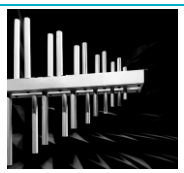
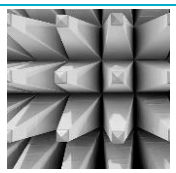




CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-5326/17-01-03-C

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

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-12076-01-03

Applicant

Phoenix Contact GmbH & Co.KG
Flachsmarktstraße 8
32825 Blomberg / GERMANY
Phone: +49 (0) 52 35 3-00
Fax: +49 (0) 52 35 3-30 99 9
Contact: Andreas Pape
e-mail: apape@phoenixcontact.com
Phone: +49 (0) 5281 9 46-1545

Manufacturer

Silex Technology, Inc.
2-3-1 Hikaridai, Seika-cho Sourakugun
619-0237 Kyoto / JAPAN

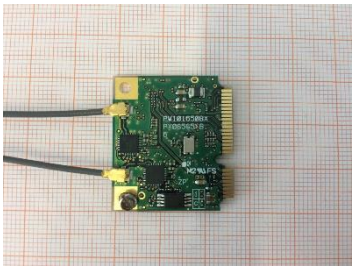
Test standard/s

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**
Model name:	**SX-PCEAN2**
FCC ID:	**YG3-SXPCEAN2**
IC:	**4720B-SXPCEAN2**
Frequency:	UNII bands: 5150MHz to 5250MHz & 5725MHz to 5850MHz
Technology tested:	WLAN (OFDM/a-; n HT20- & n HT40-mode)
Antenna:	2 external antennas
Power supply:	2.805 V to 3.795 V DC, by Evaluation Board
Temperature range:	0°C to +60°C



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.

Test report authorized:

cn=Marco Bertolino, o=CTC advanced GmbH, ou=BTL-161128, email=Marco.Bertolino@ctcadvanced.com, c=DE
2018.08.27 06:21:12 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

Test performed:

Digital unterschrieben von David Lang
DN: cn=David Lang, o=CTC advanced GmbH, ou=LNG-161129, email=david.lang@ctcadvanced.com, c=DE
Datum: 2018.08.24 13:32:40 +02'00'

David Lang
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 1-5326/17-01-03-B and dated 2018-07-06.

2.2 Application details

Date of receipt of order:	2017-11-21
Date of receipt of test item:	2017-11-21
Start of test:	2017-11-21
End of test:	2018-05-16
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	v02r01	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
KDB 662911 D01	v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
KDB 412172 D01	V01r01	Guidelines for determining the effective radiated power (erp) and equivalent isotopically radiated power (eirp) of an RF transmitting system

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests No testing under extreme conditions required! No testing under extreme conditions required!
Relative humidity content	:		42 %
Barometric pressure	:		Not relevant for testing
Power supply	:	V_{nom} V_{max} V_{min}	24.0 V DC by external power supply No testing under extreme conditions required! No testing under extreme conditions required!

5 Test item

5.1 General description

Kind of test item	:	WLAN module
Type identification	:	SX-PCEAN2
HMN	:	-/-
PMN	:	SX-PCEAN2
HVIN	:	SX-PCEAN2
FVIN	:	1.0.3.0.2
S/N serial number	:	Rad. M7086839; Cond. M7086839
HW hardware status	:	ZXE03263 (separation of HW by changing of order code)
SW software status	:	RF test software
Frequency band	:	UNII bands: 5150MHz to 5250MHz & 5725MHz to 5850MHz
Type of radio transmission Use of frequency spectrum	: :	OFDM
Type of modulation	:	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM
Number of channels	:	5 GHz 21 (802.11 a/n20), 9 (802.11 n40)
Antenna	:	2 external antennas The device is equipped with two external antenna ports and will be sold with a variant of Omni-directional and Directional Antennas:

Antenna name	Type	Gain [dBi]
ANT-OMNI-2459-02	Rod Antenna	2.5 @ 2.4 GHz 5 @ 5 GHz
ANT-OMNI-5900-01	Rod Antenna	5 @ 5 GHz
ANT-DIR-2459-01	Directional	9 @ 2.4 GHz 9 @ 5 GHz

For the purpose of testing the antenna with the highest gain for any type of antenna is considered:
- Rod Antenna (5 dBi)
- Directional Antenna (9 dBi)

Power supply	:	2.805 V to 3.795 V DC, by Evaluation Board
Temperature range	:	0°C to +60°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: 1-5326/17-01-01_AnnexA
1-5326/17-01-01_AnnexB
1-5326/17-01-01_AnnexD

6 Description of the test setup

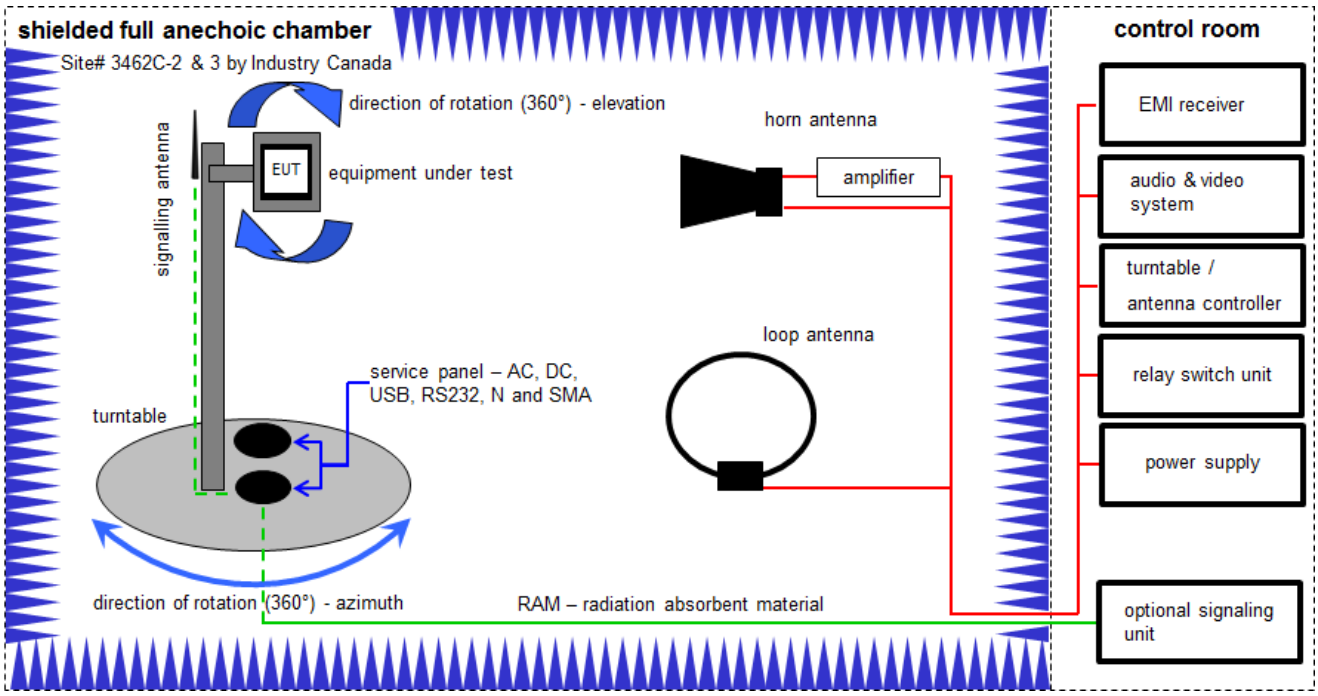
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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 fully anechoic chamber



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

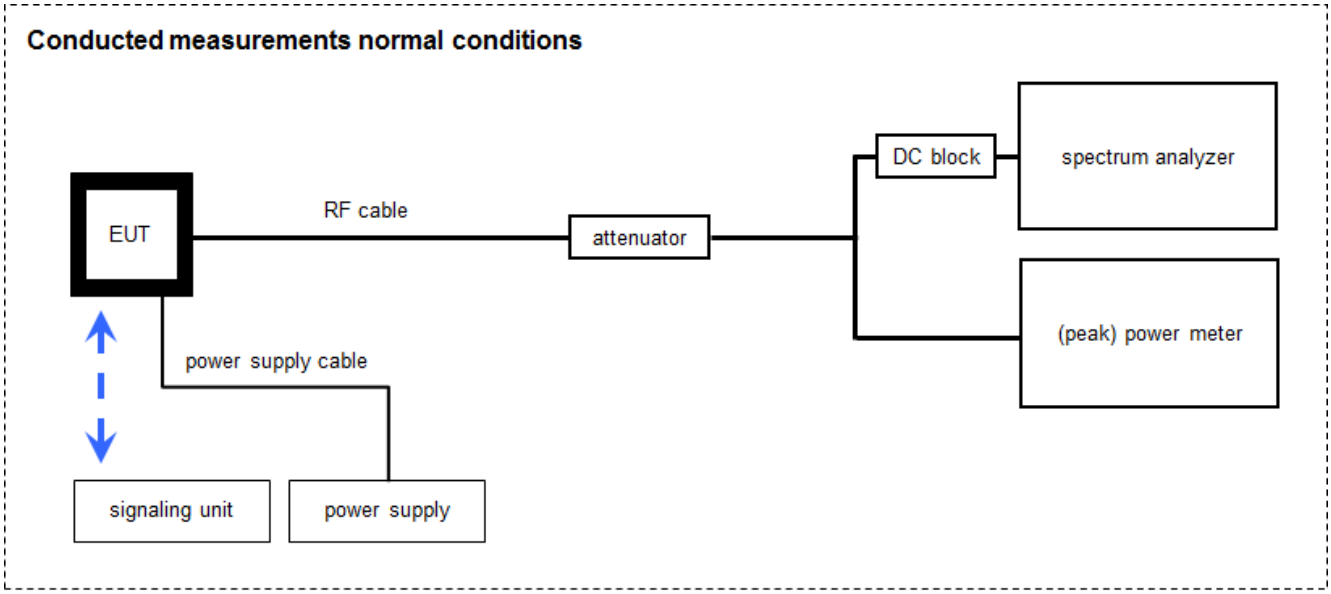
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

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	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	07.07.2017	06.07.2019
2	A	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04590	300001041	vIKI!	14.12.2017	13.12.2020
3	A	Band Reject Filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	26	300003792	ne	-/-	-/-
4	A	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
5	A	Computer	Intel Core i3 3220/3,3 GHz, Prozessor		2V2403033A5421	300004591	ne	-/-	-/-
6	A	NEXIO EMV-Software	BAT EMC V3.16.0.49	EMCO		300004682	ne	-/-	-/-
7	A	Anechoic chamber		TDK		300003726	ne	-/-	-/-
8	A	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	14.12.2017	13.12.2018
9	A	RF Amplifier	AFS4-00100800-28-20P-4-R	MITEQ	2008992	300005204	ne	-/-	-/-

6.2 Conducted measurements with peak power meter & spectrum analyzer



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	Power Meter	NRP	R&S	101367	300003678	k	18.12.2017	17.12.2018
2	A	Leistungsmeßkopf + Dämpfungsglied 30 dB	NRP-Z22	R&S	100227	300003686	k	11.12.2017	10.12.2018
3	A,B,C	DC Power Supply 0 – 32V	1108-32	Heiden Elektronik	001702	300001392	vlKl!	26.01.2017	25.01.2020
4	B	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor		2V2403033A4523	300004589	ne	-/-	-/-
5	B	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH		300004590	ne	-/-	-/-
6	B	RF-Cable	ST18/SMAm/SMAm/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
7	B+C	DC-Blocker 0.1-40 GHz	8141A	Inmet		400001185	ev	-/-	-/-
8	B	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits		400001186	ev	-/-	-/-
9	B	Signal Analyzer 40 GHz	FSV40	R&S	101353	300004819	k	12.12.2017	11.12.2019
10	B	RF-Cable WLAN-Tester Port 1	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 1273777	400001249	ev	-/-	-/-
11	C	PXA Spectrum Analyzer 3Hz to 50GHz	N9030A PXA Signal Analyzer	Agilent Technologies	US51350267	300004338	k	05.03.2018	04.03.2019

7 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

8 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	2018-08-24	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Remark
-/-	Output power verification (cond.)	Nominal	Nominal	-/-				-/-
-/-	Antenna gain	Nominal	Nominal	As per data sheet!				-/-
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 (6.2.4.1)	Spectrum bandwidth 6dB bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-
§15.407(a) RSS – 247 (6.2.1.2)	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	Nominal	Nominal	☒	☐	☐	☐	*2
§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	Nominal	Nominal	☒	☐	☐	☐	*2
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	☐	☐	☐	☒	*1
§15.209(a) RSS-Gen	Spurious emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.107(a) §15.207	Spurious emissions conducted emissions < 30 MHz	Nominal	Nominal	☐	☐	☐	☒	*1
§15.407 RSS – 247 (6.3)	DFS	Nominal	Nominal	☐	☐	☐	☒	*3

Notes:

C:	Compliant	NC:	Not compliant	NA:	Not applicable	NP:	Not performed

*1 As per module report
*2 Restricted band measurements are performed in a conducted way.
*3 Only non-DFS channels supported by the device.

9 Additional comments

Reference documents: Module Report: F161629E1_2ndVersion.pdf issued by Phoenix TESTLAB, 2017-04-18.

Antenna specification:
- ANT-DIR-2459-01-2701186_expanded
- ANT-OMNI-2459-02–2701408_Datasheet Radiation Pattern – Preliminary
- ANT-OMNI-5900-01-2701347_expanded
- RAD-ISM-2400-ANT-OMNI-2-1-RSMA-2701362
- RAD-ISM-2400-ANT-OMNI-6-0-2885919
- RAD-ISM-2400-ANT-VAN-3-0-RSMA – 2701358

Special test descriptions: For conducted measurements two operating modes are considered:
- OP1: Single antenna operation (for 9dBi Directional-Antenna)
- OP2: Dual antenna operation (for two 5dBi Omni-Antennas)

For unwanted emission measurements a correction factor of 9dB is considered to account for both antenna configurations. Hence, with regards to OP2, the results correspond to an overestimation of 1dB (5 dBi + 10*log(2) = **8 dBi**).

Radiated measurements were performed with the directional antenna (ANT-DIR-2459-01-2701186) and the omni-antenna (ANT-OMNI-5900-01-2701347_expanded) to represent the worst case configuration for each antenna type/structure with regards to the antenna gain.

Configuration descriptions: Power Settings vs. Data Rate vs. Frequency

Center Frequency [MHz]											
Mode	5180	5240	5260	5300	5320	5500	5580	5700	5745	5785	5825
a-mode	12.5	12.5	-/-	-/-	-/-	-/-	-/-	-/-	12.5	12.5	12.5
n20-mode	13.5	13.5	-/-	-/-	-/-	-/-	-/-	-/-	13	13	13
	5190	5230	5310	5510	5630	5670	5755	5795			
n40-mode	11.5	11.5	-/-	-/-	-/-	-/-	11.0	11.0			

Provided channels:

Channels with 20 MHz channel bandwidth:

U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz) channel number & centre frequency					
channel	**36**	40	44	**48**	**-/-**
f_c / MHz	**5180**	5200	5220	**5240**	

U-NII-3 (5725 MHz to 5850 MHz) channel number & centre frequency					
channel	**149**	153	**157**	161	**165**
f_c / MHz	**5745**	5765	**5785**	5805	**5825**

Channels with 40 MHz channel bandwidth:

U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz) channel number & centre frequency			
channel	**38**	**46**	**-/-**
f_c / MHz	**5190**	**5230**	

U-NII-3 (5725 MHz to 5850 MHz) channel number & centre frequency		
channel	**151**	**159**
f_c / MHz	**5755**	**5795**

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.*

10 Measurement results

10.1 Testability check

Description:

Comparison of the first assessment with the current product based on the performance and decision of the test ability.

Measurement:

Measurement parameters	
AVG Power Meter	
Test setup	See chapter 6.2 – A
Measurement uncertainty	See chapter 8

Limits:

Main report value -2 dB / +1 dB

Results:

a-mode, 9Mbit/s, UNII Band 1, Antenna 0

T_{nom}	V_{nom}	lowest channel	middle channel	highest channel
OFDM (20MHz mode (Antenna 0)				
Conducted power / dBm Main report F161629E2 3rd Version		10.8	10.9	10.3
Conducted power / dBm Test ability check – delta sample		11.1	10.6	10.2

a-mode, 9Mbit/s, UNII Band 3, Antenna 0

T_{nom}	V_{nom}	lowest channel	middle channel	highest channel
OFDM (20MHz mode (Antenna 0)				
Conducted power / dBm Main report F161629E2 3rd Version		10.1	10.4	9.9
Conducted power / dBm Test ability check – delta sample		10.0	10.0	9.5

a-mode, 9Mbit/s, UNII Band 1, Antenna 1

T_{nom}	V_{nom}	lowest channel	middle channel	highest channel
OFDM (20MHz mode (Antenna 1)				
Conducted power / dBm Main report F161629E2 3rd Version		11.9	12.1	12.1
Conducted power / dBm Test ability check – delta sample		11.2	11.6	11.7

10.2 Identify worst case data rate

Worst case data rate as specified in referential test report (see section 9).

Results:

OFDM – mode	**Modulation scheme / bandwidth**					
	U-NII-1 & U-NII-2A		U-NII-2C		U-NII-3	
	Low channel	high channel	Low channel	high channel	Low channel	high channel
a – mode	9Mbit/s	9Mbit/s	-/-		9Mbit/s	9Mbit/s
n/ac HT20 – mode	13Mbit/s	13Mbit/s			13Mbit/s	13Mbit/s
n/ac HT40 – mode	26Mbit/s	26Mbit/s			26Mbit/s	2Mbit/s

10.3 Antenna gain

As specified by the manufacturer (see section 5.1 & 9).

Limit:

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

10.4 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 6.2 – B
Measurement uncertainty:	See chapter 8

Results:

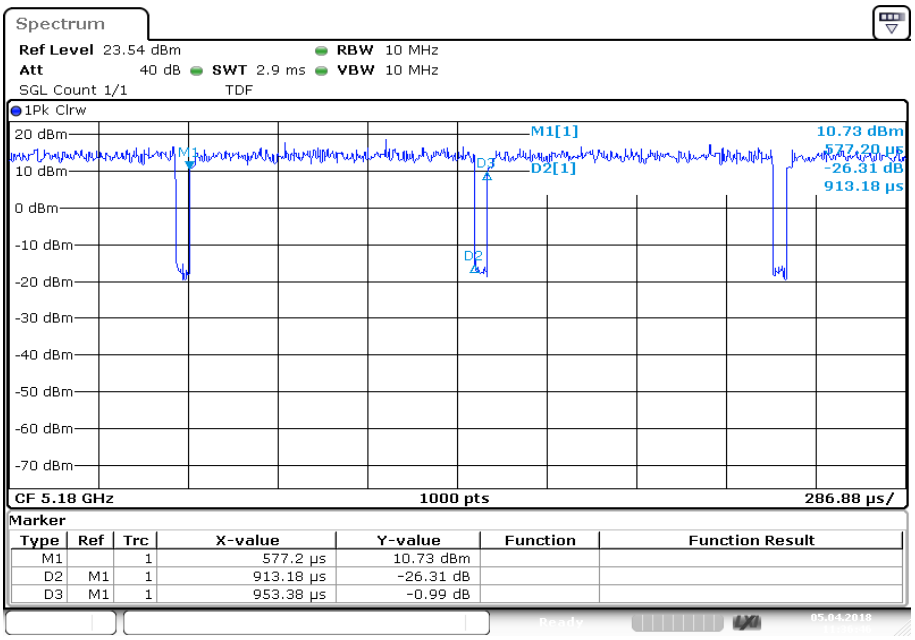
Duty cycle and correction factor:

OFDM – mode	Calculation method			
	T_{on} ($D2_{plot}$) * 100 / $T_{complete}$ ($D3_{plot}$) = duty cycle 10 * log(duty cycle) = correction factor			
	T_{on} ($D2_{plot}$)	**$T_{complete}$ ($D3_{plot}$)**	**Duty cycle**	**Correction factor**
a – mode	913 µs	954 µs	95.8 %	0.2 dB
n/ac HT20 – mode	1276 µs	1316 µs	97.0 %	0.1 dB
n/ac HT40 – mode	634.6 µs	664.5 µs	95.5 %	0.2 dB

Plots:

Duty cycle and correction factor (example for one channel & one antenna port):

Plot 1: duty cycle of the transmitter; a – mode



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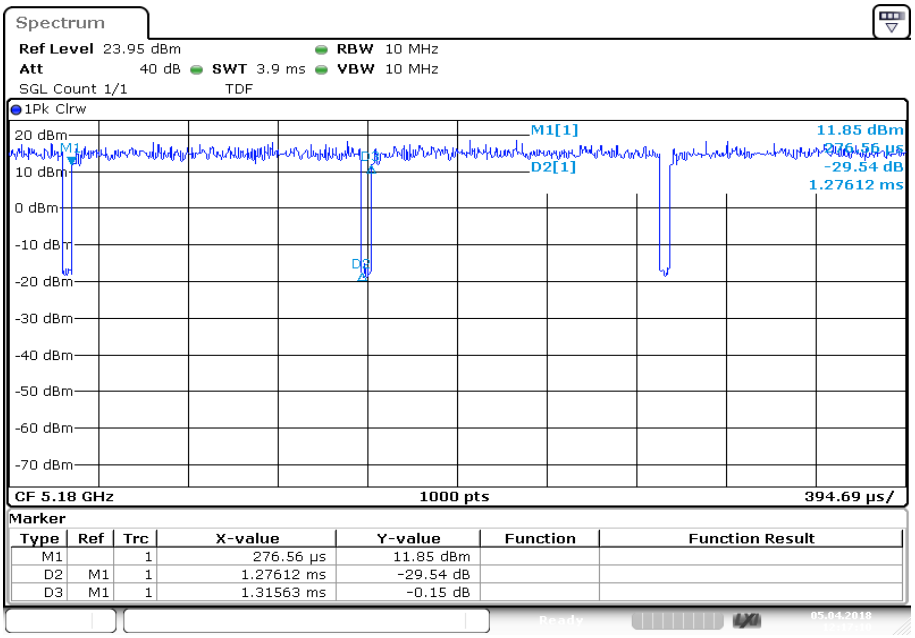
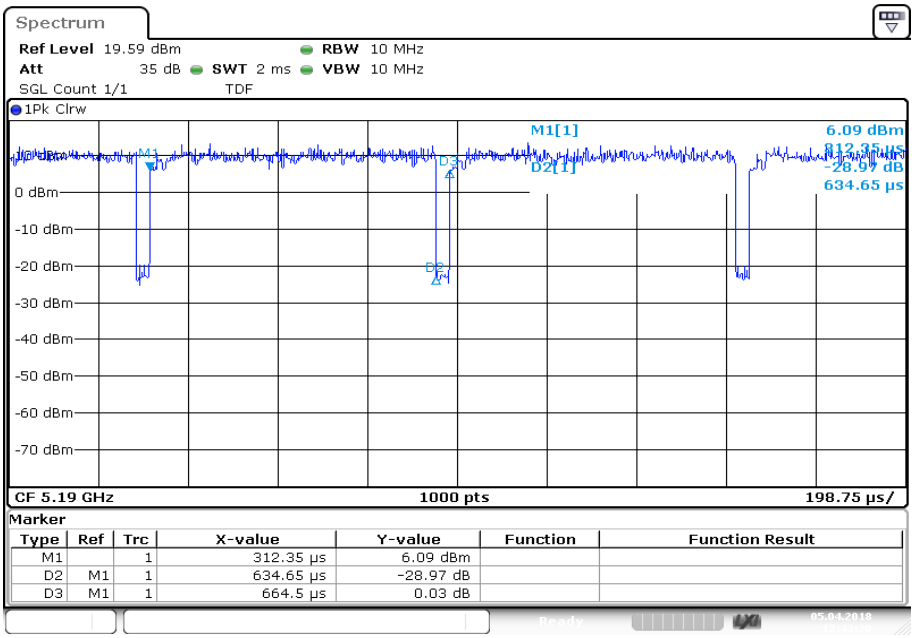
Plot 2: duty cycle of the transmitter; n/ac HT20 – mode



Date: 5.APR.2018 12:17:10

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



Date: 5.APR.2018 12:43:31

10.5 Maximum output power

10.5.1 Maximum output power according to FCC requirements

Description:

Measurement of the maximum output power conducted

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 6.2 – B
Measurement uncertainty:	See chapter 8

Limits: Single Chain Mode (9dBi Antenna consideration)

Radiated output power	Conducted output power for indoor/outdoor access point
Conducted power + 6 dBi antenna gain	5.150-5.250 GHz: 1W or 30dBm (30dBm – 3 dB = **27dBm**) 5.725-5.85 GHz: 1W or 30dBm (30dBm – 3 dB = **27dBm**)

Note: Limit is reduced by 3 dB to consider a 9dBi antenna.

Limits: Dual Chain Mode (5dBi antenna consideration)

Radiated output power	Conducted output power for indoor/outdoor access point
Conducted power + 6 dBi antenna gain	5.150-5.250 GHz: 1W or 30dBm 5.725-5.85 GHz: 1W or 30dBm

Results: a – mode / Antenna 0

a	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	10.1	10.1	9.9
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	8.5	8.6	8.1

Results: n/ac HT20 – mode / Antenna 0

n/ac HT20	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	11.1	11.1	10.9
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	8.9	8.9	8.5

Results: n/ac HT20 – mode / Antenna 0

n/ac HT40	**Maximum output power conducted [dBm]**	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Lowest channel	Highest channel
	9.5	9.6
	U-NII-2A (5250 MHz to 5350 MHz)	
	Lowest channel	Highest channel
	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)	
	Lowest channel	Highest channel
	6.7	6.8

Results: a – mode / Antenna 1

a	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	8.8	9.0	8.4
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	8.2	8.4	8.2

Results: n/ac HT20 – mode / Antenna 1

n/ac HT20	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	9.8	9.9	9.6
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	8.6	8.8	8.6

Results: n/ac HT40 – mode / Antenna 1

n/ac HT40	**Maximum output power conducted [dBm]**	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Lowest channel	Highest channel
	8.6	7.4
	U-NII-2A (5250 MHz to 5350 MHz)	
	Lowest channel	Highest channel
	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)	
	Lowest channel	Highest channel
	7.1	6.8

Results: n/ac HT20 – mode / Antenna 0&1 (Dual Chain Mode – Calculated Sum Power)

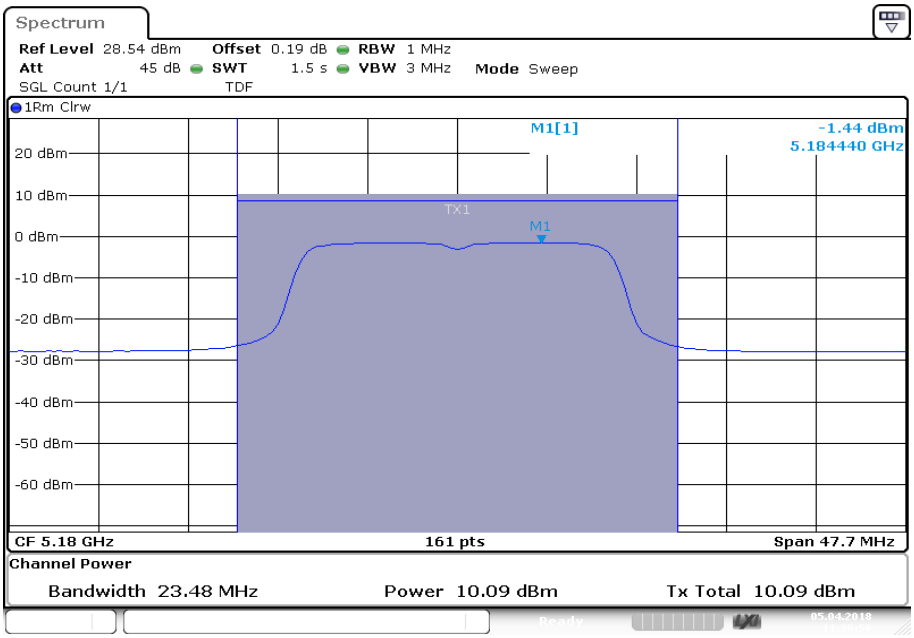
n/ac HT20	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	13.5	13.6	13.3
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	11.8	11.9	11.6

Results: n/ac HT40 – mode / Antenna 0&1 (Dual Chain Mode – Calculated Sum Power)

n/ac HT40	**Maximum output power conducted [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	12.1		11.6
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	-/-		-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	9.9		9.8

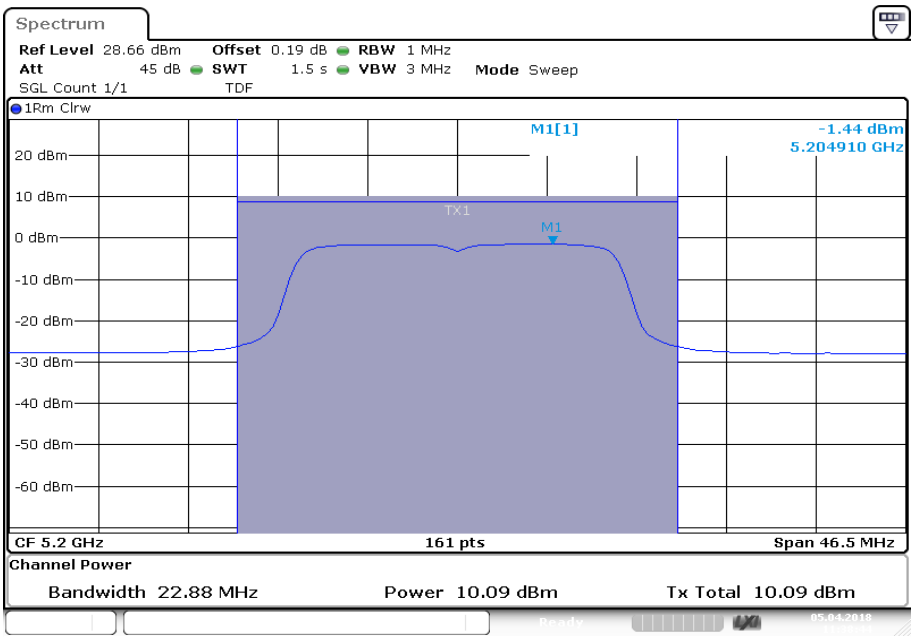
Plots: a – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



