

CBSD Test Report

Report No.: RFBEIH-WTW-P21050758-1

FCC ID: P27-SCE4255W

Test Model: SCE4255W

Received Date: Aug. 19, 2021

Test Date: Sep. 15 ~ Dec. 21, 2021

Issued Date: Jan. 05, 2022

Applicant: Sercomm Corp.

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**FCC Registration/
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P21050758-1	Original release	Jan. 05, 2022

1 Certificate of Conformity

Product: Englewood

Brand: Sercomm

Test Model: SCE4255W

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Sep. 15, 2021 ~ Dec. 21, 2021

Standards: WINNF-TS-0122 V1.0.2
CBRSA-TS-9001 V1.1.0

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 : Celine Chou , **Date:** Jan. 05, 2022
Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** Jan. 05, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

WINNF-TS-0122			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT(CBSD, DP/CBSD)	27	27	100
PT(CBSD, DP/CBSD)	1	1	100
Total	28	28	100

Note:

1. Functional Test (FT): Test to validate the conformance of the Protocols and functionalities implemented in the CBS/D/DP UUT to the requirements developed by WinnForum and supporting FCC/DoD requirements.
2. Field/Performance Test (PT): Test to check the capability of the CBS/D/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	WINNF.FT.C.REG.3 WINNF.FT.C.REG.20	Yes
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	Pass
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	Pass

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	Englewood
Brand	Sercomm
Test Model	SCE4255W
Hardware Version	1.0
Firmware Version	TEST3721@211215
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from adapter or 55Vdc from PoE
Antenna Type	Refer to note as below
Antenna Connector	Refer to note as below
Accessory Device	Adapter, GPS Antenna
Data Cable Supplied	Shielded LAN cable (1.5m)

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of BV CPS report no.: RFBEIH-WTW-P21090875. Difference compared with the original report is adding external antenna. All test data had been re-tested.
2. The EUT consumes power from the following adapter.

Brand	APD
Model	WA-30P12FU
Input Power	100-240Vac, 50-60Hz, 0.9A
Output Power	12Vdc, 2.5A
Power Line	2m cable without core attached on adapter

3. The following antennas were provided to the EUT. (additional as shaded area)

TX Antenna		Antenna Type	Antenna Connector	Antenna Gain (dBi)	Frequency Range
Internal	Ant 1	PIFA	I-PEX	5.30	3.5~3.7GHz
	Ant 2			5.26	
	Ant 3			5.48	
	Ant 4			5.68	
External	Ant 1	Dipole	N-Type	5.0	3.5~3.7GHz
	Ant 2			5.0	
	Ant 3			5.0	
	Ant 4			5.0	

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
WINNF-TS-0122	27deg. C, 68%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

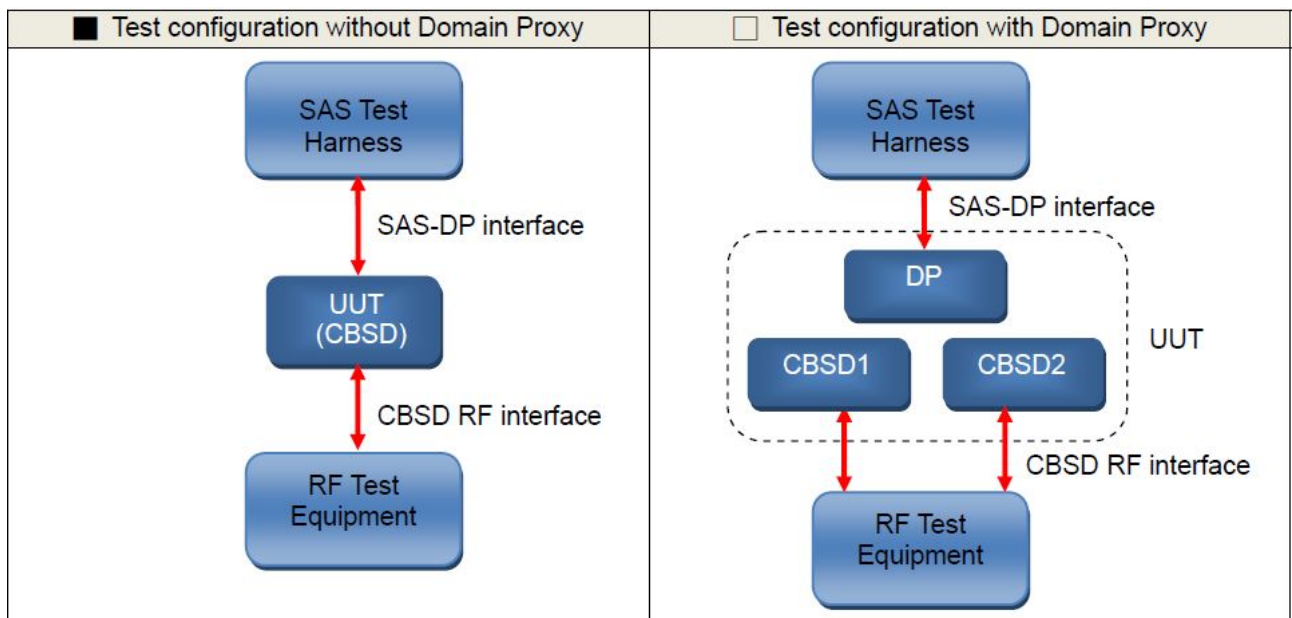
Test Harness Version	V1.0.0.3
Operating System	Microsoft Windows 10
TLS Version	1.2
Python	2.7.13

4.4 Test Equipment

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
ROHDE & SCHWARZ Signal Analyzer	FSV	E2-010642	May. 28, 2021	May. 27, 2022
Temperature & Humidity Chamber TERCHY	5098.00	E2-010117	Jan. 07, 2021	Jan. 06, 2022
Laptop Lenovo	L470	PF-11H9B8	NA	NA

Note: 1. The test was performed in InfoSec Test Room.
 2. The calibration interval of the above test instruments is 12 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness: <ul style="list-style-type: none"> ● The required <i>userId</i>, <i>fcld</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	<ul style="list-style-type: none"> ● SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - <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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.1.2 WINNF.FT.C.REG.3

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

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends Registration request to SAS Test Harness: all required and REG-Conditional parameter included (userId, fcld, cbsdSerialNumber, cbsdCategory, airInterface, installationParam, measCapability) for a Category A CBSD. <ul style="list-style-type: none"> ● The required userId, fcld and cbsdSerialNumber and REG-Conditional cbsdCategory, airInterface, installationParam, and measCapability registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. ● Any optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges. 	■ Pass	□ Fail
3	<ul style="list-style-type: none"> ● SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - <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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.1.3 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.4 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <i>cbstdId</i> - <i>responseCode</i> = R = 200 	--	--
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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.5 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <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> =0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.1.6 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <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> =0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.7 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <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> =0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.1.8 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT is in the Unregistered state 	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: <ul style="list-style-type: none"> - SAS response does not include <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> =0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.1.9 WINNF.FT.C.REG.20

The test case ID is provided as a means to ensure that evidence is provided showing compliance to this requirement.

