



## SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 1 of 50

# TEST REPORT

Application No.:	SZCR2407002522AT
Applicant:	Baicells Technologies Co., Ltd.
Address of Applicant:	9-10F, 1st Bldg., No. 81 Beiqing Road, Haidian District, Beijing, China
Manufacturer:	Baicells Technologies Co., Ltd.
Address of Manufacturer:	9-10F, 1st Bldg., No. 81 Beiqing Road, Haidian District, Beijing, China
Equipment Under Test (EUT):	
EUT Name:	5G Outdoor CPE
Model No.:	EG8561A-NR11
Trade Mark:	Baicells
FCC ID:	2AG32EG8561ANR11
Standard(s) :	FCC 47 CFR Part 96 CBRSA-TS-9001-V1.2.1 WINNF-19-IN-00033 V1.0 KDB 940660 D01 Part 96 CBRS Eqpt v03 KDB 940660 D02 CPE-CBSD Handshake Procedures v02 WINNF-TS-0122-V1.0.2 CBRS CBSD Test Specification
Date of Receipt:	2024-07-01
Date of Test:	2024-07-10 to 2024-09-26
Date of Issue:	2024-10-09
Test Result:	Pass*

\* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu  
EMC Laboratory Manager



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 2 of 50

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-10-09		Original

Authorized for issue by:			
	Frank Chen	Frank Chen /Project Engineer	
	Eric Fu	Eric Fu/Reviewer	

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## 2 Test Summary

Test Summary for Standalone CBSD			
Item	Standard	Test Case ID	Result
Multi-Step registration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.1	Pass
Single-Step registration for CBSD with CPI signed data	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.5	Pass
Missing Required parameters (responseCode 102)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.8	Pass
Pending registration (responseCode 200)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.10	Pass
Invalid parameter (responseCode 103)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.12	Pass
Blacklisted CBSD (responseCode 101)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.14	Pass
Unsupported SAS protocol version (responseCode 100)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.16	Pass
Group Error (responseCode 201)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.18	Pass
Unsuccessful Grant responseCode=400 (INTERFERENCE)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.GRA.1	Pass
Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.GRA.2	Pass
Heartbeat Success Case (first Heartbeat Response)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.1	Pass
Heartbeat responseCode=105 (DREGISTER)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.3	Pass
Heartbeat responseCode=500 (TERMINATED_GRANT)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.4	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.5	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.6	Pass
Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.7	Pass
Heartbeat Response Absent (First Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.9	Pass
Heartbeat Response Absent (Subsequent Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.10	Pass
Successful Relinquishment	WINNF-TS-0122-V1.0.2	WINNF.FT.C.RLQ.1	Pass
Successful Deregistration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.DRG.1	Pass

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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 4 of 50

Test Summary for Standalone CBSD			
Item	Standard	Test Case ID	Result
Successful TLS connection between UUT and SAS Test Harness	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.1	Pass
TLS failure due to revoked certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.2	Pass
TLS failure due to expired server certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.3	Pass
TLS failure when SAS Test Harness certificate is issued by unknown CA	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.4	Pass
TLS failure when certificate at the SAS Test Harness is corrupted	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.5	Pass
UUT RF Transmit Power Measurement	WINNF-TS-0122-V1.0.2	WINNF.PT.C.HBT	Pass
SAS Version: 1.0.0.3			

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

**Test standards:**

**CBRSA-TS-9001-V1.2.1**

CBRS Alliance Certification Test Plan

**WINNF-TS-0122-V1.0.2**

Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT)

**WINNF-19-IN-00033 V1.0**

CBRS CPE-CBSD as UUT Test Guidelines

**KDB 940660 D01 Part 96 CBRS Eqpt v03**

**KDB 940660 D02 CPE-CBSD Handshake Procedures v02**

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### 3 Contents

	Page
<b>1 Cover Page .....</b>	<b>1</b>
<b>2 Test Summary .....</b>	<b>3</b>
<b>3 Contents .....</b>	<b>5</b>
<b>4 General Information .....</b>	<b>7</b>
4.1 Details of E.U.T .....	7
4.2 Description of CBSD/DP Support Features .....	8
4.3 Summary of Test Results .....	9
4.4 Measurement Uncertainty .....	9
4.5 Description of Support Units .....	9
4.6 Test Location .....	10
<b>5 Equipment List .....</b>	<b>11</b>
<b>6 Test Method and Environment .....</b>	<b>12</b>
6.1 CBSD/DP Conformance and Performance .....	12
6.2 CPE-CBSD Handshake Procedures .....	12
6.3 CBSD Test Procedure .....	12
6.4 Duration and Duty Cycle Measurement .....	12
6.5 Duration and Duty Cycle Test Procedure .....	12
6.6 Test Environment .....	13
6.7 Test Setup .....	13
<b>7 Test Data .....</b>	<b>15</b>
7.1 CBSD Registration Process .....	15
7.1.1 WINNF.FT.C.REG.1 .....	15
7.1.2 WINNF.FT.C.REG.5 .....	16
7.1.3 WINNF.FT.C.REG.8 .....	17
7.1.4 WINNF.FT.C.REG.10 .....	18
7.1.5 WINNF.FT.C.REG.12 .....	19
7.1.6 WINNF.FT.C.REG.14 .....	20
7.1.7 WINNF.FT.C.REG.16 .....	21
7.1.8 WINNF.FT.C.REG.18 .....	22
7.2 CBSD Spectrum Grant Process .....	23
7.2.1 WINNF.FT.C.GRA.1 .....	23
7.2.2 WINNF.FT.C.GRA.2 .....	23
7.3 CBSD HeartBeat Process .....	24
7.3.1 WINNF.FT.C.HBT.1 .....	24
7.3.2 WINNF.FT.C.HBT.3 .....	26
7.3.3 WINNF.FT.C.HBT.4 .....	27



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 6 of 50

7.3.4	WINNF.FT.C.HBT.5 .....	28
7.3.5	WINNF.FT.C.HBT.6 .....	29
7.3.6	WINNF.FT.C.HBT.7 .....	30
7.3.7	WINNF.FT.C.HBT.9 .....	31
7.3.8	WINNF.FT.C.HBT.10 .....	32
7.4	CBSD Relinquishment Process .....	33
7.4.1	WINNF.FT.C.RLQ.1 .....	33
7.5	CBSD Deregistration Process .....	34
7.5.1	WINNF.FT.C.DRG.1 .....	34
7.6	CBSD Security Validation .....	35
7.6.1	WINNF.FT.C.SCS.1 .....	35
7.6.2	WINNF.FT.C.SCS.2 .....	35
7.6.3	WINNF.FT.C.SCS.3 .....	36
7.6.4	WINNF.FT.C.SCS.4 .....	36
7.6.5	WINNF.FT.C.SCS.5 .....	37
7.7	CBSD RF Power Measurement .....	38
7.7.1	WINNF.PT.C.HBT .....	38
7.8	Duration and Duty Cycle .....	42
7.9	Verify that the device will register with a SAS when operating below 23 dBm .....	44
<b>8</b>	<b>Test Data Log For Standalone CBSD.....</b>	<b>45</b>
8.1	WINNF.FT.C.SCS.1 .....	45
8.2	WINNF.FT.C.SCS.2 .....	46
8.3	WINNF.FT.C.SCS.3 .....	47
8.4	WINNF.FT.C.SCS.4 .....	48
8.5	WINNF.FT.C.SCS.5 .....	49
<b>9</b>	<b>Photographs .....</b>	<b>50</b>
9.1	EUT Constructional Details (EUT Photos) .....	50



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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	POE POWER SUPPLY Model: G0720-240-100 Input Power: AC 100-240V 50-60Hz 0.75A Max DC Output: 24V 1A
Sample Type:	Fixed device
CBSD Class:	B
Transmitter Frequency Band:	LTE: Band 48; 5G NR: n48
Transmitter Frequency Range:	3550~3700MHz
Hardware Version:	VER.B
Software Version:	BaiCE_BQ_1.2.16.28_NA
Test sample:	120300017923CSD0023
Antenna Type:	Directional Antenna
Antenna Gain:	14dBi
MIMO supported	2*2

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## 4.2 Description of CBSD/DP Support Features

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

Y: Supported

N: Not supported



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 9 of 50

### 4.3 Summary of Test Results

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

Note:

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

### 4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	RF conducted power	$\pm 0.75\text{dB}$
3	Temperature test	$\pm 1^\circ\text{C}$
4	Humidity test	$\pm 3\%$
5	Supply voltages	$\pm 1.5\%$
6	Time	$\pm 3\%$

### 4.5 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
EPC	Lanner Electronics Inc.	LICA-1513A	LR202002004052
Router	TP-LINK	TL-R860+	1175379002425
LTE Base station	Baicells	mBS1105 (FCC ID: 2AG32MBS110596N)	120200007219BSP0001
5G NR Base station	Baicells	BSC7048A243 (FCC ID: 2AG32BSC7048A243)	1202000577233VB0002



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 10 of 50

### 4.6 Test Location

All tests were performed at:

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No tests were sub-contracted.