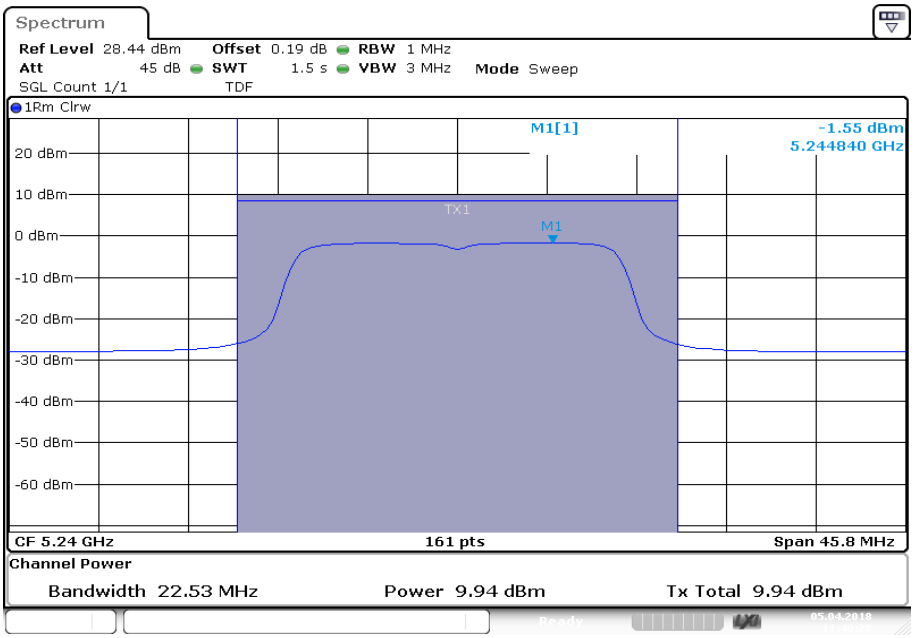
Date: 5.APR.2018 11:36:57

Plot 2: U-NII-1; middle channel



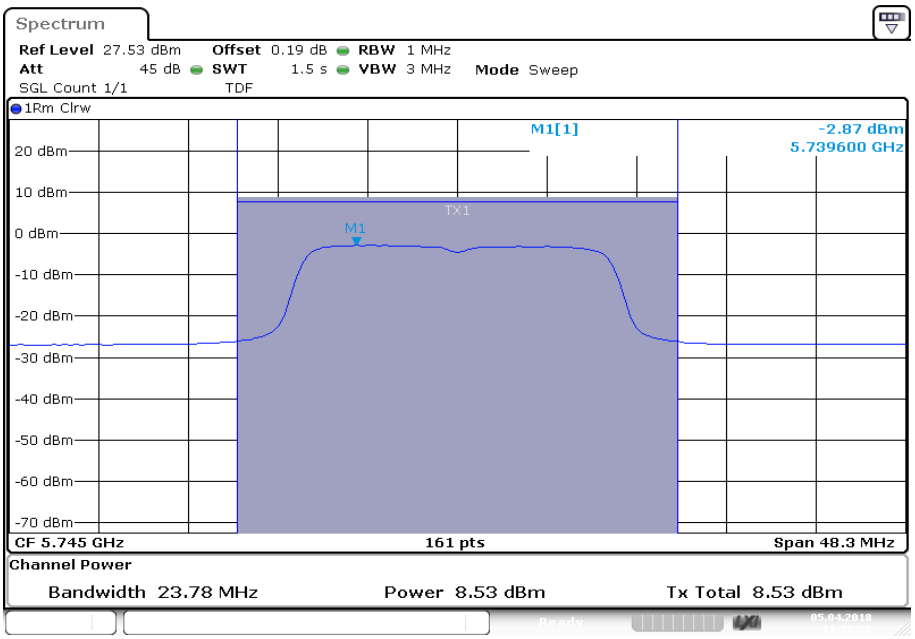
Date: 5.APR.2018 11:38:45

Plot 3: U-NII-1; highest channel



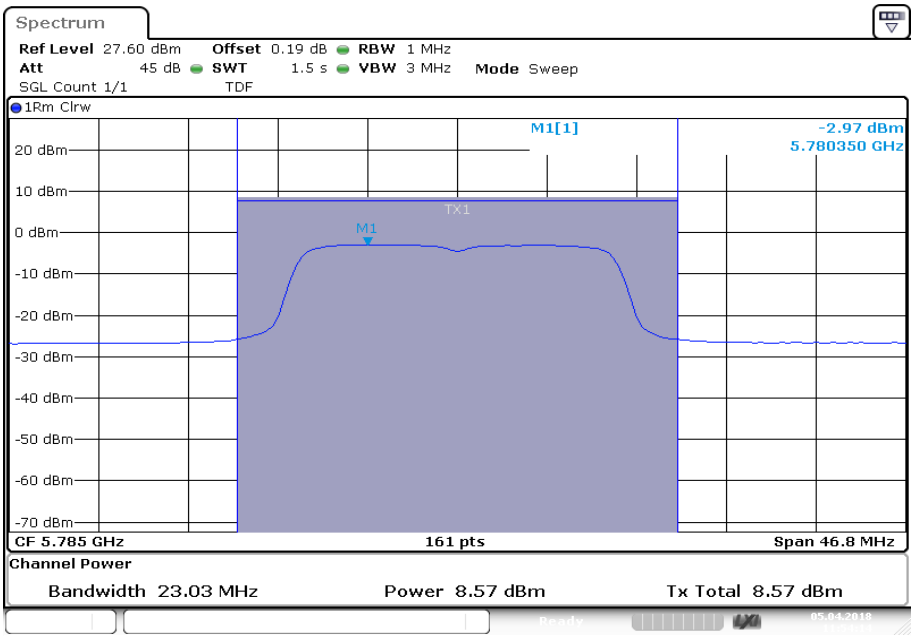
Date: 5.APR.2018 11:40:29

Plot 4: U-NII-3; lowest channel



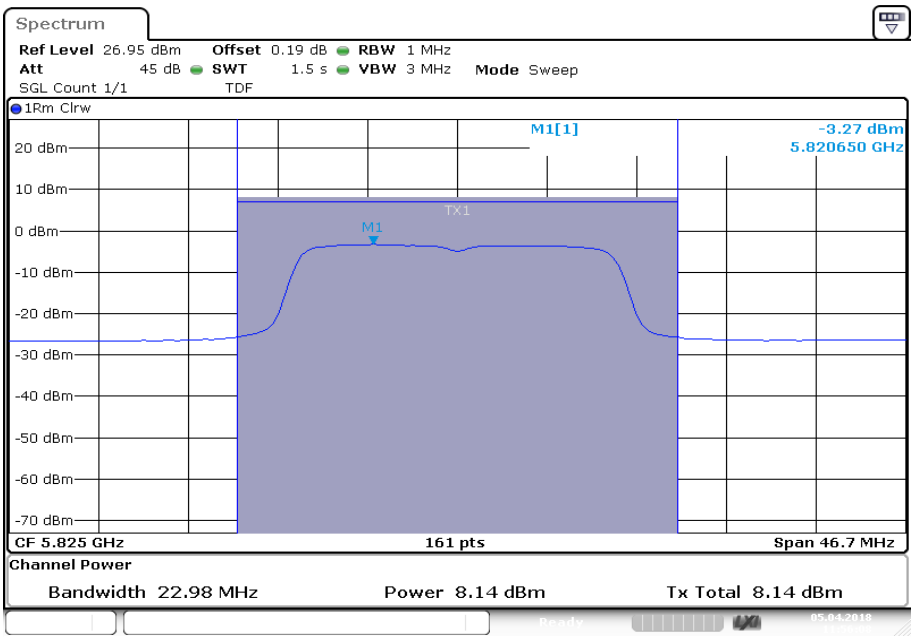
Date: 5.APR.2018 11:52:23

Plot 5: U-NII-3; middle channel



Date: 5.APR.2018 11:54:15

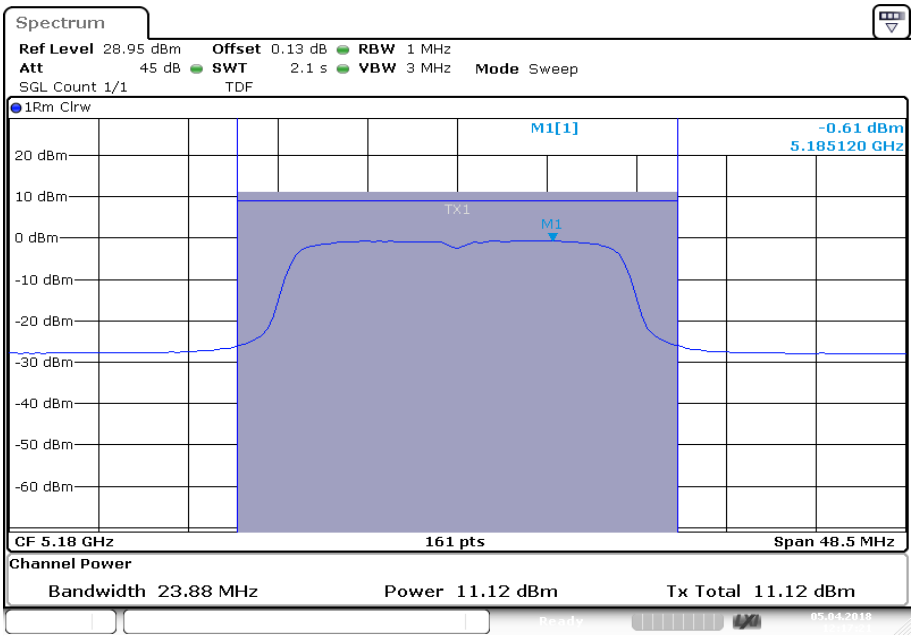
Plot 6: U-NII-3; highest channel



Date: 5.APR.2018 11:56:09

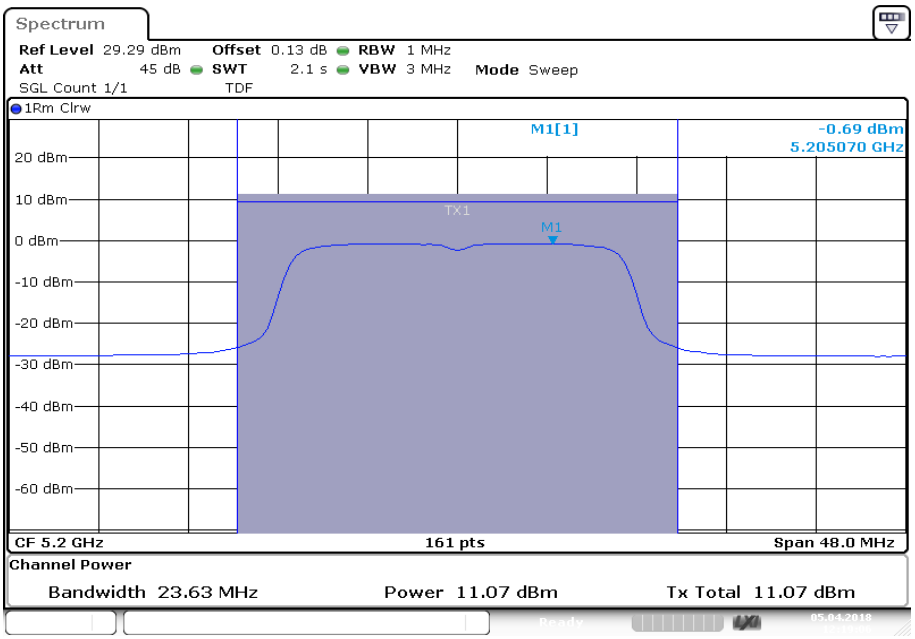
Plots: n/ac HT20 – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



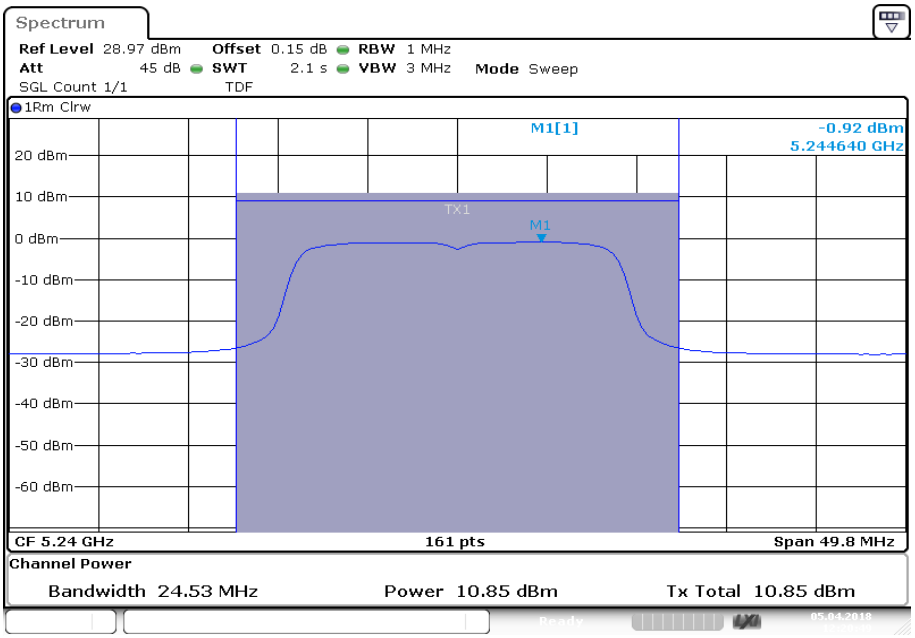
Date: 5.APR.2018 12:17:22

Plot 2: U-NII-1; middle channel



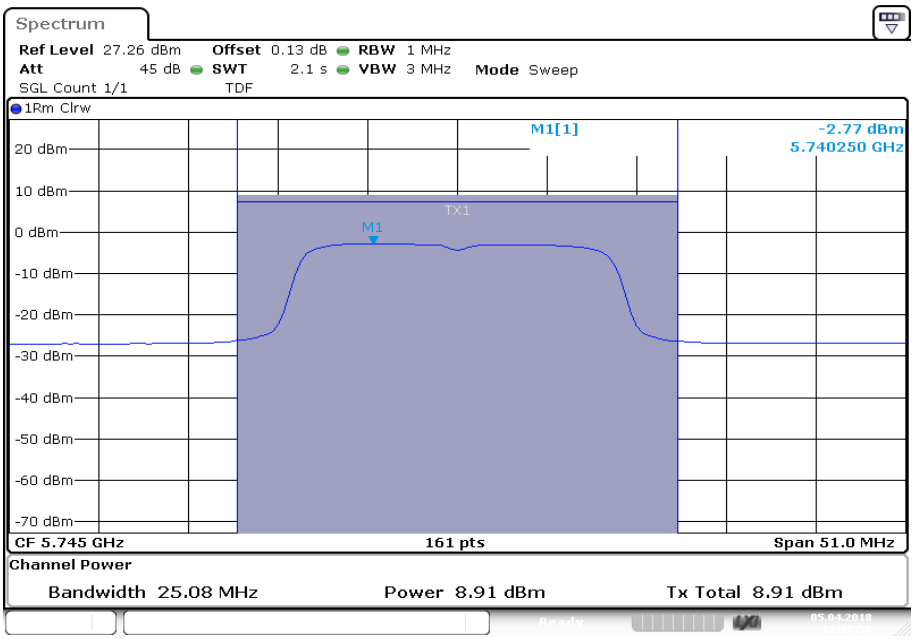
Date: 5.APR.2018 12:19:07

Plot 3: U-NII-1; highest channel



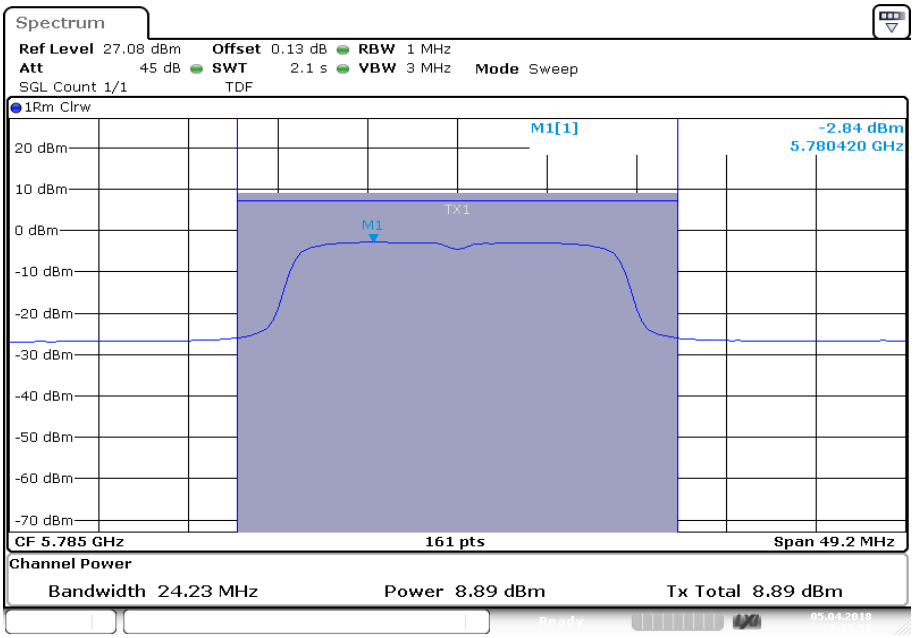
Date: 5.APR.2018 12:20:50

Plot 4: U-NII-3; lowest channel



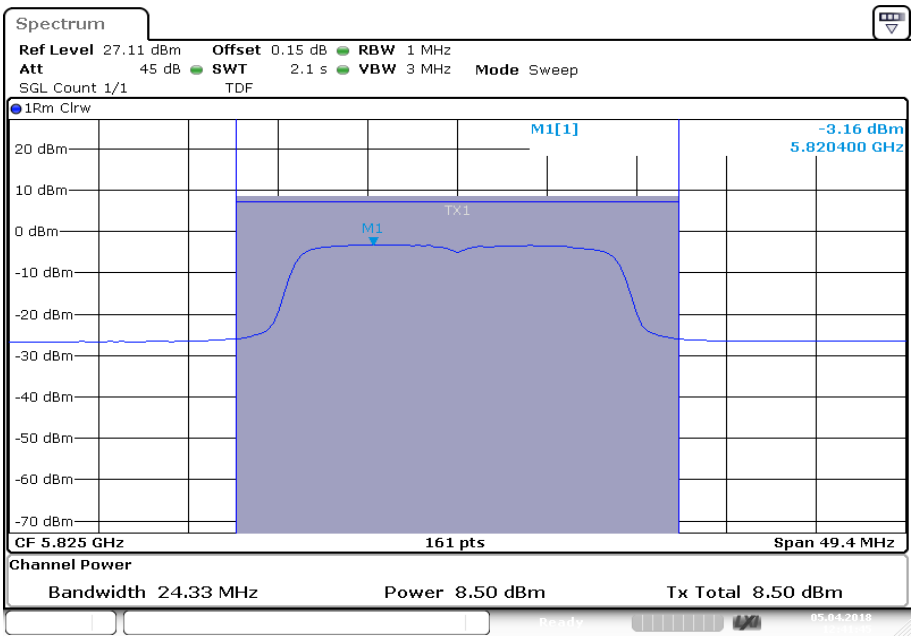
Date: 5.APR.2018 12:37:59

Plot 5: U-NII-3; middle channel



Date: 5.APR.2018 12:39:51

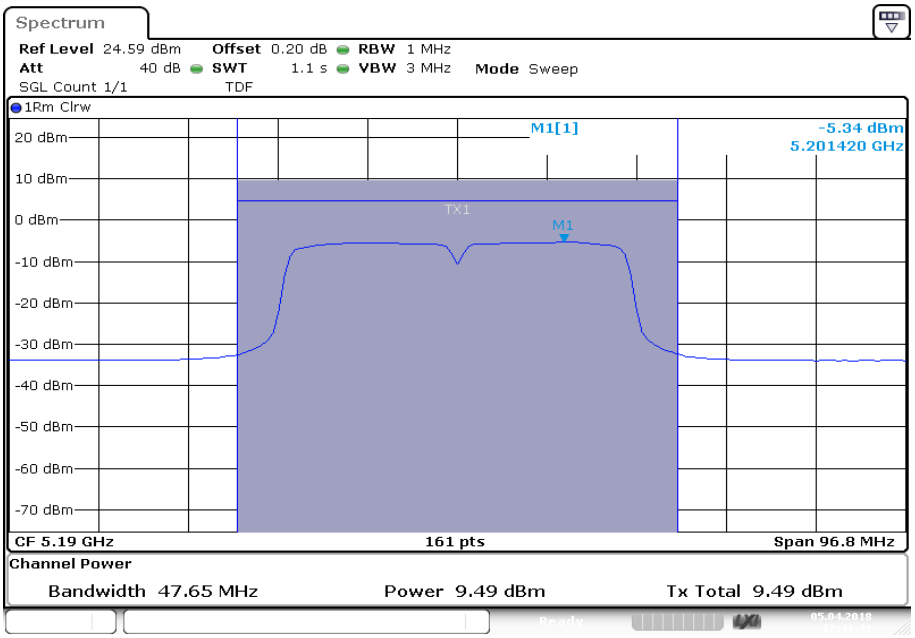
Plot 6: U-NII-3; highest channel



Date: 5.APR.2018 12:41:46

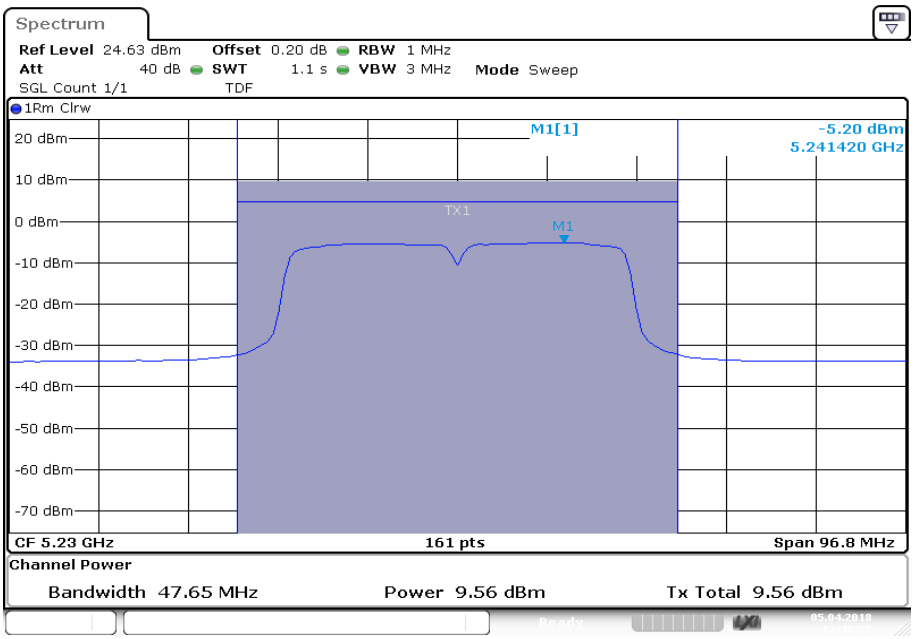
Plots: n/ac HT40 – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



