SUPPLEMENTAL DFS TEST DATA for FCC 47 CFR PART 15 SUBPART E
SUPPLEMENTAL DFS TEST DATA for INDUSTRY CANADA RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

FOR

SHERWOOD XC MASTER RADIO MODULE

MODEL NUMBER: 444-2251

FCC ID: UA9800
IC: 9129A-800

REPORT NUMBER: 12410952-E1V1

ISSUE DATE: AUGUST 9, 2018

Prepared for
SUMMIT SEMICONDUCTOR LLC
20575 NW VON NEUMANN DRIVE, SUITE 100
BEAVERTON, OR 97006, USA

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/09/18	Initial Issue	Henry Lau

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SUMMIT SEMICONDUCTOR LLC
20575 NW VON NEUMANN DRIVE, SUITE 100
BEAVERTON, OR 97006, U.S.A.

EUT DESCRIPTION: SHERWOOD XC MASTER RADIO MODULE

MODEL: 444-2251

SERIAL NUMBER: 02EA3F012CAD

DATE TESTED: AUGUST 02, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	See Scope and Results Sections
DFS Portion of INDUSTRY CANADA RSS-247 Issue 2	See Scope and Results Sections

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

HENRY LAU
TEST ENGINEER
UL Verification Services Inc.

Prepared By:

DOUG ANDERSON
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY AND SCOPE

2.1. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the DFS portion of FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, KDB 905462 D02 and D03 and RSS-247 Issue 2.

2.2. SCOPE

This test is to confirm compliance to the FCC Type 5 Long Pulse radar requirements of KDB 905462 D02. Type 5 Long Pulse radar In-Service Monitoring and associated tests that facilitate performing In-Service Monitoring of Type 5 Long Pulse radar In-Service monitoring were the only tests performed per feedback after a review of previous test results and manufacturer request.

3. REFERENCE DOCUMENTS

Measurements of transmitter parameters and previous DFS test results as referenced in this report are documented in Northwest EMC Labs reports number FOCU0169.4 and FOCU0169.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty level has been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Time	± 0.02 %

The Uncertainty figure is valid to a confidence level of 95%.

6. DYNAMIC FREQUENCY SELECTION

6.1. OVERVIEW

6.1.1. LIMITS

INDUSTRY CANADA

IC RSS-247 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-247 Issue 2

Note: For the band 5600–5650 MHz, no operation is permitted.

Until further notice, devices subject to this annex shall not be capable of transmitting in the band 5600–5650 MHz. This restriction is for the protection of Environment Canada weather radars operating in this band.

FCC

§15.407 (h), FCC KDB 905462 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” and KDB 905462 D03 “U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY”.

Table 1: Applicability of DFS requirements prior to use of a channel

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

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
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 DFS	Client (without DFS)
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 all 20 MHz channel blocks and a null frequency between the bonded 20 MHz channel blocks.		

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see notes)
E.I.R.P. ≥ 200 mill watt	-64 dBm
E.I.R.P. < 200 mill watt and power spectral density < 10 dBm/MHz	-62 dBm
E.I.R.P. < 200 mill watt that do not meet 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 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.
Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB publication 662911 D01.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 milliseconds + approx. 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.

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (usec)	PRI (usec)	Pulses	Minimum Percentage of Successful Detection	Minimum 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: {(1/360) x (19 x 10^6 PRI_{usec})}	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 usec. With a minimum increment of 1 usec, 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.

