



# WINNF-TS-0122 TEST REPORT

**FCC ID** : W9V-OAB48-GP  
**Equipment** : LTE Outdoor CPE  
**Brand Name** : GreenPacket  
**Model Name** : OA-B48  
**Applicant** : Green Packet Berhad, Taiwan  
2F, NO.23, LANE 583 RUEIGUANG RD, NEIHU  
DISTRICT, Taipei City , Taiwan  
**Manufacturer** : Green Packet Berhad, Taiwan  
2F, NO.23, LANE 583 RUEIGUANG RD, NEIHU  
DISTRICT, Taipei City , Taiwan  
**Standard** : WINNF-TS-0122 Version V1.0.1  
CBRSA-TS-9001 V1.1.0

The product was received on Dec. 02, 2020, and testing was started from Jan. 25, 2021 and completed on Jan. 26, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in WINNF-TS-0122 Version V1.0.1, CBRSA-TS-9001 V1.1.0 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
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**Photographs of EUT v01**



## History of this test report



## Summary of Test Result

### Protocol Test Summary

Report Clause	Ref Std. Clause	CBSD	DP	Required for Cert.	Test Case ID	Test Case Title	Result (PASS/FAIL)	Remark
-	6.1.4.1.1	X	-	C1	WINNF.FT.C.REG.1	Multi-Step registration	N/A	-
-	6.1.4.1.2	-	X	C1	WINNF.FT.D.REG.2	Domain Proxy Multi-Step registration	N/A	-
-	6.1.4.1.3	X	-	C2	WINNF.FT.C.REG.3	Single-Step registration for Category A CBSD	N/A	-
-	6.1.4.1.4	-	X	C2	WINNF.FT.D.REG.4	Domain Proxy Single-Step registration for Cat A CBSD	N/A	-
3.1	6.1.4.1.5	X	-	C3	WINNF.FT.C.REG.5	Single-Step registration for CBSD with CPI signed data	PASS	Note3
-	6.1.4.1.6	-	X	C3	WINNF.FT.D.REG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	N/A	-
-	6.1.4.1.7	X	X	C6	WINNF.FT.C.REG.7	Registration due to change of an installation parameter	N/A	-
3.2	6.1.4.2.1	X	-	M	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	PASS	-
-	6.1.4.2.2	-	X	M	WINNF.FT.D.REG.9	Domain Proxy Missing Required parameters (responseCode 102)	N/A	-
3.3	6.1.4.2.3	X	-	M	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	PASS	-
-	6.1.4.2.4	-	X	M	WINNF.FT.D.REG.11	Domain Proxy Pending registration (responseCode 200)	N/A	-
3.4	6.1.4.2.5	X	-	M	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	PASS	-
-	6.1.4.2.6	-	X	M	WINNF.FT.D.REG.13	Domain Proxy Invalidparameters (responseCode103)	N/A	-
3.5	6.1.4.2.7	X	-	M	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	PASS	-
-	6.1.4.2.8	-	X	M	WINNF.FT.D.REG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	N/A	-
3.6	6.1.4.2.9	X	-	M	WINNF.FT.C.REG.16	UnsupportedSASprotocolverson (responseCode100)	PASS	-
-	6.1.4.2.10	-	X	M	WINNF.FT.D.REG.17	Domain Proxy Unsupported SAS protocol version responseCode 100)	N/A	-
3.7	6.1.4.2.11	X	-	M	WINNF.FT.C.REG.18	Group Error (responseCode 201)	PASS	-
-	6.1.4.2.12	-	X	M	WINNF.FT.D.REG.19	Domain Proxy Group Error (responseCode 201)	N/A	-



-	6.1.4.3.1	X	X	C2	WINNF.FT.C.REG.20	Category A CBSD location Update	N/A	-
3.8	6.3.4.2.1	X	X	M	WINNF.FT.C.GRA.1	Unsuccessful Grant responseCode=400 (INTERFERENCE)	PASS	-
3.9	6.3.4.2.2	X	X	M	WINNF.FT.C.GRA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	PASS	-
3.10	6.4.4.1.1	X	-	M	WINNF.FT.C.HBT.1	Heartbeat Success Case (first Heartbeat Response)	PASS	-
-	6.4.4.1.2	-	X	M	WINNF.FT.D.HBT.2	Domain Proxy Heartbeat Success Case (first Heartbeat Response)	N/A	-
3.11	6.4.4.2.1	X	X	M	WINNF.FT.C.HBT.3	Heartbeat responseCode=105 (DREGISTER)	PASS	-
3.12	6.4.4.2.2	X	-	M	WINNF.FT.C.HBT.4	Heartbeat responseCode=500 (TERMINATED_GRANT)	PASS	-
3.13	6.4.4.2.3	X	X	M	WINNF.FT.C.HBT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	PASS	-
3.14	6.4.4.2.4	X	X	M	WINNF.FT.C.HBT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	PASS	-
3.15	6.4.4.2.5	X	X	M	WINNF.FT.C.HBT.7	Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	PASS	-
-	6.4.4.2.6	-	X	M	WINNF.FT.D.HBT.8	Domain Proxy Heartbeat responseCode=500 (TEMINATED_GRANT)	N/A	-
3.16	6.4.4.3.1	X	X	M	WINNF.FT.C.HBT.9	Heartbeat Response Absent (First Heartbeat)	PASS	-
3.17	6.4.4.3.2	X	X	M	WINNF.FT.C.HBT.10	Heartbeat Response Absent (Subsequent Heartbeat)	PASS	-
3.18	6.4.4.4.1	X	X	O	WINNF.FT.C.HBT.11	SuccessfulGrantRenewal in HeartbeatTestCase	PASS	-
-	6.5.4.2.1	X	-	C4	WINNF.FT.C.MES.1	Registration Response contains measReportConfig	N/A	-
-	6.5.4.2.2	-	X	C4	WINNF.FT.D.MES.2	Domain Proxy Registration Response contains measReportConfig	N/A	-
-	6.5.4.2.3	X	X	C5	WINNF.FT.C.MES.3	Grant Response contains measReportConfig	N/A	-
-	6.5.4.2.4	X	-	C5	WINNF.FT.C.MES.4	Heartbeat Response contains measReportConfig	N/A	-
-	6.5.4.2.5	-	X	C5	WINNF.FT.D.MES.5	Domain Proxy Heartbeat Response contains measReportConfig	N/A	-
3.19	6.6.4.1.1	X	-	M	WINNF.FT.C.RLQ.1	Successful Relinquishment	PASS	-
-	6.6.4.1.2	-	X	M	WINNF.FT.D.RLQ.2	Domain Proxy Successful Relinquishment	N/A	-



3.20	6.6.4.2.1	X	-	O	WINNF.FT.C.RLQ.3	Unsuccessful Relinquishment, responseCode=102	PASS	-
-	6.6.4.2.2	-	X	O	WINNF.FT.D.RLQ.4	Domain Proxy Unsuccessful Relinquishment, responseCode=102	N/A	-
-	6.6.4.3.1	X	-	O	WINNF.FT.C.RLQ.5	Unsuccessful Relinquishment, responseCode=103	N/A	-
-	6.6.4.3.2	-	X	O	WINNF.FT.D.RLQ.6	Domain Proxy Unsuccessful Relinquishment, responseCode=103	N/A	-
3.21	6.7.4.1.1	X	-	M	WINNF.FT.C.DRG.1	Successful Dereistration	PASS	-
-	6.7.4.1.2	-	X	M	WINNF.FT.D.DRG.2	Domain Proxy Successful Dereistration	N/A	-
3.22	6.7.4.2.1	X	-	O	WINNF.FT.C.DRG.3	Dereistration responseCode=102	PASS	-
-	6.7.4.2.2	-	X	O	WINNF.FT.D.DRG.4	Domain Proxy Dereistration responseCode=102	N/A	-
-	6.7.4.3.1	X	X	O	WINNF.FT.C.DRG.5	Dereistration responseCode=103	N/A	-
3.23	6.8.4.1.1	X	X	M	WINNF.FT.C.SCS.1	Successful TLS connection between UUT and SAS Test Harness	PASS	Note3
3.24	6.8.4.2.1	X	X	M	WINNF.FT.C.SCS.2	TLS failure due to revoked certificate	PASS	Note3
3.25	6.8.4.2.2	X	X	M	WINNF.FT.C.SCS.3	TLS failure due to expired server certificate	PASS	Note3
3.26	6.8.4.2.3	X	X	M	WINNF.FT.C.SCS.4	TLS failure when SAS Test Harness certificate is issued by unknown CA	PASS	Note3
3.27	6.8.4.2.4	X	X	M	WINNF.FT.C.SCS.5	TLS failure when certificate at the SAS Test Harness is corrupted	PASS	Note3
3.28	7.1.4.1.1	X	X	M	WINNF.PT.C.HBT	UUT RF Transmit Power Measurement	PASS	-

Note1:  
 ♦ M: Mandatory for certification  
 ♦ O: Optional. Not required for certification.  
 ♦ C: Conditional. Mandatory if CBSD supports relevant functionality.

Note2: The unit under test type is CBSD without Domain Proxy and Conditional Test Case Definitions are C3.

Note3: The single-step registration tests are using waiver test cases since the device does not support sensing capability.

#### Time Test for Getting Grant Summary

Trail	Time limit	Monitoring time	Measured result	Verdict	Remark
1	1 second	10 seconds	0.008 second	PASS	-



**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Sam Chen**

**Report Producer: Viola Huang**



## 1 General Description

### 1.1 Product Feature of Equipment Under Test

Product Feature of Equipment Under Test	
EUT Type	CPE-CBSD
Power Type	From PoE
Category of EUT	<input type="checkbox"/> Category A <input checked="" type="checkbox"/> Category B
Professional Installation	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
EUT in Test ID	<input type="checkbox"/> EUT with Domain Proxy <input checked="" type="checkbox"/> EUT without Domain Proxy
CBSD Hardware Version	V1.0
CBSD Software Version	V1.5.0.P0.2576 Build on: Jan 11 2021
CBSD Firmware Version	0.3.4.0

Note: The above information was declared by manufacturer.

### 1.2 Accessories

N/A

### 1.3 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	WLAN AP	Netgear	R7500	PY314300288
B	Switch	Panasonic	Switch-S9GPWR	N/A
C	Notebook (BTS SAS)	DELL	E4300	N/A
D	Notebook (CPE SAS)	DELL	E4300	N/A
E	Desktop PC (EPC)	Shuttle	XH110G	N/A
F	Base Transceiver Station	Ruckus	Q410	S9GQ410US01
G	Notebook	DELL	E4300	N/A
H	PoE	GOSPELL	G0720-240-100	N/A



## 1.4 Testing Location

Testing Location						
		Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
<input type="checkbox"/>	HWA YA	RF Conducted	TH01-CB	Jeff Wu	22-23.4 / 56-57	Jan. 25, 2021 ~ Jan. 26, 2021
<input checked="" type="checkbox"/>	JHUBEI					

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.



