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# Report On

FCC Testing of the  
Ericsson KRD 901 060/83 (RBS 6402)  
LAA (Band 46A and 46D) Base Station In accordance with  
FCC CFR 47 Part 15E

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRD90106083



PREPARED BY

Nic Forsyth  
Senior Engineer

APPROVED BY

Simon Bennett  
Authorised Signatory

DATED

30 September 2016

Document 75934780 Report 03 Issue 5

September 2016

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Product Service

## **SECTION 1**

### **REPORT INFORMATION**

## 1.1 REPORT DETAILS

|                               |                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------|
| Manufacturer                  | Ericsson                                                                                                      |
| Address                       | Elektroniikkatie 10<br>Oulu<br>90590<br>Finland                                                               |
| Product Name                  | RBS 6402                                                                                                      |
| Product Number                | KRD 901 060/83                                                                                                |
| Serial Number(s)              | C82A516905                                                                                                    |
| Software Version              | RASW_20160516_LBT_DFE_4_5_UPDATE                                                                              |
| Hardware Version              | R1C                                                                                                           |
| Test Specification/Issue/Date | FCC CFR 47 Part 15E (2015)                                                                                    |
| Start of Test                 | 08 August 2016                                                                                                |
| Finish of Test                | 10 August 2016                                                                                                |
| Name of Engineer(s)           | N Forsyth                                                                                                     |
| Related Document(s)           | 789033 D02 General U-NII Test Procedures New Rules<br>v01r02<br>662911 D01 Multiple Transmitter Output v02r01 |

### ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15E. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

---

Nic Forsyth

**This report has been up-issued to Issue 5 and should be read in place of Issue 4. This report has been up-issued to correct the FCC ID.**

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15E is shown below.

| Section | Specification Clause |                     | Test Description       | Result |
|---------|----------------------|---------------------|------------------------|--------|
|         | FCC CFR 47 Part 2    | FCC CFR 47 Part 15E |                        |        |
| 2.1     | -                    | 15.407 (a)          | 26 dB Bandwidth        | Pass   |
| 2.2     | -                    | 15.407 (a)(1)(2)(3) | Conducted Output Power | Pass   |
| 2.3     | -                    | 15.407 (a)(5)       | Power Spectral Density | Pass   |
| 2.4     | 2.1055               | 15.407 (g)          | Frequency Stability    | Pass   |

### 1.3 CONFIGURATION DESCRIPTION

The RBS 6402 supports up to two different types of RF module.

The first type of RF module supports LAA single carrier and is capable of 2 port, single carrier MIMO operation.

The second type of RF module supports LTE single and dual carrier and is capable of 4 port, single carrier and 2 port, dual carrier MIMO operation.

The EUT also supports Test Models E-TM1.1, E-TM3.2 and E-TM3.1 as defined in 3GPP TS 36.141. Test Model E-TM1.1 was used to represent QPSK modulation only, Test Model E-TM3.2 was used to represent 16QAM modulation, and Test Model E-TM3.1 was used to represent 64QAM modulation.

The EUT was configured with both types of RF module in position 0 and 1. RF module 0 was an LTE module, transmitting in 3GPP band 7 on ports A and B. RF module 1 was an LAA module, transmitting on ports C and D.

All LAA RF ports were tested for conducted output power and results recorded using the Measure and Sum approach to account for MIMO operation. All testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

#### 1.4 DECLARATION OF BUILD STATUS

|                                      |                                                                                                                                  |                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Manufacturer                         | Ericsson AB                                                                                                                      |                                      |
| Model number(s)                      | RBS 6402                                                                                                                         |                                      |
| Identification/Type(s)               | KRD 901 060/83                                                                                                                   |                                      |
| Cabinet type(s)                      | Indoor                                                                                                                           |                                      |
| Cabinet identification(s)            | N/A                                                                                                                              |                                      |
| Number of sectors                    | 1                                                                                                                                |                                      |
| Number of carriers                   | 1                                                                                                                                |                                      |
| Base station class                   | Local Area                                                                                                                       |                                      |
| Maximum rated output power(s)        |                                                                                                                                  |                                      |
| FCC                                  | 5150-5170MHz 2 x 100mW, 5170MHz-5250MHz: 2 x 125mW, 5735MHz-5845MHz: 2 x 125mW                                                   |                                      |
| IC                                   | 5150MHz-5250MHz: 2 x 25mW, 5735MHz-5835MHz: 2 x 125mW                                                                            |                                      |
| Duplex Mode                          | FDD                                                                                                                              |                                      |
| Frequency Band                       | 5150 – 5250 MHz<br>5725 – 5875 MHz                                                                                               |                                      |
| Modulation type(s)                   | QPSK<br>16 QAM<br>64 QAM                                                                                                         |                                      |
| Channel Bandwidth(s)                 | LTE: 20MHz                                                                                                                       |                                      |
| Transmit diversity                   | Yes <sup>1</sup>                                                                                                                 |                                      |
| Receive diversity                    | Yes <sup>2</sup>                                                                                                                 |                                      |
| MIMO                                 | 2 x 1                                                                                                                            |                                      |
| ITU designation or class of emission | LTE: 17M9G7D, 17M9W7D                                                                                                            |                                      |
| Environment temperature range(s)     | Minimum<br>0 C                                                                                                                   | Maximum<br>+50 C (+40 C without fan) |
| AC Power source                      | Yes<br>Voltage Range(s)<br>Minimum VAC    Nominal VAC    Maximum VAC<br>100                      230                      240    |                                      |
| DC Power source                      | Yes (PoE)<br>Voltage Range(s)<br>Minimum VDC    Nominal VDC    Maximum VDC<br>37                      48                      58 |                                      |
| Options                              | Type                                                                                                                             | Model                                |
|                                      |                                                                                                                                  |                                      |
|                                      |                                                                                                                                  |                                      |
|                                      |                                                                                                                                  |                                      |

<sup>1</sup> Each transmitter path is declared to be equivalent.

<sup>2</sup> Each receiver path is declared to be equivalent.

I hereby declare that I am entitled to sign on behalf of the manufacturer and that the information supplied is correct and complete.

Signature: 

Name : Mika Savilakso

Position held : Senior Developer, Regulatory Approvals

Date :19.08.2016

## 1.5 PRODUCT INFORMATION

### 1.5.1 Technical Description

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.

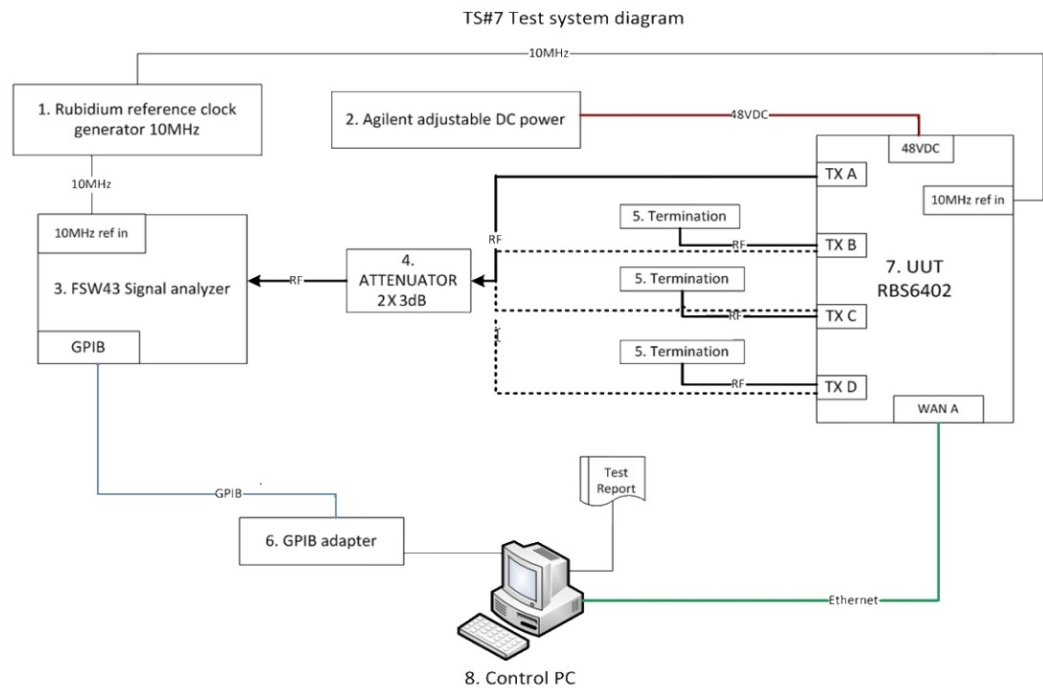


Equipment Under Test



## 1.6 TEST SETUP

### Test Setup, Conducted Measurement:



See Section 3 for a list of the test equipment used in the test.

## **1.7 TEST CONDITIONS**

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or a chamber as appropriate.

The EUT was powered from a +48V DC supply.

## **1.8 DEVIATION FROM THE STANDARD**

No deviations from the applicable test standards or test plan were made during testing.

## **1.9 MODIFICATION RECORD**

No modifications were made to the EUT during testing.

## **1.10 ALTERNATIVE TEST SITE**

Under our group UKAS Accreditation, TÜV SÜD Product Service conducted the tests at Ericsson in Oulu, Finland.



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## **SECTION 2**

### **TEST DETAILS**

## 2.1 26 DB BANDWIDTH

### 2.1.1 Specification Reference

FCC CFR 47 Part 15E, Clause 15.407 (a)

### 2.1.2 Date of Test and Modification State

08 August 2016 - Modification State 0

### 2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.4 Environmental Conditions

Ambient Temperature 23.4°C  
Relative Humidity 53.2%

### 2.1.5 Test Method

All measurements were made in accordance with FCC KDB 789033 D02 sections II.C.1, II.C.2 and II.D.

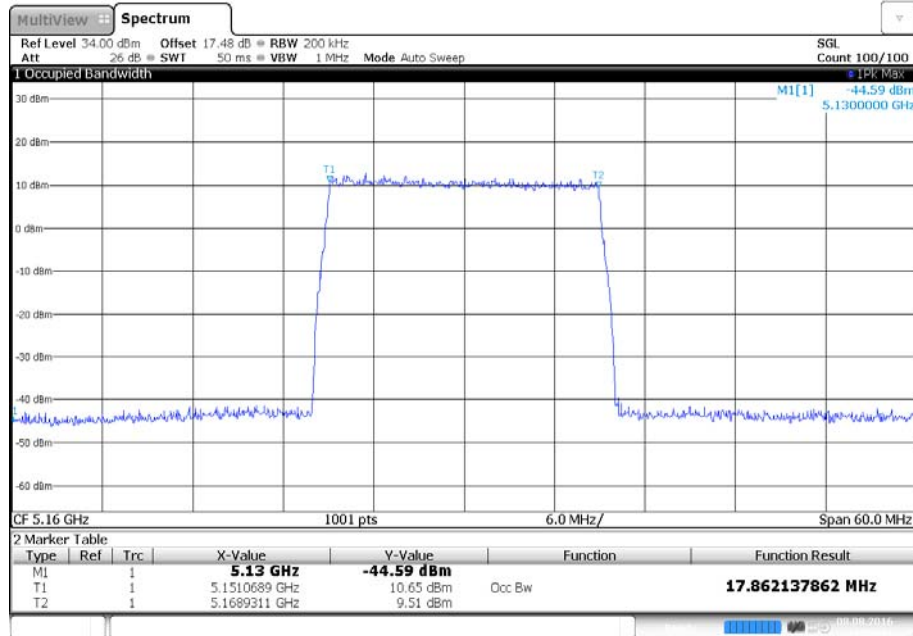
### 2.1.6 Test Results

Configuration A

Maximum Output Power Per Carrier 21 dBm

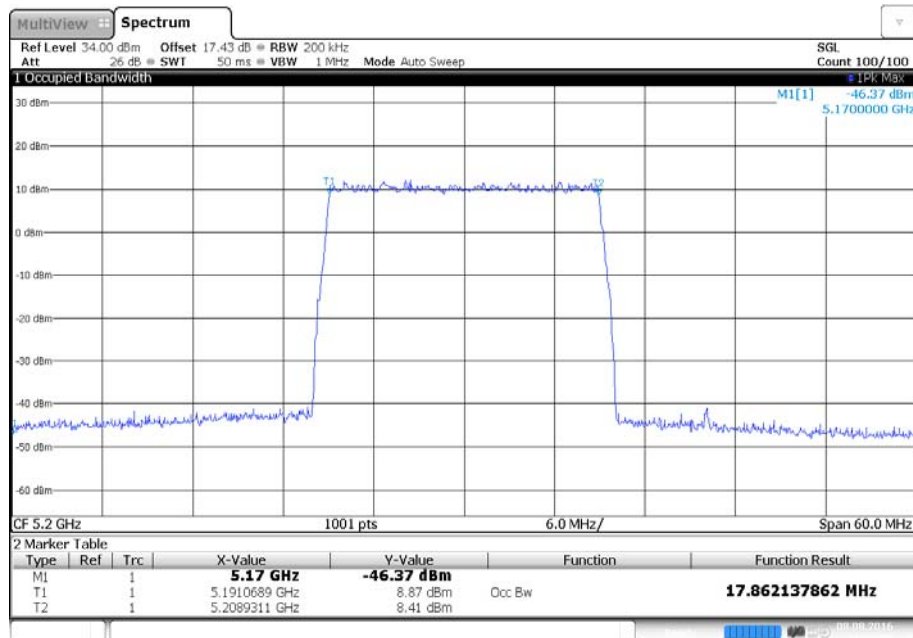
| Modulation | Carrier Bandwidth | Result (MHz)  |                  |               |                  |               |                  |
|------------|-------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|            |                   | 5160 MHz      |                  | 5200 MHz      |                  | 5240 MHz      |                  |
|            |                   | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth |
| QPSK       | 20.0 MHz          | 17.86         | 19.24            | 17.86         | 19.30            | 17.86         | 19.24            |
| 16QAM      | 20.0 MHz          | 17.92         | 19.18            | 17.86         | 19.24            | 17.92         | 19.24            |
| 64QAM      | 20.0 MHz          | 17.92         | 19.24            | 17.92         | 19.18            | 17.86         | 19.24            |

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW



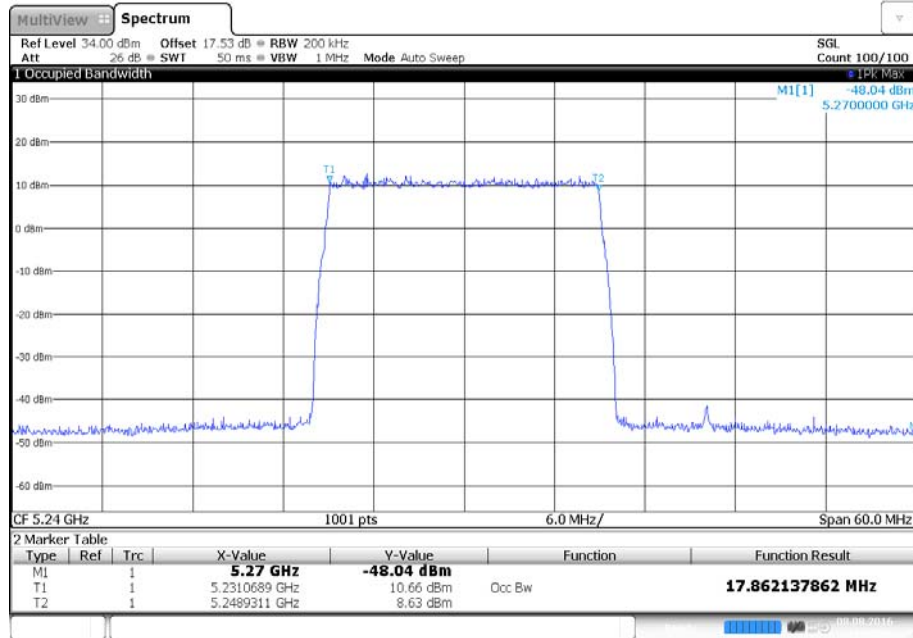
16:00:14 08.08.2016

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



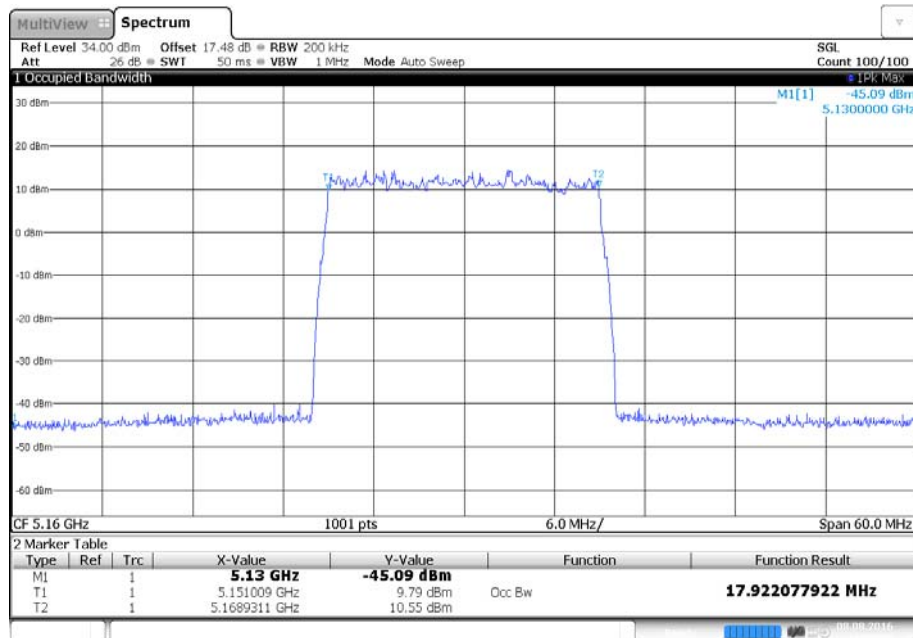
16:01:59 08.08.2016

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW



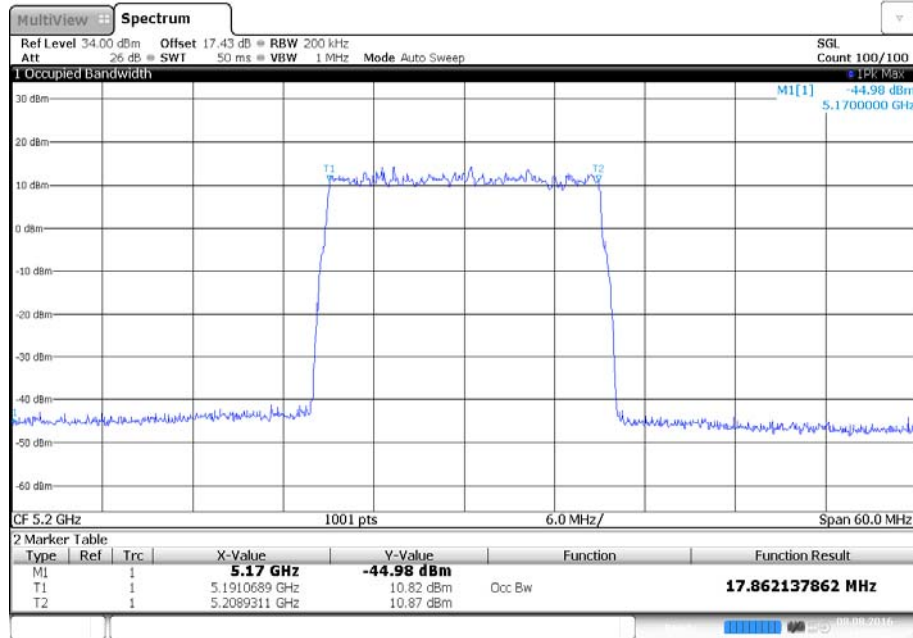
16:03:42 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW



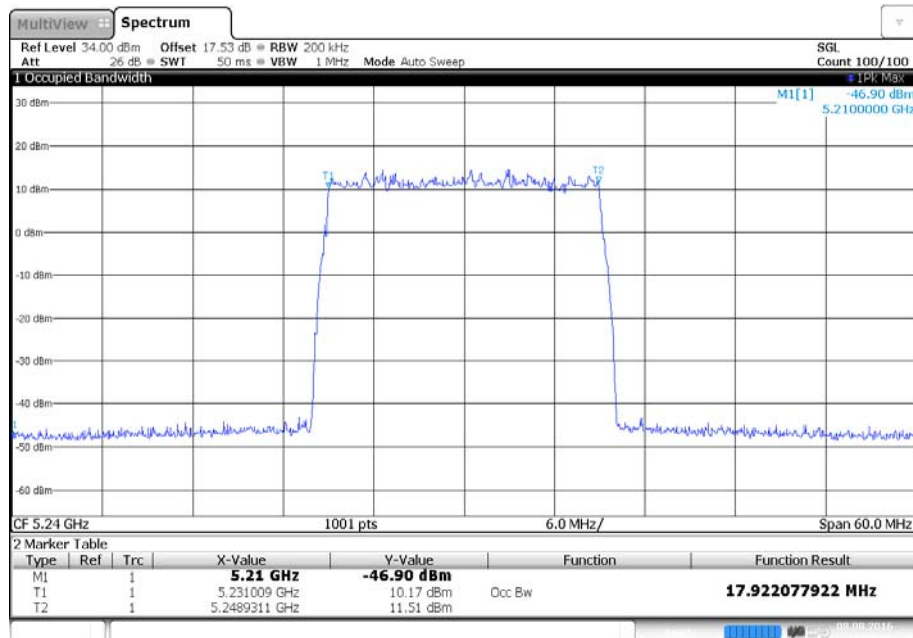
16:53:28 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



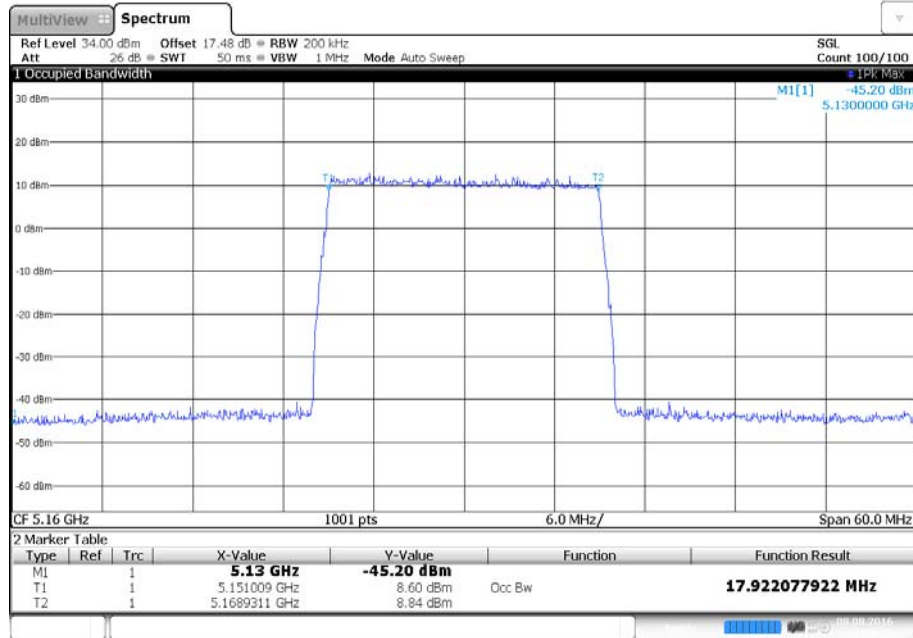
16:55:13 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW



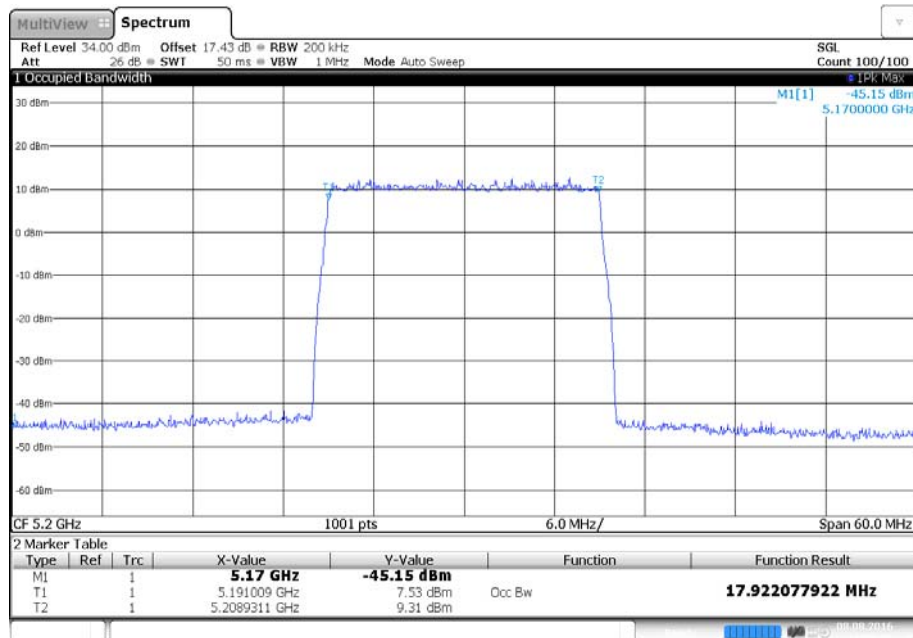
16:56:57 08.08.2016

Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW



16:26:52 08.08.2016

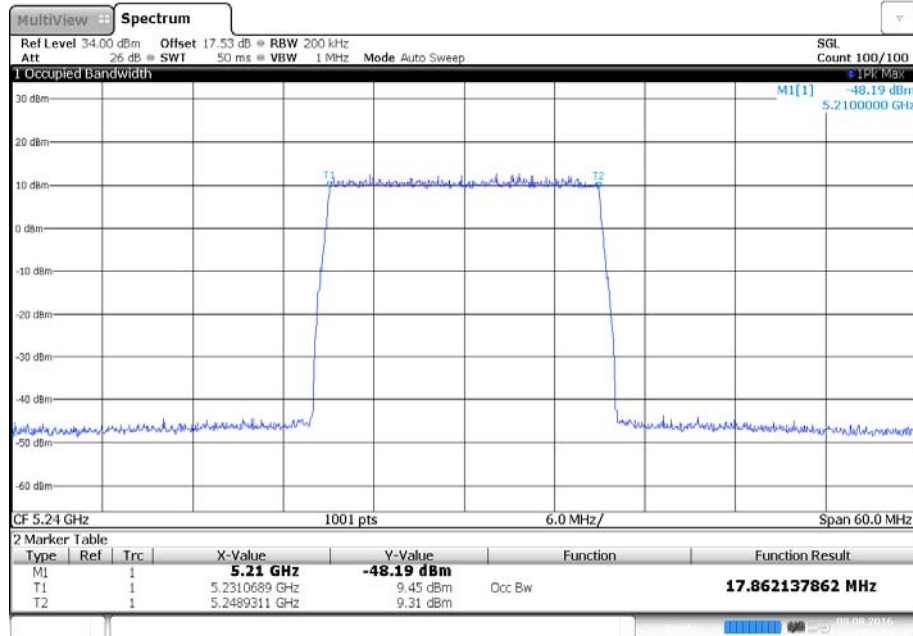
Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



