

TEST REPORT
CBSD-SAS Interoperability**Applicant Name:**

EUCAST Co., Ltd.

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Hwangsaeul-ro Bundang-Gu, Seongnam-si

Greonggi-do, Korea

Date of Testing:

8/22/2022 – 8/24/2022

Test Report Issue Date:

8/31/2022

Test Site/Location:

Element Lab. Columbia, MD, USA

Test Report Serial No.:

1M2208030084-01.2AXTR

FCC ID:**2AXTR-EPL2248-1690****APPLICANT:****EUCAST Co., Ltd****Application Type:**

Certification

Model:

EPL2248-1690

EUT Type:

LTE portable base station

Frequency Range:

3550 – 3700 MHz

FCC Classification:

Citizens Band Category B Devices (CBD)

FCC Rule Part(s):

Part 96

Test Procedure(s):

KDB 940660 D01 v03, 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

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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 7185 Oakland Mills Road, Columbia, MD 21046.

1.3 Test Facility / Accreditations

Measurements were performed at the 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **EUCAST, CAT B LTE portable base station**
FCC ID: 2AXTR-EPL2248-1690. The test data contained in this report pertains only to CBSD-SAS interoperability.
The EUT is a Category B CBSD.

Test Device Serial Number(s): EE0A0100223000005

Test Device Hardware Version: 1.0

Test Device Software Version: 02.04.14

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48

This device supports the following conditional features:

	Conditional Test Case Definitions	Supported
C1	Mandatory for UUT which supports multi-step registration message	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	<input checked="" type="checkbox"/>
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	<input type="checkbox"/>
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	<input checked="" type="checkbox"/>
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration	<input type="checkbox"/>

Table 2-1. Conditional Features

2.3 Test Configuration

The EUT was connected to the SAS Test Harness developed by WINNF WG4-CBSD. The latest version of the SAS Test Harness (V1.0.0.2) provided by CBRs Alliance was used. The SAS Test Harness is synchronized to UTC time.

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	3/4/2022	Annual	3/4/2023	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: EUCAST Co., Ltd
 FCC ID: 2AXTR-EPL2248-1690

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.C.REG.1 WINNF.FT.C.REG.5 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18 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.C.REG.1 WINNF.FT.C.REG.5 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18	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.C.HBT.1	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(b)(c)	6	Confirm that the device transmits with a bandwidth less than or equal to the SAS specified bandwidth.	WINNF.FT.C.HBT.1	Pass
96.39(c)(2)	7	Confirm that the device transmits on the SAS specified frequency.	WINNF.FT.C.HBT.1	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.4 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.C.HBT.10 WINNF.FT.C.RLQ.1 WINNF.FT.C.DRG.1	Pass

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

96.39 (c)	9	Confirm that the device sends measurements data in response to the command from the SAS.	WINNF.FT.C.MES.3 WINNF.FT.C.MES.4	Pass
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 (c)	11	Confirm that the device is capable of reporting the signal level (measurement data) and frequency to SAS.	WINNF.FT.C.MES.3 WINNF.FT.C.MES.4	Pass
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

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.
- A combiner was used to monitor both ports simultaneously
- Please see Appendices for test data.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **EUCAST, LTE Portable Base Station**
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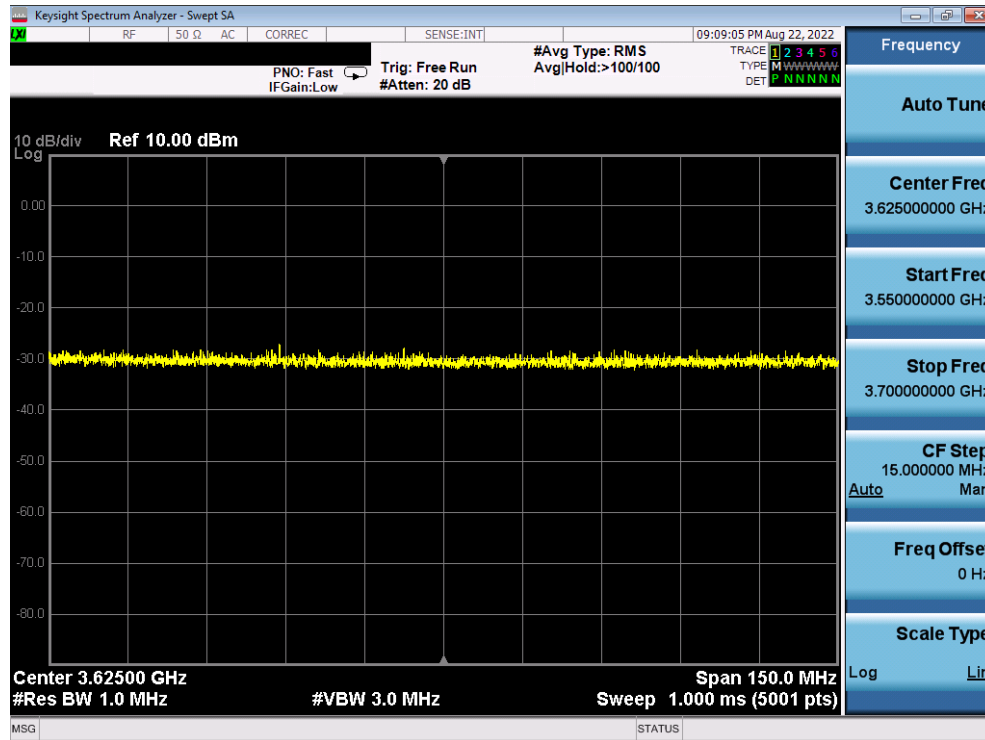
APPENDIX A – TEST RESULT AND DATA

A1 [WINNF.FT.C.REG.1] Multi-Step registration

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT is in the Unregistered state <p>CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness:</p>	--	--
2	<ul style="list-style-type: none"> • The required userId, fcId and cbsdSerialNumber registration parameters shall be sent from the 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. <p>Note: It is outside the scope of this document to test the Registration information that is supplied via another means.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<ul style="list-style-type: none"> • SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - cbsdId = Ci - measReportConfig shall not be included - responseCode = 0 	--	--
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	<p>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:</p> <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 1. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.1)

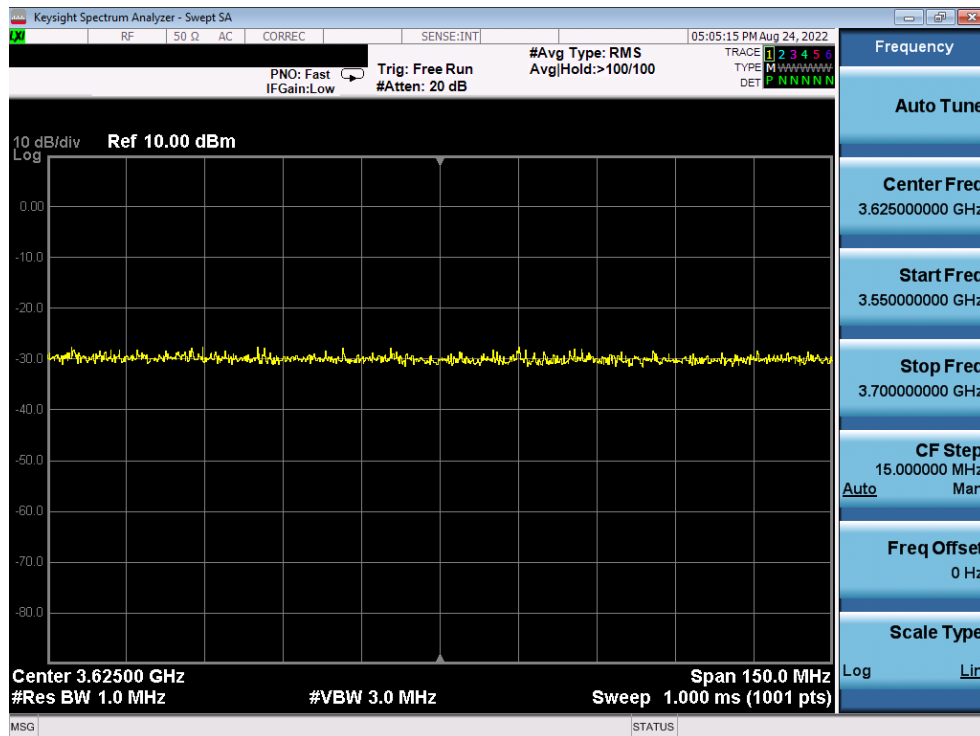
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A2 [WINNF.FT.C.REG.5] Single-Step registration for CBSD with CPI signed data

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state • All of the required and REG-Conditional parameters shall be configured and CPI signature provided 	--	--
2	CBSD sends Registration request to the SAS Test Harness: <ul style="list-style-type: none"> • The required userId, fcId and cbsdSerialNumber and REG-Conditional cbsdCategory, airInterface, measCapability and cpiSignatureData registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. • Any optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<ul style="list-style-type: none"> • SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - cbsdId = C - measReportConfig shall not be included - responseCode = 0 	--	--
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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



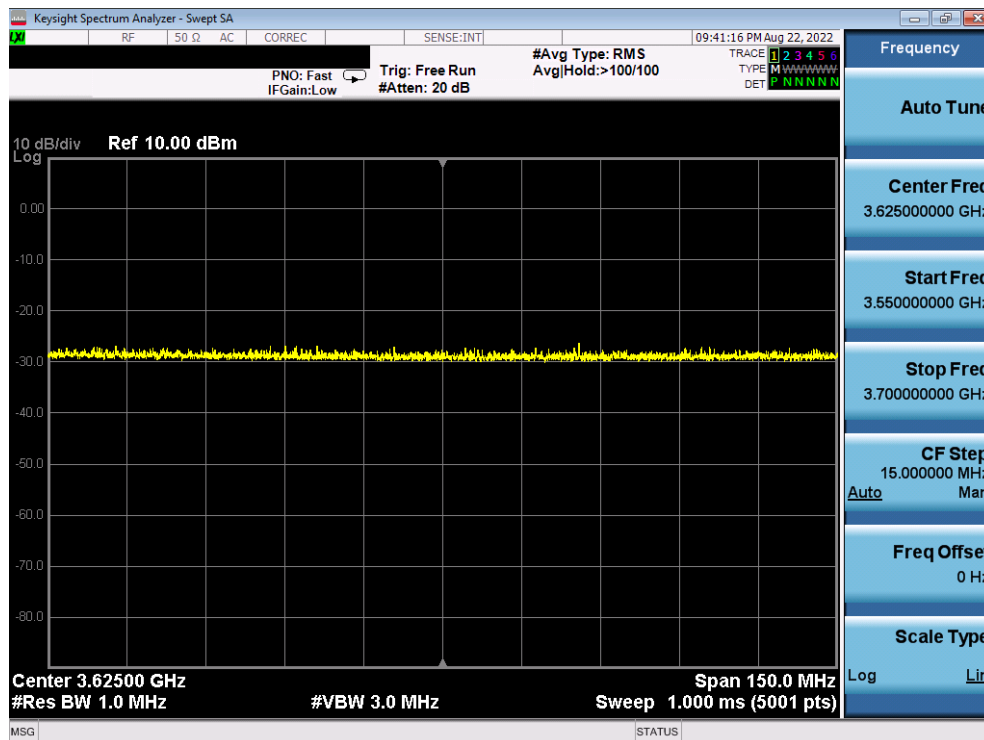
Plot 2. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.5)