## 2 Measurement Environment

Measurement Environment Information	
Test Harness version	1.0.0.3
Operating System	Microsoft Windows 7
TLS version	1.2
Python	2.7.16

### 2.1 Conditional Test Case

<input type="checkbox"/>	C1	Mandatory for UUT which supports multi-step registration message
<input type="checkbox"/>	C2	Mandatory for UUT which supports single-step registration with no CPI-signed data in the registration message. By definition, this is a subset of Category A devices which determine all registration information, including location, without CPI intervention.
<input checked="" type="checkbox"/>	C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.
<input type="checkbox"/>	C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.
<input type="checkbox"/>	C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.
<input type="checkbox"/>	C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration.

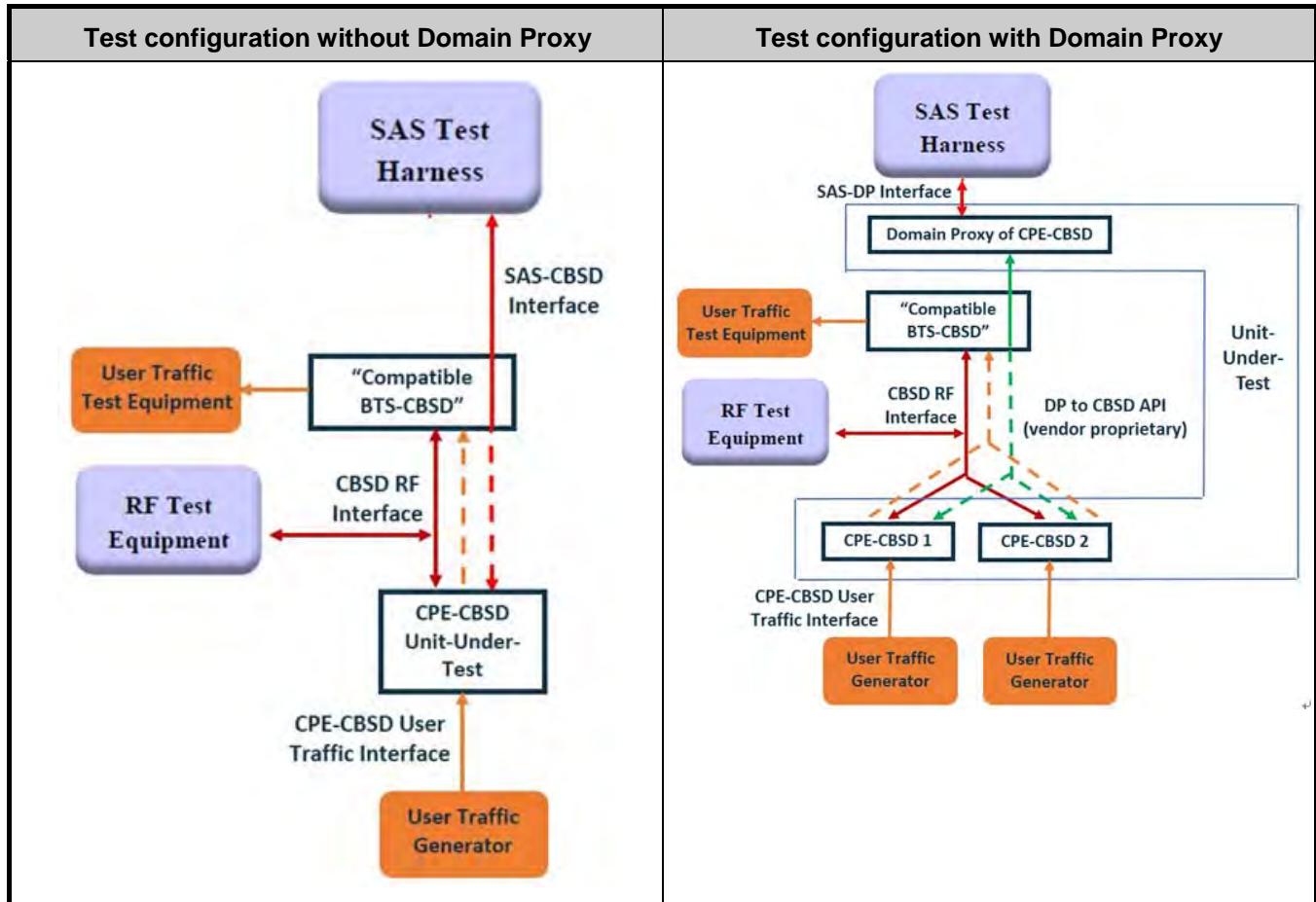
Note1: The above information was declared by manufacturer.

Note2: The PoE is for measurement only, would not be marketed.

PoE information as below:

Power	Brand	Model
PoE	GOSPELL	G0720-240-100

## 2.2 Test Configuration





## 2.3 Standards

- [n.1]. FCC KDB 940660 D02 CPE-CBSD Handshake Procedures v02
- [n.2]. WINNF-TS-0122 Version 1.0.1, "Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT)"

## 2.4 Protocol test Procedure

The test cases for SAS<->CBSD protocol in [n.2] apply for CPE-CBSD device type. Following the [n.1], when running the test cases in [n.2] for CPE-CBSD device type, verify that

1. CPE-CBSD can begin transmitting its RF only after receiving radio signal from its compatible BTS-CBSD.
2. For all CPE-CBSD RF transmissions, the CPE-CBSD UUT radio frequency range and bandwidth are less or equal to the frequency range and bandwidth of its compatible BTS-CBSD.
3. Judging the last execution step appearing in [n.2] with "User data traffics" instead of "RF transmission."

## 2.5 Time Test for Getting Grant Procedure

Use the WinnForum SAS Harness run test case WINNF.FT.C.GRA.1. Without answering the last question in WINNF.FT.C.GRA.1 will keep UUT's grant request being rejected, then measure the time.



### 3 Test Result of Protocol

#### 3.1 WINNF.FT.C.REG.5 - Single-Step registration for CBSD with CPI signed data

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li><li>• All of the required and REG-Conditional parameters shall be configured and CPI signature provided</li></ul>	--	--
2	CBSD sends Registration request to the SAS Test Harness: <ul style="list-style-type: none"><li>• The required <i>userId</i>, <i>fccId</i> and <i>cbsdSerialNumber</i> and REG- Conditional <i>cbsdCategory</i>, <i>airInterface</i>, <i>measCapability</i> and <i>cpiSignatureData</i> registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges.</li><li>• 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.</li></ul>	PASS	--
3	<ul style="list-style-type: none"><li>• SAS Test Harness sends a CBSD Registration Response as follows:<ul style="list-style-type: none"><li>– <i>cbsdId</i> = C</li><li>– <i>measReportConfig</i> shall not be included.</li><li>– <i>responseCode</i> = 0</li></ul></li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.2 WINNF.FT.C.REG.8 - Missing Required parameters (responseCode 102)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbsdId</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.3 WINNF.FT.C.REG.10 - Pending registration (responseCode 200)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbsdId</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.4 WINNF.FT.C.REG.12 - Invalid parameter (responseCode 103)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbsdId</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.5 WINNF.FT.C.REG.14 - Blacklisted CBSD (responseCode 101)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbsdId</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.6 WINNF.FT.C.REG.16 - Unsupported SAS protocol version (responseCode 100)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbssid</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.7 WINNF.FT.C.REG.18 - Group Error (responseCode 201)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT is in the Unregistered state</li></ul>	--	--
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"><li>– SAS response does not include <i>cbsdId</i></li><li>– <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.8 WINNF.FT.C.GRA.1 - Unsuccessful Grant responseCode=400 (INTERFERENCE)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C</li></ul>	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"><li>• <i>cbsdId</i>=C</li><li>• <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.9 WINNF.FT.C.GRA.2 - Unsuccessful Grant responseCode=401 (GRANT\_CONFLICT)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C</li></ul>	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"><li>• <i>cbsdId</i>=C</li><li>• <i>responseCode</i> = R</li></ul>	--	--
4	After completion of step 3, SAS Test Harness does 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: <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.10 WINNF.FT.C.HBT.1 - Heartbeat Success Case (first Heartbeat Response)

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C</li></ul>	--	--
2	UUT sends a message: <ul style="list-style-type: none"><li>If message is type Spectrum Inquiry Request, go to step 3, or</li><li>If message is type Grant Request, go to step 5</li></ul>	--	--
3	UUT sends Spectrum Inquiry Request. Validate: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li>List of frequencyRange objects sent by UUT are within the CBRS frequency range</li></ul>	PASS	--
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li><i>availableChannel</i> is an array of availableChannel objects</li><li><i>responseCode</i> = 0</li></ul>	--	--
5	UUT sends Grant Request message. Validate: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li><i>maxEIRP</i> is at or below the limit appropriate for CBSD category as defined by Part 96</li><li><i>operationFrequencyRange</i>, F, sent by UUT is a valid range within the CBRS band</li></ul>	PASS	--
6	SAS Test Harness sends a Grant Response message, including the parameters: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li><i>grantId</i> = G = a valid grant ID</li><li><i>grantExpireTime</i> = UTC time greater than duration of the test</li><li><i>responseCode</i> = 0</li></ul>	--	--
7	UUT sends a first Heartbeat Request message. VerifyHeartbeatRequest message is formatted correctly, including: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li><i>grantId</i> = G</li><li><i>operationState</i> = "GRANTED"</li></ul>	PASS	--
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: <ul style="list-style-type: none"><li><i>cbsdId</i> = C</li><li><i>grantId</i> = G</li><li><i>transmitExpireTime</i> = current UTC time + 200 seconds</li><li><i>responseCode</i> = 0</li></ul>	--	--



9	<p>For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and:</p> <ul style="list-style-type: none"><li>• <i>cbsId = C</i></li><li>• <i>grantId = G</i></li><li>• <i>operationState = "AUTHORIZED"</i></li></ul> <p>and SAS Test Harness responds with a Heartbeat Response message including the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId = C</i></li><li>• <i>grantId = G</i></li><li>• <i>transmitExpireTime = current UTC time + 200 seconds</i></li><li>• <i>responseCode = 0</i></li></ul>	PASS	--
10	<p>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</p> <ul style="list-style-type: none"><li>• UUT does not transmit at any time prior to completion of the first heartbeat response</li><li>• UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li></ul>	PASS	--



### 3.11 WINNF.FT.C.HBT.3 - Heartbeat responseCode=105 (DEREGISTER)

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> =C</li><li>◦ valid <i>grantId</i> =G</li><li>◦ grant is for frequency range F, power P</li><li>◦ <i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> =C</li><li>• <i>grantId</i> =G</li><li>• <i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> =C</li><li>• <i>grantId</i> =G</li><li>• <i>transmitExpireTime</i> = <i>T</i> = Current UTC time</li><li>• <i>responseCode</i> = 105 (DEREGISTER)</li></ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall stop transmitting user traffic within (<i>T</i> + 60 seconds) of completion of step 3</li></ul>	PASS	--



### 3.12 WINNF.FT.C.HBT.4 - Heartbeat responseCode=500 (TERMINATED\_GRANT)

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> =C</li><li>◦ valid <i>grantId</i> =G</li><li>◦ grant is for frequency range F, power P</li><li>◦ <i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> =C</li><li>• <i>grantId</i> =G</li><li>• <i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> =C</li><li>• <i>grantId</i> =G</li><li>• <i>transmitExpireTime</i> = T = current UTC time</li><li>• <i>responseCode</i> = 500 (TERMINATED_GRANT)</li></ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall stop transmitting user traffic within (T + 60 seconds) of completion of step 3</li></ul>	PASS	--



