

TEST REPORT

Test report no.: 1-7682/14-01-03-B



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Area of Testing: Radio Communications & EMC (RCE)

Applicant

Echostar Technologies

90 Inverness Circle East

Englewood CO 80112 / USA

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Regulatory Compliance Engineer

e-mail: ian.schroeder@echostar.com

Phone: +1 303 706-5234

Manufacturer

Echostar Technologies

90 Inverness Circle East

Englewood CO 80112 / USA

Test standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

RSS - 210 Issue 8

Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: TV streaming media device

Model name: M1

FCC ID: DKN-L37

IC: 1707A-L37

Frequency: DTS band 5150 MHz to 5725 MHz
(lowest channel 36 – 5180 MHz;
highest channel 140 – 5700 MHz)

Technology tested: WLAN (OFDM / a – mode; n HT20 / HT40)

Antenna: Integrated antennas

Power supply: 110V AC by mains adapter

Temperature range: -20°C to +55°C



This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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Marco Bertolino
Testing Manager

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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2.2 Application details

Date of receipt of order:	2014-03-24
Date of receipt of test item:	2014-04-22
Start of test:	2014-04-22
End of test:	2014-05-07
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

3.1 Measurement guidance

UNII: KDB 789033	2013-04	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+55 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		43 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	110 V AC by mains adapter
	V_{max}	121 V
	V_{min}	99 V

5 Test item

Kind of test item	:	TV streaming media device
Type identification	:	M1
S/N serial number	:	No information available!
HW hardware status	:	1.0.1.
SW software status	:	Secured: 0.2.272 (No 364 & 383)
Frequency band [MHz]	:	DTS band 5150 MHz to 5725 MHz (lowest channel 36 – 5180 MHz; highest channel 140 – 5700 MHz)
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK, 16 – QAM, 64 – QAM
Number of channels	:	19
Antenna	:	Integrated antennas
Power supply	:	110 V AC by mains adapter
Temperature range	:	-20°C to +55 °C

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-7682/14-01-01_AnnexA
 1-7682/14-01-01_AnnexB
 1-7682/14-01-01_AnnexD

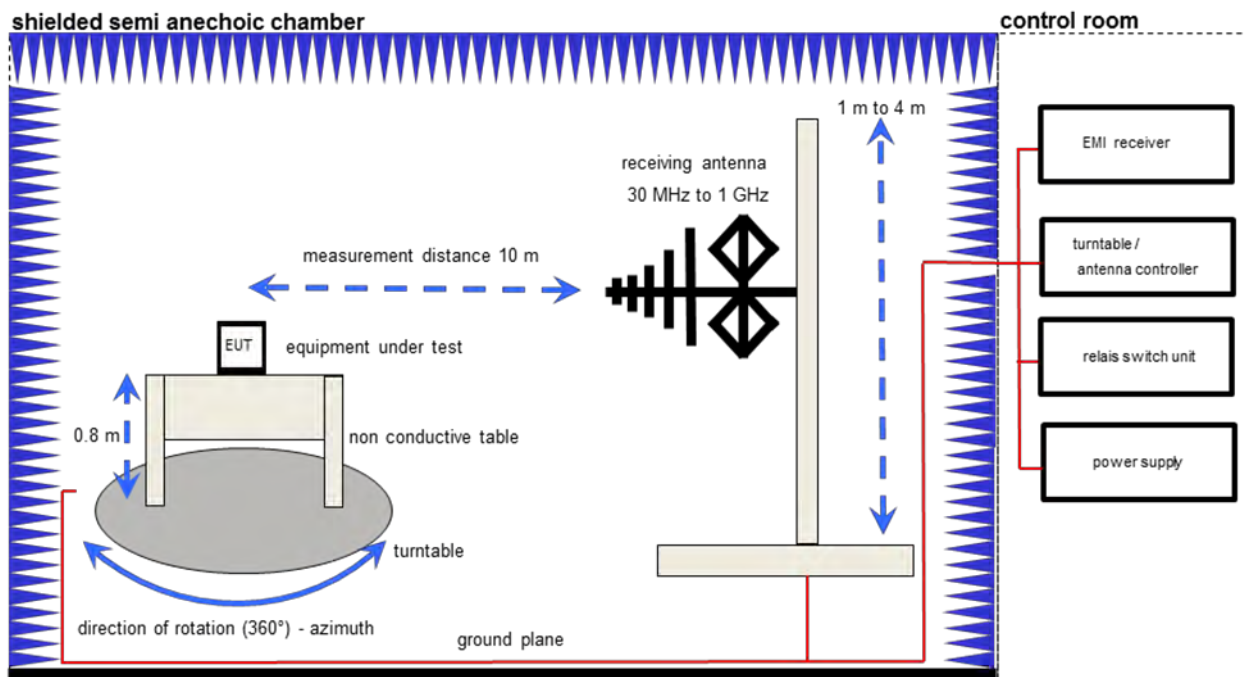
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

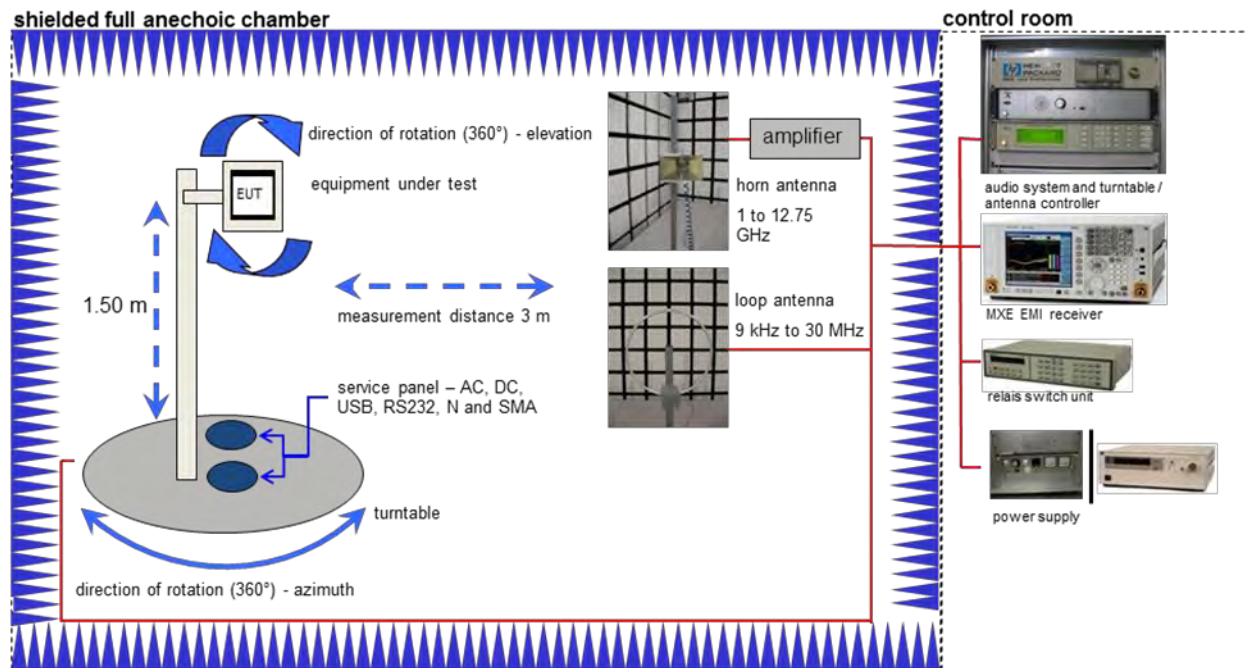
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

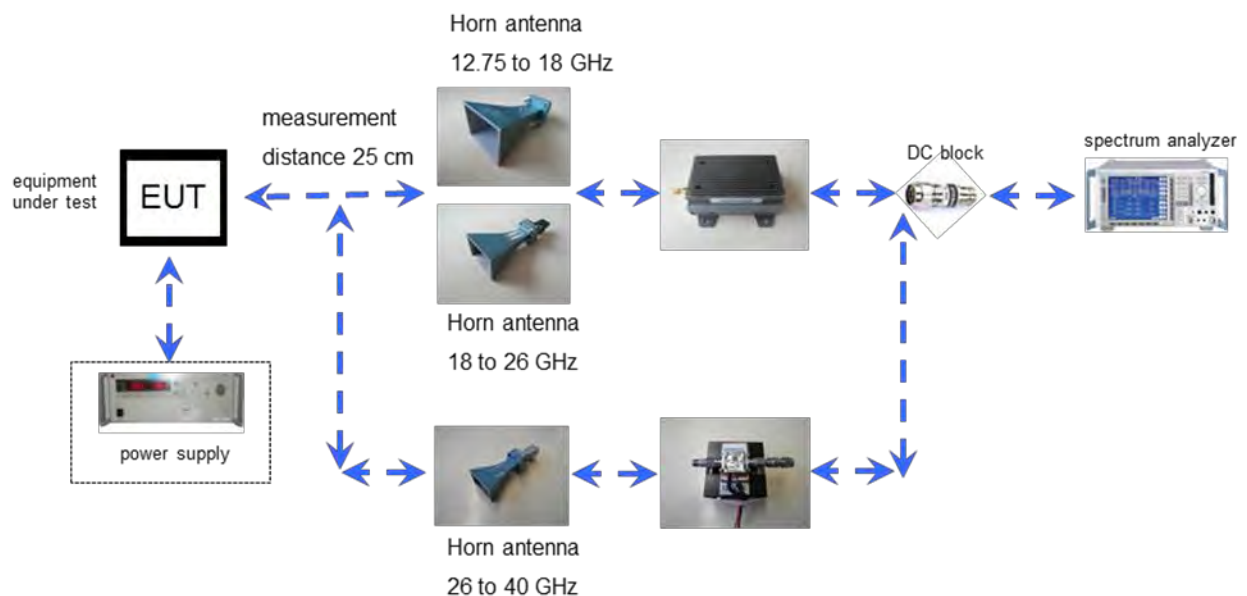
7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

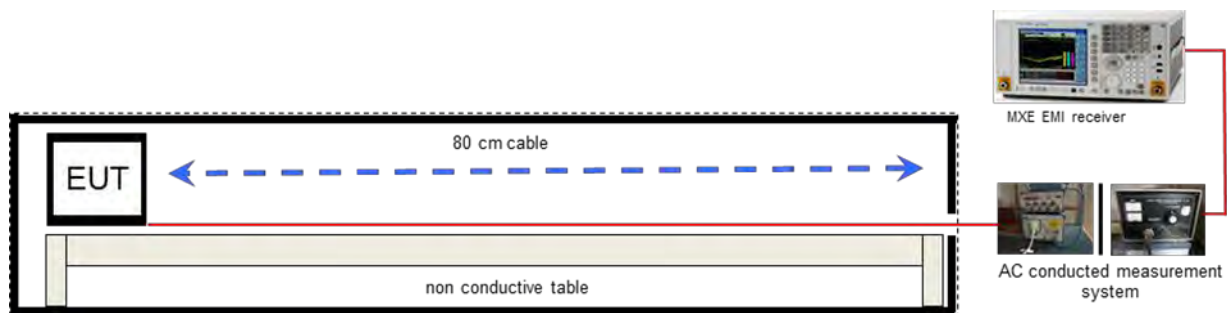
7.3 Radiated measurements 12.75 GHz to 40 GHz



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751
Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273
Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

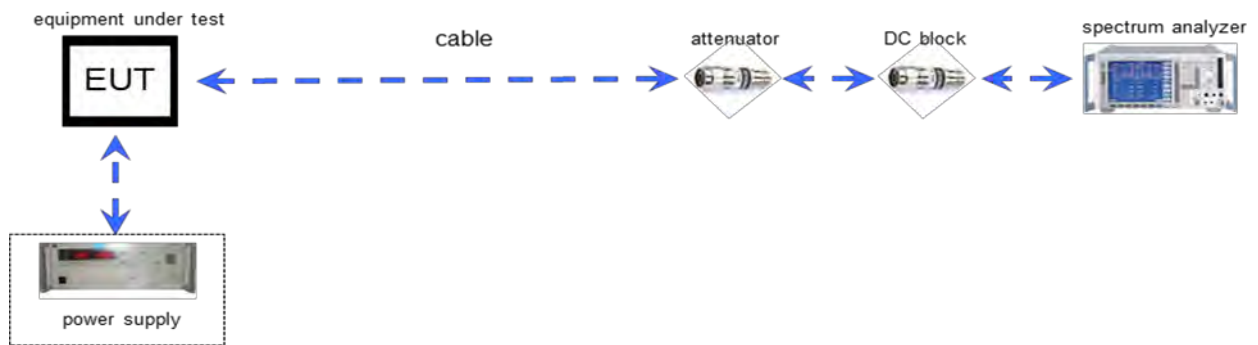
7.4 AC conducted



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erft	91350	300001155
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001168
Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210

7.5 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

8 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 9	Passed	2014-05-27	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Pass	Fail	NA	NP	Results (max.)
-/-	Output power verification (conducted)	Nominal	Nominal	☐	☐	☐	☐	No passed / fail criteria!
-/-	Gain	Nominal	Nominal	☐	☐	☐	☐	No passed / fail criteria!
U-NII Part 15	Duty cycle	Nominal	Nominal	☐	☐	☐	☐	No passed / fail criteria!
§15.407(a) RSS-210	Maximum output power (conducted & radiated)	Nominal	Nominal	☒	☐	☐	☐	complies
§15.407(a) RSS-210	Power spectral density	Nominal	Nominal	☒	☐	☐	☐	complies
§15.407(a) RSS-210	Spectrum bandwidth 26dB bandwidth	Nominal	Nominal	☒	☐	☐	☐	complies
§15.407(a) RSS-210	Peak excursion measurements	Nominal	Nominal	☒	☐	☐	☐	complies
§15.205 RSS-210	Band edge compliance radiated	Nominal	Nominal	☒	☐	☐	☐	complies
§15.407(b) RSS-210	TX spurious emissions radiated	Nominal	Nominal	☒	☐	☐	☐	complies
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	Spurious emissions radiated < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	complies
§15.107(a) §15.207	Spurious emissions conducted emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: Customer power table information

Special test descriptions: See power table information below:

OFDM/a – mode:

Mode	Lowest channel 5180 MHz	-/-	Highest channel 5240 MHz
6-24	16		16
36	14		14
48	12		12
54	11		11

Mode	Lowest channel 5260 MHz	-/-	Highest channel 5320 MHz
6-24	16		16
36	15		15
48	13		13
54	12		12

Mode	Lowest channel 5500 MHz	Middle channel 5600 MHz	Highest channel 5700 MHz
6-24	16	16	16
36	15	15	14
48	13	13	12
54	12	12	11

OFDM/n HT20 – mode:

Mode	Lowest channel 5180 MHz	-/-	Highest channel 5240 MHz
MCS0	16		16
MCS1	15		15
MCS2	15		15
MCS3	15		15
MCS4	14		14
MCS5	12		12
MCS6	11		11
MCS7	9		9

Mode	Lowest channel 5260 MHz	-/-	Highest channel 5320 MHz
MCS0	16		16
MCS1	15		15
MCS2	15		15
MCS3	15		15
MCS4	14		14
MCS5	13		13
MCS6	12		12
MCS7	10		10

Mode	Lowest channel 5500 MHz	Middle channel 5600 MHz	Highest channel 5700 MHz
MCS0	16	16	16
MCS1	15	15	15
MCS2	15	15	15
MCS3	15	15	15
MCS4	14	14	14
MCS5	13	13	12
MCS6	12	12	11
MCS7	10	10	9

OFDM/n HT40 – mode:

Mode	Lowest channel 5190 MHz	-/-	Highest channel 5230
MCS0	13		13
MCS1	13		13
MCS2	13		13
MCS3	13		13
MCS4	13		13
MCS5	12		12
MCS6	10		10
MCS7	9		9

Mode	Lowest channel 5270 MHz	-/-	Highest channel 5310 MHz
MCS0	13		13
MCS1	13		13
MCS2	13		13
MCS3	13		13
MCS4	13		13
MCS5	13		13
MCS6	11		11
MCS7	10		10

Mode	Lowest channel 5510 MHz	Middle channel 5590 MHz	Highest channel 5670
MCS0	14	14	14
MCS1	13	13	13
MCS2	13	13	13
MCS3	13	13	13
MCS4	13	13	13
MCS5	13	13	12
MCS6	11	11	10
MCS7	10	10	9

Configuration descriptions: None

Test mode: ☐ No test mode available.

☒ Special software is used.
EUT is transmitting pseudo random data by itself

10 Measurement results

10.1 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average power meter to identify the maximum transmission power on low, mid and high channel. In the case that only one or two channels are available, only these will be measured.

In further tests only the identified worst case modulation scheme or bandwidth will be measured. Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Average Power Meter

Results:

Ant 0:

Modulation	Modulation scheme / bandwidth						
Frequency	5180 MHz	5240 MHz	5260 MHz	5320 MHz	5500 MHz	5600 MHz	5700 MHz
OFDM / a – mode	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s
OFDM / n/ac – mode HT20	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0
Frequency	5190 MHz	5230 MHz	5270 MHz	5310 MHz	5510 MHz	5590 MHz	5670 MHz
OFDM / n/ac – mode HT40	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0

Ant 1:

Modulation	Modulation scheme / bandwidth						
Frequency	5180 MHz	5240 MHz	5260 MHz	5320 MHz	5500 MHz	5600 MHz	5700 MHz
OFDM / a – mode	12Mbit/s	12Mbit/s	6Mbit/s	6Mbit/s	18Mbit/s	12Mbit/s	12Mbit/s
OFDM / n/ac – mode HT20	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0
Frequency	5190 MHz	5230 MHz	5270 MHz	5310 MHz	5510 MHz	5590 MHz	5670 MHz
OFDM / n/ac – mode HT40	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0

10.2 Gain

Description:

Measurement of the maximum output power conducted and radiated

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	5s
Resolution bandwidth:	3 MHz
Video bandwidth:	> RBW
Span:	See complete signal!
Trace-Mode:	Max Hold

Limits:

Antenna Gain
Maximum 6 dBi

Result: ANT0

OFDM Band 5150 MHz to 5250 MHz Channel	Gain		
	Lowest 5180 MHz	-/-	Highest 5240 MHz
Radiated power for gain calculation	18.37	-/-	16.08
Conducted power for gain calculation	16.27	-/-	15.15
Gain	+2.10	-/-	+0.93
Measurement uncertainty	± 3 dB		

OFDM Band 5250 MHz to 5350 MHz Channel	Gain		
	Lowest 5260 MHz	-/-	Highest 5320 MHz
Radiated power for gain calculation	15.59	-/-	14.71
Conducted power for gain calculation	14.92	-/-	15.69
Gain	+0.67	-/-	-0.98
Measurement uncertainty	± 3 dB		

OFDM Band 5470 MHz to 5725 MHz Channel	Gain		
	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz
Radiated power for gain calculation	15.15	14.70	14.65
Conducted power for gain calculation	15.17	15.28	15.01
Gain	-0.02	-0.58	-0.36
Measurement uncertainty	± 3 dB		

Result: Passed

Result: ANT1

OFDM Band 5150 MHz to 5250 MHz Channel	Gain		
	Lowest 5180 MHz	-/-	Highest 5240 MHz
Radiated power for gain calculation	18.61	-/-	17.26
Conducted power for gain calculation	16.87	-/-	15.89
Gain	+1.74	-/-	+1.37
Measurement uncertainty	± 3 dB		

OFDM Band 5250 MHz to 5350 MHz Channel	Gain		
	Lowest 5260 MHz	-/-	Highest 5320 MHz
Radiated power for gain calculation	17.42	-/-	16.02
Conducted power for gain calculation	16.55	-/-	16.43
Gain	+0.87	-/-	-0.41
Measurement uncertainty	± 3 dB		

OFDM Band 5470 MHz to 5725 MHz Channel	Gain		
	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz
Radiated power for gain calculation	17.82	16.94	16.75
Conducted power for gain calculation	18.21	17.88	17.38
Gain	-0.39	-0.94	-0.63
Measurement uncertainty	± 3 dB		

Result: Passed

10.3 Duty cycle

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	10 MHz
Video bandwidth:	10 MHz
Span:	Zero
Trace-Mode:	Video trigger / view / single sweep

Results:

Duty cycle and correction factor:

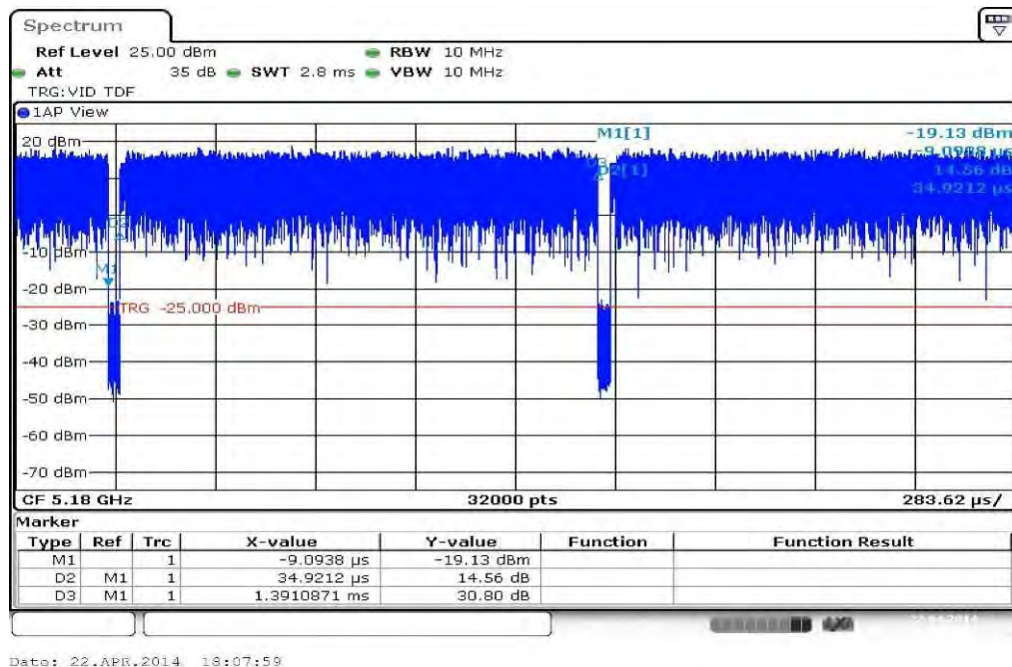
OFDM / a – mode: 97.49 % duty cycle => 0.11 dB

OFDM / n – mode HT20: 98.18 % duty cycle => 0.08 dB

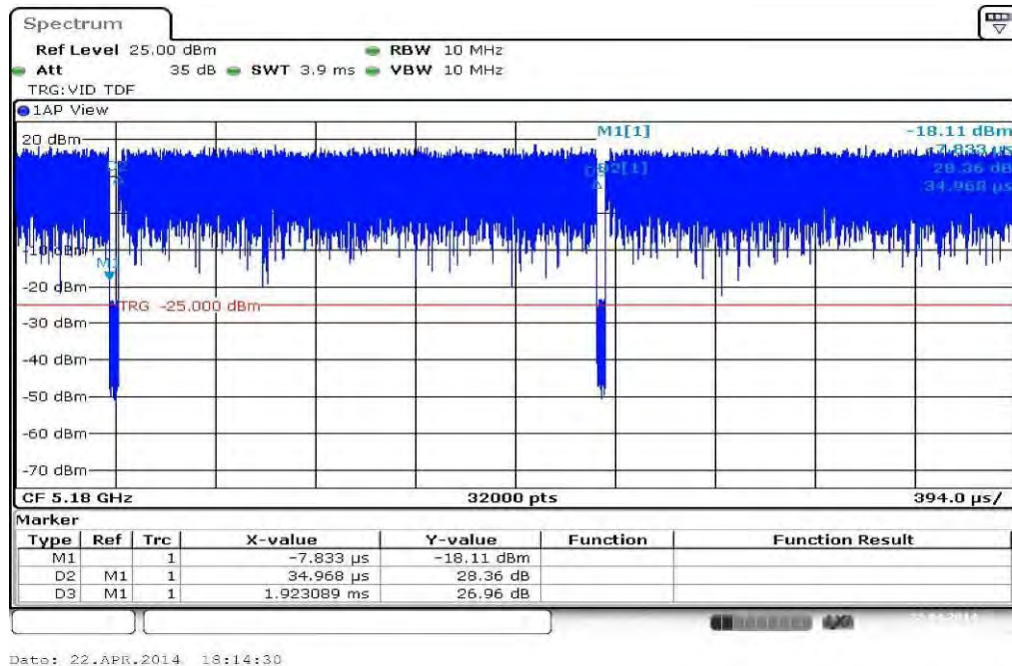
OFDM / n – mode HT40: 96.43 % duty cycle => 0.16 dB

Plots: valid for both antennas

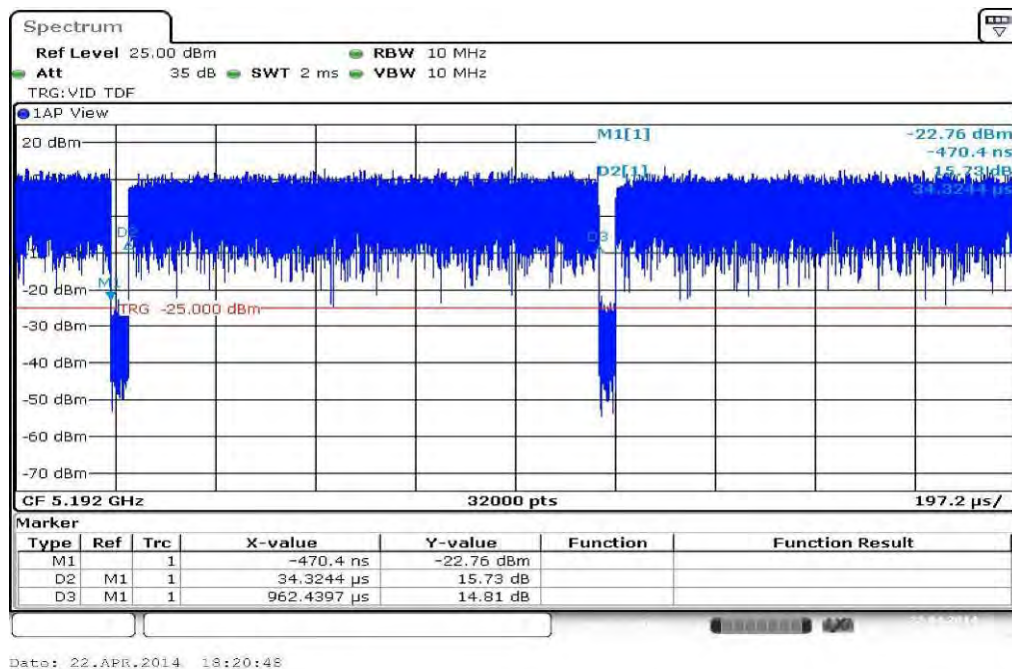
Plot 1: duty cycle of the transmitter – OFDM / a – mode



Plot 2: duty cycle of the transmitter – OFDM / n – mode HT20



Plot 3: duty cycle of the transmitter – OFDM / n – mode HT40



10.4 Maximum output power conducted and radiated

Description:

Measurement of the maximum output power conducted and radiated

Measurement:

Measurement parameter	
Detector:	RMS
Sweep time:	60s
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 MHz
Span:	> EBW
Trace-Mode:	Max hold
Analyser function	Band power / channel power Interval > 26 dB EBW

Limits:

Radiated output power	Conducted output power
Conducted power + 6dBi antenna gain	The lesser one of 50mW or 4 dBm + 10 log Bandwidth 5.150-5.250 GHz 250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz 250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz (where Bandwidth is the 26dB Bandwidth [MHz])

Plots: ANT0**Result:** OFDM / a – mode

OFDM / a – mode Channel	Maximum output power conducted [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	11.58	10.59	10.75	10.44
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	10.26	11.08	11.25	-/-
Measurement uncertainty	± 1 dB			

Result: **Passed**

OFDM / a – mode Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	13.68	11.52	11.42	9.46
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	10.24	10.50	10.89	-/-
Measurement uncertainty	± 3 dB			

Result: **Passed**

Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	Maximum output power conducted [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	11.92	10.50	10.72	10.66
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	10.15	10.98	11.30	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

OFDM / n – mode HT20 Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	14.02	11.43	11.39	9.68
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	10.13	10.40	10.94	-/-
Measurement uncertainty	± 3 dB			

Result: Passed

Result: OFDM / n – mode HT40

OFDM / n – mode HT40 Channel	Maximum output power conducted [dBm]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	8.26	8.91	8.45	8.25
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	8.09	8.32	8.24	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

OFDM / n – mode HT40 Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	10.36	9.84	9.12	7.27
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	8.07	7.74	7.88	-/-
Measurement uncertainty	± 3 dB			

Result: Passed

Plots: ANT1**Result:** OFDM / a – mode

OFDM / a – mode Channel	Maximum output power conducted [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	11.90	10.85	10.74	10.95
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	10.50	11.26	10.92	-/-
Measurement uncertainty	± 1 dB			

Result: **Passed**

OFDM / a – mode Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	14.00	11.78	11.41	9.97
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	10.48	10.68	10.56	-/-
Measurement uncertainty	± 3 dB			

Result: **Passed**

Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	Maximum output power conducted [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	11.92	10.70	10.95	11.17
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	10.39	11.14	10.81	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

OFDM / n – mode HT20 Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	14.02	11.63	11.62	10.19
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	10.37	10.56	10.45	-/-
Measurement uncertainty	± 3 dB			

Result: Passed

Result: OFDM / n – mode HT40

OFDM / n – mode HT40 Channel	Maximum output power conducted [dBm]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	7.85	8.00	7.88	7.74
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	7.90	8.30	8.07	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

OFDM / n – mode HT40 Channel	Maximum output power radiated - EIRP [dBm]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	9.95	8.93	8.55	6.76
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	7.88	7.72	7.71	-/-
Measurement uncertainty	± 3 dB			

Result: Passed

10.5 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	
Detector:	RMS
Sweep time:	60 s / 120 s
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 MHz
Span:	> EBW
Trace-Mode:	Max hold

Limits:

Power Spectral Density
power spectral density conducted ≤ 4 dBm in any 1 MHz band (band 5150 – 5250 MHz) power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz) power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz)

Results: ANT0**Result: OFDM / a – mode**

OFDM / a – mode Channel	Power Spectral density [dBm/MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	-1.59	-2.61	-2.25	-1.76
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	-2.98	-1.99	-1.95	-/-
Measurement uncertainty	± 1 dB			

Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	Power Spectral density [dBm/MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	-1.53	-3.07	-2.52	-2.15
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	-3.28	-2.15	-1.65	-/-
Measurement uncertainty	± 1 dB			

Result: OFDM / n – mode HT40

OFDM / n – mode HT40 Channel	Power Spectral density [dBm/MHz]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	-8.05	-7.07	-7.09	-8.00
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	-8.34	-7.64	-7.68	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

Results: ANT1**Result: OFDM / a – mode**

OFDM / a – mode Channel	Power Spectral density [dBm/MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.11 dB duty cycle correction	-0.92	-1.99	-2.41	-1.66
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.11 dB duty cycle correction	-2.45	-1.75	-2.23	-/-
Measurement uncertainty	± 1 dB			

Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	Power Spectral density [dBm/MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
+0.08 dB duty cycle correction	-1.18	-2.29	-2.58	-2.12
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
+0.08 dB duty cycle correction	-2.87	-2.09	-2.51	-/-
Measurement uncertainty	± 1 dB			

Result: OFDM / n – mode HT40

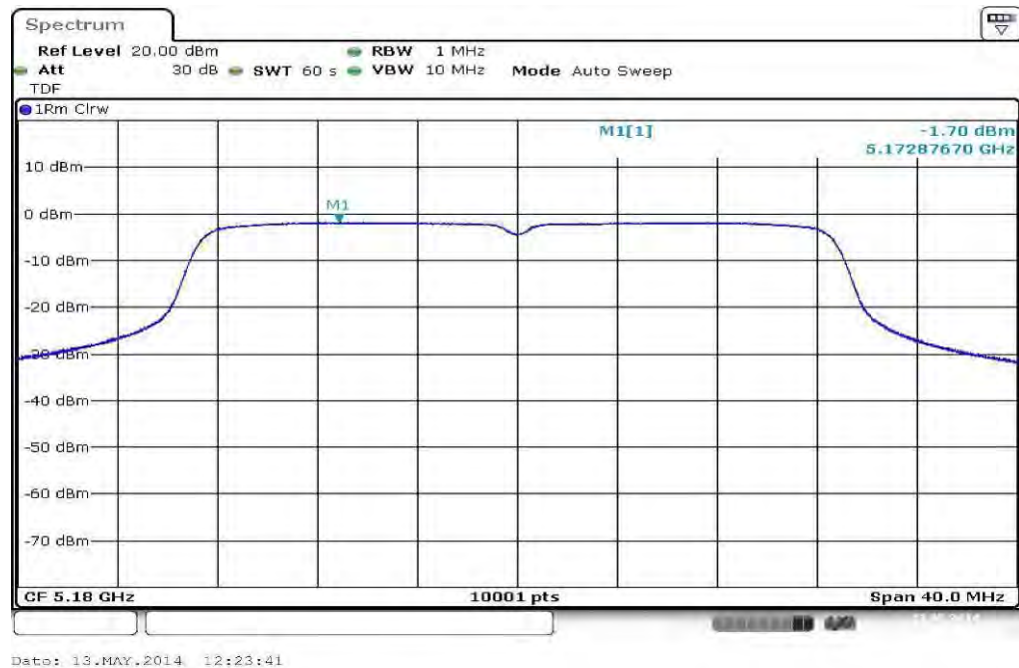
OFDM / n – mode HT40 Channel	Power Spectral density [dBm/MHz]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
+0.16 dB duty cycle correction	-8.51	-7.30	-7.72	-8.57
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
+0.16 dB duty cycle correction	-8.24	-7.66	-7.92	-/-
Measurement uncertainty	± 1 dB			