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 11 of 50

### 5 Equipment List

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Laptop (With SAS Test harness)	Lenovo	T14	/	/	/
Spectrum Analyzer	Keysight	N9020A	SEM004-21	2024-03-18	2025-03-17
Shield Room	SAEMC	MSR433	SEM001-11	2024-03-11	2027-03-10
Coaxial Cable	SGS	N/A	SEM031-01	2024-07-09	2025-07-08
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Splitter	MACOM	2090-6214-00	N/A	N/A	N/A
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2023-09-27	2024-09-26



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## 6 Test Method and Environment

### 6.1 CBSD/DP Conformance and Performance

Test Requirement: CBRS CBSD Test Specification WINNF-TS-0122-V1.0.2

Test Method: WINNF-IN-0156\_WInnForum\_SAS\_Test\_Harness\_CBSD\_UUT\_Tutorial\_v1\_0\_0\_1

### 6.2 CPE-CBSD Handshake Procedures

Test Requirement: KDB 940660 D02 CPE-CBSD Handshake Procedures v02

Test Method: WINNF-19-IN-00033 V1.0

KDB 940660 D02 CPE-CBSD Handshake Procedures v02

### 6.3 CBSD Test Procedure

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

### 6.4 Duration and Duty Cycle Measurement

The CPE-CBSD shall validate and ensure that limited in duration and duty cycle to the minimum time necessary to get a grant from the SAS.

### 6.5 Duration and Duty Cycle Test Procedure

- a. CPE-CBSD as UUT does not receive any RF signal from its "Compatible BTS-CBSD" (FCC ID: 2AG32BSC7048A243), so CPE-CBSD as UUT does not transmit. UUT shall be UTC time synchronized.
- b. Use the WinnForum SAS Harness #1 for CPE-CBSD as UUT and run test case WINNF.FT.C.GRA.1 for CPE-CBSD as UUT.
- c. CPE-CBSD as UUT starts to receive the RF signal from its "Compatible BTS-CBSD", so CPE-CBSD can start communicating with the WinnForum SAS Harness #1. Make note of the time when RF Test equipment logs the first transmission from CPE-CBSD which is above 23dBm/10MHz – this is the start time of the {X time out of Y time}.
- d. When the test case WINNF.FT.C.GRA.1 finishes and the questions appear on the WinnForum SAS Harness #1 console, do NOT answer the questions. Wait until Y time has passed from step #3. During this Y time, the RF test equipment is logging the amount of time CPE-CBSD as UUT transmitted EiRP above 23dBm/10MHz. The amount of time logged for transmitting EIRP above 23dBm/10MHz is the X time.
- e. Answer the questions on the WinnForum SAS Harness #1 console so the WinnForum SAS

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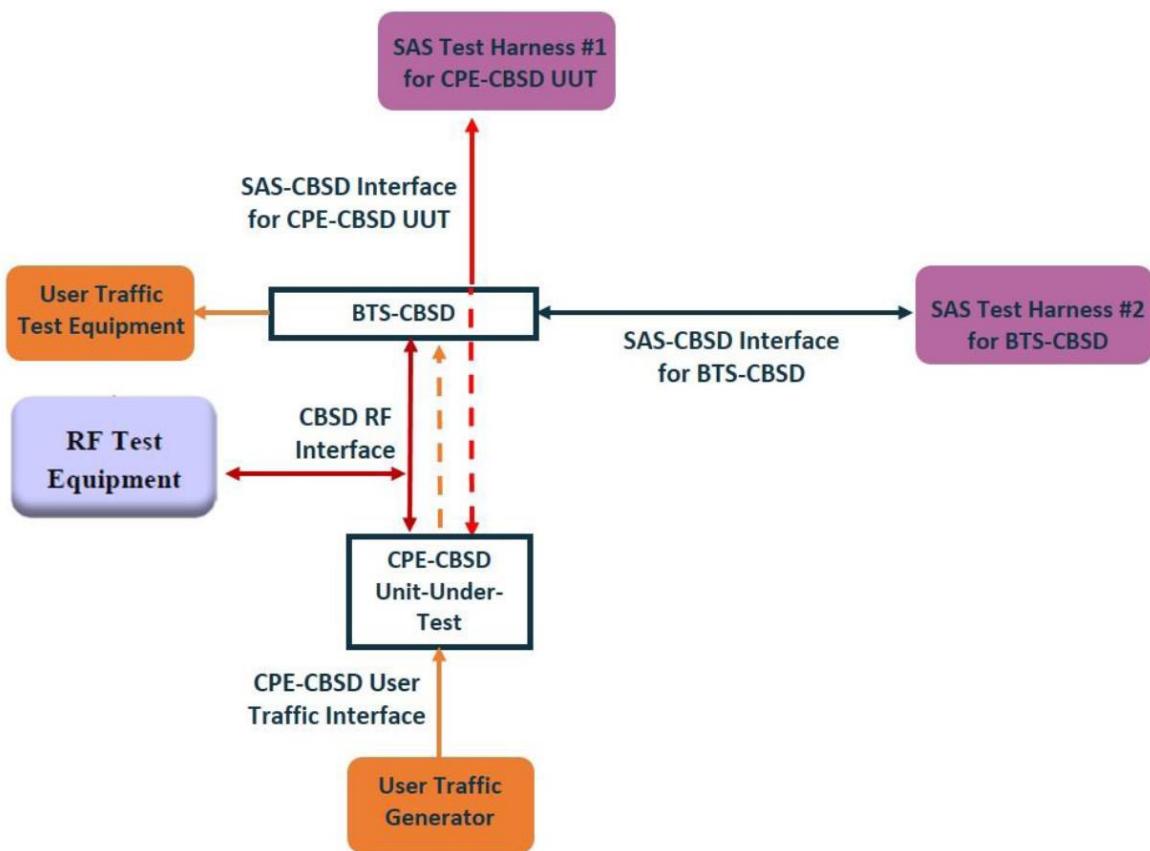
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Harness #1 is ready for the next test.

