	CTC I advanced member of RWTÜV group						
Bundesnetzagentur TEST R Test report no.:							
BNetzA-CAB-02/21-102 Testing laboratory	Applicant						
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Accredited Testing Laboratory: The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS) The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-04 and D-PL-12076-01-05	<b>Manufacturer</b> Ingenico Group 9 Avenue de la Gare Rovaltain 26958 Valence Cedex 9 / FRANCE						
Test standard/sFCC - Title 47 CFRFCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices							

RSS - 247 Issue 2Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and<br/>Licence - Exempt Local Area Network (LE-LAN) DevicesRSS - Gen Issue 5Spectrum Management and Telecommunications Radio Standards Specification<br/>- General Requirements for Compliance of Radio Apparatus

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

#### Test Item

Kind of test item:	Payment terminal
Model name:	AXIUM D7 CL/4G/WIFI/BT
FCC ID:	XKB-AXICL4GWBT
IC:	2586D-AXICL4GWBT
Frequency:	DTS band 2400 MHz to 2483.5 MHz
Technology tested:	WLAN
Antenna:	Integrated antenna
Power supply:	3.7 V DC by Li-polymer battery 115 V AC by mains adapter
Temperature range:	0°C to +50°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:

Andreas Luckenbill Lab Manager Radio Communications & EMC

### **Test performed:**

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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### 2.2 Application details

Date of receipt of order:	2018-09-21
Date of receipt of test item:	2018-09-21
Start of test:	2018-10-29
End of test:	2019-02-26
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
Guidance	Version	Description
DTS: KDB 558074 D01	v05r01	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio- noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American national standard of procedures for compliance testing of unlicensed wireless devices





#### 4 **Test environment**

Temperature	:	T <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	:		42 %
Barometric pressure	:		1026 hpa
Power supply	:	V <sub>nom</sub> V <sub>max</sub> V <sub>min</sub>	<ul> <li>3.7 V DC by Li-polymer battery</li> <li>115 V AC by mains adapter</li> <li>No tests under extreme voltage conditions required.</li> <li>No tests under extreme voltage conditions required.</li> </ul>

#### 5 **Test item**

#### 5.1 **General description**

Kind of test item	Payment terminal
Type identification	AXIUM D7 CL/4G/WIFI/BT
HMN	-/-
PMN	Axium D7
HVIN	AXIUM D7 CL/4G/WIFI/BT
FVIN	4.19.1
S/N serial number	Radiated unit: 182667314091119803183628 Conducted unit:182677314091119803190341
Hardware status	296230079
Software status	4.19.1
Firmware status	-/-
Frequency band	DTS band 2400 MHz to 2483.5 MHz
Type of radio transmission Use of frequency spectrum	DSSS, OFDM
Type of modulation	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM
Number of channels	11 with 20 MHz channel bandwidth 9 with 40 MHz channel bandwidth
Antenna	Integrated antenna
Power supply	3.7 V DC by Li-polymer battery
Temperature range	0°C to +50°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:

1-6927/18-01-22 AnnexA 1-6927/18-01-22\_AnnexB 1-6927/18-01-22\_AnnexD



### 6 Description of the test setup

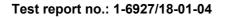
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements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

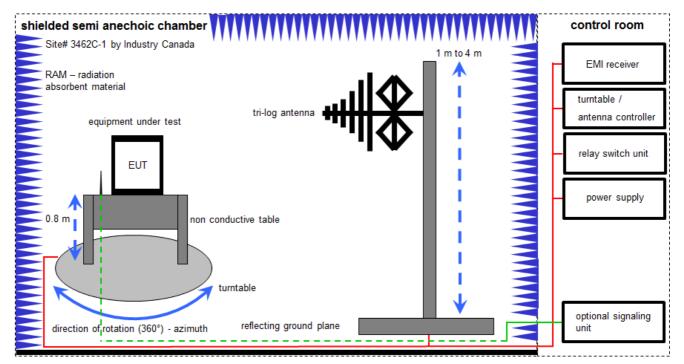
- EK limited calibration
- zw cyclical maintenance (external cyclical maintenance)
- izw internal cyclical maintenance
- g blocked for accredited testing
- \*) next calibration ordered / currently in progress



## 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.

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Measurement distance: tri-log antenna 10 meter EMC32 software version: 10.30.0

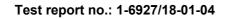
FS = UR + CL + AF

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

<u>Example calculation</u>: FS [dB $\mu$ V/m] = 12.35 [dB $\mu$ V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB $\mu$ V/m] (35.69  $\mu$ V/m)

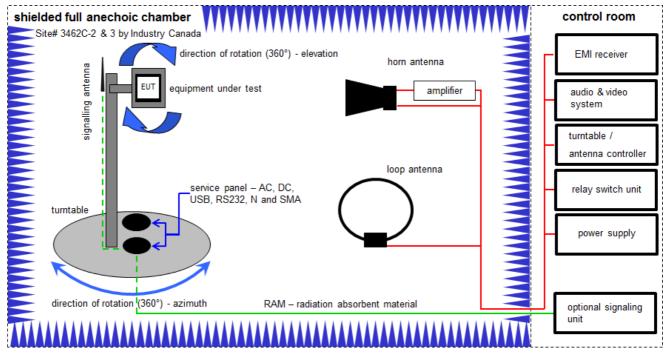
### Equipment table:

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	А	Analyzer-Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	vIKI!	15.01.2018	14.01.2020
5	Α	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
6	А	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
7	А	Turntable Interface- Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
8	А	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vIKI!	24.11.2017	23.11.2020





### 6.2 Shielded fully anechoic chamber



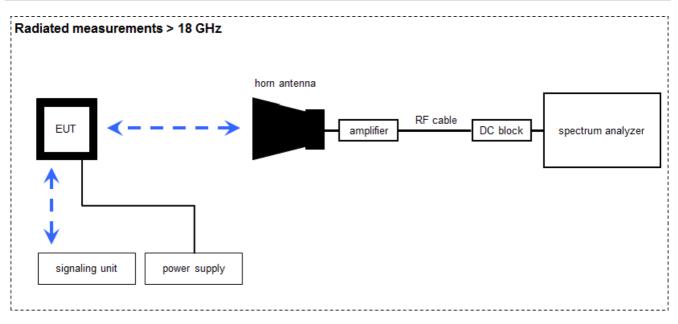
Measurement distance: horn antenna 3 meter; loop antenna 3 meter

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

# FS $[dB\mu V/m] = 40.0 [dB\mu V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB\mu V/m] (71.61 <math>\mu V/m$ ) Equipment table:

Example calculation:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	А, В	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	viKi!	07.07.2017	06.07.2019
2	С	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vlKl!	07.07.2017	06.07.2019
3	Α	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
4	Α	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
5	Α	Band Reject Filter	WRCG2400/2483- 2375/2505-50/10SS	Wainwright	26	300003792	ne	-/-	-/-
6	Α	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
7	A, B, C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
8	A, B, C	Computer	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A54 21	300004591	ne	-/-	-/-
9	A, B, C	NEXIO EMV- Software	BAT EMC V3.16.0.49	EMCO	-/-	300004682	ne	-/-	-/-
10	A, B, C	Anechoic chamber	-/-	TDK	-/-	300003726	ne	-/-	-/-
11	A, B, C	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	14.12.2017	13.12.2018
12	А	RF Amplifier	AFS4-00100800-28- 20P-4-R	MITEQ	2008992	300005204	ne	-/-	-/-
13	A	RF-Amplifier	AMF-6F06001800- 30-10P-R	NARDA-MITEQ Inc	2011571	300005240	ev	-/-	-/-



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)

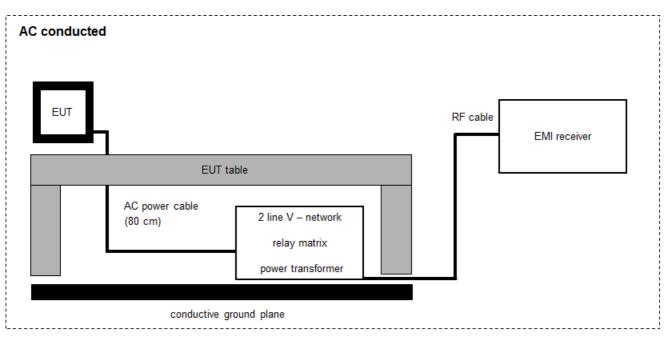
## Example calculation:

 $FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dB\mu V/m] (6.79 \mu V/m)$ 

### Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev	-/-	-/-
2	А	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda	-/-	300000486	viKi!	13.12.2017	12.12.2019
3	А	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	16.01.2018 17.12.2018	15.01.2019 16.12.2019
4	А	RF-Cable	ST18/SMAm/SMAm/ 48	Huber & Suhner	Batch no. 600918	400001182	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	-/-	-/-

# 6.4 AC conducted



FS = UR + CF + VC

(FS-field strength; UR-voltage at the receiver; CR-loss of the cable and filter; VC-correction factor of the ISN)

### Example calculation:

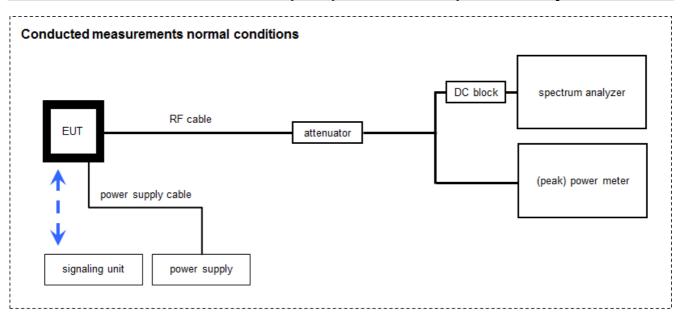
 $\overline{FS}$  [dBµV/m] = 37.62 [dBµV/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dBµV/m] (244.06 µV/m)

### Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Two-line V-Network (LISN) 9 kHz to 30 MHz	ESH3-Z5	R&S	892475/017	300002209	viKi!	13.12.2017	12.12.2019
2	Α	RF-Filter-section	85420E	HP	3427A00162	300002214	NK!	-/-	-/-
3	Α	Hochpass 150 kHz	EZ-25	R&S	100010	300003798	ev	-/-	-/-
4	А	MXE EMI Receiver 20 Hz to 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	18.12.2017	17.12.2018
5	А	Bluetooth Tester	CBT35	R&S	100635	300003907	NK!	-/-	-/-

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## 6.5 Conducted measurements with peak power meter & spectrum analyzer



WLAN tester version: 1.1.13; LabView2015

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	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
2	A, B	Hygro-Thermometer	-/-, 5-45°C, 20- 100%rF	Thies Clima	-/-	400000108	ev	11.05.2018	10.05.2020
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	16.01.2018	15.01.2019
4	A, B	PC Tester R005	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A45 23	300004589	ne	-/-	-/-
5	A, B	Teststand	Teststand Custom Sequence Editor	National Instruments GmbH	-/-	300004590	ne	-/-	-/-
6	В	Power Sensor	NRP-Z81	R&S	100010	300003780	vlKl!	26.01.2017	25.01.2019
7	A, B	RF-Cable	ST18/SMAm/SMAm/ 60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
8	A, B	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10- 2W44+	Mini Circuits	-/-	400001186	ev	-/-	-/-
9	A, B	Synchron Power Meter	SPM-4	стс	1	300005580	ev	-/-	-/-
10	A	DC-Blocker	WA7046	Weinschel Associates	-/-	400001310	ev	-/-	-/-
11	A, B	DC Power Supply	HMP2020	Rohde & Schwarz	102850	300005517	vlKl!	14.12.2017	13.12.2019

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### 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.

#### **Measurement uncertainty** 8

Measurement uncertainty								
Test case	Unce	rtainty						
Antenna gain	± 3	dB						
Power spectral density	± 1.1	5 dB						
DTS bandwidth	± 100 kHz (depend	s on the used RBW)						
Occupied bandwidth ± 100 kHz (depends on the u								
Maximum output power conducted ± 1.15 dB								
Detailed spurious emissions @ the band edge - conducted ± 1.15 dB								
Band edge compliance radiated	± 3 dB							
	> 3.6 GHz	± 1.15 dB						
Spurious emissions conducted	> 7 GHz	± 1.15 dB						
	> 18 GHz	± 1.89 dB						
	≥ 40 GHz	± 3.12 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.	± 2.6 dB						

## 9 Summary of measurement results

	No deviations from the technical specifications were ascertained						
	There were deviations from the technical specifications ascertained						
	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.						
TC Identifier	Description	Verdict	Date	Remark			

CTC I advanced

RF-Testing	F		See table! 2019-03-07			7	-/-				
Test specification clause	Test case	Guideline	Temperature conditions	S	ower ource Itages	Mode	с	NC	NA	NP	Remark
§15.247(b)(4) RSS - 247 / 5.4 (f)(ii)	Antenna gain	-/-	Nominal	No	ominal	DSSS		-/	/_		-/-
§15.35	Duty cycle	-/-	Nominal	No	ominal	DSSS OFDM		-/	/_		-/-
§15.247(e) RSS - 247 / 5.2 (b)	Power spectral density	KDB 558074 DTS clause: 8.4	Nominal	No	ominal	DSSS OFDM					-/-
§15.247(a)(2) RSS - 247 / 5.2 (a)	DTS bandwidth	KDB 558074 DTS clause: 8.2	Nominal	No	ominal	DSSS OFDM					-/-
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	No	ominal	DSSS OFDM					-/-
§15.247(b)(3) RSS - 247 / 5.4 (d)	Maximum output power	KDB 558074 DTS clause: 8.3.1.3	Nominal	No	ominal	DSSS OFDM	$\boxtimes$				-/-
§15.247(d) RSS - 247 / 5.5	Detailed spurious emissions @ the band edge – cond.	-/-	Nominal	N	ominal	DSSS OFDM					-/-
§15.205 RSS - 247 / 5.5 RSS - Gen	Band edge compliance cond. & rad.	KDB 558074 DTS clause: 8.7.3	Nominal	No	ominal	DSSS OFDM					-/-
§15.247(d) RSS - 247 / 5.5	TX spurious emissions cond.	KDB 558074 DTS clause: 8.5	Nominal	No	ominal	DSSS OFDM					-/-
§15.209(a) RSS-Gen	TX spurious emissions rad. below 30 MHz	-/-	Nominal	No	ominal	DSSS OFDM					-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions rad. 30 MHz to 1 GHz	-/-	Nominal	N	ominal	DSSS OFDM	$\boxtimes$				-/-
§15.247(d) RSS - 247 / 5.5 RSS-Gen	TX spurious emissions rad. above 1 GHz	-/-	Nominal	No	ominal	DSSS OFDM					-/-
§15.109 RSS-Gen	RX spurious emissions rad. 30 MHz to 1 GHz	-/-	Nominal	No	ominal	RX / idle					-/-
§15.109 RSS-Gen	RX spurious emissions rad. above 1 GHz	-/-	Nominal	No	ominal	RX / idle					-/-
§15.107(a) §15.207	Conducted emissions < 30 MHz	-/-	Nominal	No	ominal	DSSS OFDM					-/-

## Notes:

С	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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### Test report no.: 1-6927/18-01-04



### 10 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Provided channels:

Channels with 20 MHz channel bandwidth:

channel number & center frequency													
channel	1	2	3	4	5	6	7	8	9	10	11	12	13
f <sub>c</sub> / MHz	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472

### Channels with 40 MHz channel bandwidth:

channel number & center frequency													
channel	-/-	-/-	3	4	5	6	7	8	9	10	11	-/-	-/-
f <sub>c</sub> / MHz	-/-	-/-	2422	2427	2432	2437	2442	2447	2452	2457	2462	-/-	-/-

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



# 11 Additional EUT parameter

Test mode:		No test mode available Iperf was used to ping another device with the largest support packet size
		Test mode available Special software is used. EUT is transmitting pseudo random data by itself
Modulation types:	$\boxtimes$	Wide Band Modulation (None Hopping – e.g. DSSS, OFDM)
		Frequency Hopping Spread Spectrum (FHSS)
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>



### 12 Measurement results

# 12.1 Antenna gain

### **Description:**

The antenna gain of the complete system is calculated by the difference of radiated power (@ 3 MHz) in EIRP and the conducted power (@ 3 MHz) of the module.

#### Measurement:

Measurement parameter						
Detector	Peak					
Sweep time	Auto					
Resolution bandwidth	3 MHz					
Video bandwidth	3 MHz / 10 MHz					
Trace mode	Max hold					
Test setup	See chapter 6.5 – A (conducted) See chapter 6.2 – A (radiated)					
Measurement uncertainty	See chapter 8					

### Limits:

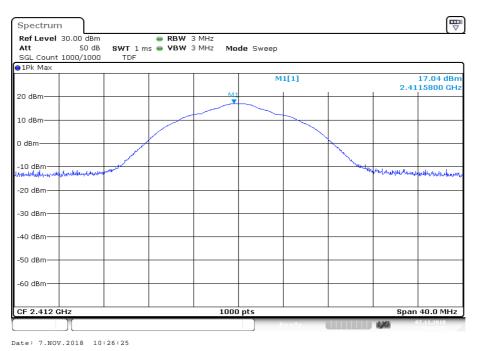
FCC	IC				
6 dBi / > 6 dBi output power and power density reduction required					

	lowest channel	middle channel	highest channel
Conducted power / dBm Measured with DSSS modulation	17.0	18.4	18.1
Radiated power / dBm Measured with DSSS modulation	15.0	15.6	15.3
Gain [dBi] / Calculated	-2.0	-2.8	-3.2

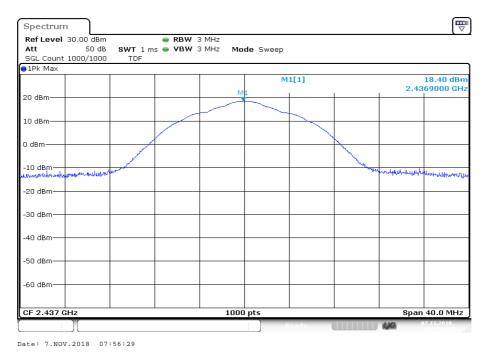


#### Plots: DSSS / b - mode

#### Plot 1: Lowest channel

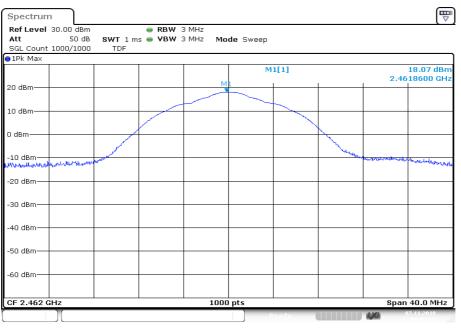


#### Plot 2: Middle channel





#### Plot 3: Highest channel



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## 12.2 Identify worst case data rate

### **Description:**

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

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

#### Measurement:

Measurement parameter						
Detector	Peak					
Sweep time	Auto					
Resolution bandwidth	3 MHz					
Video bandwidth	3 MHz					
Trace mode	Max hold					
Test setup	See chapter 6.5 – A					
Measurement uncertainty	-/-					

Modulation scheme / bandwidth								
DSSS / b – mode	1 Mbit/s							
OFDM / g – mode	6 Mbit/s							
OFDM / n HT20 – mode	MCS0							
OFDM / n HT40 – mode	MCS0							



## 12.3 Maximum output power

### **Description:**

Measurement of the maximum conducted peak output power. The measurements are performed using the data rate identified in the previous chapter.