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: <ul style="list-style-type: none"> ● 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 <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId = C</i> 	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"> ● <i>cbsdId=C</i> ● <i>responseCode = R = 401</i> 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode=0</i>) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

4.6.3 CBSD Heart Beat Process

4.6.3.1 WINNF.FT.C.HBT.1

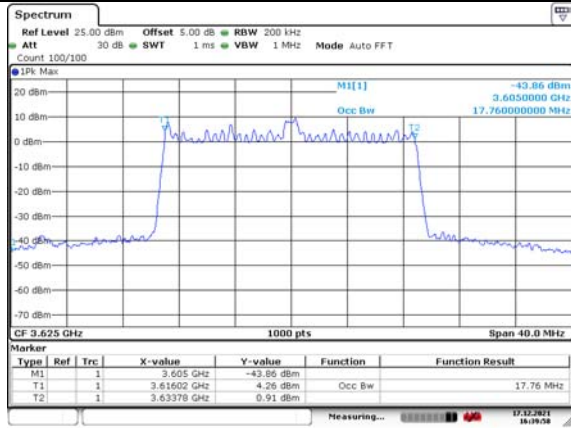
■ Test Case ID : WINNF.FT.C.HBT.1 □ NA

#	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 ● availableChannel is an array of availableChannel objects ● <i>responseCode</i> = 0	--	--
5	UUT sends Grant Request message. Validate: ● <i>cbsdId</i> = 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	■ 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 ● grantExpireTime = 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

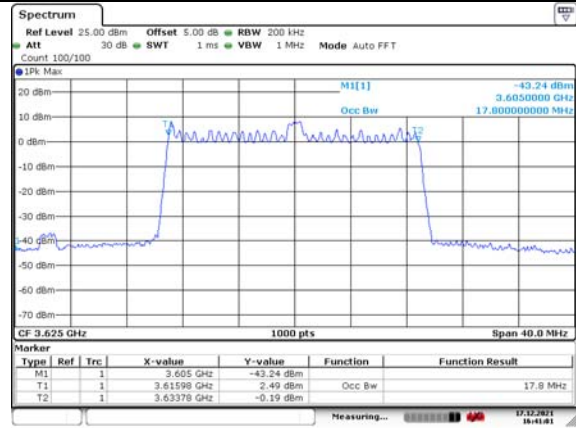
- UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)			
		F = 20MHz			
		Chain (0)	Chain (1)	Chain (2)	Chain (3)
Middle	3625	17.76	17.80	17.76	17.76

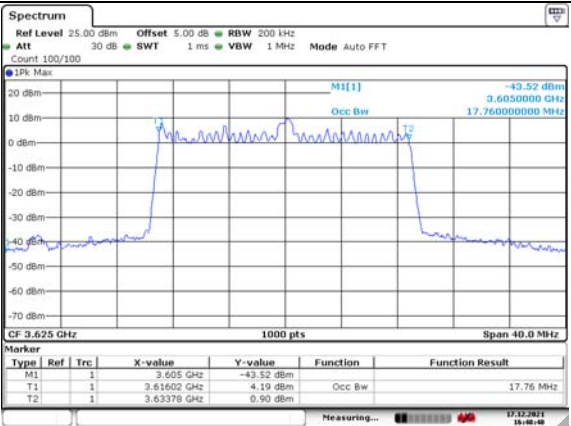
Spectrum Plot
Chain (0 ~ 3)



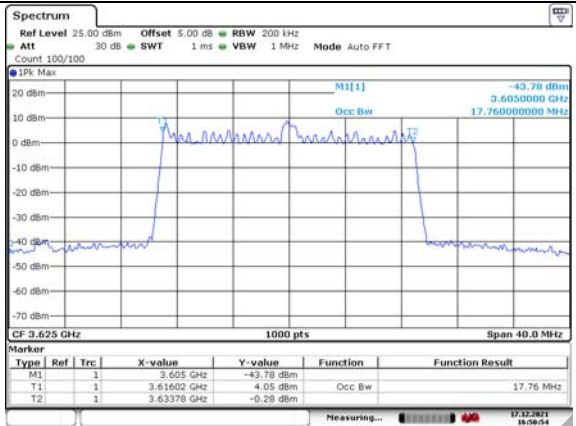
Date: 17.DEC.2021 16:39:58



Date: 17.DEC.2021 16:41:01



Date: 17.DEC.2021 16:48:48



Date: 17.DEC.2021 16:50:54

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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● <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: <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● <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: <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT shall stop transmission within (T+60) seconds of completion of step 3 	■ 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: <ul style="list-style-type: none"> ○ <i>cbsdId</i> = C ○ <i>grantId</i> = G Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> ● UUT shall stop transmission within (T+60) seconds of completion of step 3 	■ 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● <i>cbsdlId</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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● 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 <ul style="list-style-type: none"> ● <i>fcclId</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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● <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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with <i>cbsdId=C</i> ● UUT has received a valid grant with <i>grantId = G</i> ● 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: <ul style="list-style-type: none"> ● <i>cbsdId = C</i> ● <i>grantId = G</i> 	■ Pass	□ Fail
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: <ul style="list-style-type: none"> - <i>cbsdId = C</i> - <i>grantId = G</i> - <i>responseCode = 0</i> 	--	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode=0</i>) to further request messages from the UUT	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> ● UUT shall 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: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with <i>cbsdId=C</i> ● UUT has received a valid grant with <i>grantId = G</i> ● 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=0</i>	--	--
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdId = C</i> .	■ Pass	□ Fail
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: <ul style="list-style-type: none"> ● <i>cbsdId = C</i> ● <i>responseCode = 0</i> 	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode=0</i>) 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: <ul style="list-style-type: none"> ● UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: <ul style="list-style-type: none"> A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message 	■ Pass	□ Fail

