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

MODEL NUMBER: A2849

FCC ID: BCG-E8439A

ISED ID: 579C-E8439A

REPORT NUMBER: 14523771-E30V2

ISSUE DATE: AUGUST 11, 2023

Prepared for
APPLE, INC.
1 APPLE PARK WAY
CUPERTINO CA 95014, U.S.A

Prepared by
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Cert. #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/08/23	Initial Issue	--
V2	08/11/23	Address TCB question on antenna gain	Edgard Rincand

TABLE OF CONTENTS

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.

Reviewed By:

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

Prepared By:

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UL Verification Services Inc.

Approved & Released For
UL Verification Services Inc. By:

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

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

4. REFERENCE DOCUMENTS

Measurements of transmitter parameters as referenced in this report and all other manufacturer's declarations relevant to the RF test requirements are documented in 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
☒	Building 1: 47173 Benicia Street, Fremont, California, USA	US0104	2324A	550739

6. DECISION RULES AND MEASUREMENT UNCERTAINTY

6.1. METROLOGICAL TRACEABILITY

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

6.2. DECISION RULES

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

7. CONTENTION BASED PROTOCOL

7.1. OVERVIEW

7.1.1. LIMITS

FCC

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:

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	987594
U-NII 6	6.425-6.525	15.407(a)(5), (6), (8)	Dual Client	
U-NII 7	6.525-6.875	15.407(a)(4) – (8)	Dual Client	
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	987594 D02
U-NII 6	6.425-6.525	RSS 248, section 4.7	Dual Client	
U-NII 7	6.525-6.875	RSS 248, section 4.7	Dual Client	
U-NII 8	6.875 -7.125	RSS 248, section 4.7	Dual Client	

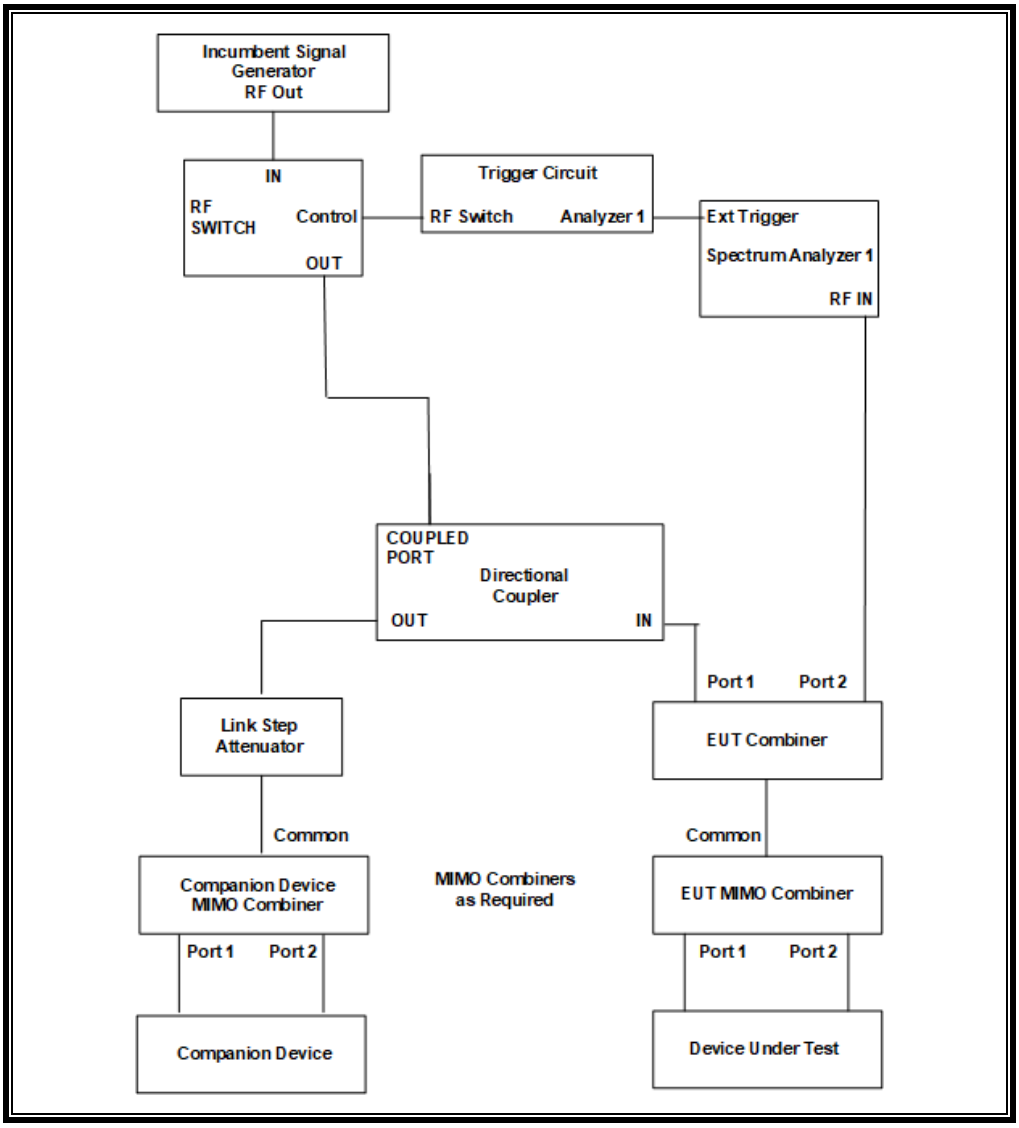
7.2. DESCRIPTION OF TEST SETUP

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.



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.

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

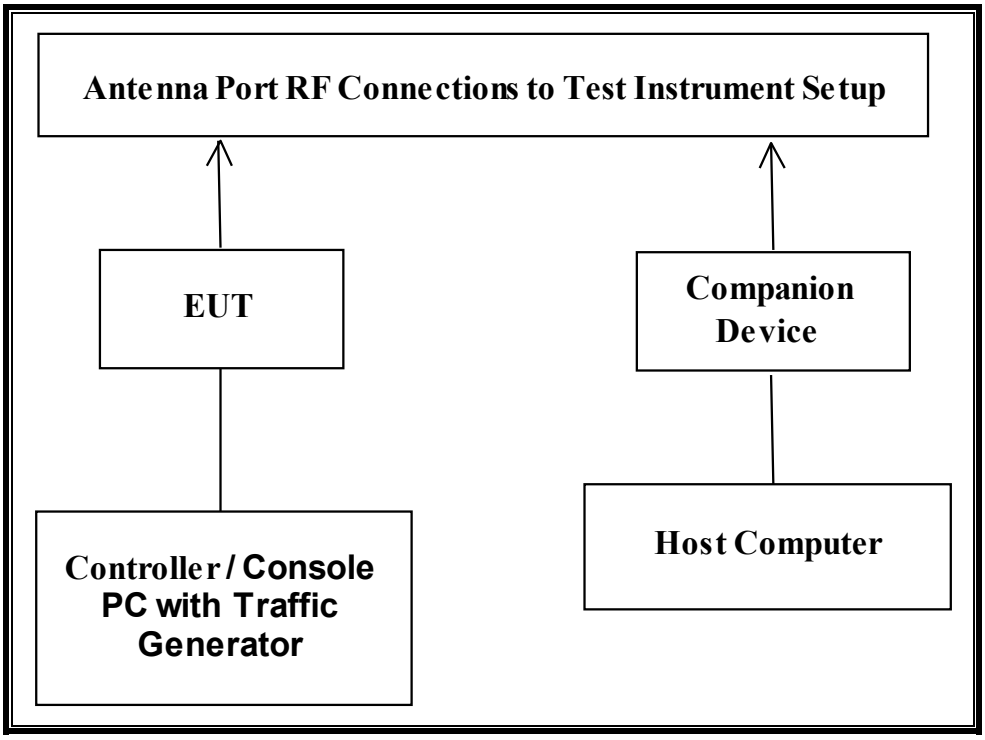
The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

ENVIRONMENT CONDITION

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

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 (Companion Device)	ASUS Computer International	GT-AXE11000	M9IG0X403210HEZ	MSQ-RTAXJF00
AC Adapter 1 (Companion)	AC BEL	ADD011 LPS	ADD01117AG213402136A	DoC
Notebook PC 2 (Companion Host)	Lenovo	Type 20B7-S0A200	PF-02JN9J 14/06	DoC
AC Adapter 2 (Notebook PC 2)	Lenovo	ADLX65NLC2A	11S45N0259Z1ZS974594A9	DoC

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.

8. CONTENTION BASED PROTOCOL

8.1. LIMITS AND PROCEDURES

LIMITS

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).

8.2. U-NII 5 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

$$\textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{99\% BW}_{\textbf{INC}}$$

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

$$\textbf{99\% BW}_{\textbf{INC}} < \textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{2 x 99\% BW}_{\textbf{INC}}$$

8.3.1. TEST CHANNEL

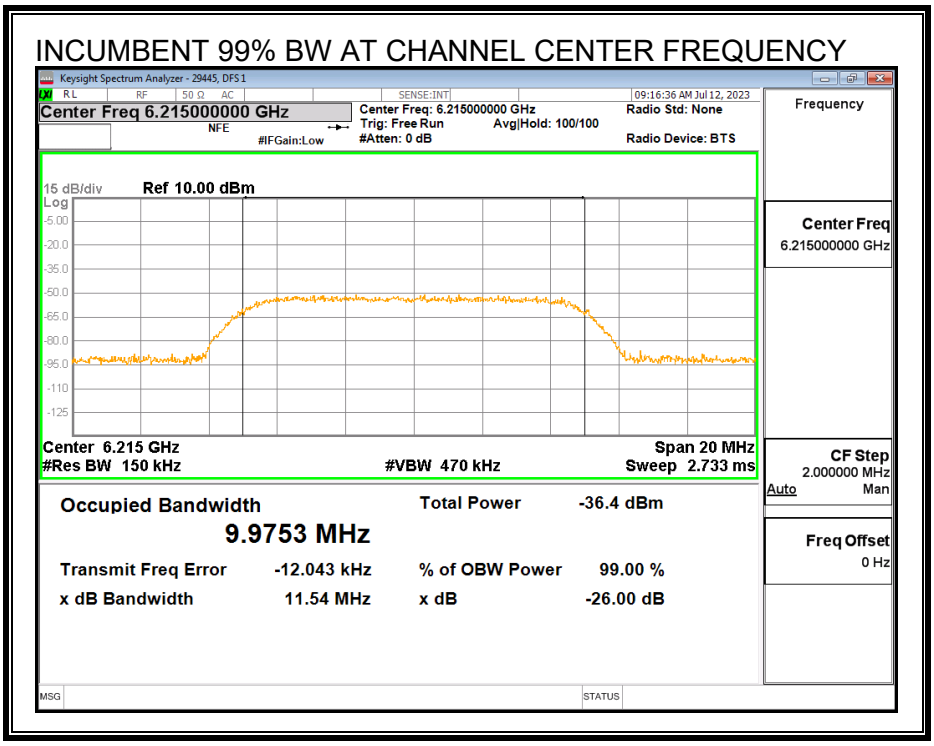
All tests were performed with the EUT set to a channel center frequency of 6215 MHz and a nominal channel bandwidth of 20 MHz.

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

8.3.2. INCUMBENT SIGNAL PLOTS

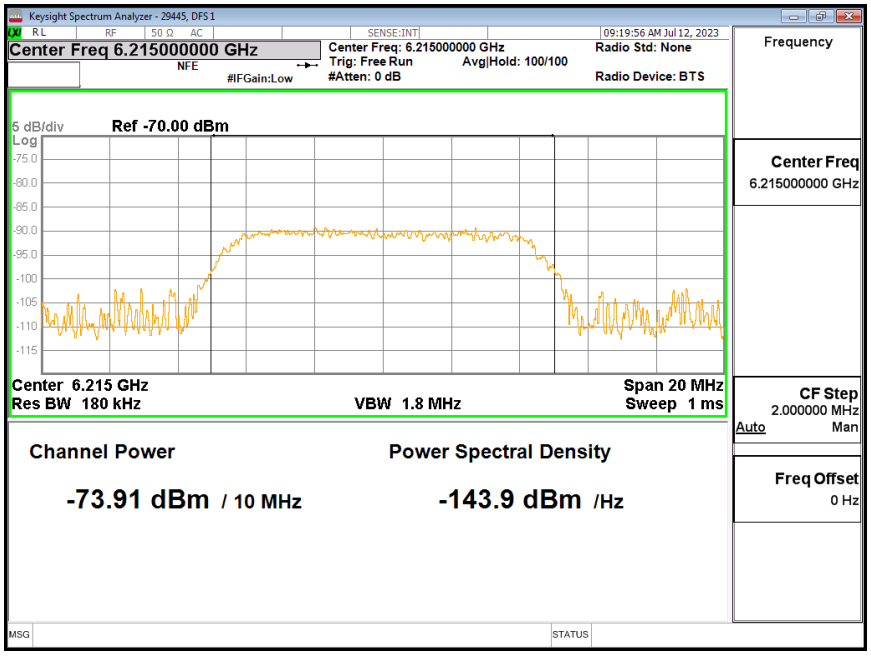
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH



MINIMUM PASSING INCUMBENT SIGNAL POWER

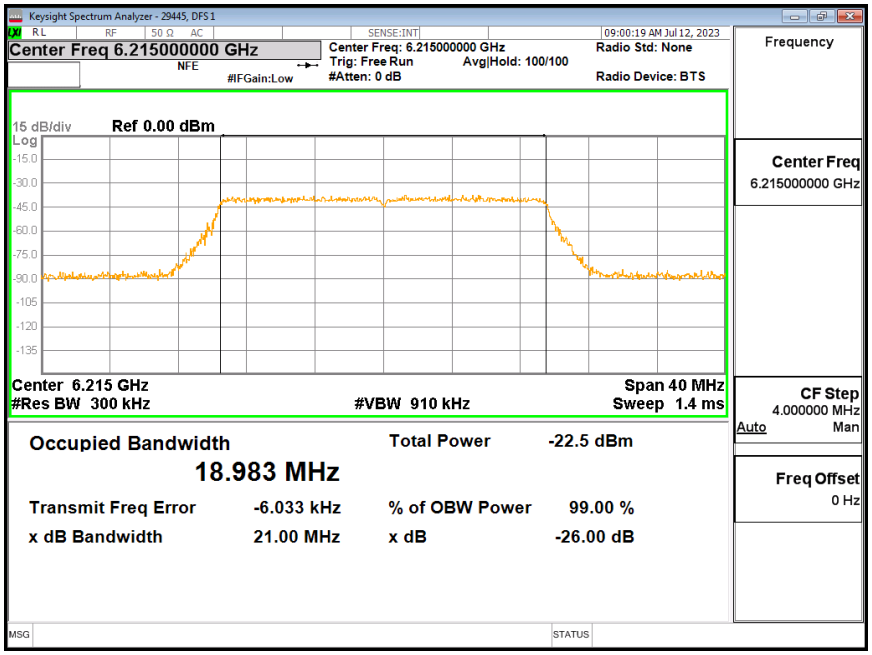
MINIMUM PASSING INCUMBENT SIGNAL POWER



8.3.3. EUT TRANSMISSION PLOTS

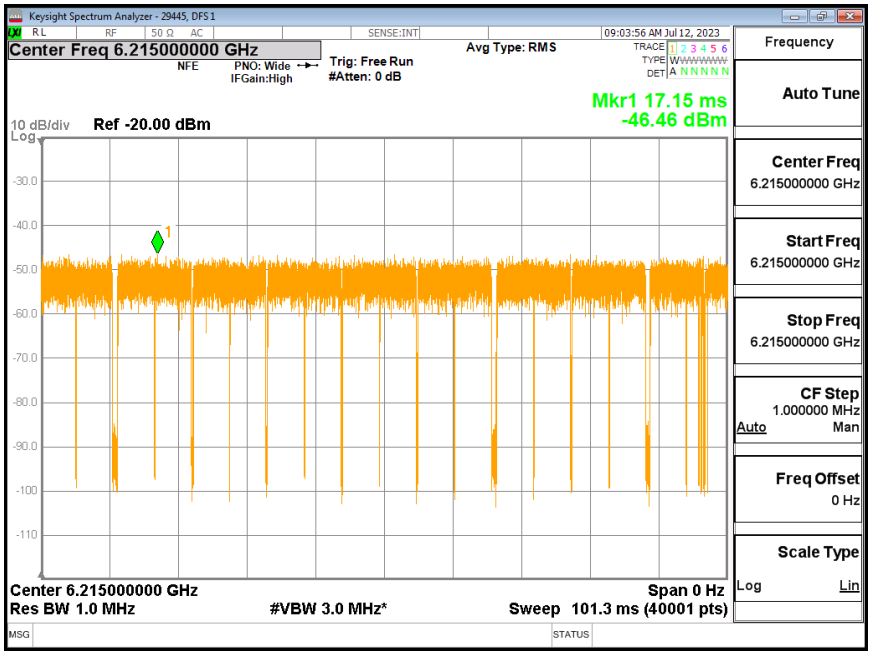
EUT 99% OCCUPIED POWER BANDWIDTH

EUT 99% OCCUPIED POWER BANDWIDTH



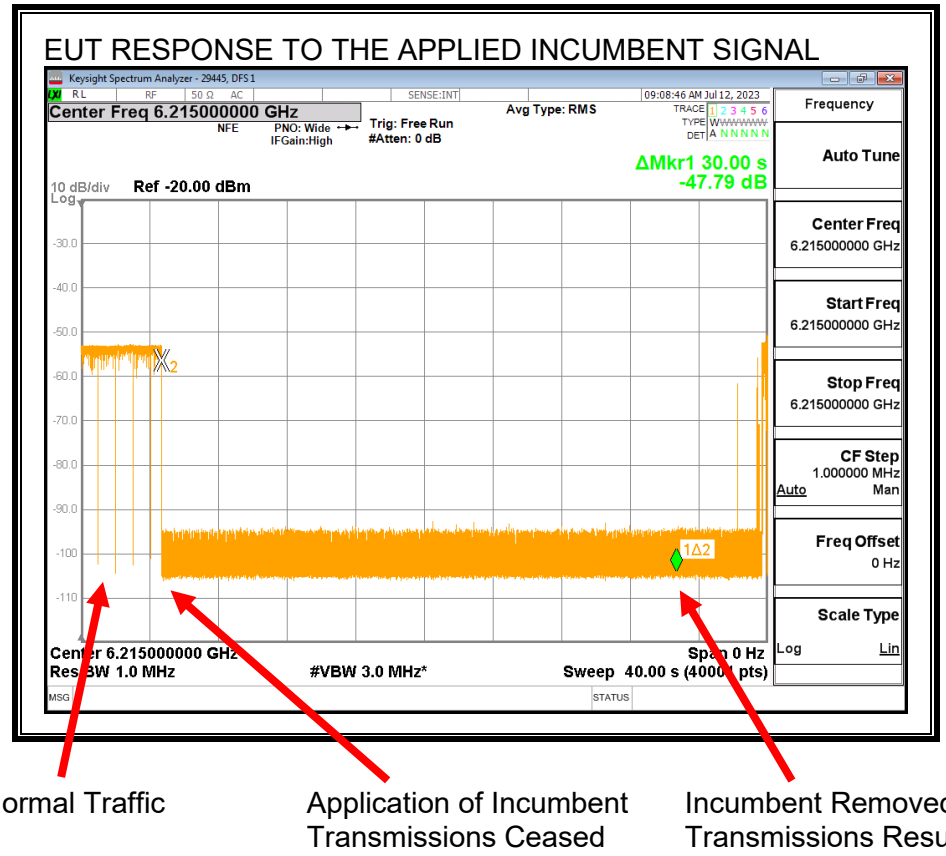
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



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.

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

INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)
Trial	Incumbent AWGN at 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.

8.3.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

Incumbent AWGN at f_{C1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

8.4. U-NII 5 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

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

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

$$\mathbf{99\%\ BW_{EUT} > 4 \times 99\%\ BW_{INC}}$$

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.

