



TEST REPORT

Reference No. : WTX21X07066106W
FCC ID : 2AQ7Q-DBA13310
Applicant : DTEN Inc
Address : 97 E. Brokaw Road, Suite 180, San Jose, CA 95112 United States
Product Name : DTEN Mate
Test Model : DBA13310
Standards : FCC Part 15E
Date of Receipt sample : Jul. 05, 2021
Date of Test : Jul. 05, 2021 to Jul. 27, 2021
Date of Issue : Jul. 27, 2021
Test Result : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F, Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,
Block 70 Bao'an District, Shenzhen, Guangdong, China

Tel.: +86-755-33663308

Fax.: +86-755-33663309

Tested by:

Reviewed By:

Approved & Authorized By:

Jason Su / Project Engineer

Lion Cai / RF Manager

Silin Chen / Manager



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**Report version**

Version No.	Date of issue	Description
Rev.00	Jul. 13, 2021	Original
/	/	/

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: DTEN Inc
Address of applicant: 97 E. Brokaw Road, Suite 180, San Jose, CA 95112

Manufacturer: DTEN Inc
Address of manufacturer: 97 E. Brokaw Road, Suite 180, San Jose, CA 95112

General Description of EUT

Product Name:	DTEN Mate
Trade Name:	DTEN
Model No.:	DBA13310
Adding Model:	/
Test Sample No.:	07066106W
Hardware Version:	/
Software Version:	/
Rated Voltage:	DC3.7V
Battery Capacity:	3500mAh
Power Adapter:	FJ-SW2120502400U Input:AC100-240V, 50/60Hz , 0.4A Output:DC5V, 2.4A
The EUT is only support slave without radar Detection function.	
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT

Support Standards:	802.11a, 802.11n(HT20), 802.11n(HT40), 802.11ac-VH80
Frequency Range:	5250-5350MHz, 5470-5725MHz,
Type of Modulation:	BPSK, QPSK, 16QAM, 64QAM, 256QAM
Type of Antenna:	Integral Antenna
Antenna Gain:	1.8dBi



1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.407:General technical requirements.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

KDB905462 D02:COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION.

KDB905462 D03:U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

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1.3 Test Methodology

All measurements contained in this report were conducted with KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

1.4 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under WIN XP were executed.

1.5 Test Facility

Address of the test laboratory

Laboratory:Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

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The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.6EUT Setup and Test Mode

The EUT in this application is a client device without radar detection capability and indicate the FCC identifier for the Master U-NII Device. During the test, the product works on the designated test channel and transmits normal data to the master.

Messages for communication between Master and Client Devices: 0101010101..... (Continuous cycle.)

The type of system architecture for the device in this application is IP based.,
more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11ac-HT(80)	5290MHz, 5530MHz,
Note: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report.		

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Core
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details				
Description	Manufacturer	Model	Serial Number	Antenna Gain
Router	LINKSYS	WRT32X	FCC ID: Q87-WRT3200ACM	1.41dBi



1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2021-03-27	2022-03-26
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2021-03-27	2022-03-26
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2021-03-27	2022-03-26
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2021-03-27	2022-03-26
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2021-03-27	2022-03-26
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2021-03-27	2022-03-26
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2021-03-27	2022-03-26
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2021-03-27	2022-03-26
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2021-03-27	2022-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2021-03-27	2022-03-26
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2021-04-12	2022-04-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2021-04-12	2022-04-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-19	2023-03-18
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-19	2023-03-18
SEMT-1042	Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2021-04-27	2023-04-26
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2021-04-27	2022-04-26
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2021-03-27	2022-03-26
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2021-03-27	2022-03-26
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2021-03-19	2023-03-18
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/



Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

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2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.407(h)	Dynamic Frequency Selection (DFS)	Pass

N/A: Not applicable

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3.Dynamic Frequency Selection (DFS)