## 6.6 Test Environment

Test Harness Version:	V1.0.0.3
Operating System:	Microsoft Windows 10
TLS Version:	1.2
Python Version:	2.7.13
Environmental Conditions:	25deg. C, 65%RH
Input Power:	120Vac, 60Hz

## 6.7 Test Setup

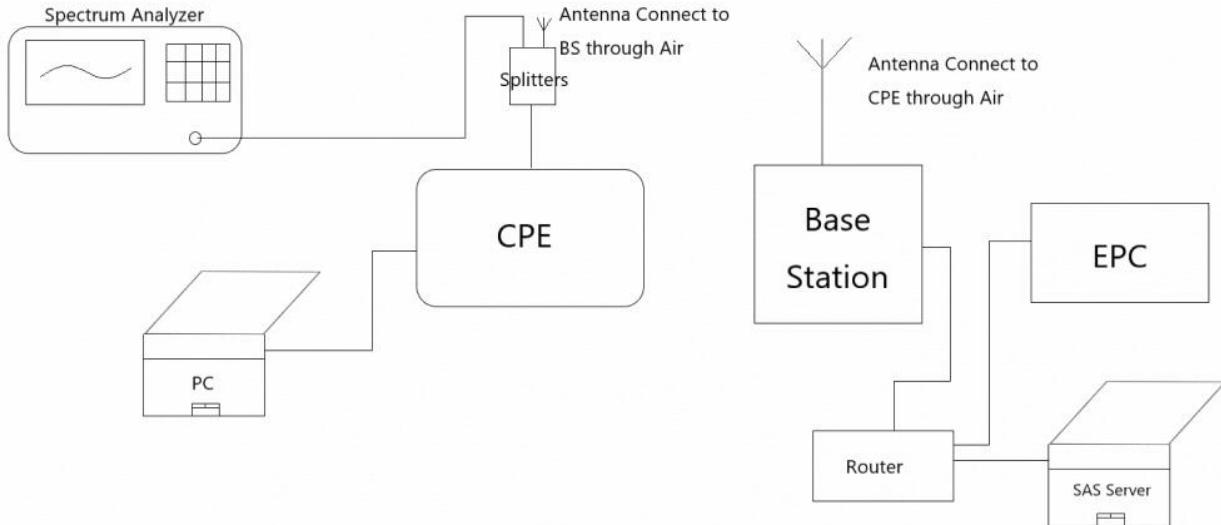


CPE-CBSD as UUT, BTS-CBSD direct communication without Domain Proxy



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Test setup diagram for WINNF.PT.C.HBT Test case

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## 7 Test Data

### 7.1 CBSD Registration Process

#### 7.1.1 WINNF.FT.C.REG.1

#	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 userId, fcId and cbsdSerialNumber 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	<p>SAS Test Harness sends a CBSD Registration Response as follows:</p> <ul style="list-style-type: none"> <li>- cbsdId = C</li> <li>- measReportConfig shall not be included</li> <li>- responseCode = 0</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=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 checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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**7.1.2 WINNF.FT.C.REG.5**

#	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 userId, fcId and cbsdSerialNumber and REG-Conditional cbsdCategory, airInterface, measCapability and cpiSignatureData 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	SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> <li>- cbsdId = C</li> <li>- measReportConfig shall not be included.</li> <li>- responseCode = 0</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any 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: <ul style="list-style-type: none"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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**7.1.3 WINNF.FT.C.REG.8**

#	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 cbsdId</li><li>- responseCode = 102</li></ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any 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: <ul style="list-style-type: none"><li>● UUT shall not transmit RF</li></ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



**7.1.4 WINNF.FT.C.REG.10**

#	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 cbsdId</li> <li>- responseCode = 200</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=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

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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 19 of 50

## 7.1.5 WINNF.FT.C.REG.12

#	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> </ul>	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	<p>SAS Test Harness rejects the request by sending a CBSD Registration Response as follows:</p> <ul style="list-style-type: none"> <li>- SAS response does not include cbsId</li> <li>- responseCode = 103</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=103) 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 checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 20 of 50

## 7.1.6 WINNF.FT.C.REG.14

#	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> </ul>	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	<p>SAS Test Harness rejects the request by sending a CBSD Registration Response as follows:</p> <ul style="list-style-type: none"> <li>- SAS response does not include cbsdId</li> <li>- responseCode = 101</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=101) 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 checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 21 of 50

## 7.1.7 WINNF.FT.C.REG.16

#	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> </ul>	--	--
2	CBSD sends a Registration request to SAS Test Harness.	--	--
3	<p>SAS Test Harness rejects the request by sending a CBSD Registration Response as follows:</p> <ul style="list-style-type: none"> <li>- SAS response does not include cbsdId</li> <li>- responseCode = 100</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=100) 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 checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



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**7.1.8 WINNF.FT.C.REG.18**

#	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 cbsdId</li> <li>- responseCode = 201</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=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

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## 7.2 CBSD Spectrum Grant Process

### 7.2.1 WINNF.FT.C.GRA.1

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with cbsdId = C	--	--
2	UUT sends valid Grant Request.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness sends a Grant Response message, including ● cbsdId=C - responseCode = 400	--	--
4	After completion of step 3, SAS Test Harness will not provide any 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 not transmit RF	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

### 7.2.2 WINNF.FT.C.GRA.2

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with cbsdId = C	--	--
2	UUT sends valid Grant Request.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness sends a Grant Response message, including - cbsdId=C - responseCode = 401	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=401) to further request messages from the UUT.	--	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: ● UUT shall not transmit RF	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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## 7.3 CBSD HeartBeat Process

### 7.3.1 WINNF.FT.C.HBT.1

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with cbsdId = 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: ● cbsdId = C ● List of frequencyRange objects sent by UUT are within the CBRS frequency range	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: ● cbsdId = C ● availableChannel is an array of availableChannel objects ● responseCode = 0	--	--
5	UUT sends Grant Request message. Validate: ● cbsdId = 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	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
6	SAS Test Harness sends a Grant Response message, including the parameters: ● cbsdId = C ● grantId = G = a valid grant ID ● grantExpireTime = UTC time greater than duration of the test ● responseCode = 0	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: ● cbsdId = C ● grantId = G ● operationState = "GRANTED"	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	--	--

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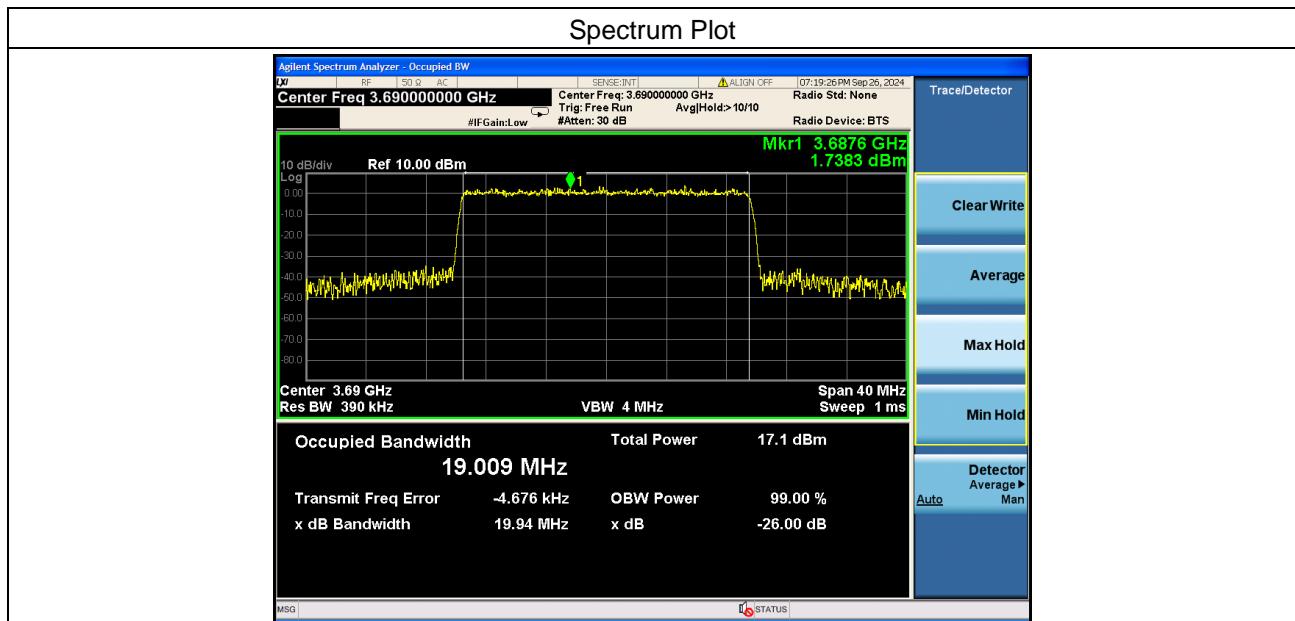
## SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 25 of 50

