

# DFS PORTION of FCC 47 CFR PART 15 SUBPART E

# **CERTIFICATION TEST REPORT**

FOR

# TV SET TOP BOX

# **MODEL NUMBER: D45**

# FCC ID: DKNRW33

# REPORT NUMBER: 13619076-E8V2

# **ISSUE DATE: JUNE 7, 2021**

Prepared for DISH TECHNOLOGIES, INC. 9601 MERIDIAN BLVD. ENGLEWOOD CO., 80112, U.S.A.

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



## **Revision History**

Rev.	Issue Date	Revisions	Revised By
V1	06/03/21	Initial Issue	
V2	06/07/21	Updated EIRP under section 7.1.6	Edgard Rincand

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# **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	DISH TECHNOLOGIES, INC. 9601 MERIDIAN BLVD. ENGLEWOOD, CO., 80112, U.S.A.	
EUT DESCRIPTION:	TV SET TOP BOX	
MODEL:	D45	
SERIAL NUMBER:	E4EXUH00008A	
DATE TESTED:	JUNE 02, 2021	
	APPLICABLE STANDARDS	
STA	ANDARD	TEST RESULTS
DFS Portion of CF	R 47 Part 15 Subpart E	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.

Approved & Released For UL Verification Services Inc. By:

Edges Miner

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

Prepared By:

STEVEN NORTH Test Engineer CONSUMER TECHNOLOGY DIVISION UL Verification Services Inc.

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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 KDB 789033, KDB 905462 D02 and D03.

# 3. SUMMARY OF TEST RESULTS

Requirement Description	Result	Remarks
DFS Portion of FCC 47 CFR PART 15 SUBPART E	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 UL Verification Services report number 13619076-E4V2.

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 NVLAP, Laboratory Code 200065-0, 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,	US0104	2324A	208313
$\boxtimes$	Fremont, California, USA			
	Building 2: 47266 Benicia Street,	US0104	2324A	208313
Fremont, California, USA				
	Building 4: 47658 Kato Rd, Fremont,	US0104	2324A	208313
	California, USA			

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# 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).

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# 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".

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## 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	Master Device or Client with Radar DFS	Client (without DFS)				
modes		(				
U-NII Detection Bandwidth and	All BW modes must be	Not required				
Statistical Performance Check	tested					
Channel Move Time and Channel	Test using widest BW mode	Test using the				
Closing Transmission Time	available	widest BW mode				
		available for the link				
All other tests	Any single BW mode	Not required				
<b>Note:</b> 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 freque	ency between the bonded 20 MHz	channel blocks.				

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# Table 3: Interference Threshold values, Master or Client incorporating In-ServiceMonitoring

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

publication 662911 D01.

Table 4. Di O 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

Dede	Dular				Minima		
Radar	Pulse	PRI	Pulses	Minimum	Minimum		
Туре	Width	(usec)		Percentage	Trials		
	(usec)			of Successful			
				Detection			
0	1	1428	18	See Note 1	See Note		
					1		
1	1	Test A: 15 unique		60%	30		
		PRI values randomly					
		selected from the list	Roundup:				
		of 23 PRI values in	{(1/360) x (19 x 10 <sup>6</sup> PRI <sub>usec</sub> )}				
		table 5a					
		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 7	<i>Time</i> , and	Channel Closing Time to	ests.				

Table 6 – Long Pulse Radar Test Signal

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

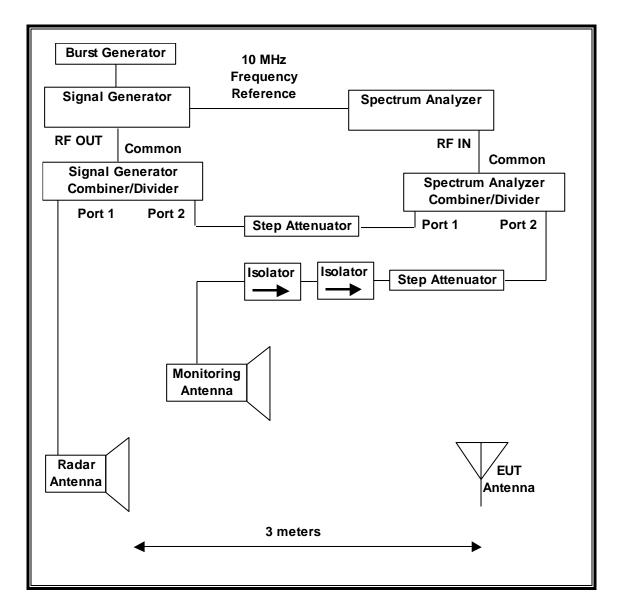
#### Table 7 – Frequency Hopping Radar Test Signal

