



TEST REPORT

Application No.: SZEM2102001947CR
Applicant: Mavenir Systems, Inc.
Address of Applicant: 1700 International Parkway, Ste 200, Richardson, Texas 75081 USA
Manufacturer: Mavenir Systems, Inc.
Address of Manufacturer: 1700 International Parkway, Ste 200, Richardson, Texas 75081 USA
Factory: Sunwave Communications Co., Ltd.
Address of Factory: 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053
Equipment Under Test (EUT):
EUT Name: Remote Unit
Model No.: DRRU-R304024
FCC ID: 2AWAS-910-00021
Standard(s) : 47 CFR Part 2
47 CFR Part 96
Date of Receipt: 2021-02-22
Date of Test: 2021-04-09 to 2021-05-10
Date of Issue: 2021-05-10

Test Result:	Pass
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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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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-05-10		Original

Authorized for issue by:			
			
		Edison Li /Project Engineer	
			
		Eric Fu /Reviewer	



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2 Test Summary

Test Item	FCC Rule No.	Verdict
Field strength of spurious radiation	§2.1051, §96.41	PASS

Remark:

This EUT is a remote unit which is part of Distributed base station systems. The distributed base station system is an O-RAN system and contains CU & DU. CU and DU works as BBU. Detailed information of CU and DU show in clause 4.3.

This test report (Ref. No.: SZEM210200194701) is only valid with the original test report (Ref. No.: SZEM201001020201).

Compared with the original report, this report changed the internal antenna to external antenna connector, since the models in this report and models in original report were identical with only difference being the antenna.

Considering the difference, field strength of spurious radiation were performed on the sample in this report to find the items which can be influential to the result in the original test report.



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4 General Information

4.1 Details of E.U.T.

Product Name:	Remote Unit
Model No.:	DRRU-R304024
Trade Mark:	MAVENIR
Sample Type:	Fixed production
Antenna Gain:	With external antenna with 4dBi gain
Power Supply:	DC48V
Optical Fiber:	200cm (unshielded)
DC Cable:	200cm (unshielded)
RF Cable:	200cm (shielded)
Type of Modulation	TDD
Frequency Band:	3550MHz to 3700MHz
Modulation Type:	QPSK, 16QAM, 64QAM, 256QAM
Channel Bandwidth:	Single carrier: 5MHz, 10MHz, 15MHz, 20MHz; Multi-carrier enabled, up to 60MHz. Detailed Multi-carrier combination please refer to clause 4.2
System Gain:	20dB
MIMO:	2T2R MIMO or 4T4R MIMO
Power Control Method:	ALC



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4.2 Test Frequency

Configuration	Carrier	Carrier Bandwidth	Carrier Frequency Configuration(MHz)		
			Low(L)	Middle(M)	High(H)
LTE_5MHz_Single carrier	1C	5MHz	3552.5	3625	3697.5
LTE_10MHz_Single carrier	1C	10MHz	3555	3625	3695
LTE_15MHz_Single carrier	1C	15MHz	3557.5	3625	3692.5
LTE_20MHz_Single carrier	1C	20MHz	3560	3625	3690
LTE_5MHz_2 carriers contiguous	2C	5MHz+5MHz	3552.5+3557.5	3622.5+3627.5	3692.5+3697.5
LTE_10MHz_2 carriers contiguous	2C	10MHz+10MHz	3555+3565	3620+3630	3685+3695
LTE_15MHz_2 carriers contiguous	2C	15MHz+15MHz	3557.5+3572.5	3617.5+3632.5	3677.5+3692.5
LTE_20MHz_2 carriers contiguous	2C	20MHz+20MHz	3560+3580	3615+3635	3670+3690
LTE_5MHz_3 carriers contiguous	3C	5MHz+5MHz+5MHz	3552.5+3557.5+3562.5	3620+3625+3630	3687.5+3692.5+3697.5
LTE_10MHz_3 carriers contiguous	3C	10MHz+10MHz+10MHz	3555+3565+3575	3615+3625+3635	3675+3685+3695
LTE_15MHz_3 carriers contiguous	3C	15MHz+15MHz+15MHz	3557.5+3572.5+3587.5	3610+3625+3640	3662.5+3677.5+3692.5
LTE_20MHz_3 carriers contiguous	3C	20MHz+20MHz+20MHz	3560+3580+3600	3605+3625+3645	3650+3670+3690
LTE_5MHz_2 carriers non-contiguous	2C	5MHz+5MHz	3552.5+3642.5	/	3607.5+3697.5
LTE_10MHz_2 carriers non-contiguous	2C	10MHz+10MHz	3555+3635	/	3515+3695
LTE_15MHz_2 carriers non-contiguous	2C	15MHz+15MHz	3557.5+3627.5	/	3622.5+3692.5
LTE_20MHz_2 carriers non-contiguous	2C	20MHz+20MHz	3560+3620	/	3630+3690
LTE_5MHz_3 carriers non-contiguous	3C	5MHz+5MHz+5MHz	3552.5+3592.5+3632.5	/	3617.5+3657.5+3697.5
LTE_10MHz_3 carriers non-contiguous	3C	10MHz+10MHz+10MHz	3555+3595+3635	/	3615+3655+3695
LTE_15MHz_3 carriers non-contiguous	3C	15MHz+15MHz+15MHz	3557.5+3597.5+3637.5	/	3612.5+3652.5+3692.5



