

CBSD Test Report

Report No.: RFBEIH-WTW-P24110561-3

FCC ID: 2ASK5AIOID5GSC03

Test Model: Nokia AIOSC Indoor 5G n48

Received Date: Dec. 31, 2024

Test Date: Aug. 18, 2025 ~ Jan. 16, 2026

Issued Date: Jan. 20, 2026

Applicant: Nokia

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration/
Designation Number:** 788550 / TW0003



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Appendix – Information of the Testing Laboratories 48

Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P24110561-3	Original release	Jan. 20, 2026

1 Certificate of Conformity

Product: Nokia AIOSC Indoor 5G

Brand: Nokia

Test Model: Nokia AIOSC Indoor 5G n48

Sample Status: Engineering sample

Applicant: Nokia

Test Date: Aug. 18, 2025 ~ Jan. 16, 2026

Standards: WINNF-TS-0122 V1.0.2
ONGO-TS-9001 V1.3.0

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Gina Liu , **Date:** Jan. 20, 2026
Gina Liu / Specialist

Approved by : Jeremy Lin , **Date:** Jan. 20, 2026
Jeremy Lin / Project Engineer

2 Summary of Test Results

WINNF-TS-0122			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT(CBSD, DP/CBSD)	25	25	100
PT(CBSD, DP/CBSD)	1	1	100
Total	26	26	100

Note:

1. Functional Test (FT): Test to validate the conformance of the Protocols and functionalities implemented in the CBSD/DP UUT to the requirements developed by WINNF and supporting FCC/DoD requirements.
2. Field/Performance Test (PT): Test to check the capability of the CBSD/DP UUT to support various traffic models and actual operations in the field.

Supported Features in details:

WINNF-TS-0122 Test Case		
Definitions	Test Case ID	Supported
C1	WINNF.FT.C.REG.1	Yes
C2	NA	No
C3	NA	No
C4	WINNF.FT.C.MES.1	Yes
C5	NA	No
C6	NA	No

WINNF-TS-0122 Test Case

Section	Test Case ID	Test Case Title	Test Result
6.1.4.1.1	WINNF.FT.C.REG.1	Multi-Step registration	Pass
6.1.4.1.2	WINNF.FT.D.REG.2	Domain Proxy Multi-Step registration	NA
6.1.4.1.3	WINNF.FT.C.REG.3	Single-Step registration for Category A CBSD	NA
6.1.4.1.4	WINNF.FT.D.REG.4	Domain Proxy Single-Step registration for Cat A CBSD	NA
6.1.4.1.5	WINNF.FT.C.REG.5	Single-Step registration for CBSD with CPI signed data	NA
6.1.4.1.6	WINNF.FT.D.REG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	NA
6.1.4.1.7	WINNF.FT.C.REG.7	Registration due to change of an installation parameter	NA
6.1.4.2.1	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	Pass
6.1.4.2.2	WINNF.FT.D.REG.9	Domain Proxy Missing Required parameters (responseCode 102)	NA
6.1.4.2.3	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	Pass
6.1.4.2.4	WINNF.FT.D.REG.11	Domain Proxy Pending registration (responseCode 200)	NA
6.1.4.2.5	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	Pass
6.1.4.2.6	WINNF.FT.D.REG.13	Domain Proxy Invalid parameters (responseCode 103)	NA
6.1.4.2.7	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	Pass
6.1.4.2.8	WINNF.FT.D.REG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	NA
6.1.4.2.9	WINNF.FT.C.REG.16	Unsupported SAS protocol version (responseCode 100)	Pass
6.1.4.2.10	WINNF.FT.D.REG.17	Domain Proxy Unsupported SAS protocol version (responseCode 100)	NA
6.1.4.2.11	WINNF.FT.C.REG.18	Group Error (responseCode 201)	Pass
6.1.4.2.12	WINNF.FT.D.REG.19	Domain Proxy Group Error (responseCode 201)	NA
6.1.4.3.1	WINNF.FT.C.REG.20	Category A CBSD location update	NA

WINNF-TS-0122 Test Case

Section	Test Case ID	Test Case Title	Test Result
6.3.4.2.1	WINNF.FT.D.GRA.1	Unsuccessful Grant responseCode=400 (INTERFERENCE)	Pass
6.3.4.2.2	WINNF.FT.C.GRA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	Pass
6.4.4.1.1	WINNF.FT.C.HBT.1	Heartbeat Success Case (first Heartbeat Response)	Pass
6.4.4.1.2	WINNF.FT.D.HBT.2	Domain Proxy Heartbeat Success Case (first Heartbeat Response)	NA
6.4.4.2.1	WINNF.FT.C.HBT.3	Heartbeat responseCode=105 (DEREGISTER)	Pass
6.4.4.2.2	WINNF.FT.C.HBT.4	Heartbeat responseCode=500 (TERMINATED_GRANT)	Pass
6.4.4.2.3	WINNF.FT.C.HBT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	Pass
6.4.4.2.4	WINNF.FT.C.HBT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	Pass
6.4.4.2.5	WINNF.FT.C.HBT.7	Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	Pass
6.4.4.2.6	WINNF.FT.D.HBT.8	Domain Proxy Heartbeat responseCode=500 (TERMINATED_GRANT)	NA
6.4.4.3.1	WINNF.FT.C.HBT.9	Heartbeat Response Absent (First Heartbeat)	Pass
6.4.4.3.2	WINNF.FT.C.HBT.10	Heartbeat Response Absent (Subsequent Heartbeat)	Pass
6.4.4.4.1	WINNF.FT.C.HBT.11	Successful Grant Renewal in Heartbeat Test Case	NA
6.5.4.2.1	WINNF.FT.C.MES.1	Registration Response contains measReportConfig	Pass
6.5.4.2.2	WINNF.FT.D.MES.2	Domain Proxy Registration Response contains measReportConfig	NA
6.5.4.2.3	WINNF.FT.C.MES.3	Grant Response contains measReportConfig	NA
6.5.4.2.4	WINNF.FT.C.MES.4	Heartbeat Response contains measReportConfig	NA
6.5.4.2.5	WINNF.FT.D.MES.5	Domain Proxy Heartbeat Response contains measReportConfig	NA

WINNF-TS-0122 Test Case

Section	Test Case ID	Test Case Title	Test Result
6.6.4.1.1	WINNF.FT.C.RLQ.1	Successful Relinquishment	Pass
6.6.4.1.2	WINNF.FT.D.RLQ.2	Domain Proxy Successful Relinquishment	NA
6.6.4.2.1	WINNF.FT.C.RLQ.3	Unsuccessful Relinquishment, responseCode=102	NA
6.6.4.2.2	WINNF.FT.D.RLQ.4	Domain Proxy Unsuccessful Relinquishment, responseCode=102	NA
6.6.4.3.1	WINNF.FT.C.RLQ.5	Unsuccessful Relinquishment, responseCode=103	NA
6.6.4.3.2	WINNF.FT.D.RLQ.6	Domain Proxy Unsuccessful Relinquishment, responseCode=103	NA
6.7.4.1.1	WINNF.FT.C.DRG.1	Successful Deregistration	Pass
6.7.4.1.2	WINNF.FT.D.DRG.2	Domain Proxy Successful Deregistration	NA
6.7.4.2.1	WINNF.FT.C.DRG.3	Deregistration responseCode=102	NA
6.7.4.2.2	WINNF.FT.D.DRG.4	Domain Proxy Deregistration responseCode=102	NA
6.7.4.3.1	WINNF.FT.C.DRG.5	Deregistration responseCode=103	NA
6.8.4.1.1	WINNF.FT.C.SCS.1	Successful TLS connection between UUT and SAS Test Harness	Pass
6.8.4.2.1	WINNF.FT.C.SCS.2	TLS failure due to revoked certificate	Pass
6.8.4.2.2	WINNF.FT.C.SCS.3	TLS failure due to expired server certificate	Pass
6.8.4.2.3	WINNF.FT.C.SCS.4	TLS failure when SAS Test Harness certificate is issue by unknown CA	Pass
6.8.4.2.4	WINNF.FT.C.SCS.5	TLS failure when certificate at the SAS Test Harness is corrupted	Pass
7.1.4.1.1	WINNF.PT.C.HBT	UUT RF Transmit Power Measurement	Pass

Note: Section as per WINNF-TS-0122 If the product as tested complies with the specification, the UUT is deemed to comply with the standard and is deemed a "Pass" grade. If not "Fail" grade is issued. Where "NA" is stated this means the test case is not applicable.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the UUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions above 1 GHz	1GHz ~ 18GHz	1 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Nokia AIO SC Indoor 5G
Brand	Nokia
Test Model	Nokia AIO SC Indoor 5G n48
Hardware Version	C00
Firmware Version	IndoorV1
Status of EUT	Engineering sample
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT consumes power from the following adapter.