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

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# 7.1.2. TEST AND MEASUREMENT SYSTEM

#### RADIATED METHOD SYSTEM BLOCK DIAGRAM



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#### SYSTEM OVERVIEW

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

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

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

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

#### SYSTEM CALIBRATION

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

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#### ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

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

#### TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST									
Description	Manufacturer	Model	ID No.	Cal Due					
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1634	02/24/22					
Signal Generator, MXG X-Series RF Vector	Agilent	N5182B	T1633	01/26/22					

# 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				
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).

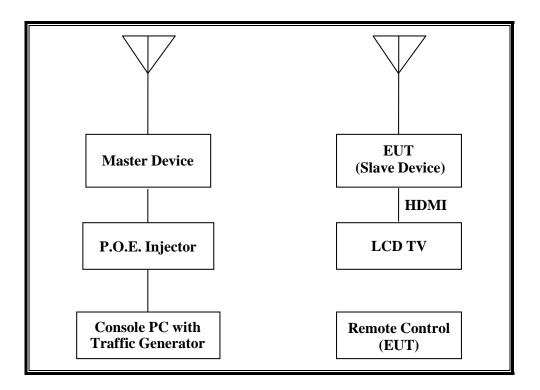
#### **ENVIRONMENT CONDITION**

Parameter	Value
Temperature	24.7 °C
Humidity	38 %

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# 7.1.5. SETUP OF EUT

#### RADIATED METHOD EUT TEST SETUP



#### SUPPORT EQUIPMENT

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

PI	ERIPHERAL SUPPO	RT EQUIPMENT LI	ST	
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter 1 (EUT)	Dish Technologies,	54.3 UHF 2G	219801	MG3-R32-
	Inc.			27B6
Remote Control (EUT)	Dish Technologies, Inc.	54.1 UHF 2G	219265	QVE4BRIS
LCD TV	ViewSonic	VS12114-1M	QYE092113208	DoC
802.11ac Dual Band Wireless Access Point (Master)	Cisco	AIR-CAP3702E-A- K9	FTX181570A6	LDK102087
P.O.E. Injector (Master)	Phihong	POE30U-560(G)	PHI170102N2	DoC
Notebook PC (Master Console / Traffic Generator)	Lenovo	Туре 4236-В92	PB-HEX04 12/05	DoC
AC Adapter 2 (Notebook PC)	Lenovo	42T4418	11S42T4418Z1ZG WG08R90M	DoC

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# 7.1.6. DESCRIPTION OF EUT

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

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 23.37 dBm EIRP in the 5250-5350 MHz band and 25.19 dBm EIRP in the 5470-5725 MHz band.

EUT uses three antennas for 3TX MIMO operation. The radio utilizes PCB Inverted F antennas.

The highest gain antenna assembly utilized with the EUT has a gain of 3.2 dBi in the 5250-5350 MHz band and 3.2 dBi in the 5470-5725 MHz band.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses three transmitter/receiver chains, each connected to an antenna to perform radiated tests.

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.

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

The software installed in the EUT is Androin version 10, build number 4.9.243-1-19.

The software installed in the access point is AP3G2-K9W7-M Version 15.3(3)JAB.

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#### UNIFORM CHANNEL SPREADING

This is requirement not applicable to Slave Devices.

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

The Master Device is a Cisco Access Point, FCC ID: LDK102087. The minimum antenna gain for the Master Device is 6 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The software installed in the access point is AP3G2-K9W7-M Version 15.3(3)JAB.

