Bundesnetzagentur	<b>CTC</b> advanced member of RWTÜV group
Test report no.: 1	Deutsche Akkreditierungsstelle
Testing laboratory	Applicant
CTC advanced GmbH Untertuerkheimer Strasse 6 – 10 66117 Saarbruecken / Germany Phone: + 49 681 5 98 - 0 Fax: + 49 681 5 98 - 9075 Internet: <u>http://www.ctcadvanced.com</u> e-mail: <u>mail@ctcadvanced.com</u>	Bury GmbH & Co. KG Robert-Koch-Str. 1-7 32584 Löhne / GERMANY Phone: +49 5732 9706-100 Contact: Johann Dshus e-mail: <u>Johann.Dshus@bury.com</u>
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	Manufacturer BURY Sp. z o.o. ul. Wojska Polskiego 4 39-300 Mielec, POLAND
Test sta	
FCC - Title 47 CFRFCC - Title 47 of the Code ofPart 15frequency devices	Federal Regulations; Chapter I; Part 15 - Radio

PCC - Title 47 CFR Part 15	FCC - Litle 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 5	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus
For further applied test star	ndards please refer to section 3 of this test report.

	Test Item	
Kind of test item:	Touchscreen remote wireless control unit	
Model name:	TSR2	
FCC ID:	QZ9-TSR2	Home H
IC:	5927A-TSR2	Jukebiax / Climaco /
Frequency:	U-NII bands: U-NII-1; U-NII-2A & 2C; U-NII-3	
Technology tested:	WLAN	Track Tide ZZ.0 ZZ.0 Artiste Name V
Antenna:	Integrated antenna	
Power supply:	8.25 V DC by Li-ion battery	
Temperature range:	-40°C to +80°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=Andreas Luckenbill, o=CTC advanced 'GmbH, ou=LUC-180217, email=andreas.luckenbill@ctcadvanced.co m, c=DE 2019.09.13 07:58:44 +02'00'

Andreas Luckenbill Lab Manager Radio Communications & EMC

## **Test performed:**

Unc

cn=Marco Bertolino, o=CTC advanced GmbH, ou=BTL-161128, email=Marco.Bertolino@ctcadvanced.com, c=DE 2019.09.13 07:59:11 +02'00'

Marco Bertolino Lab Manager Radio Communications & EMC



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### 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. 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 replaces the test report with the number 1-6730/18-01-09 and dated 2018-12-12.

### 2.2 Application details

Date of receipt of order:	2018-10-01
Date of receipt of test item:	2018-11-05
Start of test:	2018-11-05
End of test:	2018-11-21
Person(s) present during the test:	-/-

#### 2.3 Test laboratories sub-contracted

None

### 3 Test standard/s and references

Test standard	Date	Description
FCC - Title 47 CFR Part 15	-/-	FCC - 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 5	April 2018	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

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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



#### **Test environment** 4

Temperature	:	T <sub>nom</sub> T <sub>max</sub> T <sub>min</sub>	+22 °C during room temperature tests No tests under extreme temperature conditions required. No tests under extreme temperature conditions required.
Relative humidity content	:		44 %
Barometric pressure	:		1022 hpa
Power supply	:	V <sub>nom</sub> V <sub>max</sub> V <sub>min</sub>	8.25 V DC by Li-ion battery No tests under extreme voltage conditions required. No tests under extreme voltage conditions required.

#### 5 **Test item**

#### 5.1 **General description**

Hardware status	:	Conducted unit:         Sample 3         (MAC: 30:45:11:18:58:A4)           H09				
Software status	:	X087				
Firmware status	:	-/-				
Frequency band	:	U-NII bands: U-NII-1; U-NII-2A & 2C; U-NII-3				
Type of radio transmission Use of frequency spectrum	:	OFDM				
Type of modulation	:	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM, 256 – QAM				
Number of channels	:	24 channels @ 20 MHz bandwidth 11 channels @ 40 MHz bandwidth				
Antenna						
	•	Integrated antenna				
Power supply	:	.25 V DC by Li-ion battery				
Temperature range	:	-40°C to +80°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:

1-6730/18-01-01\_AnnexA 1-6730/18-01-01 AnnexB 1-6730/18-01-01\_AnnexD



### 6 Description of the test setup

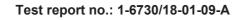
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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
- ne not required (k, ev, izw, zw not required)
- ev periodic self verification
- Ve long-term stability recognized
- vlkl! Attention: extended calibration interval
- NK! Attention: not calibrated

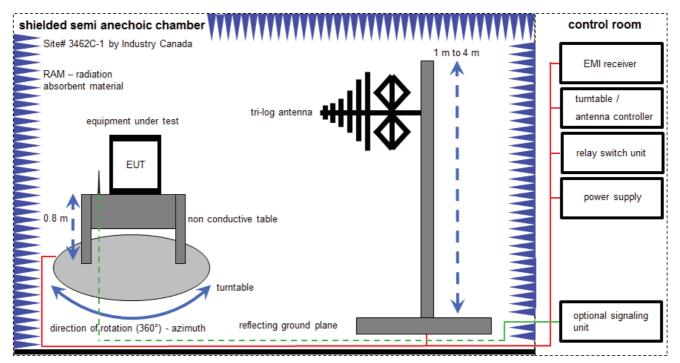
- EK limited calibration
- zw cyclical maintenance (external cyclical maintenance)
- izw internal cyclical maintenance
- g blocked for accredited testing
- \*) next calibration ordered / currently in progress





### 6.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz 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 conform to 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 EMC32 software version: 10.30.0

FS = UR + CL + AF

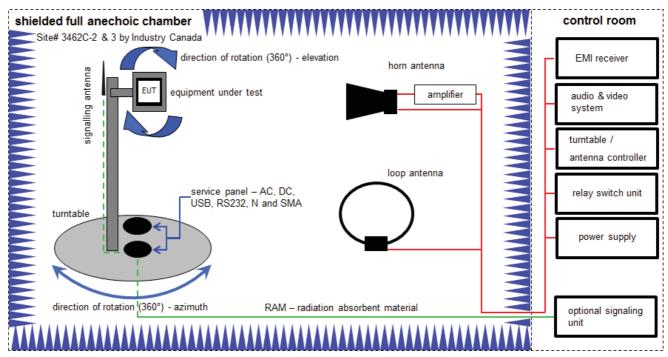
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

#### <u>Example calculation</u>: 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	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	Α	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	Α	Meßkabine 1	HF-Absorberhalle	MWB AG 300023	-/-	300000551	ne	-/-	-/-
3	Α	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	15.12.2017	14.12.2018
4	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
5	А	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
6	А	Turntable Interface- Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
7	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vlKl!	24.11.2017	23.11.2020

### 6.2 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)

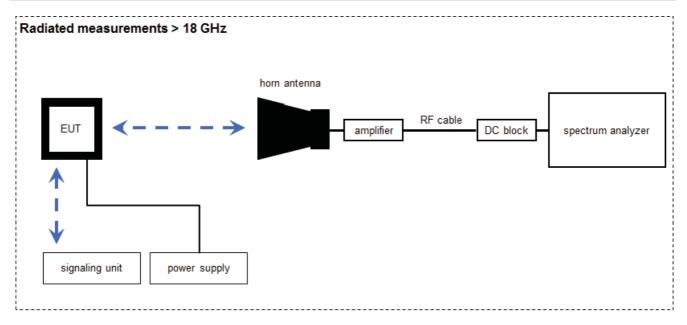
#### Example calculation:

 $FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB\mu V/m] (71.61 \mu V/m)$ 

### Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	07.07.2017	06.07.2019
2	C Active Loop Antenna 9 kHz to 30 MHz		6502	EMCO	2210	300001015	vlKl!	07.07.2017	06.07.2019
3	A	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
4	A	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
5	A	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
6	A, B, C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
7	A, B, C	Computer	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A54 21	300004591	ne	-/-	-/-
8	A, B, C	NEXIO EMV- Software	BAT EMC V3.16.0.49	EMCO	-/-	300004682	ne	-/-	-/-
9	A, B, C	Anechoic chamber	-/-	TDK	-/-	300003726	ne	-/-	-/-
10	A, B, C	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	14.12.2017	13.12.2018
11	A	Band Reject Filter	WRCJV12-5120-5150- 5350-5380-40SS	Wainwright	5	300005168	ev	-/-	-/-
12	A	Band Reject Filter	WRCJV12-5695-5725- 5850-5880-40SS	Wainwright	5	300005169	ev	-/-	-/-
13	A	Band Reject Filter	WRCJV16-5440-5470- 5725-5755-40SS	Wainwright	9	300005170	ev	-/-	-/-
14	A	RF Amplifier	AFS4-00100800-28- 20P-4-R	MITEQ	2008992	300005204	ne	-/-	-/-
15	A	RF-Amplifier	AMF-6F06001800-30- 10P-R	NARDA-MITEQ Inc	2011571	300005240	ev	-/-	-/-

### 6.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

FS = UR + CA + AF

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

<u>Example calculation</u>: FS [dB $\mu$ V/m] = 40.0 [dB $\mu$ V/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dB $\mu$ V/m] (6.79  $\mu$ V/m)

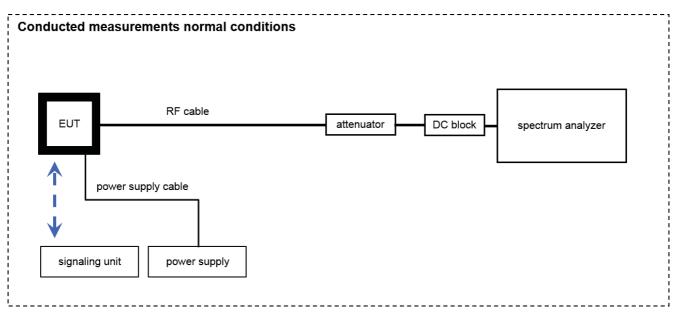
# Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	А	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda	-/-	300000486	vIKI!	13.12.2017	12.12.2019
2	A	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	82-16	300000510	vIKI!	13.12.2017	12.12.2019
3	А	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	16.01.2018	15.01.2019
4	А	Amplifier 2-40 GHz	JS32-02004000-57- 5P	MITEQ	1777200	300004541	ev	-/-	-/-
5	А	RF-Cable	ST18/SMAm/SMAm/ 48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
6	А	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-

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## 6.4 Conducted measurements



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	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	А	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	16.01.2018	15.01.2019
2	А	RF-Cable	ST18/SMAm/SMAm/ 48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
3	А	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
4	А	Hygro-Thermometer	-/-, 5-45°C, 20- 100%rF	Thies Clima	-/-	400000108	ev	11.05.2018	10.05.2020
5	А	PC Tester R005	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A45 23	300004589	ne	-/-	-/-
6	А	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	-/-	300004590	ne	-/-	-/-
7	А	RF-Cable	ST18/SMAm/SMAm/ 60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
8	А	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10- 2W44+	Mini Circuits	-/-	400001186	ev	-/-	-/-
9	А	Synchron Power Meter	SPM-4	СТС	1	300005580	ev	-/-	-/-
10	A	DC-Blocker	WA7046	Weinschel Associates	-/-	400001310	ev	-/-	-/-
11	A	DC Power Supply	HMP2020	Rohde & Schwarz	102850	300005517	vlKI!	14.12.2017	13.12.2019



### 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, it is placed on a table with 0.8 m height.
- 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 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 pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- 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.

\*)Note: The sequence will be repeated three times with different EUT orientations.



### 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	Unce	Uncertainty				
Antenna gain	± 3	3 dB				
Power spectral density	± 1.1	15 dB				
Spectrum bandwidth	± 100 kHz (depend	s on the used RBW)				
Occupied bandwidth	± 100 kHz (depend	s on the used RBW)				
Maximum output power		± 1.15 dB conducted ± 3 dB radiated				
Minimum emissions bandwidth	± 100 kHz (depend	± 100 kHz (depends on the used RBW)				
Band edge compliance radiated	± 3	± 3 dB				
Spurious emissions conducted	> 3.6 GHz > 7 GHz > 18 GHz ≥ 40 GHz	± 1.15 dB ± 1.15 dB ± 1.89 dB ± 3.12 dB				
Spurious emissions radiated below 30 MHz	± 3	± 3 dB				
Spurious emissions radiated 30 MHz to 1 GHz	± 3	± 3 dB				
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.	± 3.7 dB				
Spurious emissions radiated above 12.75 GHz	± 4.	± 4.5 dB				



#### 9 Summary of measurement results

	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained
$\square$	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	2019-09-13	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	с	NC	NA	NP	Remark
-/-	Output power verification (cond.)			-/-				
-/-	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	$\boxtimes$				-/-
§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	$\boxtimes$				-/-
RSS - 247 (6.2.4.1)	Spectrum bandwidth 6dB bandwidth	Nominal	Nominal	$\boxtimes$				-/-
§15.407(a) RSS - 247 (6.2.1.2)	Spectrum bandwidth 26dB bandwidth	Nominal	Nominal	$\boxtimes$				-/-
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	$\boxtimes$				-/-
§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	$\boxtimes$				-/-
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	$\boxtimes$				-/-
§15.209(a) RSS-Gen	Spurious emissions radiated < 30 MHz	Nominal	Nominal	$\boxtimes$				-/-
§15.107(a) §15.207	Spurious emissions conducted emissions < 30 MHz	Nominal	Nominal	$\boxtimes$				-/-
§15.407 RSS - 247 (6.3)	DFS	Nominal	Nominal	Nominal -/-			See report 1-6730/18-01-17	

### Notes:

C:	Compliant	NC:	Not compliant	NA:	Not applicable	NP:	Not performed
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### 10 Additional comments

Reference documents: DFS report: CTC advanced test report 1-6730/18-01-17

Special test descriptions: None

Configuration descriptions: All tests performed using the highest available power setting within test mode.