Item	Brand	Model	Specification
AC Adapter 1	Mass Power Electronics Inc.	NBS100A120600M2	AC Input : 100-240Vac, 50/60Hz, 1.6A DC Output : 12.0V, 6.0A, 72.0W DC Output Cable : 2pin, 1.5m non shielded without core
AC Adapter 2	Mass Power Electronics Inc.	NBS100A120600M3	AC Input : 100-240Vac, 50/60Hz, 1.6A DC Output : 12.0V, 6.0A, 72.0W DC Output Cable : 3pin, 1.5m non shielded without core

* After pre-tested all the adapters and found adapter 1 was the worst. Therefore, only adapter 1 was for the final test and presented in the test report.

2. The product is an indoor Small Cell, with built-in antenna as the primary usage scenario.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
WINNF-TS-0122	25deg. C, 65%RH	120Vac, 60Hz	Matthew Yang

3.2 General Description of Applied Standards

The UUT is a BTS-CBSD product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:

FCC 47 CFR Part 96

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 940660 D01 Part 96 CBRS Eqpt v03

All test items have been performed as a reference to the above KDB test guidance.

4 Measurement

4.1 CBSD Measurement

The CBSD shall validate and ensure that the Conformance and Performance Test results from compliance with SAS functional requirements.

4.2 CBSD Test Procedure

- a. Connect the UUT to SAS Test Harness system and RF Test instruments via the CBSD interface and RF components. The highest level is set to test configuration.
- b. UUT shall be UTC time synchronized
- c. The frequency band is granted and set as UUT supported Modulation and Channels, transmitted power of the UUT according to it granted parameters from the SAS Test Harness.
- d. Each test case results was recorded and validated by SAS Test Harness system and RF instruments test cases was recorded test results from SAS Test Harness system.

4.3 Test Environment

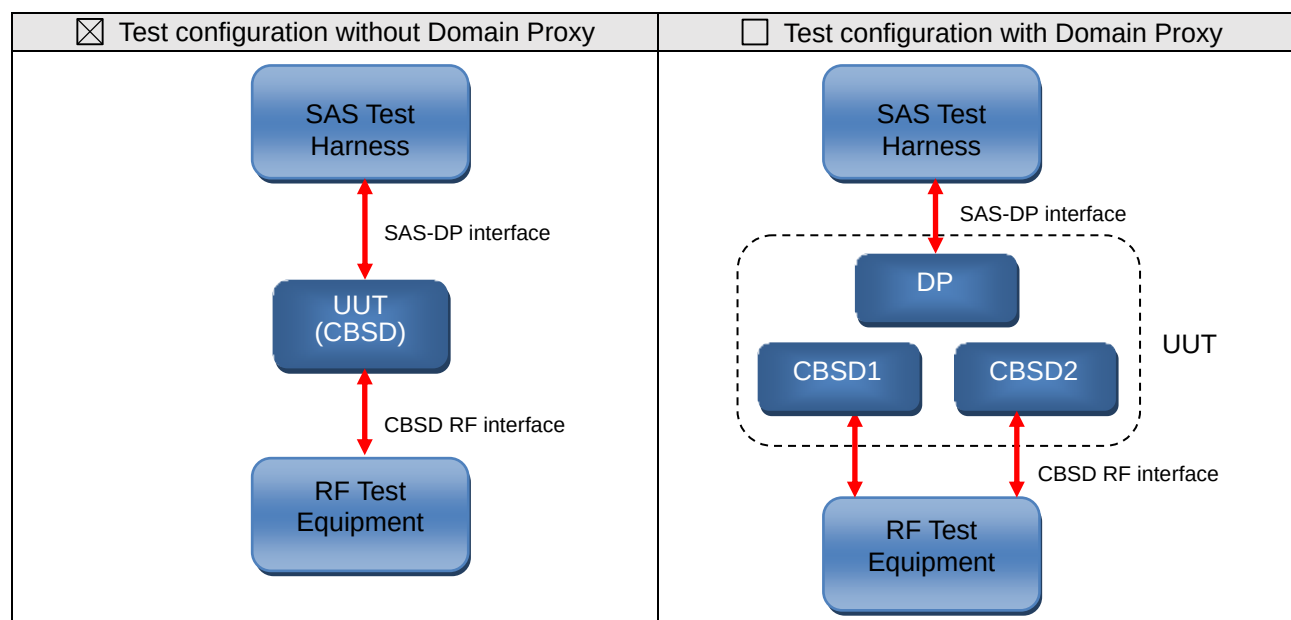
Test Harness Version	V1.0.0.3
Operating System	Microsoft Windows 10
TLS Version	1.2
Python	2.7.13

4.4 Test Equipment

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
ROHDE & SCHWARZ Signal Analyzer	FSV	E2-010642	May. 29, 2024	May. 28, 2026
Temperature & Humidity Chamber TERCHY	TFA 452019	E2-010883	Dec. 13, 2024	Dec. 12, 2025
			Dec. 12, 2025	Dec. 11, 2026
Laptop Lenovo	P137G	P137G001	NA	NA

Note: 1. The test was performed in HY-OVEN Test Room.
2. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5 Test Setup



4.6 Test Results

4.6.1 CBSD Registration Process

4.6.1.1 WINNF.FT.C.REG.1

☒ Test Case ID : WINNF.FT.C.REG.1
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT is in the Unregistered state	--	--
2	CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness: ● The required <i>userId</i>, <i>fccId</i> and <i>cbsdSerialNumber</i> 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.	☒ Pass	☐ Fail
3	● SAS Test Harness sends a CBSD Registration Response as follows: - <i>cbsdId</i> = C - <i>measReportConfig</i> shall not be included - <i>responseCode</i> = 0	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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	☒ Pass	☐ Fail

4.6.1.2 WINNF.FT.C.REG.8

■ Test Case ID : WINNF.FT.C.REG.8 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 102	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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	☒ Pass	☐ Fail

4.6.1.3 WINNF.FT.C.REG.10

■ Test Case ID : WINNF.FT.C.REG.10 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 200	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =200) 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	☒ Pass	☐ Fail

4.6.1.4 WINNF.FT.C.REG.12

☒ Test Case ID : WINNF.FT.C.REG.12
 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 103	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =103) 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	☒ Pass	☐ Fail

4.6.1.5 WINNF.FT.C.REG.14

■ Test Case ID : WINNF.FT.C.REG.14 □ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 101	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =101) 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	☒ Pass	☐ Fail

4.6.1.6 WINNF.FT.C.REG.16

■ Test Case ID : WINNF.FT.C.REG.16 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 100	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =100) 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	☒ Pass	☐ Fail

4.6.1.7 WINNF.FT.C.REG.18

☒ Test Case ID : WINNF.FT.C.REG.18
 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i> - <i>responseCode</i> = R = 201	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =201) 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	☒ Pass	☐ Fail

4.6.2 CBSD Spectrum Grant Process

4.6.2.1 WINNF.FT.C.GRA.1

☒ Test Case ID : WINNF.FT.C.GRA.1
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <i>cbsdId</i>=C <i>responseCode</i> = R = 400	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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	☒ Pass	☐ Fail

4.6.2.2 WINNF.FT.C.GRA.2

■ Test Case ID : WINNF.FT.C.GRA.2 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including ● <i>cbsdId</i> =C ● <i>responseCode</i> = R = 401	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =401) 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	■ Pass	□ Fail

