## 12.5 Power spectral density

**Description:**

Measurement of the power spectral density of a digital modulated system. The measurement is repeated at the lowest, middle and highest channel.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to: KDB789033 D02, F.** | |
| Detector: | RMS |
| Sweep time: | ≥10*(swp points)*(total on/off time) |
| Resolution bandwidth: | 1 MHz (500 kHz for 5.8 GHz band) |
| Video bandwidth: | ≥ 3xRBW |
| Span: | > EBW |
| Trace-Mode: | Max hold |
| Used test setup: | see chapter 7.4 – A |
| Measurement uncertainty: | see chapter 9 |

**Limits:**

| Power Spectral Density |
|---|
| **FCC**<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5150 – 5250 MHz)* → **10dBm**<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz)* → **10dBm**<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz)* → **10dBm**<br><br>power spectral density conducted ≤ 30 dBm in any 500 kHz band (band 5725 – 5850 MHz)* → **29dBm**<br><br>**IC**<br>power spectral density **e.i.r.p. ≤ 10 dBm** in any 1 MHz band (band 5150 – 5250 MHz)<br><br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz)* → **10dBm**<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz)* → **10dBm**<br><br>power spectral density conducted ≤ 30 dBm in any 500 kHz band (band 5725 – 5850 MHz)* → **29dBm** |

*limit shall be reduced by 1 dB because of the 7dBi antenna gain.

Results plots for 5150 MHz to 5725 MHz are shown in sub chapter 12.4

**Result:** antenna port 1

| OFDM / a – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -2.87 | -3.03 | 4.03 | 2.17 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 4.60 | 3.83 | 4.52 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | -0.73 | -7.78 | -8.98 | -3.32 |

| OFDM / n HT20 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -3.02 | -2.51 | 3.51 | 1.81 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 4.11 | 3.63 | 4.28 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | -1.07 | -11.39 | -11.61 | -3.54 |

| OFDM / n HT40 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5190 MHz | 5230 MHz | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor | -4.89 | -2.46 | -1.91 | -1.81 |
| Channel | 5510 MHz | 5550 MHz | 5630 MHz | 5670 MHz |
| Including duty cycle correction factor | -5.77 | -2.95 | -2.96 | -12.22 |
| Channel | 5755 MHz | 5795 MHz | -/- | -/- |
| Including duty cycle correction factor | -12.43 | -10.78 | -/- | -/- |

**Result:** antenna port 2

| OFDM / a – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -2.99 | -2.99 | 3.65 | 1.87 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 4.17 | 3.69 | 4.95 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | -0.10 | -7.41 | -8.12 | -3.61 |

| OFDM / n HT20 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -3.50 | -2.62 | 3.39 | 1.66 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 3.69 | 3.64 | 4.61 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | -0.38 | -11.01 | -10.78 | -3.86 |

| OFDM / n HT40 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5190 MHz | 5230 MHz | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor | -5.08 | -2.97 | -1.54 | -2.16 |
| Channel | 5510 MHz | 5550 MHz | 5630 MHz | 5670 MHz |
| Including duty cycle correction factor | -6.44 | -4.00 | -4.04 | -12.62 |
| Channel | 5755 MHz | 5795 MHz | -/- | -/- |
| Including duty cycle correction factor | -11.93 | -10.87 | -/- | -/- |

**Result:** antenna port 3

| OFDM / a – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -2.12 | -2.53 | 4.59 | 2.45 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 4.83 | 4.66 | 4.80 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | 0.12 | -6.78 | -8.26 | -2.41 |

| OFDM / n HT20 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -2.79 | -2.06 | 4.52 | 2.44 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 4.35 | 4.38 | 4.54 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | -0.25 | -10.72 | -10.80 | -2.67 |

| OFDM / n HT40 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5190 MHz | 5210 MHz | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor | -6.28 | -2.08 | -0.98 | -5.25 |
| Channel | 5510 MHz | 5550 MHz | 5630 MHz | 5670 MHz |
| Including duty cycle correction factor | -4.92 | -2.69 | -2.18 | -11.02 |
| Channel | 5755 MHz | 5795 MHz | -/- | -/- |
| Including duty cycle correction factor | -12.12 | -13.82 | -/- | -/- |

**Result:** antenna port 1 + antenna port 2

| OFDM / a – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | 0.08 | 0.00 | 6.85 | 5.03 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 7.40 | 6.77 | 7.75 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | 2.61 | -4.58 | -5.52 | -0.45 |

| OFDM / n HT20 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | -0.24 | 0.45 | 6.46 | 4.75 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 6.92 | 6.65 | 7.46 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | 2.30 | -8.19 | -8.16 | -0.69 |

| OFDM / n HT40 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5190 MHz | 5230 MHz | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor | -1.97 | 0.30 | 1.29 | 1.03 |
| Channel | 5510 MHz | 5550 MHz | 5630 MHz | 5670 MHz |
| Including duty cycle correction factor | -3.08 | -0.43 | -0.46 | -9.41 |
| Channel | 5755 MHz | 5795 MHz | -/- | -/- |
| Including duty cycle correction factor | -9.16 | -7.81 | -/- | -/- |

**Result:** antenna port 1 + antenna port 2 + antenna port 3

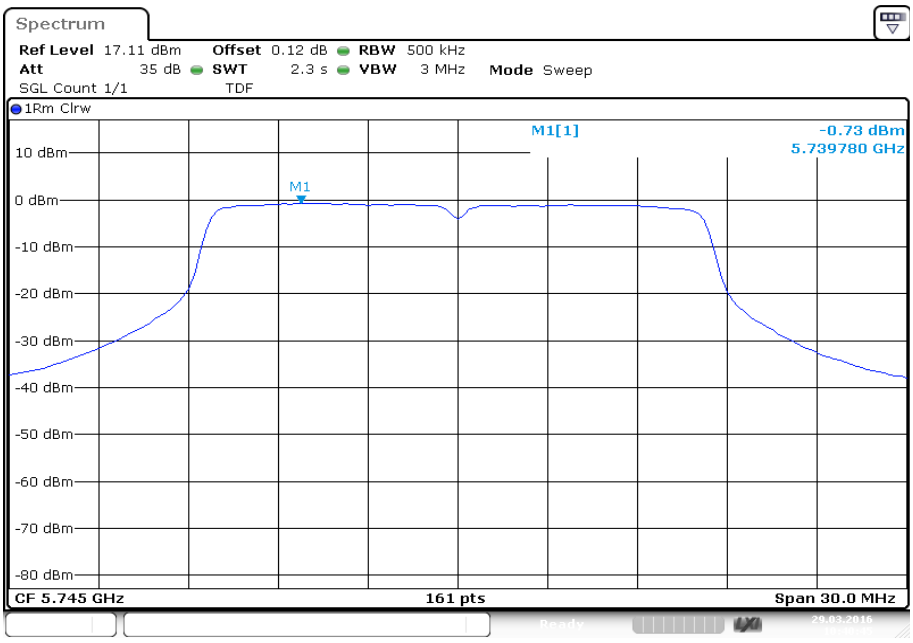
| OFDM / a – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | 2.13 | 1.93 | 8.88 | 6.94 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 9.31 | 8.85 | 9.53 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | 4.55 | -2.53 | -3.67 | 1.69 |

| OFDM / n HT20 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5180 MHz | 5200 MHz | 5300 MHz | 5320 MHz |
| Including duty cycle correction factor | 1.68 | 2.38 | 8.61 | 6.75 |
| Channel | 5500 MHz | 5600 MHz | 5700 MHz | -/- |
| Including duty cycle correction factor | 8.83 | 8.67 | 9.25 | -/- |
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| Including duty cycle correction factor | 4.22 | -6.26 | -6.28 | 1.44 |

| OFDM / n HT40 – mode | Power spectral density [dBm/MHz] | | | |
|---|---|---|---|---|
| Channel | 5190 MHz | 5230 MHz | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor | -0.60 | 2.28 | 3.31 | 1.95 |
| Channel | 5510 MHz | 5550 MHz | 5630 MHz | 5670 MHz |
| Including duty cycle correction factor | -0.89 | 1.59 | 1.78 | -7.13 |
| Channel | 5755 MHz | 5795 MHz | -/- | -/- |
| Including duty cycle correction factor | -7.38 | -6.84 | -/- | -/- |

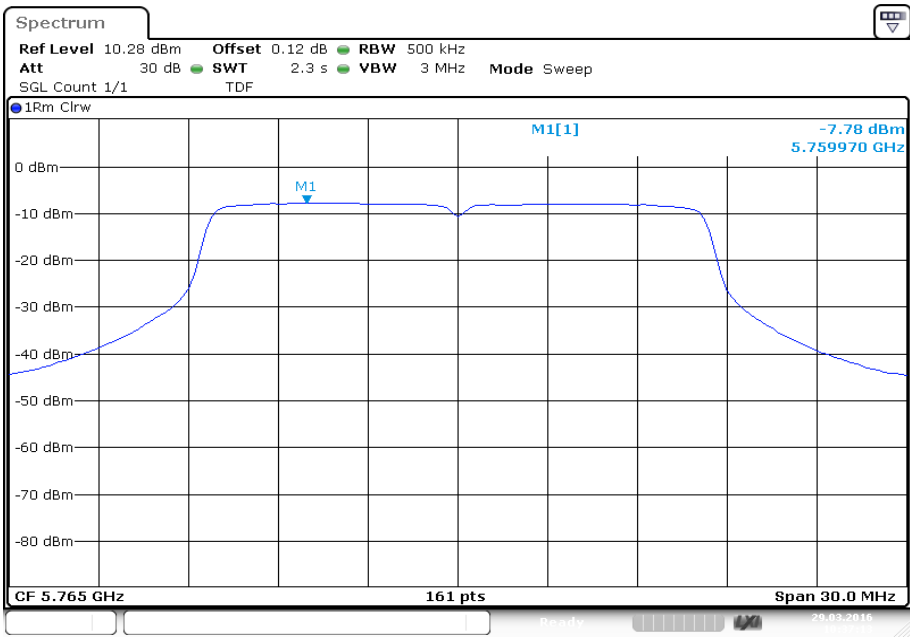
**Plots:** OFDM / a – mode, antenna port 1

**Plot 1:** 5745 MHz



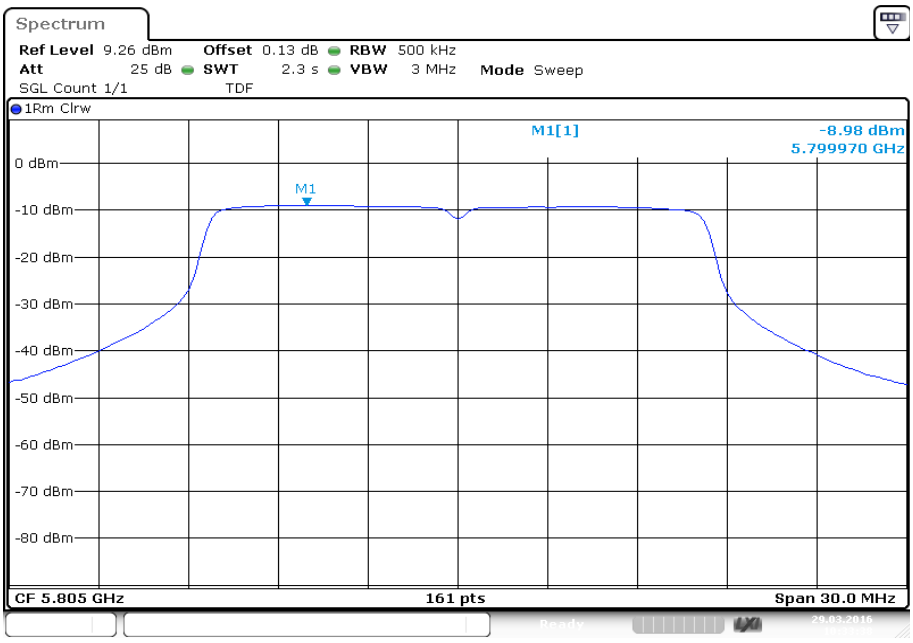

Date: 29.MAR.2016 10:40:45

**Plot 2:** 5765 MHz



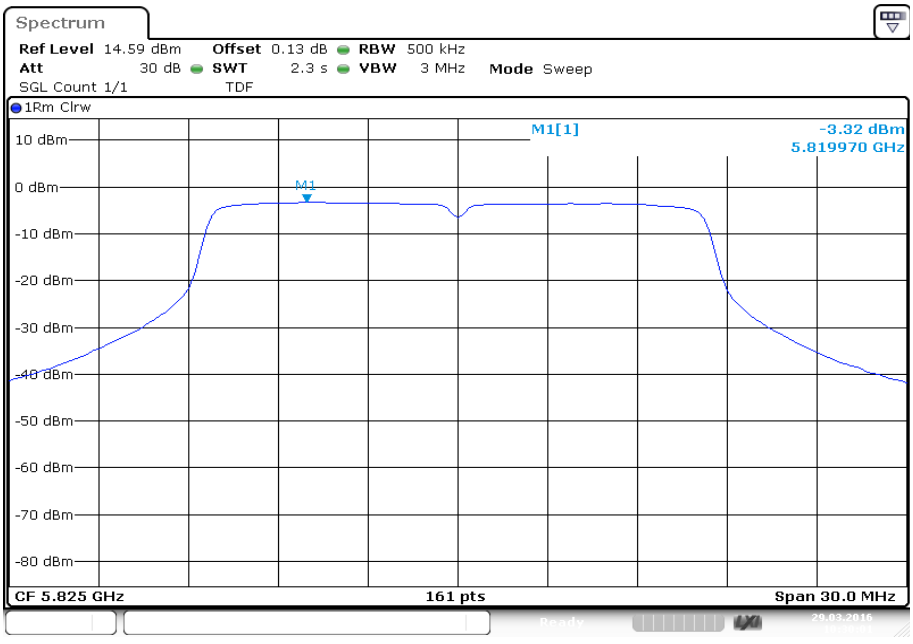

Date: 29.MAR.2016 10:37:13

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 10:33:39

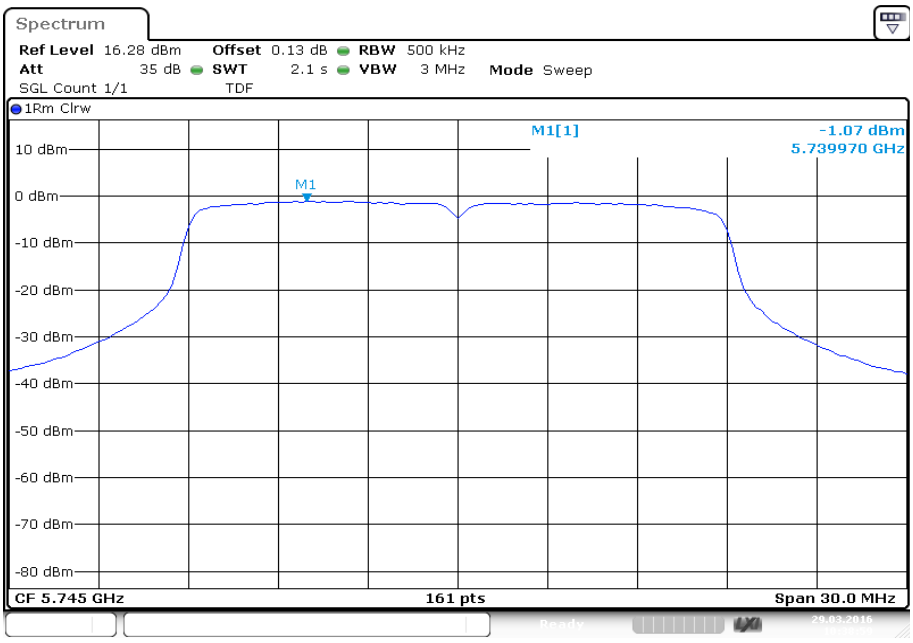
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 10:30:02

