RF – TEST REPORT

- FCC Part 15.407, RSS-247 – DFS -

Type / Model Name	:	AMN42012
Product Description	:	Video display unit
Applicant	:	TQ-Systems GmbH
Address	:	Gut Delling, Mühlstraße 2
		82229 SEEFELD, GERMANY
Manufacturer	:	Amimon Ltd.
Address	:	Zarhin St. 26
		4366250 RA'ANANA, ISRAEL

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. : 80190169-00 Rev_1	12. January 2024 Date of issue

Deutsche Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 15, Subpart E, Section 15.407	Operation within the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, 5.47 - 5.725 GHz and 5.725 - 5.825 GHz
KDB 905462 D02 v02	UNII DFS Compliance Procedures New Rules
RSS-247 Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 Photo documentation of the EUT – Detailed photos see attachment A

2.4 General remarks

The EUT is a master device operating in the DFS frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz.

2.5 Short description of the equipment under test (EUT)

The EUT is a receiving unit which receives signals transmitted from a video source unit, which is connected to a camera to capture video signals thus creating a wireless video link. The EUT is the video display unit that receives the video information transmitted from a companion unit and transfers the image to various types of computer monitors/displays. This enables the user or camera operator to monitor the video transmitted from the remoted camera connected to the companion.
The EUT is integrated into a 4k WHDI Video Receiver WLV.RX with internal antennas.
The EUT uses modulation with 40 MHz bandwidth and is carried over the 5 GHz band.
It has no TPC function.
The output power is not accessible by the user.

Number of tested samples:	1
Serial number:	Prototype
Firmware version:	DracoRx_VER_7_6_9
FCC ID:	2ANFF-AMN42012
IC ID:	23072-AMN42012
Highest EIRP:	18.9 dBm
Lowest EIRP:	18.5 dBm

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency and channel plan

The operating frequency in DFS frequency bands is 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz

Channel	Frequency (MHz)
54	5270
62	5310

102	5510
110	5550
118	5590
126	5630
134	5670
142	5710

Note: For use in Canada channels 118 and 126 are blocked.

2.8 Transmit operating modes

- only the 40 MHz BW is supported by the EUT

2.9 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Name	Connector	Frequency band	Gain
1	Wide band PCB antenna	X8	U.FI	5 GHz – 7 GHz	1.8 dBi
2	Wide band PCB antenna	X15	U.FI	5 GHz – 7 GHz	1.8 dBi
3	Wide band PCB antenna	X16	U.FI	5 GHz – 7 GHz	1.8 dBi
4	Wide band PCB antenna	X17	U.FI	5 GHz – 7 GHz	1.8 dBi
5	Wide band PCB antenna	X18	U.FI	5 GHz – 7 GHz	1.8 dBi

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 12 V/DC +/-5% (AC-Adapter, 100..240 V/AC, 50Hz..60Hz)

2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables were connected during the measurements:

- AC-Adapter Model : Friwo FOX18-FW8001/12
- Companion device with camera Model : TQ-Systems, CBLV.TX
- Laptop Model : Hp EliteBook 840
- PC + Display Model : BENQ + Elegato Camlink 4k

2.12 Determination of worst-case conditions for final measurement

Following channels and test modes were selected for the final test as listed below:

Available Channel	Tested Channel	Power Setting	Modulation	Modulation Type	BW
54 - 142	54	P16	OFDM	BPSK	40 MHz

2.12.1 **Test jig**

No test jig is used.

2.12.2 **Test software**

Special test software provided by customer is used.

3 TEST RESULT SUMMARY

Operating in the 5250 MHz - 5350 MHz and 5470 MHz - 5725 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.407(h)(2)	RSS-247, 6.3.1	U-NII detection bandwidth	passed
15.407(h)(2)(ii)	RSS-247, 6.3.2b	Channel availability check time	passed
15.407(h)(2)(iii)	RSS-247, 6.3.2c	Channel move time	passed
15.407(h)(2)(iii)	RSS-247, 6.3.2d	Channel close time	passed
15.407(h)(2)(iv)	RSS-247, 6.3.2e	Non-occupancy period	passed
15.407(h)(2)	RSS-247, 6.3	Statistical performance check	passed

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80190169-00	0	28 November 2023	Initial test report
80190169-00	1	12 January 2024	2.7 Channel plan Canada updated

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 15 November 2023

Testing concluded on : 22 November 2023

Checked by:

Jürgen Pessinger 2024.01.15 07:48:01 +01'00'

Jürgen Pessinger
Radio Team

Tested by:

C. Thaller 2024.01.15 07:00:33 +01'00'

Christopher Thaller
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15 - 35 °C
Humidity:	30 - 60 %
Atmospheric pressure:	86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 % The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 2011 + A1 / 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement protocol for FCC and ISED

4.4.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011
ISED: DE0009

4.4.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

5 TEST CONDITIONS AND RESULTS

5.1 DFS requirements

Applicability of DFS requirements prior to use of a channel (KDB 905462 table 1)

Requirement	Operational mode		
	Master	Client without radar detection	Client with radar detection
Non-Occupancy Period	**Yes**	Not required	Yes
DFS Detection Threshold	**Yes**	Not required	Yes
Channel Availability Check Time	**Yes**	Not required	Not required
U-NII Detection Bandwidth	**Yes**	Not required	Yes

Applicability of DFS requirements during normal operation (KDB 905462 table 2)

Requirement	Operational mode		
	Master	Client without radar detection	Client with radar detection
DFS Detection Threshold	**Yes**	Not required	Yes
Channel Closing Transmission Time	**Yes**	Yes	Yes
Channel Move Time	**Yes**	Yes	Yes
U-NII Detection Bandwidth	**Yes**	Not required	Yes

DFS Detection Tresholds for master or Client Incorporating DFS (KDB 905462 table 3)

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-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 waveform 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. **Note 3**: EIRP is based on the highest antenna gain. For MIMO evices refer to KDB Publication 66291 D01.	

DFS DFS Response Requirement Values (KDB 905462 table 4)

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.

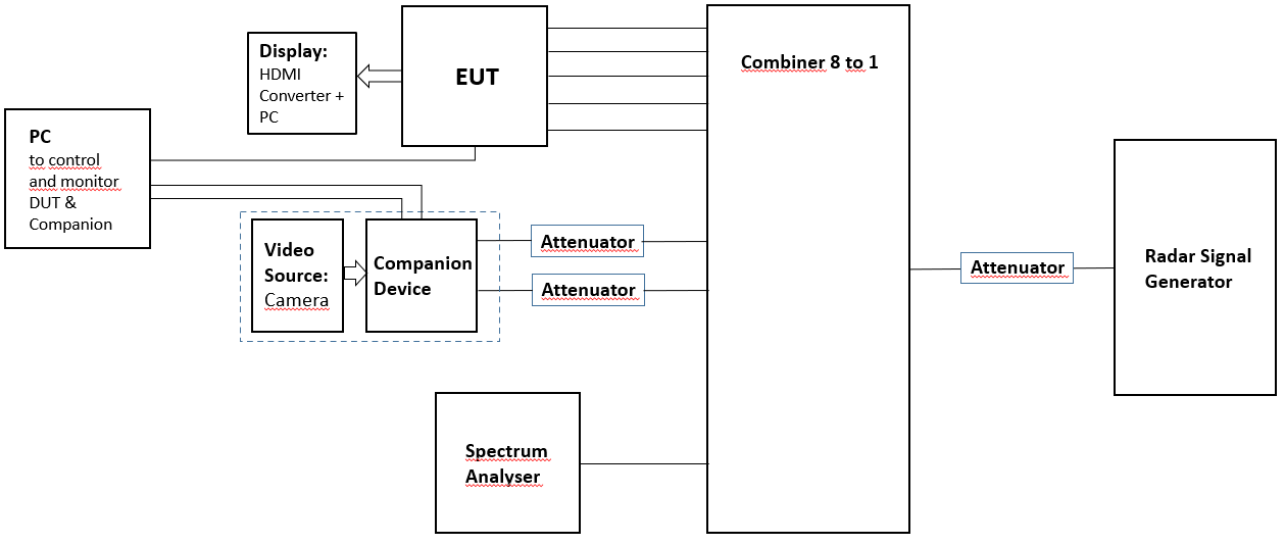
5.2 Description of measurement

For test instruments and accessories used see section 6 Part **DFS**.

For measurement of DFS the conducted setup for Master with injection at the Master according to KDB 905462 is considered. The setup consists of a radar test signal generator, spectrum analyser, EUT (master device), client (slave device), power combiner/splitters and attenuators. The client device is set up to accociate with the EUT. The radar waveform is injected into the EUT (Master).

