7.3.8 WINNF.FT.C.HBT.10

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: ○ valid cbsdId = C ○ valid grantId = G ○ grant is for frequency range F, power P ○ grantExpireTime = UTC time greater than duration of the test ● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--	–
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: ● cbsdId = C ● grantId = G ● operationState = “AUTHORIZED”	■ Pass	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: cbsdId = C grantId = G transmitExpireTime = T = current UTC time + 200 seconds ● responseCode = 0	--	–
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	–
5	Monitor the RF output of the UUT. Verify: ● UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.	■ Pass	□ Fail

7.3.9 WINNF.FT.C.HBT.11

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: ○ valid cbsdId = C ○ valid grantId = G ○ grant is for frequency range F, power P ● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface. ● Grant has the following parameters at the start of the test: ○ grantExpireTime =UTC time equal to time at start of test + 300 seconds = Tgrant_expire ○ *transmitExpireTime* = UTC time equal to time at start of test + 200 seconds ○ *heartbeatInterval* = 60 seconds	--	–
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 heartbeatInterval, and is formatted correctly, including: ● cbsdId = C ● grantId = G ● operationState = “AUTHORIZED”	■ Pass	□ Fail
4	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = current UTC + 200 seconds ● grantExpireTime = same as Step 1 ● responseCode = 0	--	–
5	Go to Step 2	--	–
6	Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: ● cbsdId = C ● grantId = G ● operationState = “AUTHORIZED” ● grantRenew = TRUE	■ Pass	□ Fail
7	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● cbsdId = C ● grantId = G ● grantExpireTime = UTC time set far in the future ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	--	--
8	Continue to respond to any subsquentHeartbeat Request from CBSD with Heartbeat Response with the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = same as Step 7 ● responseCode = 0	--	--
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

7.4 CBSD Measurement Report

7.4.1 WINNF.FT.C.MES.1

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness	–	--
2	UUT sends a Registration Request message. ● userId is present and correct ● fccId is present and correct ● cbsdSerialNumber is present and correct ● measCapability = "RECEIVED_POWER_WITHOUT_GRANT"	■ Pass	□ Fail
3	SAS Test Harness sends a Grant Response message, with the following parameters: ● cbsdId = C = valid cbsdId for this UUT ● measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" ● responseCode = 0	–	--
4	UUT sends a message. ● • If message is type Spectrum Inquiry Request, go to step 5, or ● If message is type Grant Request, go to step 7	–	--
5	UUT sends message type Spectrum Inquiry Request. ● cbsdId = C ● measReport is present, and is a properly formatted rcvdPowerMeasReport.	■ Pass	□ Fail
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: ● cbsdId = C ● availableChannel is an array of availableChannel /objects ● responseCode = 0	–	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● measReport is present, and is a properly formatted rcvdPowerMeasReport.	■ Pass	□ Fail

7.4.2 WINNF.FT.C.MES.3

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C and measCapability = "RECEIVED_POWER_WITH_GRANT"	–	--

2	UUT sends a Grant Request message. Verify Grant Request message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● operationParam is present and format is valid	■ Pass	□ Fail
3	SAS Test Harness sends a Grant Response message, with the following parameters: ● cbsdId = C ● grantId = G = valid grant ID ● grantExpireTime = UTC time in the future ● heartbeatInterval = 60 seconds ● measReportConfig= “RECEIVED_POWER_WITH_GRANT” ● operationParam is set to valid operating parameters ● channelType = “GAA” ● responseCode = 0	–	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● operationState = “GRANTED”	■ Pass	□ Fail
5	If Heartbeat Request message (step 4) contains measReport object, then: ● verify measReport is properly formatted as object rcvdPowerMeasReport ● end test, with PASS result else, if Heartbeat Request message (step 4) does not contain measReport object, then: ● If number of Heartbeat Requests sent by UUT after Step 3 is =5, then stop test with result of FAIL	■ Pass	□ Fail
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0 Go to Step 4, above	–	--

7.4.3 WINNF.FT.C.MES.4

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C and measCapability = "RECEIVED_POWER_WITH_GRANT" ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. ● Grant has heartbeatInterval = 60 seconds	–	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● operationState = "AUTHORIZED"	■ Pass	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● measReportConfig= "RECEIVED_POWER_WITH_GRANT" ● responseCode = 0	–	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● operationState = "AUTHORIZED"	■ Pass	□ Fail
5	If Heartbeat Request message (step 4) contains measReport object, then: ● verify measReport is properly formatted as object ● rcvdPowerMeasReport ● end test, with PASS result else, if Heartbeat Request message (step 4) does not contain measReport object, then: ● If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL	■ Pass	□ Fail
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G ● responseCode = 0 Go to Step 4, above	–	--