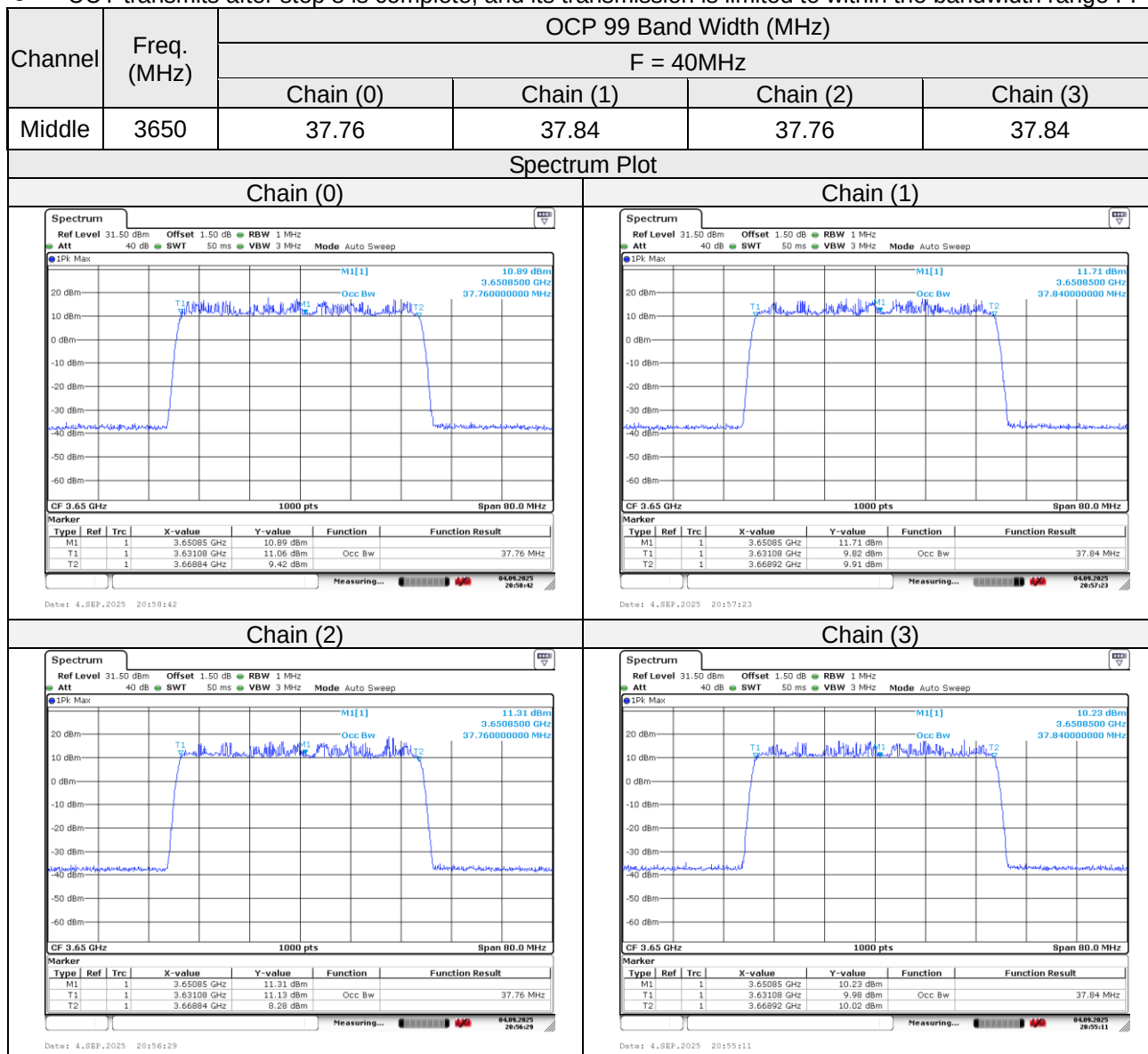
4.6.3 CBSD Heart Beat Process

4.6.3.1 WINNF.FT.C.HBT.1

■ Test Case ID : WINNF.FT.C.HBT.1 □ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = 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: ● <i>cbsdId</i> = C ● List of frequencyRange objects sent by UUT are within the CBRS frequency range	■ Pass	□ Fail
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>availableChannel</i> is an array of availableChannel objects ● <i>responseCode</i> = 0	--	--
5	UUT sends Grant Request message. Validate: ● <i>cbsdId</i> = C ● <i>maxEIRP</i> is at or below the limit appropriate for CBSD category as defined by Part 96 ● <i>operationFrequencyRange</i> , F, sent by UUT is a valid range within the CBRS band	■ Pass	□ Fail
6	SAS Test Harness sends a Grant Response message, including the parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G = a valid grant ID ● <i>grantExpireTime</i> = UTC time greater than duration of the test ● <i>responseCode</i> = 0	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED"	■ Pass	□ Fail
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 0	--	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 0	■ Pass	□ Fail
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.	■ Pass	□ Fail

- UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.



4.6.3.2 WINNF.FT.C.HBT.3

■ Test Case ID : WINNF.FT.C.HBT.3 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED"	--	--
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = Current UTC time ● <i>responseCode</i> = 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	☒ Pass	☐ Fail

4.6.3.3 WINNF.FT.C.HBT.4

■ Test Case ID : WINNF.FT.C.HBT.4 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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 latest specified heartbeatInterval, and is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED"	■ Pass	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 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	■ Pass	□ Fail

4.6.3.4 WINNF.FT.C.HBT.5

■ Test Case ID : WINNF.FT.C.HBT.5 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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. Verify Heartbeat Request message is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED"	☒ Pass	☐ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ? <i>responseCode</i> = 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G Monitor the RF output of the UUT. Verify: ● UUT does not transmit at any time	☒ Pass	☐ Fail

4.6.3.5 WINNF.FT.C.HBT.6

■ Test Case ID : WINNF.FT.C.HBT.6 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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 latest specified heartbeatInterval, and is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED"	☒ Pass	☐ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G Monitor the RF output of the UUT. Verify: ● UUT shall stop transmission within (T+60) seconds of completion of step 3	☒ Pass	☐ Fail

4.6.3.6 WINNF.FT.C.HBT.7

■ Test Case ID : WINNF.FT.C.HBT.7 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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 latest specified heartbeatInterval, and is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED"	■ Pass	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 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: ○ <i>cbsdId</i> = C ○ <i>grantId</i> = G Monitor the RF output of the UUT. Verify: ● UUT shall stop transmission within (T+60) seconds of completion of step 3	■ Pass	□ Fail

4.6.3.7 WINNF.FT.C.HBT.9

■ Test Case ID : WINNF.FT.C.HBT.9 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED"	☒ Pass	☐ Fail
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	☒ Pass	☐ Fail

4.6.3.8 WINNF.FT.C.HBT.10

■ Test Case ID : WINNF.FT.C.HBT.10 □ NA

#	Test Execution Steps	Results	
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: ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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 latest specified <i>heartbeatInterval</i>, and is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED"	■ Pass	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time + 200 seconds ● <i>responseCode</i> = 0	--	--
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 all transmission on RF interface within (<i>transmitExpireTime</i> + 60 seconds), using the <i>transmitExpireTime</i> sent in Step 3.	■ Pass	□ Fail

4.6.4 CBSD Measurement Report

4.6.4.1 WINNF.FT.C.MES.1

☒ Test Case ID : WINNF.FT.C.MES.1
 ☐ NA

#	Test Execution Steps	Results	
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: <i>userId</i> is present and correct <i>fcId</i> is present and correct <i>cbSdSerialNumber</i> is present and correct <i>measCapability</i> = "RECEIVED_POWER_WITHOUT_GRANT"	☒ Pass	☐ Fail
3	SAS Test Harness sends a Registration Response message, with the following parameters: <i>cbSdId</i> = C = valid <i>cbSdId</i> for this UUT <i>measReportConfig</i> = "RECEIVED_POWER_WITHOUT_GRANT" <i>responseCode</i> = 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: <i>cbSdId</i> = C <i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.	☒ Pass	☐ Fail
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: <i>cbSdId</i> = C <i>availableChannel</i> is an array of <i>availableChannel</i> objects <i>responseCode</i> = 0	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: <i>cbSdId</i> = C <i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.	☒ Pass	☐ Fail

4.6.5 CBSD Relinquishment Process

4.6.5.1 WINNF.FT.C.RLQ.1

■ Test Case ID : WINNF.FT.C.RLQ.1 □ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i>=C ● UUT has received a valid grant with <i>grantId</i> = 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G	■ Pass	□ Fail
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: - <i>cbsdId</i> = C - <i>grantId</i> = G - <i>responseCode</i> = 0	--	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode</i>=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	■ Pass	□ Fail

4.6.6 CBSD Deregistration Process

4.6.6.1 WINNF.FT.C.DRG.1

☒ Test Case ID : WINNF.FT.C.DRG.1
 ☐ NA

#	Test Execution Steps	Results	
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 <i>cbsdId</i>=C - UUT has received a valid grant with <i>grantId</i> = 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 <i>responseCode</i> =0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdId</i> = C.	☒ Pass	☐ Fail
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: <i>cbsdId</i> = C <i>responseCode</i> = 0	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode</i> =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	☒ Pass	☐ Fail

