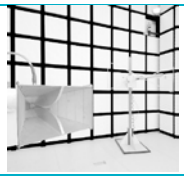
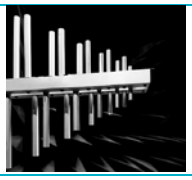
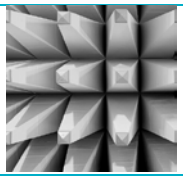

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TEST REPORT

Test report no.: 1-2846/16-02-05-C

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CTC advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.ctcadvanced.com
e-mail: mail@ctcadvanced.com

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

Applicant

Philips Medizin Systeme Böblingen GmbH
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY
Phone: +49 7031 463 1083
Fax: +49 7031 463 2944
Contact: Stephan Walter
e-mail: stephan.walter@philips.com
Phone: +49 7031 463 - 1083

Manufacturer

Philips Medizin Systeme Böblingen GmbH
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS - Gen Issue 4	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

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

Test Item

Kind of test item:	**WLAN module IEEE 802.11 a / b / g / n**
Model name:	**WLANBV3-A**
FCC ID:	**PQC-WLANBV3**
IC:	**3549C-WLANBV3**
Frequency:	U-NII bands: 5150-5250 MHz; 5250-5350 MHz; 5470-5600 MHz; 5650-5725 MHz; 5725-5850 MHz
Technology tested:	WLAN (OFDM/a- & ac/n HT20/HT40-mode)
Antenna:	1 Foil antenna + 4 PCB antennas
Power supply:	5 V DC by USB interface
Temperature range:	-10°C to +70°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.

Test report authorized:

cn=Marco Bertolino, o=CTC advanced GmbH, ou=BTL-161128, email=Marco.Bertolino@ctcadvanced.com, c=DE
2017.05.10 15:28:10 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

Test performed:

cn=Andreas Luckenbill, o=CTC advanced GmbH, ou=LUC-170203, email=Andreas.Luckenbill@ctcadvanced.com, c=DE
2017.05.10 15:26:58 +02'00'

Andreas Luckenbill
Lab Manager
Radio Communications & EMC

1 Table of contents

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

This test report replaces the test report with the number 1-2846/16-02-05-B and dated 2017-04-20.

2.2 Application details

Date of receipt of order:	2016-11-17
Date of receipt of test item:	2017-01-17
Start of test:	2017-01-17
End of test:	2017-02-18
Person(s) present during the test:	-/-

2.3 Test laboratories sub-contracted

None

3 Test standard/s and references

Test standard	Date	Description
47 CFR Part 15	-/-	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 247 Issue 2	February 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS - Gen Issue 4	November 2014	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

Guidance	Version	Description
UNII: KDB 789033 D02	v01r03	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American national standard of procedures for compliance testing of unlicensed wireless devices

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests No tests under extreme conditions required. No tests under extreme conditions required.
Relative humidity content	:		35 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	5 V DC by USB interface No tests under extreme conditions required. No tests under extreme conditions required.

5 Test item

5.1 General description

Kind of test item	:	WLAN module IEEE 802.11 a / b / g / n
Type identification	:	WLANBV3-A
HMN	:	-/-
PMN	:	WLANBV3-A
HVIN	:	WLANBV3-A
FVIN	:	-/-
S/N serial number	:	Radiated unit: 752C94 Conducted unit: 752C94
HW hardware status	:	PW100120BA
SW software status	:	3.2.0.137 api 3
Frequency band	:	U-NII bands: 5150-5250 MHz; 5250-5350 MHz; 5470-5600 MHz; 5650-5725 MHz; 5725-5850 MHz (lowest channel 5180 MHz; highest channel 5825 MHz)
Type of radio transmission Use of frequency spectrum	: :	OFDM
Type of modulation	:	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM
Number of channels	:	22 (20 MHz) 10 (40 MHz)
Antenna	:	1 Foil antenna + 4 PCB antennas Foil antenna: "IV2 TRNS Antenna WLAN IIT 1.4; 453564521811 Rev. 1631" PCB antennas: Ant M3002-66494 Ant 453564154611 Ant 453564175981 Ant 453564271931
Power supply	:	5 V DC by USB interface
Temperature range	:	-10°C to +70°C

5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-2846/16-02-01_AnnexA
1-2846/16-02-01_AnnexB
1-2846/16-02-01_AnnexD

6 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

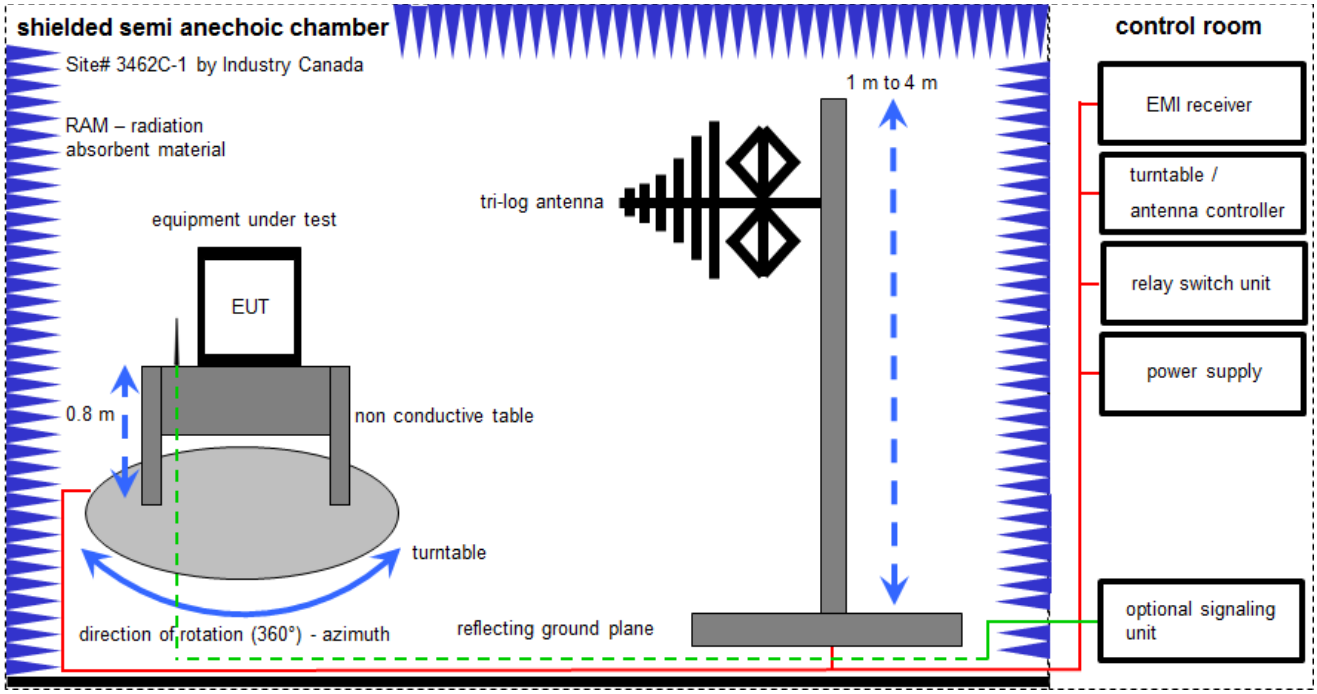
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

6.1 Shielded semi anechoic chamber

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.



Measurement distance: tri-log antenna 10 meter

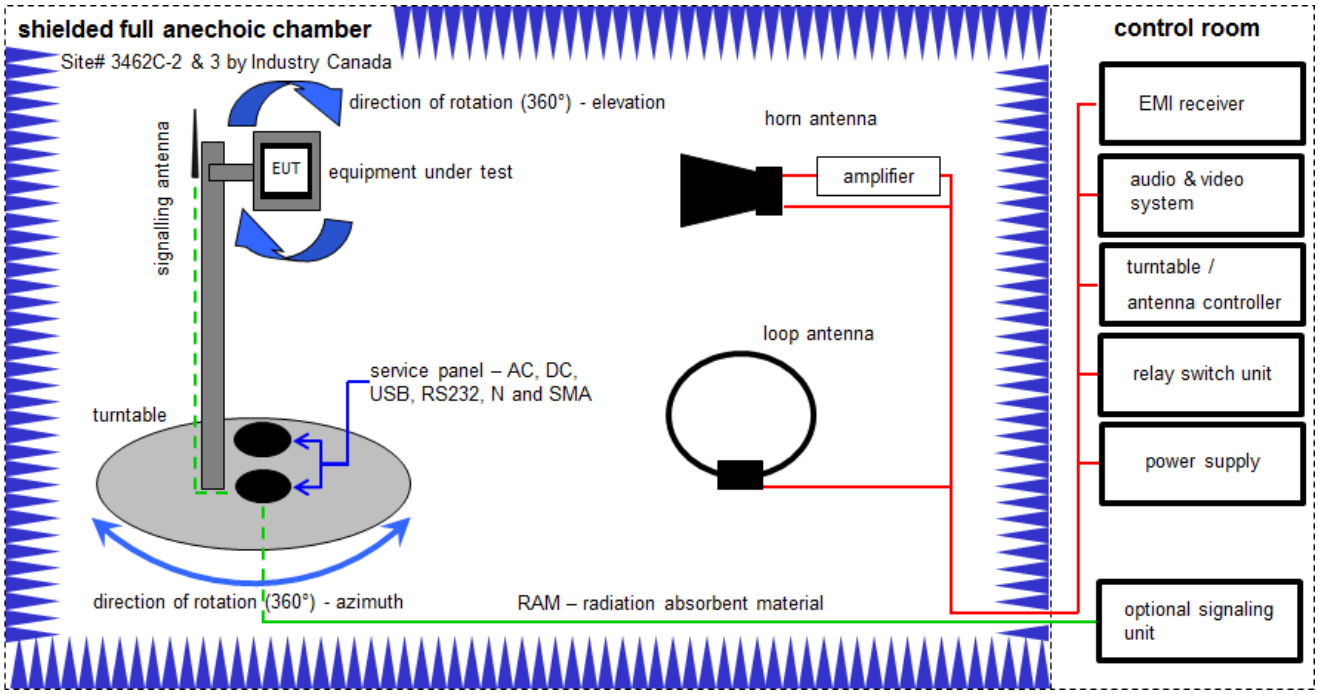
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	08.03.2016	08.03.2017
3	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
4	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
5	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	25.04.2016	25.04.2018

6.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

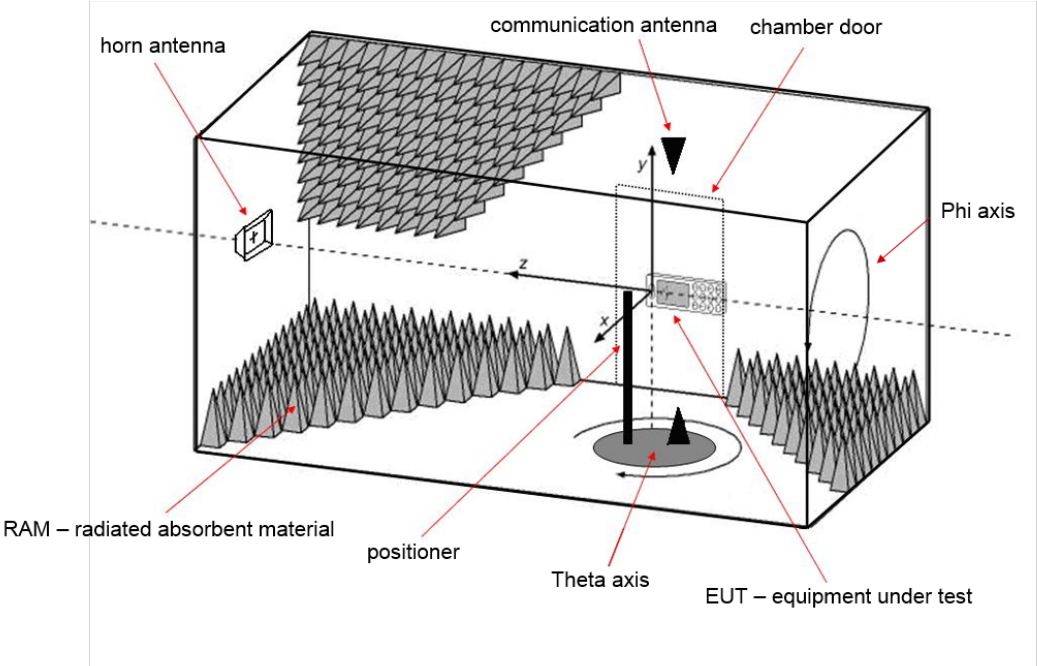
Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Active Loop Antenna 10 kHz to 30 MHz	6502	EMCO	2210	300001015	k	20.05.2015	20.05.2017
2	B, C	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	13.08.2015	13.08.2017
3	A, B, C	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	02.02.2016	02.02.2017
4	C	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
5	B, C	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev	-/-	-/-
6	C	Broadband Amplifier 5-13 GHz	CBLU5135235	CERNEX	22011	300004492	ev	-/-	-/-
7	A, B, C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
8	A, B, C	Messrechner und Monitor	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A5421	300004591	ne	-/-	-/-
9	A, B, C	NEXIO EMV-Software	BAT EMC	EMCO	2V2403033A5421	300004682	ne	-/-	-/-
10	A, B, C	Vollabsorberkammer	BAT EMC	TDK	2V2403033A5421	300003726	ne	-/-	-/-

6.3 Shielded fully anechoic chamber

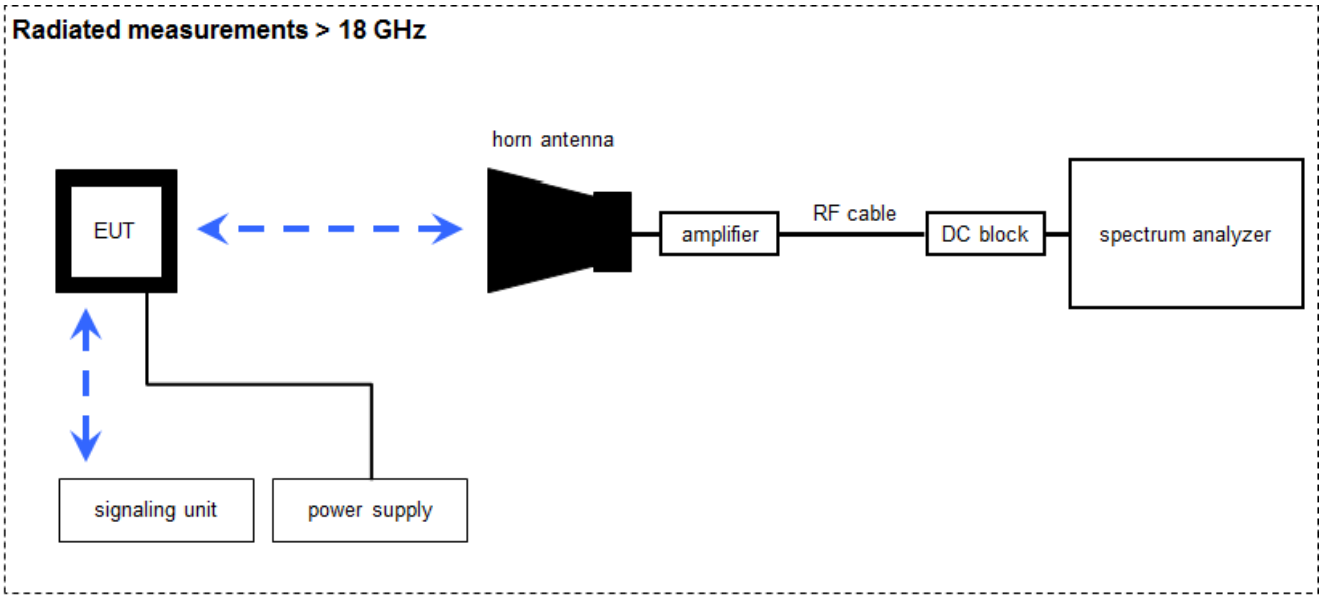
OTA – over the air performance



Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Splitter	15542	Mini Circuits	15542	400000086	ev	-/-	-/-
2	A	Splitter	42000	Anaren	4730	400000085	ev	-/-	-/-
3	A	Switch Unit	TS-RSP	R&S	100155	300003281	ev	-/-	-/-
4	A	CTIA-Chamber	CTIA-Chamber AMS 8500	ETS-Lindgren Finnland	-/-	300003327	ne	-/-	-/-
5	A	CTIA-Chamber - Positioning Equipment	CTIA-Chamber - Positioning Equipment	EMCO/2	-/-	300003328	ne	-/-	-/-
6	A	Limiting Amplifier	JLA 02-801	JCA Tech.	101	300003341	ne	-/-	-/-
7	A	Spectrum Analyzer	FSP30	R&S	100623	300003464	Ve	29.01.2017	30.01.2018

6.4 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

FS = U_R + CA + AF
(FS-field strength; U_R-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

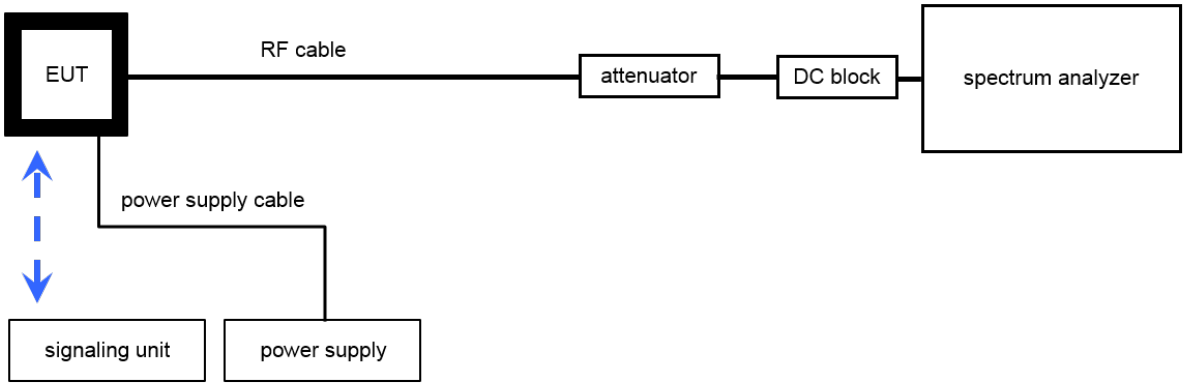
Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
2	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
3	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
4	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-
5	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8402	300000486	k	10.09.2015	10.09.2017
6	A	Std. Gain Horn Antenna 26.5 to 40.0 GHz	V637	Narda	82-16	300000510	k	14.08.2015	14.08.2017

6.5 Conducted measurements

Conducted measurements normal conditions



OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	2V2403033A4523	300004590	ne	-/-	-/-
2	A	Synchron Power Meter	SPM-4	CTC	1	400001294	ev	-/-	-/-
3	A	PowerSplitter/Combiner 150-6000MHz N-Type	ZB3PD-63-N+	Mini-Circuits	100010	400000451	ev	-/-	-/-
4	A	RF-Cable	ST18/SMAm/SMAm/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
5	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	Batch no. 127377	400001185	ev	-/-	-/-
6	A	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	Batch no. 127377	400001186	ev	-/-	-/-
7	A	Switch / Control Unit	3488A	HP	2719A15013	300000151	ne	-/-	-/-
8	A	Hygro-Thermometer	-/-, 5-45C, 20-100rF	HP	-/-	400000108	ev	07.09.2015	07.09.2017
9	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2016	21.01.2017

7 Sequence of testing

7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

7.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

7.4 Sequence of testing radiated spurious above 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Antenna gain	± 3 dB
Power spectral density	± 1.5 dB
Spectrum bandwidth	± 100 kHz (depends on the used RBW)
Occupied bandwidth	± 100 kHz (depends on the used RBW)
Maximum output power	± 1.5 dB
Minimum emissions bandwidth	± 100 kHz (depends on the used RBW)
Spurious emissions conducted	± 3 dB
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted below 30 MHz (AC conducted)	± 2.6 dB

9 Summary of measurement results

☐	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 247, Issue 2	see table	2017-05-10	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Remark
-/-	Output power verification (conducted)	Nominal	Nominal	-/-				-/-
-/-	Antenna gain	Nominal	Nominal	-/-				-/-
U-NII Part 15	Duty cycle	Nominal	Nominal	-/-				-/-
§15.407(a) RSS - 247 (6.2.1) (1) RSS - 247 (6.2.2) (1) RSS - 247 (6.2.3) (1) RSS - 247 (6.2.4) (1)	Maximum output power (conducted & radiated)	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.407(a) RSS - 247 (6.2.1) (1) RSS - 247 (6.2.2) (1) RSS - 247 (6.2.3) (1) RSS - 247 (6.2.4) (1)	Power spectral density	Nominal	Nominal	☒	☐	☐	☐	-/-
RSS - 247 (6.2.4)	Spectrum bandwidth 6dB bandwidth	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.407(a)	Spectrum bandwidth 26dB bandwidth	Nominal	Nominal	☒	☐	☐	☐	-/-
RSS Gen clause 6.6	Spectrum bandwidth 99% bandwidth	Nominal	Nominal	-/-				-/-
§15.205 RSS - 247 (6.2.1) (2) RSS - 247 (6.2.2) (2) RSS - 247 (6.2.3) (2) RSS - 247 (6.2.4) (2)	Band edge compliance radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.407(b) RSS - 247 (6.2.1) (2) RSS - 247 (6.2.2) (2) RSS - 247 (6.2.3) (2) RSS - 247 (6.2.4) (2)	TX spurious emissions radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.209(a) RSS-Gen	Spurious emissions radiated < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.107(a) §15.207	Spurious emissions conducted emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.407 RSS - 247 (6.3)	DFS	Nominal	Nominal	-/-				Note 1

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

Note 1: See test report 32IE0154-HO-01-D-R1

10 Additional comments

Reference documents: PowerTableWLANBV2-A

	Frequency [MHz]	2412	2417	2422	2427-2447	2452-2457	2462	2467-2472	2484	5180	5190-5220	5230-5300	5310	5320	5500	5510-5690	5700	5745	5755-5815	5825
Data rate	--txrate																			
802.11b 1Mbit/s	0	13	13	13	13	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
802.11b 2Mbit/s	1	13	13	13	13	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
802.11b 5.5Mbit/s	2	13	13	13	13	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
802.11b 11Mbit/s	3	13	13	13	13	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
802.11a/g 6 - 24Mbit/s	4-8	8	13	13	13	13	8,5	8,5	-	14	14	14	14	14	14	14	14	13	13	13
802.11a/g 36Mbit/s	9	8	13	13	13	13	8,5	8,5	-	14	14	14	14	14	12,5	12,5	12,5	12	12	12
802.11a/g 48Mbit/s	10	8	12,50	12,50	12,50	12,50	8,5	8,5	-	12,5	12,5	12,5	12,5	12,5	12	12	12	11,5	11,5	11,5
802.11a/g 54Mbit/s	11	8	11	11	11	11	8,5	8,5	-	11,5	11,5	11,5	11,5	11,5	11	11	11	9,5	9,5	9,5
802.11n MCS0 HT20	12	7	12,5	12,5	12,5	12,5	7,5	7,5	-	13	13	13	13	14	14	14	14	13	13	13
802.11n MCS1 HT20	13	7	12,5	12,5	12,5	12,5	7,5	7,5	-	13	13	13	13	14	14	14	14	13	13	13
802.11n MCS2 HT20	14	7	12,5	12,5	12,5	12,5	7,5	7,5	-	13	13	13	13	14	14	14	14	13	13	13
802.11n MCS3 HT20	15	7	12	12	12	12	7,5	7,5	-	13	13	13	13	14	14	14	14	13	13	13
802.11n MCS4 HT20	16	7	12	12	12	12	7,5	7,5	-	13	13	13	13	14	12,5	12,5	12,5	12	12	12
802.11n MCS5 HT20	17	7	12	12	12	12	7,5	7,5	-	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	11	11	11
802.11n MCS6 HT20	18	7	10,5	10,5	10,5	10,5	7,5	7,5	-	11	11	11	11	11	10	10	10	9,5	9,5	9,5
802.11n MCS7 HT20	19	5	5	5	5	5	5	5	-	8	8	8	8	8	6,5	6,5	6,5	5	5	5
802.11n MCS0 HT40	20	-	-	7	12,5	7,5	7,5	-	-	-	9,5	14	11,5	-	-	14	-	-	13	-
802.11n MCS1 HT40	21	-	-	7	12,5	7,5	7,5	-	-	-	9,5	14	11,5	-	-	14	-	-	13	-
802.11n MCS2 HT40	22	-	-	7	12,5	7,5	7,5	-	-	-	9,5	14	11,5	-	-	14	-	-	13	-
802.11n MCS3 HT40	23	-	-	7	12	7,5	7,5	-	-	-	9,5	14	11,5	-	-	14	-	-	13	-
802.11n MCS4 HT40	24	-	-	7	12	7,5	7,5	-	-	-	9,5	14	11,5	-	-	12,5	-	-	12	-
802.11n MCS5 HT40	25	-	-	7	12	7,5	7,5	-	-	-	9,5	12,5	11,5	-	-	12,5	-	-	11	-
802.11n MCS6 HT40	26	-	-	7	8	7,5	7,5	-	-	-	9,5	11	11	-	-	10	-	-	9,5	-
802.11n MCS7 HT40	27	-	-	5	5	5	5	-	-	-	8	8	8	-	-	6,5	-	-	5	-

DFS test report: 32IE0154-HO-01-D-R1

Special test descriptions: None

Configuration descriptions: None

Test mode:

☐ No test mode available.
Iperf was used to ping another device with the largest support packet size

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

Antennas and transmit operating modes:

☒ Operating mode 1 (single antenna)

- *Equipment with 1 antenna,*
- *Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,*
- *Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)*

☐ Operating mode 2 (multiple antennas, no beamforming)

- *Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.*

☐ Operating mode 3 (multiple antennas, with beamforming)

- *Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming.*
  In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.

11 Measurement results

11.1 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average power meter or spectrum analyzer to identify the maximum transmission power.

In further tests only the identified worst case modulation scheme or bandwidth will be measured and this mode is used as representative mode for all other modulation schemes.

Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace mode:	Max hold
Used test setup:	See chapter 6.5 A
Measurement uncertainty:	See chapter 8

Results:

Modulation	Modulation scheme / bandwidth					
Frequency	5180 MHz	5320 MHz	5500 MH	5700 MHz	5745 MHz	5825 MHz
OFDM / a – mode	6 Mbit/s	6 Mbit/s	6 Mbit/s	6 Mbit/s	6 Mbit/s	6 Mbit/s
OFDM / n/ac HT20 – mode	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0
Frequency	5190 MHz	5310 MHz	5510 MHz	5670 MHz	5755 MHz	5815 MHz
OFDM / n/ac HT40 – mode	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0

11.2 Gain

Measurement:

The antenna gain of the complete system was determined Over-The-Air in a fully shielded anechoic chamber. The system's antenna was disconnected from the RF output of the EUT. An external 50 Ohms signal generator was used to feed the system's antenna with a constant signal at the certain frequency and a power level of 0dBm. The EUT was then rotated horizontally and vertically in steps of 15°. The emission at each position was measured with a horizontal and vertical polarized horn antenna. The resulting 3 dimensional antenna diagram displays the radiation character of the system at the tested frequency. The detected peak power (EIRP) equals the antenna gain.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace mode:	Max hold
Test setup:	See sub clause 6.3 A
Measurement uncertainty:	See sub clause 8

Limits:

Antenna Gain
6 dBi / > 6 dBi output power and power density reduction required

Result:

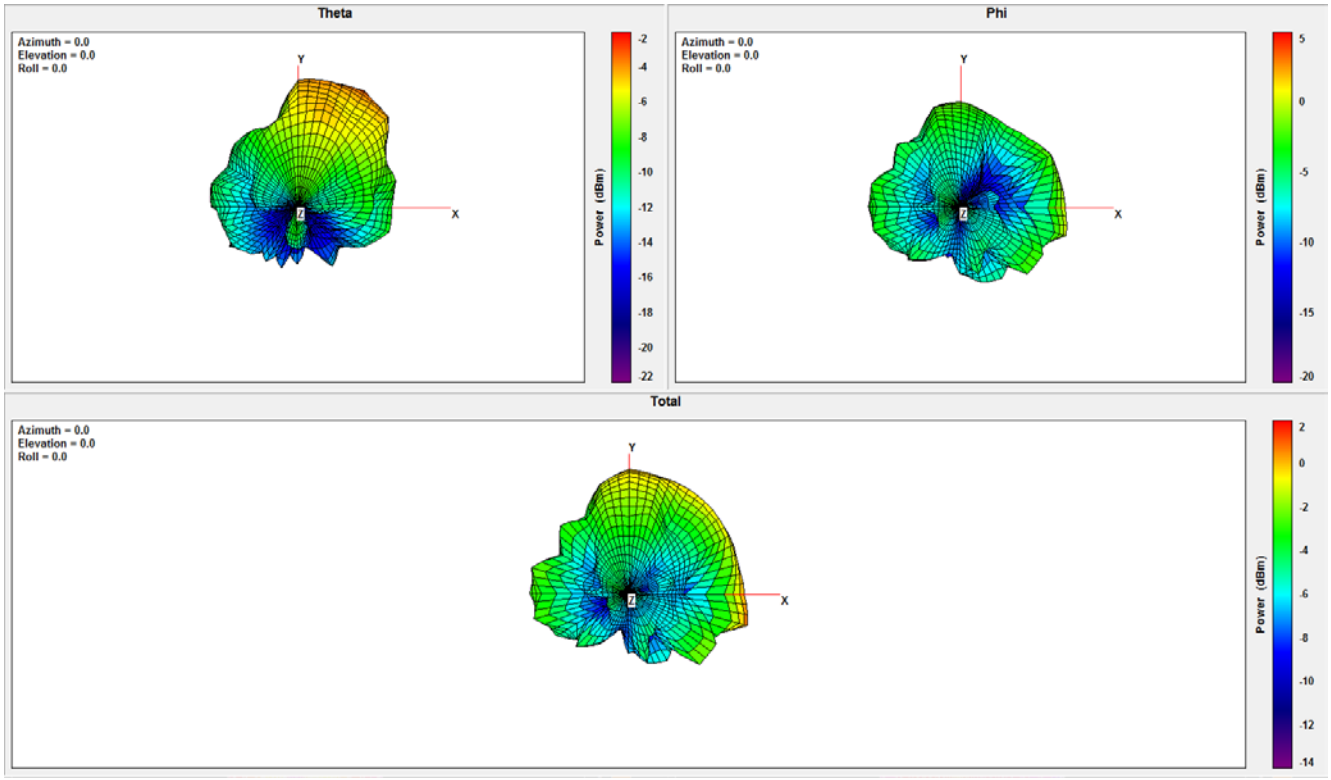
	antenna gain					
	lowest channel - 5180 MHz	highest channel - 5320 MHz	lowest channel - 5500 MHz	highest channel - 5700 MHz	lowest channel - 5745 MHz	highest channel - 5825 MHz
Gain [dBi]	1.9	-0.1	1.0	1.4	1.3	1.4

Results: (External antennas)

For the results of the antenna gain of all external antennas see "Appendix_to_1-2846/16-02-05-B"

Plots:

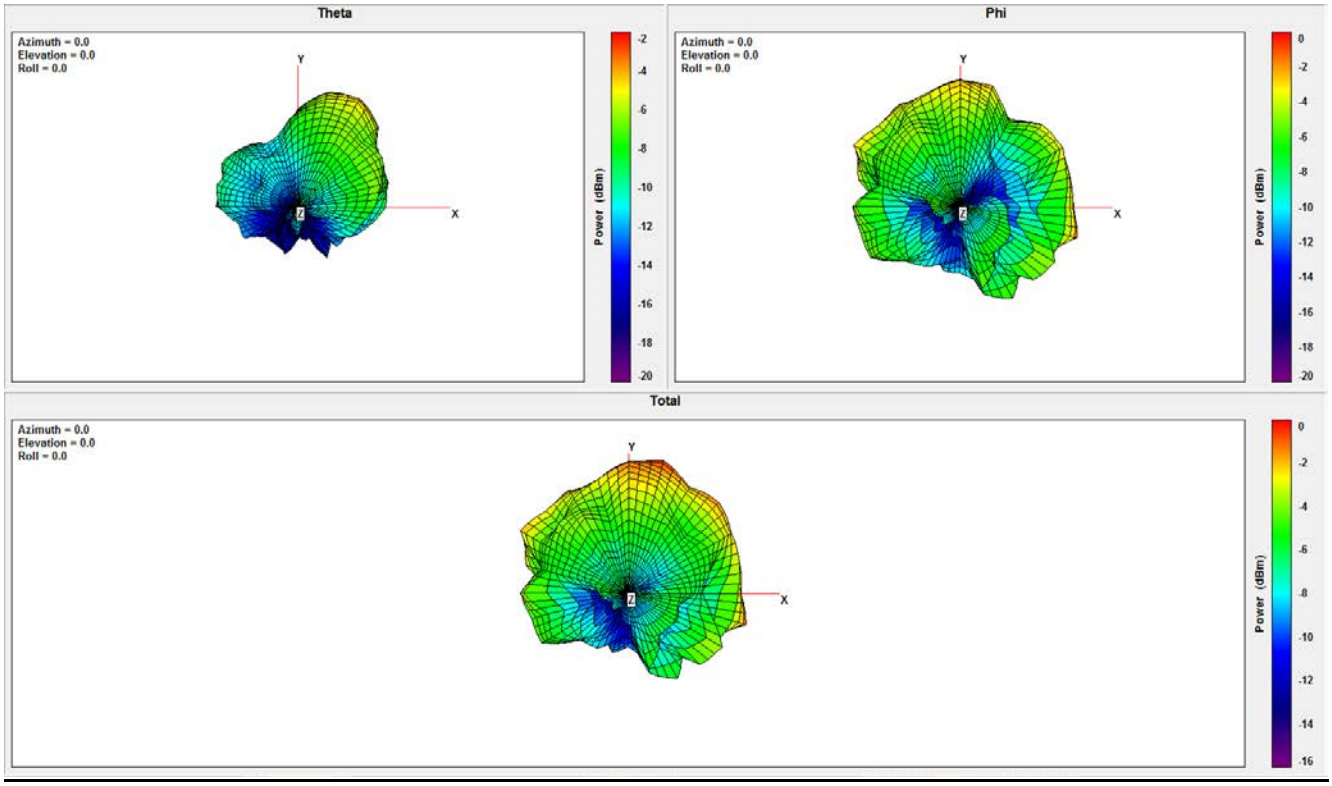
Plot 1: Antenna diagram, 5180 MHz



Plot 2:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-3,85816
	Peak EIRP (dBm)	1,91045
	Directivity (dBi)	5,76861
	Efficiency (dB)	-3,85816
	Efficiency (%)	41,1324
	Gain (dBi)	1,91045

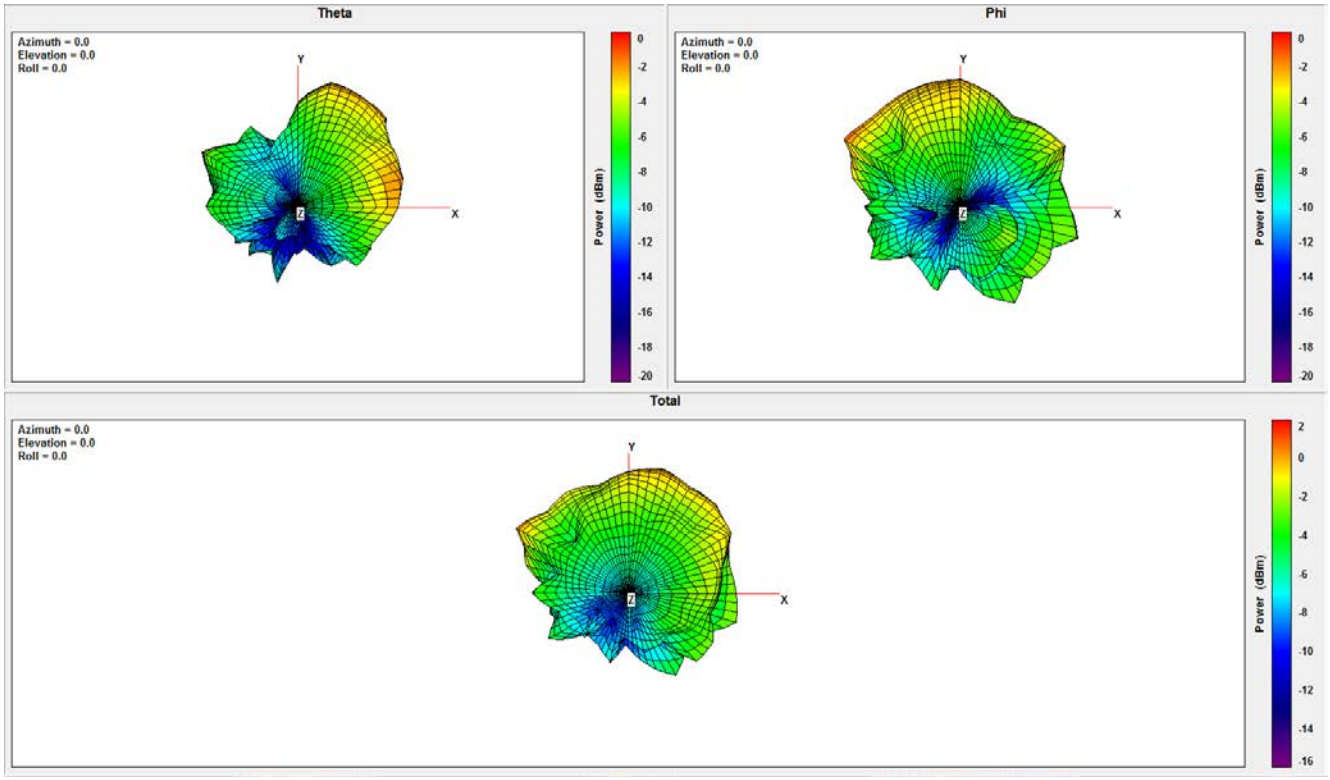
Plot 3: Antenna diagram, 5320 MHz



Plot 4:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-4,76376
	Peak EIRP (dBm)	-0,111799
	Directivity (dBi)	4,65196
	Efficiency (dB)	-4,76376
	Efficiency (%)	33,3906
	Gain (dBi)	-0,111799

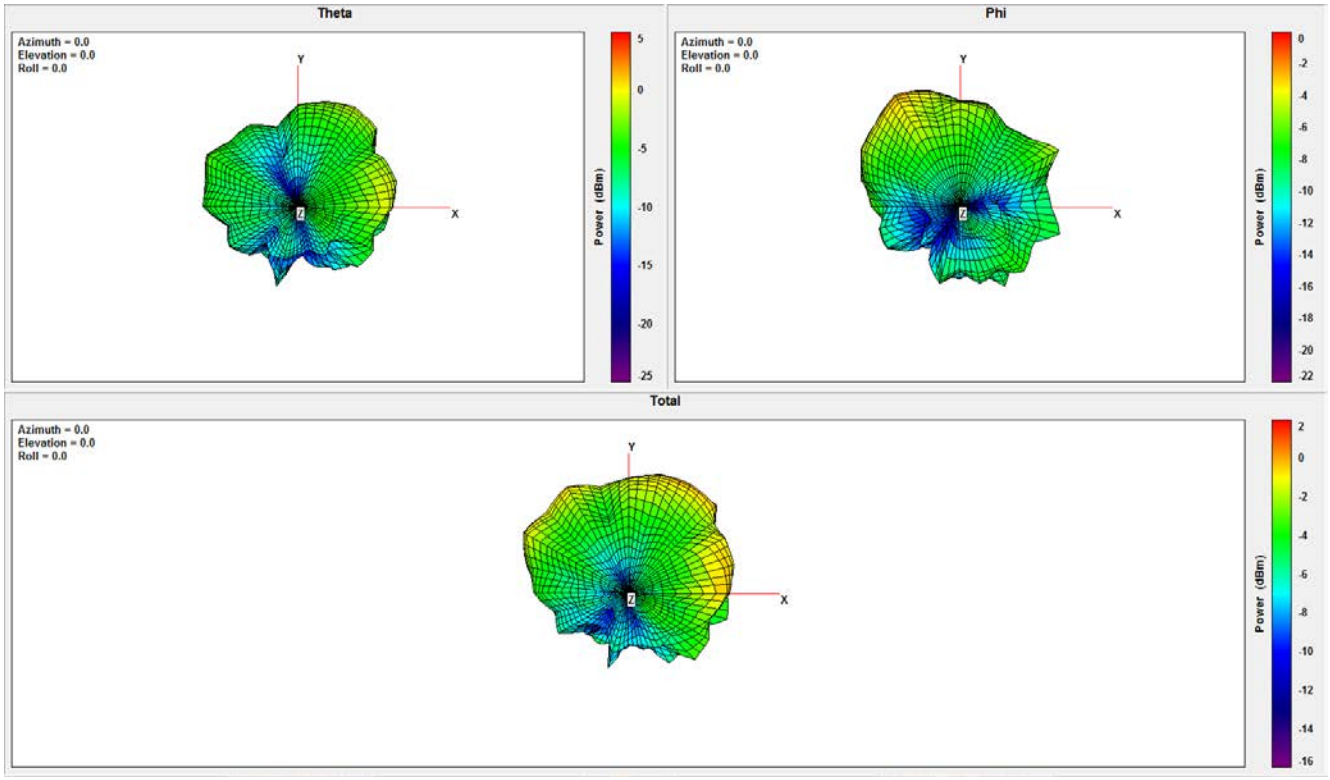
Plot 5: Antenna diagram, 5500 MHz



Plot 6:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-3,68996
	Peak EIRP (dBm)	0,992601
	Directivity (dBi)	4,68256
	Efficiency (dB)	-3,68996
	Efficiency (%)	42,7567
	Gain (dBi)	0,992601

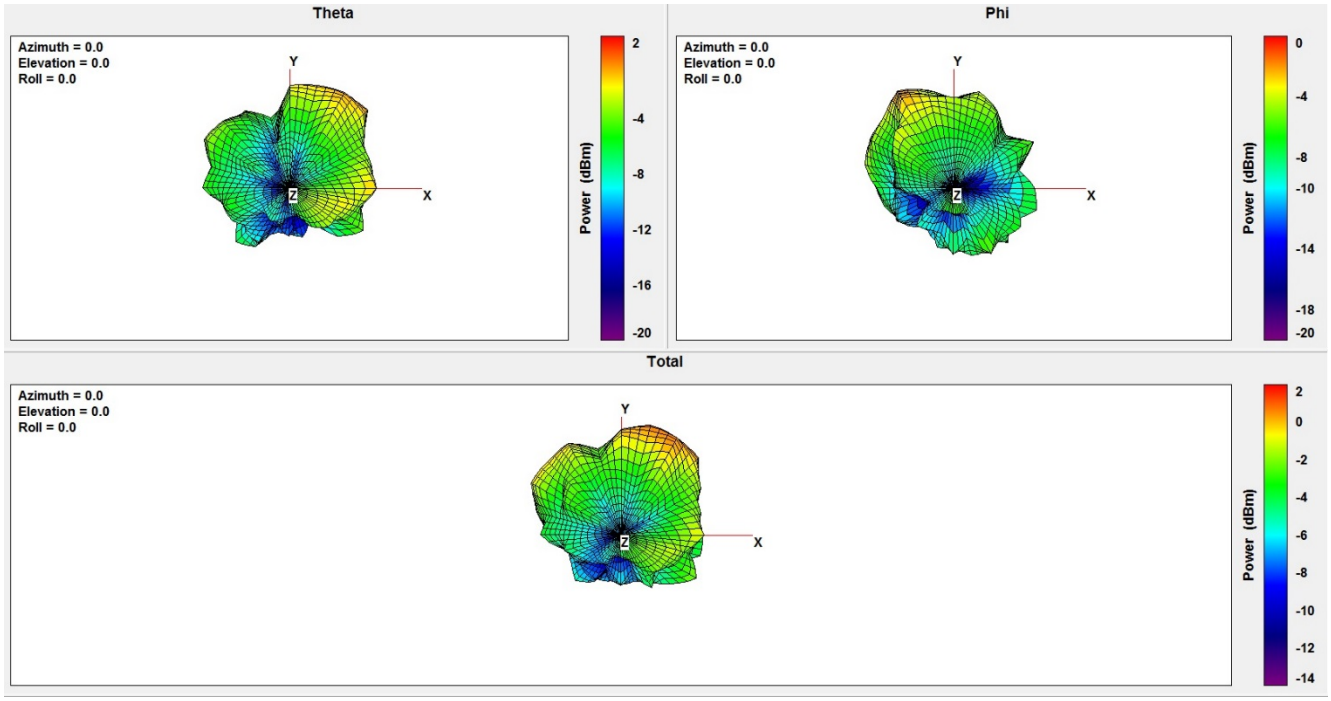
Plot 7: Antenna diagram, 5700 MHz



Plot 8:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-4,11835
	Peak EIRP (dBm)	1,39913
	Directivity (dBi)	5,51748
	Efficiency (dB)	-4,11835
	Efficiency (%)	38,7405
	Gain (dBi)	1,39913

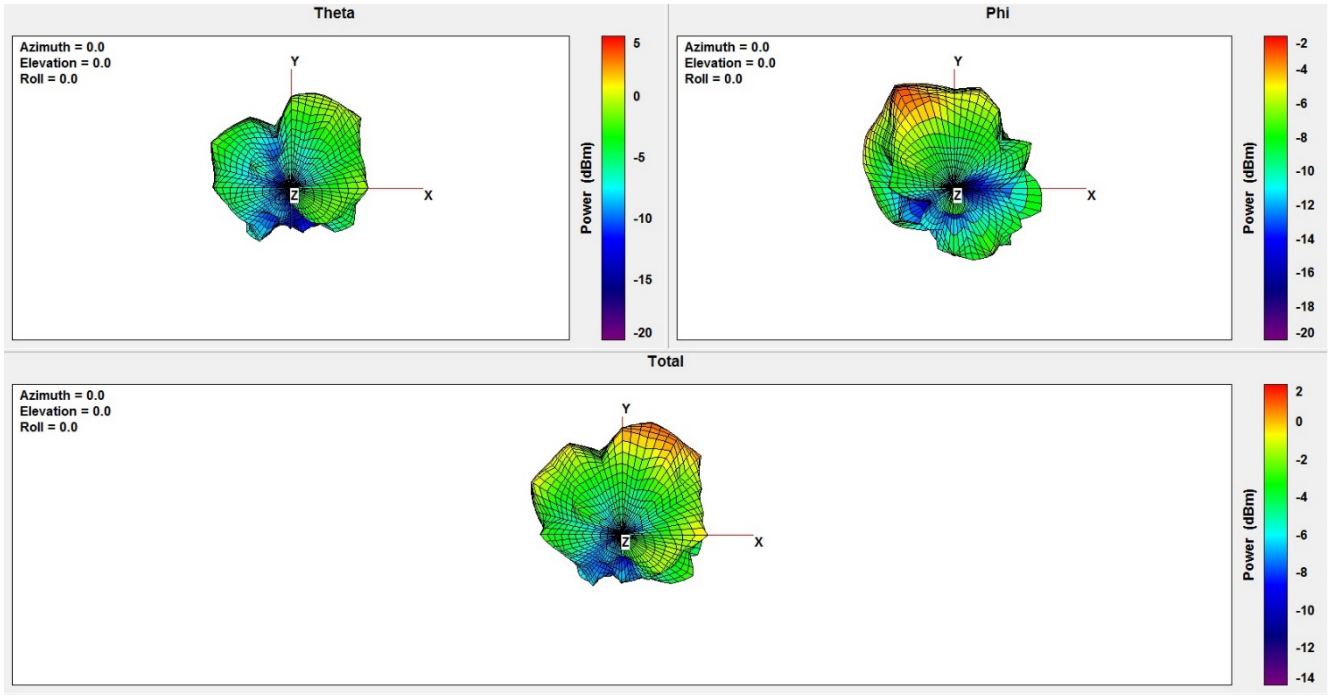
Plot 9: Antenna diagram, 5745 MHz



Plot 10:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-3,65115
	Peak EIRP (dBm)	1,27249
	Directivity (dBi)	4,92364
	Efficiency (dB)	-3,65115
	Efficiency (%)	43,1405
	Gain (dBi)	1,27249

Plot 11: Antenna Diagram, 5825 MHz



Plot 12:

Total	Point Values	
	Ant. Port Input Pwr. (dBm)	0
	Tot. Rad. Pwr. (dBm)	-3,54355
	Peak EIRP (dBm)	1,37877
	Directivity (dBi)	4,92232
	Efficiency (dB)	-3,54355
	Efficiency (%)	44,2227
	Gain (dBi)	1,37877

11.3 Duty cycle

Description:

The duty cycle is necessary to compute the maximum power during an actual transmission. The shown plots and values are to show an example of the measurement procedure. The real value is measured direct during the power measurement or power density measurement. The correction value is shown in each plot of these measurements.