Result: Passed

Plots: ANT0

Plots: OFDM / a – mode

Plot 1: 5180 MHz



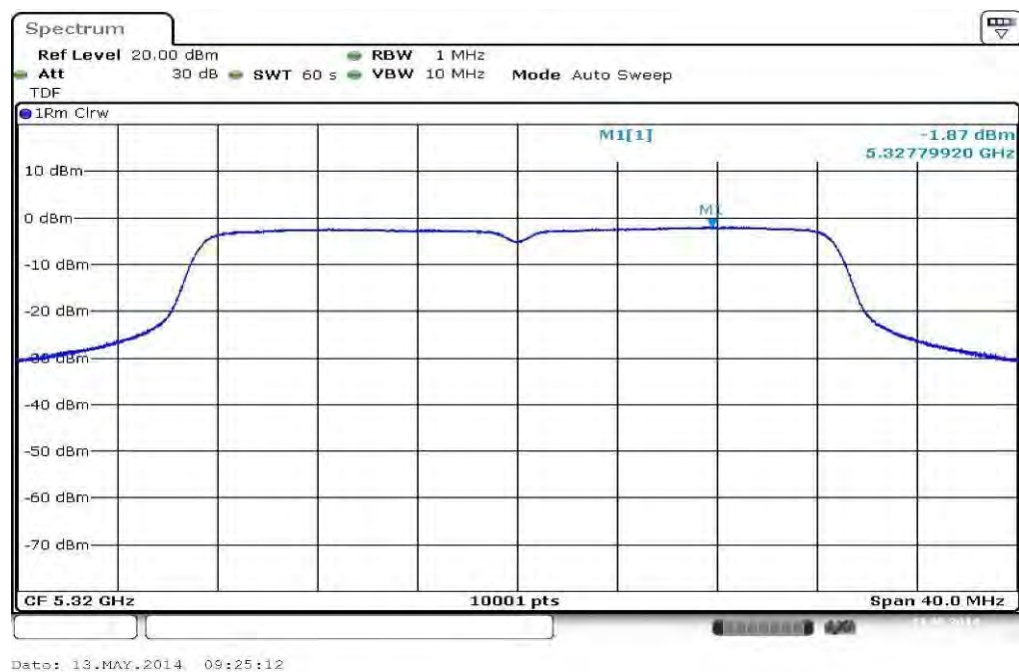
Plot 2: 5240 MHz



Plot 3: 5260 MHz



Plot 4: 5320 MHz



Plot 5: 5500 MHz



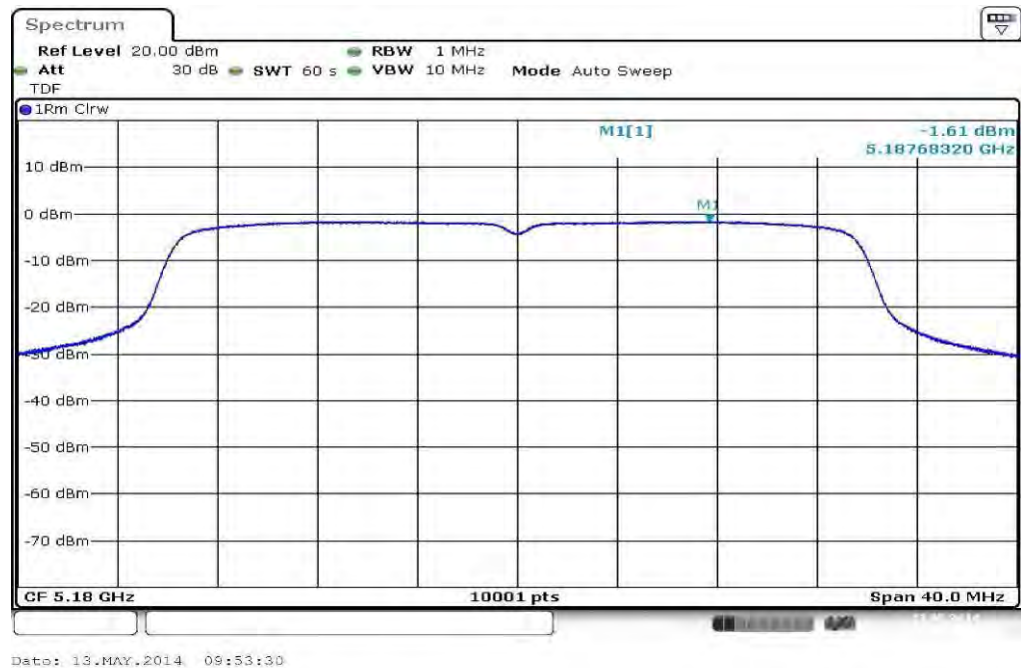
Plot 6: 5600 MHz



Plot 7: 5700 MHz



Date: 13.MAY.2014 09:47:06

Plots: OFDM / n – mode HT20**Plot 1: 5180 MHz****Plot 2: 5240 MHz**

Plot 3: 5260 MHz



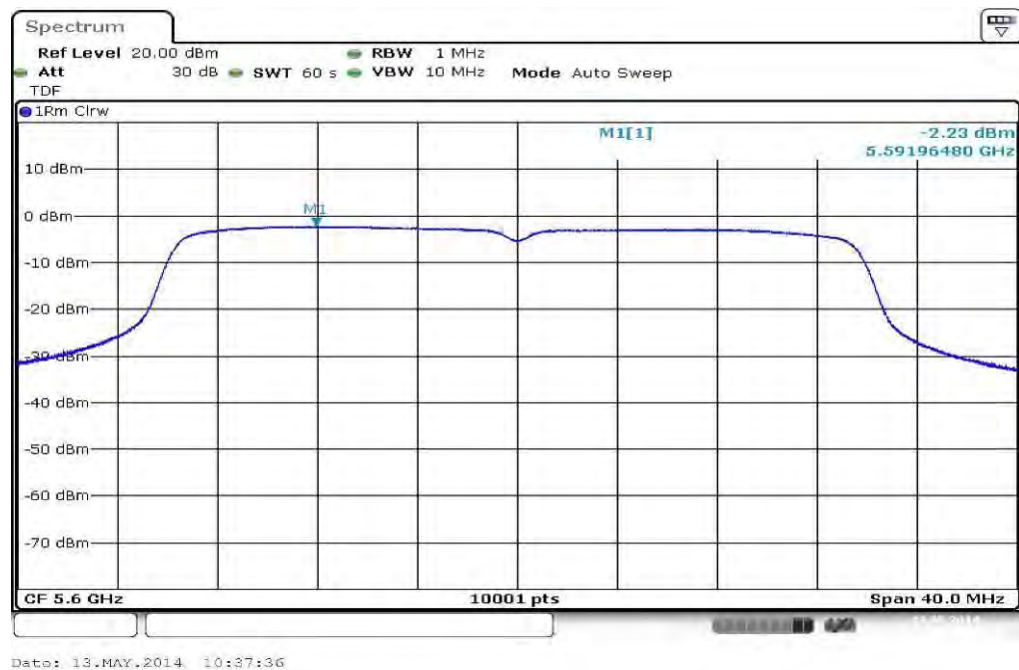
Plot 4: 5320 MHz



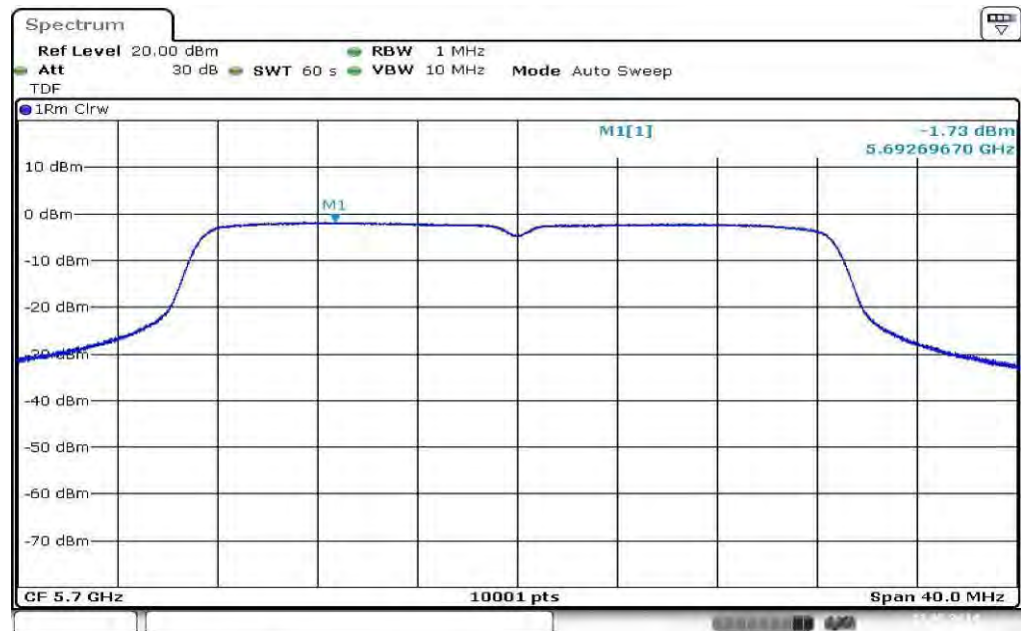
Plot 5: 5500 MHz

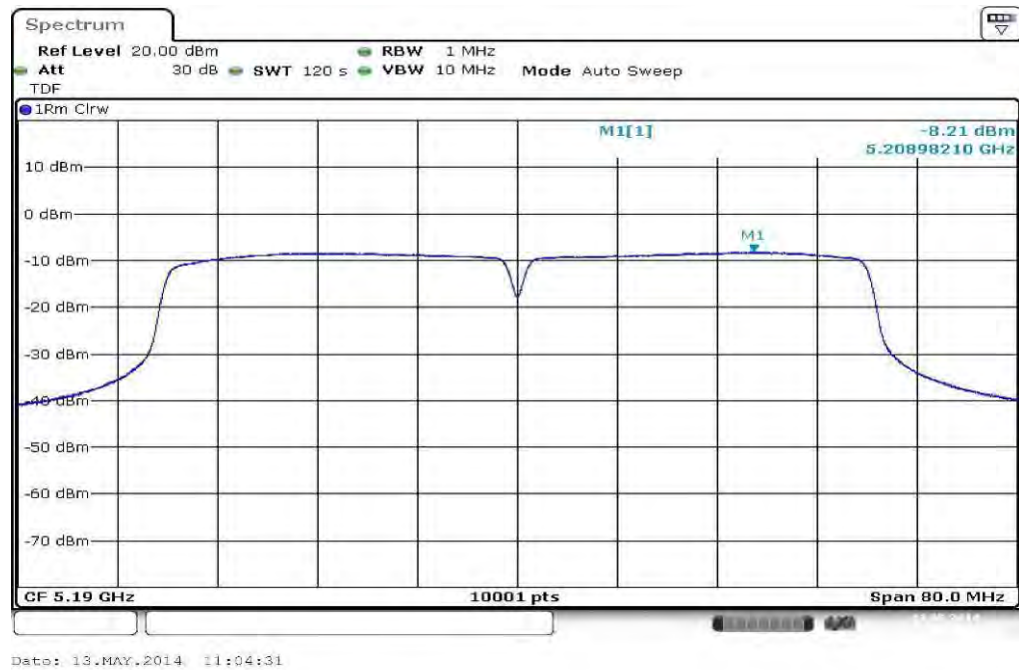


Plot 6: 5600 MHz



Plot 7: 5700 MHz

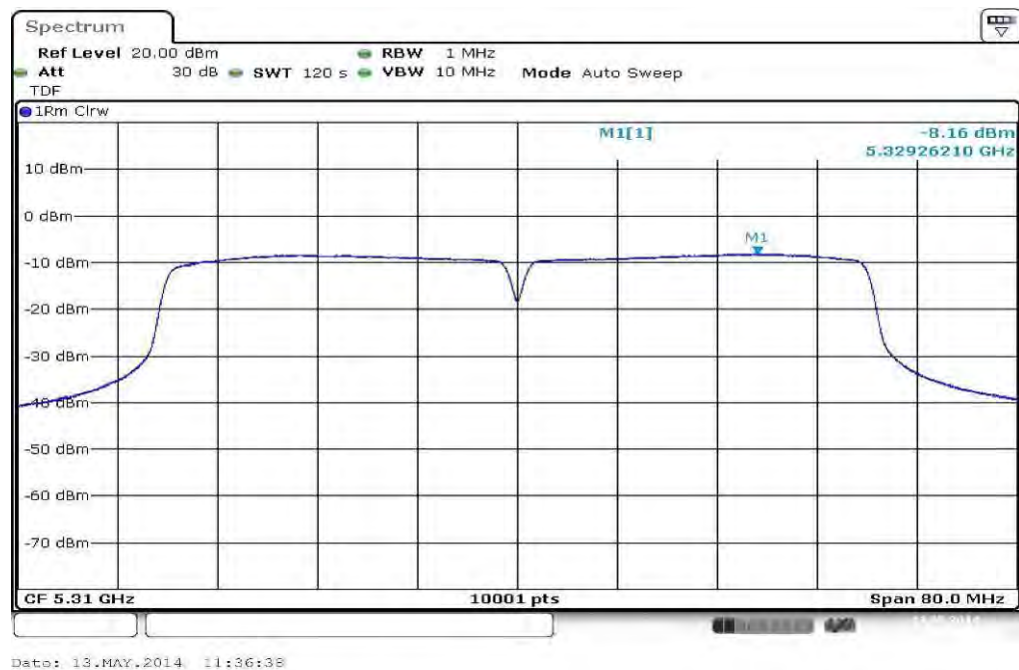


Plots: OFDM / n – mode HT40**Plot 1: 5190 MHz****Plot 2: 5230 MHz**

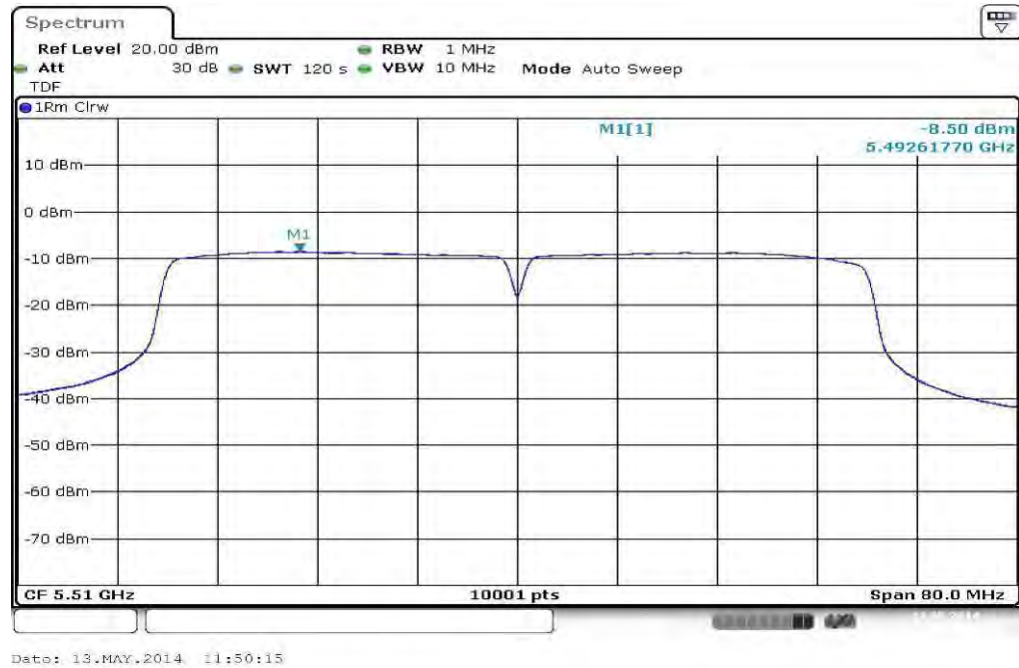
Plot 3: 5270 MHz



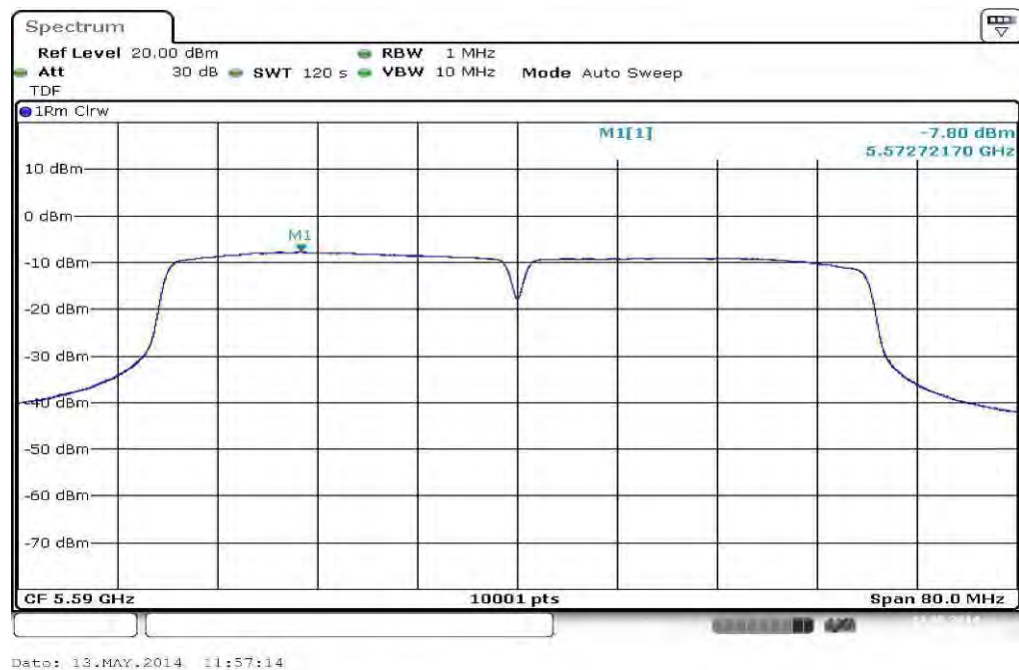
Plot 4: 5310 MHz



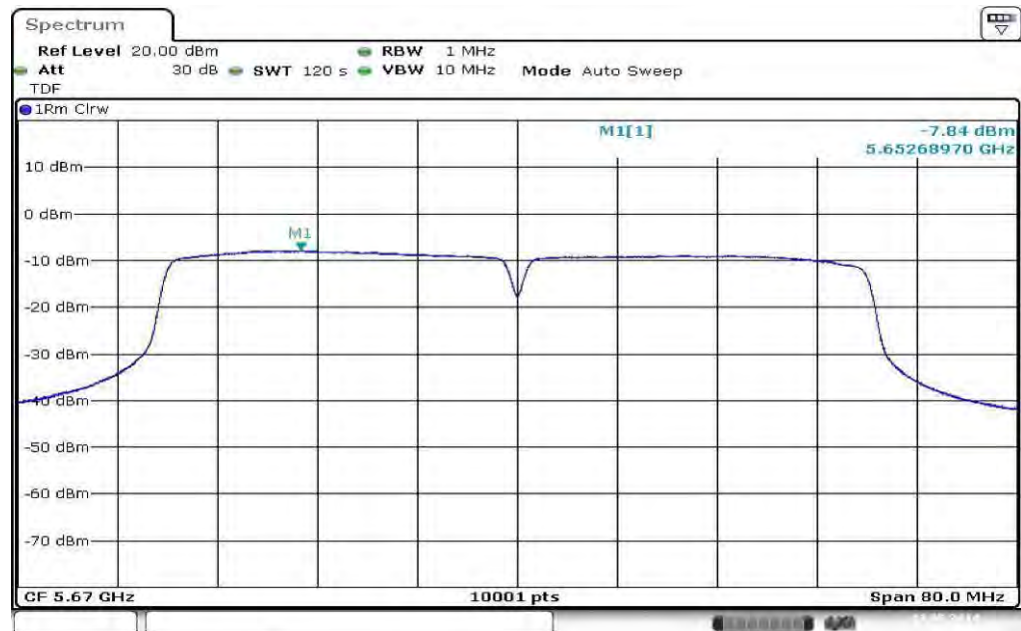
Plot 5: 5510 MHz



Plot 6: 5590 MHz



Plot 7: 5670 MHz



Date: 13.MAY.2014 12:04:56

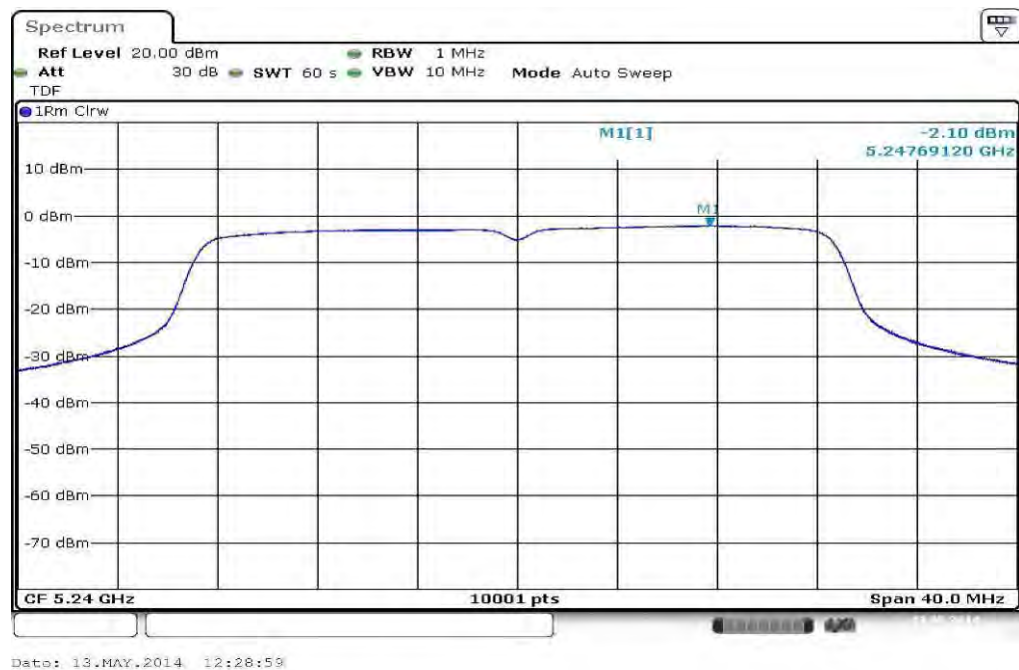
Plots: ANT1

Plots: OFDM / a – mode

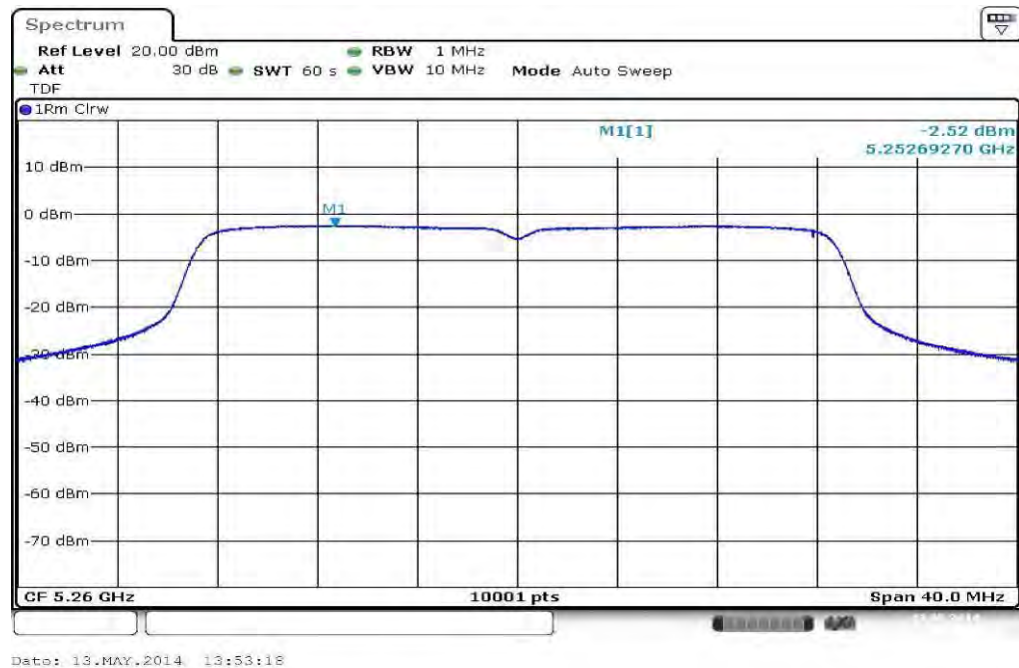
Plot 1: 5180 MHz



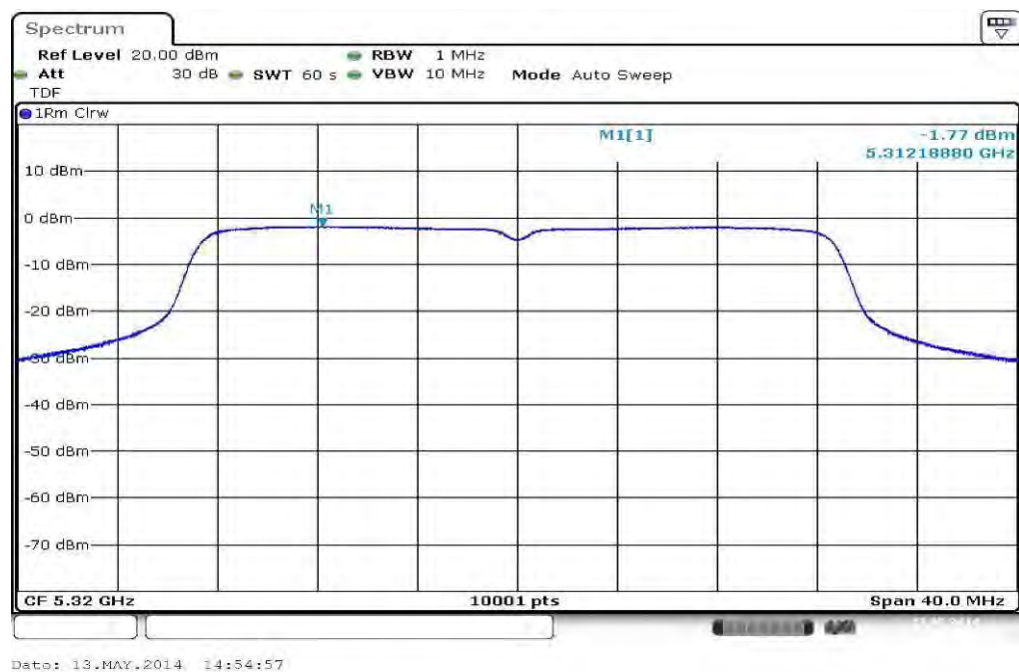
Plot 2: 5240 MHz



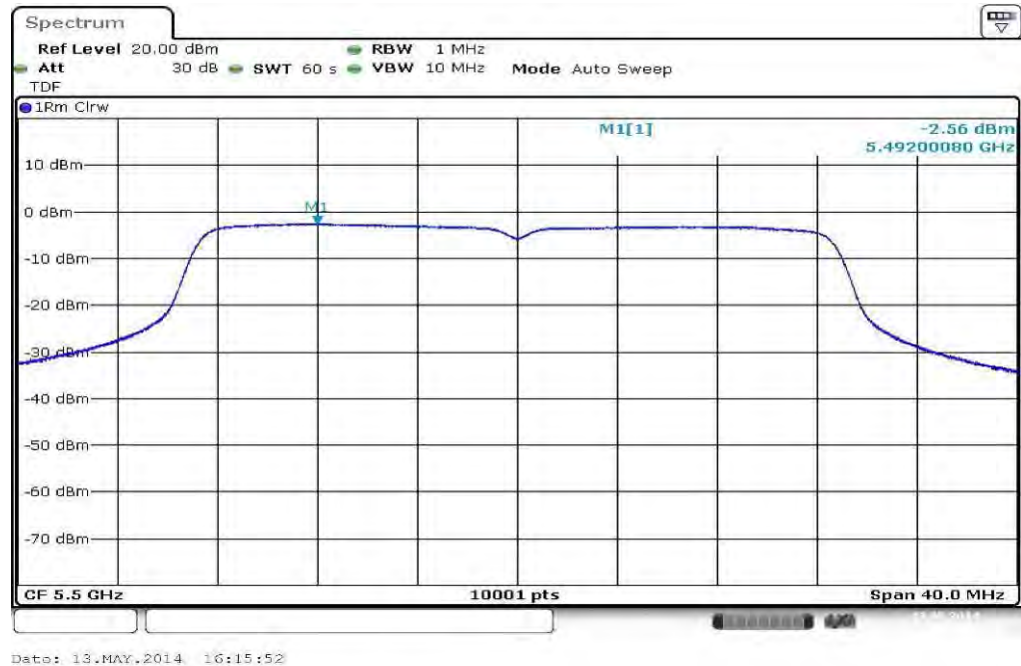
Plot 3: 5260 MHz



Plot 4: 5320 MHz



Plot 5: 5500 MHz



Plot 6: 5600 MHz



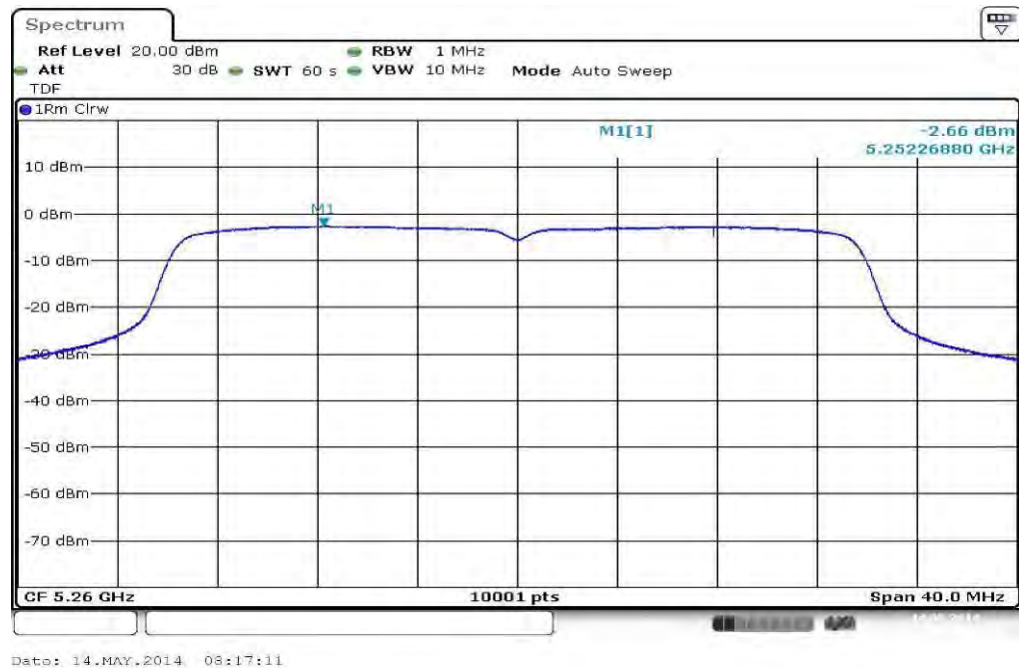
Plot 7: 5700 MHz



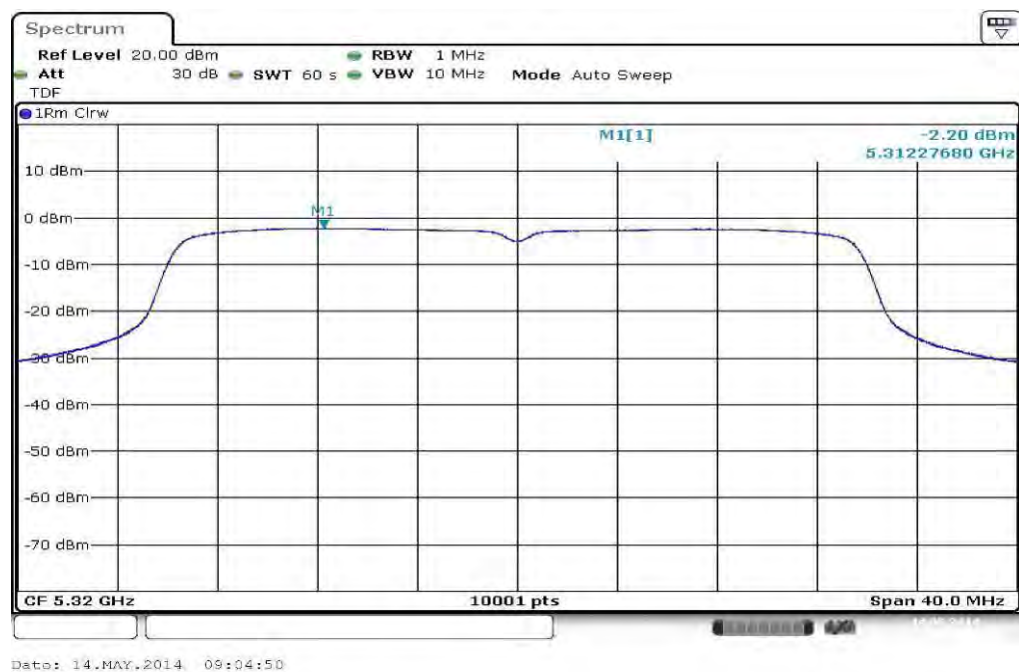
Date: 13.MAY.2014 16:27:32

Plots: OFDM / n – mode HT20**Plot 1: 5180 MHz****Plot 2: 5240 MHz**

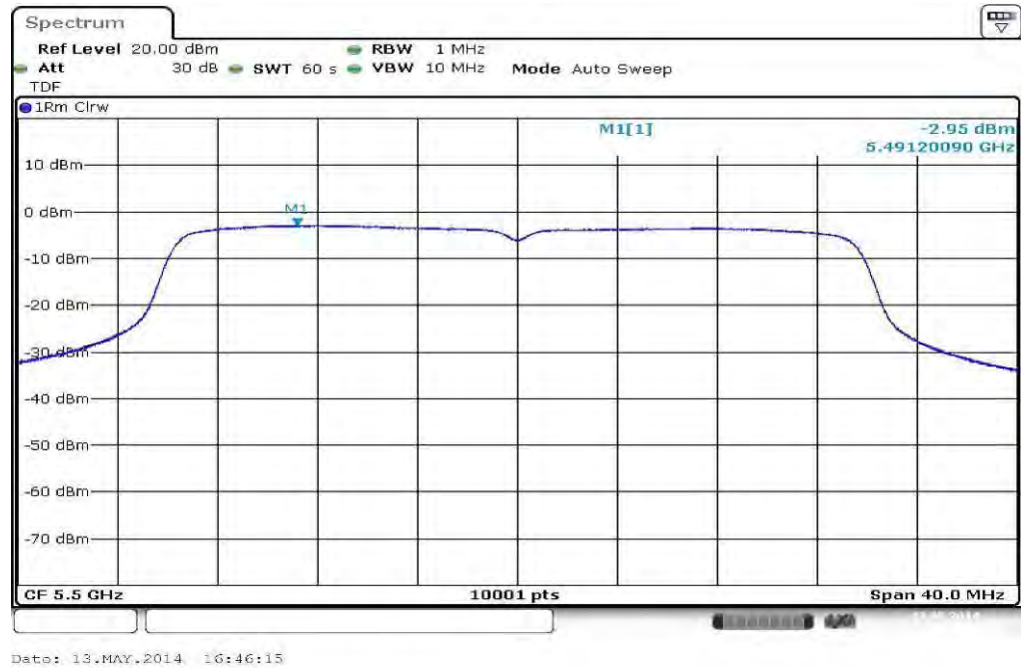
Plot 3: 5260 MHz



Plot 4: 5320 MHz



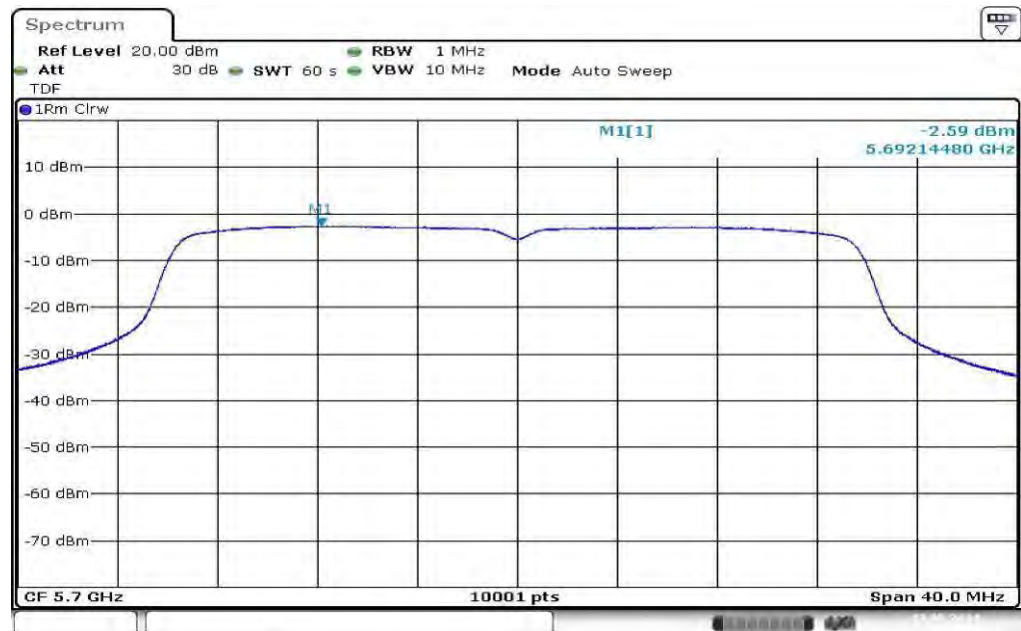
Plot 5: 5500 MHz



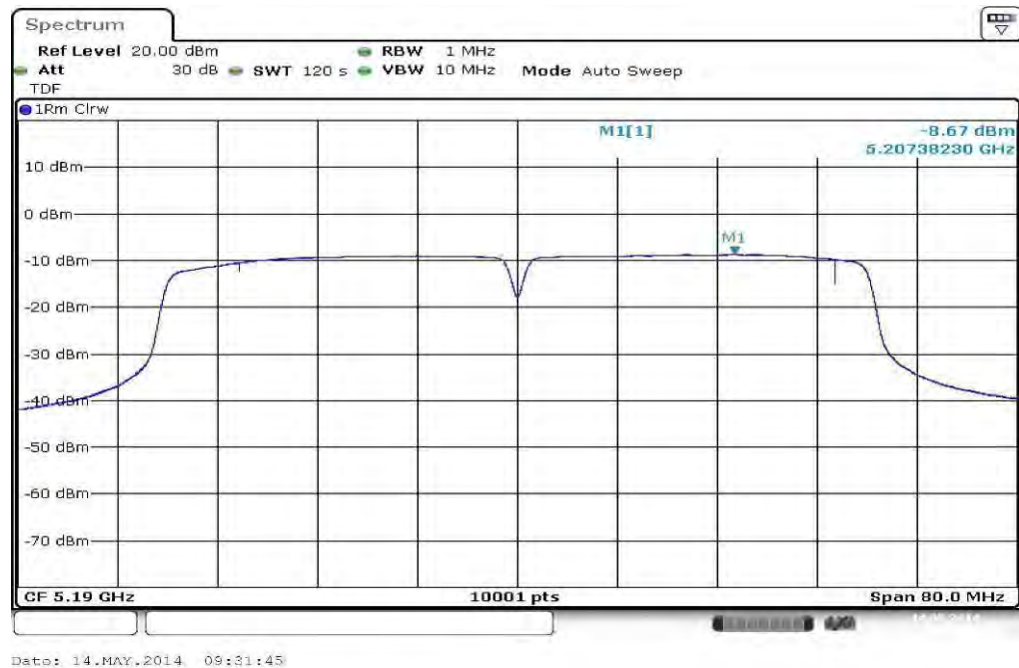
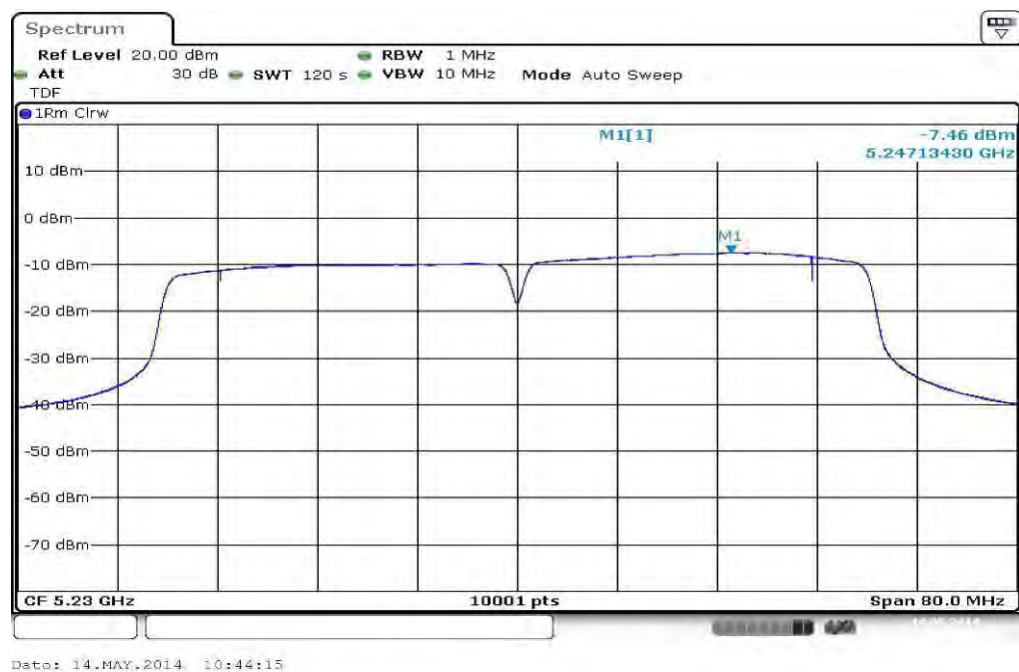
Plot 6: 5600 MHz



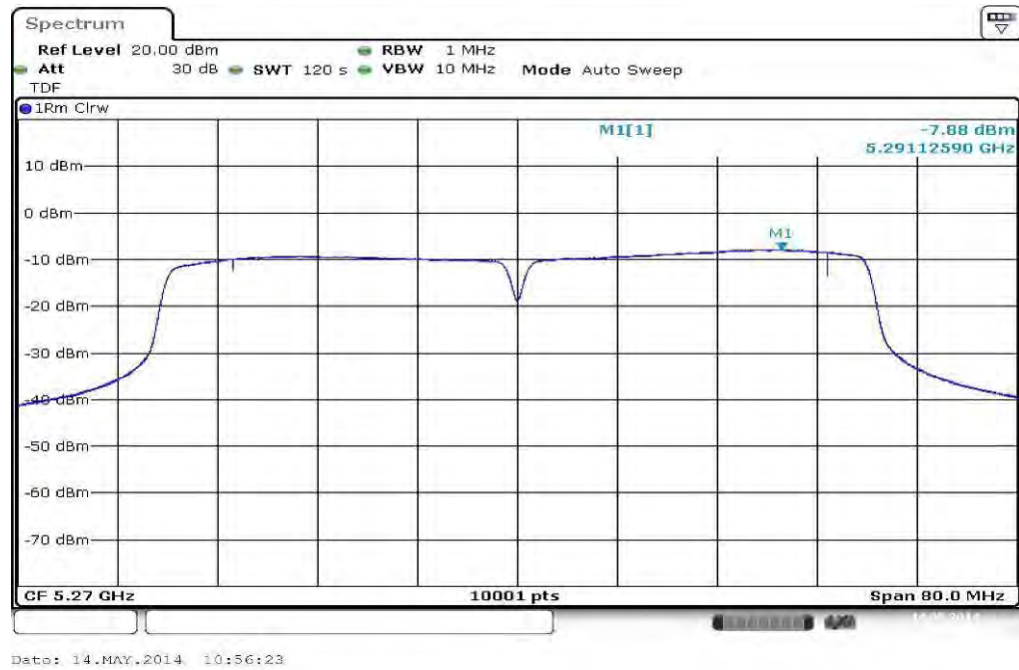
Plot 7: 5700 MHz



Date: 13.MAY.2014 16:32:26

Plots: OFDM / n – mode HT40**Plot 1: 5190 MHz****Plot 2: 5230 MHz**

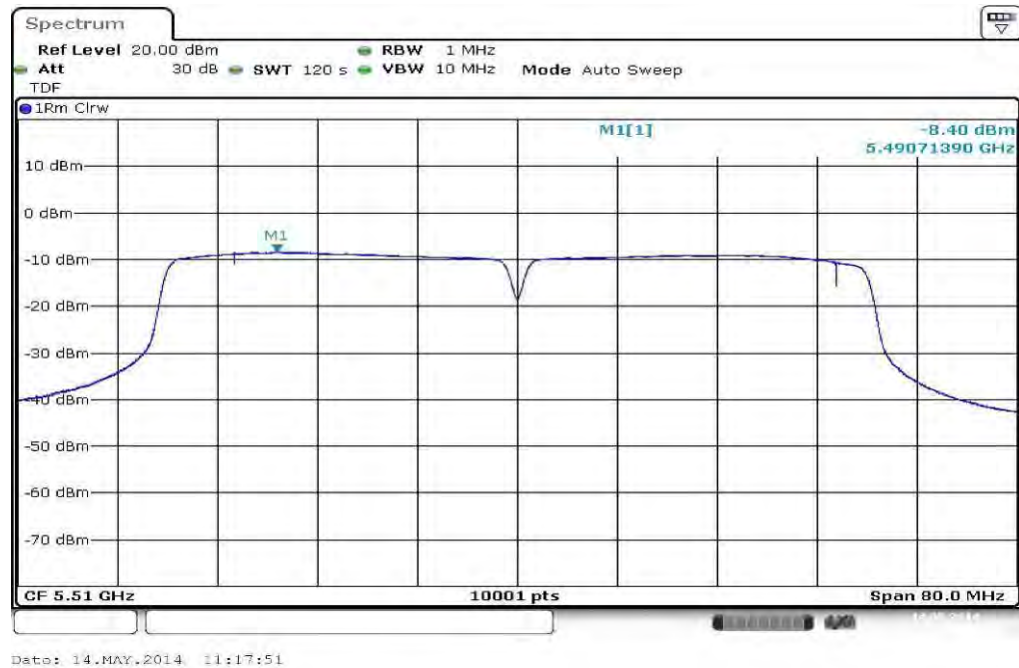
Plot 3: 5270 MHz



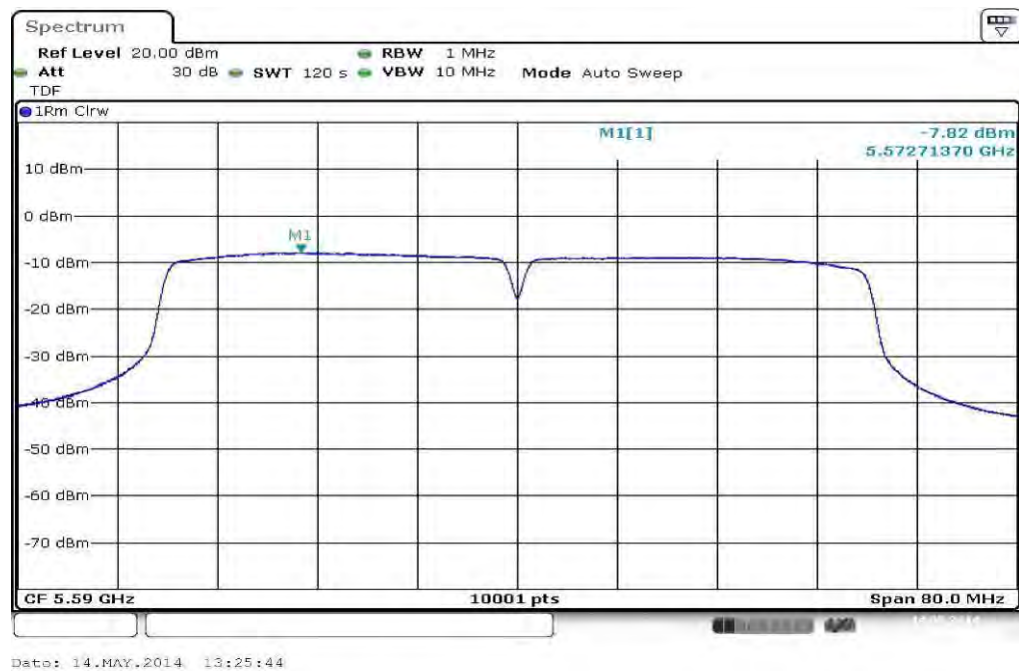
Plot 4: 5310 MHz



Plot 5: 5510 MHz



Plot 6: 5590 MHz



Plot 7: 5670 MHz



Date: 14.MAY.2014 13:35:32

10.6 Spectrum bandwidth – 26 dB bandwidth**Description:**

Measurement of the 26 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1% EBW
