

## FCC Part 15E Compliance Test Report

|                                                         |                                                                                                                                                                                                                                                                                         |                                   |                                                                                                                             |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Test Report no.:</b>                                 | FCC15E_RM-1105_18.docx                                                                                                                                                                                                                                                                  | <b>Date of Report:</b>            | 04-Mar-2015                                                                                                                 |
| <b>Number of pages:</b>                                 | 78                                                                                                                                                                                                                                                                                      | <b>Customer's Contact person:</b> | Jari Rontu                                                                                                                  |
| <b>Testing laboratory:</b>                              | TCC Microsoft Salo Laboratory<br>P.O.Box(86)<br>Joensuunkatu 7E<br>FIN-24101 SALO, FINLAND<br>Tel. +358 (0) 7180 08000<br>Fax. +358 71 80 44122                                                                                                                                         | <b>Customer:</b>                  | Microsoft<br>P.O.Box(86)<br>Joensuunkatu 7E<br>FIN-24101 SALO, FINLAND<br>Tel. +358 (0) 7180 08000<br>Fax. +358 71 80 44122 |
| <b>FCC listing no.:</b>                                 | 533467                                                                                                                                                                                                                                                                                  |                                   |                                                                                                                             |
| <b>IC recognition no.:</b>                              | 661V-1                                                                                                                                                                                                                                                                                  |                                   |                                                                                                                             |
| <b>Tested devices/ accessories:</b>                     | Phone RM-1105 / Dummy Battery SD-244R / Headset WH-308                                                                                                                                                                                                                                  |                                   |                                                                                                                             |
| <b>FCC ID:</b>                                          | PYARM-1105                                                                                                                                                                                                                                                                              | <b>IC:</b>                        | 661X-RM1105                                                                                                                 |
| <b>Supplement reports:</b>                              | -                                                                                                                                                                                                                                                                                       |                                   |                                                                                                                             |
| <b>Testing has been carried out in accordance with:</b> | CFR 47, FCC rules Part 15 Subpart E, ANSI C63.4 (2014), DTS procedures KDB 789033 D02 v01, IC standards, RSS-210 (Issue 8, December 2010). Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit". |                                   |                                                                                                                             |
| <b>Documentation:</b>                                   | The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Microsoft.                                |                                   |                                                                                                                             |
| <b>Test Results:</b>                                    | The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document                                                                                                                             |                                   |                                                                                                                             |
| <b>Date and signature for the contents:</b>             |                                                                                                                                                                                                                                                                                         |                                   |                                                                                                                             |

Hannu Söderholm, Engineer, EMC

## 1. Summary for FCC Part 15E Compliance Test Report

|                               |                                                               |
|-------------------------------|---------------------------------------------------------------|
| Date of receipt               | 15-Jun-2015                                                   |
| Testing completed             | 03-Sep-2015                                                   |
| The customer's contact person | Jari Rontu                                                    |
| Test Plan referred to         | T:\Projects\RM-1104\TestPlan\RS_TestPlan_RM-1104_EMC_FCC.xlsm |
| Notes                         | -                                                             |
| Document name                 | T:\Projects\RM-1105\EMC\FCC15E_RM-1105_18.docx                |

### 1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:

GSM/WCDMA/WLAN/Bluetooth

The EUT is tested with maximum rated TX power.

Devices under tests

| Product       | Type    | SN                      | HW   | MV | SW                      | DUT    |
|---------------|---------|-------------------------|------|----|-------------------------|--------|
| Phone         | RM-1104 | 004402742178886ö059X034 | 2012 | -  | 01062.00000.15233.39000 | 100007 |
| Dummy Battery | SD-244R | -                       | V.1  | -  | -                       | 100021 |
| Headset       | WH-308  | 51251B1                 | -    | -  | -                       | 100029 |

### 1.2. Summary of Test Results

5 GHz RLAN:

| Section in CFR 47 | Section in RSS-GEN or RSS-210 | Name of the test                     | Result |
|-------------------|-------------------------------|--------------------------------------|--------|
| 15.407(a)         | A9.2                          | Conducted peak output power          | PASSED |
| 15.407(b)         | A9.2                          | Band edge compliance of RF emissions | NP     |
| 15.407(b)         | A9.2                          | Spurious radiated emissions          | NP     |
| 15.407(b)(6)      | A9.2                          | AC powerline conducted emissions     | NP     |
|                   | A9.2                          | 6dB(bandwidth)                       | PASSED |
|                   | A9.2                          | 26dB(bandwidth)                      | NP     |
| 15.407(a)         | A9.2                          | Maximum power spectral density       | NP     |

The test results of RM-1104 are re-used for certification of the RM-1105. The table above indicates the results, which will be re-used.

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

The EUT does not comply with the essential requirements in the standard.

NP

The test was not performed by the TCC Microsoft Laboratory.

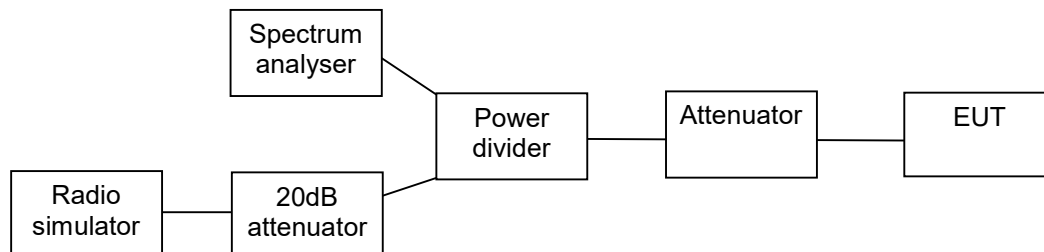
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## 2. Conducted peak output power (FCC §15.407(a), RSS-210 A9.2)

|                                                 |                                          |
|-------------------------------------------------|------------------------------------------|
| EUT with DUT number                             | RM-1104, DUT 100007                      |
| Accessories with DUT numbers                    | SD-244R, DUT 100021 ; WH-308, DUT 100029 |
| Operation Voltage [V] / [Hz]                    | Nominal                                  |
| Results                                         | PASSED                                   |
| Remarks                                         | -                                        |
| Temp [°C] / Humidity [%RH] / Air Pressure [kPa] | 20-24 / 40-49 / 99.1-101.2               |
| Date of measurements                            | 03-Sep.. 04-Nov-2015                     |
| Measured by                                     | Jari Keto, Jari Jantunen                 |

### 2.1. Test Setup



### 2.2. Test method and limit

The measurement is made according to Public Notice KDB 789033 D02 v01 and IC standard RSS-210.

Limits for Maximum conducted output power measurements

| Frequency range [MHz] | Limit [mW] / (dBm) | Limit [dBm] | Limit [dBm] for B=20 MHz |
|-----------------------|--------------------|-------------|--------------------------|
| 5150-5250             | 250 (24)           | -           | 24                       |
| 5250-5350             | 250 (24)           | 11+10 log B | 24                       |
| 5470-5725             | 250 (24)           | 11+10 log B | 24                       |
| 5725-5850             | 1000 (30)          | -           | 30                       |

### 2.3. Power results summary

| Channel / fC [MHz] | Mode          | Modulation | Data rate        | Level [dBm] |
|--------------------|---------------|------------|------------------|-------------|
| 36 / 5180          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.65       |
| 40 / 5200          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.39       |
| 48 / 5240          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.53       |
| 52 / 5260          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.55       |
| 60 / 5300          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.49       |
| 64 / 5320          | 802.11a MIMO  | BPSK       | 9 Mbps           | 19.61       |
| 100 / 5500         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.09       |
| 116 / 5580         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.03       |
| 140 / 5700         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.17       |
| 149 / 5745         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.18       |
| 157 / 5785         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.25       |
| 165 / 5825         | 802.11a MIMO  | BPSK       | 9 Mbps           | 20.36       |
| 36+40 / 5190       | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.23       |
| 44+48 / 5230       | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.09       |
| 52+56 / 5270       | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.17       |
| 60+64 / 5310       | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.07       |
| 100+104 / 5510     | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.62       |
| 108+112 / 5550     | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.61       |
| 132+136 / 5670     | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.38       |
| 149+153 / 5755     | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.67       |
| 157+161 / 5795     | 802.11n MIMO  | BPSK       | 13.5 / 15.0 Mbps | 20.87       |
| 36-48 / 5210       | 802.11ac MIMO | BPSK       | 29.3 / 32.5 Mbps | 18.57       |
| 52-64 / 5290       | 802.11ac MIMO | BPSK       | 29.3 / 32.5 Mbps | 18.72       |
| 100-112 / 5530     | 802.11ac MIMO | BPSK       | 29.3 / 32.5 Mbps | 19.38       |
| 149-161 / 5775     | 802.11ac MIMO | BPSK       | 29.3 / 32.5 Mbps | 19.37       |
| 36 / 5180          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.49       |
| 40 / 5200          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.27       |
| 48 / 5240          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.46       |
| 52 / 5260          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.50       |
| 60 / 5300          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.48       |
| 64 / 5320          | 802.11a MIMO  | QPSK       | 18 Mbps          | 19.61       |
| 100 / 5500         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.03       |
| 116 / 5580         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.02       |
| 140 / 5700         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.15       |
| 149 / 5745         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.20       |
| 157 / 5785         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.27       |
| 165 / 5825         | 802.11a MIMO  | QPSK       | 18 Mbps          | 20.36       |
| 36+40 / 5190       | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 19.93       |
| 44+48 / 5230       | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 19.80       |
| 52+56 / 5270       | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 19.92       |
| 60+64 / 5310       | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 19.83       |
| 100+104 / 5510     | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 20.42       |
| 108+112 / 5550     | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 20.39       |
| 132+136 / 5670     | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 20.21       |
| 149+153 / 5755     | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 20.43       |
| 157+161 / 5795     | 802.11n MIMO  | QPSK       | 40.5 / 45.0 Mbps | 20.73       |

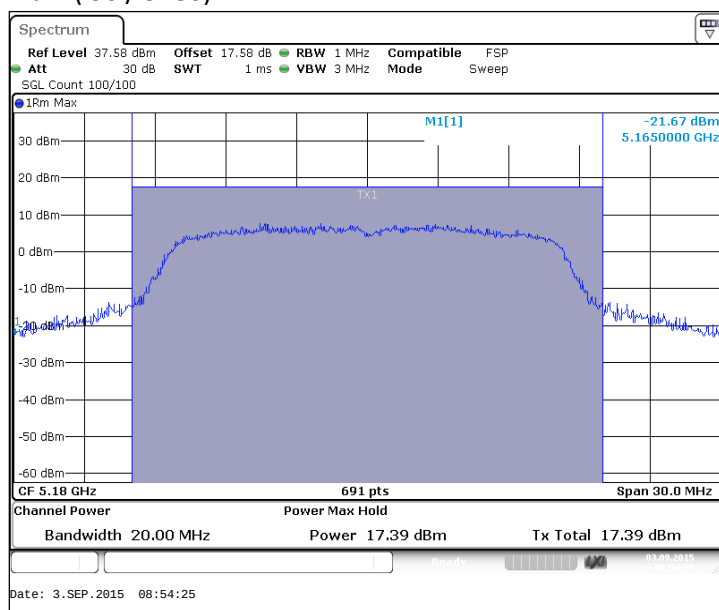
|                |               |       |                    |       |
|----------------|---------------|-------|--------------------|-------|
| 36-48 / 5210   | 802.11ac MIMO | 16QAM | 175.5 / 195.0 Mbps | 18.41 |
| 52-64 / 5290   | 802.11ac MIMO | 16QAM | 175.5 / 195.0 Mbps | 18.60 |
| 100-112 / 5530 | 802.11ac MIMO | 16QAM | 175.5 / 195.0 Mbps | 19.22 |
| 149-161 / 5775 | 802.11ac MIMO | 16QAM | 175.5 / 195.0 Mbps | 19.33 |

## 2.4. 5 GHz RLAN Test results

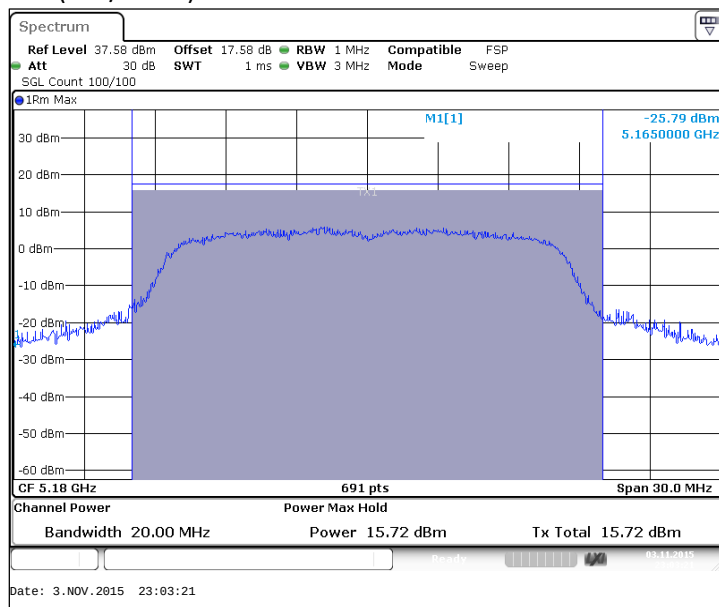
### 2.4.1 802.11a MIMO mode, BPSK modulation, 9 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | Sum [dBm] | Main [dBm] | Aux [dBm] | Antenna Gain Main [dBi] | Antenna Gain Aux [dBi] | Antenna Gain DG [dBi] | Limit [dBm] | Limit adjusted [dBm] | Result |
|--------------------------------|-----------|------------|-----------|-------------------------|------------------------|-----------------------|-------------|----------------------|--------|
| 36 / 5180                      | 19.65     | 17.39      | 15.72     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 40 / 5200                      | 19.39     | 17.13      | 15.48     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 48 / 5240                      | 19.53     | 17.42      | 15.39     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 52 / 5260                      | 19.55     | 17.45      | 15.39     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 60 / 5300                      | 19.49     | 17.44      | 15.24     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 64 / 5320                      | 19.61     | 17.6       | 15.29     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 100 / 5500                     | 20.09     | 18.08      | 15.77     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 116 / 5580                     | 20.03     | 17.96      | 15.83     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 140 / 5700                     | 20.17     | 18.01      | 16.09     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 149 / 5745                     | 20.18     | 18.07      | 16.03     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |
| 157 / 5785                     | 20.25     | 18.19      | 16.02     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |
| 165 / 5825                     | 20.36     | 18.28      | 16.17     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |

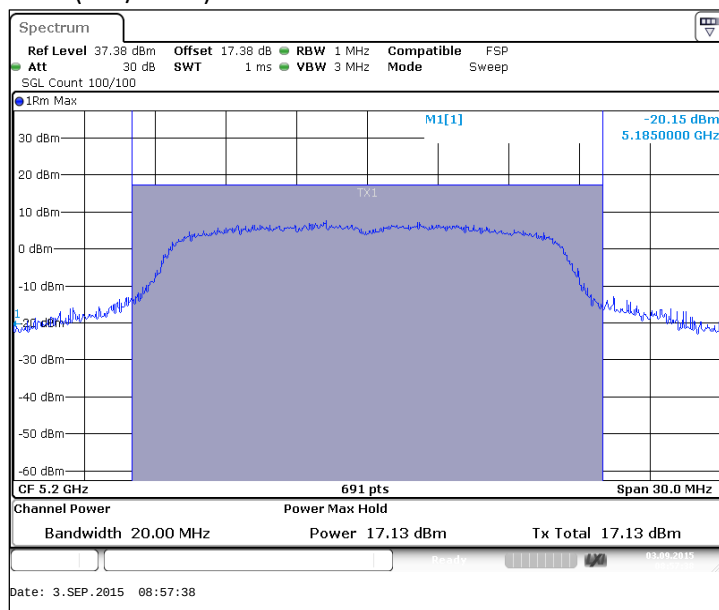
#### Main ( 36 / 5180)



## Aux ( 36 / 5180)

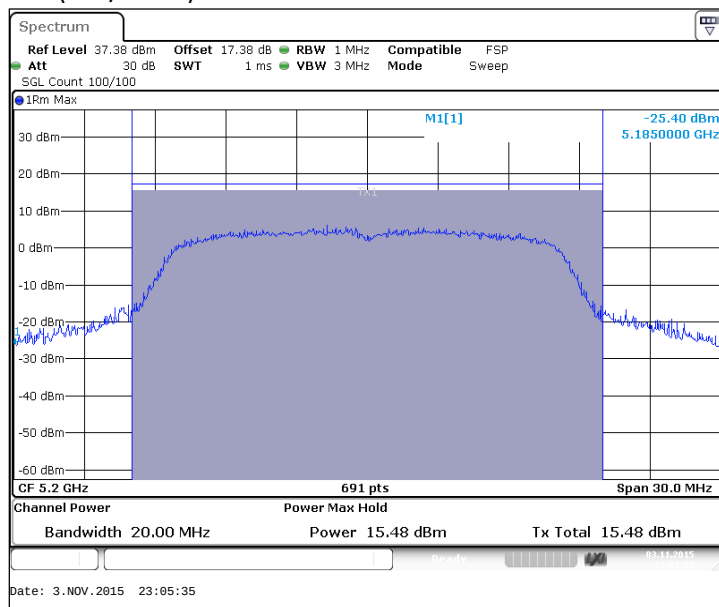


## Main ( 40 / 5200)

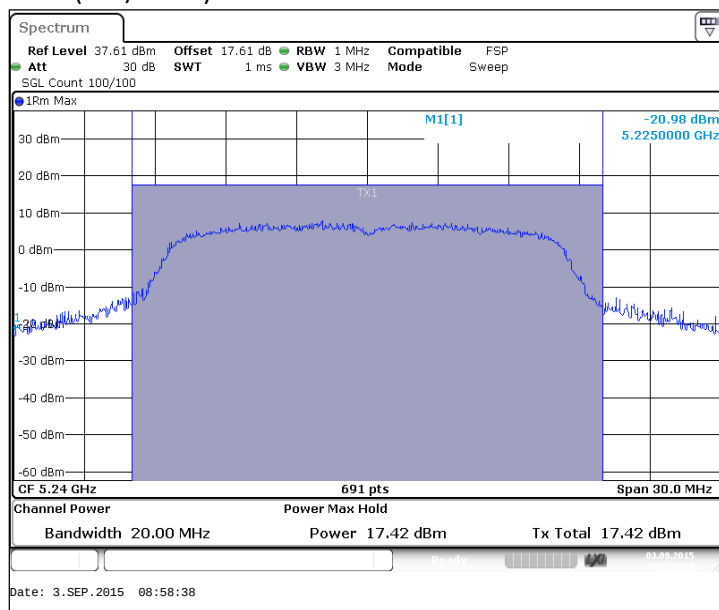




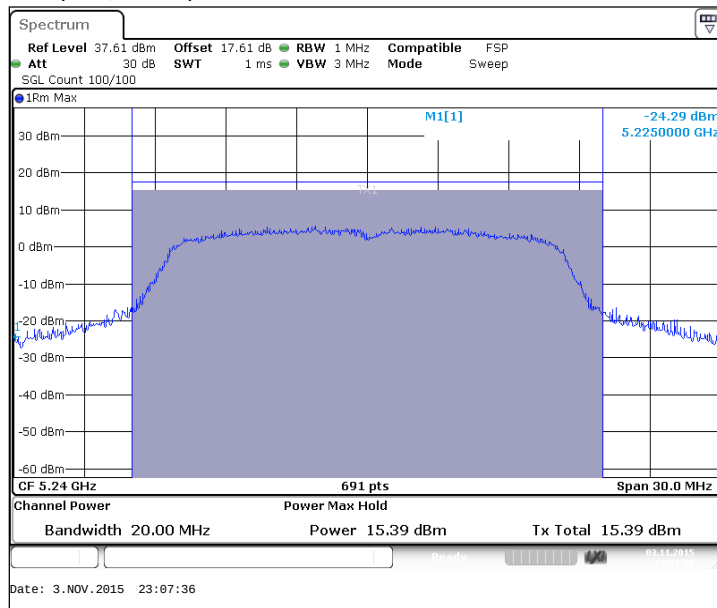
## Aux ( 40 / 5200)



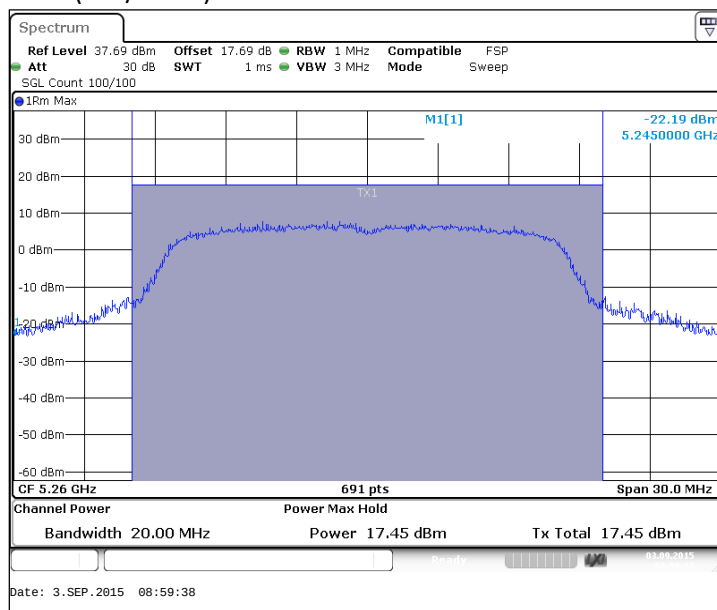
## Main ( 48 / 5240)



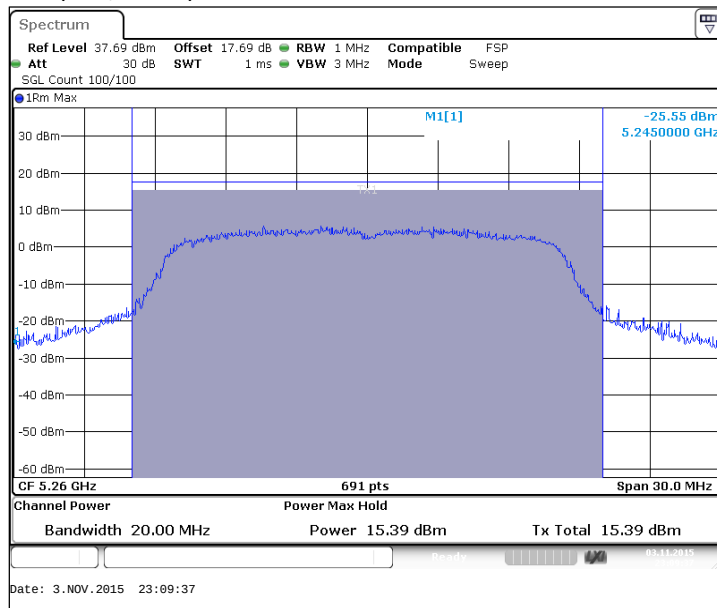
## Aux ( 48 / 5240)



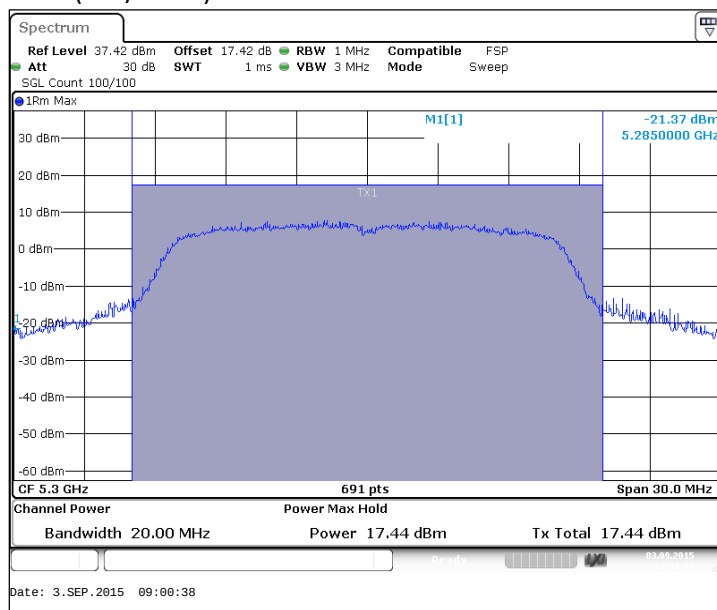
## Main ( 52 / 5260)



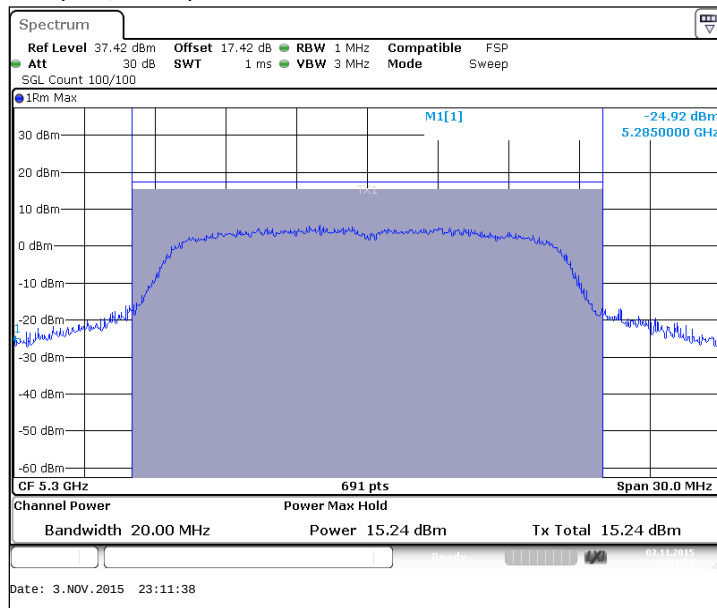
## Aux ( 52 / 5260)