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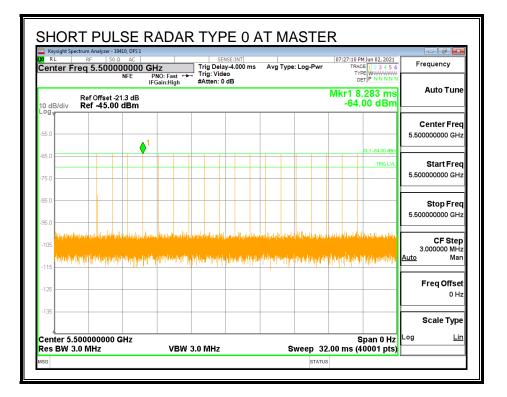
# 7.2. RESULTS FOR 20 MHz BANDWIDTH

# 7.2.1. TEST CHANNEL

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

# 7.2.2. RADAR WAVEFORM AND TRAFFIC

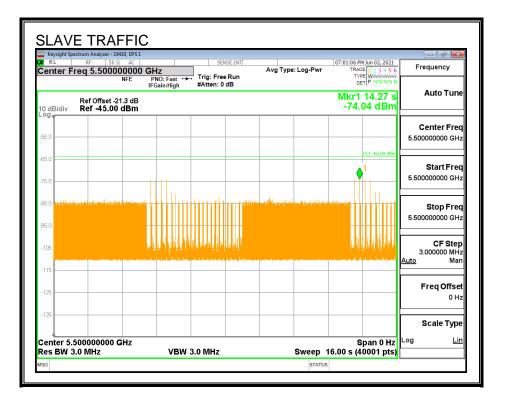
#### RADAR WAVEFORM



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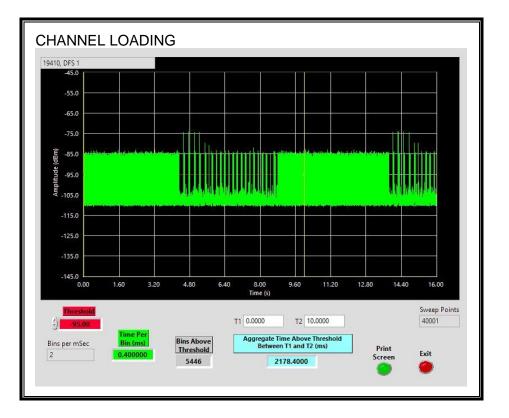
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#### **TRAFFIC**



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#### **CHANNEL LOADING**



The level of traffic loading on the channel by the EUT is 21.78%.

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# 7.2.3. OVERLAPPING CHANNEL TESTS

#### **RESULTS**

These tests are not applicable.

# 7.2.4. MOVE AND CLOSING TIME

#### REPORTING NOTES

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

#### **RESULTS**

Channel Move Time	Limit
(sec)	(sec)
0.309	10

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

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## MOVE TIME

	pectrum Analyzer										X
RL	RF 5		CH7	SENS	E:INT	Avg Type: L	og-Pwr	07:04:45 PM J TRACE	un 02, 2021	Frequ	lency
enteri	164 3.300	NFE	PNO: Fast + IFGain:High	Trig: Free # #Atten: 0 d	Run			TYPE	WWWWWWW PNNNNN	_	
0 dB/div	Ref Offset Ref -45.						ΔΙ	Mkr1 30. -23	86 ms 32 dB	Au	uto Tune
og											
55.0	×//							~	1 -64.00 dBm		nter Frec
6.0									1 -04.00 4241	5.50000	0000 GH
5.0	102										
5.0 <b></b>										s	tart Free
5.0											0000 GH
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25											top Free
135										5.50000	0000 GH
	.50000000 3.0 MHz	0 GHz	VOV	V 3.0 MHz		~			an 0 Hz		CF Step 0000 MH
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KR MODE	TRC SCL 1 t (Δ)	Х	30.86 ms (A	Y -23.32 d	FUNCTIO	DN FUNCTI	ON WIDTH	FUNCTION	VALUE ^		
2 F	1 t		1.656 s	-63.33 dBi						Ere	eq Offse
3 4											0 H
5 6									E		011
7										-	
8 9										SC	ale Type
										Log	Lir
0 1											

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#### **CHANNEL CLOSING TIME**

