

## CBSD Test Report

**Report No.:** RF180607D01-2

**Test Model:** P208-TP

**Received Date:** Jun. 07, 2018

**Test Date:** Jul. 25 ~ Aug. 08, 2018

**Issued Date:** Aug. 08, 2018

**Applicant:** Sercomm Corp.

**Address:** 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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



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### Release Control Record

Issue No.	Description	Date Issued
RF180607D01-2	Original release.	Aug. 08, 2018

## 1 Certificate of Conformity

**Product:** CBRS Outdoor Small Cell

**Brand:** Sercomm

**Test Model:** P208-TP

**Sample Status:** MASS-PRODUCTION

**Applicant:** Sercomm Corp.

**Test Date:** Jul. 25 ~ Aug. 08, 2018

**Standards:** WINNF-TS-0122 V1.0.0  
CBRSA-TS-9001 V1.0.0

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 conformance characteristics under the conditions specified in this report.


**Prepared by :**

  
Polly Chien / Specialist

**Date:**

Aug. 08, 2018

**Approved by :**

  
Look Huang / Supervisor

**Date:**

Aug. 08, 2018

## 2 Summary of Test Results

WINNF-TS-0122 Version V1.0.0			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT(CBSD, DP/CBSD)	32	32	100
PT(CBSD, DP/CBSD)	1	1	100
Total	33	33	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.

WINNF-TS-0122 Test Case			
Section	Test Case ID	Test Case Title	Test Result
6.1.4.1.1	WINNF.FT.C.REG.1	Multi-Step registration	PASS
6.1.4.1.2	WINNF.FT.D.REG.2	Domain Proxy Multi-Step registration	NA
6.1.4.1.3	WINNF.FT.C.REG.3	Single-Step registration for Category A CBSD	NA
6.1.4.1.4	WINNF.FT.D.REG.4	Domain Proxy Single-Step registration for Cat A CBSD	NA
6.1.4.1.5	WINNF.FT.C.REG.5	Single-Step registration for CBSD with CPI signed data	PASS
6.1.4.1.6	WINNF.FT.D.REG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	NA
6.1.4.1.7	WINNF.FT.C.REG.7	Registration due to change of an installation parameter	NA
6.1.4.2.1	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	PASS
6.1.4.2.2	WINNF.FT.D.REG.9	Domain Proxy Missing Required parameters (responseCode 102)	NA
6.1.4.2.3	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	PASS
6.1.4.2.4	WINNF.FT.D.REG.11	Domain Proxy Pending registration (responseCode 200)	NA
6.1.4.2.5	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	PASS
6.1.4.2.6	WINNF.FT.D.REG.13	Domain Proxy Invalid parameters (responseCode 103)	NA
6.1.4.2.7	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	PASS
6.1.4.2.8	WINNF.FT.D.REG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	NA
6.1.4.2.9	WINNF.FT.C.REG.16	Unsupported SAS protocol version (responseCode 100)	PASS
6.1.4.2.10	WINNF.FT.D.REG.17	Domain Proxy Unsupported SAS protocol version (responseCode 100)	NA
6.1.4.2.11	WINNF.FT.C.REG.18	Group Error (responseCode 201)	PASS
6.1.4.2.12	WINNF.FT.D.REG.19	Domain Proxy Group Error (responseCode 201)	NA
6.1.4.3.1	WINNF.FT.C.REG.20	Category A CBSD location update	NA

### WINNF-TS-0122 Test Case

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

## 2.1 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	CBRS Outdoor Small Cell		
Brand	Sercomm		
Test Model	P208-TP		
Hardware Version	3.4		
FCC ID	P27P208		
Serial Number	1801BVV000034		
Software Version	FF3451		
Status of EUT	MASS-PRODUCTION		
Power Supply Rating	48Vdc from PoE		
Modulation Type	QPSK, 16QAM, 64QAM		
Operating Frequency	LTE	Channel Bandwidth 5MHz	TX: 3552.5 ~ 3697.5 MHz
			RX: 3552.5 ~ 3697.5 MHz
		Channel Bandwidth 10MHz	TX: 3555 ~ 3695 MHz
			RX: 3555 ~ 3695 MHz
		Channel Bandwidth 15MHz	TX: 3557.5 ~ 3692.5 MHz
			RX: 3557.5 ~ 3692.5 MHz
Channel Bandwidth	LTE	Channel Bandwidth 20MHz	TX: 3560 ~ 3690 MHz
			RX: 3560 ~ 3690 MHz
Channel Bandwidth	LTE	5MHz, 10MHz, 15MHz & 20MHz	
Max. EIRP Power	LTE	Channel Bandwidth 5MHz	32.72 dBm
		Channel Bandwidth 10MHz	32.74 dBm
		Channel Bandwidth 15MHz	32.73 dBm
		Channel Bandwidth 20MHz	32.71 dBm
Emission Designator	LTE	Channel Bandwidth 5MHz	QPSK: 4M49G7D
			16QAM: 4M50D7W
			64QAM: 4M50D7W
		Channel Bandwidth 10MHz	QPSK: 8M96G7D
			16QAM: 8M94D7W
			64QAM: 8M96D7W
		Channel Bandwidth 15MHz	QPSK: 13M4G7D
			16QAM: 13M4D7W
			64QAM: 13M4D7W
		Channel Bandwidth 20MHz	QPSK: 17M9G7D
			16QAM: 17M9D7W
			64QAM: 17M9D7W

Antenna Type	Refer to note as below
Antenna Connector	Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT uses following PoE.

Brand	Microsemi
Model	PD-9601G/AC
Input Power	100-240Vac, 50/60Hz, 1.35A,
Output Power	55Vdc, 1.75A

2. The antennas provided to the EUT, please refer to the following table:

Antenna	Brand	Model	Antenna Type	Antenna Connector	Antenna Gain (dBi)	Frequency Range
Chain 0	Sercomm	617210UG	Patch	IPEX	7.62	3.5~3.7GHz
Chain 1	Sercomm	617210UG	Patch	IPEX	7.16	3.5~3.7GHz

#### Cable Spec.

Brand	Model	Connector Type	Cable Loss(dB)	Cable Length (mm)
NA	NA	Right angle MMCX Plug	peak gain included	287mm

3. The EUT support single carrier and two carriers in intra-band contiguous spectrum operation, the two carrier mode is operation in 20MHz channel bandwidth and MIMO technology.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

#### Test Condition:

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

## 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 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 its granted parameters from the SAS Test Harness.
- d. Each test case result was recorded and validated by SAS Test Harness system and RF instrument. Test cases were recorded test results from SAS Test Harness system

### 4.3 Test Environment

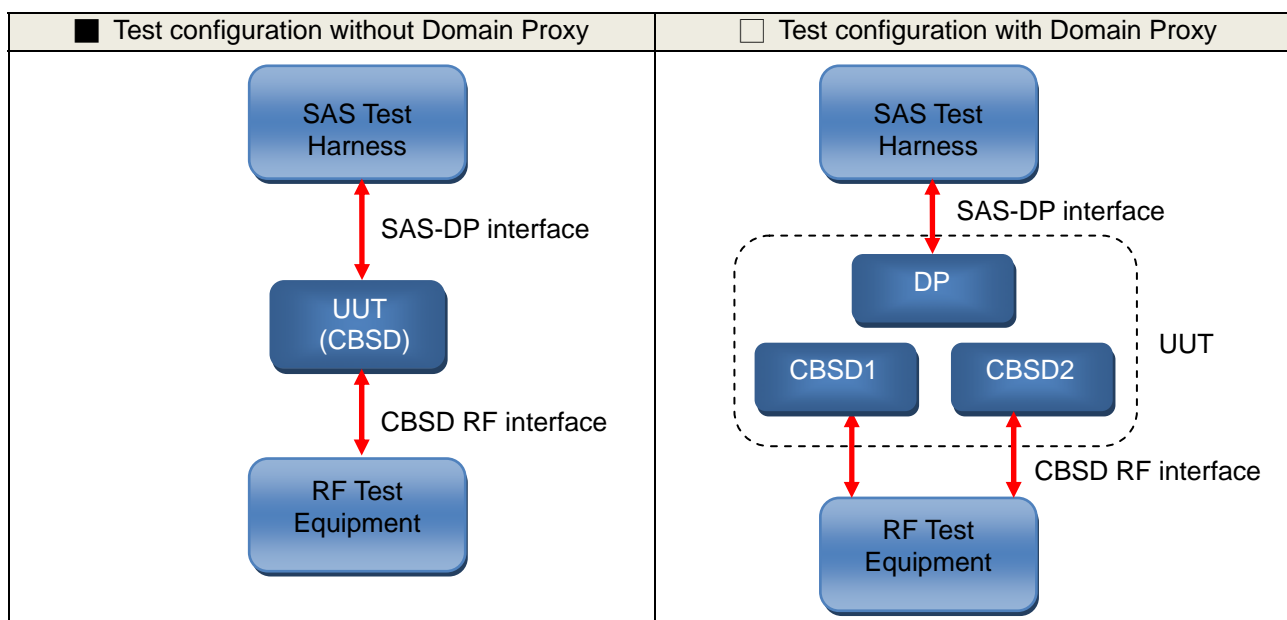
Test Harness Version	V1.0.0.2
Operating System	Microsoft Windows 10
TLS Version	1.2
Python	2.7.13

#### 4.4 Test Equipment

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030A	MY54490617	Oct. 16, 2017	Oct. 15, 2018
Temperature & Humidity Chamber TERCHY	MHU-225AU	920842	Jun. 01, 2018	May 31, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Mar. 25, 2018	Mar. 24, 2019
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.
  3. Tested Date: Jul. 25 ~ Aug. 08, 2018

#### 4.5 Test Setup



## 4.6 Test Results

Test case need to monitor RF interface and the measurement plots are in Section 5.

The test parameter used shall be referred to the test log file in Section 6.

### 4.6.1 CBSD Registration Process

#### 4.6.1.1 Successful registration (responseCode 0)

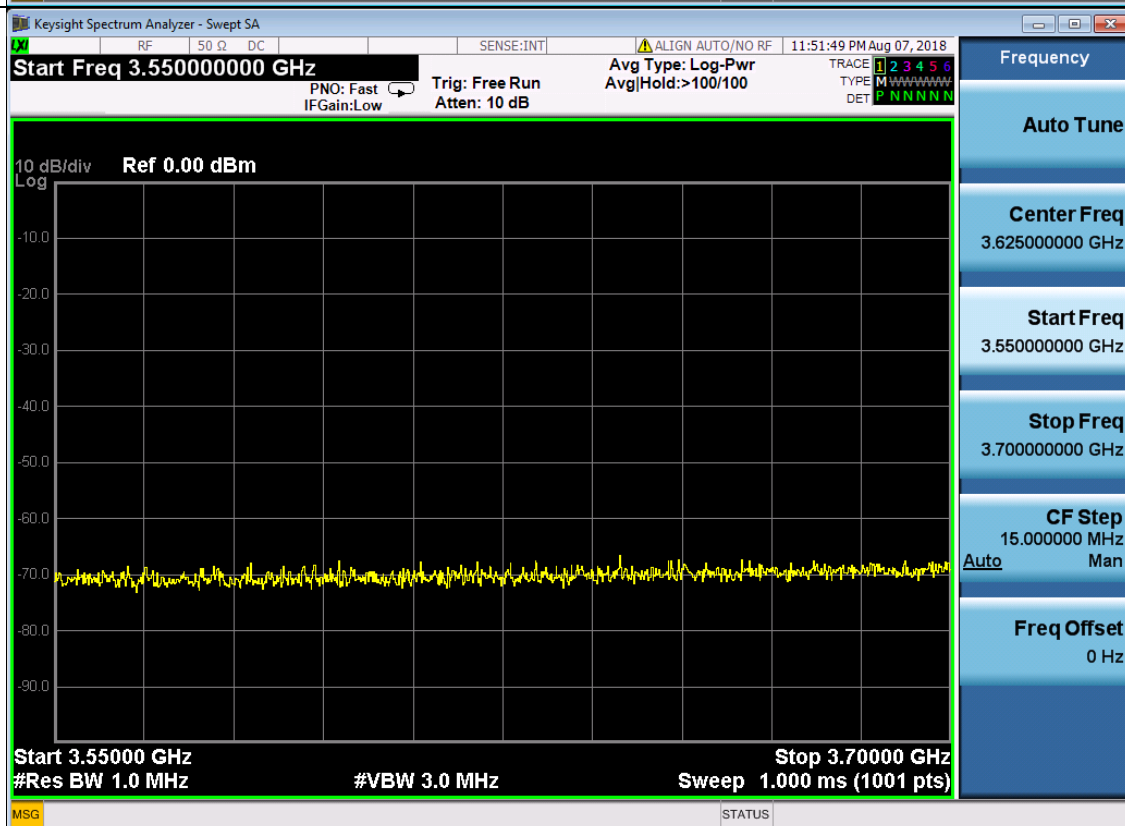
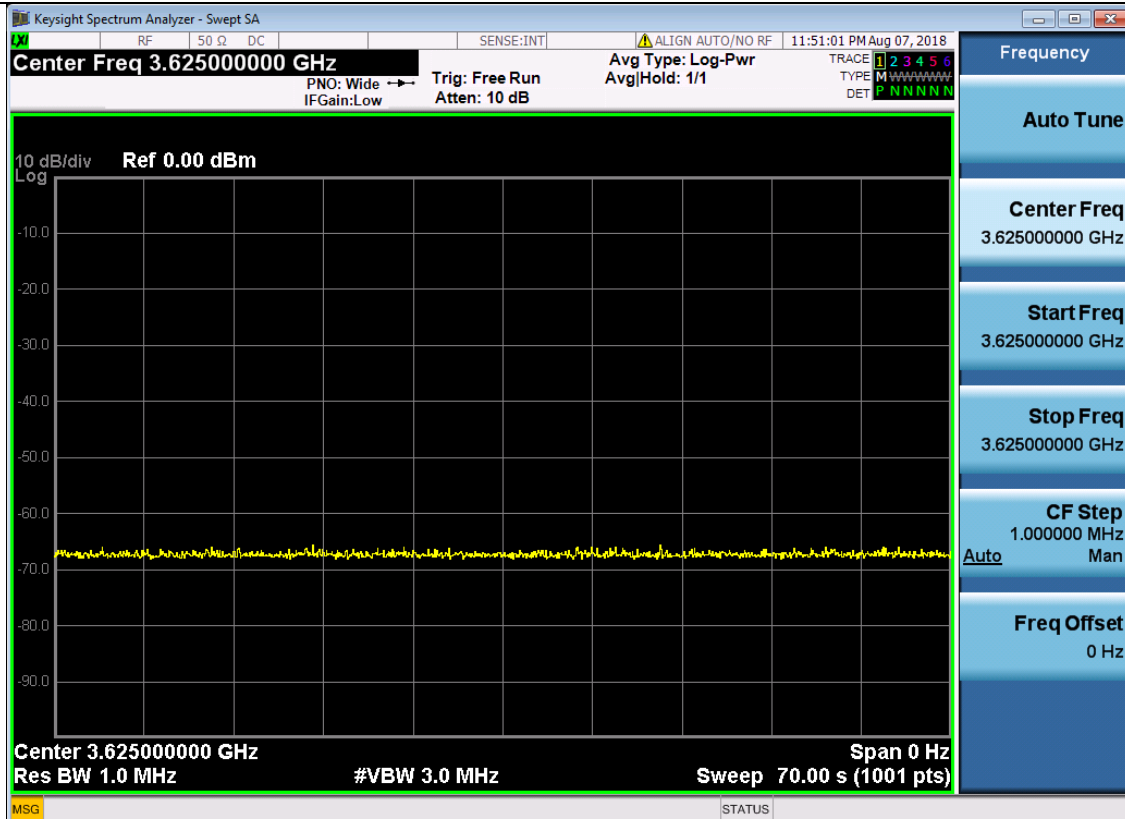
##### 4.6.1.1.1 Multi-Step registration

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

#	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 is in the Unregistered state</li> </ul>	--	--
2	<p>CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness:</p> <ul style="list-style-type: none"> <li>The required <i>userId</i>, <i>fcId</i> and <i>cbsdSerialNumber</i> registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges.</li> <li>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.</li> </ul> <p>Note: It is outside the scope of this document to test the Registration information that is supplied via another means.</p>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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	<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 shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.1.2 Domain Proxy Multi-Step registration

☐ Test Case ID : WINNF.FT.D.REG.2 ☒ NA

#	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 is in the Unregistered state</li> </ul>	--	--
2	<p>DP with two CBSD sends correct Registration request information, as specified in [n.5], in the form of one 2-element Array or as individual messages to the SAS Test Harness:</p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul> <p>Note: It is outside the scope of this document to test the Registration information that is supplied via another means.</p>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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> = Ci</li> <li><i>measReportConfig</i> shall not be included</li> <li><i>responseCode</i> = 0 for each CBSD</li> </ul> </li> </ul>	--	--
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	<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 not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL



#### 4.6.1.1.3 Single-Step registration for Category A CBSD

☐ Test Case ID : WINNF.FT.C.REG.3 ☒ NA

#	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 is in the Unregistered state</li> </ul>	--	--
2	<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</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>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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	<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 shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.1.4 Domain Proxy Single-Step registration for Cat A CBSD

☐ Test Case ID : WINNF.FT.D.REG.4 ☒ NA

#	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 the SAS Test Harness</li> <li>• UUT is in the Unregistered state</li> </ul>	--	--
2	The DP with two CBSDs sends Registration requests in the form of one 2-element Array or as individual messages to SAS Test Harness. <ul style="list-style-type: none"> <li>• The required <i>userId</i>, <i>fcid</i> and <i>cbsdSerialNumber</i> and REG-Conditional <i>cbsdCategory</i>, <i>airInterface</i>, <i>installationParam</i>, and <i>measCapability</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>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	<ul style="list-style-type: none"> <li>• SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or individual messages as follows:               <ul style="list-style-type: none"> <li>- <i>cbsdId</i> = C</li> <li>- <i>measReportConfig</i> for each CBSD shall not be included</li> <li>- <i>responseCode</i> = 0 for each CBSD</li> </ul> </li> </ul>	--	--
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"> <li>• UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

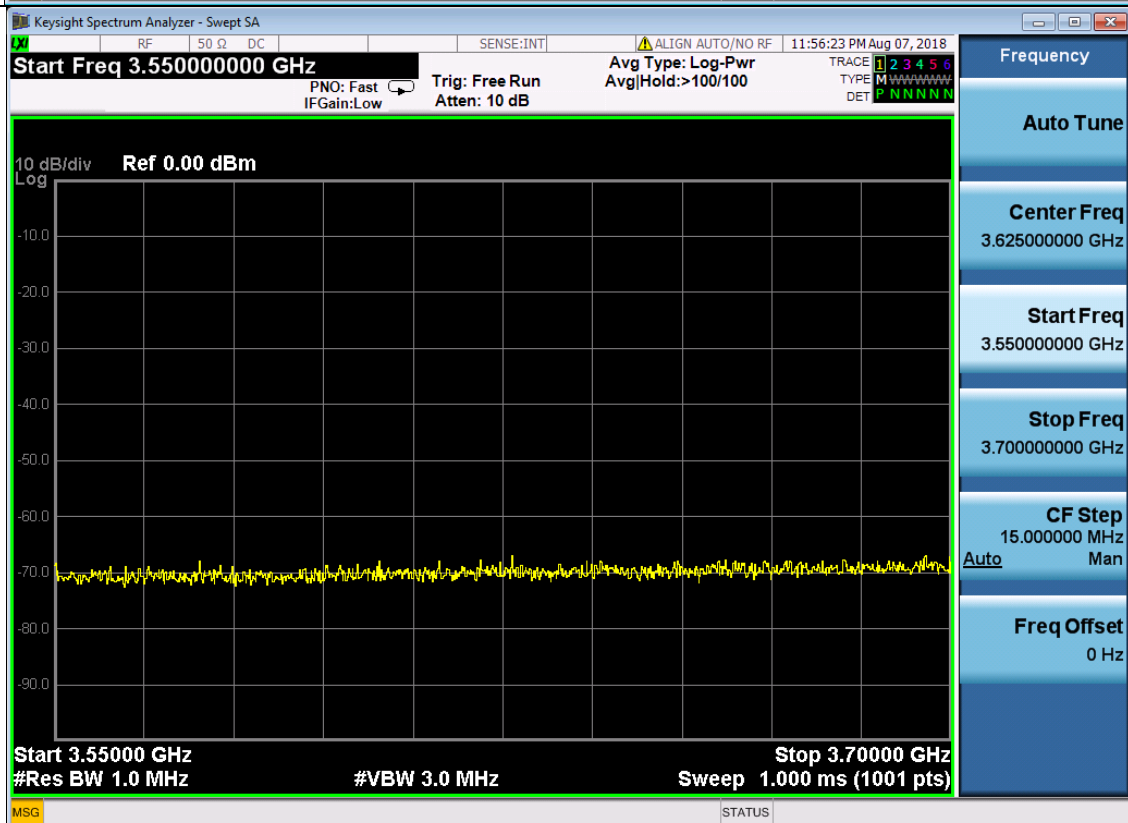
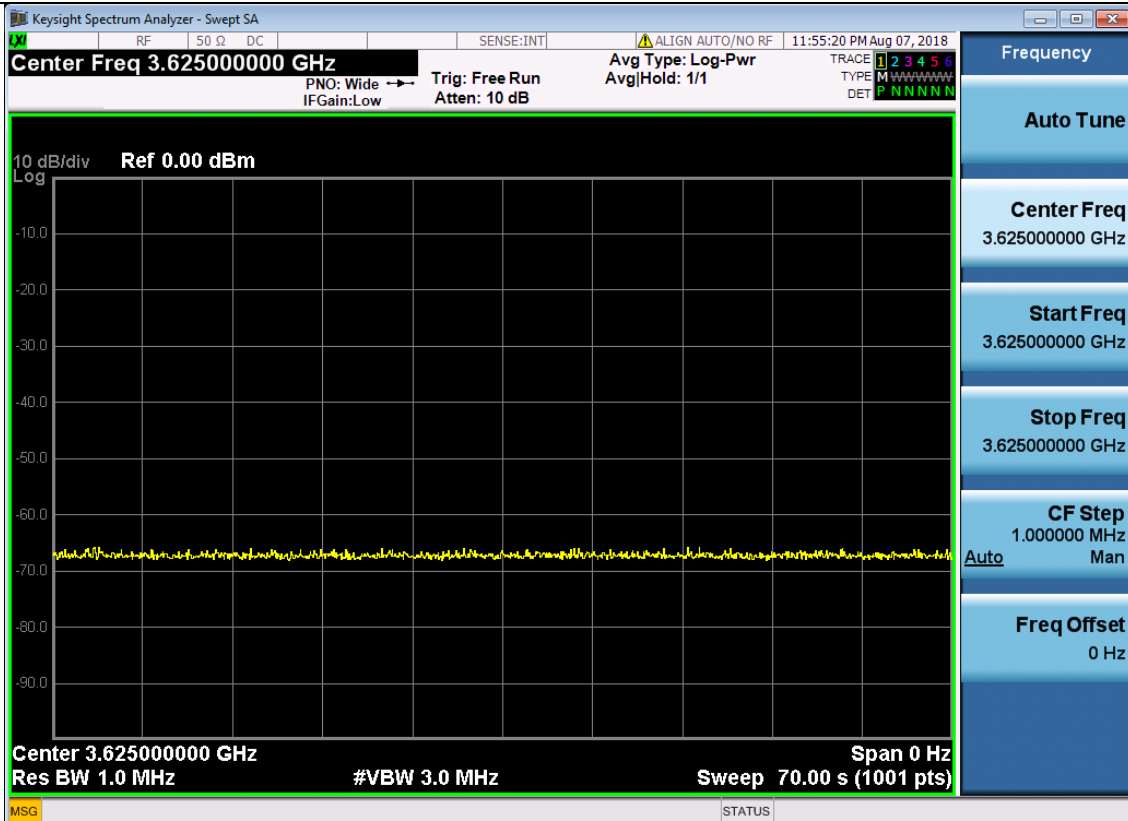
#### 4.6.1.1.5 Single-Step registration for CBSD with CPI signed data

☒ Test Case ID : WINNF.FT.C.REG.5
 ☐ NA

#	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>fcld</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>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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 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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.1.6 Domain Proxy Single-Step registration for CBSD with CPI signed data

☐ Test Case ID : WINNF.FT.D.REG.6 ☒ NA

#	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 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	<p>The DP with two CBSD sends Registration request in the form of one 2-element Array or as individual messages to the SAS Test Harness:</p> <ul style="list-style-type: none"> <li>The required <i>userId</i>, <i>fcid</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>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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> = Ci</li> <li><i>measReportConfig</i> for each CBSD shall not be included.</li> <li><i>responseCode</i> = 0 for each CBSD</li> </ul> </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 shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.1.7 Registration due to change of an installation parameter

☐ Test Case ID : WINNF.FT.C.REG.7 ☒ NA

#	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> </ul>	--	--
2	UUT has successfully registered with SAS Test Harness	--	--
3	Change an installation parameters at the UUT (time T) Tester needs to record the current time at which the parameter change is executed.	--	--
4	Monitor the SAS-CBSD interface. UUT sends a deregistrationRequest to the SAS Test Harness The deregistration request shall be sent within (T + 60 seconds) from step 3.	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.2 Unsuccessful registration: non-zero responseCodes

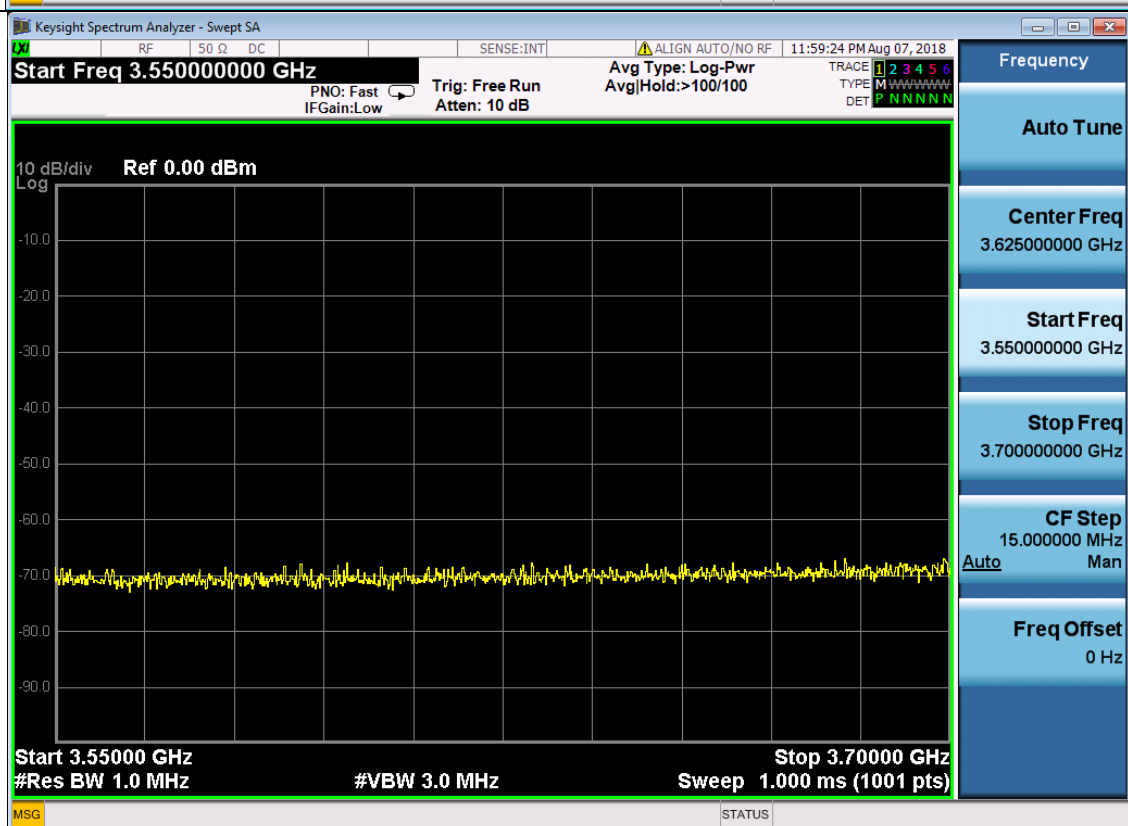
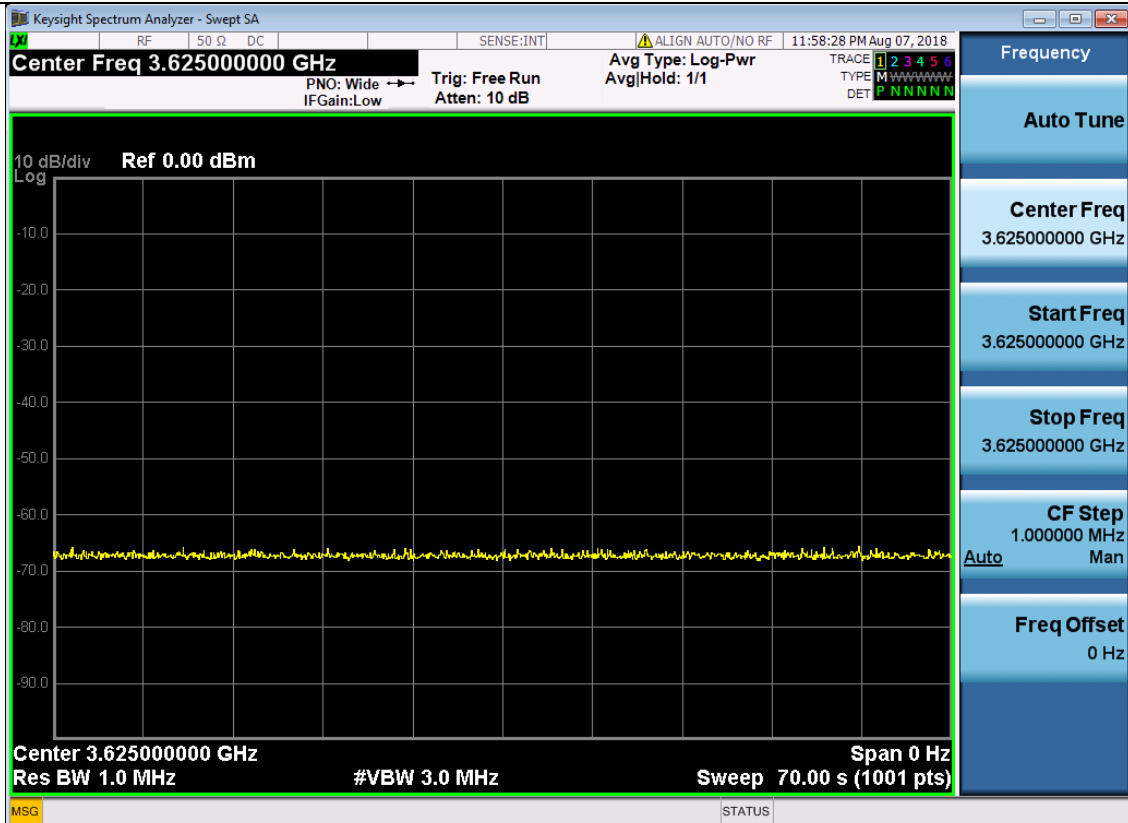
##### 4.6.1.2.1 Missing Required parameters (responseCode 102)