3.1Requirement

Table 1:ApplicabilityofDFSRequirementsPriorto Use of a Channel

Requirement	OperationalMode		
	Master	ClientWithout RadarDetection	ClientWith Radar Detection
Non-OccupancyPeriod	Yes	Notrequired	Yes
DFSDetectionThreshold	Yes	Notrequired	Yes
ChannelAvailabilityCheckTime	Yes	Notrequired	Notrequired
U-NIIDetection Bandwidth	Yes	Notrequired	Yes

Table 2:ApplicabilityofDFSrequirementsduring normaloperation

Requirement	OperationalMode	
	MasterDevice orClientwith RadarDetection	ClientWithoutRadar Detection
DFSDetectionThreshold	Yes	Notrequired
ChannelClosing Transmission Time	Yes	Yes
ChannelMoveTime	Yes	Yes
U-NIIDetection Bandwidth	Yes	Notrequired

Additional requirementsfor deviceswithmultiple bandwidth	MasterDevice orClientwith RadarDetection	ClientWithoutRadarDetection
U-NIIDetection Bandwidth and StatisticalPerformance Check	AllBWmodesmustbe tested	Notrequired
ChannelMoveTimeand ChannelClosing Transmission	Testusing widestBWmode available	Testusing the widestBWmode availableforthelink
Allthertests	Anysingle BWmode	Notrequired

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.



LIMIT

1. DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

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 does 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 devices refer to KDB Publication 662911D01.	

2. DFS Response Requirements

Table 4: 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 facilitating 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.	

3.2 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. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.



Table 5 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 $\left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	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. 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

$$\left\lceil \left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{3066} \right) \right\} \right\rceil$$

would be Round up = Round up {17.2} = 18.



Table5a -PulseRepetitionIntervalsValuesforTestA

Pulse RepetitionFrequency Number	Pulse RepetitionFrequency (Pulses PerSecond)	Pulse RepetitionInterval (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

Table6 –LongPulse RadarTestWaveform

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

Theparameters forthiswaveformsarerandomlychosen.Thirtyunique waveformsarerequiredforthe

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LongPulseRadarTypewaveforms.Ifmorethan30waveformsareusedfortheLongPulseRadar Typewave forms,theneachadditionalwaveformmust alsobeuniqueandnotrepeatedfromthe previouswaveforms.

Table7 –Frequency HoppingRadarTest Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulsesper Hop	Hopping Rate (kHz)	Hopping Sequence Length	Minimum Percentage of Successful	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

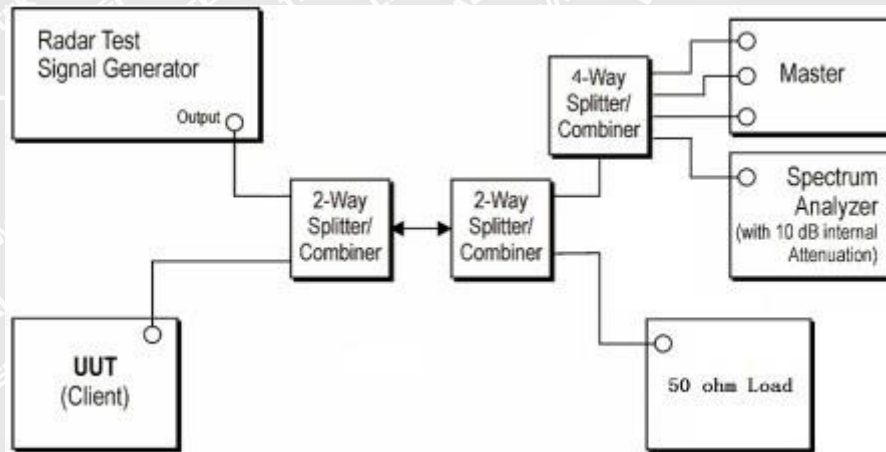
For theFrequencyHopping RadarType,the sameBurstparametersare used foreach wave form.The hopping sequence isdifferentforeach wave formand a100-length segmentisselectedfrom the hopping sequence defined bythefollowing algorithm:

Thefirst frequency in a hopping sequence is selectedrandomly from the group of 475 integer frequenciesfrom5250–5724MHz.Next,thefrequencythatwasjustchosenisremovedfromthe groupandafrequencyisrandomlyselected fromtheremaining474 frequenciesinthegroup.This processcontinuesuntilall475 frequenciesarechosenfor theset.Forselectionofa randomfrequency, thefrequenciesremaining within the group arealwaystreated asequallylikely.