The EUT and the companion device (CBLV.TX + camera) are controlled by AppCom with Scripts. Monitoring of the EUT is done with DebugView. For using these SW Tools, refer to *AppCom_ Connecting devices and using scripts.pdf*

Schematic of conducted DFS test setup:



For detailed photo documentation of test setup please refer to **Attachment B**.

5.3 Radar test waveforms

Short Pulse Radar Test Waveforms (KDB 905462)

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 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	$Roundup\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	60 %	30
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. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 µsec is selected, the number of pulses would be $Roundup\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{3066}\right)\right\} = Roundup\{17.2\} = 18$

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

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

Long Pulse Radar Test Waveform (KDB 905462)

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. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a transmission period will have the same chirp width. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst Count. Each interval is of length (12,000,000 / Burst Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

Frequency hopping radar test waveform (KDB 905462)

Radar type	Pulse width (µsec)	PRI (µsec)	Pulses per hop	Hopping rate (kHz)	Hopping sequence length (ms)	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 by the following algorithm:

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. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

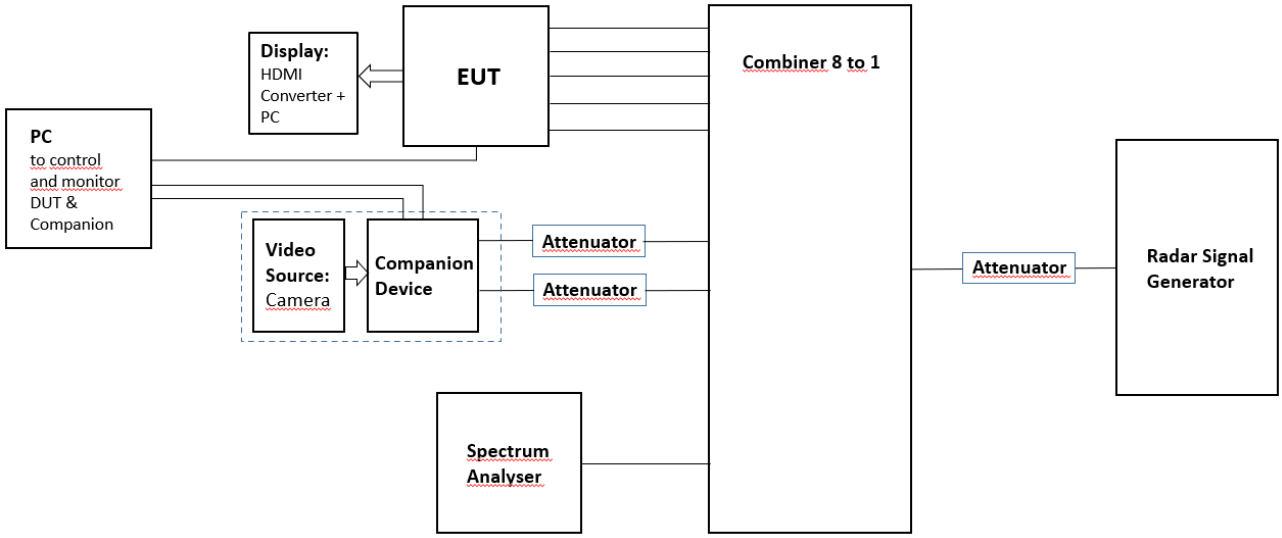
5.4 Radar waveform calibration procedure

The calibration of the radar waveforms is performed conducted. A vector signal generator is used to establish the test signal level for each radar type. During the calibration process the master device and the slavedevice is set on no transmission. The spectrum analyser is set to zero span (time domain) at the frequency of the radar waveform generator. Peak detection is used for the measurement.

With the signal generator and spectrum analyser tuned to the test frequency, each radar pulse is triggered and observed on the spectrum analyser. The DFS Detection Threshold is then verified for each radar pulse type (0-6).
The level of the signal generator is varied till the spectrum analyser reading shows the wanted level at the input of the master.

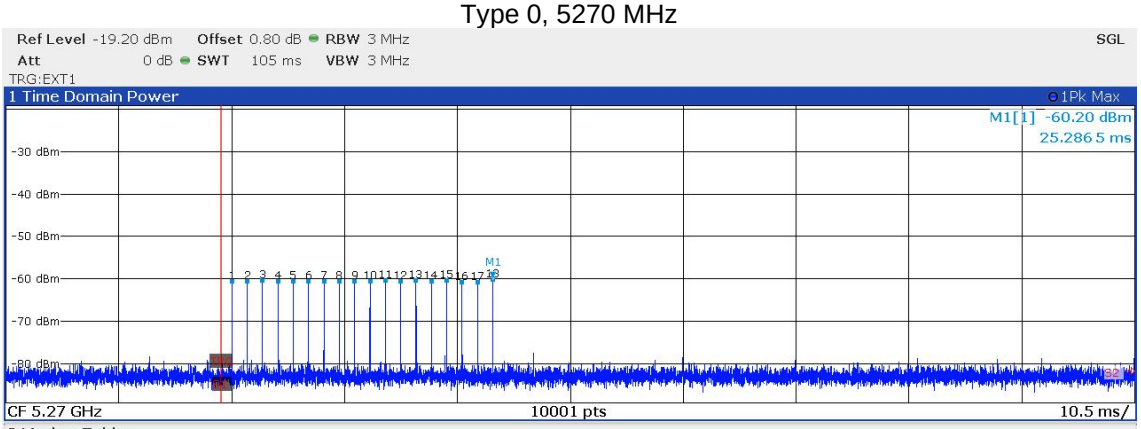
Test setup and radar waveform calibration:

Calibration setup:



Radar Waveform Calibration results:

Type 0, 5270 MHz



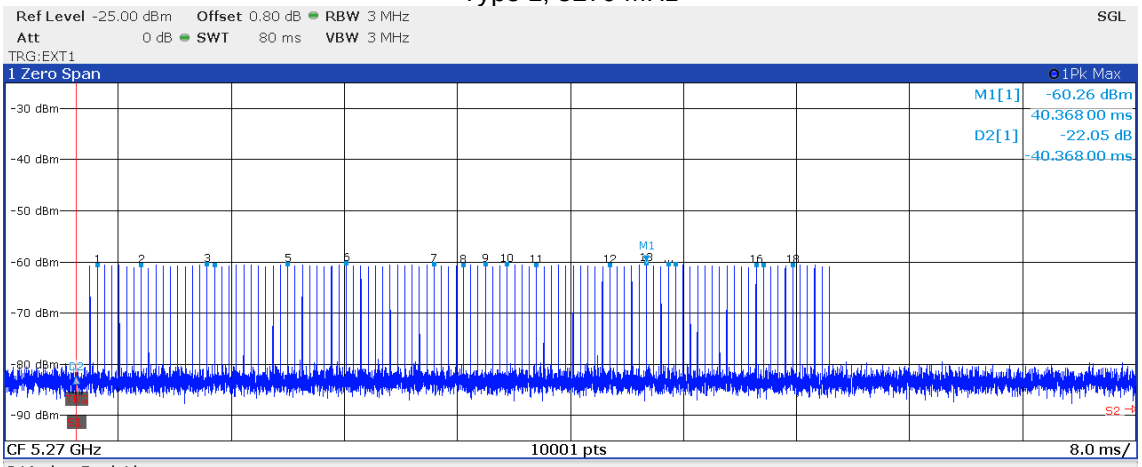
2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**25.286 5 ms**	**-60.20 dBm**	TD Pow RMS	**-81.45 dBm**

3 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.010 500 ms	-60.631 dBm	10	13.862 500 ms	-60.516 dBm
2	2.438 500 ms	-60.492 dBm	11	15.290 500 ms	-60.376 dBm
3	3.866 500 ms	-60.445 dBm	12	16.718 500 ms	-60.470 dBm
4	5.294 500 ms	-60.485 dBm	13	18.146 500 ms	-60.430 dBm
5	6.722 500 ms	-60.540 dBm	14	19.574 500 ms	-60.523 dBm
6	8.150 500 ms	-60.517 dBm	15	21.002 500 ms	-60.266 dBm
7	9.578 500 ms	-60.568 dBm	16	22.430 500 ms	-60.722 dBm
8	11.006 500 ms	-60.648 dBm	17	23.858 500 ms	-60.724 dBm
9	12.434 500 ms	-60.564 dBm	18	25.286 500 ms	-60.200 dBm