☒ 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"> <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 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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.2 Domain Proxy Missing Required parameters (responseCode 102)

☐ Test Case ID : WINNF.FT.D.REG.9 ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>SAS response does not include a <i>cbsdId</i>.</li> <li><i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
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 each 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>UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.2.3 Pending registration (responseCode 200)

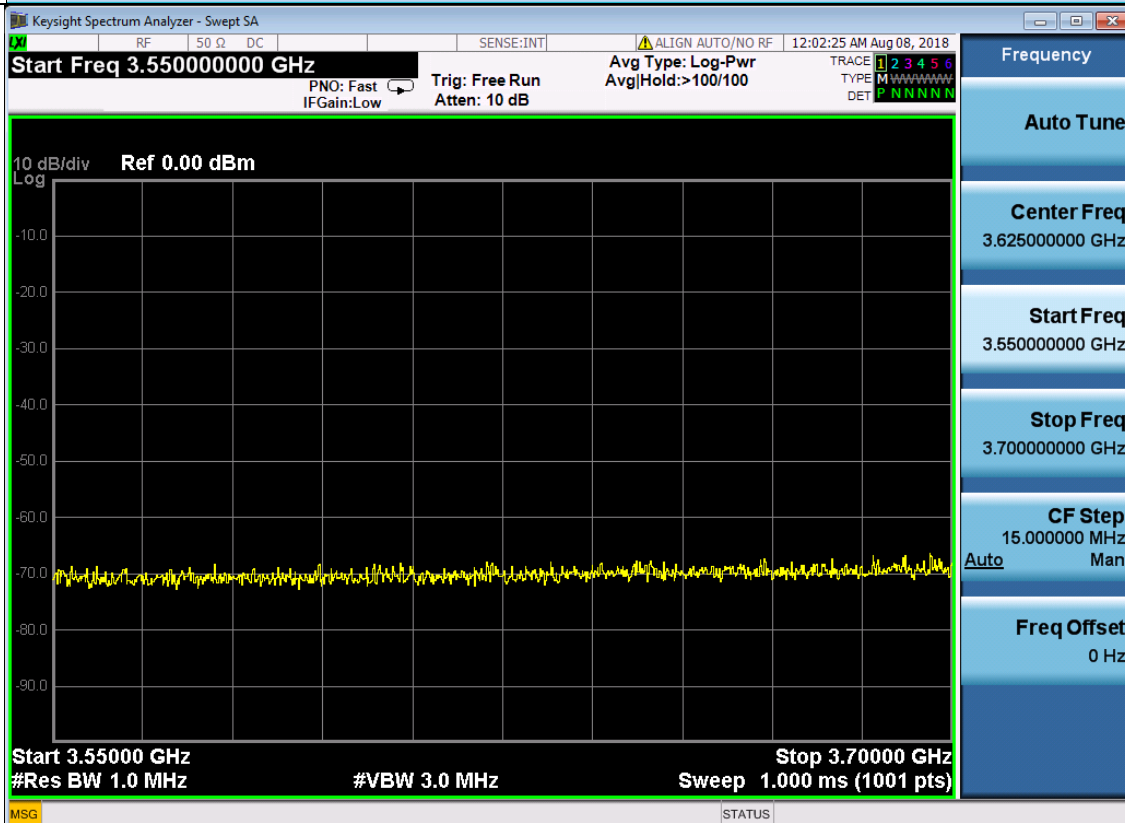
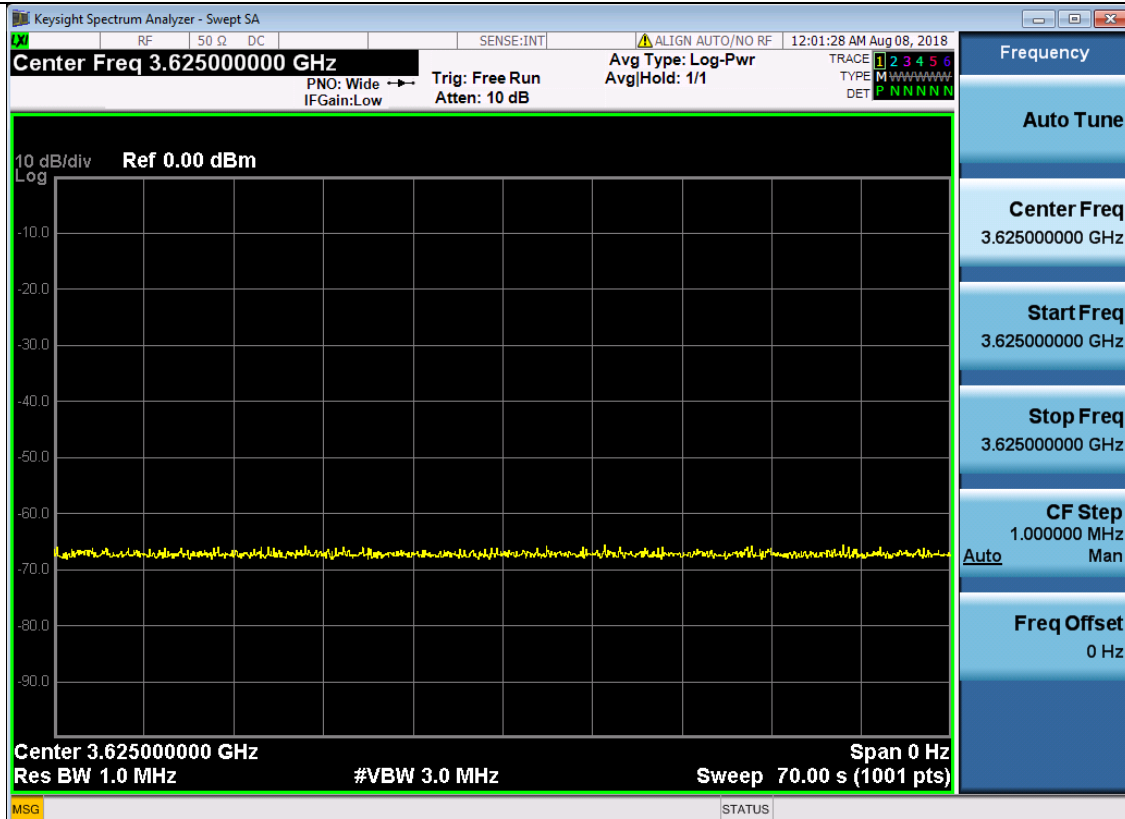
☒ Test Case ID : WINNF.FT.C.REG.10 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <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 will not provide any positive response ( <i>responseCode</i> =200) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL



RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.4 Domain Proxy Pending registration (responseCode 200)

☐ Test Case ID : WINNF.FT.D.REG.11      ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>SAS response does not include a <i>cbsdId</i>.</li> <li><i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> =200) to further request messages from the UUT.	--	--
5	Monitor the RF output of each 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>UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

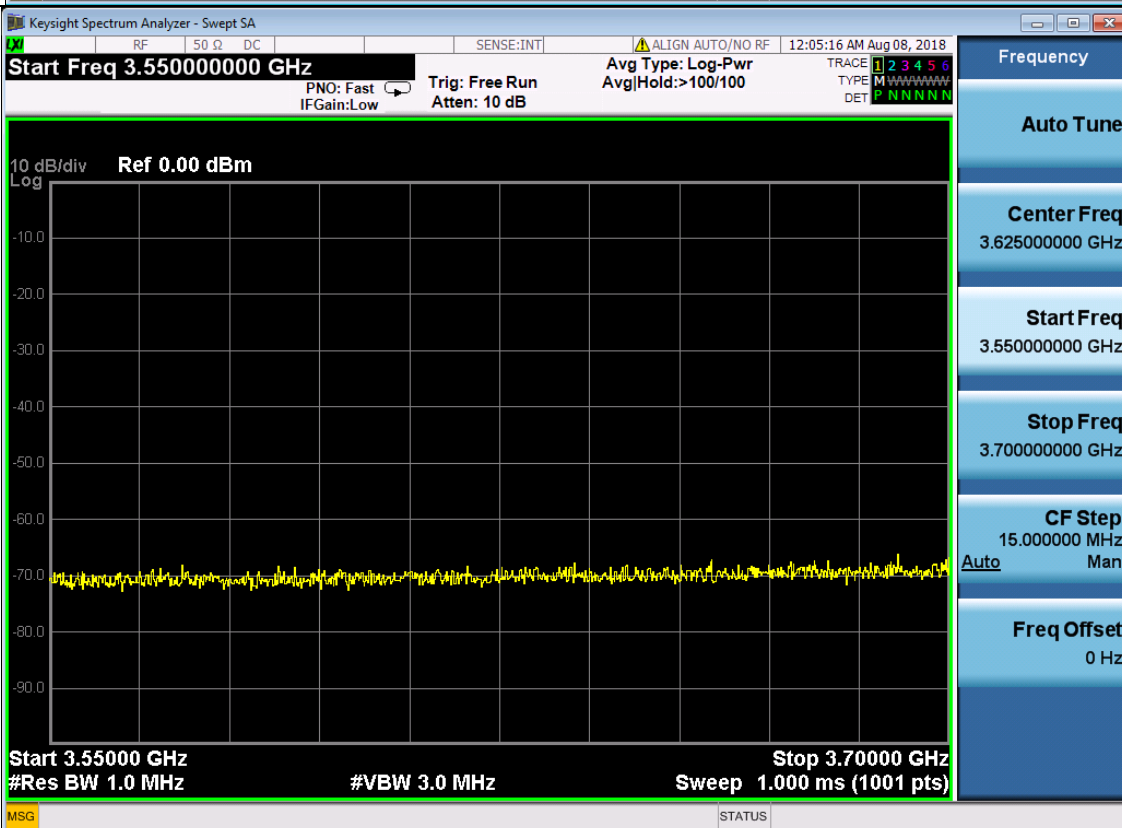
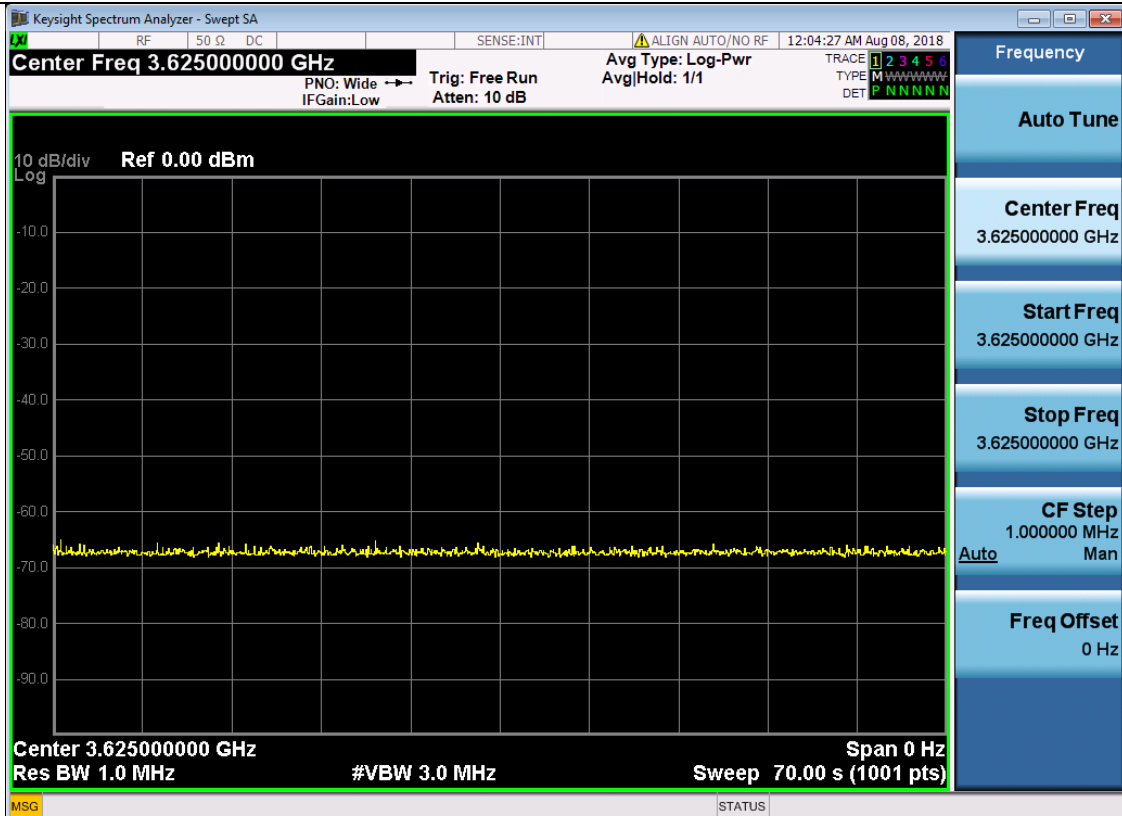
#### 4.6.1.2.5 Invalid parameter (responseCode 103)

☒ 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"> <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 will not provide any positive response ( <i>responseCode</i> =103) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.6 Domain Proxy Invalid parameters (responseCode 103)

☐ Test Case ID : WINNF.FT.D.REG.13      ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>SAS response does not include a <i>cbsdId</i>.</li> <li><i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> R1 = 0 for CBSD1 and R2 = 103 for CBSD2) to further request messages from the UUT.	--	--
5	Monitor the RF output of each 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>UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

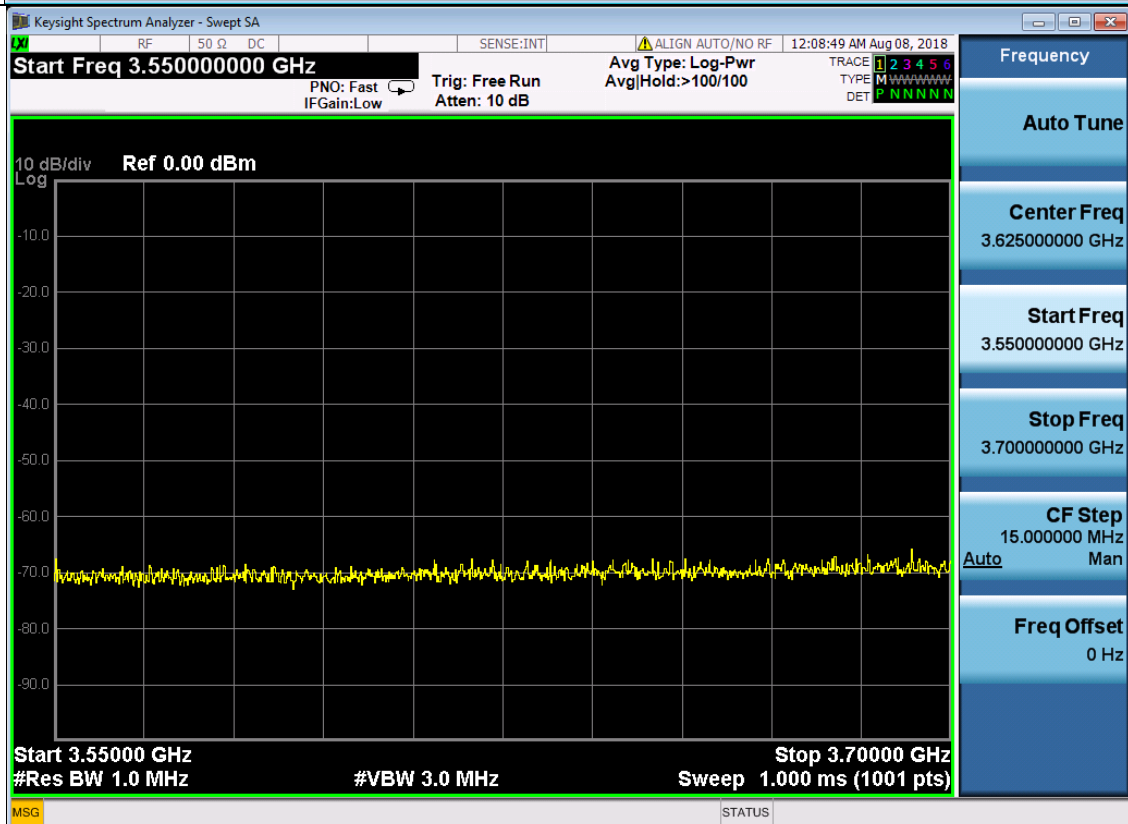
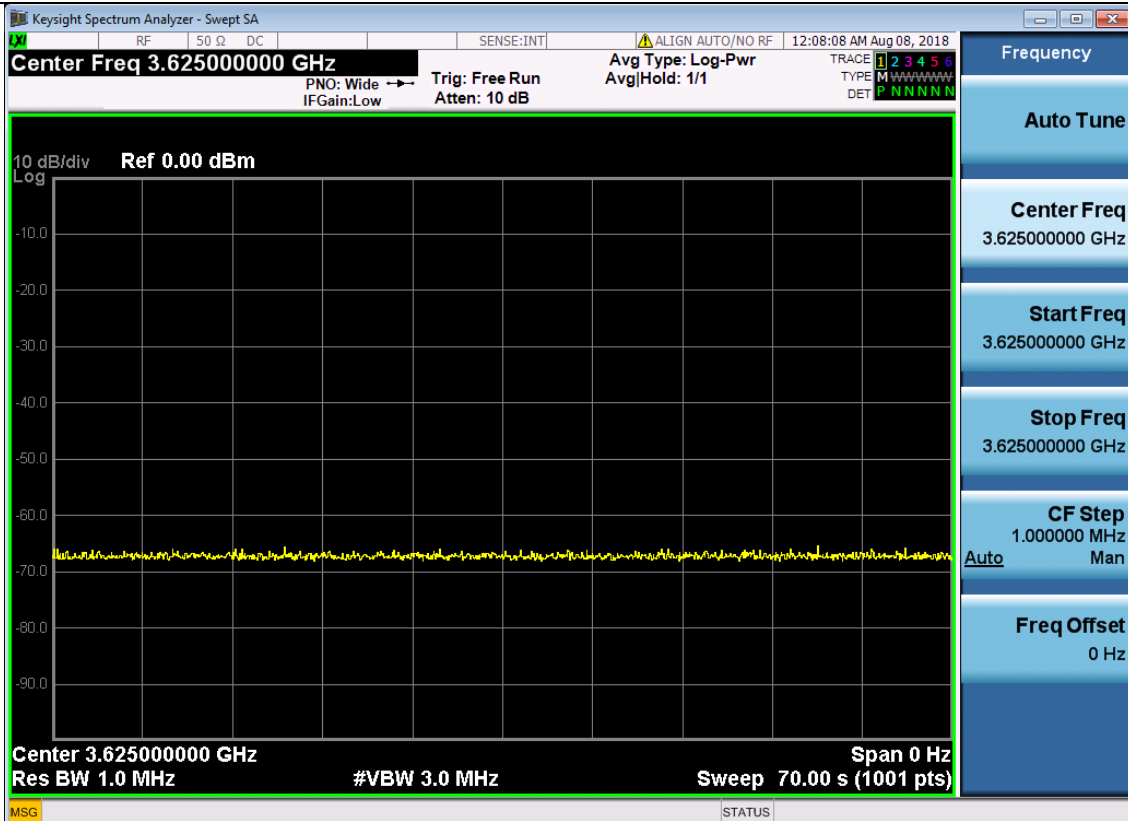
#### 4.6.1.2.7 Blacklisted CBSD (responseCode 101)

☒ 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"> <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 will not provide any positive response ( <i>responseCode</i> =101) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.8 Domain Proxy Blacklisted CBSD (responseCode 101)

☐ Test Case ID : WINNF.FT.D.REG.15      ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>SAS response does not include a <i>cbsdId</i>.</li> <li><i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> R1 = 0 for CBSD1 and R2 = 101 for CBSD2) to further request messages from the UUT.	--	--
5	Monitor the RF output of each 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>UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

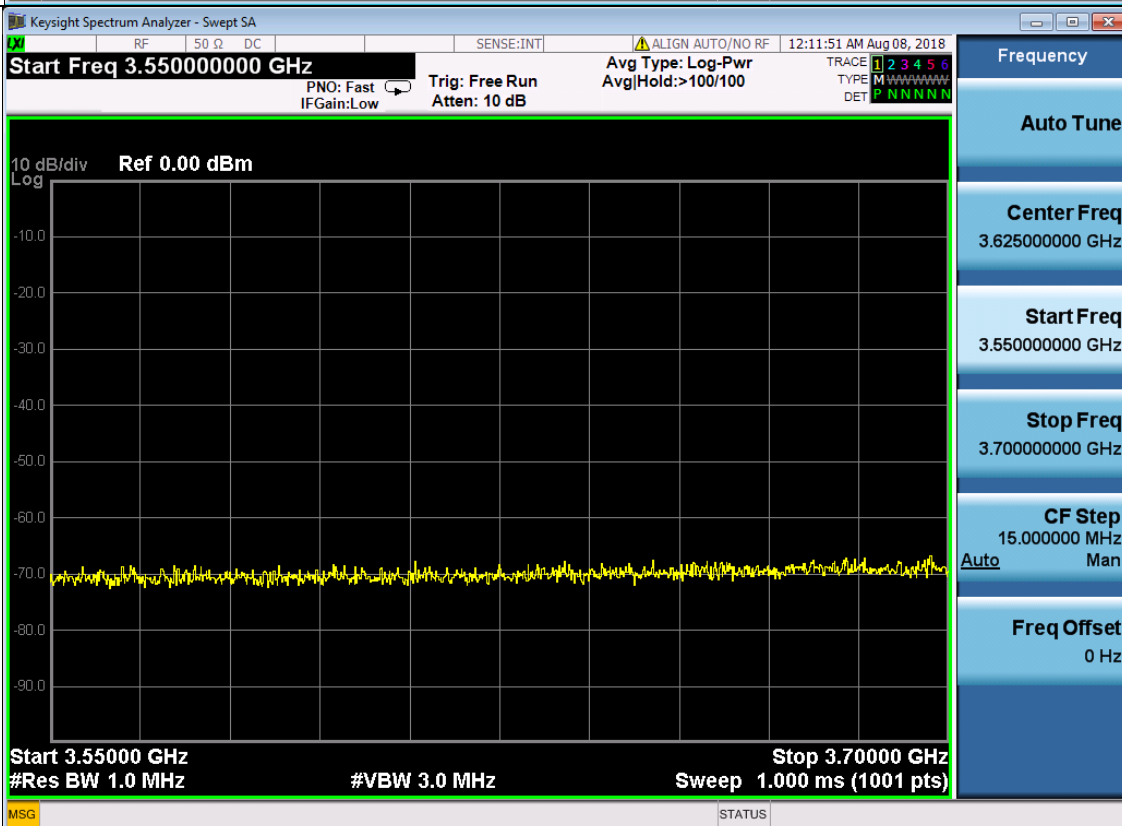
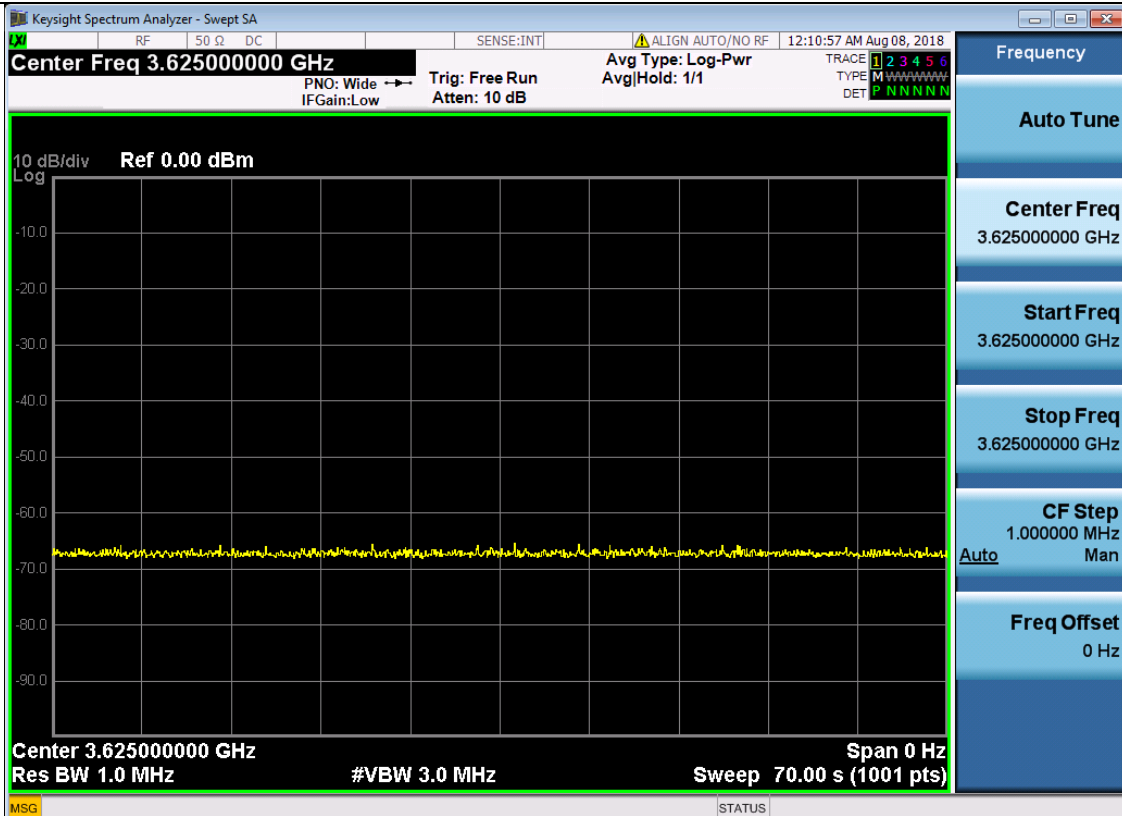
#### 4.6.1.2.9 Unsupported SAS protocol version (responseCode 100)

☒ 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"> <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 will not provide any positive response ( <i>responseCode</i> =100) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.10 Domain Proxy Unsupported SAS protocol version (responseCode 100)

☐ Test Case ID : WINNF.FT.D.REG.17 ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>SAS response does not include a <i>cbsdId</i>.</li> <li><i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> (Ri) = 100 for each CBS) to further request messages from the UUT.	--	--
5	Monitor the RF output of each 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>UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.2.11 Group Error (responseCode 201)

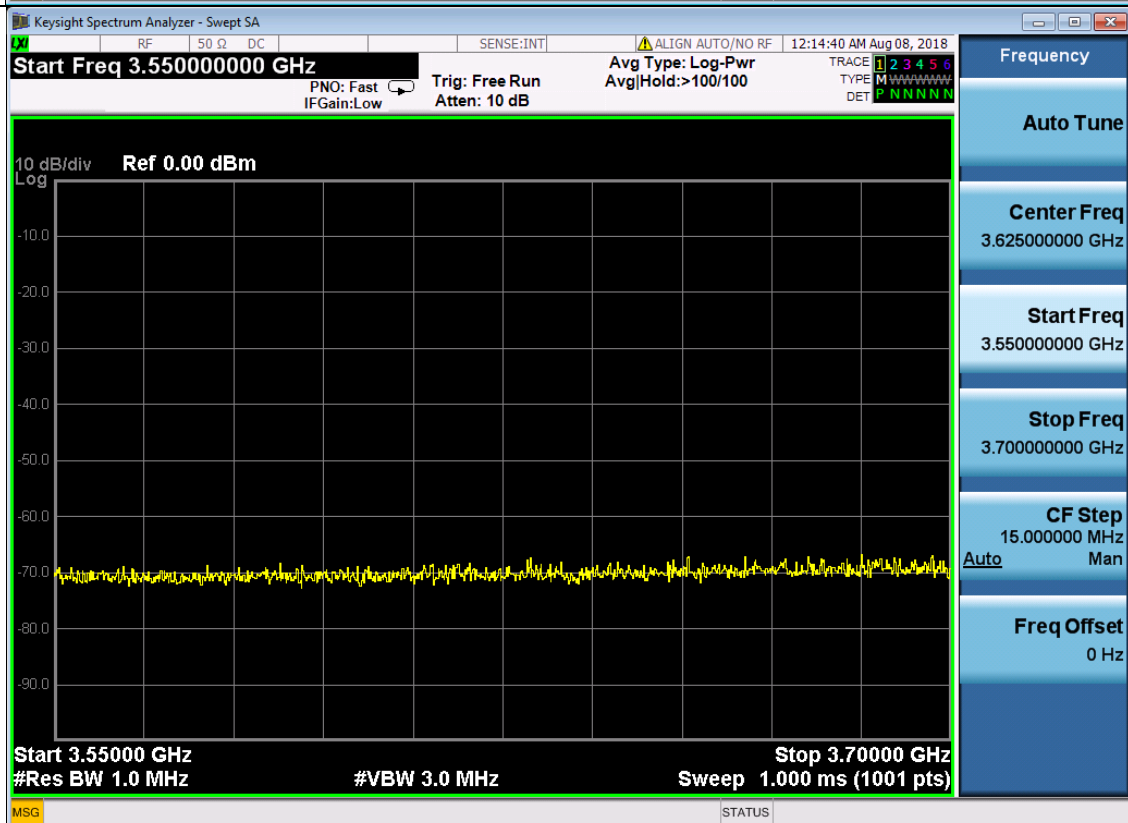
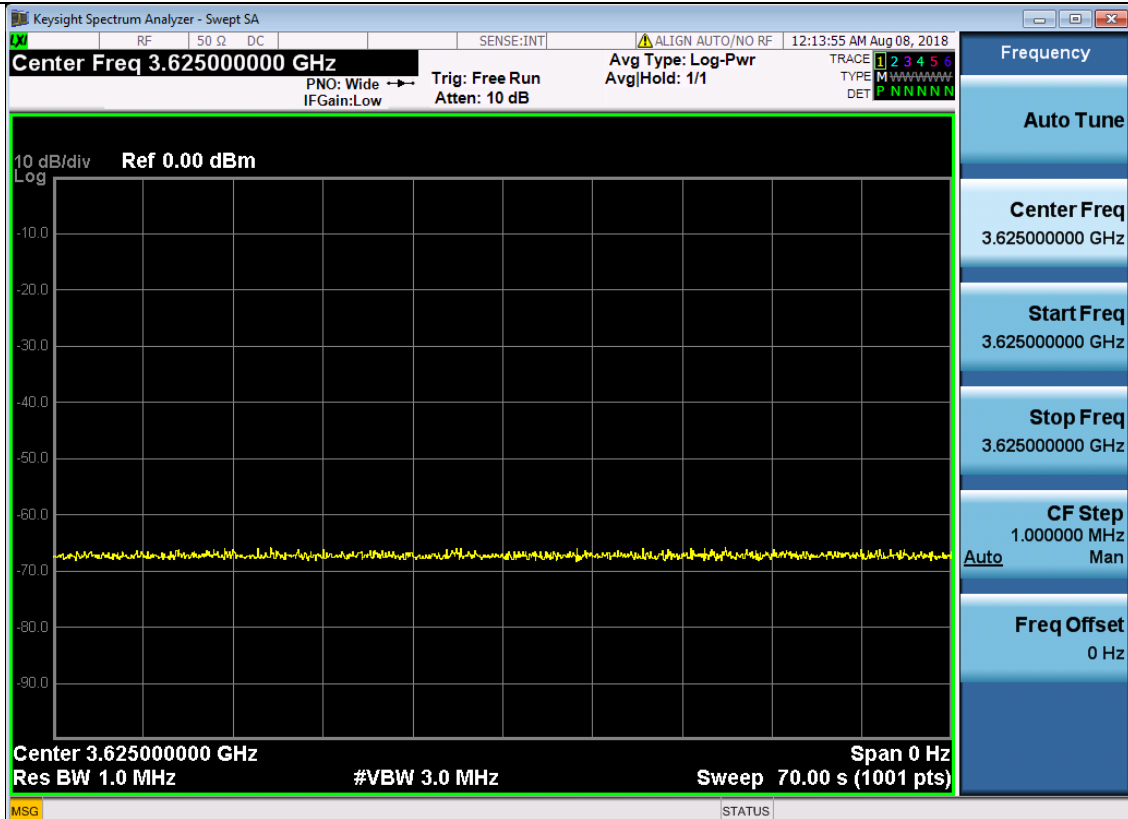
☒ Test Case ID : WINNF.FT.C.REG.18 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <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 will not provide any positive response ( <i>responseCode</i> =201) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL



RF measurement plot for Test Case :

- UUT shall not transmit.