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A3 [WINNF.FT.C.REG.8] Missing Required parameters (responseCode 102)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



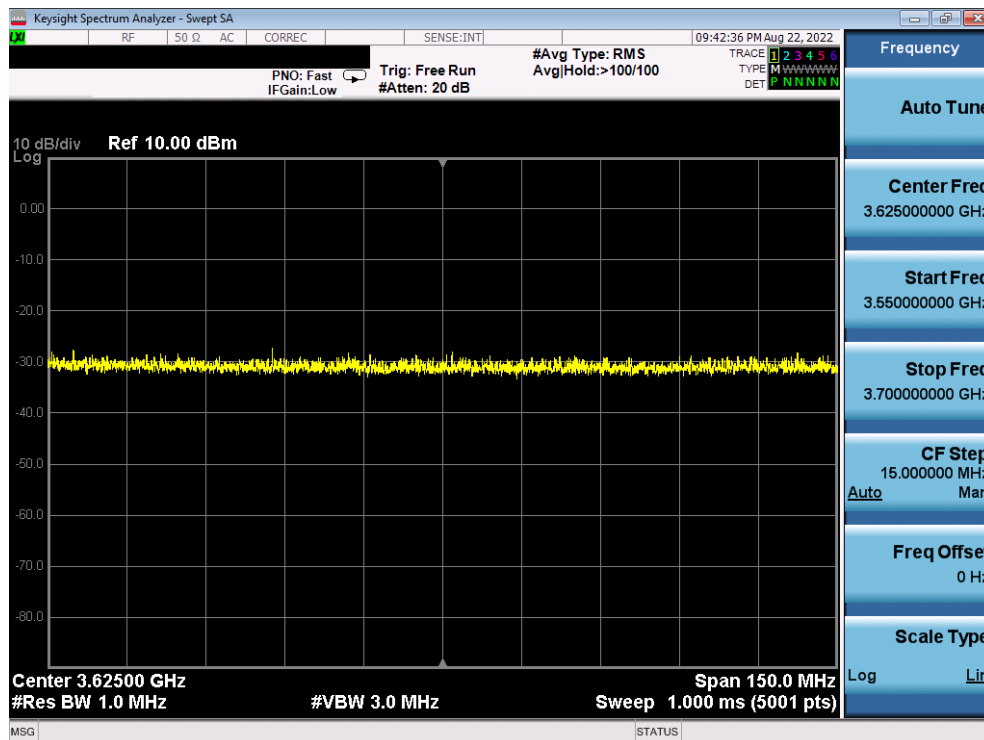
Plot 3. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.8)

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A4 [WINNF.FT.C.REG.10] Pending registration (responseCode 200)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



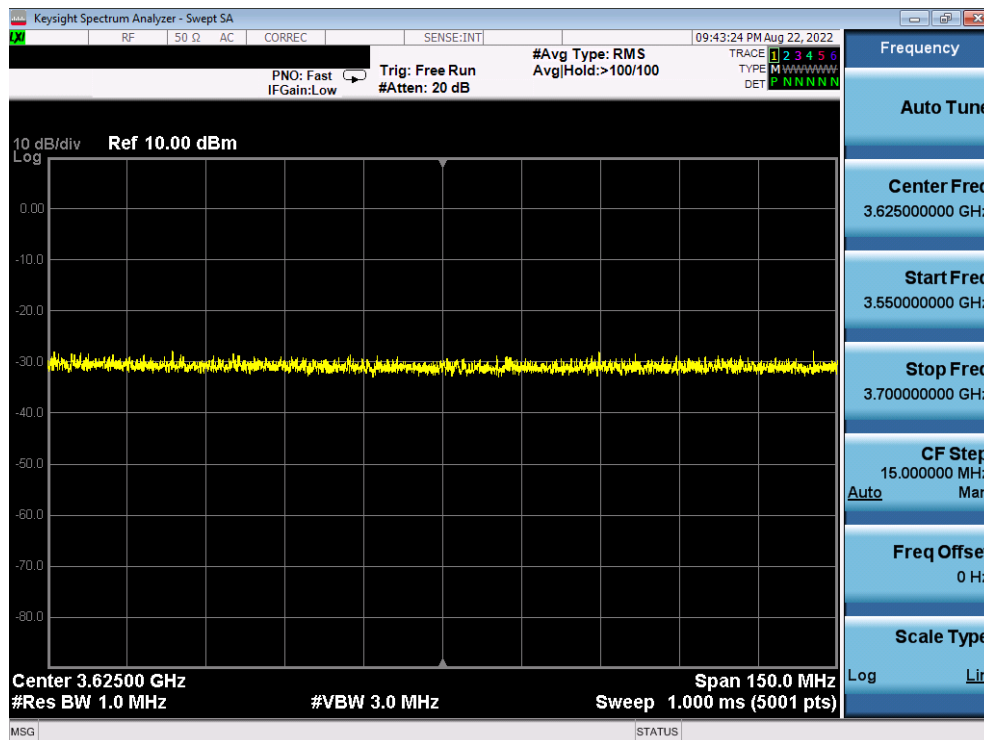
Plot 4. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.10)

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A5 [WINNF.FT.C.REG.12] Invalid parameter (responseCode 103)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



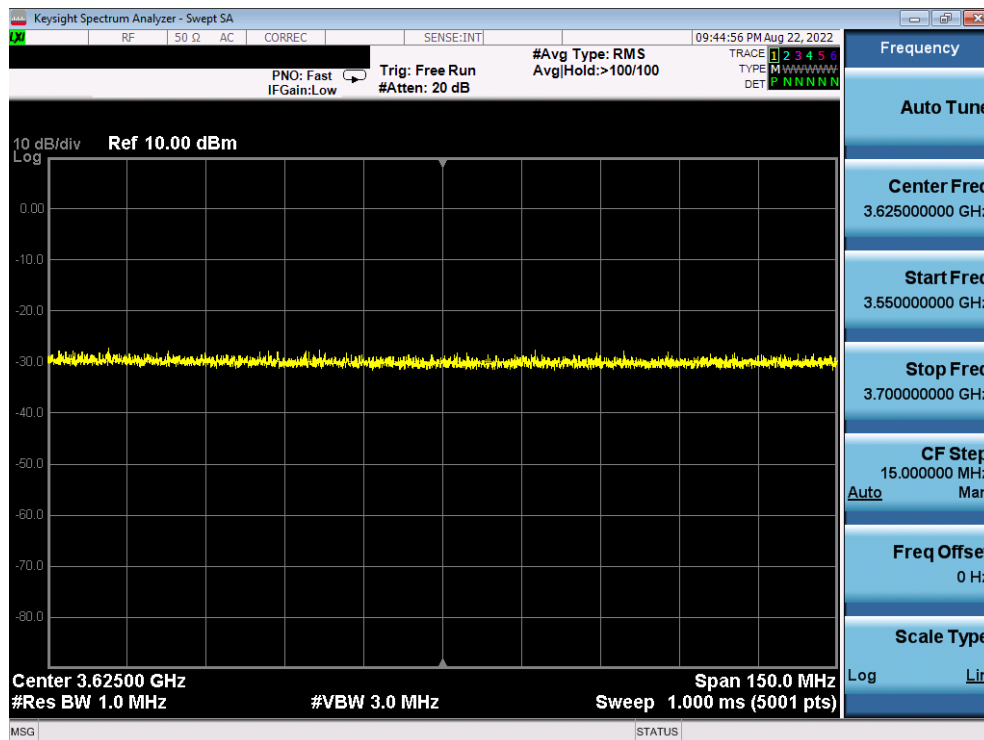
Plot 5. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.12)

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A6 [WINNF.FT.C.REG.14] Blacklisted CBSD (responseCode 101)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



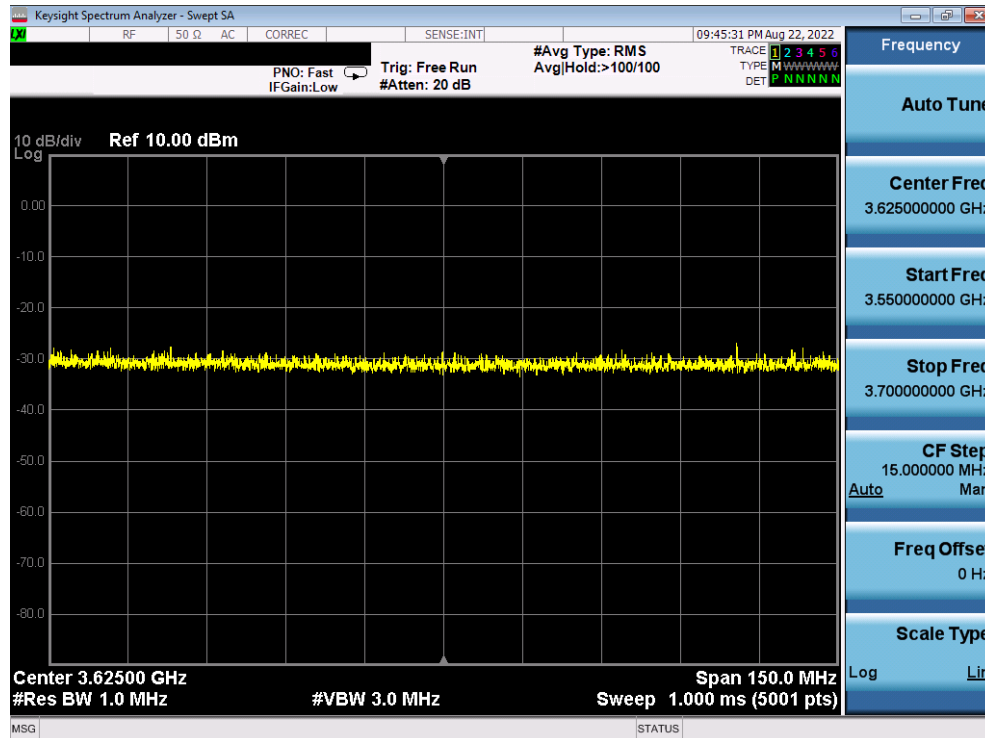
Plot 6. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.14)