7.5 CBSD Relinquishment Process

7.5.1 WINNF.FT.C.RLQ.1

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS	–	--

	Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness		
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G	■ Pass	□ Fail
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: - cbsdId = C - grantId = G ● responseCode = 0	–	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive ● response (responseCode=0) to further request messages from the UUT	–	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	■ Pass	□ Fail

7.5.2 WINNF.FT.C.RLQ.3

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	–	--
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G	–	--
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: - cbsdId = C - grantId = G ● responseCode = R	–	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive ● response (responseCode=0) to further request messages from the UUT	–	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	■ Pass	□ Fail

7.5.3 WINNF.FT.C.RLQ.5

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	–	--
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● grantId = G	–	--
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: - cbsdId = C - grantId = G ● responseCode = 103	–	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive ● response (responseCode=0) to further request messages from the UUT	–	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	■ Pass	□ Fail

7.6 CBSD Deregistration Process

7.6.1 WINNF.FT.C.DRG.1

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with ● responseCode=0	--	--
3	● UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	■ Pass	□ Fail
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: ● cbsdId = C ● responseCode = 0	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive ● response (responseCode=0) to further request messages from the UUT.	--	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: ● UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	■ Pass	□ Fail

7.6.2 WINNF.FT.C.DRG.3

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	–	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	–	--
3	● UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	–	--
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: ● No cbsdId ● responseCode = 103	–	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT.	–	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: ● UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	■ Pass	□ Fail

7.6.3 WINNF.FT.C.DRG.5

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with cbsdId=C ● UUT has received a valid grant with grantId = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	–	–
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	–	–
3	● UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	–	–
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: ● cbsdId=C ● responseCode = 103	–	–
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=0) to further request messages from the UUT.	–	–
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: ● UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: C. UUT sending a Registration Request message, as this is not mandatory D. UUT sending a Deregistration Request message	■ Pass	□ Fail

7.7 CBSD Security Validation

7.7.1 WINNF.FT.C.SCS.1

#	Test Execution Steps	Results	
1	● UUT shall start CBSD-SAS communication with the security procedure ● The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate. ● Configure the SAS Test Harness to accept the security procedure and establish the connection	■ Pass	□ Fail
2	● Make sure that Mutual authentication happens between UUT and the SAS Test Harness. ● Make sure that UUT uses TLS v1.2 ● Make sure that cipher suites from one of the following is selected, ● TLS_RSA_WITH_AES_128_GCM_SHA256 ● TLS_RSA_WITH_AES_256_GCM_SHA384 ● TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 ● TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 ● TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	■ Pass	□ Fail
3	A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability. E. UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with responseCode = 0 and cbsdId.	■ Pass	□ Fail
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall not transmit RF	■ Pass	□ Fail

