

CONTENTION BASED PROTOCOL PORTION of FCC 47 CFR PART 15 SUBPART E, KDB 987594

CONTENTION BASED PROTOCOL PORTION of RSS-248, ISSUE 2

CERTIFICATION TEST REPORT

FOR

SMARTPHONE

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V1	08/08/23	Initial Issue	
V2	08/11/23	Address TCB question on antenna gain	Edgard Rincand

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC.
	1 APPLE PARK WAY
	CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: SMARTPHONE

MODEL NUMBER: A2849

SERIAL NUMBER: MGGMF42JJ1

DATE TESTED: JULY 12 to 13, 2023

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
Contention Based Protocol Portion of 47 CFR Part 15 Subpart E, KDB 987594	Complies
Contention Based Protocol Portion of RSS-248, 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.

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REPORT NO: 14523771-E30V2 FCC ID: BCG-E8439A

Reviewed By:

Frank Ibrahim Staff Engineer CONSUMER TECHNOLOGY DIVISION UL Verification Services Inc.

Prepared By:

Douçlas Comelicaen

Doug Anderson Test Engineer CONSUMER TECHNOLOGY DIVISION UL Verification Services Inc.

Approved & Released For UL Verification Services Inc. By:

es fliner

Edgard Rincand Operations Leader 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 following standards/rules/KDBs:

- FCC KDB 987594 D01 U-NII 6GHz General Requirements v01r03
- FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01
- FCC KDB 987594 D03 U-NII 6GHz Q&A v01
- FCC KDB 987594 D04 UN6GHZ Pre-Approval Guidance Checklist v01
- RSS-248, ISSUE 2

3. SUMMARY OF TEST RESULTS

Requirement Description	Result	Remarks
Contention Based Protocol Portion of FCC	Complies	
47 CFR PART 15 SUBPART E, KDB 987594		
Contention Based Protocol Portion of RSS-	Complies	
248, Issue 2		

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 14523771-E8V2 & E9V2 "FCCIC_6e Conducted Report" and "FCCIC_6e Radiated Report".

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 LLC is accredited by A2LA, certification #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
\boxtimes	Building 1: 47173 Benicia Street, Fremont, California, USA	US0104	2324A	550739

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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. CONTENTION BASED PROTOCOL

7.1. OVERVIEW

7.1.1. LIMITS

<u>FCC</u>

FCC Part 15 Subpart E, FCC KDB 987594 "U-NII 6 GHz devices operating in the 5.925-7.125 GHz band"; Section I.

INNOVATION, SCIENCE and ECONOMIC DEVELOPMENT CANADA (ISED)

Per Section 4.8.1 of RSS-248, Issue 2:

"The Federal Communications Commission's accepted KDB procedure KDB 987594 D02 shall be used to demonstrate the compliance of a device with the contention-based protocol requirements set out in this section:

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7.1.1. FREQUENCY BANDS AND GOVERNING RULES

FCC Rules

Band	Frequency (GHz)	Rules	Notes	KDB/Publication
U-NII 5	5.925-6.425	15.407(a)(4) - (8)	Dual Client	
U-NII 6	6.425-6.525	15.407(a)(5), (6), (8)	Dual Client	097504
U-NII 7	6.525-6.875	15.407(a)(4) - (8)	Dual Client	987594
U-NII 8	6.875 -7.125	15.407(a)(5), (6), (8)	Dual Client	

ISED Rules

Band	Frequency (GHz)	Rules	Notes	KDB/Publication
U-NII 5	5.925-6.425	RSS 248, section 4.7	Dual Client	
U-NII 6	6.425-6.525	RSS 248, section 4.7	Dual Client	987594 D02
U-NII 7	6.525-6.875	RSS 248, section 4.7	Dual Client	907594 DUZ
U-NII 8	6.875 -7.125	RSS 248, section 4.7	Dual Client	

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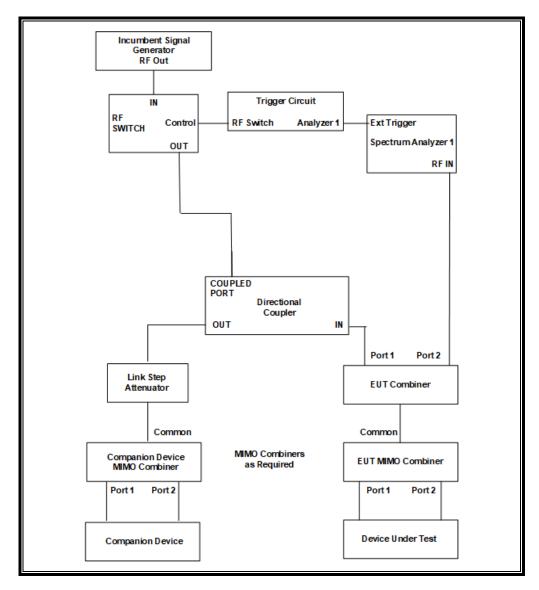
7.2. DESCRIPTION OF TEST SETUP

7.2.1. TEST AND MEASUREMENT SYSTEM

These tests were performed using a Conducted instrument configuration.

CONDUCTED TEST CONFIGURATION

NOTE: This is a comprehensive setup diagram of the receiver performance test and measurement system. Not all of the devices shown below are used for every applicable receiver test. Also, coupler port designations "IN" and "OUT" refer to labeling on the coupler, not the RF signal flow.



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SYSTEM OVERVIEW

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

SYSTEM CALIBRATION

The monitoring cable is disconnected fron the spectrum analyzer and a 50-ohm load is connected to the end of the monitoring cable in place of the spectrum analyzer. The cable connected to the EUT is then attached to the spectrum analyzer in place of the monitoring cable. A signal generator is then set to produce a modulated AWGN Incumbent Signal that has a 99% occupied power bandwidth of 10 MHz. The output amplitude of the signal generator is adjusted to yield the allowable maximum AWGN Incumbent Signal level as measured on the spectrum analyzer. The EUT and monitoring cables are then returned to their original configurations to perform the test.

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 8.4GHz	Keysight	N9030A	150667	01/31/24	
Signal Generator, MXG X-Series RF Vector	Keysight	N5182B	215999	02/07/24	
Frequency Extender	Keysight	N5182BX	213906	02/06/24	

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

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7.2.2. 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				
PXA Read 3.1 Signal Generator Screen Capture				

7.2.3. 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).

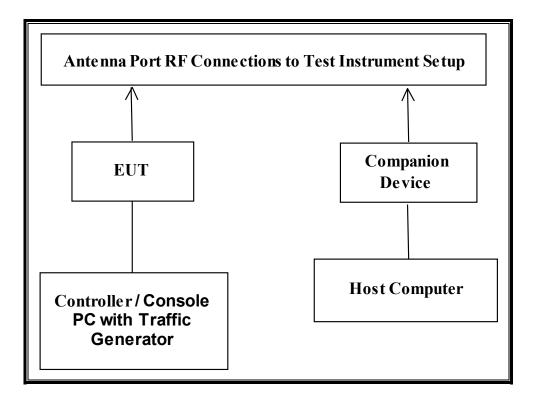
ENVIRONMENT CONDITION

Parameter	Value
Temperature	23.0 and 23.2 °C
Humidity	55 and 54 %

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7.2.4. 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		
Notebook PC 1 (EUT Console)	Apple	A2779	C962RJ4D3Y	DoC		
WiFi 6e Gaming Router	ASUS Computer	GT-AXE11000	M9IG0X403210HEZ	MSQ-		
(Companion Device)	International			RTAXJF00		
AC Adapter 1 (Companion)	AC BEL	ADD011 LPS	ADD01117AG213402	DoC		
			136A			
Notebook PC 2 (Companion	Lenovo	Туре 20В7-	PF-02JN9J 14/06	DoC		
Host)		S0A200				
AC Adapter 2 (Notebook PC 2)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS97	DoC		
			4594A9			

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7.2.5. DESCRIPTION OF EUT

The EUT operates in the following band / bands: U-NII 5 (5925 MHz-6425 MHz), U-NII 6 (6425 MHz-6525 MHz), U-NII 7 (6525 MHz-6875 MHz) and U-NII 8 (6875 MHz-7125 MHz).

The EUT is classified as a 6 GHz Dual Client.

The manufacturer has declared that the lowest gain antenna assembly utilized with the EUT has a gain of -4.5 dBi in the U-NII 5 band, -1.7 dBi in the U-NII 6 band, -4.3 dBi in the U-NII 7 band and -6.0 dBi in the U-NII 8 band.

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

The maximum allowable conducted AWGN Incumbent Detection Threshold level is –62 dBm/MHz. After correction for antenna gain the conducted AWGN Incumbent Detection Threshold at the antenna port is –62 + antenna gain. This results in a maximum allowable AWGN Incumbent Detection Threshold of -66.5 dBm in the U-NII 5 band, -63.7 dBm in the U-NII 6 band, -66.3 dBm in the U-NII 7 band and -68.0 dBm in the U-NII 8 band.

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.

WLAN traffic was generated by transferring a data stream from the EUT to the Companion Device using iPerf version 2.0.5 software package.

The EUT utilizes the 802.11ax architecture. Four nominal channel bandwidths are implemented: 20 MHz, 40 MHz, 80 MHz and 160 MHz.

The software installed in the EUT is version 17.0.

The firmware installed in the Companion Device is ASUS version V3.0.0.4.386.42489.

TEST SETUP

The EUT is attached to a USB port of a host notebook PC during testing. The EUT is linked to a companion 802.11 wireless radio device. A commercial traffic generation program (iPERF) was utilized to generate traffic from the EUT to the companion radio device.

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8. CONTENTION BASED PROTOCOL

8.1. LIMITS AND PROCEDURES

<u>LIMITS</u>

FCC Part 15 Subpart E, FCC KDB 987594 "U-NII 6 GHz devices operating in the 5.925-7.125 GHz band"; Section I.

AWGN INCUMBENT SIGNAL DETECTION THRESHOLD

FCC Part 15 Subpart E, FCC KDB 987594 "U-NII 6 GHz devices operating in the 5.925-7.125 GHz band"; Section I, Clause (c), Step 6.

For an EUT with a non-zero dBi antenna gain the maximum detection threshold level, T_{L} , of the 10 MHz wide AWGN Incumbent Signal at the port of the radio module in a conducted test setup shall be no greater than -62 dBm/MHz. It shall be adjusted by the gain of the bypassed antenna as shown in the table below:

Band	Frequency Range (MHz)	Antenna Gain (dBi)	T _L at Radio Port (dBm/MHz)
U-NII 5	5925 to 6425	-4.5	-66.5
U-NII 6	6425 to 6525	-1.7	-63.7
U-NII 7	6525 to 6875	-4.3	-66.3
U-NII 8	6875 to 7125	-6.0	-68.0

TEST PROCEDURE

FCC Part 15 Subpart E, FCC KDB 987594 "U-NII 6 GHz devices operating in the 5.925-7.125 GHz band"; Section I, Clause (c).