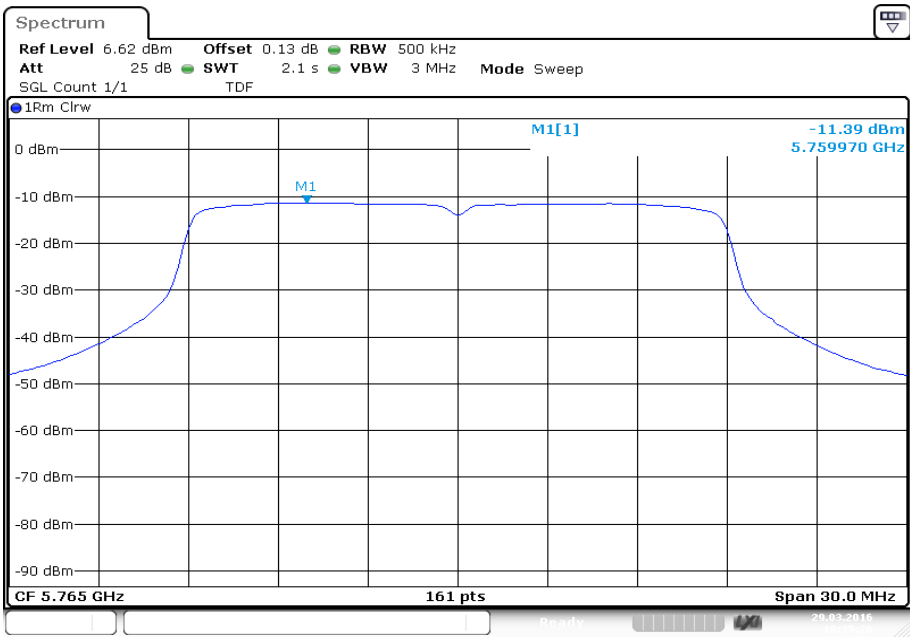
**Plots:** OFDM / n – mode, antenna port 1

**Plot 1:** 5745 MHz



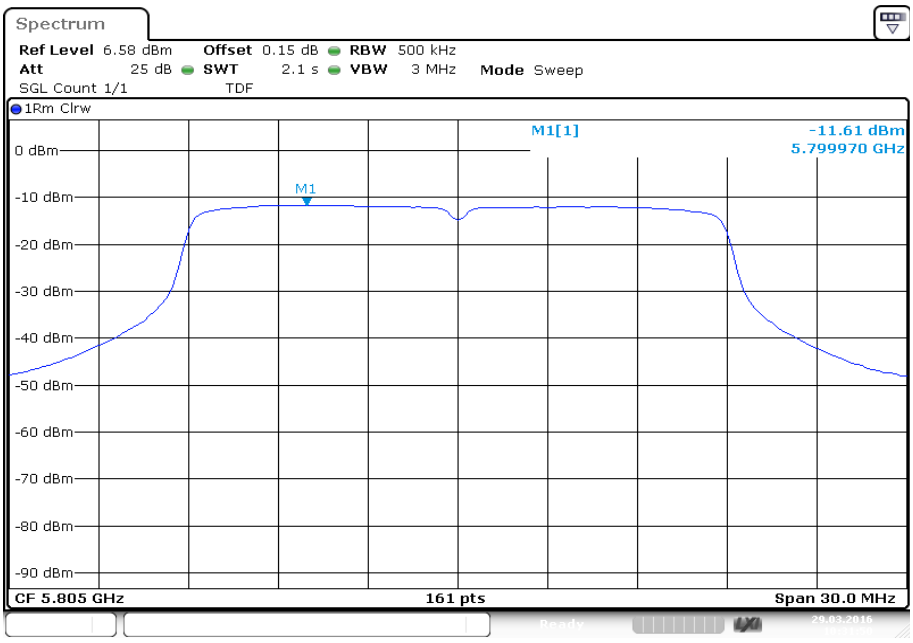

Date: 29.MAR.2016 10:39:00

**Plot 2:** 5765 MHz



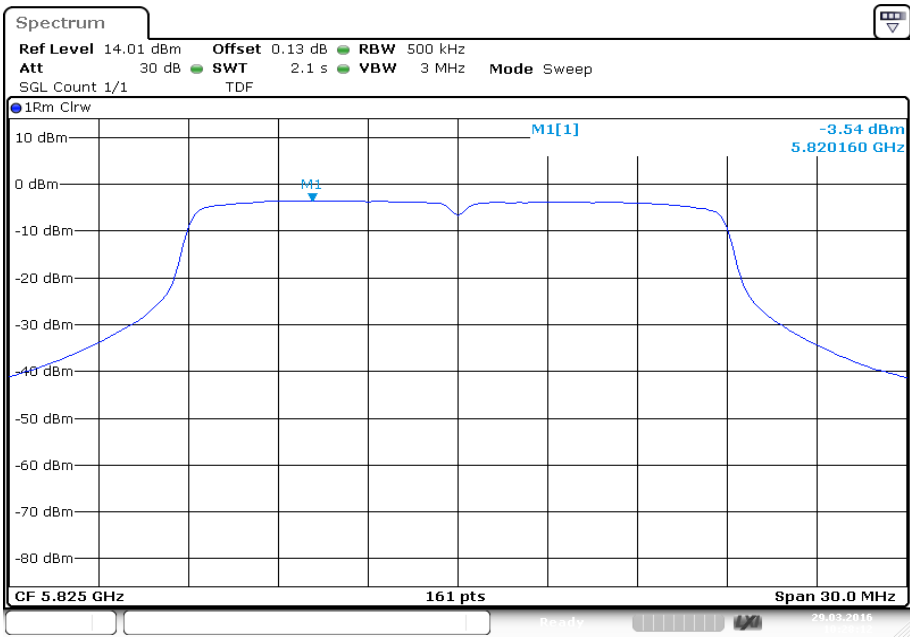

Date: 29.MAR.2016 10:35:27

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 10:31:50

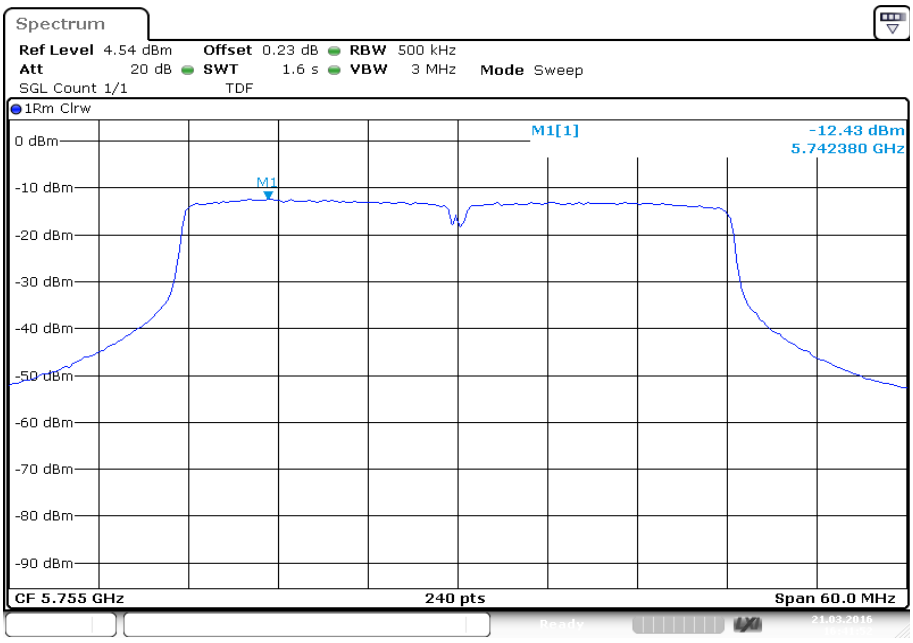
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 10:28:13

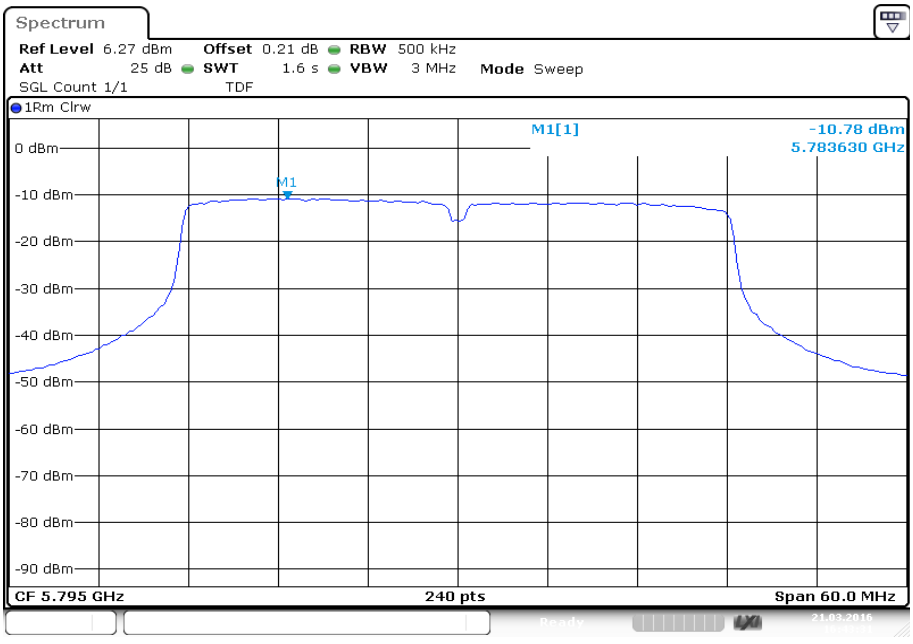
**Plots:** OFDM / n40 – mode, antenna port 1

**Plot 1:** 5755 MHz




Date: 21.MAR.2016 16:41:52

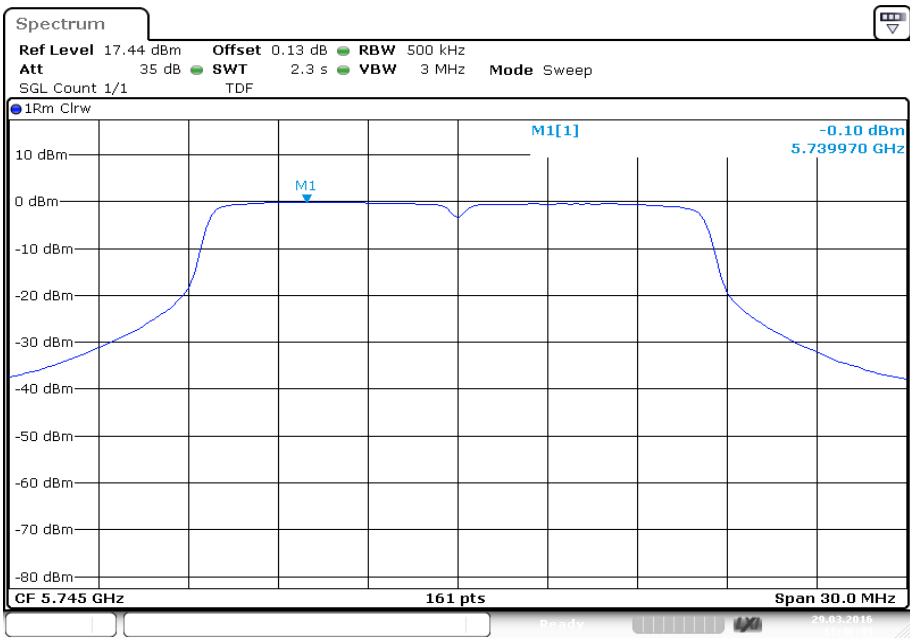
**Plot 2:** 5795 MHz




Date: 21.MAR.2016 16:43:31

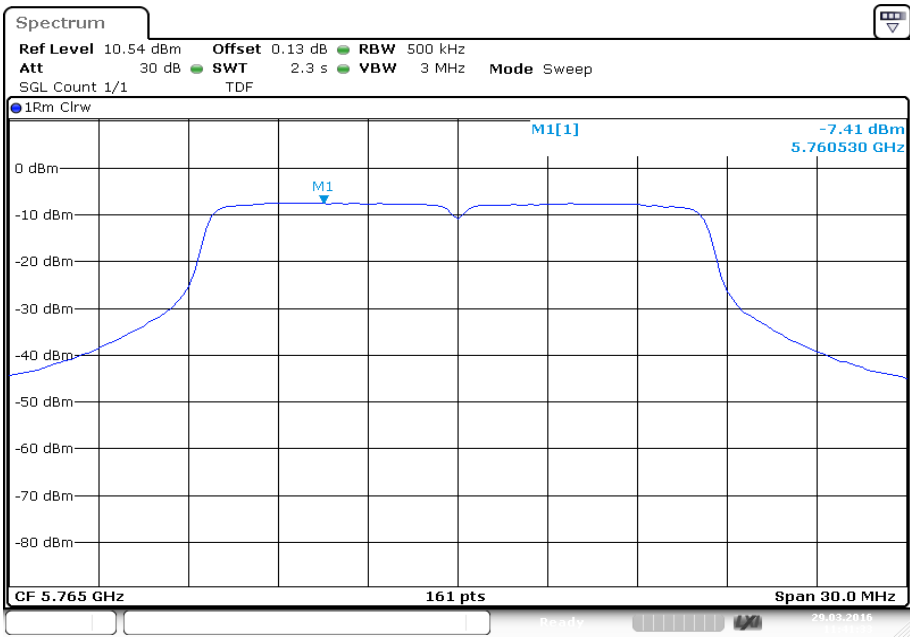
**Plots:** OFDM / a – mode, antenna port 2

