
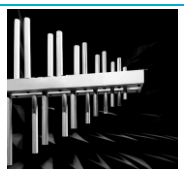
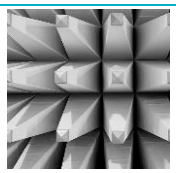

CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-3977/22-03-05-A

Testing laboratory

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

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

Applicant

SAGEMCOM BROADBAND SAS
250, route de l´ Empereur
92848 Rueil-Malmaison Cedex / FRANCE
Phone: -/-
Contact: Ludovic Bomba
e-mail: ludovic.bomba@sagemcom.com

Manufacturer

SAGEMCOM BROADBAND SAS
250, route de l´ Empereur
92848 Rueil-Malmaison Cedex / FRANCE

Test standard/s

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

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

Test Item

Kind of test item:	**Gateway**
Model name:	**F5688W**
FCC ID:	**VW3F5688W**
Frequency:	UNII bands: 5150 MHz to 5250 MHz; 5250 MHz to 5350 MHz; 5470 MHz to 5725 MHz; 5725 MHz to 5850 MHz
Technology tested:	IEEE 802.11 (W-LAN), DFS only
Antenna:	4 integrated antennas
Power supply:	120 V AC by power supply unit
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:

cn=Michael Dorongovski, o=CTC advanced GmbH, ou=DOR-210422, email=Michael.Dorongovski@ctcadvanced.com, c=DE
2023.02.02 14:16:03 +01'00'

Michael Dorongovski
Lab Manager
Radio Communications

Test performed:

cn=David Lang, o=CTC advanced GmbH, ou=LNG-211202, email=david.lang@ctcadvanced.com, c=DE
2023.02.02 14:01:00 +01'00'

David Lang
Lab Manager
Radio Communications

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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In no case this test report can be considered as a Letter of Approval.

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

This test report replaces the test report with the number 1-3977/22-03-05 and dated 2022-12-19

2.2 Application details

Date of receipt of order:	2022-02-08
Date of receipt of test item:	2022-02-16
Start of test:*	2022-03-17
End of test:*	2022-07-04
Person(s) present during the test:	-/-

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

None

3 Test standard/s, references and accreditations

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 incl. Amendment 1 & 2	February 2021	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

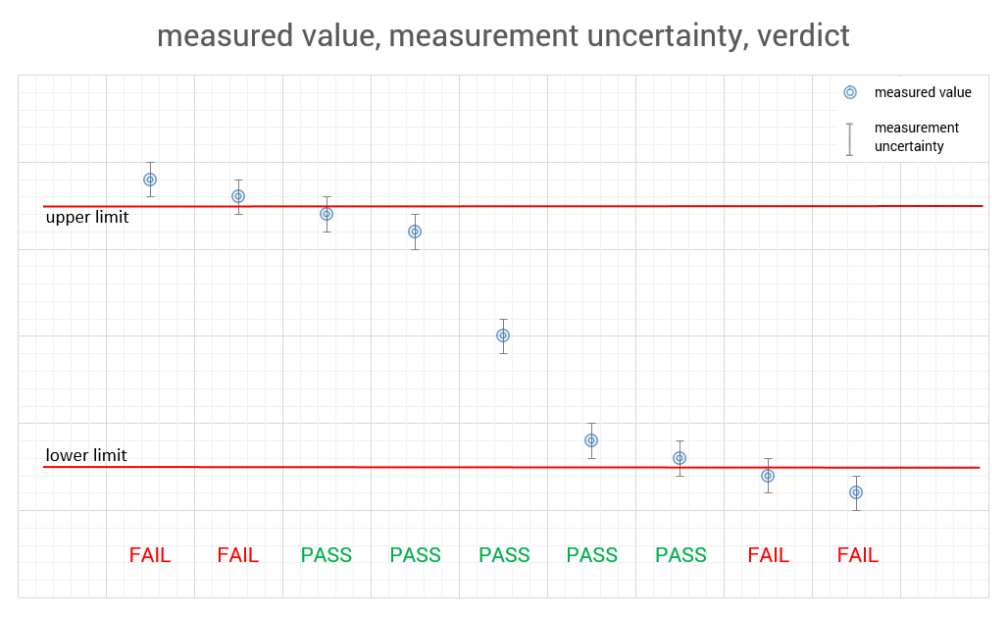
Guidance	Version	Description
KDB 789033 D02	v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E
ANSI C63.4-2014	-/-	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 662911 D01	v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
UNII: KDB 905462 D02	v02	Compliance measurement procedures for unlicensed - national information infrastructure devices operating in the 5250 - 5350 MHz and 5470 - 5725 MHz bands incorporating dynamic frequency selection
UNII: KDB 905462 D04	v01	Operational Modes for DFS Testing New Rules

Accreditation	Description
D-PL-12076-01-05	Telecommunication FCC requirements https://www.dakks.de/as/ast/d/D-PL-12076-01-05e.pdf

FCC designation number: DE0002

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.
The measurement uncertainty is mentioned in this test report, see chapter 8 but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



5 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests No tests under extreme environmental conditions required. No tests under extreme environmental conditions required.
Relative humidity content	:		46 %
Barometric pressure	:		1031 hpa
Power supply	:	V_{nom} V_{max} V_{min}	120 V AC by power supply unit No tests under extreme environmental conditions required. No tests under extreme environmental conditions required.