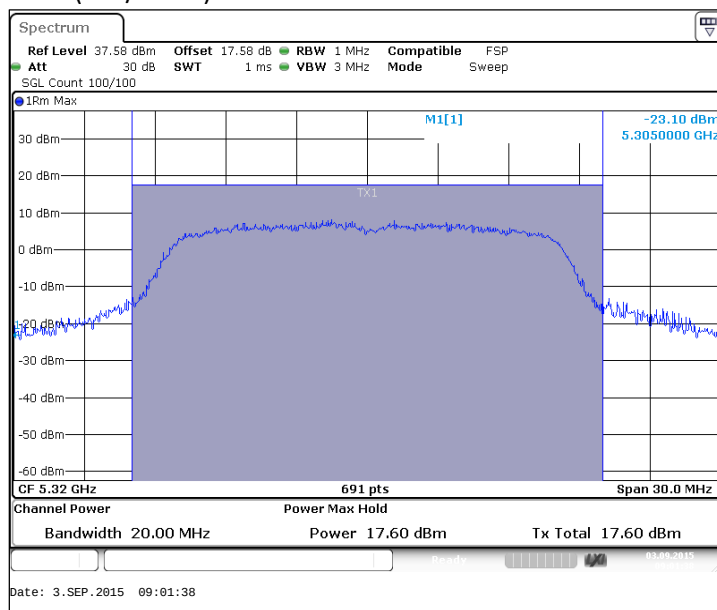
## Main ( 60 / 5300)



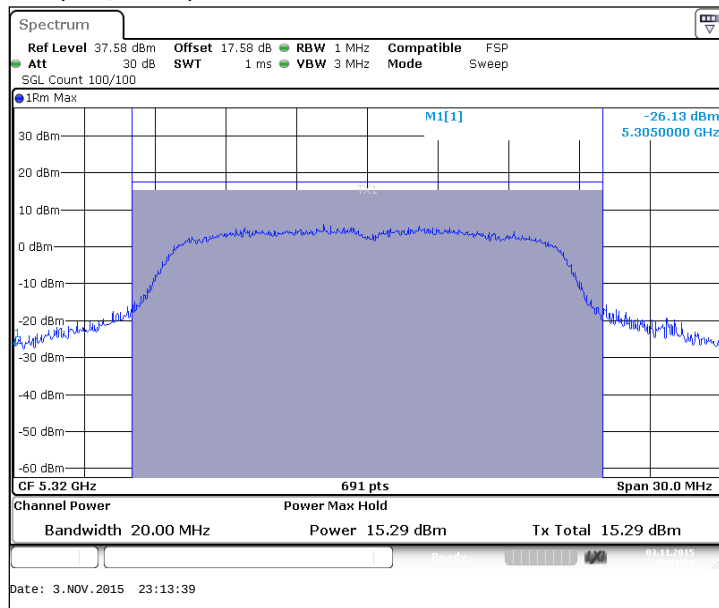
## Aux ( 60 / 5300)



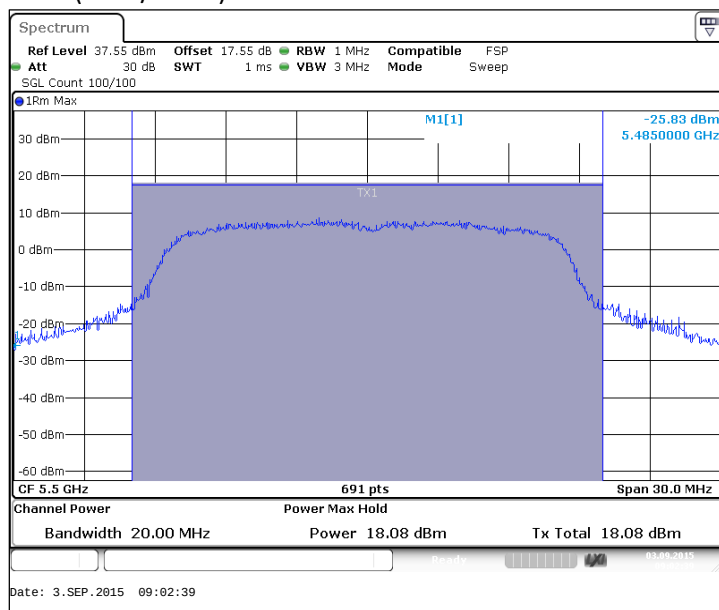
## Main ( 64 / 5320)



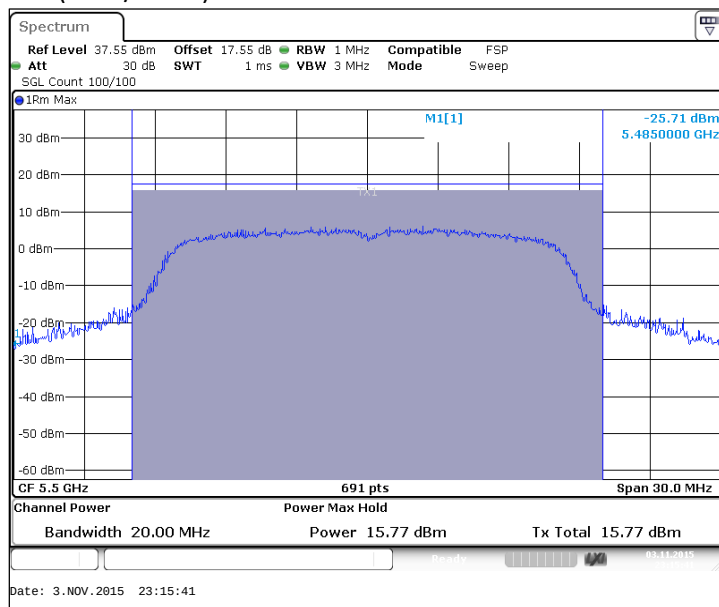
## Aux ( 64 / 5320)



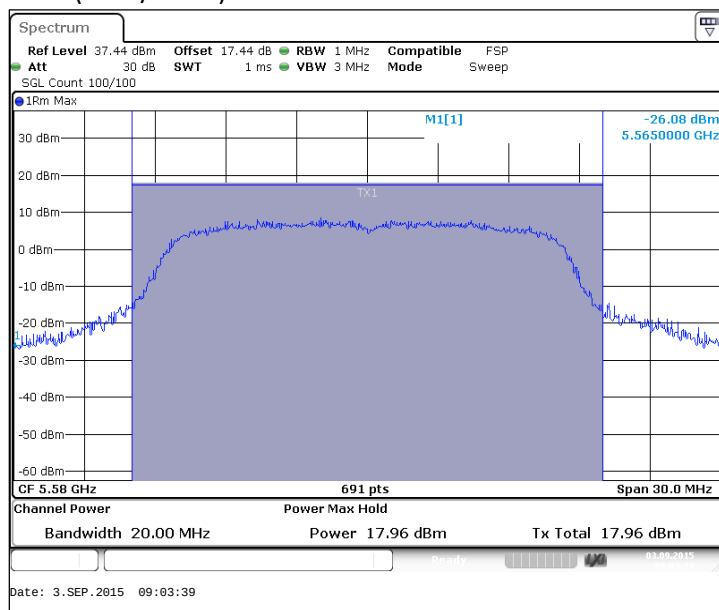
## Main ( 100 / 5500)



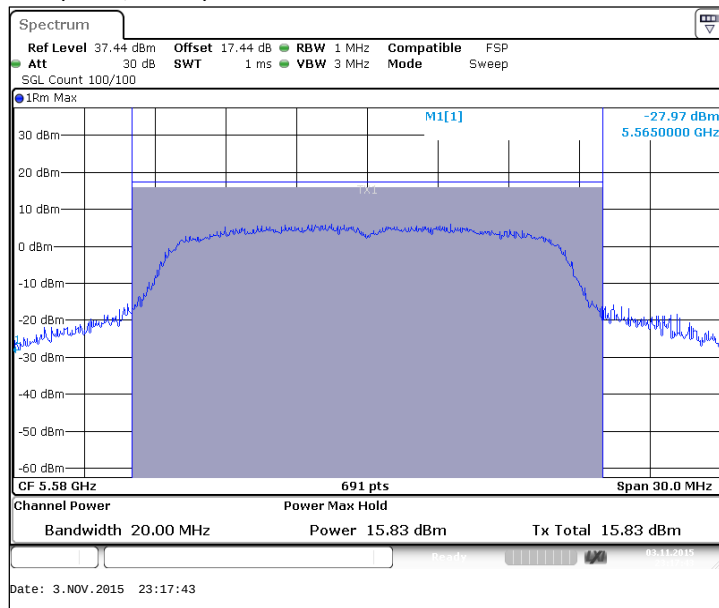
### Aux ( 100 / 5500)



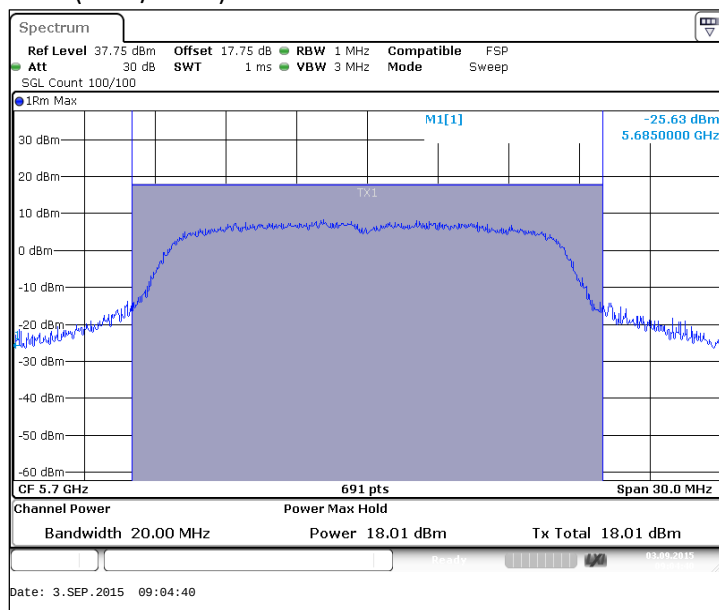
### Main ( 116 / 5580)



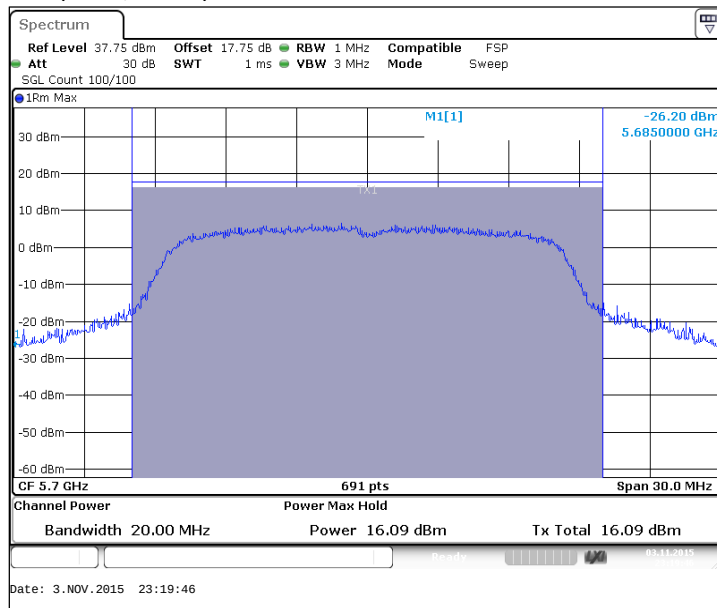
### Aux ( 116 / 5580)



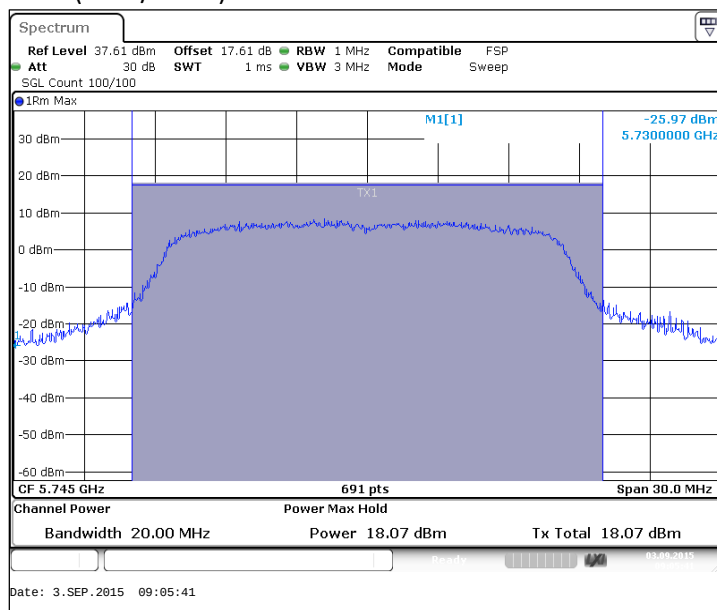
### Main ( 140 / 5700)



### Aux ( 140 / 5700)

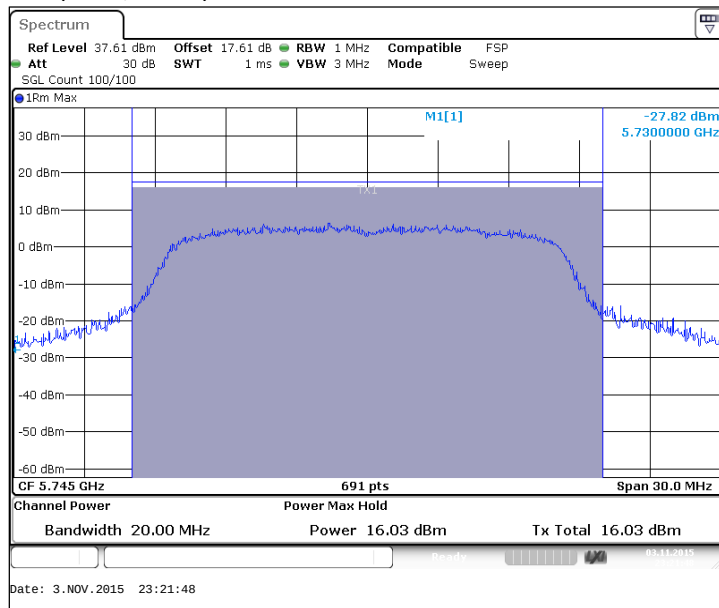


### Main ( 149 / 5745)

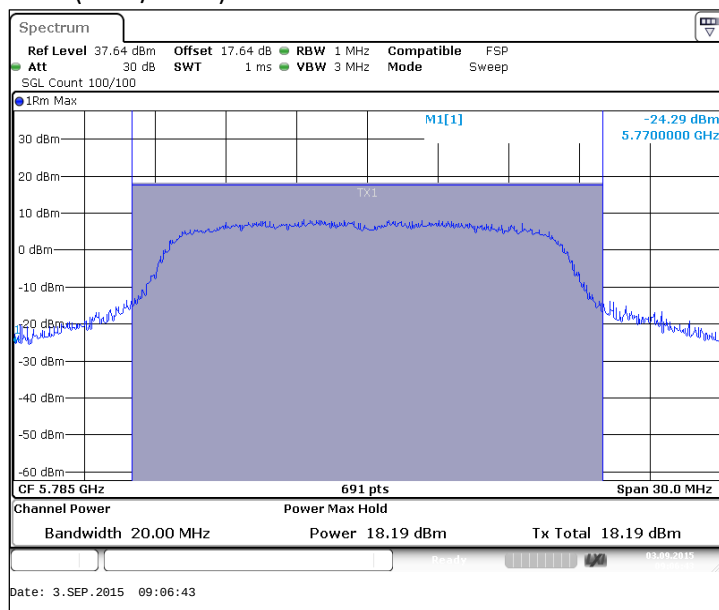




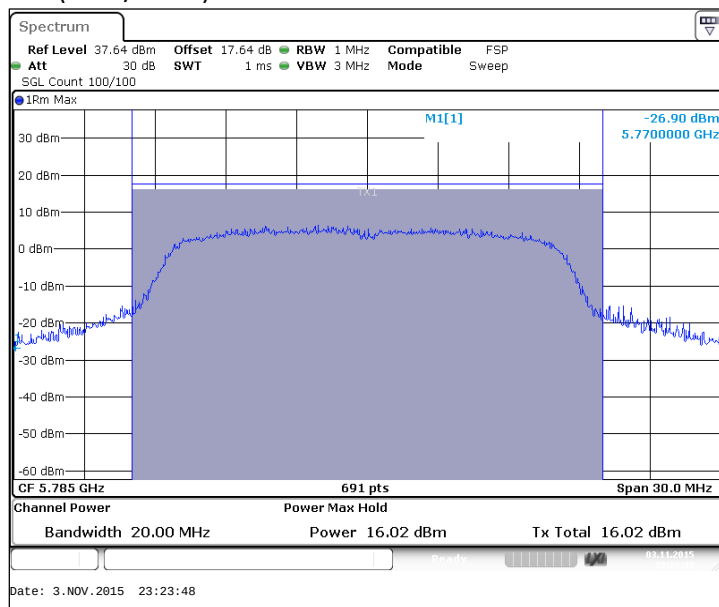
### Aux ( 149 / 5745)



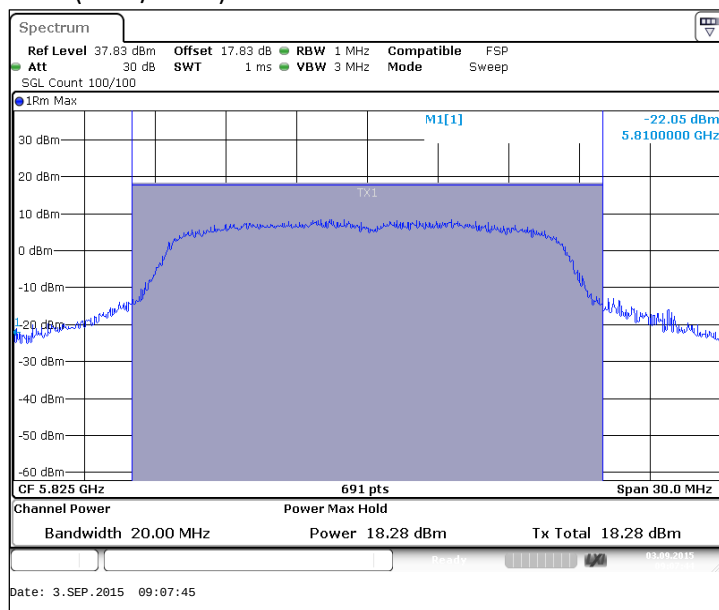
### Main ( 157 / 5785)



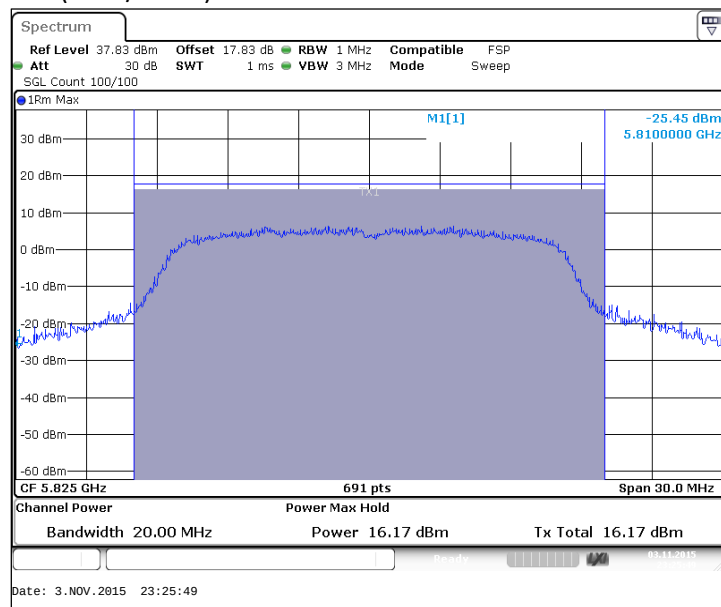
### Aux ( 157 / 5785)



### Main ( 165 / 5825)



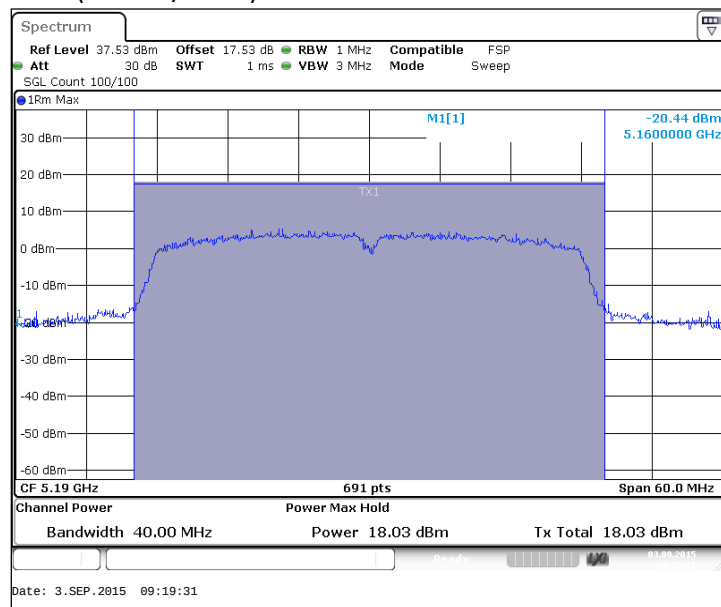
Aux ( 165 / 5825)



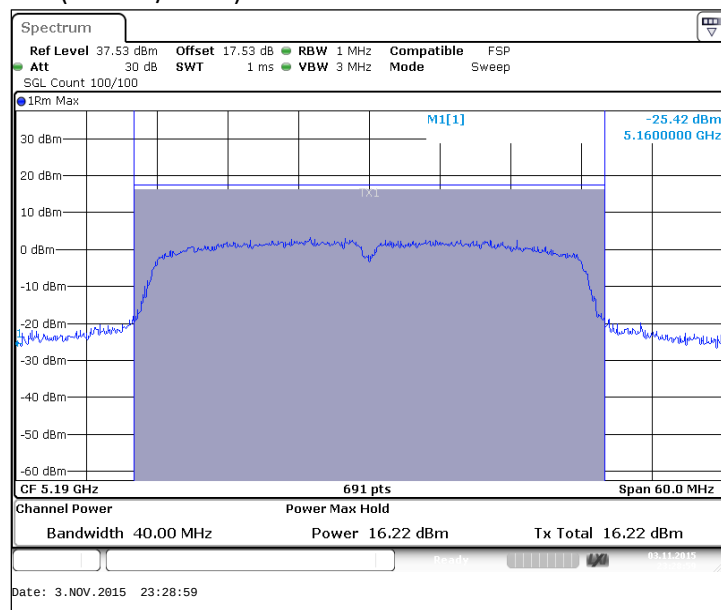
## 2.4.2 802.11n MIMO mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

| Channel /<br>f <sub>c</sub> [MHz] | Sum<br>[dBm] | Main<br>[dBm] | Aux<br>[dBm] | Antenna<br>Gain<br>Main<br>[dBi] | Antenna<br>Gain<br>Aux [dBi] | Antenna<br>Gain<br>DG<br>[dBi] | Limit<br>[dBm] | Limit<br>adjusted<br>[dBm] | Result |
|-----------------------------------|--------------|---------------|--------------|----------------------------------|------------------------------|--------------------------------|----------------|----------------------------|--------|
| 36+40 /<br>5190                   | 20.23        | 18.03         | 16.22        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 44+48 /<br>5230                   | 20.09        | 17.95         | 15.98        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 52+56 /<br>5270                   | 20.17        | 18.11         | 15.93        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 60+64 /<br>5310                   | 20.07        | 18.04         | 15.8         | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 100+104 /<br>5510                 | 20.62        | 18.58         | 16.37        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 108+112 /<br>5550                 | 20.61        | 18.58         | 16.34        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 132+136 /<br>5670                 | 20.38        | 18.25         | 16.27        | 1.4                              | 1.4                          | 1.4                            | 24             | 24                         | PASSED |
| 149+153 /<br>5755                 | 20.67        | 18.58         | 16.5         | 1.4                              | 1.4                          | 1.4                            | 30             | 30                         | PASSED |
| 157+161 /<br>5795                 | 20.87        | 18.79         | 16.67        | 1.4                              | 1.4                          | 1.4                            | 30             | 30                         | PASSED |

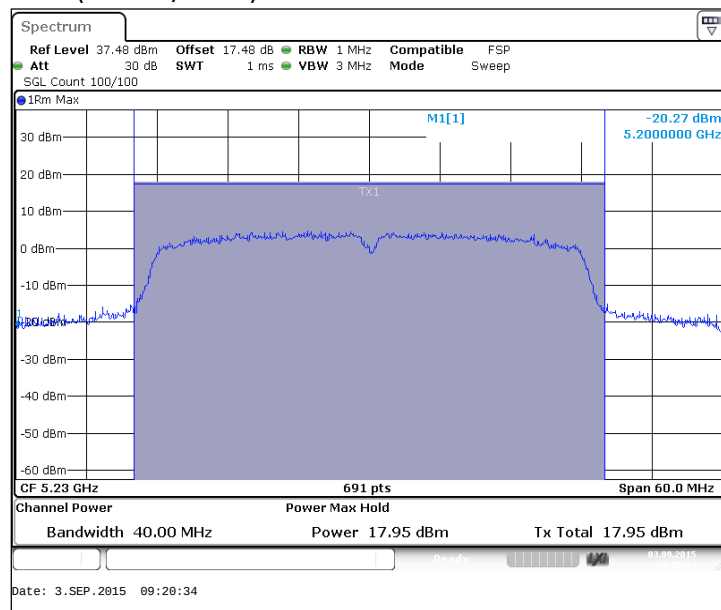
## Main ( 36+40 / 5190)