### 3.13 WINNF.FT.C.HBT.5 - Heartbeat responseCode=501 (SUSPENDED\_GRANT) in First Heartbeat Response

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>UUT has registered successfully with SAS Test Harness</li><li>UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>valid <i>cbsId</i> = C</li><li>valid <i>grantId</i> = G</li><li>grant is for frequency range F, power P</li><li><i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)</li></ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: <ul style="list-style-type: none"><li><i>cbsId</i> = C</li><li><i>grantId</i> = G</li><li><i>operationState</i> = "GRANTED"</li></ul>	PASS	--
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"><li><i>cbsId</i> = C</li><li><i>grantId</i> = G</li><li><i>transmitExpireTime</i> = T = current UTC time</li><li><i>responseCode</i> = 501 (SUSPENDED_GRANT)</li></ul>	--	--
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: <ul style="list-style-type: none"><li>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:<ul style="list-style-type: none"><li><i>cbsId</i> = C</li><li><i>grantId</i> = G</li><li><i>operationState</i> = "GRANTED"</li></ul></li><li>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:<ul style="list-style-type: none"><li><i>cbdsId</i> = C</li><li><i>grantId</i> = G</li></ul></li></ul> Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"><li>UUT does not transmit at any time</li></ul>	PASS	--



### 3.14 WINNF.FT.C.HBT.6 - Heartbeat responseCode=501 (SUSPENDED\_GRANT) in Subsequent Heartbeat Response

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"><li>UUT has registered successfully with SAS Test Harness</li><li>UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>valid <i>cbsId</i> =C</li><li>valid <i>grantId</i> =G</li><li>grant is for frequency range F, power P</li><li><i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li></ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: <ul style="list-style-type: none"><li><i>cbsId</i> =C</li><li><i>grantId</i> =G</li><li><i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"><li><i>cbsId</i> =C</li><li><i>grantId</i> =G</li><li><i>transmitExpireTime</i> = T = current UTC time</li><li><i>responseCode</i> = 501 (SUSPENDED_GRANT)</li></ul>	--	--
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: <ul style="list-style-type: none"><li>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:<ul style="list-style-type: none"><li><i>cbsId</i> =C</li><li><i>grantId</i> =G</li><li><i>operationState</i> = "GRANTED"</li></ul></li><li>B. UUT sends a Relinquishment Request message. Ensure message is correctly formatted with parameters:<ul style="list-style-type: none"><li><i>cbsId</i> =C</li><li><i>grantId</i> =G</li></ul></li></ul> Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"><li>CPE-CBSD UUT shall stop transmitting user traffic within (T+60 seconds) of completion of step 3</li></ul>	PASS	--



### 3.15 WINNF.FT.C.HBT.7 - Heartbeat responseCode=502 (UNSYNC\_OP\_PARAM)

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> = C</li><li>◦ valid <i>grantId</i> = G</li><li>◦ grant is for frequency range F, power P</li><li>◦ <i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified <i>heartbeatInterval</i>, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>transmitExpireTime</i> = T = Current UTC Time</li><li>• <i>responseCode</i> = 502 (UNSYNC_OP_PARAM)</li></ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the SAS-CBSD interface. Verify:</p> <ul style="list-style-type: none"><li>• UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters:<ul style="list-style-type: none"><li>◦ <i>cbsId</i> = C</li><li>◦ <i>grantId</i> = G</li></ul></li></ul> <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"><li>• CPE-CBSD UUT shall stop transmitting user traffic within (T+60) seconds of completion of step 3.</li></ul>	PASS	--



### 3.16 WINNF.FT.C.HBT.9 - Heartbeat Response Absent (First Heartbeat)

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> = C</li><li>◦ valid <i>grantId</i> = G</li><li>◦ grant is for frequency range F, power P</li><li>◦ <i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>• UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)</li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified <i>heartbeatInterval</i>, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>operationState</i> = "GRANTED"</li></ul>	PASS	--
3	After completion of Step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection	--	--
4	<p>Monitor the RF output of the UUT from start of test to 60 seconds after step 3.</p> <p>Verify:</p> <ul style="list-style-type: none"><li>• At any time during the test, UUT shall not transmit on RF interface</li></ul>	PASS	--



### 3.17 WINNF.FT.C.HBT.10 - Heartbeat Response Absent (Subsequent Heartbeat)

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> = C</li><li>◦ valid <i>grantId</i> = G</li><li>◦ grant is for frequency range F, power P</li><li>◦ <i>grantExpireTime</i> = UTC time greater than duration of the test</li></ul></li><li>• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within the latest specified <i>heartbeatInterval</i>, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
3	<p>SAS Test Harness sends a Heartbeat Response message, with the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>transmitExpireTime</i> = current UTC time + 200 seconds</li><li>• <i>responseCode</i> = 0</li></ul>	--	--
4	After completion of Step 3, SAS Test Harness does not respond to any further messages from UUT	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"><li>• UUT shall stop all transmission on RF interface within (<i>transmitExpireTime</i> + 60 seconds), using the <i>transmitExpireTime</i> sent in Step 3.</li></ul>	PASS	--



### 3.18 WINNF.FT.C.HBT.11 - Successful Grant Renewal in Heartbeat Test Case

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has registered successfully with SAS Test Harness</li><li>• UUT has a valid single grant as follows:<ul style="list-style-type: none"><li>◦ valid <i>cbsId</i> = C</li><li>◦ valid <i>grantId</i> = G</li><li>◦ grant is for frequency range F, power P</li></ul></li><li>• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface.</li><li>• Grant has the following parameters at the start of the test:<ul style="list-style-type: none"><li>◦ <i>grantExpireTime</i> = UTC time equal to time at start of test + 300 seconds = <i>Tgrant_expire</i></li><li>◦ <i>transmitExpireTime</i> = UTC time equal to time at start of test + 200 seconds</li><li>◦ <i>heartbeatInterval</i> = 60 seconds</li></ul></li></ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>If Heartbeat Request message contains <i>grantRenew</i> = TRUE, go to Step 6, else go to Step 3.</p>	--	--
3	<p>Verify Heartbeat Request message is sent within the latest specified <i>heartbeatInterval</i>, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>operationState</i> = "AUTHORIZED"</li></ul>	PASS	--
4	<p>SAS Test Harness sends a Heartbeat Response message, with the following parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>transmitExpireTime</i> = current UTC + 200 seconds</li><li>• <i>grantExpireTime</i> = same as Step 1</li><li>• <i>responseCode</i> = 0</li></ul>	--	--
5	Go to Step 2	--	--
6	<p>Verify Heartbeat Request message is sent within the latest specified <i>heartbeatInterval</i>, and is formatted correctly, including:</p> <ul style="list-style-type: none"><li>• <i>cbsId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>operationState</i> = "AUTHORIZED"</li><li>• <i>grantRenew</i> = TRUE</li></ul>	PASS	--



7	SAS Test Harness sends a Heartbeat Response message, with the following parameters: <ul style="list-style-type: none"><li>• <i>cbsdId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>grantExpireTime</i> = UTC time set far in the future</li><li>• <i>transmitExpireTime</i> = current UTC time + 200 seconds</li><li>• <i>responseCode</i> = 0</li></ul>	--	--
8	Continues to respond to any subsequent Heartbeat Request from CBSD with Heartbeat Response with the following parameters: <ul style="list-style-type: none"><li>• <i>cbsdId</i> = C</li><li>• <i>grantId</i> = G</li><li>• <i>transmitExpireTime</i> = same as Step 7</li><li>• <i>responseCode</i> = 0</li></ul>	--	--
9	Monitor RF transmission of UUT from start of test until <i>Tgrant_expire</i> + 60 seconds and ensure UUT continues to transmit throughout the time period.	PASS	--



### 3.19 WINNF.FT.C.RLQ.1 - Successful Relinquishment

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C</li><li>• UUT has received a valid grant with <i>grantId</i>=G</li><li>• UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li></ul> <p>Invoke trigger to relinquish UUT Grant from the SAS Test Harness</p>	--	--
2	<p>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"><li>• <i>cbsdId</i> =C</li><li>• <i>grantId</i> =G</li></ul>	PASS	--
3	<p>SAS Test Harness shall approve the request with a Relinquishment Response message with parameters:</p> <ul style="list-style-type: none"><li>– <i>cbsdId</i> =C</li><li>– <i>grantId</i> =G</li><li>– <i>responseCode</i> =0</li></ul>	--	--
4	<p>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.</p>	--	--
5	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"><li>• UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</li></ul>	PASS	--



### 3.20 WINNF.FT.C.RLQ.3 - Unsuccessful Relinquishment, responseCode=102

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C</li><li>• UUT has received a valid grant with <i>grantId</i>=G</li><li>• UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li></ul> <p>Invoke trigger to Relinquish UUT Grant from the SAS Test Harness</p>	--	--
2	<p>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"><li>• <i>cbsdId</i>=C</li><li>• <i>grantId</i>=G</li></ul>	--	--
3	<p>SAS Test Harness shall send a Relinquishment Response message with parameters:</p> <ul style="list-style-type: none"><li>• <i>cbsdId</i> =C</li><li>• No <i>grantId</i></li><li>• <i>responseCode</i> =R</li></ul>	--	--
4	<p>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.</p>	--	--
5	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"><li>• UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</li></ul>	PASS	--



### 3.21 WINNF.FT.C.DRG.1 - Successful Deregistration

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C</li><li>• UUT has received a valid grant with <i>grantId</i>=G</li><li>• UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li></ul> <p>Invoke trigger to deregister UUT from the SAS Test Harness</p>	--	--
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	--
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: <ul style="list-style-type: none"><li>• <i>cbsdId</i> =C</li><li>• <i>responseCode</i> =0</li></ul>	--	--
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	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"><li>• UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:<ol style="list-style-type: none"><li>A. UUT sending a Registration Request message, as this is not mandatory</li><li>B. UUT sending a Deregistration Request message</li></ol></li></ul>	PASS	--



### 3.22 WINNF.FT.C.DRG.3 - Deregistration responseCode=102

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li><li>• UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C</li><li>• UUT has received a valid grant with <i>grantId</i>=G</li><li>• UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li></ul> <p>Invoke trigger to deregister UUT from the SAS Test Harness</p>	--	--
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	--	--
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: <ul style="list-style-type: none"><li>• No <i>cbsdId</i></li><li>• <i>responseCode</i> = 102</li></ul>	--	--
5	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.	--	--
6	<p>Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify:</p> <ul style="list-style-type: none"><li>• UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:<ol style="list-style-type: none"><li>UUT sending a Registration Request message, as this is not mandatory</li><li>UUT sending a Deregistration Request message</li></ol></li></ul>	PASS	--



### 3.23 WINNF.FT.C.SCS.1 - Successful TLS connection between UUT and SAS Test Harness

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"><li>UUT shall start CBSD-SAS communication with the security procedure</li><li>The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate.</li><li>Configure the SAS Test Harness to accept the security procedure and establish the connection</li></ul>	PASS	--
2	<ul style="list-style-type: none"><li>Make sure that Mutual authentication happens between UUT and the SAS Test Harness.</li><li>Make sure that UUT uses TLS v1.2</li><li>Makesure that ciphersuites from one of the following is selected,<ul style="list-style-type: none"><li>TLS_RSA_WITH_AES_128_GCM_SHA256</li><li>TLS_RSA_WITH_AES_256_GCM_SHA384</li><li>TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256</li><li>TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384</li><li>TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li></ul></li></ul>	PASS	--
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"><li>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>.</li></ul>	PASS	--
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"><li>CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.24 WINNF.FT.C.SCS.2 - TLS failure due to revoked certificate