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8.2. U-NII 5 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

99% $BW_{EUT} \le 99\% BW_{INC}$

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.3. U-NII 5 BAND TEST CONDITION 2 RESULTS

TEST CONDITION 2 CRITERIA

99% BW_{INC} < 99% BW_{EUT} \leq 2 x 99% BW_{INC}

8.3.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6215 MHz and a nominal channel bandwidth of 20 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.3.2. INCUMBENT SIGNAL PLOTS

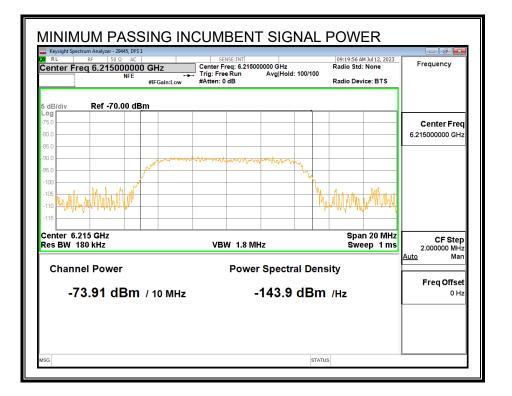
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

		#IFGain:Low #Atten	Free Run Avg Ho n: 0 dB	ld: 100/100	Radio Device: BT	s
15 dB/div R	ef 10.00 dBm	<u> </u>				_
20.0						Center Free 6.215000000 GH
35.0 50.0 55.0		And and the state of the state	^{าก} าสุน ¹⁴ ส์แสนตร์ เป็นไขกรรณีไหกการให้ปูงและสะเร	mashing		
0.0 5.0 <mark></mark>	with a factor				V. Unternomprophylics	
110						
Center 6.215 C #Res BW 150		#	VBW 470 kHz		Span 20 N Sweep 2.733	
Occupied	Bandwidtl 9.9	^h 9753 MHz	Total Power	-36.4	4 dBm	Auto Mar Freq Offse
Transmit Fi x dB Bandv	•	-12.043 kHz 11.54 MHz	% of OBW Pov x dB		9.00 % .00 dB	он

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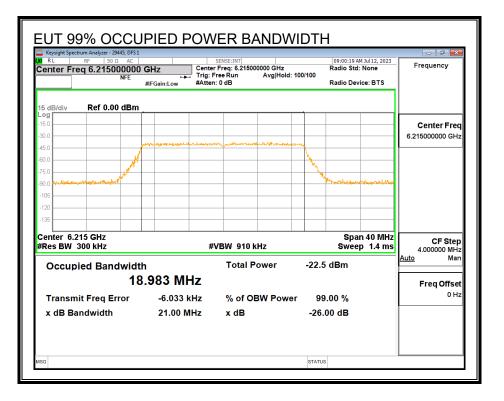
MINIMUM PASSING INCUMBENT SIGNAL POWER



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8.3.3. EUT TRANSMISSION PLOTS

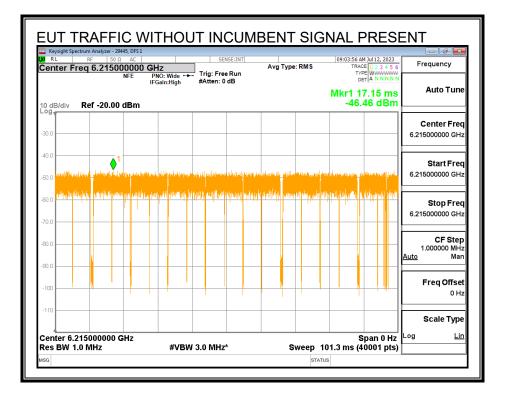
EUT 99% OCCUPIED POWER BANDWIDTH



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TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

⊈ RL RF 50 Ω AC Center Freq 6.21500000 NFE	PNO: Wide +++ Trig: Free Run	Avg Type: RMS	09:08:46 AM Jul 12, 2023 TRACE 1 2 3 4 5 6 TYPE WWWWW DET A N N N N N	Frequency
0 dB/div Ref -20.00 dBn	n ounnign		ΔMkr1 30.00 s -47.79 dB	Auto Tune
og				Center Freq 6.215000000 GHz
50.0				Start Freq 6.215000000 GHz
				Stop Freq 6.215000000 GHz
30.0				CF Step 1.000000 MHz Auto Man
90.0 100	panan in a supervision providence providence providence providence providence providence providence providence	an a		Freq Offset 0 Hz
110				Scale Type
Center 6.215000000 GHZ Res 3W 1.0 MHz sg	#VBW 3.0 MHz*	Sweep statu	40.00 s (4000) pts)	Log <u>Lin</u>
 				

Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.3.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6215
EUT Nominal Channel Bandwidth (MHz)	20
99% Occupied Bandwidth of the EUT (MHz)	18.983
EUT 99% OBW Lower Edge, F _L (MHz)	6205.51
EUT 99% OBW Upper Edge, F _H (MHz)	6224.49
Test Frequency of Incumbent Signal (MHz)	6215
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-4.5
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-66.5
	•
Lowest Passing Measured Incumbent Signal Amplitude (dBm)	-78.41
Margin (dBm)	-11.91
Result (PASS / FAIL)	PASS

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)
Trial	Incumbent AWGN at ${\rm f_{c1}}$
1	Yes
2	No
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
Test Result	PASS

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.3.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BWINC < 99% BWEUT ≤ 2 x 99% BWINC

Incumbent AWGN at f_{c1}:

		Adjusted		Adjusted		
Measured Incumbent		Incumbent		Incumbent		
Power at the EUT Test	Test Fixture	Power at the		Power at the	Detection	
Fixture Connector	Cable Path	Radio Port	Antenna	Antenna	Limit	EUT Tx
(dBm)	Loss (dB)	(dBm)	Gain (dBi)	(dBm)	(dBm)	Status
-73.91	4.5	-78.41	-4.5	-73.91	-62	Ceased
-79.18	4.5	-83.68	-4.5	-79.18	-62	Minimal
-79.91	4.5	-84.41	-4.5	-79.91	-62	Normal

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

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8.4. U-NII 5 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

$2 \times 99\% BW_{INC} < 99\% BW_{EUT} \le 4 \times 99\% BW_{INC}$

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.5. U-NII 5 BAND TEST CONDITION 4 RESULTS

TEST CONDITION 4 CRITERIA

99% BW_{EUT} > 4 x 99% BW_{INC}

8.5.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6185 MHz and a nominal channel bandwidth of 160 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.5.2. INCUMBENT SIGNAL PLOTS

All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

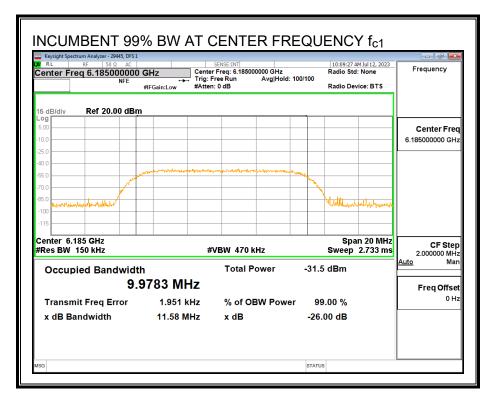
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

Lower Edge Incumbent Signal fc2:

Keysight Spectrum Analyzer - 29445, DFS 1 R L RF 50 Ω AC enter Freq 6.112000000		SENSE:INT		10:08:31 AM Jul 12, 20 Radio Std: None	Frequency
NFE		g: Free Run ten: 0 dB	Avg Hold: 100/100	Radio Device: BTS	
dB/div Ref 20.00 dBm	1				
9g					Center Fre
0.0					6.112000000 GH
5.0					
0.0	a manager a settion has	Anona in the loss through the	Makima da su a		
5.0	Population and a strate free for	In . California and a free of the	Mark Marken Marken		
0.0					
i.0 Agersenette alveret den ander berged				monorman	Math.
15					
enter 6.112 GHz Res BW 150 kHz		#VBW 470 kł	Ηz	Span 20 M Sweep 2.733 i	
Occupied Bandwidt	•	Total Po	wer -31	.1 dBm	Auto Ma
	9718 MHz	, otarr c	-51		
					Freq Offs
Transmit Freq Error	-3.938 kHz	% of OB	W Power 9	99.00 %	
x dB Bandwidth	11.51 MHz	x dB	-2	6.00 dB	

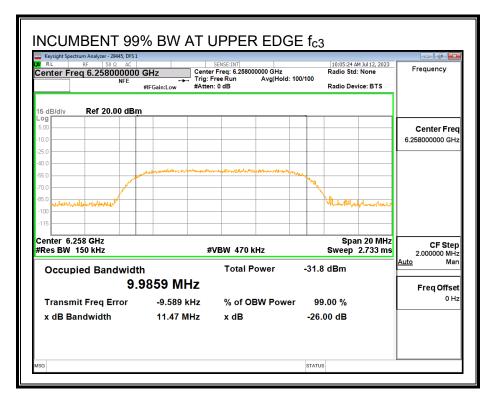
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Center Frequency Incumbent Signal fc1:



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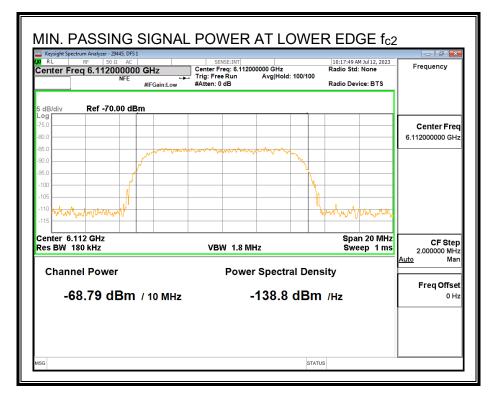
Upper Edge Incumbent Signal fc3:



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MINIMUM PASSING INCUMBENT SIGNAL POWER

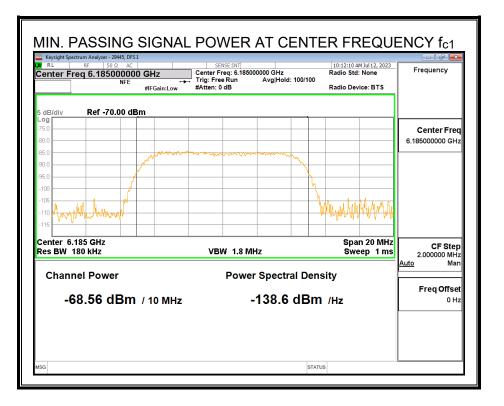
Lower Edge Incumbent Signal fc2:



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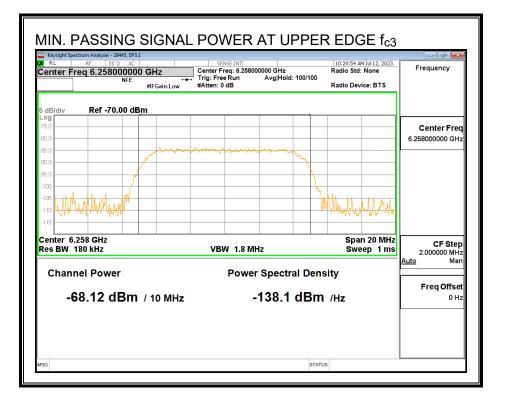
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Center Frequency Incumbent Signal fc1:



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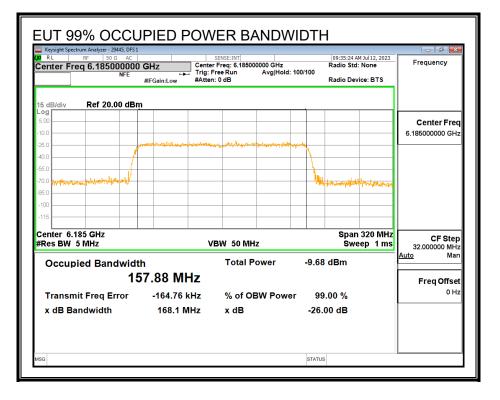
Upper Edge Incumbent Signal fc3:



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8.5.3. EUT TRANSMISSION PLOTS