4.6.7 CBSD Security Validation

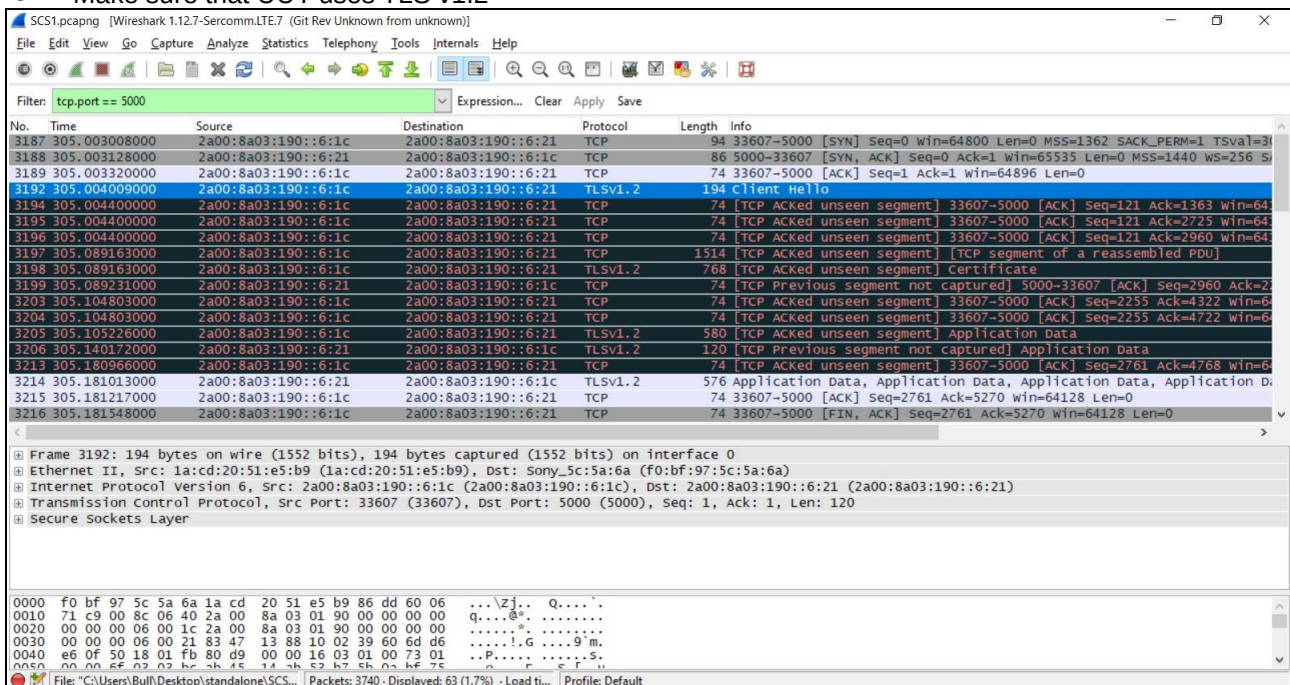
4.6.7.1 WINNF.FT.C.SCS.1

Test Case ID : WINNF.FT.C.SCS.1 ☐ NA

#	Test Execution Steps	Results	
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	☒ Pass	☐ Fail
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	☒ Pass	☐ Fail
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 <i>responseCode</i> = 0 and <i>cbsdId</i>.	☒ Pass	☐ Fail
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	☒ Pass	☐ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS1.pcapng [Wireshark 1.12.7-SercommLTE7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000

No.	Time	Source	Destination	Protocol	Length	Info
3187	305.003008000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	94	33607-5000 [SYN] Seq=0 Win=64800 Len=0 MSS=1362 SACK_PERM=1 TSval=3187
3188	305.003128000	2a00:8a03:190::6:21	2a00:8a03:190::6:1c	TCP	86	5000-33607 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1440 WS=256 S
3189	305.003320000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	33607-5000 [ACK] Seq=1 Ack=1 Win=64896 Len=0
3192	305.004009000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TLSv1.2	194	Client Hello
3194	305.004400000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=121 Ack=1363 win=64
3195	305.004400000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=121 Ack=2725 win=64
3196	305.004400000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=121 Ack=2960 win=64
3197	305.009163000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	1514	[TCP ACKed unseen segment] [TCP segment of a reassembled PDU]
3198	305.009163000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TLSv1.2	768	[TCP ACKed unseen segment] Certificate
3199	305.009231000	2a00:8a03:190::6:21	2a00:8a03:190::6:1c	TCP	74	[TCP Previous segment not captured] 5000-33607 [ACK] Seq=2960 Ack=2
3203	305.104803000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=2255 Ack=4322 win=6
3204	305.104803000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=2255 Ack=4722 win=6
3205	305.105226000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TLSv1.2	580	[TCP ACKed unseen segment] Application Data
3206	305.140172000	2a00:8a03:190::6:21	2a00:8a03:190::6:1c	TLSv1.2	120	[TCP Previous segment not captured] Application Data
3213	305.180966000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	[TCP ACKed unseen segment] 33607-5000 [ACK] Seq=2761 Ack=4768 win=6
3214	305.181013000	2a00:8a03:190::6:21	2a00:8a03:190::6:1c	TLSv1.2	576	Application Data, Application Data, Application Data, Application D
3215	305.181217000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	33607-5000 [ACK] Seq=2761 Ack=5270 Win=64128 Len=0
3216	305.181548000	2a00:8a03:190::6:1c	2a00:8a03:190::6:21	TCP	74	33607-5000 [FIN, ACK] Seq=2761 Ack=5270 Win=64128 Len=0

Frame 3192: 194 bytes on wire (1552 bits), 194 bytes captured (1552 bits) on interface 0

Ethernet II, Src: 1a:cd:20:51:e5:b9 (1a:cd:20:51:e5:b9), Dst: Sony_5c:5a:6a (f0:bf:97:5c:5a:6a)

Internet Protocol Version 6, Src: 2a00:8a03:190::6:1c (2a00:8a03:190::6:1c), Dst: 2a00:8a03:190::6:21 (2a00:8a03:190::6:21)

Transmission Control Protocol, Src Port: 33607 (33607), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 120

Secure Sockets Layer

File: "C:\Users\Bull\Desktop\standalone\SCS1..." Packets: 3740 - Displayed: 63 (1.7%) - Load ti... Profile: Default

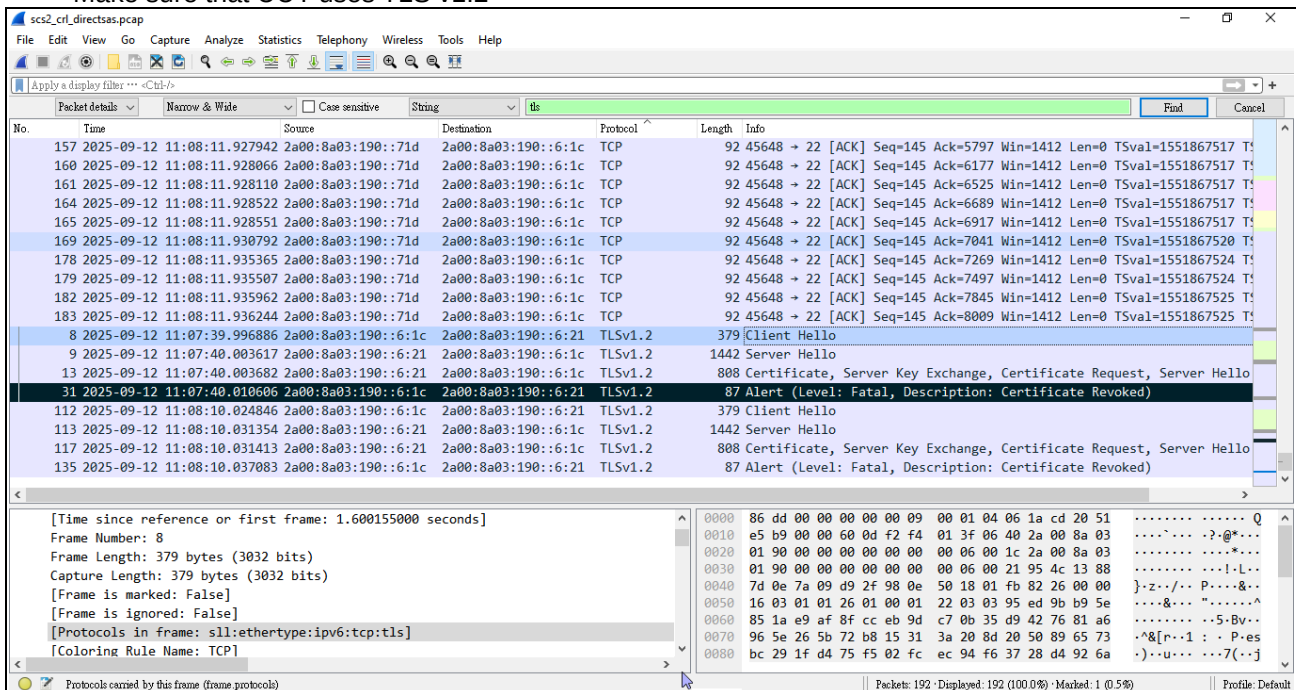
4.6.7.2 WINNF.FT.C.SCS.2

Test Case ID : WINNF.FT.C.SCS.2 ☐ NA

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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.	☒ Pass	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ 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	☒ Pass	☐ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The screenshot shows a Wireshark capture of a network session. The packet list on the left shows several TCP and TLSv1.2 packets. The selected packet (No. 31) is a TLSv1.2 Alert (Level: Fatal, Description: Certificate Revoked). The packet details pane on the right shows the alert message structure, including the frame number (8), length (379 bytes), and the alert message itself (87 bytes).

