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

CERTIFICATION TEST REPORT

FOR

OUTDOOR POINT to MULTIPOINT ACCESS POINT

MODEL NUMBER: ePMP 3000

FCC ID: Z8H89FT0024
IC: 109W-0024

REPORT NUMBER: 12577413-E1V2

ISSUE DATE: APRIL 15, 2019

Prepared for
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3800 GOLF ROAD
ROLLING MEADOWS, IL 60008-4023, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	11/27/18	Initial Issue	--
V2	04/15/19	Update Download/Uplink Ratio to 75/25	Doug Anderson
			--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CAMBIUM NETWORKS, LTD.
3800 GOLF ROAD
ROLLING MEADOWS, IL 60008-4023, U.S.A.

EUT DESCRIPTION: OUTDOOR POINT to MULTIPOINT ACCESS POINT

MODEL: ePMP 3000

SERIAL NUMBER: 0004562057C9

DATE TESTED: NOVEMBER 07 to 08, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	Complies
DFS Portion of INDUSTRY 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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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 06-96, FCC KDB 789033, KDB 905462 D02 and D03 and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Specific facilities are also identified in the test results sections.

The test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers are covered under Industry Canada company address and respective code.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Time	± 0.02 %

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

5. DYNAMIC FREQUENCY SELECTION

5.1. OVERVIEW

5.1.1. LIMITS

INDUSTRY CANADA

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

RSS-247 Issue 2

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

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

FCC

§15.407 (h), FCC KDB 905462 D02 “COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION” and KDB 905462 D03 “U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY”.

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

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar DFS	Client (without DFS)
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in all 20 MHz channel blocks and a null frequency between the bonded 20 MHz channel blocks.		

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

Maximum Transmit Power	Value (see notes)
E.I.R.P. ≥ 200 mill watt	-64 dBm
E.I.R.P. < 200 mill watt and power spectral density < 10 dBm/MHz	-62 dBm
E.I.R.P. < 200 mill watt that do not meet power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB publication 662911 D01.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period. (See Notes 1 and 2)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (See Note 3)

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (usec)	PRI (usec)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in table 5a	Roundup: {(1/360) x (19 x 10^6 PRI_{usec})}	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 usec. With a minimum increment of 1 usec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the *Detection Bandwidth* test, *Channel Move Time*, and *Channel Closing Time* tests.

Table 6 – Long Pulse Radar Test Signal

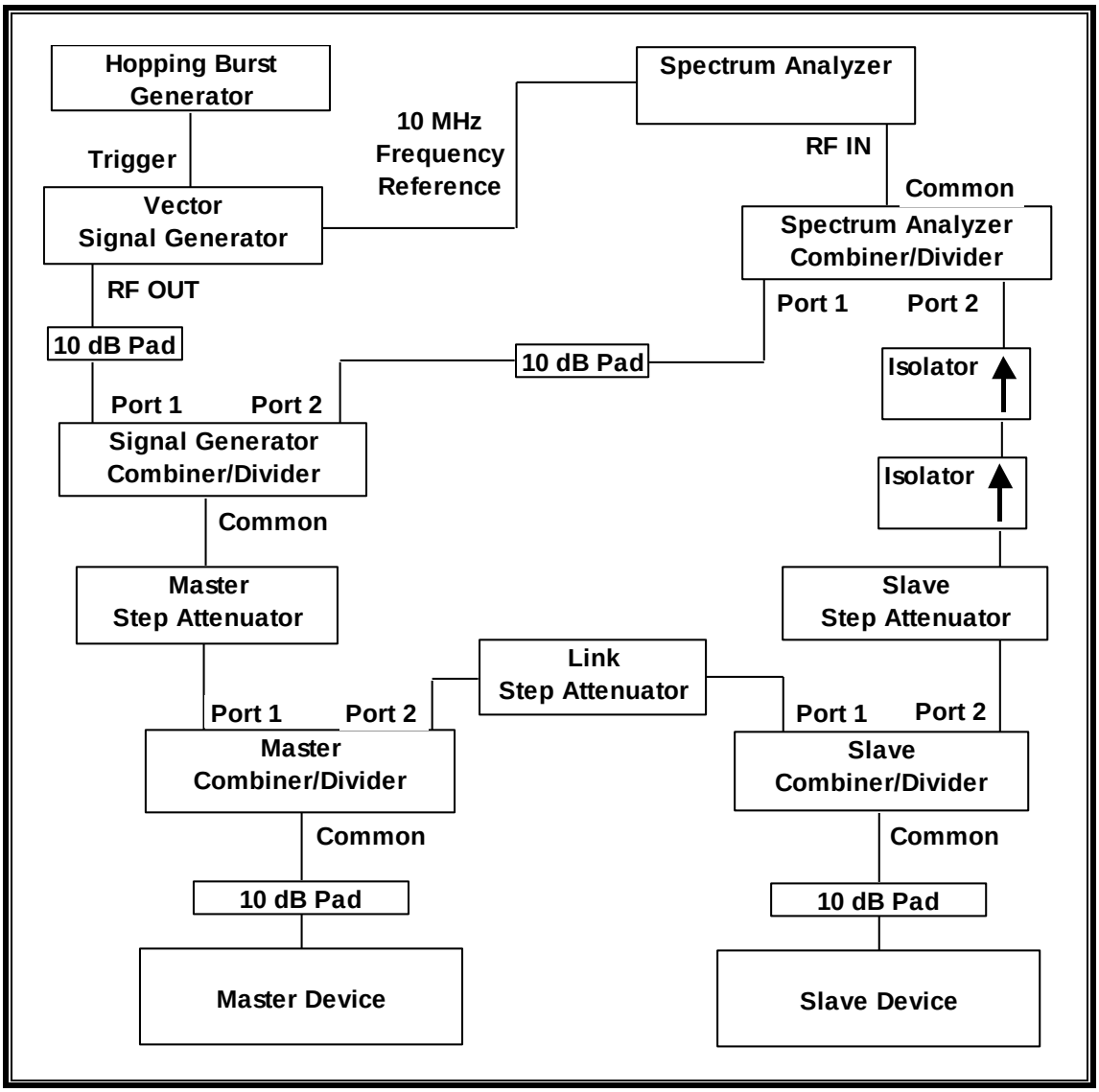
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Signal

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

5.1.2. 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 DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID No.**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T459	07/25/19
Signal Generator, MXG X-Series RF Vector	Agilent	N5182B	T1134	04/23/19
Arbitrary Waveform Generator	Agilent / HP	33220A	T190	04/23/19

5.1.3. 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	3.3.4	In-Service Monitoring (Probability of Detection)
PXA Read	3.1	Signal Generator Screen Capture Utility
SGXProject.exe	1.7	Radar Waveform Generation and Download

TEST ROOM ENVIRONMENT

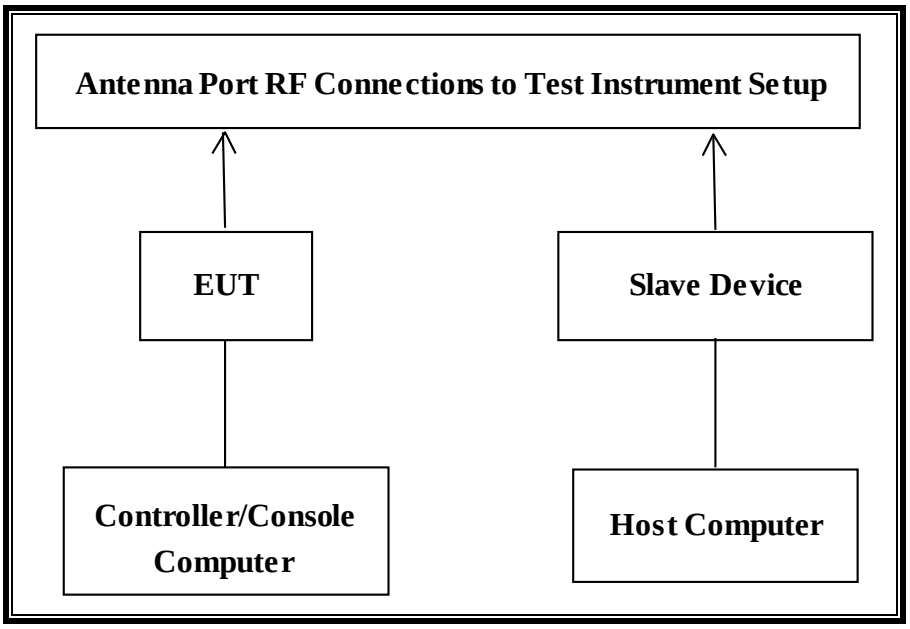
The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

ENVIRONMENT CONDITION

Parameter	Value
Temperature	23.6 and 24.3 °C
Humidity	29 and 23 %

5.1.4. SETUP OF EUT

CONDUCTED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Gigabit P.O.E. Adapter (EUT)	Cambium Networks	NET-P15-56IN	N000000L034A180200290	DoC
Notebook PC (EUT Controller/Console)	Lenovo	Type 4236-B92	PB-HEX04 12/05	DoC
AC Adapter (Console/Controller PC)	Lenovo	42T4418	11S42T4418Z1ZGWG08R90M	DoC
Outdoor Subscriber Module (Slave Device)	Cambium Networks	Force 300-16	00045620BABE	Z8HT890016
Gigabit P.O.E. Adapter (Slave)	Phihong	PSA15M-300 (AP)	0167552117P0401	DoC
Notebook PC (Slave Host)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter (Host PC)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS974594A9	DoC

5.1.5. DESCRIPTION OF EUT

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

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

The EUT is a Master Device.

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

The highest gain antenna assembly utilized with the EUT has a gain of 17 dBi in the 5250-5350 MHz band and 17 dBi in the 5470-5725 MHz band. 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.

The EUT was tested using a manufacturer declared antenna gain of 0 dBi.

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 –63 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

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.

The EUT is a frame-based system. EUT system traffic was tested while running at a worst-case 75/25 percent uplink to downlink ratio.

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 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 80 MHz.

The software installed in the Master EUT is revision 4.3-RC19.

UNIFORM CHANNEL SPREADING

This function is not required per KDB 905462.

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

The Master EUT Device is a Cambium Networks outdoor point to multi-point access point, FCC ID: Z8H89FT0024. 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 EUT was tested using a manufacturer declared antenna gain of 0 dBi.