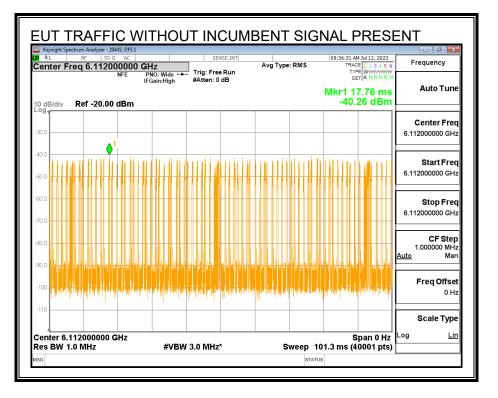
EUT 99% OCCUPIED POWER BANDWIDTH



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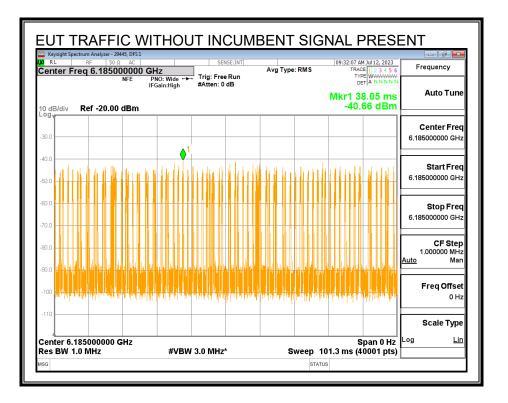
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

Lower Edge fc2:



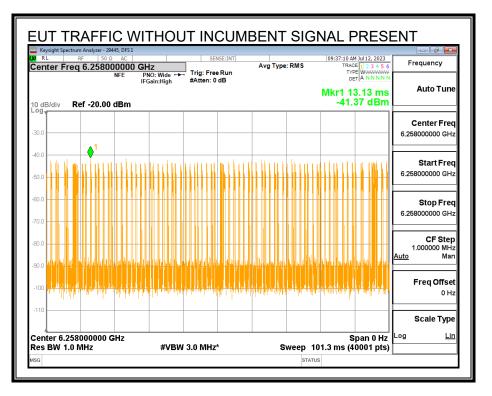
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Center Frequency f_{c1}:



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Upper Edge f_{c3}:



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

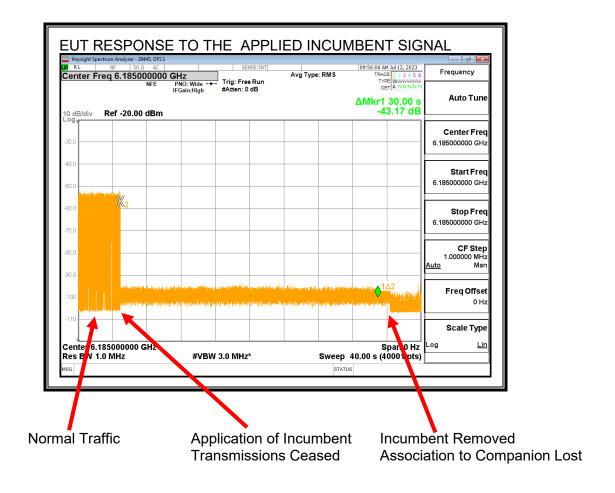
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

Lower Edge Incumbent Signal f_{c2}:

Keysight Spectrum Analyzer - 29445, DFS RL RF 50 Ω AC Center Freq 6.11200000 NFE	O GHZ PNO: Wide ↔ Trig: Free Run	Avg Type: RMS	09:47:05 AM Jul 12, 2023 TRACE 1 2 3 4 5 0 TYPE WWWWWWW DET A NNNN	·
10 dB/div Ref -20.00 dBm	IFGain:High #Atten: 0 dB		ΔMkr1 30.00 s -56.75 dB	Auto Tune
-30.0				Center Freq 6.112000000 GHz
-40.0				Start Freq 6.112000000 GHz
-60.0 m 11 1.0 0 0 1 2				Stop Freq 6.112000000 GHz
-80.0				CF Step 1.00000 MHz Auto Man
-90.0			1Δ2	Freq Offset
-110				Scale Type
Cent r 6.112000000 GH2 Res 3W 1.0 MHz	#VBW 3.0 MHz*	Sweep	Spin 0 Hz 40.00 s (400 1 pts)	
+				
al Traffic	Application of	Incumben	t Incum	bent Removed

Transmissions cease while the Incumbent AWGN Signal is present and do not resume after it is removed due to the loss of the association to the Companion Device.

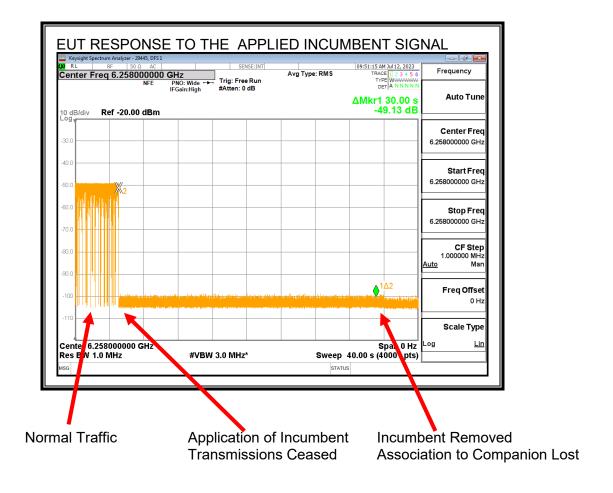
Center Frequency Incumbent Signal fc1:



Transmissions cease while the Incumbent AWGN Signal is present and do not resume after it is removed due to the loss of the association to the Companion Device.

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Upper Edge Incumbent Signal f_{c3}:



Transmissions cease while the Incumbent AWGN Signal is present and do not resume after it is removed due to the loss of the association to the Companion Device.

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8.5.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6185
EUT Nominal Channel Bandwidth (MHz)	160
99% Occupied Bandwidth of the EUT (MHz)	157.88
EUT 99% OBW Lower Edge, F _L (MHz)	6106.06
EUT 99% OBW Upper Edge, F _H (MHz)	6263.94
99% Occupied Bandwidth of the Incumbent Signal (MHz)	9.9783
Test Frequency of Incumbent Signal (f _{c2}) Near EUT F _L (MHz)	6112
Test Frequency of Incumbent Signal at f _{c1} (MHz)	6185
Test Frequency of Incumbent Signal(f _{c3})Near EUT F _H (MHz)	6258
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-4.5
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-66.50
	-
Lowest Passing Measured Incumbent Signal Amplitude at f _{c2} (dBm)	-73.29
Margin (dBm)	-6.79
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c1} (dBm)	-73.06
Margin (dBm)	-6.56
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c3} (dBm)	-72.62
Margin (dBm)	-6.12
Result (PASS / FAIL)	PASS

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN	I Detected (Yes / No)
	Incumbent AWGN	Incumbent AWGN	Incumbent
Trial	at f _{c2}	at f _{c1}	AWGN at $\rm f_{c3}$
1	Yes	Yes	Yes
2	Yes	Yes	Yes
3	Yes	Yes	Yes
4	Yes	Yes	No
5	Yes	Yes	Yes
6	Yes	Yes	Yes
7	Yes	Yes	Yes
8	Yes	No	Yes
9	Yes	Yes	Yes
10	Yes	Yes	Yes
Test Result	PASS	PASS	PASS

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.5.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 4: 99% BW_{EUT} > 4 x 99% BW_{INC}

Incumbent AWGN at f_{c2}:

Measured Incumbent Power at the EUT Test	Test Fixture Cable Path	the Radio	Antenna	Adjusted Incumbent Power at the	Detection Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-68.79	4.5	-73.29	-4.5	-68.79	-62	Ceased
-74.31	4.5	-78.81	-4.5	-74.31	-62	Minimal
-76.25	4.5	-80.75	-4.5	-76.25	-62	Normal

Incumbent AWGN at f_{c1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-68.56	4.5	-73.06	-4.5	-68.56	-62	Ceased
-73.51	4.5	-78.01	-4.5	-73.51	-62	Minimal
-76.44	4.5	-80.94	-4.5	-76.44	-62	Normal

Incumbent AWGN at f_{c3}:

Measured Incumbent	Test Fixture	Adjusted Incumbent Power at		Adjusted Incumbent	Detection	
Power at the EUT Test	Cable Path	the Radio	Antenna	Power at the	Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-68.12	4.5	-72.62	-4.5	-68.12	-62	Ceased
-71.29	4.5	-75.79	-4.5	-71.29	-62	Minimal
-73.88	4.5	-78.38	-4.5	-73.88	-62	Normal

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

8.6. U-NII 6 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

99% BW_{EUT} ≤ **99% BW**_{INC}

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.7. U-NII 6 BAND TEST CONDITION 2 RESULTS

TEST CONDITION 2 CRITERIA

99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

8.7.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6455 MHz and a nominal channel bandwidth of 20 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.7.2. INCUMBENT SIGNAL PLOTS

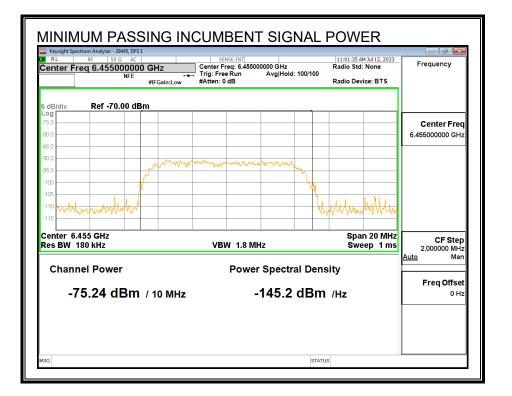
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

RL	um Analyzer - 29445, DFS 1 RF 50 Ω AC q 6.455000000 NFE) GHz Cente	SENSE:INT Freq: 6.455000000 GHz Free Run Avg Hold: n: 0 dB	Ra 100/100	0:59:48 AM Jul 12, 2023 adio Std: None adio Device: BTS	Frequency
5 dB/div	Ref 20.00 dBr	<u>n</u>				
5.00						Center Fred 6.455000000 GH
40.0 55.0		and the second second	สระบองสมองสาราย	www.		
85.0	handran Andrew				duent have been and	
Center 6.45 Res BW 1		#	¢VBW 470 kHz	S	Span 20 MHz weep 2.733 ms	CF Step 2.000000 MH
Occupie	ed Bandwidi 9.	th 9740 MHz	Total Power	-33.2 dl	Bm	Auto Mar Freq Offse
	t Freq Error	481 Hz	% of OBW Powe			0 H:
x dB Ban	ndwidth	11.52 MHz	x dB	-26.00	dB	

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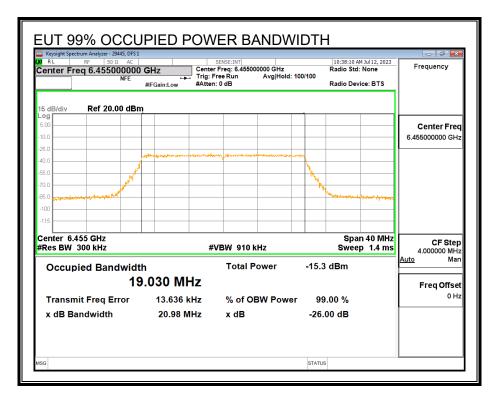
MINIMUM PASSING INCUMBENT SIGNAL POWER



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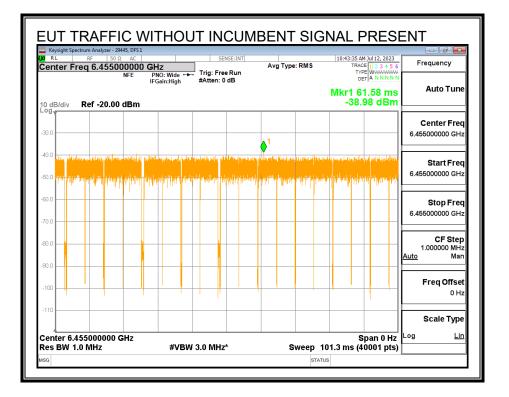
8.7.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH



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TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

X RL RF 50Ω AC Center Freq 6.455000000 NFE	BHZ PNO: Wide ↔ Trig: Free Run IFGain:High #Atten: 0 dB	Avg Type: RMS	10:48:23 AM Jul 12, 2023 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET A N N N N N	Frequency
10 dB/div Ref -20.00 dBm	ream:nign writen. o db		ΔMkr1 30.00 s -60.06 dB	Auto Tune
-30.0				Center Freq 6.455000000 GHz
-40.0				Start Freq 6.455000000 GHz
-60.0				Stop Freq 6.455000000 GHz
-80.0				CF Step 1.000000 MHz <u>Auto</u> Man
-100			A <mark>1Δ2</mark>	Freq Offset 0 Hz
-110				Scale Type
Center 6.455000000 GHZ Res I W 1.0 MHz ^{MSG}	#VBW 3.0 MHz*	Sweep state	40.00 s (400 1 pts)	
1				

Transmissions cease while the Incumbent AWGN Signal is present and do not resume after it is removed due to the loss of the association to the Companion Device.