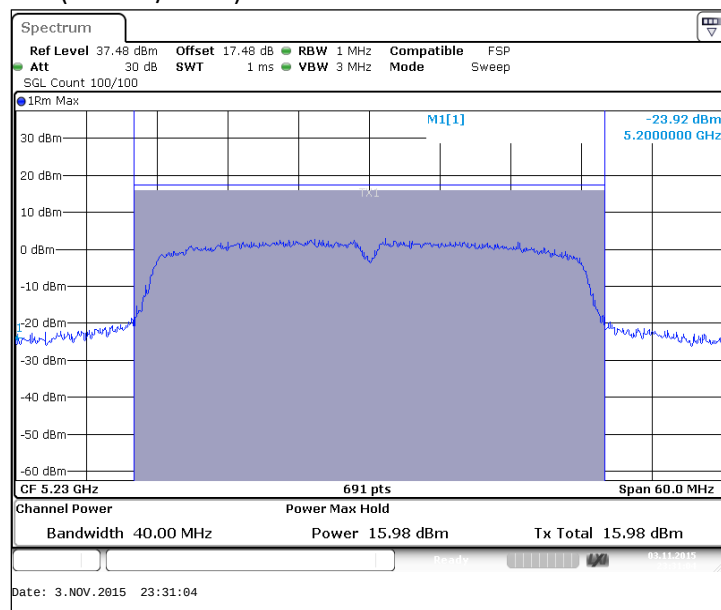
## Aux ( 36+40 / 5190)



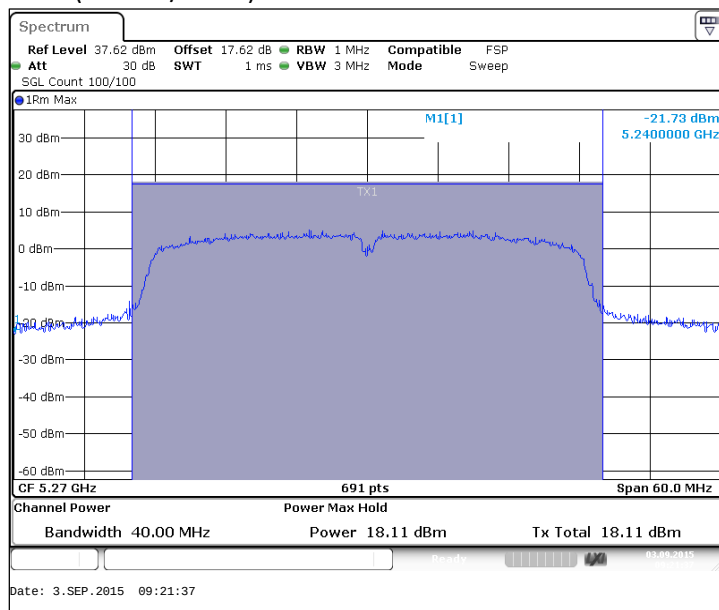
## Main ( 44+48 / 5230)



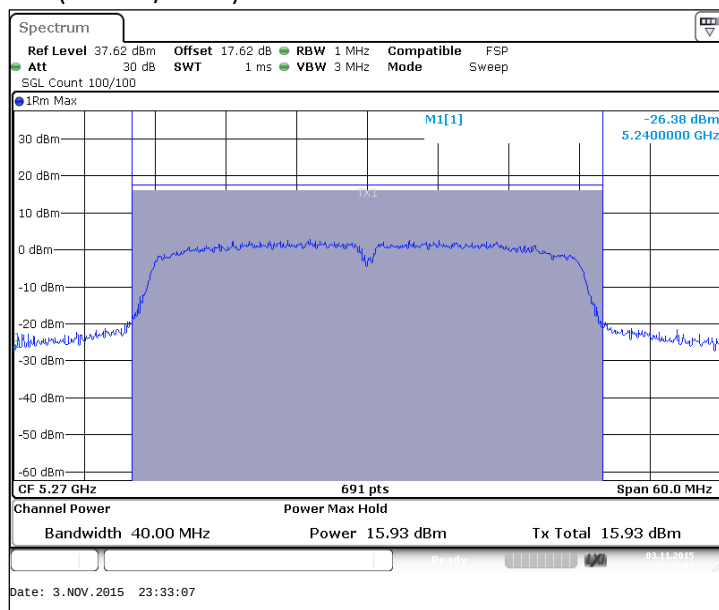
## Aux ( 44+48 / 5230)



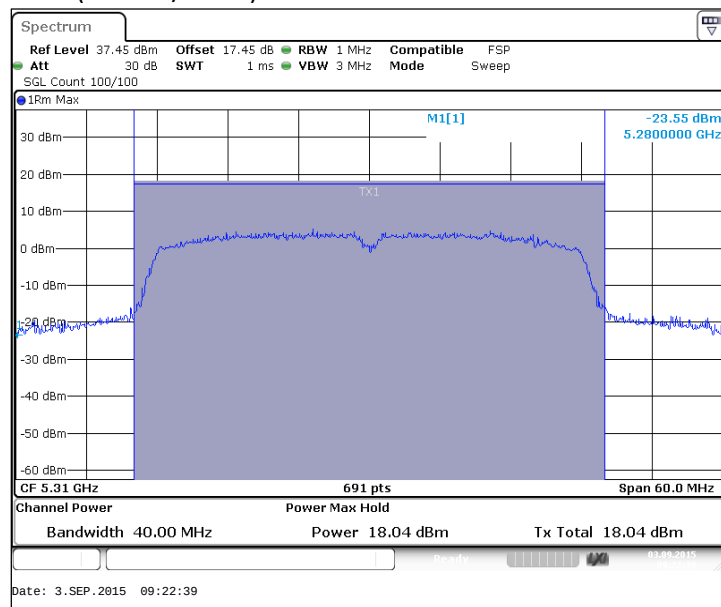
## Main ( 52+56 / 5270)



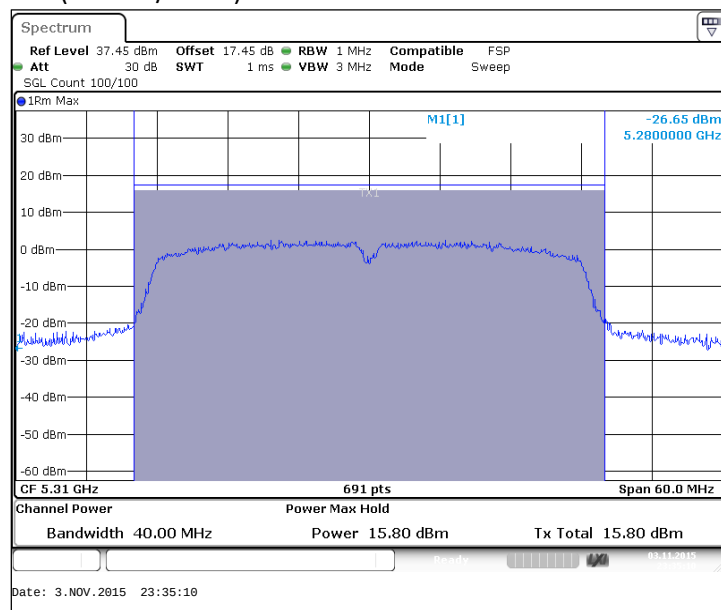
## Aux ( 52+56 / 5270)



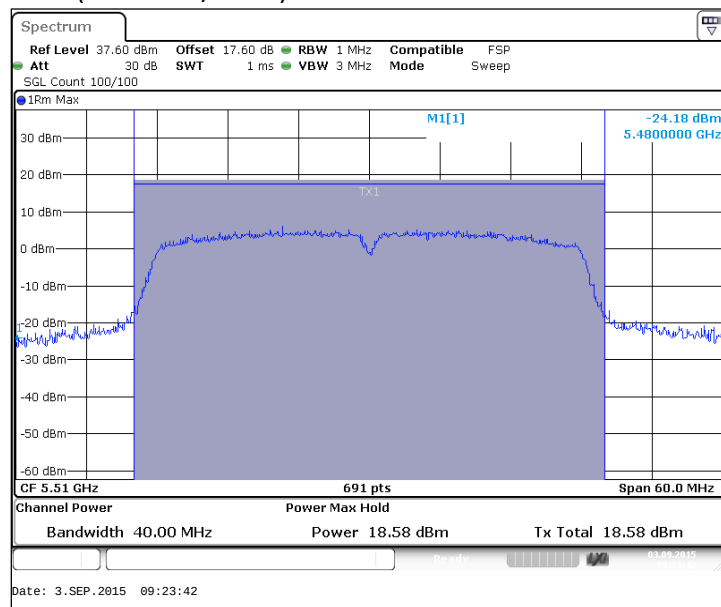
## Main ( 60+64 / 5310)



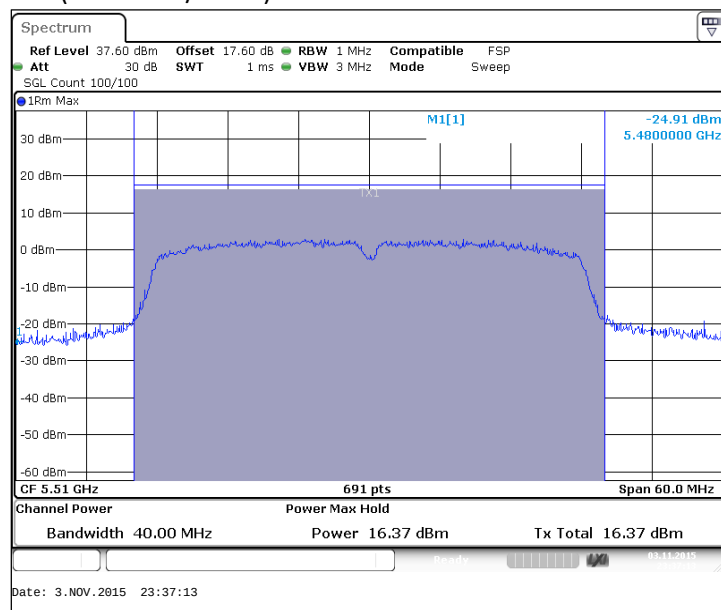
## Aux ( 60+64 / 5310)



## Main ( 100+104 / 5510)

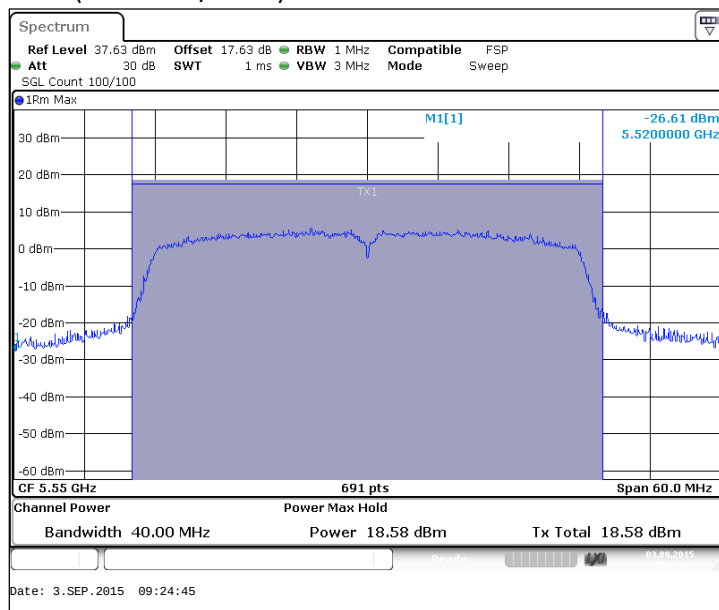


## Aux ( 100+104 / 5510)

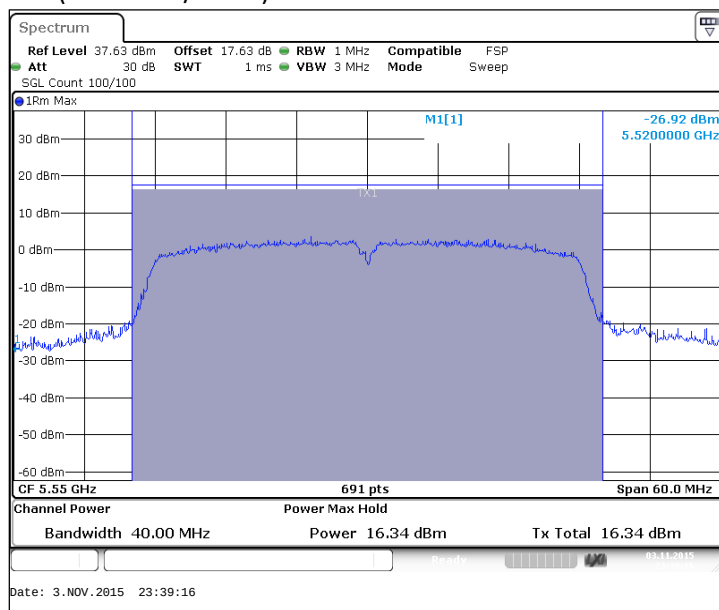




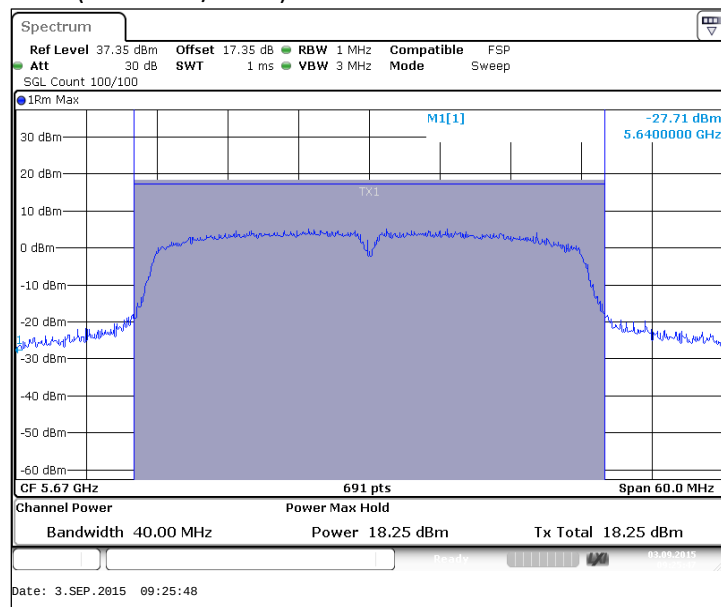
## Main ( 108+112 / 5550)



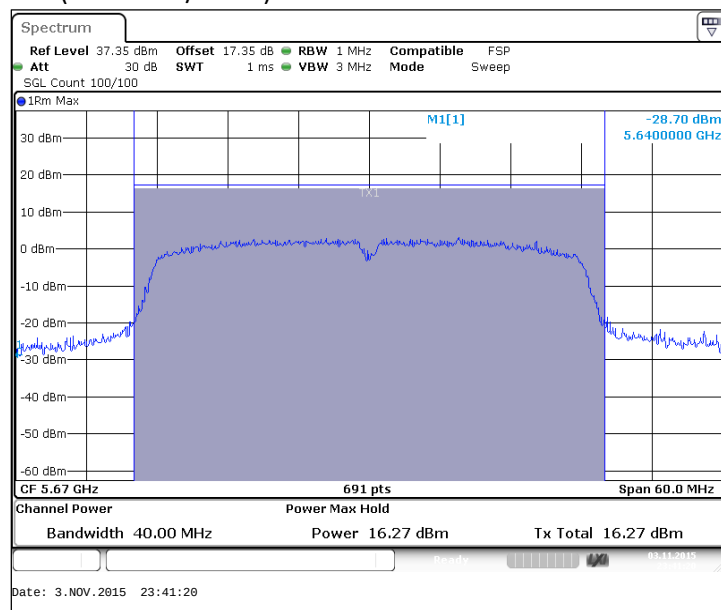
## Aux ( 108+112 / 5550)



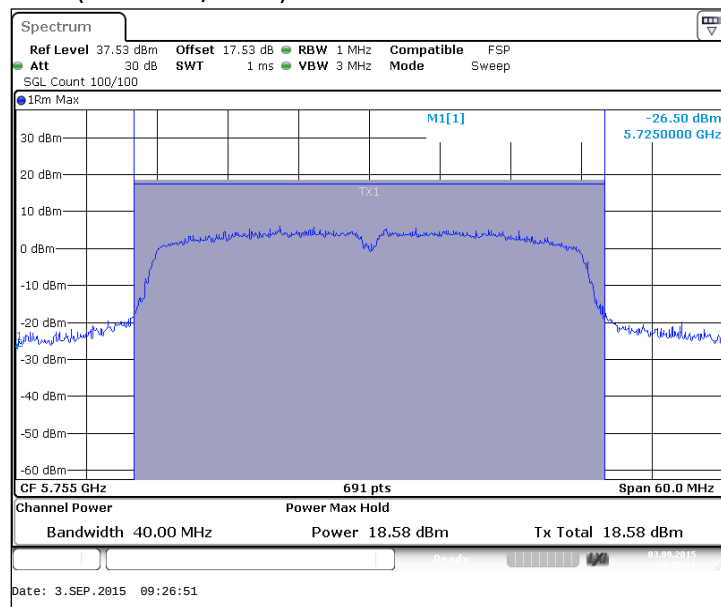
## Main ( 132+136 / 5670)



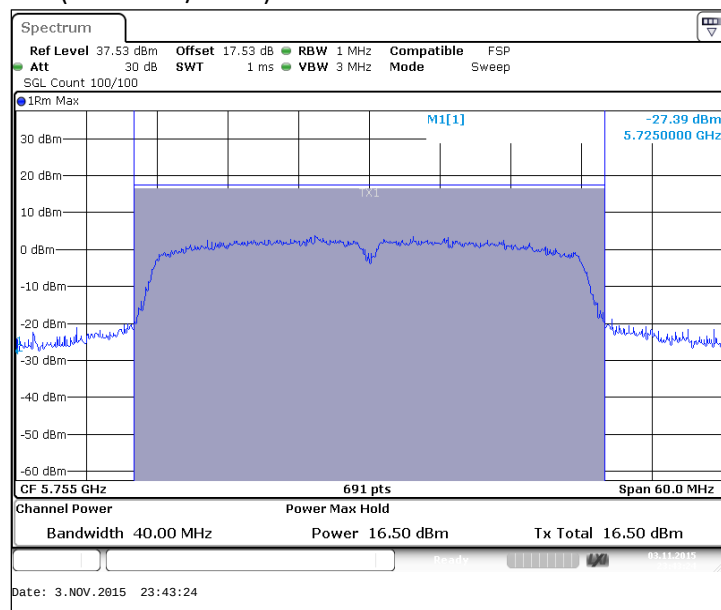
## Aux ( 132+136 / 5670)



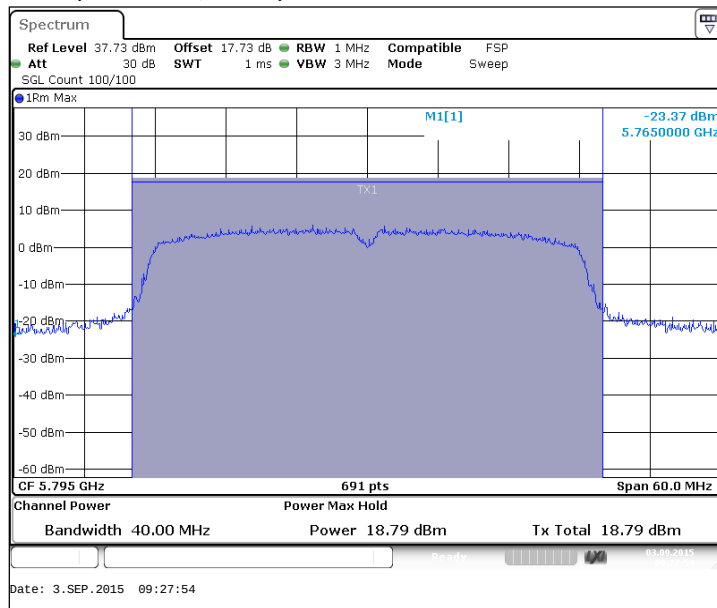
## Main ( 149+153 / 5755)



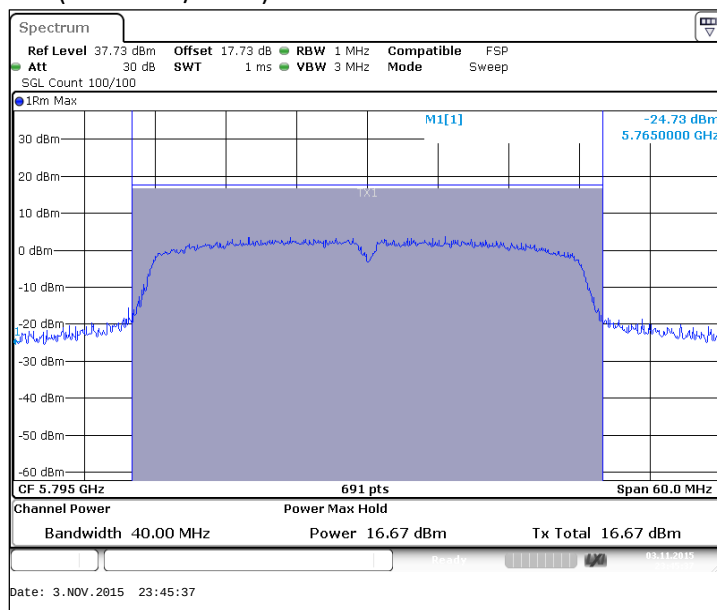
## Aux ( 149+153 / 5755)



## Main ( 157+161 / 5795)



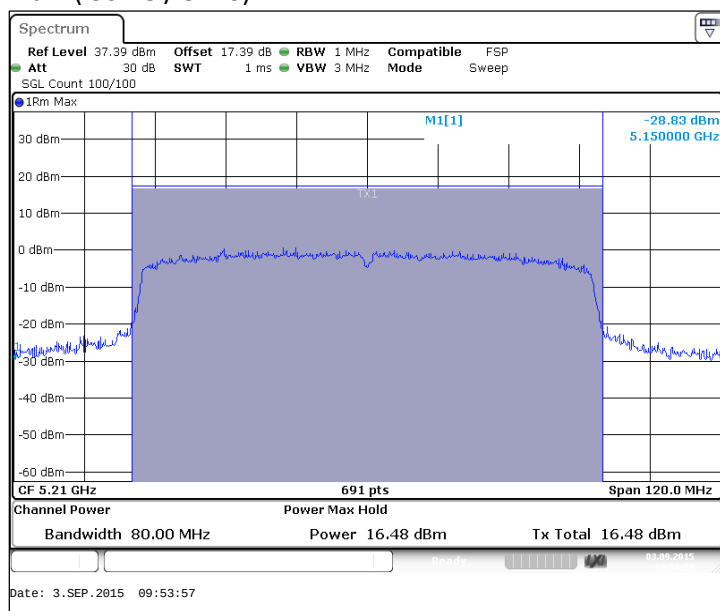
## Aux ( 157+161 / 5795)



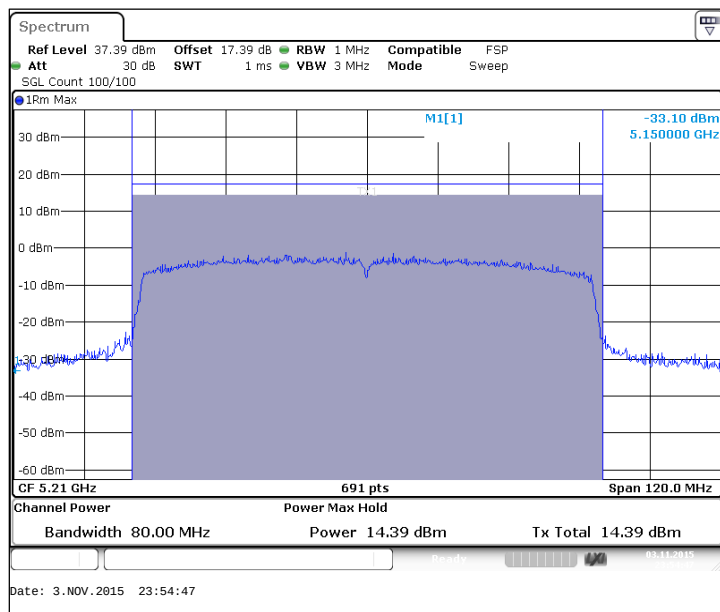
### 2.4.3 802.11ac MIMO mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | Sum [dBm] | Main [dBm] | Aux [dBm] | Antenna Gain Main [dBi] | Antenna Gain Aux [dBi] | Antenna Gain DG [dBi] | Limit [dBm] | Limit adjusted [dBm] | Result |
|--------------------------------|-----------|------------|-----------|-------------------------|------------------------|-----------------------|-------------|----------------------|--------|
| 36-48 / 5210                   | 18.57     | 16.48      | 14.39     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 52-64 / 5290                   | 18.72     | 16.74      | 14.36     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 100-112 / 5530                 | 19.38     | 17.44      | 14.94     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 149-161 / 5775                 | 19.37     | 17.34      | 15.09     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |

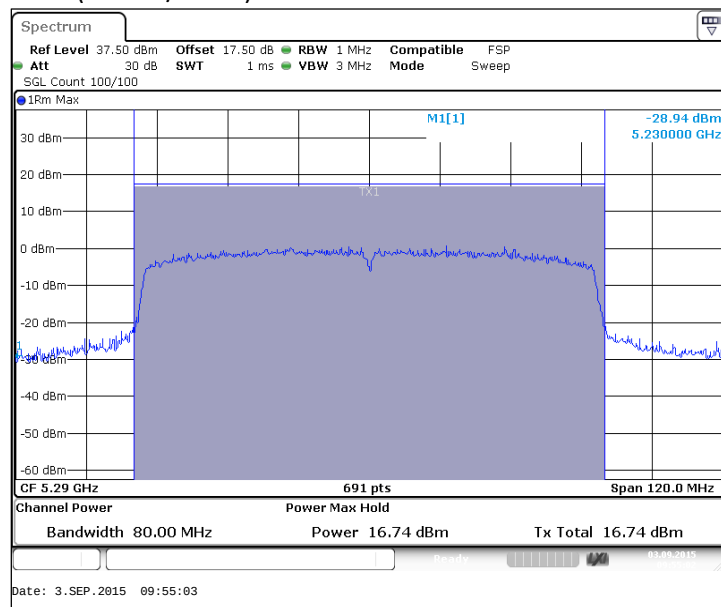
#### Main ( 36-48 / 5210)