16:28:37 08.08.2016

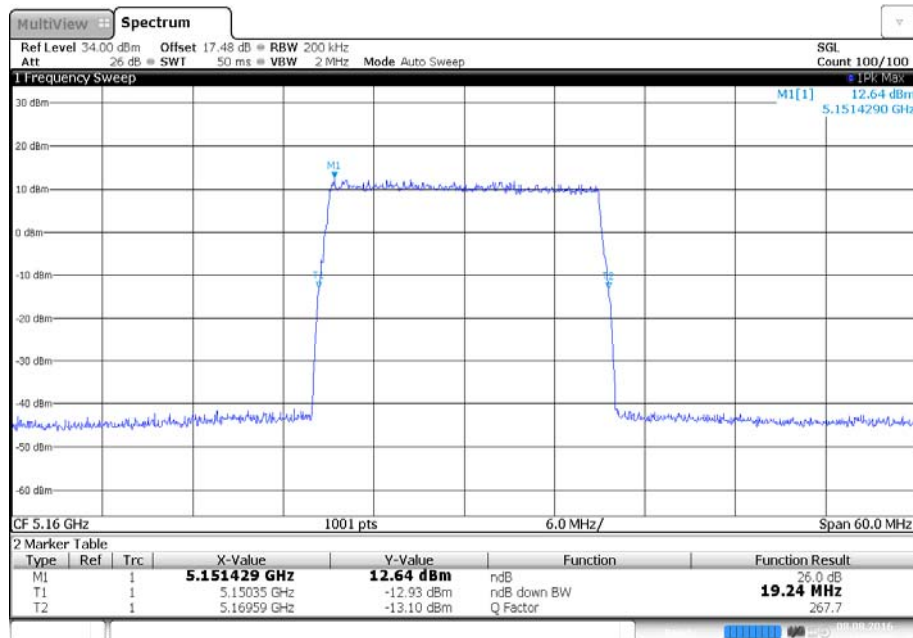


Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW



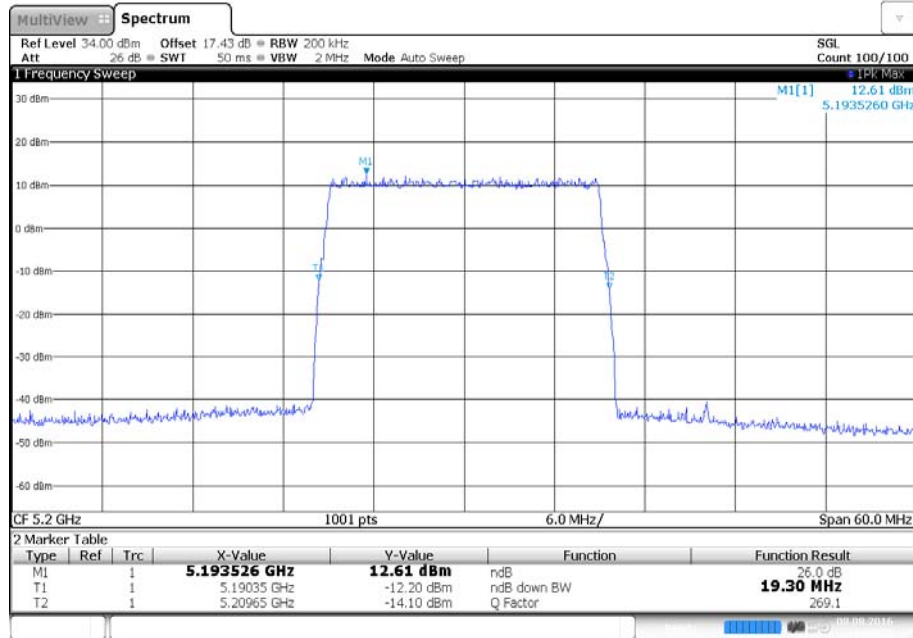
16:30:21 08.08.2016

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW



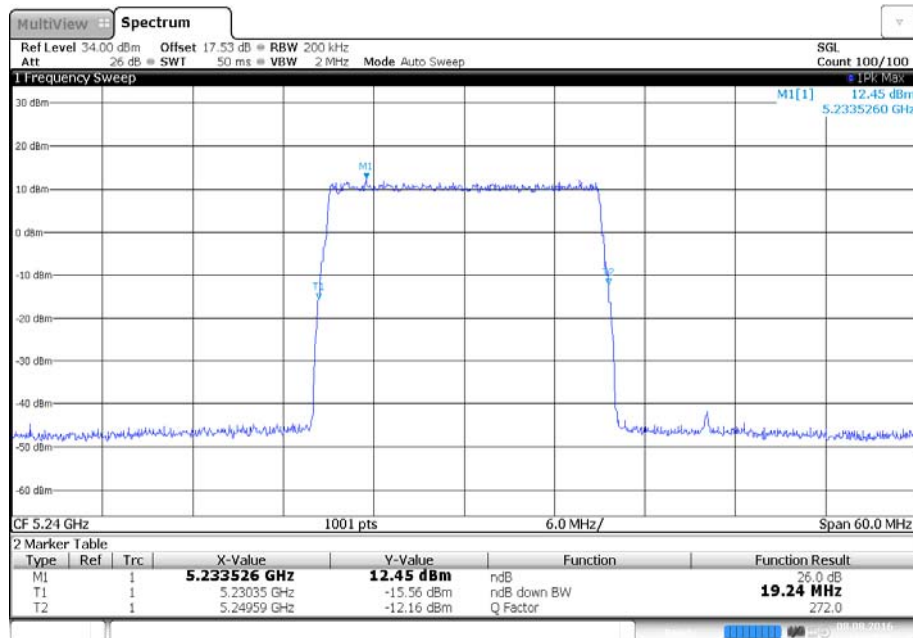
16:00:29 08.08.2016

## Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW



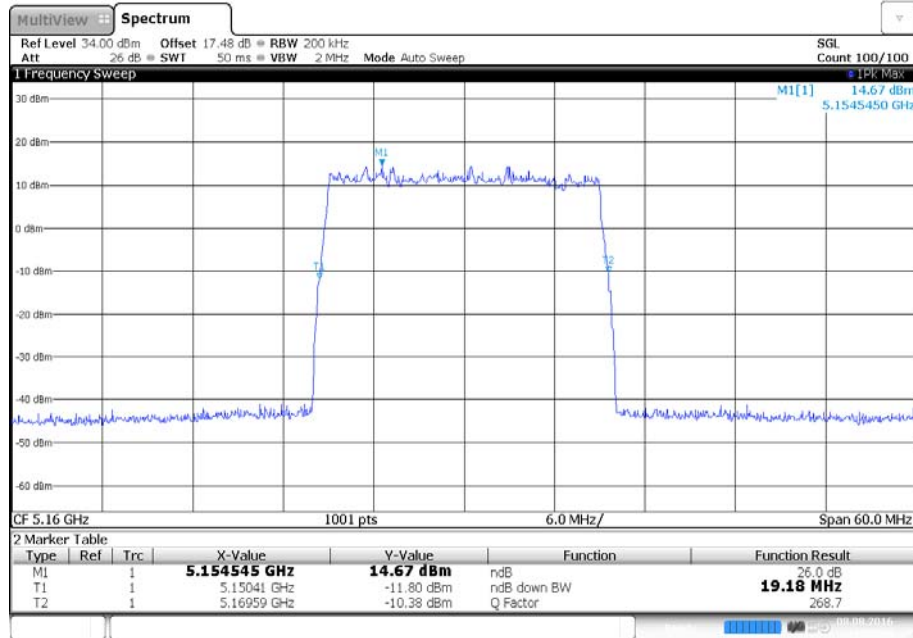
16:02:14 08.08.2016

## Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement -26 dB BW



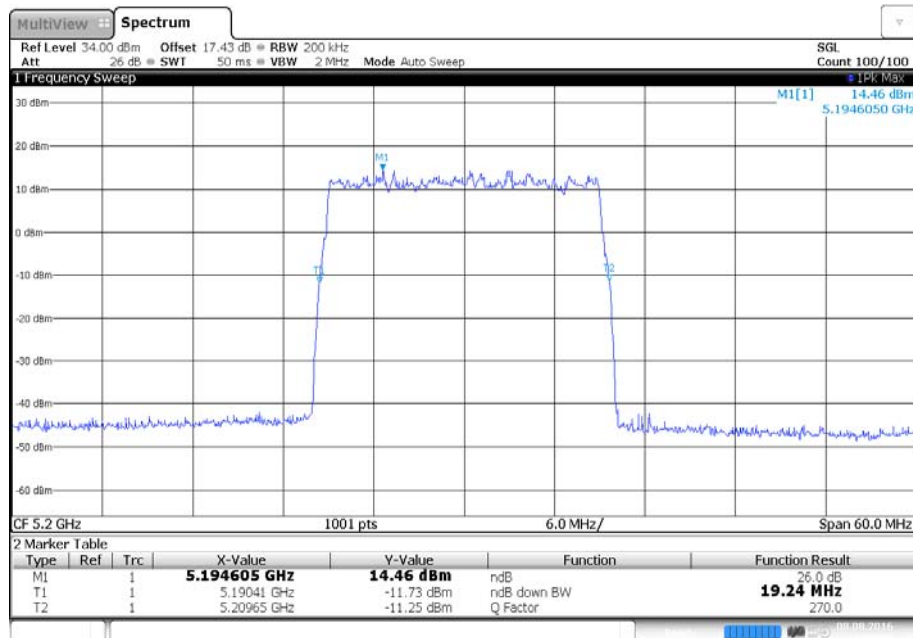
16:03:58 08.08.2016

## Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW



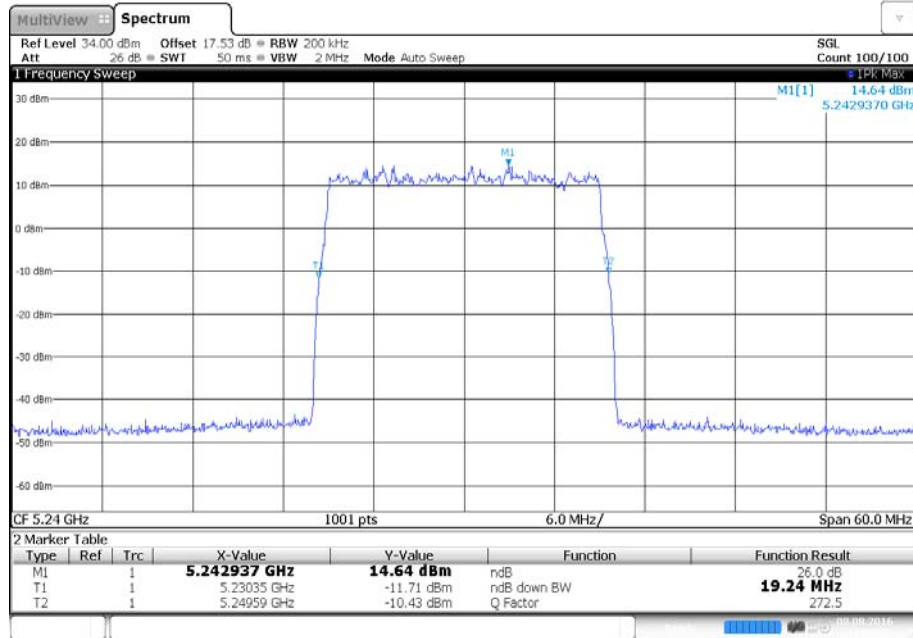
16:53:44 08.08.2016

## Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW



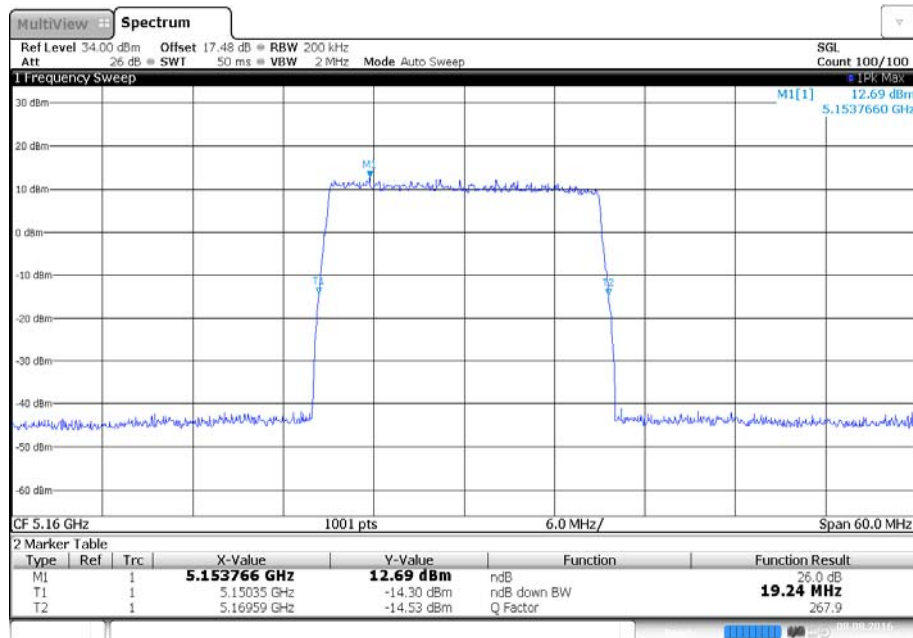
16:55:28 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement -26 dB BW



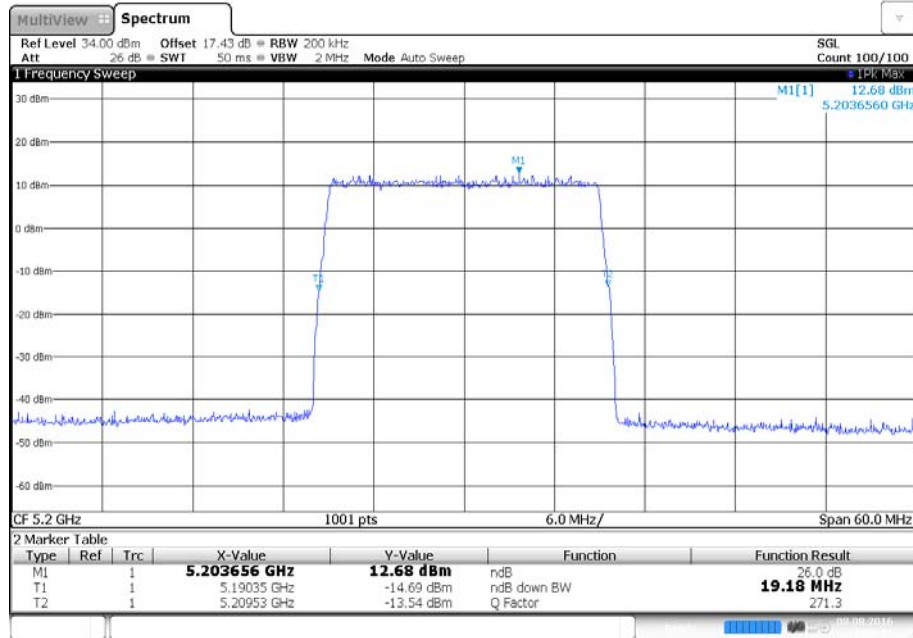
16:57:12 08.08.2016

Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW



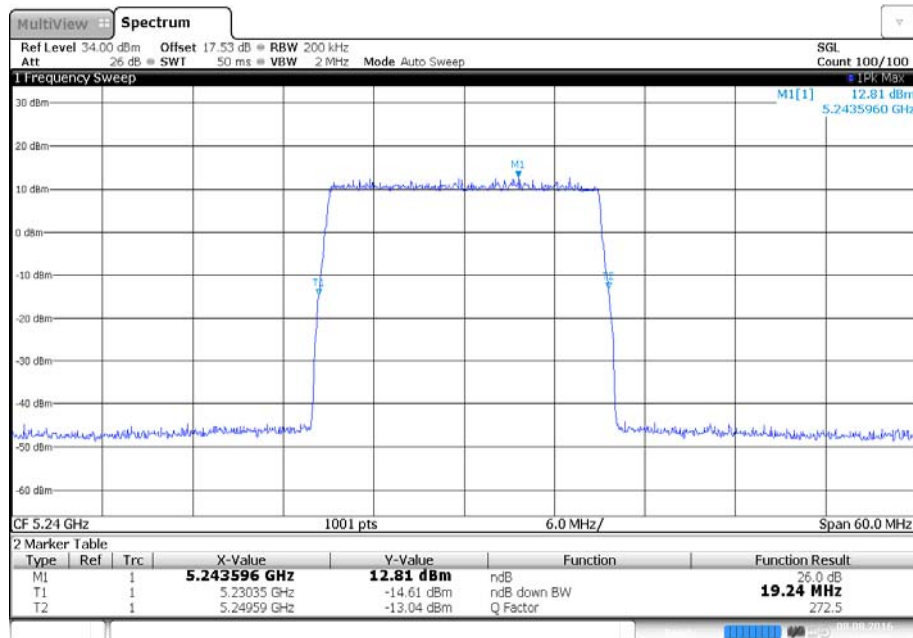
16:27:08 08.08.2016

## Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW



16:28:52 08.08.2016

## Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement -26 dB BW



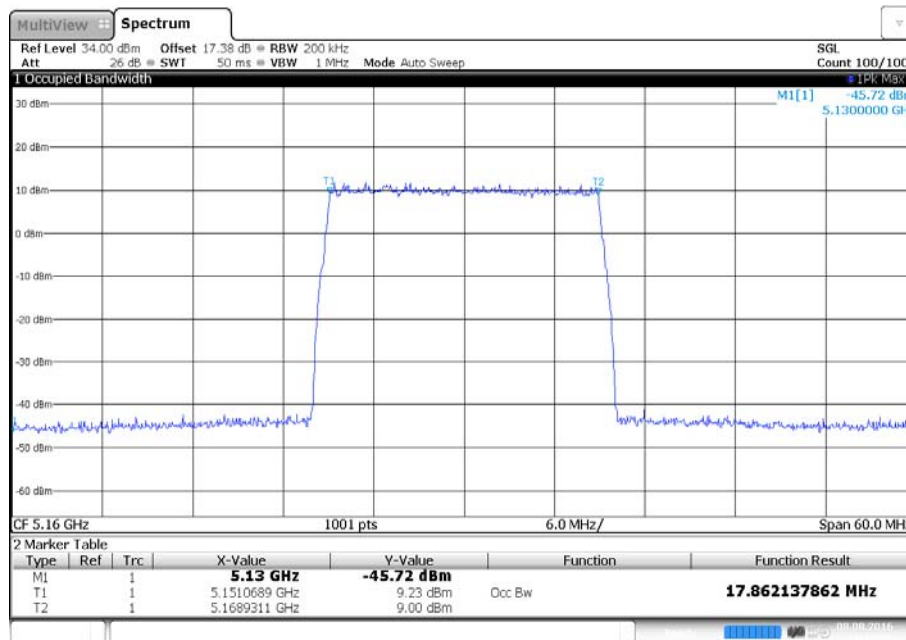
16:30:36 08.08.2016

### Configuration A

Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth | Result (MHz)  |                  |               |                  |               |                  |
|------------|-------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|            |                   | 5160 MHz      |                  | 5200 MHz      |                  | 5240 MHz      |                  |
|            |                   | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth |
| QPSK       | 20.0 MHz          | 17.86         | 19.24            | 17.92         | 19.30            | 17.86         | 19.30            |
| 16QAM      | 20.0 MHz          | 17.92         | 19.18            | 17.98         | 19.18            | 17.92         | 19.18            |
| 64QAM      | 20.0 MHz          | 17.92         | 19.24            | 17.92         | 19.24            | 17.92         | 19.24            |

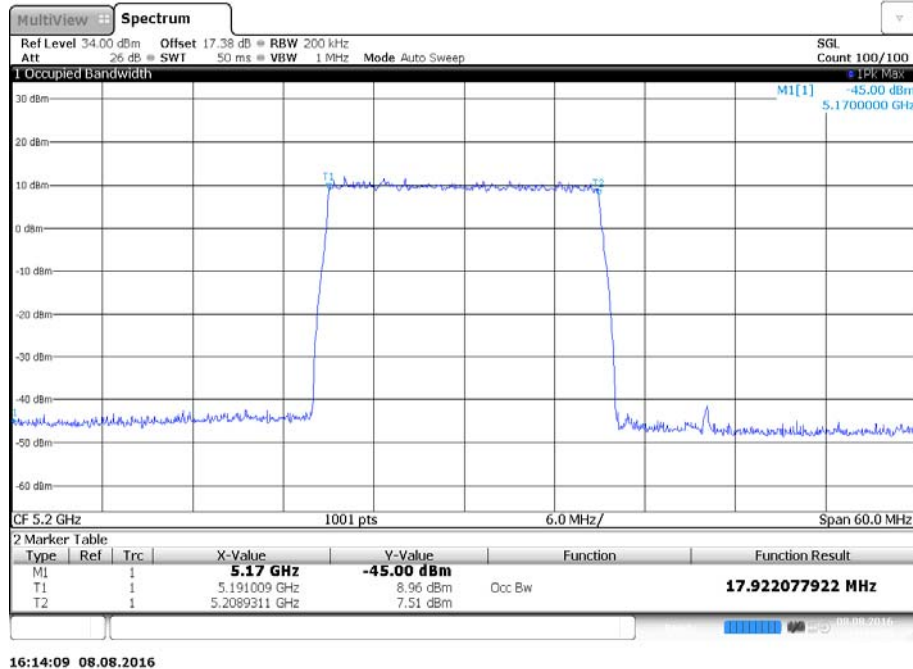
Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW



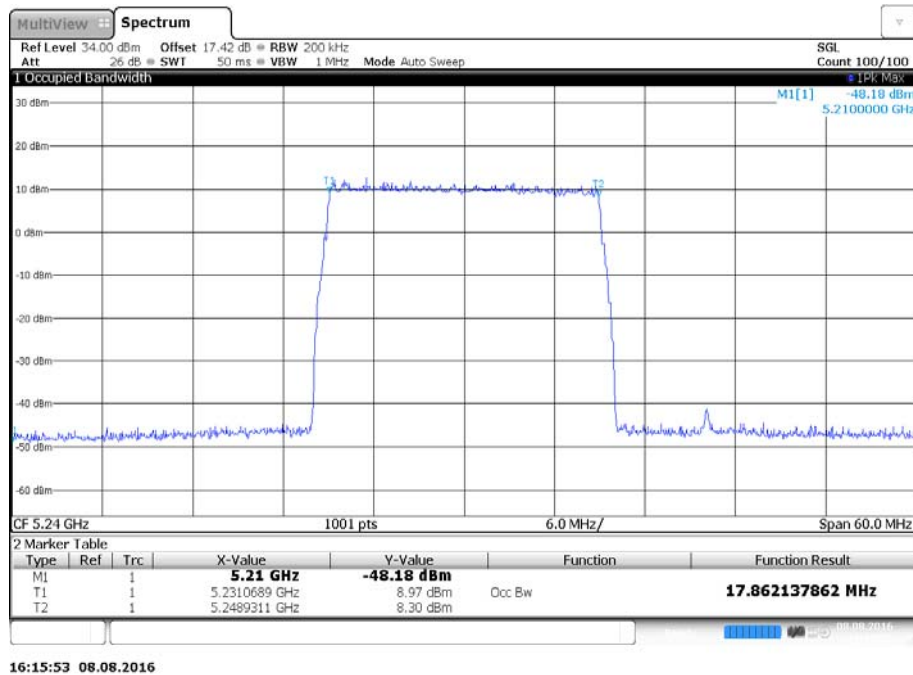
16:12:24 08.08.2016



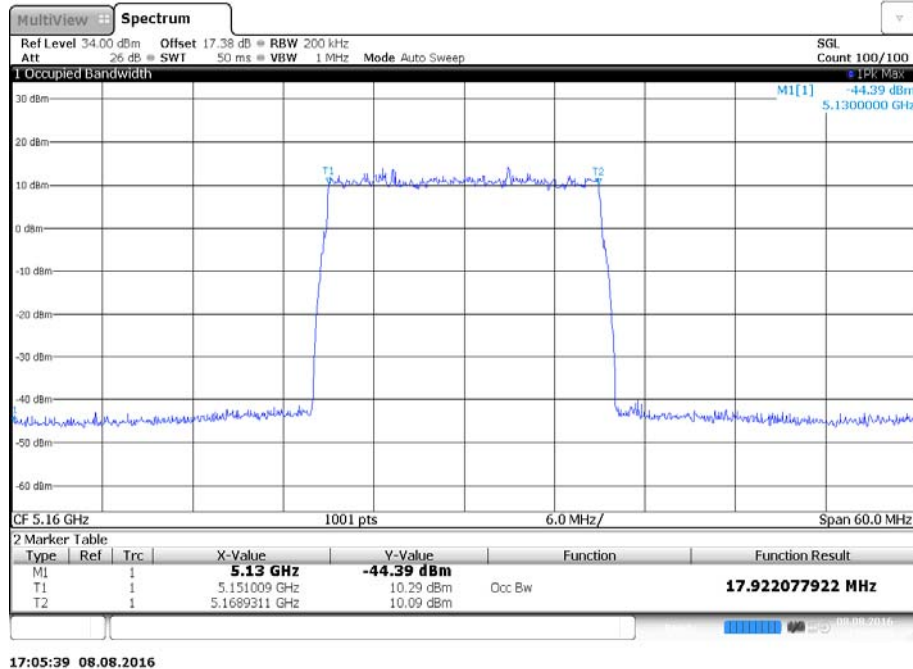
Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



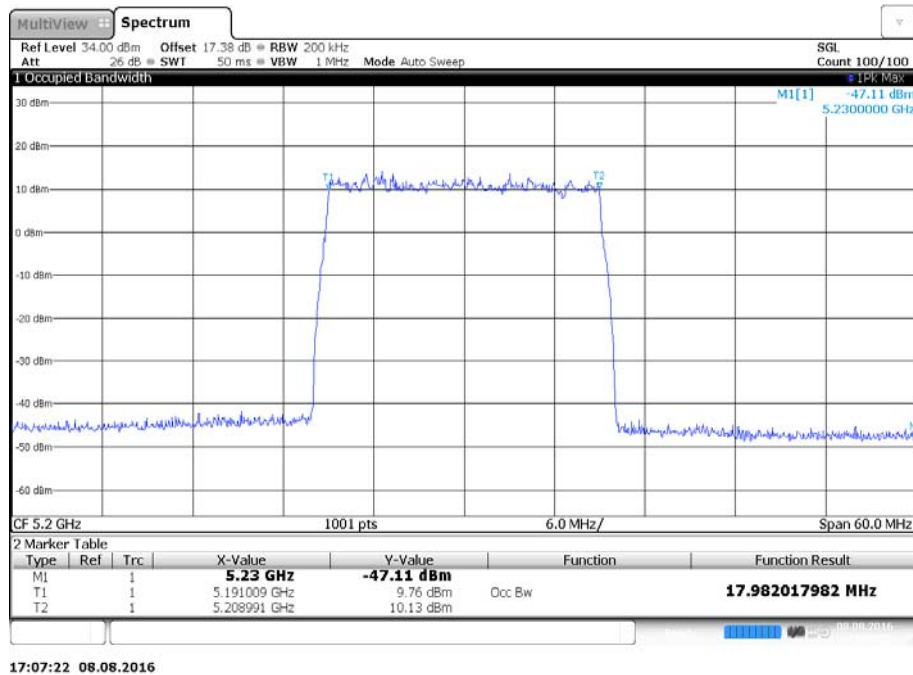
Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW



Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW

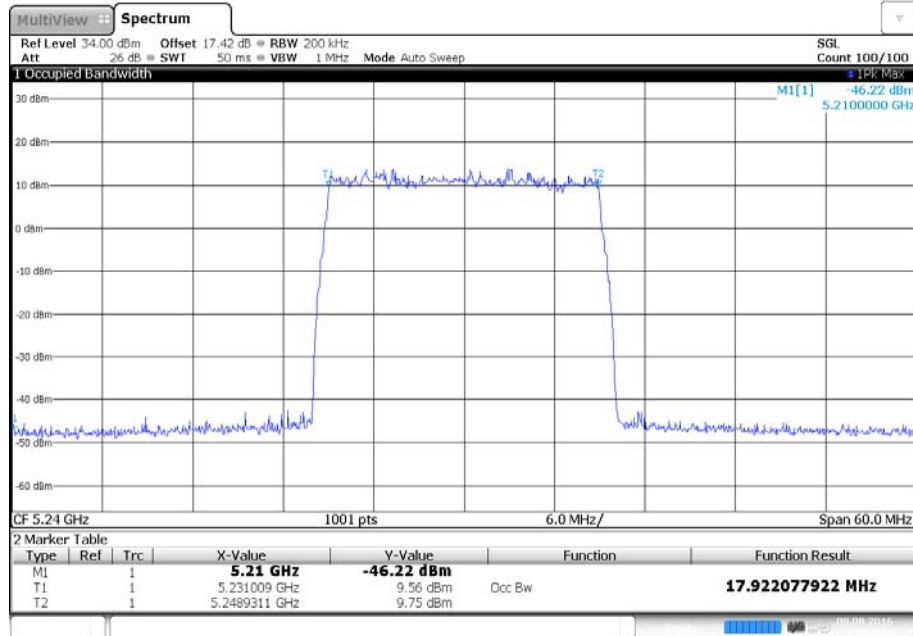


Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



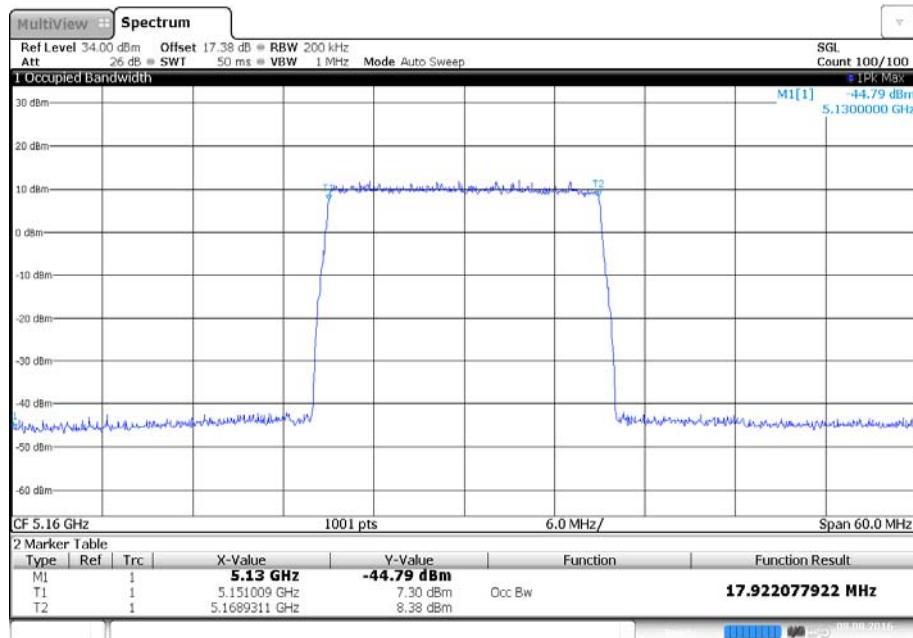


Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW



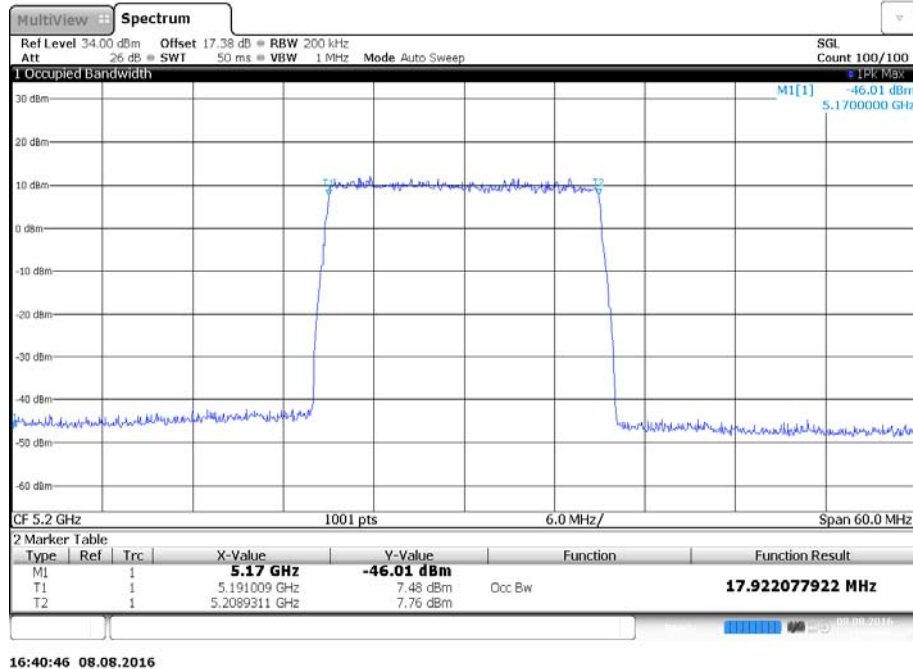
17:09:06 08.08.2016

Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement 99 % BW

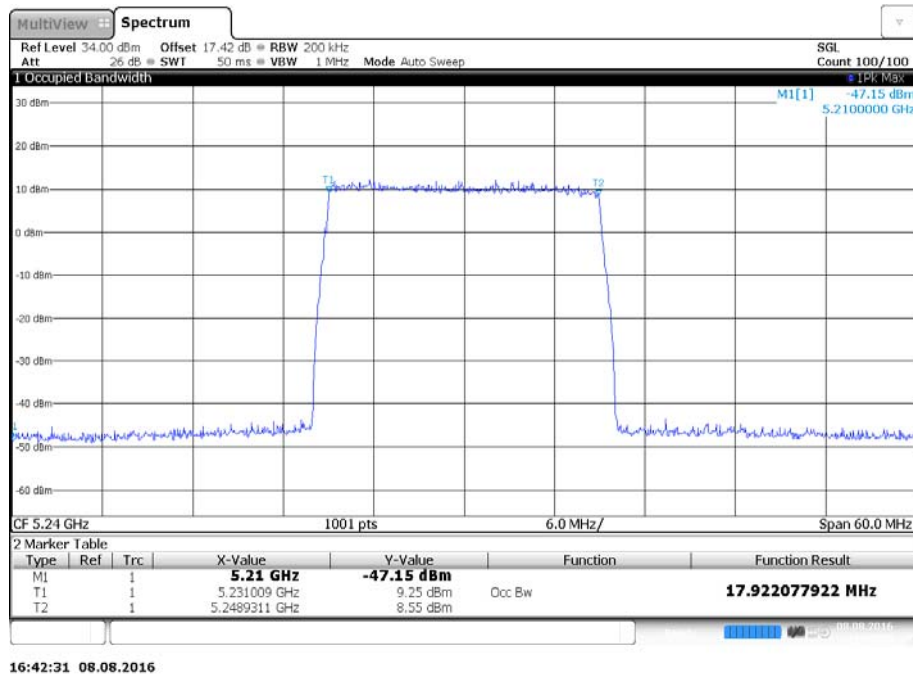


16:39:02 08.08.2016

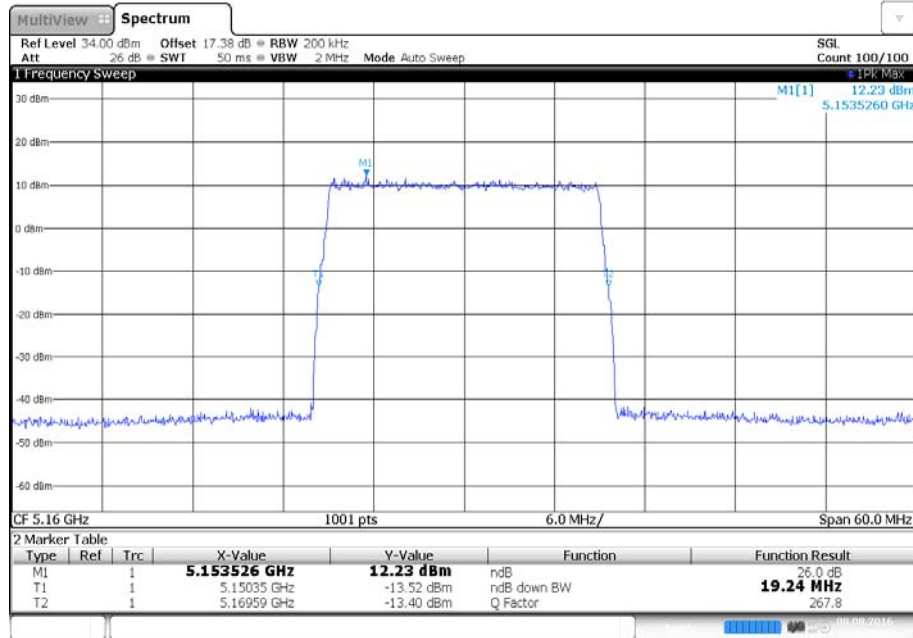
Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement 99 % BW



Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement 99 % BW

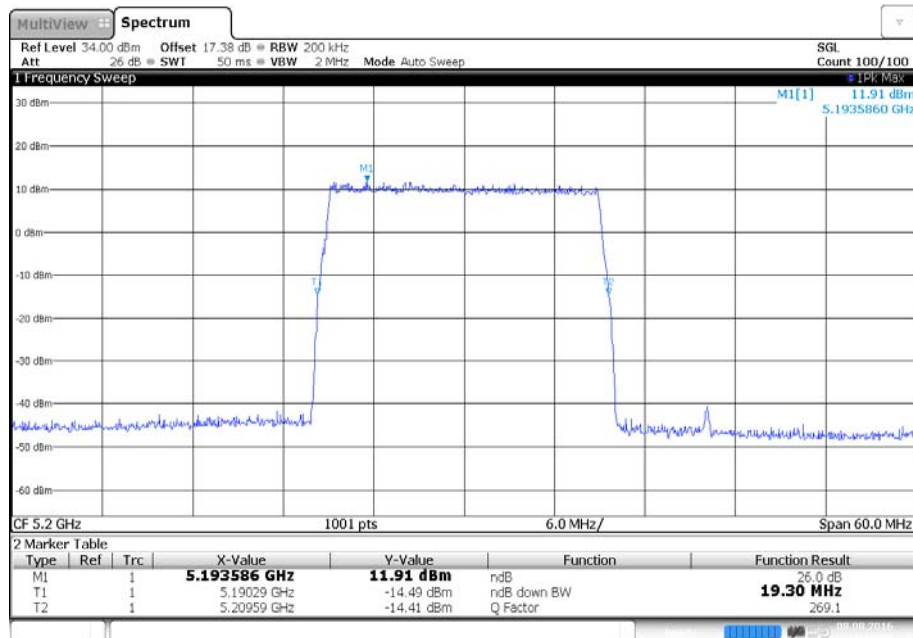


## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW



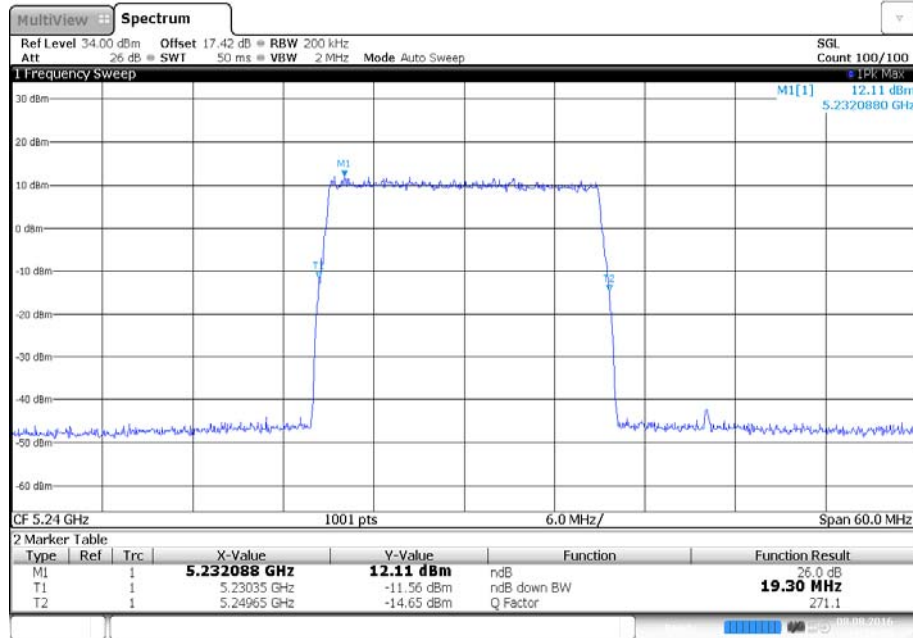
16:12:40 08.08.2016

## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW



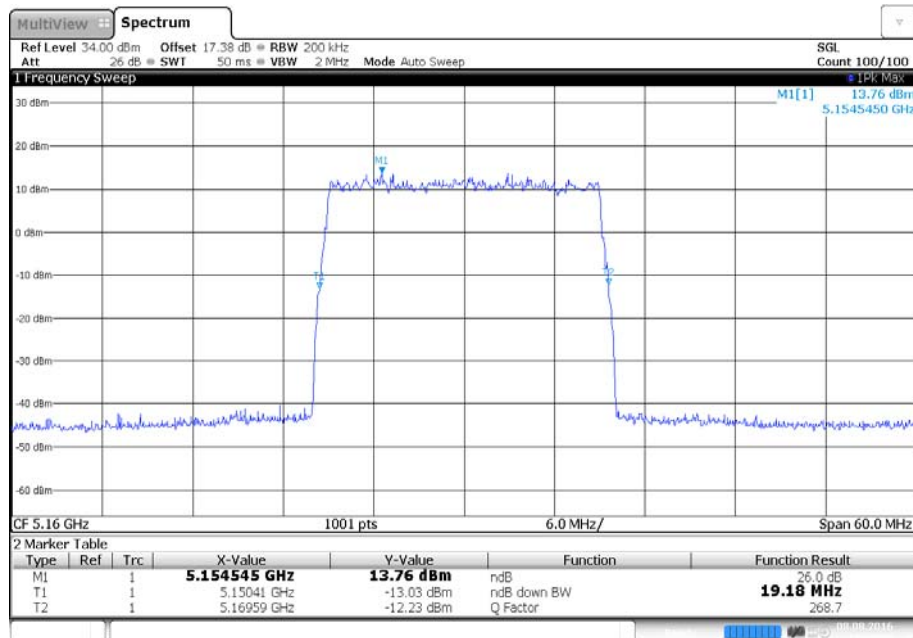
16:14:24 08.08.2016

## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement -26 dB BW



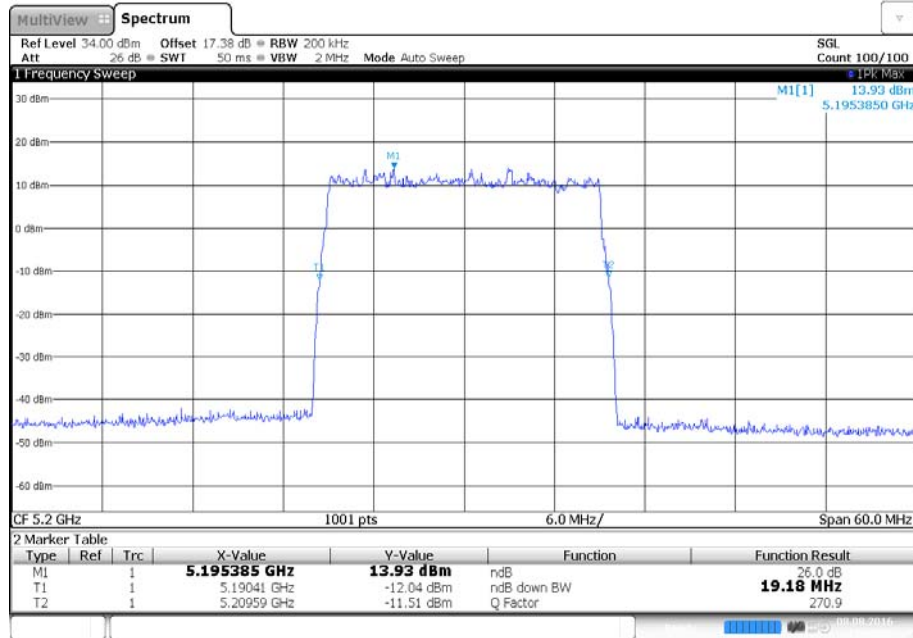
16:16:08 08.08.2016

## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW



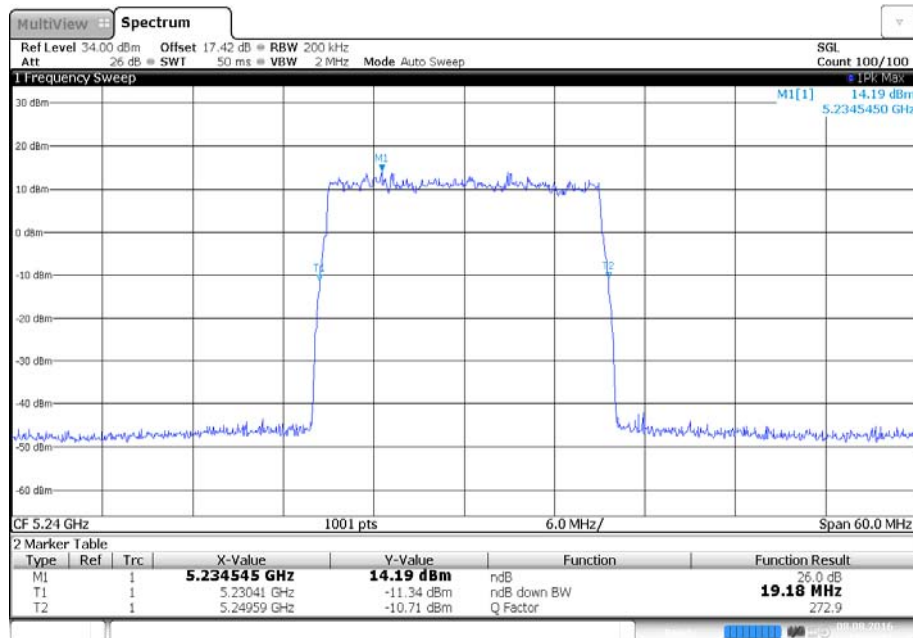
17:05:54 08.08.2016

## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW



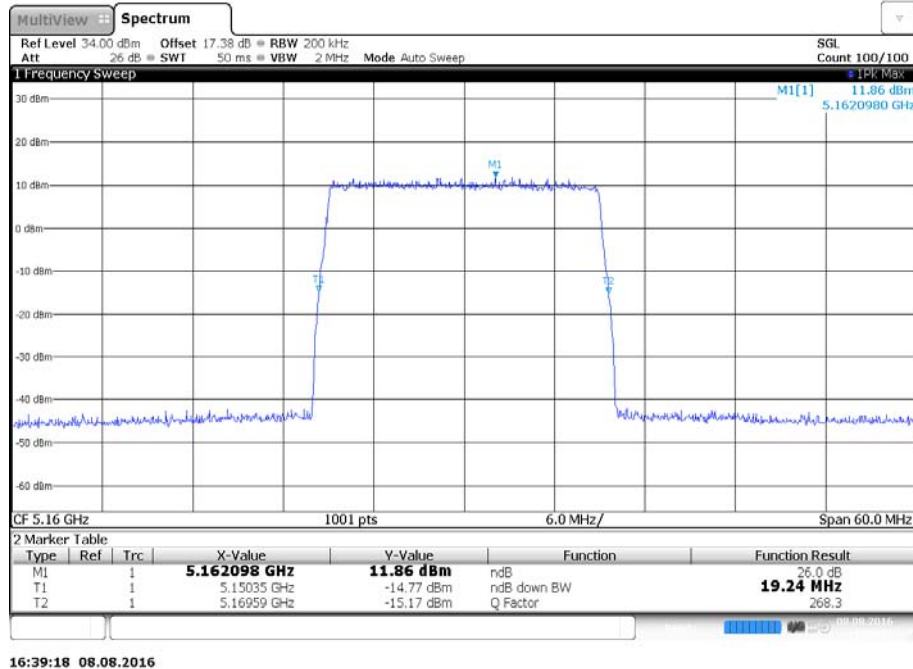
17:07:38 08.08.2016

## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz - Measurement -26 dB BW

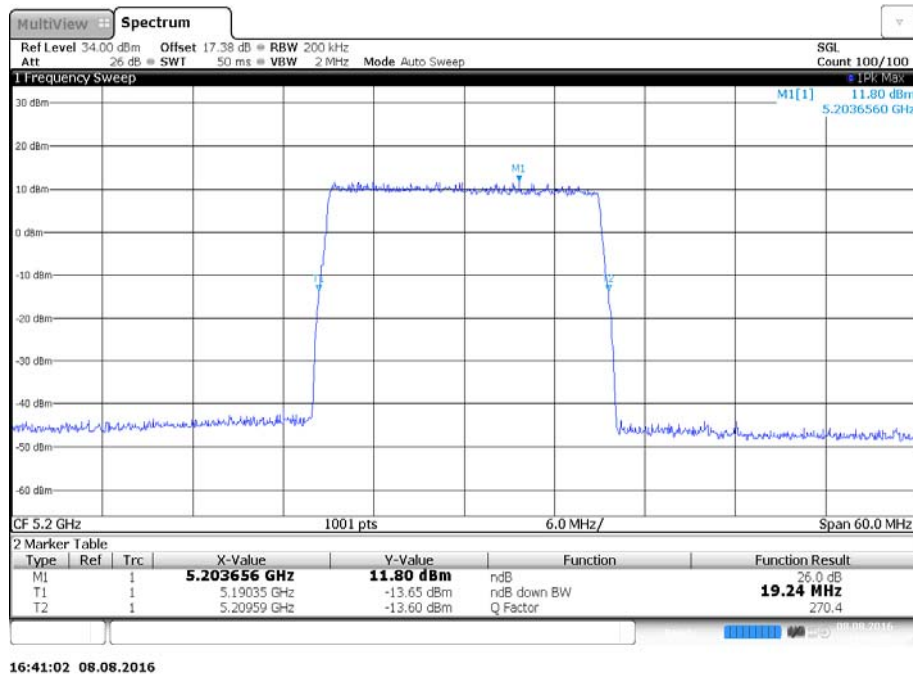


17:09:21 08.08.2016

Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5160 MHz - Measurement -26 dB BW

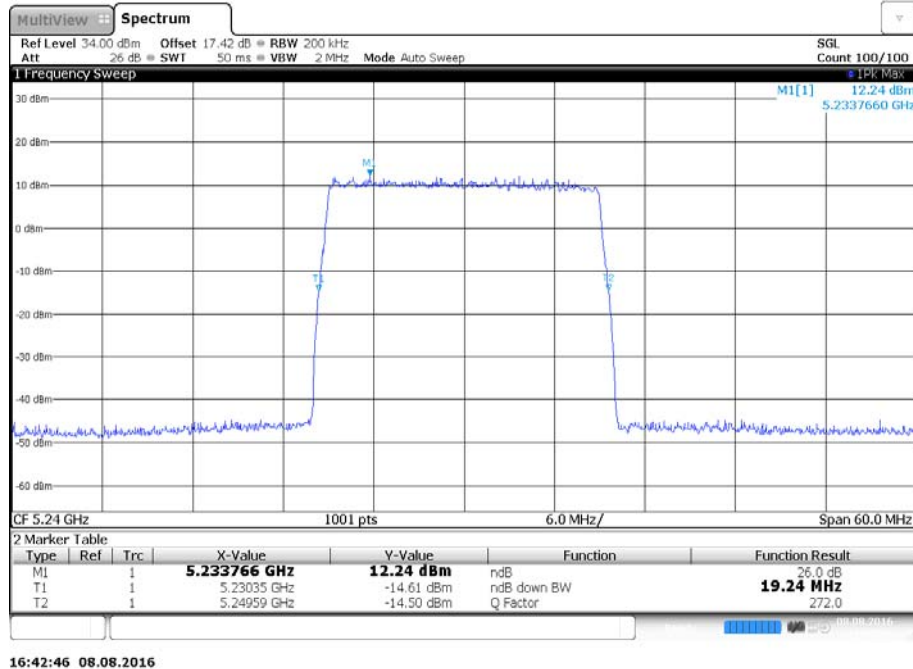


Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5200 MHz - Measurement -26 dB BW





Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5240 MHz -  
Measurement -26 dB BW



Configuration B

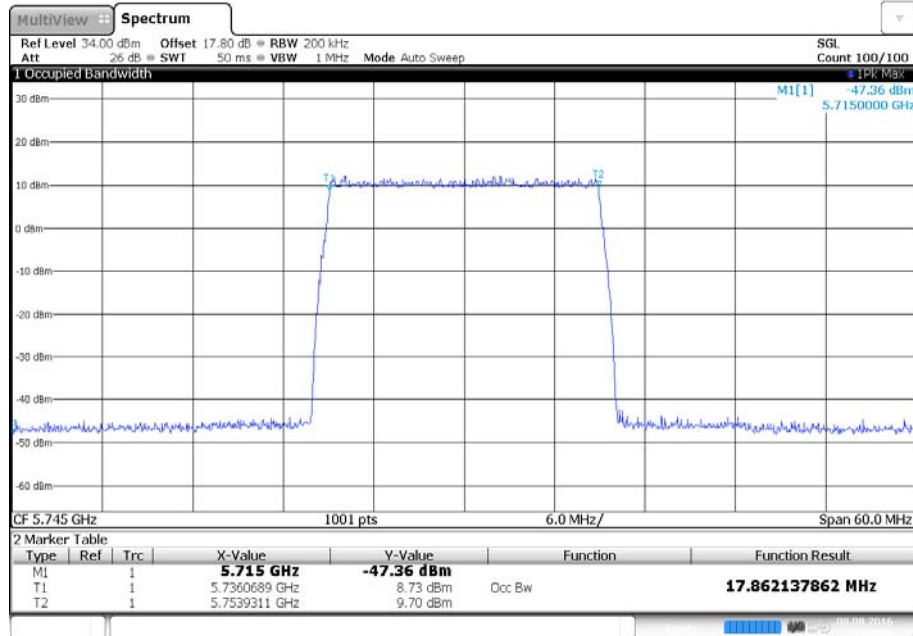
Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth | Result (MHz)  |                  |               |                  |               |                  |
|------------|-------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|            |                   | 5745 MHz      |                  | 5785 MHz      |                  | 5825 MHz      |                  |
|            |                   | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth |
| QPSK       | 20.0 MHz          | 17.86         | 19.24            | 17.86         | 19.24            | 17.86         | 19.30            |
| 16QAM      | 20.0 MHz          | 17.92         | 19.18            | 17.92         | 19.24            | 17.86         | 19.18            |
| 64QAM      | 20.0 MHz          | 17.86         | 19.24            | 17.86         | 19.18            | 17.86         | 19.24            |

Remarks

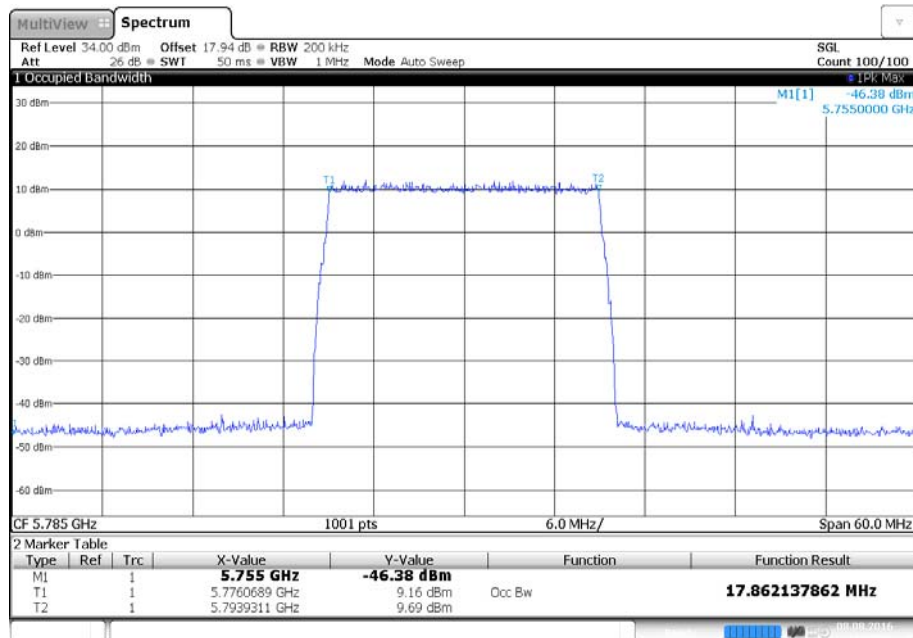
The minimum 6 dB bandwidth was greater than 500 kHz.