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"><li>UUT shall start CBSD-SAS communication with the security procedures</li></ul>	PASS	--
2	<ul style="list-style-type: none"><li>Make sure that UUT uses TLS v1.2 for security establishment.</li><li>Make sure UUT selects the correct cipher suite.</li><li>UUT shall use CRL or OCSP to verify the validity of the server certificate.</li><li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li></ul>	PASS	--
3	UUT may retry for the security procedure which shall fail	PASS	--
4	SASTest-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"><li>CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.25 WINNF.FT.C.SCS.3 - TLS failure due to expired server certificate

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"><li>UUT shall start CBSD-SAS communication with the security procedures</li></ul>	PASS	--
2	<ul style="list-style-type: none"><li>Make sure that UUT uses TLS v1.2 for security establishment.</li><li>Make sure UUT selects the correct cipher suite.</li><li>UUT shall use CRL or OCSP to verify the validity of the server certificate.</li><li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li></ul>	PASS	--
3	UUT may retry for the security procedure which shall fail.	PASS	--
4	SAS Test Harness shall not receive any Registration requests 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"><li>CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--



### 3.26 WINNF.FT.C.SCS.4 - TLS failure when SAS Test Harness certificate is issued by an unknown CA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"><li>UUT shall start CBSD-SAS communication with the security procedures</li></ul>	PASS	--
2	<ul style="list-style-type: none"><li>Make sure that UUT uses TLS v1.2 for security establishment.</li><li>Make sure UUT selects the correct cipher suite.</li><li>UUT shall use CRL or OCSP to verify the validity of the server certificate</li><li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li></ul>	PASS	--
3	UUT may retry for the security procedure which shall fail.	PASS	--
4	SAS Test-Harness shall not receive any Registration requests 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"><li>CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--

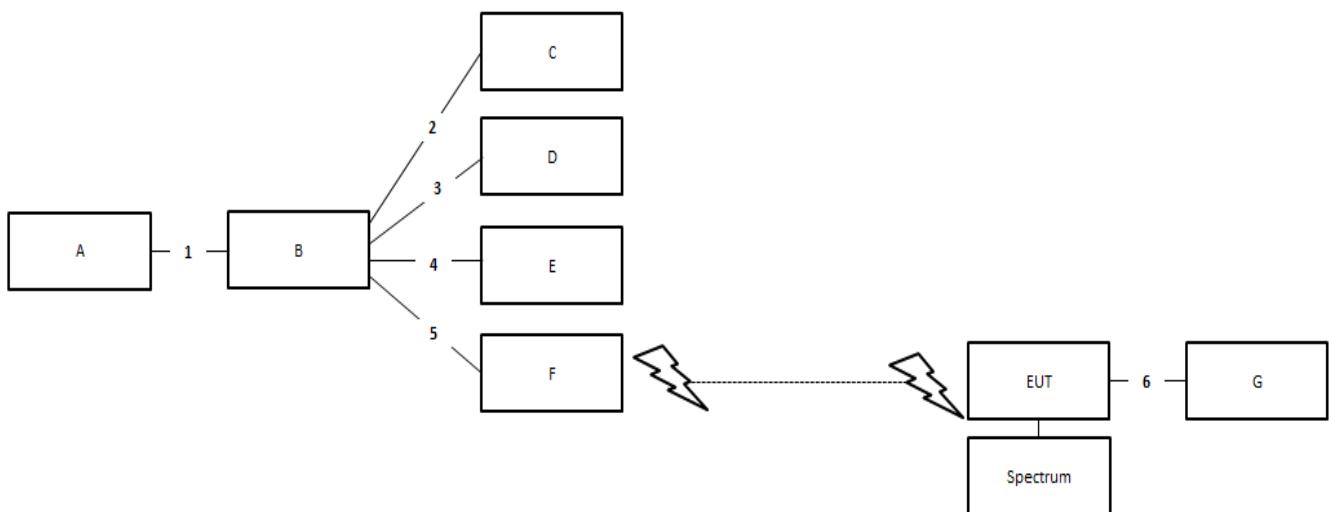


### 3.27 WINNF.FT.C.SCS.5 - TLS failure when certificate at the SAS Test Harness is corrupted

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"><li>UUT shall start CBSD-SAS communication with the security procedures</li></ul>	PASS	--
2	<ul style="list-style-type: none"><li>Make sure that UUT uses TLS v1.2 for security establishment.</li><li>Make sure UUT selects the correct cipher suite.</li><li>UUT shall use CRL or OCSP to verify the validity of the server certificate.</li><li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li></ul>	PASS	--
3	UUT may retry for the security procedure which shall fail.	PASS	--
4	SASTest-Harness shall not receive any Registration requests 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"><li>CPE-CBSD UUT shall not transmit user traffic</li></ul>	PASS	--

### 3.28 WINNF.PT.C.HBT - UUT RF Transmit Power Measurement

Items	Parameters
Maximum rated power (EIRP, dBm/MHz)	37dBm/MHz
Transmit dynamic range (EIRP, dBm/MHz)	1dB increments from 27 dBm/MHz to 37 dBm/MHz (11 steps)
Occupied bandwidth (OBW)	10MHz
maxEirp values	37 dBm/MHz



Item	Connection	Shielded	Length
1	RJ-45 cable	No	1.5m
2	RJ-45 cable	No	1.5m
3	RJ-45 cable	No	1.5m
4	RJ-45 cable	No	1.5m
5	RJ-45 cable	No	1.5m
6	RJ-45 cable	No	1.5m

Note: To ensure EUT transmits with full power across the Bandwidth during the on duration of duty cycle, EUT is running maximum traffic during the test.



Spectrum Analyzer Setting		Parameters
<b>Center Frequency</b>		3655MHz
<b>Frequency Span</b>		20MHz
<b>RBW / VBW</b>		1MHz / 3MHz
<b>Channel Power Meas Bandwidth</b>		10MHz
<b>Sweep Time</b>		1ms

#	Test Execution Steps	Results
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"><li>• UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness</li><li>• UUT has registered with the SAS, with CBSID ID = C</li><li>• 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</li></ul> <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"><li>• UUT sends Heartbeat Request, including:<ul style="list-style-type: none"><li>○ cbsdId = C</li><li>○ grantId = G</li></ul></li><li>• SAS Test Harness responds with Heartbeat Response, including:<ul style="list-style-type: none"><li>○ cbsdId = C</li><li>○ grantId = G</li><li>○ transmitExpireTime = current UTC time + 200 seconds</li><li>○ responseCode = 0</li></ul></li></ul>	-- --



3	<p>Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfil the requirements of the power measurement method.</p> <p><i>Note: it may be required for the vendor to provide a method or configuration to bring the UUT to a mode which is required by the measurement methodology. Any such mode is vendor-specific and depends upon UUT behavior and the measurement methodology.</i></p>	PASS	--
---	--	------	----

Frequency	Bandwidth	Antenna Gain	Conducted PSD	maxEirp	Grant maxEirp	Result
			Port 1			
(MHz)	(dB)	(dBi)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	
3655MHz	10	16	8.824	24.82	37	PASS
3655MHz	10	16	3.019	19.02	32	PASS
3655MHz	10	16	-4.543	11.46	27	PASS



## 4 Test Result of Time Test for Getting Grant

Refer as Appendix D



## 5 Test Equipment and Calibration Data

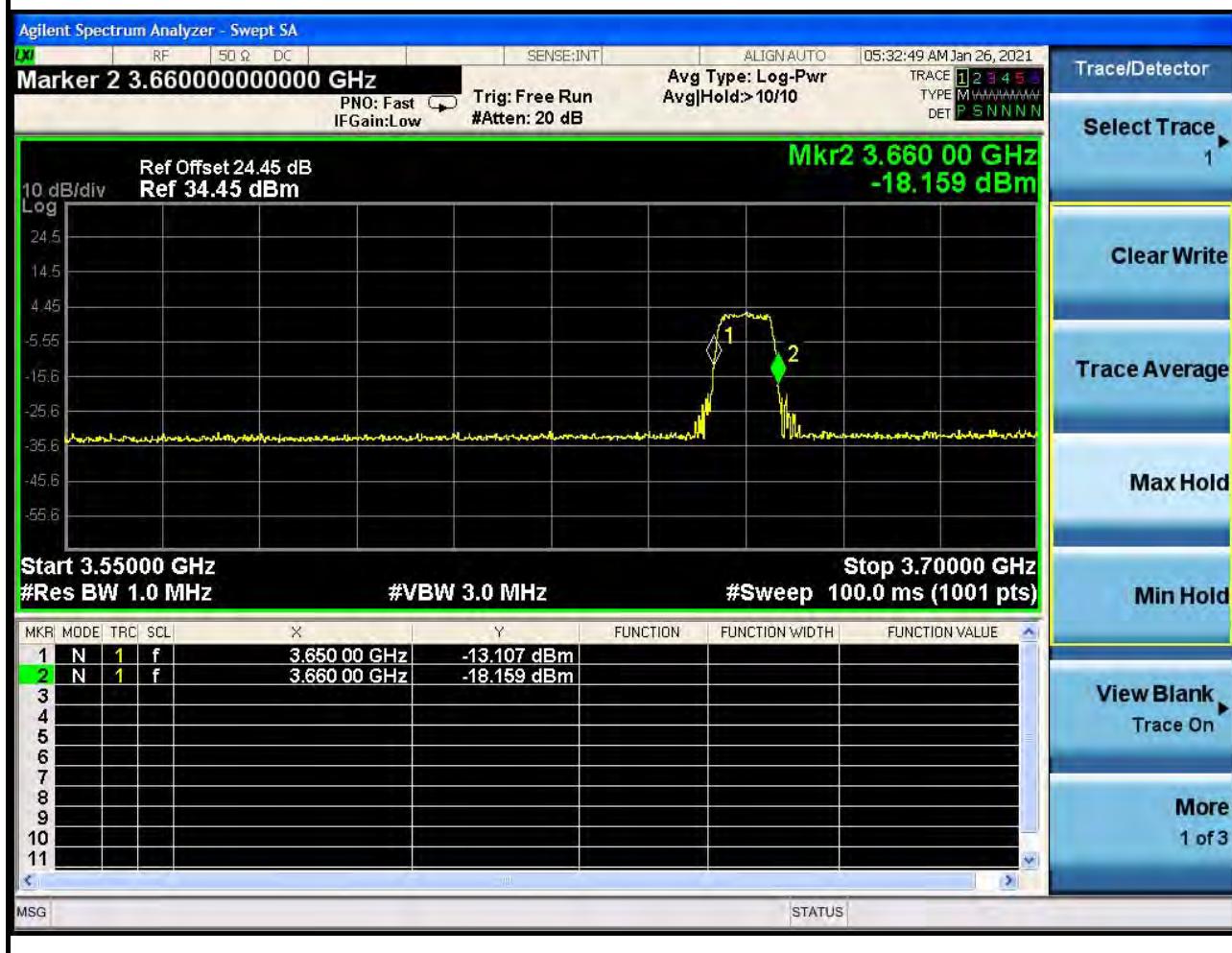
Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Signal analyzer	Keysight	N9020A	MY55400138	10 Hz up to 26.5 GHz	Jan. 13, 2021	Jan. 12, 2022	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-30	1 GHz –26.5 GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	TH01-DV-01	1GHz ~ 6GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	TH01-DV-02	1GHz ~ 6GHz	Oct. 05, 2020	Oct. 04, 2021	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

