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TEST REPORT CBSD-SAS Interoperability

Applicant Name:

GenXComm Inc
10000 Metric Blvd. Suite 200
Austin, TX 78758
USA

Date of Testing:

1/29/2024 – 2/16/2024

Test Report Issue Date:

7/12/2024

Test Site/Location:

Element lab. Columbia, MD, USA

Test Report Serial No.:

1M2401260008.02-2AZH6

FCC ID: 2AZH6GXCMEN002

APPLICANT: GenXComm Inc

Application Type:

Certification

Model:

GM02

EUT Type:

CBRS CPE

Frequency Range:

3550 – 3700 MHz

FCC Classification:

Citizens Band Category B Devices (CBD)

FCC Rule Part(s):

Part 96

Test Procedure(s):

WINNF-TS-0122-V1.0.2, CBRSA-TS-9001 V.1.0.0

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in the test procedures listed above. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President



FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZH6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 1 of 61

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of compliance with the technical rules and regulations of the Federal Communications Commission.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7195 Oakland Mills Road, Columbia, MD 21046.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element is a CBRS Alliance (OnGo) Approved Test Lab
- Element is a WinnForum Approved Test Lab
- Element is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for CBRS Alliance Certification Test Plan and WinnForum Conformance and Performance Test Technical Standard.
- Element is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISSED Standards (RSS).
- Element facility is a registered (2451B) test laboratory with the site description on file with ISSED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISSED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **GenXComm Inc, CBRS CPE FCC ID: 2AZH6GXCMEN002**. The test data contained in this report pertains only to CBSD-SAS interoperability. The EUT is a category B CBSD. The EUT is operating under the control of a domain proxy.

Test Device Serial Number(s): 2332IT00006, 2332IT00007

Test Device Software Version: 3.0.0

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48 (including 2 carries ULCA), 2.4GHz WiFi

This device supports the following conditional features:

	Conditional Test Case Definitions	Supported
C1	Mandatory for UUT which supports multi-step registration message	☒
C2	Mandatory for UUT which supports single-step registration with no CPI-signed data in the registration message. By definition, this is a subset of Category A devices which determine all registration information, including location, without CPI intervention.	☐
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	☐
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	☐
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	☐
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration	☐

Table 2-1. Conditional Features

2.3 Test Configuration

The EUT was connected to the SAS Test Harness developed by WINNF WG4-CBSD. The SAS Test Harness (V1.0.0.2) provided by CBRS Alliance was used. The SAS Test Harness is synchronized to UTC time. For tests requiring two CBSDs to be monitored, outputs from both modules were coupled together and monitored simultaneously.

2.4 Modifications

No modifications were made to EUT during testing.

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3.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	3/15/2023	Annual	3/15/2024	US46470561
Dell	Latitude 5580	Test Harness Laptop	N/A	N/A	N/A	N/A

Table 3-1 Annual Test Equipment Calibration Schedule

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4.0 ENVIRONMENTAL CONDITIONS

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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5.0 EVALUATION PROCEDURE

The measurement procedure described in KDB 940660 D01 v03 and WINNF-TS-0122-V1.0.2 was used in the measurement of the EUT.

Deviation from measurement procedure.....None

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6.0 TEST SUMMARY

6.1 Summary

Company Name: GenXComm Inc
 FCC ID: 2AZH6GXCMEN002

Table 6-1. Summary of Test Results

FCC Part Section(s)	KDB940660 D01 Section 3.3 a)	Test Case Description	WinnForum Test Case	Test Result
96.39 (c)	1	Confirm that the device will only transmit after it receives authorization from a SAS	WINNF.FT.D.REG.2 WINNF.FT.D.REG.9 WINNF.FT.D.REG.11 WINNF.FT.D.REG.13 WINNF.FT.D.REG.15 WINNF.FT.D.REG.17 WINNF.FT.D.REG.19 WINNF.FT.C.GRA.1 WINNF.FT.C.GRA.2 WINNF.FT.C.HBT.5	Pass
96.39 (c)	2	Check the device registration and authorization with the SAS – determine if the device behaves appropriately for successful and unsuccessful registrations. The device should not be transmitting without authorization from the SAS.	WINNF.FT.D.REG.2 WINNF.FT.D.REG.9 WINNF.FT.D.REG.11 WINNF.FT.D.REG.13 WINNF.FT.D.REG.15 WINNF.FT.D.REG.17 WINNF.FT.D.REG.19	Pass
96.39(c)(1)	3	Confirm that the device changes its operating power and/or channel in response to a command from the SAS.	WINNF.FT.D.HBT.2	Pass
96.39	4	Confirm that the device correctly configures based on the different license classes	N/A	Pass
96.39(c)(1)	5	Confirm that the device transmits at a power level less than or equal to the maximum power level approved by the SAS.	WINNF.PT.C.HBT.1	Pass
96.39(c)	6	Confirm that the device transmits with a bandwidth less than or equal to the SAS specified bandwidth.	WINNF.FT.D.HBT.2	Pass
96.39(c)(2)	7	Confirm that the device transmits on the SAS specified frequency.	WINNF.FT.D.HBT.2	Pass
96.39(c)(2)	8	Confirm that the device stops transmission in response to a command from the SAS, within a period as required by Part 96.	WINNF.FT.C.HBT.3 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.D.HBT.8 WINNF.FT.C.HBT.10 WINNF.FT.D.RLQ.2 WINNF.FT.D.DRG.2	Pass

Table 6-2. Summary of Test Results (continued)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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96.39 (d)	9	Confirm that the device sends measurements data in response to the command from the SAS.	N/A	N/A
96.39(a)	10	For devices with geo-location, confirm that it notifies the SAS of a new location when it is beyond the required distance parameter (± 50 m) within the required time frame.	N/A	N/A
96.39 (d)	11	Confirm that the device is capable of reporting the signal level (measurement data) and frequency to SAS.	N/A	N/A
96 E	12	When CBSDs communicate through a management system, confirm compliance with all requirements.	N/A	Pass
96.39	13	When communication between the CBSD and SAS is lost: i) Describe how the CBSD would react if the communications between the device and the SAS is lost. Confirm that the CBSD stops transmission once it loses the link to the SAS. ii) Describe the process for re-establishment of the communications and confirm that the CBSD acts accordingly. iii) Confirm power-on restart process for registration (re-registration) occurs as expected. iv) Confirm the process for de-registration occurs as expected.	WINNF.FT.C.HBT.9 WINNF.FT.C.HBT.10	Pass
96.39(f)	KDB940660 D01 Section 4	SAS and Device Security Requirements	WINNF.FT.C.SCS.1 WINNF.FT.C.SCS.2 WINNF.FT.C.SCS.3 WINNF.FT.C.SCS.4 WINNF.FT.C.SCS.5	Pass
96.39(e)	N/A	The CBSD must report to the SAS which available channels or frequencies it will use	WINNF.PT.C.HBT.1 WINNF.FT.D.HBT.2 WINNF.FT.C.HBT.3 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.D.HBT.8 WINNF.FT.C.HBT.10 WINNF.FT.D.RLQ.2 WINNF.FT.D.DRG.2	Pass

Notes:

- Test cases denoted as “N/A” in the table above are not applicable to the EUT and are either Optional or Conditional per Section 6 of WINNF-TS-0122.
- Please see Appendices for test data.
- SAS Harness Logs are available upon request.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **GenXComm Inc CBRS CPE FCC ID: 2AZH6GXCMEN002** has been tested to show compliance with Part 96 and WINNF-TS-0122.

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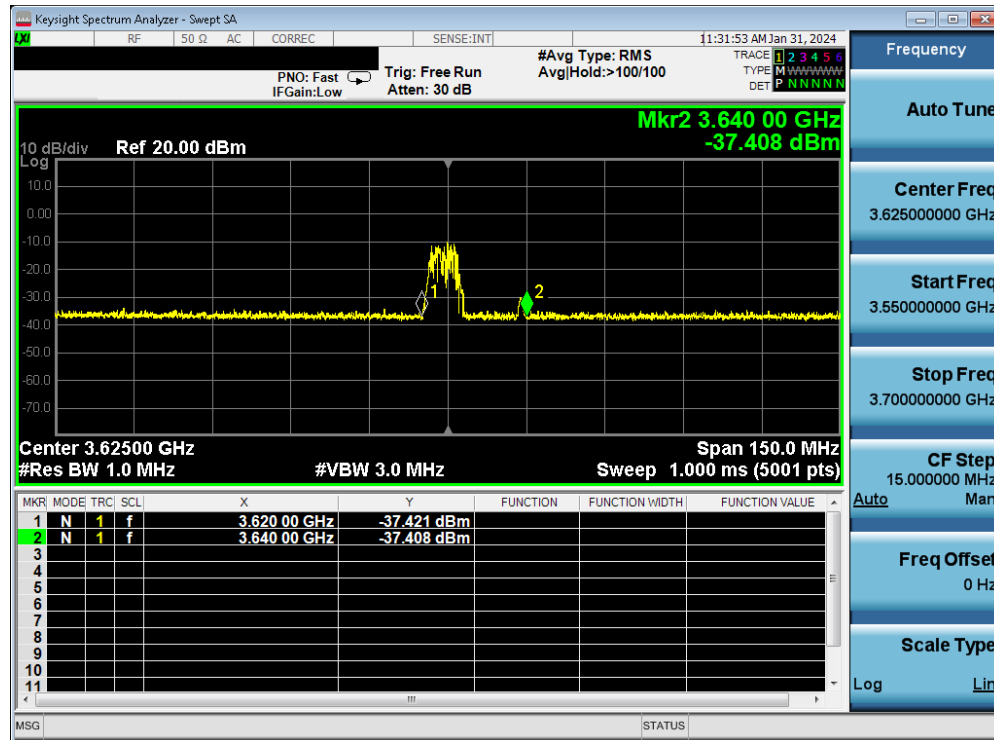
APPENDIX A – TEST RESULT AND DATA

A1 [WINNF.FT.D.REG.2] Domain Proxy Multi-Step registration

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT is in the Unregistered state	--	--
2	• DP with two CBSD sends correct Registration request information, as specified in [n.5], in the form of one 2-element Array or as individual messages to the SAS Test Harness: • The required userId, fcId and cbsdSerialNumber registration parameters shall be sent for each CBSD and conform to proper format and acceptable ranges. • Any REG-conditional or optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges Note: It is outside the scope of this document to test the Registration information that is supplied via another means.	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or individual messages as follows: - cbsdId = Ci - measReportConfig shall not be included - responseCode = 0 for each CBSD	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

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Test Plots:



Plot 1. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.2)

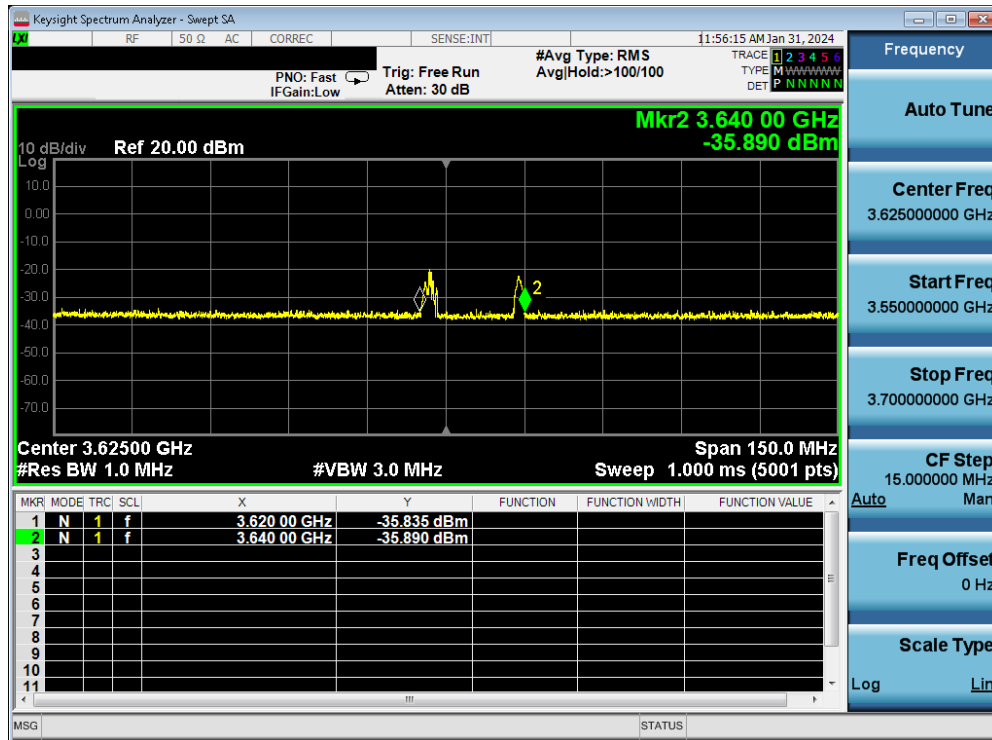
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A3 [WINNF.FT.D.REG.9] Domain Proxy Missing Required parameters (responseCode 102)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	--	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 102 for CBSD1 and CBSD2	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

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Test Plots:



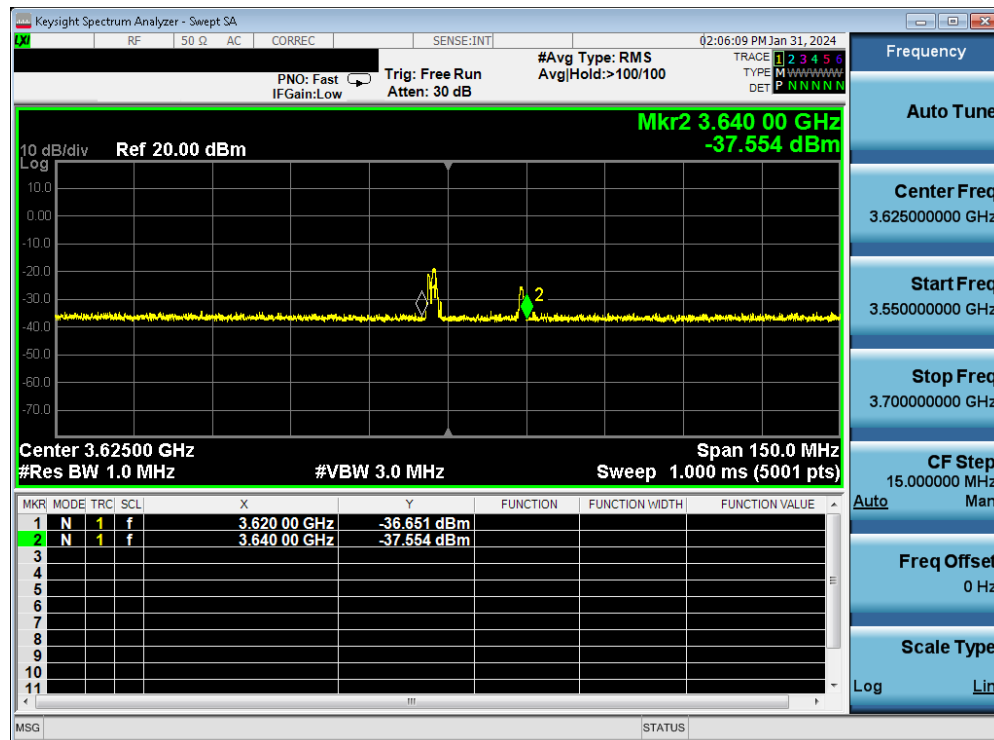
Plot 2. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.9)

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A4 [WINNF.FT.D.REG.11] Domain Proxy Pending Registration (responseCode 200)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 200 for CBSD1 and CBSD2	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

Test Plots:



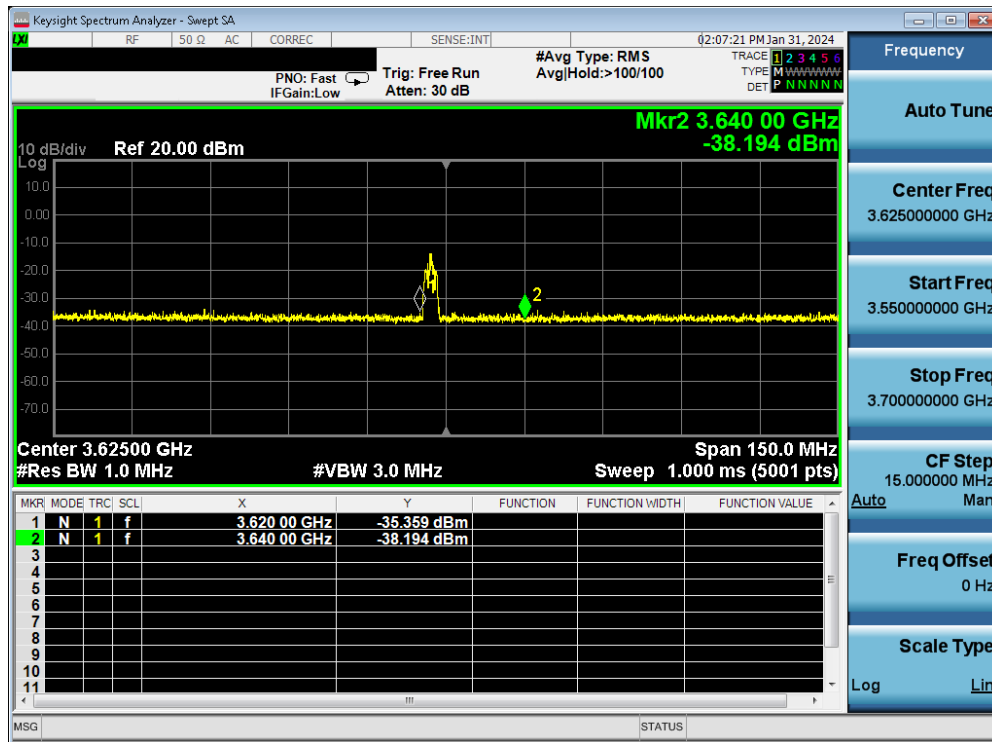
Plot 3. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.11)

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A5 [WINNF.FT.D.REG.13] Domain Proxy Invalid parameters (responseCode 103)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 103 for CBSD1 and CBSD2	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:	☒	☐

Test Plots:



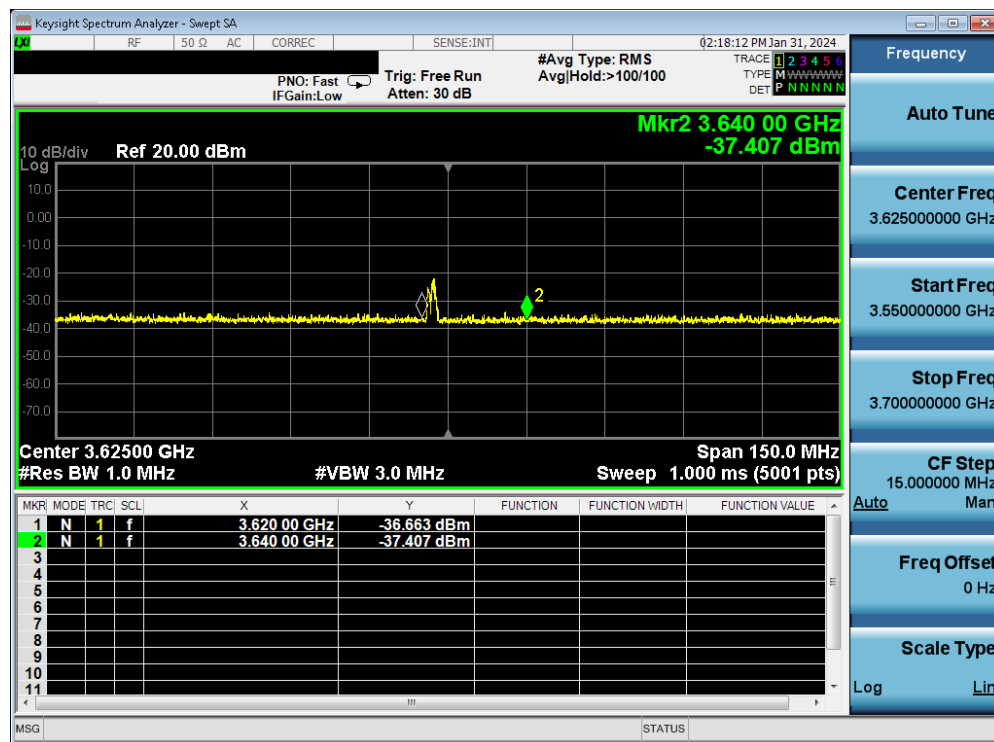
Plot 4. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.13)

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A6 [WINNF.FT.D.REG.15] Domain Proxy Blacklisted CBSD (responseCode 101)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 0 for CBSD1 - responseCode = 101 and CBSD2	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:	☒	☐

Test Plots:



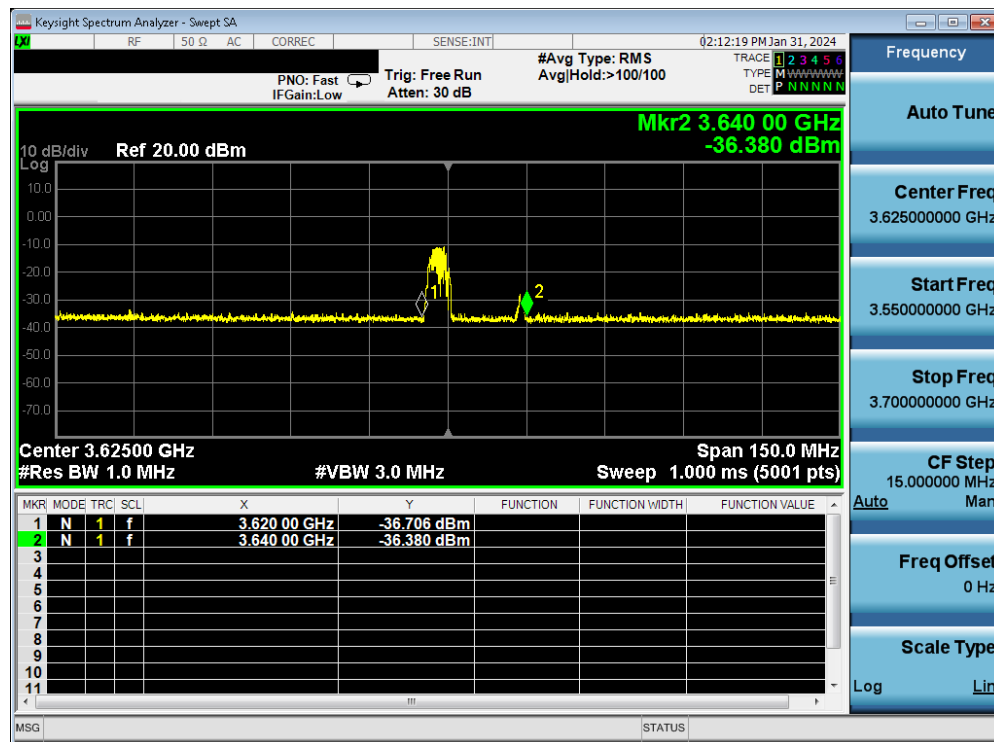
Plot 5. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.15)

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A7 [WINNF.FT.D.REG.17] Domain Proxy Unsupported SAS protocol version (responseCode100)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 100 for each CBSD	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:	☒	☐

Test Plots:



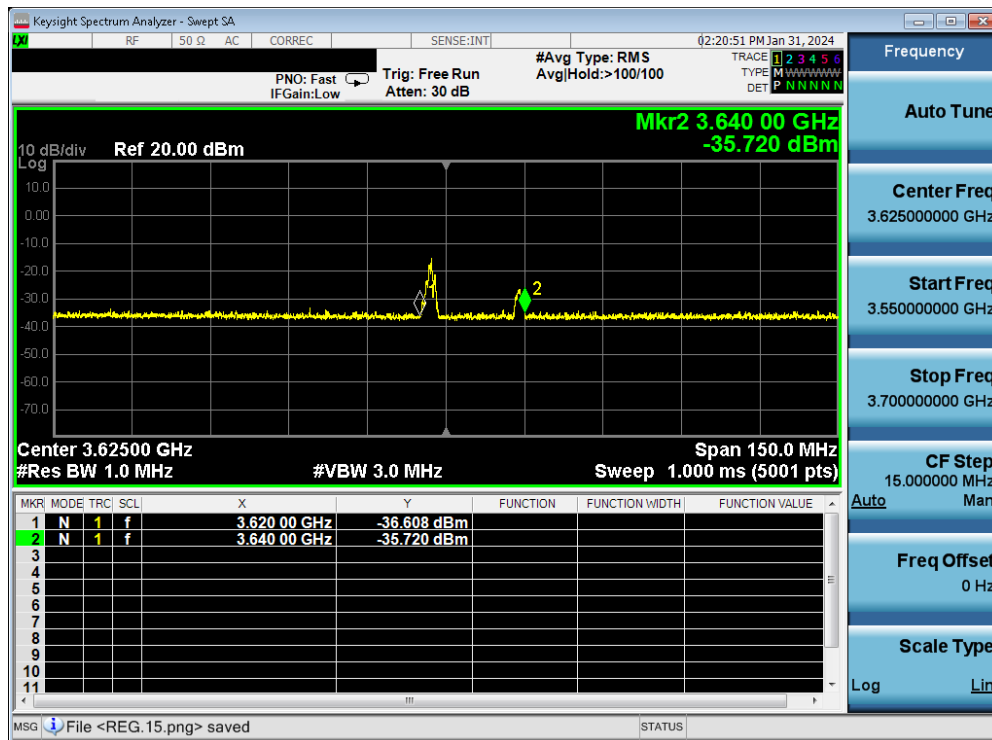
Plot 6. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.17)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A8 [WINNF.FT.D.REG.19] Domain Proxy Group Error (responseCode 201)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--	--
2	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:	☒	☐
3	• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdID - responseCode = 0 for CBSD1 - responseCode = 201 and CBSD2	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:	☒	☐

Test Plots:



Plot 7. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.REG.19)