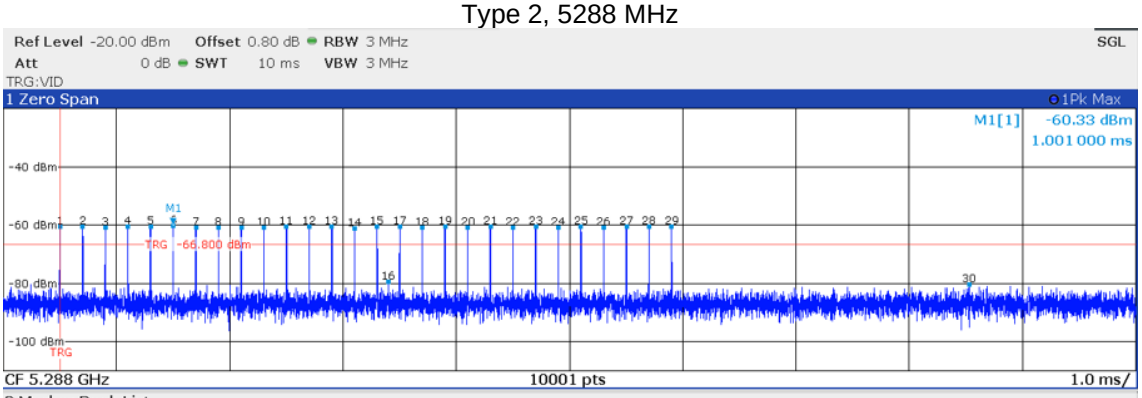
Type 1, 5270 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.520 000 ms	-60.570 dBm	10	30.528 000 ms	-60.457 dBm
2	4.632 000 ms	-60.570 dBm	11	32.600 000 ms	-60.527 dBm
3	9.288 000 ms	-60.377 dBm	12	37.784 000 ms	-60.549 dBm
4	9.808 000 ms	-60.530 dBm	13	40.368 000 ms	-60.258 dBm
5	14.992 000 ms	-60.465 dBm	14	41.928 000 ms	-60.464 dBm
6	19.136 000 ms	-60.337 dBm	15	42.440 000 ms	-60.462 dBm
7	25.352 000 ms	-60.445 dBm	16	48.144 000 ms	-60.547 dBm
8	27.424 000 ms	-60.577 dBm	17	48.656 000 ms	-60.544 dBm
9	28.976 000 ms	-60.506 dBm	18	50.728 000 ms	-60.580 dBm

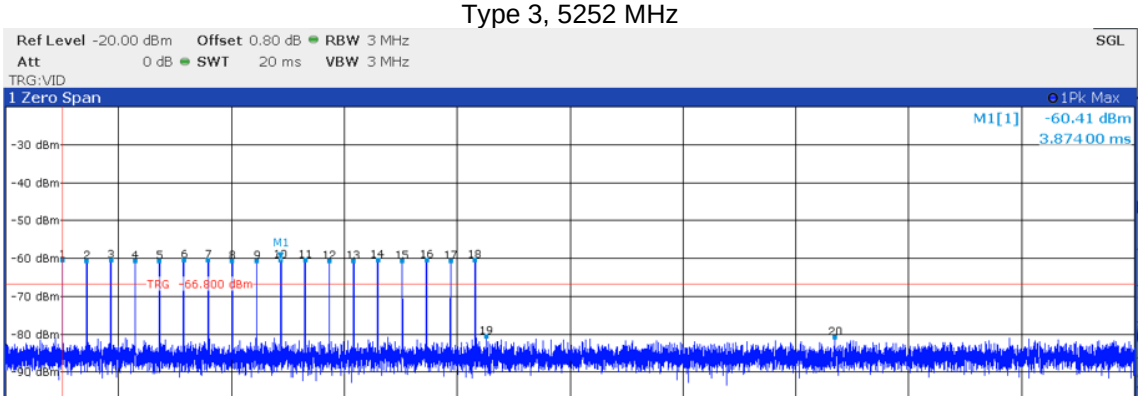
Type 2, 5288 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	2.000 000 µs	-60.719 dBm	16	2.902 000 ms	-79.572 dBm
2	201.000 000 µs	-60.727 dBm	17	3.003 000 ms	-60.700 dBm
3	403.000 000 µs	-60.829 dBm	18	3.202 000 ms	-60.752 dBm
4	603.000 000 µs	-60.720 dBm	19	3.401 000 ms	-60.660 dBm
5	802.000 000 µs	-60.724 dBm	20	3.602 000 ms	-60.856 dBm
6	1.001 000 ms	-60.327 dBm	21	3.803 000 ms	-60.435 dBm
7	1.201 000 ms	-60.748 dBm	22	4.001 000 ms	-60.756 dBm
8	1.401 000 ms	-60.804 dBm	23	4.202 000 ms	-60.687 dBm
9	1.602 000 ms	-60.981 dBm	24	4.403 000 ms	-60.759 dBm
10	1.802 000 ms	-60.793 dBm	25	4.602 000 ms	-60.675 dBm
11	2.001 000 ms	-60.710 dBm	26	4.801 000 ms	-60.752 dBm
12	2.201 000 ms	-60.700 dBm	27	5.003 000 ms	-60.689 dBm
13	2.401 000 ms	-60.710 dBm	28	5.202 000 ms	-60.589 dBm
14	2.603 000 ms	-61.071 dBm	29	5.402 000 ms	-60.711 dBm
15	2.802 000 ms	-60.632 dBm	30	8.030 000 ms	-80.269 dBm

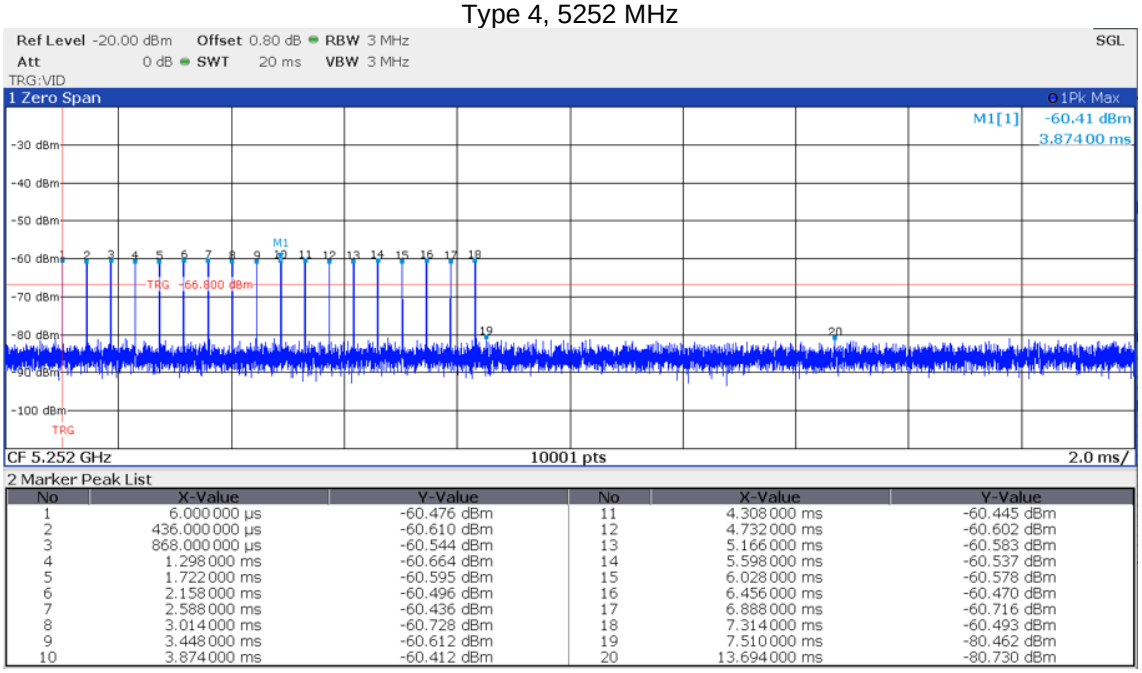
Type 3, 5252 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	6.000 000 µs	-60.476 dBm	11	4.308 000 ms	-60.445 dBm
2	436.000 000 µs	-60.610 dBm	12	4.732 000 ms	-60.602 dBm
3	868.000 000 µs	-60.544 dBm	13	5.166 000 ms	-60.583 dBm
4	1.298 000 ms	-60.664 dBm	14	5.598 000 ms	-60.537 dBm
5	1.722 000 ms	-60.595 dBm	15	6.028 000 ms	-60.578 dBm
6	2.158 000 ms	-60.496 dBm	16	6.456 000 ms	-60.470 dBm
7	2.588 000 ms	-60.436 dBm	17	6.888 000 ms	-60.716 dBm
8	3.014 000 ms	-60.728 dBm	18	7.314 000 ms	-60.493 dBm
9	3.448 000 ms	-60.612 dBm	19	7.510 000 ms	-80.462 dBm
10	3.874 000 ms	-60.412 dBm	20	13.694 000 ms	-80.730 dBm