3.3 Calibration of Radar Waveform

Radar Waveform Calibration Procedure

- 1)A50ohmloadisdisconnectedinplaceof thespectrumanalyzer,andthespectrumanalyzeris connected to placeofthemaster
- 2)TheinterferenceRadarDetectionThresholdLevelis-62dBm+0dBi+1dB=-61dBmthathadbeen taken into accountthe outputpowerrange and antenna gain.
- 3)Thefollowingequipmentsetupwasusedto calibrate theconductedradarwaveform.Avectorsignal generatorwasutilizedtoestablishthetestsignallevelforradartype0.Duringthisprocessthere werenottransmissionsbyeitherthe masterorclientdevice.Thespectrumanalyzerwasswitchedto thezerospans(timedomain)atthe frequencyoftheradarwaveformgenerator.Peakdetectionwas used.Thespectrumanalyzerresolutionbandwidth(RBW)and videobandwidth(VBW)weresetto3 MHz.The spectrumanalyzerhad offset-1.0dB tocompensate RFcableloss1.0dB.
- 4)Thevectorsignalgeneratoramplitudewassetsothatthepowerlevelmeasuredatthespectrum analyzerwas -62dBm+0dBi+1dB =-61dBm.Capturethespectrumanalyzerplots onshortpulse radarwaveform.