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A7 [WINNF.FT.C.REG.16] Unsupported SAS protocol version (responseCode 100)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



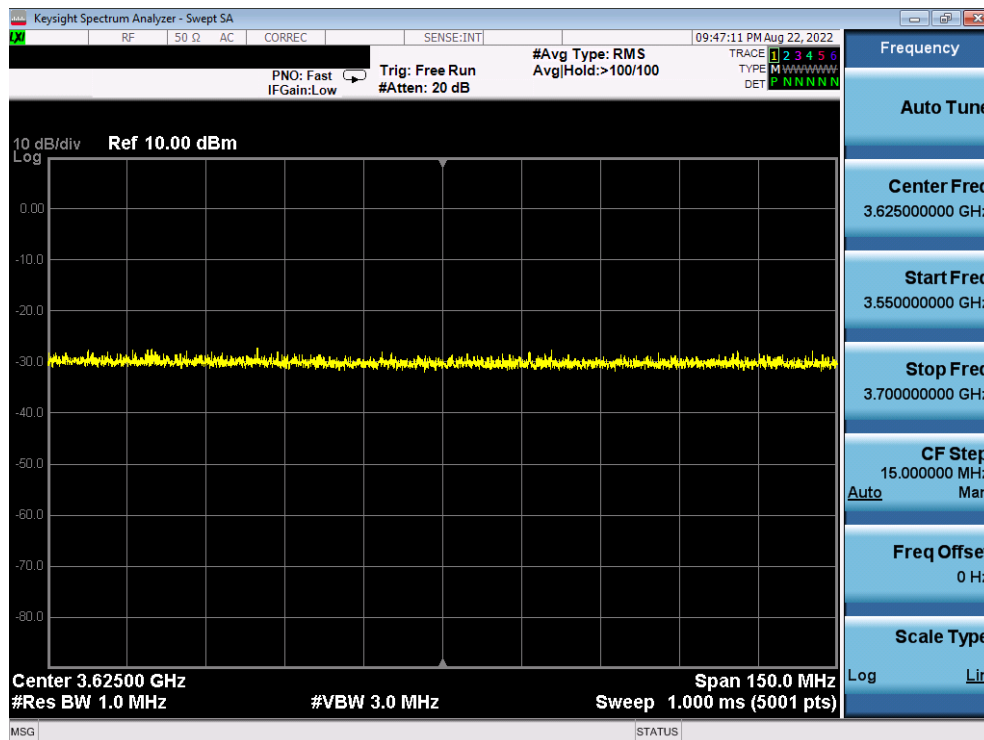
Plot 7. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.16)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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A8 [WINNF.FT.C.REG.18] Group Error (responseCode 201)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include cbsdId - 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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



Plot 8. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.18)

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A11 [WINNF.FT.C.HBT.1] Heartbeat Success Case (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, with cbsdId = C	--	--
2	UUT 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	UUT sends Spectrum Inquiry Request. Validate: • cbsdId = C • List of frequencyRange objects sent by UUT are within the CBRS frequency range	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • cbsdId = C • availableChannel is an array of availableChannel objects • responseCode = 0	--	--
5	UUT sends Grant Request message. Validate: • cbsdId = C • maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 • operationFrequencyRange, F, sent by UUT is a valid range within the CBRS band	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	SAS Test Harness sends a Grant Response message, including the parameters: • cbsdId = C • grantId = G = a valid grant ID • grantExpireTime = UTC time greater than duration of the test • responseCode = 0	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • cbsdId = C • grantId = G • operationState = "GRANTED"	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • cbsdId = C • grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0	--	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: • cbsdId = C • grantId = G • operationState = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: • cbsdId = C	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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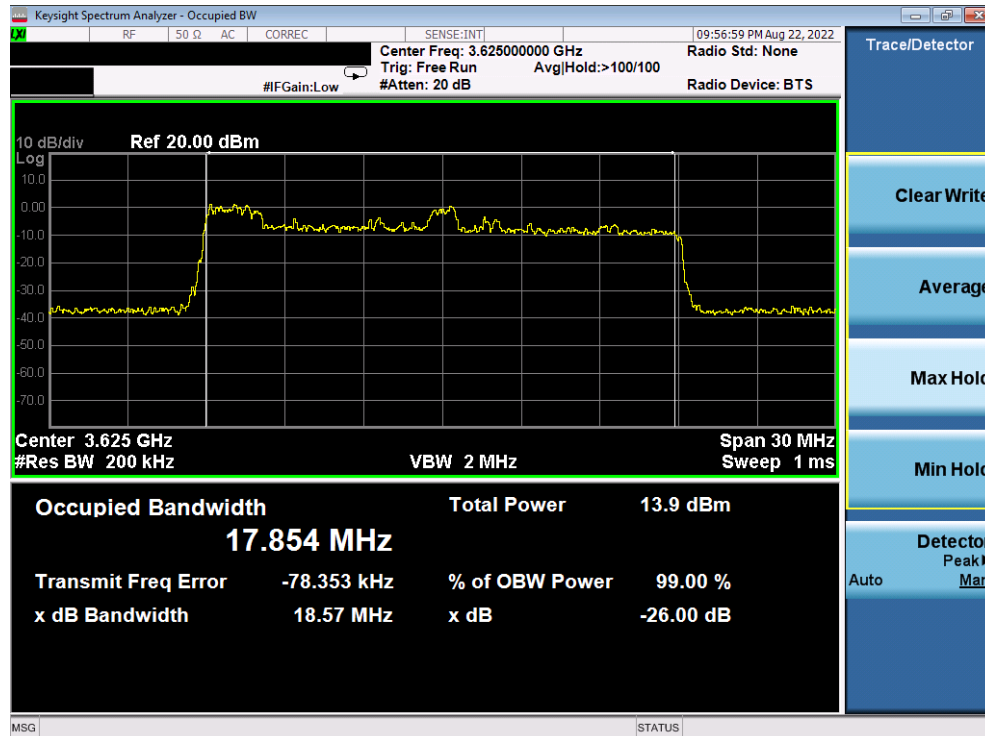
	<ul style="list-style-type: none"> • grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0 		
10	<p>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</p> <ul style="list-style-type: none"> • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



Plot 11. Conducted Measurement - RF transmission after SAS heartbeat response (WINNF.FT.C.HBT.1)

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Plot 12. Conducted Measurement Occupied Bandwidth for 20MHz (WINNF.FT.C.HBT.1)

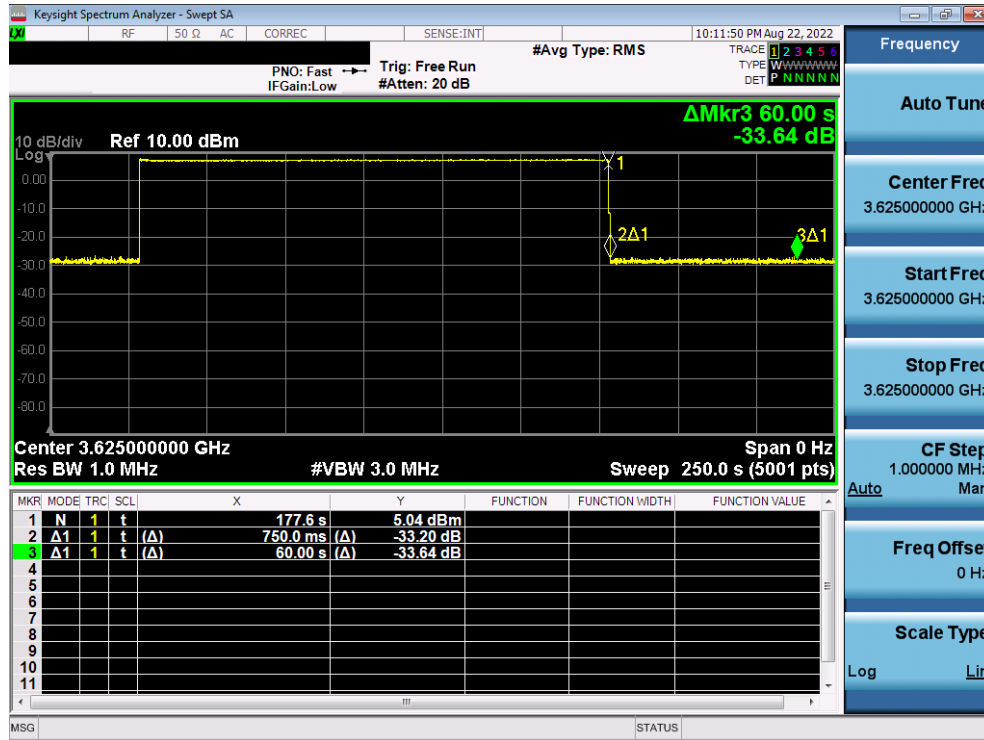
FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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A12 [WINNF.FT.C.HBT.3] Heartbeat responseCode=105 (DEREGISTER)

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 13. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.3)

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A13 [WINNF.FT.C.HBT.4] Heartbeat responseCode=500 (TERMINATED_GRANT)

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • 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.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 14. Conducted Measurement - RF transmission stops within 60s of SAS message indicated by Marker 1 (X) (WINNF.FT.C.HBT.4)

