

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

Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:

8/6/2025 – 8/13/2025

Test Report Issue Date:

8/13/2025

Test Site/Location:

Element lab. Columbia, MD, USA

Test Report Serial No.:

1M2508040073-01.A3L

FCC ID:

A3LMT1602D-48B

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type:

Certification

Model:

MT1602D-48B

EUT Type:

MMU (MT1602D)

Frequency Range:

3550 – 3700 MHz

FCC Classification:

Citizens Band Category A and 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: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 1 of 59

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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 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 **Samsung MMU (MT1602) FCC ID: A3LMT1602D-48B**. The test data contained in this report pertains only to CBSD-SAS interoperability. The EUT can operate as a Category A or B CBSD depending on the installation and the antenna used. The EUT is not a domain proxy. This is a 16-port device where all outputs are equal.

Test Device Serial Number(s): S619345965

Test Device Hardware Version: PCS01

Test Device Software Version: 25A

2.2 Device Capabilities

This device contains the following capabilities:

NR n48

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. The full WINNF-TS-0122 test scope was performed on NR.

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
Keysight	N9030A	PXA Signal Analyzer	6/6/2025	Annual	6/6/2026	MY52350166
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: Samsung Electronics

FCC ID: A3LMT1602D-48B

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.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.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

Table 6-1. Summary of Test Results

FCC ID: A3LMT1602D-48B	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.	WINNF.FT.C.MES.1	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 (d)	11	Confirm that the device is capable of reporting the signal level (measurement data) and frequency to SAS.	WINNF.FT.C.MES.1	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
96.39(e)	N/A	The CBSD must report to the SAS which available channels of frequencies it will use	WINNF.PT.C.HBT.1 WINNF.FT.C.HBT.1 WINNF.FT.C.HBT.3 WINNF.FT.C.HBT.4 WINNF.FT.C.HBT.5 WINNF.FT.C.HBT.7 WINNF.FT.C.HBT.9 WINNF.FT.C.HBT.10 WINNF.FT.C.RLQ.1 WINNF.FT.C.DRG.1	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.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung MMU (MT1602)** **FCC ID: A3LMT1602D-48B** has been tested to show compliance with Part 96 and WINNF-TS-0122.

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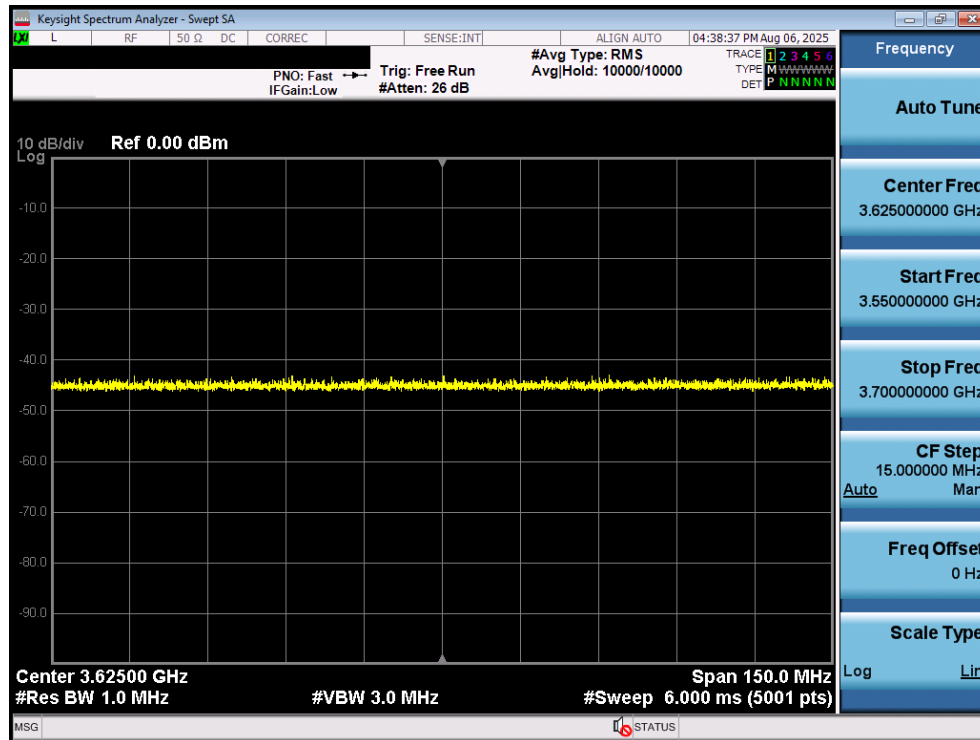
APPENDIX A – TEST RESULT AND DATA

A1 [WINNF.FT.C.REG.1] 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 CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness:	--	--
2	• 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. 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 as follows: - 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	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	☒	☐

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Test Plots:



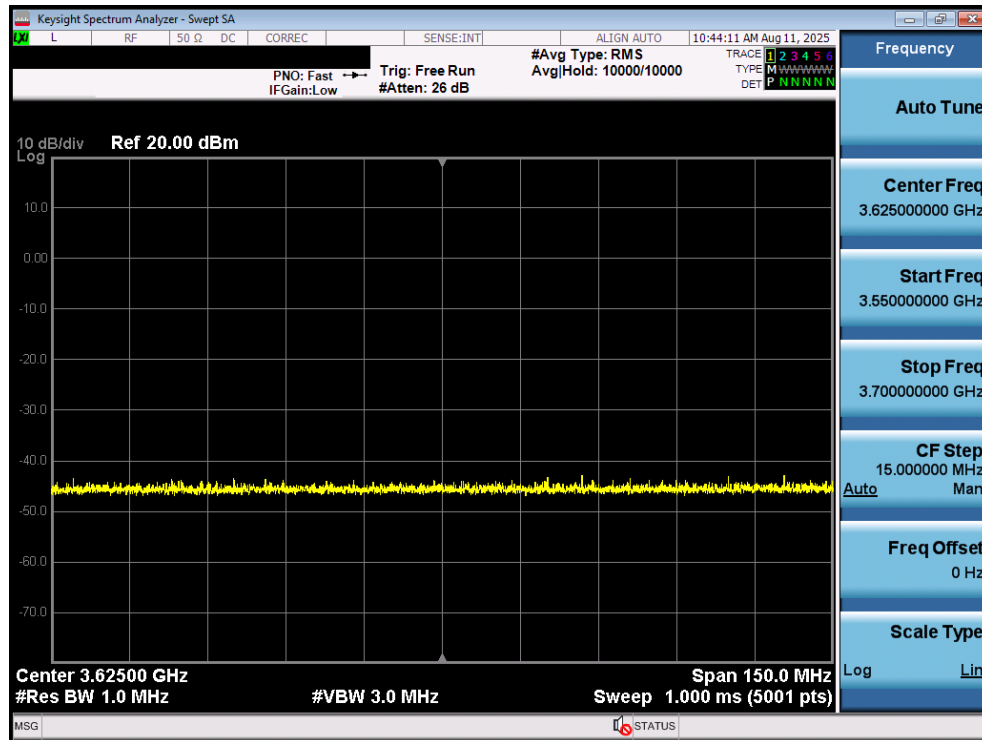
Plot 1. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.1)

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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: • 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: - 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: • UUT shall not transmit RF	☒	☐

Test Plots:



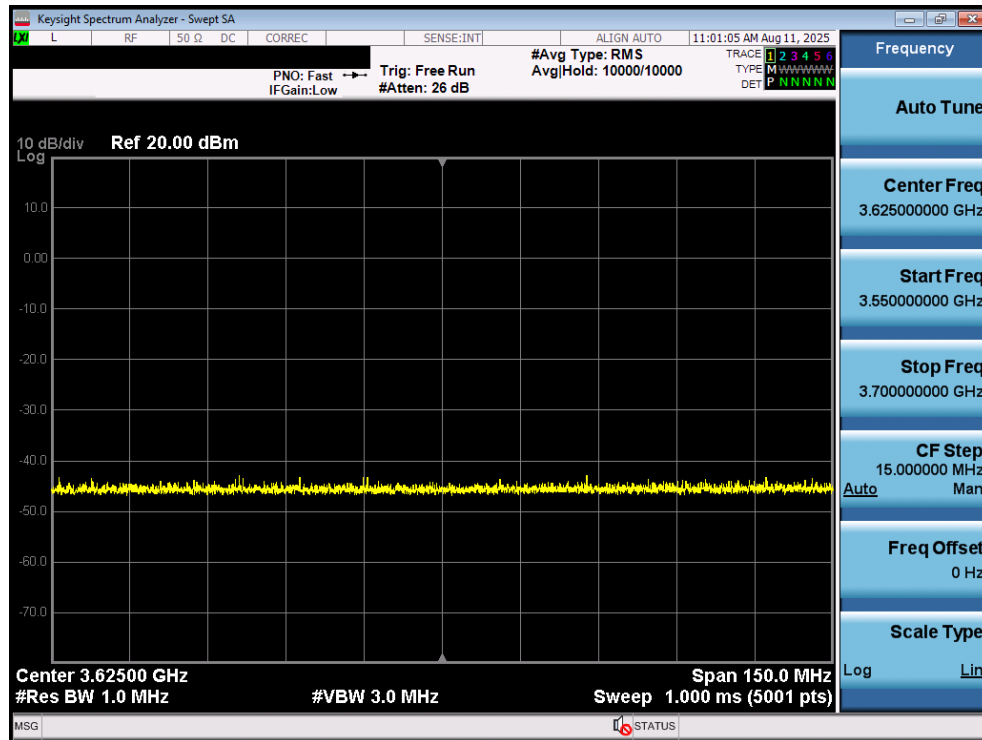
Plot 2. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.8)

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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: • 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: - 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: • UUT shall not transmit RF	☒	☐

Test Plots:



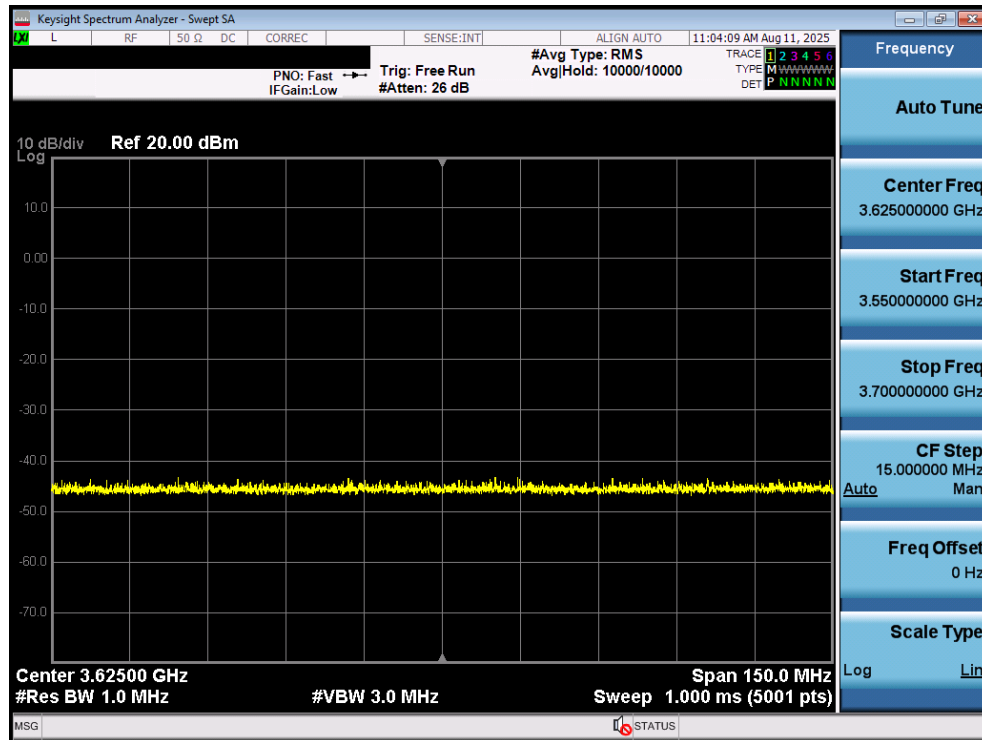
Plot 4. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.12)

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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: • 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: - 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: • UUT shall not transmit RF	☒	☐

Test Plots:



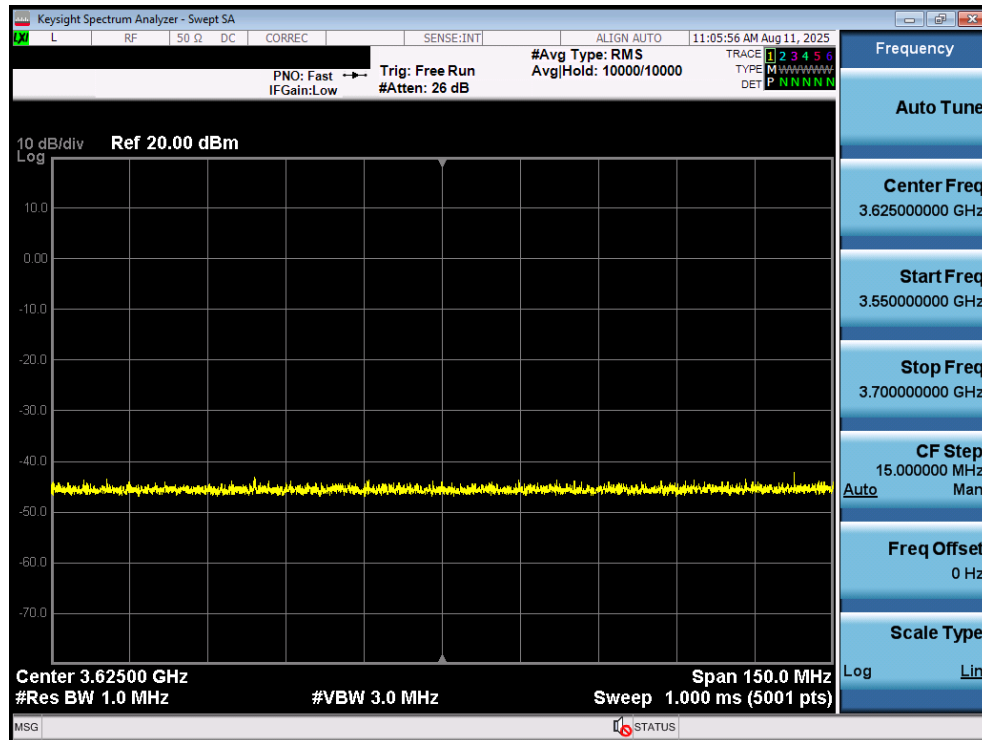
Plot 5. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.14)

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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: • 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: - 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: • UUT shall not transmit RF	☒	☐

Test Plots:



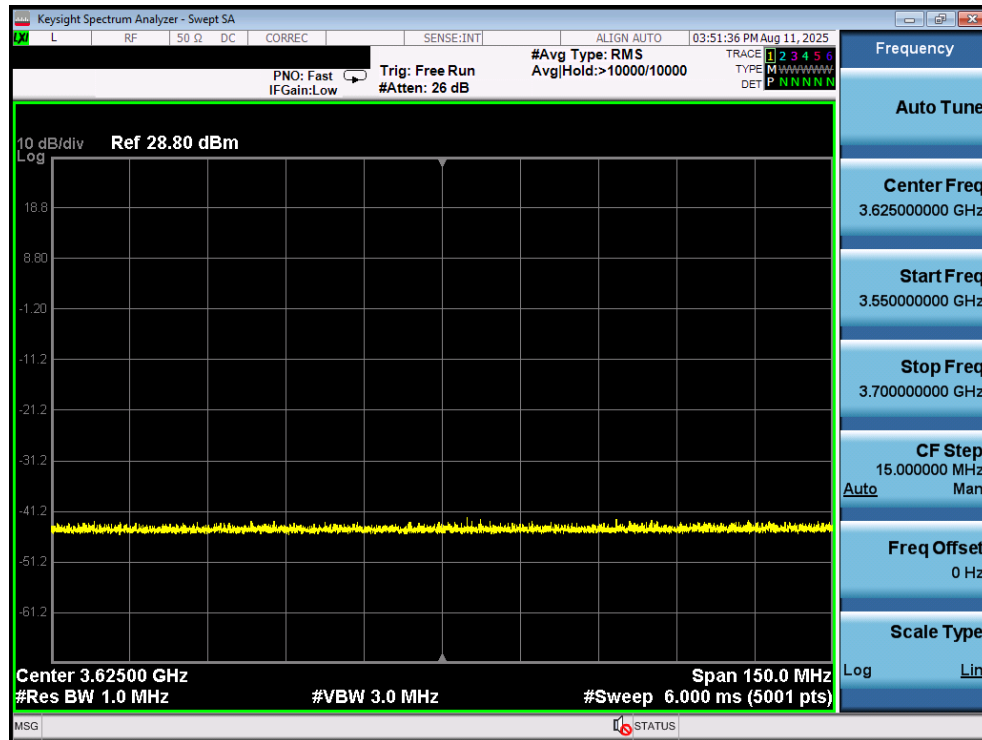
Plot 6. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.16)

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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: • 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: - 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: • UUT shall not transmit RF	☒	☐

Test Plots:



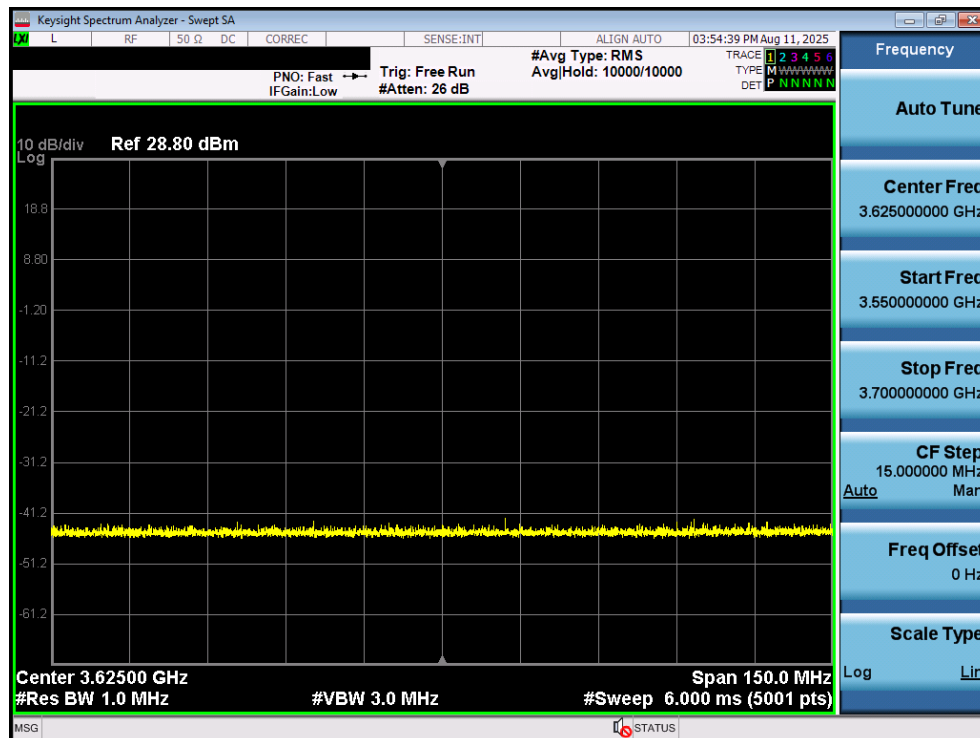
Plot 7. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.REG.18)

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A9 [WINNF.FT.C.GRA.1] Unsuccessful Grant responseCode=400 (INTERFERENCE)

	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:



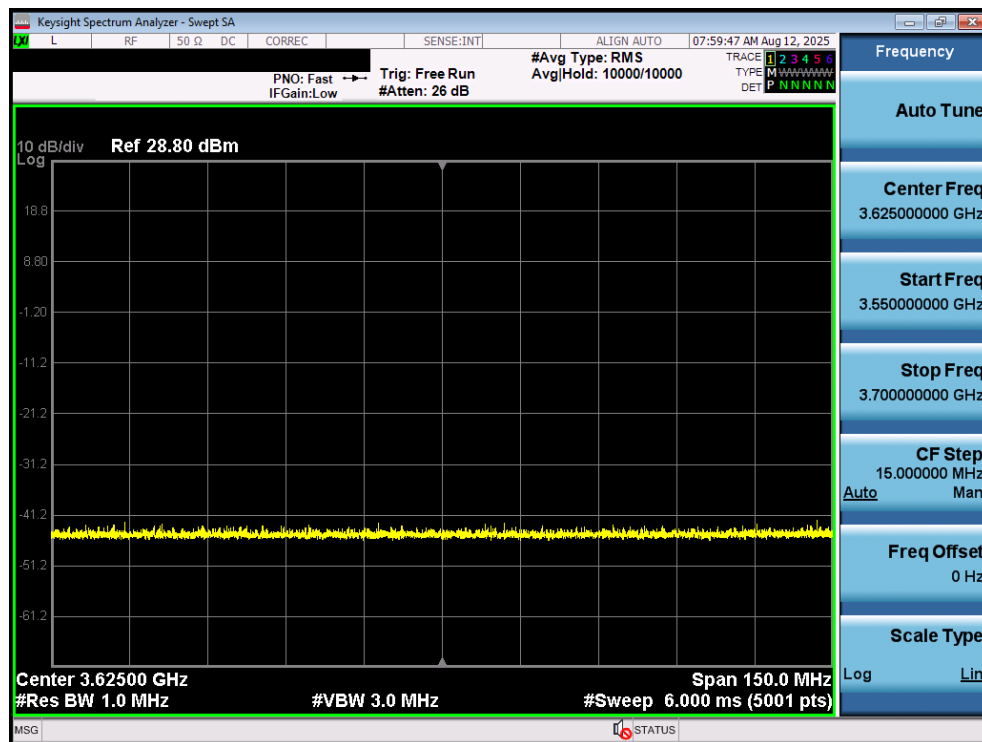
Plot 8. Conducted Measurement – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.GRA.1)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A10 [WINNF.FT.C.GRA.2] Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)

	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 – No RF transmission in entire band for 60s of elapsed time (WINNF.FT.C.GRA.2)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 20 of 59

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	☒	☐
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	☒	☐
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"	☒	☐
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	☒	☐

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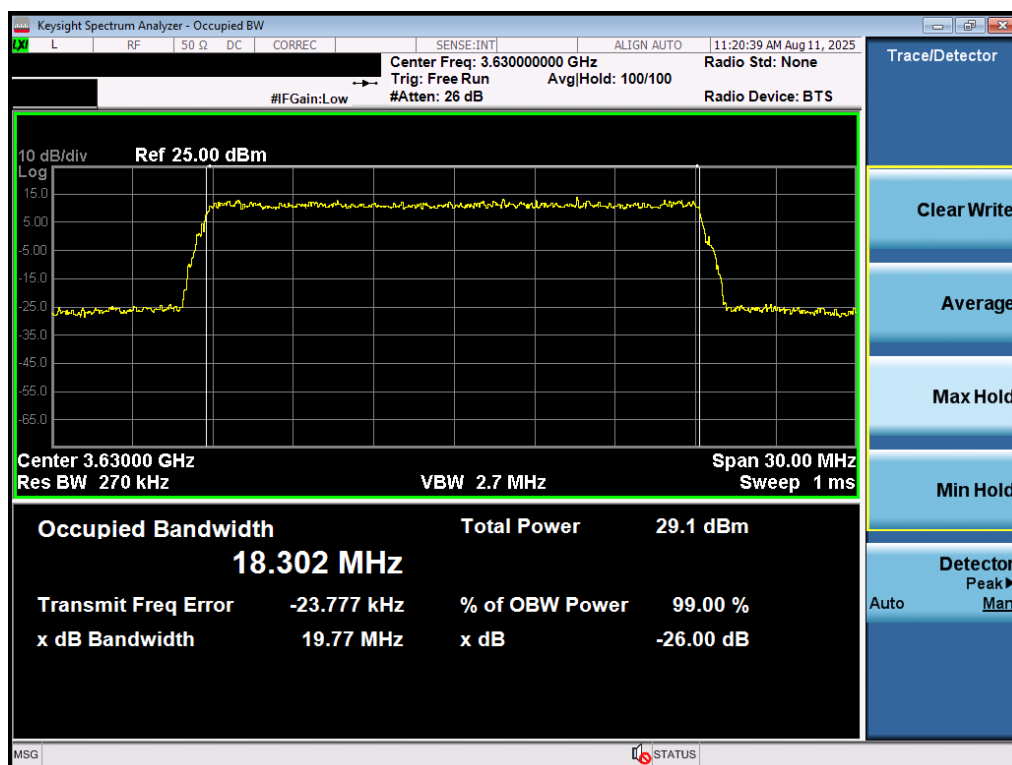
	• grantId = G • transmitExpireTime = current UTC time + 200 seconds • responseCode = 0		
10	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F	☒	☐

Test Plots:



Plot 10. Conducted Measurement - RF transmission after SAS heartbeat response noted by marker 1 (WINNF.FT.C.HBT.1)

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Plot 11. Conducted Measurement Occupied Bandwidth for 20MHz (WINNF.FT.C.HBT.1) – NR

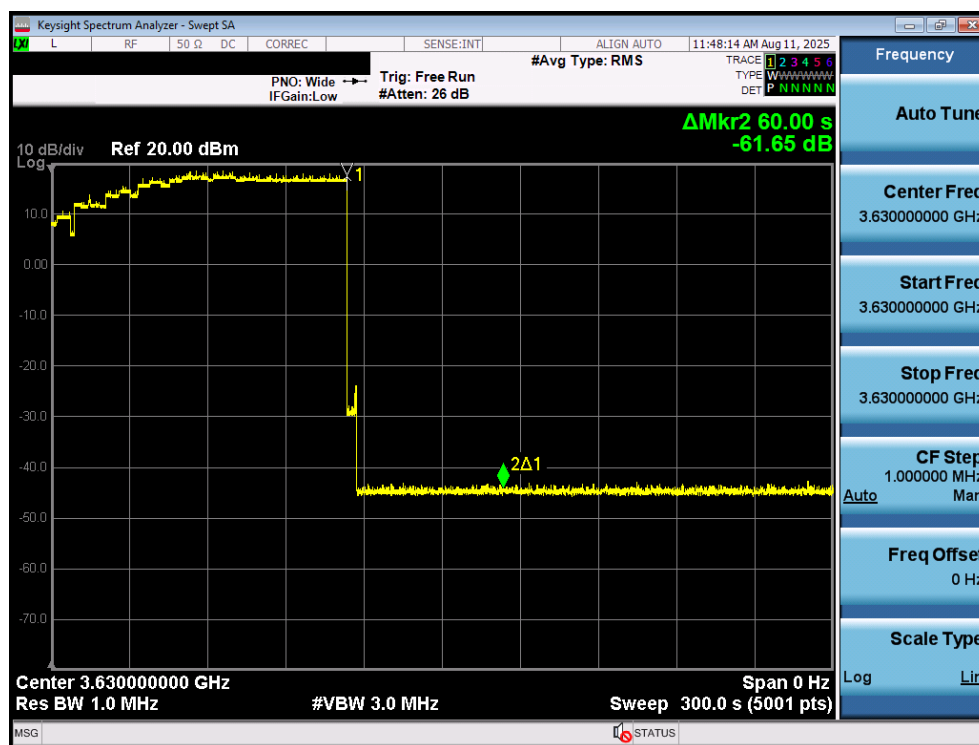
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 23 of 59

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	☒	☐

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Test Plots:



Plot 11. Conducted Measurement – RF transmission stops within 60s of SAS heartbeat response (Marker 1) (WINNF.FT.C.HBT.3)

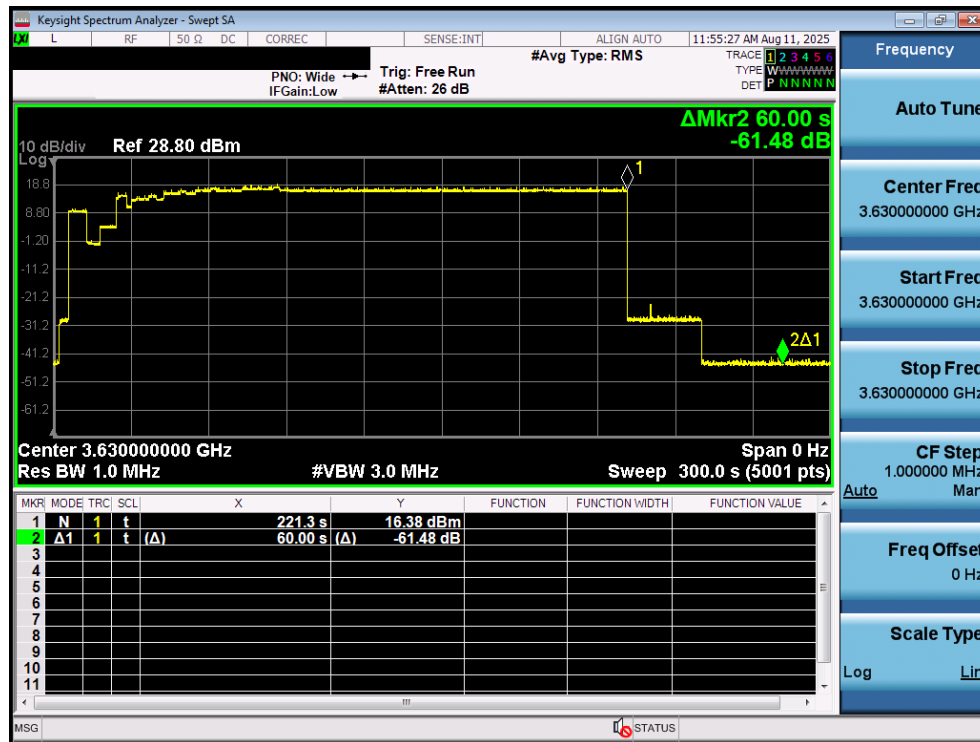
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 25 of 59