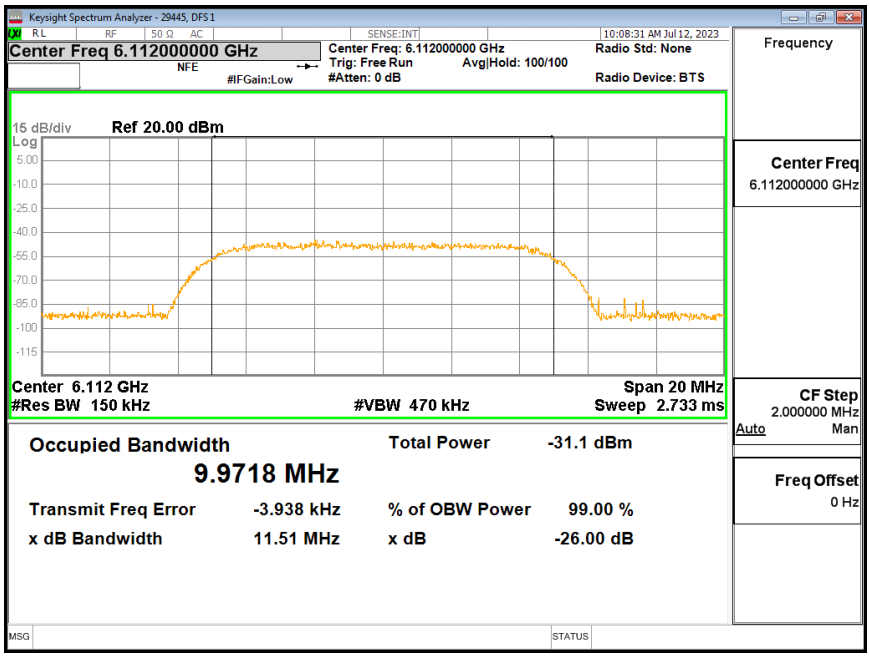
8.5.2. INCUMBENT SIGNAL PLOTS

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

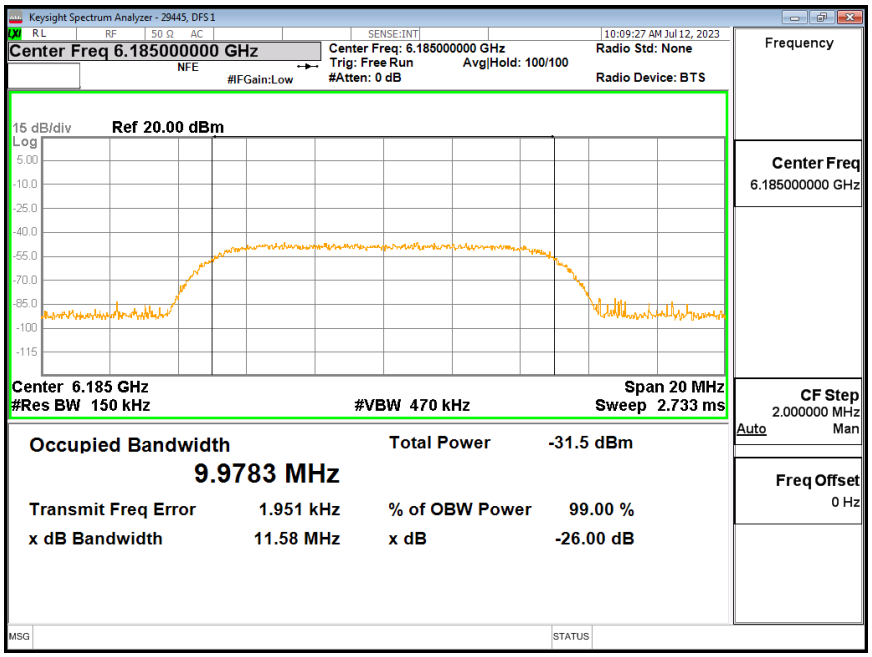
Lower Edge Incumbent Signal f_{c2}:

INCUMBENT 99% BW AT LOWER EDGE f_{c2}



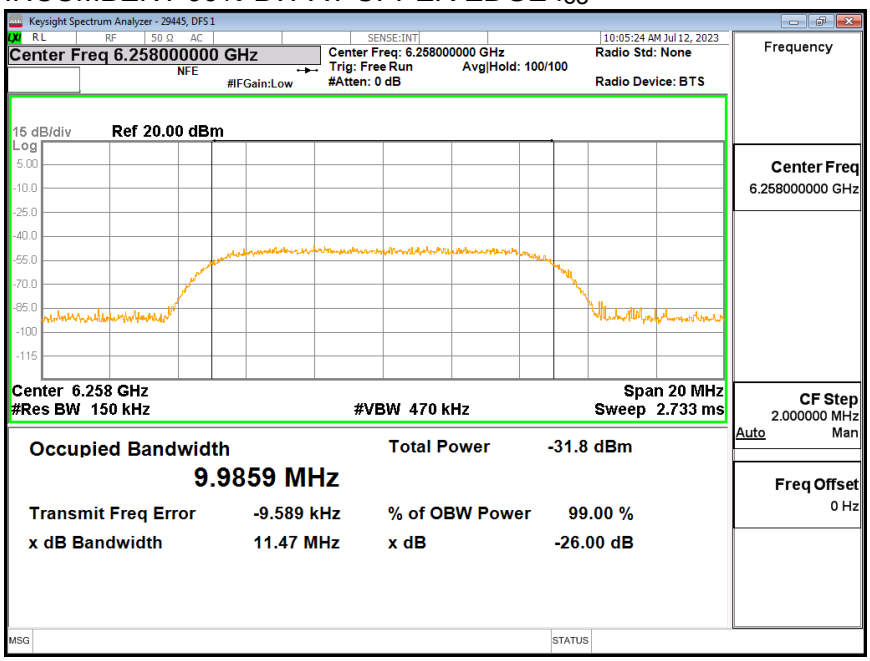
Center Frequency Incumbent Signal f_{c1}:

INCUMBENT 99% BW AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

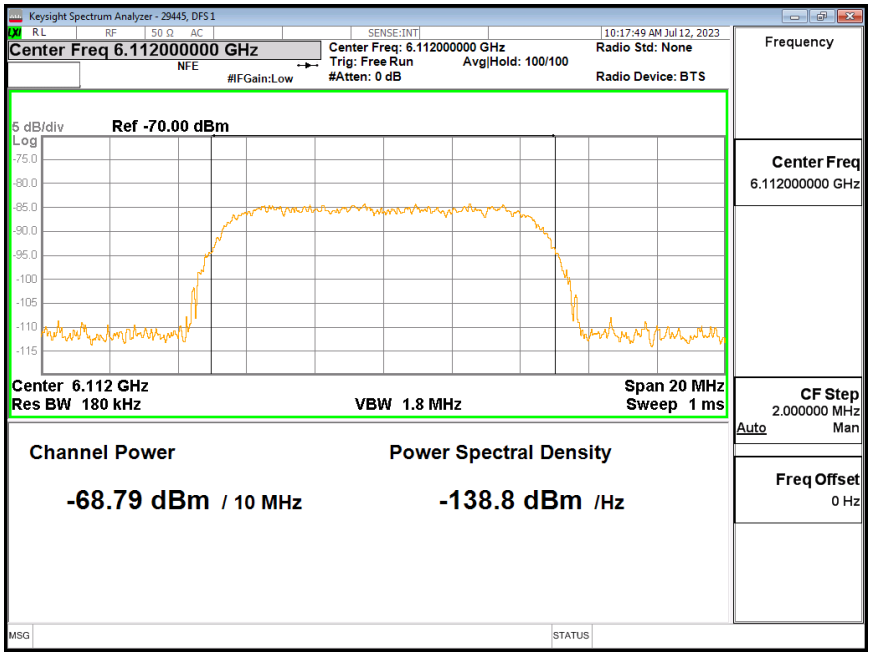
INCUMBENT 99% BW AT UPPER EDGE f_{c3}



MINIMUM PASSING INCUMBENT SIGNAL POWER

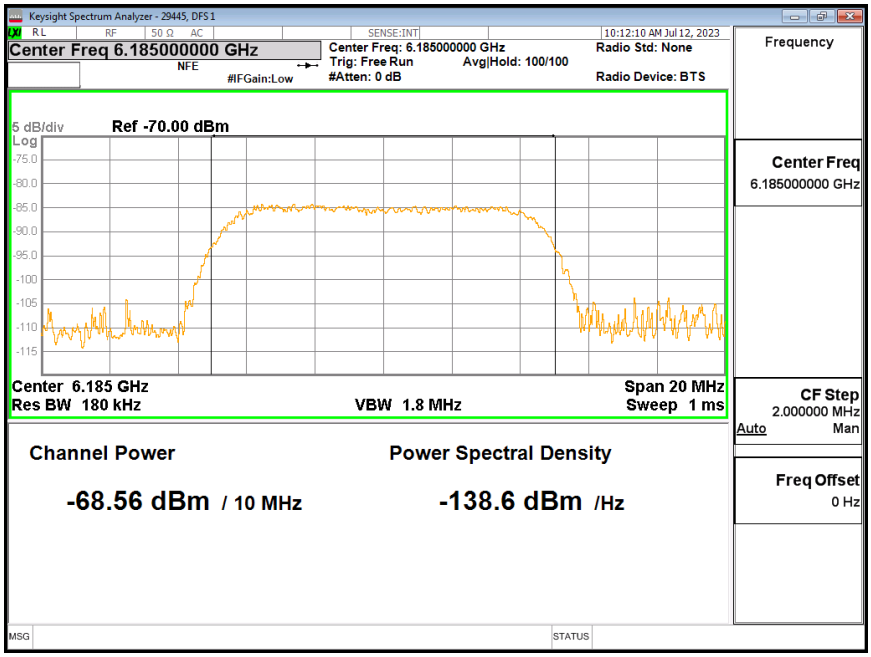
Lower Edge Incumbent Signal f_{c2}:

MIN. PASSING SIGNAL POWER AT LOWER EDGE f_{c2}



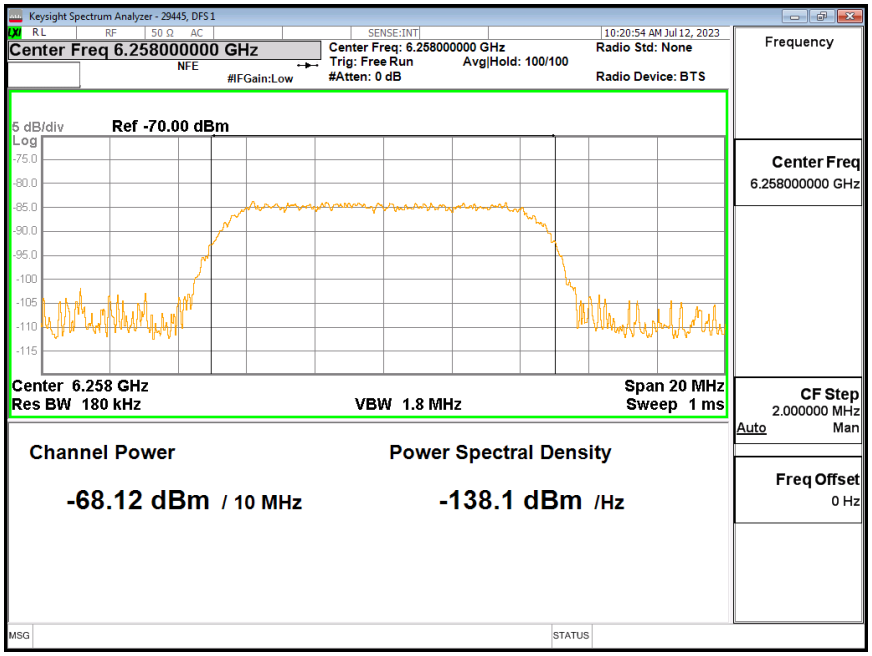
Center Frequency Incumbent Signal f_{c1}:

MIN. PASSING SIGNAL POWER AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

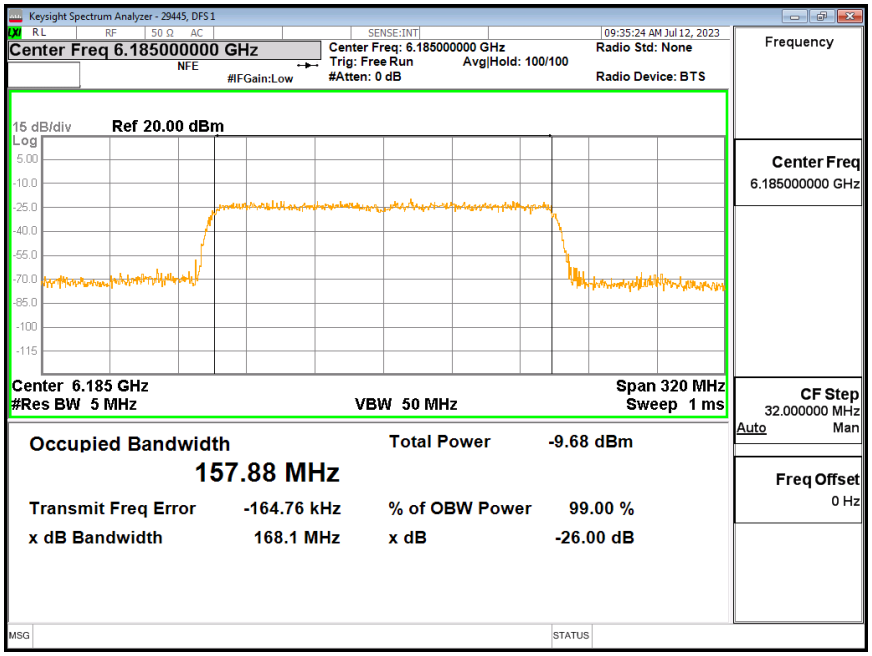
MIN. PASSING SIGNAL POWER AT UPPER EDGE f_{c3}



8.5.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH

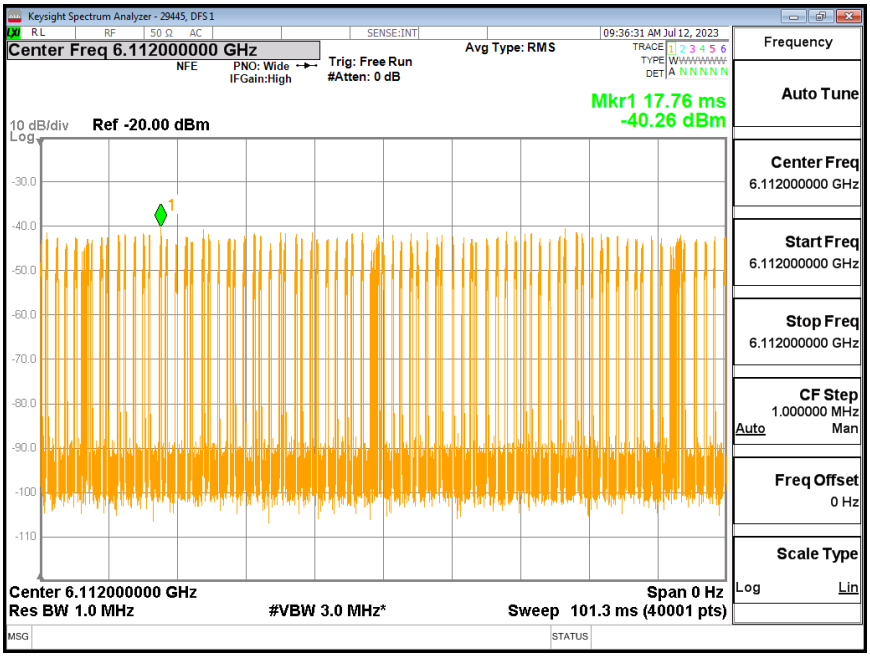
EUT 99% OCCUPIED POWER BANDWIDTH



TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

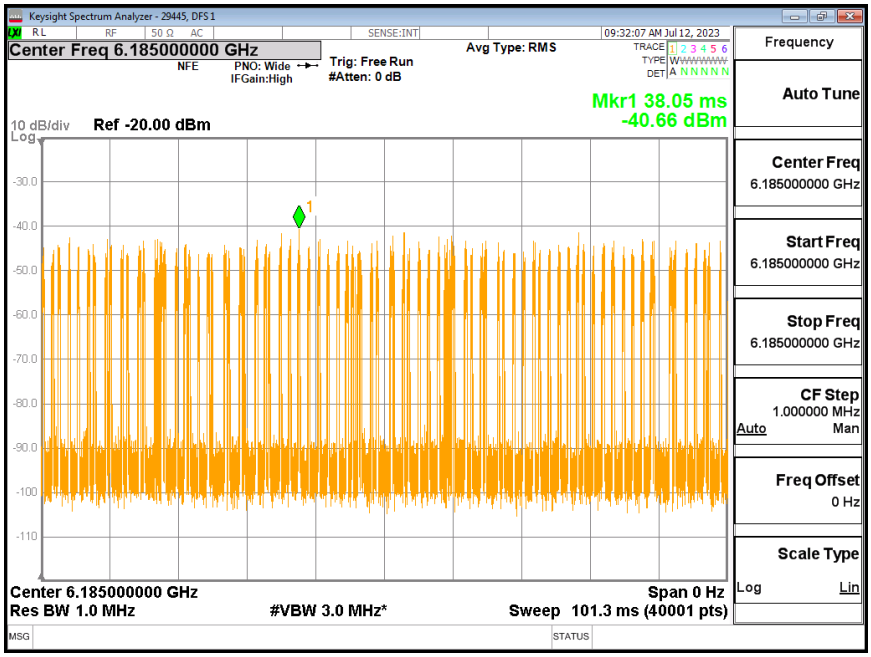
Lower Edge f_{c2}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT

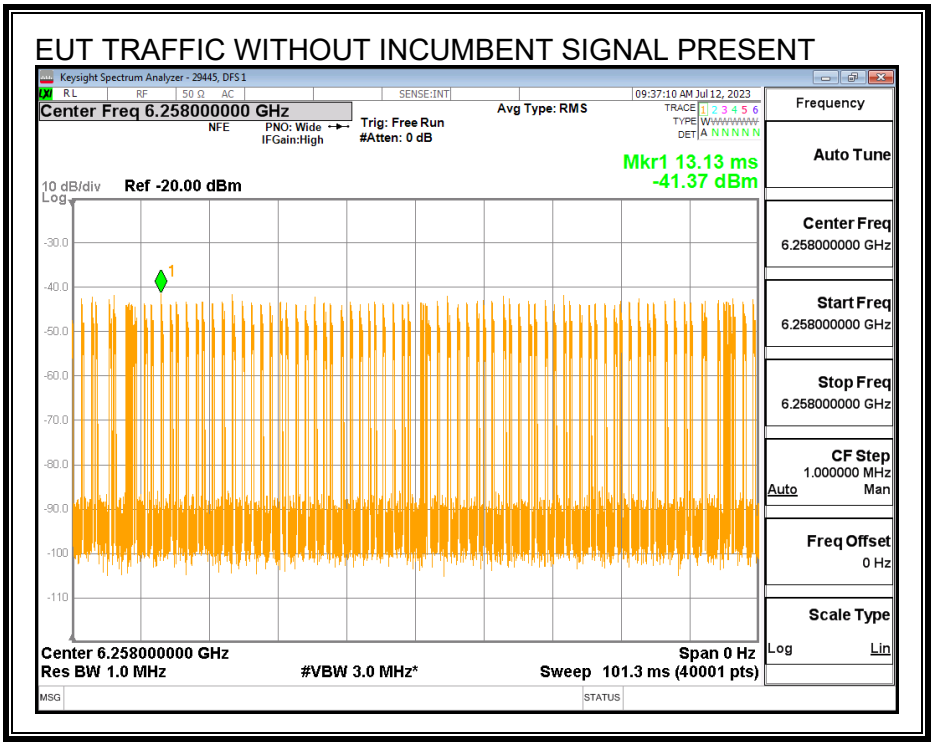


Center Frequency f_{c1}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



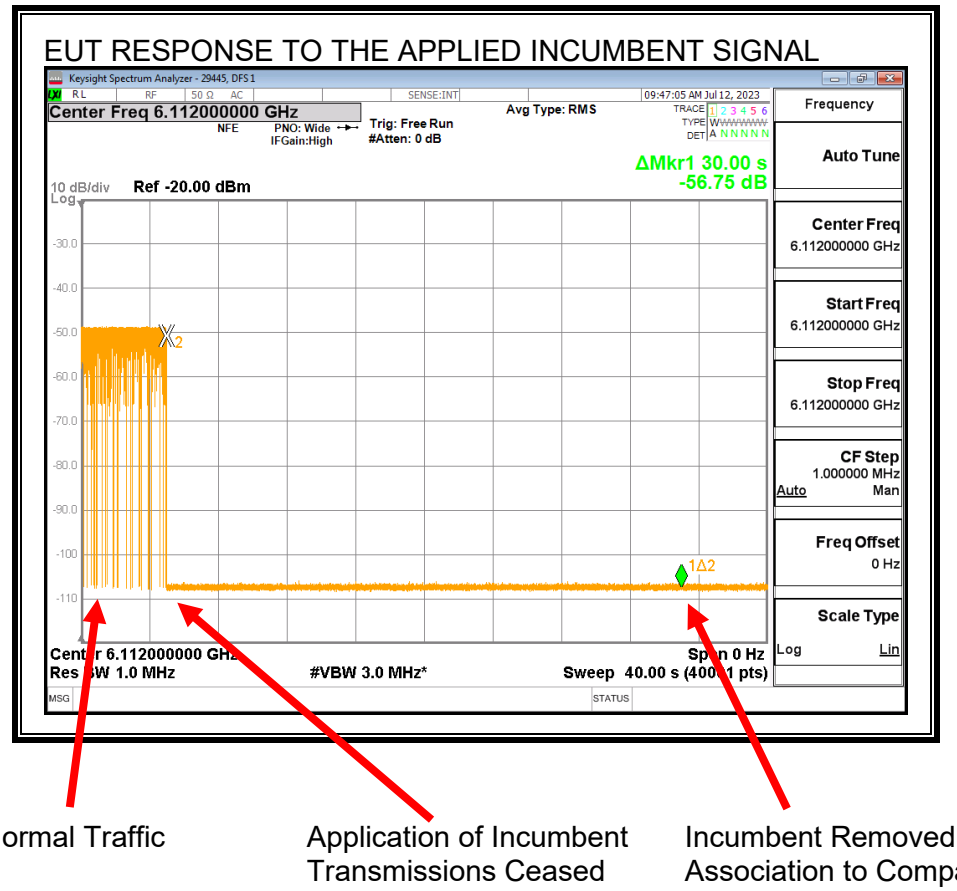
Upper Edge f_{C3}:



EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

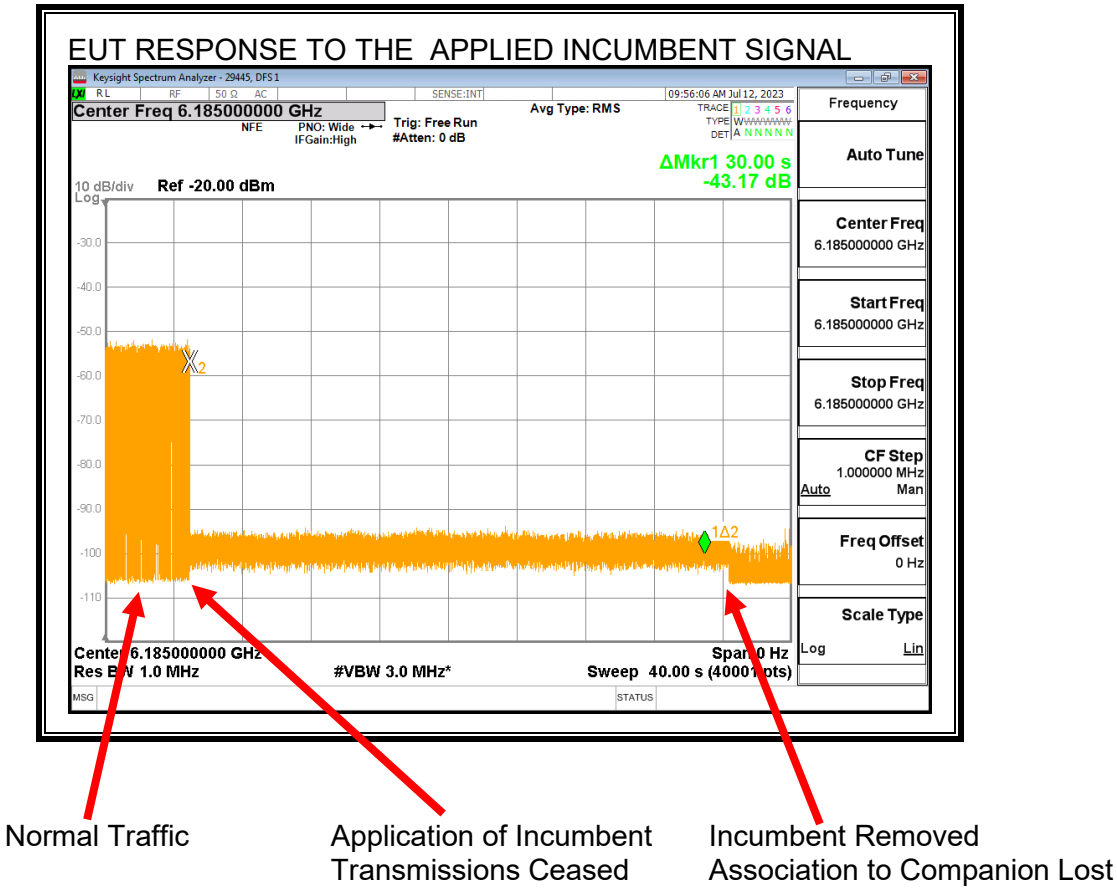
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 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}:



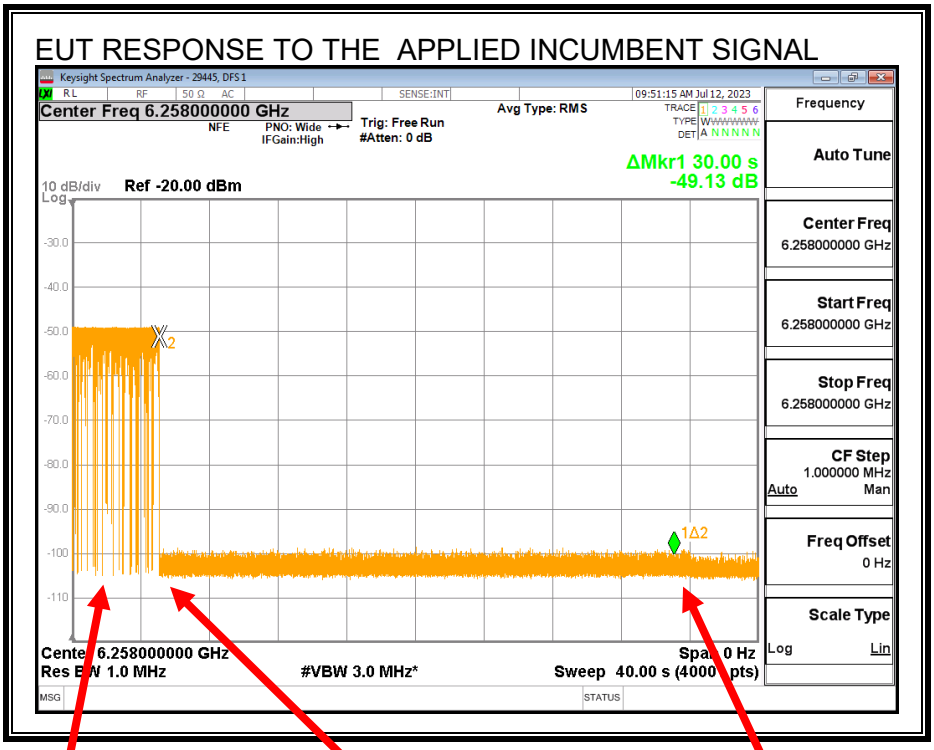
Transmissions cease while the Incumbent AWGN Signal is present and do not resume after it is removed due to the loss of the association to the Companion Device.

Center Frequency Incumbent Signal f_{C1}:



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.

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.

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

INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)		
Trial	Incumbent AWGN at f_{c2}	Incumbent AWGN at f_{c1}	Incumbent AWGN at 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.

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 Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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 Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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 Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

$$\textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{99\% BW}_{\textbf{INC}}$$

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

$$\textbf{99\% BW}_{\textbf{INC}} < \textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{2 x 99\% BW}_{\textbf{INC}}$$

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.

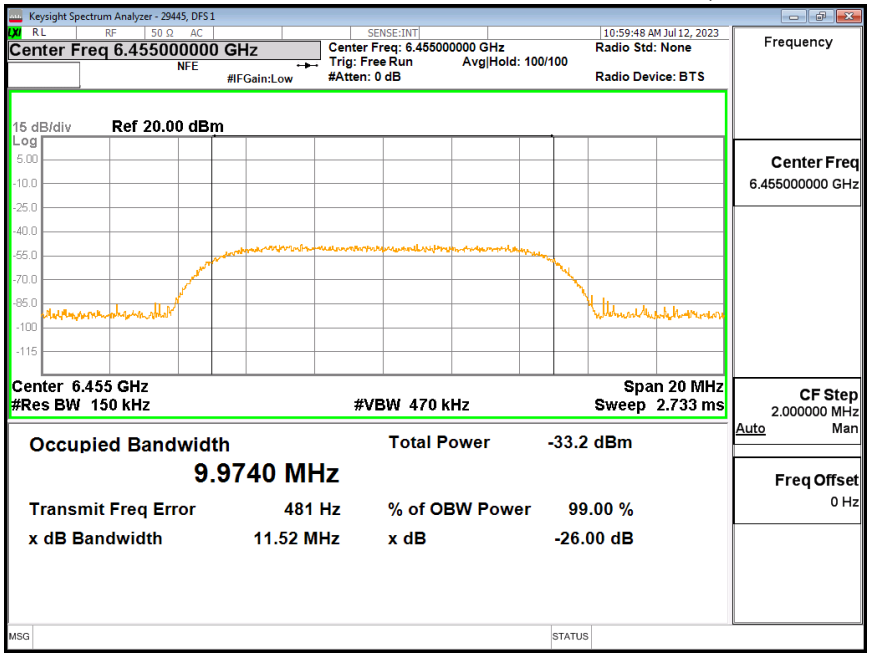
Only the lowest and highest supported channel bandwidths are required to be tested.

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.

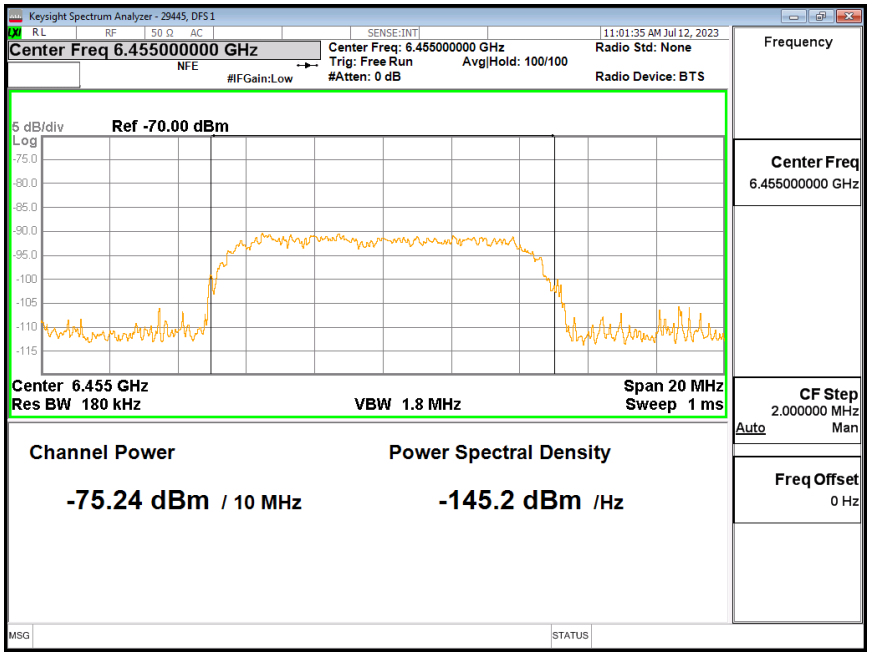
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

INCUMBENT 99% BW AT CHANNEL CENTER FREQUENCY



MINIMUM PASSING INCUMBENT SIGNAL POWER

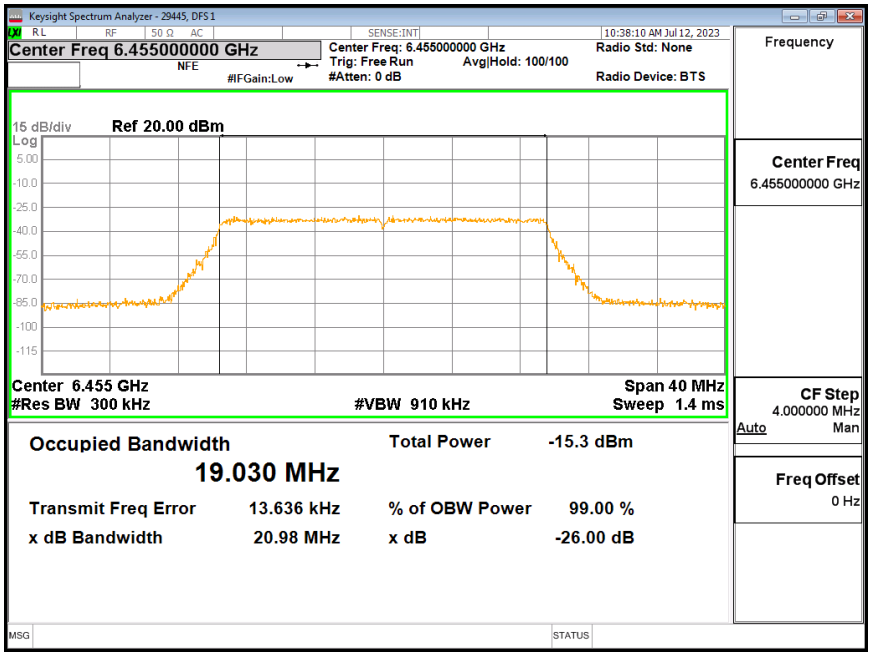
MINIMUM PASSING INCUMBENT SIGNAL POWER



8.7.3. EUT TRANSMISSION PLOTS

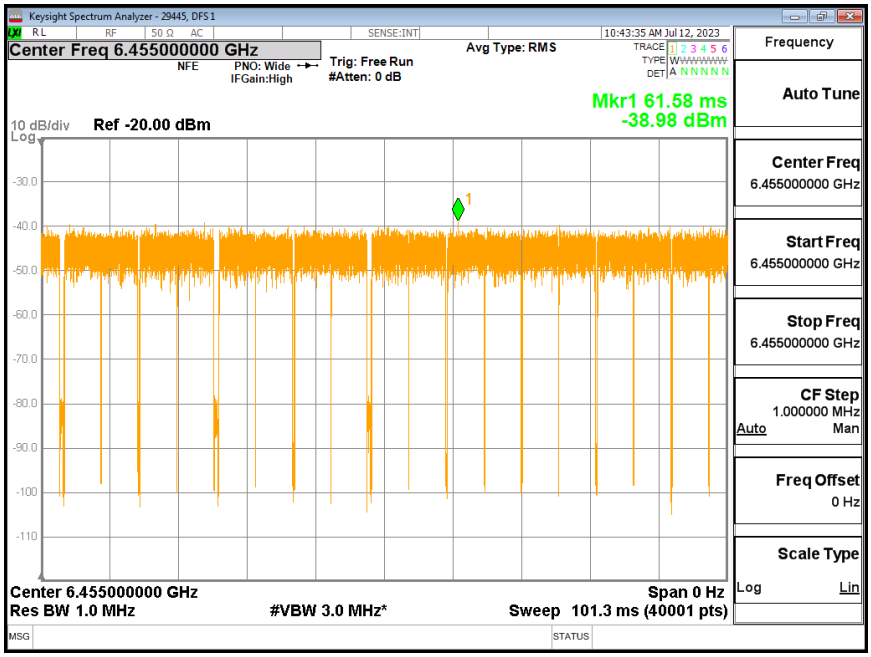
EUT 99% OCCUPIED POWER BANDWIDTH

EUT 99% OCCUPIED POWER BANDWIDTH



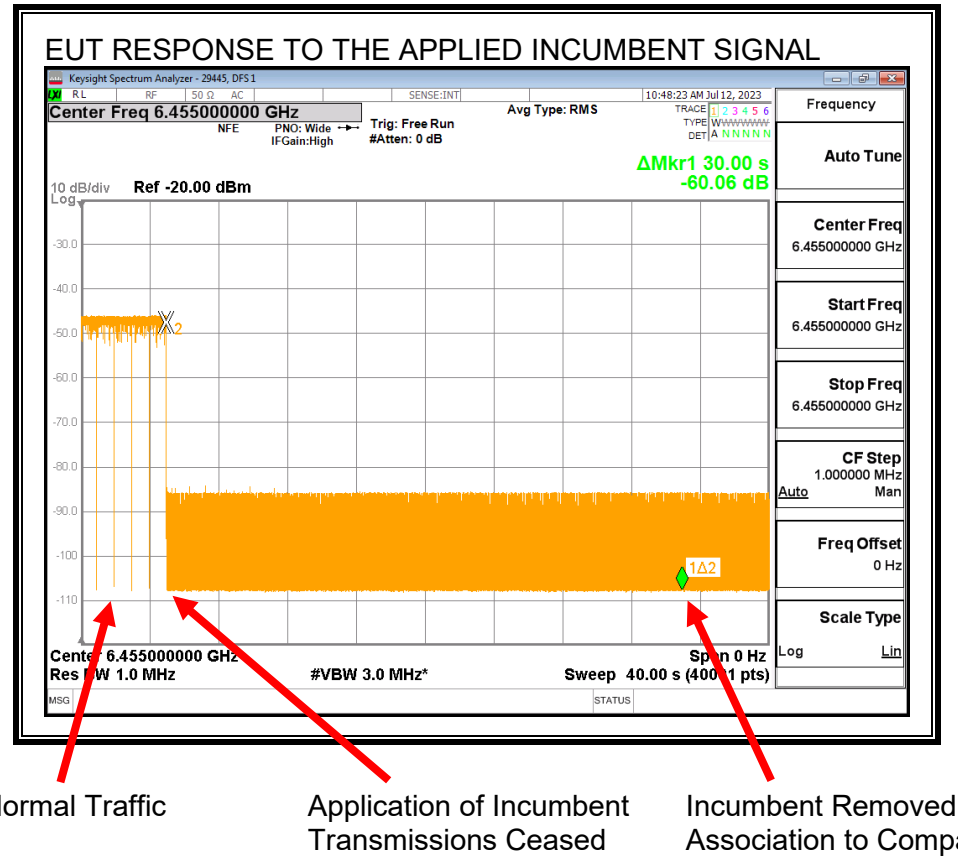
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



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 do not resume after it is removed due to the loss of the association to the Companion Device.

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, 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

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.

8.7.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

Incumbent AWGN at f_{C1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

8.8. U-NII 6 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

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

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

$$\mathbf{99\%\ BW_{EUT} > 4 \times 99\%\ BW_{INC}}$$

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.

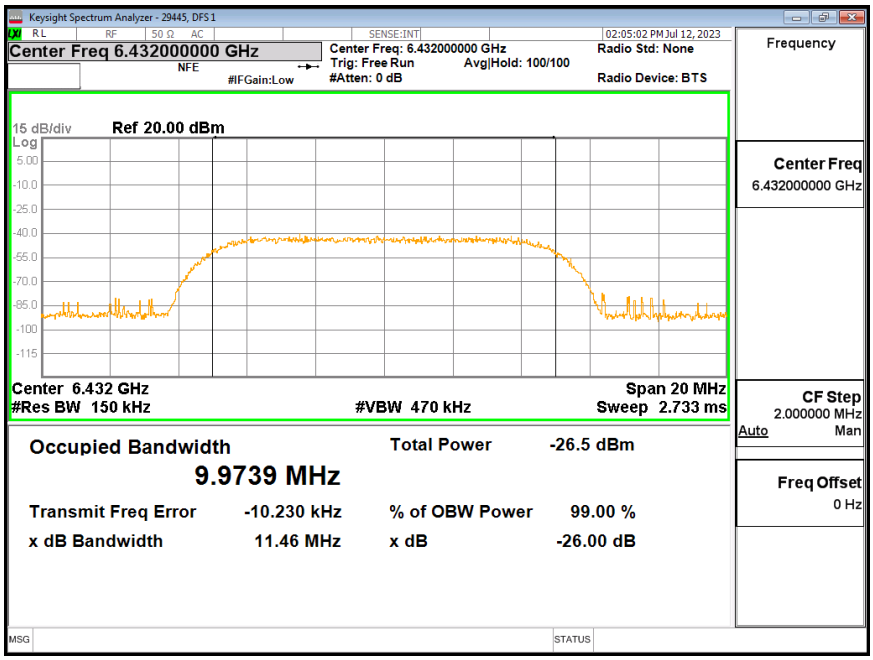
8.9.2. INCUMBENT SIGNAL PLOTS

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

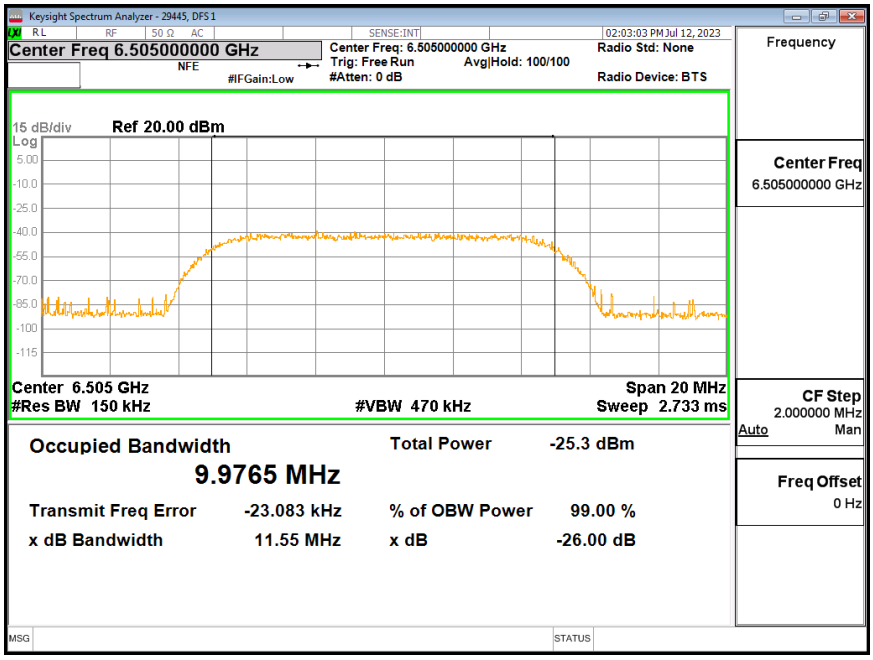
Lower Edge Incumbent Signal f_{c2}:

INCUMBENT 99% BW AT LOWER EDGE f_{c2}



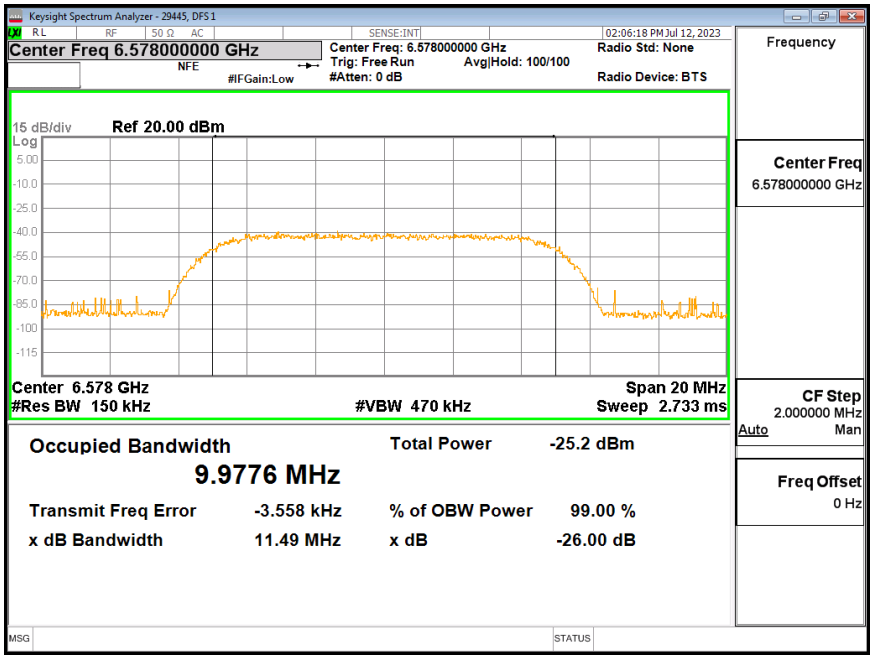
Center Frequency Incumbent Signal f_{c1}:

INCUMBENT 99% BW AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

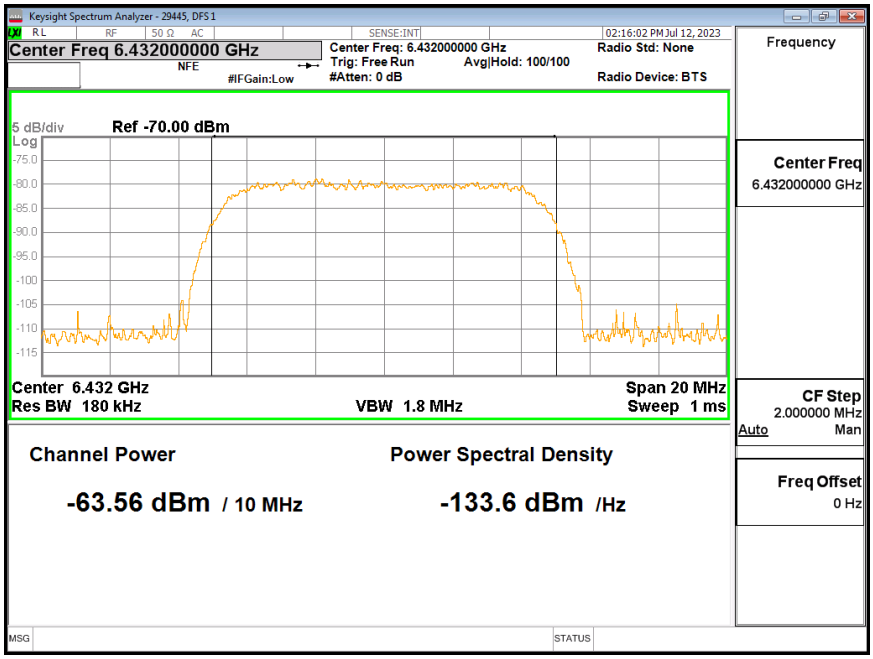
INCUMBENT 99% BW AT UPPER EDGE f_{c3}



MINIMUM PASSING INCUMBENT SIGNAL POWER

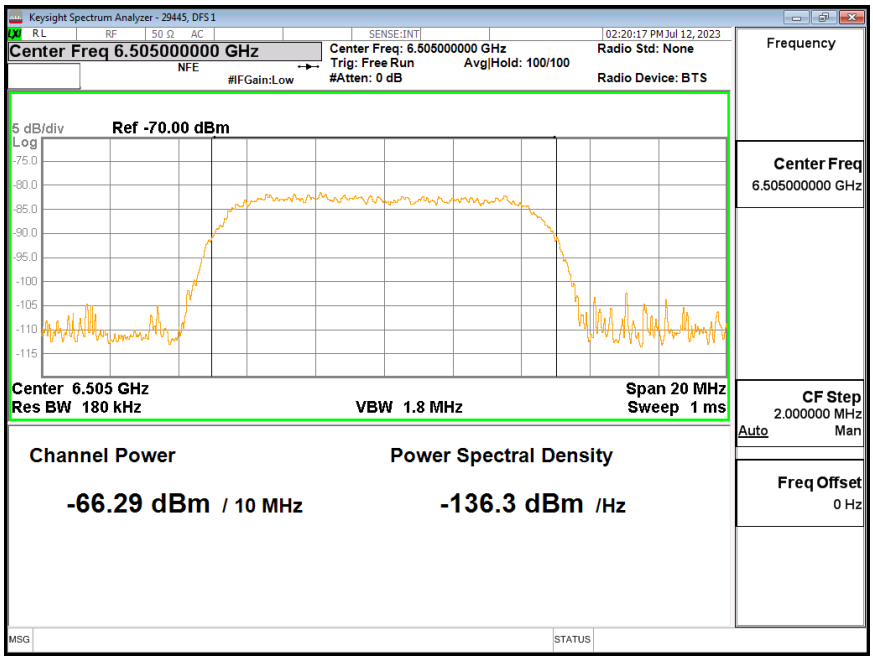
Lower Edge Incumbent Signal f_{c2}:

MIN. PASSING SIGNAL POWER AT LOWER EDGE f_{c2}



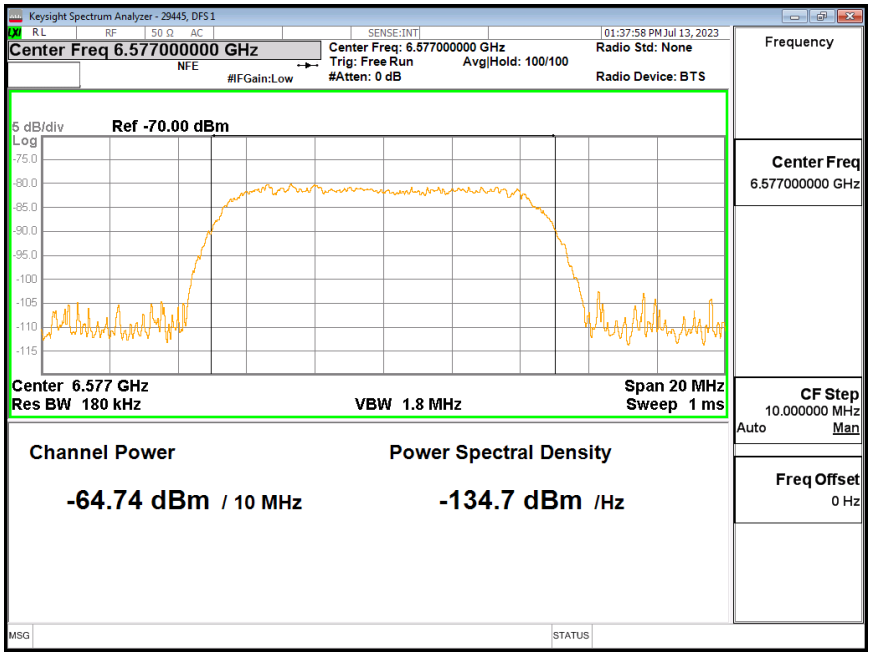
Center Frequency Incumbent Signal f_{c1}:

MIN. PASSING SIGNAL POWER AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

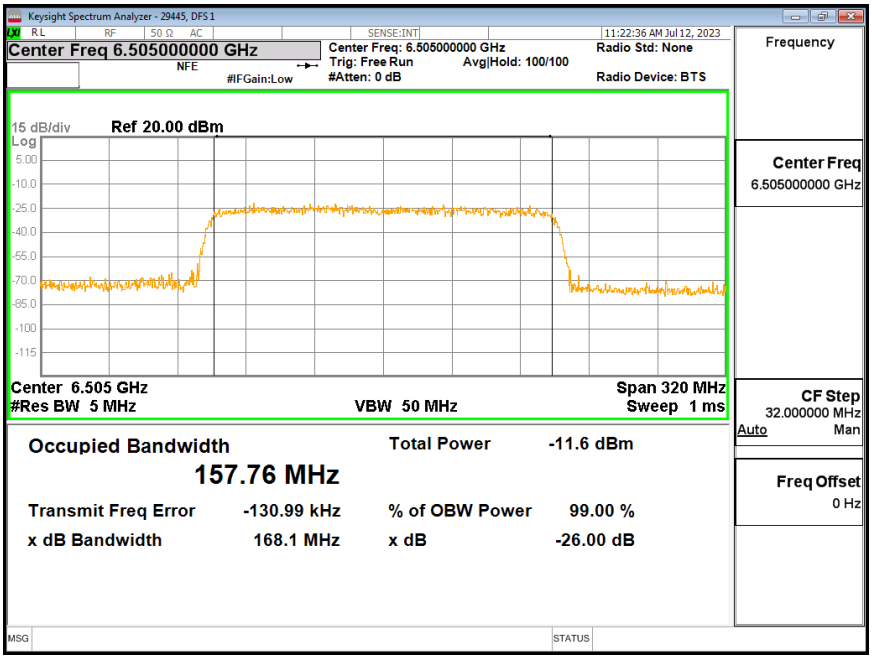
MIN. PASSING SIGNAL POWER AT UPPER EDGE f_{c3}



8.9.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH

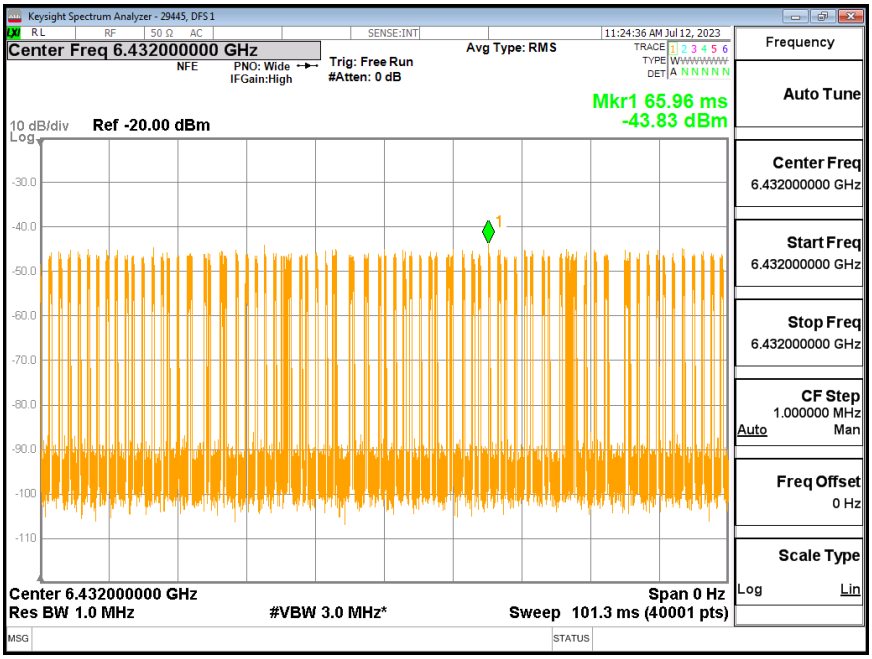
EUT 99% OCCUPIED POWER BANDWIDTH



TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

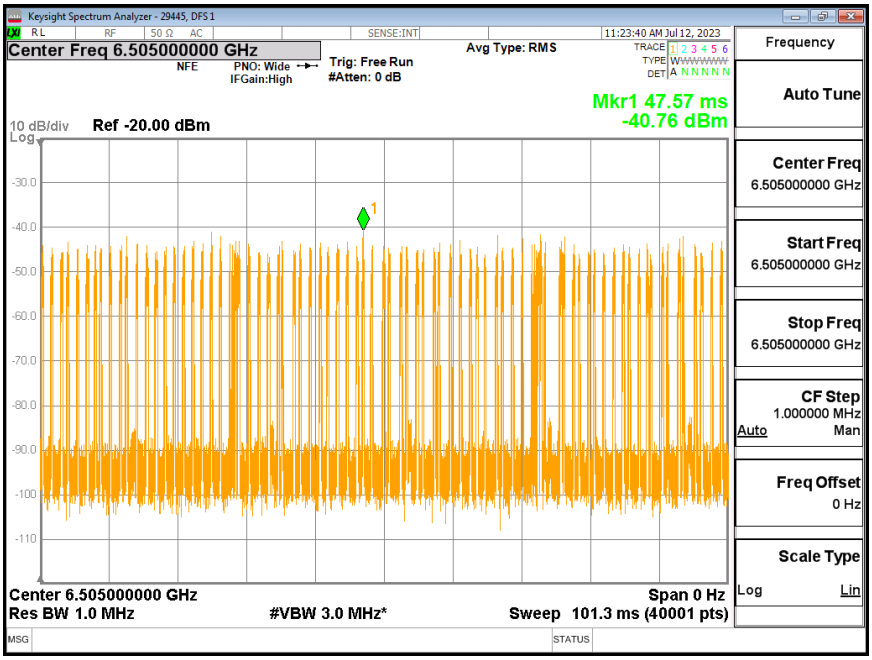
Lower Edge f_{c2}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT

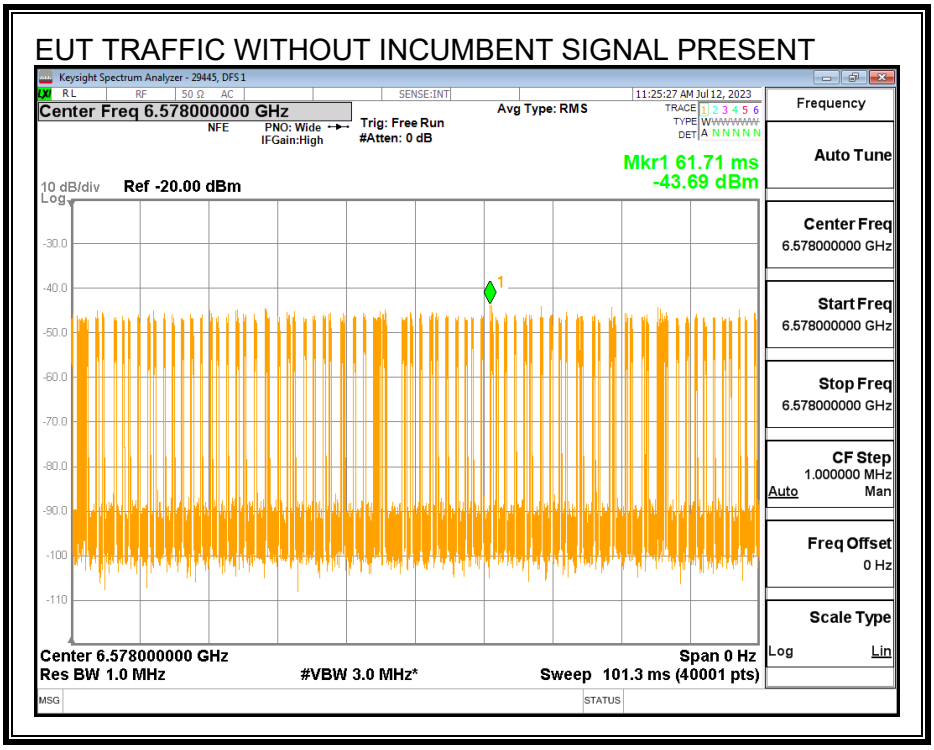


Center Frequency f_{c1}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



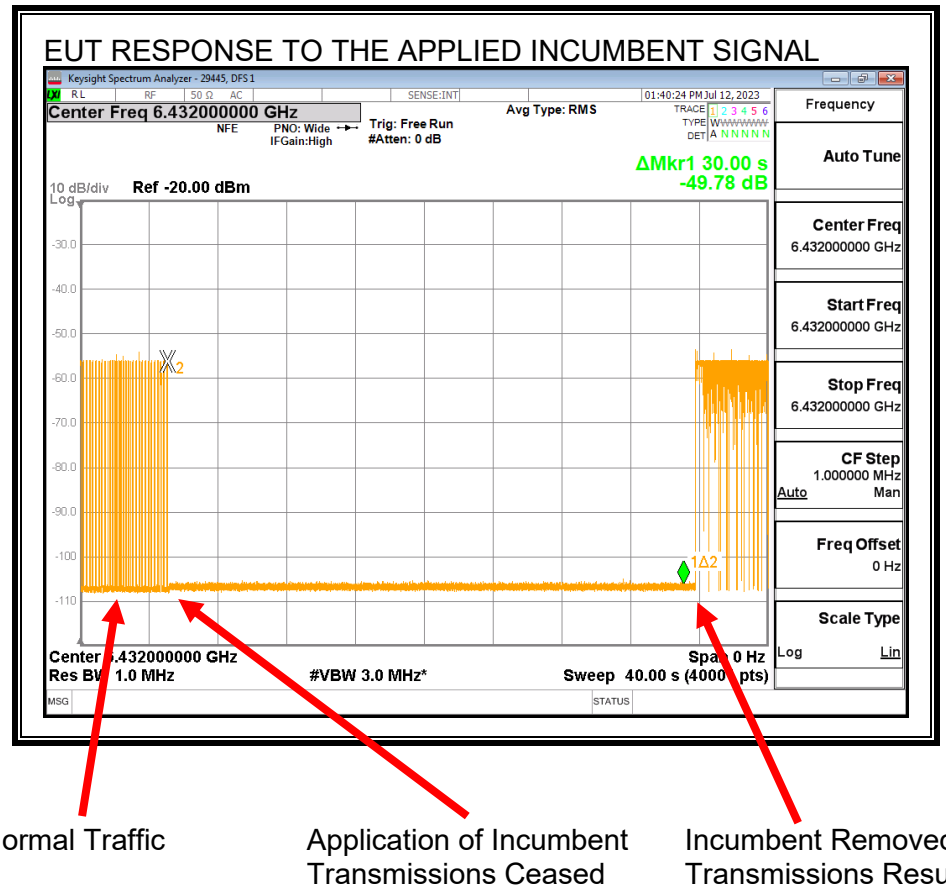
Upper Edge f_{C3}:



EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

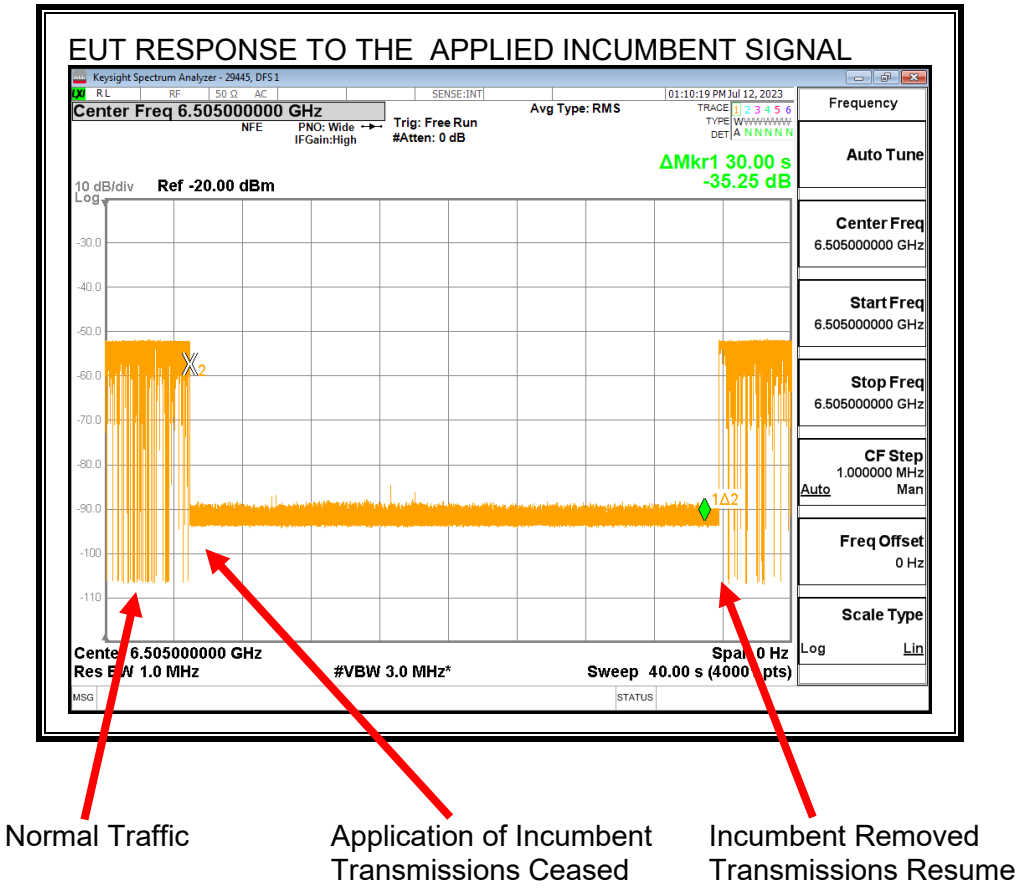
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 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}:



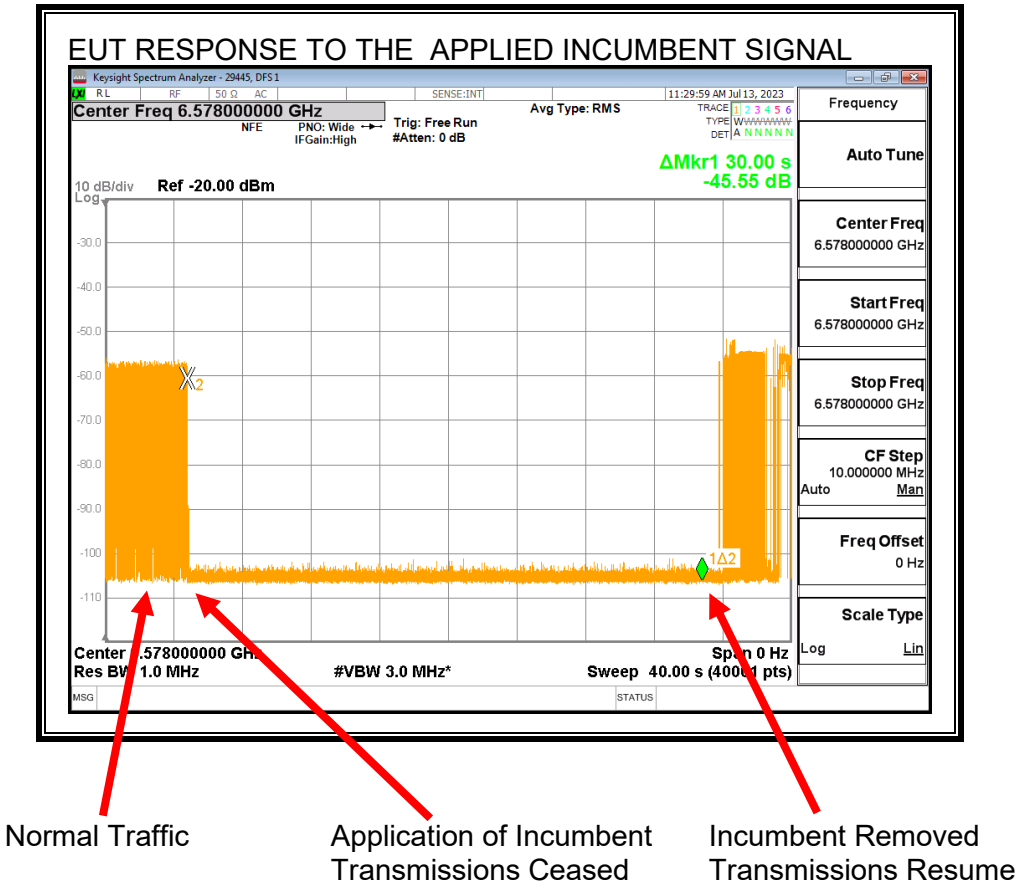
Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

Center Frequency Incumbent Signal f_{C1}:



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

Upper Edge Incumbent Signal f_{C3}:



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

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

INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)		
Trial	Incumbent AWGN at f_{c2}	Incumbent AWGN at f_{c1}	Incumbent 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	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.