### Measurement:

Measurement parameter										
According to DTS clause: 8.3.1.3										
	Peak power meter									
Test setup See chapter 6.5 – B										
Measurement uncertainty	See chapter 8									

### Limits:

FCC	IC
Conducted 1.0 W / 30 dBm with	n an antenna gain of max. 6 dBi

	maximum output power / dBm								
	lowest channel	middle channel	highest channel						
Output power conducted DSSS / b – mode	20.0	21.5	21.1						
Output power conducted OFDM / g – mode	19.3	20.1	20.9						
Output power conducted OFDM / n HT20 – mode	19.2	20.6	20.7						
Output power conducted OFDM / n HT40 – mode	19.0	18.7	18.8						



# 12.4 Duty cycle

## **Description:**

Measurement of the timing behavior.

## Measurement:

Measureme	nt parameter
Detector	Peak
Sweep time	Depends on the signal see plot
Resolution bandwidth	10 MHz
Video bandwidth	10 MHz
Trace mode	Max hold
Test setup	See chapter 6.5 – A
Measurement uncertainty	See chapter 8

### Limits:

FCC	IC
No lim	itation!

T <sub>nom</sub>	V <sub>nom</sub>	lowest channel	middle channel	highest channel
DSSS / k	o – mode	97.9 % / 0.09 dB	97.9 % / 0.09 dB	97.9 % / 0.09 dB
OFDM /	g – mode	87.7 % / 0.57 dB	87.7 % / 0.57 dB	87.4 % / 0.58 dB
OFDM / n H	T20 – mode	86.8 % / 0.61 dB	86.8 % / 0.61 dB	86.8 % / 0.61 dB
OFDM / n H	T40 – mode	76.5 % / 1.16 dB	76.6 % / 1.16 dB	76.5 % / 1.16 dB



### Plots: DSSS / b - mode

### Plot 1: Lowest channel

Ref Level Att SGL Count 1Pk Clrw 20 dBm	45 dE	B SWT 25.3 ms TDF	RBW 10 MHz VBW 10 MHz	M1[1]		19.12 d	Bm
SGL Count 1Pk Clrw 20 dBm	1/1		VBW 10 MHz	M1[1]			Bm
1Pk Clrw 20 dBm		TDF	D3	M1[1]			Bm
20 dBm	M1		D3	M1[1]			Bm
	M1		D3	M1[1]			Bm
			4				
						4.3753	
				D2[1]		-32.93	
10 dBm —						8.2448	ms
0 dBm							
JUBIII							
-10 dBm							
-10 0011	la la					V	
-20 dBm							
-30 dBm							
-40 dBm							
-50 dBm							
-60 dBm							
-70 dBm							
CF 2.412 G			1000 pt	-		2.53 m	- /
0F 2.412 G Narker	Π <u>2</u>		1000 pt	s		2.53 m	>/
		X-value	Y-value	Function	E	tion Result	
Type Ref M1	Trc 1	4.3753 ms	19.12 dBm	Function	Func	uon kesult	
D2 M		4.3753 ms 8.2448 ms	-32.93 dB				
D3 M		8.4219 ms	-0.02 dB				
	1			,	2	07.11.2018	_

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#### Plot 2: Middle channel

Ref Level 28.48 dBm         RBW 10 MHz           Att         45 dB         SWT 25.3 ms         VBW 10 MHz           SGL Count 1/1         TDF         20.48         6.997           PIPK Clrw         M1         M1[1]         -3.31         6.997           20 dBm         M1         D2[1]         -3.31         6.997           10 dBm         M1         D2[1]         -3.31         6.997           10 dBm         M1         D2[1]         -3.31         6.997           -10 dBm         M1         D2[1]         -3.31         6.997           -20 dBm         M1         M1         0         0.21 <th>Spectr</th> <th>um</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>∣⊽</th>	Spectr	um										∣⊽
SGL Count 1/1     TDF       1Pk Clrw     M1     M11     20.48       20 dBm     0211     -33       10 dBm     0211     -33       0 dBm     0211     -33       -10 dBm     04     04       -20 dBm     04     04       -30 dBm     04     04       -30 dBm     04     04       -20 dBm     04     04       -20 dBm     04     04       -30 dBm     04     04       -50 dBm     04     04<	Ref Lev	el 2	8.48 di	3m	🖷 RBW 🗈	l0 MHz						
IPk Clrw       M1       M1[1]       20.48         20 dBm       0.49       6.99         10 dBm       0.211       -33         0 dBm       0.48       0.211       -34         -10 dBm       0.48       0.49       -34         -20 dBm       0.49       0.49       -34         -30 dBm       -30 dBm       -30       -40         -50 dBm       -30       -30       -34         -50 dBm       -30       -30       -30         -40 dBm       -30       -30       -30         -50 dBm       -30       -30       -30         -40 dBm       -30       -30       -30         -50 dBm       -30       -30       -30         -60 dBm       -30       -30       -30       -30         -10 dBm       -30       -30       -30       -30         -10 dBm       -30       -30       -30       -30         -20 dBm       -30       -30       -30       -30         -50 dBm       -30       -30       -30       -30         -10 dBm       -30       -30       -30       -30         -40 dBm       -30       -				-	ns 👄 VBW 1	.0 MHz						
M1     M1     M11     20.48       20 dBm     0     0.211     -33       10 dBm     0     0.211     -38.24       0 dBm     0     0     0.211     -38.24       -10 dBm     0     0     0.48     0.48       -20 dBm     0     0     0     0.48       -30 dBm     0     0     0     0       -30 dBm     0     0     0     0       -60 dBm     0     0     0     0       -60 dBm     0     0     0     0       -50 dBm     0     0     0     0       -60 dBm     0     0     0     0       -60 dBm     0     0     0     0       -10 dBm     0     0     0     0       -10 dBm     0     0     0     0       -20 dBm     0     0     0     0       -10 dBm     0     0     0       -10 dBm     0     0			/1	TDF								
20 dBm     0 dBm     02 11     -30 4       -10 dBm     -20 dBm     -20 dBm     -20 dBm       -20 dBm     -20 dBm     -20 dBm     -20 dBm       -20 dBm     -20 dBm     -20 dBm     -20 dBm       -20 dBm     -20 dBm     -20 dBm     -20 dBm       -30 dBm     -20 dBm     -20 dBm     -20 dBm       -30 dBm     -20 dBm     -20 dBm     -20 dBm       -40 dBm     -20 dBm     -20 dBm     -20 dBm       -50 dBm     -20 dBm     -20 dBm     -20 dBm       -60 dBm     -20 dBm     -20 dBm     -20 dBm       -50 dBm     -20 dBm     -20 dBm     -20 dBm       -60 dBm     -20 dBm     -20 dBm     -20 dBm       -60 dBm     -20 dBm     -20 dBm     -20 dBm       -60 dBm     -20 dBm     -20 dBm     -20 dBm       -10 dBm     -20 dBm     -20 dBm	1Pk Clr	w .										
20 dBm     0 <td< td=""><td></td><td></td><td></td><td>M1</td><td></td><td></td><td>M1</td><td>[1]</td><td></td><td></td><td></td><td></td></td<>				M1			M1	[1]				
10 dBm	20 dBm-											
0 dBm     -10 dBm	O dB es						D2	11				
-10 dBm	о чып-									1	1	10 1113
-20 dBm	) dBm—											
-20 dBm												
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10 dBm	_									+	
-30 dBm I				e(			f	2			1	
-40 dBm	20 dBm											
-40 dBm	30 dBm											
-50 dBm     -50 dBm     Image: Constraint of the second se	00 00111											
-60 dBm         -60 dBm         Image: CF 2.437 GHz         <	40 dBm	_									-	
-60 dBm         -60 dBm         Image: CF 2.437 GHz         <												
CF 2.437 GHz         1000 pts         2.53           Marker         Your Best         Your Best         Function Result           M1         1         6.9803 ms         20.48 dBm         Function           D2         M1         1         8.2448 ms         -33.77 dB         Function	50 dBm										1	
CF 2.437 GHz         1000 pts         2.53           Marker         Yuge         Ref         Trc         X-value         Function         Function Result           M1         1         6.9803 ms         20.48 dBm         0         0         0           D2         M1         1         8.2448 ms         -33.77 dB         0         0	eo dem											
Marker         Your Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         6.9803 ms         20.48 dBm              D2         M1         1         8.2448 ms         -33.77 dB	ou ubin											
Marker         Your Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         6.9803 ms         20.48 dBm              D2         M1         1         8.2448 ms         -33.77 dB												
Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         6.9803 ms         20.48 dBm             D2         M1         1         8.2448 ms         -33.77 dB	CF 2.43	7 GH	lz			1000 pt	s				2.53	3 ms/
M1         1         6.9803 ms         20.48 dBm           D2         M1         1         8.2448 ms         ~33.77 dB												
D2 M1 1 8.2448 ms -33.77 dB		Ref					Funct	ion	Fur	nction Resul	t	
		641										
	D2	M1	1			0.06 dB						
	55		1	0.1215		0.00 00	<u>۱</u>				07 11 2	010

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### Plot 3: Highest channel

Spect	rum											
Ref Le	vel 2			_		10 MHz						
Att			dB 👄 SWT 29	5.3 ms 👄	VBW	10 MHz						
SGL Co		/1	TDF									
∋1Pk Cl	rw											
			M1				D3	M1[1]				20.03 dBm
20 dBm			- IT				14	D of 11				5.3364 ms
								D2[1]				-33.77 dB 8.2701 ms
10 dBm									I.	1		8.2701 ms
0 dBm—												
o ubiii-												
-10 dBm												
10 000	·		Ŷ				2				ų	
-20 dBm	∩											
-30 dBm	η <del></del>											
-40 dBm	<u>ו</u> רי											
-50 dBm												
-60 dBm	ד ו											
CF 2.4	62 GH	z		1		1000	pts					2.53 ms/
Marker												
Type	Ref	Trc	X-valu	e	Y-	value	FI	unction		Function	Resul	t
M1		1	5.3	364 ms		20.03 dB	m					
D2	M1	1		701 ms		-33.77 0						
D3	M1	1	8.4	472 ms		0.03 0	1B					
								Ready		100		07.11.2018

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## Plots: OFDM / g - mode

### Plot 1: Lowest channel

Spect	rum												₩
Ref Le	vel 2	0.82 c	Bm		😑 R	BW 10 MHz							
Att			dB 😑 :	SWT 4.1	7 ms 😑 🎙	BW 10 MHz							
SGL Co		/1		TDF									
∋1Pk Cl	rw												
									1[1]				.28 dBm
io den	water	phanhoa	When we	Mitute	milwihilling	wegbeen managered before	alleyesse	—B <sub>2</sub>	жылыңды 2[1]	Nanjashilangkaharan	Humbulturalyw		3873 ms 19.88 dB 7011 ms
0 dBm—	_									1	1	1.3	011 ms
-10 dBm	<u>ا</u> ــــ									_			
-20 dBm	n			Hupe			E	fur-M/4	1			Wayete	,
-30 dBm	η											+	
-40 dBm	<b>۱</b>											+	
-50 dBm	<u>ا</u> ر											+	
-60 dBr	η <del></del>											_	
-70 dBm	<b>۱</b>											+	
CF 2.4	 12 G⊦	Iz				100	D pts					468.	75 µs/
Marker													
Type	Ref			X-value		Y-value		Func	tion	F	unction Resu	lt	
M1 D2	M1	1			873 ms 011 ms	8.28 di -30.88							
D2 D3	M1 M1	1			249 ms	-30.88							
		)[							teady		4,40	07.11	.2018

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### Plot 2: Middle channel

Spect	rum												□
Ref Le	vel 2	2.24 dB	m		RBW	10 MHz							
Att		40 0	ib 👄 SWT 4.7	7 ms 🕳 1	vвw	10 MHz							
SGL Co	unt 1,	/1	TDF										
∋1Pk Cl	rw												
								M	1[1]				9.58 dBm
und. 10 dBm·	Million	distriction of the	when he when the	the publics	$\downarrow$	- A	aNhain	ndelan	муракрадин 2 <b>[</b> ]]	Нация	Aughter	unthrough	un <mark>利用机和机</mark> 用和 -28.39 dB
						T							1.37013 ms
0 dBn—													
10 00-													
-10 dBm	'												
-20 d <mark>87</mark>					)2 4년(1	,L				- Lituret	ļ		
	~				- and					monto.			
-30 dBm	∩									_			
-40 dBm	<u>ו</u> רי												
-50 dBm													
00 00.	.												
-60 dBm	n———				_					_			
-70 dBm					-								
CF 2.4	27 CH	7				1000	Inte						468.75 μs/
Marker	57 GN	٤.				1000	prs						100.70 µ3/
Type	Ref	Trc	X-value	. I		Y-value	1	Func	tion		Eun	ction Resu	lt l
M1		1		8.84 µs		9.58 dB	m				7 6411		
D2	M1	1	1.370	013 ms		-28.39 (							
D3	M1	1	1.56	251 ms		-0.02 (	dΒ						
									leady			1.20	07.11.2018

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### Plot 3: Highest channel

Spectr	um													(	
Ref Lev	zel 2	2.51 dB	m		RBV	/ 10 MHz									
Att		40 c	ib 👄 SWT 4.7	ms 👄	VBV	V 10 MHz									
SGL Co	unt 1,	/1	TDF												
●1Pk Clr	W														
								M1	[1]					9.90 d	Bm
ML MMU 10 dBm-	LANU	how when the states of the sta	hulppunkutunulde	1 03	Mullip/	unihantuk	nu			ľ	phonerarkauchkally	underverte			
0 dBm—	_		_								-			1.36543	ms
-10 dBm	+		_												
, <b>≉</b> 20 dBm	_			2 4.00/10						tanda					hard
-30 dBm	+														_
-40 dBm	+														_
-50 dBm	+														_
-60 dBm	+														
-70 dBm	+														_
CF 2.46	i2 GH	z				1000	pts						4	68.75 μ	s/ ]
Marker															
Type	Ref	Trc	X-value			Y-value		Funct	ion		F	unctior	Resul	t	1
M1		1		.08 µs		9.90 dB									
D2	M1	1		543 ms		-27.59 0				_					_
D3	M1	1	1.562	251 ms		0.13 0	1B								
								Re	eady		1	1,00	h	07.11.2018	

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## Plots: OFDM / n HT20 - mode

#### Plot 1: Lowest channel

Spect	rum										ſ	₩
Ref Le	vel 2	0.67 dB	n	•	RBW 10 MHz							
Att		40 d	B 🕳 SWT	4.4 ms 🕳 🕻	BW 10 MHz							
SGL Co		/1	TD	F								
∋1Pk Cl	rw											
							11[1]				49 d	
ndra <mark>b</mark> fir	UM 14	mound	Wenner	Maghlyanar	a y Uswanda yul	where where y	D.	putationalistic	11 who resserved and the	Anag	928	12-6
				r.		· · · C	2[1]4				9.63 '740	
0 dBm—							-		-	1.2	740	
-10 dBr	+-י											
-20 dBm						D	<b>a</b>					
-20 UBN			7	Participal		1	and the la				ખાલીયભા	)
-30 dBrr	∩									_		
-40 dBrr	ו—ר									-		
-50 dBr	ד י						-					
-60 dBr												
-00 060												
-70 dBm	∩									_		
CF 2.4	12 GH	z		I	1000	pts	-	I		441.	56 µ	s/
Marker												<u> </u>
Type	Ref	Trc	X-v	alue	Y-value	Fund	tion	Fu	nction Resul	t		
M1		1	1	1.33928 ms	8.49 dBr							
D2	M1	1		1.2774 ms	-29.63 d							
D3	M1	1	1	L.47188 ms	0.06 d	B						
							Ready		14,401	07.11	.2018	

Date: 7.NOV.2018 08:43:06

#### Plot 2: Middle channel

Spectru													
Ref Leve	el 22				BW 10 MHz								
Att			👄 SWT 4.4	ms 🔵 V	BW 10 MHz								
SGL Cour		1	TDF										
∋1Pk Clrw						_							
						-	M1[1					9.68 d	
Mayburne	hany	- politikan	verycollidenter	L DAV	Har Altra Maraha	uhy	When the half	July 1	population	rypanyahlani	astrongently	whet all the state	λha
10 ubiii—				4			D2[1	'				-29.37 1.28182	a B
0 dBm—													-
- <mark>1</mark> 0 dBm—	-					-							+
				2									
20 dBm—				204pmp-W				Anderg					Well
-30 dBm-													
-40 dBm—	-												
-50 dBm—													
-60 dBm—													
-00 ubiii—													
-70 dBm—						_			_				
CF 2.437	GH	z			100	0 pts					4	41.56 μ	s/
Marker													
	ef	Trc	X-value		Y-value		Functior	<u>۱</u>		Functior	n Result	t	
M1		1		.72 μs	9.68 d								
D2 D3	M1 M1	1		182 ms 763 ms	-29.37 -0.08								
03	1911	1	1.4	-us ms	-0.08	ub	<u></u>						_

Date: 7.NOV.2018 08:51:52



### Plot 3: Highest channel

Spectr	um										
Ref Lev	vel 2	2.36 dB	m	🖷 R	BW 10 MHz						
Att			iB 👄 SWT 4.4	4 ms 👄 🗸	BW 10 MHz						
SGL Co		/1	TDF								
●1Pk Ch	rw .										
							11[1]				L9 dBm
<mark>ካው ላይ አመ</mark> 10 dBm-	Norm	MANNU	nhaddenath	- pengeterda	whithoutomatery	hydrou Wyddiae D	an P	John and the second sec	wy.wy.humany.h	1411;XII.4; -31	1.92 dB
						_				1.28	010 ms
0 dBm—									-		
-10 dBm											
-10 aBm											
-20 dBm			Sector Sector			[	Ronor .		_		actition
				T.			A -10 F				1.0
-30 dBm											
-40 dBm											
-40 0011											
-50 dBm					_				_		
-60 dBm											
-70 dBm											
, o abin											
CF 2.46	52 GH	Iz		·	1000	pts				442	.5 µs/
Marker											
Туре	Ref		X-value		Y-value	Fund	tion	Fu	nction Resu	lt	
M1		1		312 ms	10.19 dE						
D2 D3	M1 M1	1		801 ms 475 ms	-30.92						
	1411		1.	1101115	0.10			7	14.5478	07.11	2018
		Л							174		

Date: 7.NOV.2018 09:00:46



## Plots: OFDM / n HT40 - mode

#### Plot 1: Lowest channel

Spect	um													
Ref Le	vel 1	6.06 dBr	n	-	RBW 1	.0 MHz								
Att		35 d	B 👄 SWT 2.5	ims 😑	VBW 1	.0 MHz								
SGL Co		/1	TDF											
●1Pk Cl	'W													
10 - 10									1[1]					3.69 dBm
10 dBm-	ML	Marufahid	www.hulleyn	water		ad authority	all the second	within	1ини <mark>/Шми</mark> 2[1]	n,		والمصارين	My June	-29.95 dB
0 dBm—	<b>P</b> <sup>0</sup>	· ·					·	D2	2[1]		ſ	• •		
Gabin						P				1		1		638.82 µs
-10 dBm						T								
-20 dBm	-				_									
46 Acher	huho			<u></u>	yntyruhn					Waykinle	المال إللم			
-30 dBm	-				- II -									
-40 dBm														
-50 dBm														
-SU UBII														
-60 dBm														
00 001														
-70 dBm	_													
-80 dBm	-									_				
CF 2.42	22 GH	Iz	1	1		1000	pts			- (			2	251.25 µs/
Marker														
Type	Ref	Trc	X-value	.	Y	value	1	Funct	tion		F	unctio	on Resul	t
M1		1	246	i.47 μs		3.69 dB	lm 🗌							
D2	M1	1		3.82 µs		-29.95 (								
D3	M1	1	834	99 μs		-8.11 (	зB							
								R	eady	1		1.4	KA	07.11.2018

