roduct Name:	BT/BLE/WiFi 6 radio module
Brand Name:	SMART
Model No.:	SKI.WB800D.3
Series Model:	---
Applicant:	SMART TECHNOLOGIES ULC 3636 RESEARCH ROAD NW CALGARY, AB T2L 1Y1 CANADA
Date of Receipt:	Jul. 03, 2023
Finished date of Test:	Jul. 27, 2023
Applicable Standards:	47 CFR Part 15, Subpart C, 15.247 ANSI C63.10: 2013 FCC publication KDB 558074 D01 15.247 Meas Guidance v05r02 Apr 02, 2019

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By : Jimmy Tseng , Date: Aug. 02. 2023

(Jimmy Tseng)

Approved By : , Date: 8/2/2023

(Johnson Ho, Director)

Testing Laboratory 1016

Revisions History

Report No.	Issue Date	Revisions
DGTA23070303-D0	Aug. 02, 2023	Initial issue.

Table of Contents

1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.
- FCC Registered Test Site Number：TW1016

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- DC power source from DC 5V

1.3 EUT MODIFICATION

- No modification in SRT Lab.

1.4 DECISION RULE

- To make sure the testing report(s) meet the requirement of ISO/IEC 17025:2017 standard and meet chapter 7.1 (Review of Requests, Tenders and Contracts), chapter 7.4 (Handling of Test or Calibration Items), chapter 7.8.2 (Reporting of Results – Common Requirement for Reports (Test, Calibration or Sampling)), This decision rule will be the base of adjustment (include the disclaimer scope) from SRT LAB.
- After communicate between SRT LAB. and clients /applicants and get the agreement, SRT LAB. will do the adjustment. According to this decision rule, SRT LAB. Manager(s) will do the Pass or Fail adjustment. (But one thing need to be concerned is, not every assessing rule suits all declaration of conformity assessing actions, it should be ruled depends on product's feature, test standard, technical regulation, test results, and also acceptance of risk of both sides.)
- This report according to the "description of applied standards and statements of conformity" on the report, as the decision rule.

1.5 REPORTING STATEMENTS OF CONFORMITY

Base on ISO/IEC 17025, the statements of conformity requirement of testing results.

□ It does not need to provide the statements of conformity.

■ It need to provide the statements of conformity and

■ Use CISPR 16-4,ISO/IEC Guide 98-3, IEC Guide 115,etsi ETR 028 speciation and it does not need to provide additional uncertainty of the testing results or data on the report(s).

□ It need to provide additional uncertainty of the testing results or data on the report(s).

2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	BT/BLE/WiFi 6 radio module
MODEL NO.	SKI.WB800D.3
BRAND NAME	SMART
POWER SUPPLY	5Vdc 1A
FREQUENCY BAND	5250 ~ 5350 MHz、5470 ~ 5725 MHz
CARRIER FREQUENCY	5250 ~ 5350 MHz、5470 ~ 5725 MHz
NUMBER OF CHANNEL	
RATED RF OUTPUT POWER	20 / 40MHz Operating Channel Bandwirth
RATED RF OUTPUT POWER	11A Band 2 ： 17.46 dBm = 50.11 mW Band 3 ： 18.65 dBm = 63.09 mW 11AC(20M) Band 2 ： 16.25 dBm = 39.81 mW Band 3 ： 18.55 dBm = 50.11 mW 11AC(40M) Band 2 ： 16.44dBm = 39.81 mW Band 3 ： 18.34 dBm = 63.09 mW 11AX(20M) Band 2 ： 15.96 dBm = 31.62 mW Band 3 ： 18.61 dBm = 63.09 mW 11AX(40M) Band 2 ： 16.45 dBm = 39.81 mW Band 3 ： 18.47 dBm = 63.09 mW
MODULATION TYPE	11A，11AN HT20/HT40：OFDM-BPSK, QPSK, 16QAM, 64QAM 11AC VHT20 / VHT40：OFDM- 16QAM, 64QAM, 256QAM, 11AX HE20 / HE40：OFDM 16QAM, 64QAM, 256QAM, 1024QAM
Operation Mode	Duplex
ANTENNA TYPE	Dipole Antenna
ANTENNA GAIN	3.09 dBi
Device Mode	☐ Main control device ☐ Slave device（With radar detect） ■ Slave device（Without radar detect）
Communication Mode	☐ IP based(Load Based) ☐PC control

Transmit power control	☐With TPC	■Without TPC
Weather radar frequency band	■With 5600~5650MHz	☐Without 5600~5650MHz

NOTE:
For more detailed information, please refer to the EUT's specification or user's manual provided by manufacturer.

2.2 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	FCC ID / DOC	REMARK
RF IC	AICSEMI	AIC8800D	N/A	WIFI 6 BT5.0 Moudle
XTLA	N/A	M26.00	N/A	26MHz XTAL
Front end IC	CHIPBETTER	CB5717	N/A	WIFI 6 5G Front-end Module
Antenna	HONGFUTAI	Dipole	N/A	5G paek Gain 3.09dbi 602-0015-065-A
Antenna	Megahertz	Dipole	N/A	5G paek Gain 2.95dbi 6150-000000-36000001
Antenna	Megahertz	Dipole	N/A	5G paek Gain 2.61dbi 6150-015600-36000001

2.3 DESCRIPTION OF TEST MODE

Test Mode		Channel	Frequence (MHz)	Power Setting
1	802-11A Band 1	CH36	5180	11
2		CH40	5200	11
3		CH48	5240	11
4	802-11A Band 2	CH52	5260	11
5		CH60	5300	11
6		CH64	5320	11
7	802-11A Band 3	CH100	5500	11
8		CH116	5580	11
9		CH140	5700	11
10	802-11A Band 4	CH149	5745	11
11		CH157	5785	11
12		CH165	5825	11
13	802-11AC20 Band 1	CH36	5180	11
14		CH44	5200	11
15		CH48	5240	11
16	802-11AC20 Band 2	CH52	5260	11
17		CH60	5300	11
18		CH64	5320	11
19	802-11AC20 Band 3	CH100	5500	11
20		CH116	5580	11
21		CH140	5700	11