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW



16:05:27 08.08.2016

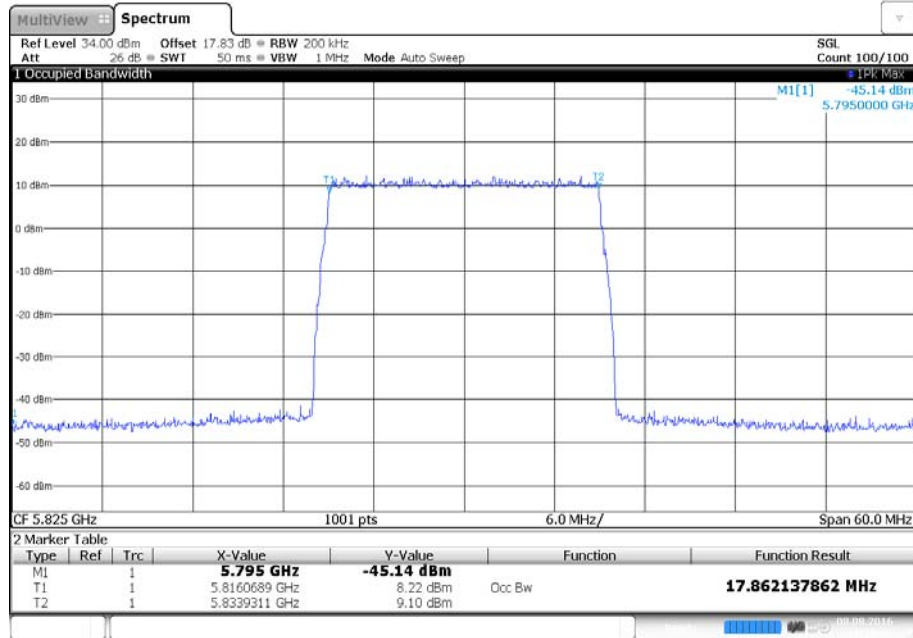
Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW



16:07:46 08.08.2016

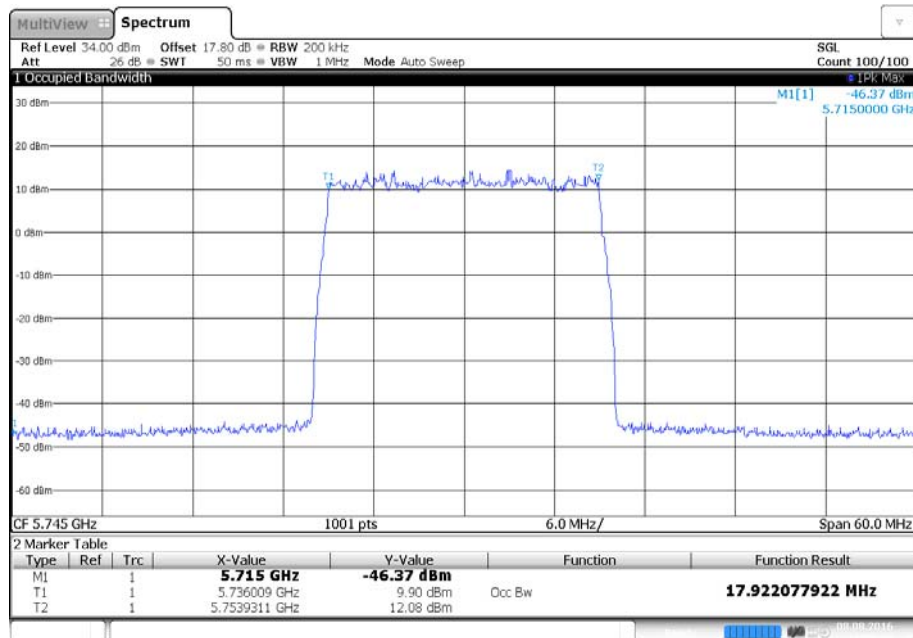


Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW



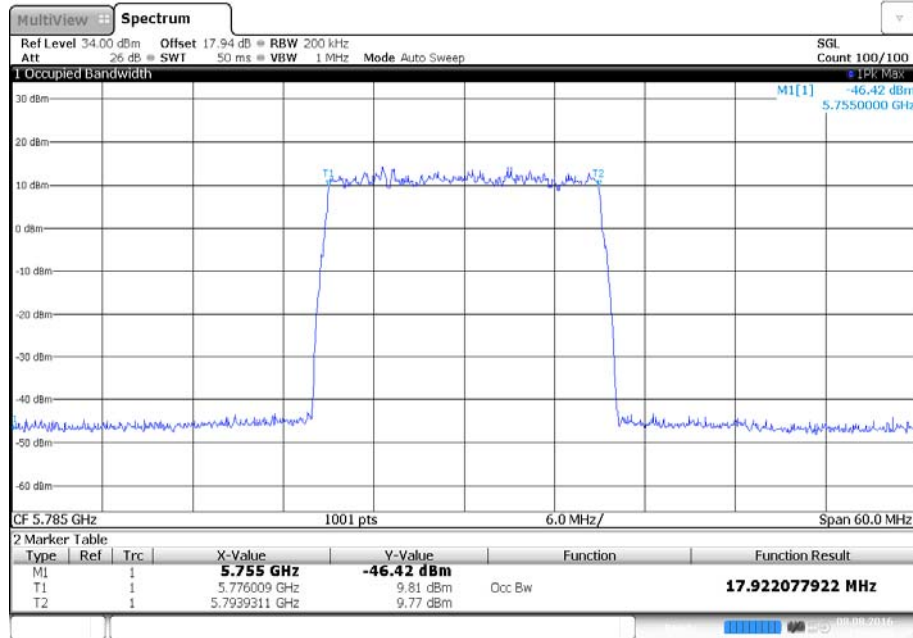
16:10:05 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW



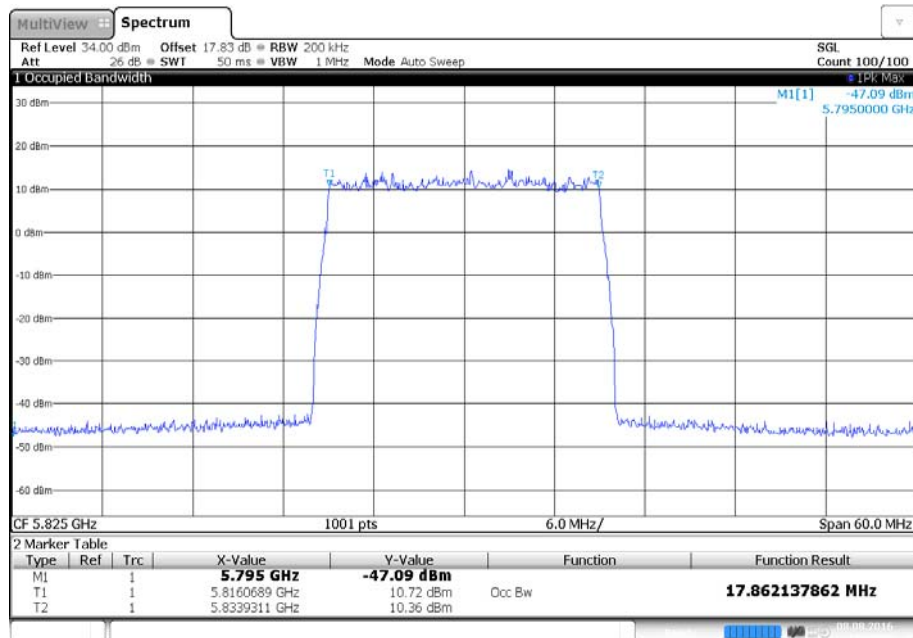
16:58:41 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW



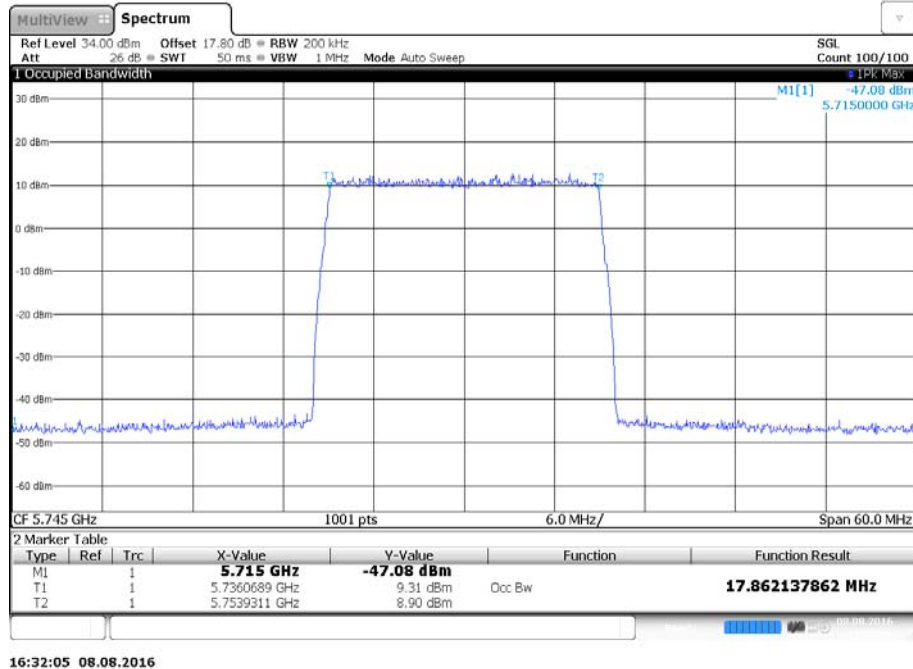
17:01:00 08.08.2016

Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW

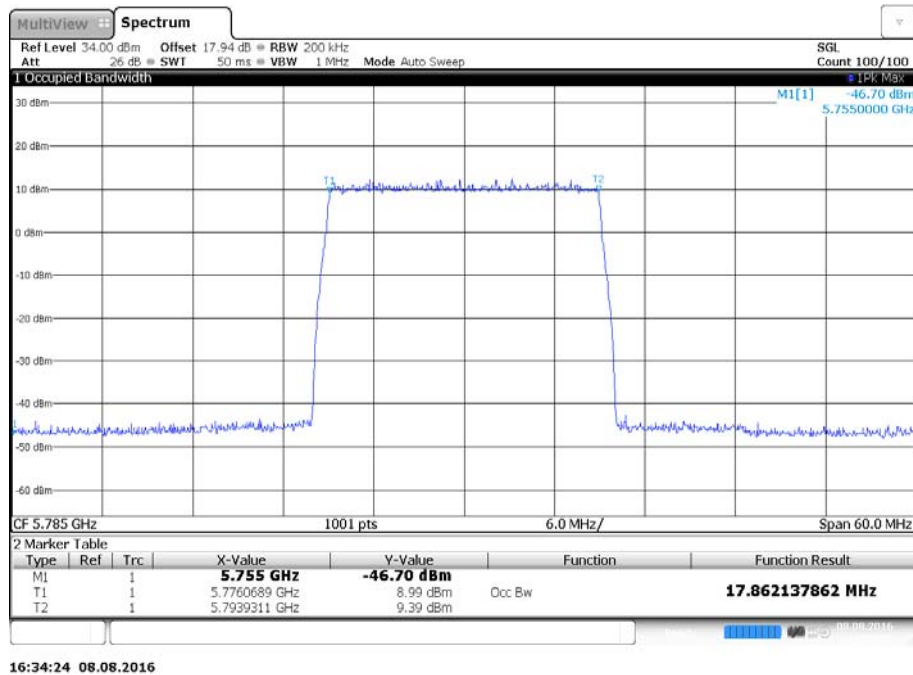


17:03:19 08.08.2016

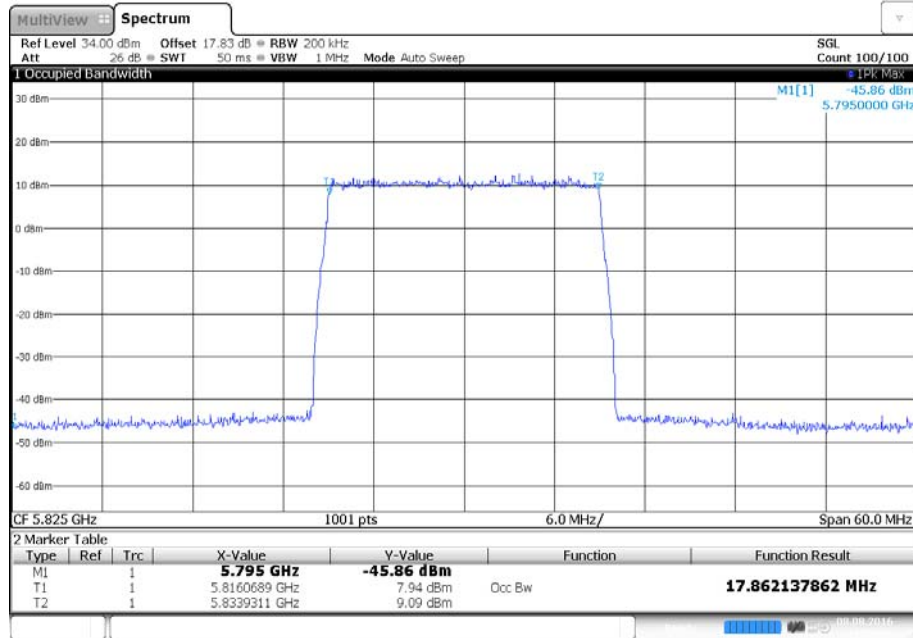
Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW



Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW

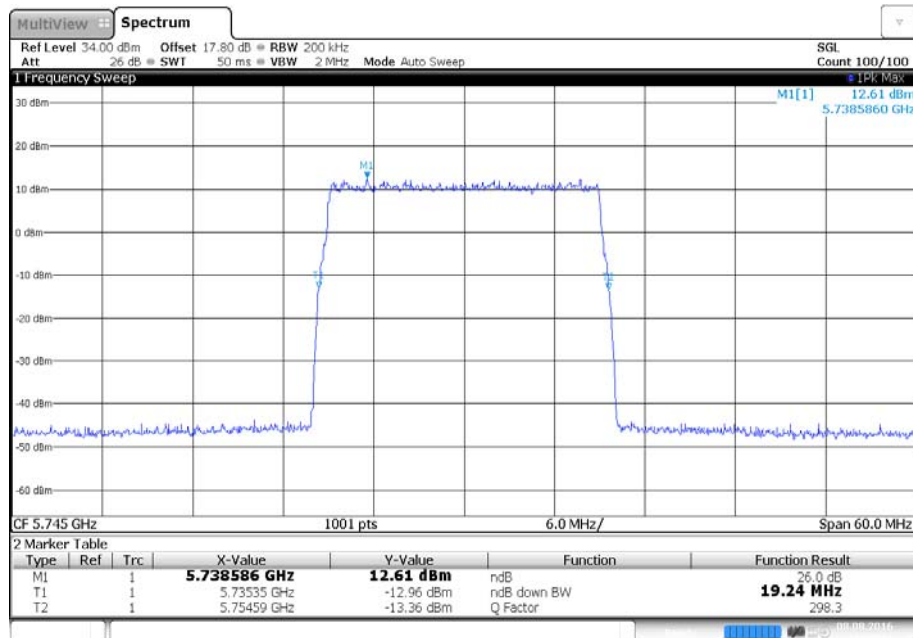


Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW



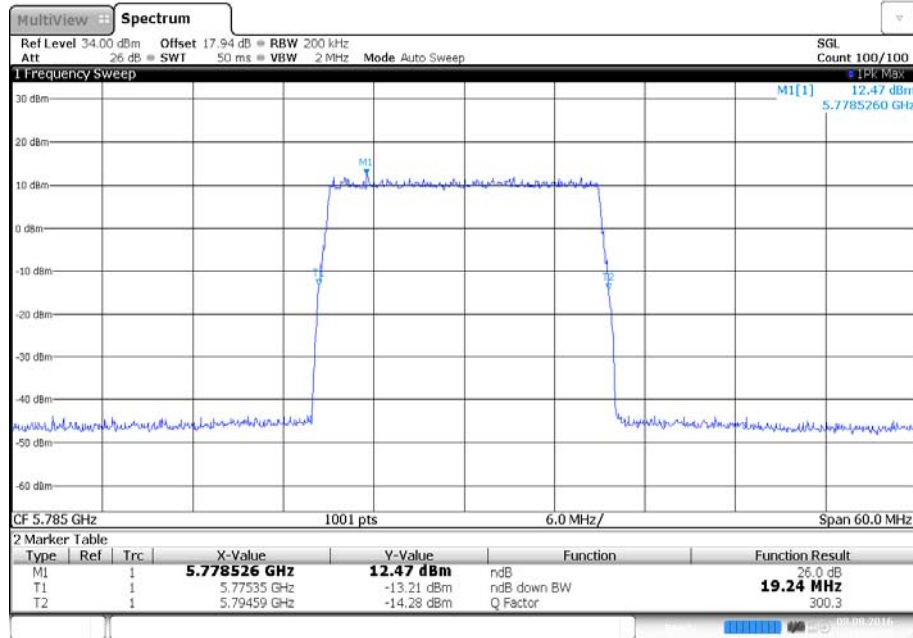
16:36:43 08.08.2016

Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW



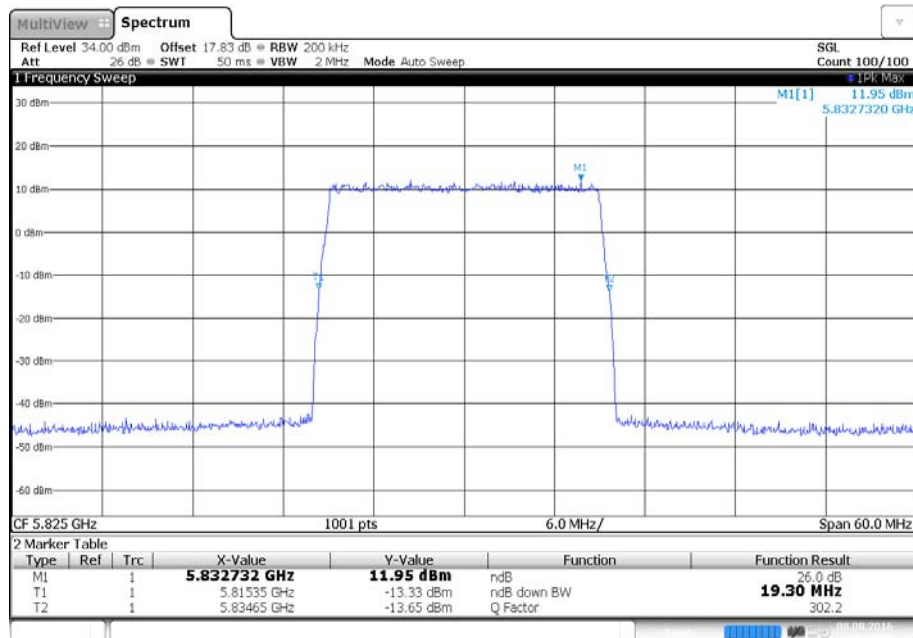
16:05:42 08.08.2016

## Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



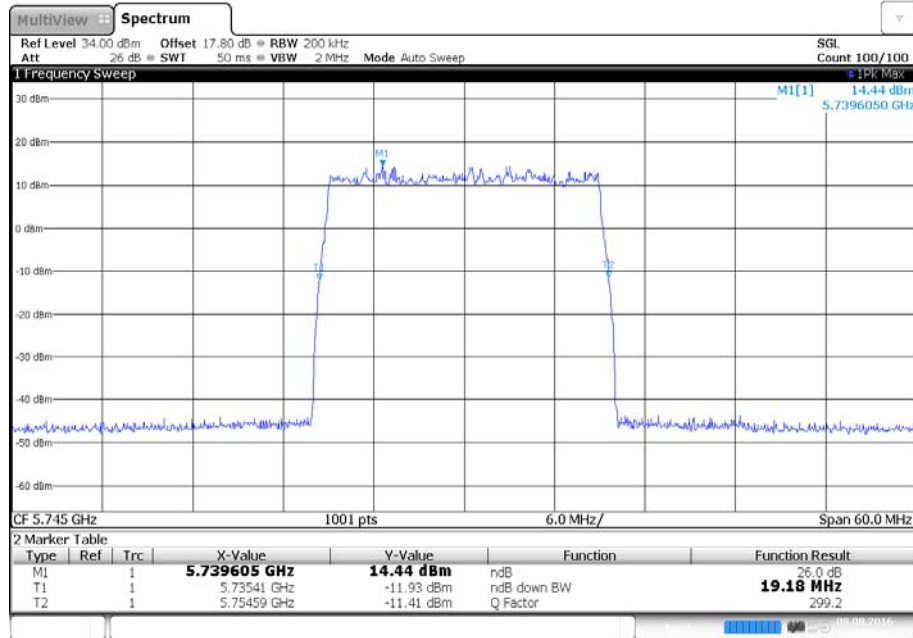
16:08:01 08.08.2016

## Antenna C - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement -26 dB BW



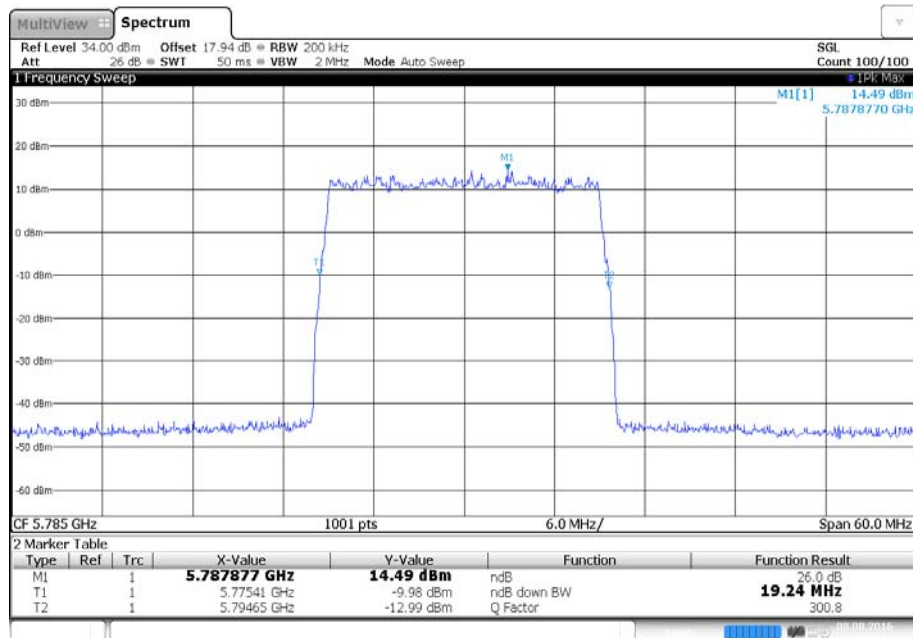
16:10:20 08.08.2016

## Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW



16:58:57 08.08.2016

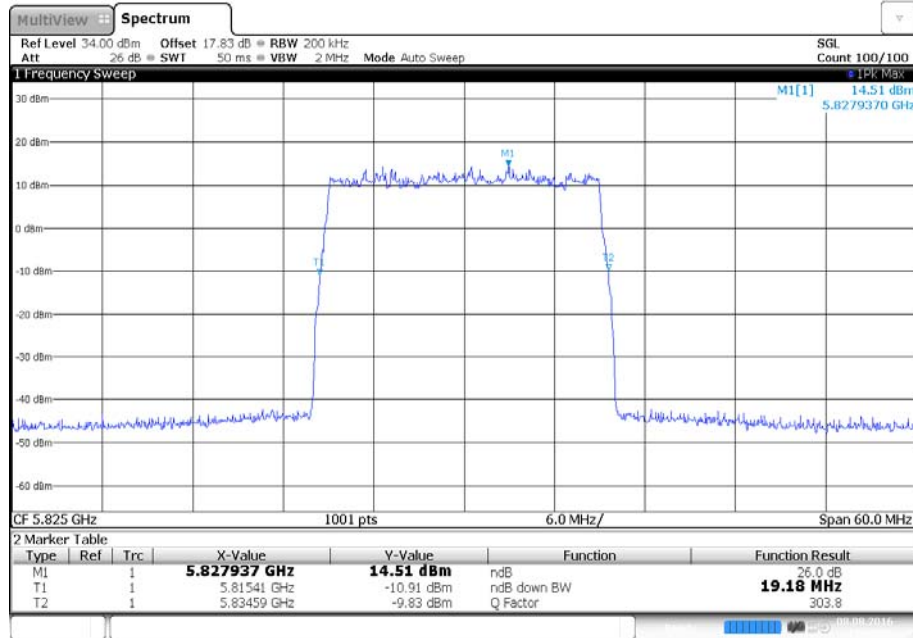
## Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



17:01:15 08.08.2016

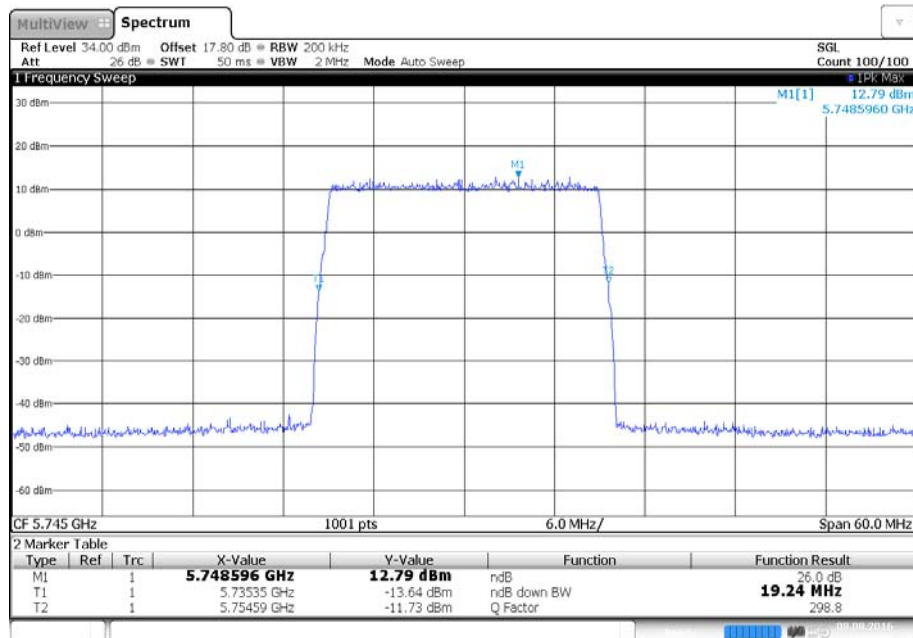


Antenna C - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement -26 dB BW



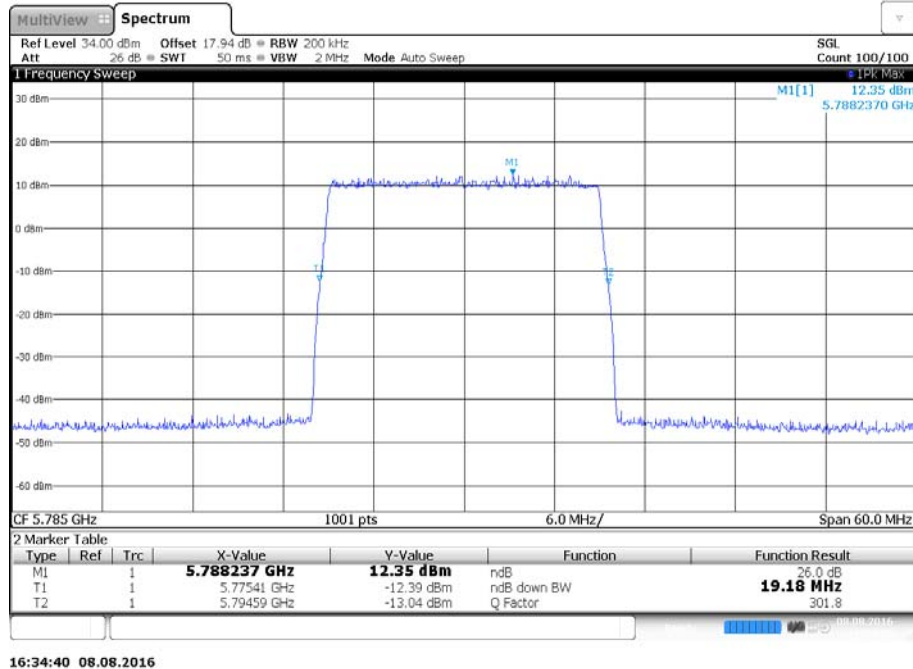
17:03:35 08.08.2016

Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW

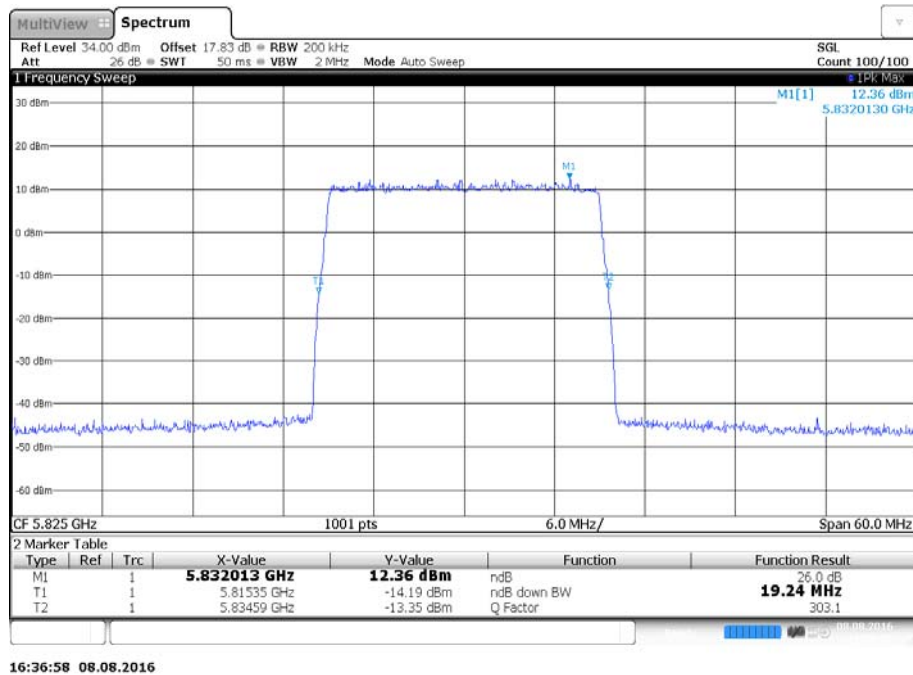


16:32:21 08.08.2016

Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



Antenna C - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement -26 dB BW





## Configuration B

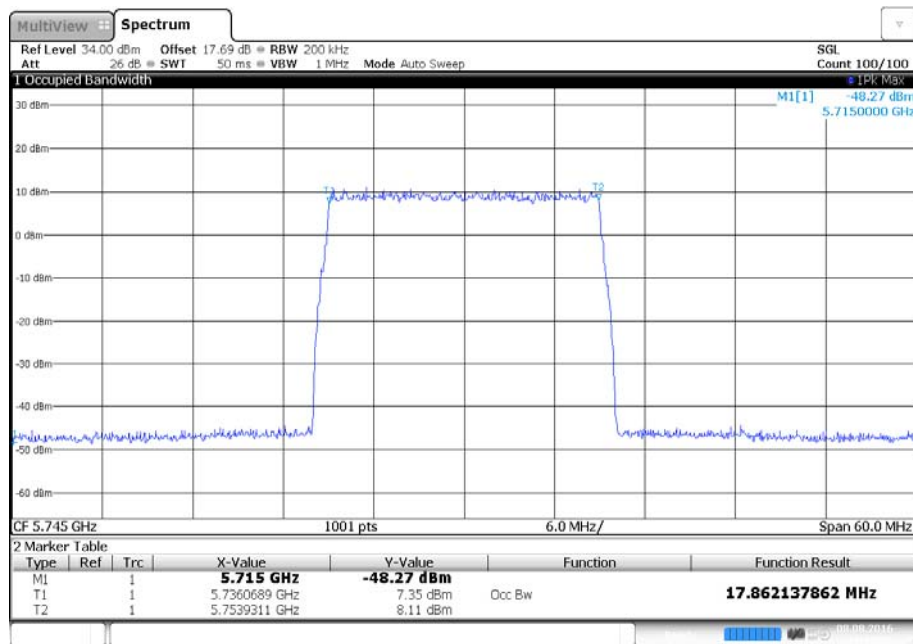
Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth | Result (MHz)  |                  |               |                  |               |                  |
|------------|-------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|            |                   | 5745 MHz      |                  | 5785 MHz      |                  | 5825 MHz      |                  |
|            |                   | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth | 99% Bandwidth | -26 dB Bandwidth |
| QPSK       | 20.0 MHz          | 17.86         | 19.30            | 17.86         | 19.30            | 17.86         | 19.30            |
| 16QAM      | 20.0 MHz          | 17.98         | 19.24            | 17.92         | 19.18            | 17.92         | 19.24            |
| 64QAM      | 20.0 MHz          | 17.92         | 19.30            | 17.86         | 19.12            | 17.86         | 19.24            |

## Remarks

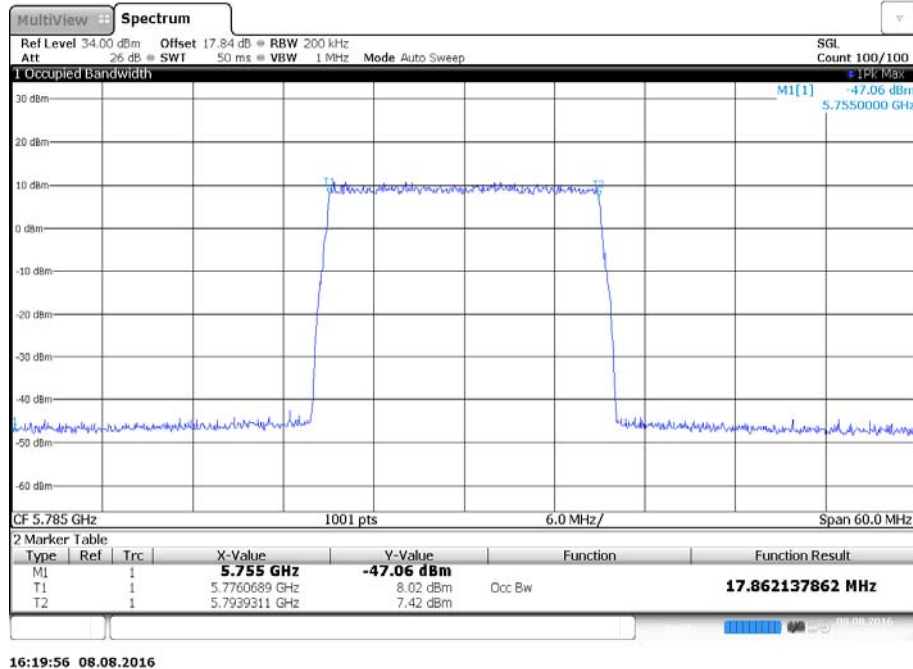
The minimum 6 dB bandwidth was greater than 500 kHz.

Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW

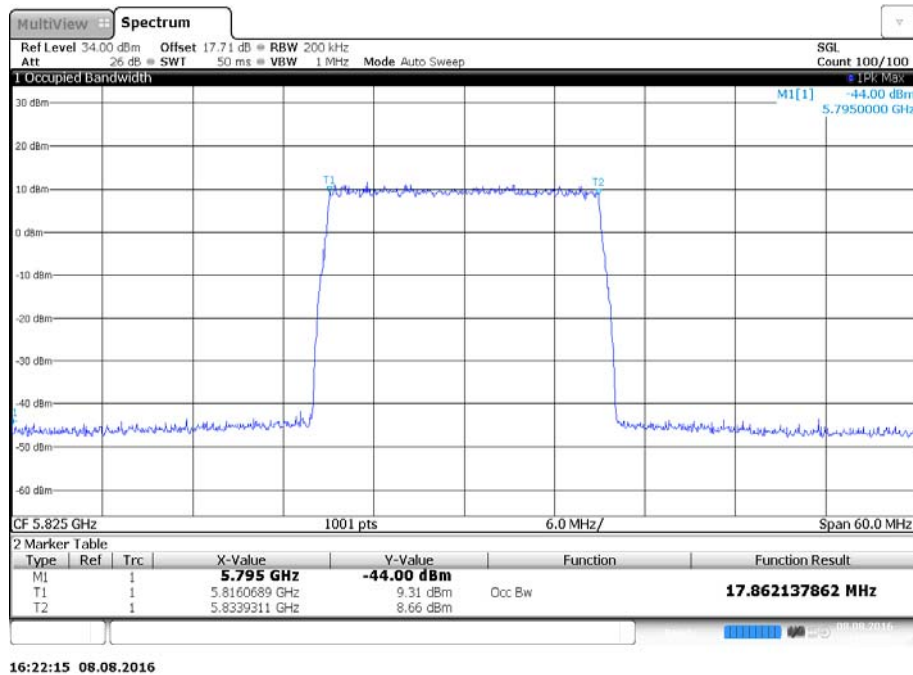


16:17:37 08.08.2016

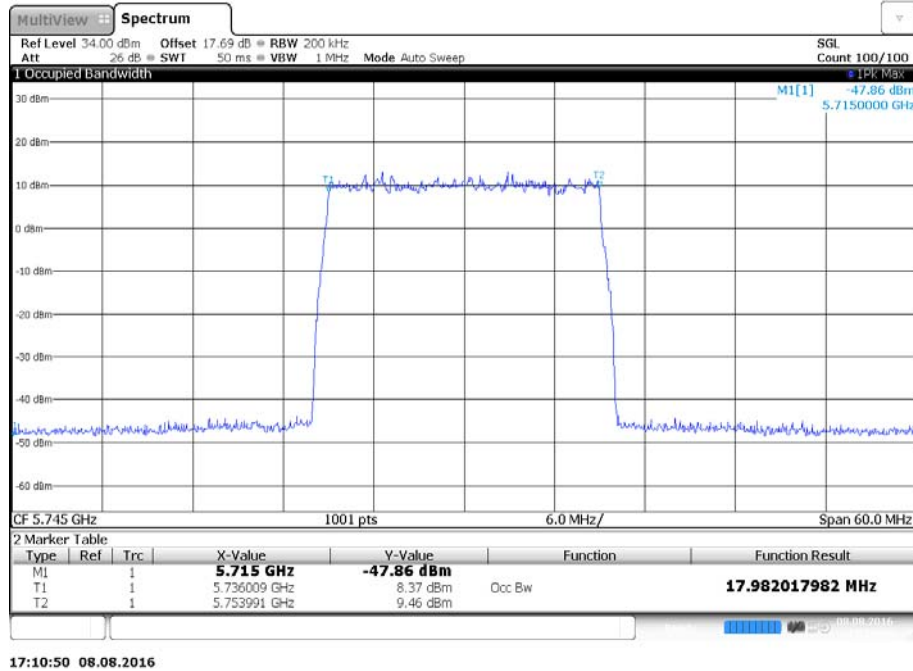
Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW



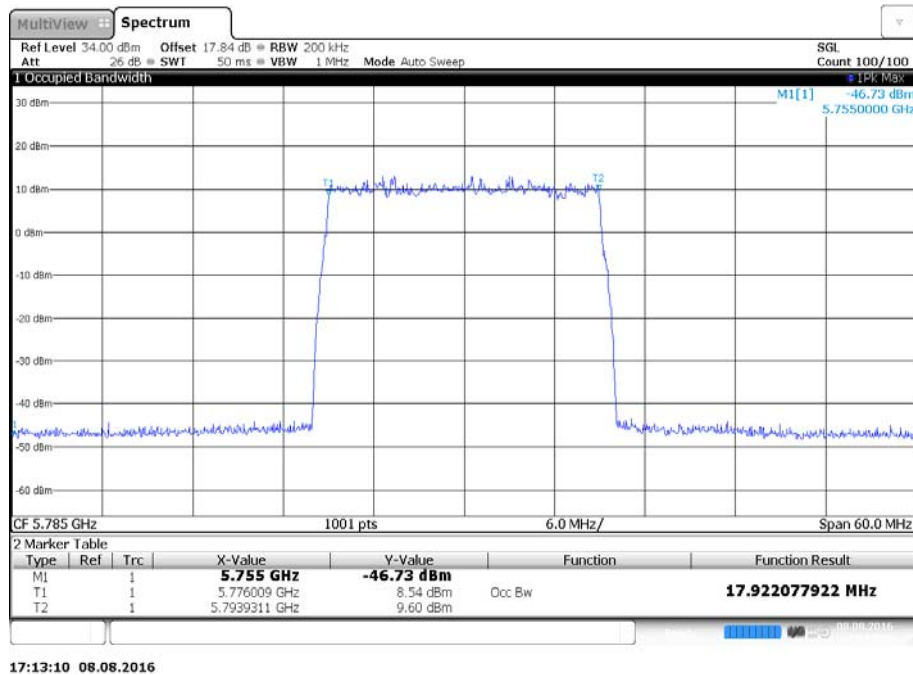
Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW



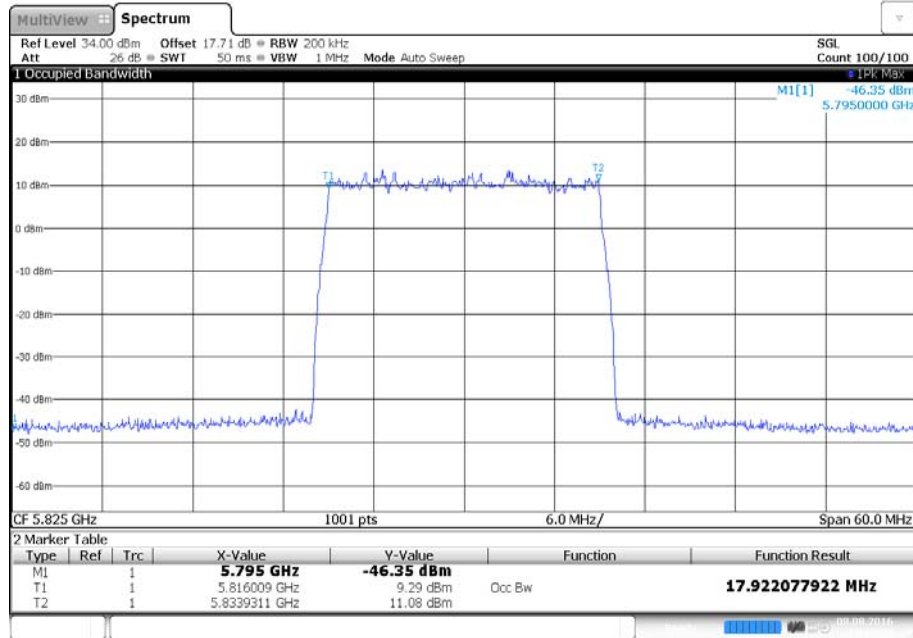
Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW



Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW

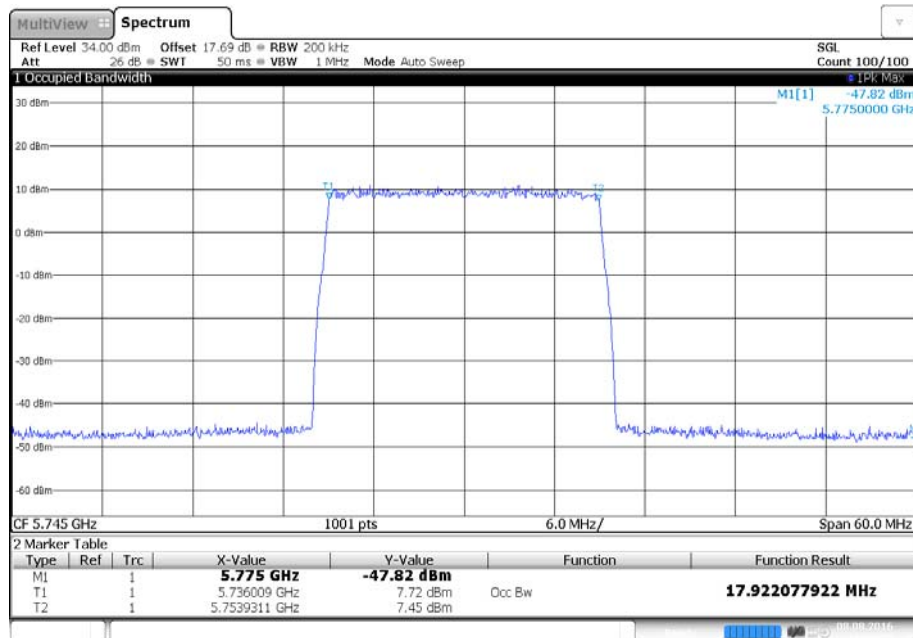


Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW



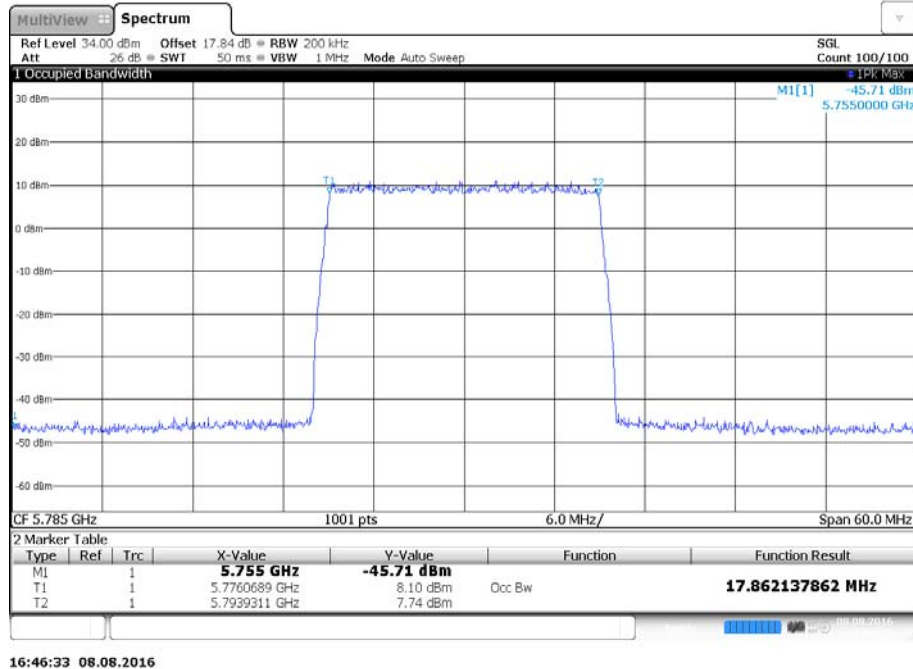
17:15:29 08.08.2016

Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement 99 % BW

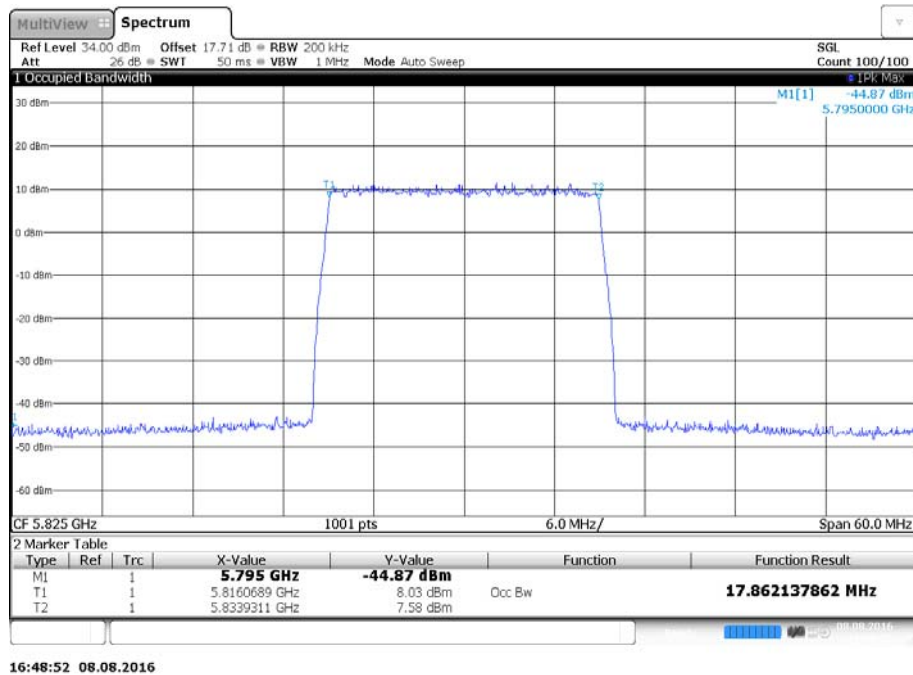


16:44:14 08.08.2016

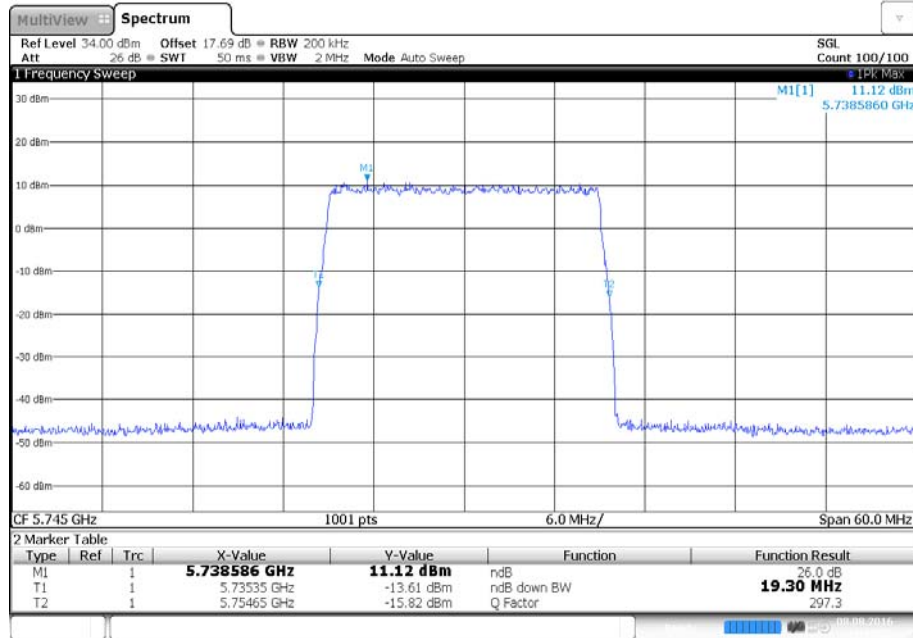
Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement 99 % BW



Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement 99 % BW

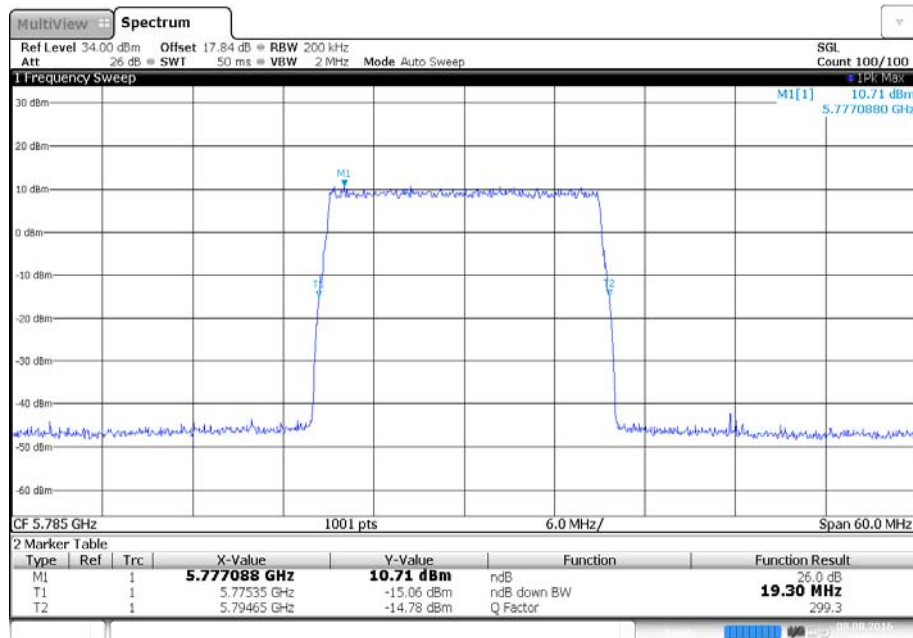


## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW



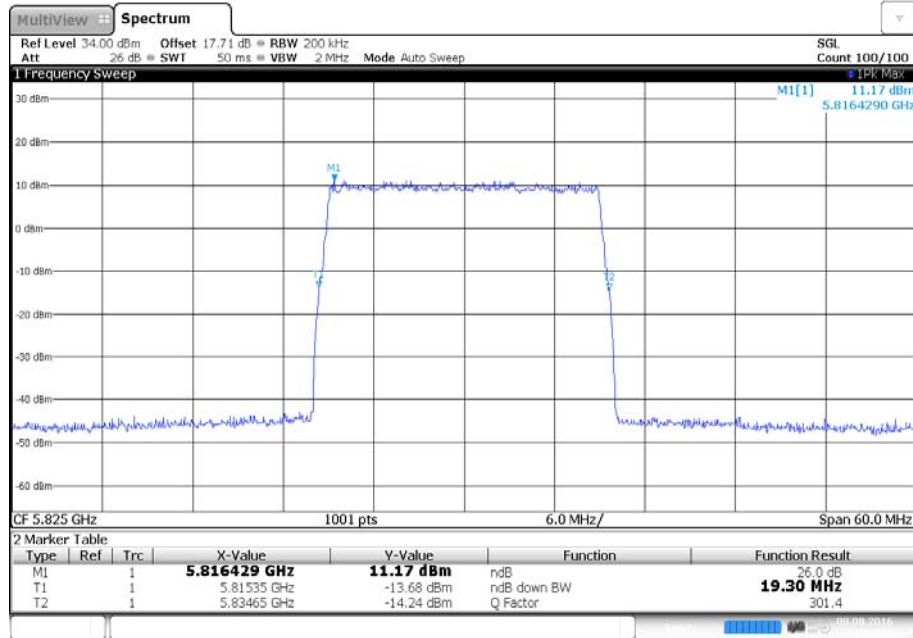
16:17:53 08.08.2016

## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



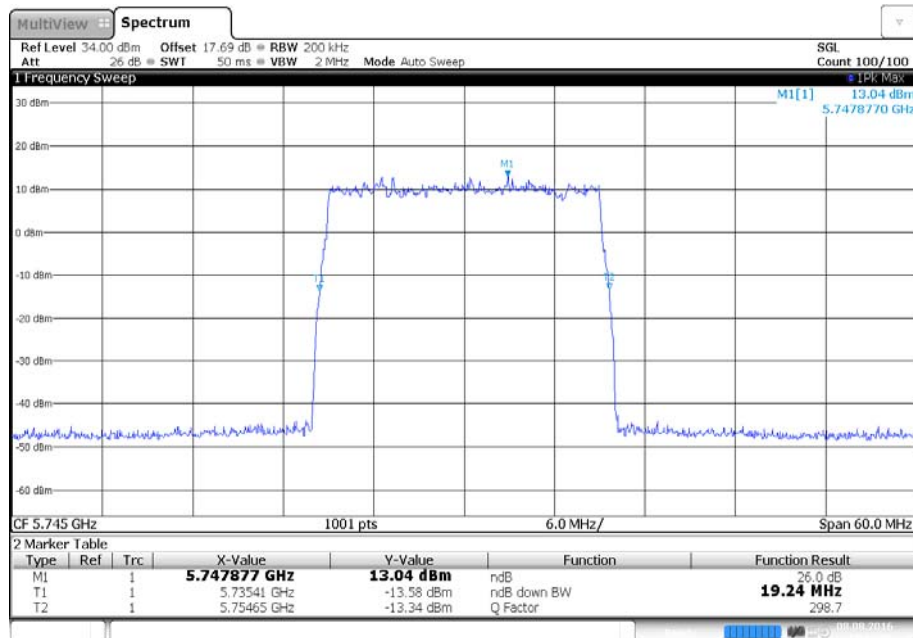
16:20:11 08.08.2016

## Antenna D - Modulation QPSK - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement -26 dB BW



16:22:31 08.08.2016

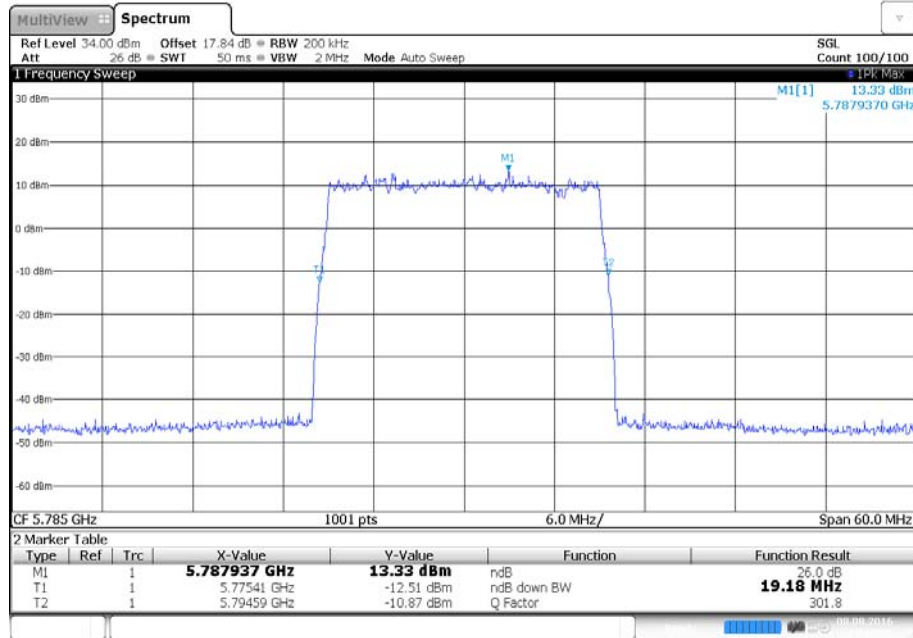
## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW



17:11:06 08.08.2016

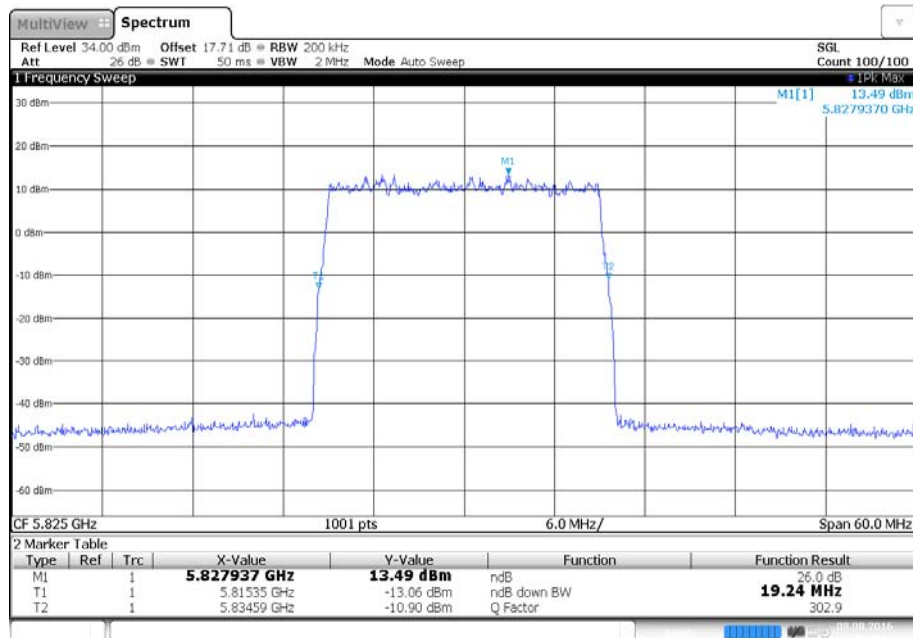


## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



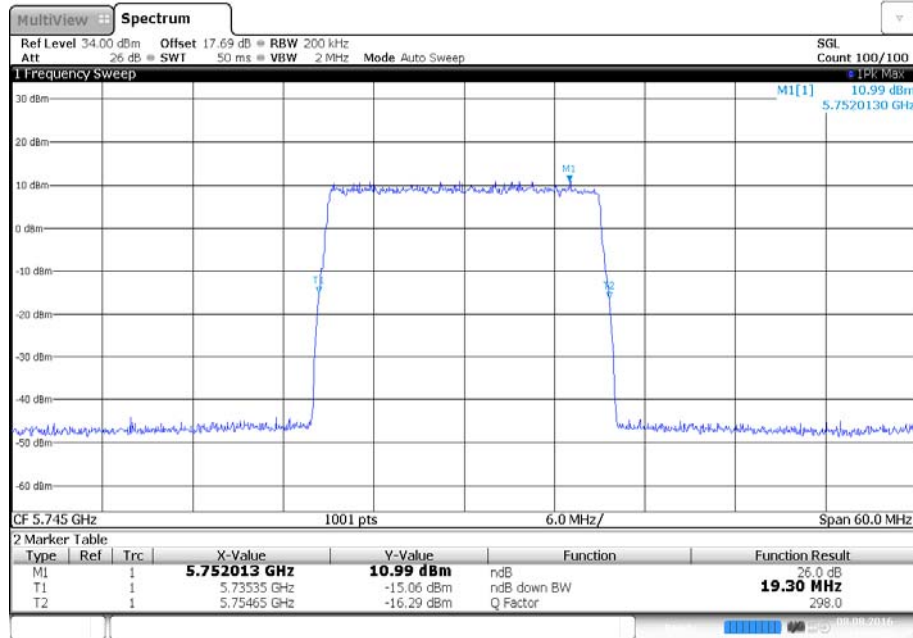
17:13:25 08.08.2016

## Antenna D - Modulation 16QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz - Measurement -26 dB BW



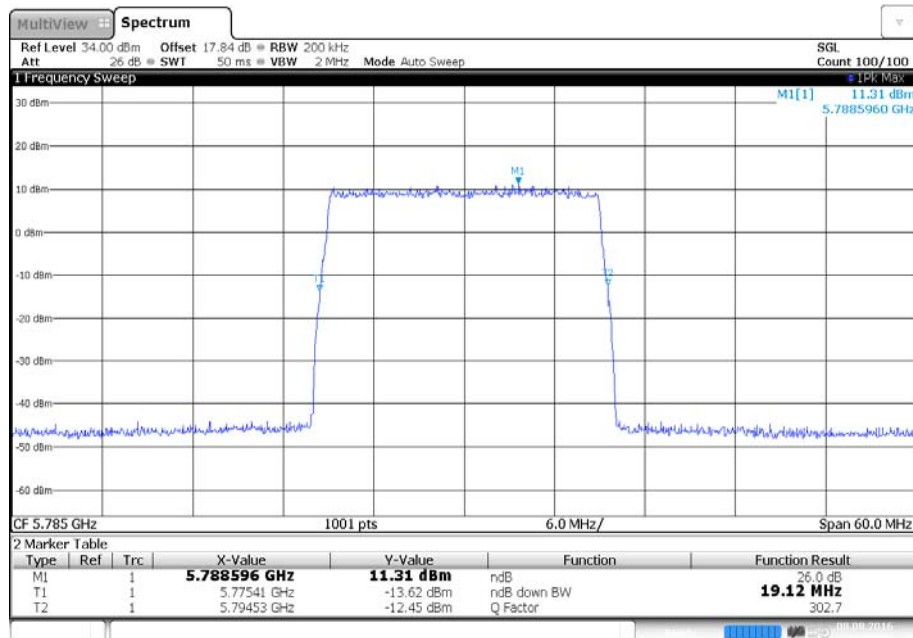
17:15:45 08.08.2016

## Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5745 MHz - Measurement -26 dB BW



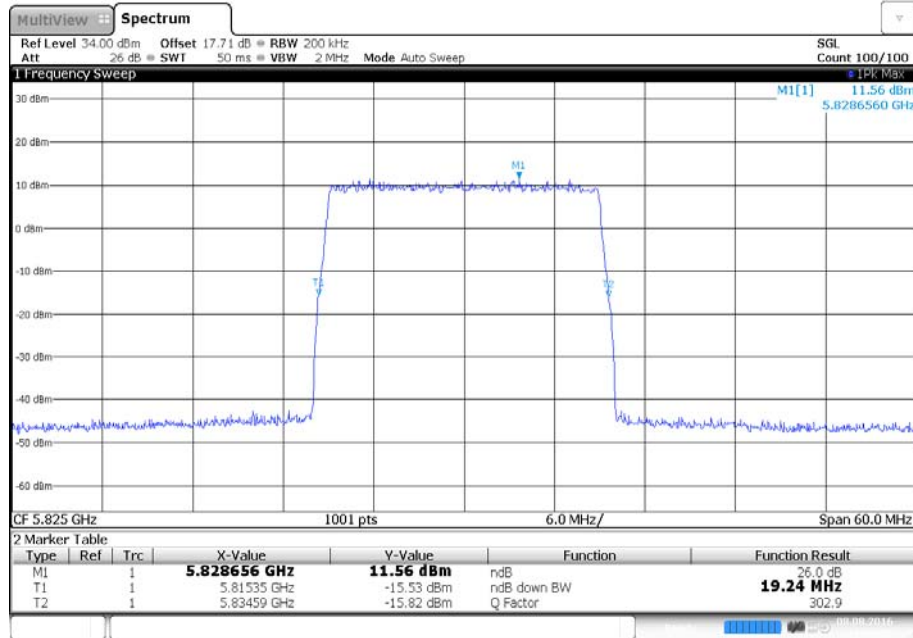
16:44:30 08.08.2016

## Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5785 MHz - Measurement -26 dB BW



16:46:49 08.08.2016

Antenna D - Modulation 64QAM - Carrier Bandwidth 20.0 MHz - Frequency 5825 MHz -  
Measurement -26 dB BW



16:49:07 08.08.2016

## 2.2 CONDUCTED OUTPUT POWER

### 2.2.1 Specification Reference

FCC CFR 47 Part 15E, Clause 15.407 (a)(1)(2)(3)

### 2.2.2 Date of Test and Modification State

08 August 2016 - Modification State 0

### 2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.4 Environmental Conditions

Ambient Temperature 23.2°C  
Relative Humidity 51.2%

### 2.2.5 Test Method

All measurements were made in accordance with FCC KDB 789033 D02 section II.E.3.a) and summed in accordance with FCC KDB 662911 D01.

### 2.2.6 Test Results

Configuration A

Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth (MHz) | Antenna | Conducted Output Power (dBm) |          |          |
|------------|-------------------------|---------|------------------------------|----------|----------|
|            |                         |         | 5160 MHz                     | 5200 MHz | 5240 MHz |
| QPSK       | 20.0 MHz                | C       | 19.40                        | 20.66    | 20.77    |
|            |                         | D       | 18.84                        | 20.12    | 20.26    |
| Total      |                         |         | 22.14                        | 23.41    | 23.53    |
| 16QAM      | 20.0 MHz                | C       | 19.42                        | 20.65    | 20.74    |
|            |                         | D       | 18.82                        | 20.07    | 20.27    |
| Total      |                         |         | 22.14                        | 23.38    | 23.52    |
| 64QAM      | 20.0 MHz                | C       | 19.39                        | 20.64    | 20.74    |
|            |                         | D       | 18.85                        | 20.08    | 20.28    |
| Total      |                         |         | 22.14                        | 23.38    | 23.53    |

#### Remarks

The radiation pattern is different for both antennas. The gain of one antenna is higher in one direction than the other resulting in an overall maximum gain of 5 dBi.

### Configuration B

Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth (MHz) | Antenna | Conducted Output Power (dBm) |          |          |
|------------|-------------------------|---------|------------------------------|----------|----------|
|            |                         |         | 5745 MHz                     | 5785 MHz | 5825 MHz |
| QPSK       | 20.0 MHz                | C       | 20.48                        | 20.37    | 20.38    |
|            |                         | D       | 18.89                        | 19.16    | 19.55    |
| Total      |                         |         | 22.77                        | 22.82    | 23.00    |
| 16QAM      | 20.0 MHz                | C       | 20.49                        | 20.36    | 20.41    |
|            |                         | D       | 18.90                        | 19.13    | 19.54    |
| Total      |                         |         | 22.78                        | 22.80    | 23.01    |
| 64QAM      | 20.0 MHz                | C       | 20.48                        | 20.34    | 20.38    |
|            |                         | D       | 18.90                        | 19.12    | 19.53    |
| Total      |                         |         | 22.77                        | 22.78    | 22.99    |

### Remarks

The radiation pattern is different for both antennas. The gain of one antenna is higher in one direction than the other resulting in an overall maximum gain of 5 dBi.

## 2.3 POWER SPECTRAL DENSITY

### 2.3.1 Specification Reference

FCC CFR 47 Part 15E, Clause 15.407 (a)(5)

### 2.3.2 Date of Test and Modification State

08 August 2016 - Modification State 0

### 2.3.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.4 Environmental Conditions

Ambient Temperature 23.1°C  
Relative Humidity 54.7%

### 2.3.5 Test Method

All measurements were made in accordance with FCC KDB 789033 D02 section II.F.

### 2.3.6 Test Results

Configuration A

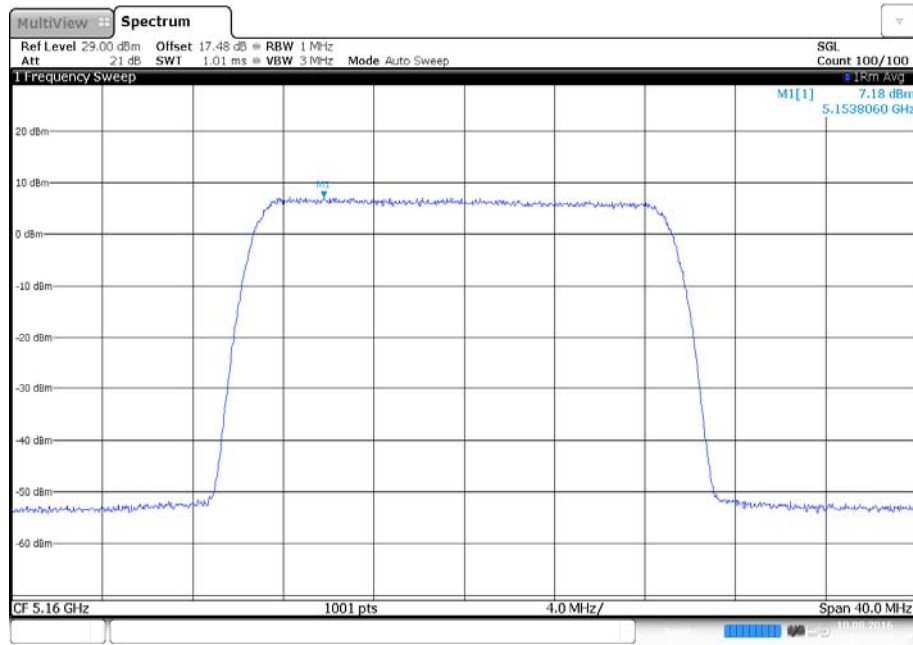
Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth (MHz) | Antenna | Power Spectral Density (dBm) |          |          |
|------------|-------------------------|---------|------------------------------|----------|----------|
|            |                         |         | 5160 MHz                     | 5200 MHz | 5240 MHz |
| QPSK       | 20.0 MHz                | C       | 7.18                         | 7.95     | 7.98     |
|            |                         | D       | 6.48                         | 7.58     | 7.76     |
| Total      |                         |         | 9.85                         | 10.78    | 10.88    |
| 16QAM      | 20.0 MHz                | C       | 7.39                         | 8.43     | 8.19     |
|            |                         | D       | 6.55                         | 7.97     | 8.39     |
| Total      |                         |         | 10.00                        | 11.22    | 11.30    |
| 64QAM      | 20.0 MHz                | C       | 7.25                         | 8.17     | 8.03     |
|            |                         | D       | 6.80                         | 7.80     | 8.26     |
| Total      |                         |         | 10.04                        | 11.00    | 11.16    |

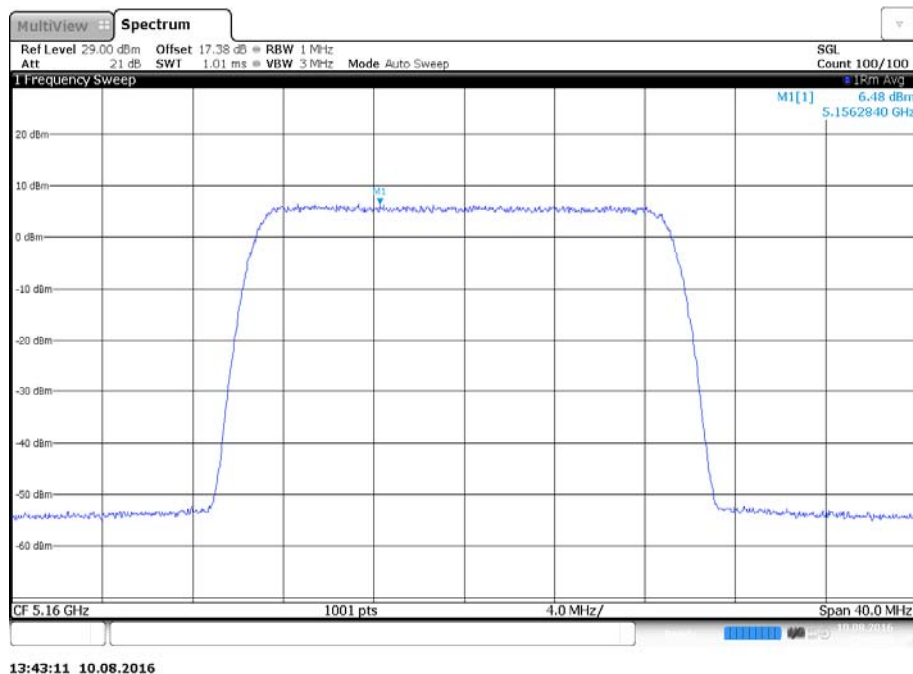
#### Remarks

The radiation pattern is different for both antennas. The gain of one antenna is higher in one direction than the other resulting in an overall maximum gain of 5 dBi.

Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5160 MHz

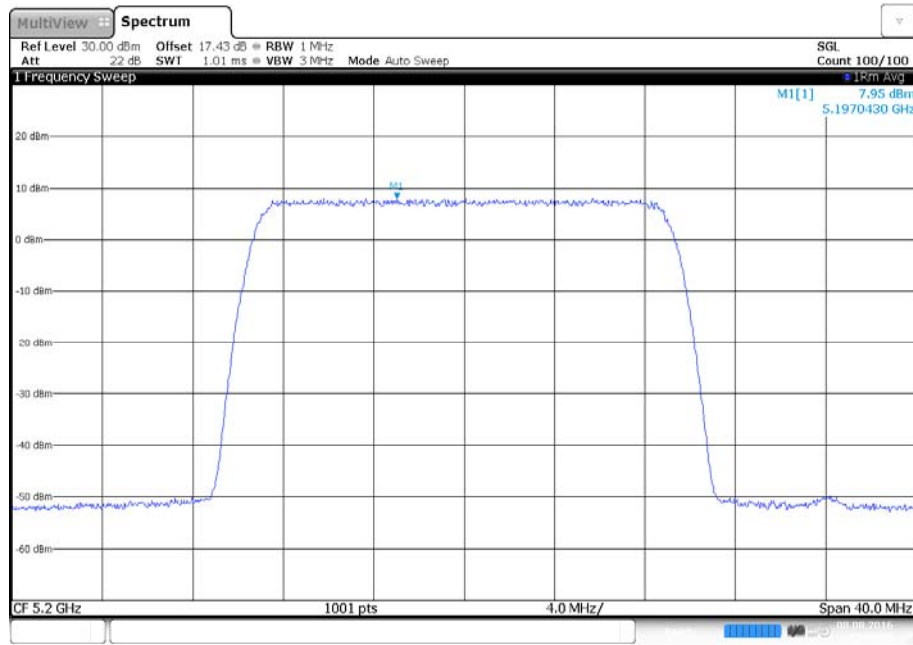


Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5160 MHz

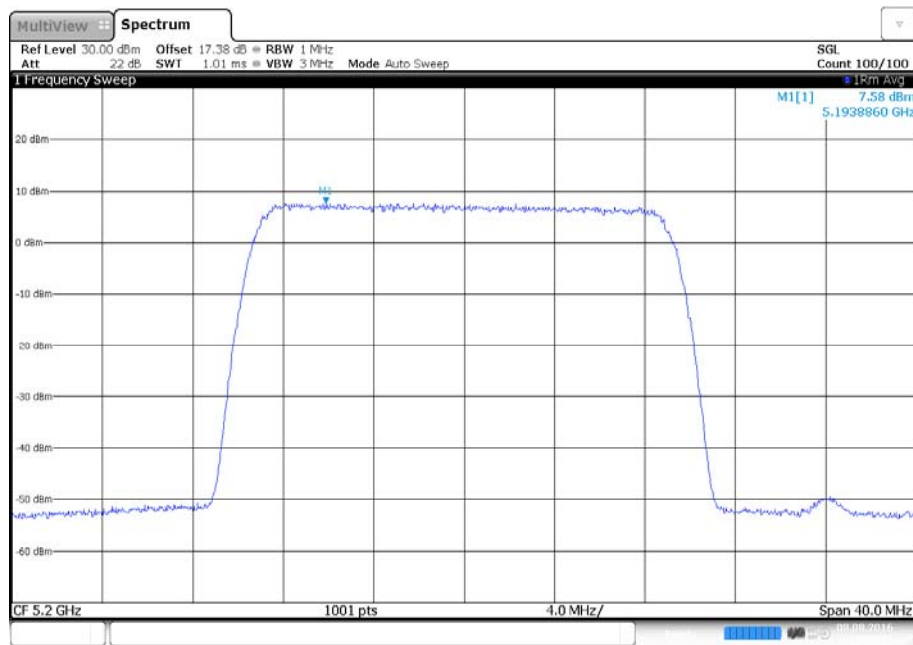




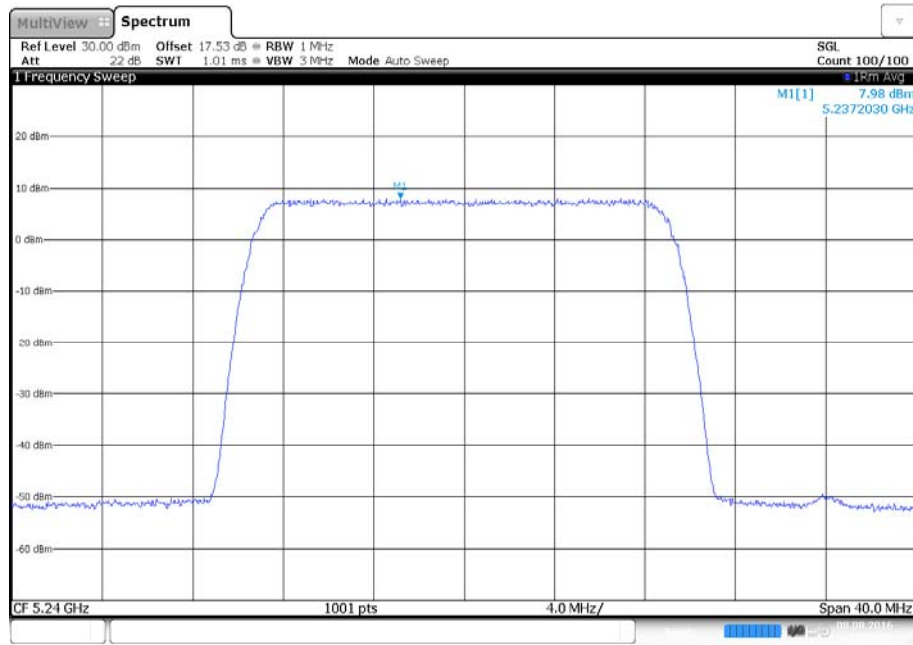
Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5200 MHz



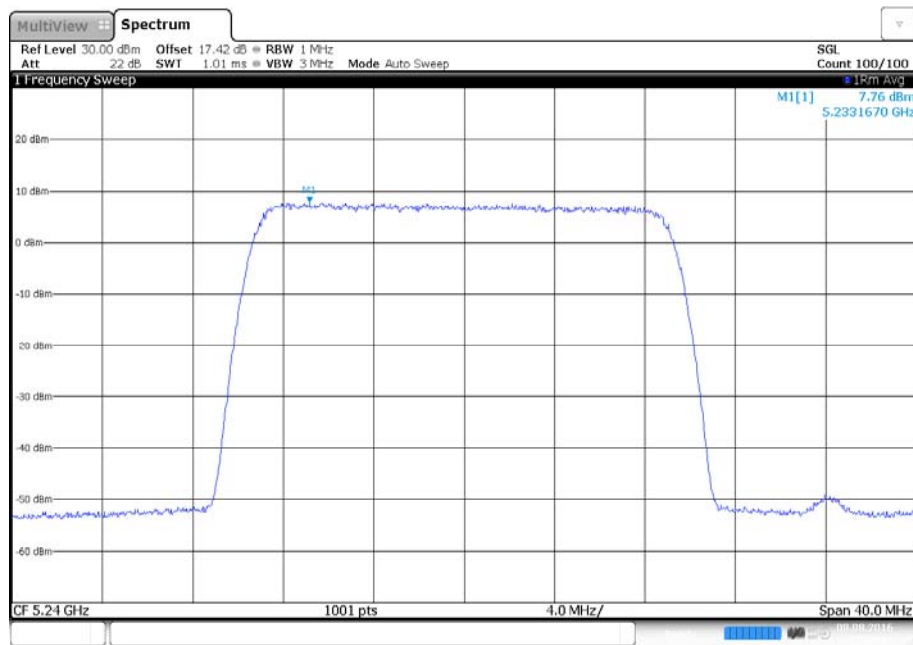
Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5200 MHz



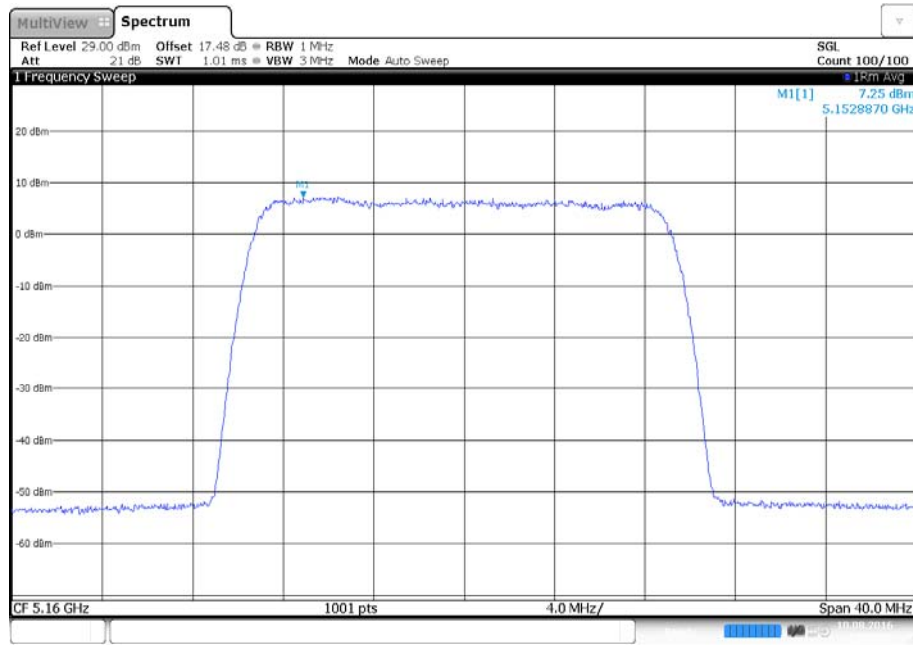
Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5240 MHz



Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5240 MHz

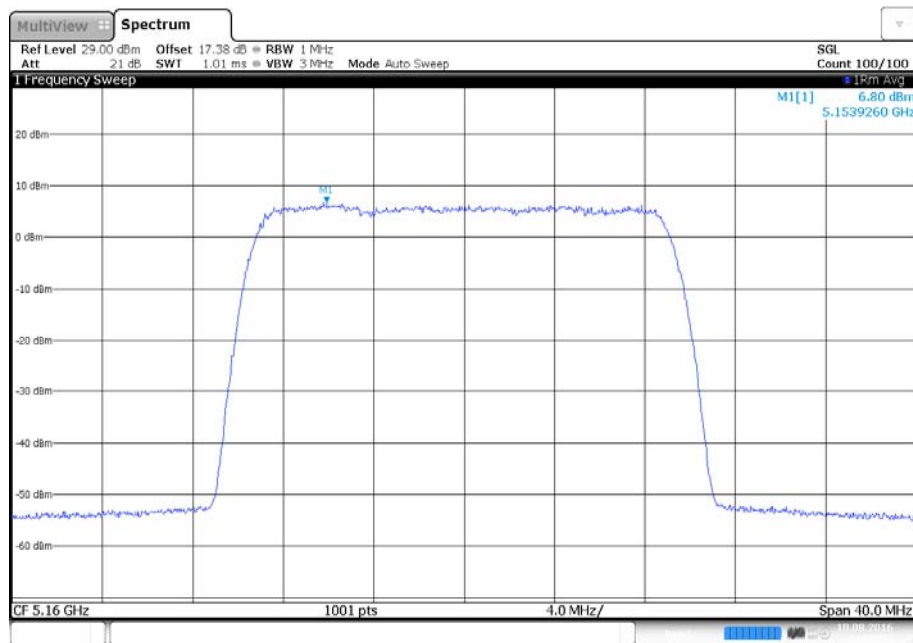


Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5160 MHz



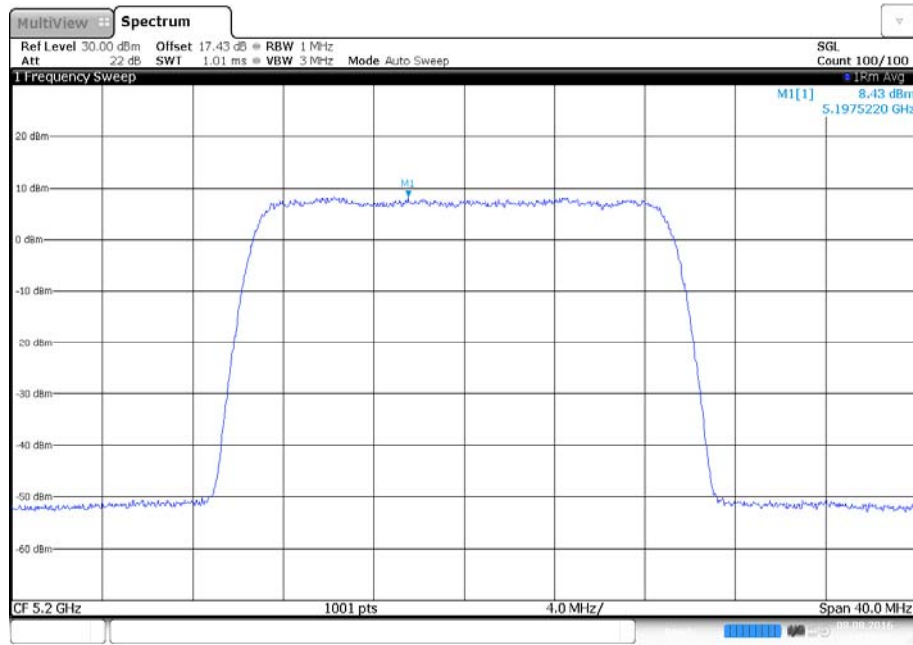
13:52:07 10.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5160 MHz



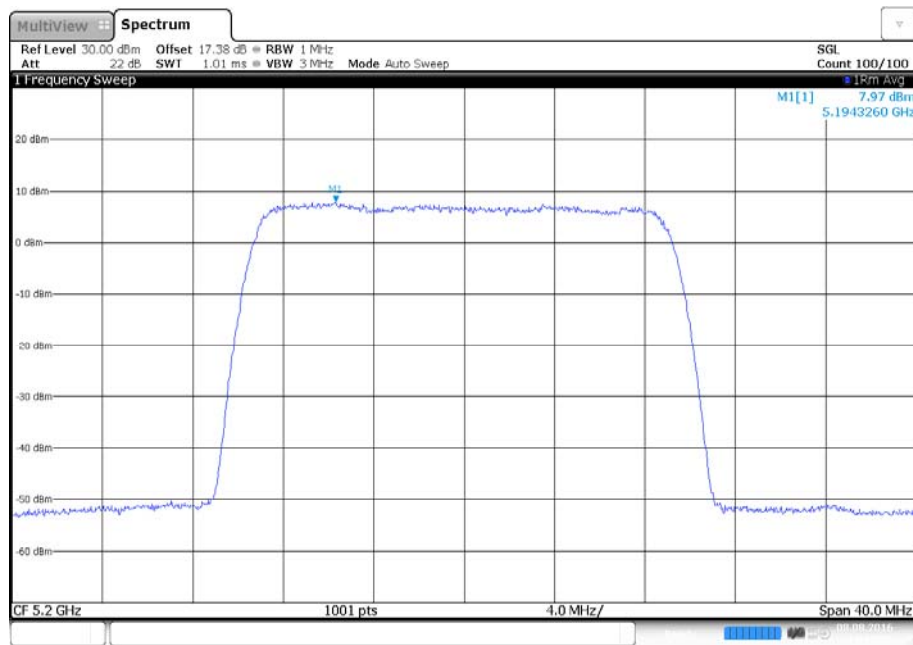
13:53:34 10.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5200 MHz