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



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**7.3.2 WINNF.FT.C.HBT.3**

#	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 cbsId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● operationState = "AUTHORIZED"</li> </ul>	--	--
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● transmitExpireTime = T = Current UTC time</li> <li>● responseCode = 105 (DEREGISTER)</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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**7.3.3 WINNF.FT.C.HBT.4**

#	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 cbsId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● operationState = "AUTHORIZED"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● transmitExpireTime = T = current UTC time</li> <li>● responseCode = 500 (TERMINATED_GRANT)</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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**7.3.4 WINNF.FT.C.HBT.5**

#	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 cbSdId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)</li> </ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: <ul style="list-style-type: none"> <li>● cbSdId = C</li> <li>● grantId = G</li> <li>● operationState = "GRANTED"</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>● cbSdId = C</li> <li>● grantId = G</li> <li>● transmitExpireTime = T = current UTC time</li> <li>● ?responseCode = 501 (SUSPENDED_GRANT)</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	Monitor the SAS-CBSD interface. Verify either A OR B occurs: <ul style="list-style-type: none"> <li>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:               <ul style="list-style-type: none"> <li>● cbSdId = C</li> <li>● grantId = G</li> <li>● operationState = "GRANTED"</li> </ul> </li> <li>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:               <ul style="list-style-type: none"> <li>● cbSdId = C</li> <li>● grantId = G</li> </ul> </li> </ul> Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> <li>● UUT does not transmit at any time</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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**7.3.5 WINNF.FT.C.HBT.6**

#	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 cbssid = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbssid = C</li> <li>● grantId = G</li> <li>● operationState = "AUTHORIZED"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>cbssid = C</li> <li>grantId = G</li> <li>transmitExpireTime = T = current UTC time</li> <li>● responseCode = 501 (SUSPENDED_GRANT)</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the 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>● cbssid = C</li> <li>● grantId = G</li> <li>● operationState = "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>● cbssid = C</li> <li>● grantId = 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 30 of 50

## 7.3.6 WINNF.FT.C.HBT.7

#	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 cbsId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● operationState = "AUTHORIZED"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>cbsId = C</li> <li>grantId = G</li> <li>transmitExpireTime = T = current UTC time</li> <li>● responseCode = 502 (UNSYNC_OP_PARAM)</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the SAS-CBSD interface. Verify:</p> <ul style="list-style-type: none"> <li>● UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters:           <ul style="list-style-type: none"> <li>○ cbsId = C</li> <li>○ grantId = 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



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**7.3.7 WINNF.FT.C.HBT.9**

#	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 cbsId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in GRANTED, but not AUTHORIZED state(i.e. has not performed its first Heartbeat Request)</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● operationState = "GRANTED"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>After completion of step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection</p>	--	--
4	<p>Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify:</p> <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



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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 32 of 50

## 7.3.8 WINNF.FT.C.HBT.10

#	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 cbsId = C</li> <li>○ valid grantId = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ grantExpireTime = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	<p>UUT sends a Heartbeat Request message.</p> <p>Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● operationState = "AUTHORIZED"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> <li>● cbsId = C</li> <li>● grantId = G</li> <li>● transmitExpireTime = T = current UTC time + 200 seconds</li> <li>● responseCode = 0</li> </ul>	--	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT shall stop all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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## 7.4 CBSD Relinquishment Process

### 7.4.1 WINNF.FT.C.RLQ.1

#	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 cbsdId=C</li> <li>● UUT has received a valid grant with grantId = 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>● cbsdId = C</li> <li>● grantId = G</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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>- cbsdId = C</li> <li>- grantId = G</li> <li>● responseCode = 0</li> </ul>	--	--
4	<p>After completion of step 3, SAS Test Harness will not provide any additional positive response (responseCode=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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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## 7.5 CBSD Deregistration Process

### 7.5.1 WINNF.FT.C.DRG.1

#	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 cbsdId=C</li> <li>● UUT has received a valid grant with grantId = 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	<p>UUT sends a Relinquishment request and receives Relinquishment response with</p> <ul style="list-style-type: none"> <li>● responseCode=0</li> </ul>	--	--
3	<ul style="list-style-type: none"> <li>● UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.</li> </ul>	<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>● cbsdId = C</li> <li>● responseCode = 0</li> </ul>	--	--
5	<p>After completion of step 3, SAS Test Harness will not provide any additional positive</p> <ul style="list-style-type: none"> <li>● response (responseCode=0) to further request messages from the UUT.</li> </ul>	--	--
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

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## 7.6 CBSD Security Validation

### 7.6.1 WINNF.FT.C.SCS.1

#	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 responseCode = 0 and cbsId.</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

### 7.6.2 WINNF.FT.C.SCS.2

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>● UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> <li>● UUT may retry for the security procedure which shall fail.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	<ul style="list-style-type: none"> <li>● SAS Test-Harness shall not receive any Registration request or any application data.</li> </ul>	--	--
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

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**7.6.3 WINNF.FT.C.SCS.3**

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>● UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> <li>● UUT may retry for the security procedure which shall fail.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	<ul style="list-style-type: none"> <li>● SAS Test-Harness shall not receive any Registration request or any application data.</li> </ul>	--	--
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

**7.6.4 WINNF.FT.C.SCS.4**

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>● UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> <li>● UUT may retry for the security procedure which shall fail.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	<ul style="list-style-type: none"> <li>● SAS Test-Harness shall not receive any Registration request or any application data.</li> </ul>	--	--
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

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**7.6.5 WINNF.FT.C.SCS.5**

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>● UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> <li>● UUT may retry for the security procedure which shall fail.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	<ul style="list-style-type: none"> <li>● SAS Test-Harness shall not receive any Registration request or any application data.</li> </ul>	--	--
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



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## 7.7 CBSD RF Power Measurement

### 7.7.1 WINNF.PT.C.HBT

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> <li>● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness</li> <li>● UUT has registered with the SAS, with CBSID = 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> <li>● 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</li> </ul>	--	--
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>○ cbsId = C</li> <li>○ grantId = G</li> </ul> </li> <li>● SAS Test Harness responds with Heartbeat Response, including:           <ul style="list-style-type: none"> <li>○ cbsId = 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> <ul style="list-style-type: none"> <li>● 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.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 39 of 50

## 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.

Freq. (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Loss (dB)	Array Gain (dB)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
LTE							
3690	2.073	14	8	3.01	27.083	29	Pass
3690	-7.608	14	8	3.01	17.402	18	Pass
5G NR							
3690	1.193	14	8	3.01	26.203	29	Pass
3690	-7.371	14	8	3.01	17.639	18	Pass

### Note:

- Array Gain=10log(n), n is the antenna number, for this test the n=2
- EIRP PSD= Conducted PSD+ Antenna Gain+ Array Gain
- Loss includes cable loss and loss of attenuator