Test Mode		Channel	Frequence (MHz)	Power Setting
22	802-11AC20 Band 4	CH149	5745	11
23		CH157	5785	11
24		CH165	5825	11
25	802-11AC40 Band 1	CH38	5190	11
26		CH46	5230	11
27	802-11AC40 Band 2	CH54	5270	11
28		CH62	5310	10
29	802-11AC40 Band 3	CH110	5550	10
30		CH134	5670	11
31	802-11AC40 Band 4	CH151	5755	11
32		CH159	5795	11
33	802-11AX20 Band 1	CH36	5180	11
34		CH44	5200	11
35		CH48	5240	11
36	802-11AX20 Band 2	CH52	5260	11
37		CH60	5300	11
38		CH64	5320	11
39	802-11AX20 Band 3	CH100	5500	11
40		CH116	5580	11
41		CH140	5700	11
42	802-11AX20 Band 4	CH149	5745	11
43		CH157	5785	11
44		CH165	5825	11
45	802-11AX40 Band 1	CH38	5190	11
46		CH46	5230	11
47	802-11AX40 Band 2	CH54	5270	11
48		CH62	5310	10
49	802-11AX40 Band 3	CH110	5550	10
50		CH134	5670	11
51	802-11AX40 Band 4	CH151	5755	11
52		CH159	5795	11

3. Dynamic Frequency Selection (DFS) Test Result

3.1 General DFS Information DFS Parameters

Table D.1: DFS requirement values	
Parameter	**Value**
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds[Note 1]
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second periods.[Notes 1 and 2]
U-NII Detection Bandwidth	Minimum 100% of the 99% power bandwidth[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 Channel changes (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 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

Table D.2: Interference threshold values	
Maximum Transmit Power	**Value (see note)**
EIRP ≥ 200 mW	-64 dBm
EIRP < 200 mW and PSD < 10dBm/MHz	-62 dBm
EIRP < 200 mW and PSD >= 10dBm/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 662911D01.

3.2 Applicability of DFS Requirements Prior to Use of a Channel

Requirement	DFS 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

3.3 Applicability of DFS Requirements during Normal Operation

Requirement	DFS 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

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

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.

3.4 Support Equipment

PRODUCT	Manufacturer	MODEL	Due Date of Cal. & Cal. Center
PC	Lenvo	Neo 50T	NCR
LCD	DELL	U2311Hb	NCR
Mouse	ASUS	MOBTUO	NCR
Keyboard	ASUS	AW211	NCR
4 Way Divider	MARVELOUS	15120703	DEC.12,2023
2 Way Divider	WOKEN	150902	DEC.12,2023
2 Way Divider	WOKEN	DSU83KW3K4	DEC.12,2023
Singal Genernator	Keysight	N5182B	OCT.19,2023
Singal Analyear	Agilent	A9010A	MAY,24,2023
Attenuator	VICOMN	VAS076501S21	NCR
InService Monitor Utility	Keysight	ISMonitor11	NCR
Signal Studio	Keysight	Signal Studio	NCR
Wireless Router	ASUS	RT-AX3000	NCR

RT-AX3000 FCC ID is MSQ-RTAX5000

3.5 User Access Restrictions

■ DFS controls (hardware or software) related to radar detection are NOT accessible to the user. Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user.

3.6 Channel Loading/Data Streaming

□ The data file (MPEG-4) has been transmitting in a streaming mode.

■ Software to ping the client is permitted to simulate data transfer with random ping intervals.

■ Minimum channel loading of approximately 17%.

□ Unicast protocol has been used.

4. Radar Test Waveform Calibration

4.1 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1A	1	15 unique PRI in KDB 905462 D02 Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)x\left(\frac{19x10^6}{PRI}\right)\right\}$	60%	15
1B	1	15 unique PRI within 518-3066, Excluding 1A PRI	N/A	60%	15
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 1 through 4. If more than 30 waveforms are used for short pulse radar types 1 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

4.2 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 Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Each waveform is defined as follows:

The transmission period for the Long Pulse Radar test signal is 12 seconds.

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.

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.

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.

Each pulse has a linear FM 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.

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 time between the first and second pulses is chosen independently of the time between the second and third pulses.

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 independently.

4.3 Frequency Hopping Radar Test Waveform

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

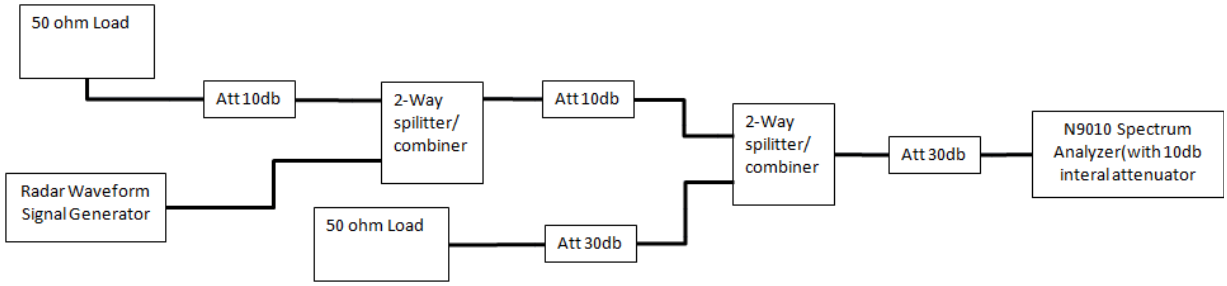
The FCC Type 6 waveform uses a static waveform with 100 bursts in the instruments ARB. In addition, the RF list mode is operated with a list containing 100 frequencies from a randomly generated list and it had be ensured that at least one of the random frequencies falls into the UNII Detection Bandwidth of the DUT. Each burst from the waveform file initiates a trigger pulse at the beginning that switches the RF list from one item to the next one.

4.4 DFS Threshold Level

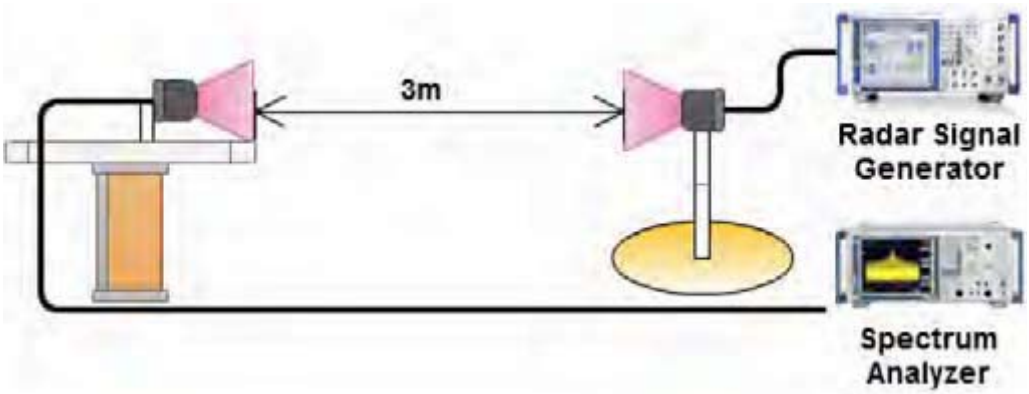
DFS Threshold Level	
DFS Threshold level: -64 dBm	□ at the antenna connector ■ in front of the antenna
The Interference **Radar Detection Threshold Level** is is *-64 dBm + 0 [dBi]* = -64 dBm. That had been been taken into account the output power range and antenna gain.	