4.6.7 CBSD Security Validation

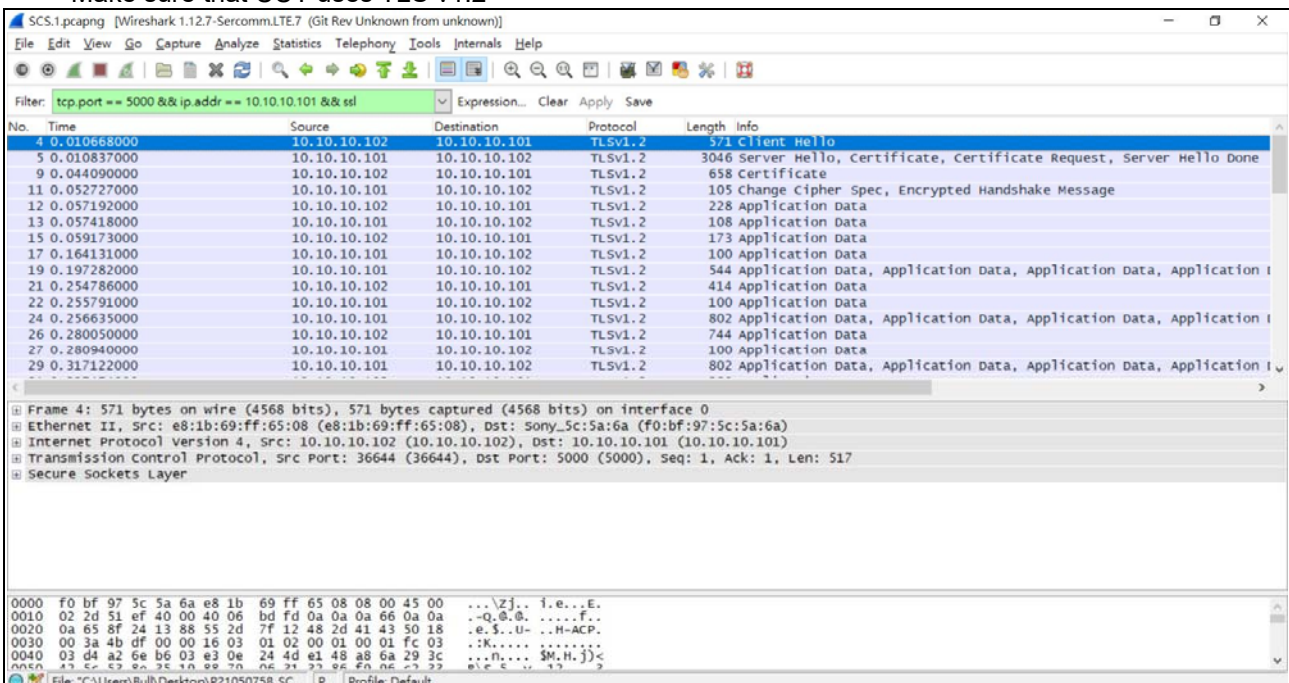
4.6.7.1 WINNF.FT.C.SCS.1

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

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> UUT shall start CBSD-SAS communication with the security procedure The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate. Configure the SAS Test Harness to accept the security procedure and establish the connection 	■ Pass	□ Fail
2	<ul style="list-style-type: none"> Make sure that Mutual authentication happens between UUT and the SAS Test Harness. Make sure that UUT uses TLS v1.2 Make sure that cipher suites from one of the following is selected, <ul style="list-style-type: none"> 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	<p>A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability.</p> <ul style="list-style-type: none"> UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with <i>responseCode</i> = 0 and <i>cbsdId</i>. 	■ Pass	□ Fail
4	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"> UUT shall not transmit RF 	■ Pass	□ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The screenshot shows a Wireshark capture of a TLS handshake. The filter is set to 'tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl'. The packet list shows the following frames:

- 4: 0.010668000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 571 Client Hello
- 5: 0.010837000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 3046 Server Hello, Certificate, Certificate Request, Server Hello Done
- 9: 0.044090000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 658 Certificate
- 11: 0.052727000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 105 Change Cipher Spec, Encrypted Handshake Message
- 12: 0.057192000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 228 Application Data
- 13: 0.057418000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 108 Application Data
- 15: 0.059173000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 173 Application Data
- 17: 0.164131000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 100 Application Data
- 19: 0.197282000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 544 Application Data, Application Data, Application data, Application data
- 21: 0.254786000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 414 Application Data
- 22: 0.255791000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 100 Application Data
- 24: 0.256635000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 802 Application Data, Application Data, Application data, Application data
- 26: 0.280050000: 10.10.10.102 → 10.10.10.101: TLSv1.2: 744 Application Data
- 27: 0.280940000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 100 Application Data
- 29: 0.317122000: 10.10.10.101 → 10.10.10.102: TLSv1.2: 802 Application Data, Application Data, Application data, Application data

The packet details for Frame 4 (Client Hello) are expanded, showing:

- Ethernet II, Src: e8:1b:69:ff:65:08 (e8:1b:69:ff:65:08), Dst: sony_5c:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.102 (10.10.10.102), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 36644 (36644), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 517
- Secure Sockets Layer

The packet bytes pane shows the raw data of the Client Hello frame, including the TLS record structure.