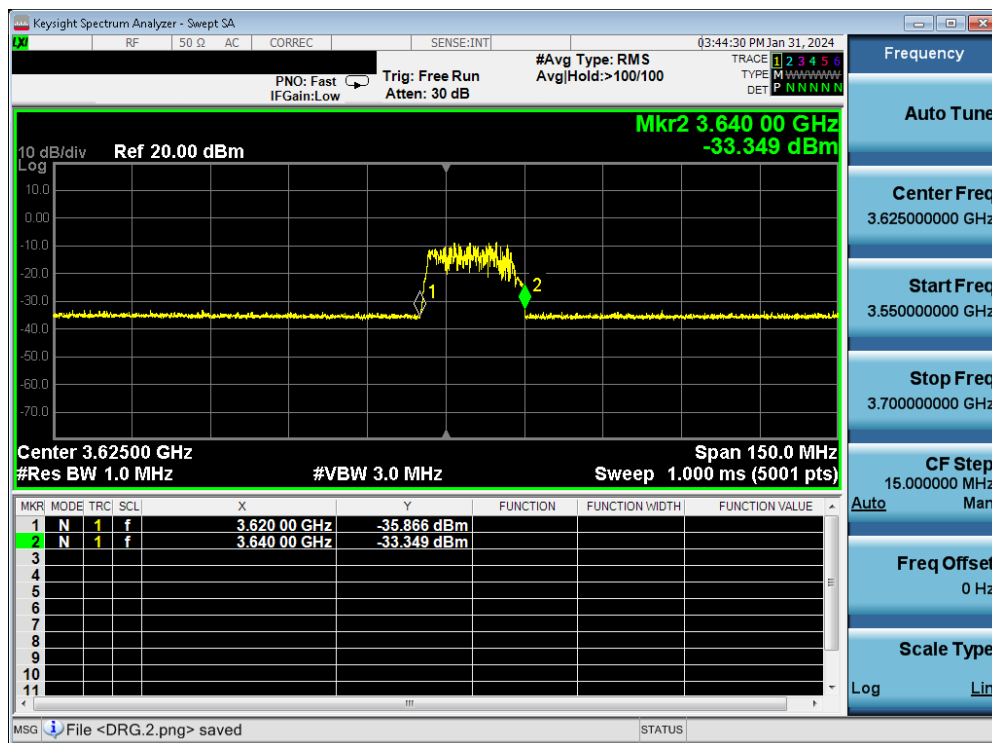
FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A9 [WINNF.FT.C.GRA.1] Unsuccessful Grant responseCode=400 (INTERFERENCE)

The following steps describe the test execution where the Grant response contains responseCode (R) = 400:

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness, with cbsdId = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including • cbsdId=C • responseCode = R	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

Test Plots:



Plot 8. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.GRA.1)

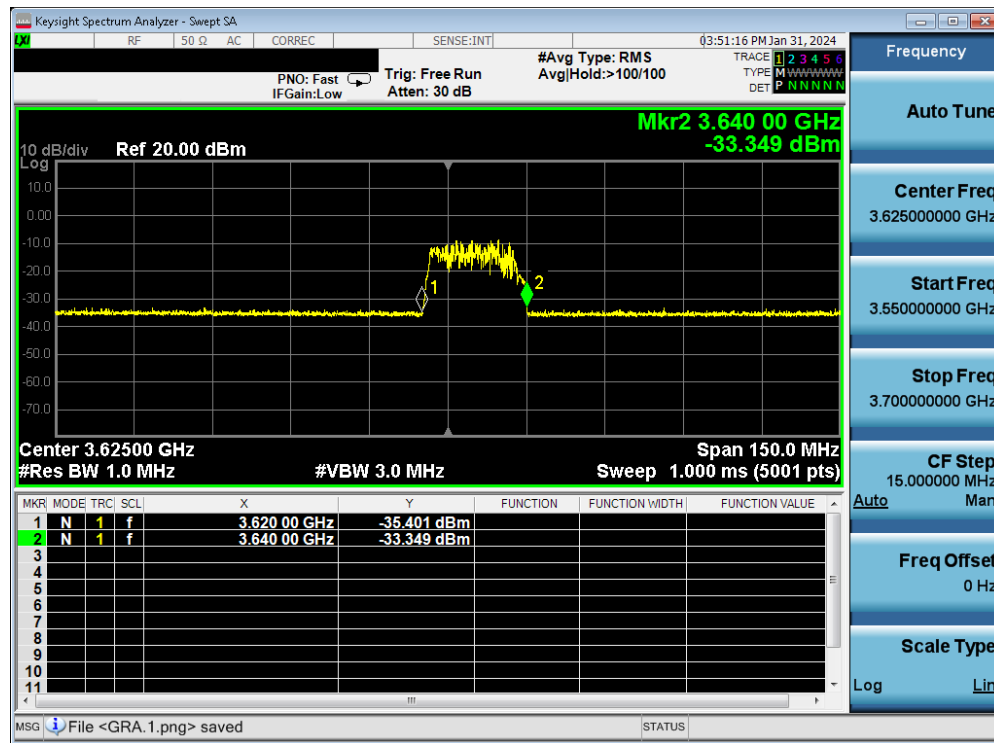
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 20 of 61

A10 [WINNF.FT.C.GRA.2] Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)

The following steps describe the test execution where the Grant response contains responseCode (R) = 401:

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: UUT has registered successfully with SAS Test Harness, with cbsdId = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including - cbsdId=C - responseCode = R	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: UUT shall not transmit RF	☒	☐

Test Plots:



Plot 9. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.GRA.2)

FCC ID: 2AZH6XCME002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A11 [WINNF.FT.D.HBT.2] Domain ProxyHeartbeat Success Case (first Heartbeat Response)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: DP has two CBSD registered successfully with SAS Test Harness, with cbsdId = Ci, i={1,2}	--	--
2	DP sends a message: - If message is type Spectrum Inquiry Request, go to step 3, or - If message is type Grant Request, go to step 5	--	--
3	DP sends a Spectrum Inquiry Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message is formatted correctly for each CBSD, including for CBSDi, i={1,2}: - cbsdId = Ci - List of frequencyRange objects sent by DP are within the CBRS frequency range	☒	☐
4	If a separate Spectrum Inquiry Request message was sent for each CBSD, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message. If a single Spectrum Inquiry Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array. Verify parameters for each CBSD withing the Spectrum Inquiry Response message are as follows, for CBSDi, i={1,2}: - cbsdId = Ci - availableChannel is an array of availableChannel objects - responseCode = 0	--	--
5	DP sends Grant Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Grant Request message is formatted correctly for each CBSD including for CBSDi, i={1,2} - cbsdId = Ci - maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 - operationFrequencyRange, Fi, sent by UUT is a valid range within the CBRS band	☒	☐

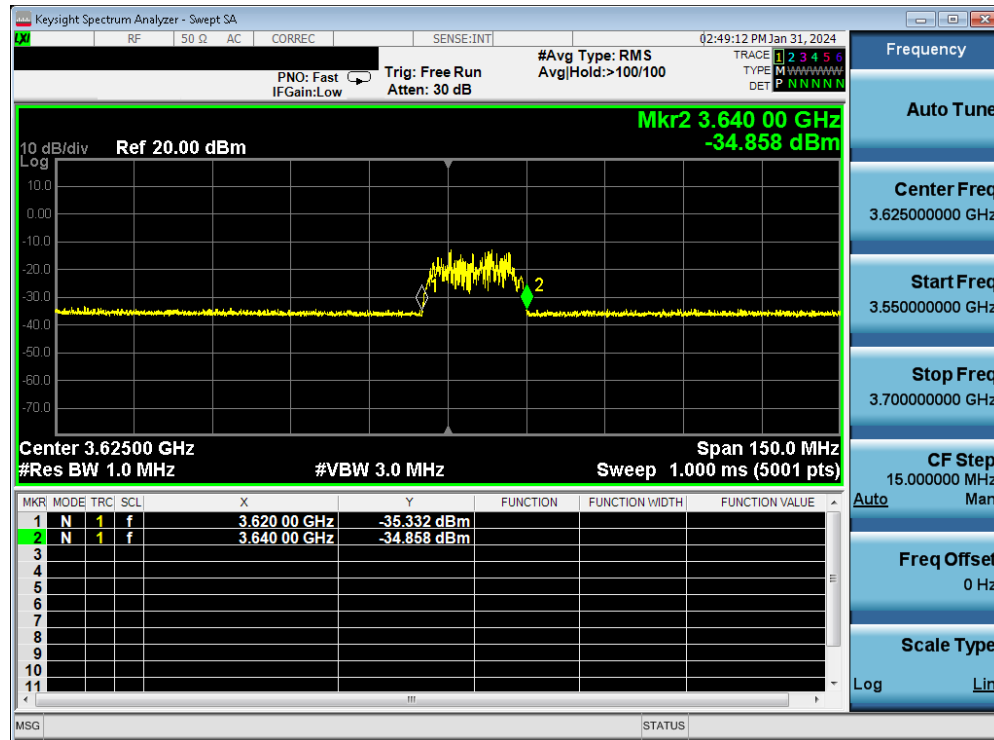
FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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6	If a separate Grant Request message was sent ofr each CBSD, the SAS Test Harness shall respond to each Grant Request message with a separate Grant Response message. If a single Grant Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Grant Response message containing a 2-object array. Verify parameters for each CBSD within the Grant Response message are as follows, for CBSDi, i={1,2} • cbsdId = Ci • grantId = Gi = a valid grant ID • grantExpireTime = UTC time greater than duration of the test • responseCode = 0	--	--
7	Ensure DP sends first Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Heartbeat Request message is formatted correctly for each CBSD, including, for CBSDi i={1,2} • cbsdId = Ci, i={1,2} • grantId = G, i={1,2} • operationState = "GRANTED"	☒	☐
8	If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent for each CBSD by the D containing a 2-object arry (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Verify parameters for each CBSD within the Heartbeat Response message are as follows, for CBSDi: • cbsdId = Ci • grantId = Gi • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0	--	--
9	For further Heartbeat Request messages sent from DP after completion of step 8, validate message is sent within latest specified heartbeatInterval for CBSDi, and: • cbsdId = Ci • grantId = Gi	☒	☐

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	• operationState = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: • cbsdId = Ci • grantId = Gi • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0		
10	Monitor the RF output of each UUT from start of test until UUT transmission commences. Verify: • Each UUT does not transmit at any time prior to completion of the first heartbeat response • Each UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F	☒	☐

Test Plots:



Plot 10. Conducted Measurement - RF transmission after SAS heartbeat response (WINNF.FT.D.HBT.2)

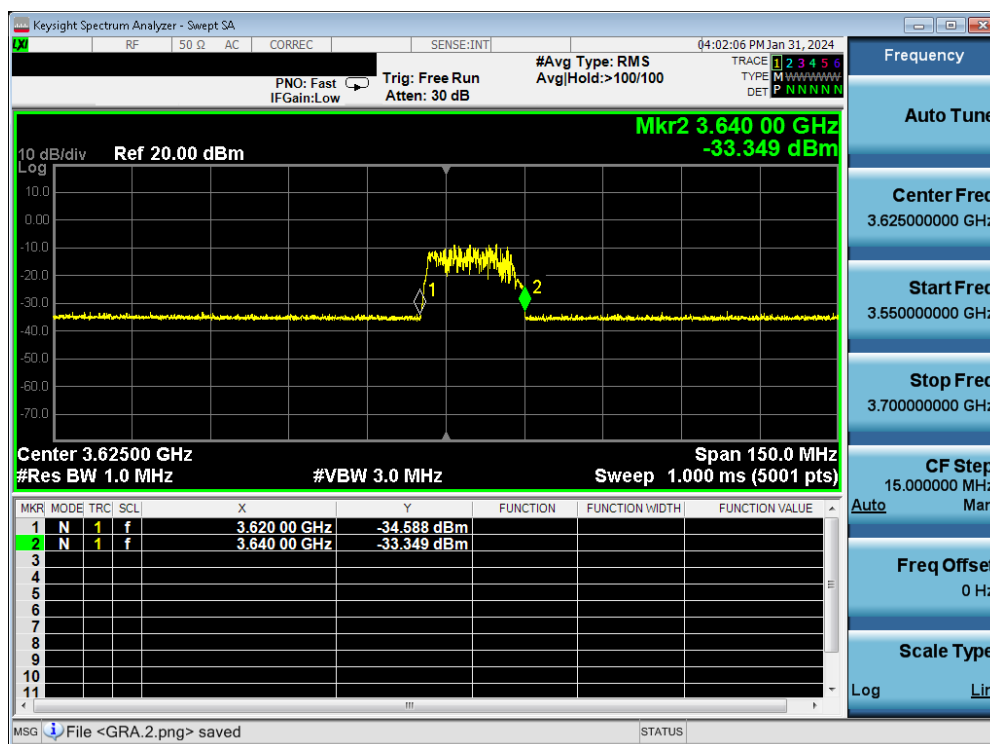
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A12 [WINNF.FT.C.HBT.3] Heartbeat responseCode=105 (DEREGISTER)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: • cbsdId = C • grantId = G • operationState = "AUTHORIZED"	☒	☐
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 105 (DEREGISTER)	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	☒	☐

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Test Plots:



Plot 11. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.3)

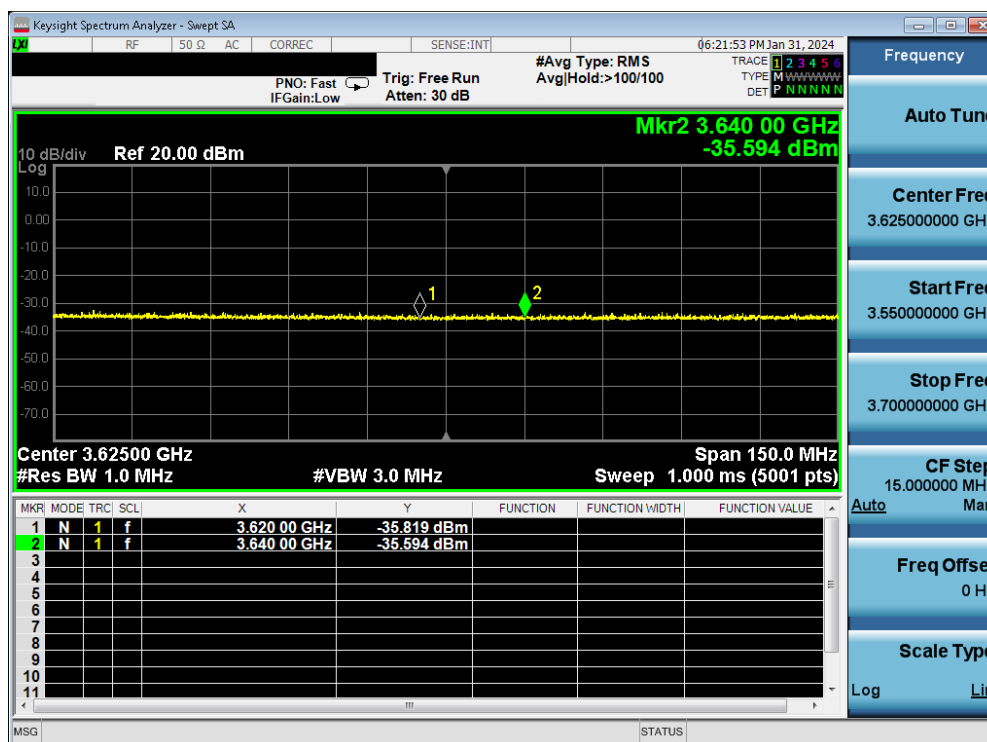
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A13 [WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: • cbsdId = C • grantId = G • operationState = "GRANTED"	☒	☐
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT)	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSD interface. Verify either A OR B occurs: A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters: • cbsdId = C • grantId = G • operationState = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: • cbsdId = C • grantId = G Monitor the RF output of the UUT. Verify: • UUT does not transmit at any time	☒	☐

