

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:	$\geq 10^*(\text{swp points}) * (\text{total on/off time})$
Resolution bandwidth:	1 MHz (500 kHz for 5.8 GHz band)
Video bandwidth:	$\geq 3 \times \text{RBW}$
Span:	$> \text{EBW}$
Trace-Mode:	Max hold
Used test setup:	see chapter 7.4 – A
Measurement uncertainty:	see chapter 9

Limits:

Power Spectral Density	
FCC	
power spectral density conducted $\leq 11 \text{ dBm}$ in any 1 MHz band (band 5150 – 5250 MHz)* $\rightarrow 5 \text{ dBm}$	
power spectral density conducted $\leq 11 \text{ dBm}$ in any 1 MHz band (band 5250 – 5350 MHz)* $\rightarrow 5 \text{ dBm}$	
power spectral density conducted $\leq 11 \text{ dBm}$ in any 1 MHz band (band 5470 – 5725 MHz)* $\rightarrow 5 \text{ dBm}$	
power spectral density conducted $\leq 30 \text{ dBm}$ in any 500 kHz band (band 5725 – 5850 MHz)* $\rightarrow 24 \text{ dBm}$	
IC	
power spectral density e.i.r.p. $\leq 10 \text{ dBm}$ in any 1 MHz band (band 5150 – 5250 MHz)	
power spectral density conducted $\leq 11 \text{ dBm}$ in any 1 MHz band (band 5250 – 5350 MHz)* $\rightarrow 5 \text{ dBm}$	
power spectral density conducted $\leq 11 \text{ dBm}$ in any 1 MHz band (band 5470 – 5725 MHz)* $\rightarrow 5 \text{ dBm}$	
power spectral density conducted $\leq 30 \text{ dBm}$ in any 500 kHz band (band 5725 – 5850 MHz)* $\rightarrow 24 \text{ dBm}$	

*limit shall be reduced by 6 dB because of the 12dBi effective antenna gain.

Results plots are shown in sub chapter 12.4.

Result: antenna port 1

OFDM / a – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-8.6	-8.2	-1.2	-1.1
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	-0.4	-2.6	-4.5	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	-5.0	-5.5	-5.8	-6.4

OFDM / n HT20 – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-7.5	-7.7	-0.8	-0.8
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	-1.3	-0.3	-1.1	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	-1.4	-0.8	-4.2	-2.6

OFDM / n HT40 – mode	Power spectral density [dBm/MHz]			
	5190 MHz	5230 MHz	5270 MHz	5310 MHz
Channel				
Including duty cycle correction factor	-9.1	-9.0	-3.5	-7.4
Channel	5510 MHz	5550 MHz	5630 MHz	5670 MHz
Including duty cycle correction factor	-4.9	-2.3	-2.2	-2.6
Channel	5755 MHz	5795 MHz	-/-	-/-
Including duty cycle correction factor	-1.8	-1.4	-/-	-/-

Result: antenna port 2

OFDM / a – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-8.2	-8.3	-1.3	-1.4
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	-0.8	-2.3	-3.5	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	-4.4	-5.6	-5.0	-6.2

OFDM / n HT20 – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-7.6	-7.2	-0.4	-0.5
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	-1.1	-0.3	-0.7	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	-0.2	-0.6	-3.3	-2.6

OFDM / n HT40 – mode	Power spectral density [dBm/MHz]			
	5190 MHz	5230 MHz	5270 MHz	5310 MHz
Channel				
Including duty cycle correction factor	-8.9	-8.9	-2.7	-7.1
Channel	5510 MHz	5550 MHz	5630 MHz	5670 MHz
Including duty cycle correction factor	-4.9	-2.7	-2.5	-2.4
Channel	5755 MHz	5795 MHz	-/-	-/-
Including duty cycle correction factor	-0.3	-1.6	-/-	-/-

Result: antenna port 1 + antenna port 2

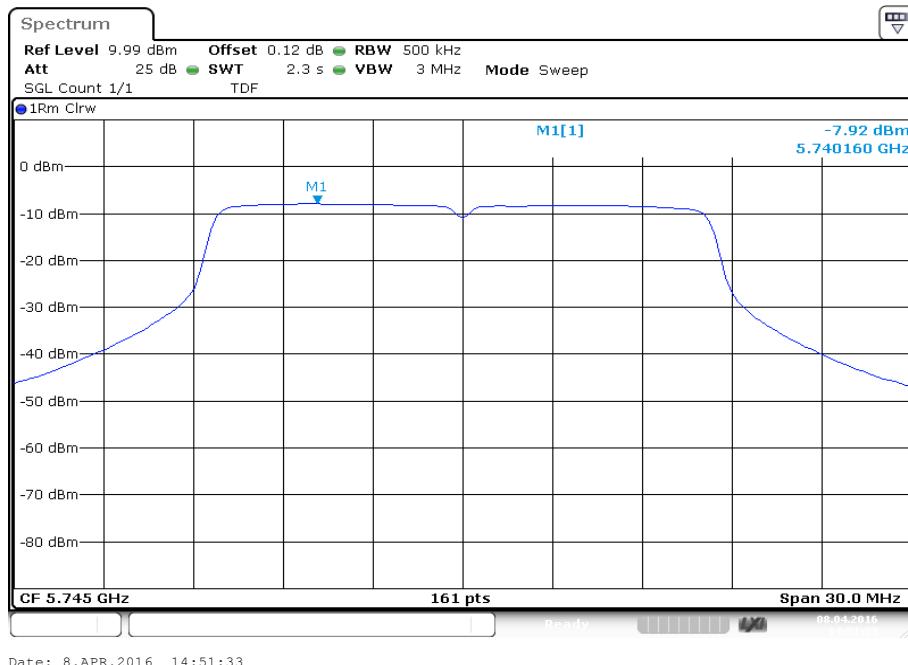
OFDM / a – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-5.4	-5.2	1.8	1.8
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	2.4	0.6	-1.0	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	-1.7	-2.5	-2.4	-3.3

OFDM / n HT20 – mode	Power spectral density [dBm/MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel				
Including duty cycle correction factor	-4.5	-4.4	2.4	2.4
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	1.8	2.7	2.1	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
Including duty cycle correction factor	2.3	2.3	-0.7	0.4

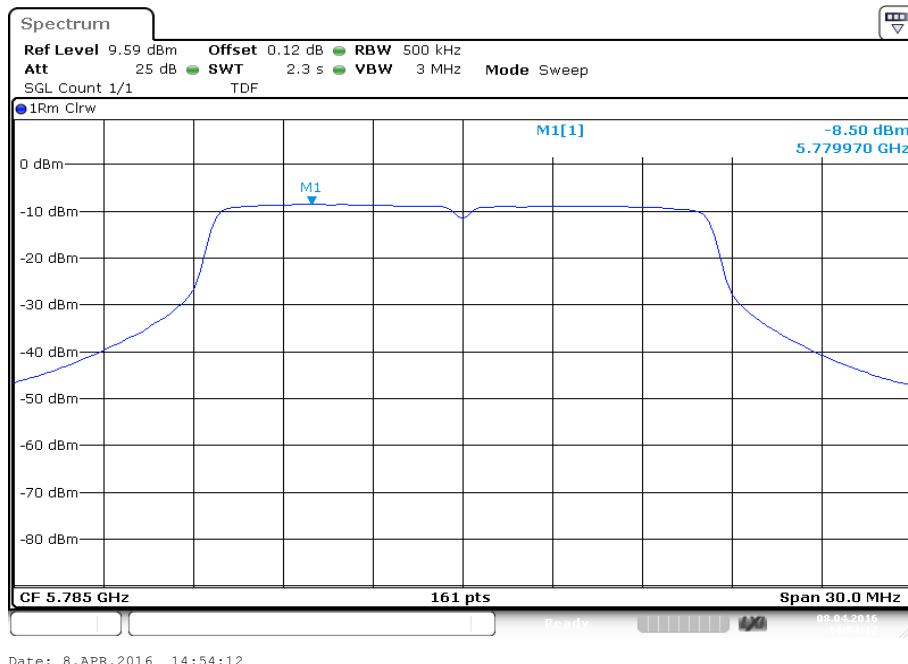
OFDM / n HT40 – mode	Power spectral density [dBm/MHz]			
	5190 MHz	5210 MHz	5270 MHz	5310 MHz
Channel				
Including duty cycle correction factor	-6.0	-5.9	-0.1	-4.2
Channel	5510 MHz	5550 MHz	5630 MHz	5670 MHz
Including duty cycle correction factor	-1.9	0.5	0.7	0.5
Channel	5755 MHz	5795 MHz	-/-	-/-
Including duty cycle correction factor	2.0	1.5	-/-	-/-

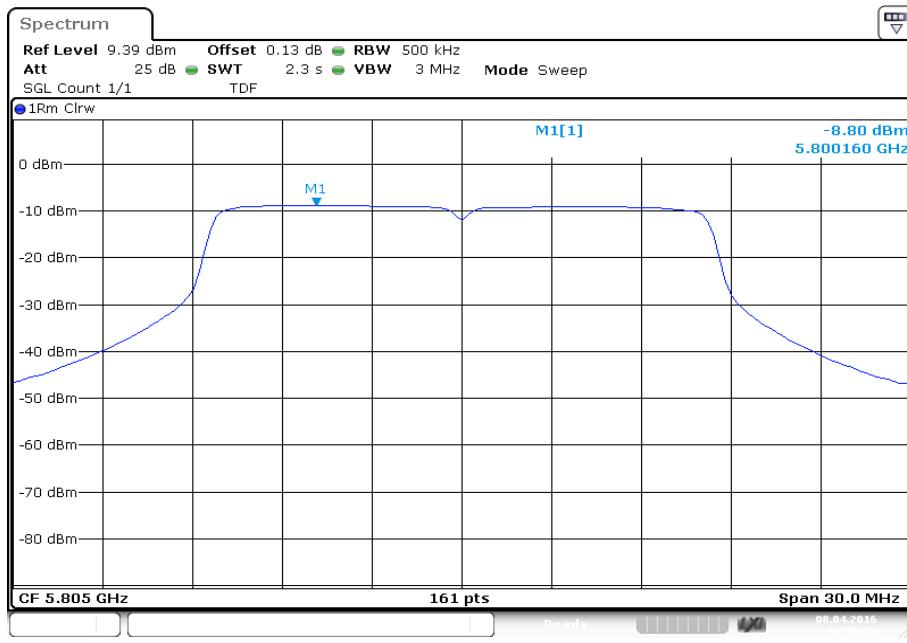
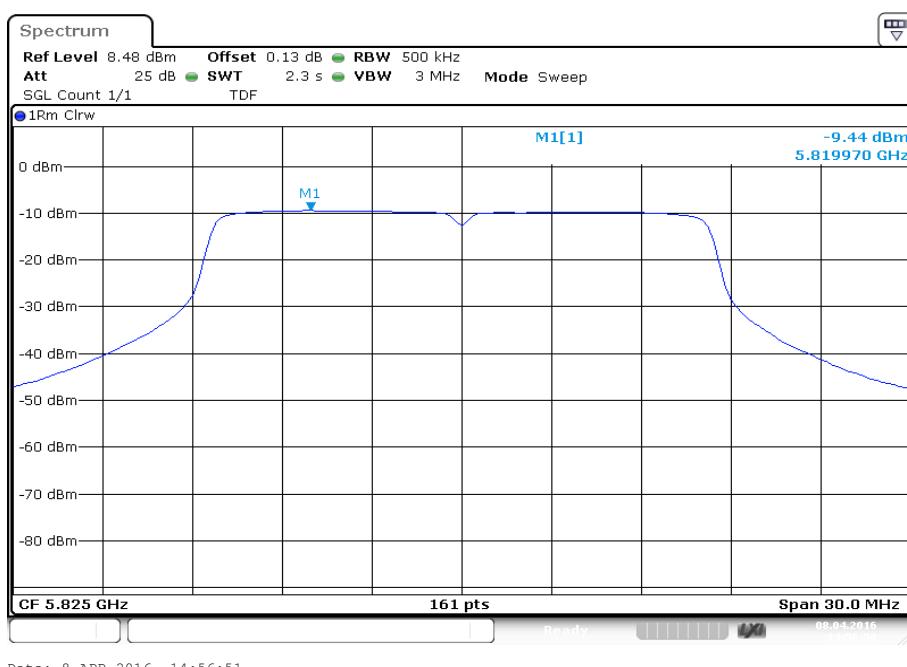
Plots: OFDM / a – mode; antenna port 1

Plot 1: 5745 MHz



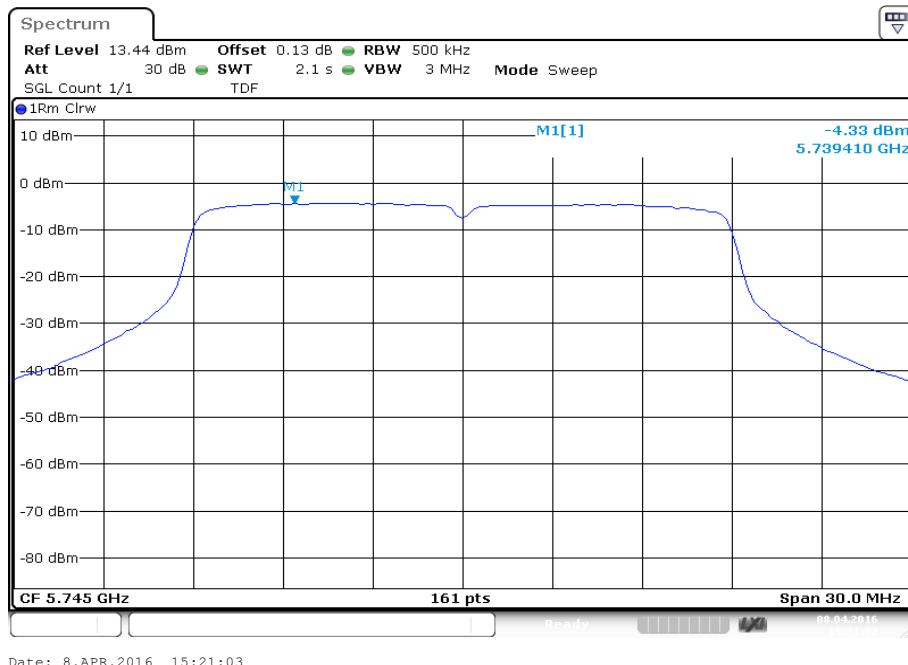
Plot 2: 5785 MHz



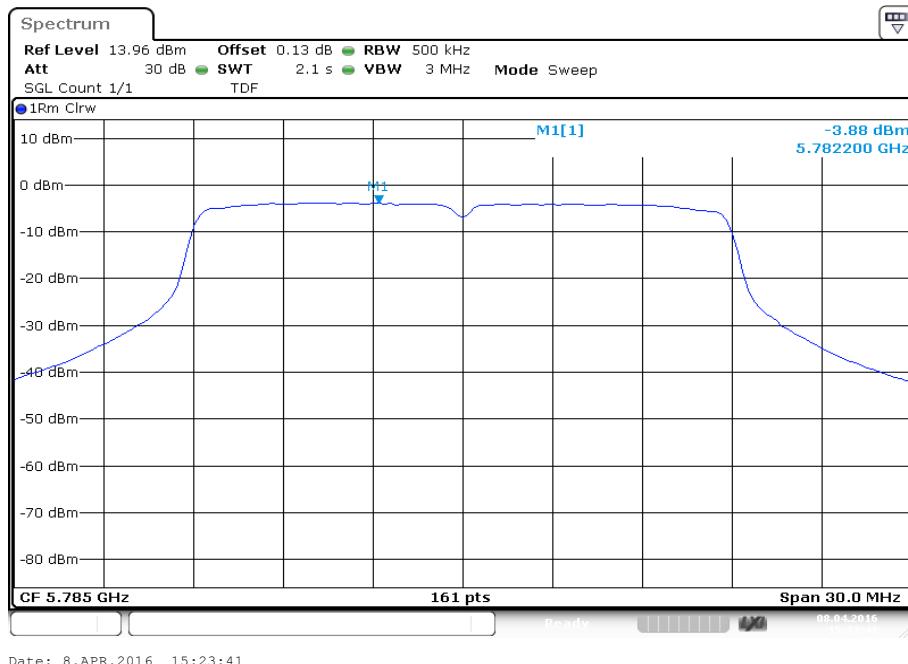
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

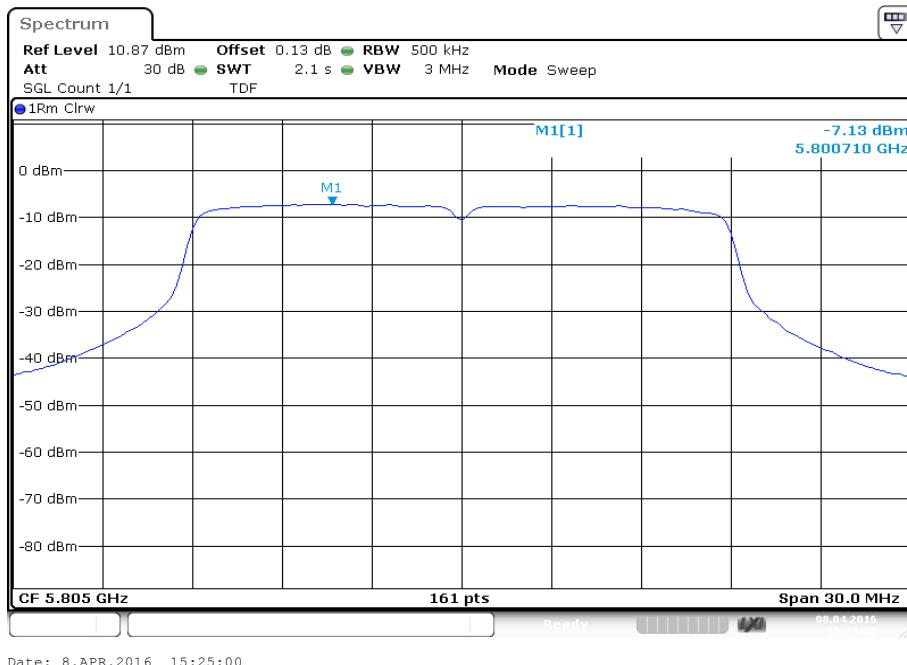
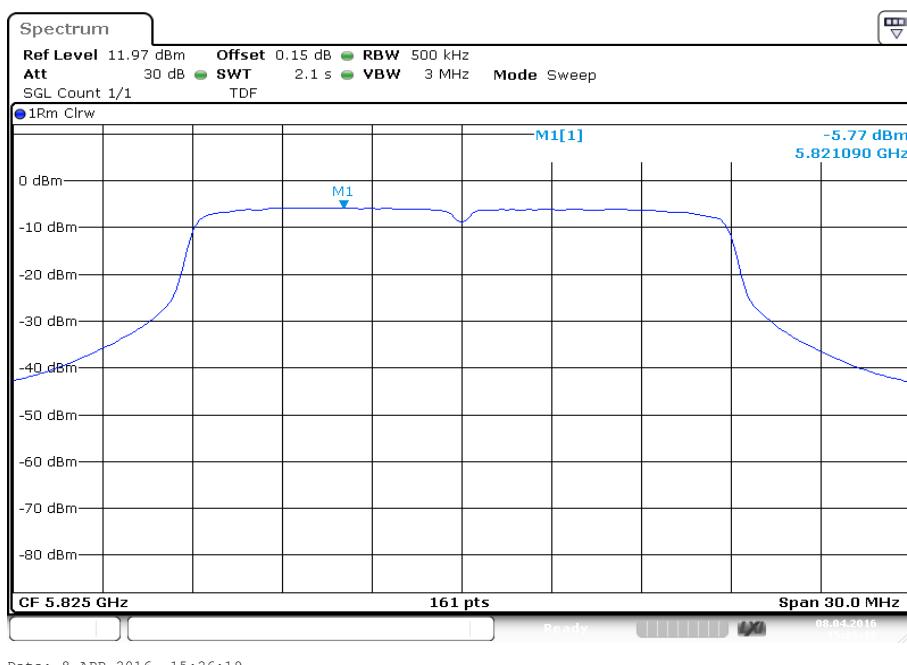
Plots: OFDM / n HT20 – mode; antenna port 1

Plot 1: 5745 MHz



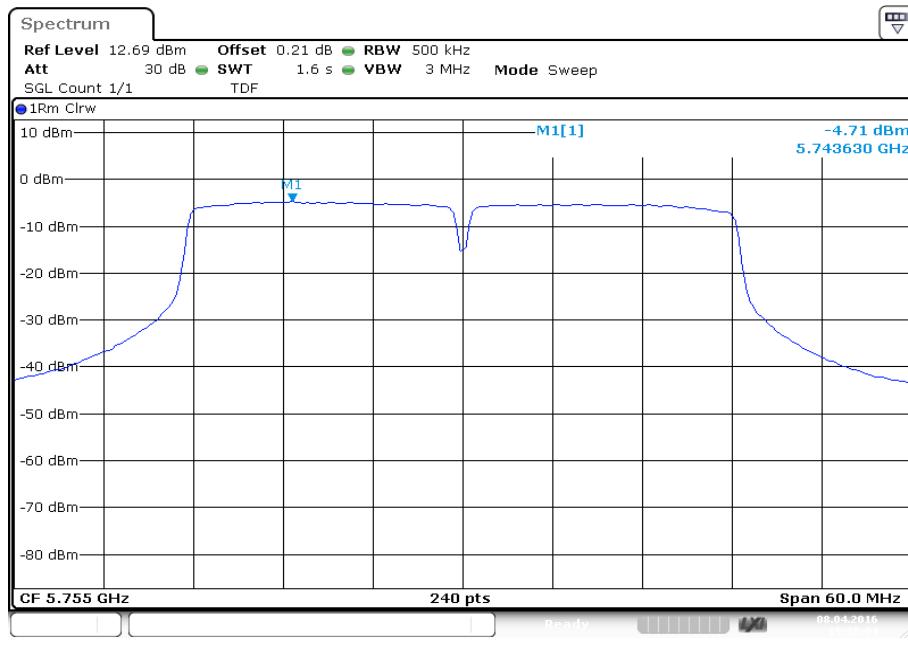
Plot 2: 5785 MHz



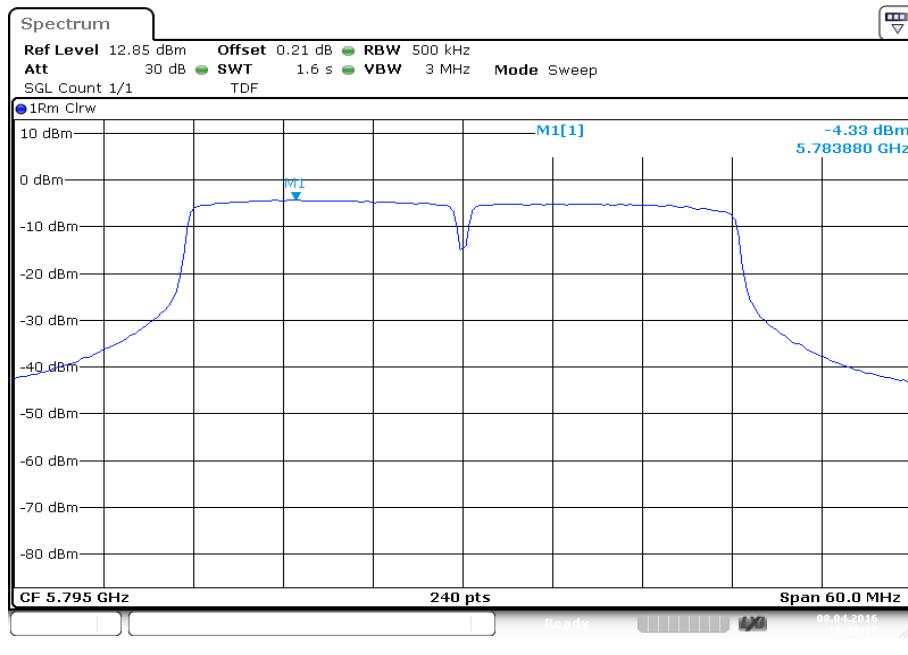
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