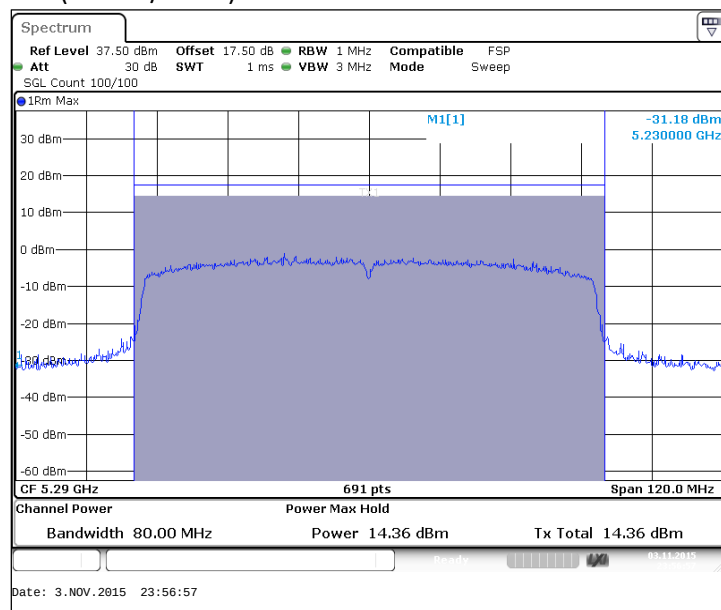
#### Aux ( 36-48 / 5210)



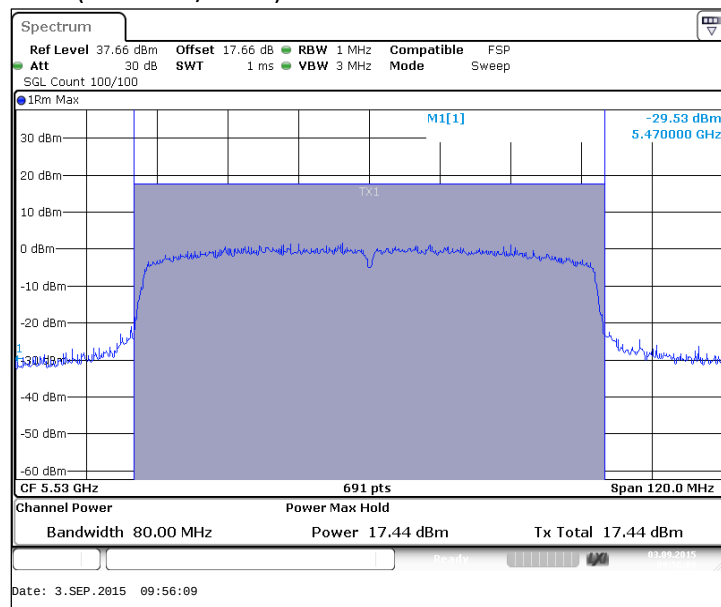
## Main ( 52-64 / 5290)



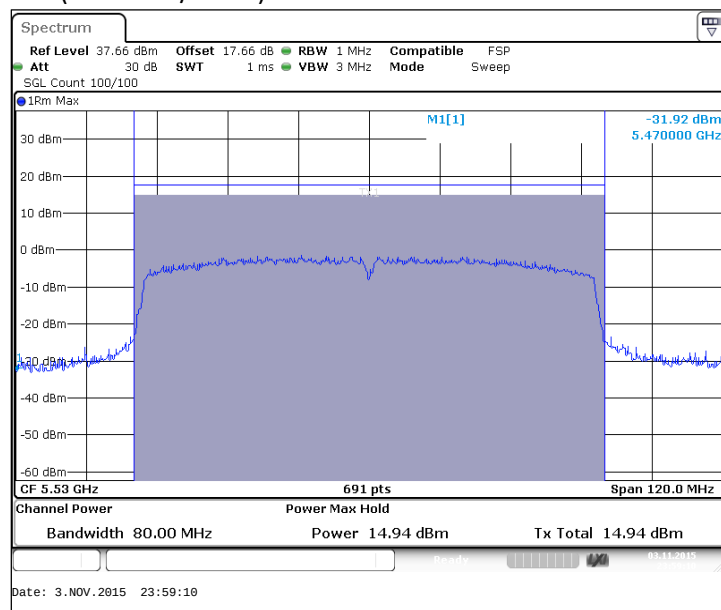
## Aux ( 52-64 / 5290)



## Main ( 100-112 / 5530)

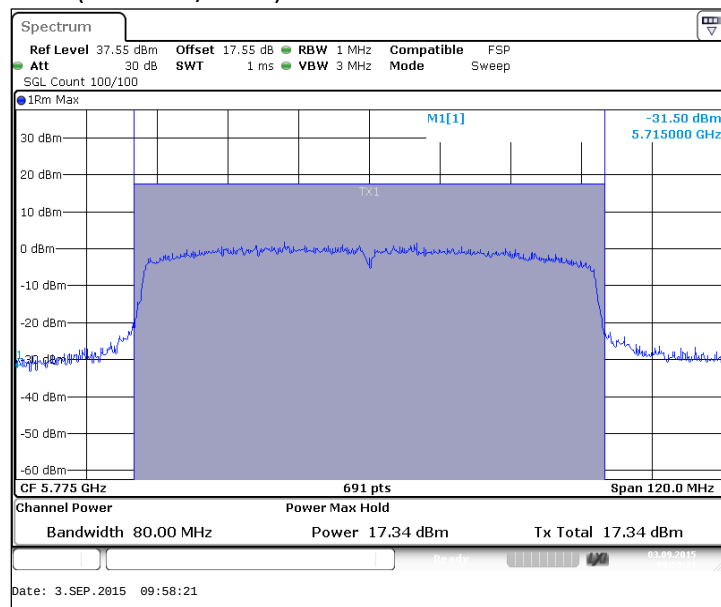


## Aux ( 100-112 / 5530)

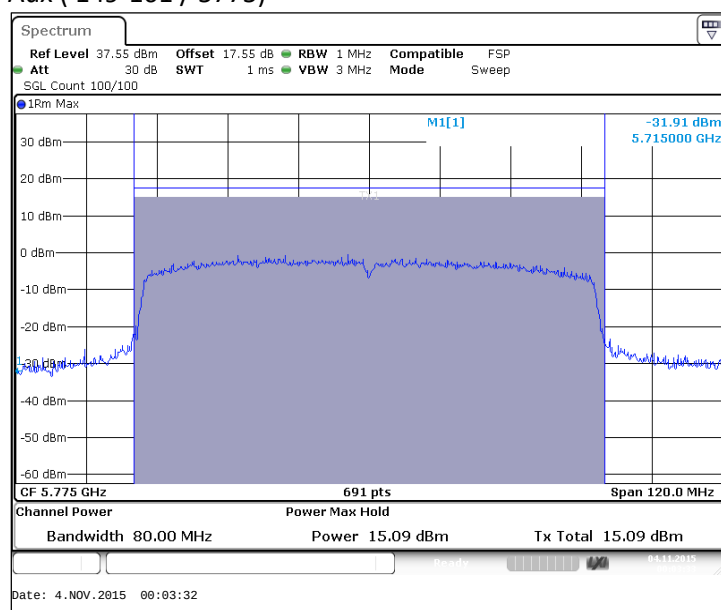




## Main ( 149-161 / 5775)



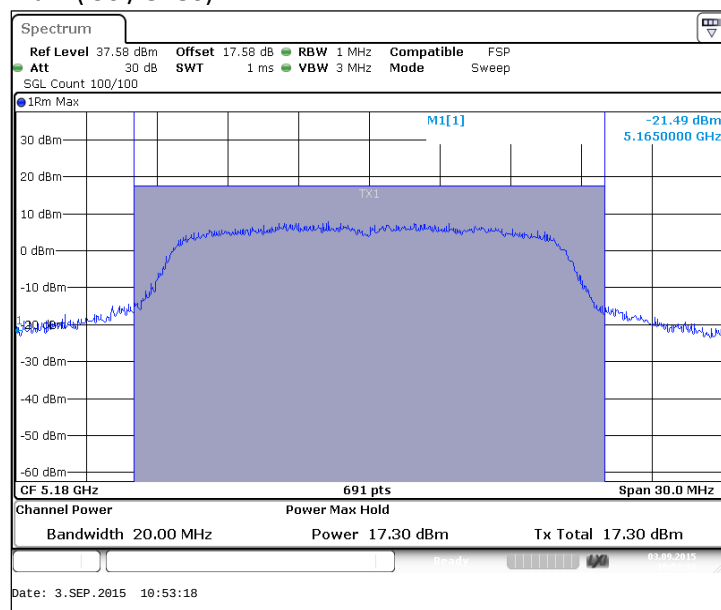
## Aux ( 149-161 / 5775)



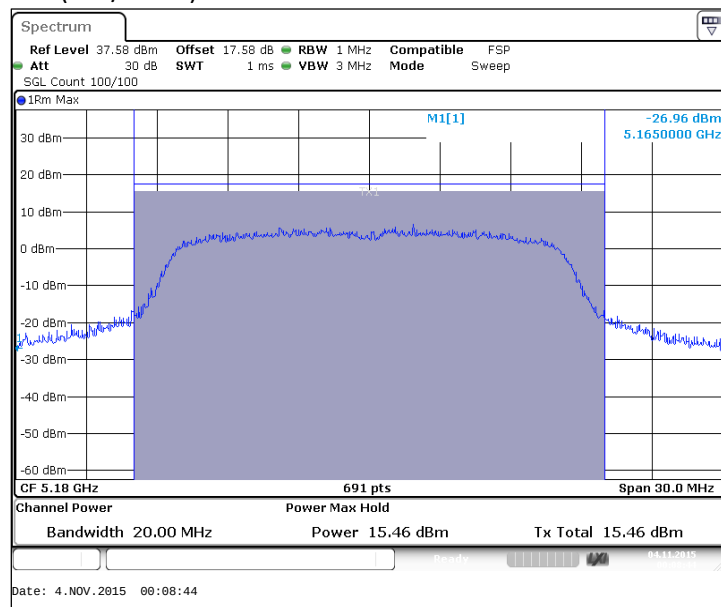
#### 2.4.4 802.11a MIMO mode, QPSK modulation, 18 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | Sum [dBm] | Main [dBm] | Aux [dBm] | Antenna Gain Main [dBi] | Antenna Gain Aux [dBi] | Antenna Gain DG [dBi] | Limit [dBm] | Limit adjusted [dBm] | Result |
|--------------------------------|-----------|------------|-----------|-------------------------|------------------------|-----------------------|-------------|----------------------|--------|
| 36 / 5180                      | 19.49     | 17.3       | 15.46     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 40 / 5200                      | 19.27     | 17.09      | 15.23     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 48 / 5240                      | 19.46     | 17.36      | 15.29     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 52 / 5260                      | 19.50     | 17.44      | 15.28     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 60 / 5300                      | 19.48     | 17.43      | 15.23     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 64 / 5320                      | 19.61     | 17.65      | 15.2      | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 100 / 5500                     | 20.03     | 18.04      | 15.69     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 116 / 5580                     | 20.02     | 17.99      | 15.73     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 140 / 5700                     | 20.15     | 18.02      | 16.04     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 149 / 5745                     | 20.20     | 18.16      | 15.95     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |
| 157 / 5785                     | 20.27     | 18.24      | 16        | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |
| 165 / 5825                     | 20.36     | 18.35      | 16.04     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |

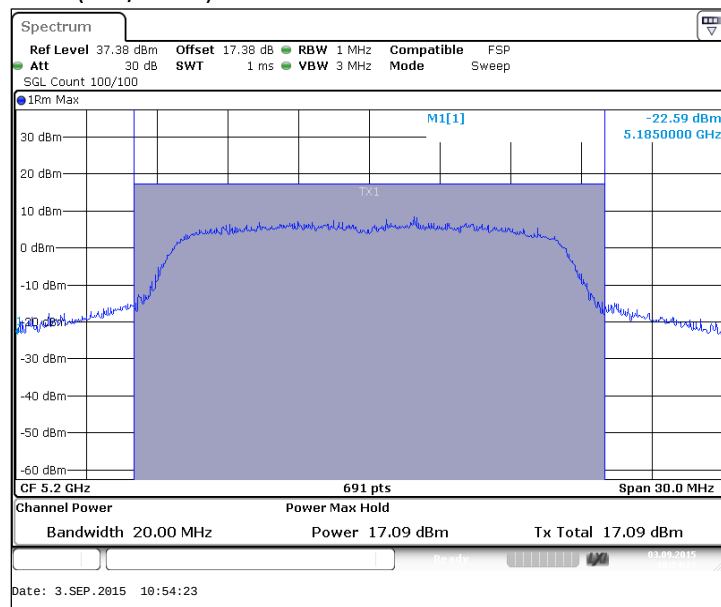
#### Main ( 36 / 5180)



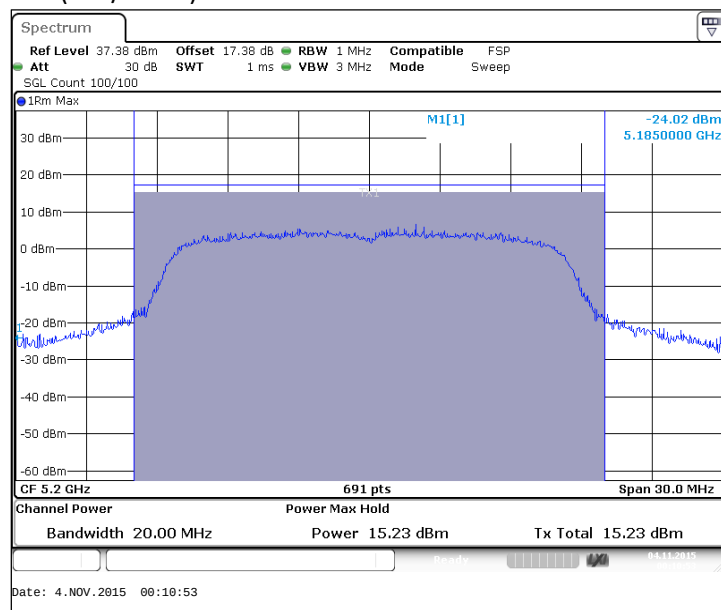
Aux ( 36 / 5180)



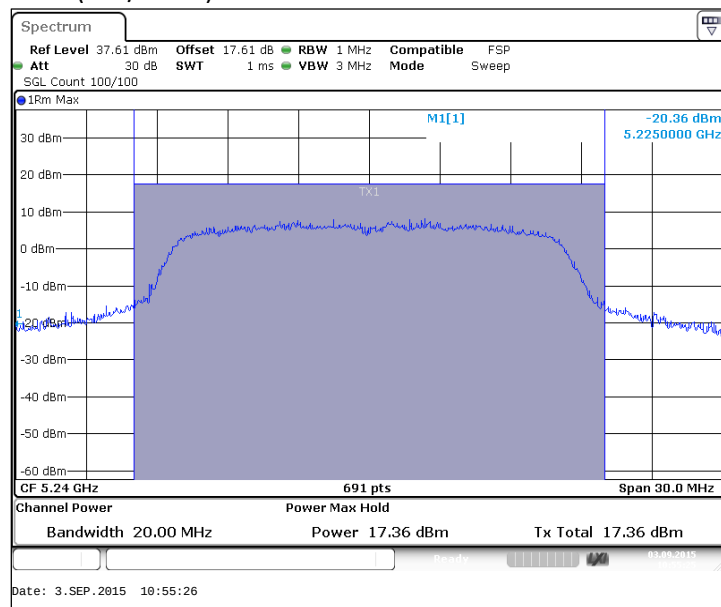
## Main ( 40 / 5200)



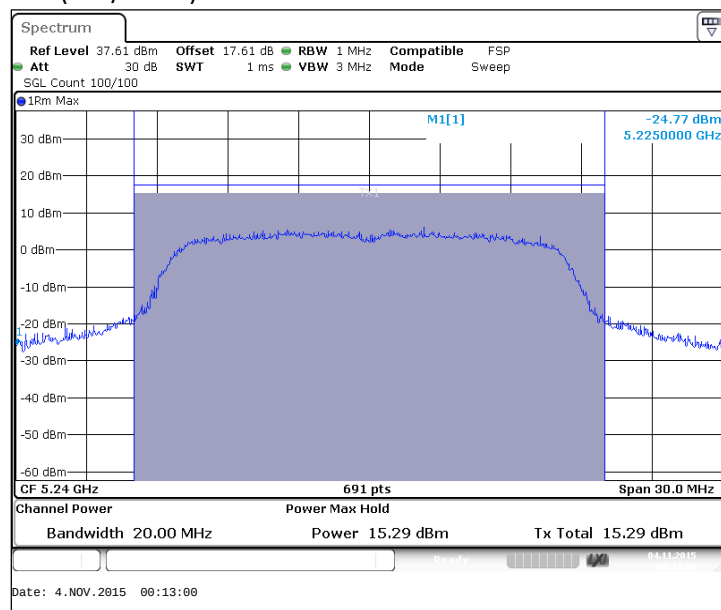
## Aux ( 40 / 5200)



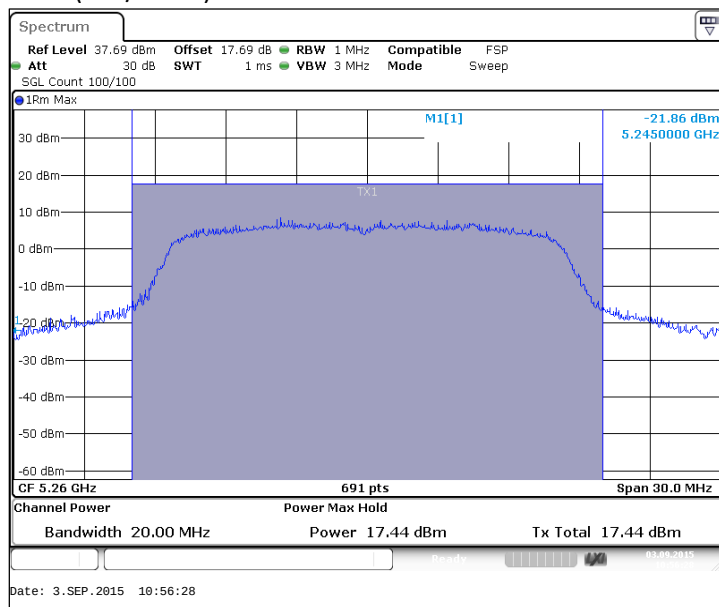
## Main ( 48 / 5240)



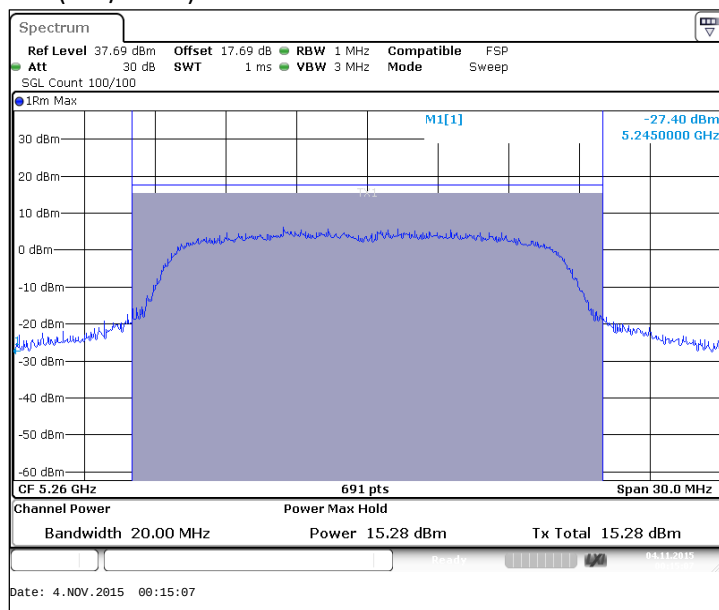
## Aux ( 48 / 5240)



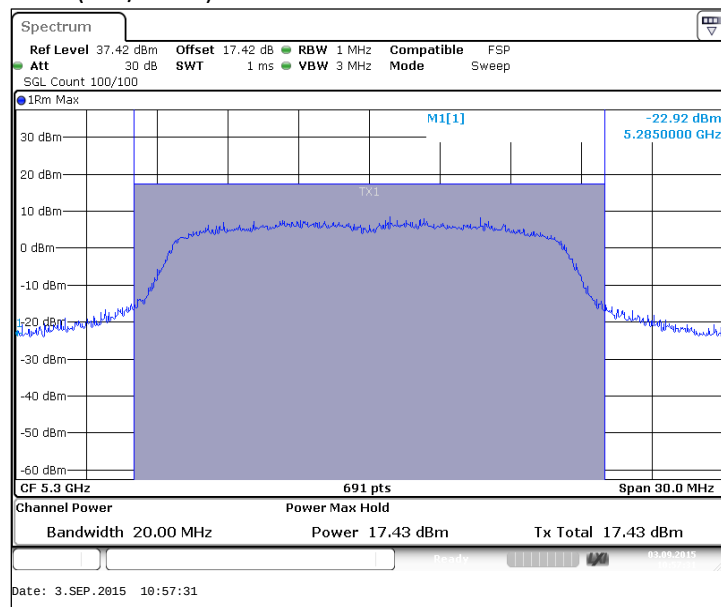
## Main ( 52 / 5260)



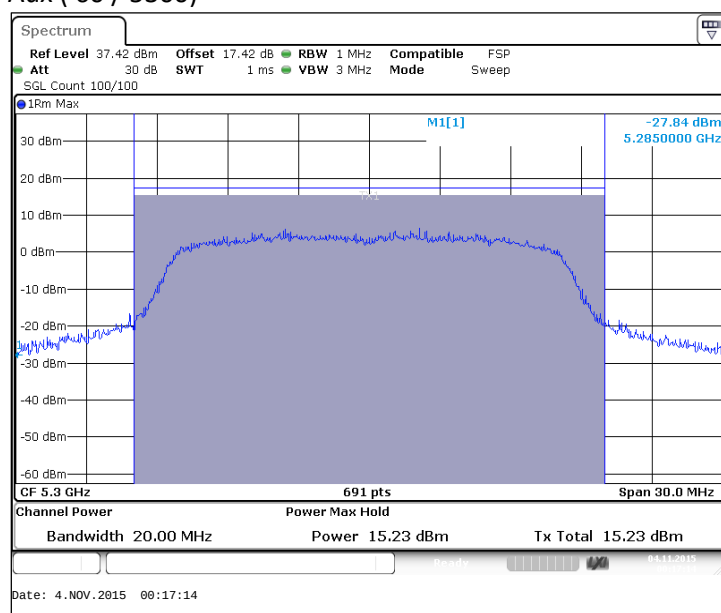
## Aux ( 52 / 5260)



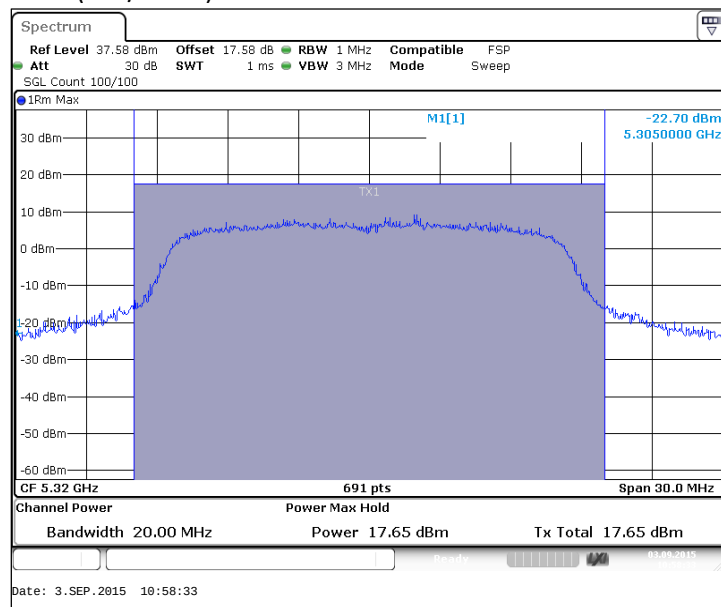
## Main ( 60 / 5300)



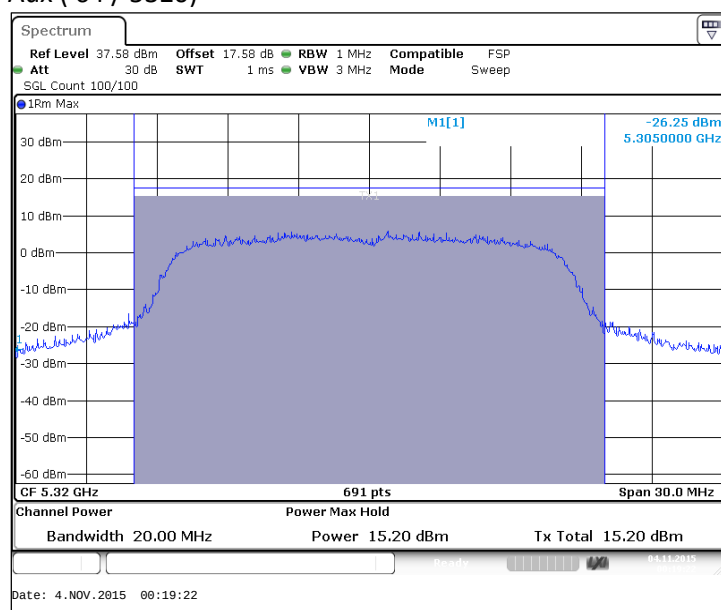
## Aux ( 60 / 5300)