The calibrated radiated DFS Detection Threshold level is set to –63 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

5.2. RESULTS FOR 20 MHz BANDWIDTH

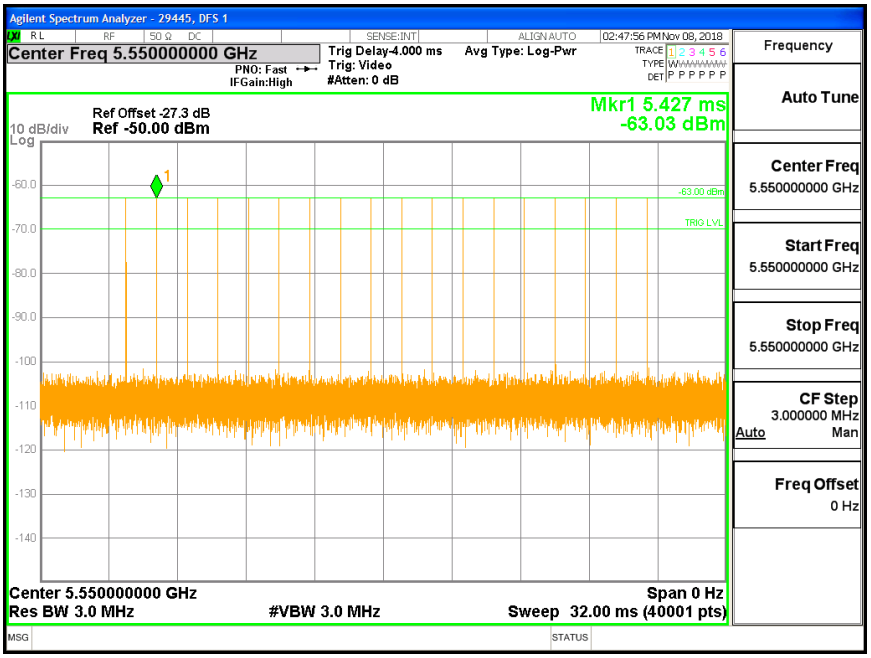
5.2.1. TEST CHANNEL

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

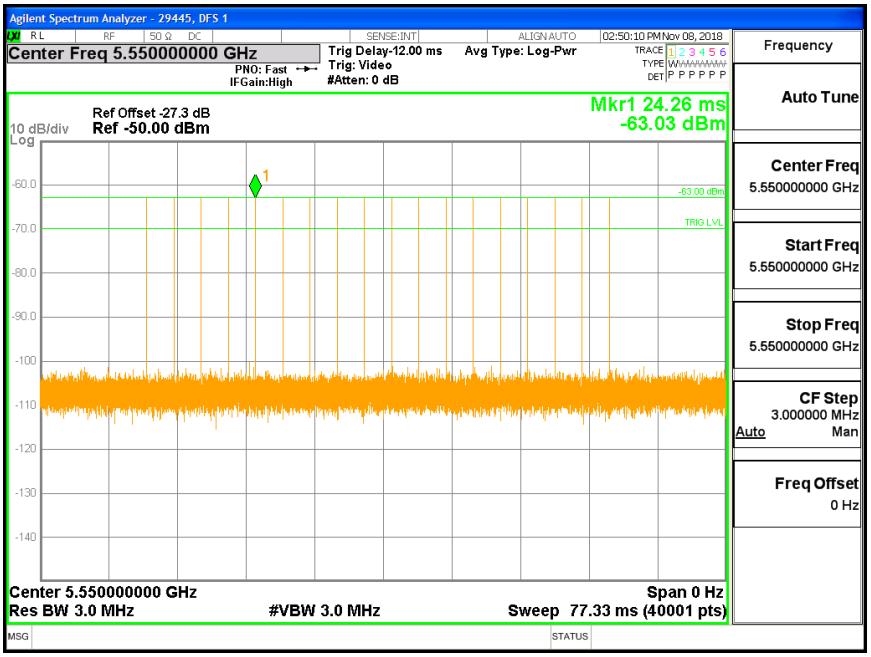
5.2.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

