regulatory distance, using:

$$FS = PR + CL + AF - PA + DC - CF$$

Where,

PR is the power recorded on the receiver / spectrum analyzer in dBμV;

CL is the cable loss in dB;

AF is the test antenna factor in dB/m;

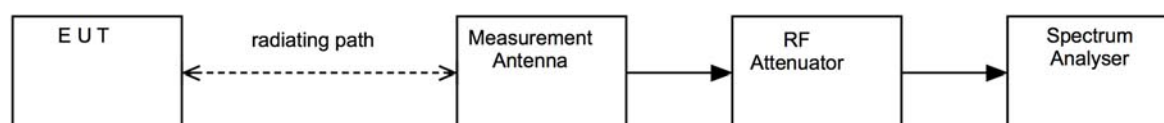
PA is the pre-amplifier gain in dB (where used);

DC is the duty correction factor in dB (where used, e.g. harmonics of pulsed fundamental);

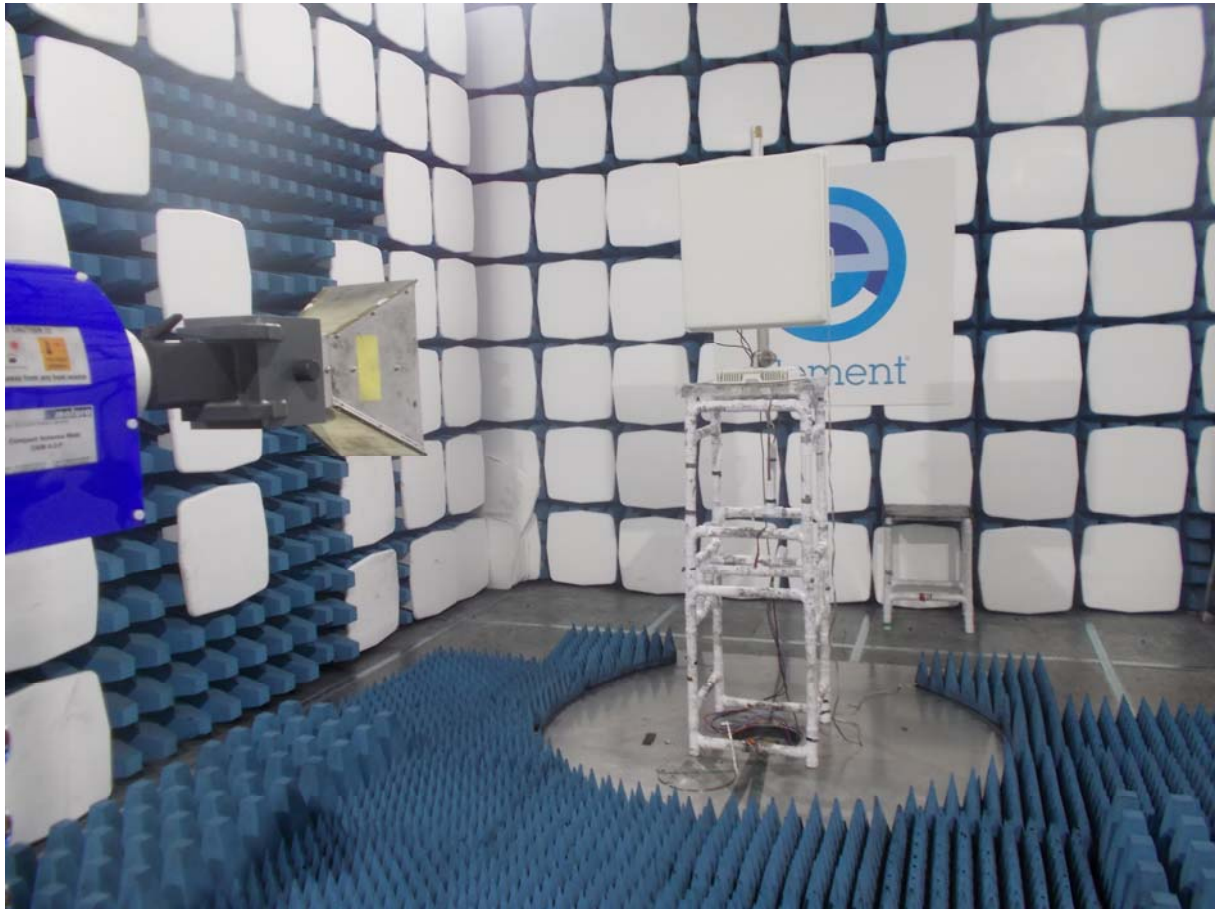
CF is the distance factor in dB (where measurement distance different to limit distance);

This field strength value is then compared with the regulatory limit.

**Figure i Test Setup**



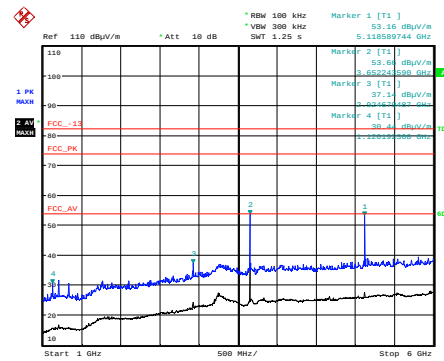
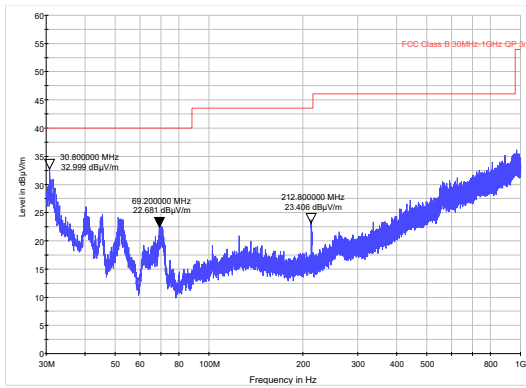
### 11.5 Test Set-up Photograph



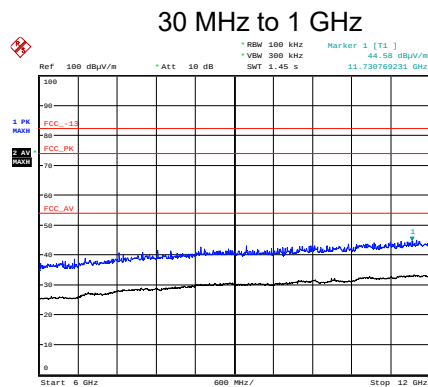
### 11.6 Test Equipment

| Equipment Type | Manufacturer | Equipment Description    | Element No | Due For Calibration |
|----------------|--------------|--------------------------|------------|---------------------|
| CBL611/A       | Chase        | Bilog                    | U573       | 2019-08-02          |
| ESR7           | R&S          | EMI Receiver             | U456       | 2018-09-12          |
| 3115           | EMCO         | 1-18GHz Horn             | L139       | 2019-09-25          |
| FSU50          | R&S          | Spectrum Analyser        | U544       | 2019-05-22          |
| 20240-20       | Flann        | Horn 18-26GHz (&U330)    | L300       | 2020-04-24          |
| 22240-20       | Flann        | Standard Gain Horn 26-40 | L301       | 2019-08-10          |

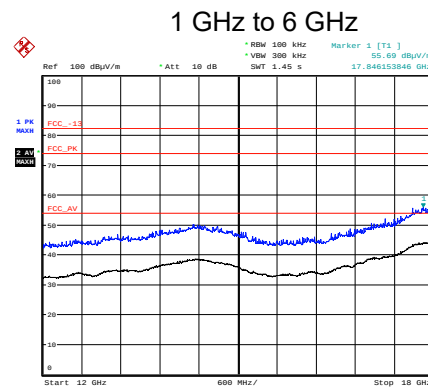
## 11.7 Test Results



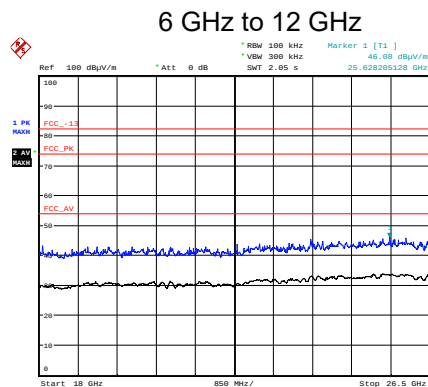
Date: 10.JUL.2018 01:19:28



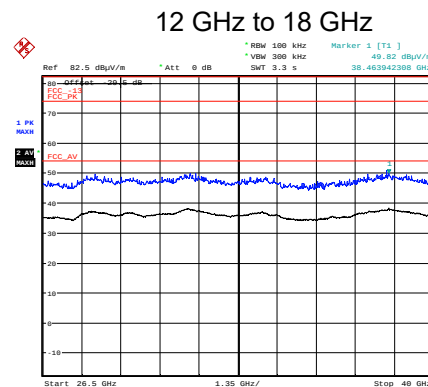
Date: 10.JUL.2018 01:26:07



Date: 10.JUL.2018 01:23:39



Date: 10.JUL.2018 22:34:08

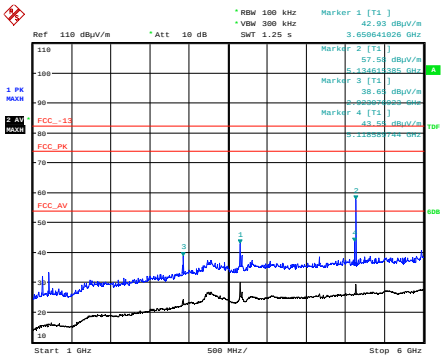
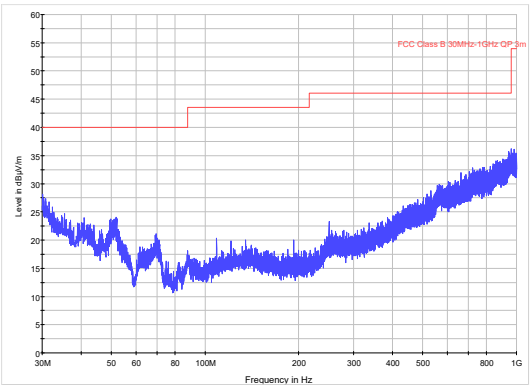


Date: 11.JUL.2018 01:22:17

18 GHz to 26.5 GHz

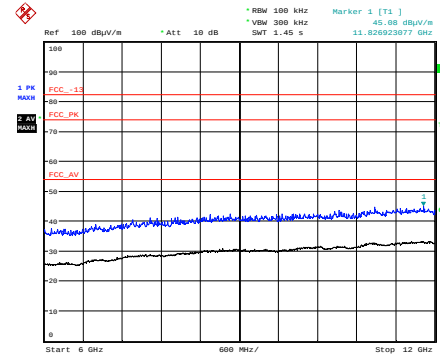
26.5 GHz to 40 GHz

| Beamforming; Power setting: 34.5; QPSK MIMO; Channel: 3652.5 MHz |                |                              |                       |                             |                             |                                 |                                        |                               |                             |                 |
|------------------------------------------------------------------|----------------|------------------------------|-----------------------|-----------------------------|-----------------------------|---------------------------------|----------------------------------------|-------------------------------|-----------------------------|-----------------|
| Detector                                                         | Freq.<br>(MHz) | Meas'd<br>Emission<br>(dBμV) | Cable<br>Loss<br>(dB) | Antenna<br>Factor<br>(dB/m) | Pre-<br>amp<br>Gain<br>(dB) | Duty<br>Cycle<br>Corr'n<br>(dB) | Distance<br>Extrap'n<br>Factor<br>(dB) | Field<br>Strength<br>(dBμV/m) | Field<br>Strength<br>(μV/m) | Limit<br>(μV/m) |
| No emissions within 20 dB of the limit                           |                |                              |                       |                             |                             |                                 |                                        |                               |                             |                 |



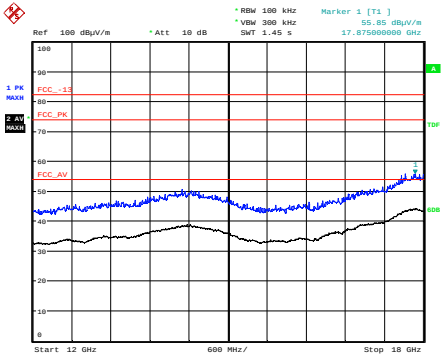
Date: 10.JUL.2018 01:27:29

30 MHz to 1 GHz



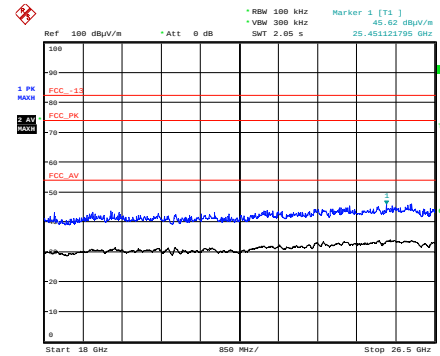
Date: 10.JUL.2018 01:30:38

1 GHz to 6 GHz



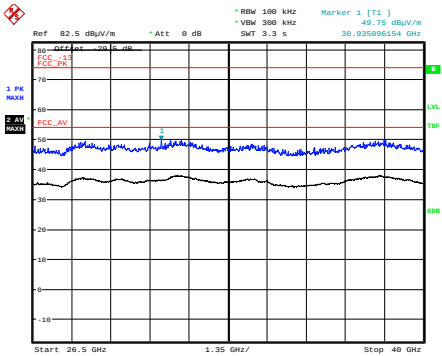
Date: 10.JUL.2018 01:31:31

6 GHz to 12 GHz



Date: 10.JUL.2018 22:35:40

12 GHz to 18 GHz

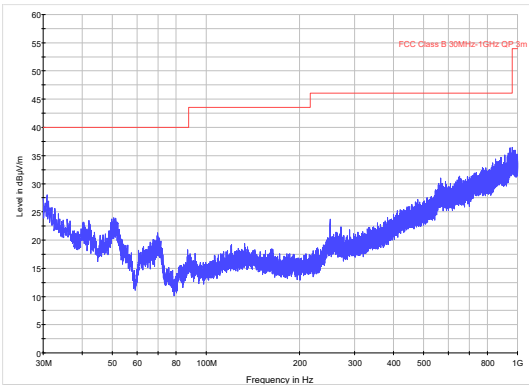


Date: 11.JUL.2018 01:26:00

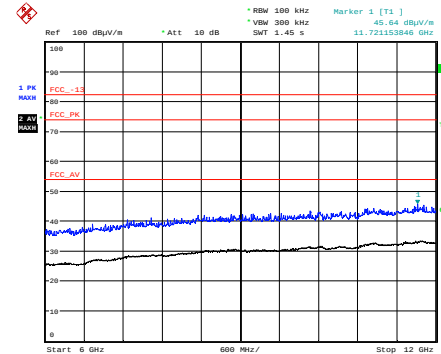
18 GHz to 26.5 GHz

26.5 GHz to 40 GHz

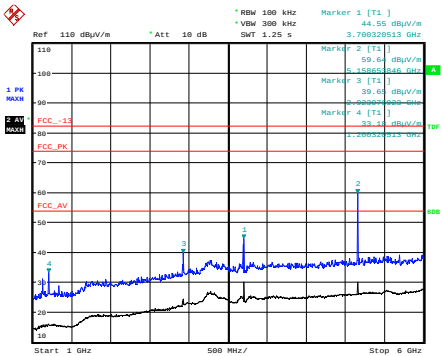
| Beamforming; Power setting: 34.5; QPSK MIMO; Channel: 3675 MHz |             |                        |                 |                       |                   |                        |                               |                         |                       |              |
|----------------------------------------------------------------|-------------|------------------------|-----------------|-----------------------|-------------------|------------------------|-------------------------------|-------------------------|-----------------------|--------------|
| Detector                                                       | Freq. (MHz) | Meas'd Emission (dBµV) | Cable Loss (dB) | Antenna Factor (dB/m) | Pre-amp Gain (dB) | Duty Cycle Corr'n (dB) | Distance Extrap'n Factor (dB) | Field Strength (dBµV/m) | Field Strength (µV/m) | Limit (µV/m) |
| No emissions within 20 dB of the limit                         |             |                        |                 |                       |                   |                        |                               |                         |                       |              |



30 MHz to 1 GHz

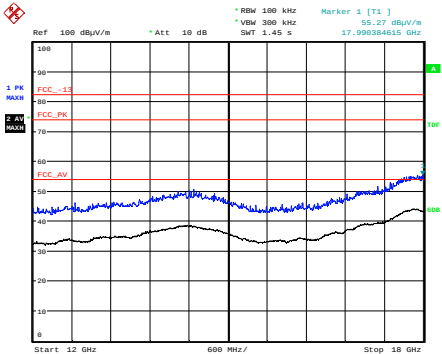


Date: 10.JUL.2018 01:35:13



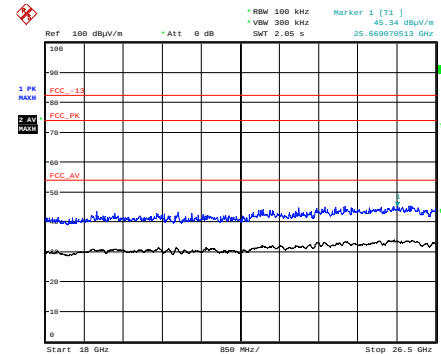
Date: 10.JUL.2018 01:37:48

1 GHz to 6 GHz



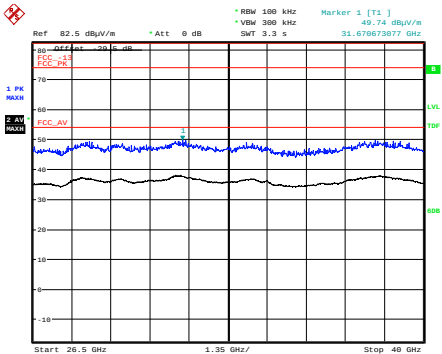
Date: 10.JUL.2018 01:34:19

6 GHz to 12 GHz



Date: 10.JUL.2018 22:49:49

12 GHz to 18 GHz



Date: 11.JUL.2018 01:36:48

18 GHz to 26.5 GHz

26.5 GHz to 40 GHz

| Beamforming; Power setting: 34.5; QPSK MIMO; Channel: 3697.5 MHz |             |                        |                 |                       |                   |                        |                               |                         |                       |              |
|------------------------------------------------------------------|-------------|------------------------|-----------------|-----------------------|-------------------|------------------------|-------------------------------|-------------------------|-----------------------|--------------|
| Detector                                                         | Freq. (MHz) | Meas'd Emission (dBµV) | Cable Loss (dB) | Antenna Factor (dB/m) | Pre-amp Gain (dB) | Duty Cycle Corr'n (dB) | Distance Extrap'n Factor (dB) | Field Strength (dBµV/m) | Field Strength (µV/m) | Limit (µV/m) |
| No emissions within 20 dB of the limit                           |             |                        |                 |                       |                   |                        |                               |                         |                       |              |

## 12 Occupied Bandwidth

### 12.1 Definition

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

### 12.2 Test Parameters

|                                      |                                                                           |
|--------------------------------------|---------------------------------------------------------------------------|
| Test Location:                       | Element Skelmersdale                                                      |
| Test Chamber:                        | Radio Chamber                                                             |
| Test Standard and Clause:            | Part 90.209                                                               |
| EUT Channels / Frequencies Measured: | Low / Mid / High                                                          |
| EUT Channel Bandwidths:              | 5 MHz, 20 MHz and 40 MHz                                                  |
| EUT Test Modulations:                | QPSK MIMO A & B, 16QAM MIMO A & B, 64QAM MIMO A & B and 256QAM MIMO A & B |
| Deviations From Standard:            | None                                                                      |
| Measurement BW:                      | 200 kHz and 500 kHz                                                       |
| (Requirement: 1% to 5% OBW)          |                                                                           |
| Spectrum Analyzer Video BW:          | 500 kHz and 2 MHz                                                         |
| (requirement at least 3x RBW)        |                                                                           |
| Measurement Span:                    | 7.5 MHz, 30 MHz and 60 MHz                                                |
| (requirement 2 to 5 times OBW)       |                                                                           |
| Measurement Detector:                | Peak                                                                      |

### Environmental Conditions (Normal Environment)

|                    |                                  |
|--------------------|----------------------------------|
| Temperature: 24 °C | +15 °C to +35 °C (as declared)   |
| Humidity: 60 % RH  | 20 % RH to 75 % RH (as declared) |
| Supply: 48 V dc    | 48 V dc (as declared)            |

### 12.3 Test Limit

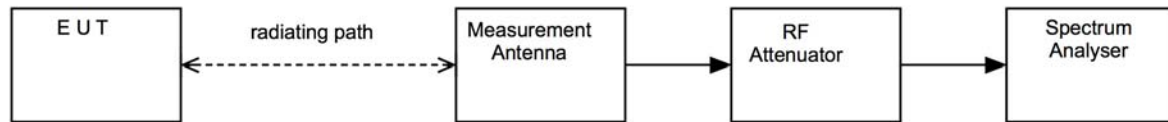
Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

## 12.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure iii, the bandwidth of the EUT was measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

**Figure iii Test Setup**

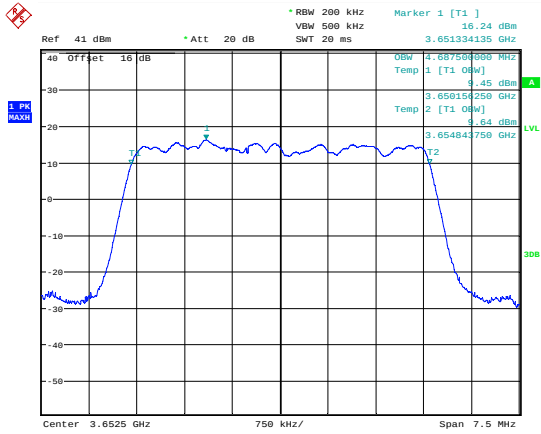


## 12.5 Test Equipment

| Equipment Type | Manufacturer | Equipment Description | Element No | Due For Calibration |
|----------------|--------------|-----------------------|------------|---------------------|
| 3115           | EMCO         | 1-18GHz Horn          | L139       | 2019-09-25          |
| FSU50          | R&S          | Spectrum Analyser     | U544       | 2019-05-22          |

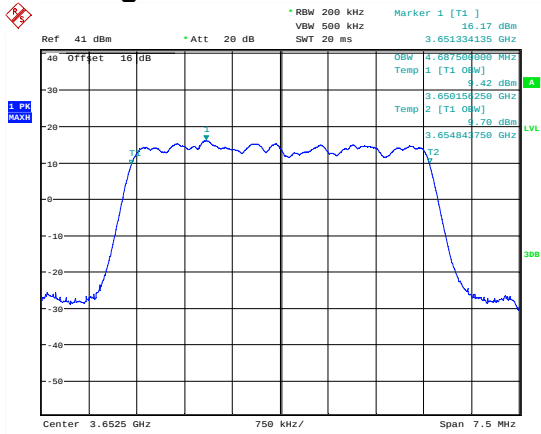
12.6 Test Results

5 MHz Bandwidth Beamforming



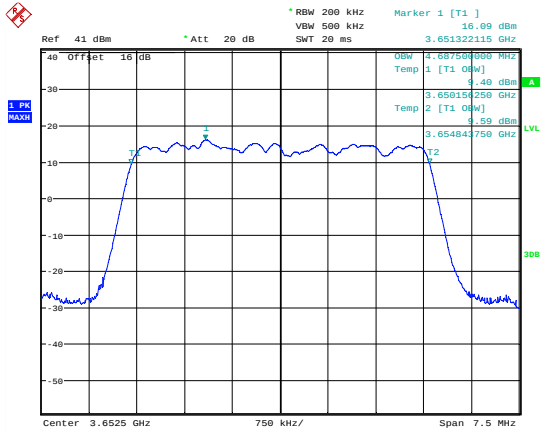
Date: 7.JUL.2018 18:33:48

99 % Bandwidth; QPSK; 3652.5 MHz; MIMO A.



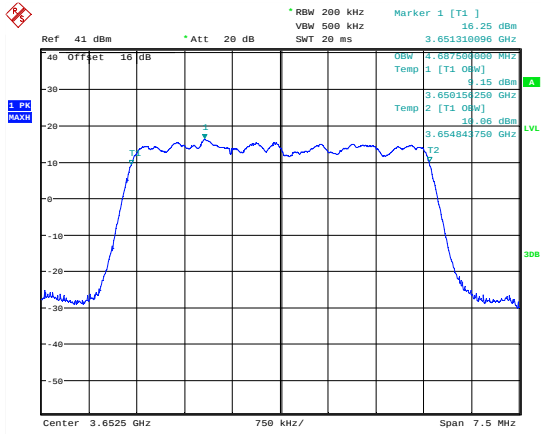
Date: 7.JUL.2018 18:31:01

99 % Bandwidth; QPSK; 3652.5 MHz; MIMO B.



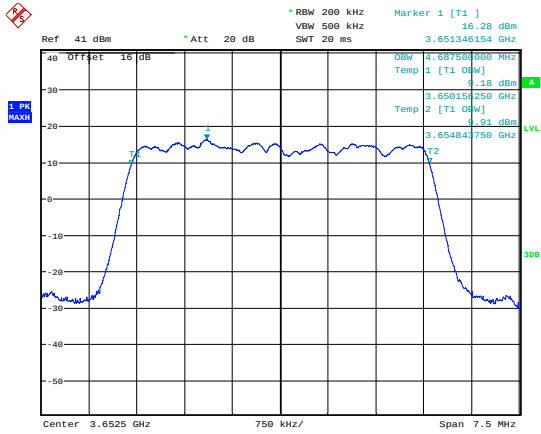
Date: 7.JUL.2018 18:33:10

99 % Bandwidth; 16QAM; 3652.5 MHz; MIMO A.



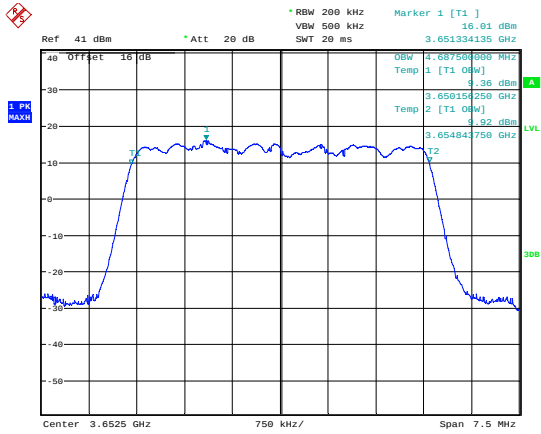
Date: 7.JUL.2018 18:29:56

99 % Bandwidth; 16QAM; 3652.5 MHz; MIMO B.



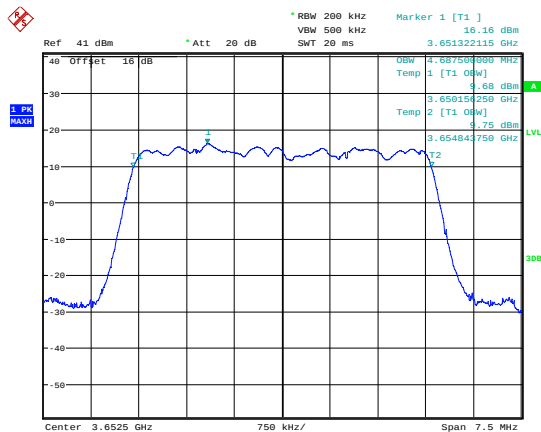
Date: 7.JUL.2018 18:32:23

99 % Bandwidth; 64QAM; 3652.5 MHz; MIMO A.



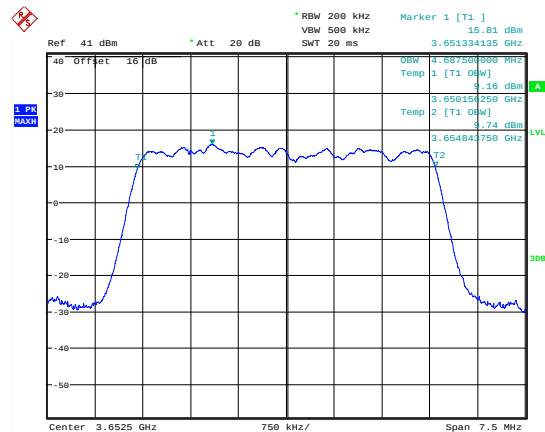
Date: 7.JUL.2018 18:29:16

99 % Bandwidth; 64QAM; 3652.5 MHz; MIMO B.



Date: 7.JUL.2018 18:31:39

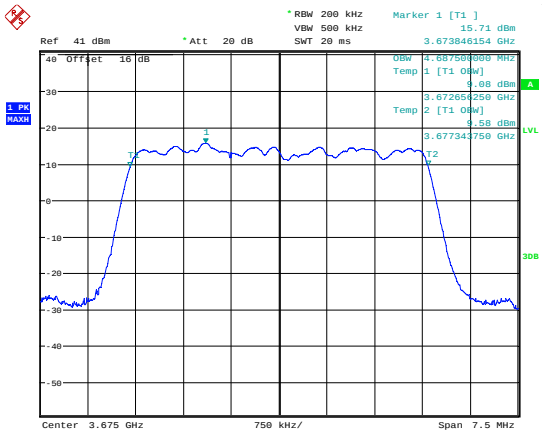
99 % Bandwidth; 256QAM; 3652.5 MHz; MIMO A.



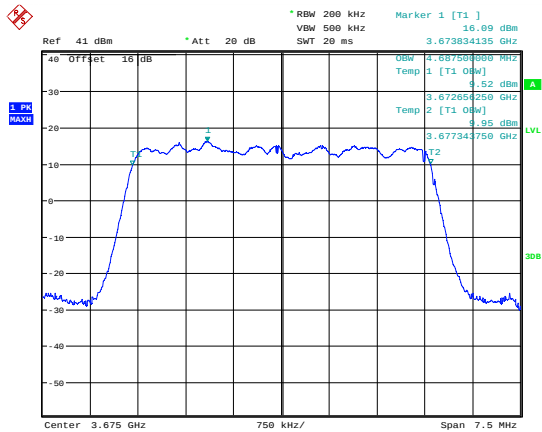
Date: 7.JUL.2018 18:28:38

99 % Bandwidth; 256QAM; 3652.5 MHz; MIMO B.

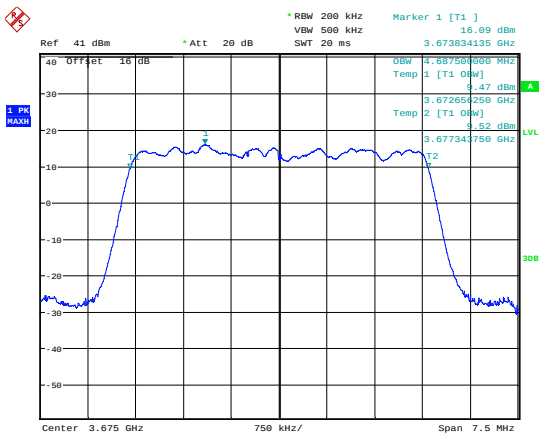
| Bottom Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3652.5                         | QPSK            | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | QPSK            | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 16QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 16QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | B    | 3650.156 | 3654.843 | 4687                 | Pass   |



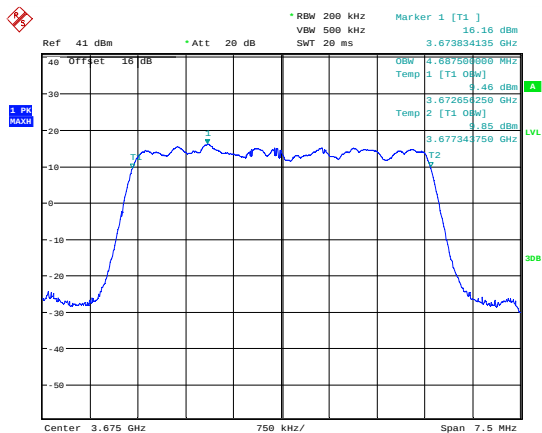
99 % Bandwidth; QPSK; 3675 MHz; MIMO A.