## Main ( 64 / 5320)

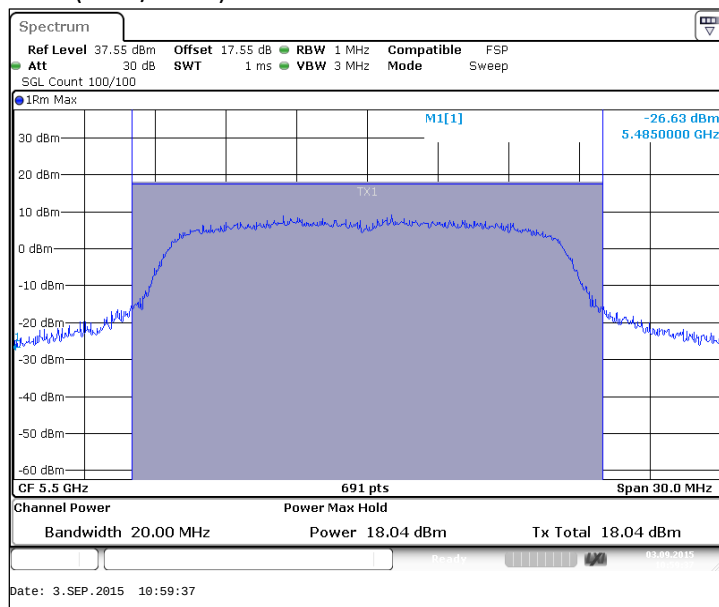


## Aux ( 64 / 5320)

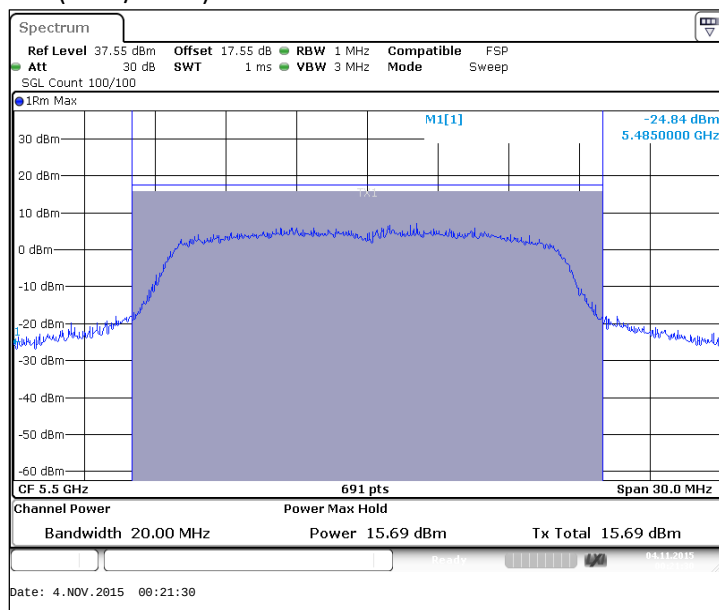




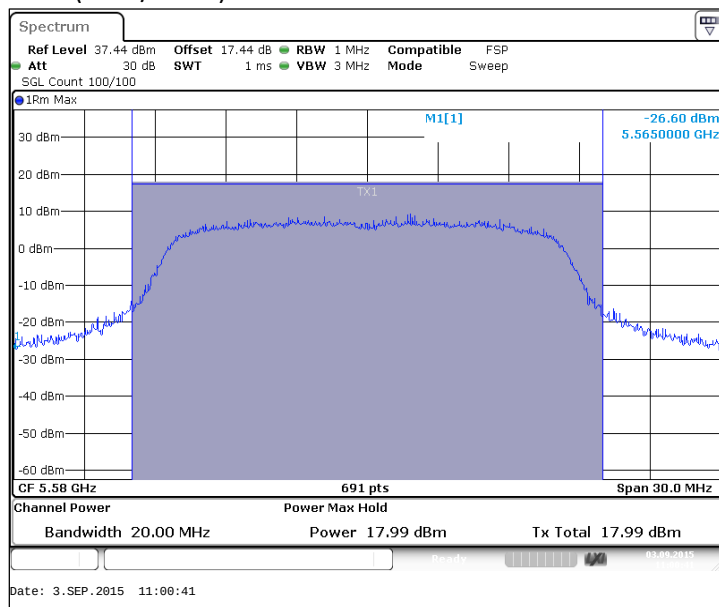
## Main ( 100 / 5500)



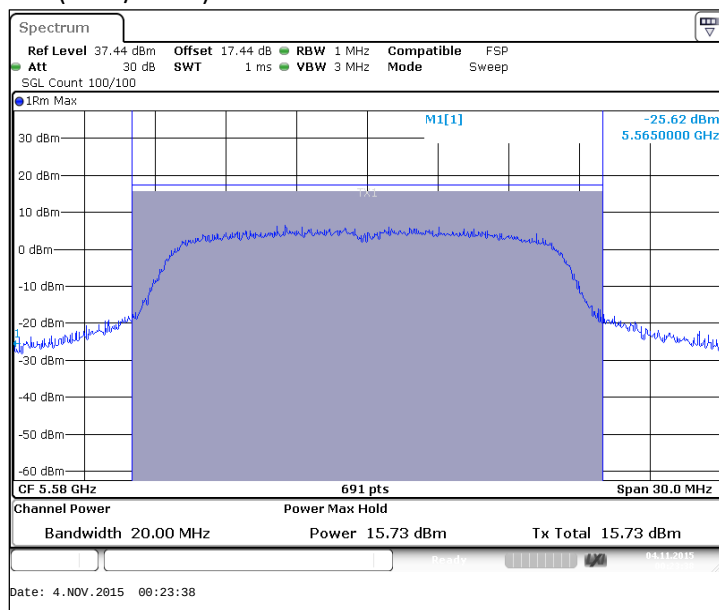
## Aux ( 100 / 5500)



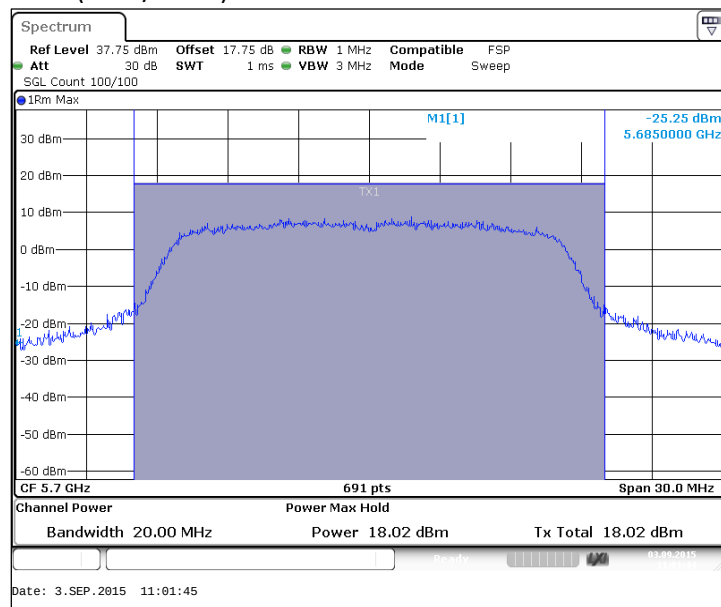
## Main ( 116 / 5580)



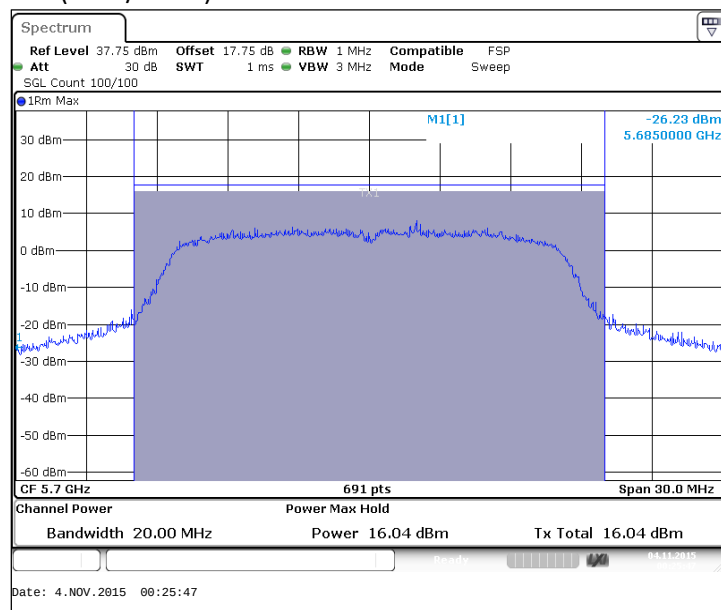
## Aux ( 116 / 5580)



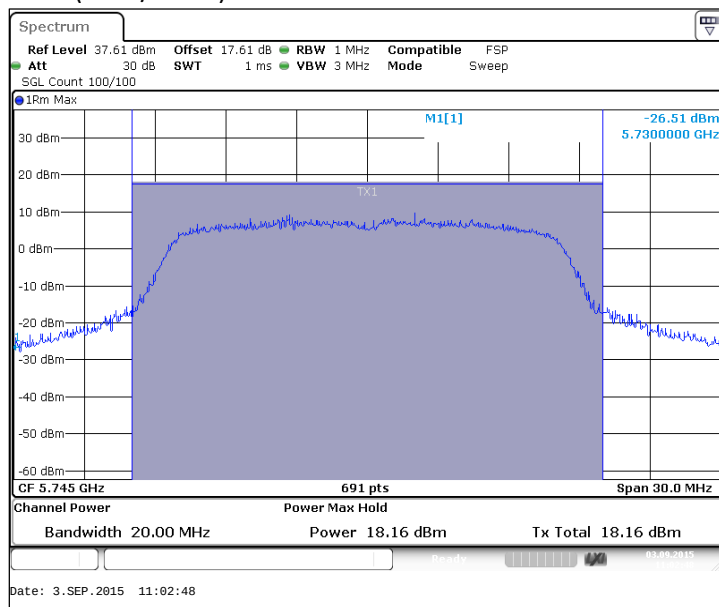
## Main ( 140 / 5700)



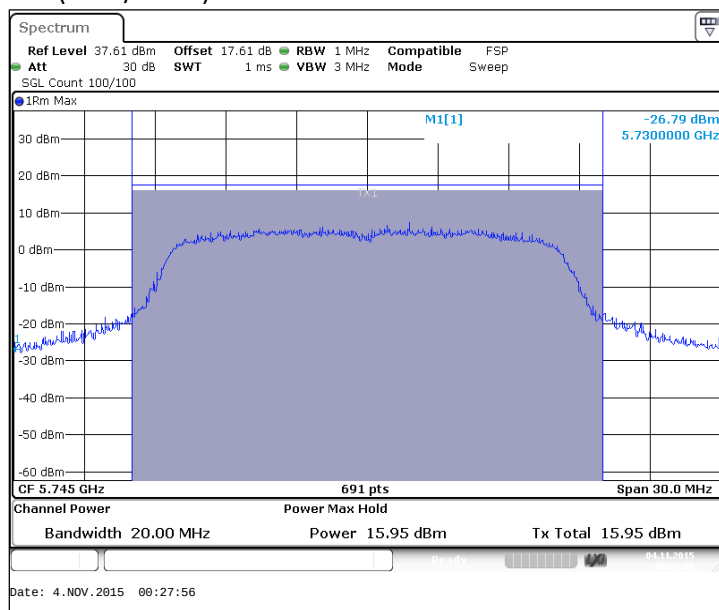
## Aux ( 140 / 5700)



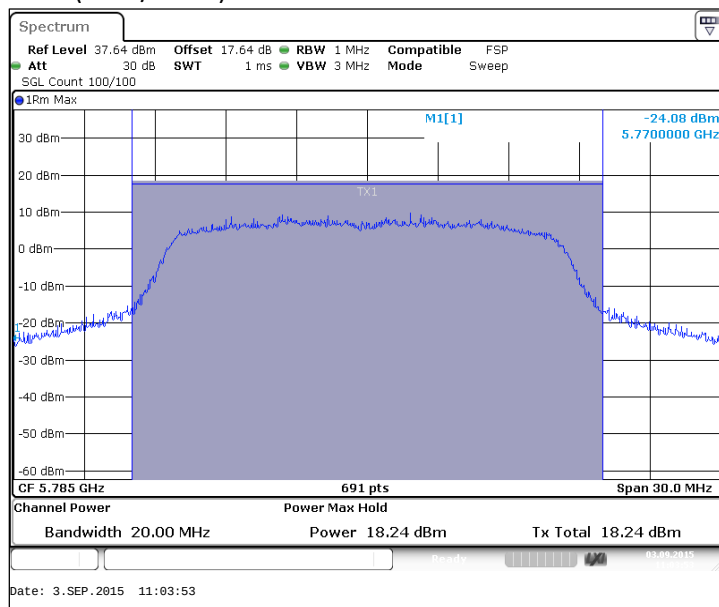
## Main ( 149 / 5745)



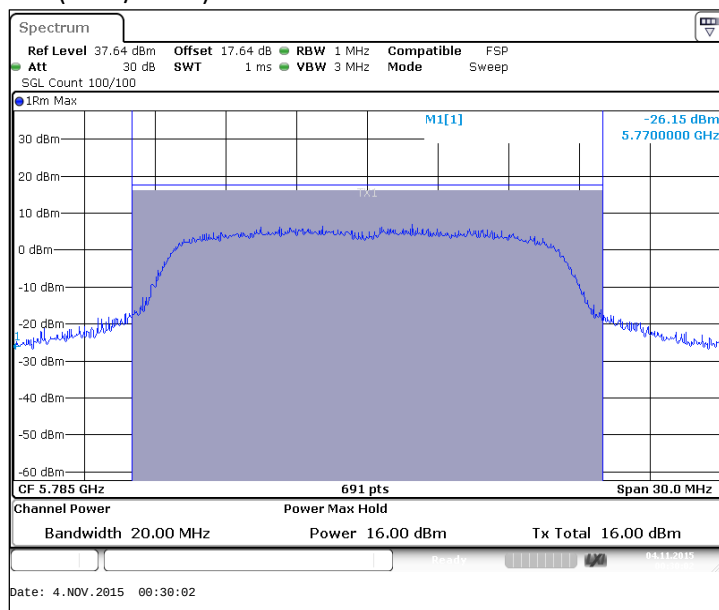
## Aux ( 149 / 5745)



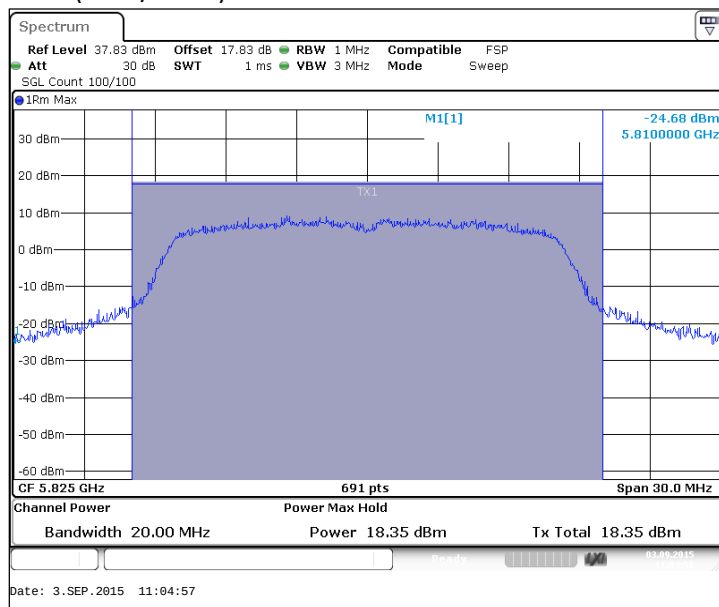
## Main ( 157 / 5785)



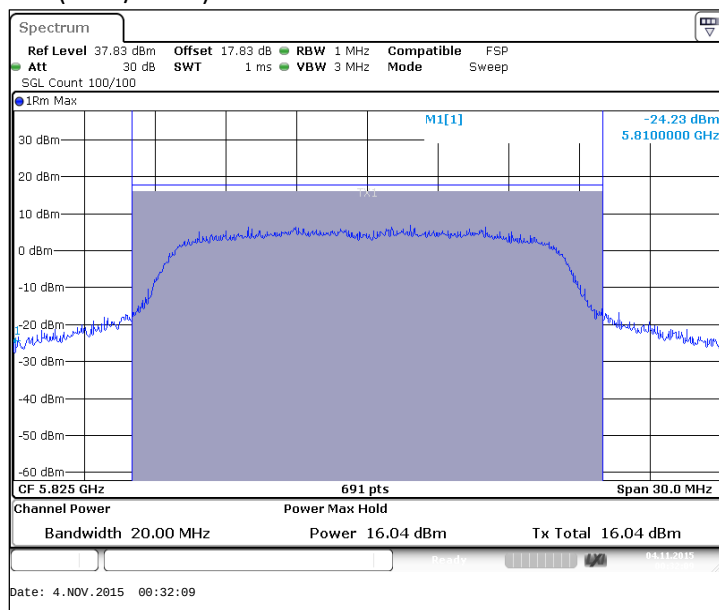
## Aux ( 157 / 5785)



## Main ( 165 / 5825)



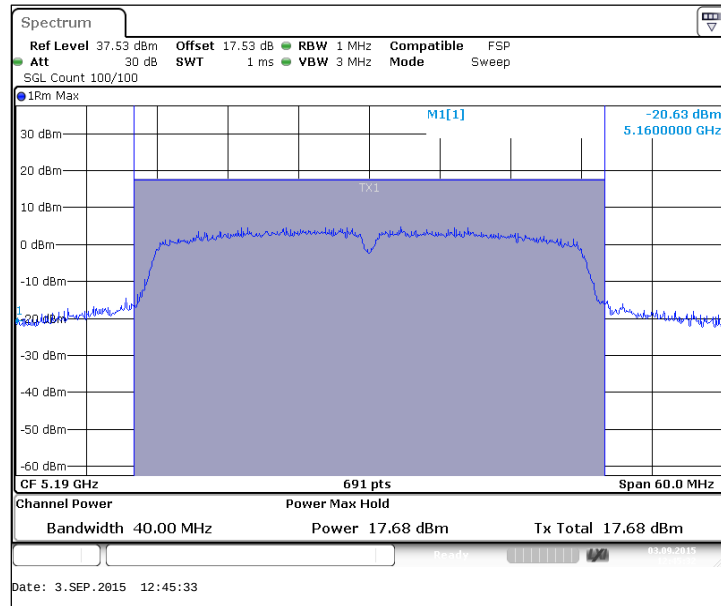
## Aux ( 165 / 5825)



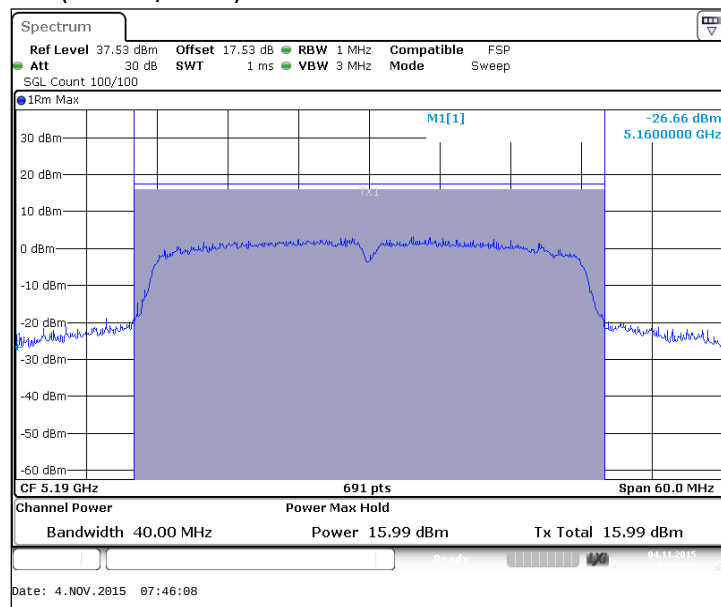
## 2.4.5 802.11n MIMO mode, QPSK modulation, 40.5 / 45.0 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | Sum [dBm] | Main [dBm] | Aux [dBm] | Antenna Gain Main [dBi] | Antenna Gain Aux [dBi] | Antenna Gain DG [dBi] | Limit [dBm] | Limit adjusted [dBm] | Result |
|--------------------------------|-----------|------------|-----------|-------------------------|------------------------|-----------------------|-------------|----------------------|--------|
| 36+40 / 5190                   | 19.93     | 17.68      | 15.99     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 44+48 / 5230                   | 19.80     | 17.65      | 15.71     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 52+56 / 5270                   | 19.92     | 17.83      | 15.73     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 60+64 / 5310                   | 19.83     | 17.78      | 15.58     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 100+104 / 5510                 | 20.42     | 18.39      | 16.14     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 108+112 / 5550                 | 20.39     | 18.36      | 16.1      | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 132+136 / 5670                 | 20.21     | 18.1       | 16.07     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 149+153 / 5755                 | 20.43     | 18.3       | 16.31     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |
| 157+161 / 5795                 | 20.73     | 18.59      | 16.63     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |

### Main ( 36+40 / 5190)

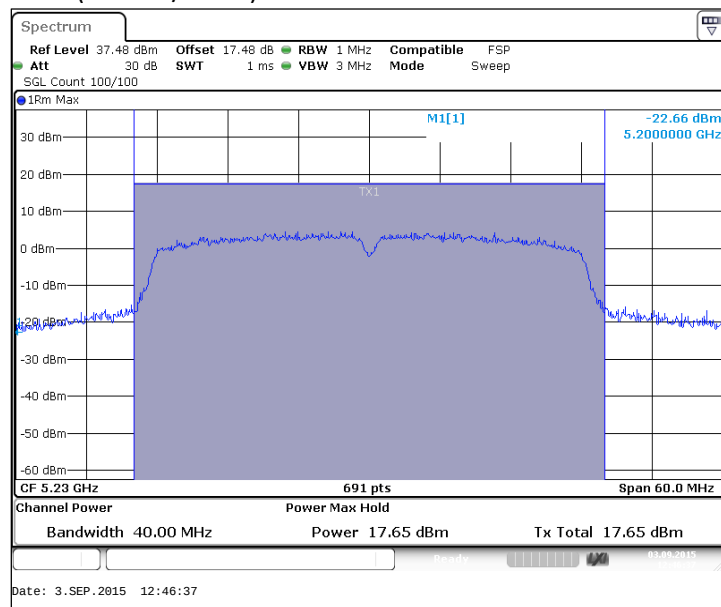


Aux ( 36+40 / 5190)

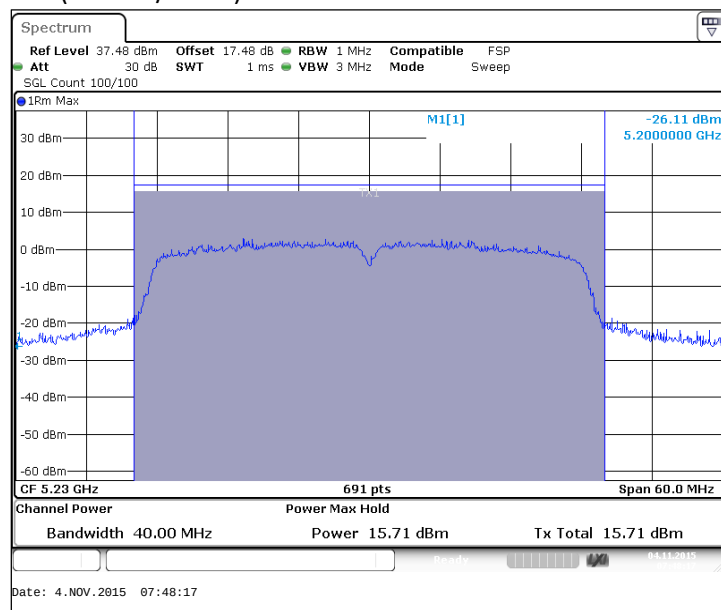




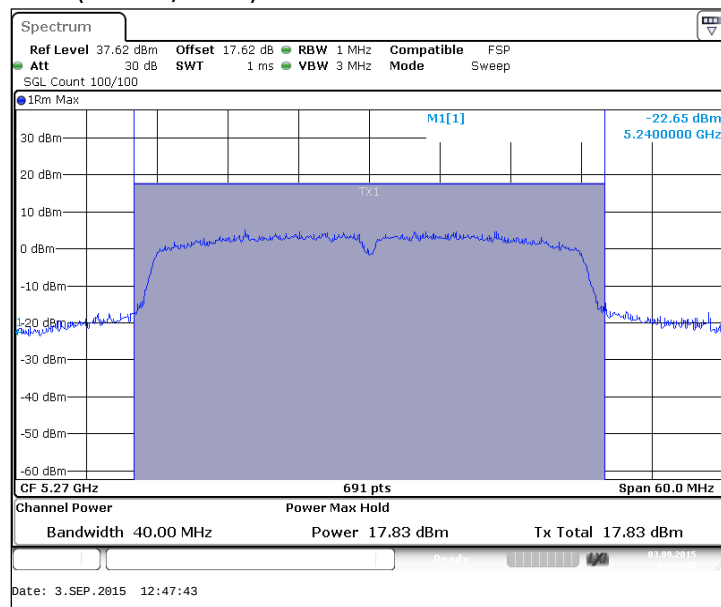
## Main ( 44+48 / 5230)