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

Plot 1: 5755 MHz

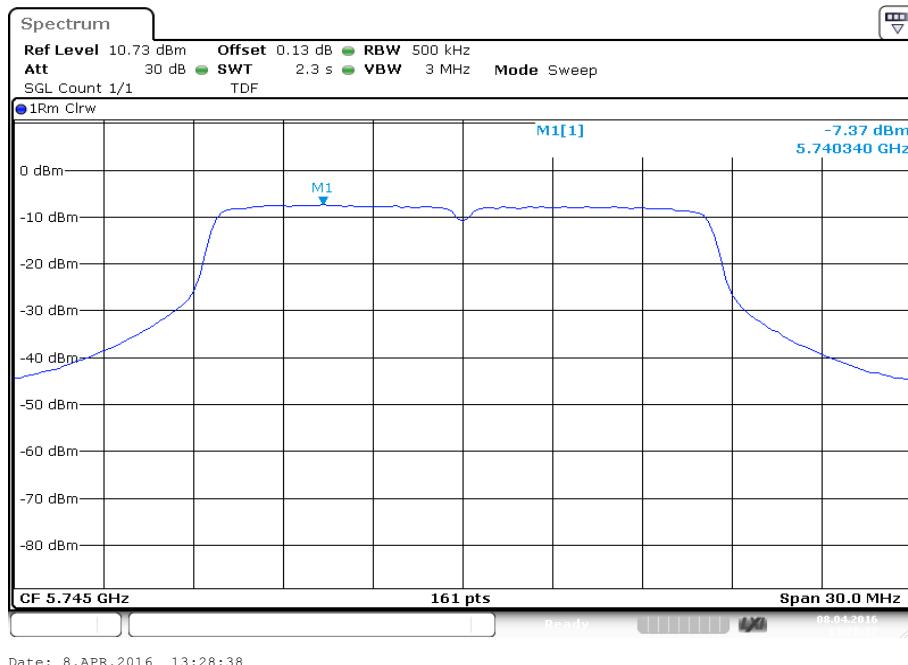


Plot 2: 5795 MHz

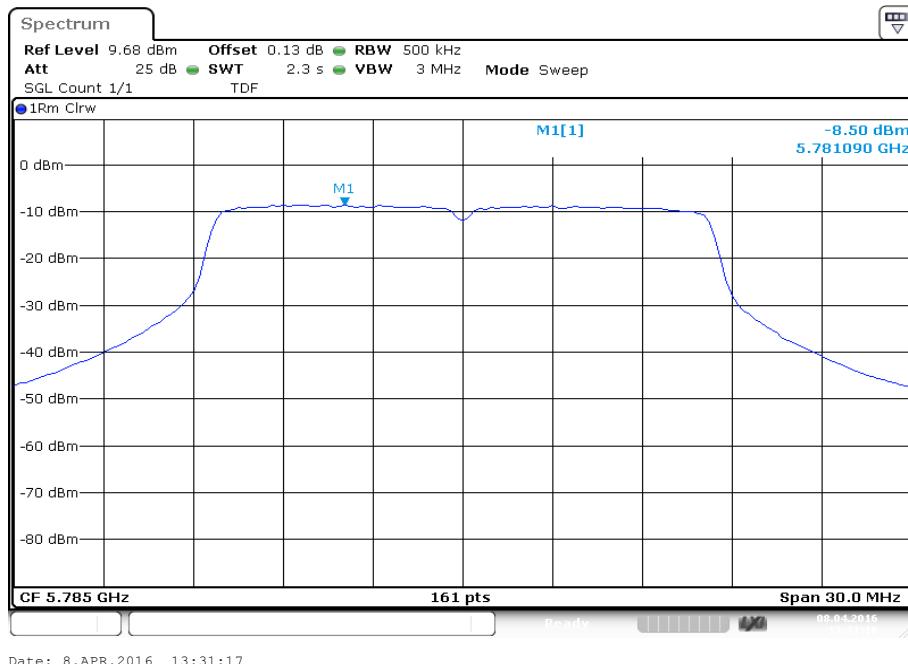


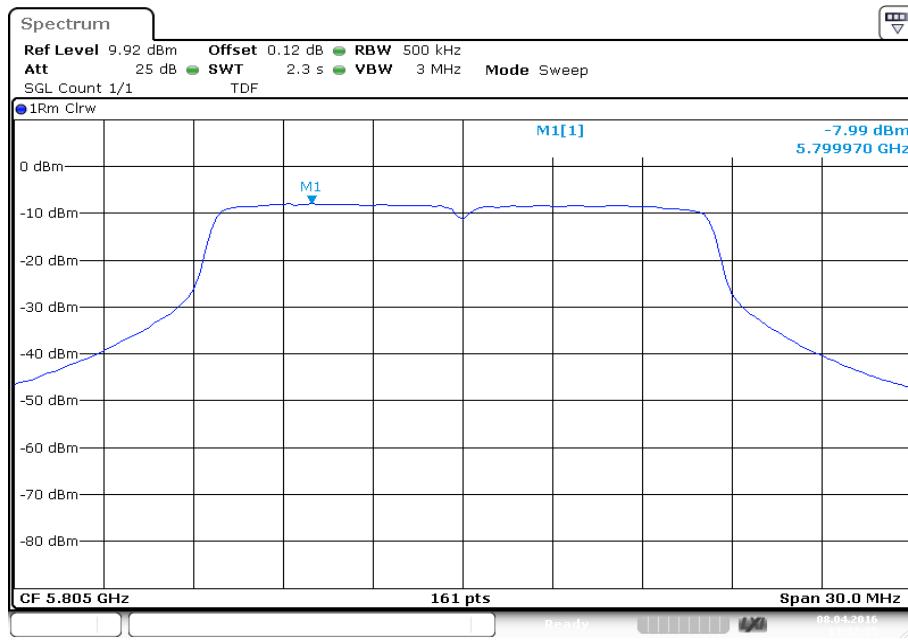
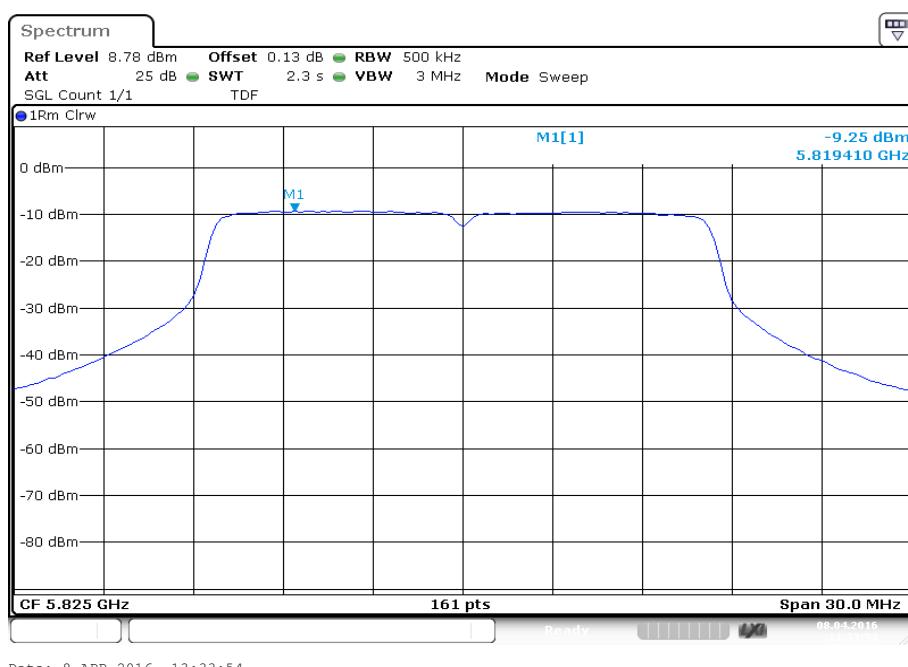
Plots: OFDM / a – mode; antenna port 2

Plot 1: 5745 MHz



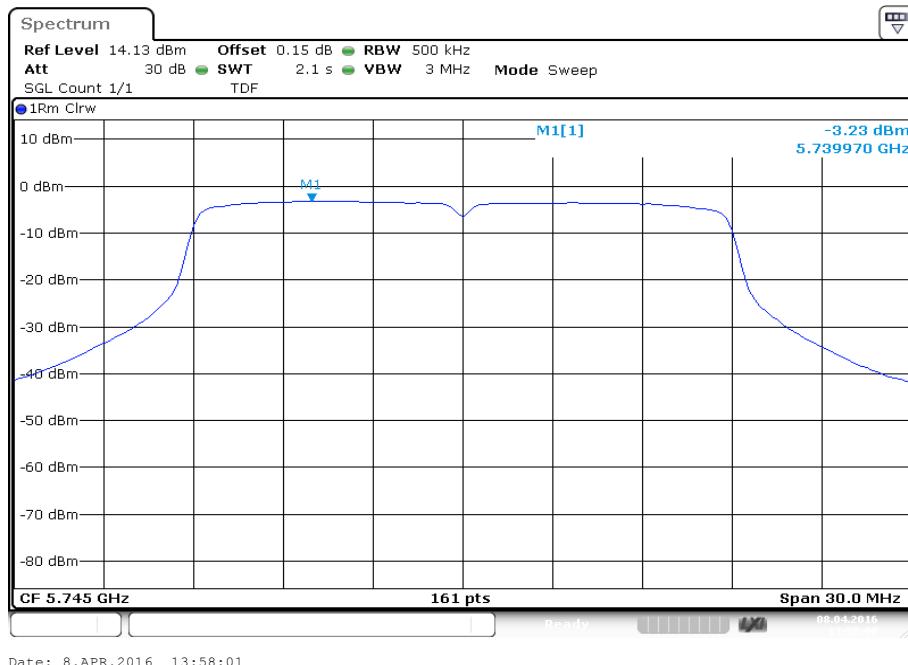
Plot 2: 5785 MHz



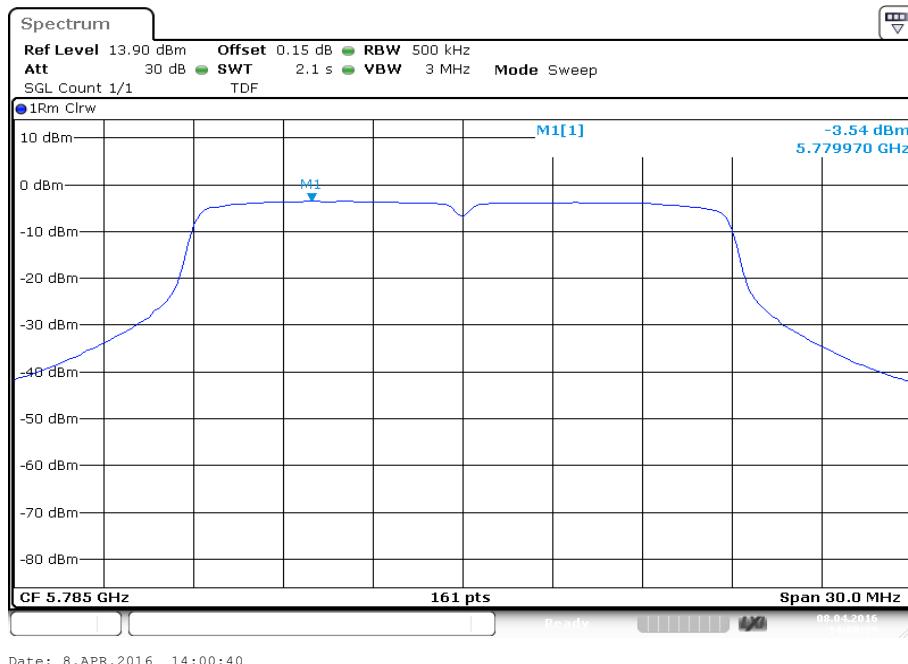
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

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

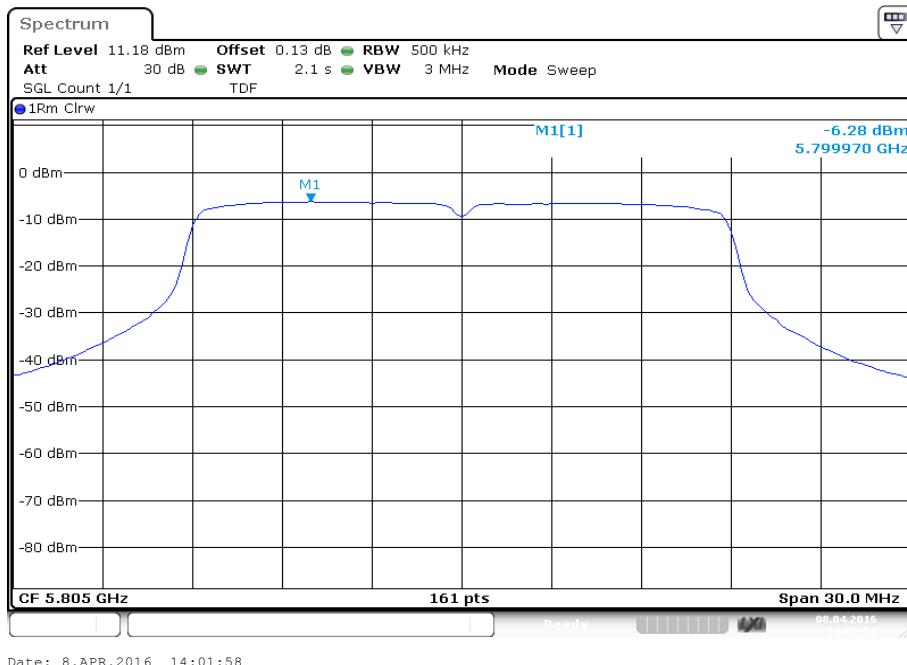
Plot 1: 5745 MHz



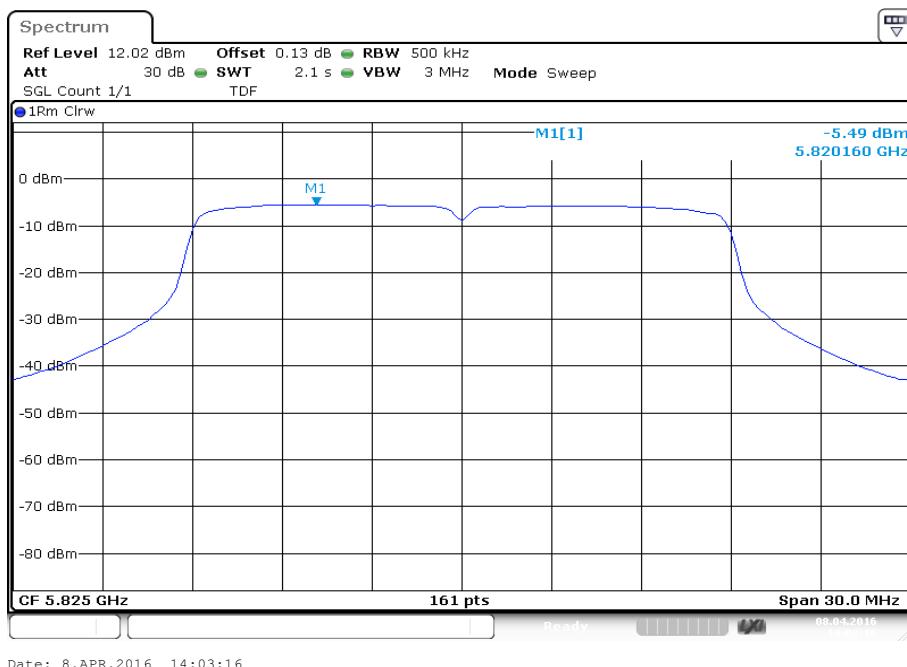
Plot 2: 5785 MHz



Plot 3: 5805 MHz

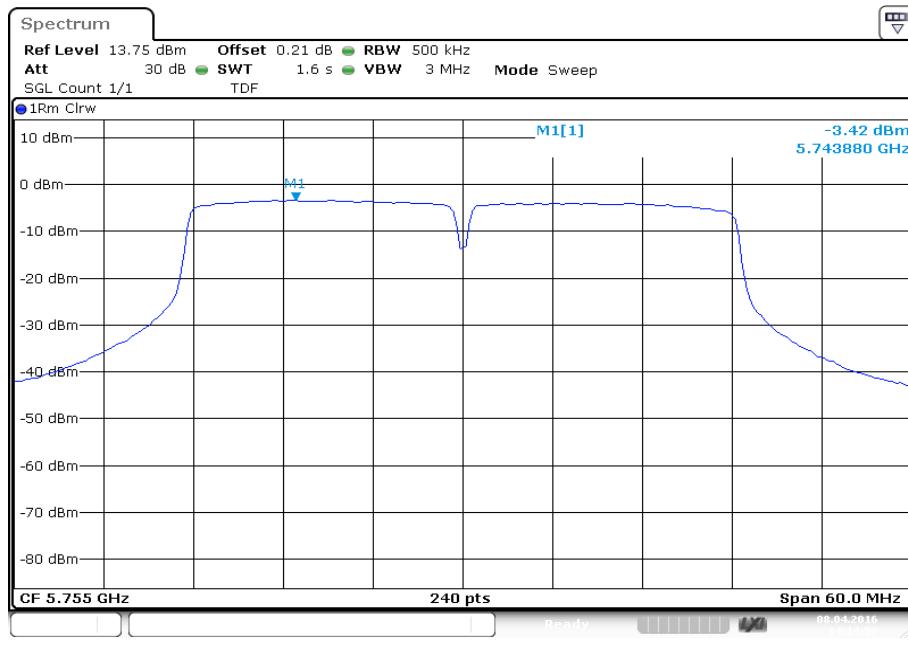


Plot 4: 5825 MHz

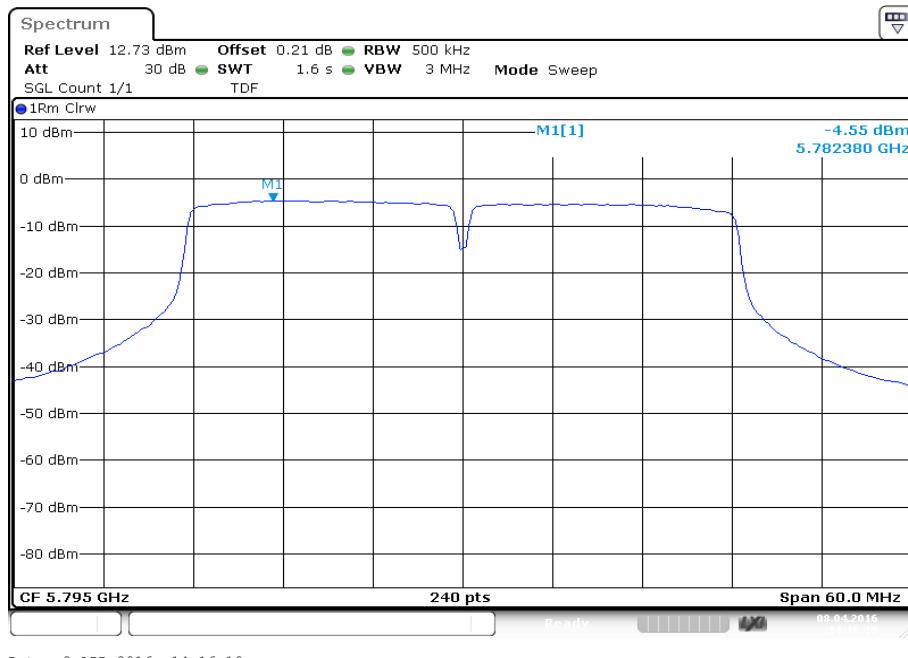


Plots: OFDM / n HT40 – mode; antenna port 2

Plot 1: 5755 MHz



Plot 2: 5795 MHz



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 7.4 -A
Measurement uncertainty:	see chapter 9

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]			
	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	16.39	16.39	16.39	16.39

OFDM / n HT20 – mode	6 dB bandwidth [MHz]			
	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	17.41	17.35	17.62	17.59

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

Result: antenna port 2

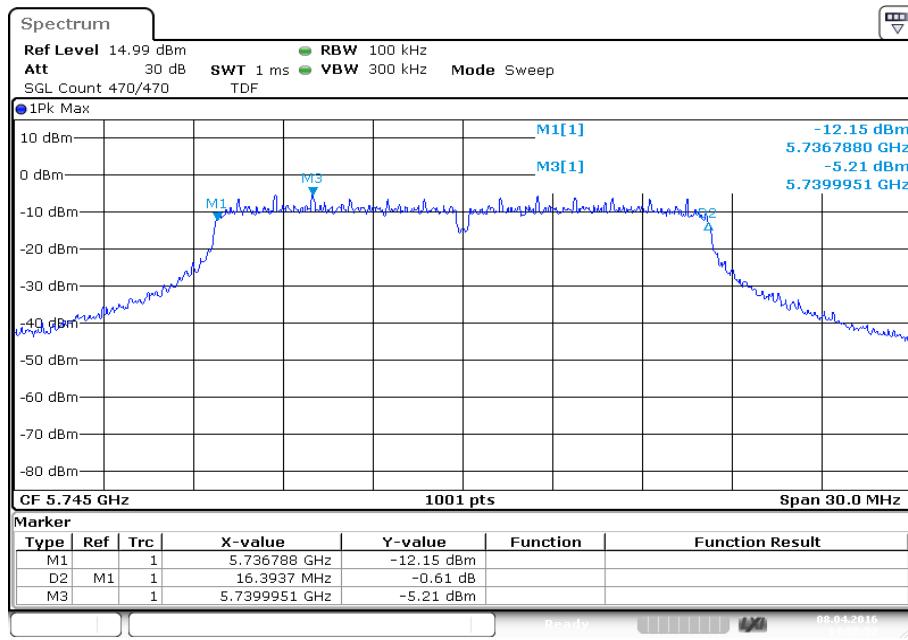
OFDM / a – mode	6 dB bandwidth [MHz]			
	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	16.33	16.33	16.36	16.39

OFDM / n HT20 – mode	6 dB bandwidth [MHz]			
	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	17.56	17.56	17.59	17.35

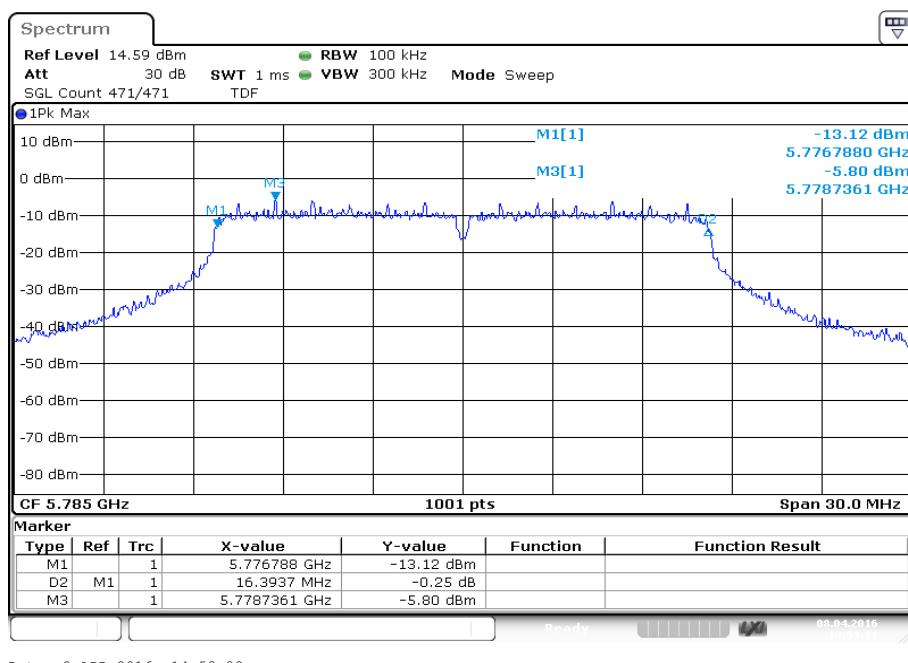
OFDM / n HT40 – mode	6 dB bandwidth [MHz]	
	5755 MHz	5795 MHz
	36.14	35.90

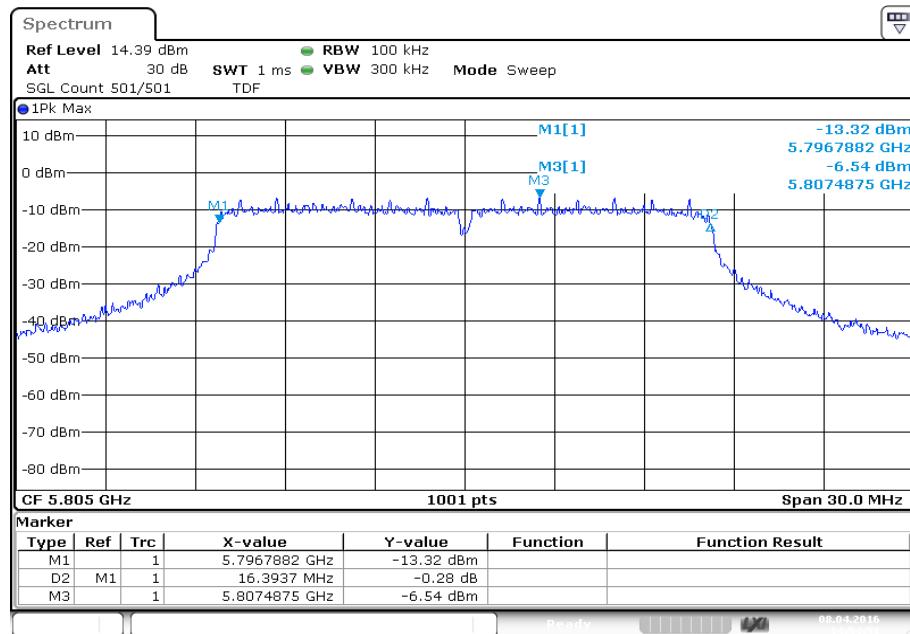
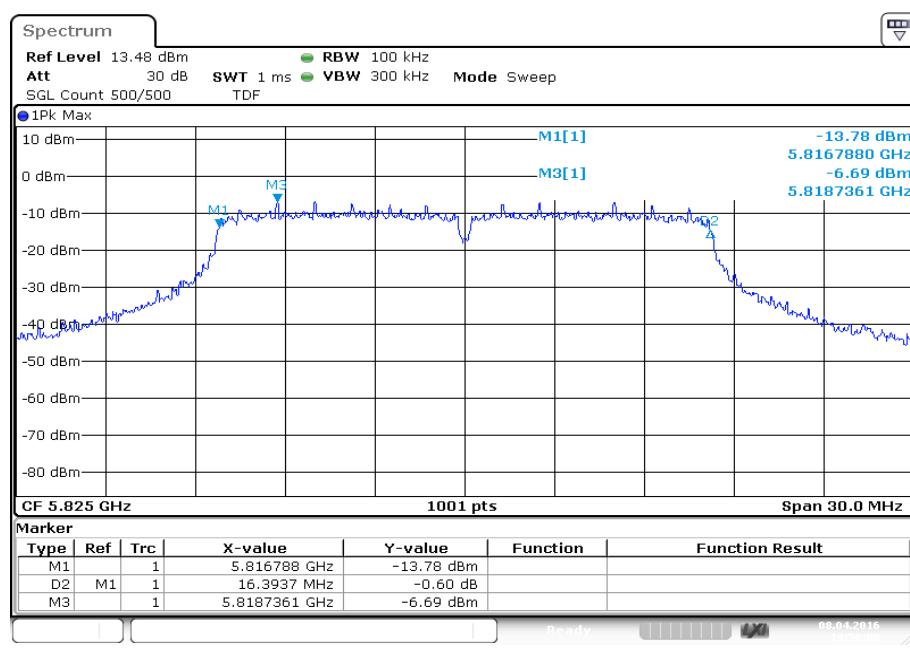
Plots: OFDM / a – mode; antenna port 1