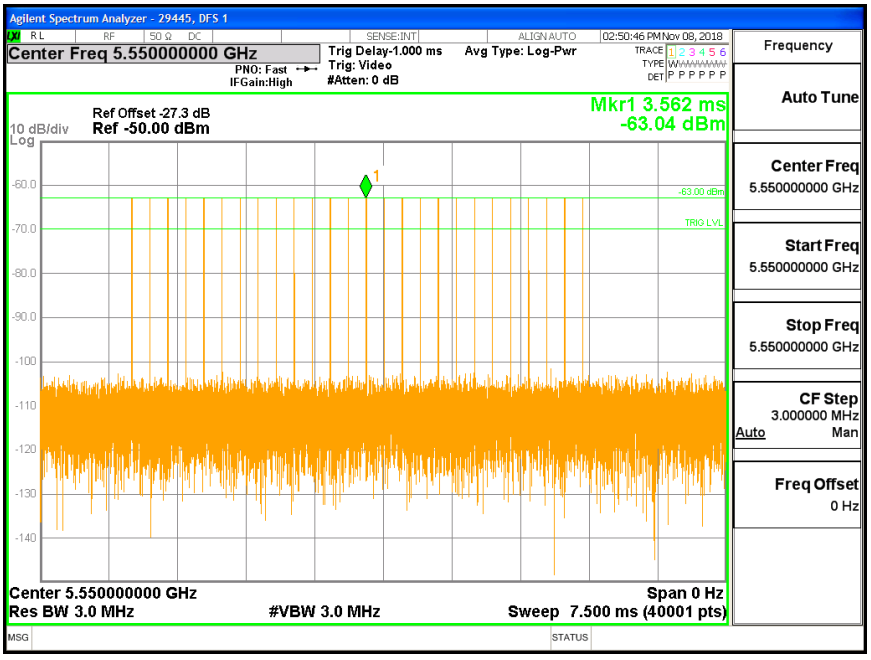
SHORT PULSE RADAR TYPE 0



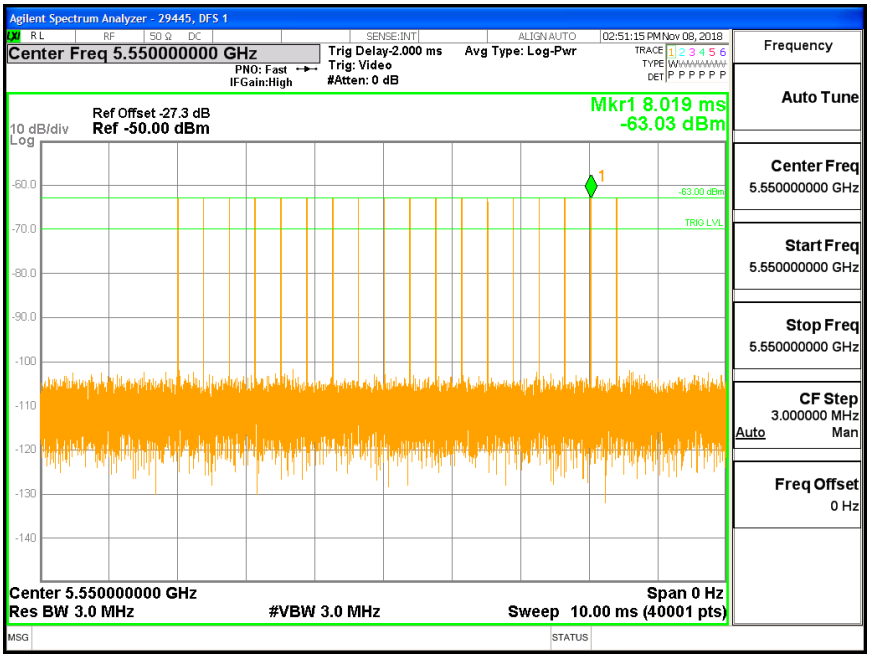
SAMPLE OF RADAR TYPE 1



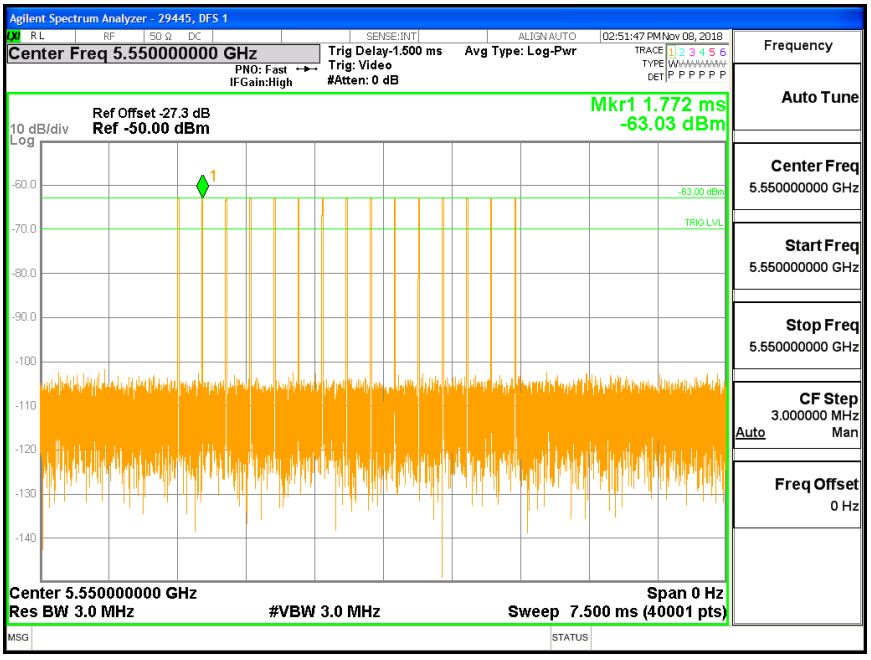
SAMPLE OF RADAR TYPE 2



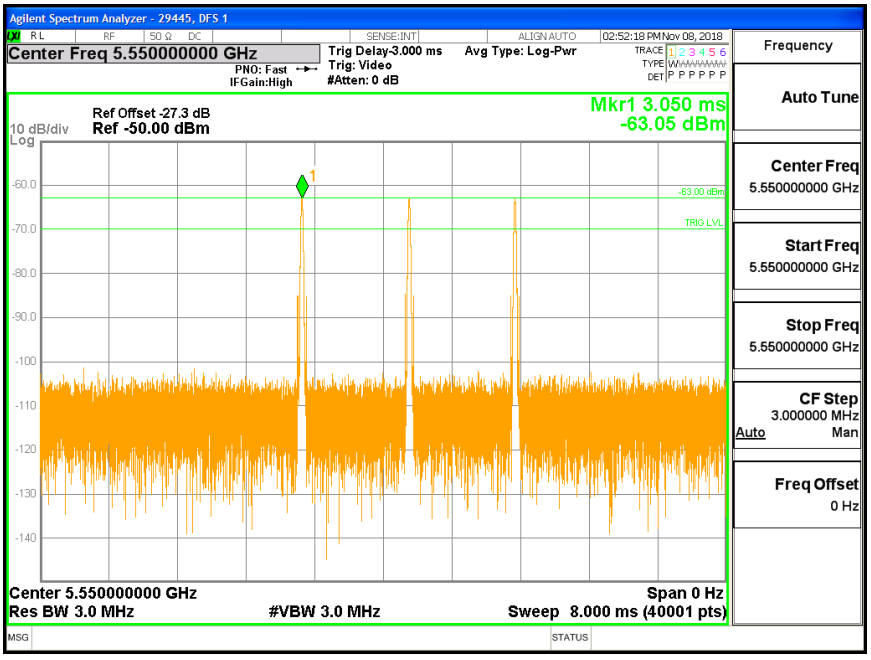
SAMPLE OF RADAR TYPE 3



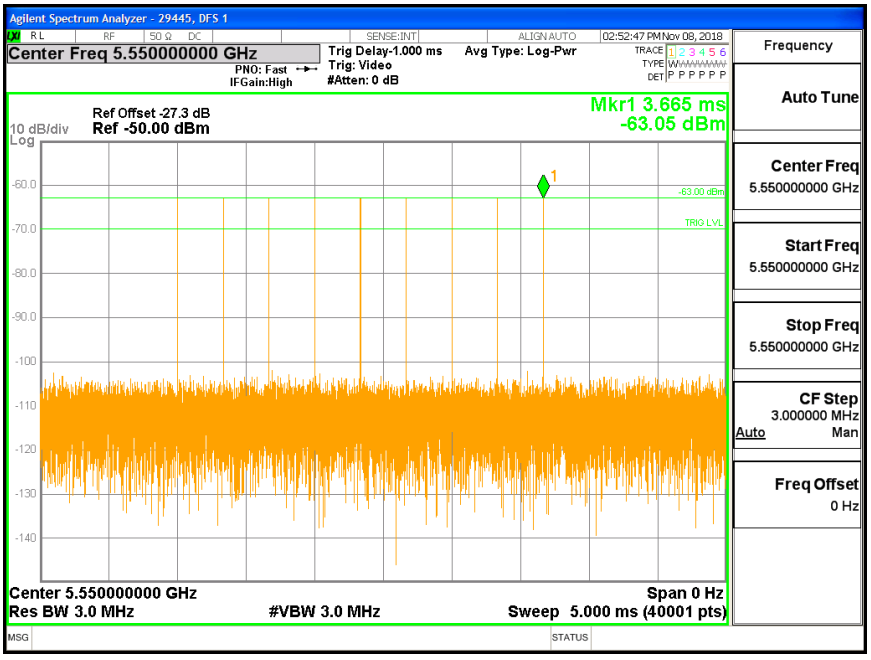
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

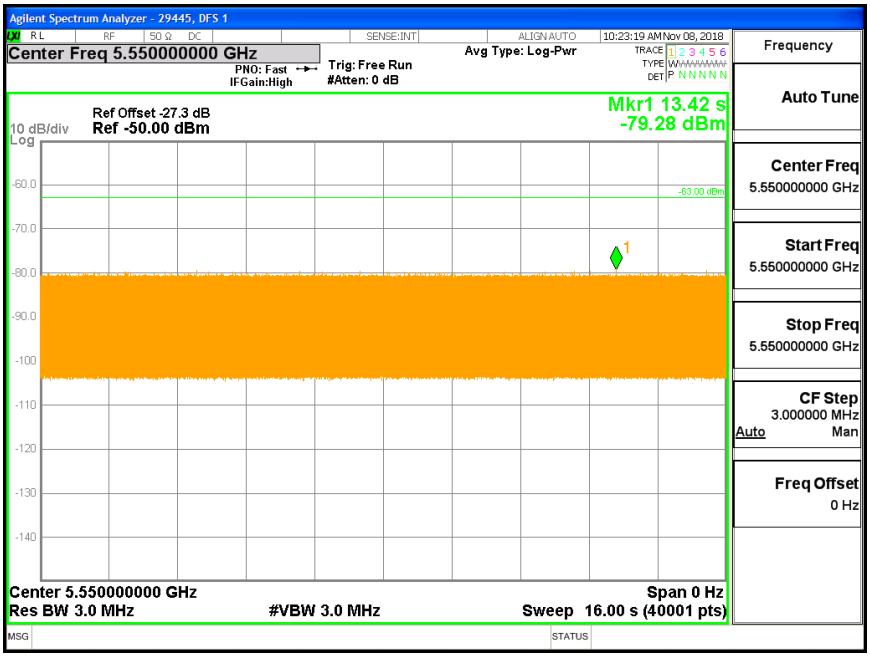


SINGLE BURST OF RADAR TYPE 6

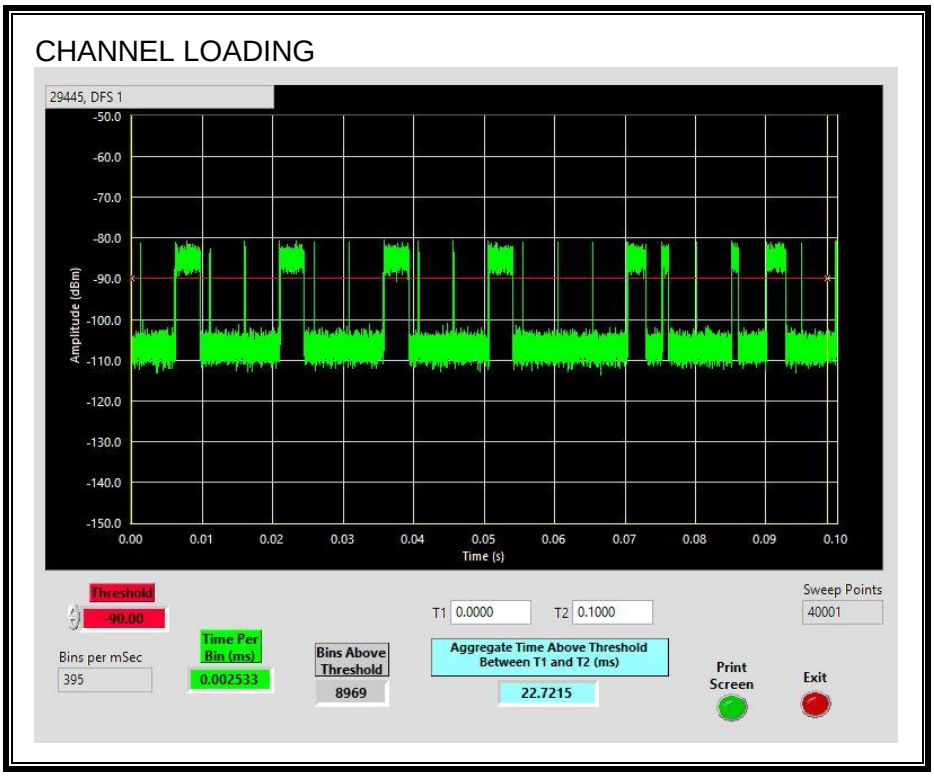


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 22.72%

5.2.3. CHANNEL AVAILABILITY CHECK TIME

Note: Per table 2 of KDB 905462 D02, this test is only required to be performed at the highest supported channel bandwidth. Therefore the manufacturer has chosen not to perform this test for 20 MHz channel bandwidth.

5.2.4. OVERLAPPING CHANNEL TESTS

RESULTS

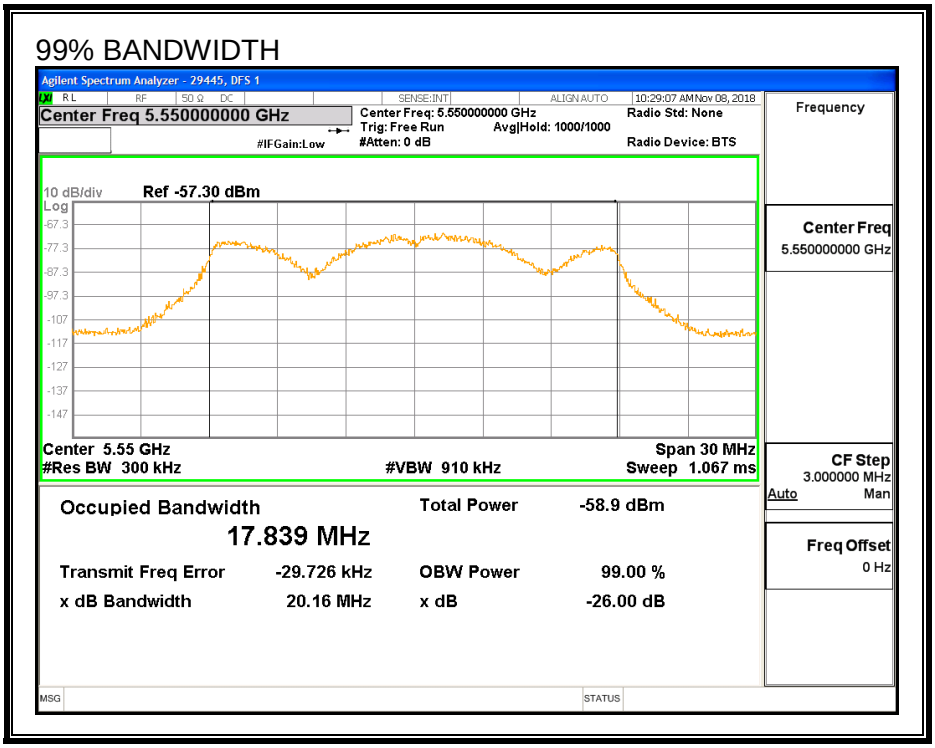
The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

5.2.5. MOVE AND CLOSING TIM

Note: Per table 2 of KDB 905462 D02, this test is only required to be performed at the highest supported channel bandwidth. Therefore the manufacturer has chosen not to perform this test for 20 MHz channel bandwidth.

5.2.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5540	5560	20	17.839	112.1	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
5540	10	10	100	FL
5545	10	10	100	
5550	10	10	100	
5555	10	10	100	
5560	10	10	100	FH

5.2.7. 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	5550	17.84	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 2	30	83.33	60	Pass	5540	5550	17.84	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 3	30	90.00	60	Pass	5540	5550	17.84	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 4	30	73.33	60	Pass	5540	5550	17.84	DFS 1	29445	Version 3.3.4
Aggregate		86.67	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5540	5550	17.84	DFS 1	29445	Version 3.3.4
FCC Hopping Type 6	42	95.24	70	Pass	5540	5560		DFS 1	29445	Version 3.3.4