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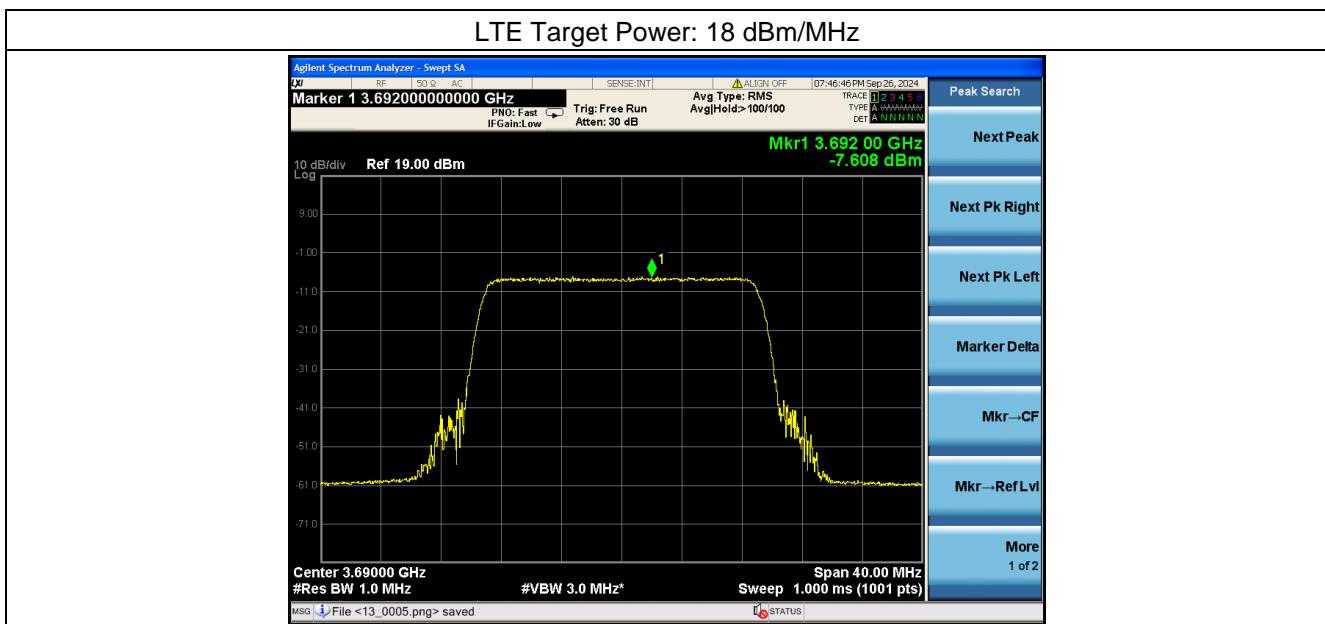
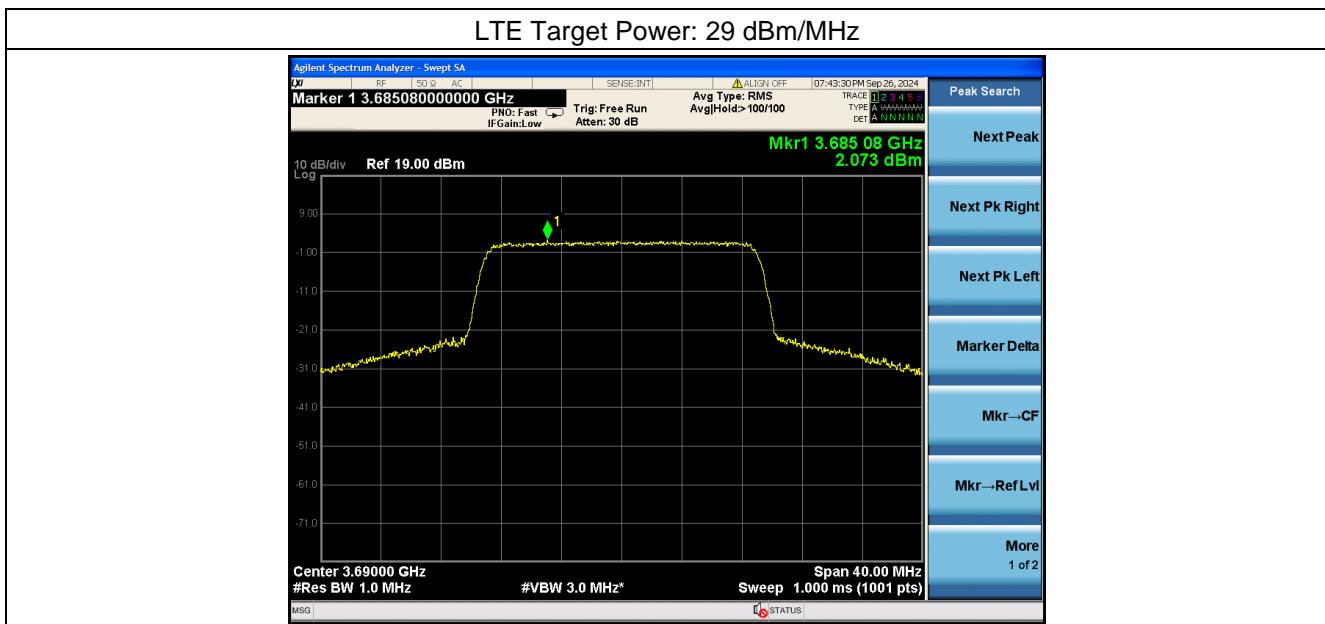
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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 40 of 50



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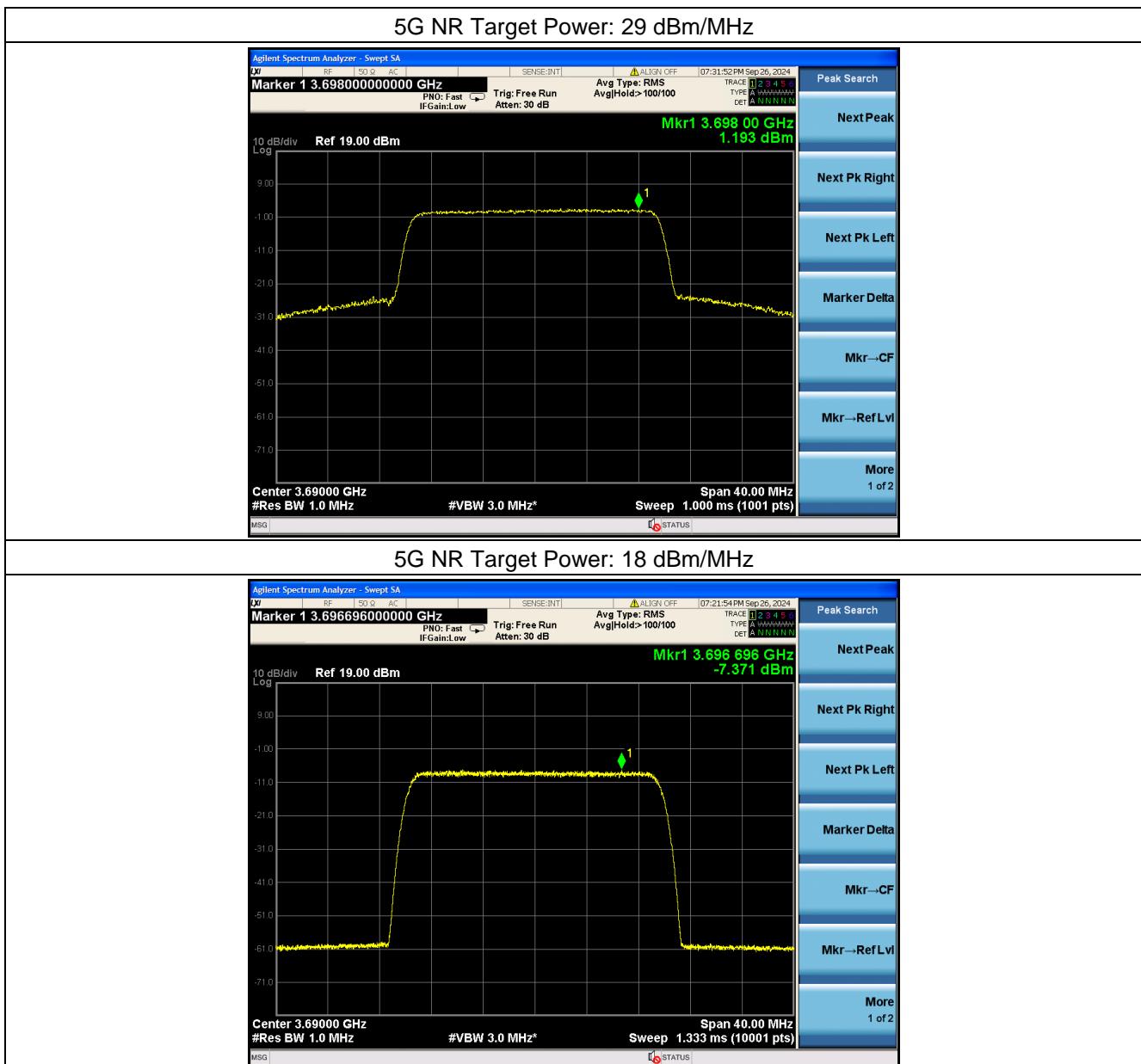