Plot 1: 5745 MHz



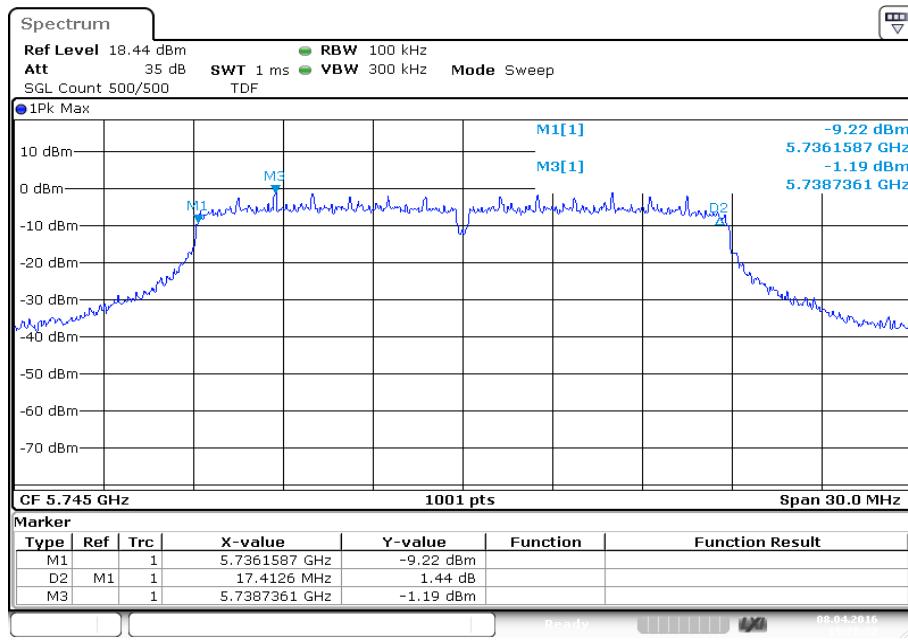
Plot 2: 5785 MHz



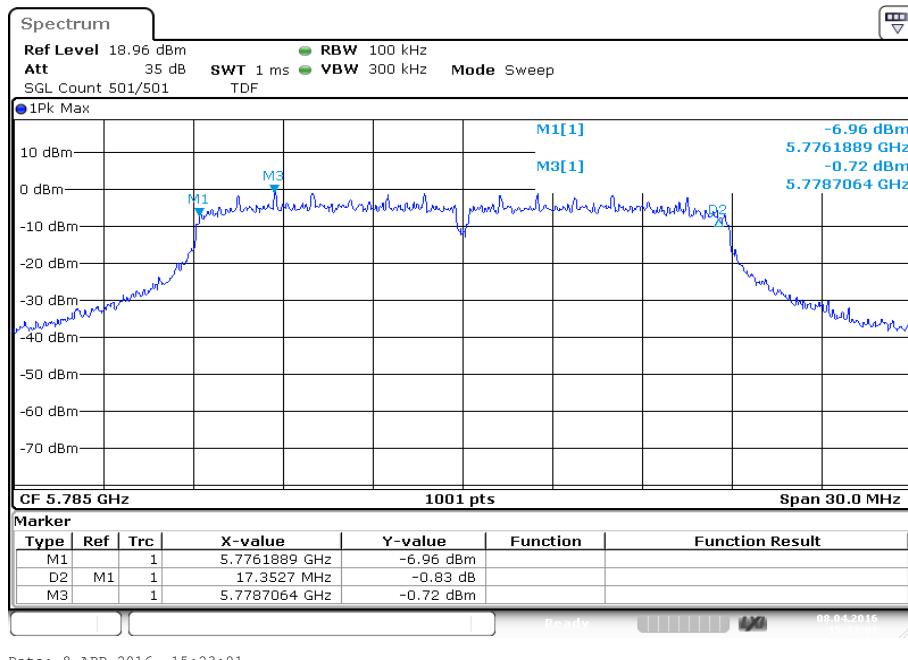
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

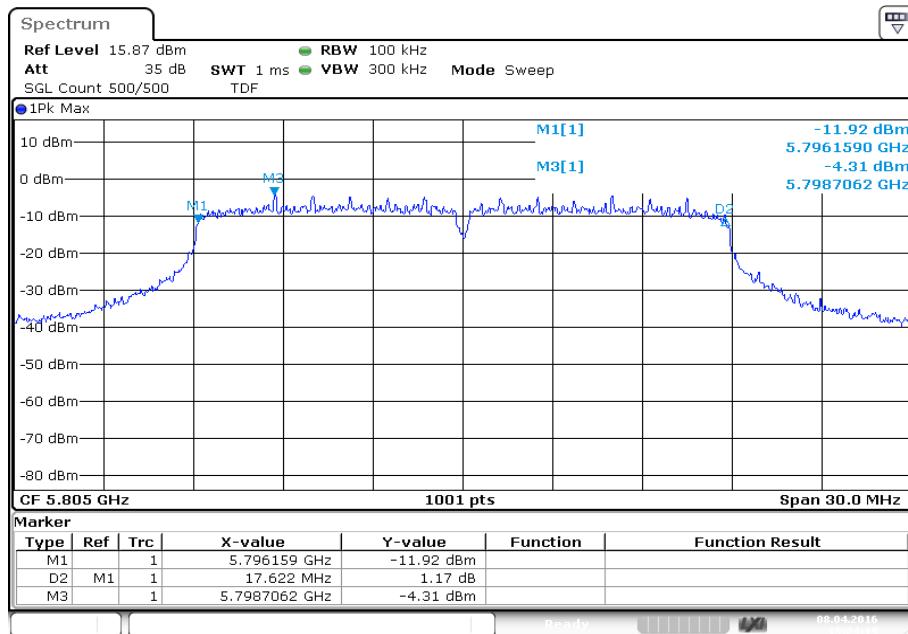
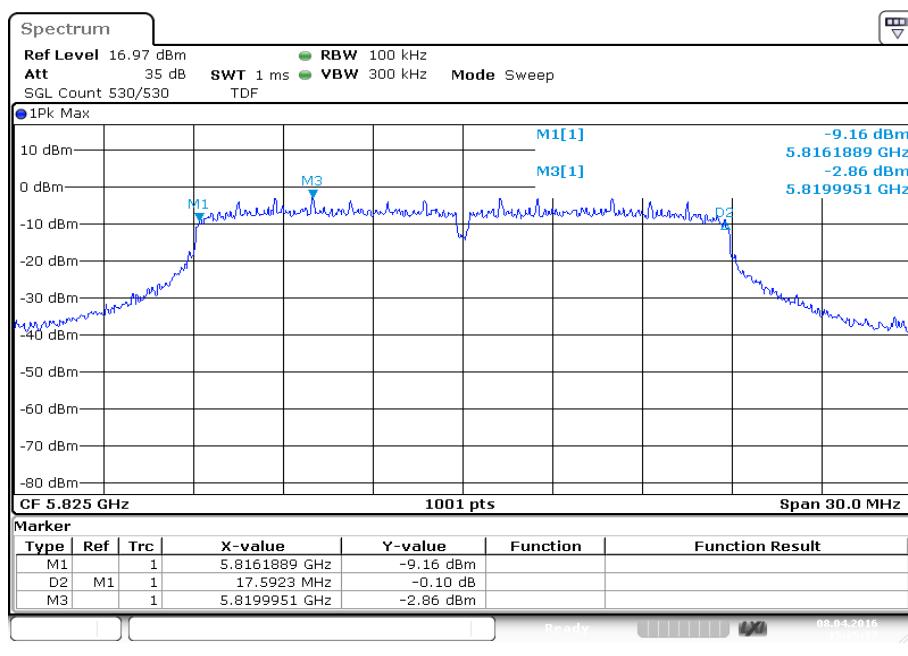
Plots: OFDM / n HT20 – mode; antenna port 1

Plot 1: 5745 MHz



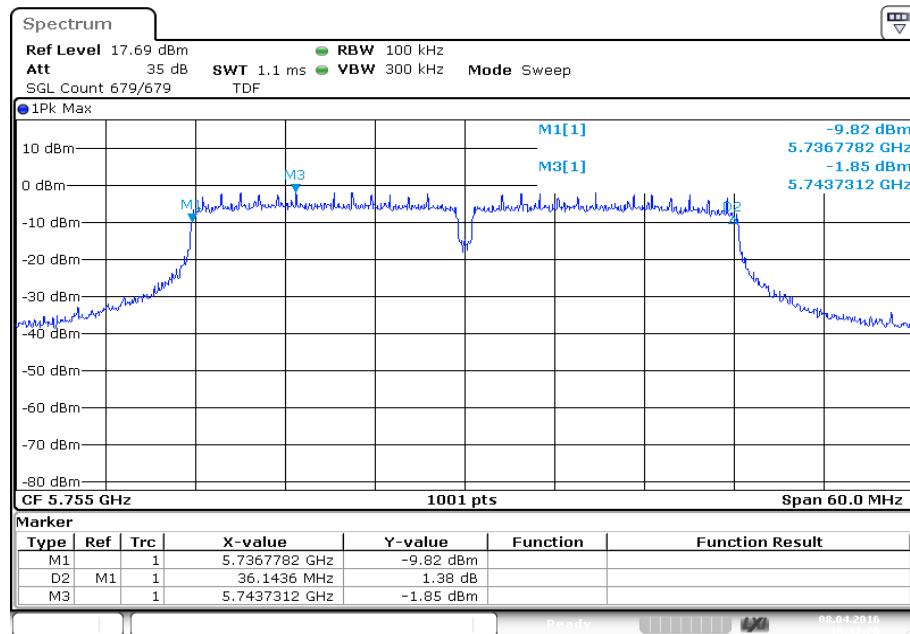
Plot 2: 5785 MHz



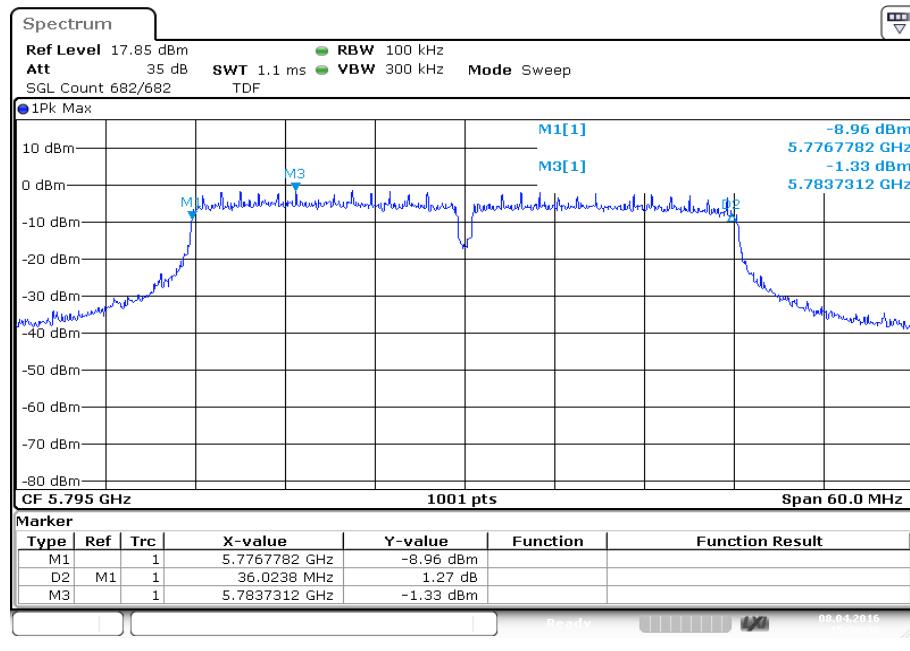
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

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

Plot 1: 5755 MHz

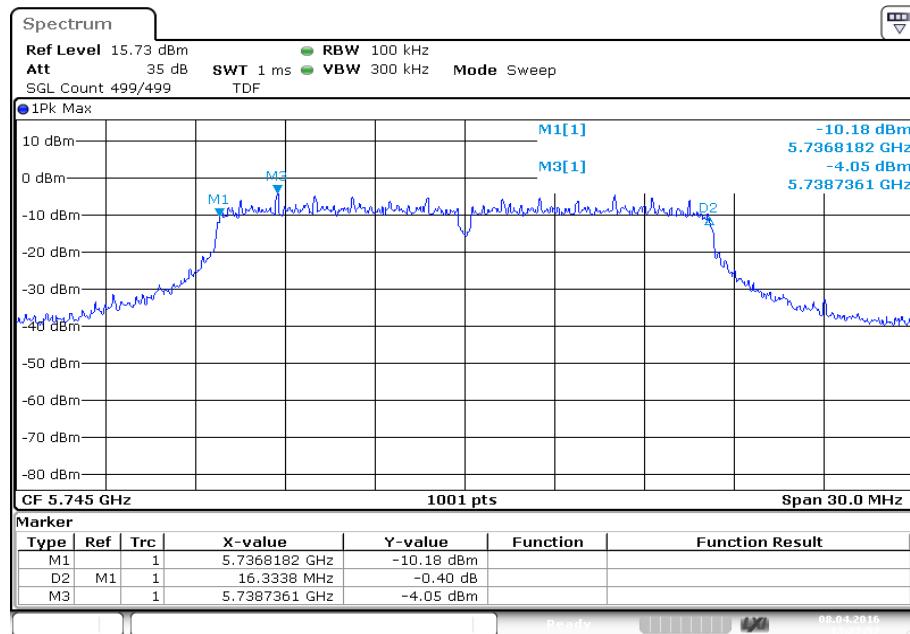


Plot 2: 5795 MHz

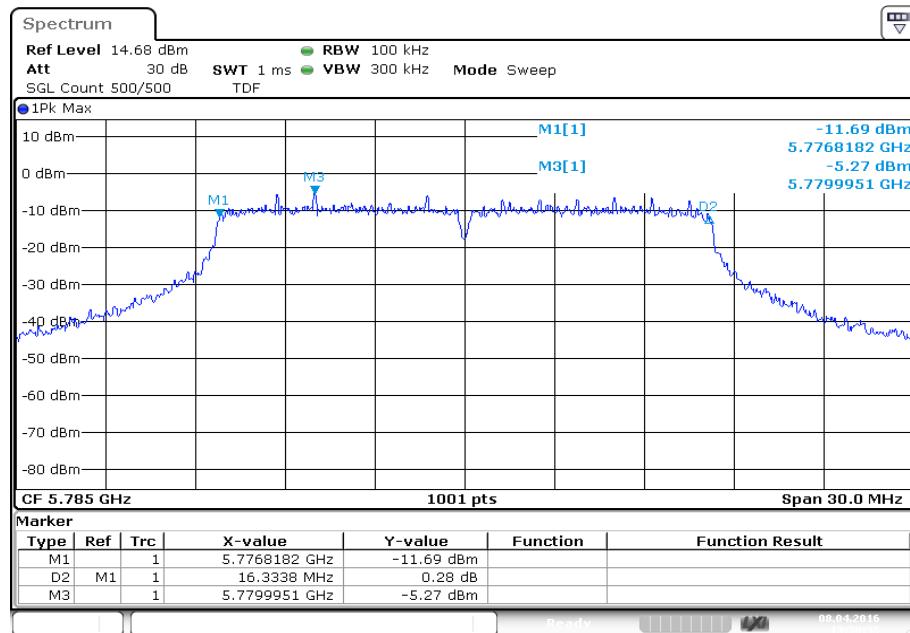


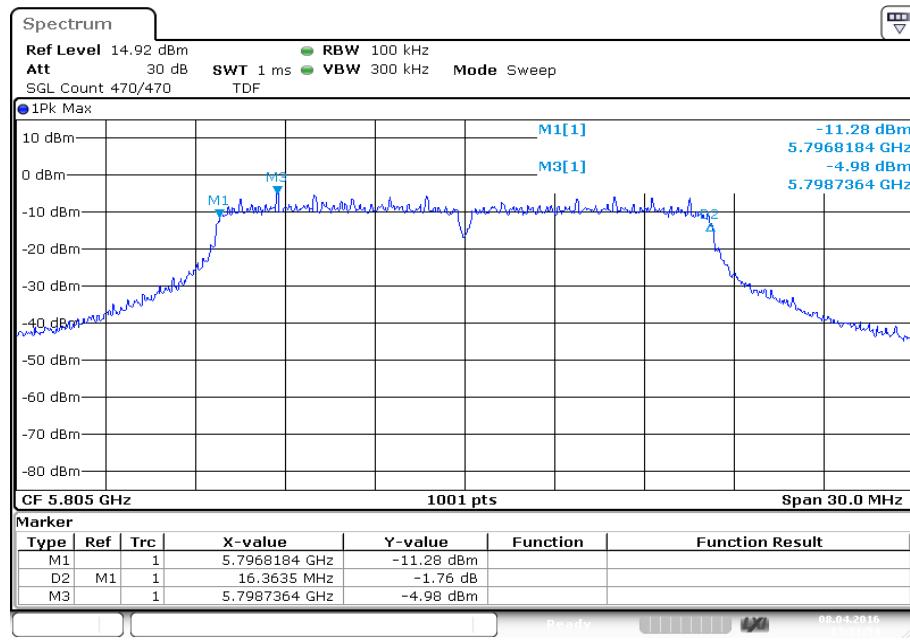
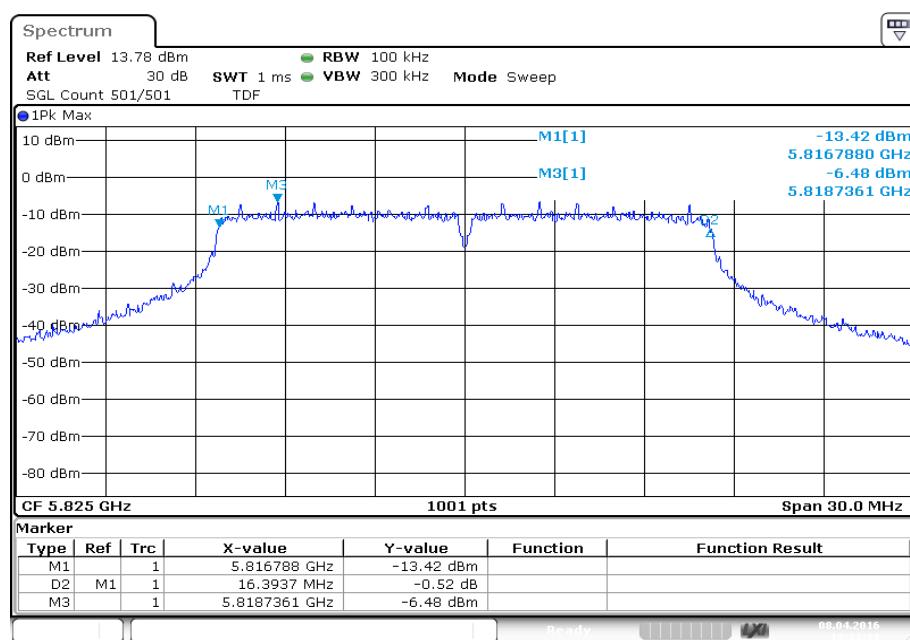
Plots: OFDM / a – mode; antenna port 2

Plot 1: 5745 MHz



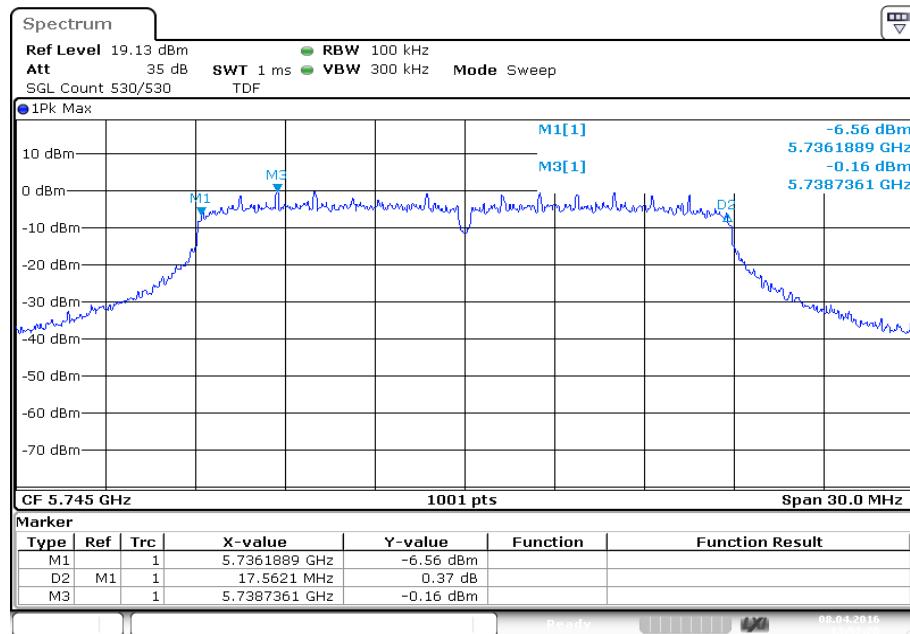
Plot 2: 5785 MHz



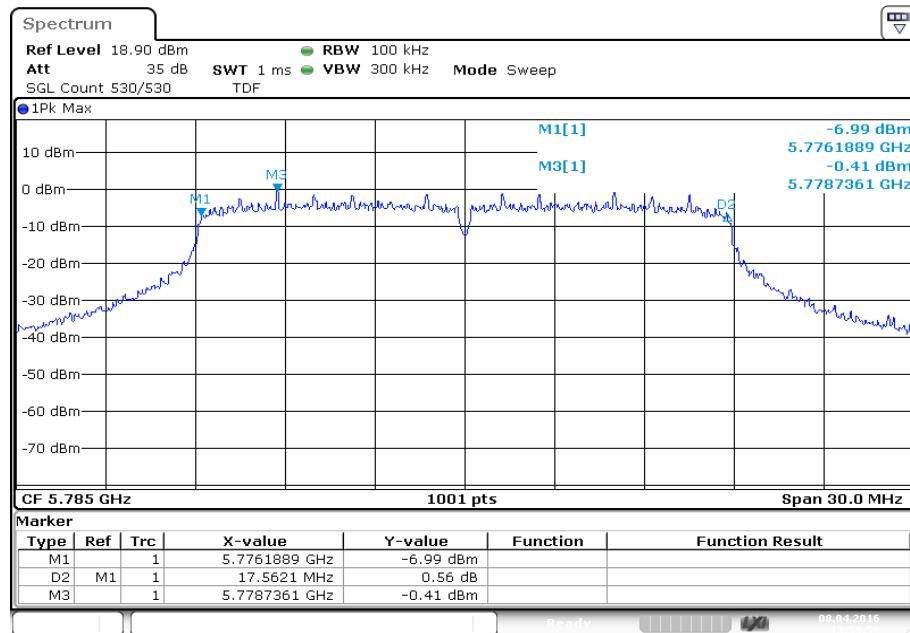
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

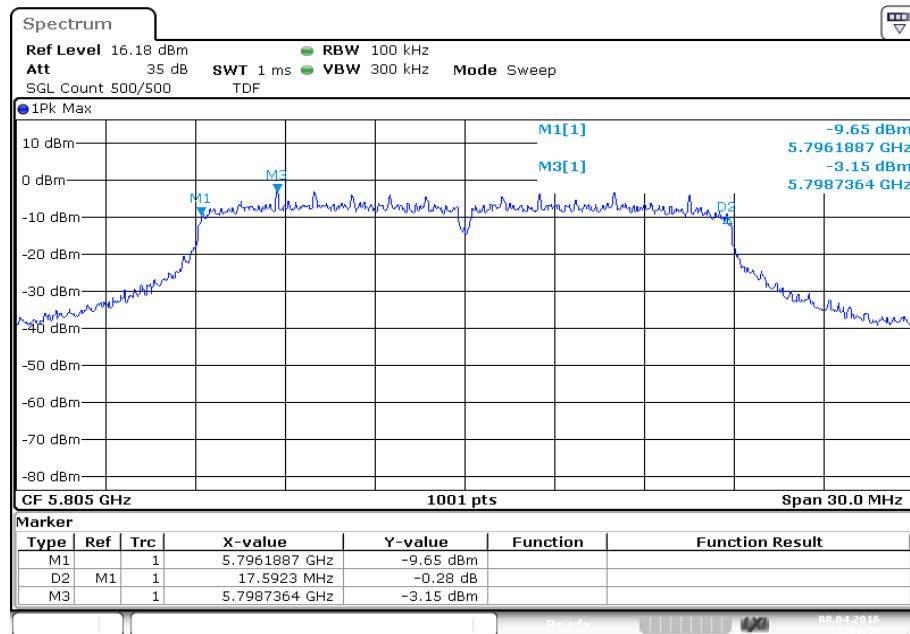
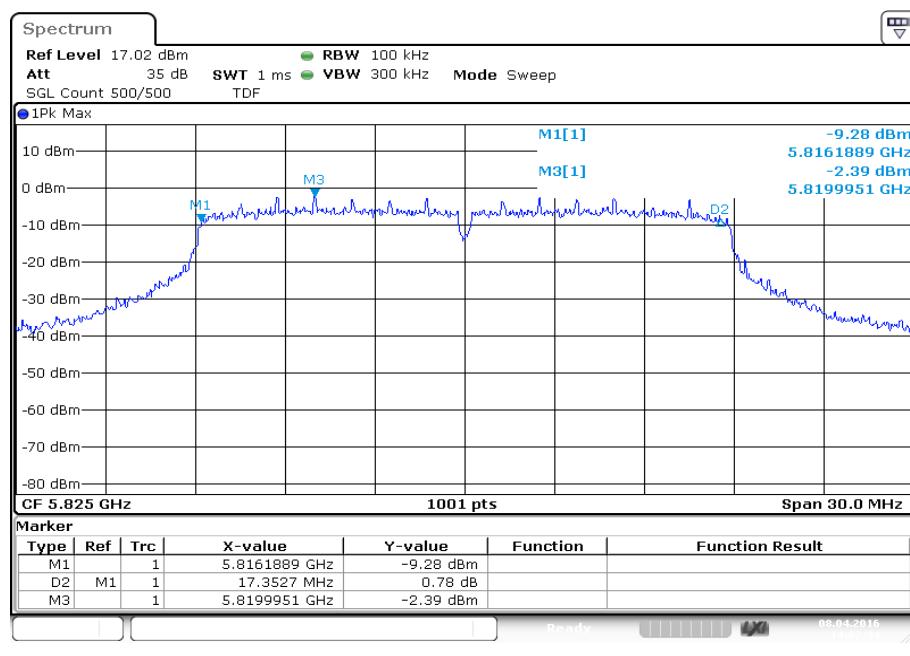
Plots: OFDM / n HT20 – mode; antenna port 2