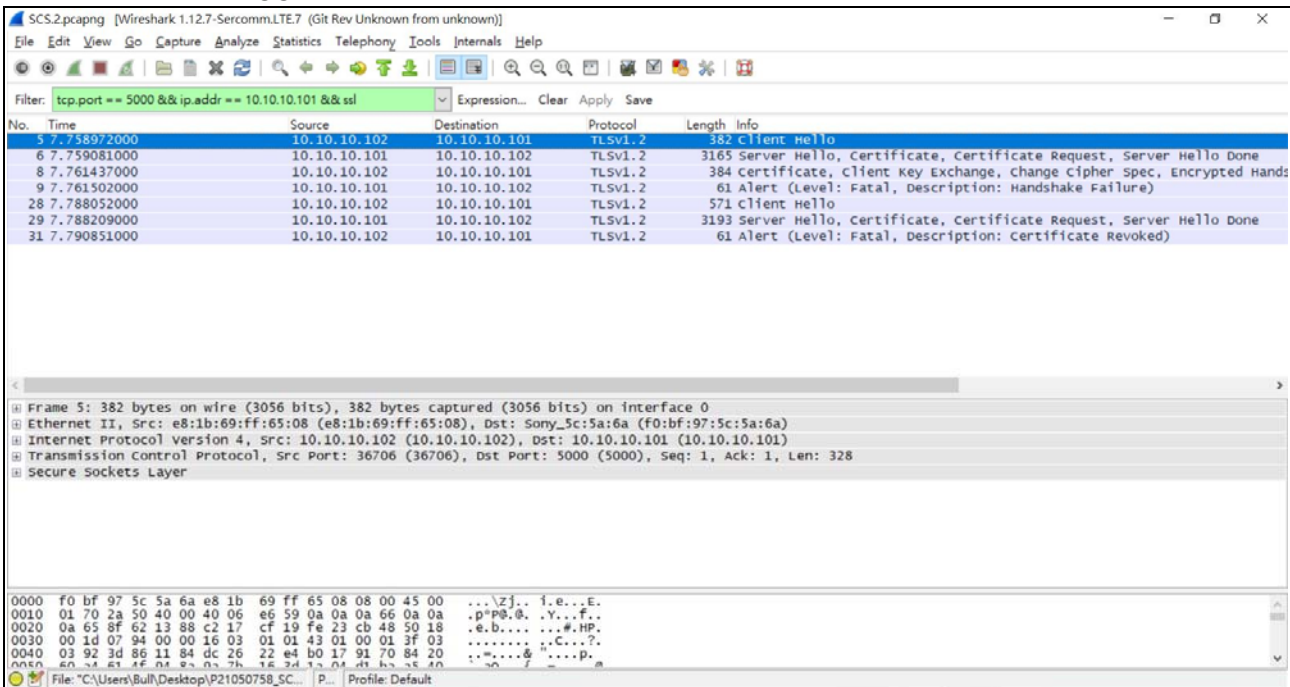
4.6.7.2 WINNF.FT.C.SCS.2

■ 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	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> ● Make sure that UUT uses TLS v1.2 for security establishment. ● Make sure UUT selects the correct cipher suite. ● UUT shall use CRL or OCSP to verify the validity of the server certificate. ● Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	■ Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	■ Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.2.pcapng [Wireshark 1.12.7-Sercomm.LTE7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
5	7.758972000	10.10.10.102	10.10.10.101	TLSv1.2	382	Client Hello
6	7.759081000	10.10.10.101	10.10.10.102	TLSv1.2	3165	Server Hello, Certificate, Certificate Request, Server Hello Done
8	7.761437000	10.10.10.102	10.10.10.101	TLSv1.2	384	certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
9	7.761502000	10.10.10.101	10.10.10.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
28	7.788052000	10.10.10.102	10.10.10.101	TLSv1.2	571	Client Hello
29	7.788209000	10.10.10.101	10.10.10.102	TLSv1.2	3193	Server Hello, Certificate, Certificate Request, Server Hello Done
31	7.790851000	10.10.10.102	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)

Frame 5: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

- Ethernet II, Src: e8:1b:69:ff:65:08 (e8:1b:69:ff:65:08), Dst: Sony_Sc:5a:16a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.102 (10.10.10.102), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 36706 (36706), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328
- Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a e8 1b 69 ff 65 08 08 00 45 00  ...Zj..i.e...E.
0010 01 70 2a 50 40 00 40 06 e6 59 0a 0a 0a 56 0a 0a  .p"PB.@.Y..f..
0020 0a 65 8f 62 13 88 c2 17 cf 19 fe 23 cb 48 50 18  .e.b....#..HP.
0030 00 1d 07 94 00 00 16 03 01 01 43 01 00 01 3f 03  .....C...?.
0040 03 92 3d 86 11 84 dc 26 22 e4 b0 17 91 70 84 20  ..:...&.....p.
0050 60 34 e1 4f 04 8c 05 7b 18 2d 15 04 03 8c 58 10  ..4..f..b..-d..4..3..h..8..
  
```

File: "C:\Users\Bull\Desktop\P21050758_SC..." Profile: Default

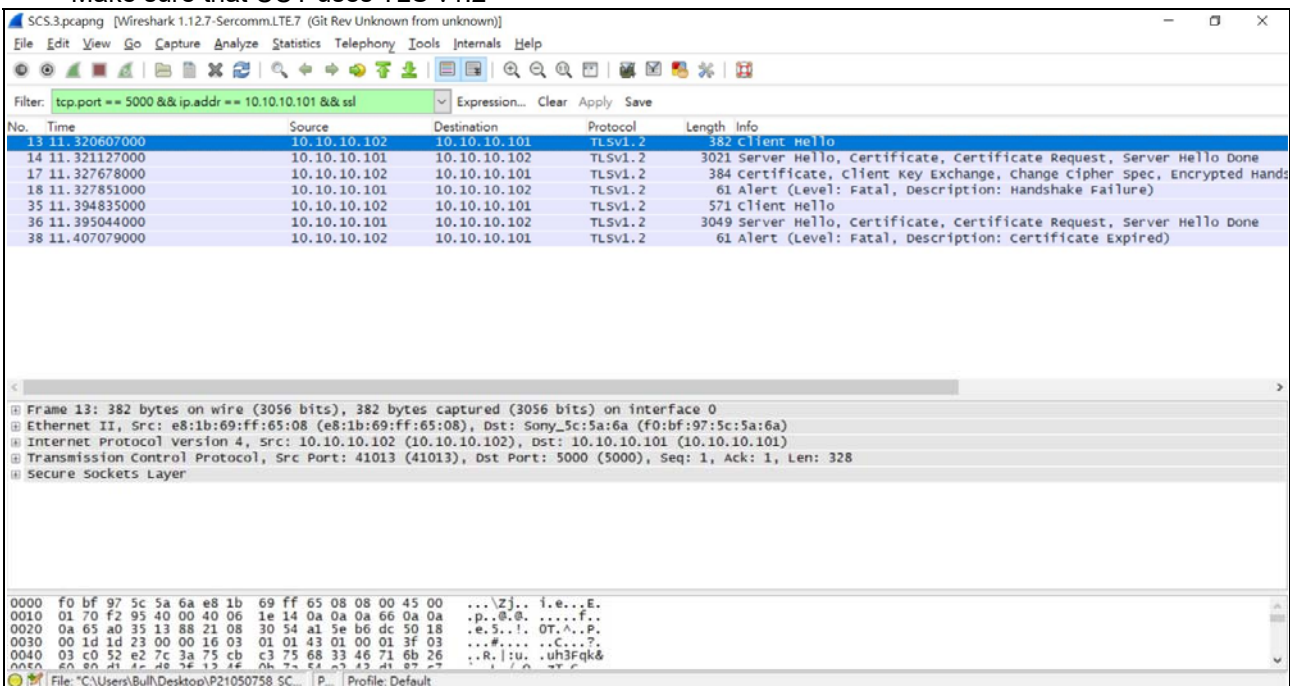
4.6.7.3 WINNF.FT.C.SCS.3

■ 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	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> ● Make sure that UUT uses TLS v1.2 for security establishment. ● Make sure UUT selects the correct cipher suite. ● UUT shall use CRL or OCSP to verify the validity of the server certificate. ● Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	■ Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	■ Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.3.pcapng [Wireshark 1.12.7-Sercomm.LTE7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
13	11.320607000	10.10.10.102	10.10.10.101	TLSv1.2	382	client Hello
14	11.321127000	10.10.10.101	10.10.10.102	TLSv1.2	3021	Server Hello, Certificate, Certificate Request, Server Hello Done
17	11.327678000	10.10.10.102	10.10.10.101	TLSv1.2	384	certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
18	11.327851000	10.10.10.101	10.10.10.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
35	11.394835000	10.10.10.102	10.10.10.101	TLSv1.2	571	client Hello
36	11.395044000	10.10.10.101	10.10.10.102	TLSv1.2	3049	Server Hello, Certificate, Certificate Request, Server Hello Done
38	11.407079000	10.10.10.102	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Expired)

Frame 13: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

- Ethernet II, Src: e8:1b:69:ff:65:08 (e8:1b:69:ff:65:08), Dst: sony_5c:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.102 (10.10.10.102), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 41013 (41013), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328
- Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a e8 1b 69 ff 65 08 08 00 45 00  ...Zj..f.e...E.
0010 01 70 f2 95 40 00 40 06 1e 14 0a 0a 0a 0a 0a  ..p..@. ....f..
0020 0a 65 a0 35 13 88 21 08 30 54 a1 5e b6 dc 50 18  ..e.5..l.0T.A.P.
0030 00 1d 1d 23 00 00 16 03 01 01 43 01 00 01 3f 03  ...#. ...C...?.
0040 03 c0 52 e2 7c 3a 75 cb c3 75 68 33 46 71 6b 26  ..R.|:u..uh3Fqk&
0050 60 80 41 1c 46 7f 13 1f 08 7c 51 a3 43 41 87 27  ..`..@. .f..8. .3.41.87.7
  