Provided channels:

Channels with 20 MHz channel bandwidth:

	U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency								
channel	channel         36         40         44         48         52         56         60         64								
f <sub>c</sub> / MHz	f <sub>c</sub> / MHz 5180 5200 5220 5240 5260 5280 5300 5320								

	U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency							
channel	channel         100         104         108         112         116         120         124         128         132         136         140							
f <sub>c</sub> / MHz	f <sub>c</sub> / MHz 5500 5520 5540 5560 5580 5600 5620 5640 5660 5680 5700							

	U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency						
channel	<b>channel 149</b> 153 <b>157</b> 161 <b>165</b>						
f <sub>c</sub> / MHz	fc / MHz 5745 5765 5785 5805 5825						

Channels with 40 MHz channel bandwidth:

	U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency							
channel	channel 38 46 54 62							
f <sub>c</sub> / MHz	f <sub>c</sub> / MHz 5190 5230 5270 5310							

	U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency						
channel	102	110	118	126	134		
f <sub>c</sub> / MHz	fc / MHz 5510 5550 5590 5630 5670						

	U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency						
channel	channel 151 159						
f <sub>c</sub> / MHz	f <sub>c</sub> / MHz 5755 5795						

Note: The channels used for the tests were marked in bold in the list.

Test report no	o.: 1-6730	V/18-01-09-A CTC I advanced
Test mode:		No test mode available. Iperf was used to ping another device with the largest support packet size
	$\boxtimes$	Special software is used. EUT is transmitting pseudo random data by itself
Antennas and transmit operating modes:		<ul> <li>Operating mode 1 (single antenna)</li> <li>Equipment with 1 antenna,</li> <li>Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,</li> <li>Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)</li> </ul>
		<ul> <li>Operating mode 2 (multiple antennas, no beamforming)</li> <li>Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.</li> </ul>
		<ul> <li>Operating mode 3 (multiple antennas, with beamforming)</li> <li>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.</li> </ul>



### **11 Measurement results**

### **11.1 Identify worst case data rate**

#### Measurement:

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

In further tests only the identified worst case modulation scheme or bandwidth will be measured.

#### 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 6.4 – A						
Measurement uncertainty:	See chapter 8						

#### **Results:**

	Modulation scheme / bandwidth									
OFDM – mode	U-NII-1 &	U-NII-2A	U-N	II-2C	U-NII-3					
	Low high		Low	high	Low	high				
	channel	channel	channel	channel	channel	channel				
a – mode	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s	6Mbit/s				
n/ac HT20 – mode	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0				
n/ac HT40 – mode	MCS0	MCS0	MCS0	MCS0	MCS0	MCS0				



### 11.2 Antenna gain

### **Description:**

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

#### Measurement parameters:

Measurement parameter								
Detector:	Peak							
Sweep time:	Auto							
Resolution bandwidth:	3 MHz							
Video bandwidth:	3 MHz							
Trace mode:	Max. hold							
Test setup:	See chapter 6.2 – B (radiated) See chapter 6.4 – A (conducted)							
Measurement uncertainty:	See chapter 8							

#### Limits:

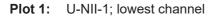
Antenna Gain
6 dBi / > 6 dBi output power and power density reduction required

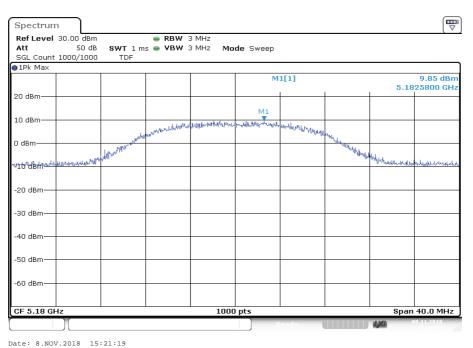
### Results:

U-NII-1		Antenna gain				
(5150 MHz to 5250 MHz)	Lowest channel	Middle channel	Highest channel			
Conducted power / dBm @ 3 MHz RBW	9.85	_/_	10.00			
Radiated power / dBm @ 3 MHz RBW	9.99	_/_	8.21			
Gain / dBi (calculated)	0.14	_/_	-1.79			
U-NII-2A		Antenna gain				
(5250 MHz to 5350 MHz)	Lowest channel	Middle channel	Highest channel			
Conducted power / dBm @ 3 MHz RBW	9.26	_/_	9.18			
Radiated power / dBm @ 3 MHz RBW	8.99	_/_	6.81			
Gain / dBi (calculated)	-0.27	_/_	-2.37			
U-NII-2C	Antenna gain					
(5470 MHz to 5725 MHz)	Lowest channel	Middle channel	Highest channel			
(5470 MHz to 5725 MHz) Conducted power / dBm @ 3 MHz RBW	Lowest channel 9.74	Middle channel 8.46	Highest channel 8.88			
			-			
Conducted power / dBm @ 3 MHz RBW	9.74	8.46	8.88			
Conducted power / dBm @ 3 MHz RBW Radiated power / dBm @ 3 MHz RBW Gain / dBi (calculated) U-NII-3	9.74 7.48	8.46 9.69	8.88 5.78			
Conducted power / dBm @ 3 MHz RBW Radiated power / dBm @ 3 MHz RBW Gain / dBi (calculated)	9.74 7.48	8.46 9.69 1.23	8.88 5.78			
Conducted power / dBm @ 3 MHz RBW Radiated power / dBm @ 3 MHz RBW Gain / dBi (calculated) U-NII-3	9.74 7.48 -2.26	8.46 9.69 1.23 Antenna gain	8.88 5.78 -3.10			
Conducted power / dBm @ 3 MHz RBW Radiated power / dBm @ 3 MHz RBW Gain / dBi (calculated) U-NII-3 (5725 MHz to 5850 MHz)	9.74 7.48 -2.26 Lowest channel	8.46 9.69 1.23 Antenna gain Middle channel	8.88 5.78 -3.10 Highest channel			

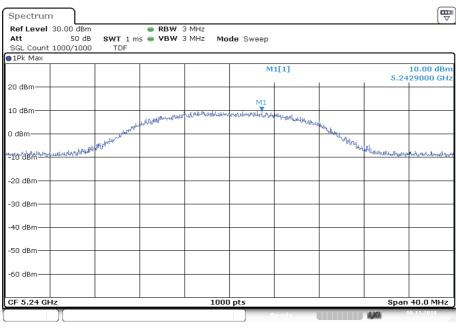


#### Plots (conducted):





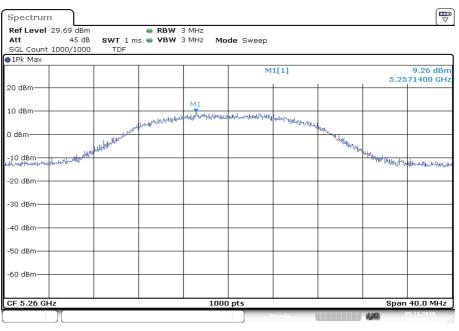
### Plot 2: U-NII-1; highest channel



Date: 8.NOV.2018 15:14:37

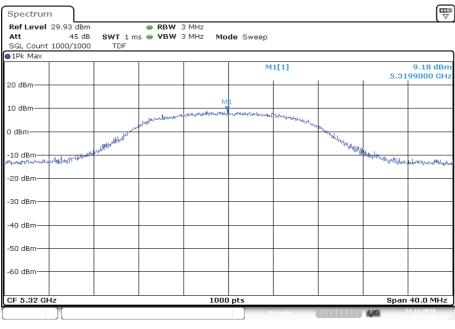


#### **Plot 3:** U-NII-2A; lowest channel



Date: 8.NOV.2018 15:07:13

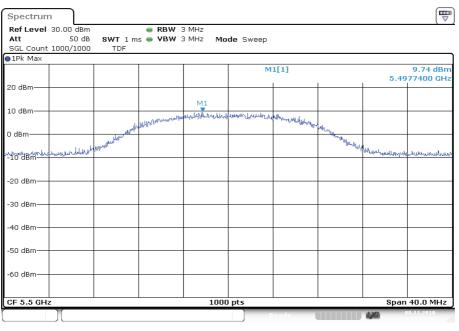
#### Plot 4: U-NII-2A; highest channel



Date: 21.NOV.2018 07:34:46

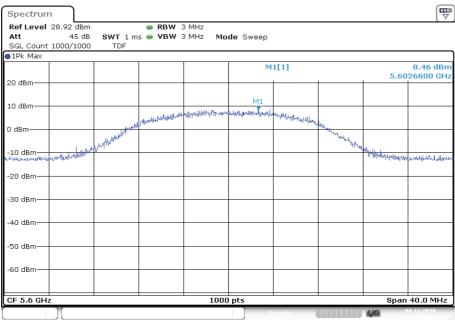


#### **Plot 5:** U-NII-2C; lowest channel



Date: 8.NOV.2018 14:55:52

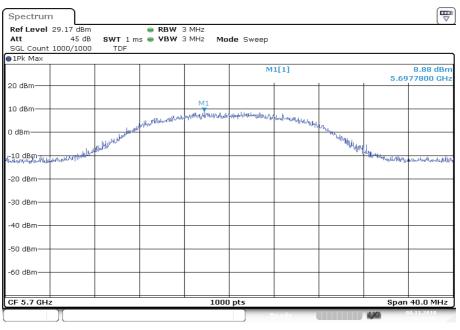
#### Plot 6: U-NII-2C; middle channel



Date: 8.NOV.2018 14:39:45

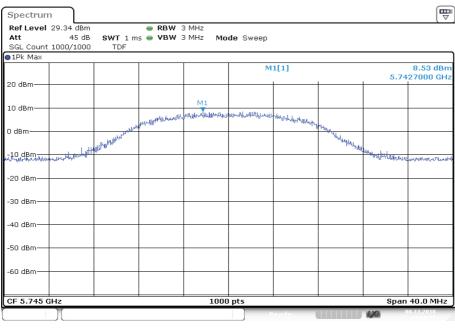


#### **Plot 7:** U-NII-2C; highest channel



Date: 8.NOV.2018 14:33:02

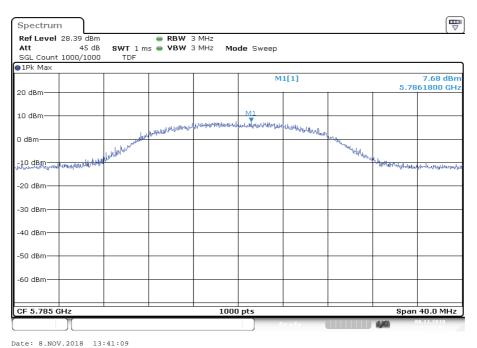
#### Plot 8: U-NII-3; lowest channel



Date: 8.NOV.2018 14:04:39



#### **Plot 9:** U-NII-3; middle channel



Plot 10: U-NII-3; highest channel





## 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 6.4 – A						
Measurement uncertainty:	See chapter 8						

#### **Results:**

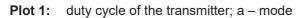
Duty cycle and correction factor:

	Calculation method								
OFDM – mode	T <sub>on</sub> (D2 <sub>plot</sub> ) * 100 / T <sub>complete</sub> (D3 <sub>plot</sub> ) = duty cycle								
		10 * log(duty cycle)	) = correction factor						
	Ton (D2 <sub>plot</sub> )	Ton (D2plot) Tcomplete (D3plot)		<b>Correction factor</b>					
a – mode	2.74344 ms	2.93751 ms	93.4 %	0.30 dB					
n/ac HT20 – mode	2.54891 ms	2.74688 ms	92.8 %	0.32 dB					
n/ac HT40 – mode	1.25136 ms	1.45123 ms	86.2 %	0.64 dB					



#### Plots:

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



Spect	rum												
Ref Le	vel 2	0.25 dBr	n	👄 RE	3W 10	) MHz							<b>`</b>
Att 40 dB • SWT 8.8 ms • VBW 10 MHz													
SGL Co	ount 1,	/1	TDF										
●1Pk Cl	rw												
								M1[1]					6.81 dBm
~45NdBM	վալ Ի <mark>վ</mark> ե	har han	hills have provided and the	ماميرويومرط برمد	dentra c		h <del>allan</del> g m	سلير D2[1]	witherwheelighter	нη	philinenter	monthe	995.06.HS
0 dBm-						Î l						2	.74344 ms
o ubili													
-10 dBn	n												
	- Yyy				D2 세네	/ /				եսելվ			
-20 dBn	n										-		
00 d0-													
-30 dBn													
-40 dBn	n												
-50 dBn	n				_						_		
-60 dBn	n												
-70 dBn													
-70 ubn													
CF 5.1	0.011-					1000							
Marker	8 GHZ					1000	prs					88	31.25 µs/
Type	Ref	Trc	X-value		v	value	1 6	unction	1		unction	Bocult	
M1	Rei	1		5.06 μs	1-	6.81 dB		unction		FI	unction	Result	
D2	M1	1		344 ms	-21.90 d								
D3	M1	1		751 ms		0.02 d							
		1						Ready	(111)	111	1.00	2	1.11.2018