#### 4.6.1.2.12 Domain Proxy Group Error (responseCode 201)

☐ Test Case ID : WINNF.FT.D.REG.19      ☒ NA

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: <ul style="list-style-type: none"> <li>- SAS response does not include a <i>cbsdId</i>.</li> <li>- <i>responseCode</i> = Ri for CBSD1 and CBSD2</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> R1 = 0 for CBSD1 and R2 = 201 for CBSD2.) to further request messages from the UUT.	--	--
5	Monitor the RF output of each 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>• UUT shall not transmit RF</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.1.3 Category A CBSD location update

##### 4.6.1.3.1 Category A CBSD location update

☐ Test Case ID : WINNF.FT.C.REG.20      ☒ NA

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 Successful responses from the SAS Test Harness

#### 4.6.2.1.1 Successful Grant response

Test Case ID : WINNF.FT.C.HBT.1

This test case is incorporated into WINNF.FT.C.HBT.1, which validates successful Grant messaging as part of that test case.

#### 4.6.2.1.2 Domain Proxy Successful Grant response

Test Case ID : WINNF.FT.D.HBT.2

This test case is incorporated into WINNF.FT.D.HBT.2, which validates successful Grant messaging as part of that test case

### 4.6.2.2 Unsuccessful responses from the SAS Test Harness

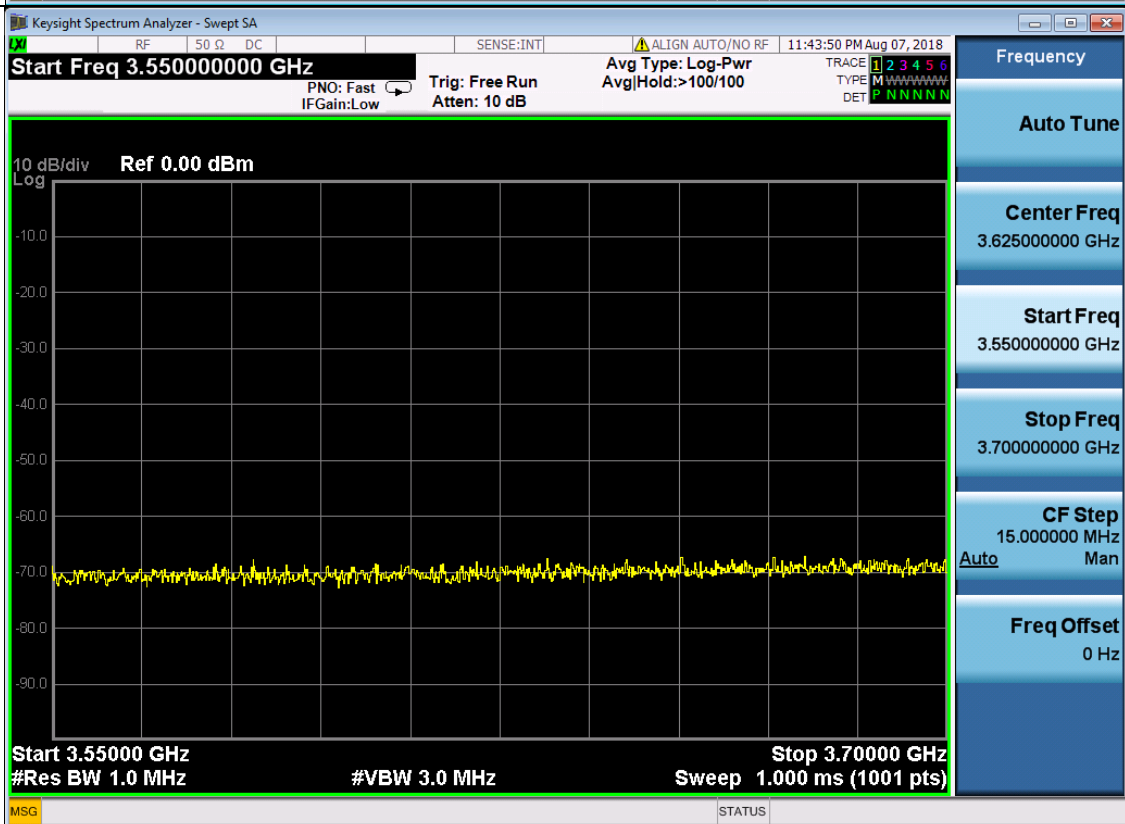
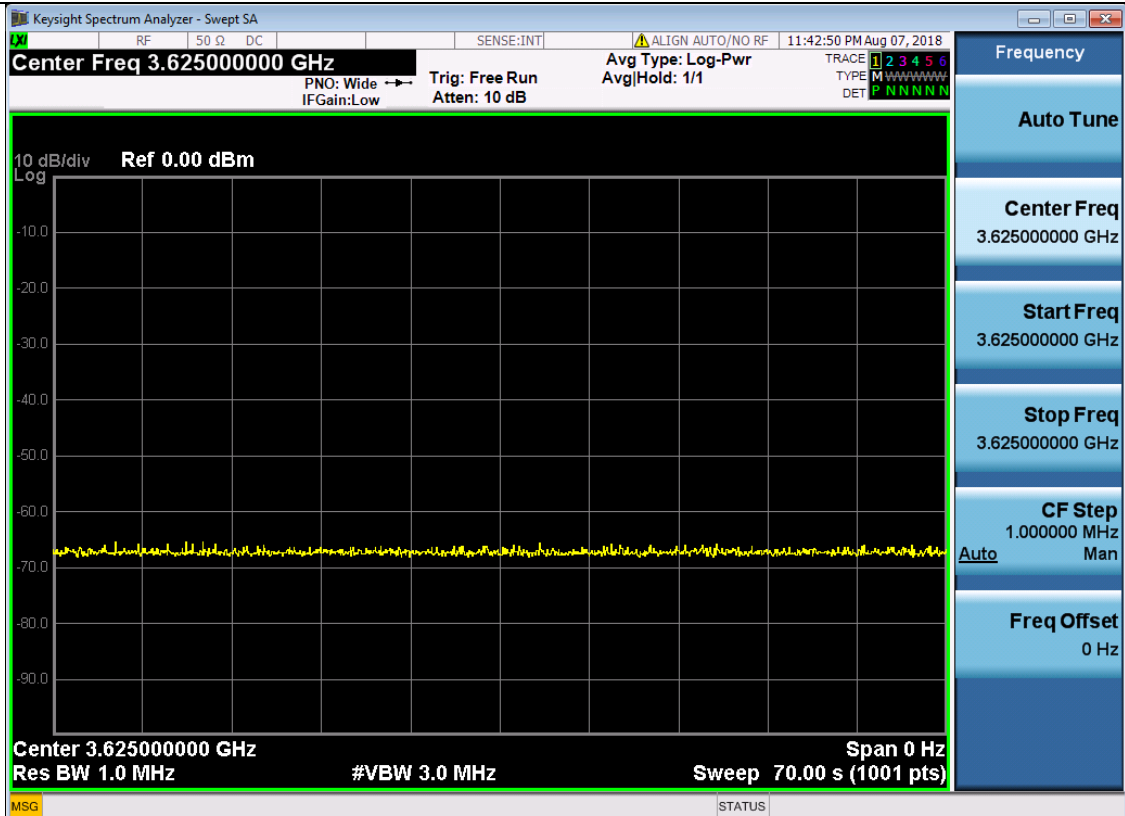
#### 4.6.2.2.1 Unsuccessful Grant responseCode=400 (INTERFERENCE)

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

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including ● <i>cbsdId</i> =C ● <i>responseCode</i> = R	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> =0) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall not transmit RF	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



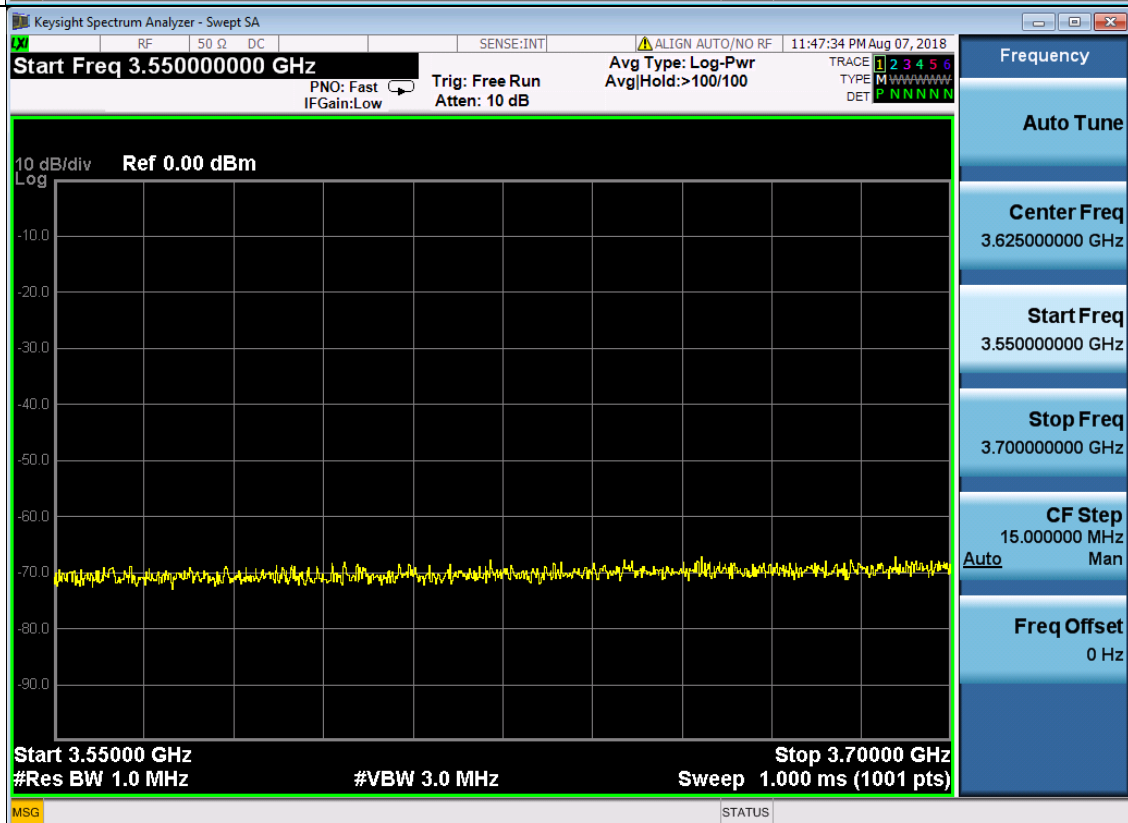
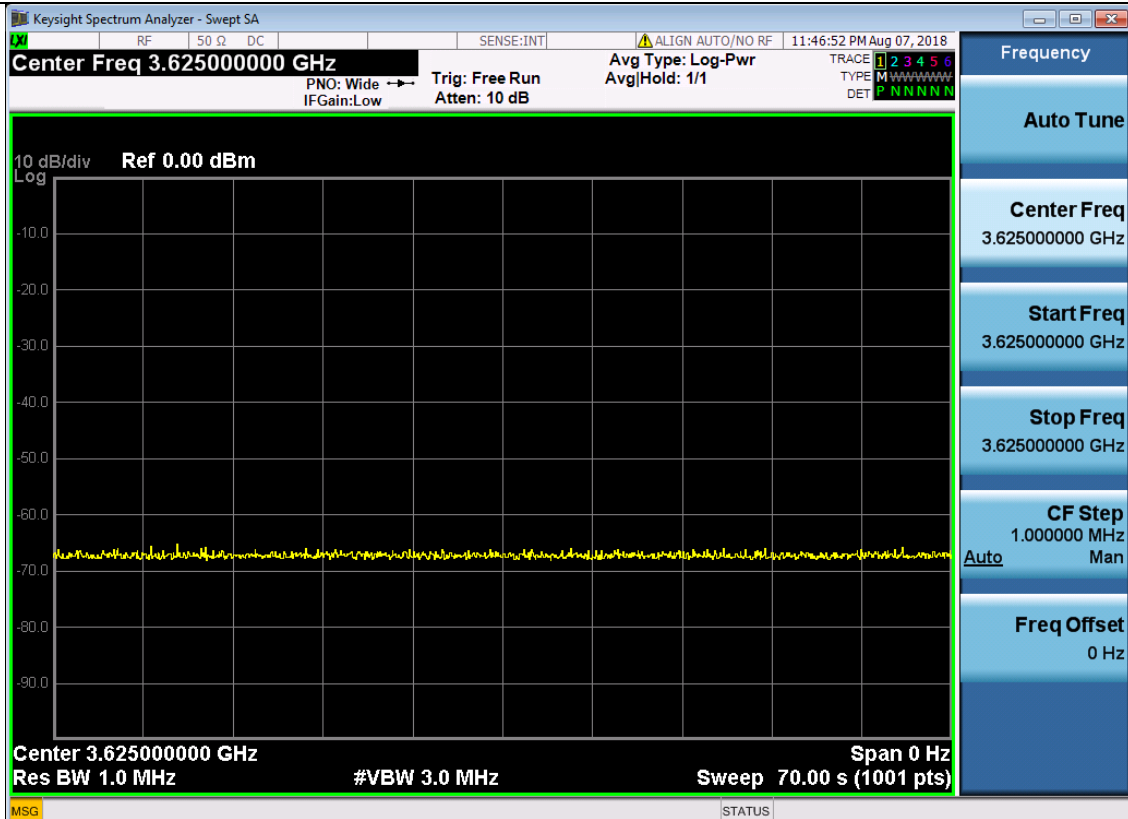
#### 4.6.2.2.2 Unsuccessful Grant responseCode=401 (GRANT\_CONFLICT)

☒ 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"> <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>responseCode = R</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> =401) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul style="list-style-type: none"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall not transmit.



## CBSD HEART BEAT PROCESS

### 4.6.2.3 Successful Heartbeat (responseCode=0)

#### 4.6.2.3.1 Heartbeat Success Case (first Heartbeat Response)

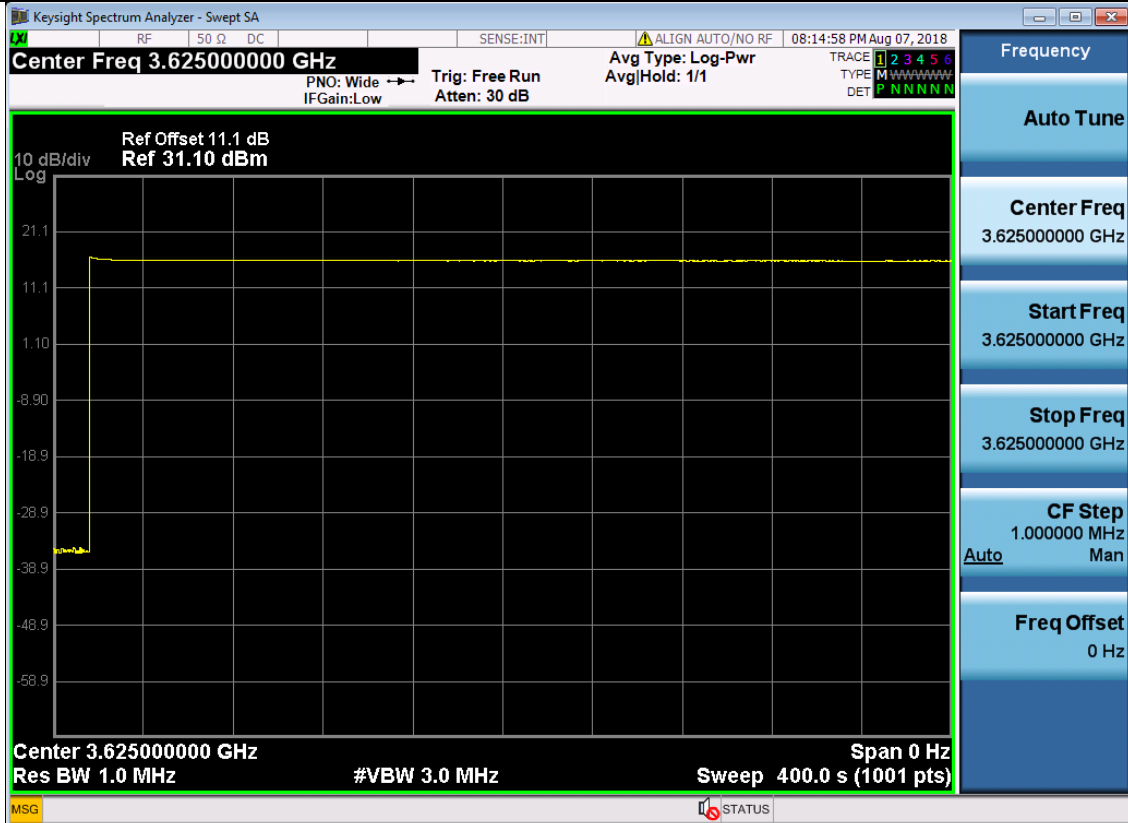
■ Test Case ID : WINNF.FT.C.HBT.1      □ NA

#	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 ● <i>grantExpireTime</i> = UTC time greater than duration of the test ● <i>responseCode</i> = 0	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED"	■ PASS	□ FAIL
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 0	--	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 0	■ PASS	□ FAIL
10	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: ● UUT does not transmit at any time prior to completion of the first heartbeat response ● UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.	■ PASS	□ FAIL

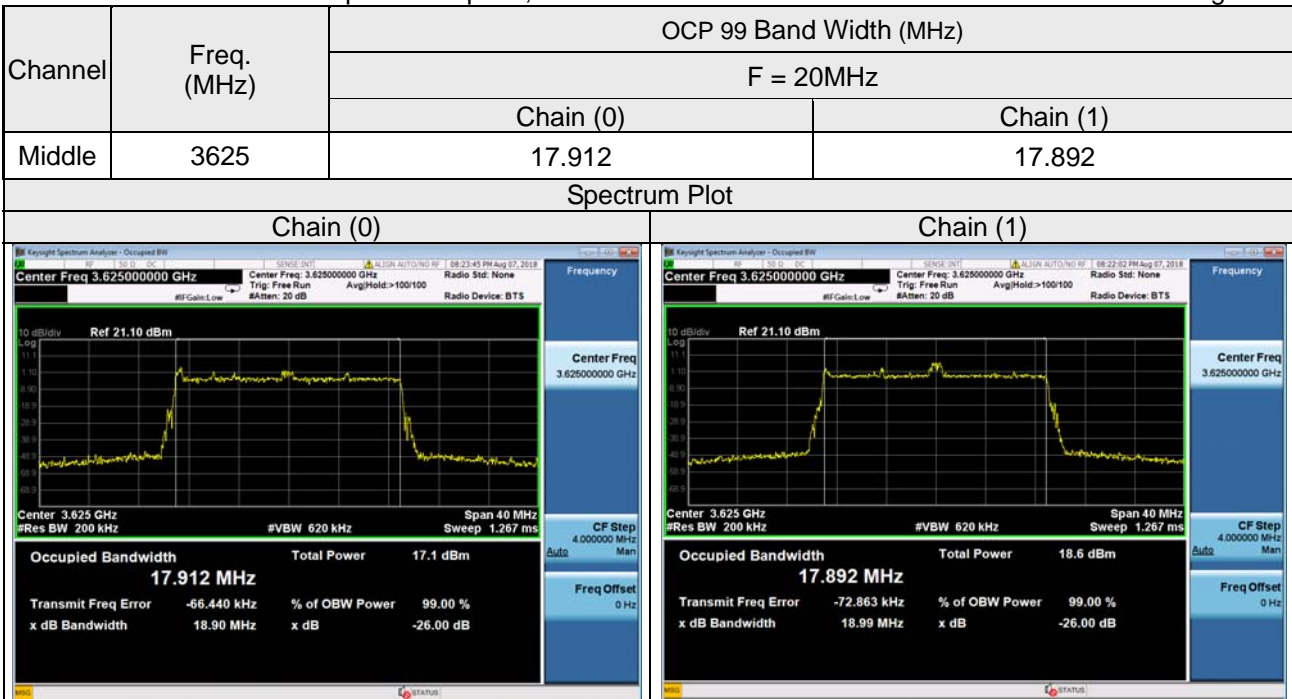


RF measurement plot for Test Case :

- UUT does not transmit at any time prior to completion of the first heartbeat response shall not transmit.



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



#### 4.6.2.3.2 Domain Proxy Heartbeat Success Case (first Heartbeat Response)

☐ Test Case ID : WINNF.FT.D.HBT.2 ☒ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ? DP has two CBSD has registered successfully with SAS Test Harness, with <i>cbsdId</i> = Ci, i={1,2}	--	--
2	DP 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	DP sends Spectrum Inquiry Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message is formatted correctly for each CBSD, including for CBSDi, i={1,2}: ● <i>cbsdId</i> = Ci ● List of frequencyRange objects sent by DP are within the CBRS frequency range	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
4	If a separate Spectrum Inquiry Request message was sent for each CBSD, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message.  If a single Spectrum Inquiry Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array.  Verify parameters for each CBSD within the Spectrum Inquiry Response message are as follows, for CBSDi, i={1,2}: ● <i>cbsdId</i> = Ci ● <i>availableChannel</i> is an array of availableChannel objects ● <i>responseCode</i> = 0	--	--
5	DP sends a Grant Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Grant Request message is formatted correctly for each CBSD, including for CBSDi, i={1,2}: ● <i>cbsdId</i> = Ci ● <i>maxEIRP</i> is at or below the limit appropriate for CBSD category as defined by Part 96 ● <i>operationFrequencyRange</i> , F, sent by UUT is a valid range within the CBRS band	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
6	If a separate Grant Request message was sent for each CBSD, the SAS Test Harness shall respond to each Grant Request message with a separate Grant Response message.  If a single Grant Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Grant Response message containing a 2-object array.  Verify parameters for each CBSD within the Grant Response message are as follows, for CBSDi, i={1,2}: ● <i>cbsdId</i> = Ci ● <i>grantId</i> = Gi = a valid grant ID ● <i>grantExpireTime</i> = UTC time greater than duration of the test ● <i>responseCode</i> = 0	--	--

#	Test Execution Steps	Results	
7	<p>Ensure DP sends first Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Heartbeat Request message is formatted correctly for each CBSD, including, for CBSDi i={1,2}:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci, i={1,2}</li> <li>● <i>grantId</i> = Gi, i={1,2}</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
8	<p>If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message.</p> <p>If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array.</p> <p>Verify parameters for each CBSD within the Heartbeat Response message are as follows, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</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 DP after completion of step 8, validate message is sent within latest specified heartbeatInterval for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul> <p>and SAS Test Harness responds with a Heartbeat Response message including the following parameters, for CBSDi</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>transmitExpireTime</i> = current UTC time + 200 seconds</li> <li>● <i>responseCode</i> = 0</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
10	<p>Monitor the RF output of the UUT from start of test until UUT transmission commences. Monitor the RF output of the UUT from start of test until RF 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 Fi.</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.2.4 Unsuccessful Heartbeat Test Cases (responseCode != 0)

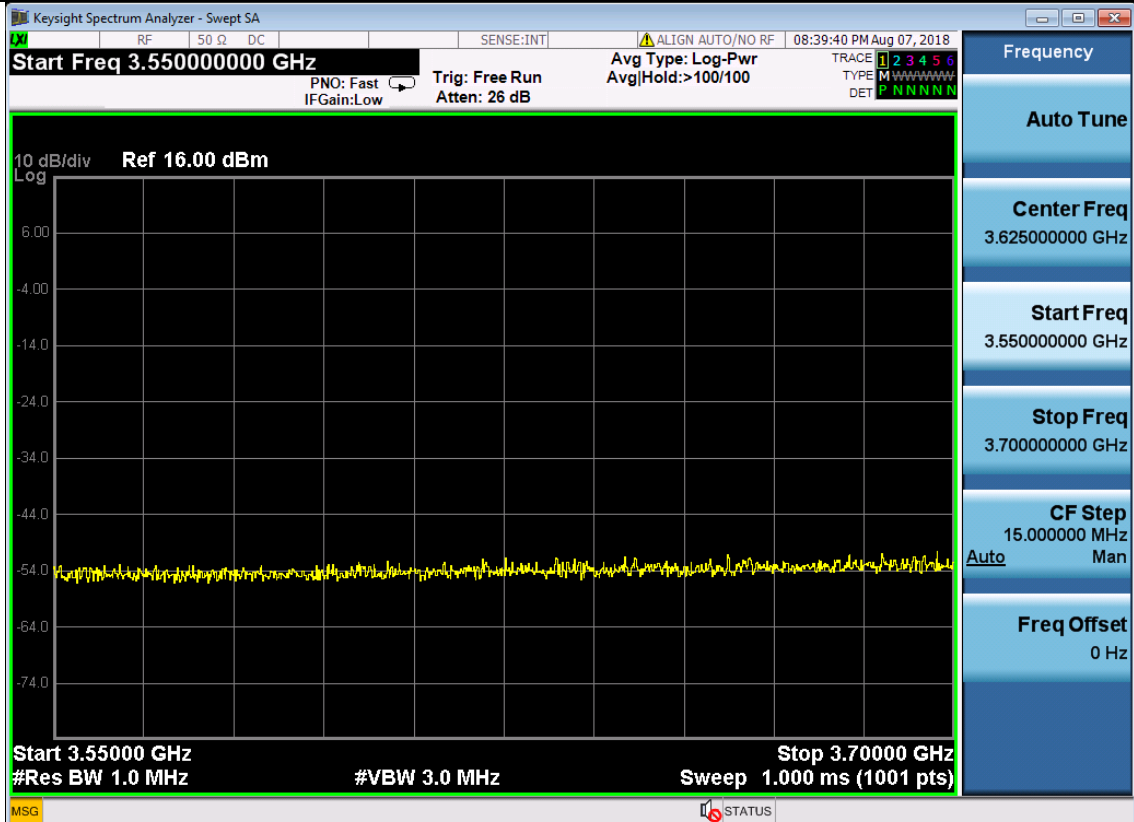
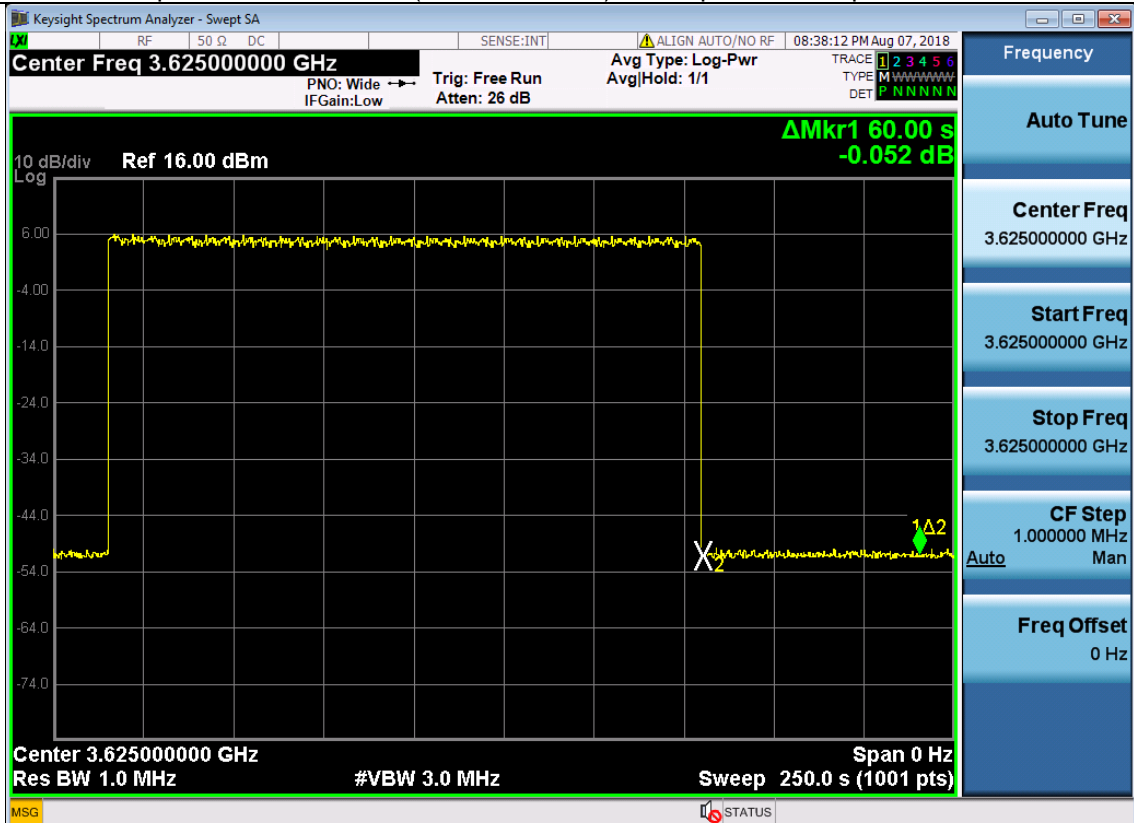
##### 4.6.2.4.1 Heartbeat responseCode=105 (DEREGISTER)

☒ 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"> <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>cbsdId</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. 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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	--	--
3	SAS Test Harness sends a Heartbeat Response message, including 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> = T = 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	Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall stop transmission within (T + 60 seconds) of completion of step 3.