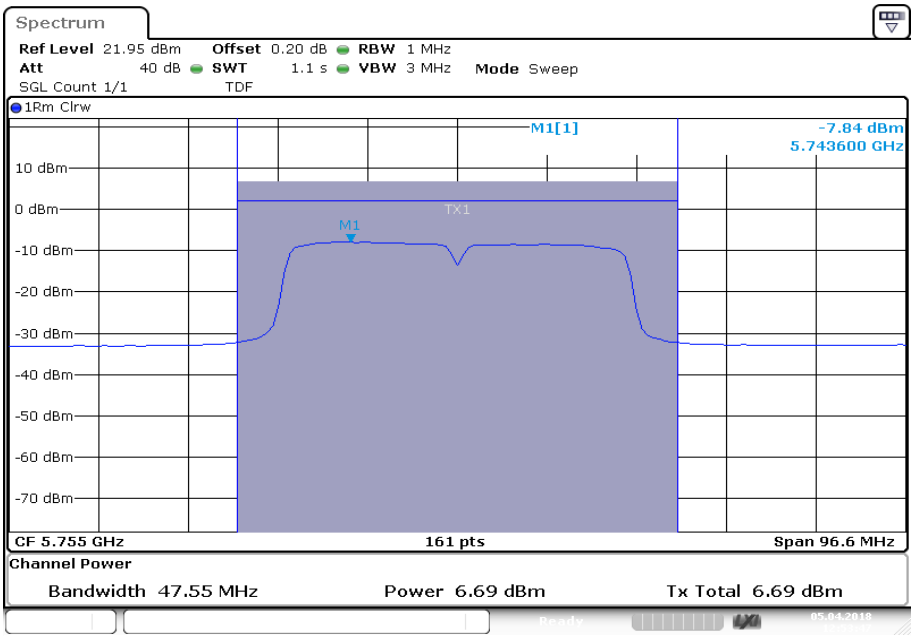
Date: 5.APR.2018 12:43:42

Plot 2: U-NII-1; highest channel



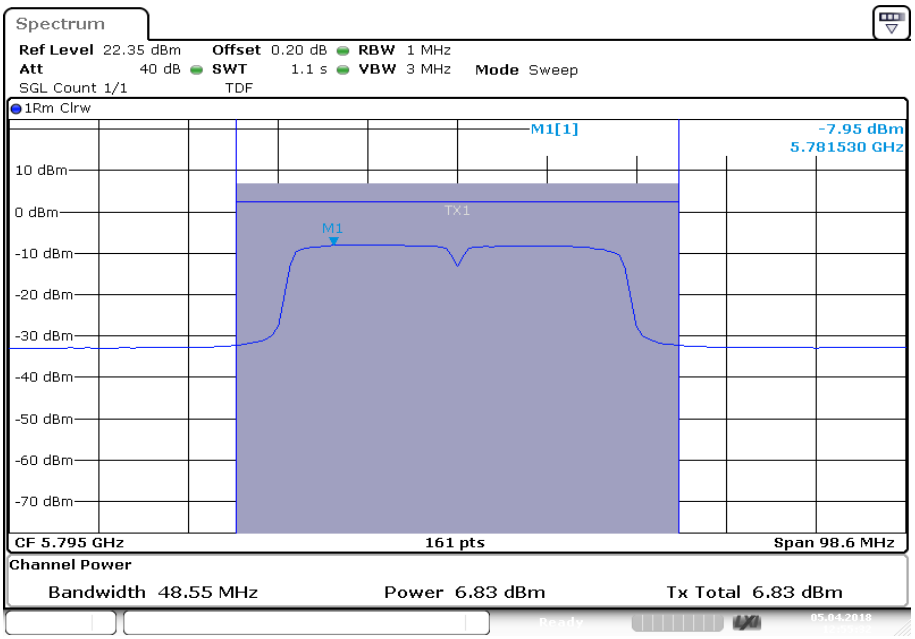
Date: 5.APR.2018 12:45:27

Plot 3: U-NII-3; lowest channel



Date: 5.APR.2018 12:53:47

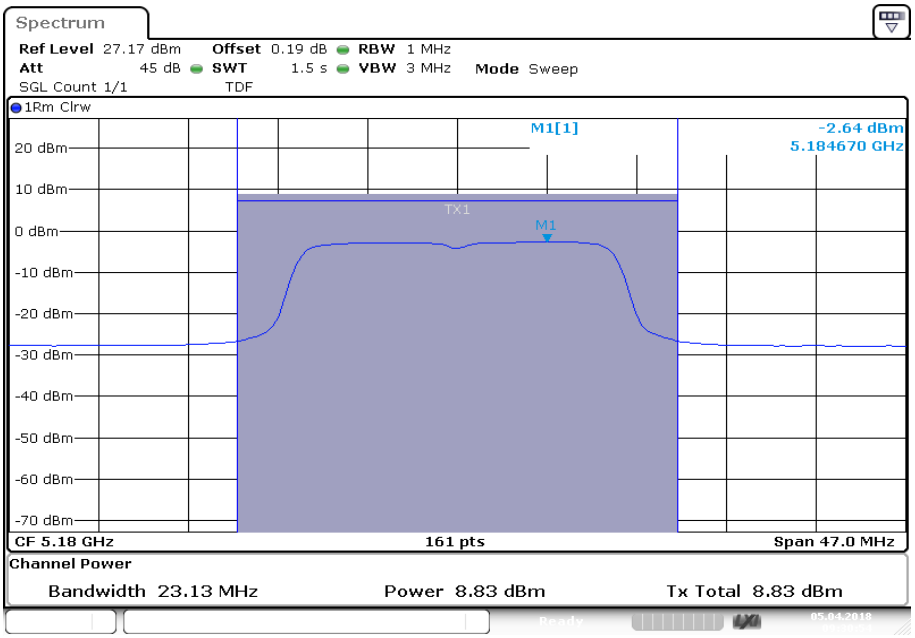
Plot 4: U-NII-3; highest channel



Date: 5.APR.2018 12:55:33

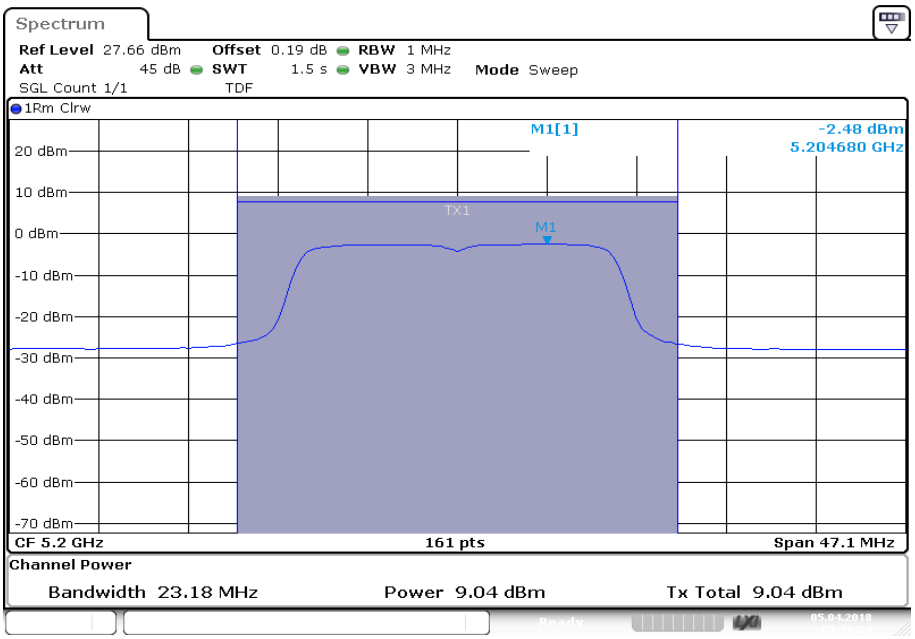
Plots: a – mode / Antenna 1

Plot 7: U-NII-1; lowest channel



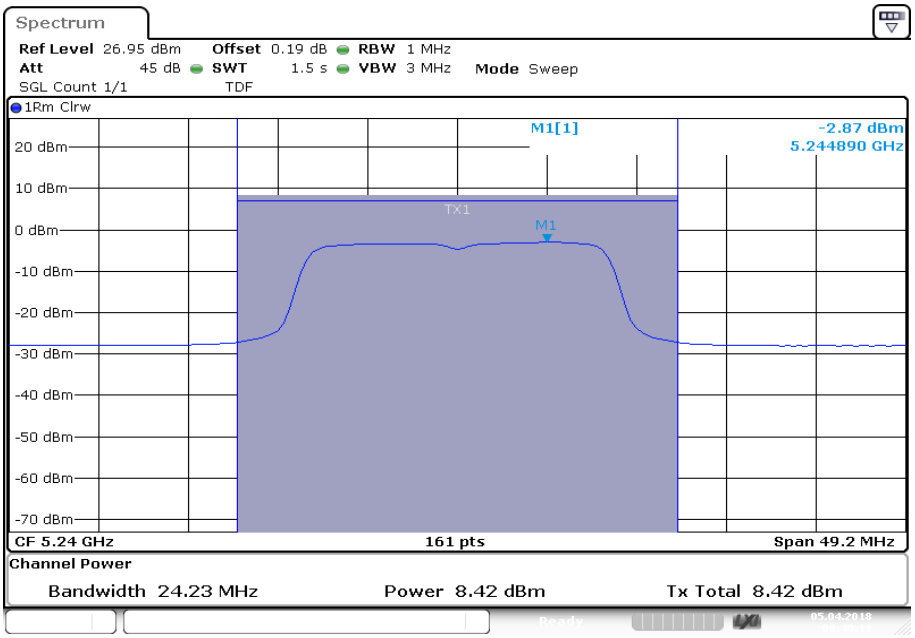
Date: 5.APR.2018 09:30:54

Plot 8: U-NII-1; middle channel



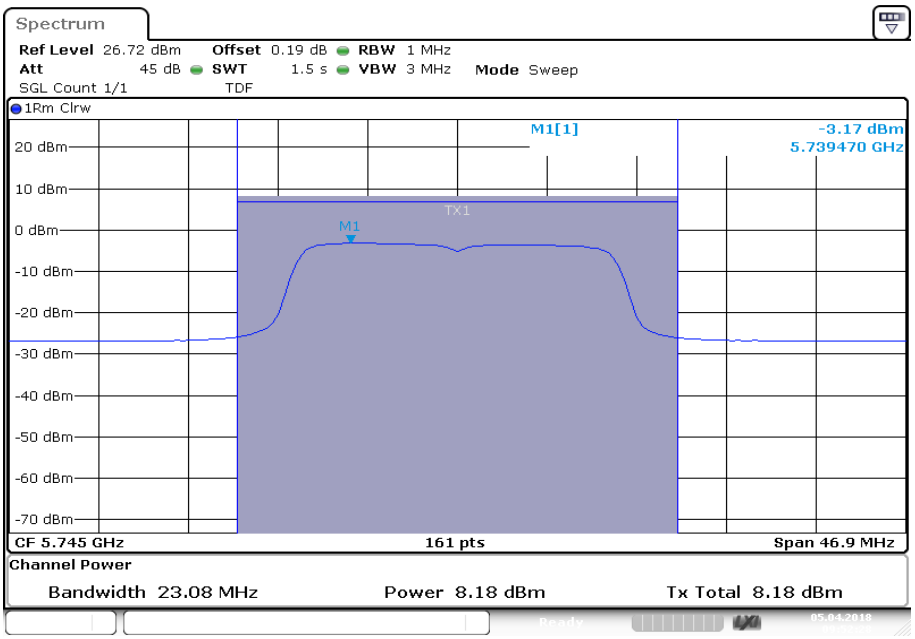
Date: 5.APR.2018 09:36:25

Plot 9: U-NII-1; highest channel



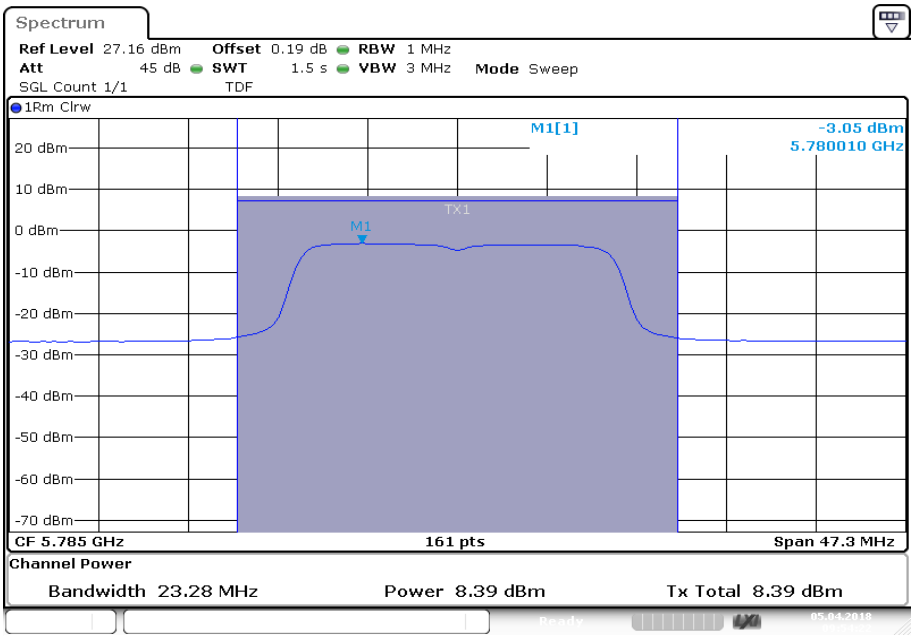
Date: 5.APR.2018 09:40:12

Plot 10: U-NII-3; lowest channel



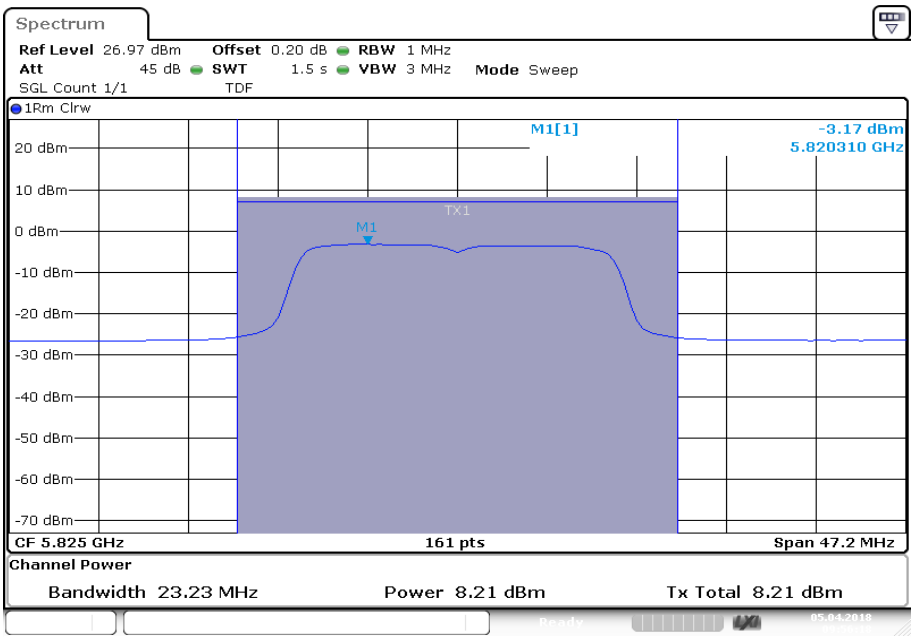
Date: 5.APR.2018 09:52:29

Plot 11: U-NII-3; middle channel



Date: 5.APR.2018 09:54:23

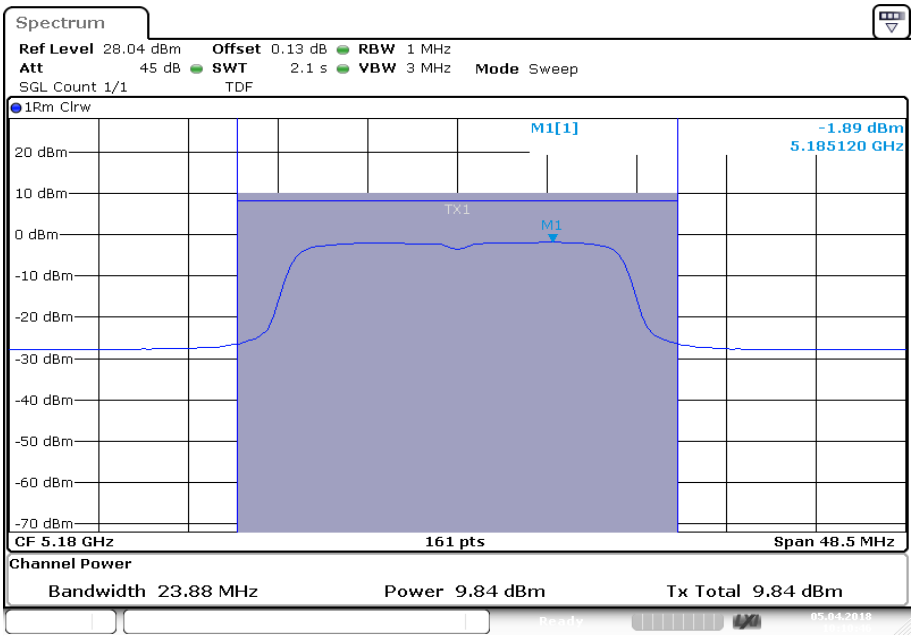
Plot 12: U-NII-3; highest channel



Date: 5.APR.2018 09:56:19

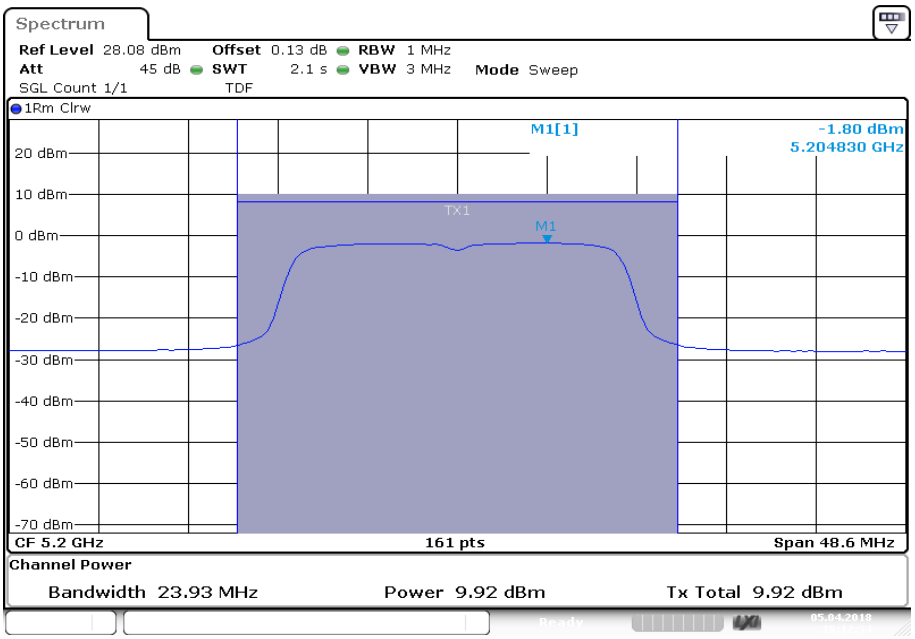
Plots: n/ac HT20 – mode / Antenna 1

Plot 7: U-NII-1; lowest channel



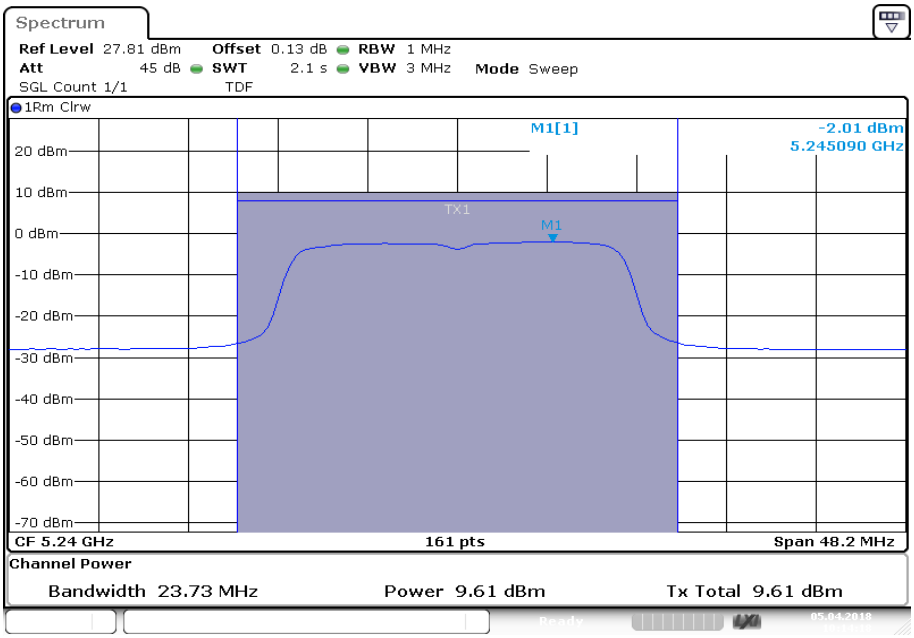
Date: 5.APR.2018 10:10:47

Plot 8: U-NII-1; middle channel



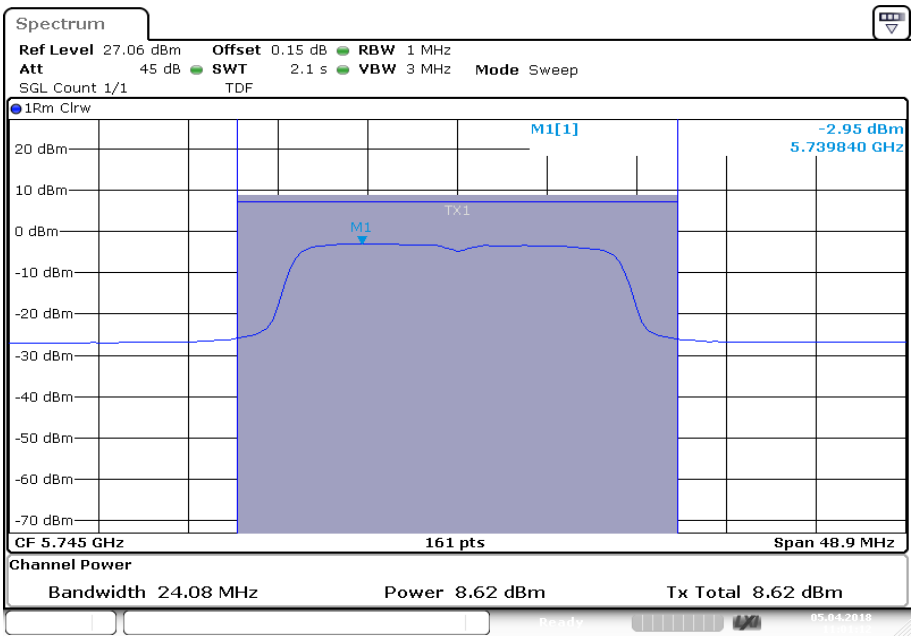
Date: 5.APR.2018 10:12:34

Plot 9: U-NII-1; highest channel



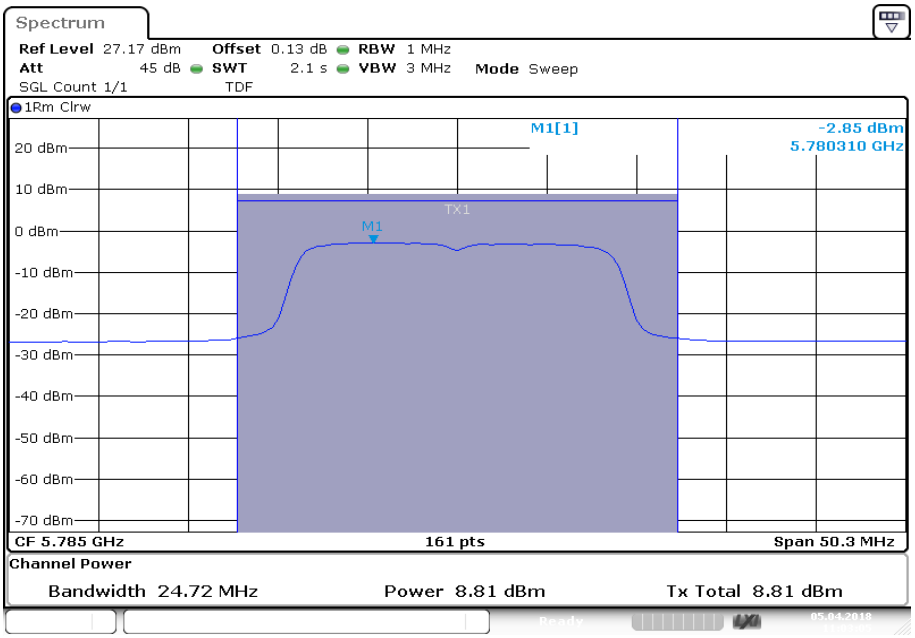
Date: 5.APR.2018 10:14:19

Plot 10: U-NII-3; lowest channel



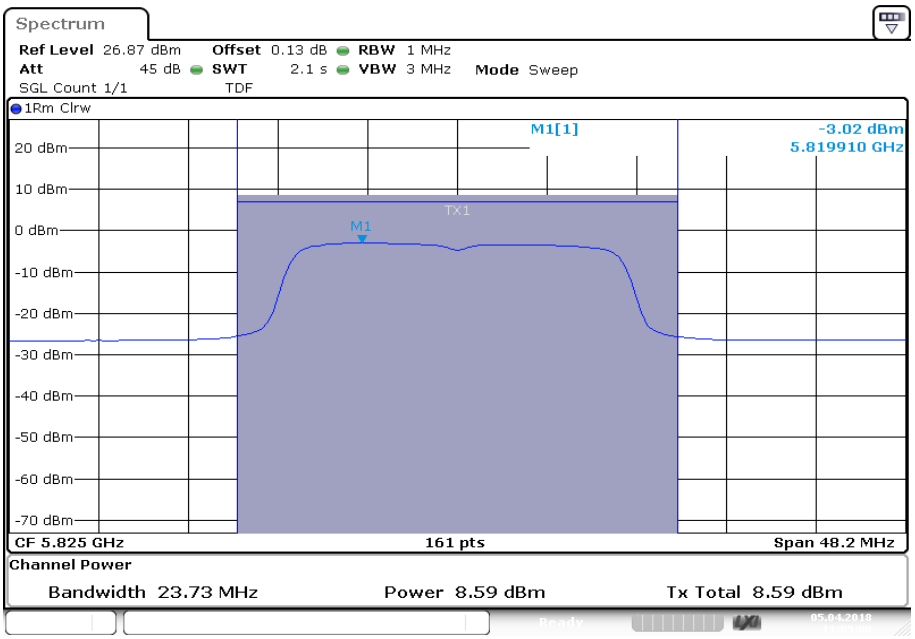
Date: 5.APR.2018 11:01:13

Plot 11: U-NII-3; middle channel



Date: 5.APR.2018 11:03:06

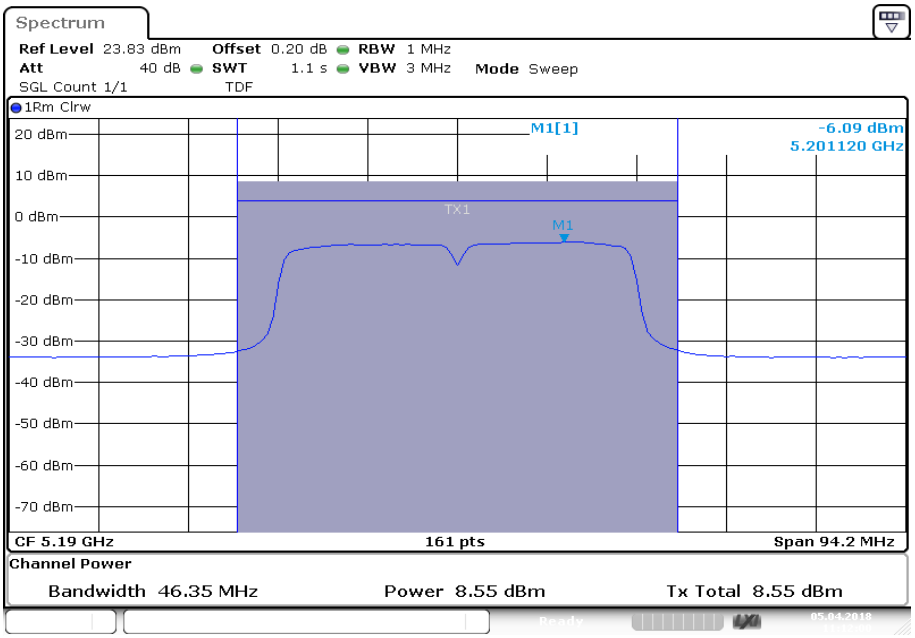
Plot 12: U-NII-3; highest channel



Date: 5.APR.2018 11:05:01

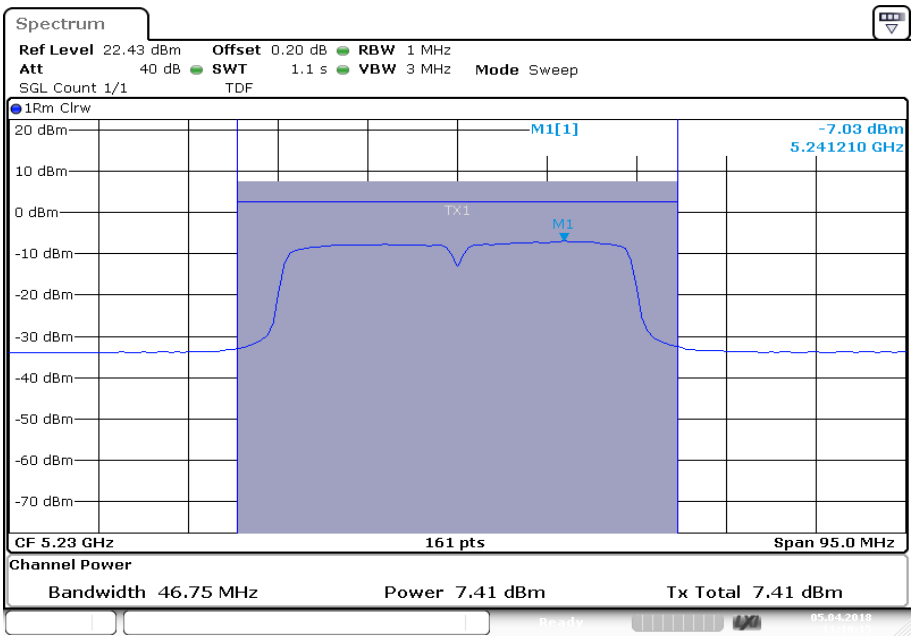
Plots: n/ac HT40 – mode / Antenna 1

Plot 5: U-NII-1; lowest channel



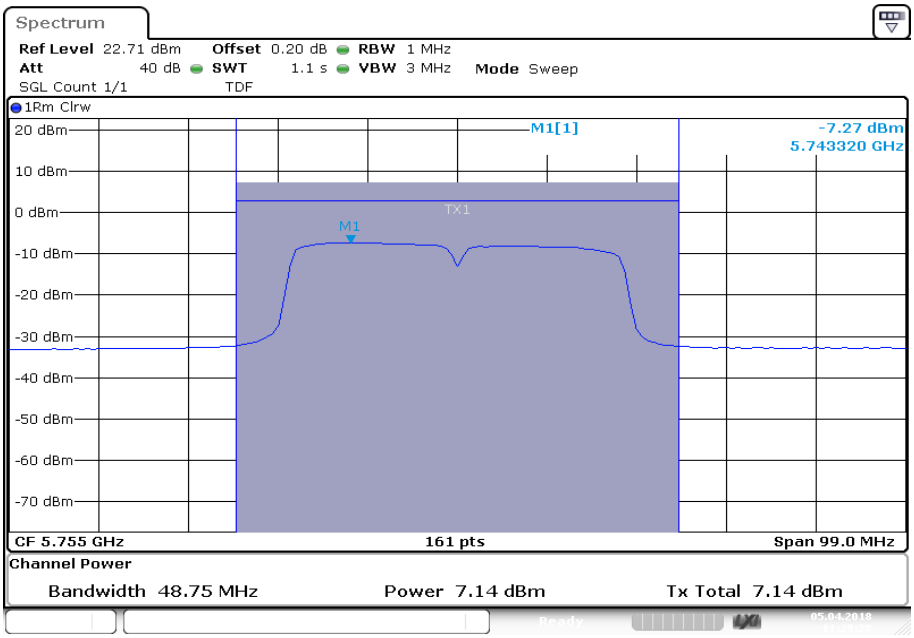
Date: 5.APR.2018 11:12:01

Plot 6: U-NII-1; highest channel



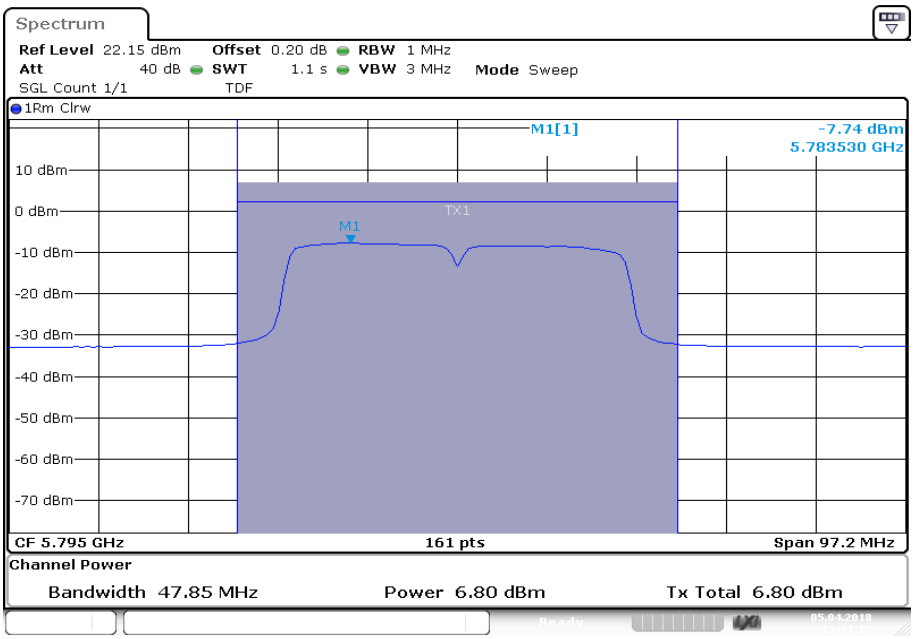
Date: 5.APR.2018 11:10:16

Plot 7: U-NII-3; lowest channel



Date: 5.APR.2018 11:29:29

Plot 8: U-NII-3; highest channel



Date: 5.APR.2018 11:31:16

10.5.2 Maximum output power according to 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 6.2 – B
Measurement uncertainty:	See chapter 8

Limits:

Radiated output power	Conducted output power for devices, other than devices installed in vehicles
The lesser one of 200 mW (23.0dBm) or 10 dBm + 10 log Bandwidth 5.150-5.250 GHz Conducted power + 6dBi antenna gain 5.725-5.825 GHz	5.725-5.85 GHz: 1W or 30dBm (30dBm – 3 dB = **27dBm**)

Note:
The conducted limit is reduced by 3 dB to consider a 9dBi antenna.
E.i.r.p results in single chain mode are calculated using the highest allowed gain of 9dBi.
E.i.r.p. results in dual chain mode are calculated using the highest allowed gain of 5dBi.

Results: a – mode / Antenna 0

a	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	10.2	9.9	9.9
	Radiated (calculated – see chapter antenna gain)		
	19.2	18.9	18.9
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	8.5	8.6	8.1
	Radiated (calculated – see chapter antenna gain)		
	17.5	17.6	17.1

Results: n/ac – mode / Antenna 0

n/ac HT20	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	11.2	10.9	10.8
	Radiated (calculated – see chapter antenna gain)		
	20.2	19.9	19.8
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	8.8	8.8	8.4
	Radiated (calculated – see chapter antenna gain)		
	17.8	17.8	17.4

Results: n/ac HT40 – mode / Antenna 0

n/ac HT40	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	Conducted		
	9.5		9.5
	Radiated (calculated – see chapter antenna gain)		
	18.5		18.5
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-/-		-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-		-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	Conducted		
	6.7		6.8
	Radiated (calculated – see chapter antenna gain)		
	15.7		15.8

Results: a – mode / Antenna 1

a	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	8.7	9.1	8.4
	Radiated (calculated – see chapter antenna gain)		
	17.7	18.1	17.4
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	8.1	8.3	8.2
	Radiated (calculated – see chapter antenna gain)		
	17.1	17.3	17.2

Results: n/ac – mode / Antenna 1

n/ac HT20	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	9.9	10.1	9.5
	Radiated (calculated – see chapter antenna gain)		
	18.9	19.1	18.5
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	8.5	8.7	8.5
	Radiated (calculated – see chapter antenna gain)		
	17.5	17.7	17.5

Results: n/ac HT40 – mode / Antenna 1

n/ac HT40	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	Conducted		
	8.5		7.5
	Radiated (calculated – see chapter antenna gain)		
	17.5		16.5
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-/-		-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-		-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	Conducted		
	7.3		6.8
	Radiated (calculated – see chapter antenna gain)		
	16.3		15.8

Results: n/ac – mode / Antenna 0&1 (Dual Chain Mode – Calculated Sum Power)

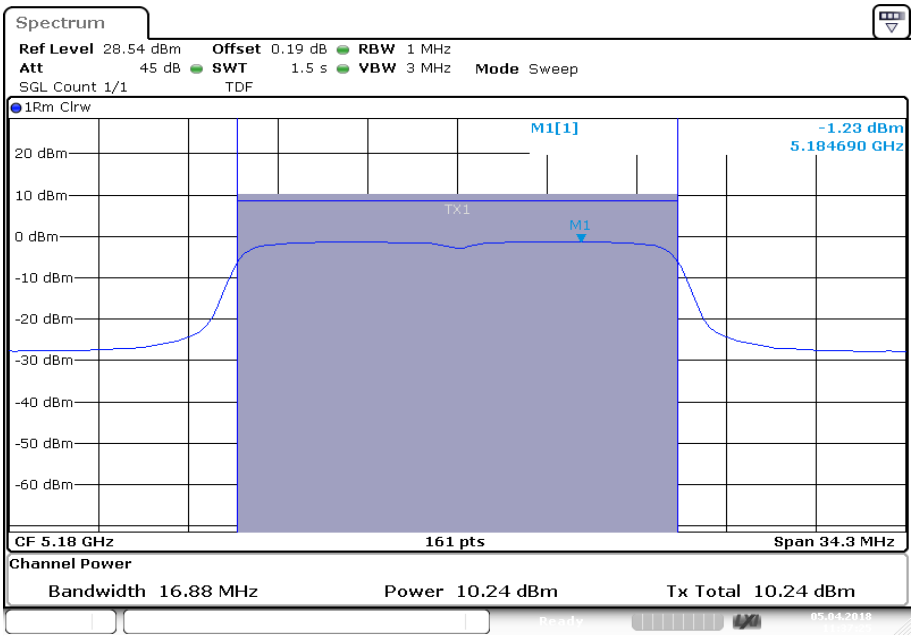
n/ac HT20	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	13.6	13.5	13.2
	Radiated (calculated – see chapter antenna gain)		
	18.6	18.5	18.2
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	11.7	11.8	11.5
	Radiated (calculated – see chapter antenna gain)		
	16.7	16.8	16.5

Results: n/ac HT40 – mode / Antenna 0&1 (Dual Chain Mode – Calculated Sum Power)

n/ac HT40	**Maximum output power [dBm]**		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	Conducted		
	12.0		11.6
	Radiated (calculated – see chapter antenna gain)		
	17.0		16.6
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-/-		-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-		-/-
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	-/-	-/-	-/-
	Radiated (calculated – see chapter antenna gain)		
	-/-	-/-	-/-
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	Conducted		
	10.0		9.8
	Radiated (calculated – see chapter antenna gain)		
	15.0		14.8

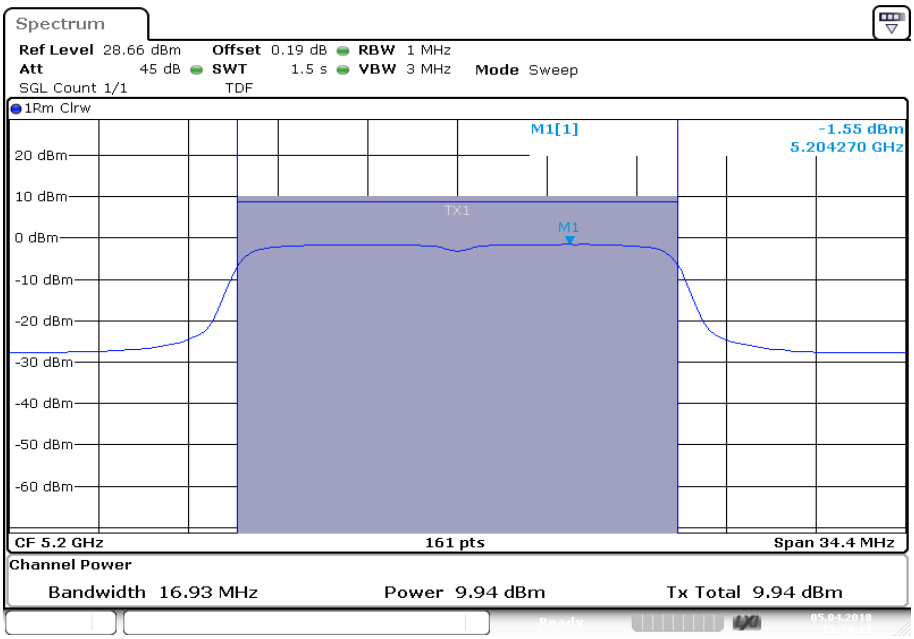
Plots: a – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



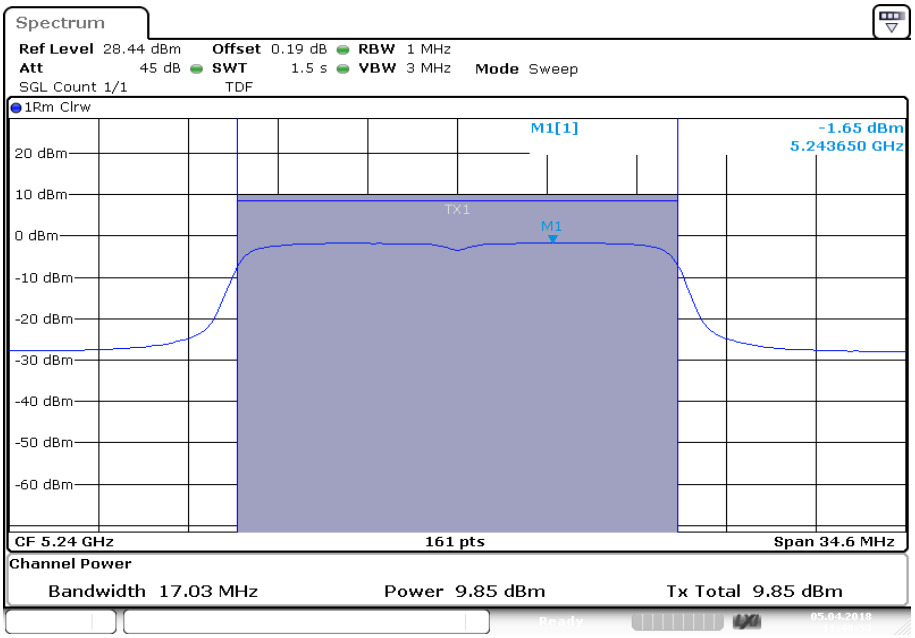
Date: 5.APR.2018 11:37:26

Plot 2: U-NII-1; middle channel



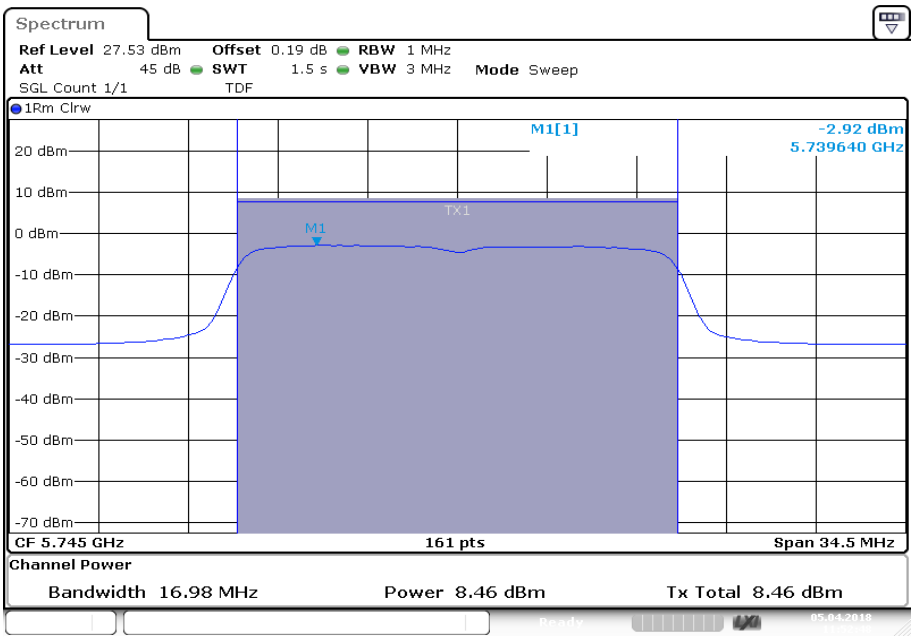
Date: 5.APR.2018 11:39:12

Plot 3: U-NII-1; highest channel



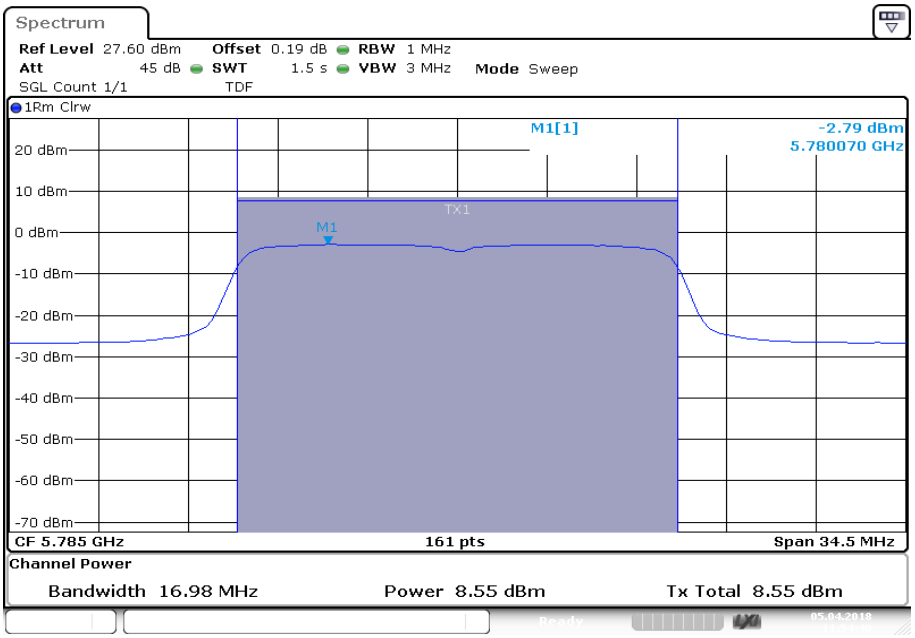
Date: 5.APR.2018 11:40:54

Plot 4: U-NII-3; lowest channel



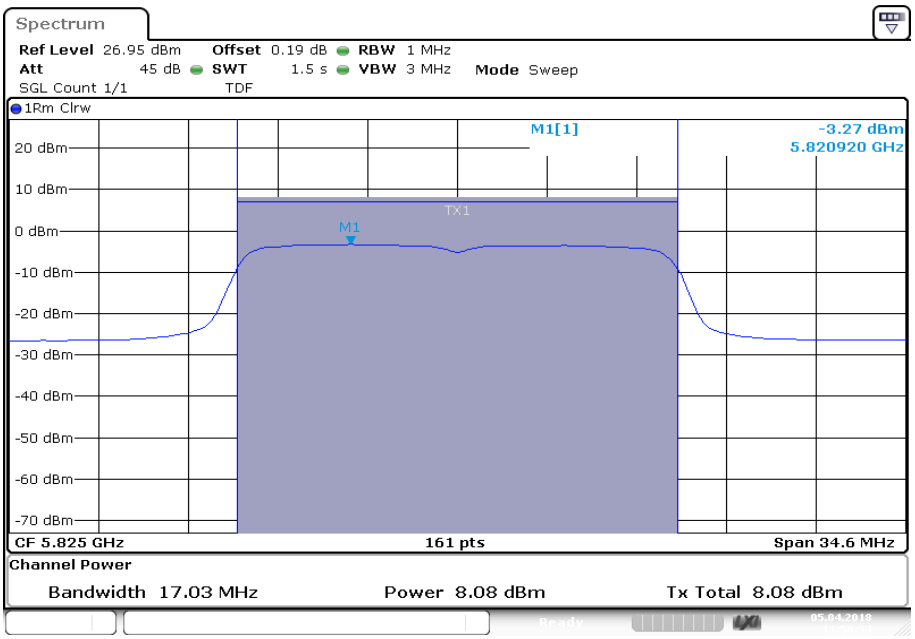
Date: 5.APR.2018 11:52:48

Plot 5: U-NII-3; middle channel



Date: 5.APR.2018 11:54:41

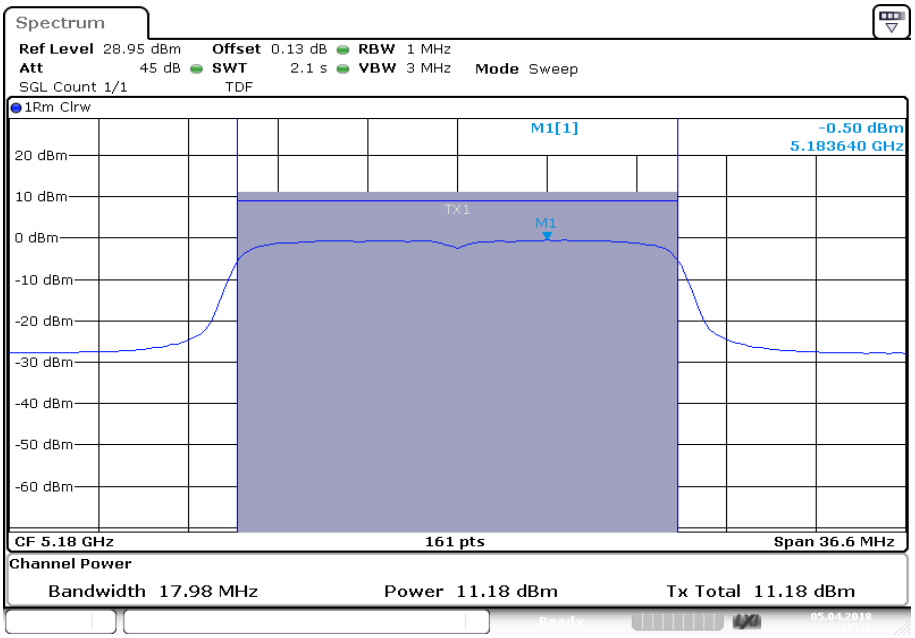
Plot 6: U-NII-3; highest channel



Date: 5.APR.2018 11:56:34

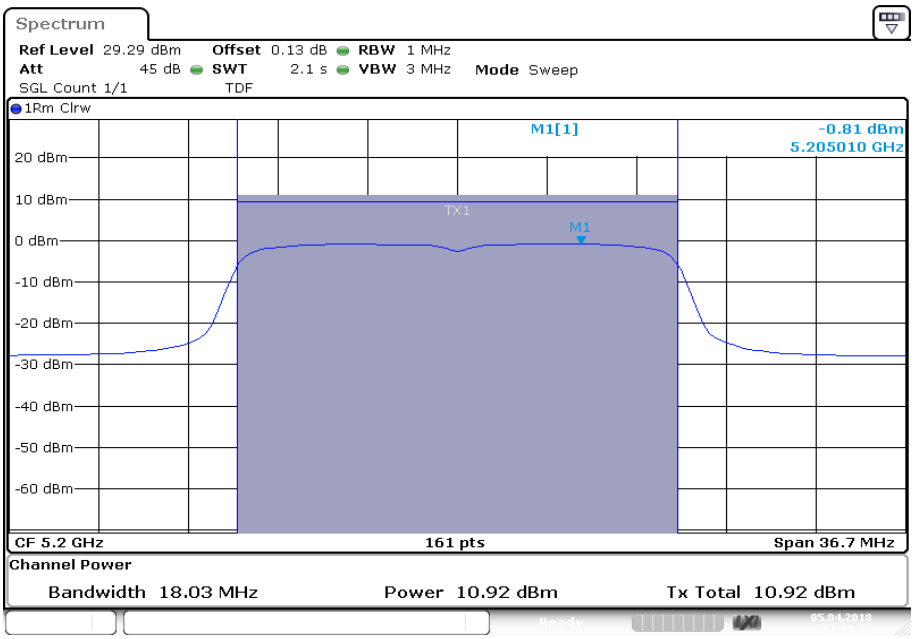
Plots: n/ac HT20 – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