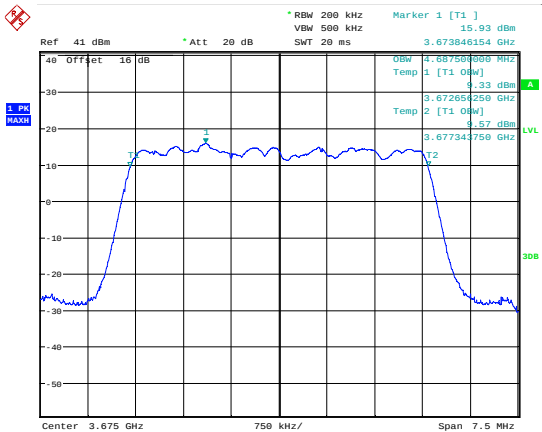
99 % Bandwidth; QPSK; 3675 MHz; MIMO B.



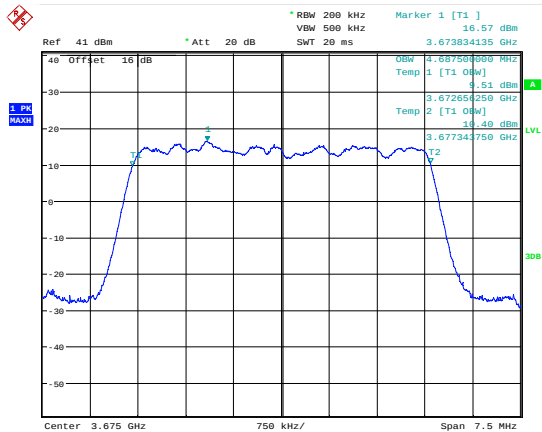
99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



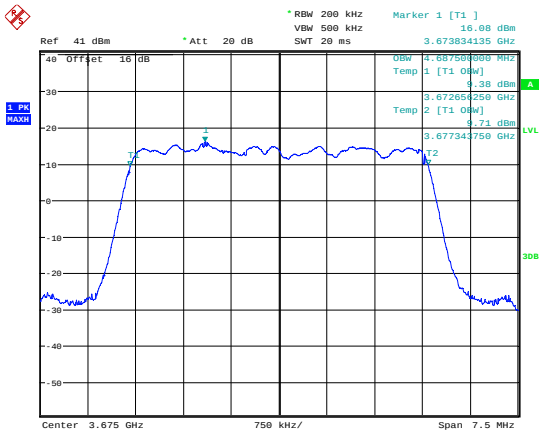
99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.

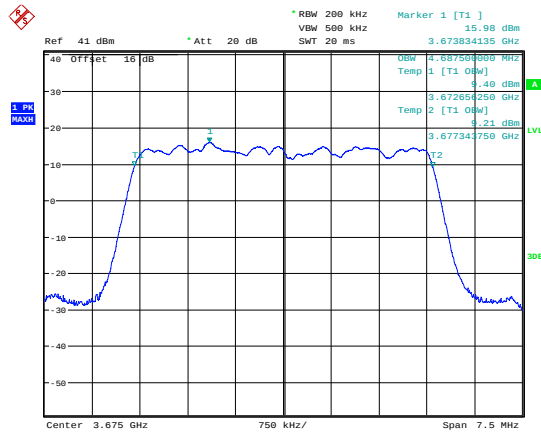


99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



Date: 7.JUL.2018 18:52:46

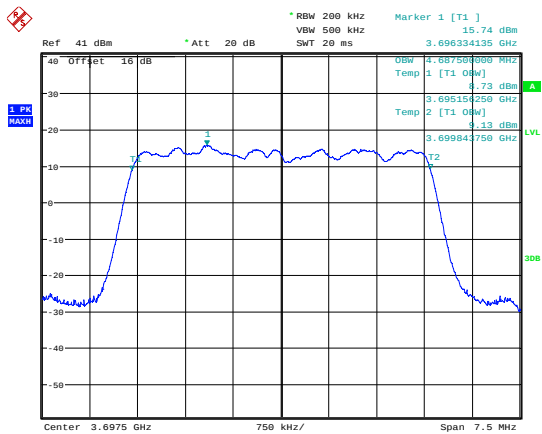
99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 18:55:48

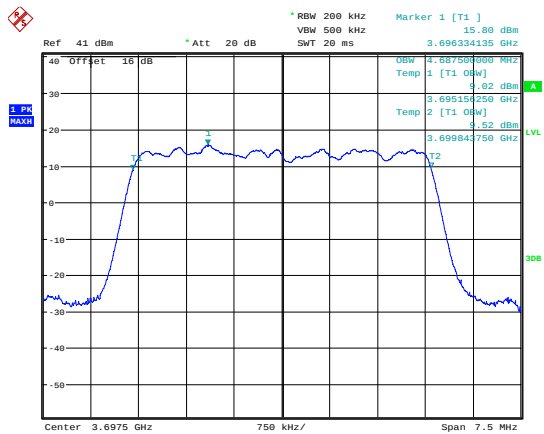
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                           | QPSK            | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | QPSK            | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | B    | 3672.656 | 3677.343 | 4687                 | Pass   |



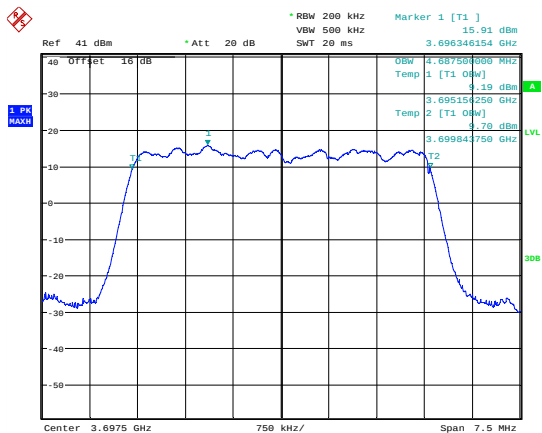
Date: 7.JUL.2018 19:14:39

99 % Bandwidth; QPSK; 3697.5 MHz; MIMO A.



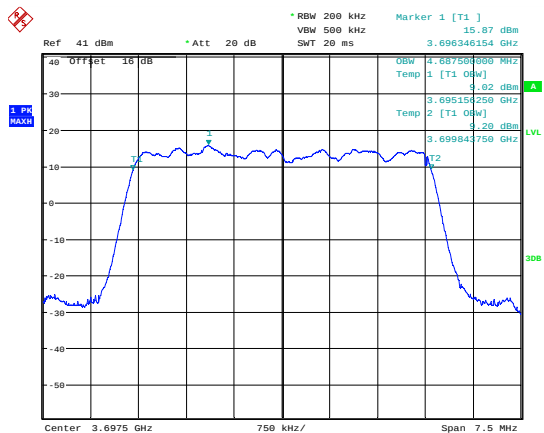
Date: 7.JUL.2018 19:12:07

99 % Bandwidth; QPSK; 3697.5 MHz; MIMO B.



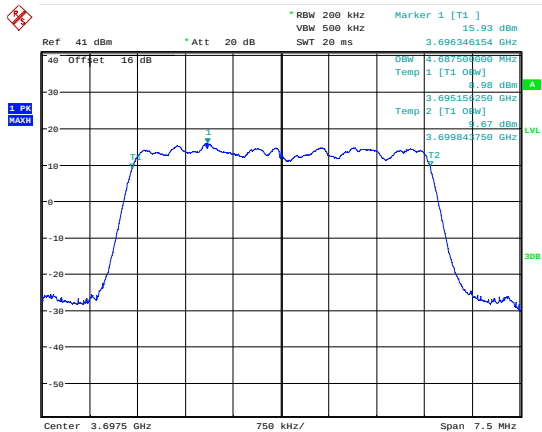
Date: 7.JUL.2018 19:13:58

99 % Bandwidth; 16QAM; 3697.5 MHz; MIMO A.



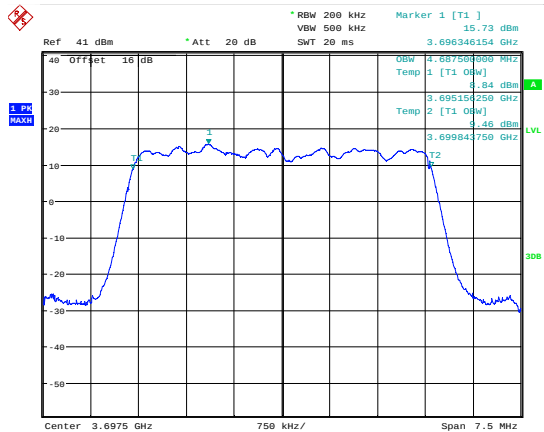
Date: 7.JUL.2018 19:11:09

99 % Bandwidth; 16QAM; 3697.5 MHz; MIMO B.



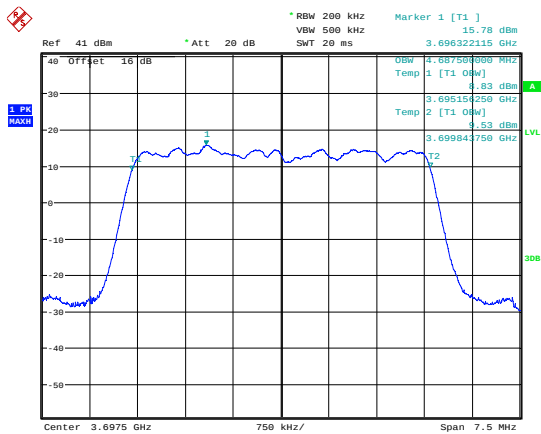
Date: 7.JUL.2018 19:13:25

99 % Bandwidth; 64QAM; 3697.5 MHz; MIMO A.



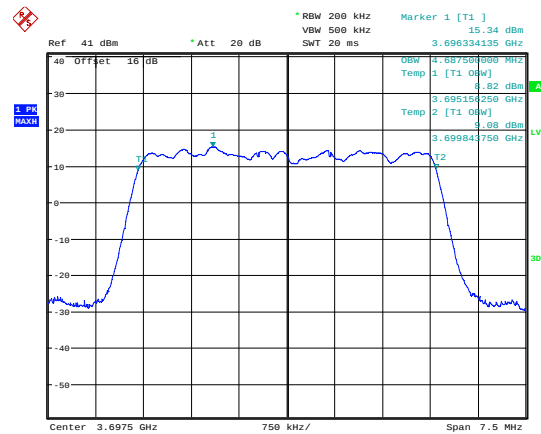
Date: 7.JUL.2018 19:10:36

99 % Bandwidth; 64QAM; 3697.5 MHz; MIMO B.



Date: 7.JUL.2018 19:12:47

99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO A.

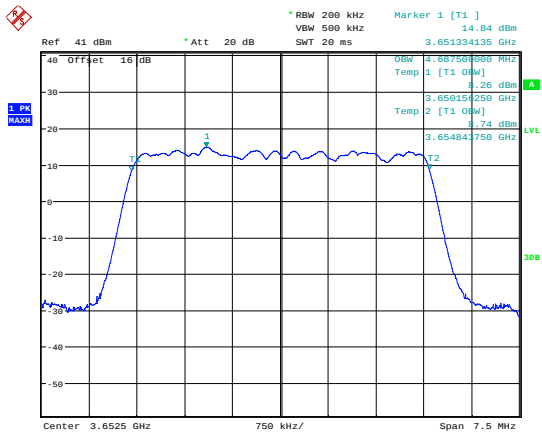


Date: 7.JUL.2018 19:10:00

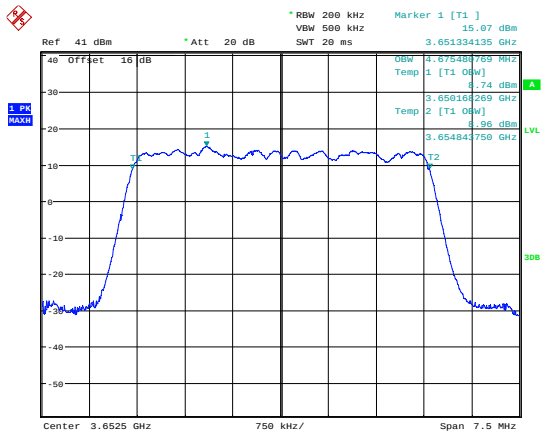
99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO B.

| Top Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|-----------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)             | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3697.5                      | QPSK            | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | QPSK            | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | B    | 3695.156 | 3699.843 | 4687                 | Pass   |

5 MHz Bandwidth Sector



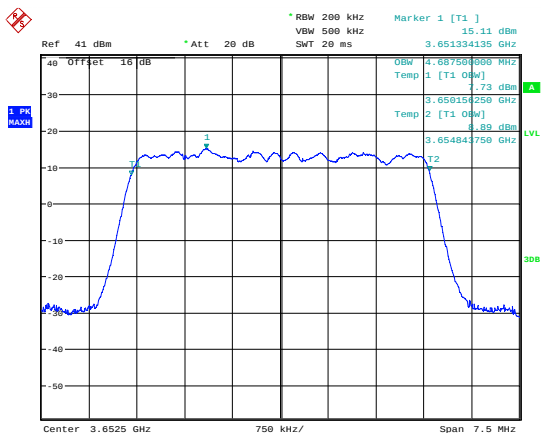
Date: 7.JUL.2018 18:12:34



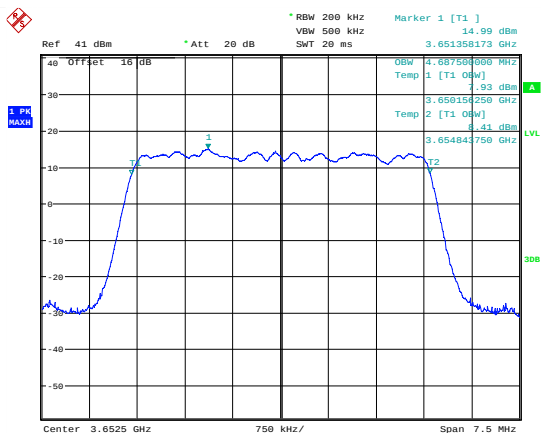
Date: 7.JUL.2018 18:19:07

99 % Bandwidth; QPSK; 3652.5 MHz; MIMO A.

99 % Bandwidth; QPSK; 3652.5 MHz; MIMO B.



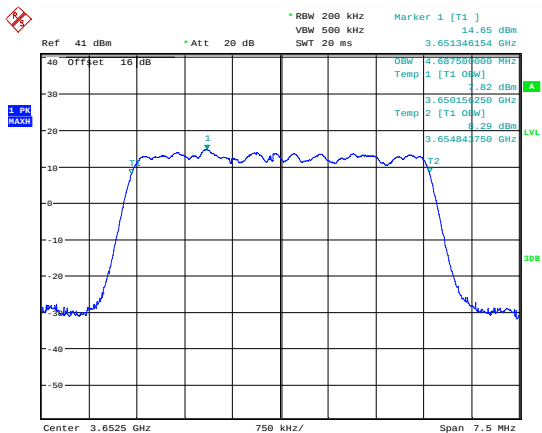
Date: 7.JUL.2018 18:15:34



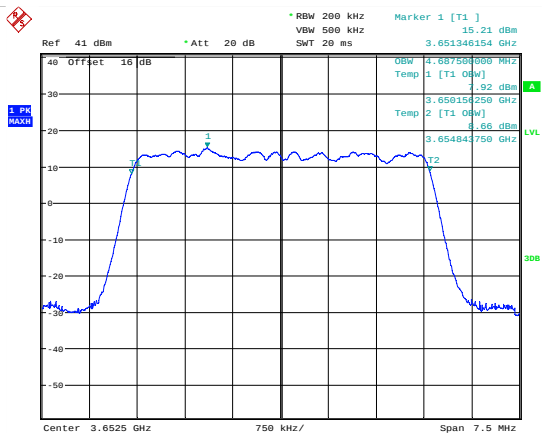
Date: 7.JUL.2018 18:19:43

99 % Bandwidth; 16QAM; 3652.5 MHz; MIMO A.

99 % Bandwidth; 16QAM; 3652.5 MHz; MIMO B.



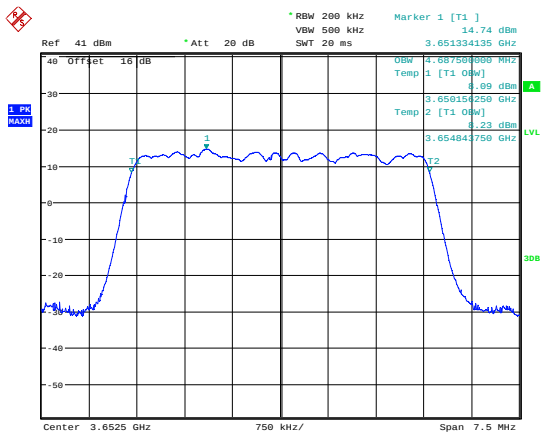
Date: 7.JUL.2018 18:17:34



Date: 7.JUL.2018 18:20:34

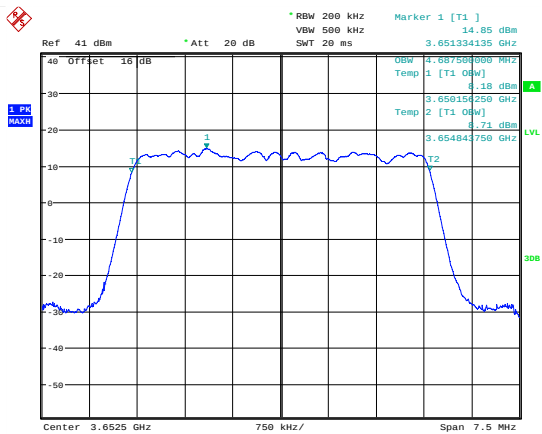
99 % Bandwidth; 64QAM; 3652.5 MHz; MIMO A.

99 % Bandwidth; 64QAM; 3652.5 MHz; MIMO B.



Date: 7.JUL.2018 18:18:37

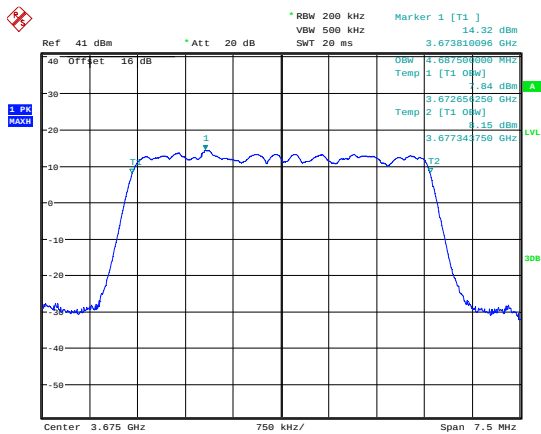
99 % Bandwidth; 256QAM; 3652.5 MHz; MIMO A.



Date: 7.JUL.2018 18:21:33

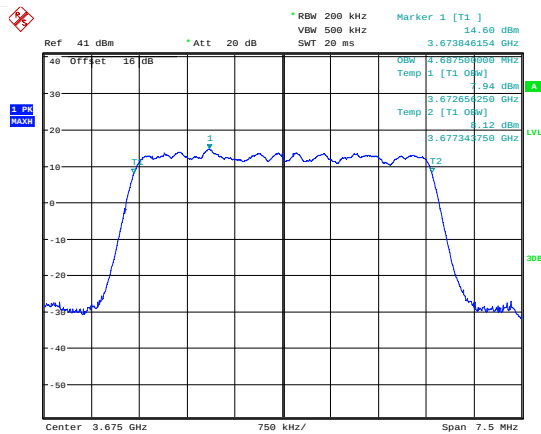
99 % Bandwidth; 256QAM; 3652.5 MHz; MIMO B.

| Bottom Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3652.5                         | QPSK            | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | QPSK            | B    | 3650.168 | 3654.843 | 4675                 | Pass   |
| 3652.5                         | 16QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 16QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | B    | 3650.156 | 3654.843 | 4687                 | Pass   |



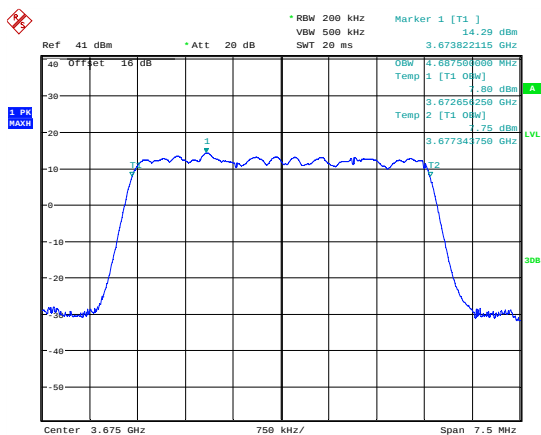
Date: 7.JUL.2018 18:47:27

99 % Bandwidth QPSK; 3675 MHz; MIMO A.



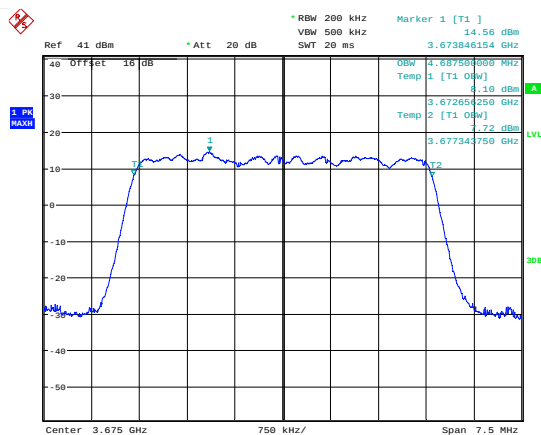
Date: 7.JUL.2018 18:44:43

99 % Bandwidth QPSK; 3675 MHz; MIMO B.



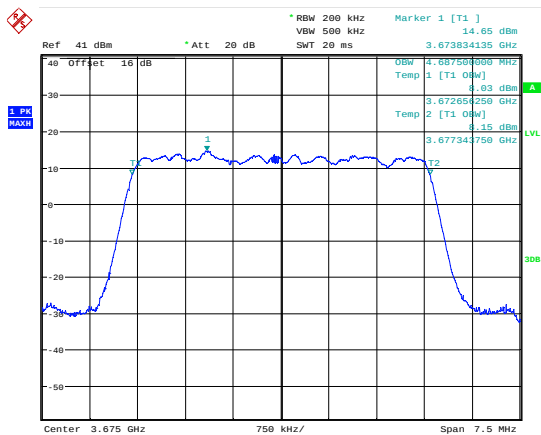
Date: 7.JUL.2018 18:46:39

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



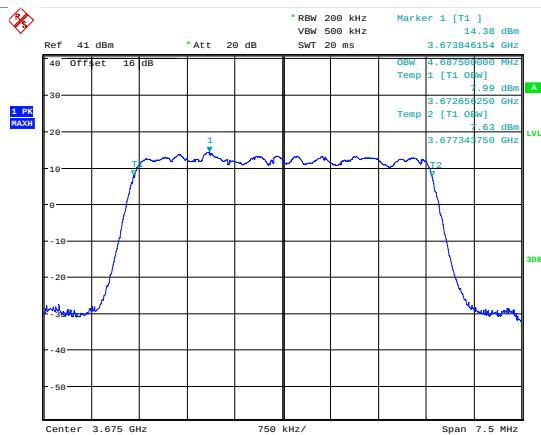
Date: 7.JUL.2018 18:43:55

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



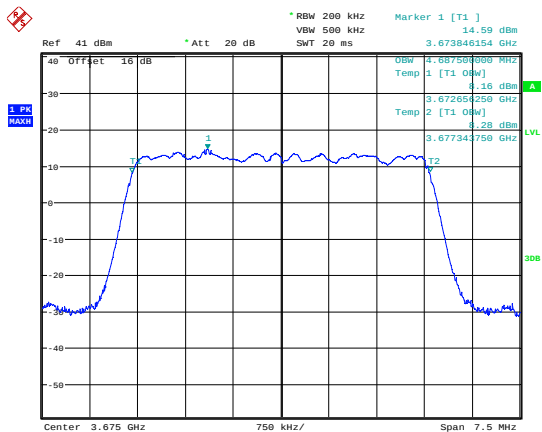
Date: 7.JUL.2018 18:45:57

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



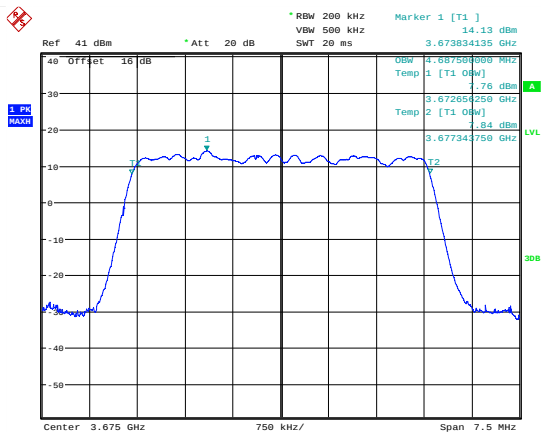
Date: 7.JUL.2018 18:43:20

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



Date: 7.JUL.2018 18:45:18

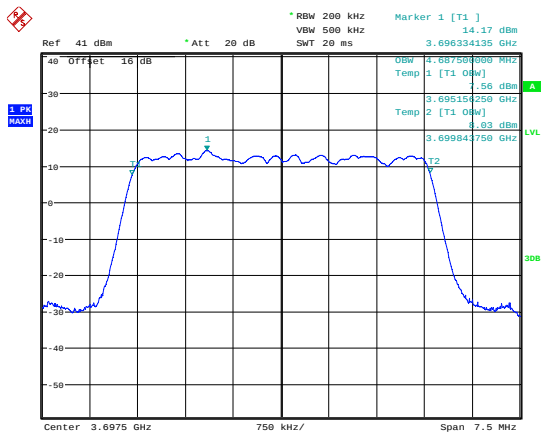
99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 18:42:50

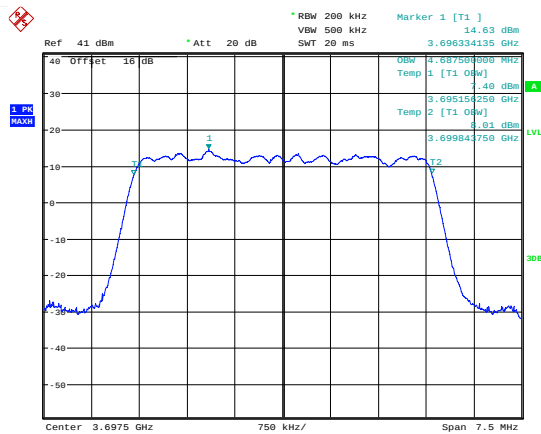
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                           | QPSK            | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | QPSK            | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | B    | 3672.656 | 3677.343 | 4687                 | Pass   |



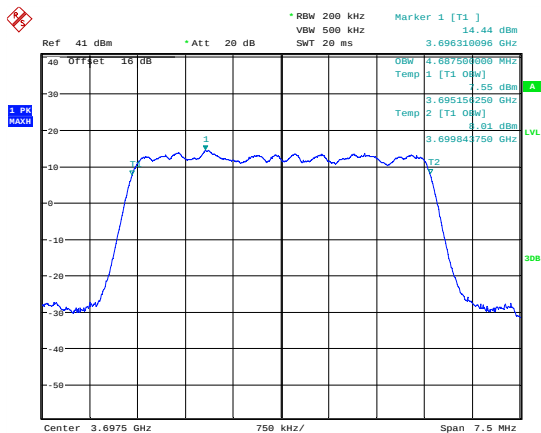
Date: 7.JUL.2018 19:16:23

99 % Bandwidth; QPSK; 3697.5 MHz; MIMO A.



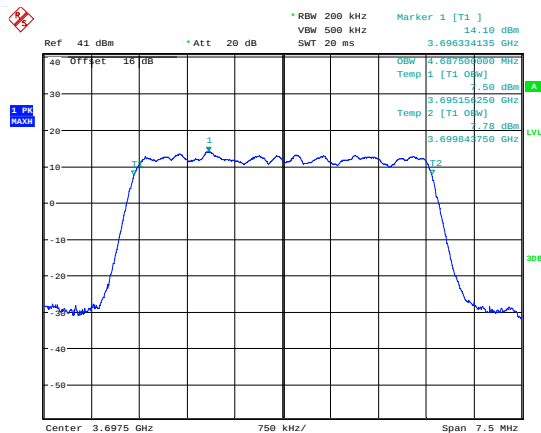
Date: 7.JUL.2018 19:19:11

99 % Bandwidth; QPSK; 3697.5 MHz; MIMO B.



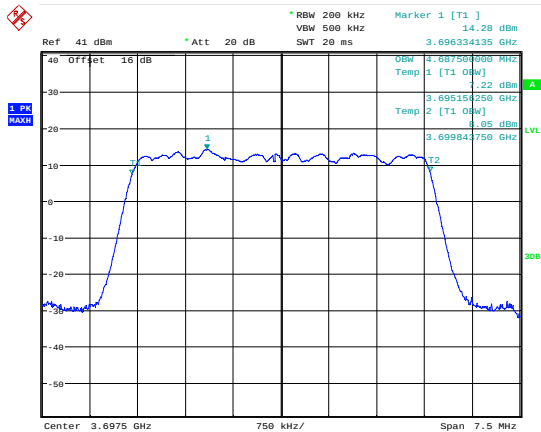
Date: 7.JUL.2018 19:17:14

99 % Bandwidth; 16QAM; 3697.5 MHz; MIMO A.



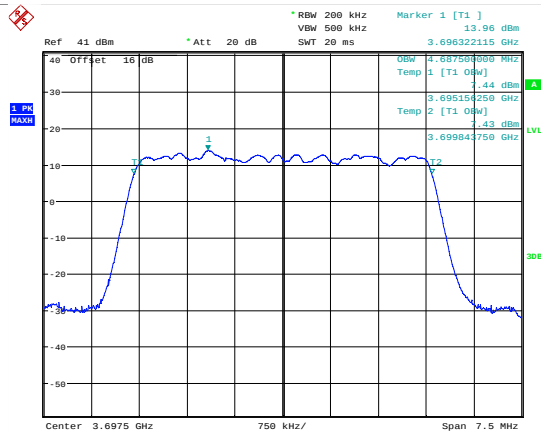
Date: 7.JUL.2018 19:19:49

99 % Bandwidth; 16QAM; 3697.5 MHz; MIMO B.



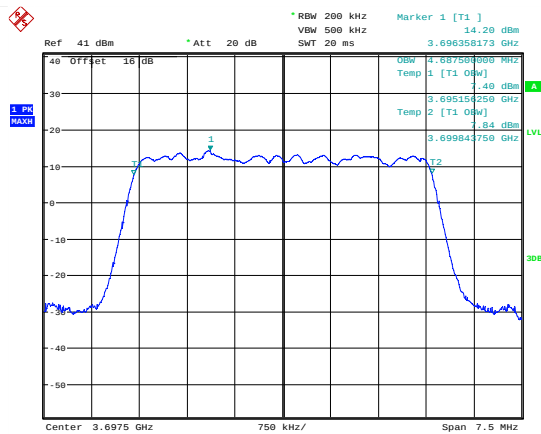
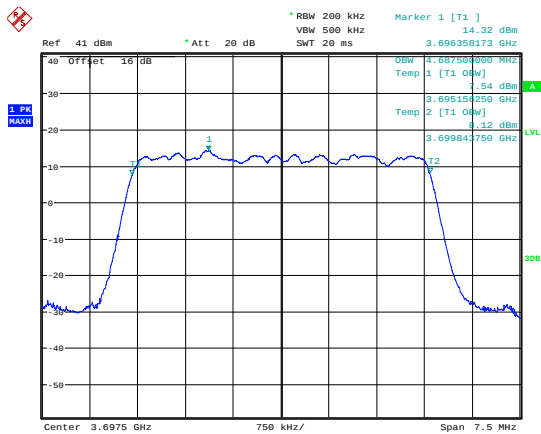
Date: 7.JUL.2018 19:17:52

99 % Bandwidth; 64QAM; 3697.5 MHz; MIMO A.