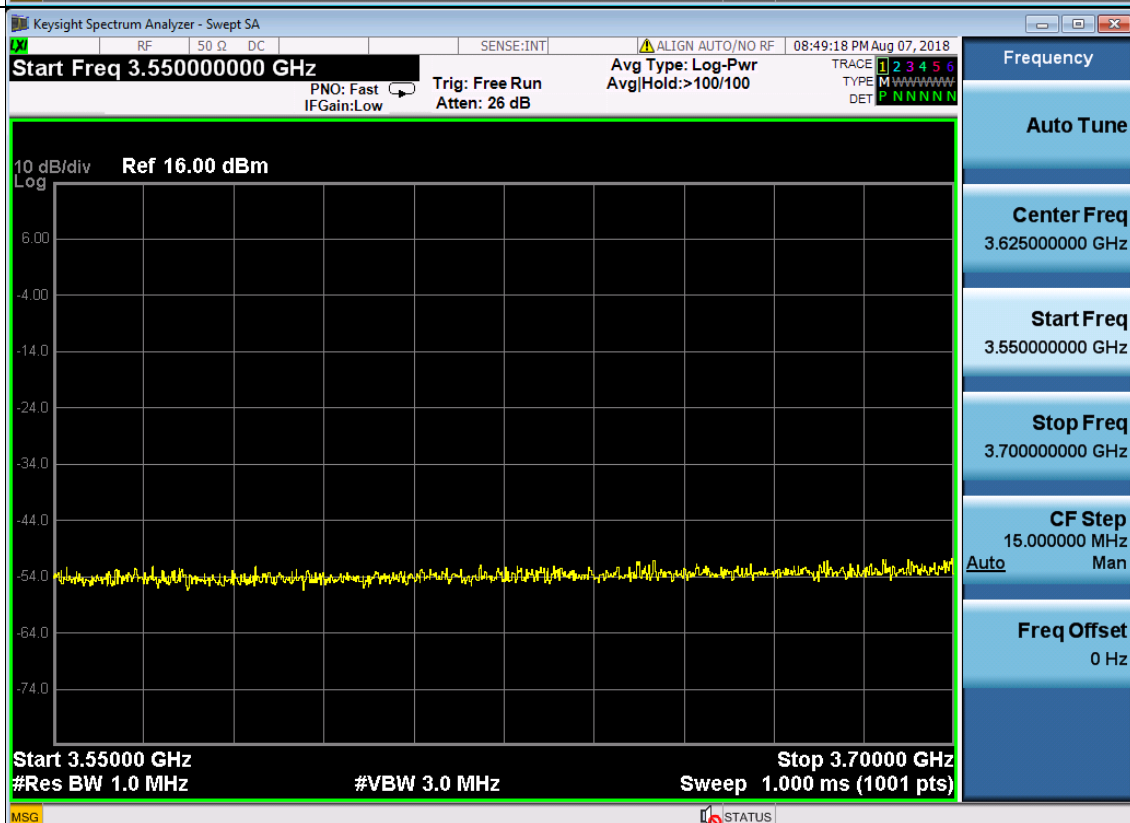
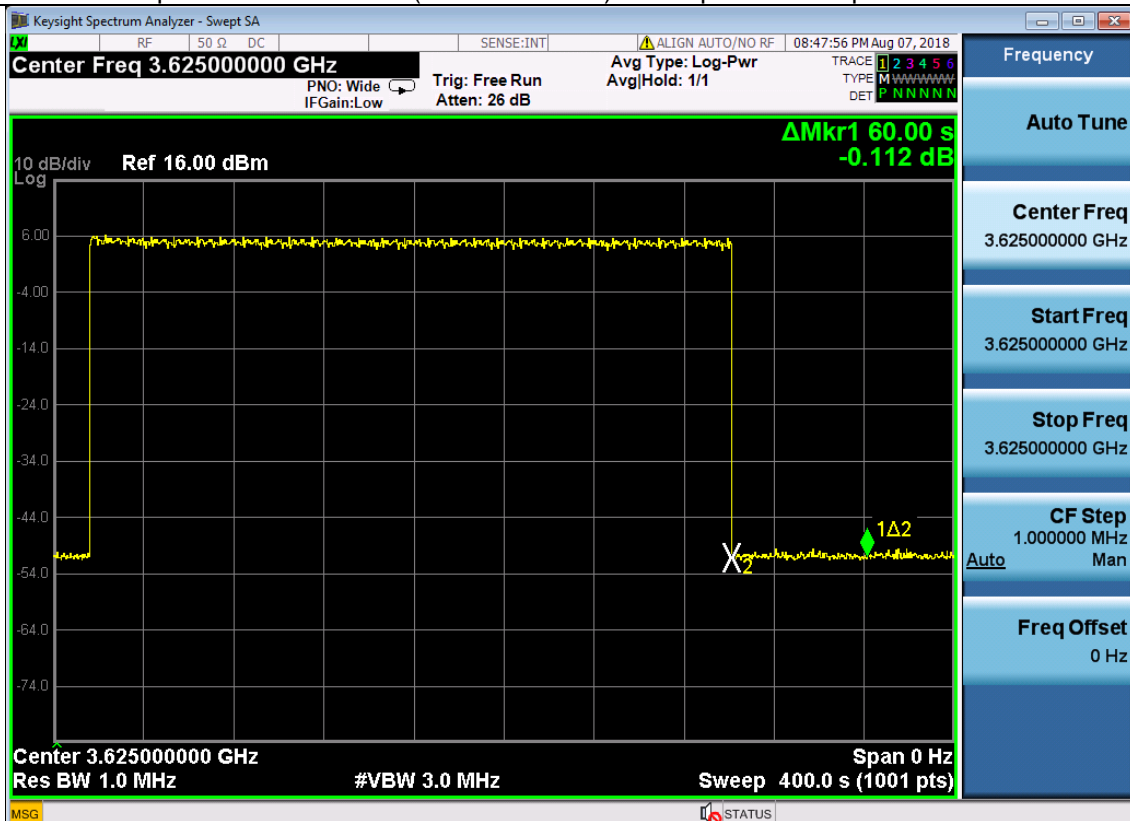
#### 4.6.2.4.2 Heartbeat responseCode=500 (TERMINATED\_GRANT)

☒ 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"> <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>cbsdId</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. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and 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> = "AUTHORIZED"</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	SAS Test Harness sends a Heartbeat Response message, including 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> = 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	Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT shall stop transmission within (T + 60 seconds) of completion of step 3.



#### 4.6.2.4.3 Heartbeat responseCode=501 (SUSPENDED\_GRANT) in First Heartbeat Response

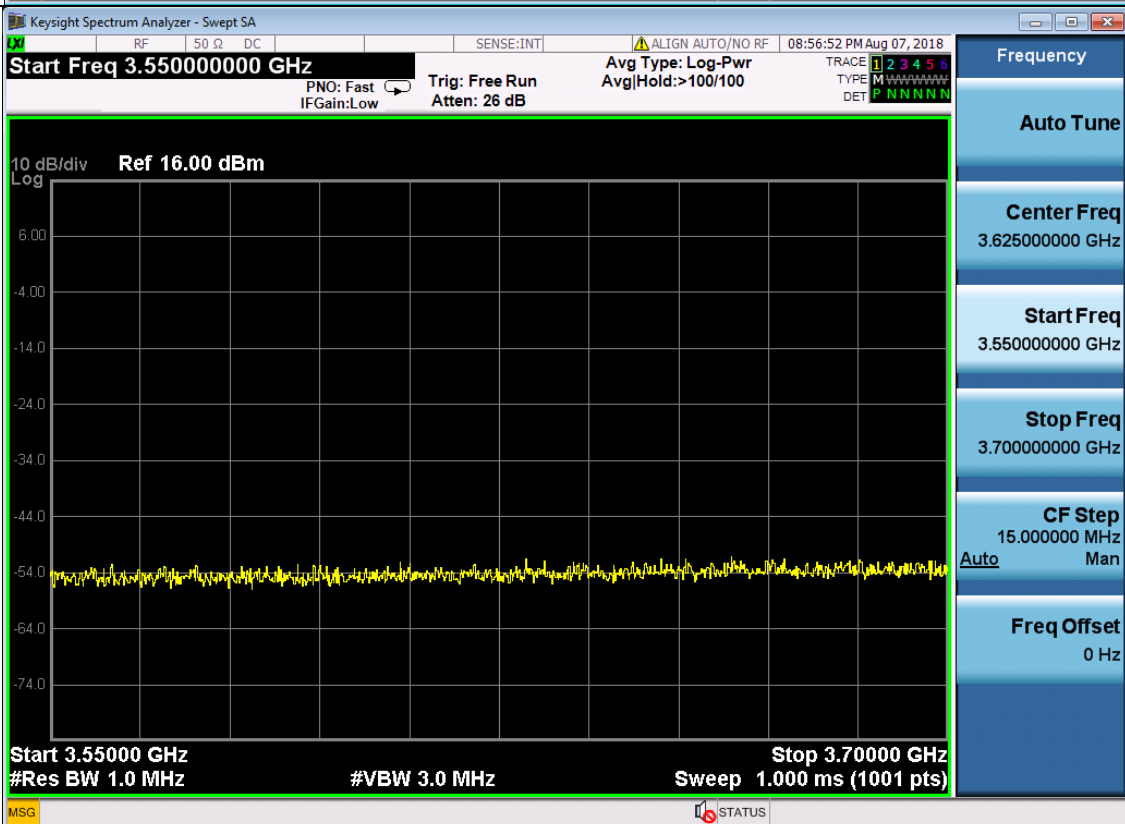
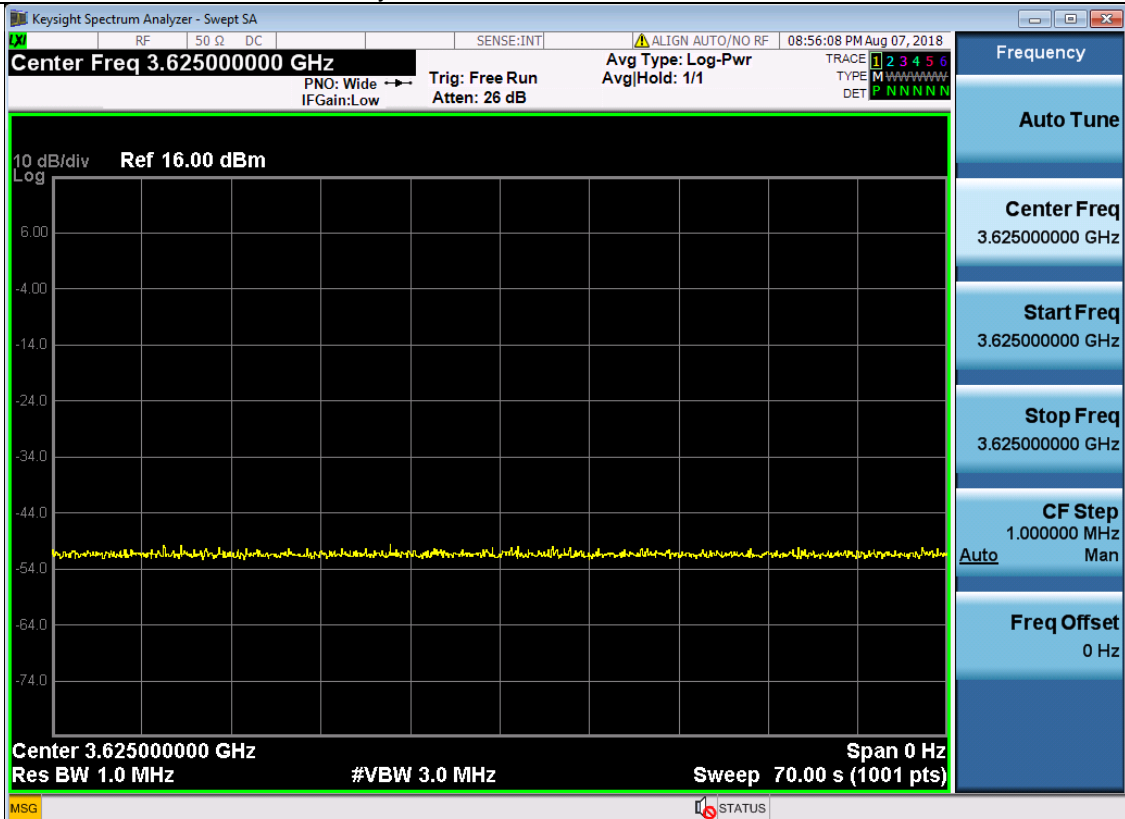
■ Test Case ID : WINNF.FT.C.HBT.5      □ NA

#	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>cbsdlId</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>cbsdlId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	■ PASS	□ FAIL
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdlId</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	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</p> <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdlId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul> <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdlId</i> = C</li> <li>● <i>grantId</i> = G</li> </ul> <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT does not transmit at any time</li> </ul>	■ PASS	□ FAIL



RF measurement plot for Test Case :

- UUT shall not transmission at any time.



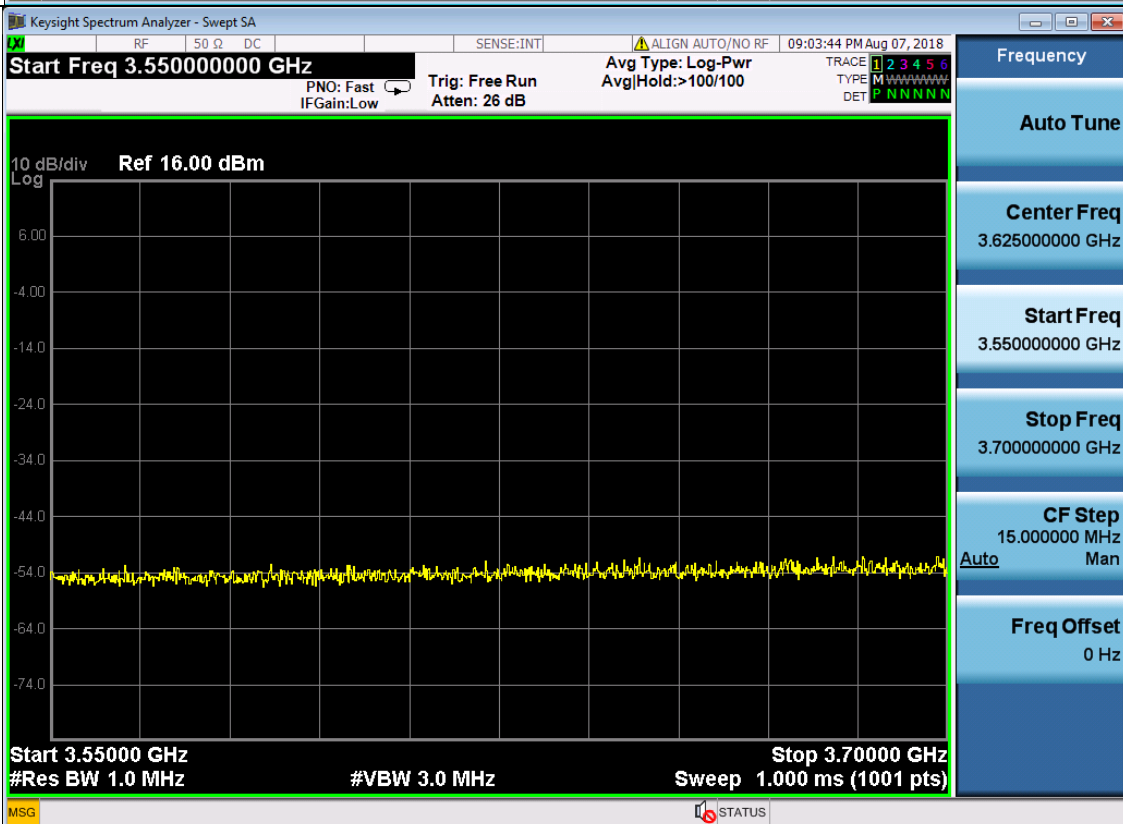
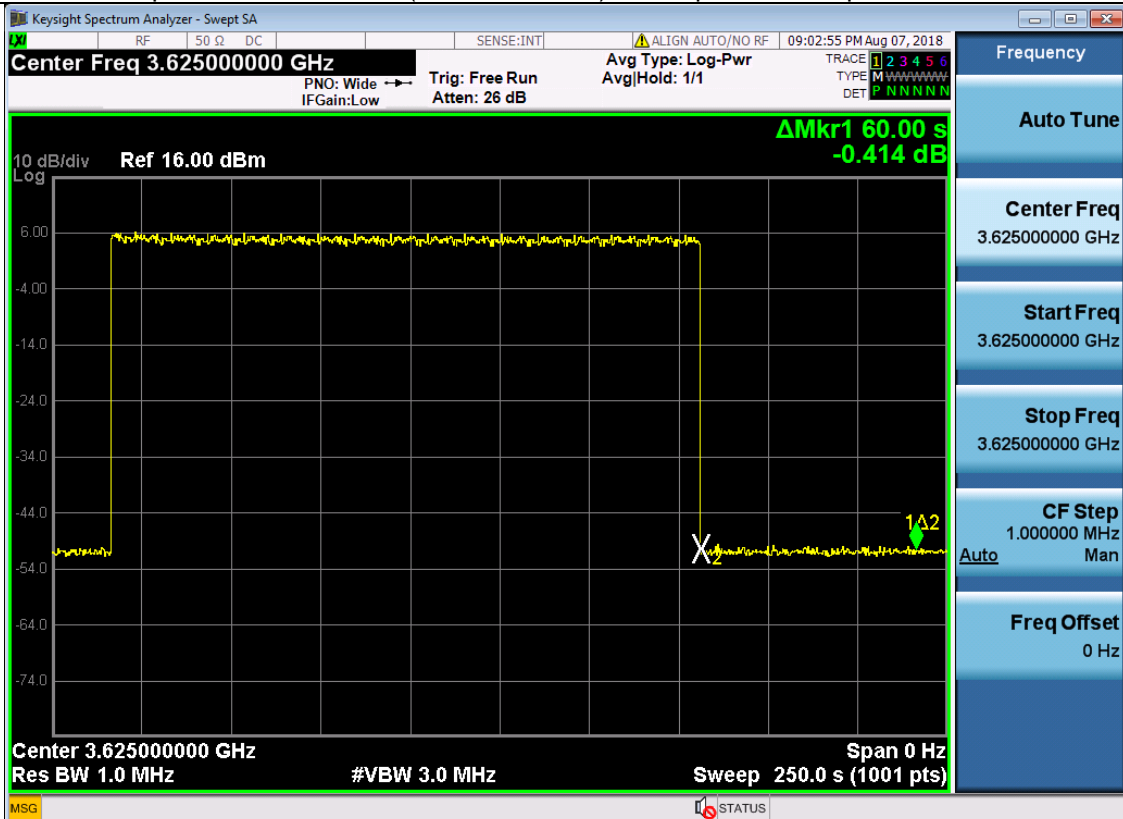
#### 4.6.2.4.4 Heartbeat responseCode=501 (SUSPENDED\_GRANT) in Subsequent Heartbeat Response

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

#	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>cbsdId</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>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	■ PASS	□ FAIL
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</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	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</p> <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul> <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> </ul> <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T+60) seconds of completion of step 3</li> </ul>	■ PASS	□ FAIL

RF measurement plot for Test Case :

- UUT shall stop transmission within (T + 60 seconds) of completion of step 3.



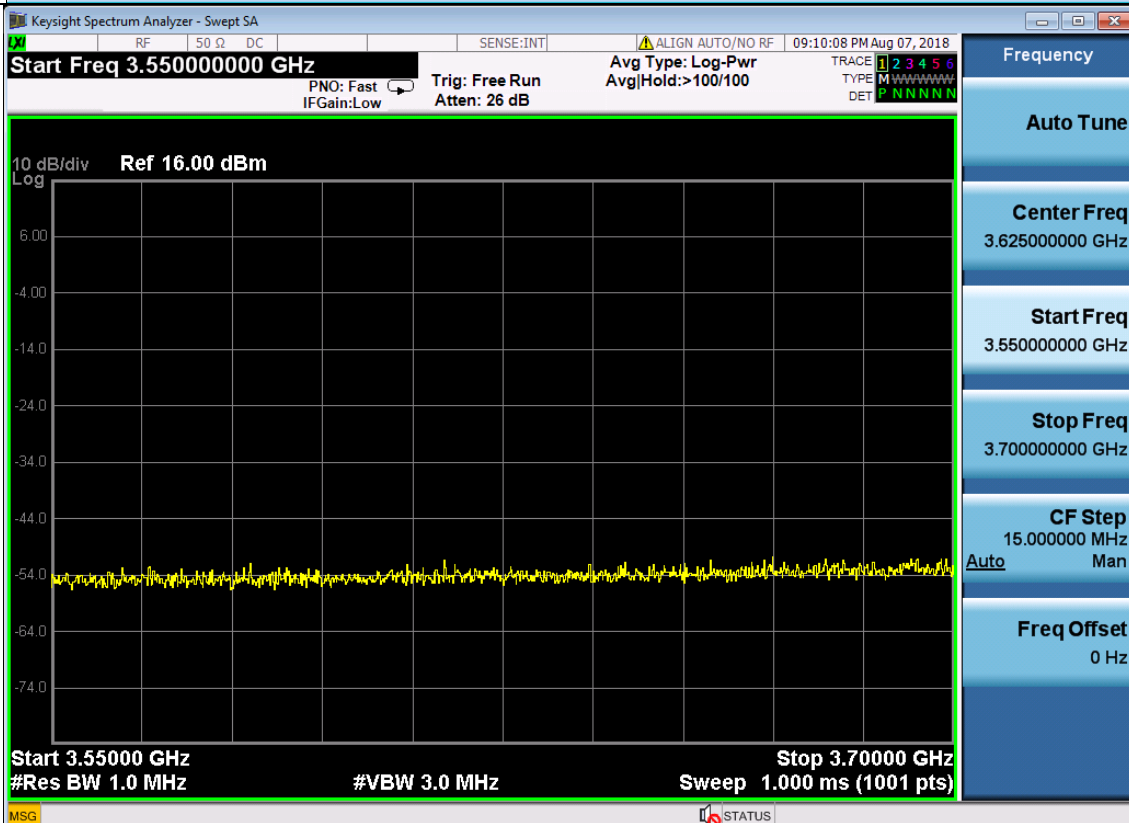
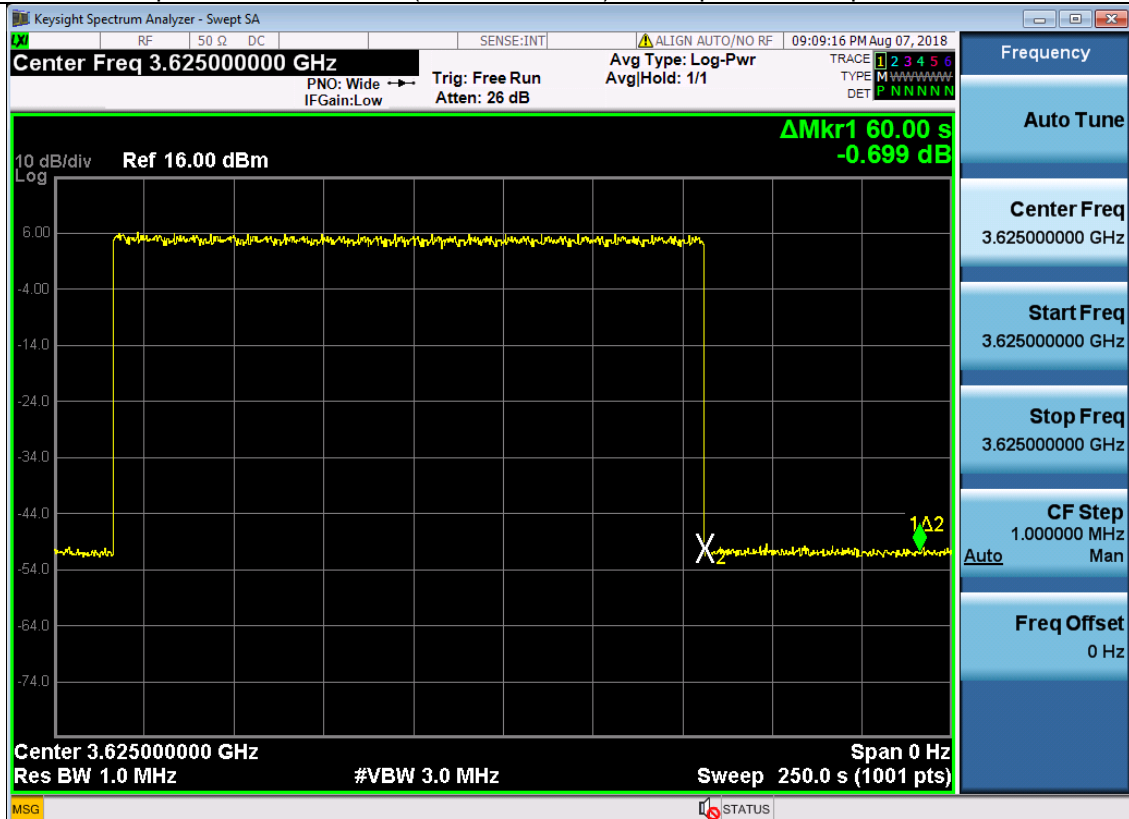
#### 4.6.2.4.5 Heartbeat responseCode=502 (UNSYNC\_OP\_PARAM)

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

#	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>cbsdId</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>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	■ PASS	□ FAIL
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</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	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify:</p> <ul style="list-style-type: none"> <li>● UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: <ul style="list-style-type: none"> <li>○ <i>cbsdId</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>● UUT shall stop transmission within (T+60) seconds of completion of step 3</li> </ul>	■ PASS	□ FAIL

RF measurement plot for Test Case :

- UUT shall stop transmission within (T + 60 seconds) of completion of step 3.