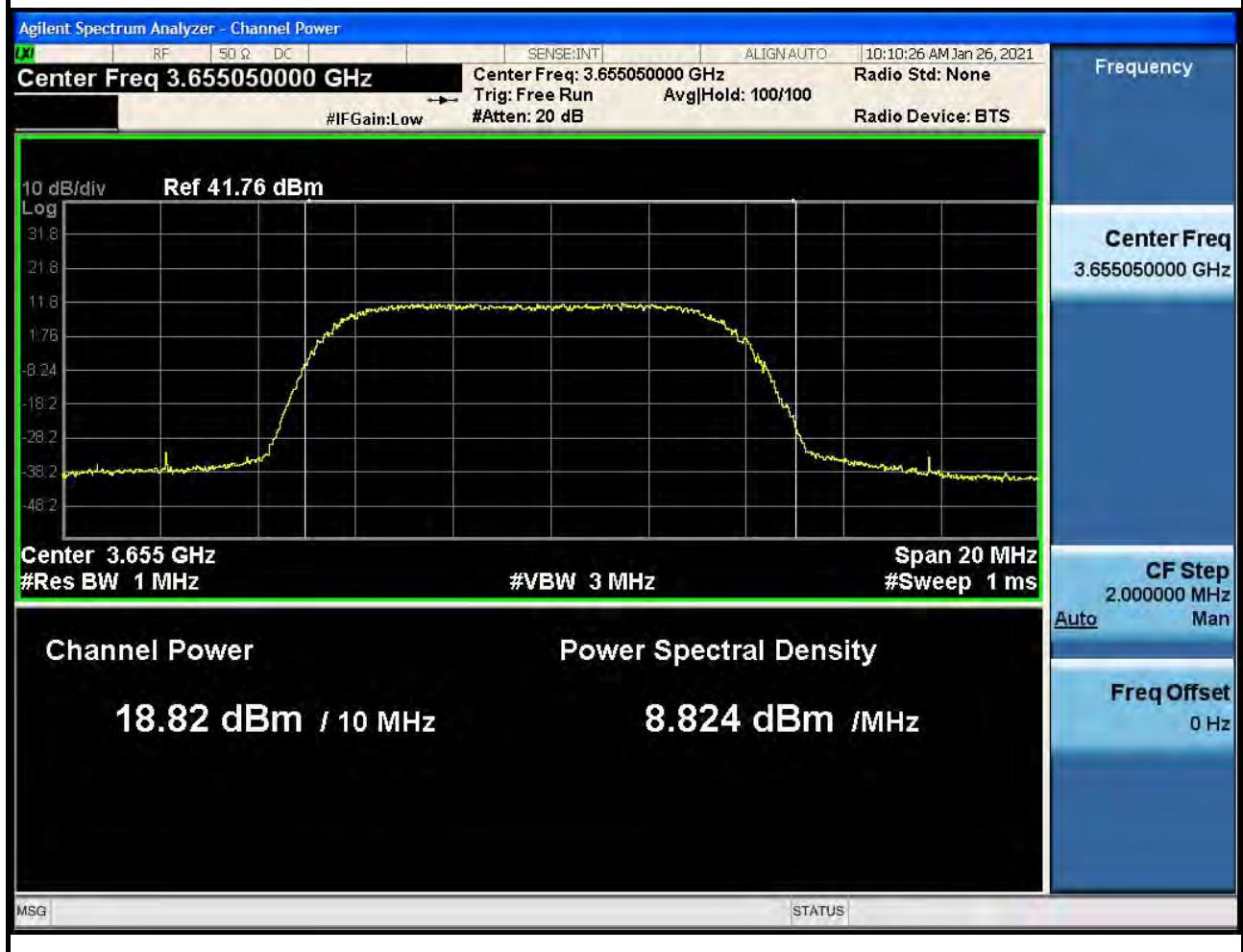


## 6 Measurement Uncertainty

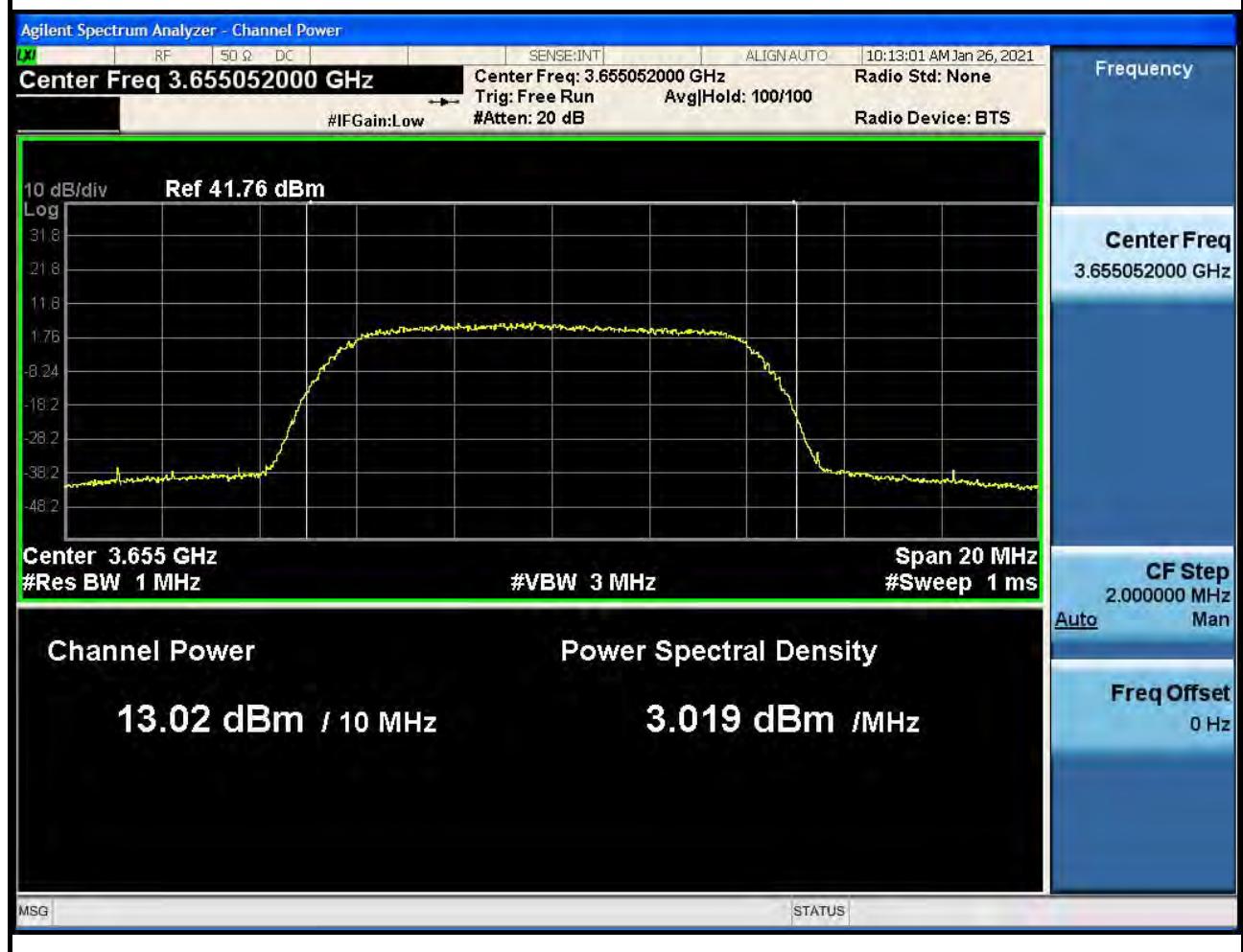
Test Items	Uncertainty	Remark
Conducted Emission	2.4 dB	Confidence levels of 95%

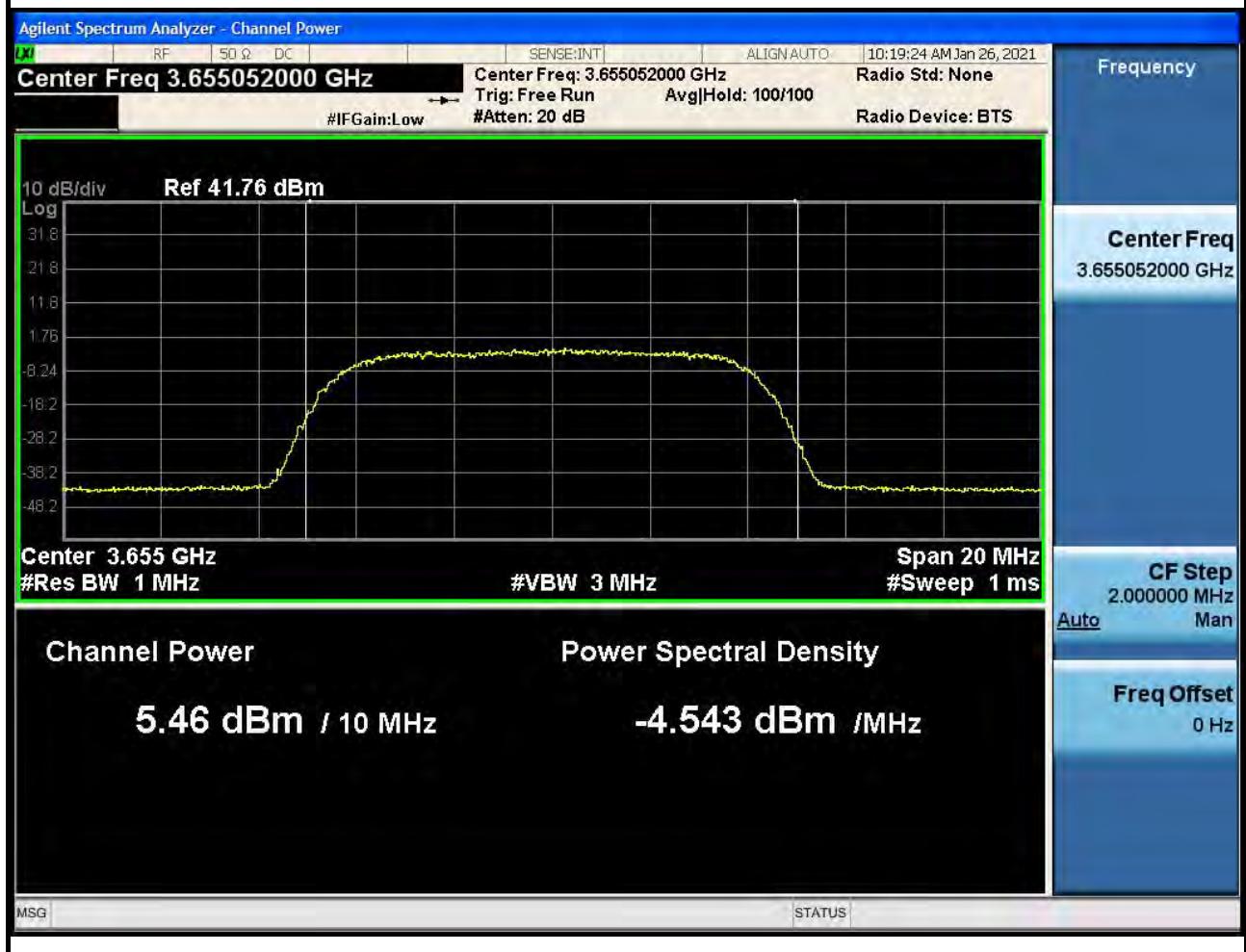
**RF measurement plot for WINNF.PT.C.HBT Test Case ID**