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LTE_20MHz_3 carriers non-contiguous	3C	20MHz+20MHz+ 20MHz	3560+3595+363 0	/	3620+3655+369 0
LTE_5M+10M_contiguous	2C	5MHz+10MHz	3555+3562.5	3622.5+3630	3687.5+3695
LTE_5M+15M_contiguous	2C	5MHz+15MHz	3557.5+3567.5	3622.5+3632.5	3682.5+3692.5
LTE_5M+20M_contiguous	2C	5MHz+20MHz	3560+3572.5	3622.5+3635	3677.5+3690
LTE_10M+15M_contiguous	2C	10MHz+15MHz	3557.5+3570	3620+3632.5	3680+3692.5
LTE_10M+20M_contiguous	2C	10MHz+20MHz	3560+3575	3620+3635	3675+3690
LTE_15M+20M_contiguous	2C	15MHz+20MHz	3560+3577.5	3617.5+3635	3672.5+3690
LTE_5M+10M+15M_contiguous	3C	5MHz+10MHz+1 5MHz	3557.5+3567.5+ 3575	3617.5+3627.5+ 3635	3675+3682.5+36 92.5
LTE_5M+10M+20M_contiguous	3C	5MHz+10MHz+2 0MHz	3560+3572.5+35 80	3617.5+3630+36 37.5	3670+3677.5+36 90
LTE_5M+15M+20M_contiguous	3C	5MHz+15MHz+2 0MHz	3560+3572.5+35 82.5	3615+3627.5+36 37.5	3667.5+3677.5+ 3690
LTE_10M+15M+20M_contiguous	3C	10MHz+15MHz+ 20MHz	3560+3575+358 7.5	3612.5+3627.5+ 3640	3662.5+3675+36 90
LTE_5M+10M_non- contiguous	2C	5MHz+10MHz	3555+3615	/	3635+3695
LTE_5M+15M_non- contiguous	2C	5MHz+15MHz	3557.5+3617.5	/	3632.5+3692.5
LTE_5M+20M_non- contiguous	2C	5MHz+20MHz	3560+3620	/	3630+3690
LTE_10M+15M_non- contiguous	2C	10MHz+15MHz	3557.5+3617.5	/	3632.5+3692.5
LTE_10M+20M_non- contiguous	2C	10MHz+20MHz	3560+3620	/	3630+3690
LTE_15M+20M_non- contiguous	2C	15MHz+20MHz	3560+3620	/	3630+3690
LTE_5M+10M+15M_non- contiguous	3C	5MHz+10MHz+1 5MHz	3557.5+3592.5+ 3627.5	/	3622.5+3657.5+ 3692.5
LTE_5M+10M+20M_non- contiguous	3C	5MHz+10MHz+2 0MHz	3560+3595+363 0	/	3620+3655+369 0
LTE_5M+15M+20M_non- contiguous	3C	5MHz+15MHz+2 0MHz	3560+3595+363 0	/	3620+3655+369 0
LTE_10M+15M+20M_non- contiguous	3C	10MHz+15MHz+ 20MHz	3560+3595+363 0	/	3620+3655+369 0



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4.3 Test Support Unit

Description	Manufacture	Model No.	S/N
CU	Dell	E385	/
DU	KONTRON	ME1100	/

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radiated Spurious emission test	± 4.5dB (Below 1GHz)
		± 4.8dB (Above 1GHz)



4.5 Test Location

All tests were performed at:

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

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

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

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

RE in Chamber (Above 1GHz)					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	2021-04-08	2022-04-07
Log Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2019-05-24	2022-05-23
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2020-09-24	2021-09-23
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13
Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2020-11-14	2023-11-13
Horn Antenna (26GHz-40GHz)	A.H.Systems, inc.	SAS-573	SEM003-13	2020-11-14	2023-11-13
Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2021-04-07	2022-04-06
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-13	2021-07-12

RE in Chamber (Below 1GHz)					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2021-03-27	2022-03-26
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-16	2020-11-02	2021-11-01
log-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2021-04-07	2022-04-06
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2020-08-14	2023-08-13
Coaxial Cable	SGS	N/A	SEM029-01	2020-07-13	2021-07-12



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6 Radio Spectrum Matter Test Results