Measurement:

Measurement parameter	
According to: KDB789033 D02, B.	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	10 MHz
Video bandwidth:	10 MHz
Span:	Zero
Trace mode:	Video trigger / view / single sweep
Used test setup:	See chapter 6.5 A
Measurement uncertainty:	See chapter 8

Results:

Duty cycle and correction factor:

OFDM / a – mode:	100 % duty cycle	=>	0.00 dB
OFDM / n/ac HT20 – mode:	100 % duty cycle	=>	0.00 dB
OFDM / n/ac HT40 – mode:	100 % duty cycle	=>	0.00 dB

11.4 Maximum output power

11.4.1 Maximum output power conducted – for FCC requirements

Description:

Measurement of the maximum output power conduced

Measurement:

Measurement parameter	
According to: KDB789033 D02, E.2.e.	
Detector:	RMS
Sweep time:	≥10*(swp points)*(total on/off time)
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	> EBW
Trace mode:	Max hold
Analyzer function	Band power / channel power Interval > 26 dB EBW
Used test setup:	See chapter 6.5 A
Measurement uncertainty:	See chapter 8

Limits:

Radiated output power	Conducted output power for mobile equipment
Conducted power + 6 dBi antenna gain	250mW 5.150-5.250 GHz The lesser one of 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]) 1W 5.725-5.85 GHz

Result: OFDM / a – mode

OFDM / a – mode	Maximum output power conducted [dBm]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	10.5	10.8	11.2	11.7
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	12.7	12.4	12.2	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	11.0	10.8	10.6	-/-

Result: OFDM / n/ac HT20 – mode

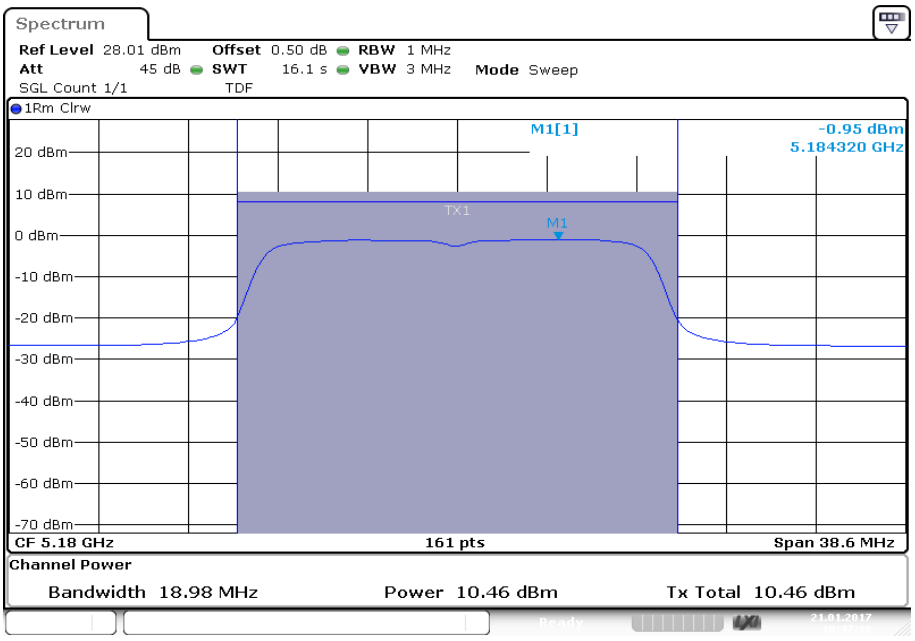
OFDM / n/ac HT20 – mode	Maximum output power conducted [dBm]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	10.0	9.5	10.0	11.2
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	12.9	12.5	12.2	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	10.5	10.9	10.6	-/-

Result: OFDM / n/ac HT40 – mode

OFDM / n/ac HT40 – mode	Maximum output power conducted [dBm]			
Channel	5190 MHz	5230 MHz	5270 MHz	5310 MHz
	5.9	11.1	11.3	8.3
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
	12.3	12.7	12.2	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
	10.9	11.2	-/-	-/-

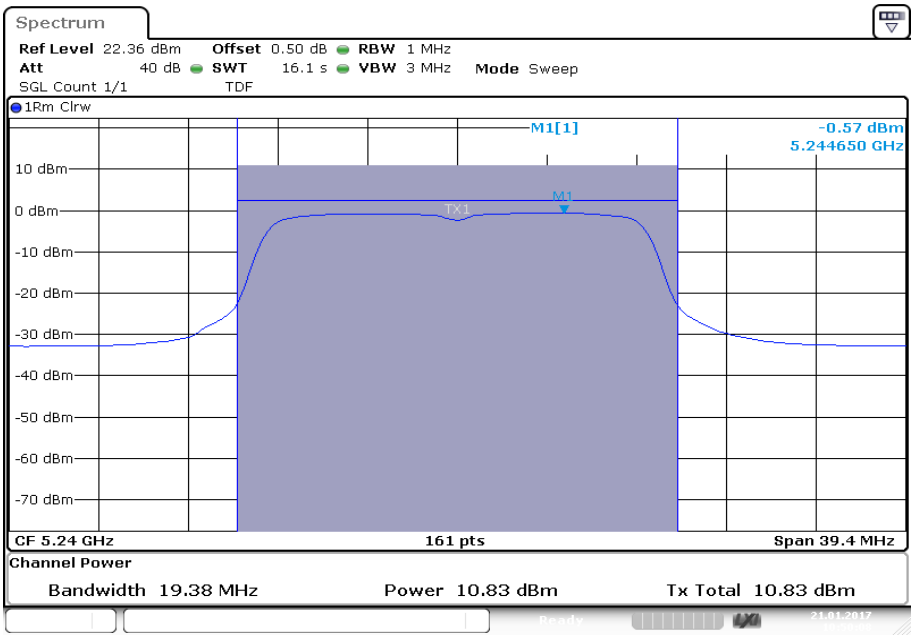
Plots: OFDM / a – mode

Plot 1: 5180 MHz



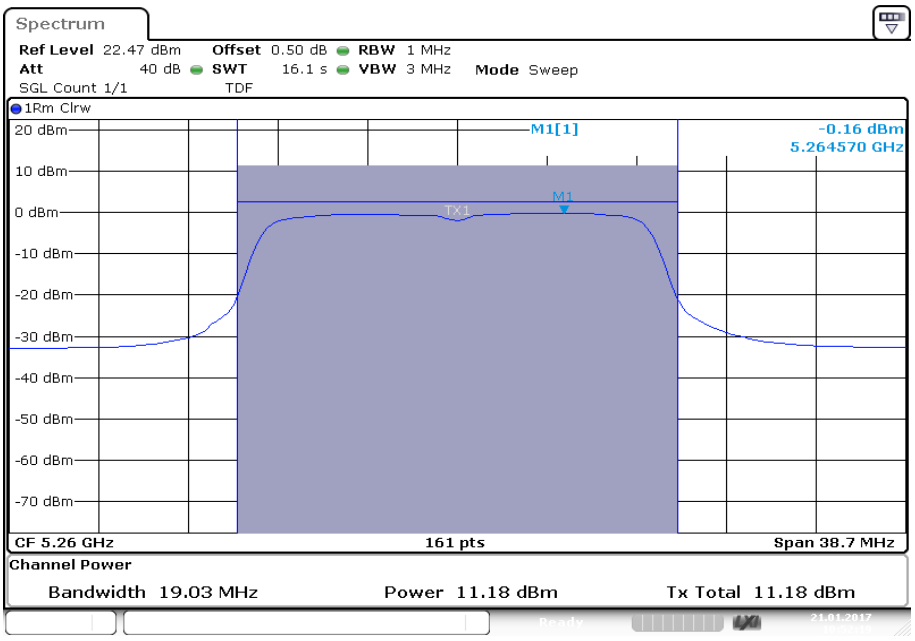
Date: 21.JAN.2017 10:47:18

Plot 2: 5240 MHz



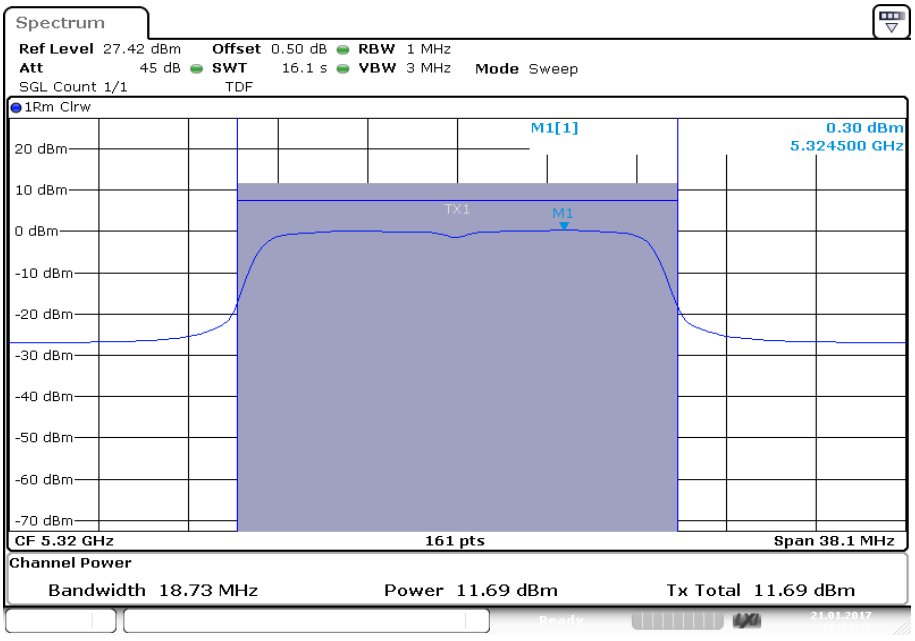
Date: 21.JAN.2017 10:50:08

Plot 3: 5260 MHz



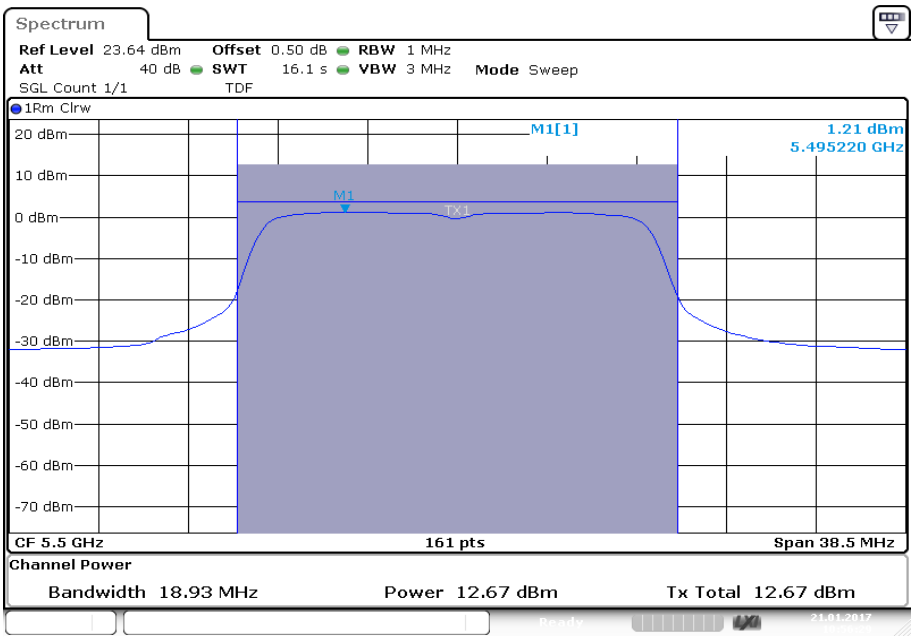
Date: 21.JAN.2017 10:52:19

Plot 4: 5320 MHz



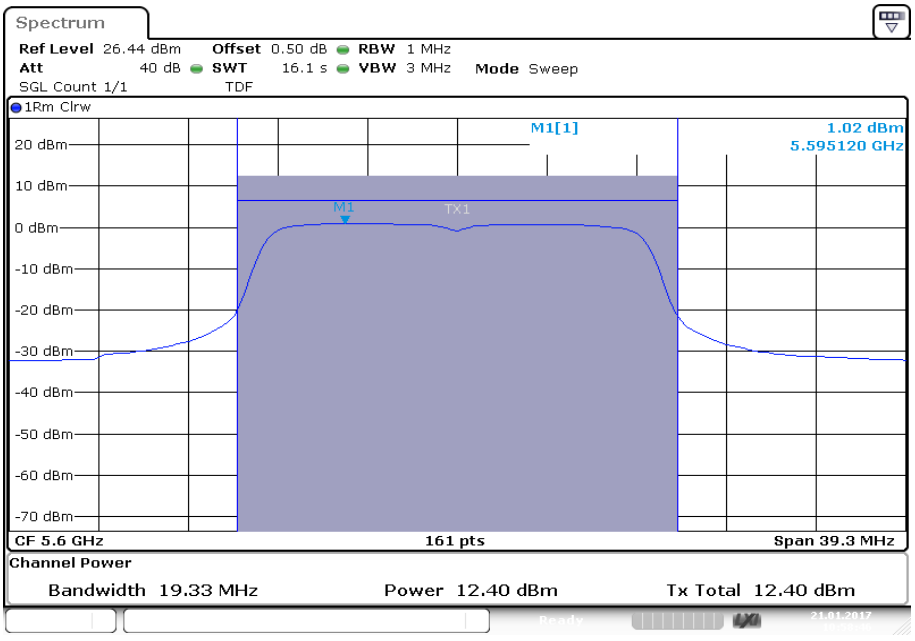
Date: 21.JAN.2017 10:54:39

Plot 5: 5500 MHz



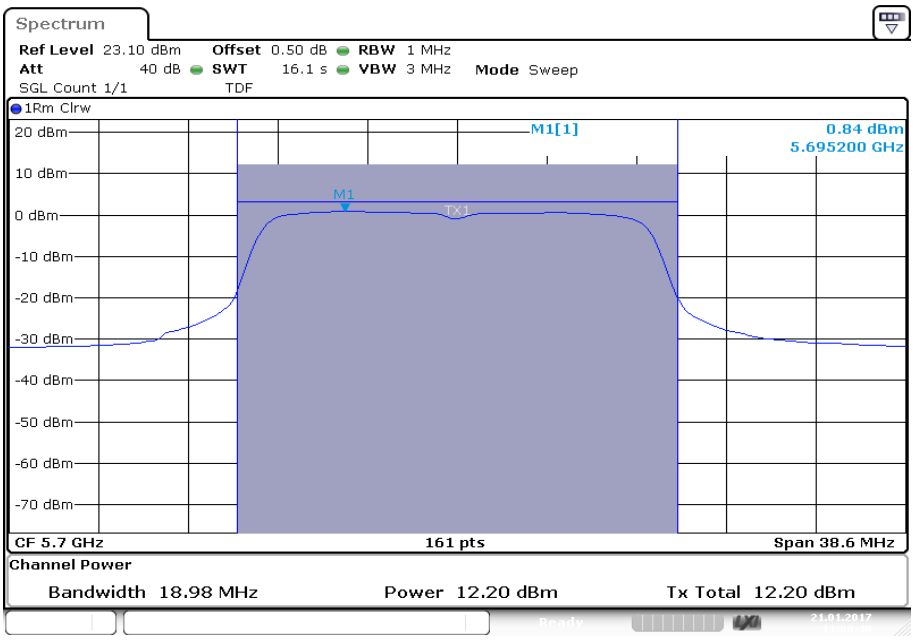
Date: 21.JAN.2017 10:56:29

Plot 6: 5600 MHz



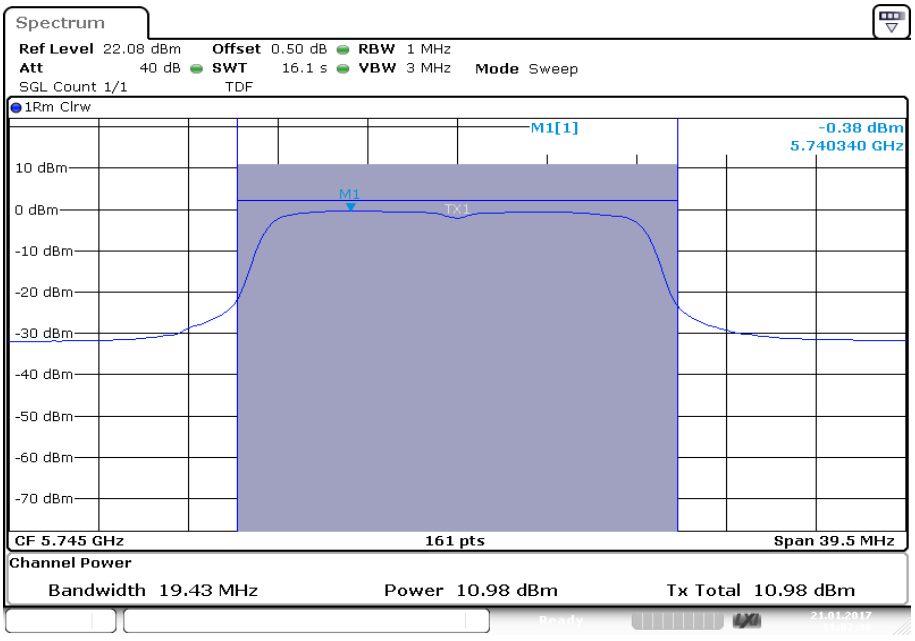
Date: 21.JAN.2017 10:58:45

Plot 7: 5700 MHz



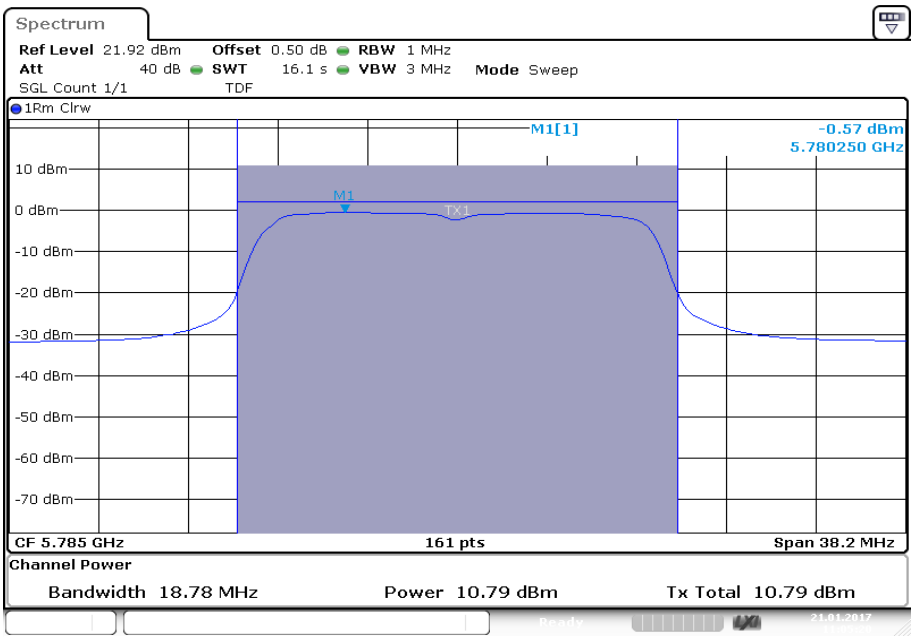
Date: 21.JAN.2017 11:00:40

Plot 8: 5745 MHz



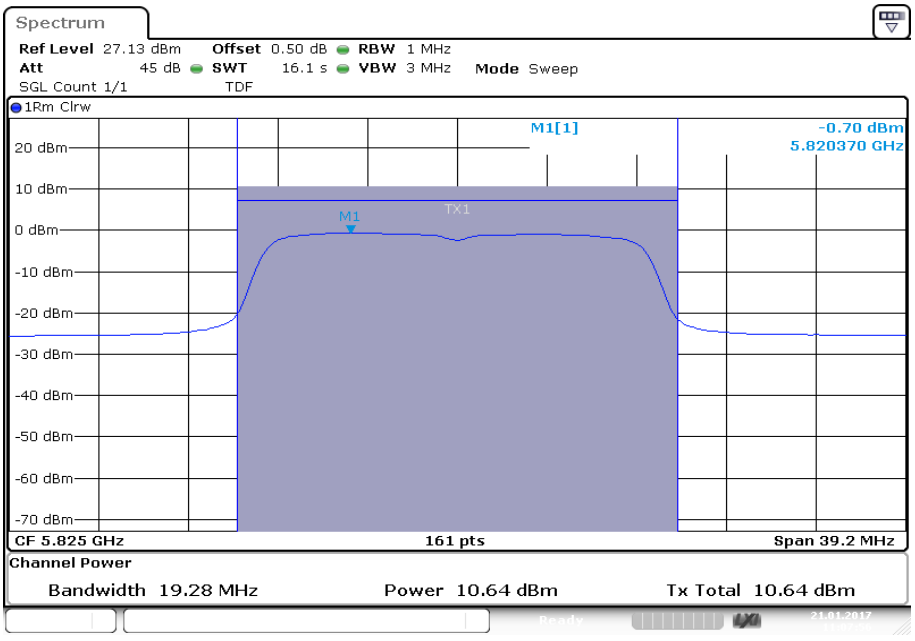
Date: 21.JAN.2017 11:02:38

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:05:20

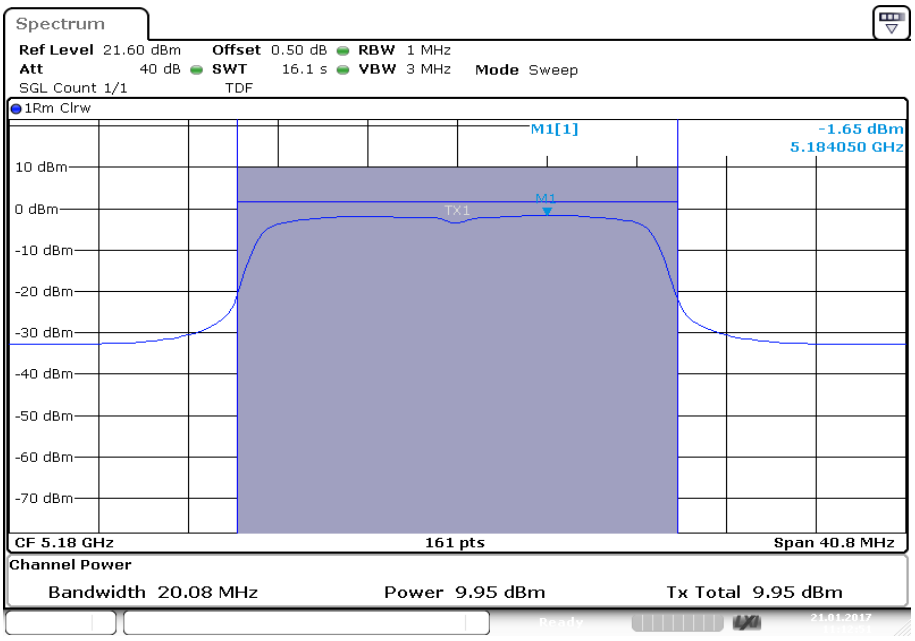
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:07:56

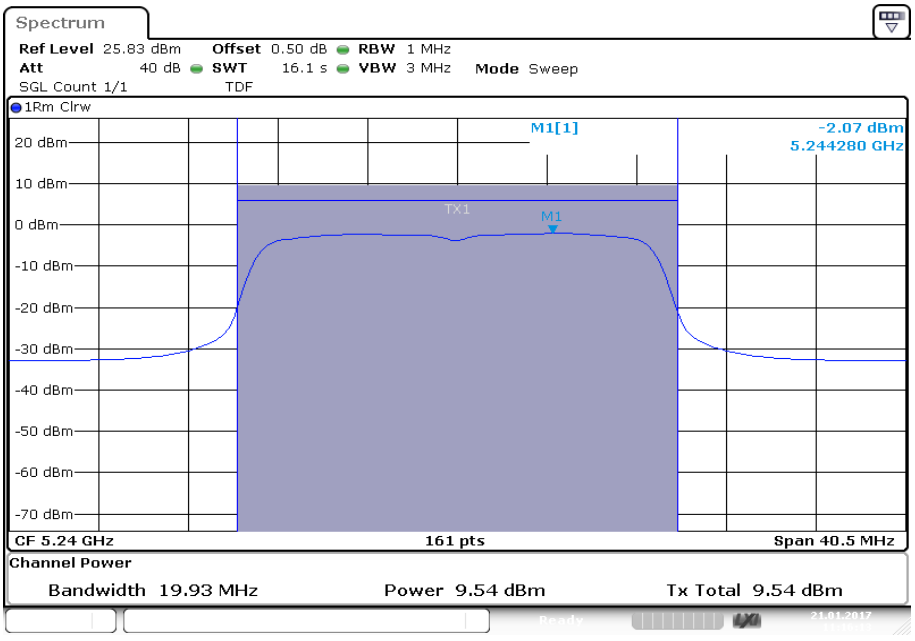
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5180 MHz



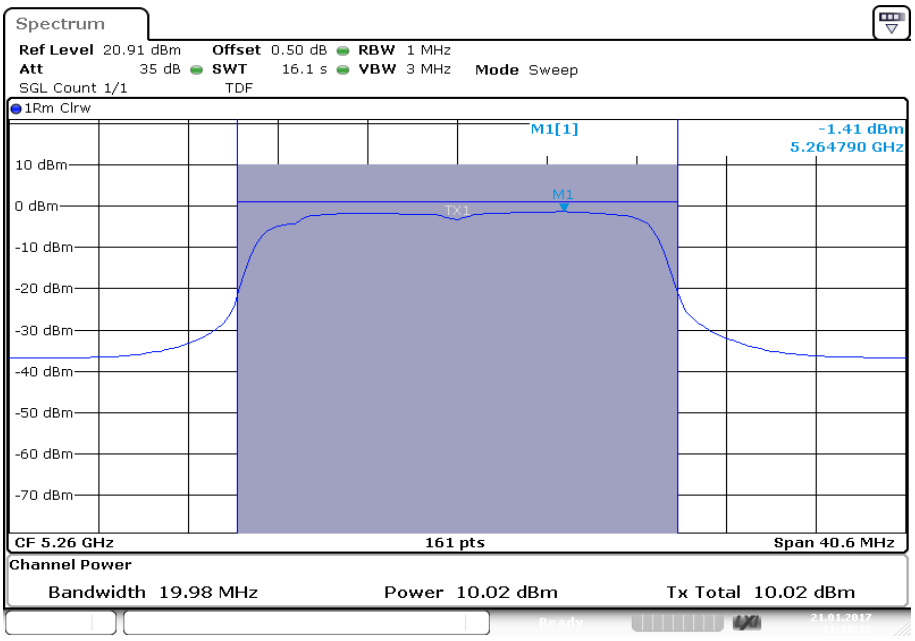
Date: 21.JAN.2017 11:12:51

Plot 2: 5240 MHz



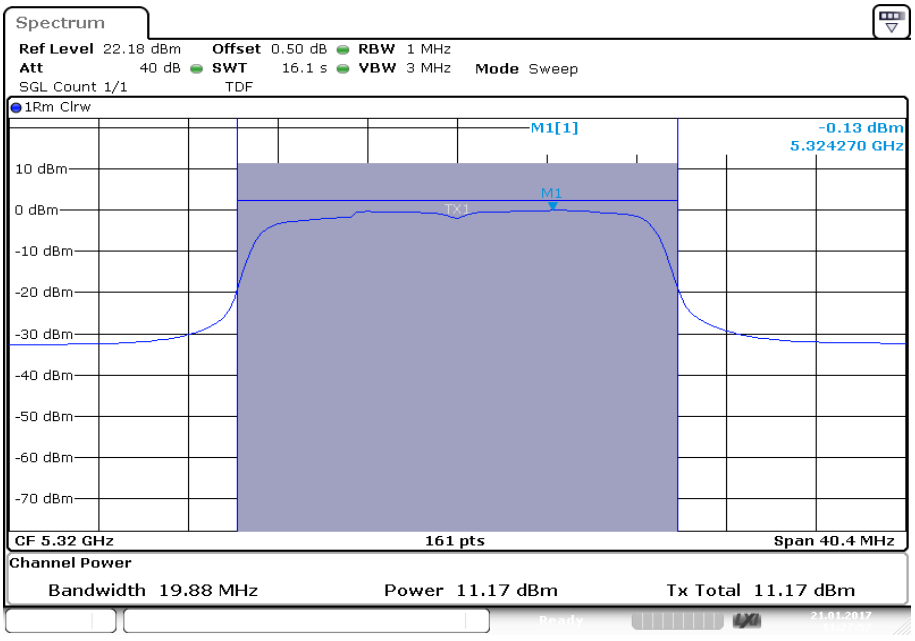
Date: 21.JAN.2017 11:16:12

Plot 3: 5260 MHz



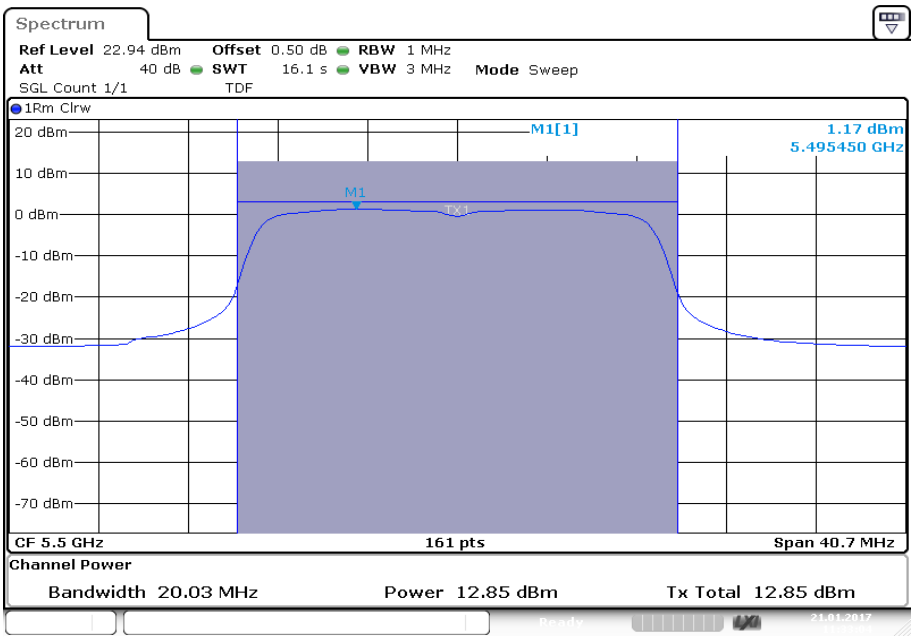
Date: 21.JAN.2017 11:18:12

Plot 4: 5320 MHz



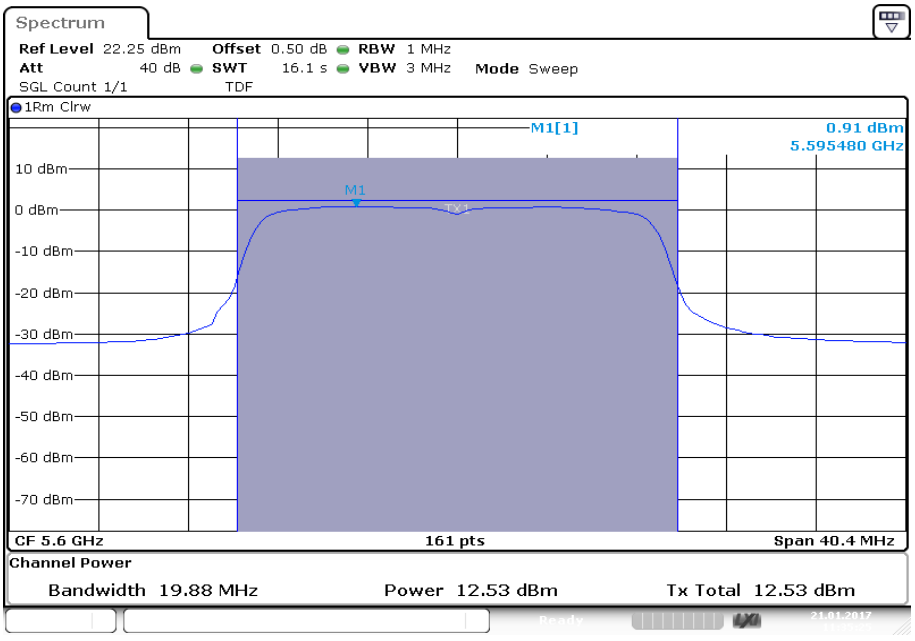
Date: 21.JAN.2017 11:27:57

Plot 5: 5500 MHz



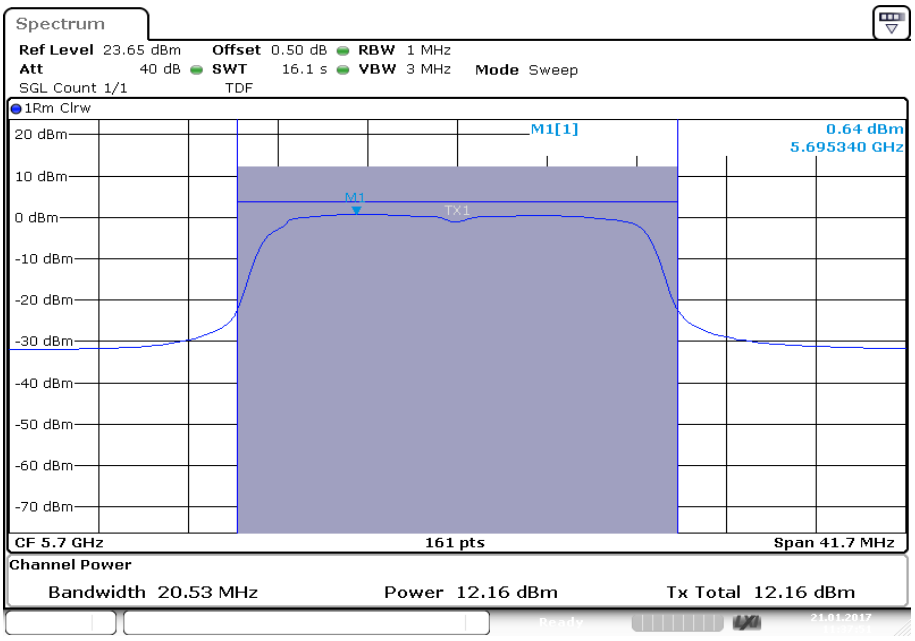
Date: 21.JAN.2017 11:33:04

Plot 6: 5600 MHz



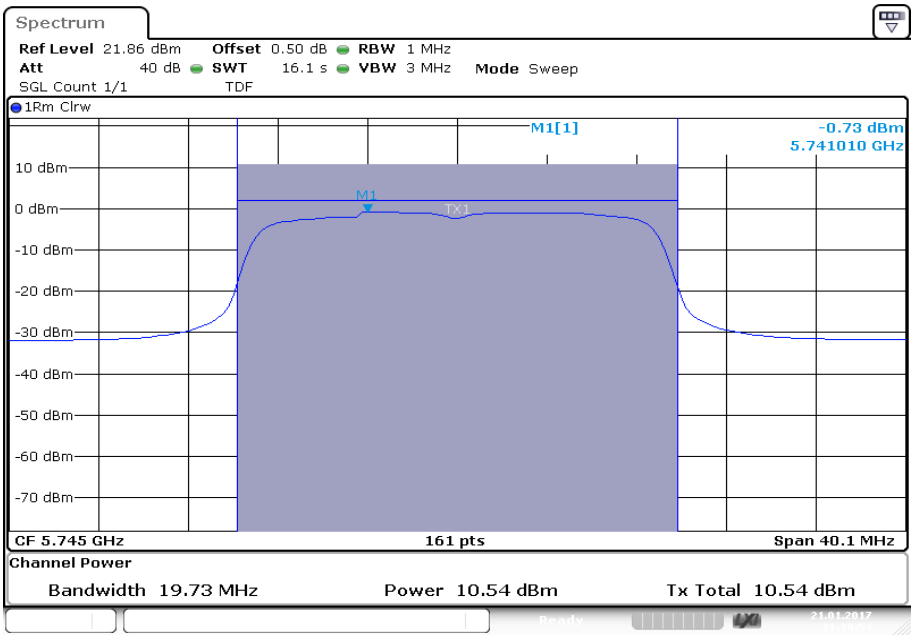
Date: 21.JAN.2017 11:35:24

Plot 7: 5700 MHz



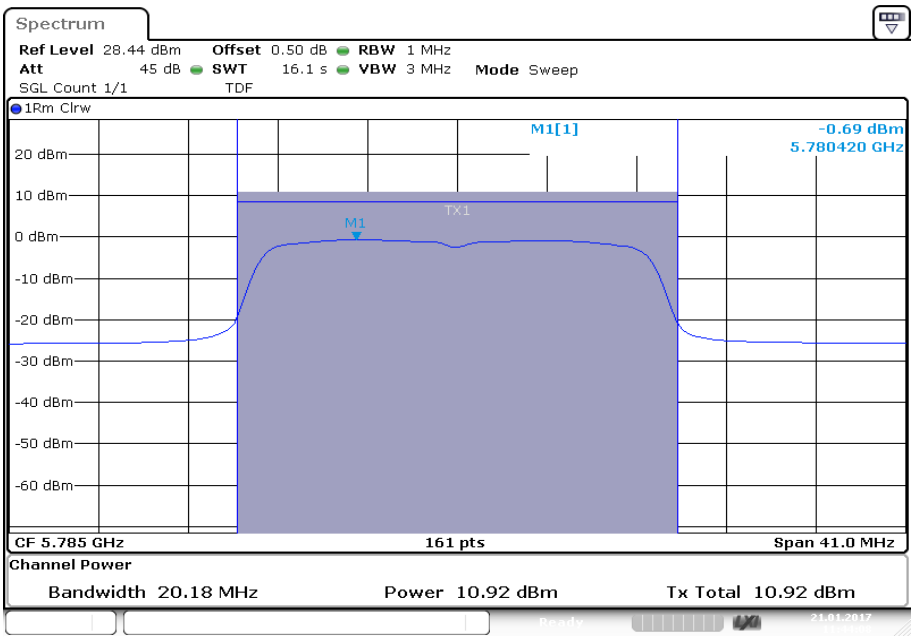
Date: 21.JAN.2017 11:37:51

Plot 8: 5745 MHz



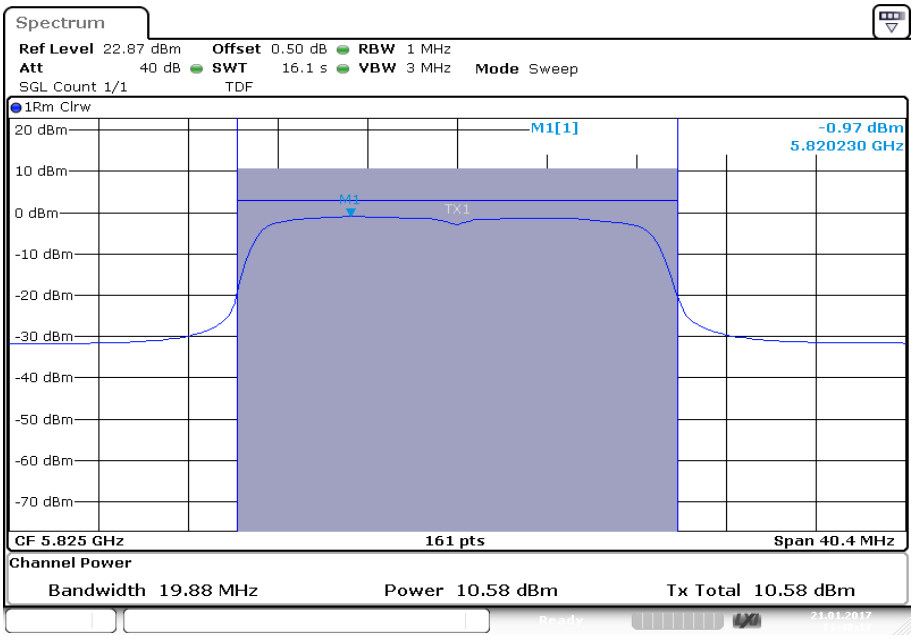
Date: 21.JAN.2017 11:39:54

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:44:08

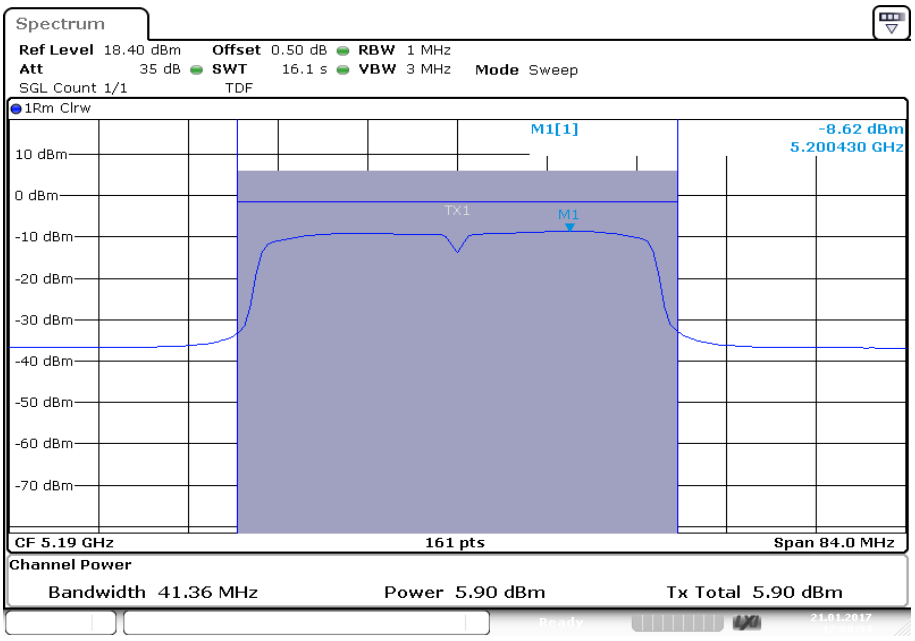
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:48:17