Table 6 – Long Pulse Radar Test Signal

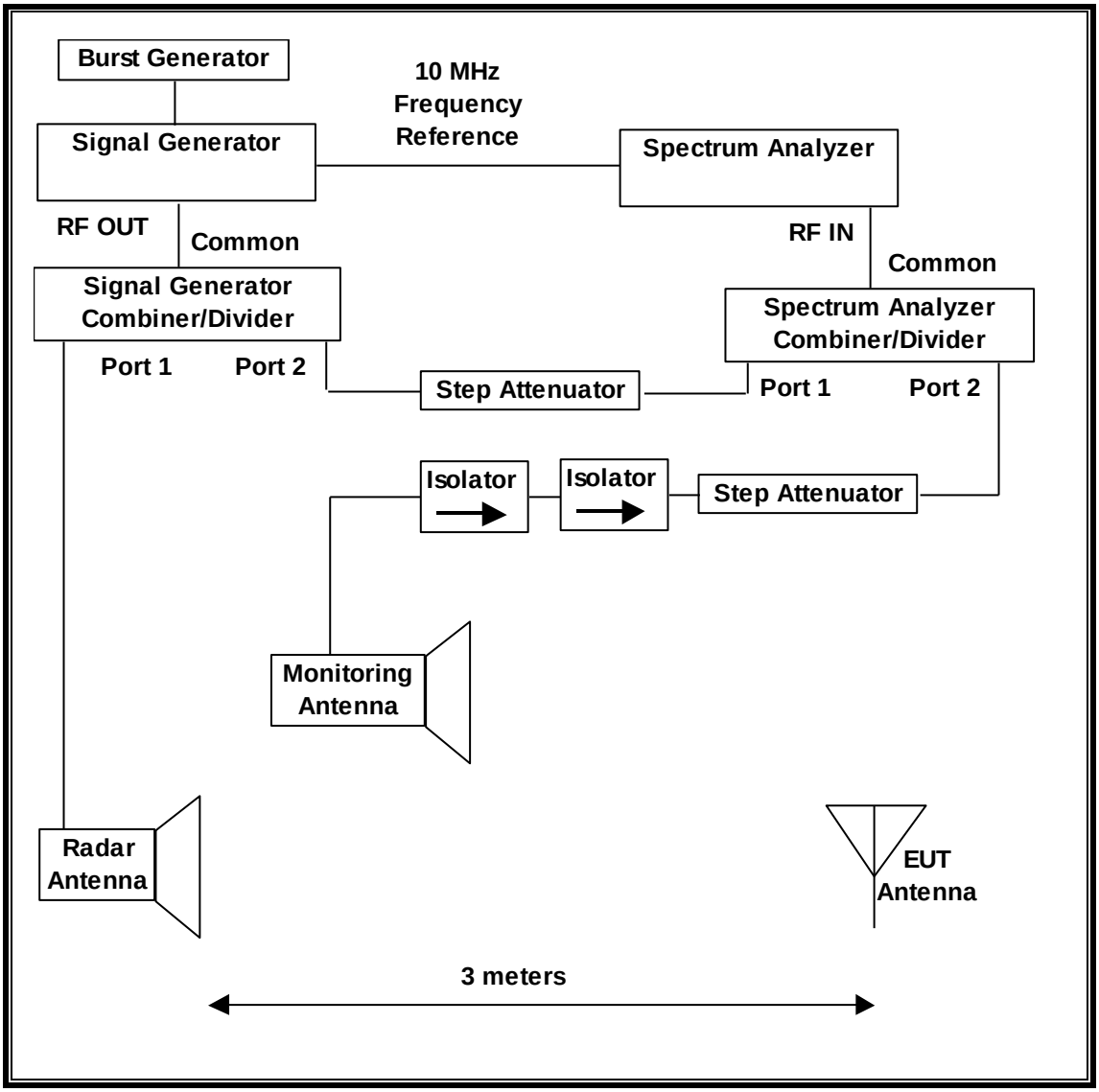
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Signal

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

6.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 1, 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of KDB 905462 D02. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –62 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –62 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –62 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The FCC audio test file is streamed from the Master EUT device to the Slave device to generate WLAN traffic that meets or exceed the minimum loading requirement. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID No.**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1634	02/22/19
Signal Generator, MXG X-Series RF Vector	Agilent	N5182B	T1134	04/23/19
Arbitrary Waveform Generator	Agilent / HP	33220A	T190	04/23/19

6.1.3. TEST AND MEASUREMENT SOFTWARE

The following test and measurement software was utilized for the tests documented in this report:

TEST SOFTWARE LIST		
Name	**Version**	**Test / Function**
Aggregate Time-PXA	3.1	Channel Loading and Aggregate Closing Time
PXA Read	3.1	Signal Generator Screen Capture Utility
SGXProject.exe	1.7	Radar Waveform Generation and Download