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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 41 of 50



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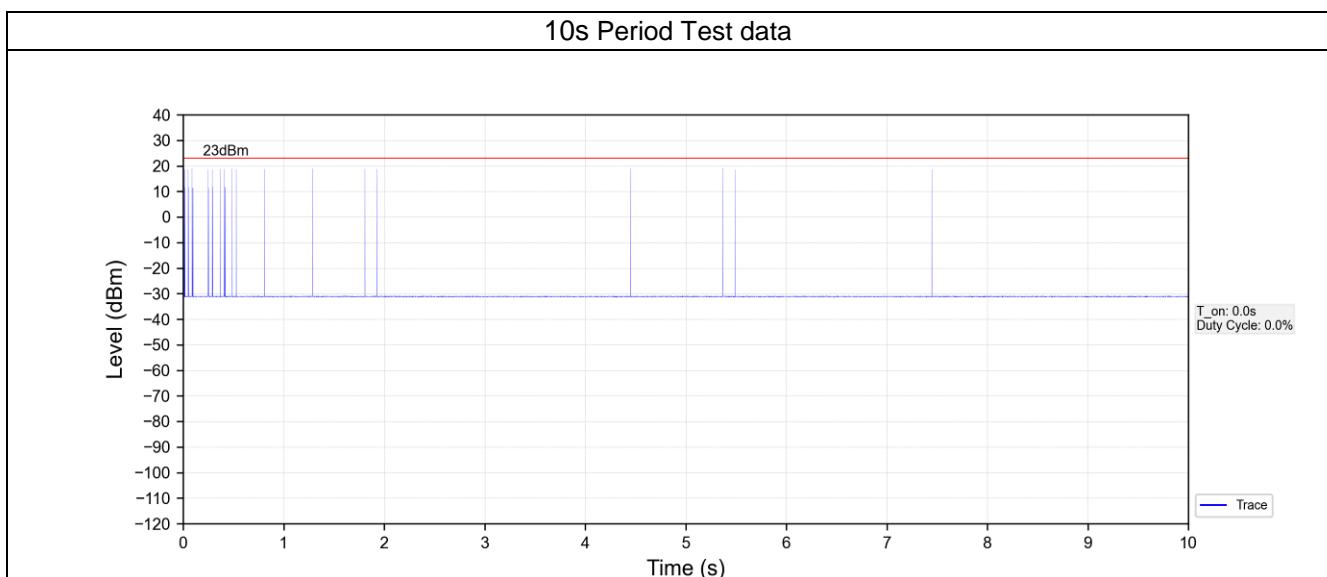


## 7.8 Duration and Duty Cycle

Duration and Duty Cycle			
Period	Minimum Time (s)	Limit (s)	Pass / Fail
10-second	0.0	1-second	Pass
300-second	0.0	10-second	Pass
3600-second	0.0	20-second	Pass

Note:

1. Limited in duration and duty cycle to the minimum time necessary to get a grant from the SAS. This time should not exceed 1 second within any 10-second period, 10 seconds within any 300-second period, or 20 seconds within any 3600-second period.
2. Pass = Minimum Time < Limit



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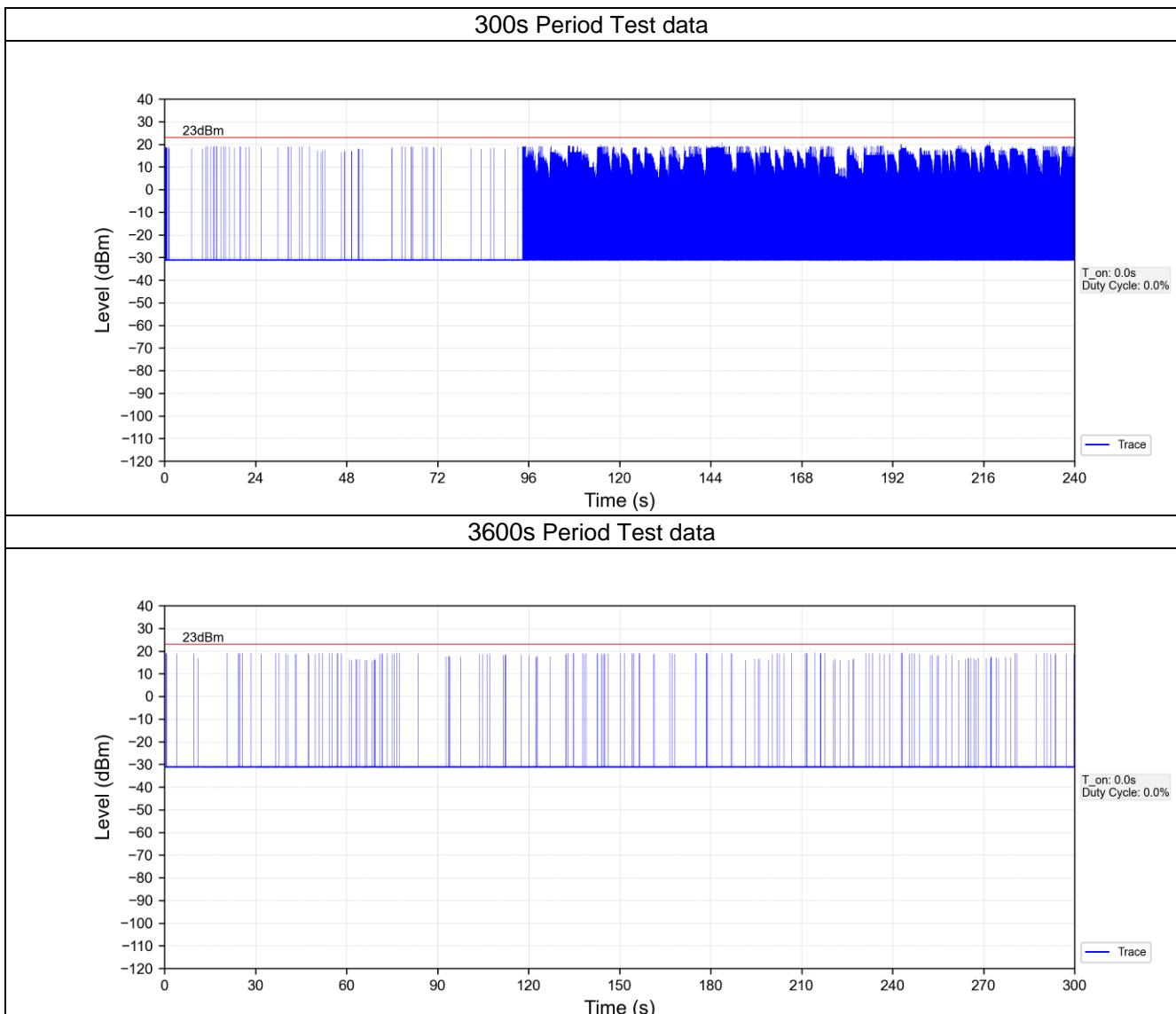


