

PCTEST

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com

MEASUREMENT REPORT CBSD-SAS Interoperability

Applicant Name: SEOWON INTECH 69, LS-ro 115beon-gil, Gunpo-si

Gyeonggi-do, Korea 15809 Date of Testing: 5/19 – 5/24/2021 Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.: 1M2105060049-02.V7M

FCC ID: V7MBHSLCTOGA
APPLICANT: SEOWON INTECH

Application Type: Certification

Model: SLC-120S48OGAH
EUT Type: Outdoor LTE Router
Frequency Range: 3550 – 3700 MHz

FCC Classification: Citizens Band Category A and B Device (CBD)

FCC Rule Part(s): Part 96

Test Procedure(s): KDB 940660 D01 v03, KDB 940660 D02 v02, WINNF-TS-0122-

V1.0.0, CBRSA-TS-9001 V.1.0.0, [WINNF-19-IN-00033] CBRS CPE-CBSD as UUT Test Guidelines Version V1.0, KDB 484596 D01 v01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in the test procedures listed above. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.









FCC ID: V7MBHSLCTOGA	POTEST:	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 1 of 15
1M2105060049 -02.V7M	5/19 – 5/24/2021	Outdoor LTE Router	Page 1 of 15



TABLE OF CONTENTS

1.0	INTRODUCTION	3
1.1	Scope	3
1.2	PCTEST Test Location	3
1.3	Test Facility / Accreditations	3
2.0	PRODUCT INFORMATION	4
2.1	Equipment Description	
2.2	Device Capabilities	2
2.3	Test Configuration	4
2.4	Modifications	2
3.0	TEST EQUIPMENT CALIBRATION DATA	5
4.0	ENVIRONMENTAL CONDITIONS	6
5.0	EVALUATION PROCEDURE	7
6.0	TEST Summary	8
6.1	Summary	8
7.0	CONCLUSION	10
	NDIX A – SPOT CHECK MEASUREMENT RESULTS FOR DATA REFERENCING	
A1 A2	INTRODUCTION DESCRIPTION OF COMPONENT DIFFERENCES	11 11
	SPOT CHECK VERIFICATION DATA: [WINNF.PT.C.HBT.1] UUT RF TRANSMIT POWER MEASUREMENT	

FCC ID: V7MBHSLCTOGA	PCTEST* Plead to be justiful @ revenue	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 2 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router		Page 2 of 15
@ 2024 DCTECT				\/4.0



1.0 INTRODUCTION

1.1 Scope

Measurement and determination of compliance with the technical rules and regulations of the Federal Communications Commission.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, LLC facility located at 7185 Oakland Mills Road, Columbia, MD 21046.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is a OnGo Alliance Approved Test Lab (ATL)
- PCTEST is a WInnForum Approved Test Lab
- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for CBRS Alliance Certification Test Plan and WInnForum Conformance and Performance Test Technical Standard.
- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: V7MBHSLCTOGA	PCTEST: Pland to be part of the review	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 2 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 3 of 15



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Seowon Intech LTE Outdoor CPE **FCC ID: V7MBHSLCTOGA.** The test data contained in this report pertains only to CBSD-SAS interoperability. The EUT is not a Domain Proxy.

Test Device Serial Number(s): KRSD201710471-00011

Test Device Hardware Version: 1.0
Test Device Software Version: 1.20.101

2.2 Device Capabilities

This device contains the following capabilities:

LTE Band 48

This device supports the following conditional features:

	Conditional Test Case Definitions	Supported
C1	Mandatory for UUT which supports multi-step registration message	\boxtimes
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.	
С3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration	\boxtimes

Table 2-1. Conditional Features

2.3 Test Configuration

Test configuration is setup per [WINNF-19-IN-00033] CBRS CPE-CBSD as UUT Test Guidelines Version V1.0. The EUT was connected to the SAS Test Harness developed by WINNF WG4-CBSD. The BTS-CBSD used is the Ruckus Q710 (FCC ID: S9GQ910US00). The latest version of the SAS Test Harness (V1.0.0.2) provided by CBRS Alliance was used for BTS-CBSD and CPE-CBSD. The SAS Test Harnesses are synchronized to UTC time.

2.4 Modifications

No modifications were made to EUT during testing.

FCC ID: V7MBHSLCTOGA	POTEST:	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 4 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 4 of 15



3.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
Dell	Latitude 5580	Test Harness Laptop	N/A	N/A	N/A	N/A
Mini-Circuits	ZN4PD1-63W-S+	250-6000 MHz Power Splitter	N/A	N/A	N/A	SF259501217
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/10/2021	Annual	2/10/2022	161662
N/A	LTE X1	RF cable set with Coupler	6/4/2019	Annual	6/4/2020	N/A

Table 3-1 Annual Test Equipment Calibration Schedule

FCC ID: V7MBHSLCTOGA	PCTEST: Pland to be posit if the recent	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo E of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 5 of 15



4.0 ENVIRONMENTAL CONDITIONS

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: V7MBHSLCTOGA	PCTEST: Plead to be partid @ revenue	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 6 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 6 of 15



5.0 EVALUATION PROCEDURE

The measurement procedure described in KDB 940660 D01 v03 and WINNF-TS-0122-V1.0.0 was used in the measurement of the EUT.