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	5542	Yes
1002	1	558	95	A	5550	Yes
1003	1	698	76	A	5543	Yes
1004	1	818	65	A	5547	Yes
1005	1	798	67	A	5550	Yes
1006	1	938	57	A	5543	Yes
1007	1	898	59	A	5541	Yes
1008	1	878	61	A	5541	Yes
1009	1	718	74	A	5547	Yes
1010	1	518	102	A	5543	Yes
1011	1	638	83	A	5545	Yes
1012	1	578	92	A	5543	Yes
1013	1	858	62	A	5542	Yes
1014	1	758	70	A	5542	Yes
1015	1	918	58	A	5543	Yes
1016	1	1759	31	B	5542	Yes
1017	1	1650	32	B	5546	Yes
1018	1	670	79	B	5543	Yes
1019	1	691	77	B	5548	Yes
1020	1	2388	23	B	5544	Yes
1021	1	1344	40	B	5543	Yes
1022	1	1976	27	B	5549	Yes
1023	1	1061	50	B	5544	Yes
1024	1	1823	29	B	5543	Yes
1025	1	1038	51	B	5549	Yes
1026	1	735	72	B	5540	Yes
1027	1	1432	37	B	5550	Yes
1028	1	1258	42	B	5547	Yes
1029	1	2085	26	B	5549	Yes
1030	1	2041	26	B	5542	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	3.2	197	26	5549	No
2002	1.6	163	25	5547	Yes
2003	4.9	204	25	5550	Yes
2004	3.5	217	24	5540	Yes
2005	2.8	181	28	5549	No
2006	3.8	199	24	5547	Yes
2007	1.5	167	28	5547	Yes
2008	2.7	150	24	5542	No
2009	4.6	166	29	5547	Yes
2010	4.1	153	26	5547	Yes
2011	2.2	173	27	5545	Yes
2012	1.9	164	28	5550	Yes
2013	4.3	150	23	5547	Yes
2014	2.2	226	24	5544	Yes
2015	2.9	216	23	5549	Yes
2016	1.1	178	25	5550	Yes
2017	1.9	172	24	5546	Yes
2018	4.4	181	23	5546	Yes
2019	3.6	179	23	5547	No
2020	2.2	192	29	5550	Yes
2021	1.6	156	25	5542	Yes
2022	4.7	173	28	5546	Yes
2023	4.3	184	26	5541	Yes
2024	1.4	206	29	5540	Yes
2025	3.3	221	27	5541	Yes
2026	2.8	209	23	5550	Yes
2027	5	228	29	5545	Yes
2028	4.7	220	26	5549	Yes
2029	3	205	28	5548	Yes
2030	5	201	29	5540	No

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	6.6	376	18	5541	Yes
3002	8.9	258	16	5547	Yes
3003	9.7	490	18	5546	Yes
3004	8.1	267	18	5543	Yes
3005	7.3	261	16	5548	Yes
3006	8.1	301	16	5544	Yes
3007	9.4	441	16	5546	Yes
3008	8.4	494	17	5550	Yes
3009	8	278	16	5547	Yes
3010	9.2	344	17	5542	Yes
3011	7	392	16	5542	Yes
3012	6.5	353	17	5548	Yes
3013	8.7	413	17	5540	No
3014	8.4	387	16	5546	Yes
3015	6.7	342	18	5544	Yes
3016	8.7	329	17	5548	No
3017	9.4	297	17	5541	No
3018	7.6	430	18	5544	Yes
3019	8.4	293	16	5543	Yes
3020	6.8	439	17	5544	Yes
3021	6	314	18	5550	Yes
3022	6.8	473	18	5541	Yes
3023	6.1	361	16	5543	Yes
3024	7.1	415	16	5542	Yes
3025	6.7	449	18	5545	Yes
3026	6	265	16	5548	Yes
3027	9.8	312	17	5550	Yes
3028	9.3	274	16	5543	Yes
3029	7.4	334	16	5541	Yes
3030	7.1	308	18	5549	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	14.5	263	15	5548	Yes
4002	14.2	250	13	5541	Yes
4003	15.7	469	12	5544	No
4004	11.7	351	16	5544	Yes
4005	13.6	465	16	5541	Yes
4006	14.9	359	12	5544	No
4007	17.3	486	14	5543	Yes
4008	19	394	14	5541	No
4009	17.6	282	16	5544	Yes
4010	19.8	469	16	5548	Yes
4011	18.8	370	14	5547	No
4012	17.2	436	16	5543	Yes
4013	16.7	484	12	5544	Yes
4014	15.6	445	15	5544	Yes
4015	11.3	254	16	5547	Yes
4016	19.7	479	14	5542	Yes
4017	11.6	434	13	5543	Yes
4018	11.3	304	14	5543	Yes
4019	12.8	272	16	5546	Yes
4020	17.9	271	15	5541	Yes
4021	19.8	385	14	5547	Yes
4022	12	280	15	5542	Yes
4023	14.4	407	13	5547	No
4024	16.1	314	12	5546	Yes
4025	14.7	336	15	5549	Yes
4026	16.9	389	14	5549	No
4027	15.9	291	12	5540	No
4028	14.3	490	15	5541	Yes
4029	13.8	404	16	5547	Yes
4030	12.7	366	13	5544	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	5544	Yes
12	5544	Yes
13	5548	Yes
14	5544	Yes
15	5548	Yes
16	5544	Yes
17	5548	Yes
18	5544	Yes
19	5548	Yes
20	5544	Yes
21	5551	Yes
22	5555	Yes
23	5552	Yes
24	5552	Yes
25	5552	Yes
26	5552	Yes
27	5552	Yes
28	5552	Yes
29	5552	Yes
30	5552	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	190	5540	3	No
2	665	5541	3	Yes
3	1140	5542	4	Yes
4	1615	5543	4	Yes
5	2090	5544	6	Yes
6	2565	5545	4	Yes
7	3040	5546	6	Yes
8	3515	5547	4	Yes
9	3990	5548	4	Yes
10	4465	5549	4	Yes
11	4940	5550	4	No
12	5415	5551	4	Yes
13	5890	5552	6	Yes
14	6365	5553	6	Yes
15	6840	5554	7	Yes
16	7315	5555	3	Yes
17	7790	5556	5	Yes
18	8265	5557	2	Yes
19	8740	5558	3	Yes
20	9215	5559	9	Yes
21	9690	5560	6	Yes
22	10165	5540	5	Yes
23	10640	5541	6	Yes
24	11115	5542	9	Yes
25	11590	5543	4	Yes
26	12065	5544	8	Yes
27	12540	5545	5	Yes
28	13015	5546	6	Yes
29	13490	5547	5	Yes
30	13965	5548	2	Yes
31	14440	5549	3	Yes
32	14915	5550	5	Yes
33	15390	5551	2	Yes
34	15865	5552	4	Yes
35	16340	5553	6	Yes
36	16815	5554	5	Yes
37	17290	5555	4	Yes
38	17765	5556	6	Yes
39	18240	5557	4	Yes
40	18715	5558	3	Yes
41	19190	5559	5	Yes
42	19665	5560	4	Yes

5.3. RESULTS FOR 80 MHz BANDWIDTH

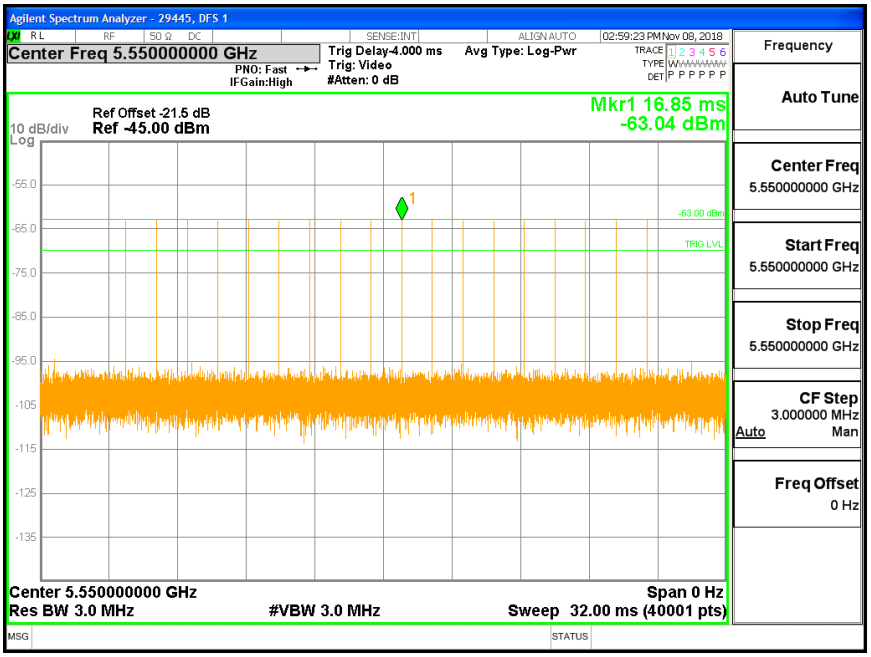
5.3.1. TEST CHANNEL

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

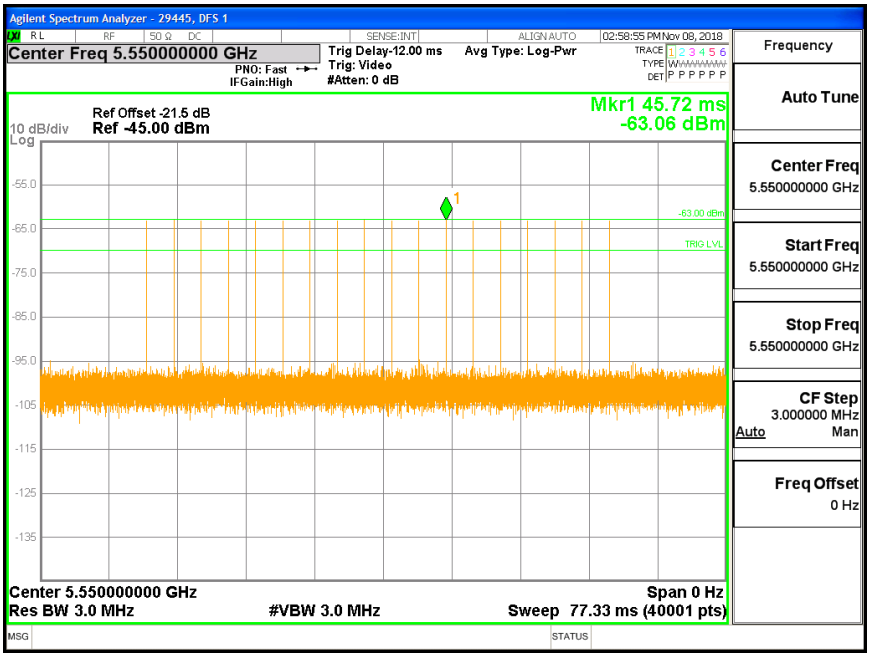
5.3.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