Video bandwidth:	≥ RBW
Span:	> complete signal!
Trace-Mode:	Max hold

Limits:

Spectrum Bandwidth – 26 dB Bandwidth
-/-

Results: ANT0**Result: OFDM / a – mode**

OFDM / a – mode Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
	38.61	36.01	39.26	40.96
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
	36.41	36.16	37.69	-/-
Measurement uncertainty	± RBW			

Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
	39.51	36.91	39.71	45.80
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
	39.76	36.76	37.11	-/-
Measurement uncertainty	± RBW			

Result: OFDM / n – mode HT40

OFDM / n – mode HT40 Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
	65.85	65.21	66.41	67.77
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
	68.65	64.90	65.53	-/-
Measurement uncertainty	± RBW			

Result: Passed

Results: ANT1**Result: OFDM / a – mode**

OFDM / a – mode Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
	39.51	35.71	41.66	42.06
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
	35.31	36.26	35.51	-/-
Measurement uncertainty	± RBW			

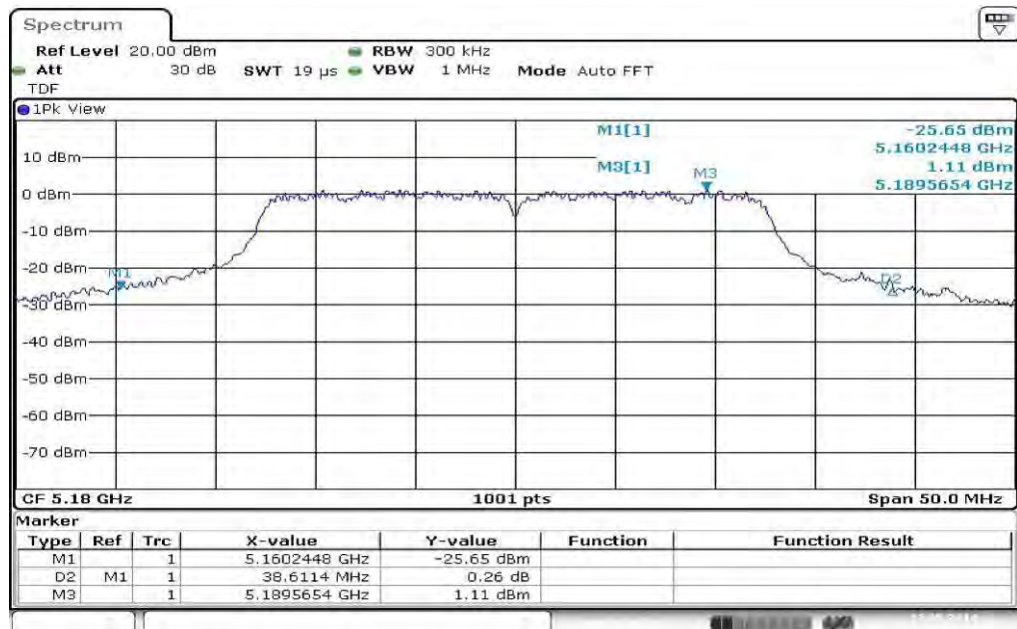
Result: OFDM / n – mode HT20

OFDM / n – mode HT20 Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5180 MHz	Highest 5240 MHz	Lowest 5260 MHz	Highest 5320 MHz
	38.46	36.56	40.76	40.66
Channel	Lowest 5500 MHz	Middle 5600 MHz	Highest 5700 MHz	-/-
	36.21	36.36	36.76	-/-
Measurement uncertainty	± RBW			

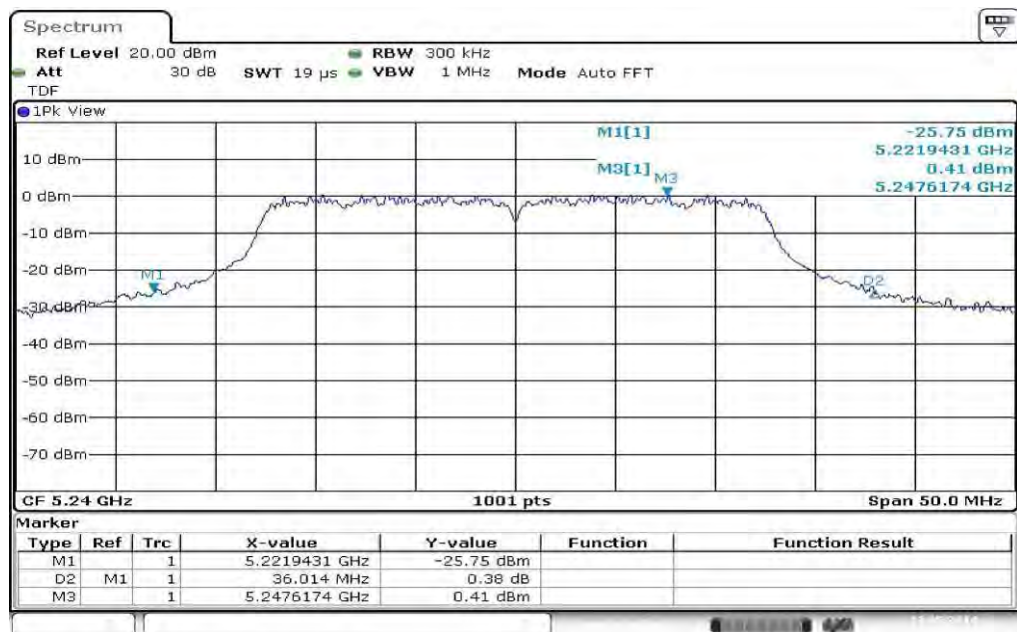
Result: OFDM / n – mode HT40

OFDM / n – mode HT40 Channel	26 dB BANDWIDTH [MHz]			
	Lowest 5190 MHz	Highest 5230 MHz	Lowest 5270 MHz	Highest 5310 MHz
	65.77	63.70	67.29	66.73
Channel	Lowest 5510 MHz	Middle 5590 MHz	Highest 5670 MHz	-/-
	67.21	64.42	64.58	-/-
Measurement uncertainty	± RBW			

Result: Passed

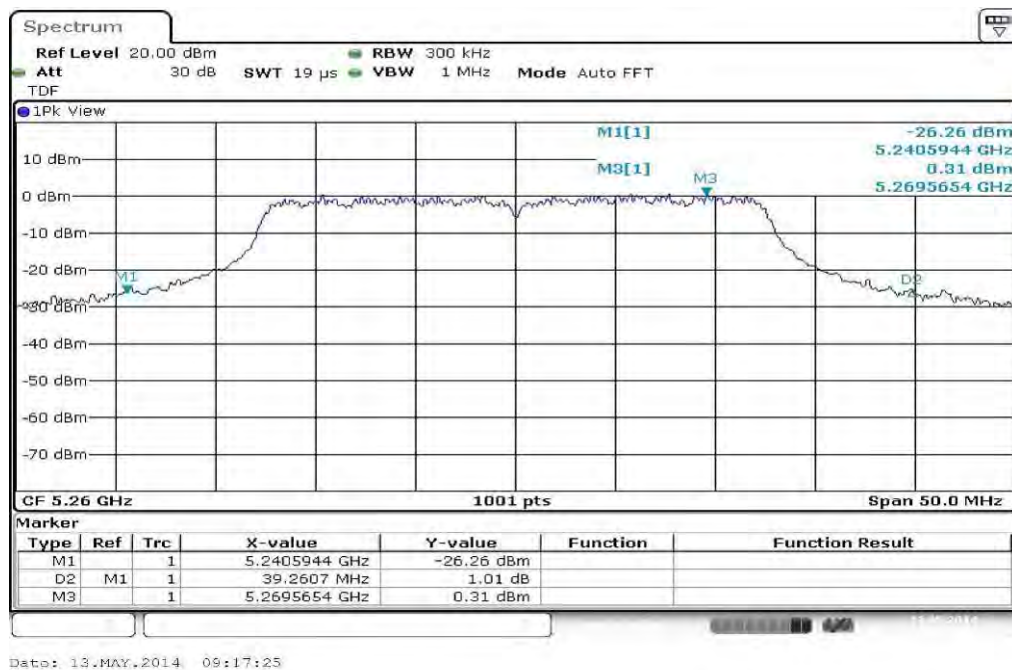
Results: ANT0**Plots:** OFDM / a – mode**Plot 1:** 5180 MHz

Date: 13.MAY.2014 12:21:17

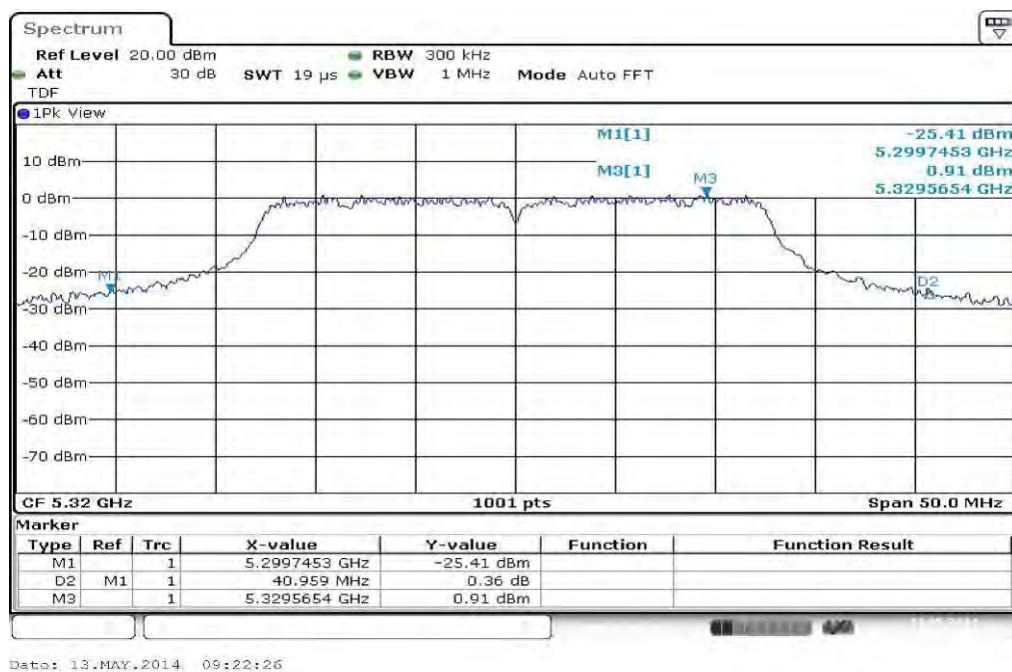
Plot 2: 5240 MHz

Date: 13.MAY.2014 09:08:14

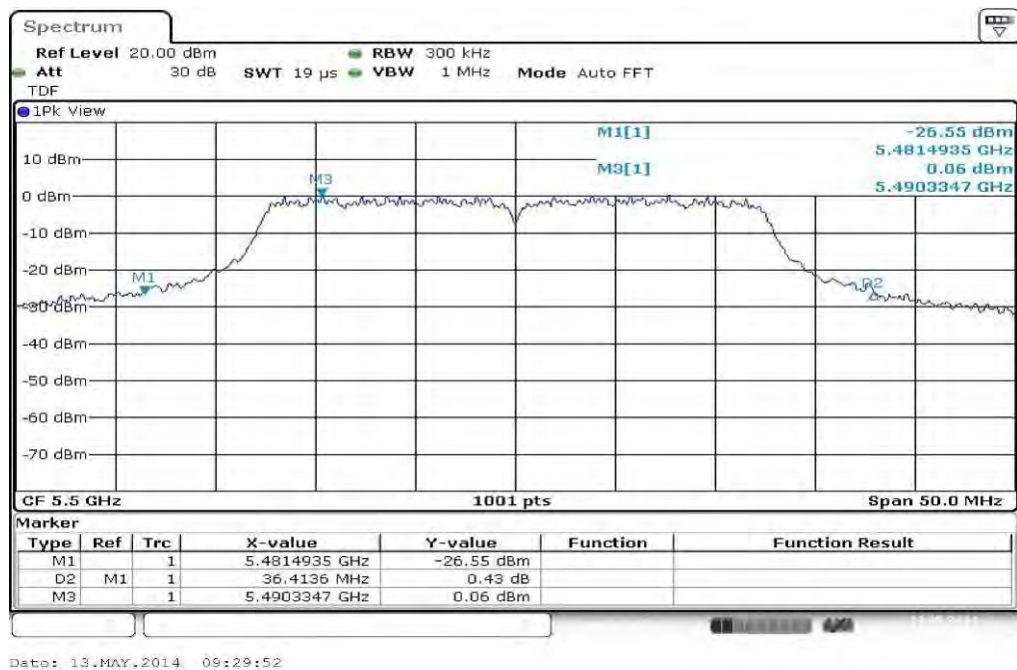
Plot 3: 5260 MHz



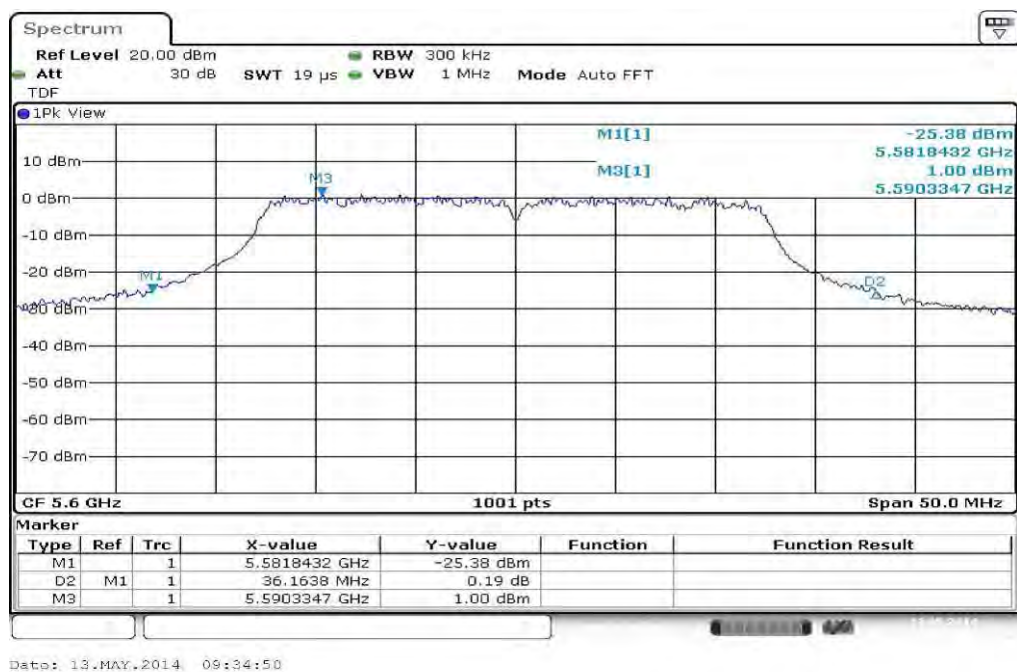
Plot 4: 5320 MHz



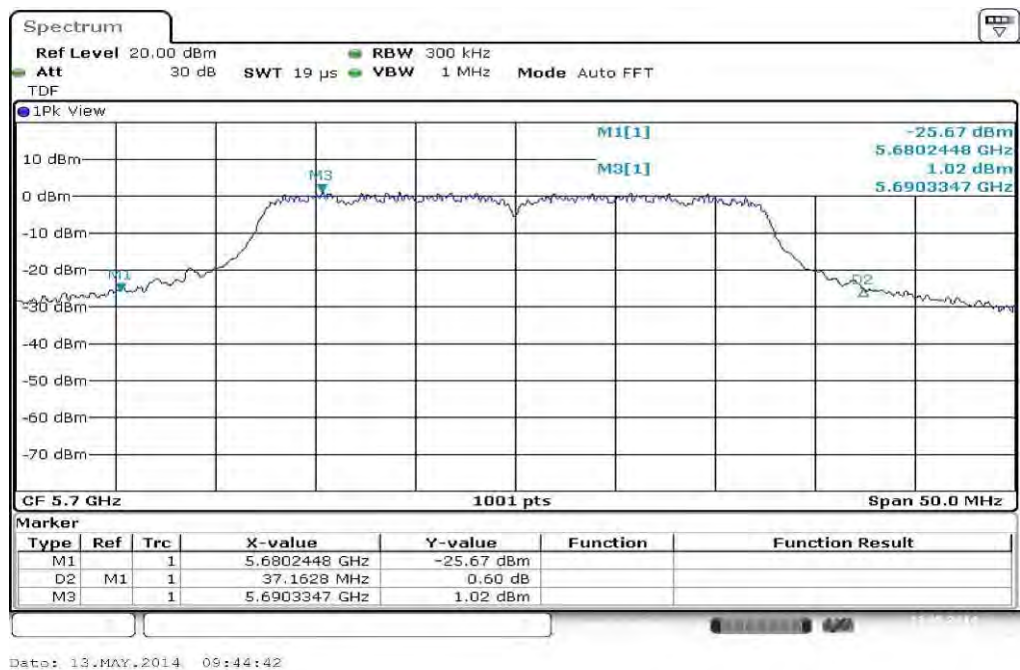
Plot 5: 5500 MHz

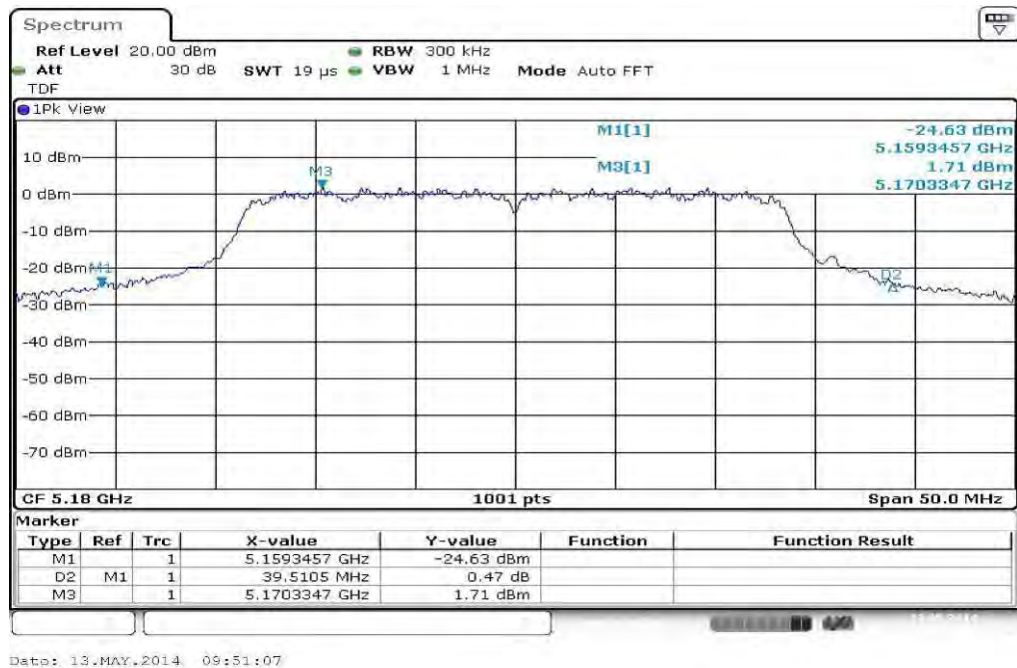
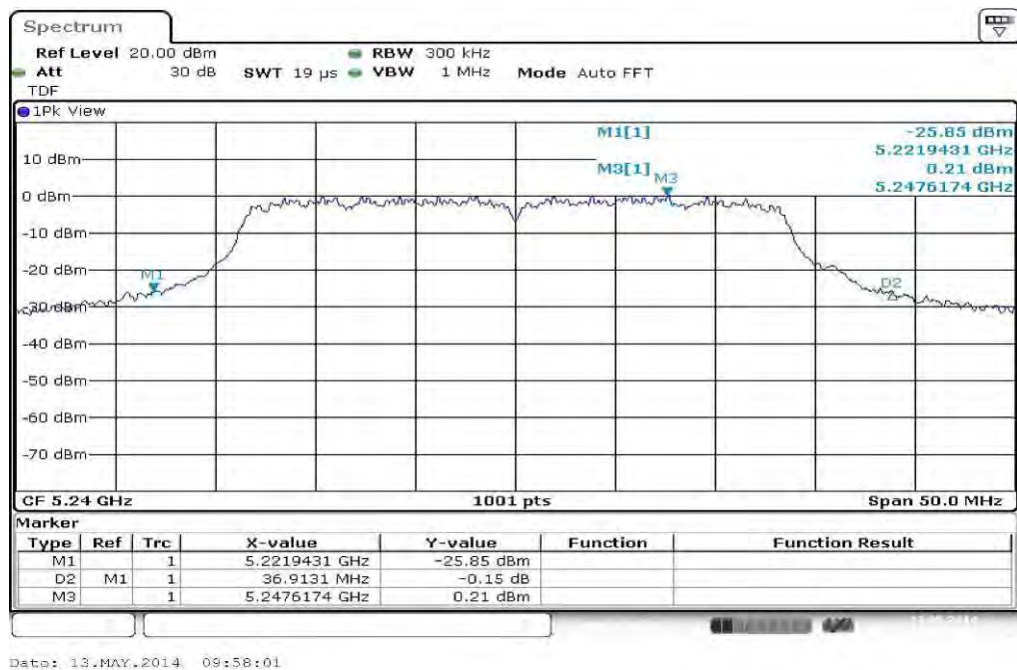