Date: 7.JUL.2018 19:20:33

99 % Bandwidth; 64QAM; 3697.5 MHz; MIMO B.



Date: 7.JUL.2018 19:18:34

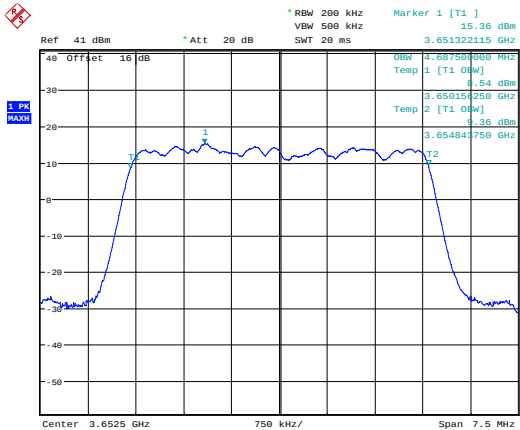
Date: 7.JUL.2018 19:21:05

99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO A.

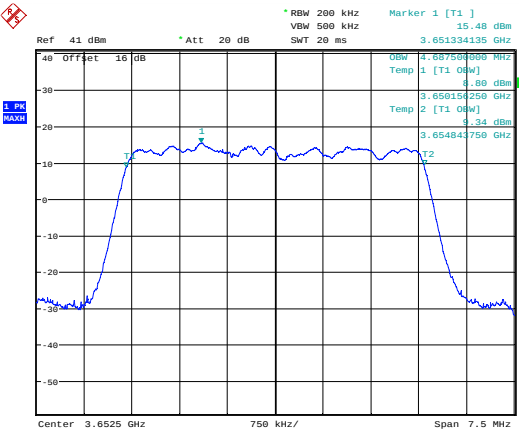
99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO B.

| Top Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|-----------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)             | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3697.5                      | QPSK            | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | QPSK            | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | B    | 3695.156 | 3699.843 | 4687                 | Pass   |

5 MHz Bandwidth MU-MIMO



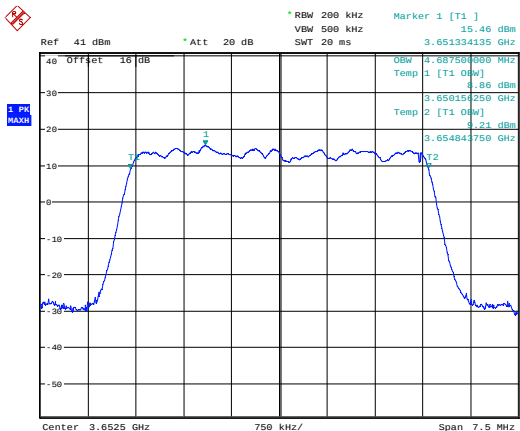
Date: 7.JUL.2018 18:35:47



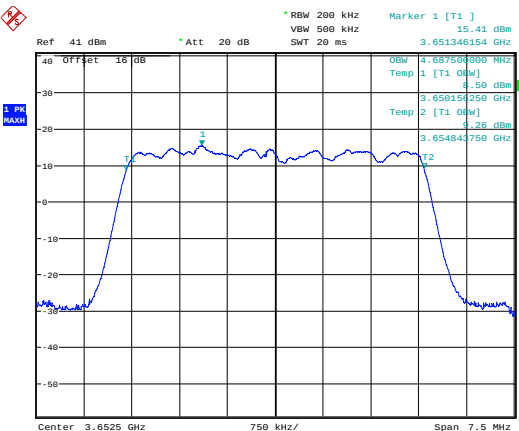
Date: 7.JUL.2018 18:38:19

99 % Bandwidth QPSK; 3652.5 MHz; MIMO A.

99 % Bandwidth QPSK; 3652.5 MHz; MIMO B.



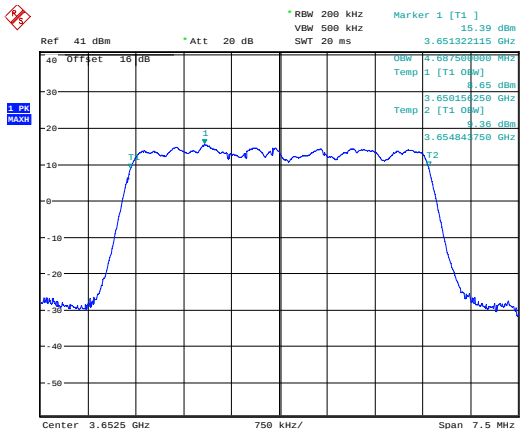
Date: 7.JUL.2018 18:36:22



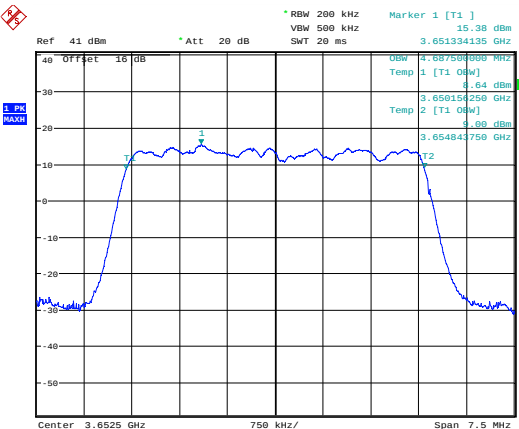
Date: 7.JUL.2018 18:39:12

99 % Bandwidth; 16QAM; 3652.5 MHz;  
MIMO A.

99 % Bandwidth; 16QAM; 3652.5 MHz;  
MIMO B.



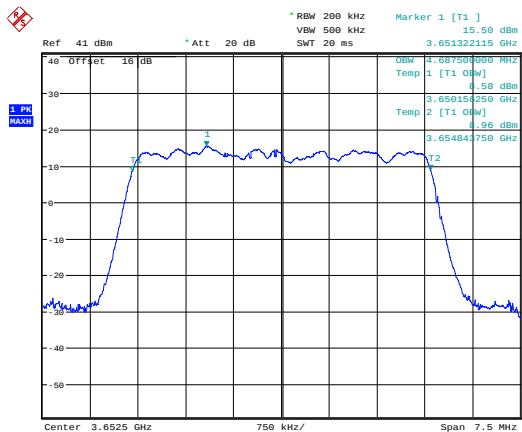
Date: 7.JUL.2018 18:37:10



Date: 7.JUL.2018 18:39:49

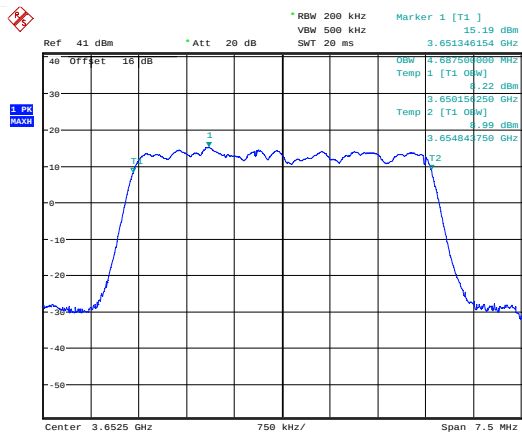
99 % Bandwidth; 64QAM; 3652.5 MHz;  
MIMO A.

99 % Bandwidth; 64QAM; 3652.5 MHz;  
MIMO B.



Date: 7.JUL.2018 18:37:45

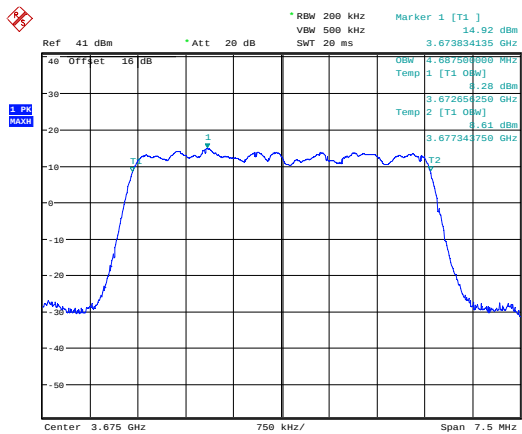
99 % Bandwidth; 256QAM; 3652.5 MHz;  
MIMO A.



Date: 7.JUL.2018 18:40:32

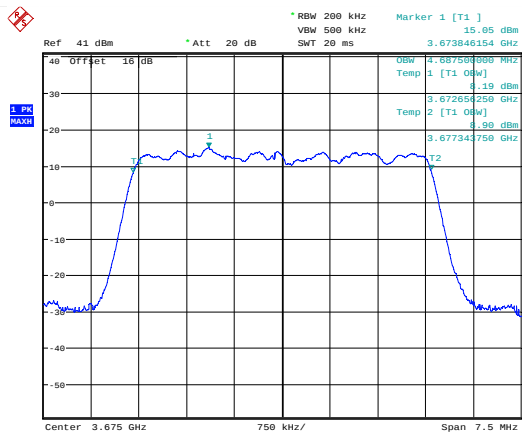
99 % Bandwidth; 256QAM; 3652.5 MHz;  
MIMO B.

| Bottom Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3652.5                         | QPSK            | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | QPSK            | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 16QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 16QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 64QAM           | B    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | A    | 3650.156 | 3654.843 | 4687                 | Pass   |
| 3652.5                         | 256QAM          | B    | 3650.156 | 3654.843 | 4687                 | Pass   |



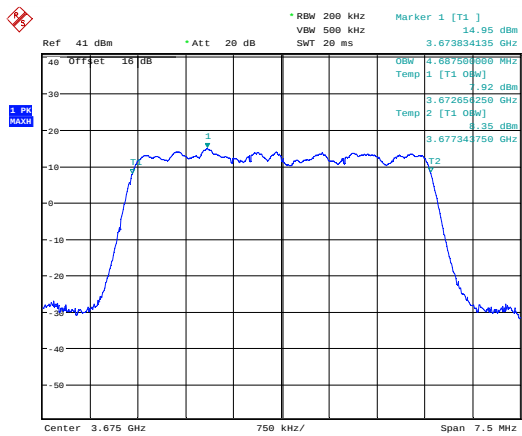
Date: 7.JUL.2018 19:02:14

99 % Bandwidth QPSK; 3675 MHz; MIMO A.



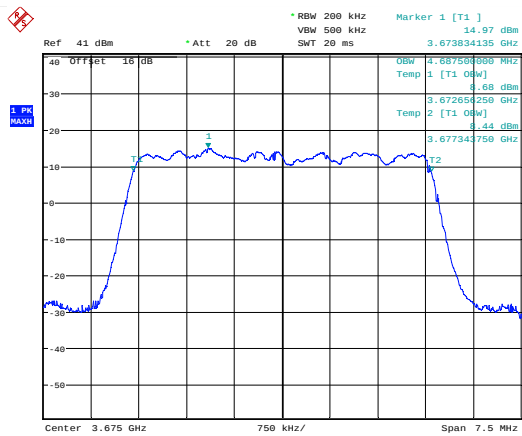
Date: 7.JUL.2018 18:59:37

99 % Bandwidth QPSK; 3675 MHz; MIMO B.



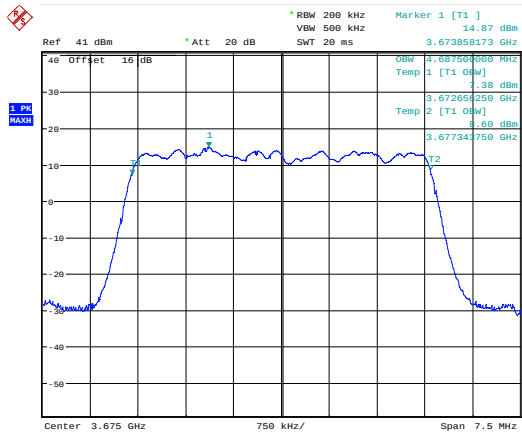
Date: 7.JUL.2018 19:01:42

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



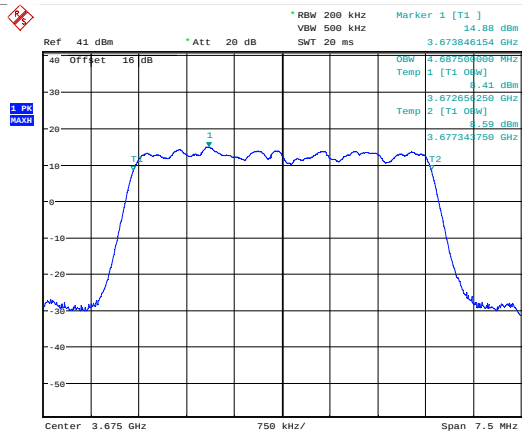
Date: 7.JUL.2018 18:58:47

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



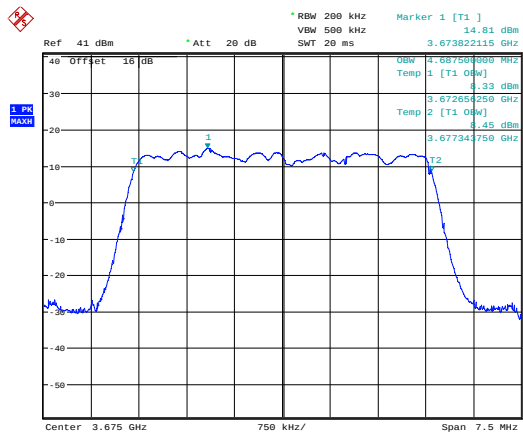
Date: 7.JUL.2018 19:01:02

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



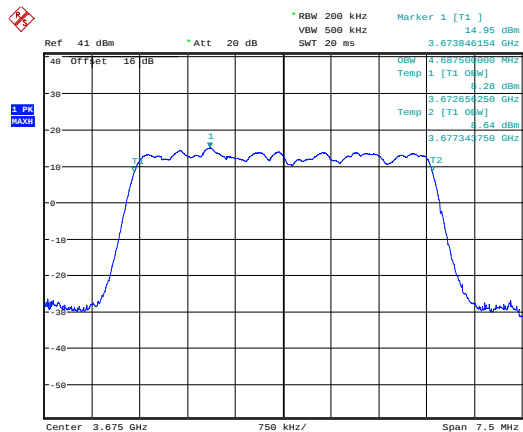
Date: 7.JUL.2018 18:58:11

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



Date: 7.JUL.2018 19:00:20

99 % Bandwidth; 256QAM; 3675 MHz;  
MIMO A.

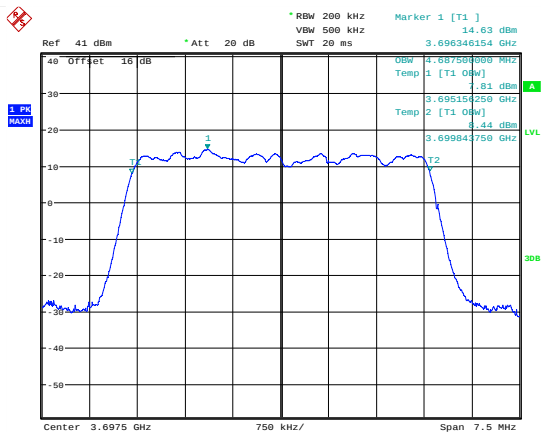
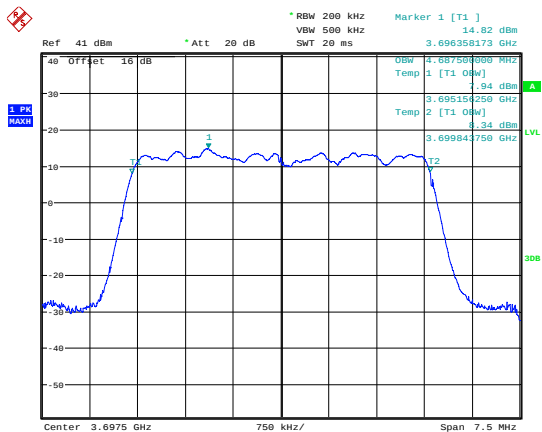


Date: 7.JUL.2018 18:57:14

99 % Bandwidth; 256QAM; 3675 MHz;  
MIMO B.

| Middle Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|--------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                           | QPSK            | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | QPSK            | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 16QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 64QAM           | B    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | A    | 3672.656 | 3677.343 | 4687                 | Pass   |
| 3675                           | 256QAM          | B    | 3672.656 | 3677.343 | 4687                 | Pass   |





Date: 7.JUL.2018 19:05:27

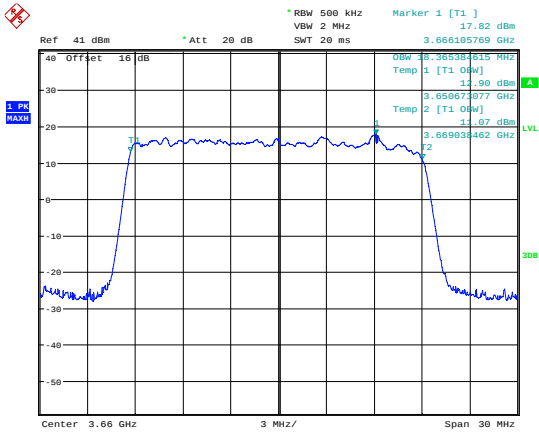
Date: 7.JUL.2018 19:08:17

99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO A.

99 % Bandwidth; 256QAM; 3697.5 MHz; MIMO B.

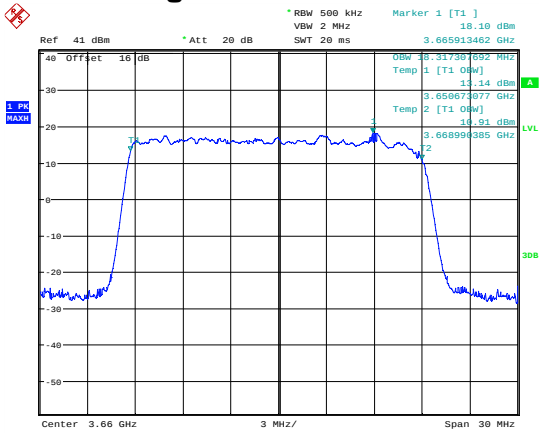
| Top Channel 5 MHz bandwidth |                 |      |          |          |                      |        |
|-----------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)             | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3697.5                      | QPSK            | A    | 3695.168 | 3699.843 | 4675                 | Pass   |
| 3697.5                      | QPSK            | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 16QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 64QAM           | B    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | A    | 3695.156 | 3699.843 | 4687                 | Pass   |
| 3697.5                      | 256QAM          | B    | 3695.156 | 3699.843 | 4687                 | Pass   |

20 MHz Bandwidth Beamforming



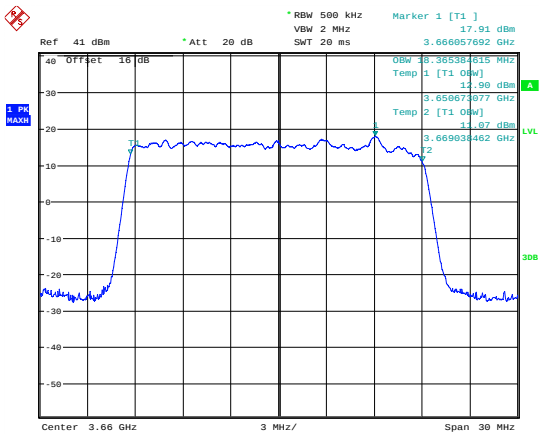
Date: 7.JUL.2018 16:31:55

99 % Bandwidth QPSK; 3660 MHz; MIMO A.



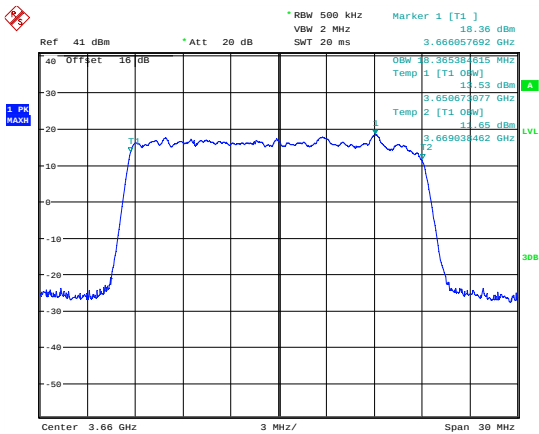
Date: 7.JUL.2018 16:34:38

99 % Bandwidth QPSK; 3660 MHz; MIMO B.



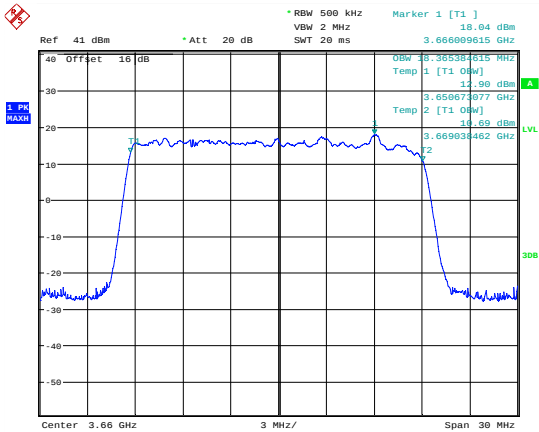
Date: 7.JUL.2018 16:32:37

99 % Bandwidth; 16QAM; 3660 MHz; MIMO A.



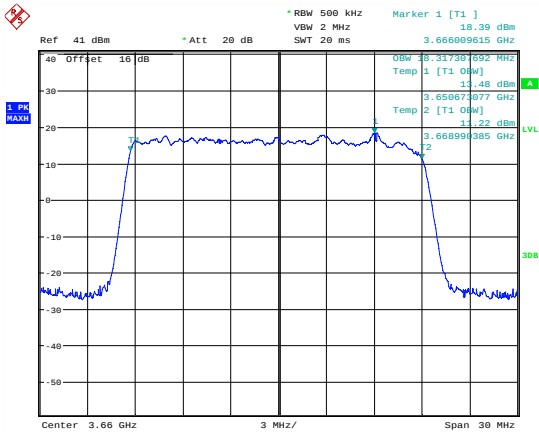
Date: 7.JUL.2018 16:35:20

99 % Bandwidth; 16QAM; 3660 MHz; MIMO B.



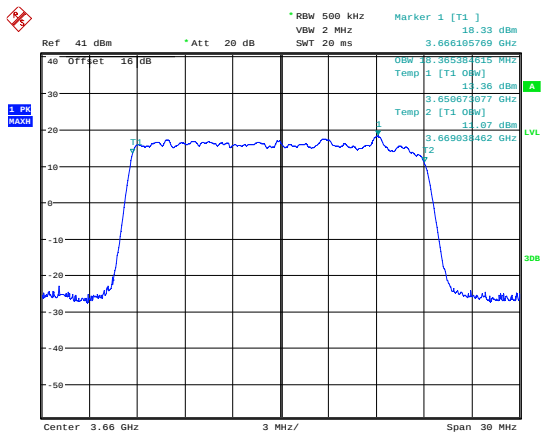
Date: 7.JUL.2018 16:33:19

99 % Bandwidth; 64QAM; 3660 MHz; MIMO A.



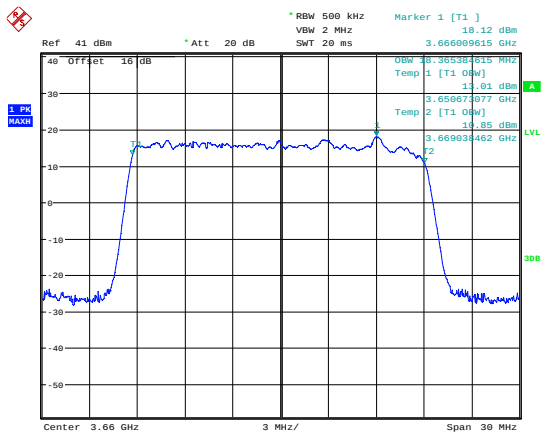
Date: 7.JUL.2018 16:35:57

99 % Bandwidth; 64QAM; 3660 MHz; MIMO B.



Date: 7.JUL.2018 16:34:14

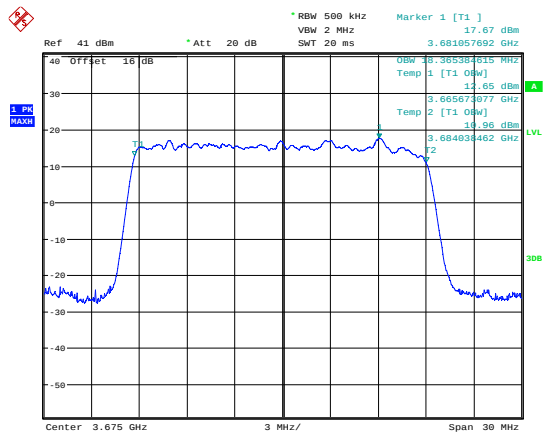
99 % Bandwidth; 256QAM; 3660 MHz; MIMO A.



Date: 7.JUL.2018 16:36:40

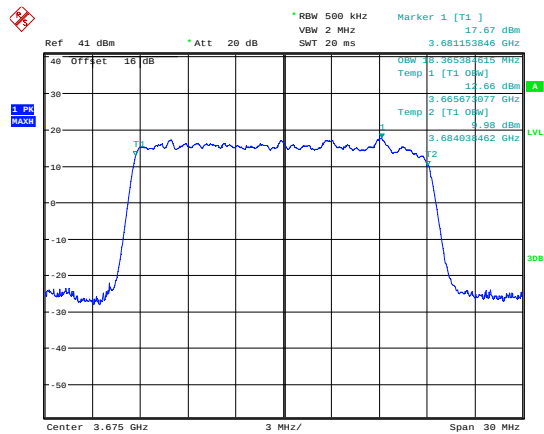
99 % Bandwidth; 256QAM; 3660 MHz; MIMO B.

| Bottom Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3660                            | QPSK            | A    | 3650.673 | 3669.038 | 18365                | Pass   |
| 3660                            | QPSK            | B    | 3650.673 | 3668.990 | 18317                | Pass   |
| 3660                            | 16QAM           | A    | 3650.673 | 3669.038 | 18365                | Pass   |
| 3660                            | 16QAM           | B    | 3650.673 | 3669.038 | 18365                | Pass   |
| 3660                            | 64QAM           | A    | 3650.673 | 3669.038 | 18365                | Pass   |
| 3660                            | 64QAM           | B    | 3650.673 | 3668.990 | 18317                | Pass   |
| 3660                            | 256QAM          | A    | 3650.673 | 3669.038 | 18365                | Pass   |
| 3660                            | 256QAM          | B    | 3650.673 | 3669.038 | 18365                | Pass   |



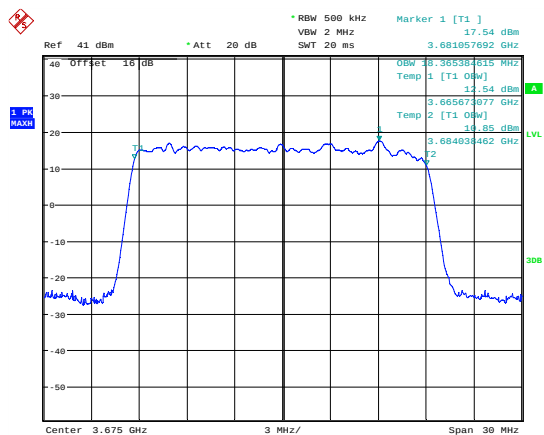
Date: 7.JUL.2018 17:18:05

99 % Bandwidth; QPSK; 3675 MHz; MIMO A.



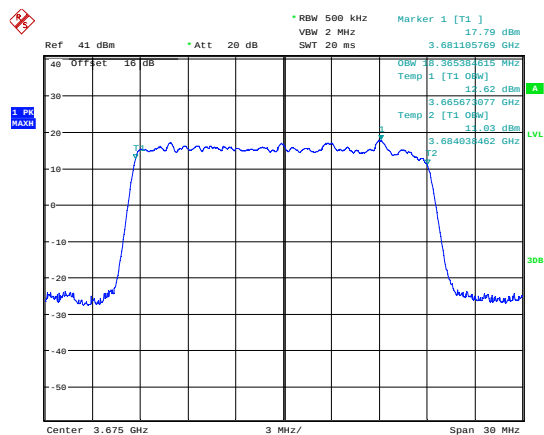
Date: 7.JUL.2018 17:11:45

99 % Bandwidth; QPSK; 3675 MHz; MIMO B.



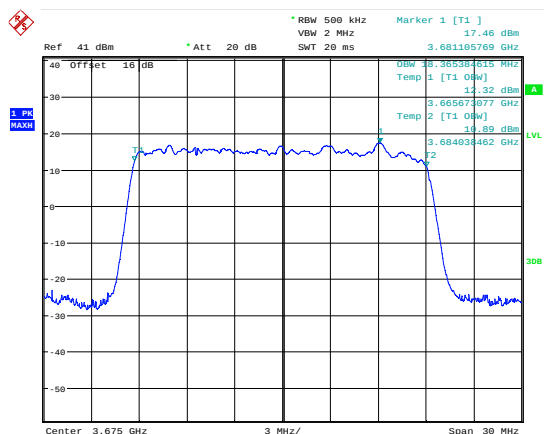
Date: 7.JUL.2018 17:16:24

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



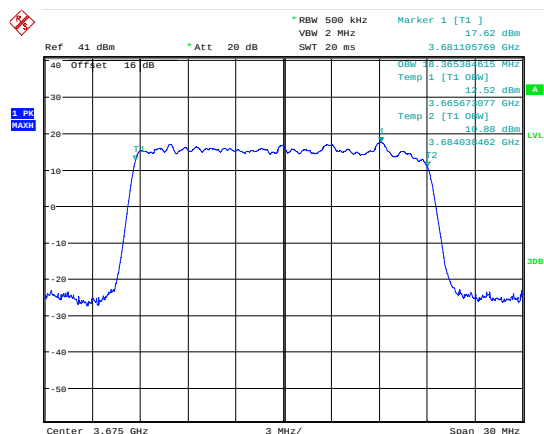
Date: 7.JUL.2018 17:10:23

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



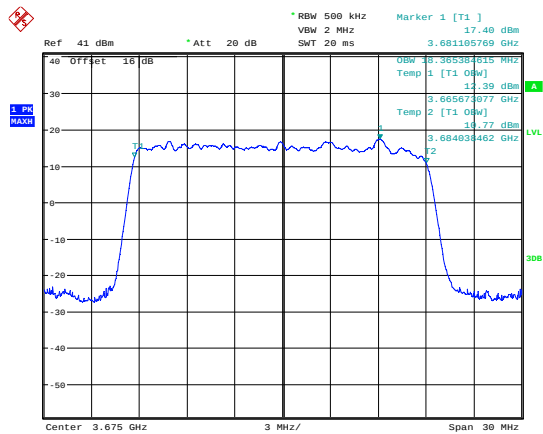
Date: 7.JUL.2018 17:14:29

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



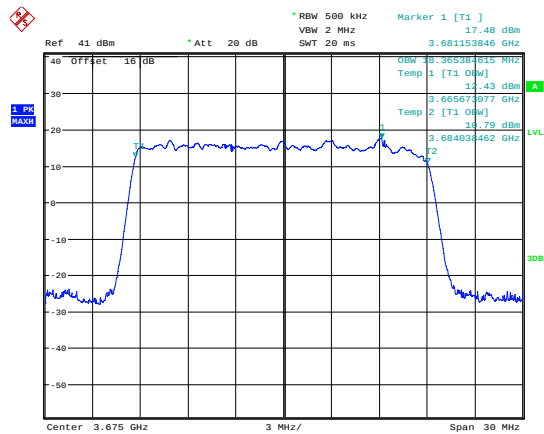
Date: 7.JUL.2018 17:09:08

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



Date: 7.JUL.2018 17:13:30

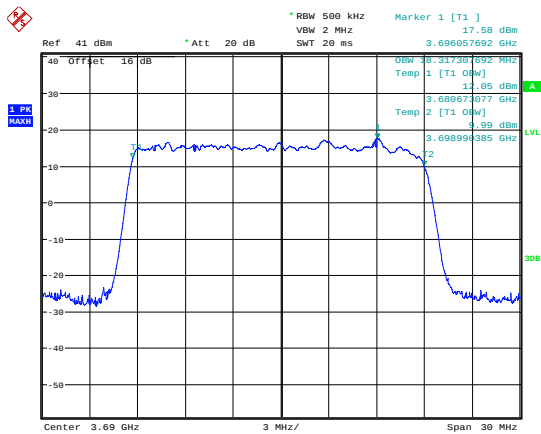
99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 17:04:55

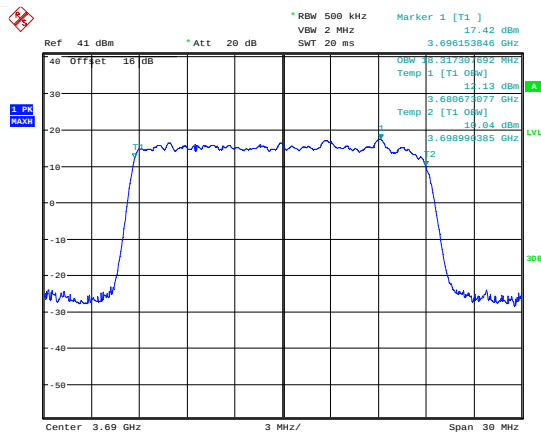
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | QPSK            | B    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 16QAM           | A    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 16QAM           | B    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 64QAM           | A    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 64QAM           | B    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 256QAM          | A    | 3665.673 | 3684.038 | 18365                | Pass   |
| 3675                            | 256QAM          | B    | 3665.673 | 3684.038 | 18365                | Pass   |



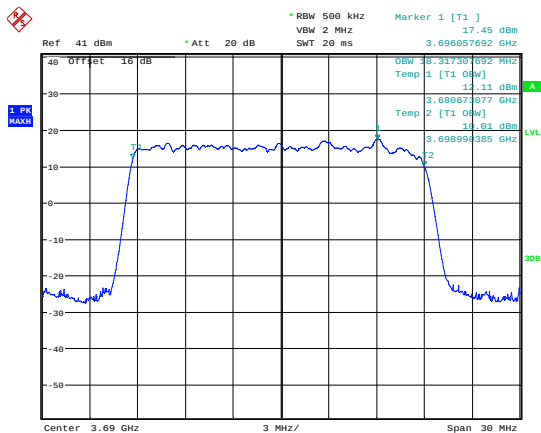
Date: 7.JUL.2018 17:34:24

99 % Bandwidth; QPSK; 3690 MHz; MIMO A.