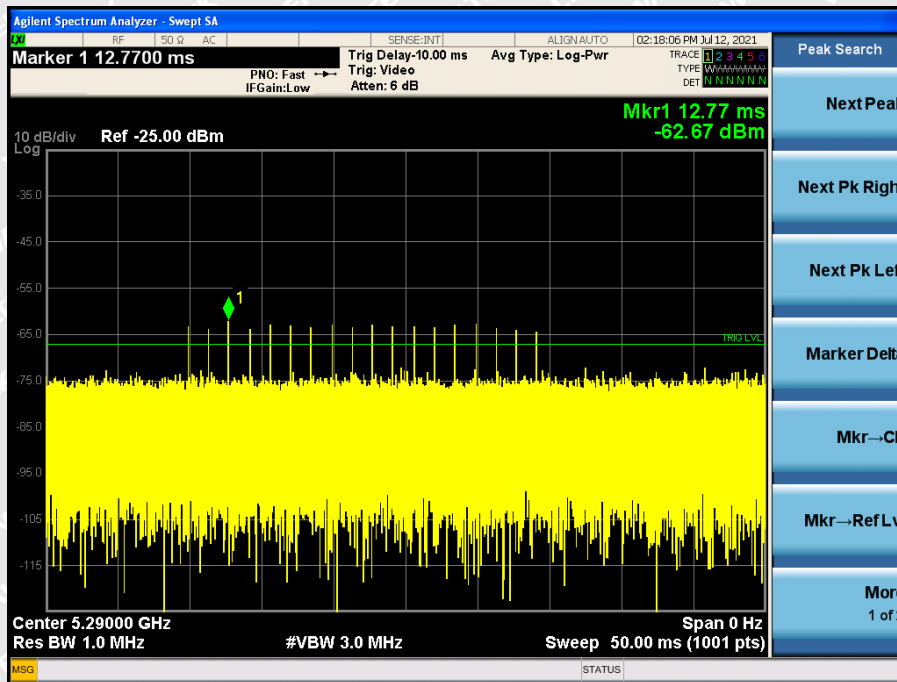
**Conducted Calibration Setup**

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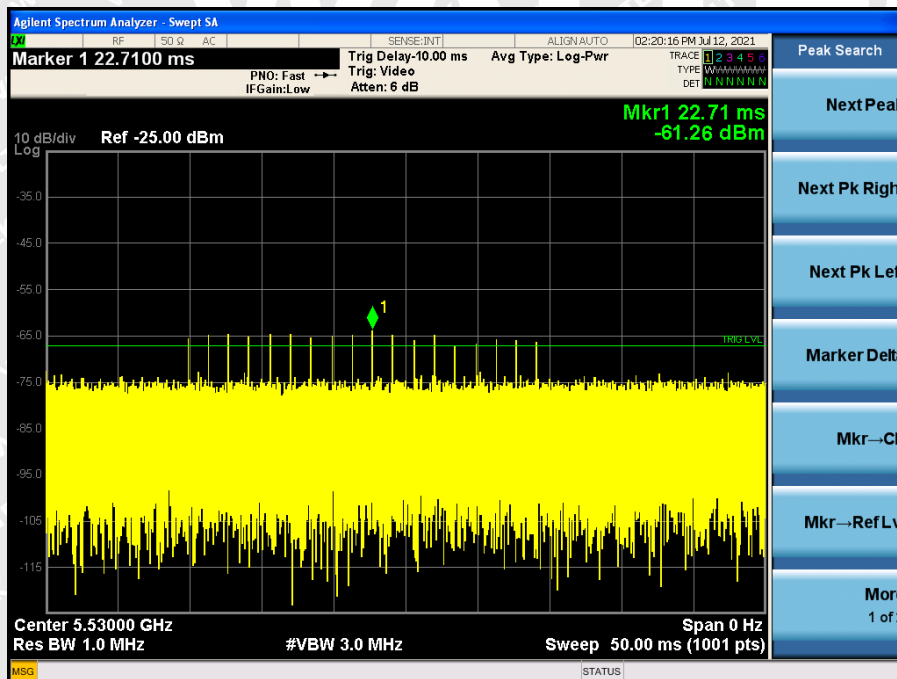


Radar Waveform Calibration Result

Radar Type 0 (80MHz / 5290Hz)

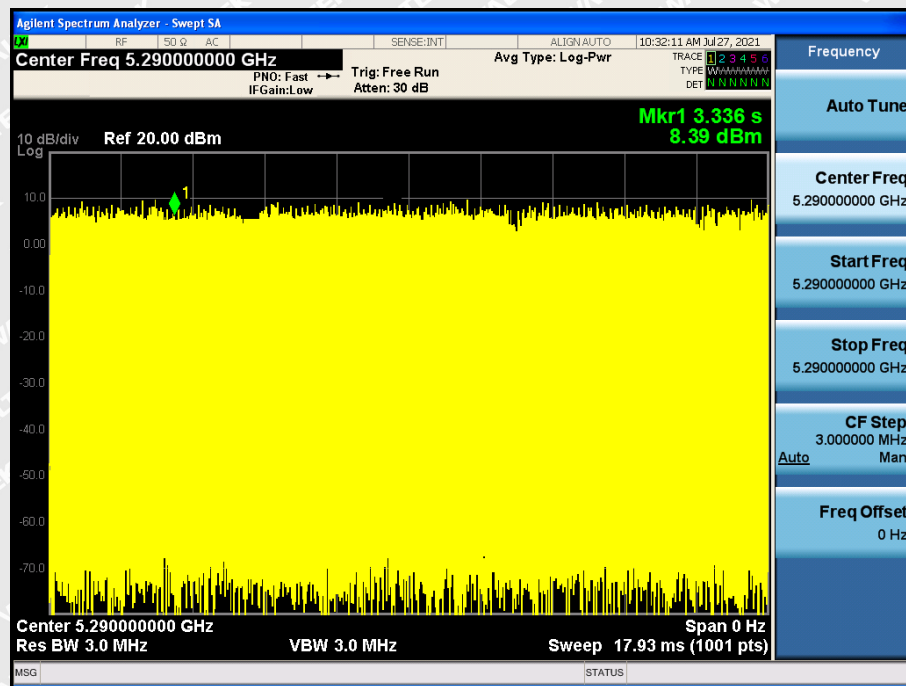


Radar Type 0 (80MHz / 5530MHz)