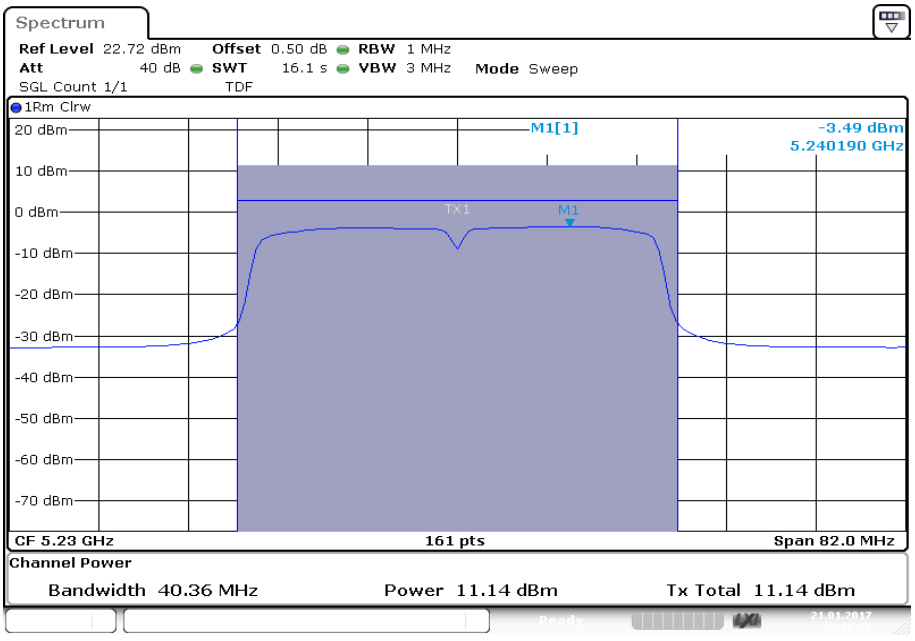
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5190 MHz



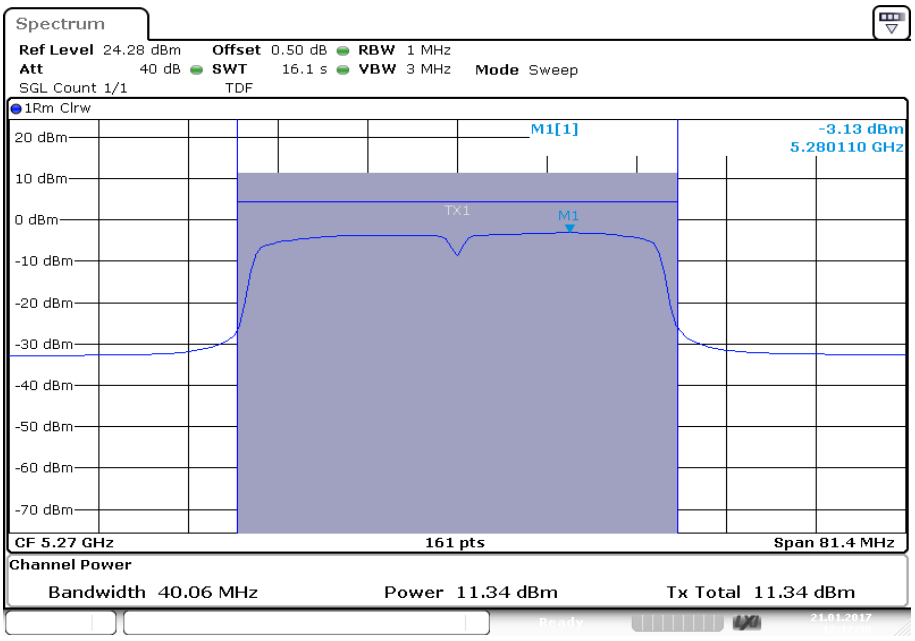
Date: 21.JAN.2017 12:08:34

Plot 2: 5230 MHz



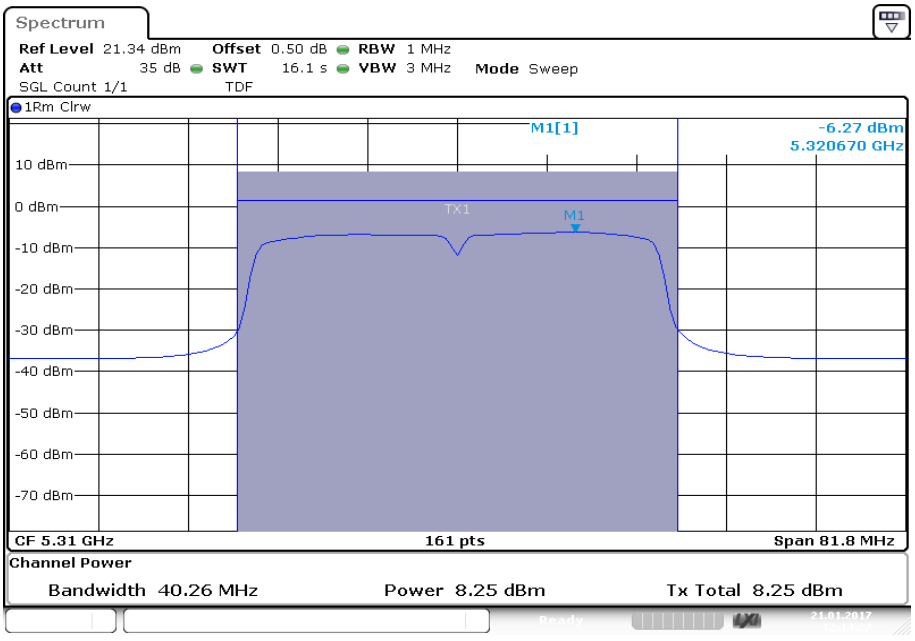
Date: 21.JAN.2017 12:10:36

Plot 3: 5270 MHz



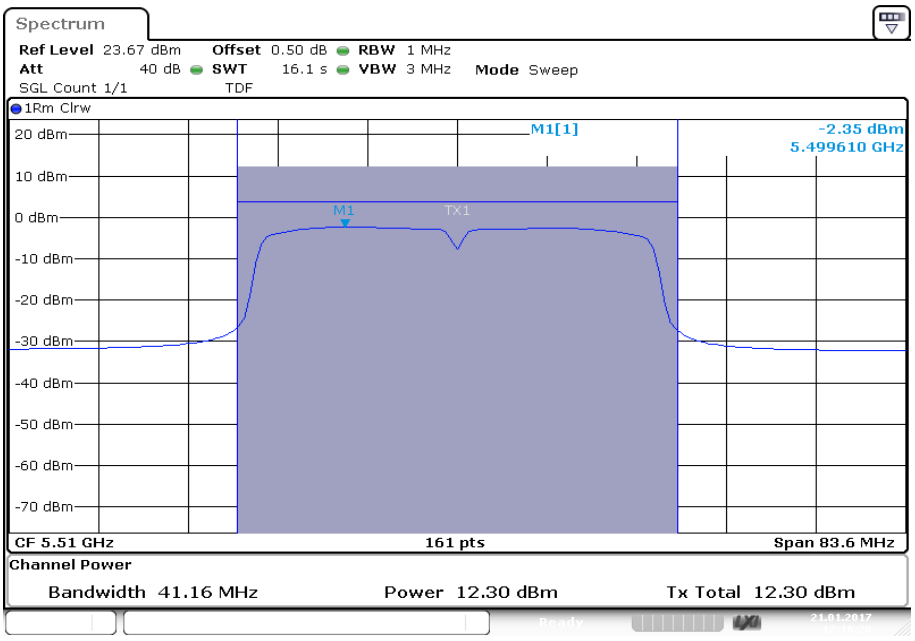
Date: 21.JAN.2017 12:12:30

Plot 4: 5310 MHz



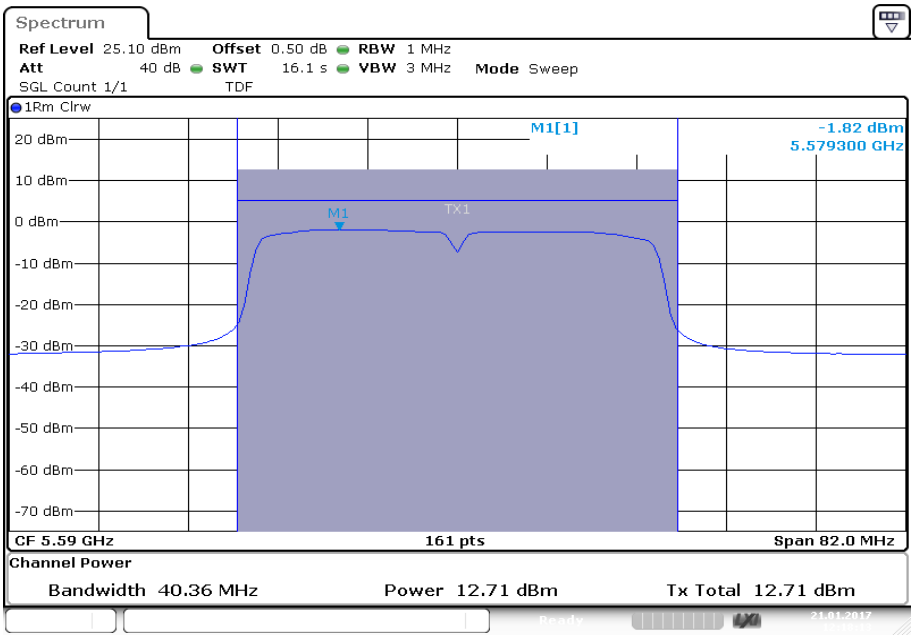
Date: 21.JAN.2017 12:14:27

Plot 5: 5510 MHz



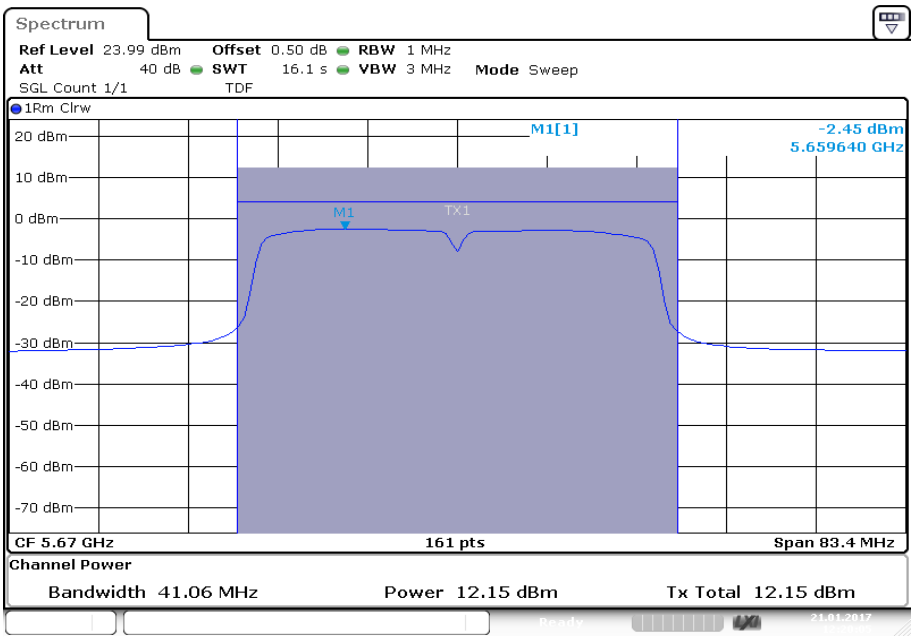
Date: 21.JAN.2017 12:16:20

Plot 6: 5590 MHz



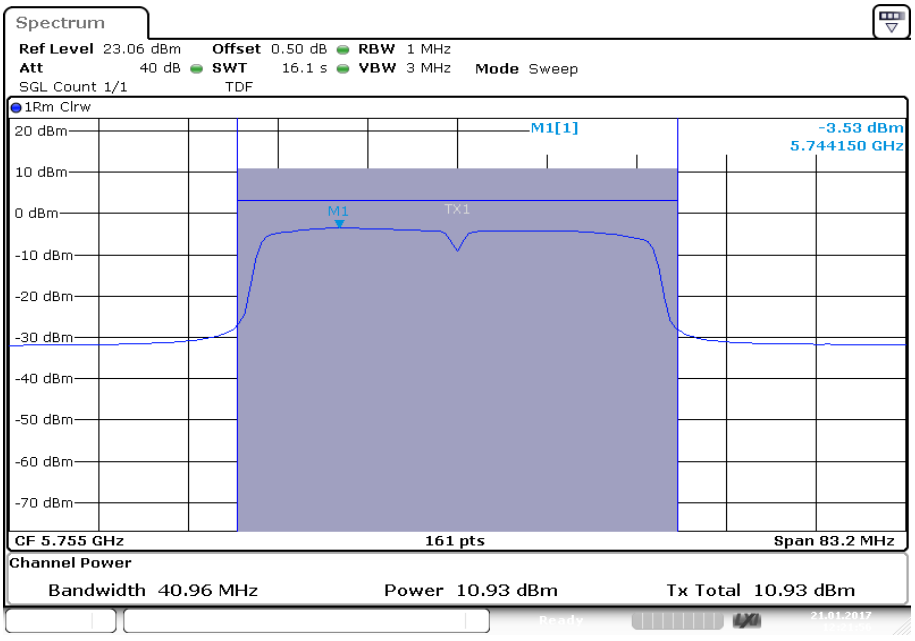
Date: 21.JAN.2017 12:18:13

Plot 7: 5670 MHz



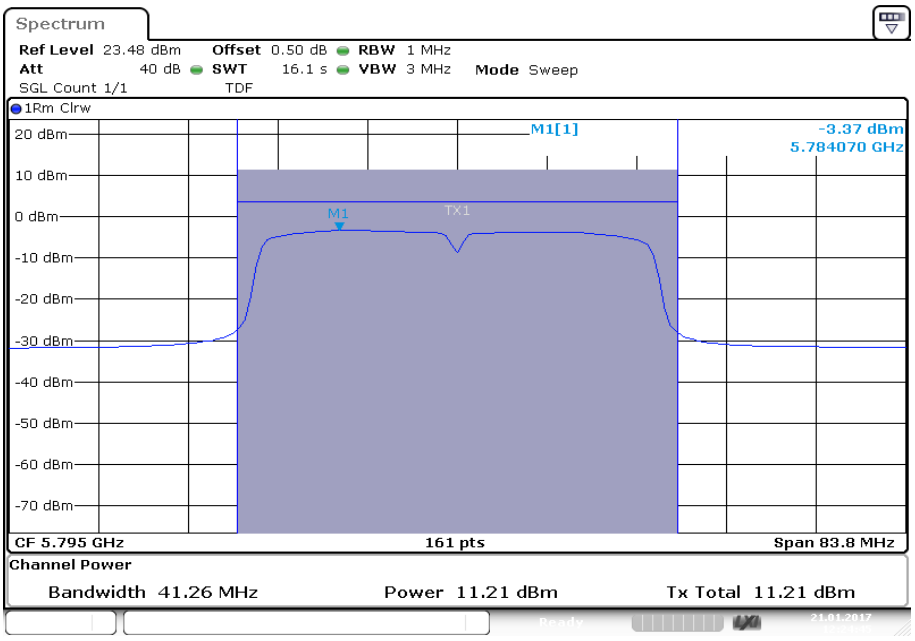
Date: 21.JAN.2017 12:20:04

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:56

Plot 9: 5795 MHz



Date: 21.JAN.2017 12:24:45

11.4.2 Maximum output power – for IC requirements

Description:

Measurement of the maximum output power conduced + radiated

Measurement:

Measurement parameter	
Detector:	RMS
Sweep time:	≥10*(swp points)*(total on/off time)
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 MHz
Span:	> EBW
Trace mode:	Max hold
Analyzer function	Band power / channel power Interval > 99% OBW
Used test setup:	See chapter 6.5 A
Measurement uncertainty:	See chapter 8

Limits:

Radiated output power	Conducted output power for mobile equipment
The lesser one of 200 mW or 10 dBm + 10 log Bandwidth 5.150-5.250 GHz 1 W or 17 dBm + 10 log Bandwidth 5.250-5.350 GHz 1 W or 17 dBm + 10 log Bandwidth 5.470-5.725 GHz (where Bandwidth is the 99% Bandwidth [MHz]) Conducted power + 6dBi antenna gain 5.725-5.825 GHz	The lesser one of 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 99% Bandwidth [MHz]) 1W 5.725-5.825 GHz

Result: OFDM / a – mode

OFDM / a – mode	Maximum output power [dBm]			
Channel	5180 MHz*	5240 MHz*	5260 MHz	5320 MHz
Including duty cycle correction factor	10.4	10.7	11.1	11.6
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	12.6	12.3	12.1	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
Including duty cycle correction factor	11.0	10.7	10.9	-/-

*find EIRP values for each antenna on the next page

Result: OFDM / n/ac HT20 – mode

OFDM / n/ac HT20 – mode	Maximum output power [dBm]			
Channel	5180 MHz*	5240 MHz*	5260 MHz	5320 MHz
Including duty cycle correction factor	9.9	9.7	10.0	11.3
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
Including duty cycle correction factor	12.7	12.4	12.1	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
Including duty cycle correction factor	10.7	10.9	10.4	-/-

*find EIRP values for each antenna on the next page

Result: OFDM / n/ac HT40 – mode

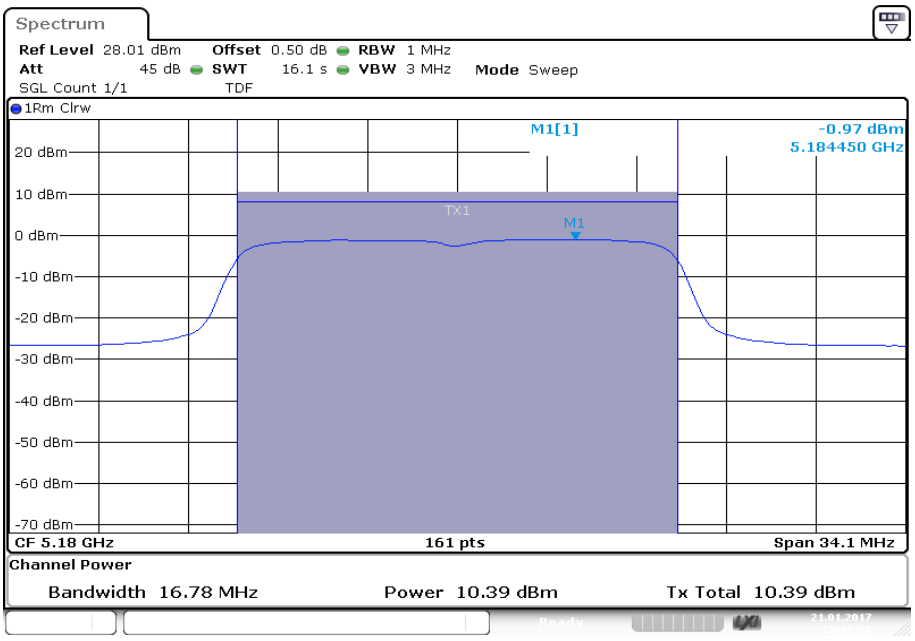
OFDM / n/ac HT40 – mode	Maximum output power [dBm]			
Channel	5190 MHz*	5230 MHz*	5270 MHz	5310 MHz
Including duty cycle correction factor	6.5	11.0	11.2	8.7
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
Including duty cycle correction factor	12.2	12.6	12.0	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
Including duty cycle correction factor	10.8	11.1	-/-	-/-

*find EIRP values for each antenna in the next table

	Maximum output power EIRP [dBm]					
	a-mode 5180 MHz	a-mode 5240 MHz	n HT20 5180 MHz	n HT20 5240 MHz	n HT40 5190 MHz	n HT40 5230 MHz
IV2 TRNS Antenna WLAN IIT 1.4	12.3	12.6	11.8	11.6	8.4	12.9
Ant M3002-66494	11.6	11.9	11.1	10.9	7.7	12.2
Ant 453564154611	7.1	7.4	6.6	6.4	3.2	7.7
Ant 453564175981	14.0	14.3	13.5	13.3	10.1	14.6
Ant 453564271931	10.2	10.5	9.7	9.5	6.3	10.8

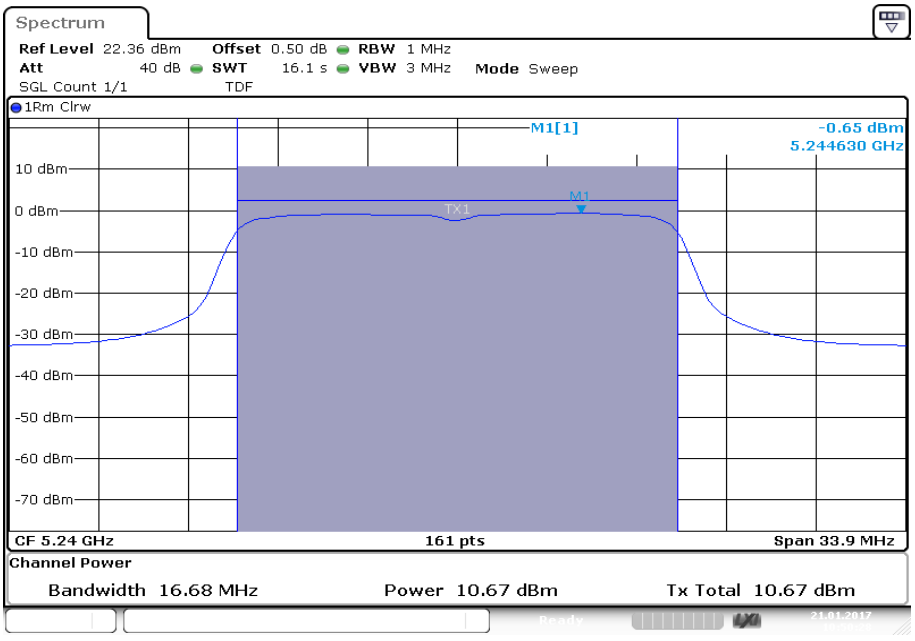
Plots: OFDM / a – mode

Plot 1: 5180 MHz



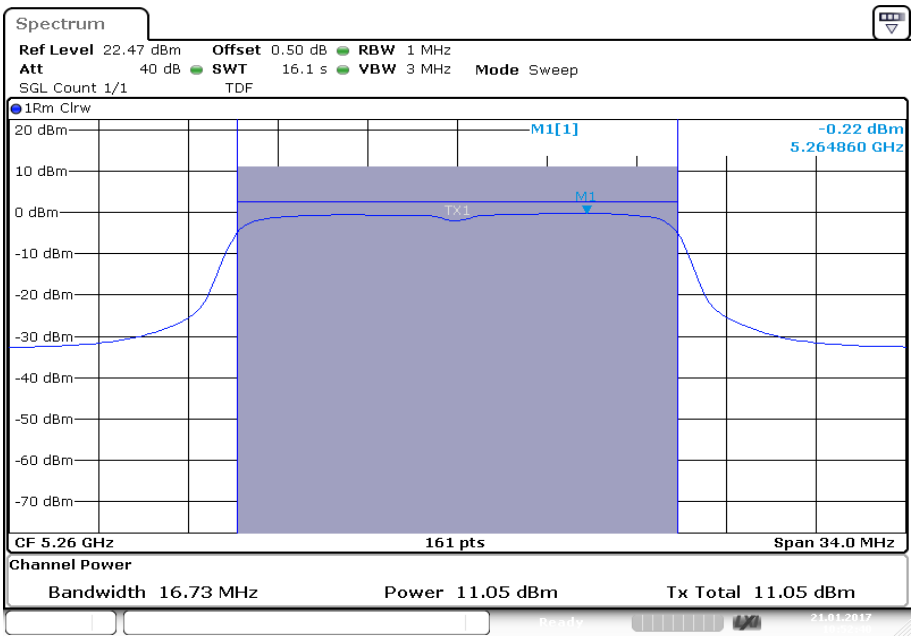
Date: 21.JAN.2017 10:47:38

Plot 2: 5240 MHz



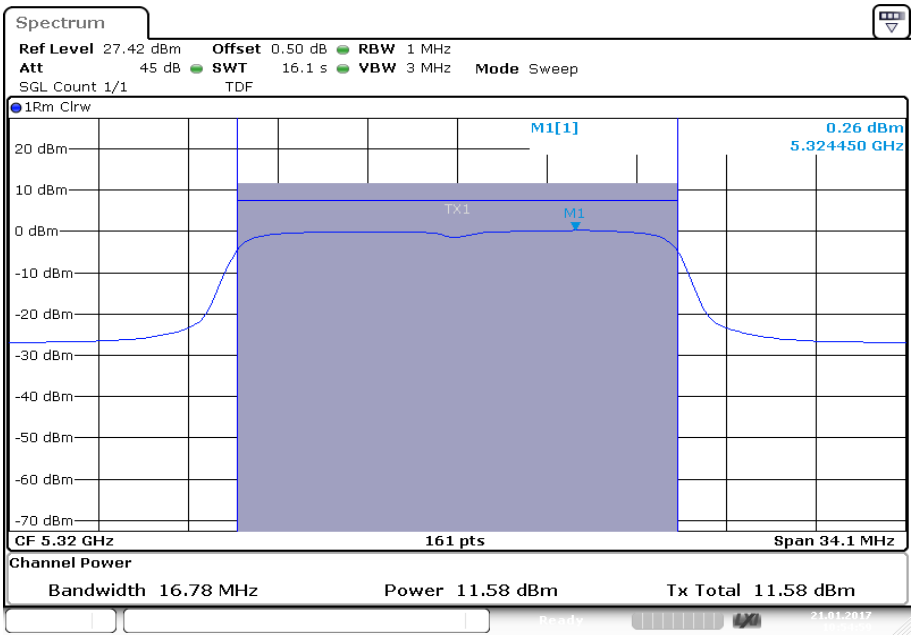
Date: 21.JAN.2017 10:50:28

Plot 3: 5260 MHz



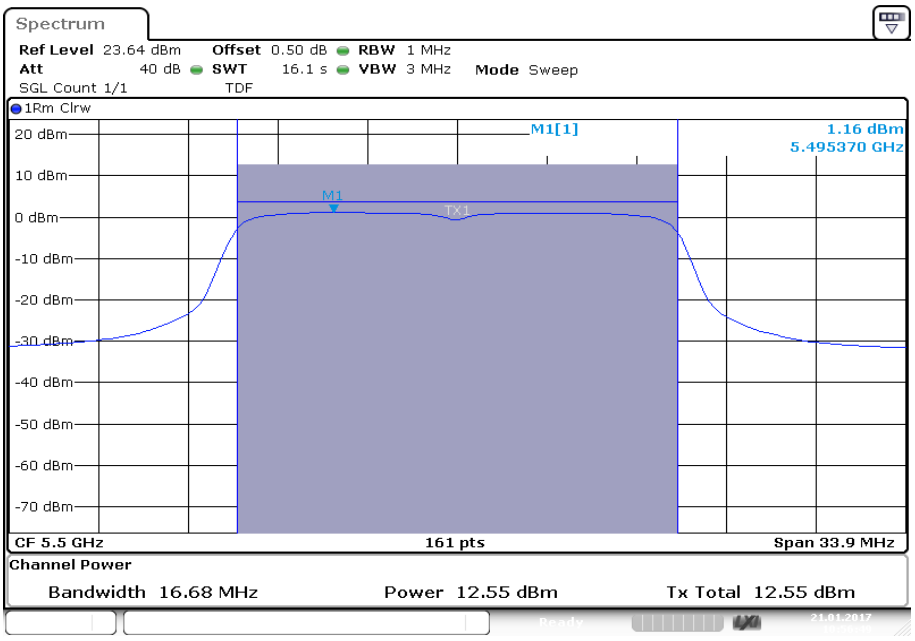
Date: 21.JAN.2017 10:52:40

Plot 4: 5320 MHz



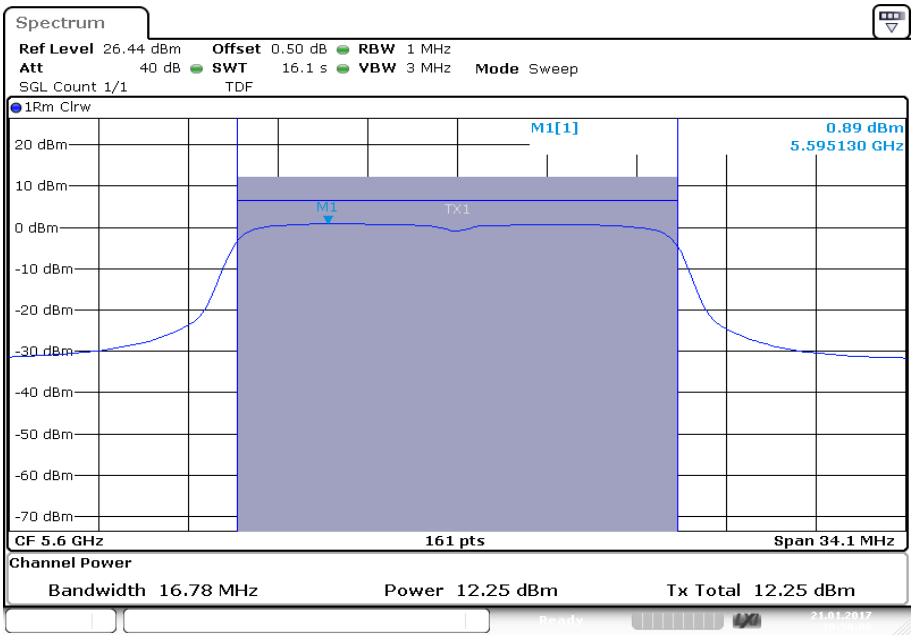
Date: 21.JAN.2017 10:54:59

Plot 5: 5500 MHz



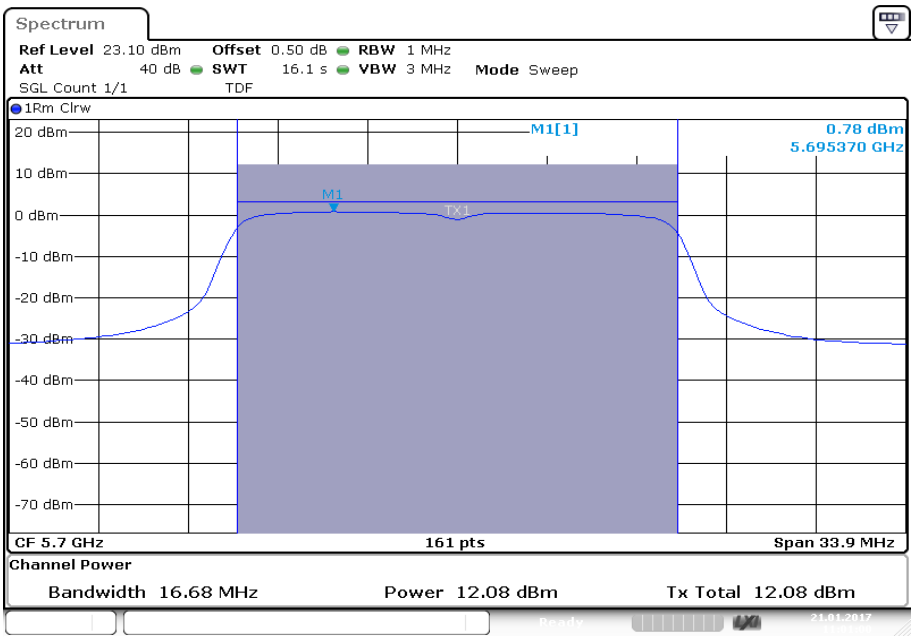
Date: 21.JAN.2017 10:56:49

Plot 6: 5600 MHz



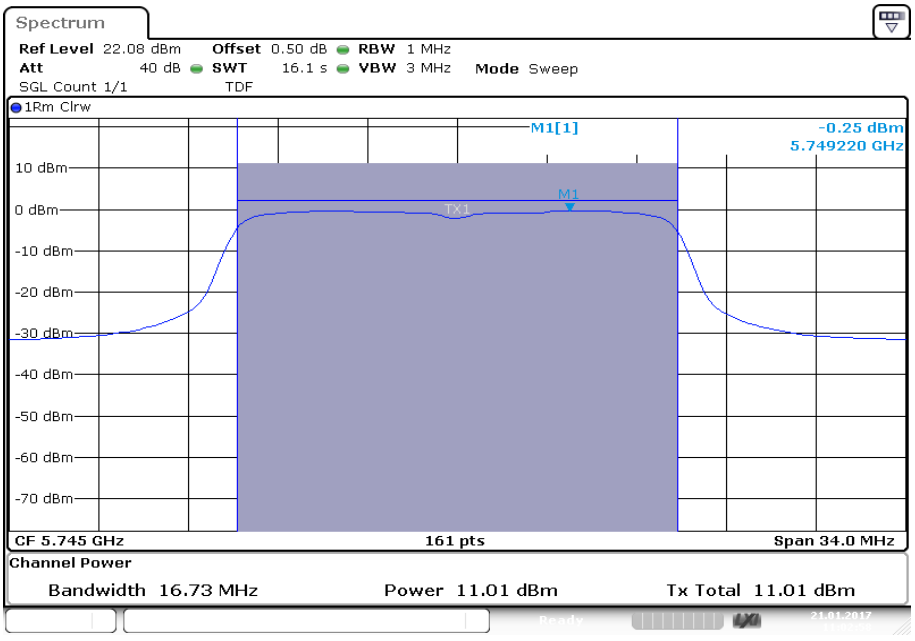
Date: 21.JAN.2017 10:59:05

Plot 7: 5700 MHz



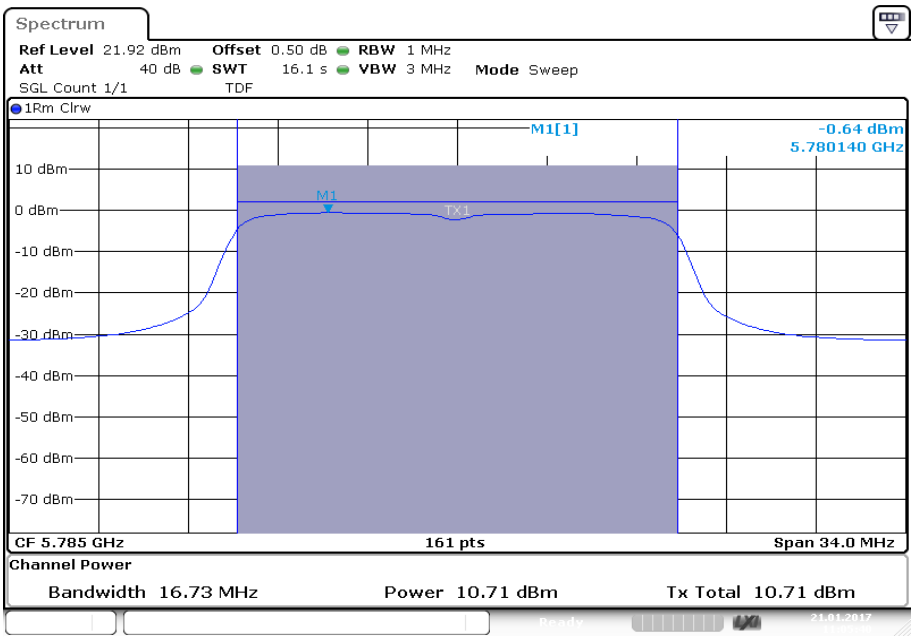
Date: 21.JAN.2017 11:01:00

Plot 8: 5745 MHz



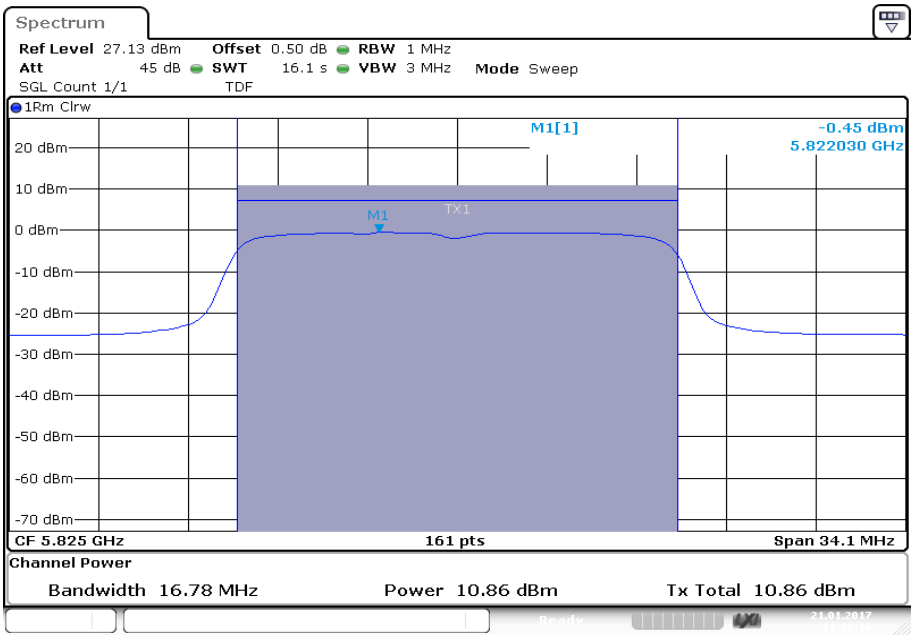
Date: 21.JAN.2017 11:02:58

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:05:40

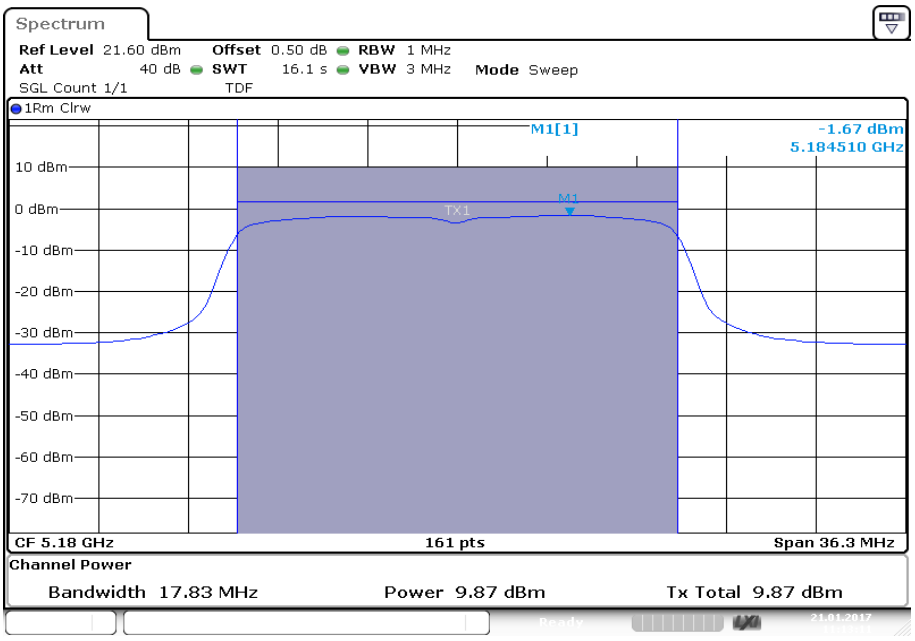
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:08:16