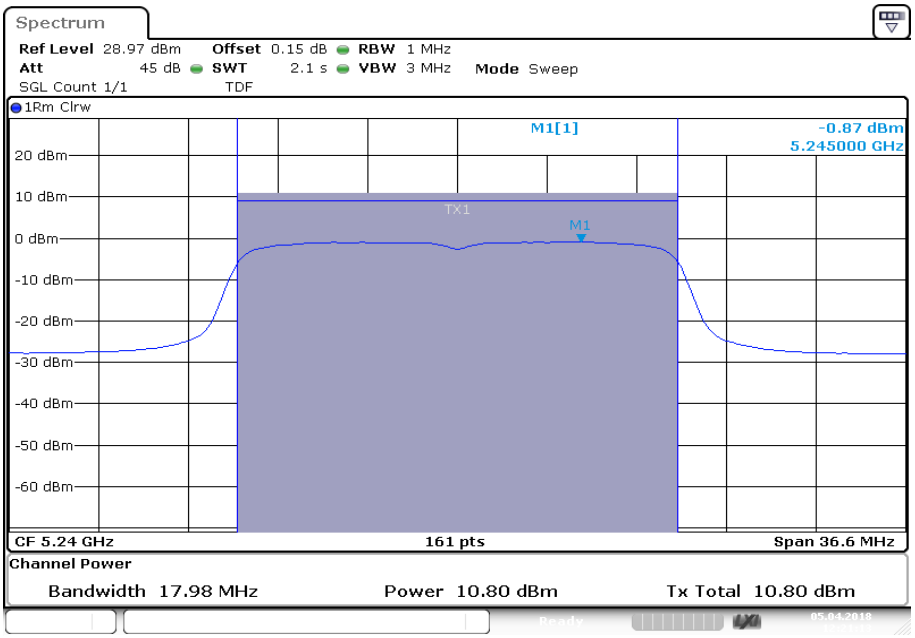
Date: 5.APR.2018 12:17:49

Plot 2: U-NII-1; middle channel



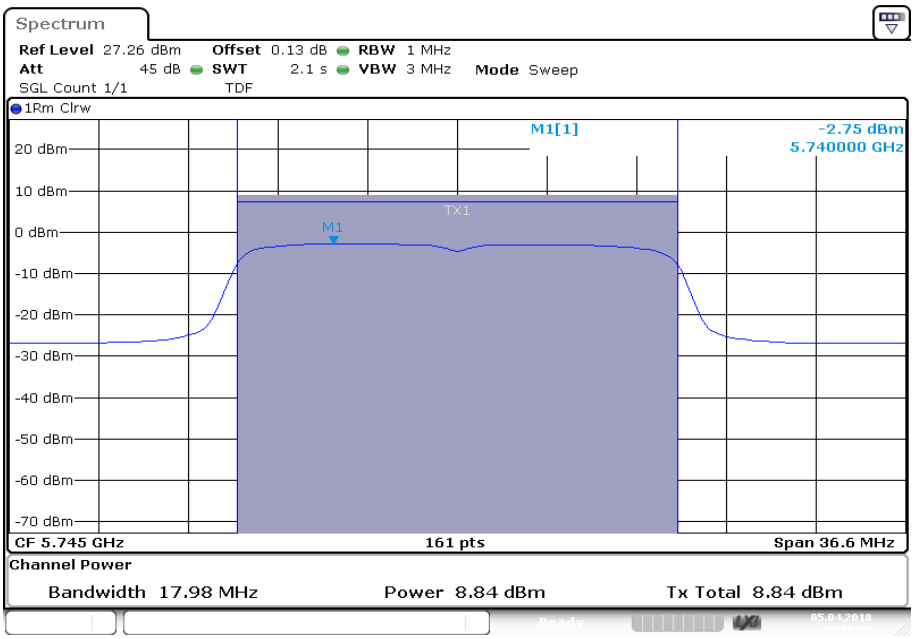
Date: 5.APR.2018 12:19:33

Plot 3: U-NII-1; highest channel



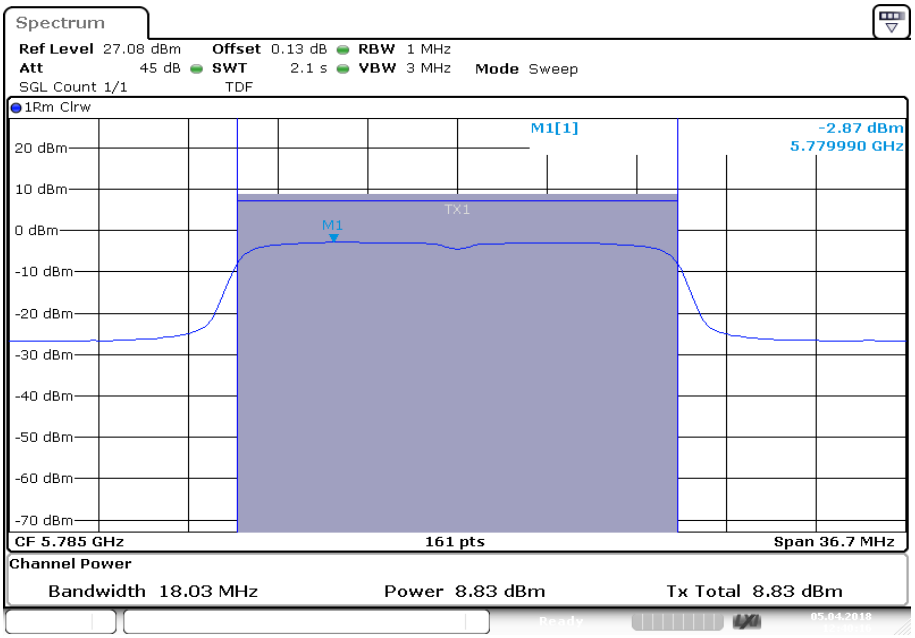
Date: 5.APR.2018 12:21:13

Plot 4: U-NII-3; lowest channel



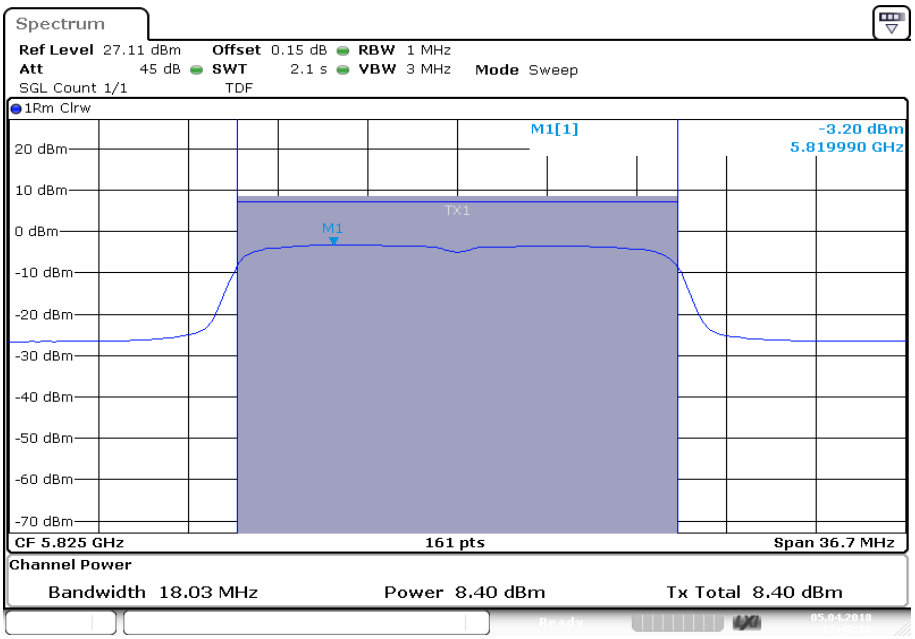
Date: 5.APR.2018 12:38:23

Plot 5: U-NII-3; middle channel



Date: 5.APR.2018 12:40:17

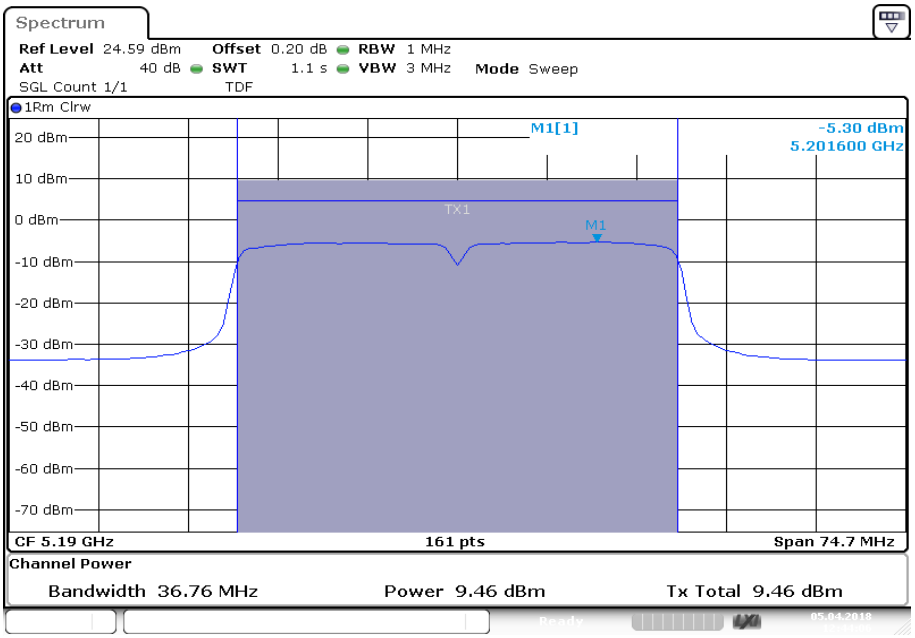
Plot 6: U-NII-3; highest channel



Date: 5.APR.2018 12:42:10

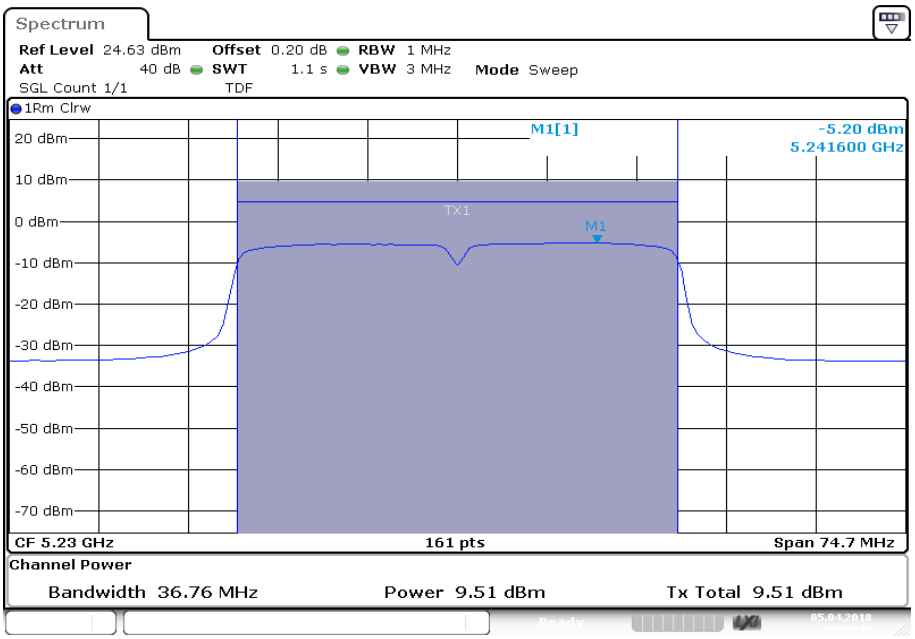
Plots: n/ac HT40 – mode / Antenna 0

Plot 1: U-NII-1; lowest channel



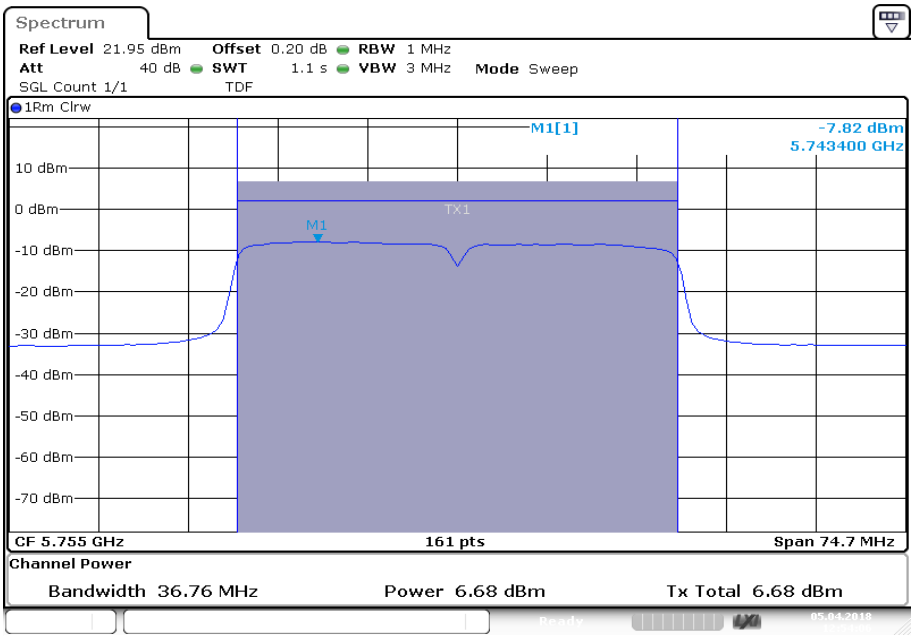
Date: 5.APR.2018 12:44:07

Plot 2: U-NII-1; highest channel



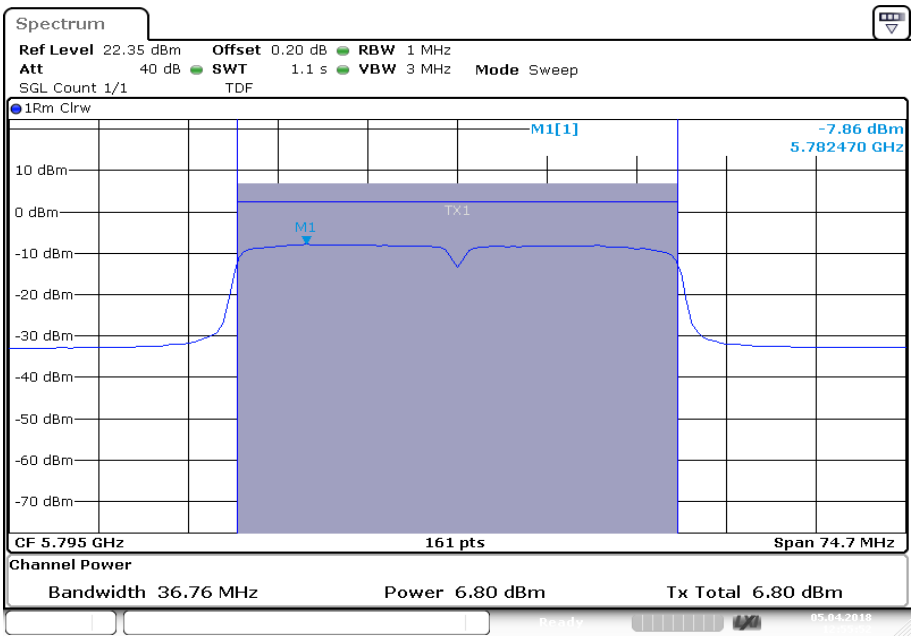
Date: 5.APR.2018 12:45:50

Plot 3: U-NII-3; lowest channel



Date: 5.APR.2018 12:54:07

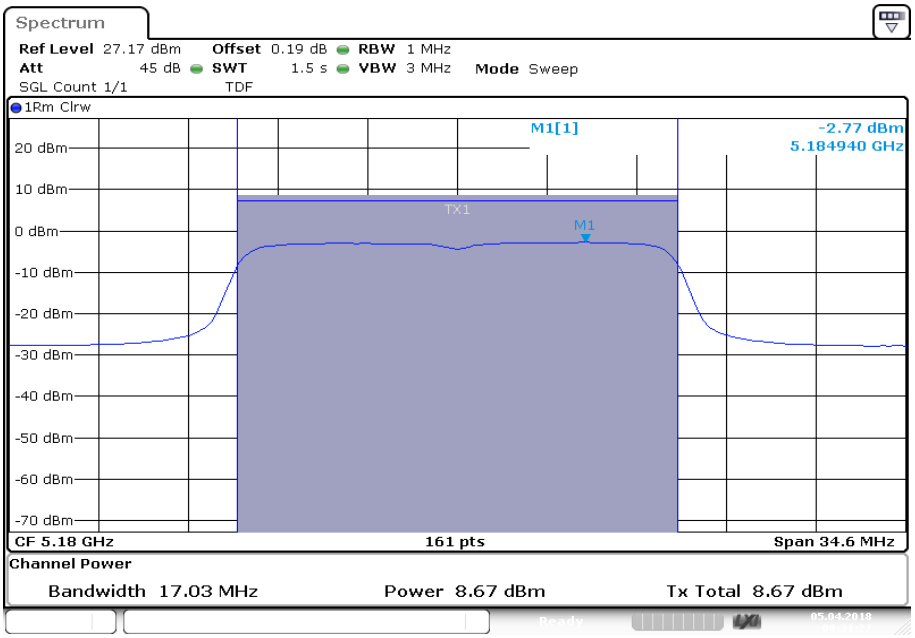
Plot 4: U-NII-3; highest channel



Date: 5.APR.2018 12:55:53

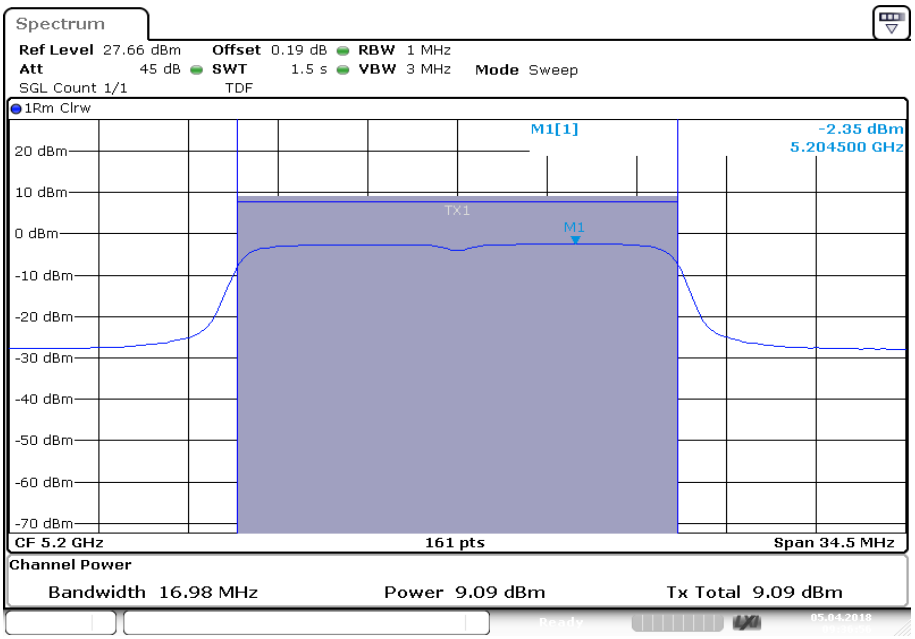
Plots: a – mode / Antenna 1

Plot 7: U-NII-1; lowest channel



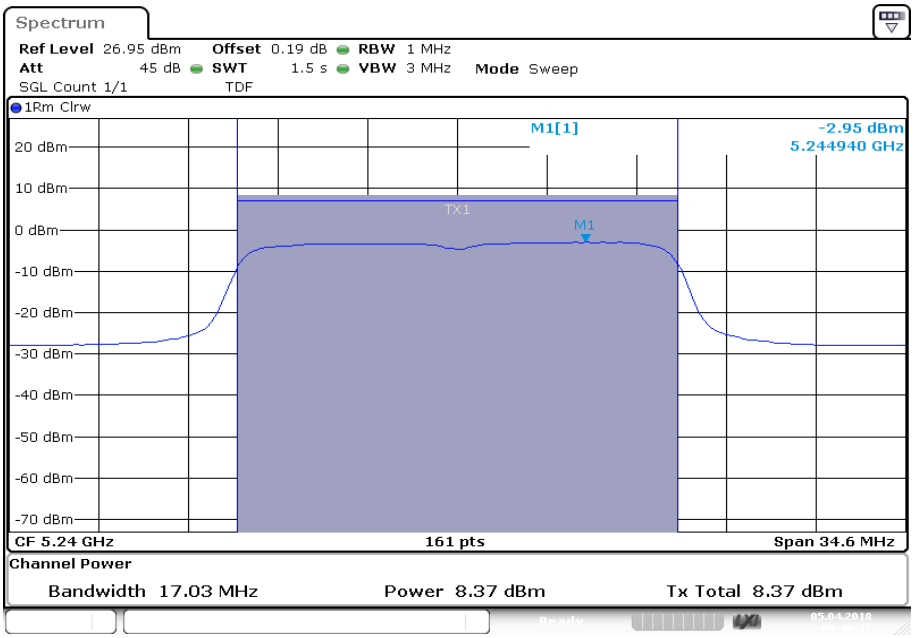
Date: 5.APR.2018 09:31:28

Plot 8: U-NII-1; middle channel



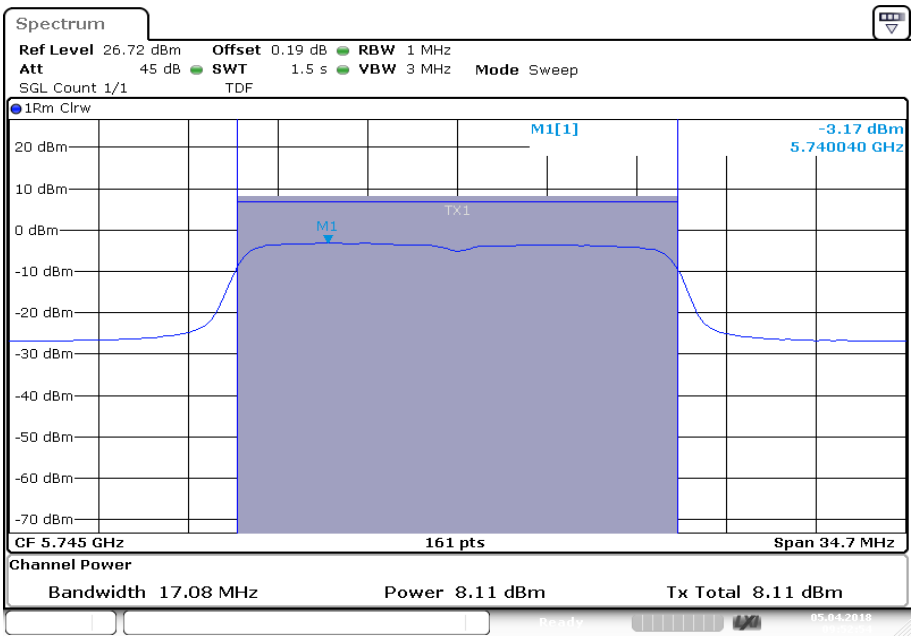
Date: 5.APR.2018 09:36:57

Plot 9: U-NII-1; highest channel



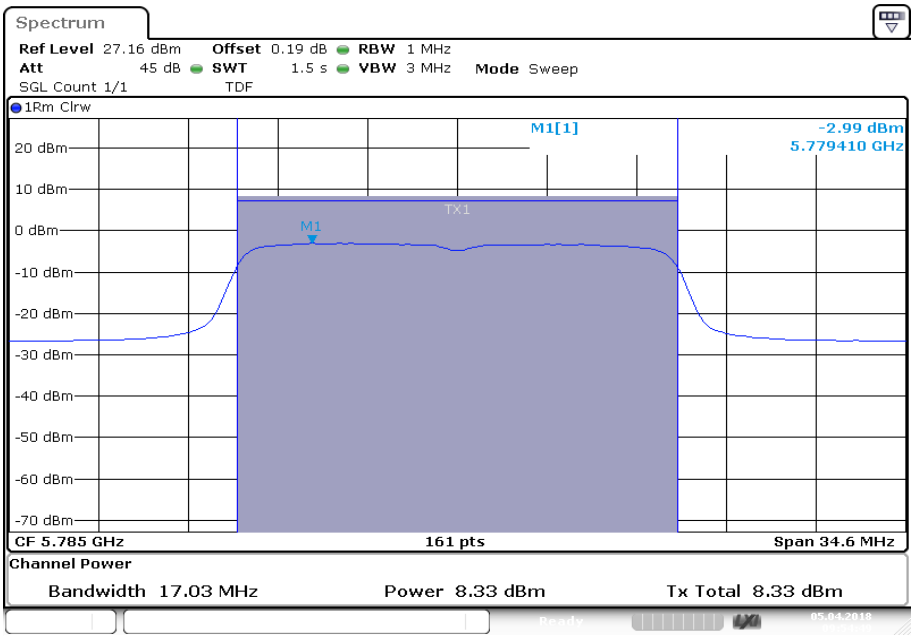
Date: 5.APR.2018 09:40:38

Plot 10: U-NII-3; lowest channel



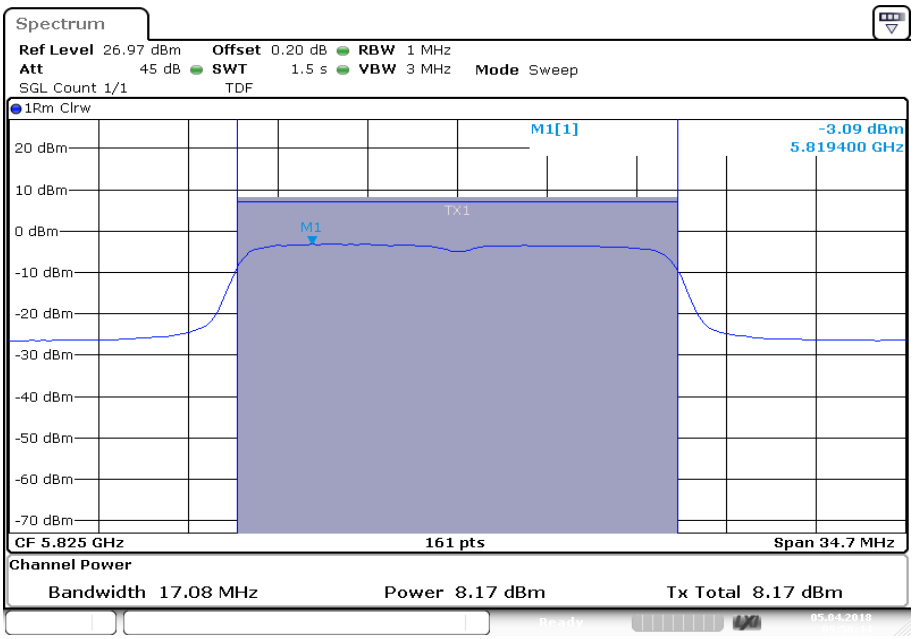
Date: 5.APR.2018 09:52:55

Plot 11: U-NII-3; middle channel



Date: 5.APR.2018 09:54:50

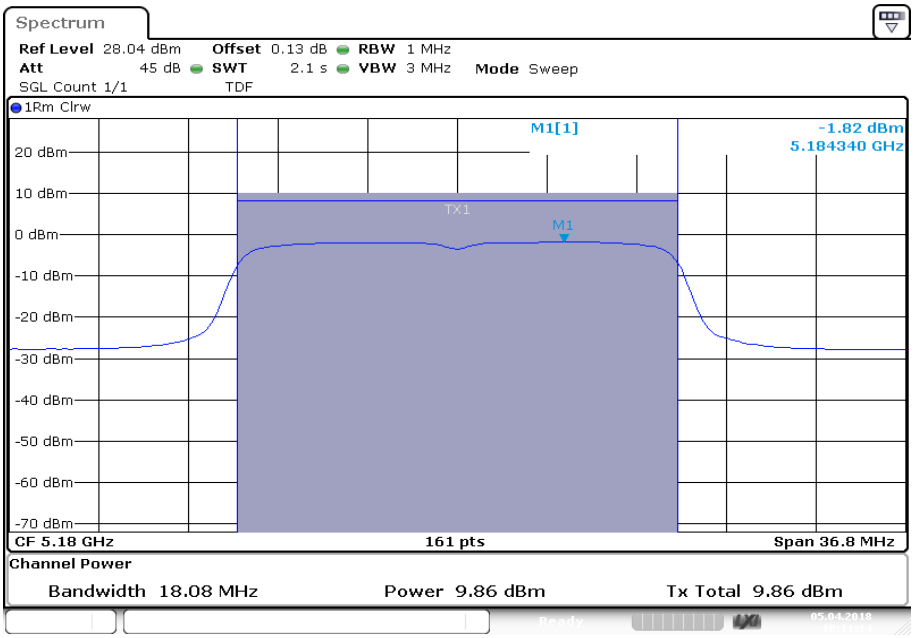
Plot 12: U-NII-3; highest channel



Date: 5.APR.2018 09:56:44

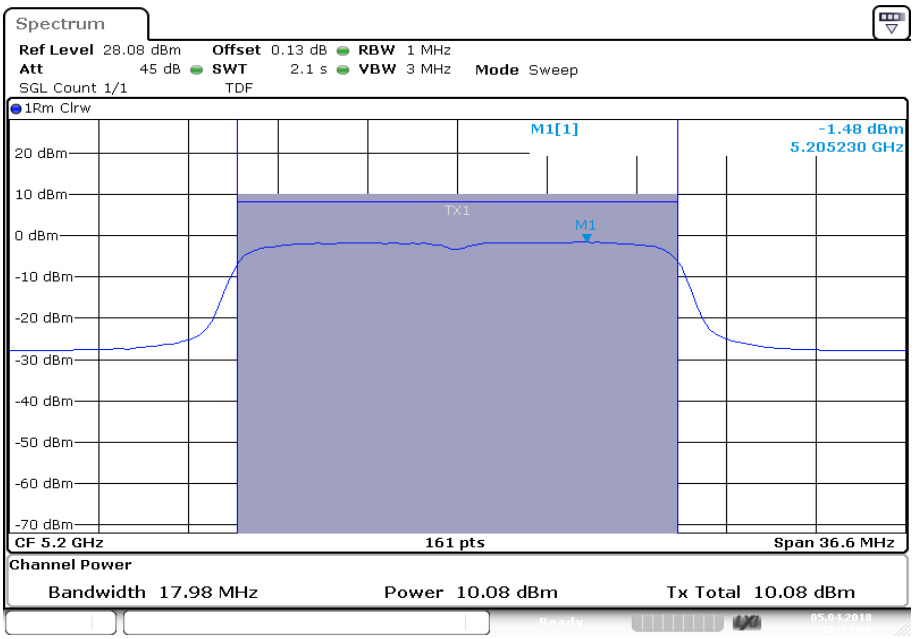
Plots: n/ac HT20 – mode / Antenna 1

Plot 7: U-NII-1; lowest channel



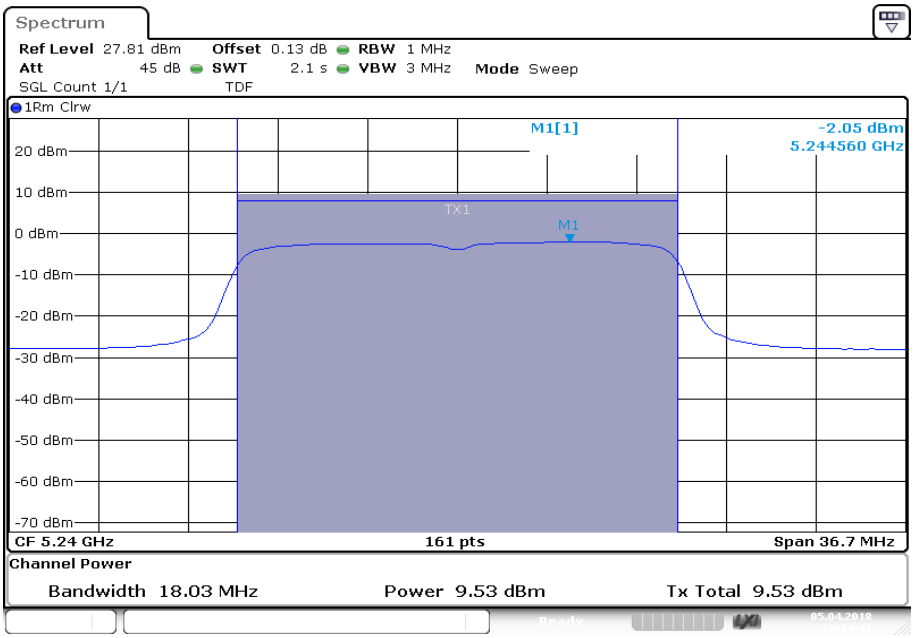
Date: 5.APR.2018 10:11:15

Plot 8: U-NII-1; middle channel



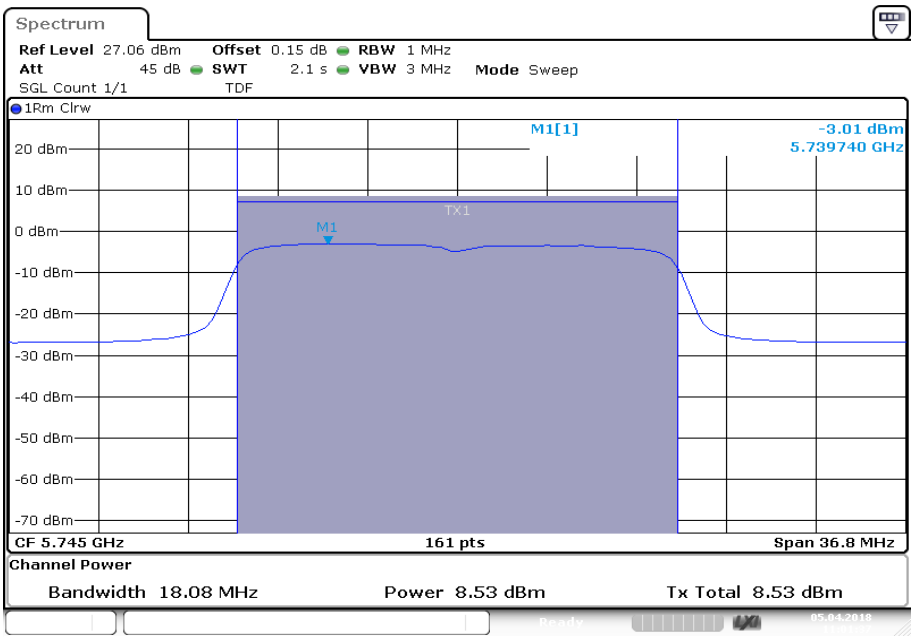
Date: 5.APR.2018 10:13:00

Plot 9: U-NII-1; highest channel



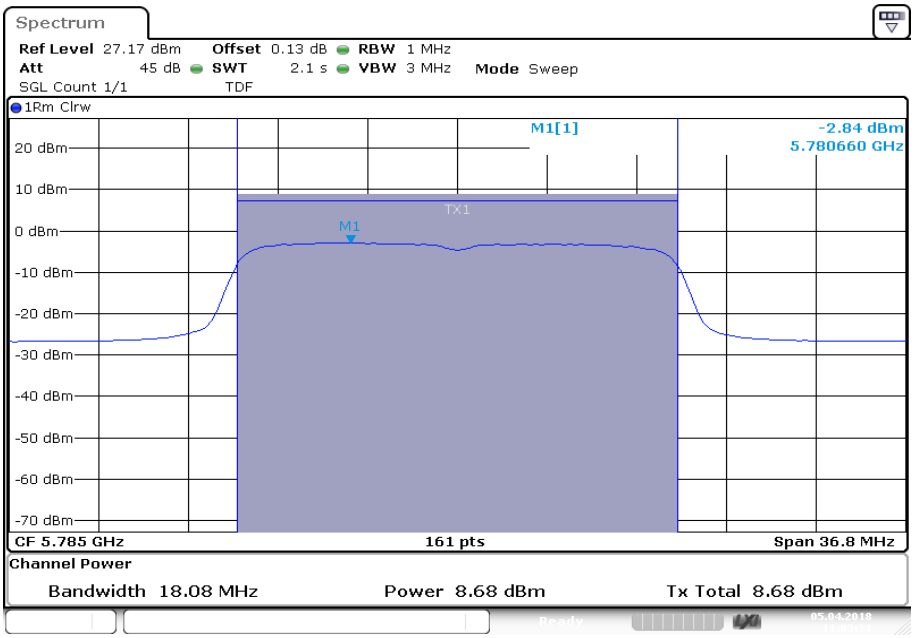
Date: 5.APR.2018 10:14:42

Plot 10: U-NII-3; lowest channel



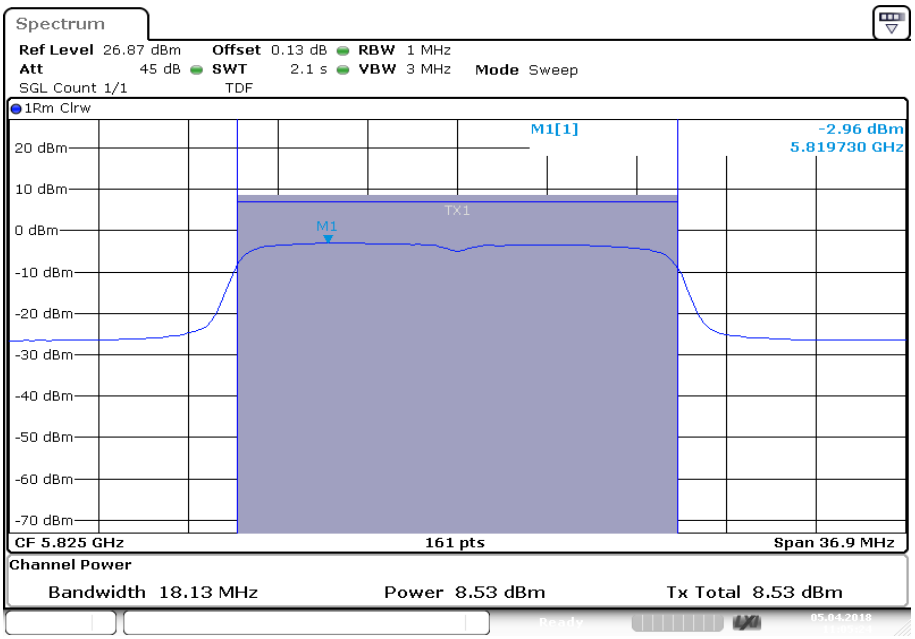
Date: 5.APR.2018 11:01:38

Plot 11: U-NII-3; middle channel



Date: 5.APR.2018 11:03:32

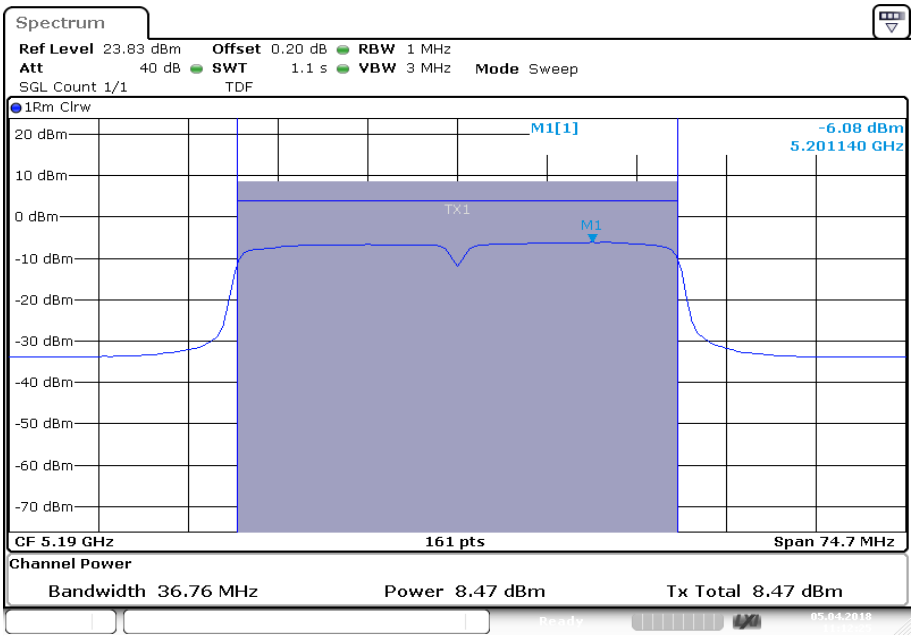
Plot 12: U-NII-3; highest channel



Date: 5.APR.2018 11:05:25

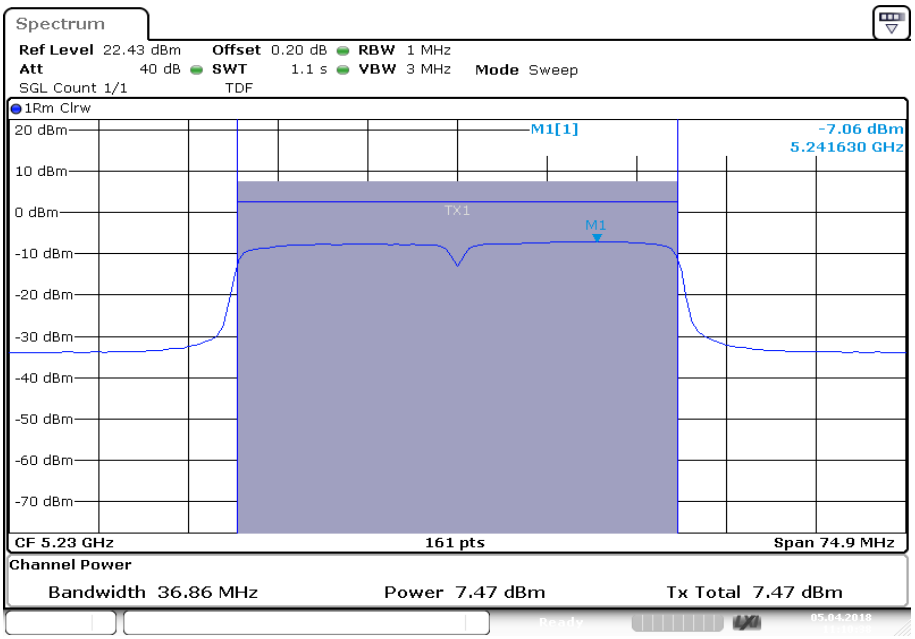
Plots: n/ac HT40 – mode / Antenna 1

Plot 5: U-NII-1; lowest channel



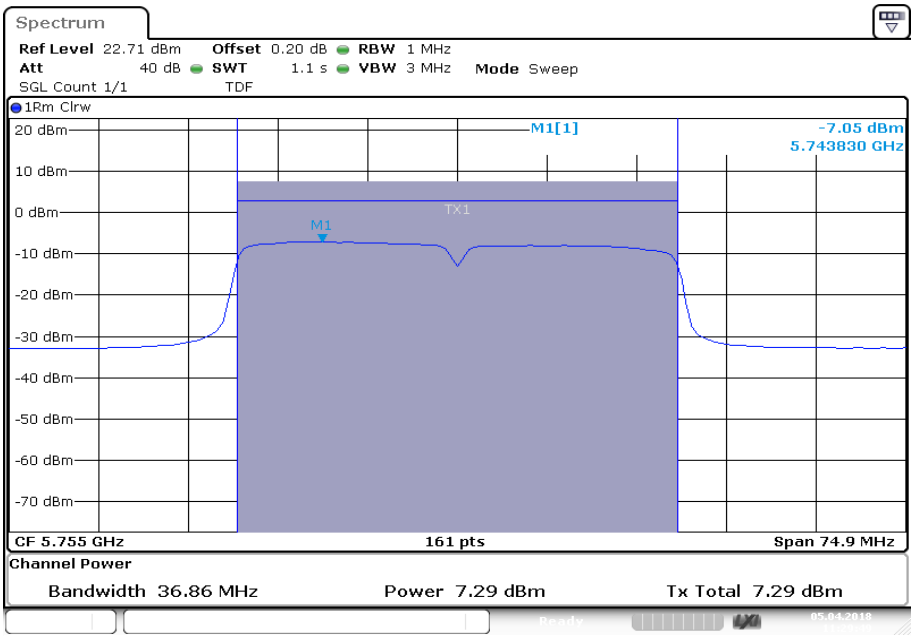
Date: 5.APR.2018 11:12:26

Plot 6: U-NII-1; highest channel



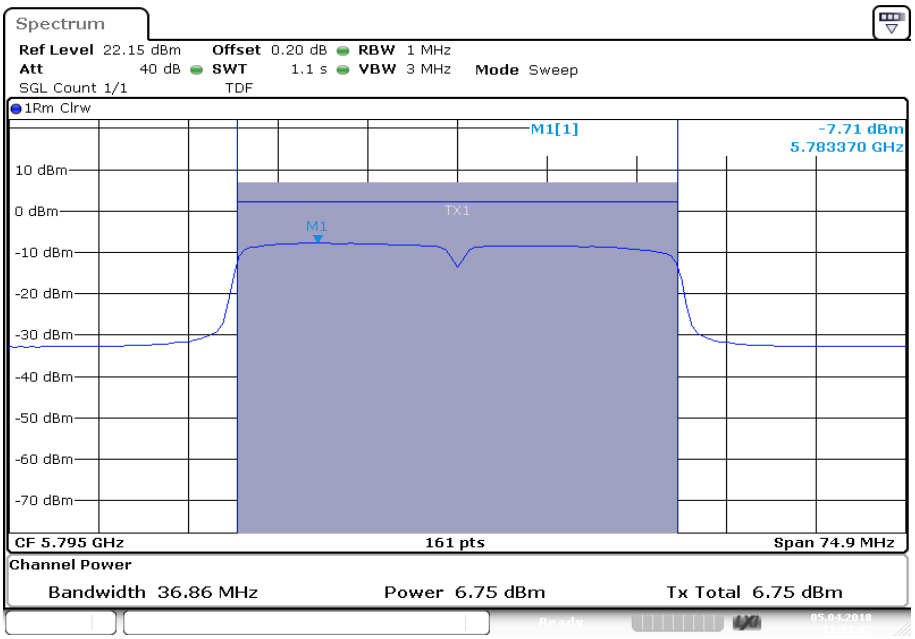
Date: 5.APR.2018 11:10:39

Plot 7: U-NII-3; lowest channel



Date: 5.APR.2018 11:29:50

Plot 8: U-NII-3; highest channel



Date: 5.APR.2018 11:31:36

10.6 Emissions in restricted frequency bands < 30MHz (radiated)

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.1 – B
Measurement uncertainty:	See sub clause 8

Limits:

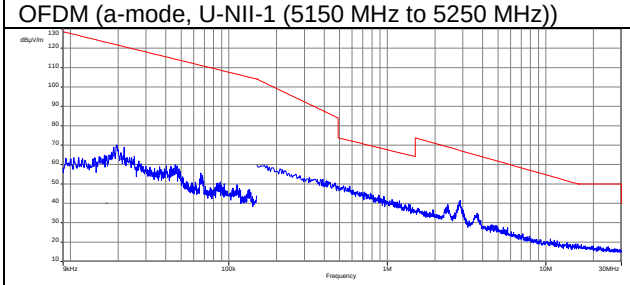
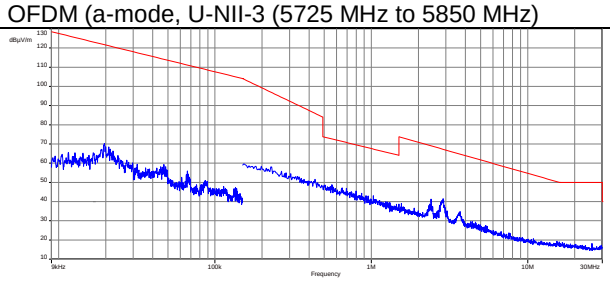
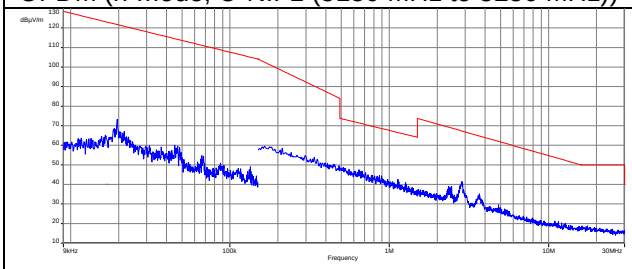
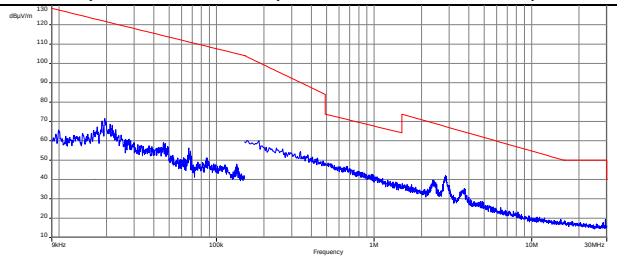
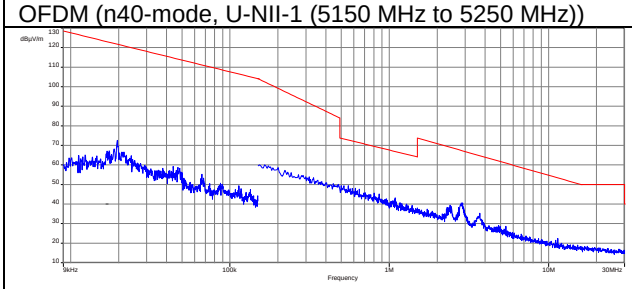
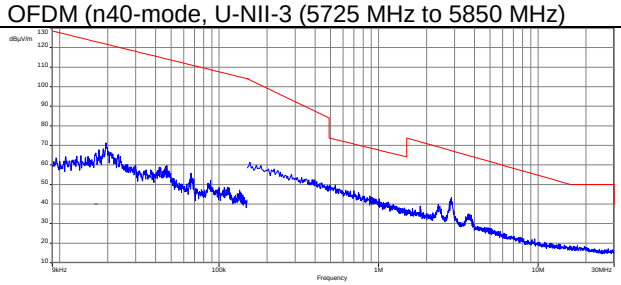
TX Spurious Emissions Radiated		
§15.209		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 – 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3
§15.407		
Outside the restricted bands!	-27 dBm / MHz	

Results:

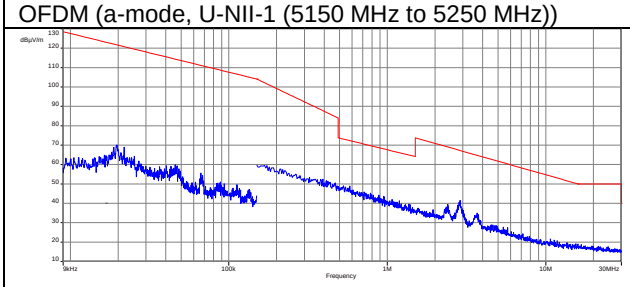
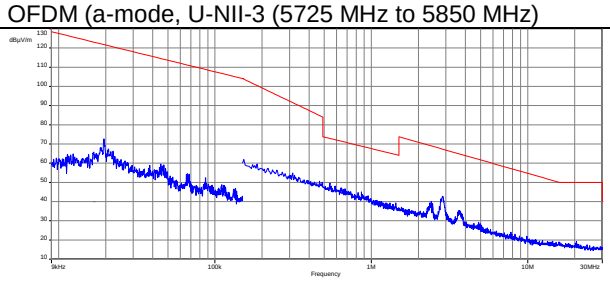
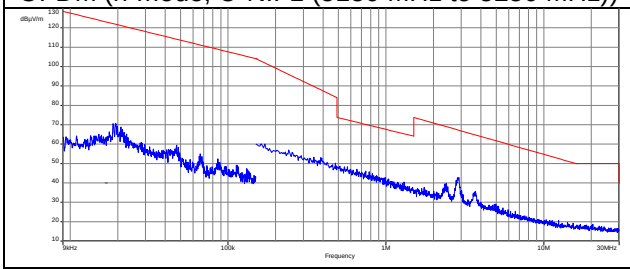
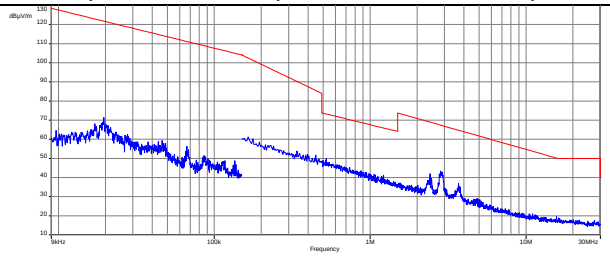
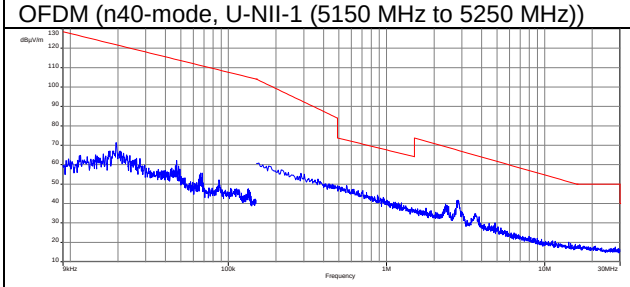
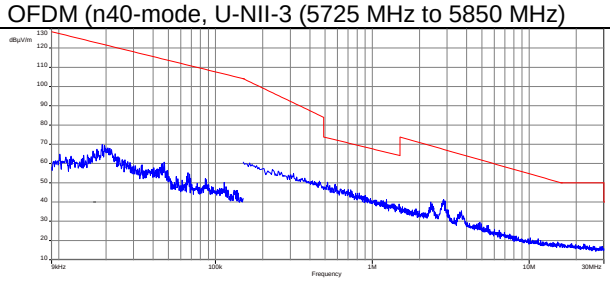
TX spurious emissions radiated < 30 MHz / (dBµV / m) @ 3 m		