Date: 21.NOV.2018 06:41:45

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

Spect	rum										
Ref Le	vel 2	0.14 d	Bm		RBW 10 MHz						`
Att		40	dB 🕳 SWT 8.:	2 ms 👄	VBW 10 MHz						
SGL Co	ount 1,	/1	TDF								
●1Pk C	lrw										
							M1	[1]			7.22 dBm
Jaudam	half and	بالالمالية	مودقه الأسال وتربيه فالغلا الحرب الم	uu od.	المراجيين والمراجع والمراجع	hun		Makhaka	anna indu	sa ndar codo e trobo dar dat	124.67 dB
10-eactri			0			0.400-	D2	(1)	In a strain for	It is becord	21101 40
0 dBm-											2.54891 ms
-10 dBn	n					—					
u)				Dam				have			
-20 dBn	n——			Å,							
-30 dBn	n —					-					
-40 dBn	n					+					
-50 dBn	n					+					
<0.40-	_										
-60 dBn											
-70 dBn											
-70 ubi	"										
CF 5.1					100	0 pts	5				824.06 µs/
Marker											
Туре	Ref	Trc	X-value		Y-value	$ \rightarrow $	Funct	ion		Function	Result
M1		1		0.74 μs	7.22 d						
D2	M1	1	2.54891 ms 2.74688 ms		-24.67						
D3	M1	1	2.74	oss ms	0.12	ив					
		1					Re	ady		100	08.11.2018

Date: 8.NOV.2018 15:21:25



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

Spectru	m	)										
Ref Leve	13.74	dBm		👄 RE	W 10	MHz						
Att		30 dB	-	3 ms 👄 🛛 🛛	W 10	MHz						
SGL Cour	nt 1/1		TDF									
●1Pk Clrw												
10 dBm-	1.							1[1]	1			-0.20 dBm
rthurman	MPN V	1 provide	Automation	e Houghbridge have	waamulky	D3	with the first state of the	YHHHallauthak	hayarallyanay		patterner	07.7482.448 -26.98 dE
0 dBm—		<u> </u>					D:	2[1]				-26.98 dE 1.25136 ms
								1	I.	T	1	1.23130 ms
-10 dBm—												
-20 dBm—												
20 00111	lutinyth				D	Statu						
-30 dBm—	and we have the	r			Ż	WANNA I				ontillipu	JP	
-40 dBm—										-		
-50 dBm—												
60 ID												
-60 dBm—												
-70 dBm—												
70 abiii												
-80 dBm—	_											
CF 5.19 (	GHZ					1000	pts				4	34.06 µs/
Marker	- 1							1				
	ef Tro		X-value			alue	Func	tion	Fu	incti	on Result	1
M1 D2		1		7.82 μs 136 ms		1.20 dBn 26.98 dB						
		1		130 ms 123 ms	-2	20.98 UB 0.55 dB						
		*	1.10.	200		0.00 0						12 11 2010
							F F				10	15:23:32

Date: 12.NOV.2018 15:23:32



## **11.4 Maximum output power**

## 11.4.1 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 6.4 – 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



### **Results:**

	Maximum output power conducted [dBm]				
	l	)			
	Lowest channel	Middle channel	Highest channel		
	5.28	_/_	5.34		
	U-NII-2A (5250 MHz to 5350 MHz)				
	Lowest channel	Middle channel	Highest channel		
а	5.16	_/_	5.18		
	U-NII-2C (5470 MHz to 5725 MHz)				
	Lowest channel	Middle channel	Highest channel		
	4.91	4.33	4.54		
	U-NII-3 (5725 MHz to 5850 MHz)				
	Lowest channel	Middle channel	Highest channel		
	4.79	4.24	3.55		

## Results:

	Maximum output power conducted [dBm]			
	U-NII-1 (5150 MHz to 5250 MHz)			
	Lowest channel	Middle channel	Highest channel	
	5.16	_/_	5.48	
	U-NII-2A (5250 MHz to 5350 MHz)			
	Lowest channel	Middle channel	Highest channel	
n/ac HT20	4.96	_/_	5.19	
	U-NII-2C (5470 MHz to 5725 MHz)			
	Lowest channel	Middle channel	Highest channel	
	4.95	4.10	4.30	
	U-NII-3 (5725 MHz to 5850 MHz)			
	Lowest channel	Middle channel	Highest channel	
	4.18	3.53	2.66	

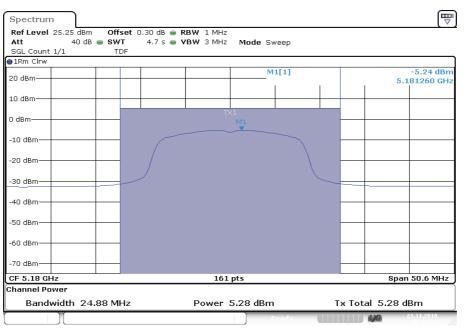
### **Results:**

	Maximum output power conducted [dBm]				
	U-NII-1 (5150 MHz to 5250 MHz)				
	Lowest channel		Highest channel		
	2.46		3.99		
	U	z)			
	Lowest channel 3.83		Highest channel		
n/ac HT40			4.25		
	U-NII-2C (5470 MHz to 5725 MHz)				
	Lowest channel	Middle	channel	Highest channel	
	3.67 2.75		75	3.19	
	U-NII-3 (5725 MHz to 5850 MHz)				
	Lowest channel	Lowest channel		Highest channel	
	2.95		2.36		