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Test Plots:



Plot 12. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.5)

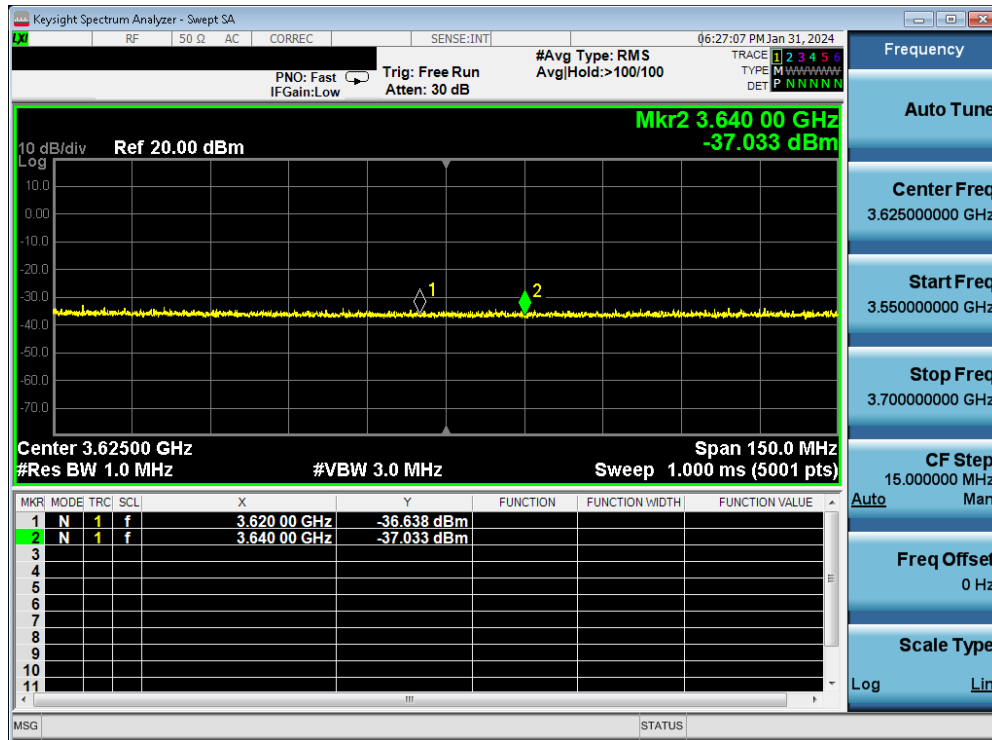
FCC ID: 2AZH6XC MEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A14 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: • cbsdId = C • grantId = G • operationState = "AUTHORIZED"	☒	☐
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT)	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSD interface. Verify either A OR B occurs: A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters: • cbsdId = C • grantId = G • operationState = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: • cbsdId = C • grantId = G Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	☒	☐

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Test Plots:



Plot 13. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.6)

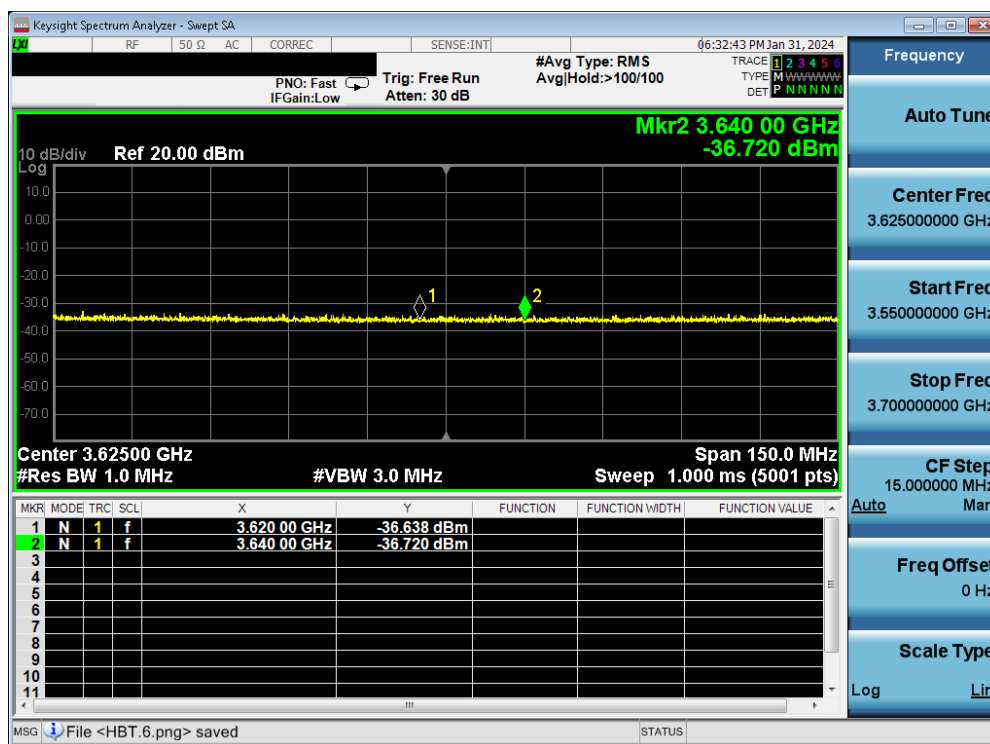
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A15 [WINNF.FT.C.HBT.7] Heartbeat responseCode=502 (UNSYNC_OP_PARAM)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: • cbsdId = C • grantId = G • operationState = "AUTHORIZED"	☒	☐
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 502 (UNSYNC_OP_PARAM)	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSD interface. Verify: • UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: - o cbsdId = C - o grantId = G Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T+60) seconds of completion of step 3.	☒	☐

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Test Plots:



Plot 14. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.7)

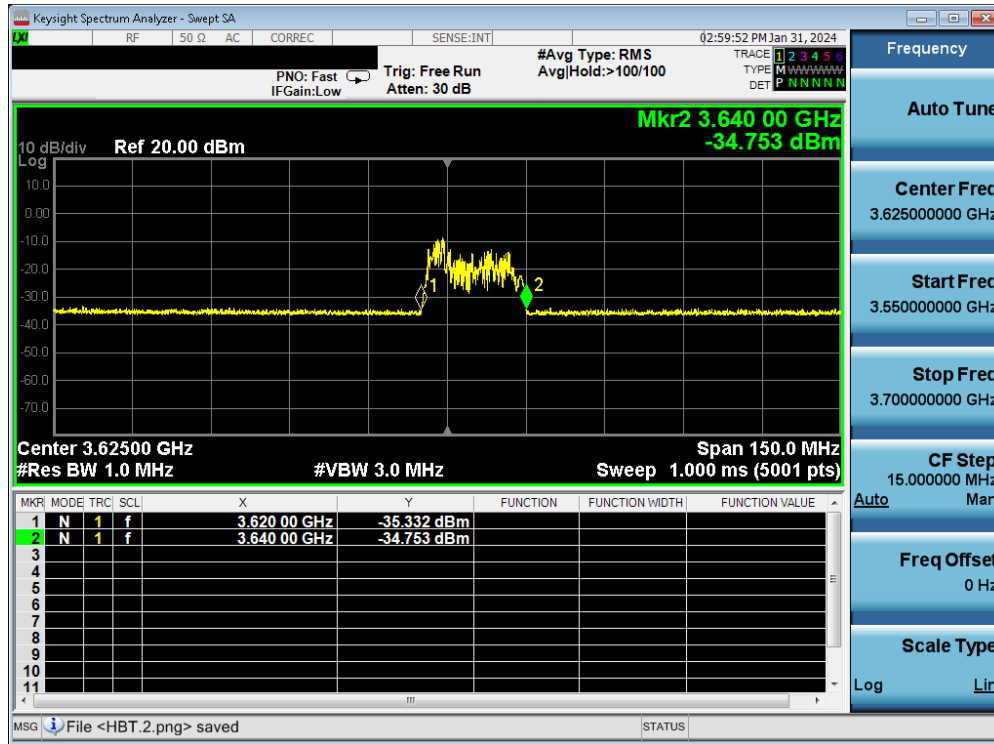
FCC ID: 2AZH6XC MEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A16 [WINNF.FT.D.HBT.8] Domain Proxy Heartbeat responseCode=500 (TERMINATED_GRANT)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: - DP has two CBSD registered successfully with SAS Test Harness - Each CBSD {1,2} has a valid single grant as follows: - o valid cbsdId = Ci, i={1,2} - o valid grantId = Gi, i={1,2} - o grant is for frequency range Fi, power Pi - o grantExpireTime = UTC time greater than duration of the test - Both CBSD are in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of size 2. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly for each CBSD, including, for CBSDi i={1,2}: - cbsdId = Ci, i={1,2} - grantId = Gi, i={1,2} - operationState = "AUTHORIZED"	☒	☐
3	If separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Parameters for each CBSD within the Heartbeat Response message should be as follows, for CBSDi: - cbsdId = Ci, i={1,2} - grantId = Gi, i={1,2} For CBSD1: - transmitExpireTime = T = Current UTC time + 200 seconds - responseCode = 0 For CBSD2 - transmitExpireTime = T = current UTC time - responseCode = 500 (TERMINATED_GRANT)	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT. If CBSD sends further Heartbeat Request messages for CBSD1, SAS Test Harness shall respond with a Heartbeat Response message with parameters: - cbsdId = C1 - grantId = G1 - transmitExpireTime = current UTS time + 200 seconds - response Code = 0	--	--

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	Heartbeat Resuest message is withing heartbeatInterval of previous Heartbeat Request message		
5	Montior the RF output of CBSD2. Verify: CBSD2 shall stop transmission within bandwidth F2 within (T + 60 seconds) of completion of step 3	☒	☐



Plot 15. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.8)

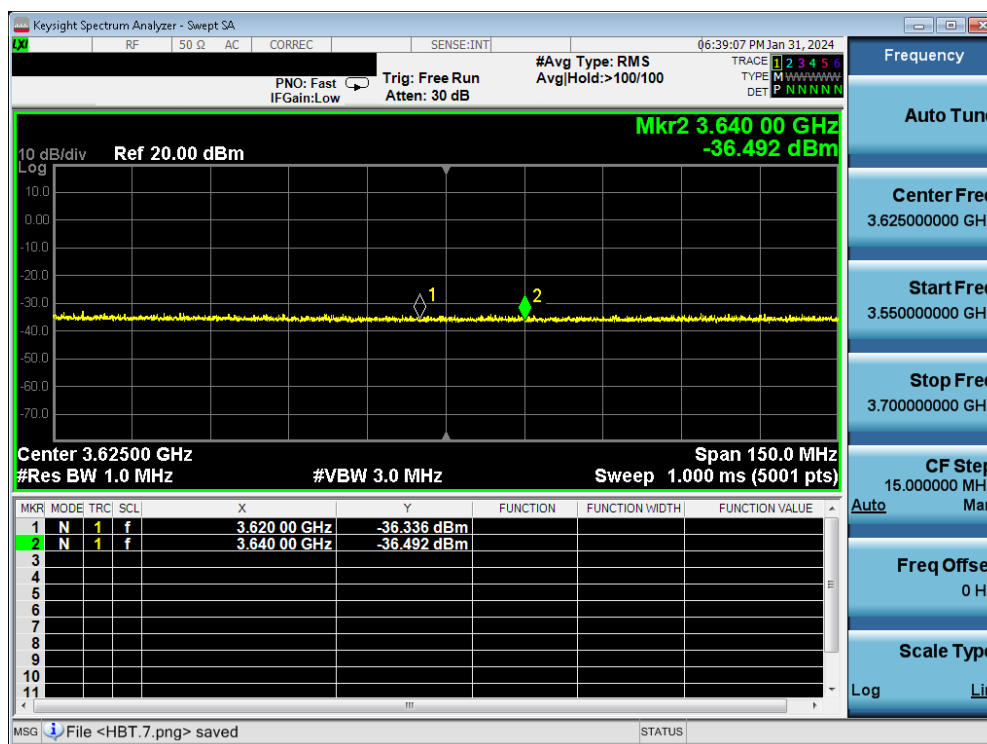
FCC ID: 2AZH6GXCME002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A17 [WINNF.FT.C.HBT.9] Heartbeat Response Absent (First Heartbeat)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)	--	--
2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: • cbsdId = C • grantId = G • operationState = "GRANTED"	☒	☐
3	After completion of Step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection	--	--
4	Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify: • At any time during the test, UUT shall not transmit on RF interface	☒	☐