```

File: C:\Users\Bull\Desktop\P21050758_SC... | Profile: Default

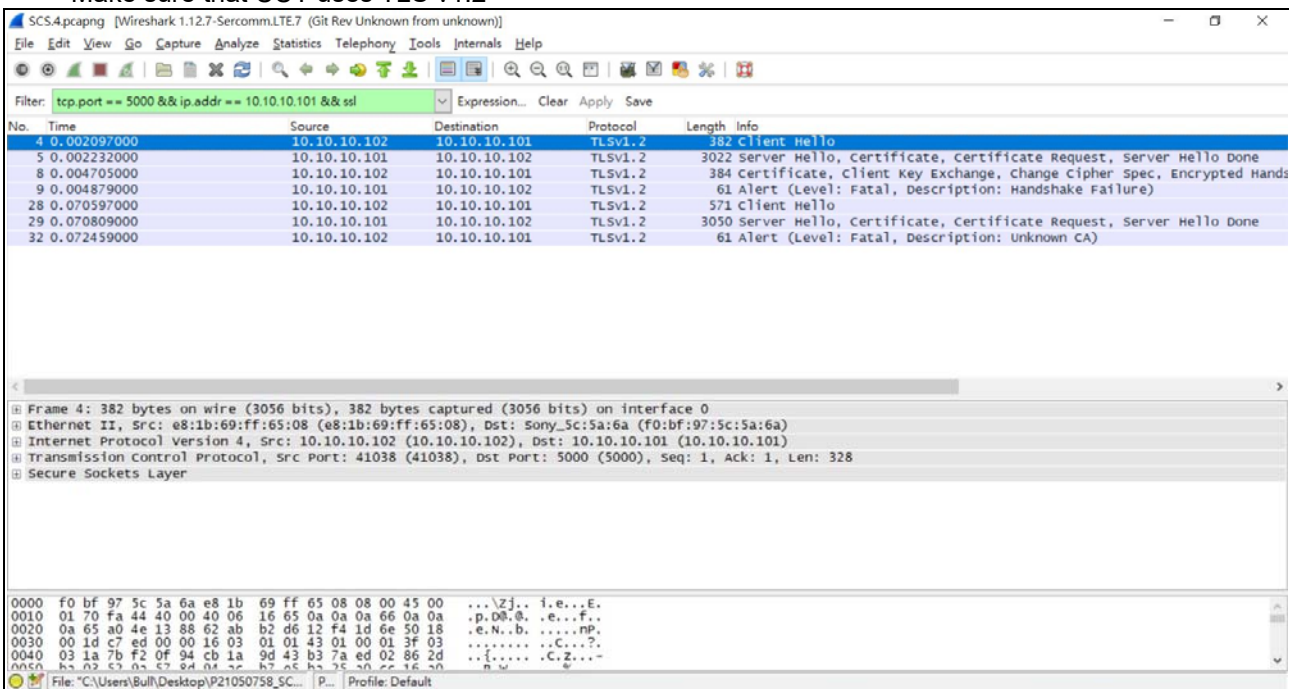
4.6.7.4 WINNF.FT.C.SCS.4

■ 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	<ul style="list-style-type: none"> ● Make sure that UUT uses TLS v1.2 for security establishment. ● Make sure UUT selects the correct cipher suite. ● UUT shall use CRL or OCSP to verify the validity of the server certificate ● Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	■ 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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	□ Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.4.pcapng [Wireshark 1.12.7-Sercomm.LTE7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
4	0.002097000	10.10.10.102	10.10.10.101	TLSv1.2	382	Client Hello
5	0.002232000	10.10.10.101	10.10.10.102	TLSv1.2	3022	Server Hello, Certificate, Certificate Request, Server Hello Done
8	0.004705000	10.10.10.102	10.10.10.101	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
9	0.004879000	10.10.10.101	10.10.10.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
28	0.070597000	10.10.10.102	10.10.10.101	TLSv1.2	571	Client Hello
29	0.070809000	10.10.10.101	10.10.10.102	TLSv1.2	3050	Server Hello, Certificate, Certificate Request, Server Hello Done
32	0.072459000	10.10.10.102	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