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8.7.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6455
EUT Nominal Channel Bandwidth (MHz)	20
99% Occupied Bandwidth of the EUT (MHz)	19.030
EUT 99% OBW Lower Edge, F _L (MHz)	6445.49
EUT 99% OBW Upper Edge <i>,</i> F _H (MHz)	6464.52
Test Frequency of Incumbent Signal (MHz)	6455
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-1.7
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-63.7
Lowest Passing Measured Incumbent Signal Amplitude (dBm)	-79.94
Margin (dBm)	-16.24
Result (PASS / FAIL)	PASS

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)
Trial	Incumbent AWGN at f_{c1}
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
Test Result	PASS

Test Date: 06/26/23 Tested by: 29445 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.7.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BWINC < 99% BWEUT ≤ 2 x 99% BWINC

Incumbent AWGN at f_{c1}:

		Adjusted		Adjusted		
Measured Incumbent		Incumbent		Incumbent		
Power at the EUT Test	Test Fixture	Power at the		Power at the	Detection	
Fixture Connector	Cable Path	Radio Port	Antenna	Antenna	Limit	EUT Tx
(dBm)	Loss (dB)	(dBm)	Gain (dBi)	(dBm)	(dBm)	Status
-75.24	4.7	-79.94	1.7	-81.64	-62	Ceased
-79.14	4.7	-83.84	-1.7	-82.14	-62	Minimal
-80.07	4.7	-84.77	-1.7	-83.07	-62	Normal

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

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8.8. U-NII 6 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

$2 \times 99\% BW_{INC} < 99\% BW_{EUT} \le 4 \times 99\% BW_{INC}$

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.9. U-NII 6 BAND TEST CONDITION 4 RESULTS

TEST CONDITION 4 CRITERIA

99% BW_{EUT} > 4 x 99% BW_{INC}

8.9.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6505 MHz and a nominal channel bandwidth of 160 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.9.2. INCUMBENT SIGNAL PLOTS

All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

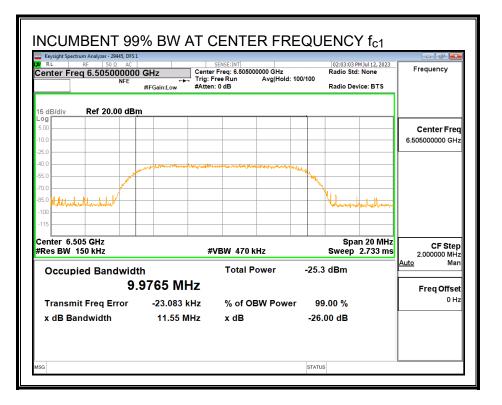
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

Lower Edge Incumbent Signal fc2:

RL RF 50 S enter Freq 6.4320	445, DFS1 2 AC	Hz		SENSE:INT	00000 GHz			02 PMJul 12, 2023 Std: None	Frequency
	NFE	FGain:Low	Trig: F #Atten	ree Run : 0 dB	Avg Hold:	100/10		Device: BTS	
5 dB/div Ref 20.0	0 dBm								
og .00									Center Fre
0.0									6.432000000 GH
5.0									
5.0	- And and a second	and more stated	-	when we have been a	wanter and the second second	ale and			
0.0							×		
5.0 molectory and Martalhard	4						Mult	Maturation	
100									
115									
enter 6.432 GHz Res BW 150 kHz			#	VBW 470	kHz			pan 20 MHz p 2.733 ms	CF Ste 2.000000 Mi
Occupied Band	dwidth			Total I	Power	-2	6.5 dBm		<u>Auto</u> Ma
-	9.9	739 M	Hz						Freq Offs
Transmit Freq Er	ror	-10.230	kHz	% of O	BW Powe	er	99.00 %		01
x dB Bandwidth		11.46	MHz	x dB		-3	26.00 dB		

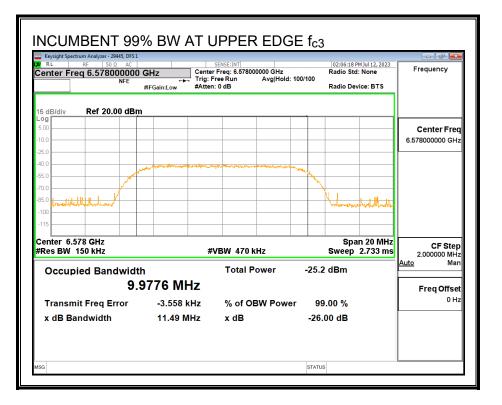
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Center Frequency Incumbent Signal fc1:



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Upper Edge Incumbent Signal fc3:

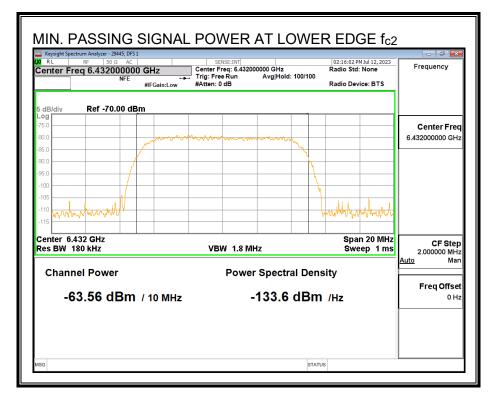


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MINIMUM PASSING INCUMBENT SIGNAL POWER

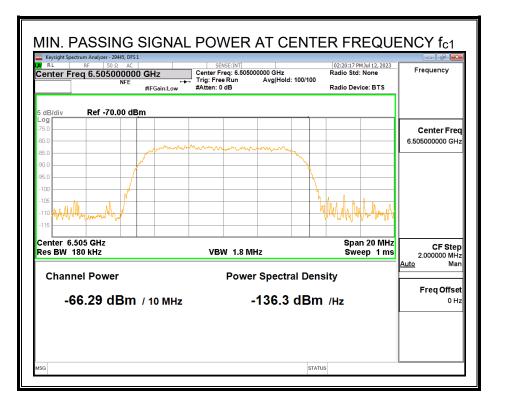
Lower Edge Incumbent Signal fc2:



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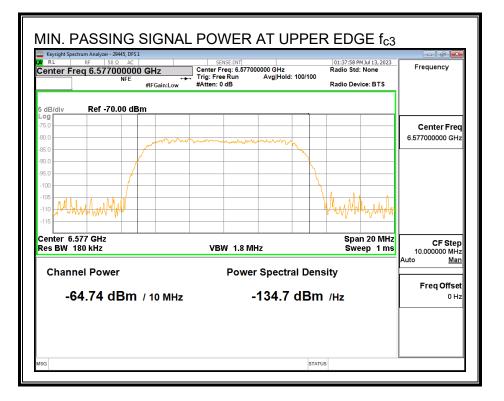
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Center Frequency Incumbent Signal fc1:



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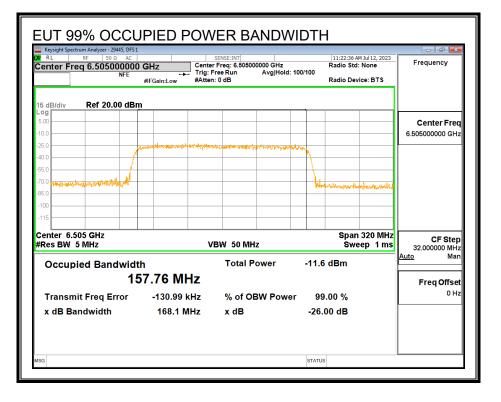
Upper Edge Incumbent Signal fc3:



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8.9.3. EUT TRANSMISSION PLOTS

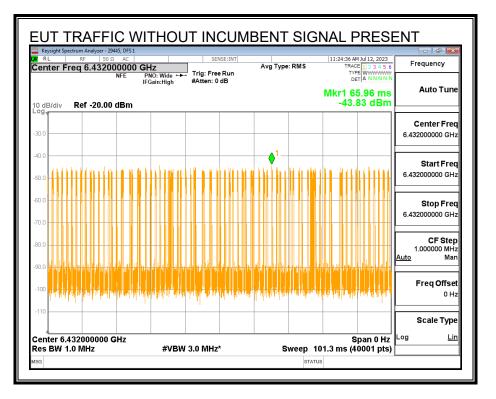
EUT 99% OCCUPIED POWER BANDWIDTH



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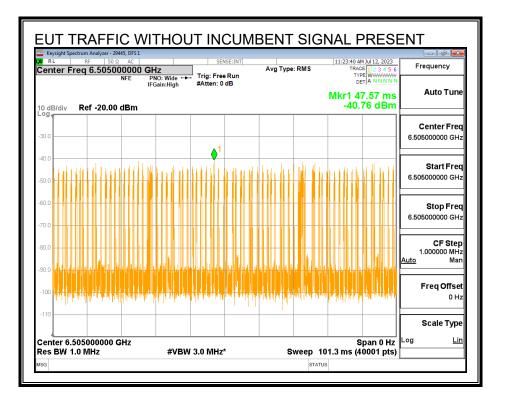
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

Lower Edge fc2:



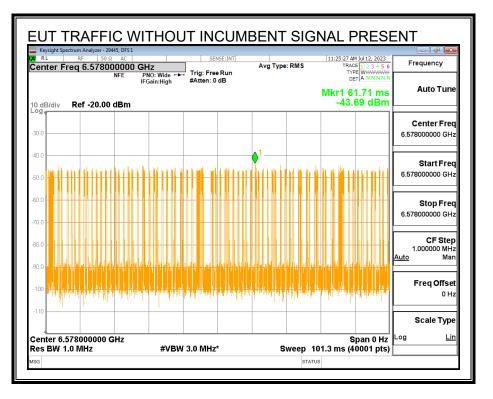
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Center Frequency fc1:



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Upper Edge f_{c3}:

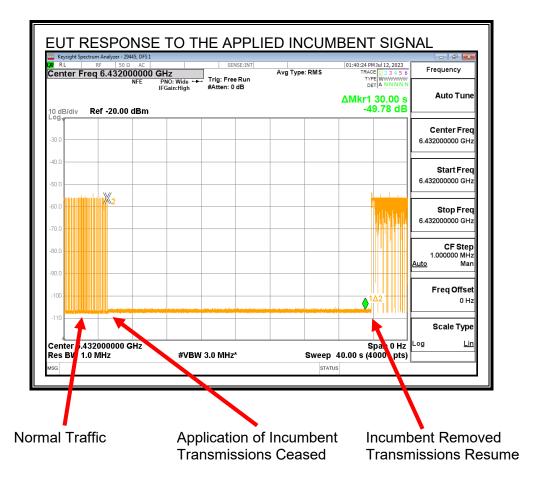


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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

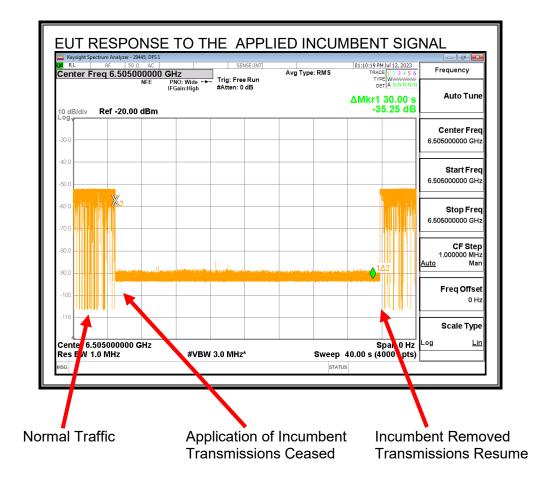
Lower Edge Incumbent Signal f_{c2}:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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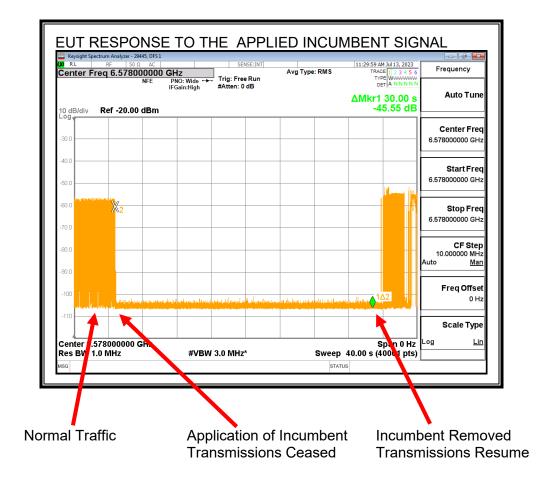
Center Frequency Incumbent Signal fc1:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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Upper Edge Incumbent Signal f_{c3}:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.9.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6505
EUT Nominal Channel Bandwidth (MHz)	160
99% Occupied Bandwidth of the EUT (MHz)	157.76
EUT 99% OBW Lower Edge, F _L (MHz)	6426.12
EUT 99% OBW Upper Edge, F _H (MHz)	6583.88
99% Occupied Bandwidth of the Incumbent Signal (MHz)	9.9765
Test Frequency of Incumbent Signal(f _{c2})Near EUT F _L (MHz)	6432
Test Frequency of Incumbent Signal at f _{c1} (MHz)	6505
Test Frequency of Incumbent Signal (f _{c3}) Near EUT F _H (MHz)	6578
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-1.7
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-63.70
Lowest Passing Measured Incumbent Signal Amplitude at f _{c2} (dBm)	-68.26
Margin (dBm)	-4.56
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c1} (dBm)	-70.99
Margin (dBm)	-7.29
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c3} (dBm)	-69.44
Margin (dBm)	-5.74
Result (PASS / FAIL)	PASS

Test Date: 07/12 and 13/23 Tested by: 29445 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)				
	Incumbent AWGN	Incumbent AWGN	Incumbent		
Trial	at f _{c2}	at f _{c1}	AWGN at $\rm f_{c3}$		
1	Yes	Yes	Yes		
2	Yes	Yes	Yes		
3	Yes	Yes	Yes		
4	Yes	Yes	Yes		
5	Yes	Yes	Yes		
6	Yes	Yes	Yes		
7	No	Yes	Yes		
8	Yes	Yes	Yes		
9	Yes	Yes	Yes		
10	Yes	Yes	Yes		
Test Result	PASS	PASS	PASS		

Test Date: 07/12/23 Tested by: 29445 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.9.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 4: 99% BW_{EUT} > 4 x 99% BW_{INC}

Incumbent AWGN at f_{c2}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-63.56	4.7	-68.26	-1.7	-66.56	-62	Ceased
-76.36	4.7	-81.06	-1.7	-79.36	-62	Minimal
-79.10	4.7	-83.80	-1.7	-82.10	-62	Normal

Incumbent AWGN at f_{c1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-66.29	4.7	-70.99	-1.7	-69.29	-62	Ceased
-73.55	4.7	-78.25	-1.7	-76.55	-62	Minimal
-76.88	4.7	-81.58	-1.7	-79.88	-62	Normal

Incumbent AWGN at f_{c3}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-64.74	4.7	-69.44	-1.7	-67.74	-62	Ceased
-71.82	4.7	-76.52	-1.7	-74.82	-62	Minimal
-75.53	4.7	-80.23	-1.7	-78.53	-62	Normal

Test Date: 07/12 and 13/23 Tested by: 29445 Test location: DFS 1

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8.10. U-NII 7 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

99% BW_{EUT} ≤ **99% BW**_{INC}

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.11. U-NII 7 BAND TEST CONDITION 2 RESULTS

TEST CONDITION 2 CRITERIA

99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

8.11.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6695 MHz and a nominal channel bandwidth of 20 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.11.2. INCUMBENT SIGNAL PLOTS

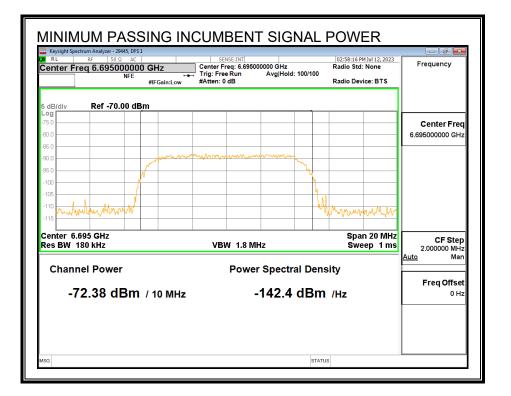
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

enter F	sectrum Analyzer - 29445, DFS1 RF 50 Ω AC Treq 6.695000000 NFE	Trig:	SENSE:INT er Freq: 6.695000 Free Run n: 0 dB	000 GHz Avg Hold: 100/1	100	Radio Sto	PM Jul 12, 2023 d: None vice: BTS	Frequency
5 dB/div	Ref 20.00 dBn	1			·			
5.00								Center Fred 6.695000000 GH;
40.0		the second second second	Jonner washington the	months through the second				
70.0	and a second second second				May	Marketter	WaryAnnaholaen	
100								
	695 GHz 150 kHz	i	≠VBW 470 kH	łz			an 20 MHz 2.733 ms	CF Step 2.000000 MH
Occu	pied Bandwidt 9.	հ 9907 MHz	Total Po	wer -	35.8	dBm		Auto Mar Freq Offse
	mit Freq Error Bandwidth	21.818 kHz 11.38 MHz	% of OB x dB	W Power		.00 % 00 dB		0 H

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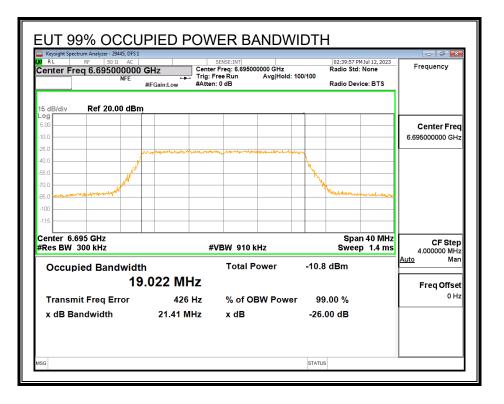
MINIMUM PASSING INCUMBENT SIGNAL POWER



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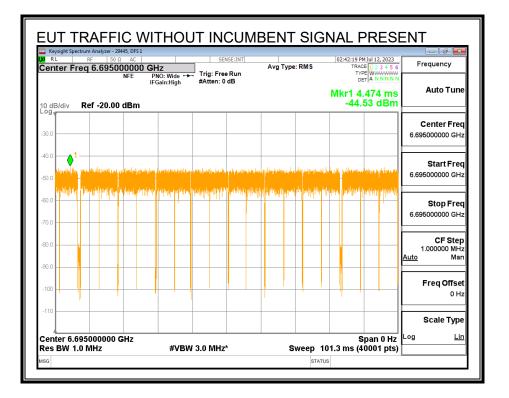
8.11.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH



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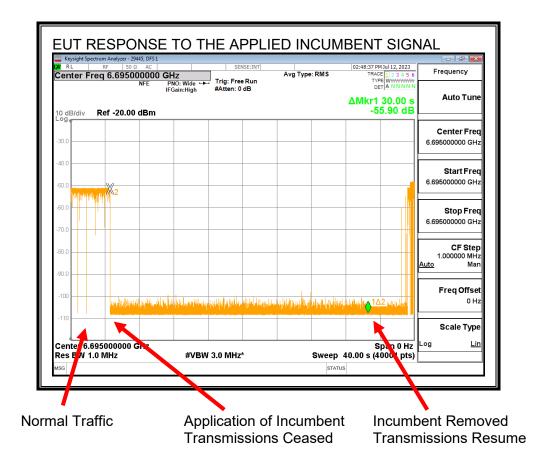
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.11.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6695
EUT Nominal Channel Bandwidth (MHz)	20
99% Occupied Bandwidth of the EUT (MHz)	19.022
EUT 99% OBW Lower Edge, F _L (MHz)	6685.49
EUT 99% OBW Upper Edge, F _H (MHz)	6704.51
Test Frequency of Incumbent Signal (MHz)	6695
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-4.3
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-66.3
Lowest Passing Measured Incumbent Signal Amplitude (dBm)	-77.18
Margin (dBm)	-10.88
Result (PASS / FAIL)	PASS

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)
Trial	Incumbent AWGN at $\rm f_{c1}$
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
Test Result	PASS

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.11.5. Tx OPERATIONAL STATUS TEST RESULTS

<u>Test Condition 2: 99% BWINC < 99% BWEUT ≤ 2 x 99% BWINC</u>

Incumbent AWGN at f_{c1}:

		Adjusted		Adjusted		
Measured Incumbent		Incumbent		Incumbent		
Power at the EUT Test	Test Fixture	Power at the		Power at the	Detection	
Fixture Connector	Cable Path	Radio Port	Antenna	Antenna	Limit	EUT Tx
(dBm)	Loss (dB)	(dBm)	Gain (dBi)	(dBm)	(dBm)	Status
-72.38	4.8	-77.18	-4.3	-72.88	-62	Ceased
-79.25	4.8	-84.05	-4.3	-79.75	-62	Minimal
-81.03	4.8	-85.83	-4.3	-81.53	-62	Normal

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

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8.12. U-NII 7 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

$2 \times 99\% BW_{INC} < 99\% BW_{EUT} \le 4 \times 99\% BW_{INC}$

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.13. U-NII 7 BAND TEST CONDITION 4 RESULTS

TEST CONDITION 4 CRITERIA

99% BW_{EUT} > 4 x 99% BW_{INC}

8.13.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6665 MHz and a nominal channel bandwidth of 160 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.13.2. INCUMBENT SIGNAL PLOTS