6.1.4. TEST ROOM ENVIRONMENT

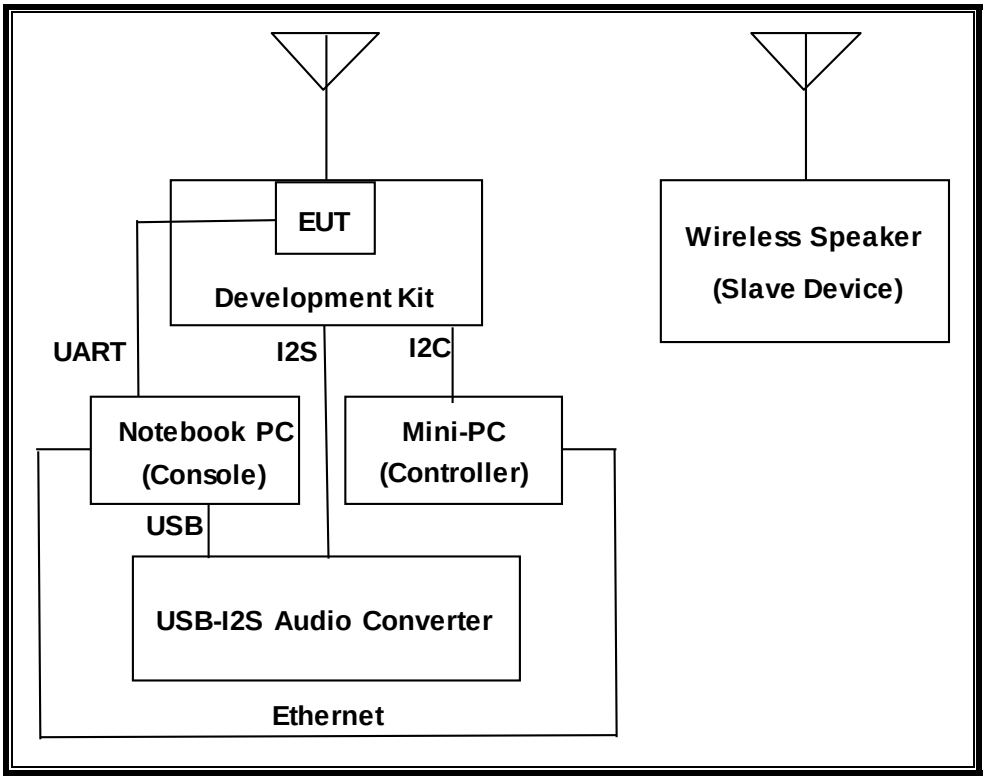
The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

ENVIRONMENT CONDITION

Parameter	Value
Temperature	24.7 °C
Humidity	42 %

6.1.5. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter (EUT)	Triad	WSU050-3000	No Serial Number	DoC
Robini Master Development Kit	Summit Semiconductor	0114R10301	No Serial Number	N/A
Notebook PC (EUT Console)	Dell	PP04X	1H9Z1D1	DoC
AC Adapter (Console PC)	Lite On Technology	LA90PS0-00	CN-0DF266-71615-72C-18FA	DoC
Wireless Test Speaker Containing Athena 4XC Client Module (Slave)	Summit Semiconductor	444-2250	01A983	UA9601
Raspberry Pi Mini-PC (Controller)	Raspberry Pi	Model 1	b8:27:eb:ea:ac:e6	DoC
AC Adapter (Controller PC)	Motorola	SSW-2222US	AJDZN9086	DoC
USB to I2S Audio Converter	Terralink	X2	No Serial Number	DoC

6.1.6. DESCRIPTION OF EUT

For FCC and the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

For IC the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges, excluding the 5600-5650 MHz range.

The EUT is a Master Device.

The highest power level within these bands is 11.766 dBm EIRP in the 5250-5350 MHz band and 12.741 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 1 dBi.

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required interference threshold level is –62 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –62 + 1 = -61 dBm.

The calibrated radiated DFS Detection Threshold level is set to –62 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic is generated by streaming the FCC audio test file from the Master to the Slave with a fixed talk/listen ration of at least 75% using the Foobar2000 media player.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes a proprietary 802.11 architecture. One nominal channel bandwidth, 20 MHz, is implemented. Additionally, two audio sampling rates of 48 kHz and 96 kHz are implemented.

The software installed in the EUT is FW 205.

UNIFORM CHANNEL SPREADING

This function is not required per KDB 905462.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Summit Semiconductor Sherwood XC Master radio module, FCC ID: UA9800. The minimum antenna gain for the Master Device is 1 dBi.

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required interference threshold level is –62 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –62 + 1 = -61 dBm.

The calibrated radiated DFS Detection Threshold level is set to –62 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