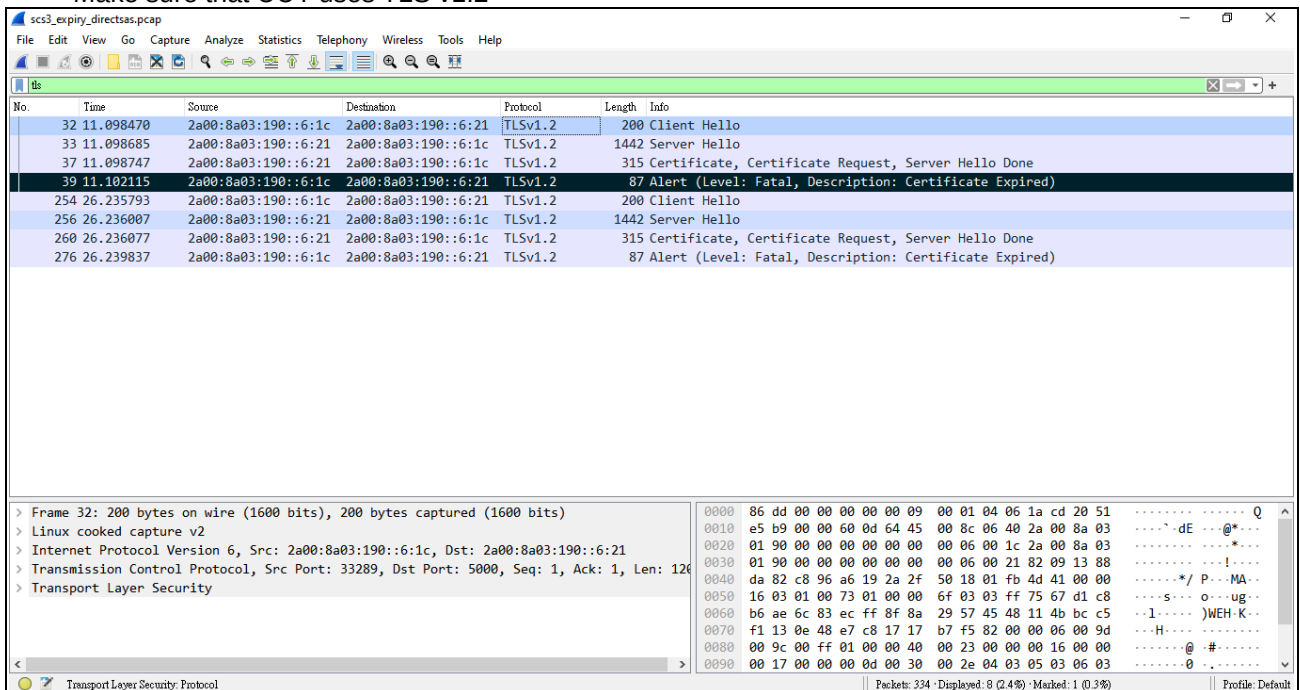
4.6.7.3 WINNF.FT.C.SCS.3

Test Case ID : WINNF.FT.C.SCS.3 ☐ NA

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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.	☒ Pass	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ 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	☒ Pass	☐ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The Wireshark capture shows a TLS v1.2 session. The first packet (No. 32) is a Client Hello from 2a00:8a03:190::6:1c to 2a00:8a03:190::6:21. The second packet (No. 33) is a Server Hello from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c. The third packet (No. 37) is a Certificate Request from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c. The fourth packet (No. 39) is an Alert (Level: Fatal, Description: Certificate Expired) from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c. The fifth packet (No. 254) is a Client Hello from 2a00:8a03:190::6:1c to 2a00:8a03:190::6:21. The sixth packet (No. 256) is a Server Hello from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c. The seventh packet (No. 260) is a Certificate Request from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c. The eighth packet (No. 276) is an Alert (Level: Fatal, Description: Certificate Expired) from 2a00:8a03:190::6:21 to 2a00:8a03:190::6:1c.

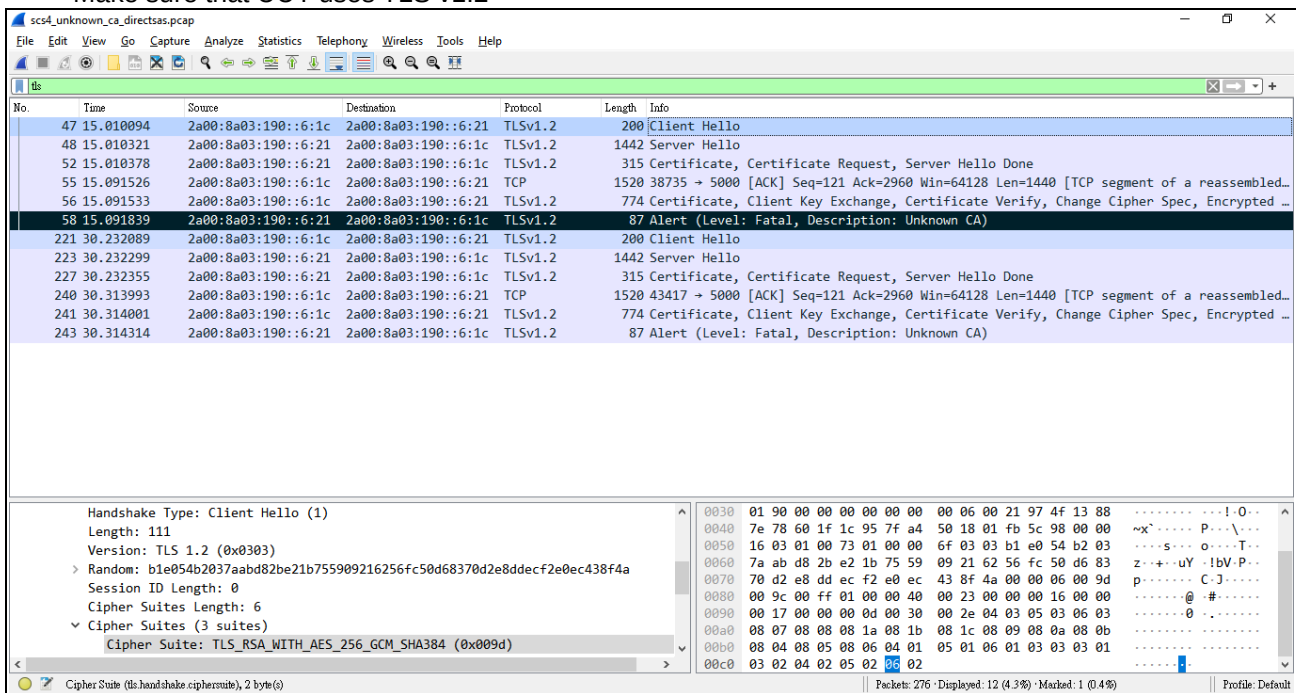
4.6.7.4 WINNF.FT.C.SCS.4

Test Case ID : WINNF.FT.C.SCS.4 ☐ NA

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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.	☒ Pass	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ 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	☒ Pass	☐ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The image shows a Wireshark capture of a TLS v1.2 handshake. The packet list shows the following sequence:

- 47 15.010094 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TLSv1.2 200 Client Hello
- 48 15.010321 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 1442 Server Hello
- 52 15.010378 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 315 Certificate, Certificate Request, Server Hello Done
- 55 15.091526 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TCP 1520 38735 → 5000 [ACK] Seq=121 Ack=2960 Win=64128 Len=1440 [TCP segment of a reassembled...]
- 56 15.091533 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TLSv1.2 774 Certificate, Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted ...
- 58 15.091839 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 87 Alert (Level: Fatal, Description: Unknown CA)
- 221 30.232089 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TLSv1.2 200 Client Hello
- 223 30.232299 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 1442 Server Hello
- 227 30.232355 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 315 Certificate, Certificate Request, Server Hello Done
- 240 30.313993 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TCP 1520 43417 → 5000 [ACK] Seq=121 Ack=2960 Win=64128 Len=1440 [TCP segment of a reassembled...]
- 241 30.314001 2a00:8a03:190::6:1c 2a00:8a03:190::6:21 TLSv1.2 774 Certificate, Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted ...
- 243 30.314314 2a00:8a03:190::6:21 2a00:8a03:190::6:1c TLSv1.2 87 Alert (Level: Fatal, Description: Unknown CA)

The packet details for the first Client Hello (packet 47) are shown below:

```

Handshake Type: Client Hello (1)
Length: 111
Version: TLS 1.2 (0x0303)
> Random: b1e054b2037aabd821b755909216256fc50d68370d2e8dddecf2e0ec438f4a
Session ID Length: 0
Cipher Suites Length: 6
  Cipher Suites (3 suites)
    Cipher Suite: TLS_RSA_WITH_AES_256_GCM_SHA384 (0x009d)
  
```

The packet bytes are displayed in hexadecimal and ASCII format at the bottom of the window.