## RF measurement plot for WINNF.PT.C.HBT Test Case ID\_BW10M\_Grant maxEirp 37



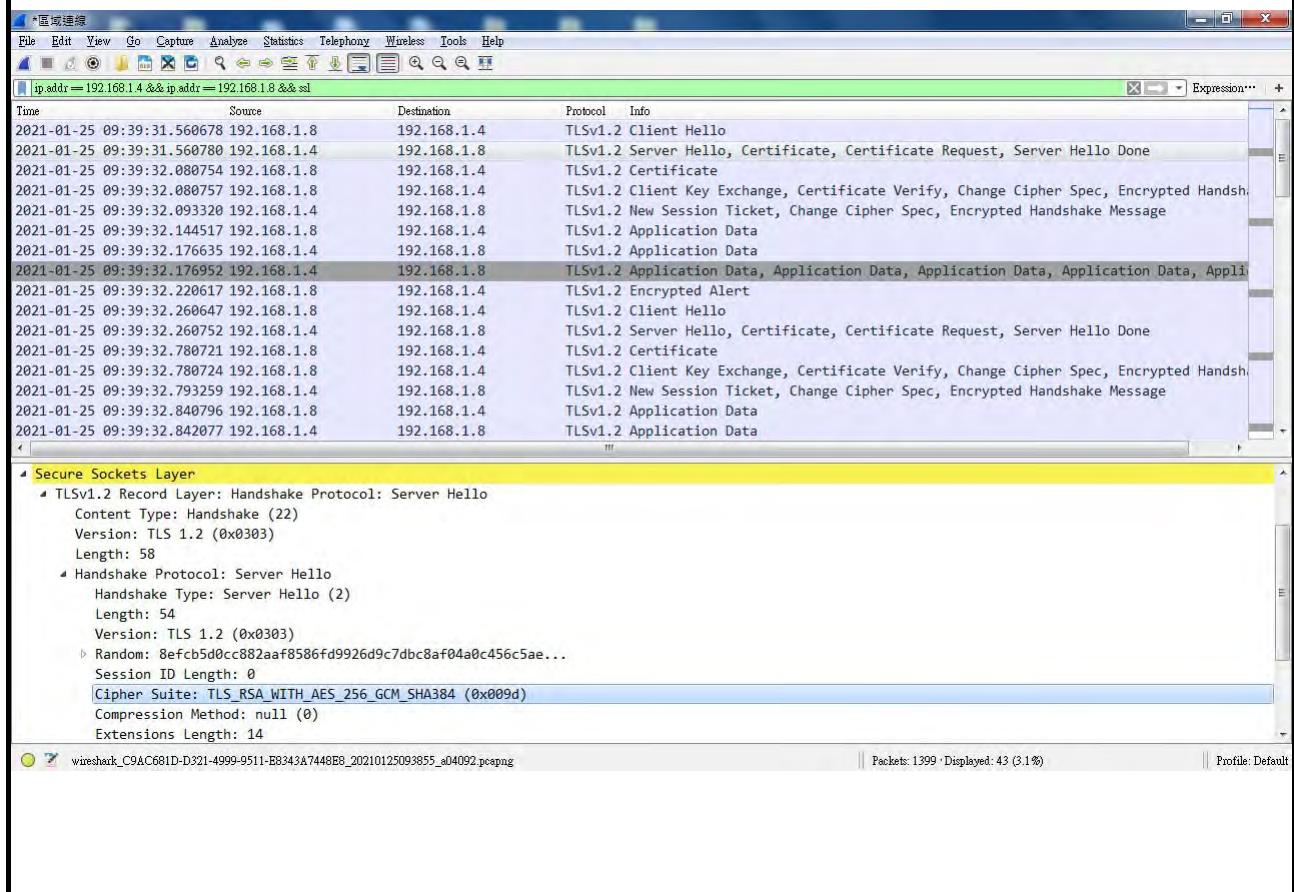
## RF measurement plot for WINNF.PT.C.HBT Test Case ID\_BW10M\_Grant maxEirp 32