Plot 6: 5600 MHz

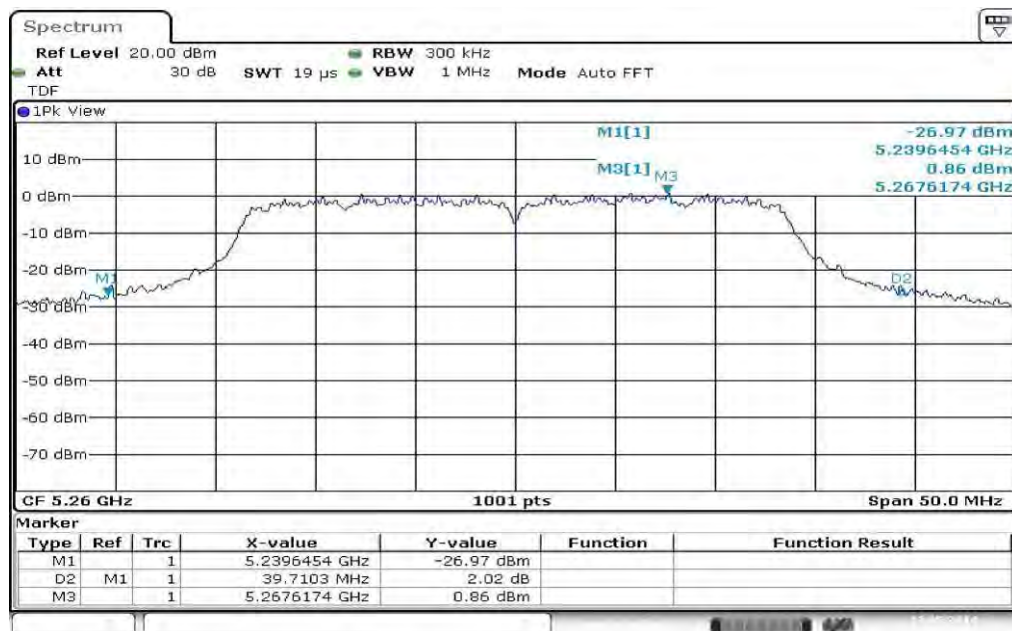


Plot 7: 5700 MHz



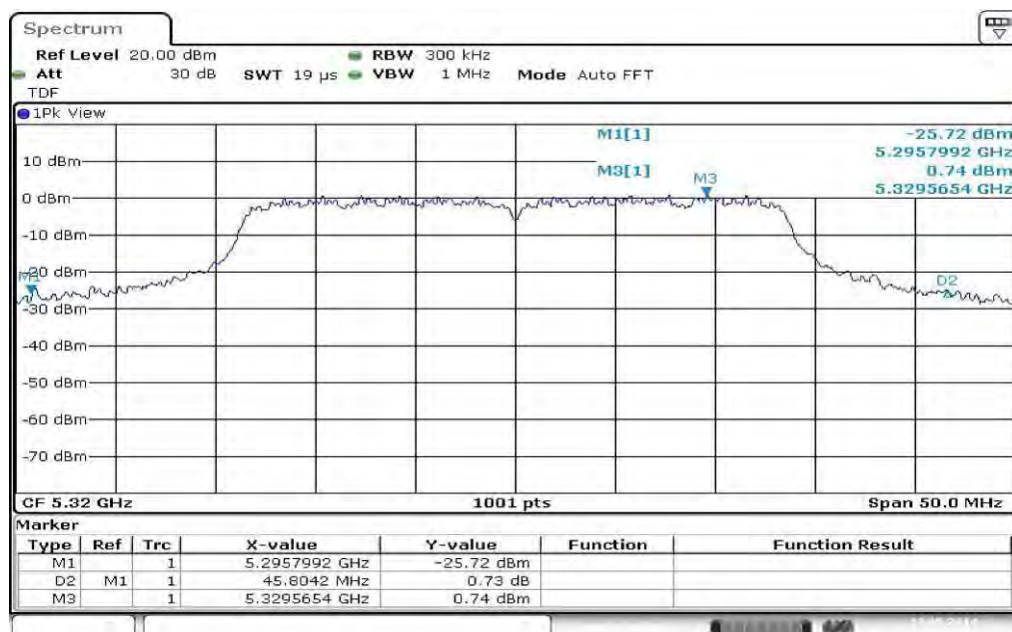
Plots: OFDM / n – mode HT20**Plot 1: 5180 MHz****Plot 2: 5240 MHz**

Plot 3: 5260 MHz



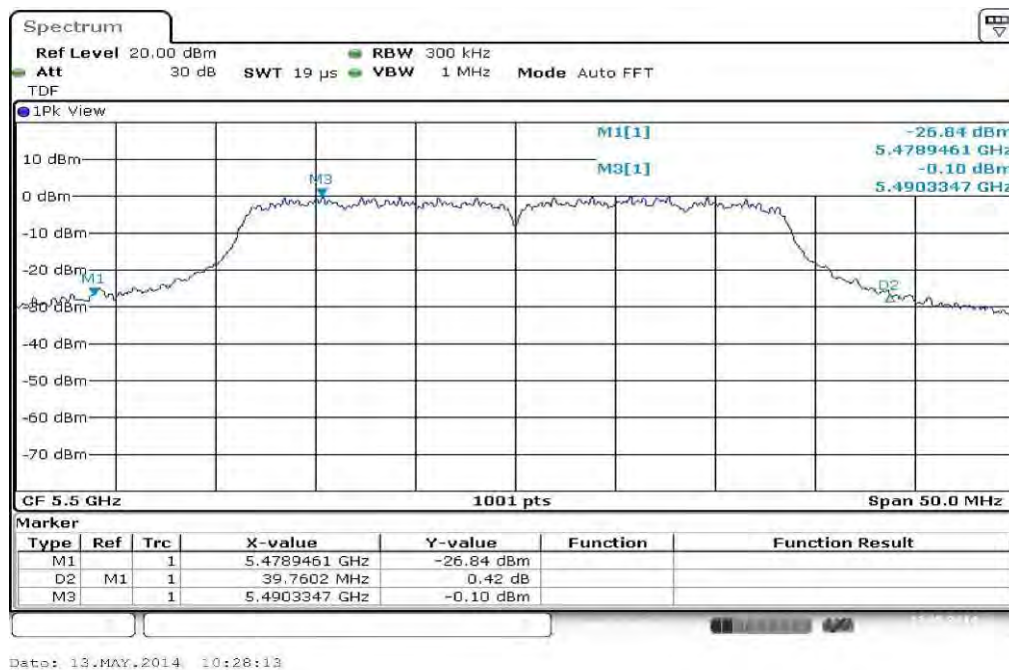
Date: 13.MAY.2014 10:08:42

Plot 4: 5320 MHz

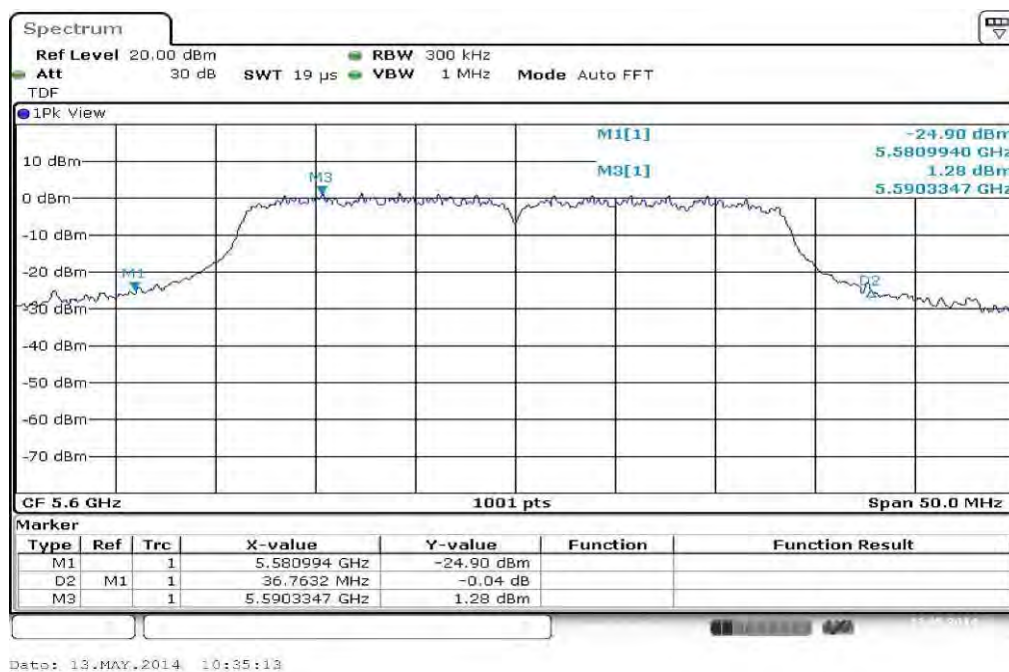


Date: 13.MAY.2014 10:14:07

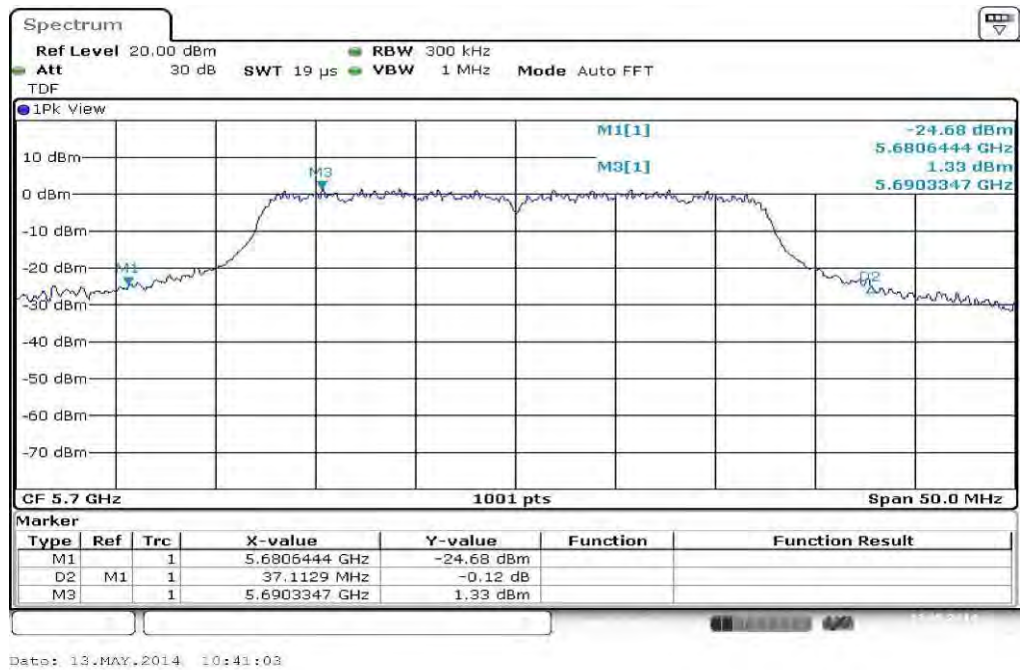
Plot 5: 5500 MHz

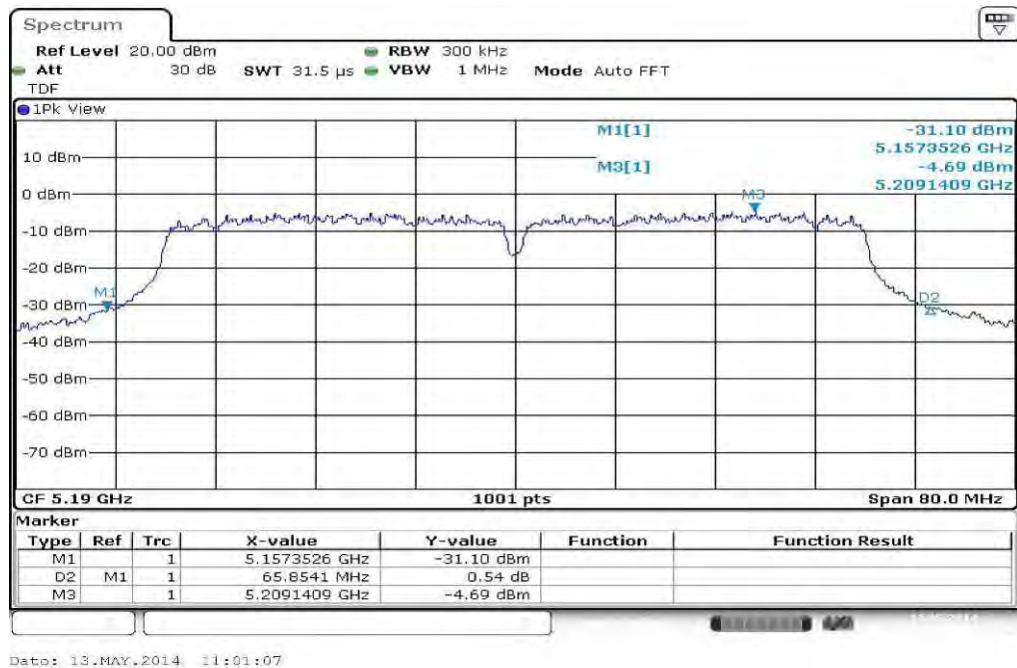
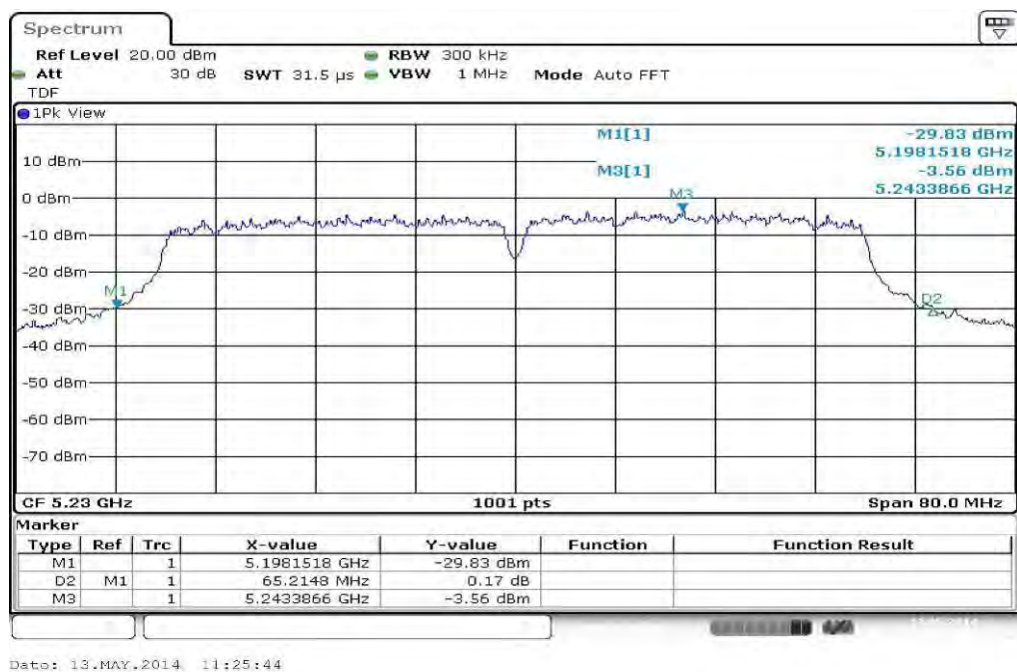


Plot 6: 5600 MHz

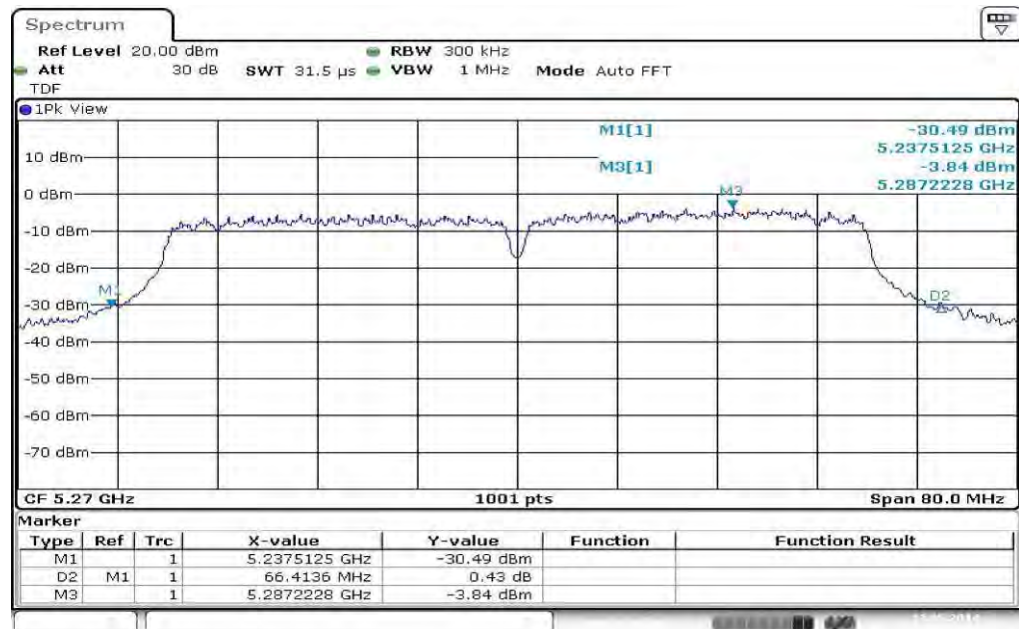


Plot 7: 5700 MHz



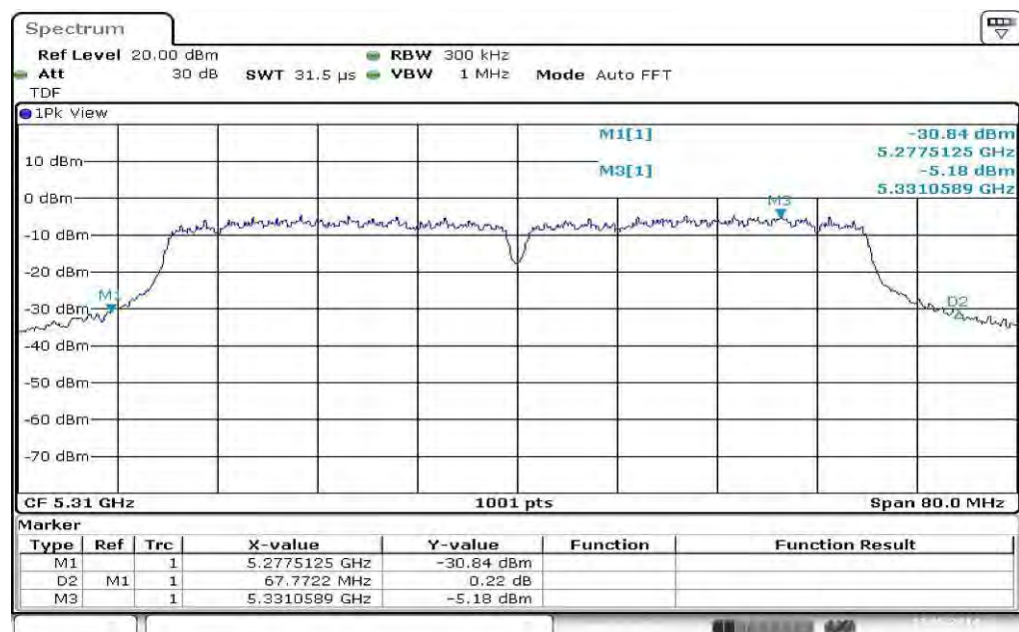
Plots: OFDM / n – mode HT40**Plot 1: 5190 MHz****Plot 2: 5230 MHz**

Plot 3: 5270 MHz



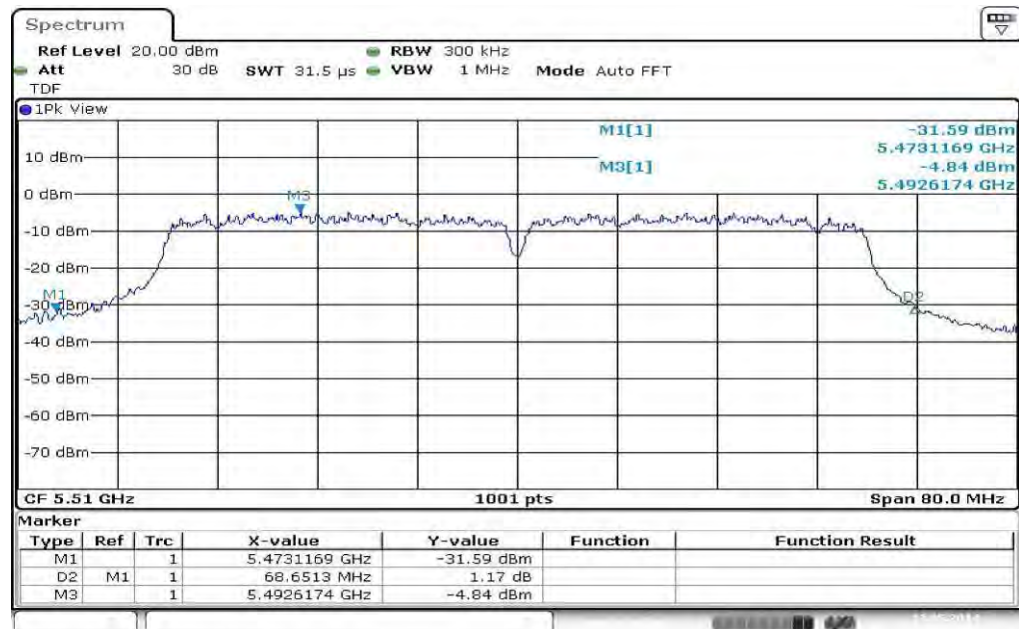
Date: 13.MAY.2014 11:17:33

Plot 4: 5310 MHz



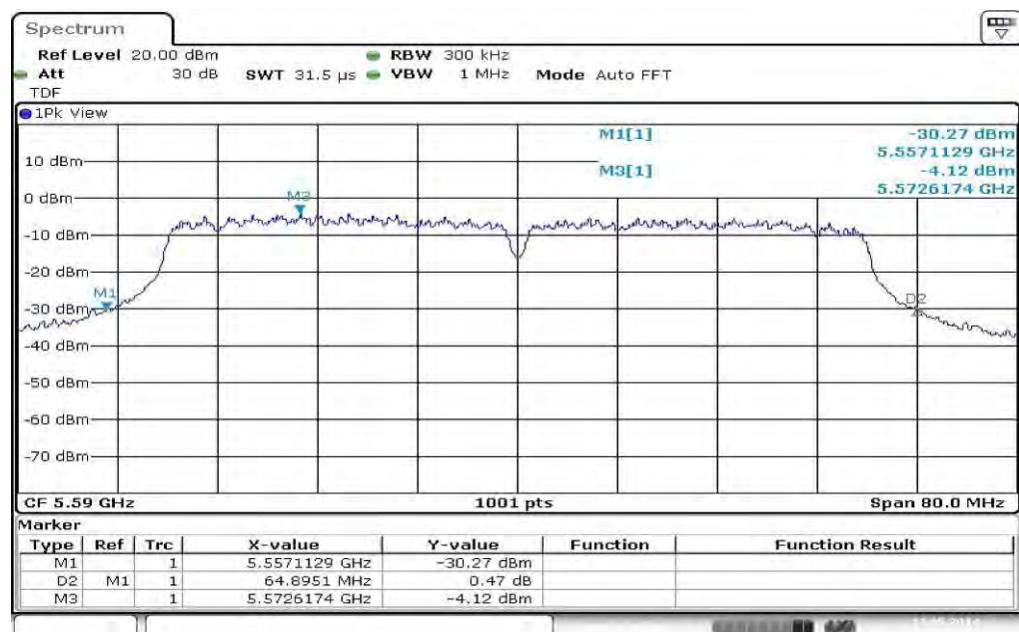
Date: 13.MAY.2014 11:33:14

Plot 5: 5510 MHz



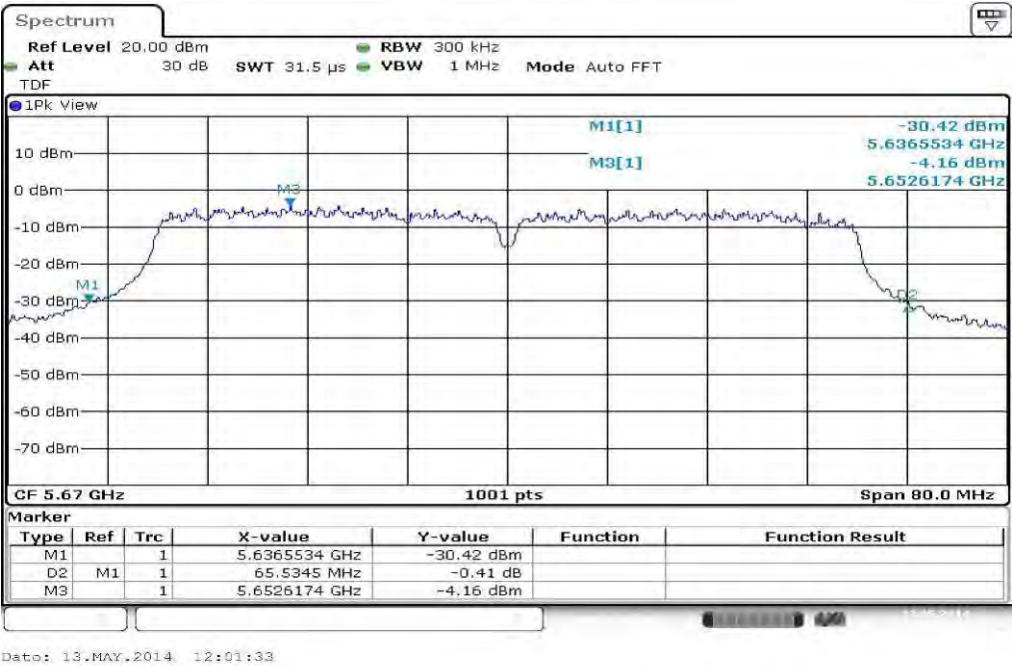
Date: 13.MAY.2014 11:46:52

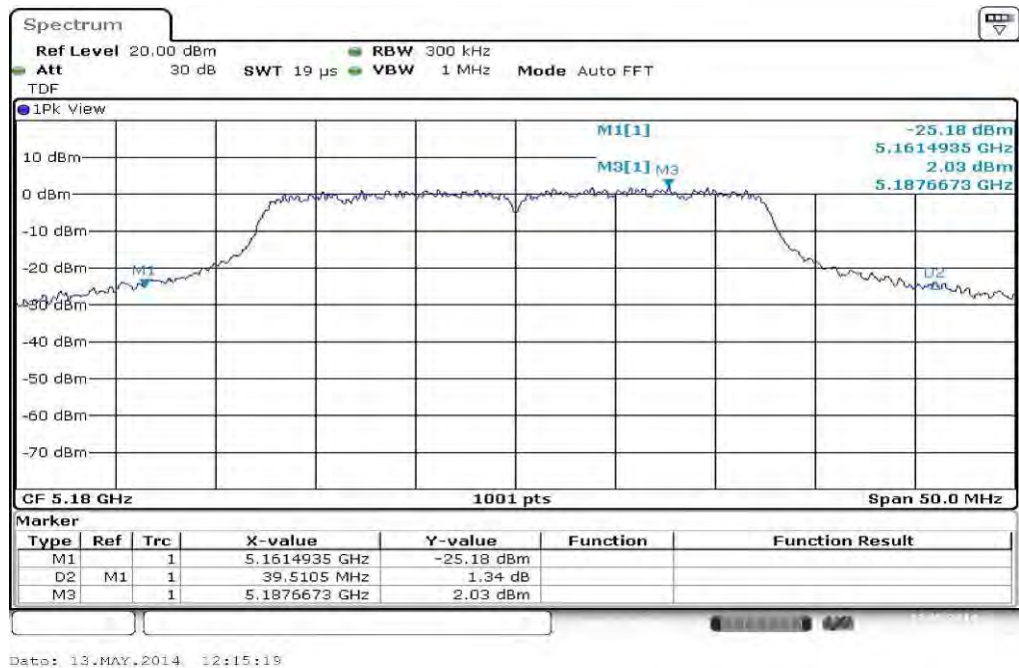
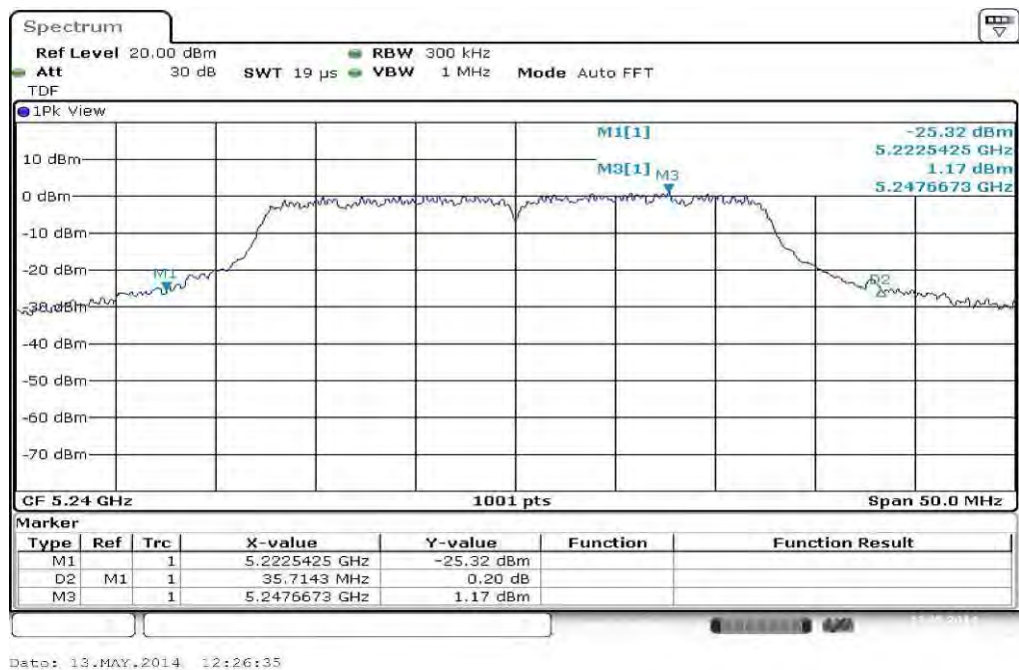
Plot 6: 5590 MHz