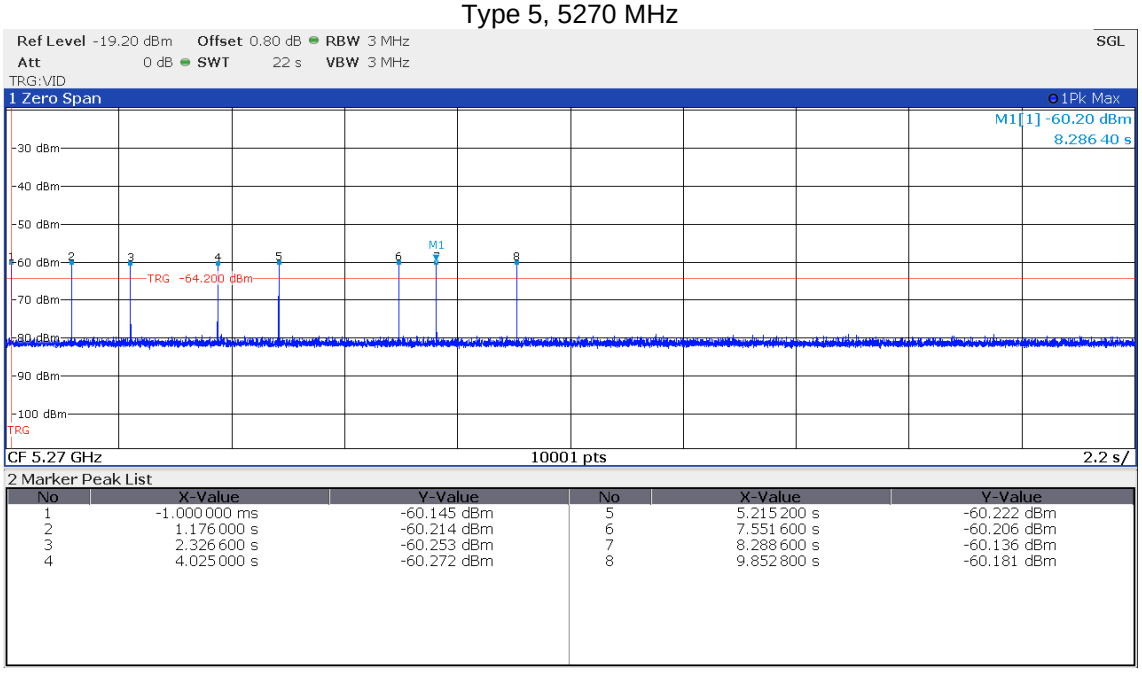
Type 4, 5252 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	6.000 000 µs	-60.476 dBm	11	4.308 000 ms	-60.445 dBm
2	436.000 000 µs	-60.610 dBm	12	4.732 000 ms	-60.602 dBm
3	868.000 000 µs	-60.544 dBm	13	5.166 000 ms	-60.583 dBm
4	1.298 000 ms	-60.664 dBm	14	5.598 000 ms	-60.537 dBm
5	1.722 000 ms	-60.595 dBm	15	6.028 000 ms	-60.578 dBm
6	2.158 000 ms	-60.496 dBm	16	6.456 000 ms	-60.470 dBm
7	2.588 000 ms	-60.436 dBm	17	6.888 000 ms	-60.716 dBm
8	3.014 000 ms	-60.728 dBm	18	7.314 000 ms	-60.493 dBm
9	3.448 000 ms	-60.612 dBm	19	7.510 000 ms	-80.462 dBm
10	3.874 000 ms	-60.412 dBm	20	13.694 000 ms	-80.730 dBm

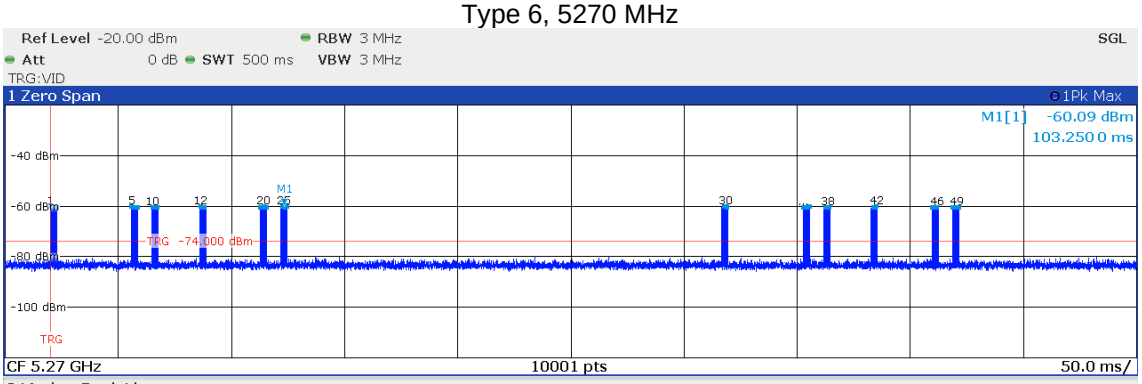
Type 5, 5270 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	-1.000 000 ms	-60.145 dBm	5	5.215 200 s	-60.222 dBm
2	1.176 000 s	-60.214 dBm	6	7.551 600 s	-60.206 dBm
3	2.326 600 s	-60.253 dBm	7	8.288 600 s	-60.136 dBm
4	4.025 000 s	-60.272 dBm	8	9.852 800 s	-60.181 dBm

Type 6, 5270 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	0.000 000 s	-60.298 dBm	26	103.900 000 ms	-60.374 dBm
2	2.000 000 ms	-60.289 dBm	27	104.550 000 ms	-60.130 dBm
3	2.300 000 ms	-60.369 dBm	28	297.700 000 ms	-60.243 dBm
4	2.650 000 ms	-60.389 dBm	29	298.050 000 ms	-60.241 dBm
5	35.950 000 ms	-60.251 dBm	30	298.400 000 ms	-60.222 dBm
6	36.600 000 ms	-60.428 dBm	31	299.050 000 ms	-60.398 dBm
7	36.950 000 ms	-60.420 dBm	32	332.700 000 ms	-60.405 dBm
8	37.300 000 ms	-60.317 dBm	33	334.000 000 ms	-60.405 dBm
9	38.600 000 ms	-60.411 dBm	34	334.350 000 ms	-60.415 dBm
10	45.300 000 ms	-60.417 dBm	35	335.350 000 ms	-60.253 dBm
11	47.300 000 ms	-60.429 dBm	36	342.350 000 ms	-60.390 dBm
12	66.250 000 ms	-60.266 dBm	37	342.700 000 ms	-60.347 dBm
13	66.950 000 ms	-60.429 dBm	38	343.700 000 ms	-60.319 dBm
14	67.600 000 ms	-60.416 dBm	39	344.000 000 ms	-60.405 dBm
15	67.900 000 ms	-60.403 dBm	40	363.650 000 ms	-60.373 dBm
16	92.900 000 ms	-60.386 dBm	41	364.650 000 ms	-60.343 dBm

5.5 U-NII Detection Bandwidth

5.5.1 Applicable standard

According to FCC Part 15 Subpart E, Section 15.407(h)(2):
U–NII devices operating with any part of its 26 dB emission bandwidth in the 5.25–5.35 GHz and 5.47–5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

According to RSS-247 6.3.1:
The device must detect radar signals within its entire emission bandwidth.

5.5.2 Description of Measurement

The EUT is set up as a standalone device with no associated client and no data traffic.

A single radar burst of type 0 at the centre frequency is generated and the response of the EUT is noted. This procedure is repeated for at least 10 times. The minimum detection percentage is 90%.

Starting at the centre frequency of the EUT operating channel, the radar frequency is increased in 5 MHz steps, repeating the minimum of 10 trials, until the detection rate falls below the U-NII detection bandwidth criterion (90%). The measurement is repeated in 1 MHz steps at frequencies 5 MHz below where the detection rate begins to fall. The highest frequency (referred as F_H) at which detection is greater or equal than the U-NII detection bandwidth criterion (90%) is recorded.
The procedure is repeated for decreasing frequencies until the lowest frequency F_L and recorded.