#### 4.6.2.4.6 Domain Proxy Heartbeat responseCode=500 (TERMINATED\_GRANT)

Test Case ID : WINNF.FT.D.HBT.8      NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>DP has two CBSD registered successfully with SAS Test Harness</li> <li>Each CBSD {1,2} has a valid single grant as follows: <ul style="list-style-type: none"> <li>valid <i>cbsdId</i> = Ci, i={1,2}</li> <li>valid <i>grantId</i> = Gi, i={1,2}</li> <li>grant is for frequency range Fi, power Pi</li> <li><i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>Both CBSD are in AUTHORIZED state and transmitting within their granted bandwidth on RF interface</li> </ul>	--	--
2	<p>DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of size 2. Verify Heartbeat Request message is sent within latest specified <i>heartbeatInterval</i>, and is formatted correctly for each CBSD, including, for CBSDi i={1,2}:</p> <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci, i = {1,2}</li> <li><i>grantId</i> = Gi, i = {1,2}</li> <li><i>operationState</i> = "AUTHORIZED"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	<p>If separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message.</p> <p>If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Heartbeat Response message should be as follows, for CBSDi:</p> <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> <li><i>grantId</i> = Gi</li> <li>For CBSD1: <ul style="list-style-type: none"> <li><i>transmitExpireTime</i> = current UTC time + 200 seconds</li> <li><i>responseCode</i> = 0</li> </ul> </li> <li>For CBSD2: <ul style="list-style-type: none"> <li><i>transmitExpireTime</i> = T = current UTC time</li> <li><i>responseCode</i> = 500 (TERMINATED_GRANT)</li> </ul> </li> </ul>	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p> <p>If CBSD sends further Heartbeat Request messages for CBSD1, SAS Test Harness shall respond with a Heartbeat Response message with parameters:</p> <ul style="list-style-type: none"> <li><i>cbsdId</i> = C1</li> <li><i>grantId</i> = G1</li> <li><i>transmitExpireTime</i> = current UTC time + 200 seconds</li> <li><i>responseCode</i> = 0</li> <li>Heartbeat Request message is within <i>heartbeatInterval</i> of previous Heartbeat Request message</li> </ul>	--	--
5	<p>Monitor the RF output of CBSD2. Verify:</p> <ul style="list-style-type: none"> <li>CBSD2 shall stop transmission within bandwidth F2 within (T + 60 seconds) of completion of step 3</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.2.5 Heartbeat Response Absent Test Cases

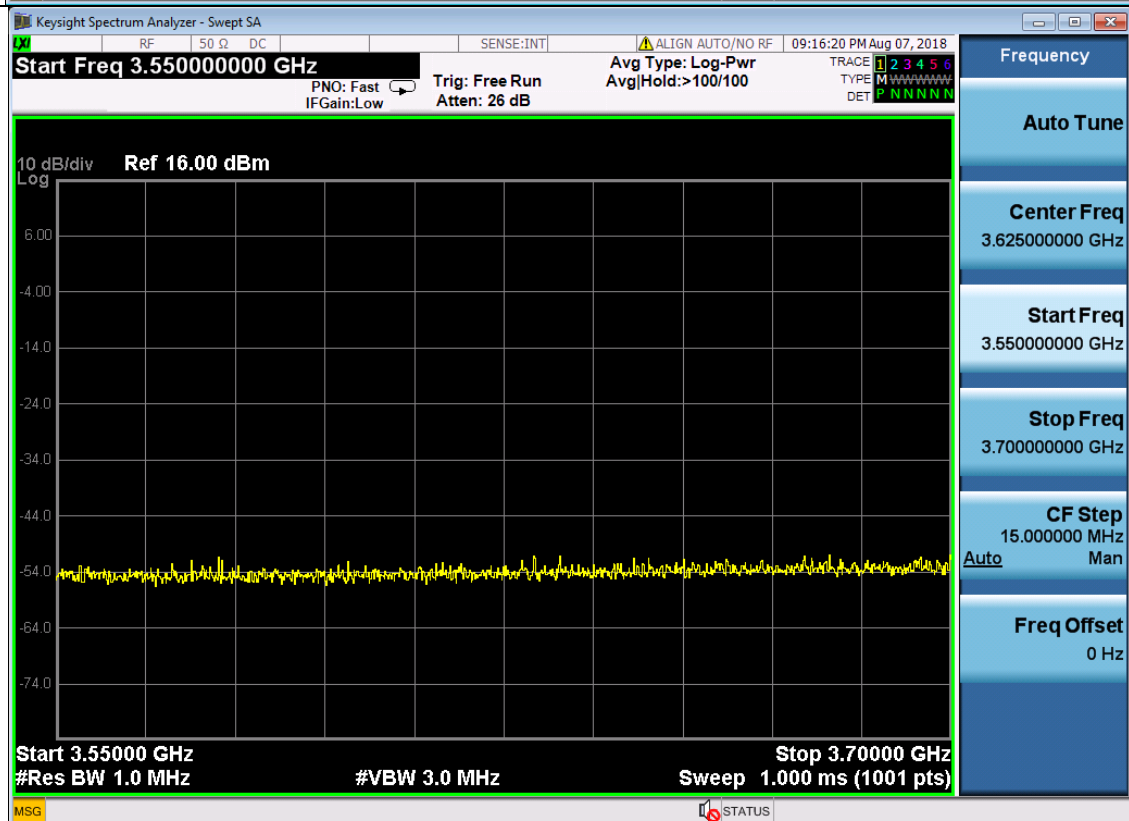
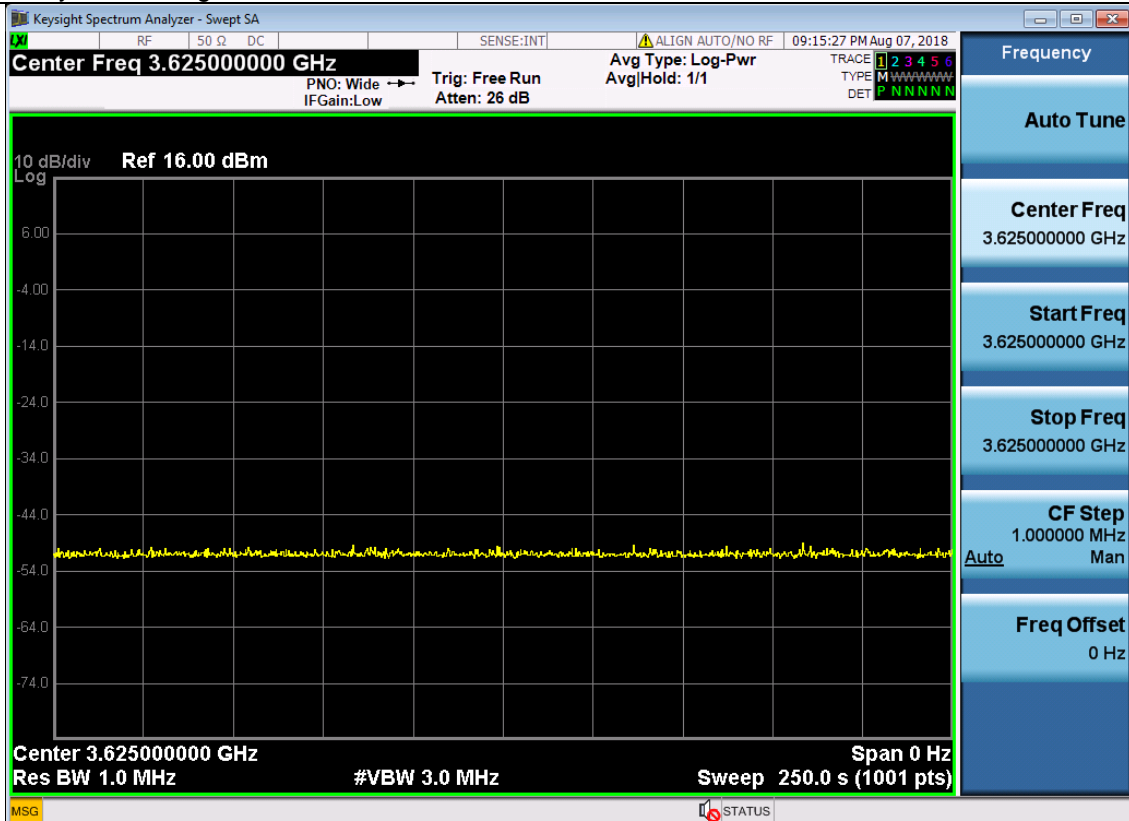
##### 4.6.2.5.1 Heartbeat Response Absent (First Heartbeat)

■ 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"> <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>cbsdId</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. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and 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>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> 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"> <li>● At any time during the test, UUT shall not transmit on RF interface</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- At any time during the test, UUT shall not transmit on RF interface.





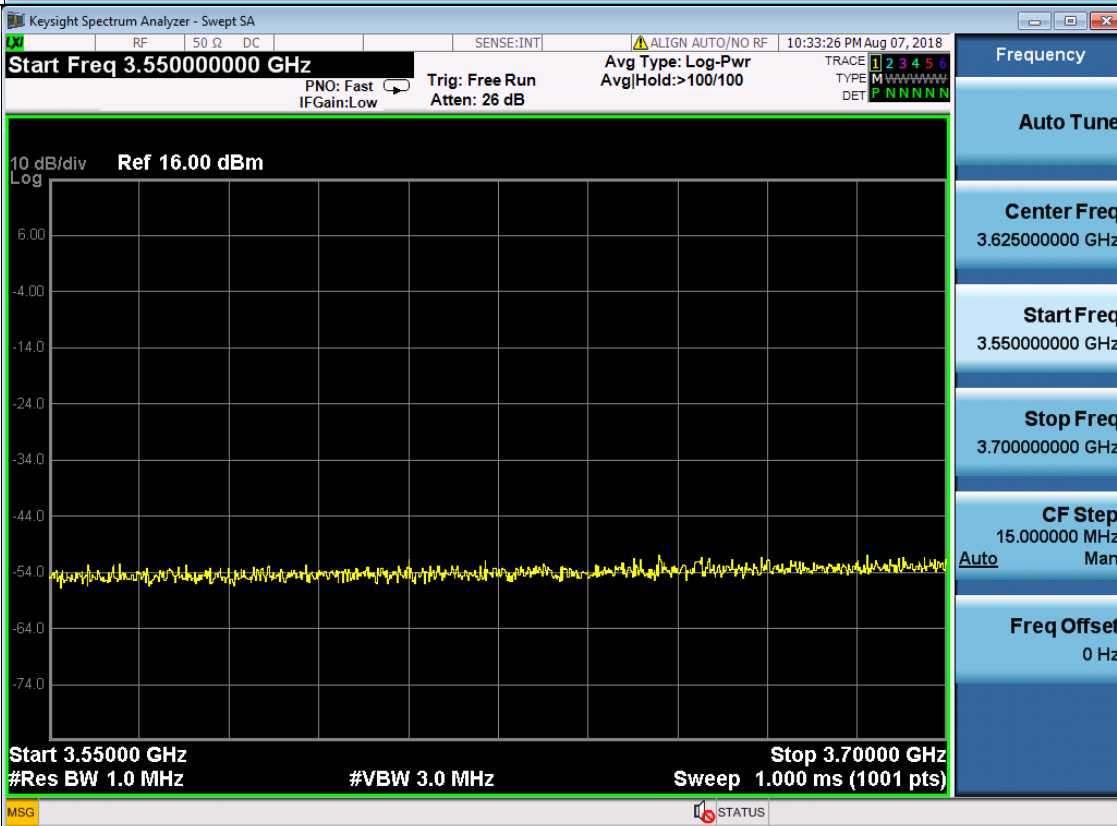
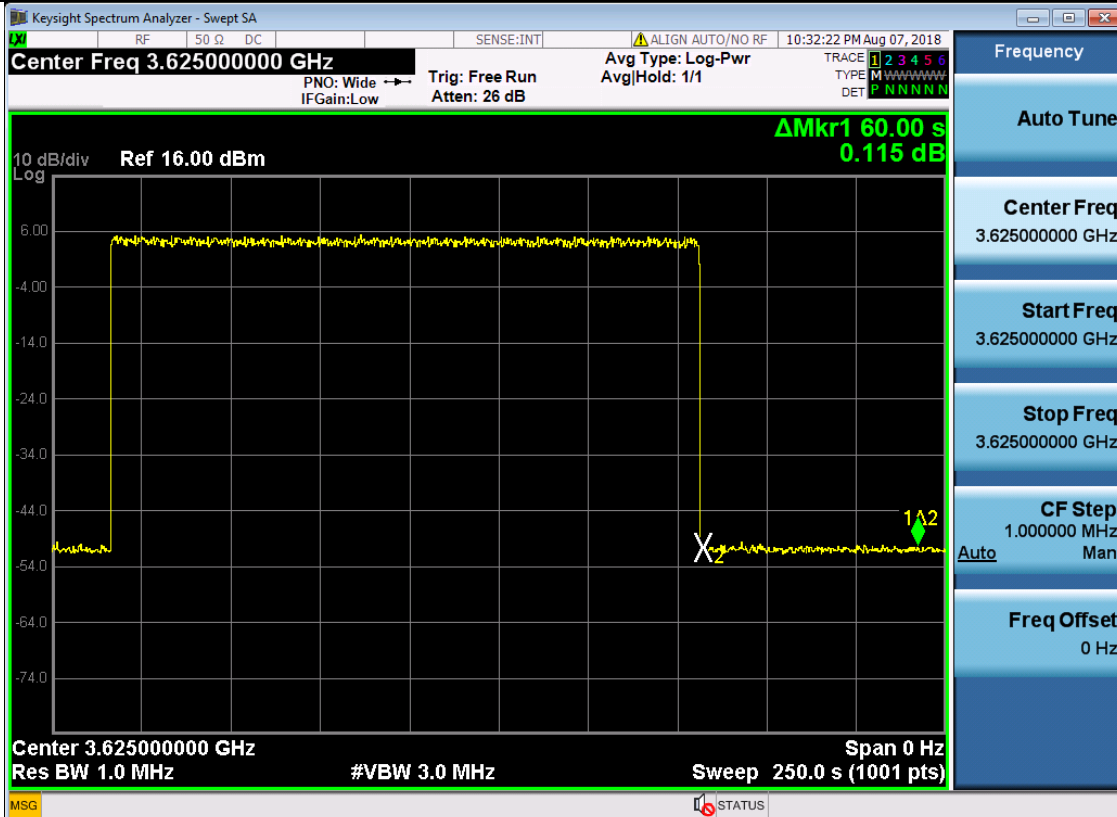
#### 4.6.2.5.2 Heartbeat Response Absent (Subsequent Heartbeat)

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

#	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>cbsdId</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>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	■ PASS	□ FAIL
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time</li> <li>● <i>responseCode</i> = 0</li> </ul>	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
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	□ FAIL

RF measurement plot for Test Case :

- UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.



#### 4.6.2.6 Heartbeat Grant Renewal Cases

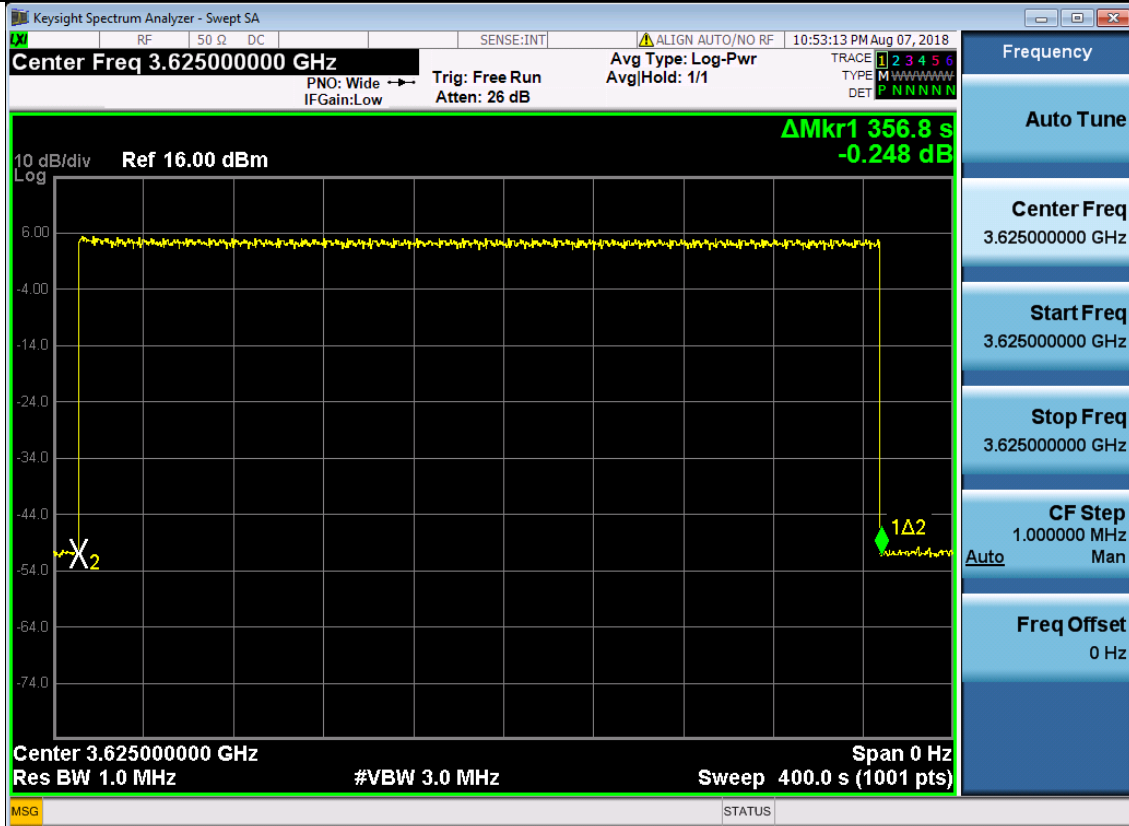
##### 4.6.2.6.1 Successful Grant Renewal in Heartbeat Test Case

■ Test Case ID : WINNF.FT.C.HBT.11      □ NA

#	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>cbsdId</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 = Tgrant_expire</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	UUT sends a Heartbeat Request message. If Heartbeat Request message contains grantRenew = TRUE, go to Step 6, else go to Step 3.	--	--
3	Verify Heartbeat Request message is sent within the latest specified <i>heartbeatInterval</i> , and 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> = "AUTHORIZED"</li> </ul>	■ PASS	□ FAIL
4	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 + 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	Verify Heartbeat Request message is sent within the latest specified <i>heartbeatInterval</i> , and 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> = "AUTHORIZED"</li> <li>● <i>grantRenew</i> = TRUE</li> </ul>	■ PASS	□ FAIL
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	Continue to respond to any subsequentHeartbeat 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 Tgrant_expire + 60 seconds and ensure UUT continues to transmit throughout the time period.	■ PASS	□ FAIL

RF measurement plot for Test Case :

- Monitor RF transmission of UUT from start of test until Tgrant\_expire + 60 seconds and ensure UUT continues to transmit throughout the time period.



### 4.6.3 CBSD Measurement Report

#### 4.6.3.1 Measurement Report Test Cases

##### 4.6.3.1.1 Registration Response contains measReportConfig

☒ 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"> <li>UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> </ul>	--	--
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"> <li><i>fcid</i> is present and correct</li> <li><i>cbsdSerialNumber</i> is present and correct</li> <li><i>measCapability</i> = "RECEIVED_POWER_WITHOUT_GRANT"</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	SAS Test Harness sends a Registration Response message, with the following parameters: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C = valid <i>cbsdId</i> for this UUT</li> <li><i>measReportConfig</i> = "RECEIVED_POWER_WITHOUT_GRANT"</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
4	UUT sends a message: <ul style="list-style-type: none"> <li>If message is type Spectrum Inquiry Request, go to step 5, or</li> <li>If message is type Grant Request, go to step 7</li> </ul>	--	--
5	UUT sends message type Spectrum Inquiry Request. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>availableChannel</i> is an array of <i>availableChannel</i> objects</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.3.1.2 Domain Proxy Registration Response contains measReportConfig

☐ Test Case ID : WINNF.FT.D.MES.2 ☒ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> </ul>	--	--
2	DP sends a Registration Request message for each of two CBSD. This may occur in a separate Request message per CBSD, or together in a single Request message with array of 2.  Verify Registration Request message contains all required parameters properly formatted for CBSDi, i={1,2}, and specifically: <ul style="list-style-type: none"> <li><i>fcclId</i> is present and correct</li> <li><i>cbsdSerialNumber</i> is present and correct</li> <li><i>measCapability</i> = "RECEIVED_POWER_WITHOUT_GRANT"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	DP sends a Registration Request message for each of two CBSD. This may occur in a separate Request message per CBSD, or together in a single Request message with array of 2.  Verify Registration Request message contains all required parameters properly formatted for CBSDi, i={1,2}, and specifically: <i>cbsdId</i> = Ci <ul style="list-style-type: none"> <li><i>measReportConfig</i> = "RECEIVED_POWER_WITHOUT_GRANT"</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
4	UUT sends a message: <ul style="list-style-type: none"> <li>If message is type Spectrum Inquiry Request, go to step 5, or</li> <li>If message is type Grant Request, go to step 7</li> </ul>	--	--
5	UUT sends message type Spectrum Inquiry Request. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message contains all required parameters properly formatted for CBSDi, i= {1,2}, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
6	If a separate Spectrum Inquiry Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message.  If a single Spectrum Inquiry Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array.  Parameters for each CBSD within the Spectrum Inquiry Response message should be as follows: <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> <li><i>availableChannel</i> is an array of <i>availableChannel</i> objects</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
7	UUT sends message type Grant Request message. This may occur in a separate message per CBSD, or together in a single message with array of 2.  Verify the Grant Request message contains all required parameters properly formatted for CBSDi, i= {1,2}, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.3.1.3 Grant Response contains measReportConfig

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

#	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 has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C and <i>measCapability</i> = "RECEIVED_POWER_WITH_GRANT"</li> </ul>	--	--
2	UUT sends a Grant Request message. Verify Grant Request message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>operationParam</i> is present and format is valid</li> </ul>	■ PASS	□ FAIL
3	SAS Test Harness sends a Grant Response message, with the following parameters: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G = valid grant ID</li> <li>● <i>grantExpireTime</i> = UTC time in the future</li> <li>● <i>heartbeatInterval</i> = 60 seconds</li> <li>● <i>measReportConfig</i>= "RECEIVED_POWER_WITH_GRANT"</li> <li>● <i>operationParam</i> is set to valid operating parameters</li> <li>● <i>channelType</i> = "GAA"</li> <li>● <i>responseCode</i> = 0</li> </ul>	--	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: <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	□ FAIL
5	If Heartbeat Request message (step 4) contains <i>measReport</i> object, then: <ul style="list-style-type: none"> <li>● verify <i>measReport</i> is properly formatted as object <i>rcvdPowerMeasReport</i></li> <li>● end test, with PASS result</li> </ul> else, if Heartbeat Request message (step 4) does not contain <i>measReport</i> object, then: <ul style="list-style-type: none"> <li>● If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL</li> </ul>	■ PASS	□ FAIL
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: <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> Go to Step 4, above	--	--

#### 4.6.3.1.4 Heartbeat Response contains measReportConfig

☐ Test Case ID : WINNF.FT.C.MES.4 ☒ NA

#	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 has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C and <i>measCapability</i> = "RECEIVED_POWER_WITH_GRANT"</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> <li>● Grant has <i>heartbeatInterval</i> = 60 seconds</li> </ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>measReportConfig</i>= "RECEIVED_POWER_WITH_GRANT"</li> <li>● <i>responseCode</i> = 0</li> </ul>	--	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
5	If Heartbeat Request message (step 4) contains <i>measReport</i> object, then: <ul style="list-style-type: none"> <li>● verify <i>measReport</i> is properly formatted as object <i>rcvdPowerMeasReport</i></li> <li>● end test, with PASS result</li> </ul> else, if Heartbeat Request message (step 4) does not contain <i>measReport</i> object, then: <ul style="list-style-type: none"> <li>● If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: <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> Go to Step 4, above	--	--



#### 4.6.3.1.5 Domain Proxy Heartbeat Response contains measReportConfig

☐ Test Case ID : WINNF.FT.D.MES.5 ☒ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2} and <i>measCapability</i> = "RECEIVED_POWER_WITH_GRANT"</li> <li>● DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> <li>● Grants have <i>heartbeatInterval</i> =60 seconds</li> </ul>	--	--
2	<p>Verify DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2.</p> <p>Verify Heartbeat Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	<p>If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message.</p> <p>If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Heartbeat Response message containing all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>measReportConfig</i>= "RECEIVED_POWER_WITH_GRANT"</li> <li>● <i>responseCode</i> = 0</li> </ul>	--	--
4	<p>Verify DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2.</p> <p>Verify Heartbeat Request message contains all required parameters properly formatted for each CBSD, and specifically, for CBSDi, i = {1,2}:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> <li>● Check whether <i>measReport</i> is present, and if present, ensure it is a properly formatted <i>rcvdPowerMeasReport</i> object, and record its reception for each CBSDi, i = {1,2}.</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
5	<p>If Heartbeat Request message (step 4) contains <i>measReport</i> object, then:</p> <ul style="list-style-type: none"> <li>● Verify <i>measReport</i> is properly formatted as object <i>rcvdPowerMeasReport</i></li> <li>● record which CBSD have successfully sent a <i>measReport</i> object</li> </ul> <p>If all CBSDi, i = {1,2} have successfully sent a <i>measReport</i> object, then</p> <ul style="list-style-type: none"> <li>● end test, with PASS result</li> </ul> <p>else, if the number of Heartbeat Requests sent per CBSD is 5 or more, then stop test with result of FAIL</p>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#	Test Execution Steps	Results	
6	<p>If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message.</p> <p>If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Heartbeat Response message containing all required parameters properly formatted, and specifically:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> <li>● <i>responseCode</i> = 0</li> </ul> <p>Go to Step 4, above.</p>	--	--

#### 4.6.4 CBSD Relinquishment Process

##### 4.6.4.1 Successful Relinquishment Request (responseCode 0)

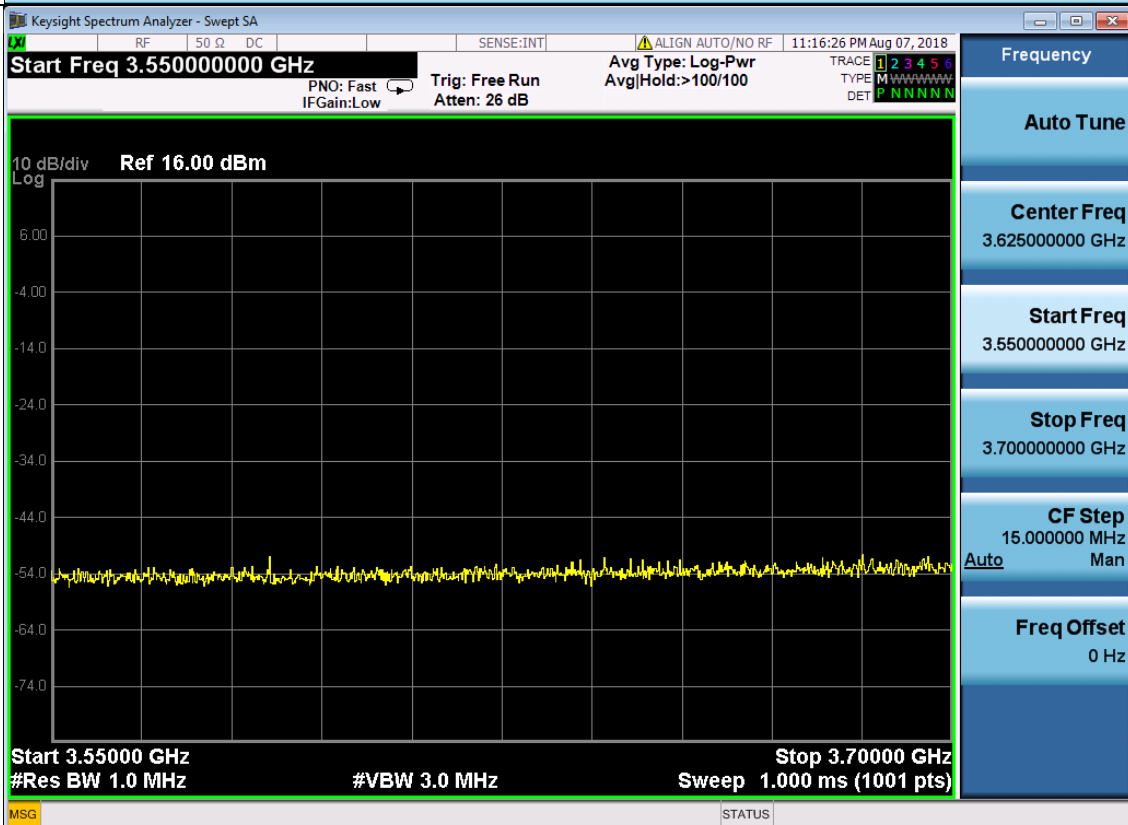
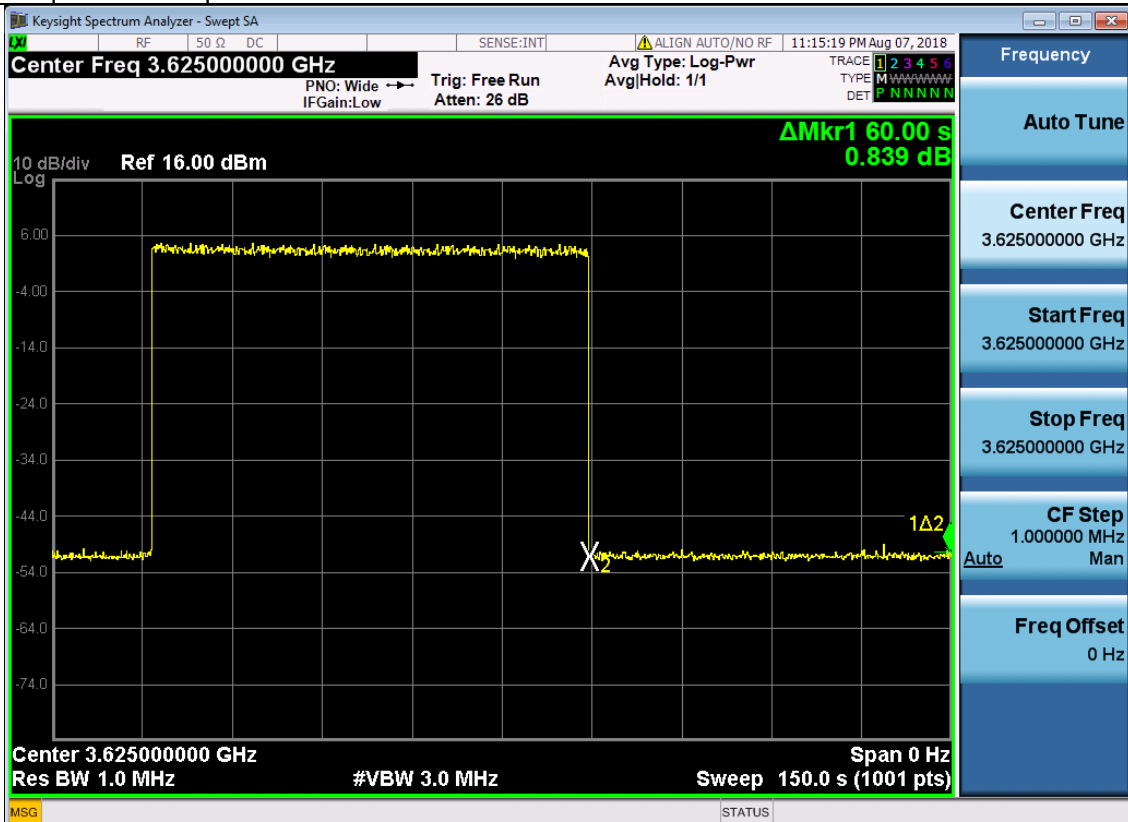
##### 4.6.4.1.1 Successful Relinquishment

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

#	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	□ FAIL
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	□ FAIL

RF measurement plot for Test Case :

- UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request.