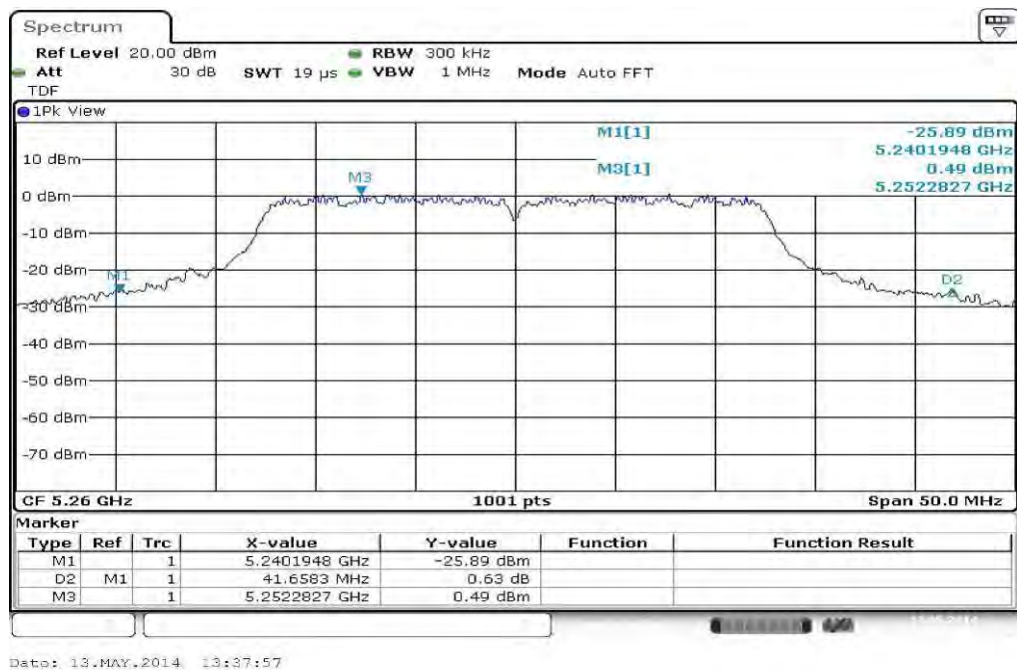
Date: 13.MAY.2014 11:53:50

Plot 7: 5670 MHz

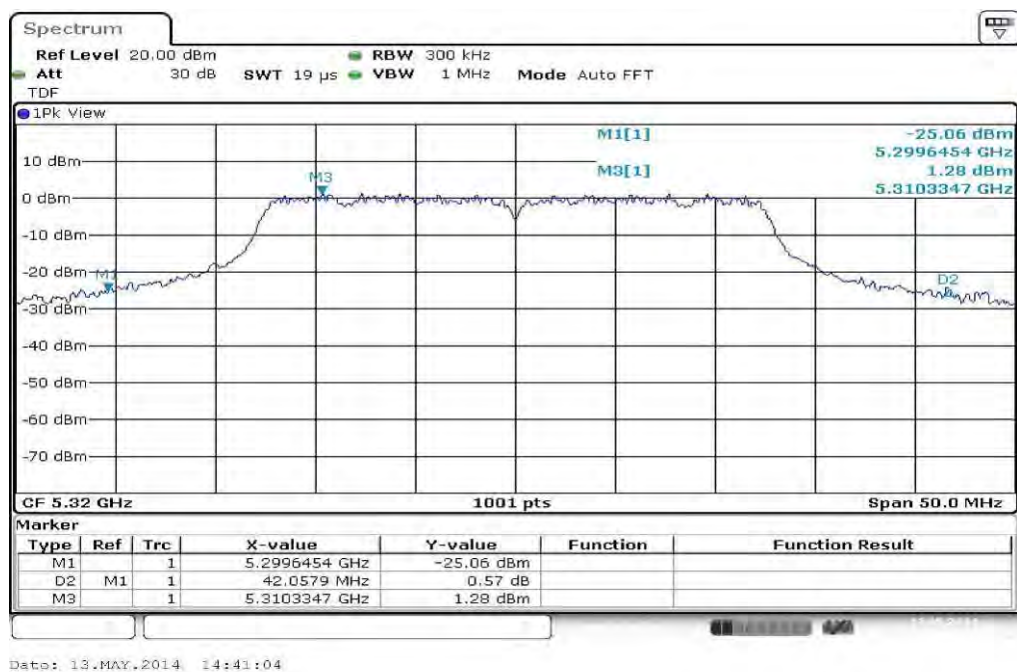


Results: ANT1**Plots:** OFDM / a – mode**Plot 1:** 5180 MHz**Plot 2:** 5240 MHz

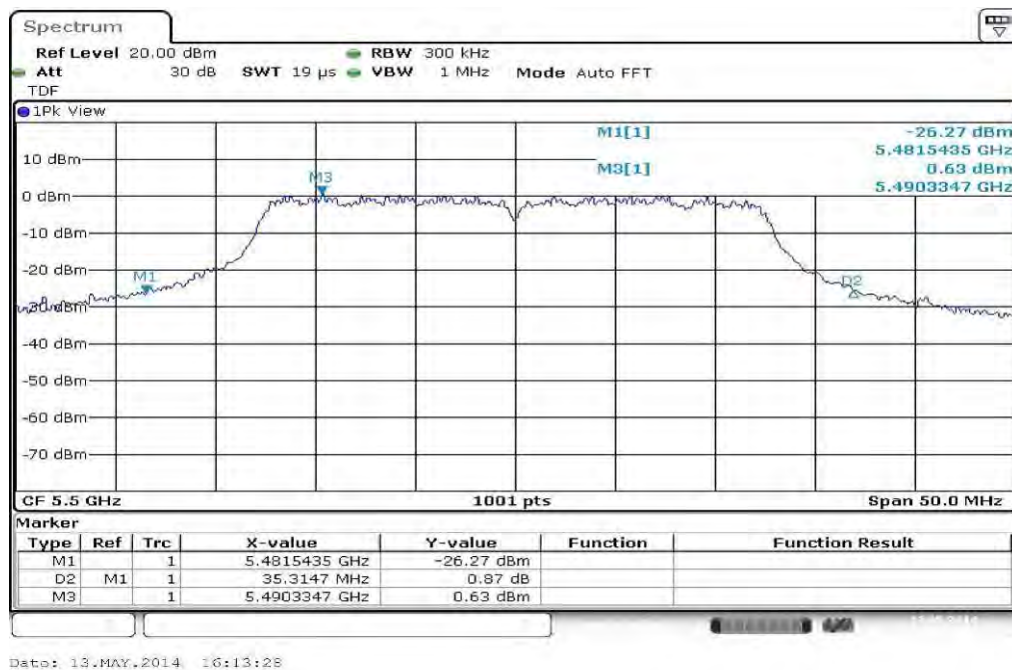
Plot 3: 5260 MHz



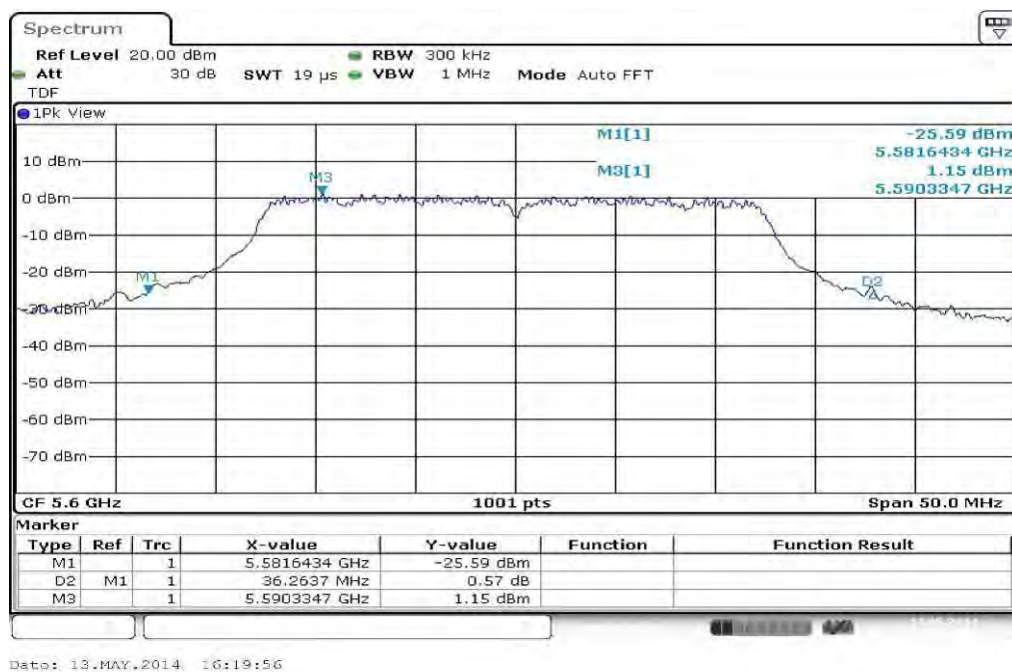
Plot 4: 5320 MHz



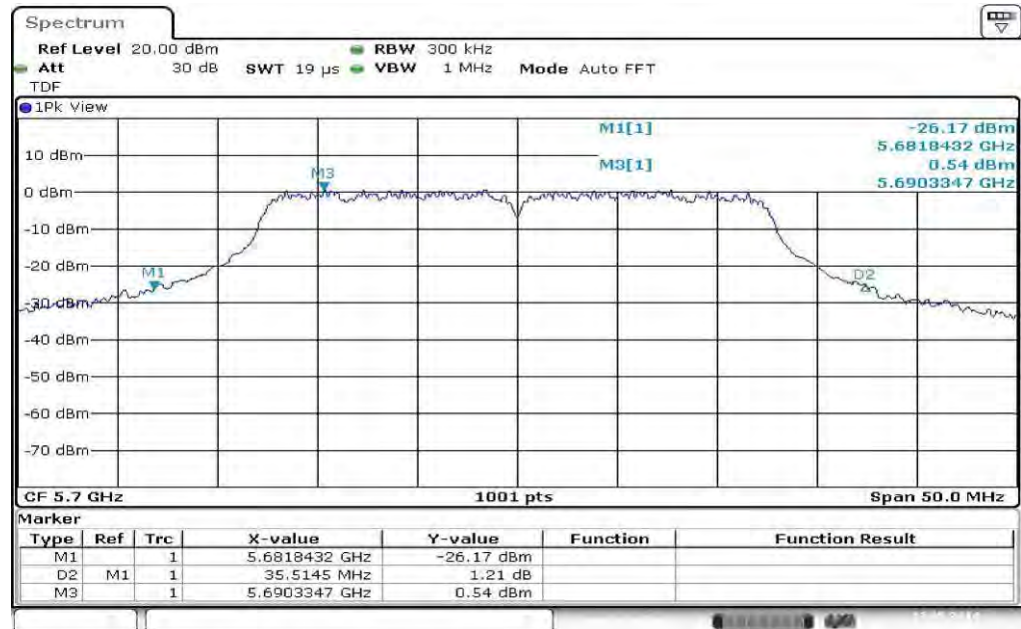
Plot 5: 5500 MHz



Plot 6: 5600 MHz



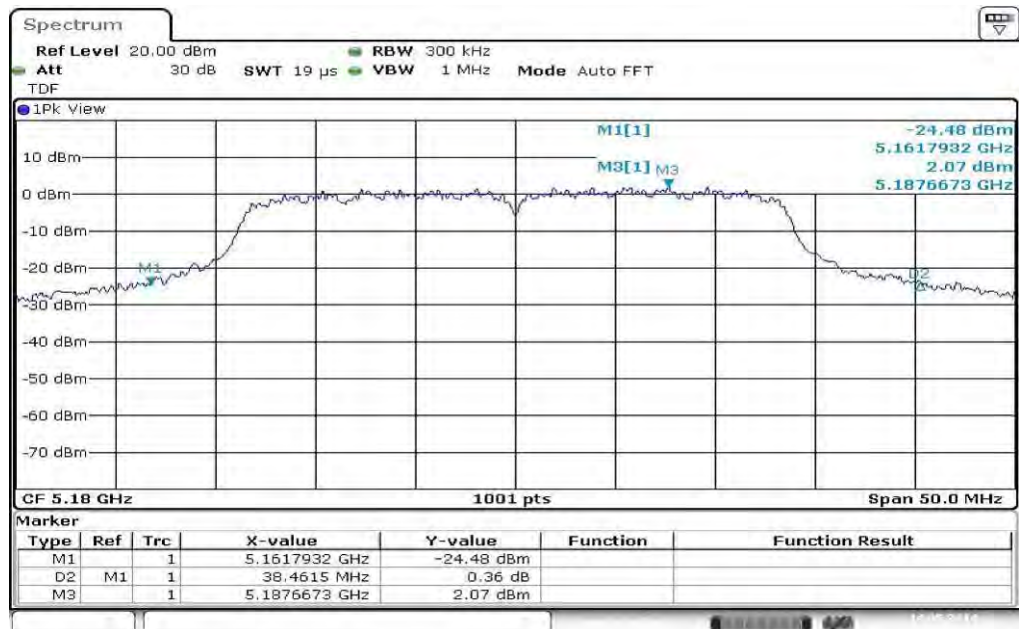
Plot 7: 5700 MHz



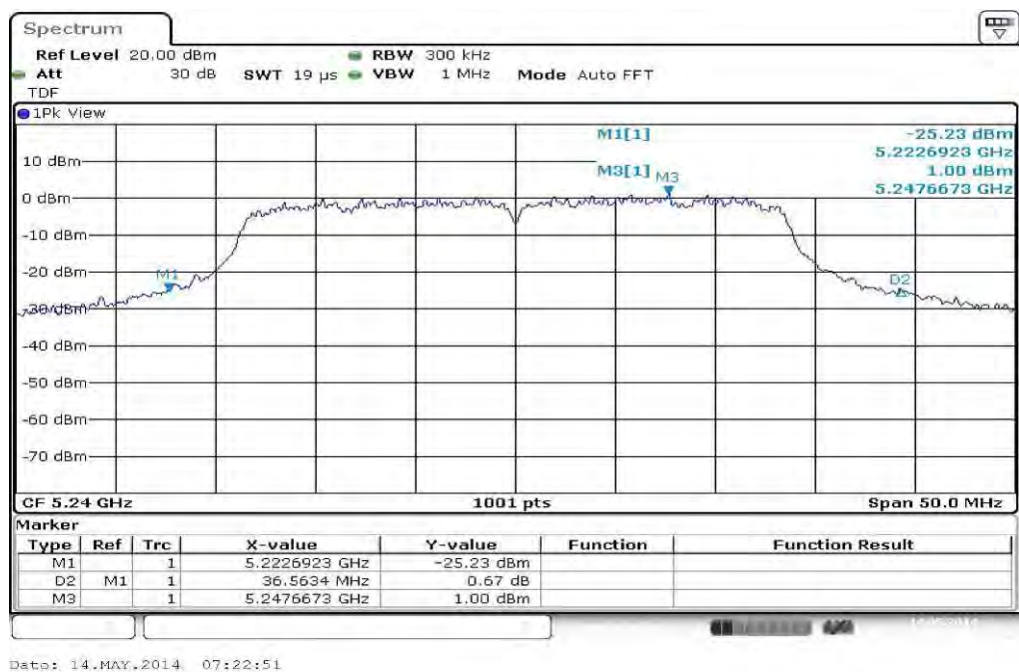
Date: 13.MAY.2014 16:25:08

Plots: OFDM / n – mode HT20

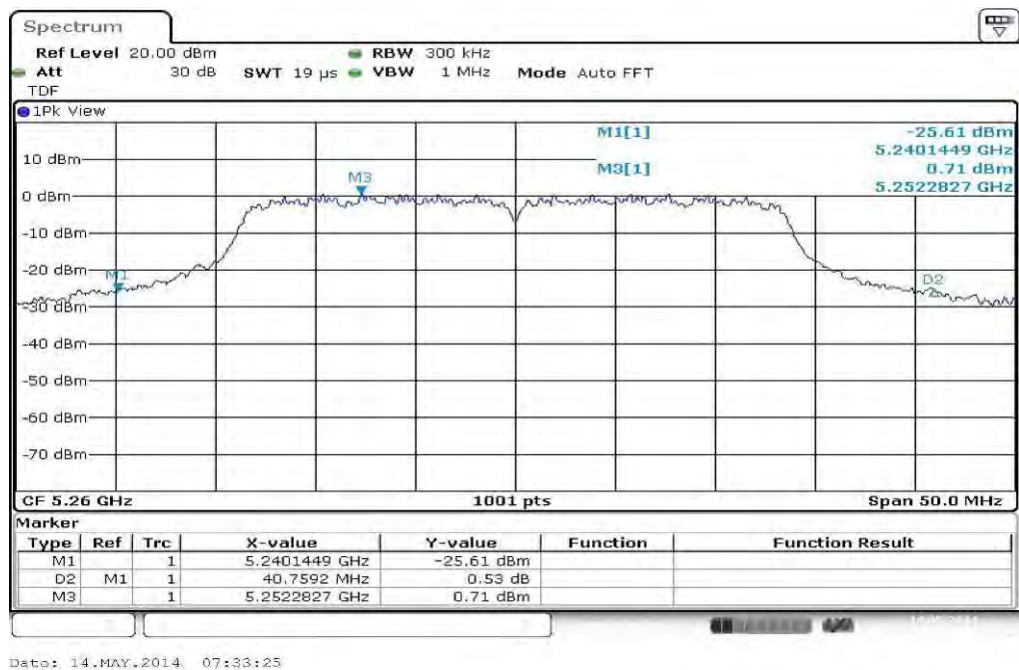
Plot 1: 5180 MHz



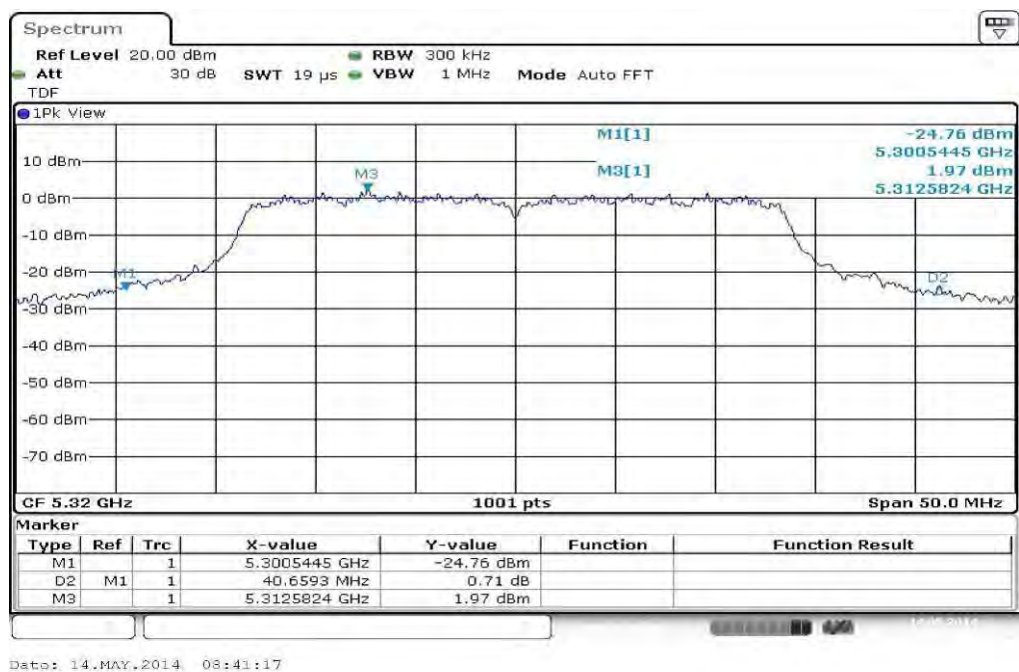
Plot 2: 5240 MHz



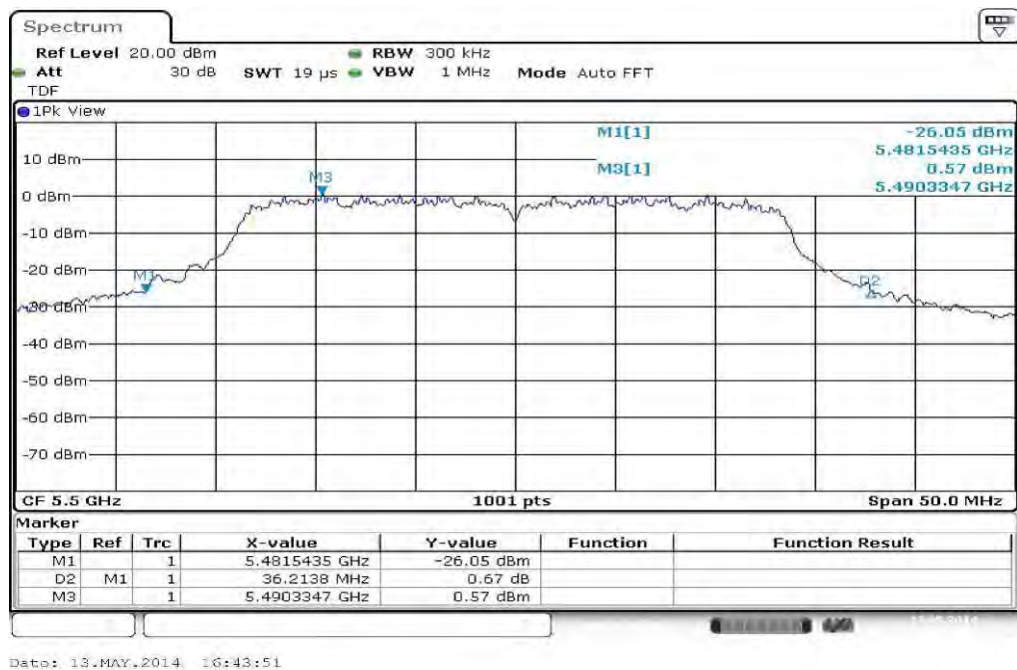
Plot 3: 5260 MHz



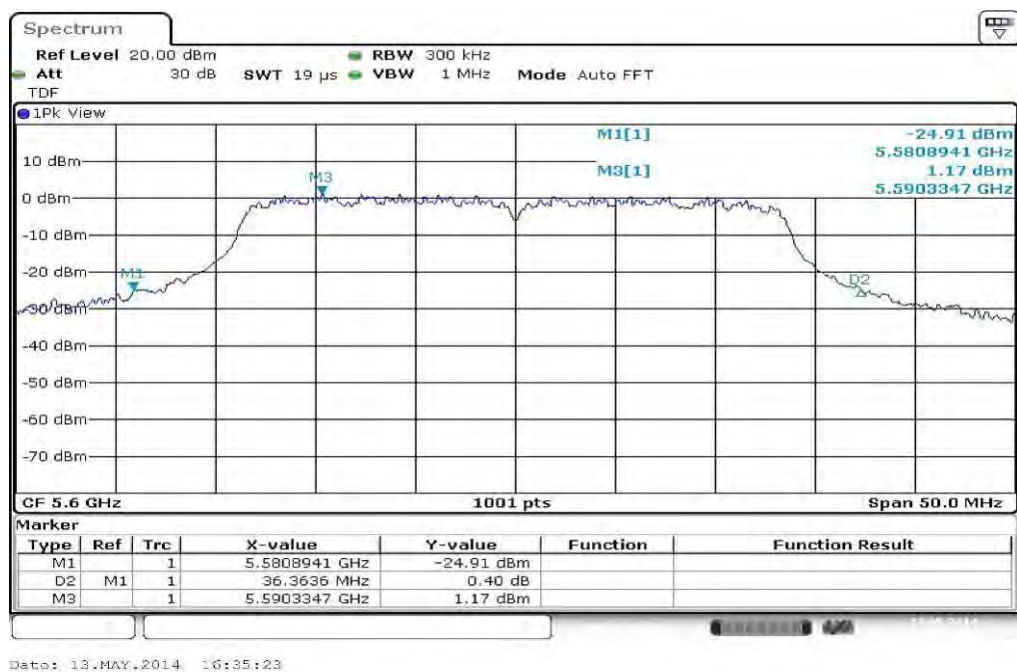
Plot 4: 5320 MHz



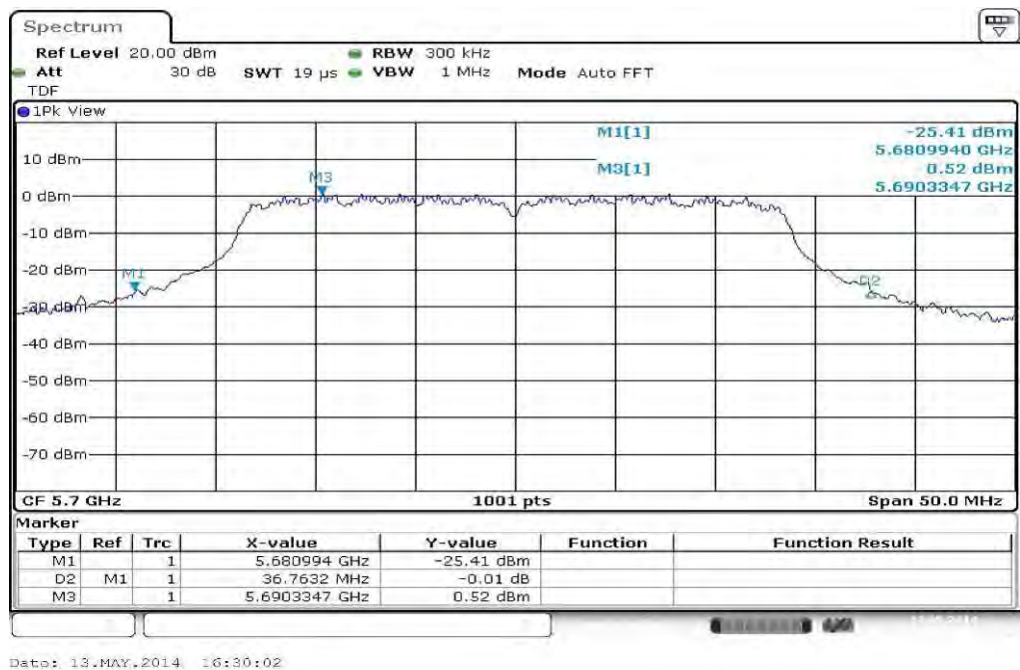
Plot 5: 5500 MHz

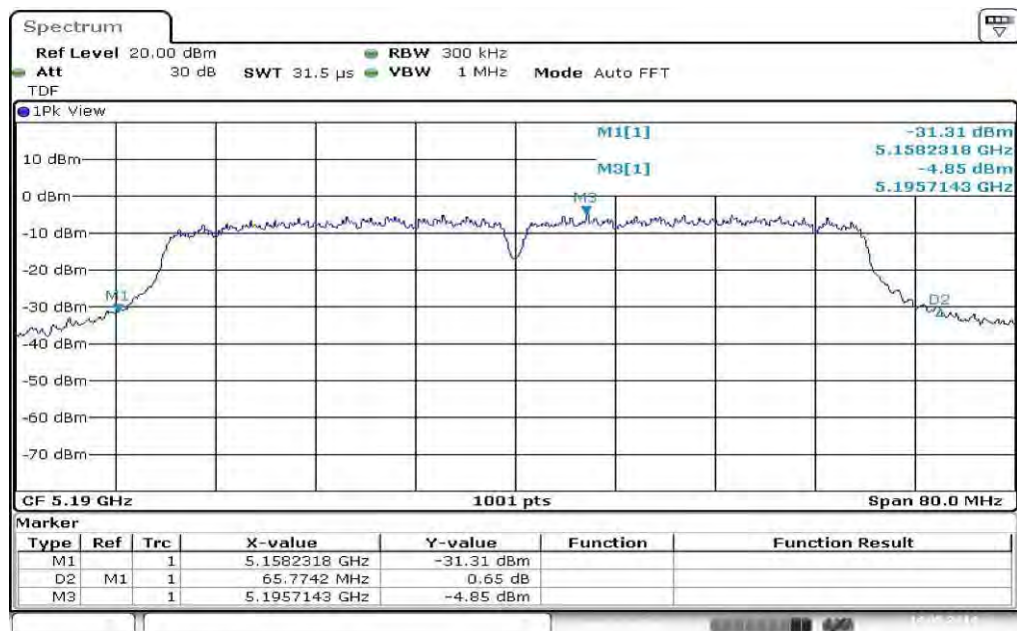


Plot 6: 5600 MHz

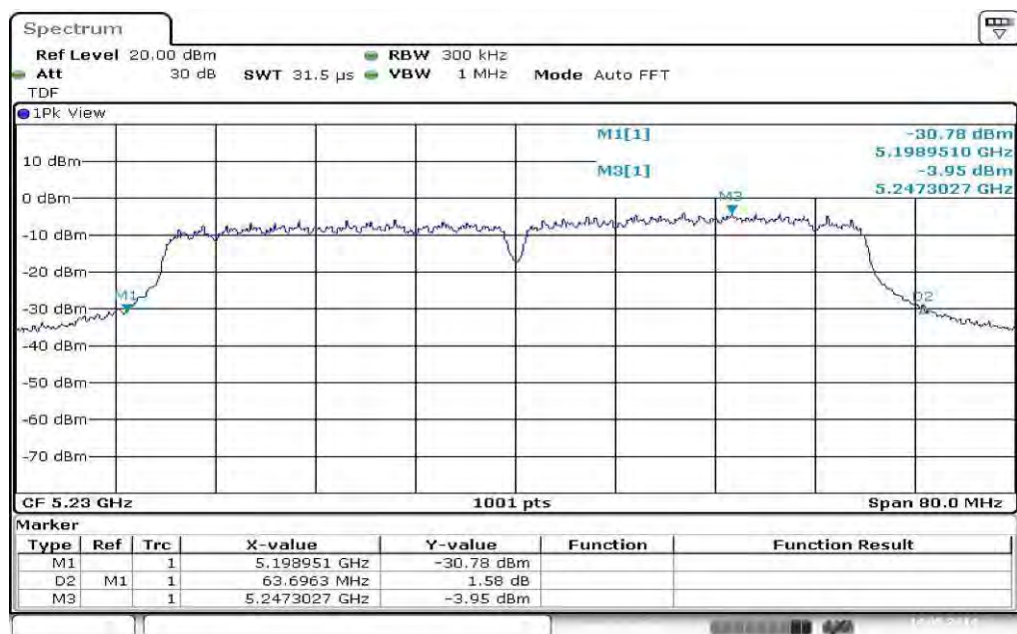


Plot 7: 5700 MHz



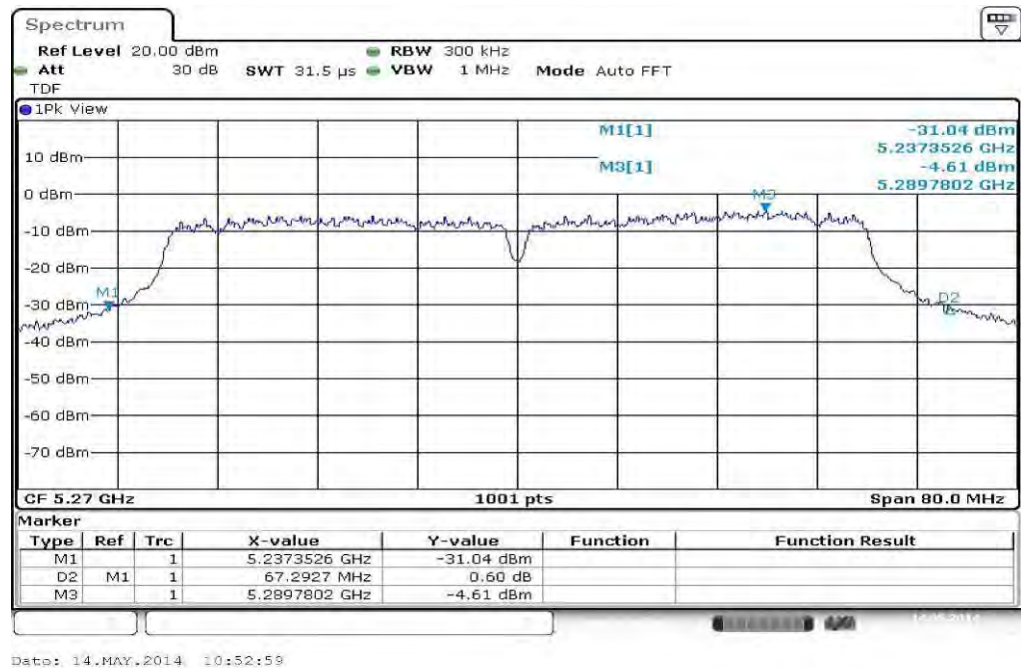
Plots: OFDM / n – mode HT40**Plot 1: 5190 MHz**