Plot 1: 5745 MHz



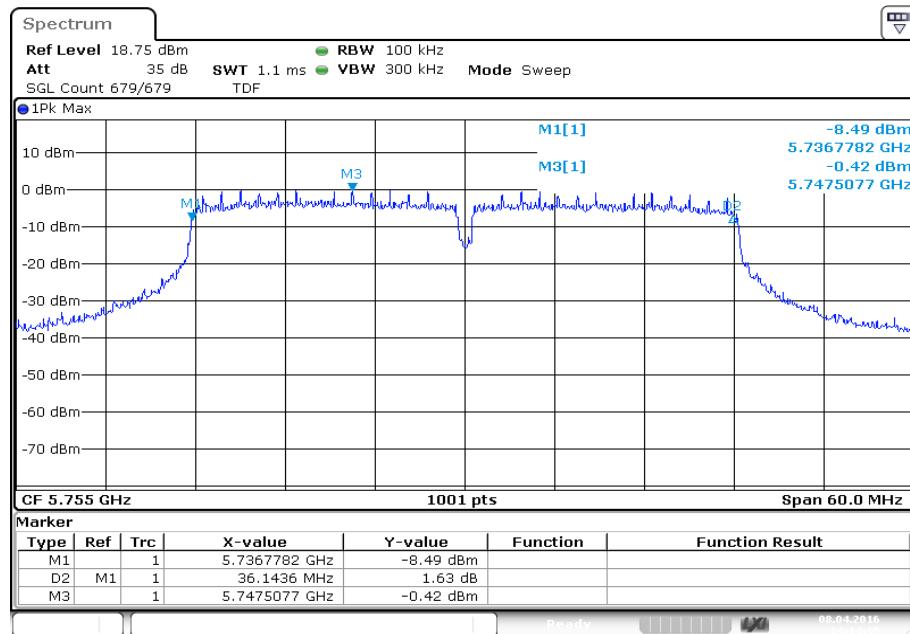
Plot 2: 5785 MHz



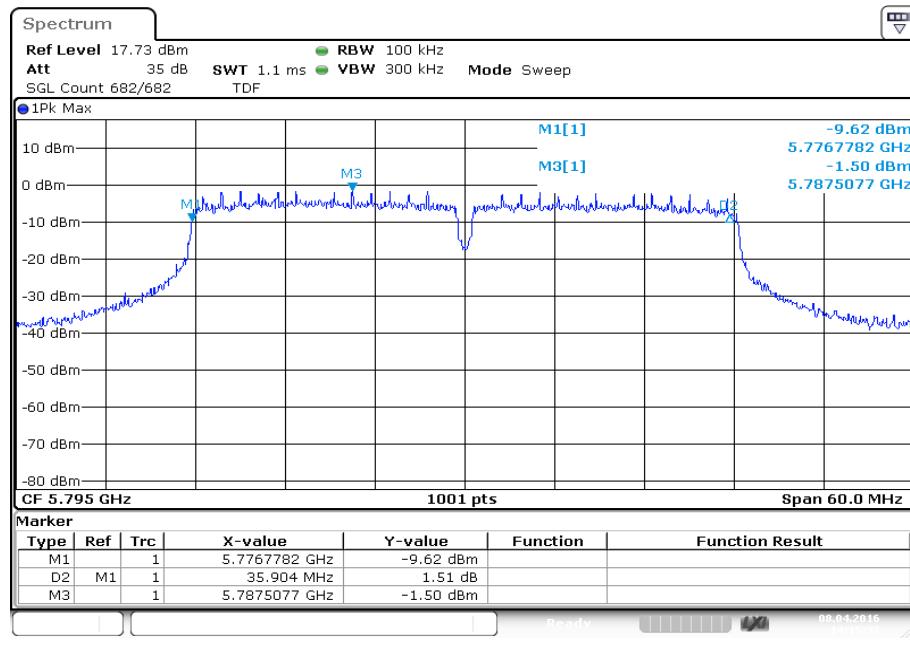
Plot 3: 5805 MHz**Plot 4: 5825 MHz**

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

Plot 1: 5755 MHz



Plot 2: 5795 MHz



12.7 Spectrum bandwidth – 26 dB bandwidth

Description:

Measurement of the 26 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to: KDB789033 D02, C.1.	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1% EBW
Video bandwidth:	\geq RBW
Span:	> complete signal!
Trace-Mode:	Max hold
Used test setup:	see chapter 7.4 – A
Measurement uncertainty:	see chapter 9

Limits:

Spectrum Bandwidth – 26 dB Bandwidth

-/-

Result: antenna port 1

OFDM / a – mode	26 dB bandwidth [MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel	22.98	23.23	23.33	23.23
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	23.23	23.23	23.68	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	23.18	23.03	22.83	23.33

OFDM / n HT20 – mode	26 dB bandwidth [MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel	24.13	24.03	23.23	23.53
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	23.93	23.78	24.68	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	23.53	23.48	24.18	23.58

OFDM / n HT40 – mode	26 dB bandwidth [MHz]			
	5190 MHz	5230 MHz	5270 MHz	5310 MHz
Channel	47.05	47.45	47.55	47.95
Channel	5510 MHz	5550 MHz	5630 MHz	5670 MHz
	46.65	47.05	47.55	48.15
Channel	5755 MHz	5795 MHz	-/-	-/-
	48.35	47.55	-/-	-/-

Result: antenna port 2

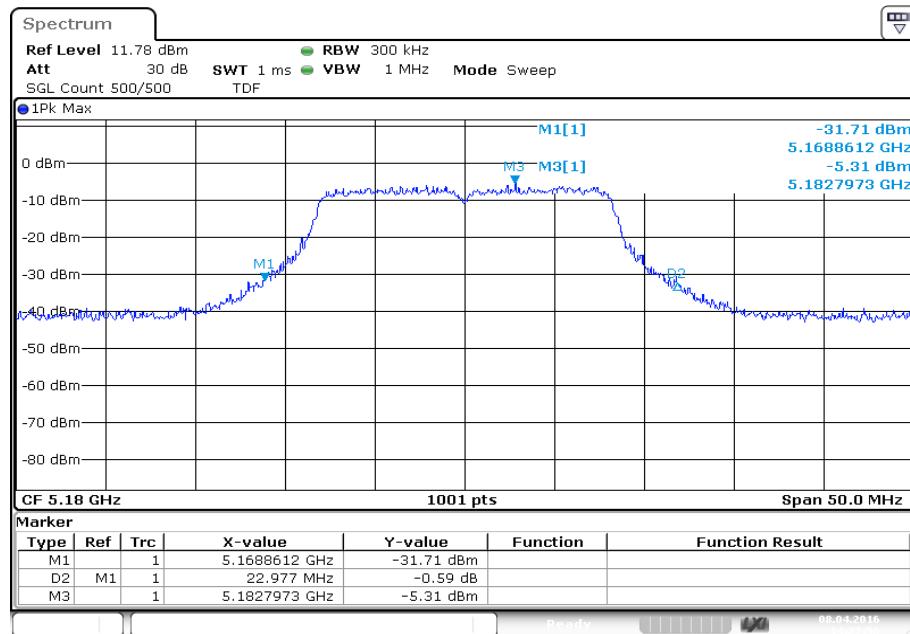
OFDM / a – mode	26 dB bandwidth [MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel	22.28	23.68	23.08	22.93
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	22.88	22.83	23.18	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	23.38	22.63	22.83	23.23

OFDM / n HT20 – mode	26 dB bandwidth [MHz]			
	5180 MHz	5200 MHz	5300 MHz	5320 MHz
Channel	23.68	23.43	23.03	23.28
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	24.33	24.18	24.23	-/-
Channel	5745 MHz	5785 MHz	5805 MHz	5825 MHz
	23.58	23.88	23.73	23.78

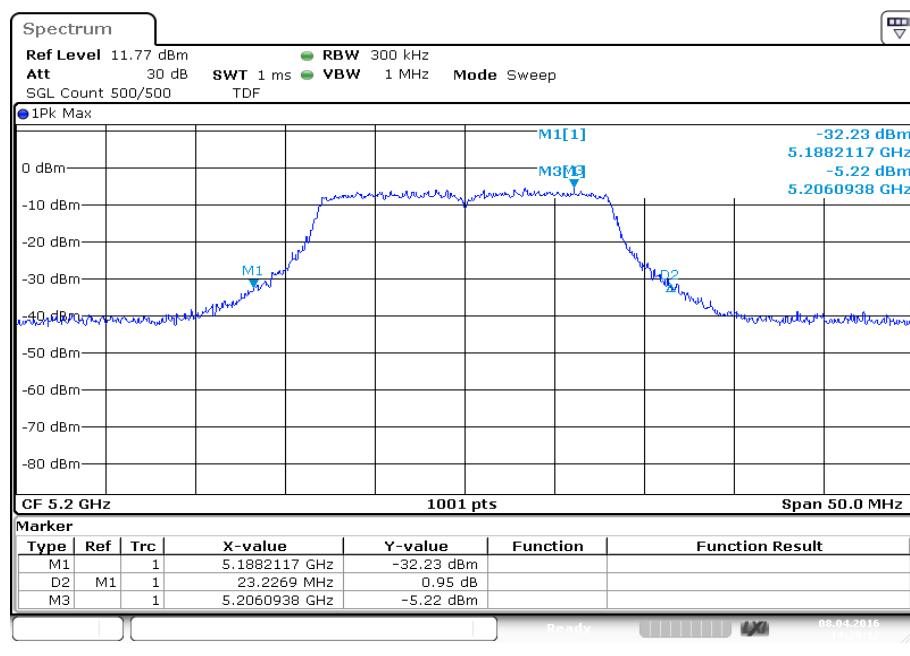
OFDM / n HT40 – mode	26 dB bandwidth [MHz]			
	5190 MHz	5230 MHz	5270 MHz	5310 MHz
Channel	47.65	48.75	47.65	48.15
Channel	5510 MHz	5550 MHz	5630 MHz	5670 MHz
	48.05	47.65	46.75	47.85
Channel	5755 MHz	5795 MHz	-/-	-/-
	47.65	47.25	-/-	-/-

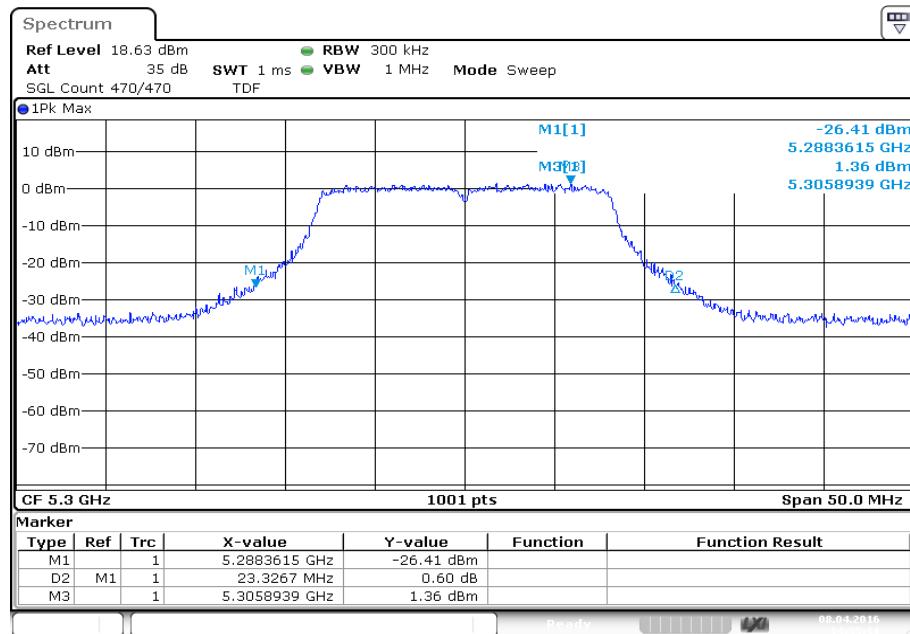
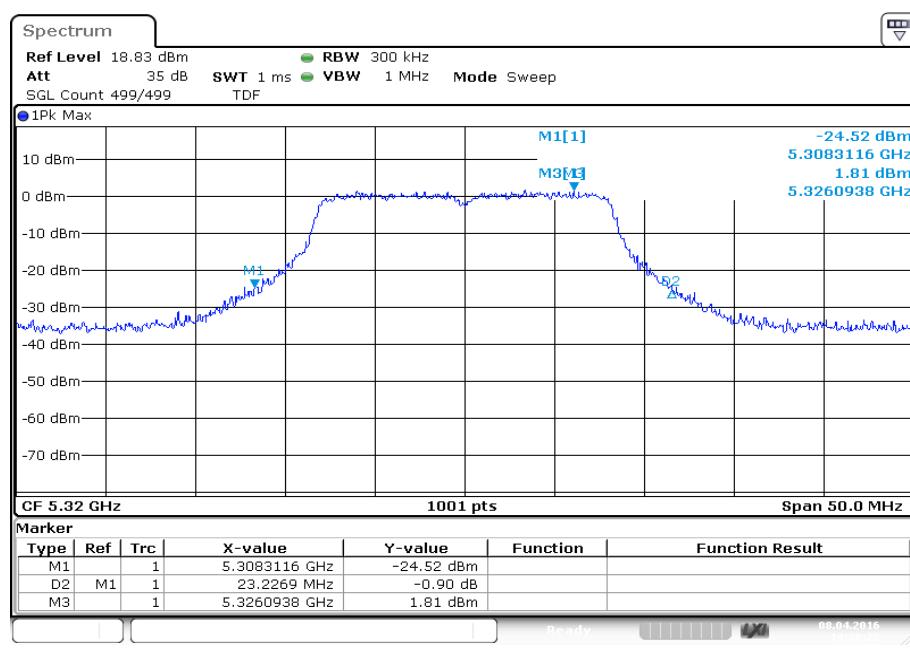
Plots: OFDM / a – mode, antenna port 1

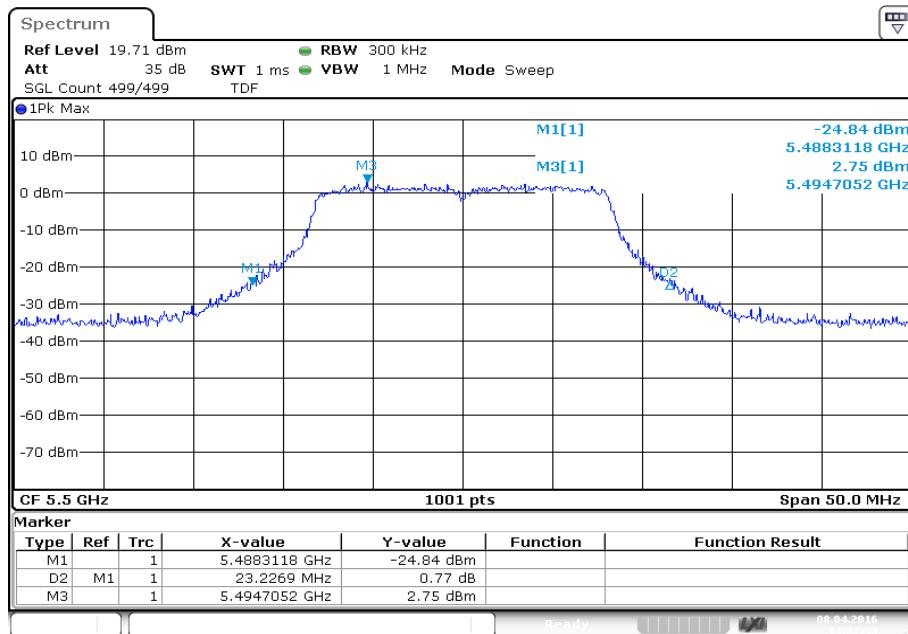
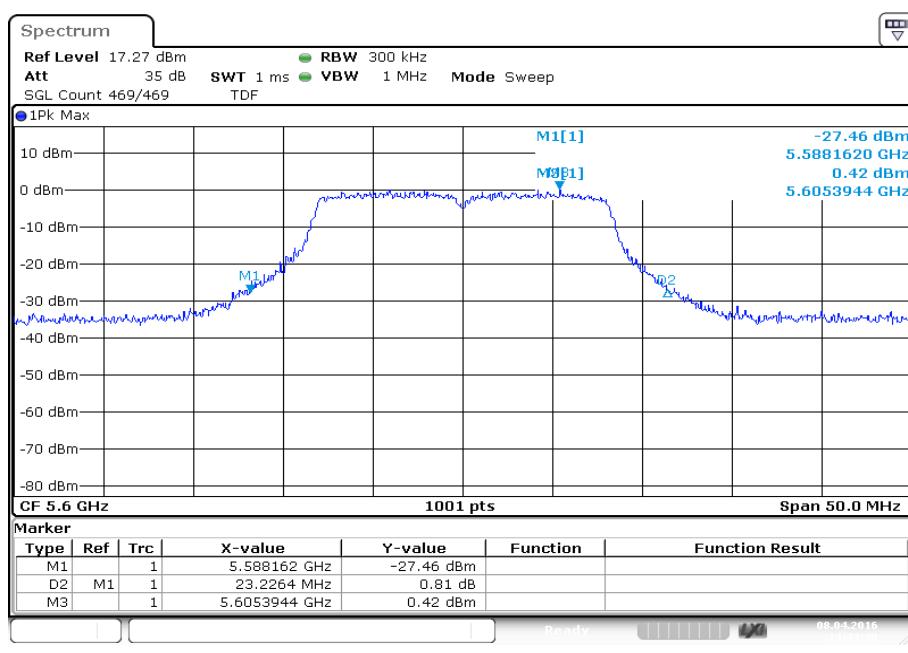
Plot 1: 5180 MHz

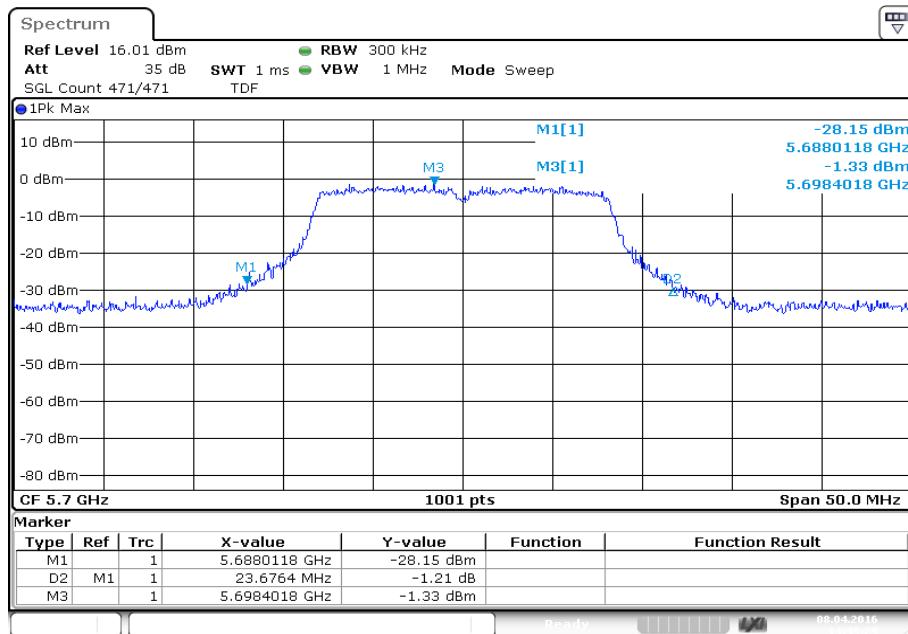
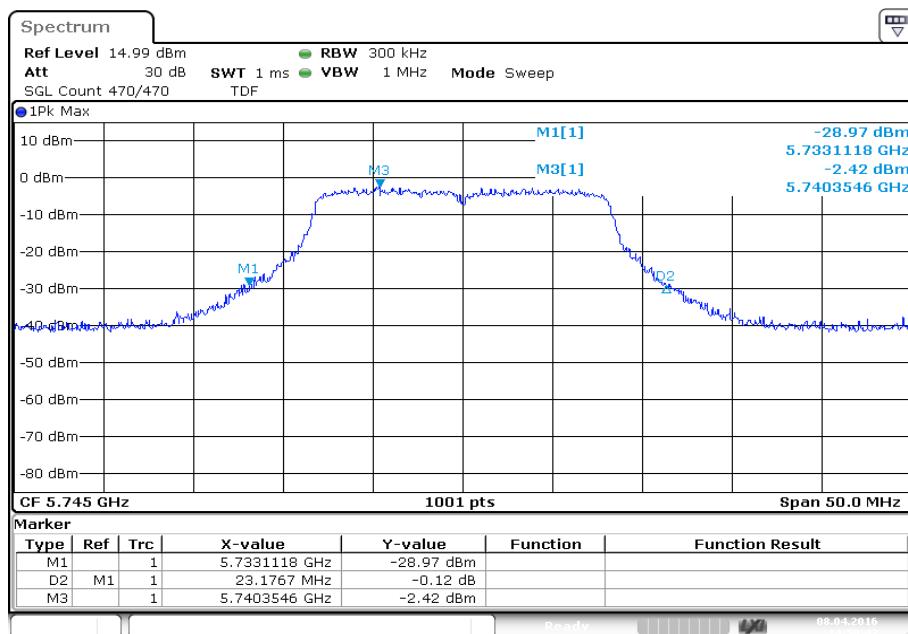


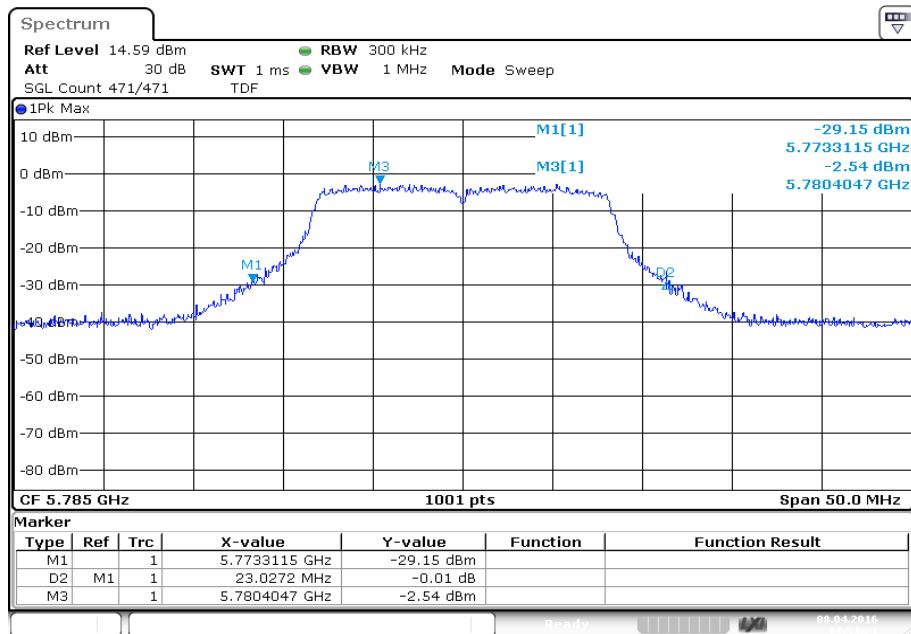
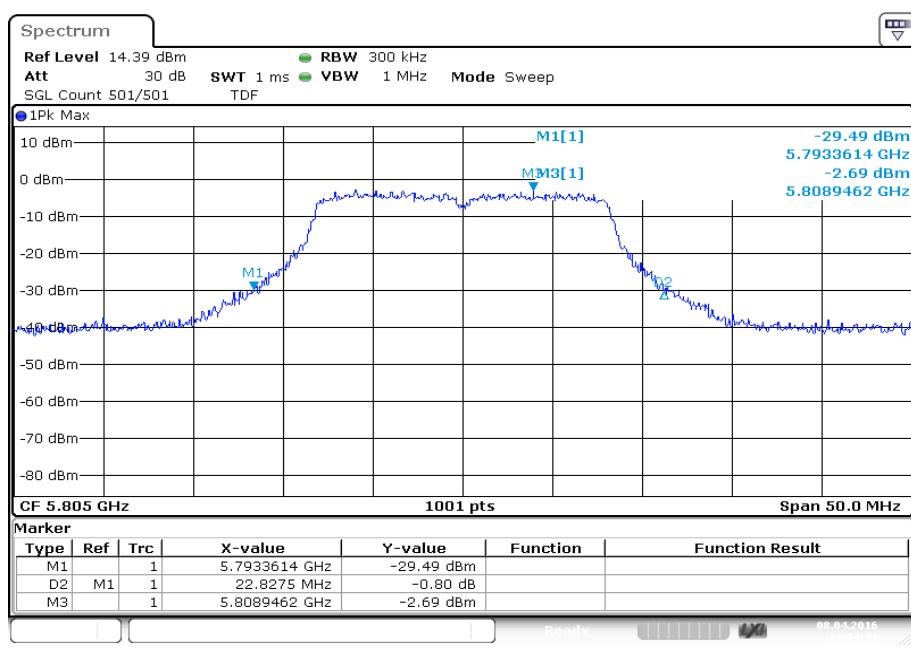
Plot 2: 5200 MHz