**Plot 1:** 5745 MHz



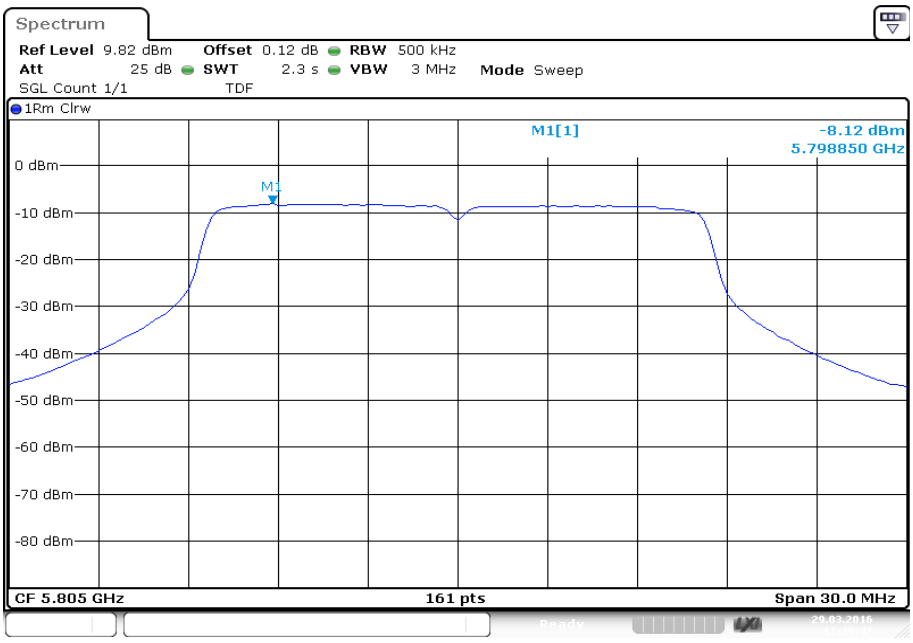

Date: 29.MAR.2016 11:46:50

**Plot 2:** 5765 MHz



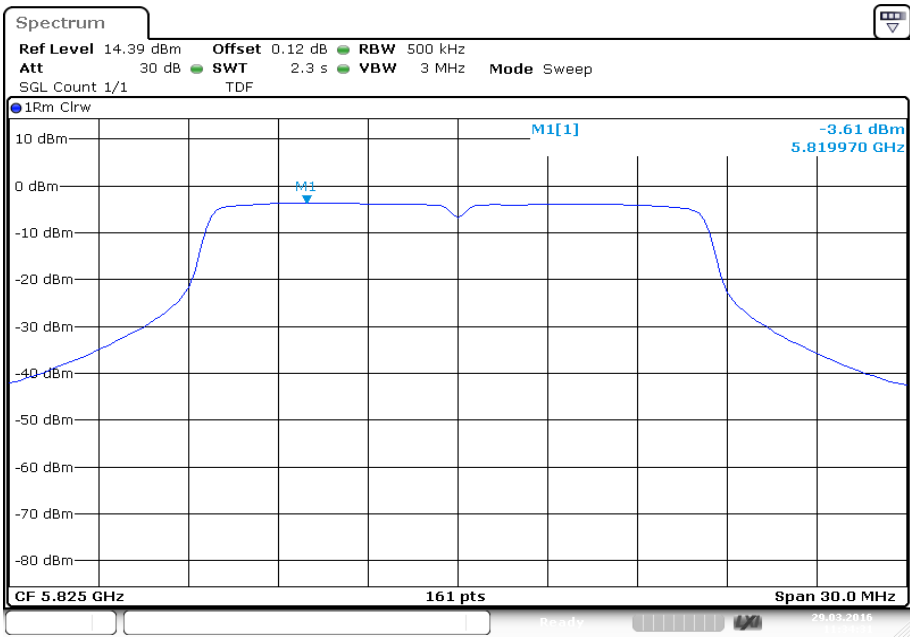

Date: 29.MAR.2016 11:41:34

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 11:39:48

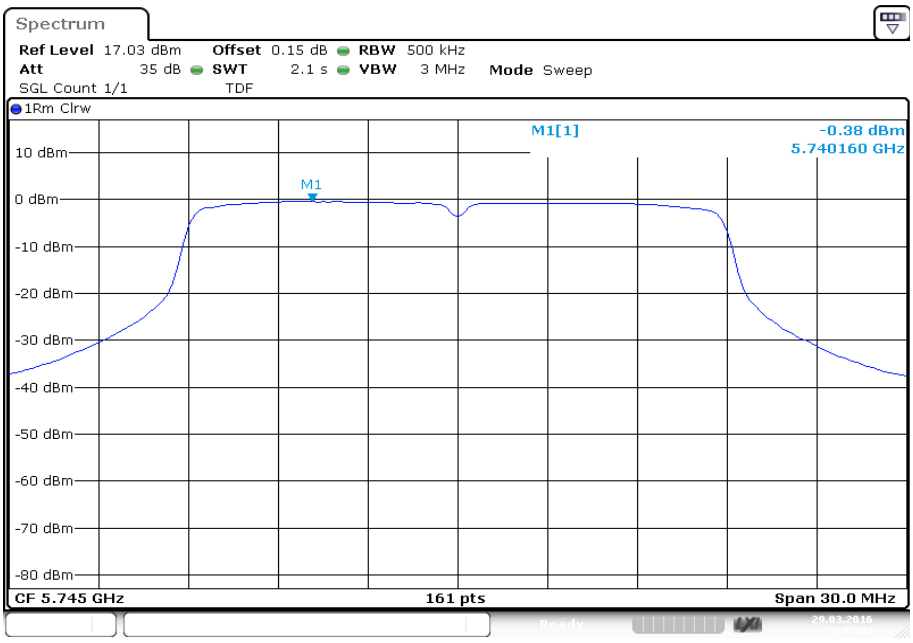
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 11:34:31

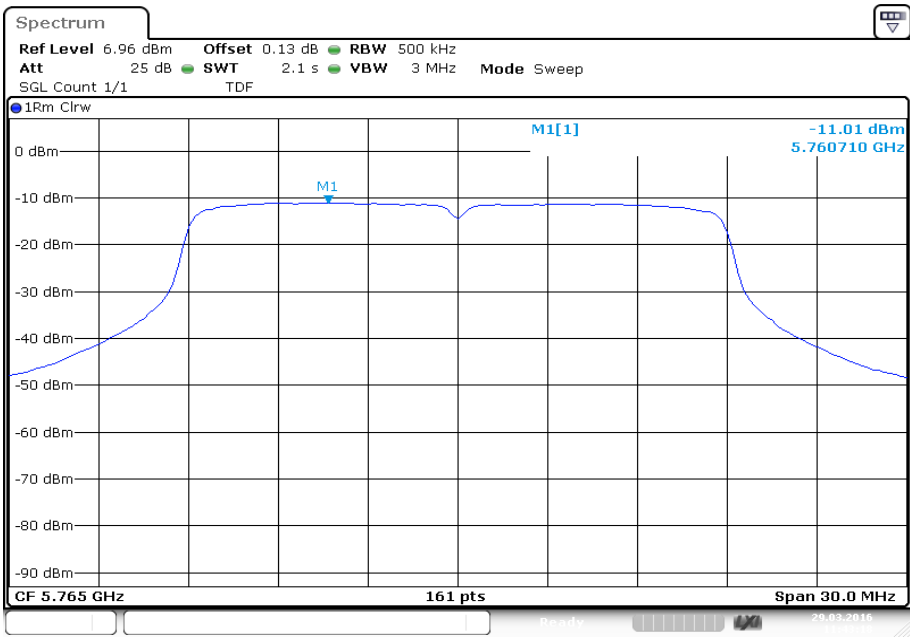
**Plots:** OFDM / n – mode, antenna port 2

**Plot 1:** 5745 MHz



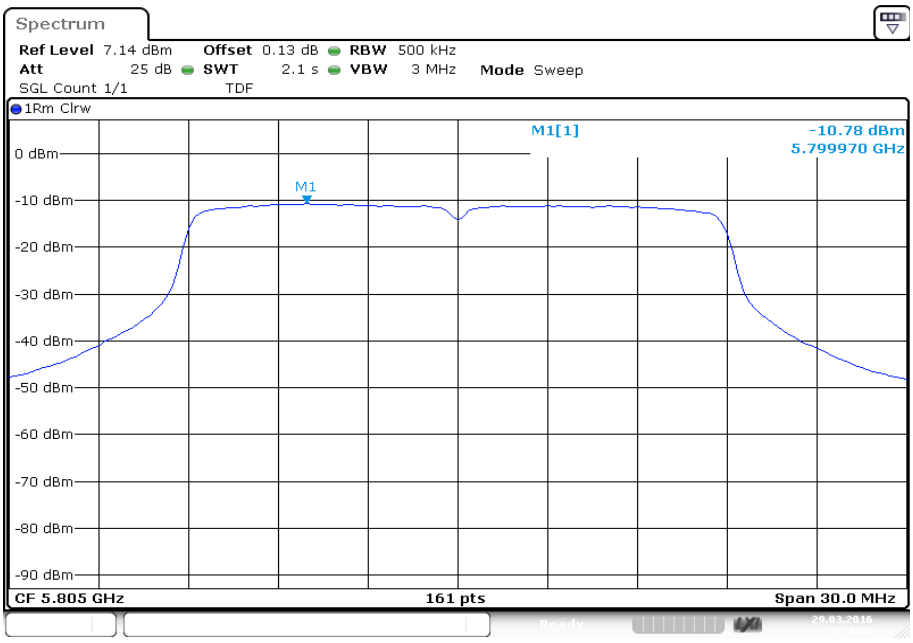

Date: 29.MAR.2016 11:45:05

**Plot 2:** 5765 MHz



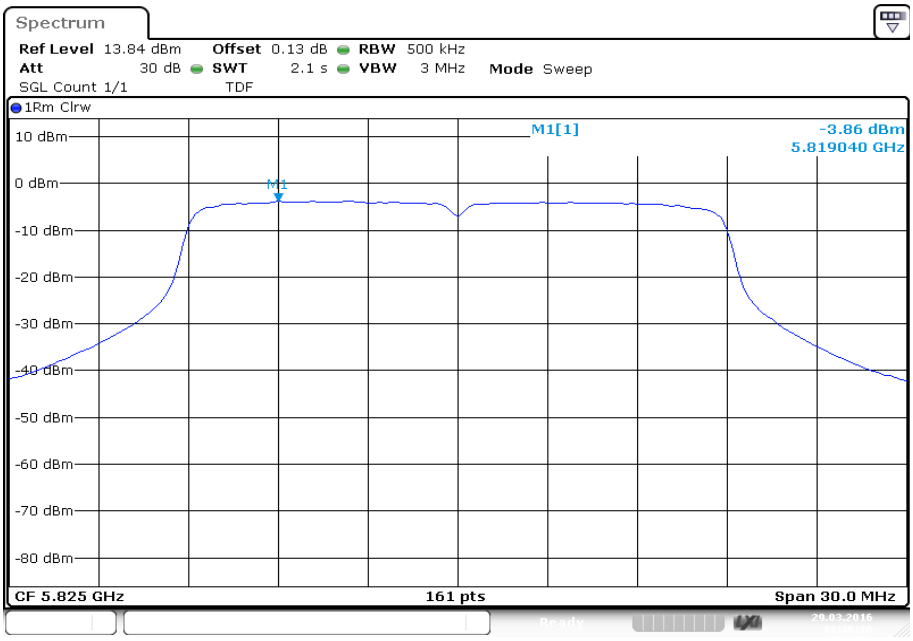

Date: 29.MAR.2016 11:43:19

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 11:38:03

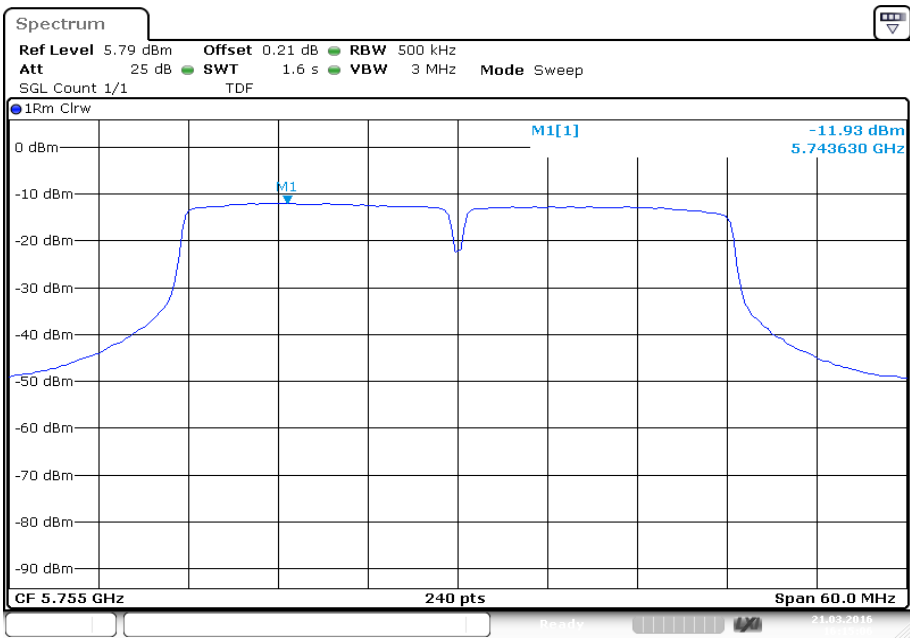
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 11:36:17

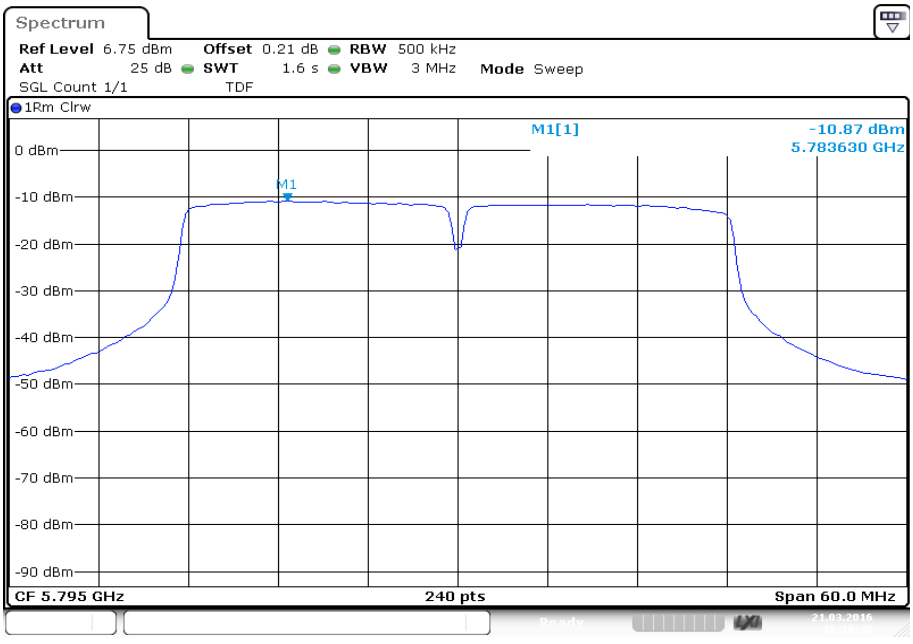
**Plots:** OFDM / n40 – mode, antenna port 2

**Plot 1:** 5755 MHz




Date: 21.MAR.2016 16:15:06

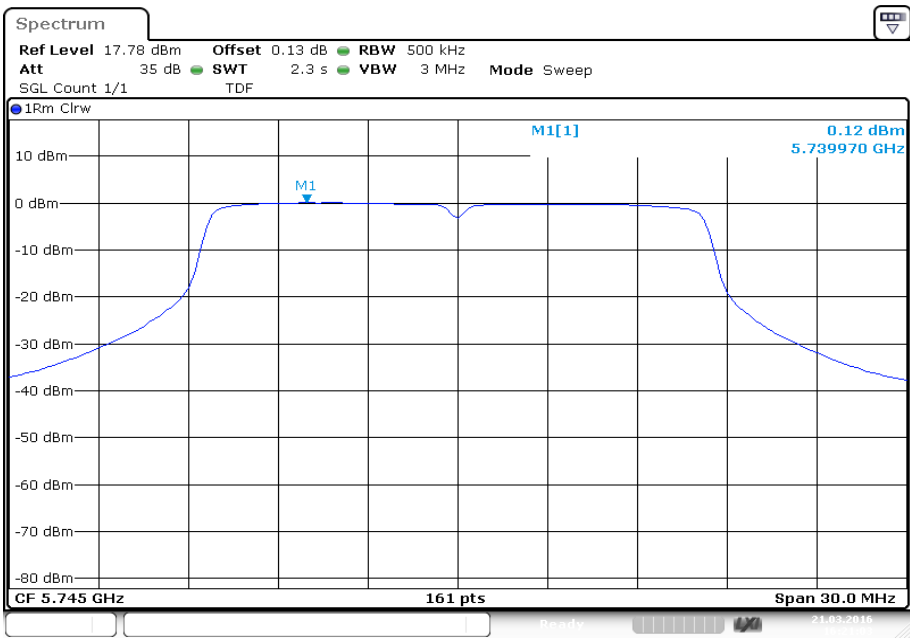
**Plot 2:** 5795 MHz




Date: 21.MAR.2016 16:16:46

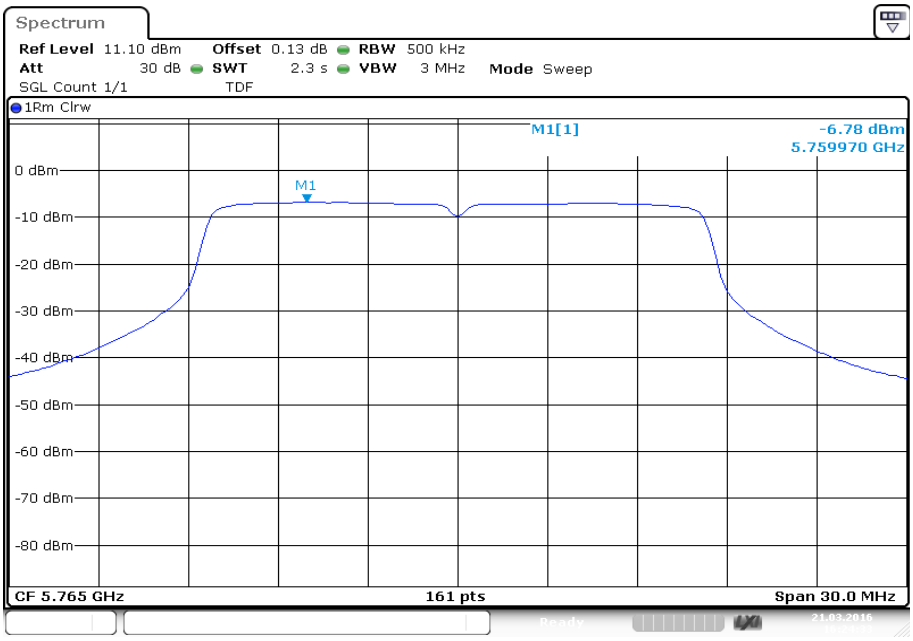
**Plots:** OFDM / a – mode, antenna port 3