Date: 14.MAY.2014 09:28:21

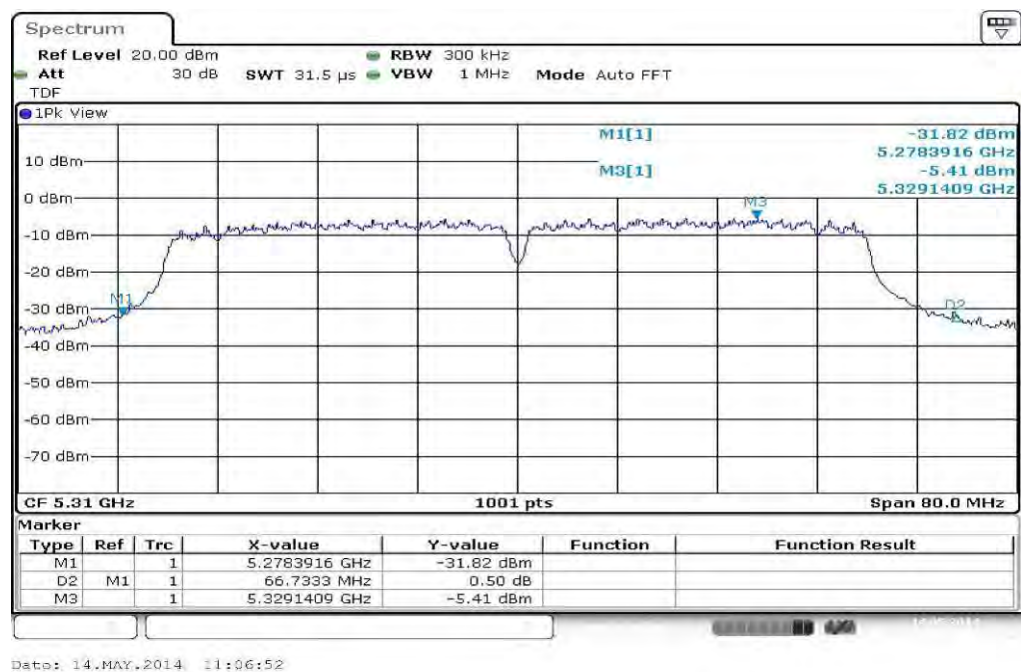
Plot 2: 5230 MHz

Date: 14.MAY.2014 10:40:51

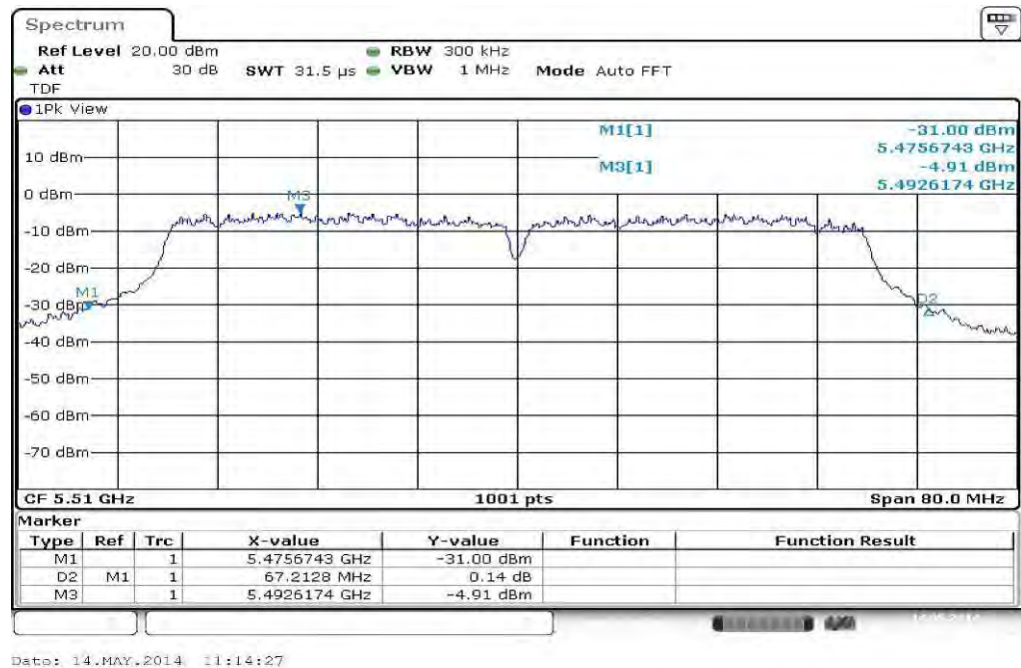
Plot 3: 5270 MHz



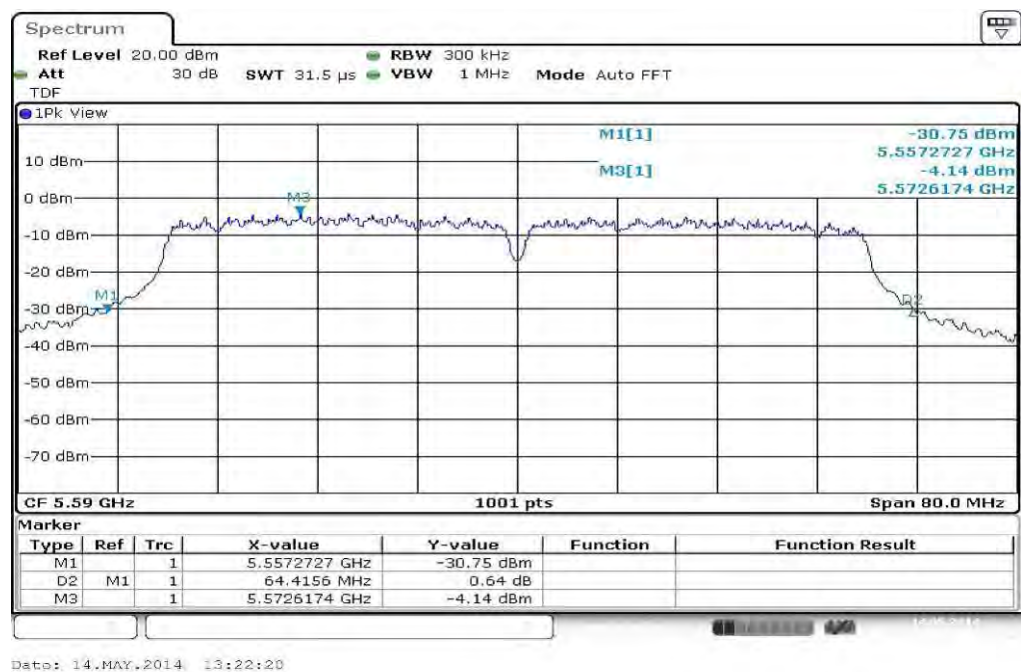
Plot 4: 5310 MHz



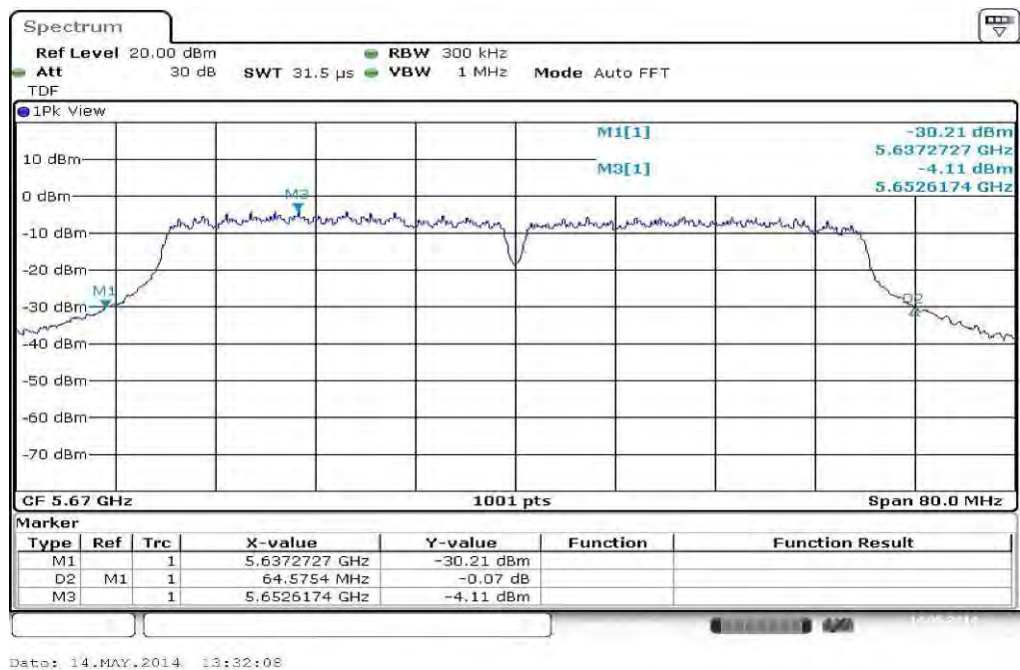
Plot 5: 5510 MHz



Plot 6: 5590 MHz



Plot 7: 5670 MHz



10.7 Peak excursion measurements**Description:**

Peak to average value.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	60 s / 120 s
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 MHz
Span:	> Complete signal
Trace-Mode:	Max hold

Limits:

Peak excursion value
Does not exceed 13 dB.

Results: ANT0**Results:**

Modulation OFDM / a – mode	Peak excursion value		
	5180 MHz	-/-	5240 MHz
Channel			
RMS	-1.59	-/-	-2.61
Peak	7.84		6.77
Peak excursion value	9.43		9.38
Channel	5260 MHz	-/-	5320 MHz
RMS	-2.25	-/-	-1.76
Peak	7.16		7.35
Peak excursion value	9.41		9.11
Channel	5500 MHz	5600 MHz	5700 MHz
RMS	-2.98	-1.99	-1.95
Peak	6.18	6.94	7.12
Peak excursion value	9.16	8.93	9.07
Measurement uncertainty	± 1 dB		

Results:

Modulation OFDM / n – mode HT20	Peak excursion value		
	5180 MHz	-/-	5240 MHz
Channel			
RMS	-1.53	-/-	-3.07
Peak	8.43		6.84
Peak excursion value	9.96		9.91
Channel	5260 MHz	-/-	5320 MHz
RMS	-2.52	-/-	-2.15
Peak	7.04		7.40
Peak excursion value	9.56		9.55
Channel	5500 MHz	5600 MHz	5700 MHz
RMS	-3.28	-2.15	-1.65
Peak	6.33	7.42	7.12
Peak excursion value	9.61	9.57	8.77
Measurement uncertainty	± 1 dB		

Results:

Modulation OFDM / n – mode HT40	Peak excursion value			
	Channel	5190 MHz	5230 MHz	5270 MHz
RMS		-8.05	-7.07	-7.09
Peak		1.88	2.94	2.75
Peak excursion value		9.93	10.01	9.84
Channel		5310 MHz	5510 MHz	5590 MHz
RMS		-8.00	-8.34	-7.64
Peak		1.68	1.45	1.88
Peak excursion value		9.68	9.79	9.52
Channel		5670 MHz	-/-	-/-
RMS		-7.68	-/-	-/-
Peak		2.00		
Peak excursion value		9.68		
Measurement uncertainty	± 1 dB			

Result: Passed

Results: ANT1**Results:**

Modulation OFDM / a – mode	Peak excursion value		
	5180 MHz	-/-	5240 MHz
Channel			
RMS	-0.92	-/-	-1.99
Peak	8.43		7.21
Peak excursion value	9.35		9.20
Channel	5260 MHz	-/-	5320 MHz
RMS	-2.41	-/-	-1.66
Peak	6.82		7.52
Peak excursion value	9.23		9.18
Channel	5500 MHz	5600 MHz	5700 MHz
RMS	-2.45	-1.75	-2.23
Peak	6.34	7.07	6.94
Peak excursion value	8.79	8.82	9.17
Measurement uncertainty	± 1 dB		

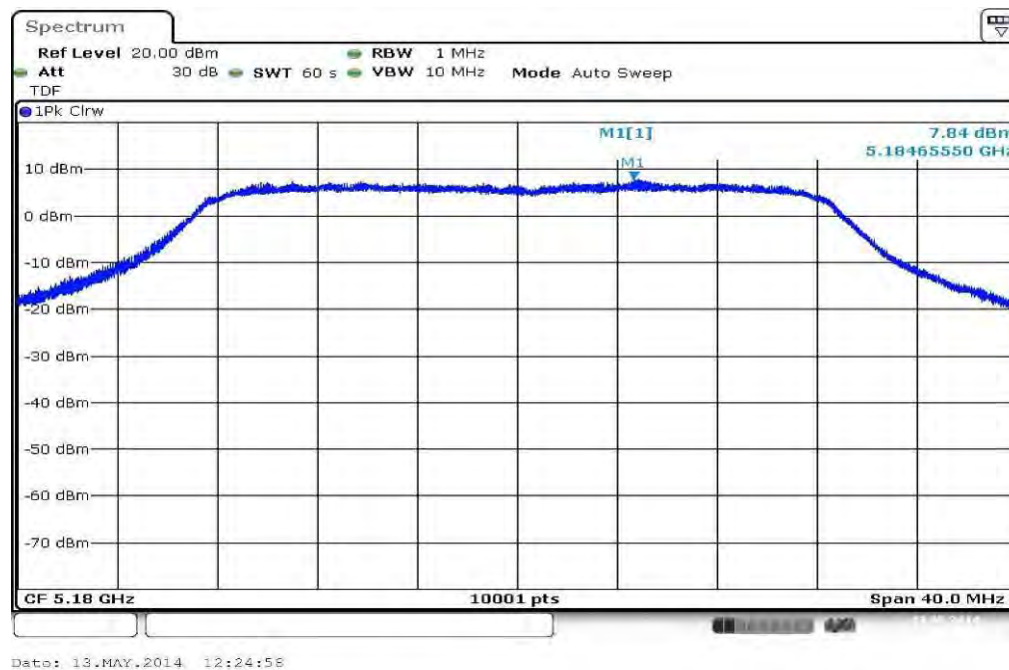
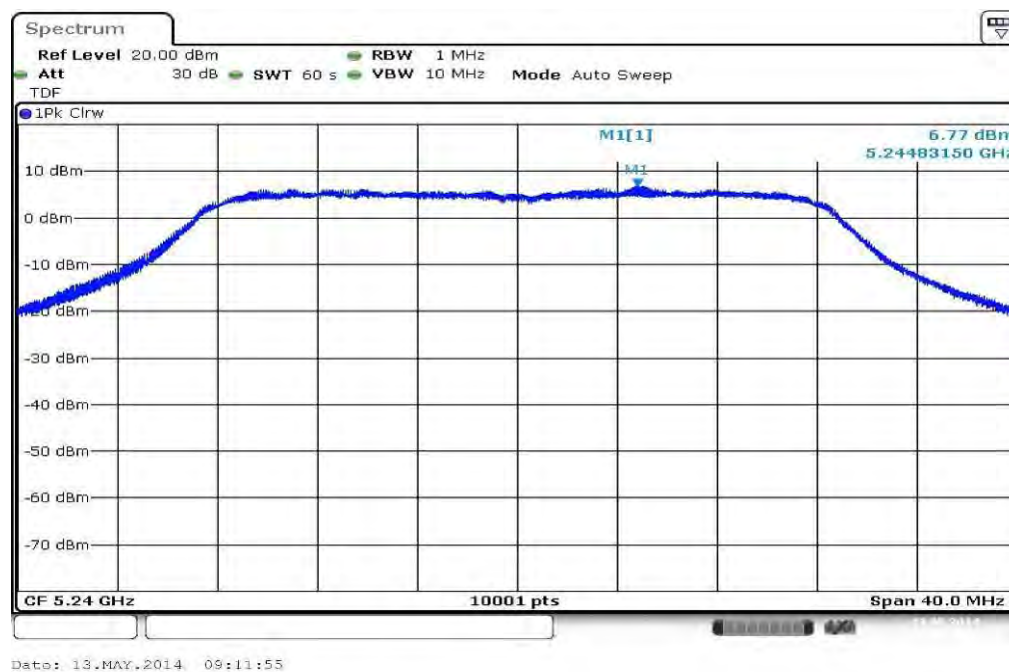
Results:

Modulation OFDM / n – mode HT20	Peak excursion value		
	5180 MHz	-/-	5240 MHz
Channel			
RMS	-1.18	-/-	-2.29
Peak	8.57		7.47
Peak excursion value	9.75		9.76
Channel	5260 MHz	-/-	5320 MHz
RMS	-2.58	-/-	-2.12
Peak	7.09		7.50
Peak excursion value	9.67		9.62
Channel	5500 MHz	5600 MHz	5700 MHz
RMS	-2.87	-2.09	-2.51
Peak	6.47	7.26	7.48
Peak excursion value	9.34	9.35	9.99
Measurement uncertainty	± 1 dB		

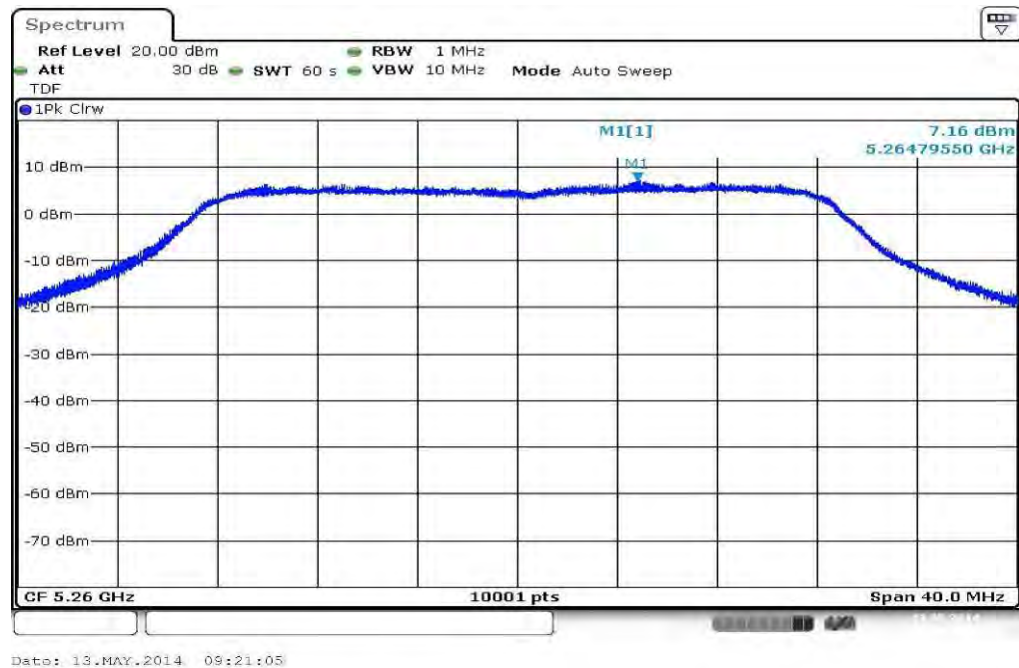
Results:

Modulation OFDM / n – mode HT40	Peak excursion value		
	5190 MHz	5230 MHz	5270 MHz
Channel			
RMS	-8.51	-7.30	-7.72
Peak	2.96	2.45	2.85
Peak excursion value	11.47	9.75	10.57
Channel	5310 MHz	5510 MHz	5590 MHz
RMS	-8.57	-8.24	-7.66
Peak	1.56	3.18	1.86
Peak excursion value	10.13	11.42	9.52
Channel	5670 MHz	-/-	-/-
RMS	-7.92	-/-	-/-
Peak	4.30		
Peak excursion value	12.22		
Measurement uncertainty	± 1 dB		

Result: Passed

Results: ANT0**Plots:** OFDM / a – mode**Plot 1:** 5180 MHz**Plot 2:** 5240 MHz

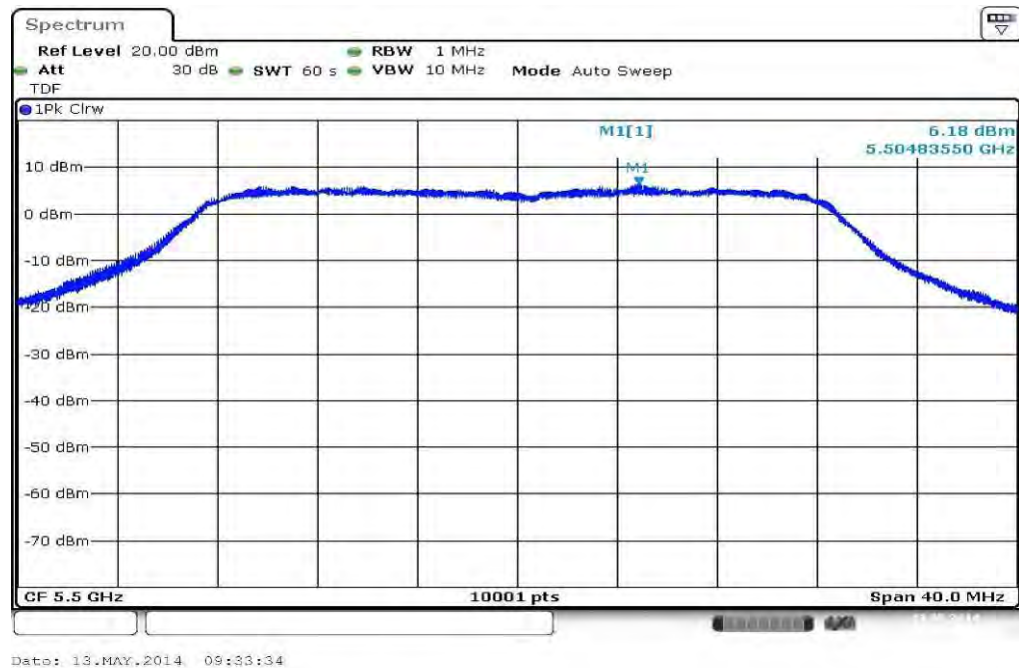
Plot 3: 5260 MHz



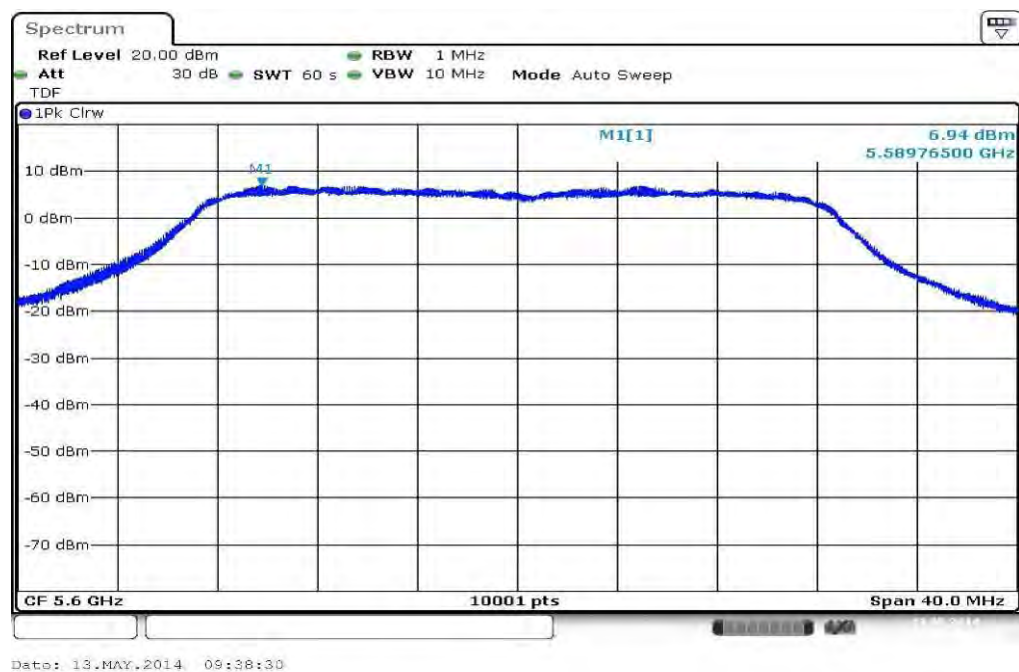
Plot 4: 5320 MHz



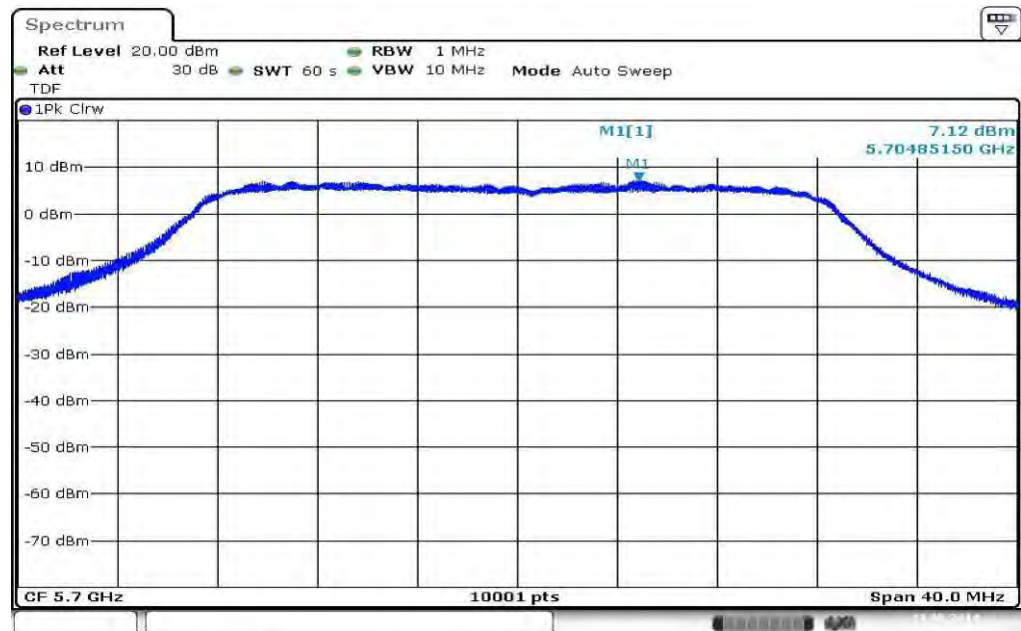
Plot 5: 5500 MHz



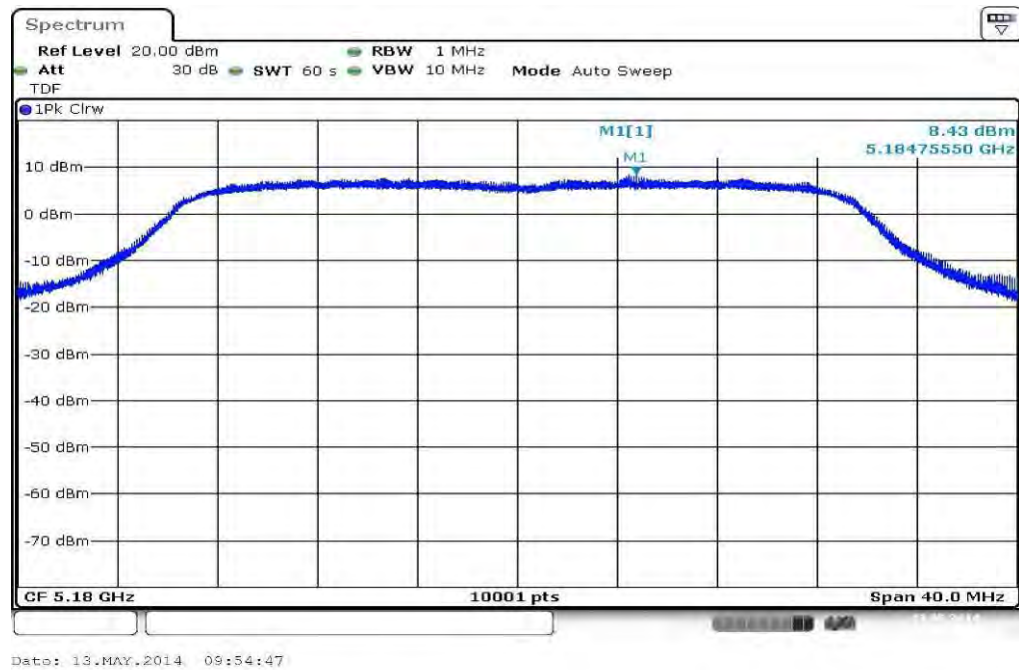
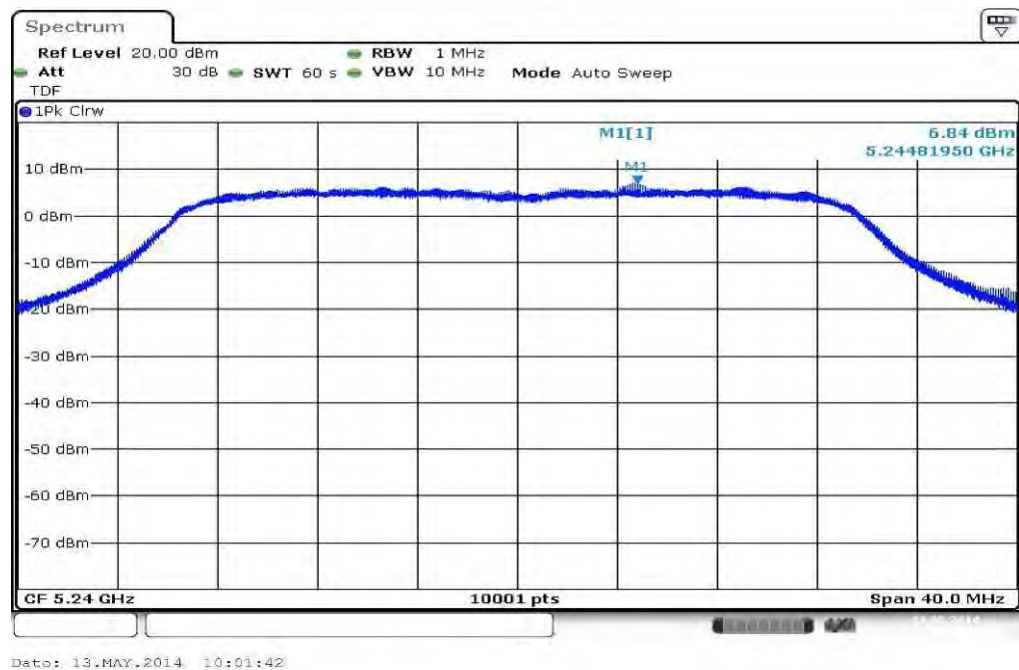
Plot 6: 5600 MHz

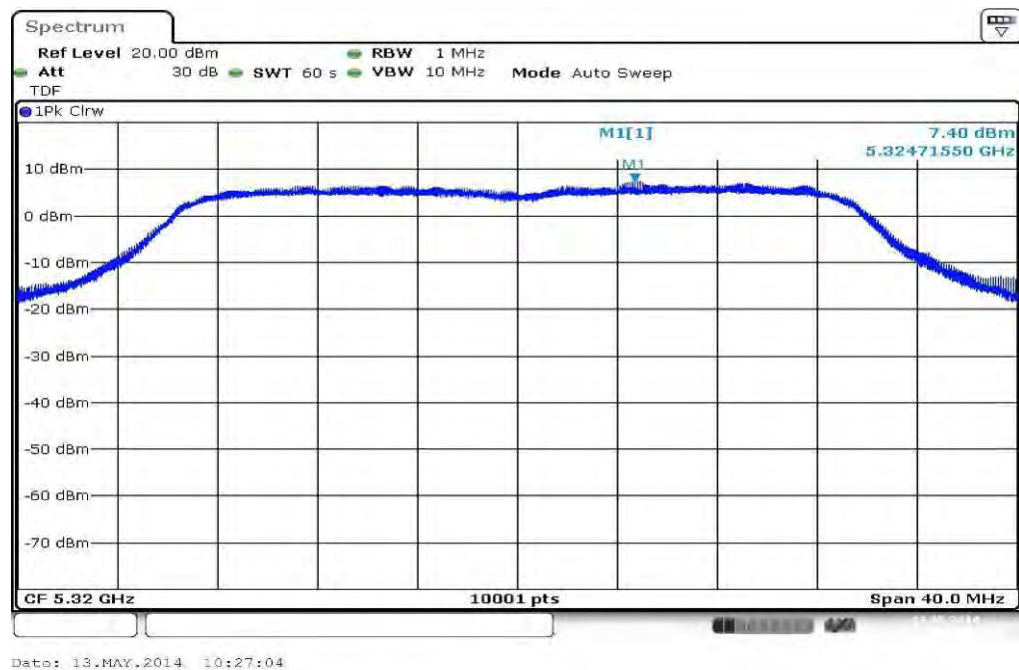
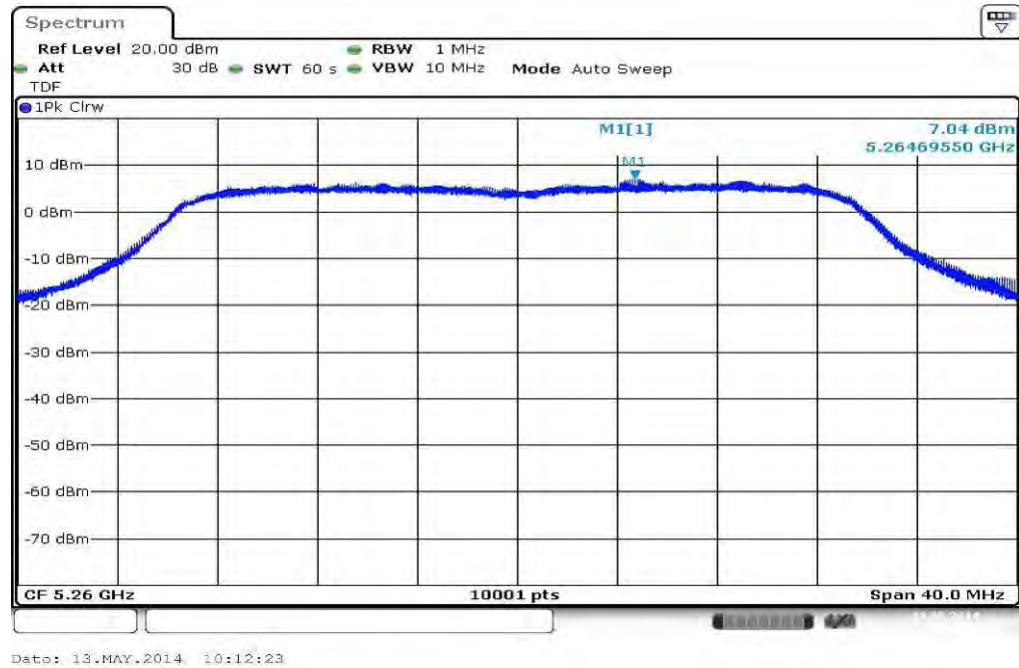