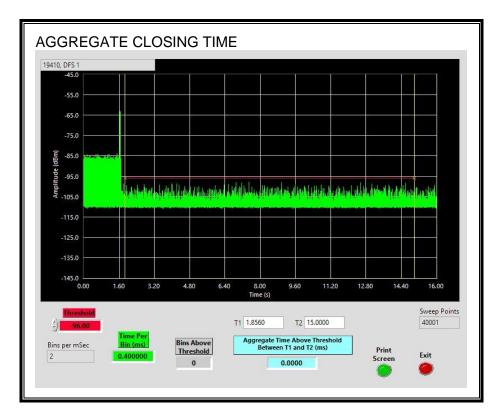
Keysight Spectrum Analyz RL RF enter Freq 5.50	50 Ω AC	Hz PNO: Fast ↔ Trig:	SENSE:INT	Avg Type: Log-Pwr	07:09:17 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency
) dB/div Ref -4			n: 0 dB	Δ	Mkr1 200.0 ms -40.85 dB	Auto Tune
5.0						Center Free 5.500000000 GH
5 N 2					DL1 -64.00 dBm	
5.0					TRIG LVL	Start Free 5.500000000 GH
5.0						<b>Stop Free</b> 5.500000000 GH:
	andan dalah Uhupatih Terhina dalah period			ite di anno asta por a constante di anti di Sana ana di Sana a Ang ang mangana taong pang pang pang pang pang pang pang pa	ini ti kanalarini ili panukenimina	CF Step 3.000000 MH: <u>Auto</u> Mar
125						Freq Offse 0 H:
135						Scale Type
enter 5.5000000	00 GHz				Span 0 Hz	Log <u>Lir</u>

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#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.



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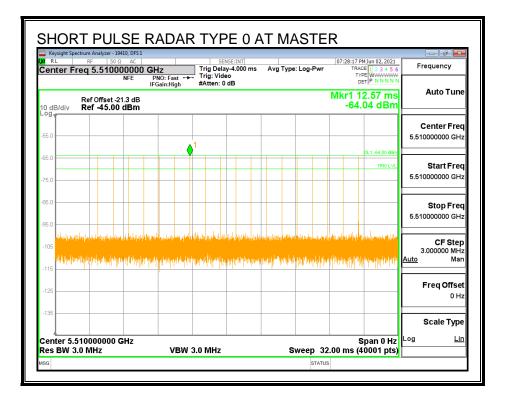
# 7.3. RESULTS FOR 40 MHz BANDWIDTH

## 7.3.1. TEST CHANNEL

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

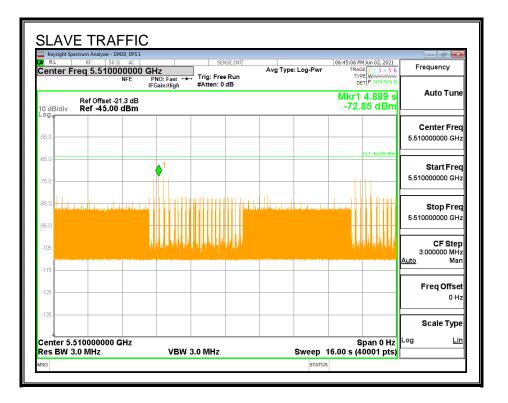
# 7.3.2. RADAR WAVEFORM AND TRAFFIC

#### RADAR WAVEFORM



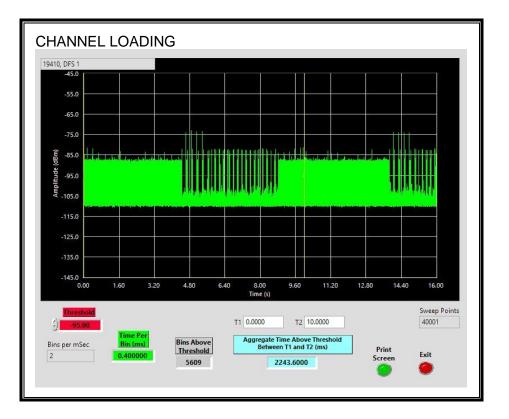
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#### **TRAFFIC**



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#### **CHANNEL LOADING**



The level of traffic loading on the channel by the EUT is 22.43%.

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# 7.3.3. OVERLAPPING CHANNEL TESTS

#### **RESULTS**

These tests are not applicable.