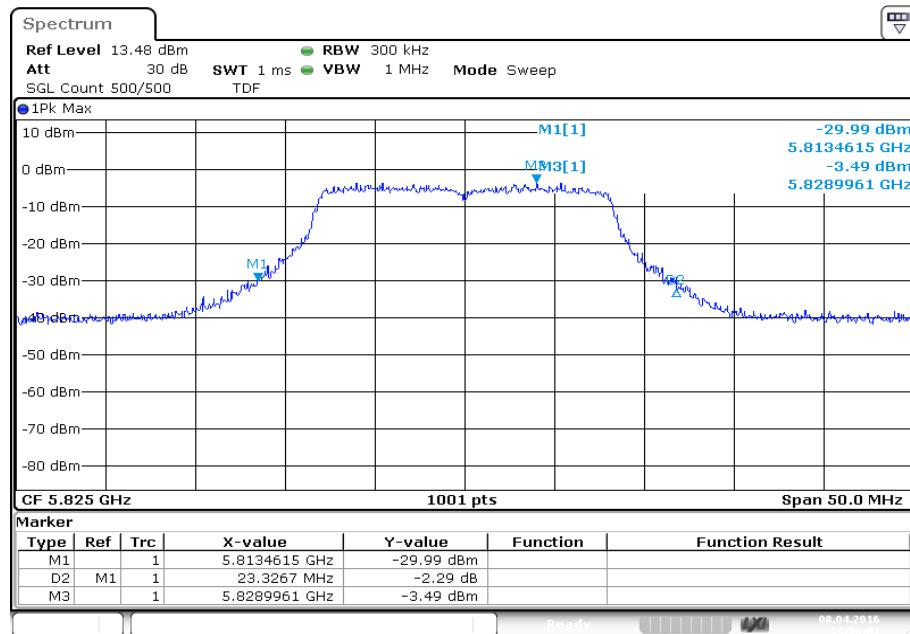


Plot 3: 5300 MHz**Plot 4: 5320 MHz**

Plot 5: 5500 MHz**Plot 6: 5600 MHz**

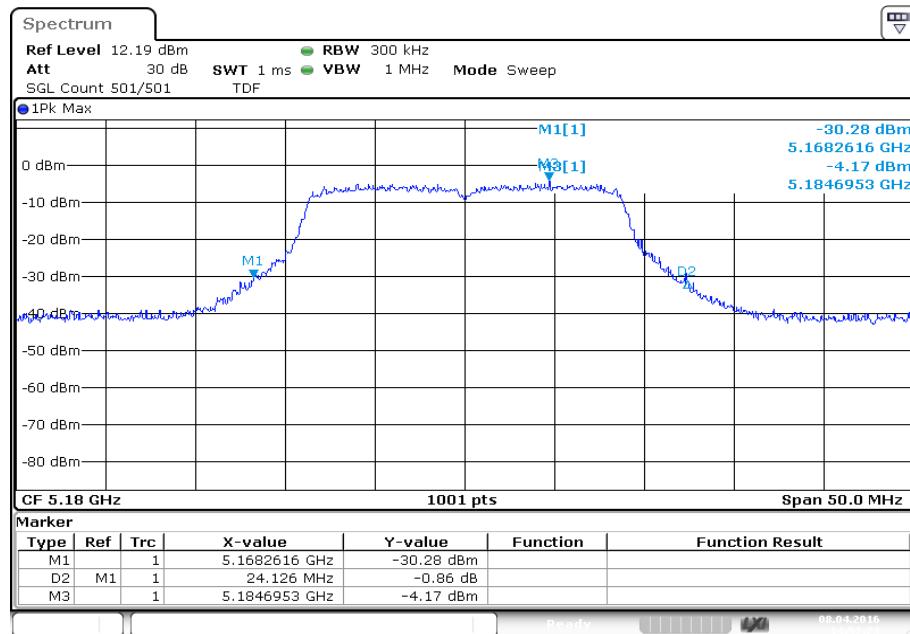
Plot 7: 5700 MHz**Plot 8: 5745 MHz**

Plot 9: 5785 MHz**Plot 10: 5805 MHz**

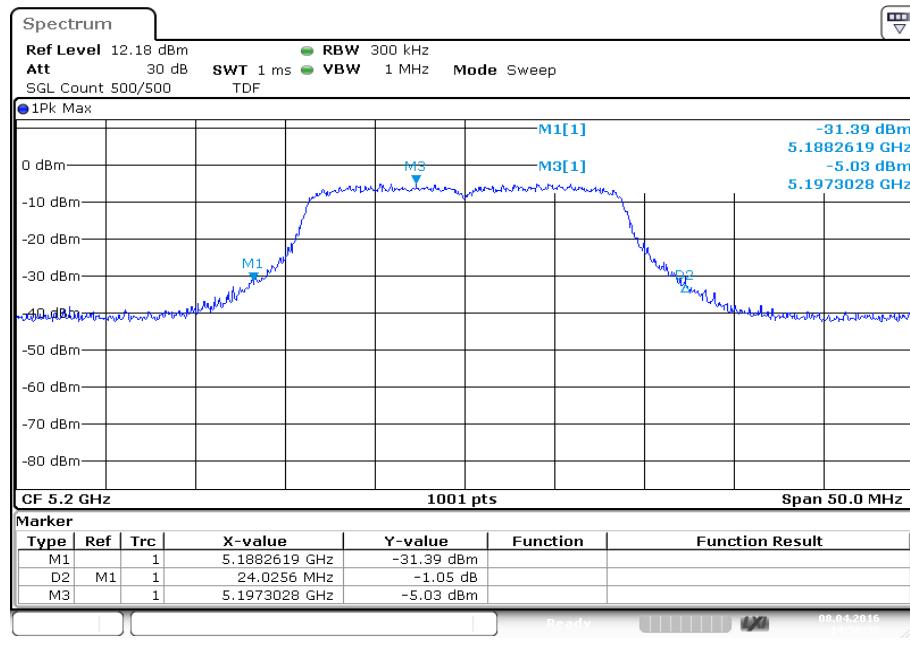
Plot 11: 5825 MHz

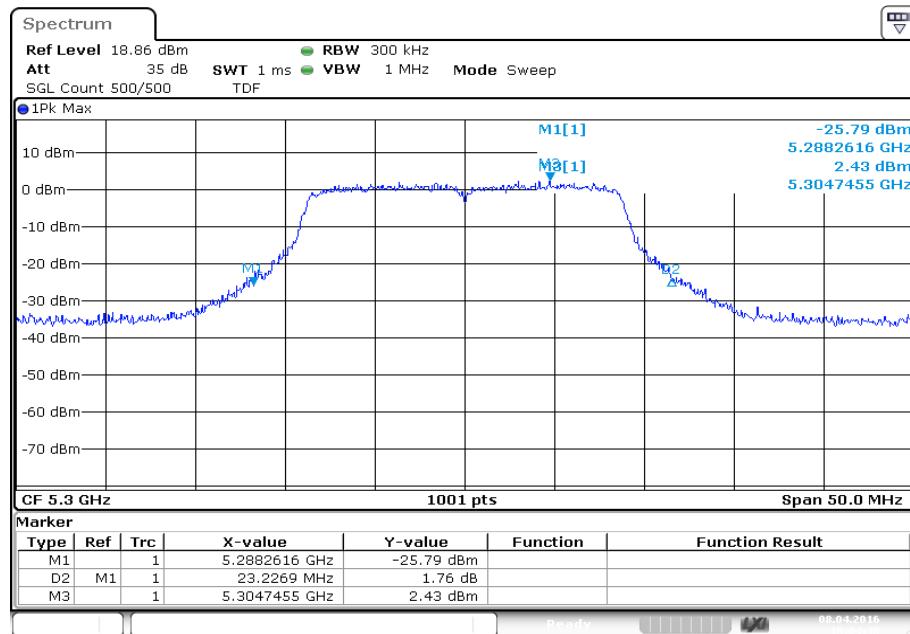
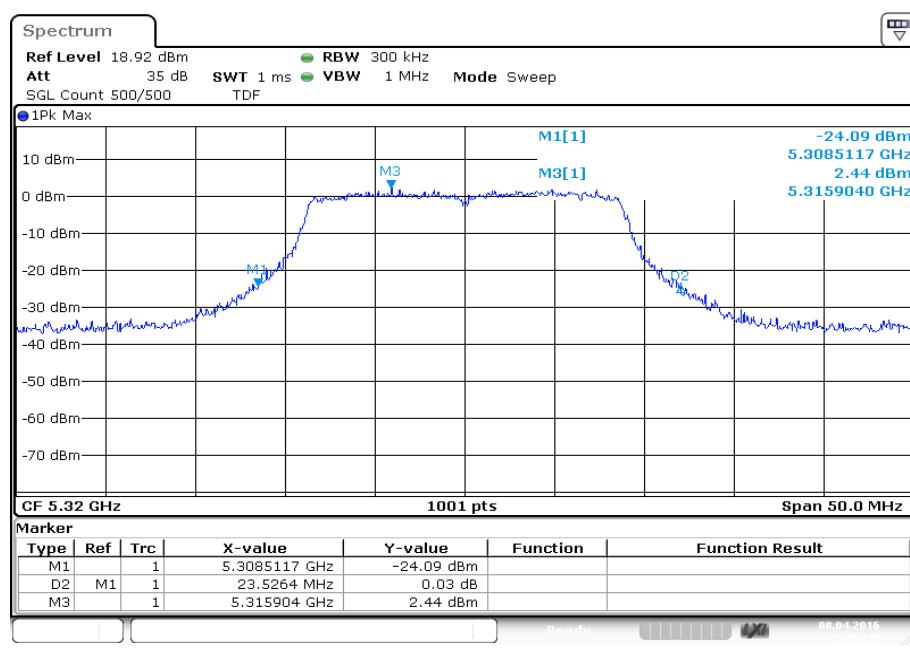
Plots: OFDM / n HT20 – mode, antenna port 1

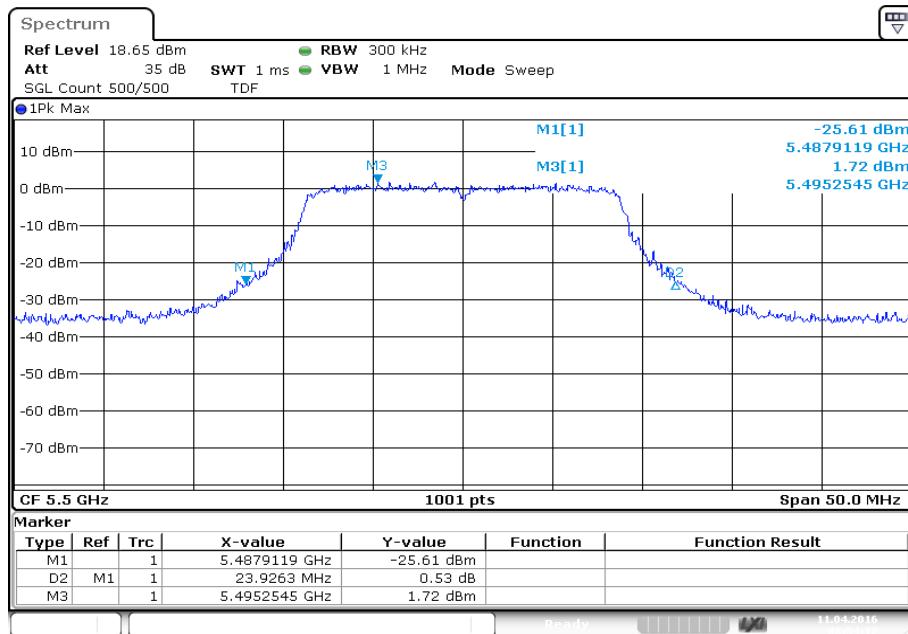
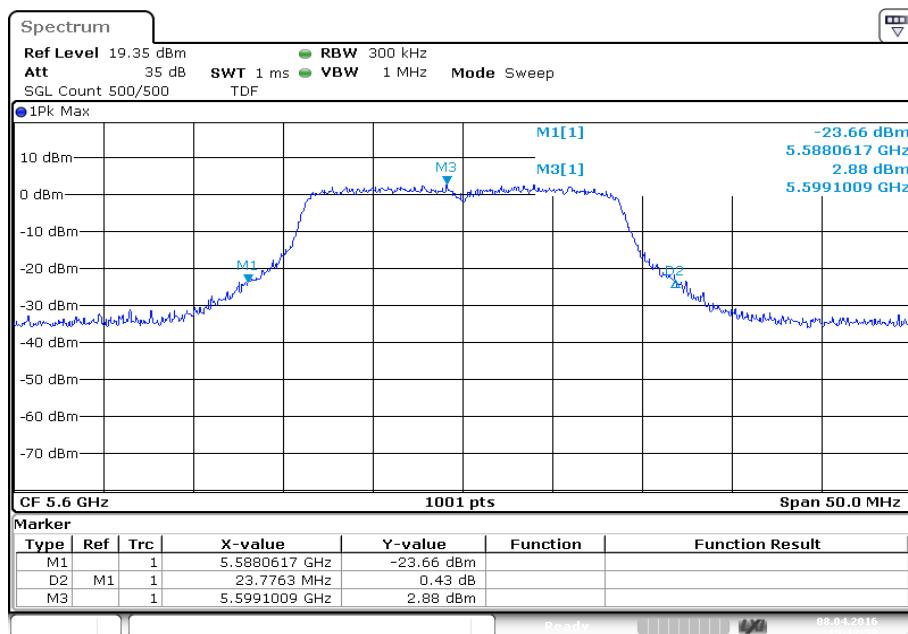
Plot 1: 5180 MHz

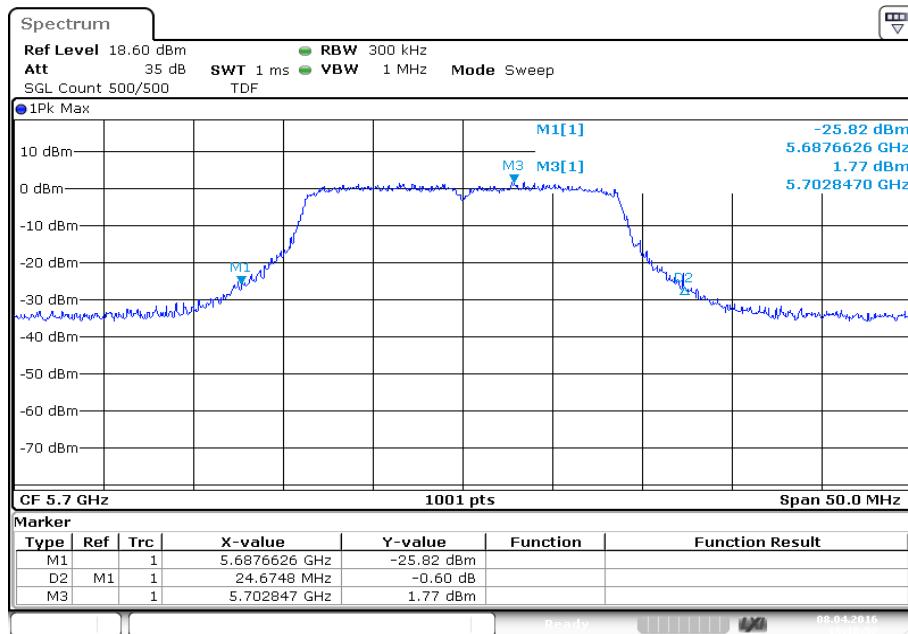
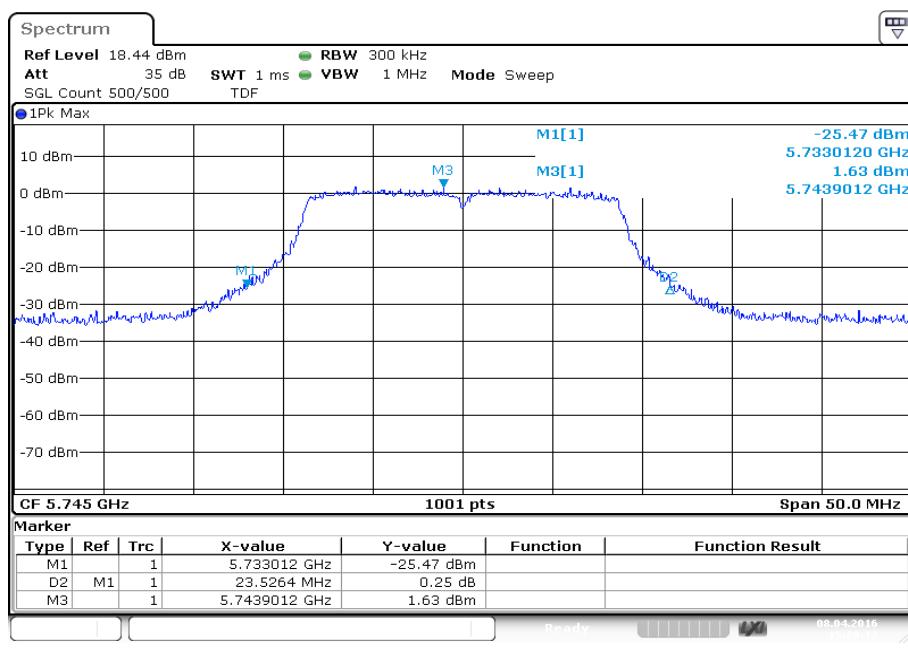


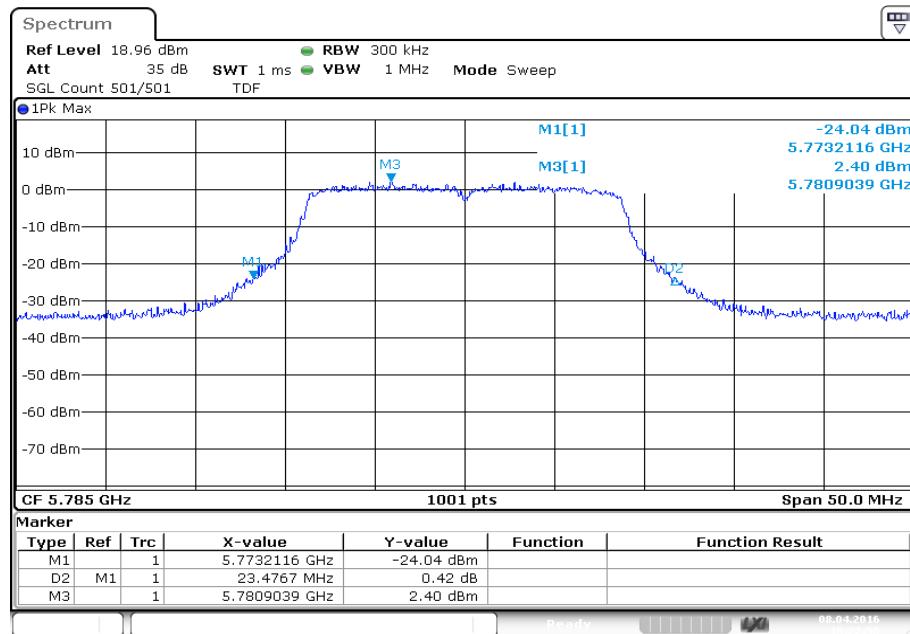
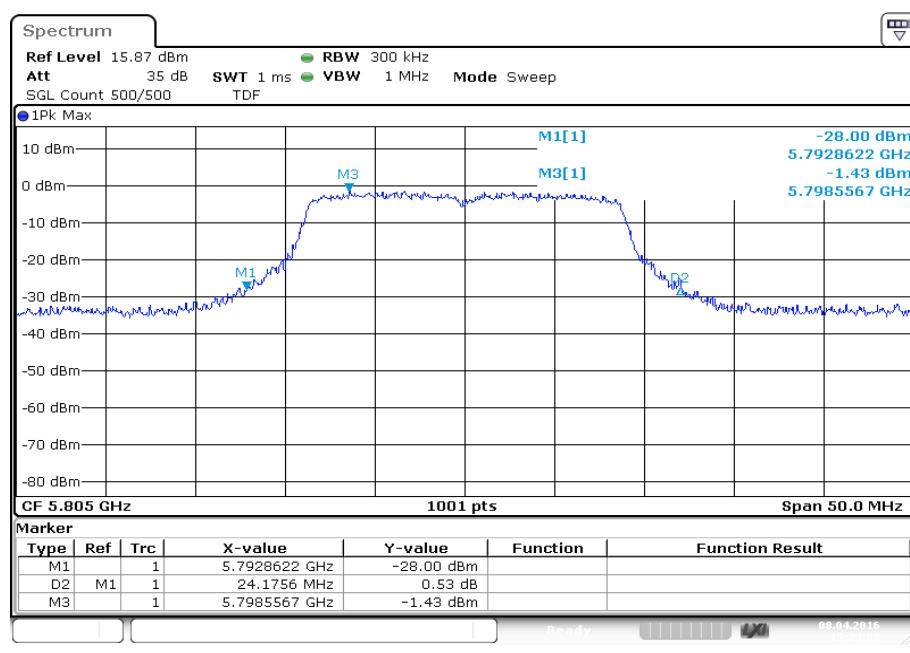
Plot 2: 5200 MHz