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

	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 = 500 (TERMINATED_GRANT)	--	--
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 12. Conducted Measurement – RF transmission stops within 60s of SAS heartbeat response (Marker 1)
(WINNF.FT.C.HBT.4)

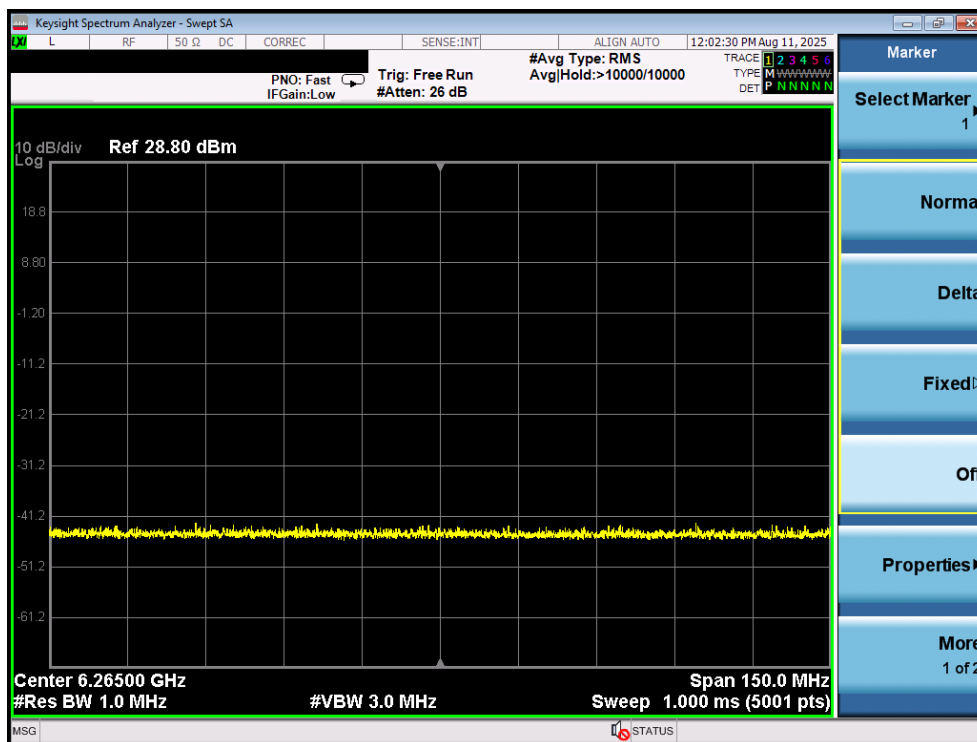
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A14 [WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	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 13. Conducted Measurement – No RF transmission in entire band at any time (WINNF.FT.C.HBT.5)

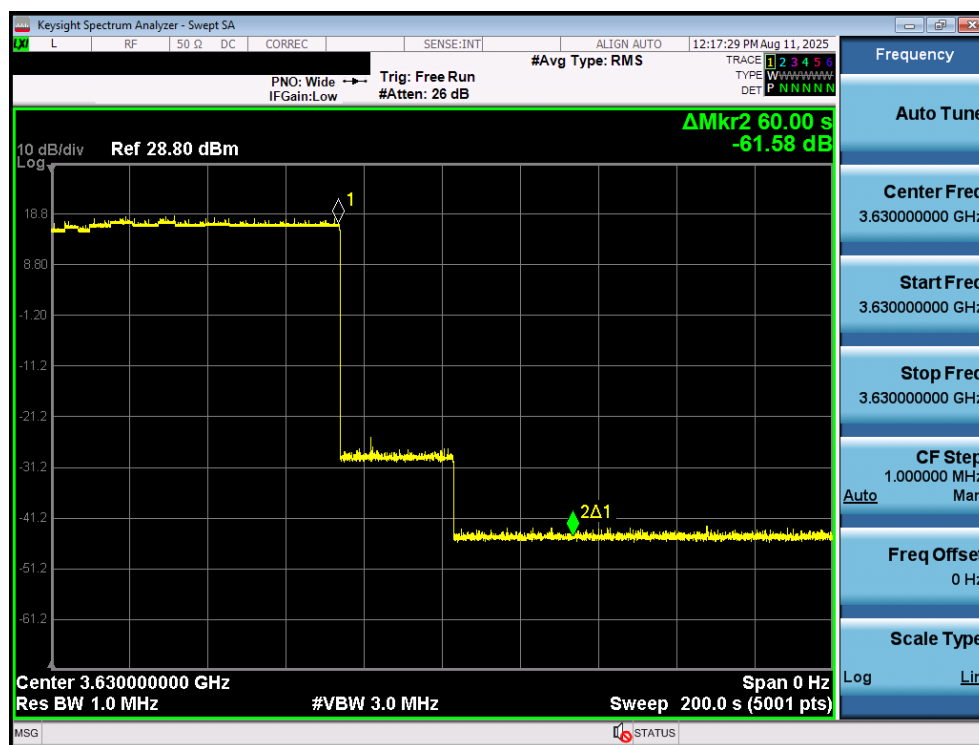
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A15 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response

	Test Execution Steps	PASS	FAIL
1	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 14. Conducted Measurement – RF transmission stops within 60s of SAS heartbeat response (Marker 1)
(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	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 15. Conducted Measurement – RF transmission stops within 60s of SAS heartbeat response (Marker 1)
(WINNF.FT.C.HBT.7)

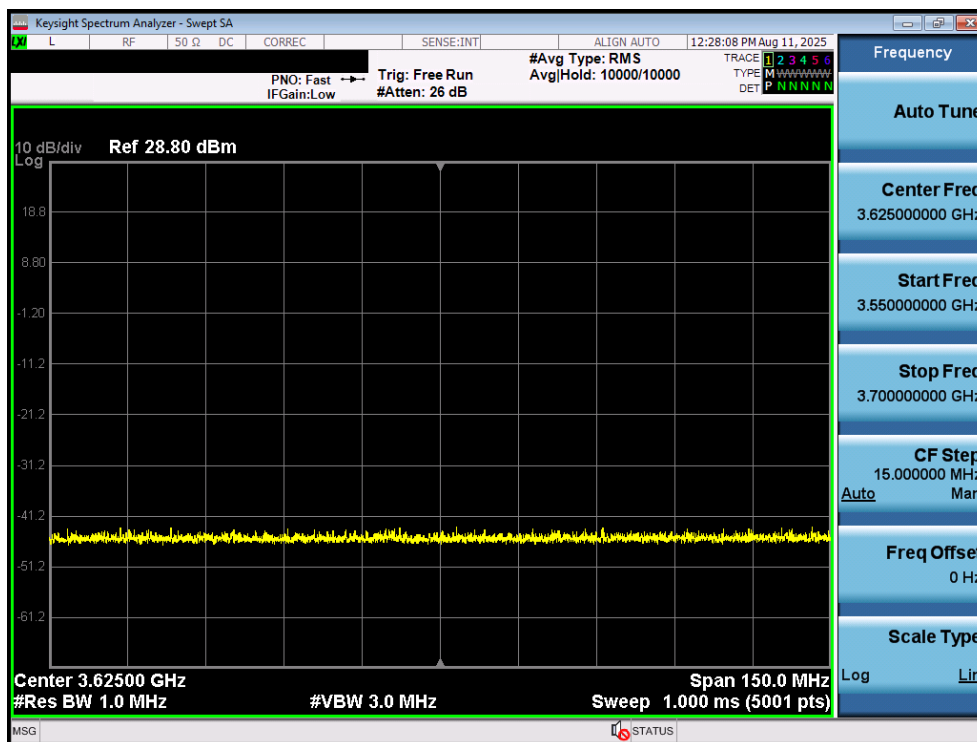
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A17 [WINNF.FT.C.HBT.9] Heartbeat Response Absent (First Heartbeat)

	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 – 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	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 - RF transmission stops within 60s of SAS heartbeat response (Marker 1)
(WINNF.FT.C.HBT.10)

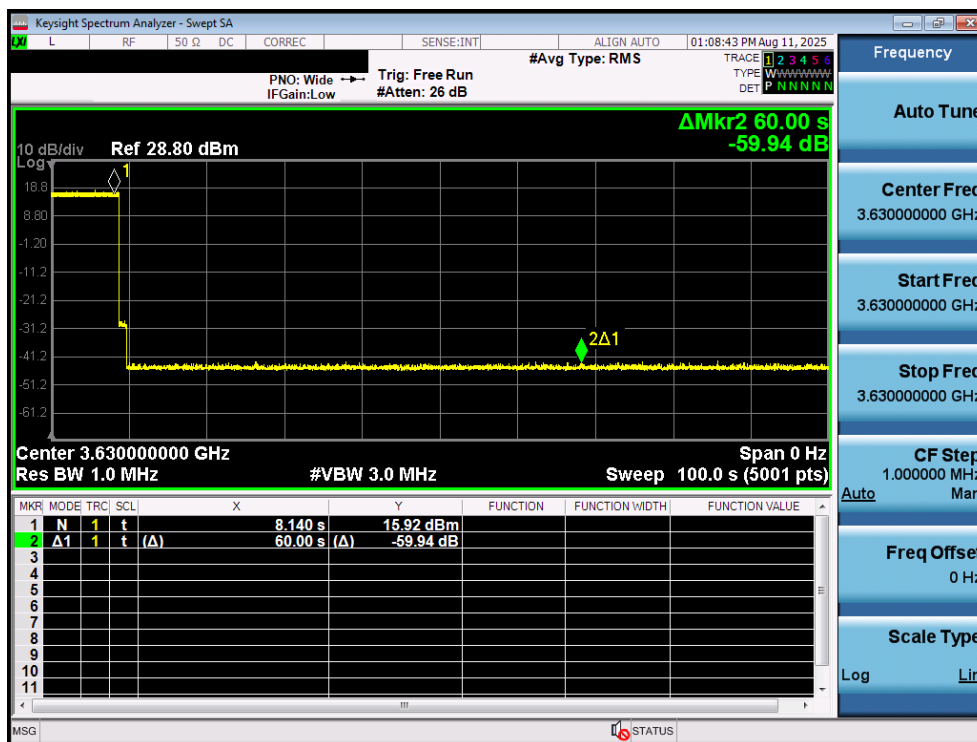
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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A19 [WINNF.FT.C.RLQ.1] Successful Relinquishment