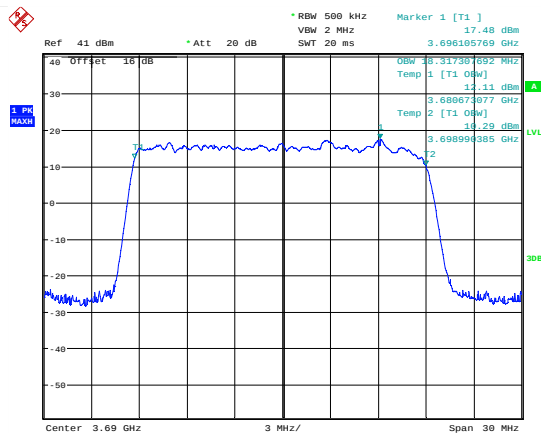
Date: 7.JUL.2018 17:38:29

99 % Bandwidth; QPSK; 3690 MHz; MIMO B.



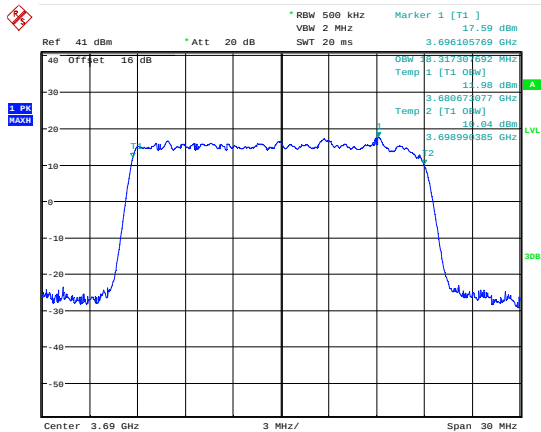
Date: 7.JUL.2018 17:36:23

99 % Bandwidth; 16QAM; 3690 MHz; MIMO A.



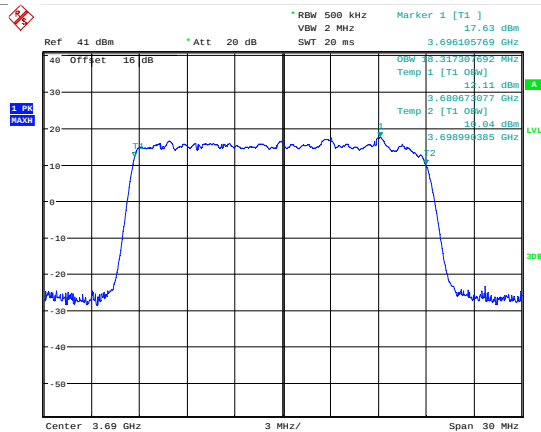
Date: 7.JUL.2018 17:39:11

99 % Bandwidth; 16QAM; 3690 MHz; MIMO B.



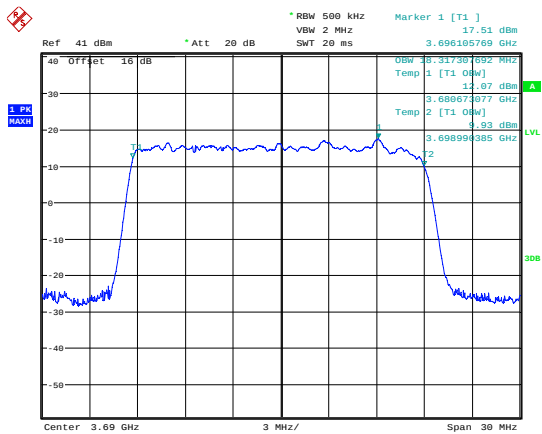
Date: 7.JUL.2018 17:36:55

99 % Bandwidth; 64QAM; 3690 MHz; MIMO A.



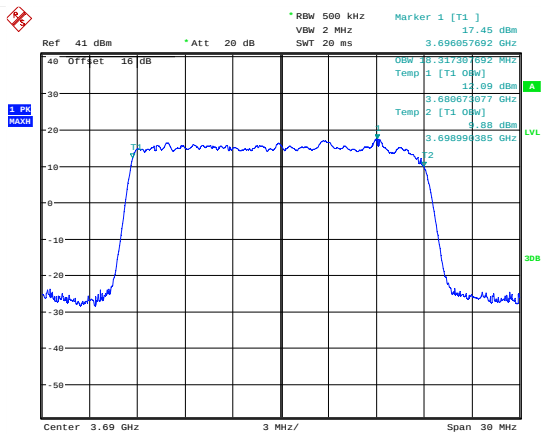
Date: 7.JUL.2018 17:39:54

99 % Bandwidth; 64QAM; 3690 MHz; MIMO B.



Date: 7.JUL.2018 17:37:37

99 % Bandwidth; 256QAM; 3690 MHz; MIMO A.

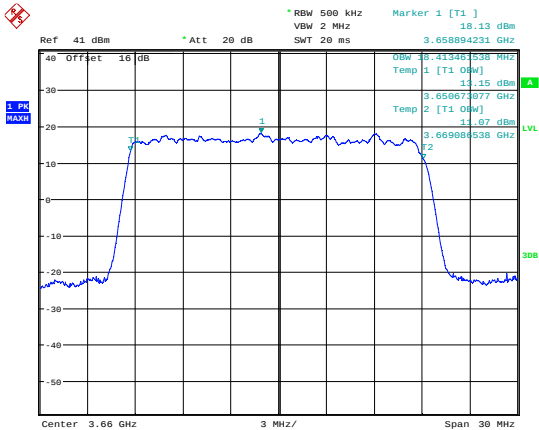


Date: 7.JUL.2018 17:40:38

99 % Bandwidth; 256QAM; 3690 MHz; MIMO B.

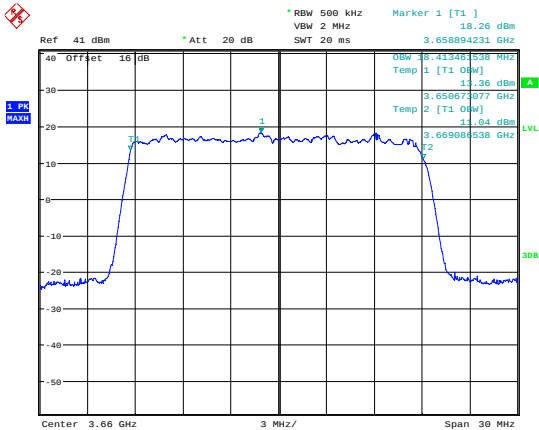
| Top Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3690                         | QPSK            | A    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | QPSK            | B    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 16QAM           | A    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 16QAM           | B    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 64QAM           | A    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 64QAM           | B    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 256QAM          | A    | 3680.673 | 3698.99  | 18317                | Pass   |
| 3690                         | 256QAM          | B    | 3680.673 | 3698.99  | 18317                | Pass   |

20 MHz Bandwidth Sector



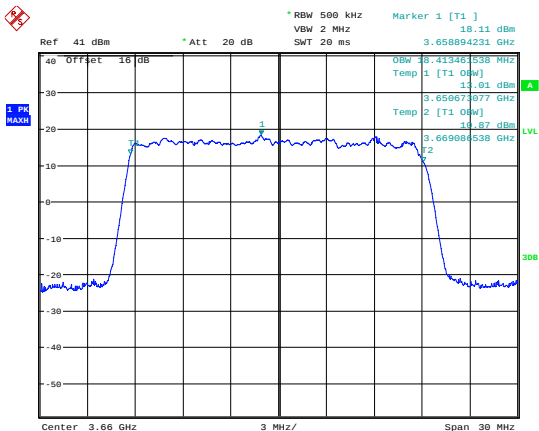
Date: 7.JUL.2018 16:26:04

99 % Bandwidth; QPSK; 3660 MHz; MIMO A.



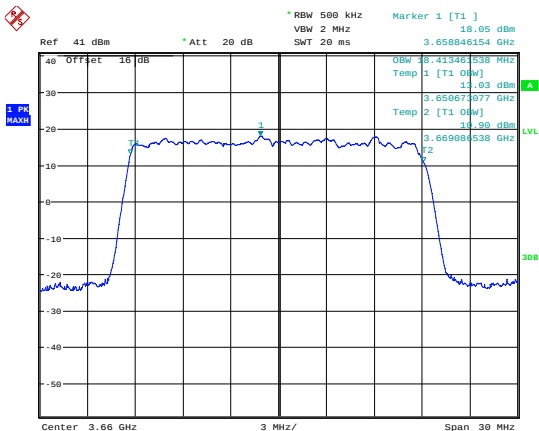
Date: 7.JUL.2018 16:28:37

99 % Bandwidth; QPSK; 3660 MHz; MIMO B.



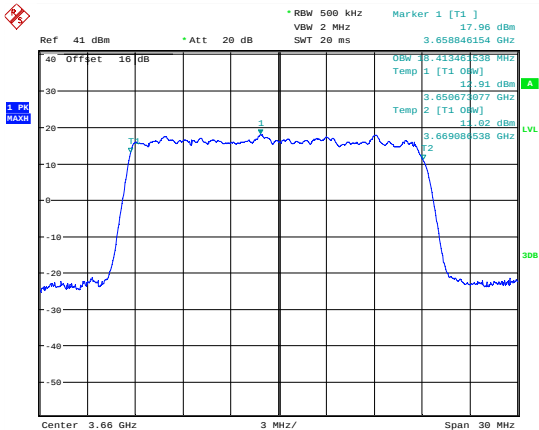
Date: 7.JUL.2018 16:26:31

99 % Bandwidth; 16QAM; 3660 MHz; MIMO A.



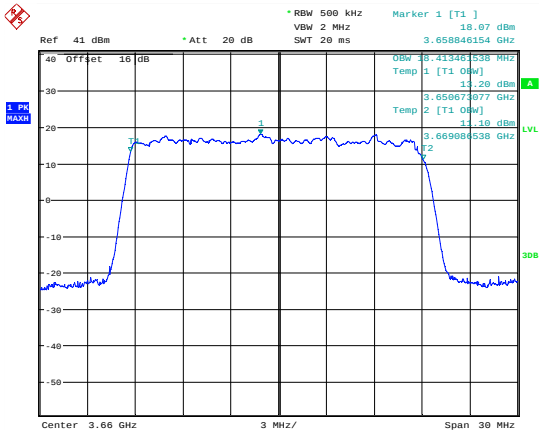
Date: 7.JUL.2018 16:29:19

99 % Bandwidth; 16QAM; 3660 MHz; MIMO B.



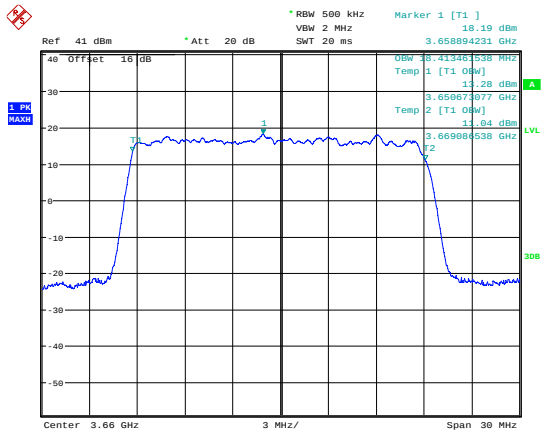
Date: 7.JUL.2018 16:27:08

99 % Bandwidth; 64QAM; 3660 MHz; MIMO A.



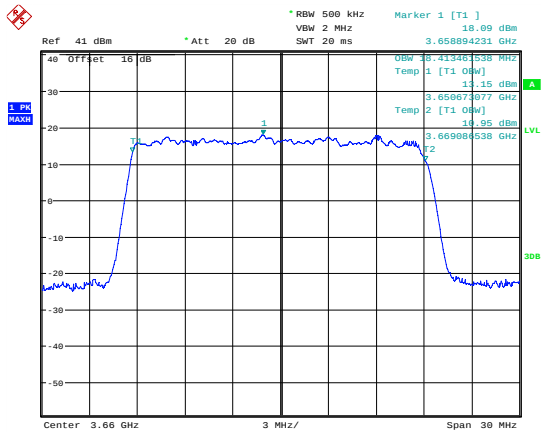
Date: 7.JUL.2018 16:29:54

99 % Bandwidth; 64QAM; 3660 MHz; MIMO B.



Date: 7.JUL.2018 16:27:58

99 % Bandwidth; 256QAM; 3660 MHz; MIMO A.

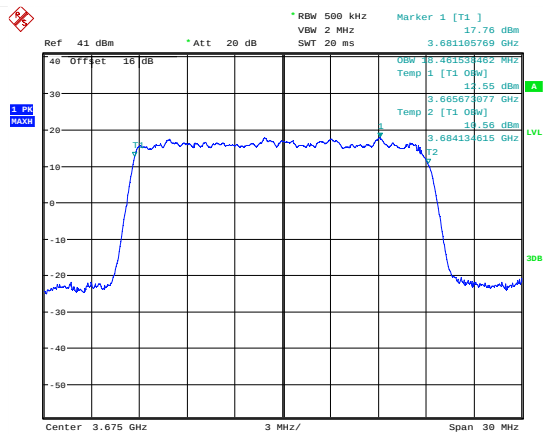
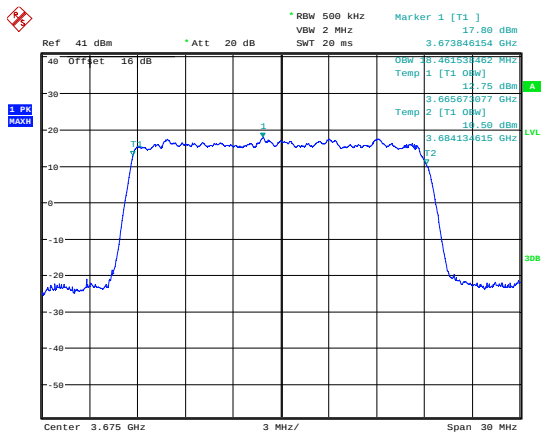


Date: 7.JUL.2018 16:30:20

99 % Bandwidth; 256QAM; 3660 MHz; MIMO B.

| Bottom Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3660                            | QPSK            | A    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | QPSK            | B    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 16QAM           | A    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 16QAM           | B    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 64QAM           | A    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 64QAM           | B    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 256QAM          | A    | 3650.673 | 3669.086 | 18413                | Pass   |
| 3660                            | 256QAM          | B    | 3650.673 | 3669.086 | 18413                | Pass   |





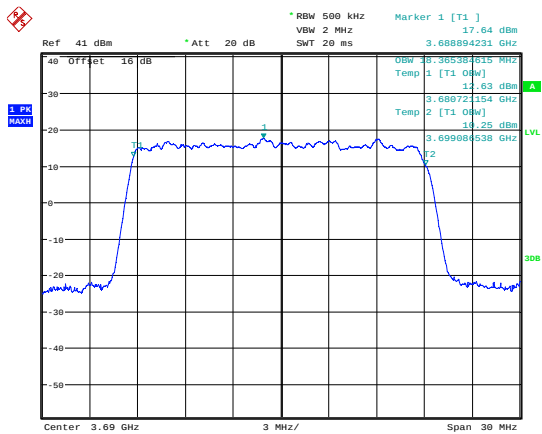
Date: 7.JUL.2018 17:01:09

Date: 7.JUL.2018 17:03:41

99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.

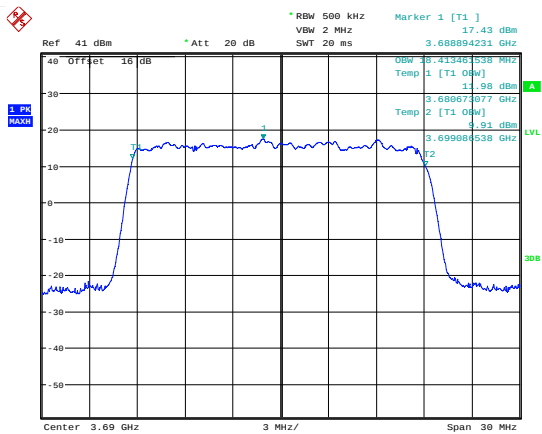
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | QPSK            | B    | 3665.673 | 3684.086 | 18413                | Pass   |
| 3675                            | 16QAM           | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 16QAM           | B    | 3665.673 | 3684.086 | 18413                | Pass   |
| 3675                            | 64QAM           | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 64QAM           | B    | 3665.673 | 3684.086 | 18413                | Pass   |
| 3675                            | 256QAM          | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 256QAM          | B    | 3665.673 | 3684.134 | 18461                | Pass   |



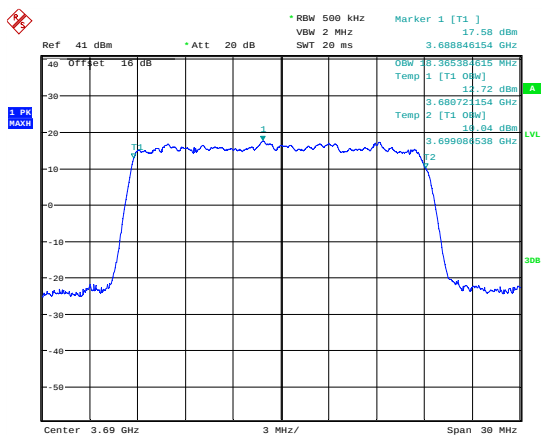
Date: 7.JUL.2018 17:27:18

99 % Bandwidth; QPSK; 3690 MHz; MIMO A.



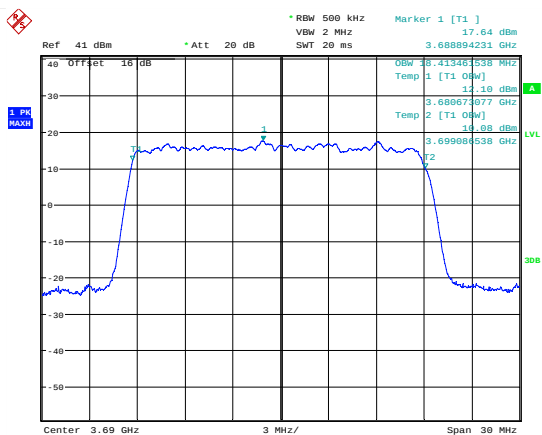
Date: 7.JUL.2018 17:29:53

99 % Bandwidth; QPSK; 3690 MHz; MIMO B.



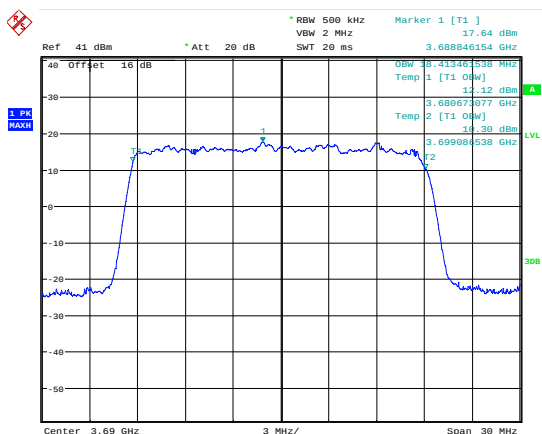
Date: 7.JUL.2018 17:27:56

99 % Bandwidth; 16QAM; 3690 MHz; MIMO A.



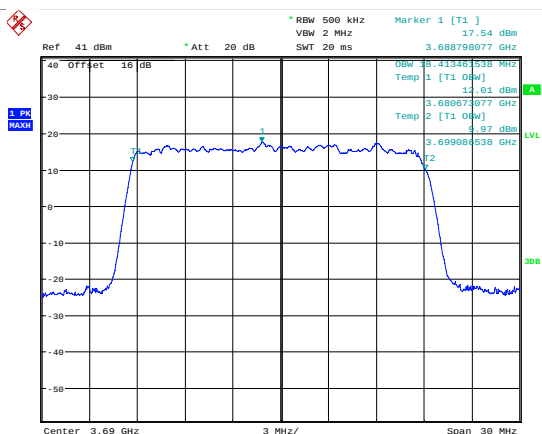
Date: 7.JUL.2018 17:31:00

99 % Bandwidth; 16QAM; 3690 MHz; MIMO B.



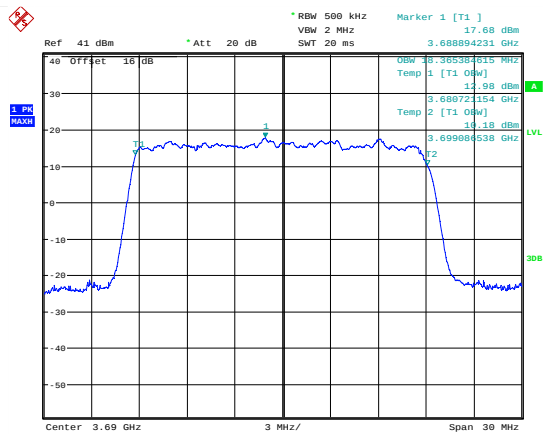
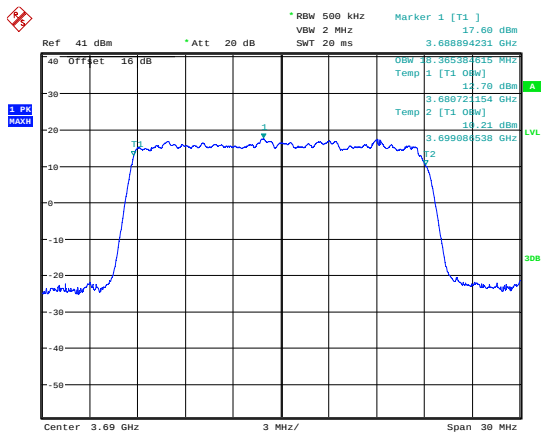
Date: 7.JUL.2018 17:28:29

99 % Bandwidth; 64QAM; 3690 MHz; MIMO A.



Date: 7.JUL.2018 17:31:52

99 % Bandwidth; 64QAM; 3690 MHz; MIMO B.



Date: 7.JUL.2018 17:29:11

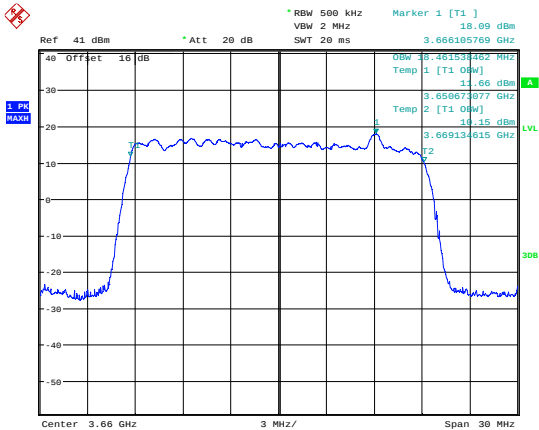
Date: 7.JUL.2018 17:32:34

99 % Bandwidth; 256QAM; 3690 MHz; MIMO A.

99 % Bandwidth; 256QAM; 3690 MHz; MIMO B.

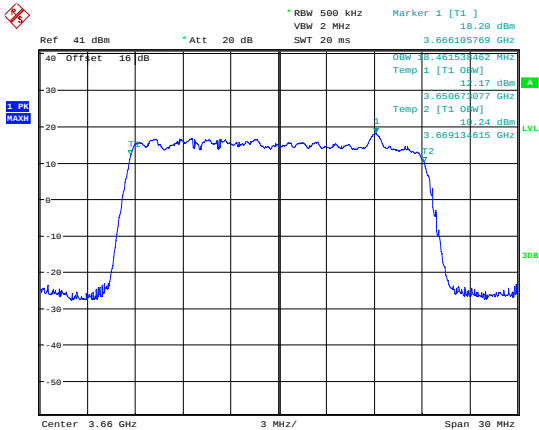
| Top Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3690                         | QPSK            | A    | 3680.721 | 3699.086 | 18365                | Pass   |
| 3690                         | QPSK            | B    | 3680.673 | 3699.086 | 18413                | Pass   |
| 3690                         | 16QAM           | A    | 3680.721 | 3699.086 | 18365                | Pass   |
| 3690                         | 16QAM           | B    | 3680.673 | 3699.086 | 18413                | Pass   |
| 3690                         | 64QAM           | A    | 3680.673 | 3699.086 | 18413                | Pass   |
| 3690                         | 64QAM           | B    | 3680.721 | 3699.086 | 18413                | Pass   |
| 3690                         | 256QAM          | A    | 3680.721 | 3699.086 | 18365                | Pass   |
| 3690                         | 256QAM          | B    | 3680.721 | 3699.086 | 18365                | Pass   |

20 MHz Bandwidth MU-MIMO



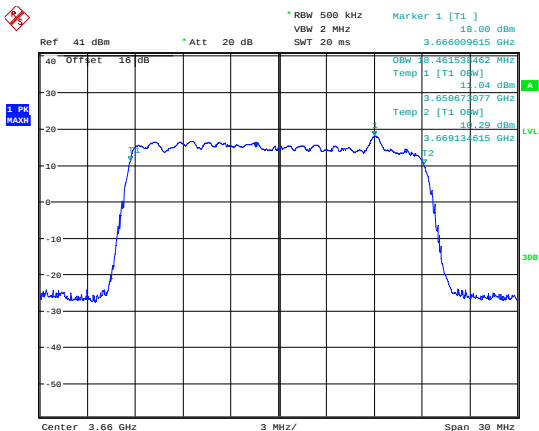
Date: 7.JUL.2018 16:38:24

99 % Bandwidth; QPSK; 3660 MHz; MIMO A.



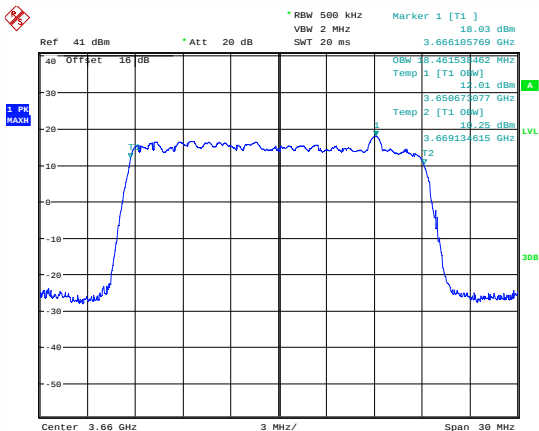
Date: 7.JUL.2018 16:53:44

99 % Bandwidth; QPSK; 3660 MHz; MIMO B.



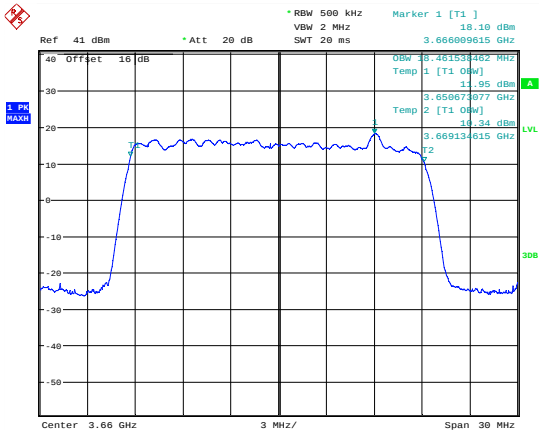
Date: 7.JUL.2018 16:39:13

99 % Bandwidth; 16QAM; 3660 MHz; MIMO A.



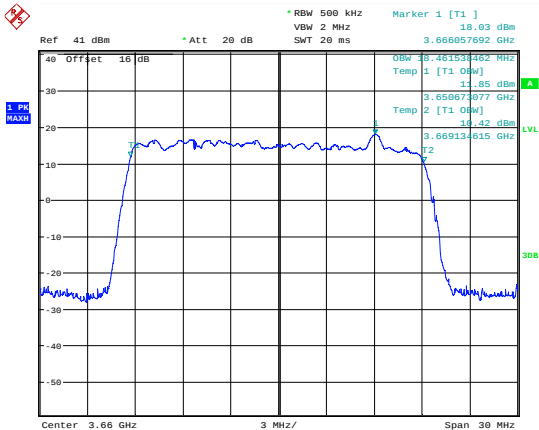
Date: 7.JUL.2018 16:54:31

99 % Bandwidth; 16QAM; 3660 MHz; MIMO B.



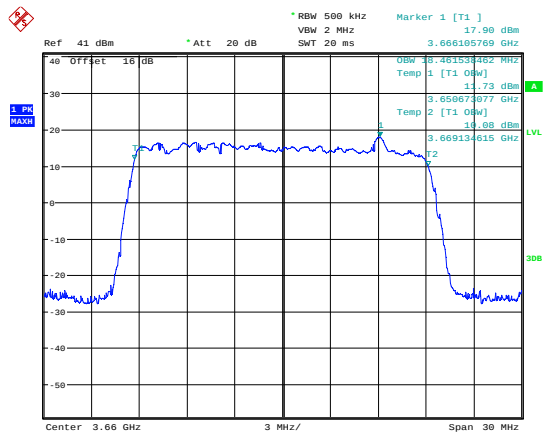
Date: 7.JUL.2018 16:52:24

99 % Bandwidth; 64QAM; 3660 MHz; MIMO A.