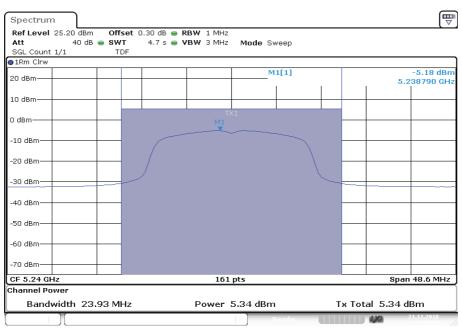
#### Plots: a - mode





Date: 21.NOV.2018 06:42:03

### **Plot 2:** U-NII-1; highest channel

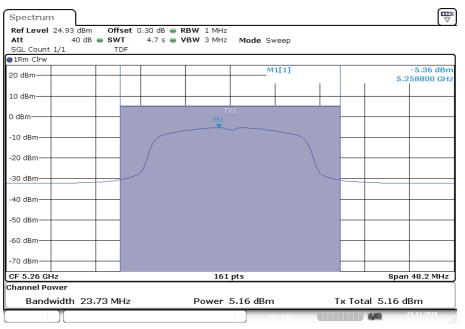


Date: 21.NOV.2018 07:11:59



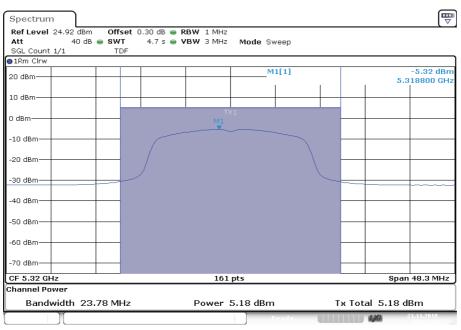


#### **Plot 3:** U-NII-2A; lowest channel



Date: 21.NOV.2018 07:14:01

#### **Plot 4:** U-NII-2A; highest channel

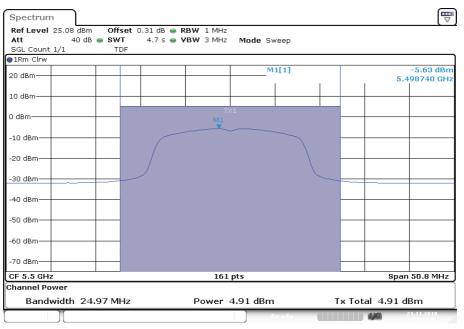


Date: 21.NOV.2018 07:17:29



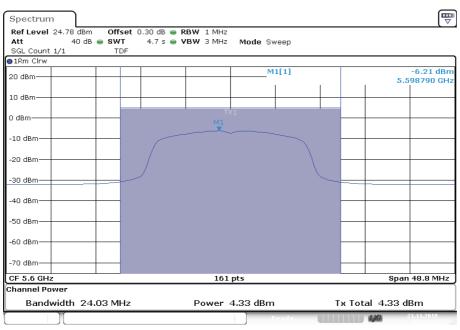


#### **Plot 5:** U-NII-2C; lowest channel



Date: 21.NOV.2018 07:21:07

#### **Plot 6:** U-NII-2C; middle channel

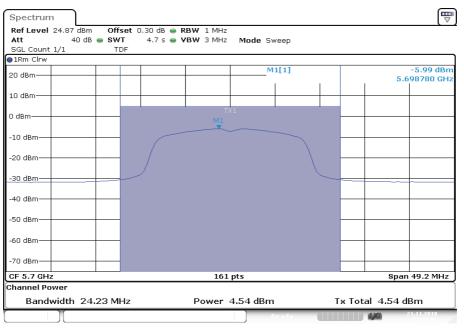


Date: 21.NOV.2018 07:23:14



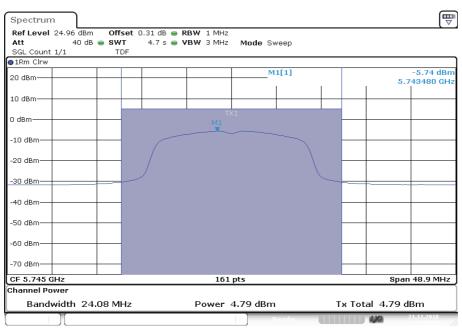


#### **Plot 7:** U-NII-2C; highest channel



Date: 21.NOV.2018 07:25:06

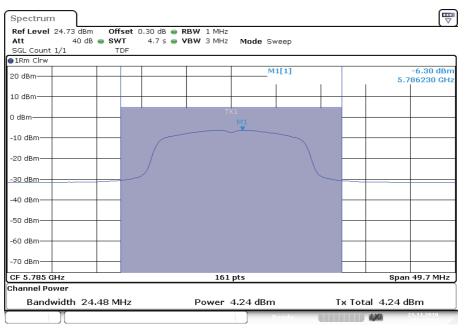
### Plot 8: U-NII-3; lowest channel



Date: 21.NOV.2018 07:27:00

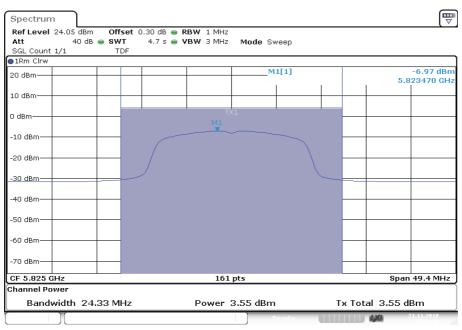


#### **Plot 9:** U-NII-3; middle channel

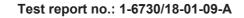


Date: 21.NOV.2018 07:29:08

#### **Plot 10:** U-NII-3; highest channel



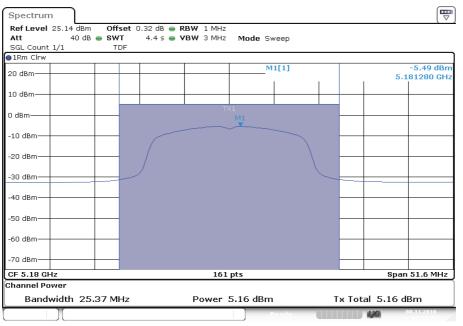
Date: 21.NOV.2018 07:31:36





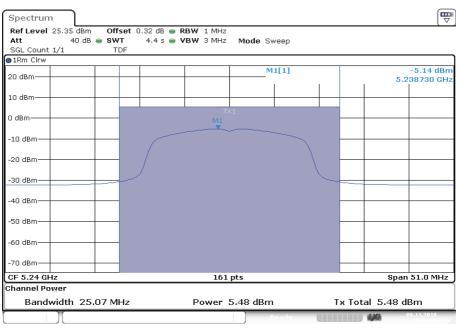
#### Plots: n/ac HT20 - mode

#### **Plot 1:** U-NII-1; lowest channel



Date: 8.NOV.2018 15:21:40

### **Plot 2:** U-NII-1; highest channel

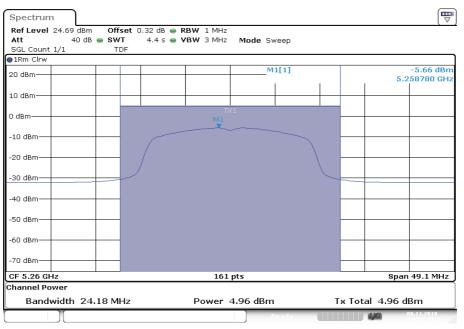


Date: 8.NOV.2018 15:14:55



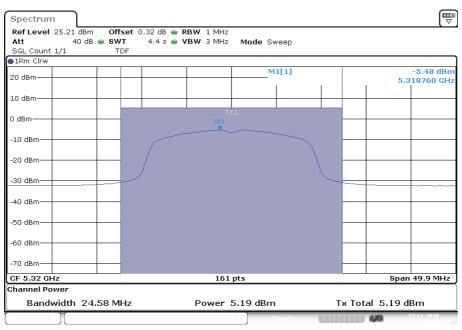


#### **Plot 3:** U-NII-2A; lowest channel



Date: 8.NOV.2018 15:07:32

#### **Plot 4:** U-NII-2A; highest channel

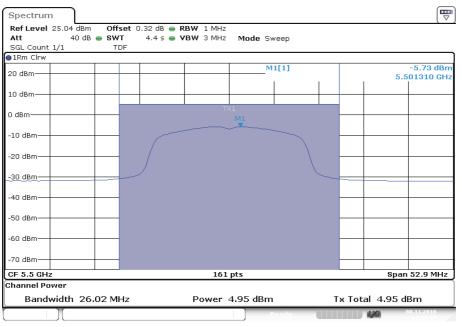


Date: 27.NOV.2018 17:12:19



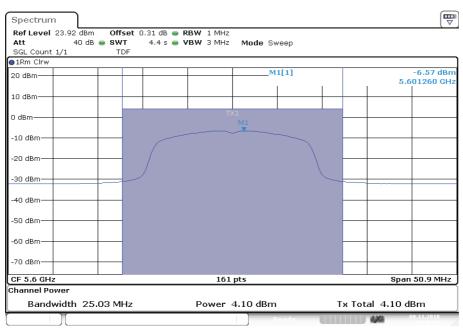


#### **Plot 5:** U-NII-2C; lowest channel



Date: 8.NOV.2018 14:56:11

#### **Plot 6:** U-NII-2C; middle channel

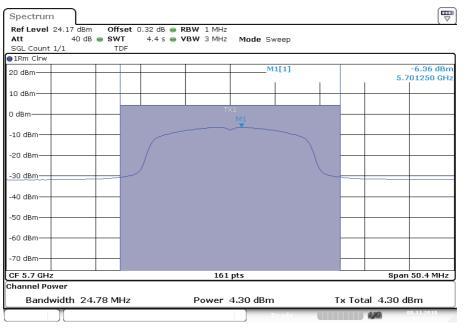


Date: 8.NOV.2018 14:40:03



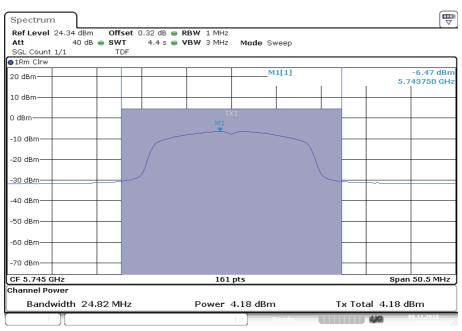


#### **Plot 7:** U-NII-2C; highest channel



Date: 8.NOV.2018 14:33:21

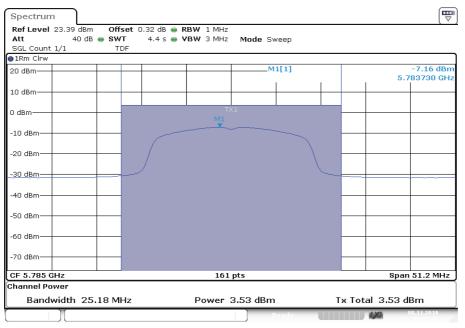
### Plot 8: U-NII-3; lowest channel



Date: 8.NOV.2018 14:04:58

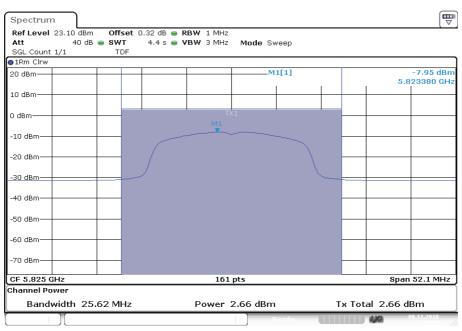


#### **Plot 9:** U-NII-3; middle channel

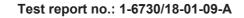


Date: 8.NOV.2018 13:41:28

### **Plot 10:** U-NII-3; highest channel



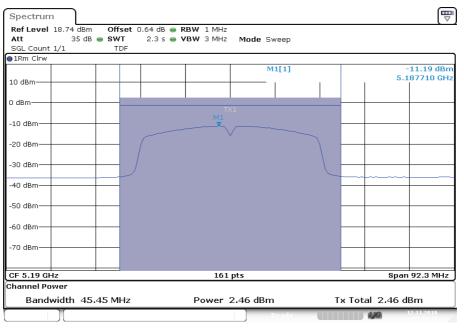
Date: 8.NOV.2018 13:26:03





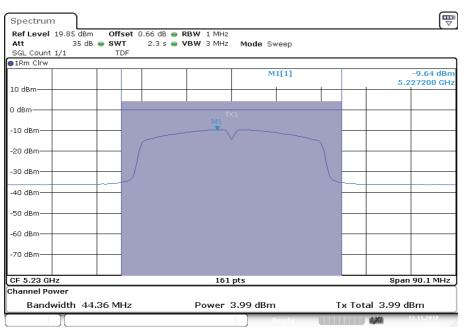
#### Plots: n/ac HT40 – mode

#### **Plot 1:** U-NII-1; lowest channel



Date: 12.NOV.2018 15:23:50

### **Plot 2:** U-NII-1; highest channel

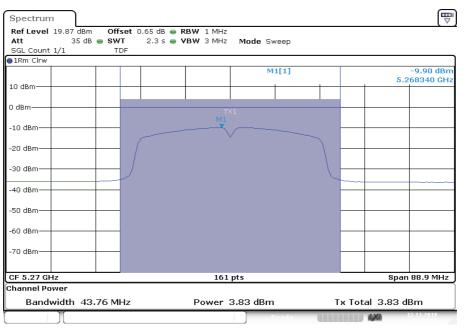


Date: 12.NOV.2018 15:36:29



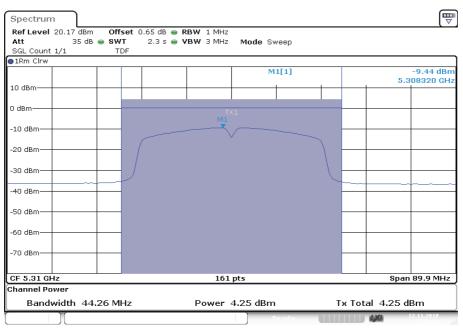


#### **Plot 3:** U-NII-2A; lowest channel



Date: 12.NOV.2018 15:52:56

# Plot 4: U-NII-2A; highest channel

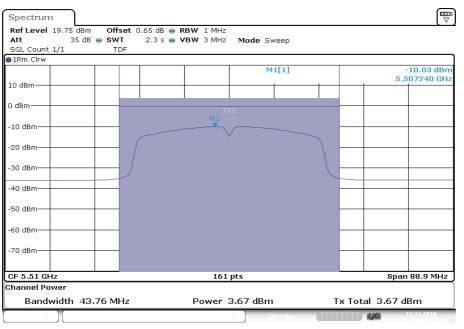


Date: 12.NOV.2018 15:59:56



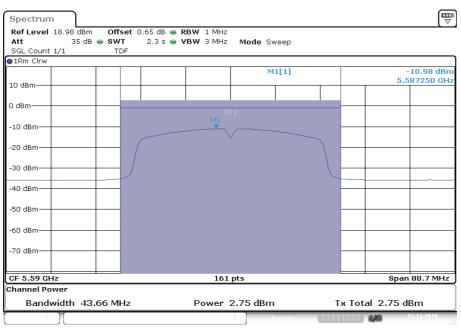


#### **Plot 5:** U-NII-2C; lowest channel



Date: 12.NOV.2018 16:06:56

#### Plot 6: U-NII-2C; middle channel

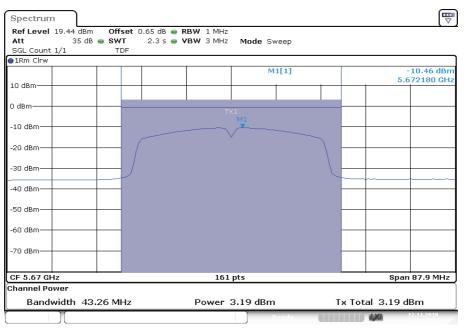


Date: 12.NOV.2018 16:13:32



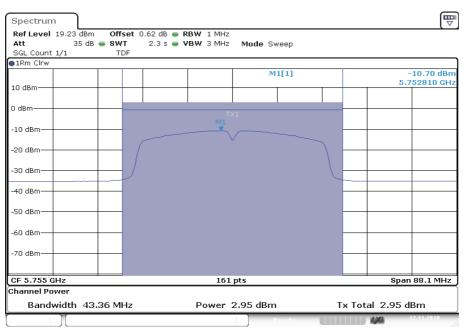


#### **Plot 7:** U-NII-2C; highest channel



Date: 12.NOV.2018 16:20:32

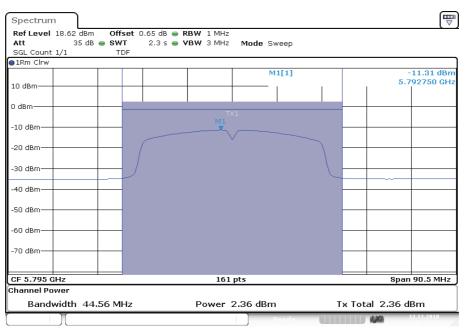
### Plot 8: U-NII-3; lowest channel



Date: 12.NOV.2018 16:27:02



### **Plot 9:** U-NII-3; highest channel



Date: 12.NOV.2018 15:45:55



# **11.4.2 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 6.4 – A		
Measurement uncertainty:	See chapter 8		

### Limits:

Radiated output power	Conducted output power for mobile equipment
The lesser one of	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	250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz
1 W or 17 dBm + 10 log Bandwidth 5.470-5.725 GHz	250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz
(where Bandwidth is the 99% Bandwidth [MHz])	(where Bandwidth is the 99% Bandwidth [MHz])
Conducted power + 6dBi antenna gain 5.725-5.825 GHz	1W 5.725-5.825 GHz



	Maximum output power [dBm]			
	U-NII-1 (5150 MHz to 5250 MHz)			
	Lowest channel	Middle channel	Highest channel	
		Conducted		
	5.16	_/_	5.28	
	Radiated	(calculated – see chapter anten	na gain)	
	5.30	_/_	3.49	
	U	-NII-2A (5250 MHz to 5350 MHz	:)	
	Lowest channel	Middle channel	Highest channel	
		Conducted		
	5.10	_/_	5.12	
	Radiated	l (calculated – see chapter anten	na gain)	
а	4.83	_/_	2.75	
	U-NII-2C (5470 MHz to 5725 MHz)			
	Lowest channel	Middle channel	Highest channel	
	Conducted			
	4.81	4.25	4.46	
	Radiated	l (calculated – see chapter anten	na gain)	
	2.55	5.48	1.36	
	U-NII-3 (5725 MHz to 5850 MHz)			
	Lowest channel	Middle channel	Highest channel	
	Conducted			
	4.71	4.17	3.48	
		l (calculated – see chapter anten		
	2.49	2.13	2.98	



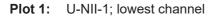
	Maximum output power [dBm]			
	l	J-NII-1 (5150 MHz to 5250 MHz	)	
	Lowest channel	Middle channel	Highest channel	
	Conducted			
	5.10	_/_	5.43	
	Radiated	l (calculated – see chapter anter	ina gain)	
	5.24	_/_	3.64	
	U	-NII-2A (5250 MHz to 5350 MHz	z)	
	Lowest channel	Middle channel	Highest channel	
		Conducted		
	4.90	_/_	5.14	
	Radiated (calculated – see chapter antenna gain)			
n/ac HT20	0 4.63 -/-			
	U-NII-2C (5470 MHz to 5725 MHz)			
	Lowest channel	Middle channel	Highest channel	
	Conducted			
	4.90	4.04	4.22	
		l (calculated – see chapter anter		
	2.64	5.27	1.12	
	U-NII-3 (5725 MHz to 5850 MHz)			
	Lowest channel	Middle channel Highest chann		
		Conducted		
	4.09	3.46	2.51	
		l (calculated – see chapter anter		
	1.87	1.42	2.01	

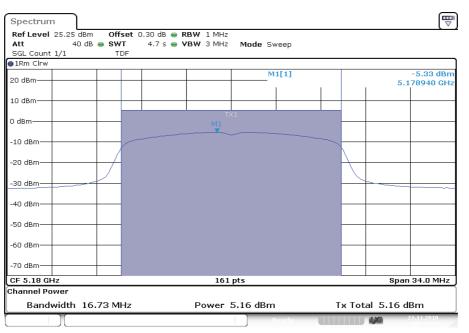


	Maximum output power [dBm]			
	L	J-NII-1 (5150 MI	Hz to 5250 MHz	:)
	Lowest channel		Highest channel	
	Conducted			
	2.41		3.95	
		l (calculated – se	ee chapter anter	nna gain)
	2.55			2.16
		-NII-2A (5250 M		
	Lowest channel			Highest channel
		Cond	ucted	
	3.80			4.22
		d (calculated – see chapter antenna gain)		
n/ac HT40	3.53	1.85		
		U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel		Highest channel
		Cond		
	3.62	2.70		3.13
		l (calculated – se	•	nna gain)
	1.36	3.9	93	0.03
	l	J-NII-3 (5725 MI	Hz to 5850 MHz	.)
	Lowest channel			Highest channel
	Conducted			
	2.91		2.30	
	Radiated (calculated – see chapter antenna gain)			
	0.69			1.80