6 Test item

6.1 General description

Kind of test item	:	Gateway
Model name	:	F5688W
S/N serial number	:	DM2205259000081 all other tests DM2205259000324 160MHz bandwidth tests
Hardware status	:	Measured with V1.0; DFS related part identical to V1.2
Firmware status	:	SGJi10000C all other tests SGJi10000C 160MHz bandwidth tests
Frequency band	:	UNII bands: 5150 MHz to 5250 MHz; 5250 MHz to 5350 MHz; 5470 MHz to 5725 MHz; 5725 MHz to 5850 MHz
Type of radio transmission Use of frequency spectrum	: :	OFDM
Type of modulation	:	CCK, (D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM, 256 – QAM
Number of channels	:	24 with 20 MHz channel bandwidth 11 with 40 MHz channel bandwidth 5 with 80 MHz channel bandwidth 2 with 160 MHz bandwidth
Antenna	:	4 integrated antennas; The combined antenna gain as of below was declared by the manufacturer and was considered for the measurements reported in this document. UNII-1 & 2A: 0.8 dBi, UNII-2C: 0.9 dBi UNII-3C: 0.9dBi
Power supply	:	120 V AC by power supply unit
Temperature range	:	0°C to +50°C

6.2 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: 1-3977/22-03-01_AnnexA
1-3977/22-03-01_AnnexB
1-3977/22-03-01_AnnexD
1-3977/22-03-01_AnnexI

7 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).

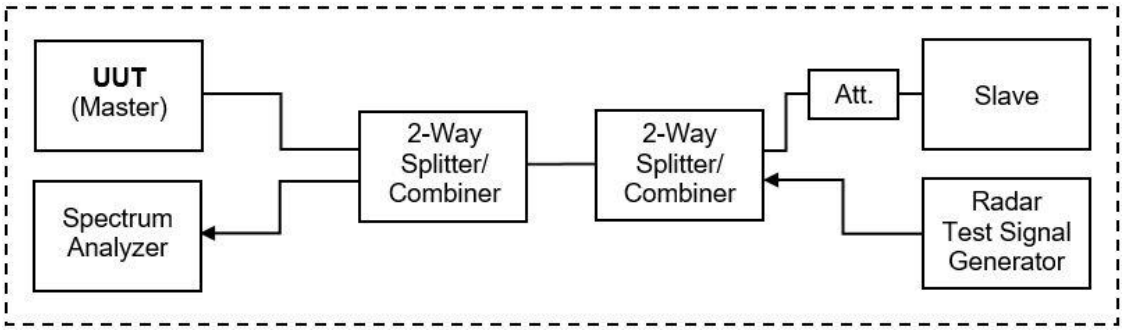
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

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

7.1 Dynamic frequency selection (DFS)



DT = GP – PL + G + VO
(DT – Detection Threshold, GP – Generator Power, PL – Path Loss, G – Antenna Gain, VO – Variation Offset)

Detection Threshold calculation:
DT [dBm] = -34.1 [dBm] - 29.9 [dB] + 0.9 [dBi] + 1.0 [dB] = -62.1.0 [dBm]

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Vector Signal Generator	SMU200A	R&S	101633	300003496	vIKI!	04.01.2022	31.01.2025
2	A	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	vIKI!	08.12.2020	07.12.2022
3	A	DFS-test site	div. Splitter, Cables, Attenuators	Mini-Circuits	na	300004557	ev	-/-	-/-
4	A	Notebook	Latitude 15 6000 Series	Dell		300004737	ne	-/-	-/-
5	A	PC	ExOne	F+W	2890296v001	300005102	ne	-/-	-/-
6	A	RF-Cable DFS-Tester Receiver	ST18/SMAm/SMAm /24	Huber & Suhner	Batch no. 1308650	400001252	ev	-/-	-/-
7	A	RF-Cable DFS-Tester SMU	1520.9927.00			400001253	ev	-/-	-/-
8	A	RF-Cable DFS-Tester No. 1	Enviroflex 316 D	Huber & Suhner	Batch no. 1560522	400001257	ev	-/-	-/-
9	A	RF-Cable DFS-Tester No. 2	Enviroflex 316 D	Huber & Suhner	Batch no. 1560522	400001258	ev	-/-	-/-
10	A	RF-Cable DFS-Tester No. 3	Enviroflex 316 D	Huber & Suhner	Batch no. 1560522	400001259	ev	-/-	-/-
11	A	RF-Cable DFS-Tester No. 4	Enviroflex 316 D	Huber & Suhner	Batch no. 1560522	400001260	ev	-/-	-/-

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
Frequency accuracy (radar burst)	0.2 Hz
Level accuracy (radar burst)	± 1.83 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
DFS-Testing	CFR Part 15, FCC 06-96	Pass	2023-02-02	DFS only

Test Standard Clause	Test Case	Bandwidth	C	NC	NA	NP	Remark
7.8.1*3	U-NII Detection Bandwidth	20 MHz 40 MHz 80 MHz 160 MHz	☒	☐	☐	☐	*1*3
§15.407 (h)(2) (ii) & 7.8.2*3	Channel Availability Check Time	20 MHz	☒	☐	☐	☐	*1
§15.407 (h)(2) (iv) & 7.8.3*3	Non-Occupancy Period	160 MHz	☒	☐	☐	☐	*2
§15.407 (h)(2) (iii) & 7.8.2*3	Channel Move Time / Channel Closing Transmission Time	160 MHz	☒	☐	☐	☐	*2
7.8.3 & 7.8.4*3	In-Service Monitoring / Statistical Performance Check	20 MHz 40 MHz 80 MHz 160 MHz	☒	☐	☐	☐	*2

