DFS PORTION of FCC 47 CFR PART 15 SUBPART E
DFS PORTION of ISED CANADA RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

FOR

XV2-22H WALLPLATE WiFi 6 2x2 ACCESS POINT

MODEL NUMBER: XV2-22H

FCC ID: Z8H89FT0077
ISED ID: 109W-0077

REPORT NUMBER: 14492992-E1V1

ISSUE DATE: 2023-01-27

Prepared for
CAMBIUM NETWORKS, INC.
3800 GOLF RD., SUITE 360
ROLLING MEADOWS
IL., 60008, U.S.A.

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	23/01/27	Initial Issue	--

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CAMBIUM NETWORKS, INC.
3800 GOLF RD., SUITE 360
ROLLING MEADOWS, IL., 60008, U.S.A.

EUT DESCRIPTION: XV2-22H WALLPLATE WiFi 6 2x2 ACCESS POINT

MODEL: XV2-22H

SERIAL NUMBER: W6YG0040WVZD (MASTER DEVICE) and
W6YG003G84DT (MESH SLAVE DEVICE)

DATE TESTED: AUGUST 12 to 13, 2022

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	Complies
DFS Portion of ISED CANADA RSS-247 Issue 2	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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.

Approved & Released For
UL Verification Services Inc. By:

Edgard Rincand
Operations Leader
CONSUMER TECHNOLOGY DIVISION
UL Verification Services Inc.

Prepared By:

DOUG ANDERSON
Test Engineer
CONSUMER TECHNOLOGY DIVISION
UL Verification Services Inc.

2. 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 KDB 789033, KDB 905462 D02 and D03 and RSS-247 Issue 2.

3. SUMMARY OF TEST RESULTS

Requirement Description	Result	Remarks
DFS Portion of FCC 47 CFR PART 15 SUBPART E	Complies	
DFS Portion of ISED CANADA RSS-247 ISSUE 2	Complies	

4. REFERENCE DOCUMENTS

Measurements of transmitter parameters as referenced in this report and all other manufacturer's declarations relevant to the RF test requirements are documented in Sporton Labs FCC report and IC report number FR270109AB.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

5. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, California, USA	US0104	2324A	550739
	Building 2: 47266 Benicia Street, Fremont, California, USA	US0104	2324A	550739
	Building 4: 47658 Kato Rd, Fremont, California, USA	US0104	2324A	550739

6. DECISION RULES AND MEASUREMENT UNCERTAINTY

6.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

6.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement).

7. DYNAMIC FREQUENCY SELECTION

7.1. OVERVIEW

7.1.1. LIMITS

INNOVATION, SCIENCE and ECONOMIC DEVELOPMENT CANADA (ISED)

ISED 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

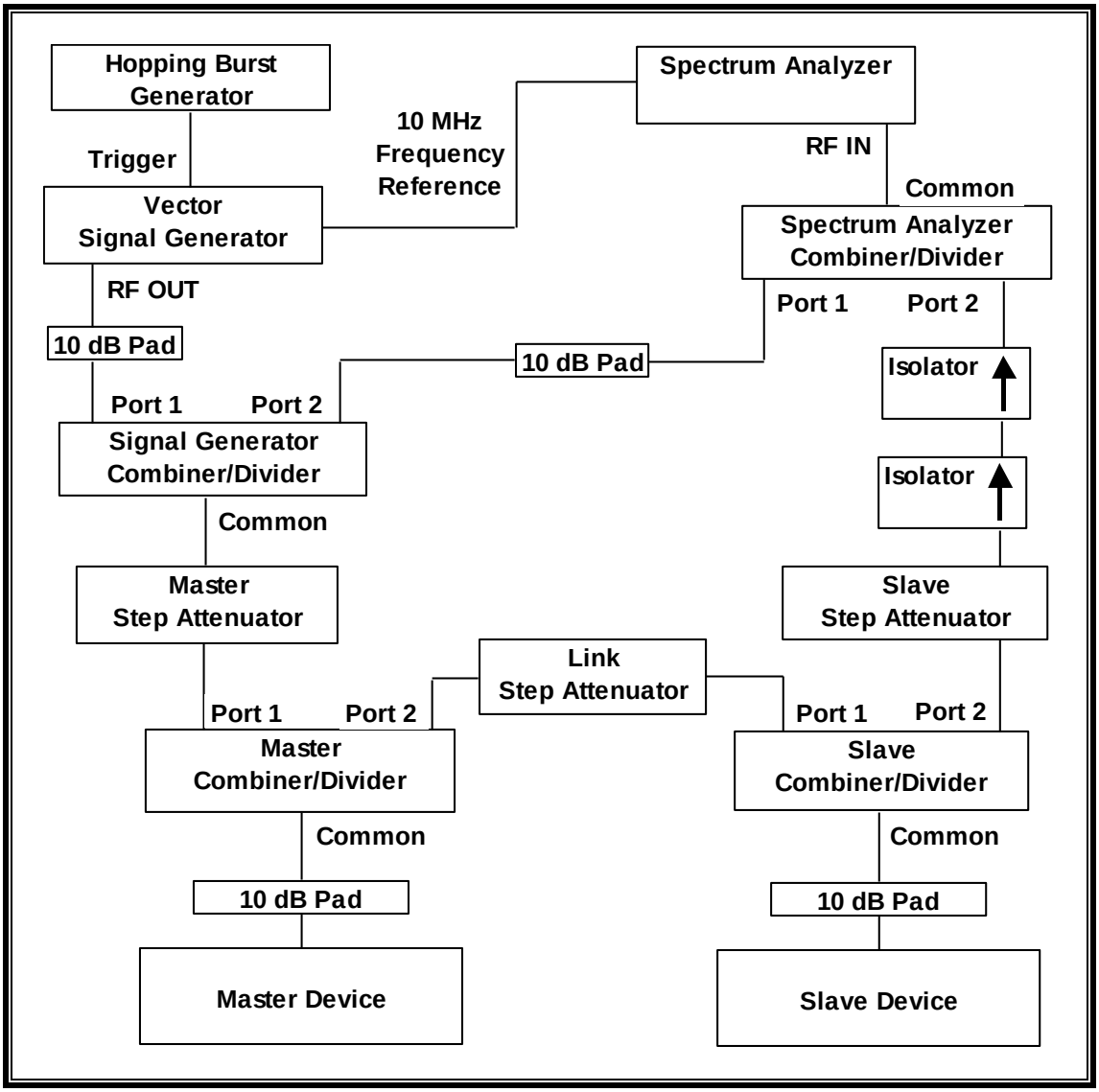
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

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

7.1.2. TEST AND MEASUREMENT SYSTEM

CONDUCTED 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.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the pad connected to the Master Device (and/or between the Slave Combiner/Divider and the pad connected to the Slave Device). Additional pads may be utilized such that there is one pad at each RF port on each EUT.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected in place of the master device. The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 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 –64 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 –64 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 Link Step Attenuator between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. Traffic that meets or exceed the minimum loading requirement is streamed from the Master device to the Slave Device. The WLAN traffic level, as displayed on the spectrum analyzer, is confirmed to be at lower amplitude than the radar detection threshold and is confirmed to be the Radar Detection Device rather than the associated device. If a different setting of the Master Step Attenuator is required to meet the above conditions, a new System Calibration is performed for the new Master Step Attenuator setting.

TEST AND MEASUREMENT EQUIPMENT

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

MASTER DEVICE

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID No.**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 8.4GHz	Keysight	N9030A	150667	01/27/23
Signal Generator, MXG X-Series RF Vector	Keysight	N5182B	215999	02/08/23
Frequency Extender	Keysight	N5182BX	213906	12/29/22
Arbitrary Waveform Generator	Agilent / HP	33220A	80815	01/24/23

MESH SLAVE DEVICE

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID No.**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 8.4GHz	Keysight	N9030A	150667	01/27/23
Signal Generator, MXG X-Series RF Vector	Keysight	N5182B	215999	02/08/23
Frequency Extender	Keysight	N5182BX	213906	12/29/22

Note: An MXG series Signal Generator and separate external Frequency Extender module are shown in the preceding test system block diagram as a stand-alone Vector Signal Generator.

7.1.3. TEST AND MEASUREMENT SOFTWARE

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

MASTER DEVICE

TEST SOFTWARE LIST		
Name	**Version**	**Test / Function**
Aggregate Time-PXA	3.1	Channel Loading and Aggregate Closing Time
FCC 2014 Detection Bandwidth-PXA	3.1.1	Detection Bandwidth in 5 MHz Steps
In Service Monitoring-PXA	4.1	In-Service Monitoring (Probability of Detection)
PXA Read	3.1	Signal Generator Screen Capture
SGXProject.exe	1.7	Radar Waveform Generation and Download

MESH SLAVE DEVICE

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
SGXProject.exe	1.7	Radar Waveform Generation and Download

7.1.4. TEST ROOM ENVIRONMENT

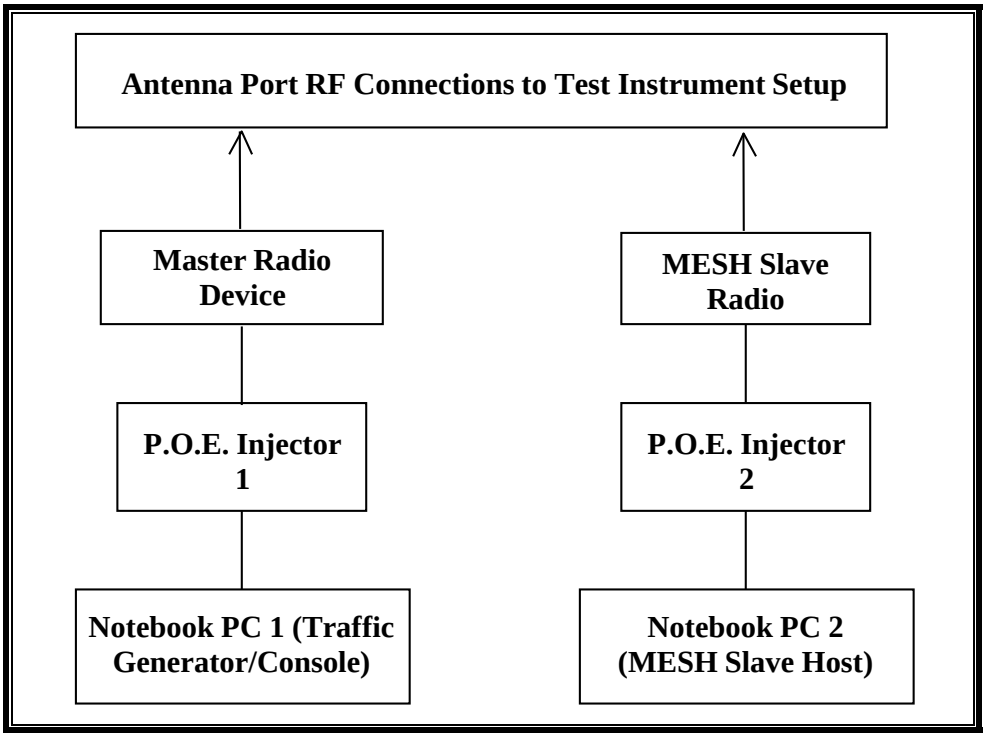
The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

ENVIRONMENT CONDITION

Parameter	Value
Temperature	23.7 and 22.4 °C
Humidity	58 and 53 %

7.1.5. SETUP OF EUT

CONDUCTED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

MASTER DEVICE

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
P.O.E. Injector 1 (Master)	Cambium Networks	NET-P60-56IN	N000000L142A2153000001	DoC
Notebook PC 1 (Master Console)	Lenovo	Type 4236-B92	PB-HEX04 12/05	DoC
AC Adapter 1 (Notebook PC 1)	Lenovo	42T4418	11S42T4418Z1ZGWG08R90M	DoC
XV2-22H Wallplate WiFi 6 2x2 Access Point (MESH Slave Radio)	Cambium Networks	XV2-22H	W6YG003G84DT	Z8H89FT0077
P.O.E. Injector 2 (MESH Slave)	Cambium Networks	NET-P60-56IN	N000000L142A20280000149	DoC
Notebook PC 2 (MESH Slave Host)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter 2 (Notebook PC 2)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS974594A9	DoC

MESH SLAVE DEVICE

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
P.O.E. Injector 1 (Master)	Cambium Networks	NET-P60-56IN	N000000L142A2153000001	DoC
Notebook PC 1 (Master Console)	Lenovo	Type 4236-B92	PB-HEX04 12/05	DoC
AC Adapter 1 (Notebook PC 1)	Lenovo	42T4418	11S42T4418Z1ZGWG08R90M	DoC
XV2-22H Wallplate WiFi 6 2x2 Access Point (Master Radio Device)	Cambium Networks	XV2-22H	W6YG0040WVZD	Z8H89FT0077
P.O.E. Injector 2 (MESH Slave)	Cambium Networks	NET-P60-56IN	N000000L142A20280000149	DoC
Notebook PC 2 (MESH Slave Host)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter 2 (Notebook PC 2)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS974594A9	DoC

7.1.6. DESCRIPTION OF EUT

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

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

The EUT can be configured as a Master Device or a Mesh Slave Device without Radar Detection.

The manufacturer has declared that the highest power level within these bands is 30 dBm EIRP in the 5250-5350 MHz band and 30 dBm EIRP in the 5470-5725 MHz band.

The manufacturer has declared that the highest gain antenna assembly utilized with the EUT has a gain of 5 dBi in the 5250-5350 MHz band and 5 dBi in the 5470-5725 MHz band. The manufacturer has declared that the lowest gain antenna assembly utilized with the EUT has a gain of 5 dBi in the 5250-5350 MHz band and 5 dBi in the 5470-5725 MHz band.

Two identical antennas are utilized to meet the diversity and MIMO operational requirements.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 5 + 1 = -58 dBm.

The calibrated conducted DFS Detection Threshold level is set to –63 dBm.

The EUT uses two transmitter/receiver chains, each connected to a 50-ohm coaxial antenna port.

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

WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the Master Device to the Slave Device using iPerf version 2.0.5 software package.

TPC is required since the maximum EIRP is greater than 500 mW (27 dBm).

The EUT utilizes the 802.11ax architecture. Three nominal channel bandwidths are implemented: 20 MHz, 40 MHz and 80 MHz.

Channel puncturing is not supported by the EUT.

The software installed in the EUT is revision 6.5-a0.

The software installed in the access point during Mesh Slave testing is revision 6.5-a0.

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 Cambium XV2-22H Wallplate WiFi 6 2x2 Access Point, FCC ID: Z8H89FT0077. The minimum antenna gain for the Master Device is 5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 5 + 1 = -58 dBm.

The calibrated conducted DFS Detection Threshold level is set to –63 dBm.

The software installed in the access point is revision 6.5-a0.

7.2. RESULTS FOR 20 MHz BANDWIDTH

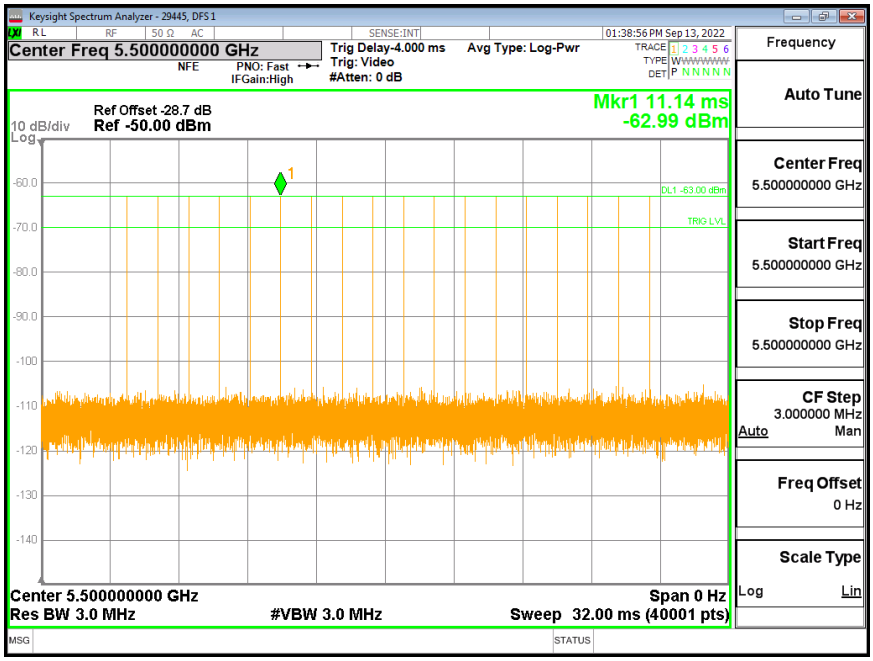
7.2.1. TEST CHANNEL

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

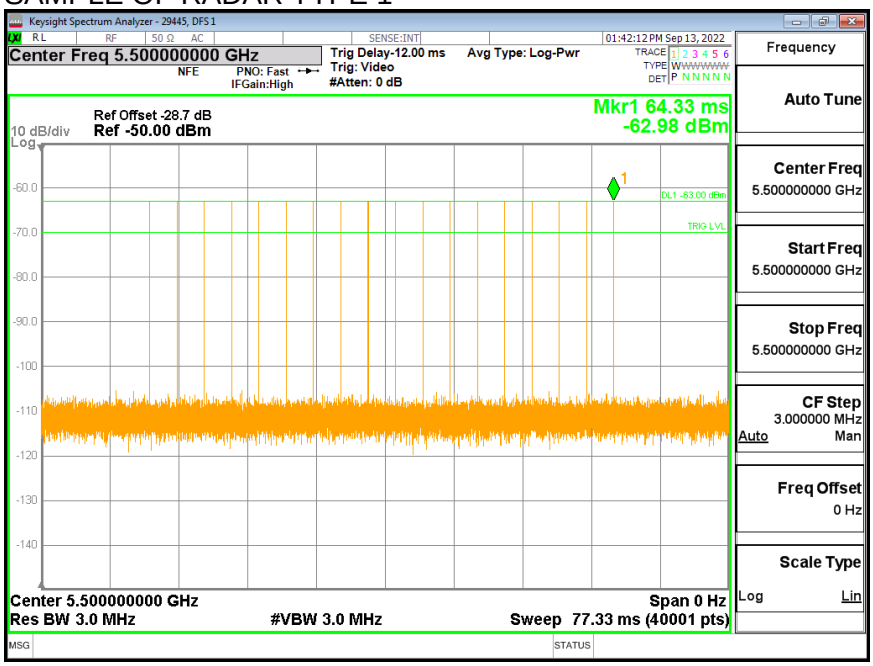
7.2.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

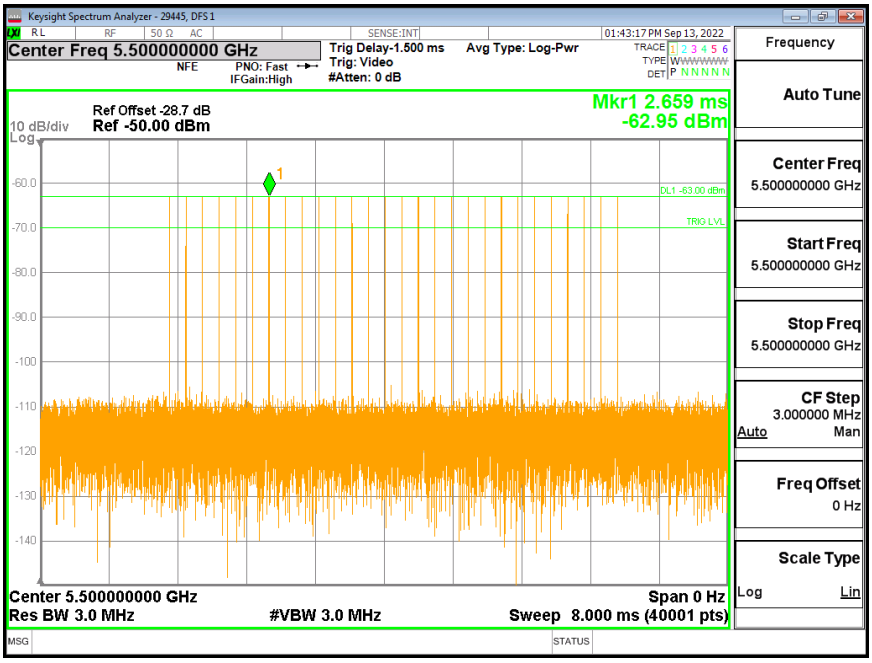
SHORT PULSE RADAR TYPE 0



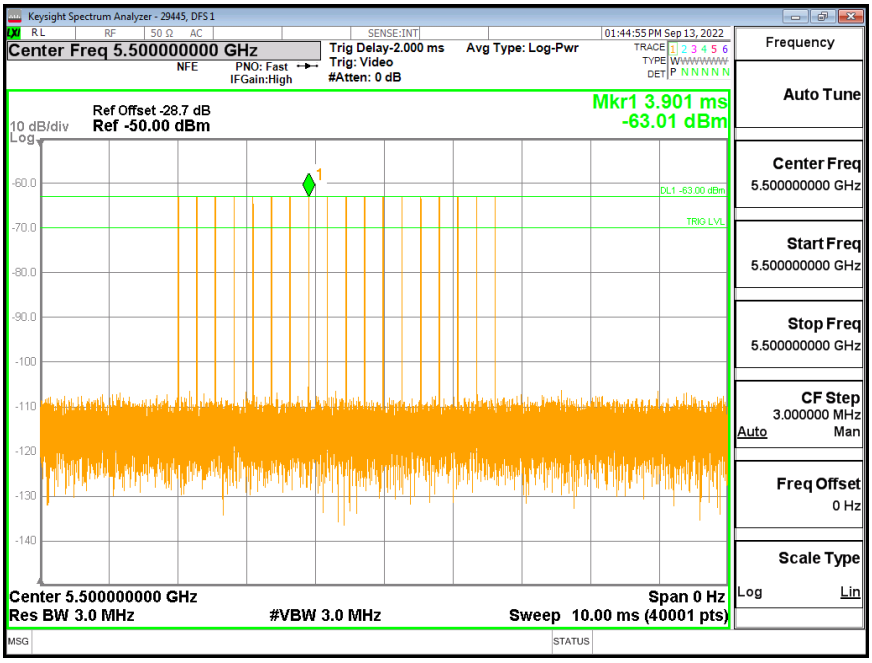
SAMPLE OF RADAR TYPE 1



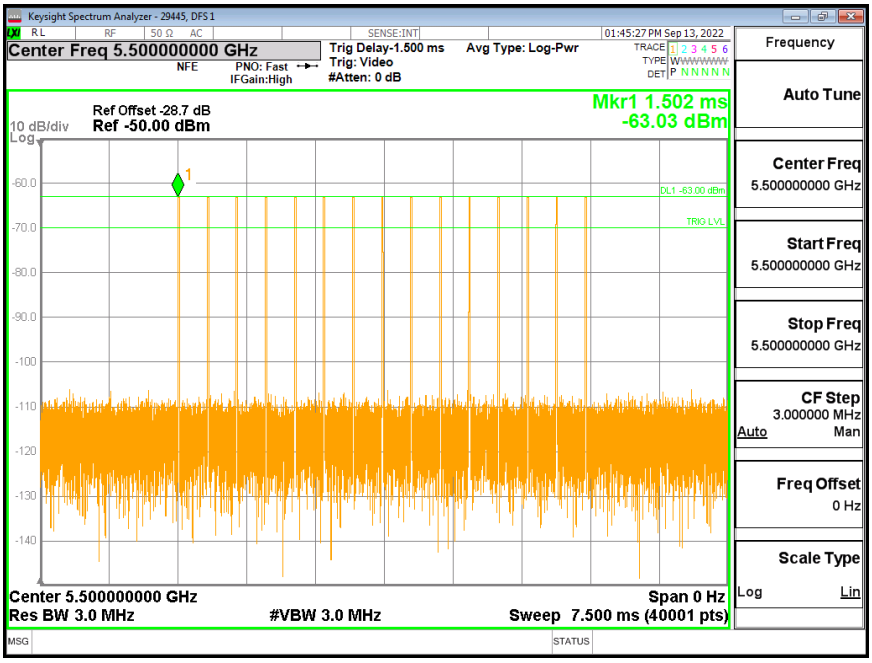
SAMPLE OF RADAR TYPE 2



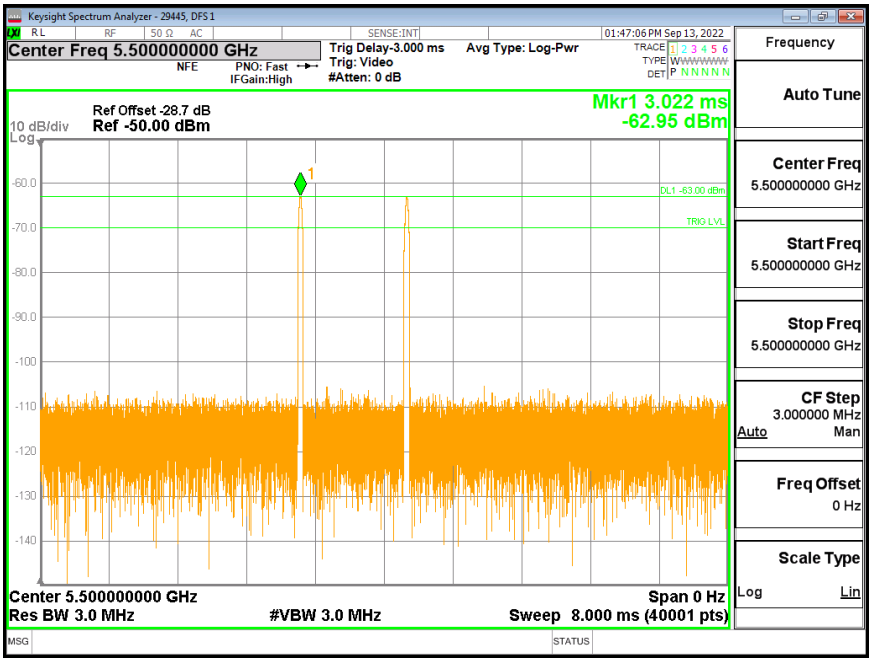
SAMPLE OF RADAR TYPE 3



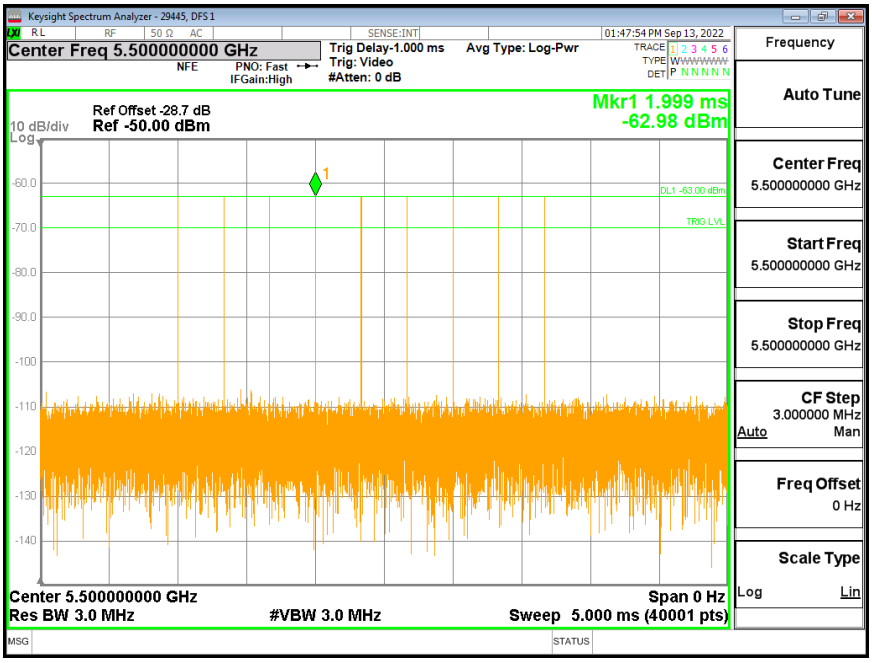
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

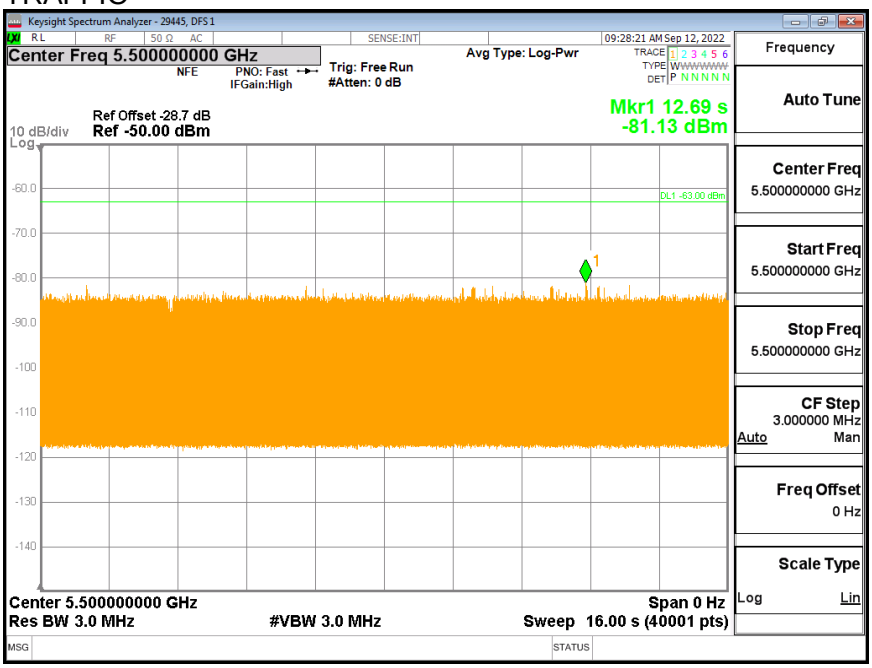


SINGLE BURST OF RADAR TYPE 6

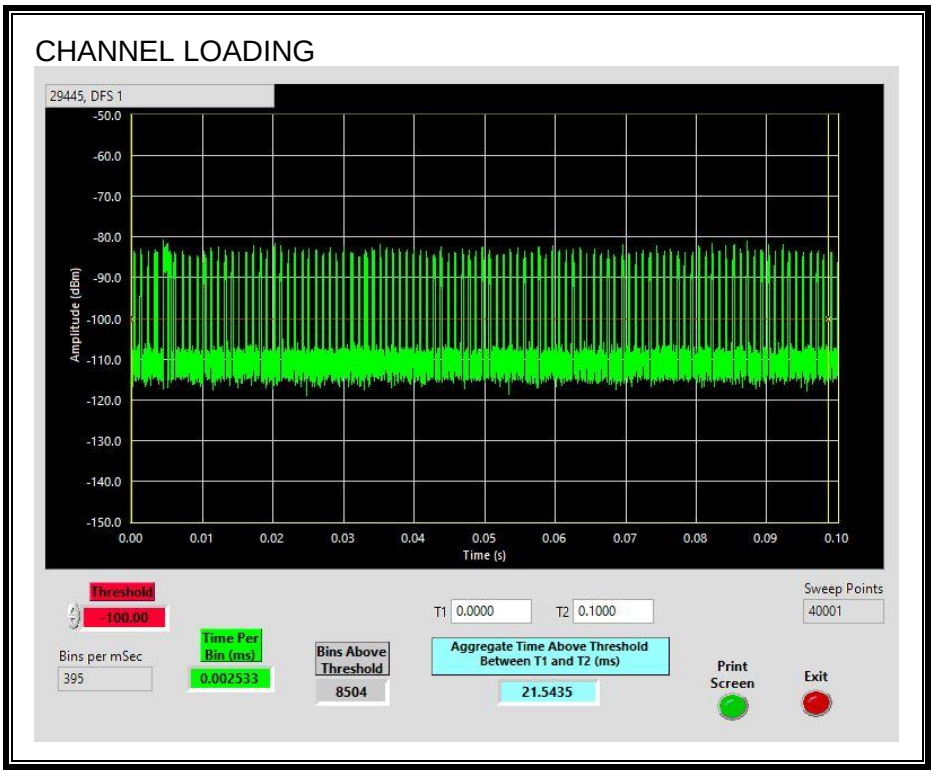


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 21.54%

7.2.3. CHANNEL AVAILABILITY CHECK TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode and all other timing tests may be tested using any single channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.2.4. OVERLAPPING CHANNEL TESTS

RESULTS

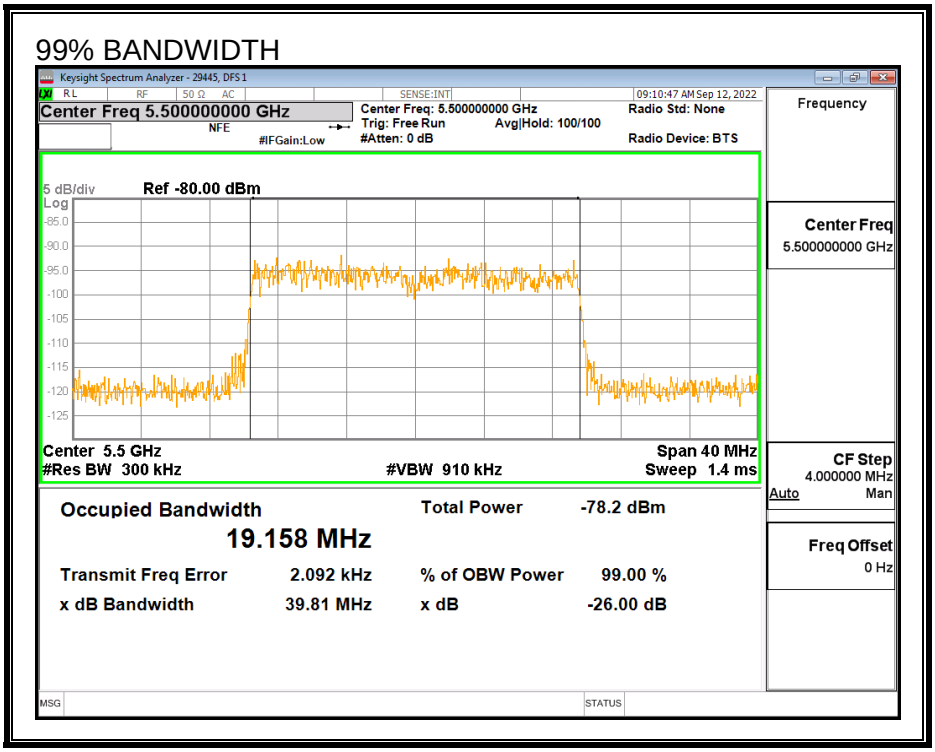
The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

7.2.5. MOVE AND CLOSING TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode and all other timing tests may be tested using any single channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.2.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5490	5510	20	19.158	104.4	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
5490	10	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	FH

7.2.7. 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 Short Pulse Type 1	30	96.67	60	Pass	5490	5510	19.16	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5510	19.16	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	96.67	60	Pass	5490	5510	19.16	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	90.00	60	Pass	5490	5510	19.16	DFS 1	29445	v4.1
Aggregate		95.83	80	Pass						
FCC Long Pulse Type 5	30	96.67	80	Pass	5490	5510	19.16	DFS 1	29445	v4.1
FCC Hopping Type 6	42	100.00	70	Pass	5490	5510		DFS 1	29445	v4.1

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5491	Yes
1002	1	858	62	A	5492	Yes
1003	1	718	74	A	5496	Yes
1004	1	538	99	A	5496	Yes
1005	1	638	83	A	5494	Yes
1006	1	918	58	A	5502	Yes
1007	1	618	86	A	5500	Yes
1008	1	658	81	A	5492	Yes
1009	1	818	65	A	5492	Yes
1010	1	598	89	A	5501	Yes
1011	1	878	61	A	5509	No
1012	1	518	102	A	5499	Yes
1013	1	558	95	A	5494	Yes
1014	1	938	57	A	5503	Yes
1015	1	738	72	A	5510	Yes
1016	1	2703	20	B	5508	Yes
1017	1	853	62	B	5497	Yes
1018	1	679	78	B	5505	Yes
1019	1	1506	36	B	5491	Yes
1020	1	1462	37	B	5505	Yes
1021	1	1223	44	B	5496	Yes
1022	1	1309	41	B	5504	Yes
1023	1	1200	44	B	5506	Yes
1024	1	2768	20	B	5494	Yes
1025	1	1594	34	B	5502	Yes
1026	1	744	71	B	5494	Yes
1027	1	2247	24	B	5496	Yes
1028	1	1526	35	B	5510	Yes
1029	1	611	87	B	5494	Yes
1030	1	1373	39	B	5500	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	1.7	193	28	5505	Yes
2002	4	155	27	5508	Yes
2003	4.9	192	26	5499	Yes
2004	1.3	158	28	5494	Yes
2005	2.4	199	24	5495	Yes
2006	3.2	169	23	5492	Yes
2007	2.6	214	27	5509	Yes
2008	3.6	193	27	5505	Yes
2009	3.1	161	24	5497	Yes
2010	2.4	183	27	5501	Yes
2011	2.2	198	28	5497	Yes
2012	1.7	186	25	5504	Yes
2013	3.8	205	27	5507	Yes
2014	3.5	197	24	5501	Yes
2015	4	182	29	5501	Yes
2016	3.9	221	24	5506	Yes
2017	4.5	211	26	5494	Yes
2018	2.7	211	24	5491	Yes
2019	3.6	166	24	5502	Yes
2020	4.1	213	26	5492	Yes
2021	1.1	173	29	5510	Yes
2022	1.9	224	28	5508	Yes
2023	1.3	150	25	5509	Yes
2024	2.3	168	24	5500	Yes
2025	1.8	217	28	5499	Yes
2026	1.1	200	25	5509	Yes
2027	5	172	26	5492	Yes
2028	4.5	160	23	5491	Yes
2029	2.5	179	24	5490	Yes
2030	4.4	214	29	5506	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	7.7	271	18	5505	Yes
3002	9.7	392	18	5509	Yes
3003	8.2	360	18	5490	Yes
3004	6.4	493	18	5497	Yes
3005	7.3	473	18	5494	Yes
3006	7.9	368	18	5493	Yes
3007	8.9	495	17	5505	Yes
3008	9.7	284	17	5492	Yes
3009	9.1	424	16	5510	Yes
3010	6	477	18	5492	Yes
3011	9.6	379	16	5509	Yes
3012	8.9	327	16	5497	Yes
3013	8.7	492	16	5506	Yes
3014	8.2	454	18	5505	Yes
3015	6.2	396	18	5491	Yes
3016	8.1	370	16	5504	Yes
3017	6.4	443	17	5497	Yes
3018	8.4	312	17	5504	Yes
3019	6.9	280	17	5504	Yes
3020	9.2	413	17	5509	Yes
3021	8.2	394	17	5509	Yes
3022	6.6	289	17	5492	Yes
3023	7.6	415	16	5492	Yes
3024	8.4	456	16	5496	Yes
3025	7.8	344	18	5495	Yes
3026	8.8	398	17	5505	Yes
3027	8.3	299	18	5495	Yes
3028	7.6	499	18	5495	No
3029	9.6	295	18	5498	Yes
3030	9	374	17	5498	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	17.8	317	15	5500	No
4002	12.8	291	15	5504	Yes
4003	18.1	364	12	5492	Yes
4004	13.6	484	13	5495	Yes
4005	19.4	452	12	5504	Yes
4006	11.1	334	13	5510	Yes
4007	13	314	13	5505	Yes
4008	18.5	460	12	5492	Yes
4009	16.7	336	16	5506	Yes
4010	13.5	377	16	5504	Yes
4011	12.1	265	13	5509	Yes
4012	14.3	319	16	5494	Yes
4013	18.2	471	14	5495	Yes
4014	11.7	420	16	5499	Yes
4015	16.1	467	14	5492	Yes
4016	14.9	428	12	5508	Yes
4017	19.8	488	13	5500	Yes
4018	19.1	462	14	5505	Yes
4019	15.2	417	15	5510	Yes
4020	19.8	404	16	5493	Yes
4021	12.2	372	15	5506	Yes
4022	17.3	254	12	5491	Yes
4023	19.2	486	16	5492	Yes
4024	15.6	263	15	5503	Yes
4025	13.8	256	15	5491	Yes
4026	19.8	297	14	5507	Yes
4027	18.4	437	12	5503	No
4028	16.3	490	14	5491	Yes
4029	15.3	274	12	5491	Yes
4030	18	340	15	5492	No

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	No
9	5500	Yes
10	5500	Yes
11	5499	Yes
12	5497	Yes
13	5497	Yes
14	5498	Yes
15	5497	Yes
16	5498	Yes
17	5497	Yes
18	5498	Yes
19	5497	Yes
20	5498	Yes
21	5503	Yes
22	5502	Yes
23	5503	Yes
24	5503	Yes
25	5507	Yes
26	5505	Yes
27	5501	Yes
28	5507	Yes
29	5505	Yes
30	5501	Yes

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

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	514	5490	6	Yes
2	989	5491	4	Yes
3	1464	5492	4	Yes
4	1939	5493	5	Yes
5	2414	5494	7	Yes
6	2889	5495	6	Yes
7	3364	5496	4	Yes
8	3839	5497	3	Yes
9	4314	5498	5	Yes
10	4789	5499	5	Yes
11	5264	5500	5	Yes
12	5739	5501	4	Yes
13	6214	5502	2	Yes
14	6689	5503	6	Yes
15	7164	5504	5	Yes
16	7639	5505	4	Yes
17	8114	5506	8	Yes
18	8589	5507	3	Yes
19	9064	5508	4	Yes
20	9539	5509	4	Yes
21	10014	5510	6	Yes
22	10489	5490	5	Yes
23	10964	5491	1	Yes
24	11439	5492	5	Yes
25	11914	5493	5	Yes
26	12389	5494	5	Yes
27	12864	5495	3	Yes
28	13339	5496	4	Yes
29	13814	5497	6	Yes
30	14289	5498	1	Yes
31	14764	5499	6	Yes
32	15239	5500	3	Yes
33	15714	5501	5	Yes
34	16189	5502	4	Yes
35	16664	5503	3	Yes
36	17139	5504	3	Yes
37	17614	5505	5	Yes
38	18089	5506	7	Yes
39	18564	5507	3	Yes
40	19039	5508	5	Yes
41	19514	5509	1	Yes
42	19989	5510	4	Yes

7.3. RESULTS FOR 40 MHz BANDWIDTH

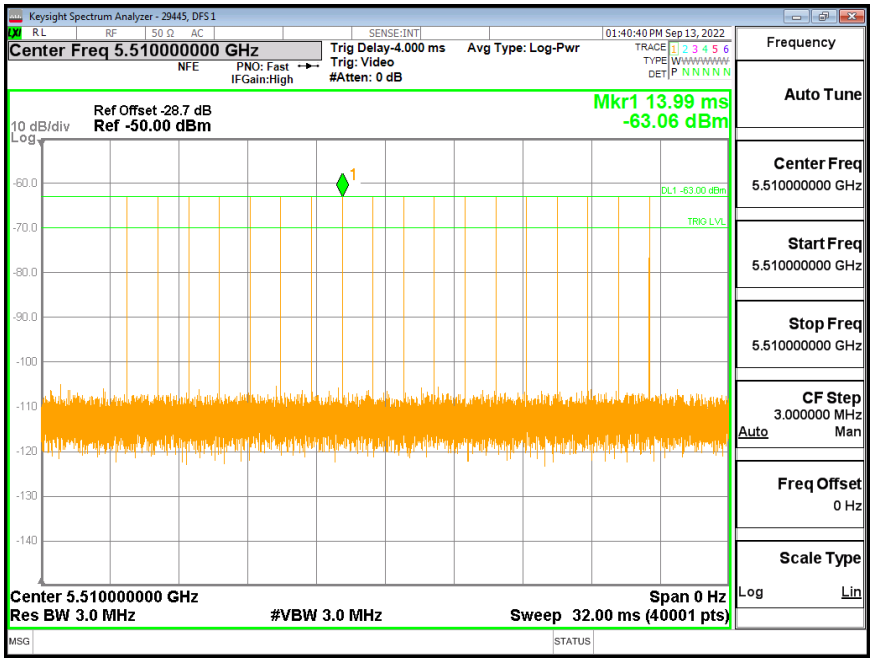
7.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

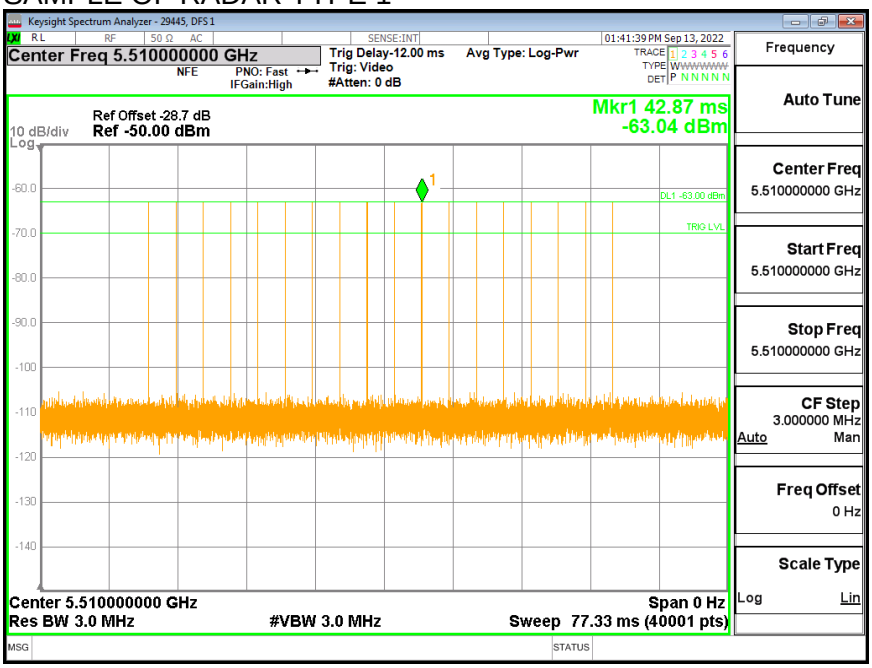
7.3.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

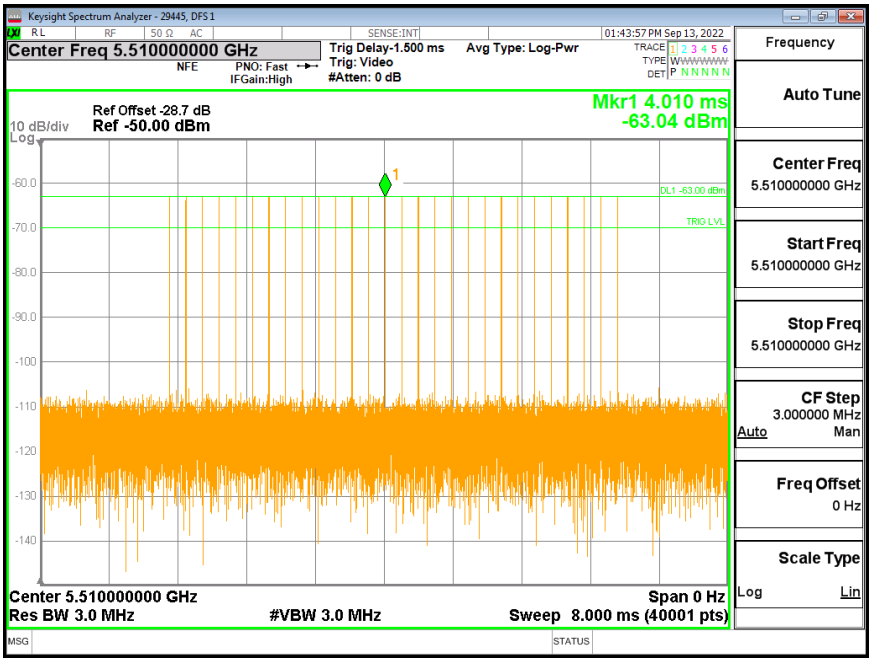
SHORT PULSE RADAR TYPE 0



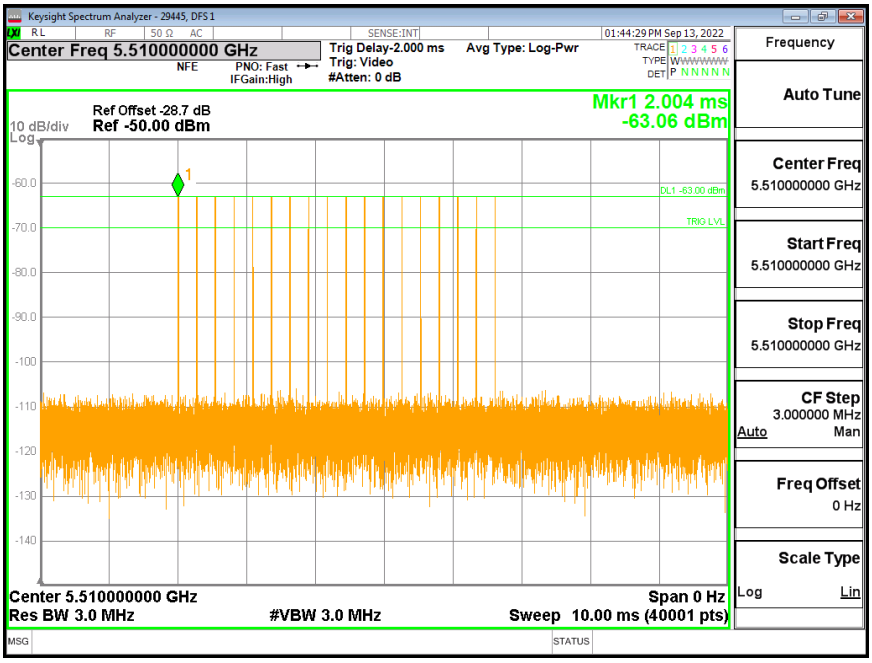
SAMPLE OF RADAR TYPE 1



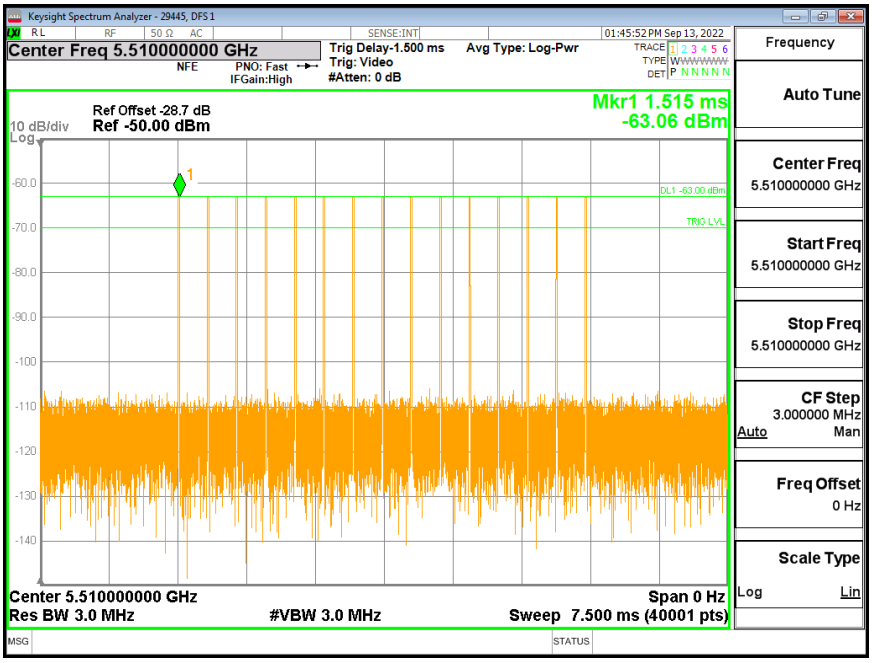
SAMPLE OF RADAR TYPE 2



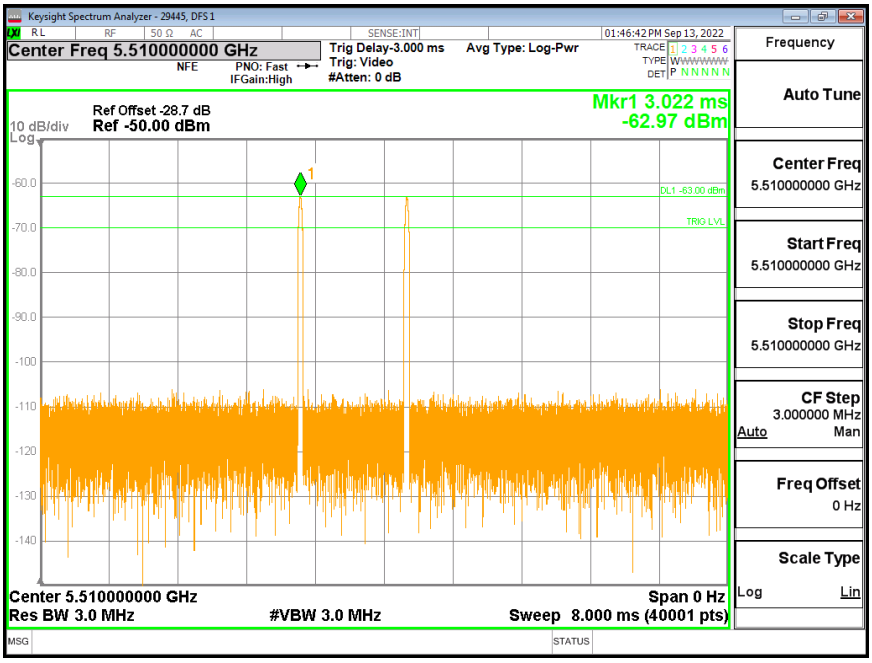
SAMPLE OF RADAR TYPE 3



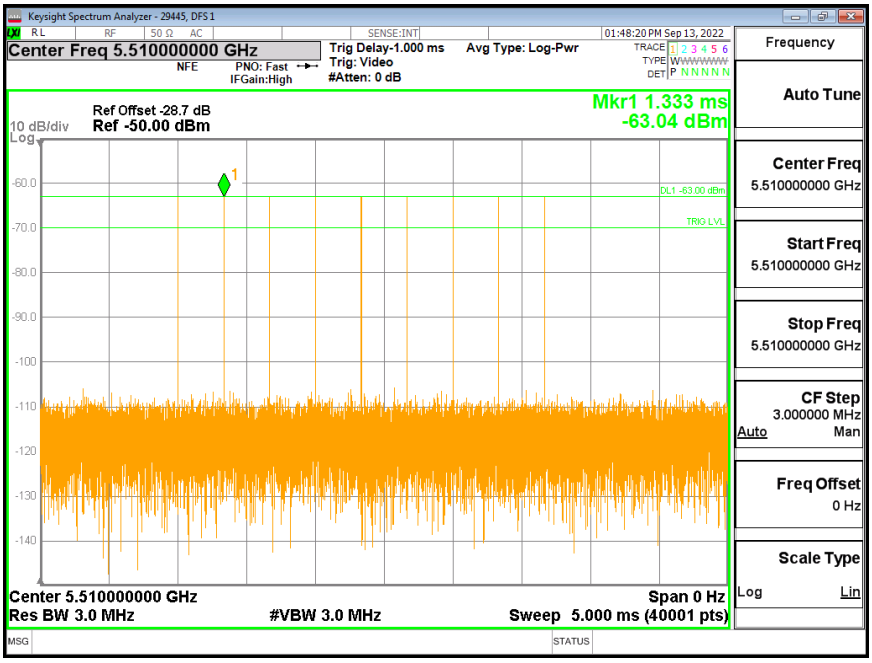
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

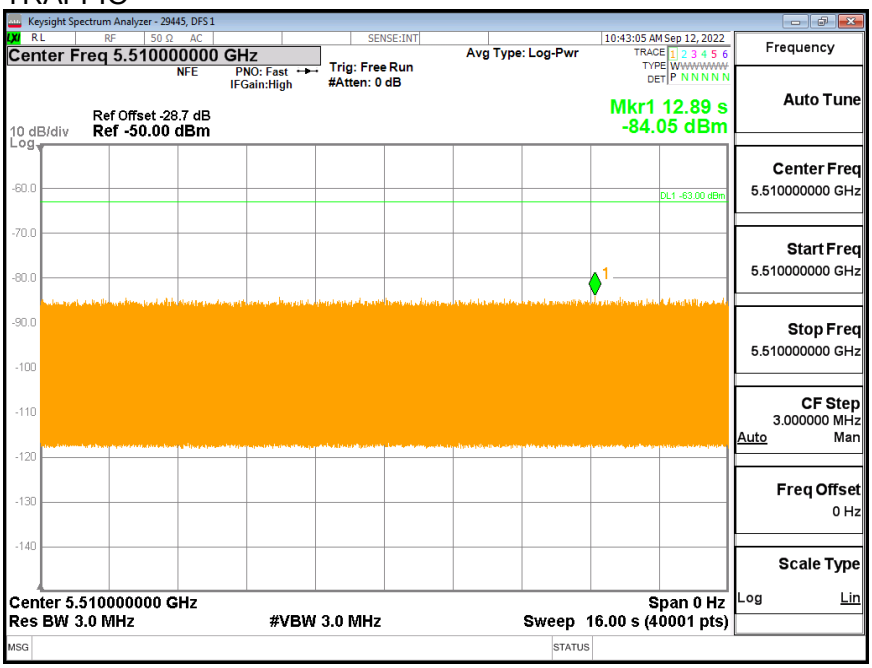


SINGLE BURST OF RADAR TYPE 6

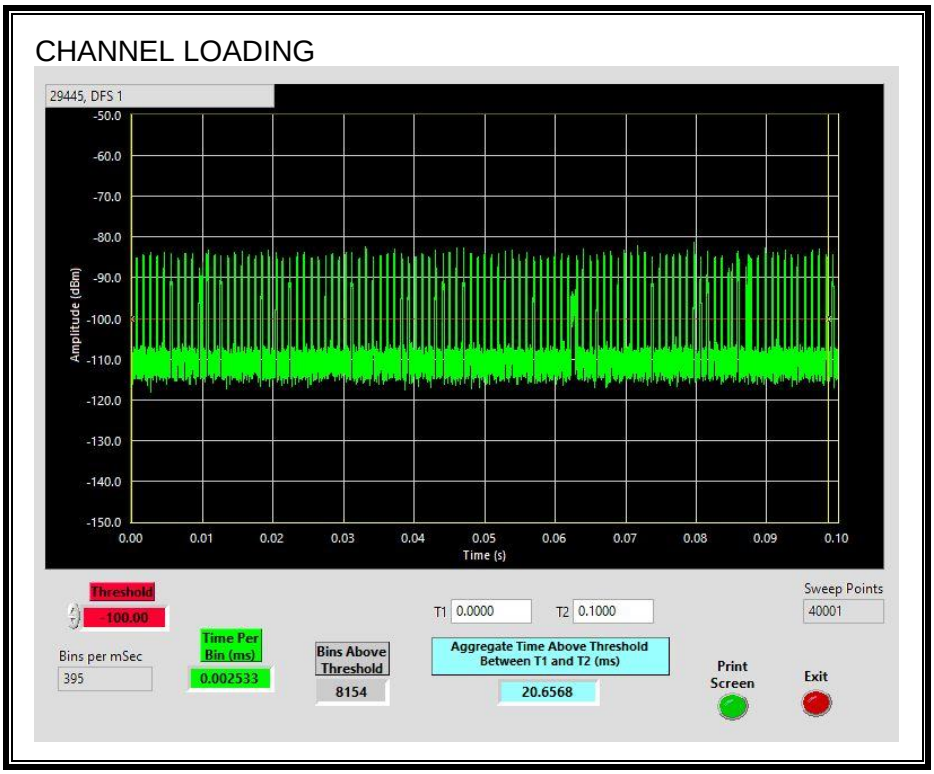


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 20.65%

7.3.3. CHANNEL AVAILABILITY CHECK TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode and all other timing tests may be tested using any single channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.3.4. OVERLAPPING CHANNEL TESTS

RESULTS

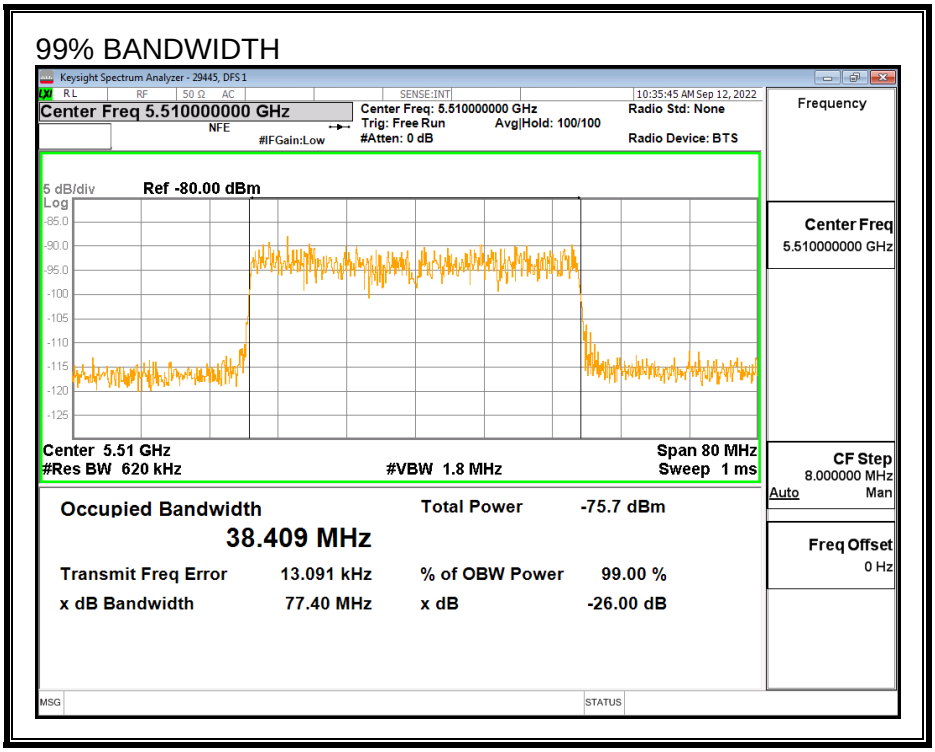
The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

7.3.5. MOVE AND CLOSING TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode and all other timing tests may be tested using any single channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.3.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5490	5530	40	38.409	104.1	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
5490	10	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	
5515	10	10	100	
5520	10	10	100	
5525	10	10	100	
5530	10	10	100	FH

7.3.7. 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 Short Pulse Type 1	30	96.67	60	Pass	5490	5530	38.41	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5530	38.41	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	96.67	60	Pass	5490	5530	38.41	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	86.67	60	Pass	5490	5530	38.41	DFS 1	29445	v4.1
Aggregate		95.00	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5530	38.41	DFS 1	29445	v4.1
FCC Hopping Type 6	41	100.00	70	Pass	5490	5530		DFS 1	29445	v4.1

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1						
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5511	Yes
1002	1	858	62	A	5494	Yes
1003	1	718	74	A	5503	No
1004	1	538	99	A	5507	Yes
1005	1	638	83	A	5524	Yes
1006	1	918	58	A	5515	Yes
1007	1	618	86	A	5498	Yes
1008	1	658	81	A	5491	Yes
1009	1	818	65	A	5530	Yes
1010	1	598	89	A	5508	Yes
1011	1	878	61	A	5510	Yes
1012	1	518	102	A	5497	Yes
1013	1	558	95	A	5514	Yes
1014	1	938	57	A	5491	Yes
1015	1	738	72	A	5493	Yes
1016	1	2703	20	B	5503	Yes
1017	1	853	62	B	5499	Yes
1018	1	679	78	B	5527	Yes
1019	1	1506	36	B	5519	Yes
1020	1	1462	37	B	5495	Yes
1021	1	1223	44	B	5494	Yes
1022	1	1309	41	B	5524	Yes
1023	1	1200	44	B	5515	Yes
1024	1	2768	20	B	5529	Yes
1025	1	1594	34	B	5526	Yes
1026	1	744	71	B	5497	Yes
1027	1	2247	24	B	5522	Yes
1028	1	1526	35	B	5520	Yes
1029	1	611	87	B	5495	Yes
1030	1	1373	39	B	5517	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	1.7	193	28	5499	Yes
2002	4	155	27	5491	Yes
2003	4.9	192	26	5520	Yes
2004	1.3	158	28	5503	Yes
2005	2.4	199	24	5505	Yes
2006	3.2	169	23	5512	Yes
2007	2.6	214	27	5515	Yes
2008	3.6	193	27	5500	Yes
2009	3.1	161	24	5492	Yes
2010	2.4	183	27	5493	Yes
2011	2.2	198	28	5527	Yes
2012	1.7	186	25	5503	Yes
2013	3.8	205	27	5519	Yes
2014	3.5	197	24	5521	Yes
2015	4	182	29	5519	Yes
2016	3.9	221	24	5509	Yes
2017	4.5	211	26	5498	Yes
2018	2.7	211	24	5496	Yes
2019	3.6	166	24	5525	Yes
2020	4.1	213	26	5510	Yes
2021	1.1	173	29	5496	Yes
2022	1.9	224	28	5507	Yes
2023	1.3	150	25	5526	Yes
2024	2.3	168	24	5522	Yes
2025	1.8	217	28	5517	Yes
2026	1.1	200	25	5529	Yes
2027	5	172	26	5490	Yes
2028	4.5	160	23	5505	Yes
2029	2.5	179	24	5525	Yes
2030	4.4	214	29	5504	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	7.7	271	18	5500	Yes
3002	9.7	392	18	5499	Yes
3003	8.2	360	18	5528	Yes
3004	6.4	493	18	5496	Yes
3005	7.3	473	18	5516	Yes
3006	7.9	368	18	5505	Yes
3007	8.9	495	17	5511	Yes
3008	9.7	284	17	5517	Yes
3009	9.1	424	16	5509	Yes
3010	6	477	18	5513	Yes
3011	9.6	379	16	5523	Yes
3012	8.9	327	16	5498	Yes
3013	8.7	492	16	5500	Yes
3014	8.2	454	18	5508	Yes
3015	6.2	396	18	5494	Yes
3016	8.1	370	16	5493	Yes
3017	6.4	443	17	5518	Yes
3018	8.4	312	17	5523	Yes
3019	6.9	280	17	5511	Yes
3020	9.2	413	17	5506	Yes
3021	8.2	394	17	5499	Yes
3022	6.6	289	17	5504	No
3023	7.6	415	16	5492	Yes
3024	8.4	456	16	5523	Yes
3025	7.8	344	18	5491	Yes
3026	8.8	398	17	5491	Yes
3027	8.3	299	18	5500	Yes
3028	7.6	499	18	5492	Yes
3029	9.6	295	18	5503	Yes
3030	9	374	17	5491	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	17.8	317	15	5494	Yes
4002	12.8	291	15	5498	Yes
4003	18.1	364	12	5505	Yes
4004	13.6	484	13	5492	Yes
4005	19.4	452	12	5490	Yes
4006	11.1	334	13	5512	Yes
4007	13	314	13	5523	Yes
4008	18.5	460	12	5518	Yes
4009	16.7	336	16	5508	Yes
4010	13.5	377	16	5493	No
4011	12.1	265	13	5523	Yes
4012	14.3	319	16	5497	Yes
4013	18.2	471	14	5528	Yes
4014	11.7	420	16	5494	Yes
4015	16.1	467	14	5522	Yes
4016	14.9	428	12	5520	No
4017	19.8	488	13	5522	Yes
4018	19.1	462	14	5505	Yes
4019	15.2	417	15	5525	Yes
4020	19.8	404	16	5498	No
4021	12.2	372	15	5498	Yes
4022	17.3	254	12	5516	Yes
4023	19.2	486	16	5522	Yes
4024	15.6	263	15	5516	Yes
4025	13.8	256	15	5511	Yes
4026	19.8	297	14	5529	Yes
4027	18.4	437	12	5506	Yes
4028	16.3	490	14	5513	Yes
4029	15.3	274	12	5515	No
4030	18	340	15	5493	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5510	Yes
2	5510	Yes
3	5510	Yes
4	5510	Yes
5	5510	Yes
6	5510	Yes
7	5510	Yes
8	5510	Yes
9	5510	Yes
10	5510	Yes
11	5499	Yes
12	5497	Yes
13	5498	Yes
14	5498	Yes
15	5498	Yes
16	5498	Yes
17	5498	Yes
18	5498	Yes
19	5498	Yes
20	5498	Yes
21	5522	Yes
22	5522	Yes
23	5522	Yes
24	5523	Yes
25	5527	Yes
26	5525	Yes
27	5521	Yes
28	5527	Yes
29	5525	Yes
30	5521	Yes

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

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	806	5490	5	Yes
2	1281	5491	3	Yes
3	1756	5492	11	Yes
4	2231	5493	7	Yes
5	2706	5494	9	Yes
6	3181	5495	6	Yes
7	3656	5496	8	Yes
8	4131	5497	9	Yes
9	4606	5498	7	Yes
10	5081	5499	4	Yes
11	5556	5500	6	Yes
12	6031	5501	6	Yes
13	6506	5502	6	Yes
14	6981	5503	7	Yes
15	7456	5504	8	Yes
16	7931	5505	7	Yes
17	8406	5506	4	Yes
18	8881	5507	9	Yes
19	9356	5508	11	Yes
20	9831	5509	8	Yes
21	10306	5510	7	Yes
22	10781	5511	6	Yes
23	11256	5512	7	Yes
24	11731	5513	11	Yes
25	12206	5514	6	Yes
26	12681	5515	10	Yes
27	13156	5516	14	Yes
28	13631	5517	7	Yes
29	14106	5518	8	Yes
30	14581	5519	11	Yes
31	15056	5520	7	Yes
32	15531	5521	10	Yes
33	16006	5522	9	Yes
34	16481	5523	8	Yes
35	16956	5524	9	Yes
36	17431	5525	7	Yes
37	17906	5526	6	Yes
38	18381	5527	4	Yes
39	18856	5528	6	Yes
40	19331	5529	10	Yes
41	19806	5530	10	Yes

7.4. RESULTS FOR 80 MHz BANDWIDTH

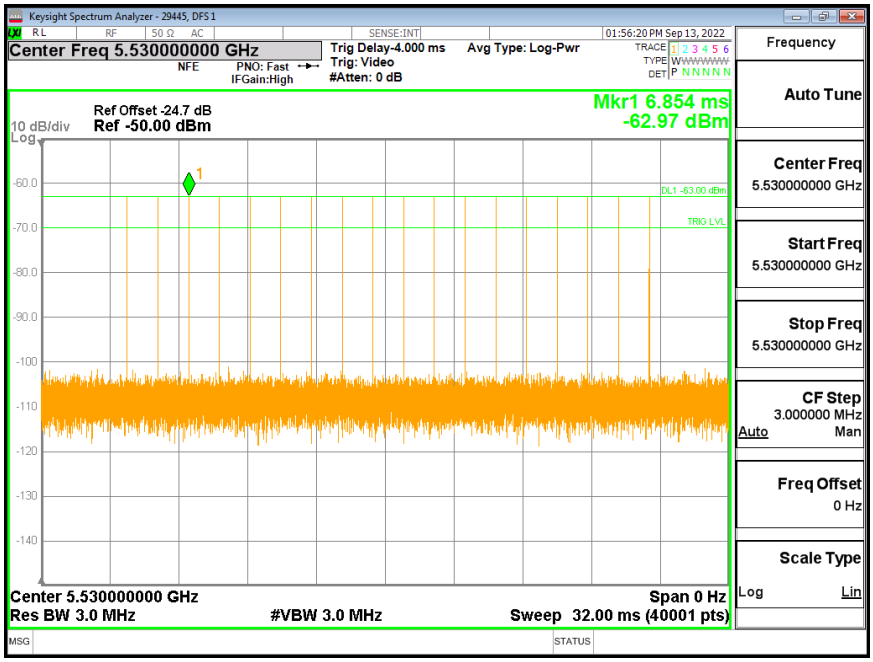
7.4.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5530 MHz.

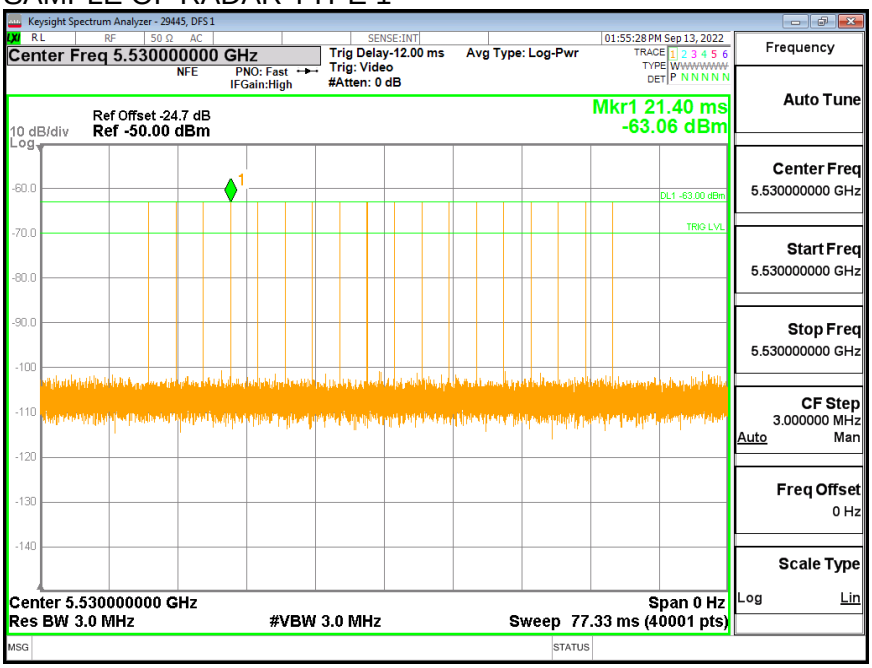
7.4.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

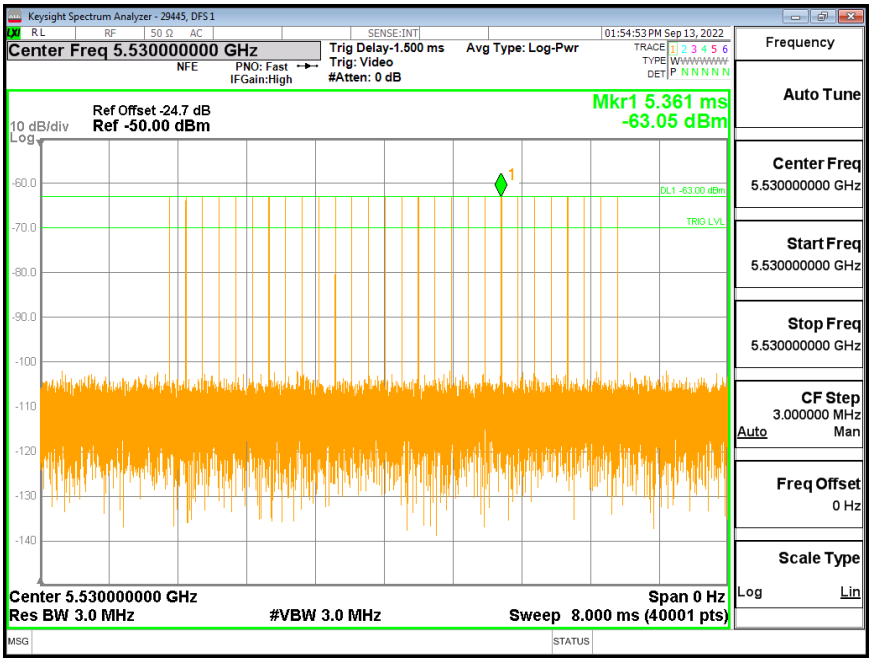
SHORT PULSE RADAR TYPE 0



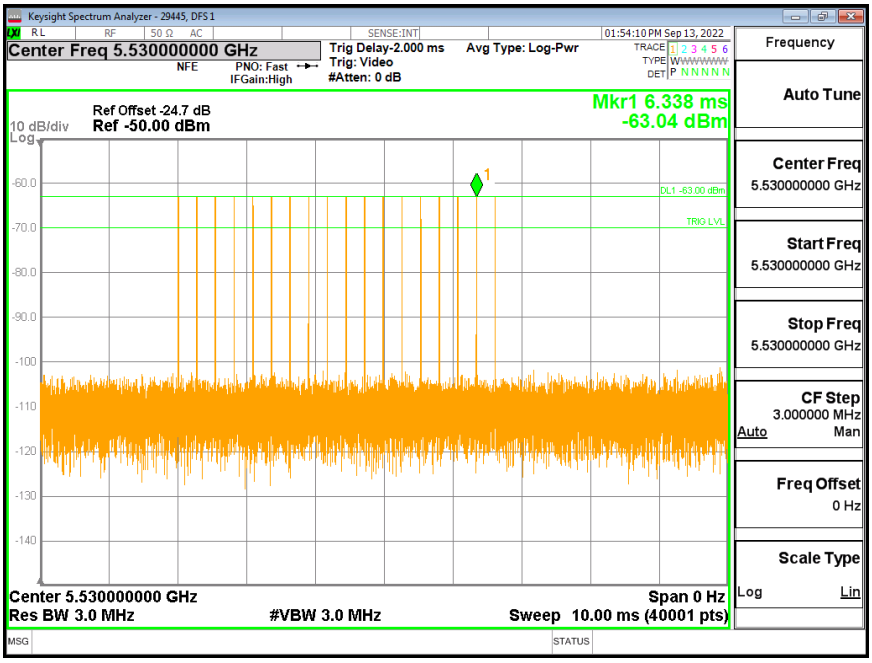
SAMPLE OF RADAR TYPE 1



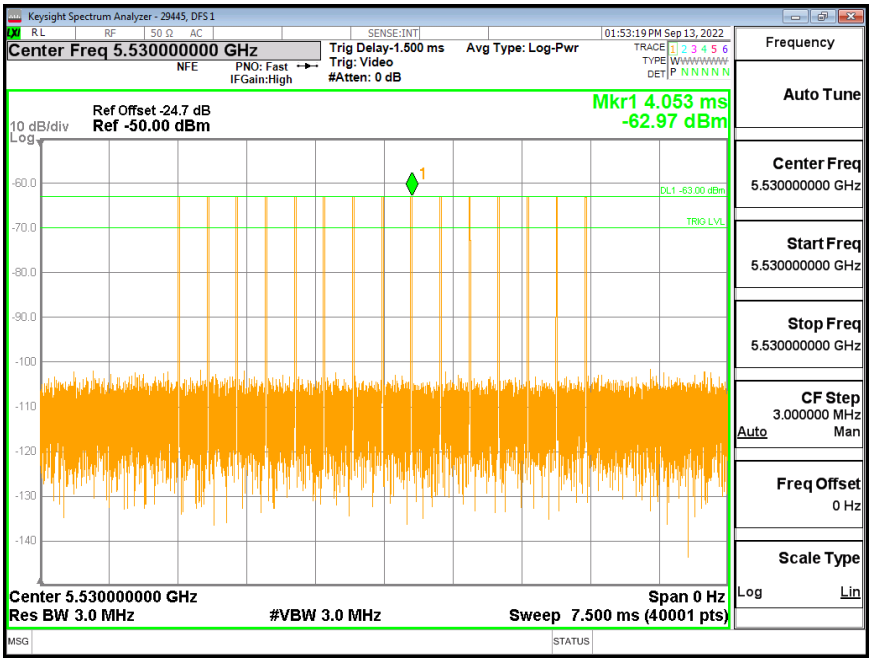
SAMPLE OF RADAR TYPE 2



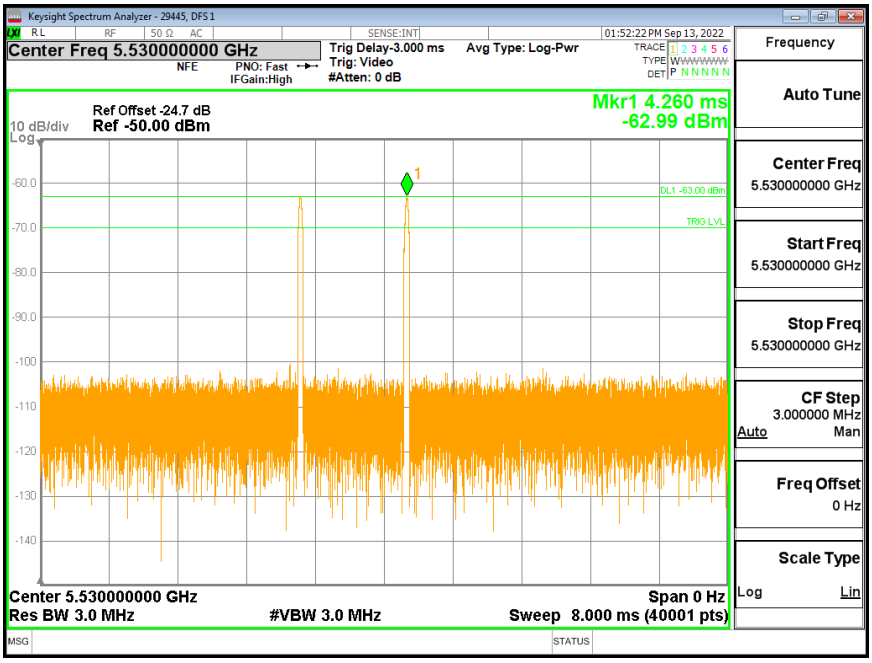
SAMPLE OF RADAR TYPE 3



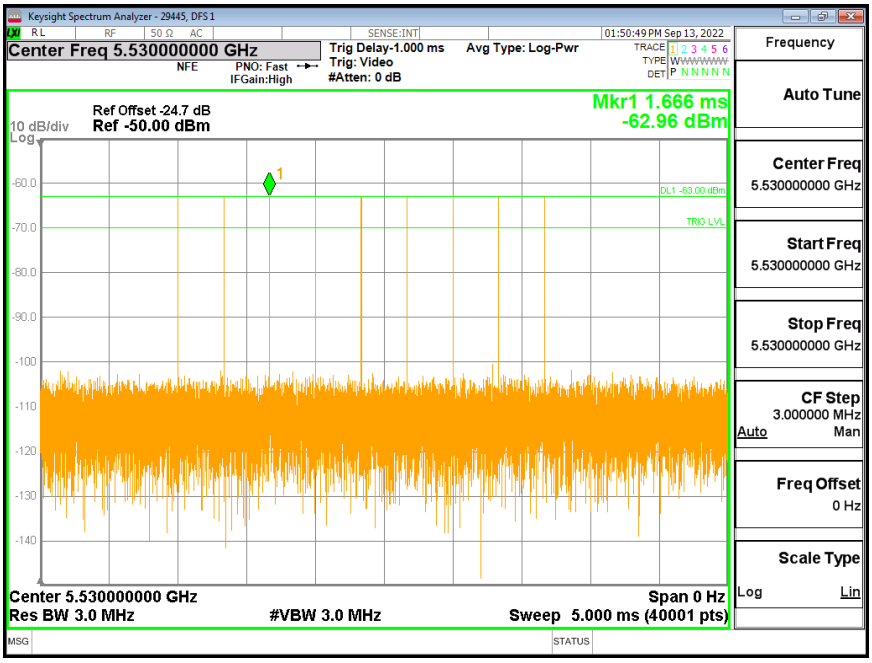
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

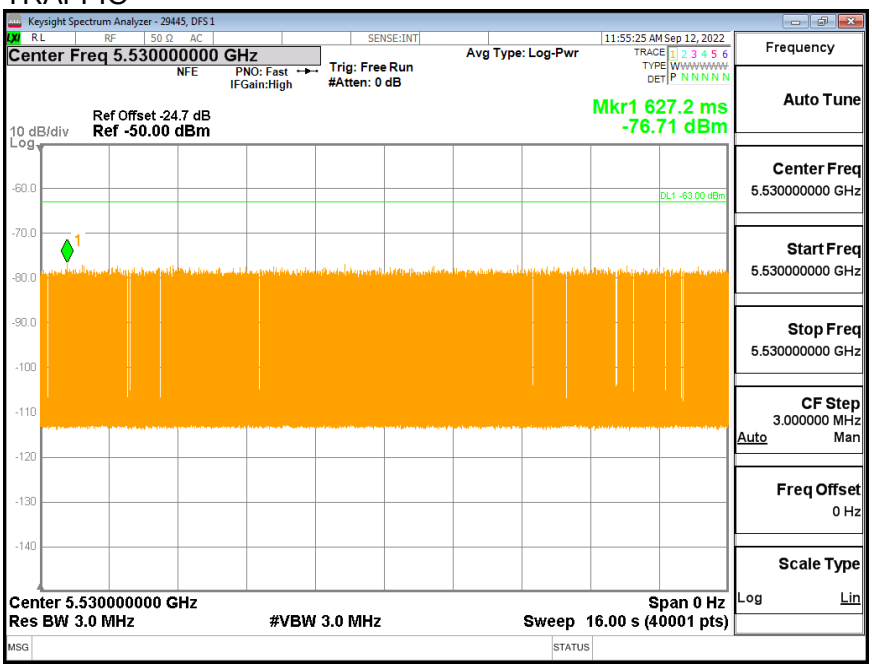


SINGLE BURST OF RADAR TYPE 6

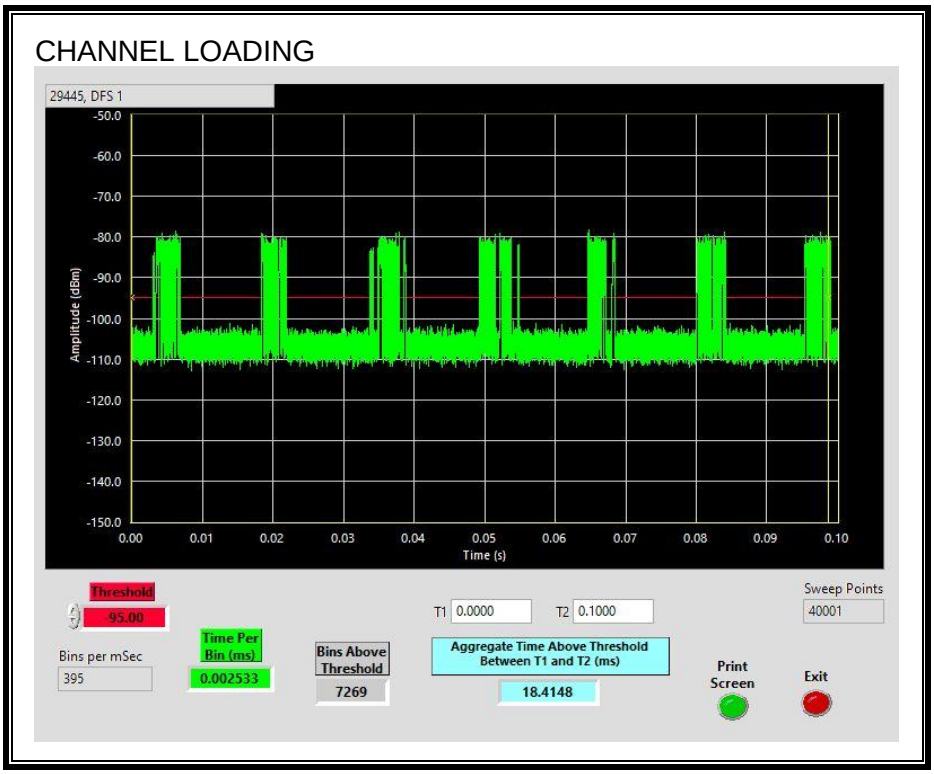


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 18.41%

7.4.3. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
30.28	227.6	197.3	137.3

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
31.01	172.0	141.0	3.7

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
30.62	225.2	194.6	57.3

QUALITATIVE RESULTS

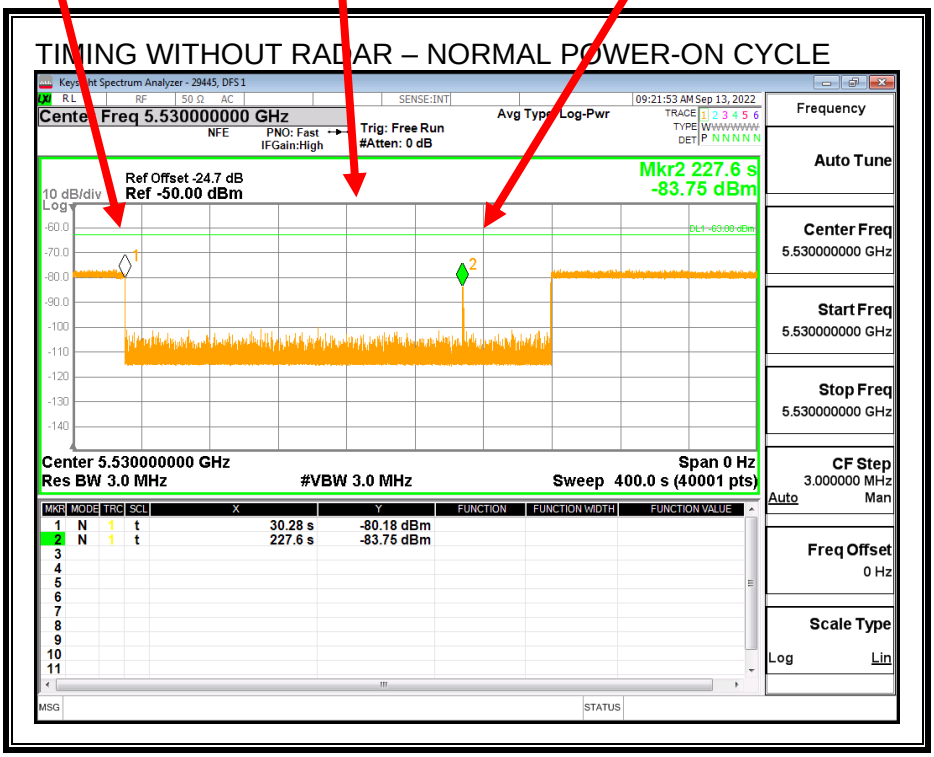
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



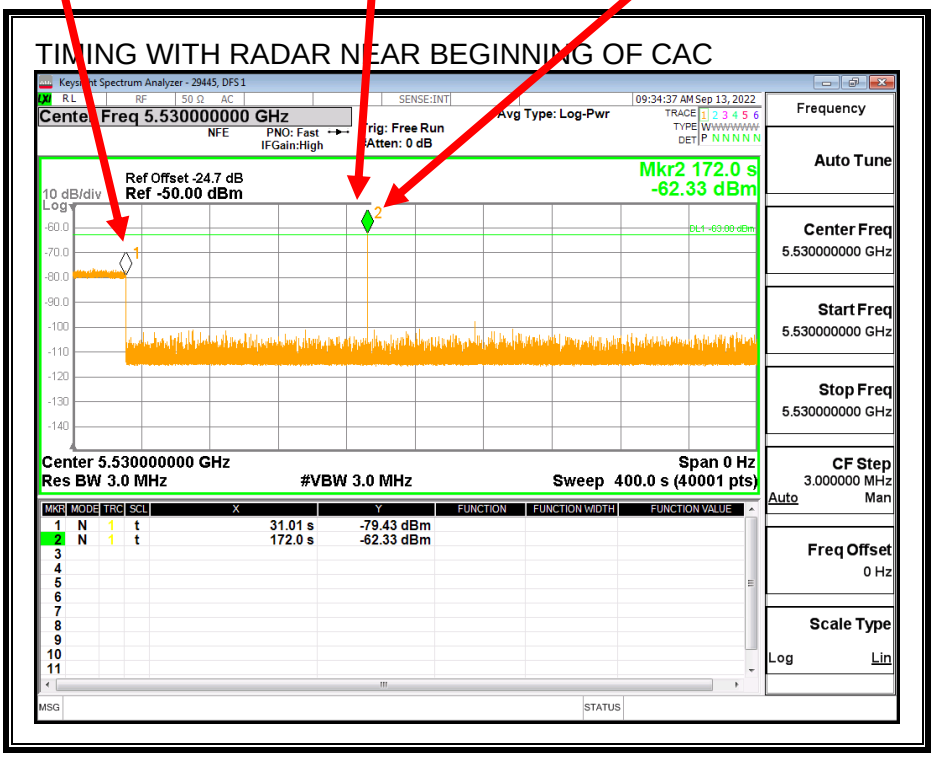
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



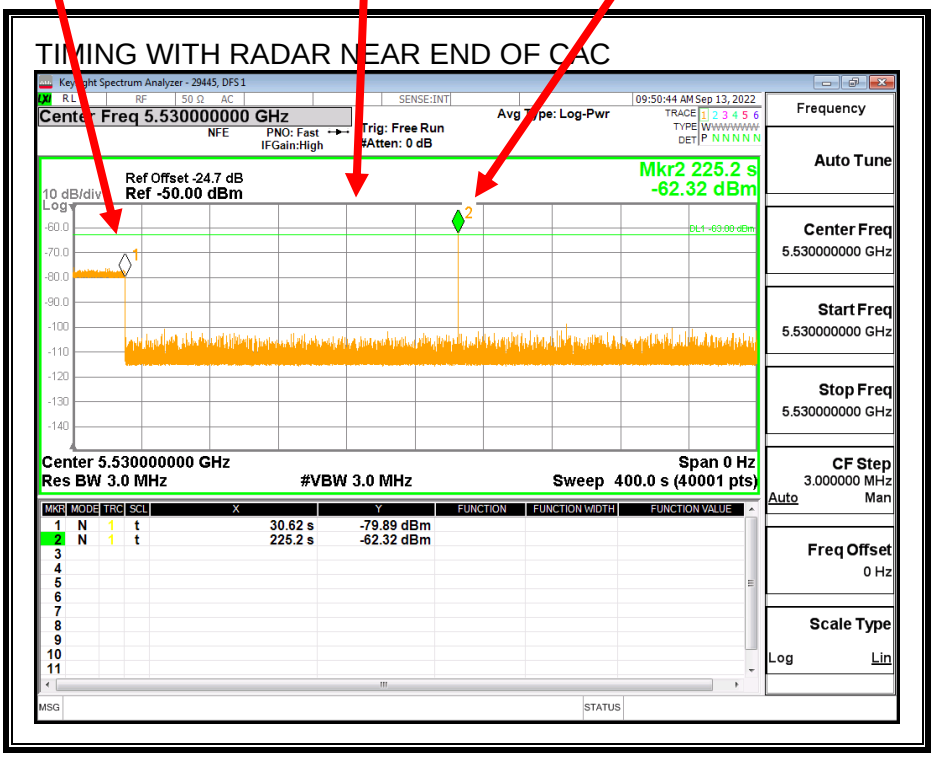
No EUT transmissions were observed after the radar signal.

TIMING WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

7.4.4. OVERLAPPING CHANNEL TESTS

RESULTS

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

7.4.5. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

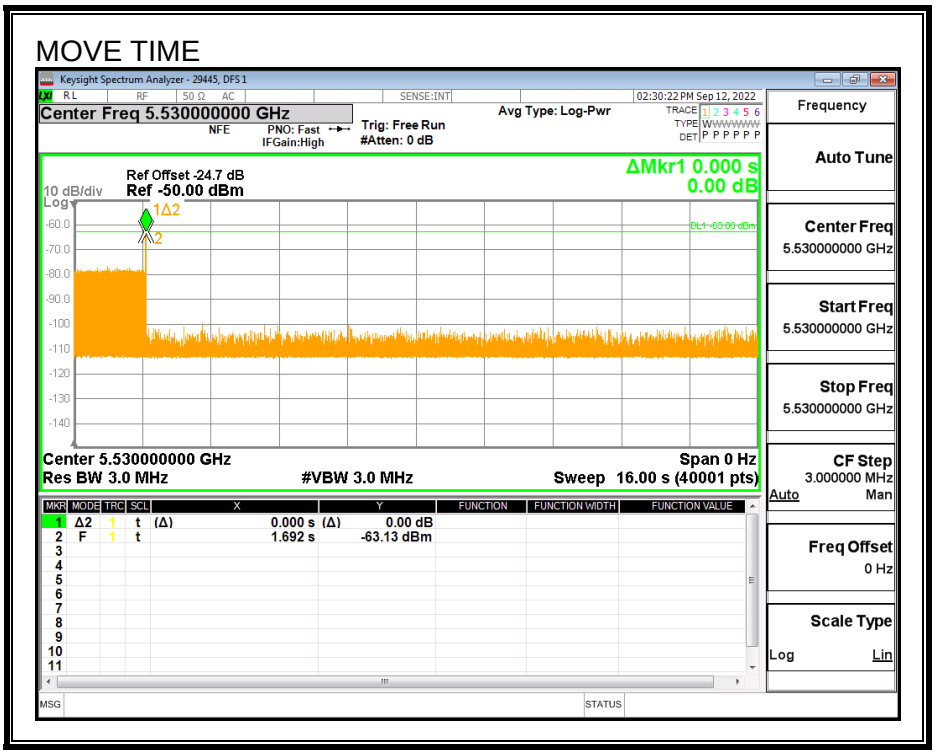
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.000	10

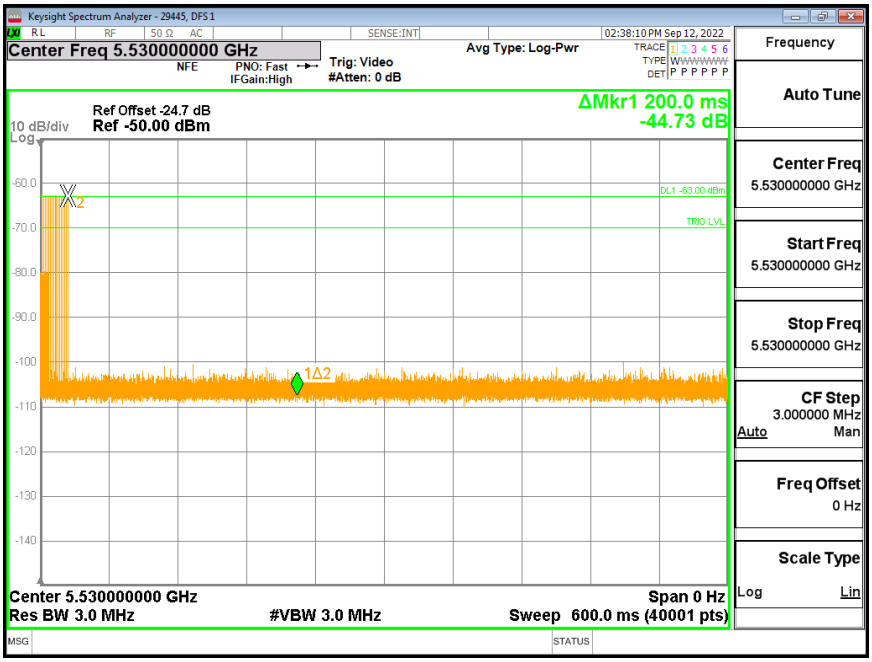
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
0.0	60

MOVE TIME



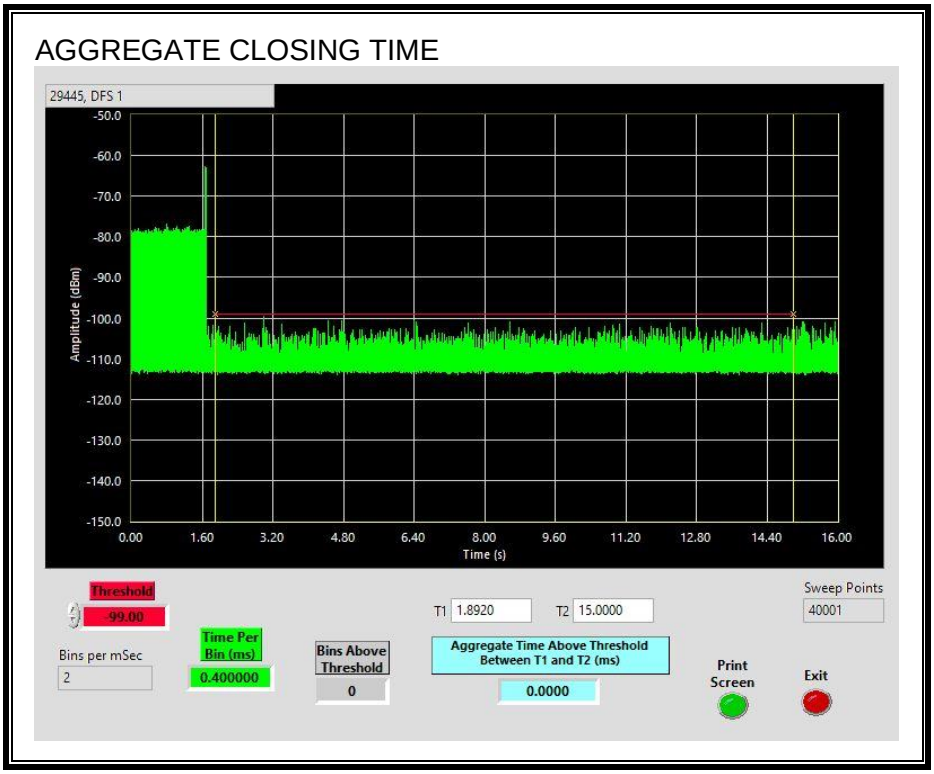
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

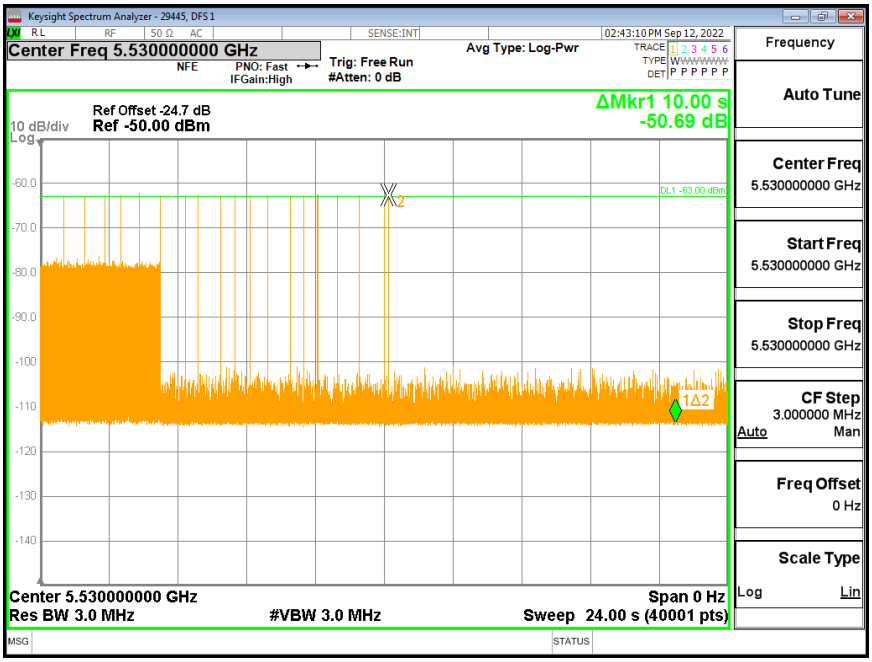
No transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME FOR LONG PULSE RADAR

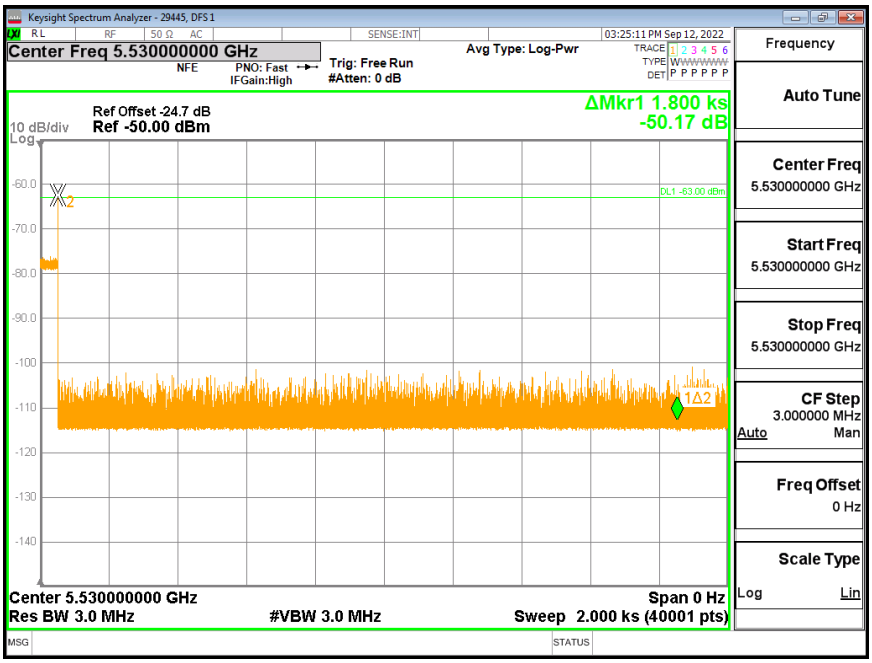


7.4.6. NON-OCCUPANCY PERIOD

RESULTS

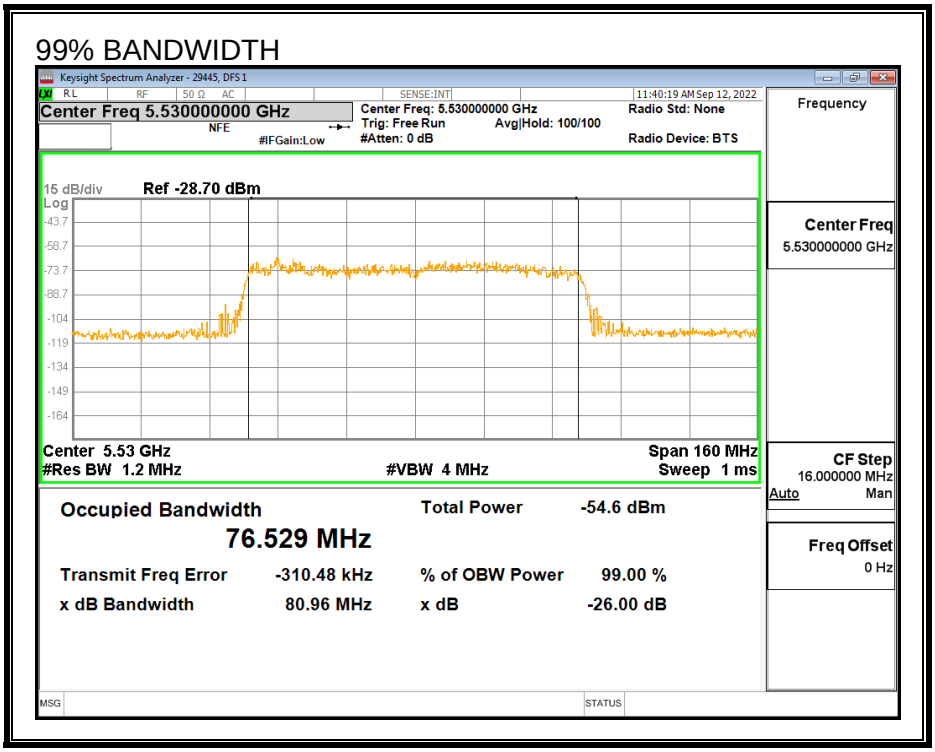
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD



7.4.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

F_L (MHz)	F_H (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5490	5570	80	76.529	104.5	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
5490	10	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	
5515	10	10	100	
5520	10	10	100	
5525	10	10	100	
5530	10	10	100	
5535	10	10	100	
5540	10	10	100	
5545	10	10	100	
5550	10	10	100	
5555	10	10	100	
5560	10	10	100	
5565	10	10	100	
5570	10	10	100	FH

7.4.8. 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 Short Pulse Type 1	30	96.67	60	Pass	5490	5570	76.53	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5570	76.53	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	96.67	60	Pass	5490	5570	76.53	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	96.67	60	Pass	5490	5570	76.53	DFS 1	29445	v4.1
Aggregate		97.50	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5570	76.53	DFS 1	29445	v4.1
FCC Hopping Type 6	81	100.00	70	Pass	5490	5570		DFS 1	29445	v4.1

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5498	Yes
1002	1	858	62	A	5491	Yes
1003	1	718	74	A	5538	Yes
1004	1	538	99	A	5568	Yes
1005	1	638	83	A	5567	Yes
1006	1	918	58	A	5495	No
1007	1	618	86	A	5544	Yes
1008	1	658	81	A	5527	Yes
1009	1	818	65	A	5502	Yes
1010	1	598	89	A	5508	Yes
1011	1	878	61	A	5545	Yes
1012	1	518	102	A	5555	Yes
1013	1	558	95	A	5555	Yes
1014	1	938	57	A	5513	Yes
1015	1	738	72	A	5544	Yes
1016	1	2703	20	B	5546	Yes
1017	1	853	62	B	5546	Yes
1018	1	679	78	B	5537	Yes
1019	1	1506	36	B	5517	Yes
1020	1	1462	37	B	5555	Yes
1021	1	1223	44	B	5523	Yes
1022	1	1309	41	B	5556	Yes
1023	1	1200	44	B	5558	Yes
1024	1	2768	20	B	5502	Yes
1025	1	1594	34	B	5505	Yes
1026	1	744	71	B	5496	Yes
1027	1	2247	24	B	5555	Yes
1028	1	1526	35	B	5506	Yes
1029	1	611	87	B	5561	Yes
1030	1	1373	39	B	5518	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	1.7	193	28	5525	Yes
2002	4	155	27	5533	Yes
2003	4.9	192	26	5504	Yes
2004	1.3	158	28	5538	Yes
2005	2.4	199	24	5498	Yes
2006	3.2	169	23	5557	Yes
2007	2.6	214	27	5499	Yes
2008	3.6	193	27	5500	Yes
2009	3.1	161	24	5496	Yes
2010	2.4	183	27	5529	Yes
2011	2.2	198	28	5537	Yes
2012	1.7	186	25	5525	Yes
2013	3.8	205	27	5494	Yes
2014	3.5	197	24	5525	Yes
2015	4	182	29	5514	Yes
2016	3.9	221	24	5515	Yes
2017	4.5	211	26	5559	Yes
2018	2.7	211	24	5524	Yes
2019	3.6	166	24	5563	Yes
2020	4.1	213	26	5569	Yes
2021	1.1	173	29	5516	Yes
2022	1.9	224	28	5527	Yes
2023	1.3	150	25	5543	Yes
2024	2.3	168	24	5522	Yes
2025	1.8	217	28	5495	Yes
2026	1.1	200	25	5520	Yes
2027	5	172	26	5560	Yes
2028	4.5	160	23	5528	Yes
2029	2.5	179	24	5500	Yes
2030	4.4	214	29	5555	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	7.7	271	18	5504	Yes
3002	9.7	392	18	5547	Yes
3003	8.2	360	18	5515	Yes
3004	6.4	493	18	5505	Yes
3005	7.3	473	18	5526	Yes
3006	7.9	368	18	5493	Yes
3007	8.9	495	17	5553	Yes
3008	9.7	284	17	5546	Yes
3009	9.1	424	16	5508	Yes
3010	6	477	18	5567	Yes
3011	9.6	379	16	5493	No
3012	8.9	327	16	5534	Yes
3013	8.7	492	16	5527	Yes
3014	8.2	454	18	5511	Yes
3015	6.2	396	18	5570	Yes
3016	8.1	370	16	5560	Yes
3017	6.4	443	17	5547	Yes
3018	8.4	312	17	5535	Yes
3019	6.9	280	17	5550	Yes
3020	9.2	413	17	5505	Yes
3021	8.2	394	17	5569	Yes
3022	6.6	289	17	5553	Yes
3023	7.6	415	16	5542	Yes
3024	8.4	456	16	5565	Yes
3025	7.8	344	18	5545	Yes
3026	8.8	398	17	5511	Yes
3027	8.3	299	18	5550	Yes
3028	7.6	499	18	5522	Yes
3029	9.6	295	18	5559	Yes
3030	9	374	17	5535	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	17.8	317	15	5557	Yes
4002	12.8	291	15	5546	Yes
4003	18.1	364	12	5528	No
4004	13.6	484	13	5556	Yes
4005	19.4	452	12	5496	Yes
4006	11.1	334	13	5518	Yes
4007	13	314	13	5495	Yes
4008	18.5	460	12	5501	Yes
4009	16.7	336	16	5569	Yes
4010	13.5	377	16	5545	Yes
4011	12.1	265	13	5552	Yes
4012	14.3	319	16	5516	Yes
4013	18.2	471	14	5565	Yes
4014	11.7	420	16	5505	Yes
4015	16.1	467	14	5511	Yes
4016	14.9	428	12	5562	Yes
4017	19.8	488	13	5543	Yes
4018	19.1	462	14	5544	Yes
4019	15.2	417	15	5558	Yes
4020	19.8	404	16	5565	Yes
4021	12.2	372	15	5510	Yes
4022	17.3	254	12	5495	Yes
4023	19.2	486	16	5519	Yes
4024	15.6	263	15	5568	Yes
4025	13.8	256	15	5548	Yes
4026	19.8	297	14	5567	Yes
4027	18.4	437	12	5566	Yes
4028	16.3	490	14	5568	Yes
4029	15.3	274	12	5531	Yes
4030	18	340	15	5518	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5530	Yes
2	5530	Yes
3	5530	Yes
4	5530	Yes
5	5530	Yes
6	5530	Yes
7	5530	Yes
8	5530	Yes
9	5530	Yes
10	5530	Yes
11	5500	Yes
12	5498	Yes
13	5499	Yes
14	5499	Yes
15	5499	Yes
16	5499	Yes
17	5499	Yes
18	5499	Yes
19	5499	Yes
20	5499	Yes
21	5561	Yes
22	5561	Yes
23	5561	Yes
24	5562	Yes
25	5566	Yes
26	5564	Yes
27	5560	Yes
28	5566	Yes
29	5564	Yes
30	5560	Yes

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

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	554	5490	16	Yes
2	1029	5491	20	Yes
3	1504	5492	17	Yes
4	1979	5493	18	Yes
5	2454	5494	18	Yes
6	2929	5495	20	Yes
7	3404	5496	16	Yes
8	3879	5497	17	Yes
9	4354	5498	17	Yes
10	4829	5499	15	Yes
11	5304	5500	17	Yes
12	5779	5501	19	Yes
13	6254	5502	21	Yes
14	6729	5503	20	Yes
15	7204	5504	14	Yes
16	7679	5505	15	Yes
17	8154	5506	11	Yes
18	8629	5507	20	Yes
19	9104	5508	15	Yes
20	9579	5509	21	Yes
21	10054	5510	17	Yes
22	10529	5511	16	Yes
23	11004	5512	14	Yes
24	11479	5513	16	Yes
25	11954	5514	17	Yes
26	12429	5515	19	Yes
27	12904	5516	13	Yes
28	13379	5517	21	Yes
29	13854	5518	23	Yes
30	14329	5519	14	Yes
31	14804	5520	17	Yes
32	15279	5521	12	Yes
33	15754	5522	19	Yes
34	16229	5523	17	Yes
35	16704	5524	13	Yes
36	17179	5525	18	Yes
37	17654	5526	16	Yes
38	18129	5527	15	Yes
39	18604	5528	21	Yes

TYPE 6 DETECTION PROBABILITY (CONTINUED)

40	19079	5529	15	Yes
41	19554	5530	12	Yes
42	20029	5531	19	Yes
43	20504	5532	13	Yes
44	20979	5533	22	Yes
45	21454	5534	21	Yes
46	21929	5535	19	Yes
47	22404	5536	23	Yes
48	22879	5537	19	Yes
49	23354	5538	17	Yes
50	23829	5539	14	Yes
51	24304	5540	21	Yes
52	24779	5541	23	Yes
53	25254	5542	20	Yes
54	25729	5543	16	Yes
55	26204	5544	20	Yes
56	26679	5545	17	Yes
57	27154	5546	17	Yes
58	27629	5547	13	Yes
59	28104	5548	16	Yes
60	28579	5549	16	Yes
61	29054	5550	17	Yes
62	29529	5551	10	Yes
63	30004	5552	12	Yes
64	30479	5553	18	Yes
65	30954	5554	15	Yes
66	31429	5555	14	Yes
67	31904	5556	22	Yes
68	32379	5557	18	Yes
69	32854	5558	15	Yes
70	33329	5559	15	Yes
71	33804	5560	13	Yes
72	34279	5561	17	Yes
73	34754	5562	17	Yes
74	35229	5563	14	Yes
75	35704	5564	18	Yes
76	36179	5565	9	Yes
77	36654	5566	18	Yes
78	37129	5567	21	Yes
79	37604	5568	20	Yes
80	38079	5569	17	Yes
81	38554	5570	16	Yes

7.5. BRIDGE MODE RESULTS

Per KDB 905462 D02, Section 5.1 (footnote 2):

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 where they act as master and client must also employ DFS function for the master. 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.

7.6. MESH SLAVE TEST RESULTS FOR 20 MHz BANDWIDTH

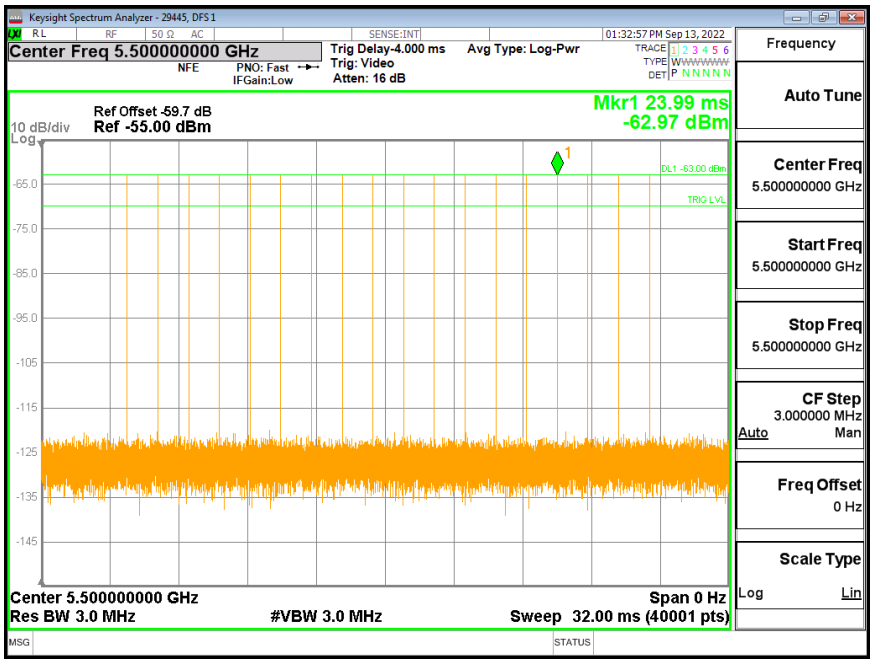
7.6.1. TEST CHANNEL

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

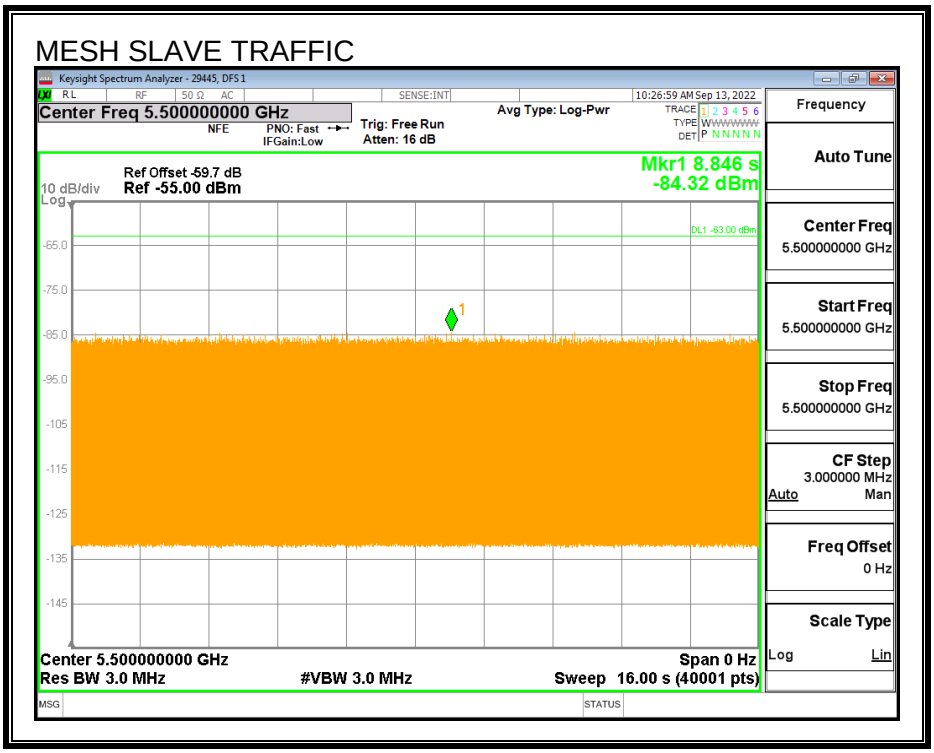
7.6.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM

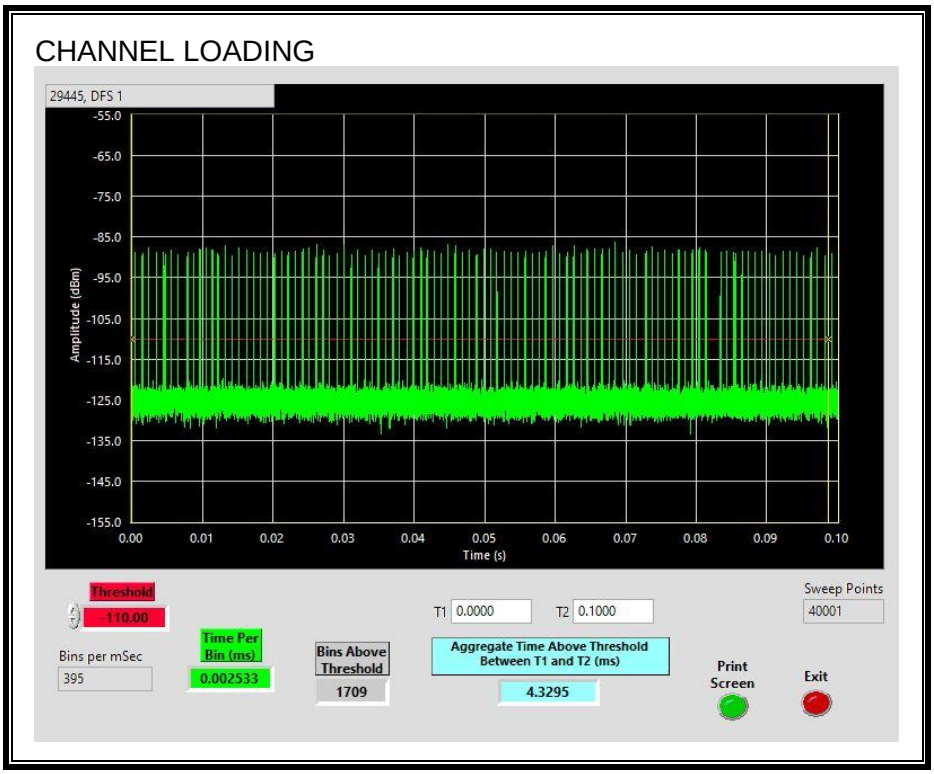
SHORT PULSE RADAR TYPE 0 AT MASTER



MESH SLAVE TRAFFIC



MESH SLAVE DEVICE CHANNEL LOADING

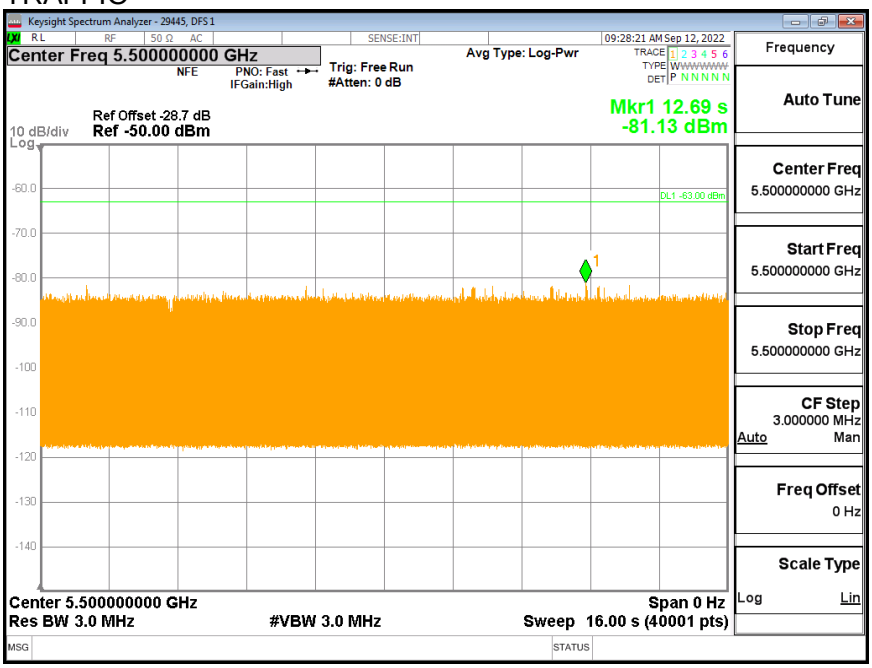


The level of traffic loading on the channel by the EUT is 4.329%

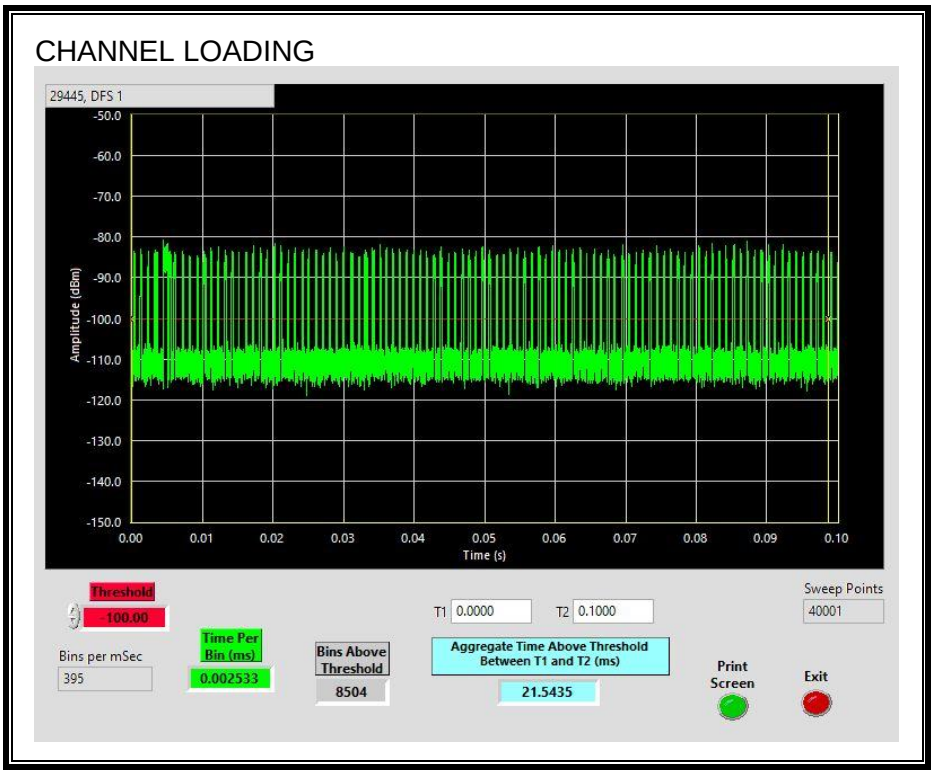
Per KDB 905462 D02 page 2, channel Loading is defined as the data transfer from the aster device to a client device. Therefore the channel loading upon the Master Device meets the requirement as shown in the following plots taken from the Master Device test results.

MASTER DEVICE TRAFFIC

TRAFFIC



MASTER DEVICE CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 21.54%

7.6.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.6.4. MOVE AND CLOSING TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.7. MESH SLAVE TEST RESULTS FOR 40 MHz BANDWIDTH

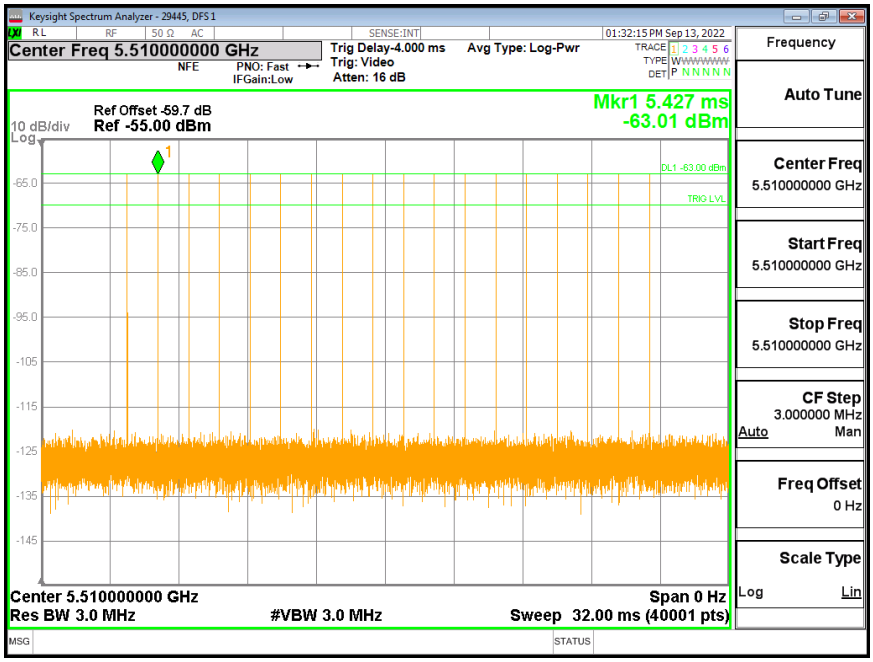
7.7.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

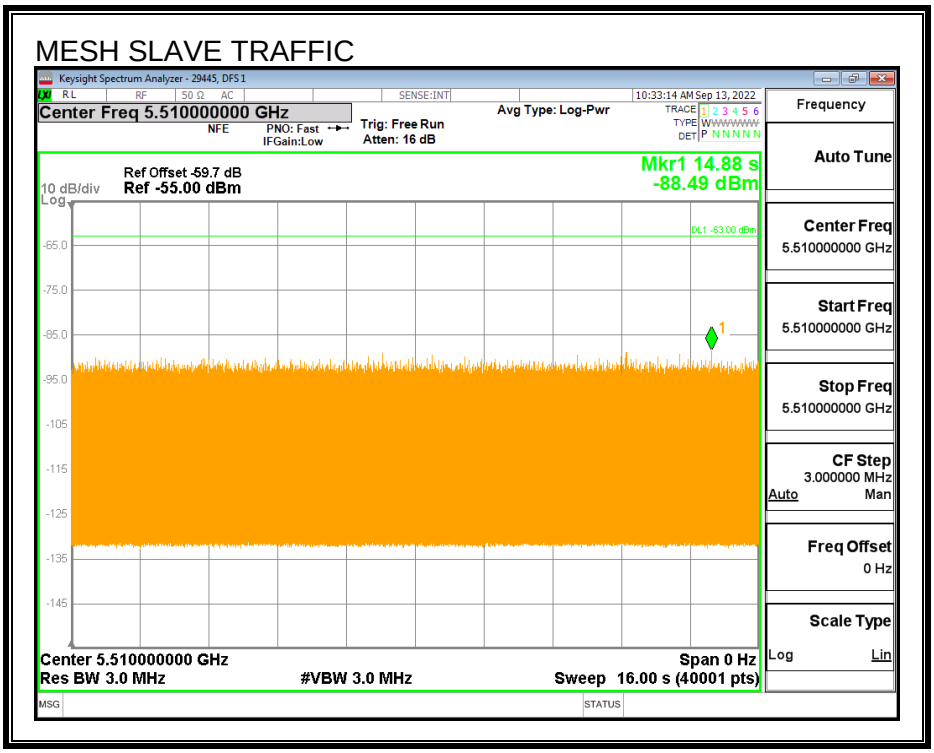
7.7.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM

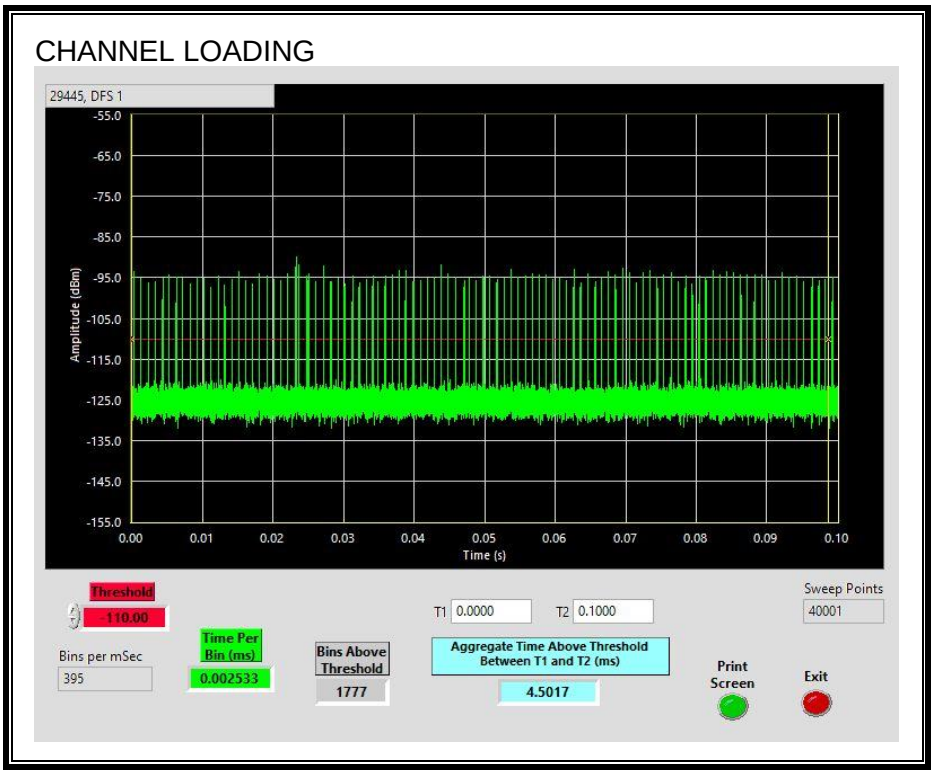
SHORT PULSE RADAR TYPE 0 AT MASTER



MESH SLAVE TRAFFIC



MESH SLAVE DEVICE CHANNEL LOADING

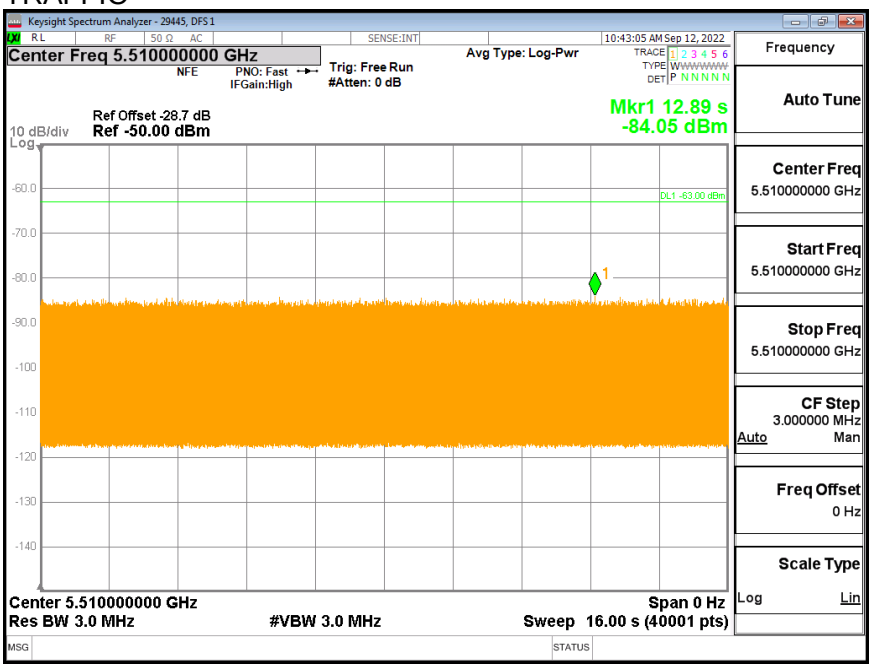


The level of traffic loading on the channel by the EUT is 4.50%

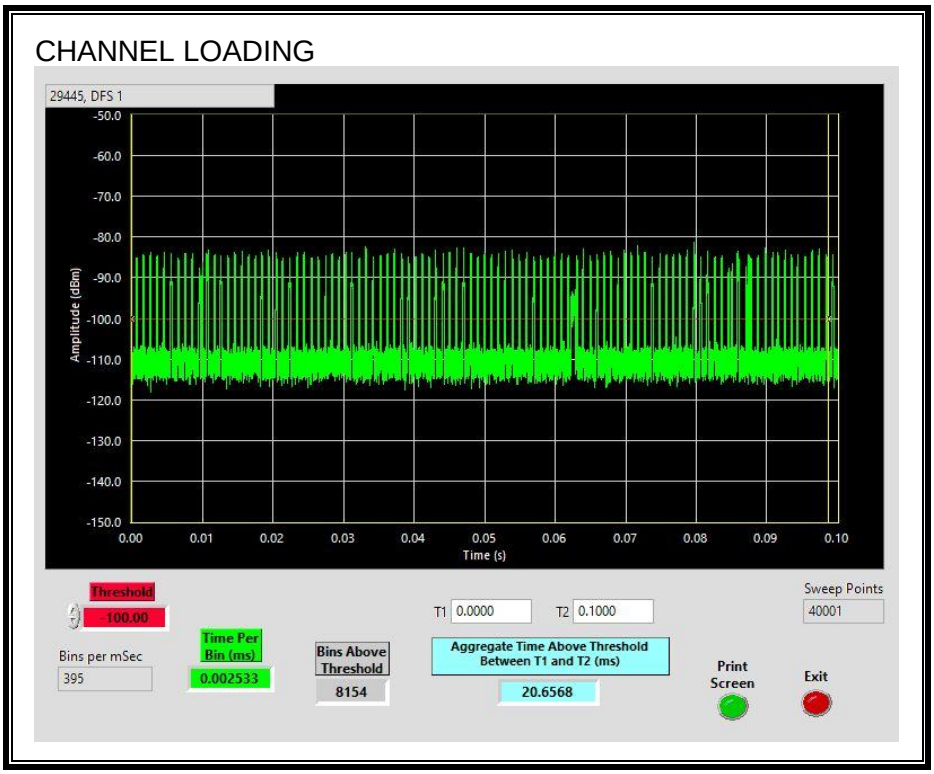
Per KDB 905462 D02 page 2, channel Loading is defined as the data transfer from the master device to a client device. Therefore the channel loading upon the Master Device meets the requirement as shown in the following plots taken from the Master Device test results.

MASTER DEVICE TRAFFIC

TRAFFIC



MASTER DEVICE CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 20.65%

7.7.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.7.4. MOVE AND CLOSING TIME

Per Table 2 on page 6 of KDB 905462 D02, Channel Move Time and Channel Closing Transmission Time are only required to be tested using the widest supported channel bandwidth mode. Therefore this test has not been performed for this channel bandwidth.

7.8. MESH SLAVE TEST RESULTS FOR 80 MHz BANDWIDTH

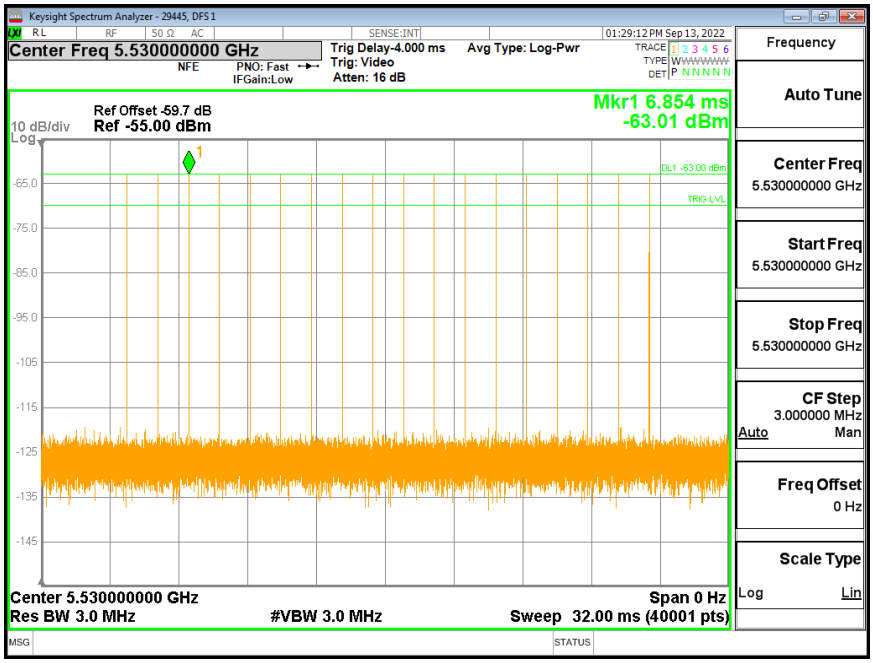
7.8.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5530 MHz.

7.8.2. RADAR WAVEFORM AND TRAFFIC

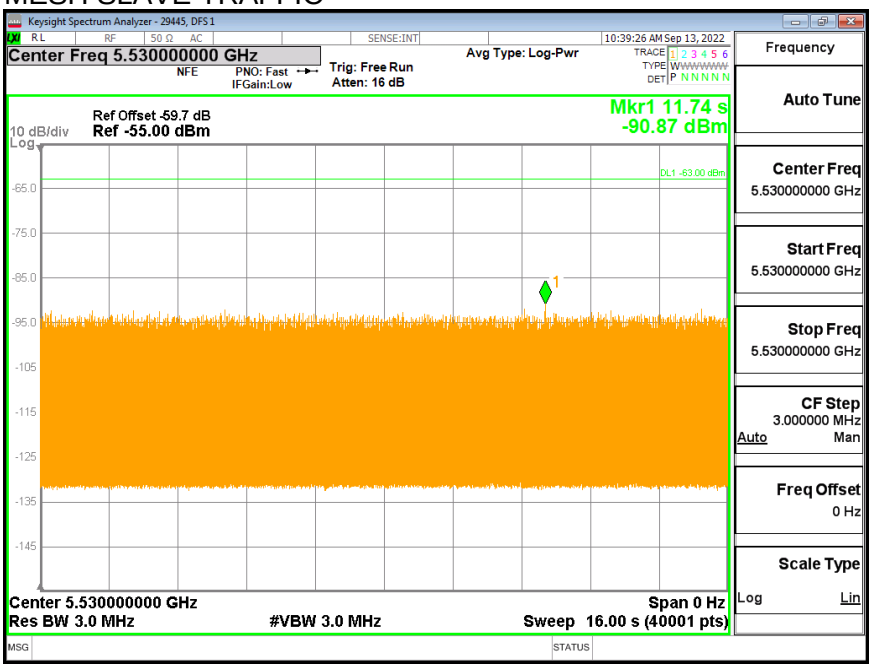
RADAR WAVEFORM

SHORT PULSE RADAR TYPE 0 AT MASTER

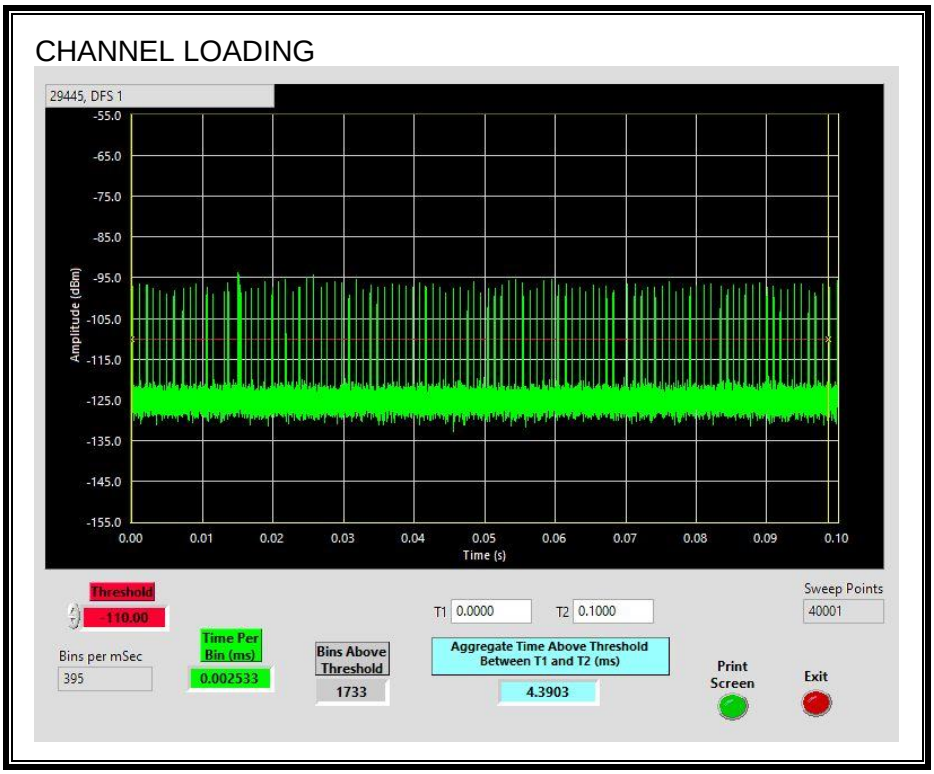


MESH SLAVE TRAFFIC

MESH SLAVE TRAFFIC



MESH SLAVE DEVICE CHANNEL LOADING

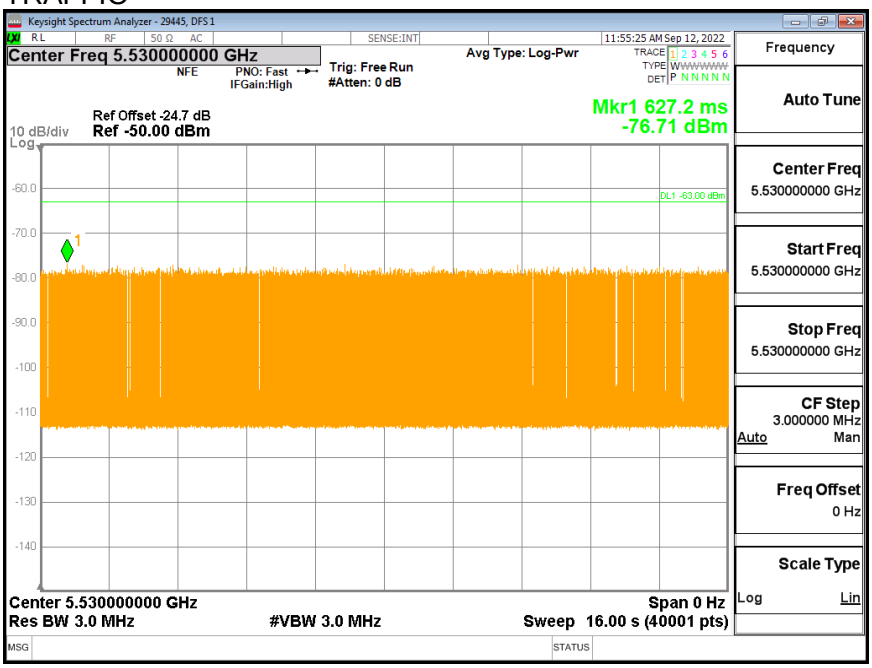


The level of traffic loading on the channel by the EUT is 4.39%

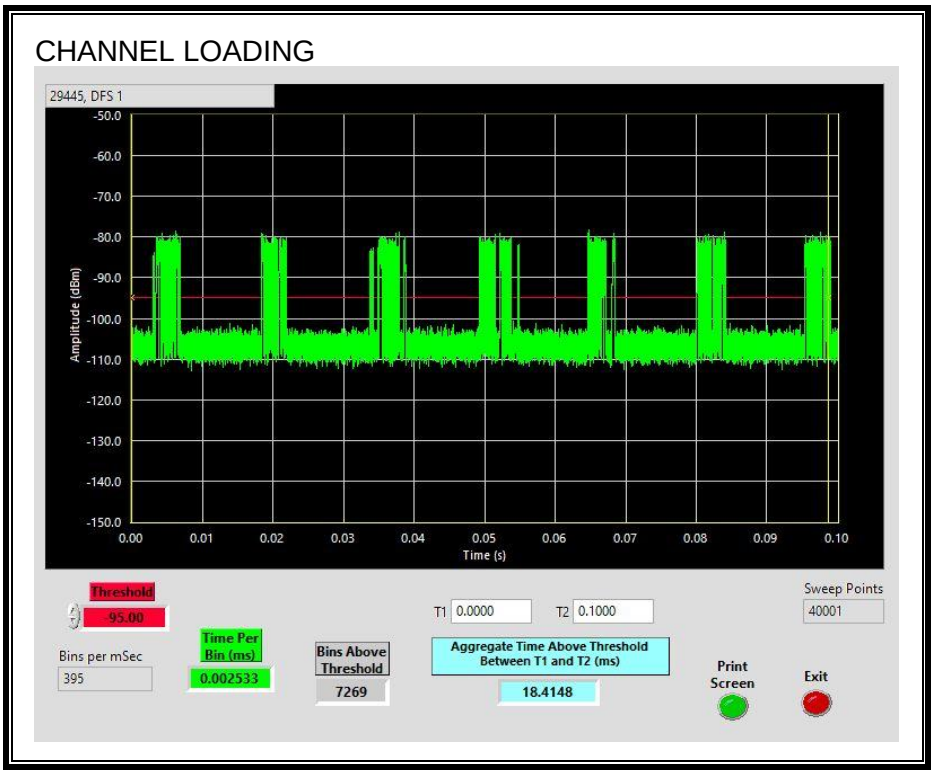
Per KDB 905462 D02 page 2, channel Loading is defined as the data transfer from the master device to a client device. Therefore the channel loading upon the Master Device meets the requirement as shown in the following plots taken from the Master Device test results.

MASTER DEVICE TRAFFIC

TRAFFIC



MASTER DEVICE CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 18.41%

7.8.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.8.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

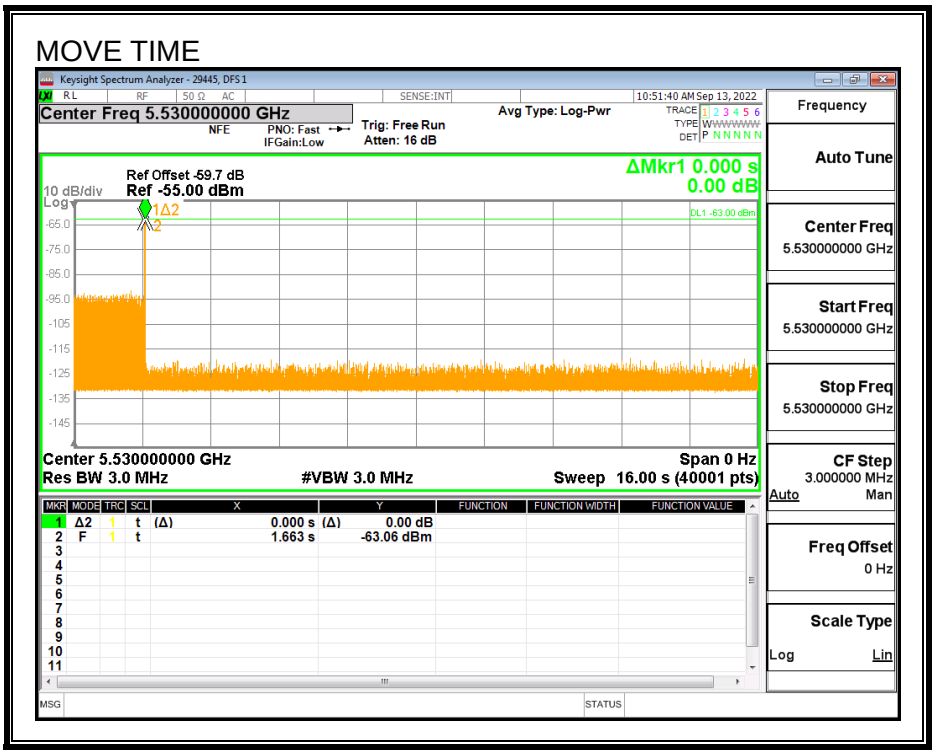
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.000	10

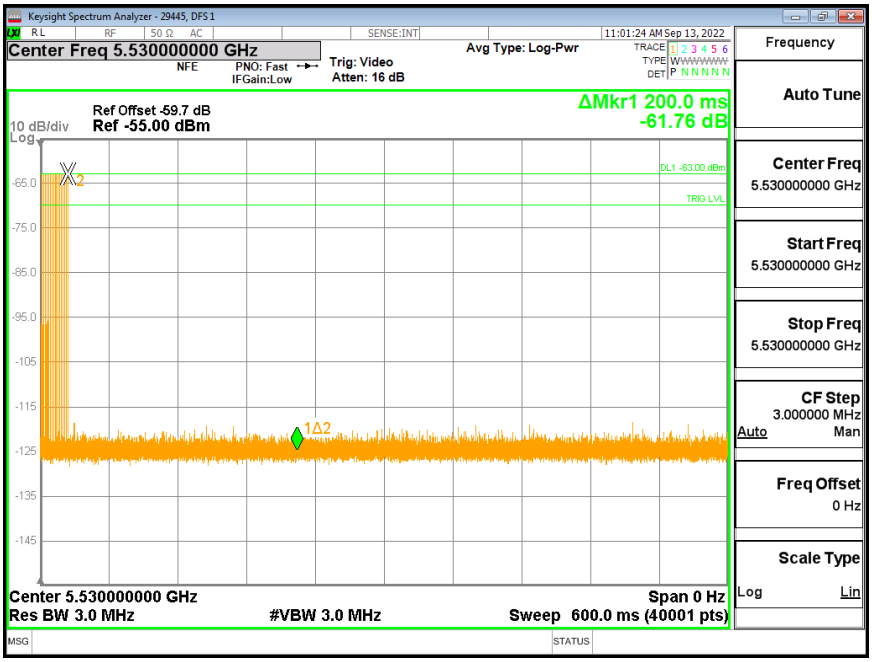
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
0.0	60

MOVE TIME



CHANNEL CLOSING TIME

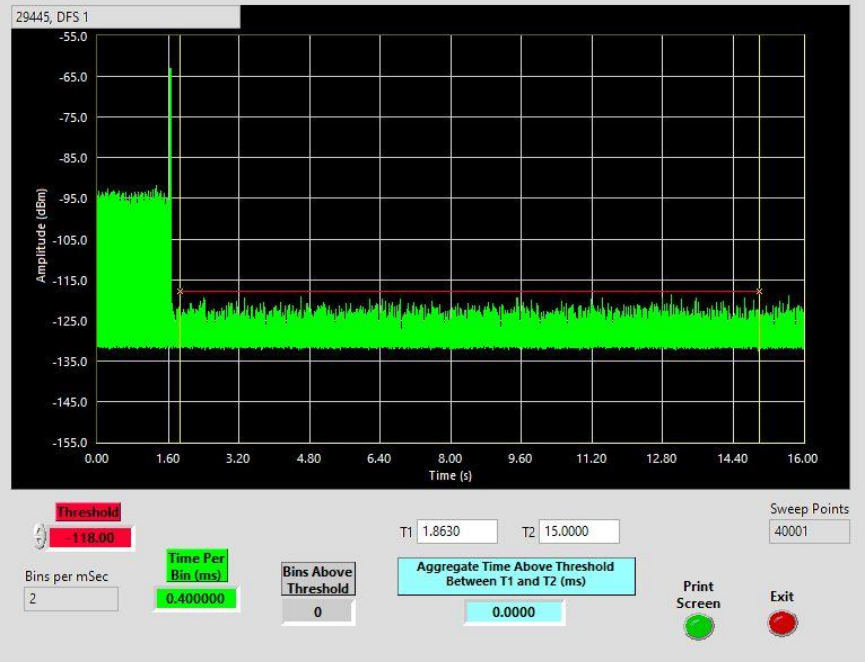
CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

AGGREGATE CLOSING TIME



7.8.5. 30-MINUTE NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

30-MINUTE NON-OCCUPANCY