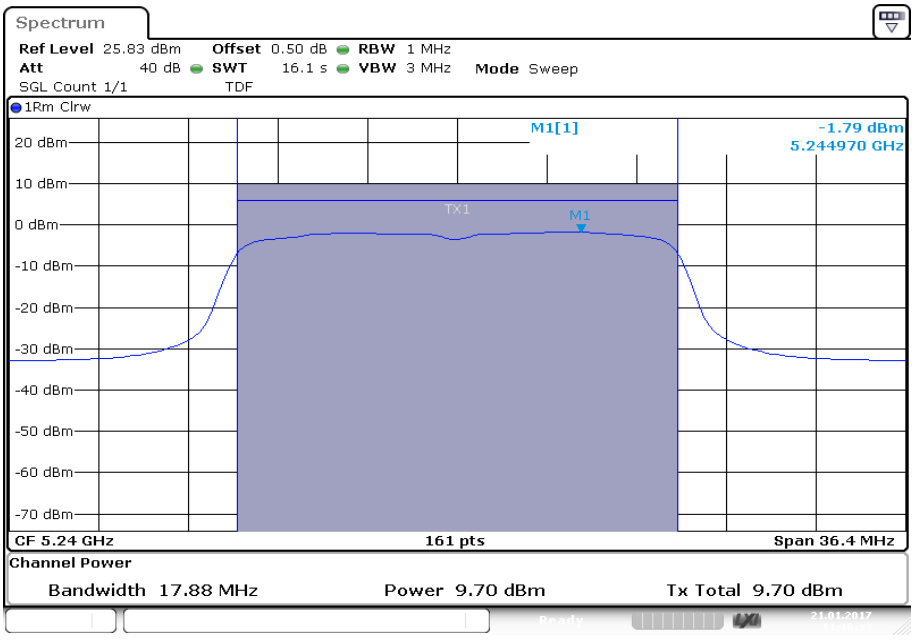
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5180 MHz



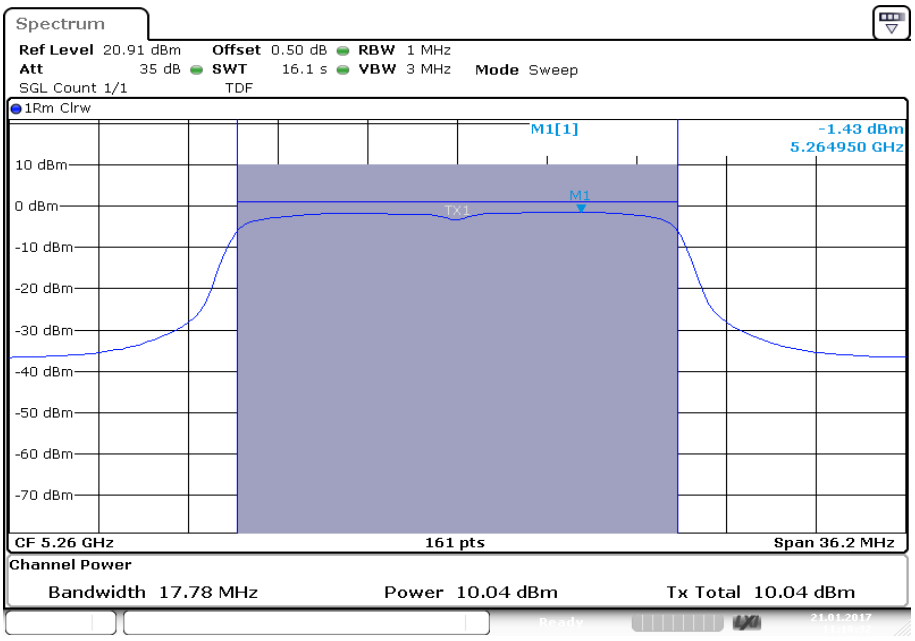
Date: 21.JAN.2017 11:13:11

Plot 2: 5240 MHz



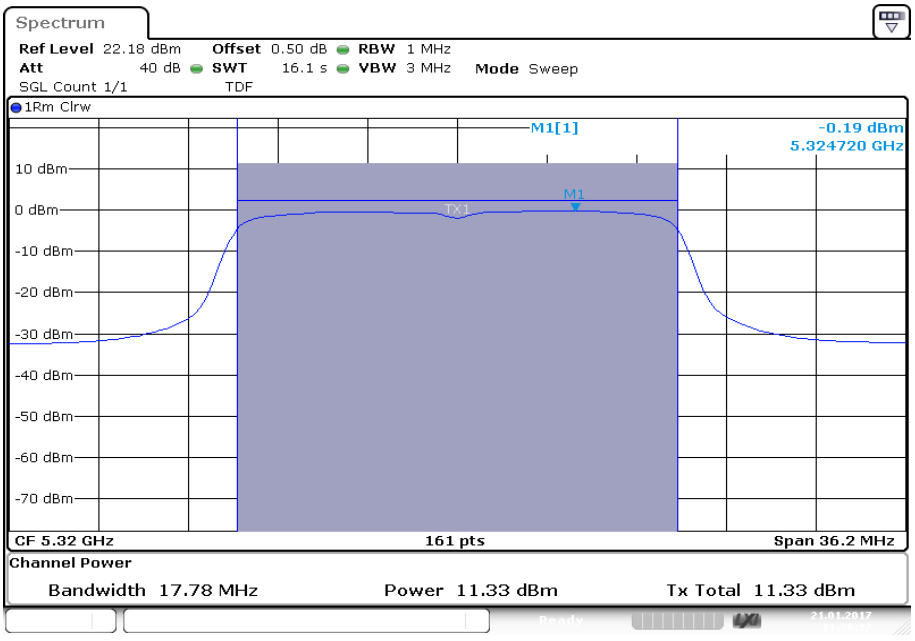
Date: 21.JAN.2017 11:16:33

Plot 3: 5260 MHz



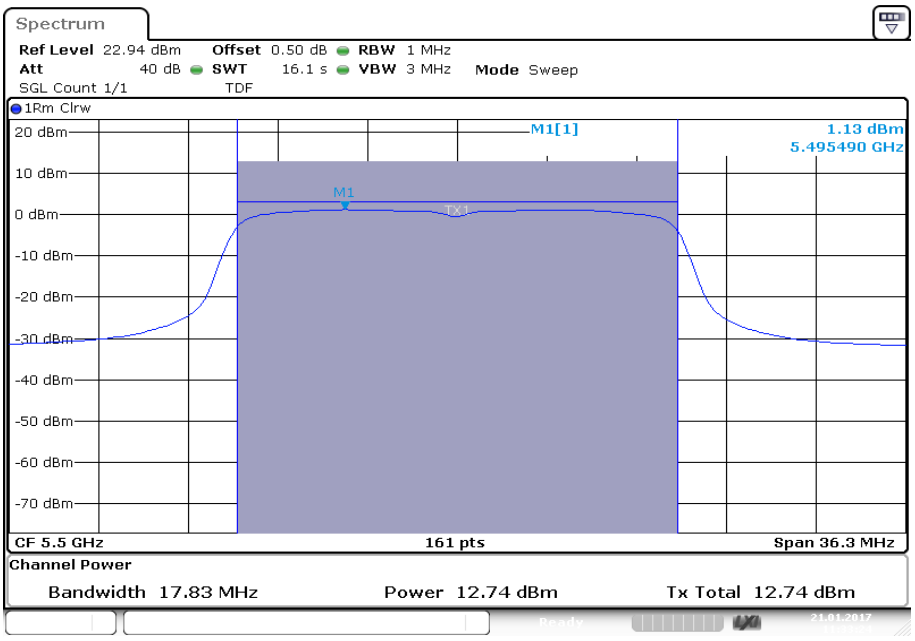
Date: 21.JAN.2017 11:18:32

Plot 4: 5320 MHz

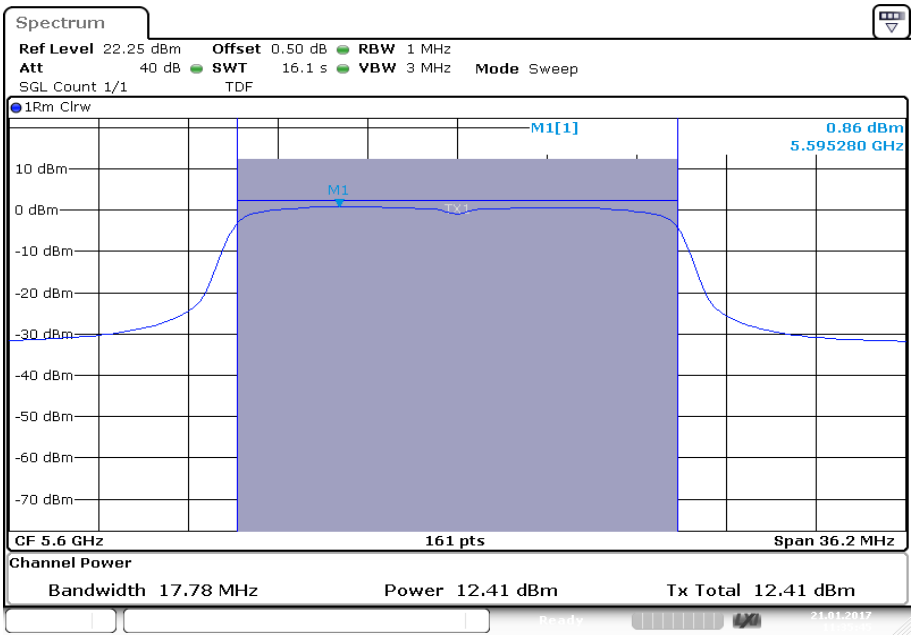


Date: 21.JAN.2017 11:28:17

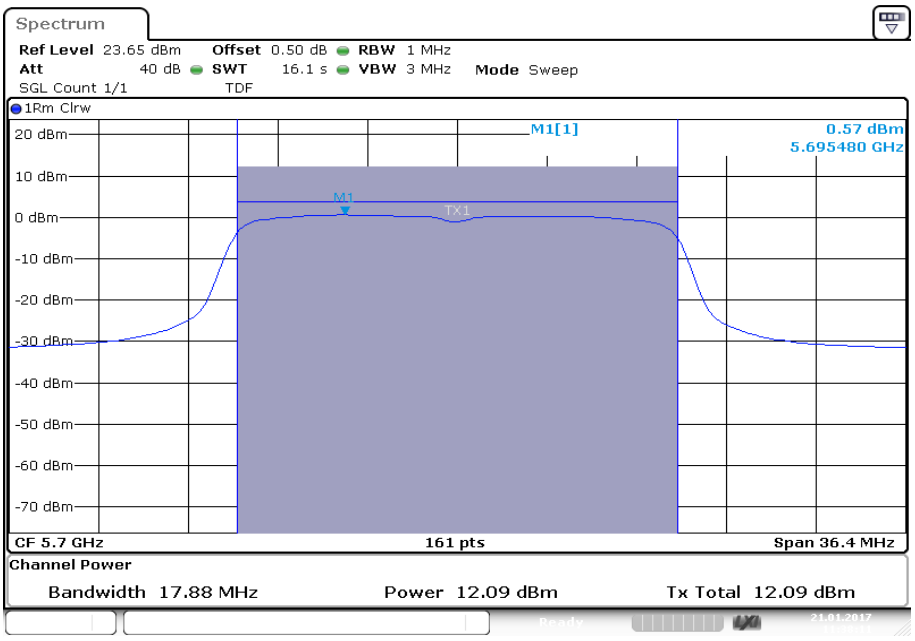
Plot 5: 5500 MHz



Plot 6: 5600 MHz

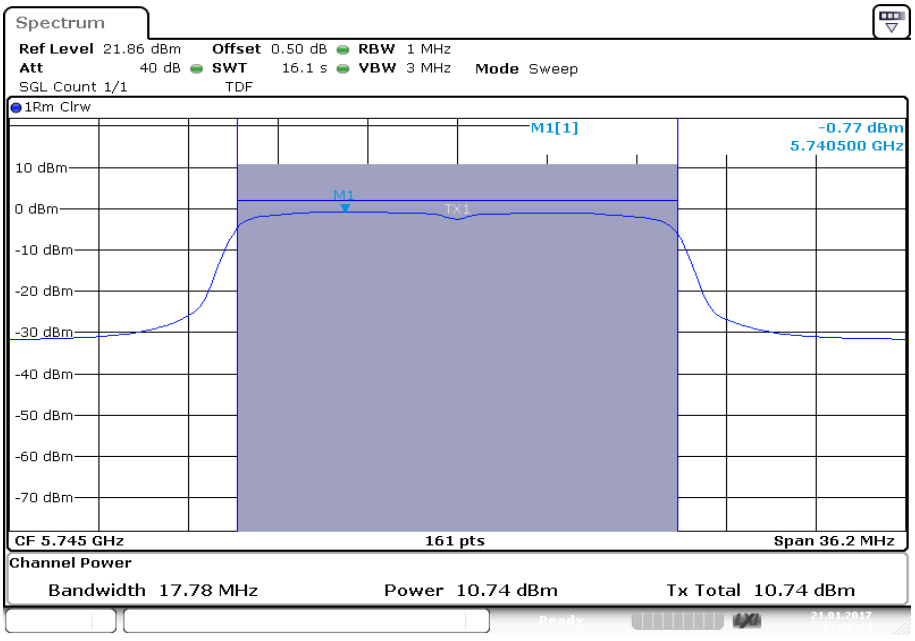


Plot 7: 5700 MHz



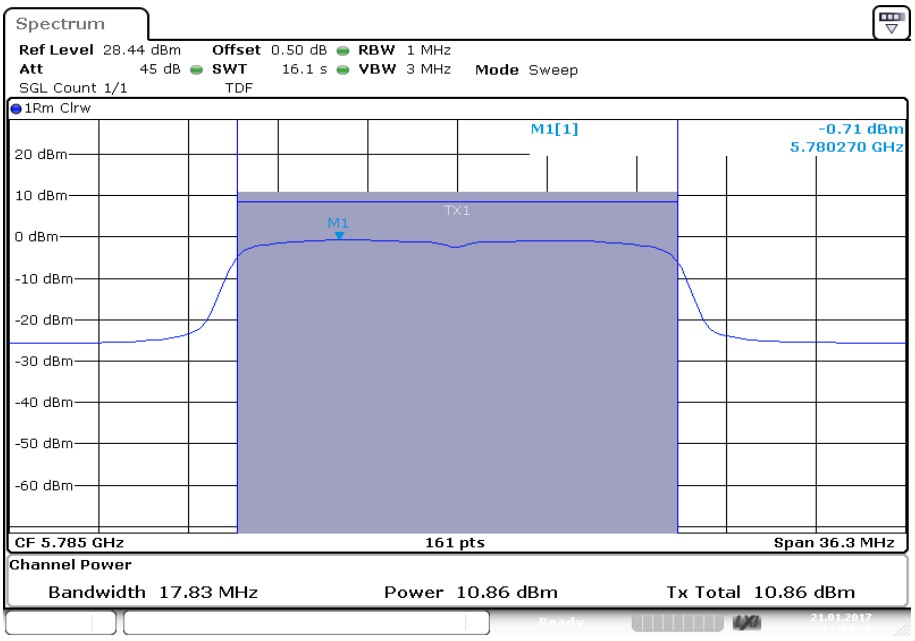
Date: 21.JAN.2017 11:38:11

Plot 8: 5745 MHz



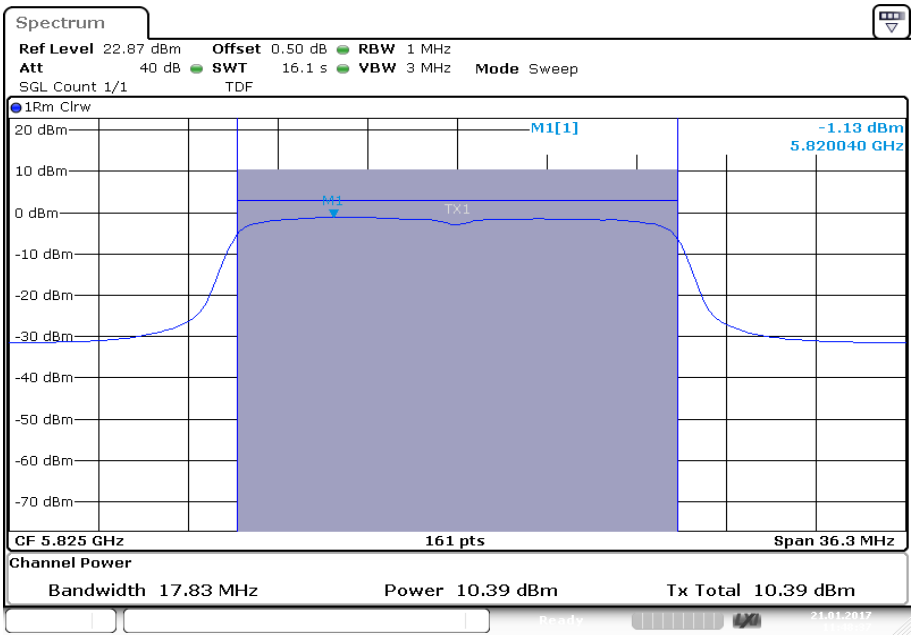
Date: 21.JAN.2017 11:40:14

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:44:28

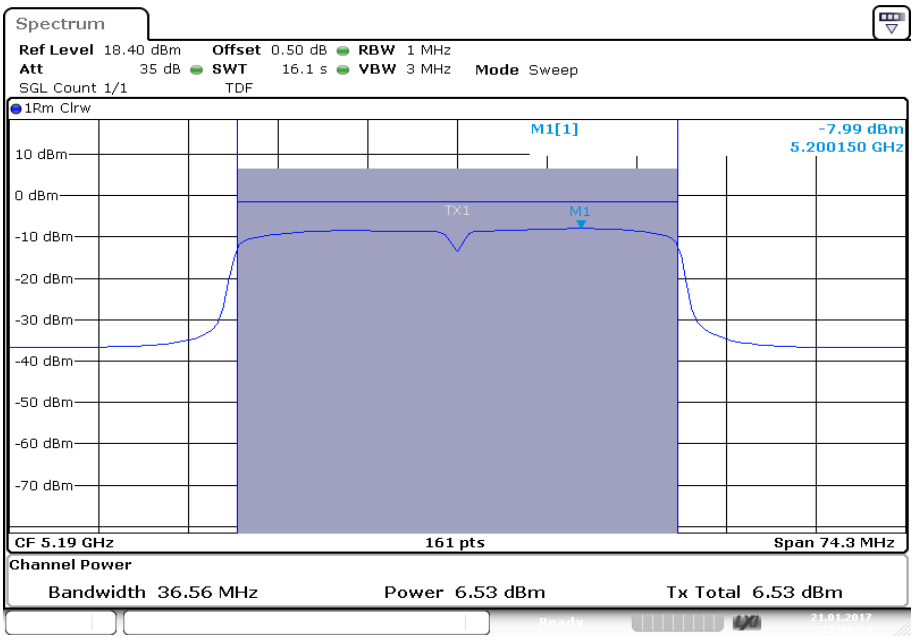
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:48:37

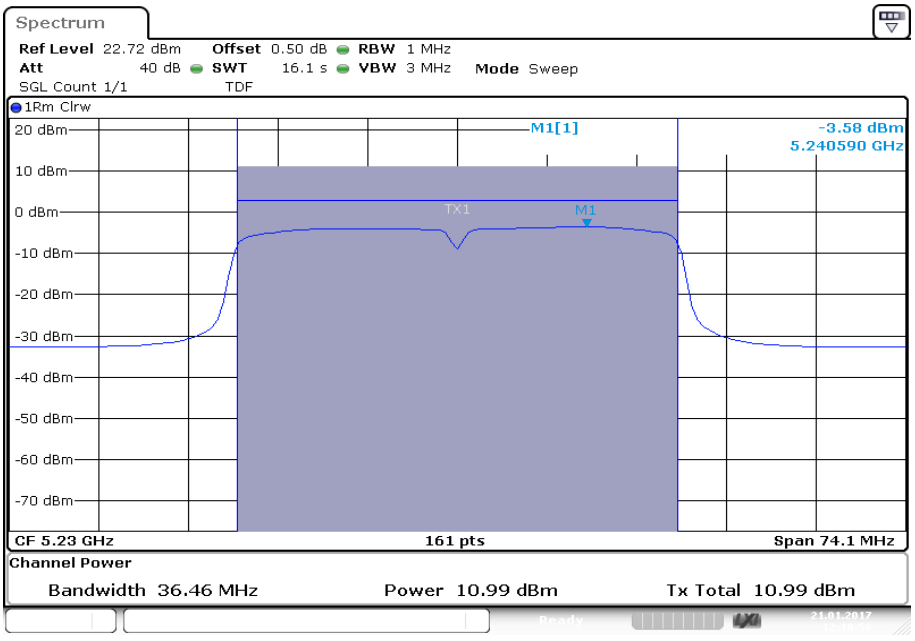
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5190 MHz



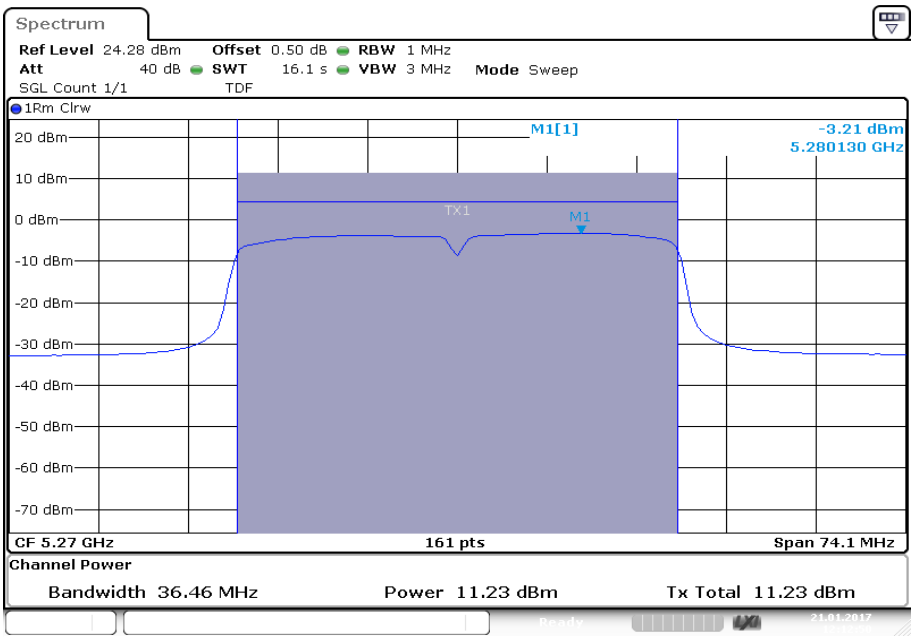
Date: 21.JAN.2017 12:08:54

Plot 2: 5230 MHz



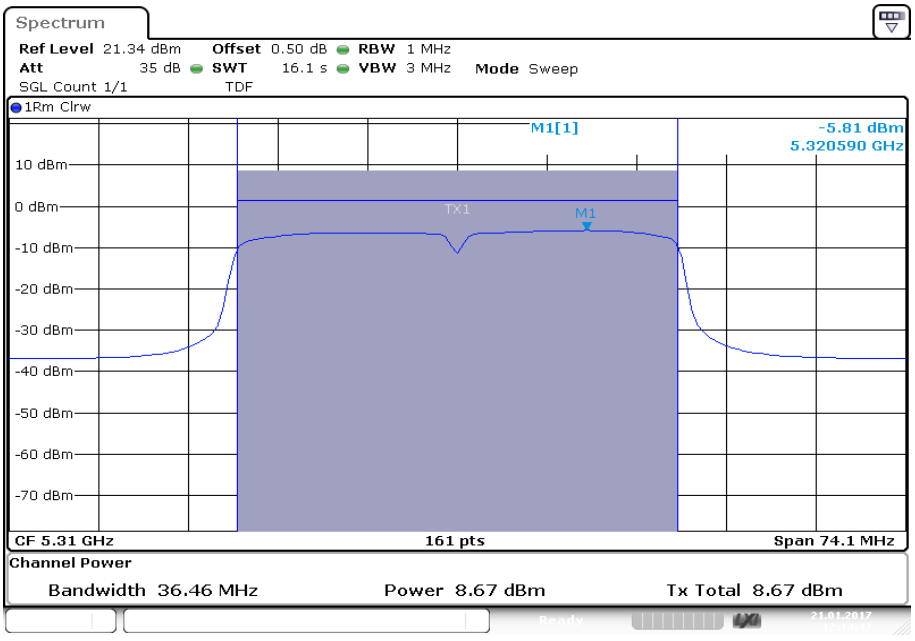
Date: 21.JAN.2017 12:10:56

Plot 3: 5270 MHz



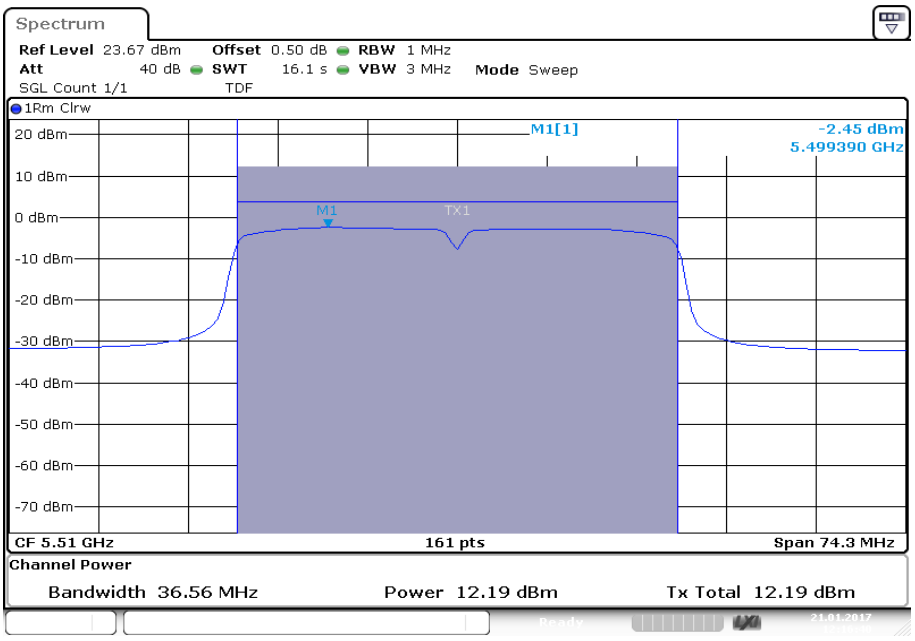
Date: 21.JAN.2017 12:12:50

Plot 4: 5310 MHz



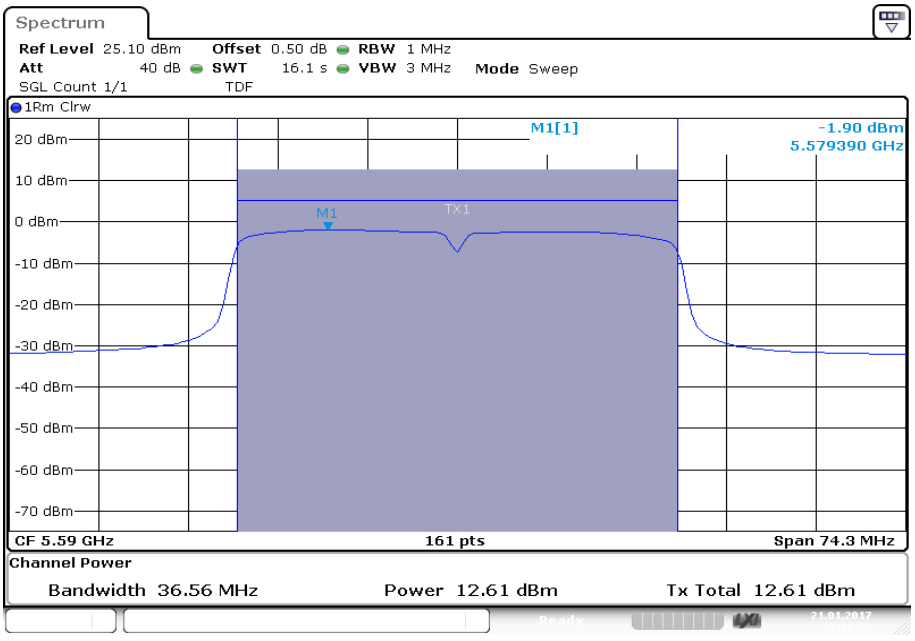
Date: 21.JAN.2017 12:14:47

Plot 5: 5510 MHz



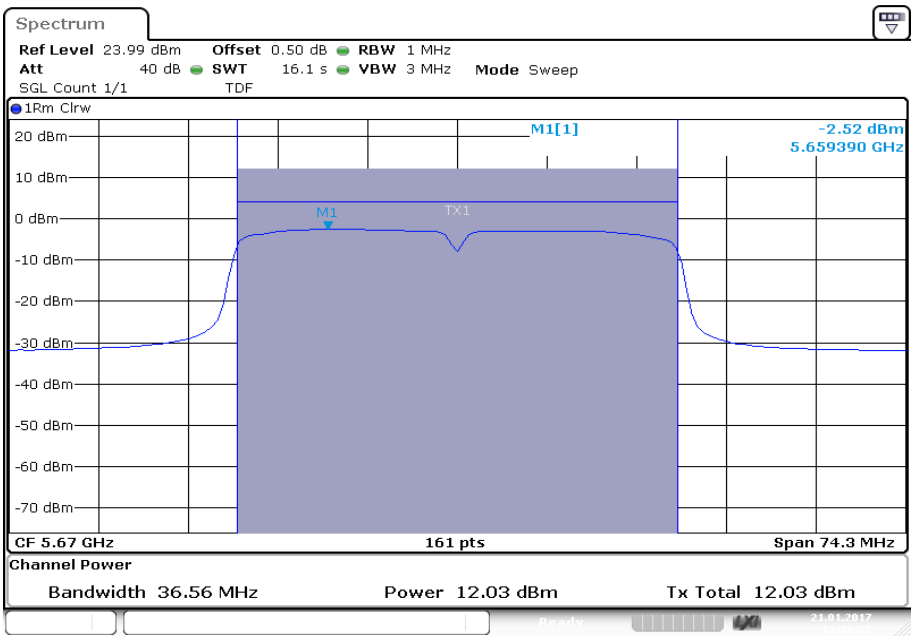
Date: 21.JAN.2017 12:16:40

Plot 6: 5590 MHz



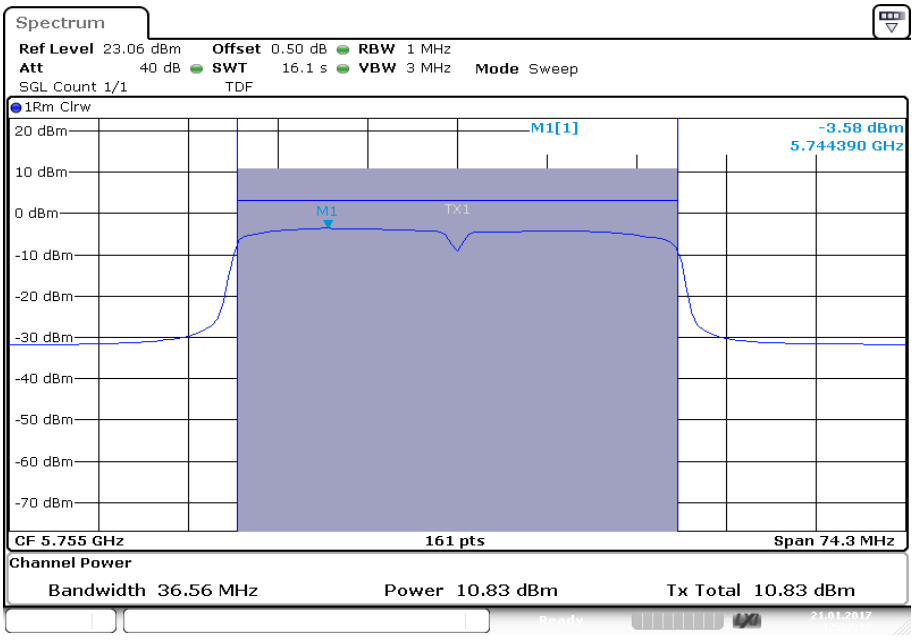
Date: 21.JAN.2017 12:18:33

Plot 7: 5670 MHz



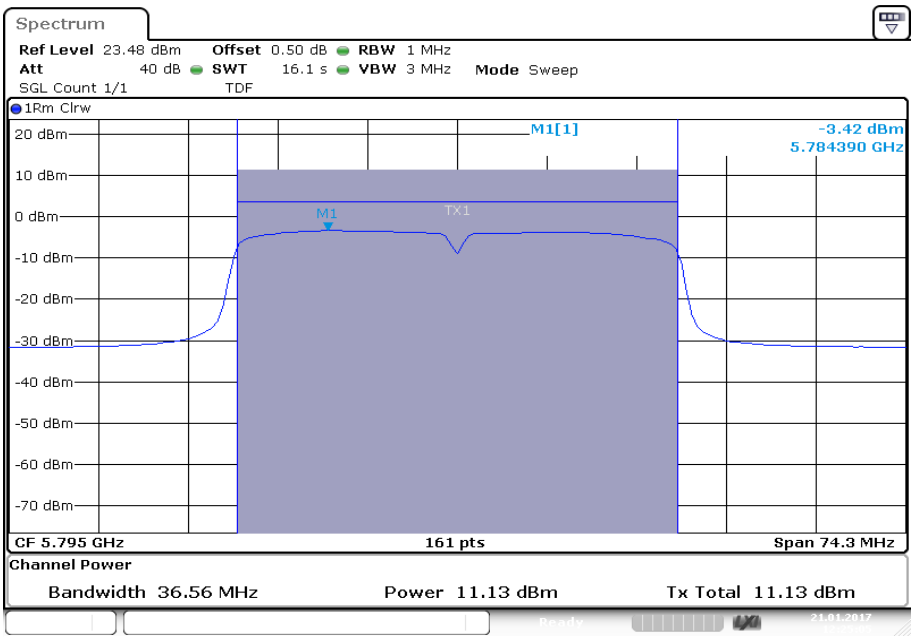
Date: 21.JAN.2017 12:20:25

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:22:16

Plot 9: 5795 MHz



Date: 21.JAN.2017 12:25:05

11.5 Power spectral density

11.5.1 Power spectral density – for FCC requirements

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 6.5 A
Measurement uncertainty:	See chapter 8

Limits:

Power Spectral Density
power spectral density conducted ≤ 11 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)
power spectral density conducted ≤ 30 dBm in any 500 kHz band (band 5725 – 5850 MHz)

Result: OFDM / a – mode

OFDM / a – mode	Power spectral density [dBm/MHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	-0.95	-0.57	-0.16	0.30
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	1.21	1.02	0.84	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	-2.97	-3.34	-3.31	-/-

Result: OFDM / n/ac HT20 – mode

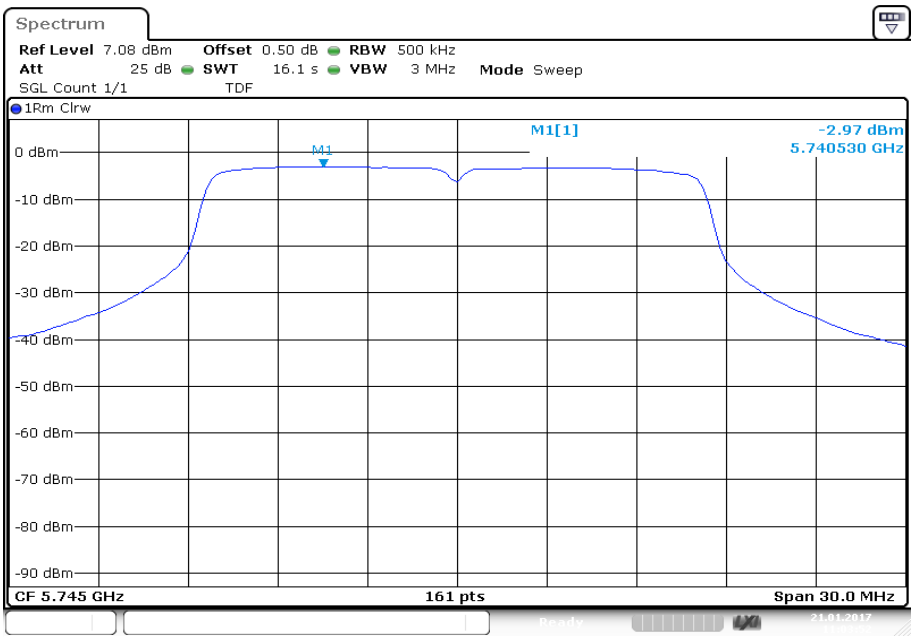
OFDM / n/ac HT20 – mode	Power spectral density [dBm/MHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	-1.65	-2.07	-1.41	-0.13
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	1.17	0.91	0.64	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	-3.29	-3.67	-4.04	-/-

Result: OFDM / n/ac HT40 – mode

OFDM / n/ac HT40 – mode	**Power spectral density [dBm/MHz]**			
Channel	5190 MHz	5230 MHz	5270 MHz	5310 MHz
	-8.62	-3.49	-3.13	-6.27
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
	-2.35	-1.82	-2.45	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
	-6.66	-6.54	-/-	-/-

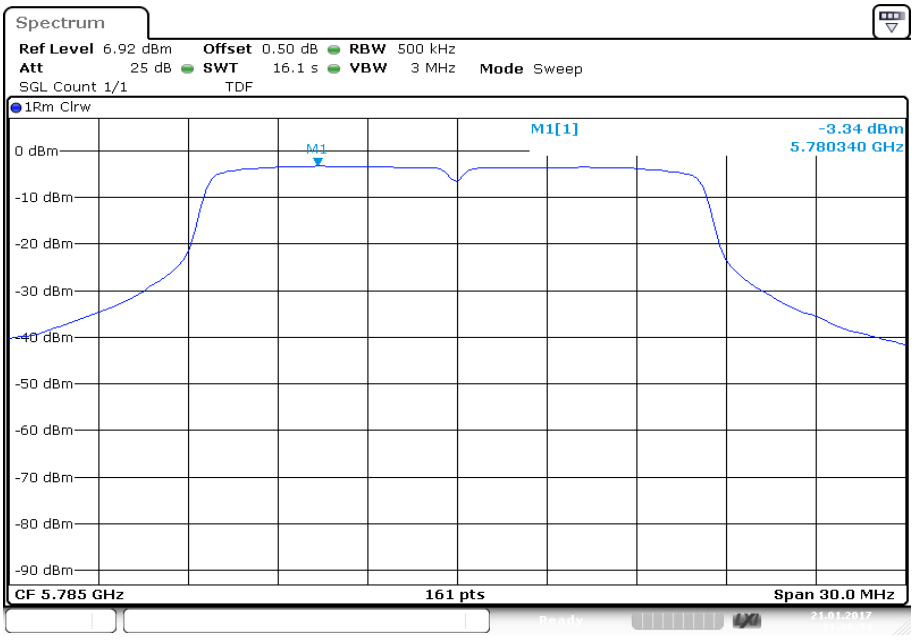
Plots: OFDM / a – mode

Plot 1: 5745 MHz



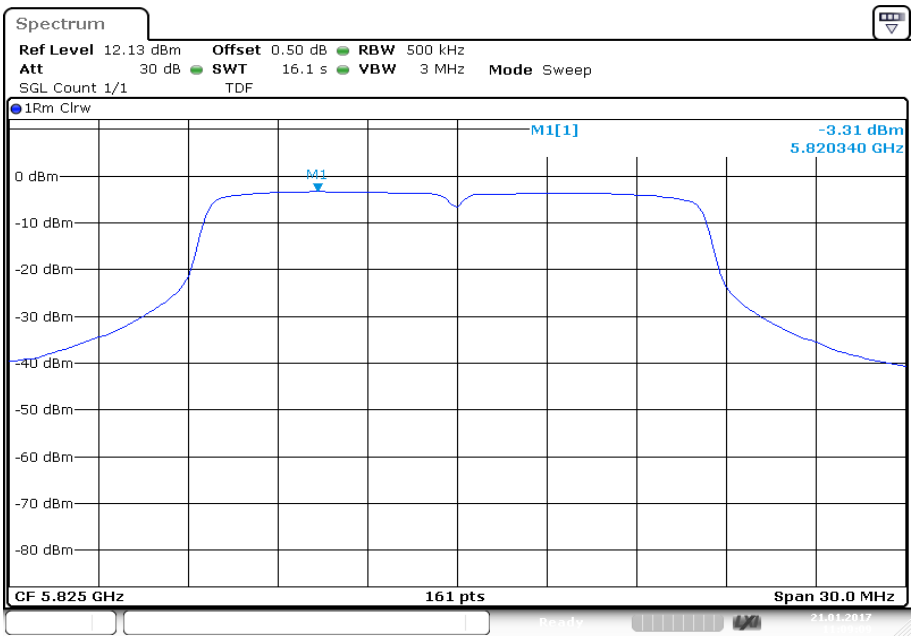
Date: 21.JAN.2017 11:03:52

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:06:34

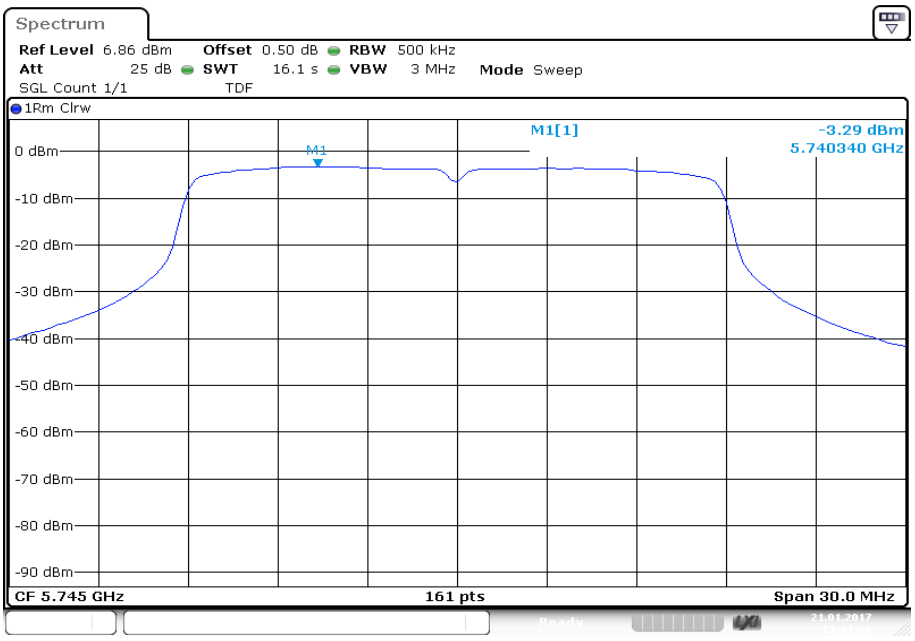
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:09:09