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Test Plots:



Plot 16. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.9)

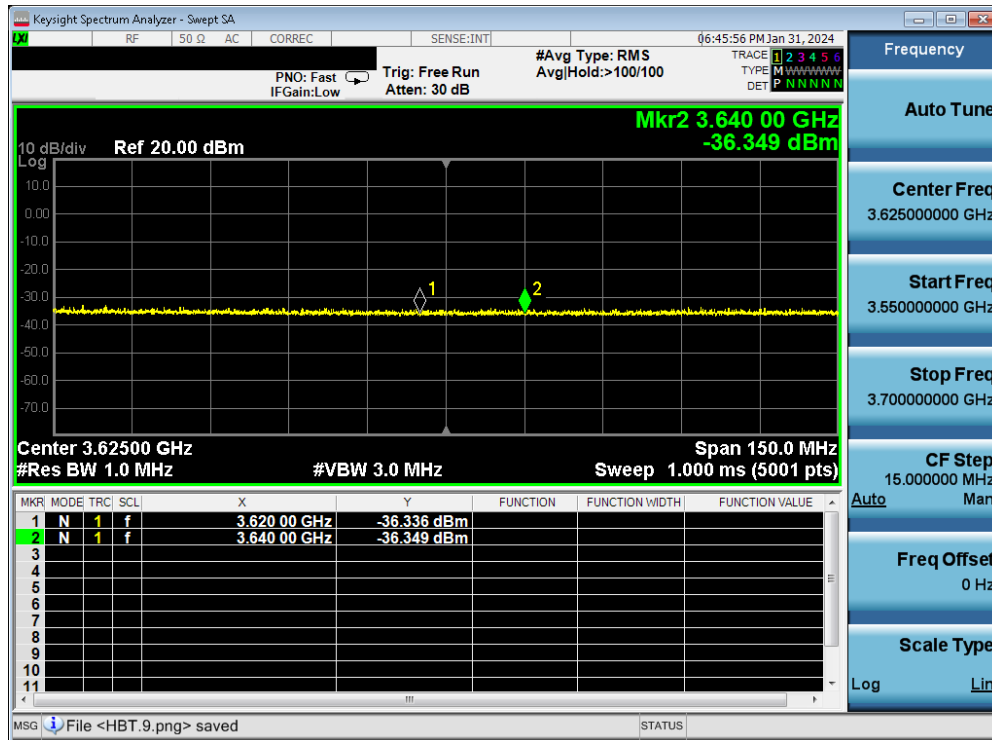
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A18 [WINNF.FT.C.HBT.10] Heartbeat Response Absent (Subsequent Heartbeat)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: - o valid cbsdId = C - o valid grantId = G - o grant is for frequency range F, power P - o grantExpireTime = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: • cbsdId = C • grantId = G • operationState = "AUTHORIZED"	☒	☐
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0	--	--
4	After completion of Step 3, SAS Test Harness does not respond to any further messages from UUT	--	--
5	Monitor the RF output of the UUT. Verify: • UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.	☒	☐

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Test Plots:



Plot 17. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.HBT.10)

FCC ID: 2AZH6XC MEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 38 of 61

A19 [WINNF.FT.D.MES.2] Domain Proxy Registration Response contains measReportConfig

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: DP has successfully completed SAS Discovery and Authentication with SAS Test Harness	--	--
2	DP sends a Registration Request message for each of two CBSD. This may occur in a separate Request message per CBSD, or together in a single Request message with array of 2. Verify the Registration Request message contains all required parameters properly formatted for CBSDi, i={1,2}, and specifically:: - userId is present and correct - fcclId is present and correct - cbsdSerialNumber is present and correct - measCapability = "RECEIVED_POWER_WITHOUT_GRANT"	☒	☐
3	If a separate Registration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Registration Response message containing a 2-object array. Parameters for each CBSD within the Registration Response message should be as follows, for CBSDi: - cbsdId = Ci - measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" - responseCode = 0	--	--
4	UUT sends a message: - If message is type Spectrum Inquiry Request, go to step 5, or - If message is type Grant Request, go to step 7	--	--
5	UUT sends message type Spectrum Inquiry Request. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message contains all required parameters properly formatted for CBSDi, i={2}, and specifically: - cbsdId = Ci - measReport is present, and is a properly formatted rcvdPowerMeasReport.	☒	☐
6	If a separate Spectrum Inquiry Request message was sent for each CBD by the DP, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message. If a single Spectrum Inquiry Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array. Parameters for each CBSD within the Spectrum Inquiry Response message should be as follows: cbsdId = Ci	--	--

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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	- availableChannel is an array of availableChannel objects - responseCode = 0		
7	UUT sends message type Grant Request message. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify the Grant Request message contains all require parameters properly formatted for CBSDi, i={1,2}, aind specifically: - cbsdId = C - measReport is present, and is a properly formatted rcvdPowerMeasReport.	☒	☐

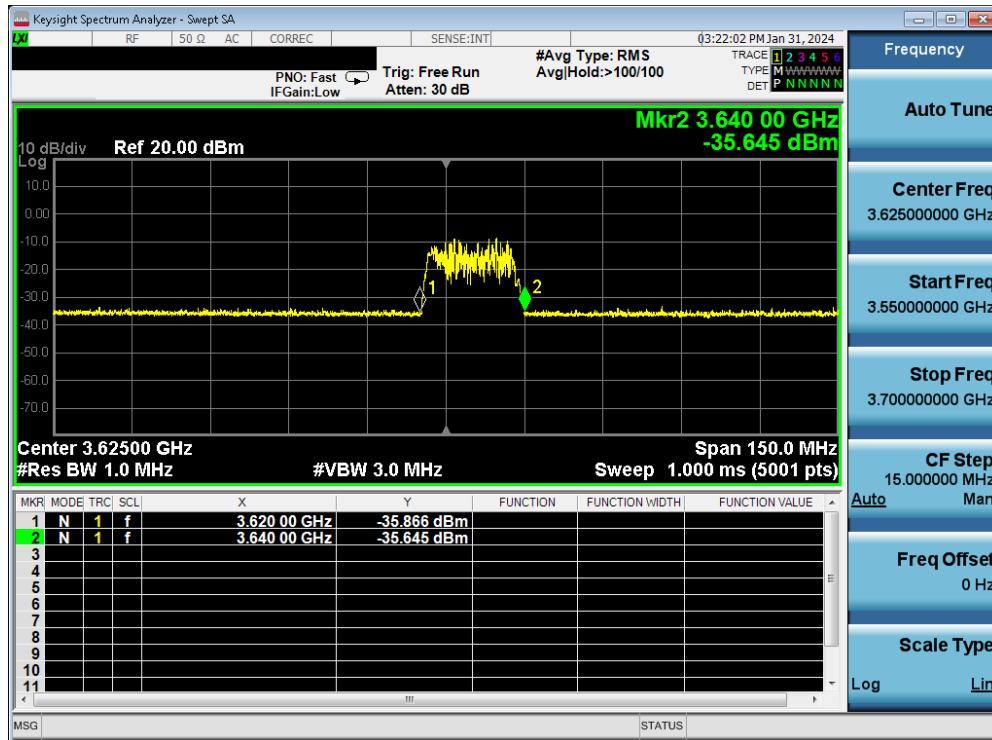
FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 40 of 61

A20 [WINNF.FT.D.RLQ.2] Domain Proxy Successful Relinquishment

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: - DP has successfully completed SAS Discovery and Authentication with SAS Test Harness - DP has successfully registered 2 CBSD with SAS Test Harness, with cbsdId=Ci, I={1,2} - DP has received a valid grant with grantId = Gi, i={1,2} for each CBSD - Both CBSD are in Grant State AUTHORIZED and is actively transmitting within the bounds of their grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--	--
2	Verify DP sends a Relinquishment Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Relinquishment Request message contains all required parameters properly formatted for each CBSD, specifically for CBSDi: - cbsdId = Ci - grantId = Gi	☒	☐
3	If a separate Relinquishment Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message. If a single Relinquishment Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array. Parameters for each CBSD within the Relinquishment Response shall be as follows: - cbsdId = Ci - grantId = Gi - responseCode = 0	--	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT.	--	--
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	☒	☐

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Test Plots:



Plot 18. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.RLQ.2)

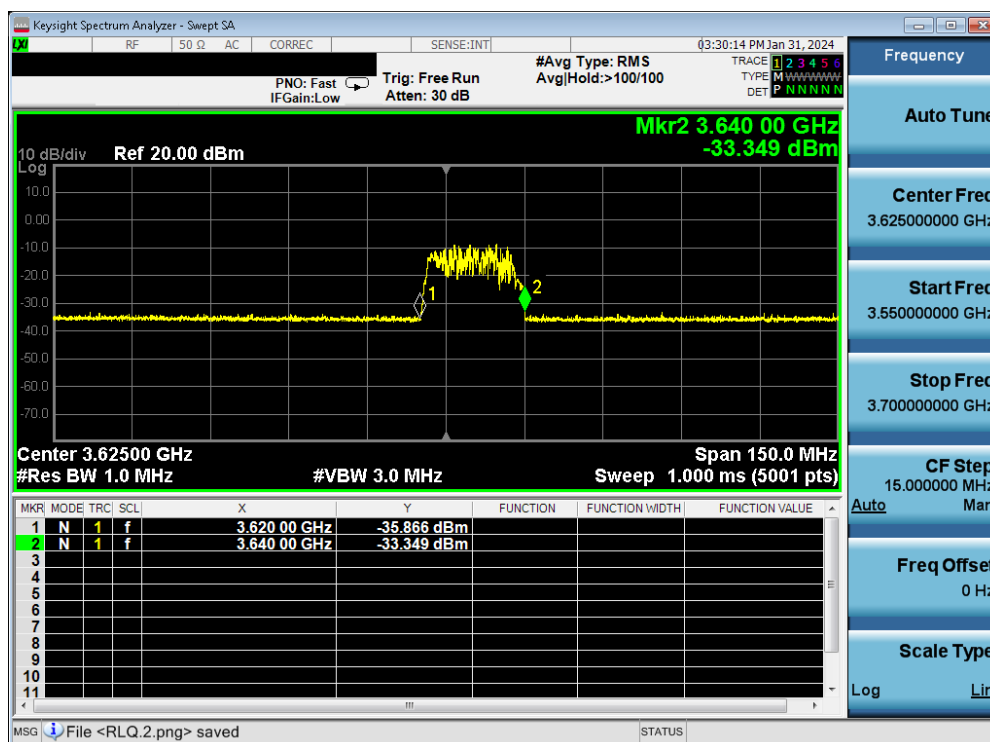
FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 42 of 61

A21 [WINNF.FT.D.DRG.2] Domain Proxy Successful Deregistration

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: - Each UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness - Each UUT is in the authorized state - DP has successfully registered 2 CBSD with SAS Test Harness, each with cbsdId=Ci, I = {1,2} - DP has received a valid grant with grandId = Gi, i={1,2} for each CBSD - Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	--	--
3	Verify DP sends a Deregistration Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Deregistration Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi" cbsdId = Ci	☒	☐
4	If a separate Deregistration Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message. If a single Deregistration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array. Parameters for each CBSD within the Deregistration Response shall be as follows: - cbsdId = Ci - responseCode = 0	--	--
5	After completion of step 4, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT	--	--
6	Monitor the RF output of each UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: - UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	☒	☐

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Test Plots:



Plot 19. Conducted Measurement - UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.D.DRG.2)

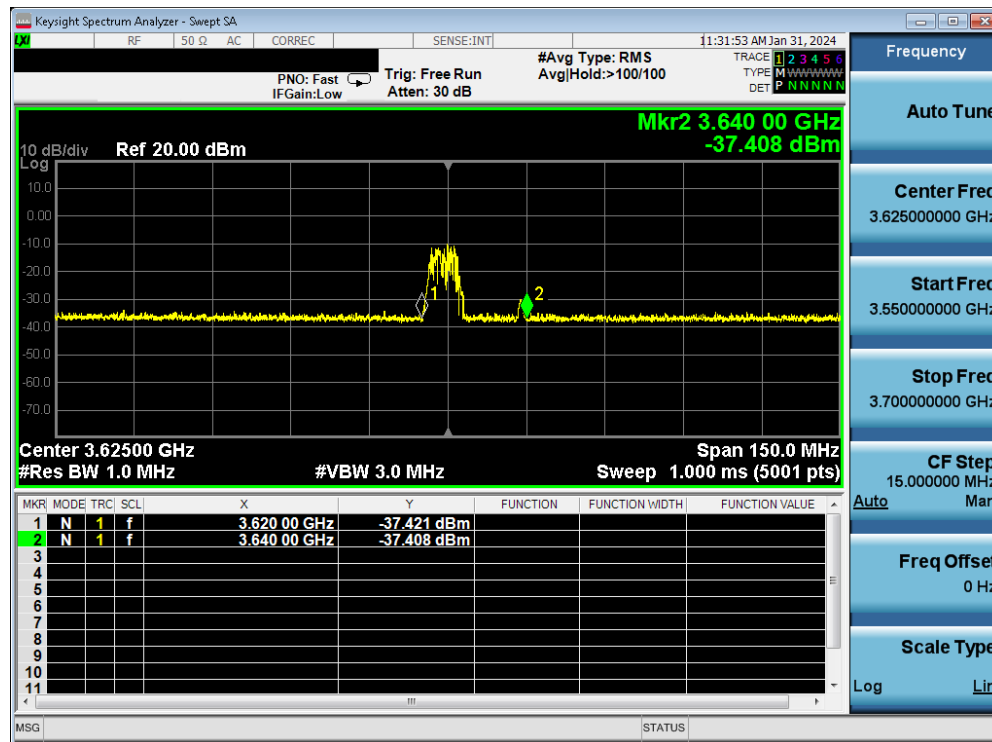
FCC ID: 2AZH6XC MEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 44 of 61