Abbreviations/References:

C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
*1	Prior to use of a channel
*2	During normal operation
*3	As per 9.2.2 Note 3 this test was performed with no data traffic

10 Additional comments

Reference documents: Main RF report 1-3977/22-03-04 issued by CTC advanced GmbH
F5688W_wifi_certif_FCC_Ed02.xlsx
Customer Questionnaire_F5688W_Sagemcom_v3.docx
F5866W Certification Radio Wi-Fi 5GHz (How To Do).pdf

Special test descriptions: All tests except the In-Service Monitoring are conducted with Pulse Type 0.

A special test command had been provided by the customer
to prevent need to reset the device between the trials.

Configuration descriptions: Iperf was used to generate the required channel load (duty cycle greater 17 percent).

e.g. for 160MHz bandwidth, the following command has been used:
iperf -c 192.168.12.20 -u -b 135m -t 999999 -i 1 -l 20000

DFS functionality:
☒ Master device
☐ Client with radar detection
☐ Client without radar detection

EUT selection:
☒ Only one device available
☐ Devices selected by the customer
☐ Devices selected by the laboratory (Randomly)

11 RF measurements

11.1 Parameters of DFS test signals

11.1.1 DFS Detection Thresholds for Master Devices as well as Client Devices With Radar Detection

Maximum Transmit Power EIRP	Value (see note)
≥ 200 mW	-64 dBm
< 200 mW and power spectral density < 10 dBm/MHz	-62 dBm
< 200 mW and That do not meet the power spectral density < 10 dBm/MHz	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

11.1.2 DFS Response Requirement Values

Parameter	Value
Non-occupancy period	minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

11.1.3 Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\mathrm{PRI}_{\mu\mathrm{sec}}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4.

Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms.

Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

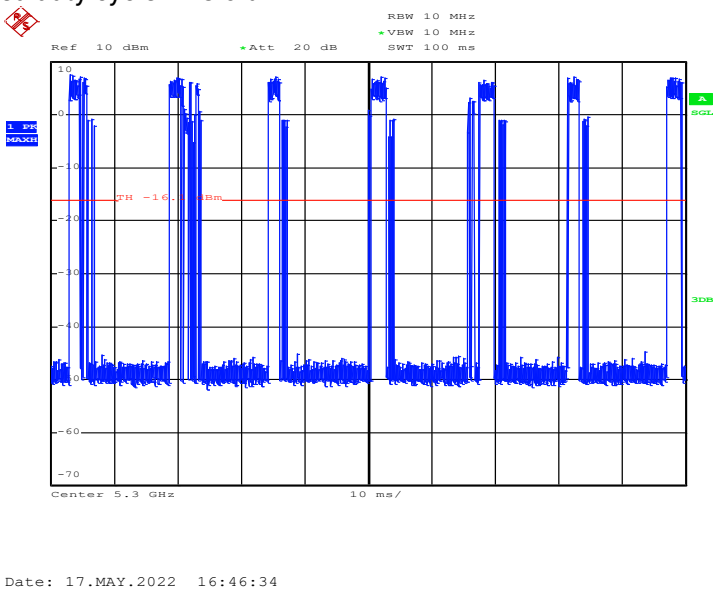
For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined.
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set.

11.2 Test preparation

11.2.1 Channel loading

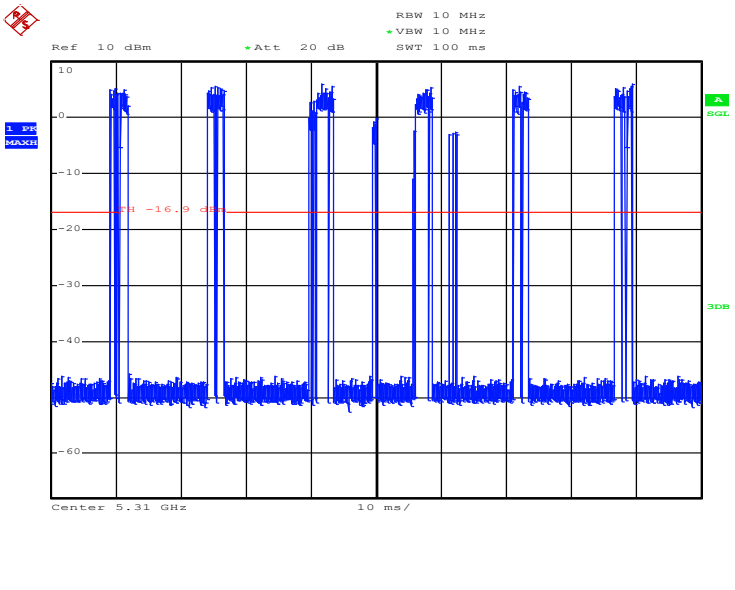
Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time). This can be done with any appropriate channel BW and modulation type.