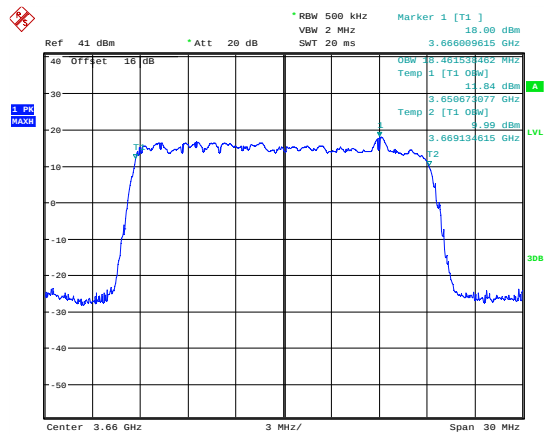
Date: 7.JUL.2018 16:55:25

99 % Bandwidth; 64QAM; 3660 MHz; MIMO B.



Date: 7.JUL.2018 16:53:07

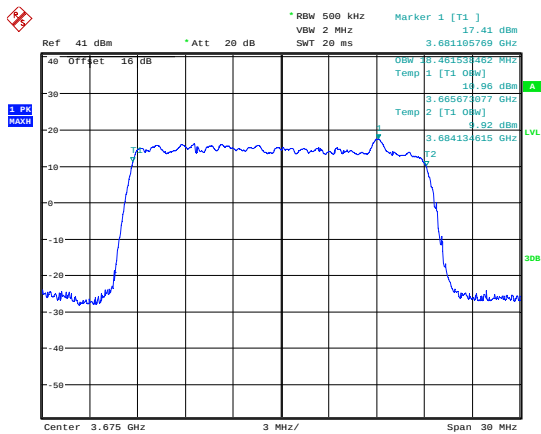
99 % Bandwidth; 256QAM; 3660 MHz; MIMO A.



Date: 7.JUL.2018 16:55:59

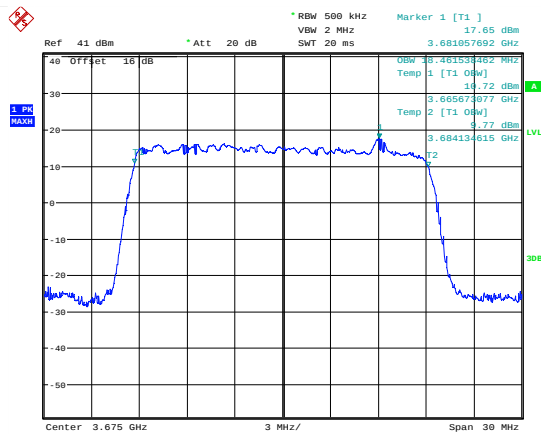
99 % Bandwidth; 256QAM; 3660 MHz; MIMO B.

| Bottom Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3660                            | QPSK            | A    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | QPSK            | B    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 16QAM           | A    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 16QAM           | B    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 64QAM           | A    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 64QAM           | B    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 256QAM          | A    | 3650.673 | 3669.134 | 18461                | Pass   |
| 3660                            | 256QAM          | B    | 3650.673 | 3669.134 | 18461                | Pass   |



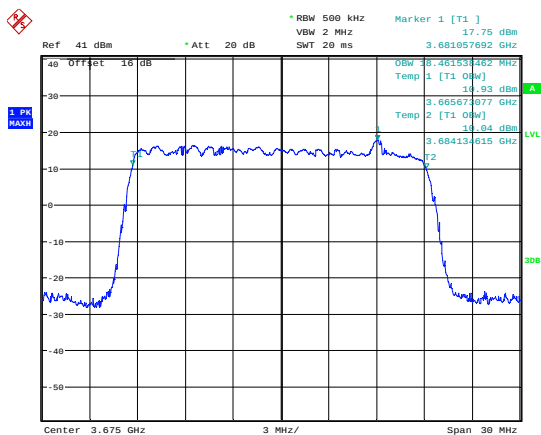
Date: 7.JUL.2018 17:19:24

99 % Bandwidth; QPSK; 3675 MHz; MIMO A.



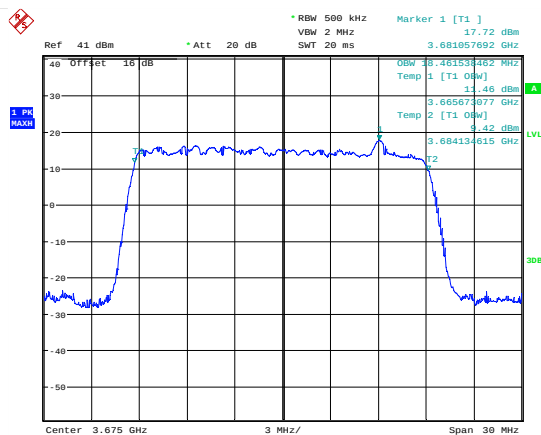
Date: 7.JUL.2018 17:22:21

99 % Bandwidth; QPSK; 3675 MHz; MIMO B.



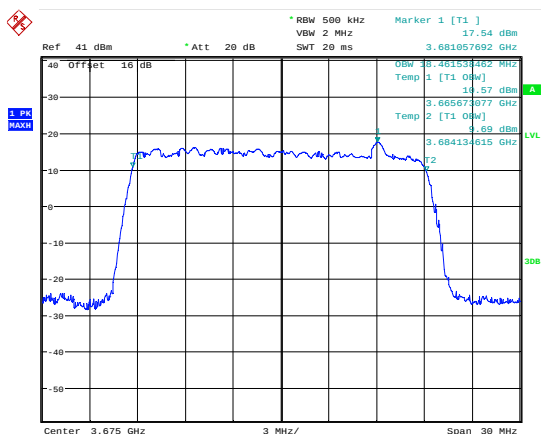
Date: 7.JUL.2018 17:20:00

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



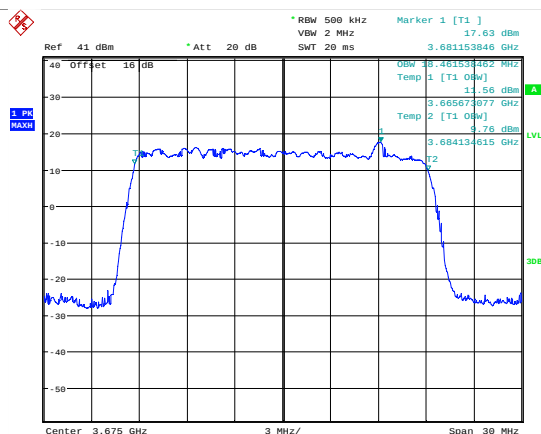
Date: 7.JUL.2018 17:23:13

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



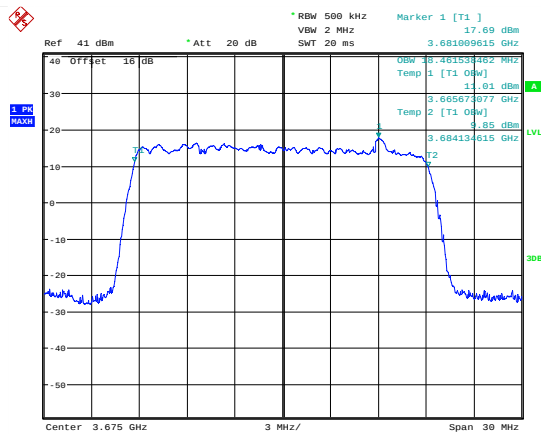
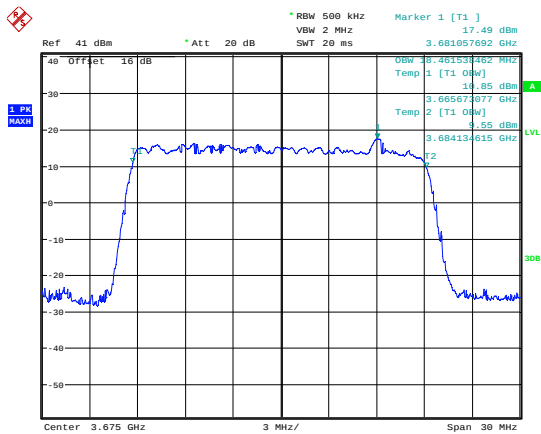
Date: 7.JUL.2018 17:20:46

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 17:23:57

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



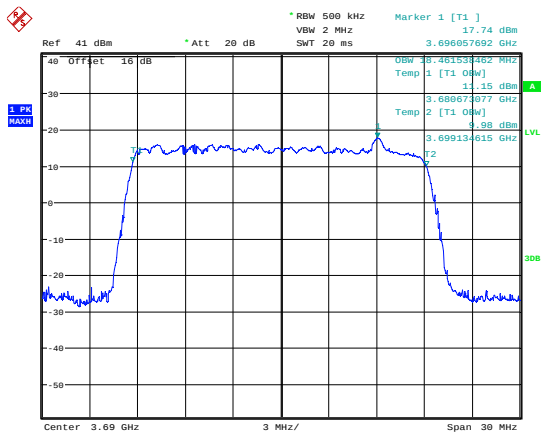
Date: 7.JUL.2018 17:21:32

Date: 7.JUL.2018 17:24:44

99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.

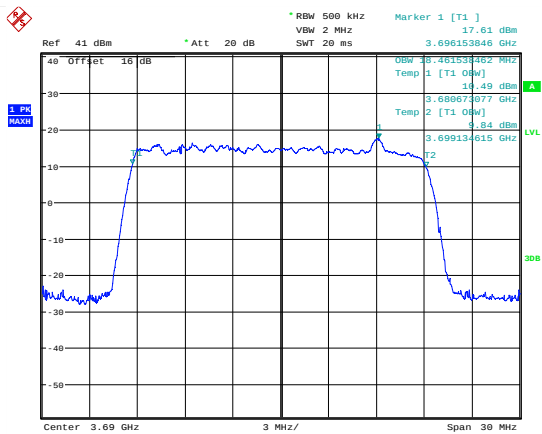
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | QPSK            | B    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 16QAM           | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 16QAM           | B    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 64QAM           | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 64QAM           | B    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 256QAM          | A    | 3665.673 | 3684.134 | 18461                | Pass   |
| 3675                            | 256QAM          | B    | 3665.673 | 3684.134 | 18461                | Pass   |



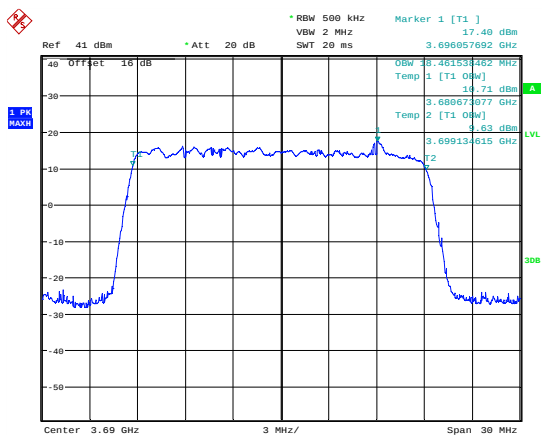
Date: 7.JUL.2018 17:47:52

99 % Bandwidth; QPSK; 3690 MHz; MIMO A.



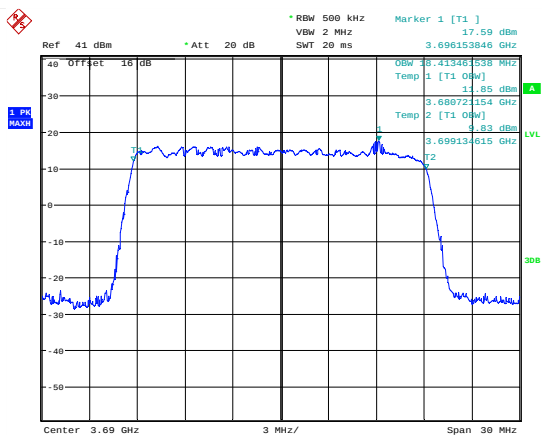
Date: 7.JUL.2018 17:44:46

99 % Bandwidth; QPSK; 3690 MHz; MIMO B.



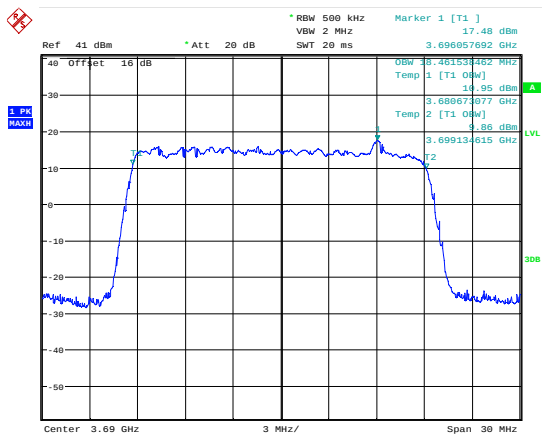
Date: 7.JUL.2018 17:47:10

99 % Bandwidth; 16QAM; 3690 MHz; MIMO A.



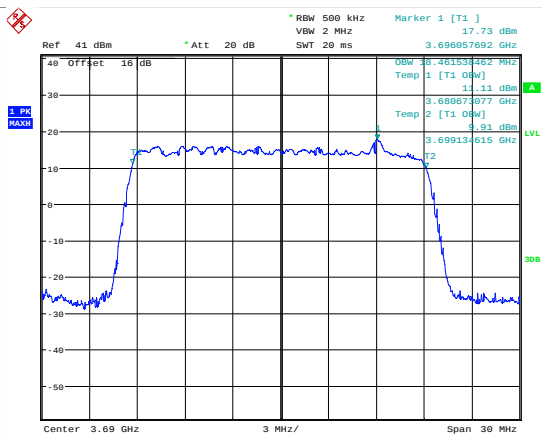
Date: 7.JUL.2018 17:43:42

99 % Bandwidth; 16QAM; 3690 MHz; MIMO B.



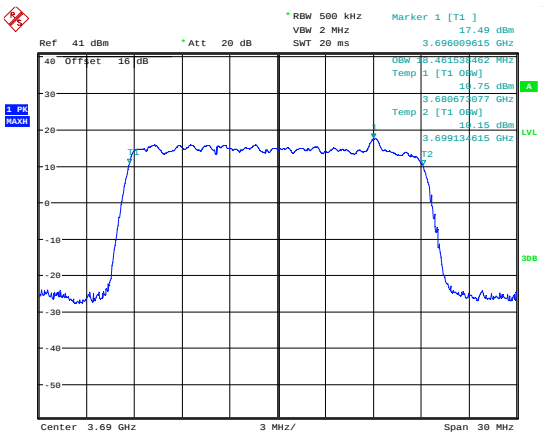
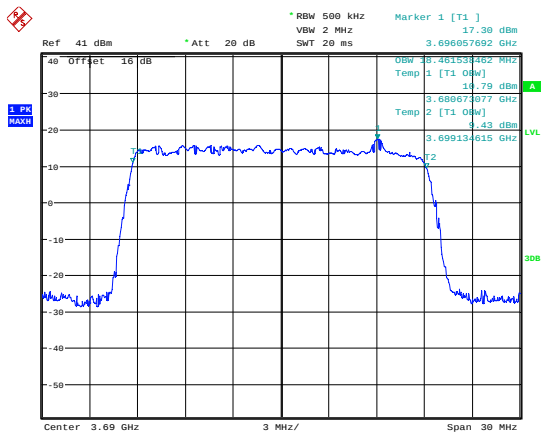
Date: 7.JUL.2018 17:46:20

99 % Bandwidth; 64QAM; 3690 MHz; MIMO A.



Date: 7.JUL.2018 17:43:08

99 % Bandwidth; 64QAM; 3690 MHz; MIMO B.



Date: 7.JUL.2018 17:45:28

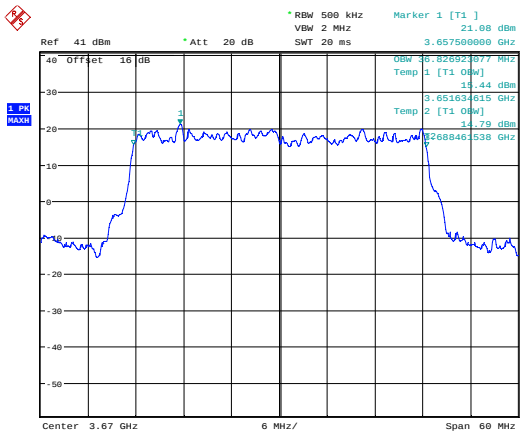
Date: 7.JUL.2018 17:42:32

99 % Bandwidth; 256QAM; 3690 MHz; MIMO A.

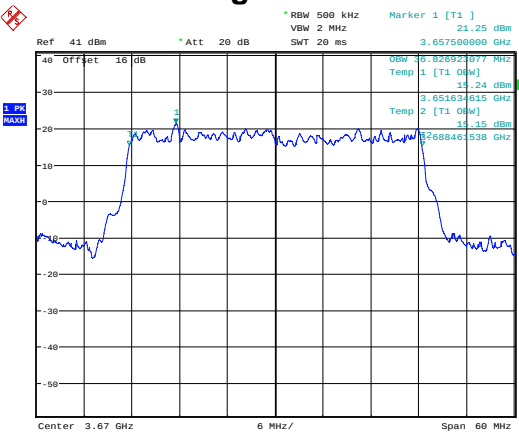
99 % Bandwidth; 256QAM; 3690 MHz; MIMO B.

| Top Channel 20 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3690                         | QPSK            | A    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | QPSK            | B    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | 16QAM           | A    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | 16QAM           | B    | 3680.721 | 3699.134 | 18413                | Pass   |
| 3690                         | 64QAM           | A    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | 64QAM           | B    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | 256QAM          | A    | 3680.673 | 3699.134 | 18461                | Pass   |
| 3690                         | 256QAM          | B    | 3680.673 | 3699.134 | 18461                | Pass   |

40 MHz Bandwidth Beamforming



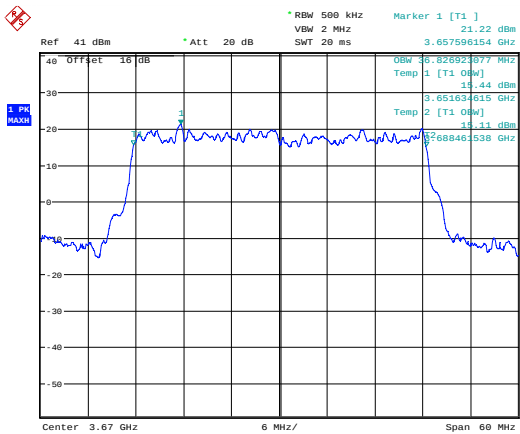
Date: 7.JUL.2018 19:40:59



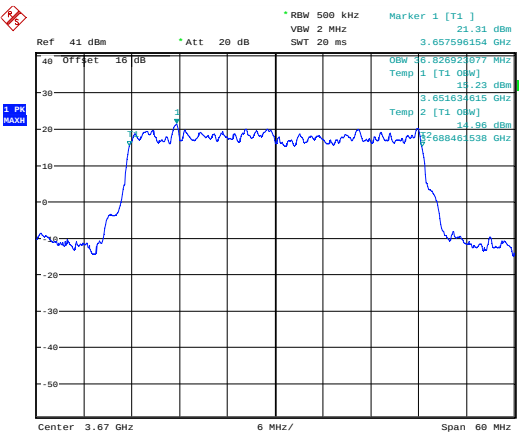
Date: 7.JUL.2018 19:38:26

99 % Bandwidth; QPSK; 3670 MHz; MIMO A.

99 % Bandwidth; QPSK; 3670 MHz; MIMO B.



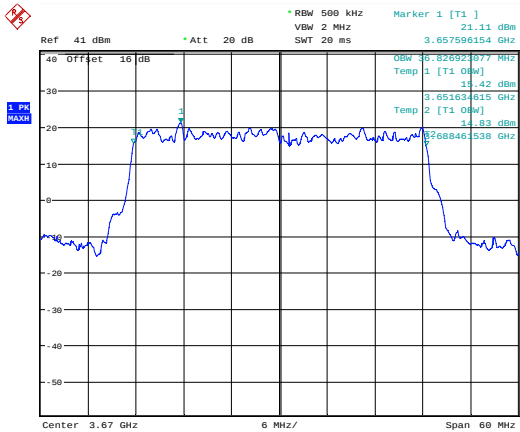
Date: 7.JUL.2018 19:40:23



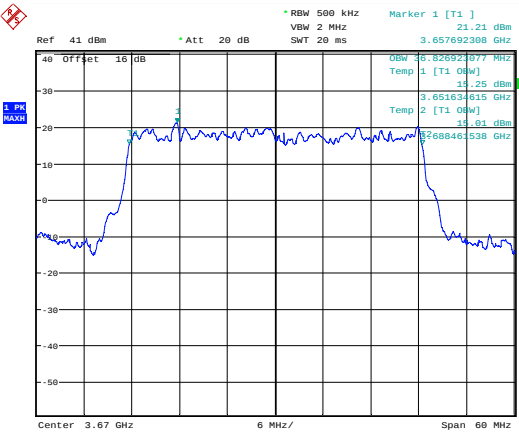
Date: 7.JUL.2018 19:37:59

99 % Bandwidth; 16QAM; 3670 MHz; MIMO A.

99 % Bandwidth; 16QAM; 3670 MHz; MIMO B.



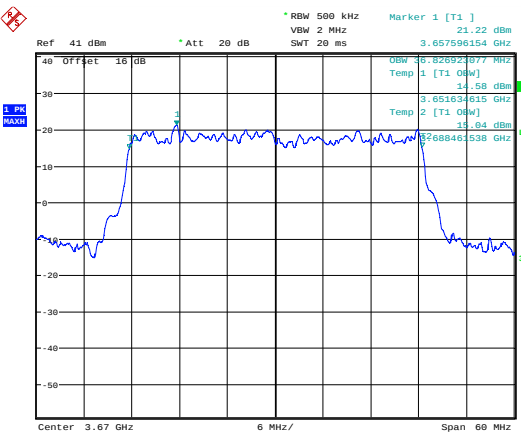
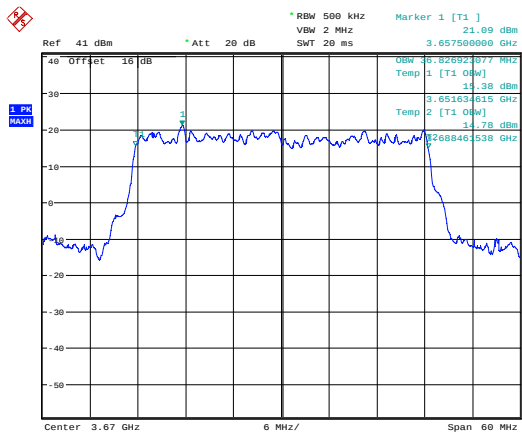
Date: 7.JUL.2018 19:39:53



Date: 7.JUL.2018 19:37:14

99 % Bandwidth; 64QAM; 3670 MHz; MIMO A.

99 % Bandwidth; 64QAM; 3670 MHz; MIMO B.



Date: 7.JUL.2018 19:39:11

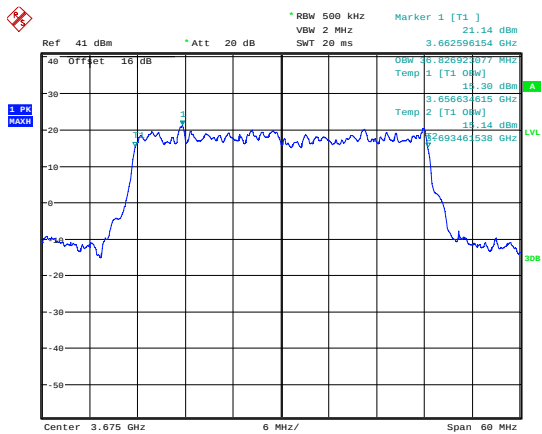
Date: 7.JUL.2018 19:36:33

99 % Bandwidth; 256QAM; 3670 MHz; MIMO A.

99 % Bandwidth; 256QAM; 3670 MHz; MIMO B.

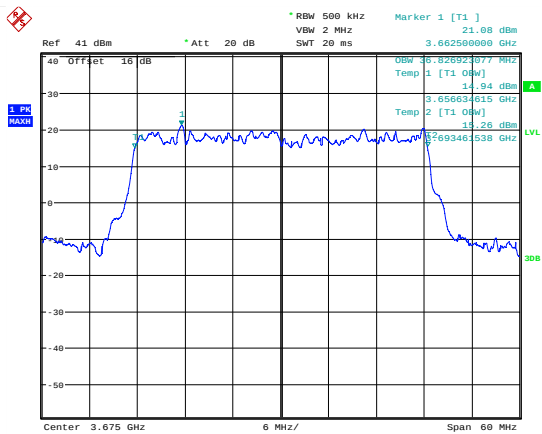
| Bottom Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3670                            | QPSK            | A    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | QPSK            | B    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 16QAM           | A    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 16QAM           | B    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 64QAM           | A    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 64QAM           | B    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 256QAM          | A    | 3651.635 | 3688.462 | 36827                | Pass   |
| 3670                            | 256QAM          | B    | 3651.635 | 3688.462 | 36827                | Pass   |





Date: 7.JUL.2018 19:57:23

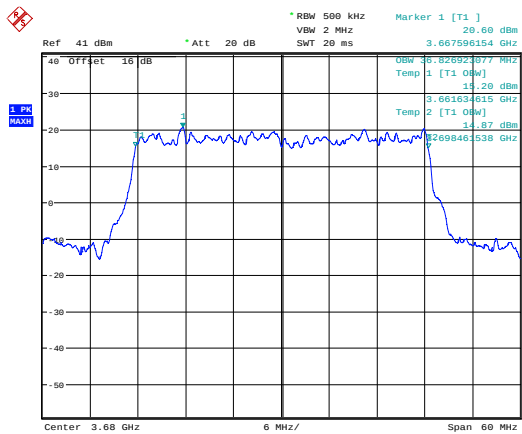
99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 19:59:38

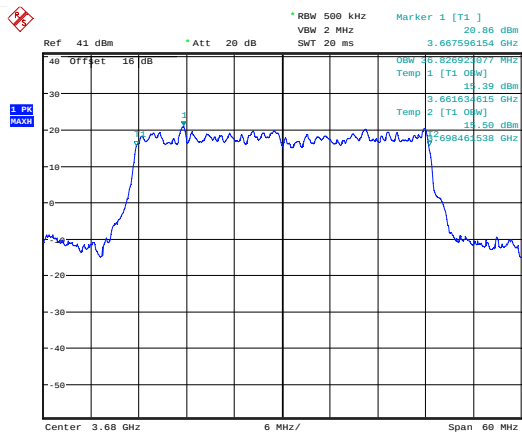
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | QPSK            | B    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | 16QAM           | A    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | 16QAM           | B    | 3656.635 | 3693.557 | 36922                | Pass   |
| 3675                            | 64QAM           | A    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | 64QAM           | B    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | 256QAM          | A    | 3656.635 | 3693.462 | 36827                | Pass   |
| 3675                            | 256QAM          | B    | 3656.635 | 3693.462 | 36827                | Pass   |



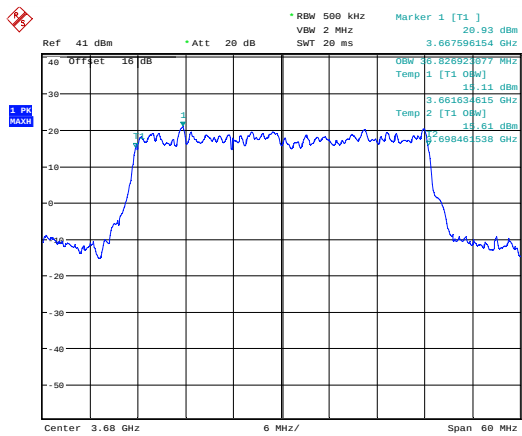
Date: 7.JUL.2018 20:22:33

99 % Bandwidth; QPSK; 3680 MHz; MIMO A.



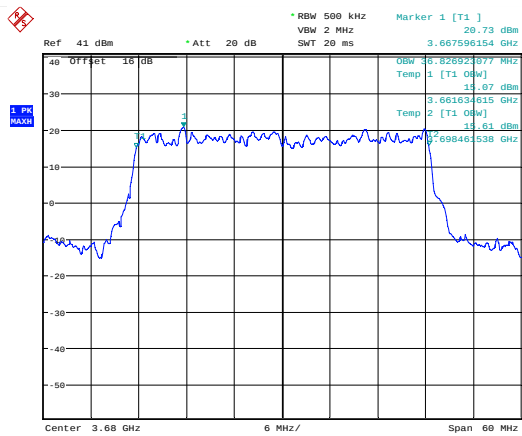
Date: 7.JUL.2018 20:19:55

99 % Bandwidth; QPSK; 3680 MHz; MIMO B.



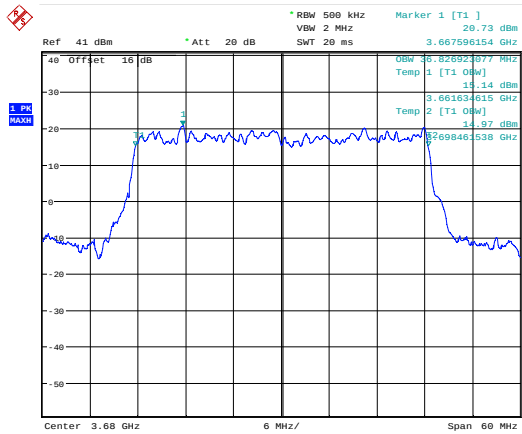
Date: 7.JUL.2018 20:21:47

99 % Bandwidth; 16QAM; 3680 MHz; MIMO A.



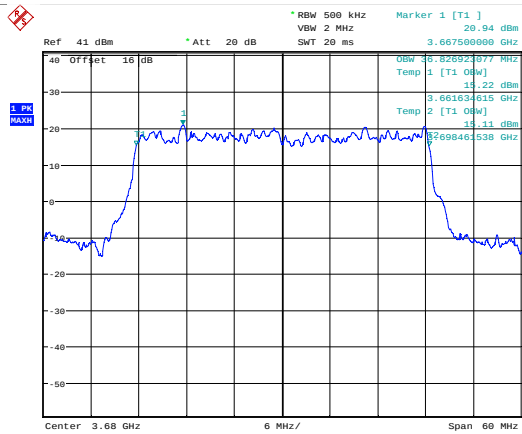
Date: 7.JUL.2018 20:19:12

99 % Bandwidth; 16QAM; 3680 MHz; MIMO B.



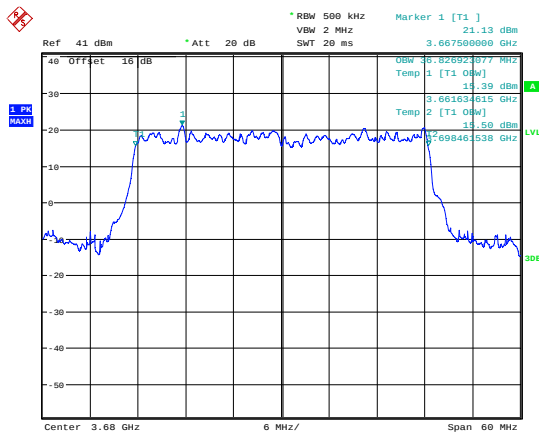
Date: 7.JUL.2018 20:21:15

99 % Bandwidth; 64QAM; 3680 MHz; MIMO A.



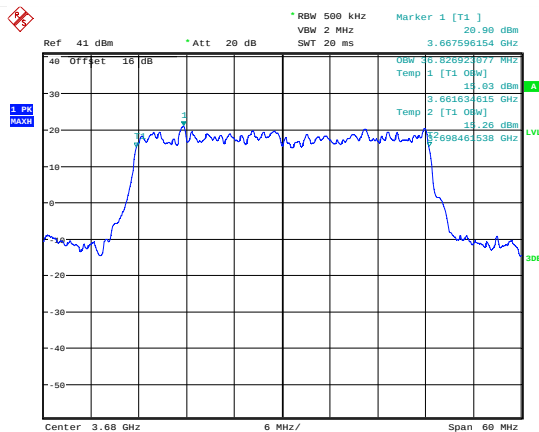
Date: 7.JUL.2018 20:18:38

99 % Bandwidth; 64QAM; 3680 MHz; MIMO B.