Frequency / MHz	Detector	Level / (dBµV / m)
All detected peaks are more than 20 dB below the limit.		

Note: Peak Emissions detected are more than 20dB below the limit on all tested channels, data rates and antenna configurations. Therefore, only one plot per modulation, UNII-band and antenna configuration is reported.

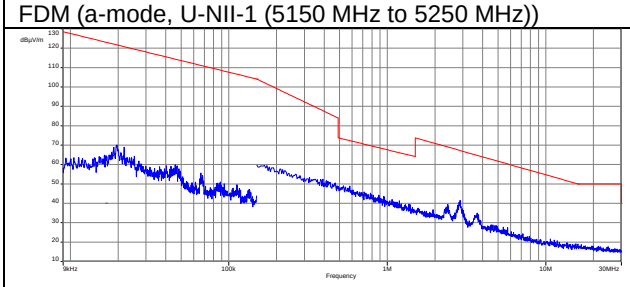
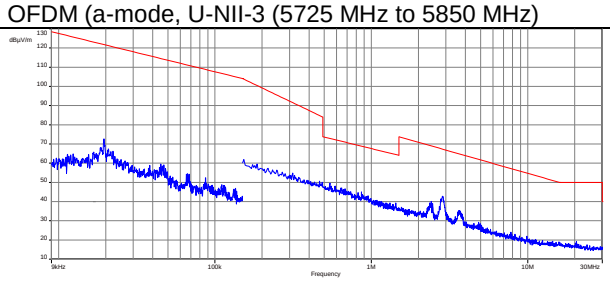
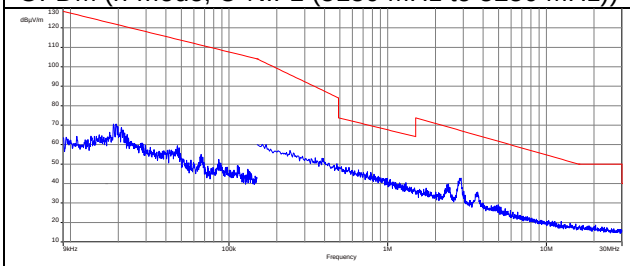
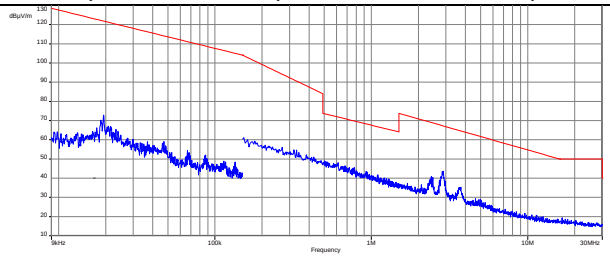
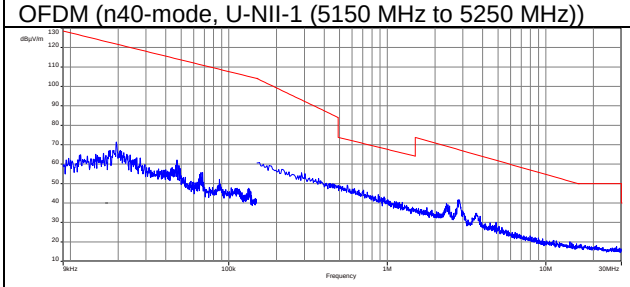
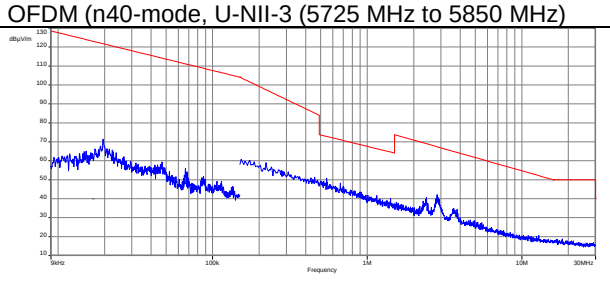
Plots: ANT-DIR-2459-01, single-chain, Antenna 0

OFDM (a-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (a-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n40-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n40-mode, U-NII-3 (5725 MHz to 5850 MHz)
	

Plots: ANT-DIR-2459-01, single-chain, Antenna 1

OFDM (a-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (a-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n40-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n40-mode, U-NII-3 (5725 MHz to 5850 MHz)
	

Plots: ANT-OMNI5900-01, dual-chain, Antenna 0&1

FDM (a-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (a-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n-mode, U-NII-3 (5725 MHz to 5850 MHz)
	
OFDM (n40-mode, U-NII-1 (5150 MHz to 5250 MHz))	OFDM (n40-mode, U-NII-3 (5725 MHz to 5850 MHz)
	

10.7 Emissions in restricted frequency bands > 30 MHz (conducted)

Description:

The UNII Test Procedures specify that emissions which fall into restricted frequency bands shall comply with the general radiated emission limits.

Measurement:

Measurement parameter	
According to UNII Test Procedures KDB clause II.G.4.b. & II.G.6.c)	
Detector	Peak / RMS (Power AVG)
Sweep time	Auto
Resolution bandwidth	30 MHz > F > 1 GHz: 100 kHz 1 GHz > F > 40 GHz: 1 MHz
Video bandwidth	3x RBW
Span	30 MHz to 40 GHz
Trace mode	Max Hold / Trace Average
Test setup	See chapter 6.2 – B (<1GHz); See sub clause 6.2 – C (>1GHz)
Measurement uncertainty	See chapter 8

Limits:

FCC	IC

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 §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

As per UNII Test Procedures KDB clause II.G.1. d) i) the field strength limit as specified in §15.209(a) is converted to an EIRP limit by the formula

EIRP = E + 20log D – 104.8

where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

Frequency / MHz	Field Strength Limit / (dBµV / m)	Distance / m	Ground Reflection Factor / dB	EIRP Limit / dBm
30 – 88	40.0	3	4.7	-60.0
88 – 216	43.5	3	4.7	-56.4
216 – 960	46.0	3	4.7	-53.9
960 – 1000	53.9	3	4.7	-46.0
Above 1000	53.9	3	0	-41.3

Note: The EIRP Limit is further reduced to account for the Ground Reflection Factor.
Antenna gain as well as antenna multiplication factor* (if applicable) is considered in the Ref.Level Offset.

***Antenna multiplication factor = 10 log (n)**

where:
n = number of antenna chains

The EIRP Limit is reduced further to account for the Ground Reflection Factor.

A **9dB** Offset is used to account for the maximum gain of the directional antenna (ANT-DIR-2459-01) in single-chain mode.
The 9dB Offset is also used to account for the 5dBi antennas (ANT-OMNI-2459-02, ANT-OMNI5900-01) in dual-chain mode (5dBi + 10 log (2) = 8dB). The overrating by 1 dB can be seen as an additional safety budget or worst case consideration respectively.

As per UNII Test Procedures II.G.6.c, an additional offset of 0.2dB is considered to account for the Duty Cycle Correction when Average Detector is used.

The number of sweeps was increased to consider the lowest duty cycle as specified in section 10.4. when Average Detector is used.