HT20-Mode: Calculated duty cycle = 18.0%



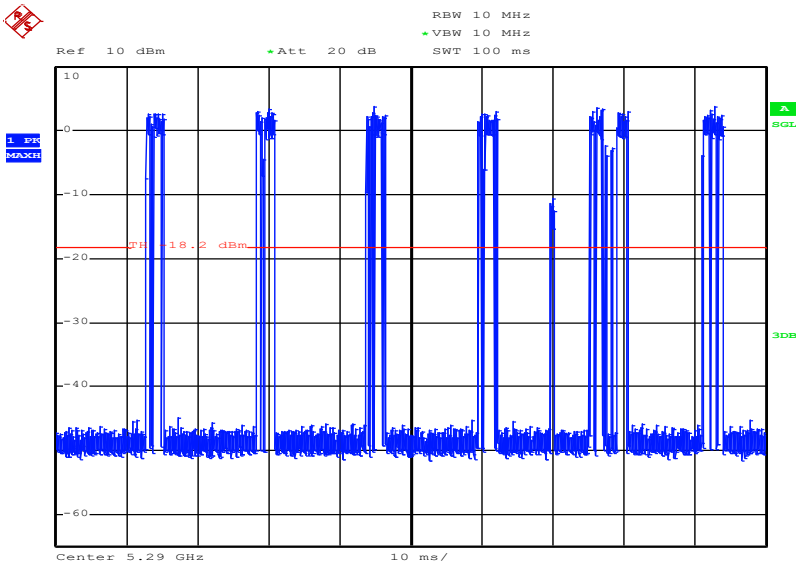
Plot 1

HT40-Mode: Calculated duty cycle = 17.3%



Plot 2

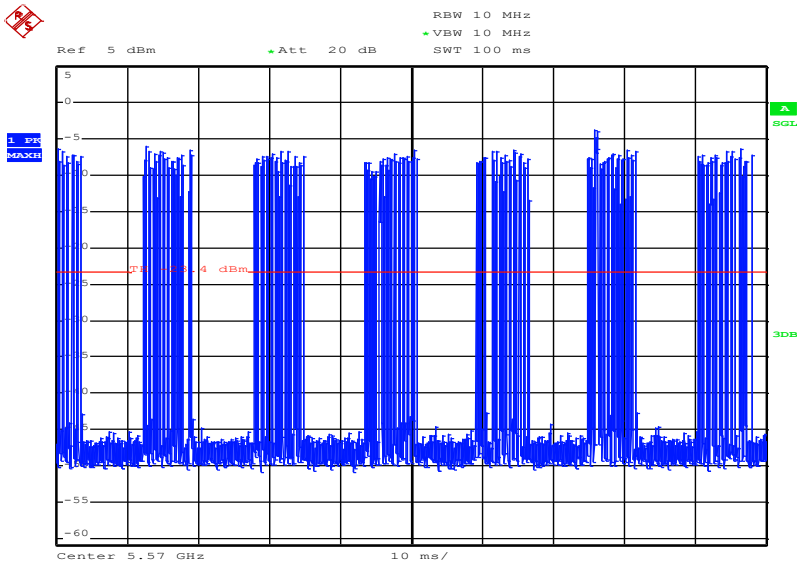
VHT80-Mode: Calculated duty cycle = 17.8 %