Date: 7.JUL.2018 20:20:39

99 % Bandwidth; 256QAM; 3680 MHz;  
MIMO A.

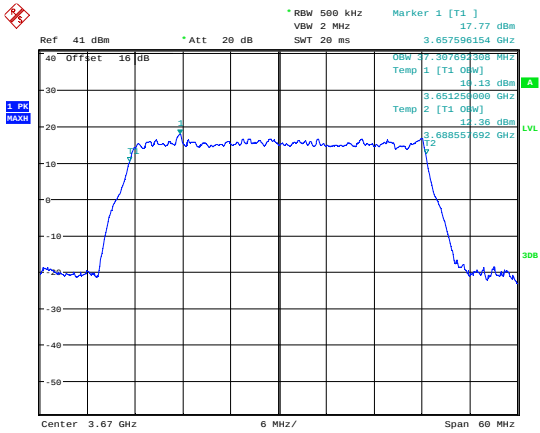


Date: 7.JUL.2018 20:18:06

99 % Bandwidth; 256QAM; 3680 MHz;  
MIMO B.

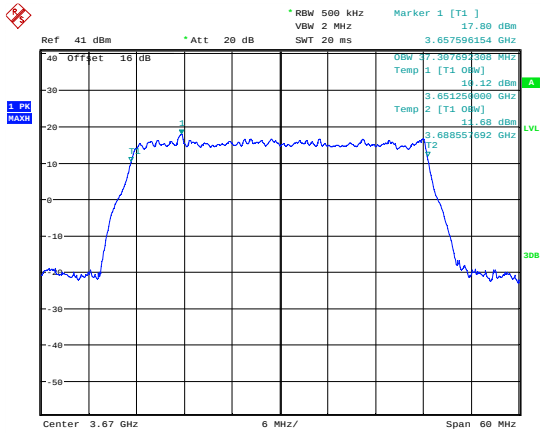
| Top Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3680                         | QPSK            | A    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | QPSK            | B    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 16QAM           | A    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 16QAM           | B    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 64QAM           | A    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 64QAM           | B    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 256QAM          | A    | 3661.635 | 3698.462 | 36827                | Pass   |
| 3680                         | 256QAM          | B    | 3661.635 | 3698.462 | 36827                | Pass   |

40 MHz Bandwidth Sector



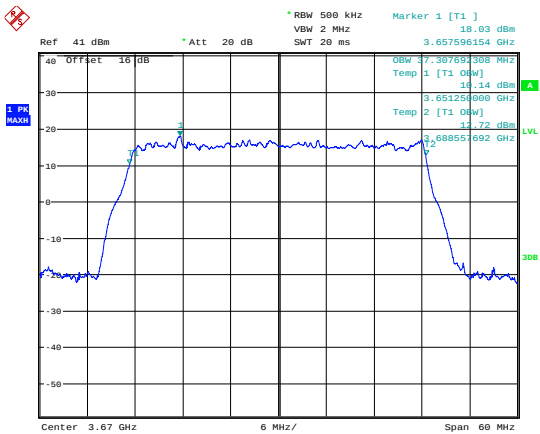
Date: 7.JUL.2018 19:29:51

99 % Bandwidth; QPSK; 3670 MHz; MIMO A.



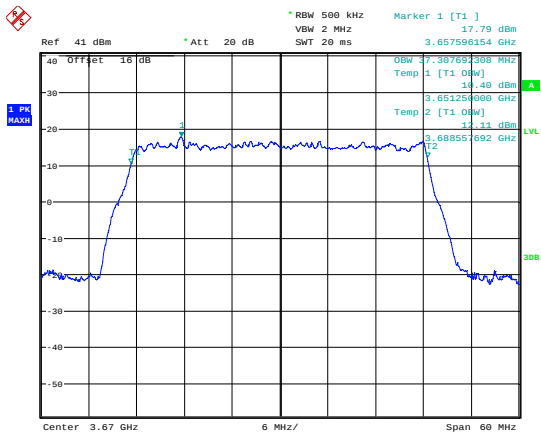
Date: 7.JUL.2018 19:32:46

99 % Bandwidth; QPSK; 3670 MHz; MIMO B.



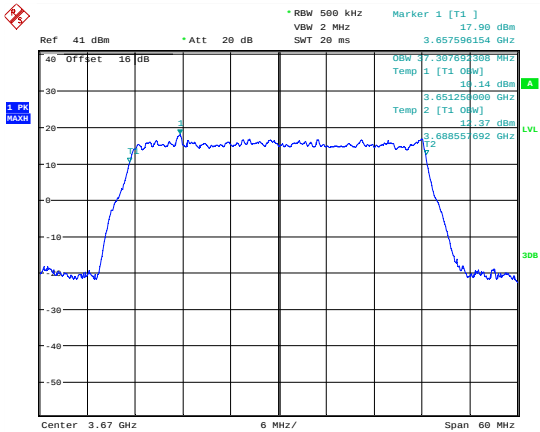
Date: 7.JUL.2018 19:30:45

99 % Bandwidth; 16QAM; 3670 MHz; MIMO A.



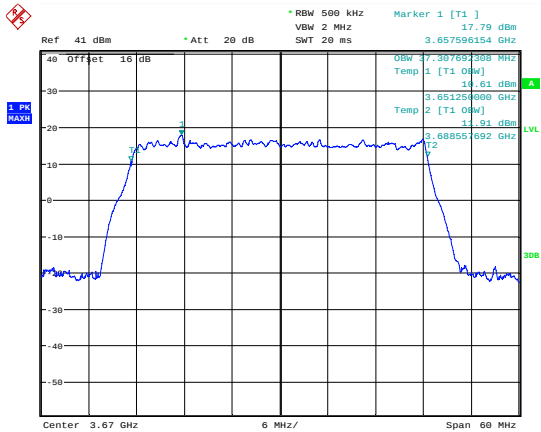
Date: 7.JUL.2018 19:33:24

99 % Bandwidth; 16QAM; 3670 MHz; MIMO B.



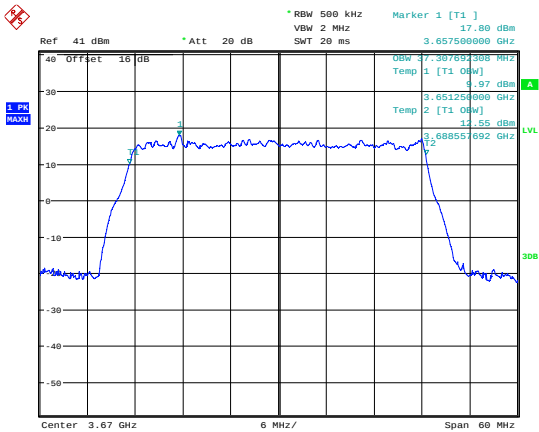
Date: 7.JUL.2018 19:31:24

99 % Bandwidth; 64QAM; 3670 MHz; MIMO A.



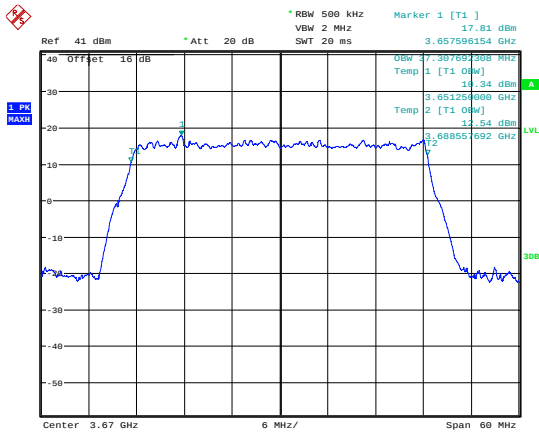
Date: 7.JUL.2018 19:34:04

99 % Bandwidth; 64QAM; 3670 MHz; MIMO B.



Date: 7.JUL.2018 19:32:05

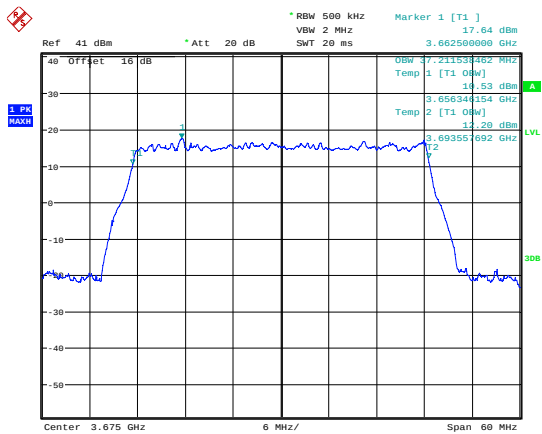
99 % Bandwidth; 256QAM; 3670 MHz; MIMO A.



Date: 7.JUL.2018 19:34:54

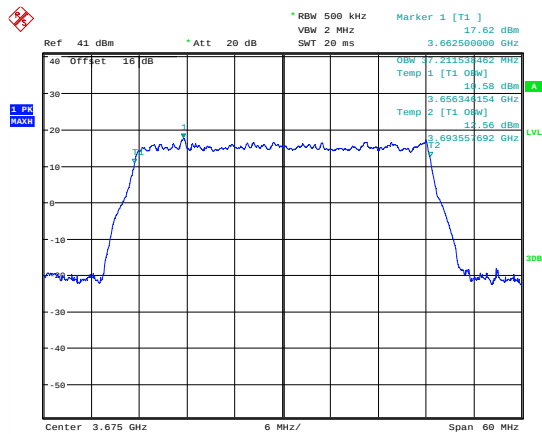
99 % Bandwidth; 256QAM; 3670 MHz; MIMO B.

| Bottom Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3670                            | QPSK            | A    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | QPSK            | B    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 16QAM           | A    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 16QAM           | B    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 64QAM           | A    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 64QAM           | B    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 256QAM          | A    | 3651.25  | 3688.558 | 37308                | Pass   |
| 3670                            | 256QAM          | B    | 3651.25  | 3688.558 | 37308                | Pass   |



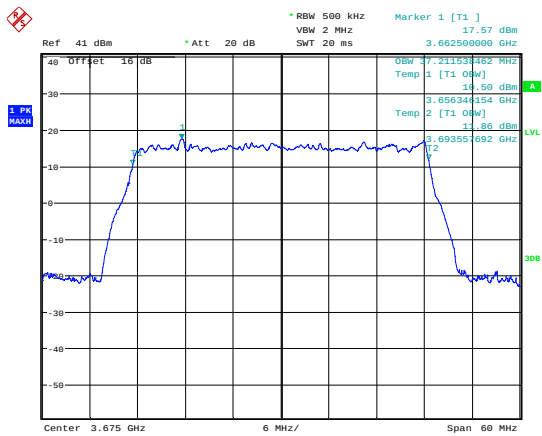
Date: 7.JUL.2018 20:07:39

99 % Bandwidth; QPSK; 3675 MHz; MIMO A.



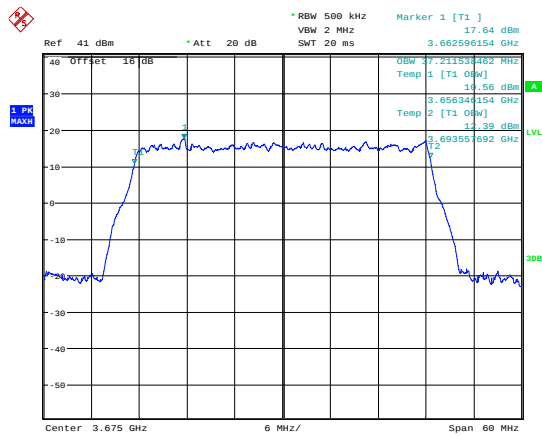
Date: 7.JUL.2018 20:05:47

99 % Bandwidth; QPSK; 3675 MHz; MIMO B.



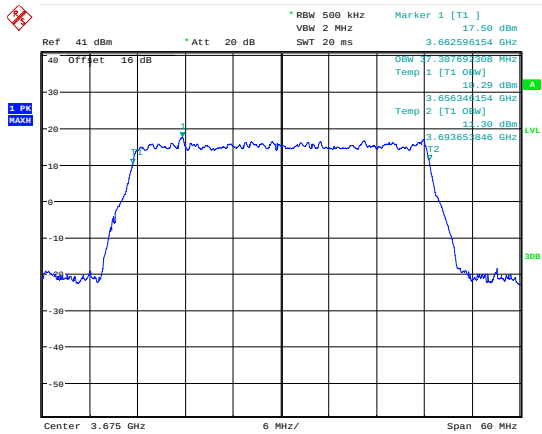
Date: 7.JUL.2018 20:07:09

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



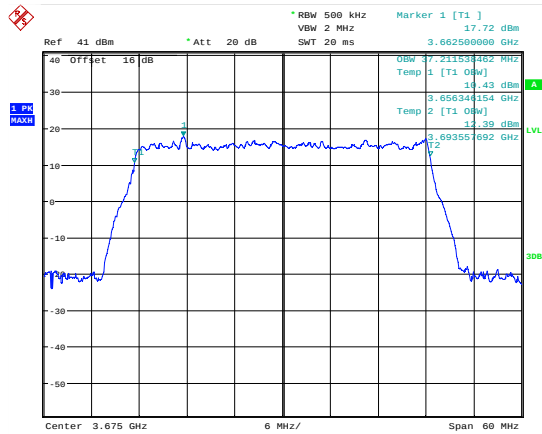
Date: 7.JUL.2018 20:05:11

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



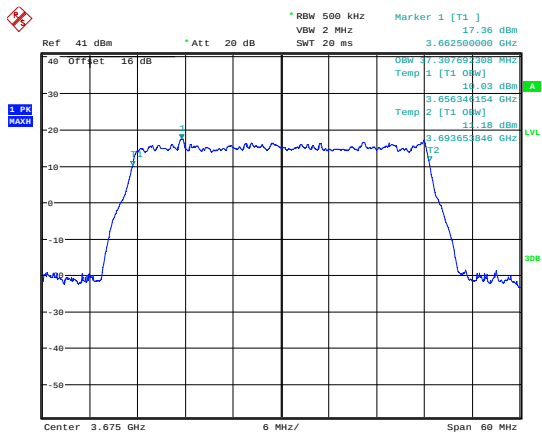
Date: 7.JUL.2018 20:06:43

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



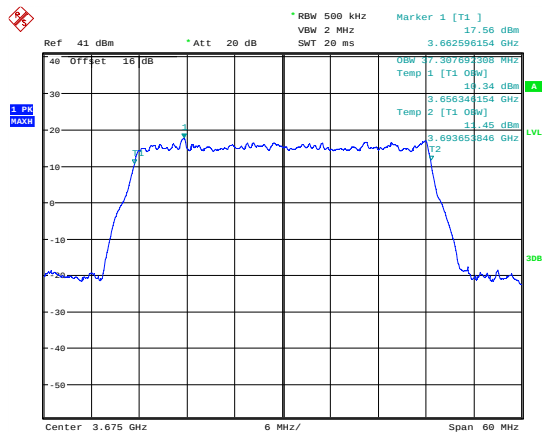
Date: 7.JUL.2018 20:04:43

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



Date: 7.JUL.2018 20:06:20

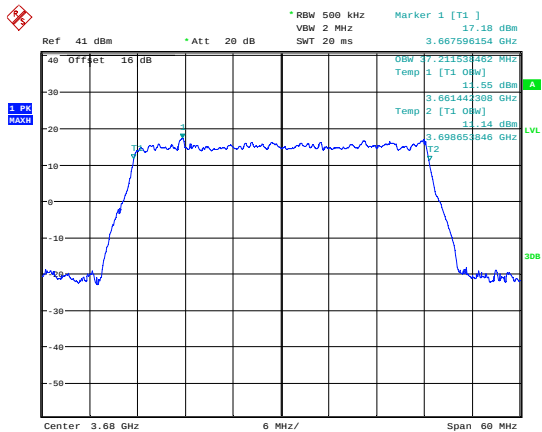
99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 20:04:17

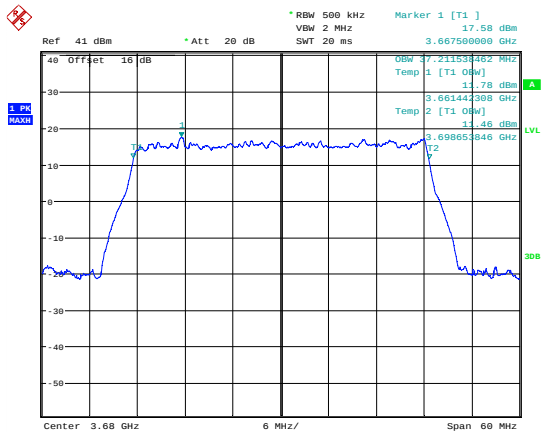
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3656.346 | 3693.558 | 37212                | Pass   |
| 3675                            | QPSK            | B    | 3656.346 | 3693.558 | 37212                | Pass   |
| 3675                            | 16QAM           | A    | 3656.346 | 3693.558 | 37212                | Pass   |
| 3675                            | 16QAM           | B    | 3656.346 | 3693.558 | 37212                | Pass   |
| 3675                            | 64QAM           | A    | 3656.346 | 3693.654 | 37308                | Pass   |
| 3675                            | 64QAM           | B    | 3656.346 | 3693.558 | 37212                | Pass   |
| 3675                            | 256QAM          | A    | 3656.346 | 3693.654 | 37308                | Pass   |
| 3675                            | 256QAM          | B    | 3656.346 | 3693.654 | 37308                | Pass   |



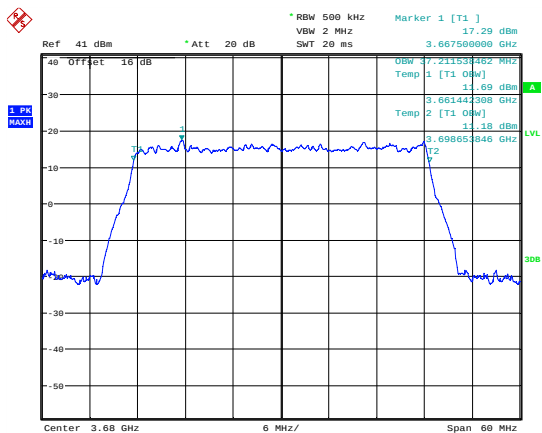
Date: 7.JUL.2018 20:08:51

99 % Bandwidth; QPSK; 3680 MHz; MIMO A.



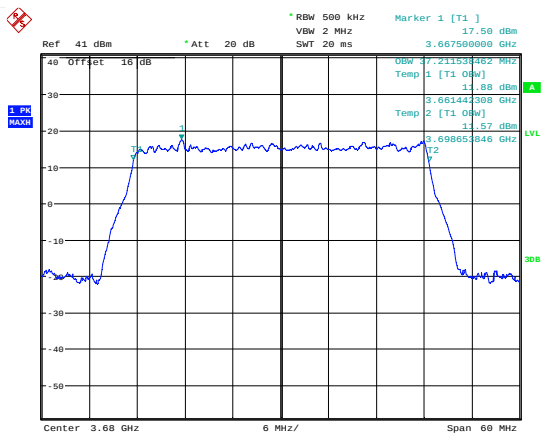
Date: 7.JUL.2018 20:12:43

99 % Bandwidth; QPSK; 3680 MHz; MIMO B.



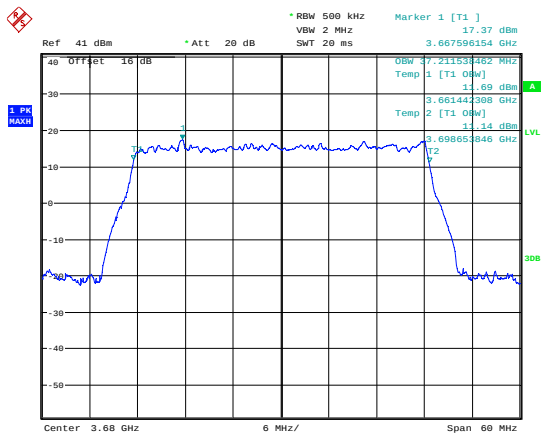
Date: 7.JUL.2018 20:09:30

99 % Bandwidth; 16QAM; 3680 MHz; MIMO A.



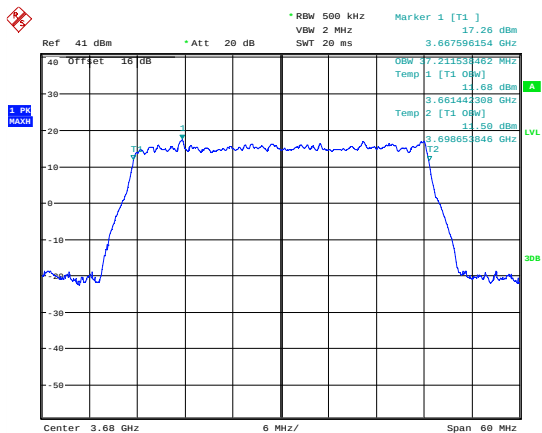
Date: 7.JUL.2018 20:13:48

99 % Bandwidth; 16QAM; 3680 MHz; MIMO B.



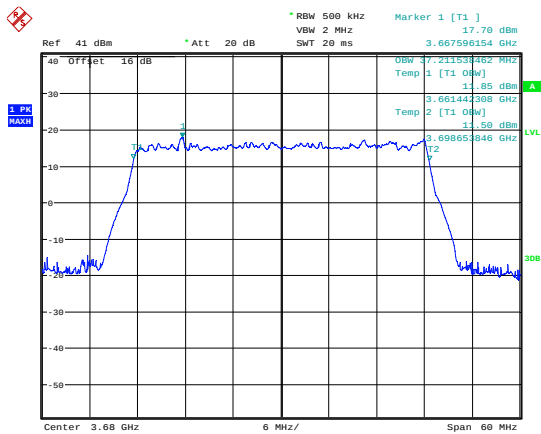
Date: 7.JUL.2018 20:10:07

99 % Bandwidth; 64QAM; 3680 MHz; MIMO A.



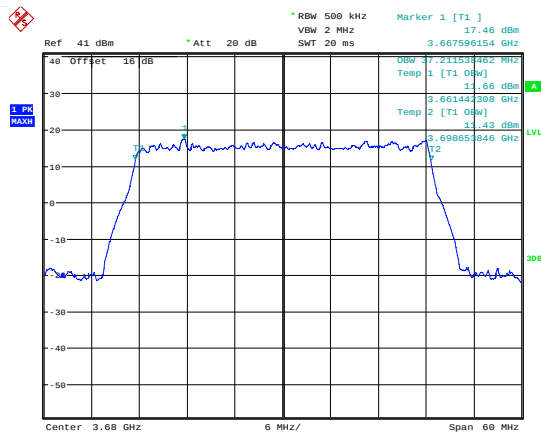
Date: 7.JUL.2018 20:14:48

99 % Bandwidth; 64QAM; 3680 MHz; MIMO B.



Date: 7.JUL.2018 20:10:55

99 % Bandwidth; 256QAM; 3680 MHz; MIMO A.

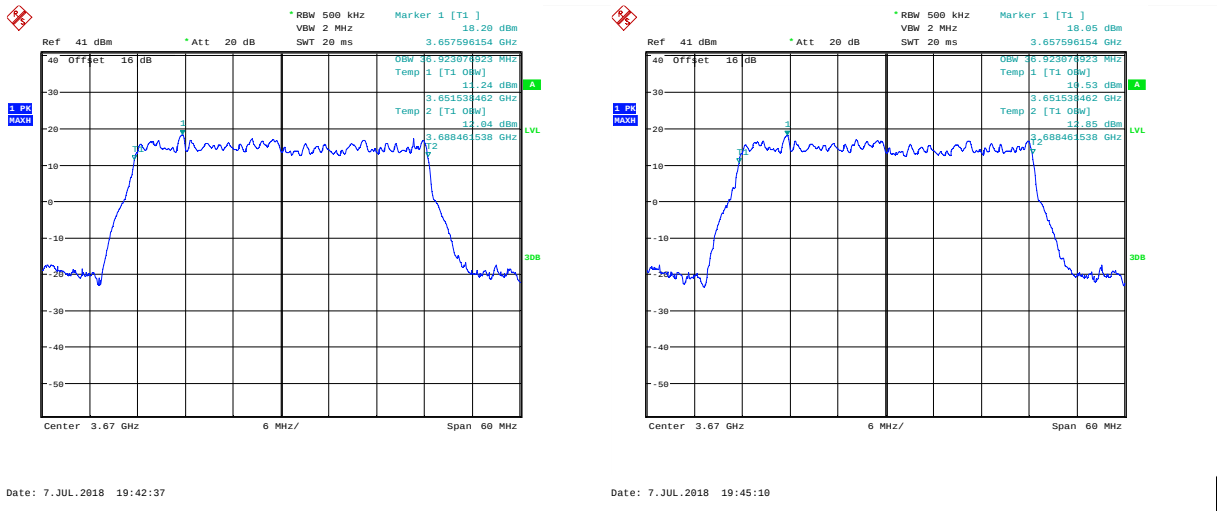


Date: 7.JUL.2018 20:16:17

99 % Bandwidth; 256QAM; 3680 MHz; MIMO B.

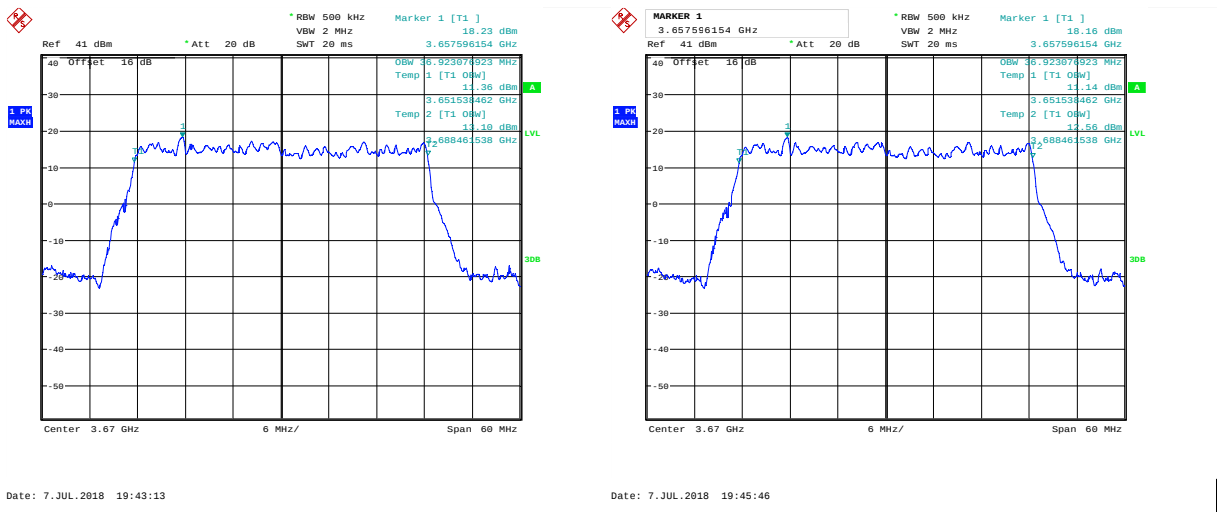
| Top Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3680                         | QPSK            | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | QPSK            | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 16QAM           | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 16QAM           | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 64QAM           | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 64QAM           | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 256QAM          | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 256QAM          | B    | 3661.442 | 3698.654 | 37212                | Pass   |

40 MHz Bandwidth MU-MIMO



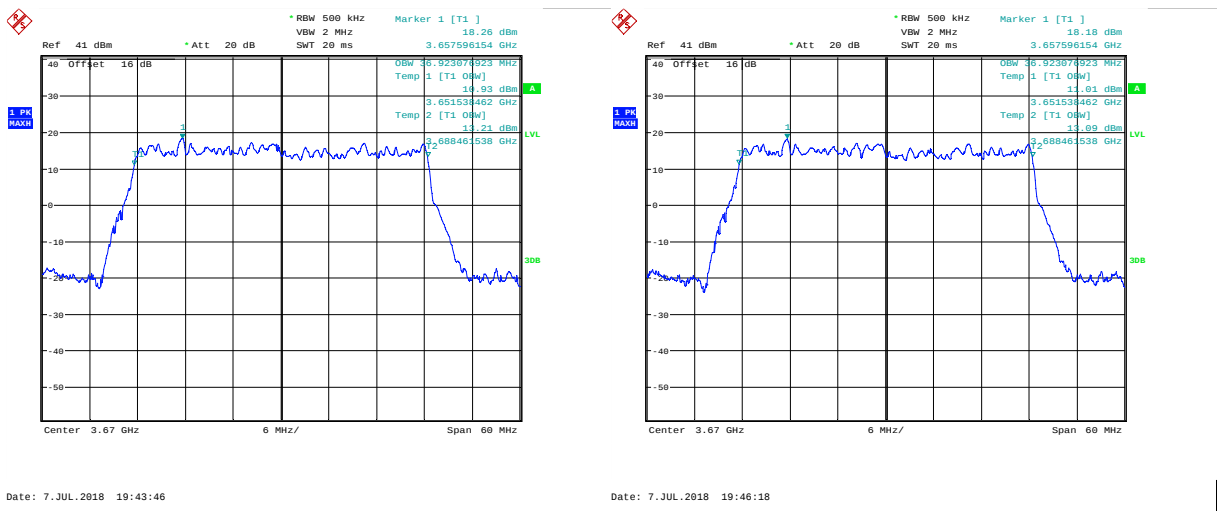
99 % Bandwidth; QPSK; 3670 MHz; MIMO A.

99 % Bandwidth; QPSK; 3670 MHz; MIMO B.



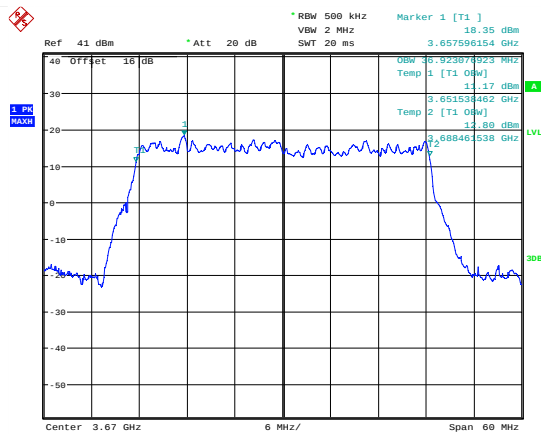
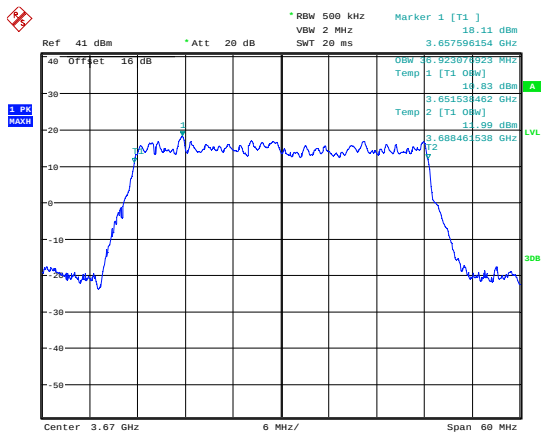
99 % Bandwidth; 16QAM; 3670 MHz; MIMO A.

99 % Bandwidth; 16QAM; 3670 MHz; MIMO B.



99 % Bandwidth; 64QAM; 3670 MHz; MIMO A.

99 % Bandwidth; 64QAM; 3670 MHz; MIMO B.



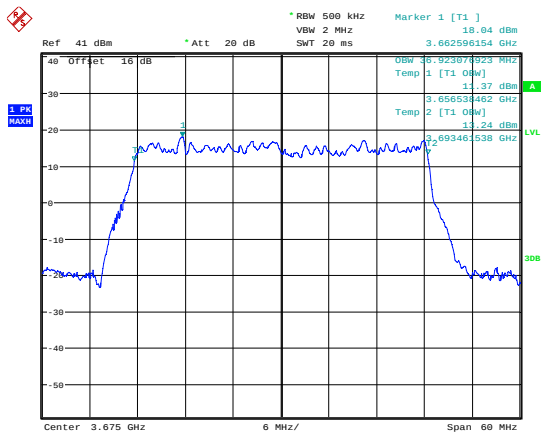
Date: 7.JUL.2018 19:44:22

Date: 7.JUL.2018 19:46:48

99 % Bandwidth; 256QAM; 3670 MHz; MIMO A.