Date: 7.NOV.2018 09:20:42

#### Plot 2: Middle channel

Spect	rum									ĺ	▽
Ref Le	vel 1	7.01 dBm		e RB	W 10 MHz						-
Att		35 dB	👄 SWT 2.3	5 ms 👄 🛛 🗷	<b>W</b> 10 MHz						
SGL Co	unt 1	/1	TDF								
∋1Pk Cl	rw										
							M1[1]			3.83 d	Bm
18,98M	June 4	adden the part	M1,	anthalphanal4	humantulaliya	Musla	- Dalla	whenter to whether the	ulphannonk	699.07	(nHe
0 dBm-			<b>V</b> U				D2[40]			-30.Ø1	
o abiii								1	1	030,93	s µs
-10 dBm	∩										
-20 dBrr	-+					_					
			manhan			- Yerh	millionant		64	Herenation	
-30 dBr	ר – י										
-40 dBr											
-10 001	'										
-50 dBm	η <u> </u>									_	
-60 dBrr	ι <del>  </del>								-		
-70 dBr											
-80 dBr											
CF 2.4		17			1000	nts				250.31 µ	د /
Marker	o, an	12			1000	pes				200.01 µ	31
Type	Ref	Trc	X-value	<b>1</b>	Y-value	1 E	unction	Eur	iction Resu	ılt	
M1		1		9.07 μs	3.83 dBi		anocion	1			
D2	M1	1		3.93 µs	-30.61 d	в					
D3	M1	1	834	1.37 µs	-0.28 d	в					
		1					Peady		1.00	07.11.2018	_

Date: 7.NOV.2018 09:41:17



### Plot 3: Highest channel

Spectr	rum											
Ref Lev	vel 1	5.76 di	Зm	-	RBW 10 MHz							
Att		35	dB 🕳 SWT 2.5	ims 🕳 '	VBW 10 MHz							
SGL Co	unt 1	/1	TDF									
⊖1Pk Clr	rw											
10.10							M	1[1]				2.93 dBm
10 dBm	11 June	Anna		white	2 Allowyound	14 August	nunanh-hu	Hubberry	ı	Rum	or whether the sour	-27.66 db
0 dBm—	<b>Y</b> # [`				420		D	2[1]	]	r <sup>AC</sup>	•	
u asm—												638.82 μs
-10 dBm												
10 00.00												
-20 dBm						_				_		
Automaticato				Bruch	6 ppp f				Wedgewiller	nly		
-30 dBm	∩—			- • ·	·	_						-
-40 dBm	<u>ا</u> –۱					-						-
-50 dBm	ι <del></del>					+						
-60 dBm						-						
-70 dBm												
-70 0011	'											
-80 dBm						_						
CF 2.45		-			100	0 pt:	_					251.25 µs/
Ver 2.4a Marker	JZ GH	12			100	o pe	>					201.20 μ5/
	Ref	Trc	X-value		Y-value		Func			<b>F</b>	nction Resu	
Type M1	Ker	11		13.6 µs	2.93 c	iBm	Func	uun		Fu	ncuon Resu	n
D2	M1	1		з.о µs 3.82 µs	-27.66							
D3	M1	1		. 99 µs	0.00							
						_	1				10 18 MPR	07 11 2019
		Л										

Date: 7.NOV.2018 09:52:43



## 12.5 Peak power spectral density

#### **Description:**

Measurement of the peak power spectral density of a digital modulated system. The PSD shows the strength of the variations as a function of the frequency. The measurement is repeated for both modulations at the lowest, middle and highest channel.

#### Measurement:

Measurement parameter							
According to DTS clause: 8.4							
Detector	Positive Peak						
Sweep time	Auto						
Resolution bandwidth	100 kHz						
Video bandwidth	300 kHz						
Span	30 MHz						
Trace mode	Max. hold (allow trace to fully stabilize)						
Test setup	See chapter 6.5 – A						
Measurement uncertainty	See chapter 8						

#### Limits:

FCC	IC						
8 dBm / 3 kHz (conducted)							

### **Results:**

measured	peak power spectral density / dBm @ 100 kHz							
	Lowest channel	Middle channel	Highest channel					
DSSS / b – mode	8.03	9.87	9.62					
OFDM / g – mode	-3.55	-2.30	-1.77					
OFDM / n HT20 – mode	-3.42	-2.19	-1.67					
OFDM / n HT40 – mode	-6.63	-7.06	-7.39					

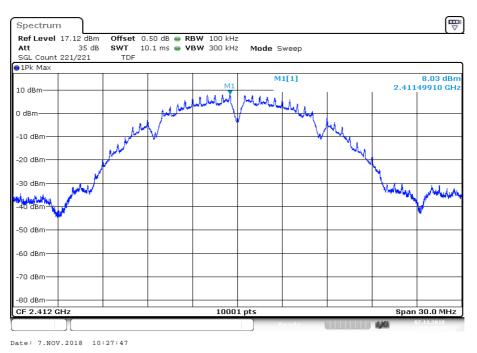
#### Formula for PKPSD calculation: PKPSD<sub>calculated</sub>=PKPSD<sub>measured</sub>+10\*log(3kHz/RBW<sub>measured</sub>[kHz])

calculated	peak power spectral density / dBm @ 3 kHz							
	Lowest channel	Middle channel	Highest channel					
DSSS / b – mode	-7.20	-5.36	-5.61					
OFDM / g – mode	-18.78	-17.53	-17.00					
OFDM / n HT20 – mode	-18.65	-17.42	-16.90					
OFDM / n HT40 – mode	-21.86	-22.29	-22.62					

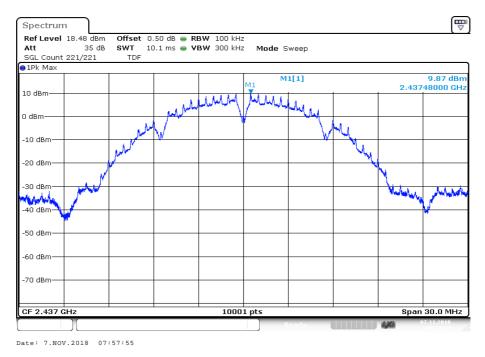


#### Plots: DSSS / b - mode

#### Plot 1: Lowest channel

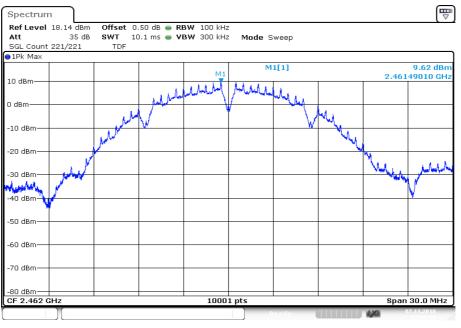


#### Plot 2: Middle channel





#### Plot 3: Highest channel

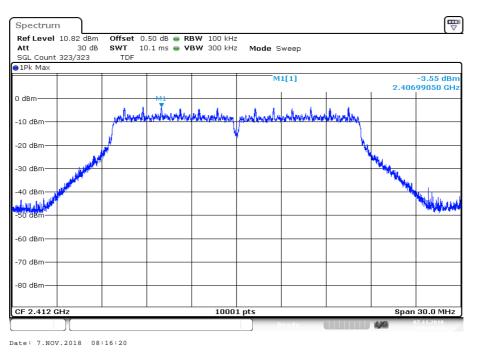


Date: 7.NOV.2018 08:06:19

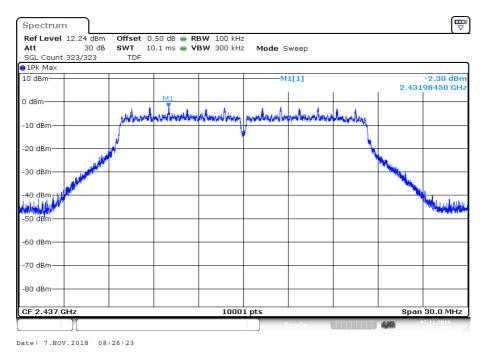


## Plots: OFDM / g - mode

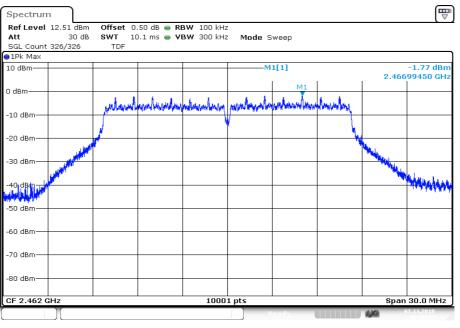
## Plot 1: Lowest channel



## Plot 2: Middle channel





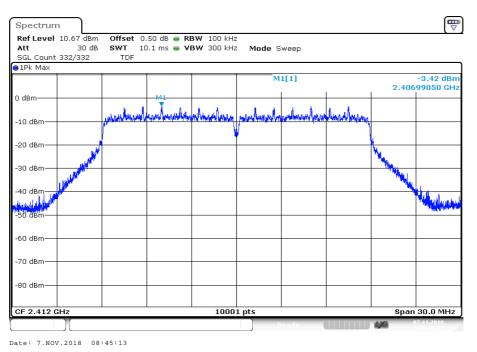


Date: 7.NOV.2018 08:36:13

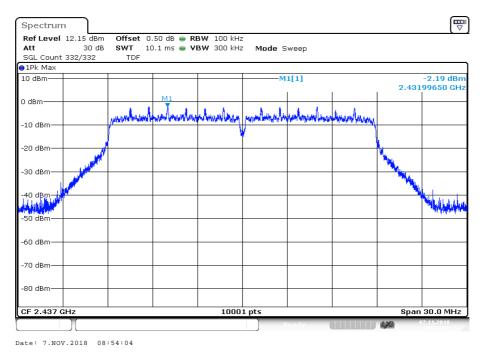


## Plots: OFDM / n HT20 - mode

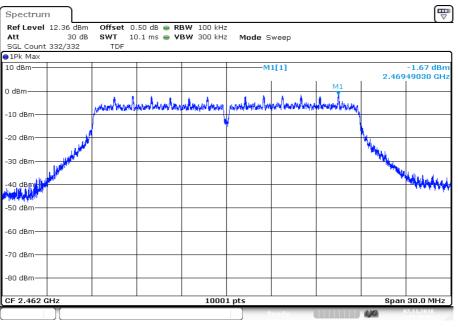
#### Plot 1: Lowest channel



#### Plot 2: Middle channel





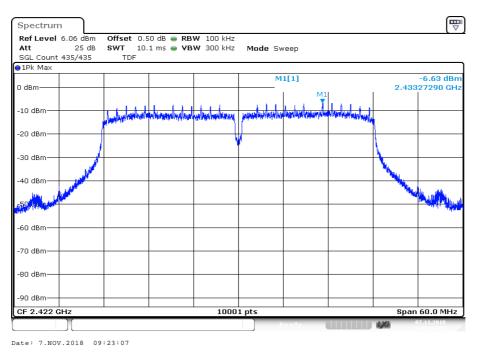


Date: 7.NOV.2018 09:03:08

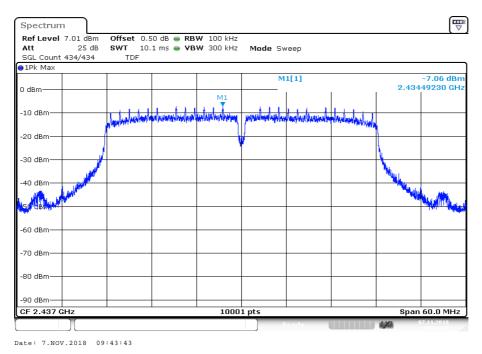


## Plots: OFDM / n HT40 - mode

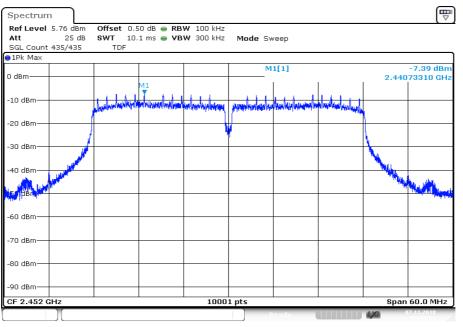
#### Plot 1: Lowest channel



#### Plot 2: Middle channel







Date: 7.NOV.2018 09:55:09



# 12.6 6 dB DTS bandwidth

## **Description:**

Measurement of the 6 dB bandwidth of the modulated signal.

## Measurement:

Measurement parameter									
According to DTS clause: 8.2									
Detector	Peak								
Sweep time	Auto								
Resolution bandwidth	100 kHz								
Video bandwidth	500 kHz								
Span	30 MHz / 50 MHz								
Trace mode	Single count with 200 counts								
Test setup	See chapter 6.5 – A								
Measurement uncertainty	See chapter 8								

# Limits:

FCC	IC
, , , , , , , , , , , , , , , , , , , ,	may operate in the 2400–2483.5 MHz band. Ith shall be at least 500 kHz.

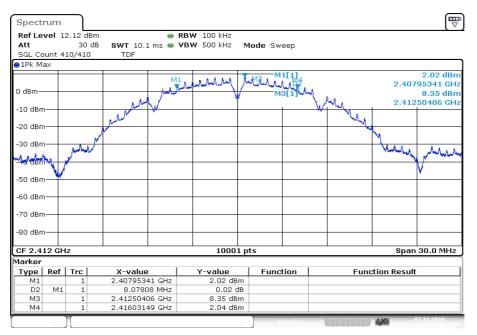
## **Results:**

	6 dB DTS bandwidth / kHz					
	lowest channel	middle channel	highest channel			
DSSS / b – mode	8078.1	8549.4	8555.0			
OFDM / g – mode	16351.5	16345.3	16348.4			
OFDM / n HT20 – mode	17575.4	17581.1	17578.2			
OFDM / n HT40 – mode	35144.5	35138.3	35462.7			



## Plots: DSSS / b - mode

#### Plot 1: Lowest channel



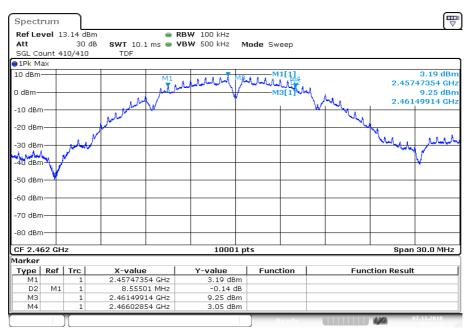
Date: 7.NOV.2018 10:26:44

#### Plot 2: Middle channel

Spectrum									
<b>Ref Level</b> 1 Att SGL Count 4	30 c			BW 100 kHz BW 500 kHz	Mode Sv	veep			
●1Pk Max									
10 dBm			M1	many	Julian	11[1] A.A.		2.432	3.40 dBm 47334 GHz
0 dBm		لسلمسا	- Inter	- V	N	13[1]*/~	Ma	2.437	9.47 dBm 48301 GHz
-10 dBm		Martin	- Yw				- NA		
-20 dBm		M						У	
-30 dBm	Julie							Mulukuk	, Julinita
-50 dBm									¥
-60 dBm									
-70 dBm									
-80 dBm									
CF 2.437 GH	łz			10001	pts			Span	30.0 MHz
Marker									
Type Ref	Trc	X-value		Y-value	Fund	tion	Func	tion Result	
M1 D2 M1	1	2.432473		3.40 dBr -0.01 d					
M3 M1	1	2.437483		-0.01 a 9.47 dBr					
M4	1	2.441022		3.39 dBr					
						Ready		4/4	07.11.2018

Date: 7.NOV.2018 07:56:49



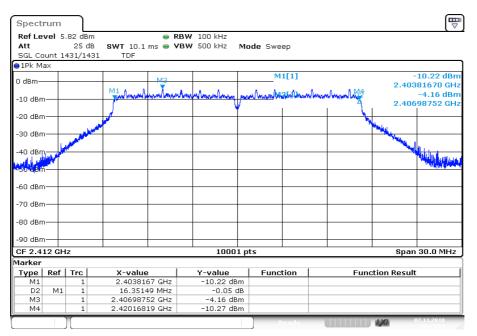


Date: 7.NOV.2018 08:05:12



## Plots: OFDM / g - mode

#### Plot 1: Lowest channel



Date: 7.NOV.2018 08:14:54

## Plot 2: Middle channel

Spectrum					Ē
Ref Level         7.24 dBm           Att         25 dB           SGL Count         1431/1431	SWT 10.1 ms 👄 VI	3W 100 kHz BW 500 kHz Mo	de Sweep		<b>L</b>
●1Pk Max					
0 dBm	M1 a d T.		M1[1]	۸ ۸ ۸ М4	-9.07 dBn 2.42881690 GH
-10 dBm	M1 Monal mandan	washe being well was any well	nd baayand galadada daraya	w have and have and have a	-2.79 dBn 2.43199053 GH
-20 dBm					
-30 dBm					Mary Andrewson 1
-40 dBmr 4					The state of the s
-60 dBm					
-70 dBm					
-80 dBm					
-90 dBm		10001 pt			Span 30.0 MHz
Marker		10001 p			3pun 30.0 Minz
Type   Ref   Trc	X-value	Y-value	Function	Eunc	tion Result
M1 1	2.4288169 GHz	-9.07 dBm		- Tune.	
D2 M1 1	16.34534 MHz	0.25 dB			
M3 1 M4 1	2.43199053 GHz 2.44516224 GHz	-2.79 dBm -8.81 dBm			
][			Ready		07.11.2018

Date: 7.NOV.2018 08:24:54



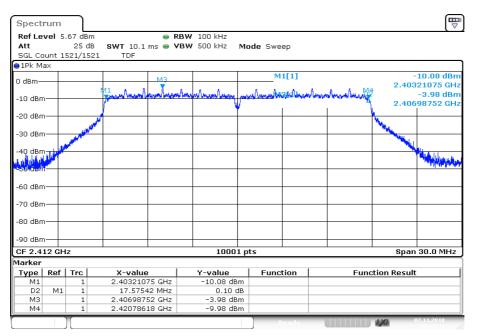
Spectru	ım										
Ref Leve	el 7.	51 dBm	1	👄 RB	<b>W</b> 100 kHz						
Att		25 dB	SWT 10.1 m	is 👄 VB	W 500 kHz	Mode	Sweep	1			
SGL Cou	nt 14	461/146	1 TDF								
1Pk Max											
							M1[	1]	МЗ		-8.26 dBm
0 dBm—			N41 • •				_			2.	45382272 GHz
10 40			The mound have	mumu	moundaring	man	NAN WAR	d little m	low paral low por al last		-2.19 dBm
-10 dBm—			1			1			, 1	2.	46949632 GHz
-20 dBm-											
20 0011										M	
-30 dBm-		- Contraction								- mu	
		No.									May Marcan
40 dBm	<b>1</b>				-						
<b>UNIVERSITY</b>											
-50 dBm-											
-60 dBm-											
-oo ubiii-											
-70 dBm-											
-80 dBm-	-										
-90 dBm-											
CF 2.462	2 GH	z			1000	1 pts				S	pan 30.0 MHz
larker											
	tef	Trc	X-value		Y-value		Functio	n	Fu	nction Re	sult
M1		1	2.45382272		-8.26 dB						
D2 M3	M1	1	16.34842		0.06 c -2.19 dB						
M4		1	2.46949632		-2.19 dB -8.20 dB						
1914	_	1	2.77017115		0.20 UB						

Date: 7.NOV.2018 08:34:37



## Plots: OFDM / n HT20 - mode

#### Plot 1: Lowest channel



Date: 7.NOV.2018 08:43:43

#### Plot 2: Middle channel

Spectrum									
Ref Level 7 Att SGL Count 1	25 dB	SWT 10.1 TDF		₩ 100 kHz ₩ 500 kHz	Mode 9	weep			
●1Pk Max									
0 dBm		M1 .AA	мз			M1[1]	Anna Anna Anna 19	2.4	-8.69 dBn 2820198 GH -2.68 dBn
-10 dBm		The second second is	nagens browned be	were were have	NACIN'S WAL	******	A MUMUNI MANAN PUMURI	2.4	3199360 GH
-20 dBm	مىن.	1						Martine .	
-30 dBm	And the second second					_			<u>нь</u> .
-40 dBm									Winak
-50"dBm									
-60 dBm									
-70 dBm						-			
-80 dBm									
-90 dBm		-							
CF 2.437 GH	lz			10001	l pts			Sp	an 30.0 MHz
/larker									
Type Ref		X-value		Y-value		inction	Func	tion Res	ult
M1	1	2.4282019		-8.69 dBr					
D2 M1	1	17.5810		-0.25 d					
M3 M4	1	2.431993 2.4457830		-2.68 dBr -8.93 dBr					
						Ready		1/1	07.11.2018