U-NII detection bandwith = F_H - F_L

5.5.3 Test result

EUT configuration - 5270 MHz, 40MHz BW											
Radar Frequency	DFS Detection Trials (1 = detection, 0 = no detection)										
(MHz)	1	2	3	4	5	6	7	8	9	10	detection rate (%)
5250	1	1	1	1	1	1	1	1	0	1	90
5255	1	1	1	1	1	1	1	1	1	1	100
5260	1	1	1	1	1	1	1	1	1	1	100
5265	1	1	1	1	1	1	1	1	1	1	100
5270	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	100
5275	1	1	1	1	1	1	1	1	1	1	100
5280	1	1	1	1	1	1	1	1	1	1	100
5285	1	1	1	1	1	1	1	1	1	1	100
5290	1	1	1	1	1	1	1	1	1	1	100
Detection Percentage											98.8%
Detection Bandwidth = f_h - f_l = 5290MHz - 5250MHz = 40MHz											
EUT 99% Bandwidth = 34MHz											

Requirements:

Minimum 100% of the U-NII 99% transmission power bandwidth.

During the U-NII Detection Bandwidth detection test, radar type 0 is be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

The requirements are **FULFILLED.**

Remarks: None

5.6 Channel availability check time

5.6.1 Applicable standard

According to FCC Part 15 Subpart E, Section 15.407(h)(2)(ii):
Channel Availability Check Time. A U–NII device shall check if there is a radar system already operating on the channel before it can initiate a transmission on a channel and when it has to move to a new channel. The U–NII device may start using the channel if no radar signal with a power level greater than the interference threshold values listed in paragraph (h)(2) of this section, is detected within 60 seconds.

According to RSS-247 6.3.2b:
Channel availability check time: the device shall check whether there is a radar system already operating on the channel before it initiates a transmission on a channel and when it moves to a channel. The device may start using the channel if no radar signal with a power level greater than the interference threshold value specified in Section 6.3.1 above is detected within 60 seconds. This requirement only applies in the master operational mode.

5.6.2 Description of Measurement

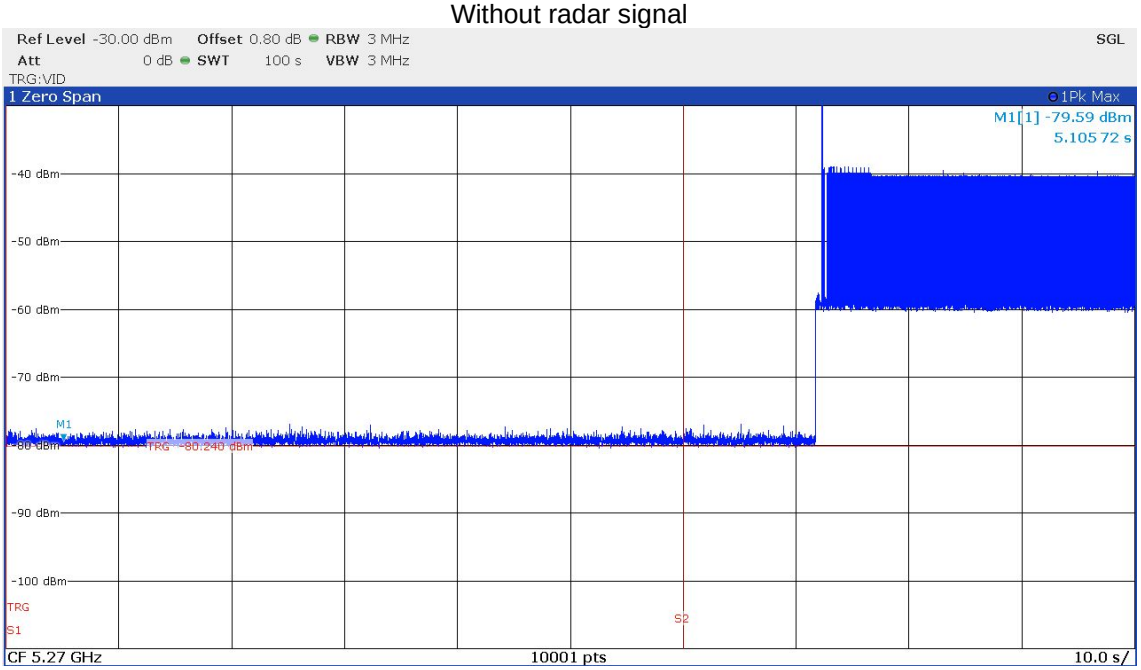
For the initial channel availbity check time:
The EUT is powered on and instructed to operate on the test channel.
At the same time the EUT is powered on, the spectrum analyser is set to zero span mode with a 3 MHz RBW and 3 MHz VBW on the channel occupied by the radar with a 2 minute sweep time. The spectrum analyser's sweep is started at the same time power is applied to the EUT. no radar burst is generated to observe the start up time of the EUT.

For Radar Burst at the Beginning of the Channel Availability Check Time:
The EUT is powered on. The instant when the EUT has completed its power-up sequence is marked.
A single burst of one of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at the marked instant.
The successful detection of the radar burst by the EUT is recorded. Observation of test channel for EUT emissions continues for 2.5 minutes after the radar burst has been generated.
It is shown that during the 2.5 minute measurement window no EUT transmissions occurres on the test channel.

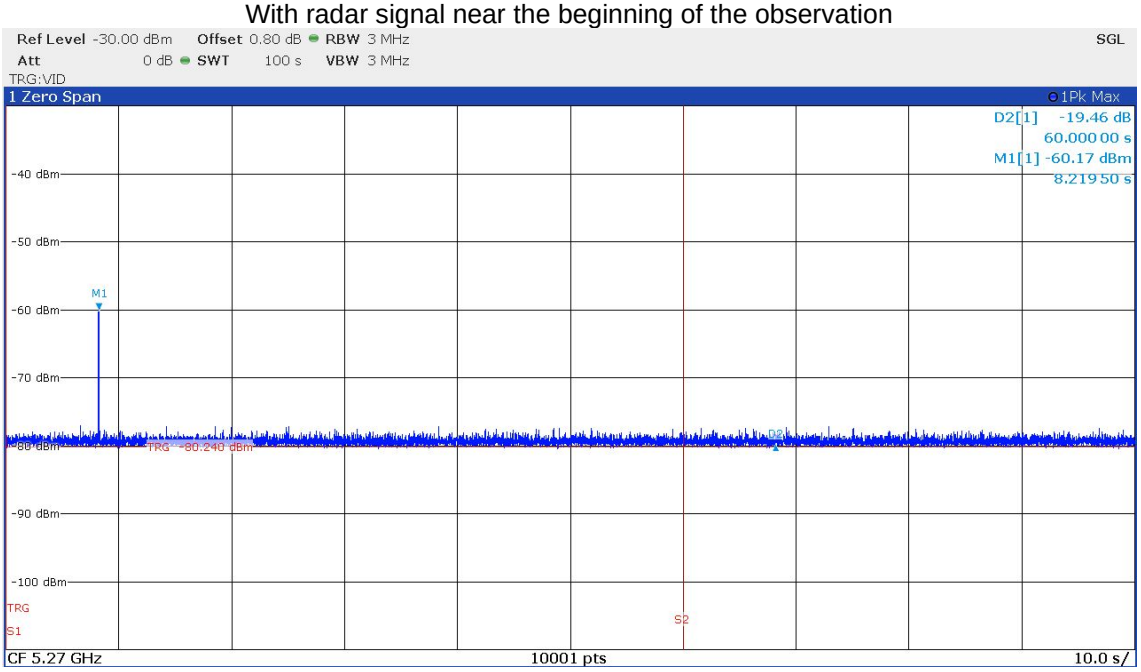
For Radar Burst at the End of the Channel Availability Check Time:
The EUT is powered on. The instant when the EUT has completed its power-up sequence is marked.
A single burst of one of the Short Pulse Radar Types 0-4 will commence within a 6 second window starting at the marked instant + 54 seconds.
The successful detection of the radar burst by the EUT is recorded. Observation of test channel for EUT emissions continues for 2.5 minutes after the radar burst has been generated.
It is shown that during the 2.5 minute measurement window no EUT transmissions occurres on the test channel.