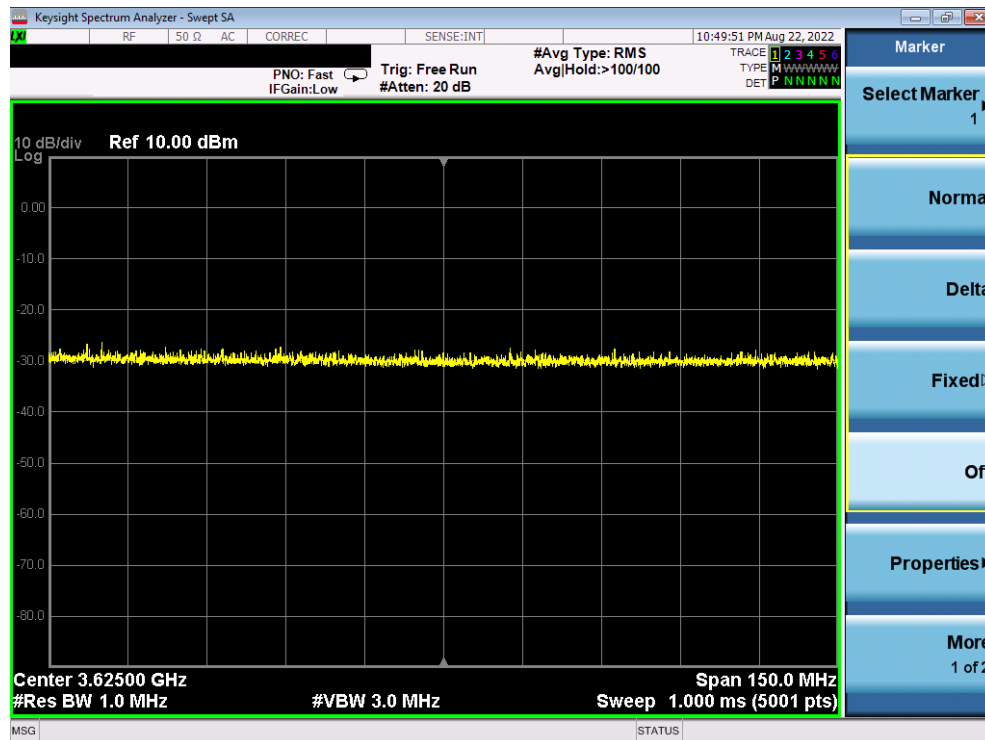
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A14 [WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</p> <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT does not transmit at any time 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 15. Conducted Measurement – No RF transmission in entire band (WINNF.FT.C.HBT.5)

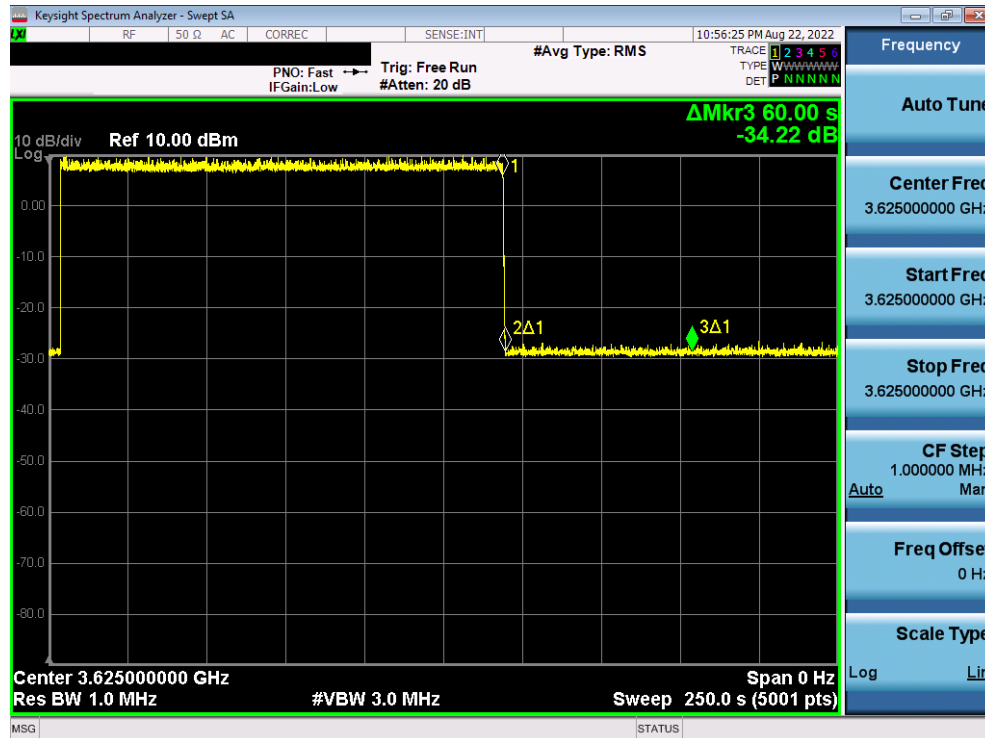
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A15 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 501 (SUSPENDED_GRANT) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</p> <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Plot 16. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.6)

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A16 [WINNF.FT.C.HBT.7] Heartbeat responseCode=502 (UNSYNC_OP_PARAM)

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = T = Current UTC time • responseCode = 502 (UNSYNC_OP_PARAM) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify:</p> <ul style="list-style-type: none"> • UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: <ul style="list-style-type: none"> o cbsdId = C o grantId = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT shall stop transmission within (T+60) seconds of completion of step 3. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Plot 17. Conducted Measurement - RF transmission stops within 60s of SAS message. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.7)

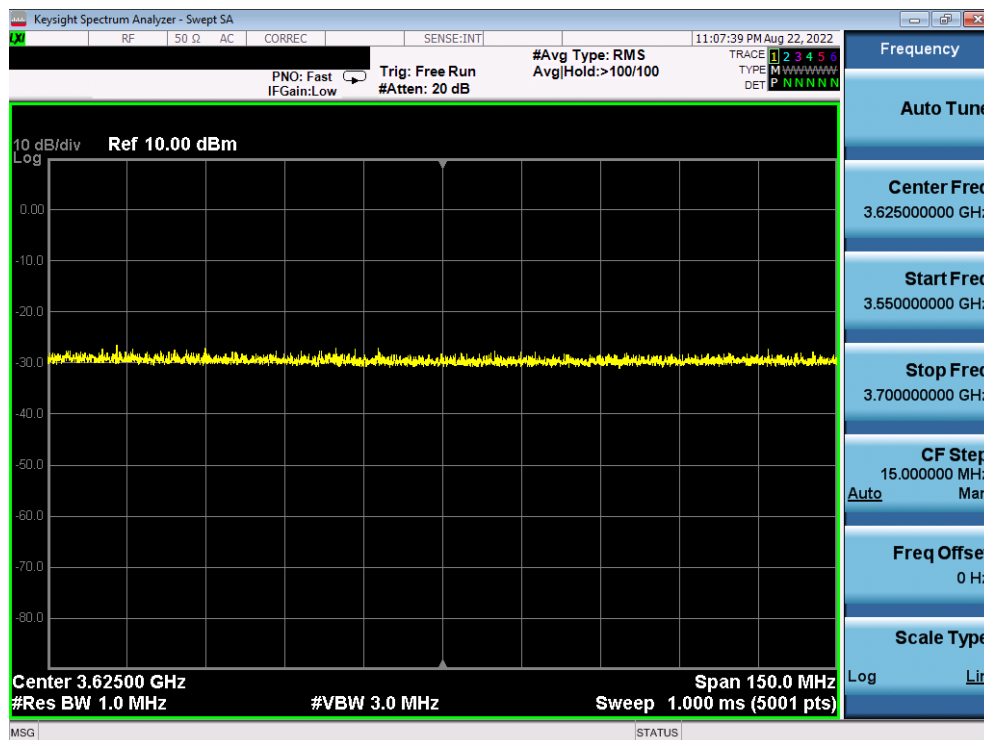
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A17 [WINNF.FT.C.HBT.9] Heartbeat Response Absent (First Heartbeat)

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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	<p>Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify:</p> <ul style="list-style-type: none"> • At any time during the test, UUT shall not transmit on RF interface 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 18. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.HBT.9)

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A18 [WINNF.FT.C.HBT.10] Heartbeat Response Absent (Subsequent Heartbeat)

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: <ul style="list-style-type: none"> 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	<p>UUT sends a Heartbeat Request message.</p> <p>Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> • 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	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> • UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Plot 19. Conducted Measurement - RF transmission stops within transmitExpireTime + 60s. The last SAS heartbeat message is indicated by Marker 1 (X) (WINNF.FT.C.HBT.10)

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A19 [WINNF.FT.C.MES.3] Grant Response contains measReportConfig

	Test Execution Steps	PASS	FAIL
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C and measCapability = "RECEIVED_POWER_WITH_GRANT" 	--	--
2	UUT sends a Grant Request message. Verify Grant Request message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> • cbsdId = C • operationParam is present and format is valid 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	SAS Test Harness sends a Grant Response message, with the following parameters: <ul style="list-style-type: none"> • cbsdId = C • grantId = G = valid grant ID • grantExpireTime = UTC time in the future • heartbeatInterval = 60 seconds • measReportConfig= "RECEIVED_POWER_WITH_GRANT" • operationParam is set to valid operating parameters • channelType = "GAA" • responseCode = 0 	--	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "GRANTED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	If Heartbeat Request message (step 4) contains measReport object, then: <ul style="list-style-type: none"> • verify measReport is properly formatted as object rcvdPowerMeasReport • end test, with PASS result else, if Heartbeat Request message (step 4) does not contain measReport object, then: If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> • cbsdId = C • grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0 Go to Step 4, above	--	--

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```

"measReport": {
  "rcvdPowerMeasReports": [
    {
      "measBandwidth": 10000000,
      "measFrequency": 3550000000,
      "measRcvdPower": -84
    }
  ]
},
"operationState": "GRANTED"

```

Plot 20.Measurement Report in Grant Response (WINNF.FT.C.MES.3)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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A20 [WINNF.FT.C.MES.4] Heartbeat Response contains measReportConfig

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C and measCapability = "RECEIVED_POWER_WITH_GRANT" • UUT has received a valid grant with grantId = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. • Grant has heartbeatInterval = 60 seconds 	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Verify Heartbeat Request message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • measReportConfig= "RECEIVED_POWER_WITH_GRANT" • responseCode = 0 	--	--
4	<p>UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • operationState = "AUTHORIZED" 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	<p>If Heartbeat Request message (step 4) contains measReport object, then:</p> <ul style="list-style-type: none"> • verify measReport is properly formatted as object rcvdPowerMeasReport • end test, with PASS result <p>else, if Heartbeat Request message (step 4) does not contain measReport object, then:</p> <ul style="list-style-type: none"> • If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	<p>SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • responseCode = 0 <p>Go to Step 4, above</p>	--	--

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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```

"measReport": {
  "rcvdPowerMeasReports": [
    {
      "measBandwidth": 10000000,
      "measFrequency": 3550000000,
      "measRcvdPower": -86
    }
  ]
},
"operationState": "AUTHORIZED"