Data transmitting calibration

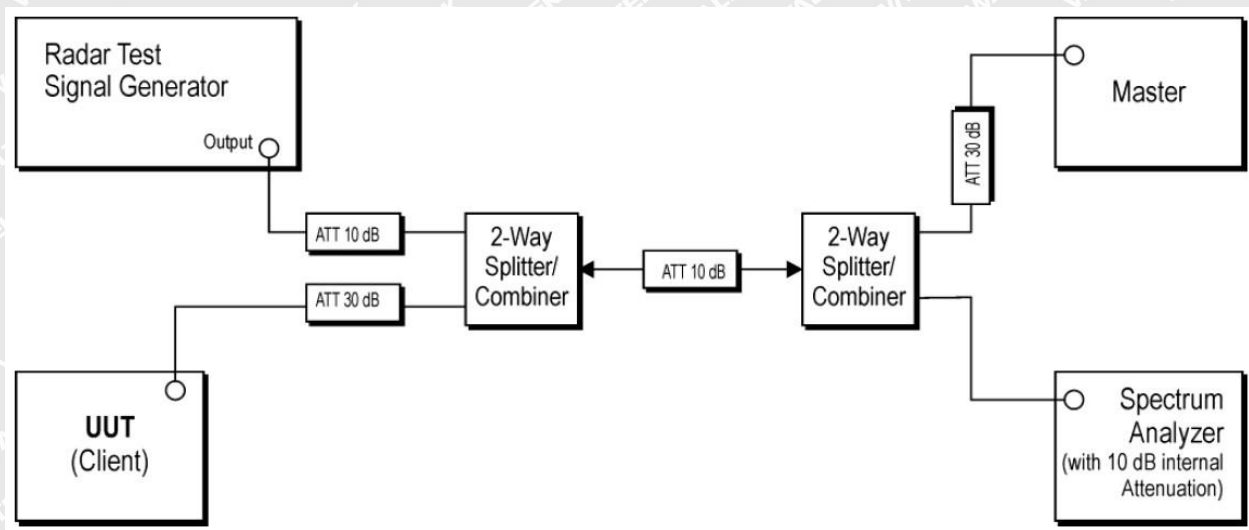


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TEST CONFIGURATION

Setup for Client with injection at the Master



3.4 TEST PROCEDURE

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
 2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
 3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
 4. EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
 5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
 6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short
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Pulse Radar Type

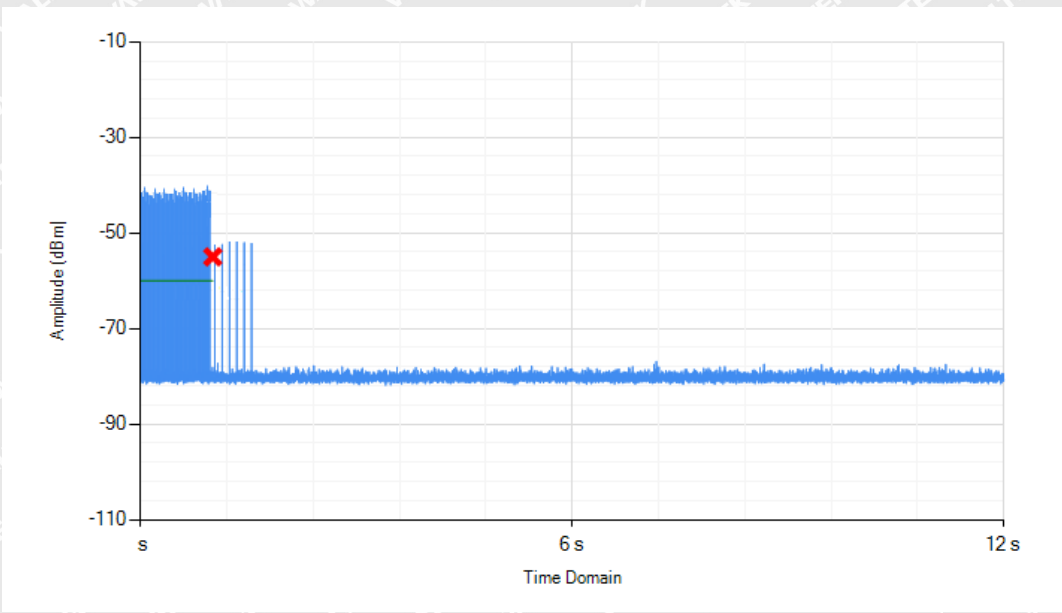
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: $Dwell (0.3ms) = S (12000ms) / B (4000)$; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: $C (ms) = N \times Dwell (0.3ms)$; where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.
8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