7.7.2 WINNF.FT.C.SCS.2

#	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	F. 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

7.7.3 WINNF.FT.C.SCS.3

#	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	G. 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

7.7.4 WINNF.FT.C.SCS.4

#	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	H. 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

7.7.5 WINNF.FT.C.SCS.5

#	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	I. 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

7.8 CBSD RF Power Measurement

7.8.1 WINNF.PT.C.HBT.1

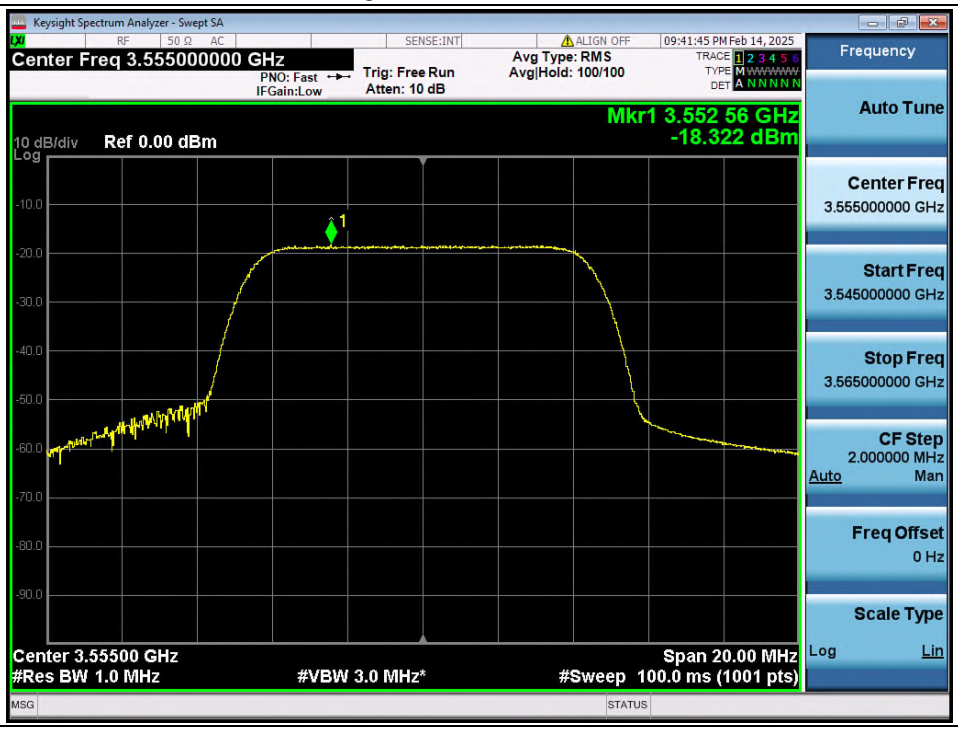
#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT has registered with the SAS, with CBSD ID = C ● UUT has a single valid grant G with parameters {lowFrequency = FL, highFrequency = FH, maxEirp = Pi}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case ● 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	–	--
2	UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows: ● UUT sends Heartbeat Request, including: ○ cbsdId = C ○ grantId = G ● SAS Test Harness responds with Heartbeat Response, including: o cbsdId = C ○ grantId = G ○ transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	–	--
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method. J. 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.	■ Pass	□ Fail

RF measurement plot for Test Case:

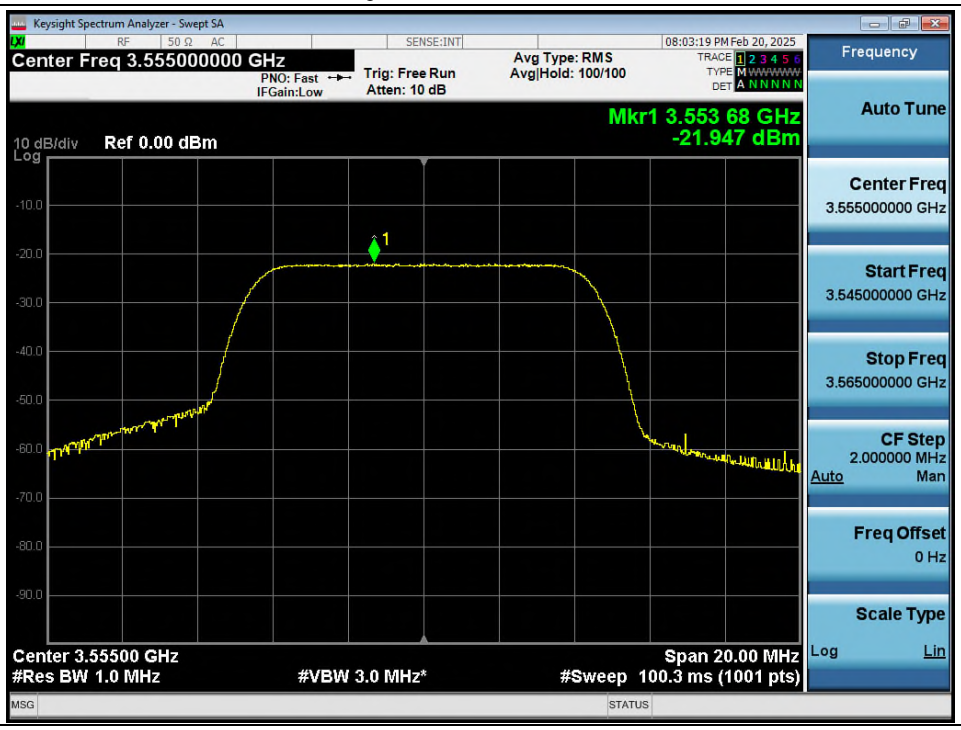
- Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.