Plot 7: 5700 MHz

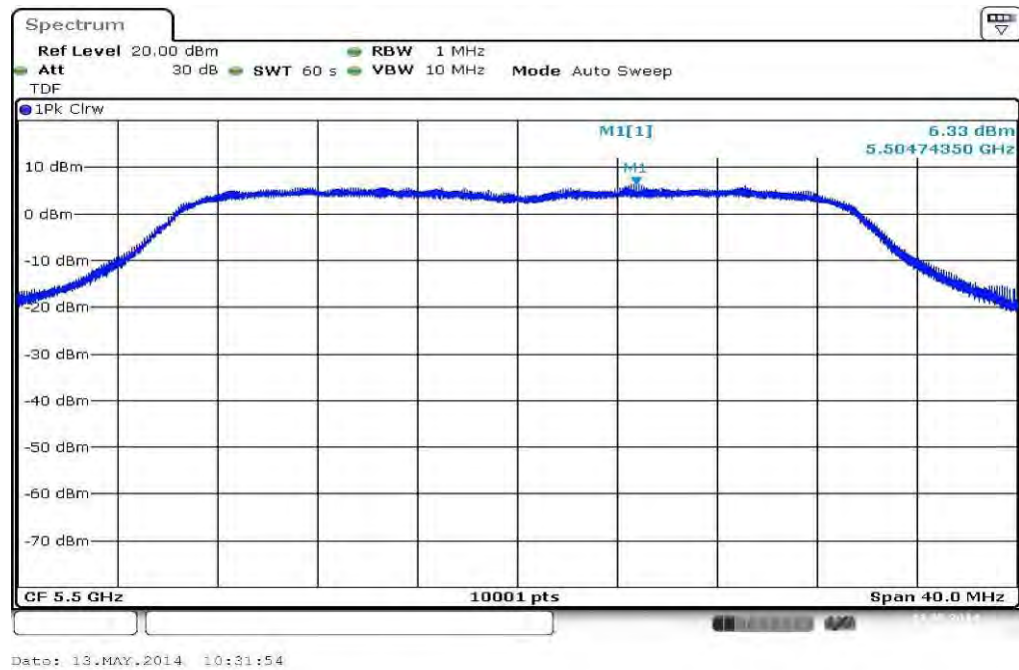


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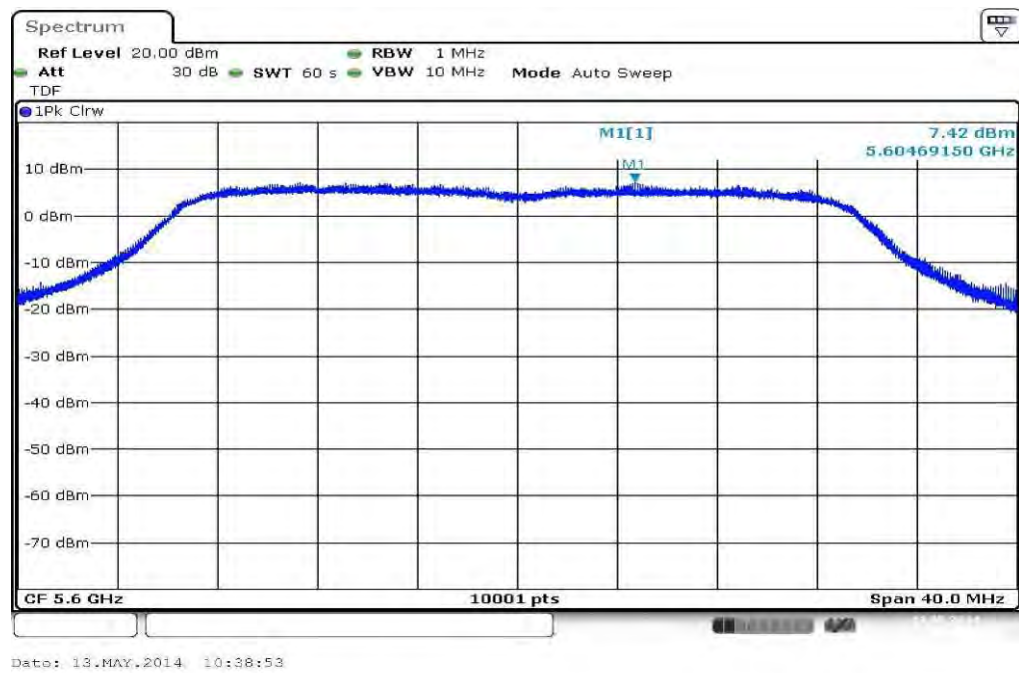
Plots: OFDM / n – mode HT20**Plot 1: 5180 MHz****Plot 2: 5240 MHz**



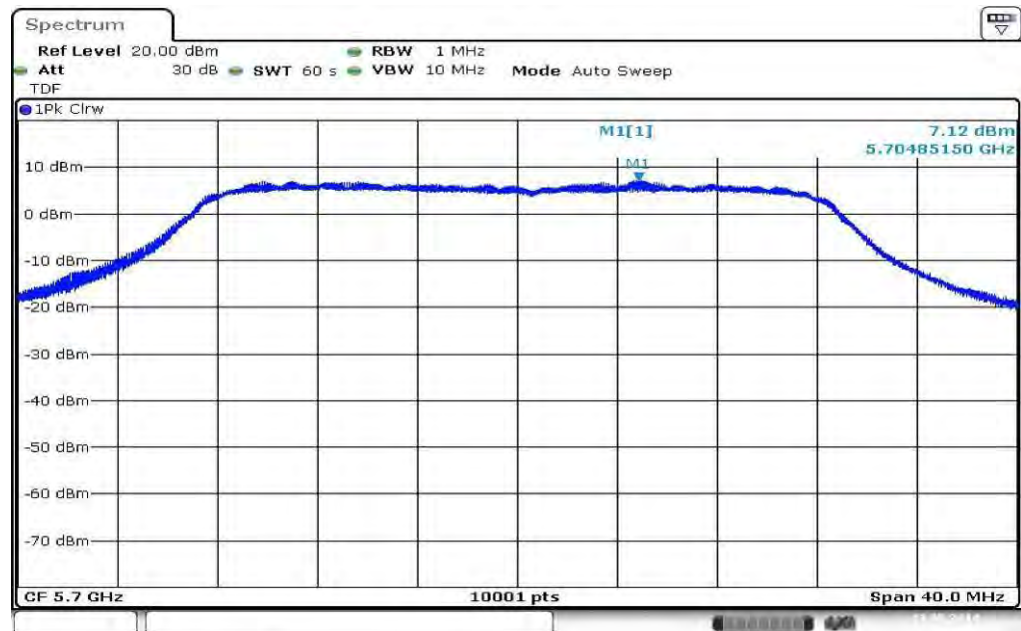
Plot 5: 5500 MHz



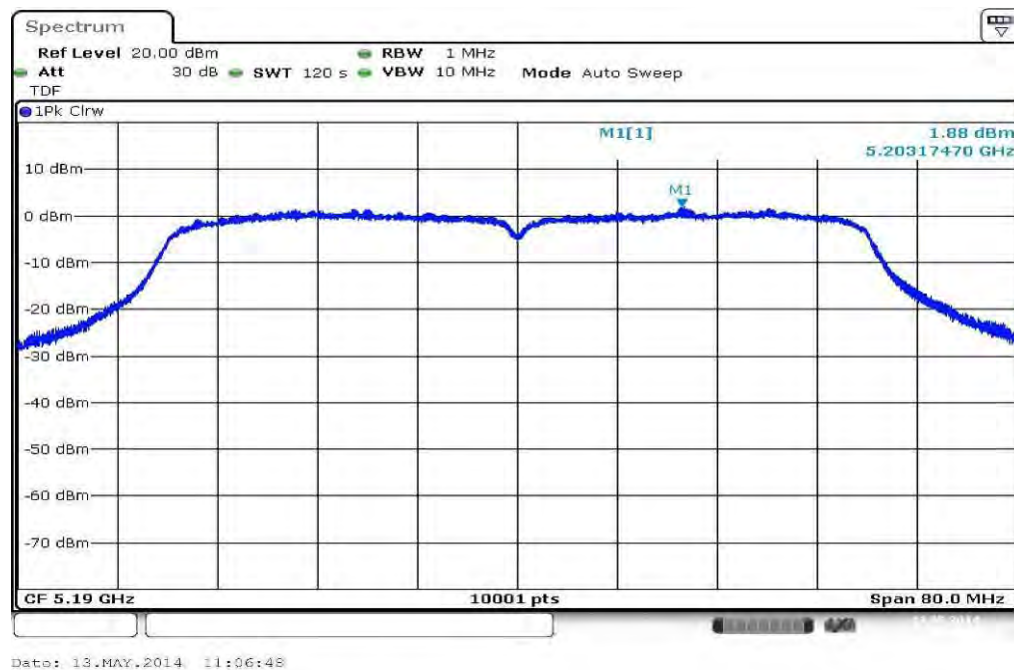
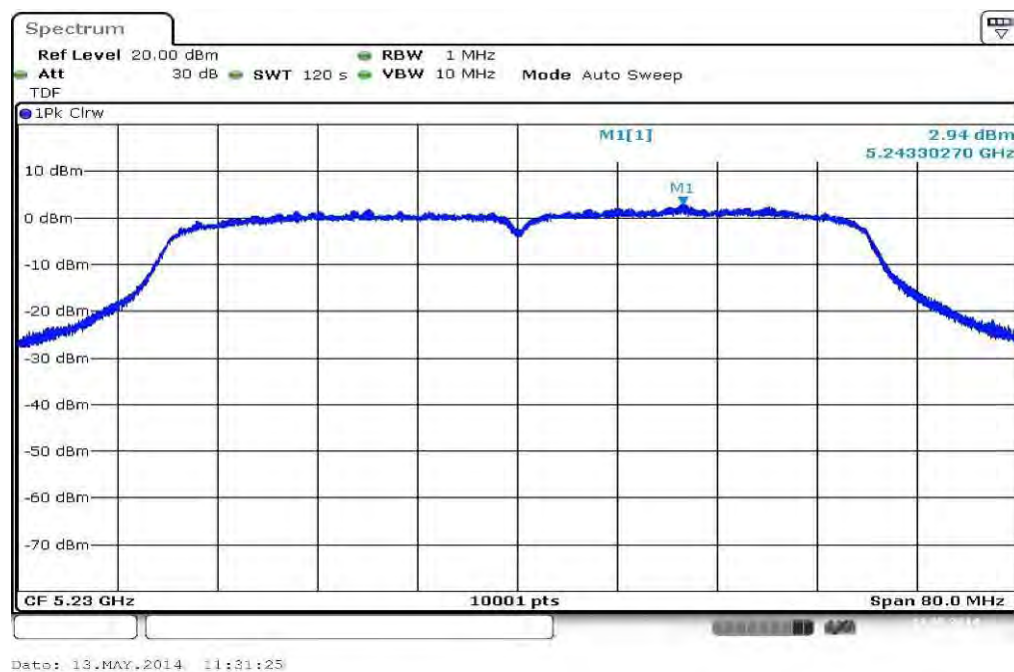
Plot 6: 5600 MHz



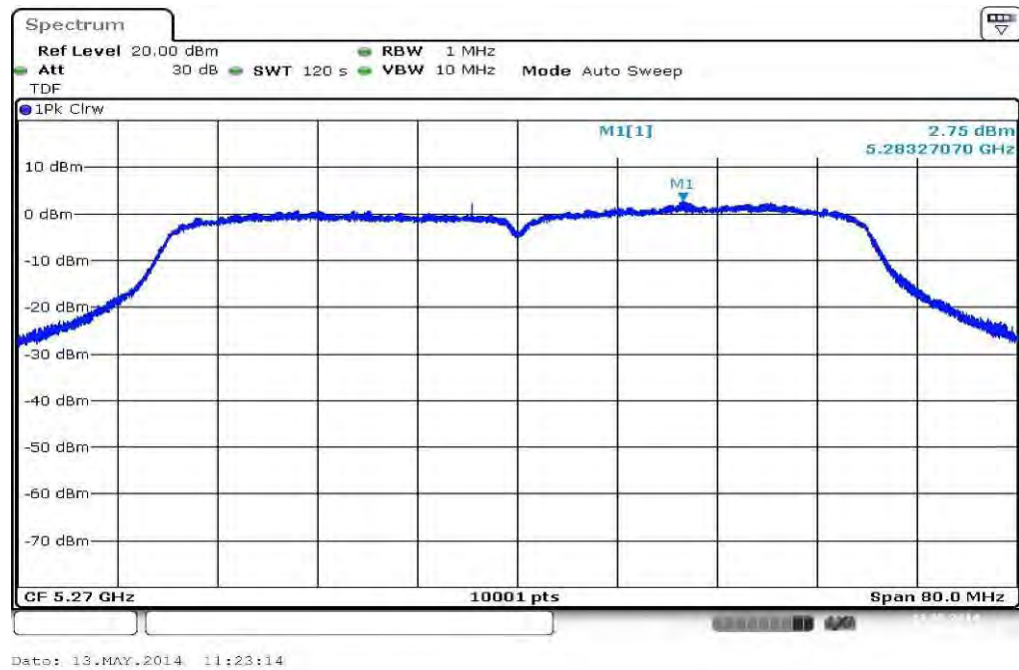
Plot 7: 5700 MHz



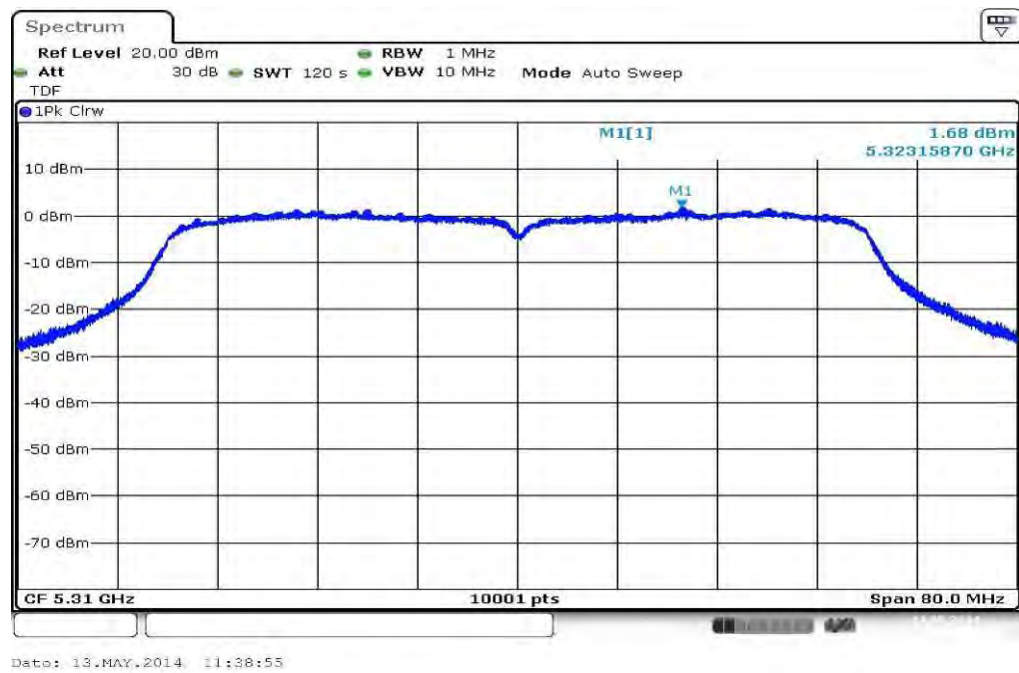
Date: 13.MAY.2014 09:48:23

Plots: OFDM / n – mode HT40**Plot 1: 5190 MHz****Plot 2: 5230 MHz**

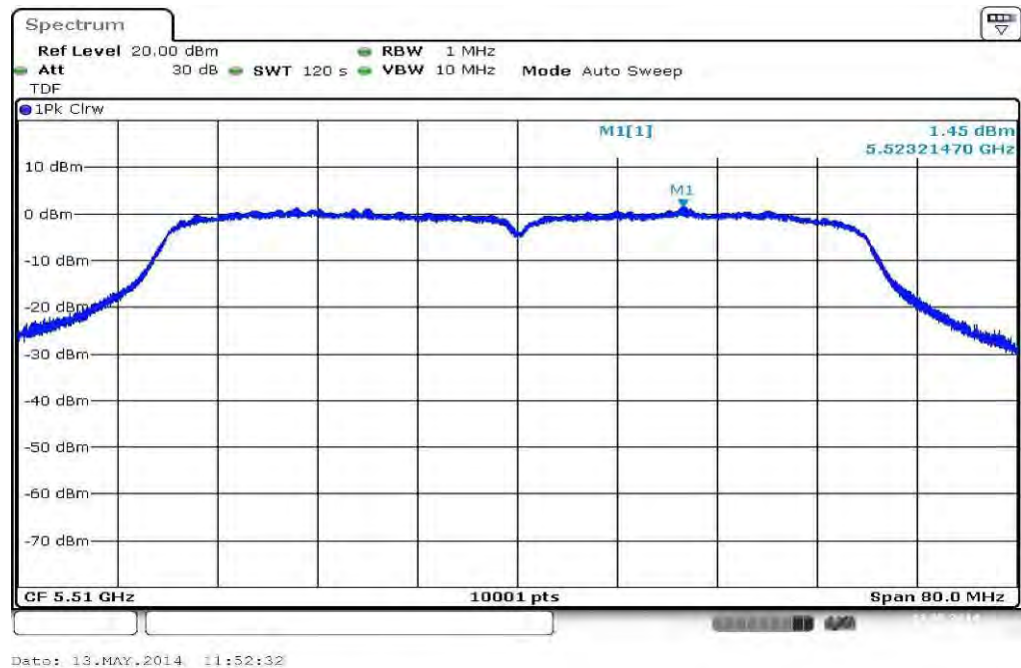
Plot 3: 5270 MHz



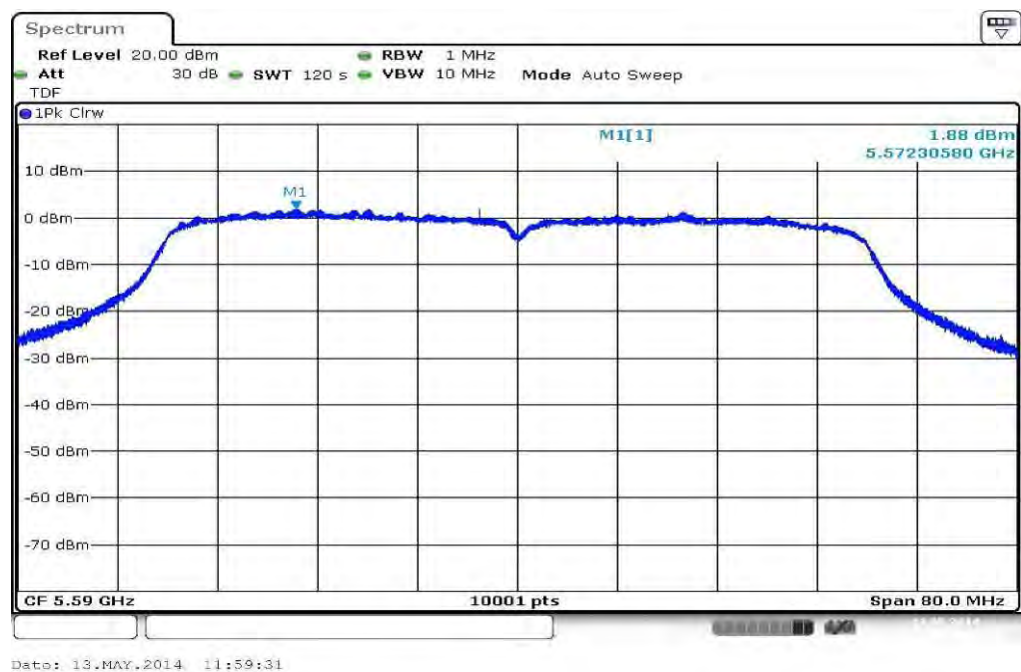
Plot 4: 5310 MHz



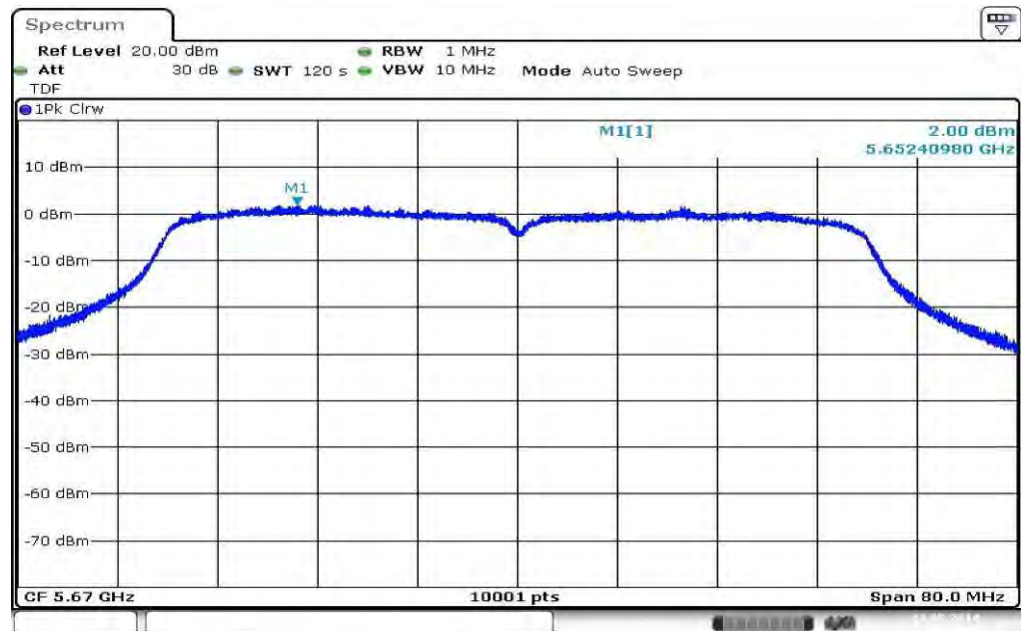
Plot 5: 5510 MHz



Plot 6: 5590 MHz



Plot 7: 5670 MHz

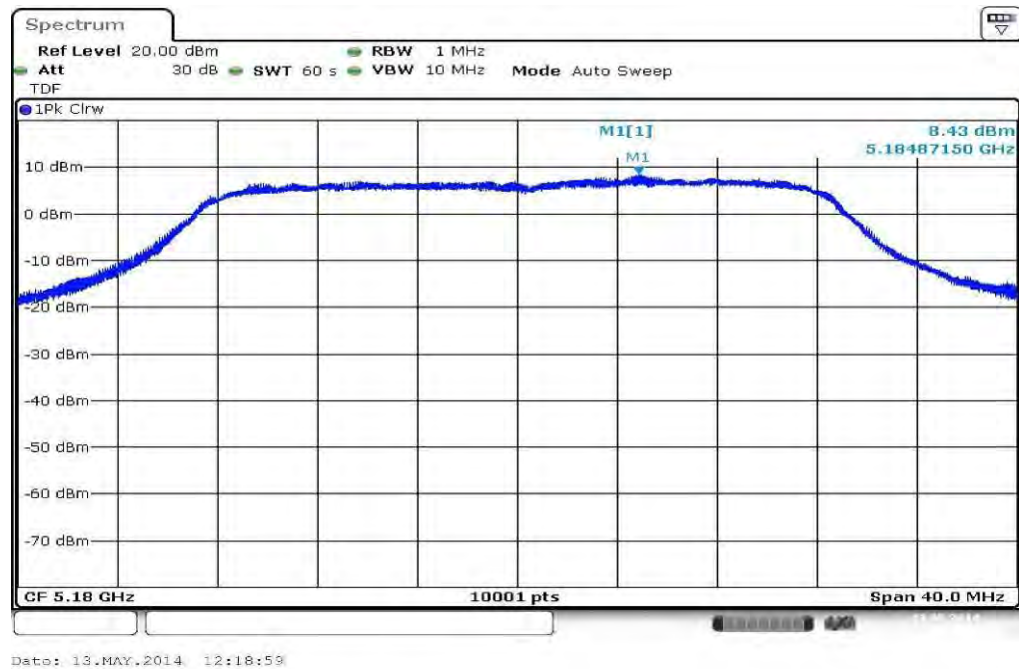


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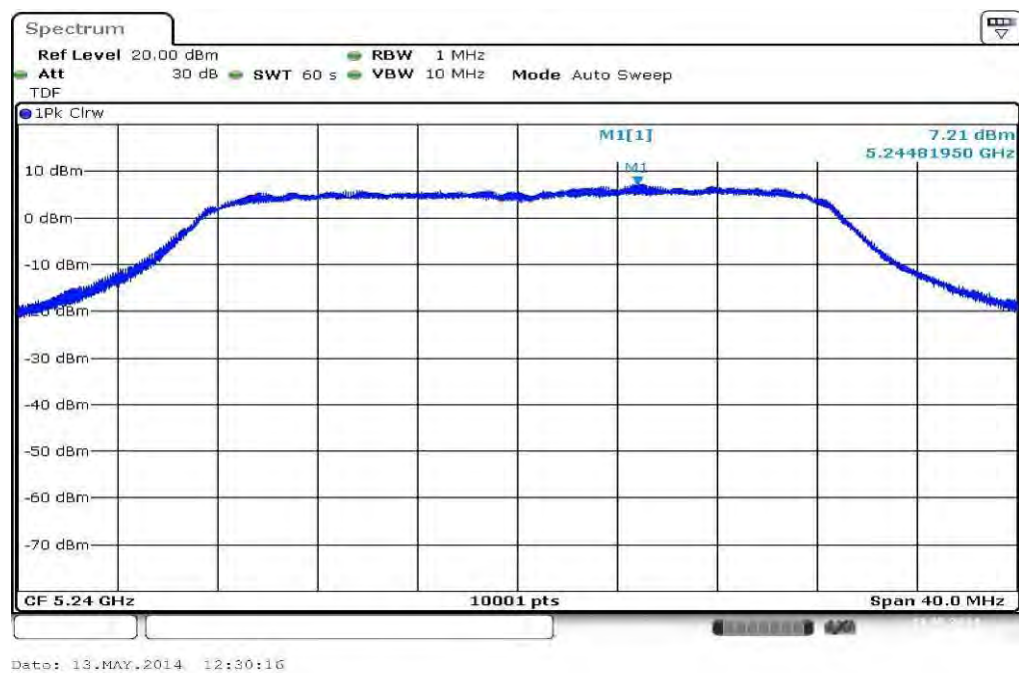
Results: ANT1