3.5 TEST RESULTS

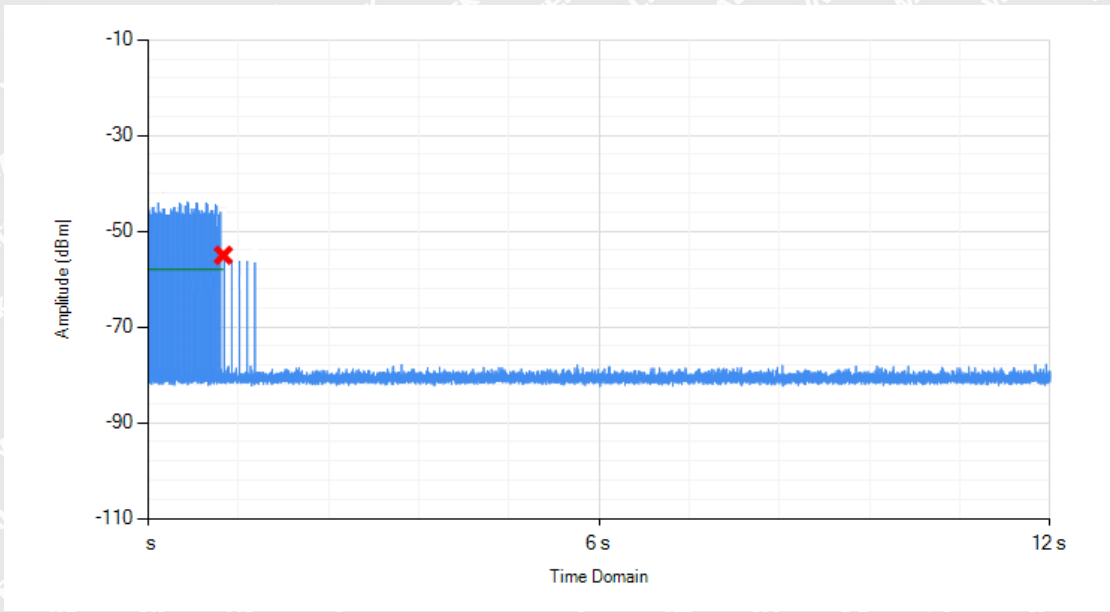
BW/Channel	Test Item	Test Result(s)	Limit	Result
80MHz/5290MHz	ChannelMoveTime	2.174	<10s	Pass
	ChannelClosing Transmission Time	0.0532	<0.06s	Pass
80MHz/5530MHz	ChannelMoveTime	2.147	<10s	Pass
	ChannelClosing Transmission Time	0.0561	<0.06s	Pass