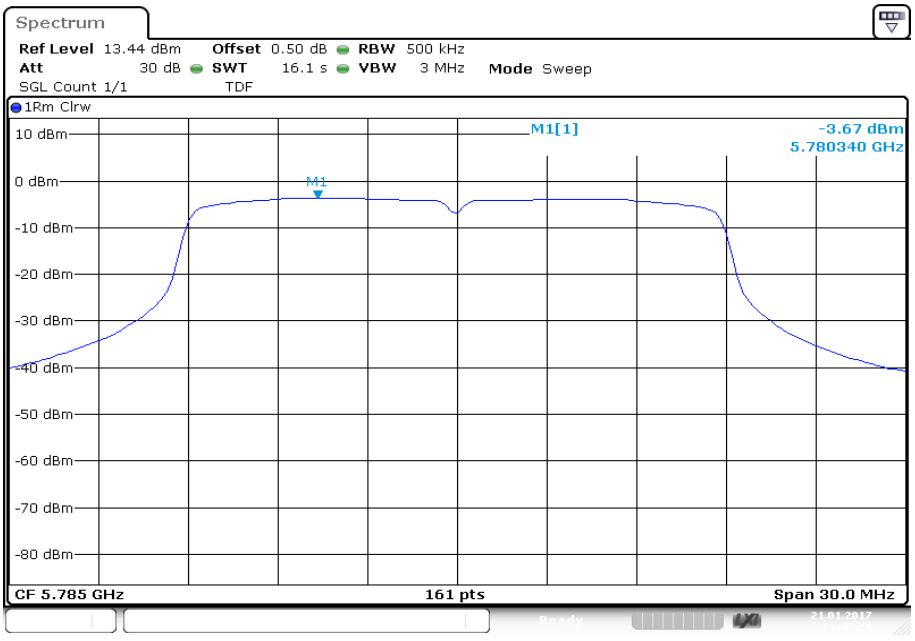
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5745 MHz



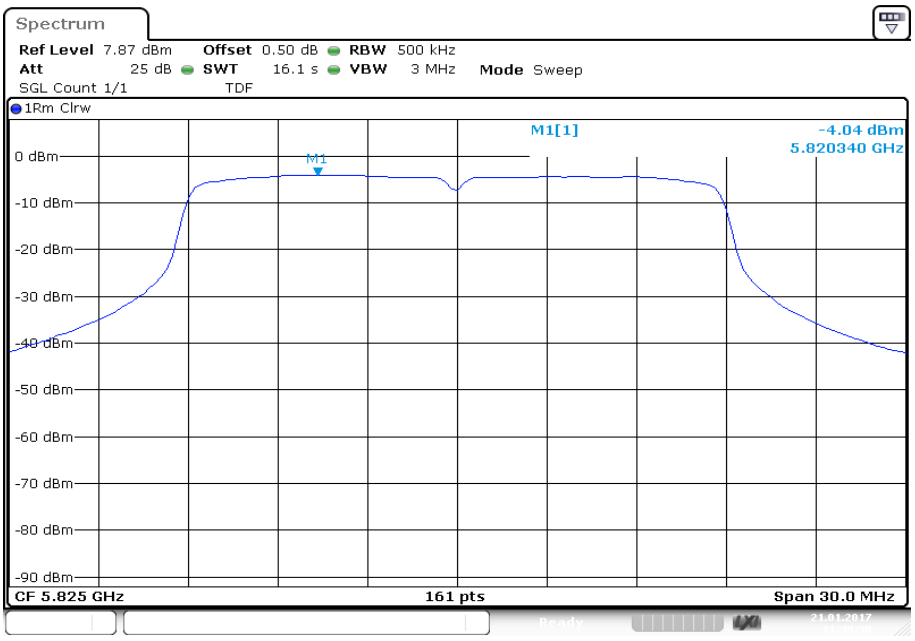
Date: 21.JAN.2017 11:41:08

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:45:21

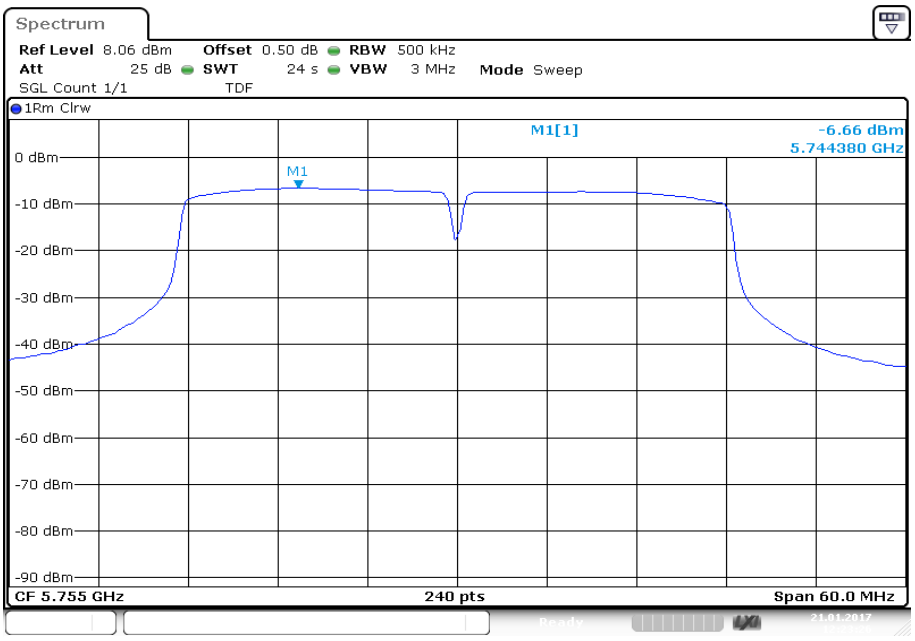
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:49:30

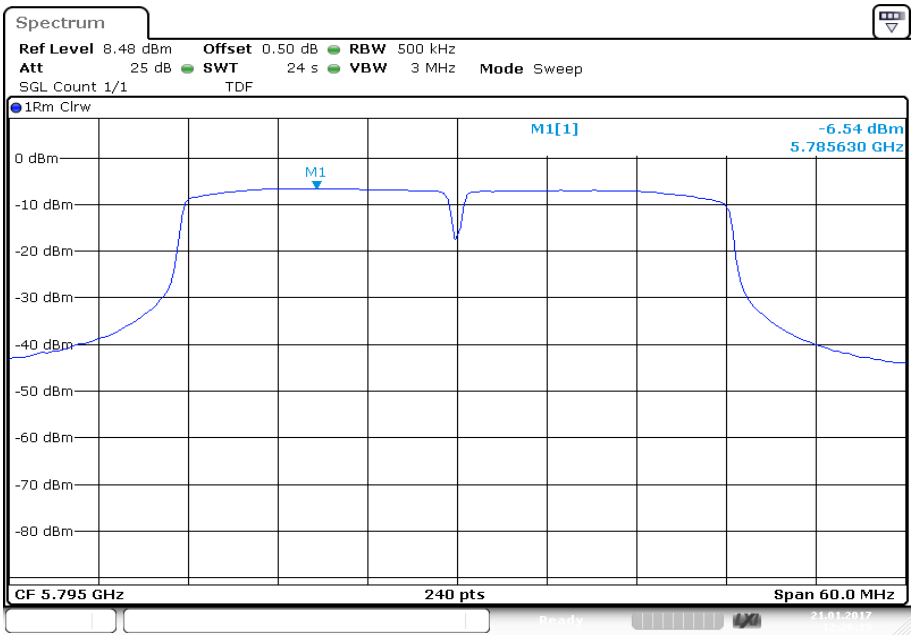
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5755 MHz



Date: 21.JAN.2017 12:23:26

Plot 2: 5795 MHz



Date: 21.JAN.2017 12:26:15

11.5.2 Power spectral density – for IC requirements

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:	≥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 6.4 A
Measurement uncertainty:	See chapter 8

Limits:

Power Spectral Density
power spectral density e.i.r.p. ≤ 10 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) power spectral density conducted ≤ 30 dBm in any 500 kHz band (band 5725 – 5850 MHz)

Result: OFDM / a – mode

OFDM / a – mode	Power spectral density [dBm/MHz]			
Channel	5180 MHz*	5240 MHz*	5260 MHz	5320 MHz
	0.93	1.25	-0.22	0.26
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	1.16	0.89	0.78	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	-2.94	-3.31	-3.27	-/-

*find EIRP values for each antenna on the next page

Result: OFDM / n/ac HT20 – mode

OFDM / n/ac HT20 – mode	Power spectral density [dBm/MHz]			
Channel	5180 MHz*	5240 MHz*	5260 MHz	5320 MHz
	0.23	0.11	-1.43	-0.19
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	1.13	0.86	0.57	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	-3.25	-3.66	-3.96	-/-

*find EIRP values for each antenna on the next page

Result: OFDM / n/ac HT40 – mode

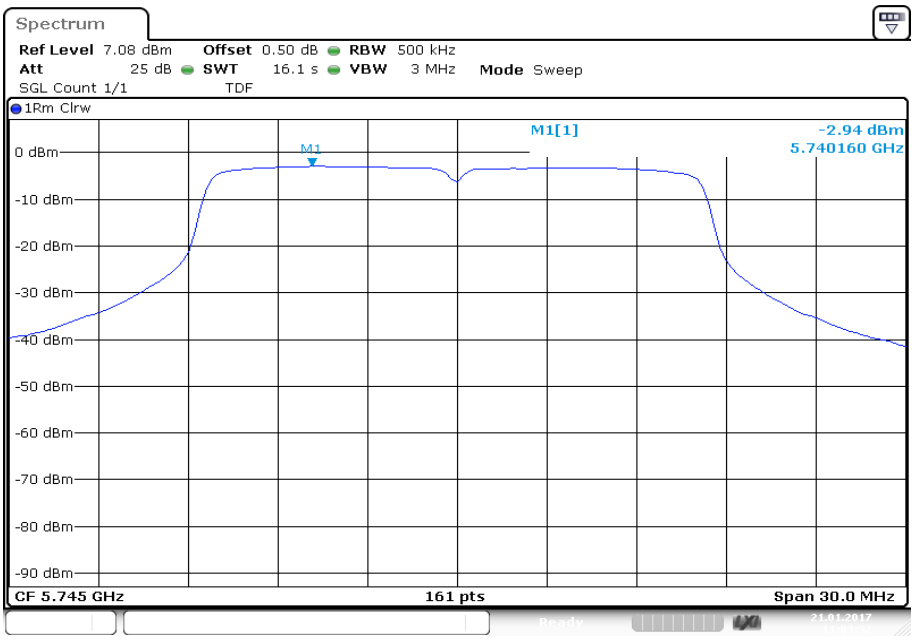
OFDM / n/ac HT40 – mode	Power spectral density [dBm/MHz]			
Channel	5190 MHz	5230 MHz	5270 MHz	5310 MHz
	-6.09	-1.68	-3.21	-5.81
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
	-2.45	-1.90	-2.52	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
	-6.64	-6.49	-/-	-/-

*find EIRP values for each antenna in the next table

	Power spectral density EIRP [dBm/MHz]					
	a-mode 5180 MHz	a-mode 5240 MHz	n HT20 5180 MHz	n HT20 5240 MHz	n HT40 5190 MHz	n HT40 5230 MHz
IV2 TRNS Antenna WLAN IIT 1.4	2.8	3.2	2.1	2.0	-4.2	0.2
Ant M3002-66494	2.1	2.5	1.4	1.3	-4.9	-0.5
Ant 453564154611	-2.4	-2.1	-3.1	-3.2	-9.4	-5.0
Ant 453564175981	4.5	4.9	3.8	3.7	-2.5	1.9
Ant 453564271931	0.7	1.1	0.0	-0.1	-6.3	-1.9

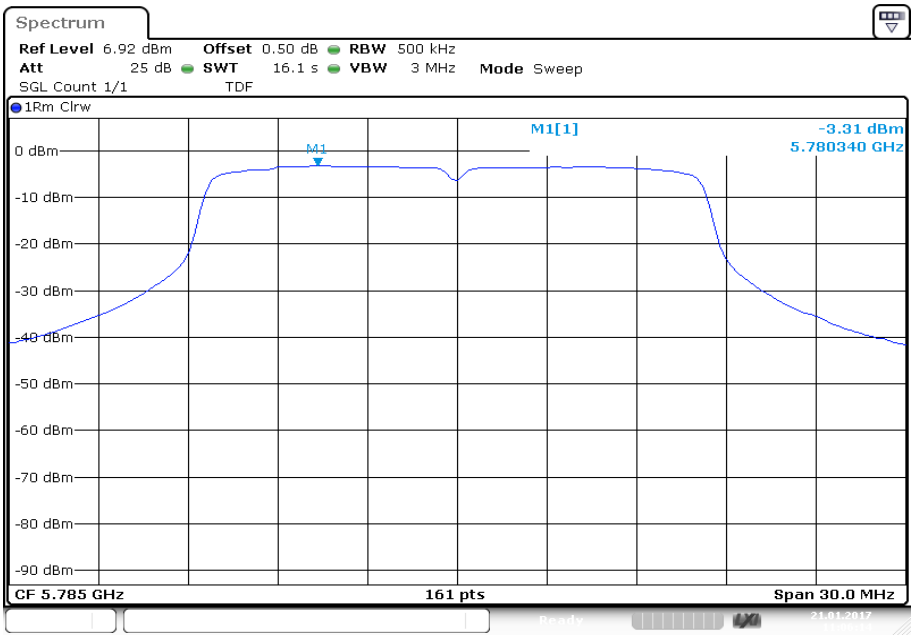
Plots: OFDM / a – mode

Plot 1: 5745 MHz



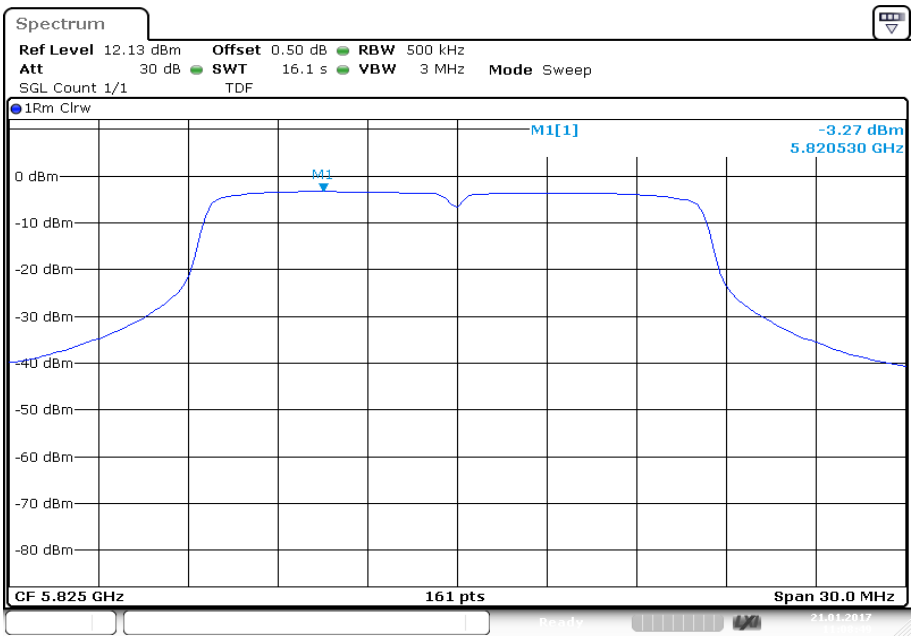
Date: 21.JAN.2017 11:03:32

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:06:14

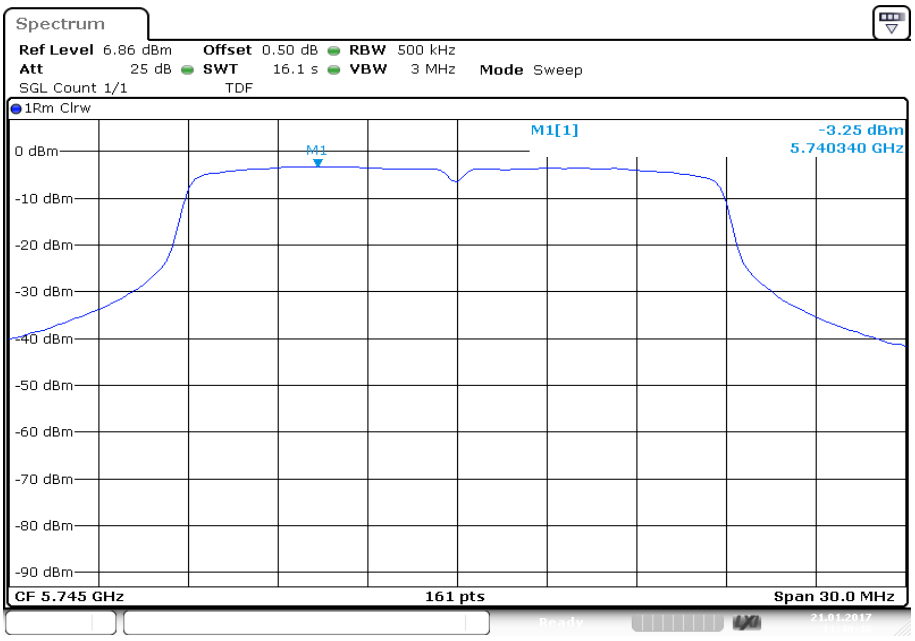
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:08:49

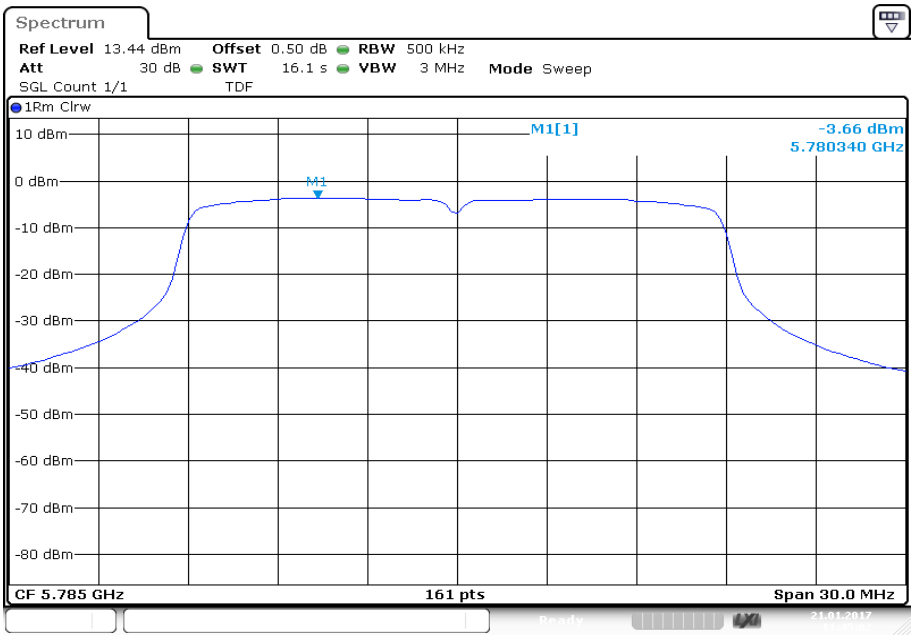
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5745 MHz



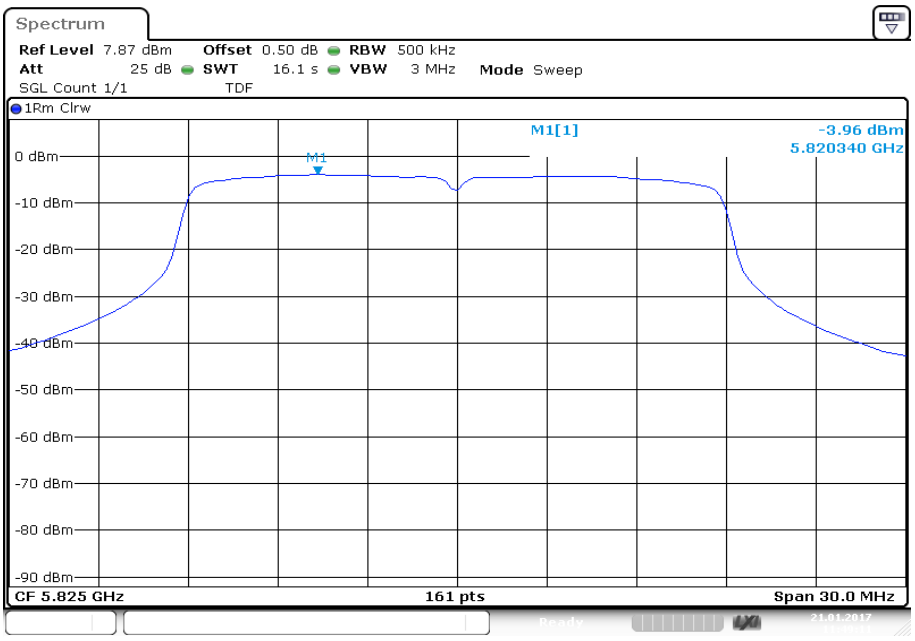
Date: 21.JAN.2017 11:40:48

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:45:01

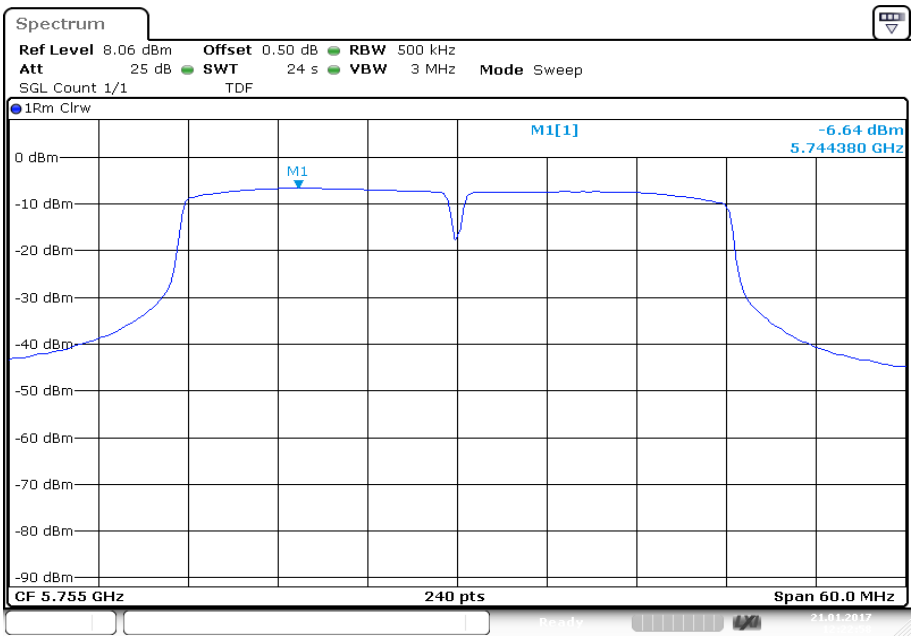
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:49:11

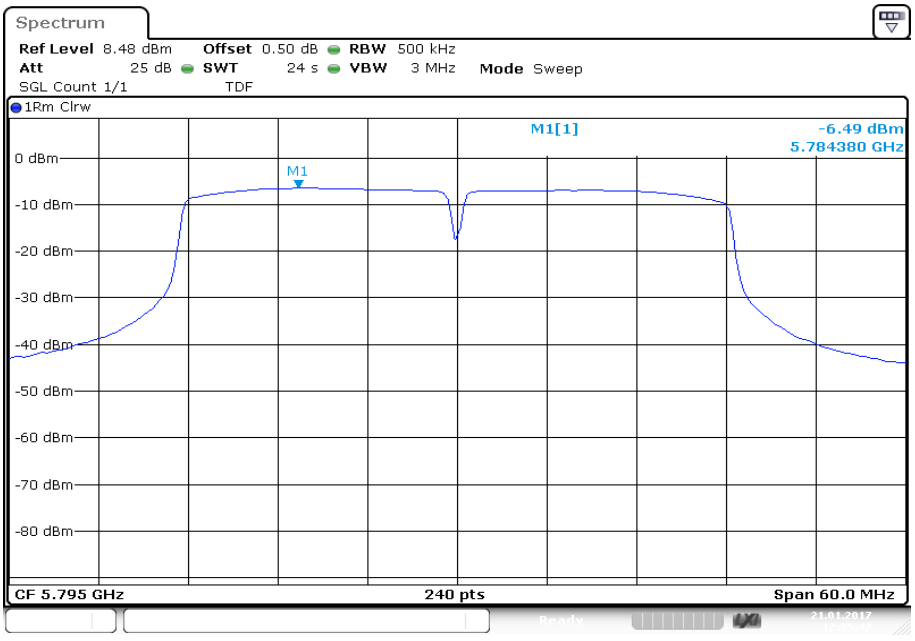
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5755 MHz



Date: 21.JAN.2017 12:22:58

Plot 2: 5795 MHz



Date: 21.JAN.2017 12:25:47

11.6 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 6.5 A
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:

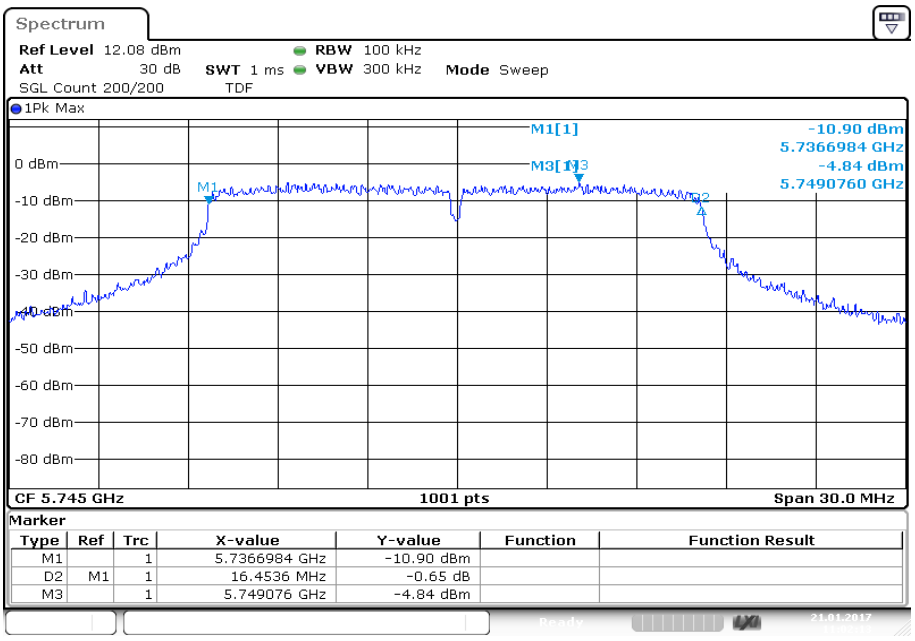
OFDM / a – mode	6 dB bandwidth [MHz]		
Channel	5745 MHz	5785 MHz	5825 MHz
	16.45	16.48	16.48

OFDM / n/ac HT20 – mode	6 dB bandwidth [MHz]		
Channel	5745 MHz	5785 MHz	5825 MHz
	17.65	17.65	17.62

OFDM / n/ac HT40 – mode	6 dB bandwidth [MHz]	
Channel	5755 MHz	5795 MHz
	36.50	36.44

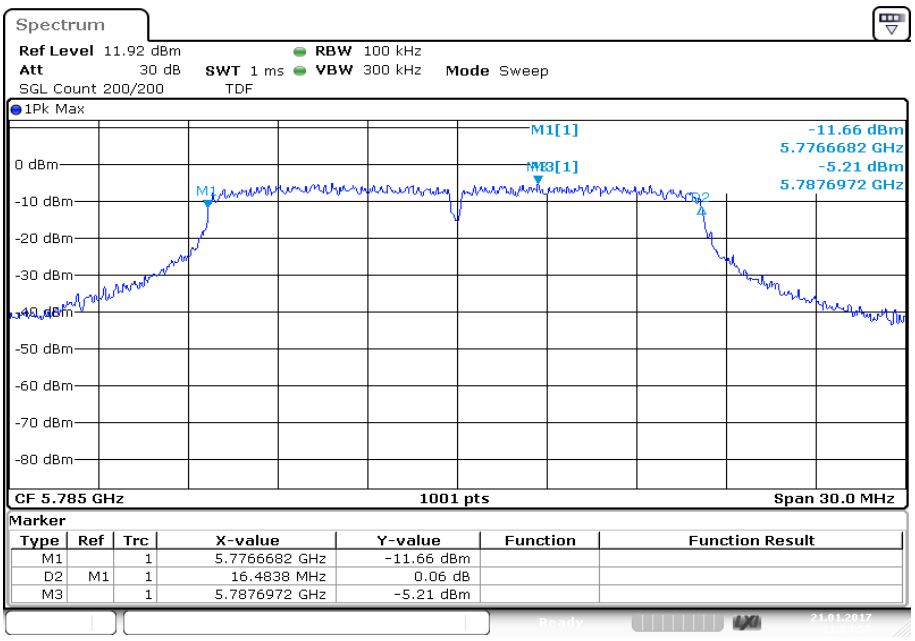
Plots: OFDM / a – mode

Plot 1: 5745 MHz



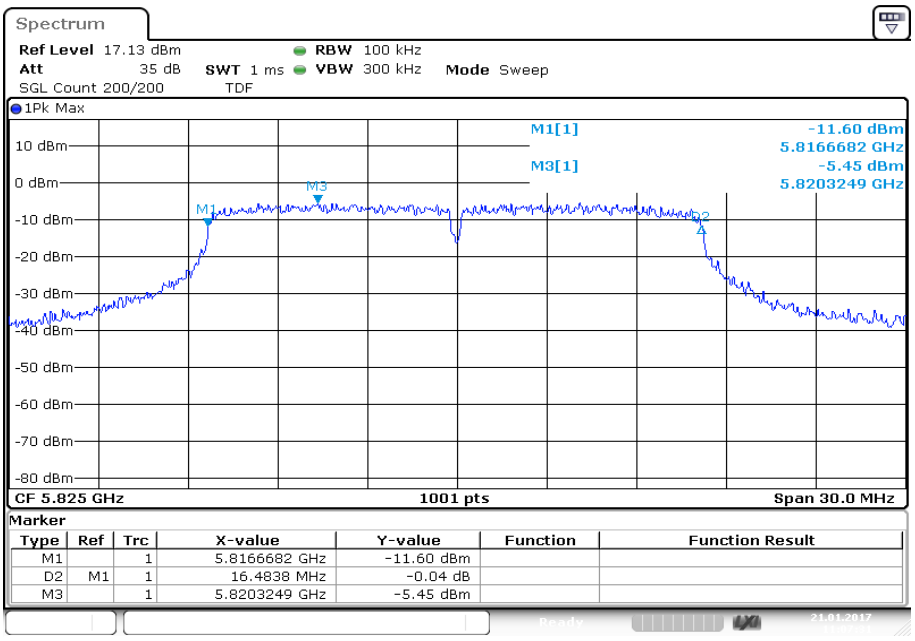
Date: 21.JAN.2017 11:02:13

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:04:55

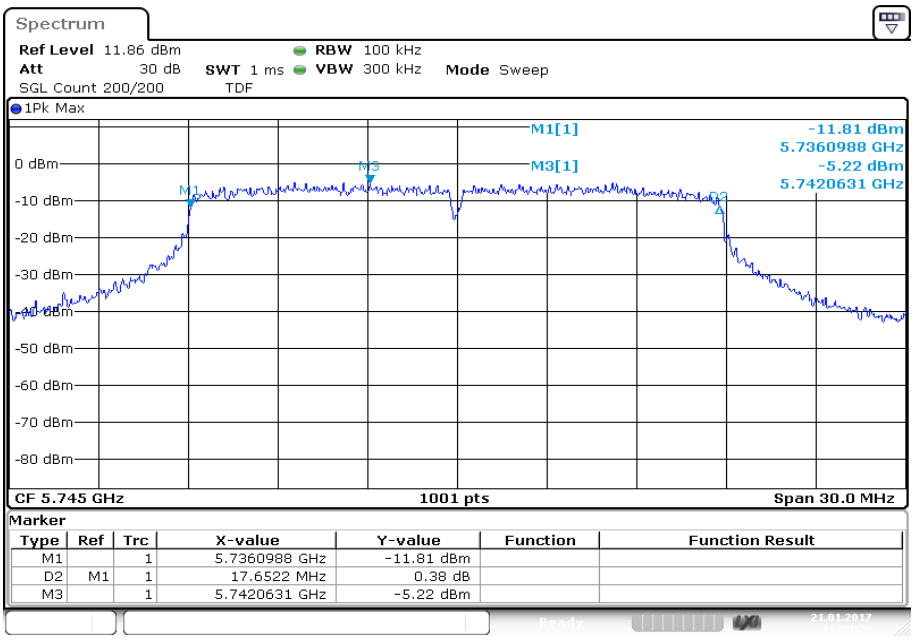
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:07:30

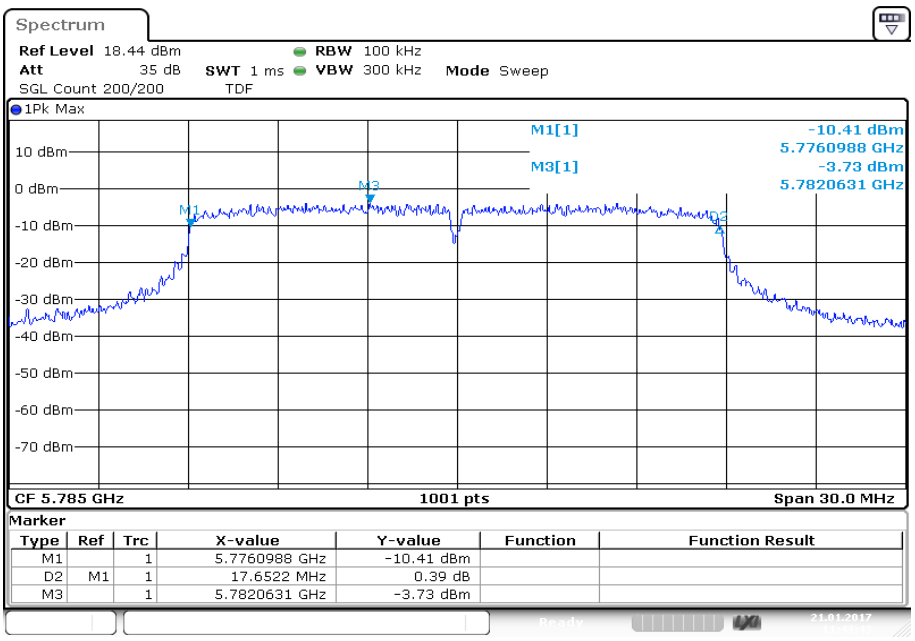
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5745 MHz



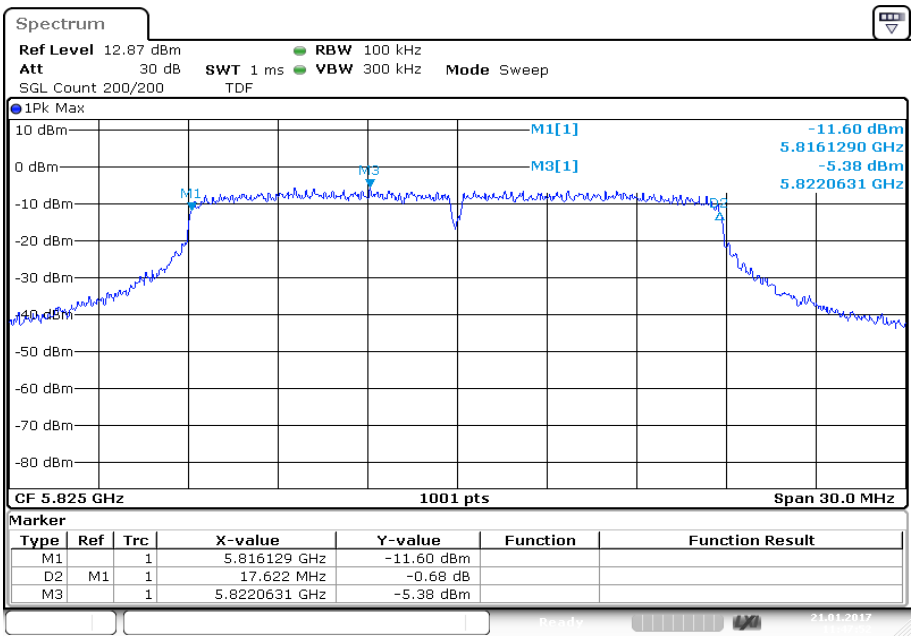
Date: 21.JAN.2017 11:39:29

Plot 2: 5785 MHz



Date: 21.JAN.2017 11:43:43

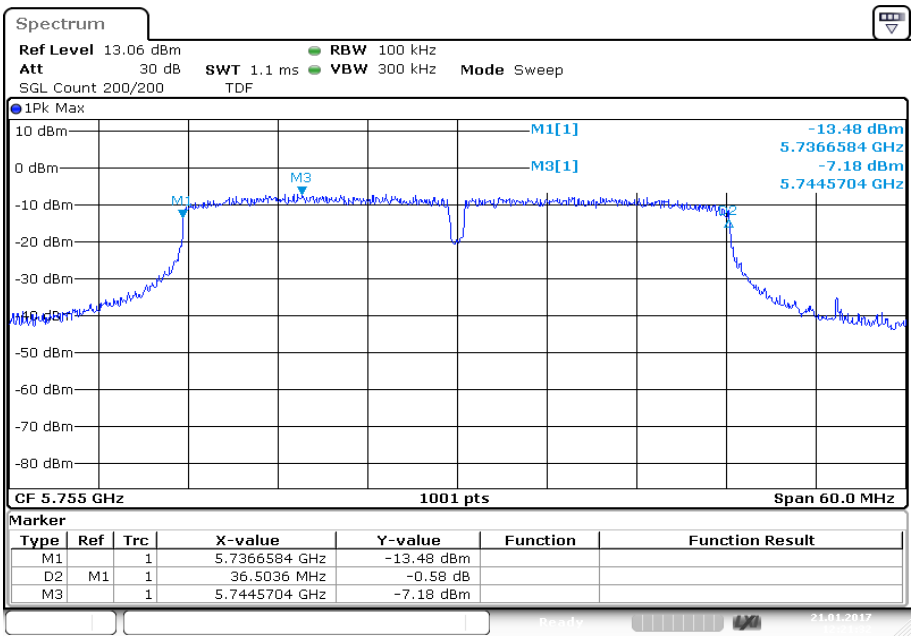
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:47:52

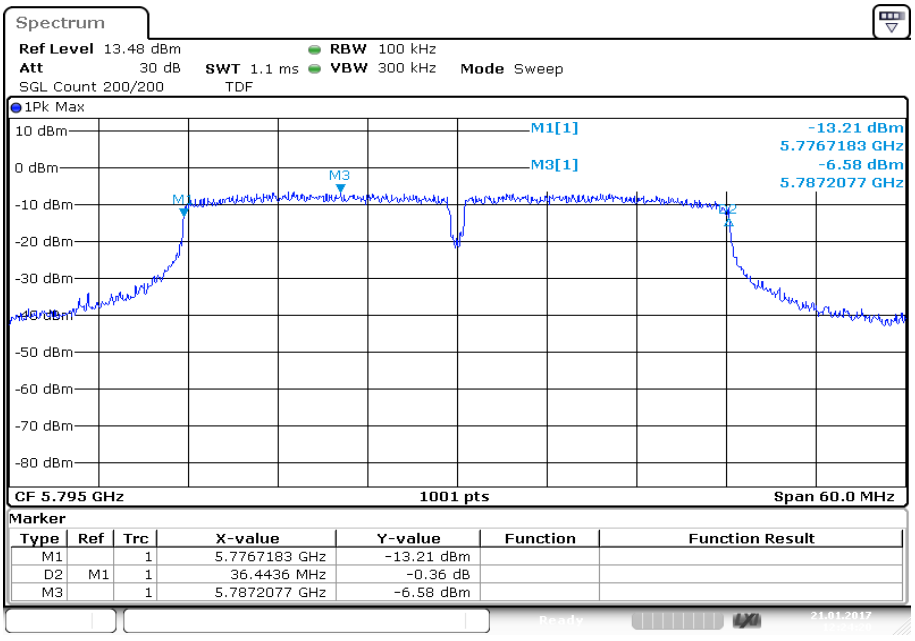
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5755 MHz