Results: 20 MHz channel bandwidth / Antenna 0

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
37.1	Peak	-73.6	10403.0	AVG	-51.5	4981.2	AVG	-47.5
4992.9	AVG	-46.7	-/-	-/-	-/-	10482.2	AVG	-50.0
5150.0	AVG	-42.1				-/-	-/-	-/-
10362.0	AVG	-50.3						

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
165.0	Peak	-68.8	3857.2	AVG	-49.4	171.6	Peak	-75.4
3830.7	AVG	-50.5	4992.1	AVG	-47.5	3884.1	AVG	-48.0
4995.2	AVG	-48.9	11570.7	AVG	-48.9	4997.9	AVG	-48.5
11488.3	AVG	-48.5	17355.6	AVG	-54.7	11650.6	AVG	-46.2
17239.4	AVG	-55.1	-/-	-/-	-/-	17475.3	AVG	-53.9

Results: 40 MHz channel bandwidth / Antenna 0

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
173.0	Peak	-75.7	-/-			171.4	Peak	-76.0
5150.0	AVG	-41.8				4993.3	AVG	-50.1
10403.0	AVG	-57.6				10459.3	AVG	-54.6

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
4986.6	AVG	-51.5	-/-			3864.2	AVG	-50.0
11509.8	AVG	-53.3				11589.4	AVG	-52.1

Results: 20 MHz channel bandwidth / Antenna 1

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
5150.0	AVG	-45.6	5400.0	AVG	-41.6	5400.0	AVG	-42.9
5400.0	AVG	-42.4	5460.0	AVG	-45.3	5440.6	AVG	-44.3
5460.0	AVG	-44.7	10403.0	AVG	-49.1	5460.0	AVG	-47.7
10362.4	AVG	-51.9	-/-	-/-	-/-	10482.2	AVG	-49.2

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
5400.0	AVG	-44.0	3856.4	AVG	-54.5	5440.2	AVG	-42.2
11494.2	AVG	-49.6	5400.0	AVG	-41.8	11649.1	AVG	-48.6
17232.4	AVG	-54.2	11569.1	AVG	-47.8	-/-	-/-	-/-

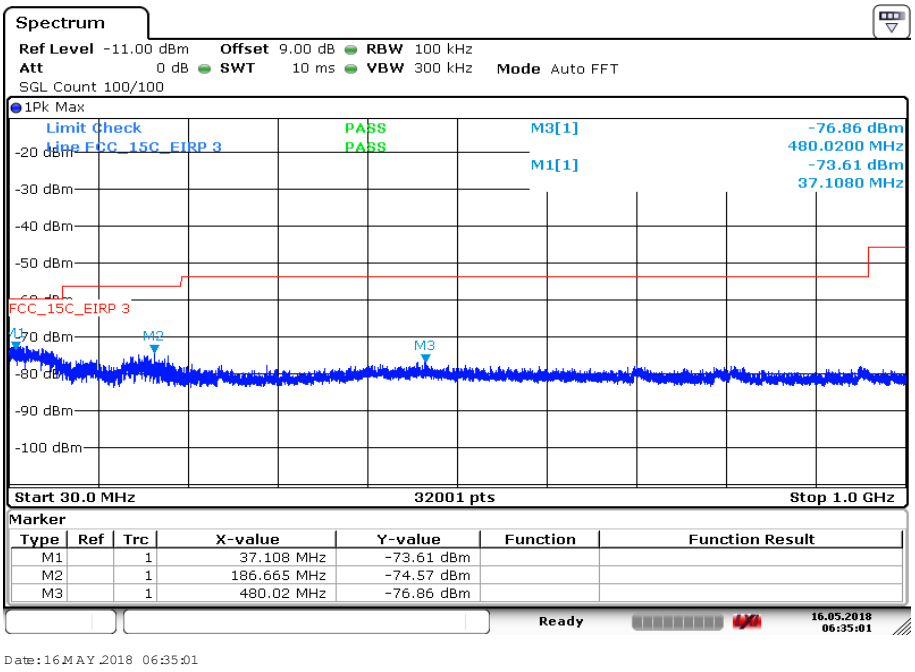
Results: 40 MHz channel bandwidth / Antenna 1

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
5150.0	AVG	-42.1	-/-			163.1	Peak	-75.2
5400.1	AVG	-43.7				5440.1	AVG	-41.5
5480.8	AVG	-42.2				-/-	-/-	-/-
6920.7	AVG	-45.1						

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]	F [MHz]	Detector	Level [dBm]
11502.8	AVG	-54.3	-/-			5400.8	AVG	-44.5
25925.5	AVG	-54.0				11587.4	AVG	-53.3

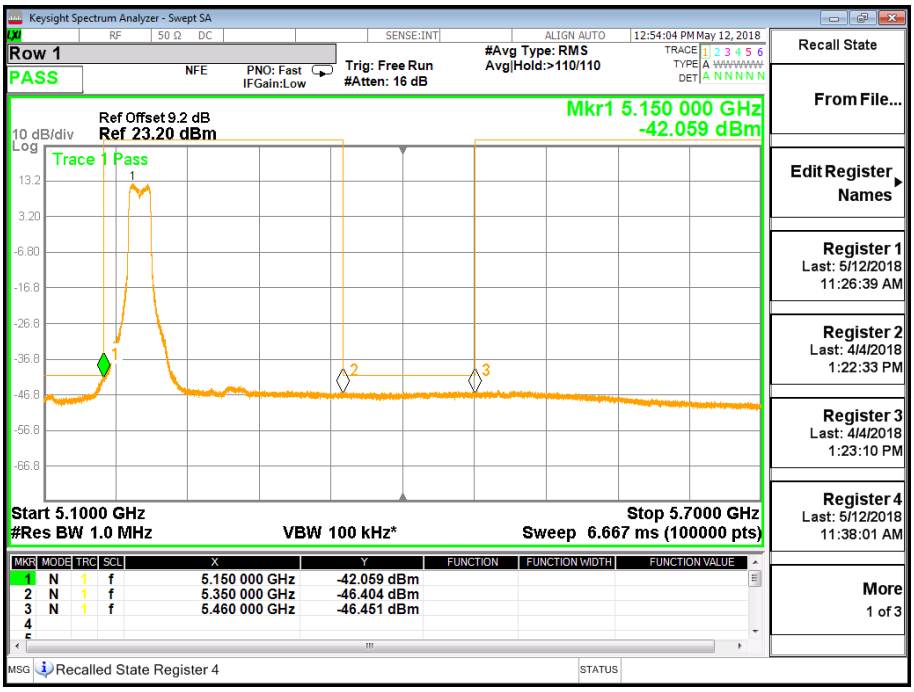
Plots: 20 MHz channel bandwidth / Antenna 0

Plot 1: 30 MHz to 1 GHz, U-NII-1; lowest channel

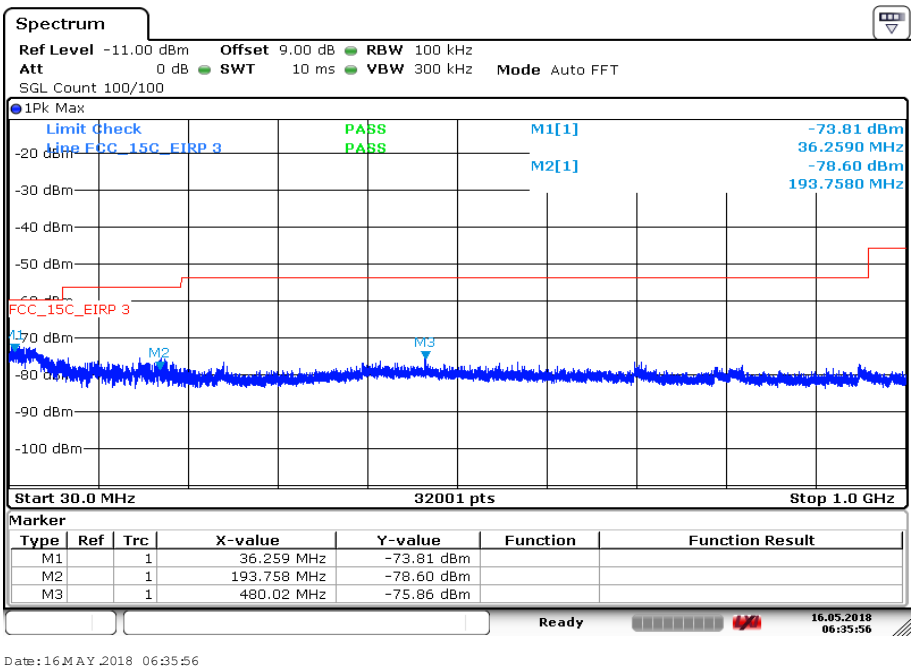


Plot 2: 1 GHz to 40 GHz, U-NII-1; lowest channel

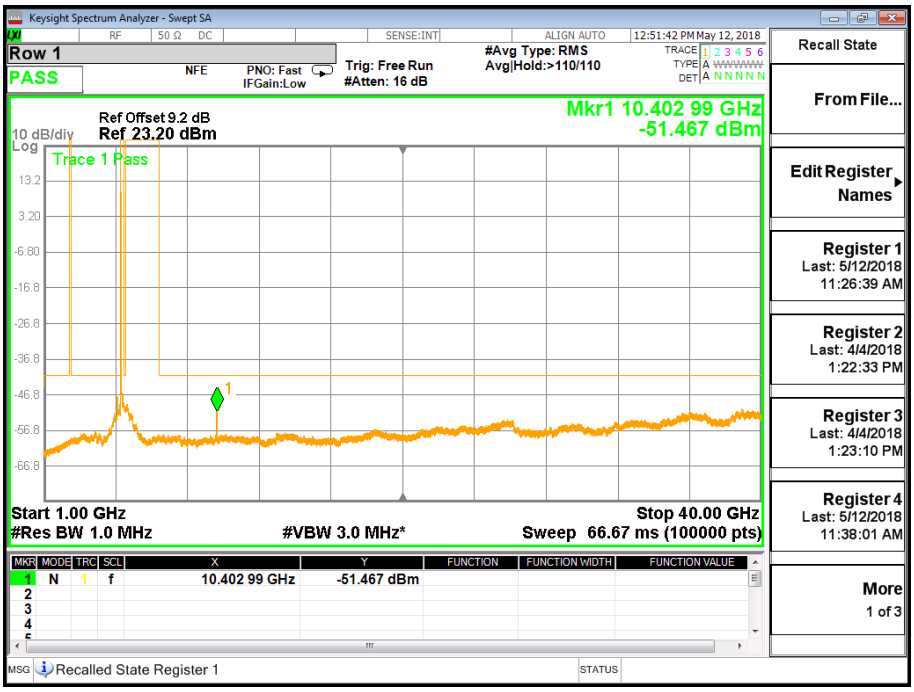
Plot 3: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; lowest channel



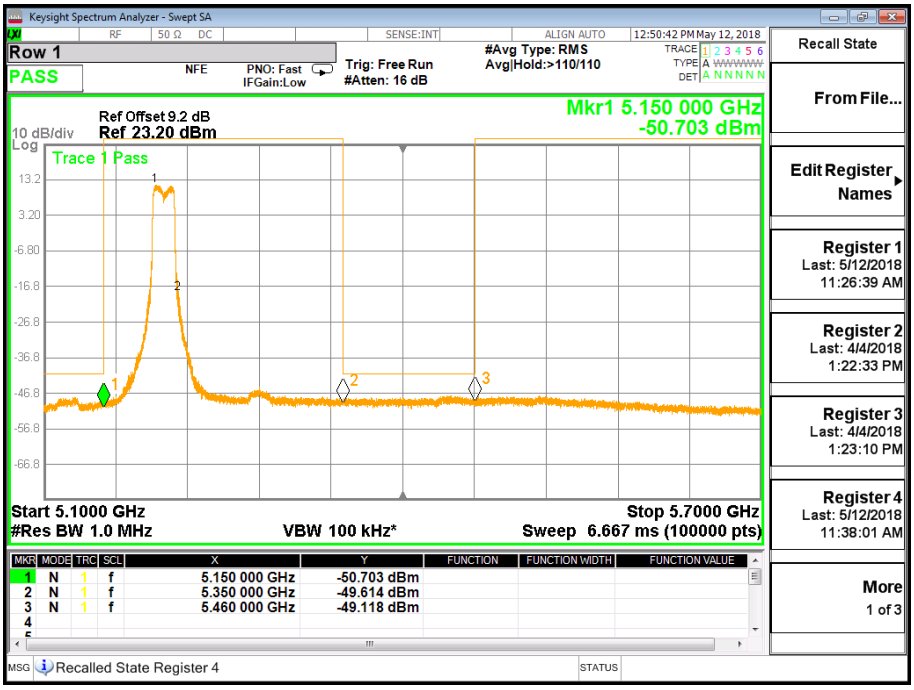
Plot 4: 30 MHz to 1 GHz, U-NII-1; middle channel



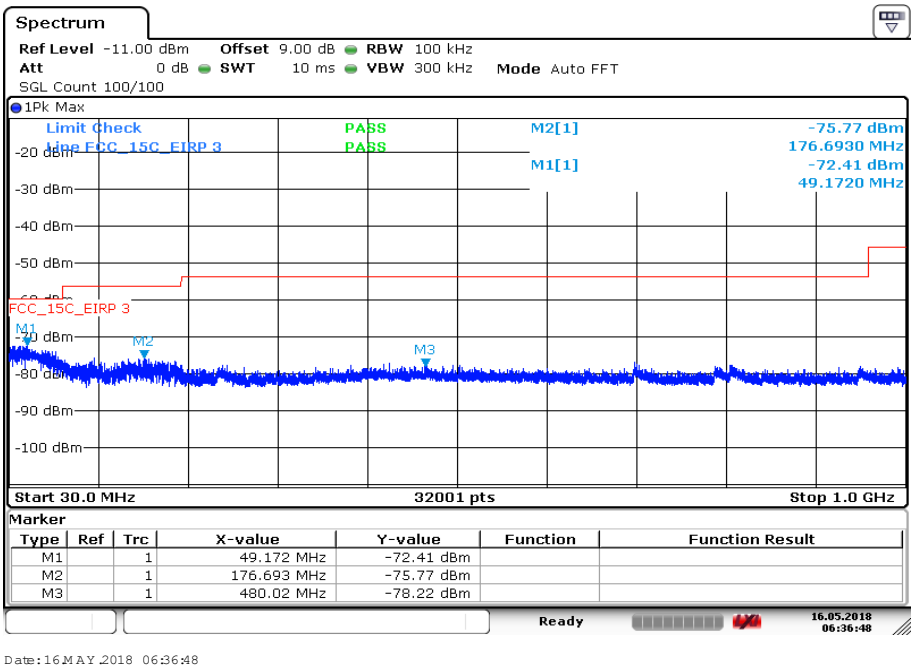
Plot 5: 1 GHz to 40 GHz, U-NII-1; middle channel



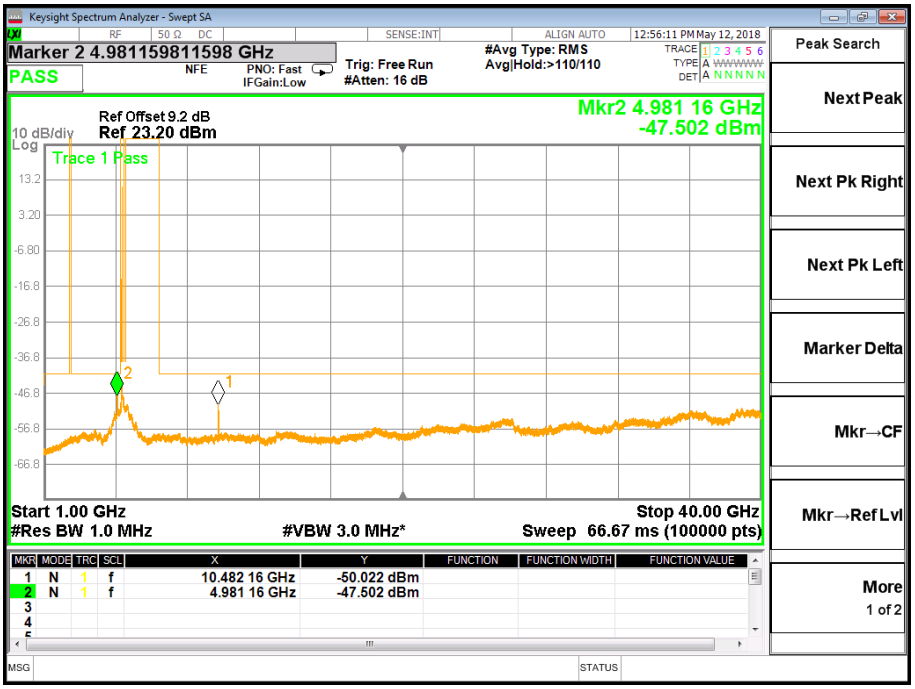
Plot 6: 5 GHz to 5.5 GHz (Zoom), U-NII-1; middle channel



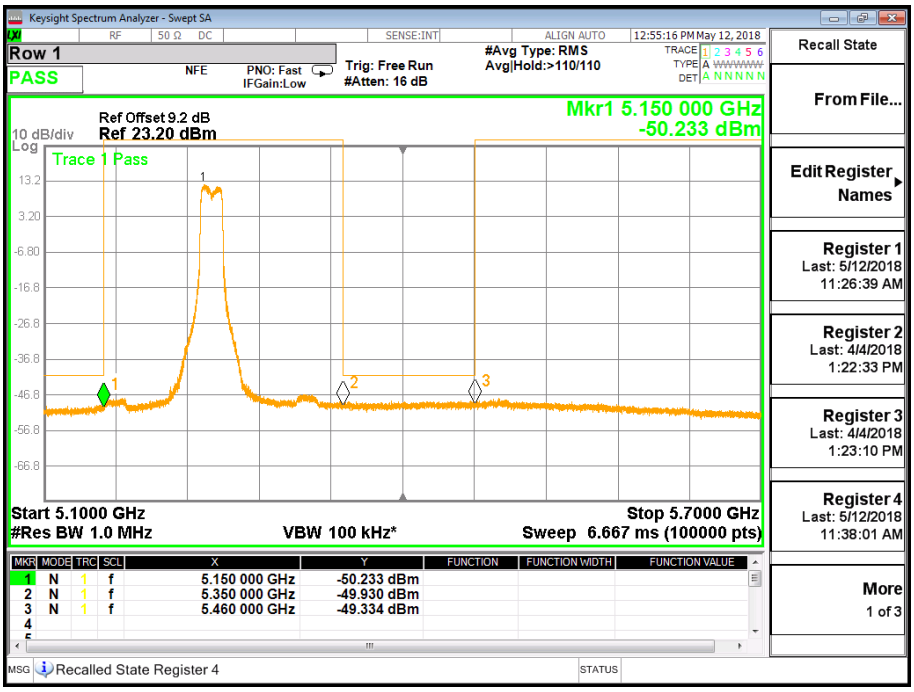
Plot 7: 30 MHz to 1 GHz, U-NII-1; highest channel



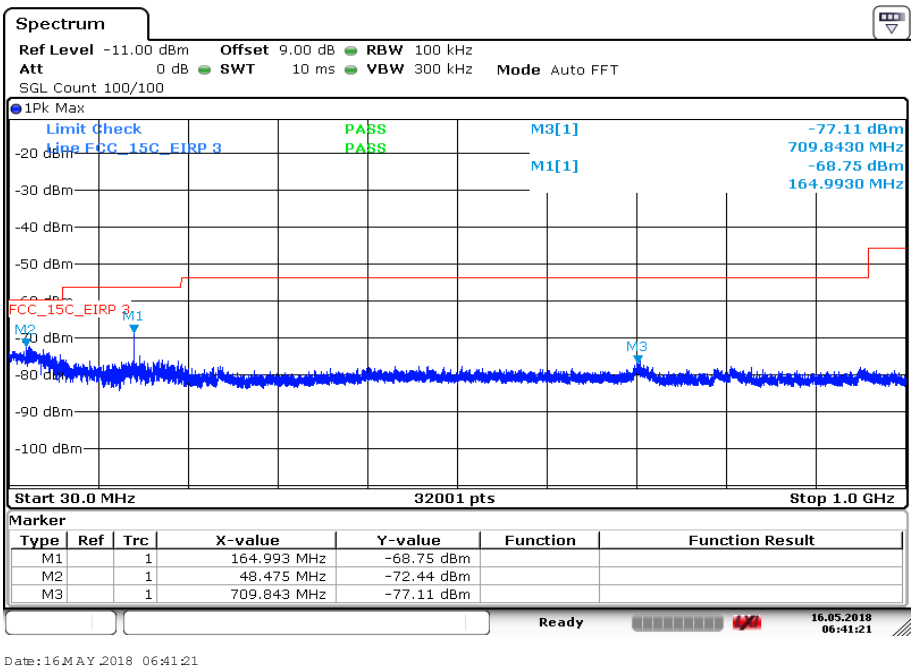
Plot 8: 1 GHz to 40 GHz, U-NII-1; highest channel



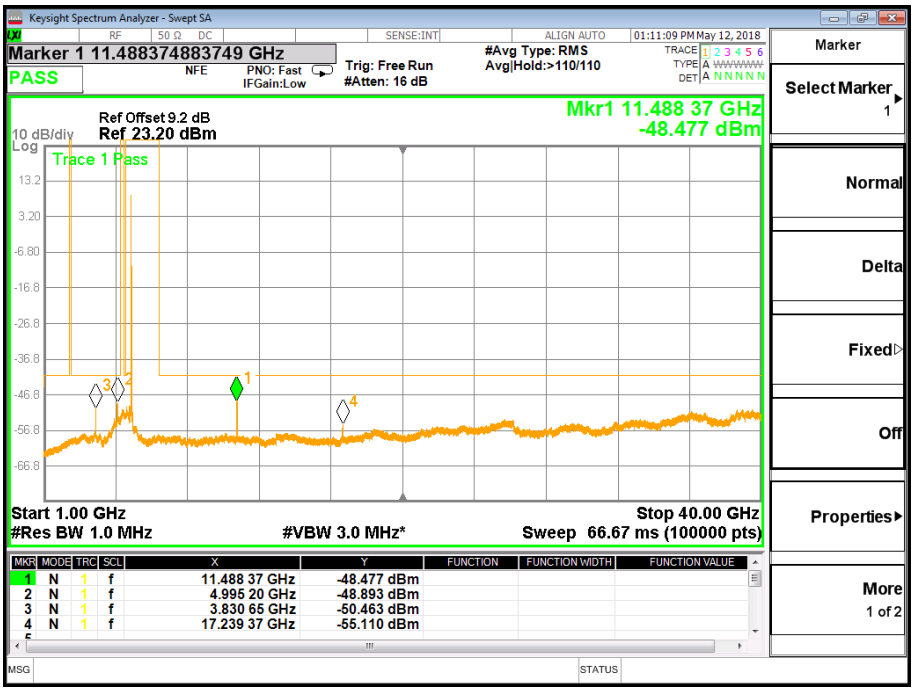
Plot 9: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; highest channel



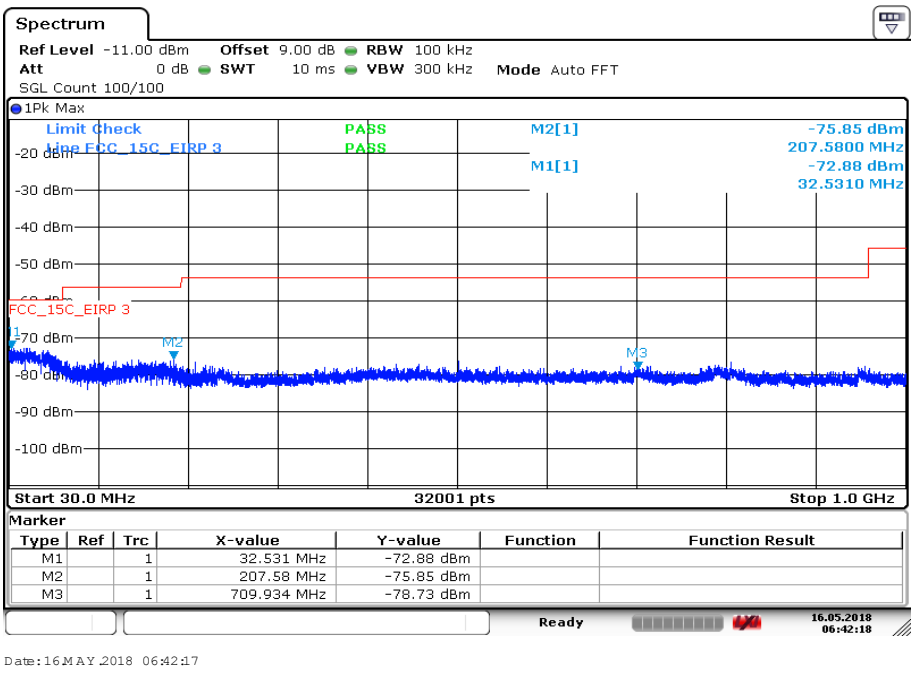
Plot 10: 30 MHz to 1 GHz, U-NII-3; lowest channel



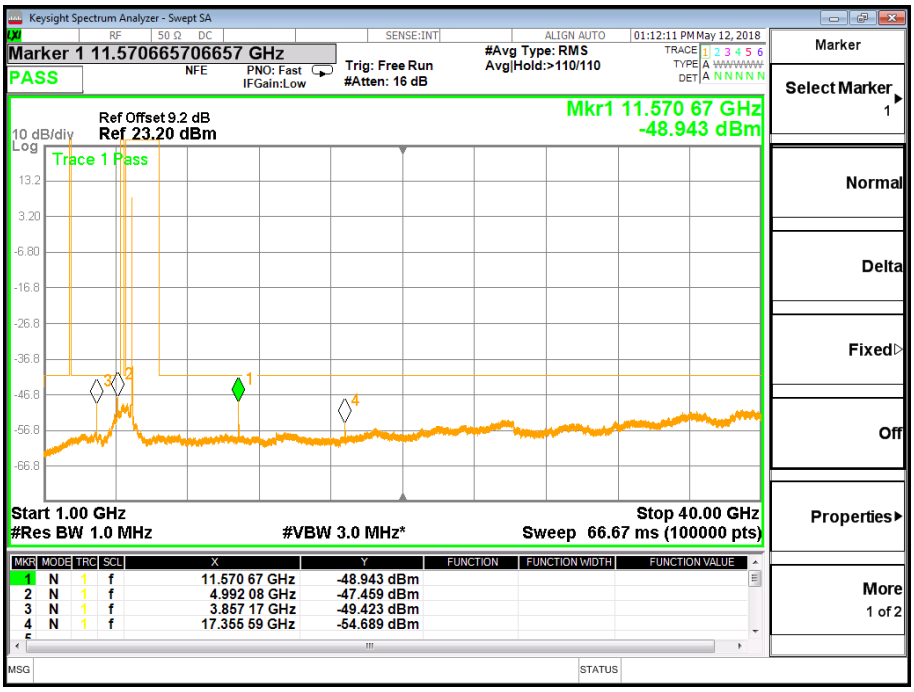
Plot 11: 1 GHz to 40 GHz, U-NII-3; lowest channel



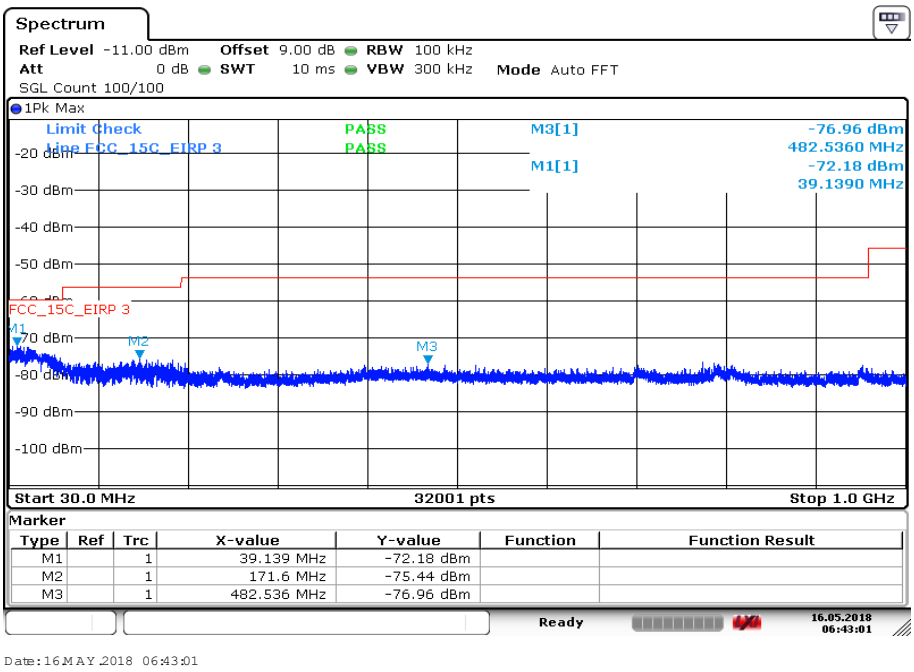
Plot 12: 30 MHz to 1 GHz, U-NII-3; middle channel



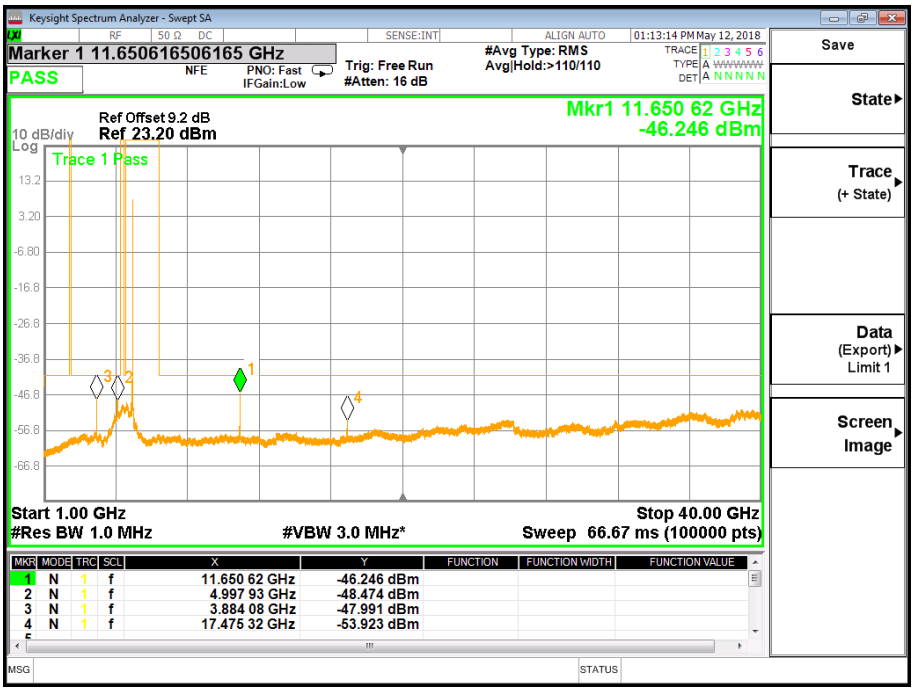
Plot 13: 1 GHz to 40 GHz, U-NII-3; middle channel



Plot 14: 30 MHz to 1 GHz, U-NII-3; highest channel

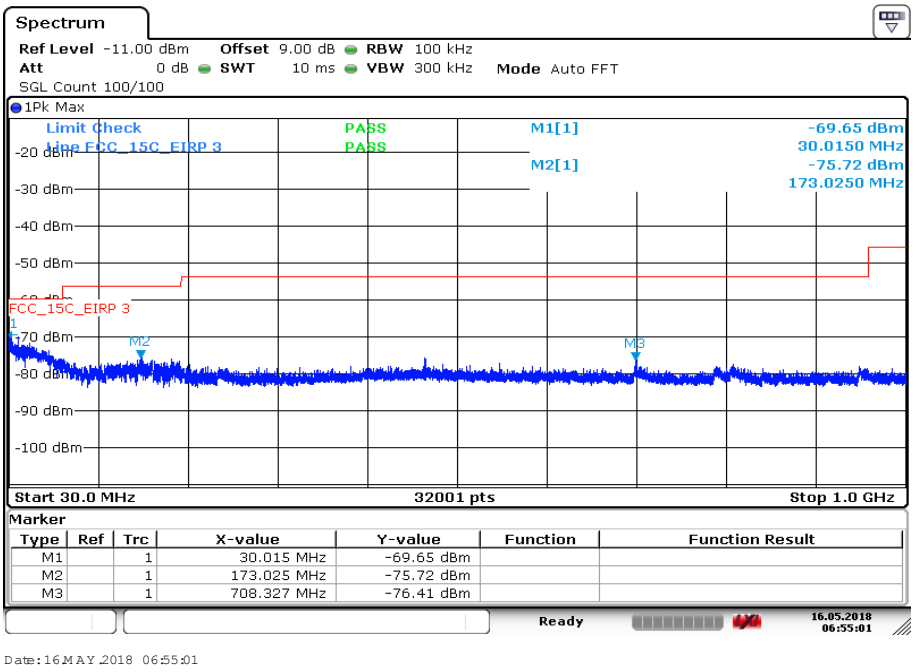


Plot 15: 1 GHz to 40 GHz, U-NII-3; highest channel

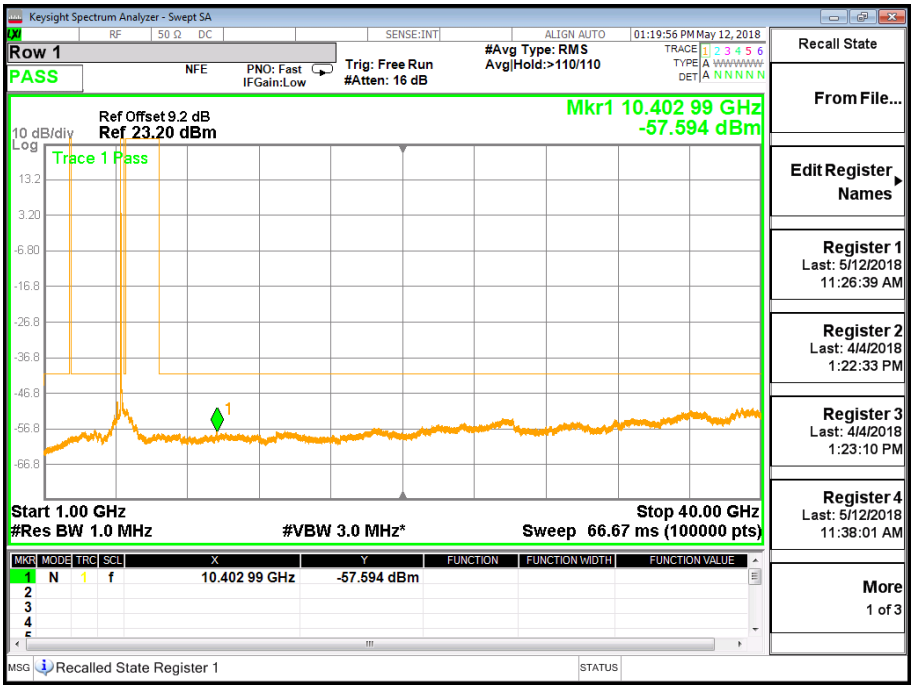


Plots: 40 MHz channel bandwidth / Antenna 0

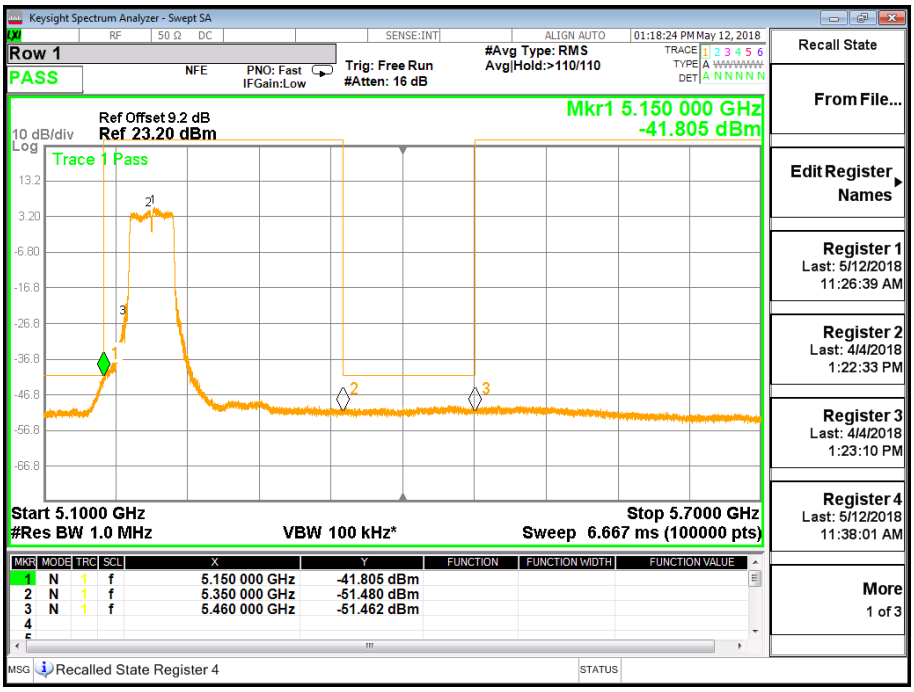
Plot 16: 30 MHz to 1 GHz, U-NII-1; lowest channel