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)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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

8.10. U-NII 7 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

$$\textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{99\% BW}_{\textbf{INC}}$$

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

$$\textbf{99\% BW}_{\textbf{INC}} < \textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{2 x 99\% BW}_{\textbf{INC}}$$

8.11.1. TEST CHANNEL

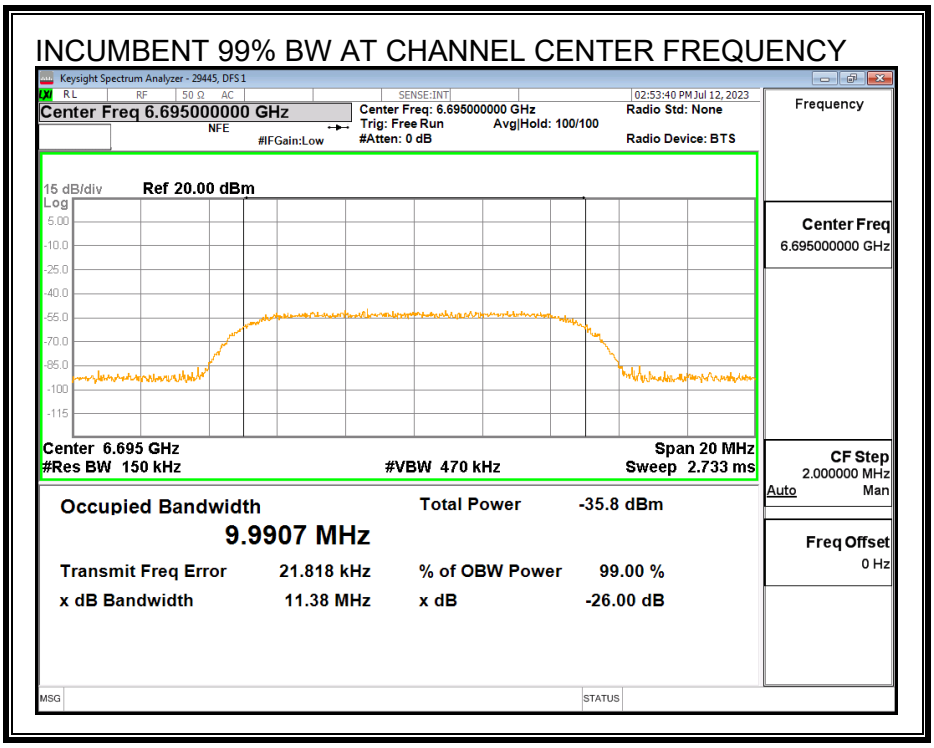
All tests were performed with the EUT set to a channel center frequency of 6695 MHz and a nominal channel bandwidth of 20 MHz.

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

8.11.2. INCUMBENT SIGNAL PLOTS

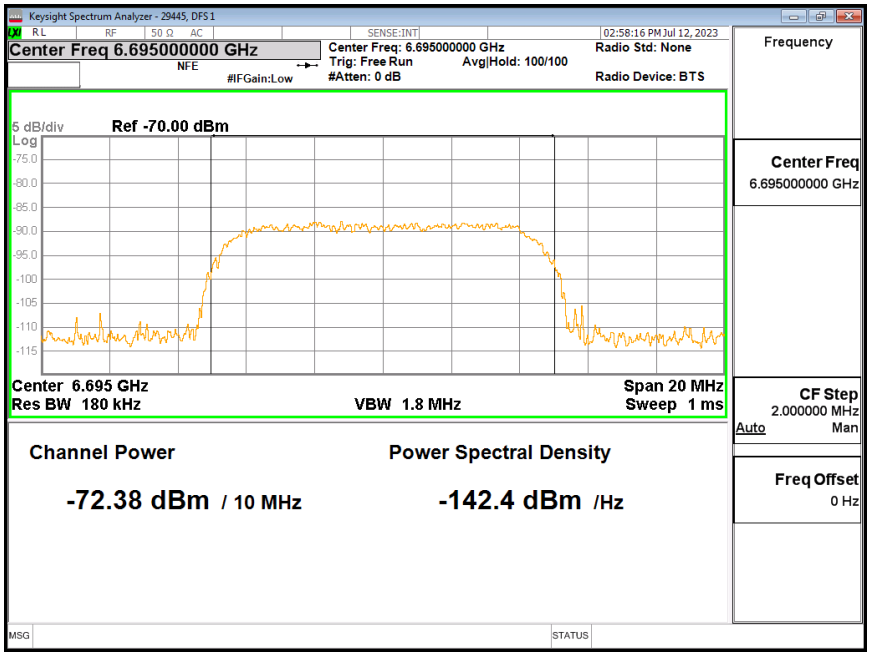
All tests were performed with the Incumbent Signal frequency set to the test channel center frequency and a nominal 99% Occupied Power Bandwidth of 10 MHz.

INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH



MINIMUM PASSING INCUMBENT SIGNAL POWER

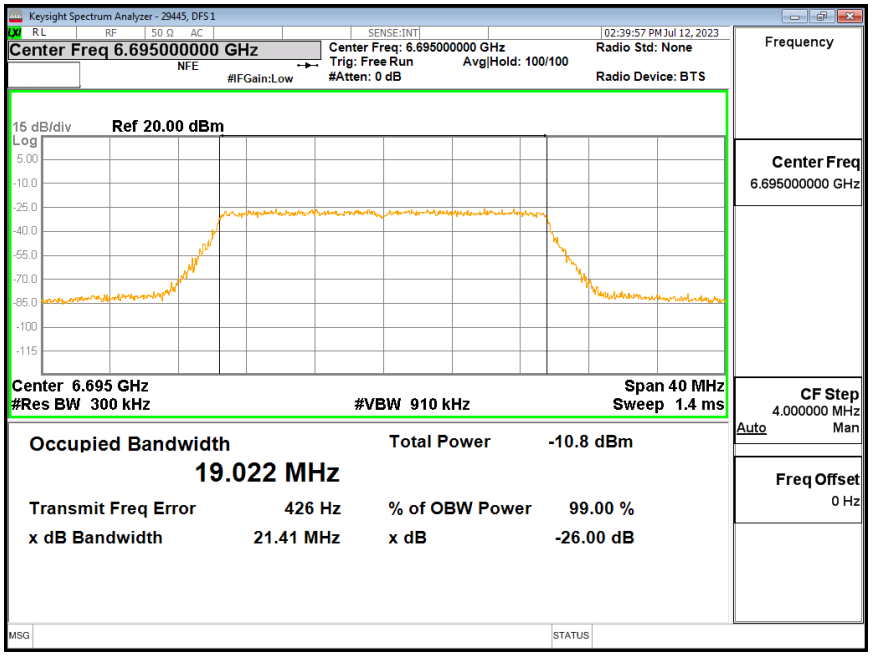
MINIMUM PASSING INCUMBENT SIGNAL POWER



8.11.3. EUT TRANSMISSION PLOTS

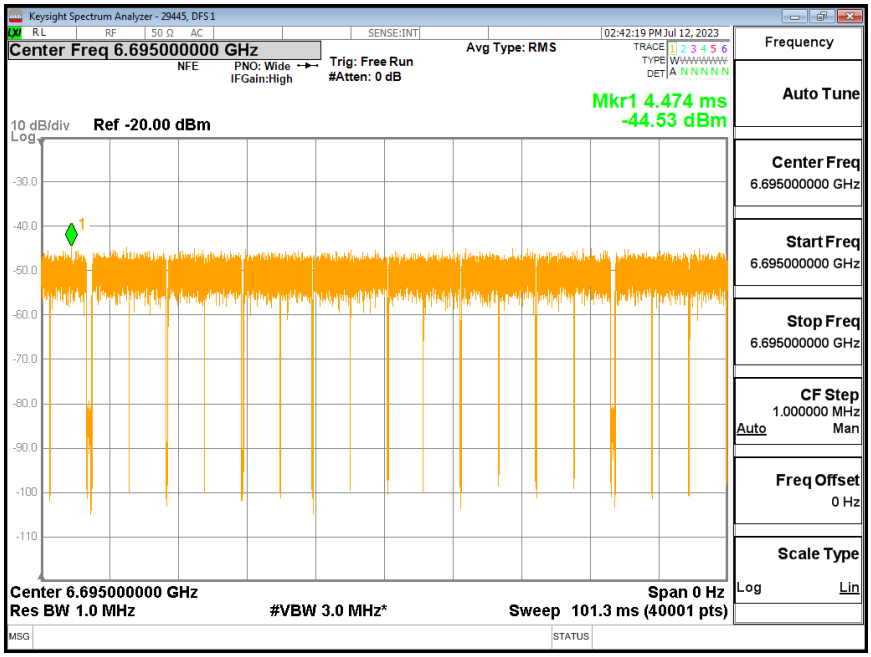
EUT 99% OCCUPIED POWER BANDWIDTH

EUT 99% OCCUPIED POWER BANDWIDTH



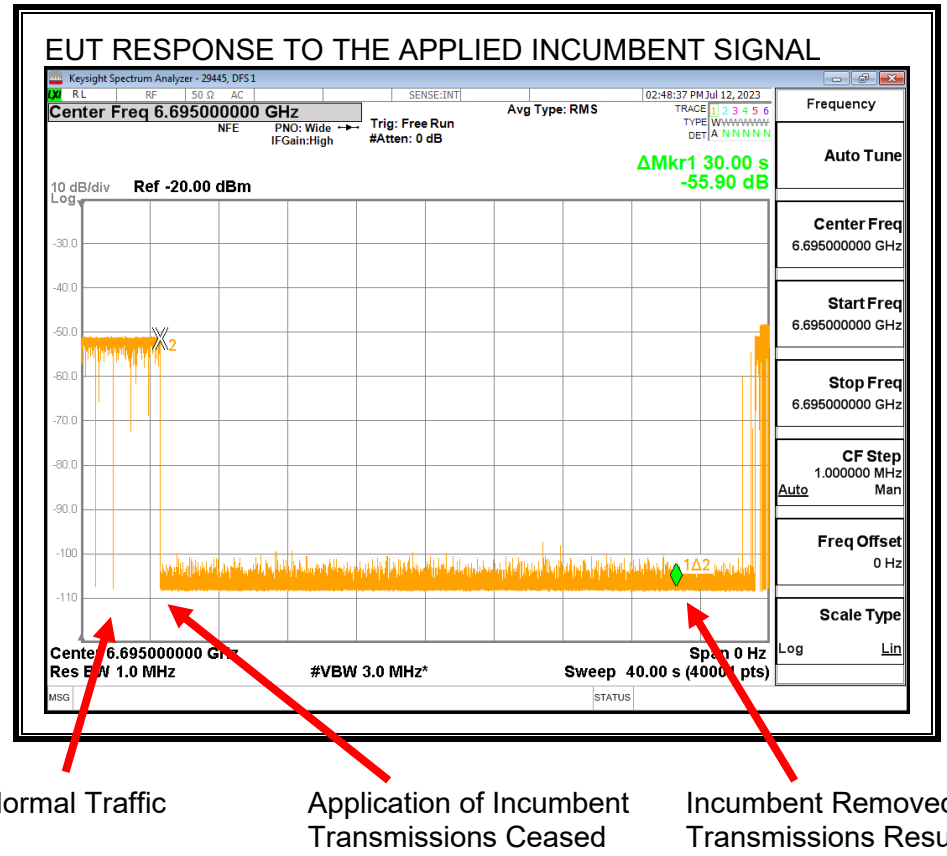
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



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.

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

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: 07/12/23

Tested by: 29945

Test location: DFS 1

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

8.11.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

Incumbent AWGN at f_{C1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

8.12. U-NII 7 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

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

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

$$99\%\ BW_{EUT} > 4 \times 99\%\ BW_{INC}$$

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.

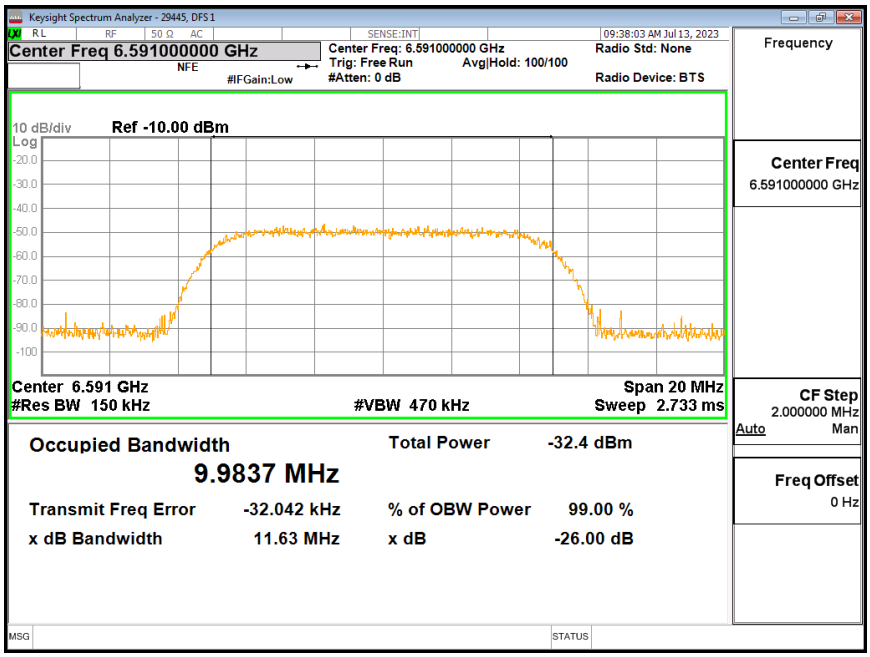
8.13.2. INCUMBENT SIGNAL PLOTS

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

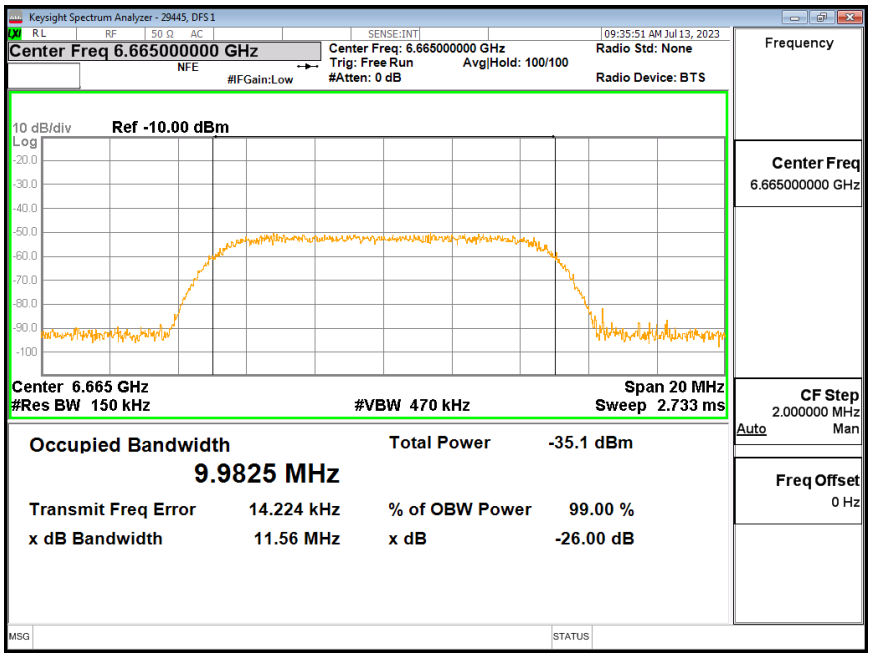
Lower Edge Incumbent Signal f_{c2}:

INCUMBENT 99% BW AT LOWER EDGE f_{c2}



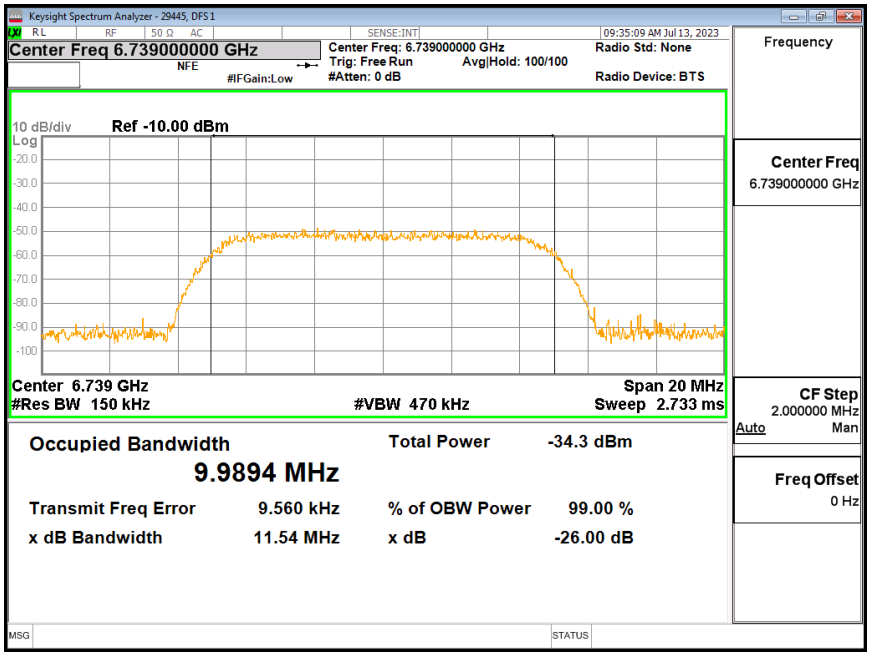
Center Frequency Incumbent Signal f_{c1}:

INCUMBENT 99% BW AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

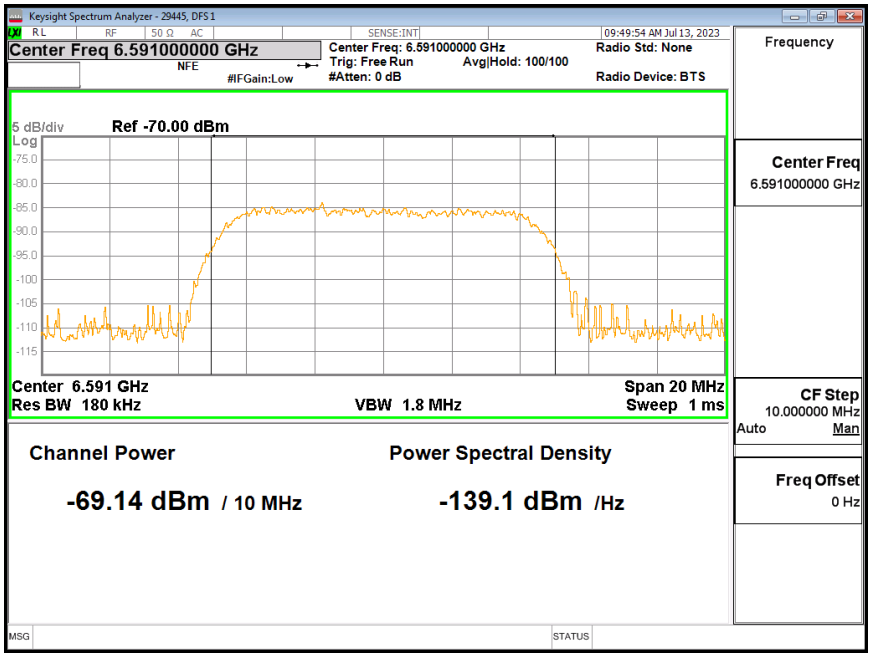
INCUMBENT 99% BW AT UPPER EDGE f_{c3}



MINIMUM PASSING INCUMBENT SIGNAL POWER

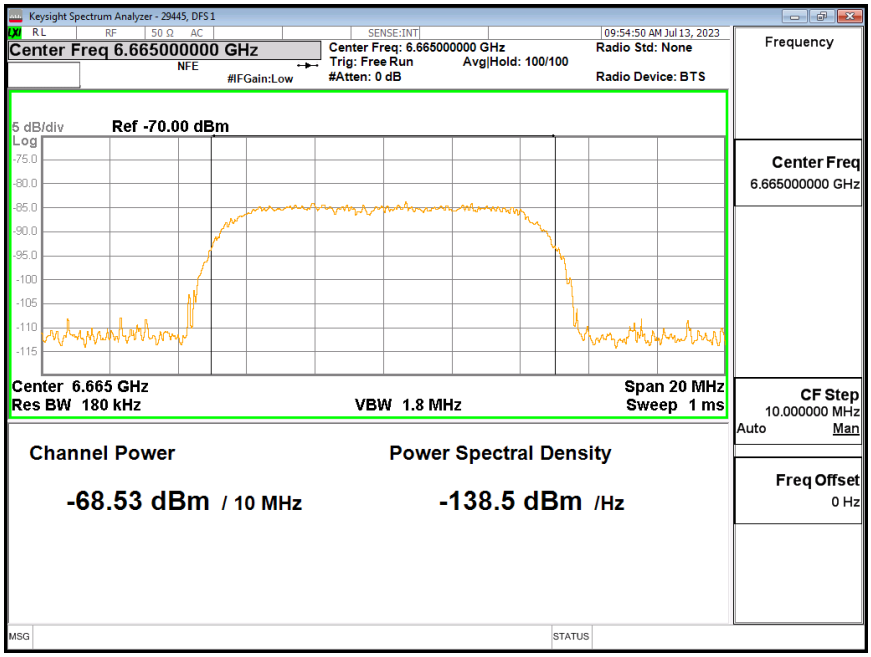
Lower Edge Incumbent Signal f_{c2}:

MIN. PASSING SIGNAL POWER AT LOWER EDGE f_{c2}



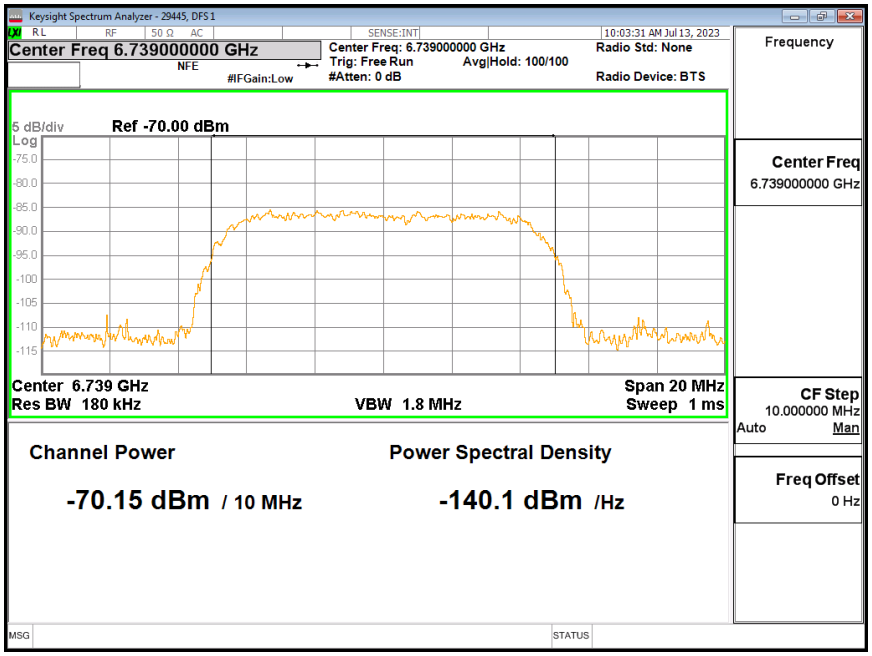
Center Frequency Incumbent Signal f_{c1}:

MIN. PASSING SIGNAL POWER AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

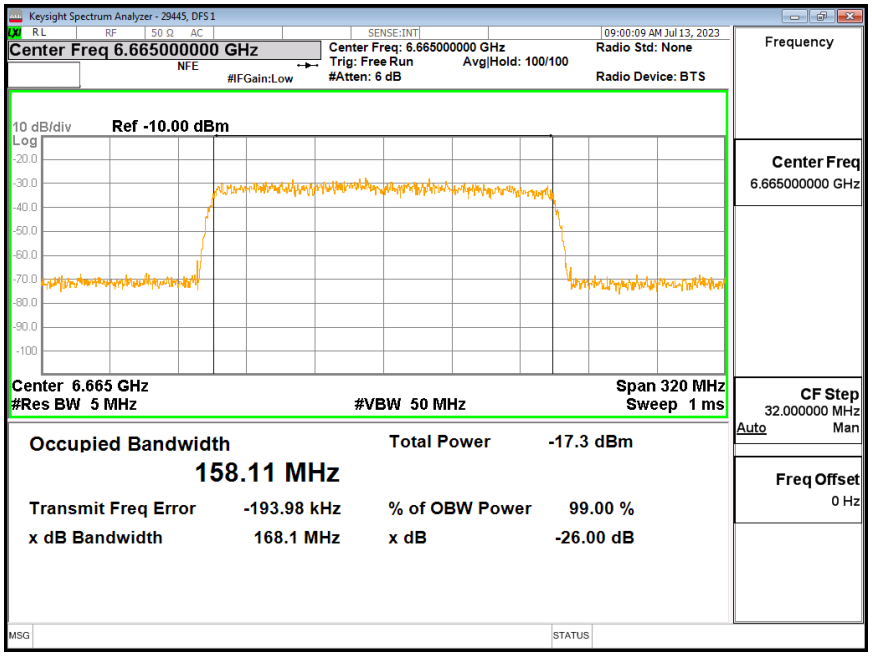
MIN. PASSING SIGNAL POWER AT UPPER EDGE f_{c3}



8.13.3. EUT TRANSMISSION PLOTS

EUT 99% OCCUPIED POWER BANDWIDTH

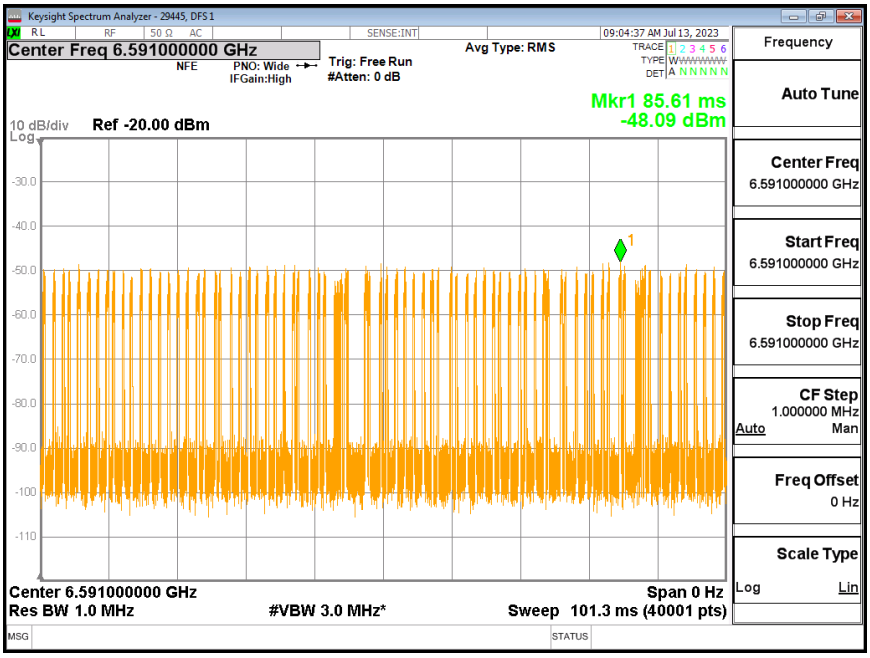
EUT 99% OCCUPIED POWER BANDWIDTH



TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

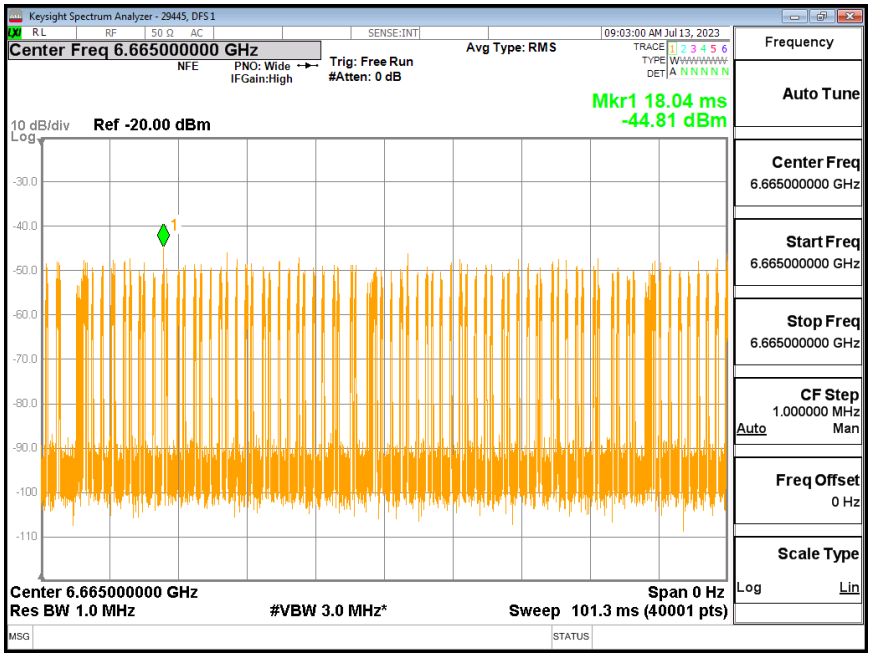
Lower Edge f_{c2}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT

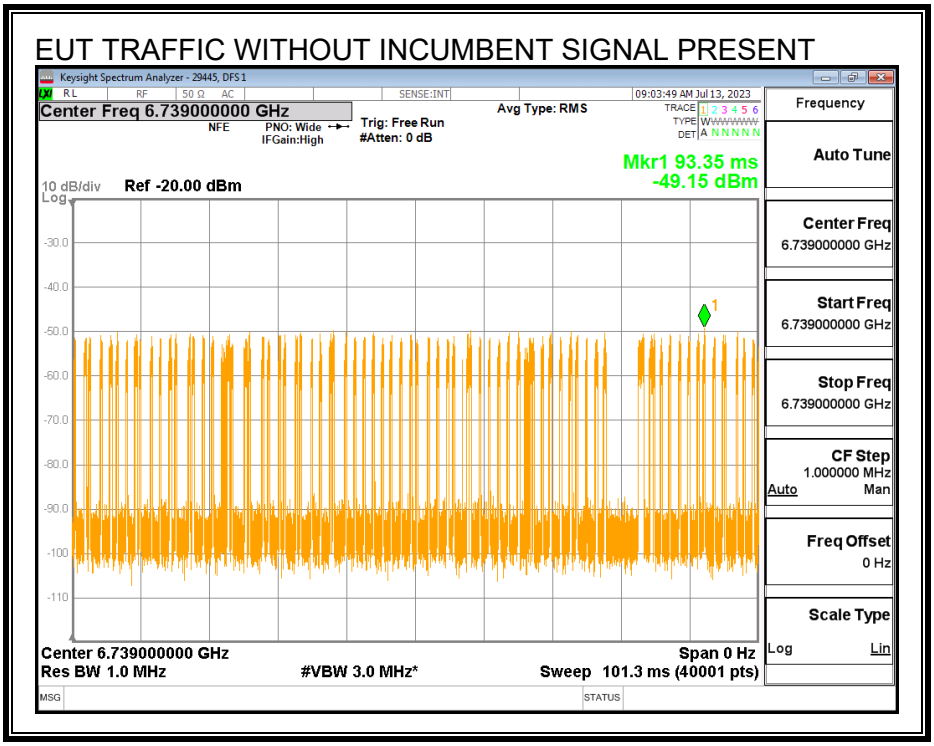


Center Frequency f_{c1}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



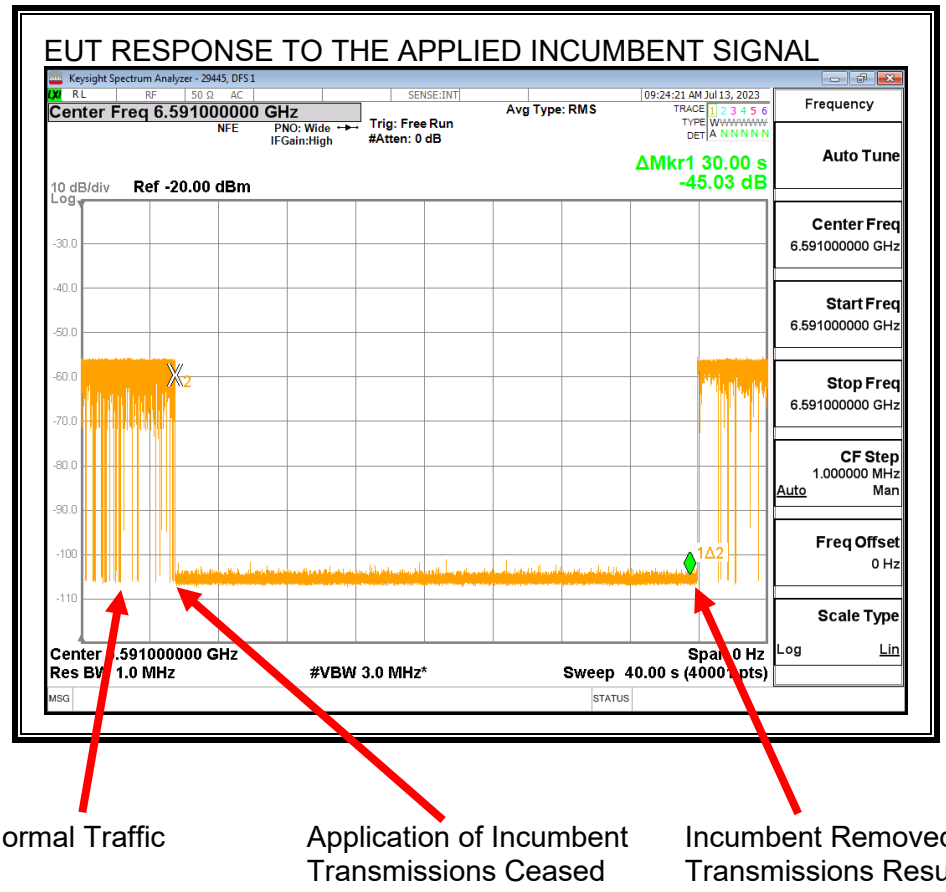
Upper Edge f_{C3}:



EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

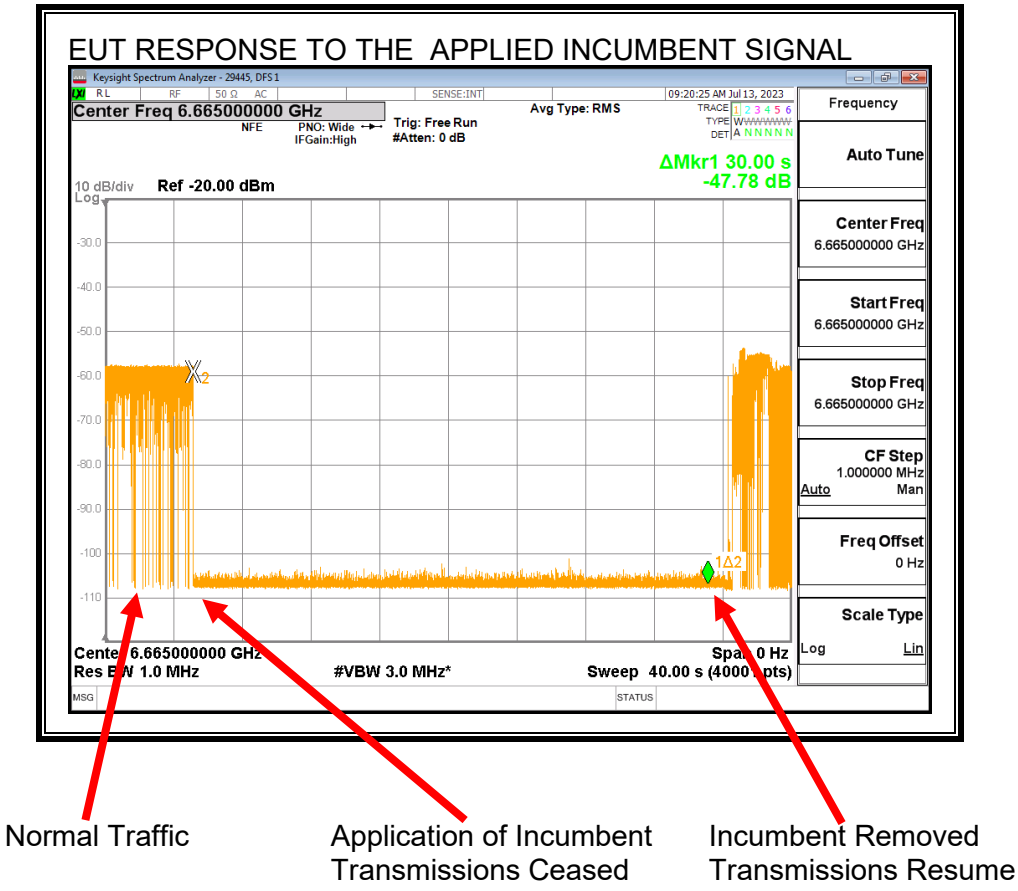
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 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}:



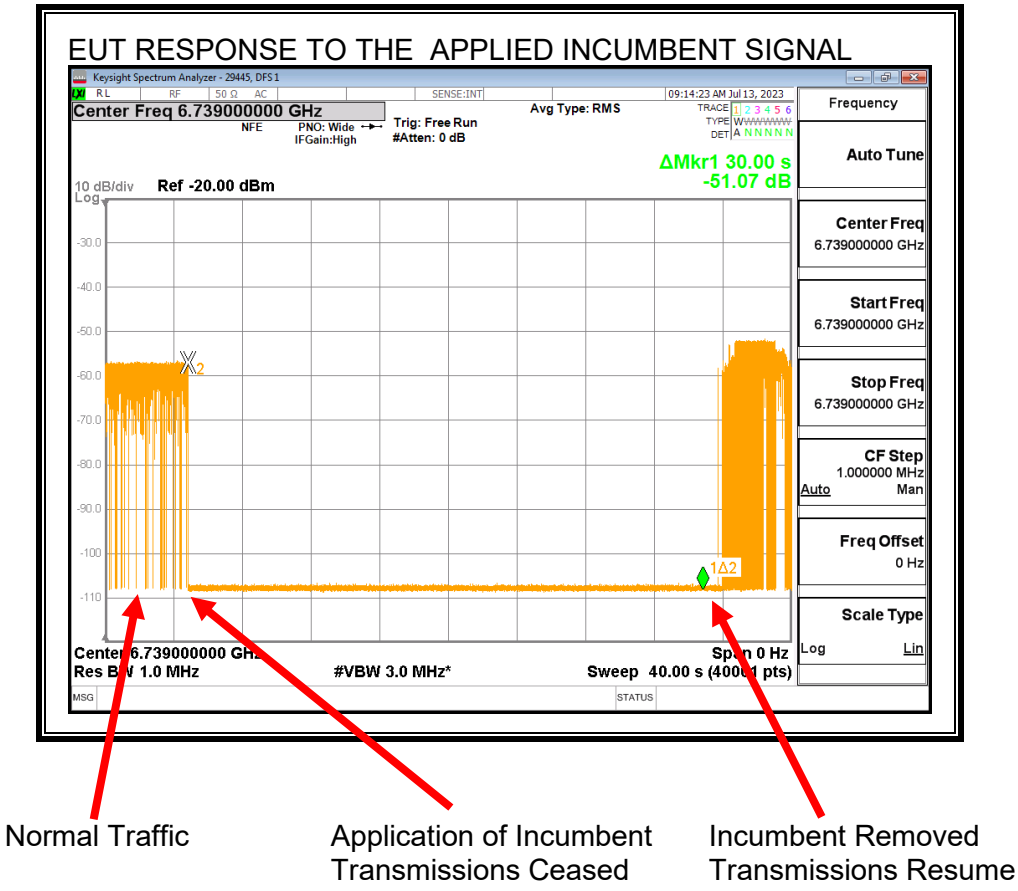
Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

Center Frequency Incumbent Signal f_{C1}:



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

Upper Edge Incumbent Signal f_{C3}:



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

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
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

INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)		
Trial	Incumbent AWGN at f_{c2}	Incumbent AWGN at f_{c1}	Incumbent AWGN at 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.