Date: 21.JAN.2017 12:21:32

Plot 2: 5795 MHz



Date: 21.JAN.2017 12:24:20

11.7 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:	≥ RBW
Span:	> complete signal!
Trace-Mode:	Max hold
Used test setup:	See chapter 6.5 A
Measurement uncertainty:	See chapter 8

Limits:

Spectrum Bandwidth – 26 dB Bandwidth
-/-

Result:

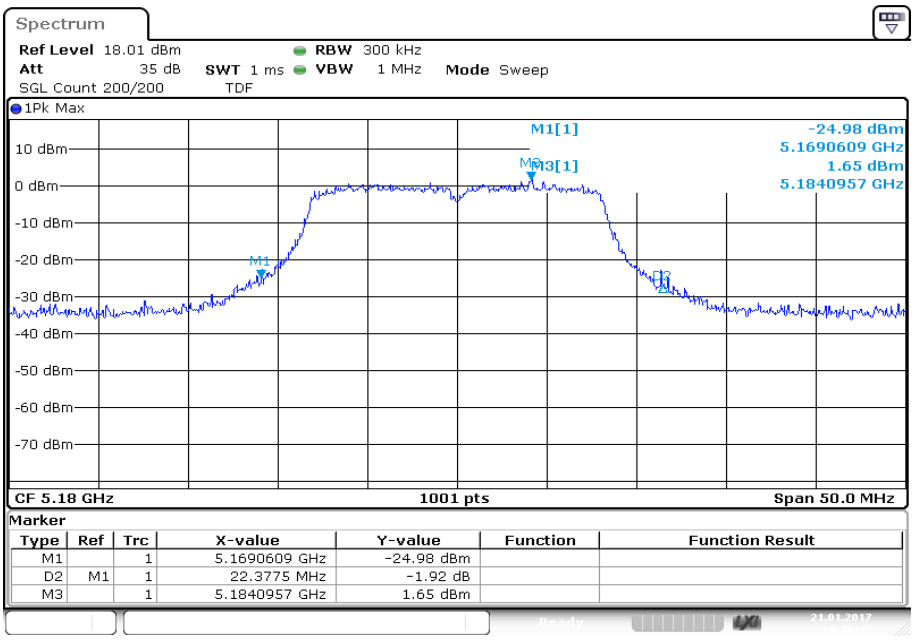
OFDM / a – mode	26 dB bandwidth [MHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	22.38	22.78	22.28	22.68
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	21.93	22.18	22.58	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	21.93	22.53	22.98	-/-

OFDM / n/ac HT20 – mode	26 dB bandwidth [MHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	22.43	22.98	22.83	22.68
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	22.98	23.63	22.97	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	22.68	23.33	22.63	-/-

OFDM / n/ac HT40 – mode	26 dB bandwidth [MHz]			
Channel	5190 MHz	5230 MHz	5270 MHz	5310 MHz
	44.96	46.05	44.96	45.85
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
	47.65	47.55	46.95	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
	46.05	45.75	-/-	-/-

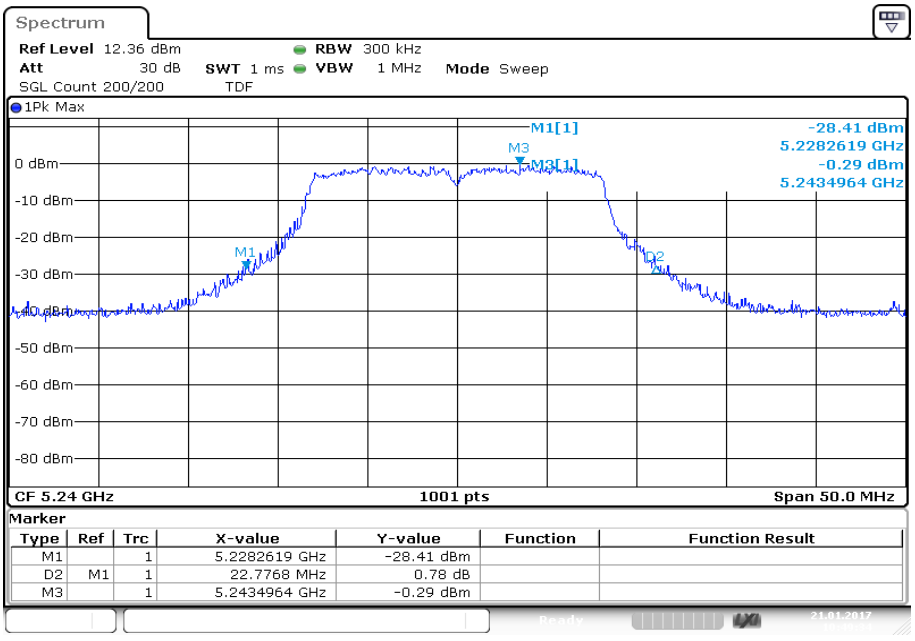
Plots: OFDM / a – mode

Plot 1: 5180 MHz



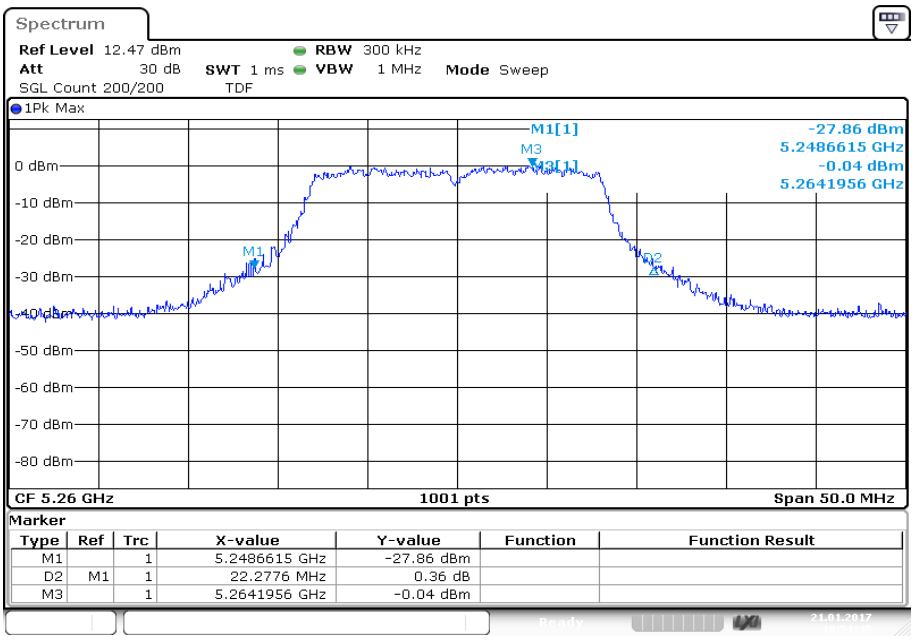
Date: 21.JAN.2017 10:46:42

Plot 2: 5240 MHz



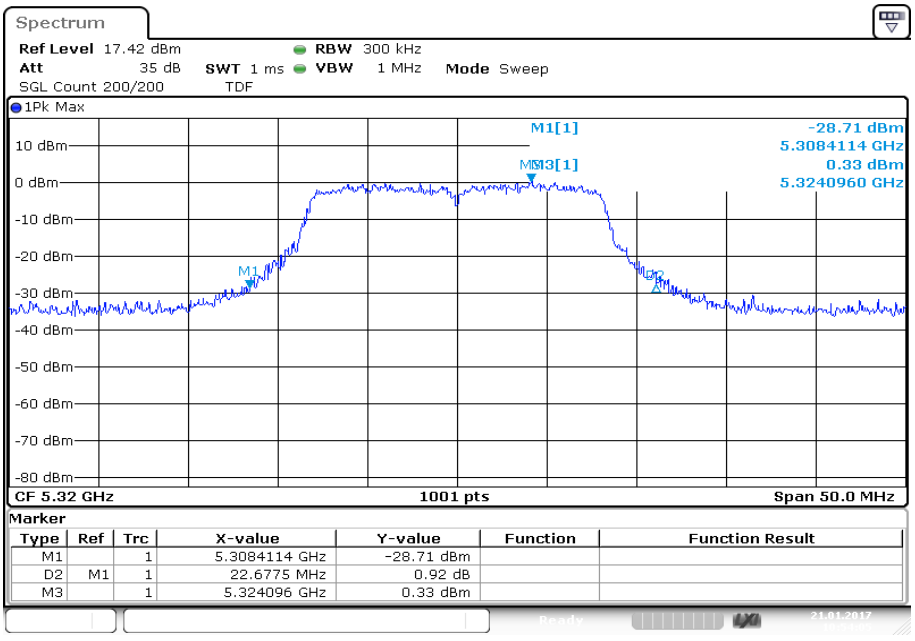
Date: 21.JAN.2017 10:49:34

Plot 3: 5260 MHz



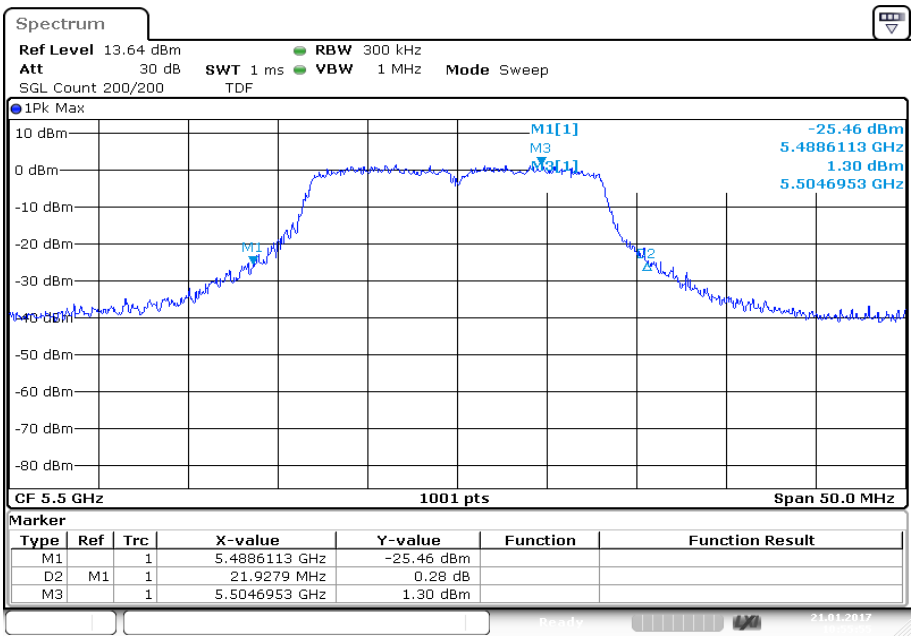
Date: 21.JAN.2017 10:51:45

Plot 4: 5320 MHz



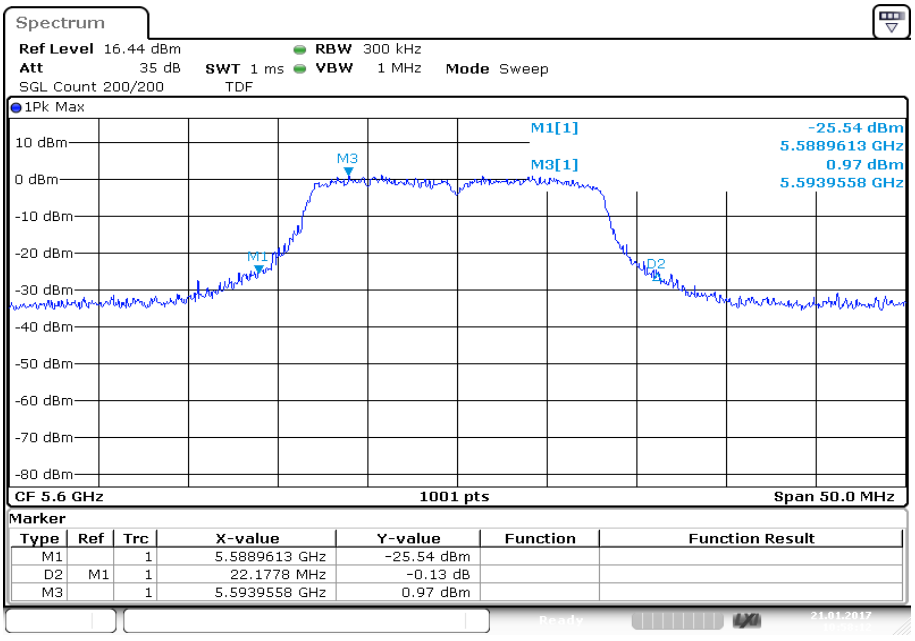
Date: 21.JAN.2017 10:54:05

Plot 5: 5500 MHz



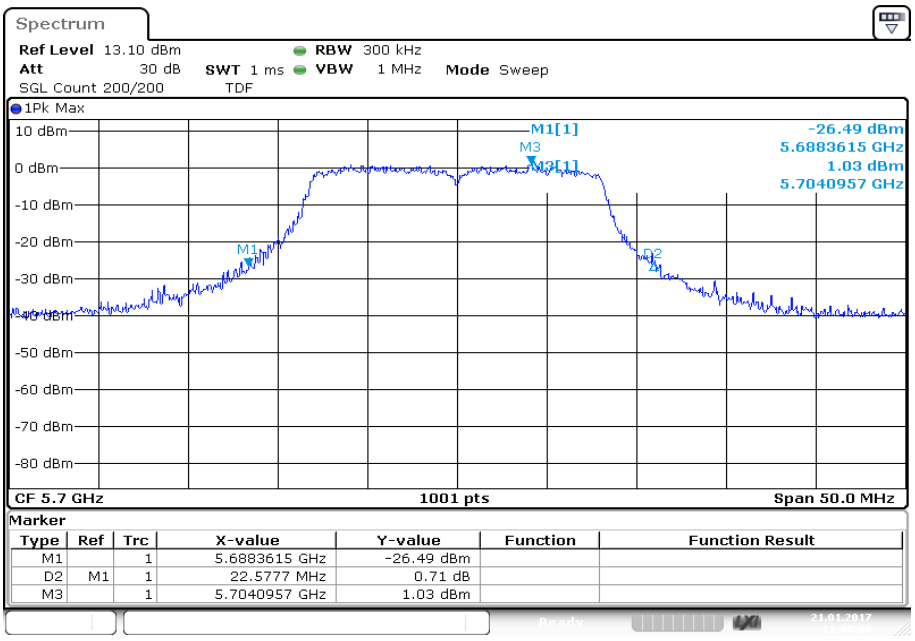
Date: 21.JAN.2017 10:55:55

Plot 6: 5600 MHz



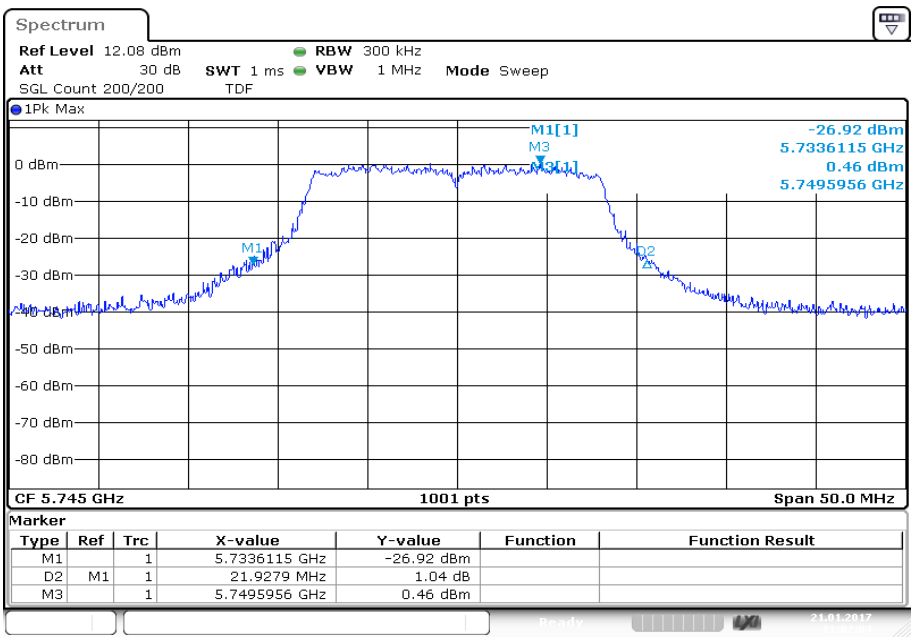
Date: 21.JAN.2017 10:58:12

Plot 7: 5700 MHz



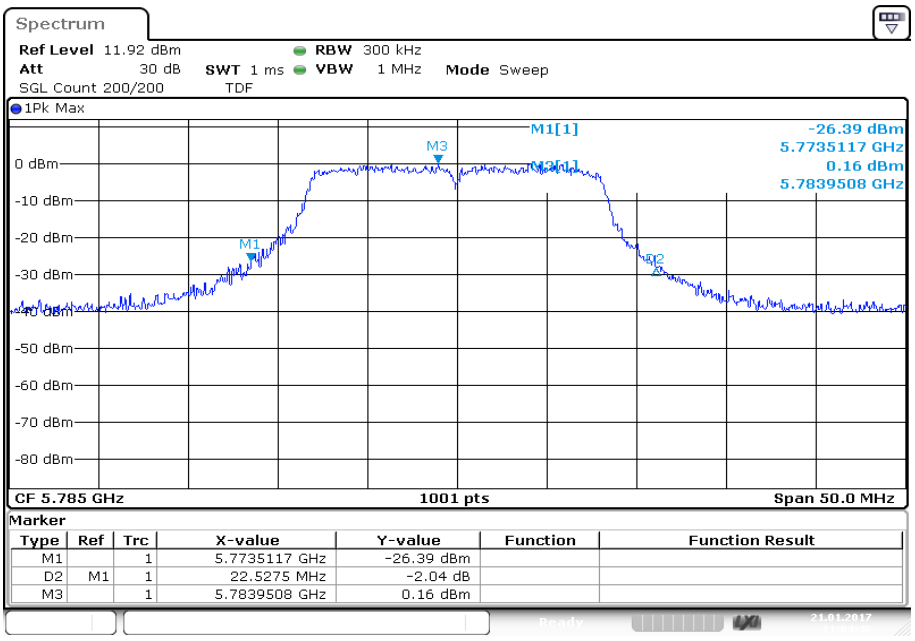
Date: 21.JAN.2017 11:00:05

Plot 8: 5745 MHz



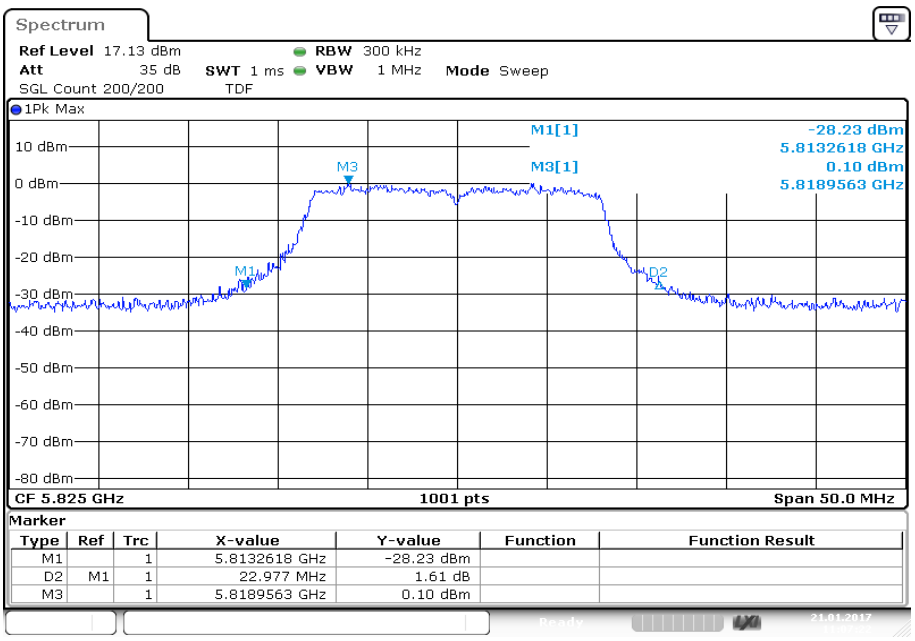
Date: 21.JAN.2017 11:02:04

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:04:46

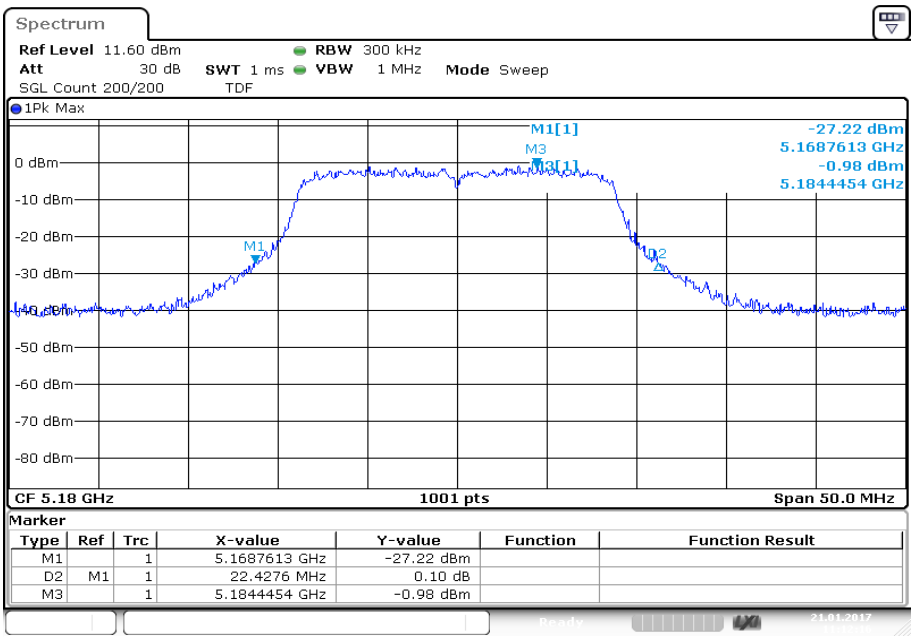
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:07:22

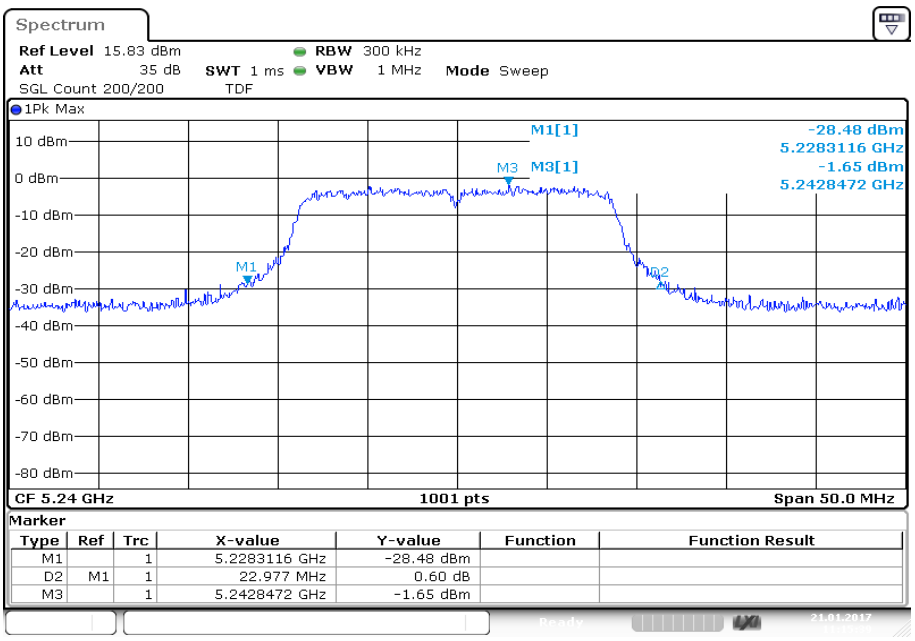
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5180 MHz



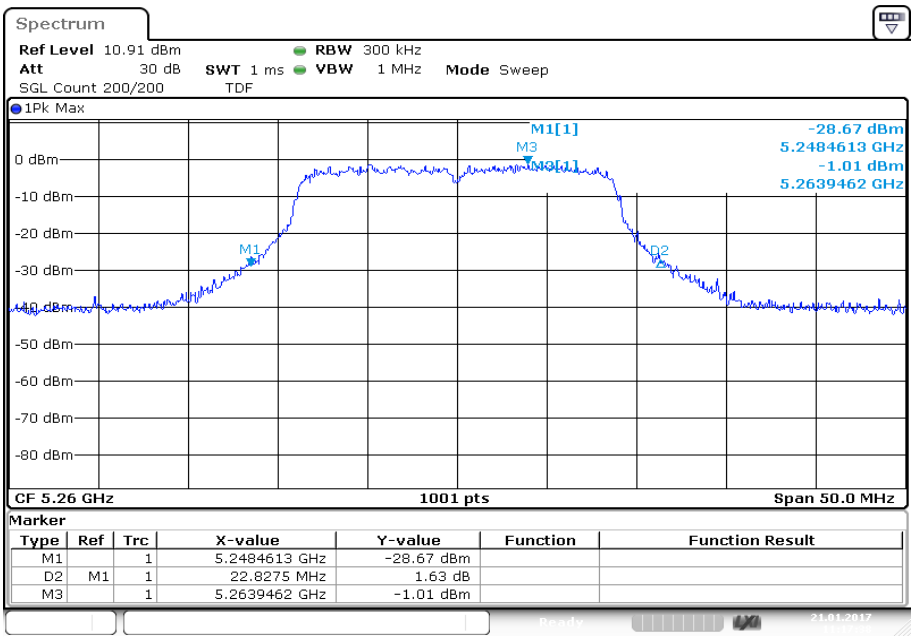
Date: 21.JAN.2017 11:12:16

Plot 2: 5240 MHz



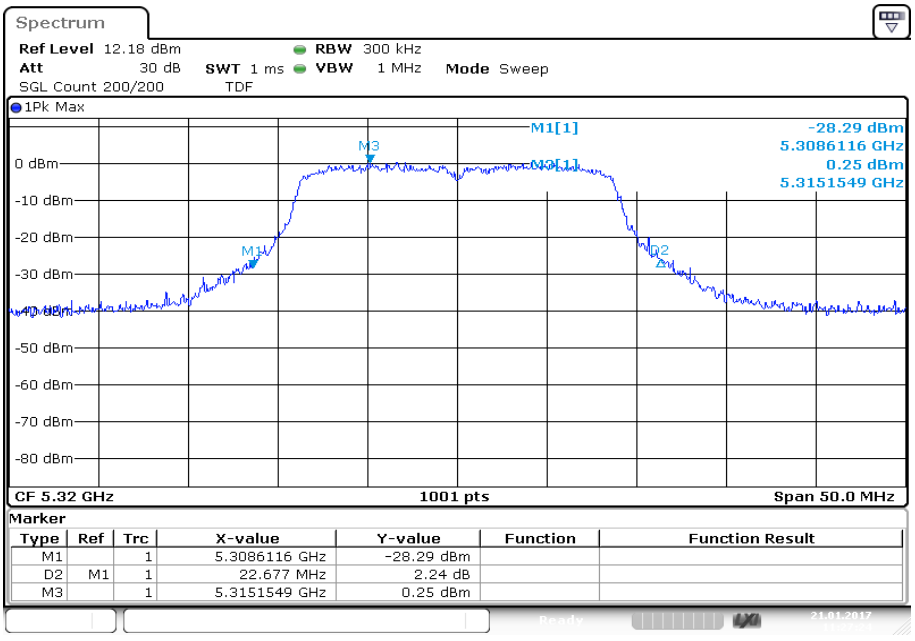
Date: 21.JAN.2017 11:15:39

Plot 3: 5260 MHz



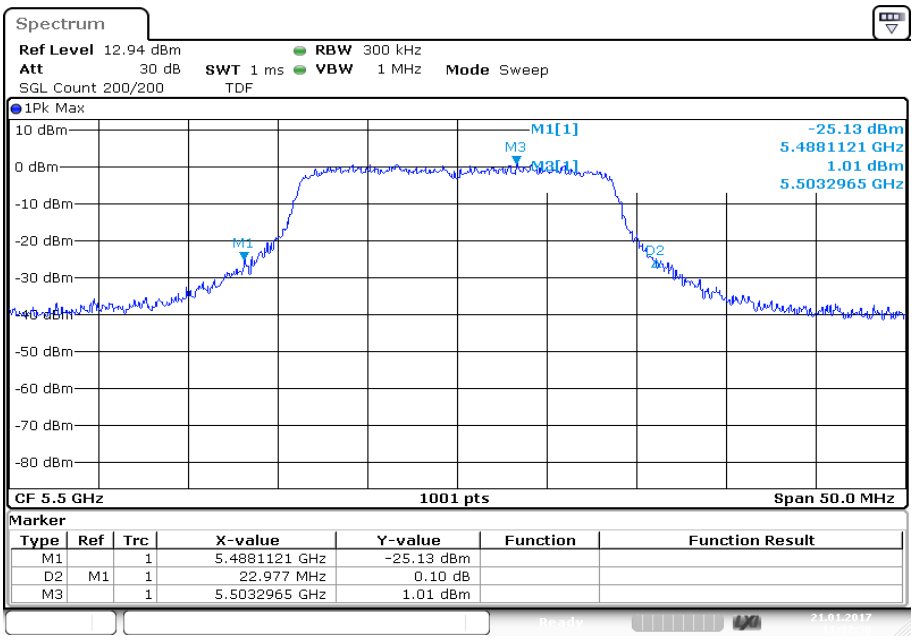
Date: 21.JAN.2017 11:17:38

Plot 4: 5320 MHz



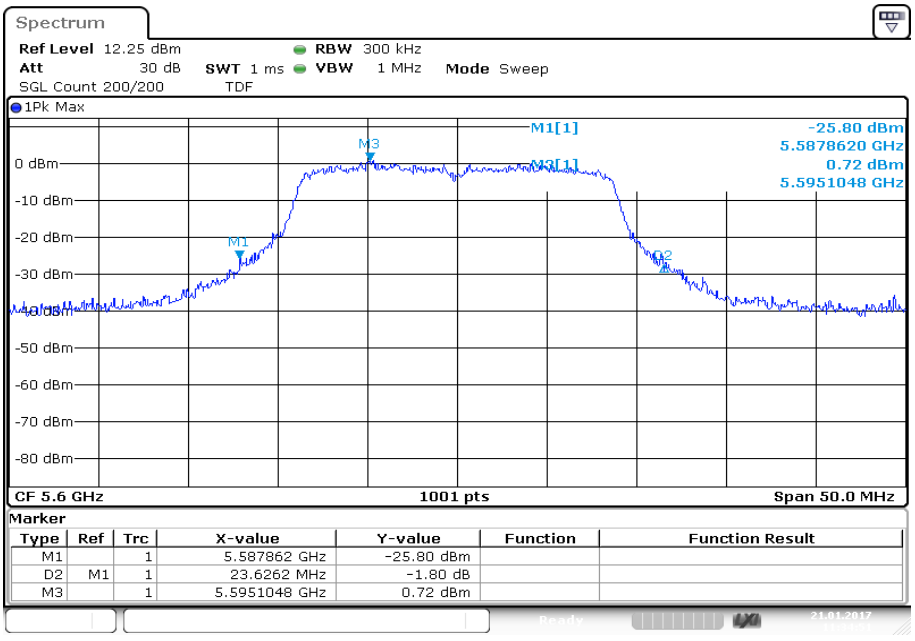
Date: 21.JAN.2017 11:27:23

Plot 5: 5500 MHz



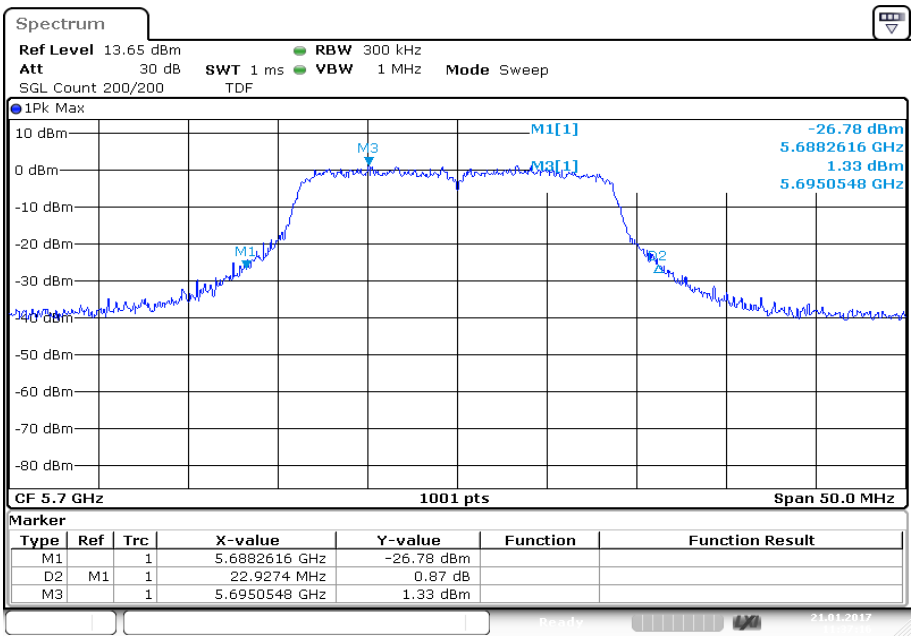
Date: 21.JAN.2017 11:32:30

Plot 6: 5600 MHz



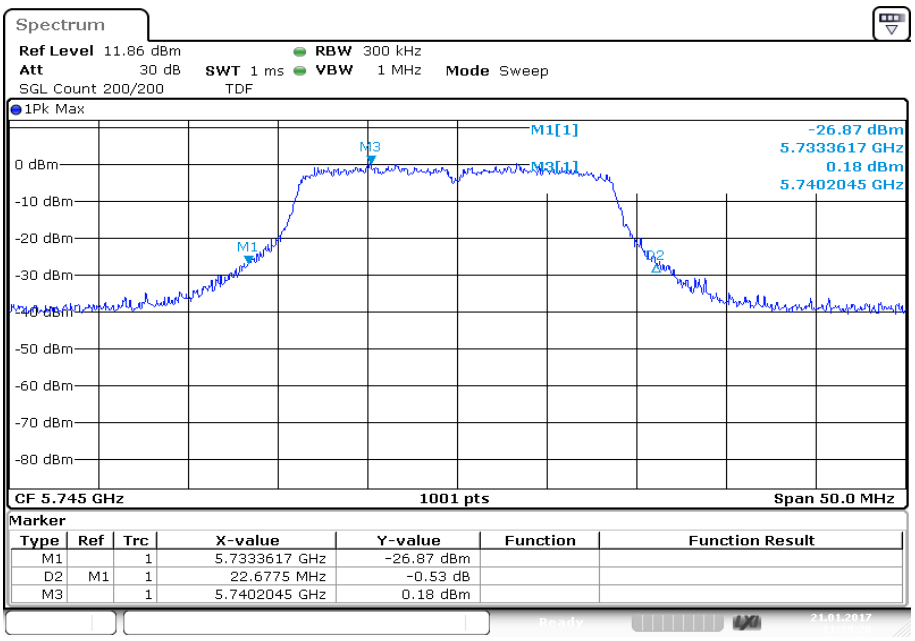
Date: 21.JAN.2017 11:34:51

Plot 7: 5700 MHz



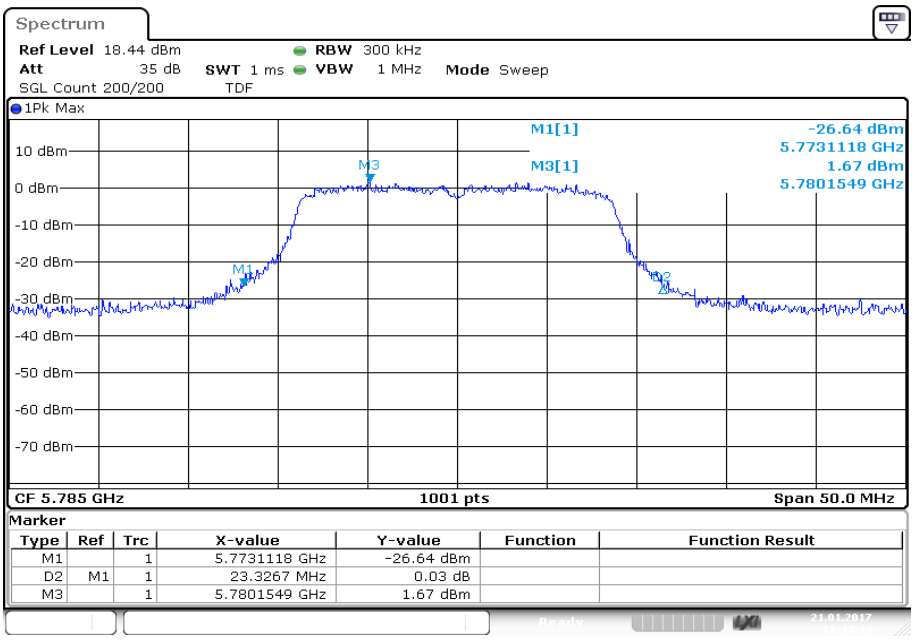
Date: 21.JAN.2017 11:37:16

Plot 8: 5745 MHz



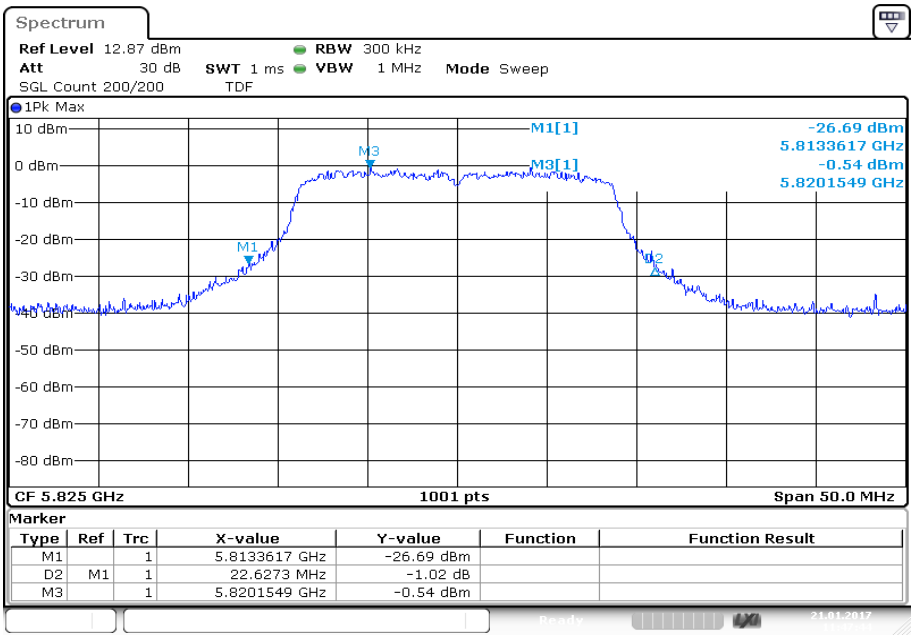
Date: 21.JAN.2017 11:39:20

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:43:34

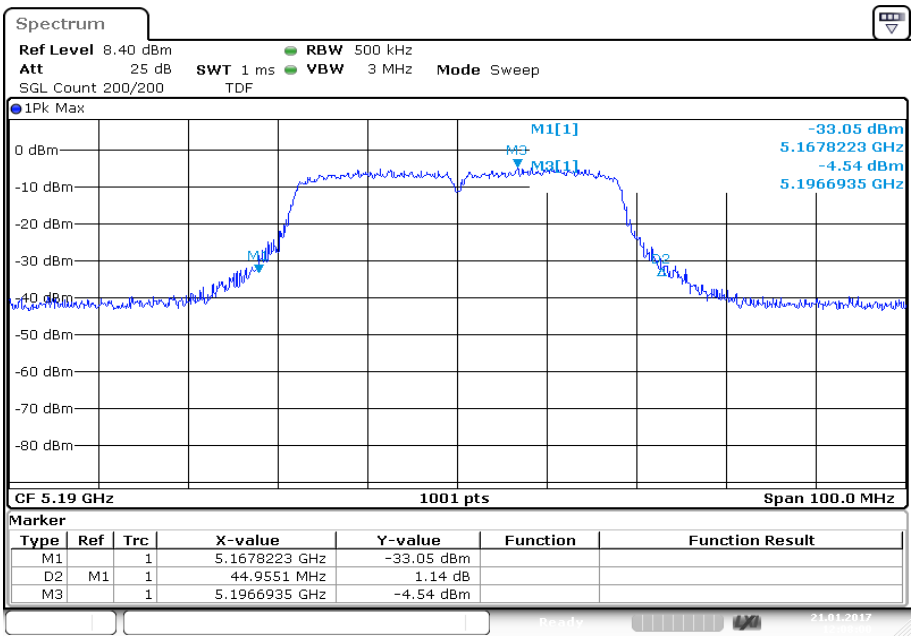
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:47:43

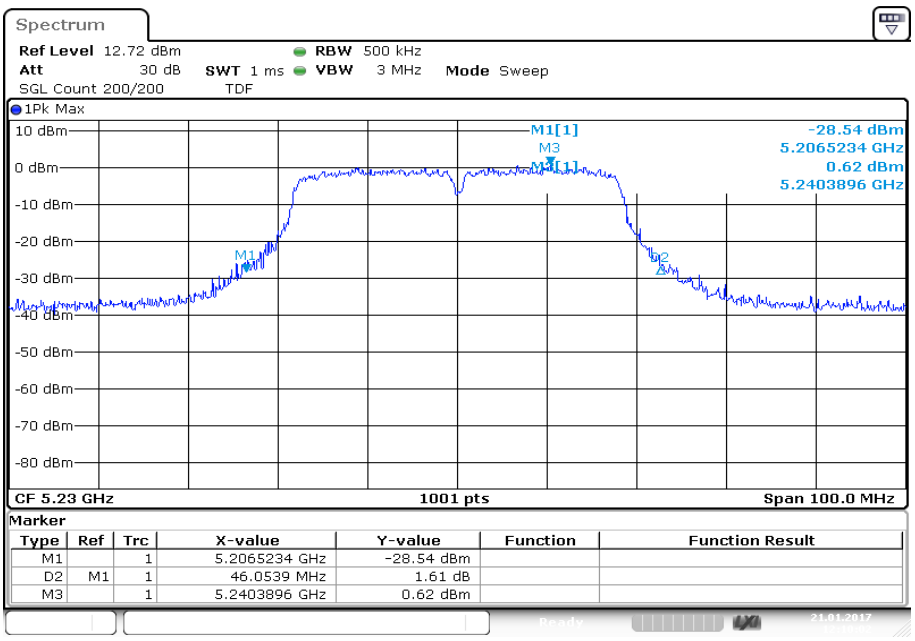
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5190 MHz