Date: 7.NOV.2018 08:52:32



Spectr	um											
Ref Lev	vel 7				BW 100 kHz							
Att		25 dB	0111 1011	ms 👄 ۷	<b>BW</b> 500 kHz	Mo	de Swe	ер				
SGL Co		521/15:	21 TDF									
)1Pk Ma	×											
0 dBm—							M	1[1]	M3		0.45	-8.14 dBm
J ubili—			M1 6 B	1	handrandenay		A A	arda	. A A		2.45	320781 GHz -2.08 dBm
-10 dBm			Walked Walked	the state in the second	ANTIMA ANTIMA ANTIM	mint	V WYWWW	NOT NO A	A PURTHER MANAGER	www.	2.46	-2.08 dBm 949325 GHz
			1			Ψ		1	I.	L.	2.40	949323 GH2
-20 dBm	_		1							- h.		-
											And and a second second	
-30 dBm											-	L
	فسحلوى	<b>.</b>										White bulle is a
40.dBm	<b>1</b>											
-50 dBm	· .											
SO UBIII												
-60 dBm						-						_
70 dBm												-
-80 dBm												
-90 dBm												
CF 2.46		7			1000	1 nt	5					n 30.0 MHz
larker	zan	2			1000	I pt	3				opu	11 30.0 MHZ
	Ref	Trc	X-value		Y-value		Func	tion		Functio	on Resu	l+
M1	1.61	1	2.453207		-8.14 di		Func	aon		ancat	n Kesu	
D2	M1	1	17.5782		-0.02							
MЗ		1	2.469493	25 GHz	-2.08 di	3m						
M4		1	2.470786	05 GHz	-8.16 di	3m						
		1						a sed se			MA.	07.11.2018

Date: 7.NOV.2018 09:01:31



# Plots: OFDM / n HT40 - mode

## Plot 1: Lowest channel

Spectr	um											
Att		.06 dBm 20 dB 549/2549			BW 100 kHz BW 500 kHz	Mode	e Sweep	D				, ,
)1Pk Ma	х		-									
-10 dBm			141	houndha	lantustraturitaraa	pund	MI	[1] gelynlear	M3 Manalanala			-13.11 dBr Ю442778 GH -6.87 dBr Ю325491 GH
-20 dBm			1			1					<u> </u>	
30 dBm	-	-	/								N.	
40 dBm	_	- Aller and a second									-	
50 080	New Mark											
60 dBm	_											
70 dBm	_								_			
80 dBm	_											_
90 dBm												
CF 2.42	2 GH	z			1000	1 pts					Sp	an 60.0 MHz
larker Type	Ref	Trc	X-value	. 1	Y-value	1	Functi	on I		Eupo	tion Res	ult
M1	1.61	1	2.404427		-13.11 dB		ancti	511		Func	alon KBS	unc
D2	M1	1	35.144		-0.08 (							
M3		1	2.433254		-6.87 dB							
M4		1	2.439572		-13.19 dB							
		1					D er	adv	1111		4.363	07.11.2018

Date: 7.NOV.2018 09:21:22

## Plot 2: Middle channel

Spectrum									R
Ref Level Att SGL Count	20 dB	<b>SWT</b> 10.1 TDF		₩ 100 kHz ₩ 500 kHz	Mod	e Sweep			
●1Pk Max									
-10 dBm		1911 Maralhandharatha		M3	mark	M1[1]	anon Indre Indra Indra		-13.51 dBr 942784 GH -7.36 dBr 449216 GH
-20 dBm				1	-				
-30 dBm	_							<u>\</u>	
-40 dBm	Jack Harrison								
50 dBn									
-60 dBm									
-70 dBm									
-80 dBm									
-90 dBm									
CF 2.437 G	Hz			10001	Ints			Sna	n 60.0 MHz
/larker									
Type   Ref	Trc	X-value	. 1	Y-value	1	Function	Func	tion Resu	lt
M1	1	2.419427		-13.51 dB	m				
D2 M	1 1	35.138	33 MHz	-0.35 d	в				
M3 M4	1	2.434492		-7.36 dBi -13.85 dBi					
	Υ					Ready		4,74	07.11.2018

Date: 7.NOV.2018 09:41:57



Specti	um								E
Ref Le <sup>.</sup> Att	vel O	.76 dBm 20 dB			₩ 100 kHz ₩ 500 kHz	Mode S	weep		
SGL Co	unt 2	549/254							
∎1Pk Ma	эх								
-10 dBm			M	M3	un ling and and and an and	ماسمالسدين	M1[1]	nules level and and a set	-13.76 dBm 2.43410970 GHz -7.66 dBm
-20 dBm							_   		2.44073318 GHz
-30 dBm		,	4		-	r			<b>4</b>
-40 dBm		and the second							
SØ dBri	1 miles								
-60 dBm									
-70 dBm									
-80 dBm									
-90 dBm									
CF 2.4	52 GH	7			1000	1 nts			Span 60.0 MHz
1arker									
Type	Ref	Trc	X-value	.	Y-value	Fu	nction	Functi	on Result
M1		1	2.43410		-13.76 dB	m			
D2	M1	1	35.4626		-0.11 (				
M3 M4		1	2.440733		-7.66 dB -13.86 dB				
1/14		1	2.409572	JJ G112	13.00 UD				

Date: 7.NOV.2018 09:53:24



# 12.7 Occupied bandwidth – 99% emission bandwidth

## **Description:**

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

## Measurement:

Measurement parameter							
Detector	Peak						
Sweep time	Auto						
Resolution bandwidth	300 kHz						
Video bandwidth	1 MHz						
Span	30 MHz / 50 MHz						
Measurement procedure	Measurement of the 99% bandwidth using the integration function of the analyzer						
Trace mode	Single count with 200 counts						
Test setup	See chapter 6.5 – A						
Measurement uncertainty	See chapter 8						

## <u>Usage:</u>

-/-	IC
OBW is necessary fo	r Emission Designator

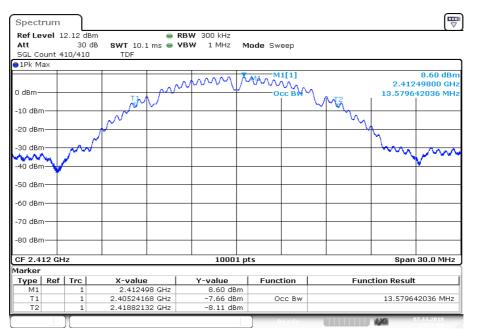
# **Results:**

	99% emission bandwidth / kHz							
	lowest channel	middle channel	highest channel					
DSSS / b – mode	13579.6	13378.7	13735.6					
OFDM / g – mode	17110.3	17062.3	17143.3					
OFDM / n HT20 – mode	18088.2	18052.2	18121.2					
OFDM / n HT40 – mode	36872.3	36758.3	37034.3					



## Plots: DSSS / b - mode

#### Plot 1: Lowest channel



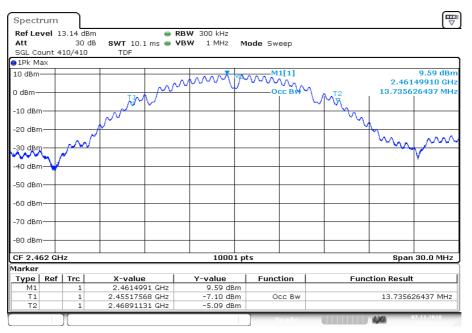
Date: 7.NOV.2018 10:27:08

#### Plot 2: Middle channel

Spectrum								
Ref Level 1 Att SGL Count 4	30 0		<ul> <li>RBW 300 kHz</li> <li>VBW 1 MHz</li> </ul>	Mode Swe	ер			
●1Pk Max								
10 dBm		~	mm			N		9.97 dBm 49200 GHz 62134 MHz
		J.M.		Ī		$M_{\rm H}^2$		
-10 dBm						- W		
-20 dBm						¥	5	
-30 dBm	-na	,					m	m
-40 dBm								¥
-50 dBm								
-60 dBm								
-70 dBm								
-80 dBm								
CF 2.437 GF	łz		10001	L pts			Span	30.0 MHz
Marker								
Type Ref		X-value	Y-value	Functi	on	Function Result		t
M1	1	2.437492 GH				w 13.378662134 N		
T1 T2	1	2.43028667 GH 2.44366533 GH			сBw		13.3786	62134 MHZ
	][			Re	ady		4,20	07.11.2018

Date: 7.NOV.2018 07:57:15



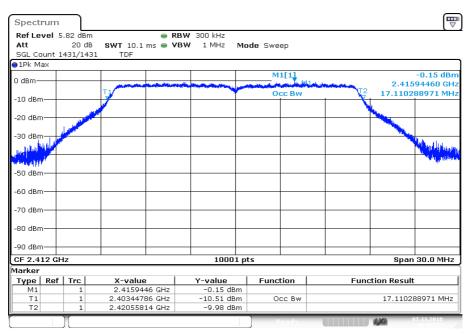


Date: 7.NOV.2018 08:05:39



## Plots: OFDM / g - mode

## Plot 1: Lowest channel



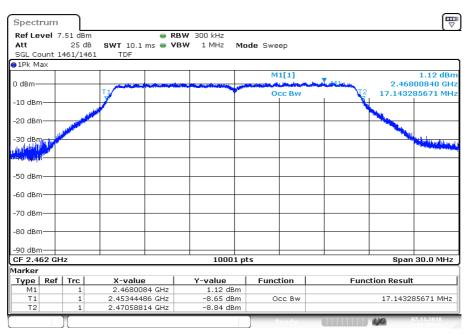
Date: 7.NOV.2018 08:15:57

## Plot 2: Middle channel

Spectrum										
Ref Level Att SGL Count	25 c	ів <b>SWT</b> 10.1 n	_	W 300 kHz W 1 MHz	Moc	le Swe	ер			
●1Pk Max						5.0	1[1]			0.81 dBm
0 dBm		-			-	IVI.		Linthe Breathlandsterre	2.43	594710 GHz
-10 dBm		₩ Ű				Ö	cc Bw		2 <b>17.062</b>	293771 MHz
-10 ubiii										
-20 dBm										
-30 dBm										
and a state of the										A Distille and
abapdypadd										A Distance
-50 dBm				-						
-60 dBm										
-70 dBm										
-80 dBm										
-90 dBm										
CF 2.437 G	Hz			1000:	L pts	5			Spa	n 30.0 MHz
Marker										
Type Ref M1	Trc 1	2.435947	1 GH7	<u>Y-value</u> 0.81 dB	m	Funct	tion	Function Result		lt
T1	1	2.4284388	6 GHz	-9.05 dB	m	Occ Bw 1		17.062	293771 MHz	
T2	1	2.4455011	5 GHz	-9.67 dB	m					
	][					R	e a d y		4,70	07.11.2018

Date: 7.NOV.2018 08:26:00



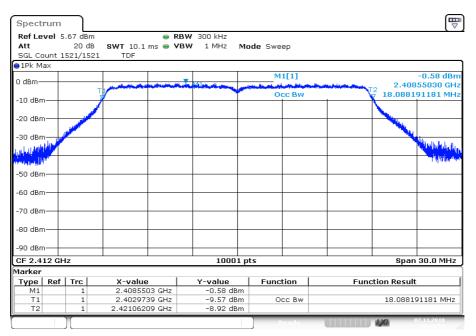


Date: 7.NOV.2018 08:35:49



## Plots: OFDM / n HT20 - mode

#### Plot 1: Lowest channel



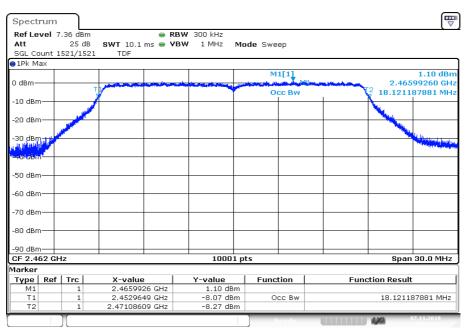
Date: 7.NOV.2018 08:44:50

## Plot 2: Middle channel

Specti	um										
Ref Le <sup>r</sup> Att SGL Co		25 d	B <b>SWT</b> 10.1 ms	_	/ 300 kHz / 1 MHz	Mod	le Swe	ер			, , , , , , , , , , , , , , , , , , ,
∎1Pk Ma	эх										
0 dBm—	<b>T H</b>					M	1[1]			0.67 dBn 43054160 GH	
o ubiii—			T			a second second		cc Bw			52194781 MH;
-10 dBm											
		الل.									
-20 dBm	' <del> </del>	1									<u>.</u>
-30 dBm											
-30 dBm	197										A CONTRACTOR OF A CONTRACT OF
المعر والي معه	<u> </u>										- Charantee
-50 dBm											
-30 001											
-60 dBm											
-70 dBm											
-80 dBm											
-90 dBm											
CF 2.4	37 GH	IZ			10001	l pts				5	pan 30.0 MHz
Marker Type	Ref	Trc	X-value	- 1	Y-value	1	Euro -	tion 1		Function Pr	cult
Type M1	Rei	1	2.4305416	GHz	0.67 dBr	m	Func	Function Function Result		suit	
Τ1		1	2.4279559		-8.08 dBr		0	cc Bw		18.0	52194781 MHz
Т2		1	2.4460081	GHz	-7.95 dBr	m					
								eady		4,00	07.11.2018

Date: 7.NOV.2018 08:53:41



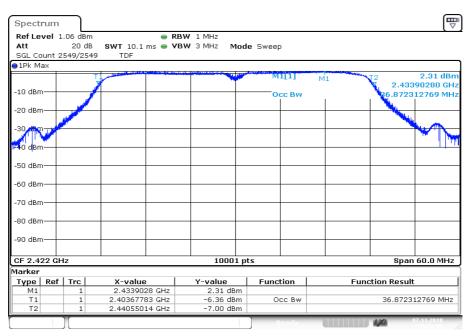


Date: 7.NOV.2018 09:02:44



## Plots: OFDM / n HT40 - mode

#### Plot 1: Lowest channel



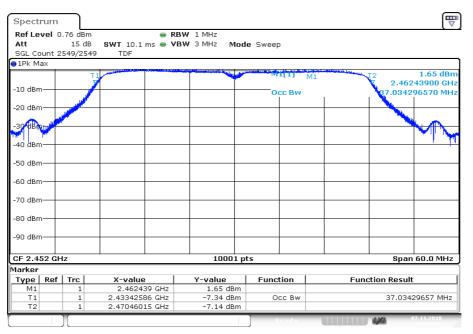
Date: 7.NOV.2018 09:22:49

## Plot 2: Middle channel

Spectrum											E
Ref Level 2	2.01 dBi	n	🖷 R	BW 1 MHz							
Att	20 d	B SWT 10.3	l ms 👄 🗸	BW 3 MHz N	lode	Sweep					
SGL Count 2	2542/25	42 TDF									
●1Pk Max											
		T - Contractor	ha fadrice on Allinesia	Malan Aliberta Malan		- designed and the special sectors and	-Telefort and and	alala tertifikase karta men	kund i		2.17 dBi
				1012 1					2	2.434	40230 GH
-10 dBm			-			Oc	c Bw		- N	36.7583	24168 MH
										L.	
-20 dBm	Land Content		+							- No. 1	
m ul										1	
-30 dBin											
											1 ° 1' M
-40 dBm											
-50 dBm											
-50 UBIII											
-60 dBm											
-00 00111											
-70 dBm											
70 abiii											
-80 dBm											
-90 dBm											
CF 2.437 GI	Ηz			1000	1 pts	;				Span	60.0 MHz
Marker											
Type   Ref	Trc	X-valu	e	Y-value	1	Funct	ion		Functio	n Result	:
M1	1	2.4344	023 GHz	2.17 dB	m						
T1	1	2.41860	584 GHz	-7.23 dB	m	m Occ Bw 36.7		36.7583	24168 MHz		
T2	1	2.45536	416 GHz	-8.03 dB	m						
	1						adv	-	44	0	07.11.2018

Date: 7.NOV.2018 09:43:24





Date: 7.NOV.2018 09:54:51



# 12.8 Occupied bandwidth – 20 dB bandwidth

## **Description:**

Measurement of the 20 dB bandwidth of the modulated carrier.

## Measurement:

Measureme	Measurement parameter							
Detector	Peak							
Sweep time	Auto							
Resolution bandwidth	100 kHz							
Video bandwidth	500 kHz							
Span	30 MHz / 50 MHz							
Trace mode	Single count with min. 200 counts							
Test setup	See chapter 6.5 – A							
Measurement uncertainty	See chapter 8							

## <u>Usage:</u>

-/-	IC
W	ithin the used band!