5.6.3 Test result

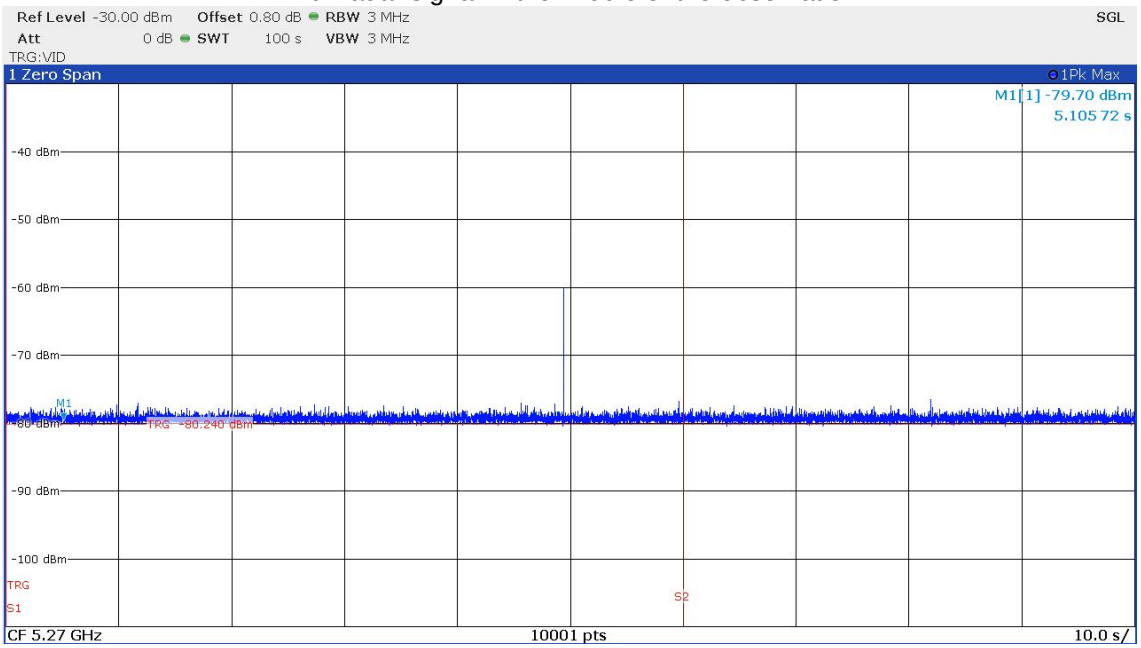
Without radar signal



With radar signal near the beginning of the observation



With radar signal in the middle of the observation



Requirements:

Parameter	Value
Channel Availability Check Time	60 seconds

The requirements are **FULFILLED.**

Remarks: None

5.7 In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

5.7.1 Applicable standard

According to FCC Part 15 Subpart E, Section 15.407(h)(2)(iii):
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.

According to FCC Part 15 Subpart E, Section 15.407(h)(2)(iv):
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.

According to RSS-247 6.3.2c:
After a radar signal is detected, the device shall cease all transmissions on the operating channel within 10 seconds.

According to RSS-247 6.3.2d:
Channel closing transmission time: is comprised of 200 ms 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 ms) over the remaining 10-second period of the channel move time.

According to RSS-247 6.3.2e:
A channel that has been flagged as containing a radar signal, either by a channel availability check or in-service monitoring, is subject to a 30-minute non-occupancy period where the channel cannot be used by the LE-LAN device. The non-occupancy period starts from the time that the radar signal is detected.

5.7.2 Description of Measurement

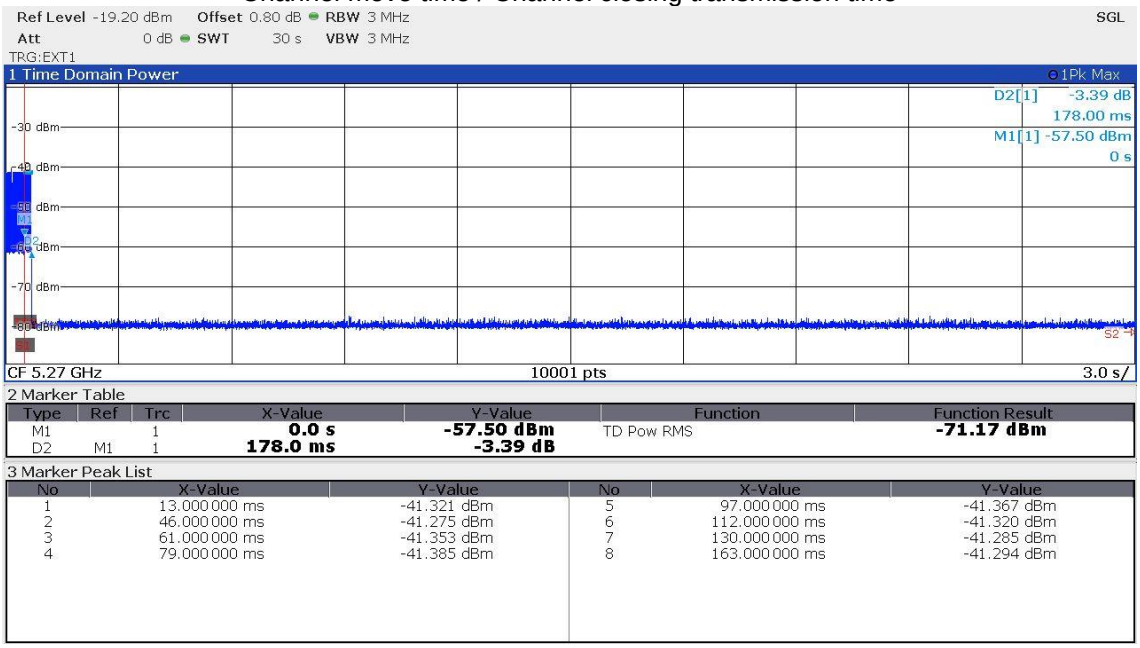
The EUT is set up as a Master device with associated client and data traffic. Live Video from the companion is streamed for the entire period of the test.

A radar burst of type 0 is generated while transmission of the EUT.

A spectrum analyser set to zero span is used to observe the transmission of the EUT after the radar burst.

5.7.3 Test result

Channel move time / Channel closing transmission time



2 Marker Table

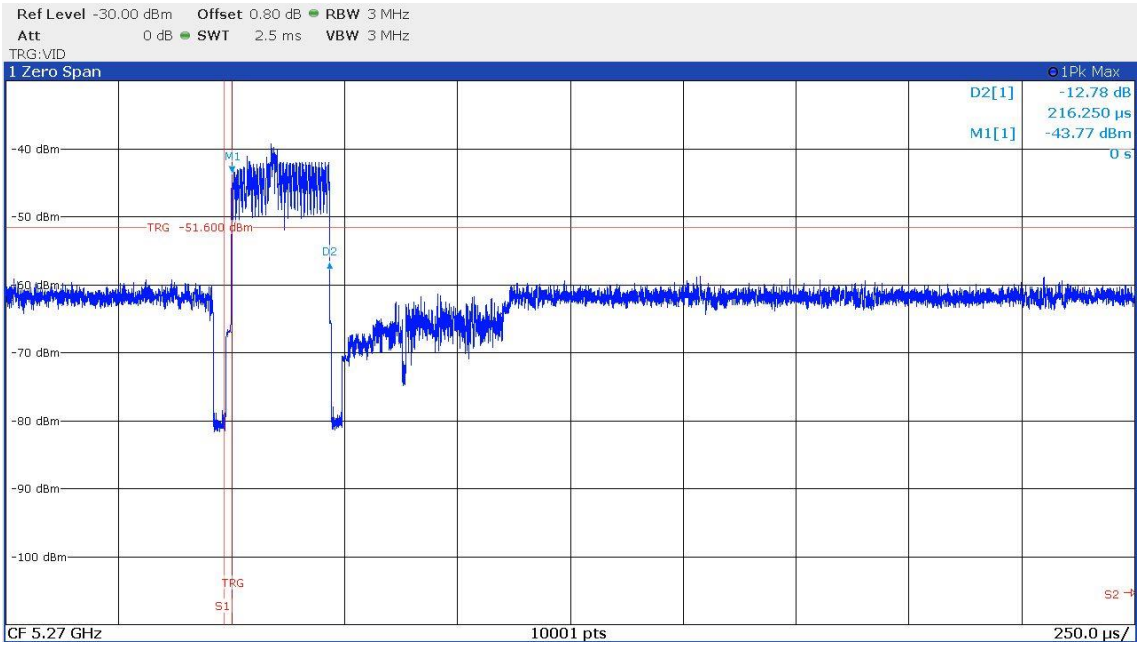
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**0.0 s**	**-57.50 dBm**	TD Pow RMS	**-71.17 dBm**
D2	M1	1	**178.0 ms**	**-3.39 dB**		

3 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	13.000 000 ms	-41.321 dBm	5	97.000 000 ms	-41.367 dBm
2	46.000 000 ms	-41.275 dBm	6	112.000 000 ms	-41.320 dBm
3	61.000 000 ms	-41.353 dBm	7	130.000 000 ms	-41.285 dBm
4	79.000 000 ms	-41.385 dBm	8	163.000 000 ms	-41.294 dBm

