



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

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

Report No.: SZCR230400092801

Page: 1 of 17

# TEST REPORT

**Application No.:** SZCR2304000928AT  
**Applicant:** Mavenir Systems, Inc.  
**Address of Applicant:** 1700 International Parkway, Suite 200, Richardson, TX 75081 USA  
**Manufacturer:** Mavenir Systems, Inc.  
**Address of Manufacturer:** 1700 International Parkway, Suite 200, Richardson, TX 75081 USA  
**Factory:** Kunshan luxshare RF Techonology Co., Ltd.  
**Address of Factory:** No.99 Xubang Road, Wuzhong District, Suzhou City 215324  
Jiangsu P.R. China

### Equipment Under Test (EUT):

**EUT Name:** Remote Radio Unit  
**Model No.:** MU44UA  
**Trade Mark:** Mavenir Systems, Inc.  
**FCC ID:** 2AWAS-MU44UA  
**Standard(s) :** FCC 47 CFR Part 96  
CBRS-TS-9001-V1.2.1  
WINNF-TS-0122-V1.0.2  
KDB 940660 D01 V03KDB 940660 D01 V03

**Date of Receipt:** 2023-03-13  
**Date of Test:** 2023-03-13 to 2023-04-03  
**Date of Issue:** 2023-04-03

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu  
EMC Laboratory Manager



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

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Report No.: SZCR230400092801

Page: 2 of 17

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-04-03		Original

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



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## 2 Test Summary

Item	Standard	Test Case ID	Result
UUT RF Transmit Power Measurement	WINNF-TS-0122-V1.0.0	WINNF.PT.C.HBT.1	Pass
SAS Version: 1.0.0.3			

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

### Test standards:

#### CBRSA-TS-9001-V1.0.0

CBRS Alliance Certification Test Plan

#### WINNF-TS-0122-V1.0.0

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

940660 D01 Part 96 CBRS Eqpt v03

This test report is based on KSCR220800146201 which is released at 2022.08.11. The product supports LTE function by software change which is open the LTE function and no other changes. The product circuit and circuit board are completely consistent with the original certification. The LTE SAS process for the product is completely consistent with the 5G NR SAS process. So only UUT RF Transmit Power Measurement is done.



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### 3 Contents

	Page
1 COVER PAGE .....	1
2 TEST SUMMARY .....	3
3 CONTENTS .....	4
4 GENERAL INFORMATION .....	5
4.1 DETAILS OF E.U.T. ....	5
4.2 DESCRIPTION OF CBSD/DP SUPPORT FEATURES .....	6
4.3 SUMMARY OF TEST RESULTS .....	7
4.4 MEASUREMENT UNCERTAINTY .....	7
4.5 DESCRIPTION OF SUPPORT UNITS .....	7
4.6 TEST LOCATION .....	8
5 EQUIPMENT LIST .....	9
6 TEST METHOD AND ENVIRONMENT .....	10
6.1 CBSD/DP CONFORMANCE AND PERFORMANCE .....	10
6.2 CBSD TEST PROCEDURE .....	10
6.3 TEST ENVIRONMENT .....	11
6.4 TEST SETUP .....	11
7 TEST DATA .....	12
7.1 CBSD RF POWER MEASUREMENT .....	12
7.1.1 WINNF.PT.C.HBT.1 .....	12
8 PHOTOGRAPHS .....	17
8.1 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS) .....	17



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## 4 General Information

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

Product Information:	Remote Radio Unit
Power supply:	Rated Input Voltage of -48V DC, Power Consumption<=140W
Sample Type:	Fixed device
CBSD Class:	B
Transmitter Frequency Band:	LTE Band 48
Transmitter Frequency Range:	3550~3700MHz
Hardware Version:	1.0
Software Version:	Release
Test sample:	SN1: LX2151MU44UA000013
Antenna Gain:	4 to 18 dBi
<p>Note: This is a BTS-CBSD communication with Domain Proxy. The Domain Proxy information show as below:</p> <p>Hardware Version of Domain Proxy: Dell PowerEdge R740</p> <p>Software Version of Domain Proxy: Master Line 5.0.1.533</p>	



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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.	N
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.	Y
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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## 4.3 Summary of Test Results

WINNF-TS-0122			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT (CBSD, DP/CBSD)	/	/	/
PT (CBSD, DP/CBSD)	1	1	100
Total	1	1	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.
CPE	SMAWAVE	USB Dongle	/
DP	Mavenir	Dell PowerEdge R740	2SVG243



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Report No.: SZCR230400092801

Page: 8 of 17

### 4.6 Test Location

All tests were performed at:

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518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.



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## 5 Equipment List

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Laptop (With SAS Test harness)	Samsung	930XCJ	REF. No.SEA1900	/	/
Spectrum Analyzer	Keysight	N9020B	SEM004-28	2022-09-20	2023-09-19
Shield Room	SAEMC	MSR433	SEM001-11	2021-03-13	2024-03-12
Coaxial Cable	SGS	N/A	SEM031-01	2022-07-11	2023-07-10
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	2022-09-27	2023-09-26



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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-V1.0.0  
 Test Method: CBRS CBSD Test Specification WINNF-TS-0122-V1.0.0  
 WINNF-IN-0156\_WinnForum\_SAS\_Test\_Harness\_CBSD\_UUT\_Tutorial\_v1\_0\_0\_1

### 6.2 CBSD Test Procedure

- Connect the UUT to SAS Test Harness system and RF Test instruments via the DP interface and RF components. The highest level is set to test configuration.
- UUT shall be UTC time synchronized
- 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.
- 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.