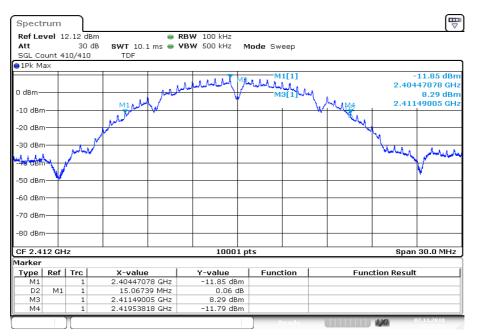
# **Results:**

	20 dB bandwidth / MHz						
	lowest channel	middle channel	highest channel				
DSSS / b – mode	15.07	15.03	15.08				
OFDM / g – mode	18.53	18.66	18.52				
OFDM / n HT20 – mode	19.31	19.23	19.31				
OFDM / n HT40 – mode	37.33	37.47	37.56				



## Plots: DSSS / b - mode

#### Plot 1: Lowest channel



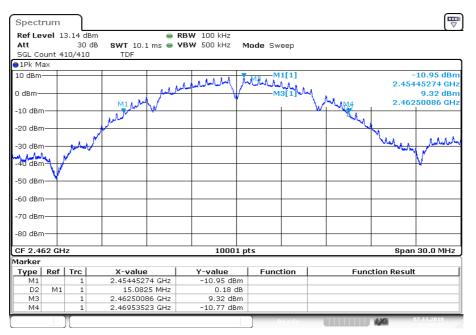
Date: 7.NOV.2018 10:26:56

#### Plot 2: Middle channel

Spectrum								
Ref Level 1 Att SGL Count 4	30 di			<b>XBW</b> 100 kHz <b>YBW</b> 500 kHz	Mode Sweep			
●1Pk Max								
10 dBm				marman 7	M1[1] M.M.M.M.M.M. M3[1]			11.00 dBm 47686 GH
0 dBm		M1	Juli	₩ ¥	M3[1]	my my	2.436	9.54 dBm i49894 GHz
-10 dBm		A aluta have	V.					
-20 dBm		1 million					<b>k</b>	
-30 dBm	- And	,					1	
-40 dBm							Winderhade	Charles and
-50 dBm	(	_						•
-60 dBm								
-70 dBm								
-/0 ubiii								
-80 dBm								
CF 2.437 GH	17			10001	nts		Snan	30.0 MHz
Marker								
Type   Ref	Trc	X-value	1	Y-value	Function	Fun	ction Result	:
M1	1	2.4294768		-11.00 dBm				
D2 M1	1	15.031	3 MHz	0.23 dB				
MЗ	1	2.4364989	4 GHz	9.54 dBm				
M4	1	2.4445081	.6 GHz	-10.78 dBm				
	][]				Ready		4,70	07.11.2018

Date: 7.NOV.2018 07:57:03



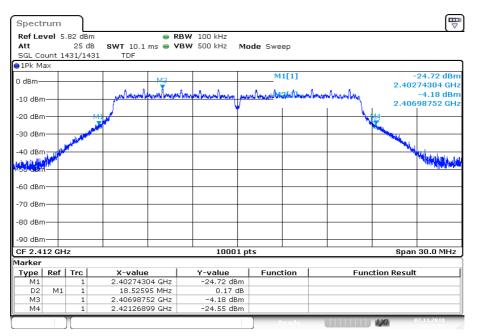


Date: 7.NOV.2018 08:05:27



## Plots: OFDM / g - mode

#### Plot 1: Lowest channel



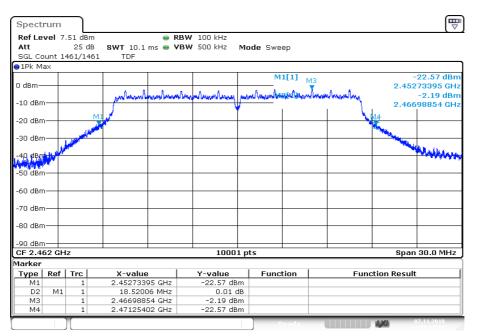
Date: 7.NOV.2018 08:15:29

## Plot 2: Middle channel

Spectr											Ę
	el 7.	.24 dBm			3W 100 kHz						
Att		25 dB		ms 😑 VI	3W 500 kHz	Mod	le Sweep				
		431/1431	TDF								
∎1Pk Ma	×										
				МЗ			M1[1]				-23.24 dB
0 dBm—				-						2.427	763802 GF
			mmm	agent magend	montermetering	INST	munhamlin	mpmmlmm			-2.79 dB
-10 dBm			10						٦	2.43	198746 GF
-20 dBm		M	1 1			ſ .			Ma		
-20 uBilli									W.		
-30 dBm		- MARTIN							~		
50 GDIII		and the second se								THE R	
40 dBm		·								1	
المتر المرياة											T What Law
-50 d8m											. confident da
-60 dBm											
-70 dBm											
-80 dBm											
-80 aBm											
-90 dBm											
CF 2.43	7 64	7			1000	1 nte				Spar	1 30.0 MHz
larker	7 011	2			1000	r pes				opui	1 00.0 0012
	Ref	Trc	X-value		Y-value	-	Function	1	unctior	Rocul	ŧ
M1		1	2.427638		-23.24 dB	m	. anction	· · · ·	anction		
D2	M1	1	18.661		-0.42						
M3		1	2.431987		-2.79 dE						
M4		1	2.446299	14 GHz	-23.66 dB	m					
		1							1.14.34		07 11 2010

Date: 7.NOV.2018 08:25:31



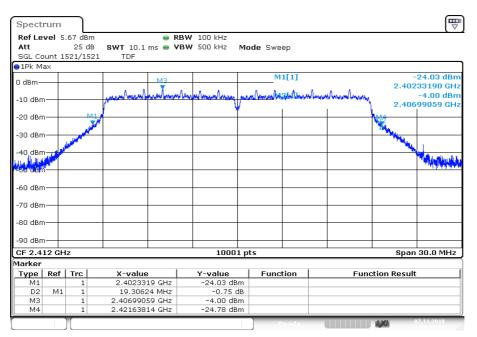


Date: 7.NOV.2018 08:35:20



## Plots: OFDM / n HT20 - mode

#### Plot 1: Lowest channel



Date: 7.NOV.2018 08:44:20

## Plot 2: Middle channel

Spectrum					
Ref Level 7.15 dBm	e Ri	3W 100 kHz			<b>`</b>
Att 25 dB	SWT 10.1 ms 👄 VI	3W 500 kHz Mc	de Sweep		
SGL Count 1517/1517	TDF				
●1Pk Max	1				
0 dBm	M3		M1[1]		-22.85 dBn 2.42739789 GH
o abiii	montimenterent	Maria Anna Ara	A Marcha	A	2.42739789 GH -2.70 dBn
-10 dBm	Vermant and an harden and harden	many many many provident	whi reaction to reaction and re-	an an and the second the second	2.43199360 GH
		_   ¥	1	1 L	1
-20 dBm					
00 d0-					The second se
-30 dBm					
-40 dBm					
					The last is a second se
-50 aBm					
-60 dBm					
-70 dBm					
-80 dBm					
-90 dBm					
CF 2.437 GHz		10001 p	ts		Span 30.0 MHz
Marker					
Type   Ref   Trc	X-value	Y-value	Function	Funct	ion Result
M1 1	2.42739789 GHz	-22.85 dBm			
D2 M1 1	19.22816 MHz	-0.10 dB			
M3 1	2.4319936 GHz	-2.70 dBm			
M4 1	2.44662605 GHz	-22.94 dBm			
			Dondy		07.11.2018

Date: 7.NOV.2018 08:53:11



Specti	um											
Ref Le	vel 7				BW 100 kHz							
Att		25 dE	0111 1011	ms 😑 V	'BW 500 kHz	Mo	de Swe	ер				
		521/15:	21 TDF									
∎1Pk Ma	эх											
							M	1[1] 1	43			-22.14 dBm
) dBm—			A (	0	0 0 Å		8 Å	. 0.	X A A		2.45	237402 GHz
10 dBm			personal mundre	low of low w	Anna Anna Anna	n para	m) browned ha	GWI VANA	N longernd bringernd he	www.		-2.09 dBm
TO UBI			(			¥			1		2.46	698854 GHz
-20 dBm		M	1/							N4		
			<b>*</b> **								Nea .	
-30 dBm		and the second second									-	
	فللدر											William Charles
49 dBr						_						TOWN
<b>ANA</b> dia.	<i>"</i>											
-50 dBm												
-60 dBm												
00 001	'											
-70 dBm						_						
-80 dBm												
-90 dBm					-							
CF 2.46	52 GH	z			100	01 pt	ts				Spa	n 30.0 MHz
1arker	-											
Type	Ref	Trc	X-valu		Y-value		Func	tion		Function	Resu	lt
M1 D2	M1	1	2.452374	02 GHz 94 MHz	-22.14 c 0.02							
M3	MT	1	2.466988		-2.09 (							
M4		1	2.471688		-22.12 (							
	_		22000				<u> </u>	_	1		_	

Date: 7.NOV.2018 09:02:14



# Plots: OFDM / n HT40 - mode

## Plot 1: Lowest channel

Spectr	um										
Att SGL Cou	unt 2	.06 dBm 20 dB 549/2549		_	3W 100 kHz BW 500 kHz	Mode S	weep				
)1Pk Ma	×		-			1	M1[1]	МЗ			26.94 dBr
10 dBm	_		where the set of the s	whenter	hantersternter	manlmin	whendowly ilow	and manufamban	hale	2.403	43782 GH -6.88 dBr 26080 GH
20 dBm		M	A						314	2.433	20000 GH
30 dBm·		_							- <del>X</del>		
40 dBm·		and the second s							~	Li La	
50 dBio	Mar North										
60 dBm-	-										
70 dBm·					_						
80 dBm·											
90 dBm-											
CF 2.42	2 GH	z			1000	1 pts				Span	60.0 MHz
larker											
	Ref		X-value		Y-value		inction	Function Result			
M1		1	2.403437		-26.94 dE						
D2 M3	M1	1	37.3342		-0.85 -6.88 dB						
M3		1	2.43326		-6.88 dE -27.79 dE						

Date: 7.NOV.2018 09:22:02

## Plot 2: Middle channel

Spectrum									
Ref Level 2 Att SGL Count 2	20 dB	SWT 10.1 TDF	_	♥ 100 kHz ♥ 500 kHz	Mode	Sweep			
●1Pk Max		-							
-10 dBm		Manufranting to	www.alu.alu.	M3	powerland		an when any land		-27.43 dBm 41825792 GH2 -7.42 dBm 43449216 GH2
-20 dBm	MI			-	-		1	-	
-30 dBm									
-40 dBm									
50 dBn									
-60 dBm									
-70 dBm									
-80 dBm									
-90 dBm									
CF 2.437 GH	lz			1000	1 pts				Span 60.0 MHz
Marker									
Type Ref	Trc	X-value		Y-value		unction	Fi	unction R	esult
M1	1	2.4182579		-27.43 dB					
D2 M1	1	37.4661		-0.58 c					
M3 M4	1	2.434492:		-7.42 dB -28.01 dB					
	)[					Ready		4/4	07.11.2018 09.42.97

Date: 7.NOV.2018 09:42:37



Spectr	um												
Att		.76 dBm 20 dB 549/2549	SWT 10.1 TDF	_	3W 100 kHz 3W 500 kHz	Mode	9 Swee	эр					
●1Pk Ma		,											
-10 dBm			- lucalized and in the	M3 Marmilyd	and used and an all an an	nunli		l[1] Igalyalaa	milmiland	level walken	2	.433209	81 dBm 86 GHz 70 dBm
-20 dBm	+	M	<u> </u>			r P	— I				2. NA	.440733	18 GHz
-30 dBm	+										×.		
-40 dBm	المول	and the second s										And all	and the second sec
50 dBri												-	With
-60 dBm													
-70 dBm -80 dBm													
-90 dBm													
CF 2.45	i2 ĠH	z			1000	1 pts			- 1		Ś	pan 60.	0 MHz
Marker													
Туре	Ref		X-value		Y-value		Funct	ion		Fun	ction Re	sult	
M1 D2	M1	1	2.433209		-27.81 dE -0.43								
M3	INI I	1	2.440733		-0.43 -7.70 de								
M4		1	2.470766		-28.24 dE								
		)[					R	eady			1,00	07.11.	2018

Date: 7.NOV.2018 09:54:04



# 12.9 Band edge compliance conducted

# **Description:**

Measurement of the radiated band edge compliance with a conducted test setup.

## Measurement:

Measurement parameter for measurements									
According to DTS clause: 8.7.3 and clause 12.2.2									
Detector	RMS								
Sweep time Auto									
Resolution bandwidth	idth 100 kHz								
Video bandwidth	300 kHz								
	2 MHz								
Span	lower band edge	2388 MHz	to	2390 MHz					
	upper band edge	2483.5 MHz	to	2485.5 MHz					
Trace mode	Trace average with 200 counts								
Test setup See chapter 6.5 – A									
Measurement uncertainty									

## Limits:

FCC	IC
-41.20	6 dBm

# Test report no.: 1-6927/18-01-04



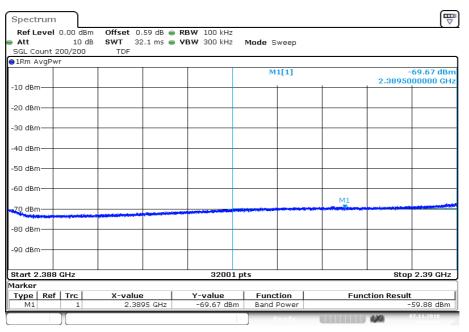
# <u>Results:</u>

	band edge compliance / dBm (gain calculation)						
Modulation:	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode	OFDM / n HT40 – mode			
Max. lower band edge power conducted	-59.88	-63.49	-63.25	-62.04			
Antenna gain / dBi	-2.0						
Max. lower band edge power radiated	-61.88	-65.49	-65.25	-64.04			
Max. upper band edge power conducted	-40.51	-48.65	-46.42	-52.22			
Antenna gain / dBi	-3.2						
Max. upper band edge power radiated	-43.71	-51.85	-49.62	-55.42			



## Plots: DSSS / b - mode

## Plot 1: Lower band edge



Date: 7.NOV.2018 10:29:09

## Plot 2: Upper band edge

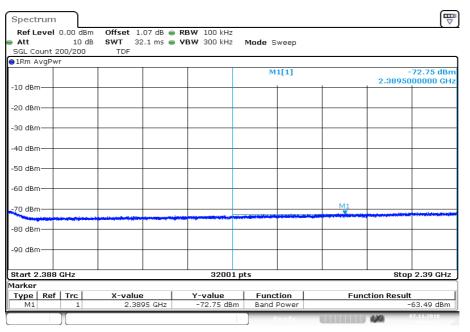
Spectrum						
Ref Level 0.00 dBm	Offset 0.59 dB 👄					
Att 10 dB		VBW 300 kHz (	Mode Sweep			
SGL Count 200/200	TDF					
●1Rm AvgPwr						
			M1[1]		1.09 dBr	
-10 dBm				2.484000	JUUU GF	
-20 dBm						
-30 dBm				+ + +		
-40 dBm						
	M1					
5011016001	The second s	and the second				
50 ID						
-60 dBm					<u> </u>	
-70 dBm						
-/ U UBIII						
-80 dBm						
oo dalii						
-90 dBm						
Start 2.4835 GHz		32001 pt		Stop 2.4	055 01-	
Jarker		32001 pt	3	3tup 2.4	000 GH2	
Type   Ref   Trc	X-value	Y-value	Function	Function Result		
M1 1	2.484 GHz	-51.09 dBm	Band Power		0.51 dBm	
1 11			)	07	11 2019	

Date: 7.NOV.2018 08:07:58



## Plots: OFDM / g - mode

#### Plot 1: Lower band edge



Date: 7.NOV.2018 08:16:51

#### Plot 2: Upper band edge

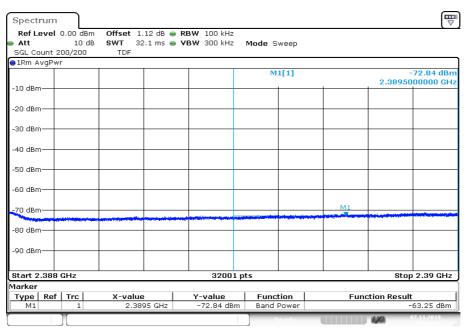
Spectrum					
Ref Level 0.00 dBm Att 10 dB SGL Count 200/200			Mode Sweep		
●1Rm AvgPwr					
			M1[1]		-59.56 dBn
-10 dBm					2.4840000000 GH
-20 dBm					
-30 dBm					
-40 dBm					
-50 dBm					
	M1				
-60 dBm				and the second data is the secon	
-70 dBm					
-70 00111					
-80 dBm					
-90 dBm					
Start 2.4835 GHz		32001 pt	5		Stop 2.4855 GHz
Marker					
Type Ref Trc M1 1	2.484 GHz	Y-value -59,56 dBm	Function Band Power	Functi	on Result -48.65 dBm
	2.707 0112	55,50 dbiii			
			Réady		07.11.2018

Date: 7.NOV.2018 08:37:00



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

#### Plot 1: Lower band edge



Date: 7.NOV.2018 08:45:45

#### Plot 2: Upper band edge

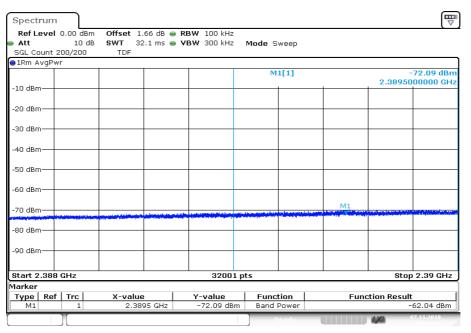
Spectrum					
Ref Level 0.00 dBm Att 10 dB SGL Count 200/200	Offset 1.12 dB ● SWT 32.1 ms ● TDF		Mode Sweep		
∋1Rm AvgPwr					
			M1[1]	-56.69	
-10 dBm				2.484000000	) GH
-20 dBm					
-20 UBIII					
-30 dBm					
-40 dBm					
-50 dBm					
	M1				
-60 dBm					
-70 dBm					
-80 dBm					
-90 dBm					
Start 2.4835 GHz		32001 pt	s	Stop 2.4855	GHz
larker					
Type Ref Trc M1 1	2,484 GHz	Y-value -56.69 dBm	Function Band Power	Function Result -46.42	dBm
	2.101.0112	30.05 0011		07.11.201	2011

Date: 7.NOV.2018 09:03:54



#### Plots: OFDM / n HT40 - mode

#### Plot 1: Lower band edge



Date: 7.NOV.2018 09:23:42

#### Plot 2: Upper band edge

Ref Level         0.00 dBm         Offset         1.66 dB         RBW         100 kHz         Mode         Sweep           SGL         Count 200/200         TDF         900 kHz         Mode         Sweep         500 cBm         -63.73 cBm         -60 dBm         -63.73 cBm         -63.73 cBm	Spectrum					
IRm AvgPwr       M1[1]       -63.73 / 2.4840000000         -10 dBm       2.4840000000       2.4840000000         -20 dBm       -30 dBm       -30 dBm         -30 dBm       -30 dBm       -30 dBm         -70 dBm       -40 dBm       -40 dBm         -70 dBm       -70 dBm       -70 dBm	Att 10 dB	SWT 32.1 ms 👄		Mode Sweep		
-10 dBm - 2.484000000 -20 dBm						
-20 dBm	10 40			M1[1]	2.4	-63.73 dBr 840000000 GH
-30 dBm	-10 dBm					
-40 dBm	-20 dBm					
-50 dBm	-30 dBm					
-50 dBm	-40 dBm					
-70 dBm-	-50 dBm					
	-60.dBm	M1			-	
-80 dBm	-70 dBm					
	-80 dBm					
-90 dBm	-90 dBm					
			32001 pt	s	St	op 2.4855 GHz
Aarker Type   Ref   Trc   X-value   Y-value   Function   Function Result		V-usluo I	X-ualua 1	Function	Eurotian P	o cult
					Function R	-52.22 dBm

Date: 7.NOV.2018 09:55:59

# 12.10 Spurious emissions conducted

# **Description:**

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at the lowest; the middle and the highest channel. The measurement is repeated for all modulations.