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Page: 43 of 50



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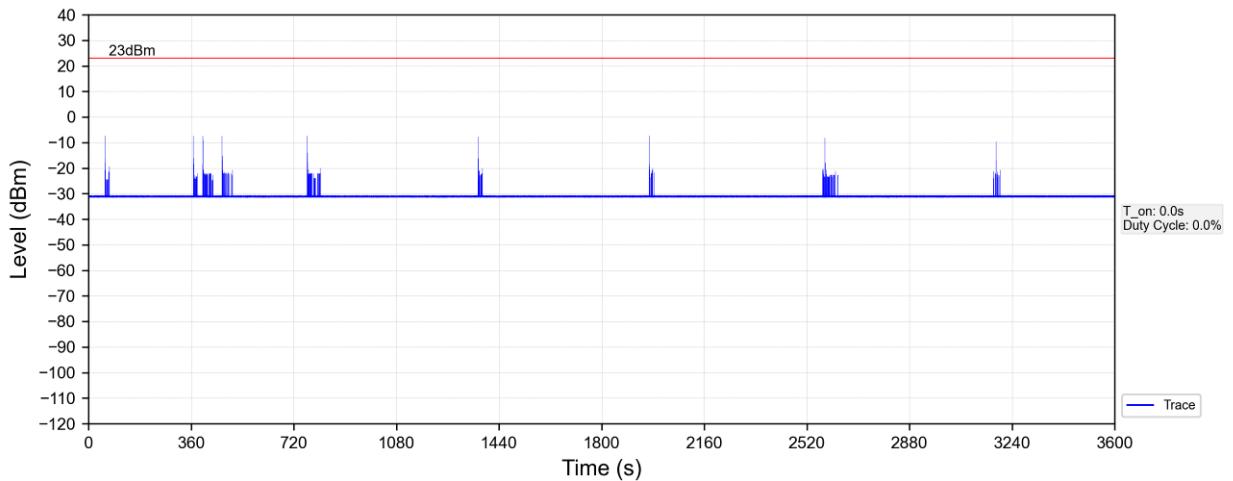
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**7.9 Verify that the device will register with a SAS when operating below 23 dBm**

Verified in test case WINNF.PT.C.HBT.1, the CPE-CBSD as UUT default EIRP is under 23 dBm and can register success with SAS. After granted, the CPE-CBSD UUT will adjust the EIRP by maxEirp.

**Note:**

1. Red color line in above plot represents the 23 dBm.
2. When Granted the product will transmit at power level above 23dBm.
3. Only when the product sends packets the product will work at max EIRP.



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 45 of 50

## 8 Test Data Log For Standalone CBSD

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

### 8.1 WINNF.FT.C.SCS.1

No.	Time	Source	Destination	Protocol	Length	Info
10	19.614544	192.168.24.180	192.168.24.183	TLSv1.2	571	Client Hello
11	19.619652	192.168.24.183	192.168.24.180	TLSv1.2	3983	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
16	19.734763	192.168.24.200	192.168.24.183	TLSv1.2	1514	Certificate
18	19.735189	192.168.24.200	192.168.24.183	TLSv1.2	432	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
19	19.735701	192.168.24.200	192.168.24.183	TLSv1.2	150	Change Cipher Spec, Encrypted Handshake Message
21	19.759292	192.168.24.200	192.168.24.183	TLSv1.2	148	Application Data
22	19.759626	192.168.24.183	192.168.24.200	TLSv1.2	198	Application Data
24	19.826481	192.168.24.200	192.168.24.183	TLSv1.2	255	Application Data
26	19.861132	192.168.24.183	192.168.24.200	TLSv1.2	199	Application Data
28	19.861448	192.168.24.183	192.168.24.200	TLSv1.2	184	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
30	19.969781	192.168.24.200	192.168.24.183	TLSv1.2	472	Application Data
31	19.971184	192.168.24.183	192.168.24.200	TLSv1.2	190	Application Data
33	20.839556	192.168.24.183	192.168.24.200	TLSv1.2	812	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
35	20.839560	192.168.24.183	192.168.24.200	TLSv1.2	190	Application Data
36	20.898625	192.168.24.183	192.168.24.200	TLSv1.2	190	Application Data
38	20.160964	192.168.24.183	192.168.24.200	TLSv1.2	413	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data

Handshake Protocol: Server Hello  
 Handshake Type: Server Hello (2)  
 Length: 85  
 Version: TLS 1.2 (0x0303)  
 > Random: 48356c57554d02a08ea34a59f03c3269a98a57c5b6331017a#0c3d189084eb2  
 Session ID Length: 32  
 Session ID: 20c3d189084eb29649296d4388c598c83253441d6e12484f1513348c98b289c8cf172  
 Ciphersuite: TLS\_ECDHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256 (0x0201)  
 Compression Method: null (0)  
 Extensions Length: 13  
 > Extension: renegotiation\_info (1ew=1)  
 Extension: ec\_point\_formats [445: 771-49196, 65381-11]  
 [4355: 30395144c30ef2e9916522546f602b1]  
 > TLSv1.2 Record Layer: Handshake Protocol: Certificate  
 Content Type: Handshake (22)  
 Version: 1.2 (0x0303)  
 Length: 2963  
 > Handshake Protocol: Certificate  
 Handshake Type: Certificate (11)  
 Length: 2954  
 Certificates Length: 2954  
 > Certificates (2954 bytes)  
 > TLSv1.2 Record Layer: Handshake Protocol: Server Key Exchange  
 Content Type: Handshake (22)  
 Version: 1.2 (0x0303)  
 Length: 333  
 > Handshake Protocol: Server Key Exchange  
 > TLSv1.2 Record Layer: Handshake Protocol: Multiple Handshake Messages  
 Content Type: Handshake (22)  
 Version: TLS 1.2 (0x0303)

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Report No.: SZCR240700252205  
Page: 46 of 50

## 8.2 WINNF.FT.C.SCS.2

No.	Time	Source	Destination	Protocol	Length	Info
1	22:20:33.004	192.168.24.200	192.168.24.103	HTTP	126	GET /criserver.cgi HTTP/1.1
17	28.265509	192.168.24.103	192.168.24.200	HTTP	1134	HTTP/1.1 200 OK (application/octet-stream)
136	157.437793	192.168.24.200	192.168.24.103	HTTP	158	GET /criserver.cgi HTTP/1.1
139	157.445049	192.168.24.103	192.168.24.200	HTTP	1134	HTTP/1.1 200 OK (application/octet-stream)
208	184.266397	192.168.24.200	192.168.24.103	HTTP	158	GET /criserver.cgi HTTP/1.1
221	184.266403	192.168.24.103	192.168.24.200	HTTP	1134	HTTP/1.1 200 OK (application/octet-stream)
289	244.317118	192.168.24.200	192.168.24.103	HTTP	158	GET /criserver.cgi HTTP/1.1
291	244.324389	192.168.24.103	192.168.24.200	HTTP	1134	HTTP/1.1 200 OK (application/octet-stream)

Frame 37: 1134 bytes on wire (9072 bits), 1134 bytes captured (9072 bits) on interface \Device\NPF_{AC3A16E7-F178-468A-860A-2420B9844620}, id 0
> Ethernet II, Src: RealtekSemi_36:84:7d (00:0e:4c:36:84:7d), Dst: BasicellTech_2c:1d:b2 (48:bf:74:2c:1d:b2)
> Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.200
> Transmission Control Protocol, Src Port: 8080, Dst Port: 55968, Seq: 326, Ack: 97, Len: 1600
[2 fragments, 12288 bytes]
[2 assembled TCP segments (1409 bytes): #x632b, #x73800]
<b>HyperText Transfer Protocol</b>
HTTP/1.1 200 OK\r\n
Content-Type: application/octet-stream\r\n
Content-Length: 1134\r\n
Accept-Ranges: bytes=0-\r\n
Server: HFS_510_X_41164877171485, path=/; HTTPOnly\r\n
Set-Cookie: HFS_510_X_41164877171485; path=/; HTTPOnly\r\n
ETag: 38991649e0286895280a1c2398485b\r\n
Last-Modified: Fri, 25 Jun 2021 00:48:12 GMT\r\n
Content-Disposition: attachment; filename="criserver.cgi";\r\n
\r\n
[Request In Frame: 31]
[Time since request: 0.007260000 seconds]
[Request URI: /criserver.cgi]
[Full request URL: http://192.168.24.103:8080/criserver.cgi]
File Data: 1080 bytes
[Expert Info (Note/Warning): HTTP body subdissector failed, trying heuristic subdissector]
Media type