	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 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. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--	--
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: • cbsdId = C • grantId = G	☒	☐
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: • cbsdId = C • grantId = G • 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 the 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	☒	☐

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Test Plots:



Plot 18. Conducted Measurement – RF transmission stops within 60s of SAS RLQ response (Marker 1)
(WINNF.FT.C.RLQ.1)

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A20 [WINNF.FT.C.MES.1] Registration Response contains measReportConfig

	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	--	--
2	UUT sends a Registration Request message. Validate the Registration Request message is formatted correctly, including: • userId is present and correct • fcId is present and correct • cbsdSerialNumber is present and correct • measCapability = "RECEIVED_POWER_WITHOUT_GRANT"	☒	☐
3	SAS Test Harness sends a Registration Response message, with the following parameters: • cbsdId = C = valid cbsdId for this UUT • 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. Verify message contains all required parameters properly formatted, and specifically: • cbsdId = C • measReport is present, and is a properly formatted rcvdPowerMeasReport.	☒	☐
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: • cbsdId = C • availableChannel is an array of availableChannel objects • responseCode = 0	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: • cbsdId = C • measReport is present, and is a properly formatted rcvdPowerMeasReport.	☒	☐

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```

    },
    "measReport": {
      "rcvdPowerMeasReports": [
        {
          "measBandwidth": 10000000,
          "measFrequency": 3550000000,
          "measRcvdPower": -96.19999694824219
        },
        {
          "measBandwidth": 10000000,
          "measFrequency": 3560000000,
          "measRcvdPower": -95
        },
        {
          "measBandwidth": 10000000,
          "measFrequency": 3570000000,
          "measRcvdPower": -98
        },
        {
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          "measFrequency": 3580000000,
          "measRcvdPower": -98.5999984741211
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        {
          "measBandwidth": 10000000,
          "measFrequency": 3590000000,
          "measRcvdPower": -93.9000015258789
        },
        {
          "measBandwidth": 10000000,
          "measFrequency": 3600000000,
          "measRcvdPower": -96.69999694824219
        },
        {
          "measBandwidth": 10000000,
          "measFrequency": 3610000000,
          "measRcvdPower": -93.69999694824219
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  }
}

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Plot 19. Measurement Report in Registration Response (WINNF.FT.C.MES.1)

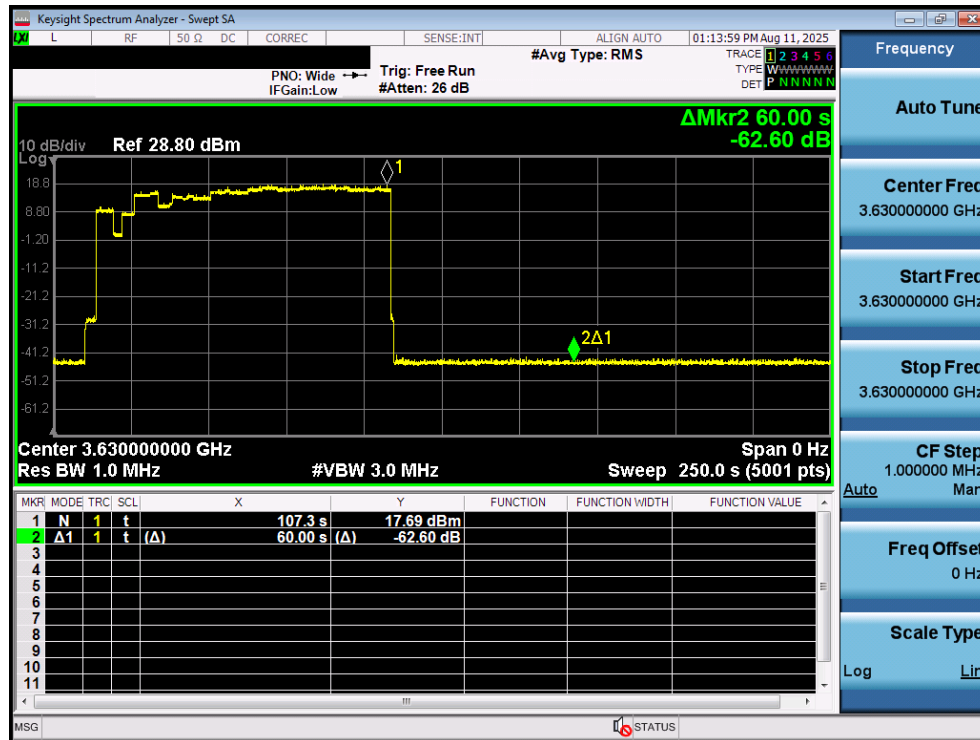
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 41 of 59

A21 [WINNF.FT.C.DRG.1] Successful Deregistration

	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 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. Invoke trigger to deregister UUT from the SAS Test Harness	--	--
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.	☒	☐
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: • 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	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: • 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: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Test Plots:



**Plot 19. Conducted Measurement – RF transmission stops within 60s of SAS DRG response (Marker 1)
(WINNF.FT.C.DRG.1)**

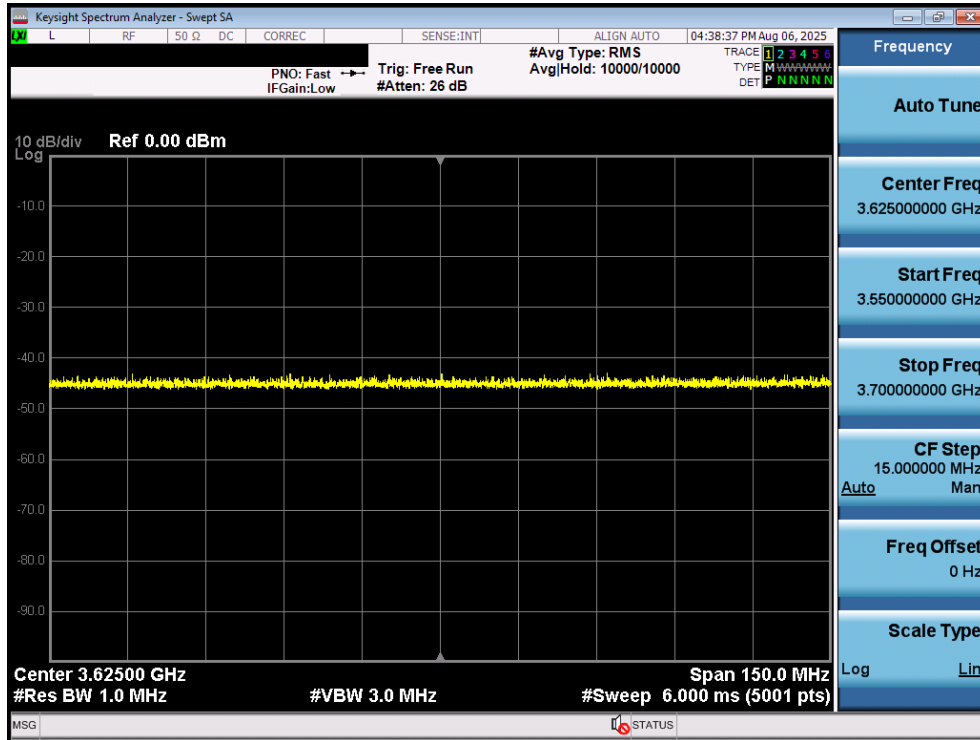
FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 43 of 59

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: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Test Plots:



Plot 20. Conducted Measurement – No Transmission at any time (WINNF.FT.C.SCS.1)