All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

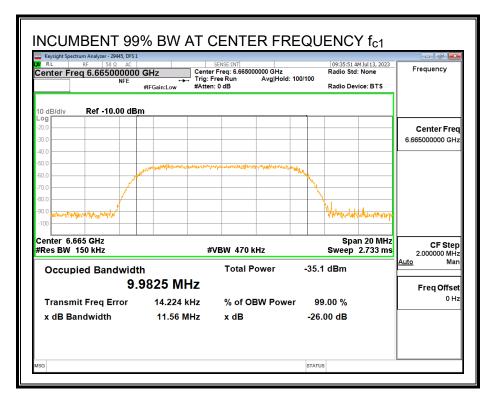
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

Lower Edge Incumbent Signal fc2:

Keysight Spectrum Analyzer - 29445, DFS1 RL RF 50 Ω AC Center Freq 6.591000000 NFE	Trig: I	SENSE:INT r Freq: 6.591000000 GHz Free Run Avg Hold h: 0 dB	I: 100/100	09:38:03 AM Jul 13, 2023 Radio Std: None Radio Device: BTS	Frequency
0 dB/div Ref -10.00 dBr					
30.0					Center Free 6.591000000 GH
50.0 50.0	and an and a second	สรามวิทรารูปอาการทำสินไปสร้างๆสู่อาการส _{านไป}	www.wheel		
70.0			- ^v		
				Weitrean that the who	
Center 6.591 GHz Res BW 150 kHz	#	VBW 470 kHz		Span 20 MHz Sweep 2.733 ms	CF Stej 2.000000 MH
Occupied Bandwidt 9.	^h 9837 MHz	Total Power	-32.4	dBm	Auto Ma Freq Offse
Transmit Freq Error x dB Bandwidth	-32.042 kHz 11.63 MHz	% of OBW Pow x dB		0.00 % 00 dB	он
	11.03 MHZ	XUD	-20.		
sg			STATUS		

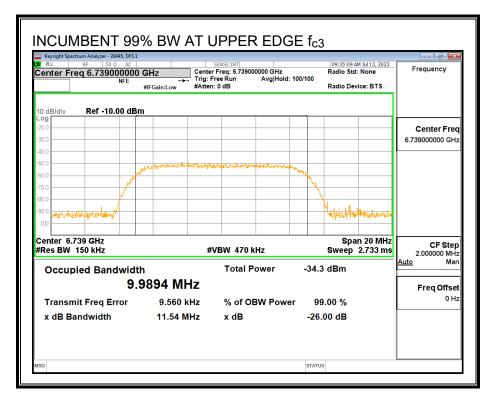
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Center Frequency Incumbent Signal fc1:



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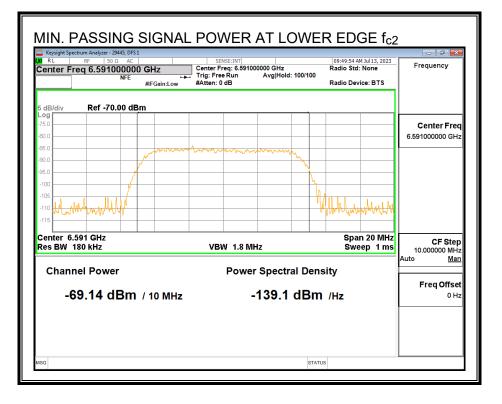
Upper Edge Incumbent Signal fc3:



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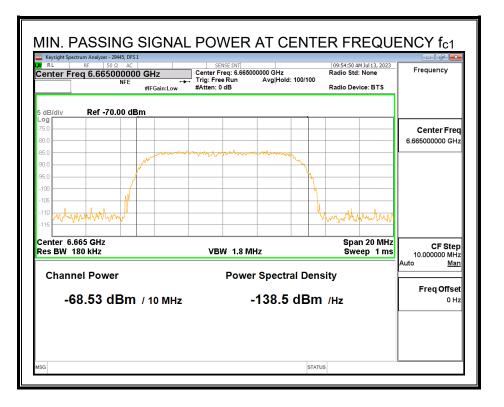
MINIMUM PASSING INCUMBENT SIGNAL POWER

Lower Edge Incumbent Signal fc2:



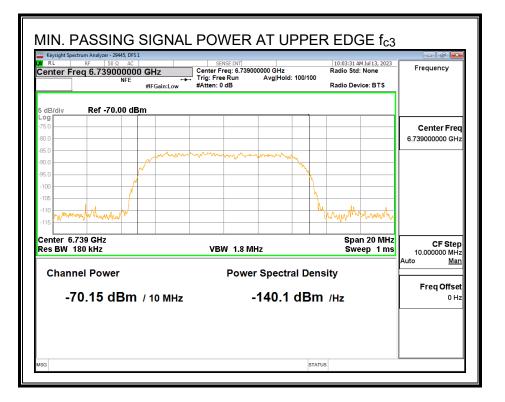
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Center Frequency Incumbent Signal fc1:



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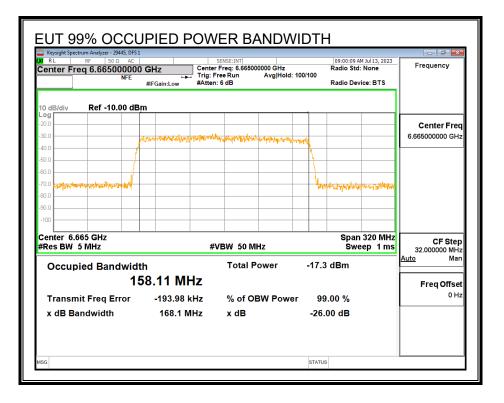
Upper Edge Incumbent Signal fc3:



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8.13.3. EUT TRANSMISSION PLOTS

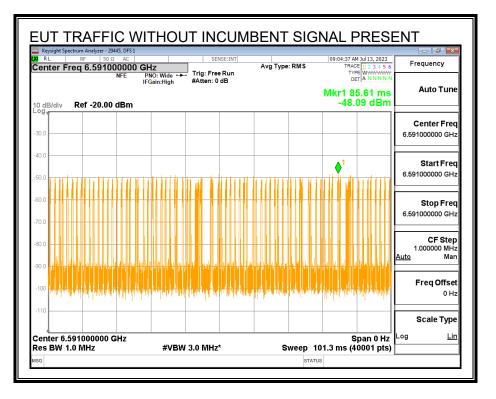
EUT 99% OCCUPIED POWER BANDWIDTH



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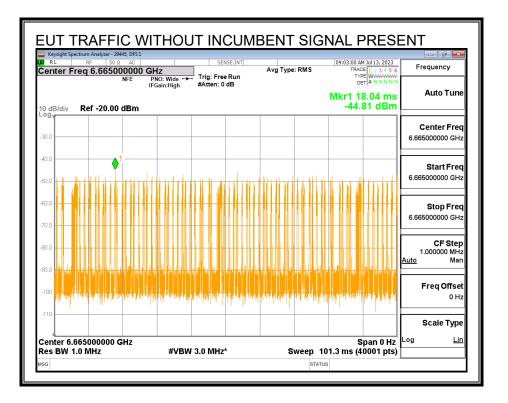
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

Lower Edge fc2:



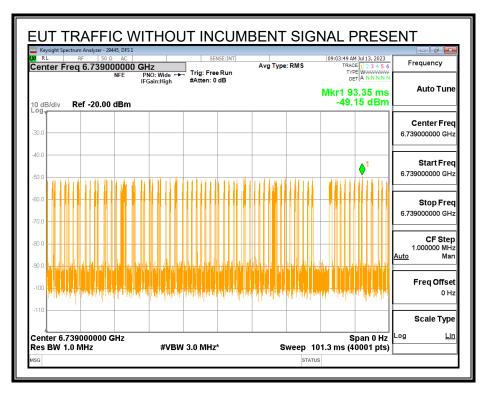
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Center Frequency f_{c1}:



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Upper Edge f_{c3}:

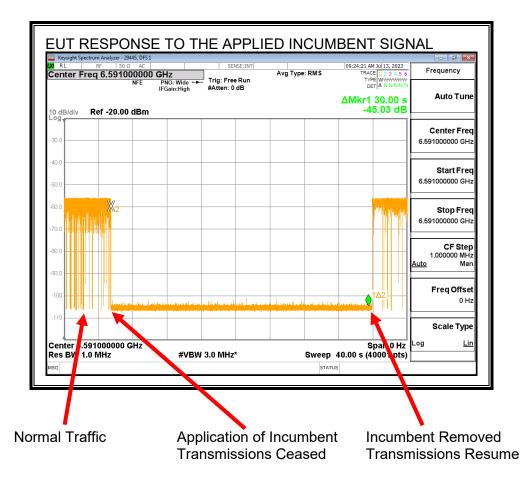


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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

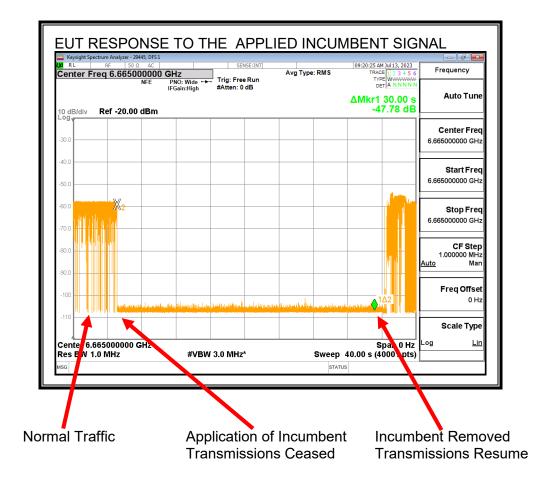
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

Lower Edge Incumbent Signal f_{c2}:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

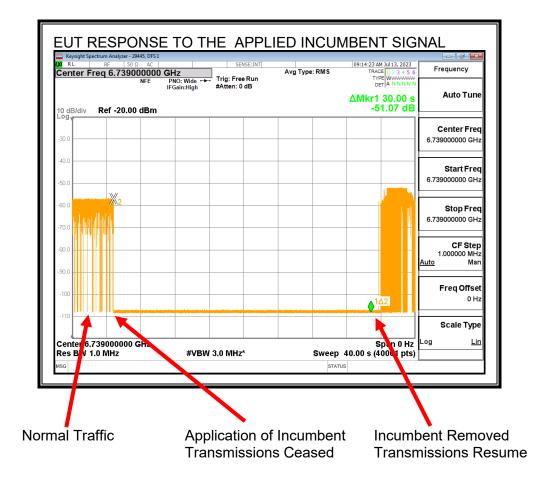
Center Frequency Incumbent Signal fc1:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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Upper Edge Incumbent Signal f_{c3}:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.13.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6665
EUT Nominal Channel Bandwidth (MHz)	160
99% Occupied Bandwidth of the EUT (MHz)	158.11
EUT 99% OBW Lower Edge, F _L (MHz)	6585.95
EUT 99% OBW Upper Edge, F _H (MHz)	6744.06
99% Occupied Bandwidth of the Incumbent Signal (MHz)	9.9825
Test Frequency of Incumbent Signal (f _{c2}) Near EUT F _L (MHz)	6591
Test Frequency of Incumbent Signal at f _{c1} (MHz)	6665
Test Frequency of Incumbent Signal (f _{c3}) Near EUT F _H (MHz)	6739
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-4.3
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-66.30
	I
Lowest Passing Measured Incumbent Signal Amplitude at f _{c2} (dBm)	-73.94
Margin (dBm)	-7.64
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c1} (dBm)	-73.33
Margin (dBm)	-7.03
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c3} (dBm)	-74.95
Margin (dBm)	-8.65
Result (PASS / FAIL)	PASS