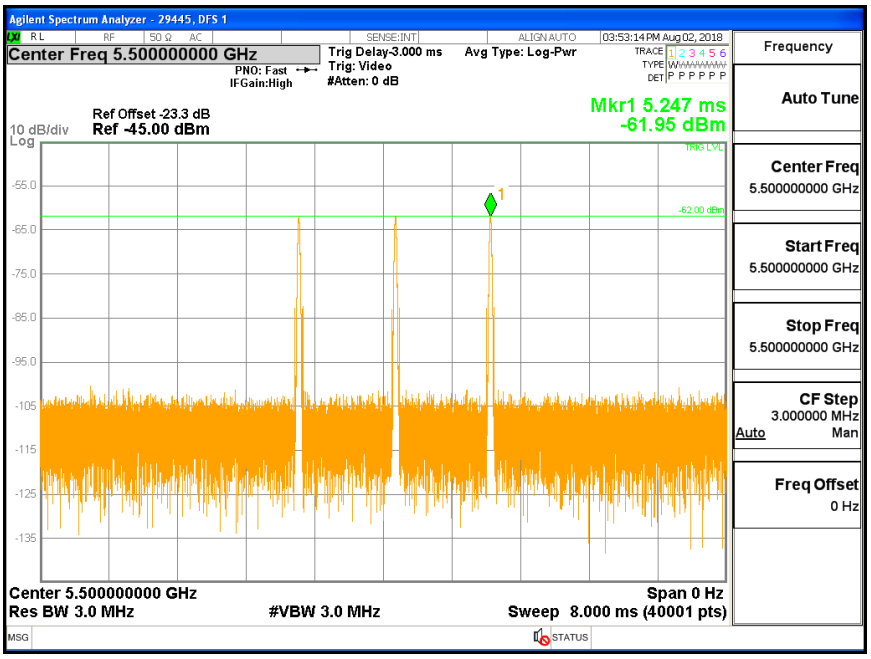
6.2. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

6.3. RADAR WAVEFORM

RADAR WAVEFORM

SAMPLE OF LONG PULSE RADAR TYPE 5

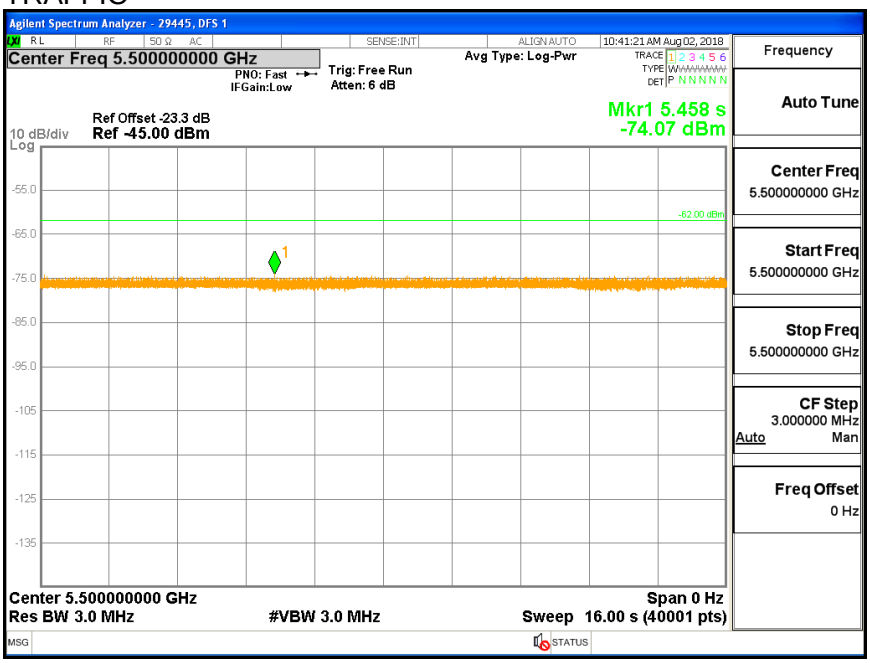


6.4. WORKING RADIO RESULTS FOR 20 MHz BANDWIDTH / 48 kHz SAMPLE RATE

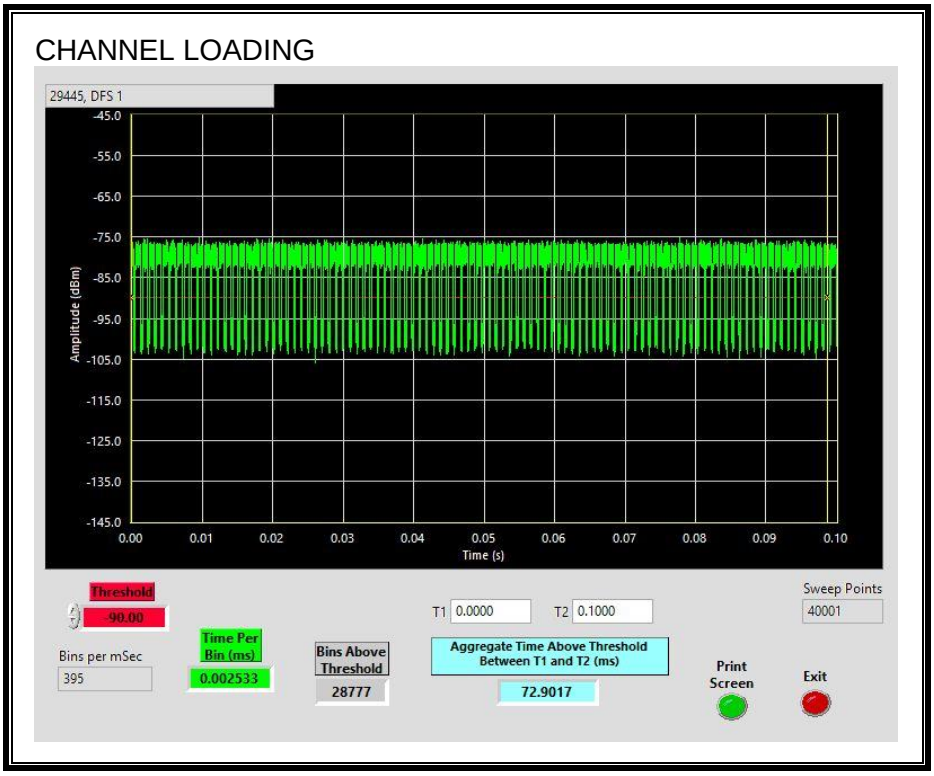
6.4.1. TRAFFIC AND CHANNEL LOADING

TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 72.90%

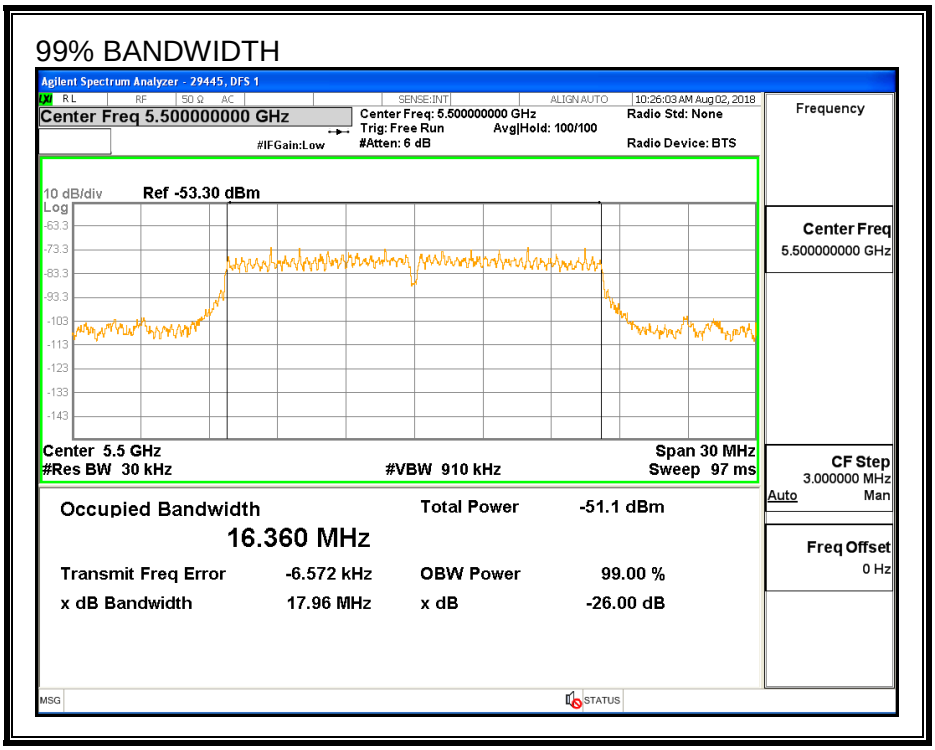
6.4.2. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

6.4.3. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5491	5509	18	16.360	110.0	100

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results		29445	DFS 1	
FCC Type 0 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5491	10	10	100	FL
5492	10	10	100	
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	10	100	FH

6.4.4. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Long Pulse Type 5	30	96.67	80	Pass	5491	5509	16.36	DFS 1	29445	Version 3.3.4

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	Yes
2	5500	Yes
3	5500	Yes
4	5500	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5494	No
12	5496	Yes
13	5494	Yes
14	5496	Yes
15	5494	Yes
16	5496	Yes
17	5494	Yes
18	5496	Yes
19	5498	Yes
20	5498	Yes
21	5501	Yes
22	5502	Yes
23	5502	Yes
24	5501	Yes
25	5502	Yes
26	5502	Yes
27	5501	Yes
28	5502	Yes
29	5502	Yes
30	5501	Yes