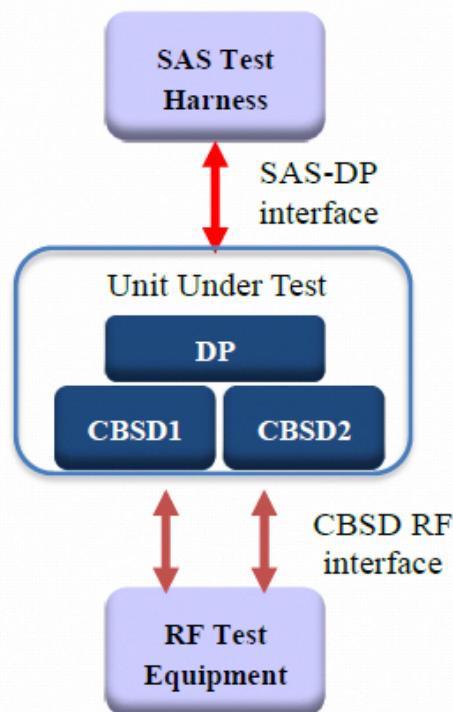


### 6.3 Test Environment

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

### 6.4 Test Setup

- 1) DP is deployed on the network management, and the registration of DP to SAS is to register with SAS according to the granularity of CBSD ID;
- 2) The DP and the network element communicate messages according to the cell granularity, and each CBSDID corresponds to a cell of an RRU which belongs to a base station.



DP/CBSD as UUT, BTS-CBSD communication with Domain Proxy



## 7 Test Data

### 7.1 CBSD RF Power Measurement

#### 7.1.1 WINNF.PT.C.HBT.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 has registered with the SAS, with CBSD ID = C</li> <li>UUT has a single valid grant G with parameters {lowFrequency = FL, highFrequency = FH, maxEirp = Pi}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case</li> <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>cbsdId = C</li> <li>grantId = G</li> </ul> </li> <li>SAS Test Harness responds with Heartbeat Response, including: <ul style="list-style-type: none"> <li>cbsdId = C</li> <li>grantId = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> </li> </ul>	--	--
3	<p>Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.</p> <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



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)	Array Gain (dB)	Loss (dB)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
3560	-21.482	4.0	6.02	47	35.538	37	Pass
3560	-34.295	4.0	6.02	47	22.725	23	Pass
3560	-43.539	4.0	6.02	47	13.481	15	Pass
3560	-35.601	18.0	6.02	47	35.419	37	Pass
3560	-48.894	18.0	6.02	47	22.126	23	Pass
3560	-57.098	18.0	6.02	47	13.922	15	Pass

Note:

- Array Gain=10log(n), n is the antenna number, for this CBSD the n=4
- EIRP PSD= Conducted PSD+ Antenna Gain+ Array Gain+ Loss, Loss includes cable loss and adjustable attenuator loss, cable loss is 47dB.
- This device support max 18dBi antenna gain, test have been done at min 4dBi and max 18dBi antenna gain separately.

Target Power: 37dBm/MHz, Antenna gain: 4dBi



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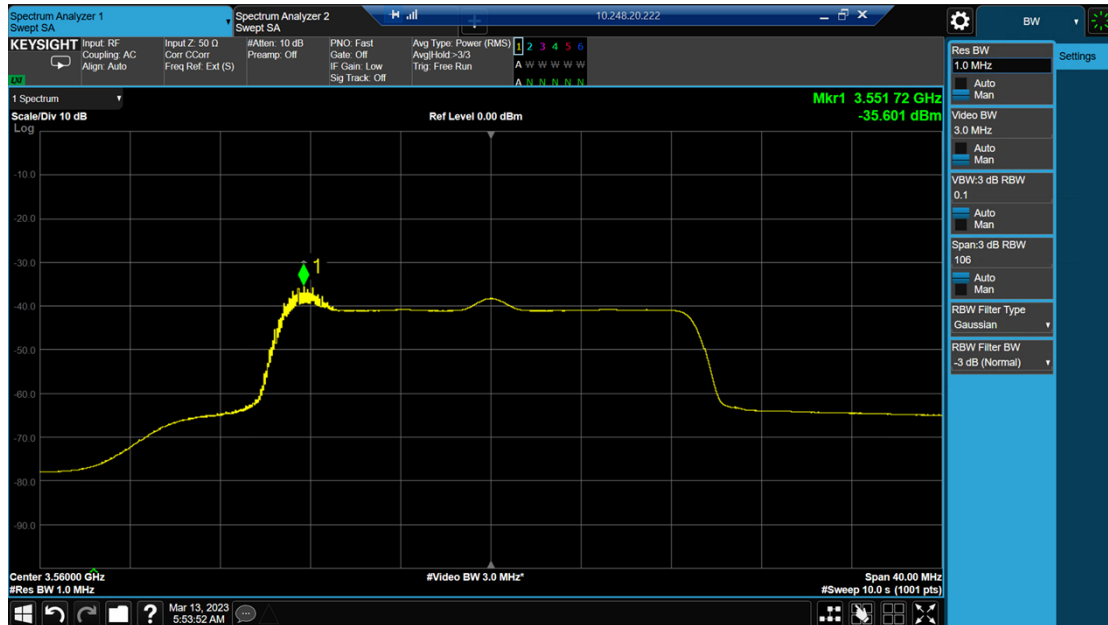
### Target Power: 23dBm/MHz, Antenna gain: 4dBi



### Target Power: 15dBm/MHz, Antenna gain: 4dBi



Target Power: 37dBm/MHz, Antenna gain: 18dBi



Target Power: 23dBm/MHz, Antenna gain: 18dBi



Target Power: 15dBm/MHz, Antenna gain: 18dBi



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## 8 Photographs

### 8.1 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -



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