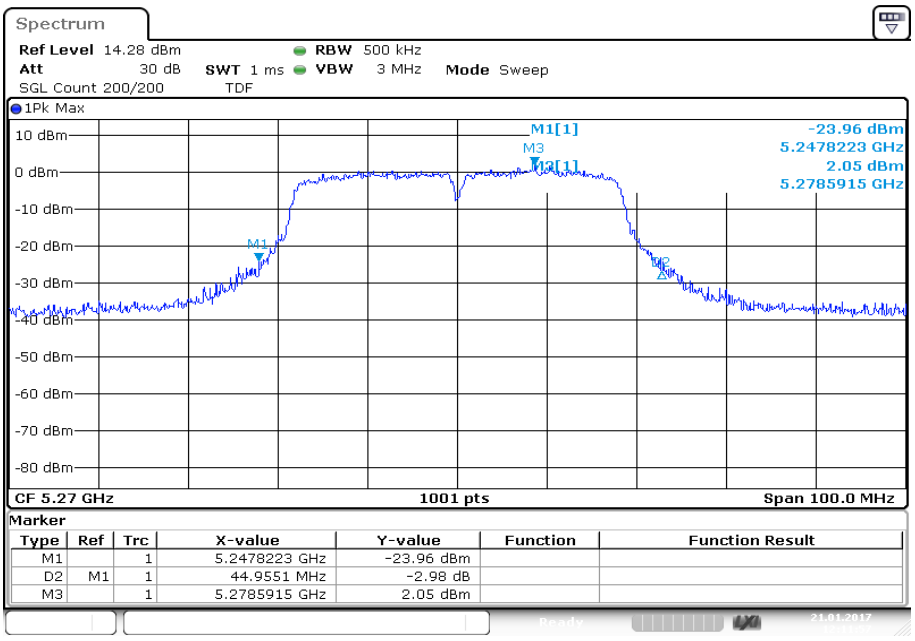
Date: 21.JAN.2017 12:08:00

Plot 2: 5230 MHz



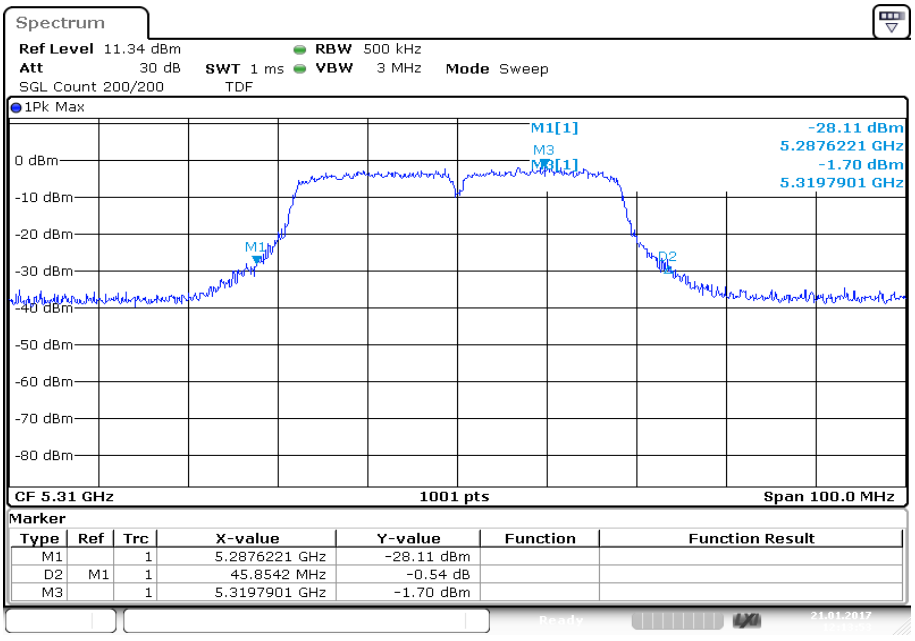
Date: 21.JAN.2017 12:10:02

Plot 3: 5270 MHz



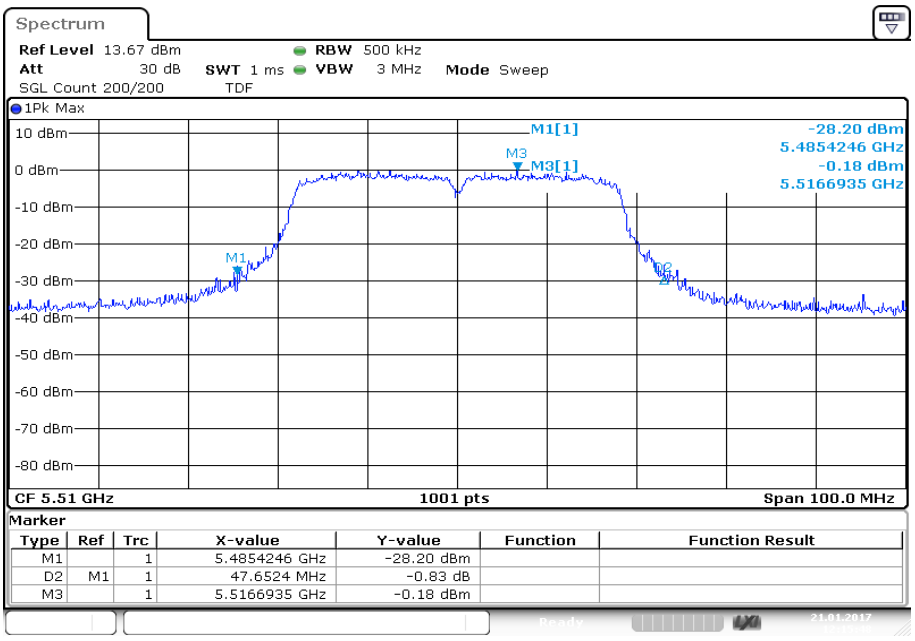
Date: 21.JAN.2017 12:11:56

Plot 4: 5310 MHz



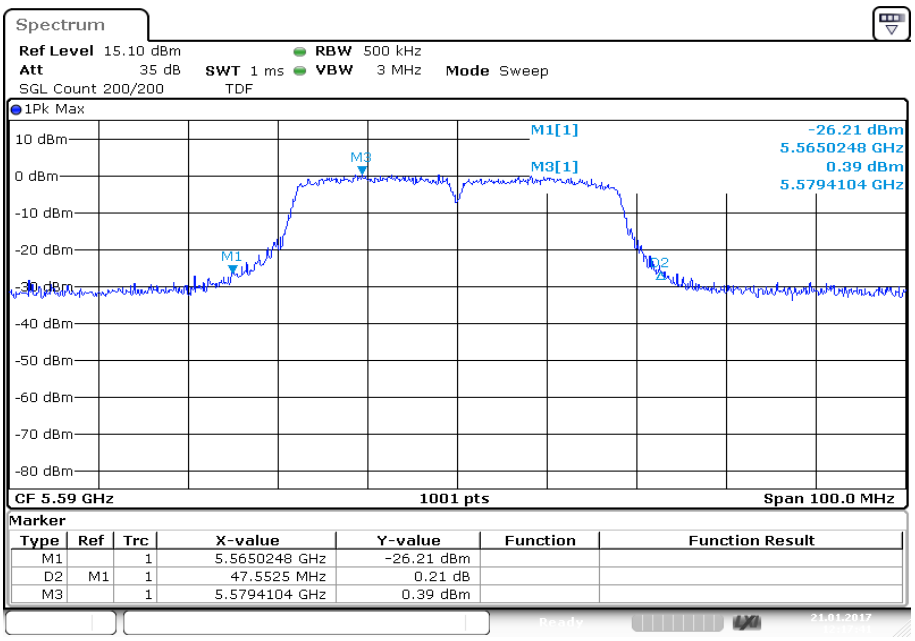
Date: 21.JAN.2017 12:13:53

Plot 5: 5510 MHz



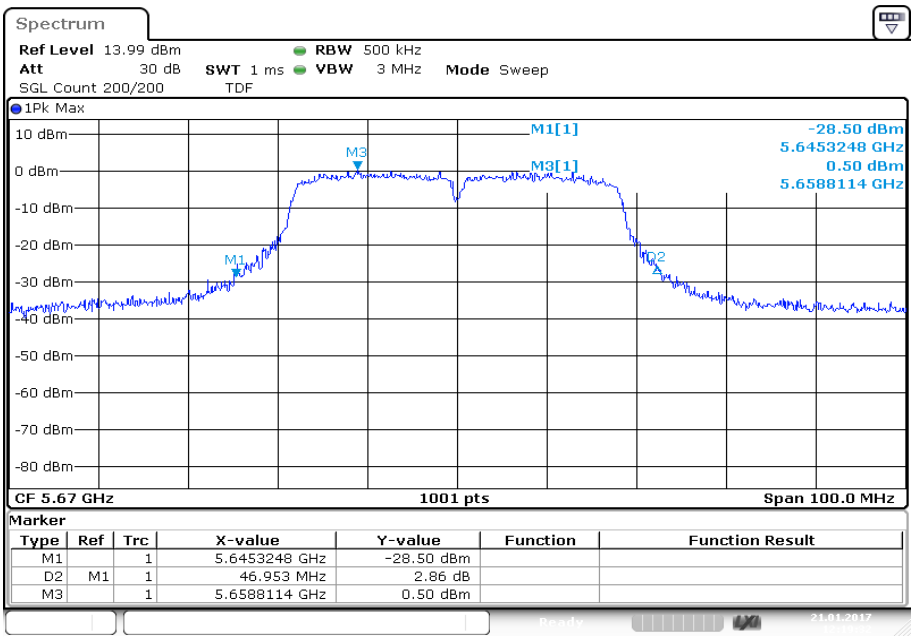
Date: 21.JAN.2017 12:15:48

Plot 6: 5590 MHz



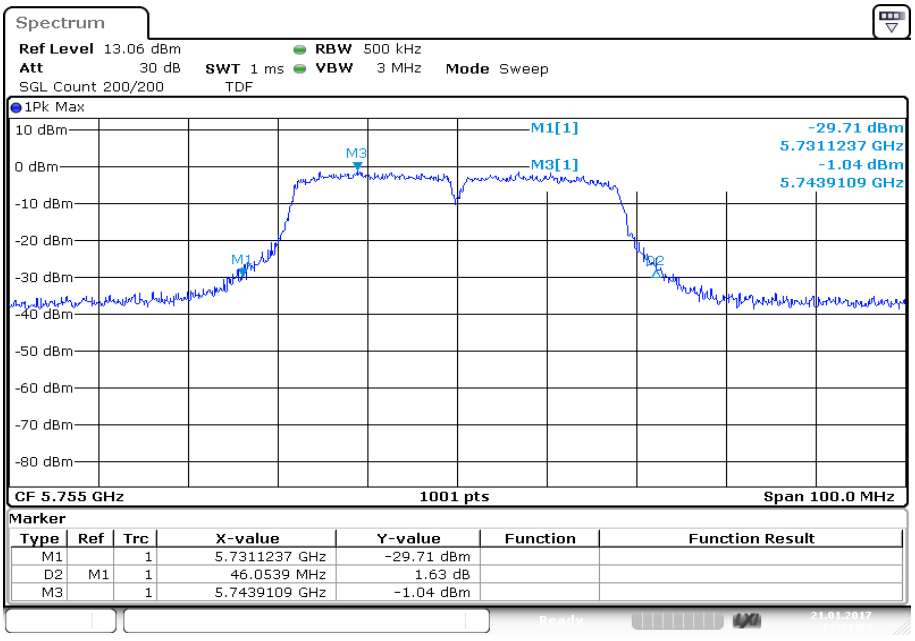
Date: 21.JAN.2017 12:17:41

Plot 7: 5670 MHz



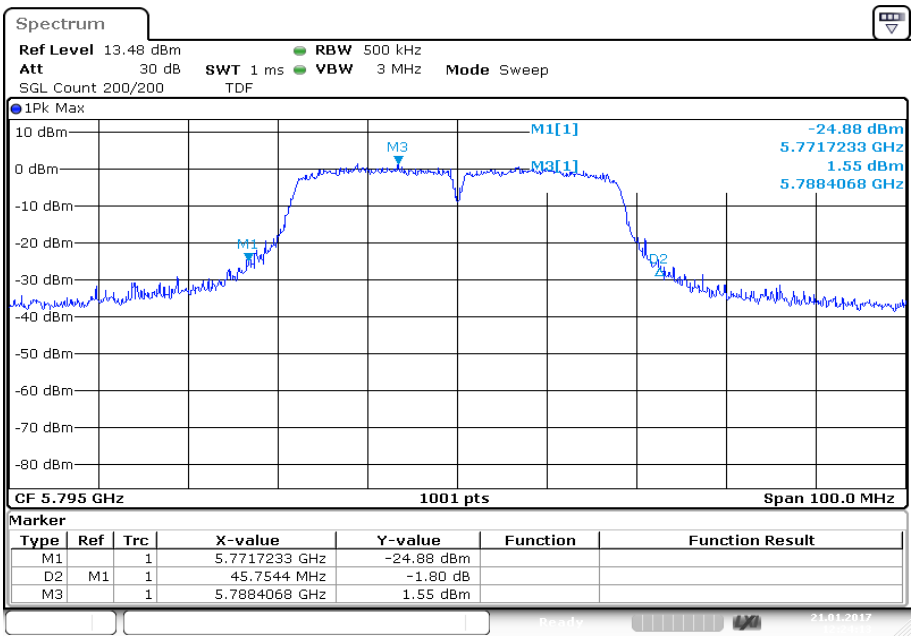
Date: 21.JAN.2017 12:19:32

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:24

Plot 9: 5795 MHz



Date: 21.JAN.2017 12:24:13

11.8 Occupied bandwidth – 99% emission bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	300 kHz / 500 kHz
Video bandwidth:	1 MHz / 3 MHz
Span:	50 MHz / 100 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace – mode:	Max hold (allow trace to stabilize)
Test setup:	See sub clause 6.5 A
Measurement uncertainty:	See sub clause 8

Usage:

-/-	IC
Occupied Bandwidth – 99% emission bandwidth	
OBW is necessary for Emission Designator	

Result:

OFDM / a – mode	99% bandwidth [kHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	16783	16683	16733	16783
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	16683	16783	16683	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	16733	16733	16783	-/-

Result:

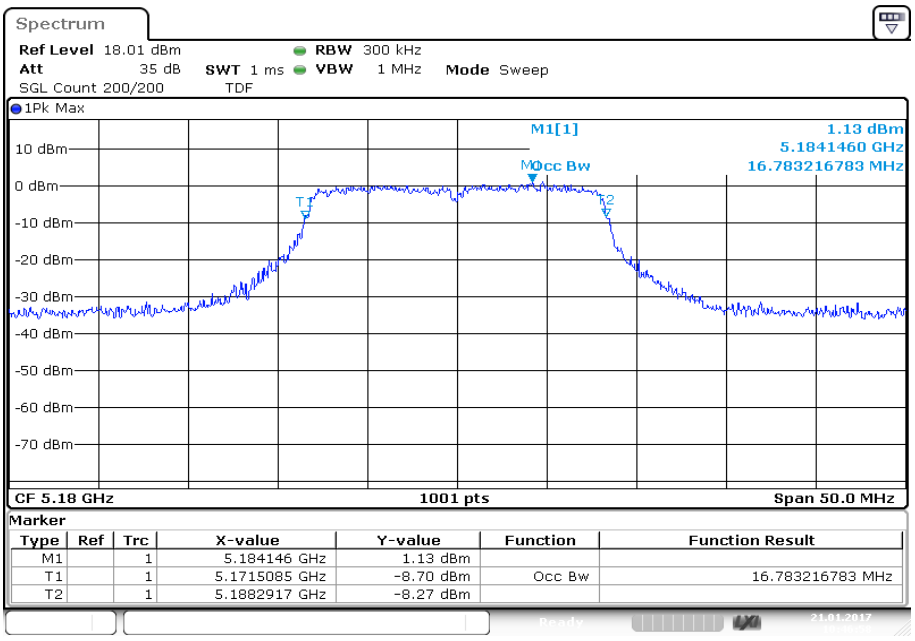
OFDM / n/ac HT20 – mode	99% bandwidth [kHz]			
Channel	5180 MHz	5240 MHz	5260 MHz	5320 MHz
	17832	17882	17782	17782
Channel	5500 MHz	5600 MHz	5700 MHz	-/-
	17832	17782	17882	-/-
Channel	5745 MHz	5785 MHz	5825 MHz	-/-
	17782	17832	17832	-/-

Result:

OFDM / n/ac HT40 – mode	99% bandwidth [kHz]			
Channel	5190 MHz	5230 MHz	5270 MHz	5310 MHz
	36563	36464	36464	36464
Channel	5510 MHz	5590 MHz	5670 MHz	-/-
	36563	36563	36563	-/-
Channel	5755 MHz	5795 MHz	-/-	-/-
	36563	36563	-/-	-/-

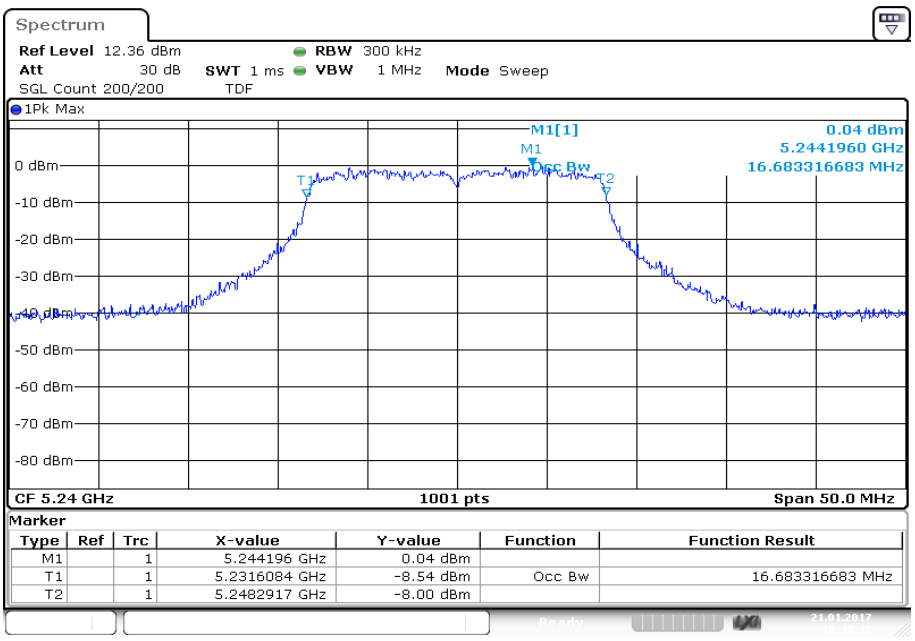
Plots: OFDM / a – mode

Plot 1: 5180 MHz



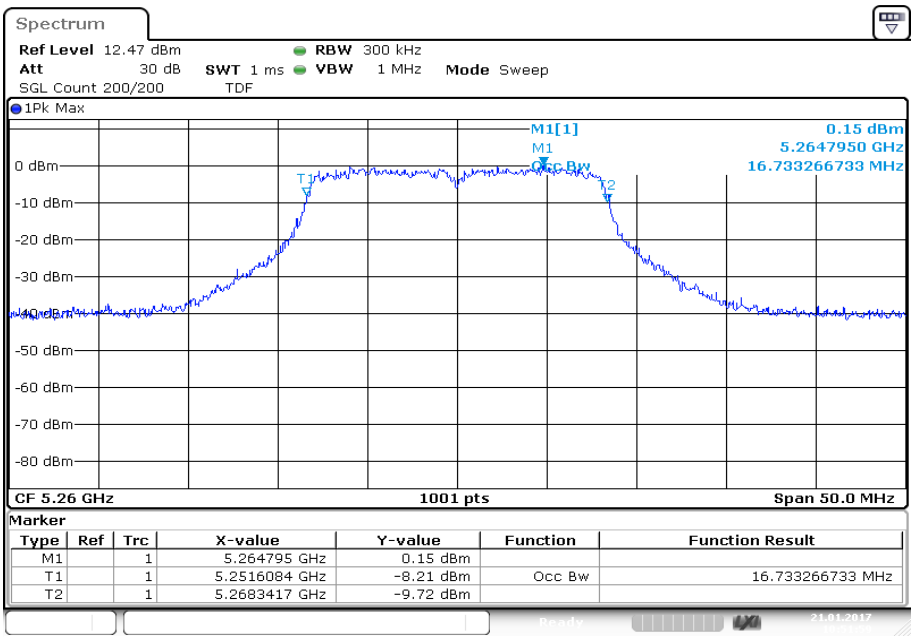
Date: 21.JAN.2017 10:46:57

Plot 2: 5240 MHz



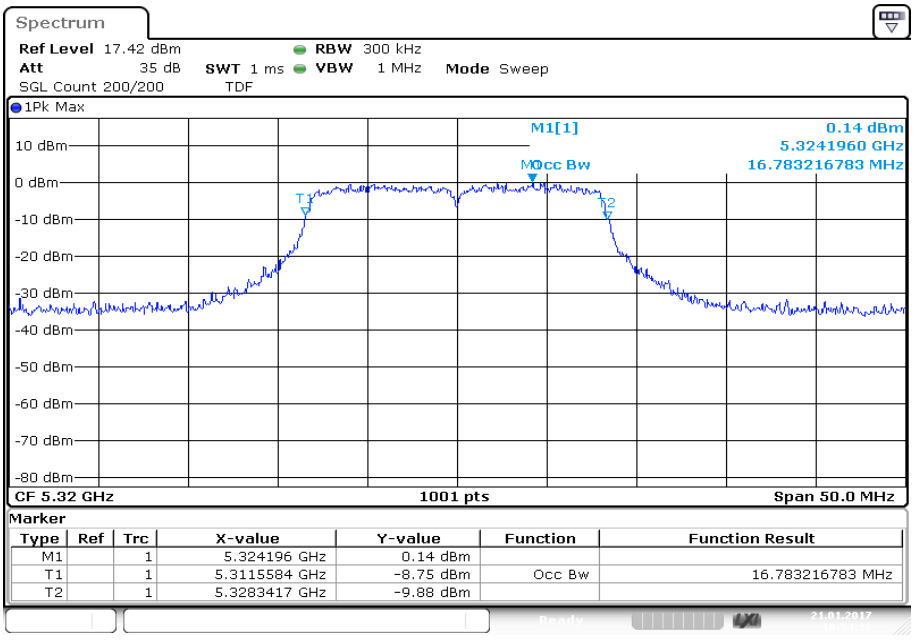
Date: 21.JAN.2017 10:49:47

Plot 3: 5260 MHz



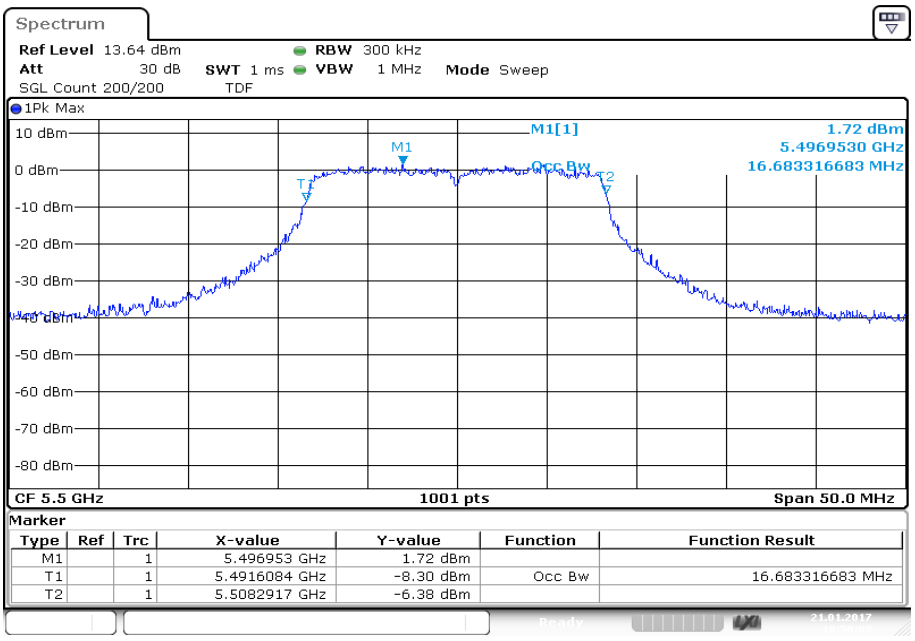
Date: 21.JAN.2017 10:51:59

Plot 4: 5320 MHz



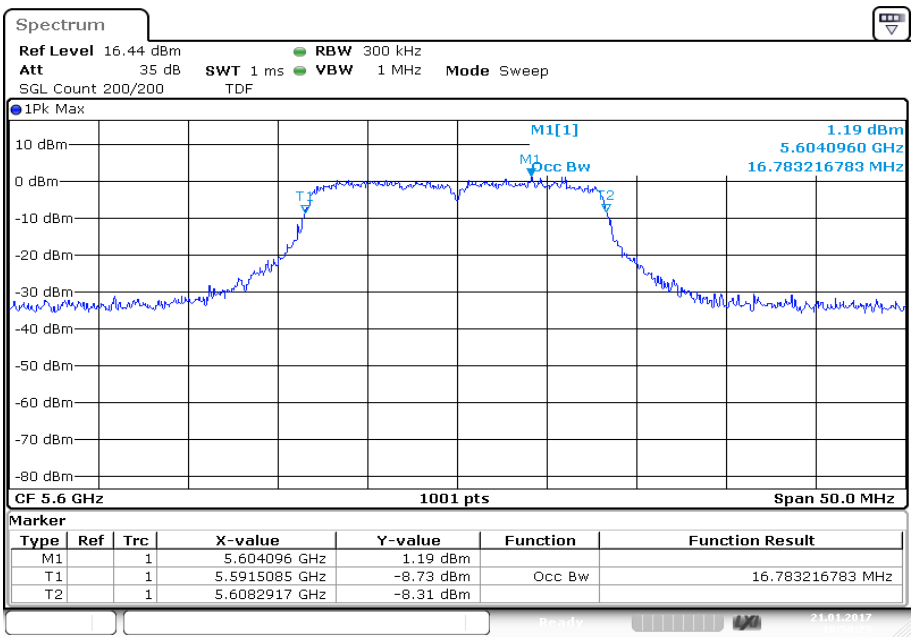
Date: 21.JAN.2017 10:54:18

Plot 5: 5500 MHz



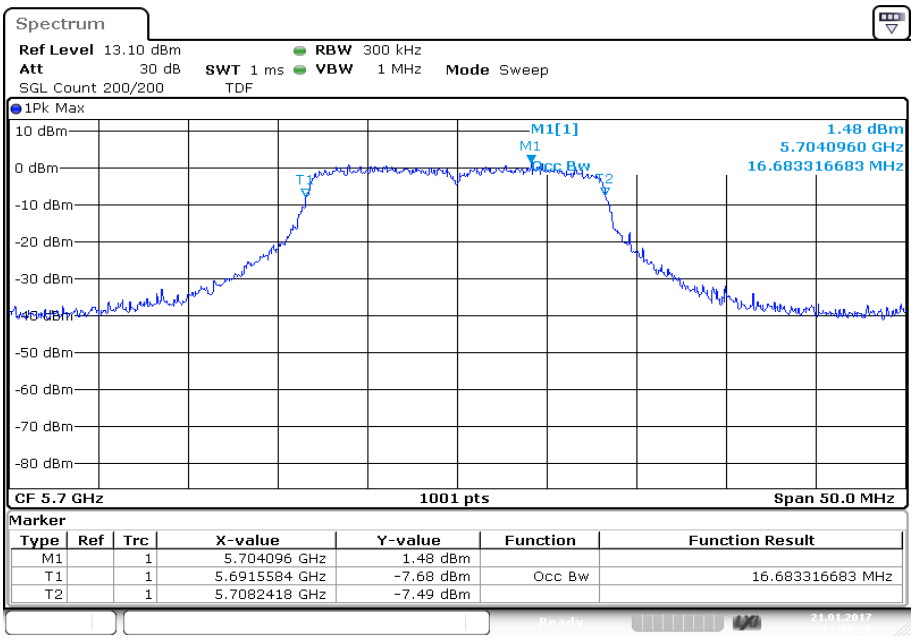
Date: 21.JAN.2017 10:56:09

Plot 6: 5600 MHz



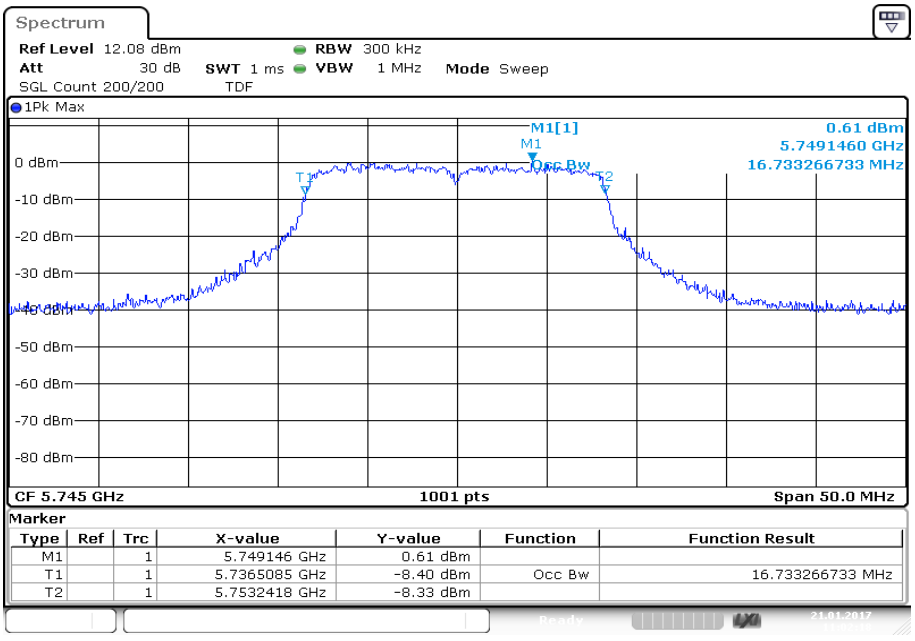
Date: 21.JAN.2017 10:58:25

Plot 7: 5700 MHz



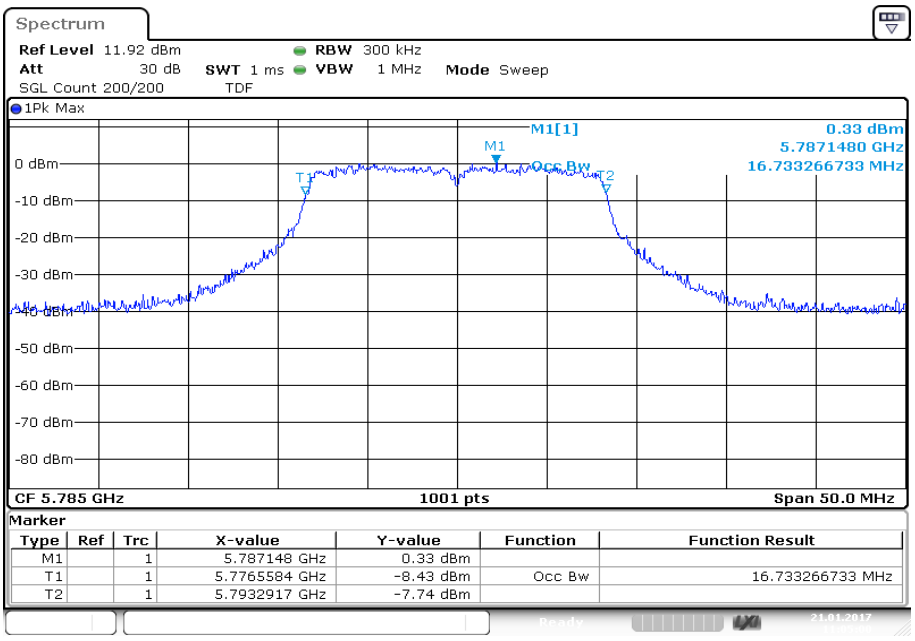
Date: 21.JAN.2017 11:00:20

Plot 8: 5745 MHz



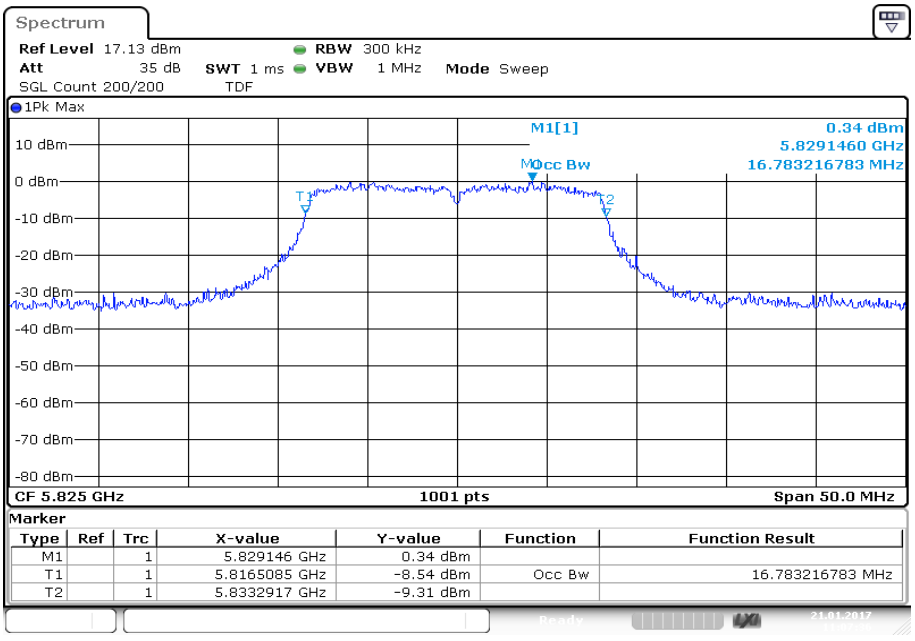
Date: 21.JAN.2017 11:02:18

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:05:00

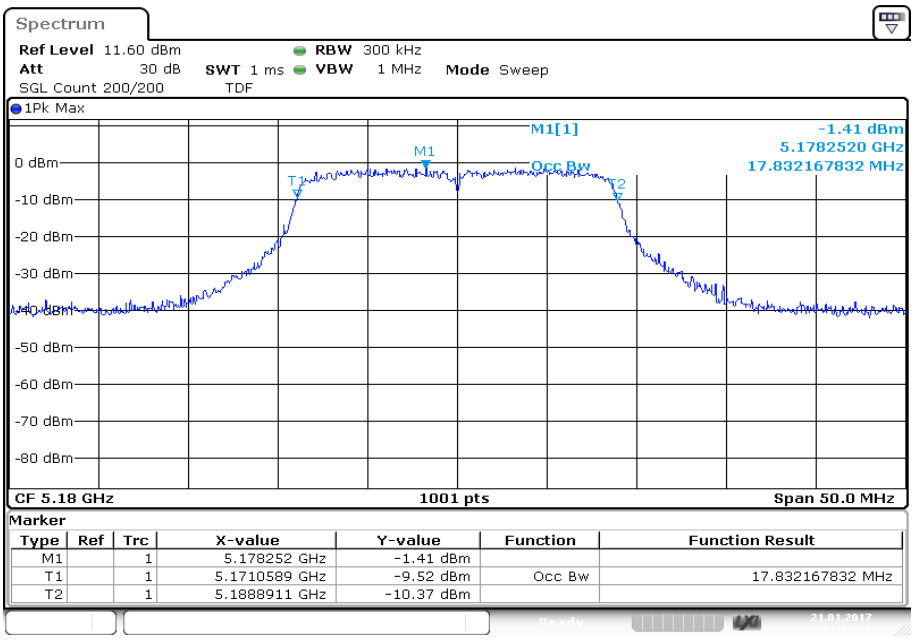
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:07:36