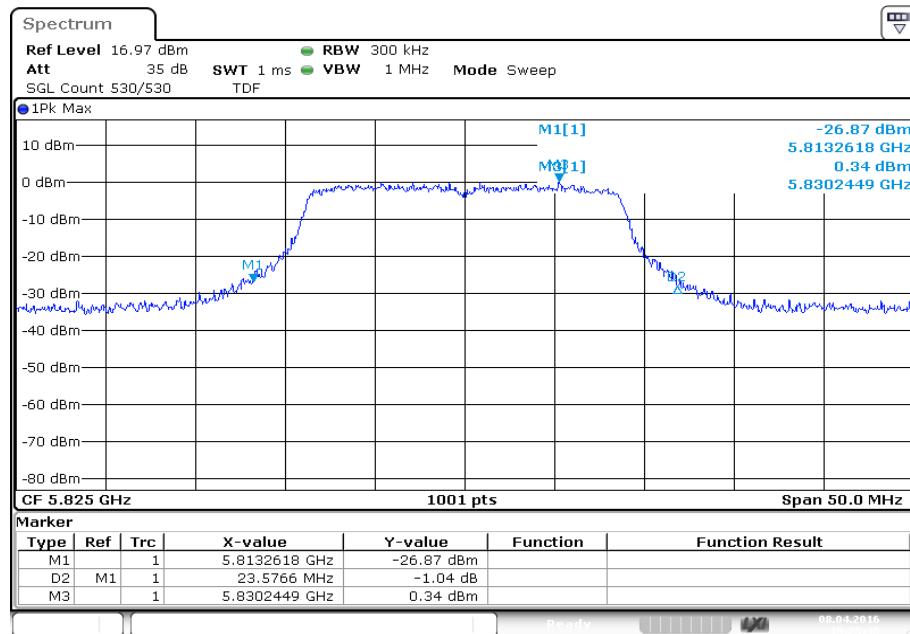


Plot 3: 5300 MHz**Plot 4: 5320 MHz**

Plot 5: 5500 MHz**Plot 6: 5600 MHz**

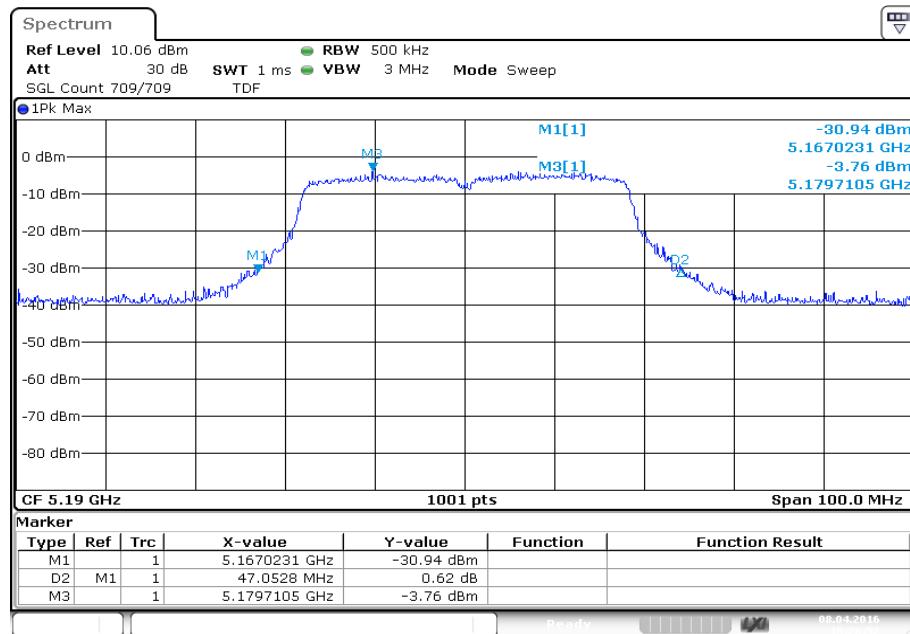
Plot 7: 5700 MHz**Plot 8:** 5745 MHz

Plot 9: 5785 MHz**Plot 10: 5805 MHz**

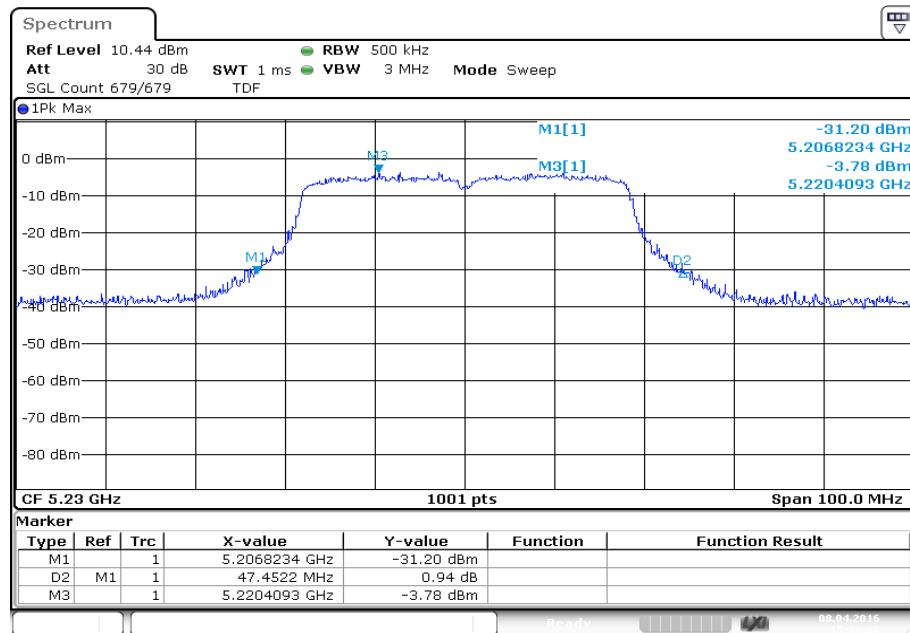
Plot 11: 5825 MHz

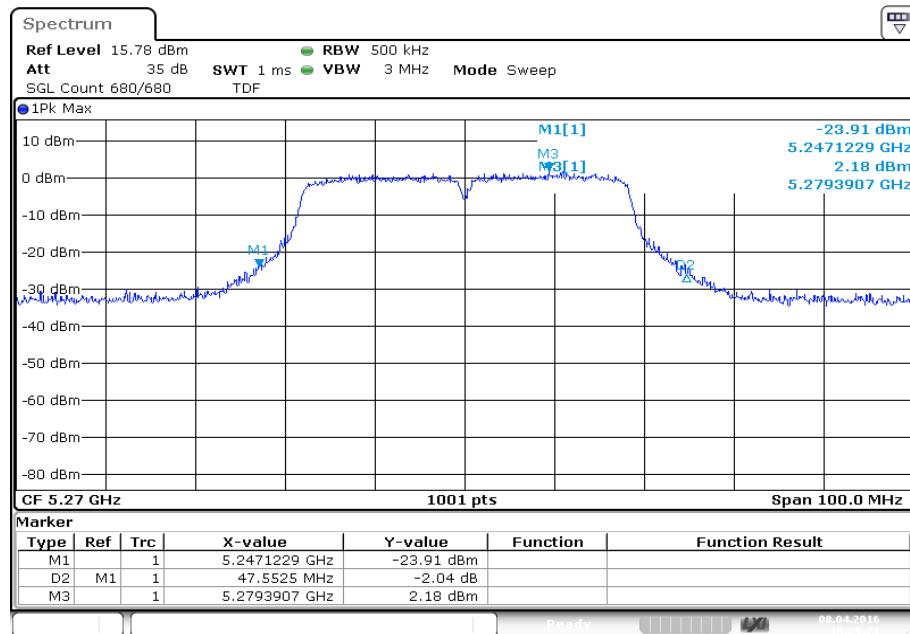
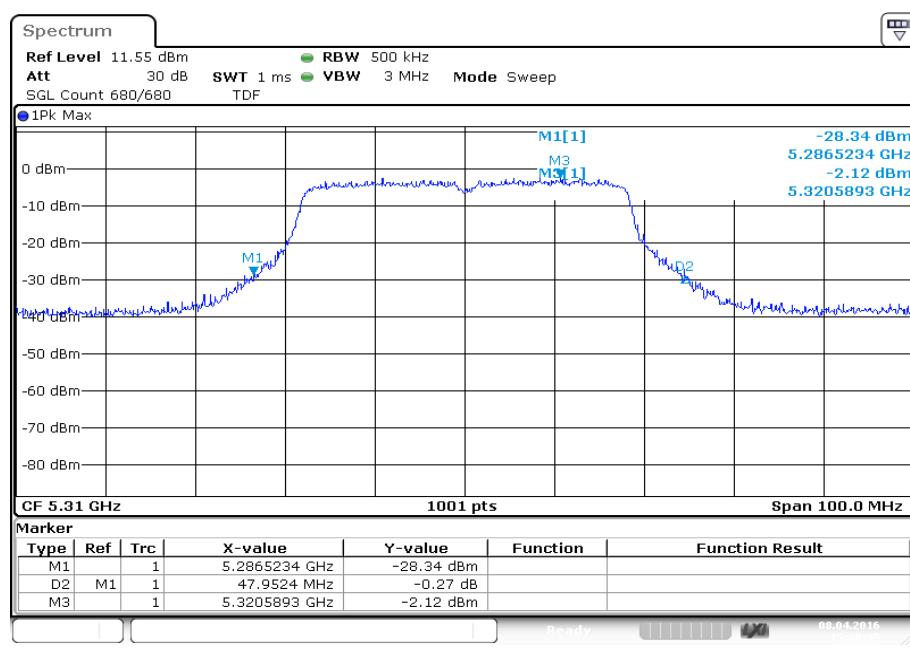
Plots: OFDM / n HT40 – mode, antenna port 1

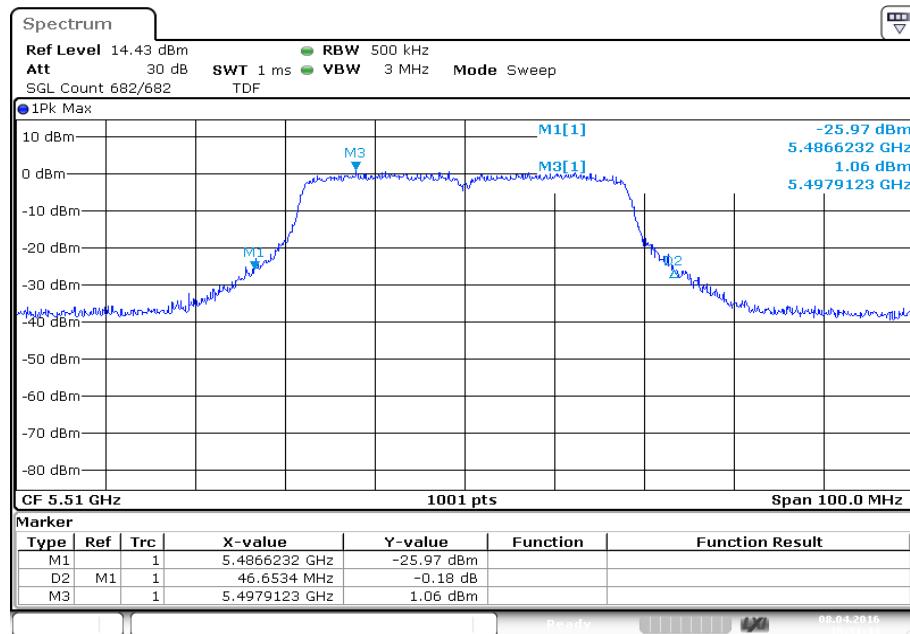
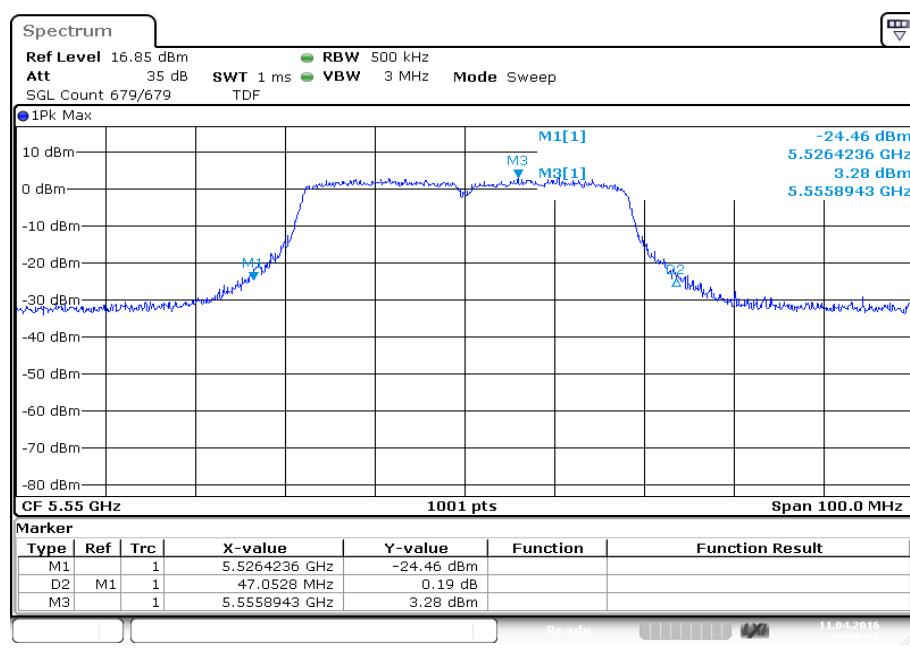
Plot 1: 5190 MHz

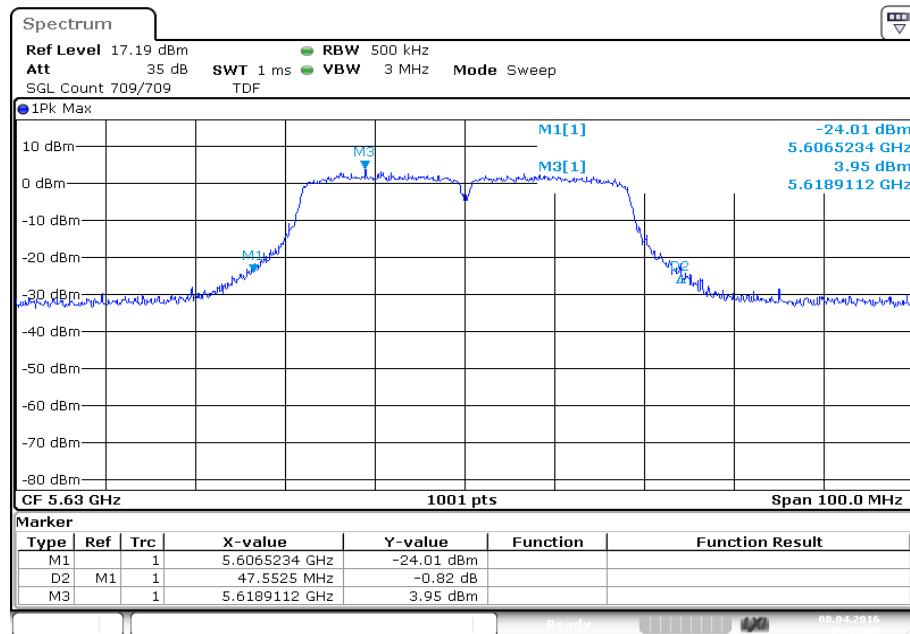
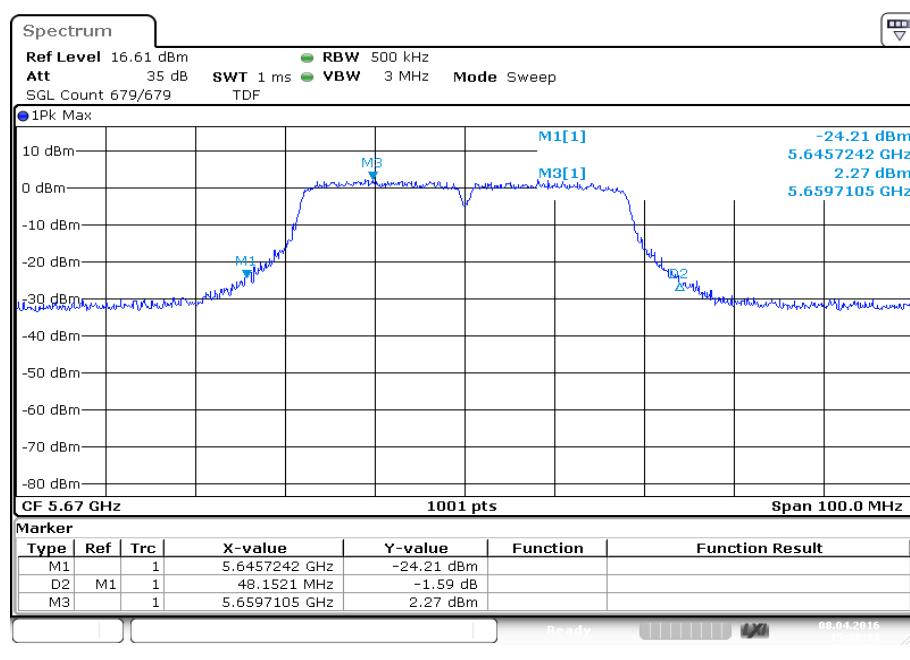


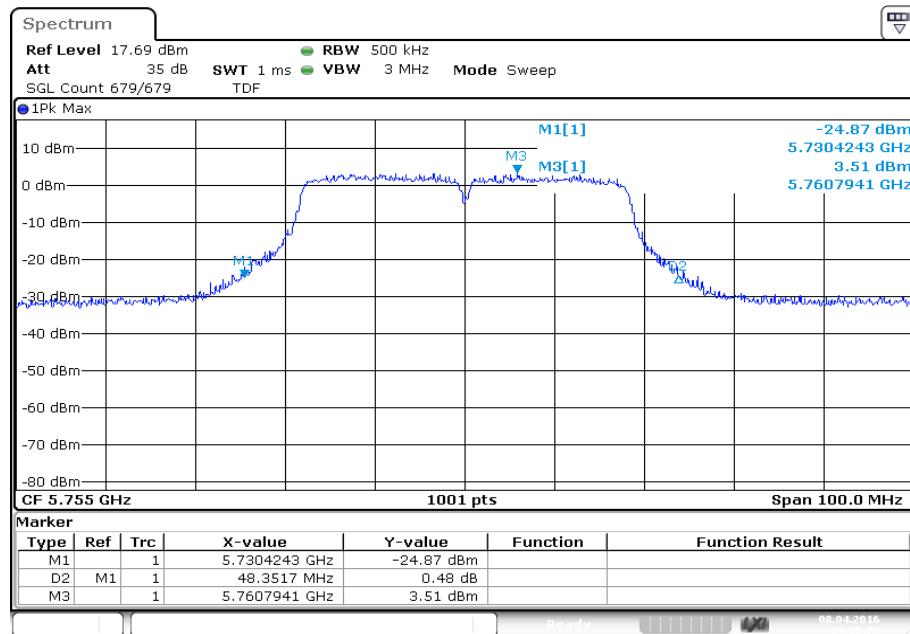
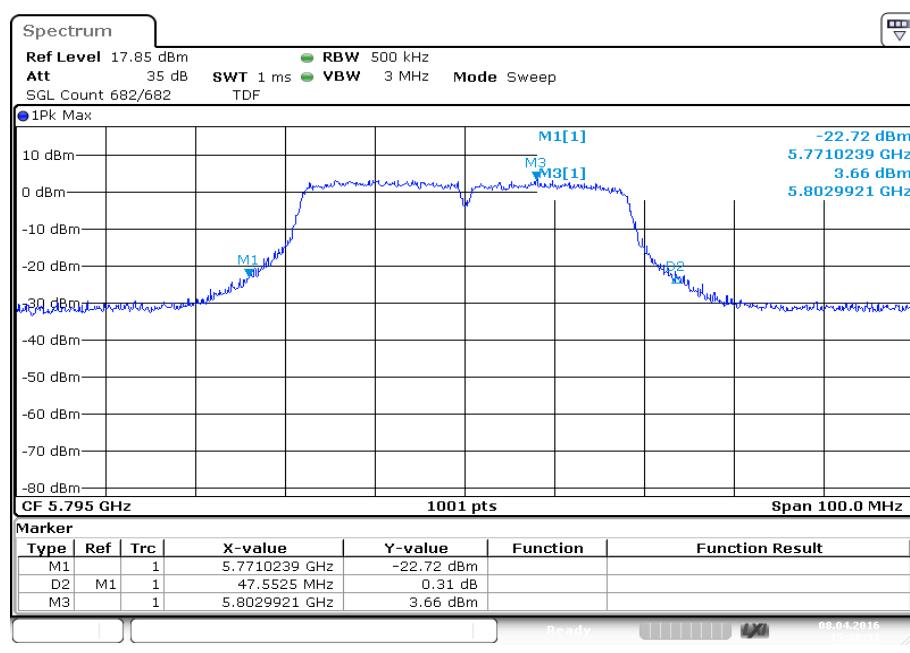
Plot 2: 5230 MHz



Plot 3: 5270 MHz**Plot 4: 5310 MHz**

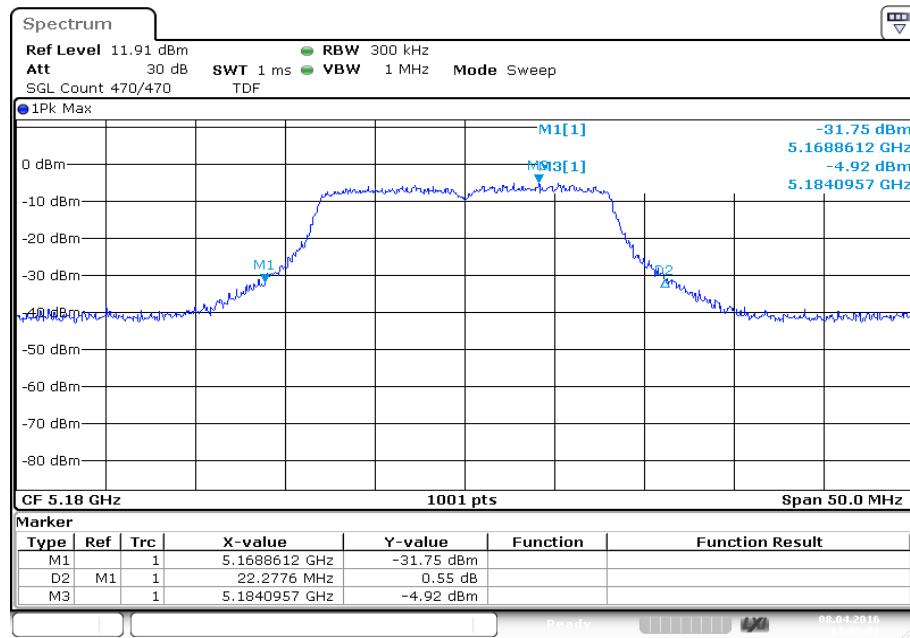
Plot 5: 5510 MHz**Plot 6: 5550 MHz**

Plot 7: 5630 MHz**Plot 8:** 5670 MHz

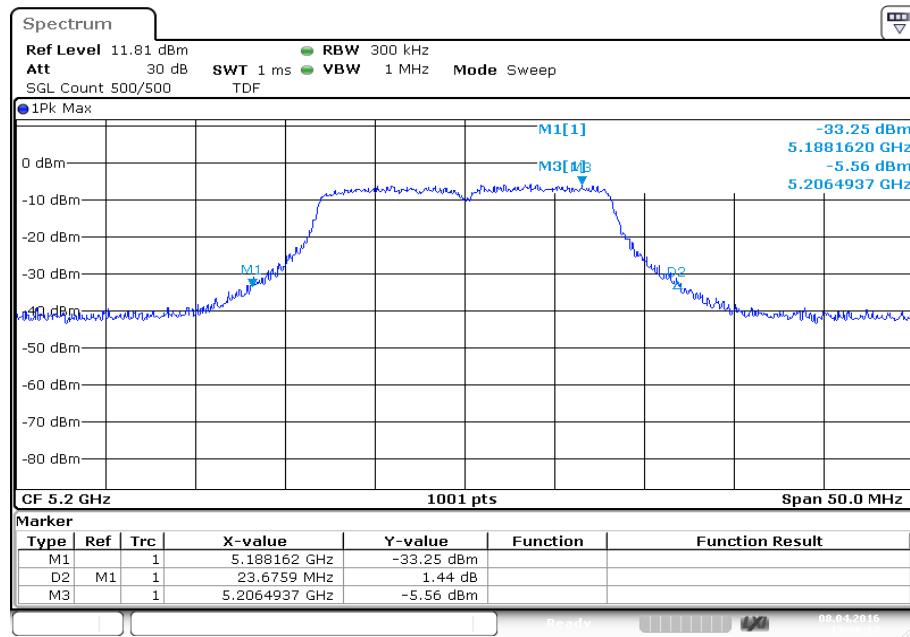
Plot 9: 5755 MHz**Plot 10: 5795 MHz**

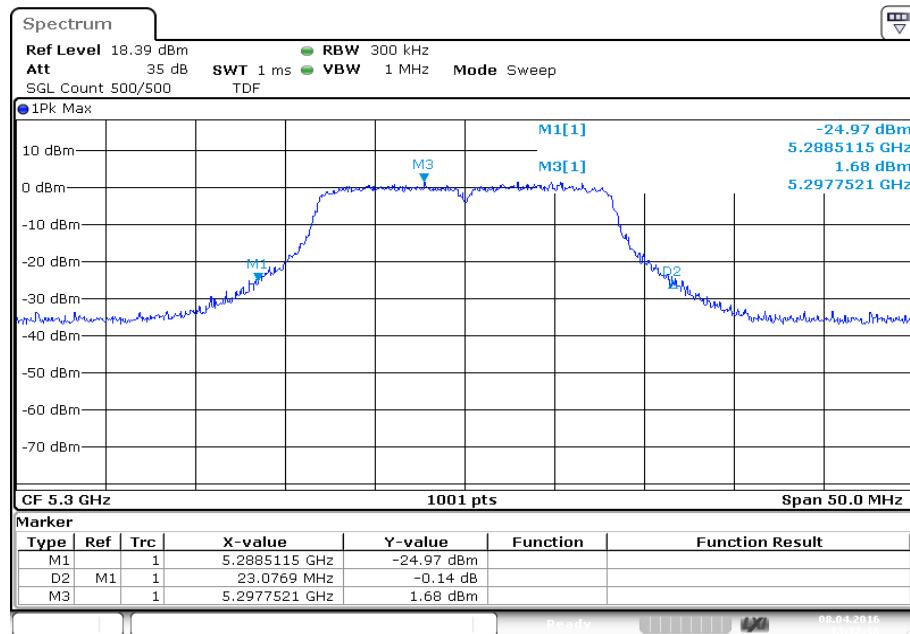
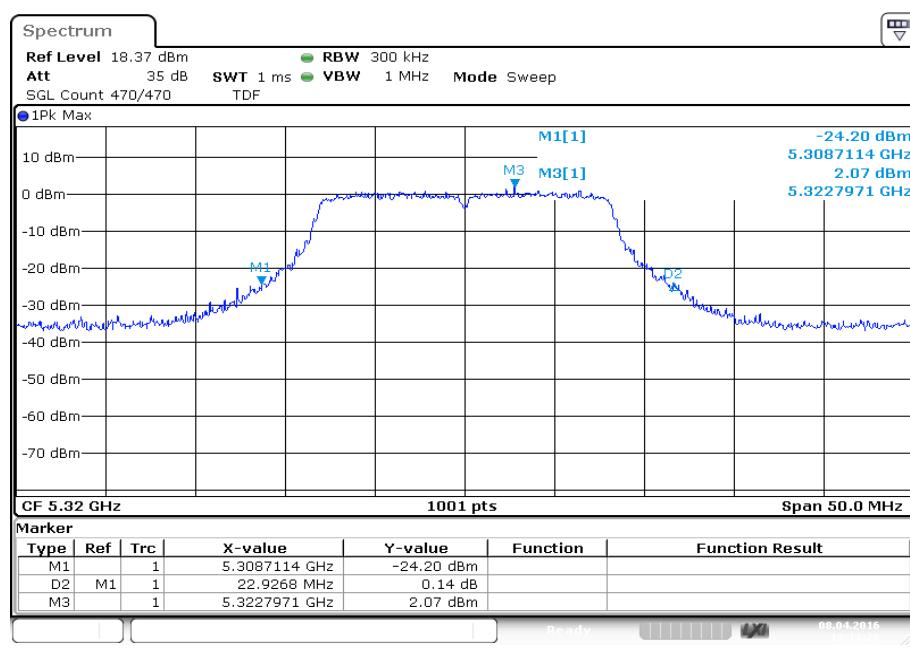
Plots: OFDM / a – mode, antenna port 2