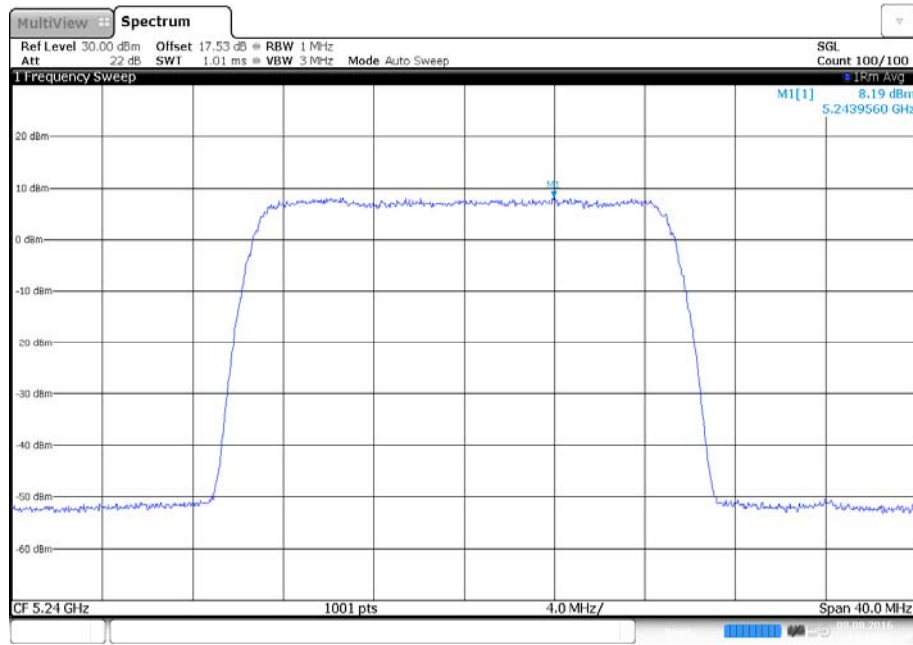
14:10:56 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5200 MHz



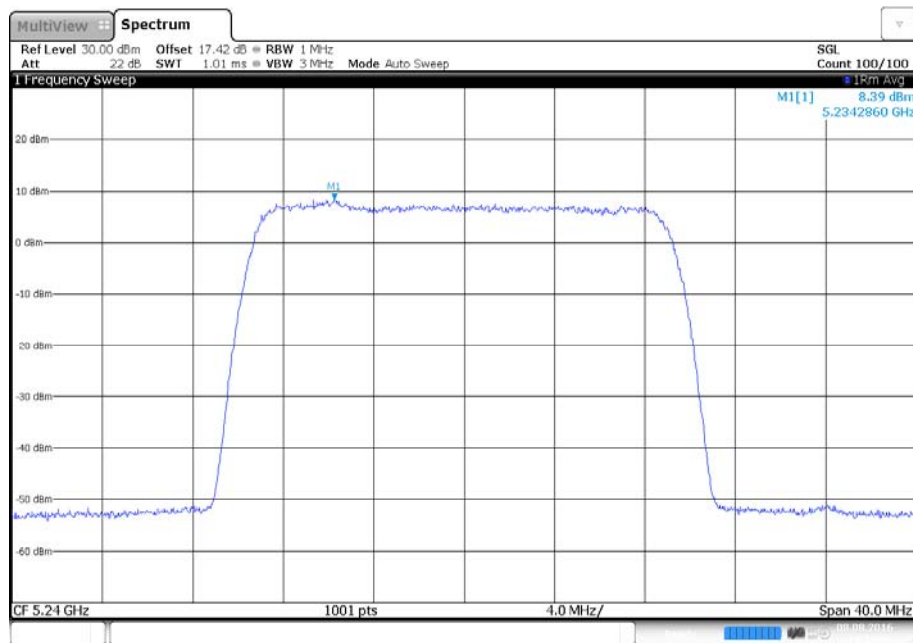
14:15:16 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5240 MHz



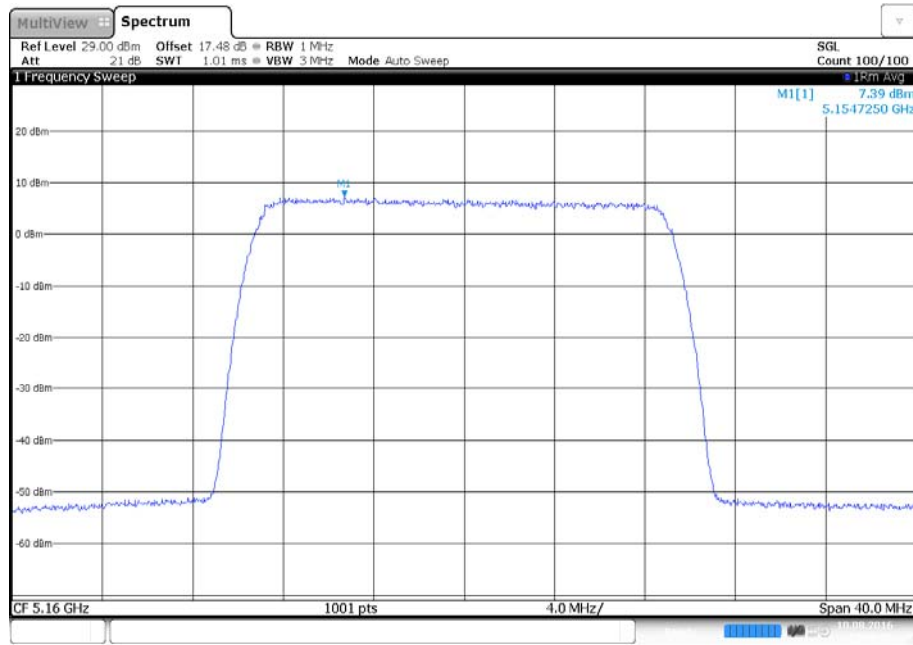
14:12:22 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5240 MHz



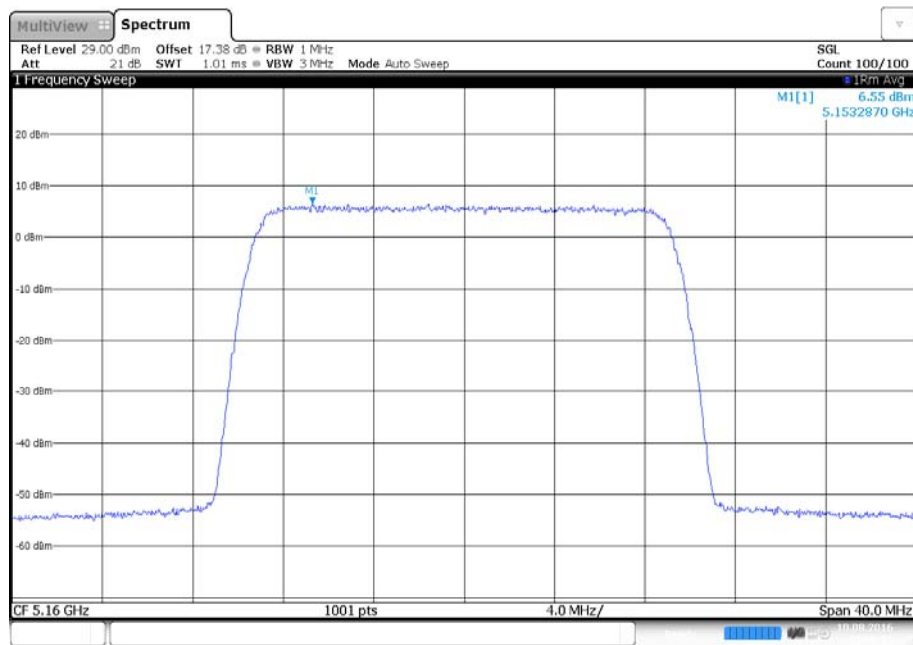
14:16:43 08.08.2016

Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5160 MHz



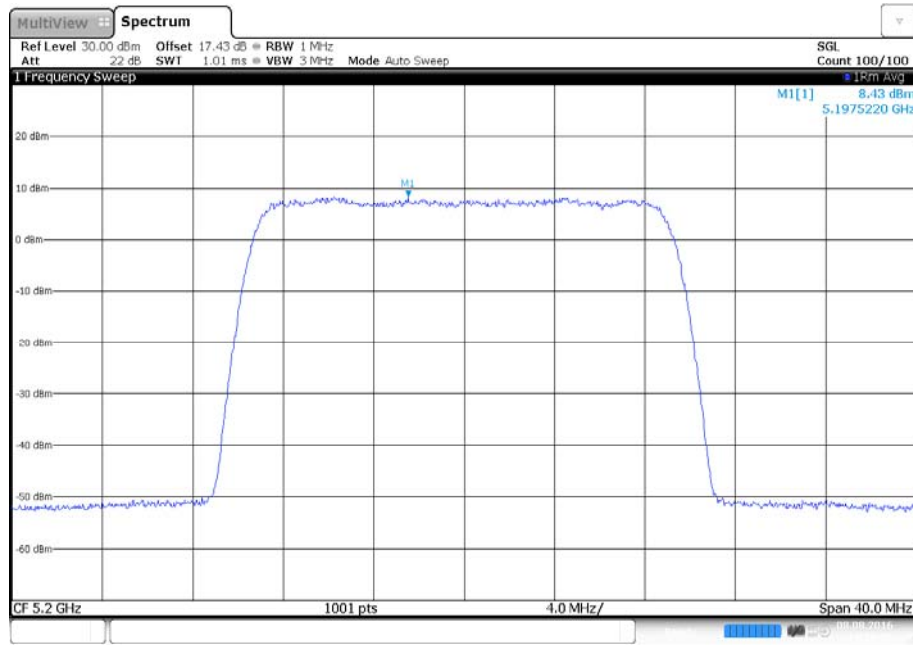
13:46:55 10.08.2016

Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5160 MHz



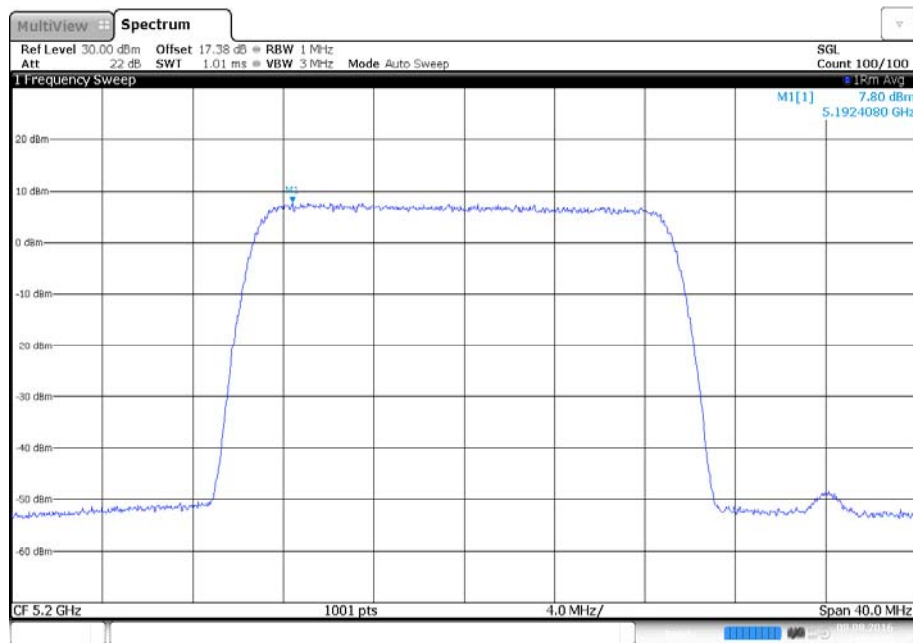
13:48:22 10.08.2016

Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5200 MHz



14:10:56 08.08.2016

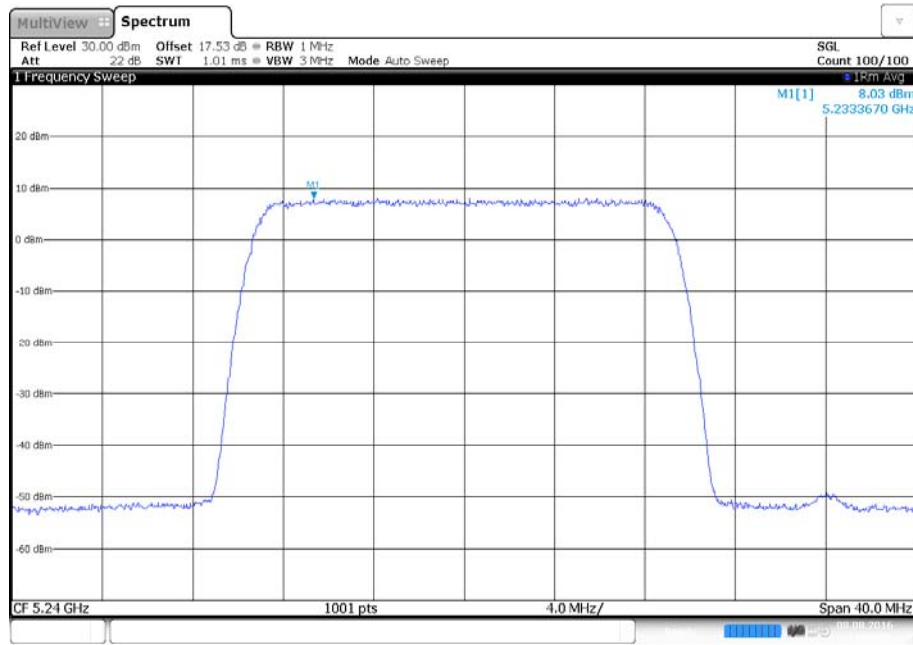
Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5200 MHz



14:04:19 08.08.2016

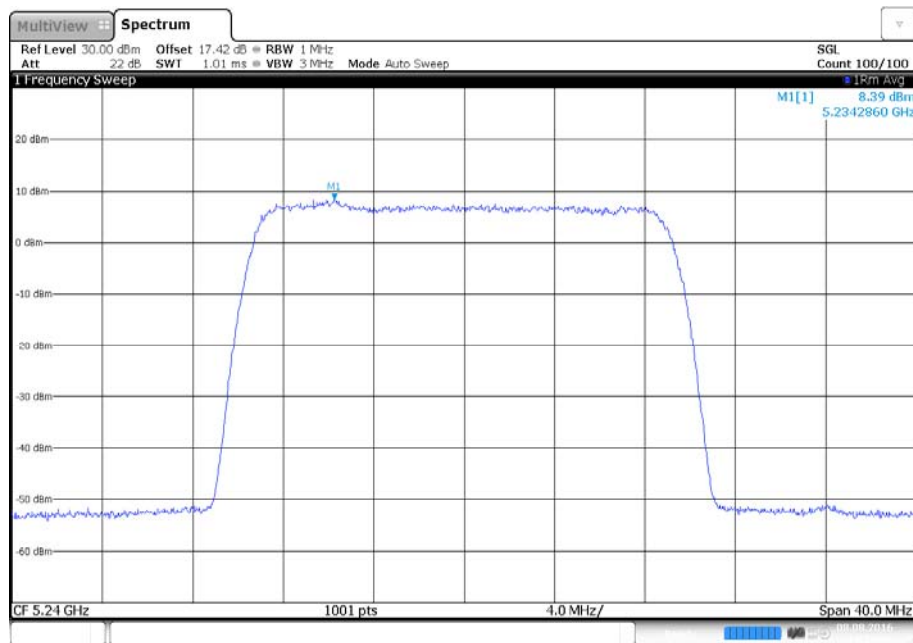


Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5240 MHz



14:01:25 08.08.2016

Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5240 MHz



14:16:43 08.08.2016

## Configuration B

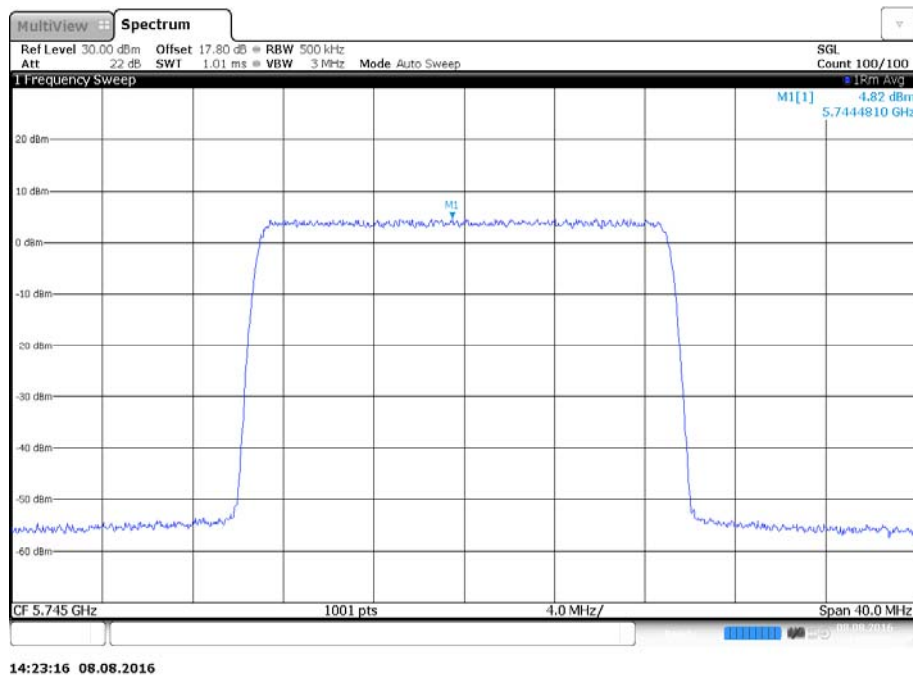
Maximum Output Power Per Carrier 21 dBm

| Modulation | Carrier Bandwidth (MHz) | Antenna | Power Spectral Density (dBm) |          |          |
|------------|-------------------------|---------|------------------------------|----------|----------|
|            |                         |         | 5745 MHz                     | 5785 MHz | 5825 MHz |
| QPSK       | 20.0 MHz                | C       | 4.82                         | 4.49     | 4.61     |
|            |                         | D       | 3.28                         | 3.15     | 3.66     |
| Total      |                         |         | 7.13                         | 6.88     | 7.17     |
| 16QAM      | 20.0 MHz                | C       | 4.96                         | 5.18     | 4.93     |
|            |                         | D       | 3.65                         | 3.56     | 4.30     |
| Total      |                         |         | 7.36                         | 7.46     | 7.64     |
| 64QAM      | 20.0 MHz                | C       | 4.88                         | 4.76     | 4.56     |
|            |                         | D       | 3.32                         | 3.38     | 3.66     |
| Total      |                         |         | 7.18                         | 7.13     | 7.14     |

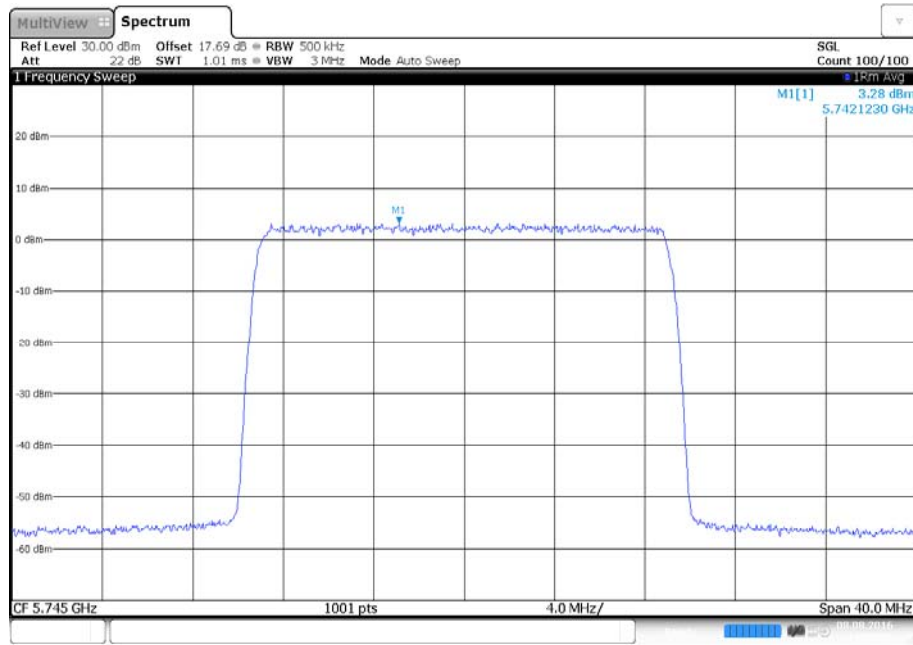
## Remarks

The radiation pattern is different for both antennas. The gain of one antenna is higher in one direction than the other resulting in an overall maximum gain of 5 dBi.

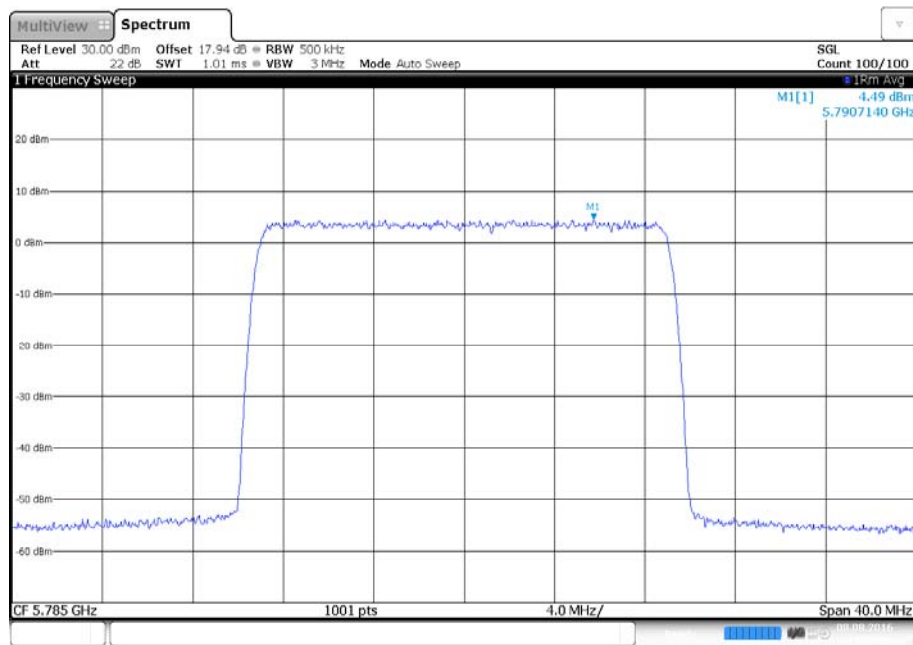
Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5745 MHz



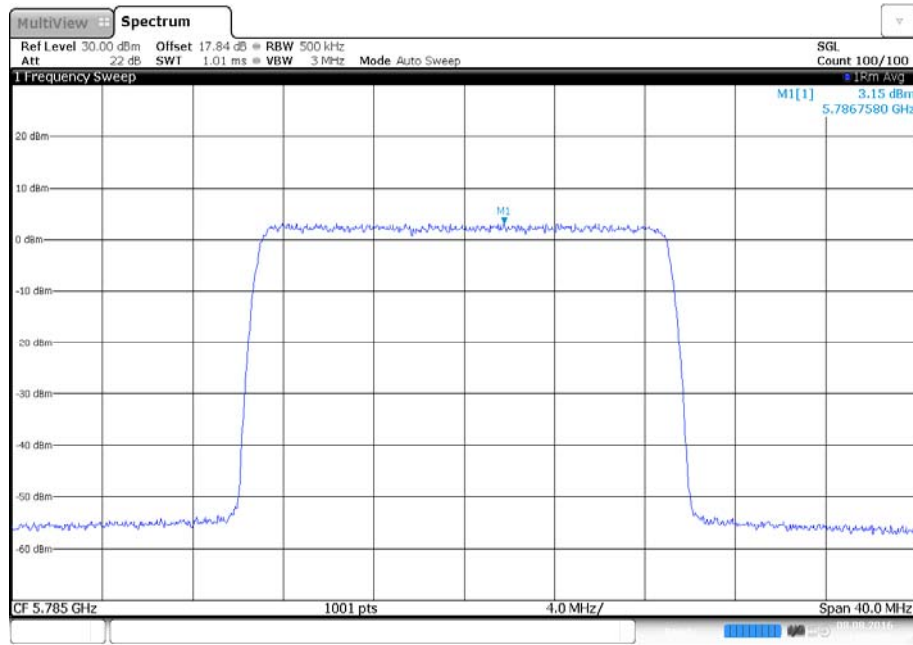
Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5745 MHz



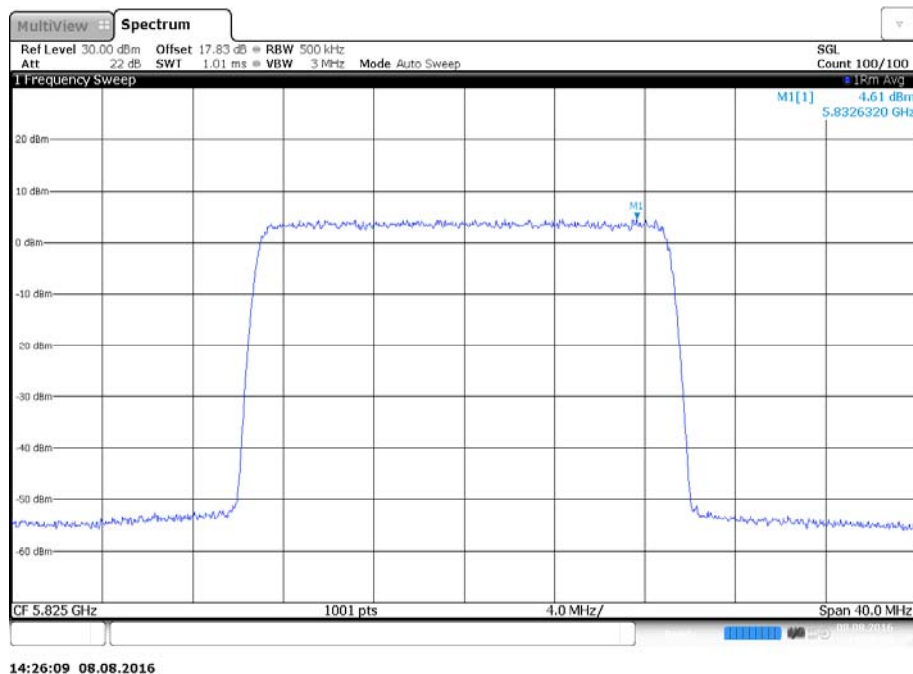
Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5785 MHz



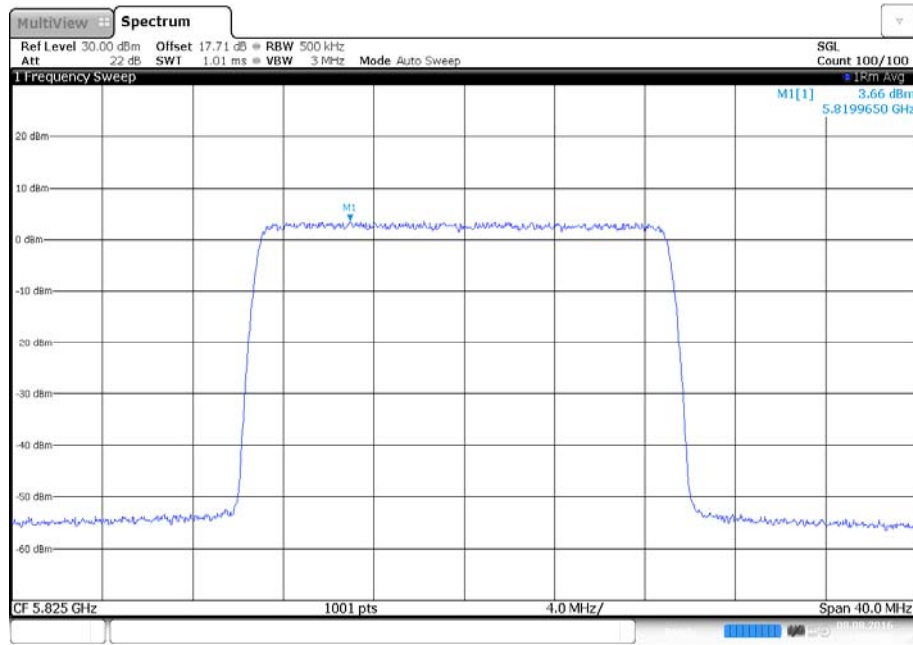
Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5785 MHz