No.	Time	Source	Info	Destination	Protocol	Length
83	2025-08-06 20:55:07.353138	4.71.13.195	12722 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=2570272196 TSecr=0 WS=256	173.59.230.213	TCP	74
84	2025-08-06 20:55:07.353379	173.59.230.213	443 → 12722 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1	4.71.13.195	TCP	66
85	2025-08-06 20:55:07.360908	4.71.13.195	12722 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0	173.59.230.213	TCP	60
86	2025-08-06 20:55:07.400993	4.71.13.195	12722 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=1440 [TCP segment of a reassembled PDU]	173.59.230.213	TCP	1494
87	2025-08-06 20:55:07.400995	4.71.13.195	Client Hello	173.59.230.213	TLSv1.2	467
88	2025-08-06 20:55:07.401008	173.59.230.213	443 → 12722 [ACK] Seq=1 Ack=1854 Win=263424 Len=0	4.71.13.195	TCP	54
89	2025-08-06 20:55:07.423758	173.59.230.213	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done	4.71.13.195	TLSv1.2	3419
90	2025-08-06 20:55:07.466343	4.71.13.195	12722 → 443 [ACK] Seq=1854 Ack=1441 Win=31744 Len=0	173.59.230.213	TCP	60
91	2025-08-06 20:55:07.466344	4.71.13.195	12722 → 443 [ACK] Seq=1854 Ack=2881 Win=34560 Len=0	173.59.230.213	TCP	60
92	2025-08-06 20:55:07.466344	4.71.13.195	12722 → 443 [ACK] Seq=1854 Ack=3366 Win=37632 Len=0	173.59.230.213	TCP	60
93	2025-08-06 20:55:07.471202	4.71.13.195	12722 → 443 [ACK] Seq=1854 Ack=3366 Win=37632 Len=1440 [TCP segment of a reassembled PDU]	173.59.230.213	TCP	1494
94	2025-08-06 20:55:07.471203	4.71.13.195	Certificate	173.59.230.213	TLSv1.2	1478
95	2025-08-06 20:55:07.471204	173.59.230.213	443 → 12722 [ACK] Seq=3366 Ack=4710 Win=263424 Len=0	4.71.13.195	TCP	54
96	2025-08-06 20:55:07.472907	4.71.13.195	Client Key Exchange	173.59.230.213	TLSv1.2	129
97	2025-08-06 20:55:07.484414	4.71.13.195	Certificate Verify	173.59.230.213	TLSv1.2	323
98	2025-08-06 20:55:07.484415	4.71.13.195	Change Cipher Spec	173.59.230.213	TLSv1.2	60
99	2025-08-06 20:55:07.484415	173.59.230.213	Encrypted Handshake Message	173.59.230.213	TLSv1.2	99
100	2025-08-06 20:55:07.484512	173.59.230.213	443 → 12722 [ACK] Seq=3366 Ack=5105 Win=262912 Len=0	4.71.13.195	TCP	54
101	2025-08-06 20:55:07.485730	173.59.230.213	New Session Ticket, Change Cipher Spec, Encrypted Handshake Message	4.71.13.195	TLSv1.2	1608
102	2025-08-06 20:55:07.534920	4.71.13.195	12722 → 443 [ACK] Seq=5105 Ack=4920 Win=40704 Len=0	173.59.230.213	TCP	60
103	2025-08-06 20:55:07.537730	4.71.13.195	Application Data	173.59.230.213	TLSv1.2	599
104	2025-08-06 20:55:07.580747	173.59.230.213	Application Data	4.71.13.195	TLSv1.2	103
105	2025-08-06 20:55:07.663496	4.71.13.195	12722 → 443 [ACK] Seq=5650 Ack=4969 Win=40704 Len=0	173.59.230.213	TCP	60
106	2025-08-06 20:55:07.663574	173.59.230.213	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data	4.71.13.195	TLSv1.2	1058
107	2025-08-06 20:55:07.711890	4.71.13.195	12722 → 443 [ACK] Seq=5650 Ack=5973 Win=43520 Len=0	173.59.230.213	TCP	60
108	2025-08-06 20:55:07.721947	4.71.13.195	Application Data	173.59.230.213	TLSv1.2	398
109	2025-08-06 20:55:07.749119	173.59.230.213	Application Data	4.71.13.195	TLSv1.2	109
110	2025-08-06 20:55:07.831567	4.71.13.195	12722 → 443 [ACK] Seq=5994 Ack=6028 Win=43520 Len=0	173.59.230.213	TCP	60
111	2025-08-06 20:55:07.831625	173.59.230.213	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data	4.71.13.195	TLSv1.2	568
112	2025-08-06 20:55:07.879183	4.71.13.195	12722 → 443 [ACK] Seq=5994 Ack=6542 Win=46336 Len=0	173.59.230.213	TCP	60

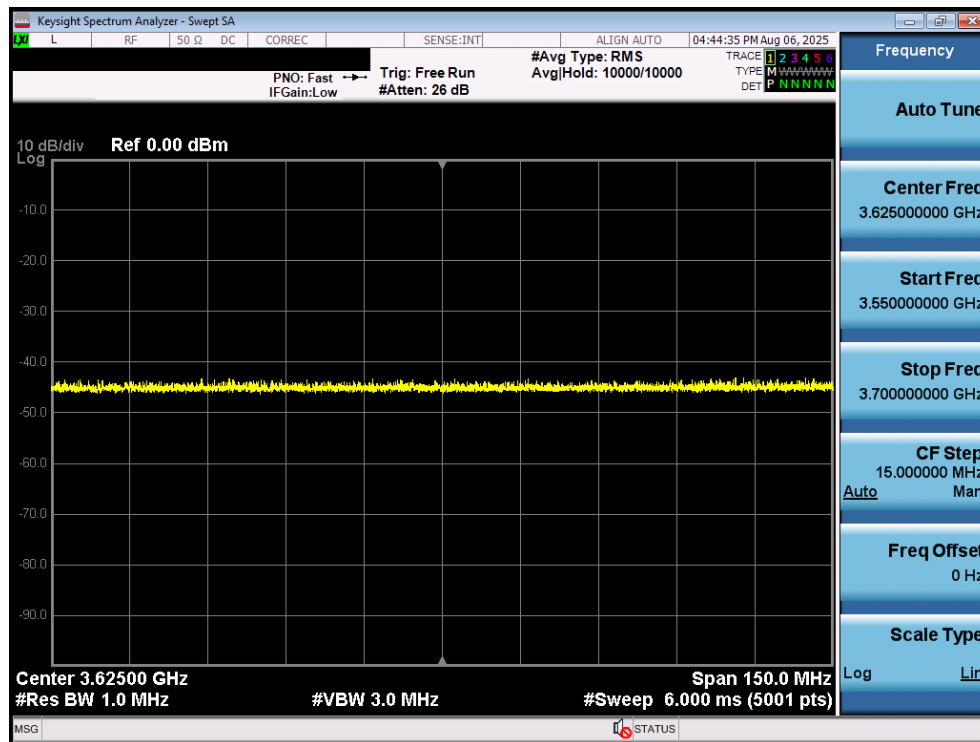
Plot 21. WireShark Screenshot – Successful Handshake (WINNF.FT.C.SCS.1)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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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 – No Transmission at any time (WINNF.FT.C.SCS.2)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 46 of 59



No.	Time	Source	Info	Destination	Protocol	Length
65	2025-08-06 20:59:07.029576	4.71.13.195	9067 → 443 [SYN] Seq=0 Win=28896 Len=0 MSS=1460 SACK_PERM=1 TSval=2570511863 TSecr=0 WS=256	173.59.230.213	TCP	74
66	2025-08-06 20:59:07.028816	173.59.230.213	443 → 9067 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1	4.71.13.195	TCP	66
67	2025-08-06 20:59:07.061567	4.71.13.195	9067 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0	173.59.230.213	TCP	60
68	2025-08-06 20:59:07.065419	4.71.13.195	9067 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=1440 [TCP segment of a reassembled PDU]	173.59.230.213	TCP	1494
69	2025-08-06 20:59:07.065420	4.71.13.195	Client Hello	173.59.230.213	TLSv1.2	467
70	2025-08-06 20:59:07.065507	173.59.230.213	443 → 9067 [ACK] Seq=1 Ack=1854 Win=263424 Len=0	4.71.13.195	TCP	54
71	2025-08-06 20:59:07.087565	173.59.230.213	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done	4.71.13.195	TLSv1.2	3547
72	2025-08-06 20:59:07.131037	4.71.13.195	9067 → 443 [ACK] Seq=1854 Ack=1441 Win=31744 Len=0	173.59.230.213	TCP	60
73	2025-08-06 20:59:07.131038	4.71.13.195	9067 → 443 [ACK] Seq=1854 Ack=2081 Win=34560 Len=0	173.59.230.213	TCP	60
74	2025-08-06 20:59:07.131038	4.71.13.195	9067 → 443 [ACK] Seq=1854 Ack=3494 Win=37632 Len=0	173.59.230.213	TCP	60
75	2025-08-06 20:59:07.144756	4.71.13.195	Alert (Level: Fatal, Description: Certificate Unknown)	173.59.230.213	TLSv1.2	61
76	2025-08-06 20:59:07.144757	4.71.13.195	9067 → 443 [FIN, ACK] Seq=1861 Ack=3494 Win=37632 Len=0	173.59.230.213	TCP	60
77	2025-08-06 20:59:07.144758	4.71.13.195	9067 → 443 [EST, ACK] Seq=1862 Ack=3494 Win=37632 Len=0	173.59.230.213	TCP	60

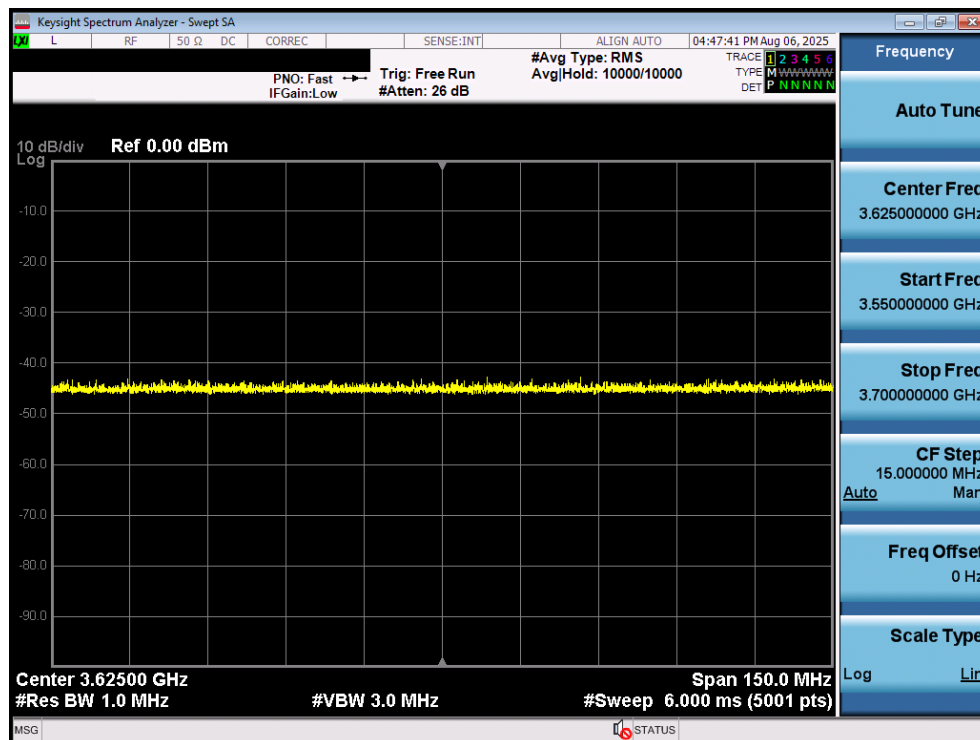
Plot 23.WireShark Screenshot 1 - Failed Handshake (WINNF.FT.C.SCS.2)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 47 of 59