A22 [WINNF.FT.C.SCS.1] Successful TLS connection between UUT and SAS Test Harness

	Test Execution Steps	PASS	FAIL
1	• UUT shall start CBSD-SAS communication with the security procedure • The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate. • Configure the SAS Test Harness to accept the security procedure and establish the connection	☒	☐
2	• Make sure that Mutual authentication happens between UUT and the SAS Test Harness. • Make sure that UUT uses TLS v1.2 • Make sure that cipher suites from one of the following is selected, • TLS_RSA_WITH_AES_128_GCM_SHA256 • TLS_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	☒	☐
3	A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability. • UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with responseCode = 0 and cbsdId.	☒	☐
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

FCC ID: 2AZH6GXCME002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Test Plots:



Plot 20. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.SCS.1)

2341..57709..677780	10.10.36.99	10.10.36.60	TCP	60 33928 + 443 [ACK] Seq=1 Ack=1 Win=64256 Len=0
2341..57709..677917	10.10.36.99	10.10.36.60	TSv1.2	337 Client Hello
2341..57709..687793	10.10.36.60	10.10.36.99	TSv1.2	1514 Server Hello
2341..57709..687793	10.10.36.60	10.10.36.99	TCP	1514 443 + 33928 [ACK] Seq=1461 Ack=284 Win=2102272 Len=1460 [TCP segment of a reassembled PDU]
2341..57709..687793	10.10.36.60	10.10.36.99	TSv1.2	468 Certificate, Server Key Exchange, Certificate Request, Server Hello Done
2341..57709..690312	10.10.36.99	10.10.36.60	TCP	60 33928 + 443 [ACK] Seq=284 Ack=3335 Win=62048 Len=0
2341..57709..690341	10.10.36.99	10.10.36.60	TCP	134 33928 + 443 [ACK] Seq=284 Ack=3335 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
2341..57709..690341	10.10.36.99	10.10.36.60	TCP	1514 33928 + 443 [ACK] Seq=1744 Ack=3335 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
2341..57709..690341	10.10.36.99	10.10.36.60	TSv1.2	1489 Certificate
2341..57709..690401	10.10.36.99	10.10.36.99	TCP	54 443 + 33928 [ACK] Seq=3335 Ack=4559 Win=2102272 Len=0
2341..57709..690738	10.10.36.99	10.10.36.60	TSv1.2	449 Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
2341..57709..690765	10.10.36.99	10.10.36.60	TCP	54 443 + 33928 [ACK] Seq=3335 Ack=4954 Win=2101760 Len=0
2341..57709..692751	10.10.36.60	10.10.36.99	TSv1.2	1514 New Session Ticket
2341..57709..692751	10.10.36.60	10.10.36.99	TSv1.2	180 Change Cipher Spec, Encrypted Handshake Message
2341..57709..693120	10.10.36.99	10.10.36.60	TCP	60 33928 + 443 [ACK] Seq=4954 Ack=4841 Win=63616 Len=0
2341..57709..693714	10.10.36.99	10.10.36.60	TSv1.2	85 Encrypted Alert
2341..57709..693791	10.10.36.99	10.10.36.60	TCP	60 33928 + 443 [FIN, ACK] Seq=4985 Ack=4841 Win=64128 Len=0
2341..57709..693810	10.10.36.60	10.10.36.99	TCP	54 443 + 33928 [ACK] Seq=4841 Ack=4986 Win=2101760 Len=0
2341..57709..693981	10.10.36.99	10.10.36.99	TCP	54 443 + 33928 [FIN, ACK] Seq=4841 Ack=4986 Win=2101760 Len=0
2341..57709..694319	10.10.36.99	10.10.36.60	TCP	60 33928 + 443 [ACK] Seq=4985 Ack=4842 Win=64128 Len=0

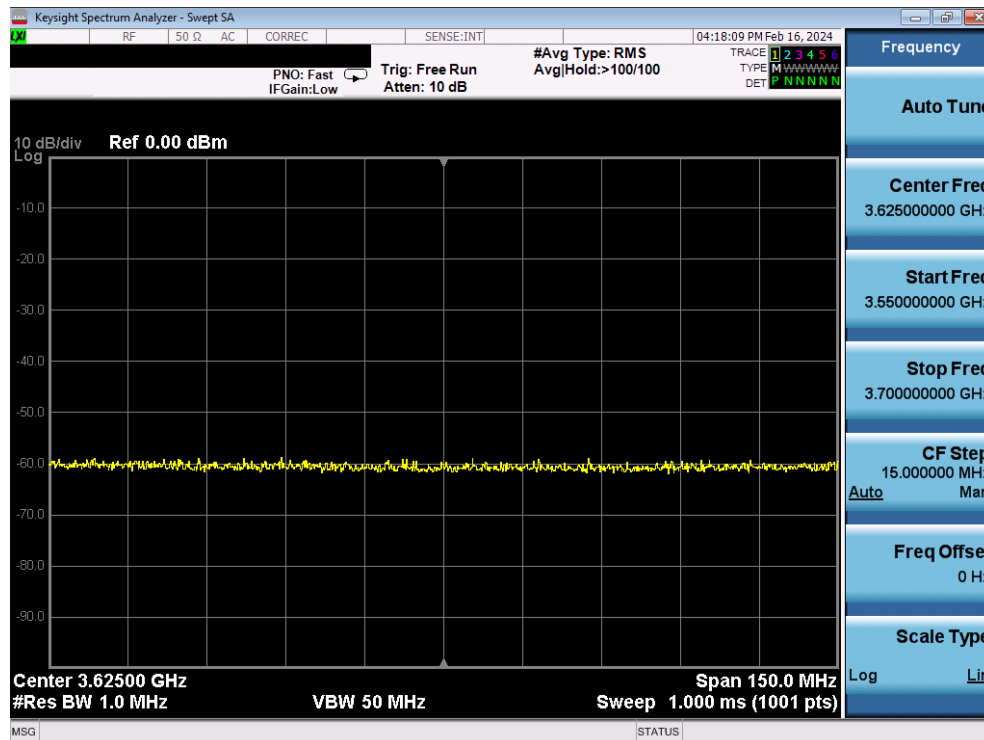
Plot 21. WireShark Screenshot – Successful Handshake (WINNF.FT.C.SCS.1)

FCC ID: 2AZH6GXCMEN002		 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE		Page 46 of 61

A23 [WINNF.FT.C.SCS.2] TLS failure due to revoked certificate

	Test Execution Steps	PASS	FAIL
1	• UUT shall start CBSD-SAS communication with the security procedure	☒	☐
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness	☒	☐
3	UUT may retry for the security procedure which shall fail	☒	☐
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

Test Plots:



Plot 22. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.SCS.2)

FCC ID: 2AZH6XC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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No.	Time	Source	Destination	Protocol	Length	Info
148	52.439256	10.10.36.99	10.10.36.60	TCP	74	39716 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=2268871677 TSecr=0 WS=128
149	52.439473	10.10.36.60	10.10.36.99	TCP	66	443 → 39716 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
150	52.441223	10.10.36.99	10.10.36.60	TCP	60	39716 → 443 [ACK] Seq=1 Ack=1 Win=64256 Len=0
151	52.441405	10.10.36.99	10.10.36.60	TLSv1.2	337	Client Hello
152	52.450882	10.10.36.60	10.10.36.99	TLSv1.2	1514	Server Hello
153	52.450882	10.10.36.60	10.10.36.99	TCP	1514	443 → 39716 [ACK] Seq=1461 Ack=284 Win=262400 Len=1460 [TCP segment of a reassembled PDU]
154	52.450882	10.10.36.60	10.10.36.99	TLSv1.2	468	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
155	52.452678	10.10.36.99	10.10.36.60	TCP	60	39716 → 443 [ACK] Seq=284 Ack=3335 Win=62840 Len=0
156	52.452742	10.10.36.99	10.10.36.60	TCP	1514	39716 → 443 [ACK] Seq=284 Ack=3335 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
157	52.452742	10.10.36.99	10.10.36.60	TCP	1514	39716 → 443 [ACK] Seq=1744 Ack=3335 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
158	52.452742	10.10.36.99	10.10.36.60	TLSv1.2	1409	Certificate
159	52.452788	10.10.36.60	10.10.36.99	TCP	54	443 → 39716 [ACK] Seq=3335 Ack=4559 Win=262656 Len=0
160	52.453971	10.10.36.99	10.10.36.60	TLSv1.2	440	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
161	52.454000	10.10.36.60	10.10.36.99	TCP	54	443 → 39716 [ACK] Seq=3335 Ack=4954 Win=262400 Len=0
162	52.455139	10.10.36.60	10.10.36.99	TLSv1.2	1514	New Session Ticket
163	52.455139	10.10.36.60	10.10.36.99	TLSv1.2	100	Change Cipher Spec, Encrypted Handshake Message
164	52.455529	10.10.36.99	10.10.36.60	TCP	60	39716 → 443 [ACK] Seq=4954 Ack=4841 Win=63616 Len=0
165	52.457329	10.10.36.99	10.10.36.60	TLSv1.2	80	Encrypted Alert
166	52.457329	10.10.36.99	10.10.36.60	TCP	60	39716 → 443 [FIN, ACK] Seq=4985 Ack=4841 Win=64128 Len=0
167	52.457391	10.10.36.60	10.10.36.99	TCP	54	443 → 39716 [ACK] Seq=4841 Ack=4986 Win=262144 Len=0
168	52.457585	10.10.36.60	10.10.36.99	TCP	54	443 → 39716 [FIN, ACK] Seq=4841 Ack=4986 Win=262144 Len=0
169	52.458024	10.10.36.99	10.10.36.60	TCP	60	39716 → 443 [ACK] Seq=4986 Ack=4842 Win=64128 Len=0

Plot 23. UUT SAS Server Log - Failed Handshake (WINNF.FT.C.SCS.2)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 48 of 61

9	3.895883	10.10.36.99	10.10.36.60	TCP	74 35942 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=947041678 TSecr=0 WS=128
10	3.896090	10.10.36.60	10.10.36.99	TCP	66 443 → 35942 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
11	3.896707	10.10.36.99	10.10.36.60	TCP	60 35942 → 443 [ACK] Seq=1 Ack=1 Win=64256 Len=0
12	3.897388	10.10.36.99	10.10.36.60	TLSv1.2	571 Client Hello
13	3.906836	10.10.36.60	10.10.36.99	TLSv1.2	1514 Server Hello
14	3.906836	10.10.36.60	10.10.36.99	TCP	1514 443 → 35942 [ACK] Seq=1461 Ack=518 Win=2102272 Len=1460 [TCP segment of a reassembled PDU]
15	3.906836	10.10.36.60	10.10.36.99	TLSv1.2	490 Certificate, Server Key Exchange, Certificate Request, Server Hello Done
16	3.907493	10.10.36.99	10.10.36.60	TCP	60 35942 → 443 [ACK] Seq=518 Ack=3365 Win=62648 Len=0
17	3.907547	10.10.36.99	10.10.36.60	TLSv1.2	61 Alert (Level: Fatal, Description: Unknown CA)
18	3.907577	10.10.36.99	10.10.36.60	TCP	60 35942 → 443 [RST, ACK] Seq=525 Ack=3365 Win=64128 Len=0
43	13.894925	10.10.36.99	10.10.36.60	TCP	74 58370 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=947041678 TSecr=0 WS=128
44	13.895007	10.10.36.60	10.10.36.99	TCP	66 443 → 58370 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
45	13.895504	10.10.36.99	10.10.36.60	TCP	60 58370 → 443 [ACK] Seq=1 Ack=1 Win=64256 Len=0
46	13.896320	10.10.36.99	10.10.36.60	TLSv1.2	571 Client Hello
47	13.903040	10.10.36.60	10.10.36.99	TLSv1.2	1514 Server Hello
48	13.903040	10.10.36.60	10.10.36.99	TCP	1514 443 → 58370 [ACK] Seq=1461 Ack=518 Win=2102272 Len=1460 [TCP segment of a reassembled PDU]
49	13.903040	10.10.36.60	10.10.36.99	TLSv1.2	490 Certificate, Server Key Exchange, Certificate Request, Server Hello Done
50	13.903093	10.10.36.99	10.10.36.60	TCP	60 58370 → 443 [ACK] Seq=518 Ack=3365 Win=62648 Len=0
51	13.903934	10.10.36.99	10.10.36.60	TLSv1.2	61 Alert (Level: Fatal, Description: Unknown CA)
52	13.903954	10.10.36.99	10.10.36.60	TCP	60 58370 → 443 [RST, ACK] Seq=525 Ack=3365 Win=64128 Len=0