**Plot 1:** 5745 MHz



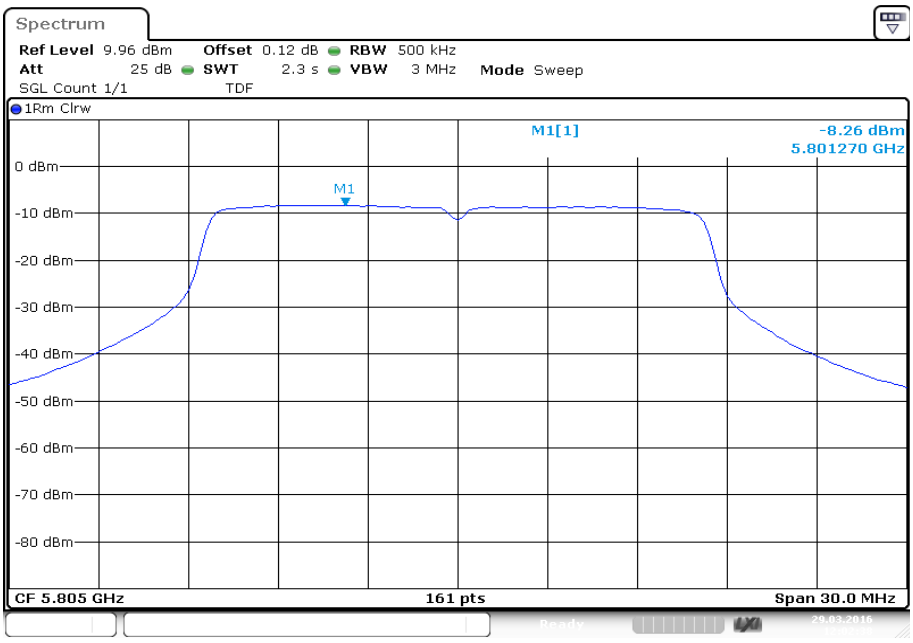

Date: 21.MAR.2016 16:21:03

**Plot 2:** 5765 MHz



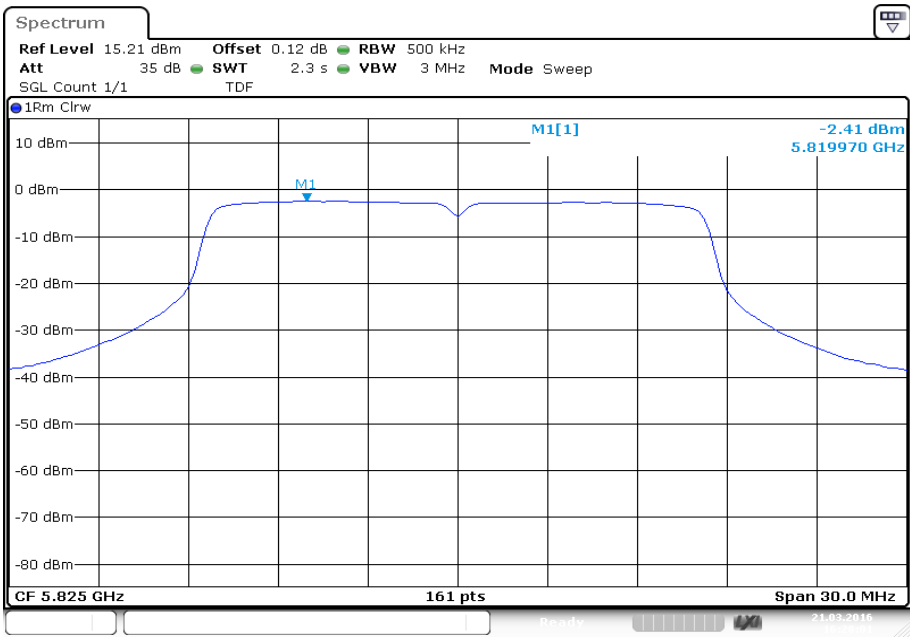

Date: 21.MAR.2016 16:24:33

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 12:02:38

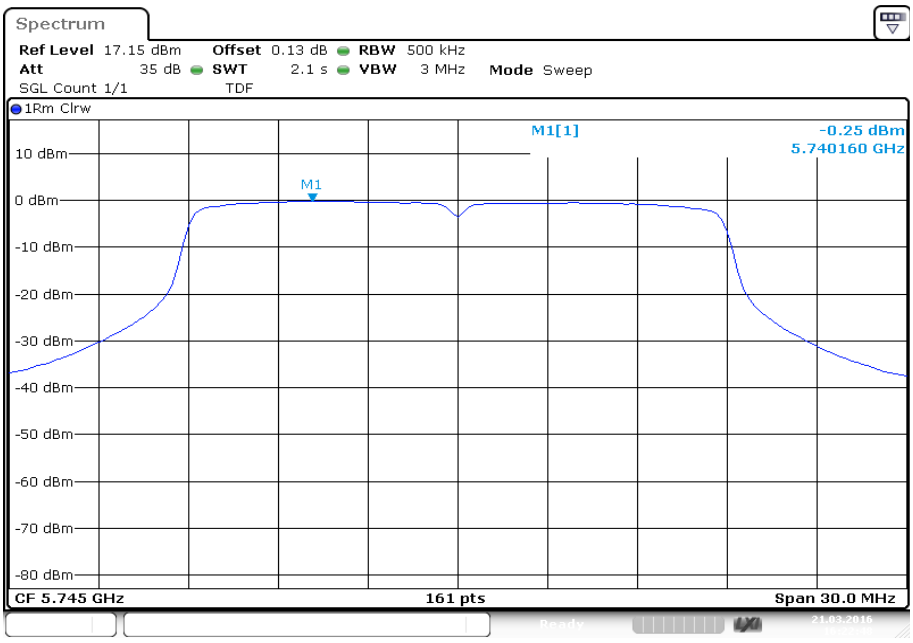
**Plot 4:** 5825 MHz




Date: 21.MAR.2016 16:28:01

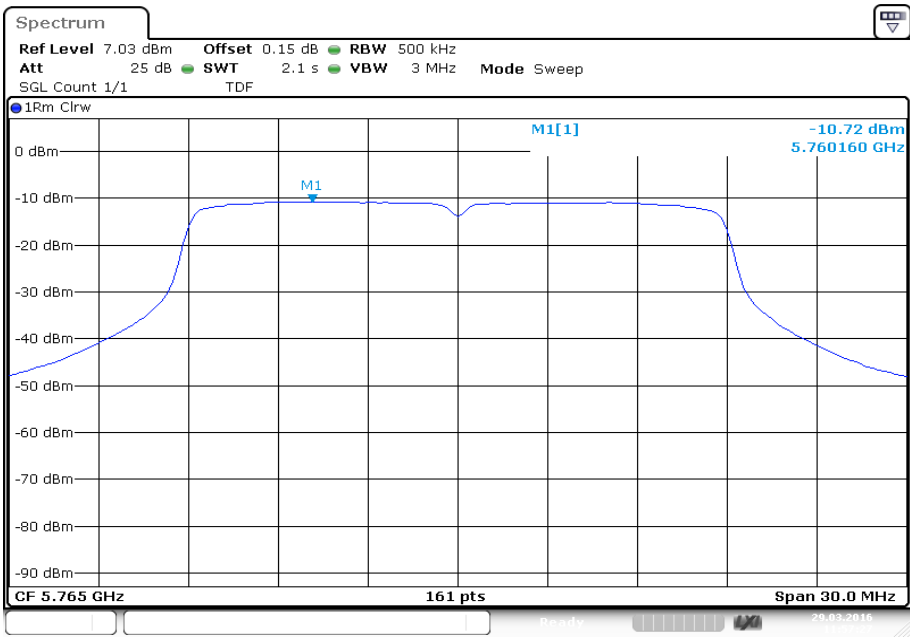
**Plots:** OFDM / n – mode, antenna port 3

**Plot 1:** 5745 MHz



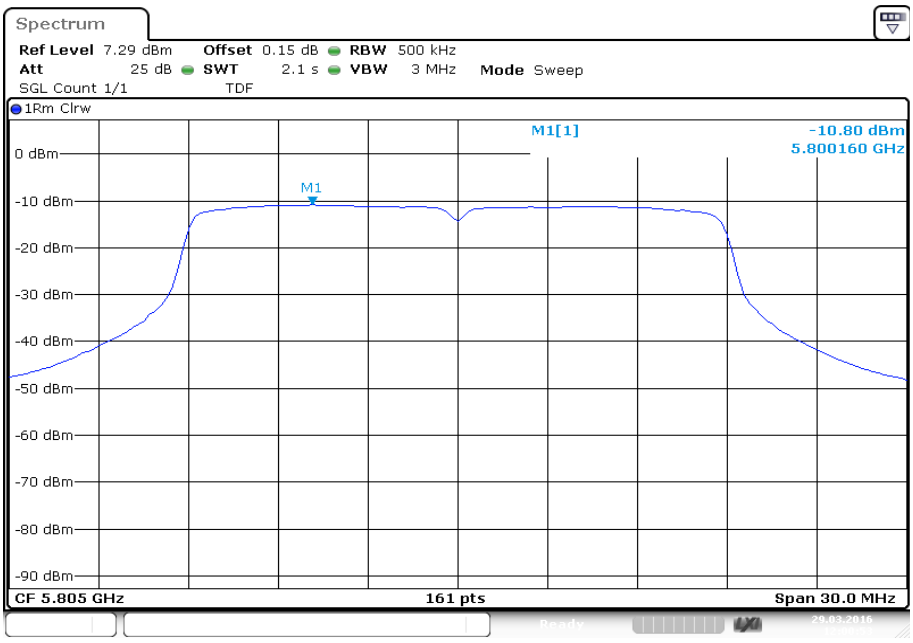

Date: 21.MAR.2016 16:22:48

**Plot 2:** 5765 MHz



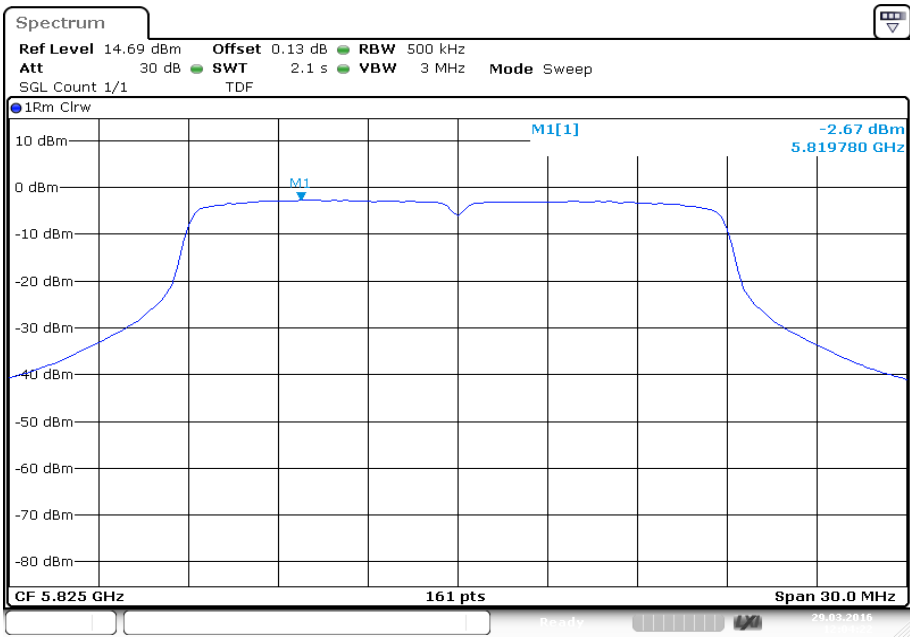

Date: 29.MAR.2016 11:57:28

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 12:00:54

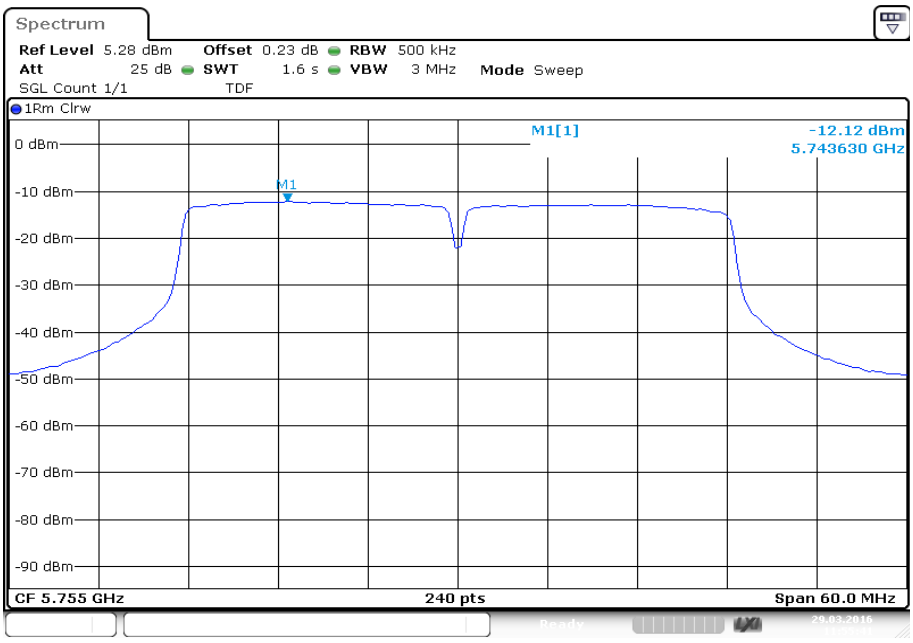
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 12:04:23