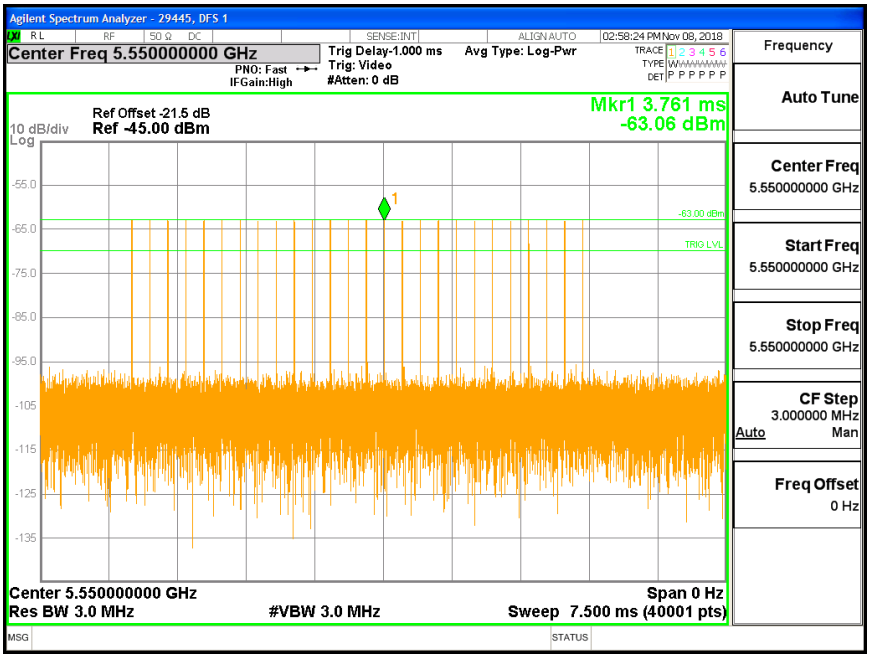
SHORT PULSE RADAR TYPE 0



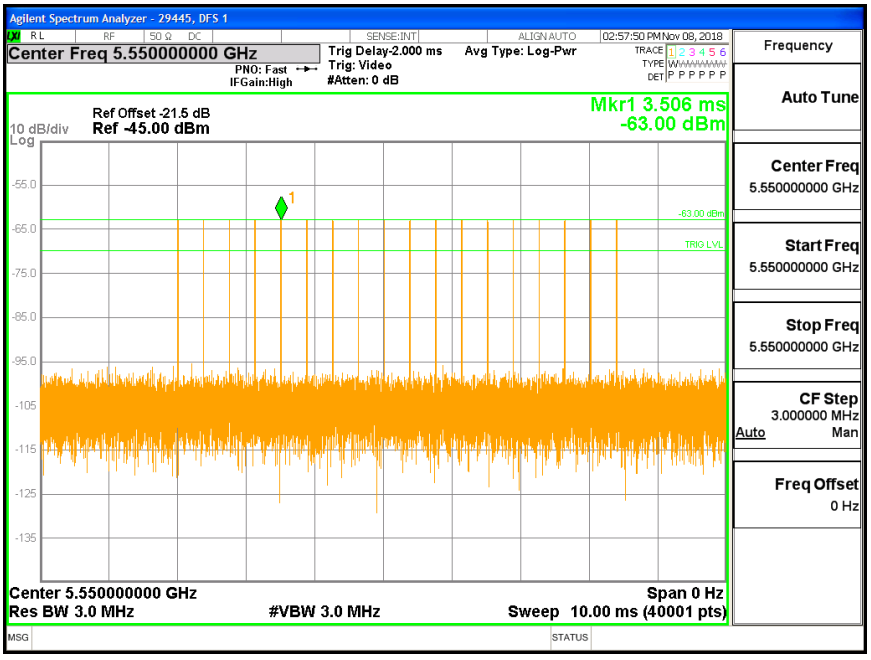
SAMPLE OF RADAR TYPE 1



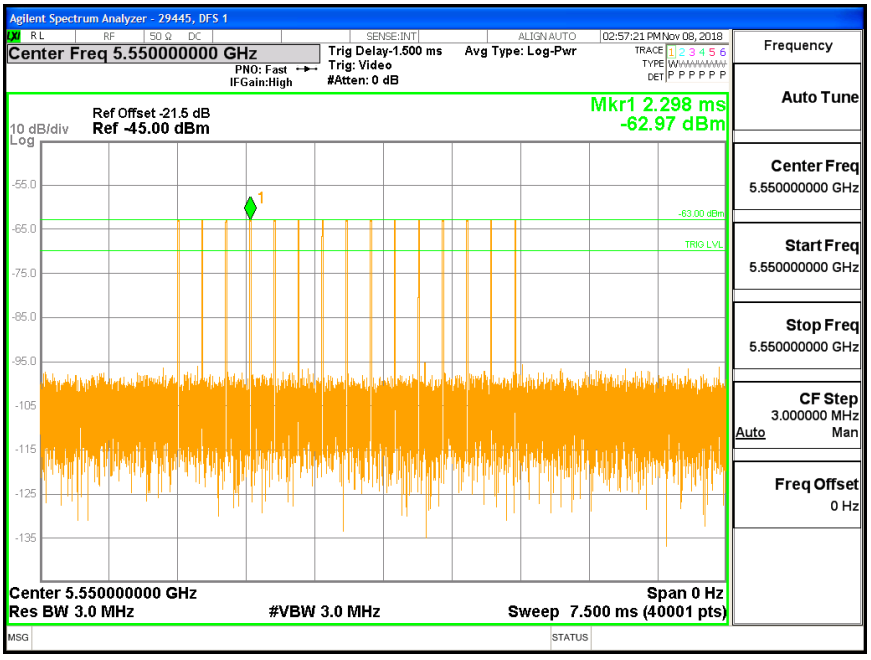
SAMPLE OF RADAR TYPE 2



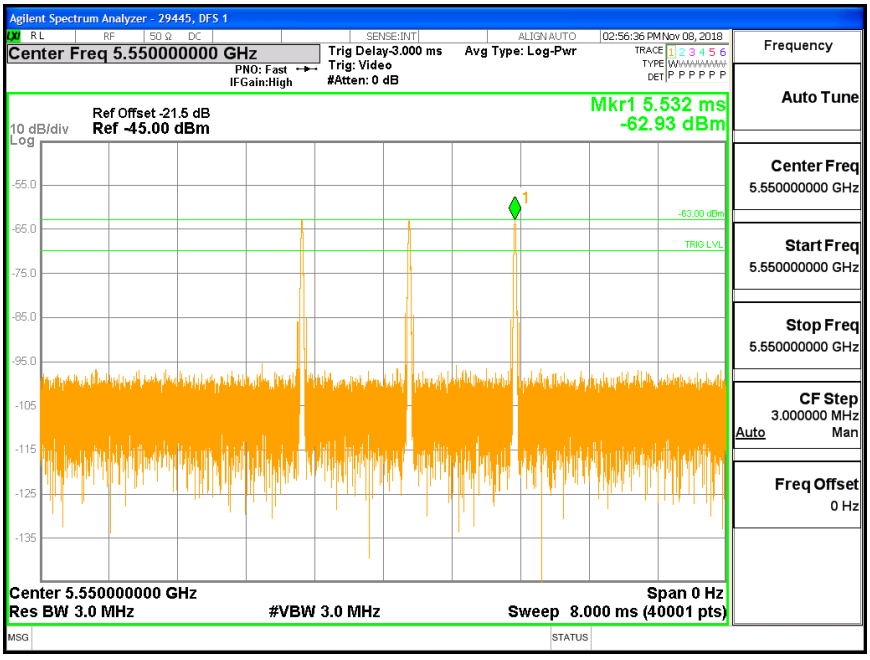
SAMPLE OF RADAR TYPE 3



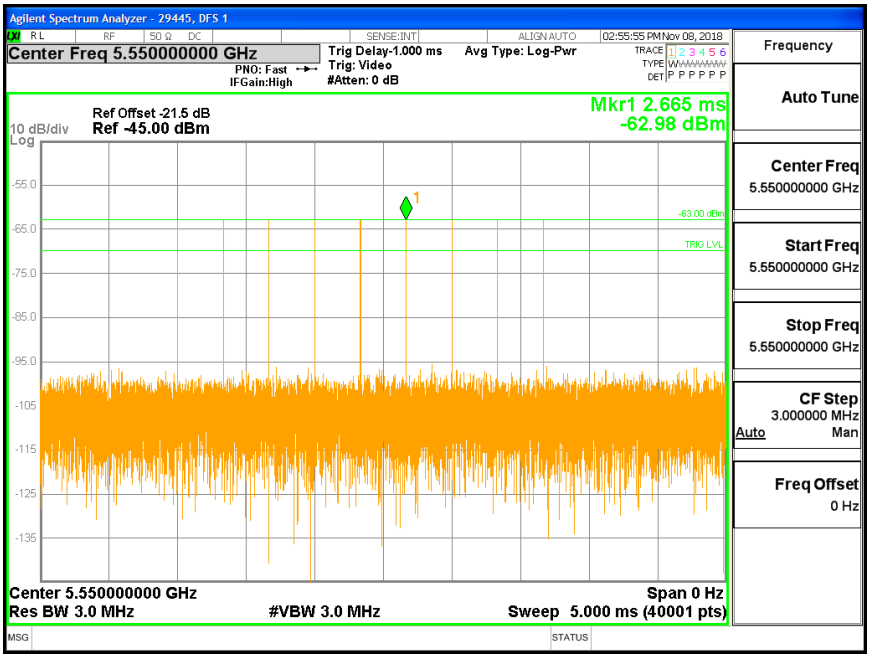
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