## Measurement:

Measurement parameter			
Detector	Peak		
Sweep time	Auto		
Resolution bandwidth	100 kHz		
Video bandwidth	500 kHz		
Span	9 kHz to 25 GHz		
Trace mode	Max Hold		
Test setup See chapter 6.5 – A			
Measurement uncertainty See chapter 8			

# Limits:

FCC	IC
intentional radiator is operating, the radio frequency po at least 30 dB below that in the 100 kHz bandwidth with	d in which the spread spectrum or digitally modulated wer that is produced by the intentional radiator shall be in the band that contains the highest level of the desired ed measurement. Attenuation below the general limits



# Results: DSSS / b - mode

	TX spurious emissions conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results	
Lowest channel		8.4	30 dBm		Operating frequency	
	No peaks detect	ied.	-20 dBc (peak) -30 dBc (average)		compliant	
Middle channel		9.4	30 dBm		Operating frequency	
	No peaks detect	ied.	-20 dBc (peak) -30 dBc (average)		compliant	
Highest channel		9.3	30 dBm		Operating frequency	
	No peaks detect	ed.	-20 dBc (peak) -30 dBc (average)		compliant	

# Results: OFDM / g - mode

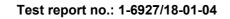
	TX spurious emissions conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results	
Lowest channel		-3.7	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	
Middle channel		-2.2	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	
Highest channel		-1.5	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	



	TX spurious emissions conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results	
Lowest channel		-3.5	30 dBm		Operating frequency	
	No peaks detected.		-20 dBc (peak)		compliant	
			-30 dBc (average)			
Middle channel		-2.8	30 dBm		Operating frequency	
	No peaks detected.		-20 dBc (peak)		compliant	
			-30 dBc (average)			
Highest channel		-2.0	30 dBm		Operating frequency	
	No peaks detected.		-20 dBc (peak)		compliant	
			-30 dBc (average)			

# Results: OFDM / n HT40 - mode

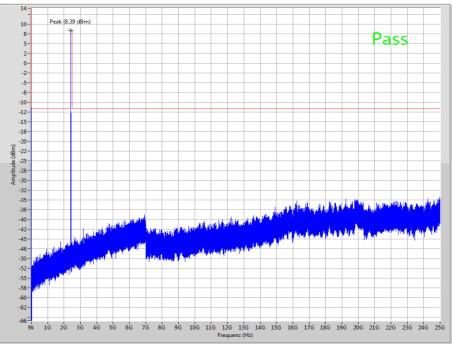
	TX spurious emissions conducted					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results	
Lowest channel		-6.9	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	
Middle channel		-7.5	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	
Highest channel		-7.0	30 dBm		Operating frequency	
	No peaks detect	ted.	-20 dBc (peak) -30 dBc (average)		compliant	





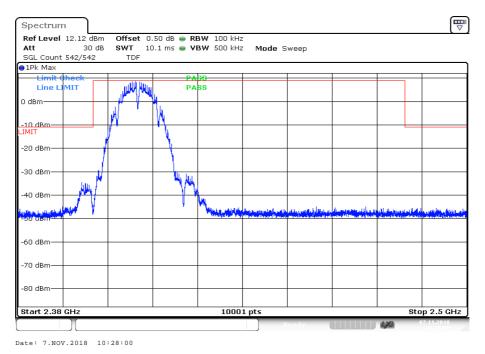
## Plots: DSSS / b - mode

Plot 1: Lowest channel, up to 25 GHz

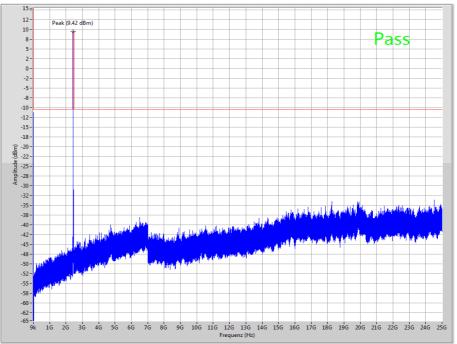


The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier

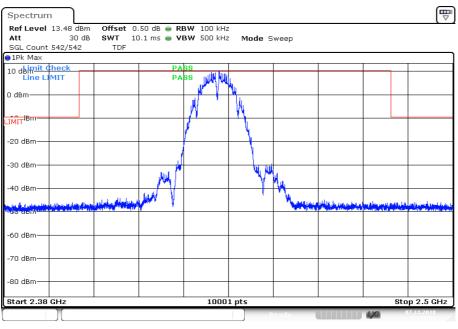


Plot 3: Middle channel, up to 25 GHz



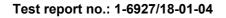
The peak at the beginning of the plot is the LO from the SA.



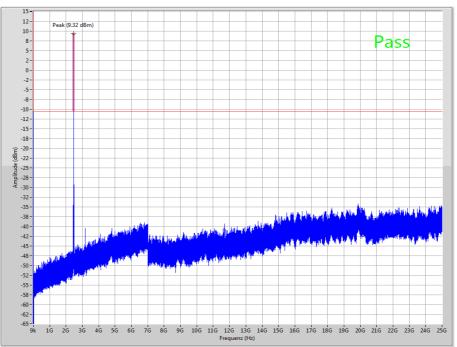


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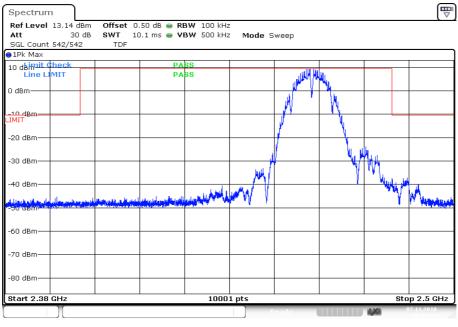






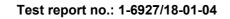
The peak at the beginning of the plot is the LO from the SA.

**Plot 6:** Highest channel, zoomed carrier



Date: 7.NOV.2018 08:06:32

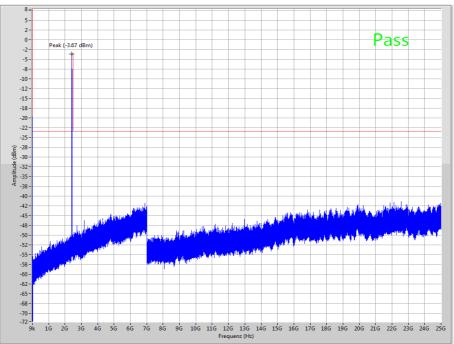
CTC I advanced





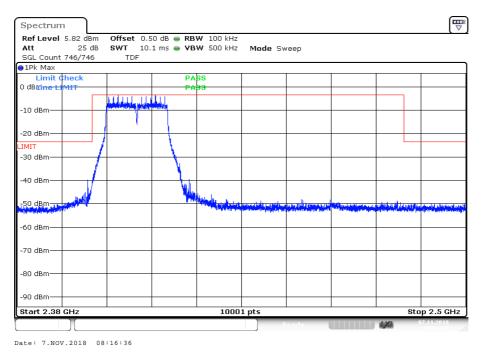
# Plots: OFDM / g - mode

Plot 1: Lowest channel, up to 25 GHz



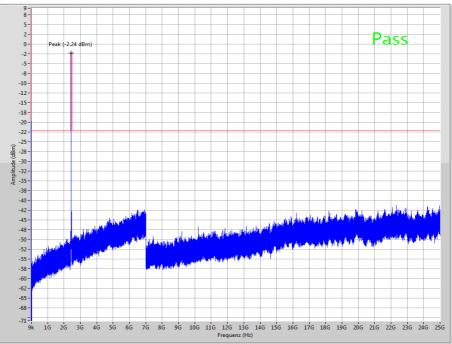
The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



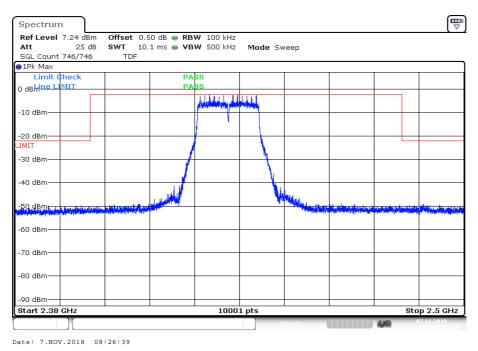


Plot 3: Middle channel, up to 25 GHz



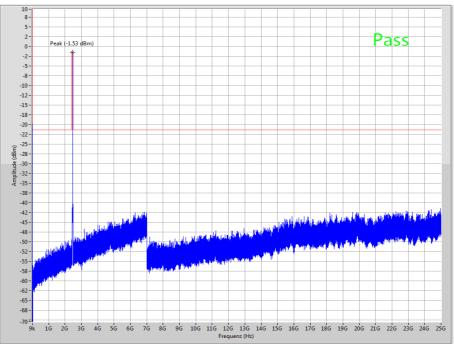
The peak at the beginning of the plot is the LO from the SA.





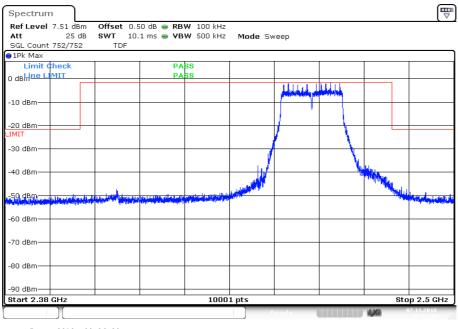


Plot 5: Highest channel, up to 25 GHz

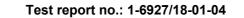


The peak at the beginning of the plot is the LO from the SA.

Plot 6: Highest channel, zoomed carrier



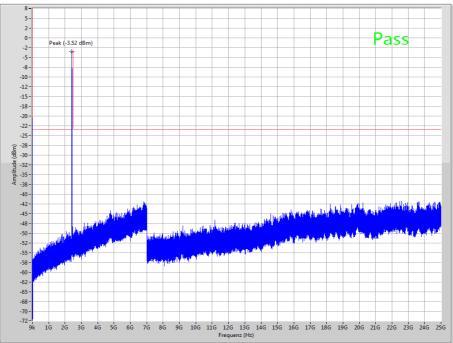
Date: 7.NOV.2018 08:36:30





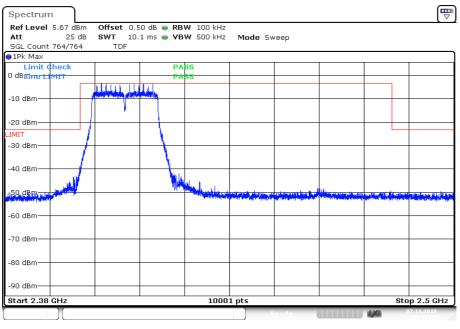
# Plots: OFDM / n HT 20 - mode

Plot 1: Lowest channel, up to 25 GHz

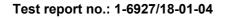


The peak at the beginning of the plot is the LO from the SA.

Plot 2: Lowest channel, zoomed carrier



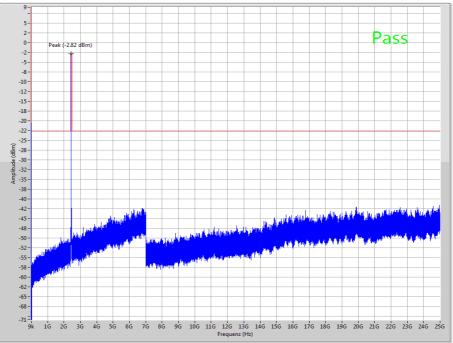
Date: 7.NOV.2018 08:45:30





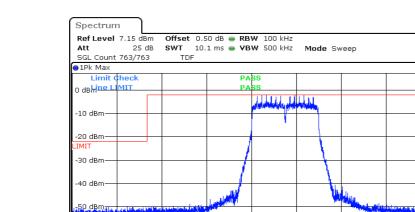
Stop 2.5 GHz

Plot 3: Middle channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

10001 pts



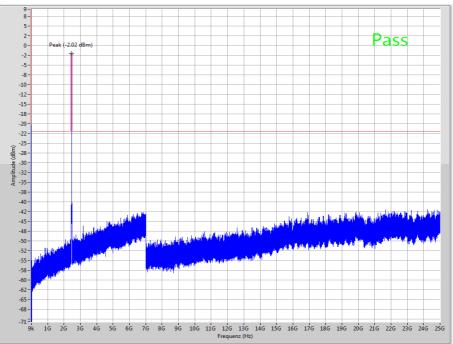
Plot 4: Middle channel, zoomed carrier

-60 dBm -70 dBm -80 dBm -90 dBm Start 2.38 GHz

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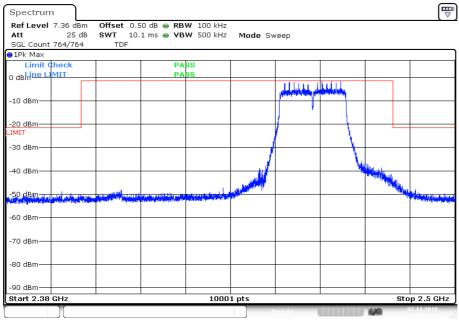
CTC I advanced

Plot 5: Highest channel, up to 25 GHz

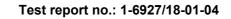


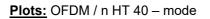
The peak at the beginning of the plot is the LO from the SA.

Plot 6: Highest channel, zoomed carrier

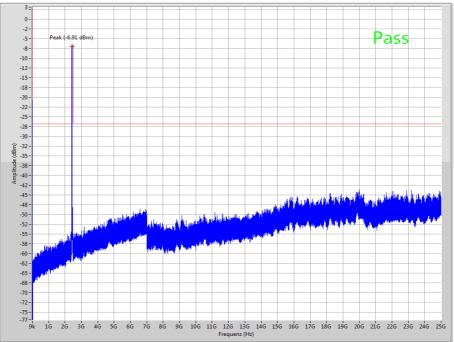


Date: 7.NOV.2018 09:03:24



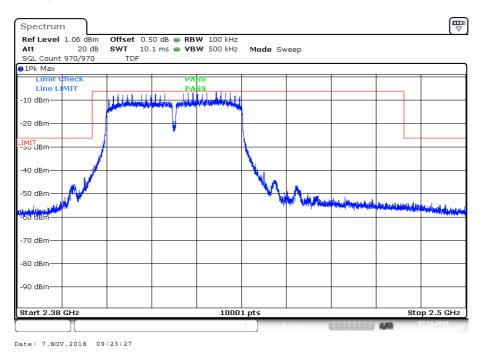


Plot 1: Lowest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

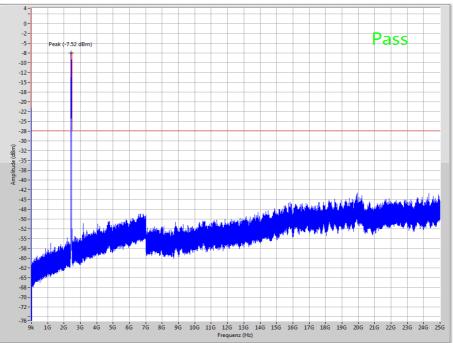
Plot 2: Lowest channel, zoomed carrier



CTC I advanced

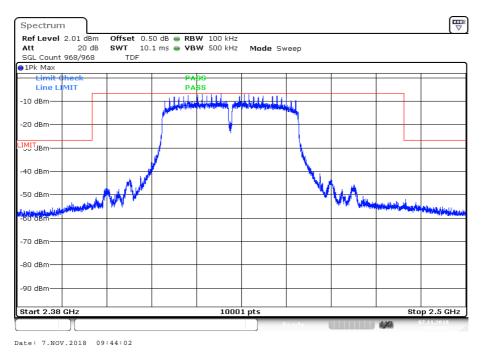
CTC I advanced

Plot 3: Middle channel, up to 25 GHz



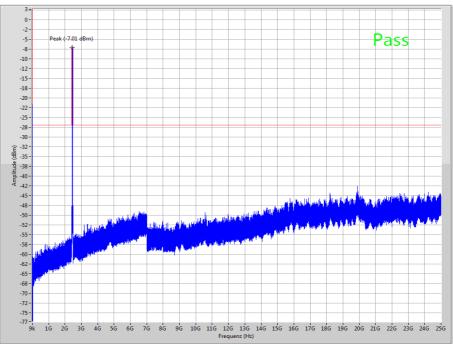
The peak at the beginning of the plot is the LO from the SA.

Plot 4: Middle channel, zoomed carrier

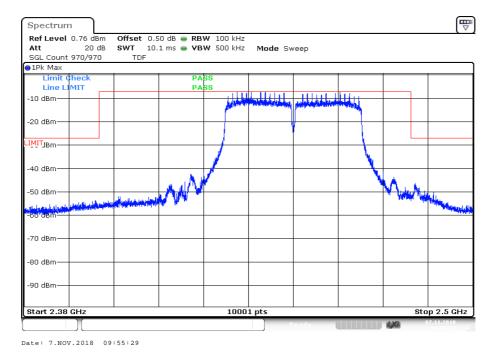




Plot 5: Highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.



Plot 6: Highest channel, zoomed carrier

# 12.11 Spurious emissions radiated below 30 MHz

# **Description:**

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

## 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				
Measured modulation	<ul> <li>DSSS b – mode</li> <li>OFDM g – mode</li> <li>OFDM n HT20 – mode</li> <li>OFDM n HT40 – mode</li> </ul>				
Test setup	See chapter 6.2 – C				
Measurement uncertainty	See chapter 8				

#### Limits:

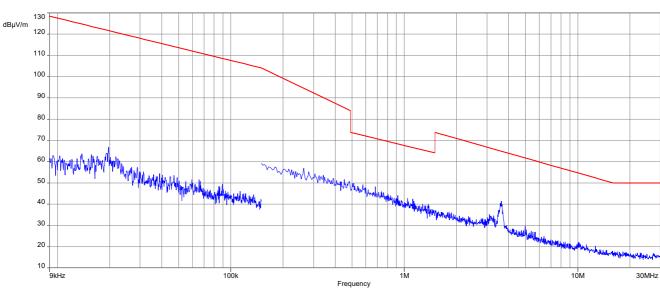
FCC			IC
Frequency / MHz	Field Strength	n / (dBµV / m)	Measurement distance / m
0.009 – 0.490 2400/F		<sup>=</sup> (kHz)	300
0.490 – 1.705	24000/F(kHz)		30
1.705 – 30.0	3	0	30

#### **Results:**

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

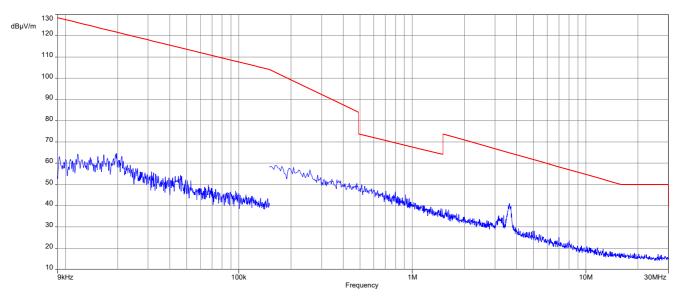
CTC I advanced

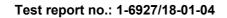
# Plots: DSSS



Plot 1: 9 kHz to 30 MHz, lowest channel

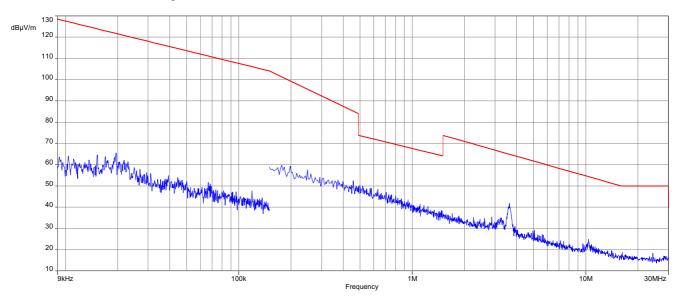








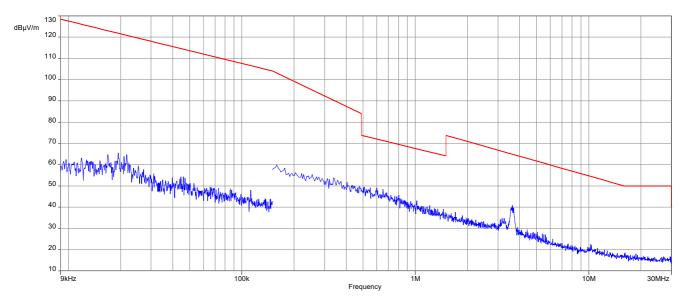
Plot 3: 9 kHz to 30 MHz, highest channel



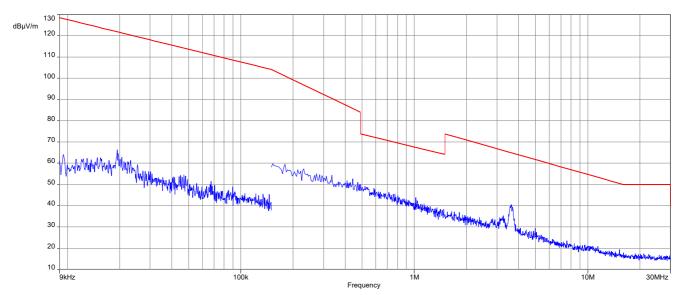


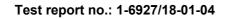
Plots: OFDM (20 MHz nominal channel bandwidth)

Plot 1: 9 kHz to 30 MHz, lowest channel



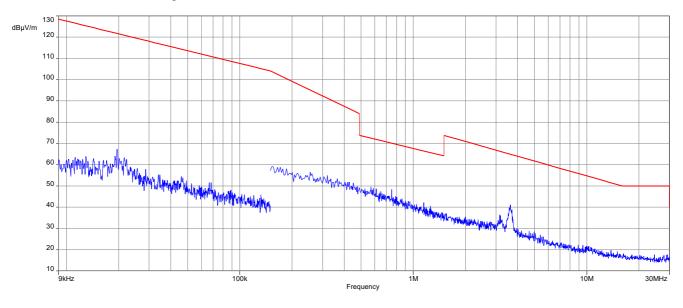
Plot 2: 9 kHz to 30 MHz, middle channel







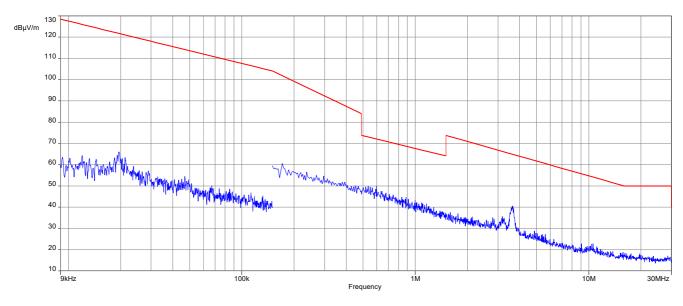
Plot 3: 9 kHz to 30 MHz, highest channel



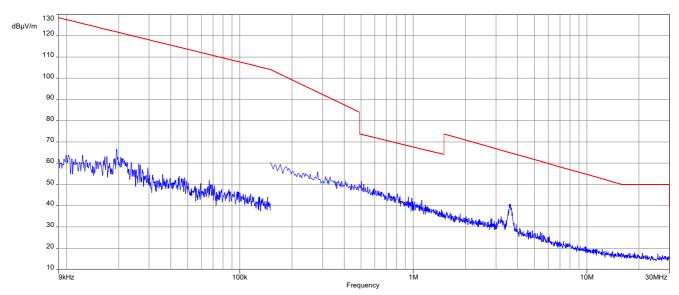


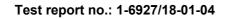
Plots: OFDM (40 MHz nominal channel bandwidth)

Plot 1: 9 kHz to 30 MHz, lowest channel



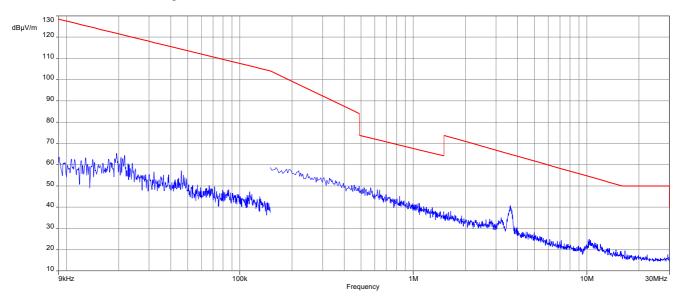
Plot 2: 9 kHz to 30 MHz, middle channel







Plot 3: 9 kHz to 30 MHz, highest channel





# 12.12 Spurious emissions radiated 30 MHz to 1 GHz

# **Description:**

Measurement of the radiated spurious emissions and cabinet radiations below 1 GHz.