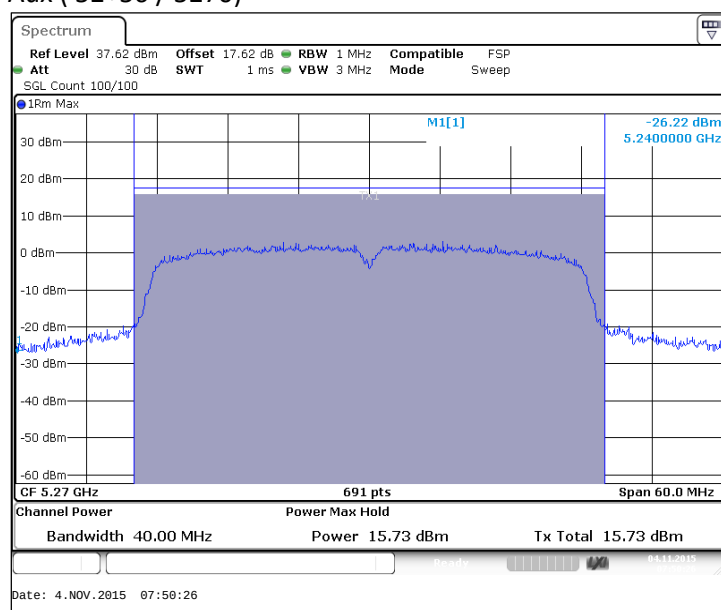
## Aux ( 44+48 / 5230)



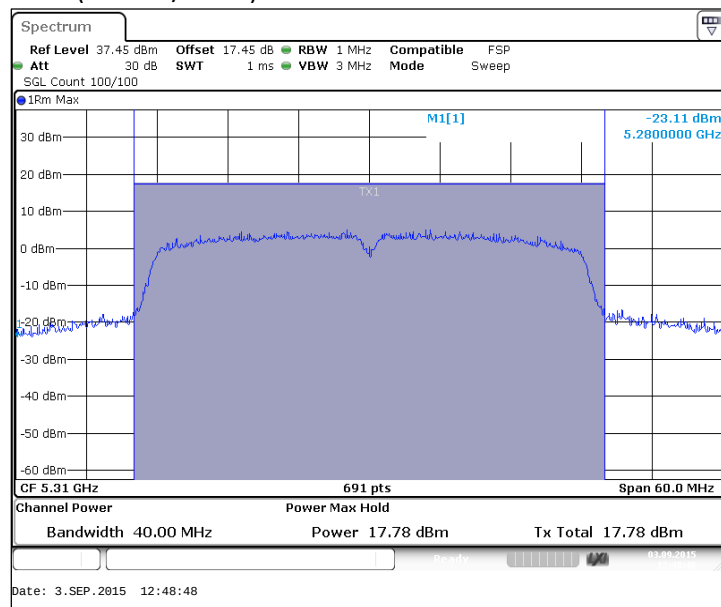
## Main ( 52+56 / 5270)



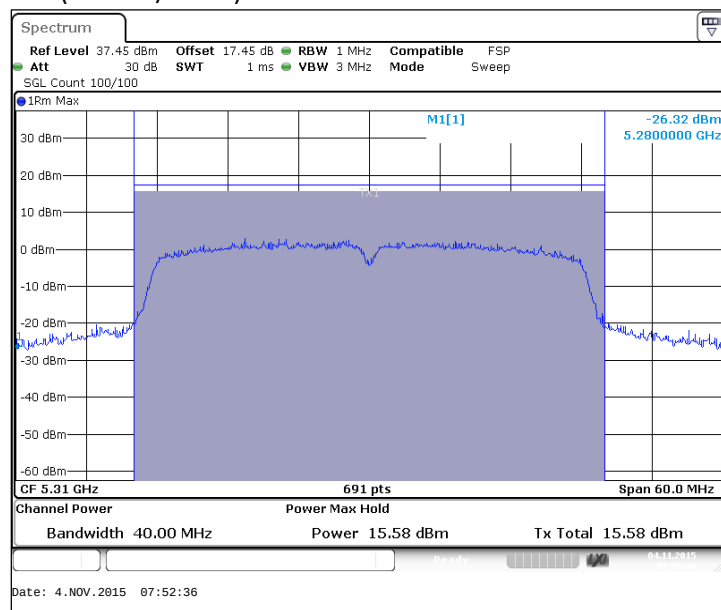
## Aux ( 52+56 / 5270)



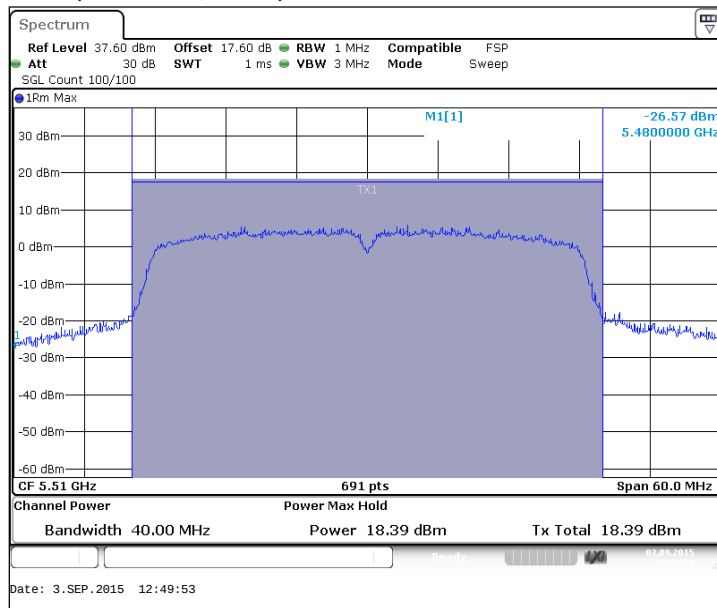
## Main ( 60+64 / 5310)



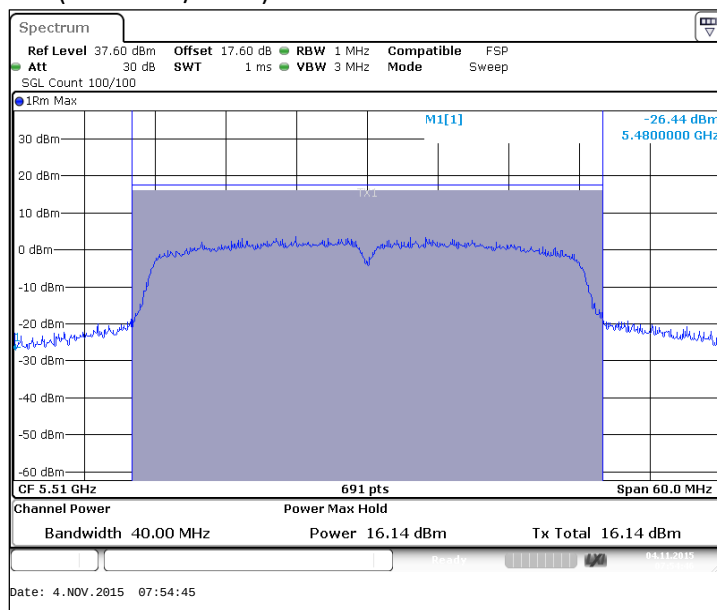
## Aux ( 60+64 / 5310)



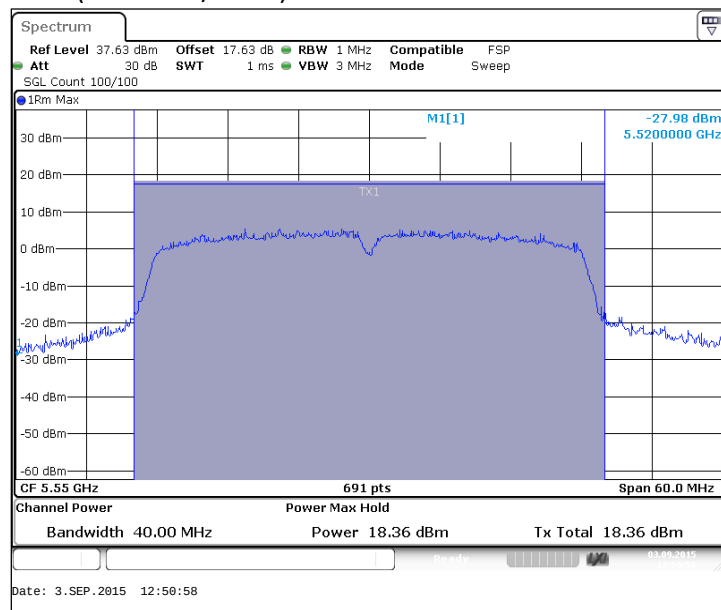
## Main ( 100+104 / 5510)



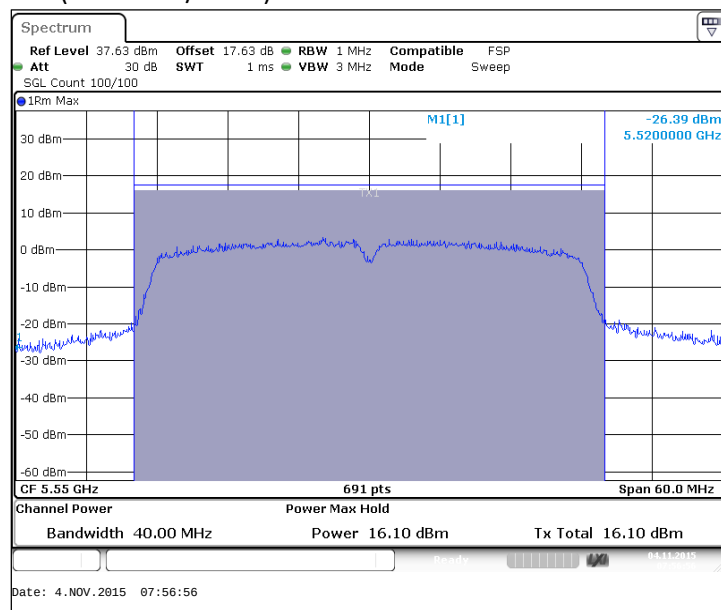
## Aux ( 100+104 / 5510)



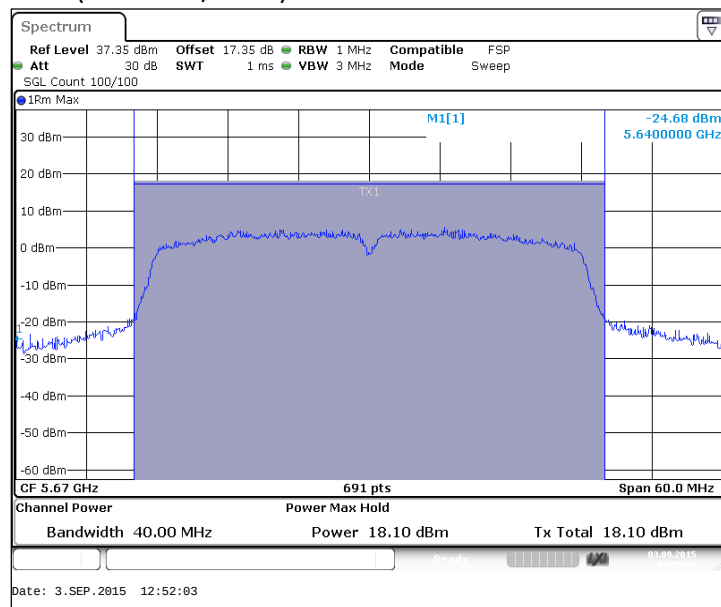
## Main ( 108+112 / 5550)



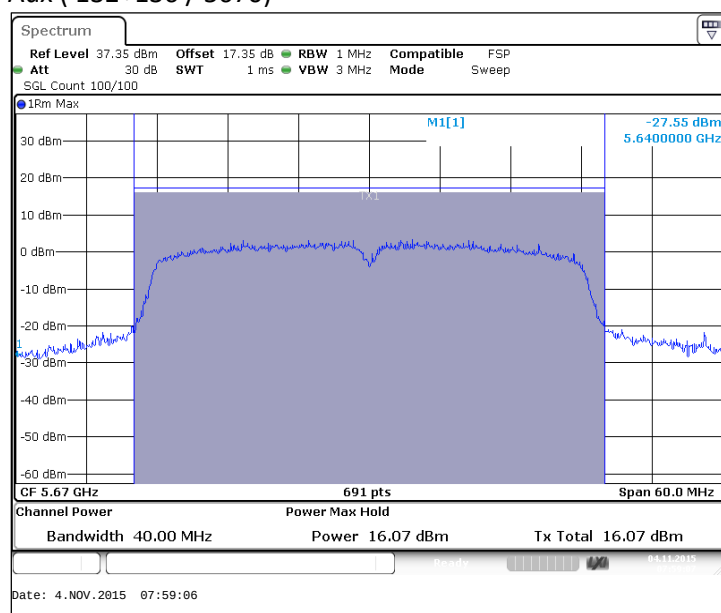
## Aux ( 108+112 / 5550)



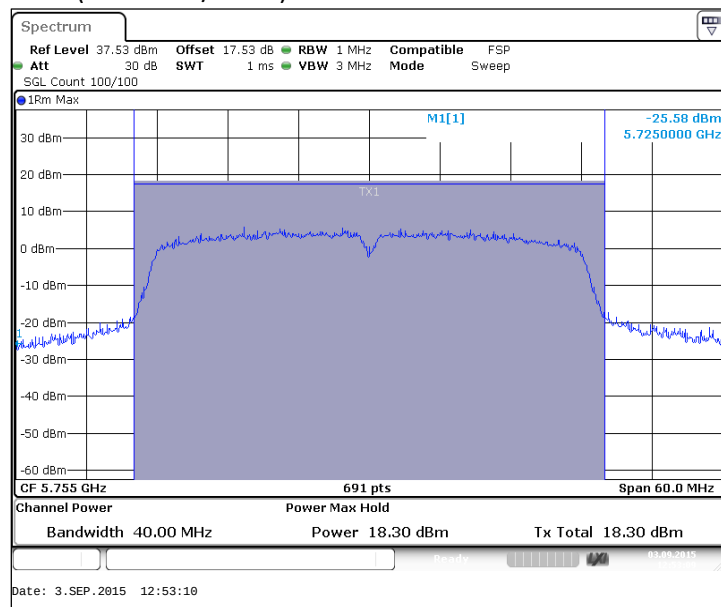
## Main ( 132+136 / 5670)



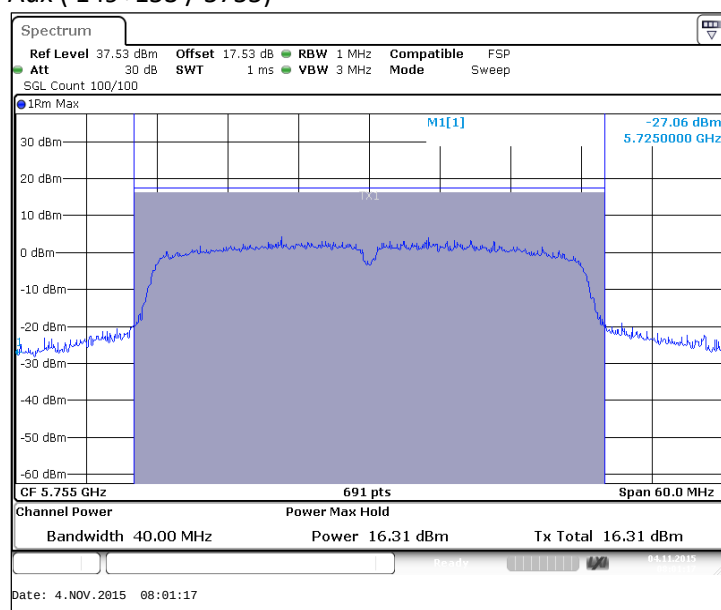
## Aux ( 132+136 / 5670)



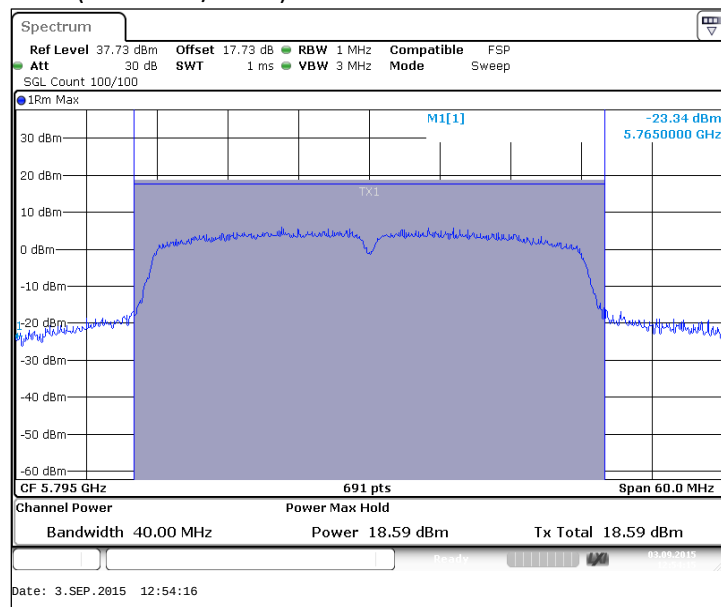
## Main ( 149+153 / 5755)



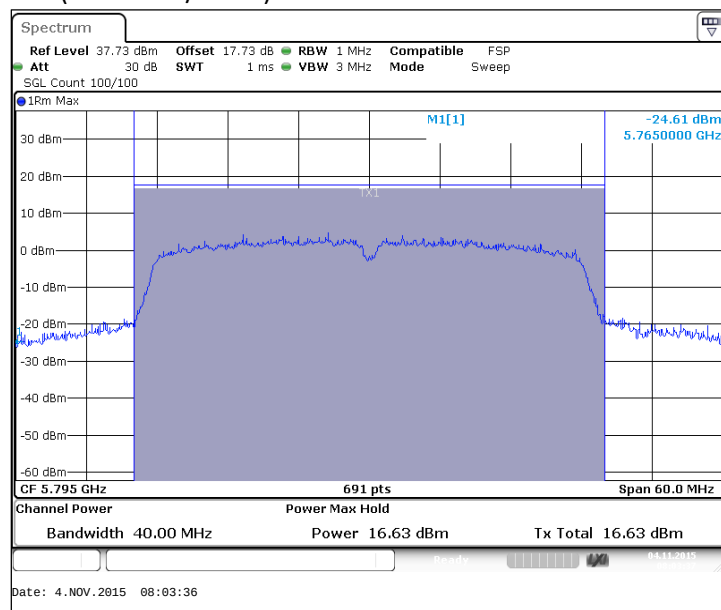
## Aux ( 149+153 / 5755)



## Main ( 157+161 / 5795)



## Aux ( 157+161 / 5795)

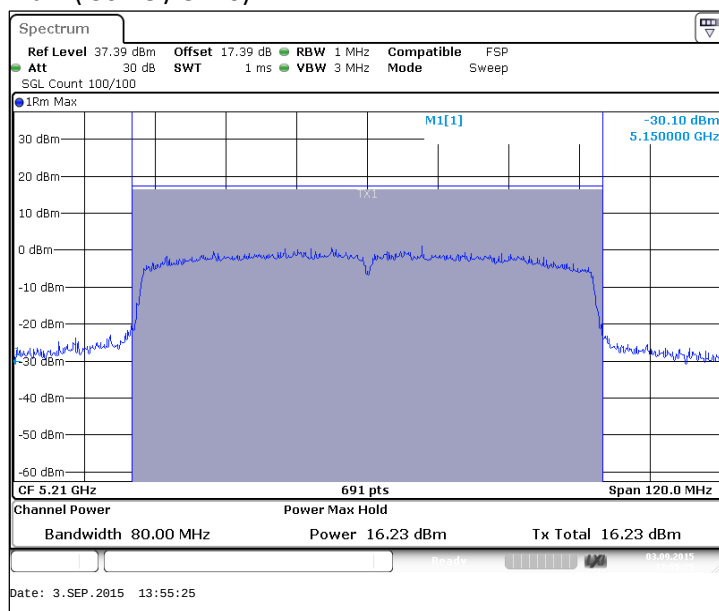




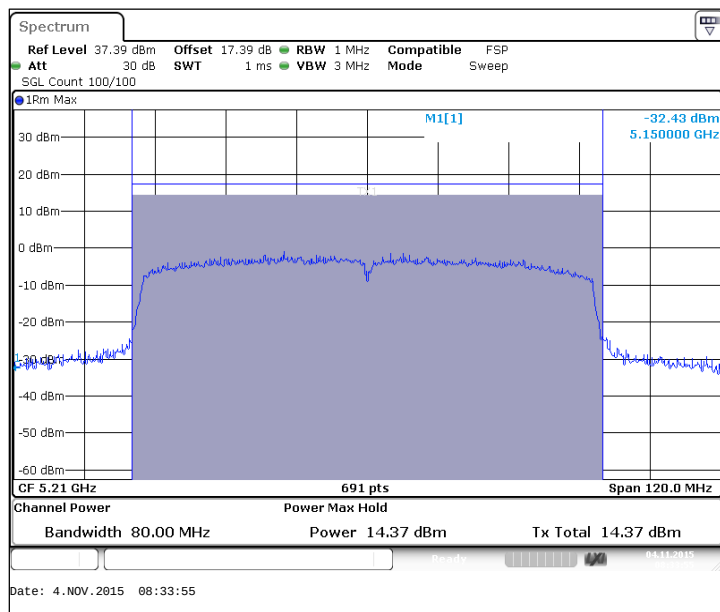
## 2.4.6 802.11ac MIMO mode, 16QAM modulation, 175.5 / 195.0 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | Sum [dBm] | Main [dBm] | Aux [dBm] | Antenna Gain Main [dBi] | Antenna Gain Aux [dBi] | Antenna Gain DG [dBi] | Limit [dBm] | Limit adjusted [dBm] | Result |
|--------------------------------|-----------|------------|-----------|-------------------------|------------------------|-----------------------|-------------|----------------------|--------|
| 36-48 / 5210                   | 18.41     | 16.23      | 14.37     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 52-64 / 5290                   | 18.60     | 16.54      | 14.37     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 100-112 / 5530                 | 19.22     | 17.19      | 14.95     | 1.4                     | 1.4                    | 1.4                   | 24          | 24                   | PASSED |
| 149-161 / 5775                 | 19.33     | 17.24      | 15.15     | 1.4                     | 1.4                    | 1.4                   | 30          | 30                   | PASSED |

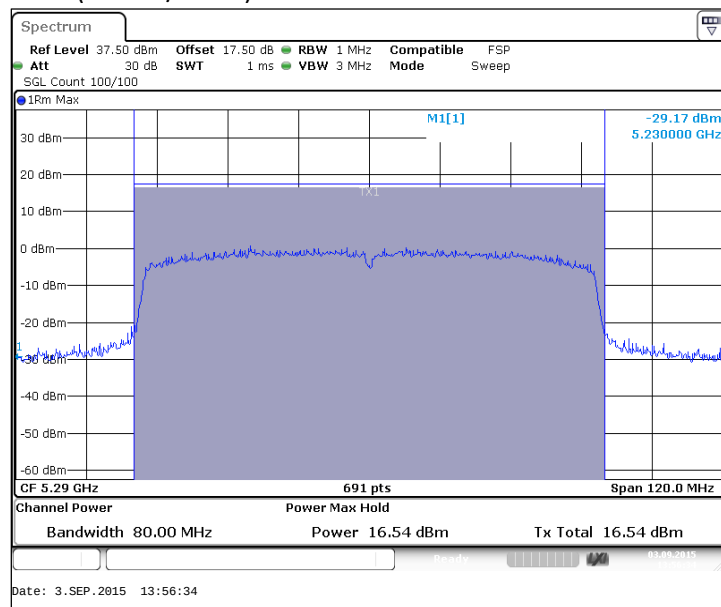
### Main ( 36-48 / 5210)



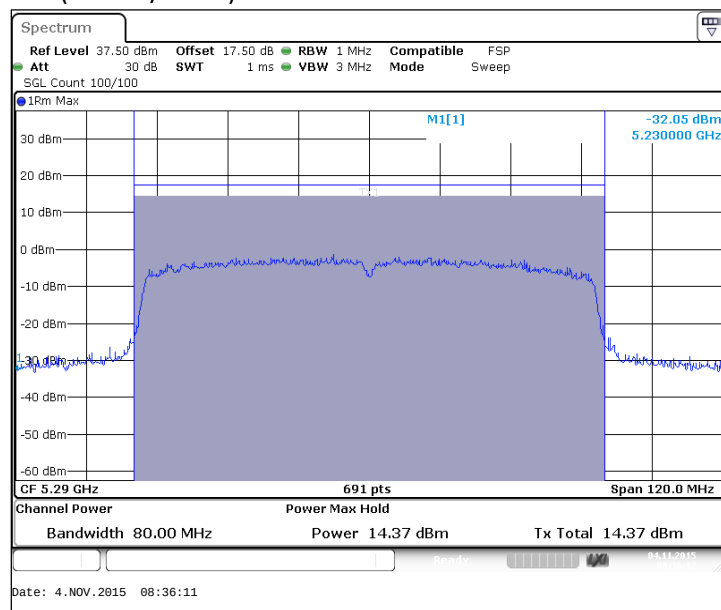
### Aux ( 36-48 / 5210)



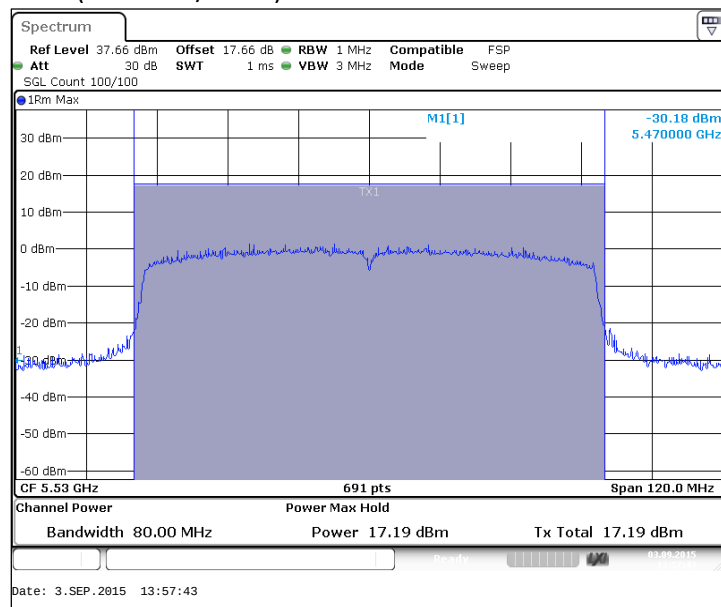
## Main ( 52-64 / 5290)