4.5 Calibration Setup

Conducted measurement



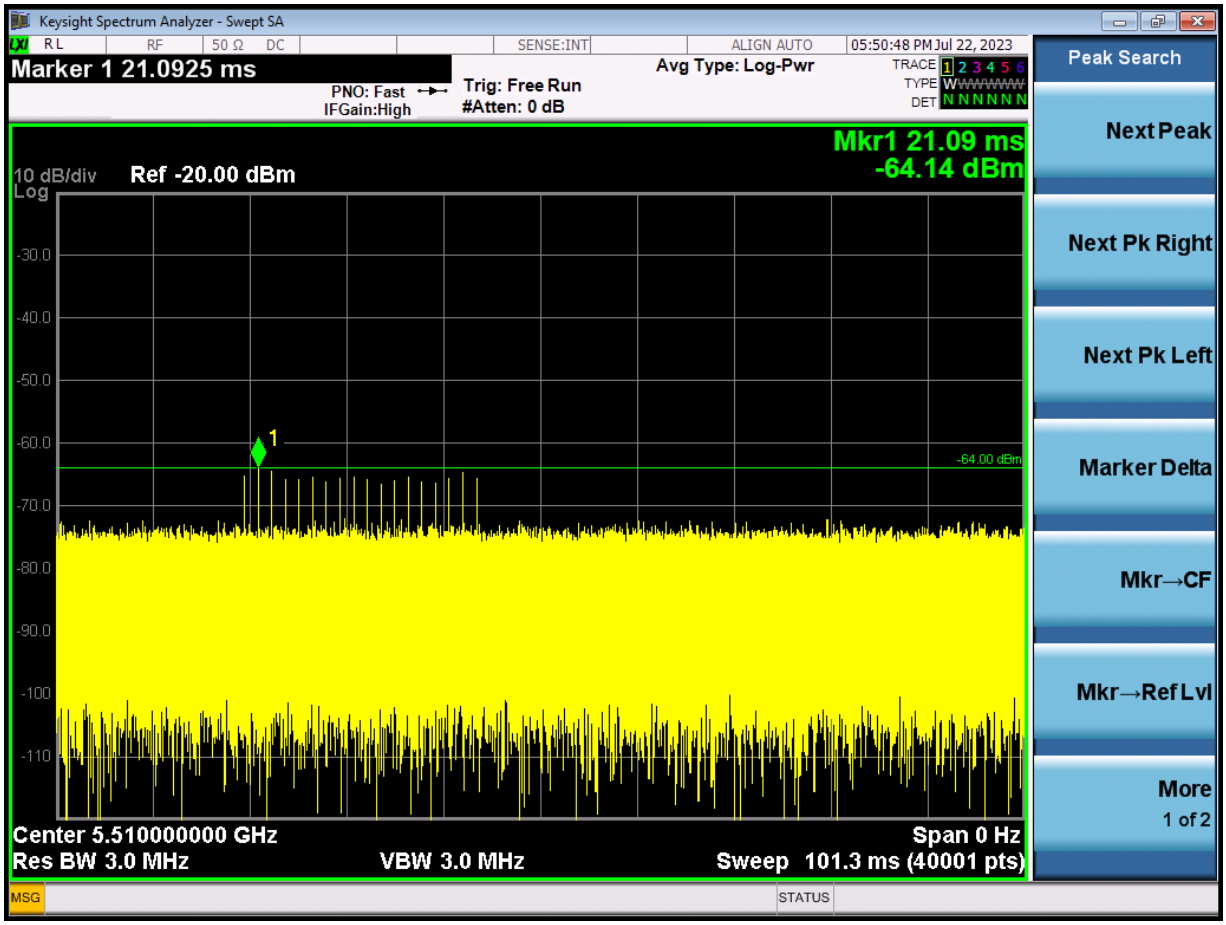
Coupling measurement



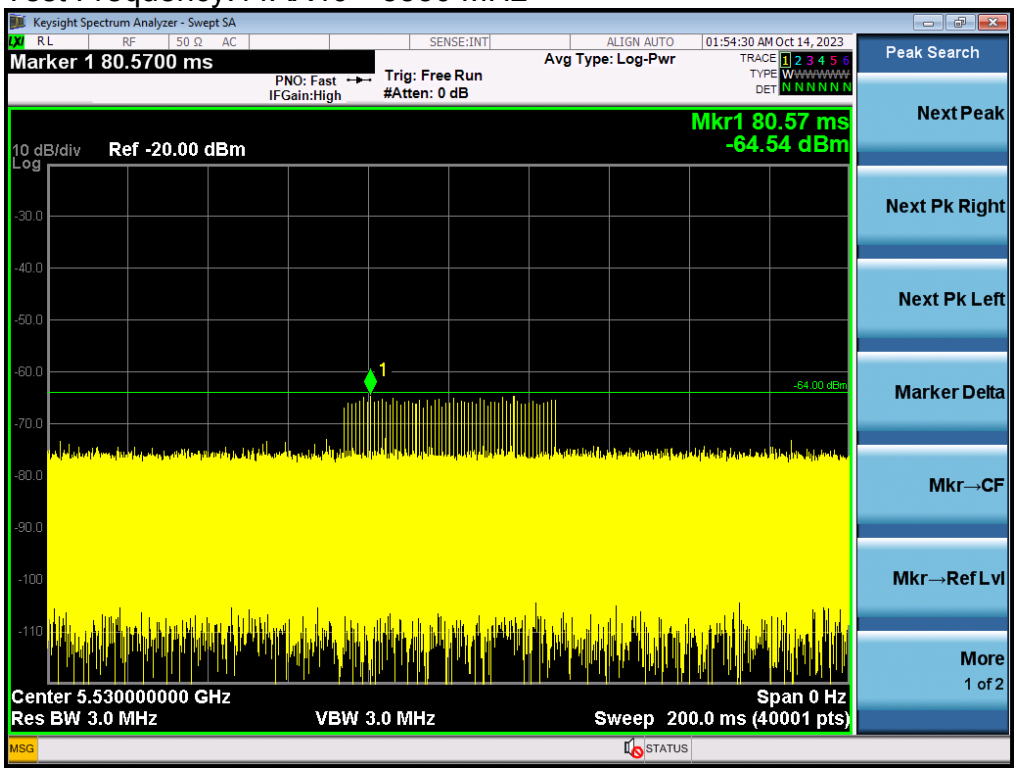
4.6 Radar Waveform calibration Plot

Test Item	Test Data (dBm)	Limit (dBm)	Result
DFS detection threshold level	-64.14	-64	Pass