Frequency (MHz)	Channel Bandwidth	Granted maxEIRP	Conducted PSD	MIMO Factor	Antenna Gain	Cable Loss	maxEIRP
	(MHz)	(dBm/MHz)	(dBm/MHz)	(dB)	(dBi)	(dB)	(dBm/MHz)
3555	10	18	-18.322	6.02	7	22.8	17.498
3555	10	15	-21.947	6.02	7	22.8	13.873
3555	10	10	-27.028	6.02	7	22.8	8.792
Note:							
MaxEIRP= Conducted PSD+ Antenna Gain+ Cable loss+MIMO Factor							

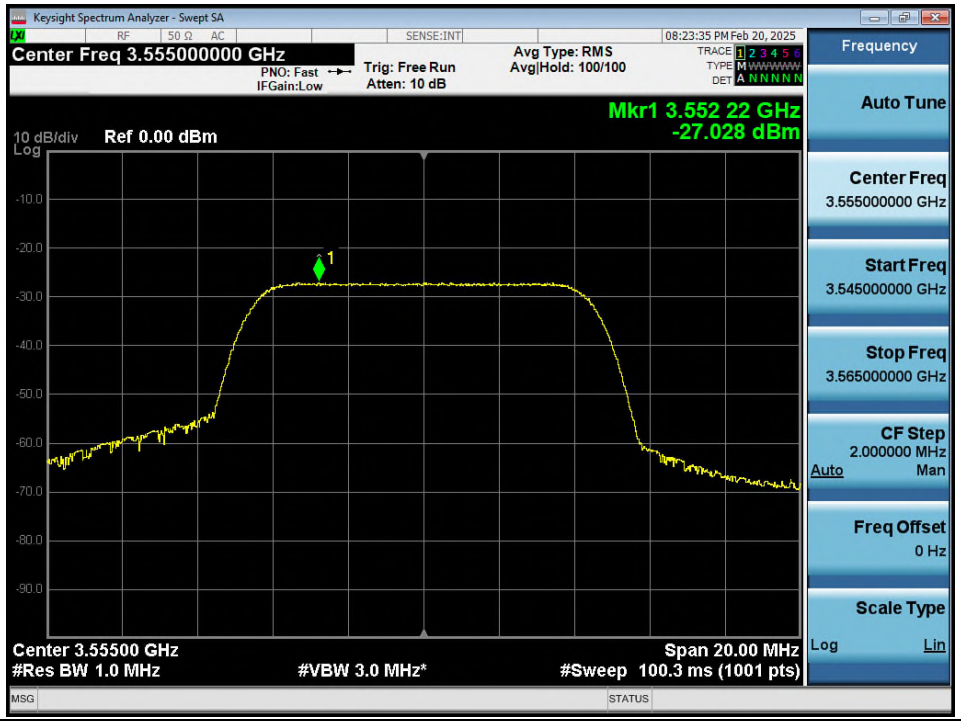
Target Power: 18 dBm/MHz



Target Power: 15 dBm/MHz



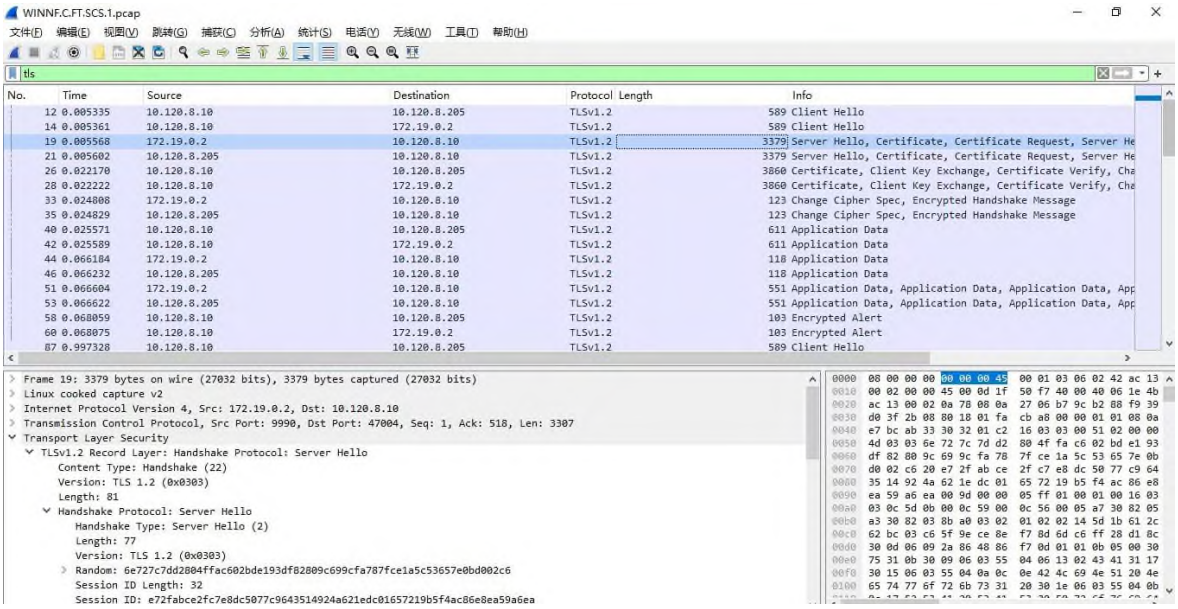
Target Power: 10 dBm/MHz



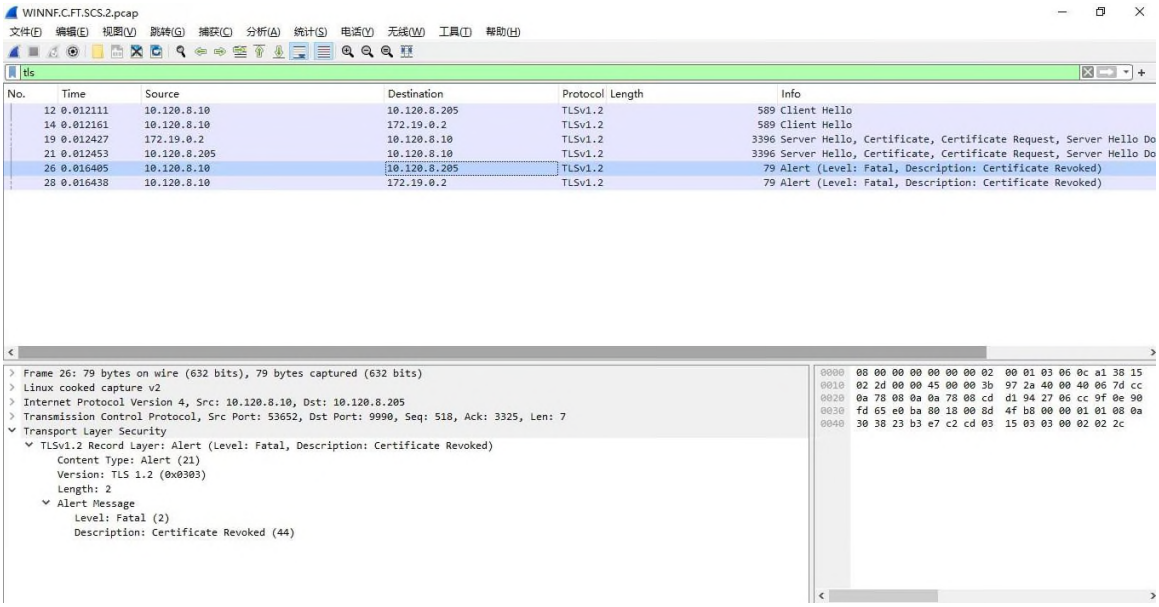
8 Test Data Log

Test data log refer to log files (Log files appendix) except for security test cases which shows below.