Channel Move Time: 178 ms

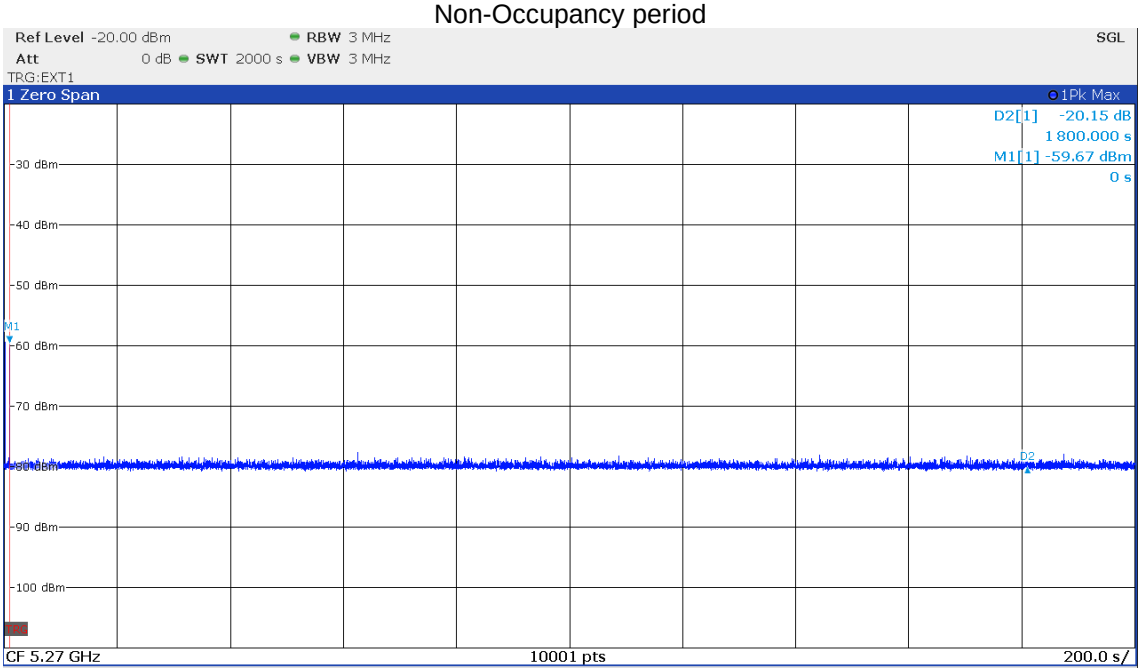
One Data Packet



Calculation of the Channel closing transmission time:

T_{cctt} = aggregate duration of all transmission from T1 to T2
8 transmission pulses are left after the radar puls (one transmission pulswidth 216.3 µs).
T_{cctt} = 8 times 216.3 µs = 1.73 ms

Non-Occupancy period



Requirements:

Parameter	Value
Non-Occupancy Period	Minimum 30 minutes
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
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.	

The requirements are **FULFILLED.**

Remarks: None

5.8 Statistical Performance Check

5.8.1 Applicable standard

According to KDB 905462 D02 v02:
Each of the Radar Pulse types requires a minimum percentage of detections while the EUT is transmitting and listening for potential radar systems operating within the DFS Detection Bandwidth.
For Short Pulse Radar types the aggregate minimum percentage of detections is 80 percent.
Fort the Long Pulse Radar types the minimum percentage of detections is 80 percent.
For the Frequency Hopping Radar type the minimum percentage of detections is 70 percent.

5.8.2 Description of Measurement

The EUT is set up as a Master device with associated client and data traffic. Live Video from companion is streamed for the entire period of the test. The EUT was also set into a test mode to show when a radar pulse was detected without reseting the device between trials.

A radar burst of type 1 - 6 is generated while transmission of the EUT. The DFS Detection Threshhold was used as the level while testing. The frequencies selected for the radar burst included several frequencies within the DFS Detection Bandwidth and frequencies near the edge of the bandwidth.

A spectrum analyser set to zero span is used to observe the transmission of the EUT after the radar burst.
For Short Pulse Radar types, observation of the EUT's transmission was made for 10 seconds after the radar burst.
For Long Pulse Radar types, an observation of the EUT's transmission was made for 22 seconds after the burst to ensre detection occurred. Also, the center frequency was varied within 90% of the Occupied Bandwidth.
After the performance check, statistical data was gathered with 40 trials each for the Short Pulse Radar types and 30 trials each for the Long Pulse Radar types.

5.8.3 Test result

Radar type	Number of trials	Number of successful detections	Minimum Percentage of Successful Detections
1	40	39	97.50%
2	40	40	100%
3	40	40	100%
4	40	38	95%
Aggregate = (97.5% + 100% + 100% + 95%) = 98.1%			

Radar Type	Trial #	Pulse Repetition Interval (µs)	Pulses per second	Pulse width (µs)	Detection (1=yes, 0=no)
1	1 (A13)	758	1319.3	1	**1**
	2 (A9)	678	1474.9	1	**1**
	3 (A3)	558	1792.1	1	**1**
	4 (A15)	798	1253.1	1	**1**
	5 (A2)	536	1858.7	1	**1**
	6 (A12)	738	1355.0	1	**1**
	7 (A4)	578	1730.1	1	**1**
	8 (A11)	718	1392.8	1	**1**
	9 (A1)	518	1930.5	1	**1**
	10 (A10)	698	1432.7	1	**1**
	11 (A6)	618	1618.1	1	**1**
	12 (A14)	778	1285.3	1	**1**
	13 (A8)	658	1519.8	1	**1**
	14 (A5)	598	1672.2	1	**1**
	15 (A7)	638	1567.4	1	**1**
	16	1112	889.3	1	**1**
	17	832	1201.9	1	**1**
	18	864	1157.4	1	**1**
	19	1880	531.9	1	**1**
	20	824	1213.6	1	**1**
	21	920	1086.9	1	**1**
	22	1590	628.9	1	**1**
	23	1980	505.1	1	**1**
	24	528	1893.9	1	**1**
	25	1400	714.3	1	**1**
	26	1690	591.7	1	**1**
	27	816	1225.5	1	**1**
	28	912	1096.5	1	**1**
	29	1008	992.1	1	**0**
	30	872	1146.8	1	**1**
	31	1200	833.3	1	**1**
	32	1310	763.4	1	**1**
	33	624	1602.6	1	**1**
	34	1500	666.7	1	**1**
	35	944	1059.3	1	**1**
	36	720	1388.9	1	**1**
	37	1800	555.6	1	**1**
	38	872	1146.8	1	**1**
	39	3072	325.5	1	**1**
	40	2080	480.8	1	**1**
					39/40
Detection Percentage					**97.5% (> 60%)**
EUT Frequency					5270 MHz
Radar Frequency					5252 - 5288 MHz

Radar Type	Trial #	Number of pulses	PRI (µs)	Pulse Width (µs)	Detection (1=yes, 0=no)
2	1	25	168	3.4	**1**
	2	23	188	4.5	**1**
	3	23	194	5.0	**1**
	4	23	196	4.7	**1**
	5	27	228	3.5	**1**
	6	26	162	3.6	**1**
	7	27	184	1.3	**1**
	8	26	176	2.6	**1**
	9	27	214	3.8	**1**
	10	26	176	1.2	**1**
	11	28	222	1.6	**1**
	12	28	182	3.0	**1**
	13	26	194	2.2	**1**
	14	24	194	4.7	**1**
	15	29	180	2.2	**1**
	16	26	194	3.5	**1**
	17	28	214	4.5	**1**
	18	25	154	1.9	**1**
	19	25	200	1.9	**1**
	20	25	186	1.1	**1**
	21	28	192	3.5	**1**
	22	26	208	2.3	**1**
	23	28	186	3.8	**1**
	24	27	188	4.3	**1**
	25	29	200	4.3	**1**
	26	28	216	3.6	**1**
	27	29	200	2.6	**1**
	28	27	216	1.6	**1**
	29	26	188	4.0	**1**
	30	25	172	4.1	**1**
	31	28	156	3.9	**1**
	32	26	220	3.6	**1**
	33	28	224	2.0	**1**
	34	28	200	2.1	**1**
	35	24	204	1.1	**1**
	36	28	201	3.1	**1**
	37	26	191	3.4	**1**
	38	26	180	2.0	**1**
	39	23	163	4.9	**1**
	40	23	167	3.6	**1**
Specifications		**23 - 29 pulses**	**150 - 230 µs**	**1 - 5 µs**	**40/40**
Detection Percentage					**100% (> 60%)**
EUT Frequency					5270 MHz
Radar Frequency					5252 - 5288 MHz