## Measurement:

Measureme	nt parameter
Detector	Peak / Quasi Peak
Sweep time	Auto
Resolution bandwidth	120 kHz
Video bandwidth	3 x RBW
Span	30 MHz to 1 GHz
Trace mode	Max Hold
Measured modulation	<ul> <li>DSSS b – mode</li> <li>OFDM g – mode</li> <li>OFDM n HT20 – mode</li> <li>OFDM n HT40 – mode</li> <li>RX / Idle – mode</li> </ul>
Test setup	See chapter 6.1 – A
Measurement uncertainty	See chapter 8

#### Limits:

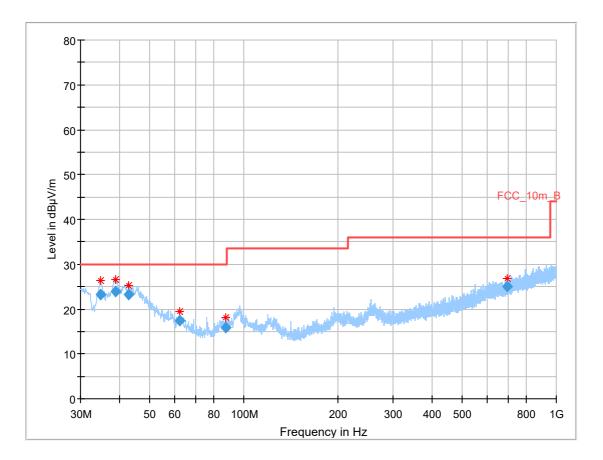
FCC		IC
intentional radiator is operating, the rad at least 20 dB below that in the 100 kHz power, based on either an RF conduct specified in Section 15.209(a) is not red	lio frequency power that is pro- bandwidth within the band the cted or a radiated measurem quired. In addition, radiated er	e spread spectrum or digitally modulated oduced by the intentional radiator shall be at contains the highest level of the desired tent. Attenuation below the general limits missions which fall in the restricted bands, ission limits specified in §15.209(a) (see

Frequency / MHz	Field Strength / (dBµV / m)	Measurement distance / m
30 – 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10



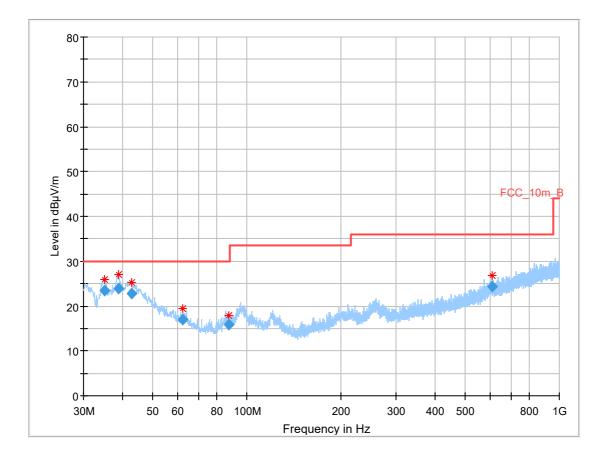
# Plot: DSSS

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.785	23.29	30.0	6.71	1000	120	98.0	v	300.0	13.8
38.748	23.94	30.0	6.06	1000	120	98.0	v	220.0	14.2
42.601	23.23	30.0	6.77	1000	120	98.0	v	228.0	14.6
62.433	17.46	30.0	12.54	1000	120	170.0	v	267.0	12.4
87.482	15.86	30.0	14.14	1000	120	170.0	v	190.0	11.4
695.322	25.07	36.0	10.93	1000	120	170.0	н	16.0	21.1

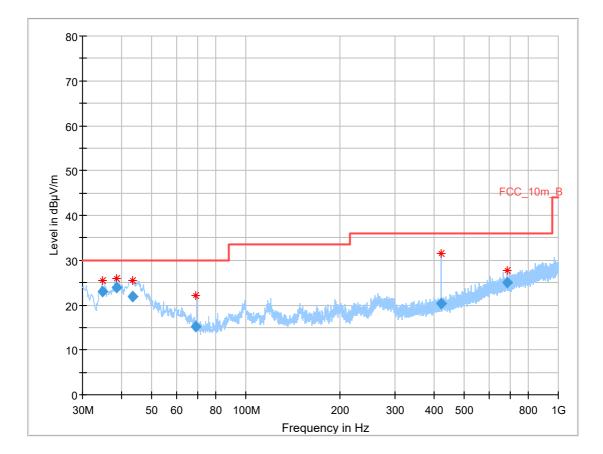




# Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel

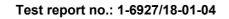
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.091	23.36	30.0	6.64	1000	120	98.0	v	223.0	13.8
38.741	23.81	30.0	6.19	1000	120	98.0	v	284.0	14.2
42.757	22.84	30.0	7.16	1000	120	98.0	v	281.0	14.6
62.212	17.07	30.0	12.93	1000	120	101.0	v	322.0	12.5
87.288	15.82	30.0	14.18	1000	120	170.0	v	83.0	11.3
610.773	24.35	36.0	11.65	1000	120	170.0	Н	347.0	20.5





# Plot 3: 30 MHz to 1 GHz, vertical & horizontal polarization, highest channel

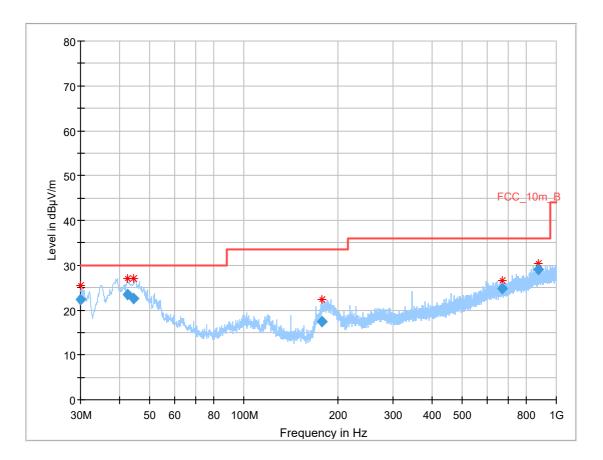
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.733	23.02	30.0	6.98	1000	120	170.0	v	113.0	13.8
38.678	23.80	30.0	6.20	1000	120	102.0	v	330.0	14.2
43.236	21.95	30.0	8.05	1000	120	98.0	v	199.0	14.6
69.012	15.19	30.0	14.81	1000	120	101.0	н	313.0	11.0
422.232	20.40	36.0	15.60	1000	120	170.0	н	81.0	17.0
686.001	25.02	36.0	10.98	1000	120	170.0	v	350.0	21.0





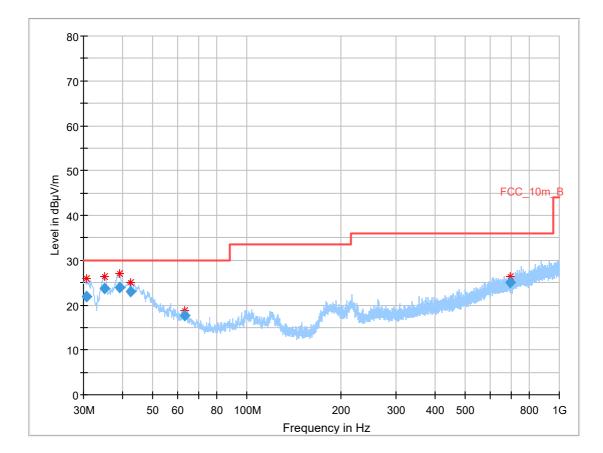
# Plot: OFDM (20 MHz nominal channel bandwidth)

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.082	22.40	30.0	7.60	1000	120	101.0	v	214.0	13.0
42.564	23.50	30.0	6.50	1000	120	98.0	v	210.0	14.6
44.498	22.49	30.0	7.51	1000	120	98.0	v	304.0	14.7
177.827	17.50	33.5	16.00	1000	120	98.0	v	166.0	11.4
670.602	24.90	36.0	11.10	1000	120	101.0	v	85.0	20.9
877.362	28.96	36.0	7.04	1000	120	98.0	v	184.0	23.6

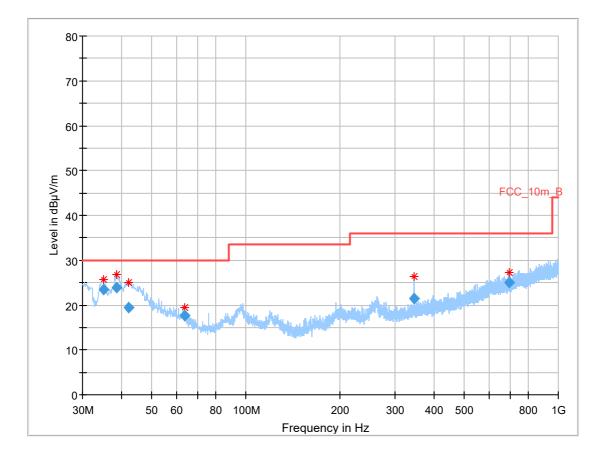




# Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel

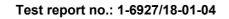
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.762	21.93	30.0	8.07	1000	120	170.0	v	245.0	13.1
35.039	23.67	30.0	6.33	1000	120	98.0	v	329.0	13.8
39.051	23.88	30.0	6.12	1000	120	98.0	v	341.0	14.3
42.506	22.95	30.0	7.05	1000	120	98.0	v	286.0	14.6
63.093	17.72	30.0	12.28	1000	120	170.0	v	313.0	12.3
696.993	25.10	36.0	10.90	1000	120	170.0	v	16.0	21.1





# Plot 3: 30 MHz to 1 GHz, vertical & horizontal polarization, highest channel

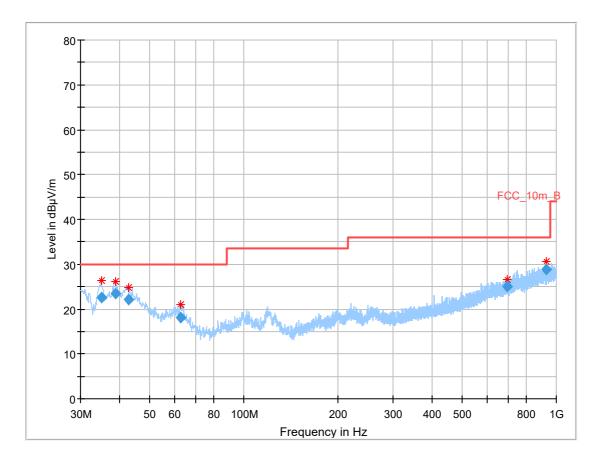
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.089	23.50	30.0	6.50	1000	120	98.0	v	290.0	13.8
38.555	23.96	30.0	6.04	1000	120	98.0	v	302.0	14.2
42.023	19.55	30.0	10.45	1000	120	170.0	v	126.0	14.5
63.517	17.58	30.0	12.42	1000	120	170.0	v	220.0	12.2
345.557	21.43	36.0	14.57	1000	120	170.0	н	211.0	15.8
697.898	25.09	36.0	10.91	1000	120	170.0	Н	131.0	21.1





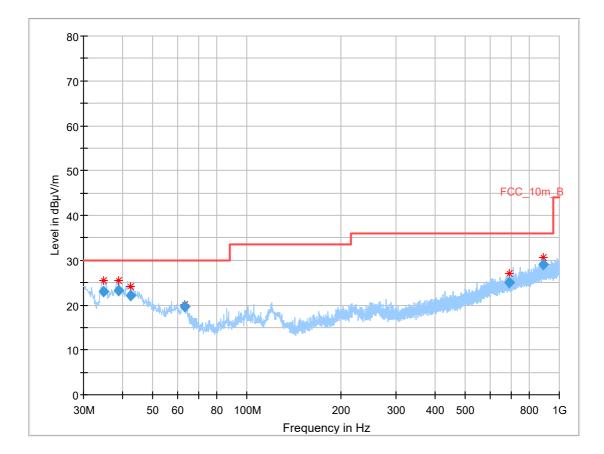
# **<u>Plot:</u>** OFDM (40 MHz nominal channel bandwidth)

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.946	22.66	30.0	12.34	1000	120	101.0	Н	86.0	13.2
38.739	23.39	30.0	6.61	1000	120	98.0	v	179.0	14.2
42.630	22.19	30.0	7.81	1000	120	98.0	v	192.0	14.6
62.644	18.14	30.0	11.86	1000	120	170.0	v	349.0	12.4
698.652	25.13	36.0	10.87	1000	120	170.0	v	35.0	21.1
928.147	28.88	36.0	7.12	1000	120	170.0	v	0.0	24.0

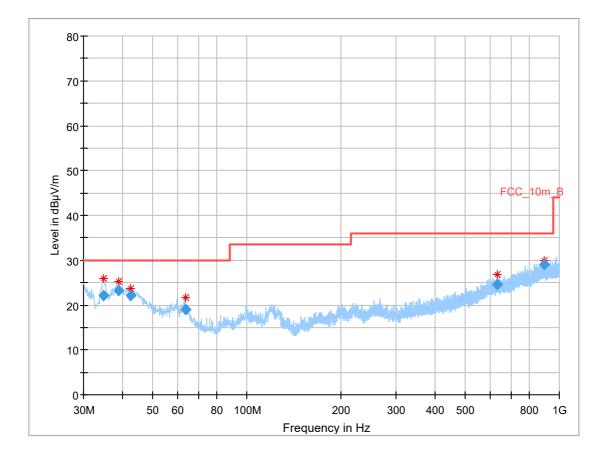




# Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel

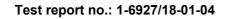
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.848	23.04	30.0	6.96	1000	120	98.0	v	98.0	13.8
38.776	23.23	30.0	6.77	1000	120	98.0	v	316.0	14.2
42.368	22.18	30.0	7.82	1000	120	98.0	v	258.0	14.6
63.325	19.59	30.0	10.41	1000	120	170.0	v	278.0	12.2
690.774	25.05	36.0	10.95	1000	120	170.0	н	133.0	21.1
891.041	29.03	36.0	6.97	1000	120	170.0	Н	124.0	23.8





# Plot 3: 30 MHz to 1 GHz, vertical & horizontal polarization, highest channel

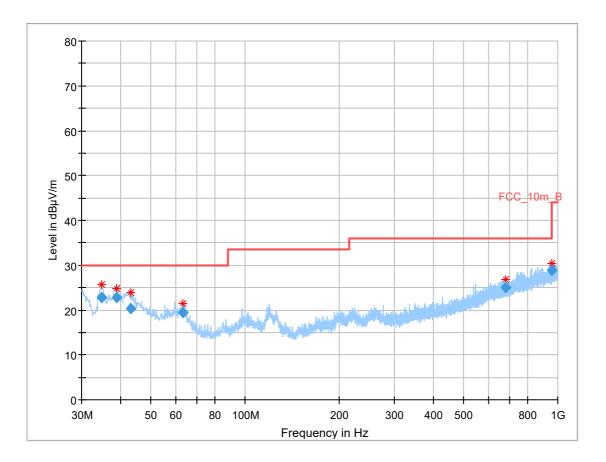
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.682	22.19	30.0	7.81	1000	120	170.0	v	192.0	13.7
38.706	23.13	30.0	6.87	1000	120	98.0	v	216.0	14.2
42.349	22.13	30.0	7.87	1000	120	98.0	v	284.0	14.6
63.766	18.94	30.0	11.06	1000	120	101.0	v	290.0	12.1
631.505	24.53	36.0	11.47	1000	120	170.0	н	141.0	20.6
896.335	29.08	36.0	6.92	1000	120	98.0	v	58.0	23.8





# Plot: RX / Idle mode

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.864	22.69	30.0	7.31	1000	120	101.0	v	252.0	13.8
38.709	22.76	30.0	7.24	1000	120	98.0	v	220.0	14.2
43.188	20.39	30.0	9.61	1000	120	104.0	v	67.0	14.6
63.335	19.35	30.0	10.65	1000	120	170.0	v	327.0	12.2
681.420	24.98	36.0	11.02	1000	120	101.0	v	218.0	21.0
954.007	28.81	36.0	7.19	1000	120	98.0	н	-1.0	24.1

# 12.13 Spurious emissions radiated above 1 GHz

## **Description:**

Measurement of the radiated spurious emissions above 1 GHz in transmit mode and receiver / idle mode.