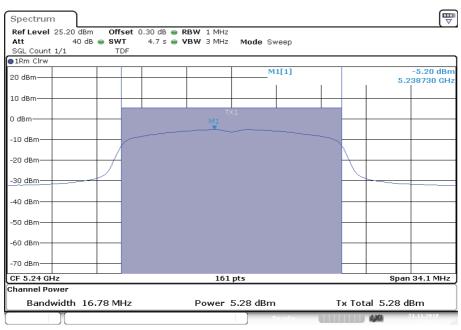
#### Plots: a - mode





Date: 21.NOV.2018 06:42:44

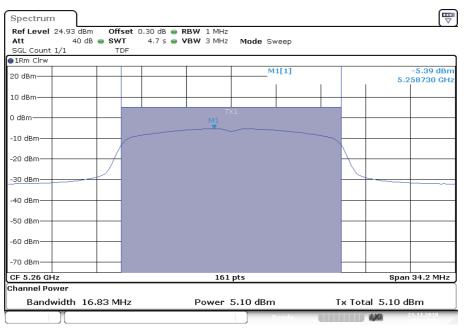
# **Plot 2:** U-NII-1; highest channel



Date: 21.NOV.2018 07:12:33

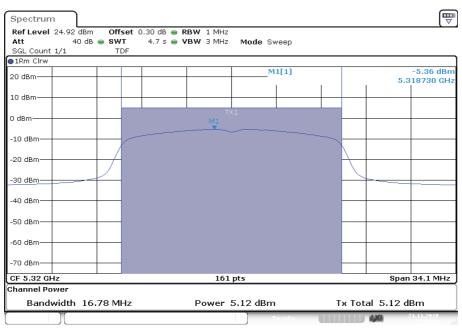


#### **Plot 3:** U-NII-2A; lowest channel



Date: 21.NOV.2018 07:14:35

#### **Plot 4:** U-NII-2A; highest channel

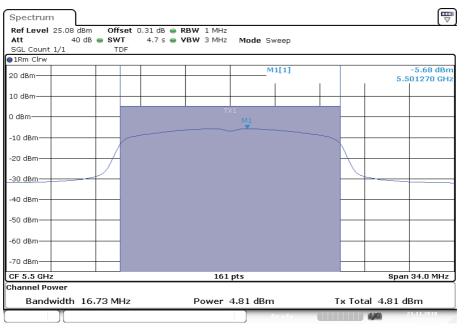


Date: 21.NOV.2018 07:18:00



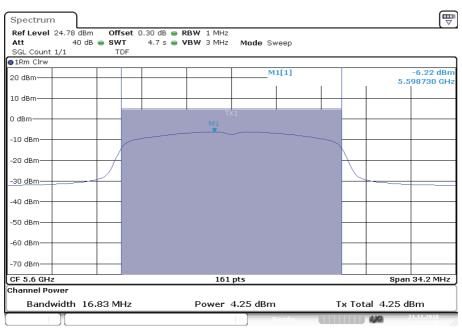


#### **Plot 5:** U-NII-2C; lowest channel



Date: 21.NOV.2018 07:21:42

#### **Plot 6:** U-NII-2C; middle channel

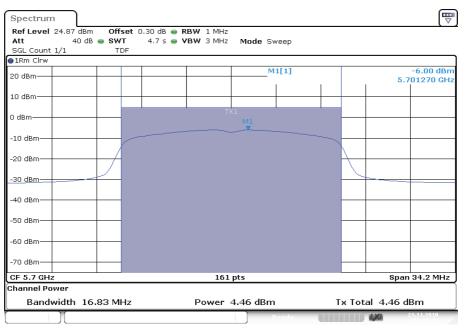


Date: 21.NOV.2018 07:23:46



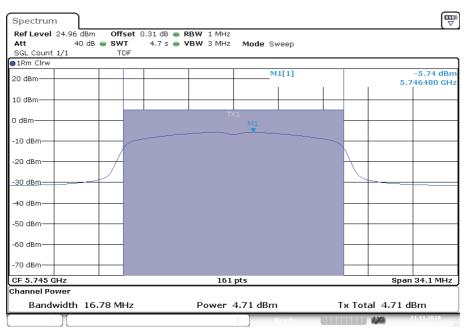


#### **Plot 7:** U-NII-2C; highest channel



Date: 21.NOV.2018 07:25:43

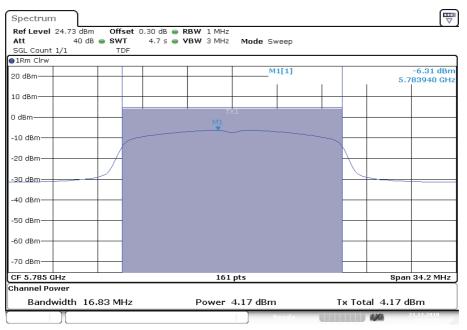
### Plot 8: U-NII-3; lowest channel



Date: 21.NOV.2018 07:27:34

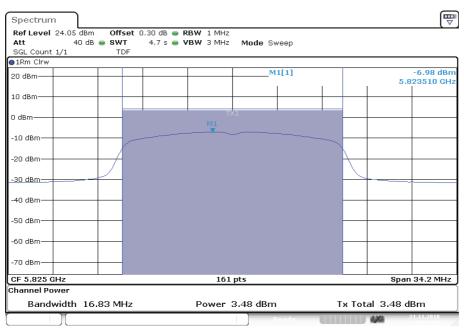


#### **Plot 9:** U-NII-3; middle channel

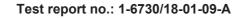


Date: 21.NOV.2018 07:29:43

### **Plot 10:** U-NII-3; highest channel



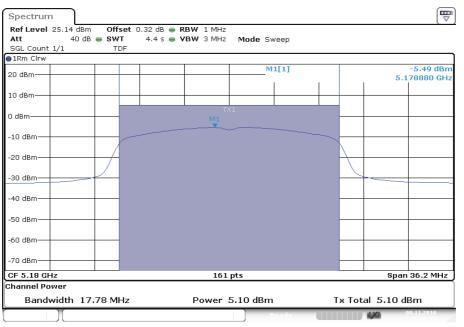
Date: 21.NOV.2018 07:32:08





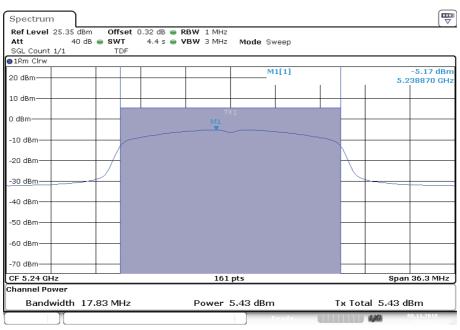
#### Plots: n/ac HT20 - mode

#### **Plot 1:** U-NII-1; lowest channel



Date: 8.NOV.2018 15:22:19

### **Plot 2:** U-NII-1; highest channel

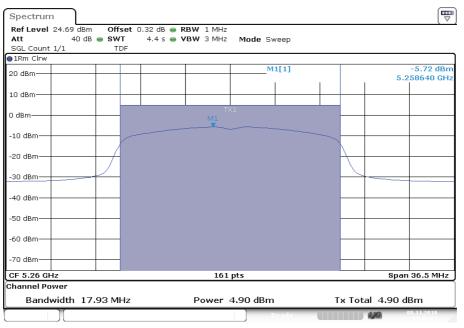


Date: 8.NOV.2018 15:15:26



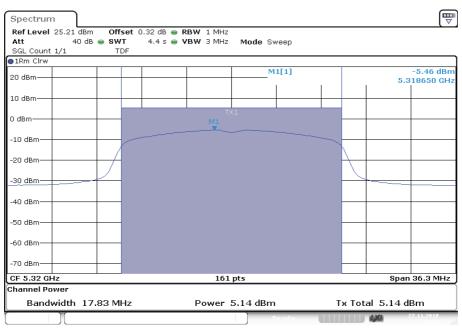


#### **Plot 3:** U-NII-2A; lowest channel



Date: 8.NOV.2018 15:08:03

#### **Plot 4:** U-NII-2A; highest channel

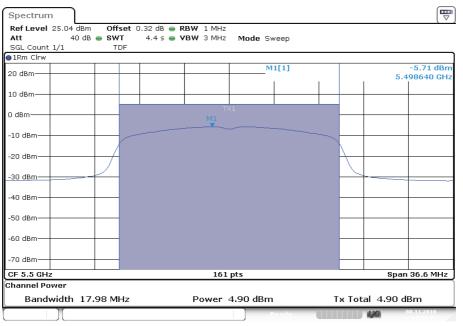


Date: 27.NOV.2018 17:12:42



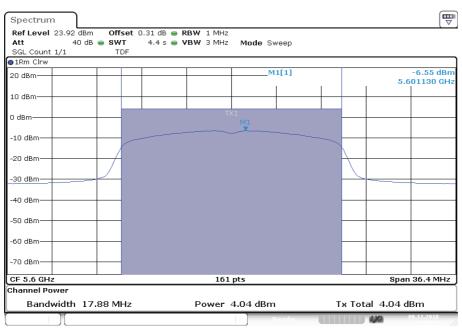


#### **Plot 5:** U-NII-2C; lowest channel



Date: 8.NOV.2018 14:56:44

#### **Plot 6:** U-NII-2C; middle channel

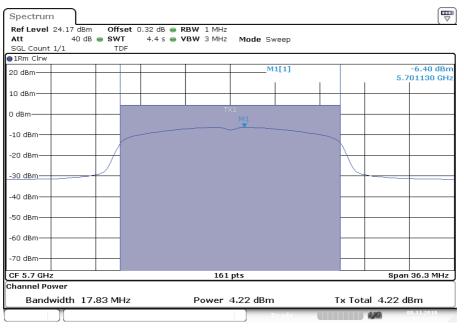


Date: 8.NOV.2018 14:40:35



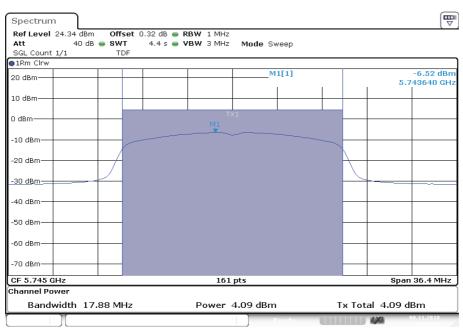


#### **Plot 7:** U-NII-2C; highest channel



Date: 8.NOV.2018 14:33:57

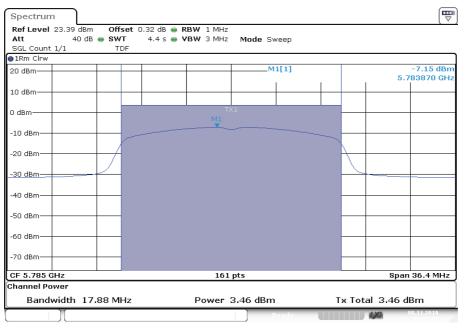
### Plot 8: U-NII-3; lowest channel



Date: 8.NOV.2018 14:05:32

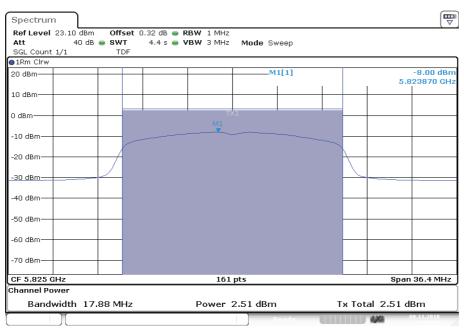


#### **Plot 9:** U-NII-3; middle channel

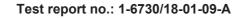


Date: 8.NOV.2018 13:42:04

### **Plot 10:** U-NII-3; highest channel



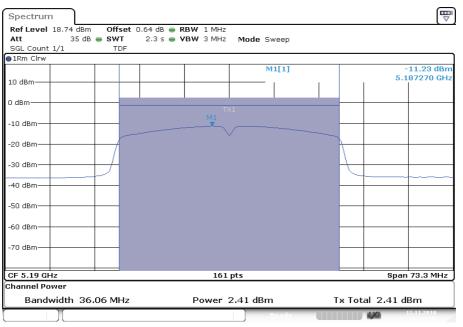
Date: 8.NOV.2018 13:26:36





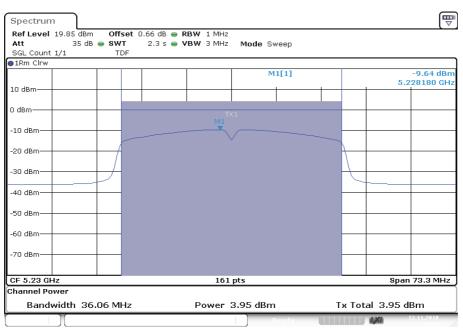
#### Plots: n/ac HT40 – mode

#### **Plot 1:** U-NII-1; lowest channel



Date: 12.NOV.2018 15:24:31

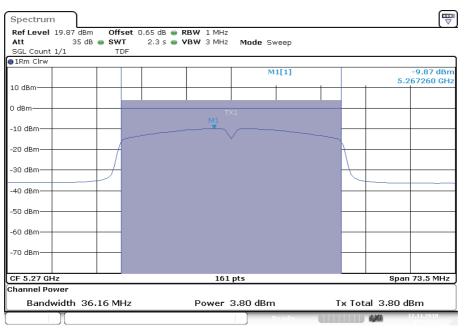
### **Plot 2:** U-NII-1; highest channel