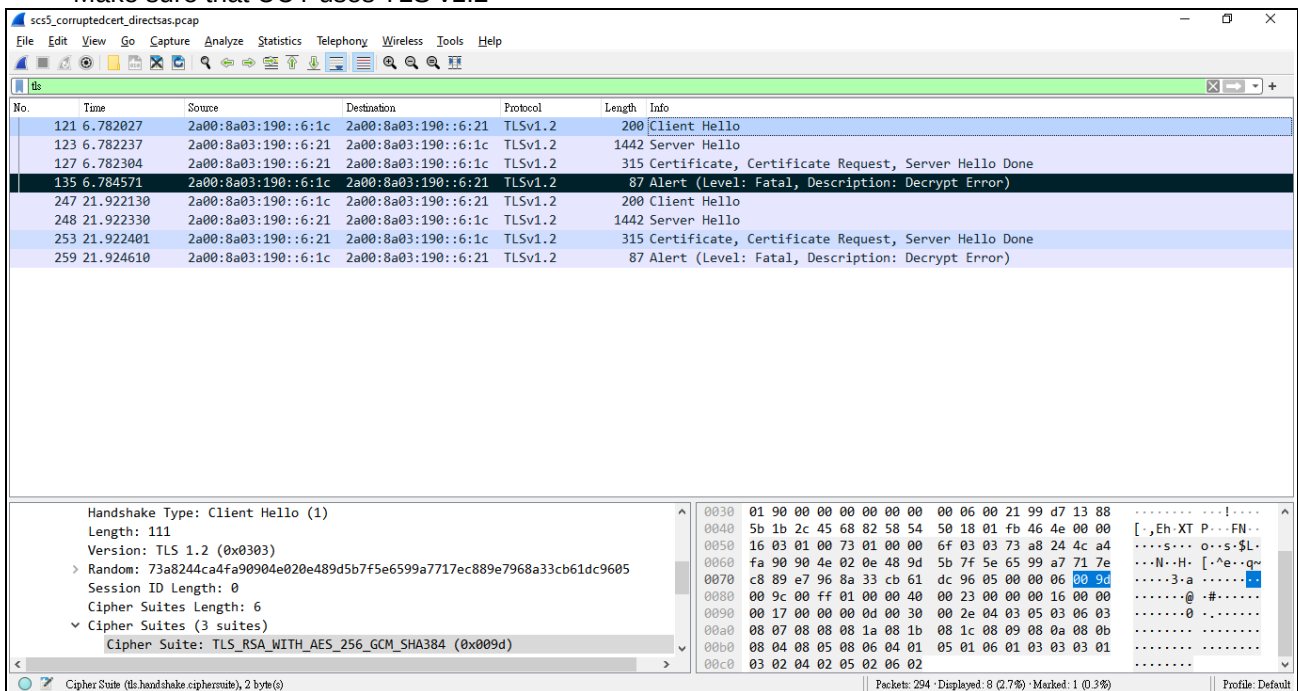
4.6.7.5 WINNF.FT.C.SCS.5

Test Case ID : WINNF.FT.C.SCS.5 ☐ NA

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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.	☒ Pass	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ 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	☒ Pass	☐ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The image shows a Wireshark capture of a TLS v1.2 handshake. The packet list on the left shows several packets, including a Client Hello (200 bytes), Server Hello (1442 bytes), Certificate (315 bytes), and an Alert (87 bytes) with a fatal description: 'Decrypt Error'. The packet details pane on the right shows the 'Handshake Type: Client Hello (1)' and 'Length: 111'. The 'Cipher Suites' section is expanded, showing 'Cipher Suite: TLS_RSA_WITH_AES_256_GCM_SHA384 (0x009d)'. The packet bytes pane at the bottom shows the raw data of the handshake, including the 'Handshake Type: Client Hello (1)' and 'Length: 111'.

4.6.8 CBSD RF Power Measurement

4.6.8.1 WINNF.PT.C.HBT.1

■ Test Case ID : WINNF.PT.C.HBT.1 □ NA

#	Test Execution Steps	Results	
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 CBSD 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: ○ cbsdId = C ○ grantId = G ● SAS Test Harness responds with Heartbeat Response, including: ○ cbsdId = C ○ grantId = G ○ transmitExpireTime = current UTC time + 200 seconds ○ 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 fulfill 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>	☒ Pass	☐ Fail

RF measurement plot for Test Case :

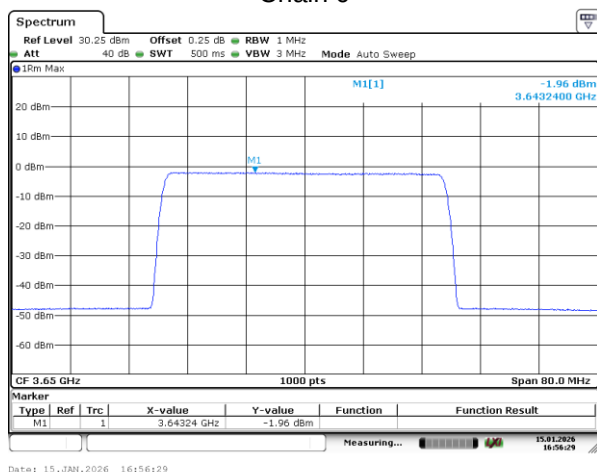
- Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.

For Internal

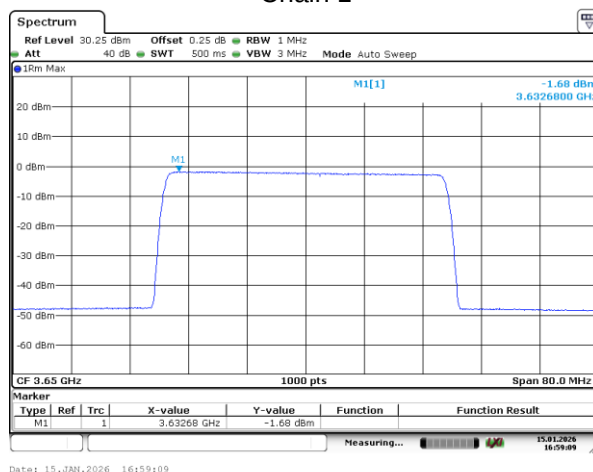
Channel	Freq. (MHz)	40MHz						Limit	Pass / Fail
		Conducted Power Density (dBm/MHz)				Gain(dBi)	5.52		
		Chain 0	Chain 1	Chain 2	Chain 3	Total	EIRP (dBm/MHz)	maxEirp(dBm)=Pi	
Middle	3650	-1.96	-1.68	-1.63	-1.90	4.23	9.75	10.0	Pass
Middle	3650	3.33	3.50	3.54	3.36	9.45	14.97	15.0	Pass
Middle	3650	8.36	8.29	8.46	8.11	14.33	19.85	20.0	Pass