### Measurement:

Measurement parameter				
Detector	Peak / RMS			
Sweep time	Auto			
Resolution bandwidth	1 MHz			
Video bandwidth 3 x RBW				
Span 1 GHz to 26 GHz				
Trace mode	Max Hold			
Measured modulation	<ul> <li>DSSS b – mode</li> <li>OFDM g – mode</li> <li>OFDM n HT20 – mode</li> <li>OFDM n HT40 – mode</li> <li>RX / Idle – mode</li> </ul>			
Test setup	See chapter 6.5 – A			
Measurement uncertainty	See chapter 8			

### Limits:

FCC			IC		
In any 100 kHz bandwidth outside intentional radiator is operating, the at least 30 dB below that in the 100 k power, based on either an RF cond specified in Section 15.209(a) is not as defined in §15.205(a), must also §15.205(c)).	radio frequency po Hz bandwidth with ducted or a radiate required. In additic	wer that is produce in the band that cor ed measurement. <i>A</i> on, radiated emissio	d by the intention Itains the highes Attenuation beloons which fall in	onal radiator at level of the ow the gener the restricted	shall be desired al limits bands,
		/// <del>-</del> .// .	• •		

Frequency / MHz	Field Strength / (dBµV / m)	Measurement distance / m	
Above 960	54.0 (AVG)	2	
Above 960	74.0 (peak)	3	



	TX spurious emissions radiated / dBµV/m @ 3 m								
l	lowest channel			niddle chann	el	h	highest channel		
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	
4824	Peak	53.07	4874	Peak	54.60	4924	Peak	54.0	
4024	AVG	47.39	4074	AVG	49.51		AVG	48.5	
-/-	Peak	-/-	_/_	Peak	-/-	-/-	Peak	-/-	
-/-	AVG	-/-	-/-	AVG	-/-	-/-	AVG	-/-	

# Results: OFDM (20 MHz nominal channel bandwidth)

TX spurious emissions radiated / dBμV/m @ 3 m								
lo	owest chann	el	r	niddle channe	el	h	ighest chann	iel
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m
		ted emissions are more 0 dB below the limit.		All detected emissions are more than 20 dB below the limit.				
-/-	Peak	-/-	_/_	Peak	-/-	_/_	Peak	-/-
-/-	AVG	-/-	-/-	AVG	-/-	-/-	AVG	-/-
1	Peak	-/-	_/_	Peak	-/-	1	Peak	-/-
-/-	AVG	-/-	-/-	AVG	-/-	-/-	AVG	-/-

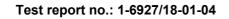
## Results: OFDM (40 MHz nominal channel bandwidth)

TX spurious emissions radiated / dBμV/m @ 3 m								
lo	owest chann	el	r	niddle channe	el	h	ighest chann	iel
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m
All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.		All detected emissions are more than 20 dB below the limit.				
-/-	Peak	-/-	1	Peak	-/-	,	Peak	-/-
-/-	AVG	-/-	-/-	AVG	-/-	-/-	AVG	-/-
-/-	Peak	-/-	_/_	Peak	-/-	1	Peak	-/-
-/-	AVG	-/-	-/-	AVG	-/-	-/-	AVG	-/-

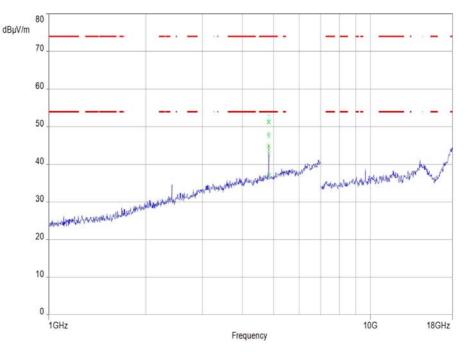


## Results: RX / idle - mode

TX spurious emissions radiated / dBµV/m @ 3 m						
f / MHz	Detector	Level / dBµV/m				
All detecte	All detected emissions are more than 20 dB below the limit.					
	Peak	-/-				
_/-	AVG	-/-				
-/-	Peak	-/-				
	AVG	-/-				



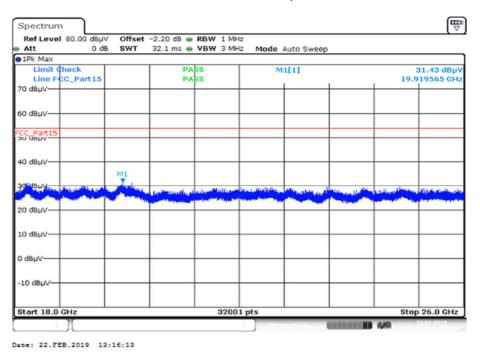
## Plots: DSSS



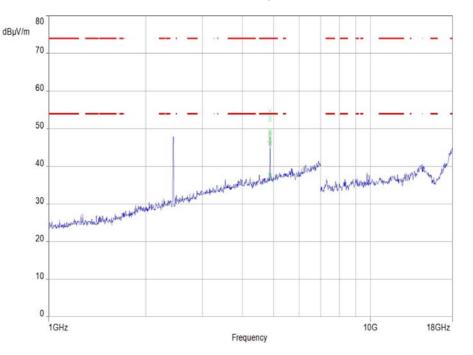
Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



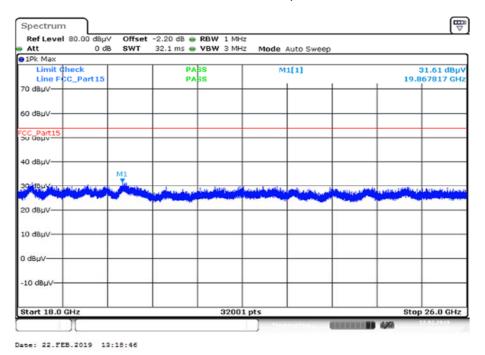




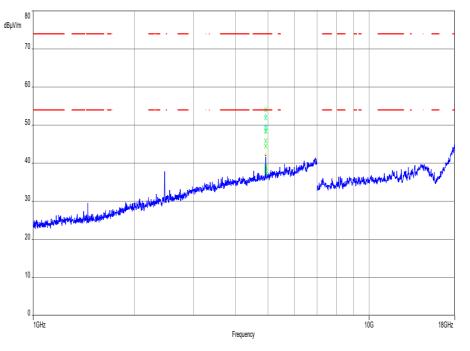


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



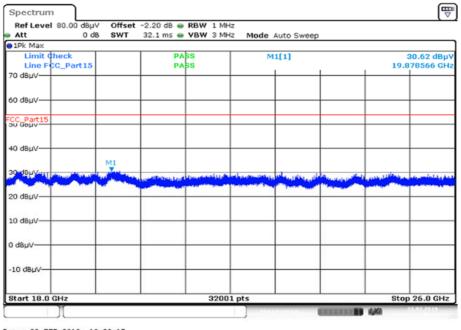




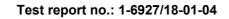
Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

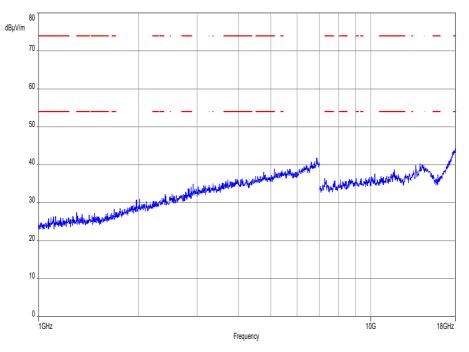


Date: 22.FEB.2019 13:20:17





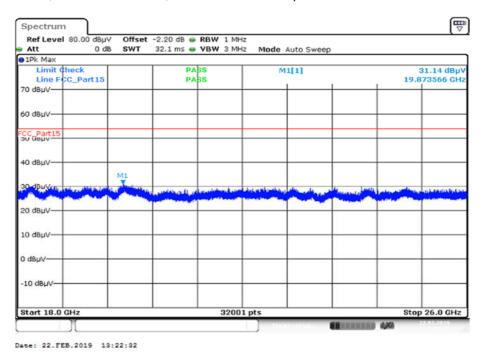
## Plots: OFDM (20 MHz bandwidth)



Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

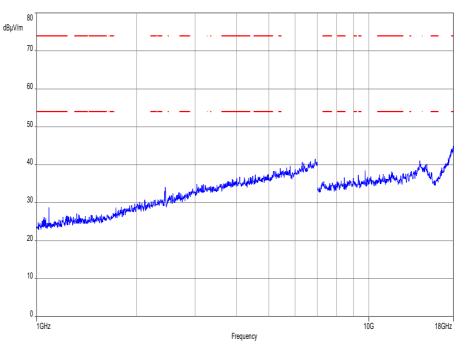
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



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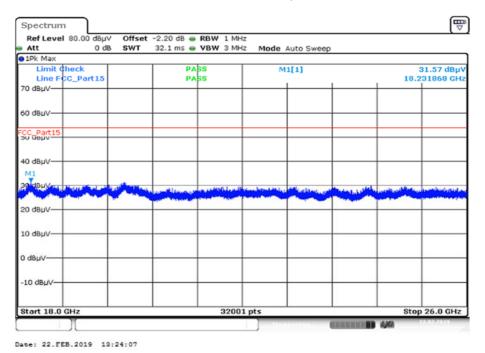




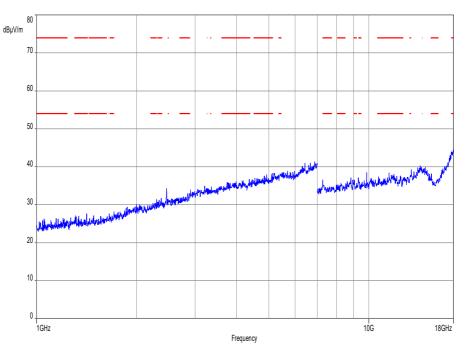
Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



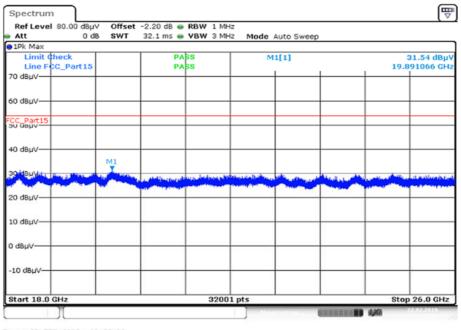




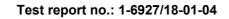
Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

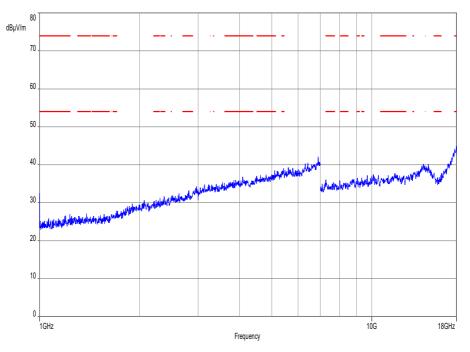


Date: 22.FEB.2019 13:25:39





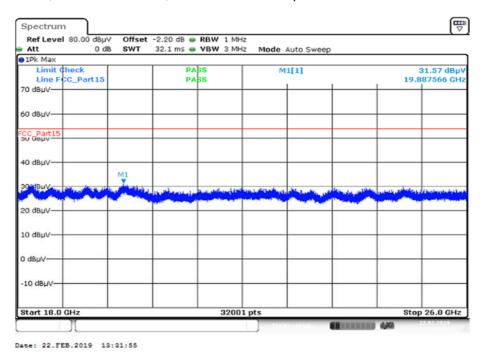
## Plots: OFDM (40 MHz bandwidth)



Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

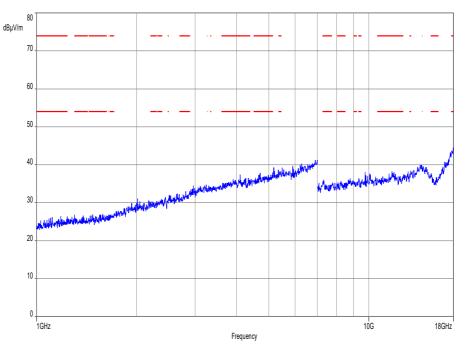
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

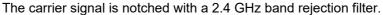


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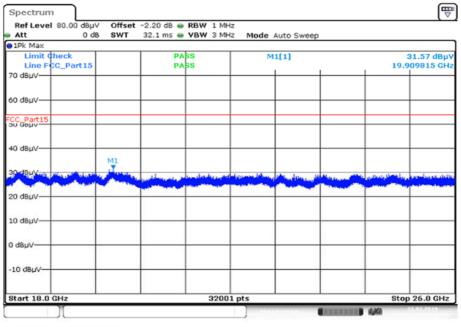




Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization

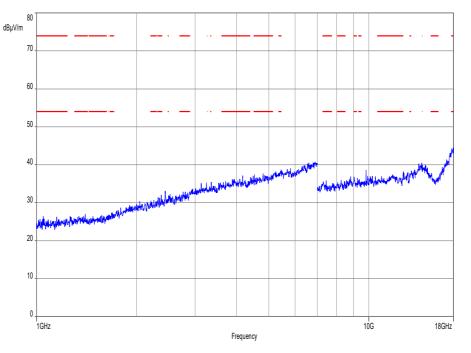


Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 22.FEB.2019 13:33:09

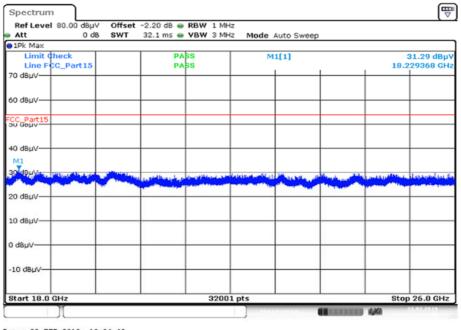




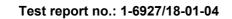
Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

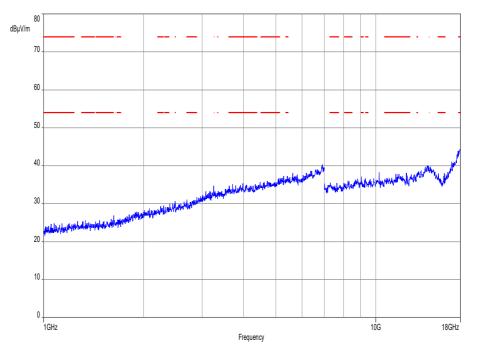
Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 22.FEB.2019 13:34:40

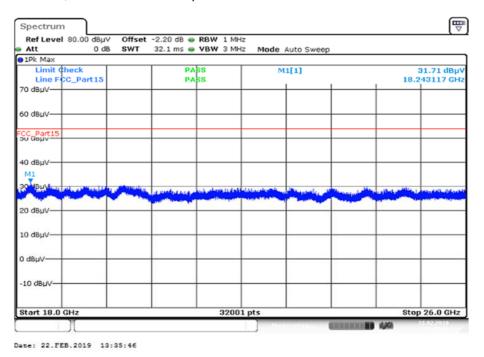


## Plots: RX / idle mode



Plot 1: 1 GHz to 18 GHz, vertical & horizontal polarization

## Plot 2: 18 GHz to 26 GHz, vertical & horizontal polarization



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## 12.14 Spurious emissions conducted below 30 MHz (AC conducted)

## **Description:**

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

#### Measurement:

Measurement parameter				
Detector	Peak - Quasi Peak / Average			
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 chapter 6.4 – A			
Measurement uncertainty	See chapter 8			

### Limits:

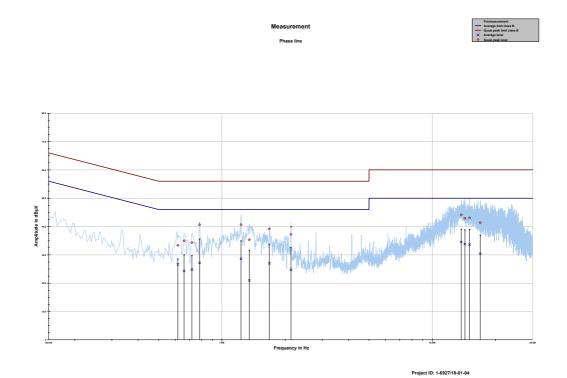
FCC		IC		
Frequency / MHz)	Quasi-Peak / (dBµV / m)		Average / (dBµV / m)	
0.15 – 0.5	66 to 56*		56 to 46*	
0.5 – 5	56		46	
5 - 30.0	60		50	

\*Decreases with the logarithm of the frequency

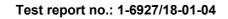


## Plots:

Plot 1: 150 kHz to 30 MHz, phase line

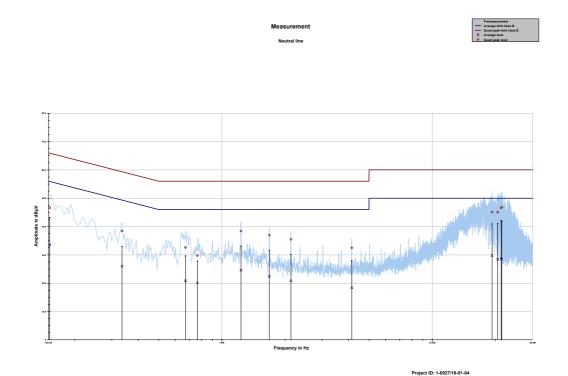


Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.617398	33.39	22.61	56.000	26.64	19.36	46.000
0.661040	34.99	21.01	56.000	24.31	21.69	46.000
0.720033	34.35	21.65	56.000	24.79	21.21	46.000
0.783528	40.69	15.31	56.000	27.17	18.83	46.000
1.232918	40.67	15.33	56.000	28.65	17.35	46.000
1.349883	35.34	20.66	56.000	20.97	25.03	46.000
1.679865	39.16	16.84	56.000	27.01	18.99	46.000
2.128990	37.23	18.77	56.000	24.74	21.26	46.000
13.720467	44.10	15.90	60.000	34.51	15.49	50.000
14.279560	42.92	17.08	60.000	33.80	16.20	50.000
15.031560	43.07	16.93	60.000	33.65	16.35	50.000
16.903465	41.36	18.64	60.000	30.39	19.61	50.000









Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.151943	46.65	19.24	65.893	33.57	22.38	55.944
0.335167	38.45	20.87	59.322	25.98	24.73	50.710
0.671392	32.62	23.38	56.000	20.85	25.15	46.000
0.764228	29.76	26.24	56.000	20.12	25.88	46.000
1.232072	38.42	17.58	56.000	24.54	21.46	46.000
1.680178	37.01	18.99	56.000	22.37	23.63	46.000
2.127410	35.51	20.49	56.000	20.85	25.15	46.000
4.142305	32.48	23.52	56.000	18.39	27.61	46.000
19.226972	45.10	14.90	60.000	29.75	20.25	50.000
20.460861	45.10	14.90	60.000	28.40	21.60	50.000
21.227486	46.64	13.36	60.000	28.74	21.26	50.000
21.382981	46.82	13.18	60.000	28.49	21.51	50.000

## 13 Observations

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

## Test report no.: 1-6927/18-01-04



#### Annex A Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
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
00	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
C/N <sub>0</sub>	Carrier to noise-density ratio, expressed in dB-Hz

# Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2019-03-07

CTC I advanced

## Annex C Accreditation Certificate – D-PL-12076-01-04

first page	last page
Deutsche Deutsche Akkreditierungsstelle GmbH	Deutsche Akkreditierungsstelle GmbH
Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition	Office Berlin Office Frankfurt am Main Office Braunschweig Spittelmarkt 10 Europa-Allee 52 Bundera liee 100 10117 Berlin 60327 Frankfurt am Main 38116 Braunschweig
The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory CTC advanced GmbH Untertürkheimer Straße 6-10, 66117 Saarbrücken is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields: Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian	
Standards The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 7 pages.	The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkroditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate diseminations of the cover sheet by the conformity assessment body mentioned overleat. No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attesside by DAKS. The accreditation assess day DAKS. The accreditation (49 July 200225) and the Regulation (EC) No 755/2008 of the Sunopan Parliament and of the Council 49 July 200225) and the Regulation (EC) No 755/2008 of the Sunopan Parliament and of Accreditation (EA). International Accreditation for the European Inclusion (218 of 9 mice) accreditation Cooperation (EA). International Accreditation Forum (AF) and International Laboratory Accreditation Cooperation (EA). International Accreditation Forum (AF) and International Laboratory Accreditation Cooperation (EA). International Accreditation accreditation accreditation accreditation accreditation Cooperation (EA). International Accreditation accreditation Cooperation (EA). International Accreditation accreditation Cooperation (EA). International Accreditation accreditation EA: www.uncopan.accreditation.org UAC: www.ilac.org MA; www.ilac.org
Registration number of the certificate: D-PL-12076-01-04	

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

https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf







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

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