**RF measurement plot for WINNF.PT.C.HBT Test Case ID\_BW10M\_Grant maxEirp 27**


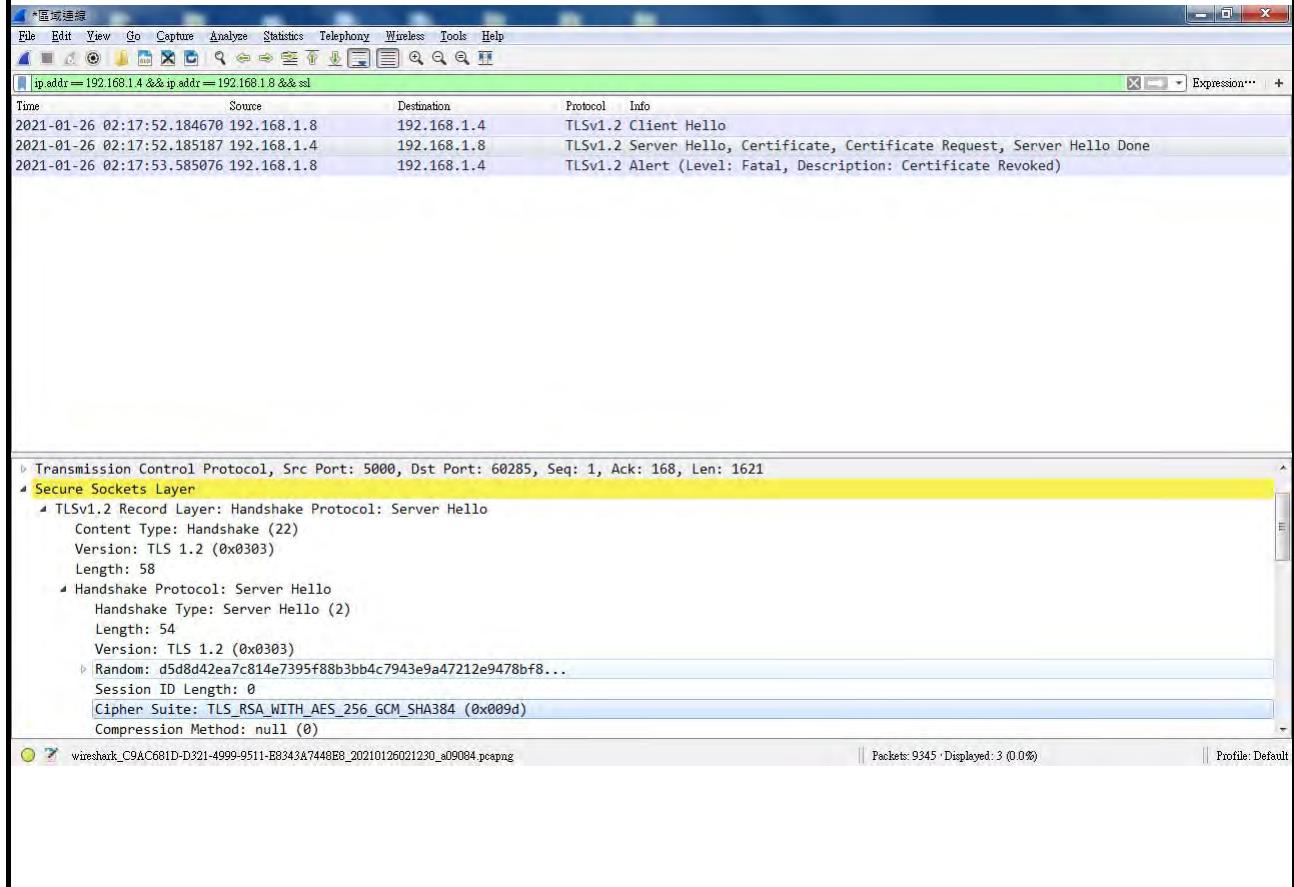


## Wireshark Plots for WINNF.FT.C.SCS.1 Test Case ID

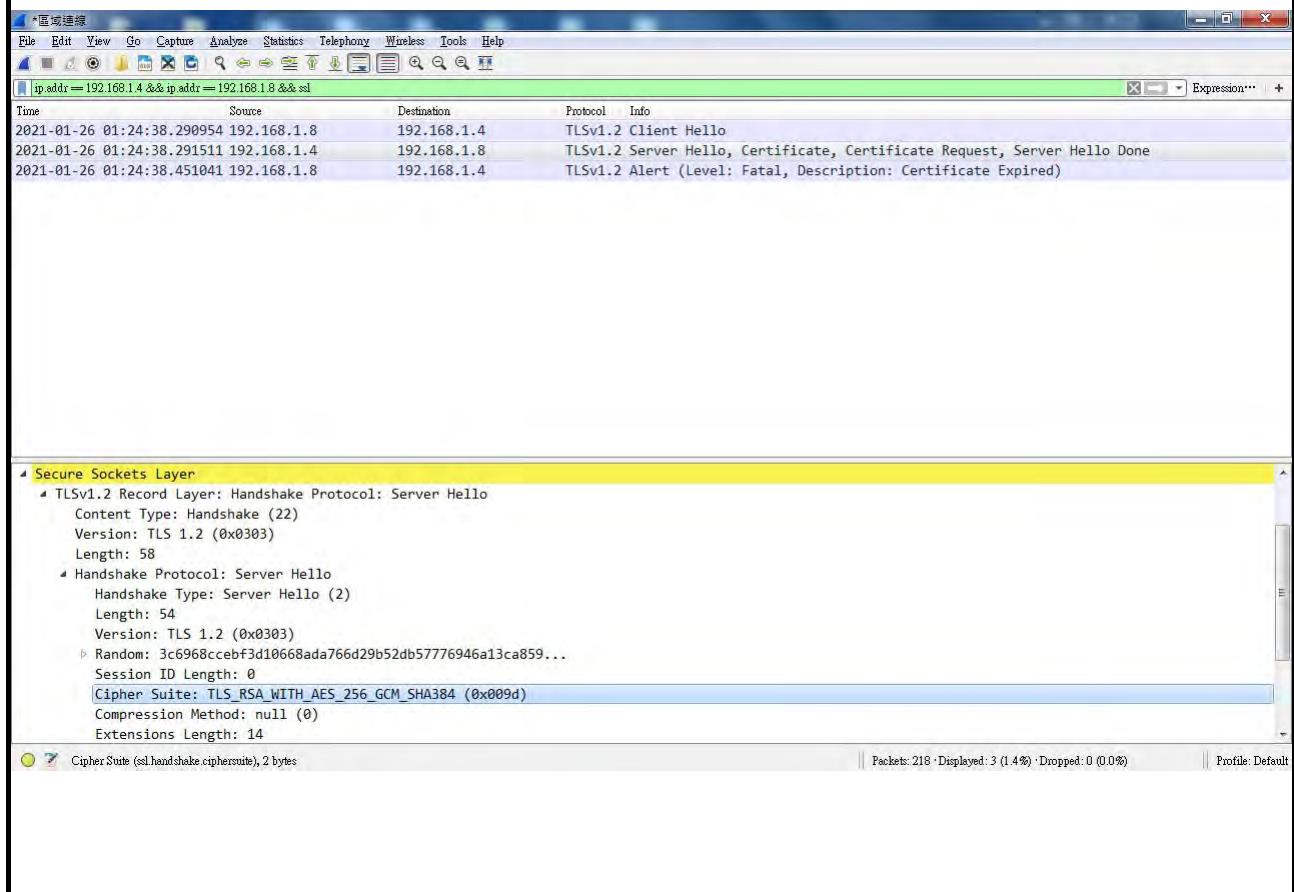




### Wireshark Plots for WINNF.FT.C.SCS.2 Test Case ID

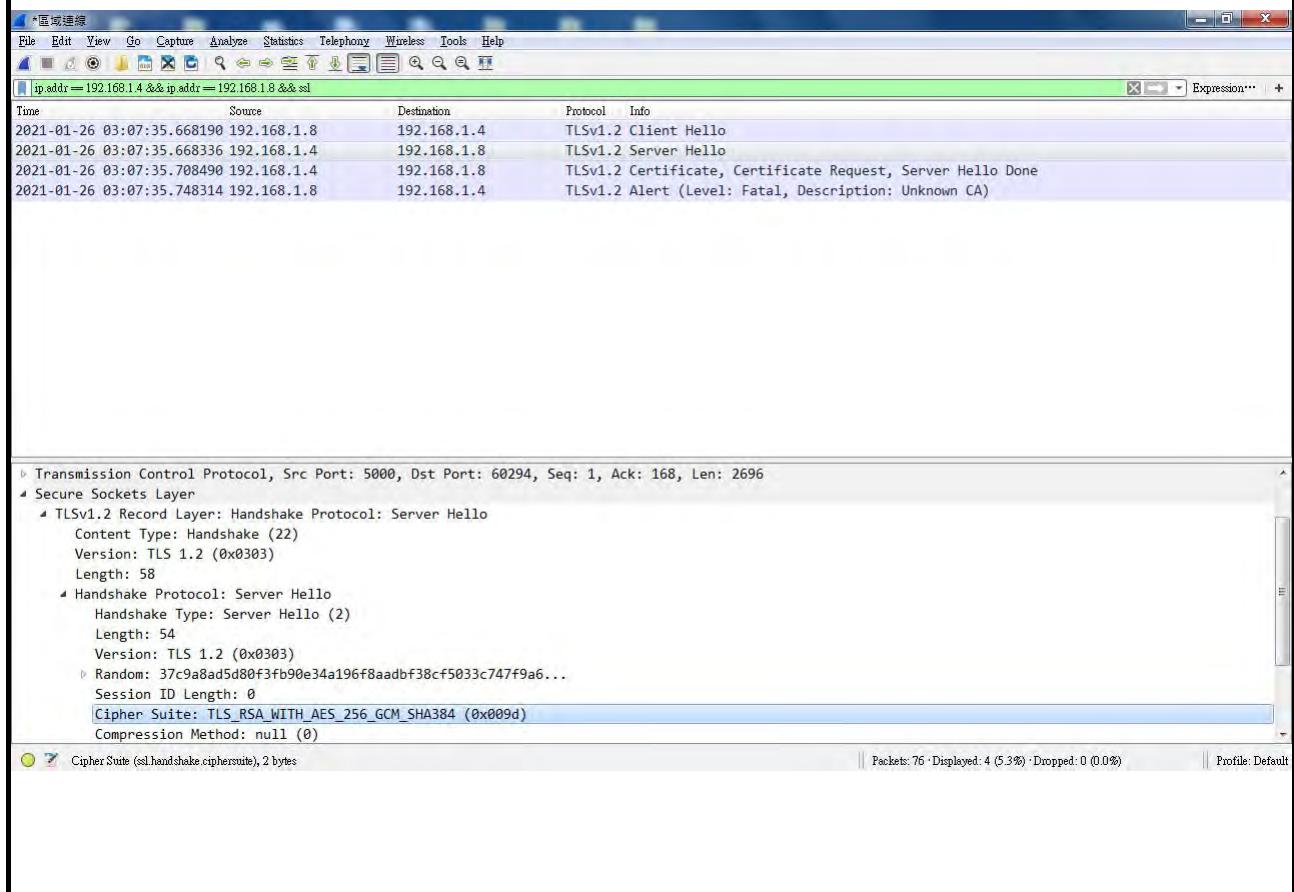


### Wireshark Plots for WINNF.FT.C.SCS.3 Test Case ID

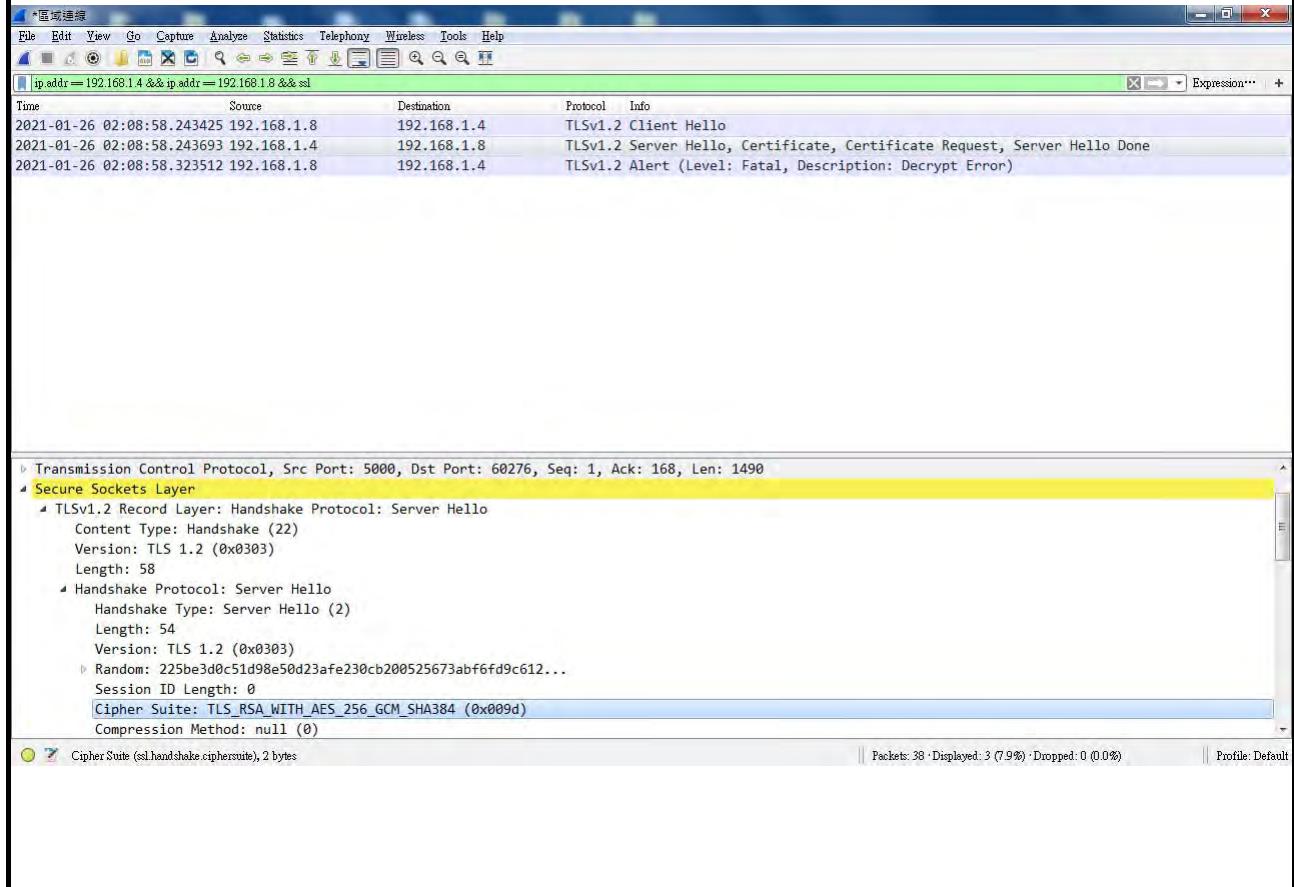


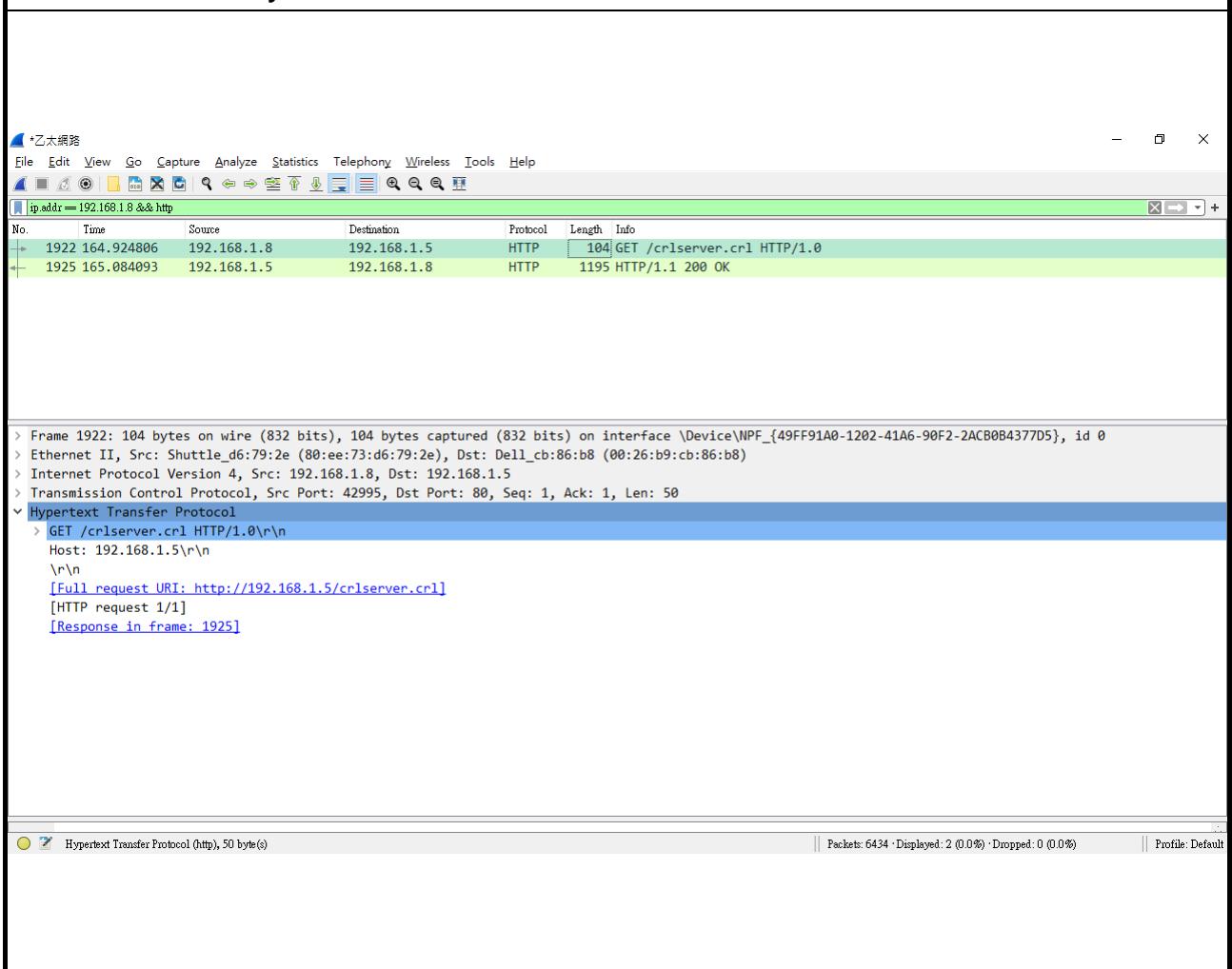


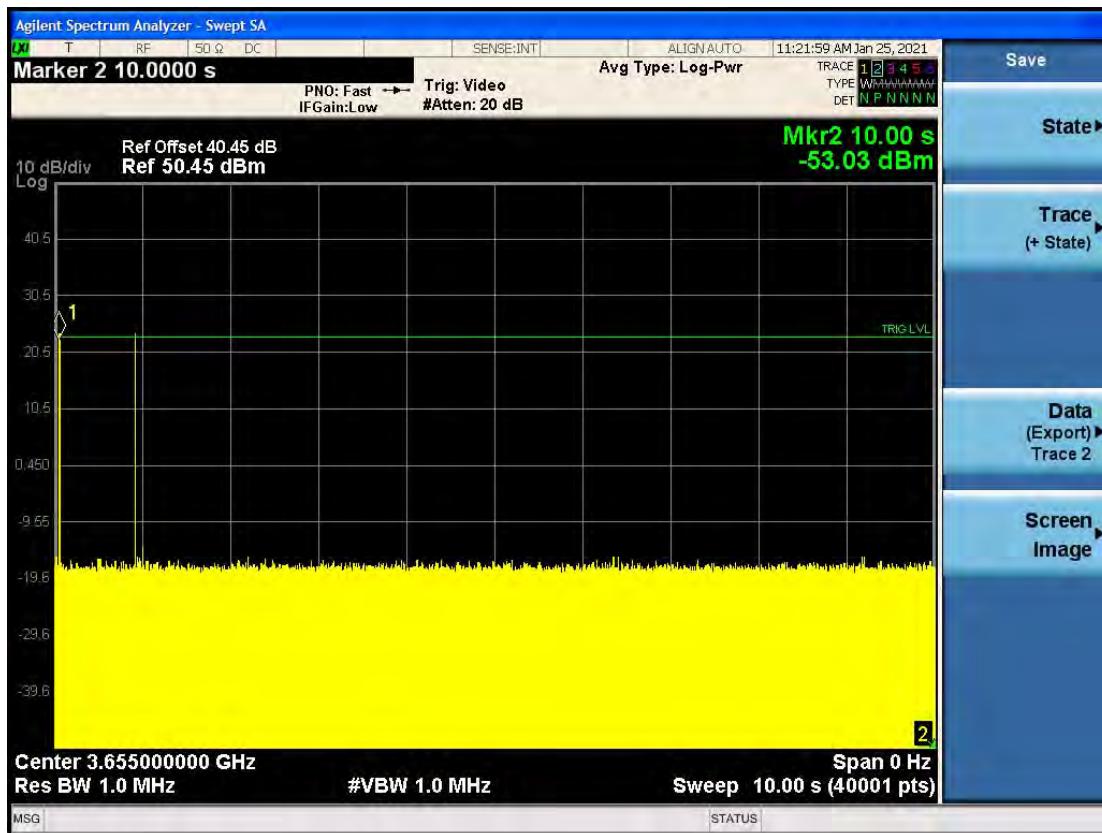