# 7.3.4. MOVE AND CLOSING TIME

#### **REPORTING NOTES**

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

#### **RESULTS**

Channel Move Time	Limit
(sec)	(sec)
0.861	10

Aggregate Channel Closing Transmission Time	Limit
(msec)	(msec)
0	60

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## MOVE TIME

	pectrum Analyzer - 1 RF 50			SENSE	TAUT		06:50:13 PM Jun (	2 2021	
enter F	req 5.5100	000000 (	GHz PNO: Fast ↔ IFGain:High		Avg un	Type: Log-Pwr	TRACE 1 2	3456	Frequency
0 dB/div	Ref Offset	-21.3 dB				2	Mkr1 86.10 -28.1		Auto Tune
og									Center Fred
5.0	<u>%</u> 2						DL1 -6	4.00 dBm E	510000000 GH
5.0 <b>  . .</b>	1Δ2								Start Free
105	Manuk	aldadada	ahitatan katalahi	where the light state of	e vitilije kal Vikelovaji	sharely hall by ma	antikan markin	nhaide	5.510000000 GH
115									Stop Free
135								E	.510000000 GH
4	.510000000 3.0 MHz	GHz	VBW	3.0 MHz		Sweep	Span 16.00 s (4000	1 pts)	CF Step 3.000000 MH
	3.0 IVIT12			~	FUNCTION	FUNCTION WIDTH	FUNCTION VAL		to Mar
es BW KR MODE	TRC SCL	Х	86.10 ma (A)	29.40 dB					
es BW KR MODE 1 Δ2 2 F			86.10 ms (Δ 1.534 s	) -28.10 dB -63.04 dBm		on on one of the	- onon-on-one		Freg Offse
es BW 1 Δ2 2 F 3 4 5 6	TRC SCL 1 t (Δ)							=	
esBW KR MODE	TRC SCL 1 t (Δ)								Freq Offse 0 H: Scale Type

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#### **CHANNEL CLOSING TIME**

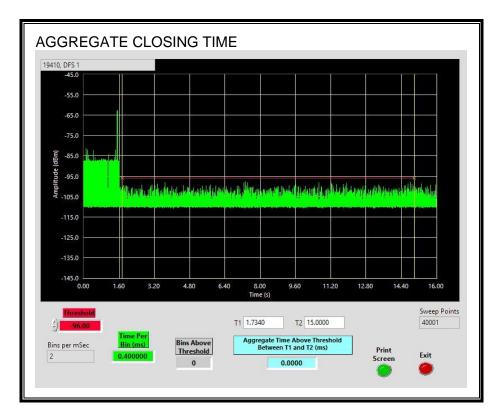
RL RF 50 Ω AC enter Freq 5.510000000 NFF	SENSE:IN CHZ PNO: Fast ↔ Trig: Video	T Avg Type: Log-Pwr	06:58:19 PM Jun 02, 2021 TRACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency
Ref Offset -21.3 dB	IFGain:High #Atten: 0 dB		DET P NNNN	Auto Tune
5.0			DL1 -64.00 dBm	Center Fred 5.510000000 GH;
5.0			TRIGLVL	Start Fred 5.510000000 GH;
5.0				<b>Stop Fred</b> 5.510000000 GH;
105 <mark>standa karakara karakara karakara karakara karakara</mark>	hi and all concerning the second s	n ta pala di se da segera pala di pengina si da se da se Na segera se da	(perjant) (permission) (permission)	CF Step 3.000000 MH: <u>Auto</u> Mar
125				Freq Offse 0 Ha
135				Scale Type

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#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the aggregate monitoring period.



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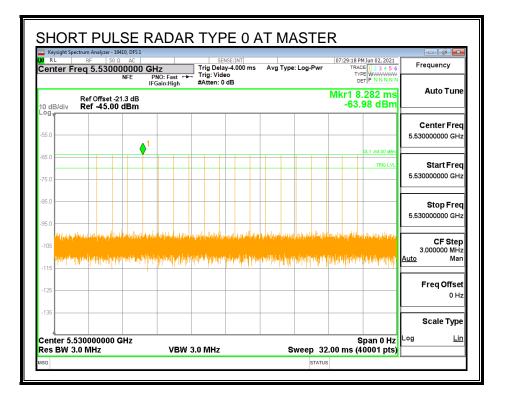
# 7.4. RESULTS FOR 80 MHz BANDWIDTH