A24 [WINNF.FT.C.SCS.3] TLS failure due to expired server 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 24. Conducted Measurement – No Transmission at any time (WINNF.FT.C.SCS.3)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 48 of 59

No.	Time	Source	Info	Destination	Protocol	Length
31	2025-08-06 21:00:37.728944	4.71.13.195	31023 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=25706002569 TSecr=0 WS=256	173.59.230.213	TCP	74
32	2025-08-06 21:00:37.721197	173.59.230.213	443 → 31023 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1	4.71.13.195	TCP	66
33	2025-08-06 21:00:37.763270	4.71.13.195	31023 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0	173.59.230.213	TCP	60
34	2025-08-06 21:00:37.765160	4.71.13.195	Client Hello	173.59.230.213	TLSv1.2	387
35	2025-08-06 21:00:37.787927	173.59.230.213	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done	4.71.13.195	TLSv1.2	3437
36	2025-08-06 21:00:37.833141	4.71.13.195	31023 → 443 [ACK] Seq=334 Ack=1441 Win=31744 Len=0	173.59.230.213	TCP	60
37	2025-08-06 21:00:37.833142	4.71.13.195	31023 → 443 [ACK] Seq=334 Ack=2081 Win=34560 Len=0	173.59.230.213	TCP	60
38	2025-08-06 21:00:37.833143	4.71.13.195	31023 → 443 [ACK] Seq=334 Ack=3304 Win=37632 Len=0	173.59.230.213	TCP	60
39	2025-08-06 21:00:37.836555	4.71.13.195	Alert (Level: Fatal, Description: Certificate Unknown)	173.59.230.213	TLSv1.2	61
40	2025-08-06 21:00:37.836555	4.71.13.195	31023 → 443 [FIN, ACK] Seq=341 Ack=3384 Win=37632 Len=0	173.59.230.213	TCP	60
41	2025-08-06 21:00:37.836556	4.71.13.195	31023 → 443 [RST, ACK] Seq=342 Ack=3384 Win=37632 Len=0	173.59.230.213	TCP	60

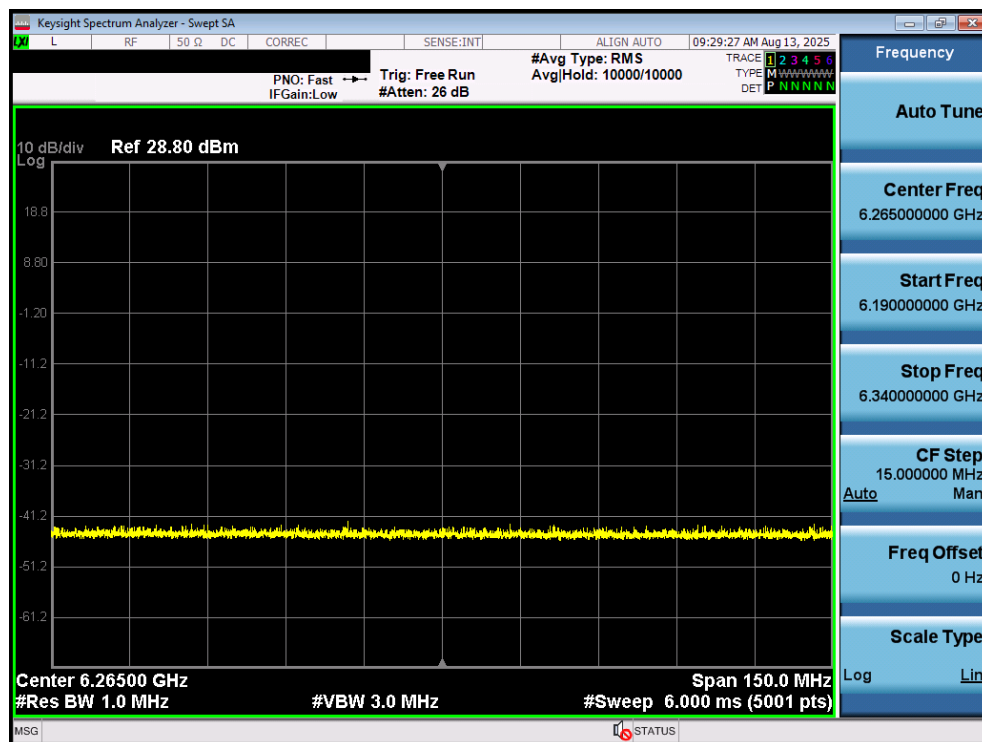
Plot 25.WireShark Screenshot - Failed Handshake (WINNF.FT.C.SCS.3)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 49 of 59

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 – No Transmission at any time (WINNF.FT.C.SCS.4)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 50 of 59

No.	Time	Source	Info	Destination	Protocol	Length
53	2025-08-06 21:02:18.738215	4.71.13.195	31230 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=2570703581 TSecr=0 WS=256	173.59.230.213	TCP	74
54	2025-08-06 21:02:18.738461	173.59.230.213	443 → 31230 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1	4.71.13.195	TCP	68
55	2025-08-06 21:02:18.779447	4.71.13.195	31230 → 443 [ACK] Seq=1 Ack=1 Win=28928 Len=0	173.59.230.213	TCP	60
56	2025-08-06 21:02:18.783330	4.71.13.195	Client Hello	173.59.230.213	TLSv1.2	387
57	2025-08-06 21:02:18.803054	173.59.230.213	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done	4.71.13.195	TLSv1.2	3439
58	2025-08-06 21:02:18.848833	4.71.13.195	31230 → 443 [ACK] Seq=334 Ack=1441 Win=31744 Len=0	173.59.230.213	TCP	60
59	2025-08-06 21:02:18.848834	4.71.13.195	31230 → 443 [ACK] Seq=334 Ack=2881 Win=34560 Len=0	173.59.230.213	TCP	60
60	2025-08-06 21:02:18.848835	4.71.13.195	31230 → 443 [ACK] Seq=334 Ack=3386 Win=37632 Len=0	173.59.230.213	TCP	60
61	2025-08-06 21:02:18.852576	4.71.13.195	Alert (Level: Fatal, Description: Certificate Unknown)	173.59.230.213	TLSv1.2	61
62	2025-08-06 21:02:18.852577	4.71.13.195	31230 → 443 [FIN, ACK] Seq=341 Ack=3386 Win=37632 Len=0	173.59.230.213	TCP	60
63	2025-08-06 21:02:18.852577	4.71.13.195	31230 → 443 [RST, ACK] Seq=342 Ack=3386 Win=37632 Len=0	173.59.230.213	TCP	60

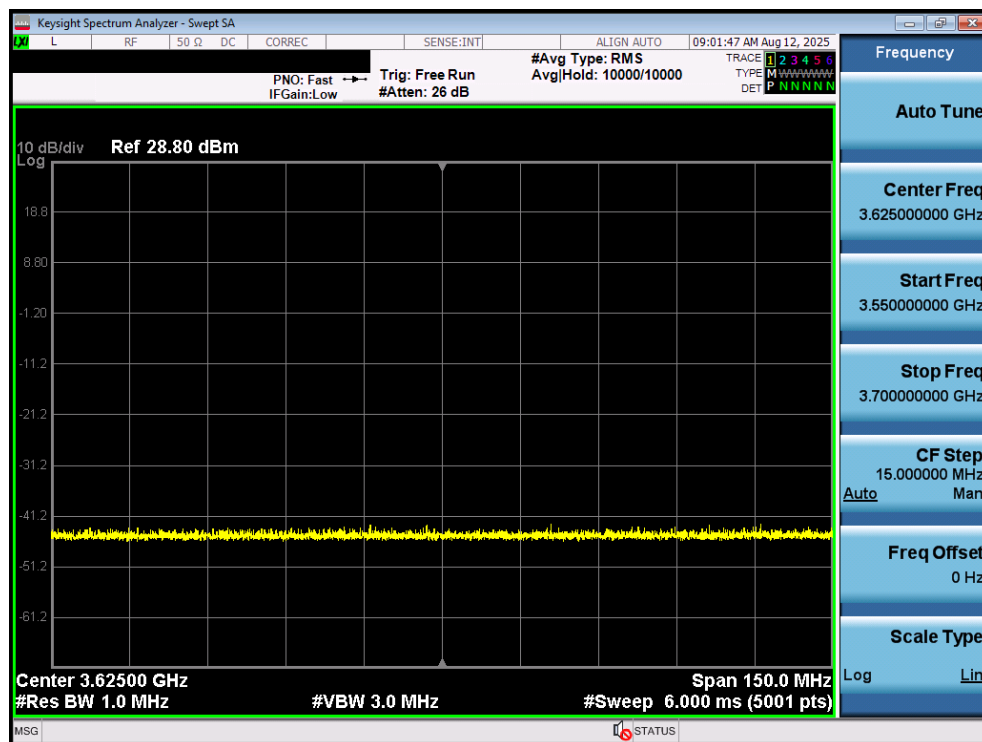
Plot 27. WireShark Screenshot - Failed Handshake (WINNF.FT.C.SCS.4)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 51 of 59

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 – No Transmission at any time (WINNF.FT.C.SCS.5)

FCC ID: A3LMT1602D-48B	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2508040073-02.A3L	Test Dates: 8/6/2025 – 8/13/2025	EUT Type: MMU (MT1602D)	Page 52 of 59