#### 4.6.4.1.2 Domain Proxy Successful Relinquishment

☐ Test Case ID : WINNF.FT.D.RLQ.2 ☒ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2}</li> <li>● DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> </ul> <p>Invoke trigger to relinquish each UUT Grant from the SAS Test Harness</p>	--	--
2	<p>Verify DP sends a Relinquishment Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2.</p> <p>Verify Relinquishment Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
3	<p>If a separate Relinquishment Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message.</p> <p>If a single Relinquishment Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Relinquishment Response shall be as follows:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</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 each 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 relinquishments and UUT sending the relinquishment requests for each CBSD.</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.4.2 Missing Parameter (responseCode 102)

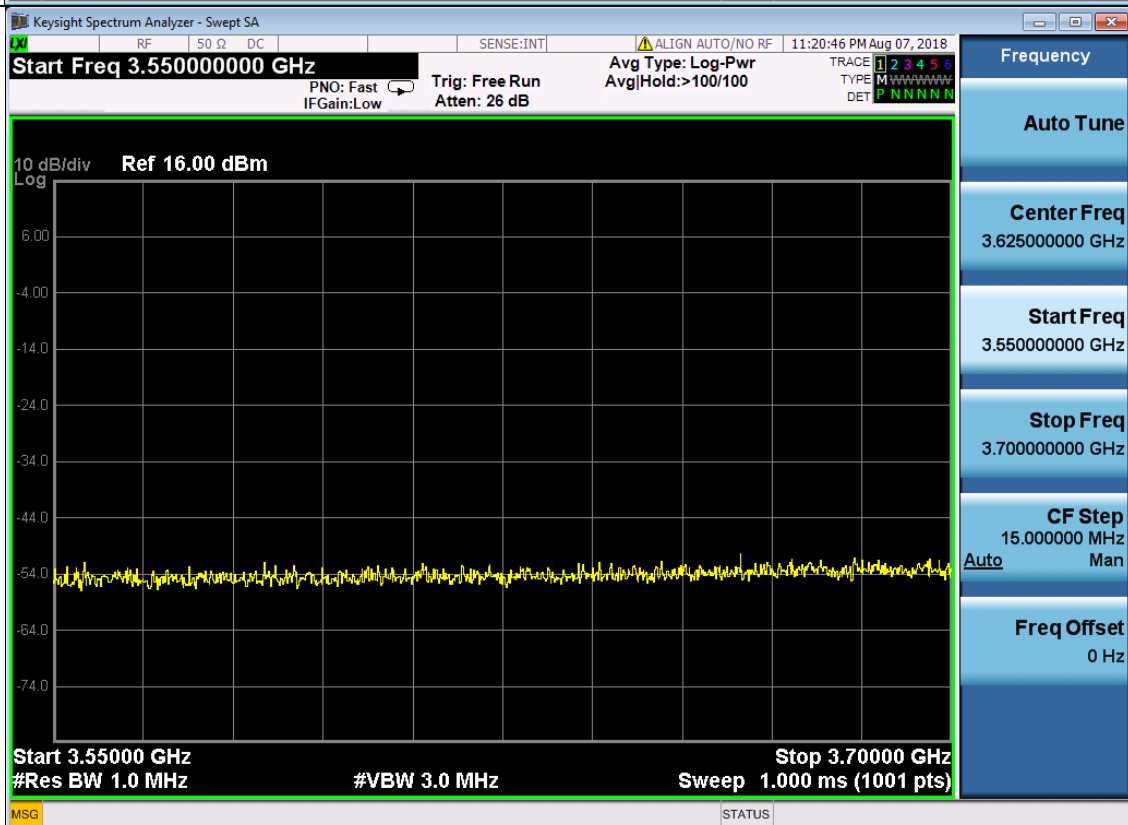
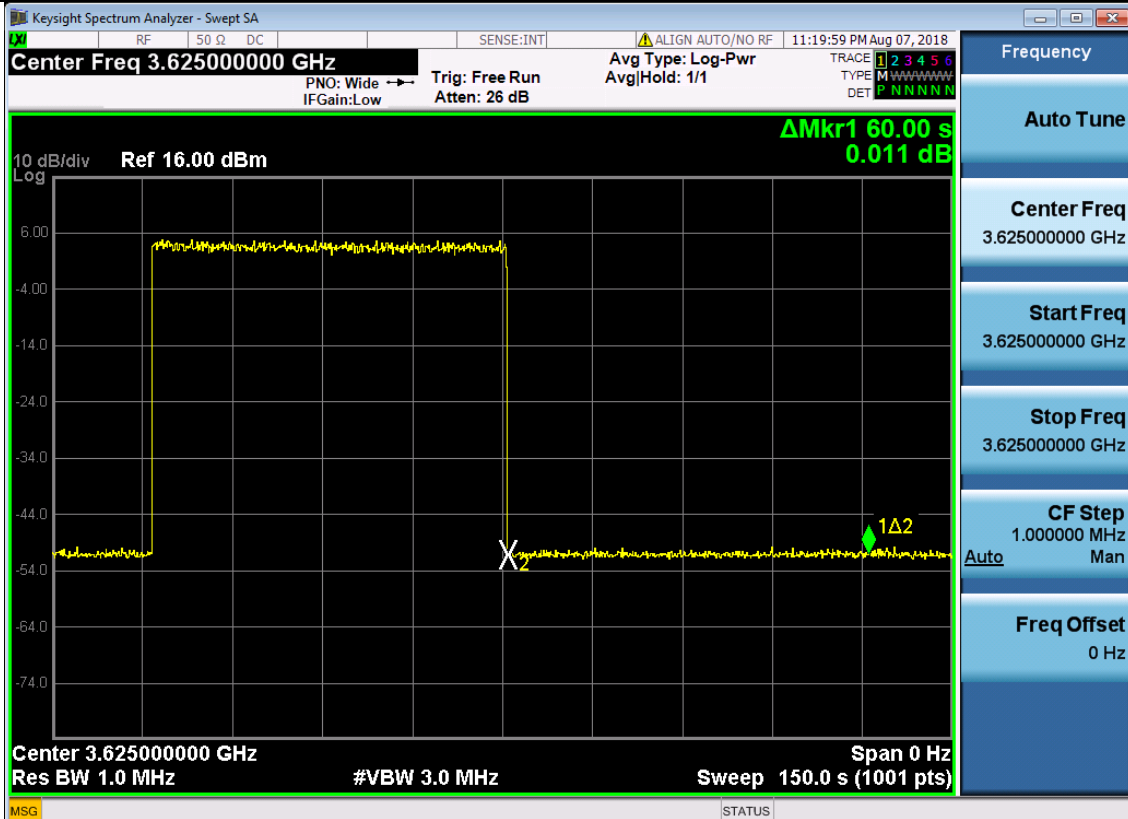
##### 4.6.4.2.1 Unsuccessful Relinquishment, responseCode=102

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

#	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>	<div>■</div> PASS	<div>□</div> FAIL

RF measurement plot for Test Case :

- UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request.



#### 4.6.4.2.2 Domain Proxy Unsuccessful Relinquishment, responseCode=102

☐ Test Case ID : WINNF.FT.D.RLQ.4 ☒ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2}</li> <li>● DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> </ul> <p>Invoke trigger on UUT to Relinquish Grant from the SAS Test Harness</p>	--	--
2	<p>DP with two CBSDs sends Relinquishment Request with two objects to the SAS Test Harness.</p> <p>This may occur in a separate message per CBSD, or together in a single message with array of 2.</p> <p>Verify DP sends a Relinquishment Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Relinquishment Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> </ul>	--	--
3	<p>If a separate Relinquishment Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message.</p> <p>If a single Relinquishment Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Relinquishment Response Message shall be as follows:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● No <i>grantId</i></li> <li>● <i>responseCode</i> = Ri</li> </ul>	--	--
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	<p>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <p>A. UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</p>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.4.3 Invalid Parameter (responseCode 103)

##### 4.6.4.3.1 Unsuccessful Relinquishment, responseCode=103

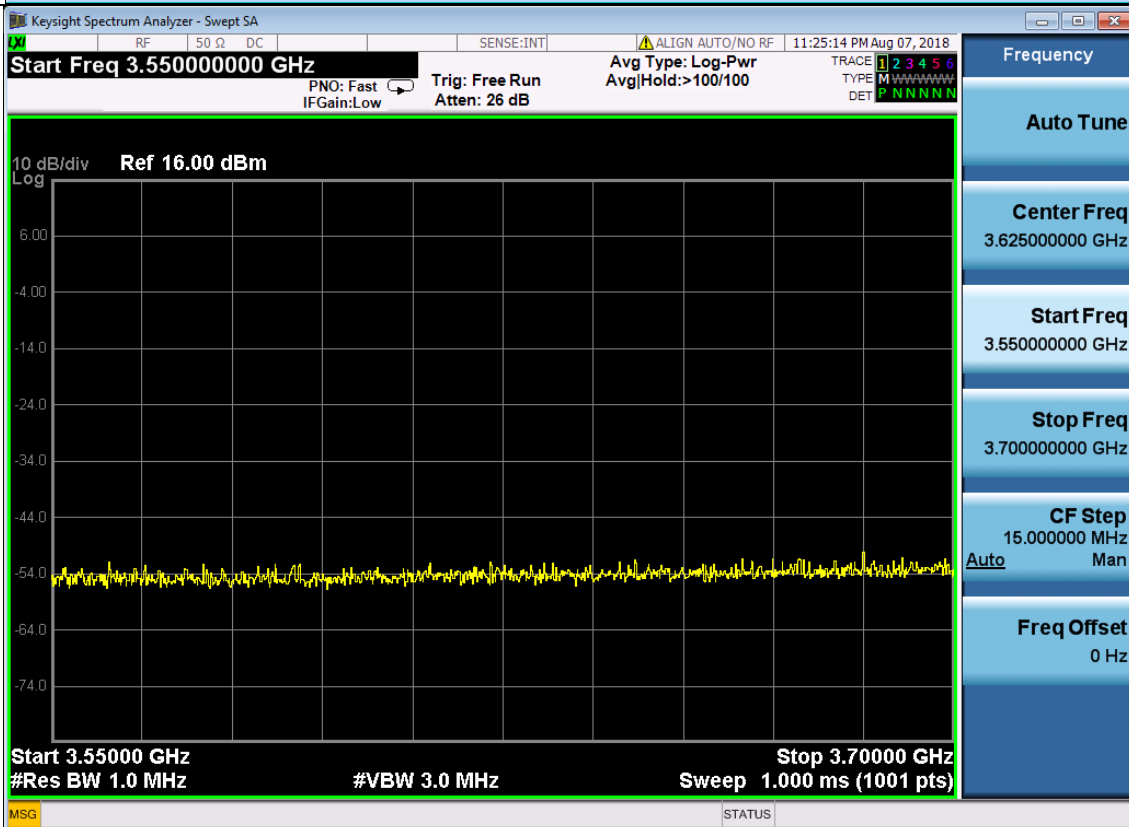
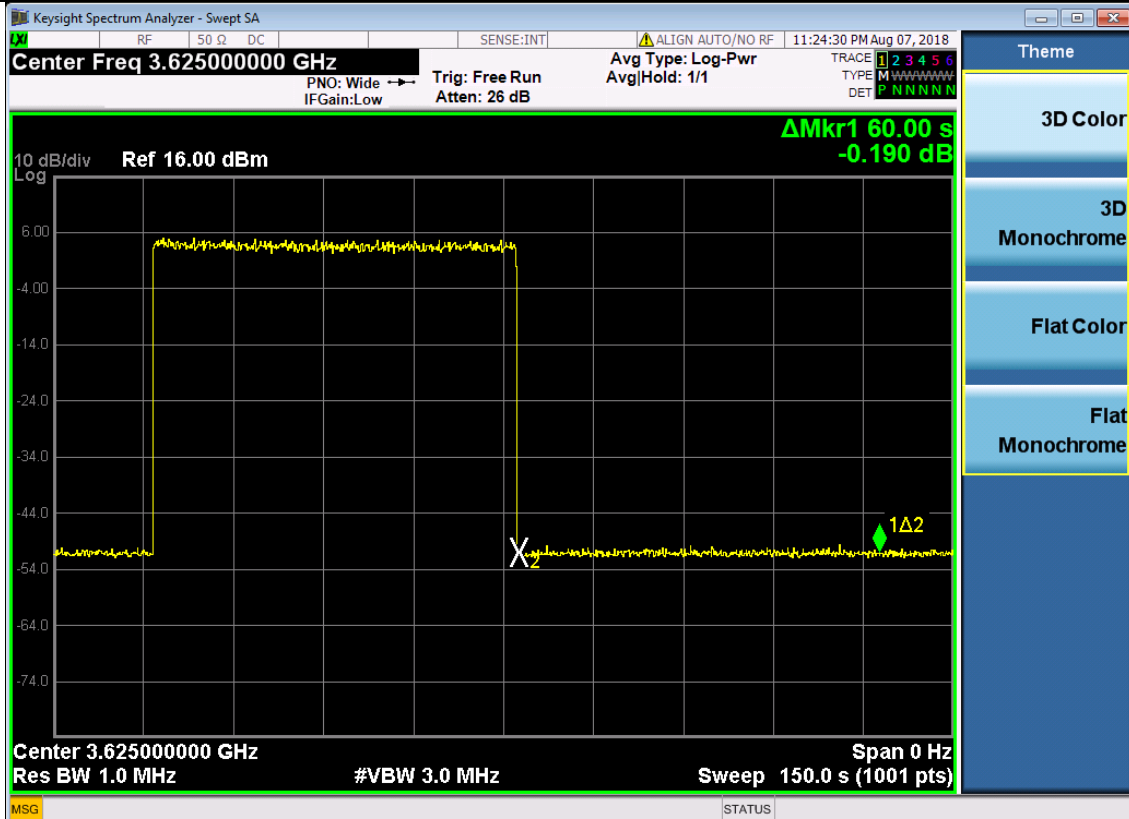
■ Test Case ID : WINNF.FT.C.RLQ.5      □ NA

#	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>=103 and <i>responseData</i> = "grantId") 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>	<div>■</div> PASS	<div>□</div> FAIL



RF measurement plot for Test Case :

- UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request.



#### 4.6.4.3.2 Domain Proxy Unsuccessful Relinquishment, responseCode=103

☐ Test Case ID : WINNF.FT.D.RLQ.6 ☒ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2}</li> <li>● DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> </ul> <p>Invoke trigger on UUT to Relinquish Grant from the SAS Test Harness</p>	--	--
2	<p>DP with two CBSDs sends Relinquishment Request with two objects to the SAS Test Harness.</p> <p>This may occur in a separate message per CBSD, or together in a single message with array of 2.</p> <p>Verify DP sends a Relinquishment Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Relinquishment Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● <i>grantId</i> = Gi</li> </ul>	--	--
3	<p>If a separate Relinquishment Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message.</p> <p>If a single Relinquishment Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Relinquishment Response Message shall be as follows:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> <li>● No <i>grantId</i></li> <li>● <i>responseCode</i> = Ri</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response ( <i>responseCode</i> (Ri) = 103 and <i>responseData</i> = "grantId" for each CBSD) to further request messages from the UUT.	--	--
5	<p>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</p> <p>B. UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</p>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.5 CBSD Deregistration Process

##### 4.6.5.1 Successful Deregistration Request (responseCode 0)

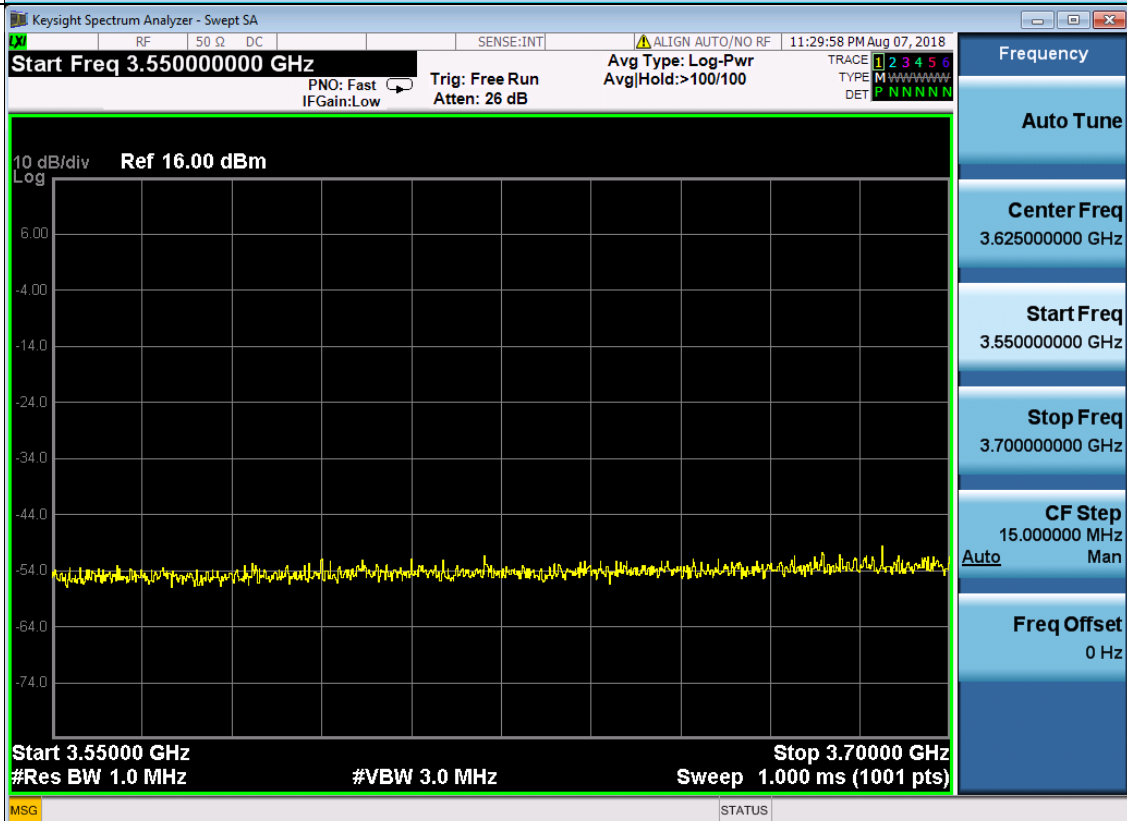
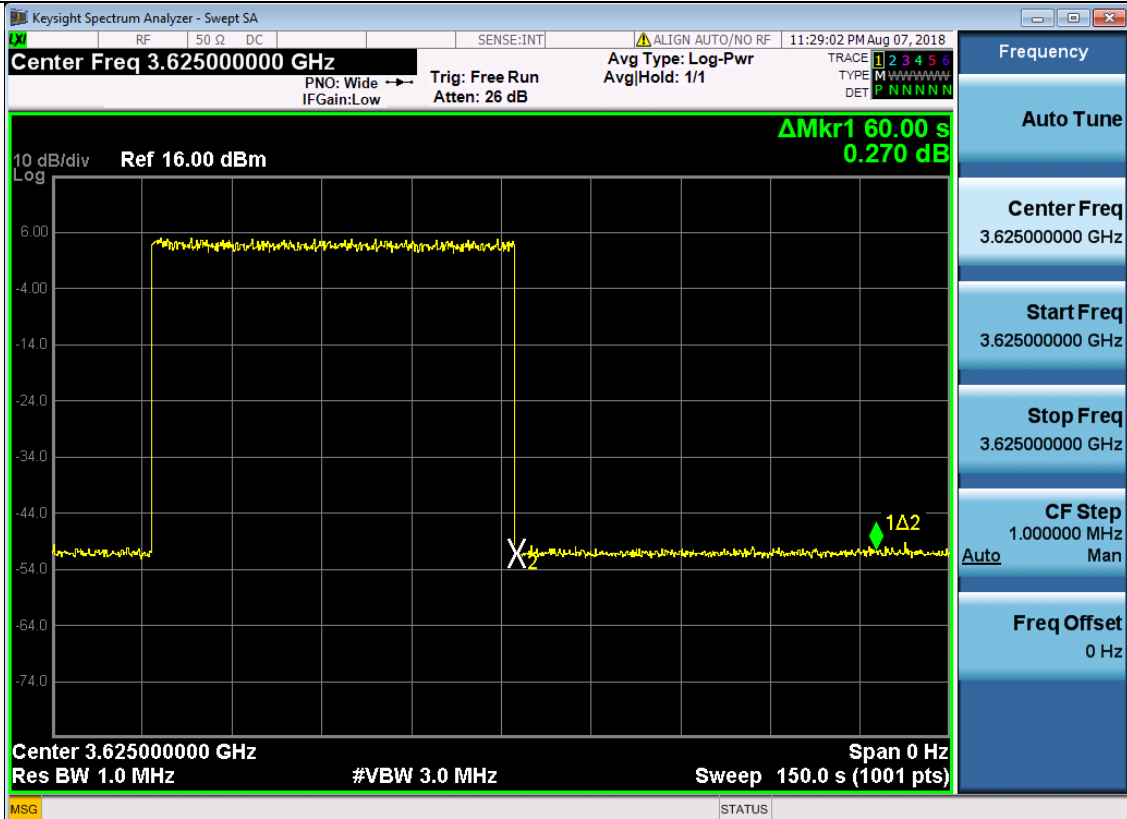
##### 4.6.5.1.1 Successful Deregistration

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

#	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.	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
4	<p>SAS Test Harness shall approve the request with a Deregistration Response message with parameters:</p> <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:               <ul 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> </ul> </li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs.



#### 4.6.5.1.2 Domain Proxy Successful Deregistration

Test Case ID : WINNF.FT.D.DRG.2      NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>Each UUT has successfully registered with SAS Test Harness</li> <li>Each UUT is in the authorized state</li> <li>DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2}</li> <li>DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> </ul> <p>Invoke trigger to deregister each UUT from the SAS Test Harness</p>	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0	--	--
3	<p>Verify DP sends a Deregistration Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Deregistration Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL
4	<p>If a separate Deregistration Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message.</p> <p>If a single Deregistration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Deregistration Response shall be as follows:</p> <ul style="list-style-type: none"> <li><i>cbsdId</i> = Ci</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
5	After completion of step 4, 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 each 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: <ul 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> </ul> </li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL

#### 4.6.5.2 Missing Parameter (responseCode 102)

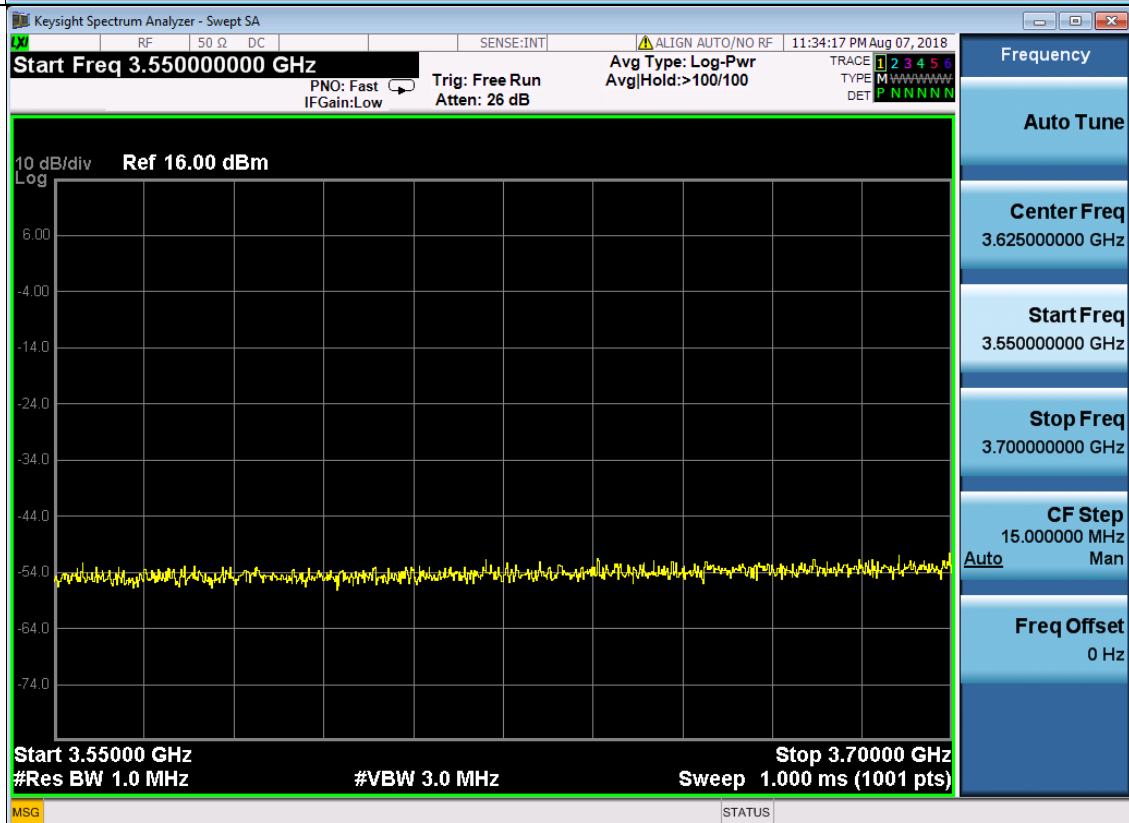
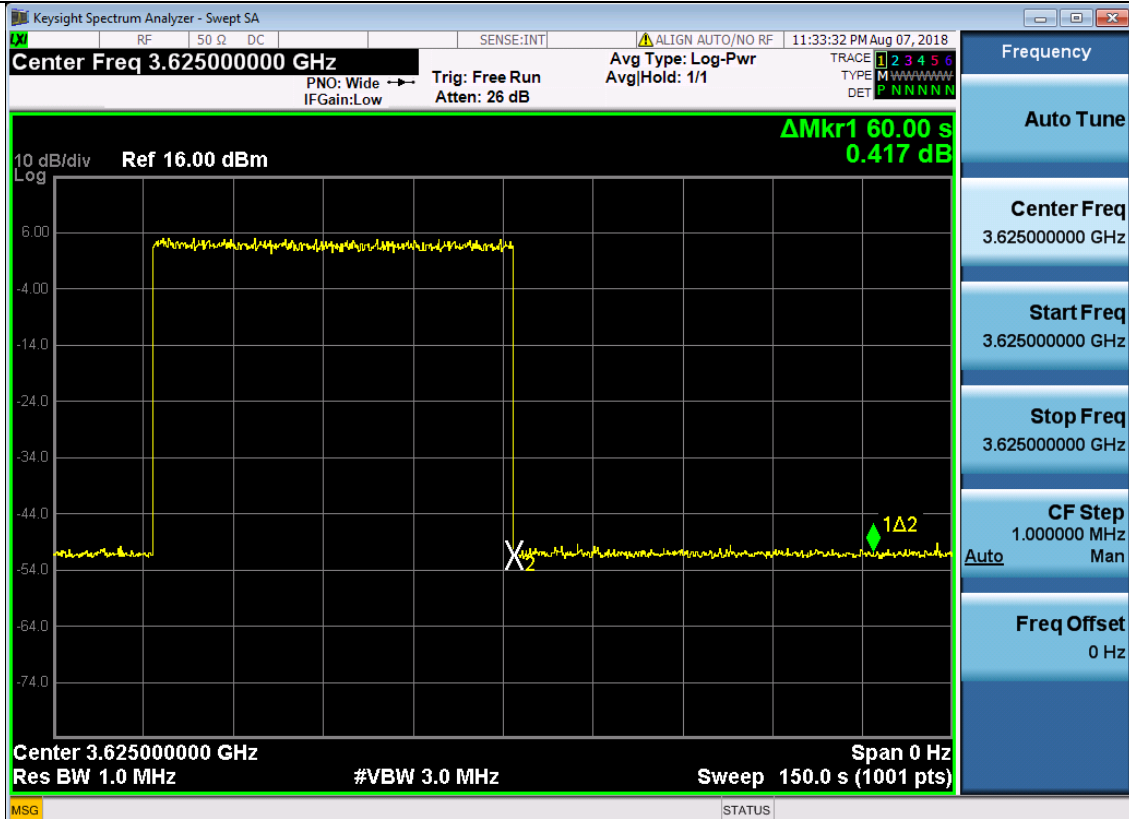
##### 4.6.5.2.1 Deregistration responseCode=102

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

#	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	<p>The SAS Test Harness sends the Deregistration Response Message to UUT with:</p> <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: <ul 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> </ul> </li> </ul>	<div>■</div> <div>PASS</div>	<div>□</div> <div>FAIL</div>

RF measurement plot for Test Case :

- UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs.



#### 4.6.5.2.2 Domain Proxy Deregistration responseCode=102

☐ Test Case ID : WINNF.FT.D.DRG.4 ☒ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● DP has successfully registered 2 CBSD with SAS Test Harness, each with <i>cbsdId</i>=Ci, i={1,2}</li> <li>● DP has received a valid grant with <i>grantId</i> = Gi, i={1,2} for each CBSD</li> <li>● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants.</li> </ul> <p>Invoke trigger to deregister each UUT from the SAS Test Harness</p>	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0 for each CBSD	--	--
3	<p>Verify DP sends a Deregistration Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Deregistration Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = Ci</li> </ul>	--	--
4	<p>If a separate Deregistration Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message.</p> <p>If a single Deregistration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array.</p> <p>Parameters for each CBSD within the Deregistration Response Message shall be as follows:</p> <ul style="list-style-type: none"> <li>● No <i>cbsdId</i> in either response</li> <li>● <i>responseCode</i> = Ri</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 each 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: <ul 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> </ul> </li> </ul>	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL



#### 4.6.5.3 Invalid Parameter (responseCode 103)

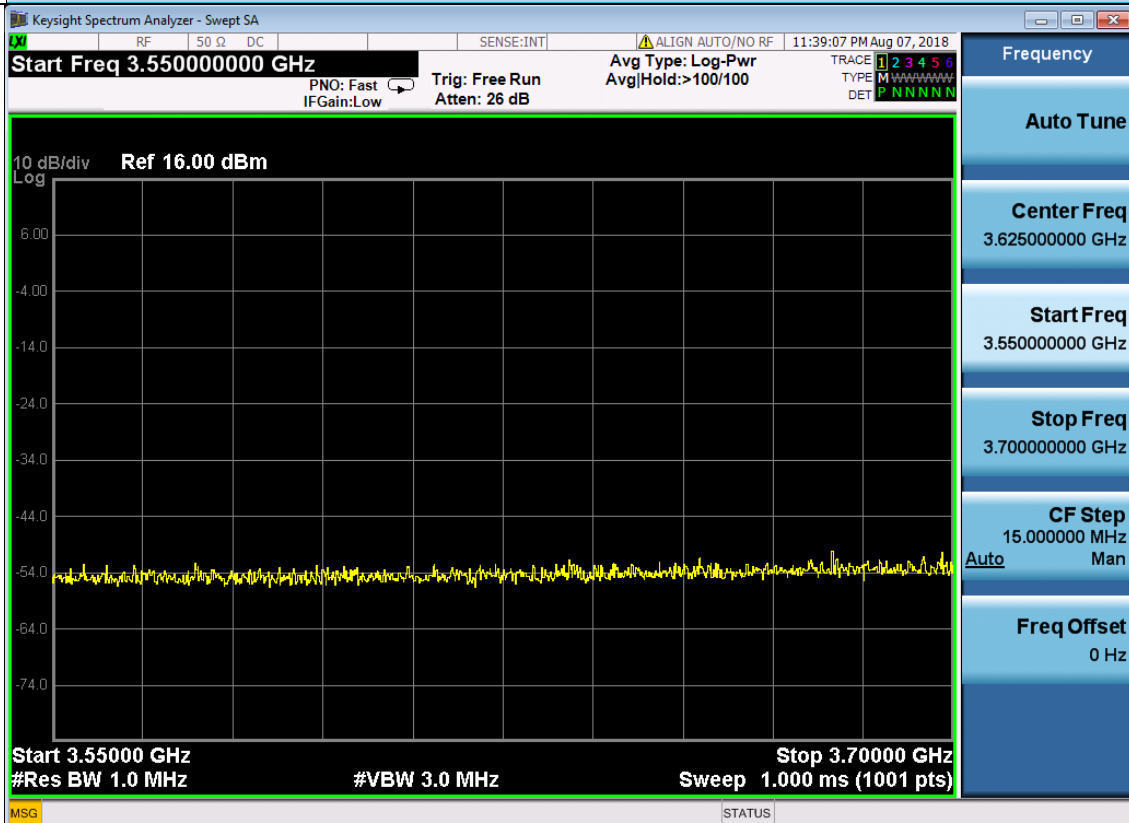
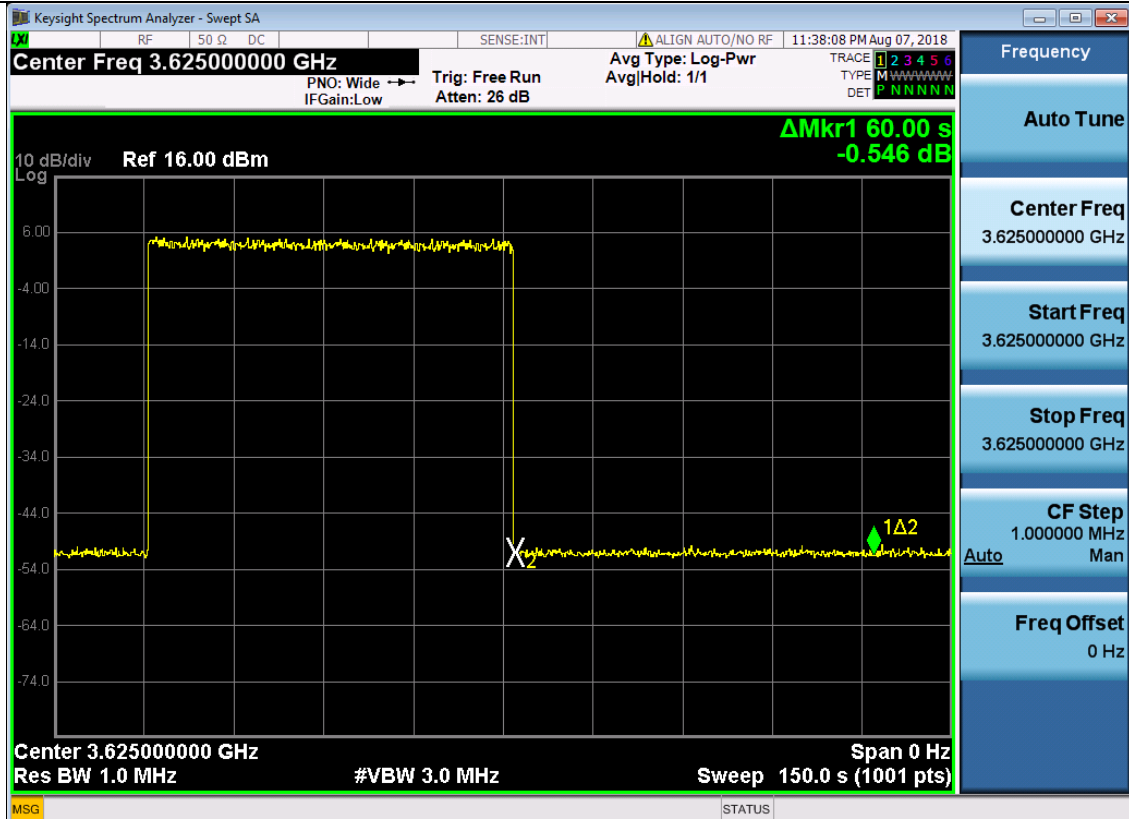
##### 4.6.5.3.1 Deregistration responseCode=103

☒ Test Case ID : WINNF.FT.C.DRG.5
 ☐ NA

#	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 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> Invoke trigger to deregister UUT from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdId</i> = C	--	--
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> =103 and <i>responseData</i> = "cbsdId".) 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"> <li>UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:               <ul 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> </ul> </li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

RF measurement plot for Test Case :

- UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs.