# 7.4.1. TEST CHANNEL

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

# 7.4.2. RADAR WAVEFORM AND TRAFFIC

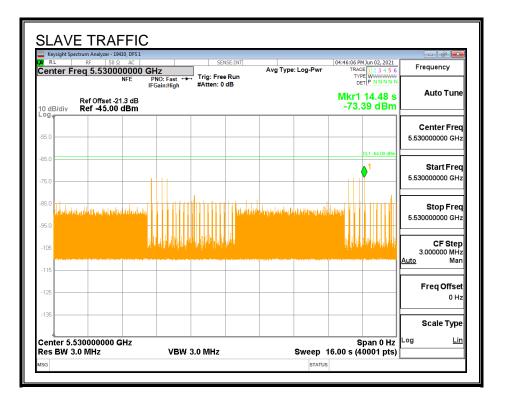
#### RADAR WAVEFORM



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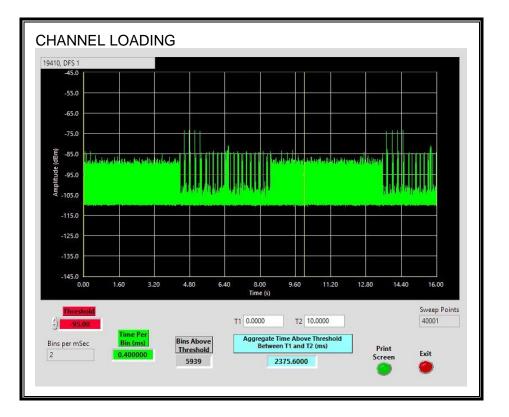
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#### **TRAFFIC**



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#### **CHANNEL LOADING**



The level of traffic loading on the channel by the EUT is 23.75%

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# 7.4.3. OVERLAPPING CHANNEL TESTS

#### **RESULTS**

These tests are not applicable.

# 7.4.4. MOVE AND CLOSING TIME

#### **REPORTING NOTES**

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

#### **RESULTS**

Channel Move Time	Limit
(sec)	(sec)
0.656	10

Aggregate Channel Closing Transmission Time	Limit
(msec)	(msec)
0	60

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## MOVE TIME

	er - 19410, DFS 1					
RL RF	50 Ω AC	SENSI		e: Log-Pwr	16:26:56 PM Jun 02, 2021 TRACE 1 2 3 4 5 6	Frequency
		Fast +++ Trig: Free F High #Atten: 0 d		-	DET P N N N N	1
	et -21.3 dB .00 dBm			ΔМ	kr1 65.60 ms -24.67 dB	Auto Tune
×//					DL1 -64.00 dBm	Center Fred 5.53000000 GHz
						5.53000000 GHz
5.0 1Δ2						
5.0 <mark>photopush</mark>						Start Free
5.0	والمقالية والعالية المقالية	ta da talenda a da hikatili	in a print the second second second second	I manifelier and	ومعرد مقاد بالدرسي والطالم المد	5.530000000 GH;
105	Ashar distances (disart alkest	a de la construcción de la constru			an a dhudhadha calaithe data	
	Constrained and a second state of a second spin to second s	and the second se				
15						Ston Free
125						
125	)0 GHz				Snan 0 Hz	5.530000000 GH
enter 5.5300000		VBW 3.0 MHz		Sweep 16.	Span 0 Hz 00 s (40001 pts)	5.53000000 GH:
enter 5.53000000 es BW 3.0 MHz		VBW 3.0 MHz		Sweep 16.	00 s (40001 pts)	5.530000000 GH; CF Step 3.000000 MH;
25	× 65.60 n	× γ ns(Δ) -24.67 di	FUNCTION FUN	•		5.530000000 GH; CF Step 3.000000 MH;
enter 5.53000000 es BW 3.0 MHz R MODE IRG SCL 4 Δ2 1 t (Δ) 2 F 1 t	×	× γ ns(Δ) -24.67 dl	FUNCTION FUN	•	00 s (40001 pts)	5.530000000 GH; CF Step 3.000000 MH; Auto Mar
25 enter 5.53000000 es BW 3.0 MHz SP MODE TRC Set 1 Δ2 1 t (Δ) 2 F 1 t 3 4	× 65.60 n	× γ ns(Δ) -24.67 dl	FUNCTION FUN	•	00 s (40001 pts) Function value	5.53000000 GH; CF Step 3.000000 MH; <u>Auto</u> Mar Freq Offset
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	× 65.60 n	× γ ns(Δ) -24.67 dl	FUNCTION FUN	•	00 s (40001 pts)	Stop Free 5.53000000 GH: 3.000000 MH: Auto Mar Freq Offset 0 H:
125 136 enter 5.53000000 es BW 3.0 MHz 14 Δ2 1 t (Δ) 3 4 5 6 6 7 8	× 65.60 n	× γ ns(Δ) -24.67 dl	FUNCTION FUN	•	00 s (40001 pts) Function value	5.53000000 GH; CF Step 3.000000 MH; <u>Auto</u> Mar Freq Offset
2 F 1 t 3	× 65.60 n	× γ ns(Δ) -24.67 dl	FUNCTION FUN	•	00 s (40001 pts) Function value	5.53000000 GH: CF Step 3.00000 MH: <u>Auto</u> Mar Freq Offse 0 H:

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#### **CHANNEL CLOSING TIME**

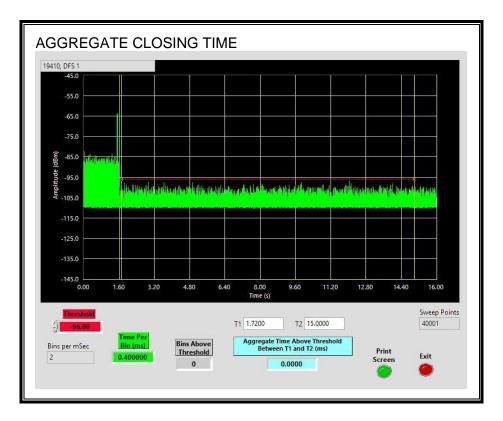
Keysight Spectrum Anal RL RF enter Freg 5.5	50 Ω AC	iHz		ISE:INT	Avg Type	: Log-Pwr	06:40:17 PM Jun 02, 20 TRACE 1 2 3 4	5 6 Frequency
	NFE	PNO: Fast 🔸	Trig: Vide #Atten: 0				DET P N N N	NN
) dB/div Ref -4	fset -21.3 dB I5.00 dBm					Δ	Mkr1 200.0 n -39.84 c	
pg								Center Free
5.0							DL1 -64.00	5.530000000 GH
5.0 <b>2</b>							DL1-64.001 TRIG	
5.0								5.530000000 GH
5.0								Stop Fre
5.0								5.530000000 GH
1 1 at hardele	ntipagea Willhousedu	Indanata da 🔨 🕺	12 mathaladad	ambdatastaha	aladaa dad	dillineadorad	at all lapped with a blittle to com	CF Ster
105	and the property of the proper		in an a star			a na ang ta ng	<u>ى را مەرىلەر بەر ئەرىلەر بەر ئەرەب تەرىپەر بەر بەر بەر بەر بەر بەر بەر بەر بەر ب</u>	3.000000 MH Auto Ma
125								Freq Offse
135								0 H
								Scale Type
enter 5.530000 es BW 3.0 MHz			3.0 MHz				Span 0   0.0 ms (40001 p	

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#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the aggregate monitoring period.



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# 7.4.5. 30-MINUTE NON-OCCUPANCY PERIOD

#### **RESULTS**

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

RL		RF	50 Ω 53000	AC 0000 G			NSE:INT	Avg Type	: Log-Pwr	TRA	M Jun 02, 2021 CE 1 2 3 4 5 6 PE W	Frequency
) dE			set -21	∥ 3 dB	PNO: Fast ↔ Gain:High	#Atten: 0				□ <mark>∆Mkr1</mark>	1.800 ks 5.66 dB	Auto Tune
5.0	N.//										DL1 -64.00 dBm	Center Free 5.530000000 GH
5.0 5.0	- X <sub>2</sub>										UL 1 -64.00 08m	Start Free 5.530000000 GH:
5.0 5.0	111  111											<b>Stop Free</b> 5.530000000 GH
105	<b>ph</b>	14) 14)	N. N.	rttpalitet	144 margad	ly Maladad	n de la complete	nn <sub>a</sub> hl Mann	ilgi Marta	d Websperger		CF Step 3.000000 MH <u>Auto</u> Mar
25												Freq Offse 0 H
35												Scale Type
	ter 5.5 BW 3.			Hz		3.0 MHz					Span 0 Hz 10001 pts)	Log <u>Lir</u>

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