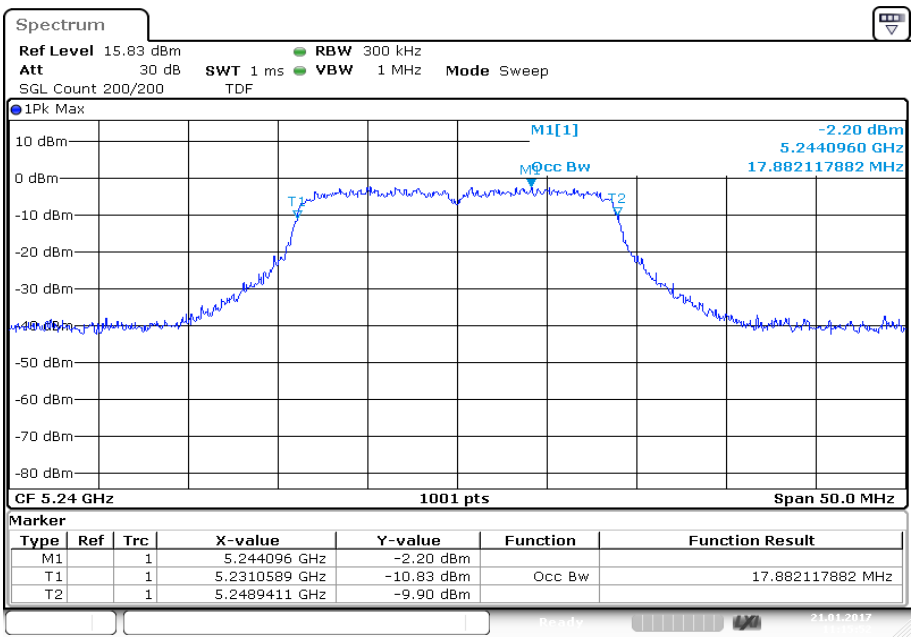
Plots: OFDM / n/ac HT20 – mode

Plot 1: 5180 MHz



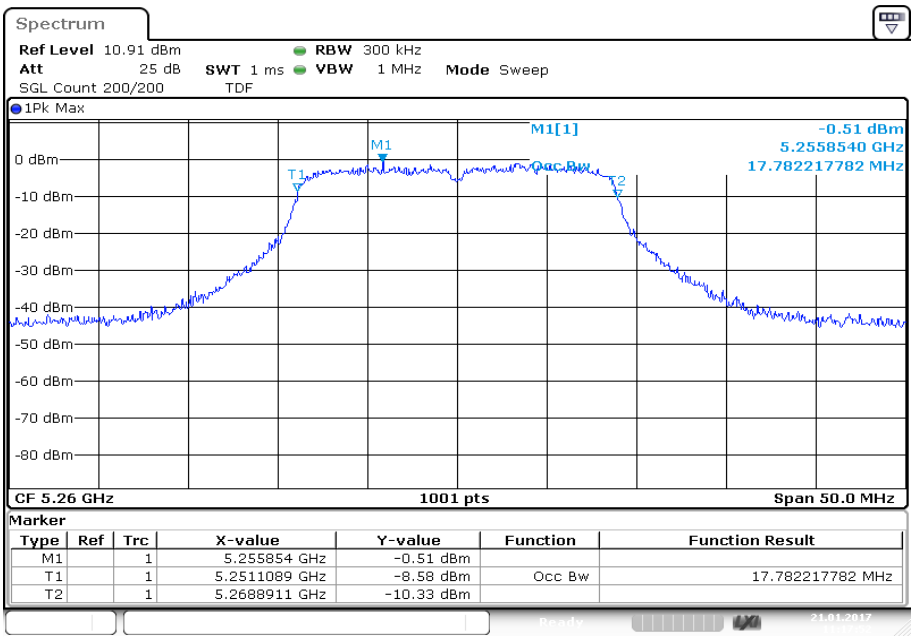
Date: 21.JAN.2017 11:12:31

Plot 2: 5240 MHz



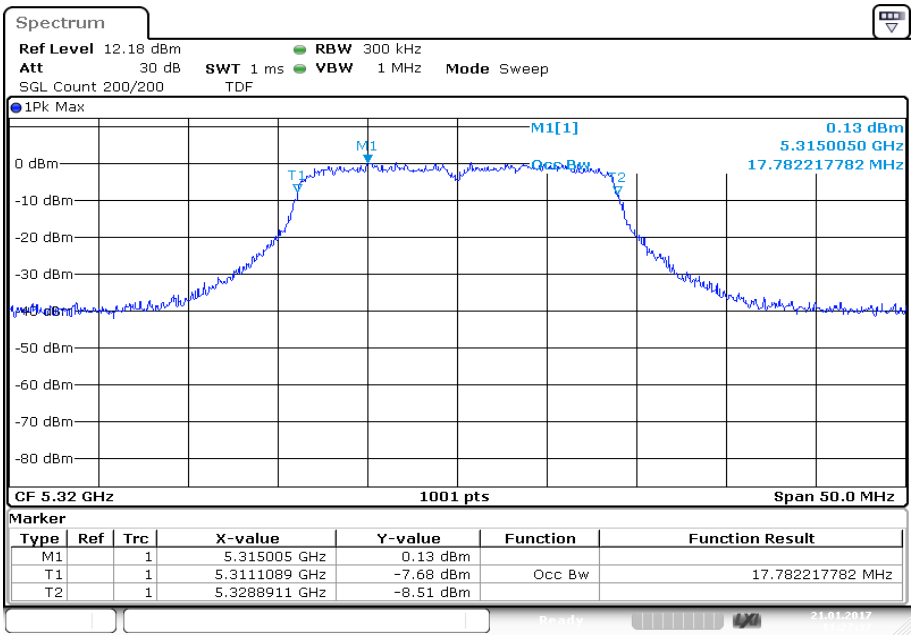
Date: 21.JAN.2017 11:15:52

Plot 3: 5260 MHz



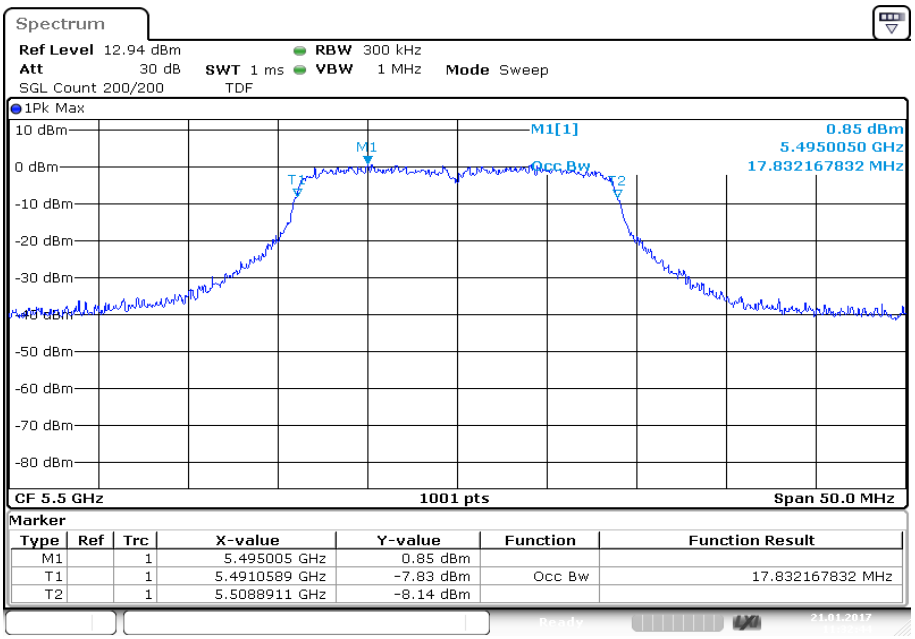
Date: 21.JAN.2017 11:17:51

Plot 4: 5320 MHz



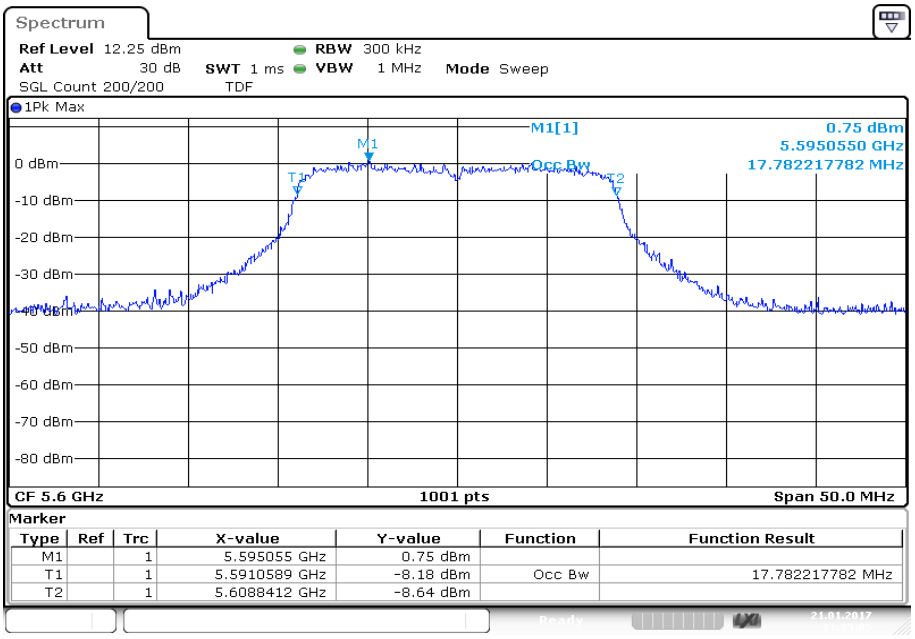
Date: 21.JAN.2017 11:27:36

Plot 5: 5500 MHz



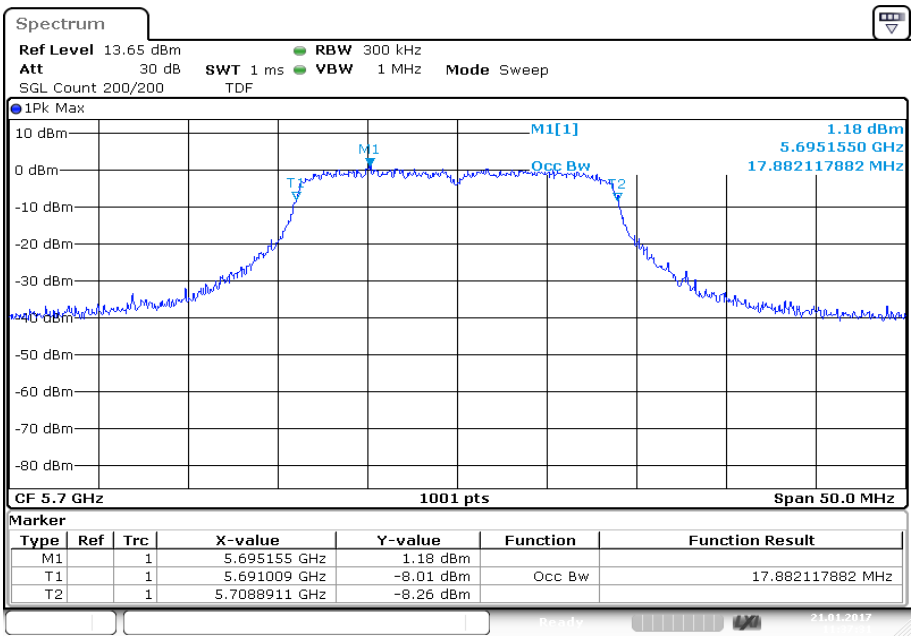
Date: 21.JAN.2017 11:32:43

Plot 6: 5600 MHz



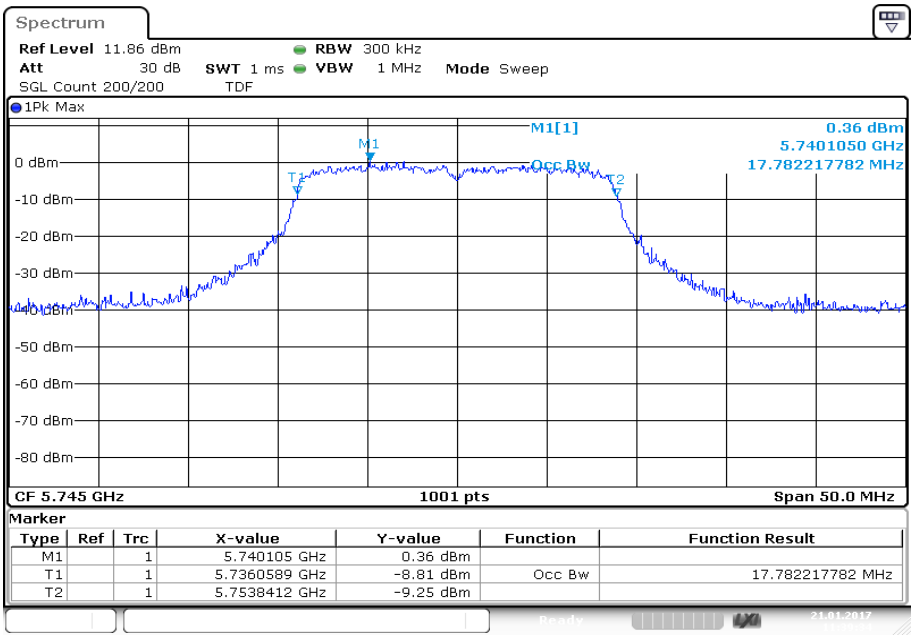
Date: 21.JAN.2017 11:35:04

Plot 7: 5700 MHz



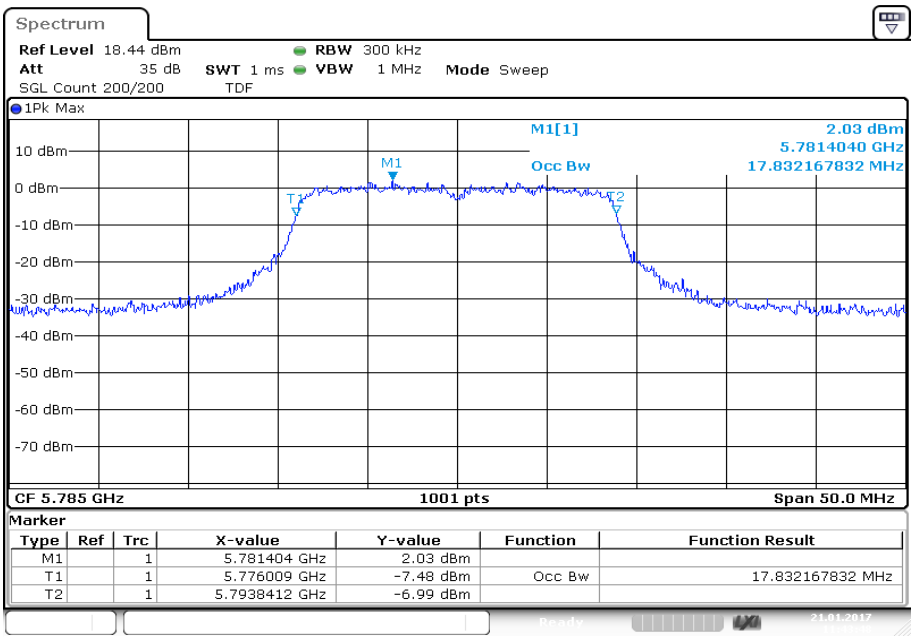
Date: 21.JAN.2017 11:37:31

Plot 8: 5745 MHz



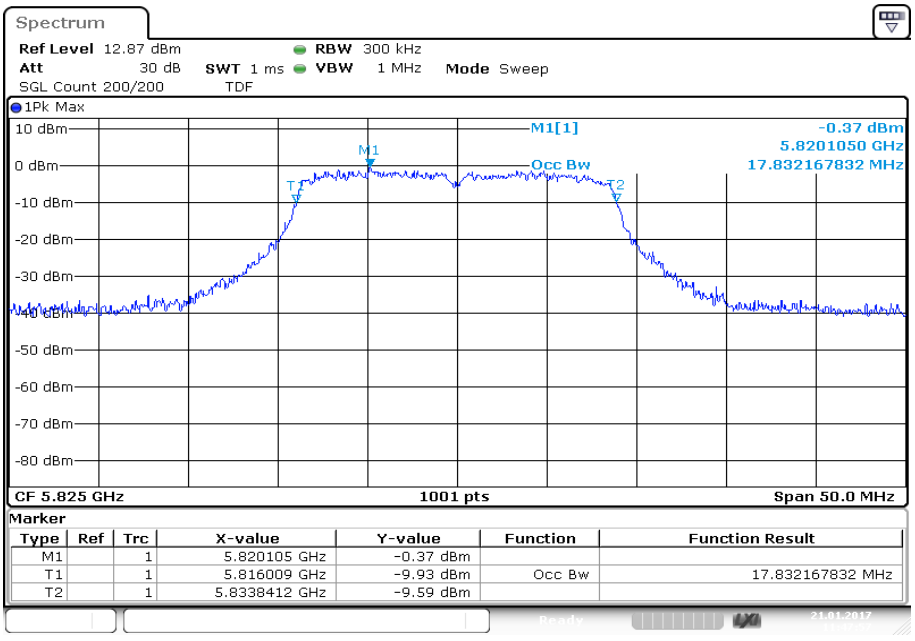
Date: 21.JAN.2017 11:39:34

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:43:48

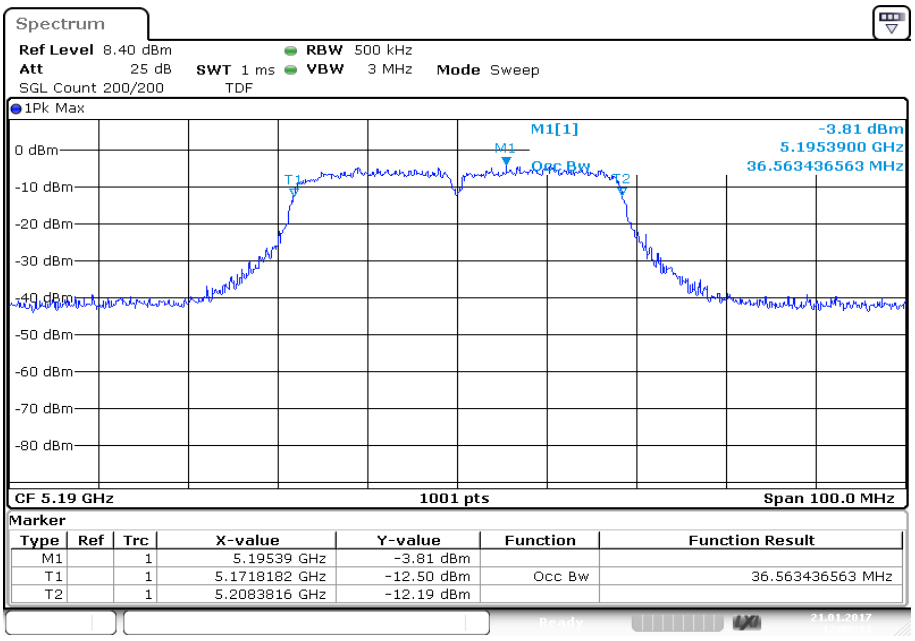
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:47:57

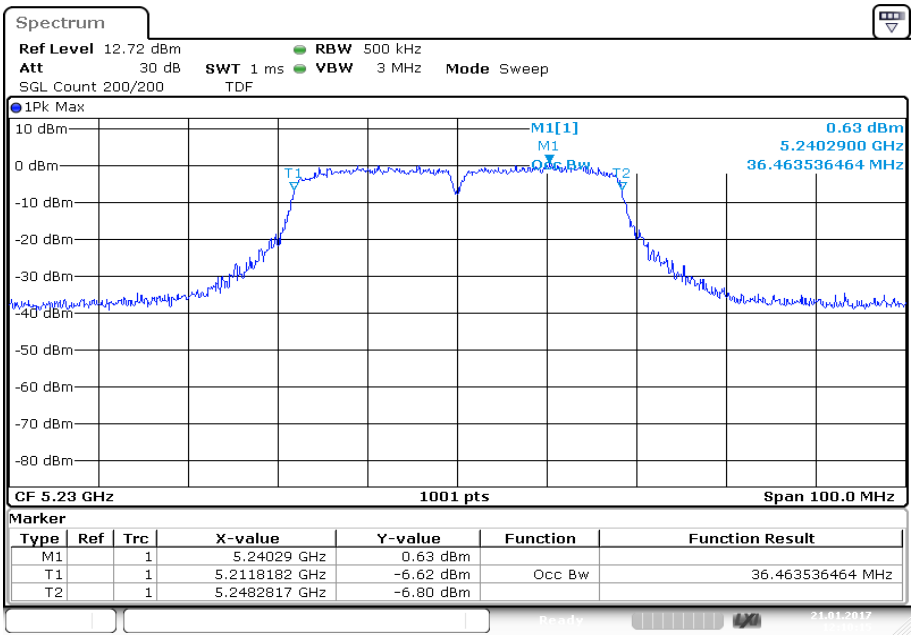
Plots: OFDM / n/ac HT40 – mode

Plot 1: 5190 MHz



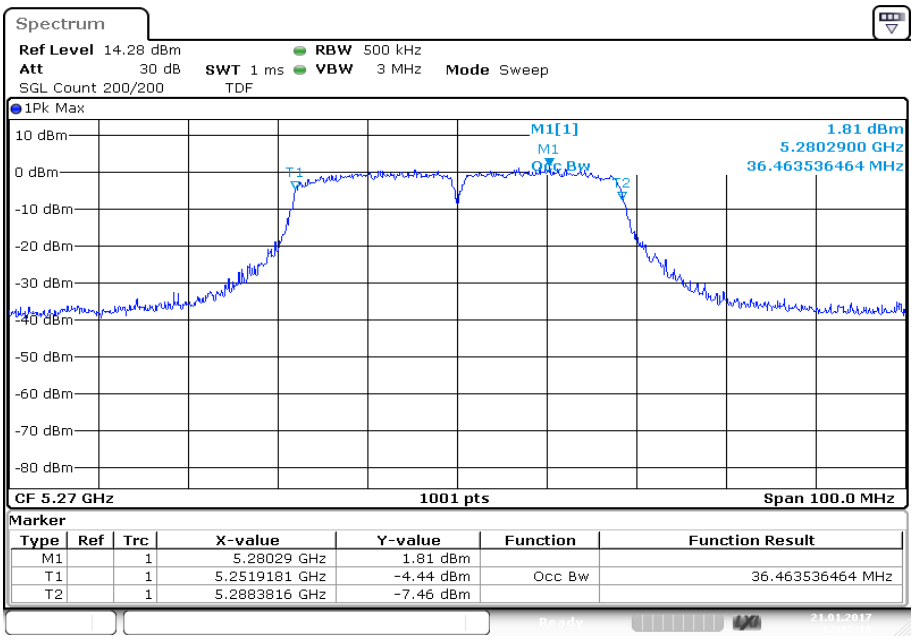
Date: 21.JAN.2017 12:08:13

Plot 2: 5230 MHz



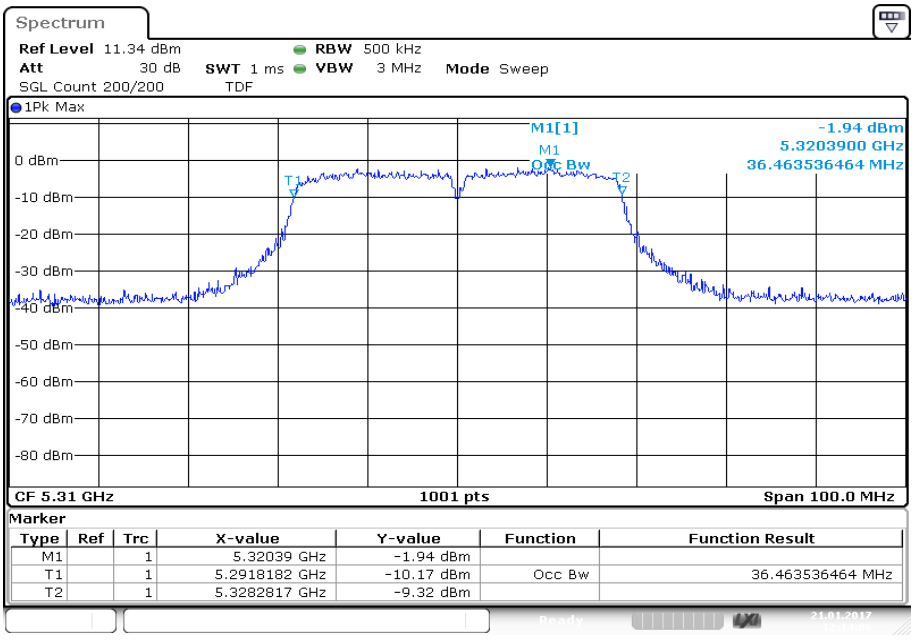
Date: 21.JAN.2017 12:10:15

Plot 3: 5270 MHz



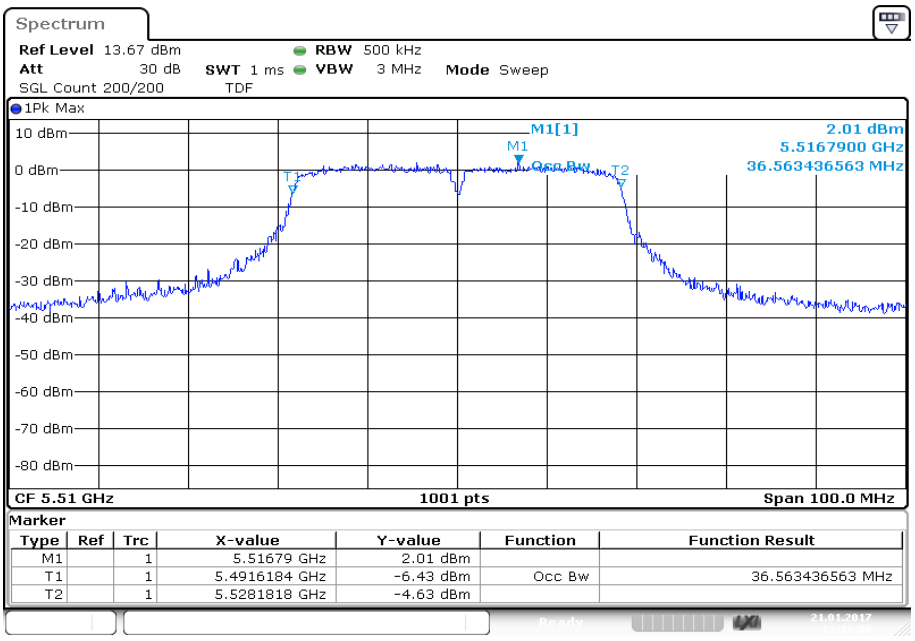
Date: 21.JAN.2017 12:12:10

Plot 4: 5310 MHz



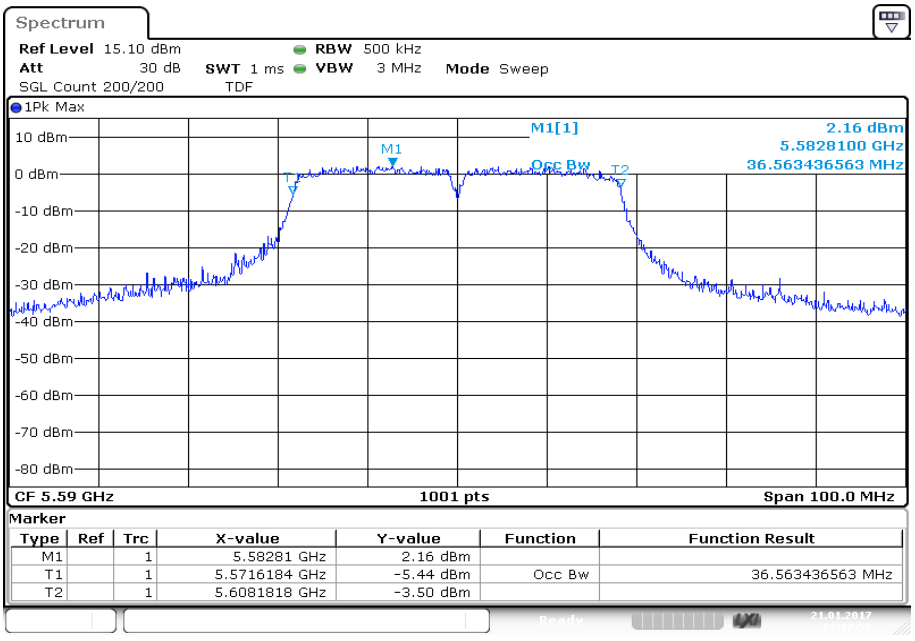
Date: 21.JAN.2017 12:14:06

Plot 5: 5510 MHz



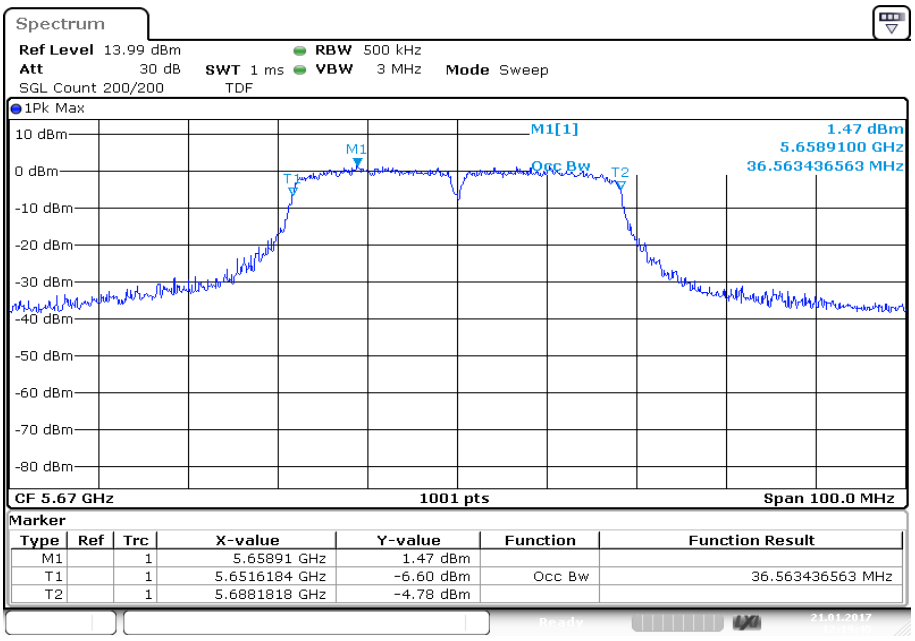
Date: 21.JAN.2017 12:16:00

Plot 6: 5590 MHz



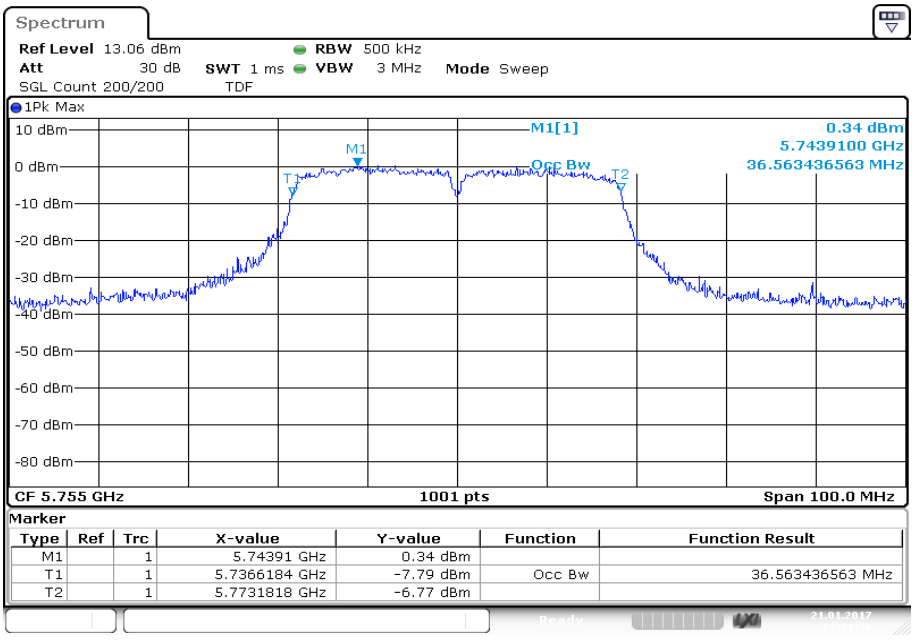
Date: 21.JAN.2017 12:17:53

Plot 7: 5670 MHz



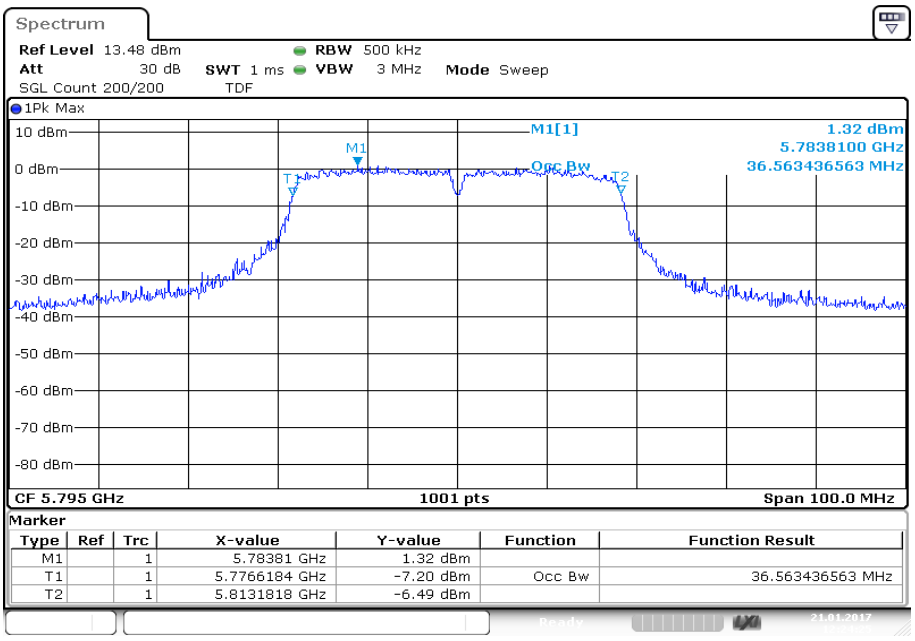
Date: 21.JAN.2017 12:19:44

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:36

Plot 9: 5795 MHz



Date: 21.JAN.2017 12:24:25

11.9 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to the lowest channel for the lower restricted band and to the highest channel for the upper restricted band. Measurement distance is 3m.

Measurement:

Measurement parameter	
Detector:	Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	≥ 3 x RBW
Span:	See plots!
Trace – mode:	Max Hold
Test setup:	See sub clause 6.2 B
Measurement uncertainty:	See sub clause 8

Limits:

Band Edge Compliance Radiated
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).
74 dBµV/m (peak) 54 dBµV/m (average)

Results: (External antennas)

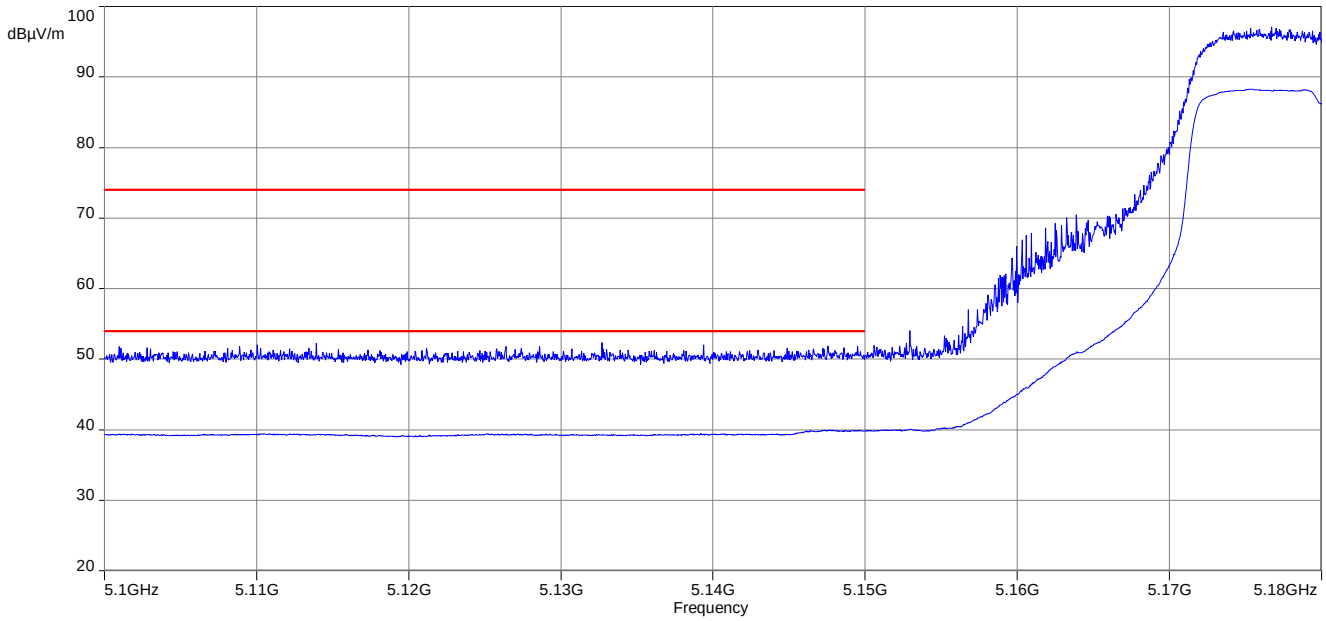
For the results of the band edge compliance radiated of all external antennas see “Appendix_to_1-2846/16-02-05-B”

Result:

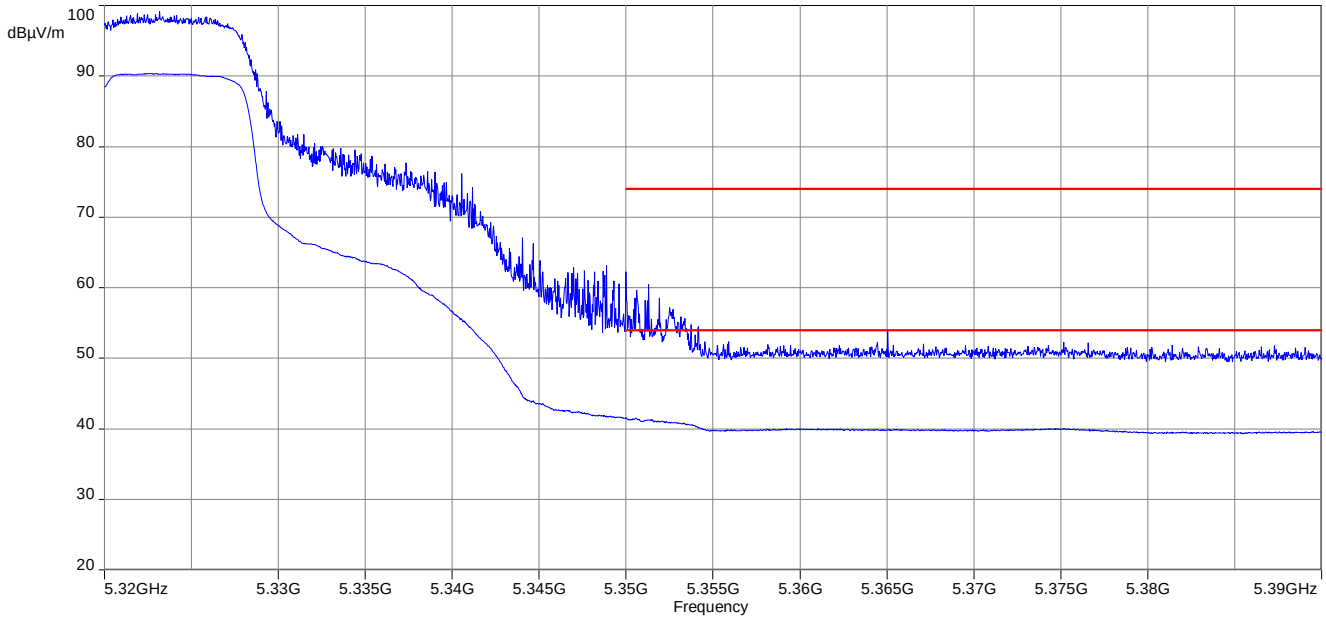
Scenario	Band Edge Compliance Radiated [dBµV/m]
band edge	< 74 dBµV/m (peak) < 54 dBµV/m (average)

Plots:

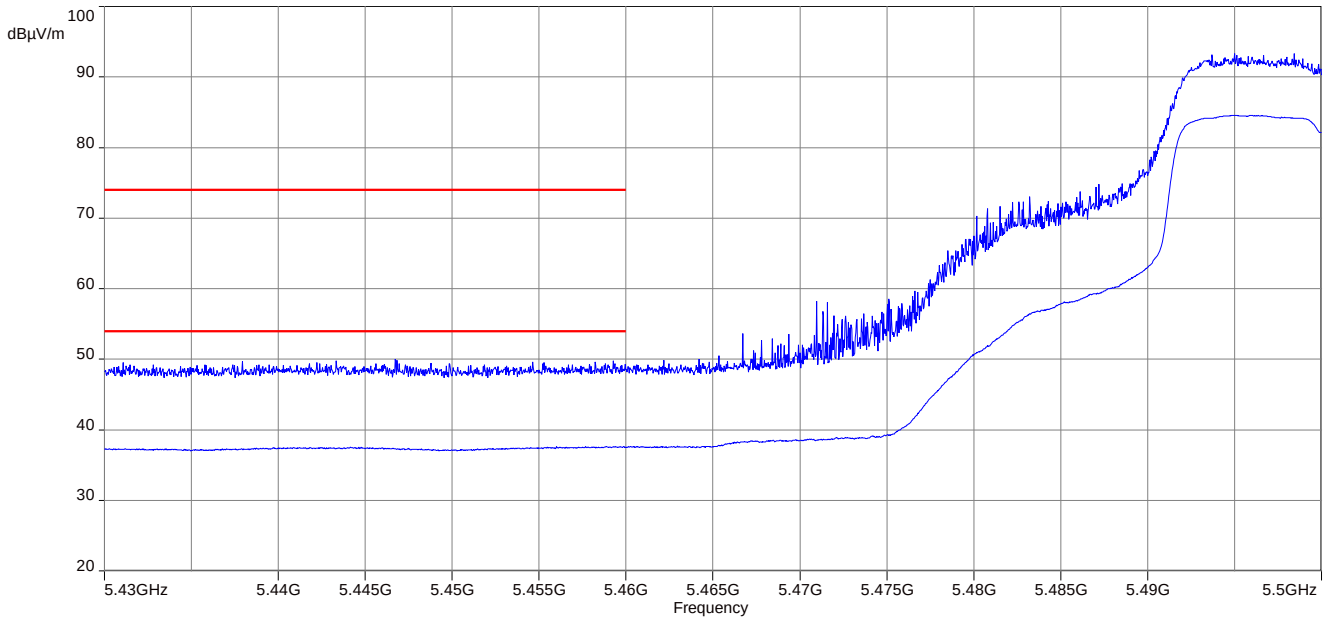
Plot 1: lower band edge, vertical & horizontal polarization – OFDM 20 MHz, 5180 MHz



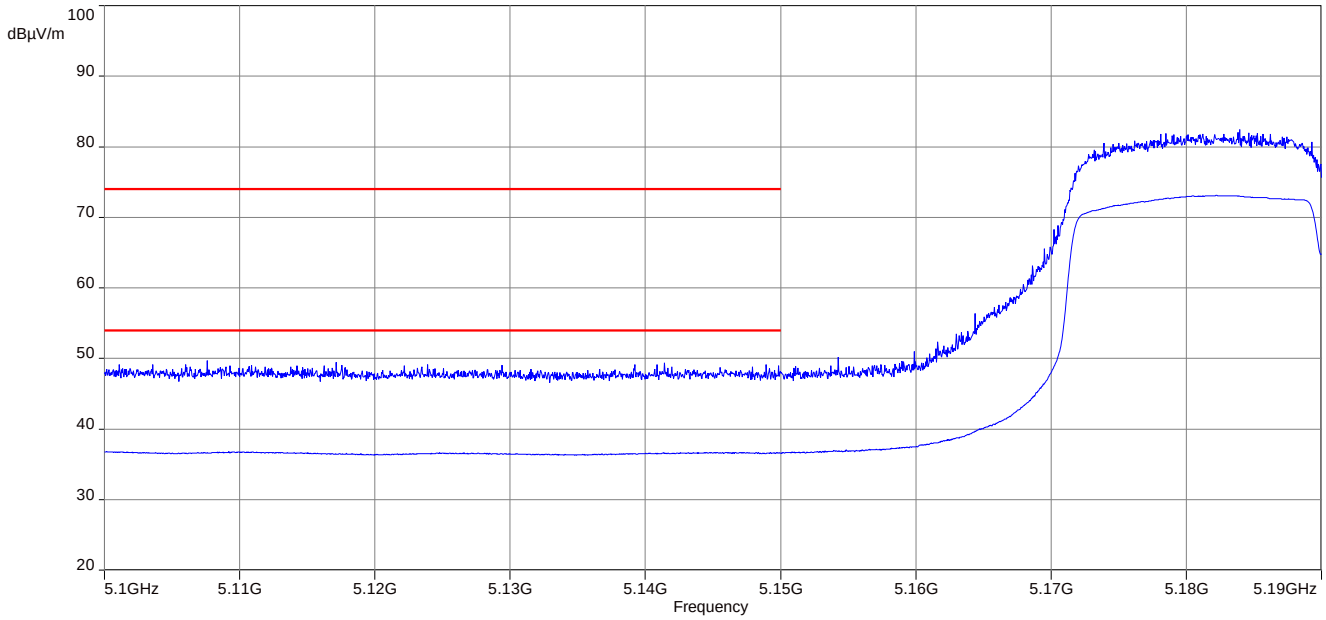
Plot 2: upper band edge, vertical & horizontal polarization – OFDM 20 MHz, 5320 MHz



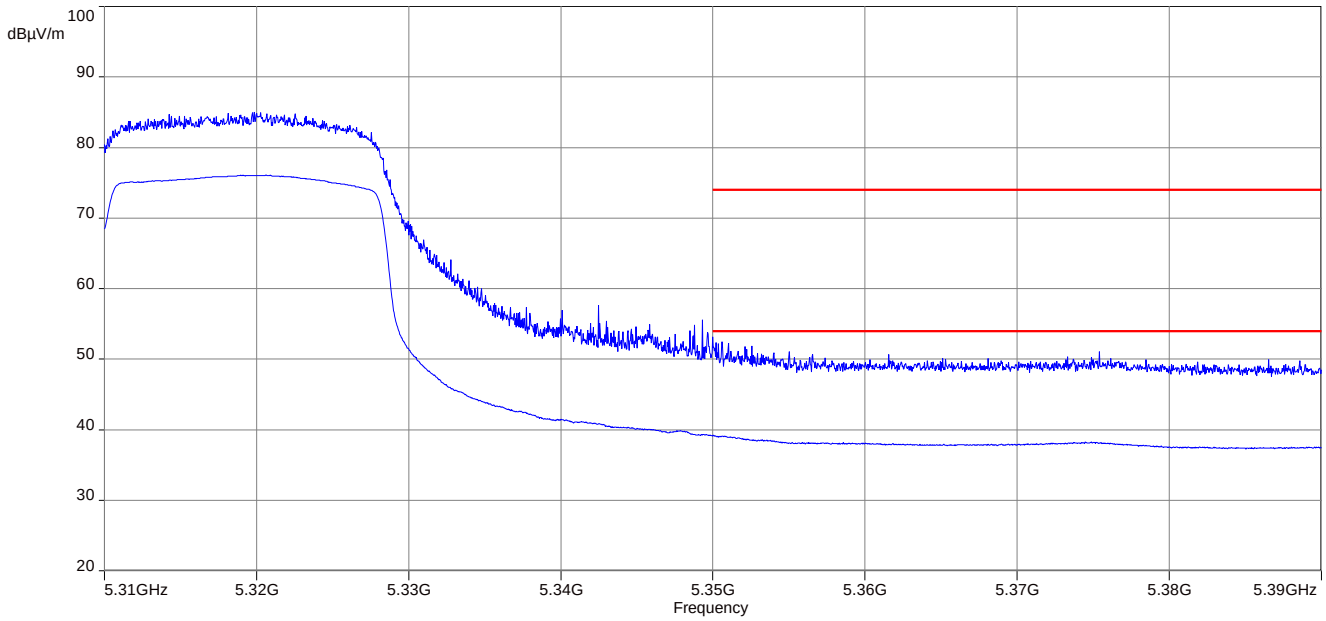
Plot 3: lower band edge, vertical & horizontal polarization – OFDM 20 MHz, 5500 MHz



Plot 4: lower band edge, vertical & horizontal polarization – OFDM 40 MHz, 5190 MHz



Plot 5: upper band edge, vertical & horizontal polarization – OFDM 40 MHz, 5310 MHz



Plot 6: lower band edge, vertical & horizontal polarization – OFDM 40 MHz, 5510 MHz