Radar Type	Trial #	Number of pulses	PRI (µs)	Pulse Width (µs)	Detection (1=yes, 0=no)
3	1	18	492	8.0	**1**
	2	17	214	7.5	**1**
	3	16	298	9.5	**1**
	4	17	460	8.3	**1**
	5	18	468	8.2	**1**
	6	17	428	7.5	**1**
	7	17	468	6.5	**1**
	8	17	354	7.0	**1**
	9	17	454	6.3	**1**
	10	17	216	9.8	**1**
	11	16	500	9.0	**1**
	12	17	462	8.0	**1**
	13	17	344	8.4	**1**
	14	16	452	6.6	**1**
	15	17	434	8.1	**1**
	16	16	336	8.8	**1**
	17	17	414	8.7	**1**
	18	18	258	6.2	**1**
	19	18	342	9.6	**1**
	20	18	272	8.2	**1**
	21	17	206	8.1	**1**
	22	17	428	6.5	**1**
	23	16	256	9.7	**1**
	24	17	376	6.0	**1**
	25	17	454	9.6	**1**
	26	17	498	9.2	**1**
	27	17	302	6.6	**1**
	28	17	314	9.8	**1**
	29	17	446	9.9	**1**
	30	18	308	8.4	**1**
	31	17	484	8.7	**1**
	32	18	350	8.6	**1**
	33	18	430	9.0	**1**
	34	17	480	6.3	**1**
	35	18	204	7.2	**1**
	36	17	496	9.7	**1**
	37	17	222	7.5	**1**
	38	17	220	6.3	**1**
	39	18	354	7.2	**1**
	40	17	266	7.4	**1**
Specifications		**16 - 18 pulses**	**200 - 500 µs**	**6 - 10 µs**	**40/40**
Detection Percentage					**100% (> 60%)**
EUT Frequency					5270 MHz
Radar Frequency					5252 - 5288 MHz

Radar Type	Trial #	Number of pulses	PRI (µs)	Pulse Width (µs)	Detection (1=yes, 0=no)
4	1	13	414	15.9	**1**
	2	12	434	19.9	**1**
	3	15	404	13.6	**1**
	4	14	354	12.6	**1**
	5	15	476	14.1	**1**
	6	13	494	18.5	**1**
	7	13	234	18.6	**1**
	8	15	282	14.1	**1**
	9	14	254	13.3	**1**
	10	12	346	14.2	**1**
	11	12	240	14.9	**1**
	12	13	464	16.0	**1**
	13	14	474	16.0	**1**
	14	16	216	16.6	**1**
	15	13	330	14.7	**1**
	16	14	356	19.9	**0**
	17	15	306	17.1	**1**
	18	15	408	15.6	**1**
	19	16	402	15.7	**1**
	20	13	432	12.3	**1**
	21	16	474	11.7	**1**
	22	13	416	17.8	**1**
	23	14	262	18.3	**1**
	24	14	398	18.1	**1**
	25	16	284	16.6	**1**
	26	16	286	18.9	**1**
	27	13	298	15.6	**1**
	28	15	316	13.0	**1**
	29	16	290	17.3	**1**
	30	14	378	11.8	**1**
	31	14	262	14.3	**1**
	32	15	191	12.5	**1**
	33	14	388	19.4	**1**
	34	14	338	17.2	**1**
	35	14	276	12.5	**1**
	36	16	407	12.4	**1**
	37	15	202	18.1	**0**
	38	15	208	15.4	**1**
	39	14	213	12.3	**1**
	40	15	241	13.5	**1**
Specifications		**12 - 16 pulses**	**200 - 500 µs**	**11 - 20 µs**	**38/40**
Detection Percentage					**96.67% (> 60%)**
EUT Frequency					5270 MHz
Radar Frequency					5252 - 5288 MHz

Radar Type	Trial #	Number of bursts	PRI (µs)	Chirp Width (MHz)	Pulse Width (µs)	Detection (1=yes, 0=no)
5	1	8	1205	9.5	63.8	**1**
	2	9	1405	6.5	56.5	**1**
	3	10	1402	15.6	84.7	**1**
	4	11	1241	10.3	78.3	**1**
	5	12	1766	14.6	86.5	**1**
	6	12	1506	14.1	92.5	**1**
	7	13	1662	7.6	54.9	**1**
	8	13	1331	9.6	90.7	**1**
	9	14	1482	17.5	70.0	**1**
	10	14	1760	11.0	60.0	**1**
	11	15	1416	14.7	66.4	**1**
	12	15	1232	13.7	78.4	**1**
	13	16	1220	17.8	64.5	**1**
	14	16	1001	16.6	96.0	**1**
	15	17	1061	14.0	76.1	**1**
	16	17	1180	13.1	66.3	**0**
	17	18	1004	11.7	88.8	**1**
	18	18	1066	8.4	67.5	**1**
	19	19	1007	8.8	61.2	**1**
	20	20	1109	7.1	53.7	**1**
	21	8	1590	9.5	85.6	**1**
	22	13	1331	5.8	77.4	**1**
	23	9	1819	10.3	63.7	**1**
	24	9	1928	11.6	96.5	**1**
	25	15	1002	14.7	90.0	**1**
	26	10	1832	11.5	94.3	**1**
	27	11	1241	10.3	61.6	**0**
	28	8	1150	6.8	76.2	**1**
	29	14	1451	17.7	81.2	**0**
	30	10	1795	11.6	73.4	**1**
Specifications		**8 - 20 bursts**	**1000 - 2000 µs**	**5 - 20 MHz**	**50 - 100 µs**	**27/30**
Detection Percentage						**90% (> 80%)**
EUT Frequency						5270 MHz
Radar Frequency						5254 - 5286 MHz

Radar Type	Trial #	Hopping Sequence Length (ms)	Pulses per Hop	Pulse Width (µs)	Detection (1=yes, 0=no)
6	1	300	9	1	**1**
	2	300	9	1	**1**
	3	300	9	1	**1**
	4	300	9	1	**1**
	5	300	9	1	**0**
	6	300	9	1	**1**
	7	300	9	1	**1**
	8	300	9	1	**1**
	9	300	9	1	**0**
	10	300	9	1	**1**
	11	300	9	1	**1**
	12	300	9	1	**1**
	13	300	9	1	**1**
	14	300	9	1	**1**
	15	300	9	1	**1**
	16	300	9	1	**1**
	17	300	9	1	**0**
	18	300	9	1	**1**
	19	300	9	1	**1**
	20	300	9	1	**1**
	21	300	9	1	**1**
	22	300	9	1	**1**
	23	300	9	1	**1**
	24	300	9	1	**1**
	25	300	9	1	**1**
	26	300	9	1	**1**
	27	300	9	1	**1**
	28	300	9	1	**1**
	29	300	9	1	**1**
	30	300	9	1	**1**
					27/30
Detection Percentage					**90% (> 70%)**
EUT Frequency					5270 MHz
Radar Frequency					5254 - 5286 MHz

Requirements:

Radar type	Pulse width (µsec)	PRI (µsec)	Number of pulses	Minimum percentage of successful detection	Minimum number of trials
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a 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	$Roundup\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	**60 %**	30
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

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

Radar type	Pulse width (µsec)	PRI (µsec)	Pulses per hop	Hopping rate (kHz)	Hopping sequence length (ms)	Minimum percentage of successful detection	Minimum number of trials
6	1	333	9	0.333	300	**70 %**	30

The requirements are **FULFILLED.**

Remarks: None

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
DFS	SMBV100A	02-02/05-09-001	24/03/2024	24/03/2021	21/02/2024	21/02/2023
	FSW43	02-02/11-21-001	22/05/2024	22/05/2023		
	HM 8143	02-02/50-10-016				
	KK-SF104-11SMA-11N-2M	02-02/50-14-002				
	minibend KR-16	02-02/50-16-017				
	18N-20	02-02/50-17-002			19/12/2023	19/06/2023
	18N-20	02-02/50-21-009			19/12/2023	19/06/2023
	6820.17.B 18GHz	02-02/50-23-002			26/12/2023	26/06/2023
	6810.17.A 12,4GHz	02-02/50-23-007			28/12/2023	28/06/2023
	53AS102-K10 DC-12,4GHz	02-02/50-23-008			28/12/2023	28/06/2023
	ZN4PD_642W_S_plus	02-02/50-23-010				

- End of test report -