ChannelMoveTime& ChannelClosing Transmission Time



80MHz/5290MHz

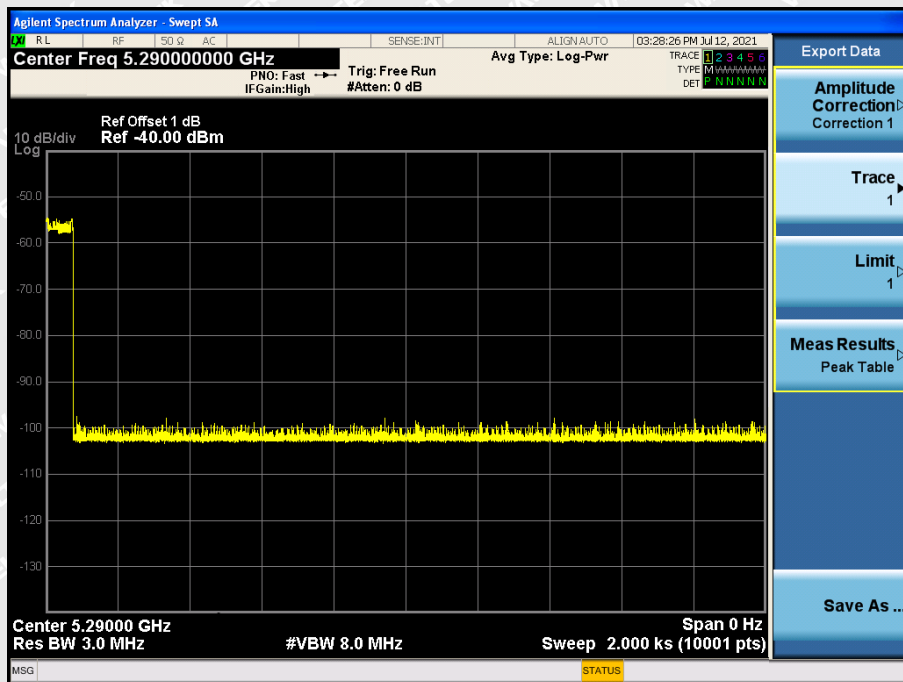


80MHz/5530MHz

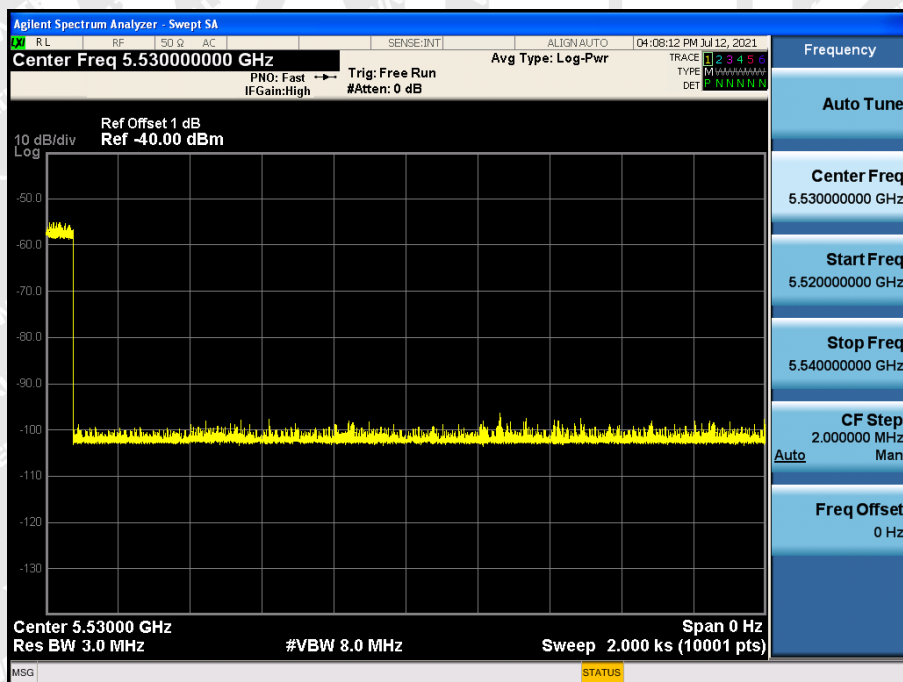


Non-occupancy Observer

Non-occupancy period



80MHz/5290MHz



80MHz/5530MHz

***** END OF REPORT *****