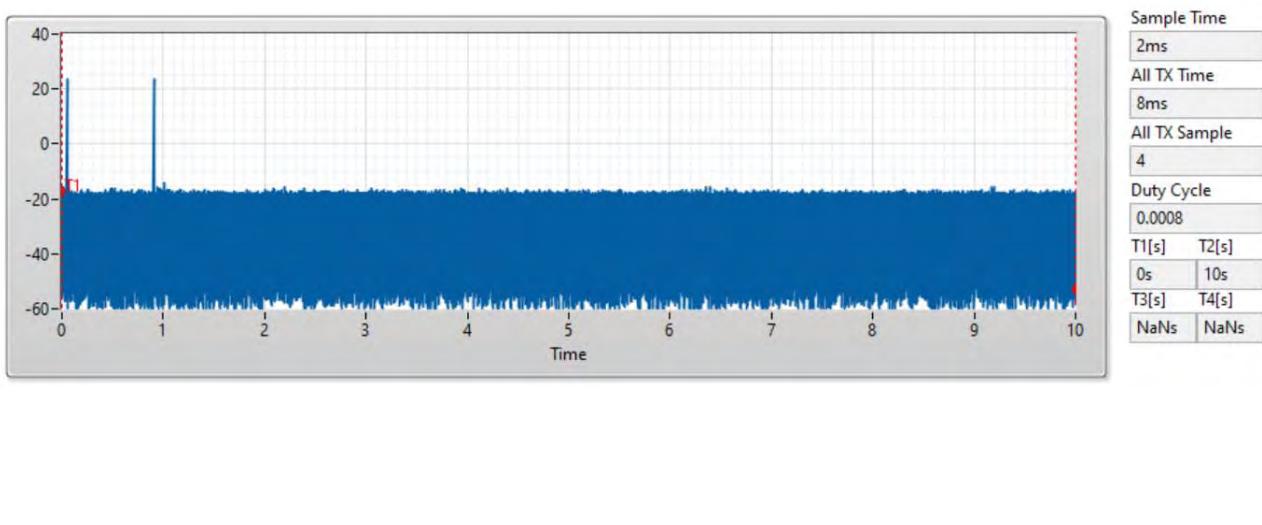
### Wireshark Plots for WINNF.FT.C.SCS.4 Test Case ID



### Wireshark Plots for WINNF.FT.C.SCS.5 Test Case ID

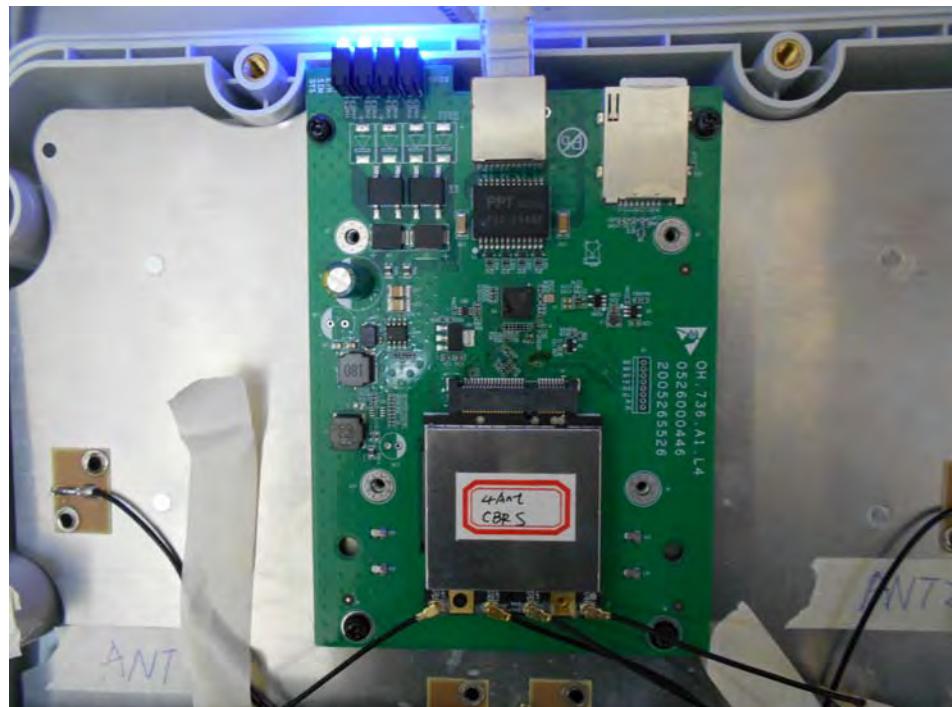
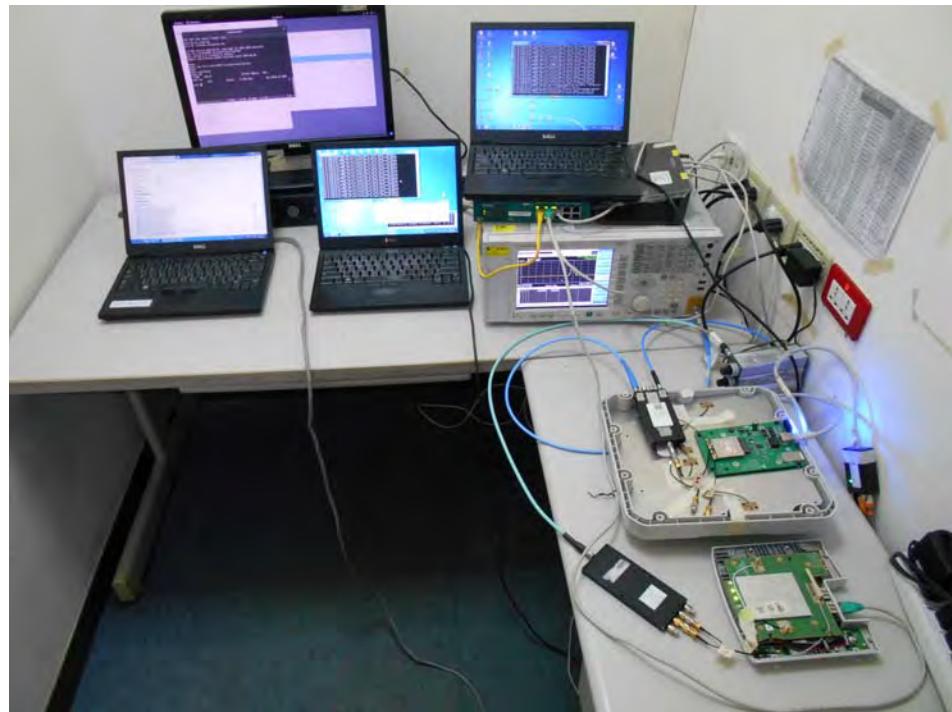


**CRL and OCSP Verify Plots for WINNF.FT.C.SCS.2 Test Case ID**

**1 second within any 10-second period**
**Spectrum Analyzer**

**Calculated Result**


The sum of On Time (aggregated time from marker 1 to 2): 0.008s < 1s = PASS

## 1. Photographs of Test Configuration



—————THE END—————