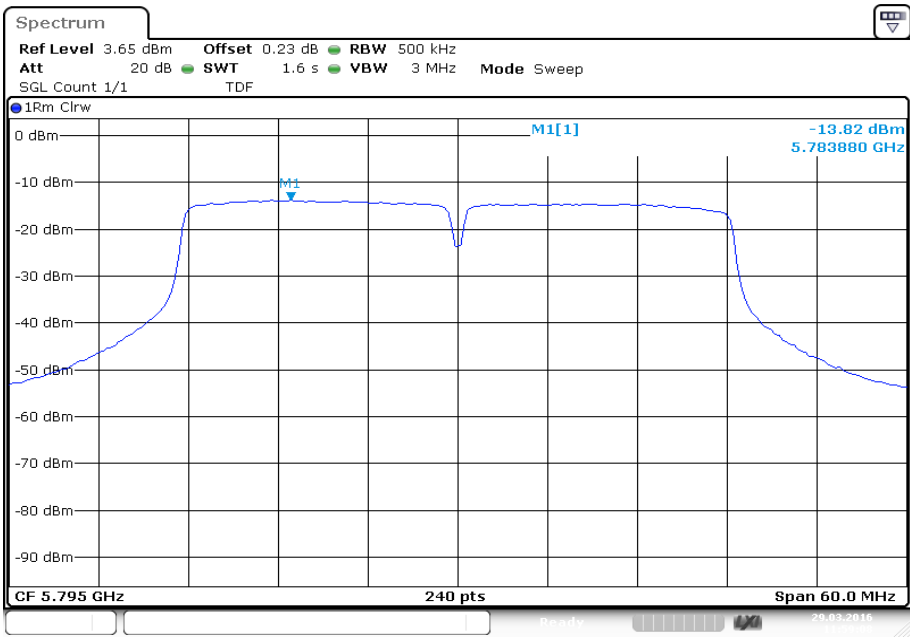
**Plots:** OFDM / n40 – mode, antenna port 3

**Plot 1:** 5755 MHz




Date: 29.MAR.2016 11:55:42

**Plot 2:** 5795 MHz




Date: 29.MAR.2016 11:59:08

## 12.6 Minimum emission bandwidth for the band 5.725-5.85 GHz

**Description:**

Measurement of the 6 dB bandwidth of the modulated signal.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to: KDB789033 D02, C.2.** | |
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 300 kHz |
| Span: | 40 MHz |
| Measurement procedure: | Using marker to find -6dBc frequencies |
| Trace-Mode: | Max hold (allow trace to stabilize) |
| Used test setup: | see chapter 7.5 |
| Measurement uncertainty: | see chapter 8 |

**Limits:**

| FCC | IC |
|---|---|
| Minimum Emission Bandwidth for the band 5.725-5.85 GHz | |
| The minimum 6 dB bandwidth shall be at least 500 kHz. | |

**Result:** antenna port 1

| OFDM / a – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 16.39 | 16.36 | 16.39 | 16.36 |

| OFDM / n HT20 – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 17.62 | 17.62 | 17.56 | 17.38 |

| OFDM / n HT40 – mode | 6 dB bandwidth [MHz] | |
|---|---|---|
| Channel | 5755 MHz | 5795 MHz |
| | 36.14 | 35.84 |

**Result:** antenna port 2

| OFDM / a – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 16.39 | 16.36 | 16.33 | 16.36 |

| OFDM / n HT20 – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 17.32 | 17.59 | 17.59 | 17.05 |

| OFDM / n HT40 – mode | 6 dB bandwidth [MHz] | |
|---|---|---|
| Channel | 5755 MHz | 5795 MHz |
| | 35.84 | 36.02 |

**Result:** antenna port 3

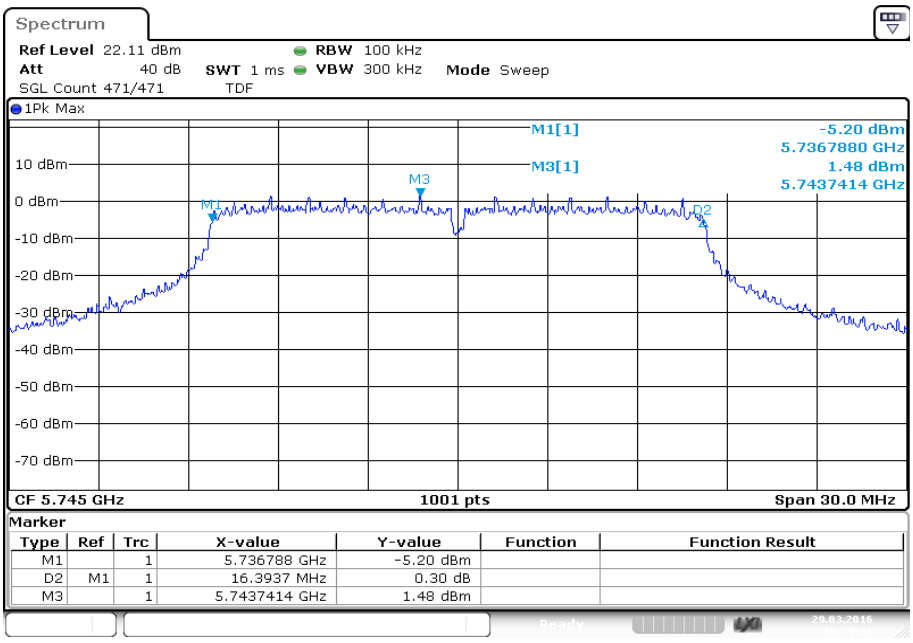
| OFDM / a – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 16.39 | 16.36 | 16.39 | 16.39 |

| OFDM / n HT20 – mode | 6 dB bandwidth [MHz] | | | |
|---|---|---|---|---|
| Channel | 5745 MHz | 5765 MHz | 5805 MHz | 5825 MHz |
| | 17.41 | 17.59 | 17.35 | 17.59 |

| OFDM / n HT40 – mode | 6 dB bandwidth [MHz] | |
|---|---|---|
| Channel | 5755 MHz | 5795 MHz |
| | 36.14 | 36.02 |

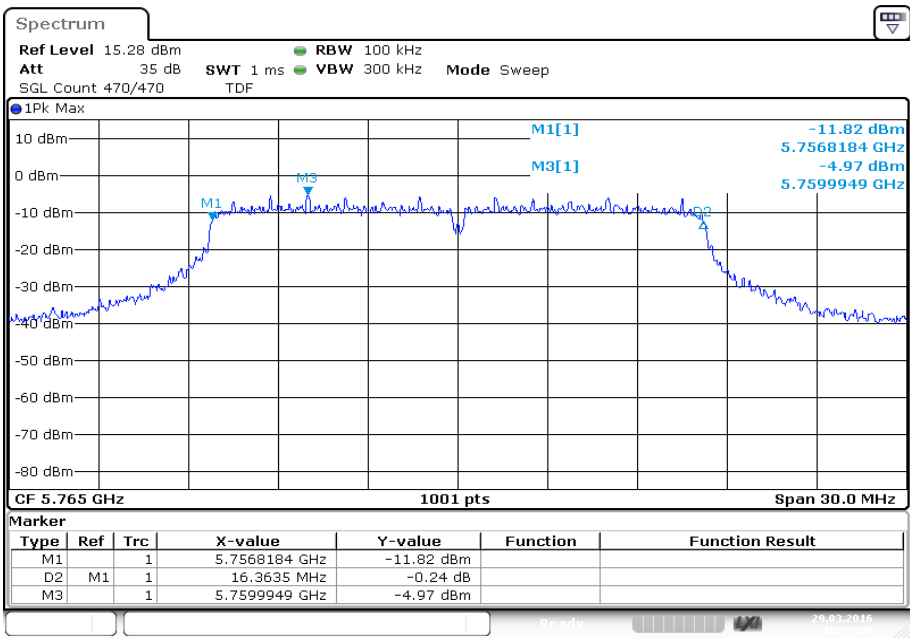
**Plots:** OFDM / a – mode; antenna port 1

**Plot 1:** 5745 MHz



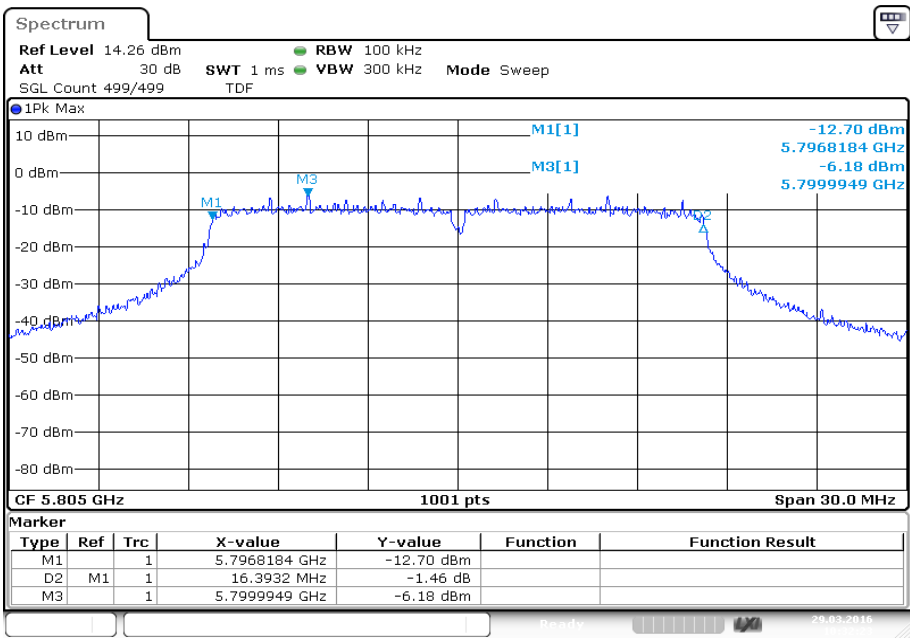

Date: 29.MAR.2016 10:39:32

**Plot 2:** 5765 MHz



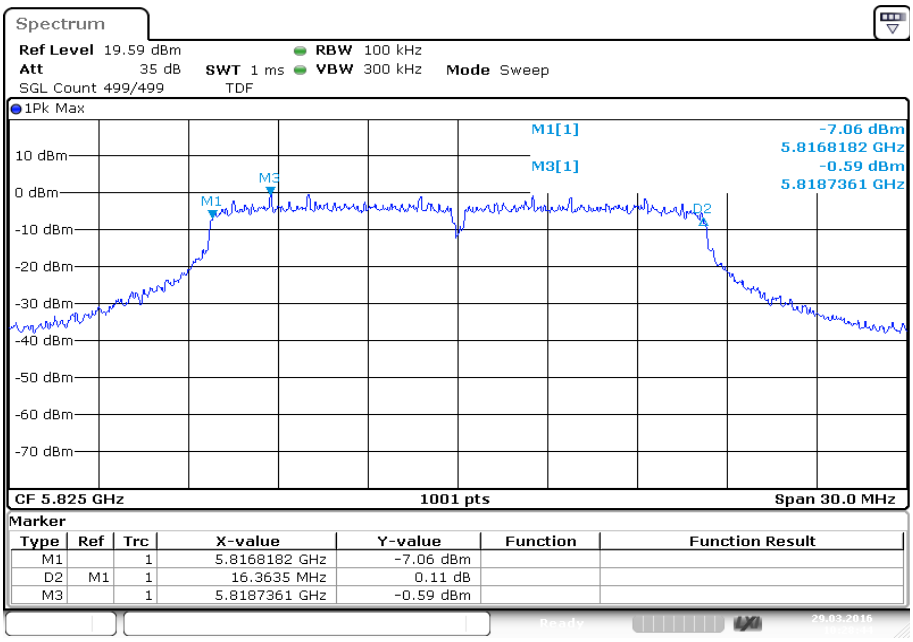

Date: 29.MAR.2016 10:35:59

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 10:32:24

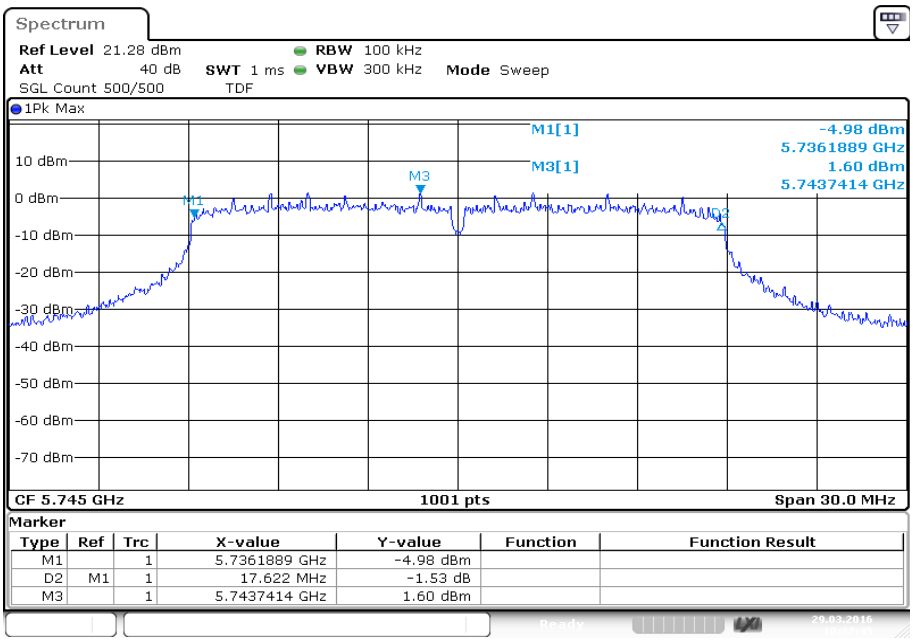
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 10:28:45

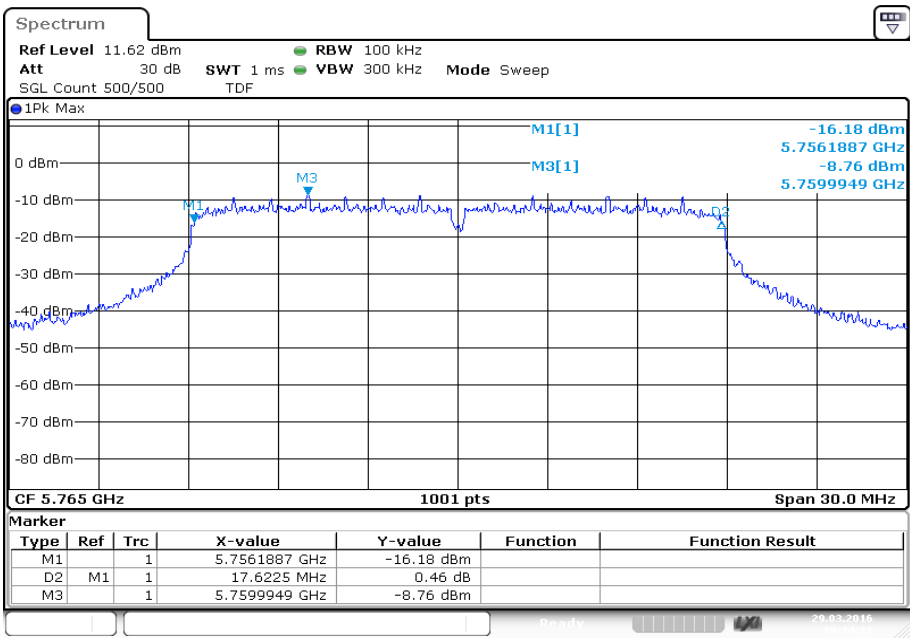
**Plots:** OFDM / n HT20 – mode; antenna port 1