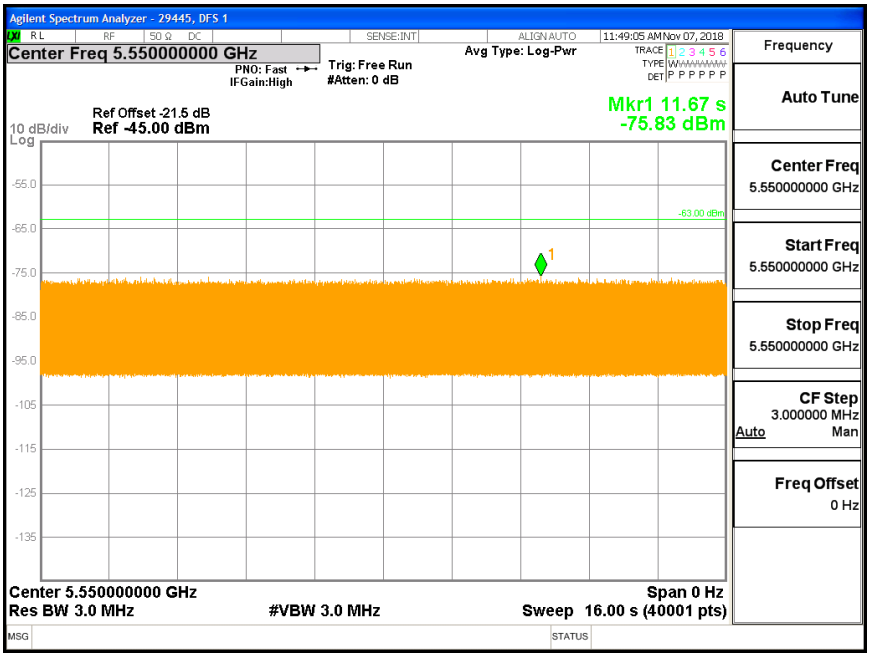


SINGLE BURST OF RADAR TYPE 6

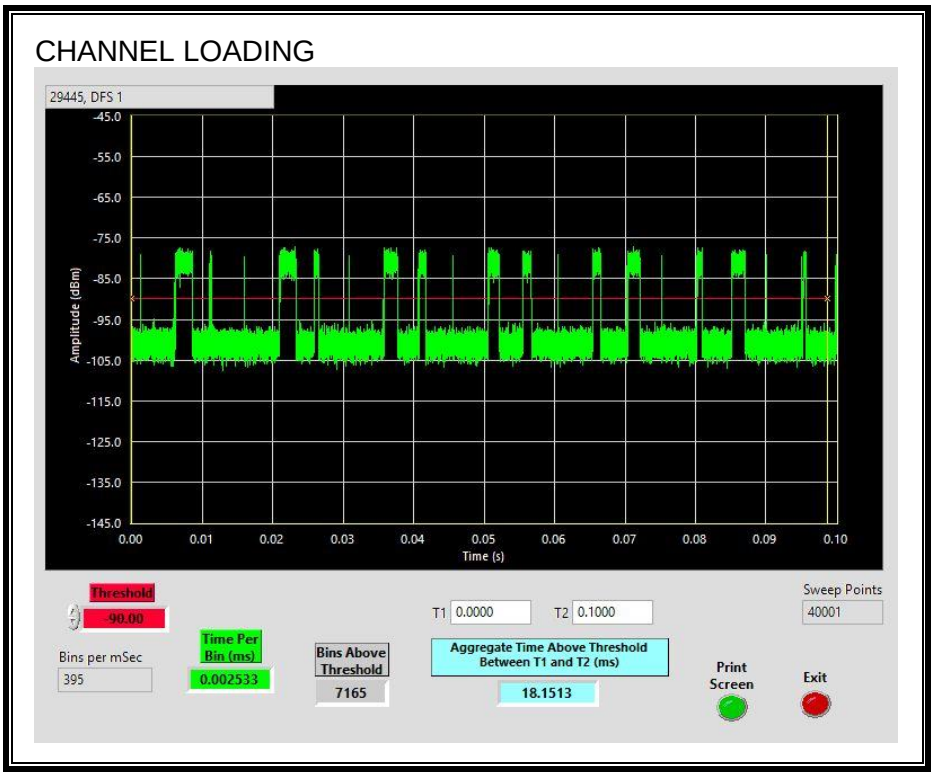


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 18.15%

5.3.3. 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)
30.29	137.5	107.2	47.2

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)
30.69	81.41	50.7	3.5

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)
30.73	136.3	105.6	58.4

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

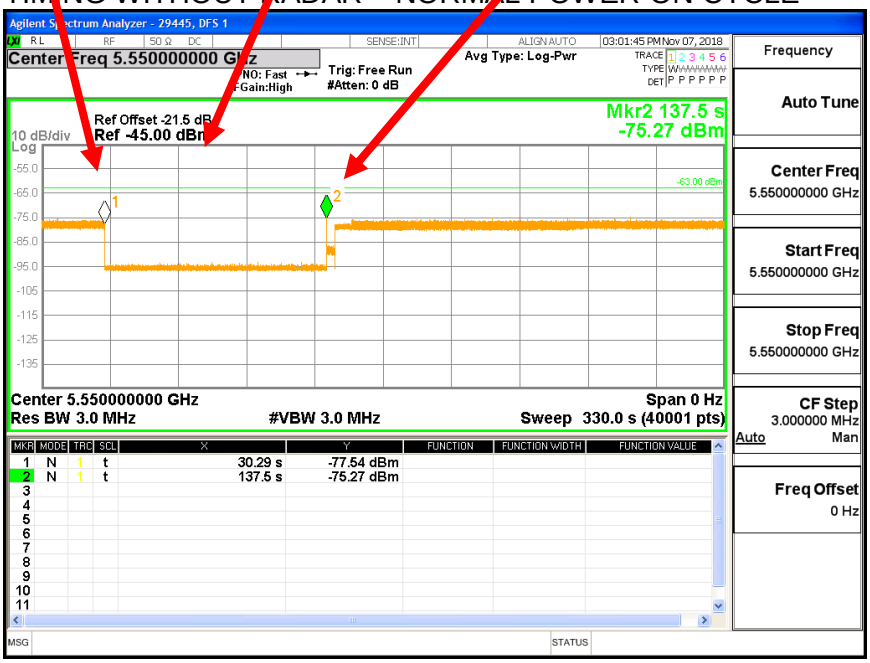
TIMING WITHOUT RADAR DURING CAC

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



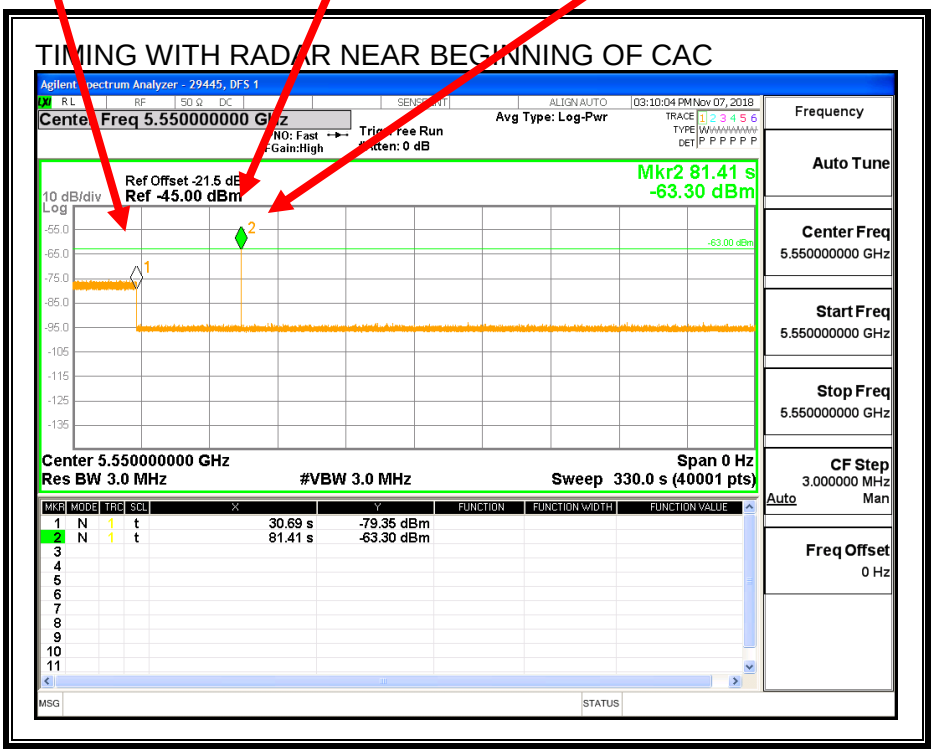
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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



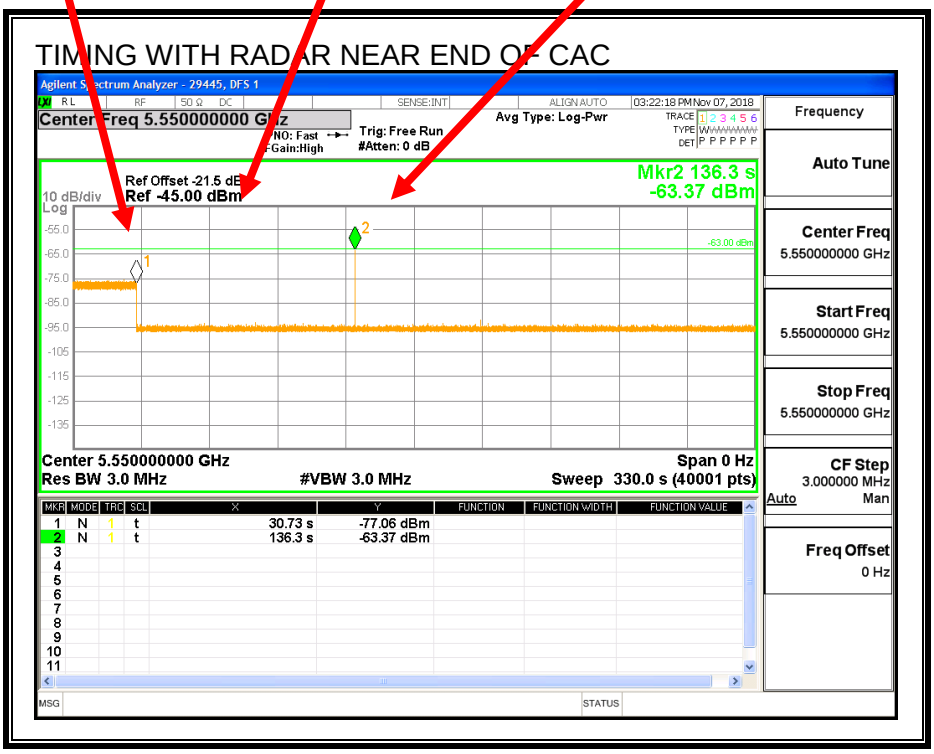
No EUT transmissions were observed after the radar signal.

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.

5.3.4. OVERLAPPING CHANNEL TESTS

RESULTS

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

5.3.5. 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).