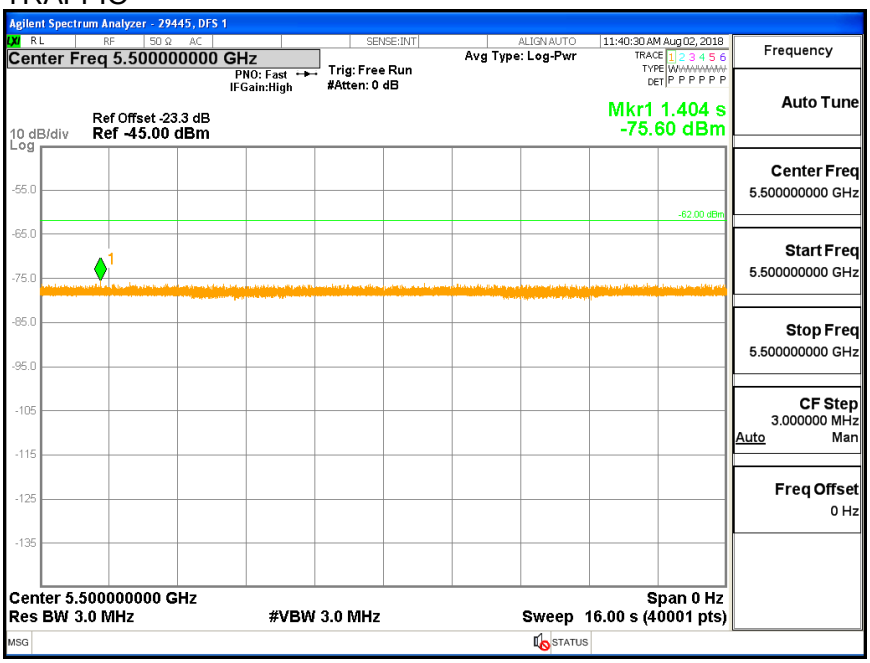
Note: The Type 5 randomized parameters tested are shown in a separate document.

6.5. WORKING RADIO RESULTS FOR 20 MHz BANDWIDTH / 96 kHz SAMPLE RATE

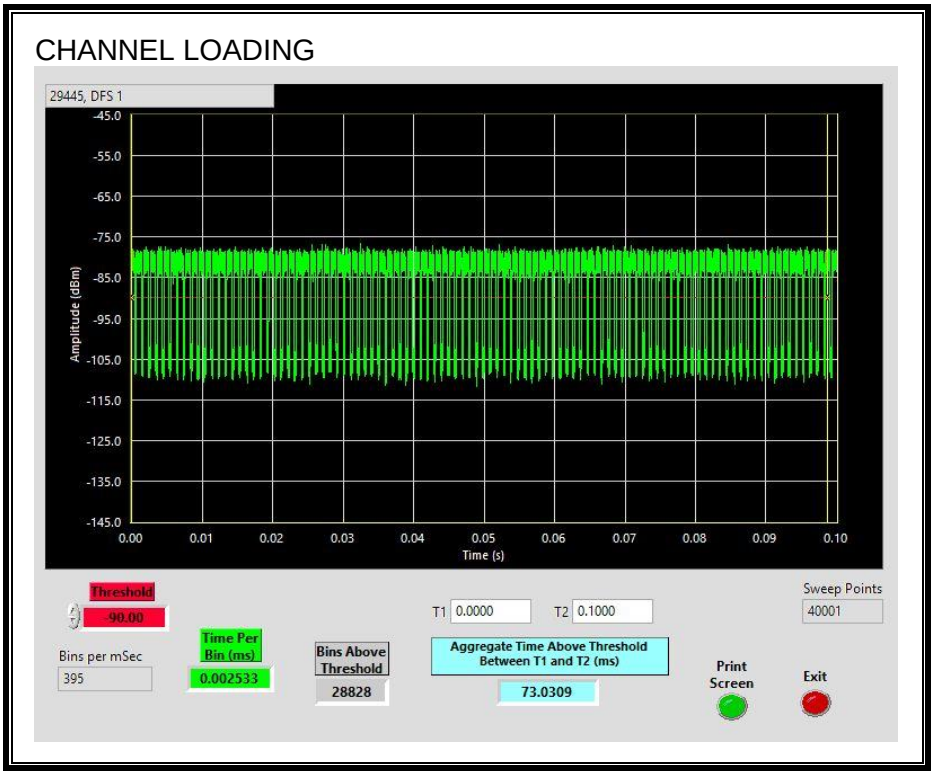
6.5.1. TRAFFIC AND CHANNEL LOADING

TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 73.03%

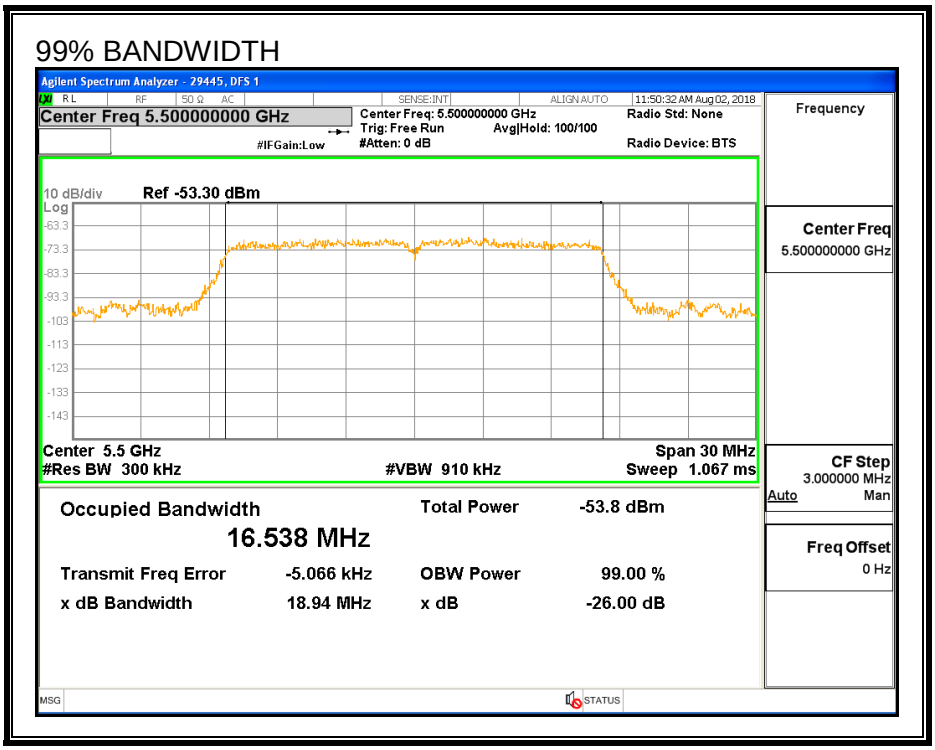
6.5.2. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

6.5.3. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5491	5509	18	16.538	108.8	100

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results		29445	DFS 1	
FCC Type 0 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5491	10	10	100	FL
5492	10	10	100	
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	10	100	FH

6.5.4. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Long Pulse Type 5	30	100.00	80	Pass	5491	5509	16.54	DFS 1	29445	Version 3.3.4

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	Yes
2	5500	Yes
3	5500	Yes
4	5500	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5494	Yes
12	5495	Yes
13	5494	Yes
14	5495	Yes
15	5494	Yes
16	5496	Yes
17	5494	Yes
18	5496	Yes
19	5498	Yes
20	5497	Yes
21	5501	Yes
22	5502	Yes
23	5503	Yes
24	5501	Yes
25	5502	Yes
26	5503	Yes
27	5501	Yes
28	5502	Yes
29	5503	Yes
30	5501	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

6.6. MONITOR RADIO RESULTS FOR 20 MHz BANDWIDTH / 48 kHz SAMPLE RATE

6.6.1. TRAFFIC AND CHANNEL LOADING

The Monitor Radio is a listen only device. It never transmits control signals or data. It is used to pre-screen a second channel as a back-up in the event that the working channel is taken out of service.

6.6.2. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

6.6.3. DETECTION BANDWIDTH

The manufacturer declares that the radio module, antenna and software used with the Monitor Radio are identical to the Working Radio. Therefore the 99% Power Bandwidth and Detection Bandwidth values of the Monitor Radio are equivalent to the Working Radio values found in section 1.3.3 of the reference DFS report. Those values are used to perform In-Service Monitoring tests for the Monitor Radio.