## 4.6.6 CBSD Security Validation

### 4.6.6.1 Successful TLS connection

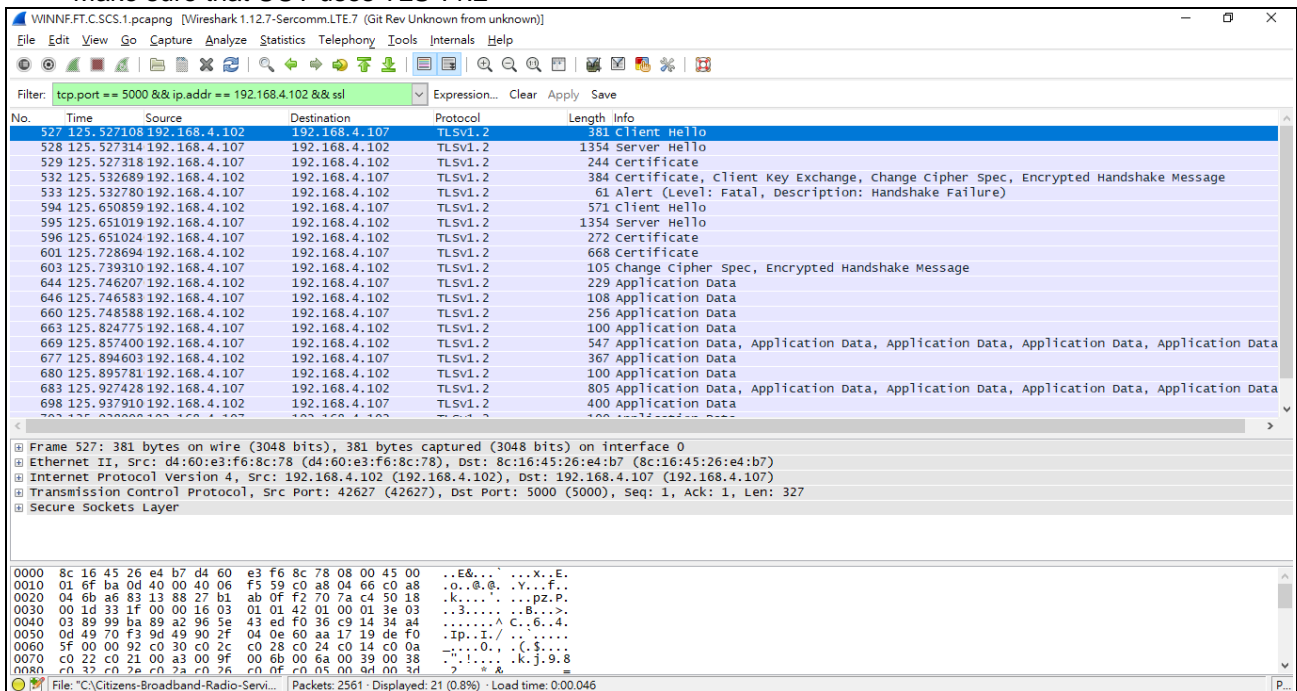
#### 4.6.6.1.1 Successful TLS connection between UUT and SAS Test Harness

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

#	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>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
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>Make sure that cipher suites 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>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> 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"> <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>cbstdId</i>.</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> 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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



WINNF.FT.C.SCS.1.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: tcp.port == 5000 && ip.addr == 192.168.4.102 && ssl

Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
527	125.527108	192.168.4.102	192.168.4.107	TLSv1.2	381	Client Hello
528	125.527314	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
529	125.527318	192.168.4.107	192.168.4.102	TLSv1.2	244	Certificate
532	125.532689	192.168.4.102	192.168.4.107	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
533	125.532780	192.168.4.107	192.168.4.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
594	125.650859	192.168.4.102	192.168.4.107	TLSv1.2	571	Client Hello
595	125.651019	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
596	125.651024	192.168.4.107	192.168.4.102	TLSv1.2	272	Certificate
601	125.728694	192.168.4.102	192.168.4.107	TLSv1.2	668	Certificate
603	125.739310	192.168.4.107	192.168.4.102	TLSv1.2	105	Change Cipher Spec, Encrypted Handshake Message
644	125.746207	192.168.4.102	192.168.4.107	TLSv1.2	229	Application Data
646	125.746583	192.168.4.107	192.168.4.102	TLSv1.2	108	Application Data
660	125.748588	192.168.4.102	192.168.4.107	TLSv1.2	256	Application Data
663	125.824775	192.168.4.107	192.168.4.102	TLSv1.2	100	Application Data
669	125.857400	192.168.4.102	192.168.4.107	TLSv1.2	547	Application Data, Application Data, Application Data, Application Data, Application Data
677	125.894603	192.168.4.107	192.168.4.102	TLSv1.2	367	Application Data
680	125.895781	192.168.4.102	192.168.4.107	TLSv1.2	100	Application Data
683	125.927428	192.168.4.107	192.168.4.102	TLSv1.2	805	Application Data, Application Data, Application Data, Application Data, Application Data
698	125.937910	192.168.4.102	192.168.4.107	TLSv1.2	400	Application Data

Frame 527: 381 bytes on wire (3048 bits), 381 bytes captured (3048 bits) on interface 0

Ethernet II, Src: d4:60:e3:f6:8c:78 (d4:60:e3:f6:8c:78), Dst: 8c:16:45:26:e4:b7 (8c:16:45:26:e4:b7)

Internet Protocol Version 4, Src: 192.168.4.102 (192.168.4.102), Dst: 192.168.4.107 (192.168.4.107)

Transmission Control Protocol, Src Port: 42627 (42627), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 327

Secure Sockets Layer

0000 8c 16 45 26 e4 b7 d4 60 e3 f6 8c 78 08 00 45 00 ..E&...X.E.

0010 01 6f ba 0d 40 00 04 06 f5 59 c0 a8 04 66 c0 a8 ..o..g..Y...F.

0020 04 6b a6 83 13 88 27 b1 ab 0f f2 70 7a c4 50 18 .k.....pz.P.

0030 00 1d 33 1f 00 00 16 03 01 01 42 01 00 01 3e 03 ..3.....B...>

0040 03 89 99 ba 89 a2 96 5e 43 ed f0 36 c9 14 34 a4 .....C.;6..4.

0050 0d 49 70 f3 9d 49 90 2f 04 0e 60 aa 17 19 de f0 ..Ip..I/.....

0060 5f 00 00 92 c0 30 c0 2c c0 28 c0 24 c0 14 c0 0a .....0..(.\$....

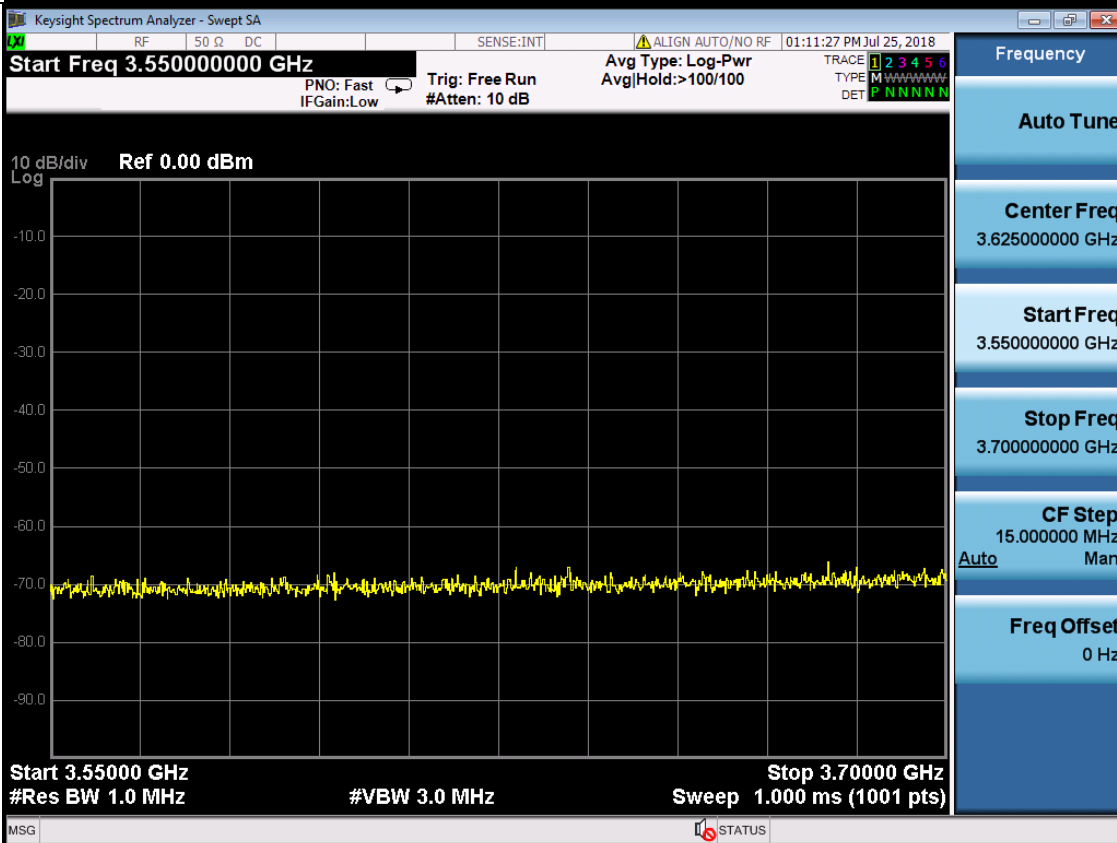
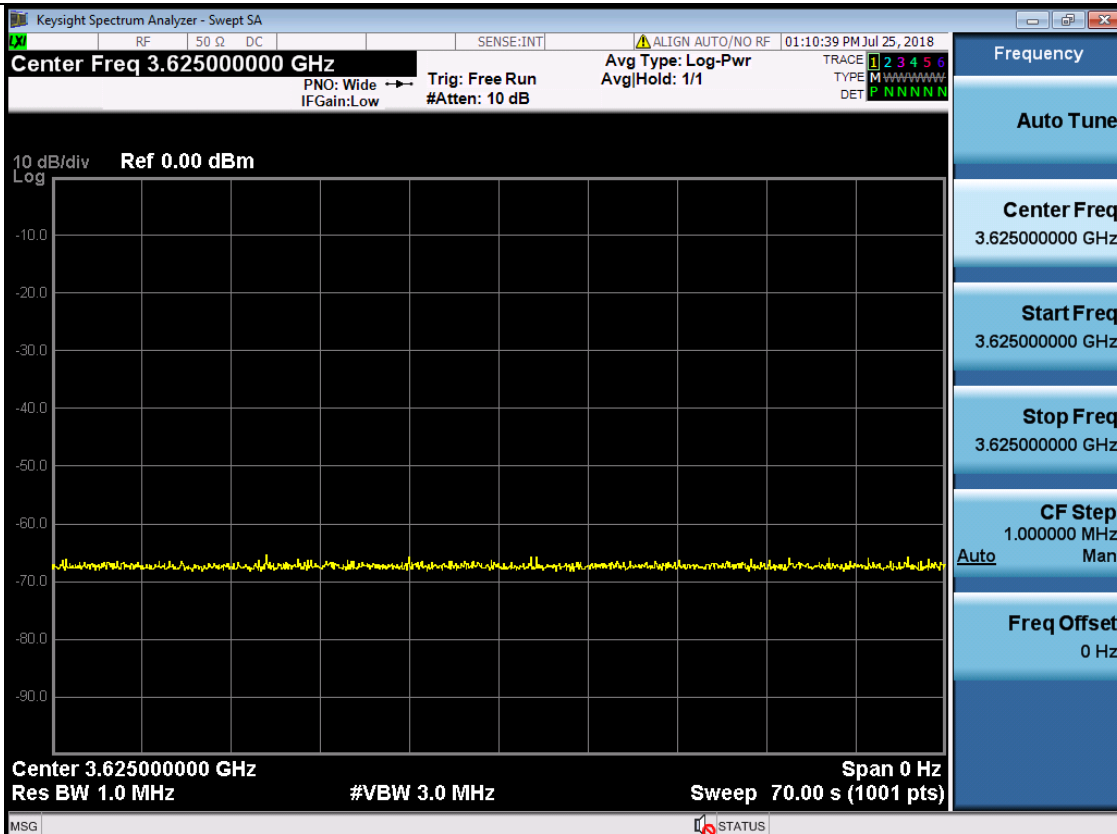
0070 c0 22 c0 21 00 a3 00 9f 00 6b 00 6a 00 39 00 38 ..!.....k.j.9.8

0080 c0 27 c0 2a c0 2a c0 26 c0 0f c0 05 00 0d 00 3d ..?..&.....=

File: C:\Citizens-Broadband-Radio-Servi... Packets: 2561 - Displayed: 21 (0.8%) - Load time: 0:00.046

RF measurement plot for Test Case :

- UUT shall not transmit RF.



#### 4.6.6.2 Unsuccessful TLS connection

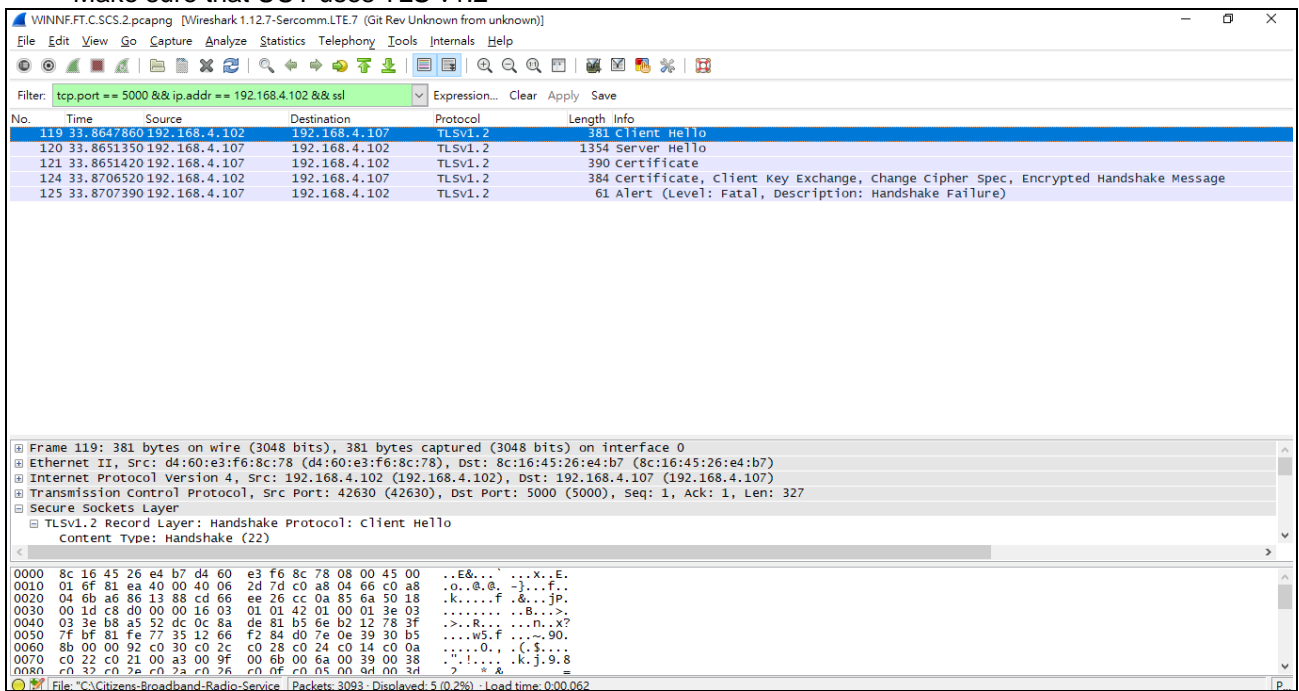
##### 4.6.6.2.1 TLS failure due to revoked certificate

■ Test Case ID : WINNF.FT.C.SCS.2      □ NA

#	Test Execution Steps	Results	
1	● UUT shall start CBSD-SAS communication with the security procedures	■ PASS	□ FAIL
2	● Make sure that UUT uses TLS v1.2 for security establishment. ● Make sure UUT selects the correct cipher suite. ● UUT shall use CRL or OCSP to verify the validity of the server certificate. ● Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	■ PASS	□ FAIL
3	UUT may retry for the security procedure which shall fail.	■ PASS	□ FAIL
4	SAS Test-Harness shall not receive any Registration request or any application data.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall not transmit RF	■ PASS	□ FAIL

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



WINNF.FT.C.SCS.2.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: tcp.port == 5000 && ip.addr == 192.168.4.102 && ssl Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
119	33.8647860	192.168.4.102	192.168.4.107	TLSv1.2	381	Client Hello
120	33.8651350	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
121	33.8651420	192.168.4.107	192.168.4.102	TLSv1.2	390	Certificate
124	33.8706520	192.168.4.107	192.168.4.102	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
125	33.8707390	192.168.4.107	192.168.4.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)

Frame 119: 381 bytes on wire (3048 bits), 381 bytes captured (3048 bits) on interface 0

Ethernet II, Src: d4:60:e3:f6:8c:78 (d4:60:e3:f6:8c:78), Dst: 8c:16:45:26:e4:b7 (8c:16:45:26:e4:b7)

Internet Protocol Version 4, Src: 192.168.4.102 (192.168.4.102), Dst: 192.168.4.107 (192.168.4.107)

Transmission Control Protocol, Src Port: 42630 (42630), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 327

Secure Sockets Layer

TLSv1.2 Record Layer: Handshake Protocol: Client Hello

Content Type: Handshake (22)

0000 8c 16 45 26 e4 b7 d4 60 e3 f6 8c 78 08 00 45 00 ..E&...x.E.

0010 01 6f 81 ea 40 00 40 06 2d 7d c0 a8 04 66 c0 a8 .o..@..-}...f..

0020 04 6b a6 86 13 88 cd 66 ee 26 cc 0a 85 6a 50 18 .k....f.&...jP.

0030 00 1d c8 00 00 00 16 03 01 01 42 01 00 01 3e 03 ->..R...n.x?

0040 03 3e b8 a5 52 dc 0c 8a de 81 b5 6e b2 12 78 3f ....w5.f...90.

0050 7f bf 81 fe 77 35 12 66 f2 84 d0 7e 0e 39 30 b5 ....0..(.\$....

0060 8b 00 00 92 c0 30 c0 2c c0 28 c0 24 c0 14 c0 0a -!....k.j.9.8

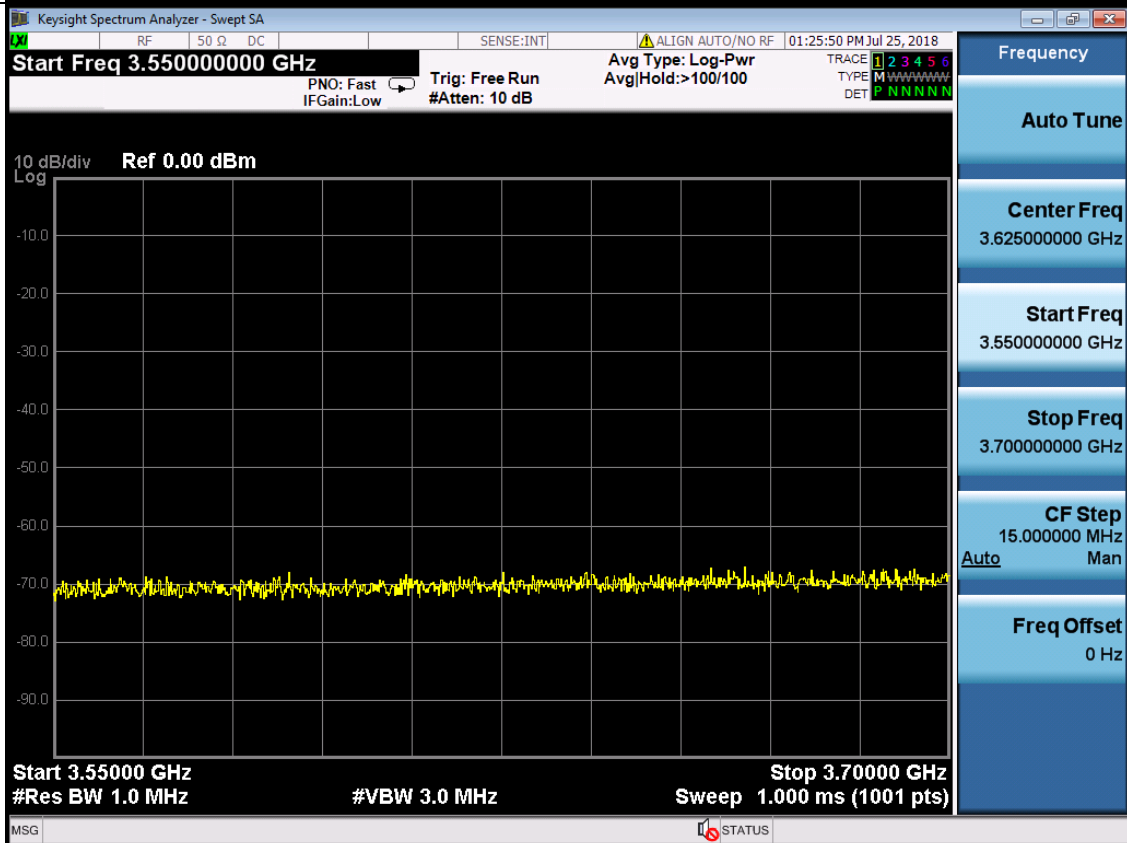
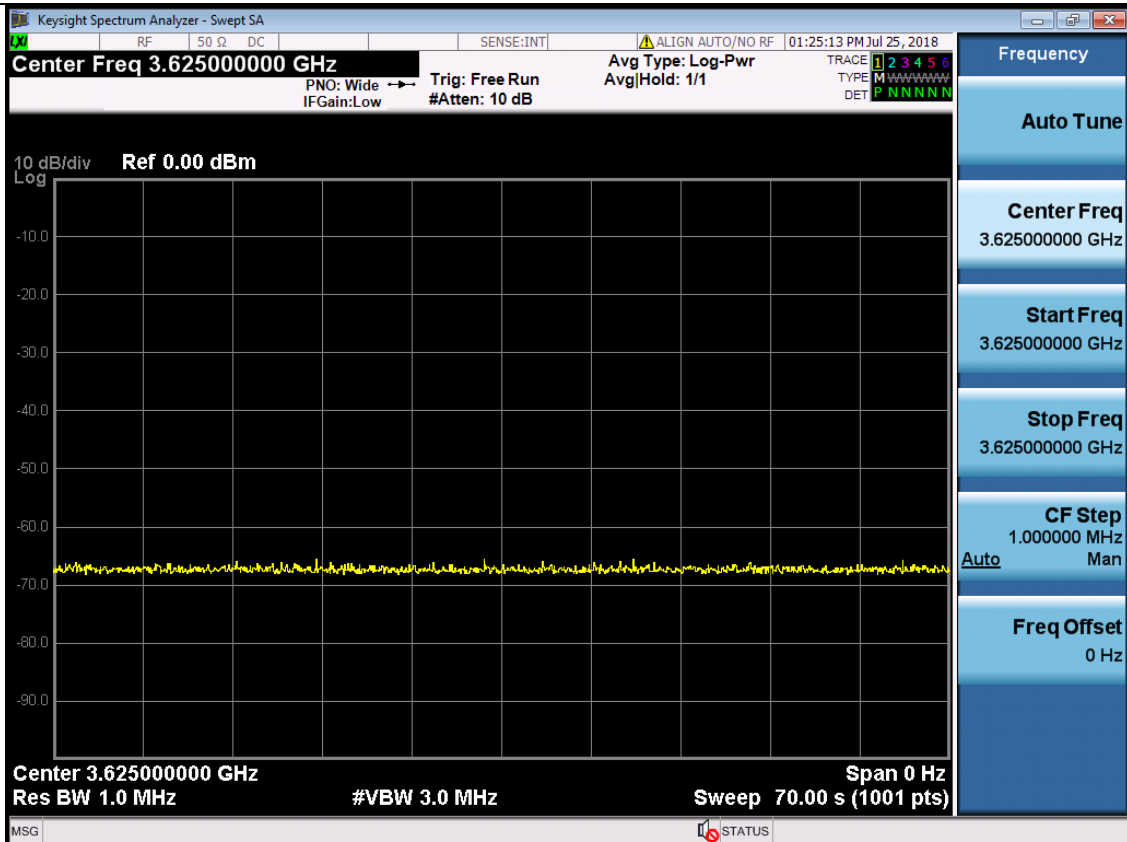
0070 c0 22 c0 21 00 a3 00 9f 00 6b 00 6a 00 39 00 38 ?...&

0080 c0 37 c0 7a c0 7a c0 7a c0 0f c0 05 00 0d 00 3d

File: C:\Citizens-Broadband-Radio-Service Packets: 3093 - Displayed: 5 (0.2%) - Load time: 0.00.062

RF measurement plot for Test Case :

- UUT shall not transmit RF.