```

Plot 21.Measurement Report in Heartbeat Response (WINNF.FT.C.MES.4)

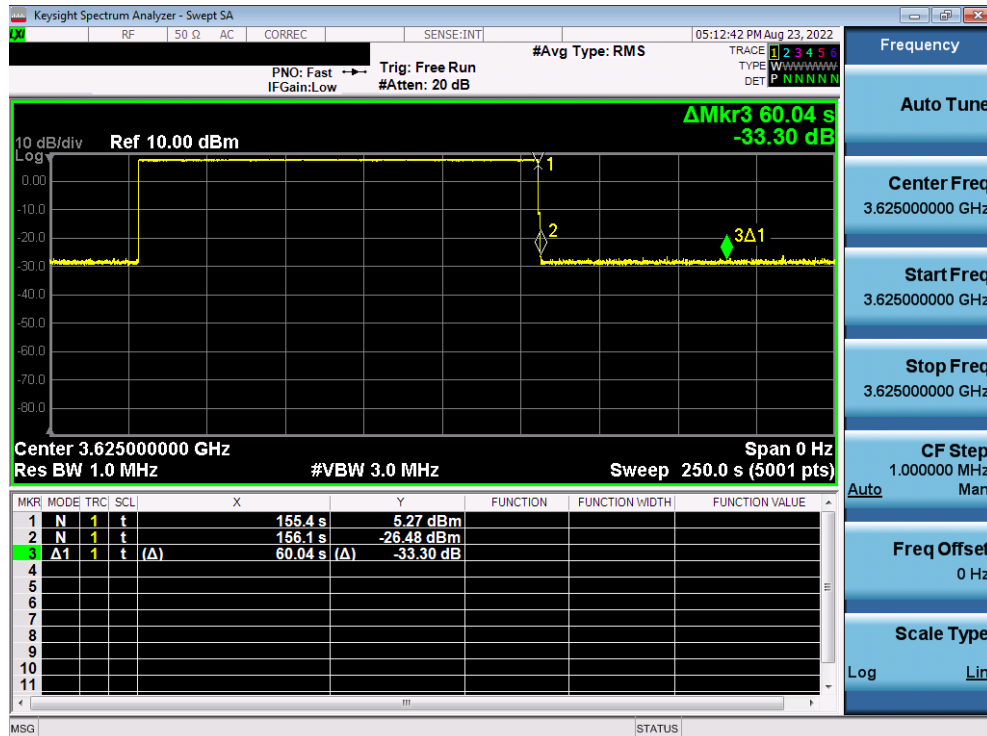
FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208030084-01.2AXTR	Test Dates: 8/22/2022 – 8/24/2022	EUT Type: LTE portable base station	Page 43 of 65

A21 [WINNF.FT.C.RLQ.1] Successful Relinquishment

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C • UUT has received a valid grant with grantId = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. <p>Invoke trigger to relinquish UUT Grant from the SAS Test Harness</p>	--	--
2	<p>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>SAS Test Harness shall approve the request with a Relinquishment Response message with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • grantId = G • responseCode = 0 	--	--
4	<p>After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT.</p>	--	--
5	<p>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:</p> <ul style="list-style-type: none"> • UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Test Plots:



Plot 22. Conducted Measurement - RF transmission stops (WINNF.FT.C.RLQ.1)

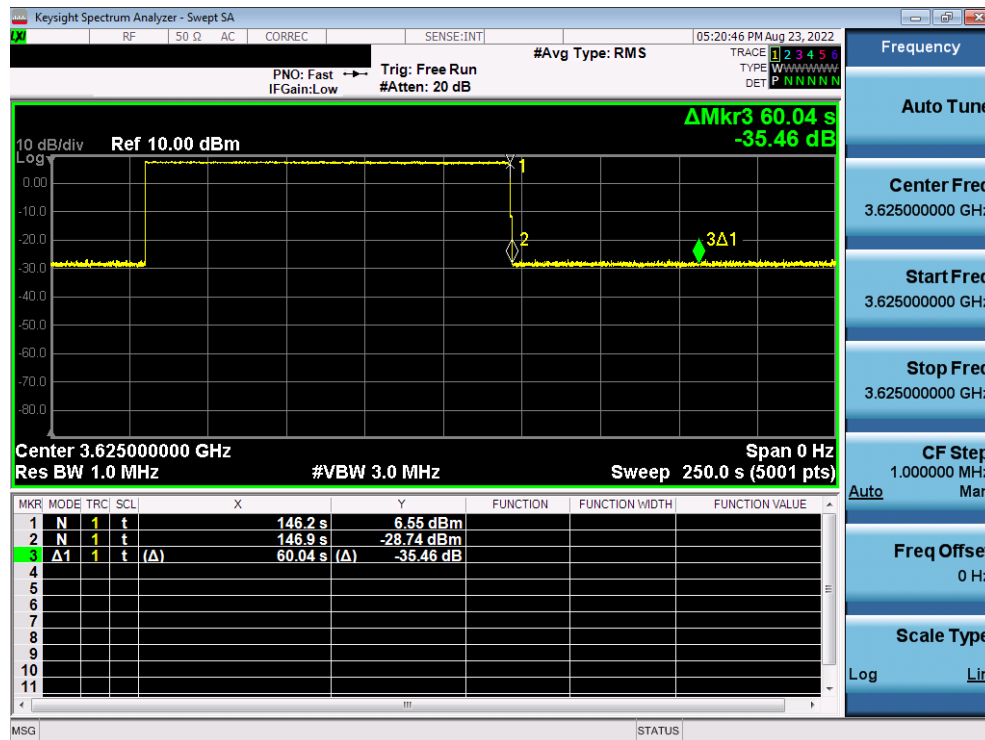
FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208030084-01.2AXTR	Test Dates: 8/22/2022 – 8/24/2022	EUT Type: LTE portable base station	Page 45 of 65

A22 [WINNF.FT.C.DRG.1] Successful Deregistration

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with cbsdId=C • UUT has received a valid grant with grantId = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. <p>Invoke trigger to deregister UUT from the SAS Test Harness</p>	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	<p>SAS Test Harness shall approve the request with a Deregistration Response message with parameters:</p> <ul style="list-style-type: none"> • cbsdId = C • responseCode = 0 	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT	--	--
6	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"> • UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: <ul style="list-style-type: none"> A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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Test Plots:



Plot 23. Conducted Measurement - RF transmission stops within 60s. The SAS message is indicated by Marker 1 (X) (WINNF.FT.C.DRG.1)

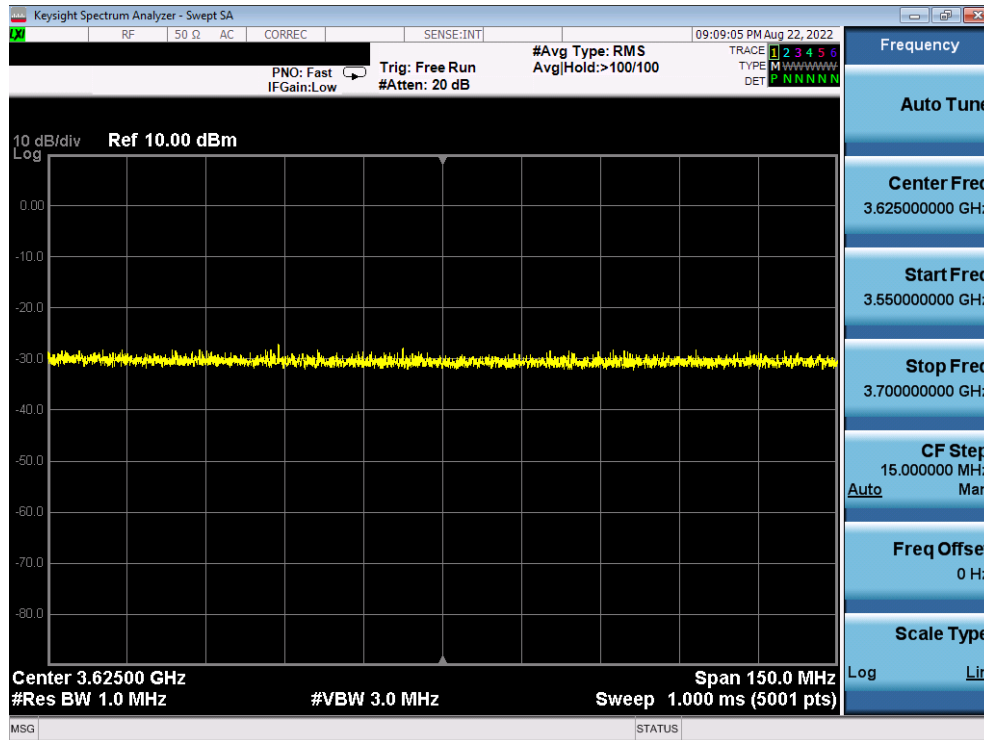
FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208030084-01.2AXTR	Test Dates: 8/22/2022 – 8/24/2022	EUT Type: LTE portable base station	Page 47 of 65

A23 [WINNF.FT.C.SCS.1] Successful TLS connection between UUT and SAS Test Harness

	Test Execution Steps	PASS	FAIL
1	<ul style="list-style-type: none"> • 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 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • 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 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<p>A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability.</p> <ul style="list-style-type: none"> • UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with responseCode = 0 and cbsdId. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	<p>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:</p> <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Test Plots:



Plot 24. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.1)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208030084-01.2AXTR	Test Dates: 8/22/2022 – 8/24/2022	EUT Type: LTE portable base station	Page 49 of 65