No.	Time	Source	Destination	Protocol	Length	Info
10	38.409457	192.168.24.200	192.168.24.103	TLSv1.2	571	Client Hello
11	38.409465	192.168.24.103	192.168.24.200	TLSv1.2	3637	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
12	38.409472	192.168.24.103	192.168.24.200	TLSv1.2	153	Encrypted Handshake Message
18	38.530865	192.168.24.200	192.168.24.103	TLSv1.2	185	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
19	38.531381	192.168.24.103	192.168.24.200	TLSv1.2	227	Application Data
21	38.559999	192.168.24.200	192.168.24.103	TLSv1.2	185	Change Cipher Spec, Encrypted Handshake Message
22	38.562377	192.168.24.103	192.168.24.200	TLSv1.2	119	Application Data
24	38.562419	192.168.24.103	192.168.24.200	TLSv1.2	153	Application Data, Application Data, Application Data, Application Data, Application Data
47	38.890366	192.168.24.200	192.168.24.103	TLSv1.2	971	Client Hello
48	38.893659	192.168.24.103	192.168.24.200	TLSv1.2	3637	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
67	38.124578	192.168.24.103	192.168.24.200	TLSv1.2	971	Client Hello
68	38.129458	192.168.24.103	192.168.24.200	TLSv1.2	3637	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
69	38.129464	192.168.24.103	192.168.24.200	TLSv1.2	971	Client Hello
85	83.488288	192.168.24.103	192.168.24.200	TLSv1.2	3637	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
98	144.003879	192.168.24.103	192.168.24.200	TLSv1.2	571	Client Hello
99	144.003857	192.168.24.103	192.168.24.200	TLSv1.2	3637	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done

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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 47 of 50

### 8.3 WINNF.FT.C.SCS.3

No.	Time	Source	Destination	Protocol	Length	Info
4	0.049455	192.168.24.200	192.168.24.103	TLSv1.2	571	Client Hello
5	0.054311	192.168.24.103	192.168.24.200	TLSv1.2	3562	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
9	0.079720	192.168.24.200	192.168.24.103	TLSv1.2	61	Alert (level: Fatal, Description: Certificate Expired)

```
Frame 5: 3562 bytes on wire (28016 bits), 3562 bytes captured (28016 bits) on interface [Device\MPF_{AC3A16E7-F178-468A-860A-2420B984620}, id 0
Ethernet II, Src: Realtek PCIe GBE (00:0c:4c:36:04:7d), Dst: BeicellsTech_2c:d1:b2 (48:bf:74:2c:d1:b2)
Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.200
Transmission Control Protocol, Src Port: 50000, Dst Port: 45476, Seq: 1, Ack: 518, Len: 3448
Transport Layer Security
  > TLSv1.2 Record Layer: Handshake Protocol: Server Hello
    Content Type: Handshake (22)
    Version: TLS 1.2 (0x0303)
    Length: 89
    > Handshake Protocol: Server Hello
      Handshake Type: Server Hello (2)
      Length: 89
      Version: TLS 1.2 (0x0303)
      Random: 6a1e0f070b781f770000bd11b7a633790eefaf8cd1fb52fd30ab6d79ec370094
      Session ID Length: 32
      Session ID: Ff00000000000000000000000000000000000000000000000000000000000000
      Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)
      Compression Method: null (0)
      Extension Length: 13
      > Extension renegotiation_info (len=1)
        > renegotiation_info (65281)
        Length: 1
      > Renegotiation Info extension
      > Extension_ec_point_formats (len=4)
        Type: ec_point_formats (11)
        Length: 4
        EC point Formats Length: 3
        > Elliptic curves point formats (3)
          [3ADS FullString: 771,49399,65241]
          [3ADS FullString: 771,49399,65241]
          [3ADS FullString: 771,49399,65241]
      > TLSv1.2 Record Layer: Handshake Protocol: Certificate
```



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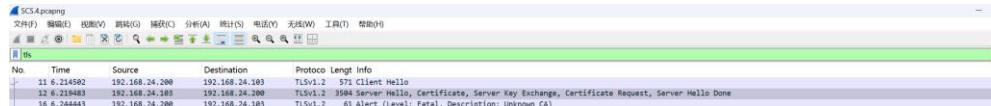
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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 48 of 50

### 8.4 WINNF.FT.C.SCS.4



```
> Frame 12: 3504 bytes on wire (28032 bits), 3504 bytes captured (28032 bits) on interface 'Device\NPF_{AC3A16E7-F178-468A-868A-24200984620}', id 0
> Ethernet II, Src: RealtekSemi_36:84:7d (00:00:4c:36:84:7d), Dst: BaicellsTech_2c:d1:b2 (48:bf:74:2c:d1:b2)
> Internet Protocol Version 4, Src: 192.168.24.183, Dst: 192.168.24.200
> Transmission Control Protocol, Src Port: 5000, Dst Port: 45758, Seq: 1, Ack: 518, Len: 3450
> Transport Layer Security
  > TLSv1.2 Record Layer: Handshake Protocol: Server Hello
    Content Type: Handshake (22)
    Version: TLS 1.2 (0x0303)
    Length: 89
    > Handshake Protocol: Server Hello
      Handshake Type: Server Hello (2)
      Length: 85
      Version: TLS 1.2 (0x0303)
      Session ID: 1e851a5218317b5a75717b0f2afca39b8262d132a29e084a55a1af00d55968d9
      Session Length: 32
      Compression Method: null (0)
      Extension Length: 13
      Extension: renegotiation_info (len=2)
      Extension: ec_point_formats (len=4)
        [D435 Fullstring: 771,49199,65281-1]
        [D435: 389951a545a9ef2e2991652225af4031]
      > TLSv1.2 Record Layer: Handshake Protocol: Certificate
        Content Type: Handshake (22)
        Version: TLS 1.2 (0x0303)
        Length: 2962
        > Handshake Protocol: Certificate
          Handshake Type: Certificate (11)
          Length: 2958
          Certificates Length: 2955
```



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR240700252205

Page: 49 of 50

## 8.5 WINNF.FT.C.SCS.5

No.	Time	Source	Destination	Protocol	Length	Info
11	7.542782	192.168.24.200	192.168.24.103	TLSv1.2	571	Client Hello
12	7.547544	192.168.24.103	192.168.24.200	TLSv1.2	3503	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
16	7.608179	192.168.24.200	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)

> Frame 12: 3503 bytes on wire (280024 bits), 3503 bytes captured (280024 bits) on interface \Device\NPF_{AC3A16E7-F178-468A-8604-242008944620}, id 8
> Ethernet II, Src: RealtekSemi_36:04:70 (00:0e:4c:36:04:70), Dst: BaicellsTech_3c:d1:b2 (48:b7:74:2c:d1:b2)
> Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.200
> Transmission Control Protocol, Src Port: 50806, Dst Port: 44306, Seq: 1, Ack: 518, Len: 3449
> Transport Layer Security
> TLSv1.2 Record Layer: Handshake Protocol: Server Hello
Content Type: Handshake (22)
Version: 1.2 (0x0303)
Length: 35
Version: TLS 1.2 (0x0303)
Random: 011a7986721010d54d281ba7291dcace79adeac0074881f33251655d5ea1467d
GMT Unix Time: Aug 29, 1971 23:08:54.000000000 中国标准时间
Random Bytes: 79383d5d40291ba7291dcace79adeac0074881f33251655d5ea1467d
Session ID: 567c7a33372250cc9a135a0fe7fcfc6353d6f3f9955af955a4f72b3dc1b810ae
Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc092)
Compression Method: null (0)
Extensions Length: 13
Extension: renegotiation_info (1ew1)
Type: renegotiation_info (45283)
Length: 1
Renegotiation Info extension
Renegotiation Info extension length: 0
Extension: ec_point_formats (1ew1)
Type: ec_point_formats (45284)
Length: 1
[JA3S FullString: 771,49199,65281-11]
[JA3S: 38995104549e92e91965225aef00201]
> TLSv1.2 Record Layer: Handshake Protocol: Certificate
> TLSv1.2 Record Layer: Handshake Protocol: Server Key Exchange



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## 9 Photographs

### 9.1 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -



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