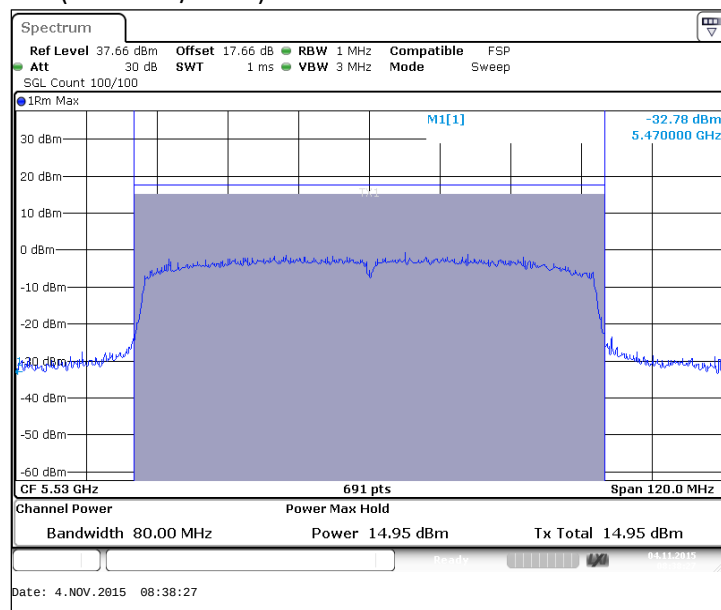
## Aux ( 52-64 / 5290)



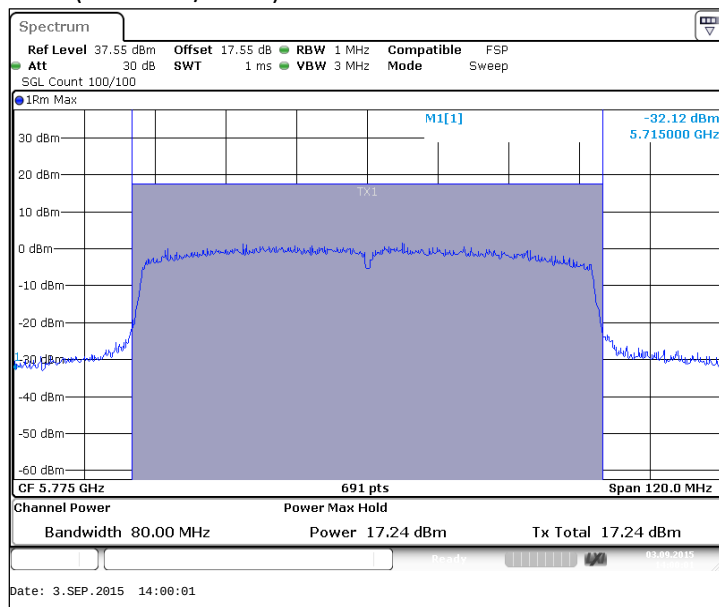
## Main ( 100-112 / 5530)



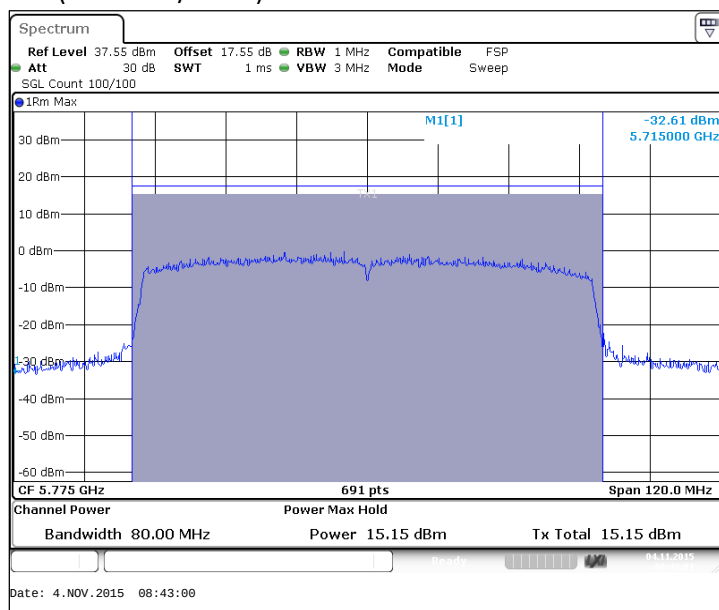
## Aux ( 100-112 / 5530)



## Main ( 149-161 / 5775)



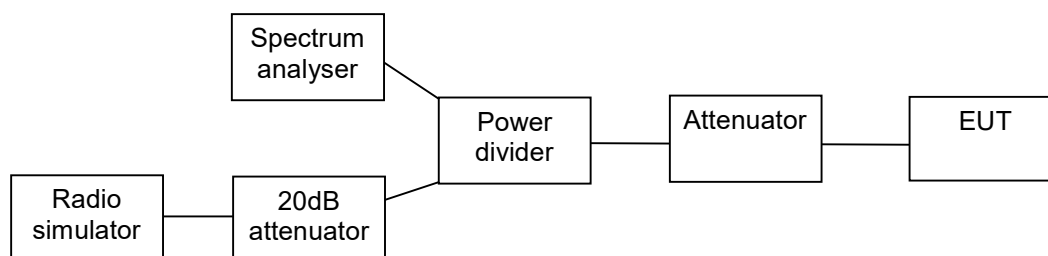
## Aux ( 149-161 / 5775)



### 3. 6dB(bandwidth) (FCC § , RSS-210 A9.2)

|                                                        |                                          |
|--------------------------------------------------------|------------------------------------------|
| <b>EUT with DUT number</b>                             | RM-1104, DUT 100007                      |
| <b>Accessories with DUT numbers</b>                    | SD-244R, DUT 100021 ; WH-308, DUT 100029 |
| <b>Operation Voltage [V] / [Hz]</b>                    | Nominal                                  |
| <b>Results</b>                                         | PASSED                                   |
| <b>Remarks</b>                                         | -                                        |
| <b>Temp [°C] / Humidity [%RH] / Air Pressure [kPa]</b> | 20 / 49 / 101.2                          |
| <b>Date of measurements</b>                            | 01-Jul-2015                              |
| <b>Measured by</b>                                     | Jari Keto                                |

#### 3.1. Test Setup



#### 3.2. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for 6 dB bandwidth measurements

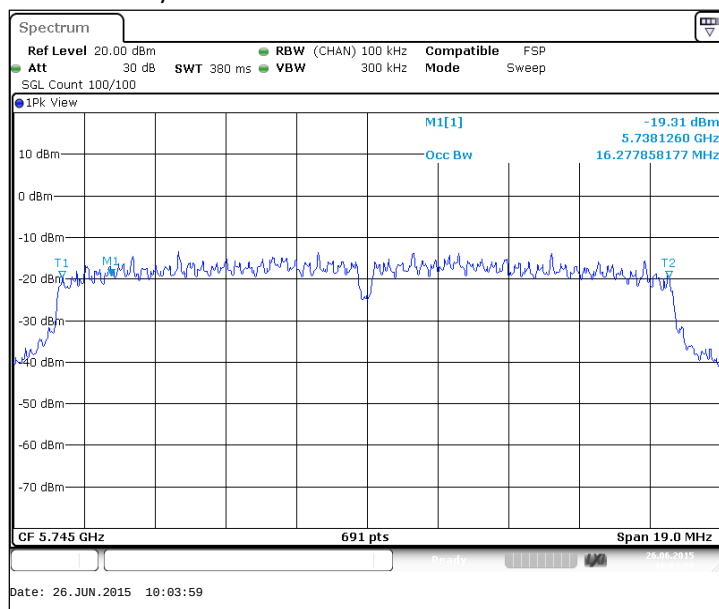
| Limit [kHz] |
|-------------|
| >= 500      |

### 3.3. 5 GHz RLAN Test results

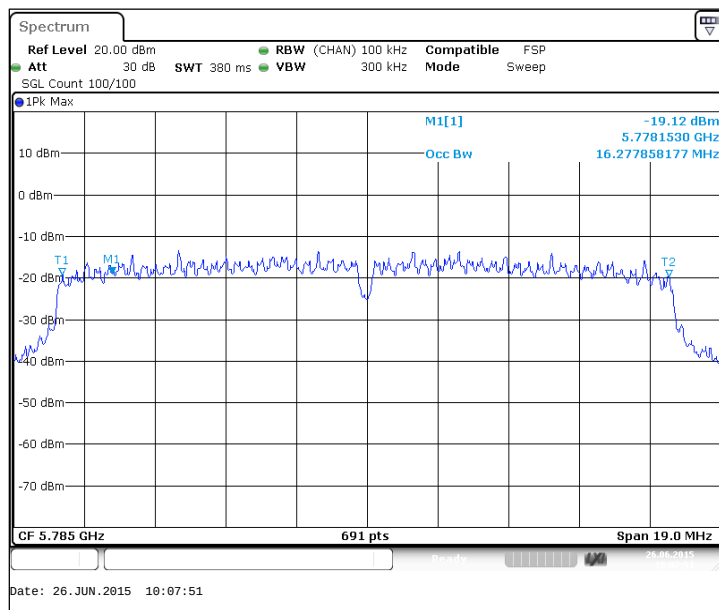
#### 3.3.1 802.11a mode, BPSK modulation, 6 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149 / 5745 MAIN                | 16277.9              | PASSED |
| 157 / 5785 MAIN                | 16277.9              | PASSED |
| 165 / 5825 MAIN                | 16277.9              | PASSED |
| 157 / 5785 AUX                 | 16250.4              | PASSED |
| 165 / 5825 AUX                 | 16277.9              | PASSED |
| 149 / 5745 AUX                 | 16277.9              | PASSED |

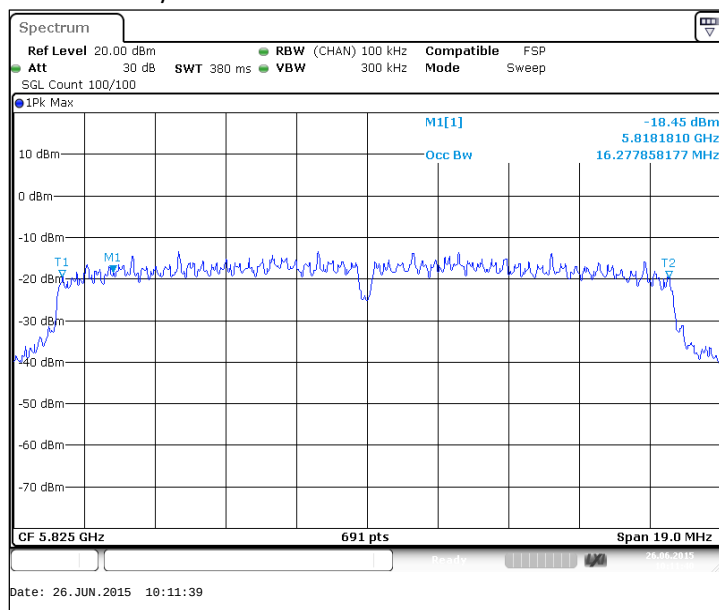
#### Channel 149 / 5745MHz



#### Channel 157 / 5785MHz

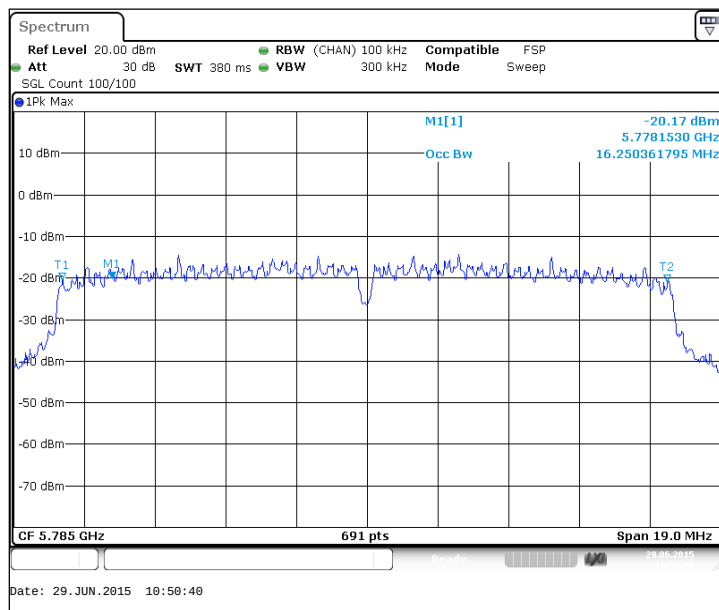


### Channel 165 / 5825MHz

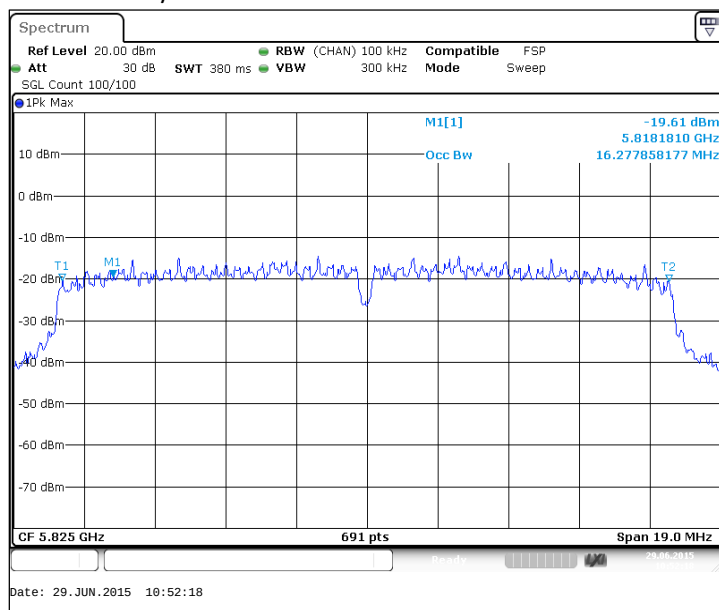


### Channel 157 / 5785MHz

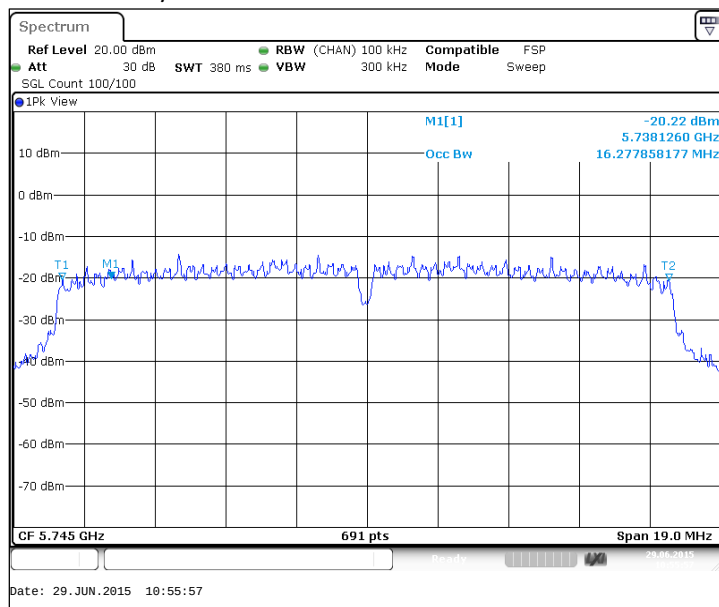




## Channel 165 / 5825MHz



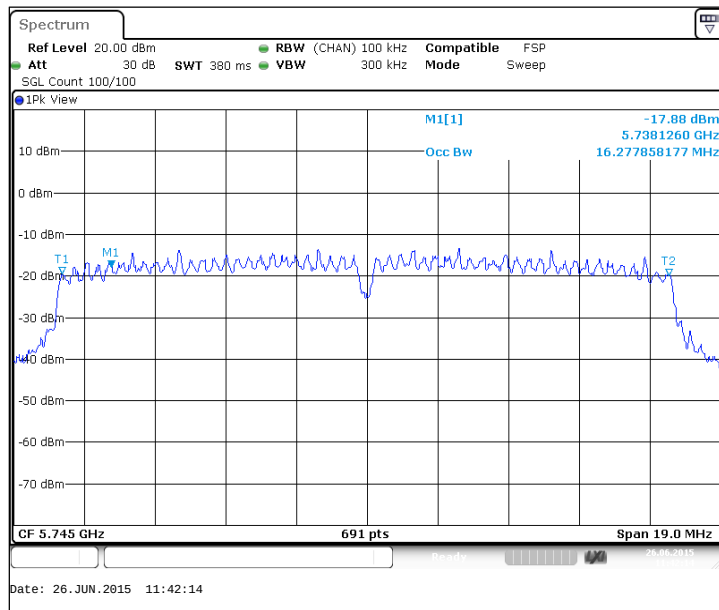
### Channel 149 / 5745MHz



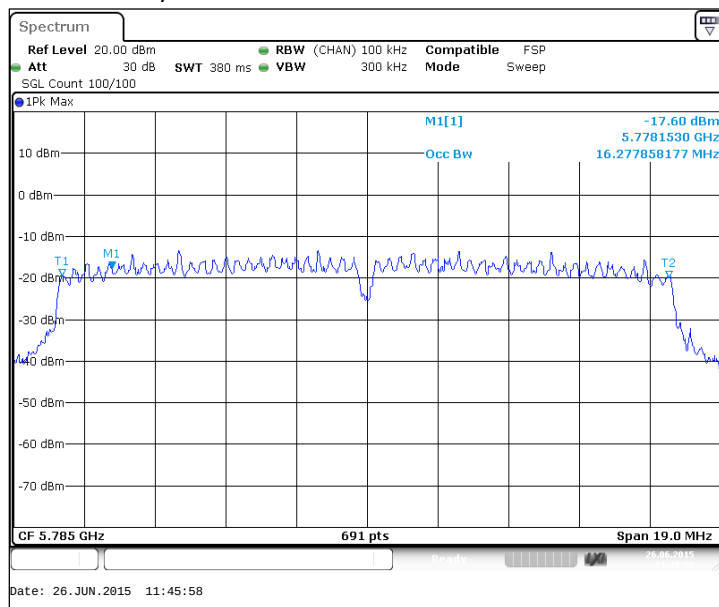
### 3.3.2 802.11a mode, QPSK modulation, 18 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149 / 5745 MAIN                | 16277.9              | PASSED |
| 157 / 5785 MAIN                | 16277.9              | PASSED |
| 165 / 5825 MAIN                | 16277.9              | PASSED |
| 149 / 5745 AUX                 | 16277.9              | PASSED |
| 157 / 5785 AUX                 | 16277.9              | PASSED |
| 165 / 5825 AUX                 | 16277.9              | PASSED |

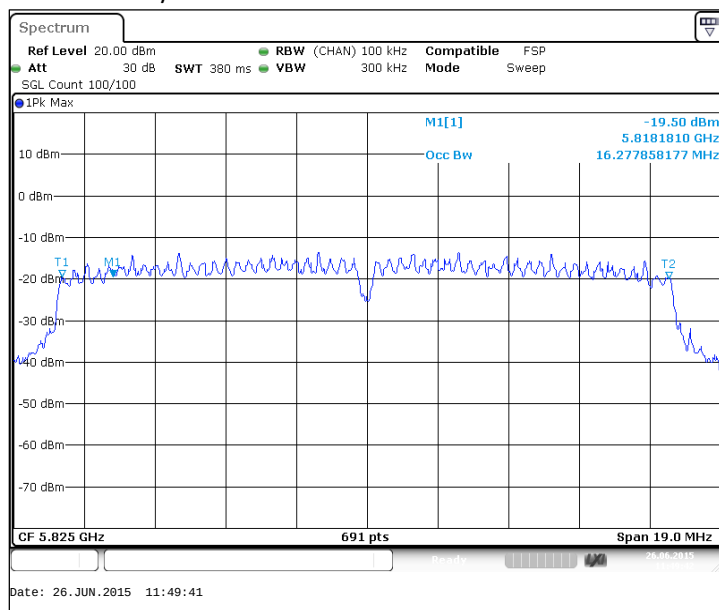
### Channel 149 / 5745MHz



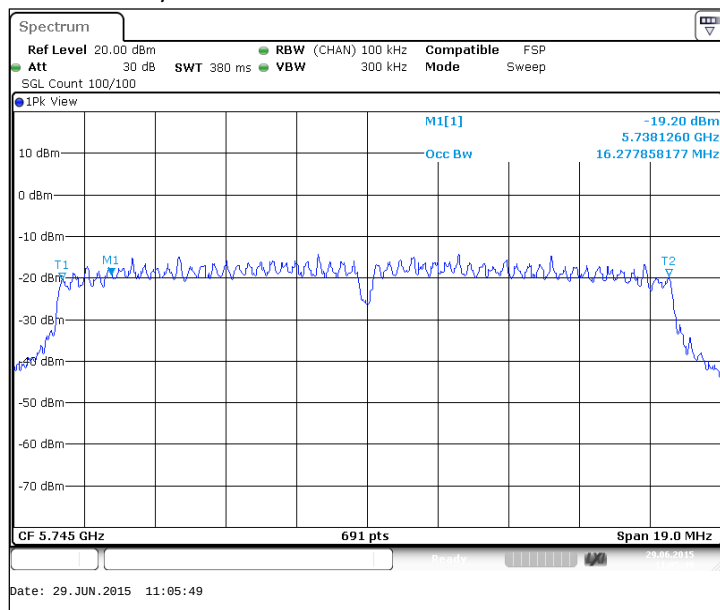
## Channel 157 / 5785MHz



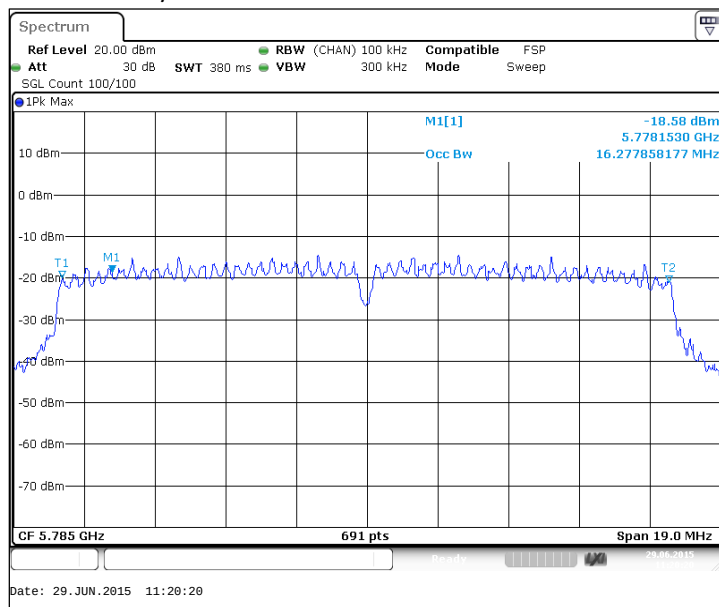
## Channel 165 / 5825MHz



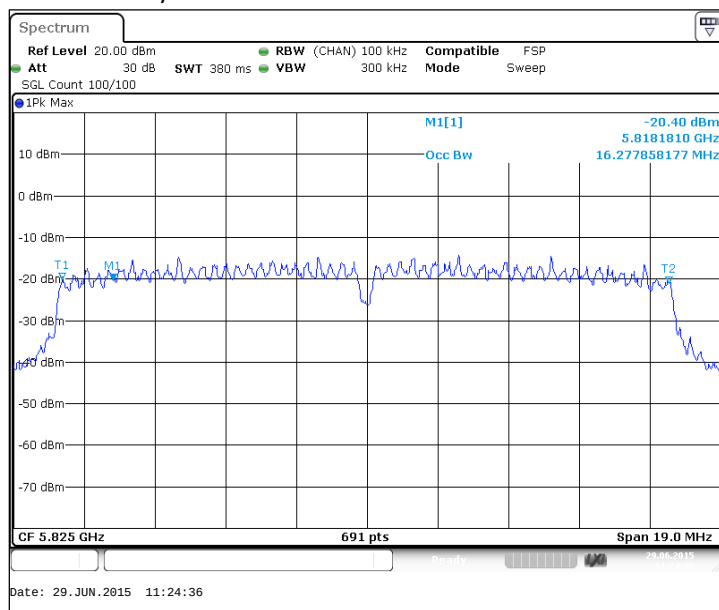
## Channel 149 / 5745MHz



## Channel 157 / 5785MHz



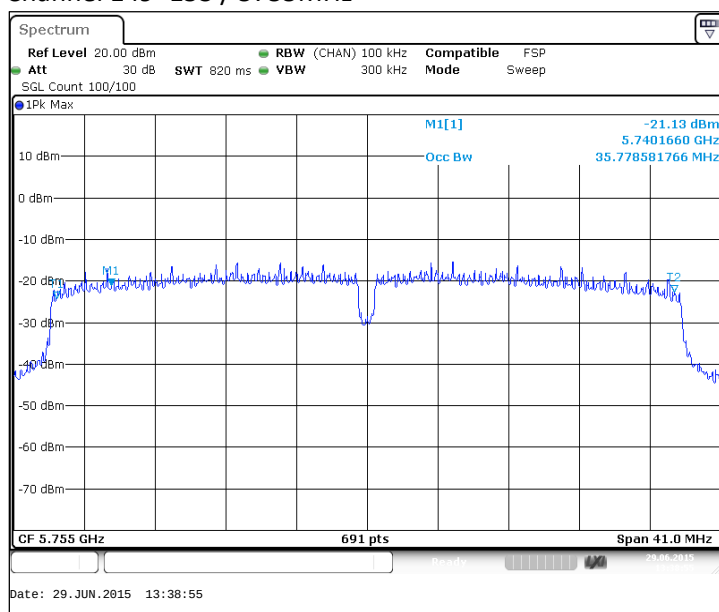
## Channel 165 / 5825MHz



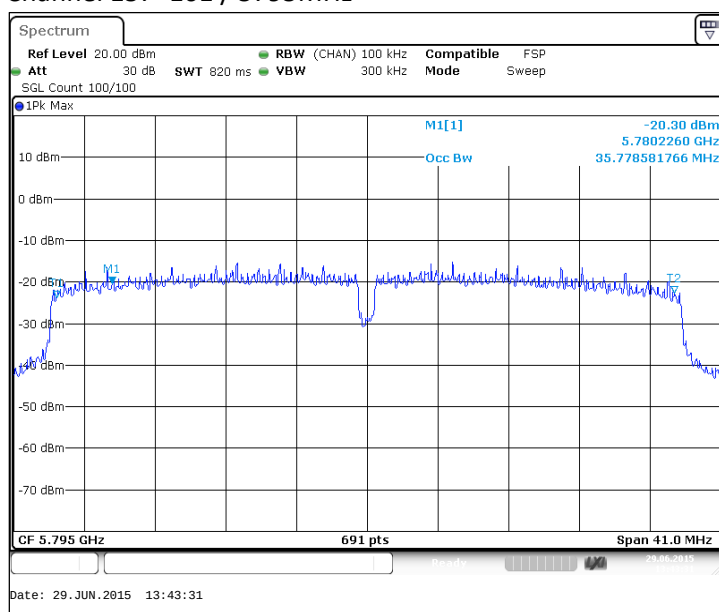
### 3.3.3 802.11n mode, BPSK modulation, 13.5 / 15.0 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149+153 / 5755 MAIN            | 35778.6              | PASSED |
| 157+161 / 5795 MAIN            | 35778.6              | PASSED |
| 149+153 / 5755 AUX             | 35778.6              | PASSED |
| 157+161 / 5795 AUX             | 35778.6              | PASSED |