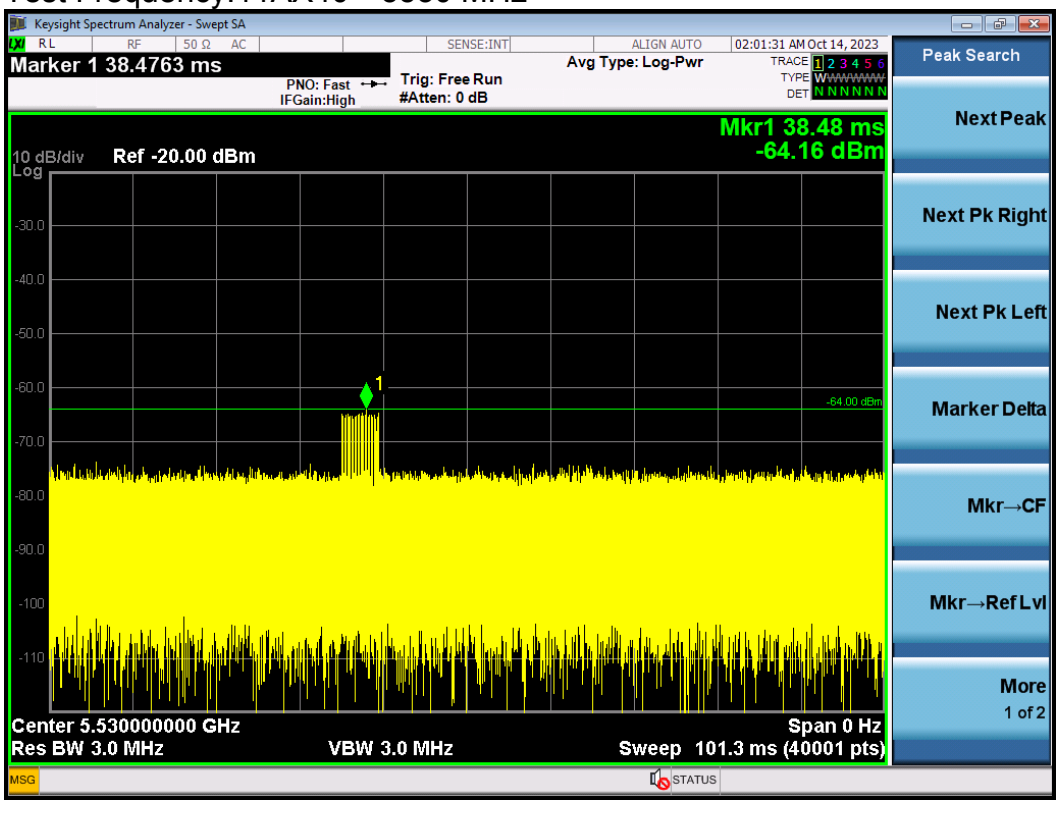
Test Frequency:11AX40 5510 MHz
Radar #0 DFS detection threshold level



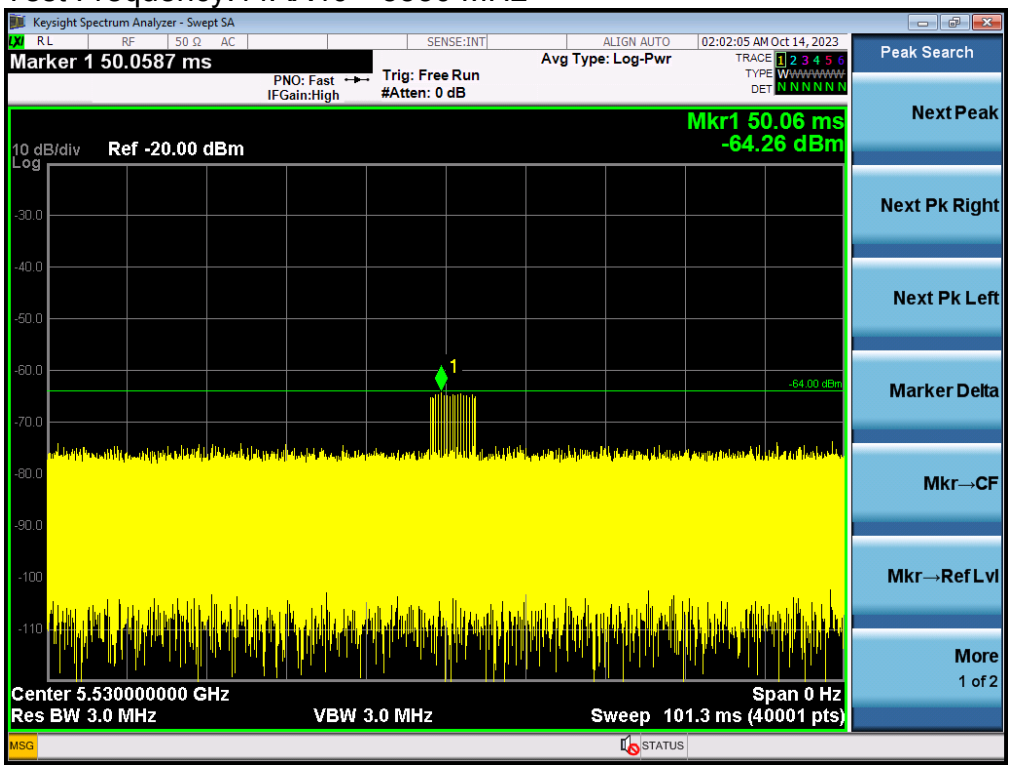
Radar #1 DFS detection threshold level
Test Frequency:11AX40 5530 MHz