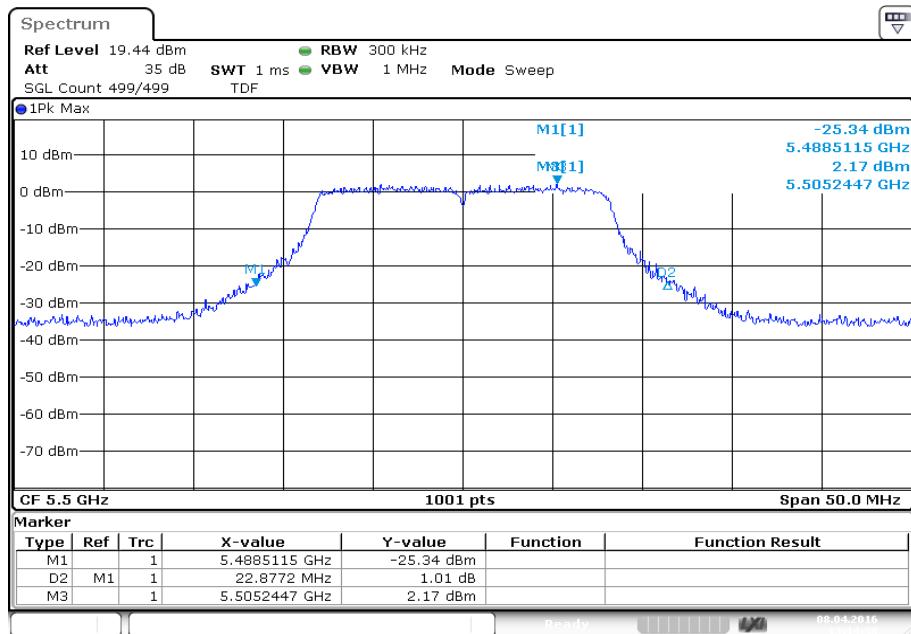
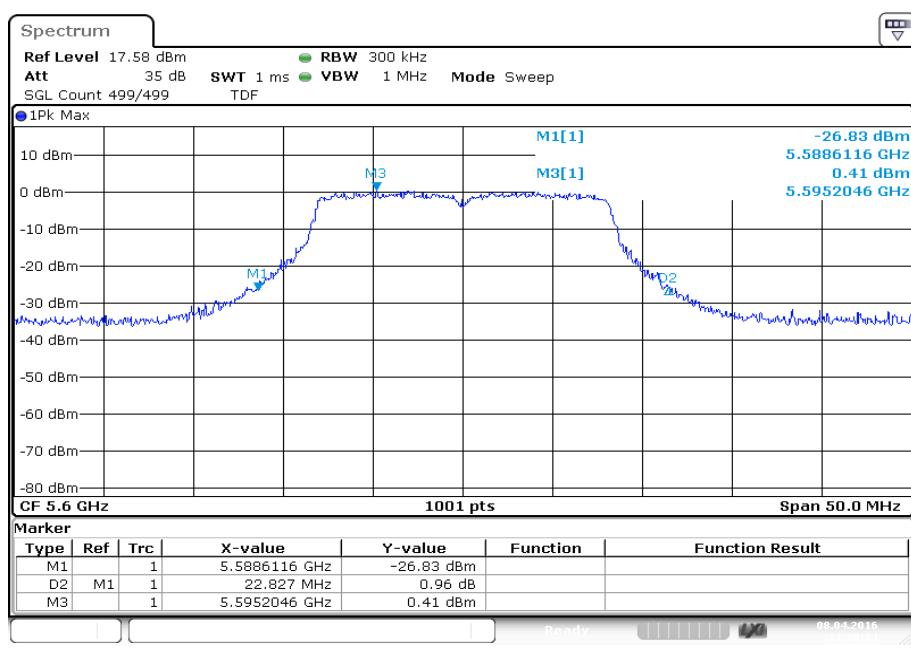
Plot 12: 5180 MHz

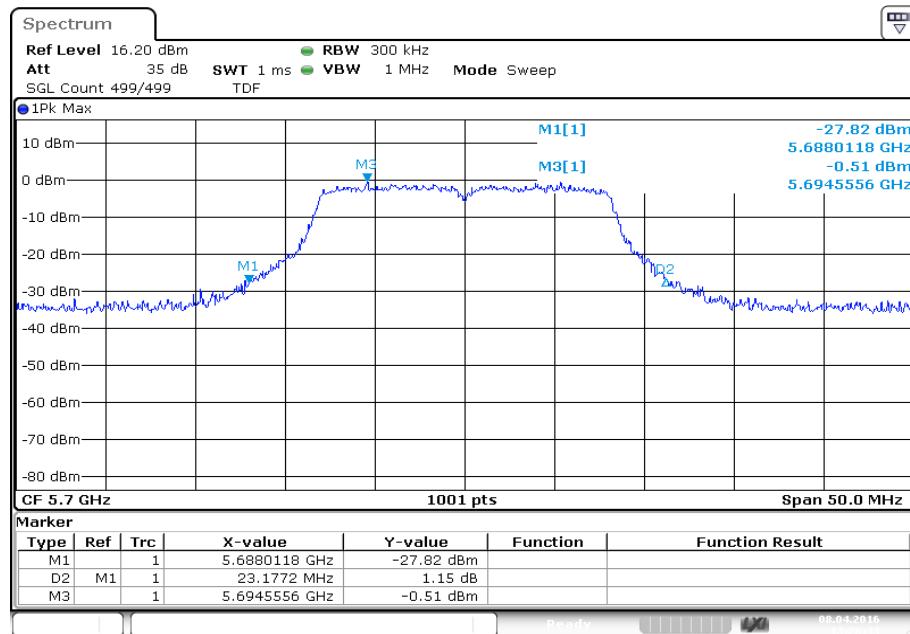
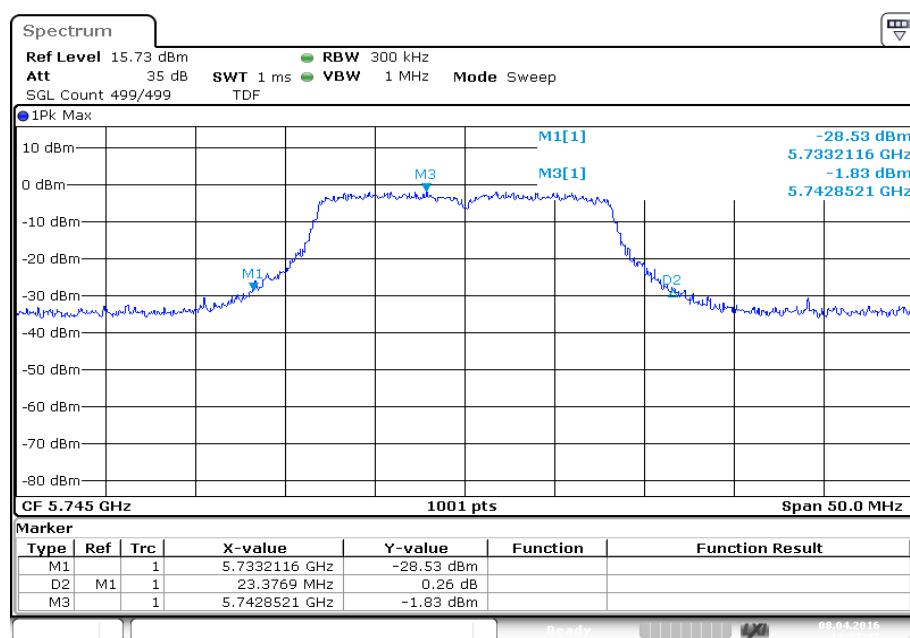


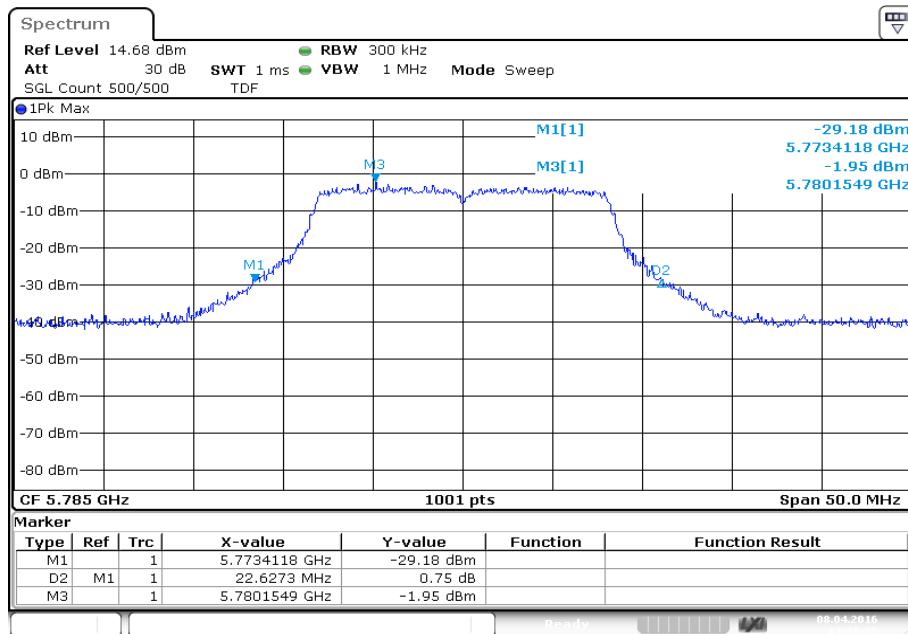
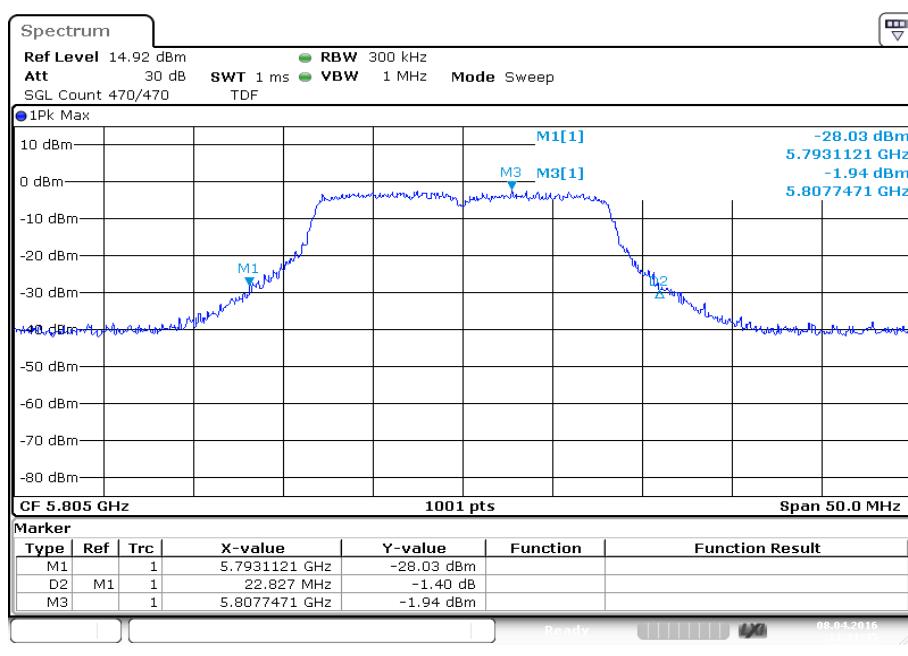
Plot 13: 5200 MHz

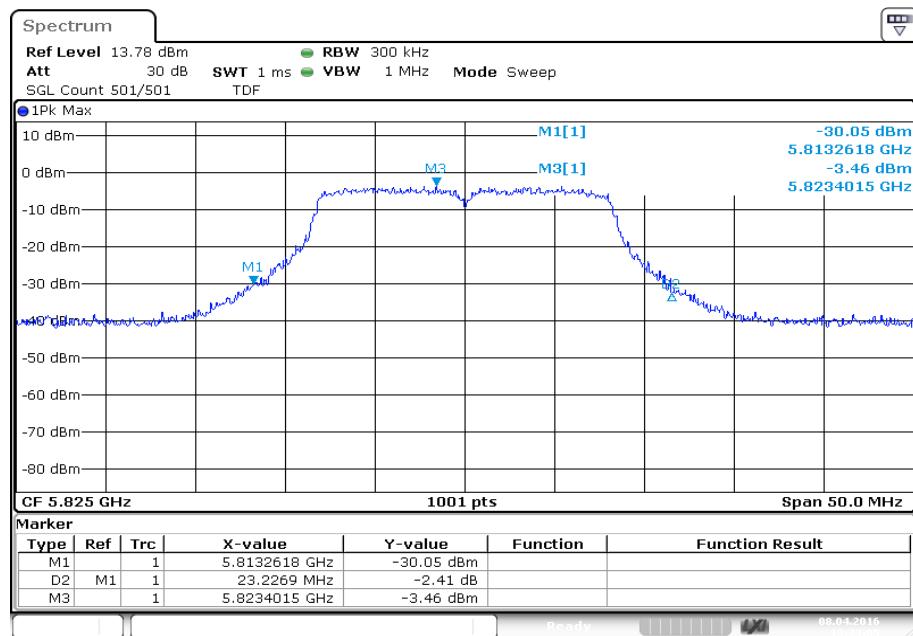


Plot 14: 5300 MHz**Plot 15: 5320 MHz**

Plot 16: 5500 MHz**Plot 17: 5600 MHz**

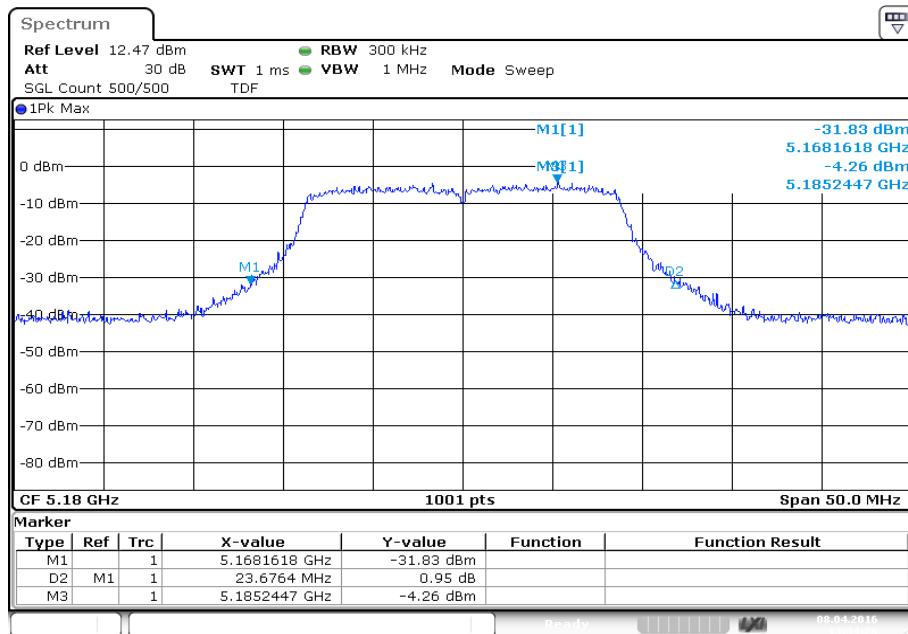
Plot 18: 5700 MHz**Plot 19:** 5745 MHz

Plot 20: 5785 MHz**Plot 21: 5805 MHz**

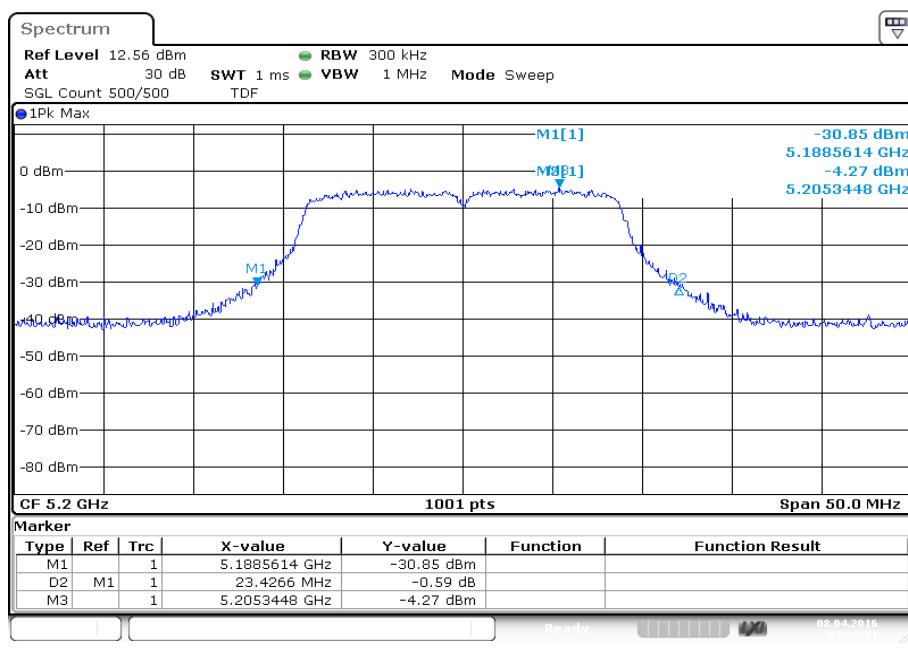
Plot 22: 5825 MHz

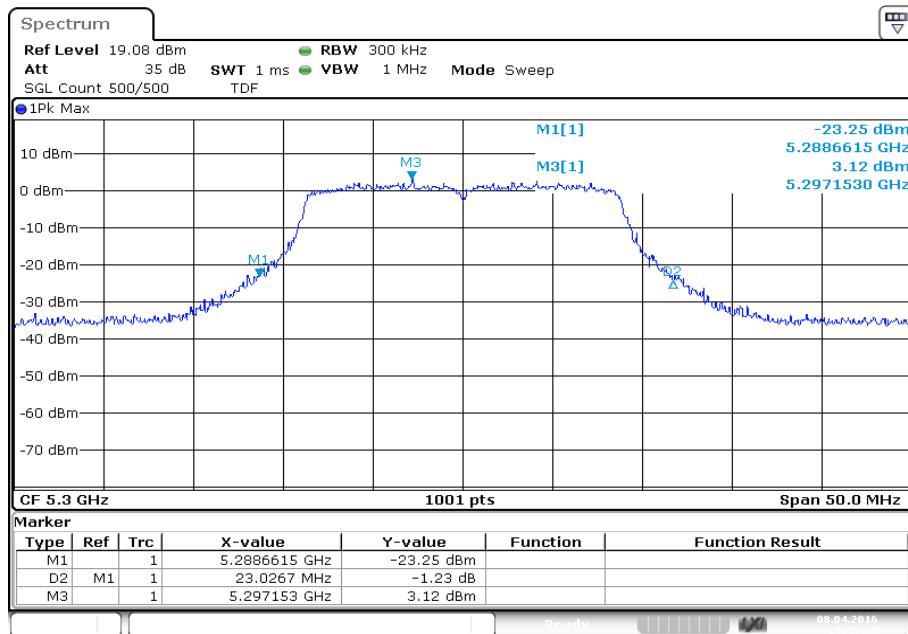
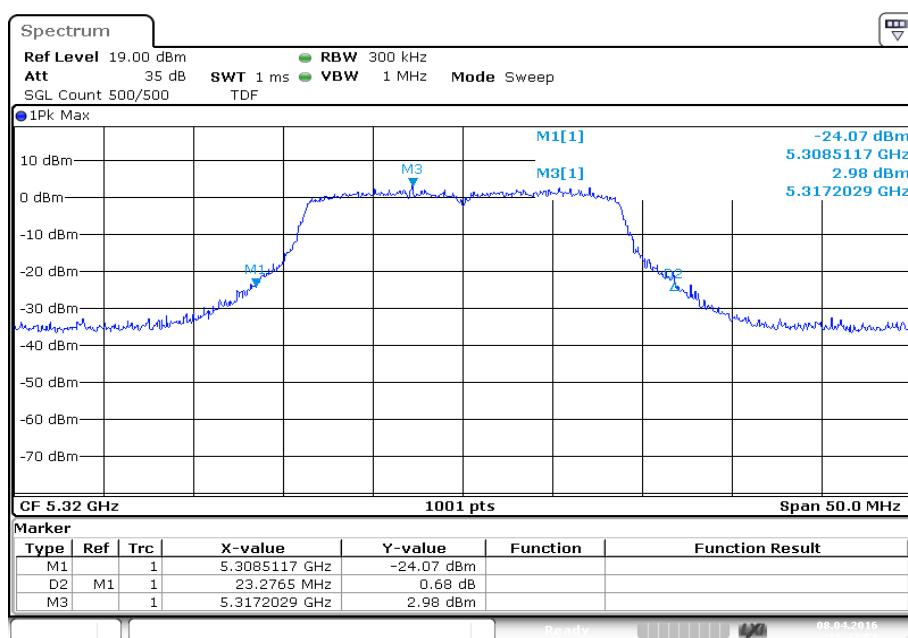
Plots: OFDM / n HT20 – mode, antenna port 2

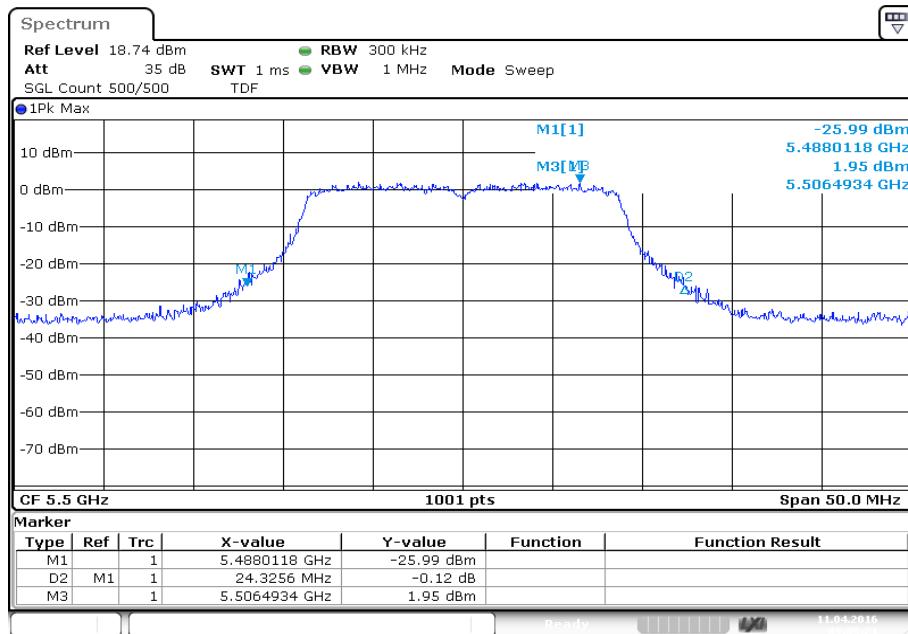
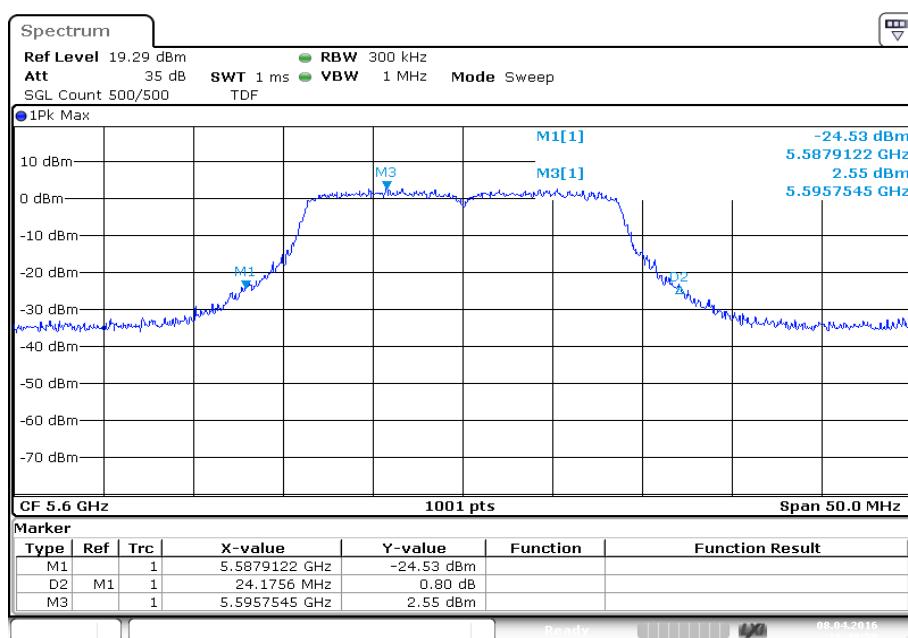
Plot 12: 5180 MHz