**Plot 1:** 5745 MHz



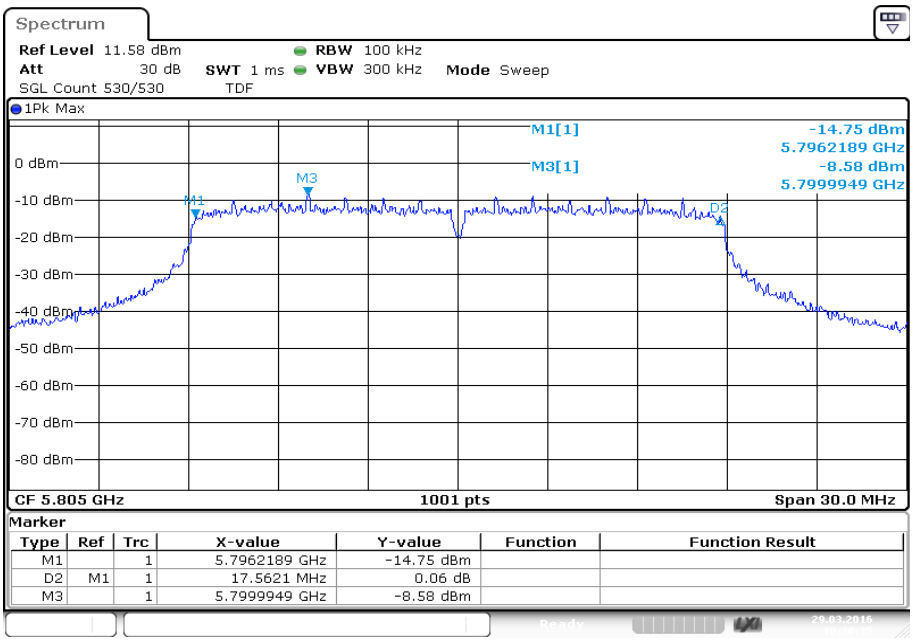

Date: 29.MAR.2016 10:37:46

**Plot 2:** 5765 MHz



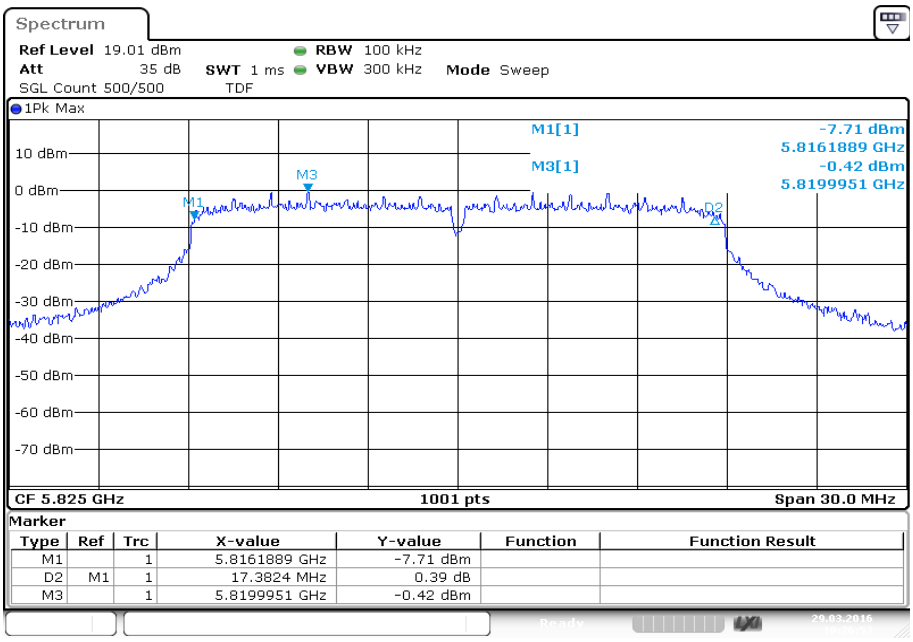

Date: 29.MAR.2016 10:34:12

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 10:30:36

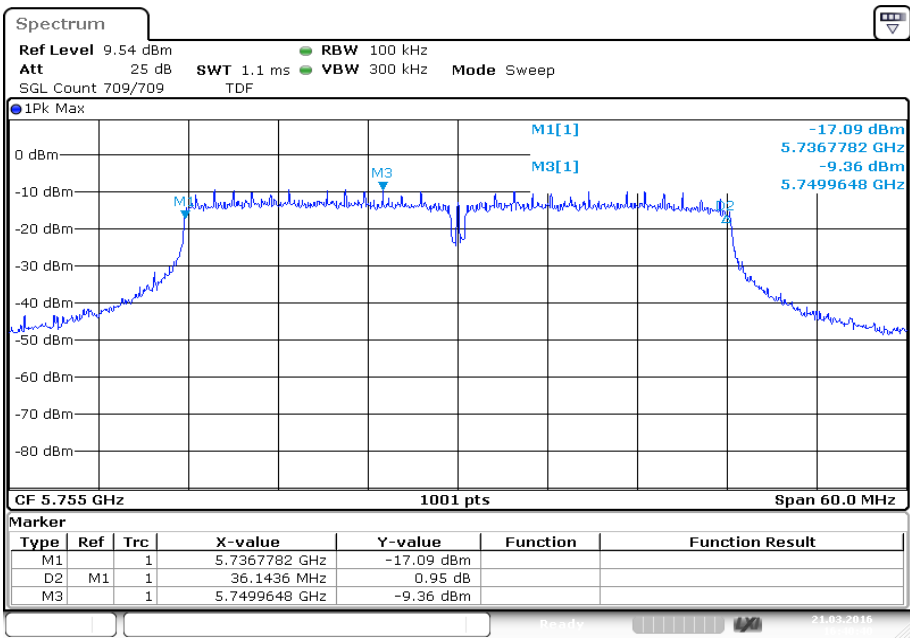
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 10:26:54

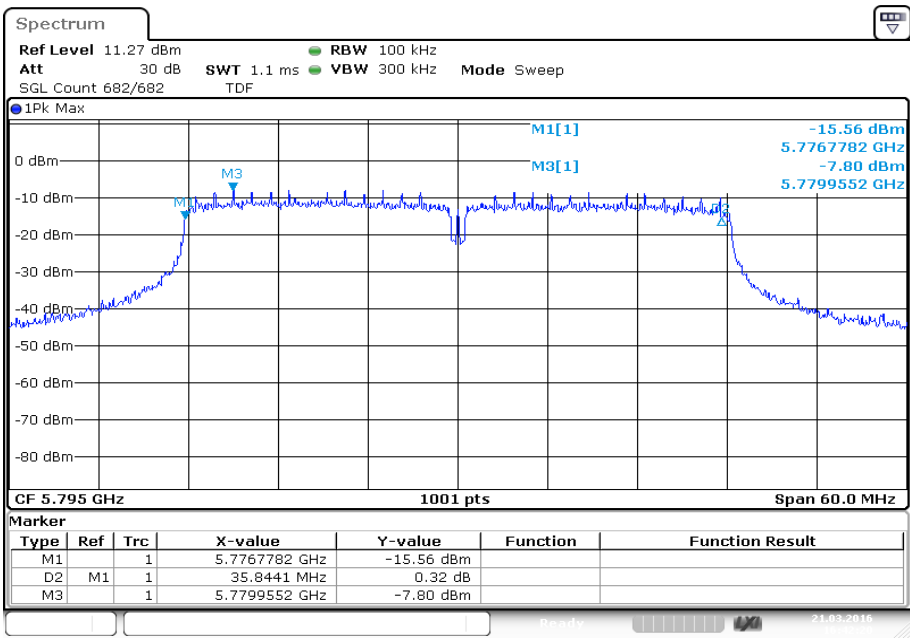
**Plots:** OFDM / n HT40 – mode; antenna port 1

**Plot 1:** 5755 MHz




Date: 21.MAR.2016 16:40:40

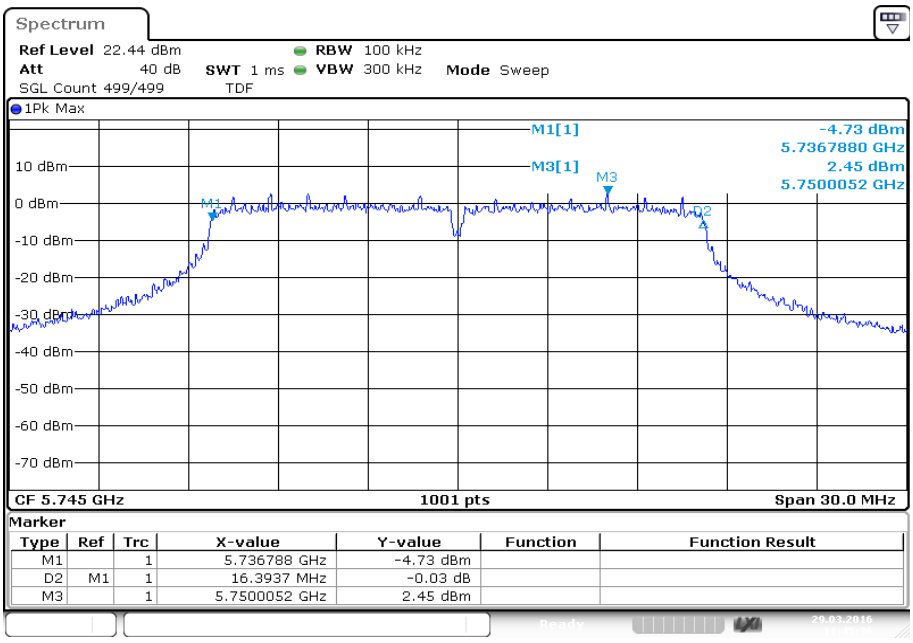
**Plot 2:** 5795 MHz




Date: 21.MAR.2016 16:42:20

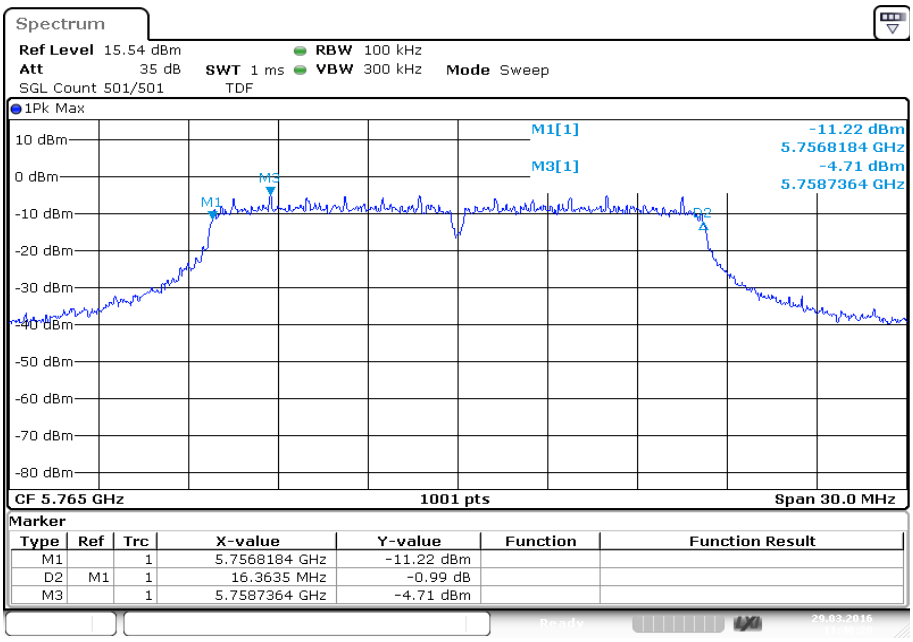
**Plots:** OFDM / a – mode; antenna port 2

**Plot 1:** 5745 MHz



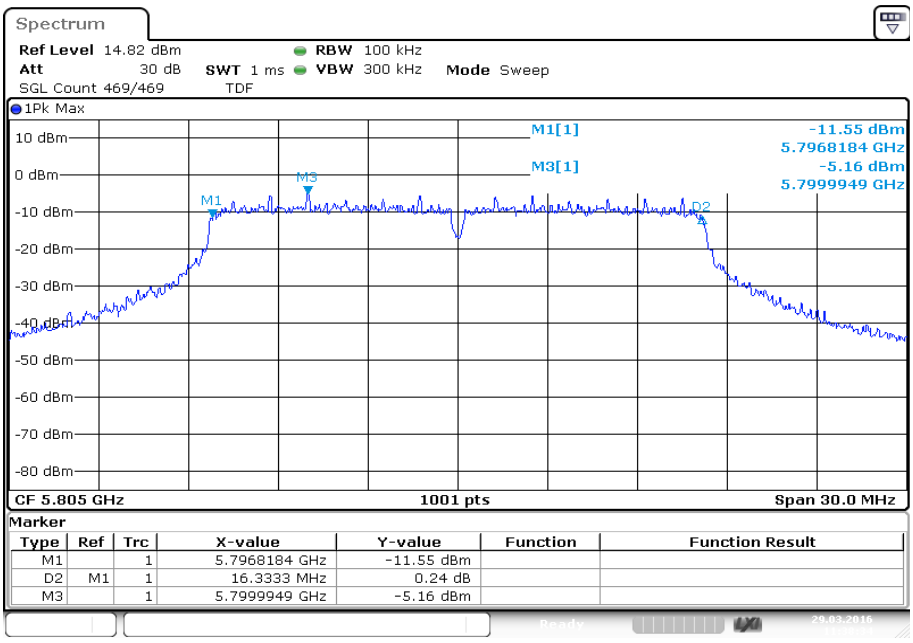

Date: 29.MAR.2016 11:45:37

**Plot 2:** 5765 MHz



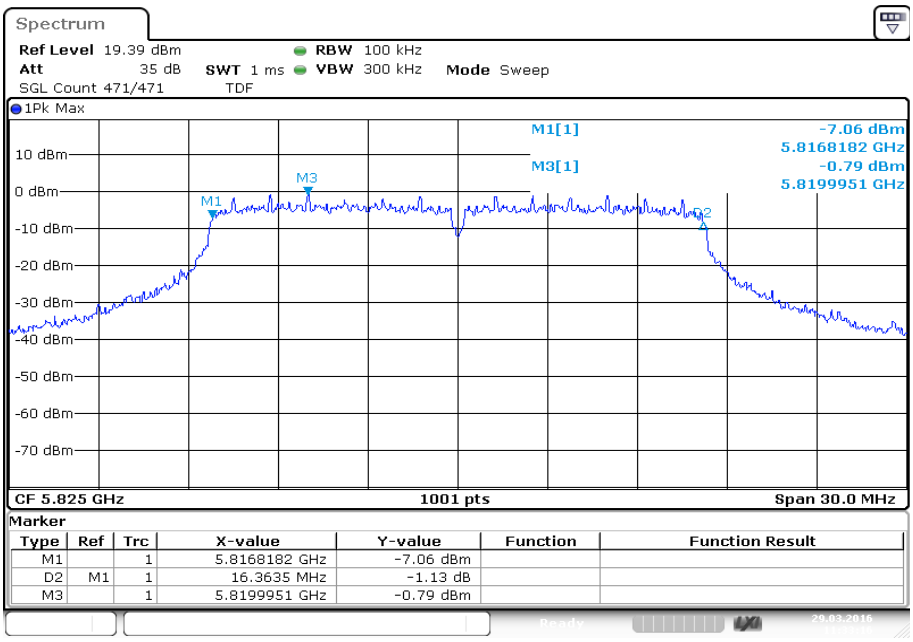

Date: 29.MAR.2016 11:40:20

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 11:38:35

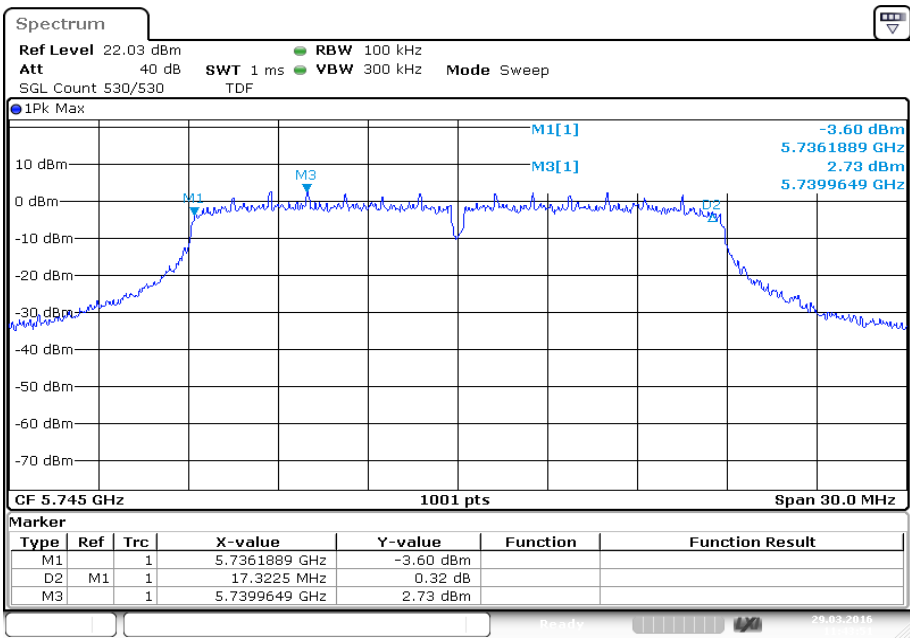
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 11:33:16