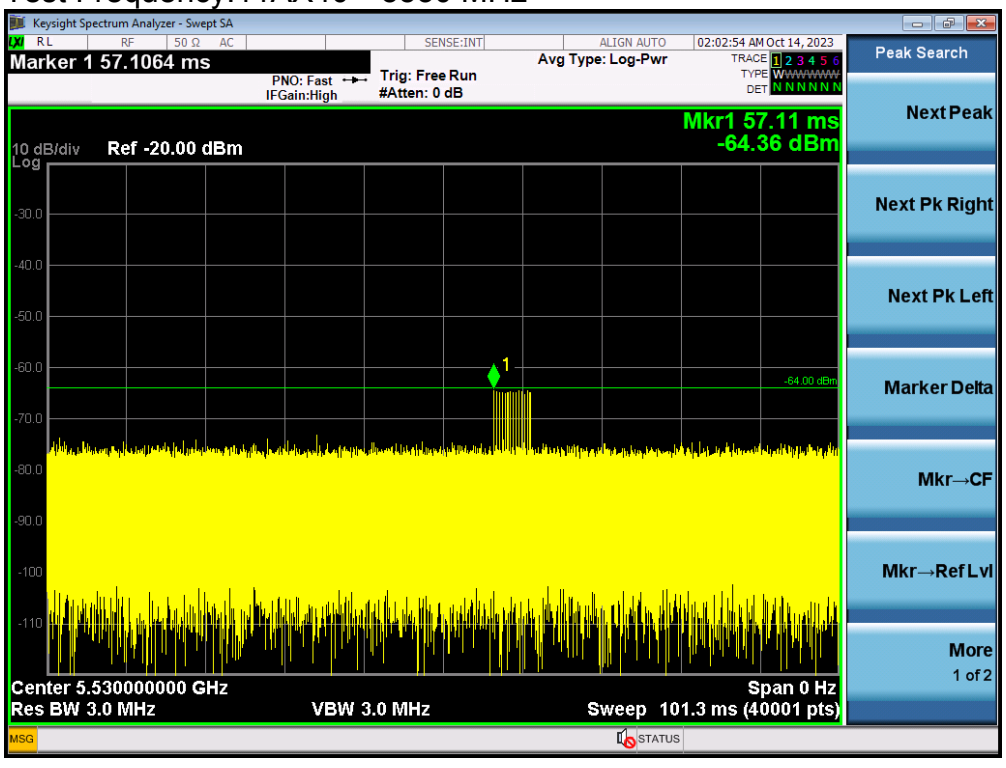
Radar #2 DFS detection threshold level
Test Frequency:11AX40 5530 MHz



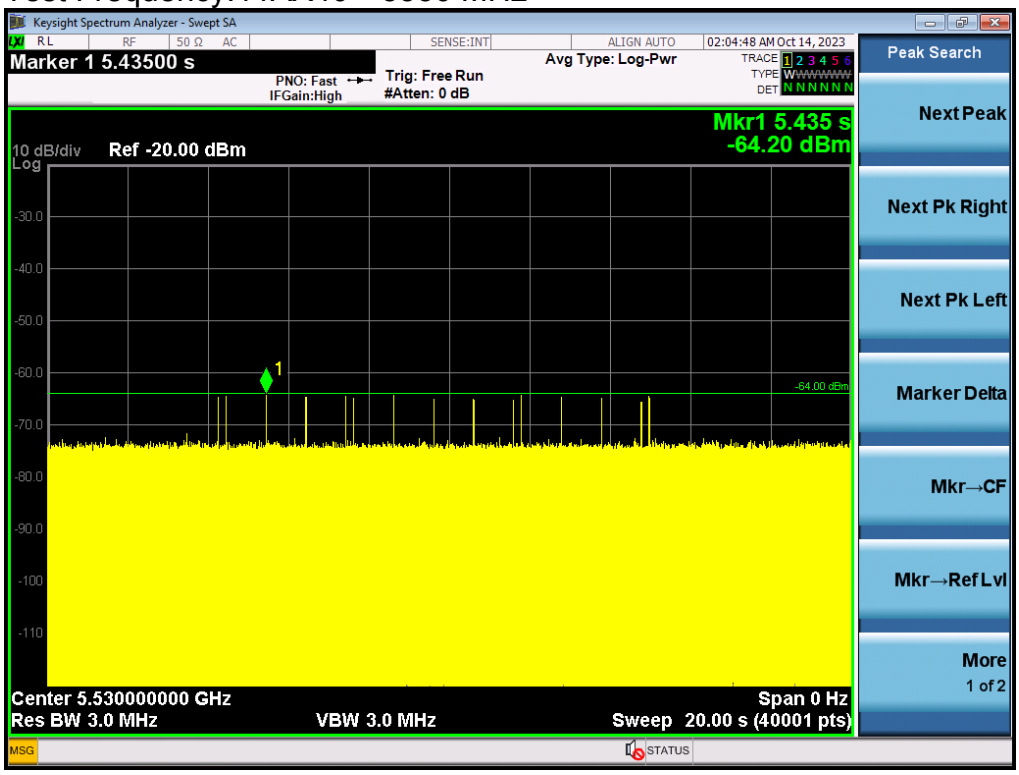
Radar #3 DFS detection threshold level
Test Frequency:11AX40 5530 MHz



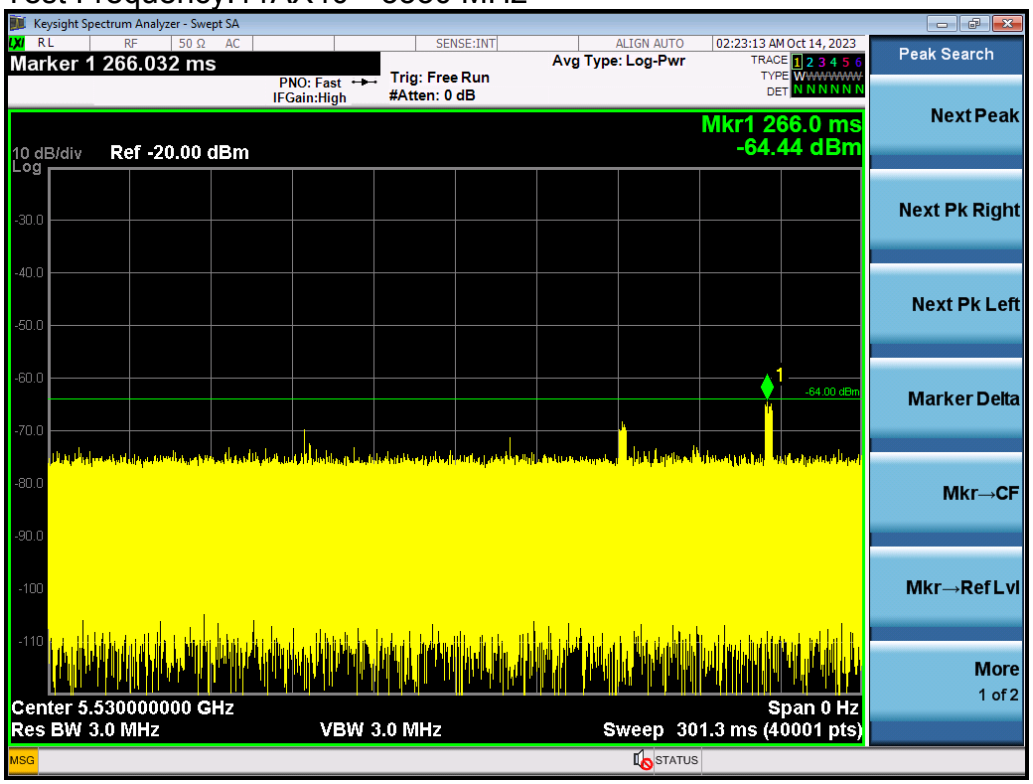
Radar #4 DFS detection threshold level
Test Frequency:11AX40 5530 MHz