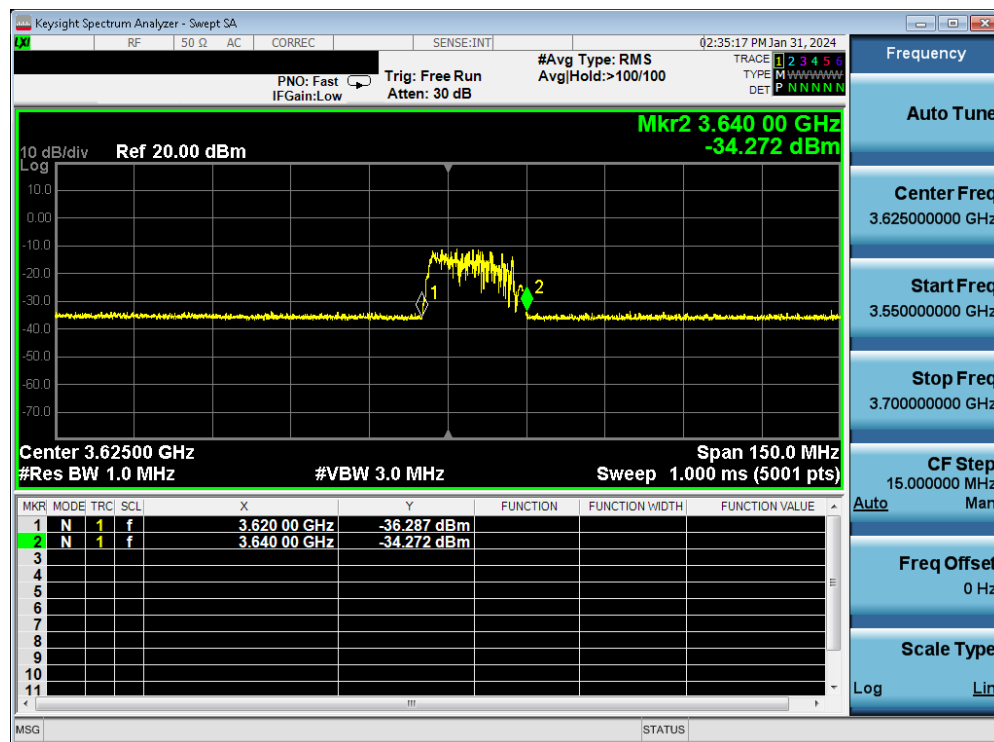
Plot 25. WireShark Screenshot - Failed Handshake (WINNF.FT.C.SCS.3)

FCC ID: 2AZH6GXCMEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 50 of 61

A25 [WINNF.FT.C.SCS.4] TLS failure when SAS Test Harness certificate is issued by an unknown CA

	Test Execution Steps	PASS	FAIL
1	• UUT shall start CBSD-SAS communication with the security procedure	☒	☐
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	☒	☐
3	UUT may retry for the security procedure which shall fail	☒	☐
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

Test Plots:



Plot 26. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.SCS.4)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 51 of 61

2254	559.564862	10.10.36.99	10.10.36.60	TLSv1.2	337 Client Hello
2255	559.575309	10.10.36.60	10.10.36.99	TLSv1.2	1514 Server Hello
2256	559.575309	10.10.36.60	10.10.36.99	TCP	1514 443 → 46804 [ACK] Seq=1461 Ack=284 Win=2102272 Len=1460 [TCP segment of a reassembled PDU]
2257	559.575309	10.10.36.60	10.10.36.99	TLSv1.2	474 Certificate, Server Key Exchange, Certificate Request, Server Hello Done
2258	559.577245	10.10.36.99	10.10.36.60	TCP	60 46804 → 443 [ACK] Seq=284 Ack=3341 Win=62840 Len=0
2259	559.577290	10.10.36.99	10.10.36.60	TCP	1514 46804 → 443 [ACK] Seq=284 Ack=3341 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
2260	559.577290	10.10.36.99	10.10.36.60	TCP	1514 46804 → 443 [ACK] Seq=1744 Ack=3341 Win=64128 Len=1460 [TCP segment of a reassembled PDU]
2261	559.577290	10.10.36.99	10.10.36.60	TLSv1.2	1409 Certificate
2262	559.577327	10.10.36.60	10.10.36.99	TCP	54 443 → 46804 [ACK] Seq=3341 Ack=4859 Win=2102272 Len=0
2263	559.578135	10.10.36.99	10.10.36.60	TLSv1.2	449 Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
2264	559.578177	10.10.36.60	10.10.36.99	TCP	54 443 → 46804 [ACK] Seq=3341 Ack=4954 Win=2101760 Len=0
2265	559.579805	10.10.36.60	10.10.36.99	TLSv1.2	1514 New Session Ticket
2266	559.579805	10.10.36.60	10.10.36.99	TLSv1.2	100 Change Cipher Spec, Encrypted Handshake Message
2267	559.580219	10.10.36.99	10.10.36.60	TCP	60 46804 → 443 [ACK] Seq=4954 Ack=4847 Win=64128 Len=0
2268	559.582228	10.10.36.99	10.10.36.60	TLSv1.2	85 Encrypted Alert
2269	559.582228	10.10.36.99	10.10.36.60	TCP	60 46804 → 443 [FIN, ACK] Seq=4985 Ack=4847 Win=64128 Len=0
2270	559.582285	10.10.36.60	10.10.36.99	TCP	54 443 → 46804 [ACK] Seq=4847 Ack=4986 Win=2101760 Len=0
2271	559.582492	10.10.36.60	10.10.36.99	TCP	54 443 → 46804 [FIN, ACK] Seq=4847 Ack=4986 Win=2101760 Len=0
2272	559.582954	10.10.36.99	10.10.36.60	TCP	60 46804 → 443 [ACK] Seq=4986 Ack=4848 Win=64128 Len=0

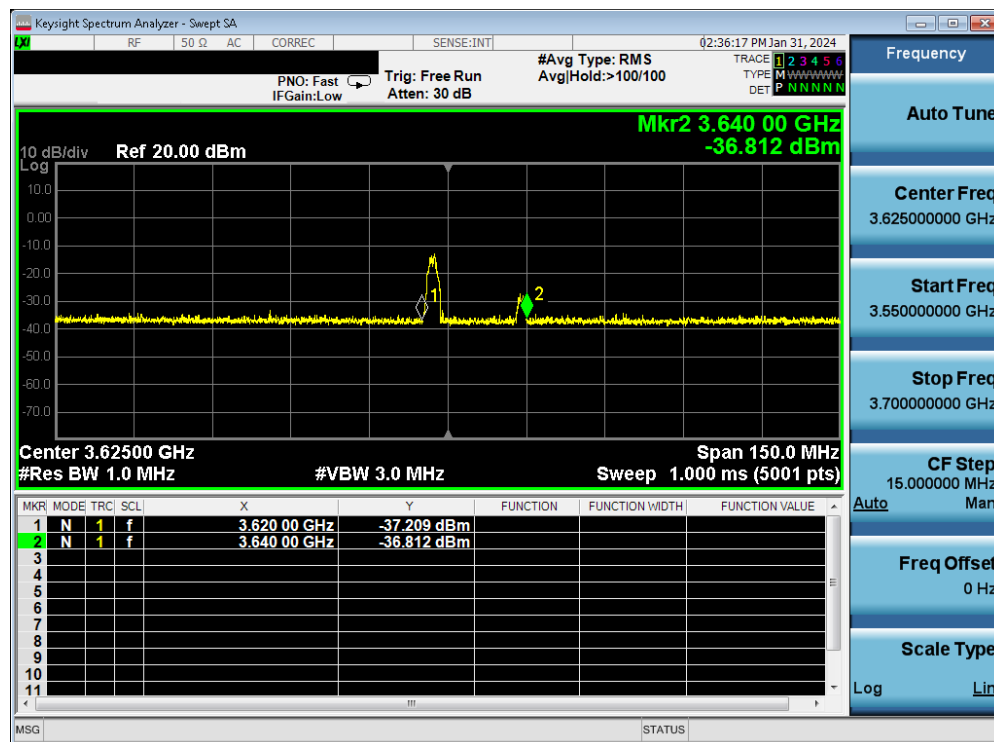
Plot 27. WireShark Screenshot - Failed Handshake (WINNF.FT.C.SCS.4)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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A26 [WINNF.FT.C.SCS.5] TLS failure when certificate at the SAS Test Harness is corrupted

	Test Execution Steps	PASS	FAIL
1	• UUT shall start CBSD-SAS communication with the security procedure	☒	☐
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	☒	☐
3	UUT may retry for the security procedure which shall fail	☒	☐
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	☒	☐

Test Plots:



Plot 28. Conducted Measurement – UUT RF transmission range and bandwidths are less or equal to frequency range and bandwidth of compatible BTS-CBSD (WINNF.FT.C.SCS.5)

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 53 of 61

50	3.474489	10.10.36.99	10.10.36.60	TCP	74 46872 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=234323197 TSecr=0 WS=128
51	3.474722	10.10.36.60	10.10.36.99	TCP	66 443 → 46872 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
52	3.475263	10.10.36.99	10.10.36.60	TCP	60 46872 → 443 [ACK] Seq=1 Ack=1 Win=64256 Len=0
53	3.476441	10.10.36.99	10.10.36.60	TLSv1.2	571 Client Hello
54	3.486899	10.10.36.60	10.10.36.99	TLSv1.2	1514 Server Hello
55	3.486899	10.10.36.60	10.10.36.99	TCP	1514 443 → 46872 [ACK] Seq=1461 Ack=518 Win=2102272 Len=1460 [TCP segment of a reassembled PDU]
56	3.486899	10.10.36.60	10.10.36.99	TLSv1.2	496 Certificate, Server Key Exchange, Certificate Request, Server Hello Done
57	3.487719	10.10.36.99	10.10.36.60	TCP	60 46872 → 443 [ACK] Seq=518 Ack=3363 Win=62848 Len=0
58	3.488259	10.10.36.99	10.10.36.60	TLSv1.2	61 Alert (Level: Fatal, Description: Decrypt Error)
59	3.488306	10.10.36.99	10.10.36.60	TCP	60 46872 → 443 [RST, ACK] Seq=525 Ack=3363 Win=64128 Len=0

Plot 29. WireShark Screenshot - Failed Handshake (WINNF.FT.C.SCS.5)

FCC ID: 2AZH6GXCMEN002	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A27 [WINNF.PT.C.HBT.1] UUT RF Transmit Power Measurement

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT has registered with the SAS, with CBSID ID = C • UUT has a single valid grant G with parameters {lowFrequency = FL, highFrequency = FH, maxEirp = Pi}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case <i>Note: in order for the UUT to request a grant with the parameters {lowFrequency, highFrequency, maxEirp}, the SAS Test Harness may need to provide appropriate guidance in the availableChannel object of the spectrumInquiry response message, and the operationParam object of the grant response message. Alternately, the UUT vendor may provide the ability to set those parameters on the UUT so that the UUT will request a grant with those parameters.</i>	--	--
2	UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows: • UUT sends Heartbeat Request, including: - o cbsdId = C - o grantId = G • SAS Test Harness responds with Heartbeat Response, including: - o cbsdId = C - o grantId = G - o transmitExpireTime = current UTC time + 200 seconds - o responseCode = 0	--	--
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfil the requirements of the power measurement method. <i>Note: it may be required for the vendor to provide a method or configuration to bring the UUT to a mode which is required by the measurement methodology. Any such mode is vendor-specific and depends upon UUT behavior and the measurement methodology.</i>	☒	☐

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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RF Power Measurements:

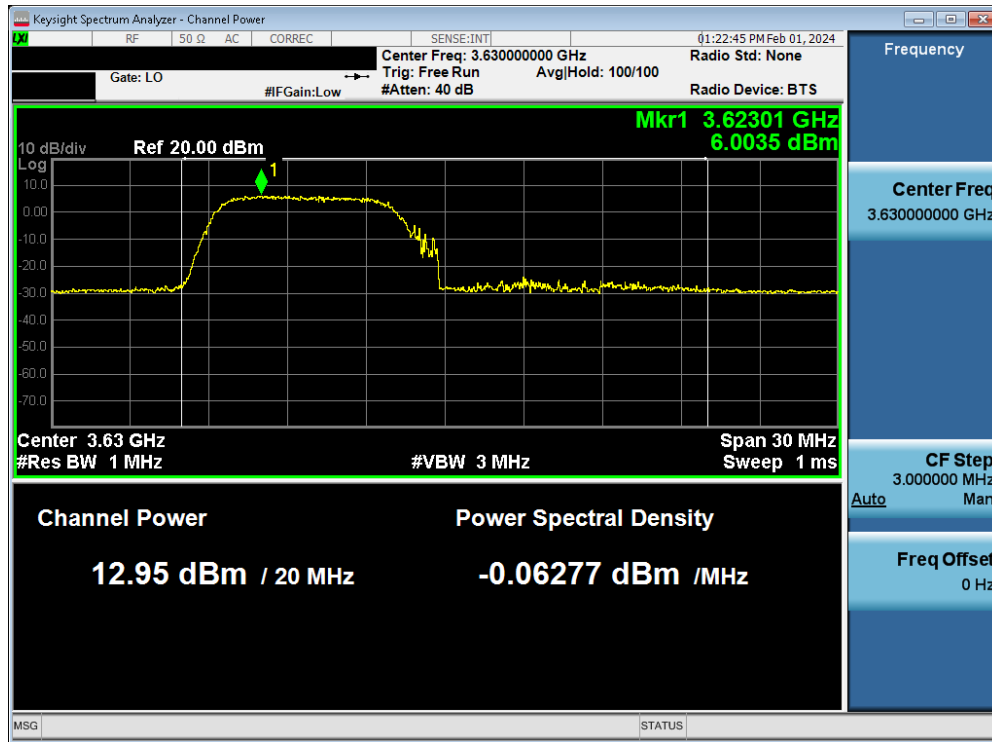
Testing is performed per KDB 971168 D01 and across the transmit dynamic range of 19dBm/MHz to 29dBm/MHz for 20MHz Bandwidth. The device transmits on one antenna port with a maximum gain of 16dBi.