maxEirp = 10 dBm/MHz

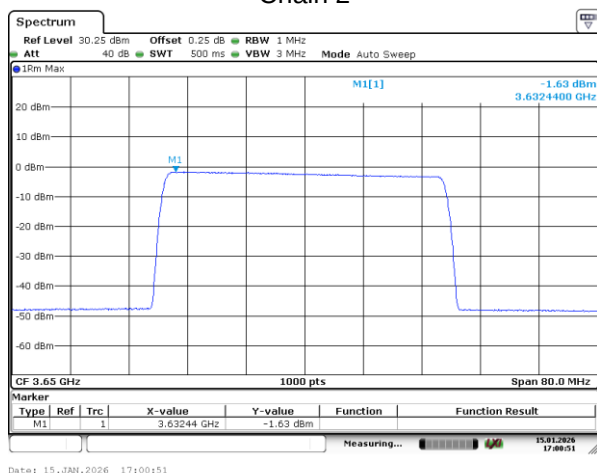
Chain 0



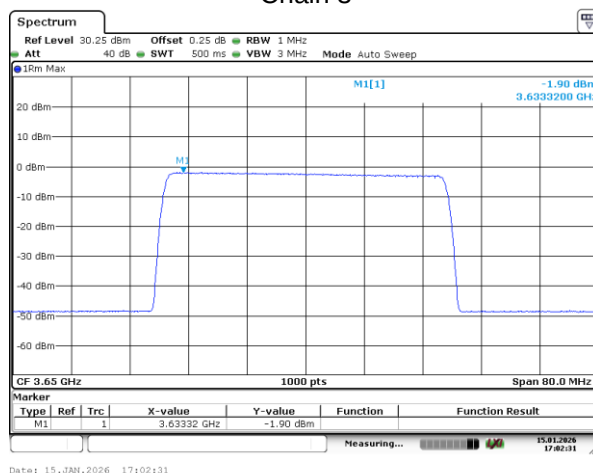
Chain 1



Chain 2

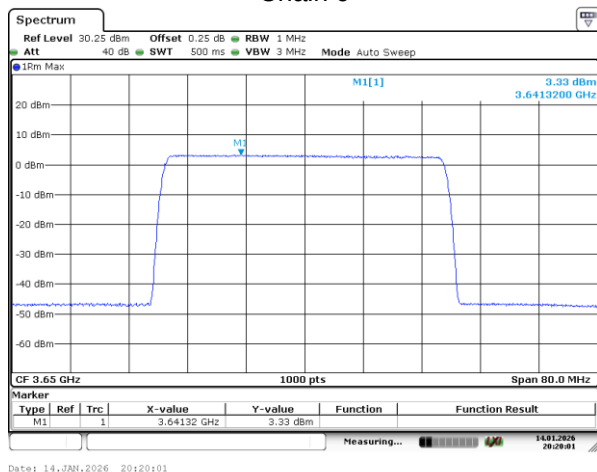


Chain 3

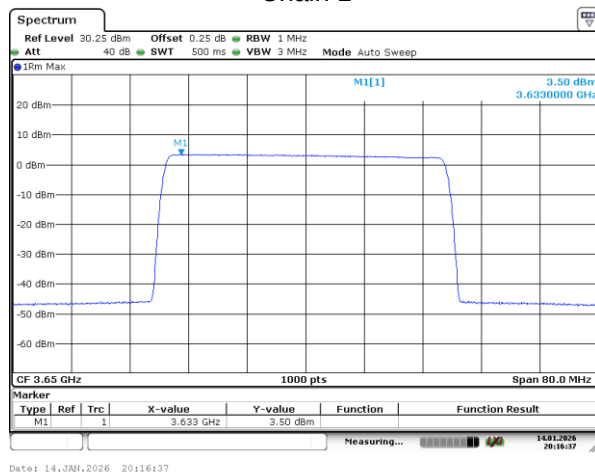


maxEirp = 15 dBm/MHz

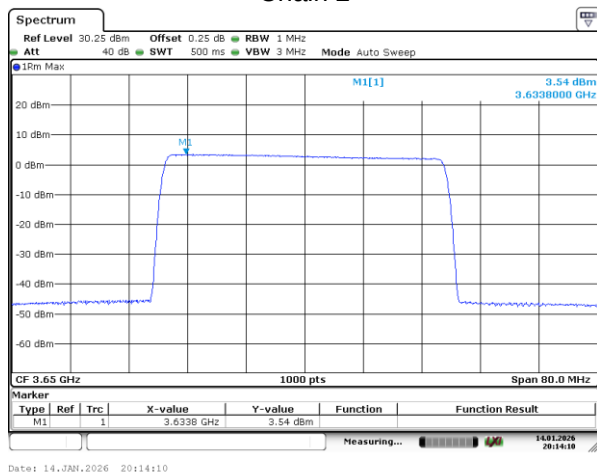
Chain 0



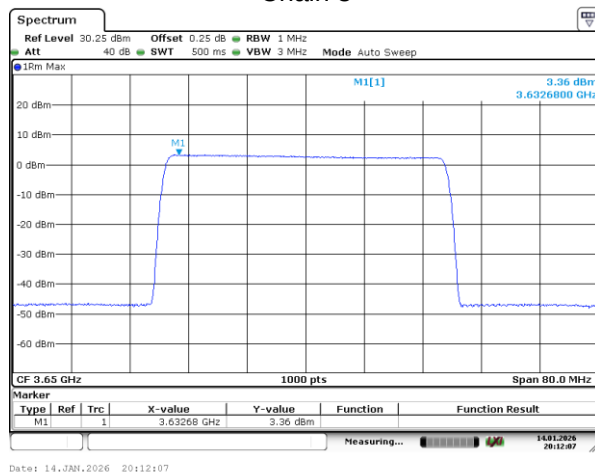
Chain 1



Chain 2

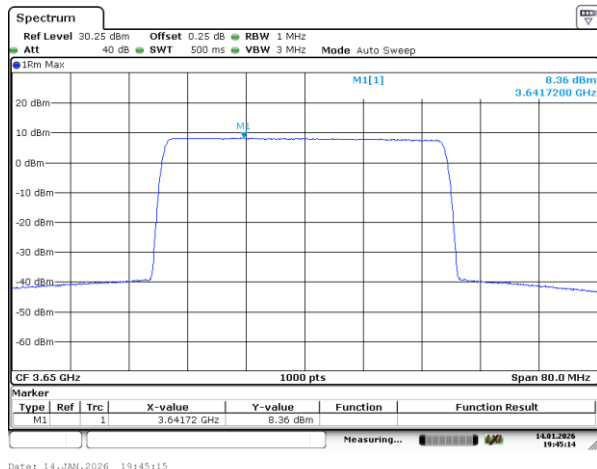


Chain 3

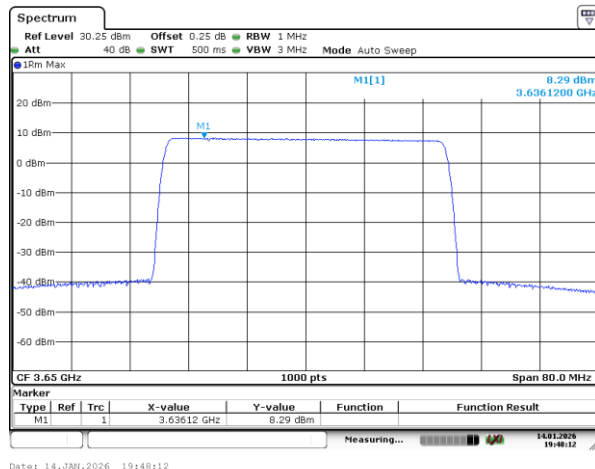


maxEirp = 20 dBm/MHz

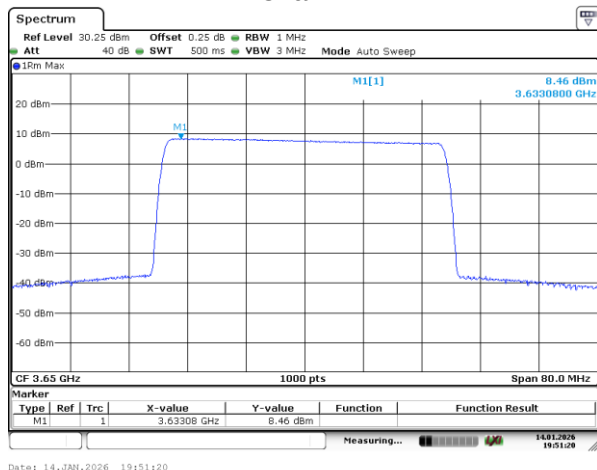
Chain 0



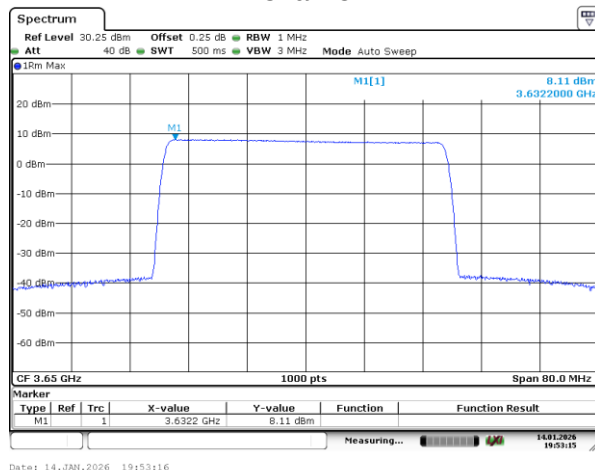
Chain 1



Chain 2



Chain 3

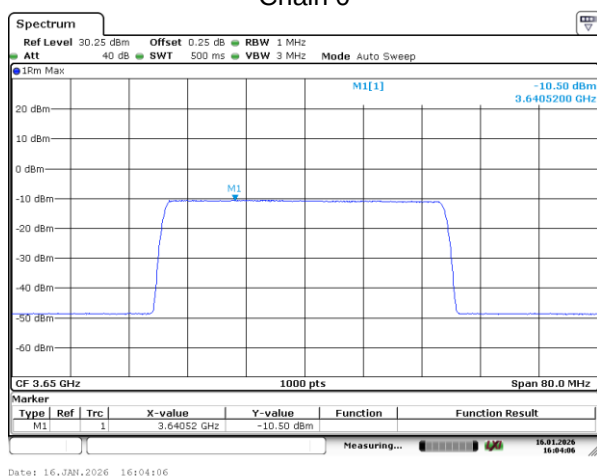


For External

Channel	Freq. (MHz)	40MHz						Limit	Pass / Fail
		Conducted Power Density (dBm/MHz)				Gain(dBi)	13.72		
		Chain 0	Chain 1	Chain 2	Chain 3	Total	EIRP (dBm/MHz)	maxEirp(dBm)=Pi	
Middle	3650	-10.50	-10.05	-10.12	-10.33	-4.23	9.49	10.0	Pass
Middle	3650	-5.26	-5.24	-5.22	-5.45	0.73	14.45	15.0	Pass
Middle	3650	-0.20	0.22	0.49	0.32	6.24	19.96	20.0	Pass