Date: 12.NOV.2018 15:37:06

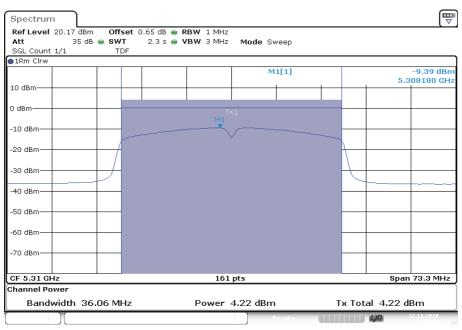


#### **Plot 3:** U-NII-2A; lowest channel



Date: 12.NOV.2018 15:53:32

# Plot 4: U-NII-2A; highest channel

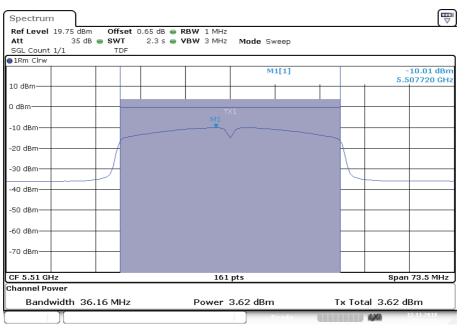


Date: 12.NOV.2018 16:00:31



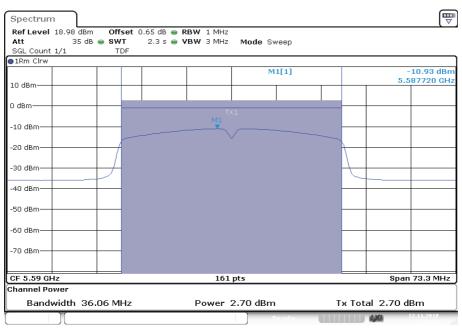


#### **Plot 5:** U-NII-2C; lowest channel



Date: 12.NOV.2018 16:07:23

#### Plot 6: U-NII-2C; middle channel

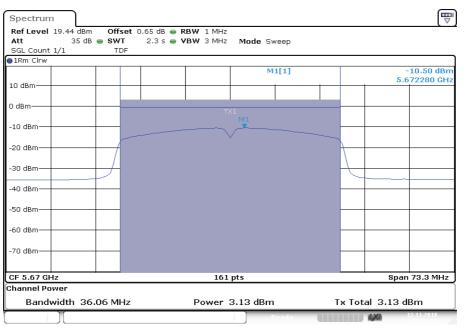


Date: 12.NOV.2018 16:14:00



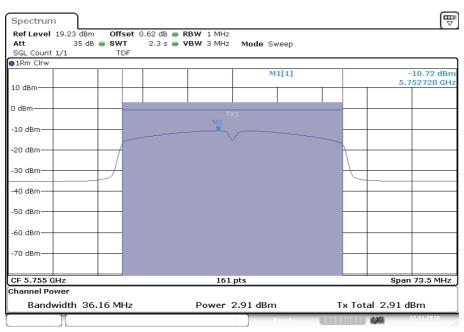


#### **Plot 7:** U-NII-2C; highest channel



Date: 12.NOV.2018 16:20:59

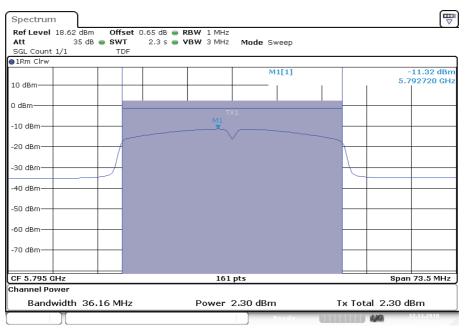
### Plot 8: U-NII-3; lowest channel



Date: 12.NOV.2018 16:27:28



### **Plot 9:** U-NII-3; highest channel



Date: 12.NOV.2018 15:46:23



# **11.5 Power spectral density**

# 11.5.1 Power spectral density according to 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 for U-NII-1/2A & 2C 500 kHz for U-NII-3	
Video bandwidth:	≥ 3xRBW	
Span:	> EBW	
Trace mode:	Max hold	
Used test setup: See chapter 6.4 – A		
leasurement 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)



### **Results:**

	Power spectral density (dBm/1MHz or dBm/500kHz)			
	U-NII-1 (5150 MHz to 5250 MHz)			
	Lowest channel	Middle channel	Highest channel	
	-5.24	_/_	-5.18	
	U-NII-2A (5250 MHz to 5350 MHz)			
	Lowest channel	Middle channel	Highest channel	
а	-5.36	_/_	-5.32	
	U-NII-2C (5470 MHz to 5725 MHz)			
	Lowest channel	Middle channel	Highest channel	
	-5.63	-6.21	-5.99	
	U-NII-3 (5725 MHz to 5850 MHz)			
	Lowest channel	Middle channel	Highest channel	
	-8.72	-9.31	-9.99	

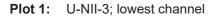
	Power spectral density (dBm/1MHz or dBm/500kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	-5.49	_/_	-5.14
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
n/ac HT20	-5.66	_/_	-5.48
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-5.73	-6.57	-6.36
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	-9.47	-10.15	-11.17

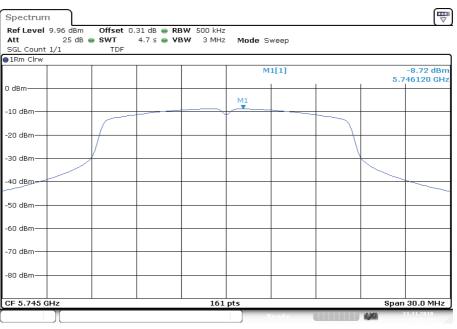


	Power spectral density (dBm/1MHz or dBm/500kHz)			
	U-NII-1 (5150 MHz to 5250 MHz)			)
	Lowest channel		Highest channel	
	-11.19		-9.64	
	U-NII-2A (5250 MHz to 5350 MHz)			z)
	Lowest channel		Highest channel	
n/ac HT40	-9.90		-9.44	
	U-NII-2C (5470 MHz to 5725 MHz)			z)
	Lowest channel	Middle channel		Highest channel
	-10.03	-10.98		-10.46
	U-NII-3 (5725 MHz to 5850 MHz)			)
	Lowest channel	el		Highest channel
	-13.65	-13.65		-14.13



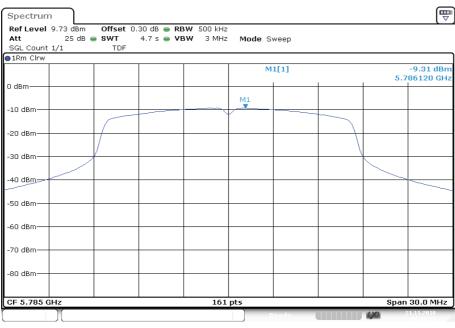
#### Plots: a - mode





Date: 21.NOV.2018 07:28:07

### Plot 2: U-NII-3; middle channel



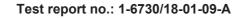
Date: 21.NOV.2018 07:30:18



### **Plot 3:** U-NII-3; highest channel



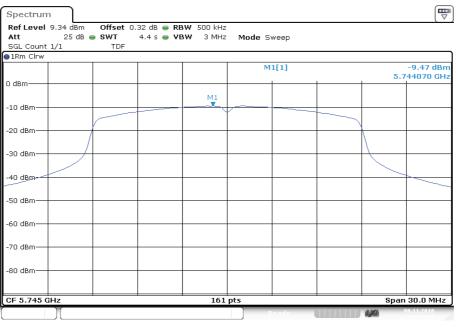
Date: 21.NOV.2018 07:32:42





#### Plots: n/ac HT20 – mode

#### **Plot 1:** U-NII-3; lowest channel



Date: 8.NOV.2018 14:06:36

### Plot 2: U-NII-3; middle channel

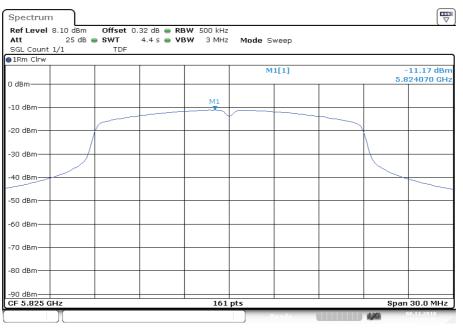
Spectrum 
 Offset
 0.32 dB
 ■
 RBW
 500 kHz

 SWT
 4.4 s
 ■
 VBW
 3 MHz
 Ref Level 8.39 dBm 25 dB 😑 SWT Att Mode Sweep SGL Count 1/1 TDF ●1Rm Clrw -10.15 dBm 5.784070 GHz M1[1] 0 dBm-M1 -10 dBm--20 dBm--30 dBm--40 dBm--50 dBm -60 dBm--70 dBm--80 dBm-CF 5.785 GHz 161 pts Span 30.0 MHz

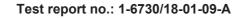
Date: 8.NOV.2018 13:43:08



### **Plot 3:** U-NII-3; highest channel



Date: 8.NOV.2018 13:27:40





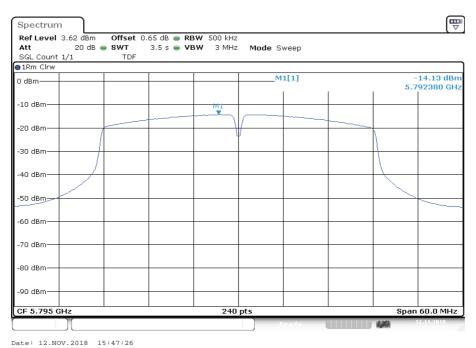
#### Plots: n/ac HT40 – mode





Date: 12.NOV.2018 16:28:30

### Plot 2: U-NII-3; highest channel





# **11.5.2** Power spectral density according to 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 for U-NII-1/2A & 2C 500 kHz for U-NII-3					
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)



# Results:

	Power spe	ctral density (dBm/1MHz or dB	sm/500kHz)					
	U-NII-1 (5150 MHz to 5250 MHz)							
	Lowest channel	Middle channel	Highest channel					
		Conducted						
	-5.33	_/_	-5.20					
	Radiated	d (calculated – see chapter anter	ina gain)					
	-5.19	_/_	-6.99					
	U-NII-2A (5250 MHz to 5350 MHz)							
а	Lowest channel	Middle channel	Highest channel					
	-5.39	_/_	-5.36					
	U	-NII-2C (5470 MHz to 5725 MHz	z)					
	Lowest channel	Middle channel	Highest channel					
	-5.68	-6.22	-6.00					
	L L L	J-NII-3 (5725 MHz to 5850 MHz	)					
	Lowest channel	Middle channel	Highest channel					
	-8.72	-9.30	-9.99					

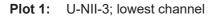
	Power spe	ctral density (dBm/1MHz or dB	sm/500kHz)					
	U-NII-1 (5150 MHz to 5250 MHz)							
	Lowest channel	Middle channel	Highest channel					
		Conducted						
	-5.49	_/_	-5.17					
	Radiated	d (calculated – see chapter anter	ina gain)					
	-5.35	_/_	-6.96					
n/ac HT20	U-NII-2A (5250 MHz to 5350 MHz)							
	Lowest channel	Middle channel	Highest channel					
	-5.72	_/_	-5.46					
	U	-NII-2C (5470 MHz to 5725 MHz	z)					
	Lowest channel	Middle channel	Highest channel					
	-5.71	-6.55	-6.40					
	L	J-NII-3 (5725 MHz to 5850 MHz	)					
	Lowest channel	Middle channel	Highest channel					
	-9.49	-10.15	-11.11					

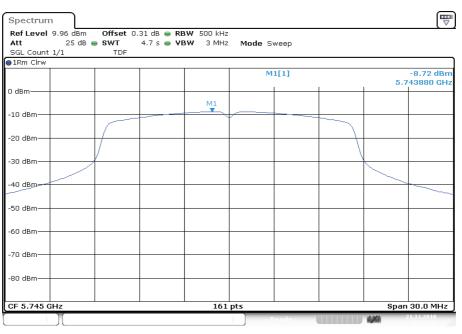


	Power spec	ctral density (d	Bm/1MHz or dB	Sm/500kHz)			
	U-NII-1 (5150 MHz to 5250 MHz)						
	Lowest channel		Highest channel				
		Cond	ucted				
	-11.23			-9.64			
	Radiated	(calculated - s	ee chapter anter	nna gain)			
	-11.09		-11.43				
n/ac HT40	U	-NII-2A (5250 N	/Hz to 5350 MHz)				
11/ac 11140	Lowest channel		Highest channel				
	-9.87		-9.39				
	U	-NII-2C (5470 N	IHz to 5725 MHz	z)			
	Lowest channel	Middle	channel	Highest channel			
	-10.01	-10	.93	-10.50			
	L	J-NII-3 (5725 M	Hz to 5850 MHz	)			
	Lowest channel		Highest channel				
	-13.66			-14.29			