Date: 18.MAY.2022 13:30:58

Plot 3

AC160-Mode: Calculated duty cycle = 17.2 %

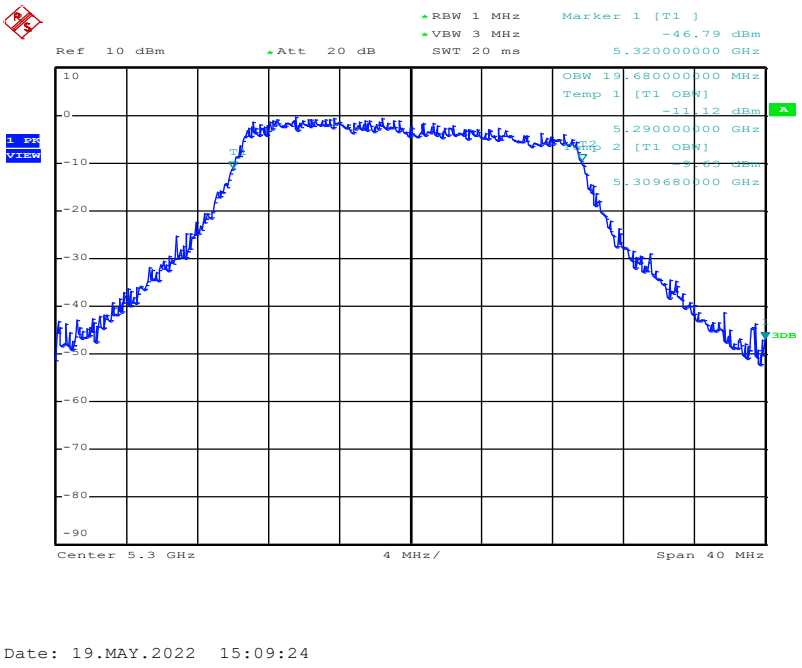


Date: 1.JUL.2022 14:26:14

Plot 4

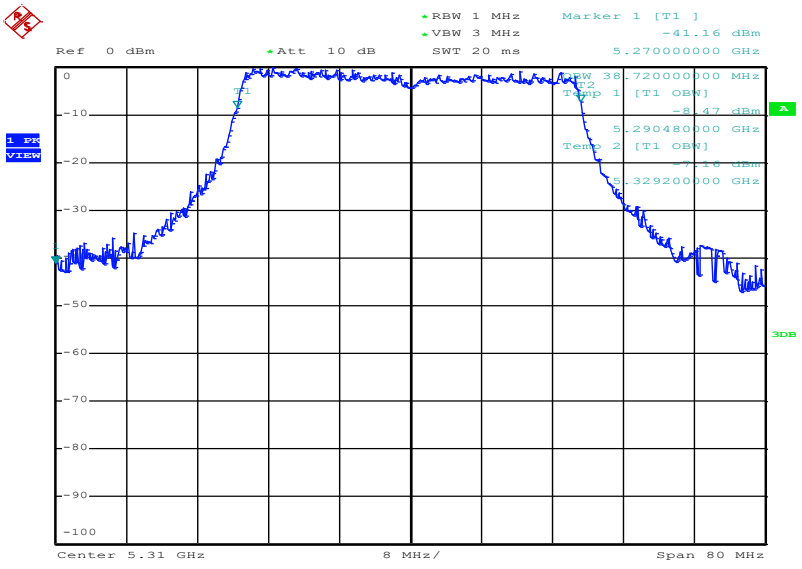
11.2.2 99% Bandwidth to determine the U-NII-bandwidth