17	2022-08-23	21:23:44.775293	173.59.230.172	173.59.230.213	TCP	74	41822 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6210955 TSecr=0 WS=64
18	2022-08-23	21:23:44.775449	173.59.230.213	173.59.230.172	TCP	66	5000 → 41822 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
19	2022-08-23	21:23:44.775656	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0
20	2022-08-23	21:23:44.778611	173.59.230.172	173.59.230.213	TLSv1.2	304	Client Hello
21	2022-08-23	21:23:44.778942	173.59.230.213	173.59.230.172	TLSv1.2	3050	Server Hello, Certificate, Certificate Request, Server Hello Done
22	2022-08-23	21:23:44.779276	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=331 Ack=1461 Win=17536 Len=0
23	2022-08-23	21:23:44.779277	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=331 Ack=2921 Win=20480 Len=0
24	2022-08-23	21:23:44.779277	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=331 Ack=3005 Win=20480 Len=0
25	2022-08-23	21:23:44.793850	173.59.230.172	173.59.230.213	TCP	1514	41822 → 5000 [ACK] Seq=331 Ack=3005 Win=20480 Len=1460 [TCP segment of a reassembled PDU]
26	2022-08-23	21:23:44.793851	173.59.230.172	173.59.230.213	TCP	1514	41822 → 5000 [ACK] Seq=1791 Ack=3005 Win=20480 Len=1460 [TCP segment of a reassembled PDU]
27	2022-08-23	21:23:44.793856	173.59.230.172	173.59.230.213	TLSv1.2	1428	Certificate
28	2022-08-23	21:23:44.793936	173.59.230.213	173.59.230.172	TCP	54	5000 → 41822 [ACK] Seq=3005 Ack=4625 Win=2102272 Len=0
29	2022-08-23	21:23:44.834484	173.59.230.172	173.59.230.213	TLSv1.2	641	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
30	2022-08-23	21:23:44.834480	173.59.230.213	173.59.230.172	TCP	54	5000 → 41822 [ACK] Seq=3005 Ack=5212 Win=2101760 Len=0
31	2022-08-23	21:23:44.853640	173.59.230.213	173.59.230.172	TLSv1.2	1680	New Session Ticket, Change Cipher Spec, Encrypted Handshake Message
32	2022-08-23	21:23:44.853939	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=5212 Ack=4559 Win=23360 Len=0
33	2022-08-23	21:23:44.853658	173.59.230.172	173.59.230.213	TCP	1514	41822 → 5000 [ACK] Seq=5212 Ack=4559 Win=23360 Len=1460 [TCP segment of a reassembled PDU]
34	2022-08-23	21:23:44.853659	173.59.230.172	173.59.230.213	TLSv1.2	259	Application Data
35	2022-08-23	21:23:44.853700	173.59.230.213	173.59.230.172	TCP	54	5000 → 41822 [ACK] Seq=4559 Ack=6877 Win=2102272 Len=0
36	2022-08-23	21:23:44.904272	173.59.230.213	173.59.230.172	TLSv1.2	100	Application Data
37	2022-08-23	21:23:44.937166	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=6877 Ack=4605 Win=23360 Len=0
38	2022-08-23	21:23:44.937199	173.59.230.213	173.59.230.172	TLSv1.2	554	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
39	2022-08-23	21:23:44.937392	173.59.230.172	173.59.230.213	TCP	60	41822 → 5000 [ACK] Seq=6877 Ack=5105 Win=26304 Len=0
40	2022-08-23	21:23:44.939020	173.59.230.172	173.59.230.213	TCP	74	41823 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6210972 TSecr=0 WS=64
41	2022-08-23	21:23:44.939022	173.59.230.213	173.59.230.172	TCP	66	5000 → 41823 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
42	2022-08-23	21:23:44.939287	173.59.230.172	173.59.230.213	TCP	60	41823 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0

Plot 25. WireShark Screenshot – Successful Handshake (WINNF.FT.C.SCS.1)

Note: Successful handshake and registration is demonstrated in the logs for WINNF.FT.C.REG.1

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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No.	Time	Source	Destination	Protocol	Length	Info
2960	2022-08-23 21:34:49.055613	173.59.230.172	173.59.230.213	TCP	74	41835 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6277384 TSecr=0 WS=64
2961	2022-08-23 21:34:49.055898	173.59.230.213	173.59.230.172	TCP	66	5000 → 41835 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
2962	2022-08-23 21:34:49.056055	173.59.230.172	173.59.230.213	TCP	60	41835 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0
2963	2022-08-23 21:34:49.059076	173.59.230.172	173.59.230.213	TLSv1.2	384	Client Hello
2964	2022-08-23 21:34:49.059537	173.59.230.213	173.59.230.172	TLSv1.2	3175	Server Hello, Certificate, Certificate Request, Server Hello Done
2965	2022-08-23 21:34:49.059987	173.59.230.172	173.59.230.213	TCP	60	41835 → 5000 [ACK] Seq=331 Ack=1461 Win=17536 Len=0
2966	2022-08-23 21:34:49.059988	173.59.230.172	173.59.230.213	TCP	60	41835 → 5000 [ACK] Seq=331 Ack=2921 Win=20480 Len=0
2967	2022-08-23 21:34:49.059988	173.59.230.172	173.59.230.213	TCP	60	41835 → 5000 [ACK] Seq=331 Ack=3122 Win=23360 Len=0
3065	2022-08-23 21:35:09.009787	173.59.230.172	173.59.230.213	TLSv1.2	81	Alert (Level: Fatal, Description: Unknown CA)
3066	2022-08-23 21:35:09.009788	173.59.230.172	173.59.230.213	TCP	60	41835 → 5000 [RST, ACK] Seq=338 Ack=3122 Win=23360 Len=0

Plot 27. WireShark Screenshot 1 - Failed Handshake – Certificate Revoked (WINNF.FT.C.SCS.2)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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No.	Time	Source	Destination	Protocol	Length	Info
44	2022-08-23 21:38:17.533790	173.59.230.172	173.59.230.213	TCP	74	41839 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6298232 TSecr=0 WS=64
45	2022-08-23 21:38:17.533890	173.59.230.213	173.59.230.172	TCP	66	5000 → 41839 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
46	2022-08-23 21:38:17.534040	173.59.230.172	173.59.230.213	TCP	60	41839 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0
47	2022-08-23 21:38:17.535854	173.59.230.172	173.59.230.213	TLSv1.2	384	Client Hello
48	2022-08-23 21:38:17.535997	173.59.230.213	173.59.230.172	TLSv1.2	3065	Server Hello, Certificate, Certificate Request, Server Hello Done
49	2022-08-23 21:38:17.536294	173.59.230.172	173.59.230.213	TCP	60	41839 → 5000 [ACK] Seq=331 Ack=1461 Win=17536 Len=0
50	2022-08-23 21:38:17.536294	173.59.230.172	173.59.230.213	TCP	60	41839 → 5000 [ACK] Seq=331 Ack=2921 Win=20480 Len=0
51	2022-08-23 21:38:17.536295	173.59.230.172	173.59.230.213	TCP	60	41839 → 5000 [ACK] Seq=331 Ack=3012 Win=20480 Len=0
52	2022-08-23 21:38:17.544026	173.59.230.172	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Expired)
53	2022-08-23 21:38:17.544202	173.59.230.213	173.59.230.172	TCP	54	5000 → 41839 [FIN, ACK] Seq=3012 Ack=338 Win=2102272 Len=0
54	2022-08-23 21:38:17.544426	173.59.230.172	173.59.230.213	TCP	60	41839 → 5000 [RST, ACK] Seq=338 Ack=3013 Win=20480 Len=0

Plot 29. WireShark Screenshot - Failed Handshake – Certificate Expired (WINNF.FT.C.SCS.3)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2208030084-01.2AXTR	Test Dates: 8/22/2022 – 8/24/2022	EUT Type: LTE portable base station	Page 54 of 65

No.	Time	Source	Destination	Protocol	Length	Info
145	2022-08-23 21:42:58.514499	173.59.230.172	173.59.230.213	TCP	74	41847 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6326330 TSecr=0 WS=64
146	2022-08-23 21:42:58.514754	173.59.230.213	173.59.230.172	TCP	66	5000 → 41847 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
147	2022-08-23 21:42:58.514959	173.59.230.172	173.59.230.213	TCP	66	41847 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0
148	2022-08-23 21:42:58.518634	173.59.230.172	173.59.230.213	TLSv1.2	384	Client Hello
149	2022-08-23 21:42:58.519294	173.59.230.213	173.59.230.172	TLSv1.2	3067	Server Hello, Certificate, Certificate Request, Server Hello Done
150	2022-08-23 21:42:58.523974	173.59.230.172	173.59.230.213	TCP	66	41847 → 5000 [ACK] Seq=331 Ack=1461 Win=17536 Len=0
151	2022-08-23 21:42:58.523975	173.59.230.172	173.59.230.213	TCP	66	41847 → 5000 [ACK] Seq=331 Ack=2921 Win=20480 Len=0
152	2022-08-23 21:42:58.523976	173.59.230.172	173.59.230.213	TCP	66	41847 → 5000 [ACK] Seq=331 Ack=3014 Win=20480 Len=0
153	2022-08-23 21:42:58.523982	173.59.230.172	173.59.230.213	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
154	2022-08-23 21:42:58.523983	173.59.230.172	173.59.230.213	TCP	66	41847 → 5000 [RST, ACK] Seq=336 Ack=3014 Win=20480 Len=0

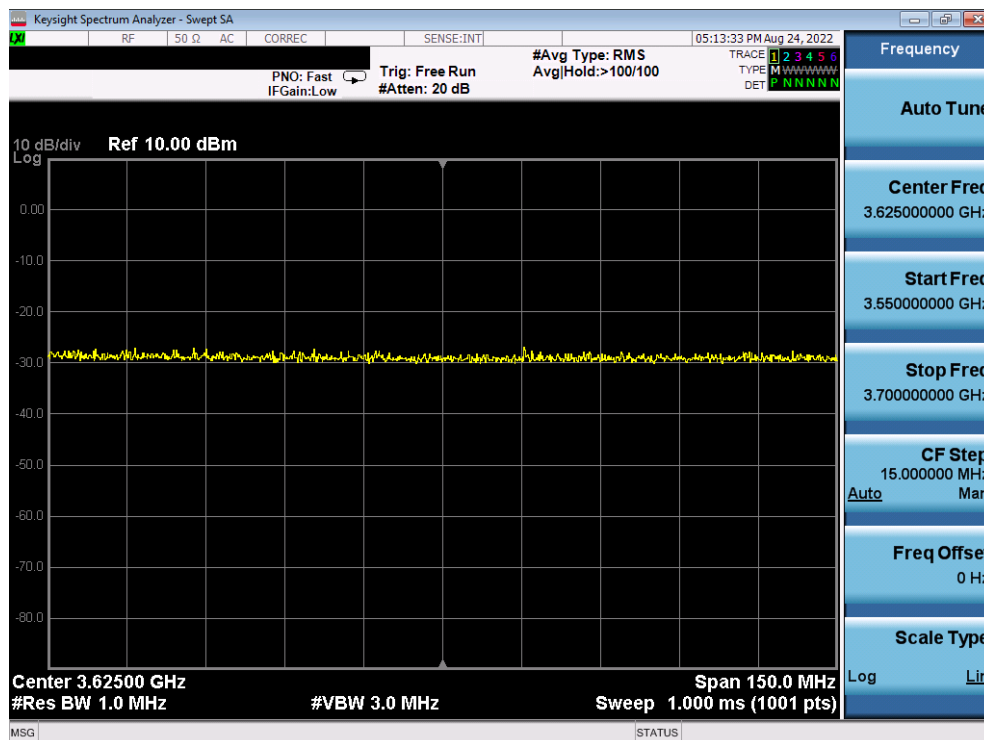
Plot 31. WireShark Screenshot - Failed Handshake – Unknown CA (WINNF.FT.C.SCS.4)