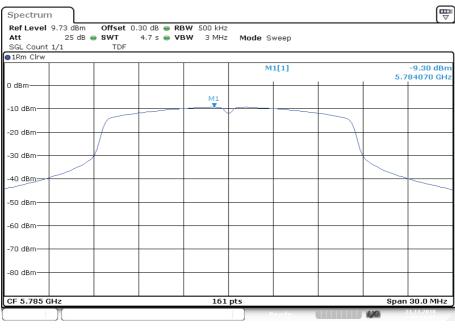
#### Plots: a - mode





Date: 21.NOV.2018 07:27:59

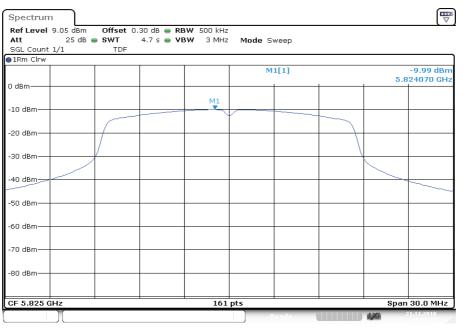
#### Plot 2: U-NII-3; middle channel



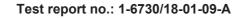
Date: 21.NOV.2018 07:30:10



## **Plot 3:** U-NII-3; highest channel



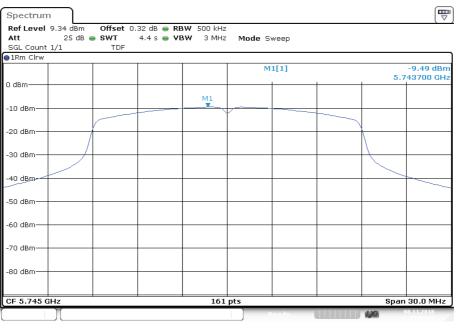
Date: 21.NOV.2018 07:32:34





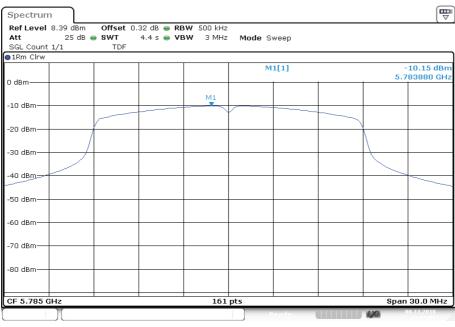
#### Plots: n/ac HT20 – mode

#### **Plot 1:** U-NII-3; lowest channel



Date: 8.NOV.2018 14:06:28

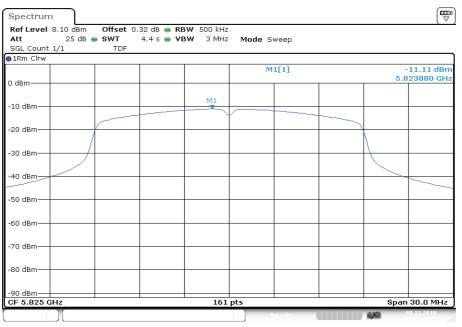
## Plot 2: U-NII-3; middle channel



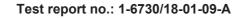
Date: 8.NOV.2018 13:43:00



### **Plot 3:** U-NII-3; highest channel



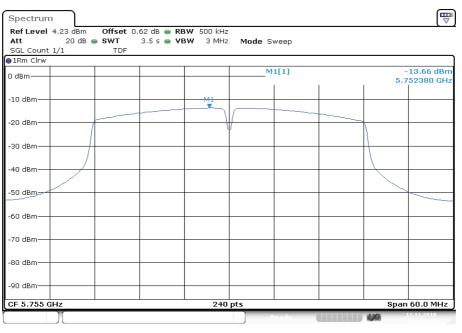
Date: 8.NOV.2018 13:27:32





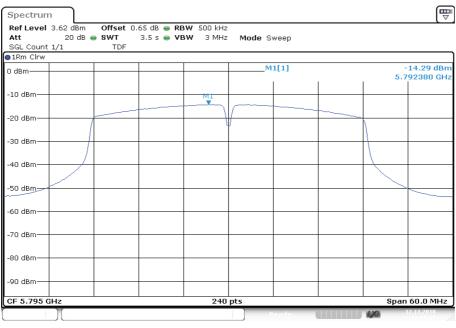
#### Plots: n/ac HT40 – mode





Date: 12.NOV.2018 16:28:23

## Plot 2: U-NII-3; highest channel



Date: 12.NOV.2018 15:47:19



# 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 6.4 – A				
Measurement uncertainty:	See chapter 8				

## Limits:

FCC	IC
The minimum 6 dB bandwid	th shall be at least 500 kHz.



## **Results:**

	6	dB emission bandwidth (MHz	)				
	U-NII-3 (5725 MHz to 5850 MHz)						
a	Lowest channel Middle channel Highest char						
	15.07	15.16	15.13				

# Results:

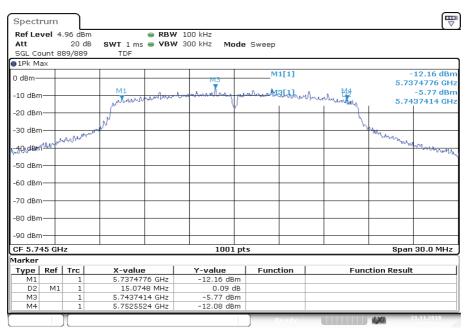
	6 dB emission bandwidth (MHz)						
n/ac HT20	U-NII-3 (5725 MHz to 5850 MHz)						
	Lowest channel	Middle channel	Highest channel				
	15.13	15.07	13.94				

	6 dB emission bandwidth (MHz)					
n/ac HT40	U-NII-3 (5725 MHz to 5850 MHz)					
	Lowest channel	Highest channel				
	35.12	35.12				



#### Plots: a - mode





Date: 21.NOV.2018 07:27:19

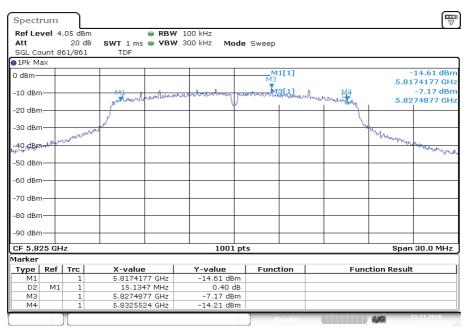
#### Plot 2: U-NII-3; middle channel

Spectrum											E
Ref Level & Att SGL Count 8	20 d	B SWT 1 ms		100 kHz 300 kHz Mi	ode S	Sweep					
●1Pk Max											
0 dBm					м						14.42 dBn 74177 GH
-10 dBm		M2 month	perserver	and the second second	frond	how MA	Breek	howhen	W	5.78	-6.67 dBn 62589 GH
-20 dBm									J.		
-30 dBm	howwo	~~							Not the second	manne	
	-									-V*	Magenthal
-50 dBm											
-60 dBm											
-70 dBm											
-80 dBm											
CF 5.785 G	Iz			100:	l pts					Span	30.0 MHz
Marker											
Type Ref		X-value		Y-value		Functi	on	F	unctio	n Result	
M1	1	5.77741		-14.42 dE							
D2 M1	-		49 MHz	0.36 -6.67 dB							
M3 M4	1	5.78625 5.79258		-6.67 dE -14.05 dE							
	][					Re	ady			0	21.11.2018

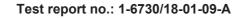
Date: 21.NOV.2018 07:29:28



### **Plot 3:** U-NII-3; highest channel



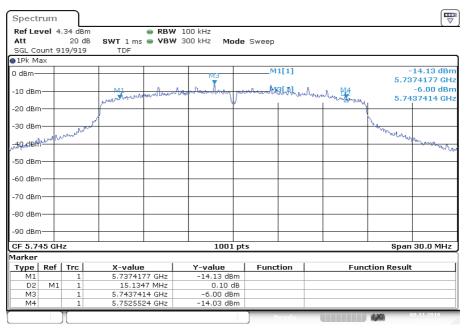
Date: 21.NOV.2018 07:31:51





#### Plots: n/ac HT20 – mode

#### **Plot 1:** U-NII-3; lowest channel



Date: 8.NOV.2018 14:05:17

## Plot 2: U-NII-3; middle channel

Specti	um										
Ref Le	vel 3	.39 dBm		😑 RBW	100 kHz						``````````````````````````````````````
Att		20 dB	SWT 1 ms	👄 VBW	' 300 kHz 🛛 Ma	ode	Sweep				
SGL Co	unt 9	21/921	TDF								
🔵 1Pk Ma	эх										
0 dBm—			_		M3		M	1[1]			-13.45 dBm
-10 dBm	-		M1	mulum	Anter transmin	بيمشرا	Arrow	36.41. <sub>111</sub>	Mounter Marine	5.77	74776 GHz -6.68 dBm
-20 dBm			NAMERICA		· · · · ·	-		1		5.78	337414 GHz
-30 dBm	-	and when the	/							2 July Land Marco	
-30 dBm -40vdBm	pholles	CHO.									Margal may
-50 dBm											
-60 dBm											
-70 dBm											
-80 dBm											
-90 dBm											
CF 5.78	35 GH	lz			1001	pts				Spar	30.0 MHz
Marker											
Туре	Ref	Trc	X-value	.	Y-value		Func	tion	Func	tion Result	t
M1		1	5.77747		-13.45 dB						
D2	M1	1		48 MHz	0.55 (						
MЗ		1	5.78374		-6.68 dB						
M4		1	5.79255	24 GHz	-12.89 dB	m					
							R	e a d y		4,74	08.11.2018

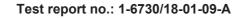
Date: 8.NOV.2018 13:41:49



## **Plot 3:** U-NII-3; highest channel

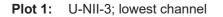
Spectrum					
Ref Level 3.10 dB	m 🖷 RBV	🗸 100 kHz			
Att 20 c	iB SWT 1 ms 👄 VBV	V 300 kHz Mode	Sweep		
SGL Count 919/919	DF TDF				
1Pk Max					
0 dBm		110	M1[1]		-15.14 dBm
		M3			5.8186465 GHz
-10 dBm	Mr. Marsh	two marked my	Mr. Maria	A M4	-7.67 dBm
	mannalow	`1 V.		Inentrum the	5.8237414 GHz
-20 dBm	Í			1	
-30 dBm	. al			h	~
-30 dBm -40,dBm44,4mA	Nº I				When when the and the
-40 dBashara					and a starting and a start of the start of t
VIL-WARMAN					" Charles and the second
-50 dBm					
-60 dBm					
-70 dBm					
-80 dBm					
-00 ubiii					
-90 dBm					
CF 5.825 GHz		1001 pt	s		Span 30.0 MHz
/larker					
Type   Ref   Trc	X-value	Y-value	Function	Funct	ion Result
M1 1	5.8186465 GHz	-15.14 dBm			
D2 M1 1	13.9361 MHz	-1.07 dB			
M3 1	5.8237414 GHz	-7.67 dBm			
M4 1	5.8325827 GHz	-16.22 dBm			
			Ready		08.11.2018

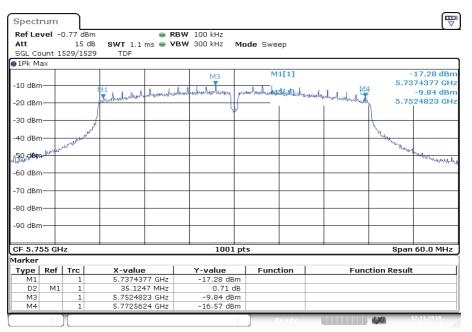
Date: 8.NOV.2018 13:26:19





## Plots: n/ac HT40 – mode





Date: 12.NOV.2018 16:27:15

## Plot 2: U-NII-3; highest channel

Spect	rum											
Ref Le	vel -	1.38 dBn	า	👄 RE	3W 100 kHz							
Att		15 dB	SWT 1.1	ms 😑 VI	3W 300 kHz	Мо	de Swee	∋р				
		581/158	1 TDF									
●1Pk M	ах											
					M3		M	1[1]			-	17.53 dBm
-10 dBm	∩——						A 1				5.77	74377 GH
-20 dBm			Laborhow	polonialas	halpedistiveling	pun	whenhankar	st.	wante	-lusterbertung		10.45 dBn 24823 GH
			1		(	J.				ĺ	ň.	
-30 dBr	1		*									
-40 dBm	۱ <del></del>	. Normalia									Lung Willing	
-50 dBn	y and the second	40V <sup>-</sup>				_					· Multing	wallen love
-60 dBm												· • • • •
-00 060												
-70 dBm	-+-											
-80 dBm												
00 001	'											
-90 dBm	∩											
CF 5.7	95 GF	łz			1001	L pt:	5				Span	60.0 MHz
Marker												
Туре	Ref	Trc	X-value	.	Y-value		Funct	tion		Func	tion Result	
M1		1	5.77743		-17.53 dE							
D2	M1	1		47 MHz	-0.12							
MЗ		1	5.79248		-10.45 dB							
M4		1	5.81256	24 GHz	-17.65 dE	m						
		1					R	eady			120	2.11.2018

Date: 12.NOV.2018 15:46:08



# 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 6.4 – A						
Measurement uncertainty:	see chapter 8						

#### Limits:

#### Spectrum Bandwidth – 26 dB Bandwidth

**IC:** Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

**FCC:** Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.



		26 dB band	width (MHz)						
	U-NII-1 (5150 MHz to 5250 MHz)								
	Lowest channel	Middle	channel	Highest channel					
	24.88	-,	/_	23.93					
	Lowest frequency	/	F	lighest frequency					
	5167.413			5251.888					
	U-NII-2A (5250 MHz to 5350 MHz)								
	Lowest channel	Middle	channel	Highest channel					
а	23.73	-,	/_	23.78					
	U-NII-2C (5470 MHz to 5725 MHz)								
	Lowest channel	Middle	channel	Highest channel					
	24.97	24	.03	24.23					
	U-NII-3 (5725 MHz to 5850 MHz)								
	Lowest channel	Middle	channel	Highest channel					
	24.08	24	.48	24.33					
	Lowest frequency	/	Highest frequency						
	5733.162		5836.888						



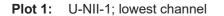
		26 dB band	width (MHz)						
	U-NII-1 (5150 MHz to 5250 MHz)								
	Lowest channel	Middle	channel	Highest channel					
	25.37	-,	/-	25.07					
	Lowest frequency	ý	F	lighest frequency					
	5167.452			5252.637					
	U-NII-2A (5250 MHz to 5350 MHz)								
	Lowest channel	Middle	channel	Highest channel					
n/ac HT20	24.18	-,	/-	24.58					
	U	NII-2C (5470 MHz to 5725 MHz)							
	Lowest channel	Middle	channel	Highest channel					
	26.02	25	.03	24.78					
	U-NII-3 (5725 MHz to 5850 MHz)								
	Lowest channel	Middle	channel	Highest channel					
	24.82	25	.18	25.62					
	Lowest frequency	ý	Highest frequency						
	5732.712		5837.837						