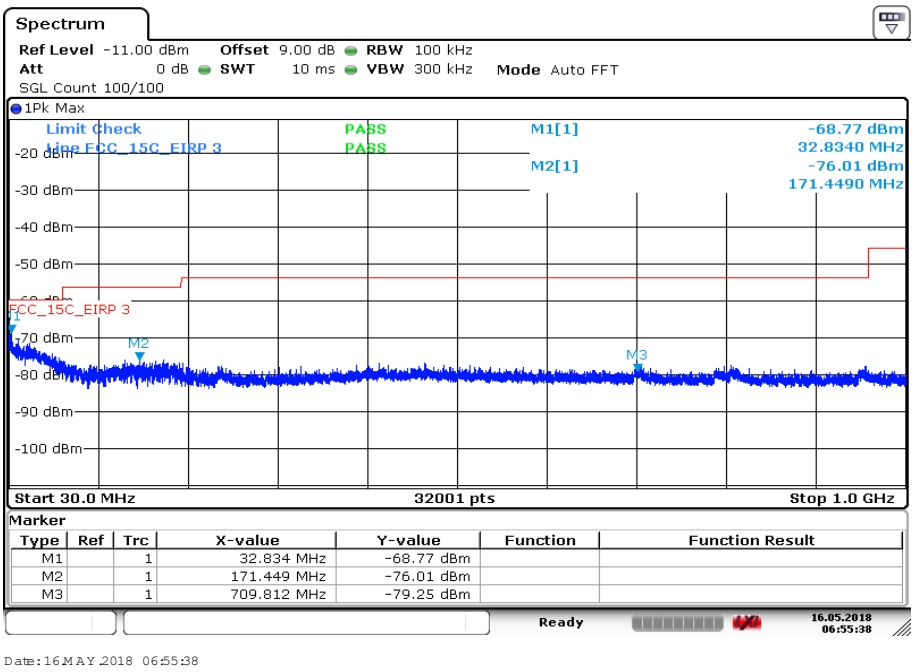
Plot 17: 1 GHz to 40 GHz, U-NII-1; lowest channel



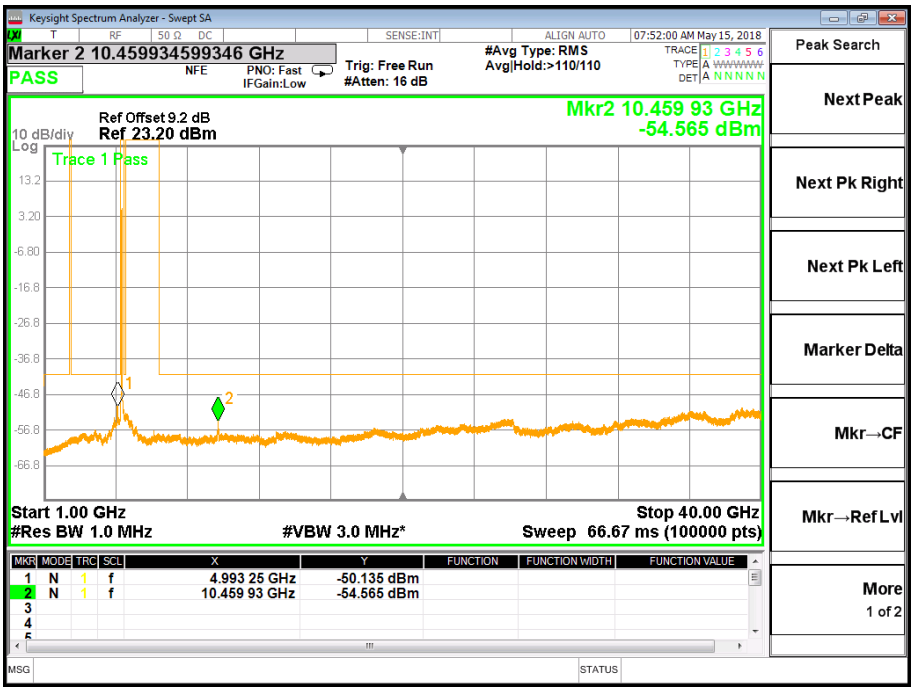
Plot 18: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; lowest channel



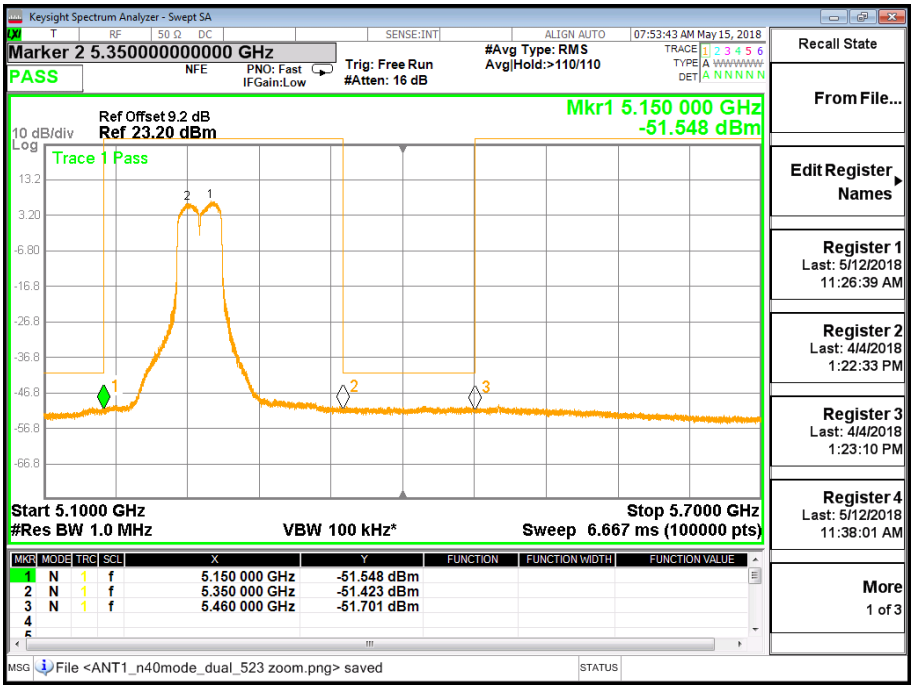
Plot 19: 30 MHz to 1 GHz, U-NII-1; highest channel



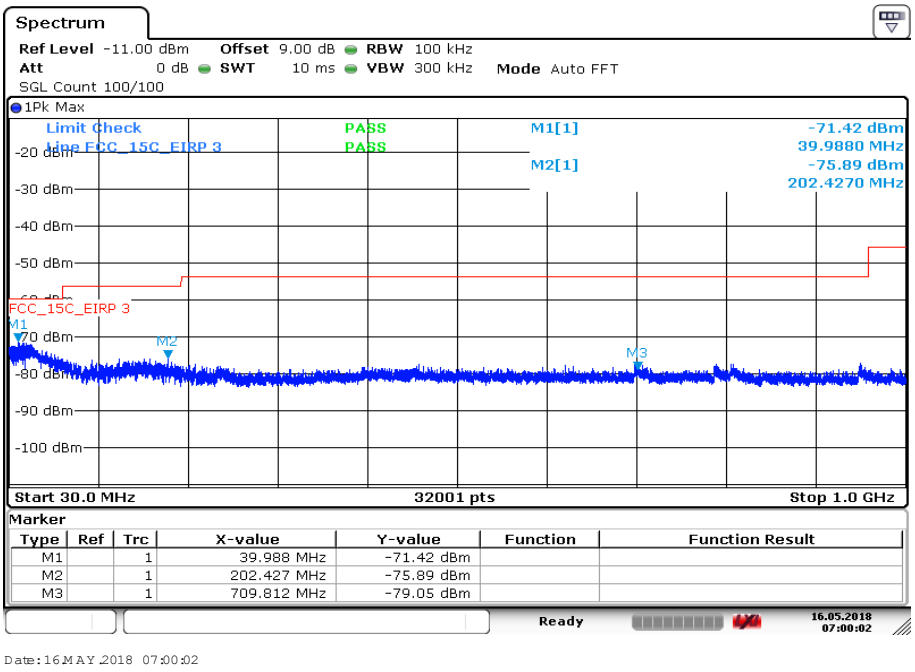
Plot 20: 1 GHz to 40 GHz, U-NII-1; highest channel



Plot 21: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; highest channel



Plot 22: 30 MHz to 1 GHz, U-NII-3; lowest channel



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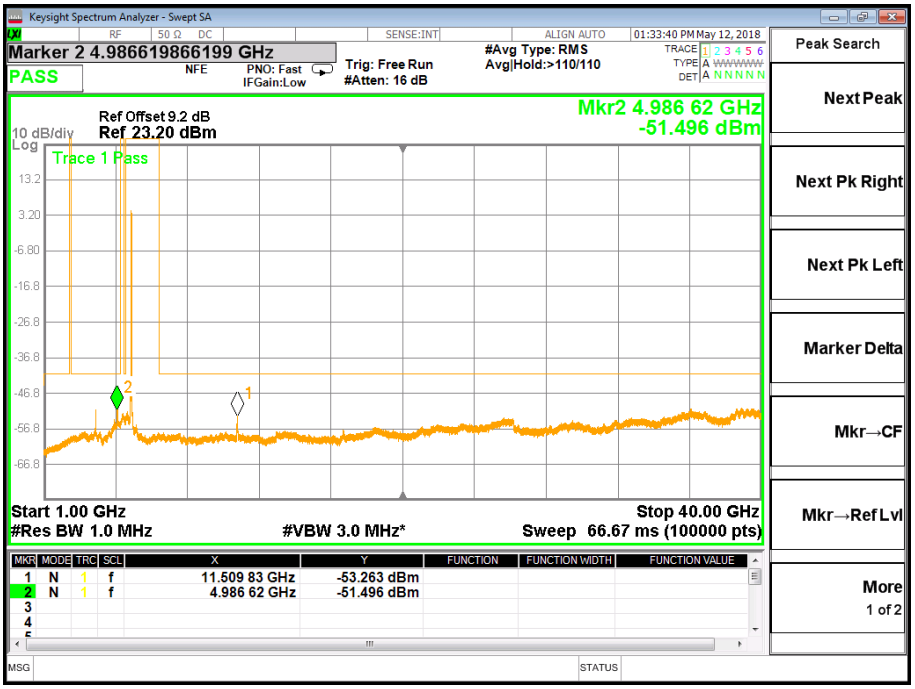
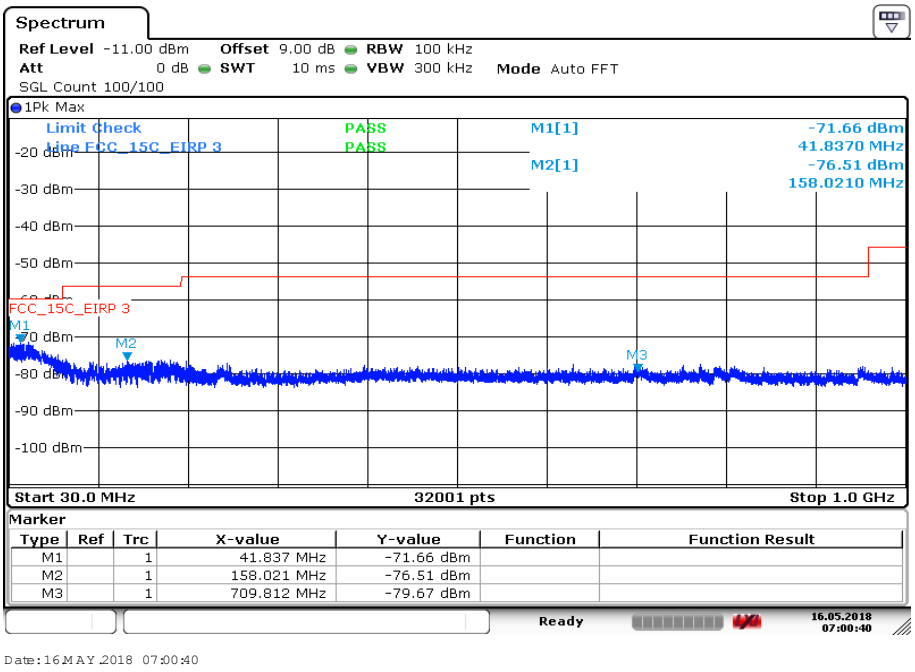
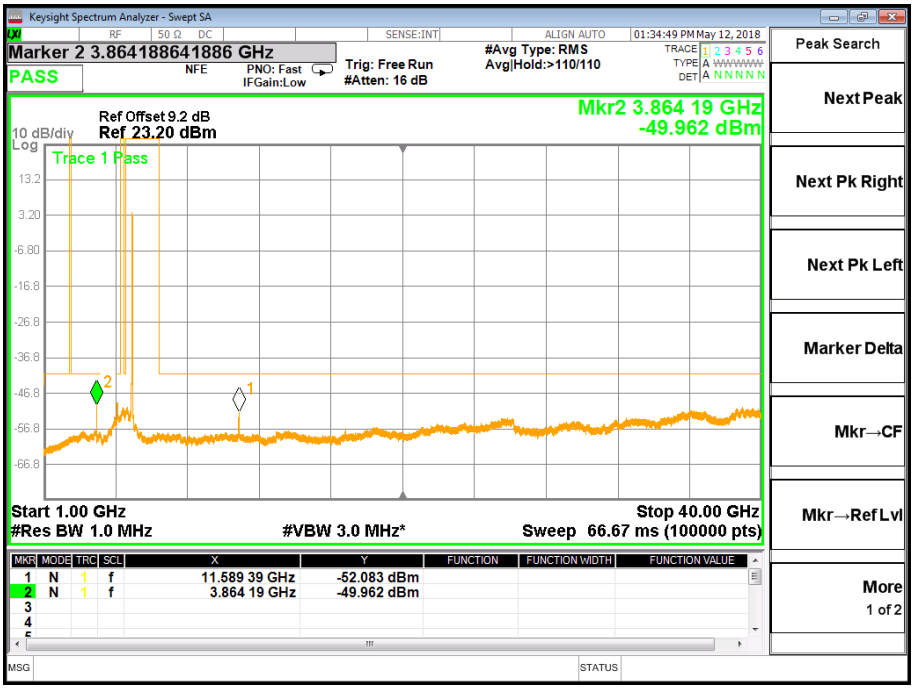
Plot 23: 1 GHz to 40 GHz, U-NII-3; lowest channel



Plot 24: 30 MHz to 1 GHz, U-NII-3; highest channel

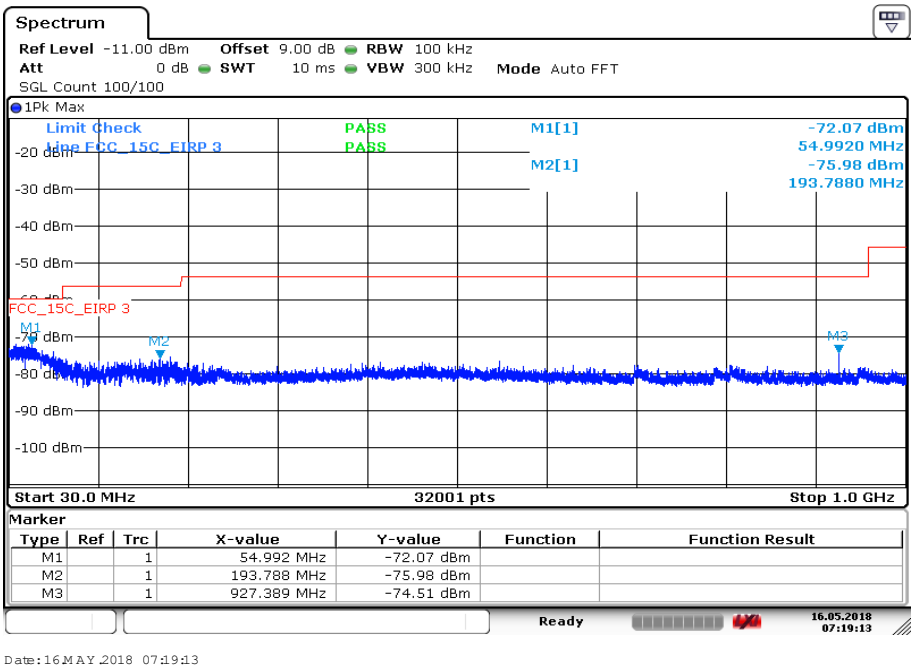


Plot 25: 1 GHz to 40 GHz, U-NII-3; highest channel

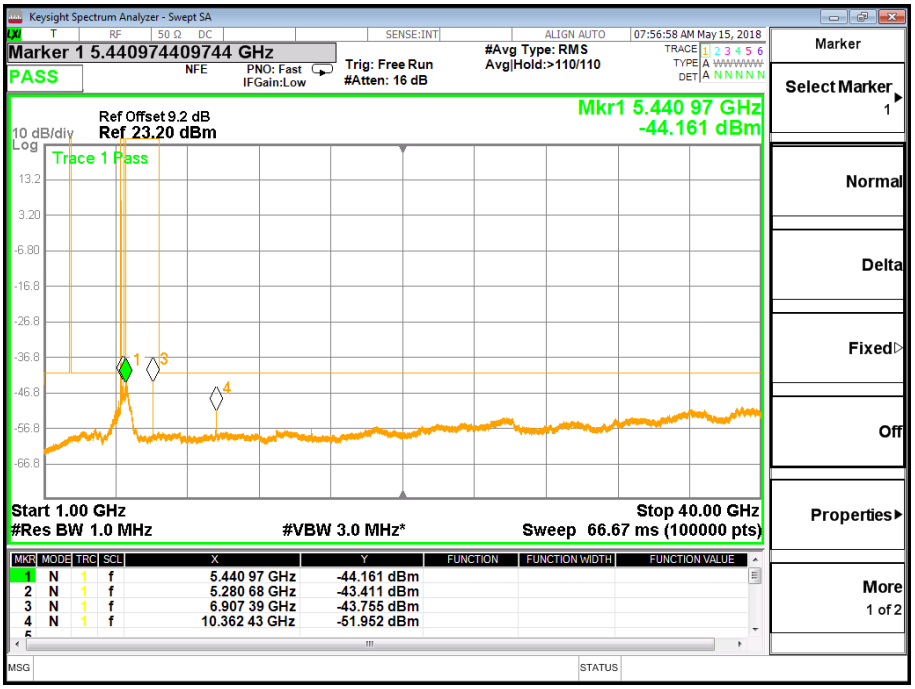


Plots: 20 MHz channel bandwidth / Antenna 1

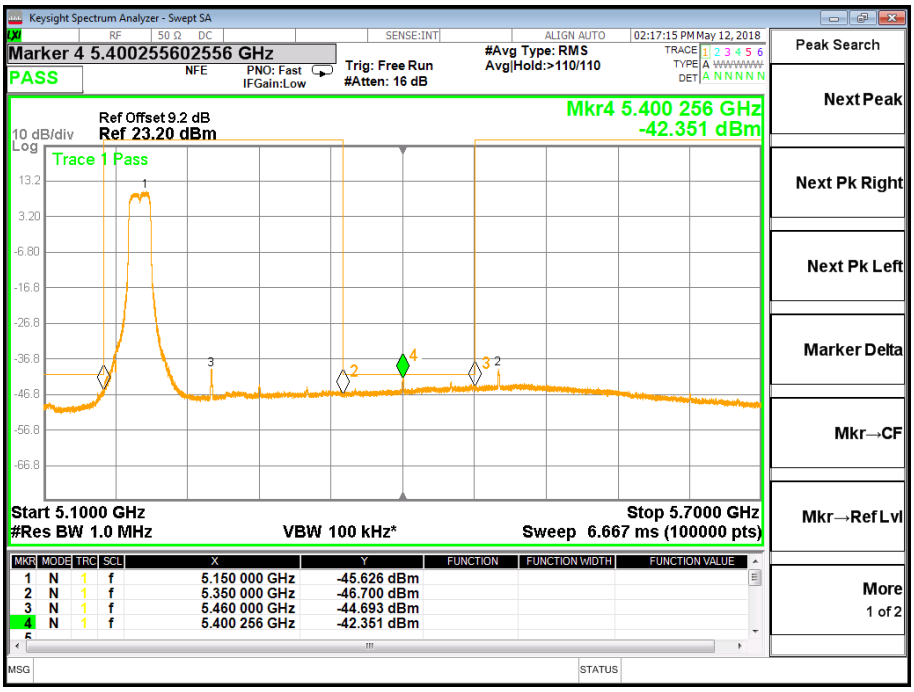
Plot 26: 30 MHz to 1 GHz, U-NII-1; lowest channel



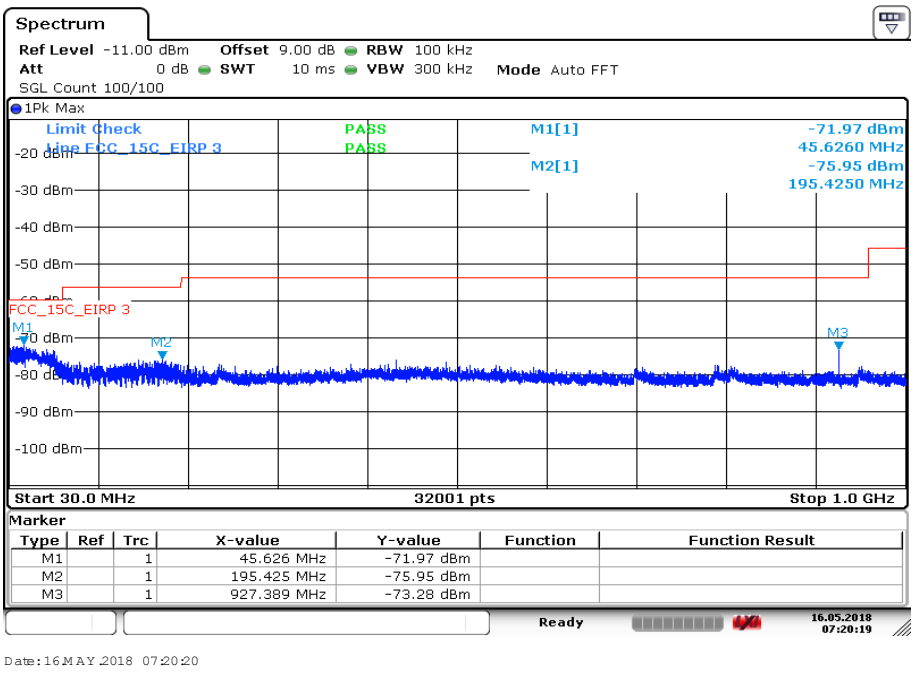
Plot 27: 1 GHz to 40 GHz, U-NII-1; lowest channel



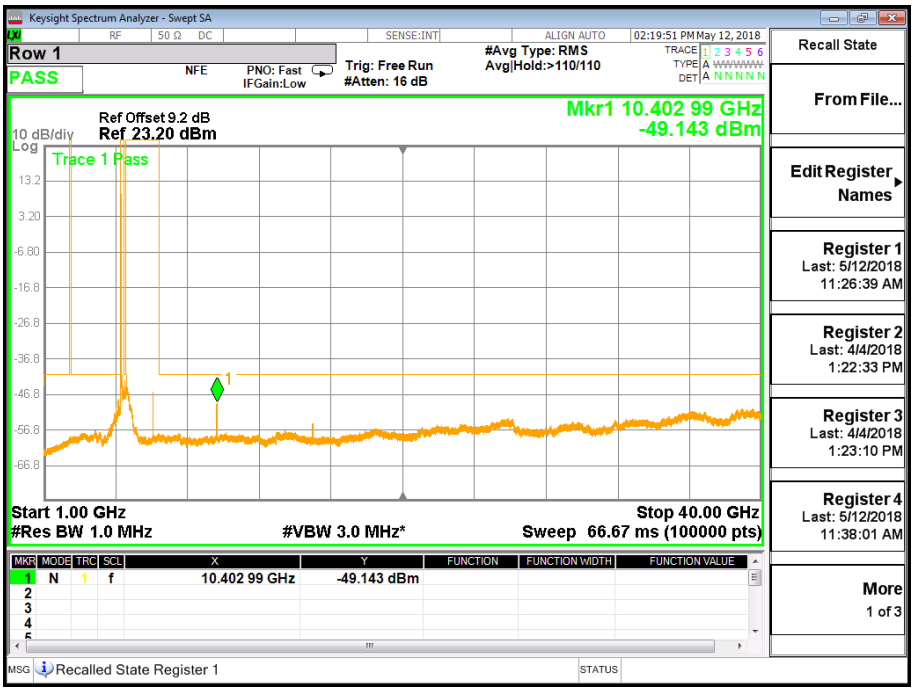
Plot 28: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; lowest channel



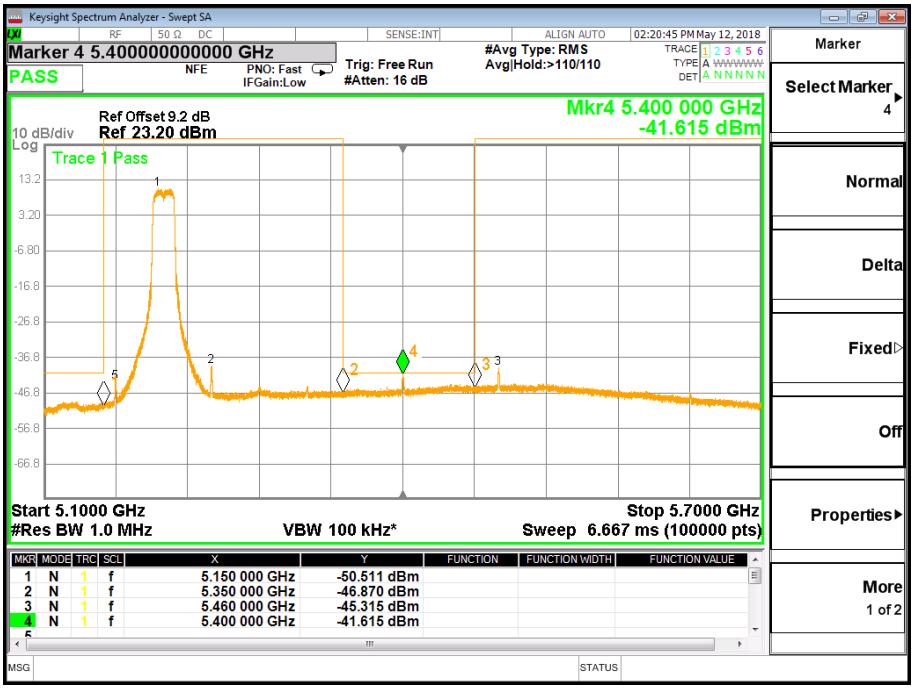
Plot 29: 30 MHz to 1 GHz, U-NII-1; middle channel



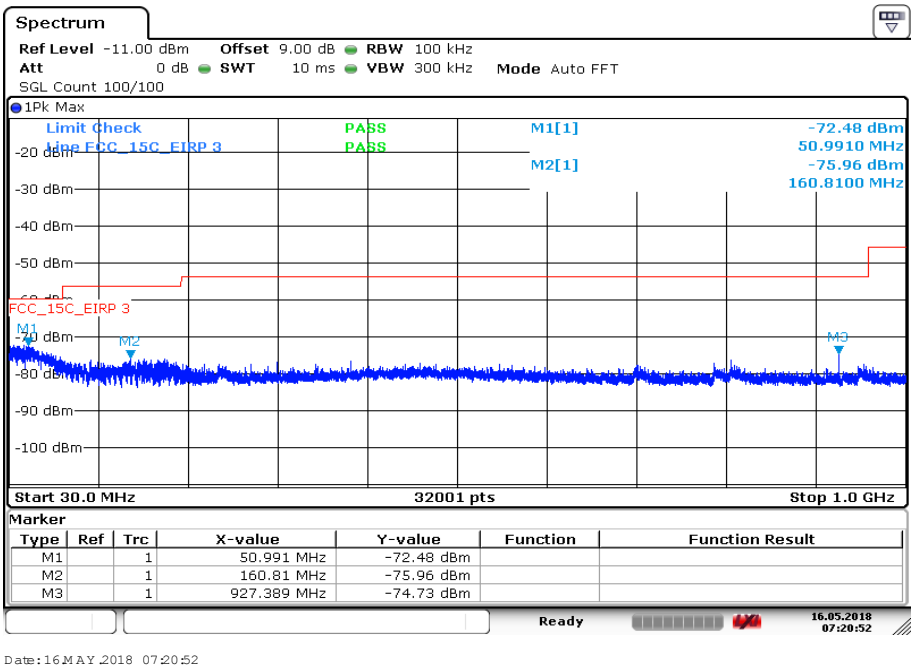
Plot 30: 1 GHz to 40 GHz, U-NII-1; middle channel



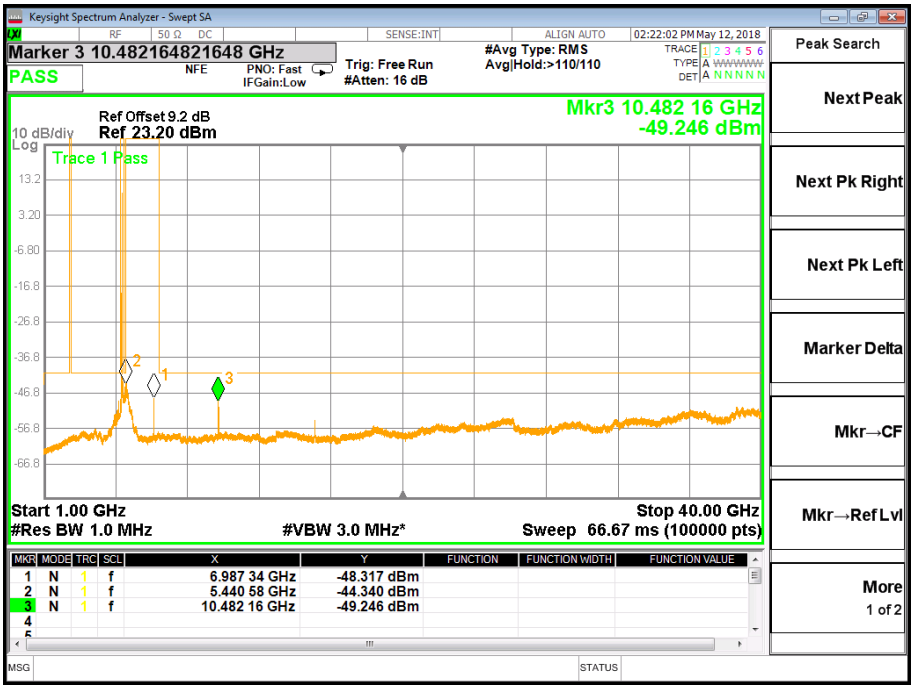
Plot 31: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; middle channel



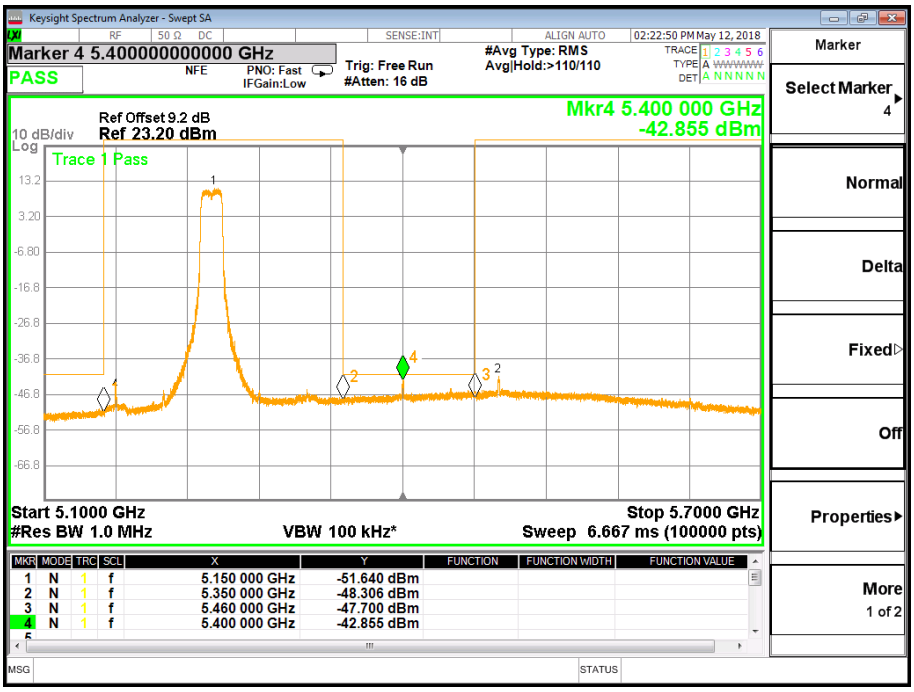
Plot 32: 30 MHz to 1 GHz, U-NII-1; highest channel



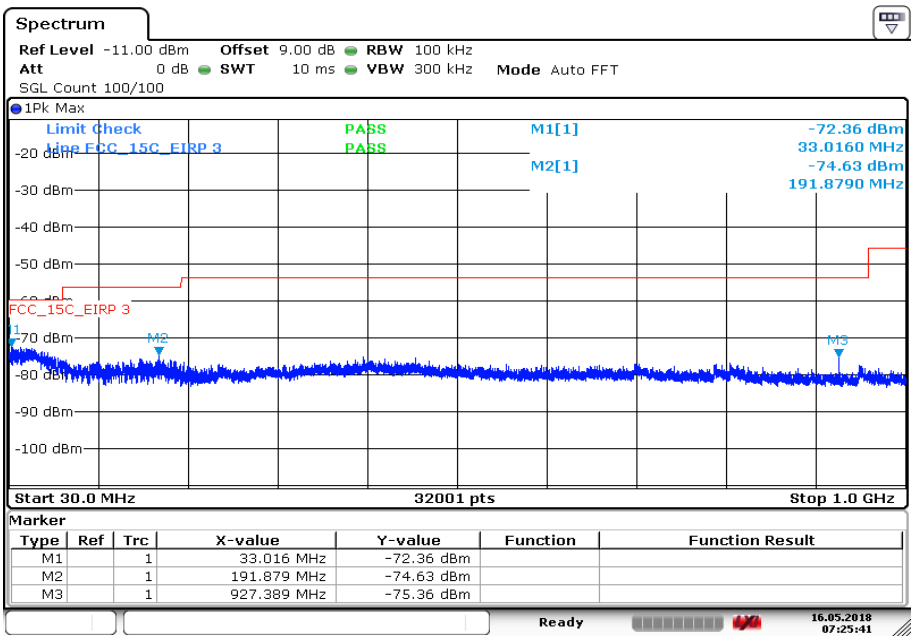
Plot 33: 1 GHz to 40 GHz, U-NII-1; highest channel