Frame 4: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

- Ethernet II, Src: e8:1b:69:ff:65:08 (e8:1b:69:ff:65:08), Dst: Sony_Sc:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.102 (10.10.10.102), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 41038 (41038), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328
- Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a e8 1b 69 ff 65 08 08 00 45 00  ...Zj..i.e...E.
0010 01 70 fa 44 40 00 40 06 16 65 0a 0a 0a 66 0a 0a  .p.DB.Q..e...f..
0020 0a 65 a0 4e 13 88 62 ab b2 d6 12 f4 1d 6e 50 18  .e.N..b....np.
0030 00 1d c7 ed 00 00 16 03 01 01 43 01 00 01 3f 03  .....C...?.
0040 03 1a 7b f2 0f 94 cb 1a 9d 43 b3 7a ed 02 86 2d  ..f.....C.Z...-
0050 8a 02 c3 0a c7 8d 04 7c b7 05 b3 0c 70 2c 16 20  n.w
  
```

File: "C:\Users\Bull\Desktop\P21050758_SC..." Profile: Default

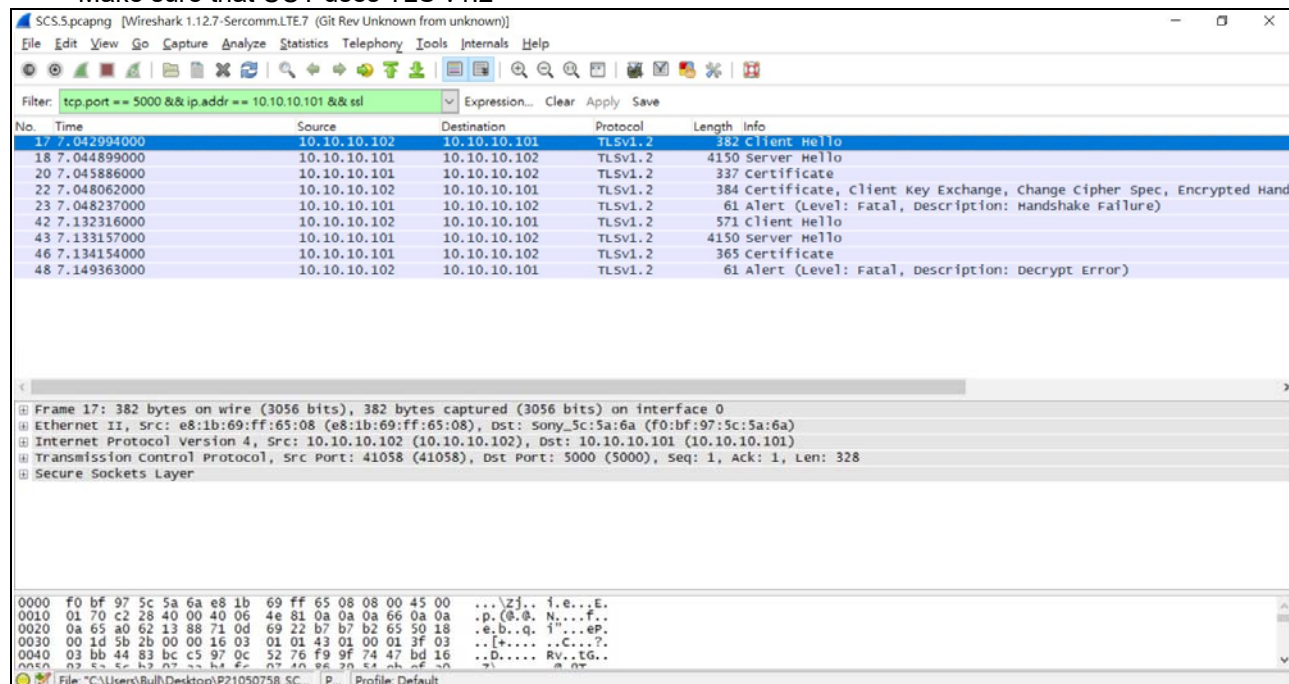
4.6.7.5 WINNF.FT.C.SCS.5

■ 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	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> ● Make sure that UUT uses TLS v1.2 for security establishment. ● Make sure UUT selects the correct cipher suite. ● UUT shall use CRL or OCSP to verify the validity of the server certificate ● Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	■ Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	■ Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	■ Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.5.pcapng [Wireshark 1.12.7-Sercomm.LTE7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
17	7.042994000	10.10.10.102	10.10.10.101	TLSv1.2	382	Client Hello
18	7.044899000	10.10.10.101	10.10.10.102	TLSv1.2	4150	Server Hello
20	7.045886000	10.10.10.101	10.10.10.102	TLSv1.2	337	Certificate
22	7.048062000	10.10.10.102	10.10.10.101	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
23	7.048237000	10.10.10.101	10.10.10.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
42	7.132316000	10.10.10.102	10.10.10.101	TLSv1.2	571	Client Hello
43	7.133157000	10.10.10.101	10.10.10.102	TLSv1.2	4150	Server Hello
46	7.134154000	10.10.10.101	10.10.10.102	TLSv1.2	365	Certificate
48	7.149363000	10.10.10.102	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: decrypt error)

Frame 17: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

- Ethernet II, Src: e8:1b:69:ff:65:08 (e8:1b:69:ff:65:08), Dst: Sony_3c:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.102 (10.10.10.102), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 41058 (41058), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328
- Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a e8 1b 69 ff 65 08 08 00 45 00  ...Z].. i.e...E.
0010 01 70 c2 28 40 00 40 06 4e 81 0a 0a 0a 66 0a 0a  .p.(.0. N...f..
0020 0a 65 a0 62 13 88 71 0d 69 22 b7 b7 b2 65 50 18  .e.b...q. i"...eP.
0030 00 1d 5b 2b 00 00 16 03 01 01 43 01 00 01 3f 03  ..[+.... ..C...?.
0040 03 bb 44 83 bc c5 97 0c 52 76 f9 9f 74 47 bd 16  ..D..... Rv..tG..