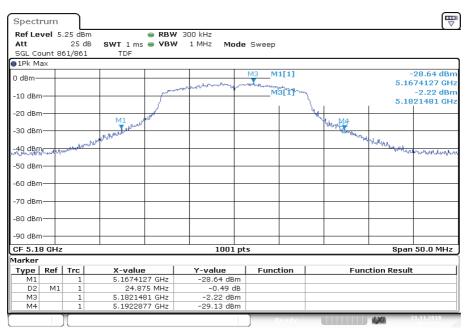


	26 dB bandwidth (MHz)							
	L	J-NII-1 (5150 MI	Hz to 5250 MHz					
	Lowest channel			Highest channel				
	45.45			44.36				
	Lowest frequency	/	F	lighest frequency				
	5167.522			5252.477				
	U	-NII-2A (5250 N	IHz to 5350 MHz	<u>z</u> )				
	Lowest channel			Highest channel				
n/ac HT40	43.76			44.26				
	U	-NII-2C (5470 N	0 MHz to 5725 MHz)					
	Lowest channel	Middle	channel	Highest channel				
	43.76	43	.66	43.26				
	U-NII-3 (5725 MHz to 5850 MHz)							
	Lowest channel		Highest channel					
	43.36		44.56					
	Lowest frequency	/	Highest frequency					
	5733.322		5816.978					



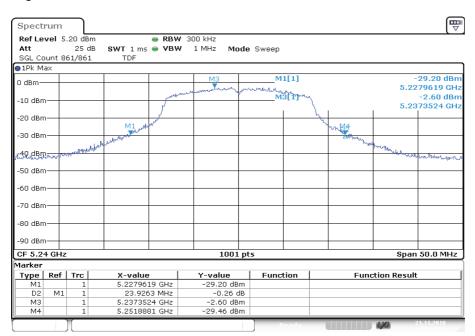
#### Plots: a - mode





Date: 21.NOV.2018 06:41:53

## **Plot 2:** U-NII-1; highest channel

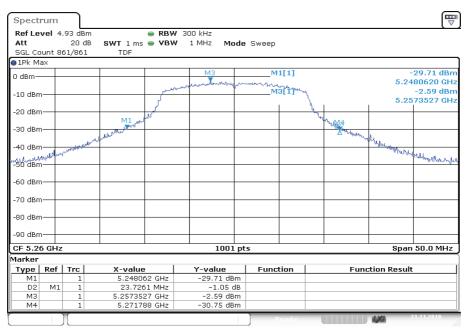


Date: 21.NOV.2018 07:11:50



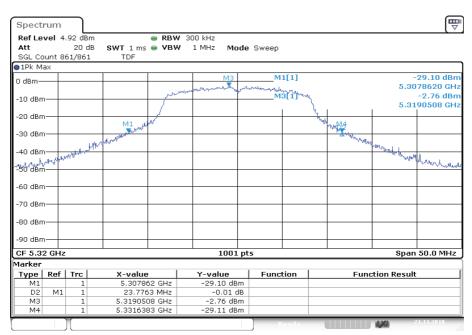


#### **Plot 3:** U-NII-2A; lowest channel



Date: 21.NOV.2018 07:13:52

#### Plot 4: U-NII-2A; highest channel

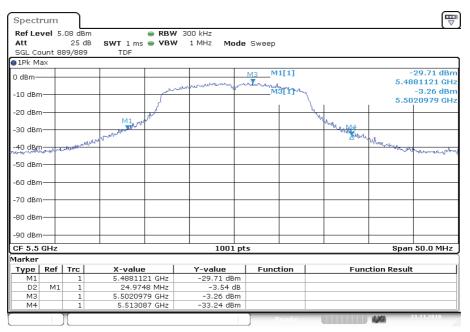


Date: 21.NOV.2018 07:17:20



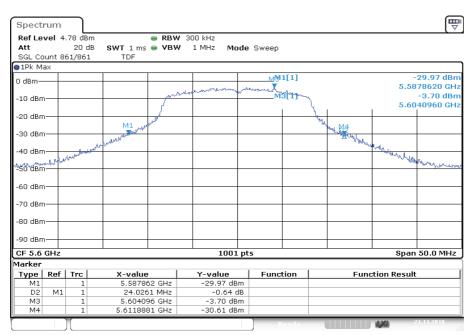


#### **Plot 5:** U-NII-2C; lowest channel



Date: 21.NOV.2018 07:20:58

#### Plot 6: U-NII-2C; middle channel

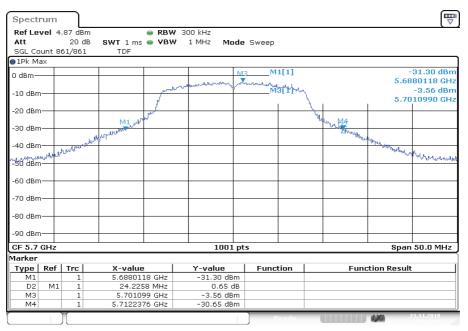


Date: 21.NOV.2018 07:23:05



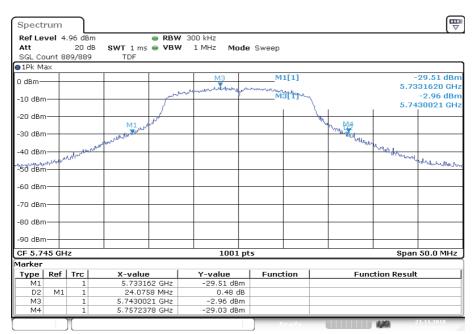


#### **Plot 7:** U-NII-2C; highest channel



Date: 21.NOV.2018 07:24:58

#### **Plot 8:** U-NII-3; lowest channel

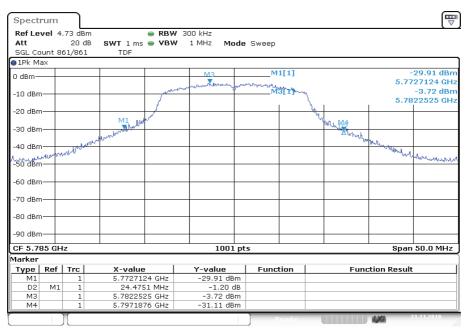


Date: 21.NOV.2018 07:26:51



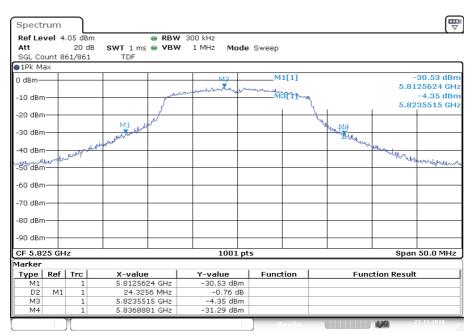


#### **Plot 9:** U-NII-3; middle channel

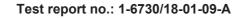


Date: 21.NOV.2018 07:29:00

#### **Plot 10:** U-NII-3; highest channel



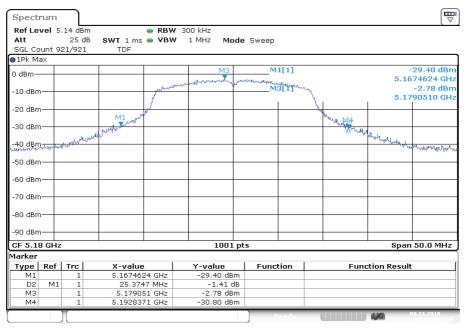
Date: 21.NOV.2018 07:31:28





## Plots: n/ac HT20 – mode

#### **Plot 1:** U-NII-1; lowest channel

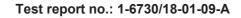


Date: 8.NOV.2018 15:21:32

#### **Plot 2:** U-NII-1; highest channel

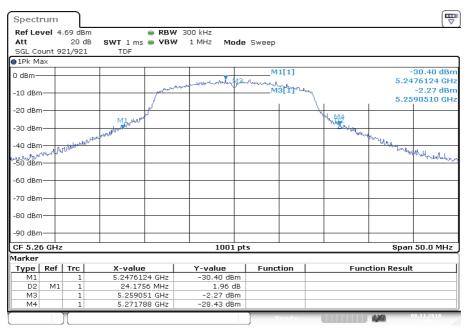
Spectrum									
Ref Level 5. Att SGL Count 92	25 dB		RBW 3 VBW		e Sweep				
●1Pk Max									
0 dBm				. r. and Tull Br	and a state of the	1[1]			-29.93 dBm 275625 GHz
-10 dBm		1	phanta and a start and a start and a start a st		M	3[1] <sup></sup>	my.	5.23	-1.70 dBm 384015 GHz
-20 dBm		Milbacker					- Vyy Volu M4		
-30 dBm	فمعلجه المد	M1 miles					With WH	hall whether we	
AL DEPENDENT	hing and							unarity	www.www.www.w
-60 dBm									
-70 dBm									
-80 dBm									
CF 5.24 GHz Marker				1001 p	ts			Spar	n 50.0 MHz
Type   Ref	Trc	X-value	1	Y-value	Funct	lion	Eun	ction Resul	t
M1	1	5.2275625 (	GHz	-29.93 dBm	- ranci		run	scion Kesul	•
D2 M1	1	25.0747 N		-0.28 dB					
M3	1	5.2384015 (	GHz	-1.70 dBm					
M4	1	5.2526372 (	GHz	-30.21 dBm					
	)[				R	e a d y		4,40	08.11.2018

Date: 8.NOV.2018 15:14:47





#### **Plot 3:** U-NII-2A; lowest channel



Date: 8.NOV.2018 15:07:23

#### Plot 4: U-NII-2A; highest channel

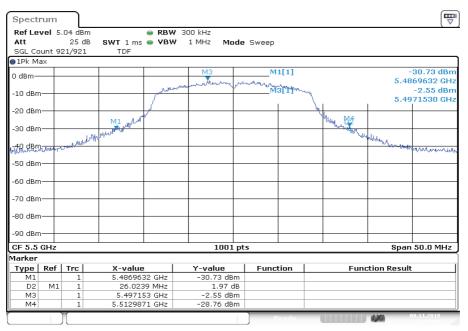
Spect	rum										
Ref Le Att SGL Co		25 d	B SWT 1 ms		300 kHz 1 MHz <b>Mc</b>	de S	weep				
OGL OC		- 1/ / - 1									
0 dBm—					mound	M3	M1[1]			5.:	-29.41 dBm 3077622 GHz
-10 dBm				- month			M3[1]	Long L		5.3	-2.63 dBm 3215985 GHz
-20 dBm			M1	-				{	HRULANA		Mulmana
-30 dBm			MI						Z hugh	4 Maylordy mand	
when all	identer									1.1.68	marmeren
-50 dBr											
-60 dBm											
-70 dBm											
-80 dBm											
-90 dBr											
CF 5.3	2 GHz			1	1001	pts				Spa	n 50.0 MHz
Marker											
Туре	Ref	Trc	X-value		Y-value		Function		Fur	nction Resu	ilt
M1		1	5.30776		-29.41 dB						
D2	M1	1		55 MHz	-0.92 c						
M3 M4		1	5.32159		-2.63 dB -30.33 dB						
		1					Read	y		1,20	27.11.2018

Date: 27.NOV.2018 17:12:13



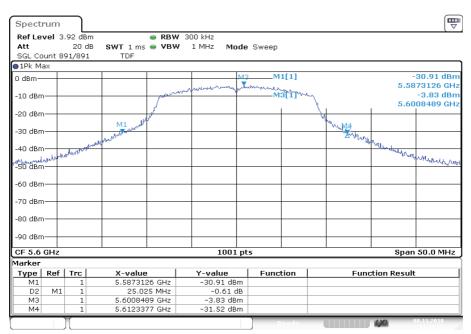


#### **Plot 5:** U-NII-2C; lowest channel



Date: 8.NOV.2018 14:56:03

#### Plot 6: U-NII-2C; middle channel

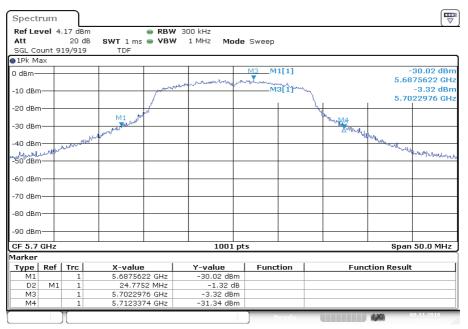


Date: 8.NOV.2018 14:39:55





### **Plot 7:** U-NII-2C; highest channel



Date: 8.NOV.2018 14:33:13

## Plot 8: U-NII-3; lowest channel

Spectrum										<b>H</b> ▼
Ref Level 4 Att SGL Count 9	20 dE			300 kHz 1 MHz <b>Mo</b>	de S	weep				
1Pk Max	19/919	101								
0 dBm				anoundaria	M3	M1[1]				-30.58 dBn 327124 GH:
-10 dBm			Jun		). 		- N 6		1	-3.85 dBn 465984 GH:
-20 dBm		M1	J <sup>u</sup>				- Yu	WWW MA		
-40 dBm		M I Million						March	Mr. Marchan	brinkuma
us los in the	po <sup>grav</sup> .								-MORA	hardhavena
-60 dBm										
-70 dBm										
-80 dBm										
-90 dBm									+	
CF 5.745 GH	lz	•		1001	pts				Spa	n 50.0 MHz
Marker										
Type Ref		X-value		Y-value		Function		Fun	ction Resu	lt
M1	1	5.73271		-30.58 dB						
D2 M1	1	24.824		-0.52 c						
M3 M4	1	5.74659		-3.85 dB -31.10 dB						
						Ready			4,40	08.11.2018

Date: 8.NOV.2018 14:04:50