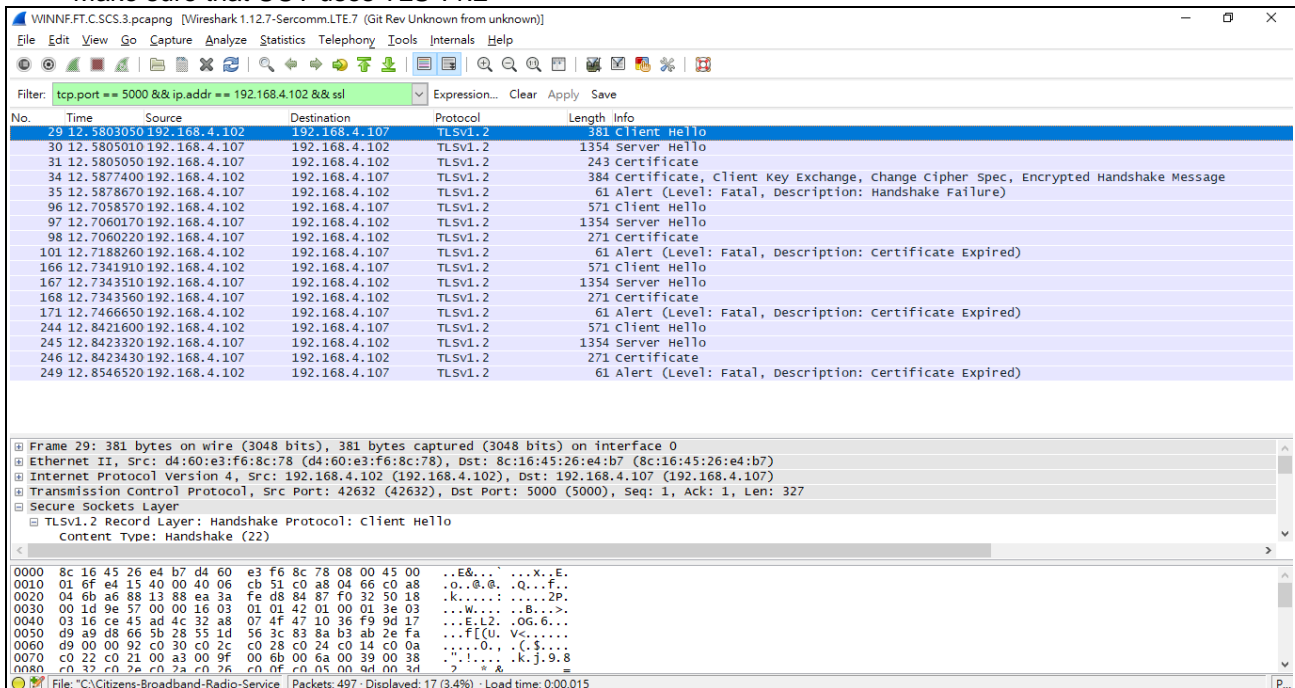
#### 4.6.6.2.2 TLS failure due to expired server certificate

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

#	Test Execution Steps	Results	
1	● UUT shall start CBSD-SAS communication with the security procedures	■ PASS	□ FAIL
2	<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	□ 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"> <li>● UUT shall not transmit RF</li> </ul>	■ PASS	□ FAIL

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The screenshot shows a Wireshark capture of a network session. The filter is set to 'tcp.port == 5000 && ip.addr == 192.168.4.102 && ssl'. The packet list shows a series of TLSv1.2 messages between 192.168.4.102 and 192.168.4.107. Key packets include:

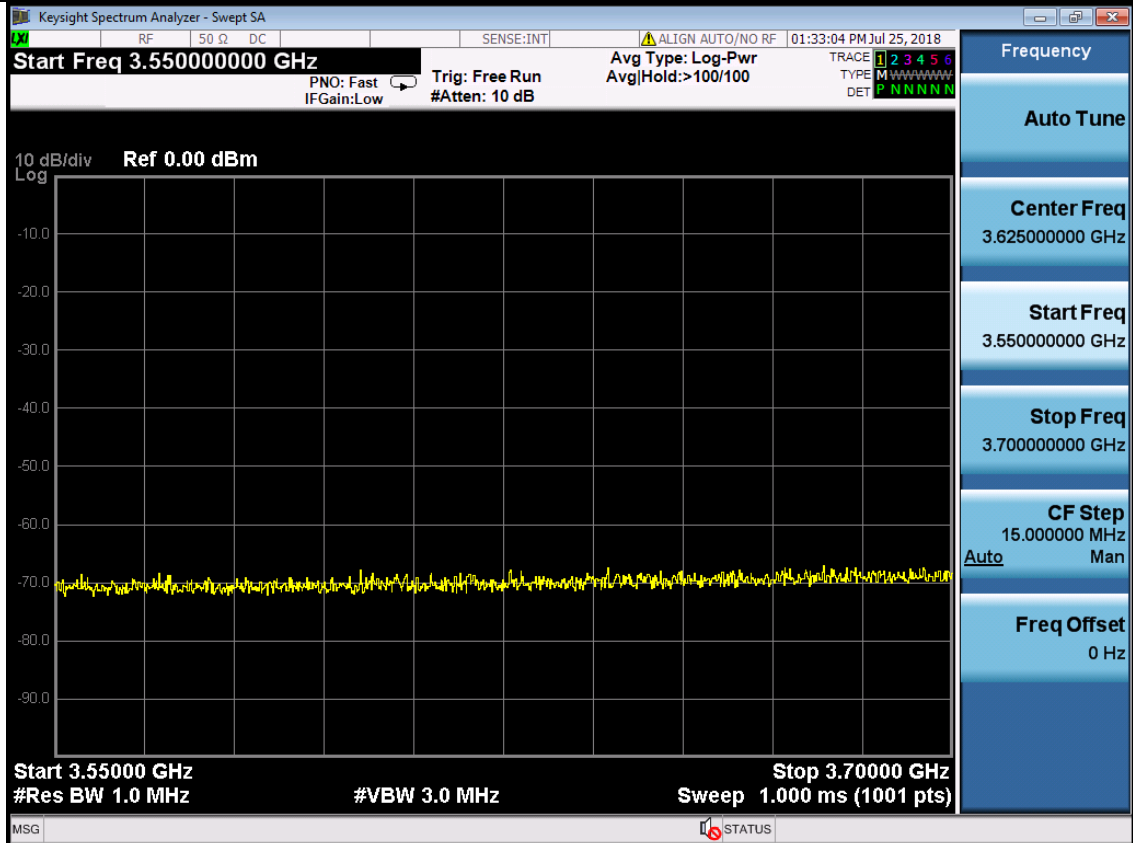
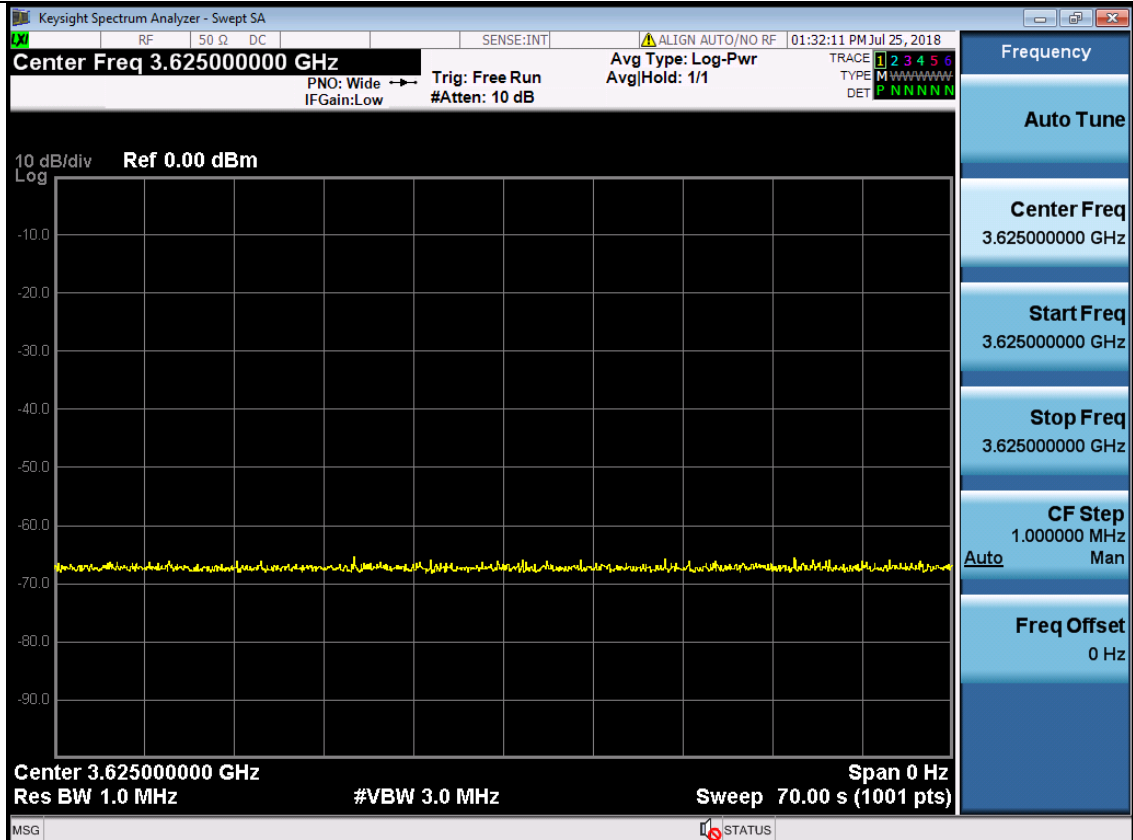
- 29: 381 Client Hello
- 30: 1354 Server Hello
- 31: 243 Certificate
- 34: 384 Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
- 35: 61 Alert (Level: Fatal, Description: Handshake Failure)
- 96: 571 Client Hello
- 97: 1354 Server Hello
- 98: 271 Certificate
- 101: 61 Alert (Level: Fatal, Description: Certificate Expired)
- 166: 571 Client Hello
- 167: 1354 Server Hello
- 168: 271 Certificate
- 171: 61 Alert (Level: Fatal, Description: Certificate Expired)
- 244: 571 Client Hello
- 245: 1354 Server Hello
- 246: 271 Certificate
- 249: 61 Alert (Level: Fatal, Description: Certificate Expired)

The packet details pane for frame 29 shows the TLSv1.2 Record Layer: Handshake Protocol: Client Hello. The packet bytes pane shows the raw hex and ASCII data of the Client Hello message.



RF measurement plot for Test Case :

- UUT shall not transmit RF.





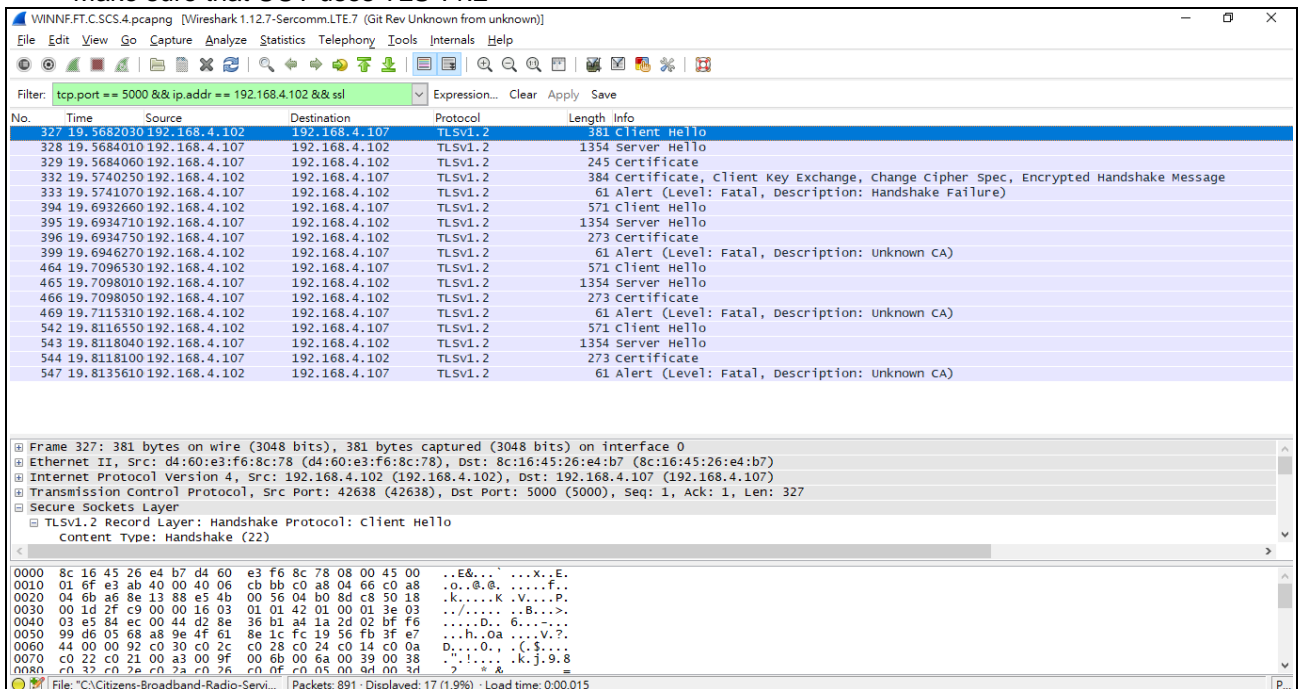
#### 4.6.6.2.3 TLS failure when SAS Test Harness certificate is issued by an unknown CA

■ 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"> <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	□ 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"> <li>● UUT shall not transmit RF</li> </ul>	■ PASS	□ FAIL

Wireshark Capture Example for Test Case :

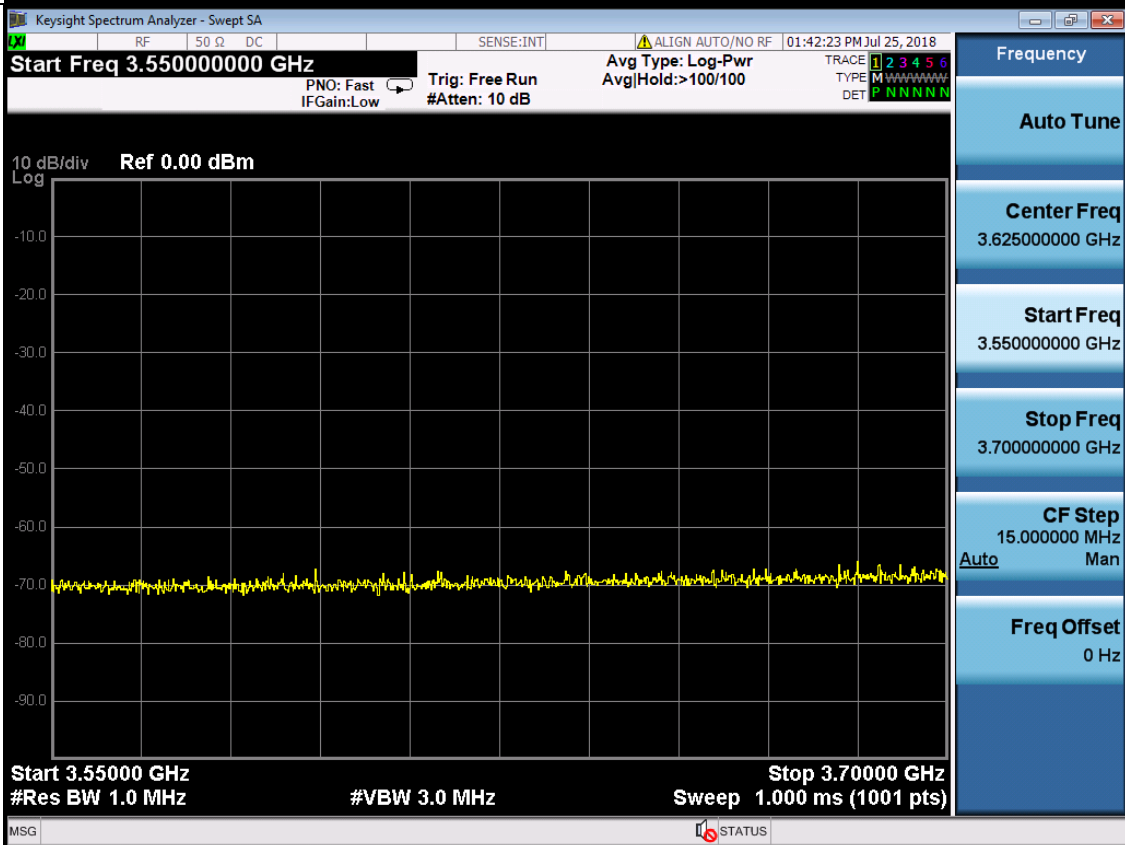
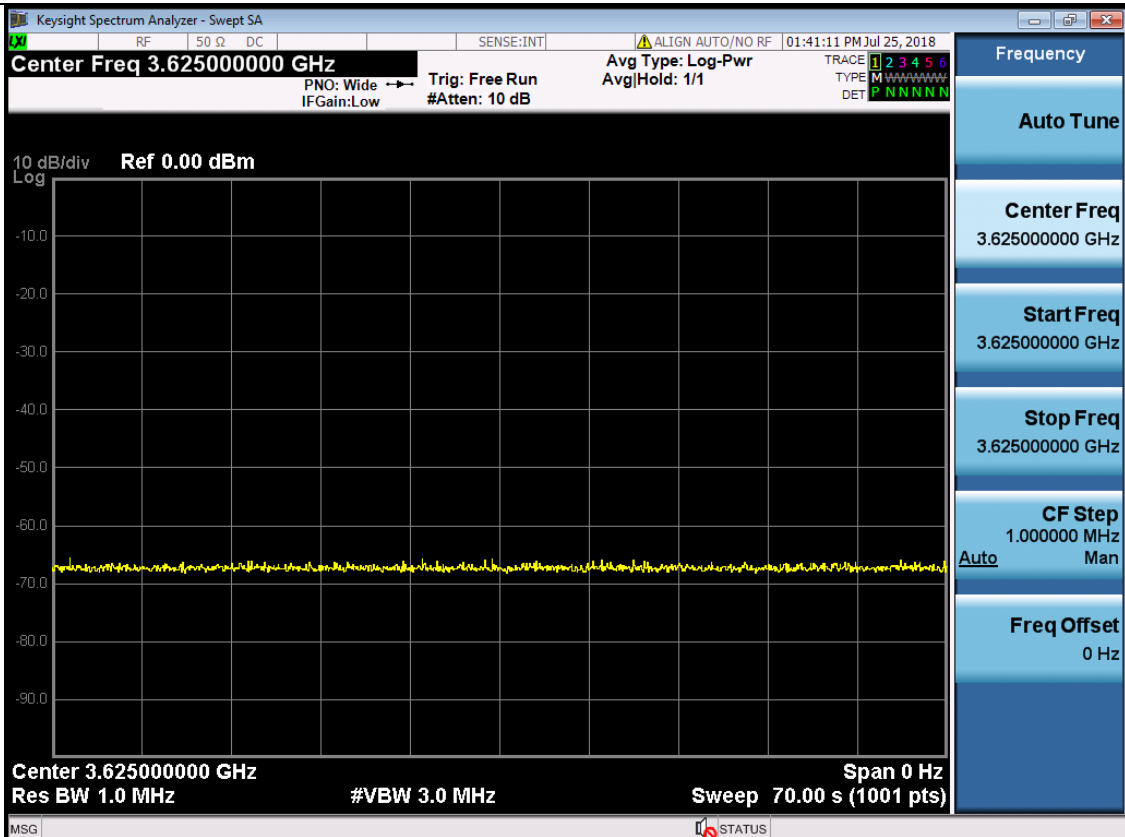
- Make sure that UUT uses TLS v1.2



The screenshot shows a Wireshark capture of a network session. The filter is set to 'tcp.port == 5000 && ip.addr == 192.168.4.102 && ssl'. The packet list shows a series of TLSv1.2 messages between 192.168.4.102 and 192.168.4.107. The handshake sequence includes Client Hello, Server Hello, Certificate, and Alert messages. The final Alert message (packet 547) has a level of 'Fatal' and a description of 'Unknown CA', indicating the failure of the security establishment process.

RF measurement plot for Test Case :

- UUT shall not transmit RF.



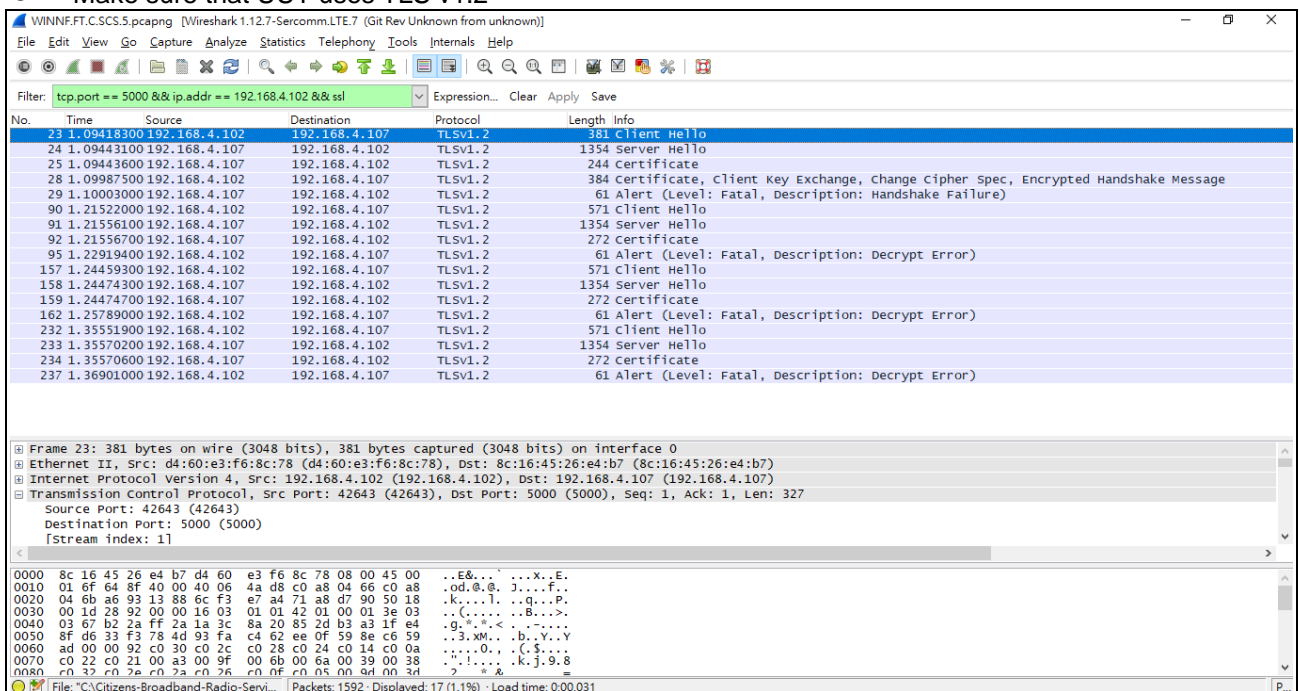
#### 4.6.6.2.4 TLS failure when certificate at the SAS Test Harness is corrupted

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

#	Test Execution Steps	Results	
1	● UUT shall start CBSD-SAS communication with the security procedures	■ PASS	□ FAIL
2	<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	□ 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"> <li>● UUT shall not transmit RF</li> </ul>	■ PASS	□ FAIL

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



Filter: tcp.port == 5000 && ip.addr == 192.168.4.102 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
23	1.09418300	192.168.4.102	192.168.4.107	TLSv1.2	381	Client Hello
24	1.09443100	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
25	1.09443600	192.168.4.102	192.168.4.107	TLSv1.2	244	Certificate
28	1.09987500	192.168.4.102	192.168.4.107	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
29	1.10003000	192.168.4.107	192.168.4.102	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
90	1.21522000	192.168.4.102	192.168.4.107	TLSv1.2	571	Client Hello
91	1.21556100	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
92	1.21556700	192.168.4.102	192.168.4.107	TLSv1.2	272	Certificate
95	1.22919400	192.168.4.102	192.168.4.107	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)
157	1.24459300	192.168.4.102	192.168.4.107	TLSv1.2	571	Client Hello
158	1.24474300	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
159	1.24474700	192.168.4.102	192.168.4.107	TLSv1.2	272	Certificate
162	1.25789000	192.168.4.102	192.168.4.107	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)
232	1.35551900	192.168.4.102	192.168.4.107	TLSv1.2	571	Client Hello
233	1.35570200	192.168.4.107	192.168.4.102	TLSv1.2	1354	Server Hello
234	1.35570600	192.168.4.102	192.168.4.107	TLSv1.2	272	Certificate
237	1.36901000	192.168.4.102	192.168.4.107	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)

Frame 23: 381 bytes on wire (3048 bits), 381 bytes captured (3048 bits) on interface 0

Ethernet II, Src: d4:60:e3:f6:8c:78 (d4:60:e3:f6:8c:78), Dst: 8c:16:45:26:e4:b7 (8c:16:45:26:e4:b7)

Internet Protocol Version 4, Src: 192.168.4.102 (192.168.4.102), Dst: 192.168.4.107 (192.168.4.107)

Transmission Control Protocol, Src Port: 42643 (42643), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 327

Source Port: 42643 (42643)

Destination Port: 5000 (5000)

Stream index: 11

0000 8c 16 45 26 e4 b7 d4 60 e3 f6 8c 78 08 00 45 00 ..E&...x.E.

0010 01 6f 64 8f 40 00 40 06 4a d8 c0 a8 04 66 c0 a8 .od.8.0.J...f.

0020 04 6b a6 93 13 88 6c f3 e7 a4 71 a8 d7 90 50 18 .k...l..g...P.

0030 00 1d 28 92 00 00 16 03 01 01 42 01 00 01 3e 03 ..(.....B...>.

0040 03 67 b2 2a ff 2a 1a 3c 8a 20 85 2d b3 a3 1f e4 .g\*%<.-...-

0050 8f d6 33 f3 78 4d 93 fa c4 62 ee 0f 59 8e c6 59 ..3.XM...b.Y..Y

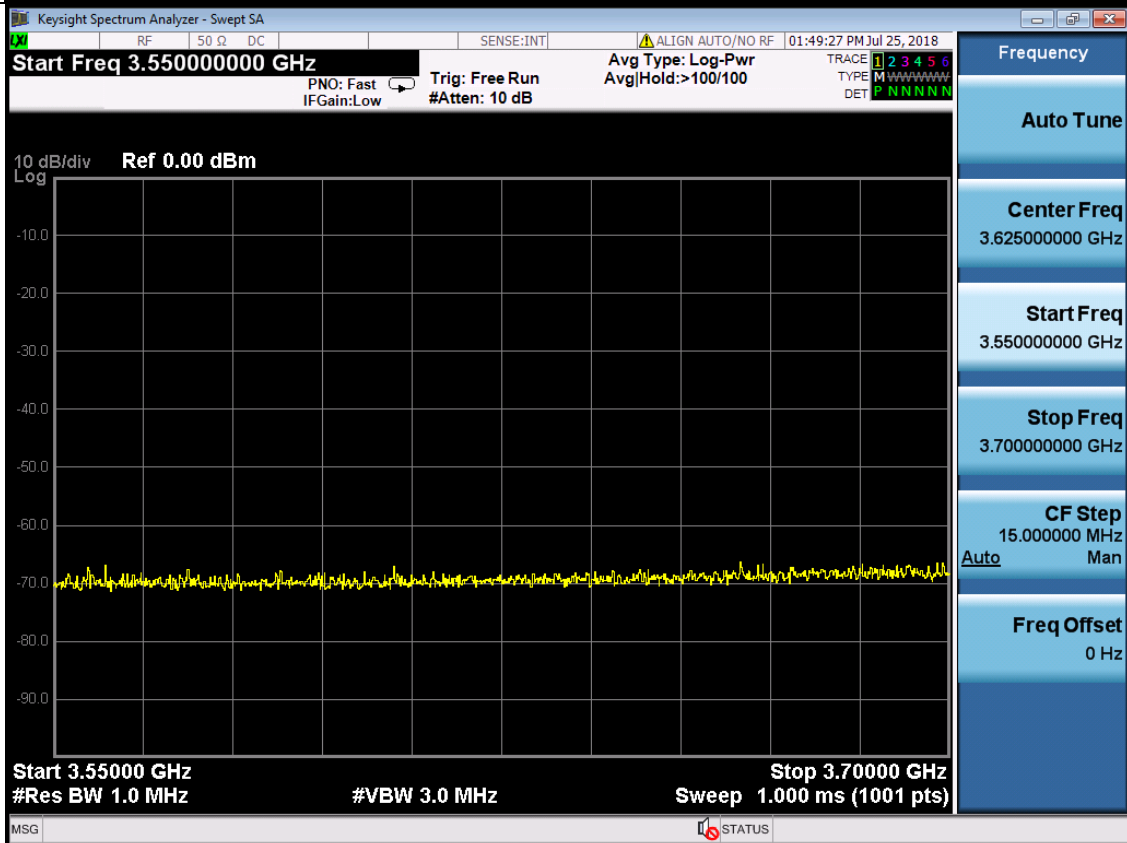
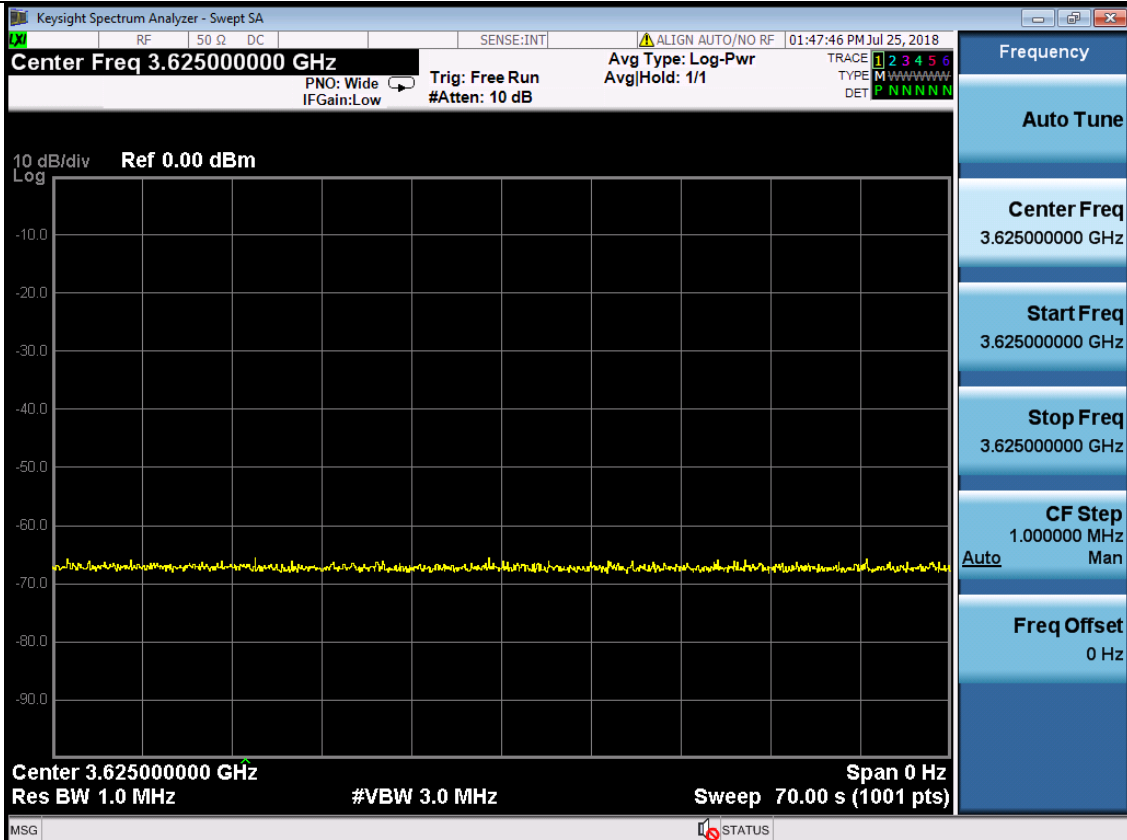
0060 ad 00 00 92 c0 30 c0 2c c0 28 c0 24 c0 14 c0 0a ....0...(.\$....

0070 c0 22 c0 21 00 a3 00 9f 00 6b 00 6a 00 39 00 38 ...!...k.j.9.8

0080 c0 32 c0 2e c0 2a c0 26 c0 0f c0 05 00 0d 00 3d ?...&=

RF measurement plot for Test Case :

- UUT shall not transmit RF.



## 4.6.7 CBSD RF Power Measurement

### 4.6.7.1 UUT RF Transmit Power Measurement Performance Test Case

#### 4.6.7.1.1 UUT RF Transmit Power Measurement

■ 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness</li> <li>● UUT has registered with the SAS, with CBSD 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 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>	<div>■</div> PASS	<div>□</div> 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				Limit(dBm)	Pass /Fail
		Conducted Power Density (dBm/MHz)			Gain(dBi) 10.63		
		Chain 0	Chain 1	Total	Power Density	Maximum	
Middle	3625	10.195	13.666	15.279	25.909	30.0	Pass

Note: Directional gain = 7.62dBi + 10log(2) = 10.63dBi

## 5 Pictures of Test Arrangements

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

## Appendix – Information on 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.

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

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