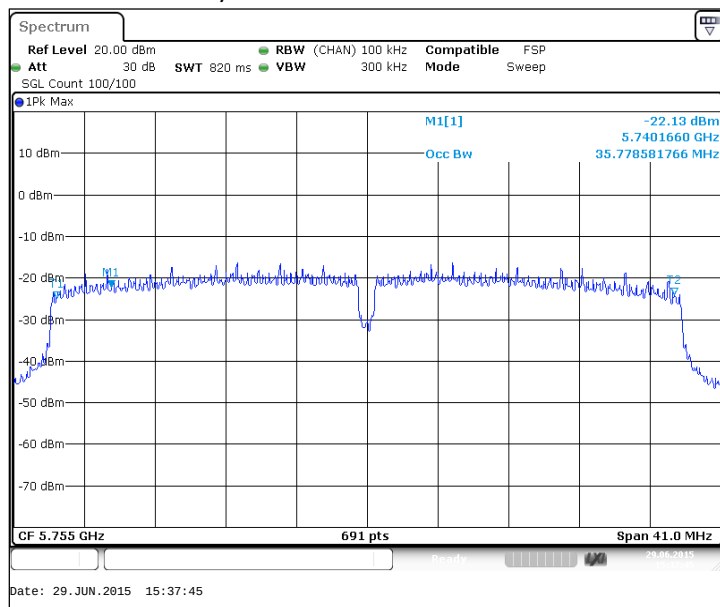
#### Channel 149+153 / 5755MHz



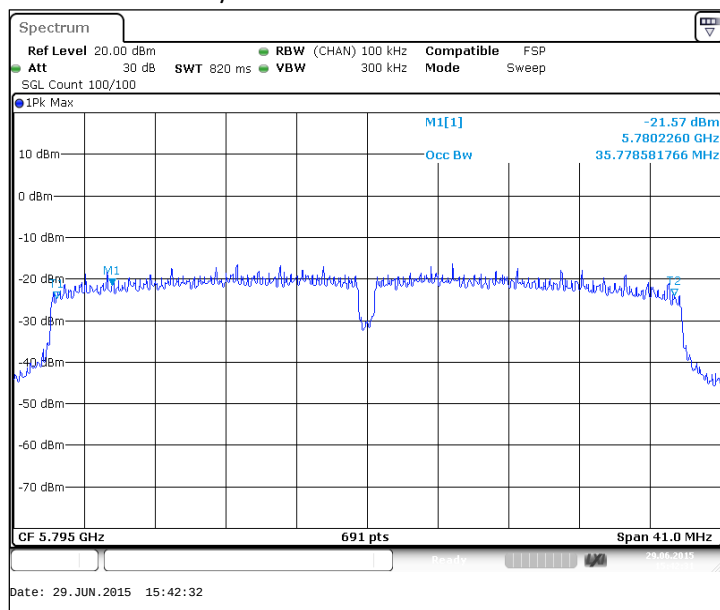
#### Channel 157+161 / 5795MHz



### Channel 149+153 / 5755MHz



### Channel 157+161 / 5795MHz

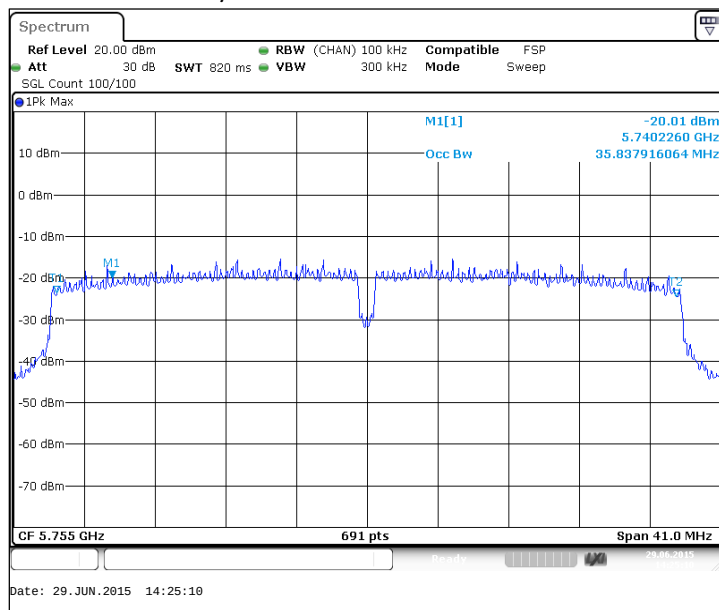


### 3.3.4 802.11n mode, QPSK modulation, 27.0 / 30.0 Mbps data rate

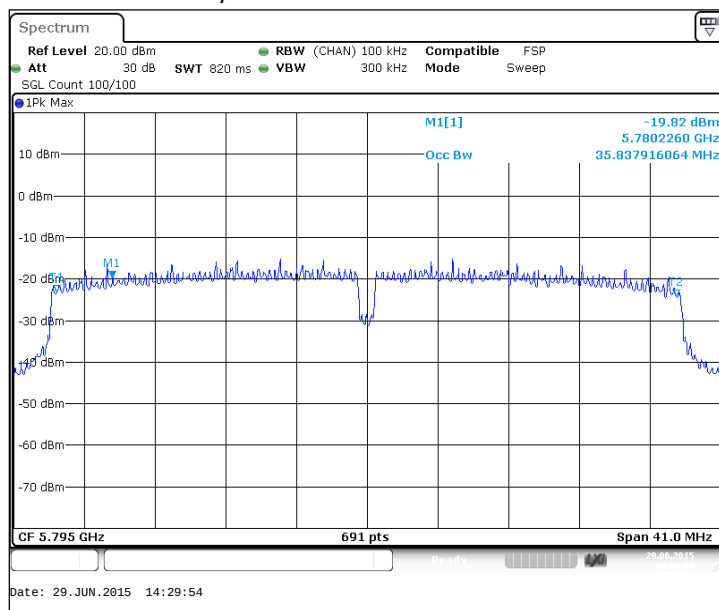
| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149+153 / 5755 MAIN            | 35837.9              | PASSED |
| 157+161 / 5795 MAIN            | 35837.9              | PASSED |
| 149+153 / 5755 AUX             | 35778.6              | PASSED |
| 157+161 / 5795 AUX             | 35778.6              | PASSED |



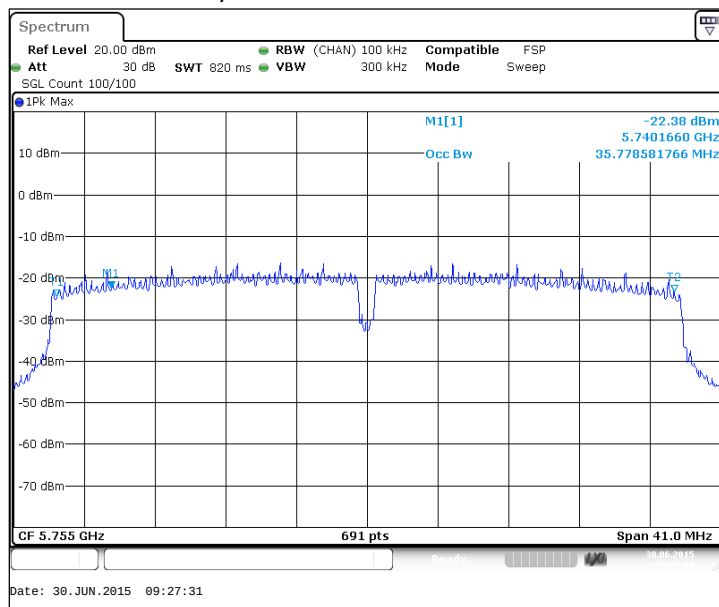
### Channel 149+153 / 5755MHz



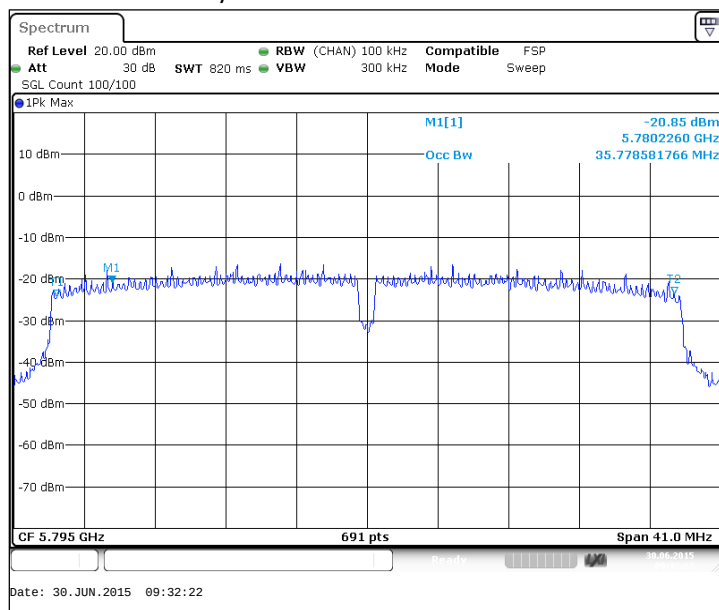
### Channel 157+161 / 5795MHz



### Channel 149+153 / 5755MHz



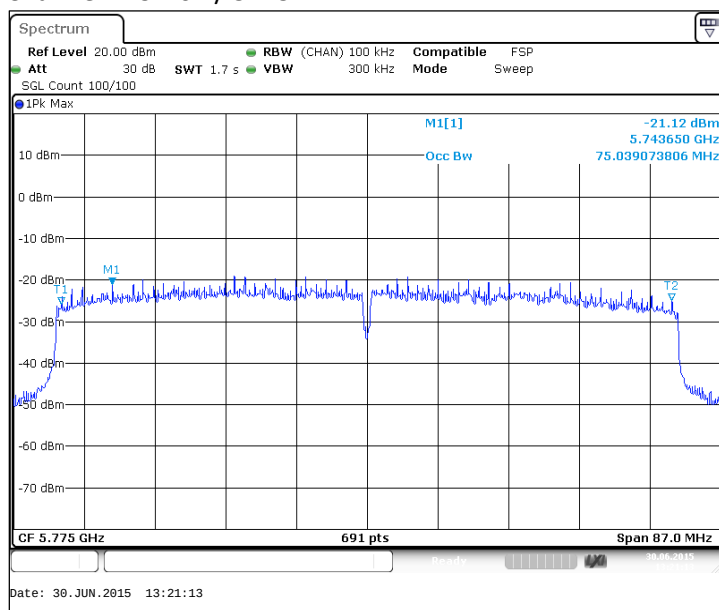
### Channel 157+161 / 5795MHz



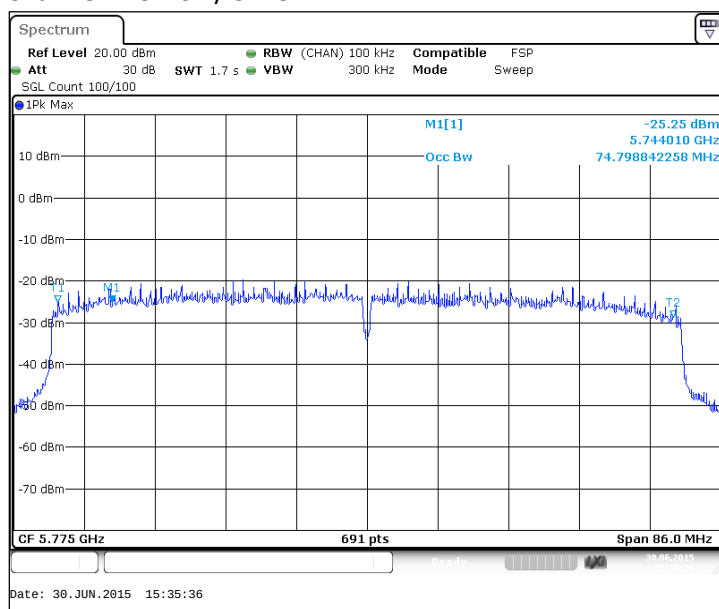
### 3.3.5 802.11ac mode, BPSK modulation, 29.3 / 32.5 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149-161 / 5775 MAIN            | 75039.1              | PASSED |
| 149-161 / 5775                 | 74798.8              | PASSED |

#### Channel 149-161 / 5775MHz



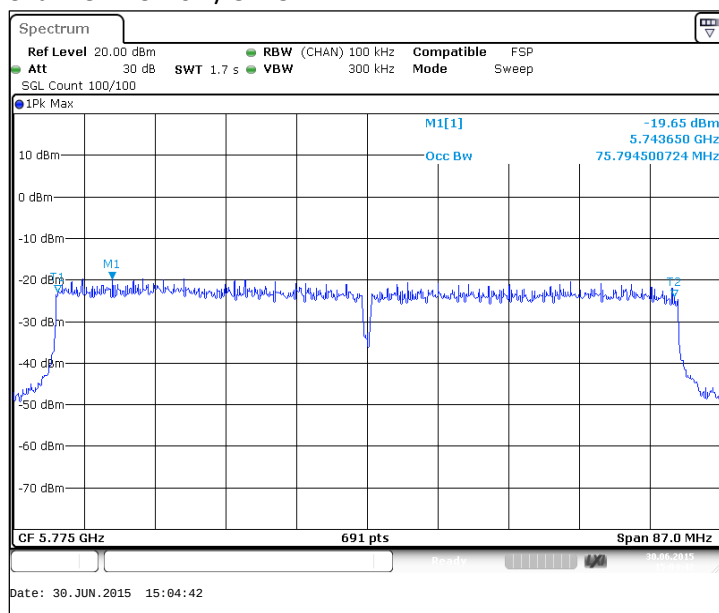
#### Channel 149-161 / 5775MHz



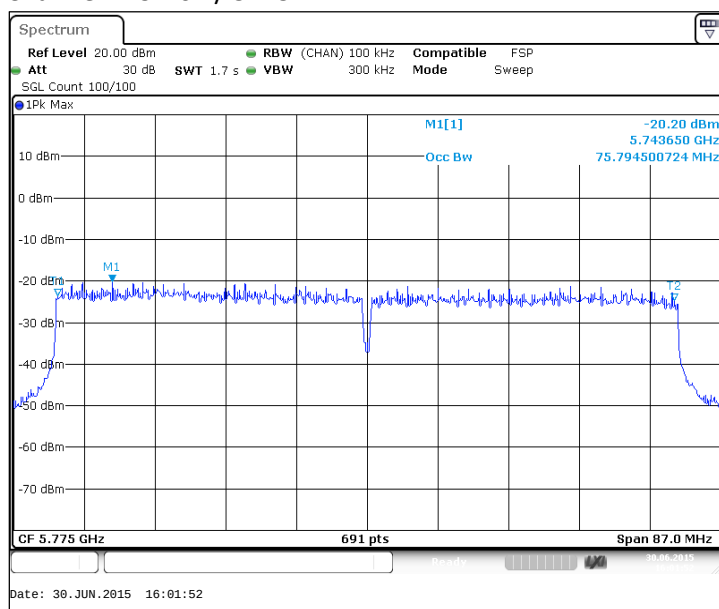
### 3.3.6 802.11ac mode, 16QAM modulation, 175.5 / 195.0 Mbps data rate

| Channel / f <sub>c</sub> [MHz] | 6 dB bandwidth [kHz] | Result |
|--------------------------------|----------------------|--------|
| 149-161 / 5775 MAIN            | 75794.5              | PASSED |
| 149-161 / 5775                 | 75794.5              | PASSED |

#### Channel 149-161 / 5775MHz



#### Channel 149-161 / 5775MHz



## 4. Test Equipment

### 4.1. Conducted measurements

| Eq. No | Equipment                       | Type          | Manufacturer  | Used in            |
|--------|---------------------------------|---------------|---------------|--------------------|
| 6039   | USB Interface                   | 5541765       | Testo         | 22/24/27, 15C, 15B |
| 6044   | V-network                       | ESH3-Z6       | R&S           | -                  |
| 2059   | V-network                       | ESH3-Z6       | R&S           | -                  |
| 1759   | LISN 50 $\mu$ H                 | ESH3-Z5       | R&S           | 22/24/27, 15C, 15B |
| 2097   | Pulse Limiter                   | ESH3-Z2       | R&S           | 22/24/27, 15C, 15B |
| 1999   | Receiver                        | ESIB26        | R&S           | 22/24/27, 15C, 15B |
| 2180   | Communication Tester            | CMU200        | R&S           | 22/24/27, 15C, 15B |
| 2390   | Directional Coupler             | DC2600        | AR            | -                  |
| -      | RF immunity / Emission Software | EMC32         | R&S           | 22/24/27, 15C, 15B |
| 2060   | LISN 50 $\mu$ H                 | ESH3-Z5       | R&S           | 15C, 15B           |
| 1759   | LISN 50 $\mu$ H                 | ESH3-Z5       | R&S           | 15C, 15B           |
| 2039   | Power Supply                    | PL330QMD      | Thurlby       | 15C, 15B           |
| 6036   | Data Logger                     | 175-H2        | Testo         | 22/24/27, 15C, 15B |
| 2359   | Temperature Test Chamber        | VT4002        | Vötsch        | 22/24/27           |
| 2352   | Spectrum Analyzer               | FSP-30        | R&S           | 22/24/27, 15C      |
| 6109   | Communication Tester            | CMU200        | R&S           | 22/24/27, 15C      |
| 6246   | Power Supply                    | 66332A        | HP            | 22/24/27, 15C      |
| 1992   | Signal Generator                | 83630B        | Agilent       | 15C, 15B           |
| 6098   | Signal Generator                | 8648C         | Agilent       | -                  |
| 6046   | Attenuator 10dB                 | 8493C         | Agilent       | 22/24/27, 15C      |
| 6047   | Attenuator 20dB                 | 8493C         | Agilent       | 22/24/27, 15C      |
| 6045   | Power splitter                  | 11667B        | Agilent       | 22/24/27, 15C      |
| 6247   | Communication Tester            | CBT           | R&S           | 22/24/27, 15C 15B  |
| 6052   | Communication Tester            | CMU200        | R&S           | 22/24/27, 15C 15B  |
| 6248   | Power Supply                    | 6632B         | -             | 22/24/27, 15C 15B  |
| 6106   | Spectrum Analyzer               | FSP-30        | R&S           | 22/24/27, 15C 15B  |
| 6113   | Signal Generator                | SMF100A       | R&S           | 22/24/27, 15C 15B  |
| 6202   | Temperature Test Chamber        | VT4002        | Vötsch        | 22/24/27, 15C 15B  |
| 6122   | Power Splitter                  | 11667B        | Agilent       | 22/24/27, 15C 15B  |
| 6134   | Attenuator 10dB                 | BW-S10-2W263+ | Mini-Circuits | 22/24/27, 15C      |
| 6136   | Attenuator 20dB                 | BW-S20-2W263+ | Mini-Circuits | 22/24/27, 15C      |
| 6103   | Bluetooth tester                | CBT           | R&S           | 22/24/27, 15C 15B  |
| 6250   | Power Supply                    | 6651A         | Agilent       | 22/24/27, 15C 15B  |
| 6108   | Communication Tester            | CMU200        | R&S           | 22/24/27, 15C 15B  |
| 6105   | Spectrum Analyzer               | FSV-30        | R&S           | 22/24/27, 15C 15B  |
| 6251   | Temperature Test Chamber        | VT4002        | Vötsch        | 22/24/27, 15C 15B  |
| 6243   | Power Splitter                  | 1167B         | Agilent       | 22/24/27, 15C 15B  |
| 6245   | Attenuator 10dB                 | BW-S10-2W263+ | Mini-Circuits | 22/24/27, 15C 15B  |
| 6244   | Attenuator 20dB                 | BW-S20-2W263+ | Mini-Circuits | 22/24/27, 15C 15B  |

## 4.2. Radiated measurements

| Eq. No | Equipment                       | Type                                   | Manufacturer | Used in            |
|--------|---------------------------------|----------------------------------------|--------------|--------------------|
| 2388   | Bluetooth Tester                | CBT                                    | R&S          | 15B                |
| 10479  | Communication Tester            | CMW500                                 | R&S          | 22/24/27, 15C, 15B |
| 2347   | Communication Tester            | CMU200                                 | R&S          | 22/24/27, 15C, 15B |
| 2009   | Signal Generator                | SMP 22                                 | R&S          | 22/24/27, 15C, 15B |
| 2348   | Controller                      | G-1000DXC                              | Yaesu        | 22/24/27, 15C, 15B |
| 2349   | Computer Controller             | g-1000DXC                              | Yaesu        | 22/24/27, 15C, 15B |
| 2116   | Controller                      | EMCO 2090                              | ETS          | 22/24/27, 15C, 15B |
| 2109   | Power Supply                    | PL330QMD                               | Thurlby      | 22/24/27, 15C, 15B |
| 2353   | Receiver                        | ESIB26                                 | R&S          | 22/24/27, 15C, 15B |
| 6115   | Open switch and control unit    | OSP 130                                | R&S          | 22/24/27, 15C, 15B |
| 6116   | Open switch and control unit    | OSP 150                                | R&S          | 22/24/27, 15C, 15B |
| 6117   | Open switch and control unit    | OSP 150                                | R&S          | 22/24/27, 15C, 15B |
| 6131   | Notch Filter                    | WRCT902.4-0.4/40-8SS                   | Wainwright   | 22/24/27, 15C, 15B |
| 6130   | Notch Filter                    | WRCD1880-1.1.25/50-10SS                | Wainwright   | 22/24/27           |
| 6159   | Band Reject Filter              | WRCD1747.8-0.4/40-5SS                  | Wainwright   | 22/24/27, 15C, 15B |
| 6158   | Band Reject Filter              | WRCT836.6-0.4/40-8SS                   | Wainwright   | 22/24/27, 15C, 15B |
| 6197   | Band Reject Filter              | WRCJV2531/2539-2523/2547-60/12SS       | Wainwright   | 22/24/27, 15C, 15B |
| 2231   | Band Reject Filter              | WRCG1947/1953-1940/1960-40/6SS         | Wainwright   | 22/24/27, 15C, 15B |
| 2391   | Band Reject Filter              | WRCG1729.4/1735.4-1722.4/1742.4-40/6SS | Wainwright   | 27                 |
| 2386   | Band Reject Filter              | WRCG1764.4/1770.4-1760.4/1774.4-40/6SS | Wainwright   | 22/24/27, 15C, 15B |
| 2385   | Band Reject Filter              | WRCG1744.4/1750.4-1740.4/1754.4-40/6SS | Wainwright   | 22/24/27, 15C, 15B |
| 2357   | Band Reject Filter              | WRCG2400/2483-2390/2493-35/10SS        | Wainwright   | 15C                |
| 2188   | Preamplifier                    | AFS4-00100300-20-23P-6                 | Miteq        | 22/24/27, 15C, 15B |
| 6195   | High Pass Filter                | -                                      | Wainwright   | 22/24/27, 15C, 15B |
| 2364   | Band Reject Filter              | WRCG1877/1883 - 1870/1890-40/6SS       | Wainwright   | 24                 |
| 2361   | Anechoic Chamber                | 3 m Semi / Full Anechoic Chamber       | Euroshield   | 22/24/27, 15C, 15B |
| 6212   | Antenna Array system            | -                                      | TCC          | 22/24/27, 15C, 15B |
| -      | RF immunity / Emission Software | EMC32                                  | R&S          | 22/24/27, 15C, 15B |
| 6089   | Antenna                         | HFH2-Z2                                | R&S          | 15C, 15B           |
| 2027   | CDN                             | M2 (modified) DC1                      | MEB          | 22/24/27, 15C, 15B |
| 2028   | CDN                             | M3 (modified) DC2                      | MEB          | 22/24/27, 15C, 15B |
| 2176   | CDN                             | CDN 801-M3                             | Lüthi        | 22/24/27, 15C, 15B |
| 2135   | CDN                             | CDN 801-M3                             | Lüthi        | 22/24/27, 15C, 15B |
| 2029   | Power Supply                    | PL330                                  | Thurlby      | 22/24/27, 15C      |
| 6038   | Data Logger                     | Testo 580                              | Testo        | 22/24/27, 15C, 15B |
| 6037   | Data Logger                     | 175-H2                                 | Testo        | 22/24/27, 15C, 15B |
| 6039   | USB Interface                   | 5541765                                | Testo        | 22/24/27, 15C, 15B |

# END OF REPORT