FCC ID: 2AXTR-EPL2248-1690	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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A27 [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	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	<ul style="list-style-type: none"> • 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. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	UUT may retry for the security procedure which shall fail	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test Plots:



Plot 32. Conducted Measurement – No RF transmission in entire band at anytime (WINNF.FT.C.SCS.5)

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No.	Time	Source	Destination	Protocol	Length	Info
140	2022-08-23 21:44:05.745732	173.59.230.172	173.59.230.213	TCP	74	41849 → 5000 [SYN] Seq=0 Win=14600 Len=0 MSS=1460 SACK_PERM=1 TSval=6339053 TSecr=0 WS=64
141	2022-08-23 21:44:05.745966	173.59.230.213	173.59.230.172	TCP	66	5000 → 41849 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1
142	2022-08-23 21:44:05.746150	173.59.230.172	173.59.230.213	TCP	60	41849 → 5000 [ACK] Seq=1 Ack=1 Win=14656 Len=0
143	2022-08-23 21:44:05.748218	173.59.230.172	173.59.230.213	TLSv1.2	384	Client Hello
144	2022-08-23 21:44:05.748665	173.59.230.213	173.59.230.172	TLSv1.2	3050	Server Hello, Certificate, Certificate Request, Server Hello Done
145	2022-08-23 21:44:05.748958	173.59.230.172	173.59.230.213	TCP	60	41849 → 5000 [ACK] Seq=331 Ack=1461 Win=17536 Len=0
146	2022-08-23 21:44:05.748959	173.59.230.172	173.59.230.213	TCP	60	41849 → 5000 [ACK] Seq=331 Ack=2921 Win=20480 Len=0
147	2022-08-23 21:44:05.748960	173.59.230.172	173.59.230.213	TCP	60	41849 → 5000 [ACK] Seq=331 Ack=3005 Win=20480 Len=0
148	2022-08-23 21:44:05.754409	173.59.230.172	173.59.230.213	TLSv1.2	81	Alert (Level: Fatal, Description: Decrypt Error)
149	2022-08-23 21:44:05.754753	173.59.230.172	173.59.230.213	TCP	60	41849 → 5000 [RST, ACK] Seq=331 Ack=3005 Win=20480 Len=0

Plot 33. WireShark Screenshot - Failed Handshake – Decrypt Error/Corrupted Certificate (WINNF.FT.C.SCS.5)

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A28 [WINNF.PT.C.HBT.1] UUT RF Transmit Power Measurement

	Test Execution Steps	PASS	FAIL
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> • 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 <p><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></p>	--	--
2	<p>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:</p> <ul style="list-style-type: none"> • UUT sends Heartbeat Request, including: <ul style="list-style-type: none"> o cbsdId = C o grantId = G • SAS Test Harness responds with Heartbeat Response, including: <ul style="list-style-type: none"> o cbsdId = C o grantId = G o transmitExpireTime = current UTC time + 200 seconds o responseCode = 0 	--	--
3	<p>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.</p> <p><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></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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RF Power Measurements:

Testing is performed per KDB 971168 D01 and across the transmit dynamic range of 32dBm/MHz to 29dBm/MHz for 20MHz (32dBm and 30dBm) and 10MHz (29dBm) bandwidths.

MIMO EIRP was calculated by summing Ant1 and Ant2 conducted PSD and adding the correlated directional gain to obtain MIMO EIRP. The correlated directional gain was calculated with the following formul:

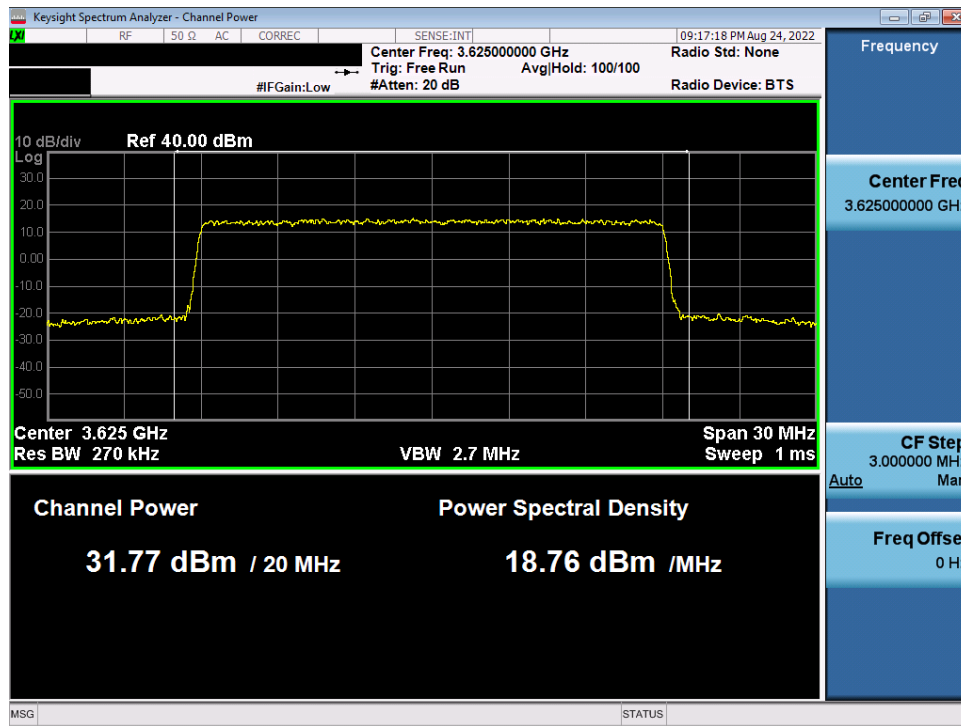
$$\text{Corr. Dir. Gain} = 10 \cdot \log\left(\frac{(10^{G1/20} + 10^{G2/20})^2}{NANT}\right) = 10 \cdot \log\left(\frac{(10^{7.3/20} + 10^{7.3/20})^2}{2}\right) = 10.30\text{dBi}$$

SAS Granted EIRP [dBm/MHz]	Ant1 Conducted PSD [dBm/MHz]	Ant2 Conducted PSD [dBm/MHz]	MIMO Summed Conducted PSD [dBm/MHz]	Ant 1 Gain [dBi]	Ant 2 Gain [dBi]	Directional Gain [dBi]	MIMO PSD EIRP [dBm/MHz]	Margin [dB]
32	18.76	18.39	21.59	7.30	7.30	10.30	31.89	-0.11
30	16.22	16.70	19.48	7.30	7.30	10.30	29.78	-0.22
29	15.36	15.15	18.27	7.30	7.30	10.30	28.57	-0.43

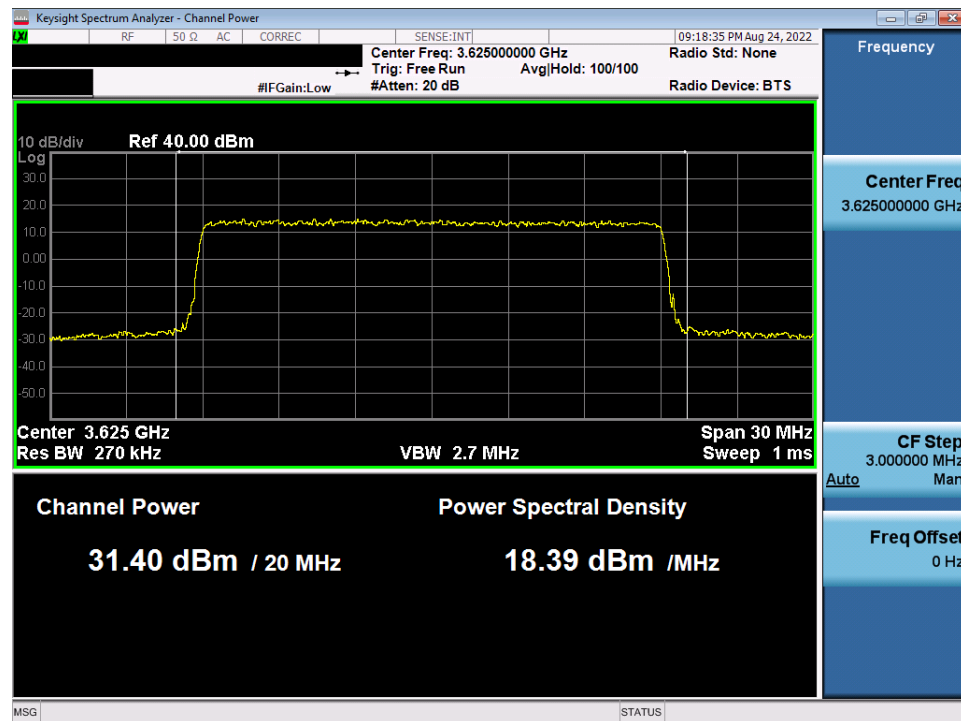
Table 7-1 RF Output Power Measurements (WINNF.PT.C.HBT.1)

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Test Plots:

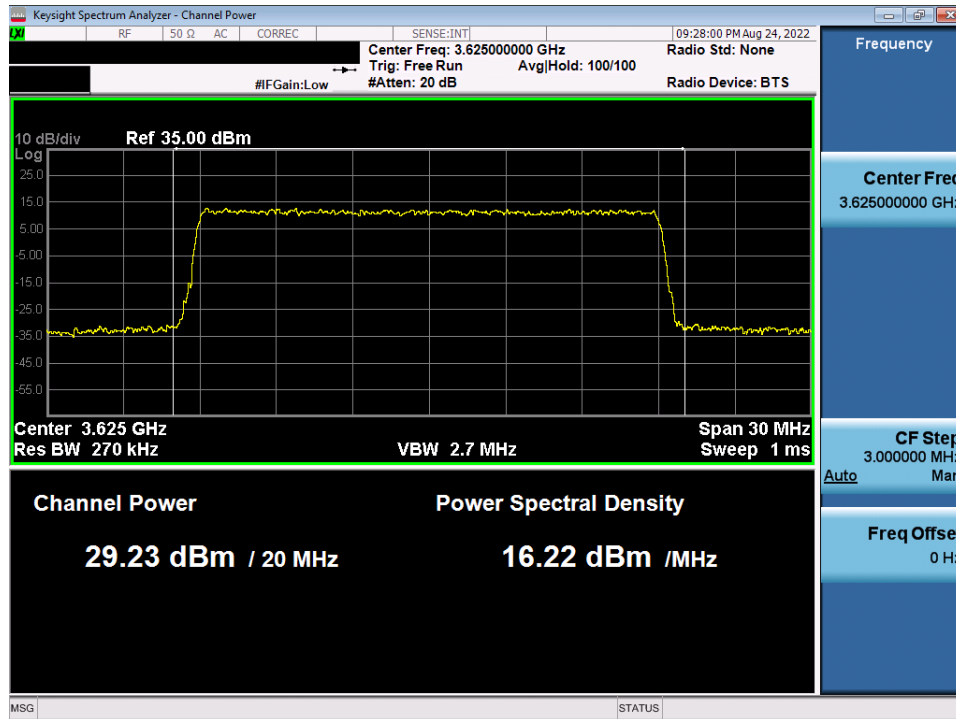


Plot 34. Conducted PSD, SAS Granted maxEIRP 32 – Ant1

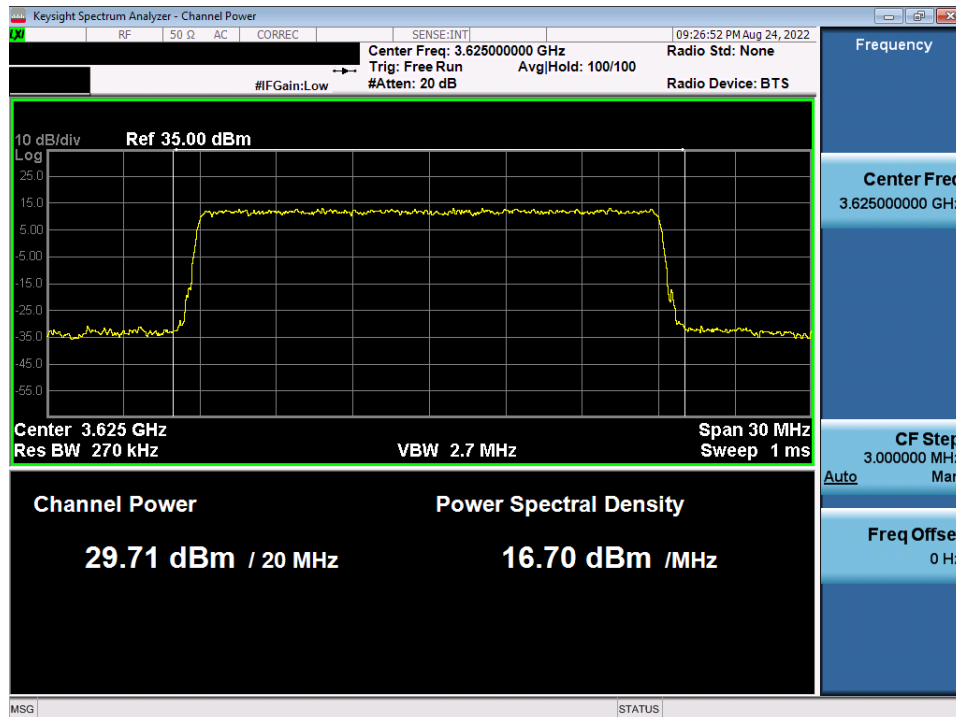


Plot 35. Conducted PSD, SAS Granted maxEIRP 32 – Ant 2

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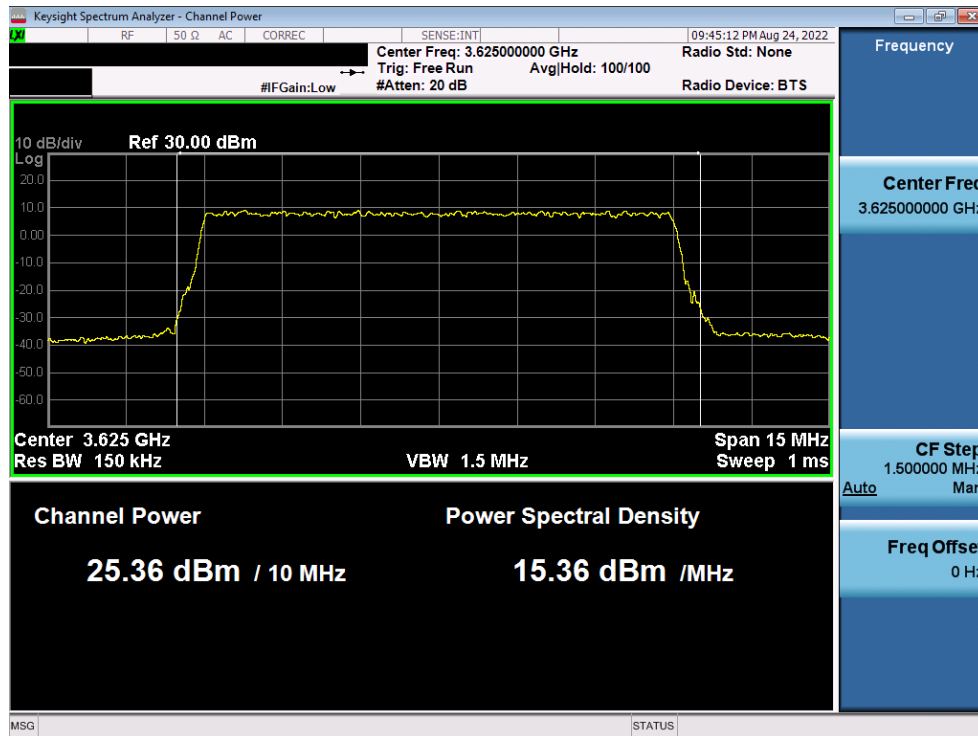


Plot 36. Conducted PSD, SAS Granted maxEIRP 30 – Ant1

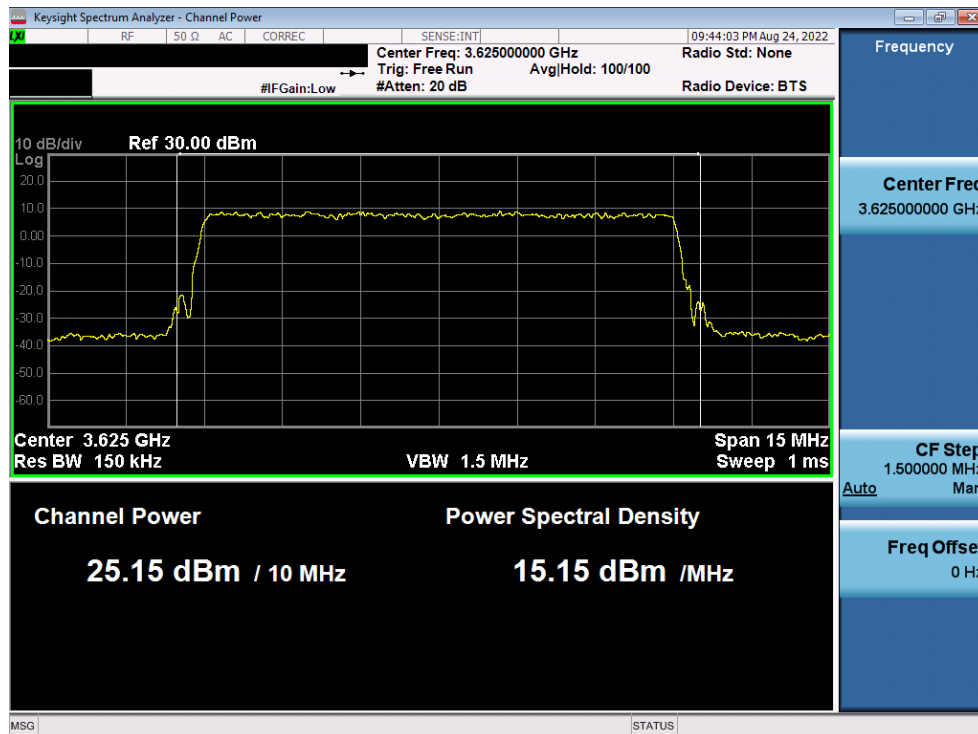


Plot 37. Conducted PSD, SAS Granted maxEIRP 30 – Ant2

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Plot 38. Conducted PSD, SAS Granted maxEIRP 29 – Ant1

























Plot 39. Conducted PSD, SAS Granted maxEIRP 29 – Ant2

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APPENDIX B – TEST LOGS

Logs are available upon request

 WINNF.FT.C.DRG.1_2022-08-23T21.10.14Z
 WINNF.FT.C.GRA.1_2022-08-23T01.45.08Z
 WINNF.FT.C.GRA.2_2022-08-23T01.46.25Z
 WINNF.FT.C.HBT.1_2022-08-23T01.56.41Z
 WINNF.FT.C.HBT.3_2022-08-23T02.04.23Z
 WINNF.FT.C.HBT.4_2022-08-23T02.09.33Z
 WINNF.FT.C.HBT.5_2022-08-23T02.45.27Z
 WINNF.FT.C.HBT.6_2022-08-23T02.48.10Z
 WINNF.FT.C.HBT.7_2022-08-23T02.54.01Z
 WINNF.FT.C.HBT.9_2022-08-23T03.00.49Z
 WINNF.FT.C.HBT.10_2022-08-23T03.06.14Z
 WINNF.FT.C.MES.3_2022-08-23T03.20.12Z
 WINNF.FT.C.MES.4_2022-08-23T03.53.13Z
 WINNF.FT.C.REG.1_2022-08-23T21.23.31Z
 WINNF.FT.C.REG.5_2022-08-23T04.05.41Z
 WINNF.FT.C.REG.8_2022-08-23T01.38.01Z
 WINNF.FT.C.REG.10_2022-08-23T01.39.24Z
 WINNF.FT.C.REG.12_2022-08-23T01.40.02Z
 WINNF.FT.C.REG.14_2022-08-23T01.41.37Z
 WINNF.FT.C.REG.16_2022-08-23T01.42.16Z
 WINNF.FT.C.REG.18_2022-08-23T01.42.54Z
 WINNF.FT.C.RLQ.1_2022-08-23T21.04.27Z

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