Radar #5 DFS detection threshold level
Test Frequency:11AX40　5530 MHz



Radar #6 DFS detection threshold level
Test Frequency:11AX40　5530 MHz

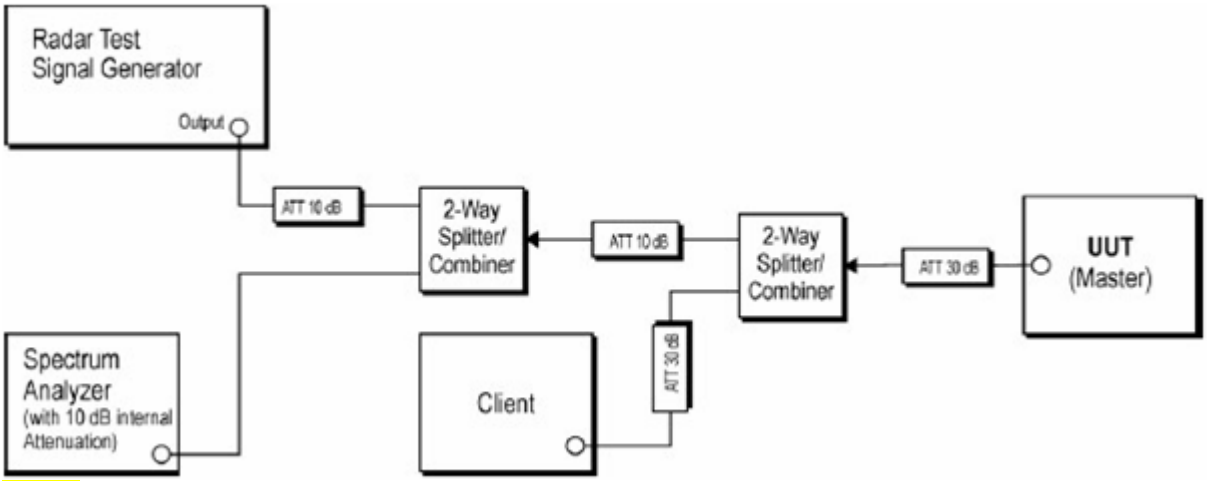


5. Channel Closing Transmission Time

A spectrum analyzer is used as a monitor to verify that the EUT has vacated the Channel within the (Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and Channel move.

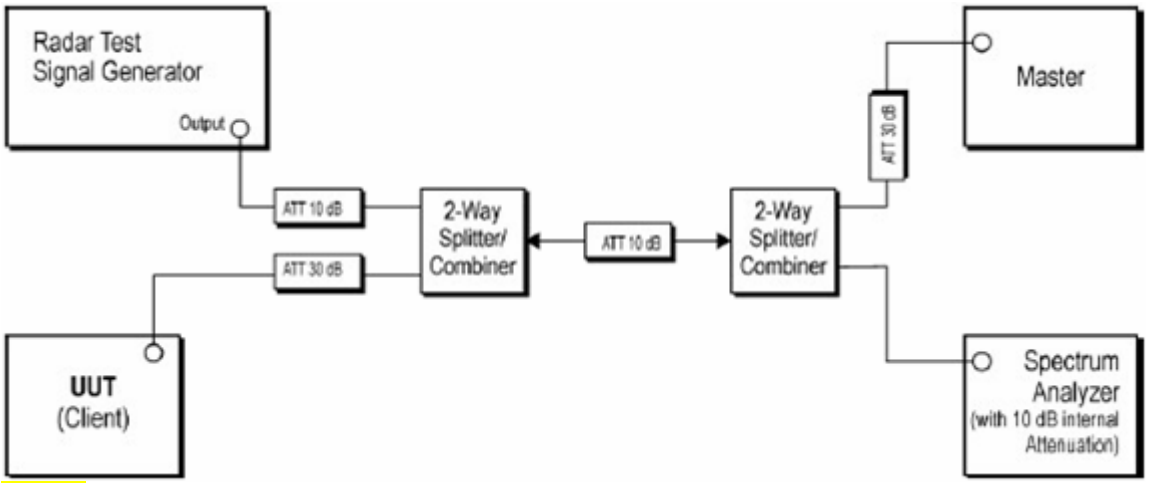
Conducted measurement

・EUT is Master Device:



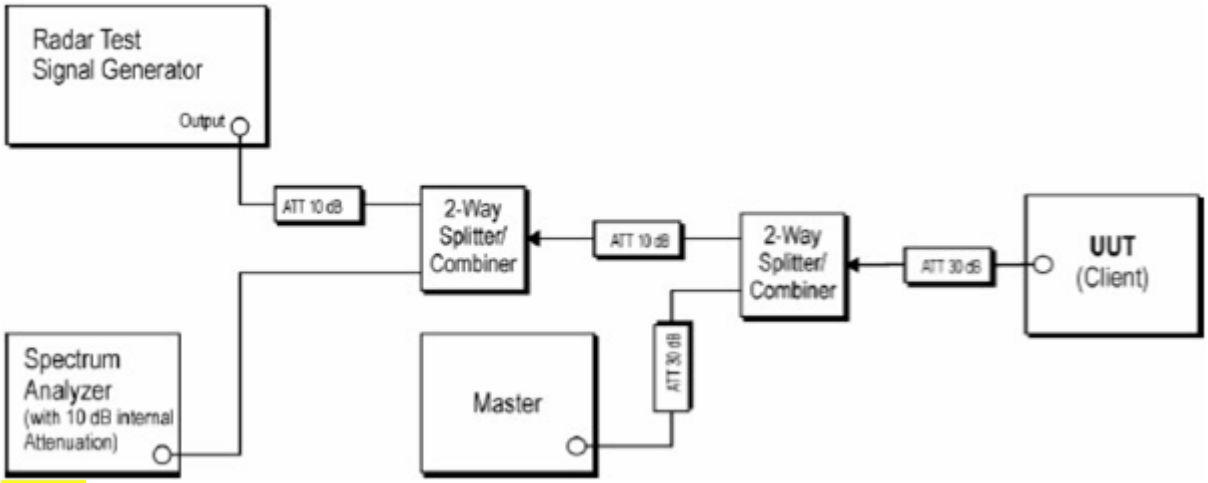
Notes: Example Conducted Setup where EUT is a Master and Radar Test Waveforms are injected into the Master.

・EUT is Client with Radar Detection:



Notes: Example Conducted Setup where EUT is a Client and Radar Test Waveforms are injected into the Master.