```


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	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT has registered with the SAS, with 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 <p><i>Note: in order for the UUT to request a grant with the parameters {lowFrequency, highFrequency, maxEirp}, the SAS Test Harness may need to provide appropriate guidance in the availableChannel object of the spectrumInquiry response message, and the operationParam object of the grant response message. Alternately, the UUT vendor may provide the ability to set those parameters on the UUT so that the UUT will request a grant with those parameters</i></p>	--	--
2	<p>UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows:</p> <ul style="list-style-type: none"> ● UUT sends Heartbeat Request, including: <ul style="list-style-type: none"> ○ cbsdId = C ○ grantId = G ● SAS Test Harness responds with Heartbeat Response, including: <ul style="list-style-type: none"> ○ cbsdId = C ○ grantId = G ○ transmitExpireTime = current UTC time + 200 seconds ○ responseCode = 0 	--	--
3	<p>Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.</p> <p><i>Note: it may be required for the vendor to provide a method or configuration to bring the UUT to a mode which is required by the measurement methodology. Any such mode is vendor-specific and depends upon UUT behavior and the measurement methodology.</i></p>	■ Pass	□ Fail

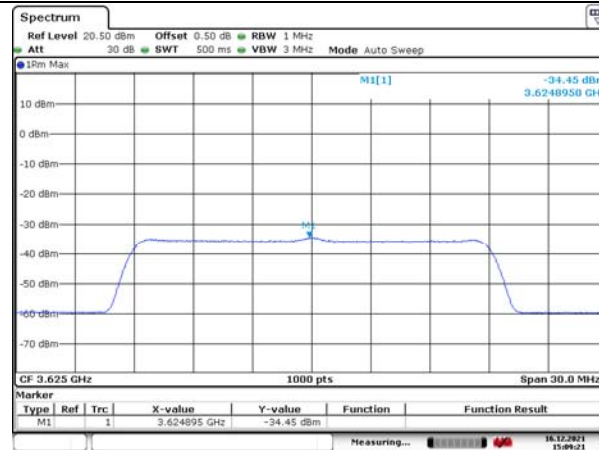
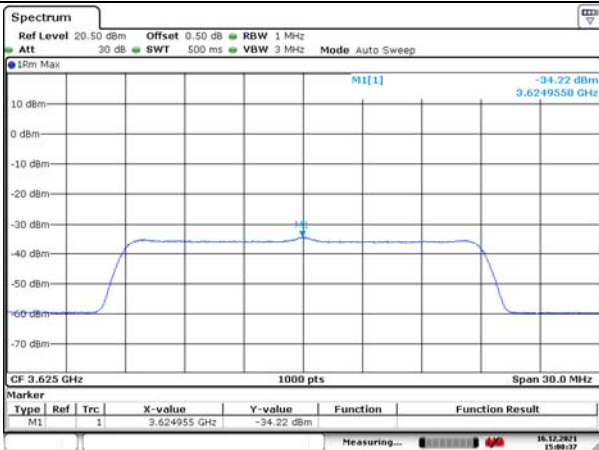
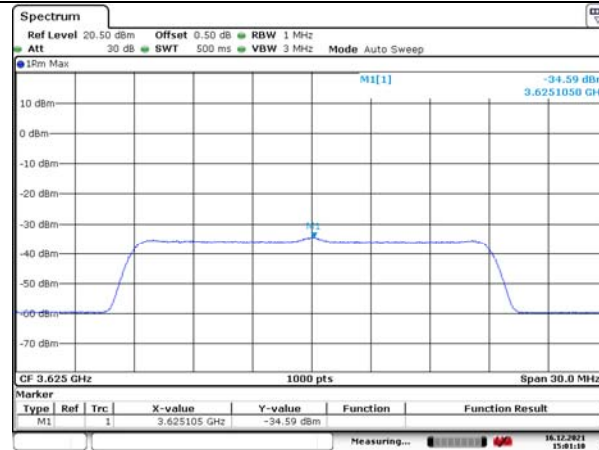
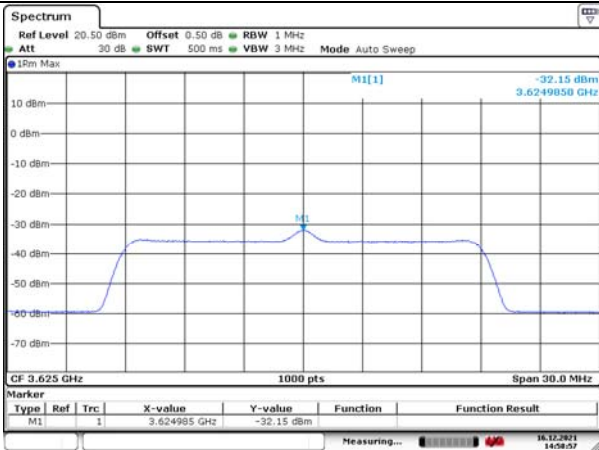
RF measurement plot for Test Case :

- 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.