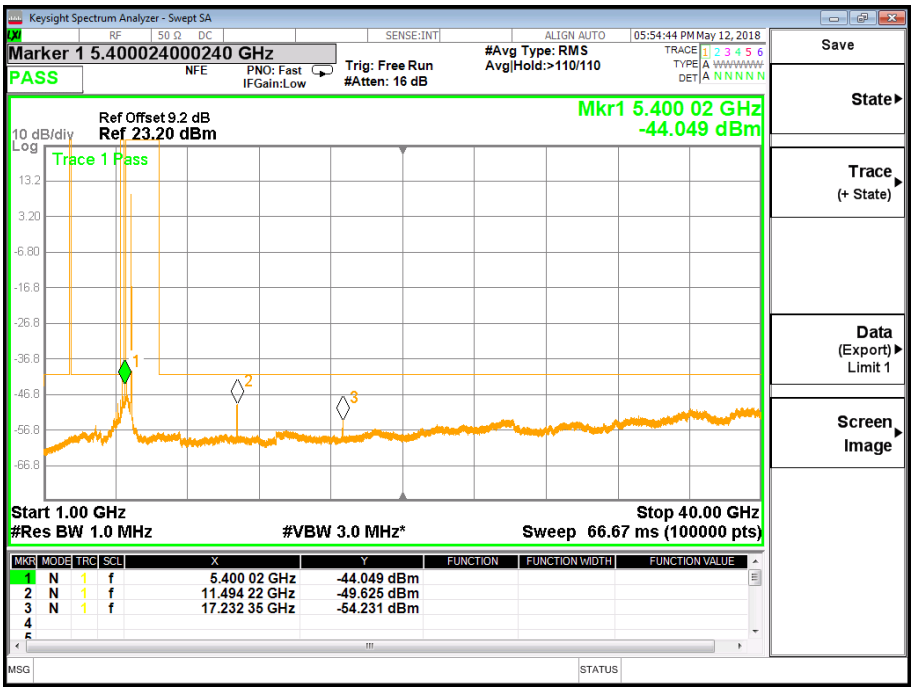
Plot 34: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; highest channel



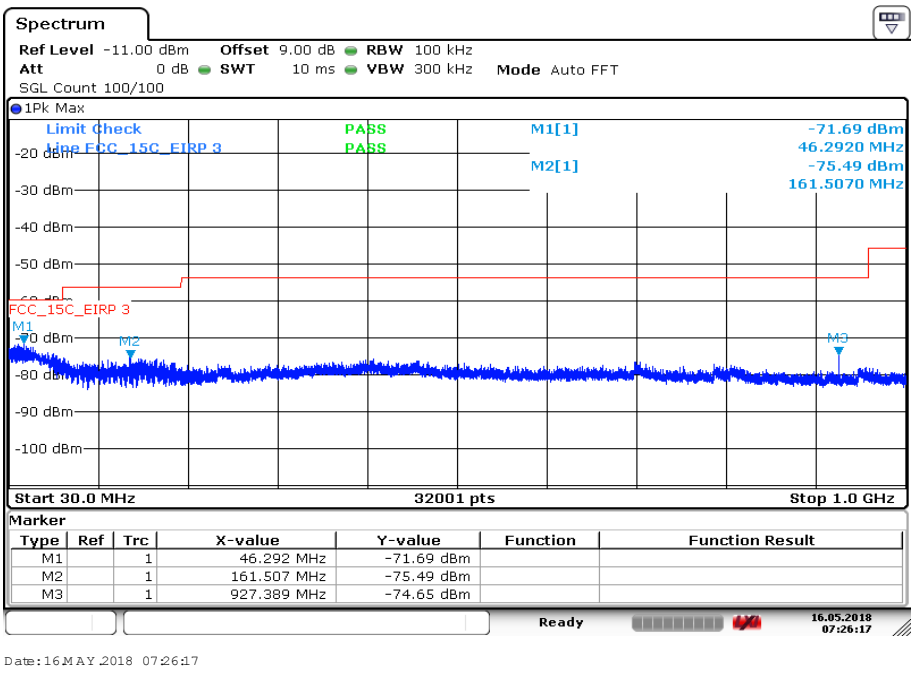
Plot 35: 30 MHz to 1 GHz, U-NII-3; lowest channel



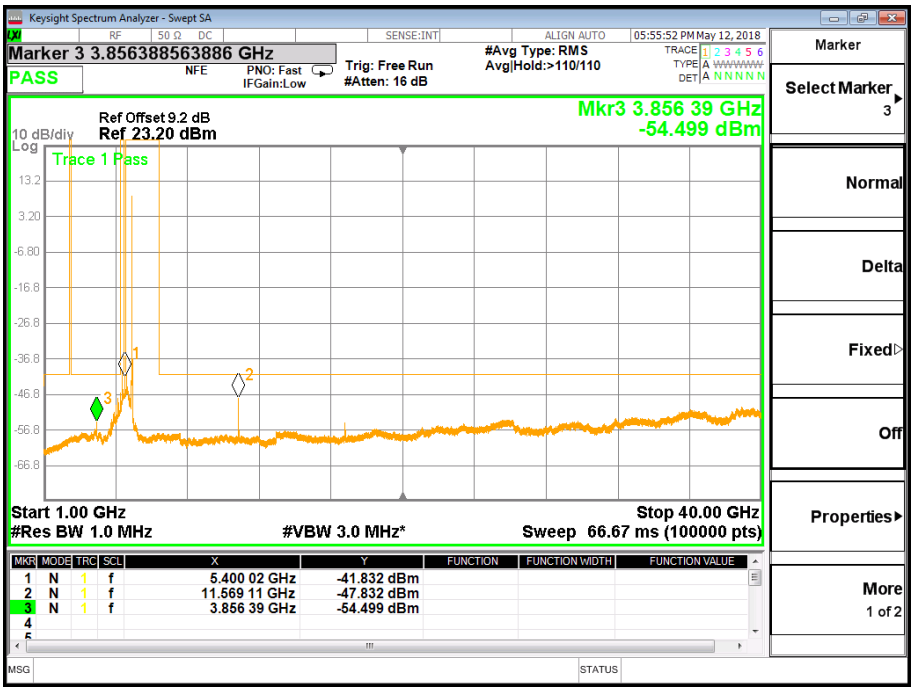
Plot 36: 1 GHz to 40 GHz, U-NII-3; lowest channel



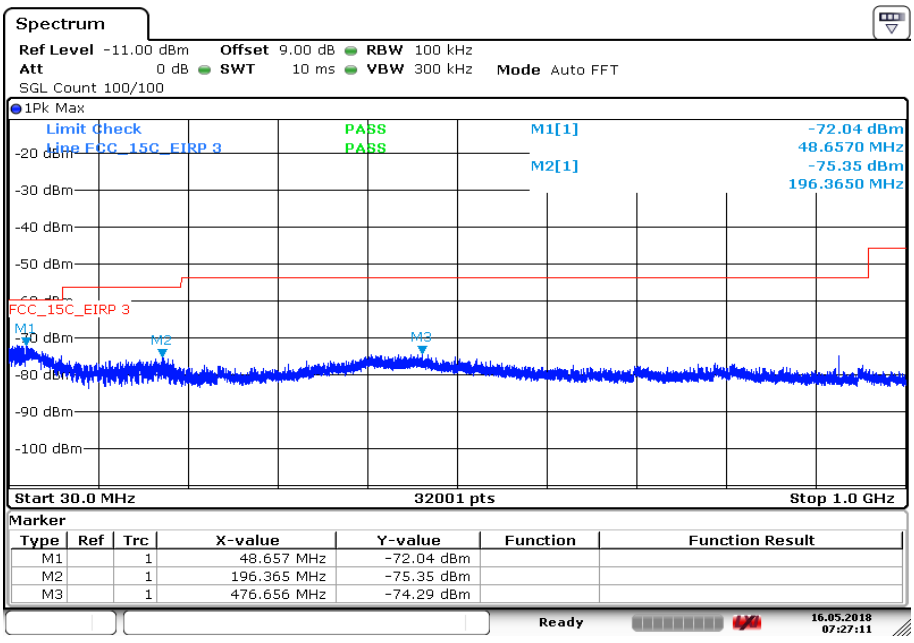
Plot 37: 30 MHz to 1 GHz, U-NII-3; middle channel



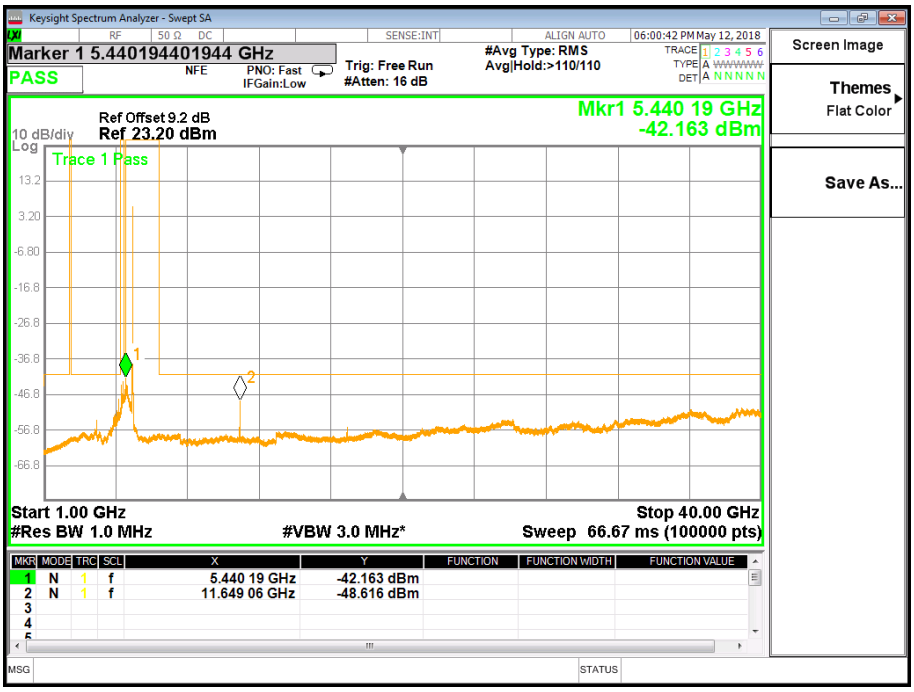
Plot 38: 1 GHz to 40 GHz, U-NII-3; middle channel



Plot 39: 30 MHz to 1 GHz, U-NII-3; highest channel

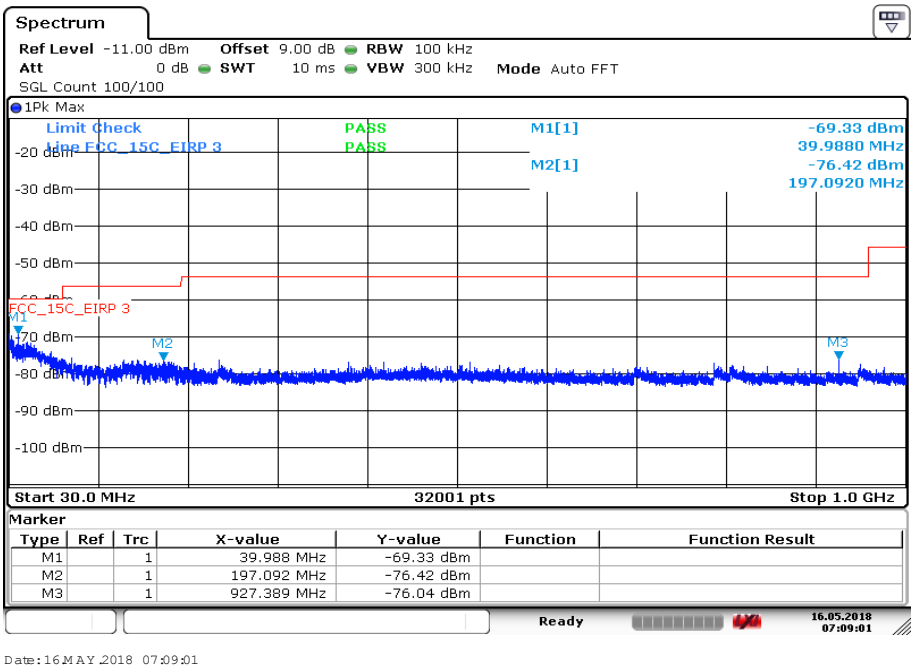


Plot 40: 1 GHz to 40 GHz, U-NII-3; highest channel

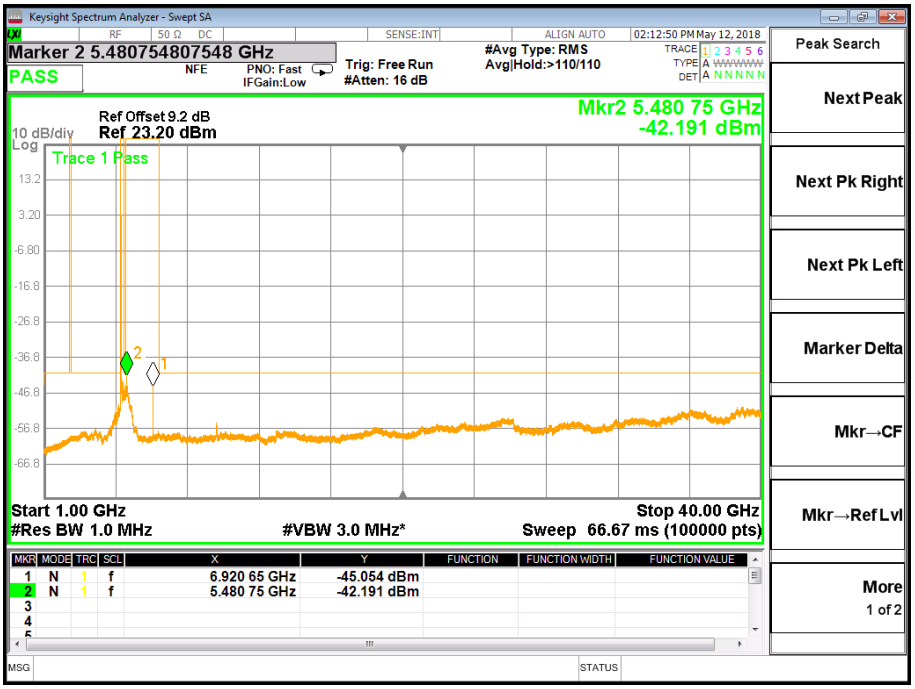


Plots: 40 MHz channel bandwidth / Antenna 1

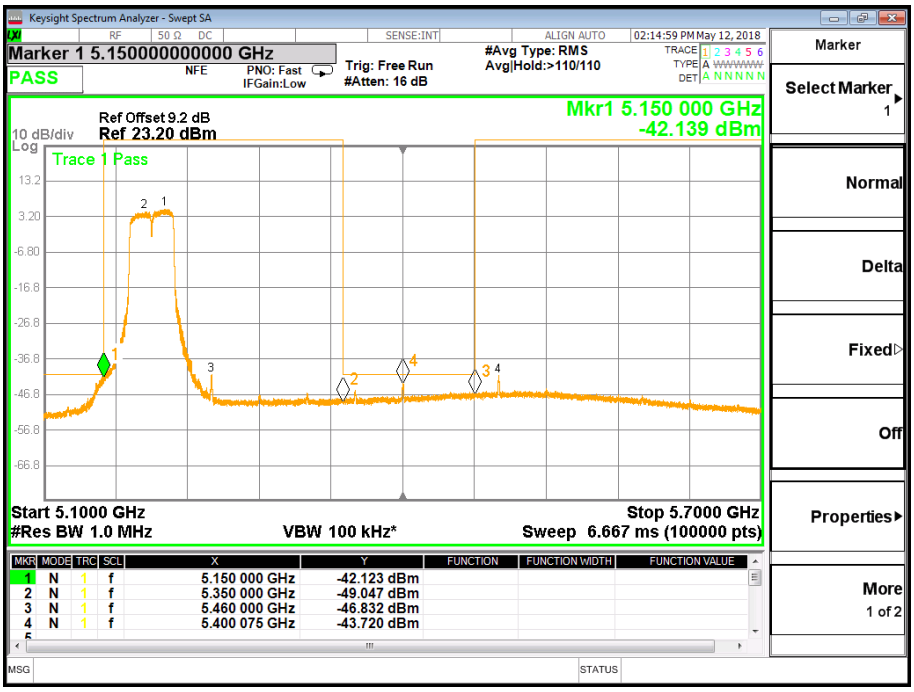
Plot 41: 30 MHz to 1 GHz, U-NII-1; lowest channel



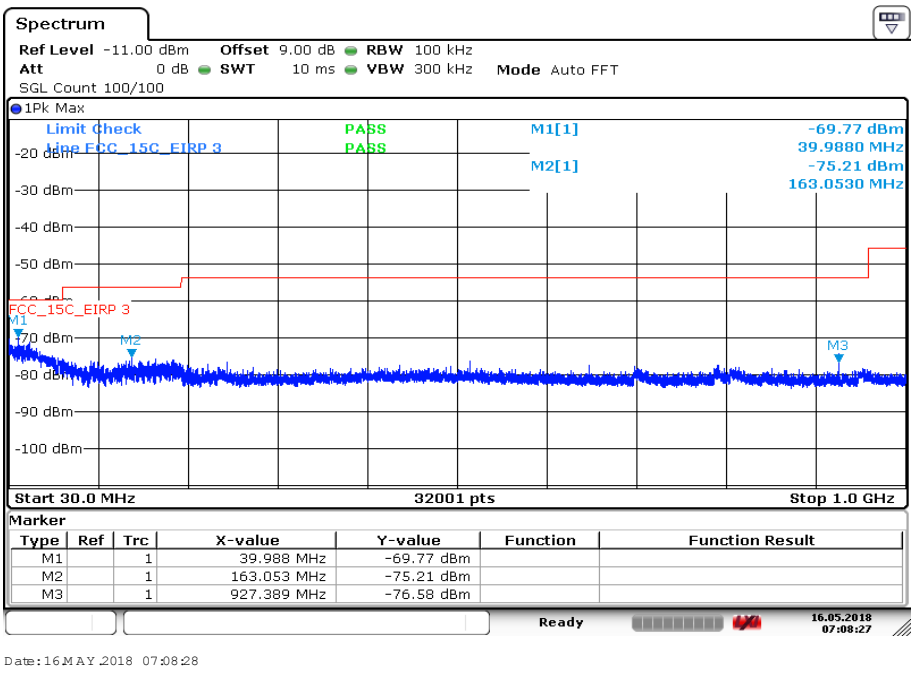
Plot 42: 1 GHz to 40 GHz, U-NII-1; lowest channel



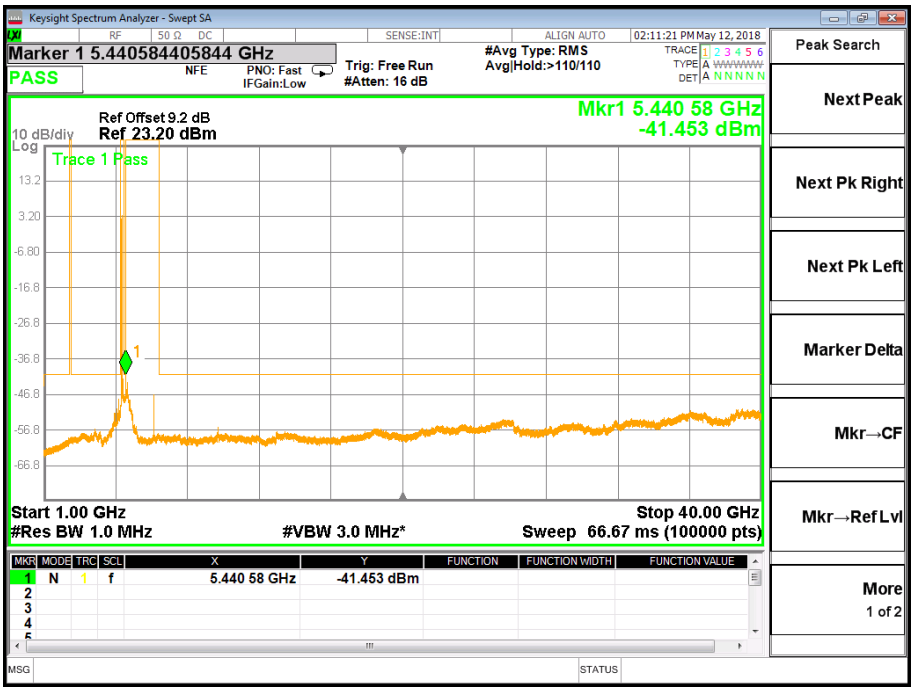
Plot 43: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; lowest channel



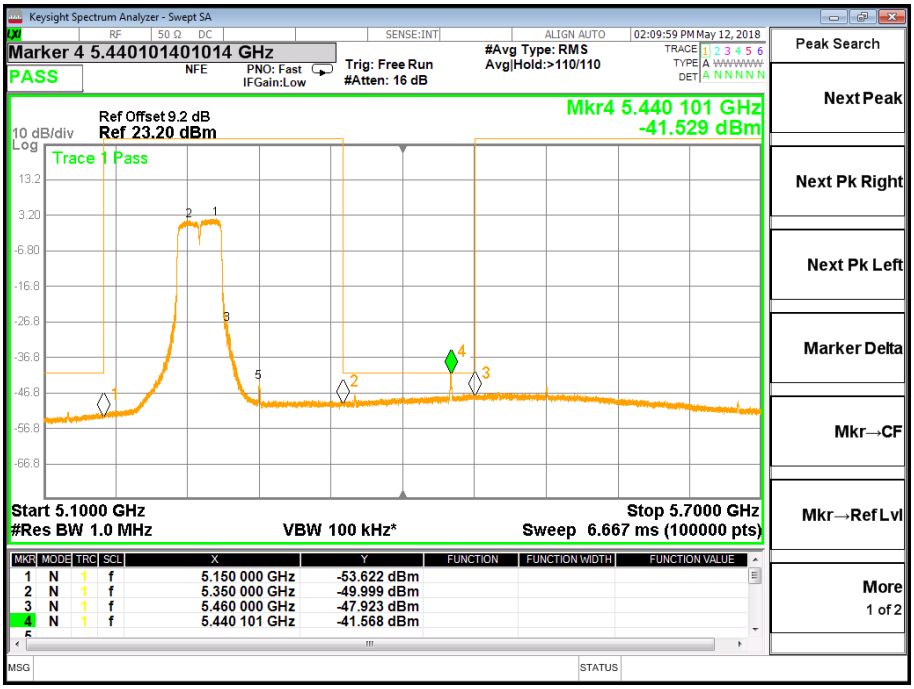
Plot 44: 30 MHz to 1 GHz, U-NII-1; highest channel



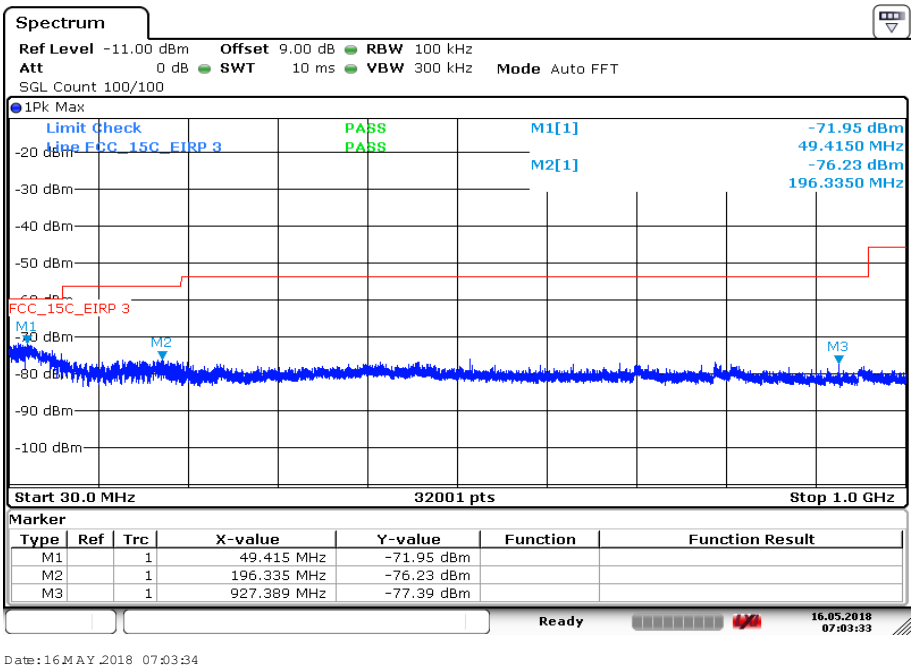
Plot 45: 1 GHz to 40 GHz, U-NII-1; highest channel



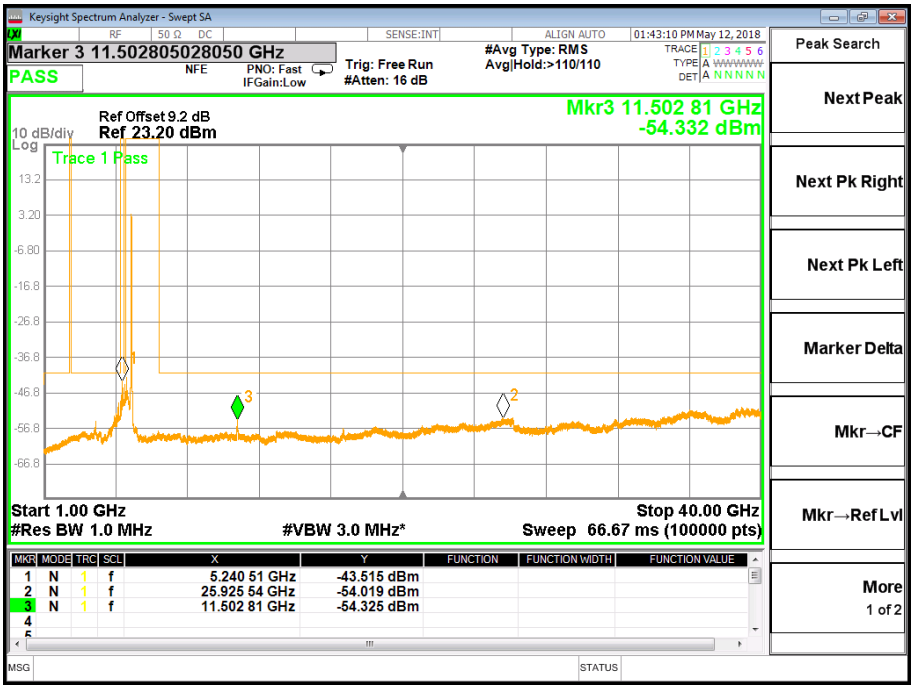
Plot 46: 5.1 GHz to 5.7 GHz (Zoom), U-NII-1; highest channel



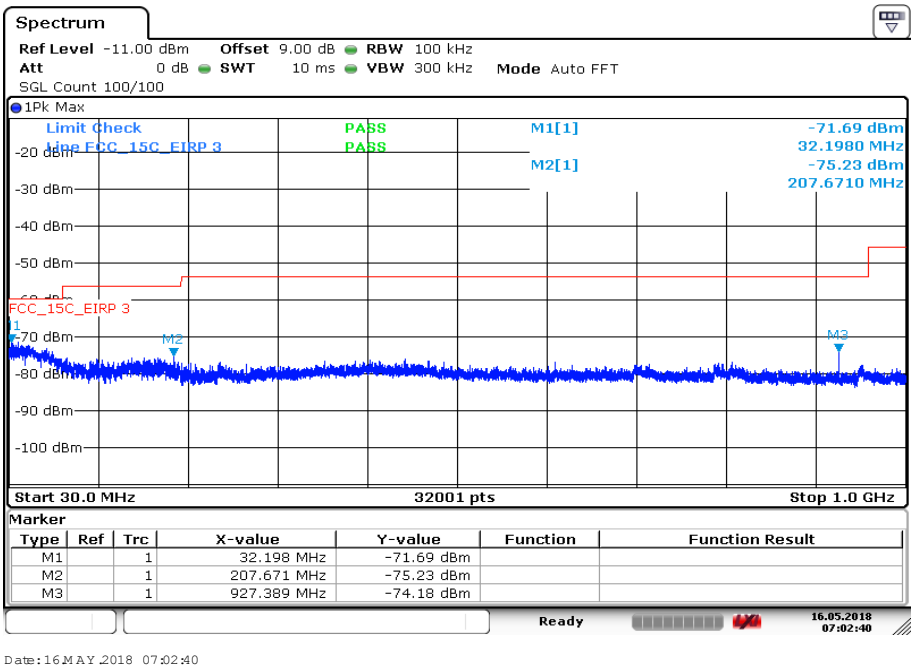
Plot 47: 30 MHz to 1 GHz, U-NII-3; lowest channel



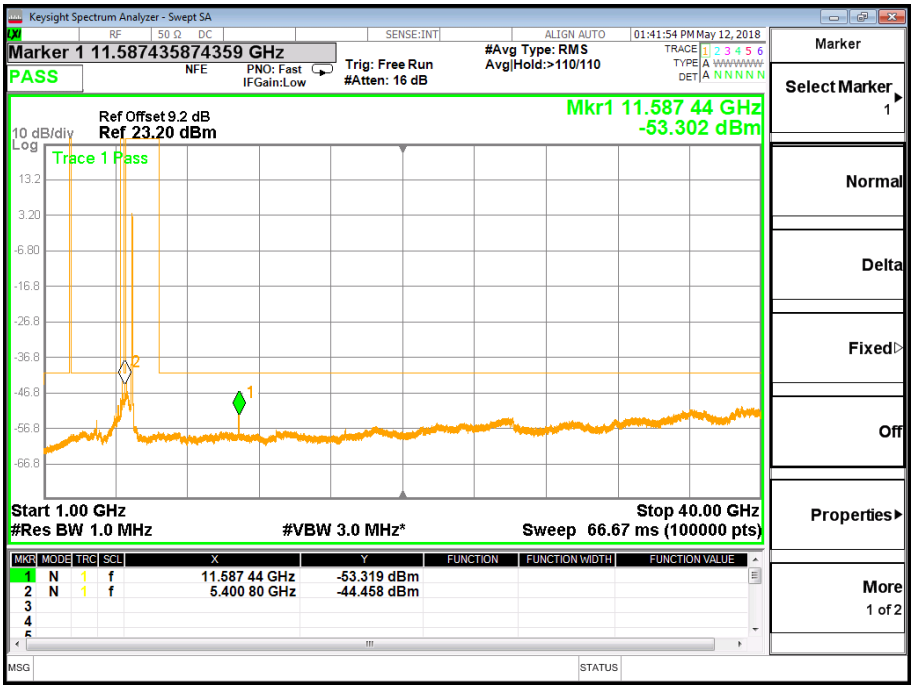
Plot 48: 1 GHz to 40 GHz, U-NII-3; lowest channel



Plot 49: 30 MHz to 1 GHz, U-NII-3; highest channel



Plot 50: 1 GHz to 40 GHz, U-NII-3; highest channel



11 Observations

No observations except those reported with the single test cases have been made.

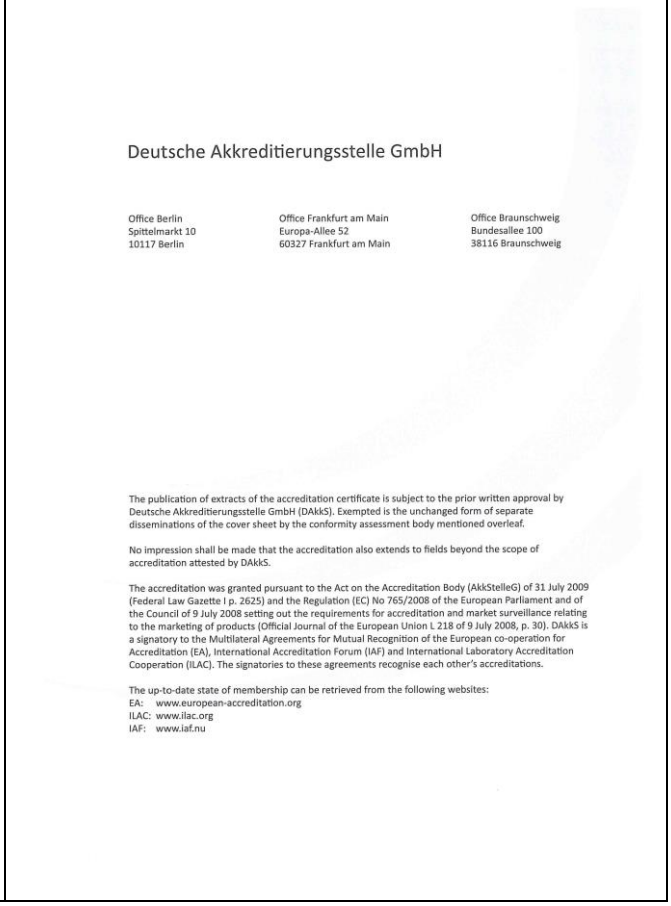
Annex A Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System

Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2018-05-18
A	Applicant, Manufacturer, FVIN, HVIN, HMN and type identification changed	2018-05-24
B	FVIN, HVIN, HMN changed	2018-07-06
C	HVIN revised	2018-08-24

Annex C Accreditation Certificate

first page	last page
	

Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

http://www.dakks.de/as/ast/d/D-PL-12076-01-03.pdf