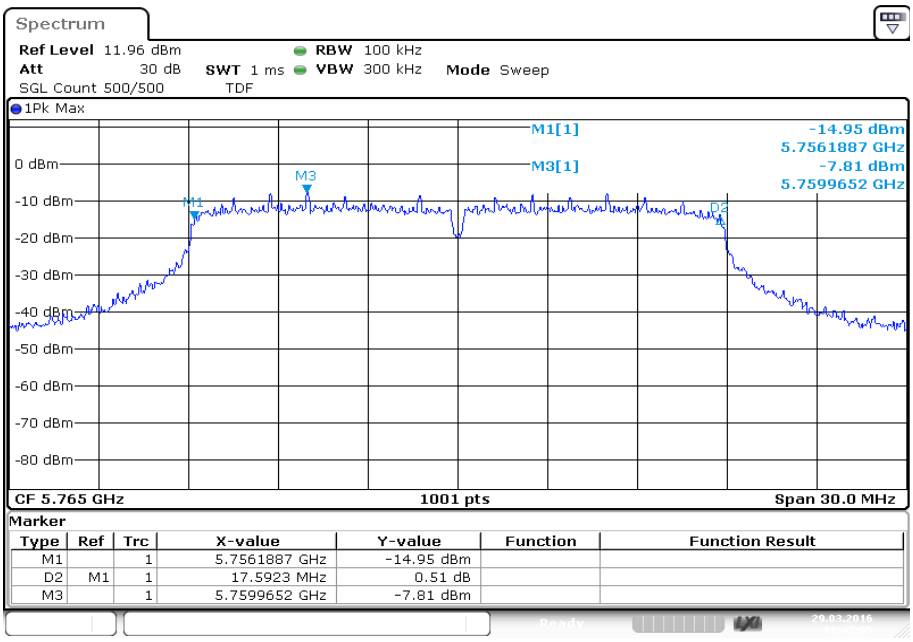
**Plots:** OFDM / n HT20 – mode; antenna port 2

**Plot 1:** 5745 MHz



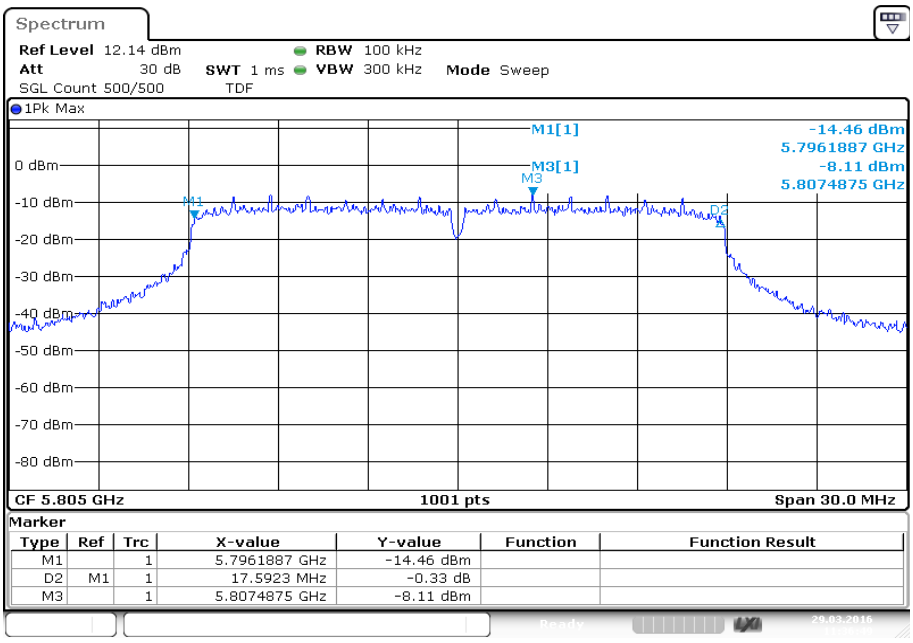

Date: 29.MAR.2016 11:43:52

**Plot 2:** 5765 MHz



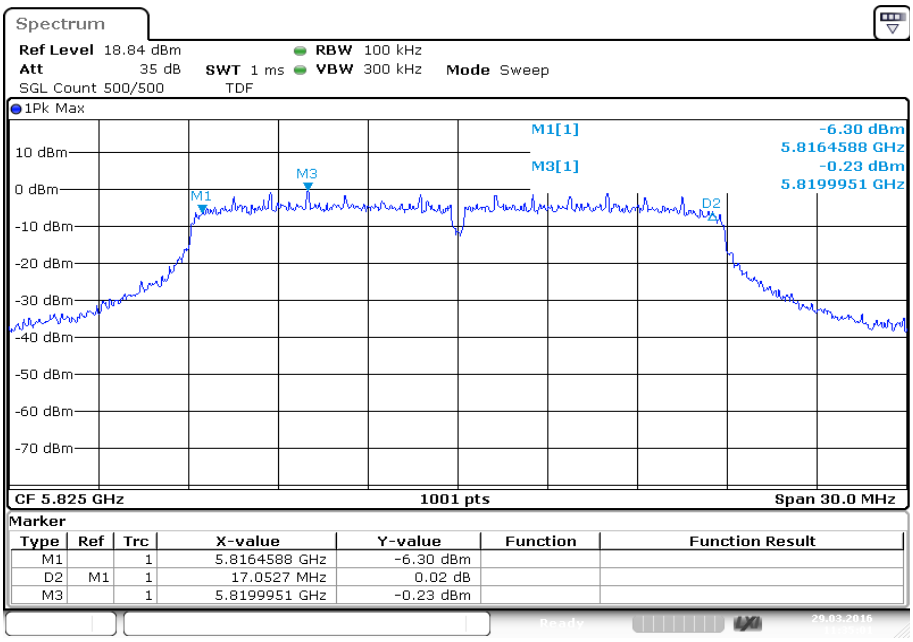

Date: 29.MAR.2016 11:42:06

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 11:36:49

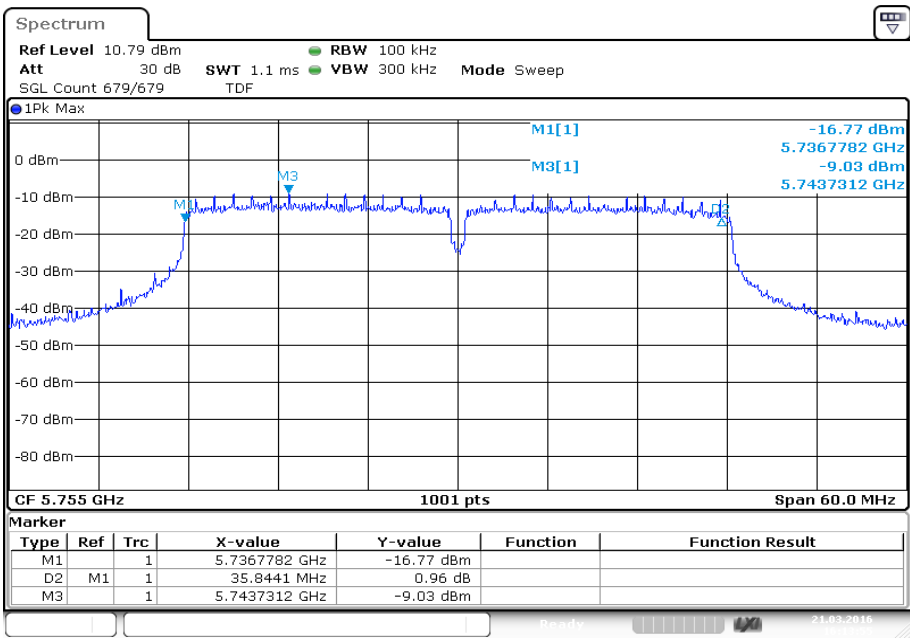
**Plot 4:** 5825 MHz




Date: 29.MAR.2016 11:35:02

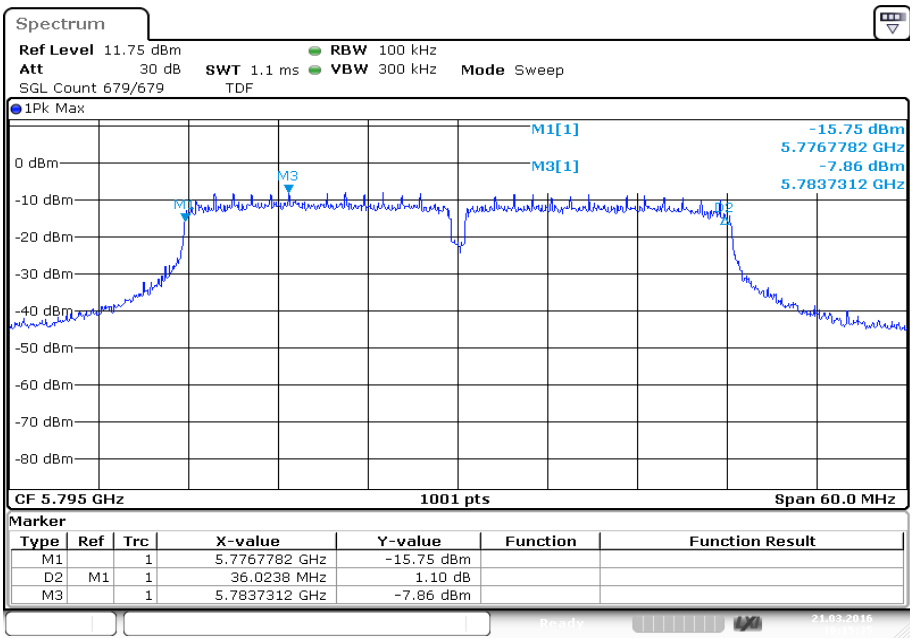
**Plots:** OFDM / n HT40 – mode; antenna port 2

**Plot 1:** 5755 MHz




Date: 21.MAR.2016 16:13:55

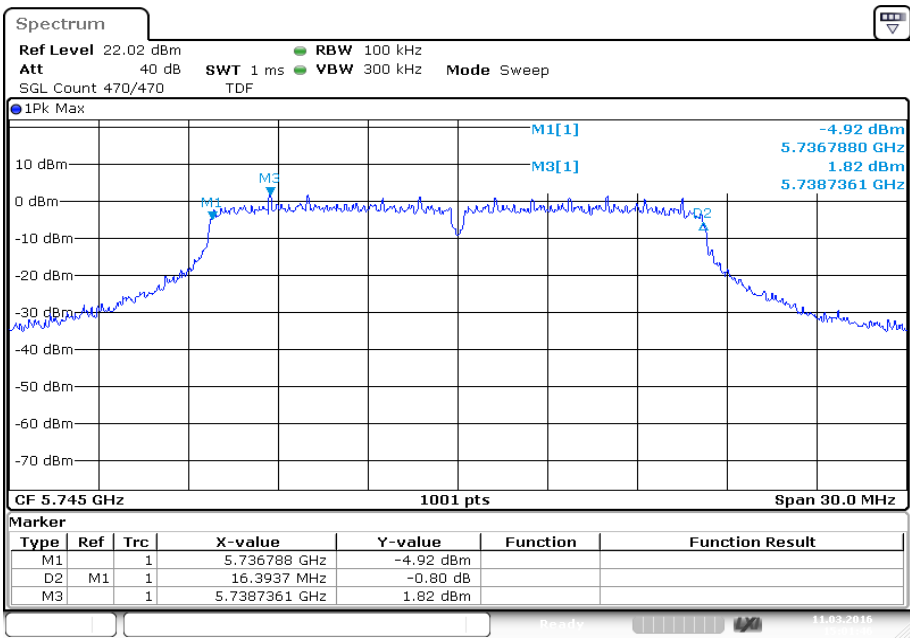
**Plot 2:** 5795 MHz




Date: 21.MAR.2016 16:15:35

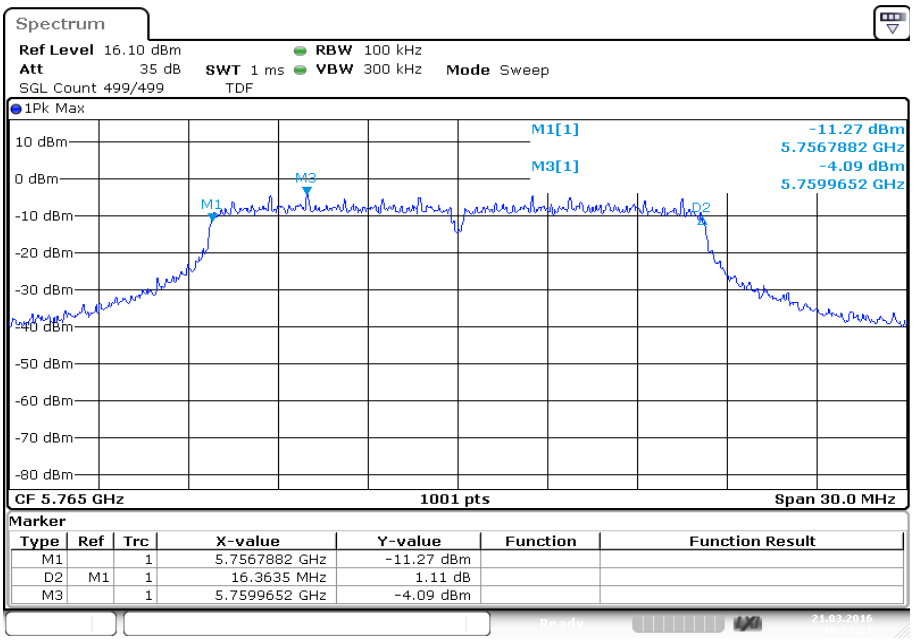
**Plots:** OFDM / a – mode; antenna port 3