HT20-Mode: 19.7 MHz



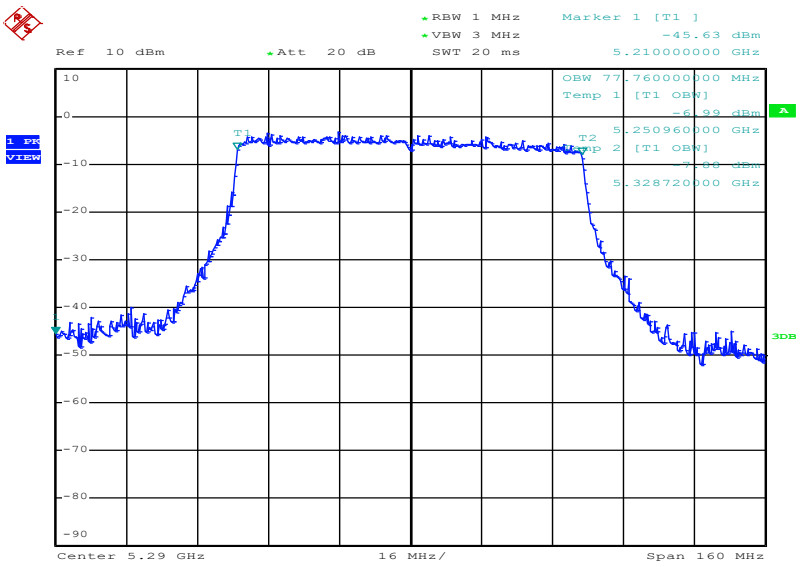
Plot 5

HT40-Mode: 38.7 MHz



Plot 6

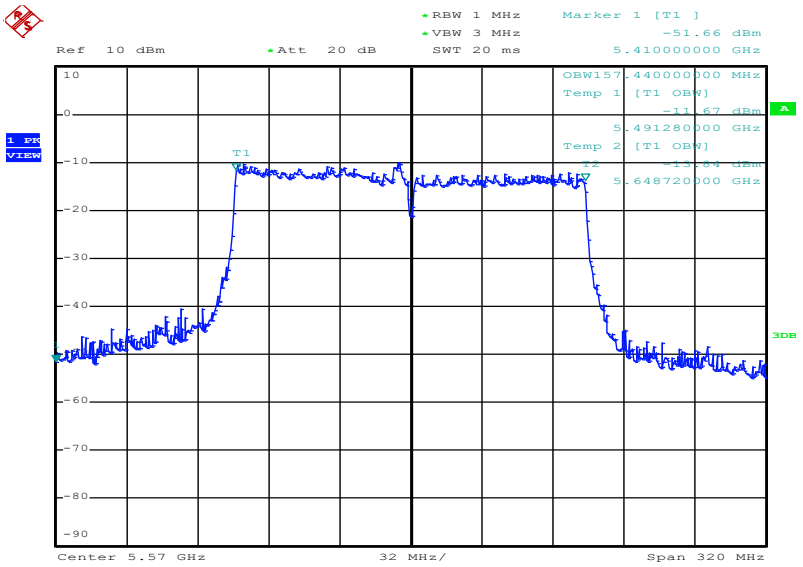
VHT80-Mode: 77.8 MHz



Date: 19.MAY.2022 10:21:03

Plot 7

AC160-Mode: 157.4 MHz



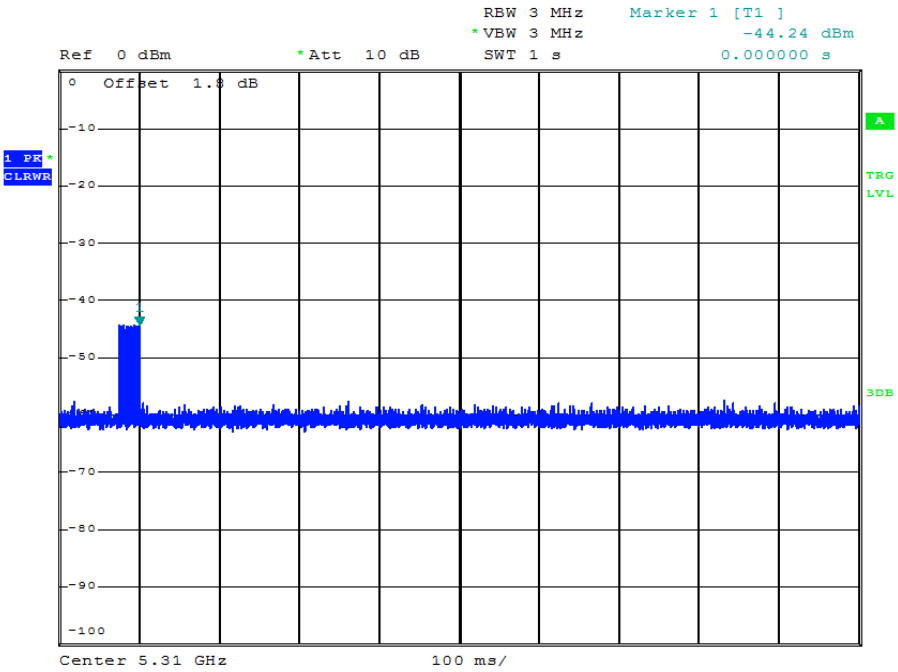
Date: 19.MAY.2022 11:14:15

Plot 8

11.2.3 Radar burst timing signal

To accurately determine the channel closing time and channel closing transmission time the spectrum analyser is triggered at the end of the radar burst (see marker at *t* = 0ms).

Example plot



Plot 9

11.3 Test results (prior to use of a channel)

11.3.1 Channel Availability Check Time

Initial Channel Availability Check Time

The Initial Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms and only needs to be performed one time.

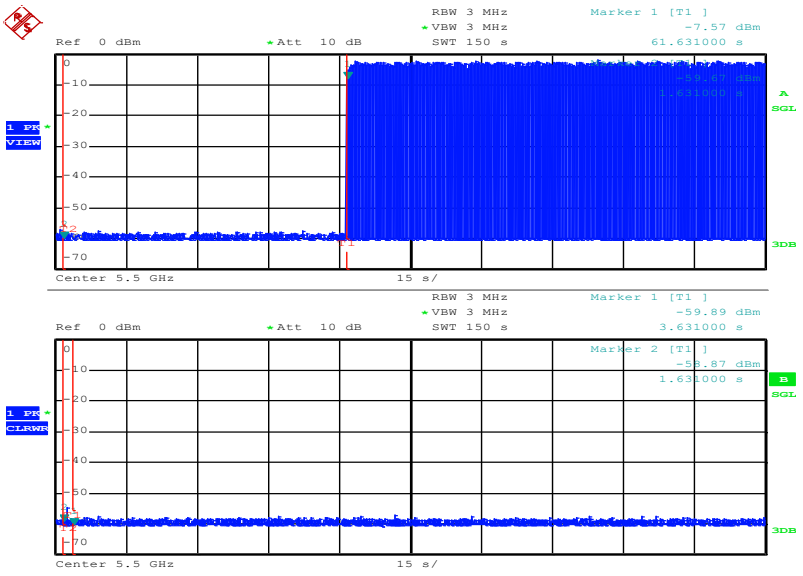
a) The U-NII devices will be powered on and be instructed to operate on the appropriate U-NII Channel that must incorporate DFS functions. At the same time the UUT is powered on, the spectrum analyzer will be set to zero span mode with a 3 MHz RBW and 3 MHz VBW on the Channel occupied by the radar with a 2.5 minute sweep time. The spectrum analyzer's sweep will be started at the same time power is applied to the U-NII device.
b) The UUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle
c) Confirm that the UUT initiates transmission on the channel

Note: The results of the Channel Availability Check Time test can be found in the upper trace in the plots below.

Radar Burst at the Beginning of the Channel Availability Check Time

In the upper trace off the plot below Time Line T_1 is set to the end of the Channel Availability Check while T_2 is set 60 seconds before to indicate the start of the Channel Availability Check.

The lower trace in the plot below shows a single burst of one of the Short Pulse Radar Types 0-4 commencing within a 6 second window starting at the end of the power-up sequence of the DUT respectively within the first 6 seconds of the Channel Availability Check.
It must be shown that no transmissions occur on this channel after the Channel Availability Check (see Time Line T1 in the upper plot).