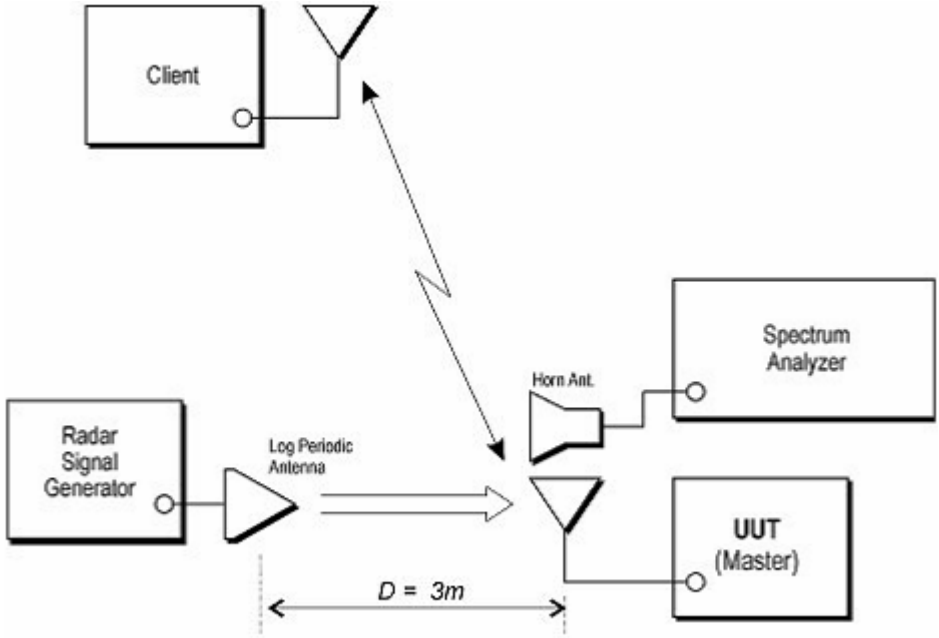
· EUT is Client Without Radar Detection:



Notes: Example Conducted Setup where EUT is a Client and Radar Test Waveforms are injected into the Client.

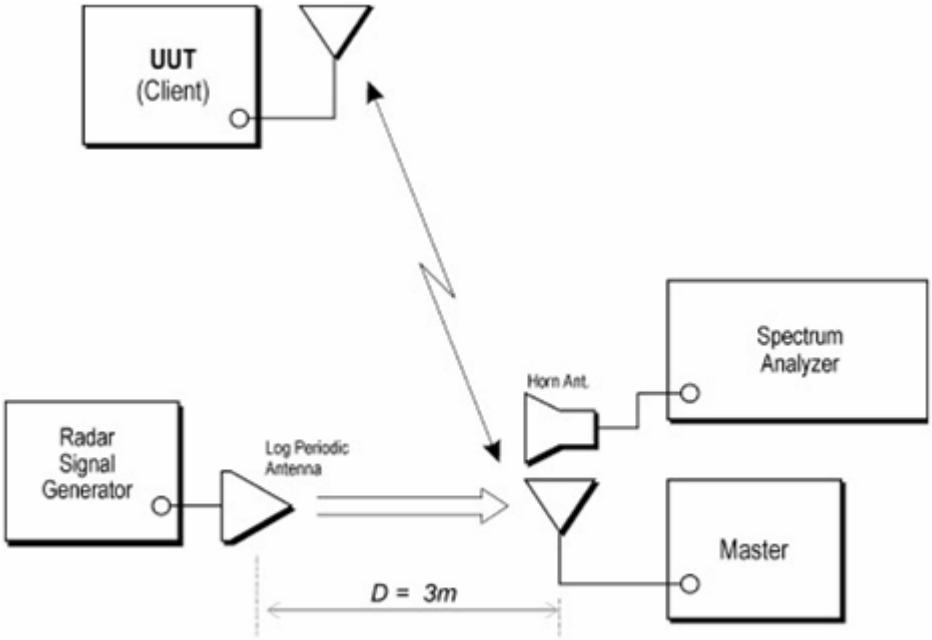
Coupling measurement

· EUT is Master Device:



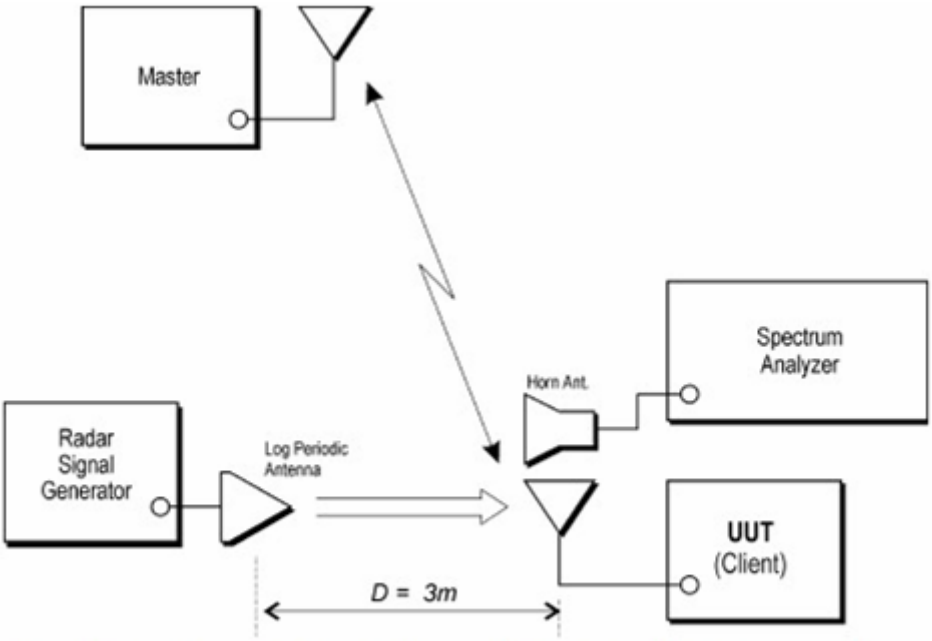
Notes: Example Radiated Setup where EUT is a Master and Radar Test Waveforms are injected into the Master.

· EUT is Client with Radar Detection:



Notes: Example Radiated Setup where EUT is a Client and Radar Test Waveforms are injected into the Master.