Modulation QPSK - Bandwidth 20.0 MHz - Antenna C - Frequency 5825 MHz

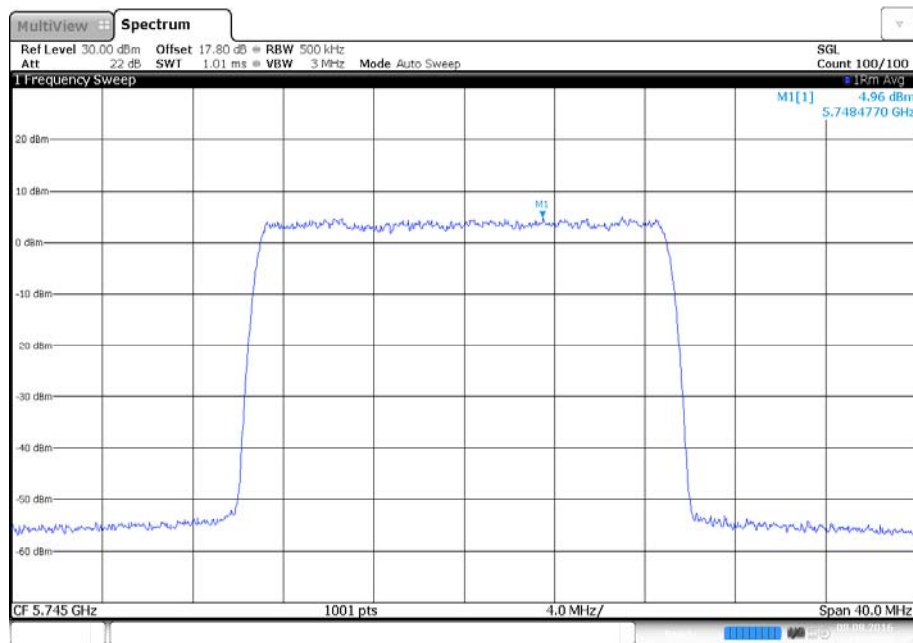


Modulation QPSK - Bandwidth 20.0 MHz - Antenna D - Frequency 5825 MHz



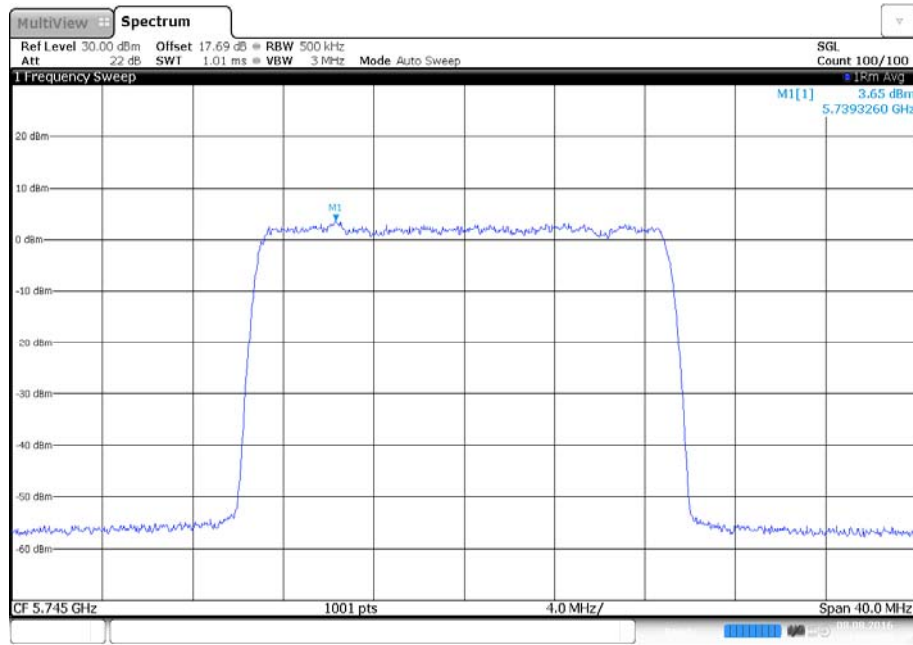
14:30:29 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5745 MHz



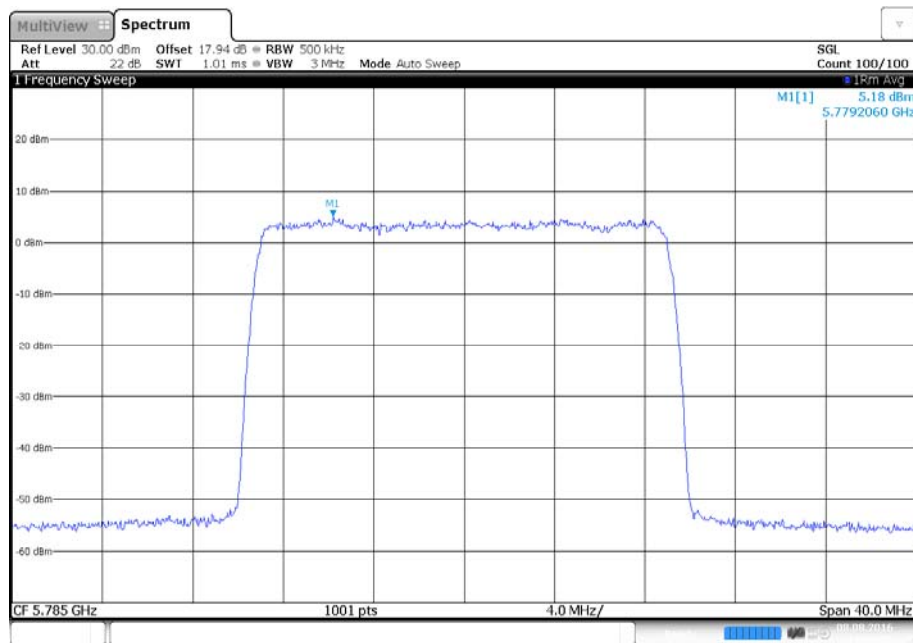
14:45:10 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5745 MHz



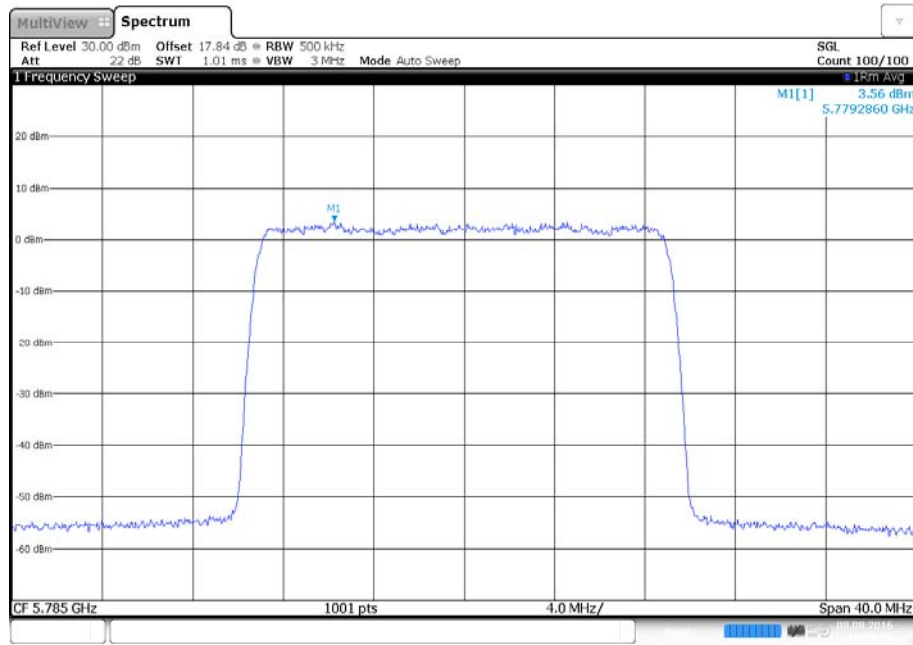
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Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5785 MHz



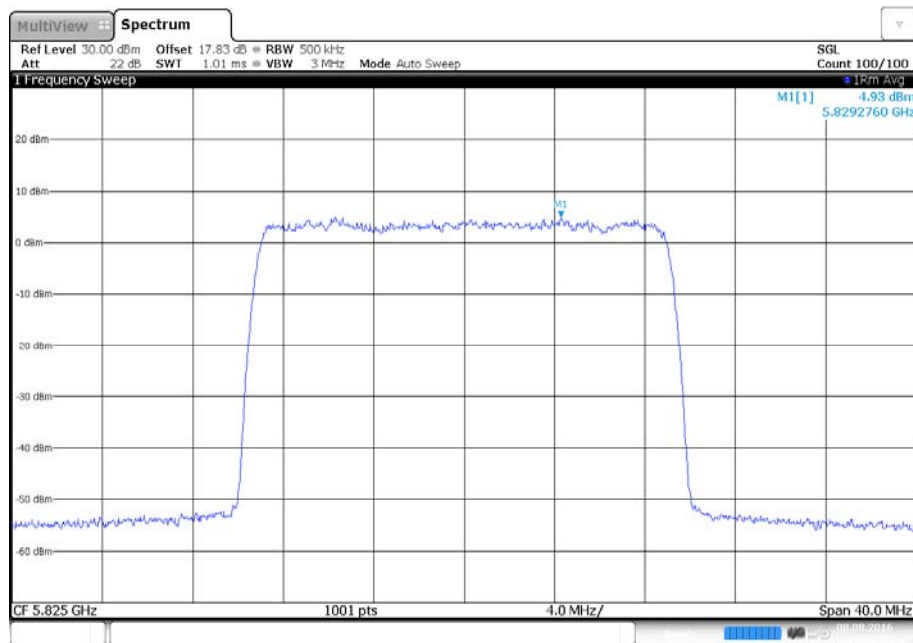
14:46:37 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5785 MHz



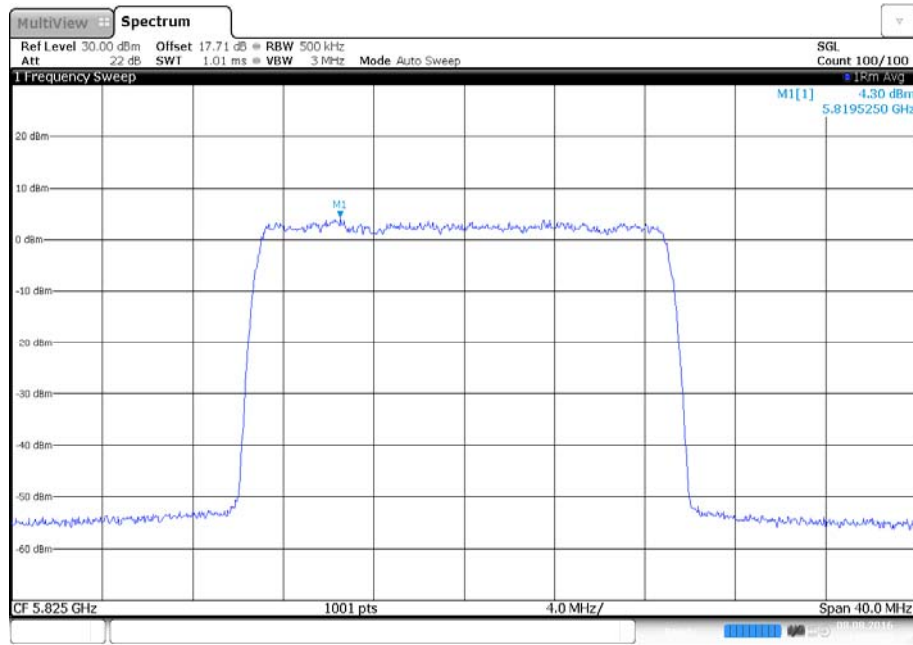
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Modulation 16QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5825 MHz

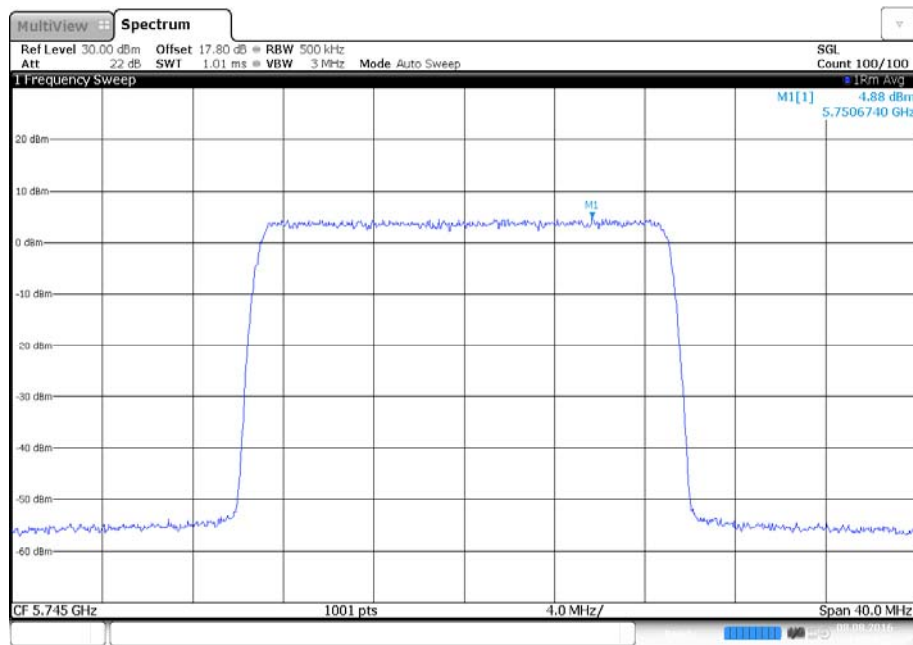


14:48:03 08.08.2016

Modulation 16QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5825 MHz

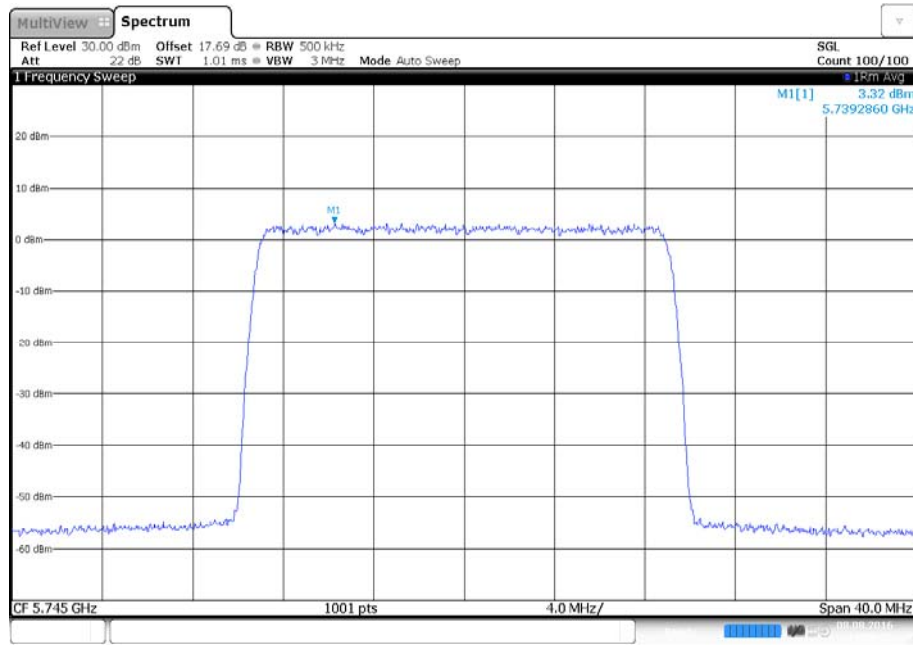


Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5745 MHz



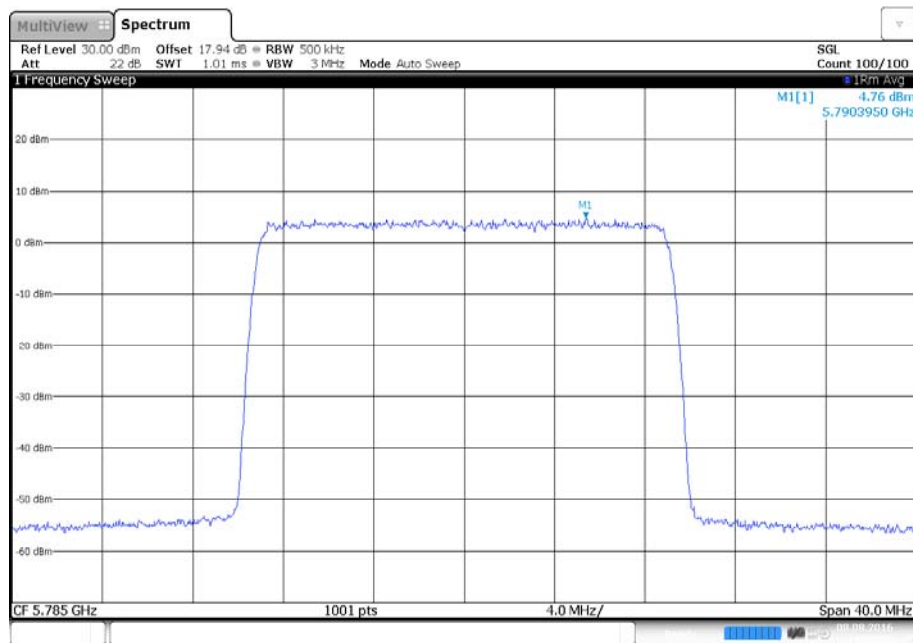


Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5745 MHz



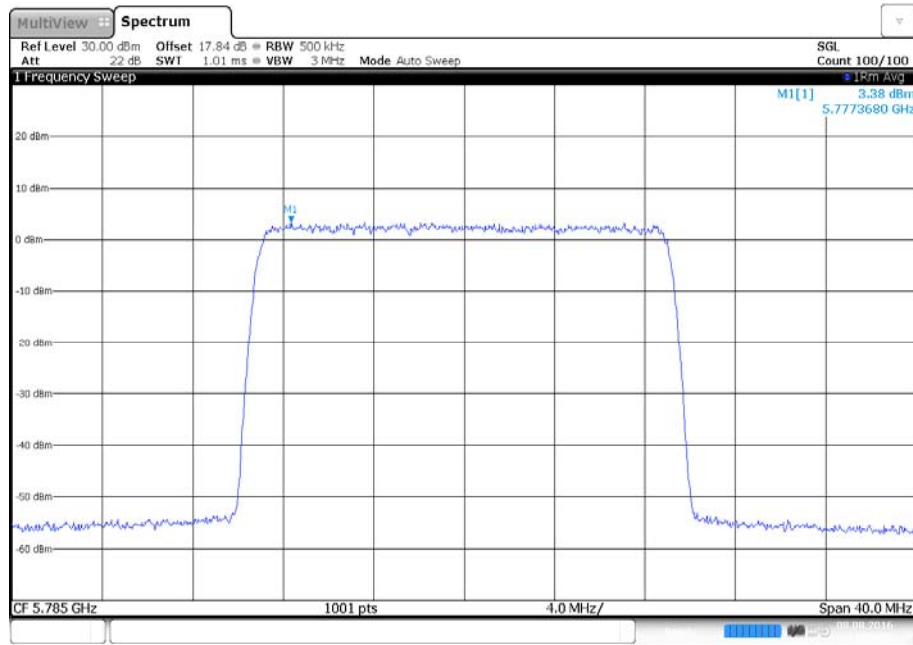
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Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5785 MHz



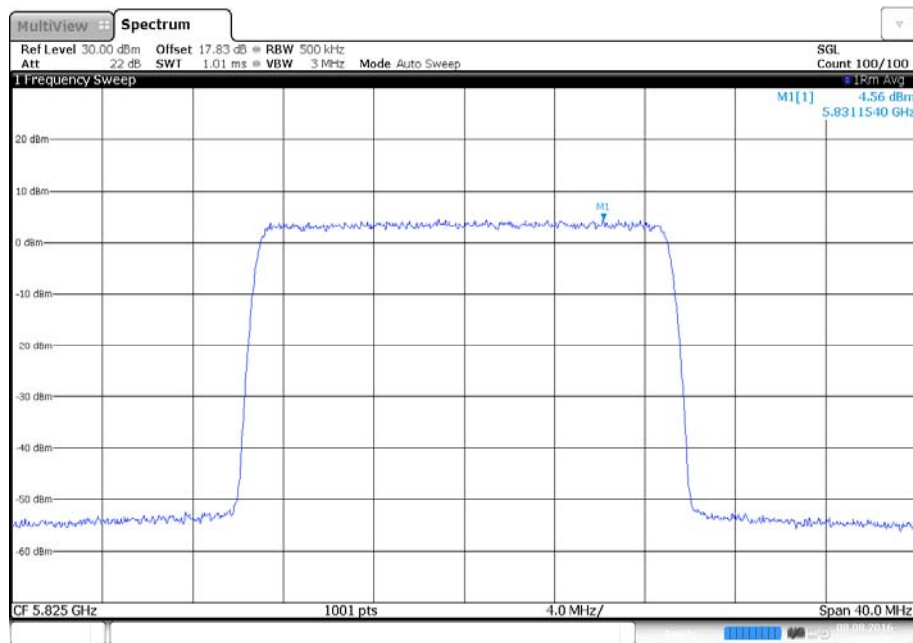
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Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5785 MHz



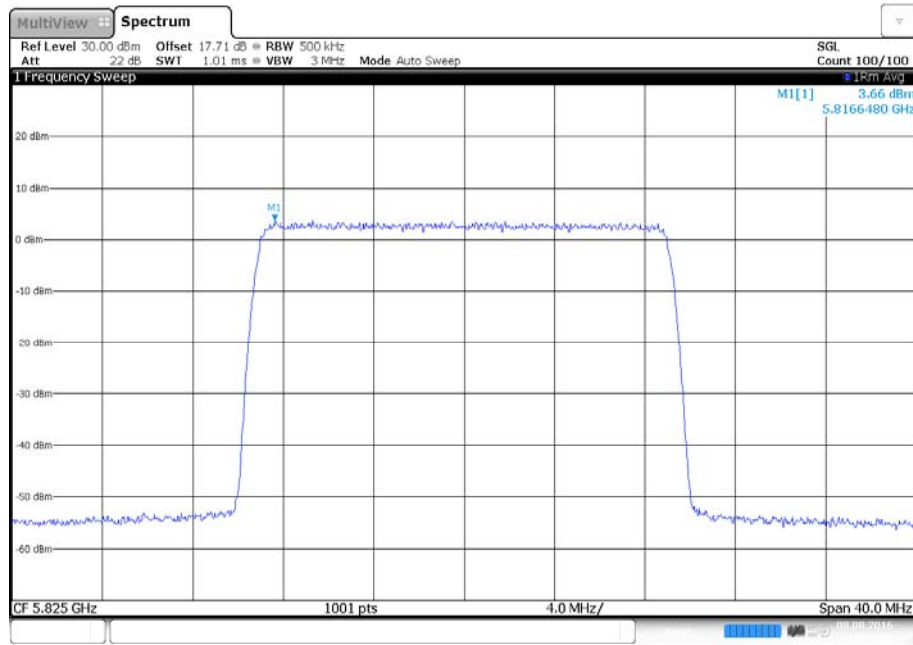
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Modulation 64QAM - Bandwidth 20.0 MHz - Antenna C - Frequency 5825 MHz



14:37:06 08.08.2016

Modulation 64QAM - Bandwidth 20.0 MHz - Antenna D - Frequency 5825 MHz



14:41:26 08.08.2016

## 2.4 FREQUENCY STABILITY

### 2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055  
FCC CFR 47 Part 15E, Clause 15.407 (g)

### 2.4.2 Date of Test and Modification State

10 August 2016 - Modification State 0

### 2.4.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.4 Environmental Conditions

Ambient Temperature 22.5 - 22.6°C  
Relative Humidity 53.2 - 54.2%

### 2.4.5 Test Method

All measurements were made in accordance with FCC KDB 789033 D02. The EUT was set to transmit at maximum power on bottom and top channels in each band of operation using the antenna that gave the highest level of conducted output power. The EUT was connected to a spectrum analyser via a cable and attenuator and the resultant trace was displayed on screen with the operating band edges shown using an emission limit of -27dBm/MHz to ensure the emission is maintained with the band of operation.

### 2.4.6 Test Results

Configuration A

Maximum Output Power Per Carrier 21 dBm

| Temperature | Voltage   | Frequency Stability |       |       |          |       |       |
|-------------|-----------|---------------------|-------|-------|----------|-------|-------|
|             |           | 5160 MHz            |       |       | 5240 MHz |       |       |
|             |           | QPSK                | 16QAM | 64QAM | QPSK     | 16QAM | 64QAM |
| 0°C         | 37.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
|             | 58.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
| +40°C       | 37.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
|             | 58.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |

#### Remarks

The emission was maintained within the band of operation at all temperature and voltage conditions. Measurements were performed on Antenna C as this antenna has the highest measured conducted output power.

### Configuration B

Maximum Output Power Per Carrier 21 dBm

| Temperature | Voltage   | Frequency Stability |       |       |          |       |       |
|-------------|-----------|---------------------|-------|-------|----------|-------|-------|
|             |           | 5745 MHz            |       |       | 5825 MHz |       |       |
|             |           | QPSK                | 16QAM | 64QAM | QPSK     | 16QAM | 64QAM |
| 0°C         | 37.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
|             | 58.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
| +40°C       | 37.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |
|             | 58.0 V DC | Pass                | Pass  | Pass  | Pass     | Pass  | Pass  |

### Remarks

The emission was maintained within the band of operation at all temperature and voltage conditions. Measurements were performed on Antenna C as this antenna has the highest measured conducted output power.



Product Service

### **SECTION 3**

#### **TEST EQUIPMENT USED**

### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

| Instrument             | Manufacturer | Type No.     | TE No.         | Calibration Period (months) | Calibration Due |
|------------------------|--------------|--------------|----------------|-----------------------------|-----------------|
| Conducted Output Power |              |              |                |                             |                 |
| Hygromer               | Rotronic     | A1           | 2138           | 12                          | 09-Dec-2016     |
| Digital Multimeter     | Fluke        | 79 Series II | 611            | 12                          | 02-Sep-2016     |
| Signal Analyzer        | R&S          | FSW          | 103947         | 12                          | 01-Feb-2017     |
| Signal Switch Unit     | Orbis        | TX SSU       | EB ID 2571     | -                           | TU              |
| DC power supply        | HP           | 6032A        | US38321561     | -                           | OP MON          |
| Power sensor           | R&S          | NRP-Z21      | 101290         | 12                          | 01-Oct-2016     |
| Power Spectral Density |              |              |                |                             |                 |
| Hygromer               | Rotronic     | A1           | 2138           | 12                          | 09-Dec-2016     |
| Digital Multimeter     | Fluke        | 79 Series II | 611            | 12                          | 02-Sep-2016     |
| Signal Analyzer        | R&S          | FSW          | 103799         | 12                          | 01-Feb-2017     |
| Signal Switch Unit     | Orbis        | TX SSU       | EB ID 2571     | -                           | TU              |
| DC power supply        | HP           | 6032A        | US38321561     | -                           | OP MON          |
| Occupied Bandwidth     |              |              |                |                             |                 |
| Hygromer               | Rotronic     | A1           | 2138           | 12                          | 09-Dec-2016     |
| Digital Multimeter     | Fluke        | 79 Series II | 611            | 12                          | 02-Sep-2016     |
| Signal Analyzer        | R&S          | FSW          | 103799         | 12                          | 01-Feb-2017     |
| Signal Switch Unit     | Orbis        | TX SSU       | EB ID 2571     | -                           | TU              |
| DC power supply        | HP           | 6032A        | US38321561     | -                           | OP MON          |
| Frequency Stability    |              |              |                |                             |                 |
| Hygromer               | Rotronic     | A1           | 2138           | 12                          | 09-Dec-2016     |
| Digital Multimeter     | Fluke        | 79 Series II | 611            | 12                          | 02-Sep-2016     |
| Signal Analyzer        | R&S          | FSW          | 103799         | 12                          | 01-Feb-2017     |
| Signal Switch Unit     | Orbis        | TX SSU       | EB ID 2571     | -                           | TU              |
| DC power supply        | HP           | 6032A        | US38321561     | -                           | OP MON          |
| Climatic Chamber       | Votsch       | VT 4018      | 58566065410010 | -                           | OP MON          |
| Digital Thermometer    | Fluke        | 51           | 2267           | 12                          | 09-Dec-2016     |

N/A – Not Applicable

OP MON – Output Monitored with Calibrated Equipment

### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

| Test Discipline        | Frequency / Parameter      | MU            |
|------------------------|----------------------------|---------------|
| Conducted Output Power | 30 MHz to 20 GHz Amplitude | $\pm 0.1$ dB  |
| Occupied Bandwidth     | Up to 20 MHz Bandwidth     | $\pm 606$ kHz |
| Band Edge              | 30 MHz to 20 GHz Amplitude | $\pm 2.3$ dB  |





Product Service

## **SECTION 5**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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Product Service

## **ANNEX A**

### **MODULE LIST**



Product Service

|                    |                                  |         |            |
|--------------------|----------------------------------|---------|------------|
| Configuration A    |                                  |         |            |
| Product            | Product No                       | R-State | Serial No  |
| RBS 6402           | KRD 901 060/83                   | R1C     | C82A516905 |
|                    |                                  |         |            |
| Software Version : | RASW_20160516_LBT_DFE_4_5_UPDATE |         |            |