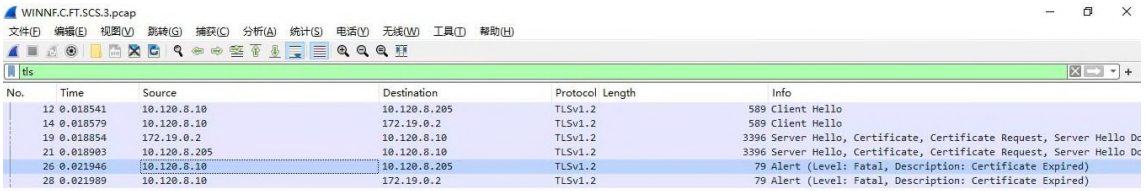
8.1 WINNF.FT.C.SCS.1



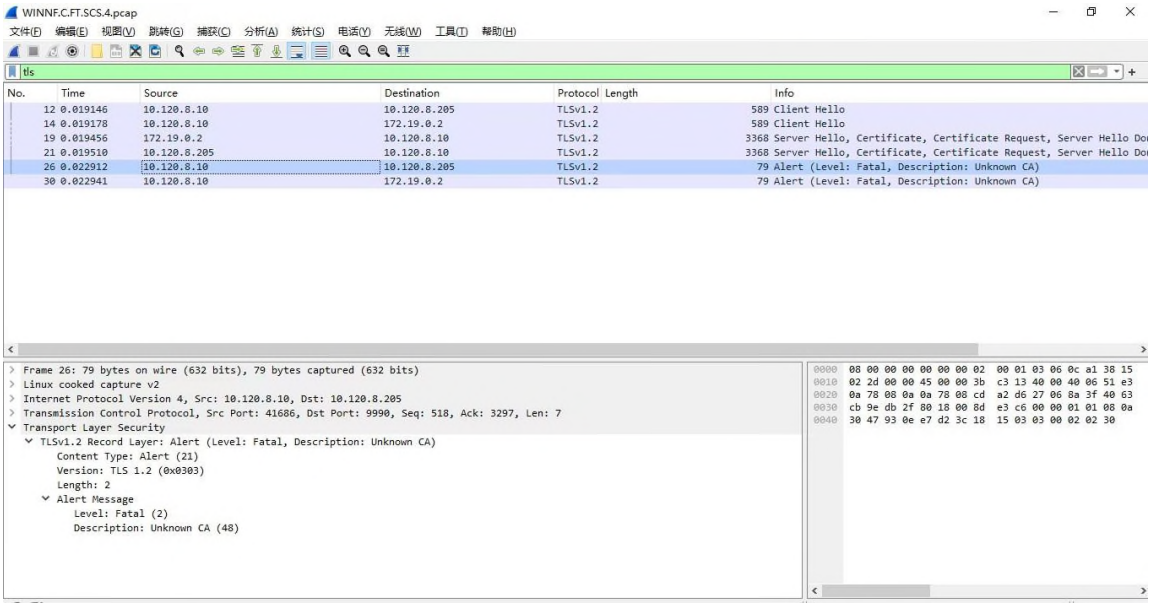
8.2 WINNF.FT.C.SCS.2



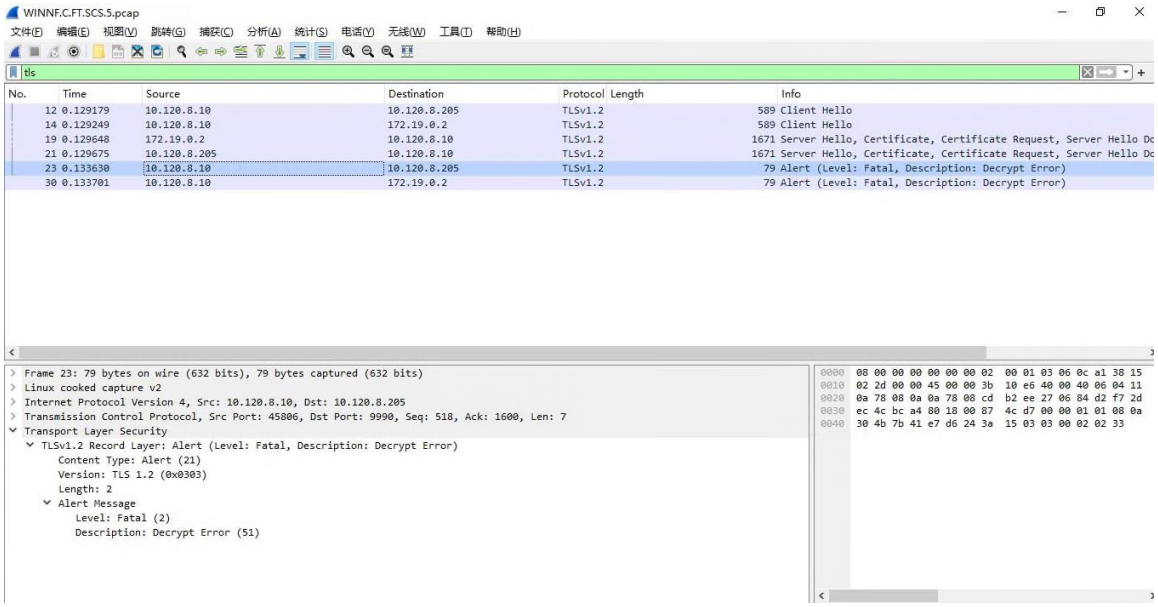
8.3 WINNF.FT.C.SCS.3



8.4 WINNF.FT.C.SCS.4



8.5 WINNF.FT.C.SCS.5



9 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2403000374AT

10 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2403000374AT