· EUT is Client Without Radar Detection:

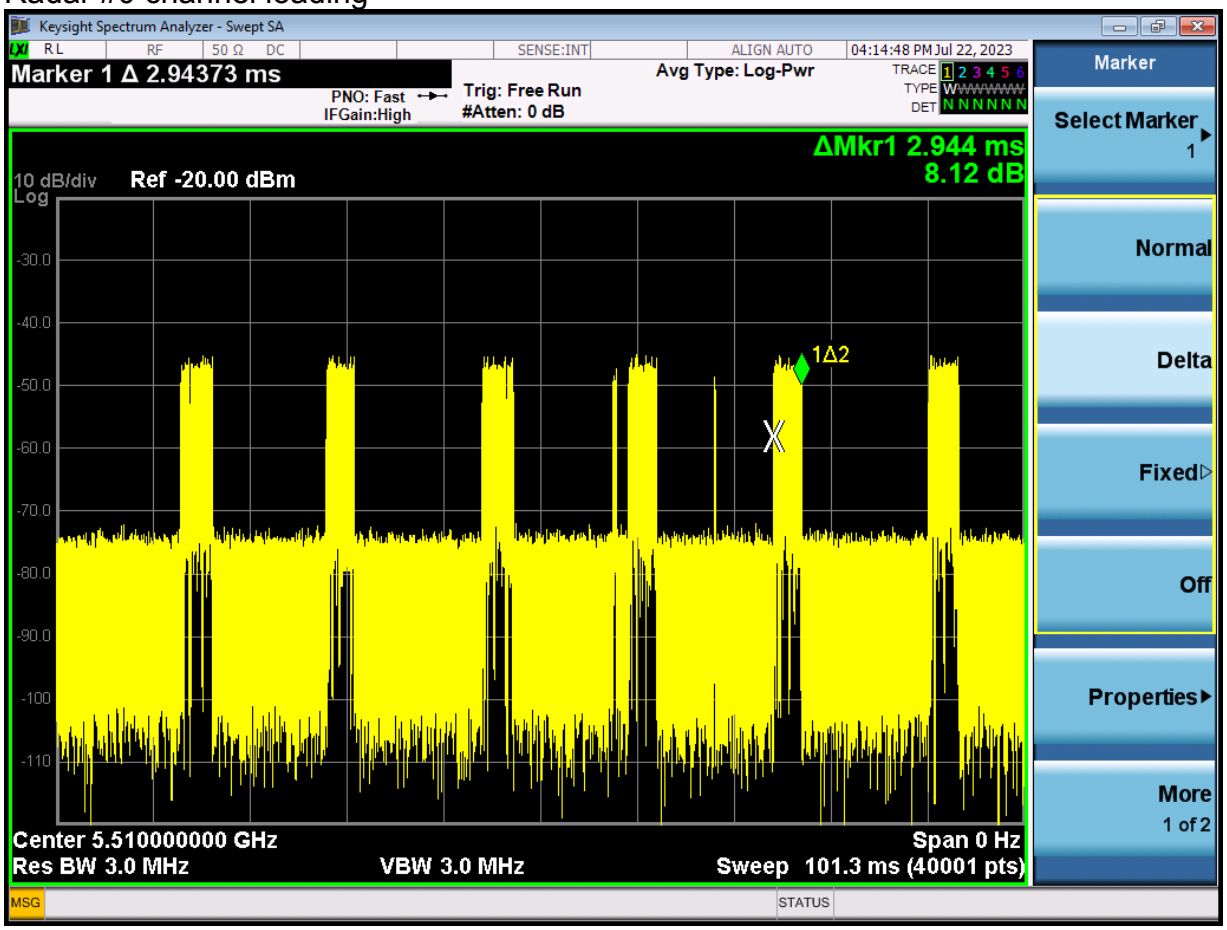


Notes: Example Radiated Setup where EUT is a Client and Radar Test Waveforms are injected into the Client.

5.1 Data Traffic Plot

Test Item	Test Data	Limit	Reault
channel loading	17.44%	17%	Pass

Test Frequency: 11AX40 5510 MHz
Radar #0 channel loading



5.2 In-service Monitoring

5.2.1 In-service Monitoring Limit

Channel Move Time	10 sec	
Channel Closing Transmission Time	200 ms + an aggregate of 60 ms	over remaining 10 sec periods.
Non-occupancy period	Minimum 30 minutes	

5.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

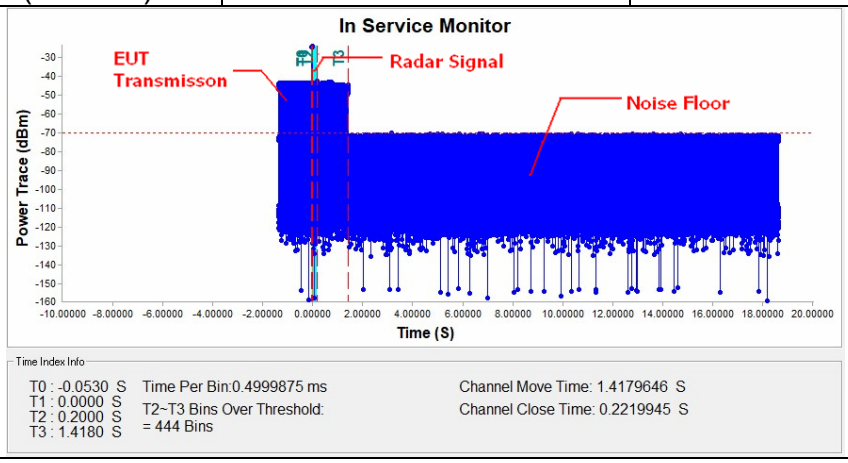
5.2.3 Test Procedures

- Verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time. Client Device will associate with the EUT. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time limits.
- Verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time. One 12 sec plot needs to be reported for the Short Pulse Radar Types 0. And zoom-in a 60 ms plot verified channel closing time for the aggregate transmission time starting from 200ms after the end of the radar signal to the completion of the channel move.
- Verified during In-Service Monitoring; Non-Occupancy Period. Client Device will associate with the EUT. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Non-Occupancy Period). Compare the Non-Occupancy Period limits.

5.2.4 Test Result of Channel Move Time

Parameter	Test Result Type 0	Limit
Test Channel (MHz)	5510 MHz	–
Channel Move Time (sec.)	1.417	< 10s
Channel Closing Transmission Time	0.22	< 60ms

Modulation Mode	Freq.	Radar Type
802.11ax (HEW40)	5510 MHz	0



Modulation Mode	Freq.	Radar Type
802.11ax (HEW40)	5510 MHz	0

5.2.5 Test Result of Non-Occupancy Period

Parameter	Test Result Type 0	Limit
Test Channel (MHz)	5510 MHz	–
Non-Occupancy Period (min.)	≧30	≧ 30 min

Modulation Mode	Freq.
802.11ax (HEW40)	5510 MHz

Non-Occupancy Period
During the 30 minutes observation time, UUT did not make any transmissions on a channel after a radar signal was detected on that channel by either the Channel Availability Check or the In-Service Monitoring.