No.	Time	Source	Info	Destination	Protocol	Length
2392	2025-08-06 21:04:31.781486	4.71.13.195	29108 → 443 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=2578836625 TSecr=0 WS=256	173.59.230.213	TCP	74
2393	2025-08-06 21:04:31.781659	173.59.230.213	443 → 29108 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM=1	4.71.13.195	TCP	68
2394	2025-08-06 21:04:31.827004	4.71.13.195	29108 → 443 [ACK] Seq=1 Ack=1 Win=20928 Len=0	173.59.230.213	TCP	60
2395	2025-08-06 21:04:31.830345	4.71.13.195	Client Hello	173.59.230.213	TLsv1.2	387
2396	2025-08-06 21:04:31.851540	173.59.230.213	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done	4.71.13.195	TLsv1.2	3419
2397	2025-08-06 21:04:31.896504	4.71.13.195	29108 → 443 [ACK] Seq=334 Ack=1441 Win=31744 Len=0	173.59.230.213	TCP	60
2398	2025-08-06 21:04:31.896505	4.71.13.195	29108 → 443 [ACK] Seq=334 Ack=3081 Win=34560 Len=0	173.59.230.213	TCP	60
2399	2025-08-06 21:04:31.896505	4.71.13.195	29108 → 443 [ACK] Seq=334 Ack=3366 Win=37632 Len=0	173.59.230.213	TCP	60
2400	2025-08-06 21:04:31.900256	4.71.13.195	Alert (Level: Fatal, Description: Certificate Unknown)	173.59.230.213	TLsv1.2	61
2401	2025-08-06 21:04:31.900257	4.71.13.195	29108 → 443 [FIN, ACK] Seq=341 Ack=3366 Win=37632 Len=0	173.59.230.213	TCP	60
2402	2025-08-06 21:04:31.900257	4.71.13.195	29108 → 443 [RST, ACK] Seq=342 Ack=3366 Win=37632 Len=0	173.59.230.213	TCP	60

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

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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>	☒	☐

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RF Power Measurements:

Testing is performed per KDB 971168 D01 and across the transmit dynamic range of 37dBm/MHz to 13dBm/MHz for 20MHz Bandwidth. This was tested in single-beam mode as this mode yields the highest EIRP.

Output power was found to be identical across the UUT's 16 antenna ports. MIMO conducted PSD was found by measuring the output on one port and correcting by a factor of $10\log(16)$.

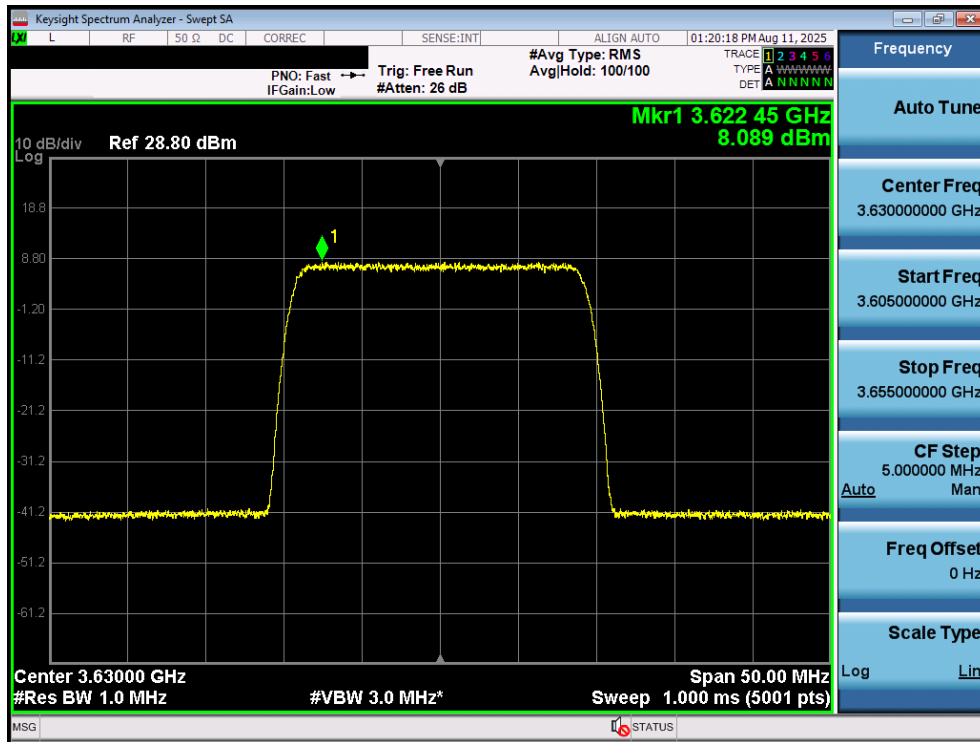
EIRP PSD is found by adding the directional antenna gain supplied by the manufacturer (14.80dBi) to the conducted PSD level.

SAS Authorized EIRP [dBm/MHz]	Single Port Conducted PSD [dBm]	16 Port Conducted PSD [dBm]	Antenna Gain [dBi]	EIRP PSD [dBm]	Margin [dB]
37	8.09	20.13	14.80	34.93	-2.07
27	-0.31	11.73	14.80	26.53	-0.47
17	-12.01	0.03	14.80	14.83	-2.17

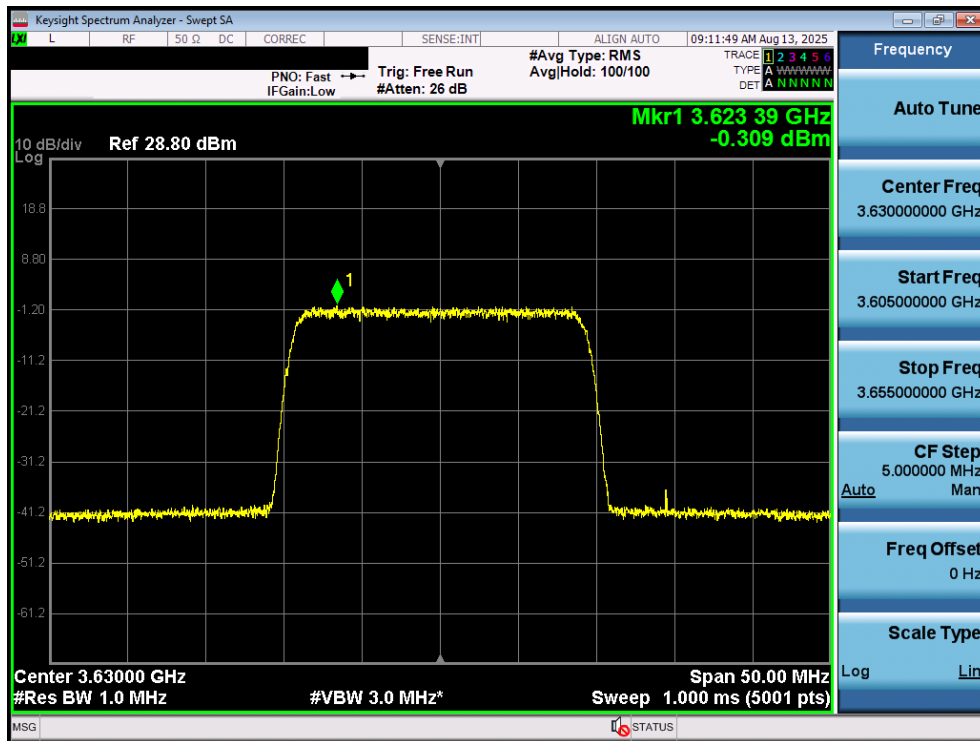
Table 7-1 RF Output Power Measurements (WINNF.PT.C.HBT.1) – NR

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Test Plots:

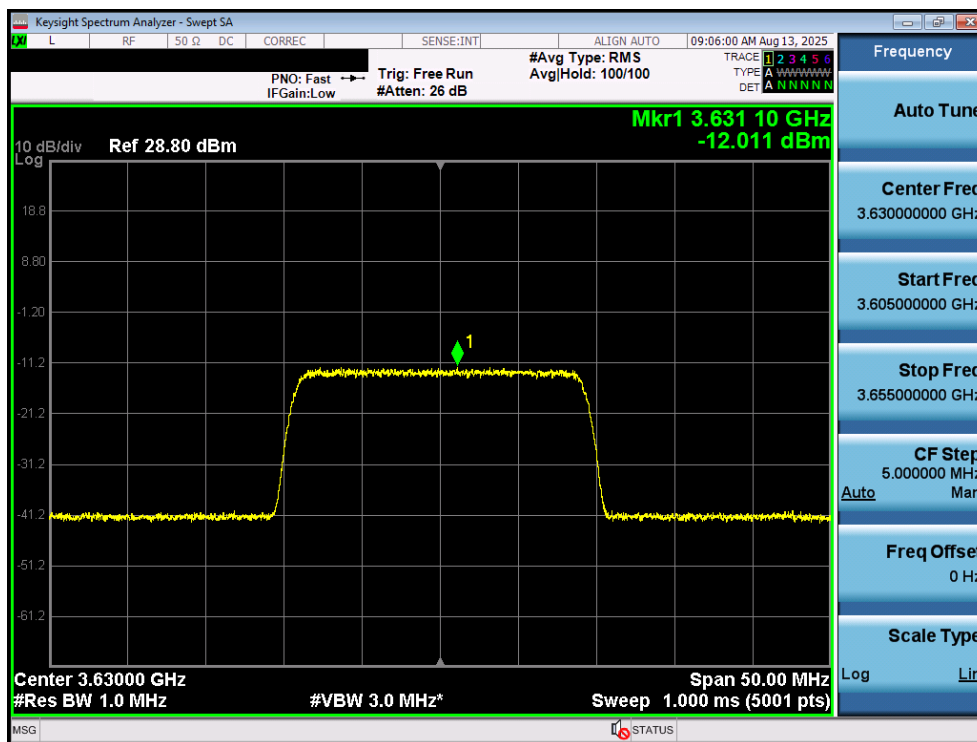


Plot 30. Conducted PSD, SAS Granted maxEIRP 37 – NR



Plot 31. Conducted PSD, SAS Granted maxEIRP 27 – NR

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Plot 32. Conducted PSD, SAS Granted maxEIRP 17 – NR

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APPENDIX B – TEST LOGS

Logs are available upon request

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