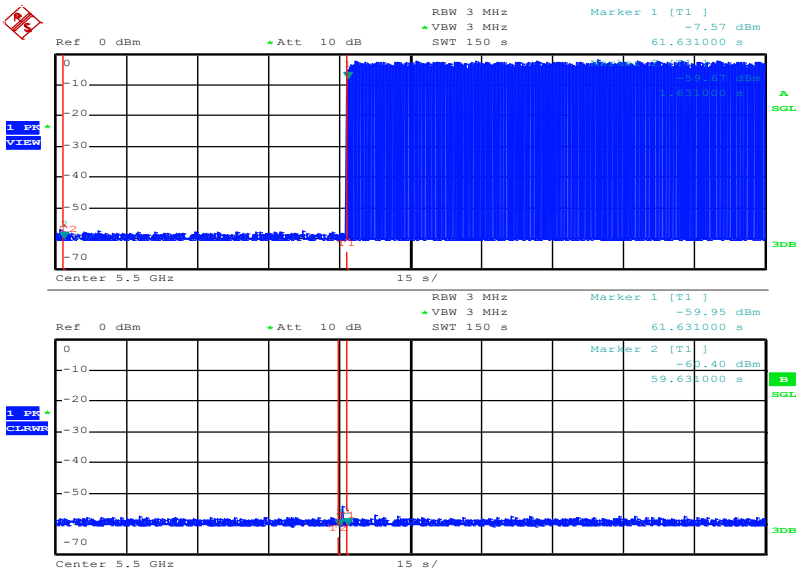
Date: 16.MAY.2022 11:16:27

Plot 10

Radar Burst at the End of the Channel Availability Check Time

In the upper trace of the plot below Time Line T_1 is set to the end of the Channel Availability Check while T_2 is set 60 seconds before to indicate the start of the Channel Availability Check.

The lower trace in the plot below shows a single burst of one of the Short Pulse Radar Types 0-4 commencing within a 6 second window at the end of the Channel Availability Check respectively within the last 6 seconds of the Channel Availability Check.
It must be shown that no transmissions occur on this channel after the Channel Availability Check (see Time Line T1 in the upper plot).



Plot 11

11.4 Test results (during normal operation)

11.4.1 U-NII Detection Bandwidth

The U-NII Detection Bandwidth was determined according the procedure as described in the correspondent KDB as referenced in section 3 of this test report for any supported bandwidth.

The U-NII Detection Bandwidth must meet the U-NII Detection Bandwidth criterion referenced in section 11.1.2. Otherwise, the UUT does not comply with DFS requirements. This is essential to ensure that the UUT is capable of detecting Radar Waveforms across the same frequency spectrum that contains the significant energy from the system. In the case that the U-NII Detection Bandwidth is greater than or equal to the 99 percent power bandwidth for the measured F_H and F_L, the test can be truncated and the U-NII Detection Bandwidth can be reported as the measured F_H and F_L.

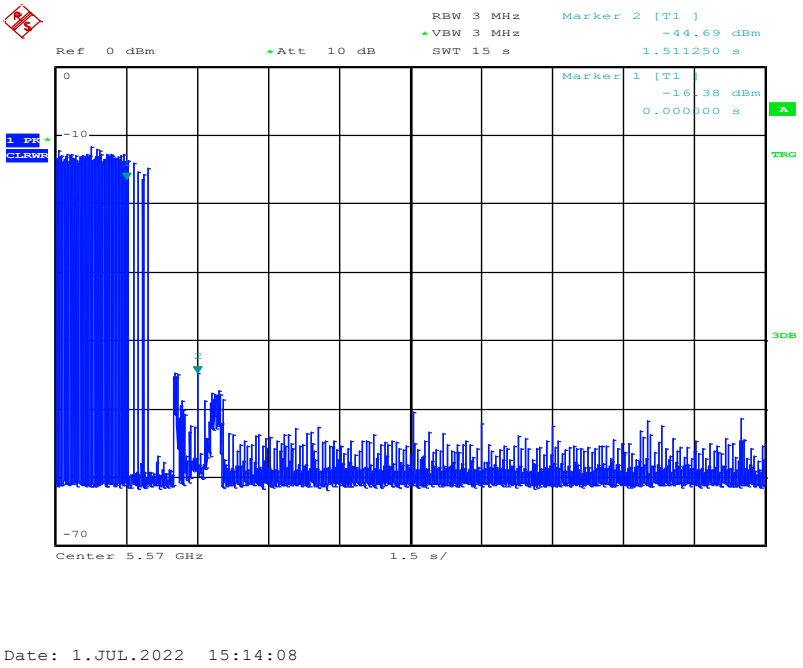
Operating mode	99% Bandwidth (MHz)	F_L (MHz)	F_H (MHz)	U-NII Detection Bandwidth / F_H-F_L (MHz)
HT20	19.7	5290	5310	20
HT40	38.7	5290	5330	40
VHT80	77.8	5250	5330	80
AC160	157.4	5490	5650	160

11.4.2 Channel move time / channel closing transmission time

After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel not exceeding 60ms.

The test is performed during normal operation with the highest bandwidth supported by the DUT.

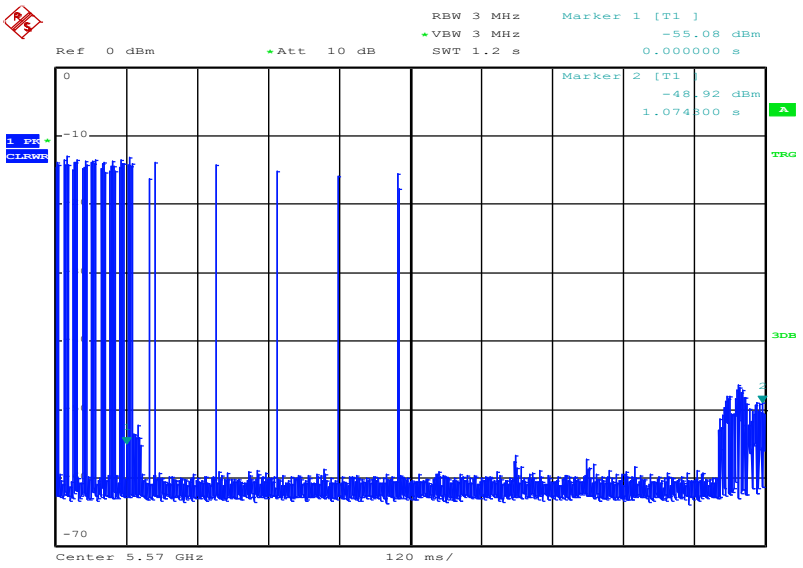
Channel Closing Time



Plot 12

Note: With Marker 1 at the end of the radar pulse (t = 0ms) the Channel Closing Time is determined by setting a Delta-Marker to the point where the last transmission occurred. The Channel Closing Time is 474.38ms.