6.1 Field strength of spurious radiation

Test Requirement: §2.1051, §96.41

Test Method: ANSI C63.26, KDB 971168 D01 v03r01

Limit: Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

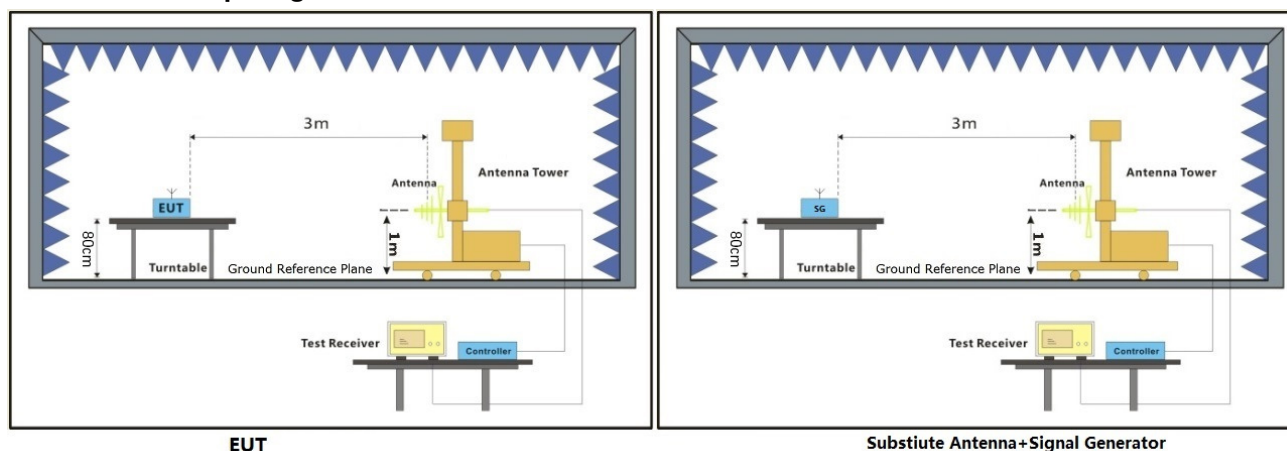
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.2 °C Humidity: 58.1 % RH Atmospheric Pressure: 1020 mbar

Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.1.2 Test Setup Diagram



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6.1.3 Measurement Procedure and Data

Test Procedure:

- (1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- (2) The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- (3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- (4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- (5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- (6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- (7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- (8) The maximum signal level detected by the measuring receiver shall be noted.
- (9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- (10) Replace the antenna with a proper Antenna (substitution antenna).
- (11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- (12) The substitution antenna shall be connected to a calibrated signal generator.
- (13) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- (14) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- (15) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- (16) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- (17) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.



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Lowest Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
45.85	39.0	H	-68.03	-40	-28.03	Pass
64.25	0.0	H	-67.73	-40	-27.73	Pass
231.75	279.0	H	-70.4	-40	-30.4	Pass
7747.00	134.0	H	-52.02	-40	-12.02	Pass
10543.50	169.0	H	-50.75	-40	-10.75	Pass
17544.00	253.0	H	-45.79	-40	-5.79	Pass

Lowest Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
49.25	74.0	V	-66.46	-40	-26.46	Pass
71.80	56.0	V	-70.47	-40	-30.47	Pass
104.25	0.0	V	-66.34	-40	-26.34	Pass
7739.50	15.0	V	-51.2	-40	-11.2	Pass
10475.00	100.0	V	-50.76	-40	-10.76	Pass
17550.00	179.0	V	-45.89	-40	-5.89	Pass

Middle Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
46.00	2.0	H	-67.8	-40	-27.8	Pass
62.80	159.0	H	-67.09	-40	-27.09	Pass
159.15	295.0	H	-71.3	-40	-31.3	Pass
8437.00	20.0	H	-51.66	-40	-11.66	Pass
13947.50	317.0	H	-47.29	-40	-7.29	Pass
17508.00	32.0	H	-45.84	-40	-5.84	Pass

Middle Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
49.00	90.0	V	-65.69	-40	-25.69	Pass
69.00	180.0	V	-68.34	-40	-28.34	Pass
104.30	22.0	V	-66.55	-40	-26.55	Pass
7352.50	101.0	V	-53.03	-40	-13.03	Pass
10491.00	53.0	V	-50.75	-40	-10.75	Pass
17624.50	101.0	V	-46.21	-40	-6.21	Pass



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Highest Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
46.10	23.0	H	-64.77	-40	-24.77	Pass
63.15	0.0	H	-68.73	-40	-28.73	Pass
156.20	0.0	H	-72.74	-40	-32.74	Pass
6155.00	66.0	H	-53.05	-40	-13.05	Pass
10537.00	8.0	H	-50.42	-40	-10.42	Pass
17491.00	89.0	H	-46.33	-40	-6.33	Pass

Highest Channel						
Frequency	Spurious Emission Level			Limit	Over limit	Result
(MHz)	(Deg)	Polaxis	(dBm)	dBm	dB	
49.00	74.0	V	-66.31	-40	-26.31	Pass
68.00	157.0	V	-66.11	-40	-26.11	Pass
104.25	0.0	V	-64.05	-40	-24.05	Pass
7016.00	150.0	V	-52.48	-40	-12.48	Pass
10520.50	88.0	V	-49.64	-40	-9.64	Pass
17529.00	28.0	V	-45.1	-40	-5.1	Pass

Remark:

- 1) Pretest with normal and extreme conditions, only the worst case data was showed in the test report.
- 2) We have tested all modulation and all Channel, but only the worst case data displayed in this report.



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7 Photographs

7.1 Setup photo

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -