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

CERTIFICATION TEST REPORT

FOR

ePMP 5GHz FORCE 400C/425 SM

MODEL NUMBER: C05X940PYZKA

WHERE:
"X" CAN BE "0" or "8"
"Y" CAN BE "0" or "1"
"Z" CAN BE" 0" or "2"
"K" CAN BE "1" or "2"

MODEL TESTED: C058940P122A

FCC ID: Z8H89FT0062
ISED ID: 109W-0062

REPORT NUMBER: 13881029-E1V1

ISSUE DATE: JULY 15, 2021

Prepared for
CAMBIUM NETWORKS, INC.
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ROLLING MEADOWS
IL., 60008, U.S.A.

Prepared by
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ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	07/15/21	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: ePMP 5GHz FORCE 400C / 425 SM

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MODEL TESTED: C058940P122A

SERIAL NUMBER: BC:E6:7C:20:14:B0

DATE TESTED: JUNE 28 and 29, 2021

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. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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CONSUMER TECHNOLOGY DIVISION
UL Verification Services Inc.

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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 report numbers FR9D0424-02 and CRD0424-02.

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	208313
	Building 2: 47266 Benicia Street, Fremont, California, USA	US0104	2324A	208313
	Building 4: 47658 Kato Rd, Fremont, California, USA	US0104	2324A	208313

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

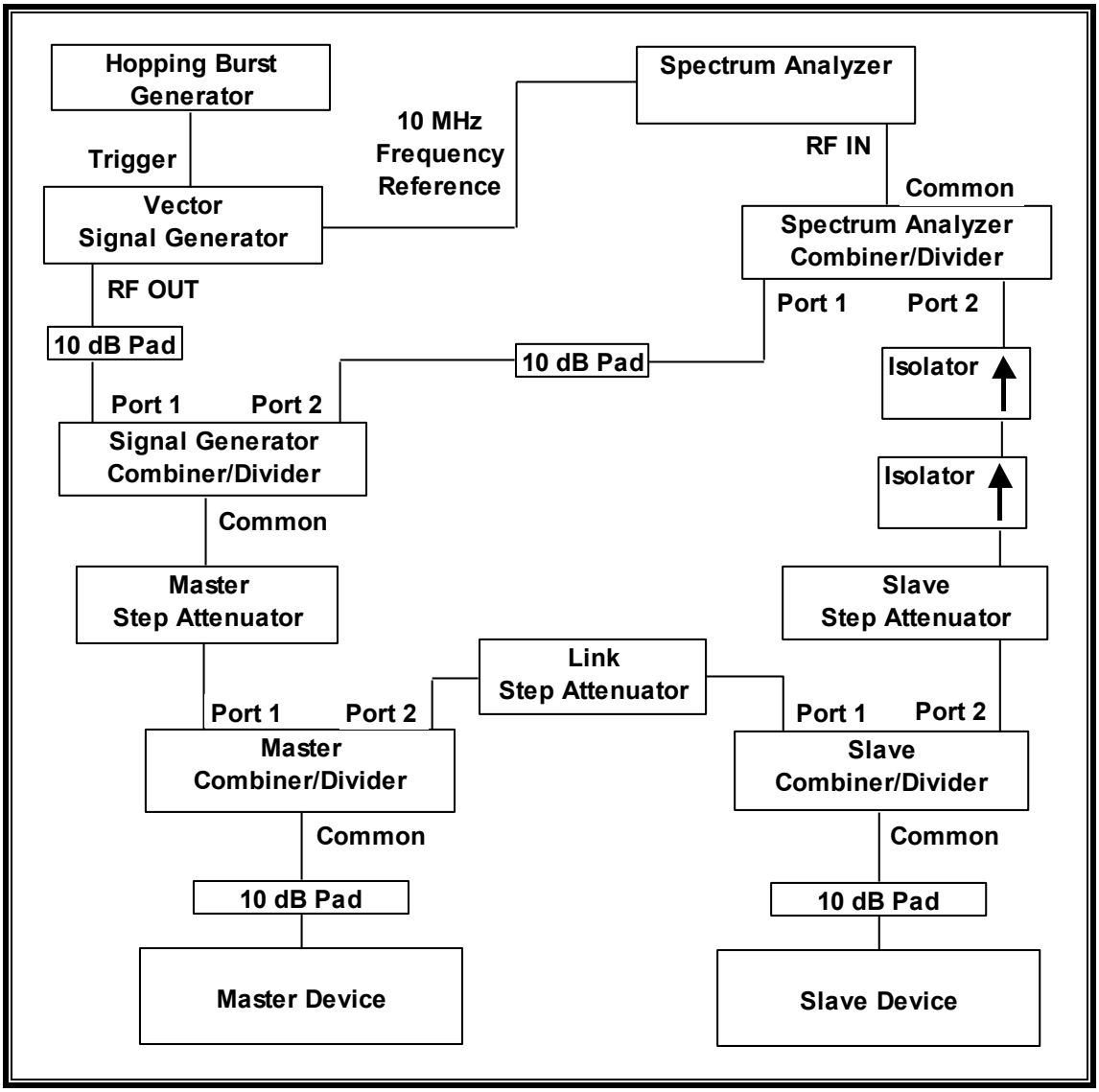
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

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:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID No.**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	150667	02/24/22
Signal Generator, MXG X-Series RF Vector	Agilent	N5182B	150666	01/26/22
Arbitrary Waveform Generator	Agilent / HP	33220A	80815	01/28/22

7.1.3. 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
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

7.1.4. TEST ROOM ENVIRONMENT

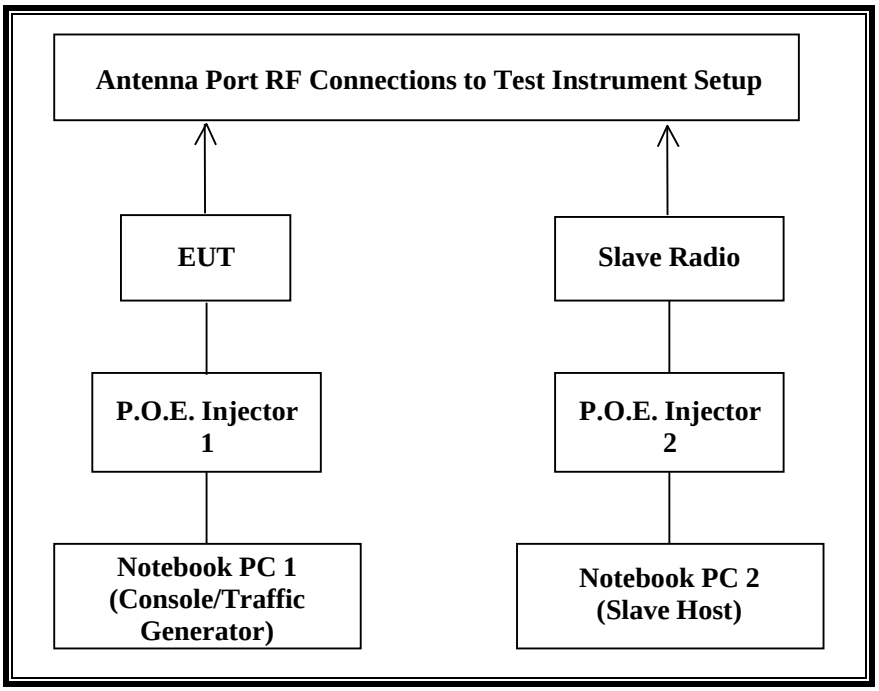
The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

ENVIRONMENT CONDITION

Parameter	Value
Temperature	25.5 and 25.3 °C
Humidity	41 and 41 %

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:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
P.O.E. Injector 1 (EUT)	Cambium Networks	NET-P60-56IN	N000000L142A2028 000149	DoC
Notebook PC 1 (EUT Console)	Lenovo	Type 4236-B92	PB-HEX04 12/05	DoC
AC Adapter 1 (Notebook PC 1)	Lenovo	42T4418	11S42T4418Z1ZG WG08R90M	DoC
ePMP 5GHz FORCE 425 SM (Slave Radio)	Cambium Networks	C058940P122A	BC:E6:7C:20:03:30	Z8H89FT0062
P.O.E. Injector 2 (Slave)	Cambium Networks	NET-P30-56IN	N000000L034A1819 004355	DoC
Notebook PC 2 (Slave Host)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter 2 (Notebook PC 2)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS9 74594A9	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 is a Master Device.

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 28 dBi in the 5250-5350 MHz band and 28 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 2 dBi in the 5250-5350 MHz band and 2 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 + 2 + 1 = -61 dBm.

The calibrated conducted DFS Detection Threshold level is set to –61 dBm.

The EUT uses two transmitter/receiver chains, each connected to a 50-ohm coaxial antenna port. All antenna ports are connected to the test system via a power divider to perform conducted tests.

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 a proprietary frame based 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 5.2.0.14.

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 Networks ePMP 5GHz FORCE 400C/425 SM Point to Multi-point Access Point, FCC ID: Z8H89FT0062. The minimum antenna gain for the Master Device is 2 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 + 2 + 1 = -61 dBm.

The calibrated radiated DFS Detection Threshold level is set to –61 dBm.

The software installed in the access point is 5.2.0.14.

7.2. RESULTS FOR 20 MHz BANDWIDTH

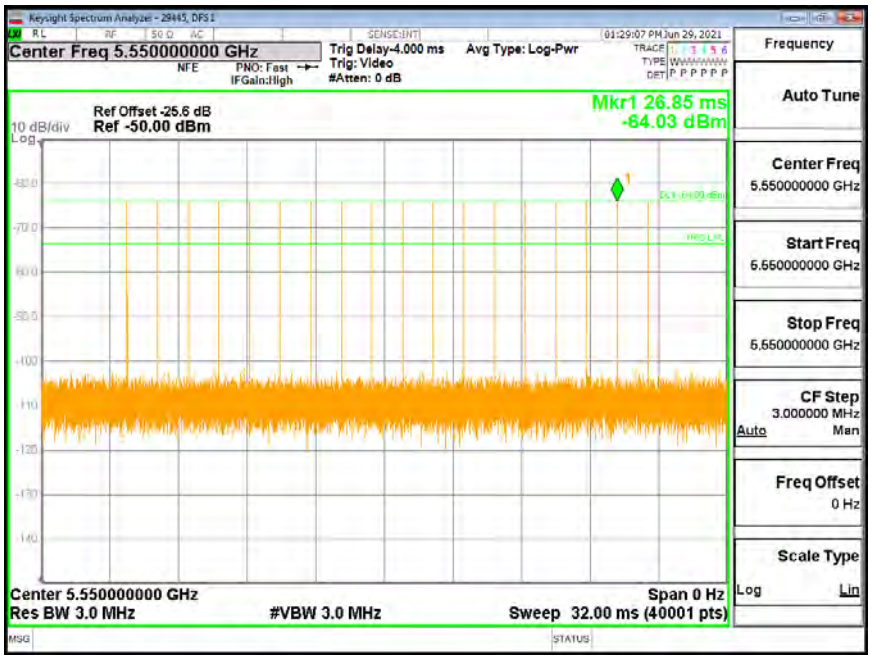
7.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5550 MHz.

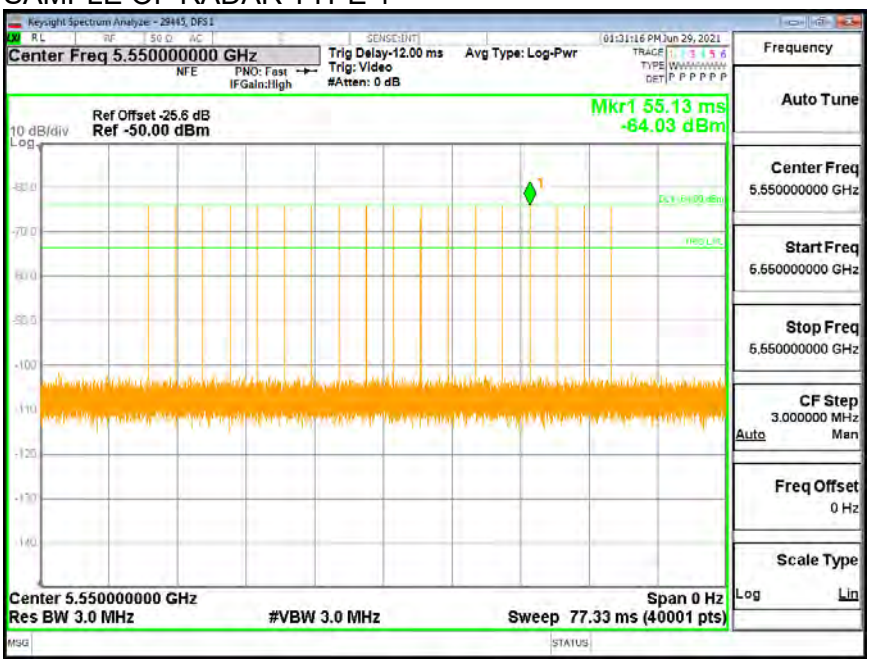
7.2.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

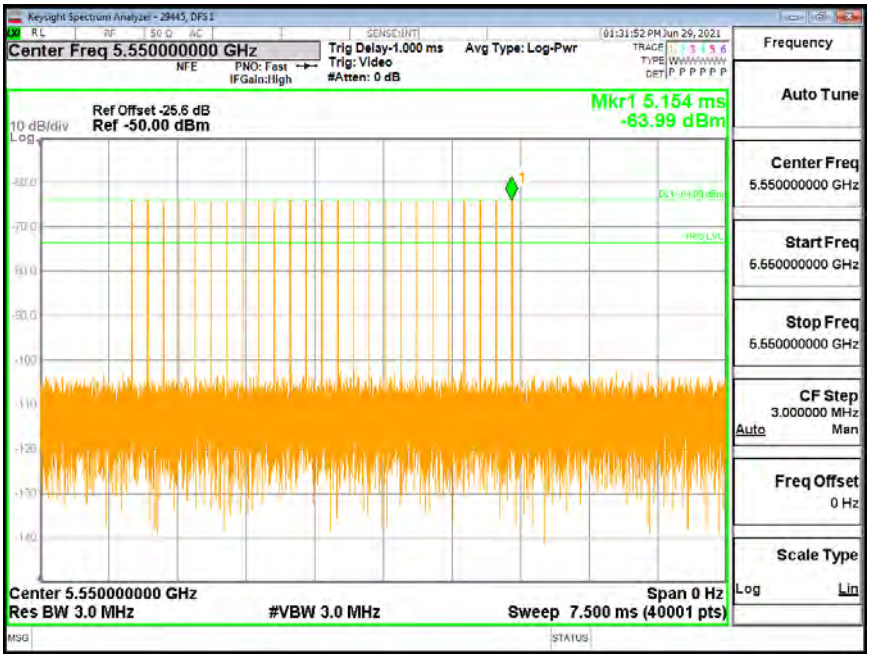
SHORT PULSE RADAR TYPE 0



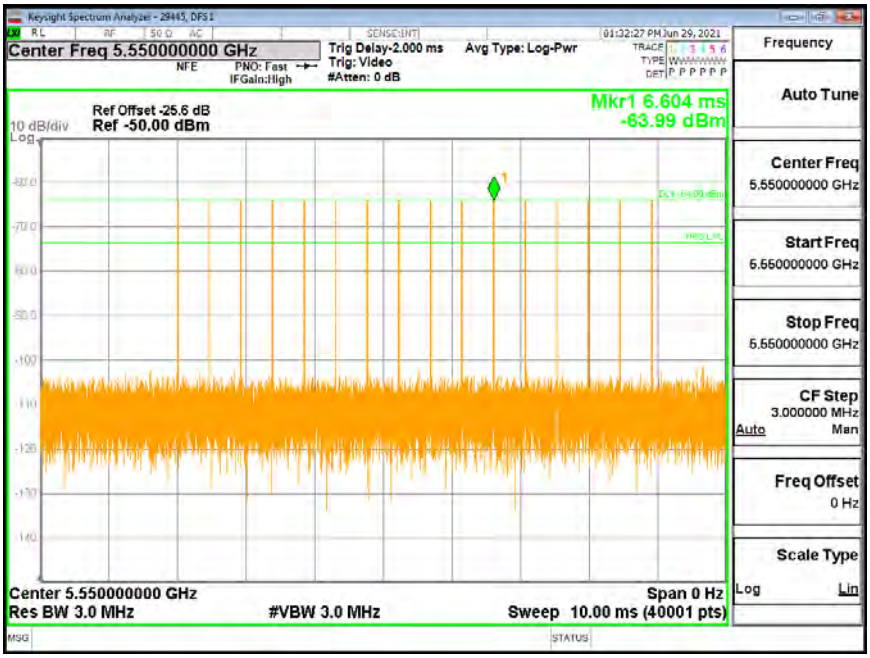
SAMPLE OF RADAR TYPE 1



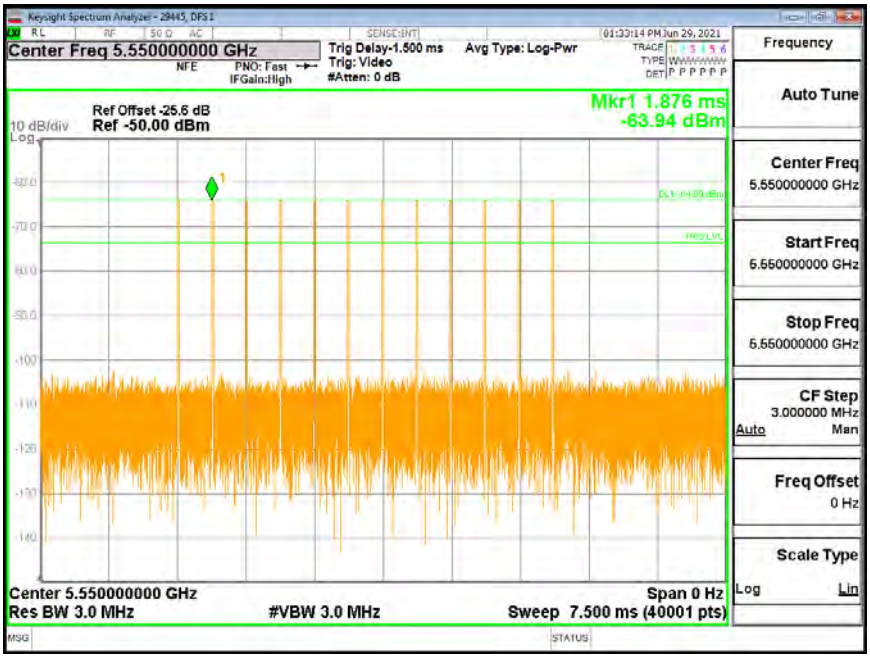
SAMPLE OF RADAR TYPE 2



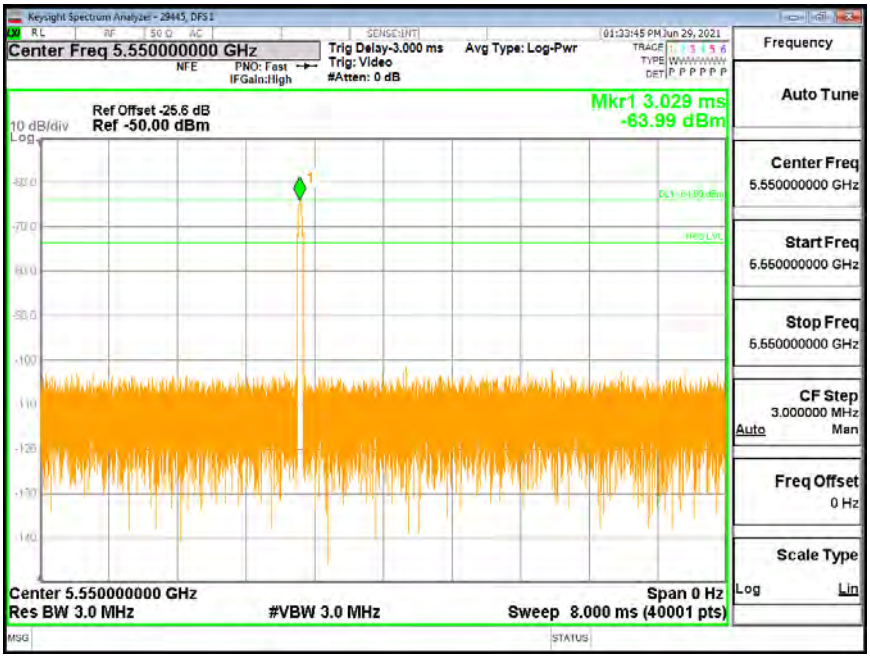
SAMPLE OF RADAR TYPE 3



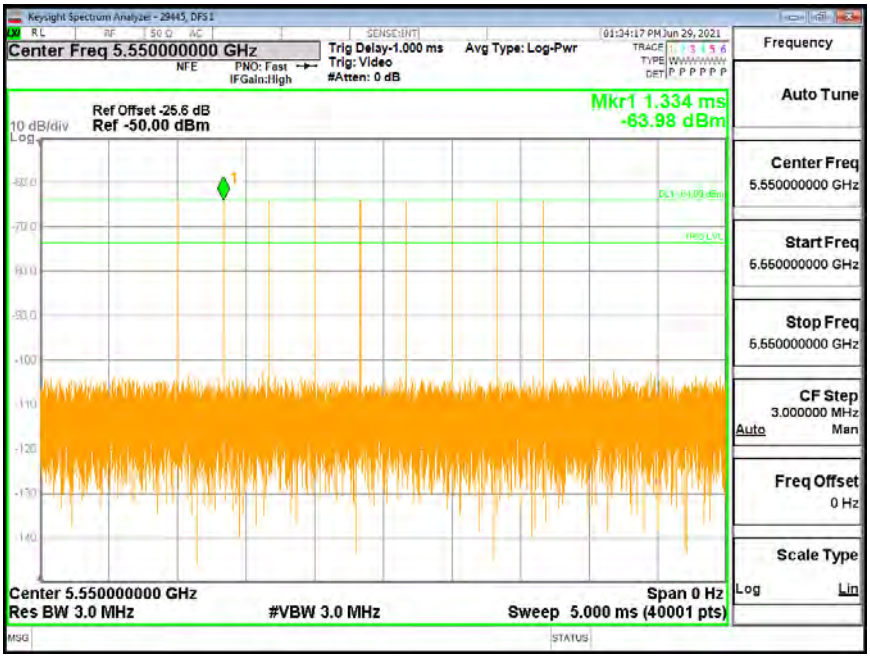
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

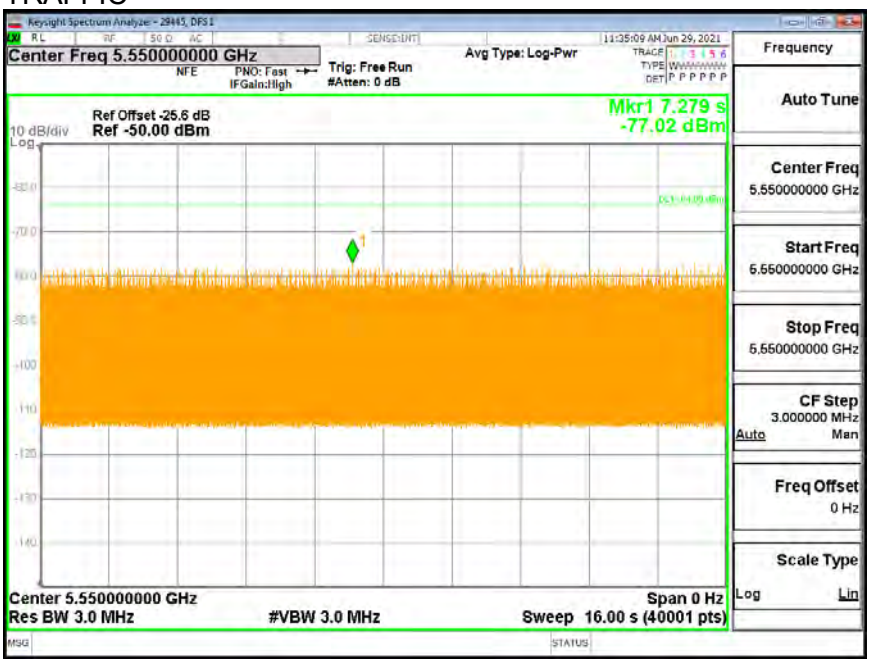


SINGLE BURST OF RADAR TYPE 6

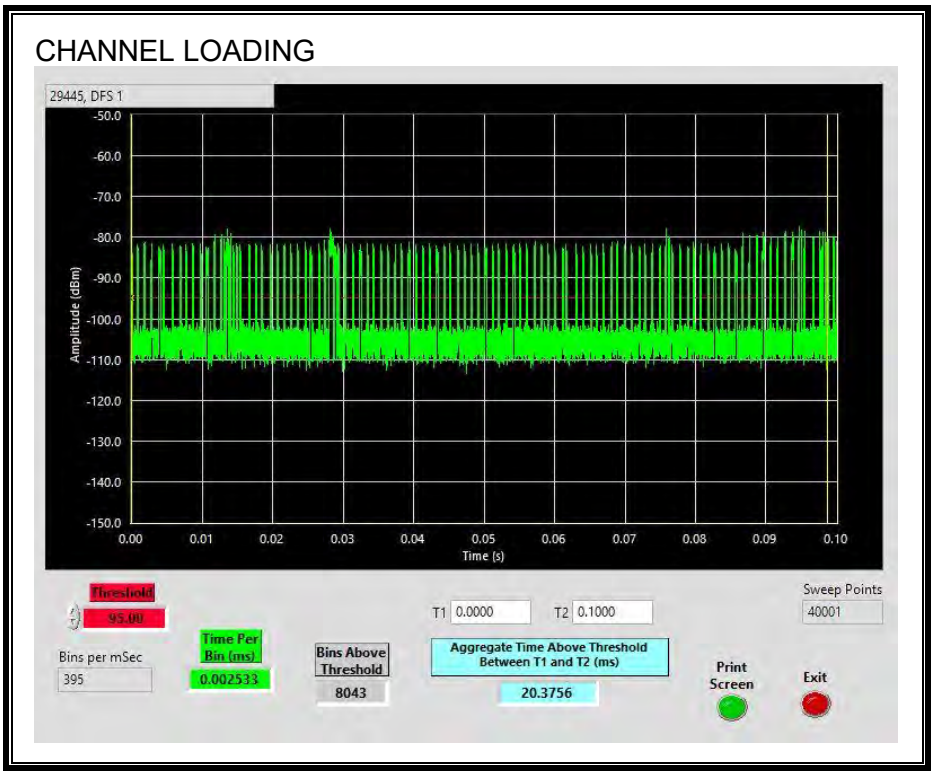


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 20.37%

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.

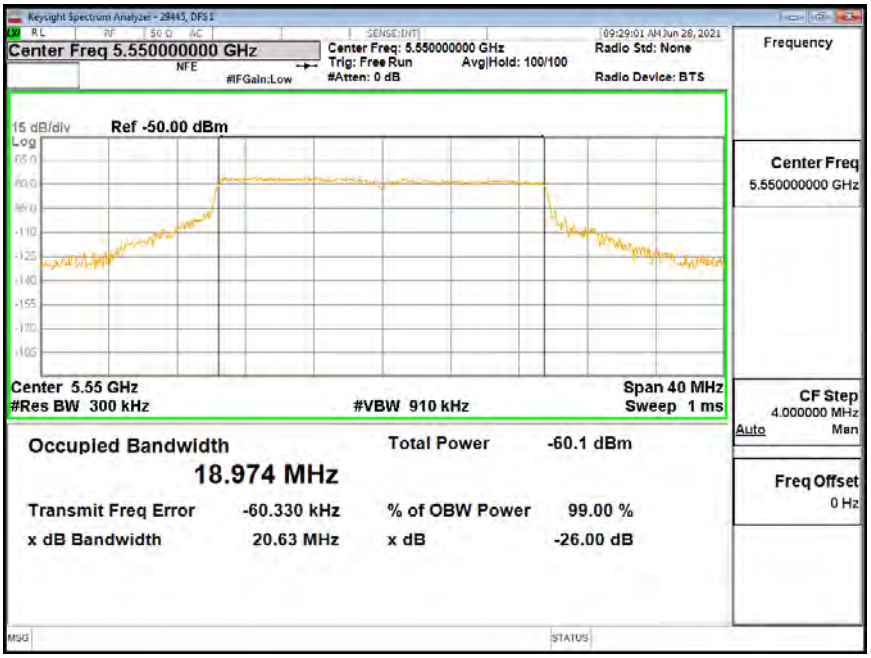
7.2.5. MOVE AND CLOSING TIME

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

99% 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 (%)
5540	5560	20	18.974	105.4	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
5539	10	0	0	
5540	10	10	100	FL
5545	10	10	100	
5550	10	10	100	
5555	10	10	100	
5560	10	10	100	FH
5561	10	0	0	

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	100.00	60	Pass	5540	5560	18.97	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	96.67	60	Pass	5540	5560	18.97	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	96.67	60	Pass	5540	5560	18.97	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	96.67	60	Pass	5540	5560	18.97	DFS 1	29445	v4.1
Aggregate		97.50	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5540	5560	18.97	DFS 1	29445	v4.1
FCC Hopping Type 6	42	100.00	70	Pass	5540	5560		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	5558	Yes
1002	1	938	57	A	5556	Yes
1003	1	898	59	A	5554	Yes
1004	1	918	58	A	5560	Yes
1005	1	738	72	A	5560	Yes
1006	1	518	102	A	5549	Yes
1007	1	818	65	A	5560	Yes
1008	1	638	83	A	5543	Yes
1009	1	798	67	A	5549	Yes
1010	1	578	92	A	5543	Yes
1011	1	858	62	A	5555	Yes
1012	1	838	63	A	5559	Yes
1013	1	538	99	A	5559	Yes
1014	1	758	70	A	5559	Yes
1015	1	718	74	A	5552	Yes
1016	1	732	73	B	5544	Yes
1017	1	752	71	B	5546	Yes
1018	1	2450	22	B	5544	Yes
1019	1	1405	38	B	5544	Yes
1020	1	2038	26	B	5543	Yes
1021	1	1123	47	B	5560	Yes
1022	1	1885	28	B	5543	Yes
1023	1	1099	49	B	5554	Yes
1024	1	796	67	B	5546	Yes
1025	1	1494	36	B	5557	Yes
1026	1	2515	21	B	5542	Yes
1027	1	2147	25	B	5549	Yes
1028	1	2103	26	B	5541	Yes
1029	1	1864	29	B	5555	Yes
1030	1	1950	28	B	5547	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	3.7	173	25	5551	Yes
2002	3	195	28	5553	Yes
2003	2.8	210	29	5556	Yes
2004	2.2	197	26	5556	Yes
2005	4.4	217	28	5560	Yes
2006	4.1	208	25	5549	Yes
2007	4.6	194	23	5553	Yes
2008	4.5	152	25	5550	Yes
2009	1	222	27	5549	Yes
2010	3.3	222	25	5544	Yes
2011	4.2	178	25	5558	Yes
2012	4.7	225	27	5543	Yes
2013	1.7	185	23	5541	Yes
2014	2.5	155	29	5560	Yes
2015	1.9	162	26	5552	Yes
2016	2.8	179	25	5555	No
2017	2.4	228	29	5552	Yes
2018	1.7	212	26	5555	Yes
2019	1.5	184	27	5545	Yes
2020	1	172	24	5547	Yes
2021	3.1	191	25	5545	Yes
2022	5	226	23	5552	Yes
2023	3.3	168	28	5553	Yes
2024	1.2	207	23	5559	Yes
2025	3.8	197	28	5543	Yes
2026	2	159	23	5542	Yes
2027	2.9	152	29	5541	Yes
2028	3.4	199	28	5549	Yes
2029	4.5	159	28	5555	Yes
2030	1.2	172	27	5551	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	9.7	460	16	5558	Yes
3002	6.5	263	16	5545	Yes
3003	6.1	415	16	5554	Yes
3004	9.5	363	16	5548	Yes
3005	9.3	277	17	5546	Yes
3006	8.8	490	18	5540	Yes
3007	6.8	432	16	5545	Yes
3008	8.7	406	16	5557	Yes
3009	7	479	17	5548	Yes
3010	9	348	18	5545	Yes
3011	7.5	316	17	5551	Yes
3012	9.8	449	18	5544	Yes
3013	8.8	430	18	5548	Yes
3014	7.1	325	17	5552	Yes
3015	8.2	451	17	5543	Yes
3016	9	492	16	5559	Yes
3017	8.4	381	18	5551	Yes
3018	9.4	434	18	5554	Yes
3019	8.9	335	18	5559	Yes
3020	8.2	284	18	5557	Yes
3021	6.1	331	16	5550	Yes
3022	9.6	410	17	5552	Yes
3023	9.6	353	18	5541	Yes
3024	7.4	327	18	5550	Yes
3025	9.8	400	16	5548	Yes
3026	7.7	269	17	5545	Yes
3027	6.2	488	16	5541	Yes
3028	6.6	370	17	5549	Yes
3029	7.5	350	17	5555	Yes
3030	9.9	496	16	5548	No

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	18	372	12	5550	Yes
4002	14.8	413	12	5554	Yes
4003	13.4	301	14	5547	Yes
4004	15.6	355	16	5557	Yes
4005	19.5	256	14	5550	Yes
4006	13.1	456	12	5543	Yes
4007	17.4	252	15	5553	Yes
4008	16.2	464	13	5550	Yes
4009	12	273	14	5553	Yes
4010	11.3	499	15	5544	Yes
4011	16.6	454	16	5544	Yes
4012	12	441	12	5540	Yes
4013	13.5	408	16	5553	Yes
4014	18.6	290	12	5546	Yes
4015	11.4	271	12	5552	Yes
4016	16.9	299	16	5551	Yes
4017	15.1	292	16	5559	Yes
4018	12	333	15	5547	Yes
4019	19.7	473	13	5550	Yes
4020	17.6	275	15	5549	Yes
4021	16.6	310	13	5540	Yes
4022	19.3	376	15	5545	Yes
4023	14.5	423	13	5545	Yes
4024	13.4	385	16	5545	Yes
4025	18.2	445	15	5544	Yes
4026	17.5	419	13	5559	No
4027	13.7	374	14	5556	Yes
4028	18.3	361	15	5547	Yes
4029	19.7	329	14	5546	Yes
4030	15.7	462	16	5546	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5550	Yes
2	5550	Yes
3	5550	Yes
4	5550	Yes
5	5550	Yes
6	5550	Yes
7	5550	Yes
8	5550	Yes
9	5550	Yes
10	5550	Yes
11	5547	Yes
12	5547	Yes
13	5547	Yes
14	5545	Yes
15	5543	Yes
16	5545	Yes
17	5547	Yes
18	5546	Yes
19	5549	Yes
20	5545	Yes
21	5552	Yes
22	5552	Yes
23	5557	Yes
24	5554	Yes
25	5555	Yes
26	5553	Yes
27	5553	Yes
28	5551	Yes
29	5554	Yes
30	5553	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	590	5540	4	Yes
2	1065	5541	6	Yes
3	1540	5542	2	Yes
4	2015	5543	6	Yes
5	2490	5544	1	Yes
6	2965	5545	3	Yes
7	3440	5546	4	Yes
8	3915	5547	6	Yes
9	4390	5548	4	Yes
10	4865	5549	2	Yes
11	5340	5550	2	Yes
12	5815	5551	2	Yes
13	6290	5552	6	Yes
14	6765	5553	5	Yes
15	7240	5554	5	Yes
16	7715	5555	2	Yes
17	8190	5556	3	Yes
18	8665	5557	3	Yes
19	9140	5558	5	Yes
20	9615	5559	7	Yes
21	10090	5560	4	Yes
22	11040	5540	4	Yes
23	11515	5541	1	Yes
24	11990	5542	6	Yes
25	12465	5543	3	Yes
26	12940	5544	5	Yes
27	13415	5545	5	Yes
28	13890	5546	2	Yes
29	14365	5547	6	Yes
30	14840	5548	4	Yes
31	15315	5549	5	Yes
32	15790	5550	4	Yes
33	16265	5551	5	Yes
34	16740	5552	4	Yes
35	17215	5553	7	Yes
36	17690	5554	6	Yes
37	18165	5555	1	Yes
38	18640	5556	3	Yes
39	19115	5557	2	Yes
40	19590	5558	3	Yes
41	20065	5559	6	Yes
42	20540	5560	6	Yes

7.3. RESULTS FOR 40 MHz BANDWIDTH

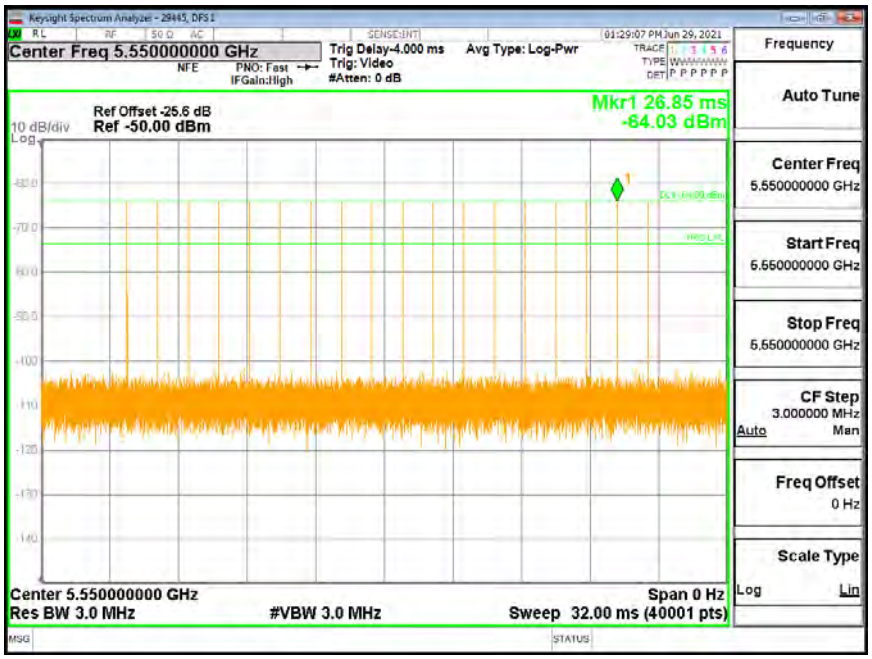
7.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5550 MHz.

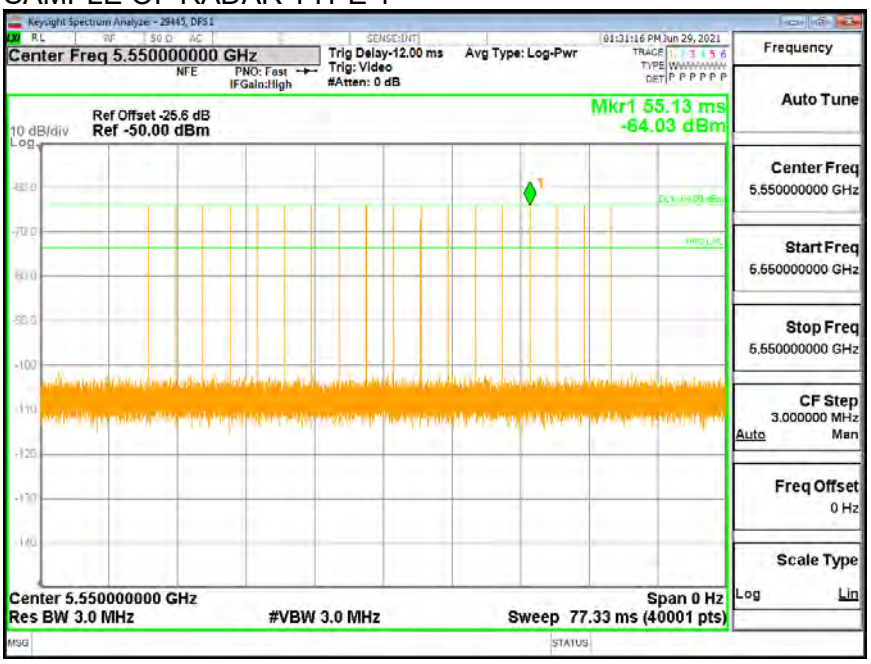
7.3.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

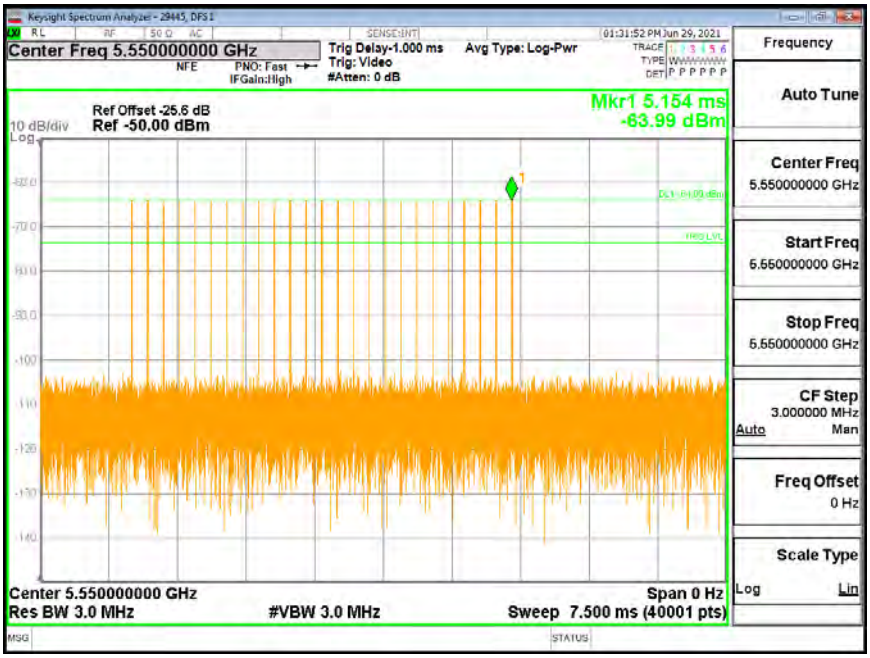
SHORT PULSE RADAR TYPE 0



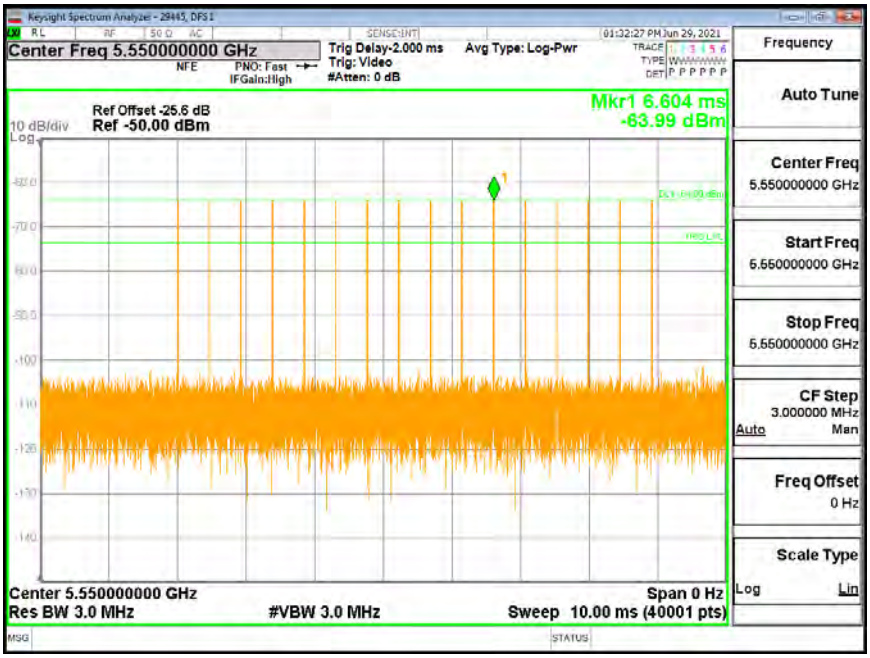
SAMPLE OF RADAR TYPE 1



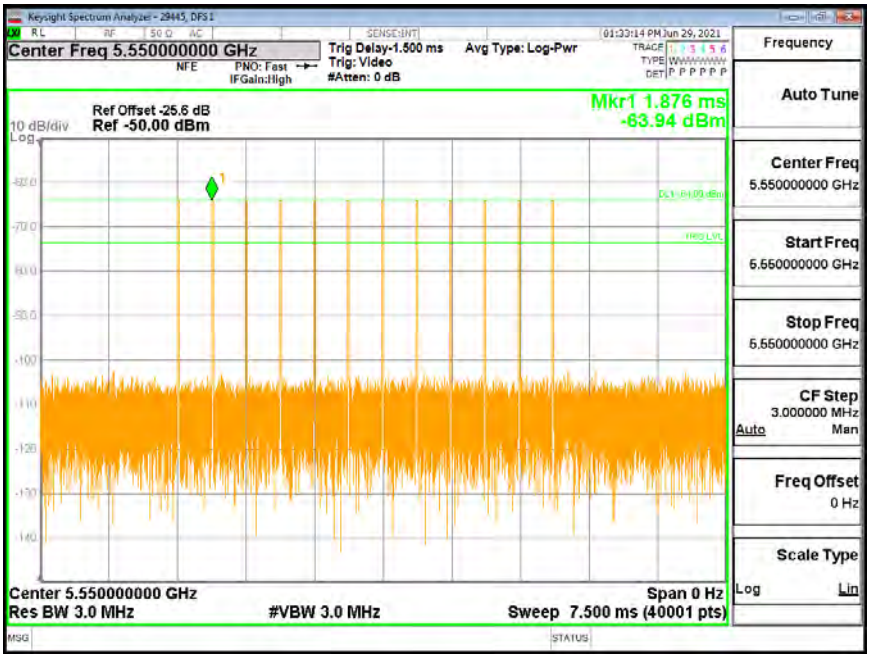
SAMPLE OF RADAR TYPE 2



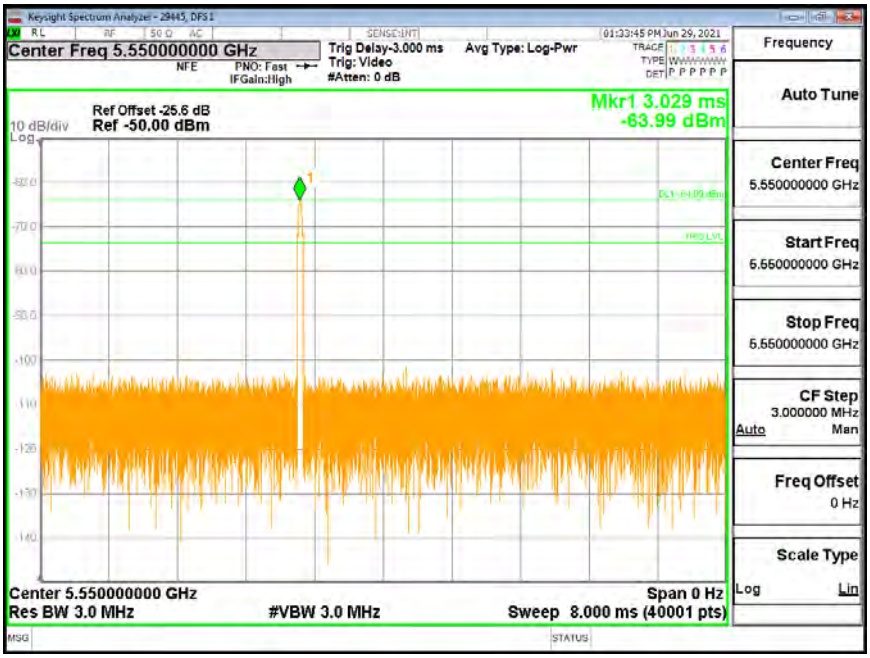
SAMPLE OF RADAR TYPE 3



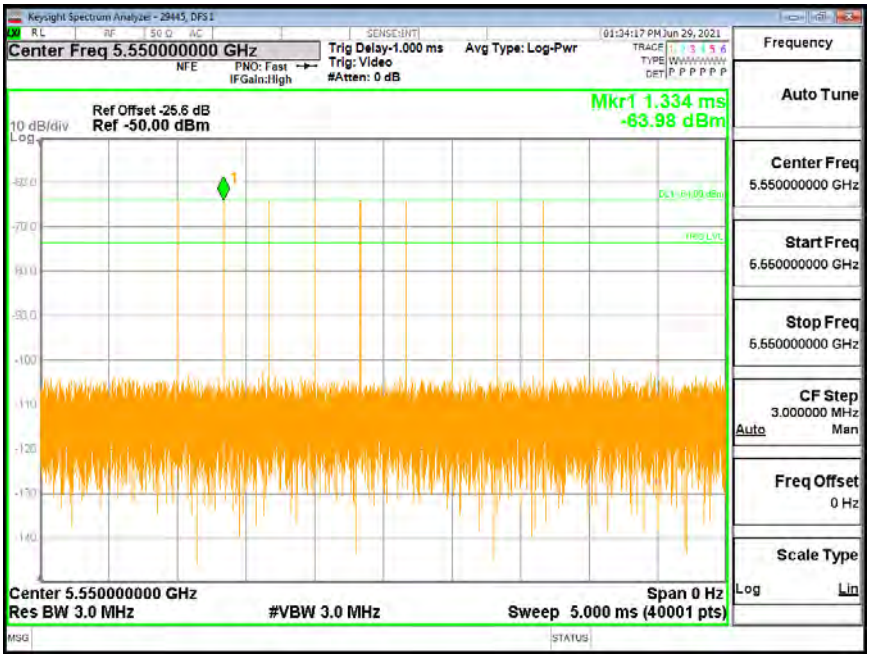
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

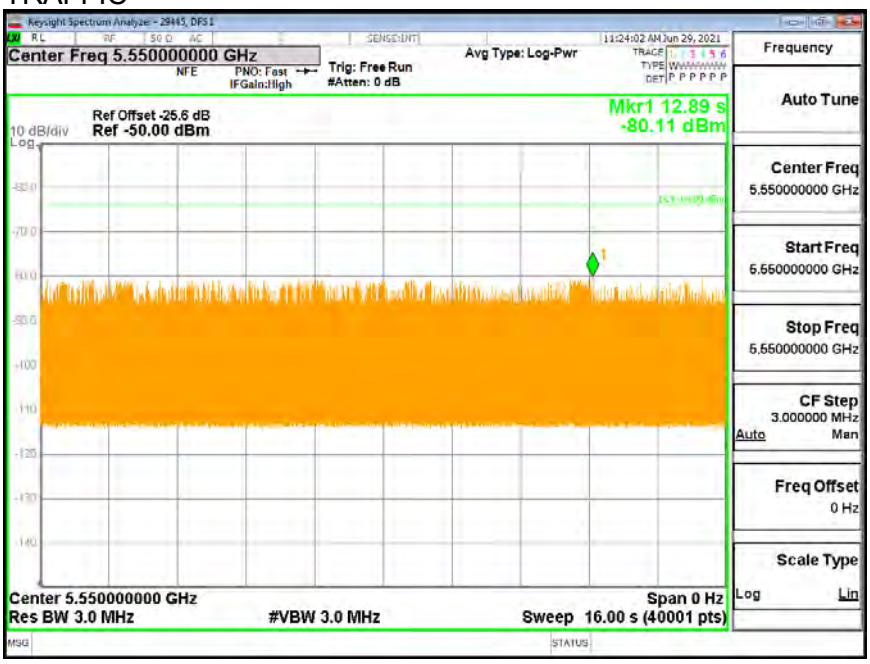


SINGLE BURST OF RADAR TYPE 6

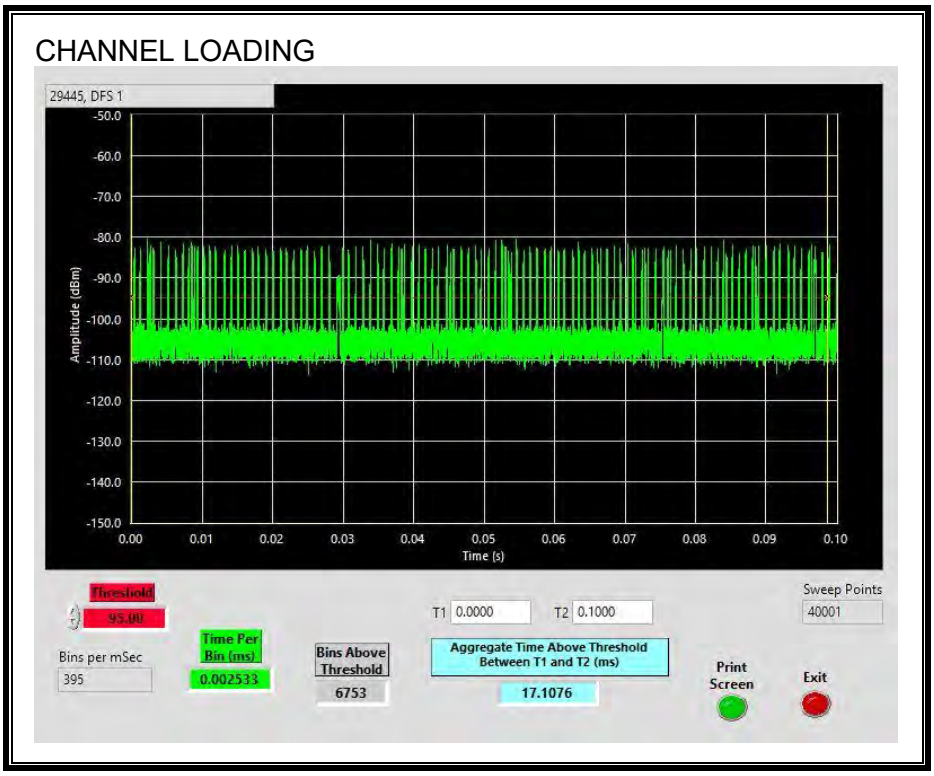


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.1%

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.

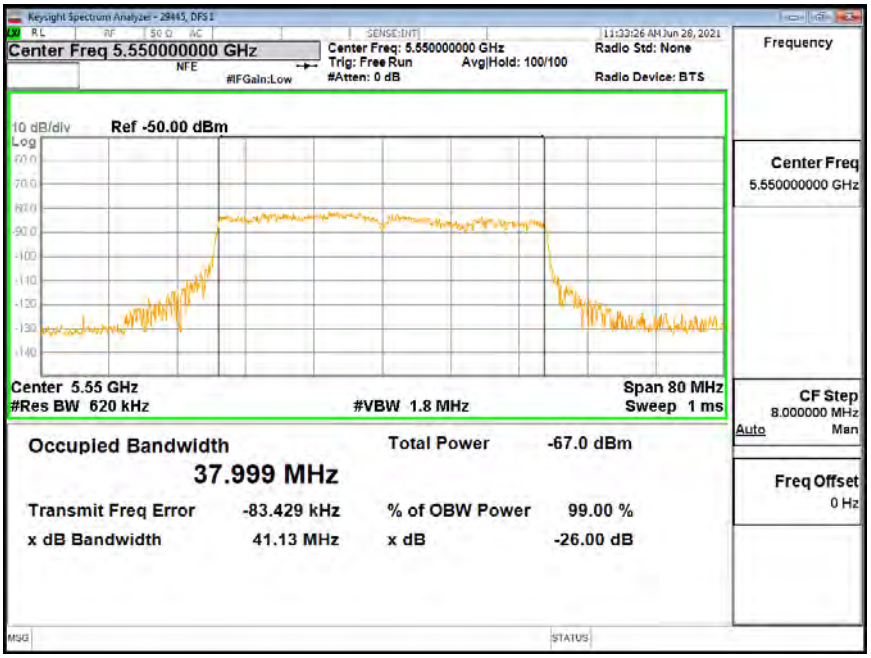
7.3.5. MOVE AND CLOSING TIME

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

99% 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 (%)
5530	5570	40	37.999	105.3	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
5529	10	0	0	
5530	10	10	100	FL
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
5571	10	0	0	

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	100.00	60	Pass	5530	5570	38	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	100.00	60	Pass	5530	5570	38	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	100.00	60	Pass	5530	5570	38	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	100.00	60	Pass	5530	5570	38	DFS 1	29445	v4.1
Aggregate		100.00	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5530	5570	38	DFS 1	29445	v4.1
FCC Hopping Type 6	41	100.00	70	Pass	5530	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	5567	Yes
1002	1	938	57	A	5537	Yes
1003	1	898	59	A	5549	Yes
1004	1	918	58	A	5541	Yes
1005	1	738	72	A	5562	Yes
1006	1	518	102	A	5558	Yes
1007	1	818	65	A	5534	Yes
1008	1	638	83	A	5535	Yes
1009	1	798	67	A	5539	Yes
1010	1	578	92	A	5545	Yes
1011	1	858	62	A	5558	Yes
1012	1	838	63	A	5564	Yes
1013	1	538	99	A	5542	Yes
1014	1	758	70	A	5563	Yes
1015	1	718	74	A	5553	Yes
1016	1	732	73	B	5539	Yes
1017	1	752	71	B	5539	Yes
1018	1	2450	22	B	5534	Yes
1019	1	1405	38	B	5532	Yes
1020	1	2038	26	B	5533	Yes
1021	1	1123	47	B	5565	Yes
1022	1	1885	28	B	5569	Yes
1023	1	1099	49	B	5557	Yes
1024	1	796	67	B	5550	Yes
1025	1	1494	36	B	5564	Yes
1026	1	2515	21	B	5555	Yes
1027	1	2147	25	B	5545	Yes
1028	1	2103	26	B	5546	Yes
1029	1	1864	29	B	5546	Yes
1030	1	1950	28	B	5568	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	3.7	173	25	5564	Yes
2002	3	195	28	5535	Yes
2003	2.8	210	29	5533	Yes
2004	2.2	197	26	5538	Yes
2005	4.4	217	28	5551	Yes
2006	4.1	208	25	5562	Yes
2007	4.6	194	23	5539	Yes
2008	4.5	152	25	5540	Yes
2009	1	222	27	5553	Yes
2010	3.3	222	25	5557	Yes
2011	4.2	178	25	5566	Yes
2012	4.7	225	27	5543	Yes
2013	1.7	185	23	5539	Yes
2014	2.5	155	29	5532	Yes
2015	1.9	162	26	5562	Yes
2016	2.8	179	25	5536	Yes
2017	2.4	228	29	5557	Yes
2018	1.7	212	26	5535	Yes
2019	1.5	184	27	5557	Yes
2020	1	172	24	5558	Yes
2021	3.1	191	25	5555	Yes
2022	5	226	23	5566	Yes
2023	3.3	168	28	5534	Yes
2024	1.2	207	23	5533	Yes
2025	3.8	197	28	5564	Yes
2026	2	159	23	5545	Yes
2027	2.9	152	29	5562	Yes
2028	3.4	199	28	5553	Yes
2029	4.5	159	28	5543	Yes
2030	1.2	172	27	5567	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	9.7	460	16	5547	Yes
3002	6.5	263	16	5533	Yes
3003	6.1	415	16	5565	Yes
3004	9.5	363	16	5539	Yes
3005	9.3	277	17	5536	Yes
3006	8.8	490	18	5559	Yes
3007	6.8	432	16	5559	Yes
3008	8.7	406	16	5536	Yes
3009	7	479	17	5530	Yes
3010	9	348	18	5540	Yes
3011	7.5	316	17	5530	Yes
3012	9.8	449	18	5532	Yes
3013	8.8	430	18	5555	Yes
3014	7.1	325	17	5532	Yes
3015	8.2	451	17	5570	Yes
3016	9	492	16	5553	Yes
3017	8.4	381	18	5565	Yes
3018	9.4	434	18	5543	Yes
3019	8.9	335	18	5561	Yes
3020	8.2	284	18	5546	Yes
3021	6.1	331	16	5537	Yes
3022	9.6	410	17	5540	Yes
3023	9.6	353	18	5551	Yes
3024	7.4	327	18	5533	Yes
3025	9.8	400	16	5536	Yes
3026	7.7	269	17	5552	Yes
3027	6.2	488	16	5557	Yes
3028	6.6	370	17	5545	Yes
3029	7.5	350	17	5550	Yes
3030	9.9	496	16	5532	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	18	372	12	5544	Yes
4002	14.8	413	12	5532	Yes
4003	13.4	301	14	5540	Yes
4004	15.6	355	16	5540	Yes
4005	19.5	256	14	5533	Yes
4006	13.1	456	12	5561	Yes
4007	17.4	252	15	5552	Yes
4008	16.2	464	13	5530	Yes
4009	12	273	14	5545	Yes
4010	11.3	499	15	5562	Yes
4011	16.6	454	16	5561	Yes
4012	12	441	12	5547	Yes
4013	13.5	408	16	5565	Yes
4014	18.6	290	12	5555	Yes
4015	11.4	271	12	5542	Yes
4016	16.9	299	16	5532	Yes
4017	15.1	292	16	5553	Yes
4018	12	333	15	5565	Yes
4019	19.7	473	13	5570	Yes
4020	17.6	275	15	5531	Yes
4021	16.6	310	13	5547	Yes
4022	19.3	376	15	5558	Yes
4023	14.5	423	13	5565	Yes
4024	13.4	385	16	5561	Yes
4025	18.2	445	15	5559	Yes
4026	17.5	419	13	5546	Yes
4027	13.7	374	14	5540	Yes
4028	18.3	361	15	5538	Yes
4029	19.7	329	14	5546	Yes
4030	15.7	462	16	5566	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5550	Yes
2	5550	Yes
3	5550	Yes
4	5550	Yes
5	5550	Yes
6	5550	Yes
7	5550	Yes
8	5550	Yes
9	5550	Yes
10	5550	Yes
11	5537	Yes
12	5537	Yes
13	5537	Yes
14	5536	Yes
15	5534	Yes
16	5536	Yes
17	5537	Yes
18	5537	Yes
19	5539	Yes
20	5535	Yes
21	5561	Yes
22	5561	Yes
23	5567	Yes
24	5564	Yes
25	5564	Yes
26	5563	Yes
27	5563	Yes
28	5561	Yes
29	5563	Yes
30	5563	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	766	5530	5	Yes
2	1241	5531	9	Yes
3	1716	5532	9	Yes
4	2191	5533	12	Yes
5	2666	5534	6	Yes
6	3141	5535	6	Yes
7	3616	5536	4	Yes
8	4091	5537	4	Yes
9	4566	5538	8	Yes
10	5041	5539	6	Yes
11	5516	5540	7	Yes
12	5991	5541	9	Yes
13	6466	5542	9	Yes
14	6941	5543	8	Yes
15	7416	5544	11	Yes
16	7891	5545	9	Yes
17	8366	5546	16	Yes
18	8841	5547	6	Yes
19	9316	5548	9	Yes
20	9791	5549	3	Yes
21	10266	5550	10	Yes
22	10741	5551	6	Yes
23	11216	5552	8	Yes
24	11691	5553	8	Yes
25	12166	5554	8	Yes
26	12641	5555	5	Yes
27	13116	5556	6	Yes
28	13591	5557	8	Yes
29	14066	5558	10	Yes
30	14541	5559	9	Yes
31	15016	5560	7	Yes
32	15491	5561	8	Yes
33	15966	5562	7	Yes
34	16441	5563	7	Yes
35	16916	5564	9	Yes
36	17391	5565	6	Yes
37	17866	5566	4	Yes
38	18341	5567	7	Yes
39	18816	5568	10	Yes
40	19291	5569	10	Yes
41	19766	5570	9	Yes

7.4. RESULTS FOR 80 MHz BANDWIDTH

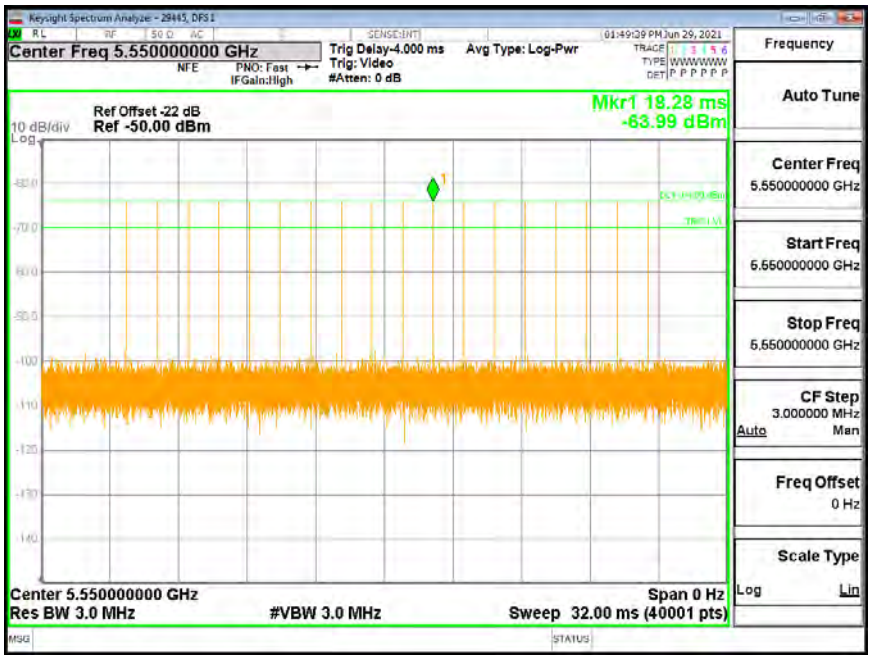
7.4.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5550 MHz.

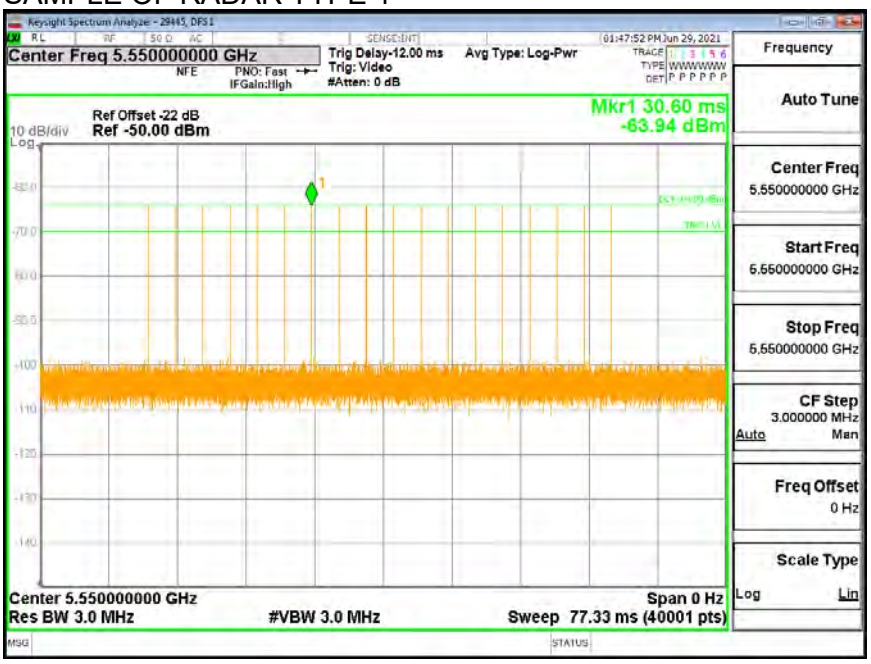
7.4.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

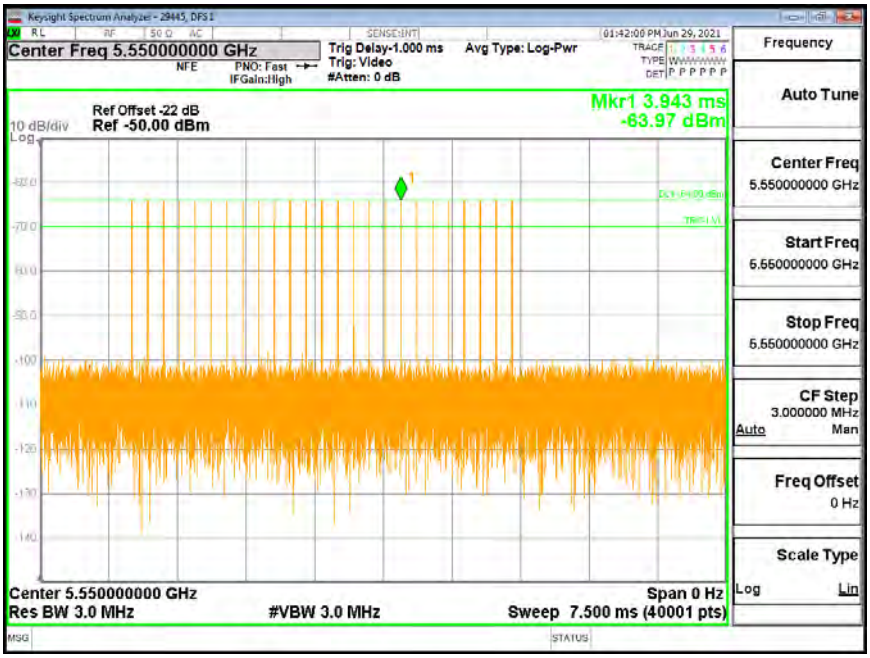
SHORT PULSE RADAR TYPE 0



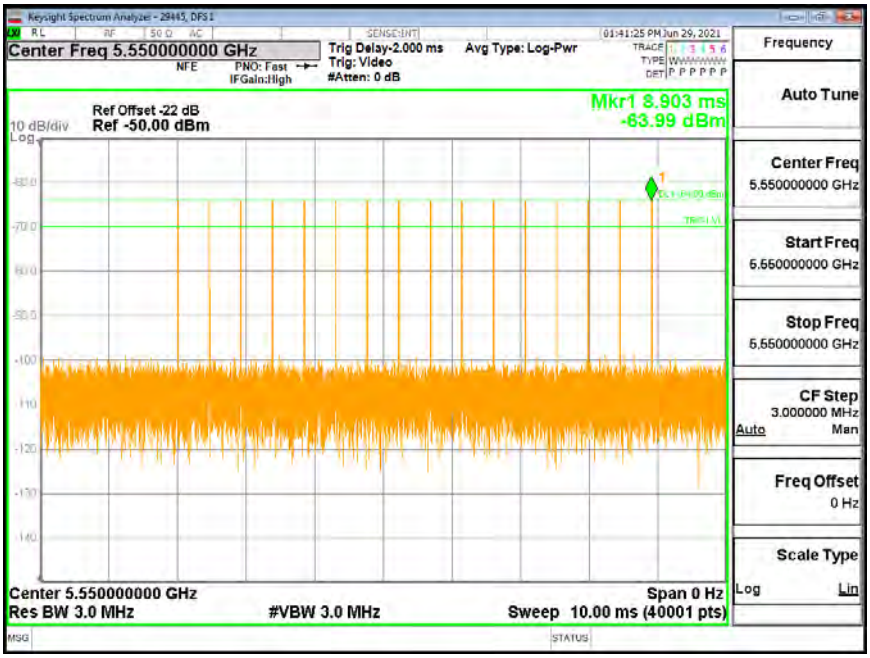
SAMPLE OF RADAR TYPE 1



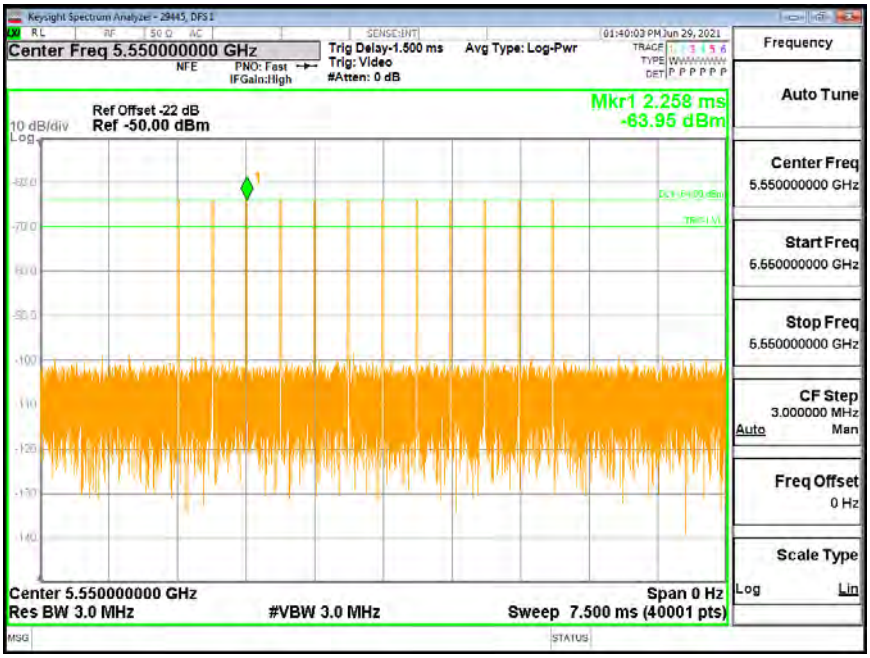
SAMPLE OF RADAR TYPE 2



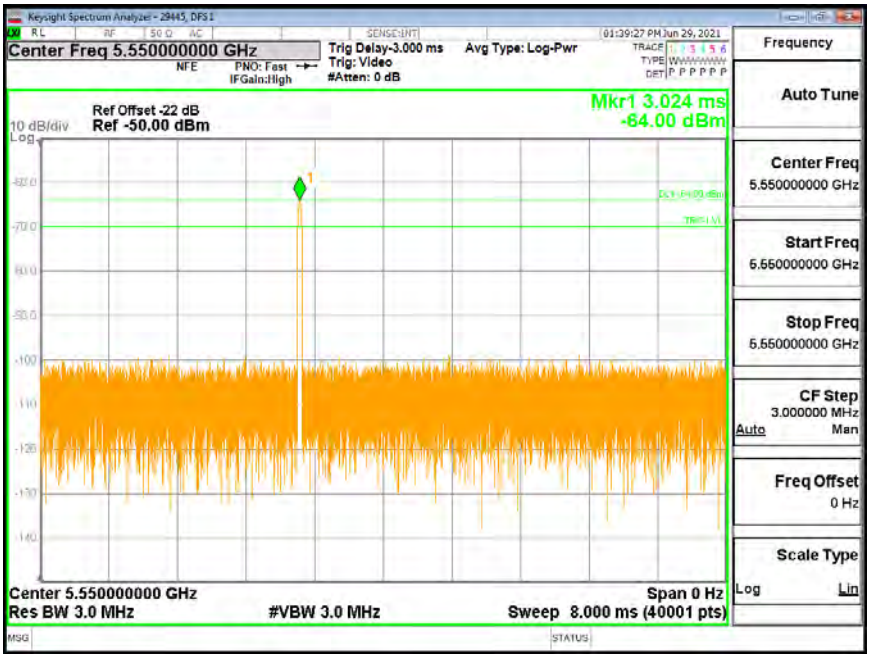
SAMPLE OF RADAR TYPE 3



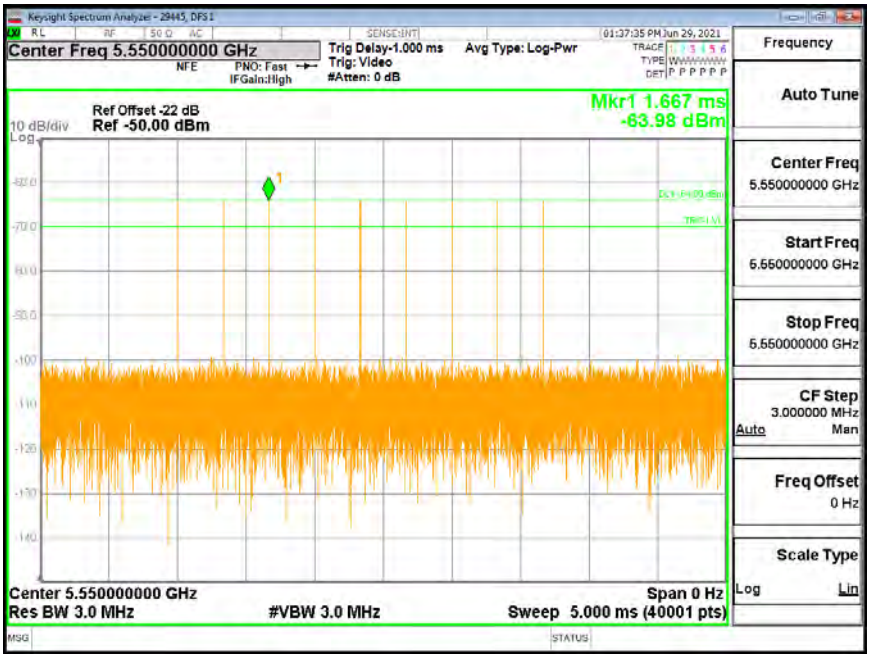
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

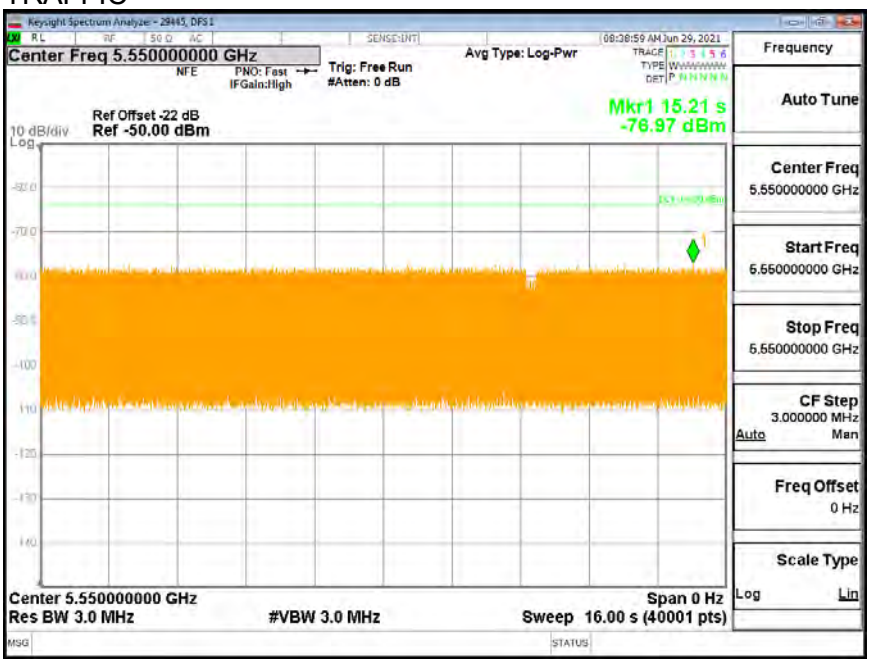


SINGLE BURST OF RADAR TYPE 6

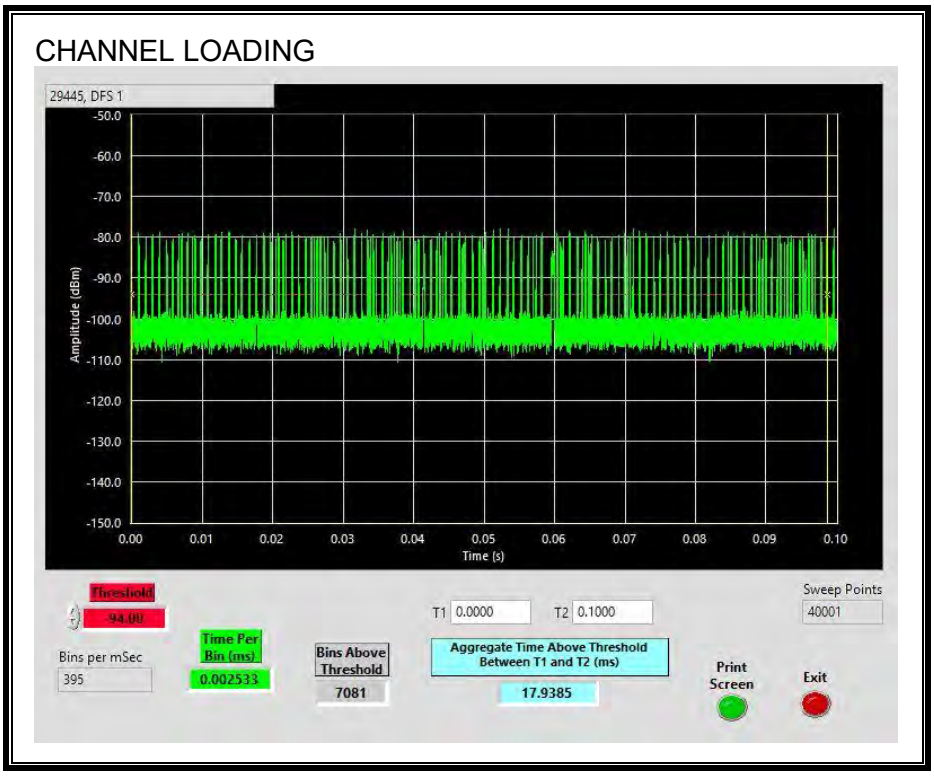


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.938%

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)
30.57	136.8	106.2	46.2

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)
30.14	79.64	49.5	3.3

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)
29.81	133.3	103.5	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

TIMING WITHOUT RADAR – NORMAL POWER-ON CYCLE

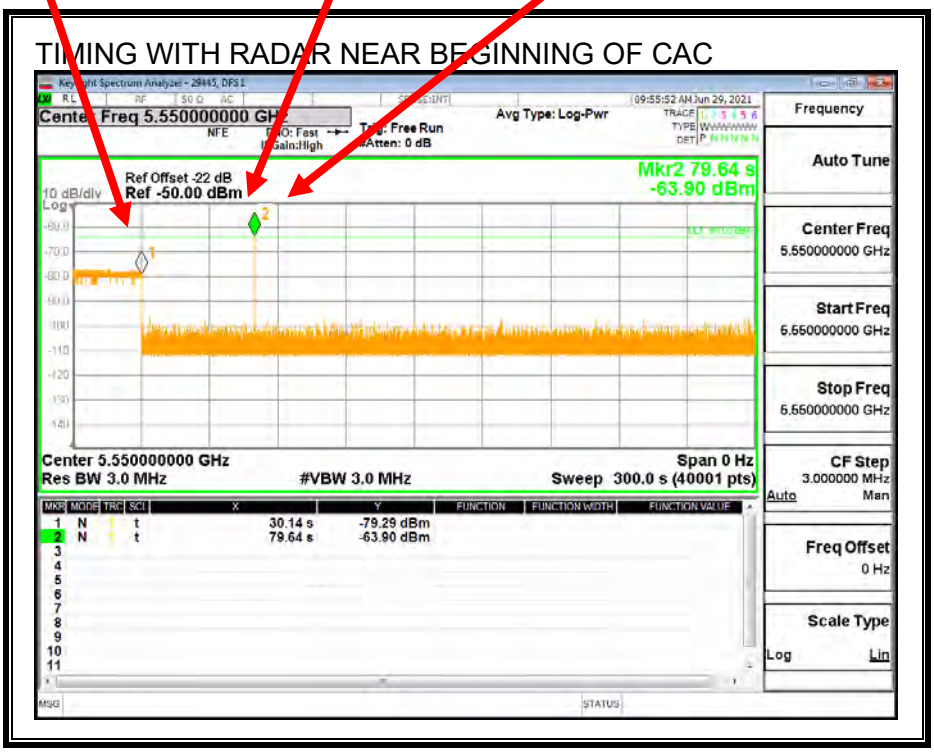
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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



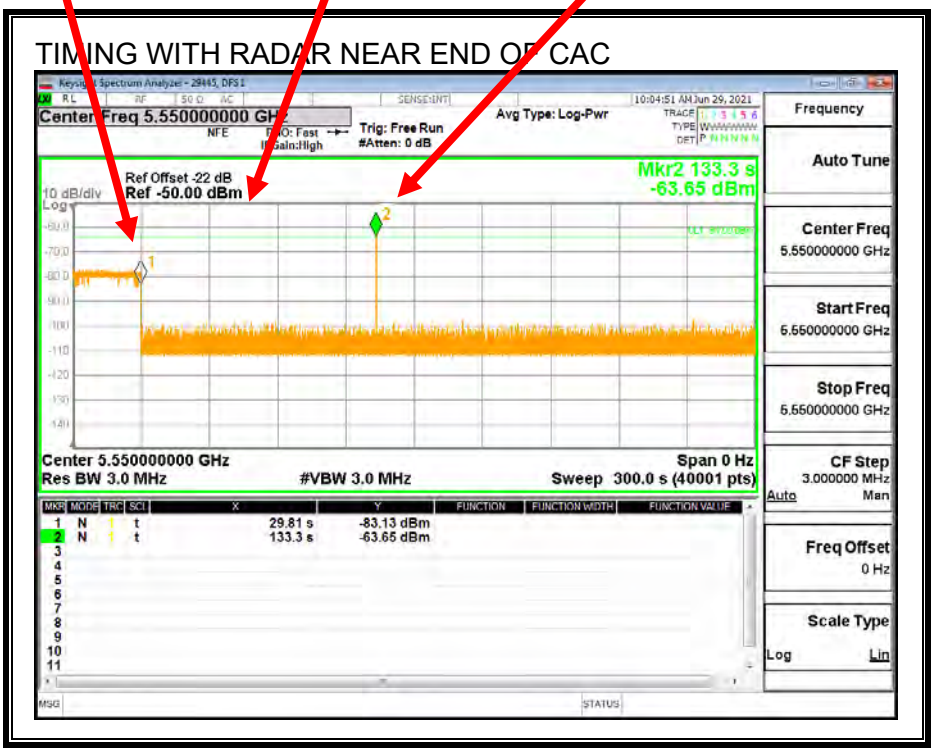
No EUT transmissions were observed after the radar signal.

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).

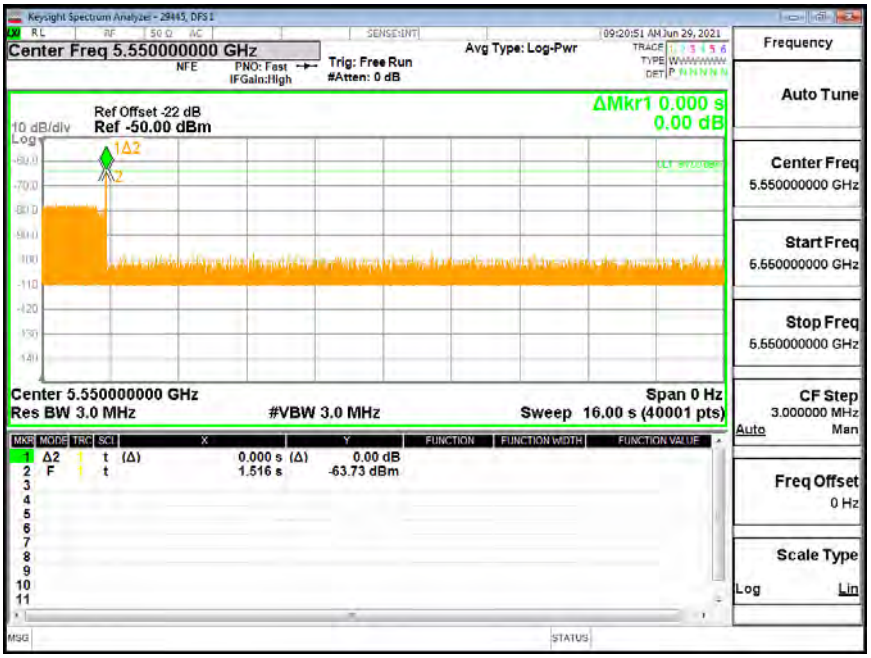
RESULTS

Channel Move Time (sec)	Limit (sec)
0.0	10

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

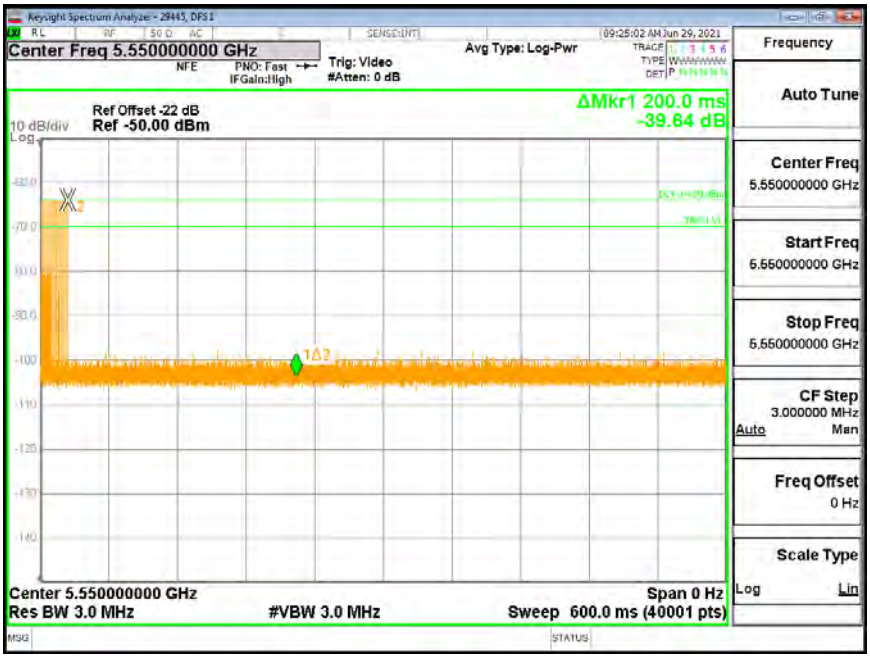
MOVE TIME

MOVE TIME



CHANNEL CLOSING TIME

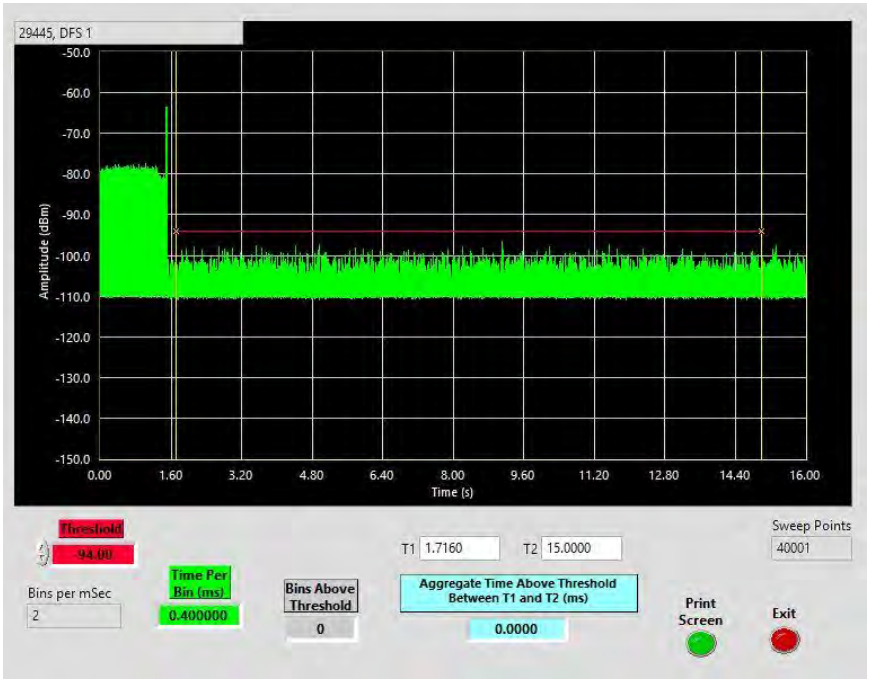
CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

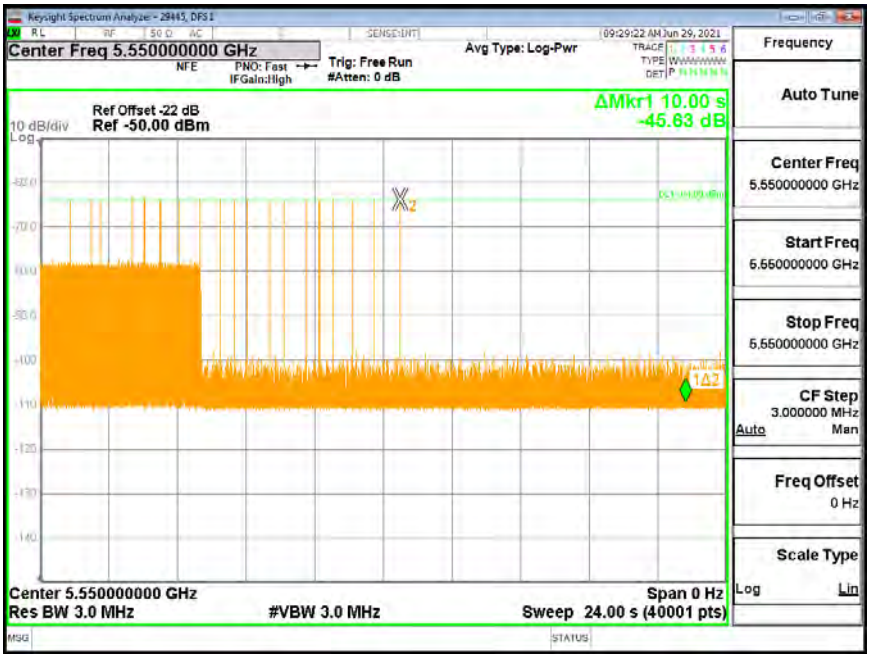
AGGREGATE CLOSING TIME



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

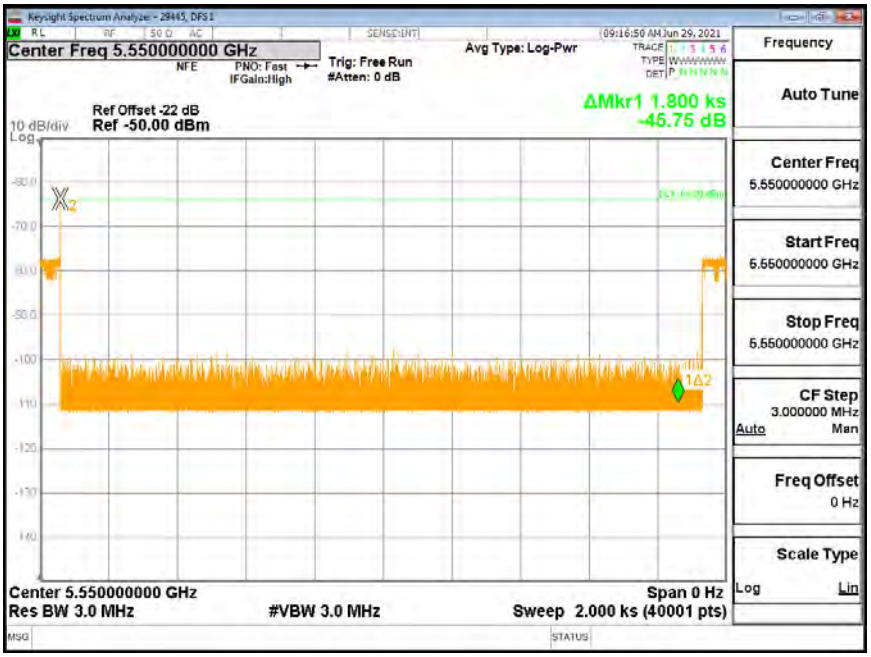


7.4.6. NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time. After the 30-minute non-occupancy period the EUT performed a new CAC, then resumed transmissions upon detecting no radar during this CAC period.

NON-OCCUPANCY PERIOD



7.4.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH

99% 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 (%)
5511	5589	78	77.662	100.4	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
5510	10	0	0	
5511	20	18	90	FL
5512	10	10	100	
5513	10	10	100	
5514	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	
5575	10	10	100	
5580	10	10	100	
5585	10	10	100	
5586	10	10	100	
5587	10	10	100	
5588	10	10	100	
5589	10	9	90	FH
5590	10	0	0	

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	100.00	60	Pass	5511	5589	77.66	DFS 1	29445	v4.1
FCC Short Pulse Type 2	30	96.67	60	Pass	5511	5589	77.66	DFS 1	29445	v4.1
FCC Short Pulse Type 3	30	93.33	60	Pass	5511	5589	77.66	DFS 1	29445	v4.1
FCC Short Pulse Type 4	30	93.33	60	Pass	5511	5589	77.66	DFS 1	29445	v4.1
Aggregate		95.83	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5511	5589	77.66	DFS 1	29445	v4.1
FCC Hopping Type 6	79	100.00	70	Pass	5511	5589		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	5539	Yes
1002	1	938	57	A	5523	Yes
1003	1	898	59	A	5561	Yes
1004	1	918	58	A	5552	Yes
1005	1	738	72	A	5512	Yes
1006	1	518	102	A	5574	Yes
1007	1	818	65	A	5581	Yes
1008	1	638	83	A	5530	Yes
1009	1	798	67	A	5583	Yes
1010	1	578	92	A	5533	Yes
1011	1	858	62	A	5522	Yes
1012	1	838	63	A	5537	Yes
1013	1	538	99	A	5513	Yes
1014	1	758	70	A	5575	Yes
1015	1	718	74	A	5561	Yes
1016	1	732	73	B	5559	Yes
1017	1	752	71	B	5583	Yes
1018	1	2450	22	B	5561	Yes
1019	1	1405	38	B	5519	Yes
1020	1	2038	26	B	5549	Yes
1021	1	1123	47	B	5585	Yes
1022	1	1885	28	B	5513	Yes
1023	1	1099	49	B	5538	Yes
1024	1	796	67	B	5548	Yes
1025	1	1494	36	B	5579	Yes
1026	1	2515	21	B	5587	Yes
1027	1	2147	25	B	5541	Yes
1028	1	2103	26	B	5544	Yes
1029	1	1864	29	B	5564	Yes
1030	1	1950	28	B	5530	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	3.7	173	25	5515	Yes
2002	3	195	28	5584	Yes
2003	2.8	210	29	5542	Yes
2004	2.2	197	26	5581	Yes
2005	4.4	217	28	5568	Yes
2006	4.1	208	25	5574	Yes
2007	4.6	194	23	5569	Yes
2008	4.5	152	25	5523	Yes
2009	1	222	27	5515	Yes
2010	3.3	222	25	5556	Yes
2011	4.2	178	25	5535	Yes
2012	4.7	225	27	5514	Yes
2013	1.7	185	23	5525	Yes
2014	2.5	155	29	5574	Yes
2015	1.9	162	26	5536	Yes
2016	2.8	179	25	5565	Yes
2017	2.4	228	29	5570	Yes
2018	1.7	212	26	5545	Yes
2019	1.5	184	27	5545	Yes
2020	1	172	24	5589	Yes
2021	3.1	191	25	5560	Yes
2022	5	226	23	5581	Yes
2023	3.3	168	28	5583	Yes
2024	1.2	207	23	5584	No
2025	3.8	197	28	5565	Yes
2026	2	159	23	5516	Yes
2027	2.9	152	29	5526	Yes
2028	3.4	199	28	5581	Yes
2029	4.5	159	28	5542	Yes
2030	1.2	172	27	5570	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	9.7	460	16	5549	Yes
3002	6.5	263	16	5556	Yes
3003	6.1	415	16	5519	Yes
3004	9.5	363	16	5536	Yes
3005	9.3	277	17	5568	Yes
3006	8.8	490	18	5533	Yes
3007	6.8	432	16	5548	Yes
3008	8.7	406	16	5528	Yes
3009	7	479	17	5518	Yes
3010	9	348	18	5559	Yes
3011	7.5	316	17	5557	Yes
3012	9.8	449	18	5562	Yes
3013	8.8	430	18	5524	Yes
3014	7.1	325	17	5566	Yes
3015	8.2	451	17	5542	Yes
3016	9	492	16	5522	Yes
3017	8.4	381	18	5586	Yes
3018	9.4	434	18	5550	Yes
3019	8.9	335	18	5532	Yes
3020	8.2	284	18	5520	Yes
3021	6.1	331	16	5587	Yes
3022	9.6	410	17	5559	Yes
3023	9.6	353	18	5579	No
3024	7.4	327	18	5514	No
3025	9.8	400	16	5517	Yes
3026	7.7	269	17	5560	Yes
3027	6.2	488	16	5577	Yes
3028	6.6	370	17	5542	Yes
3029	7.5	350	17	5554	Yes
3030	9.9	496	16	5525	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	18	372	12	5541	Yes
4002	14.8	413	12	5543	Yes
4003	13.4	301	14	5526	Yes
4004	15.6	355	16	5588	Yes
4005	19.5	256	14	5551	Yes
4006	13.1	456	12	5555	No
4007	17.4	252	15	5586	Yes
4008	16.2	464	13	5534	Yes
4009	12	273	14	5583	Yes
4010	11.3	499	15	5521	Yes
4011	16.6	454	16	5514	Yes
4012	12	441	12	5554	Yes
4013	13.5	408	16	5564	Yes
4014	18.6	290	12	5555	Yes
4015	11.4	271	12	5552	Yes
4016	16.9	299	16	5524	Yes
4017	15.1	292	16	5589	Yes
4018	12	333	15	5551	Yes
4019	19.7	473	13	5513	Yes
4020	17.6	275	15	5532	Yes
4021	16.6	310	13	5574	Yes
4022	19.3	376	15	5512	Yes
4023	14.5	423	13	5548	Yes
4024	13.4	385	16	5518	Yes
4025	18.2	445	15	5551	Yes
4026	17.5	419	13	5548	Yes
4027	13.7	374	14	5531	Yes
4028	18.3	361	15	5573	Yes
4029	19.7	329	14	5561	Yes
4030	15.7	462	16	5532	No

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5550	Yes
2	5550	Yes
3	5550	Yes
4	5550	Yes
5	5550	Yes
6	5550	Yes
7	5550	Yes
8	5550	Yes
9	5550	Yes
10	5550	Yes
11	5517	Yes
12	5517	Yes
13	5517	Yes
14	5516	Yes
15	5514	Yes
16	5516	Yes
17	5517	Yes
18	5517	Yes
19	5519	Yes
20	5515	Yes
21	5581	Yes
22	5581	Yes
23	5586	Yes
24	5584	Yes
25	5584	Yes
26	5582	Yes
27	5583	Yes
28	5581	Yes
29	5583	Yes
30	5583	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	789	5511	11	Yes
2	1264	5512	18	Yes
3	1739	5513	15	Yes
4	2214	5514	19	Yes
5	2689	5515	15	Yes
6	3164	5516	13	Yes
7	3639	5517	13	Yes
8	4114	5518	8	Yes
9	4589	5519	16	Yes
10	5064	5520	15	Yes
11	5539	5521	9	Yes
12	6014	5522	12	Yes
13	6489	5523	16	Yes
14	6964	5524	16	Yes
15	7439	5525	18	Yes
16	7914	5526	19	Yes
17	8389	5527	18	Yes
18	8864	5528	21	Yes
19	9339	5529	21	Yes
20	9814	5530	12	Yes
21	10289	5531	20	Yes
22	10764	5532	21	Yes
23	11239	5533	12	Yes
24	11714	5534	22	Yes
25	12189	5535	13	Yes
26	12664	5536	12	Yes
27	13139	5537	24	Yes
28	13614	5538	19	Yes
29	14089	5539	17	Yes
30	14564	5540	22	Yes
31	15039	5541	11	Yes
32	15514	5542	17	Yes
33	15989	5543	14	Yes
34	16464	5544	17	Yes
35	16939	5545	15	Yes
36	17414	5546	11	Yes
37	17889	5547	10	Yes
38	18364	5548	15	Yes
39	18839	5549	17	Yes

TYPE 6 DETECTION PROBABILITY (CONTINUED)

40	19314	5550	18	Yes
41	19789	5551	22	Yes
42	20264	5552	20	Yes
43	20739	5553	21	Yes
44	21214	5554	11	Yes
45	21689	5555	23	Yes
46	22164	5556	17	Yes
47	22639	5557	13	Yes
48	23114	5558	18	Yes
49	23589	5559	13	Yes
50	24064	5560	12	Yes
51	24539	5561	12	Yes
52	25014	5562	11	Yes
53	25489	5563	12	Yes
54	25964	5564	14	Yes
55	26439	5565	12	Yes
56	26914	5566	12	Yes
57	27389	5567	18	Yes
58	27864	5568	23	Yes
59	28339	5569	15	Yes
60	28814	5570	17	Yes
61	29289	5571	20	Yes
62	29764	5572	21	Yes
63	30239	5573	10	Yes
64	30714	5574	14	Yes
65	31189	5575	14	Yes
66	31664	5576	15	Yes
67	32139	5577	13	Yes
68	32614	5578	13	Yes
69	33089	5579	17	Yes
70	33564	5580	22	Yes
71	34039	5581	19	Yes
72	34514	5582	21	Yes
73	34989	5583	16	Yes
74	35464	5584	19	Yes
75	35939	5585	19	Yes
76	36414	5586	19	Yes
77	36889	5587	15	Yes
78	37364	5588	22	Yes
79	37839	5589	18	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.