**Plot 1:** 5745 MHz



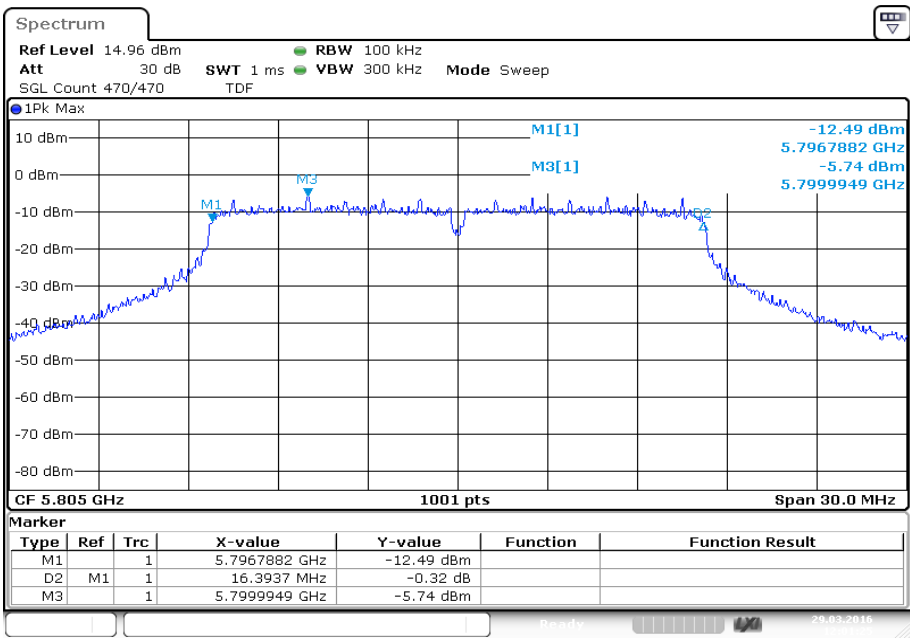

Date: 11.MAR.2016 15:01:47

**Plot 2:** 5765 MHz



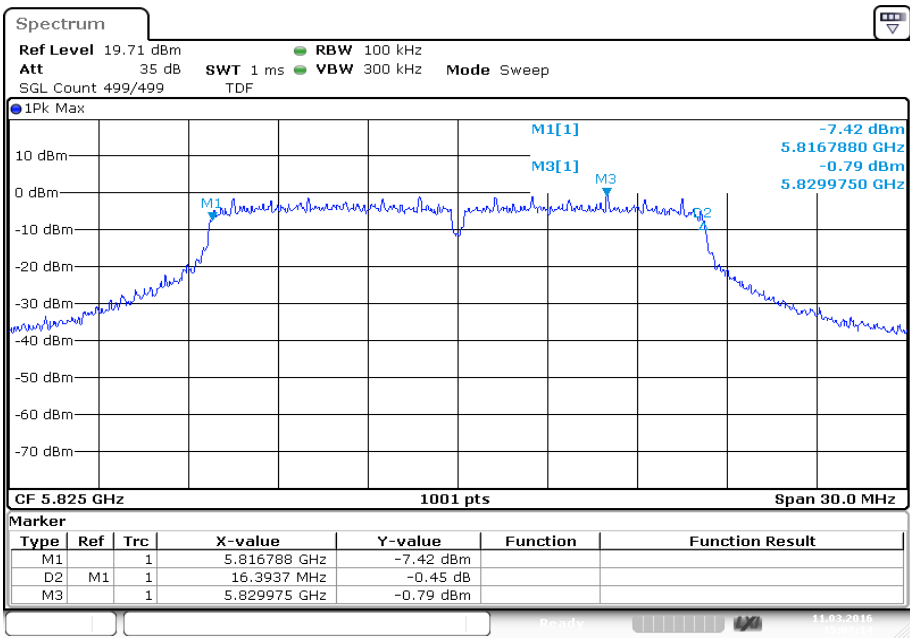

Date: 21.MAR.2016 16:23:21

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 12:01:26

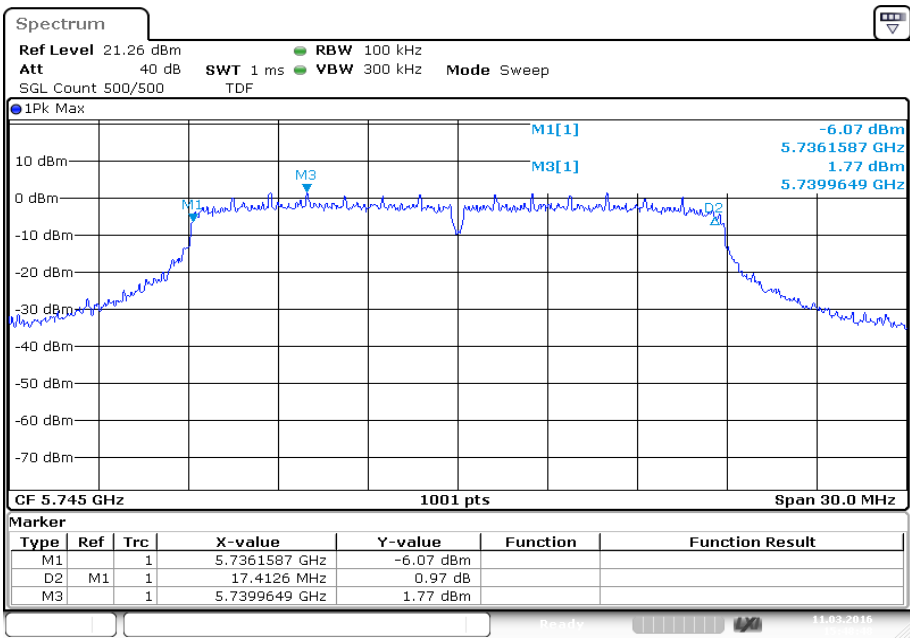
**Plot 4:** 5825 MHz




Date: 11.MAR.2016 15:07:14

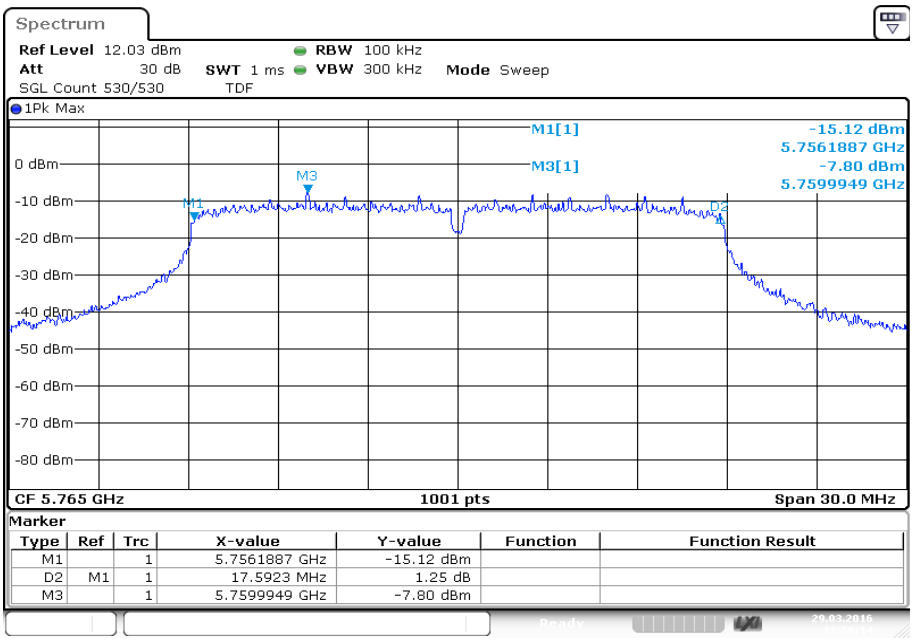
**Plots:** OFDM / n HT20 – mode; antenna port 3

**Plot 1:** 5745 MHz



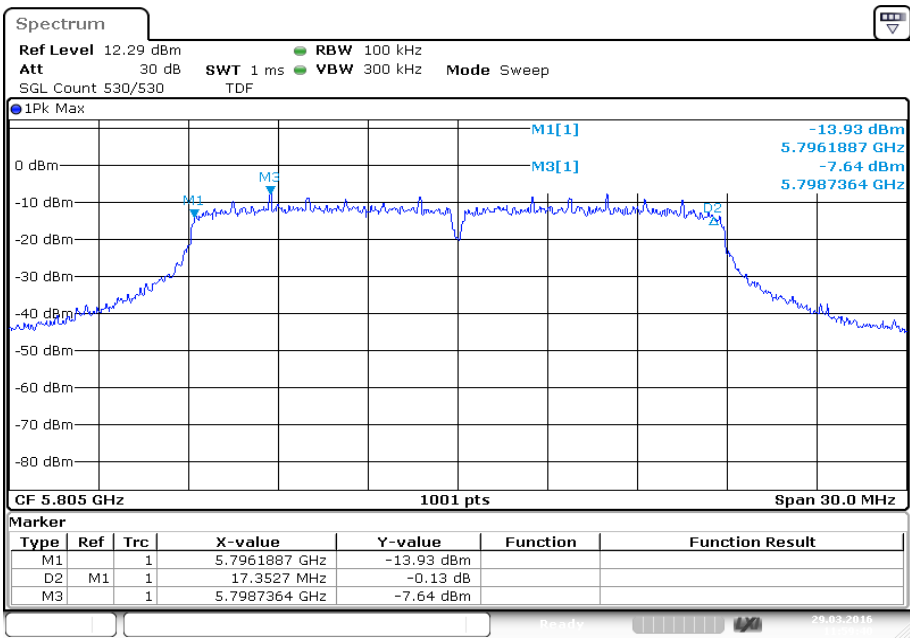

Date: 11.MAR.2016 15:48:49

**Plot 2:** 5765 MHz



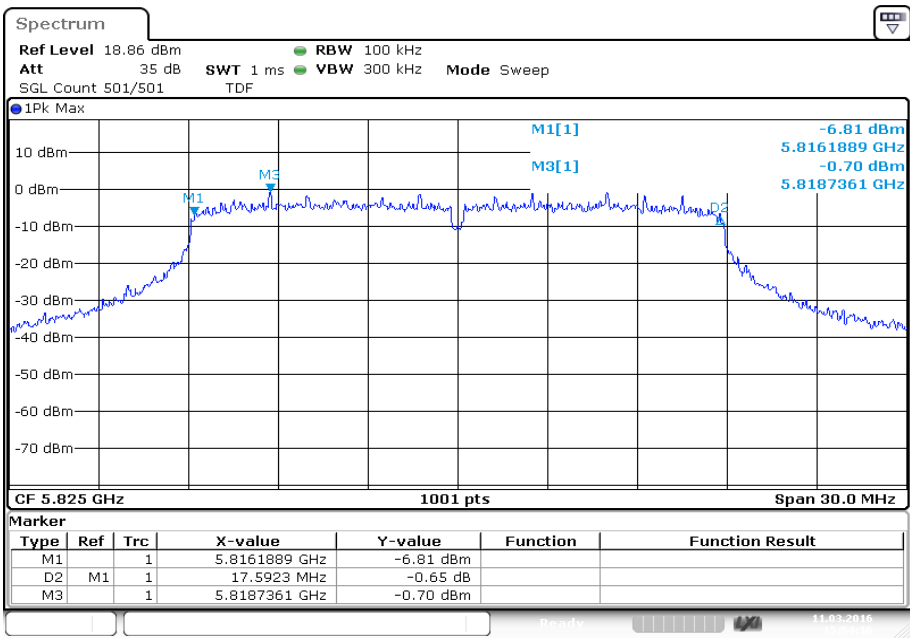

Date: 29.MAR.2016 11:56:15

**Plot 3:** 5805 MHz




Date: 29.MAR.2016 11:59:41

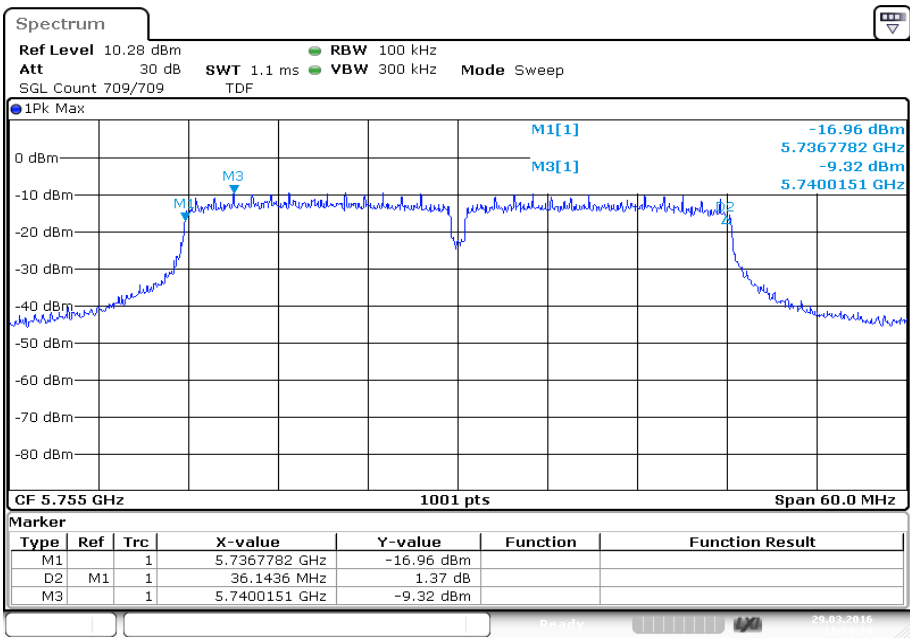
**Plot 4:** 5825 MHz




Date: 11.MAR.2016 15:54:16

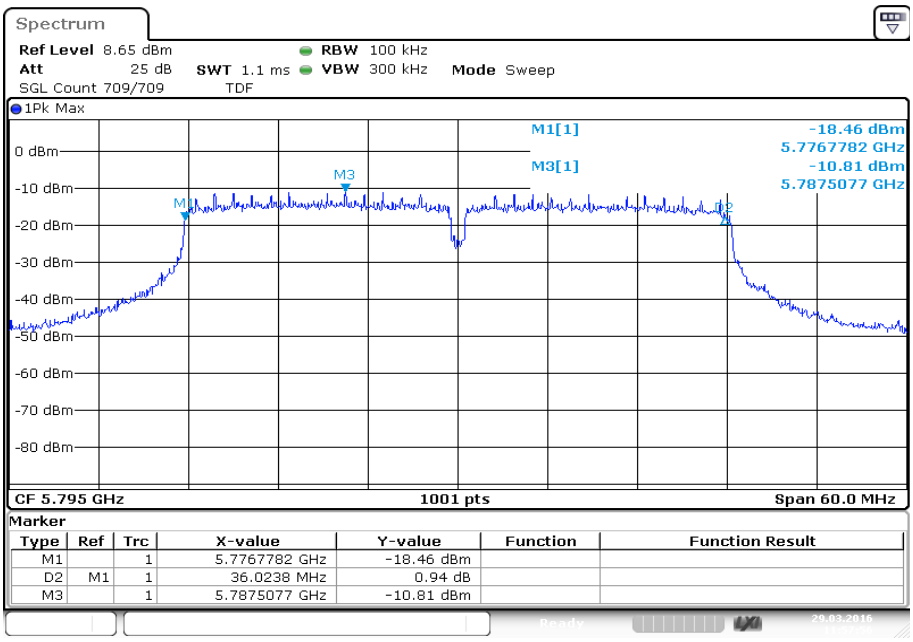
**Plots:** OFDM / n HT40 – mode; antenna port 3

**Plot 1:** 5755 MHz




Date: 29.MAR.2016 11:54:30

**Plot 2:** 5795 MHz




Date: 29.MAR.2016 11:57:57