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 Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

8.14. U-NII 8 BAND TEST CONDITION 1 RESULTS

TEST CONDITION 1 CRITERIA

$$\textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{99\% BW}_{\textbf{INC}}$$

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

$$\textbf{99\% BW}_{\textbf{INC}} < \textbf{99\% BW}_{\textbf{EUT}} \leq \textbf{2 x 99\% BW}_{\textbf{INC}}$$

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.

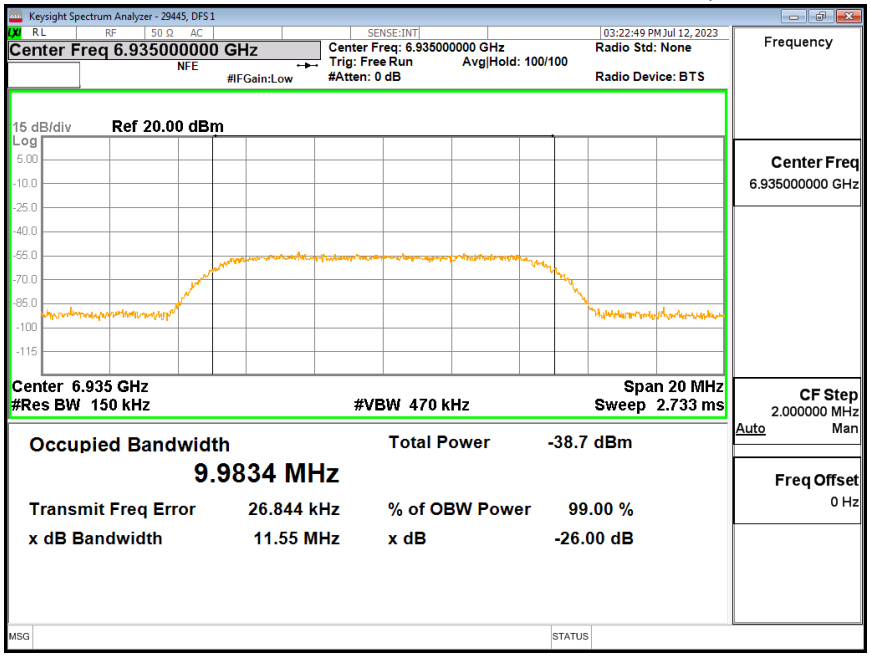
Only the lowest and highest supported channel bandwidths are required to be tested.

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.

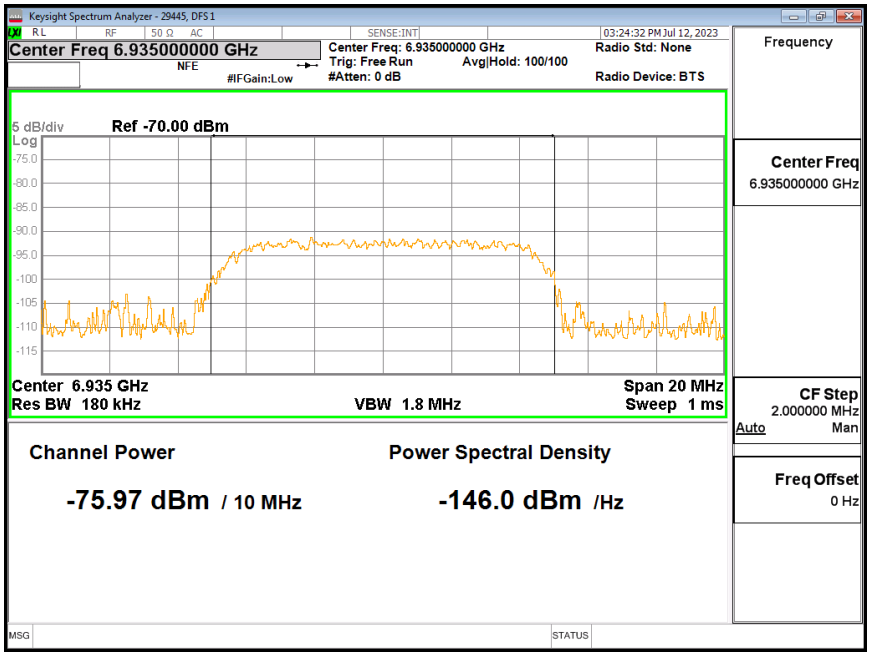
INCUMBENT SIGNAL 99% OCCUPIED POWER BANDWIDTH

INCUMBENT 99% BW AT CHANNEL CENTER FREQUENCY



MINIMUM PASSING INCUMBENT SIGNAL POWER

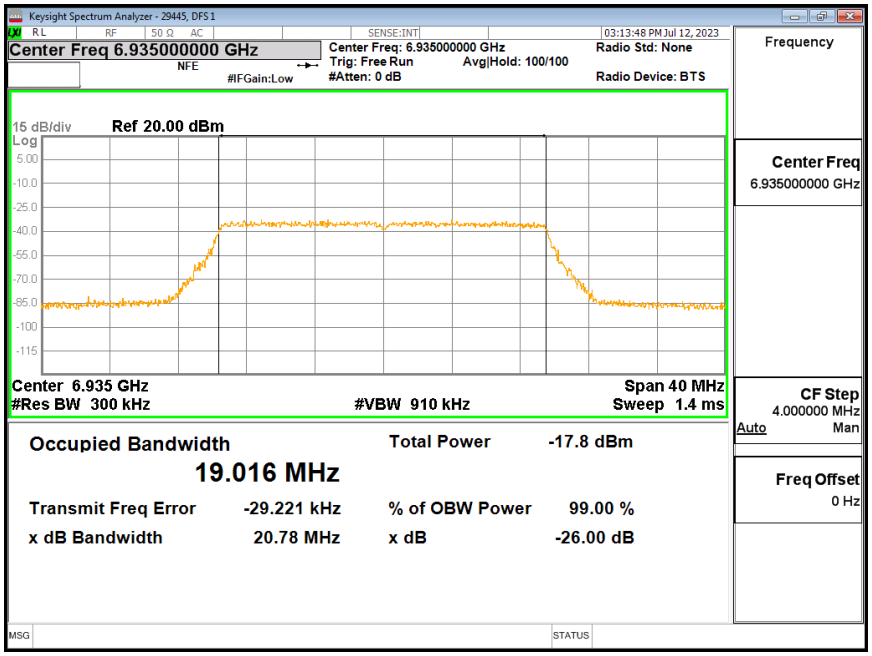
MINIMUM PASSING INCUMBENT SIGNAL POWER



8.15.3. EUT TRANSMISSION PLOTS

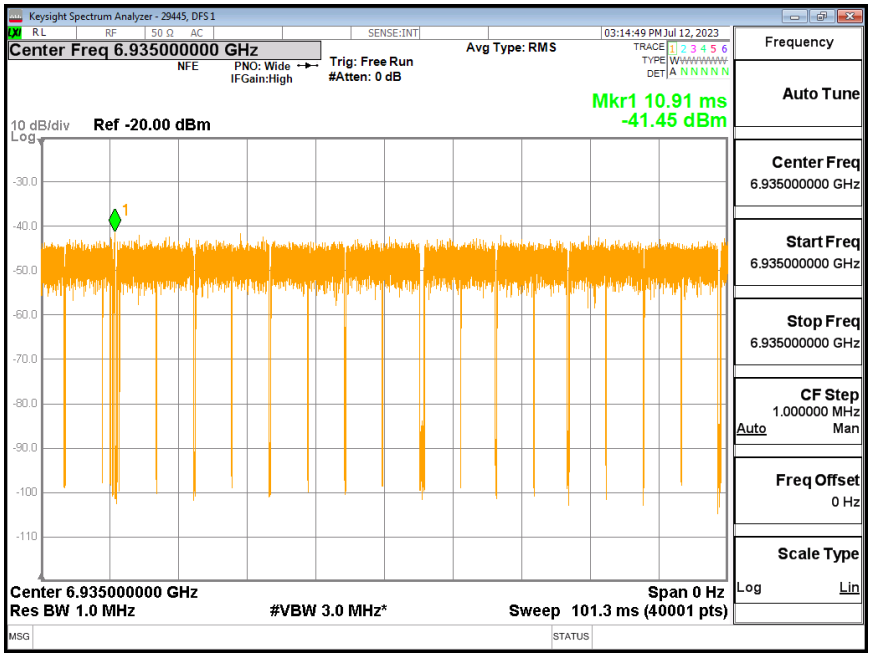
EUT 99% OCCUPIED POWER BANDWIDTH

EUT 99% OCCUPIED POWER BANDWIDTH



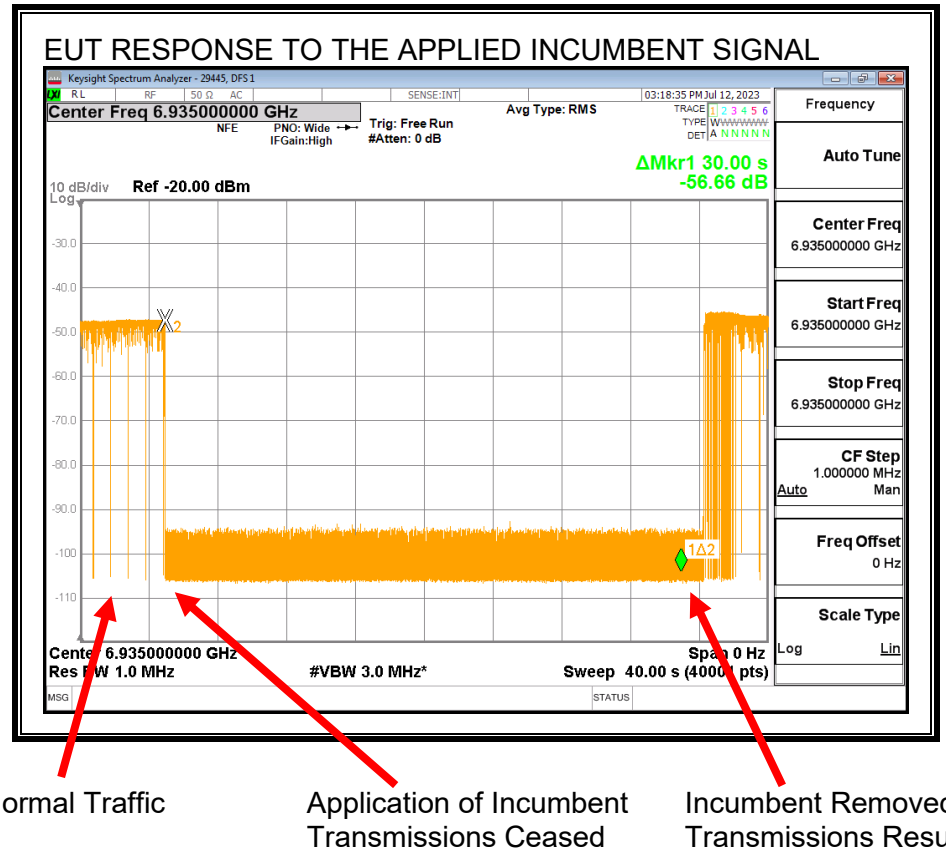
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



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.

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

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: 07/12/23

Tested by: 29945

Test location: DFS 1

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

8.15.5. Tx OPERATIONAL STATUS TEST RESULTS

Test Condition 2: 99% BW_{INC} < 99% BW_{EUT} ≤ 2 x 99% BW_{INC}

Incumbent AWGN at f_{C1}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

8.16. U-NII 8 BAND TEST CONDITION 3 RESULTS

TEST CONDITION 3 CRITERIA

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

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

$$\mathbf{99\%\ BW_{EUT} > 4 \times 99\%\ BW_{INC}}$$

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.

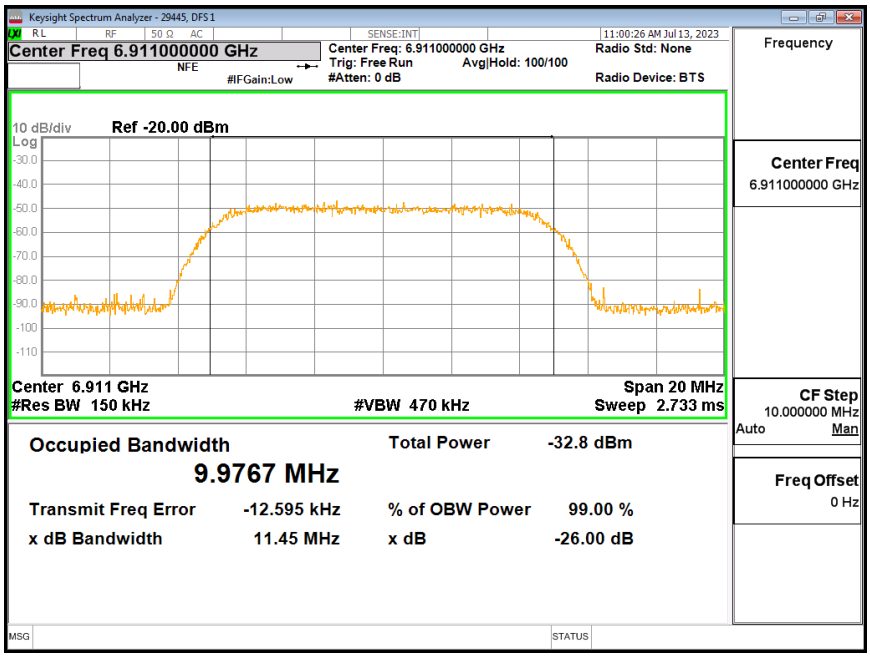
8.17.2. INCUMBENT SIGNAL PLOTS

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

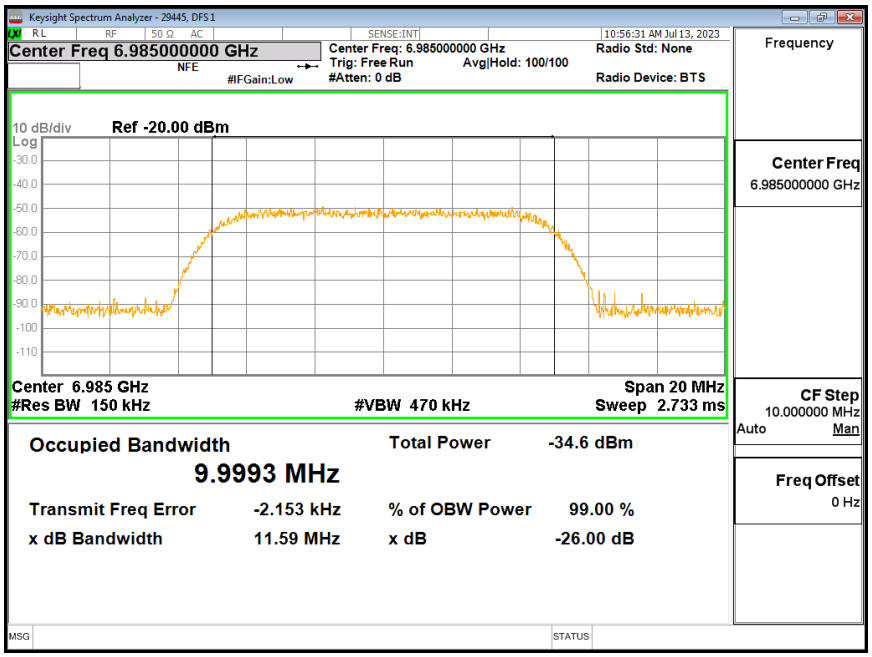
Lower Edge Incumbent Signal f_{c2}:

INCUMBENT 99% BW AT LOWER EDGE f_{c2}



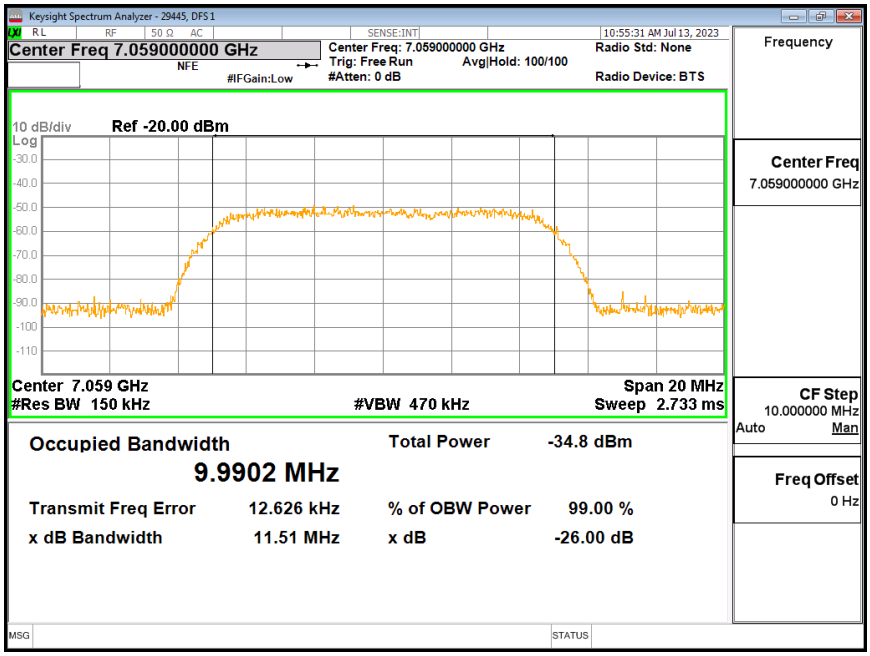
Center Frequency Incumbent Signal f_{c1}:

INCUMBENT 99% BW AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

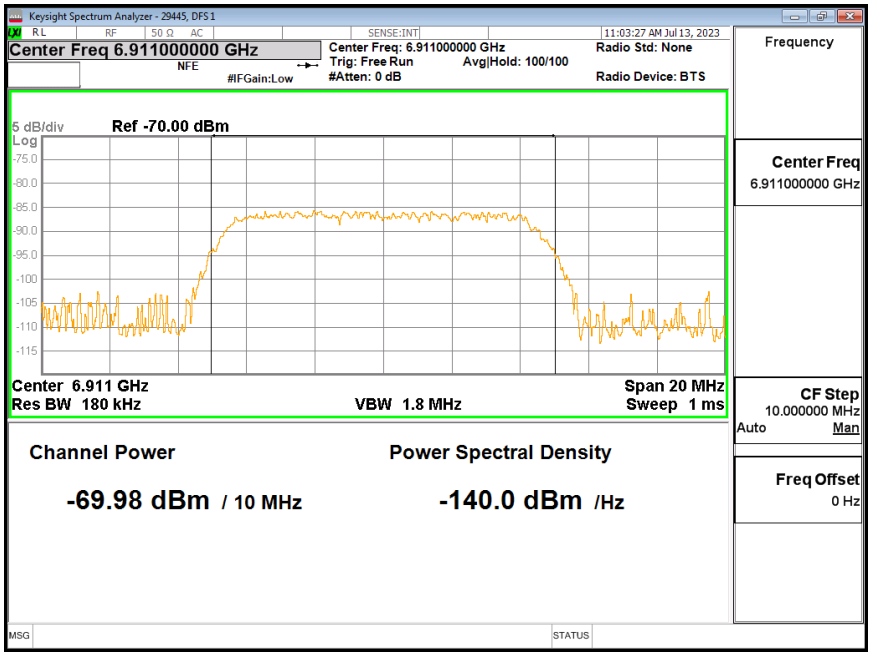
INCUMBENT 99% BW AT UPPER EDGE f_{c3}



MINIMUM PASSING INCUMBENT SIGNAL POWER

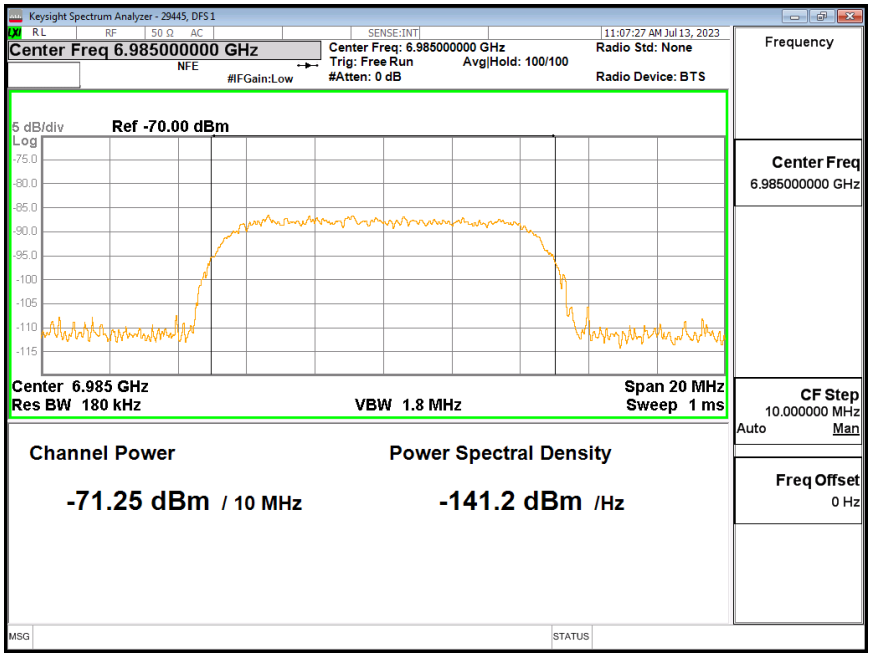
Lower Edge Incumbent Signal f_{c2}:

MIN. PASSING SIGNAL POWER AT LOWER EDGE f_{c2}



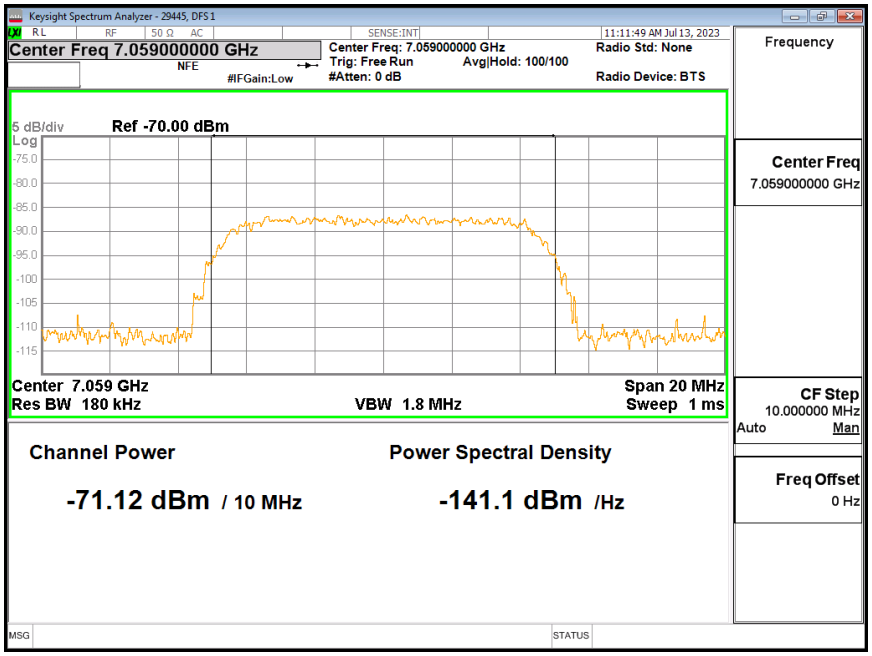
Center Frequency Incumbent Signal f_{c1}:

MIN. PASSING SIGNAL POWER AT CENTER FREQUENCY f_{c1}



Upper Edge Incumbent Signal f_{c3}:

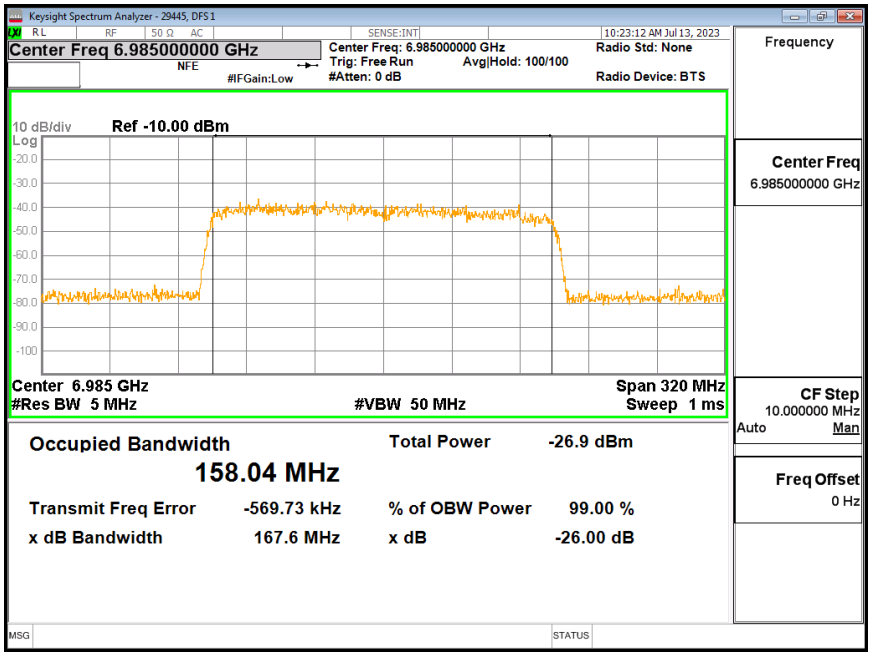
MIN. PASSING SIGNAL POWER AT UPPER EDGE f_{c3}



8.17.3. EUT TRANSMISSION PLOTS

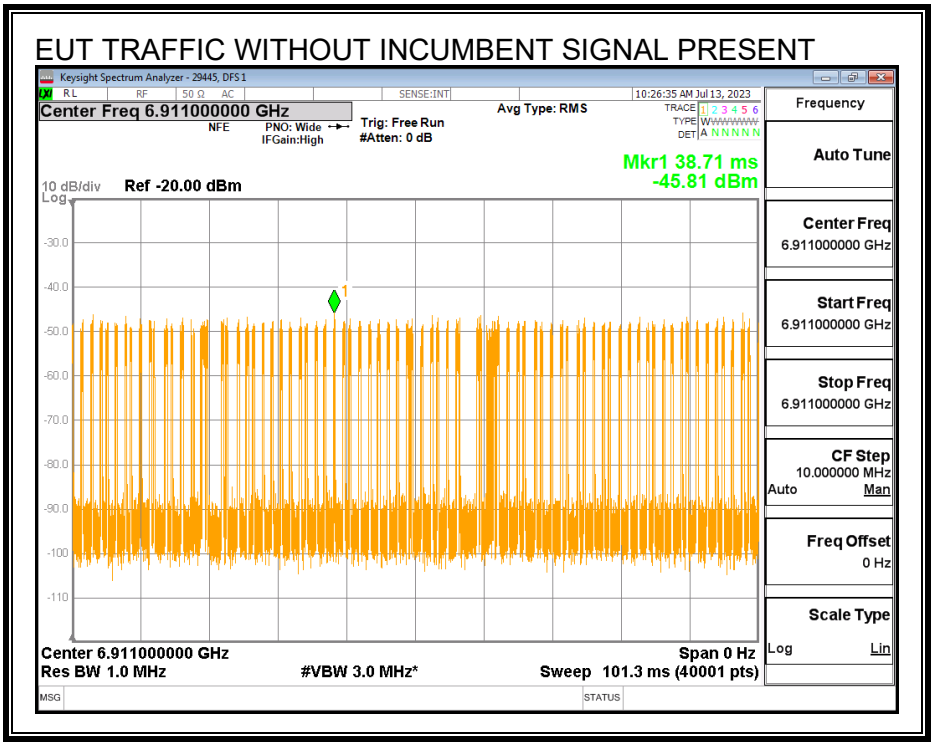
EUT 99% OCCUPIED POWER BANDWIDTH

EUT 99% OCCUPIED POWER BANDWIDTH



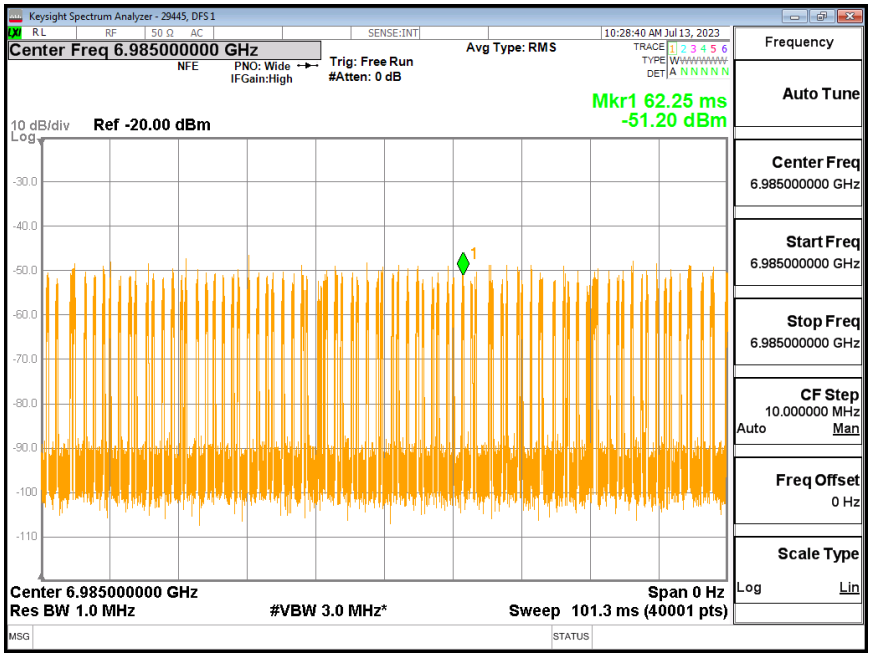
TRAFFIC WITHOUT THE INCUMBENT SIGNAL PRESENT

Lower Edge f_{c2}:

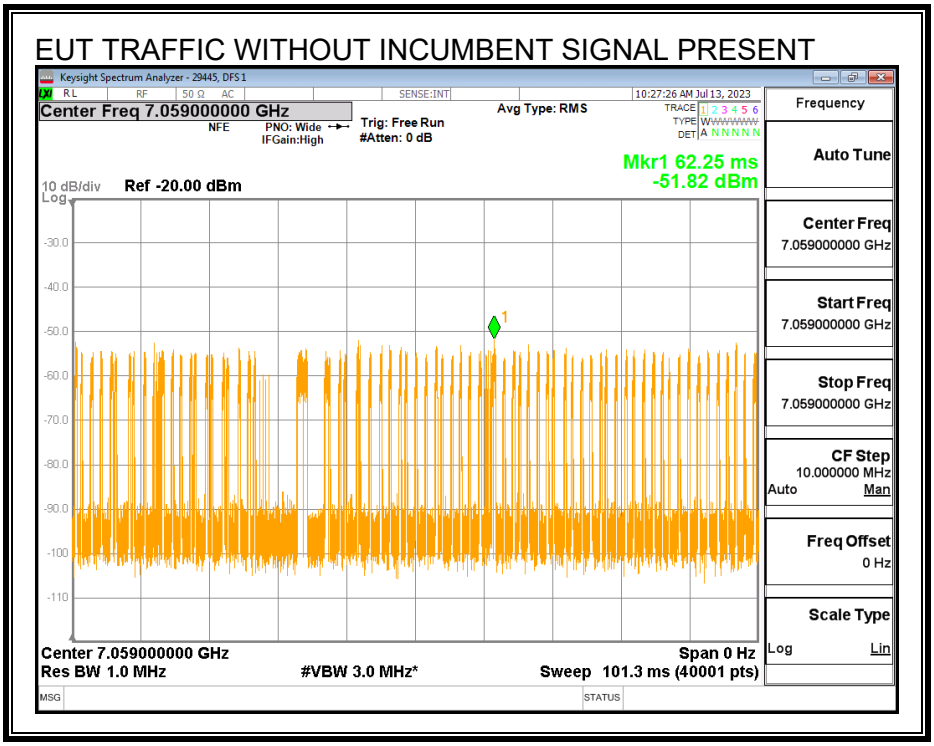


Center Frequency f_{c1}:

EUT TRAFFIC WITHOUT INCUMBENT SIGNAL PRESENT



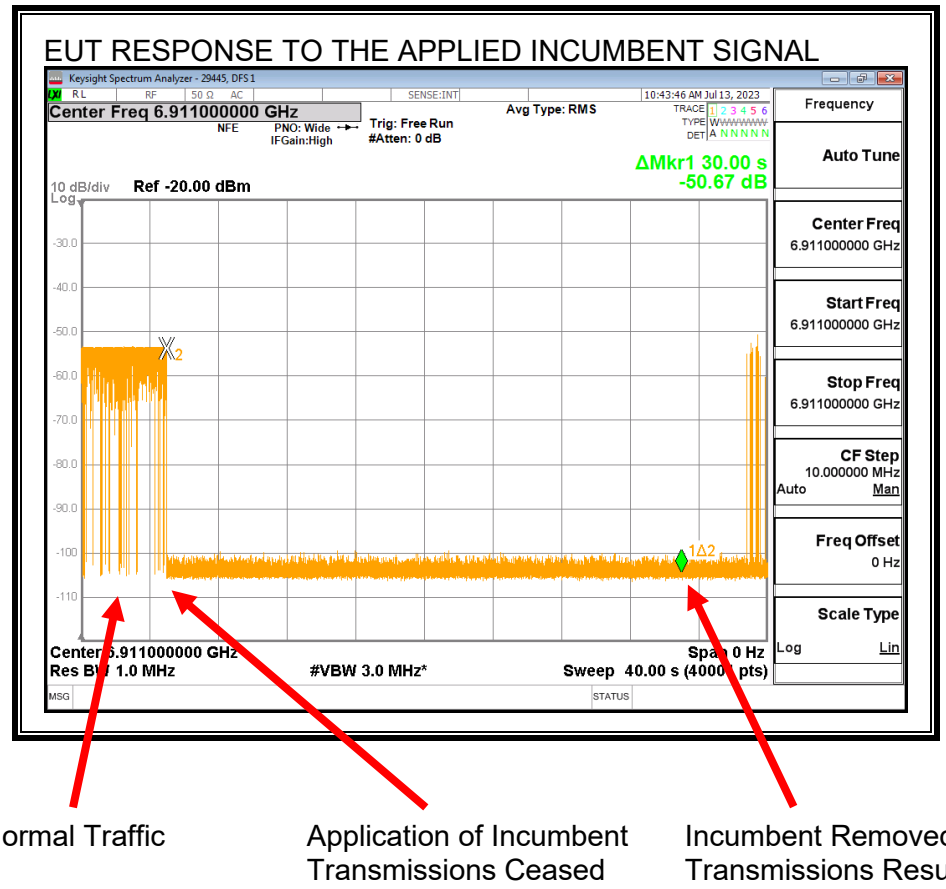
Upper Edge f_{C3}:



EUT RESPONSE TO THE APPLIED INCUMBENT SIGNAL

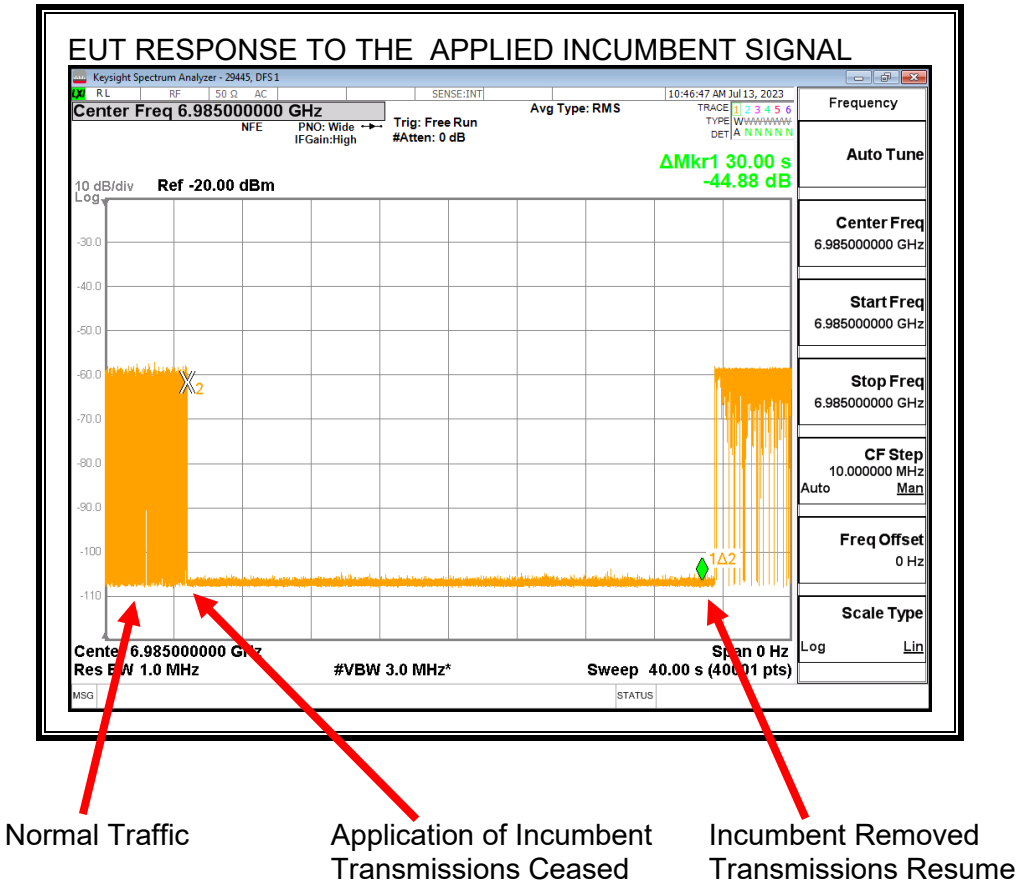
A link between the EUT and the Companion Device was established on the test channel. Traffic flowing from the EUT to the Companion Device was then initiated. A sweep was started, and the incumbent signal was continuously applied at approximately 5 seconds after the start of the sweep for a duration of 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}:



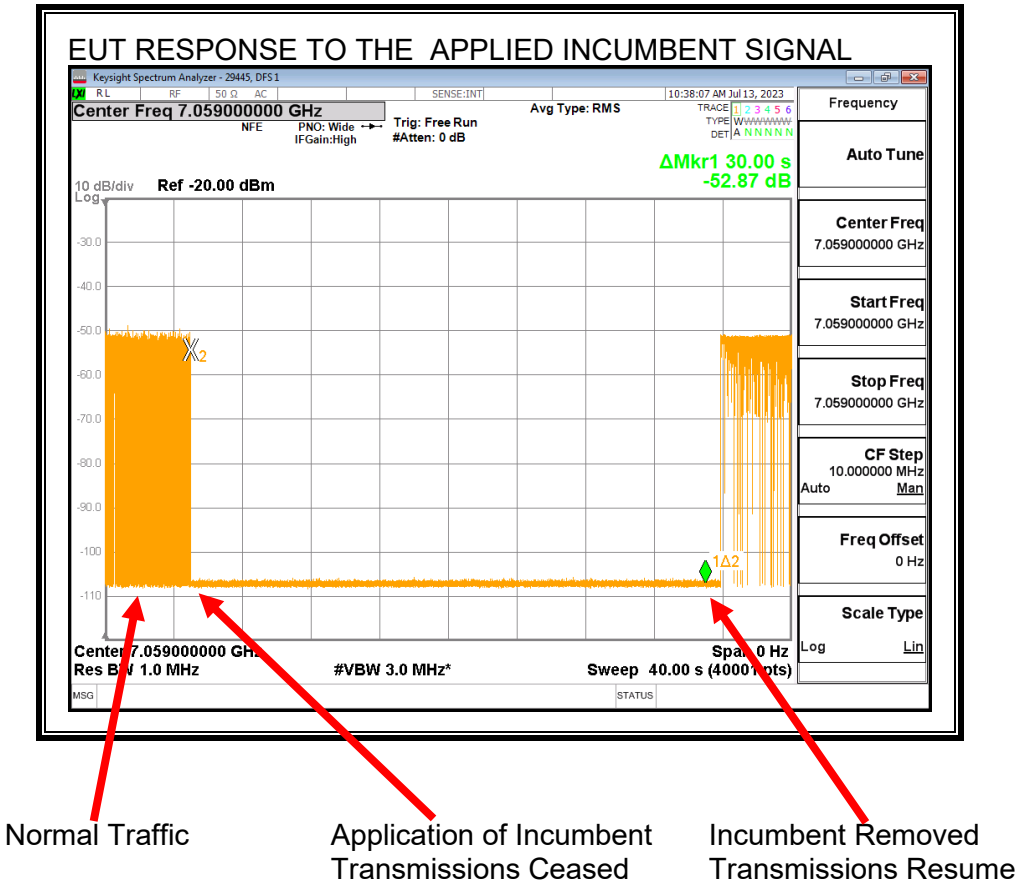
Transmissions cease while the Incumbent AWGN Signal is present and resume after it is removed.

Center Frequency Incumbent Signal f_{C1}:



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

Upper Edge Incumbent Signal f_{C3}:



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

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

INCUMBENT SIGNAL DETECTION CERTAINTY RATE

	AWGN Detected (Yes / No)		
Trial	Incumbent AWGN at f_{c2}	Incumbent AWGN at f_{c1}	Incumbent 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.

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 Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	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}:

Measured Incumbent Power at the EUT Test Fixture Connector (dBm)	Test Fixture Cable Path Loss (dB)	Adjusted Incumbent Power at the Radio Port (dBm)	Antenna Gain (dBi)	Adjusted Incumbent Power at the Antenna (dBm)	Detection Limit (dBm)	EUT Tx 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

9. SETUP PHOTOS

Please refer to setup photos 14523771-EP1V1

END OF TEST REPORT