SAS Granted EIRP [dBm/MHz]	Conducted PSD [dBm/MHz]	Gain [dBi]	Total EIRP (dBm/MHz)	Margin
29	12.95	16	28.95	-0.05
22	5.08	16	21.08	-0.92
19	1.90	16	17.90	-1.10

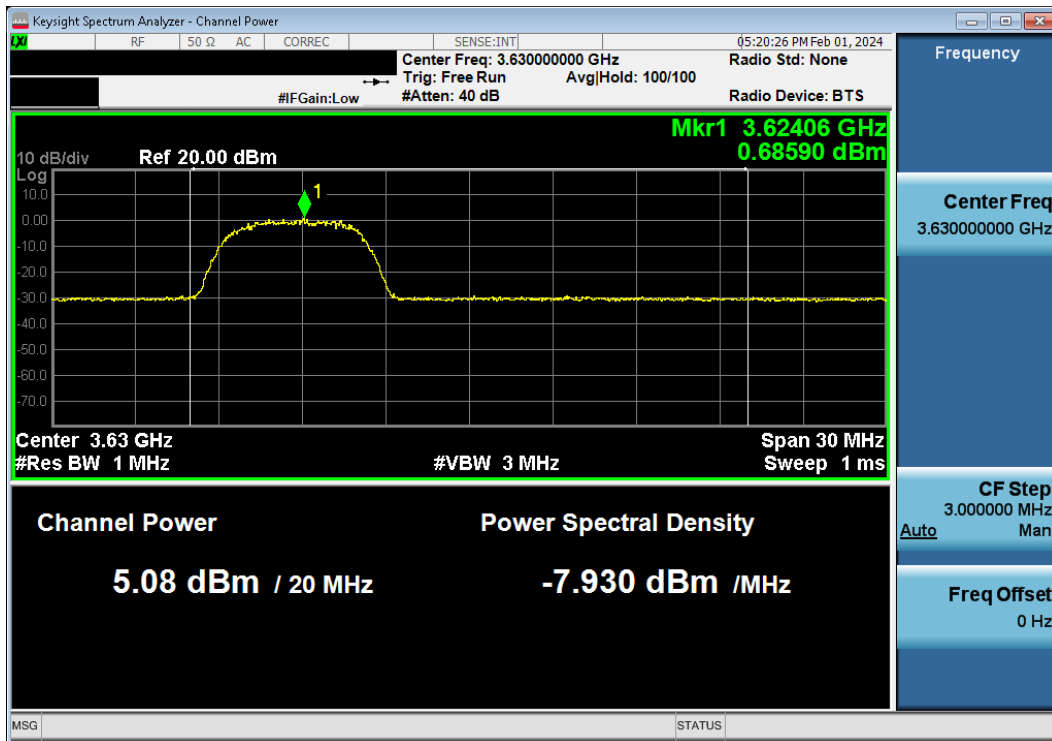
Table A.1 RF Output Power Measurements (WINNF.PT.C.HBT.1)

FCC ID: 2AZH6GXC MEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Test Plots:

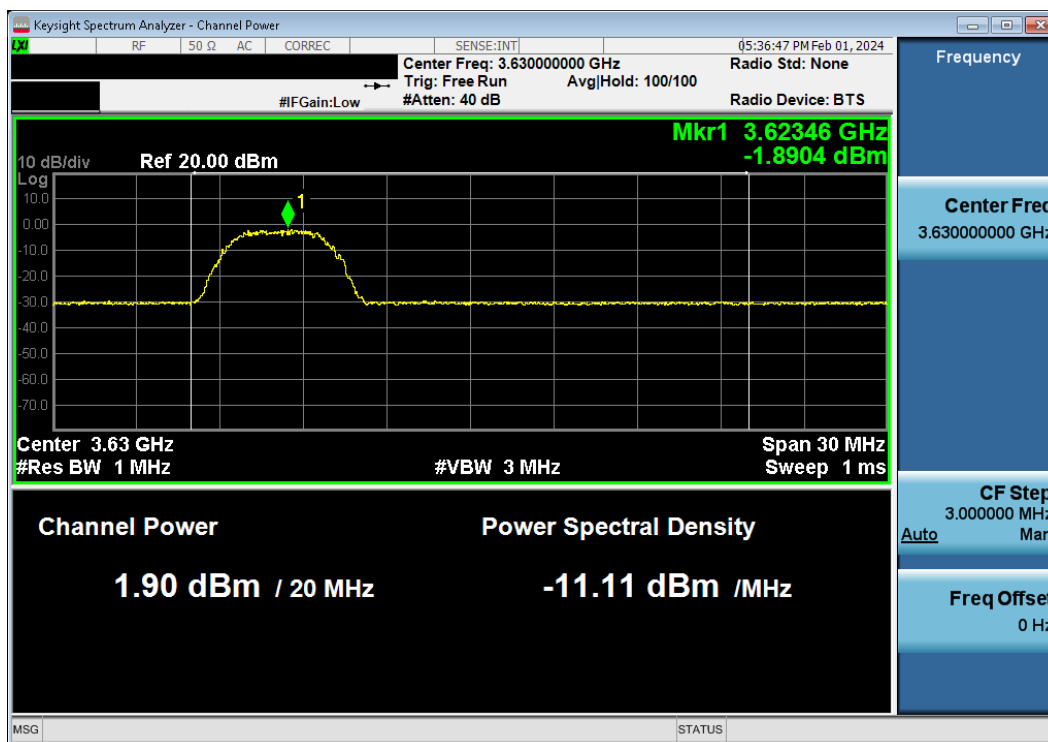


Plot 30. Conducted PSD, SAS Granted maxEIRP 29 dBm/MHz



Plot 31. Conducted PSD, SAS Granted maxEIRP 22 dBm/MHz

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 57 of 61



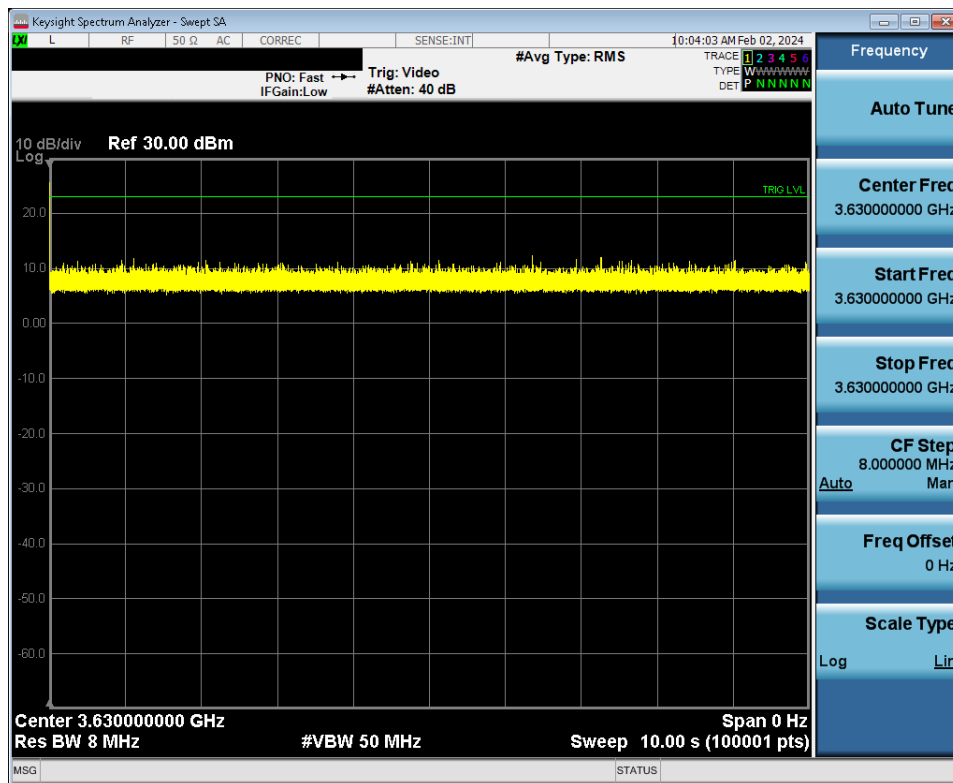
Plot 32. Conducted PSD, SAS Granted maxEIRP 19 dBm/MHz

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 58 of 61

A28 CPE-CBSD Initial SAS Communications Duty Cycle (X of Y)

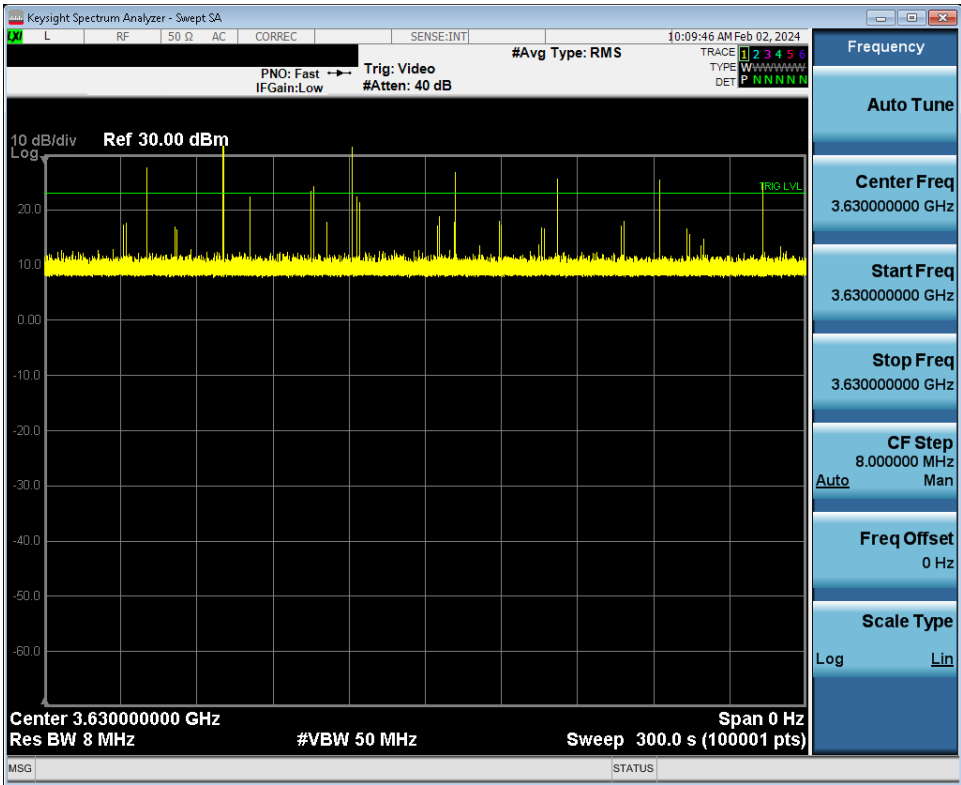
Testing is performed per WINNF-19-IN-00033 CBRS CPE CBSD as UUT Test Guidelines. Using a spectrum analyzer, time domain sweeps were performed at each time duration: 10s, 300s, and 3600s.

Time allowed per KDB	Aggregate amount of time >23dB,
1s of 10s period	0.0008s
10s of 300s period	0.0700s
20s of 3600s period	5.6879s

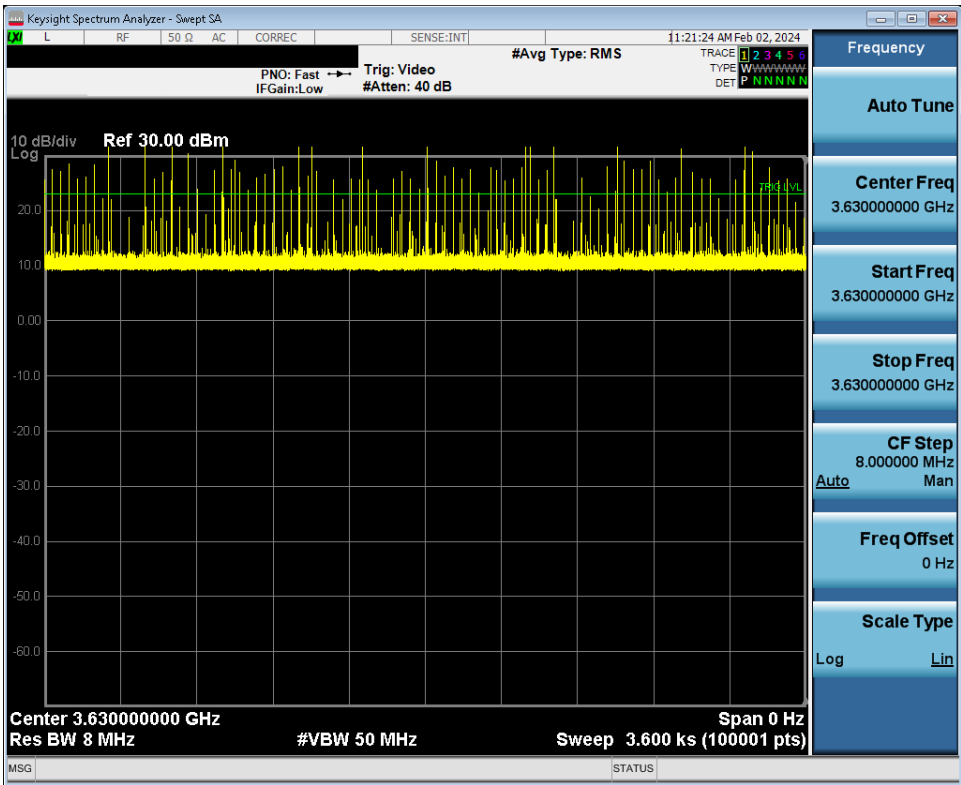


Plot 33. 10s Time Domain Sweep

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 34. 300s Time Domain Sweep



Plot 35. 3600s Time Domain Sweep

FCC ID: 2AZH6GXCMEN002		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2401260008.02-2AZh6	Test Dates: 1/29/2024 – 2/16/2024	EUT Type: CBRS CPE	Page 60 of 61