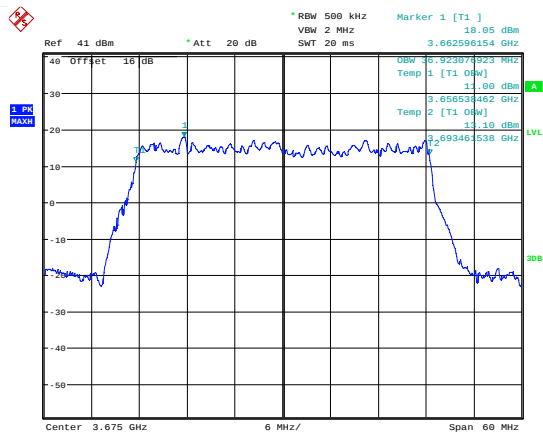
99 % Bandwidth; 256QAM; 3670 MHz; MIMO B.

| Bottom Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3670                            | QPSK            | A    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | QPSK            | B    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 16QAM           | A    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 16QAM           | B    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 64QAM           | A    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 64QAM           | B    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 256QAM          | A    | 3651.538 | 3688.461 | 36923                | Pass   |
| 3670                            | 256QAM          | B    | 3651.538 | 3688.461 | 36923                | Pass   |



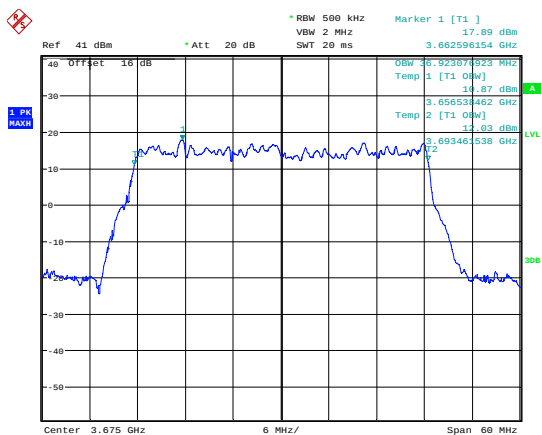
Date: 7.JUL.2018 19:52:56

99 % Bandwidth; QPSK; 3675 MHz; MIMO A.



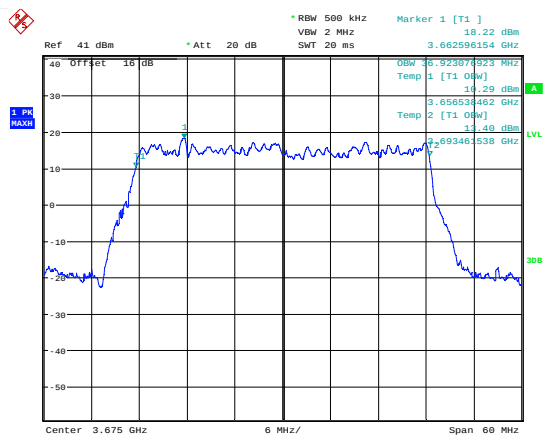
Date: 7.JUL.2018 19:50:09

99 % Bandwidth; QPSK; 3675 MHz; MIMO B.



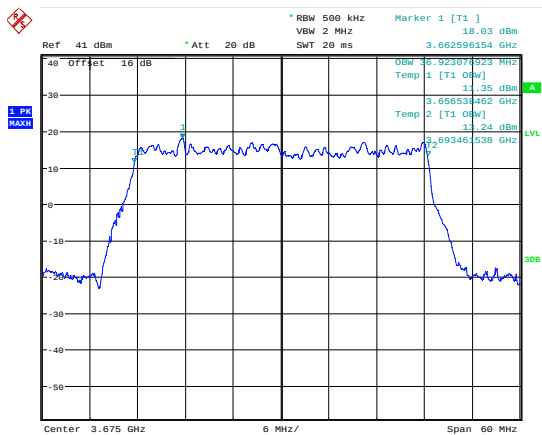
Date: 7.JUL.2018 19:52:18

99 % Bandwidth; 16QAM; 3675 MHz; MIMO A.



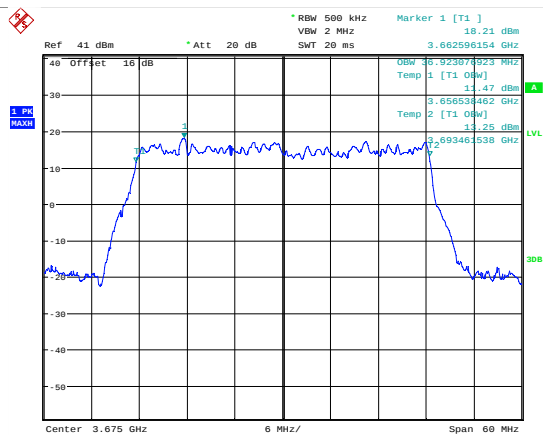
Date: 7.JUL.2018 19:49:34

99 % Bandwidth; 16QAM; 3675 MHz; MIMO B.



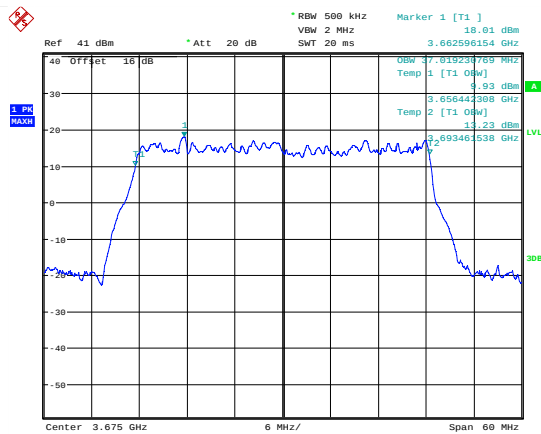
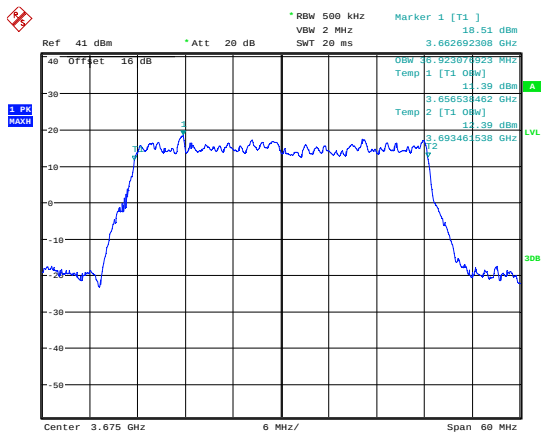
Date: 7.JUL.2018 19:51:32

99 % Bandwidth; 64QAM; 3675 MHz; MIMO A.



Date: 7.JUL.2018 19:49:06

99 % Bandwidth; 64QAM; 3675 MHz; MIMO B.



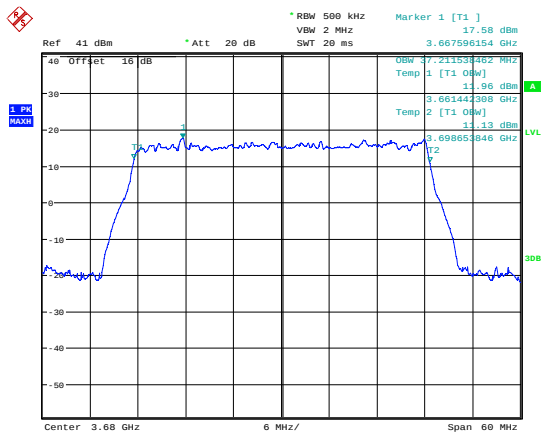
Date: 7.JUL.2018 19:50:42

Date: 7.JUL.2018 19:48:25

99 % Bandwidth; 256QAM; 3675 MHz; MIMO A.

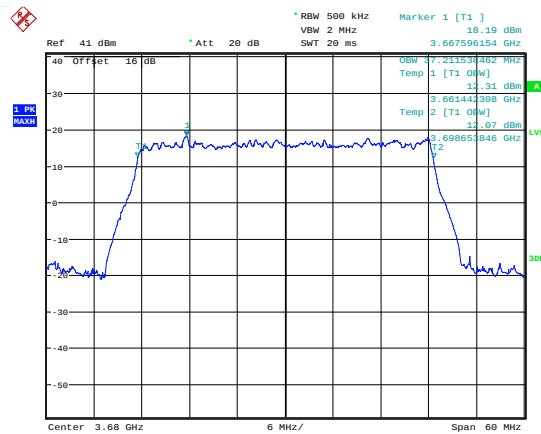
99 % Bandwidth; 256QAM; 3675 MHz; MIMO B.

| Middle Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|---------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)                 | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3675                            | QPSK            | A    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | QPSK            | B    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 16QAM           | A    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 16QAM           | B    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 64QAM           | A    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 64QAM           | B    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 256QAM          | A    | 3656.538 | 3693.462 | 36924                | Pass   |
| 3675                            | 256QAM          | B    | 3656.538 | 3693.442 | 37020                | Pass   |



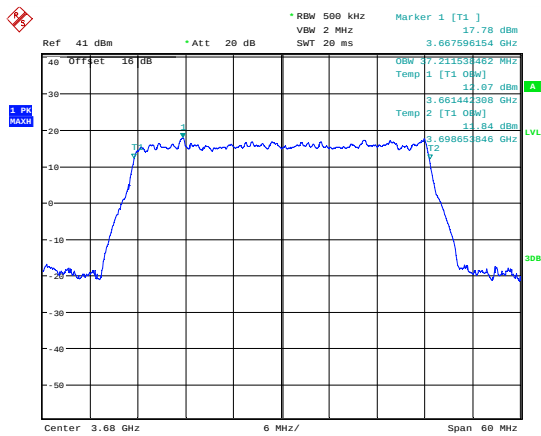
Date: 7.JUL.2018 20:24:09

99 % Bandwidth; QPSK; 3680 MHz; MIMO A.



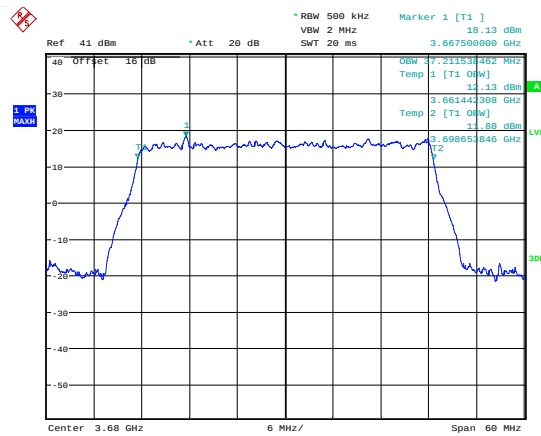
Date: 7.JUL.2018 20:26:19

99 % Bandwidth; QPSK; 3680 MHz; MIMO B.



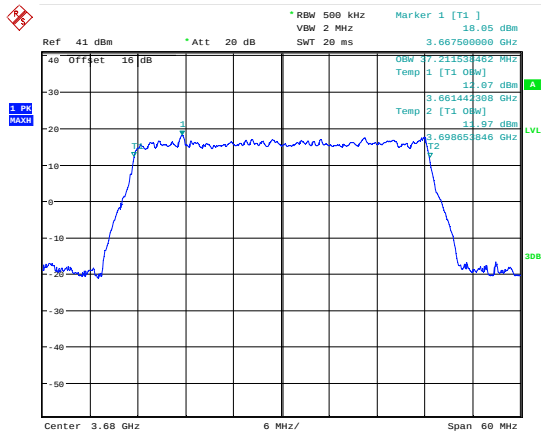
Date: 7.JUL.2018 20:24:51

99 % Bandwidth; 16QAM; 3680 MHz; MIMO A.



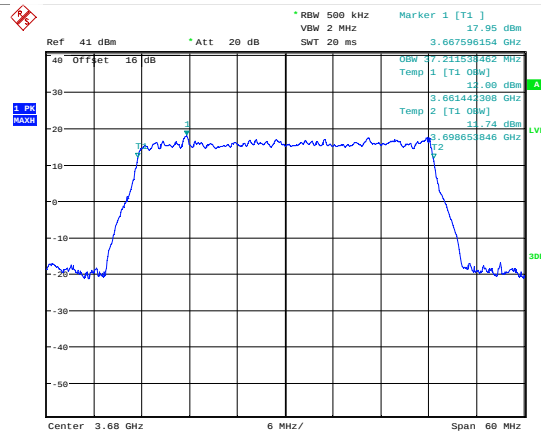
Date: 7.JUL.2018 20:26:44

99 % Bandwidth; 16QAM; 3680 MHz; MIMO B.



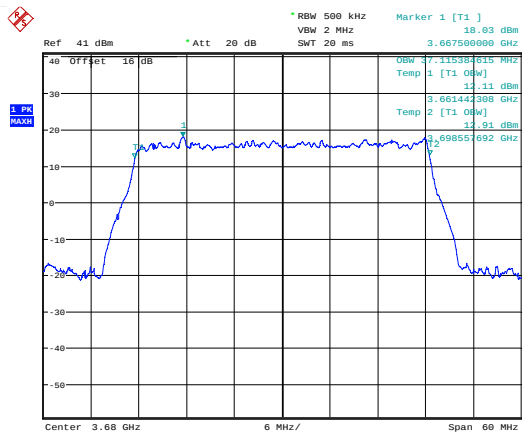
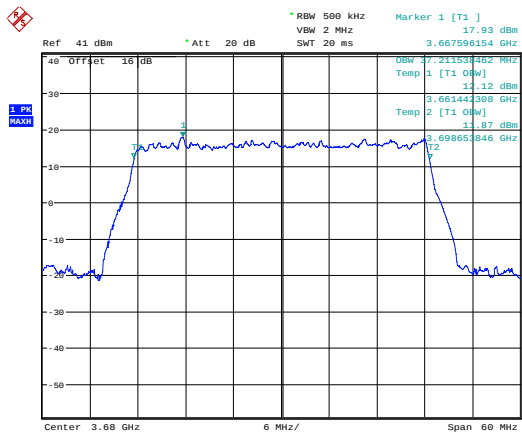
Date: 7.JUL.2018 20:25:19

99 % Bandwidth; 64QAM; 3680 MHz; MIMO A.



Date: 7.JUL.2018 20:27:14

99 % Bandwidth; 64QAM; 3680 MHz; MIMO B.



Date: 7.JUL.2018 20:25:55

Date: 7.JUL.2018 20:27:47

99 % Bandwidth; 256QAM; 3680 MHz; MIMO A.

99 % Bandwidth; 256QAM; 3680 MHz; MIMO B.

| Top Channel 40 MHz bandwidth |                 |      |          |          |                      |        |
|------------------------------|-----------------|------|----------|----------|----------------------|--------|
| Frequency (MHz)              | Modulation Mode | MIMO | FL (MHz) | FH (MHz) | 99 % Bandwidth (kHz) | Result |
| 3680                         | QPSK            | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | QPSK            | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 16QAM           | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 16QAM           | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 64QAM           | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 64QAM           | B    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 256QAM          | A    | 3661.442 | 3698.654 | 37212                | Pass   |
| 3680                         | 256QAM          | B    | 3661.442 | 3698.557 | 37115                | Pass   |

## 13 Emission Mask

### 13.1 Definition

#### *Out-of-band emission.*

Emission on a frequency or frequencies immediately outside the necessary bandwidth that results from the modulation process but excluding spurious emissions.

#### *Spurious emission.*

Emission on a frequency or frequencies that are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, but exclude out-of-band emissions.

### 13.2 Test Parameters

|                                                              |                          |
|--------------------------------------------------------------|--------------------------|
| Test Location:                                               | Element Skelmersdale     |
| Test Chamber:                                                | Radio Chamber            |
| Test Standard and Clause:                                    | Part 90.210              |
| EUT Channels:                                                | Low / Mid / High         |
| EUT Channel Bandwidths:                                      | 5 MHz, 20 MHz and 40 MHz |
| Deviations From Standard:                                    | None                     |
| Measurement BW:                                              | 100 kHz                  |
| Spectrum Analyzer Video BW:<br>(requirement at least 3x RBW) | 1 MHz                    |
| Measurement Detector:                                        | RMS                      |

### Environmental Conditions (Normal Environment)

|                    |                                  |
|--------------------|----------------------------------|
| Temperature: 24 °C | +15 °C to +35 °C (as declared)   |
| Humidity: 60 % RH  | 20 % RH to 75 % RH (as declared) |
| Supply: 48 V dc    | 48 V dc (as declared)            |

### 13.3 Test Limit

*Emission Mask B.* For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

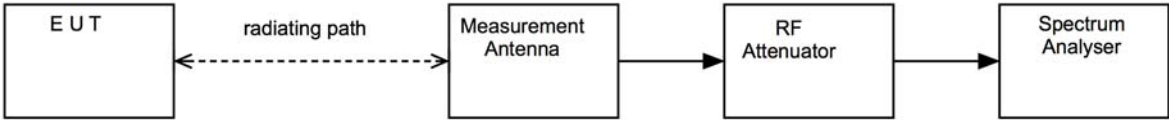
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

13.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure v, the emissions from the EUT were measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure v Test Setup



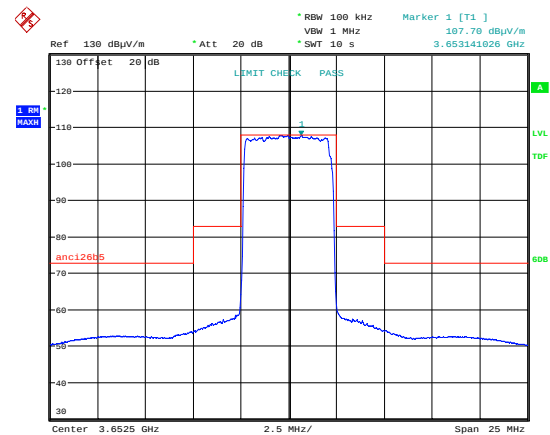
13.5 Test Equipment

| Equipment Type | Manufacturer | Equipment Description | Element No | Due For Calibration |
|----------------|--------------|-----------------------|------------|---------------------|
| 3115           | EMCO         | 1-18GHz Horn          | L139       | 2019-09-25          |
| FSU50          | R&S          | Spectrum Analyser     | U544       | 2019-05-22          |

13.6 Test Results

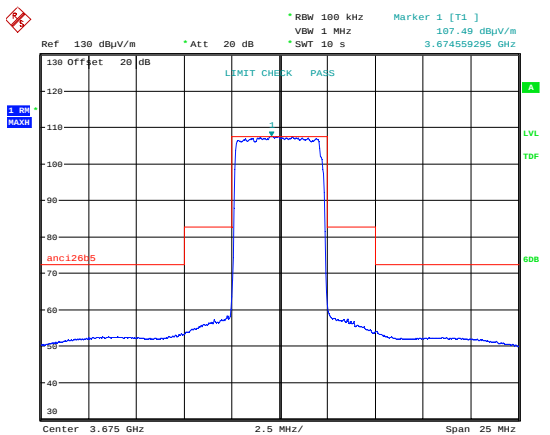
| GUI Power settings 5 MHz Bandwidth |                |                |             |
|------------------------------------|----------------|----------------|-------------|
| Transmission Mode                  | Bottom Channel | Middle Channel | Top Channel |
| Beamforming                        | 34.5           | 34.5           | 34.5        |
| Sector                             | 33             | 33             | 33          |
| MU-MIMO                            | 33             | 33             | 33          |

Beamforming 5 MHz Emission Mask



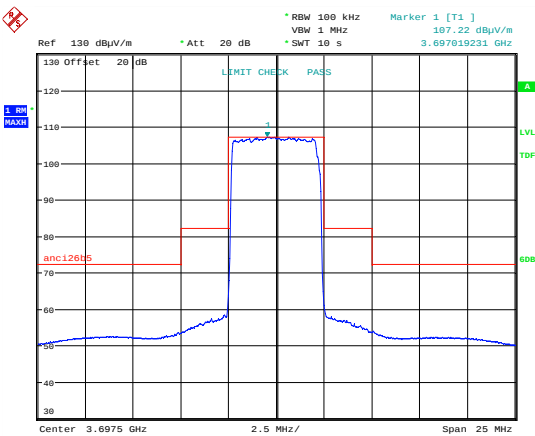
Date: 8.JUL.2018 21:11:05

Emission Mask; QPSK; 3652.5 MHz; MIMO A.



Date: 8.JUL.2018 21:03:13

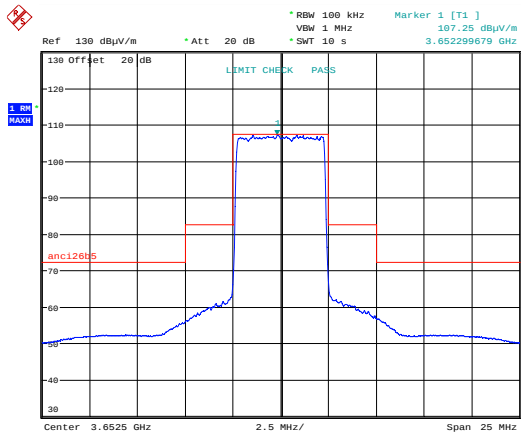
Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 21:12:22

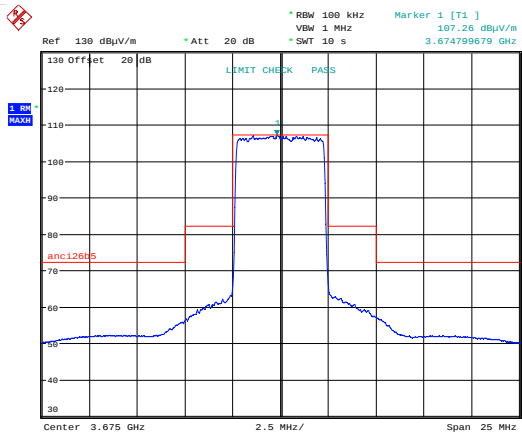
Emission Mask; QPSK; 3697.5 MHz; MIMO A.

Sector 5 MHz Emission Mask



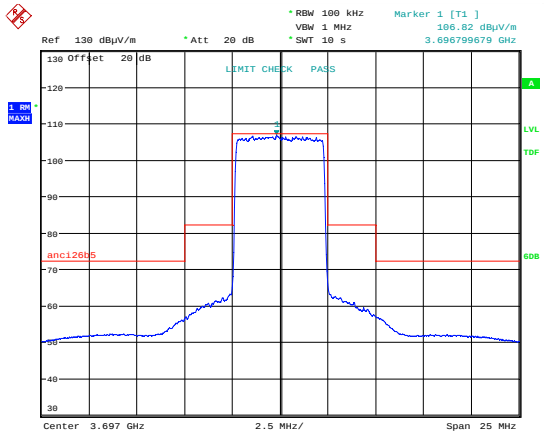
Date: 8.JUL.2018 20:54:36

Emission Mask; QPSK; 3652.5 MHz; MIMO A.



Date: 8.JUL.2018 22:33:08

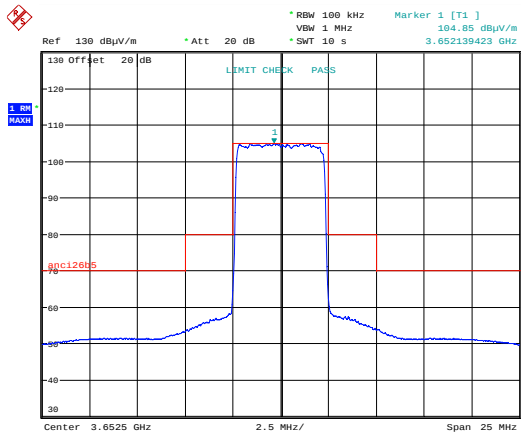
Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 22:34:06

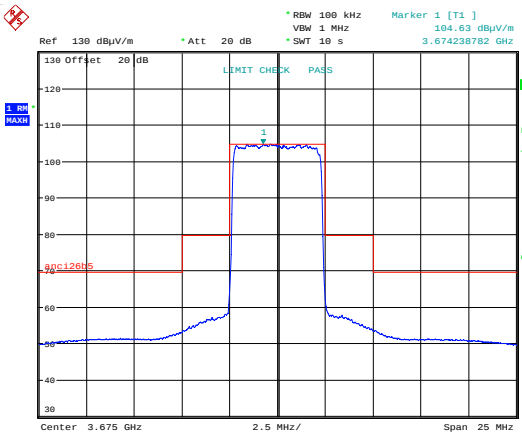
Emission Mask; QPSK; 3697.5 MHz; MIMO A.

MU-MIMO 5 MHz Emission Mask



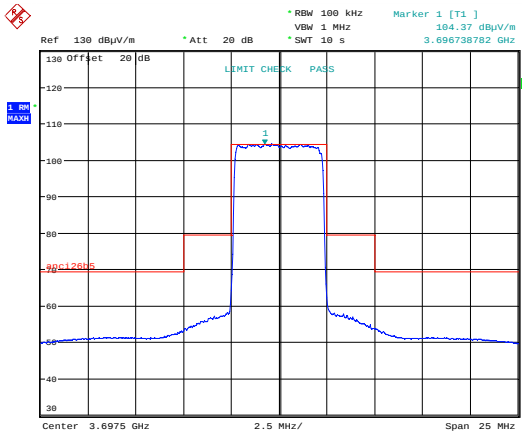
Date: 8.JUL.2018 21:26:09

Emission Mask; QPSK; 3652.5 MHz; MIMO A.



Date: 8.JUL.2018 21:22:22

Emission Mask; QPSK; 3675 MHz; MIMO A.

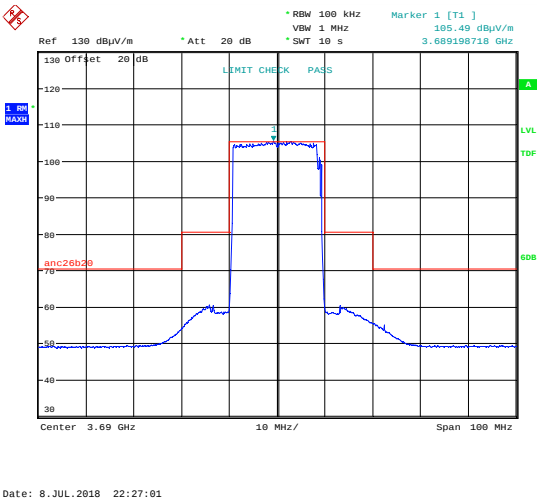
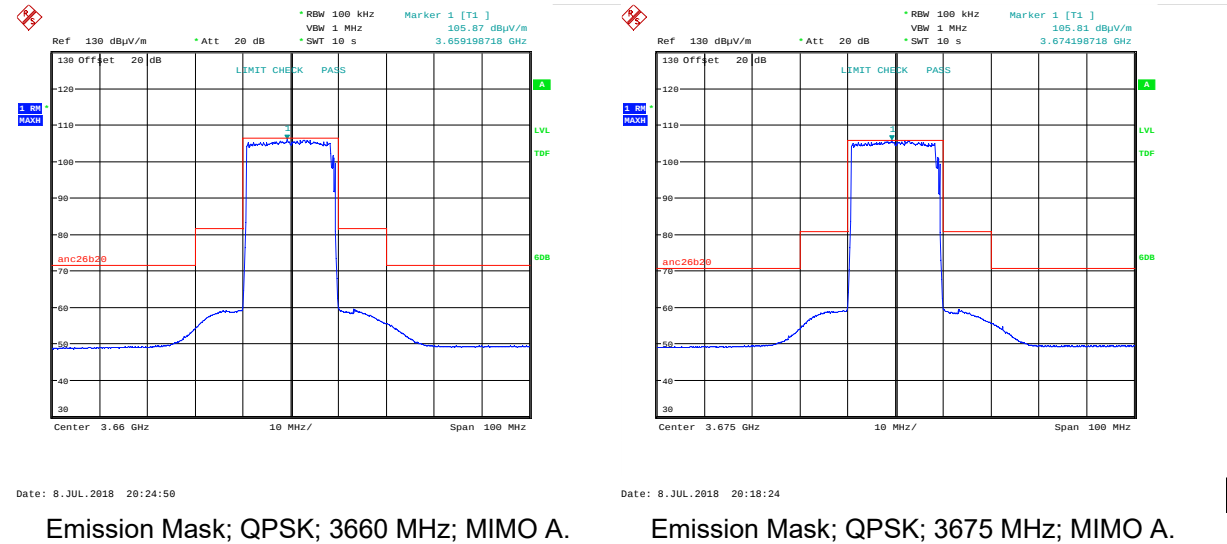


Date: 8.JUL.2018 21:20:41

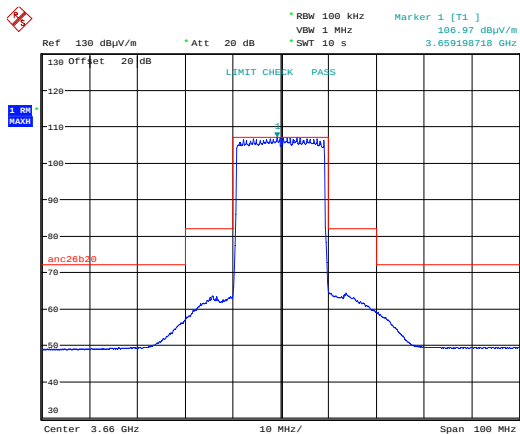
Emission Mask; QPSK; 3697.5 MHz; MIMO A.

| GUI Power settings 20 MHz Bandwidth |                |                |             |
|-------------------------------------|----------------|----------------|-------------|
| Transmission Mode                   | Bottom Channel | Middle Channel | Top Channel |
| Beamforming                         | 38.5           | 38.5           | 38.5        |
| Sector                              | 38.5           | 38.5           | 38.5        |
| MU-MIMO                             | 38.5           | 38.5           | 38.5        |

Beamforming 20 MHz Emission Mask

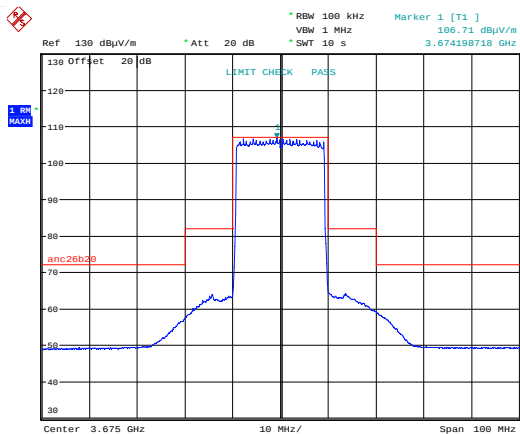


Sector 20 MHz Emission Mask



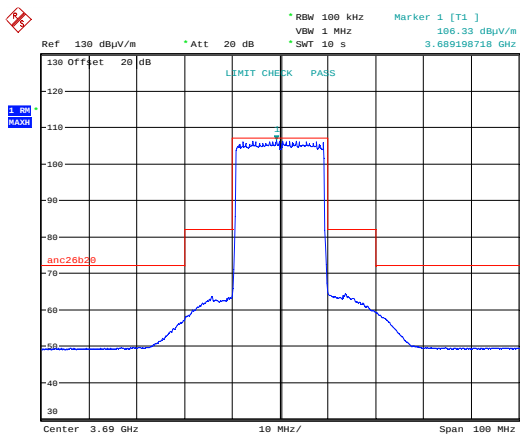
Date: 8.JUL.2018 20:06:05

Emission Mask; QPSK; 3660 MHz; MIMO A.