Plots: OFDM / a – mode

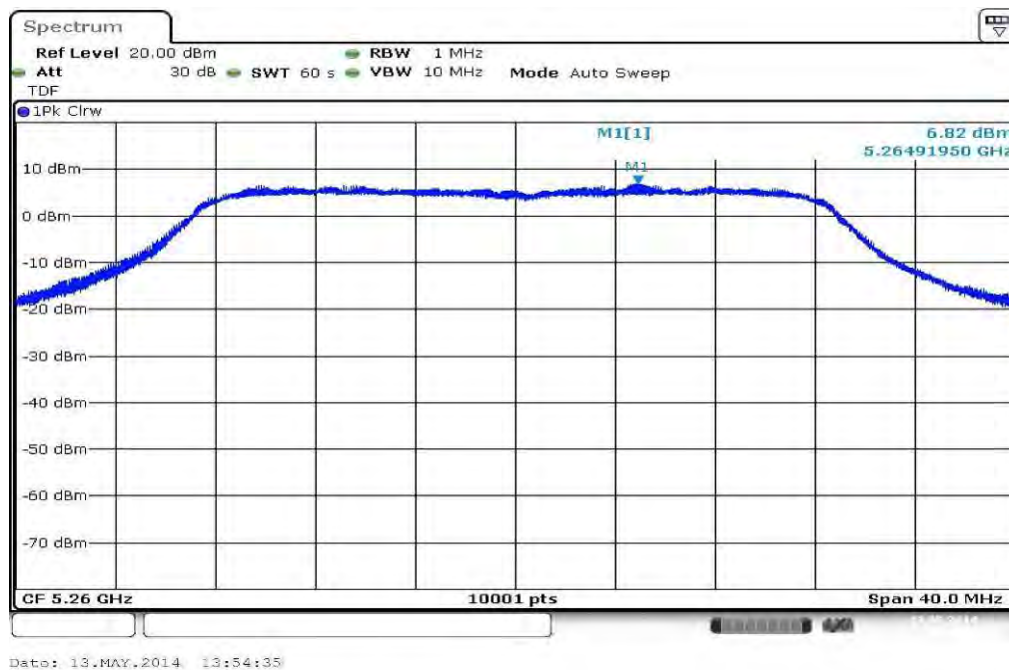
Plot 1: 5180 MHz



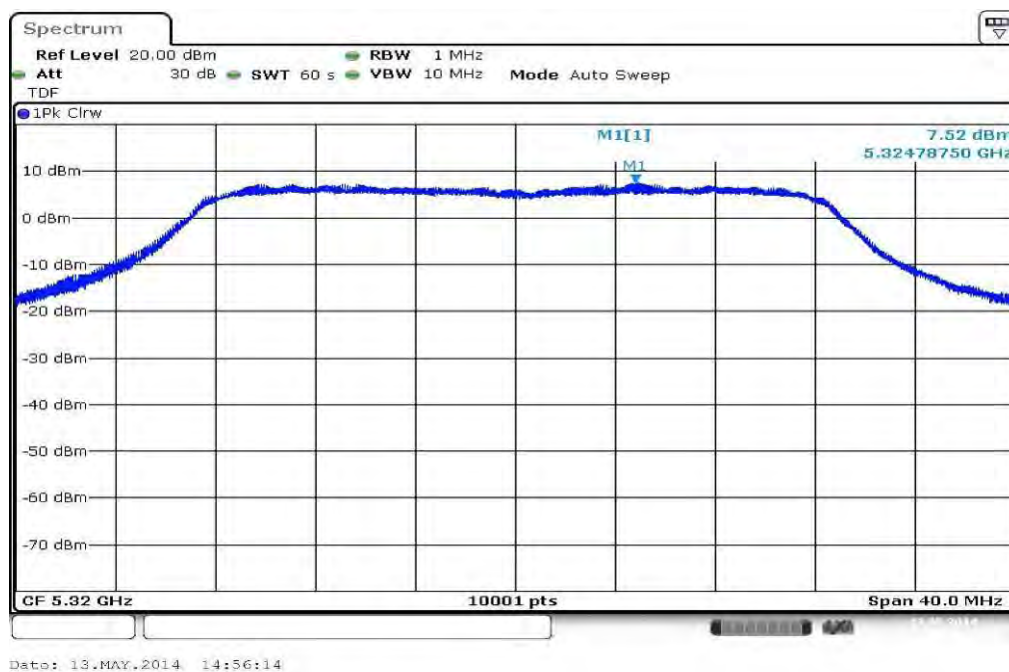
Plot 2: 5240 MHz



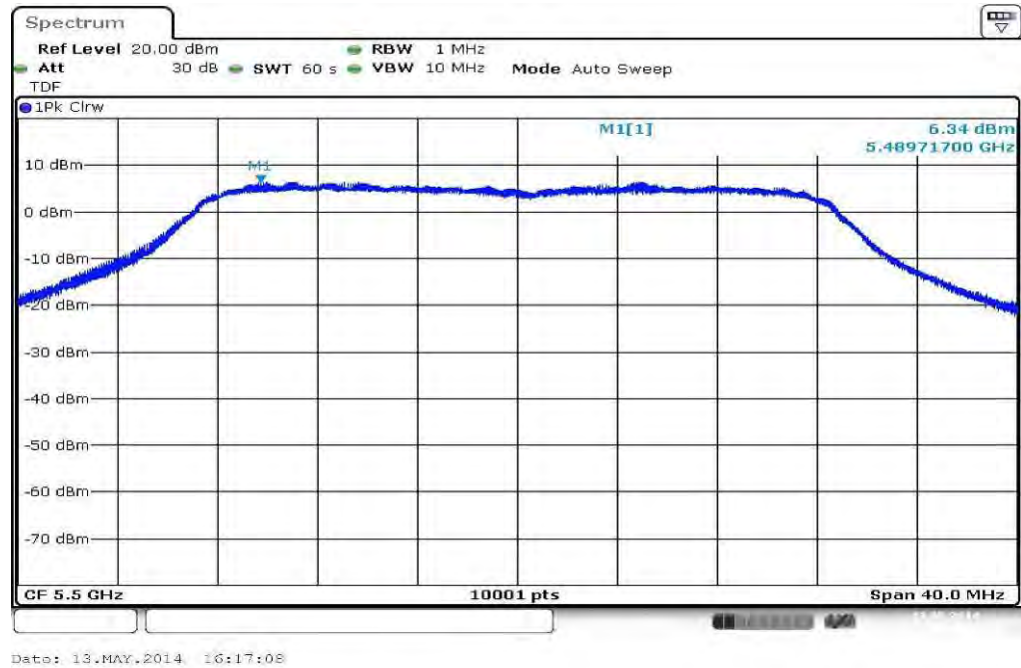
Plot 3: 5260 MHz



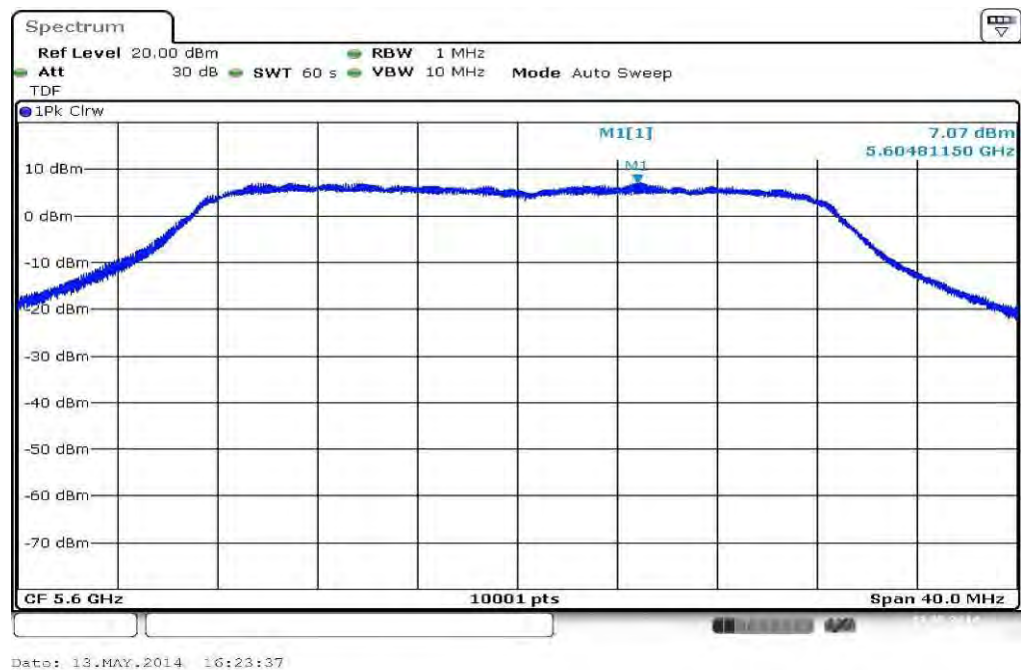
Plot 4: 5320 MHz



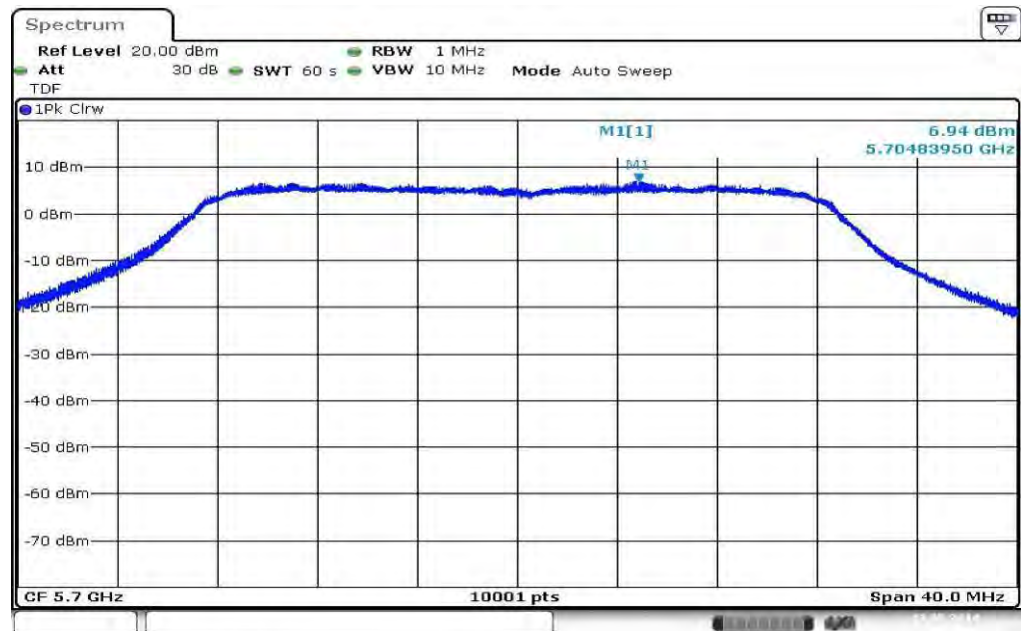
Plot 5: 5500 MHz



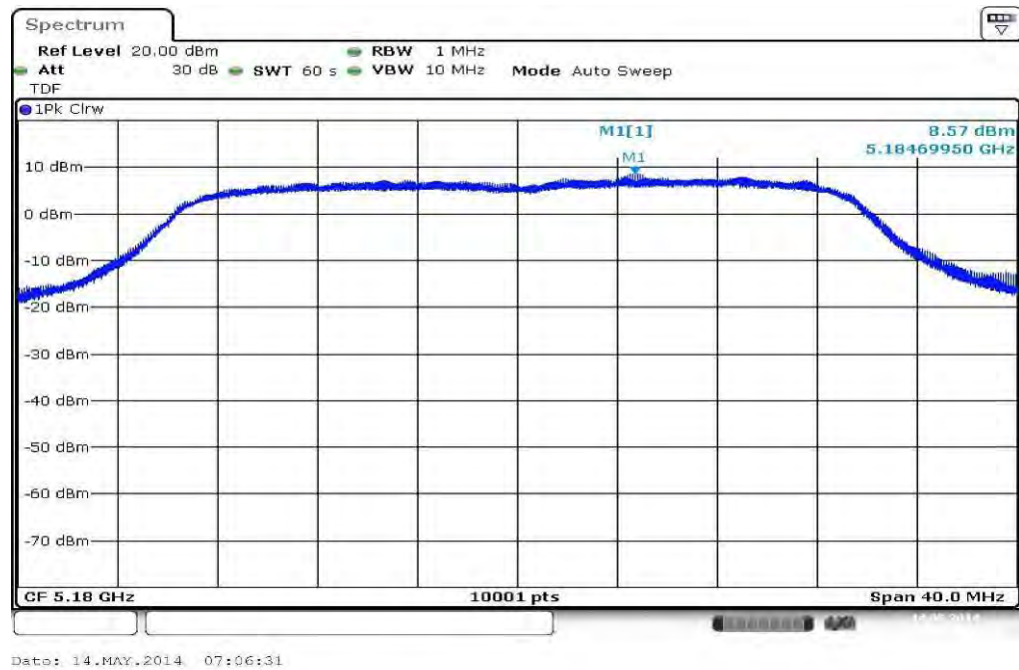
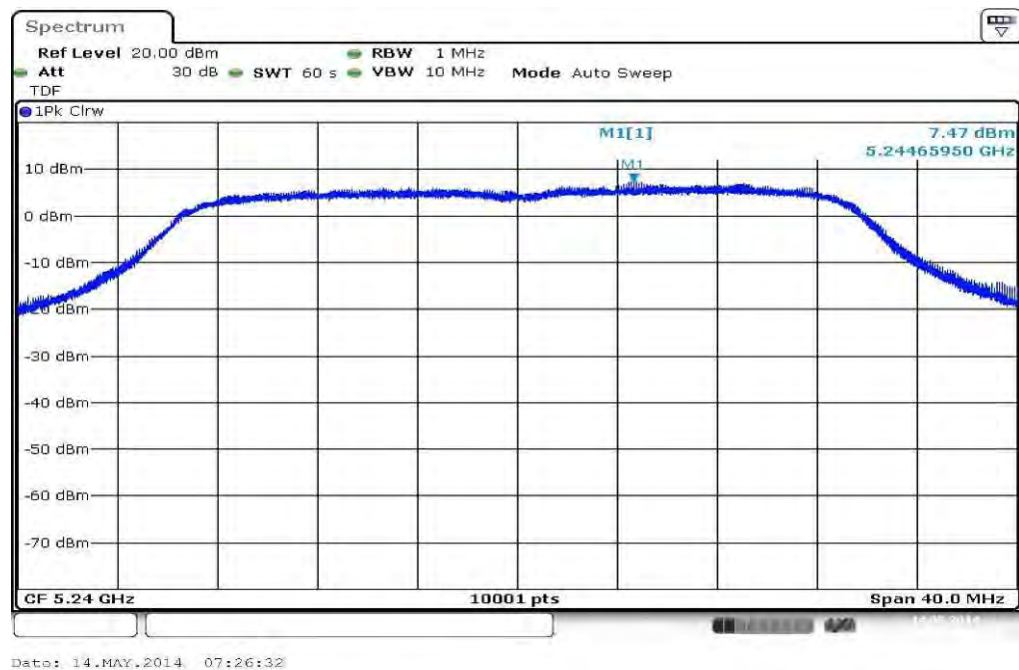
Plot 6: 5600 MHz



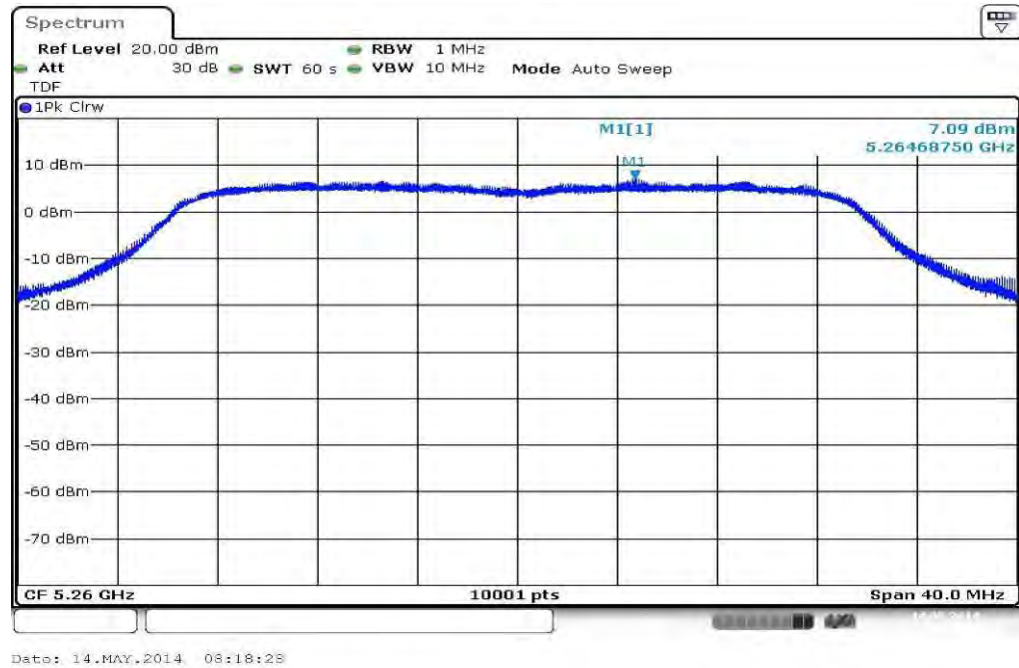
Plot 7: 5700 MHz



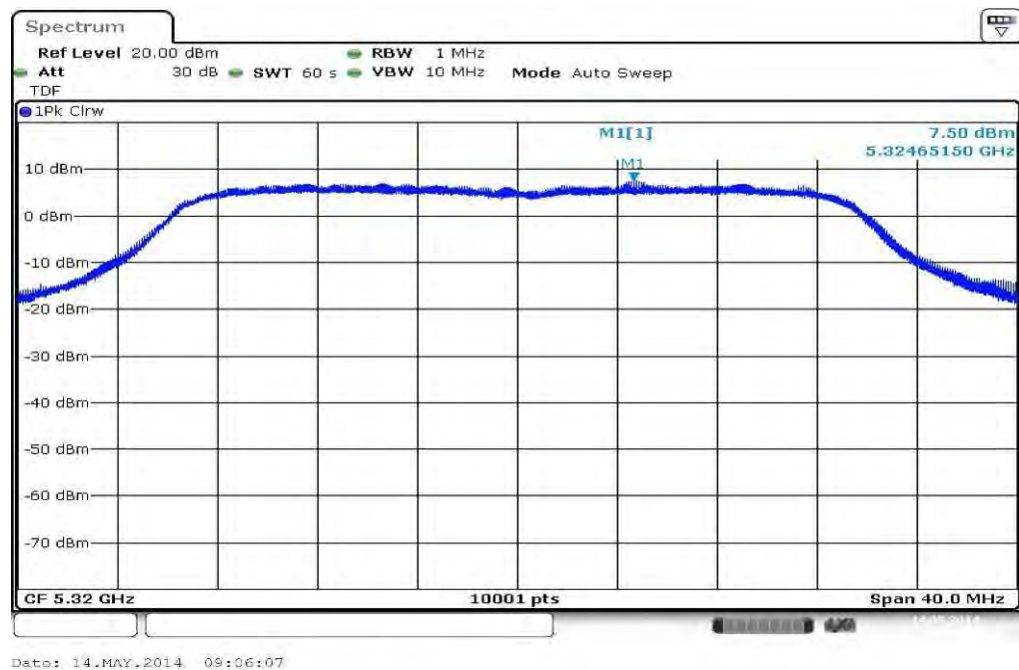
Date: 13.MAY.2014 16:28:48

Plots: OFDM / n – mode HT20**Plot 1: 5180 MHz****Plot 2: 5240 MHz**

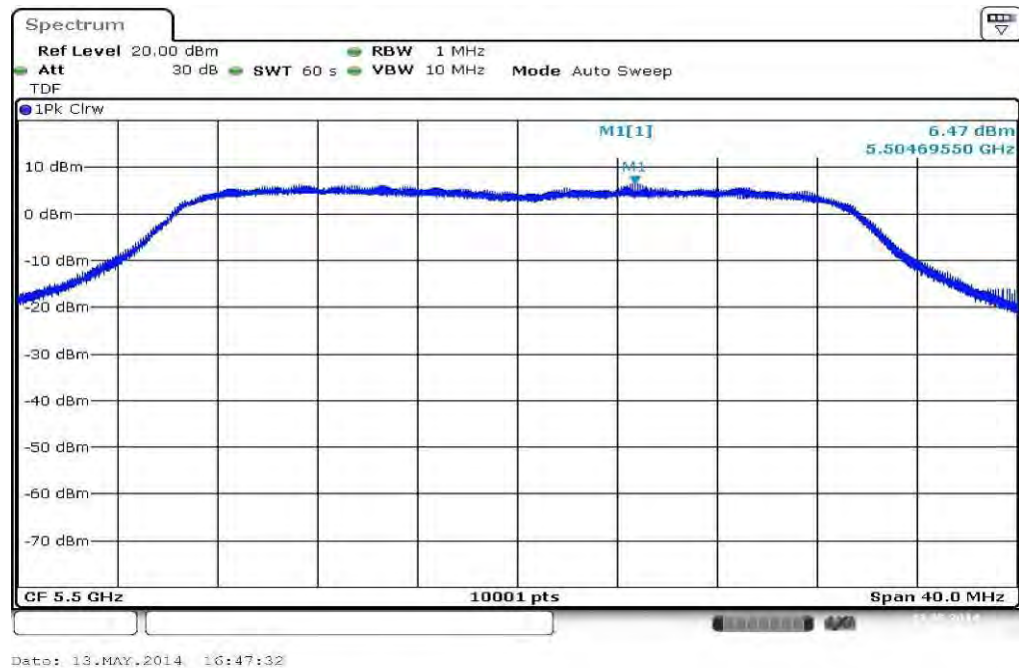
Plot 3: 5260 MHz



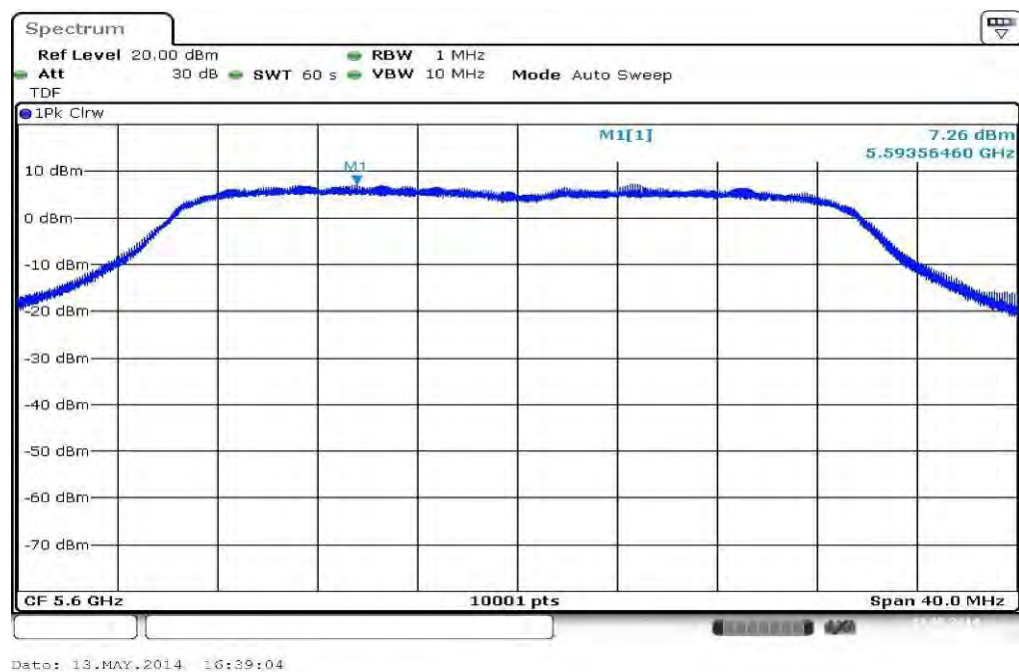
Plot 4: 5320 MHz



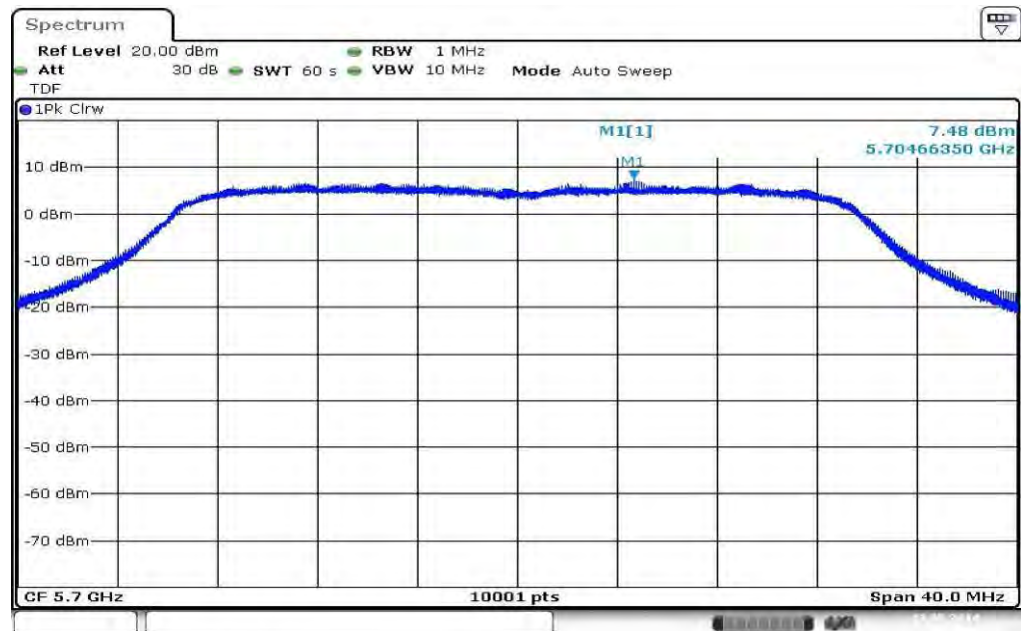
Plot 5: 5500 MHz



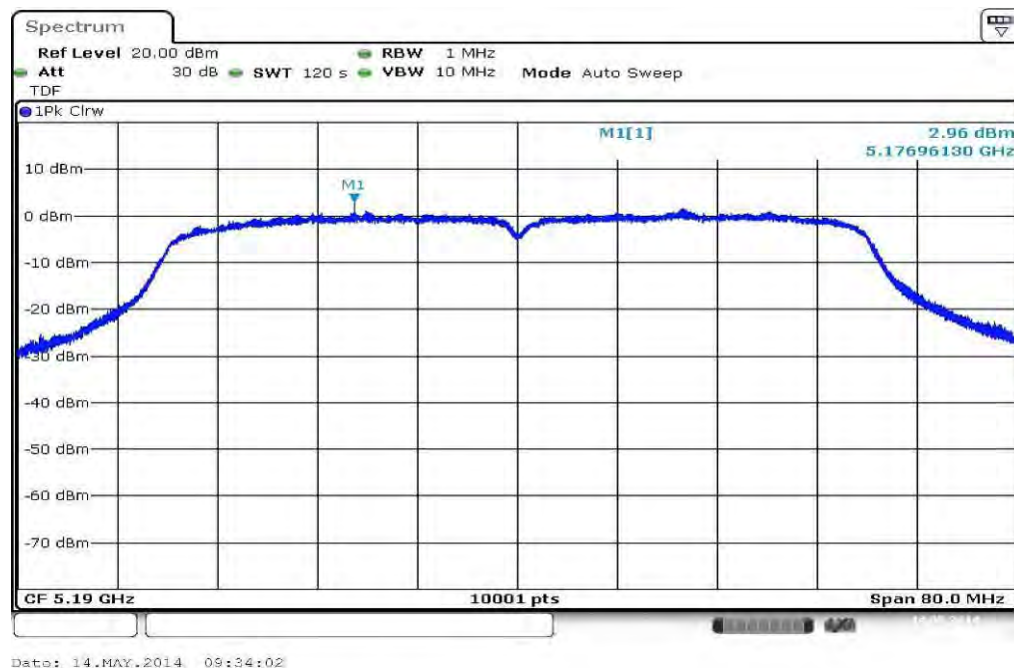
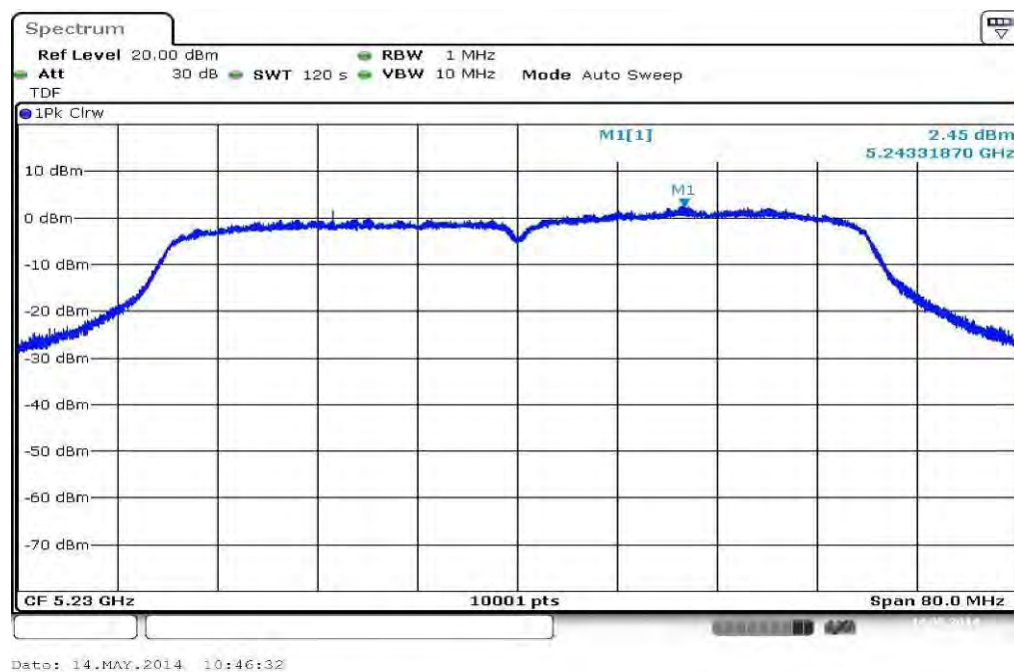
Plot 6: 5600 MHz



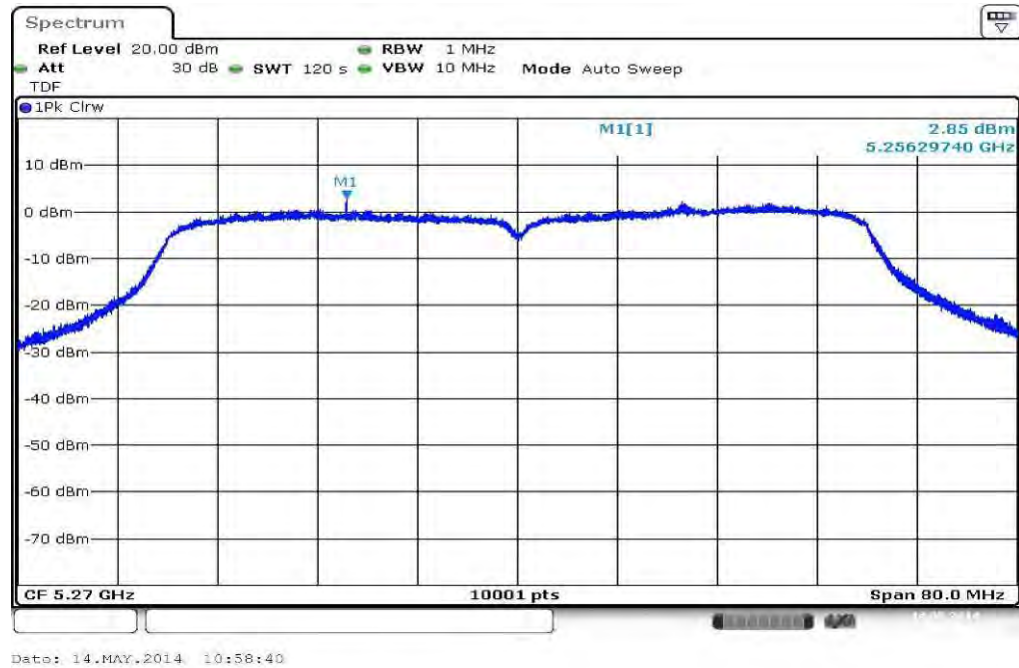
Plot 7: 5700 MHz



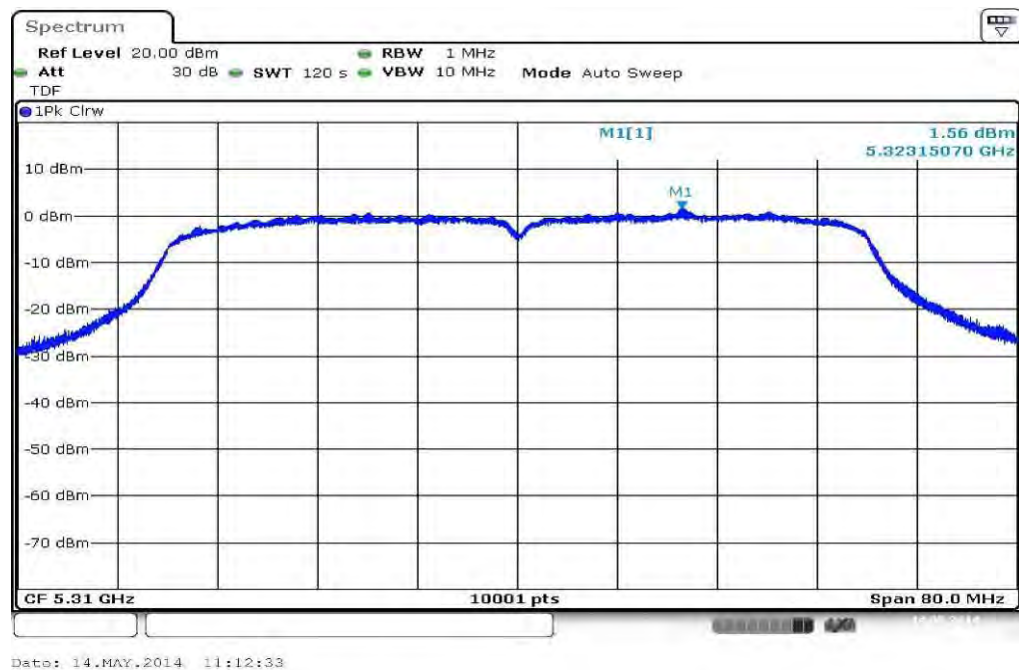
Date: 13.MAY.2014 16:33:43

Plots: OFDM / n – mode HT40**Plot 8: 5190 MHz****Plot 9: 5230 MHz**

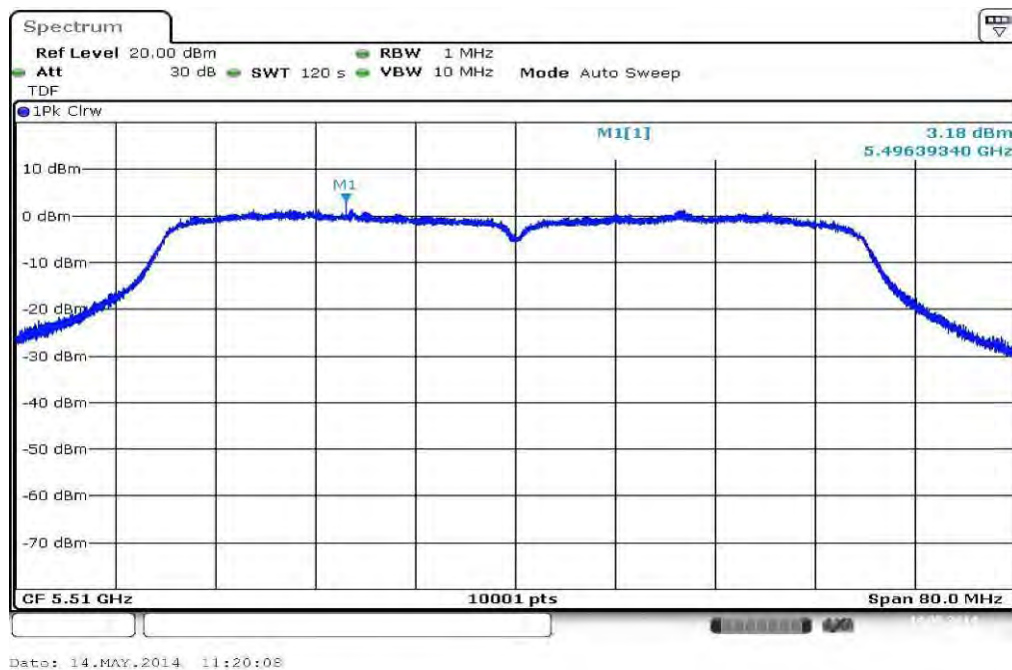
Plot 10: 5270 MHz



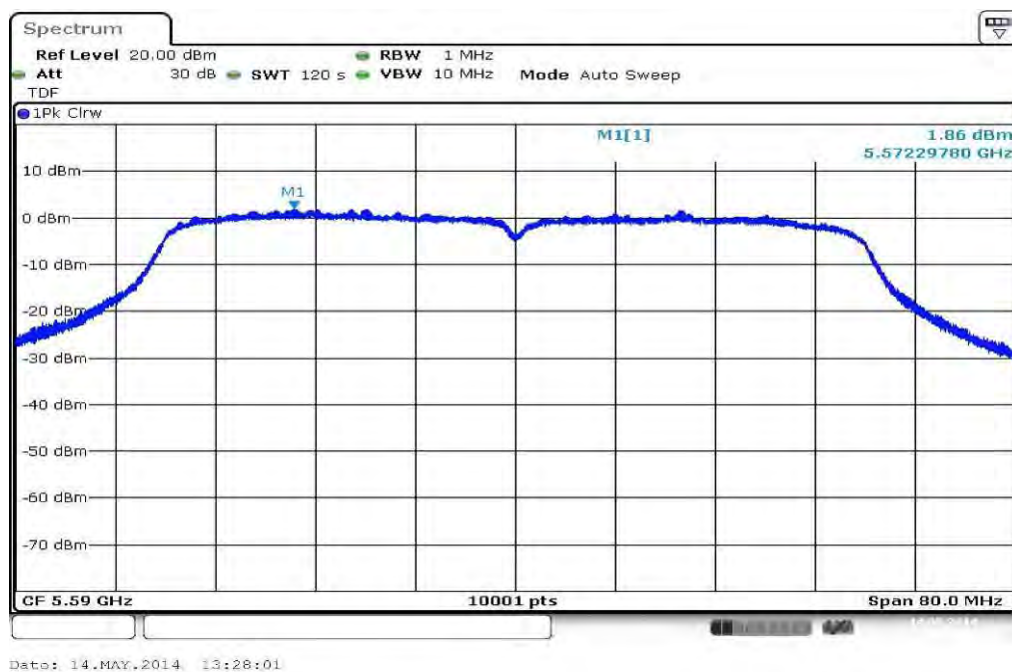
Plot 11: 5310 MHz



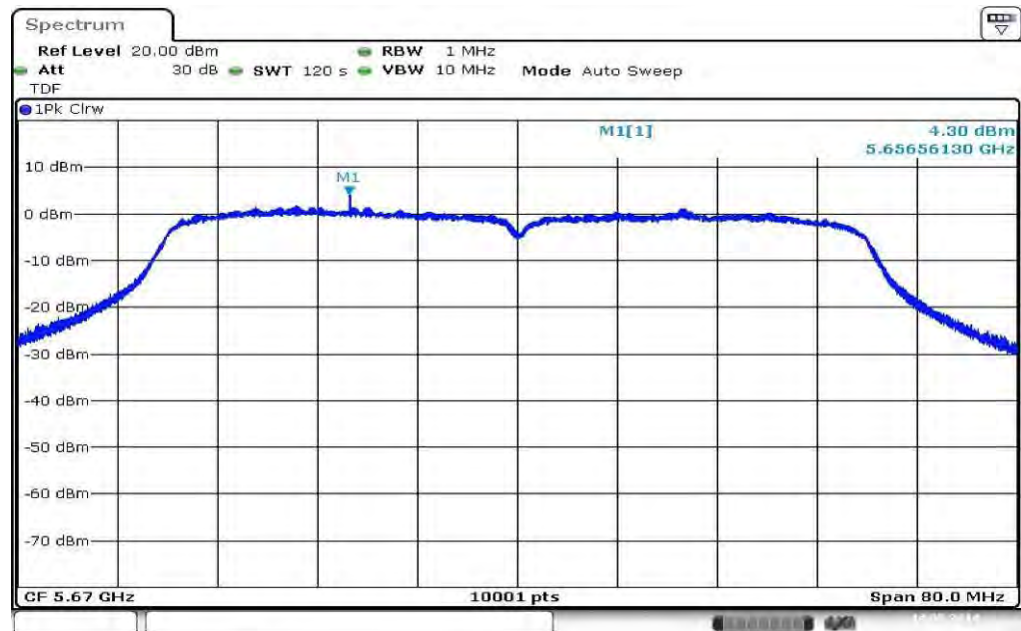
Plot 12: 5510 MHz



Plot 13: 5590 MHz



Plot 14: 5670 MHz



Date: 14.MAY.2014 13:37:49