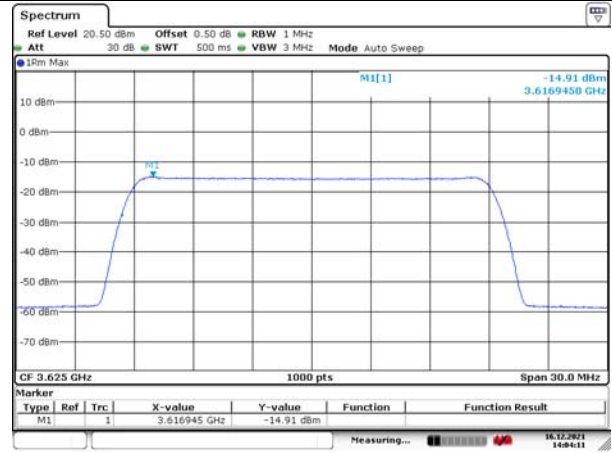
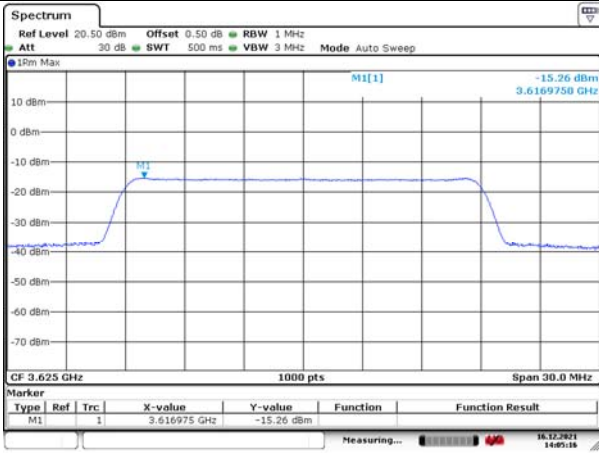
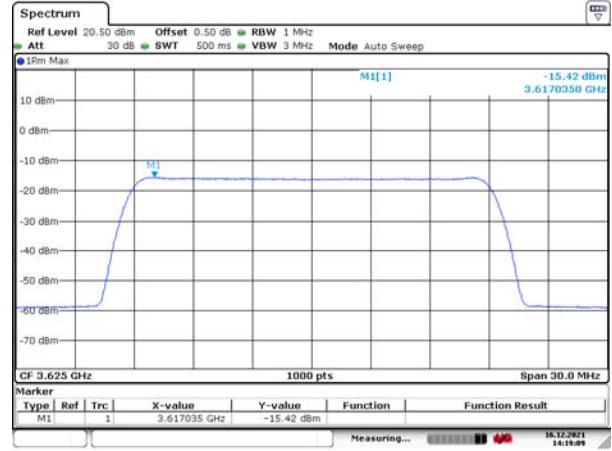
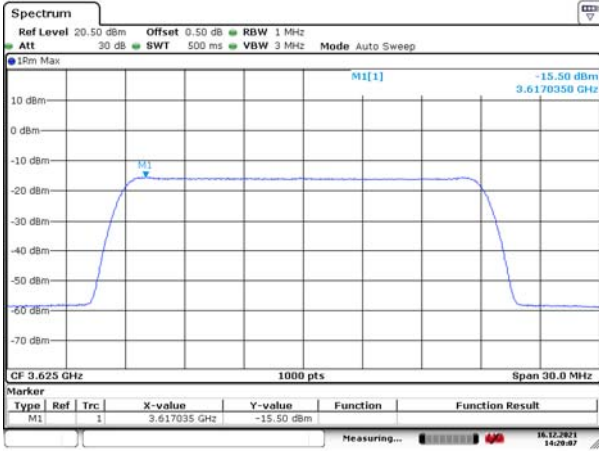
Channel	Freq. (MHz)	20MHz					Gain(dBi)	11.02	Limit	Pass / Fail
		Conducted Power Density (dBm/MHz)				Power Density				
		Chain 0	Chain 1	Chain 2	Chain 3					
Middle	3625	-32.15	-34.59	-34.22	-34.45	-27.71	-14	Pass		
Middle	3625	-15.50	-15.42	-15.26	-14.91	-9.25	3	Pass		
Middle	3625	1.29	1.02	1.79	1.63	7.46	20	Pass		

Note: Directional gain = 5dBi + 10log(4) = 11.02 dBi

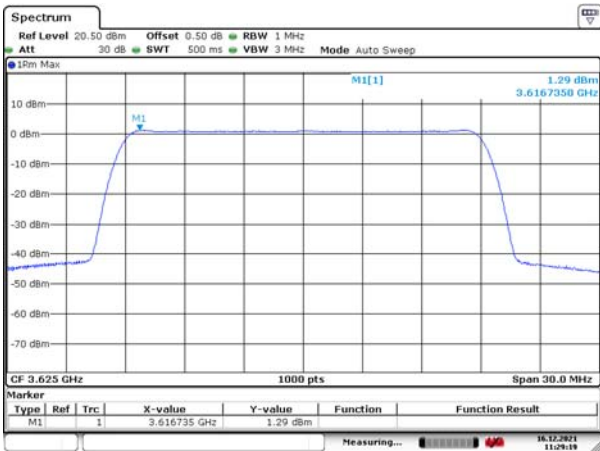
maxEirp = -14 dBm/MHz



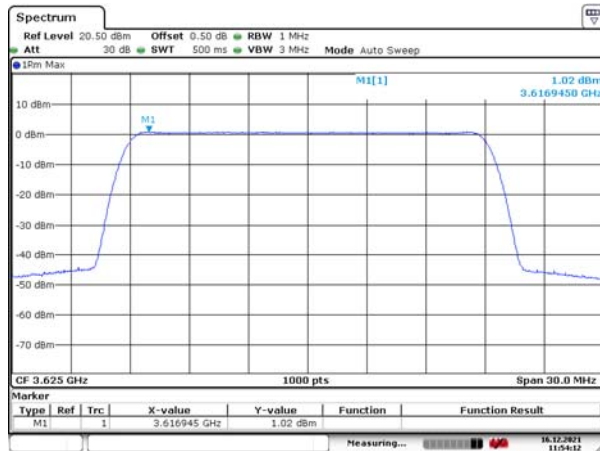
maxEirp = 3 dBm/MHz



maxEirp = 20 dBm/MHz



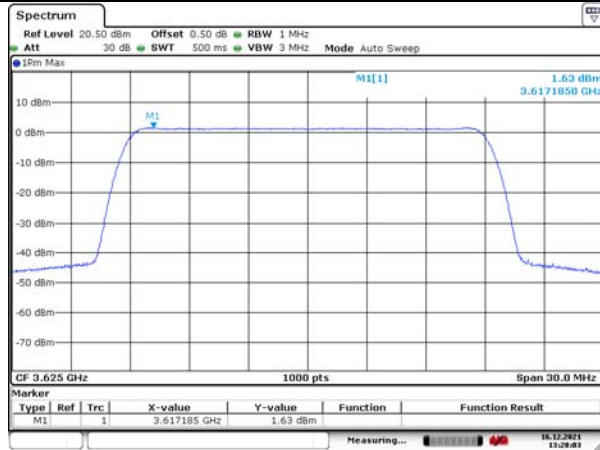
Date: 16.DEC.2021 11:29:19



Date: 16.DEC.2021 11:34:12



Date: 16.DEC.2021 13:27:04



Date: 16.DEC.2021 13:28:03

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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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---