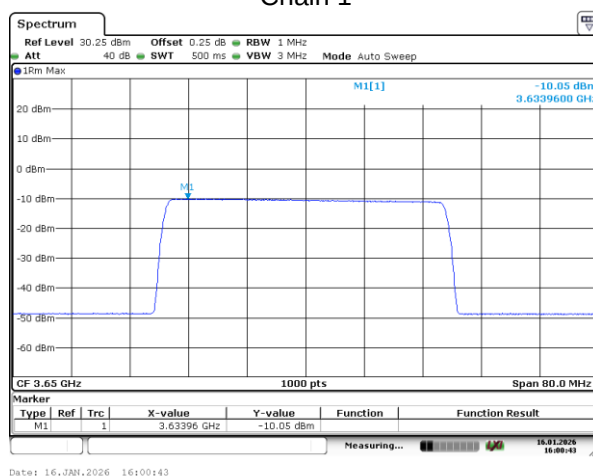
maxEirp = 10 dBm/MHz

Chain 0



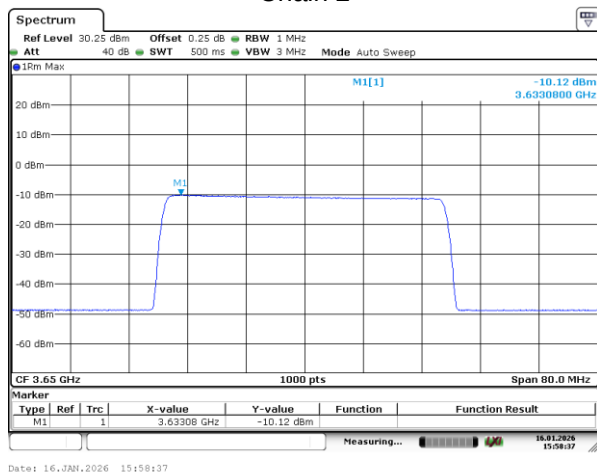
Date: 16.JAN.2026 16:04:06

Chain 1



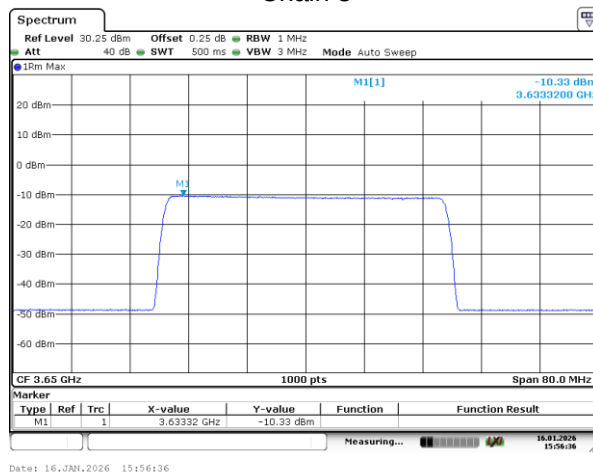
Date: 16.JAN.2026 16:00:43

Chain 2



Date: 16.JAN.2026 15:58:37

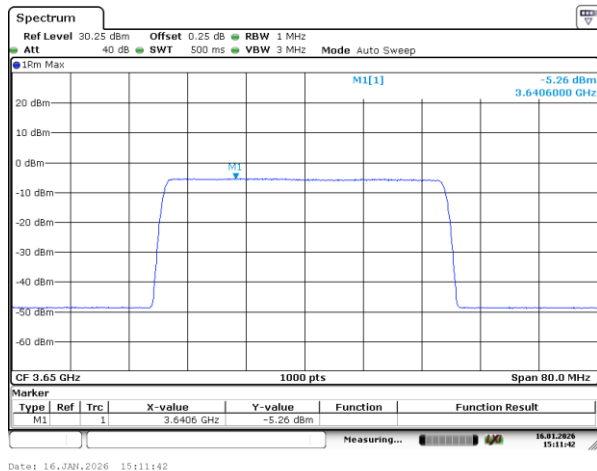
Chain 3



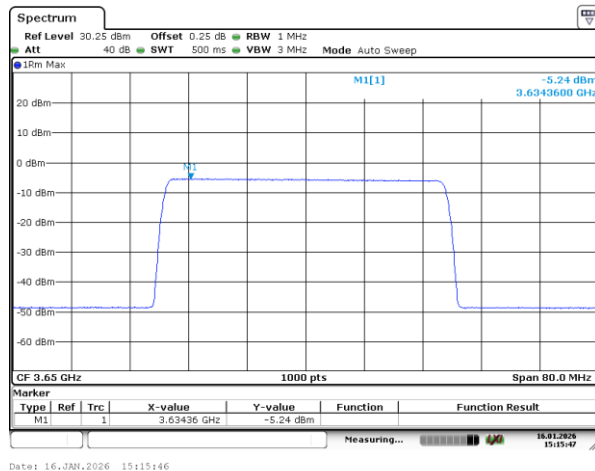
Date: 16.JAN.2026 15:56:36

maxEirp = 15 dBm/MHz

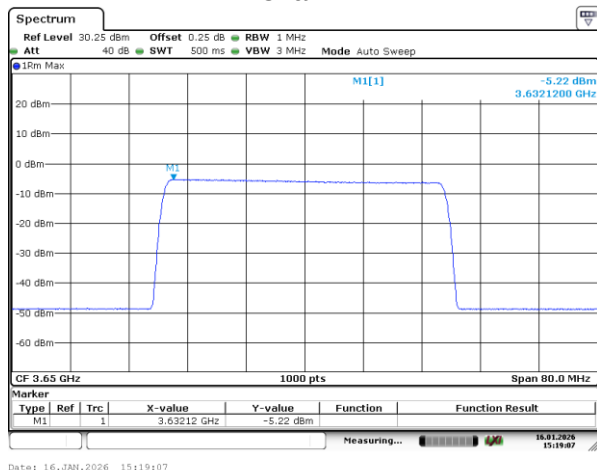
Chain 0



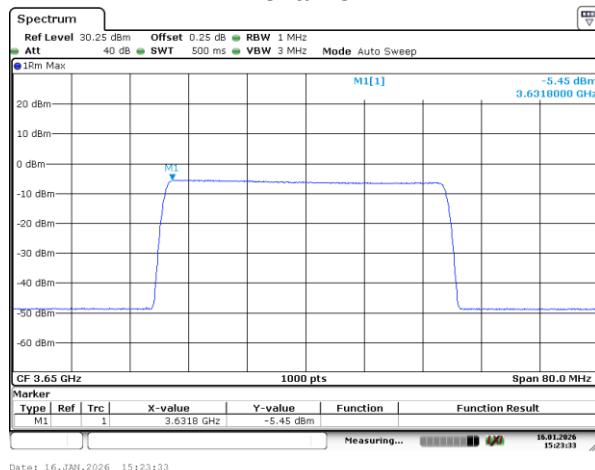
Chain 1



Chain 2

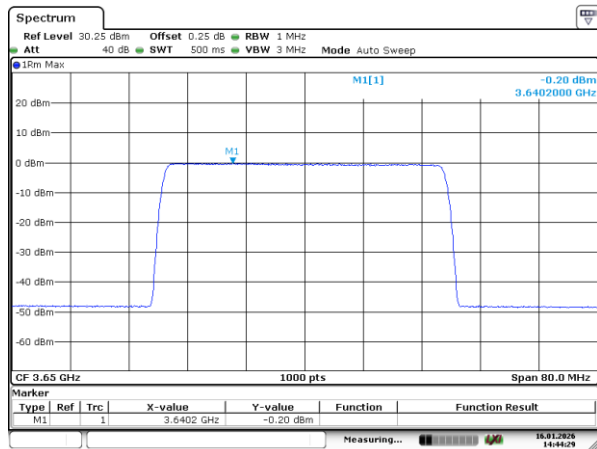


Chain 3

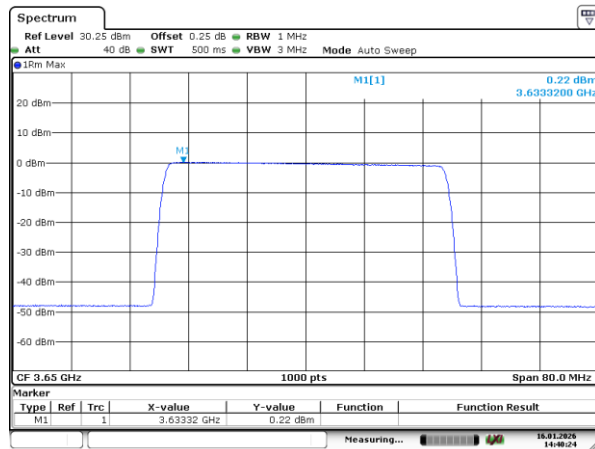


maxEirp = 20 dBm/MHz

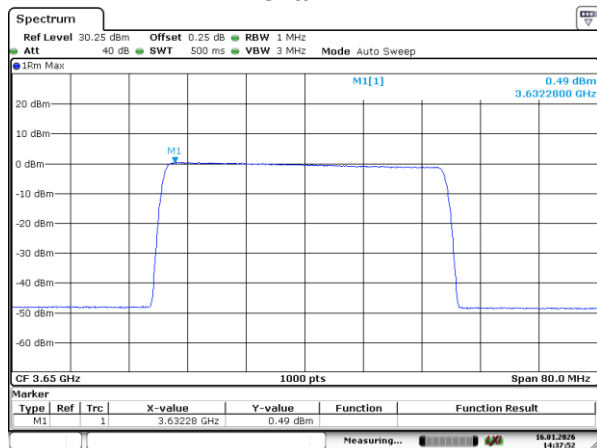
Chain 0



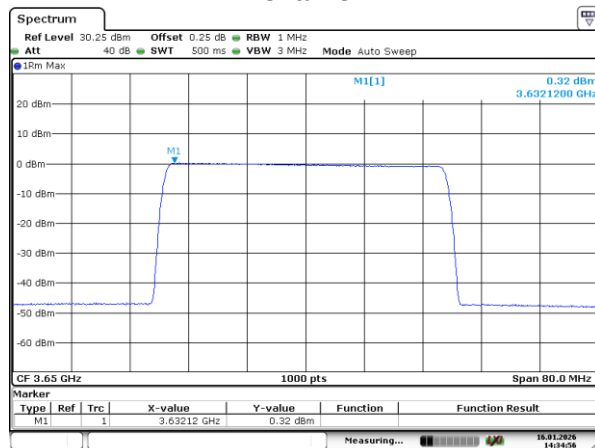
Chain 1



Chain 2



Chain 3



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

6 WinnForum Logs

Please refer to the attached file (Test Logs).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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