Channel Closing Transmission Time

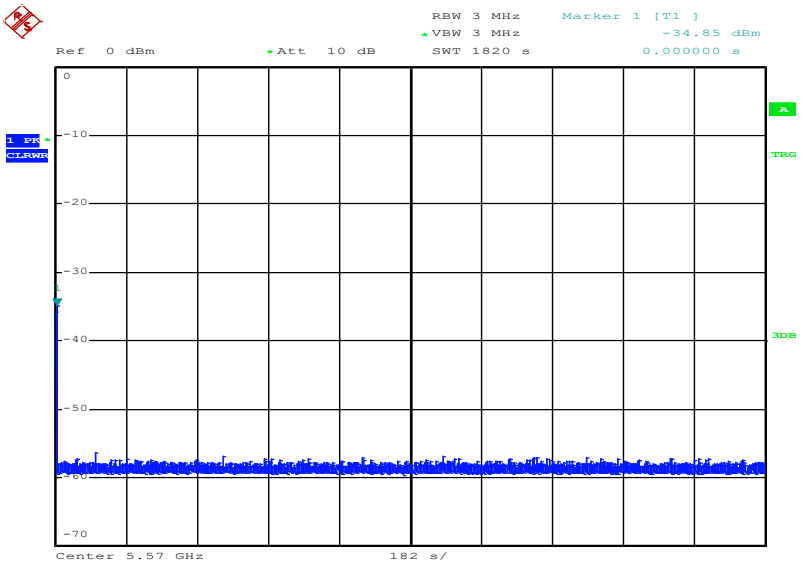


Plot 13

Note: The accumulated transmission time is calculated by the number of bins occurring after t = 0ms multiplied with the Time-per-sweep point-factor resulting from the Sweep Time and number of Sweep Points of the Spectrum Analyser.
The Channel Closing Transmission Time is 44.7ms.

11.4.3 Non-Occupancy Period

A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non occupancy period starts at the time when the radar system is detected.



Plot 14

11.4.4 In-Service Monitoring / Statistical Performance Check

To determine the ability of the device to detect the radar test waveforms statistical data is gathered.

A detailed and pulse related evaluation of the test results can be found along with the sample parameter data sheets in the Test Report Annex I.

Short Pulse Radar Test Waveforms

According the table in section 11.1.311.1.2 the minimum percentage of successful detections for Short Pulse Radar Test Waveforms is 60% out of 30 trials. In addition an aggregate minimum percentage of successful detections across all Short Pulse Radar Types 1-4 is required and calculated as follows:

$$P_{sum} = \frac{P_d1 + P_d2 + P_d3 + P_d4}{4}$$

where: P_d is the percentage of successful detections for each radar burst
P_{sum} is the aggregate percentage of successful detections

The minimum percentage of successful aggregate detections across all Short Pulse Radar Types 1-4 is 80%.

Results HT20-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
1	30	28	**93.3**
2	30	25	**83.3**
3	30	25	**83.3**
4	30	21	**70.0**
Aggregate (Radar Types 1-4)			**82.5**

Results HT40-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
1	30	28	**93.3**
2	30	24	**80.0**
3	30	24	**80.0**
4	30	27	**90.0**
Aggregate (Radar Types 1-4)			**85.8**

Results VHT80-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
1	30	26	**86.7**
2	30	26	**86.7**
3	30	23	**76.7**
4	30	22	**73.3**
Aggregate (Radar Types 1-4)			**80.8**

Results AC160-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
1	30	21	**70**
2	30	27	**90**
3	30	27	**90**
4	30	21	**70**
Aggregate (Radar Types 1-4)			**80**

Long Pulse Radar Test

Results HT20-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
5	30	28	**93.3**

Results HT40-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
5	30	26	**86.7**

Results VHT80-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
5	30	30	**100**

Results AC160-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
5	30	28	**93.3**

Frequency Hopping Radar Test

Results HT20-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
6	30	30	**100**

Results HT40-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
6	30	30	**100**

Results VHT80-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
6	30	23	**76.7**

Results AC160-Mode:

Radar Type	Number of Trials	Number of Successful Detections	Percentage of Successful Detections
6	30	30	**100**

12 Observations

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

13 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
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
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing

14 Document history

Version	Applied changes	Date of release
-/-	Initial release	2022-12-19
A	Detection Threshold calculation added (Section 7.1)	2023-02-02

15 Accreditation Certificate – D-PL-12076-01-05

first page	last page
	

Note: The current certificate annex is published on the websites (link see below).

https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-05e.pdf

https://ctcadvanced.com/app/uploads/2020/06/D-PL-12076-01-05_TCB_USA.pdf

################################ END OF TEST REPORT ################################