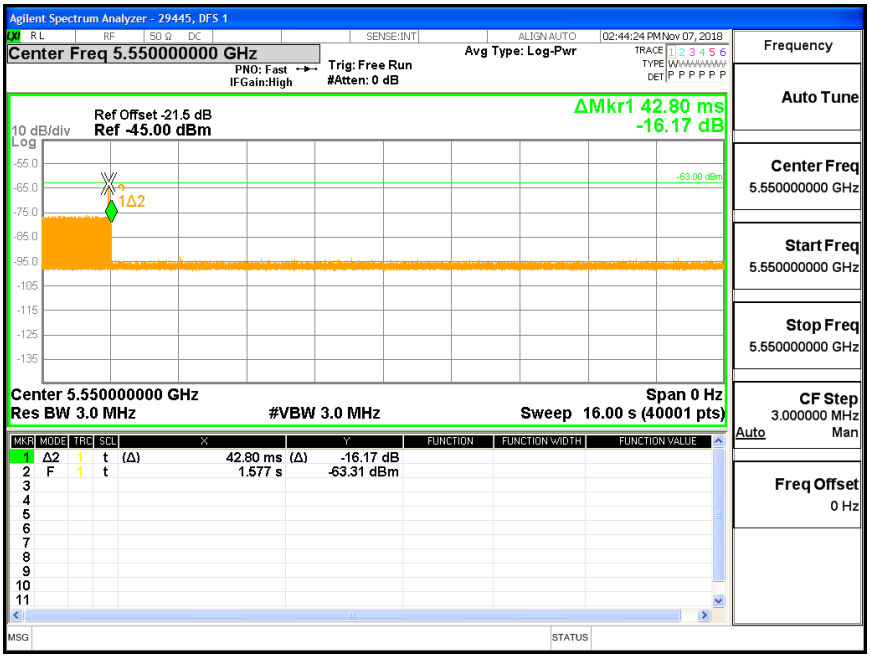
RESULTS

Channel Move Time (sec)	Limit (sec)
0.0428	10

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

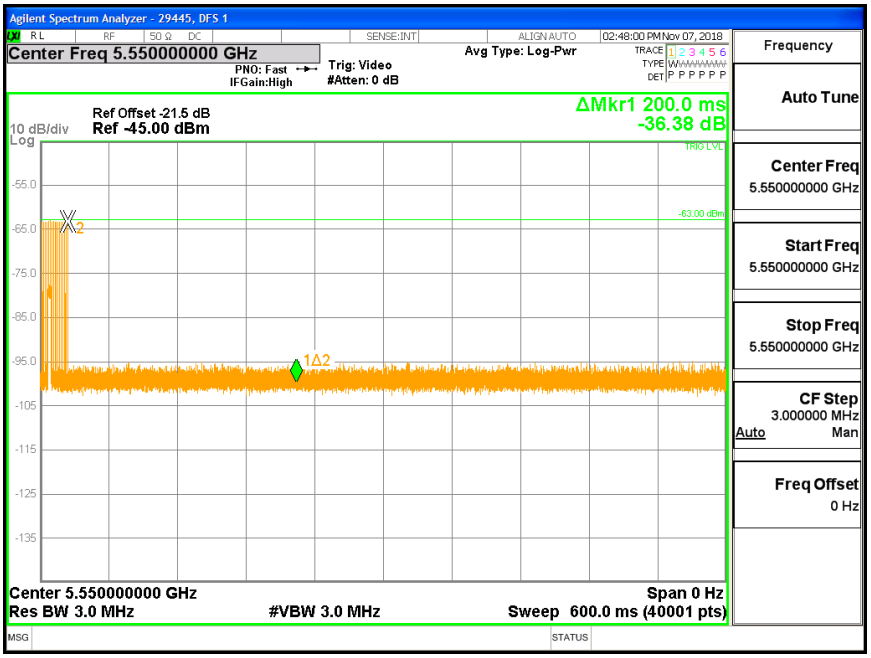
MOVE TIME

MOVE TIME



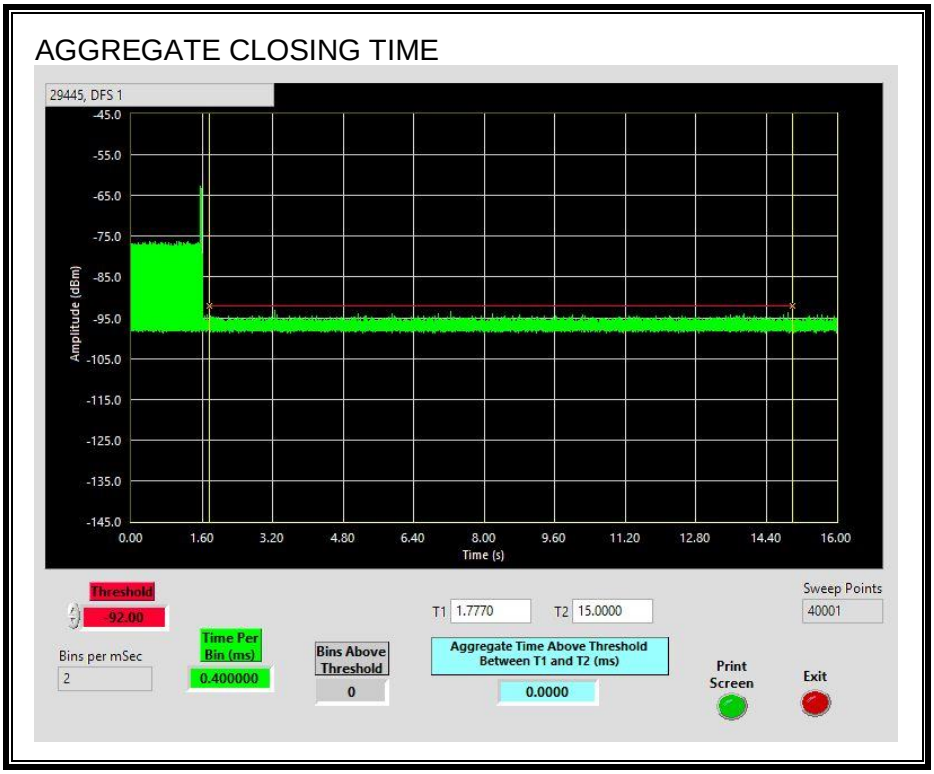
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

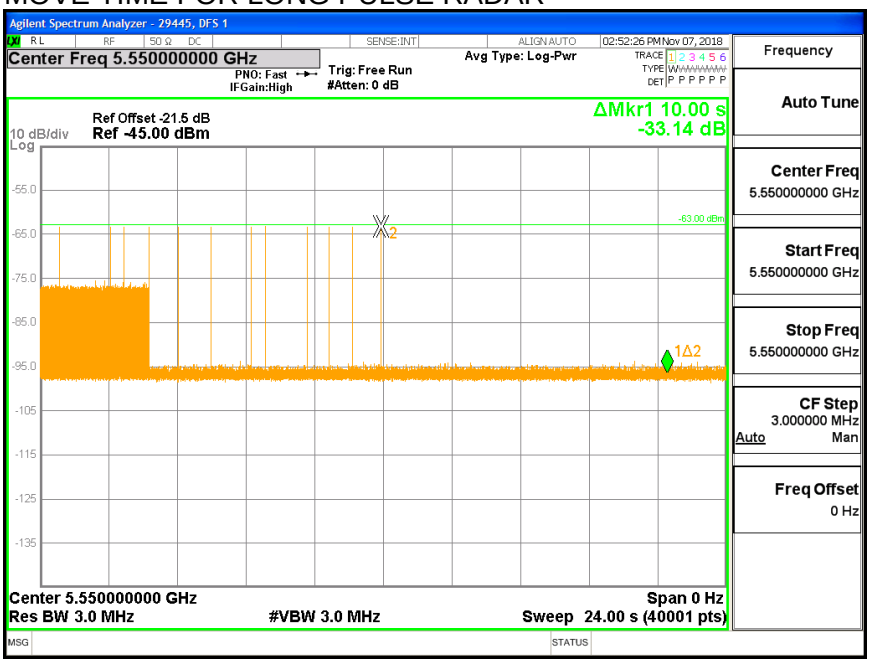
No transmissions are observed during the aggregate monitoring period.



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

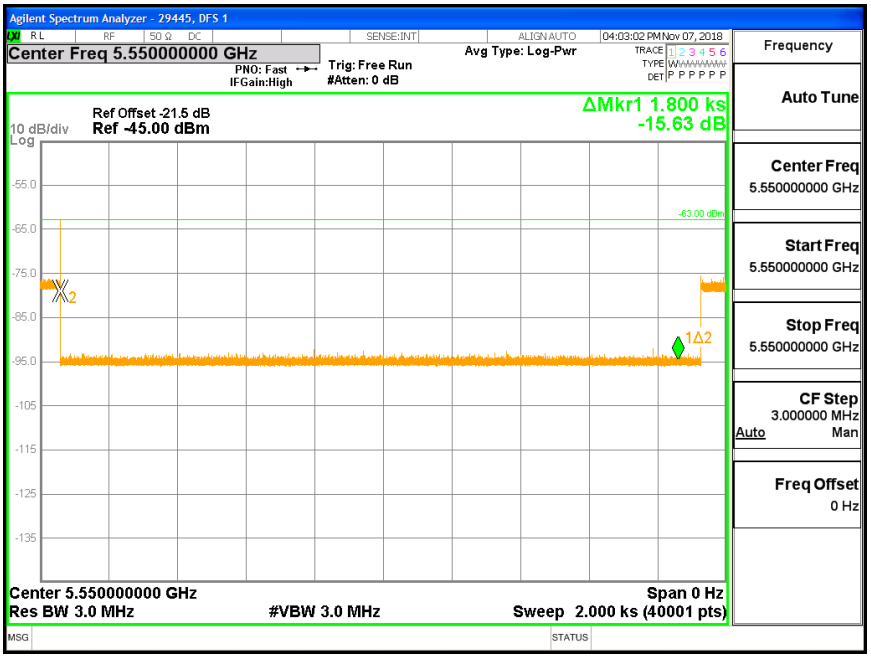


5.3.6. NON-OCCUPANCY PERIOD

RESULTS

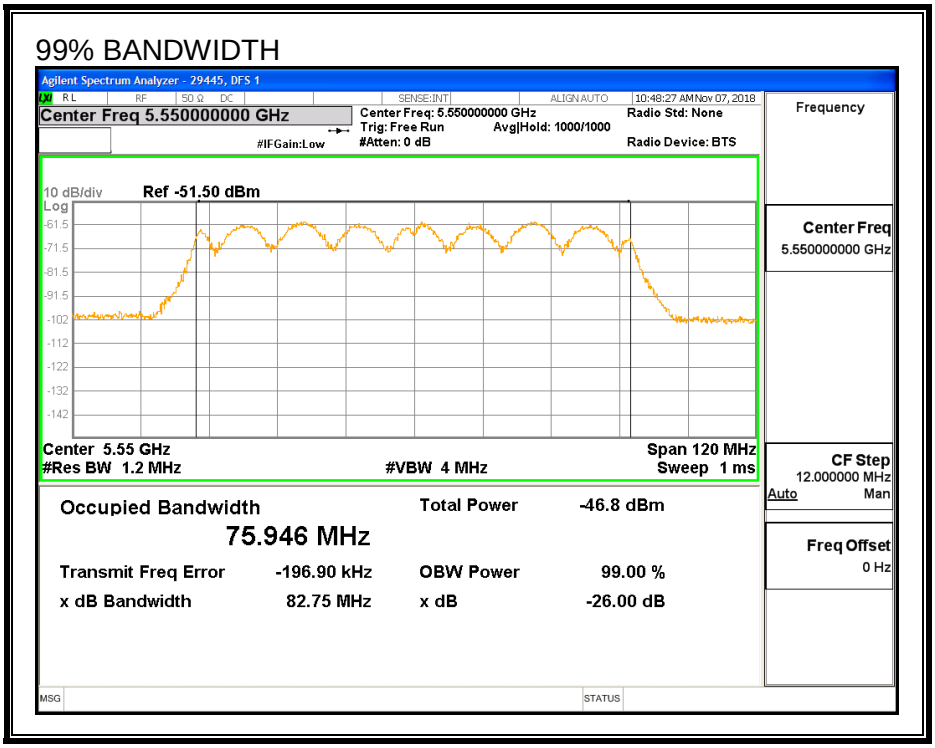
No EUT transmissions were observed on the test channel during the 30-minute observation time. After the 30-minute non-occupancy period the EUT performed a new CAC, then resumed transmissions upon detecting no radar during this CAC period.