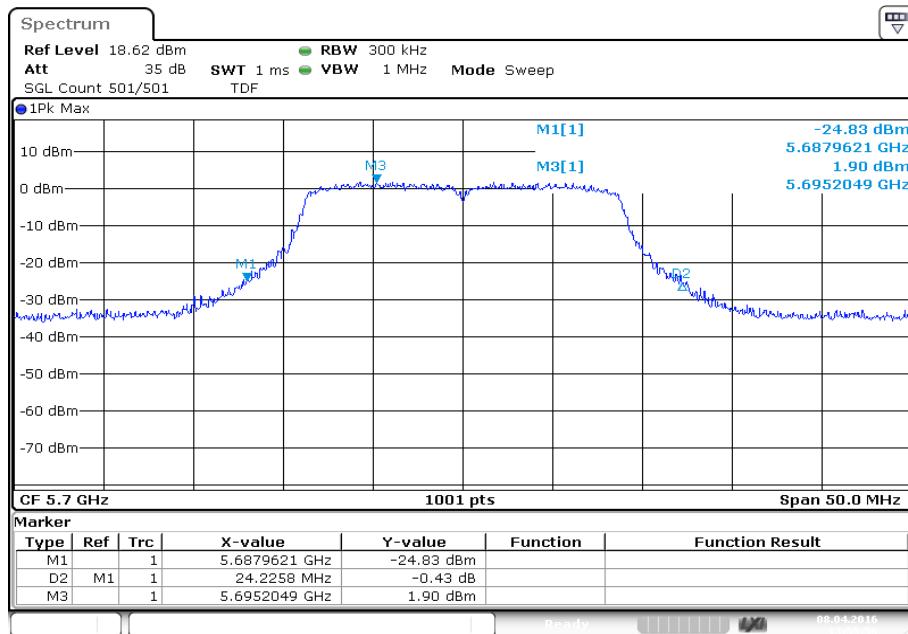
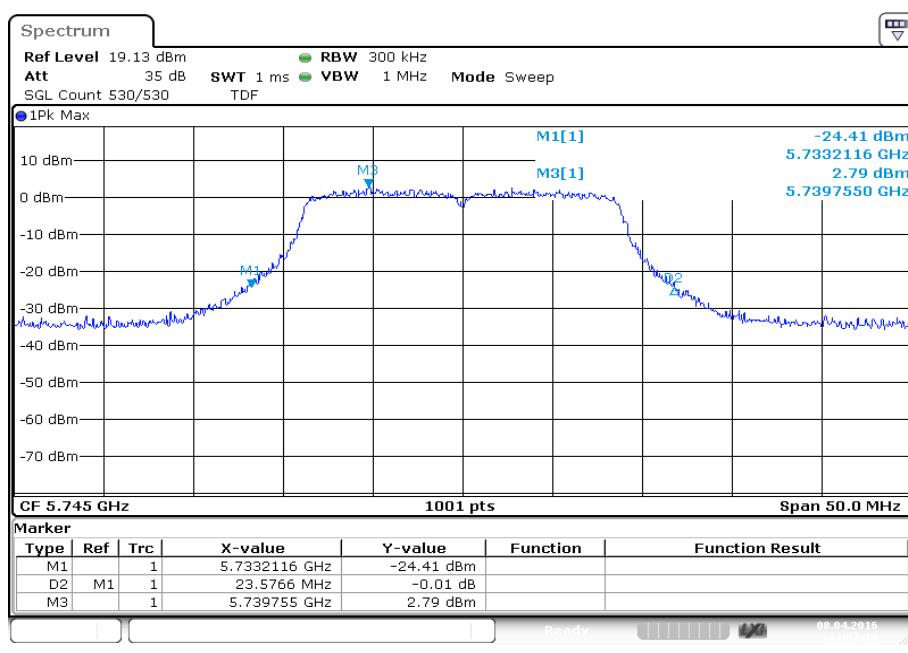


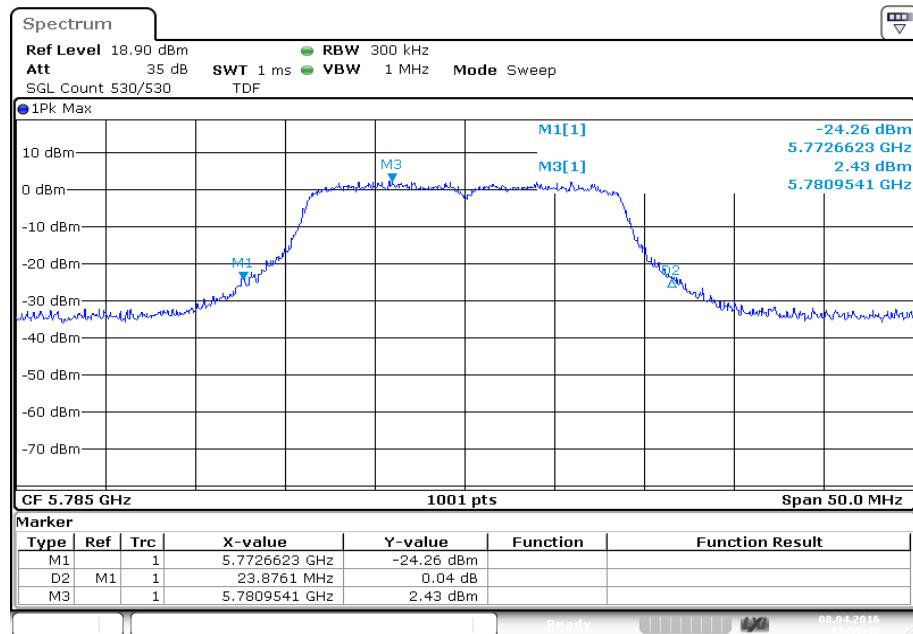
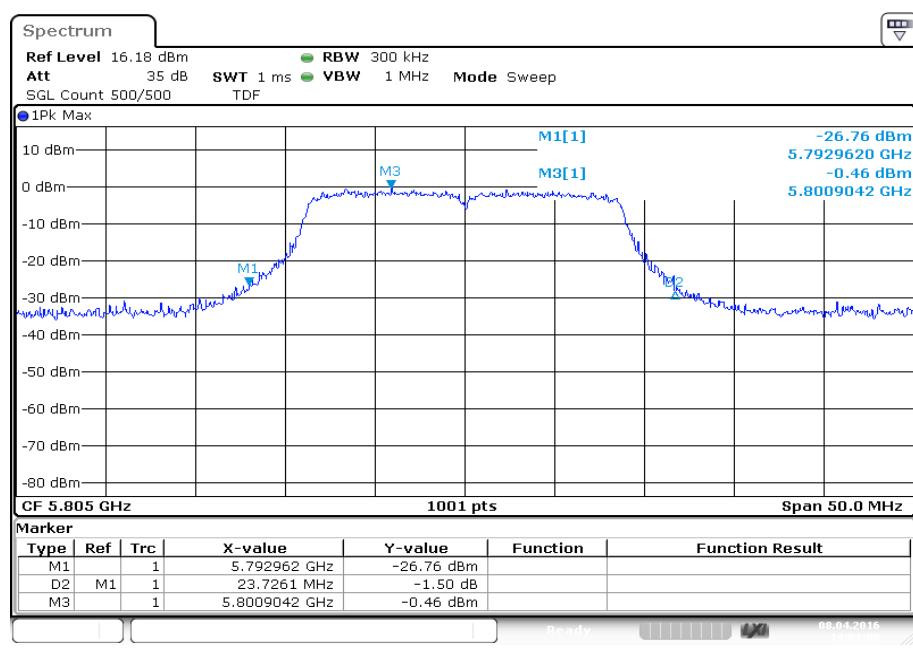
Plot 13: 5200 MHz

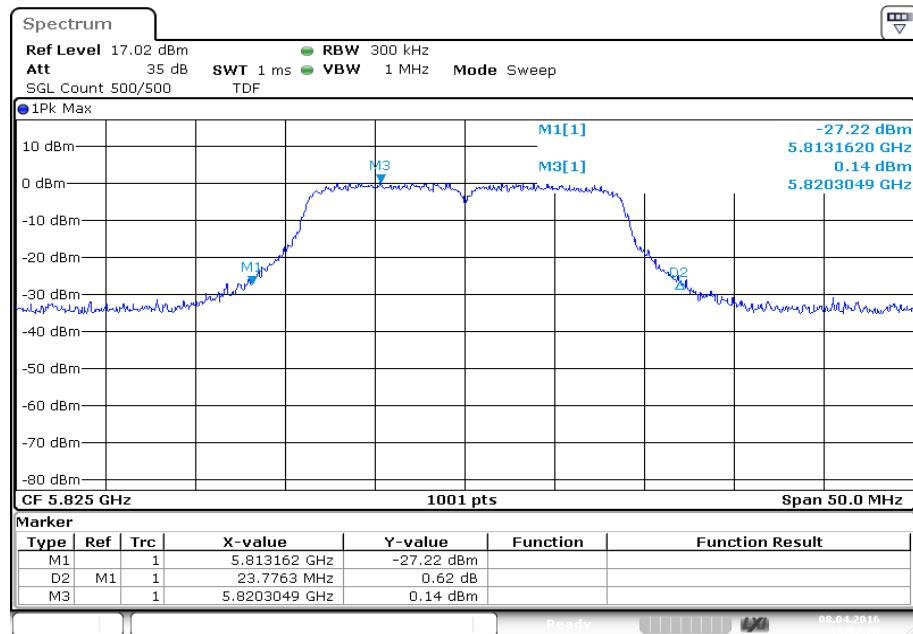


Plot 14: 5300 MHz**Plot 15:** 5320 MHz

Plot 16: 5500 MHz**Plot 17: 5600 MHz**

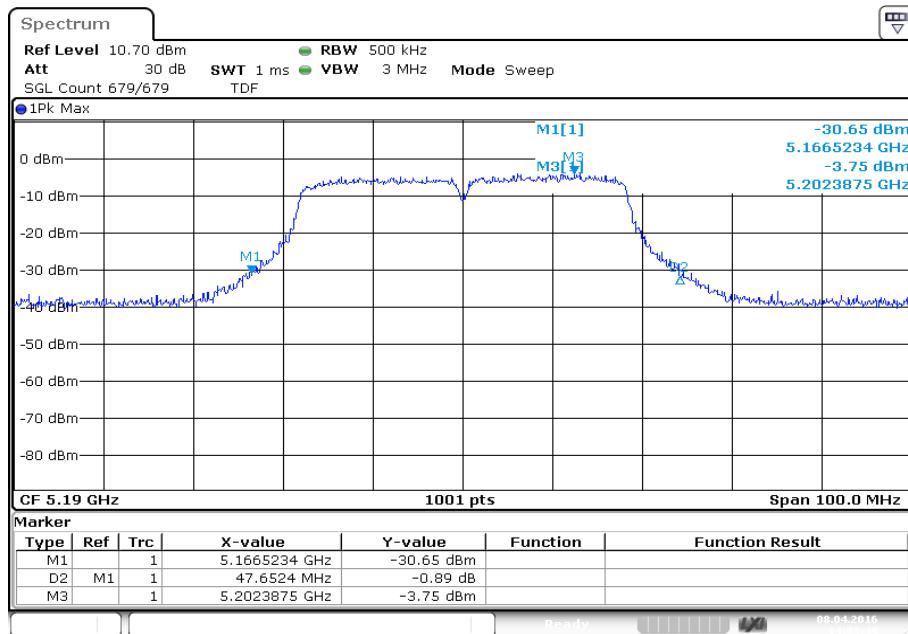
Plot 18: 5700 MHz**Plot 19: 5745 MHz**

Plot 20: 5785 MHz**Plot 21: 5805 MHz**

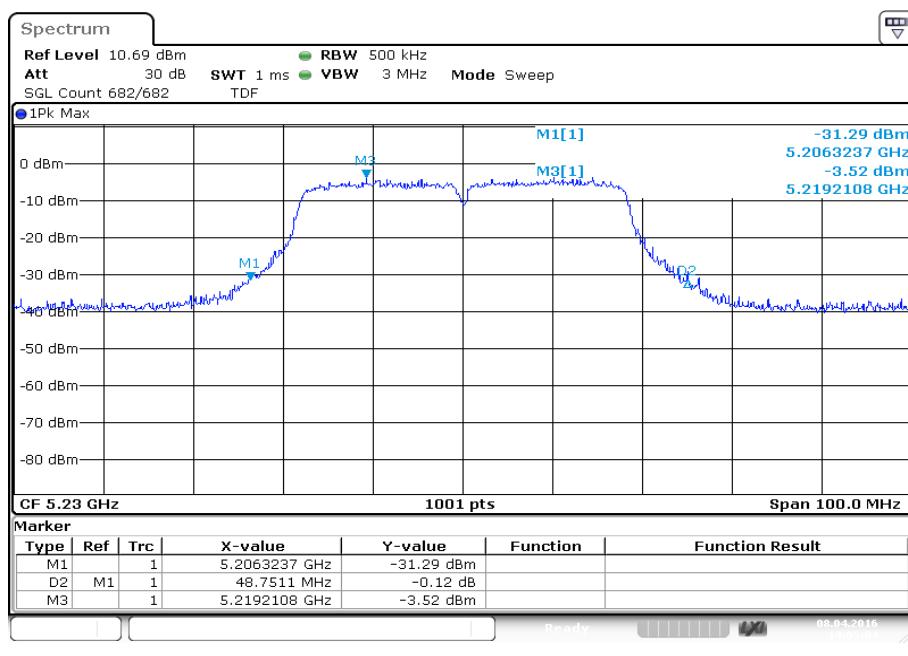
Plot 22: 5825 MHz

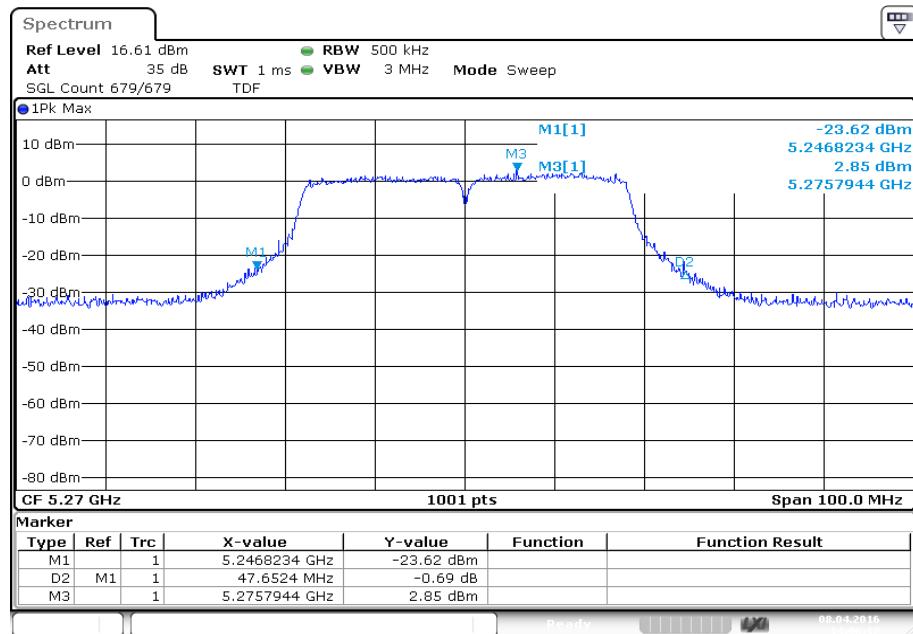
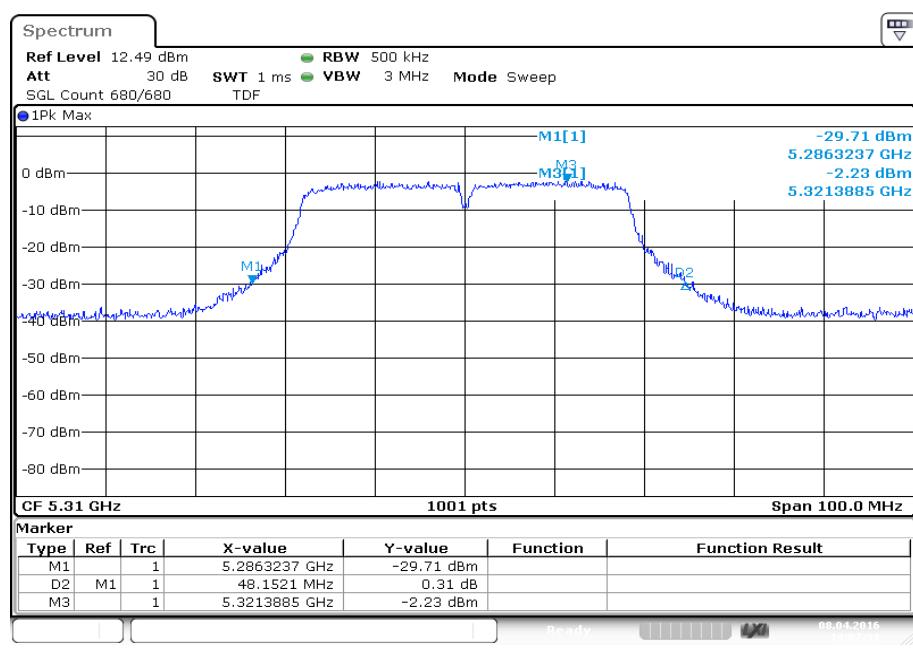
Plots: OFDM / n HT40 – mode, antenna port 2

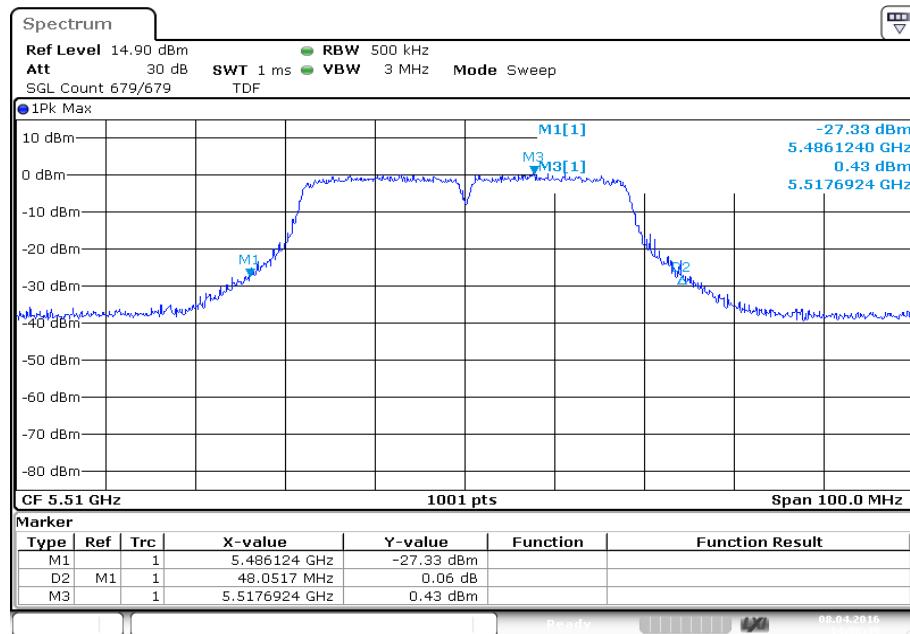
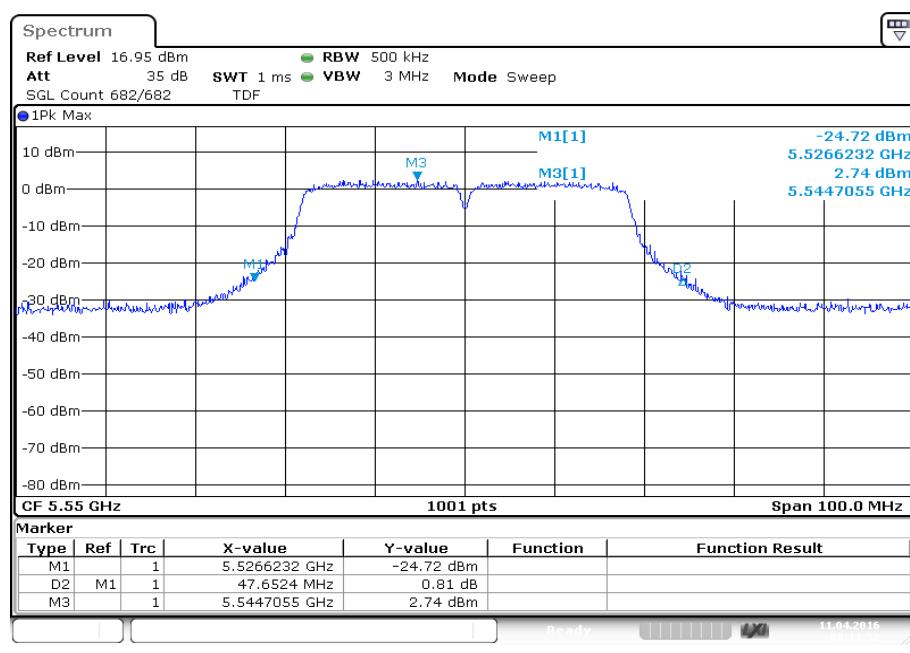
Plot 11: 5190 MHz

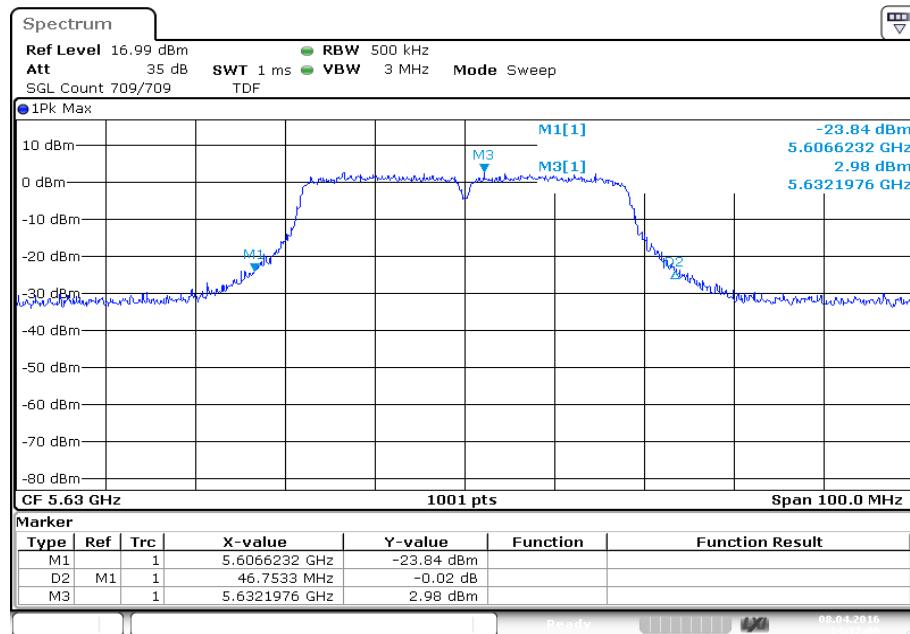
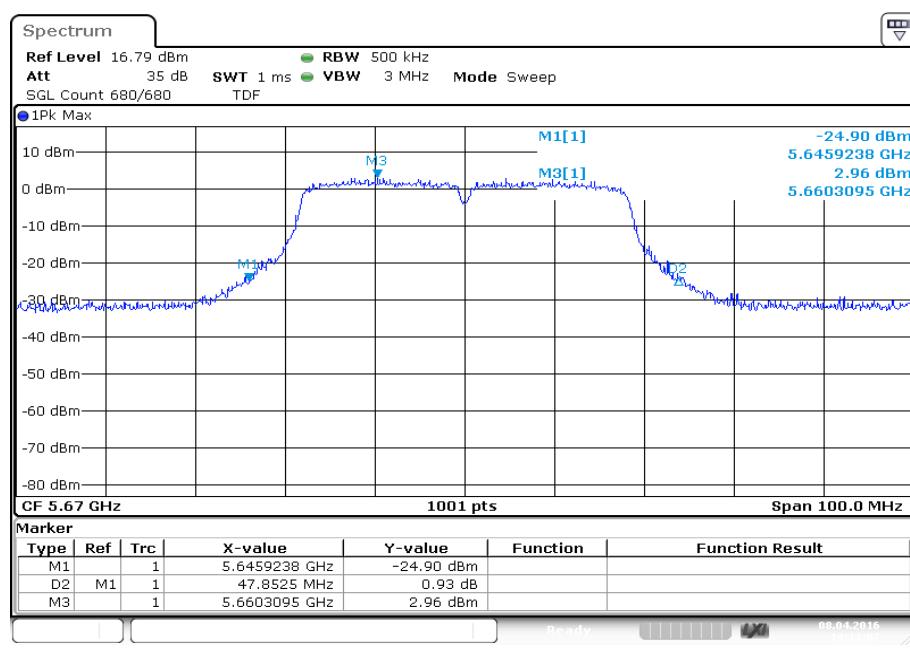


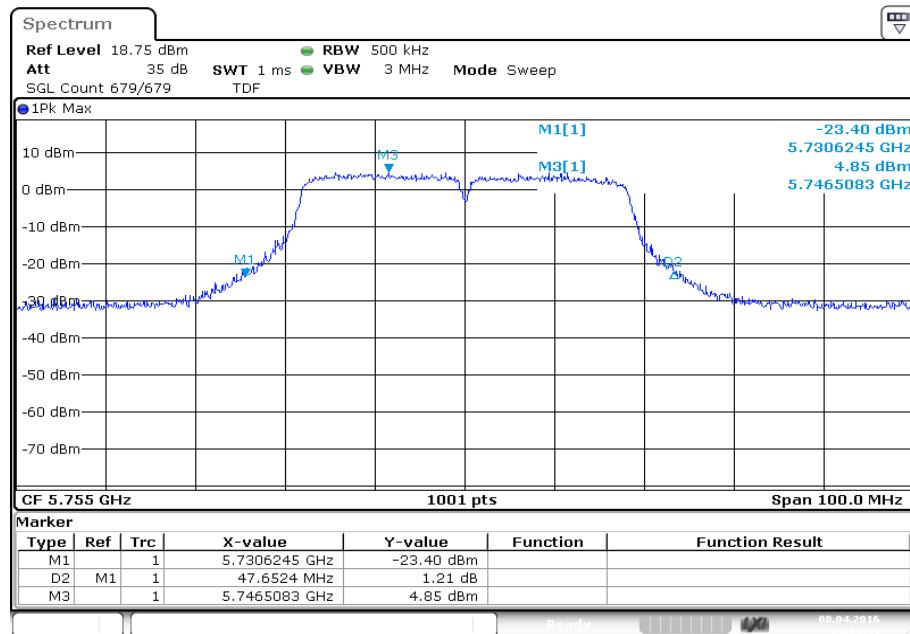
Plot 12: 5230 MHz



Plot 13: 5270 MHz**Plot 14:** 5310 MHz

Plot 15: 5510 MHz**Plot 16: 5550 MHz**

Plot 17: 5630 MHz**Plot 18: 5670 MHz**

Plot 19: 5755 MHz**Plot 20: 5795 MHz**