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN	I Detected (Yes / No)
	Incumbent AWGN	Incumbent AWGN	Incumbent
Trial	at f _{c2}	at f _{c1}	AWGN at $\rm f_{c3}$
1	Yes	Yes	Yes
2	Yes	No	Yes
3	Yes	Yes	Yes
4	Yes	Yes	Yes
5	Yes	Yes	Yes
6	Yes	Yes	Yes
7	Yes	Yes	Yes
8	Yes	Yes	No
9	No	Yes	Yes
10	Yes	Yes	Yes
Test Result	PASS	PASS	PASS

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.13.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 4: 99% BW_{EUT} > 4 x 99% BW_{INC}

Incumbent AWGN at f_{c2}:

Measured Incumbent Power at the EUT Test	Test Fixture Cable Path	the Radio	Antenna	Adjusted Incumbent Power at the	Detection Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-69.14	4.8	-73.94	-4.3	-69.64	-62	Ceased
-77.18	4.8	-81.98	-4.3	-77.68	-62	Minimal
-79.06	4.8	-83.86	-4.3	-79.56	-62	Normal

Incumbent AWGN at f_{c1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-68.53	4.8	-73.33	-4.3	-69.03	-62	Ceased
-77.09	4.8	-81.89	-4.3	-77.59	-62	Minimal
-80.17	4.8	-84.97	-4.3	-80.67	-62	Normal

Incumbent AWGN at f_{c3}:

		Adjusted Incumbent		Adjusted		
Measured Incumbent	Test Fixture	Power at		Incumbent	Detection	
Power at the EUT Test	Cable Path	the Radio	Antenna	Power at the	Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-70.15	4.8	-74.95	-4.3	-70.65	-62	Ceased
-74.52	4.8	-79.32	-4.3	-75.02	-62	Minimal
-76.80	4.8	-81.6	-4.3	-77.3	-62	Normal

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

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8.14. U-NII 8 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

99% BW_{EUT} ≤ **99% BW**_{INC}

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.15. U-NII 8 BAND TEST CONDITION 2 RESULTS

TEST CONDITION 2 CRITERIA

99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

8.15.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6935 MHz and a nominal channel bandwidth of 20 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.15.2. INCUMBENT SIGNAL PLOTS

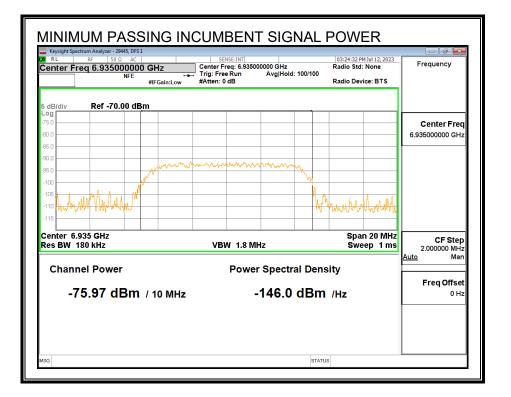
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

enter	RF 50 Ω AC Freq 6.93500000 NFE		Center	SENSE:INT Freq: 6.9350 ree Run : 0 dB	00000 GHz Avg Hold	: 100/10	00	Radio Sto	PM Jul 12, 2023 d: None vice: BTS	Frequency
5 dB/div	Ref 20.00 dB	<u>m</u>								
5.00										Center Fred 6.935000000 GH;
40.0		worker and and and	he good any m		alangungan satas	a share				
70.0 85.0 100	made a constraint of the second						No h	n Hillinger ver	ley the second second	
	6.935 GHz V 150 kHz		#\	/BW 4701	kHz				an 20 MHz 2.733 ms	CF Step 2.000000 MH
Οςςι	ıpied Bandwid 9	th .9834 N	۱Hz	Total F	ower	-3	38.7	dBm		Auto Mar Freq Offse
	smit Freq Error Bandwidth	26.844 11.55		% of O x dB	BW Powe			.00 % 00 dB		он

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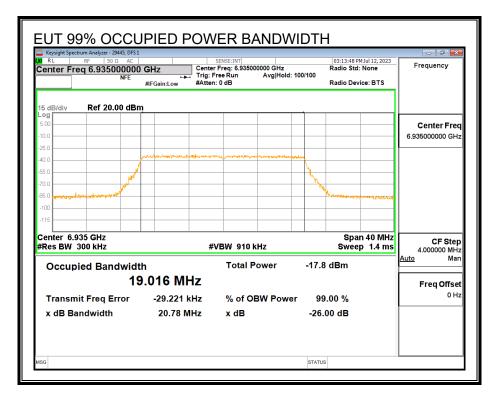
MINIMUM PASSING INCUMBENT SIGNAL POWER



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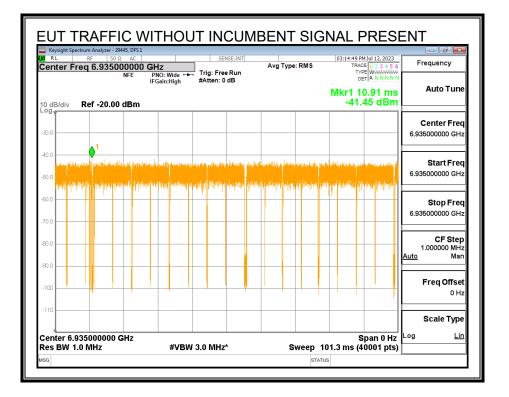
8.15.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH



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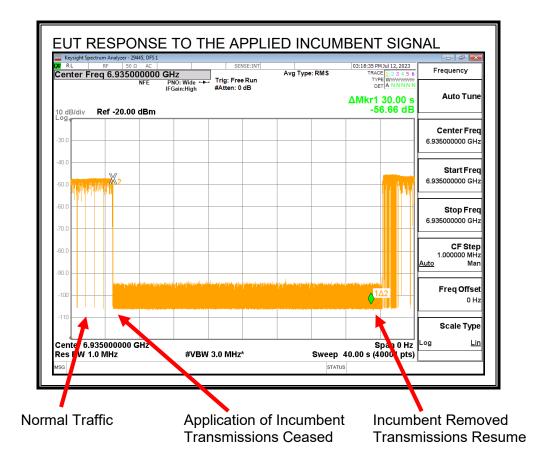
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.15.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6935
EUT Nominal Channel Bandwidth (MHz)	20
99% Occupied Bandwidth of the EUT (MHz)	19.016
EUT 99% OBW Lower Edge, F _L (MHz)	6925.49
EUT 99% OBW Upper Edge, F _H (MHz)	6944.51
Test Frequency of Incumbent Signal (MHz)	6935
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-6.0
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-68.0
Lowest Passing Measured Incumbent Signal Amplitude (dBm)	-80.87
Margin (dBm)	-12.87
Result (PASS / FAIL)	PASS

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)
Trial	Incumbent AWGN at $\rm f_{c1}$
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
Test Result	PASS

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.15.5. Tx OPERATIONAL STATUS TEST RESULTS

<u>Test Condition 2: 99% BWINC < 99% BWEUT ≤ 2 x 99% BWINC</u>

Incumbent AWGN at f_{c1}:

		Adjusted		Adjusted		
Measured Incumbent		Incumbent		Incumbent		
Power at the EUT Test	Test Fixture	Power at the		Power at the	Detection	
Fixture Connector	Cable Path	Radio Port	Antenna	Antenna	Limit	EUT Tx
(dBm)	Loss (dB)	(dBm)	Gain (dBi)	(dBm)	(dBm)	Status
-75.97	4.9	-80.87	-6.0	-74.87	-62	Ceased
-82.69	4.9	-87.59	-6.0	-81.59	-62	Minimal
-83.45	4.9	-88.35	-6.0	-82.35	-62	Normal

Test Date: 07/12/23 Tested by: 29945 Test location: DFS 1

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8.16. U-NII 8 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

$2 \times 99\% BW_{INC} < 99\% BW_{EUT} \le 4 \times 99\% BW_{INC}$

The lowest and highest supported channel bandwidths do not meet the criteria for this test condition therefore this test was not performed.

8.17. U-NII 8 BAND TEST CONDITION 4 RESULTS

TEST CONDITION 4 CRITERIA

99% BW_{EUT} > 4 x 99% BW_{INC}

8.17.1. TEST CHANNEL

All tests were performed with the EUT set to a channel center frequency of 6985 MHz and a nominal channel bandwidth of 160 MHz.

Only the lowest and highest supported channel bandwidths are required to be tested.

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8.17.2. INCUMBENT SIGNAL PLOTS

All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

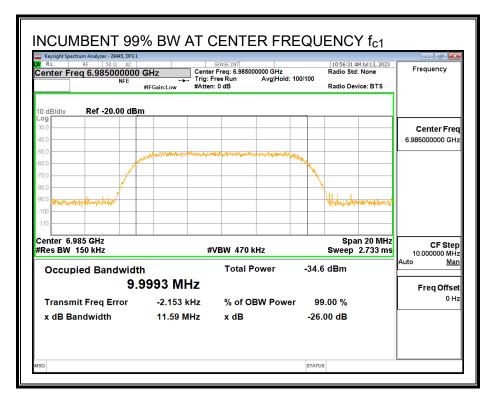
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

Lower Edge Incumbent Signal fc2:

Keysight Spectrum Analyzer - 29445, RL RF 50 Ω enter Freq 6.911000 NI	AC 000 GHz E) GHz Center Freq: 6.9' Trig: Free Run		11000000 GHz Avg Hold: 100/100		11:00:26 AM Jul 13, 2023 Radio Std: None		Frequency
0 dB/div Ref -20.00	#IFGain:Low	#Atten:	0 dB			Radio Dev	ice: BTS	
og 0.0								Center Fre
0.0	water and the second	on the states of	heraldomates.	-	Muha			6.911000000 GH
0.0	4				- NA			
D.O							walter	
10								
enter 6.911 GHz Res BW 150 kHz		#V	BW 470	kHz			n 20 MHz 2.733 ms	CF Ste
Occupied Bandw	vidth 9.9767 N	147	Total F	Power	-32.	3 dBm		Auto <u>Ma</u>
Transmit Freq Erro			% of O	BW Powe	er 9	9.00 %		FreqOffse 0⊢
x dB Bandwidth	11.45	MHz	x dB		-26	.00 dB		

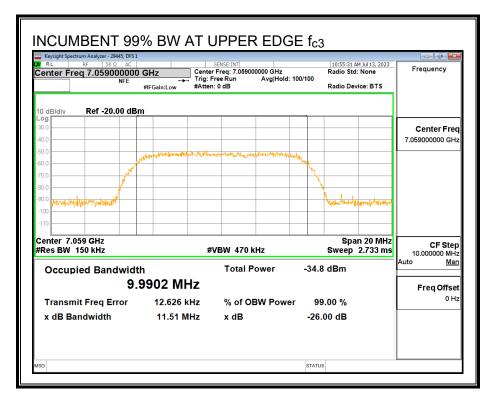
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Center Frequency Incumbent Signal fc1:



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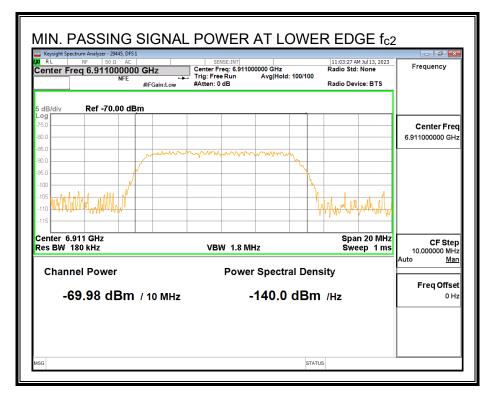
Upper Edge Incumbent Signal fc3:



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MINIMUM PASSING INCUMBENT SIGNAL POWER

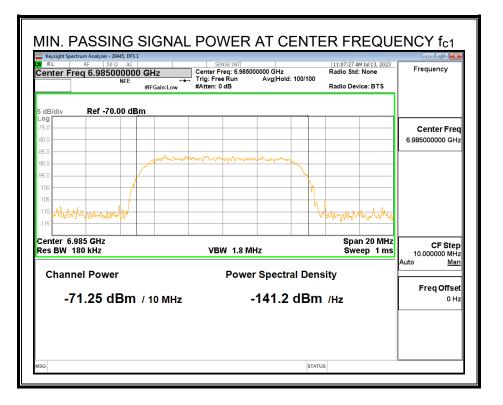
Lower Edge Incumbent Signal fc2:



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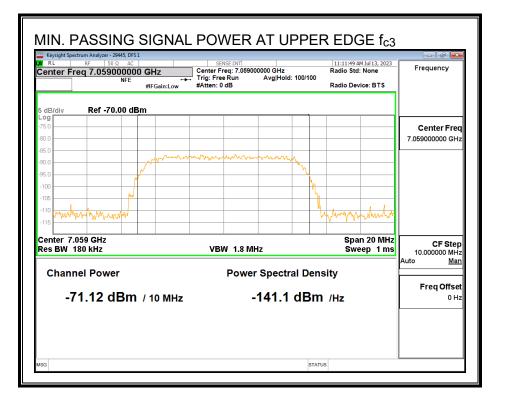
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Center Frequency Incumbent Signal fc1:



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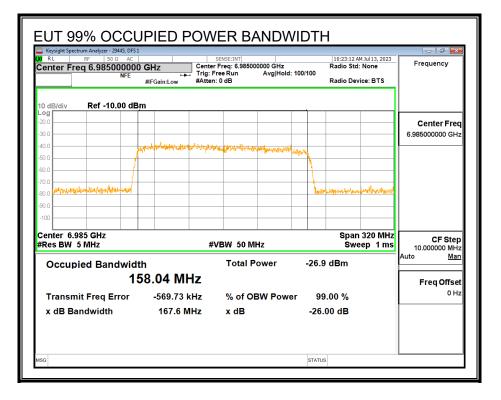
Upper Edge Incumbent Signal fc3:



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8.17.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH

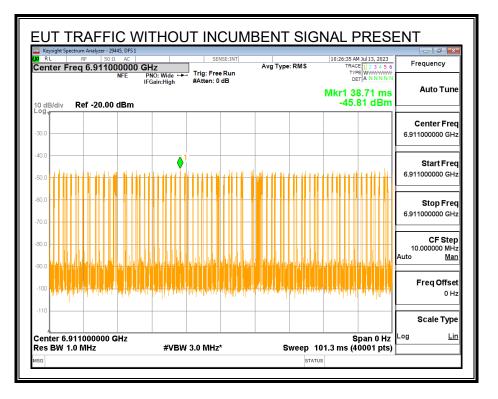


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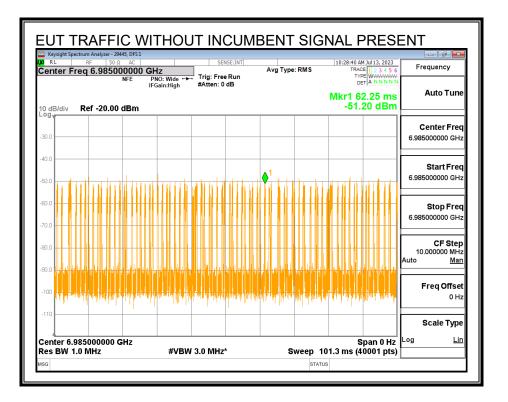
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

Lower Edge fc2:



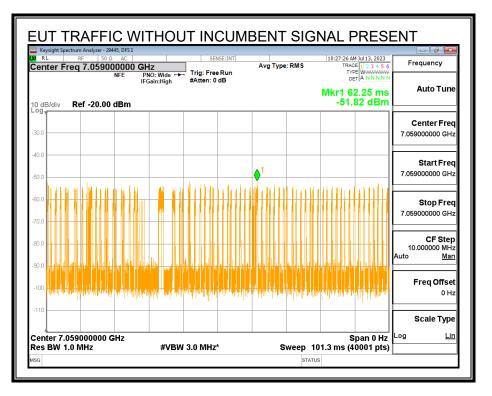
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Center Frequency f_{c1}:



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Upper Edge f_{c3}:



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EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

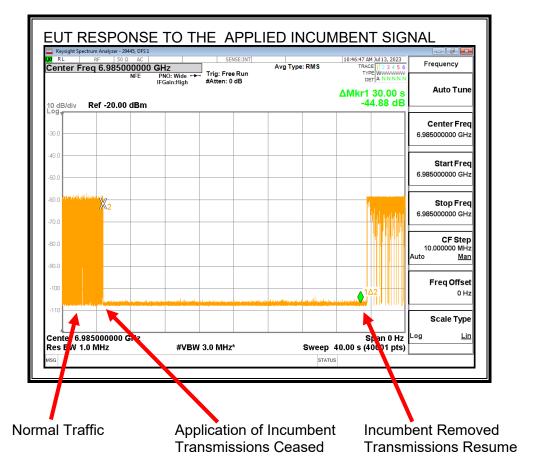
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 30 seconds and removed after the end of the observation period. Markers are placed at the beginning and end of the observation period.

Lower Edge Incumbent Signal f_{c2}:

RL RF 50 Ω AC Center Freq 6.911000000 NFE	PNO: Wide	Avg Type: RMS	10:43:46 AM Jul 13, 2023 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET A N N N N N	Frequency
0 dB/div Ref -20.00 dBm	IFGain:High #Atten: 0 dB		ΔMkr1 30.00 s -50.67 dB	Auto Tune
og				Center Freq 6.911000000 GHz
0.0				Start Freq 6.911000000 GHz
				Stop Freq 6.911000000 GHz
0.0				CF Step 10.000000 MHz Auto <u>Man</u>
	d again philipping and a state of the second s	4 9 11 1 19 11 1 12 1 14 14 14 14 14 14 14 14 14 14 14 14 1		Freq Offset 0 Hz
110				Scale Type
enter 3.911000000 GH2 es BV 1.0 MHz	#VBW 3.0 MHz*	Sweep	Span 0 Hz 40.00 s (4000, pts)	_og <u>Lin</u>
+				

Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

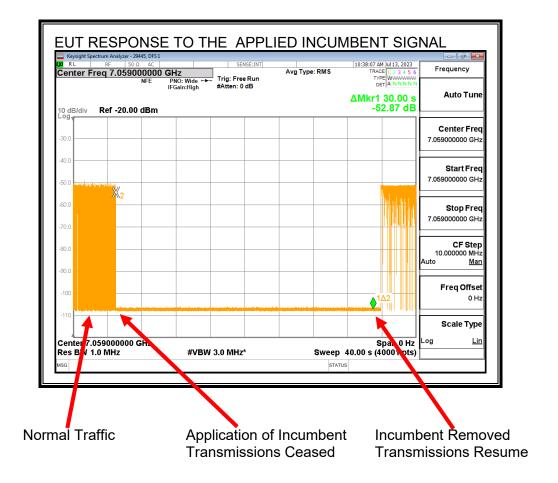
Center Frequency Incumbent Signal fc1:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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Upper Edge Incumbent Signal f_{c3}:



Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

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8.17.4. TABULATED TEST RESULTS

INCUMBENT SIGNAL DETECTION RESULTS

EUT Channel Center Frequency, f _{c1} (MHz)	6985
EUT Nominal Channel Bandwidth (MHz)	160
99% Occupied Bandwidth of the EUT (MHz)	158.04
EUT 99% OBW Lower Edge, F _L (MHz)	6905.98
EUT 99% OBW Upper Edge, F _H (MHz)	7064.02
99% Occupied Bandwidth of the Incumbent Signal (MHz)	9.9993
Test Frequency of Incumbent Signal (f _{c2}) Near EUT F _L (MHz)	6911
Test Frequency of Incumbent Signal at f _{c1} (MHz)	6985
Test Frequency of Incumbent Signal (f _{c3}) Near EUT F _H (MHz)	7059
Maximum Allowed Incumbent Amplitude at Antenna (dBm)	-62
Minimum Antenna Gain (dBi)	-6.0
Maximum Allowed Incumbent Amplitude at Radio Port (dBm)	-68.00
Lowest Passing Measured Incumbent Signal Amplitude at f _{c2} (dBm)	-74.88
Margin (dBm)	-6.88
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c1} (dBm)	-76.15
Margin (dBm)	-8.15
Result (PASS / FAIL)	PASS
Lowest Passing Measured Incumbent Signal Amplitude at f _{c3} (dBm)	-76.02
Margin (dBm)	-8.02
Result (PASS / FAIL)	PASS

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

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INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)					
	Incumbent AWGN	Incumbent AWGN	Incumbent			
Trial	at f _{c2}	at f _{c1}	AWGN at f_{c3}			
1	Yes	Yes	Yes			
2	Yes	Yes	Yes			
3	Yes	Yes	Yes			
4	Yes	Yes	Yes			
5	Yes	Yes	Yes			
6	Yes	No	Yes			
7	Yes	Yes	Yes			
8	Yes	Yes	Yes			
9	Yes	Yes	Yes			
10	Yes	Yes	Yes			
Test Result	PASS	PASS	PASS			

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

A minimum detection rate of 90% is required for the EUT to be compliant.

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8.17.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 4: 99% BW_{EUT} > 4 x 99% BW_{INC}

Incumbent AWGN at f_{c2}:

Measured Incumbent	Test Fixture			Adjusted Incumbent	Detection	
Power at the EUT Test	Cable Path	the Radio	Antenna	Power at the	Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-69.98	4.9	-74.88	-6.0	-68.88	-62	Ceased
-81.33	4.9	-86.23	-6.0	-80.23	-62	Minimal
-83.28	4.9	-88.18	-6.0	-82.18	-62	Normal

Incumbent AWGN at f_{c1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	the Radio	Antenna	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx Status
-71.25	4.9	-76.15	-6.0	-70.15	-62	Ceased
-80.1	4.9	-85	-6.0	-79	-62	Minimal
-84.54	4.9	-89.44	-6.0	-83.44	-62	Normal

Incumbent AWGN at f_{c3}:

		Adjusted Incumbent		Adjusted		
Measured Incumbent	Test Fixture	Power at		Incumbent	Detection	
Power at the EUT Test	Cable Path	the Radio	Antenna	Power at the	Limit	EUT Tx
Fixture Connector (dBm)	Loss (dB)	Port (dBm)	Gain (dBi)	Antenna (dBm)	(dBm)	Status
-71.12	4.9	-76.02	-6.0	-70.02	-62	Ceased
-77.31	4.9	-82.21	-6.0	-76.21	-62	Minimal
-80.36	4.9	-85.26	-6.0	-79.26	-62	Normal

Test Date: 07/13/23 Tested by: 29945 Test location: DFS 1

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9. SETUP PHOTOS

Please refer to setup photos 14523771-EP1V1

END OF TEST REPORT

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