NON-OCCUPANCY PERIOD



5.3.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5510	5590	80	75.946	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
5510	10	10	100	FL
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	
5590	10	10	100	FH

5.3.8. 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	5510	5590	75.95	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 2	30	100.00	60	Pass	5510	5590	75.95	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 3	30	86.67	60	Pass	5510	5590	75.95	DFS 1	29445	Version 3.3.4
FCC Short Pulse Type 4	30	96.67	60	Pass	5510	5590	75.95	DFS 1	29445	Version 3.3.4
Aggregate		95.00	80	Pass						
FCC Long Pulse Type 5	30	100.00	80	Pass	5510	5590	75.95	DFS 1	29445	Version 3.3.4
FCC Hopping Type 6	81	100.00	70	Pass	5510	5590		DFS 1	29445	Version 3.3.4

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	5518	Yes
1002	1	558	95	A	5534	Yes
1003	1	698	76	A	5581	Yes
1004	1	818	65	A	5531	Yes
1005	1	798	67	A	5521	Yes
1006	1	938	57	A	5530	Yes
1007	1	898	59	A	5537	Yes
1008	1	878	61	A	5589	Yes
1009	1	718	74	A	5559	Yes
1010	1	518	102	A	5549	Yes
1011	1	638	83	A	5576	Yes
1012	1	578	92	A	5571	Yes
1013	1	858	62	A	5513	Yes
1014	1	758	70	A	5568	Yes
1015	1	918	58	A	5572	Yes
1016	1	1759	31	B	5519	Yes
1017	1	1650	32	B	5587	Yes
1018	1	670	79	B	5521	Yes
1019	1	691	77	B	5521	Yes
1020	1	2388	23	B	5558	Yes
1021	1	1344	40	B	5534	Yes
1022	1	1976	27	B	5559	No
1023	1	1061	50	B	5564	Yes
1024	1	1823	29	B	5510	Yes
1025	1	1038	51	B	5539	Yes
1026	1	735	72	B	5550	Yes
1027	1	1432	37	B	5551	Yes
1028	1	1258	42	B	5543	Yes
1029	1	2085	26	B	5516	Yes
1030	1	2041	26	B	5550	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	3.2	197	26	5520	Yes
2002	1.6	163	25	5525	Yes
2003	4.9	204	25	5580	Yes
2004	3.5	217	24	5553	Yes
2005	2.8	181	28	5518	Yes
2006	3.8	199	24	5585	Yes
2007	1.5	167	28	5548	Yes
2008	2.7	150	24	5564	Yes
2009	4.6	166	29	5581	Yes
2010	4.1	153	26	5531	Yes
2011	2.2	173	27	5532	Yes
2012	1.9	164	28	5520	Yes
2013	4.3	150	23	5522	Yes
2014	2.2	226	24	5589	Yes
2015	2.9	216	23	5583	Yes
2016	1.1	178	25	5570	Yes
2017	1.9	172	24	5570	Yes
2018	4.4	181	23	5560	Yes
2019	3.6	179	23	5519	Yes
2020	2.2	192	29	5547	Yes
2021	1.6	156	25	5571	Yes
2022	4.7	173	28	5578	Yes
2023	4.3	184	26	5520	Yes
2024	1.4	206	29	5566	Yes
2025	3.3	221	27	5584	Yes
2026	2.8	209	23	5522	Yes
2027	5	228	29	5563	Yes
2028	4.7	220	26	5522	Yes
2029	3	205	28	5554	Yes
2030	5	201	29	5584	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	6.6	376	18	5547	Yes
3002	8.9	258	16	5530	No
3003	9.7	490	18	5544	Yes
3004	8.1	267	18	5590	Yes
3005	7.3	261	16	5513	Yes
3006	8.1	301	16	5554	No
3007	9.4	441	16	5530	Yes
3008	8.4	494	17	5585	Yes
3009	8	278	16	5547	Yes
3010	9.2	344	17	5589	No
3011	7	392	16	5511	Yes
3012	6.5	353	17	5580	Yes
3013	8.7	413	17	5548	Yes
3014	8.4	387	16	5570	Yes
3015	6.7	342	18	5516	Yes
3016	8.7	329	17	5575	Yes
3017	9.4	297	17	5581	Yes
3018	7.6	430	18	5547	Yes
3019	8.4	293	16	5579	Yes
3020	6.8	439	17	5527	Yes
3021	6	314	18	5551	Yes
3022	6.8	473	18	5541	Yes
3023	6.1	361	16	5547	Yes
3024	7.1	415	16	5552	No
3025	6.7	449	18	5528	Yes
3026	6	265	16	5563	Yes
3027	9.8	312	17	5519	Yes
3028	9.3	274	16	5513	Yes
3029	7.4	334	16	5569	Yes
3030	7.1	308	18	5579	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	14.5	263	15	5563	Yes
4002	14.2	250	13	5524	Yes
4003	15.7	469	12	5579	Yes
4004	11.7	351	16	5541	Yes
4005	13.6	465	16	5571	Yes
4006	14.9	359	12	5574	Yes
4007	17.3	486	14	5533	Yes
4008	19	394	14	5551	Yes
4009	17.6	282	16	5516	Yes
4010	19.8	469	16	5566	Yes
4011	18.8	370	14	5567	Yes
4012	17.2	436	16	5576	Yes
4013	16.7	484	12	5574	Yes
4014	15.6	445	15	5558	Yes
4015	11.3	254	16	5543	Yes
4016	19.7	479	14	5553	No
4017	11.6	434	13	5522	Yes
4018	11.3	304	14	5545	Yes
4019	12.8	272	16	5564	Yes
4020	17.9	271	15	5563	Yes
4021	19.8	385	14	5567	Yes
4022	12	280	15	5534	Yes
4023	14.4	407	13	5522	Yes
4024	16.1	314	12	5570	Yes
4025	14.7	336	15	5524	Yes
4026	16.9	389	14	5525	Yes
4027	15.9	291	12	5532	Yes
4028	14.3	490	15	5540	Yes
4029	13.8	404	16	5567	Yes
4030	12.7	366	13	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	5515	Yes
12	5515	Yes
13	5519	Yes
14	5515	Yes
15	5519	Yes
16	5515	Yes
17	5519	Yes
18	5515	Yes
19	5519	Yes
20	5515	Yes
21	5580	Yes
22	5584	Yes
23	5581	Yes
24	5581	Yes
25	5581	Yes
26	5581	Yes
27	5581	Yes
28	5581	Yes
29	5581	Yes
30	5581	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	226	5510	21	Yes
2	701	5511	14	Yes
3	1176	5512	21	Yes
4	1651	5513	16	Yes
5	2126	5514	18	Yes
6	2601	5515	14	Yes
7	3076	5516	18	Yes
8	3551	5517	16	Yes
9	4026	5518	13	Yes
10	4501	5519	15	Yes
11	4976	5520	18	Yes
12	5451	5521	20	Yes
13	5926	5522	22	Yes
14	6401	5523	16	Yes
15	6876	5524	22	Yes
16	7351	5525	16	Yes
17	7826	5526	28	Yes
18	8301	5527	11	Yes
19	8776	5528	15	Yes
20	9251	5529	17	Yes
21	9726	5530	25	Yes
22	10201	5531	18	Yes
23	10676	5532	13	Yes
24	11151	5533	20	Yes
25	11626	5534	24	Yes
26	12101	5535	22	Yes
27	12576	5536	20	Yes
28	13051	5537	11	Yes
29	13526	5538	19	Yes
30	14001	5539	18	Yes
31	14476	5540	25	Yes
32	14951	5541	17	Yes
33	15426	5542	18	Yes
34	15901	5543	16	Yes
35	16376	5544	24	Yes
36	16851	5545	21	Yes
37	17326	5546	14	Yes
38	17801	5547	20	Yes
39	18276	5548	16	Yes

TYPE 6 DETECTION PROBABILITY (CONTINUED)

40	18751	5549	17	Yes
41	19226	5550	15	Yes
42	19701	5551	22	Yes
43	20176	5552	24	Yes
44	20651	5553	27	Yes
45	21126	5554	7	Yes
46	21601	5555	20	Yes
47	22076	5556	22	Yes
48	22551	5557	15	Yes
49	23026	5558	21	Yes
50	23501	5559	18	Yes
51	23976	5560	16	Yes
52	24451	5561	12	Yes
53	24926	5562	14	Yes
54	25401	5563	16	Yes
55	25876	5564	10	Yes
56	26351	5565	14	Yes
57	26826	5566	19	Yes
58	27301	5567	16	Yes
59	27776	5568	13	Yes
60	28251	5569	20	Yes
61	28726	5570	16	Yes
62	29201	5571	21	Yes
63	29676	5572	20	Yes
64	30151	5573	20	Yes
65	30626	5574	16	Yes
66	31101	5575	22	Yes
67	31576	5576	15	Yes
68	32051	5577	19	Yes
69	32526	5578	19	Yes
70	33001	5579	17	Yes
71	33476	5580	19	Yes
72	33951	5581	14	Yes
73	34426	5582	13	Yes
74	34901	5583	17	Yes
75	35376	5584	12	Yes
76	35851	5585	17	Yes
77	36326	5586	27	Yes
78	36801	5587	18	Yes
79	37276	5588	16	Yes
80	37751	5589	18	Yes
81	38226	5590	17	Yes

5.4. BRIDGE MODE RESULTS

Per KDB 905462, Section 5.1 (footnote 1):

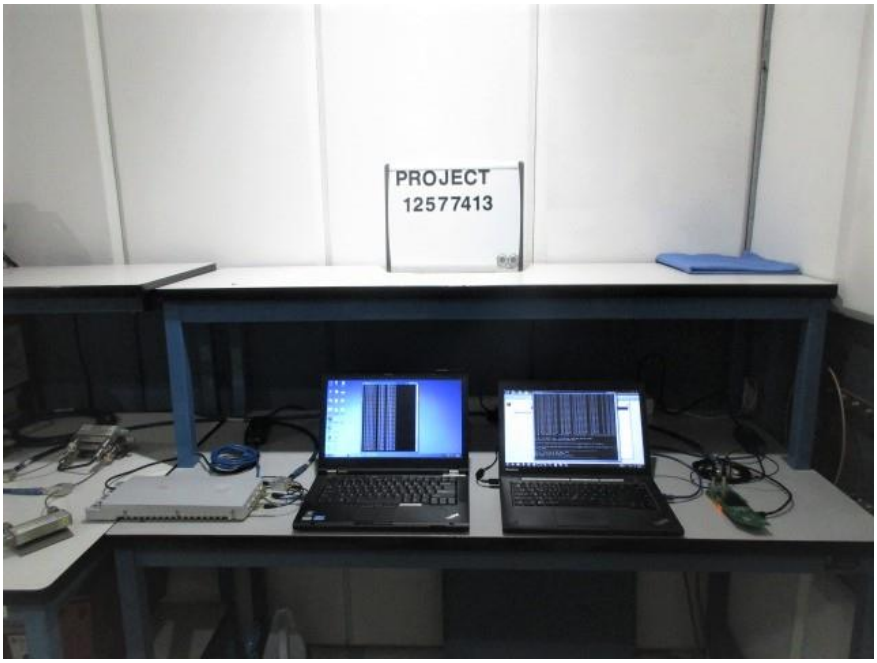
Networks Access Points with Bridge and/or MESH modes of operation are permitted to operate in the DFS bands but must employ a DFS function. The functionality of the Bridge mode as specified in §15.403(a) must be validated in the DFS test report. Devices operating as relays must also employ DFS function.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

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

6. SETUP PHOTOS

DYNAMIC FREQUENCY SELECTION MEASUREMENT SETUP

DFS FRONT PHOTO



DFS BACK PHOTO

END OF TEST REPORT