Date: 8.JUL.2018 20:08:37

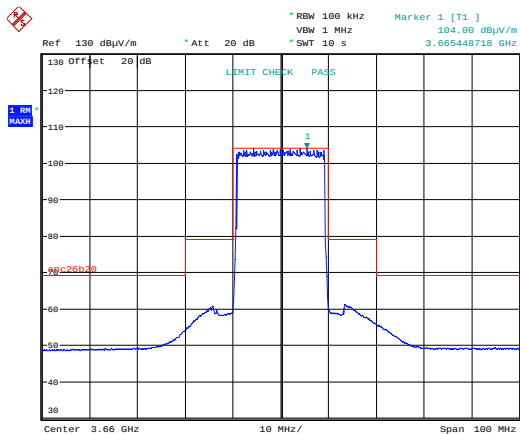
Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 20:09:59

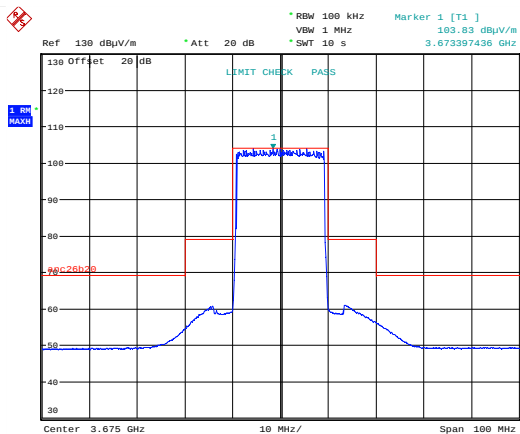
Emission Mask; QPSK; 3690 MHz; MIMO A.

MU-MIMO 20 MHz Emission Mask



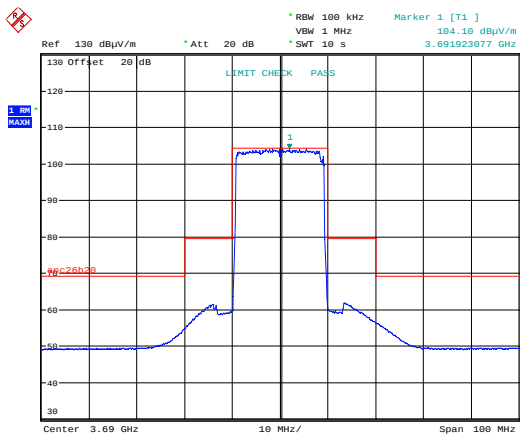
Date: 8.JUL.2018 22:17:46

Emission Mask; QPSK; 3660 MHz; MIMO A.



Date: 8.JUL.2018 22:20:04

Emission Mask; QPSK; 3675 MHz; MIMO A.

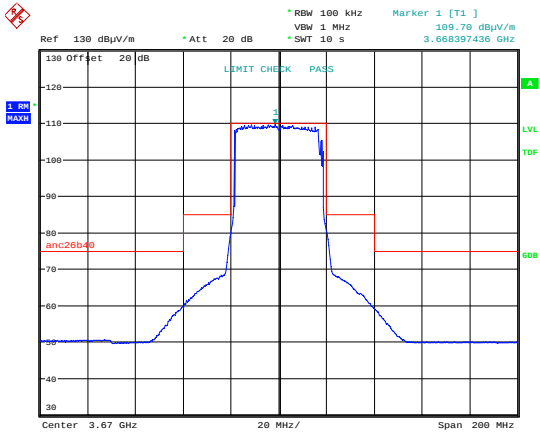


Date: 8.JUL.2018 20:39:39

Emission Mask; QPSK; 3690 MHz; MIMO A.

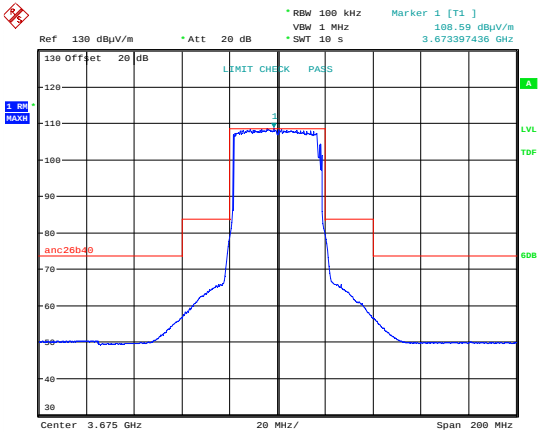
| GUI Power settings 40 MHz Bandwidth |                |                |             |
|-------------------------------------|----------------|----------------|-------------|
| Transmission Mode                   | Bottom Channel | Middle Channel | Top Channel |
| Beamforming                         | 46             | 45             | 45          |
| Sector                              | 43.6           | 41.5           | 40.5        |
| MU-MIMO                             | 42             | 42             | 41.5        |

Beamforming 40 MHz Emission Mask



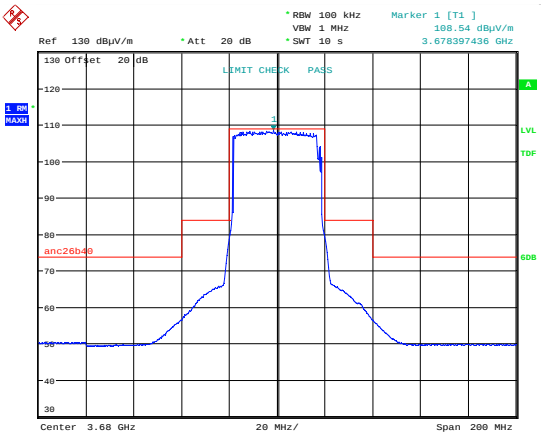
Date: 8.JUL.2018 21:48:32

Emission Mask; QPSK; 3670 MHz; MIMO A.



Date: 8.JUL.2018 21:46:01

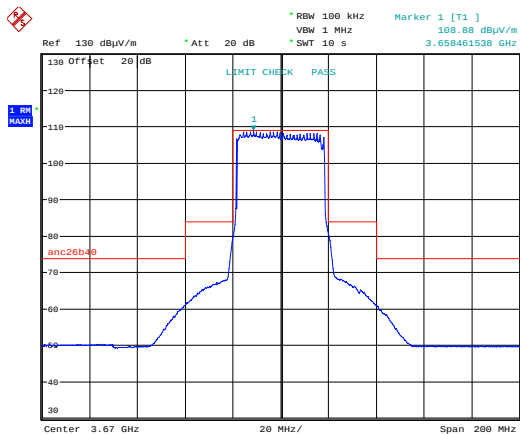
Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 21:44:30

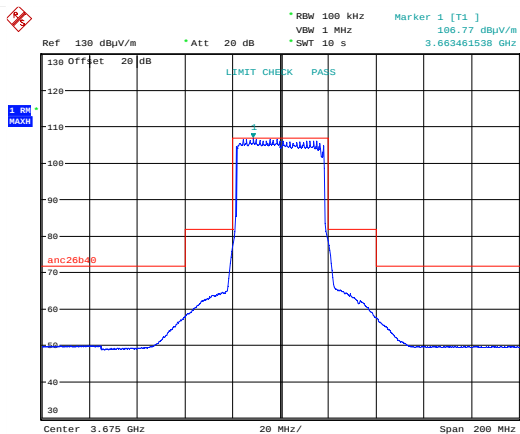
Emission Mask; QPSK; 3680 MHz; MIMO A.

Sector 40 MHz Emission Mask



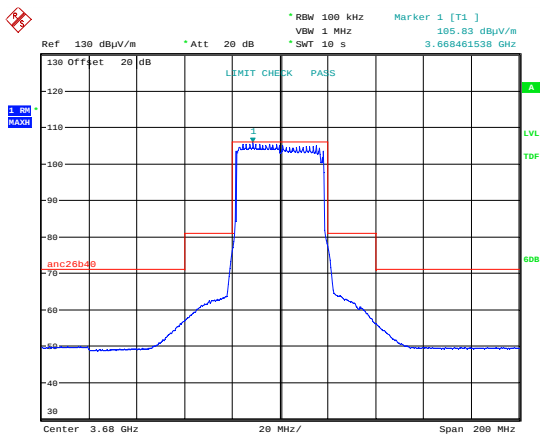
Date: 8.JUL.2018 21:33:58

Emission Mask; QPSK; 3670 MHz; MIMO A.



Date: 8.JUL.2018 21:36:28

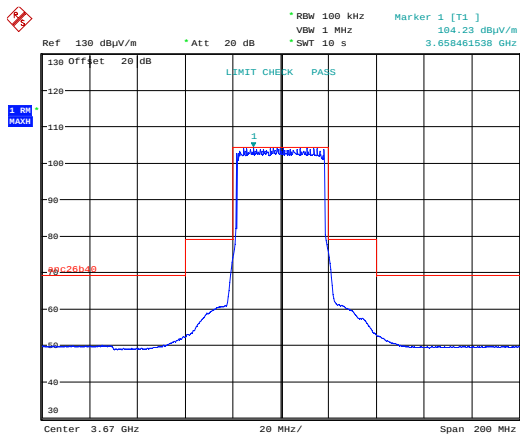
Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 21:38:53

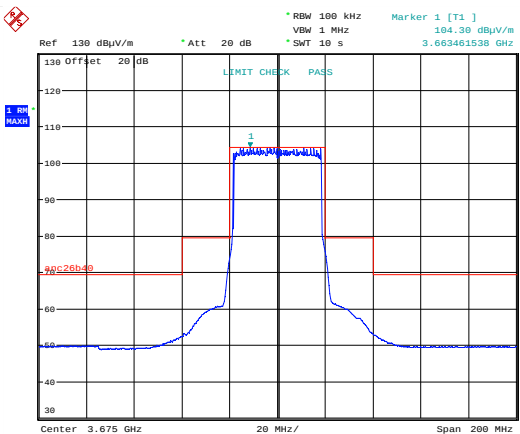
Emission Mask; QPSK; 3680 MHz; MIMO A.

MU-MIMO 40 MHz Emission Mask



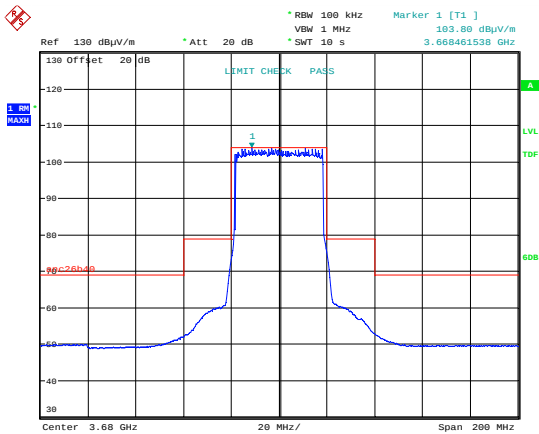
Date: 8.JUL.2018 21:53:33

Emission Mask; QPSK; 3670 MHz; MIMO A.



Date: 8.JUL.2018 21:59:20

Emission Mask; QPSK; 3675 MHz; MIMO A.



Date: 8.JUL.2018 21:56:32

Emission Mask; QPSK; 3680 MHz; MIMO A.

14 Frequency stability

14.1 Definition

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

14.2 Test Parameters

|                                                                             |                                     |
|-----------------------------------------------------------------------------|-------------------------------------|
| Test Location:                                                              | Element Skelmersdale                |
| Test Chamber:                                                               | Blocking Laboratory                 |
| Test Standard and Clause:                                                   | 90.213                              |
| Channels / Frequencies Measured:                                            | 3652.5 MHz, 3675 MHz and 3697.5 MHz |
| Resolution Bandwidth: ( Requirement 1 % of the Occupied Channel Bandwidth): | 50 kHz; 200 kHz and 400 kHz         |
| Modulation:                                                                 | Off                                 |
| Deviations From Standard:                                                   | None                                |
| Temperature Extreme Environment Test Range:                                 | -30 to +50 C                        |
| Voltage Extreme Environment Test Range:                                     | Power = ±15% of Nominal;            |

Environmental Conditions (Normal Environment)

|                    |                                  |
|--------------------|----------------------------------|
| Temperature: 24 °C | Standard Requirement: +20 °C     |
| Humidity: 60 %RH   | 20 % RH to 75 % RH (as declared) |

14.3 Test Limit

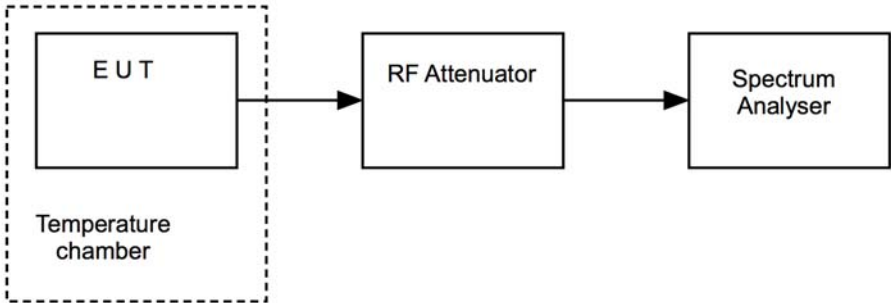
The applicant shall ensure frequency stability by showing that  $f_L$  minus the frequency offset and  $f_H$  plus the frequency offset shall be within the 3650-3700 MHz band.

14.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure v, the frequency was measured under varying conditions of temperature and supply voltage.

The measurements were performed with EUT set in a CW mode of operation.

Figure v Test Setup



14.5 Test Equipment

| Equipment Type | Manufacturer | Equipment Description | Element No | Due For Calibration |
|----------------|--------------|-----------------------|------------|---------------------|
| FSU50          | R&S          | Spectrum Analyser     | U544       | 2019-05-22          |
| 34405a         | Agilent      | Multimeter            | REF976     | 2019-01-17          |
| 52 Series II   | Fluke        | Temperature Indicator | L426       | 2019-06-18          |

## 14.6 Test Results

| <b>EUT Frequency: 3652.5 MHz</b> |                      |                                 |                              |                    |               |
|----------------------------------|----------------------|---------------------------------|------------------------------|--------------------|---------------|
| <b>Test Environment</b>          |                      | <b>Measured Frequency (MHz)</b> | <b>Frequency error (kHz)</b> | <b>Drift (ppm)</b> | <b>Result</b> |
| -30 C                            | V <sub>nominal</sub> | 3652.151923                     | 7.21                         | 1.97               | PASS          |
| -20 C                            | V <sub>nominal</sub> | 3652.150160                     | 5.45                         | 1.49               | PASS          |
| -10 C                            | V <sub>nominal</sub> | 3652.150000                     | 5.29                         | 1.45               | PASS          |
| 0 C                              | V <sub>nominal</sub> | 3652.151603                     | 6.89                         | 1.89               | PASS          |
| +10 C                            | V <sub>nominal</sub> | 3652.148397                     | 3.69                         | 1.01               | PASS          |
| +20 C                            | V <sub>minimum</sub> | 3652.144872                     | 0.16                         | 0.04               | PASS          |
|                                  | V <sub>nominal</sub> | 3652.144710                     | N/A                          | N/A                | N/A           |
|                                  | V <sub>maximum</sub> | 3652.144872                     | 0.16                         | 0.04               | PASS          |
| +30 C                            | V <sub>nominal</sub> | 3652.145673                     | 0.96                         | 0.26               | PASS          |
| +40 C                            | V <sub>nominal</sub> | 3652.145032                     | 0.32                         | 0.09               | PASS          |
| +50 C                            | V <sub>nominal</sub> | 3652.143750                     | -0.96                        | -0.26              | PASS          |

| <b>EUT Frequency: 3675 MHz</b> |                      |                                 |                              |                    |               |
|--------------------------------|----------------------|---------------------------------|------------------------------|--------------------|---------------|
| <b>Test Environment</b>        |                      | <b>Measured Frequency (MHz)</b> | <b>Frequency error (kHz)</b> | <b>Drift (ppm)</b> | <b>Result</b> |
| -30 C                          | V <sub>nominal</sub> | 3674.652083                     | 7.21                         | 1.96               | PASS          |
| -20 C                          | V <sub>nominal</sub> | 3674.650321                     | 5.45                         | 1.48               | PASS          |
| -10 C                          | V <sub>nominal</sub> | 3674.64984                      | 4.97                         | 1.35               | PASS          |
| 0 C                            | V <sub>nominal</sub> | 3674.651923                     | 7.05                         | 1.92               | PASS          |
| +10 C                          | V <sub>nominal</sub> | 3674.648397                     | 3.53                         | 0.96               | PASS          |
| +20 C                          | V <sub>minimum</sub> | 3674.644551                     | -0.32                        | -0.09              | PASS          |
|                                | V <sub>nominal</sub> | 3674.644870                     | N/A                          | N/A                | N/A           |
|                                | V <sub>maximum</sub> | 3674.644551                     | -0.32                        | -0.09              | PASS          |
| +30 C                          | V <sub>nominal</sub> | 3674.646314                     | 1.44                         | 0.39               | PASS          |
| +40 C                          | V <sub>nominal</sub> | 3674.644551                     | -0.32                        | -0.09              | PASS          |
| +50 C                          | V <sub>nominal</sub> | 3674.644231                     | -0.64                        | -0.17              | PASS          |

| <b>EUT Frequency: 3697.5</b> |                      |                                 |                              |                    |               |
|------------------------------|----------------------|---------------------------------|------------------------------|--------------------|---------------|
| <b>Test Environment</b>      |                      | <b>Measured Frequency (MHz)</b> | <b>Frequency error (kHz)</b> | <b>Drift (ppm)</b> | <b>Result</b> |
| -30 C                        | V <sub>nominal</sub> | 3697.151923                     | 7.21                         | 1.95               | PASS          |
| -20 C                        | V <sub>nominal</sub> | 3697.150321                     | 5.61                         | 1.52               | PASS          |
| -10 C                        | V <sub>nominal</sub> | 3697.149679                     | 4.97                         | 1.34               | PASS          |
| 0 C                          | V <sub>nominal</sub> | 3697.153365                     | 8.65                         | 2.34               | PASS          |
| +10 C                        | V <sub>nominal</sub> | 3697.148077                     | 3.37                         | 0.91               | PASS          |
| +20 C                        | V <sub>minimum</sub> | 3697.144712                     | 0.00                         | 0.00               | PASS          |
|                              | V <sub>nominal</sub> | 3697.144712                     | N/A                          | N/A                | N/A           |
|                              | V <sub>maximum</sub> | 3697.145032                     | 0.32                         | 0.09               | PASS          |
| +30 C                        | V <sub>nominal</sub> | 3697.147436                     | 2.72                         | 0.74               | PASS          |
| +40 C                        | V <sub>nominal</sub> | 3697.144551                     | -0.16                        | -0.04              | PASS          |
| +50 C                        | V <sub>nominal</sub> | 3697.144551                     | -0.16                        | -0.04              | PASS          |

| <b>In band checking</b>                   |          |             |                                           |
|-------------------------------------------|----------|-------------|-------------------------------------------|
| F <sub>L</sub> total 5 MHz                | 3650.156 | 3699.843    | F <sub>H</sub> total 5 MHz                |
| F <sub>L</sub> total 20 MHz               | 3650.673 | 3699.134    | F <sub>H</sub> total 20 MHz               |
| F <sub>L</sub> total 40 MHz               | 3651.25  | 3698.654    | F <sub>H</sub> total 40 MHz               |
| F <sub>L</sub> total all bandwidths (MHz) | 3650.156 | 3699.843    | F <sub>H</sub> total all bandwidths (MHz) |
| F Low including drift (MHz)               | 3650.16  | 3699.851653 | F High including drift (MHz)              |
| Verdict                                   | PASS     | PASS        | Verdict                                   |

15 Peak EIRP Density and Equivalent Isotropically Radiated Power (EIRP)

15.1 Definition

The power per unit bandwidth.

15.2 Test Parameters

|                                                              |                          |
|--------------------------------------------------------------|--------------------------|
| Test Location:                                               | Pershore Airfield        |
| Test Chamber:                                                | Air field                |
| Test Standard and Clause:                                    | Part 90.1321             |
| EUT Channels / Frequencies Measured:                         | Low / Mid / High         |
| EUT Channel Bandwidths:                                      | 5 MHz, 20 MHz and 40 MHz |
| Deviations From Standard:                                    | None                     |
| Measurement BW:                                              | 1 MHz                    |
| Spectrum Analyzer Video BW:<br>(requirement at least 3x RBW) | 3 MHz                    |
| Measurement Detector:                                        | Peak                     |

Environmental Conditions (Normal Environment)

|                    |                                  |
|--------------------|----------------------------------|
| Temperature: 20 °C | +15 °C to +35 °C (as declared)   |
| Humidity: 50 % RH  | 20 % RH to 75 % RH (as declared) |
| Supply: 48 V dc    | 48 V dc (as declared)            |

15.3 Test Limit

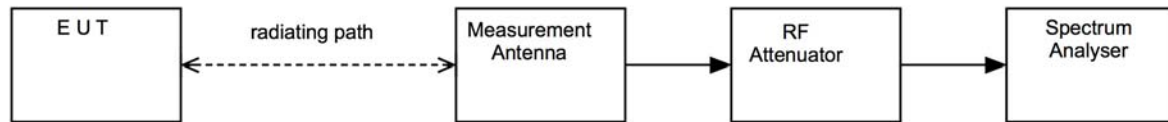
Base and fixed stations are limited to 25 watts/25 MHz equivalent isotropically radiated power (EIRP). In any event, the peak EIRP power density shall not exceed 1 Watt in any one-megahertz slice of spectrum.

### 15.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure vi, the peak emission of the EUT was measured on a spectrum analyser, with path losses taken into account.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

**Figure vi Test Setup**



### 15.5 Test Equipment

| Equipment Type | Manufacturer | Equipment Description | Element No | Due For Calibration |
|----------------|--------------|-----------------------|------------|---------------------|
| 3115           | EMCO         | 1-18GHz Horn          | U223       | 2019-10-25          |
| FSU50          | R&S          | Spectrum Analyser     | U544       | 2019-05-22          |
| 3161           | EMCO         | 2- 4 GHz Horn         | 9910-1058  | 2019-02-18          |

**15.6 Test Results – Peak EIRP Density**

| <b>Bottom channel; Bandwidth: 5 MHz;</b> |                        |                   |             |                                  |                      |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3652.5                                   | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3652.5                                   | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3652.5                                   | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |

| <b>Middle channel; Bandwidth: 5 MHz</b> |                        |                   |             |                                  |                      |               |
|-----------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>          | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3675                                    | Sector                 | QPSK              | A           | 0.8                              | 1                    | PASS          |
| 3675                                    |                        |                   | B           | 0.9                              | 1                    | PASS          |
| 3675                                    | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                    | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                    | Sector                 | 16QAM             | A           | 0.8                              | 1                    | PASS          |
| 3675                                    |                        |                   | B           | 0.8                              | 1                    | PASS          |
| 3675                                    | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                    | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                    | Sector                 | 64QAM             | A           | 0.8                              | 1                    | PASS          |
| 3675                                    |                        |                   | B           | 0.8                              | 1                    | PASS          |
| 3675                                    | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                    | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                    | Sector                 | 256QAM            | A           | 0.8                              | 1                    | PASS          |
| 3675                                    |                        |                   | B           | 0.8                              | 1                    | PASS          |
| 3675                                    | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                    | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |

| <b>Top channel; Bandwidth: 5 MHz</b> |                        |                   |             |                                  |                      |               |
|--------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>       | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3697.5                               | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3697.5                               | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3697.5                               | Beamforming            |                   | A           | 1                                | 1                    | PASS          |

| <b>Bottom channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                      |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3660                                     | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3660                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3660                                     | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |

| <b>Middle channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                      |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3675                                     | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Sector                 | 16QAM             | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Sector                 | 64QAM             | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Sector                 | 256QAM            | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |

| <b>Top channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                      |               |
|---------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>        | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3690                                  | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3690                                  | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3690                                  | Beamforming            |                   | A           | 0.9                              | 1                    | PASS          |

| <b>Bottom channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                      |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3670                                     | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3670                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3670                                     | Beamforming            |                   | A           | 1                                | 1                    | PASS          |

| <b>Middle channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                      |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3675                                     | Sector                 | QPSK              | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Sector                 | 16QAM             | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Sector                 | 64QAM             | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 1                    | PASS          |
| 3675                                     | Sector                 | 256QAM            | A           | 1                                | 1                    | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 1                    | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 1                    | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 1                    | PASS          |

| <b>Top channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                      |               |
|---------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------|---------------|
| <b>Channel Frequency (MHz)</b>        | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>Limit (W/MHz)</b> | <b>Result</b> |
| 3680                                  | Sector                 | QPSK              | A           | 0.9                              | 1                    | PASS          |
| 3680                                  | MU-MIMO                |                   | A           | 1                                | 1                    | PASS          |
| 3680                                  | Beamforming            |                   | A           | 0.8                              | 1                    | PASS          |

### 15.7 Test Results – Equivalent Isotropic Radiated Power (EIRP)

| Bottom channel; Bandwidth: 5 MHz |                 |            |      |                           |                                |                |                 |        |
|----------------------------------|-----------------|------------|------|---------------------------|--------------------------------|----------------|-----------------|--------|
| Channel Frequency (MHz)          | Transition Mode | Modulation | MIMO | Peak EIRP Density (W/MHz) | 1 MHz to 5 MHz Correction (dB) | EIRP (W/25MHz) | Limit (W/25MHz) | Result |
| 3652.5                           | Sector          | QPSK       | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3652.5                           | MU-MIMO         |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3652.5                           | Beamforming     |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |

| Middle channel; Bandwidth: 5 MHz |                 |            |      |                           |                                |                |                 |        |
|----------------------------------|-----------------|------------|------|---------------------------|--------------------------------|----------------|-----------------|--------|
| Channel Frequency (MHz)          | Transition Mode | Modulation | MIMO | Peak EIRP Density (W/MHz) | 1 MHz to 5 MHz Correction (dB) | EIRP (W/25MHz) | Limit (W/25MHz) | Result |
| 3675                             | Sector          | QPSK       | A    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             |                 |            | B    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |
| 3675                             | MU-MIMO         |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3675                             | Beamforming     |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |
| 3675                             | Sector          | 16QAM      | A    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             |                 |            | B    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             | MU-MIMO         |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3675                             | Beamforming     |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |
| 3675                             | Sector          | 64QAM      | A    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             |                 |            | B    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             | MU-MIMO         |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3675                             | Beamforming     |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |
| 3675                             | Sector          | 256QAM     | A    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             |                 |            | B    | 0.8                       | 7.0                            | 4.0            | 25              | PASS   |
| 3675                             | MU-MIMO         |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3675                             | Beamforming     |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |

| Bottom channel; Bandwidth: 5 MHz |                 |            |      |                           |                                |                |                 |        |
|----------------------------------|-----------------|------------|------|---------------------------|--------------------------------|----------------|-----------------|--------|
| Channel Frequency (MHz)          | Transition Mode | Modulation | MIMO | Peak EIRP Density (W/MHz) | 1 MHz to 5 MHz Correction (dB) | EIRP (W/25MHz) | Limit (W/25MHz) | Result |
| 3697.5                           | Sector          | QPSK       | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |
| 3697.5                           | MU-MIMO         |            | A    | 0.9                       | 7.0                            | 4.5            | 25              | PASS   |
| 3697.5                           | Beamforming     |            | A    | 1                         | 7.0                            | 5.0            | 25              | PASS   |

| <b>Bottom channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 20 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3660                                     | Sector                 | QPSK              | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3660                                     | MU-MIMO                |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |
| 3660                                     | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |

| <b>Middle channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 20 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3675                                     | Sector                 | QPSK              | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |
| 3675                                     | Sector                 | 16QAM             | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |
| 3675                                     | Sector                 | 64QAM             | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |
| 3675                                     | Sector                 | 256QAM            | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |

| <b>Top channel; Bandwidth: 20 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|---------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>        | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 20 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3690                                  | Sector                 | QPSK              | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3690                                  | MU-MIMO                |                   | A           | 1                                | 13.0                                   | 20.0                  | 25                     | PASS          |
| 3690                                  | Beamforming            |                   | A           | 0.9                              | 13.0                                   | 18.0                  | 25                     | PASS          |

| <b>Bottom channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 25 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3670                                     | Sector                 | QPSK              | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3670                                     | MU-MIMO                |                   | A           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3670                                     | Beamforming            |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |

| <b>Middle channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 25 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3675                                     | Sector                 | QPSK              | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     | Sector                 | 16QAM             | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     | Sector                 | 64QAM             | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     | Sector                 | 256QAM            | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3675                                     |                        |                   | B           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3675                                     | Beamforming            |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |

| <b>Top channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |                        |               |
|---------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|------------------------|---------------|
| <b>Channel Frequency (MHz)</b>        | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 25 MHz Correction (dB)</b> | <b>EIRP (W/25MHz)</b> | <b>Limit (W/25MHz)</b> | <b>Result</b> |
| 3680                                  | Sector                 | QPSK              | A           | 0.9                              | 14.0                                   | 22.5                  | 25                     | PASS          |
| 3680                                  | MU-MIMO                |                   | A           | 1                                | 14.0                                   | 25                    | 25                     | PASS          |
| 3680                                  | Beamforming            |                   | A           | 0.8                              | 14.0                                   | 20                    | 25                     | PASS          |

| <b>Bottom channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 40 MHz Correction (dB)</b> | <b>EIRP (W/40MHz)</b> |
| 3670                                     | Sector                 | QPSK              | A           | 1                                | 16.0                                   | 40                    |
| 3670                                     | MU-MIMO                |                   | A           | 0.9                              | 16.0                                   | 36                    |
| 3670                                     | Beamforming            |                   | A           | 1                                | 16.0                                   | 40                    |

| <b>Middle channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |
|------------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|
| <b>Channel Frequency (MHz)</b>           | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 40 MHz Correction (dB)</b> | <b>EIRP (W/40MHz)</b> |
| 3675                                     | Sector                 | QPSK              | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     |                        |                   | B           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | Beamforming            |                   | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     | Sector                 | 16QAM             | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     |                        |                   | B           | 1                                | 16.0                                   | 40                    |
| 3675                                     | MU-MIMO                |                   | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     | Beamforming            |                   | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     | Sector                 | 64QAM             | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     |                        |                   | B           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | Beamforming            |                   | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     | Sector                 | 256QAM            | A           | 1                                | 16.0                                   | 40                    |
| 3675                                     |                        |                   | B           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | MU-MIMO                |                   | A           | 0.9                              | 16.0                                   | 36                    |
| 3675                                     | Beamforming            |                   | A           | 1                                | 16.0                                   | 40                    |

| <b>Top channel; Bandwidth: 40 MHz</b> |                        |                   |             |                                  |                                        |                       |
|---------------------------------------|------------------------|-------------------|-------------|----------------------------------|----------------------------------------|-----------------------|
| <b>Channel Frequency (MHz)</b>        | <b>Transition Mode</b> | <b>Modulation</b> | <b>MIMO</b> | <b>Peak EIRP Density (W/MHz)</b> | <b>1 MHz to 40 MHz Correction (dB)</b> | <b>EIRP (W/40MHz)</b> |
| 3680                                  | Sector                 | QPSK              | A           | 0.9                              | 16.0                                   | 36                    |
| 3680                                  | MU-MIMO                |                   | A           | 1                                | 16.0                                   | 40                    |
| 3680                                  | Beamforming            |                   | A           | 0.8                              | 16.0                                   | 32                    |

## 16 Measurement Uncertainty

### Calculated Measurement Uncertainties

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95 % confidence:

#### [1] Radiated spurious emissions

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB**

Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

#### [2] AC power line conducted emissions

Uncertainty in test result = **3.2 dB**

#### [3] Occupied bandwidth

Uncertainty in test result = **15.58 %**

#### [4] Conducted carrier power

Uncertainty in test result (Power Meter) = **0.93 dB**

#### [5] Conducted RF power out-of-band

Uncertainty in test result – up to 8.1 GHz = **3.31 dB**

Uncertainty in test result – 8.1 GHz to 15.3 GHz = **4.43 dB**

#### [6] Radiated RF power out-of-band

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB**

Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

#### [7] Power spectral density

Uncertainty in test result (Spectrum Analyser) = **3.11 dB**

#### [8] ERP / EIRP

Uncertainty in test result (Laboratory) = **4.71 dB**

Uncertainty in test result (Pershore OATS) = **4.26 dB**