6.6.4. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Long Pulse Type 5	30	100.00	80	Pass	5491	5509	16.36	DFS 1	29445	Version 3.3.4

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	Yes
2	5500	Yes
3	5500	Yes
4	5500	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5494	Yes
12	5496	Yes
13	5494	Yes
14	5496	Yes
15	5494	Yes
16	5496	Yes
17	5494	Yes
18	5496	Yes
19	5498	Yes
20	5498	Yes
21	5501	Yes
22	5502	Yes
23	5502	Yes
24	5501	Yes
25	5502	Yes
26	5502	Yes
27	5501	Yes
28	5502	Yes
29	5502	Yes
30	5501	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

6.7. MONITOR RADIO RESULTS FOR 20 MHz BANDWIDTH / 96 kHz SAMPLE RATE

6.7.1. TRAFFIC AND CHANNEL LOADING

The Monitor Radio is a listen only device. It never transmits control signals or data. It is used to pre-screen a second channel as a back-up in the event that the working channel is taken out of service.

6.7.2. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

6.7.3. DETECTION BANDWIDTH

The manufacturer declares that the radio module, antenna and software used with the Monitor Radio are identical to the Working Radio. Therefore the 99% Power Bandwidth and Detection Bandwidth values of the Monitor Radio are equivalent to the Working Radio values found in section 1.4.3 of the reference DFS report.. Those values are used to perform In-Service Monitoring tests for the Monitor Radio.

6.7.4. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Long Pulse Type 5	30	96.67	80	Pass	5491	5509	16.54	DFS 1	29445	Version 3.3.4

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	Yes
2	5500	Yes
3	5500	Yes
4	5500	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5494	Yes
12	5495	Yes
13	5494	No
14	5495	Yes
15	5494	Yes
16	5496	Yes
17	5494	Yes
18	5496	Yes
19	5498	Yes
20	5497	Yes
21	5501	Yes
22	5502	Yes
23	5503	Yes
24	5501	Yes
25	5502	Yes
26	5503	Yes
27	5501	Yes
28	5502	Yes
29	5503	Yes
30	5501	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

6.8. BRIDGE MODE RESULTS

Per KDB 905462, Section 5.1 (footnote 1):

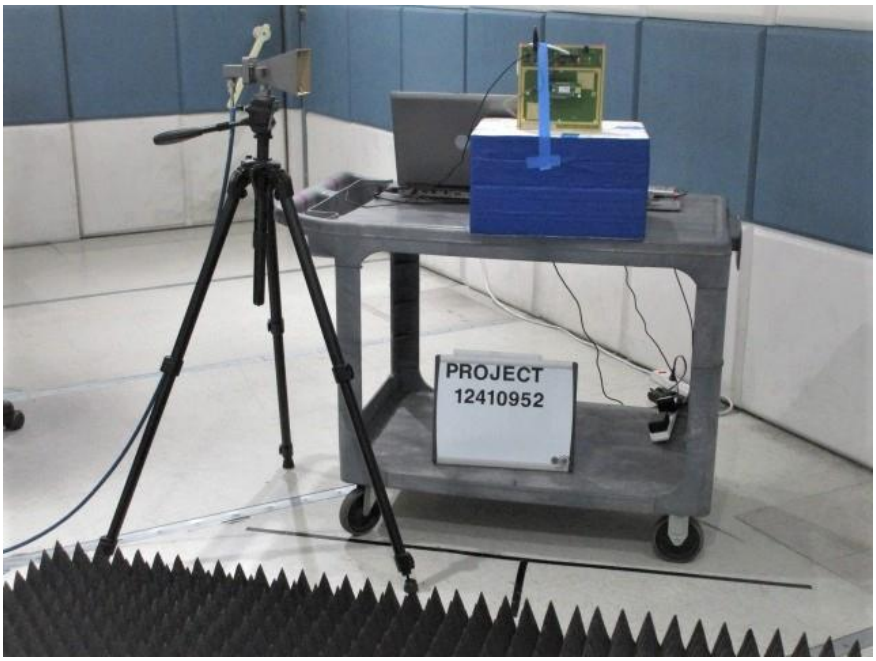
Networks Access Points with Bridge and/or MESH modes of operation are permitted to operate in the DFS bands but must employ a DFS function. The functionality of the Bridge mode as specified in §15.403(a) must be validated in the DFS test report. Devices operating as relays must also employ DFS function. The method used to validate the functionality must be documented and validation data must be documented. Bridge mode can be validated by performing a test statistical performance check (Section 7.8.4) on any one of the radar types. This is an abbreviated test to verify DFS functionality. MESH mode operational methodology must be submitted in the application for certification for evaluation by the FCC.

This device does not support Bridge Mode therefore this test was not performed.

7. SETUP PHOTOS

DYNAMIC FREQUENCY SELECTION MEASUREMENT SETUP

DFS FRONT PHOTO



DFS BACK PHOTO

END OF REPORT