Deviation from measurement procedure.....None

FCC ID: V7MBHSLCTOGA	PCTEST: Plead to be partid @ revenue	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 7 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 7 of 15



TEST SUMMARY 6.0

6.1 **Summary**

Company Name: **SEOWON INTECH** FCC ID: **V7MBHSLCTOGA**

Table 6-1. Summary of Test Results

FCC Part Section(s)	KDB 940660 D01 Section 3.3 a)	Test Case Description	WInnForum Test Case	Test Result
96.39 (c)	1	Confirm that the device will only transmit after it receives authorization from a SAS	WINNF.FT.C.REG.1 WINNF.FT.C.REG.7 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18 WINNF.FT.C.REG.11	Pass
96.39 (c)	2	Check the device registration and authorization with the SAS – determine if the device behaves appropriately for successful and unsuccessful registrations. The device should not be transmitting without authorization from the SAS.	WINNF.FT.C.REG.1 WINNF.FT.C.REG.7 WINNF.FT.C.REG.8 WINNF.FT.C.REG.10 WINNF.FT.C.REG.12 WINNF.FT.C.REG.12 WINNF.FT.C.REG.14 WINNF.FT.C.REG.16 WINNF.FT.C.REG.18	Pass
96.39(c)(1)	3	Confirm that the device changes its operating power and/or channel in response to a command from the SAS.	WINNF.FT.C.HBT.1	Pass
96.39	4	Confirm that the device correctly configures based on the different license classes	N/A	Pass
96.39(c)(1)	5	Confirm that the device transmits at a power level less than or equal to the maximum power level approved by the SAS.	WINNF.PT.C.HBT	Pass
96.39(b)(c)	6	Confirm that the device transmits with a bandwidth less than or equal to the SAS specified bandwidth.	WINNF.FT.C.HBT.1	Pass
96.39(c)(2)	7	Confirm that the device transmits on the SAS specified frequency.	WINNF.FT.C.HBT.1	Pass
96.39(c)(2)	8	Confirm that the device stops transmission in response to a command from the SAS, within a period as required by Part 96.	WINNF.FT.C.HBT.3 WINNF.FT.C.HBT.4 WINNF.FT.C.HBT.5 WINNF.FT.C.HBT.6 WINNF.FT.C.HBT.7 WINNF.FT.C.HBT.9 WINNF.FT.C.HBT.10 WINNF.FT.C.RLQ.1 WINNF.FT.C.DRG.1	Pass

FCC ID: V7MBHSLCTOGA	PCTEST* Plead to be partid @ decision	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 8 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	raye o ul 15



Table 6-2. Summary of Test Results (continued)

	Table 6-2. Summary of Test Results (continued)					
96.39 (c)	9	Confirm that the device sends measurements data in response to the command from the SAS.	WINNF.FT.C.MES.1	N/A		
96.39(a)	10	For devices with geo-location, confirm that it notifies the SAS of a new location when it is beyond the required distance parameter (±50 m) within the required time frame.	N/A	N/A		
96.39 (c)	11	Confirm that the device is capable of reporting the signal level (measurement data) and frequency to SAS.	WINNF.FT.C.MES.1	N/A		
	12	For a device that operates as a Category A CBSD and then desires to operate as a Category B CBSD (or vice versa), confirm that it reregisters with the SAS for the updated authorization status.	N/A	Pass		
96 E	13	When CBSDs communicate through a management system, confirm compliance with all requirements.	N/A	Pass		
96.39	14	When communication between the CBSD and SAS is lost: i) Describe how the CBSD would react if the communications between the device and the SAS is lost. Confirm that the CBSD stops transmission once it loses the link to the SAS. ii) Describe the process for re-establishment of the communications and confirm that the CBSD acts accordingly. iii) Confirm power-on restart process for registration (re-registration) occurs as expected. iv) Confirm the process for de-registration occurs as expected.	WINNF.FT.C.HBT.9 WINNF.FT.C.HBT.10	Pass		
96.39(f)	KDB 940660 D01 Section 4	SAS and Device Security Requirements	WINNF.FT.C.SCS.1 WINNF.FT.C.SCS.2 WINNF.FT.C.SCS.3 WINNF.FT.C.SCS.4 WINNF.FT.C.SCS.5	Pass		

Notes:

- Test cases denoted as "N/A" in the table above are not applicable to the EUT and are either Optional or Conditional per Section 6 of WINNF-TS-0122.
- During testing, the device was configured to ouput only on the main antenna output. This port was monitored during testing.
- KDB 484596 D01 was used as guidance for referencing Test Data for this application. All WINNF-TS-0122 test data is referenced from FCC ID: V7MBSLC-120T42OGA. Please see Appendix for more details and spot check verification test data.

FCC ID: V7MBHSLCTOGA	PCTEST: Pland to be part of the review	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTE	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 9 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	rage 9 01 15

V1.0



7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Seowon Intech LTE Outdoor CPE FCC ID: V7MBHSLCTOGA has been tested to show compliance with Part 96 and KDB 940660.

FCC ID: V7MBHSLCTOGA	PCTEST: Plead to be partid @ revenue	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 10 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 10 of 15



APPENDIX A - SPOT CHECK MEASUREMENT RESULTS FOR DATA REFERENCING

A1 Introduction

Per KDB 484596 D01 v01, the new original certification application of FCC ID: V7MBHSLCTOGA is referencing all WINNF-TS-0122 data from FCC ID: V7MBSLC-120T42OGA for operations under Part 96 (frequency range of operations 3550-3700MHz). The applicant Seowon Intech Co. Inc. takes full responsibility that the test data as referenced represents compliance for the new FCC ID: V7MBHSLCTOGA.

All referenced test data can be found under FCC ID: V7MBSLC-120T42OGA's test report exhibit with file name "Test Report" (Test Report number is 1M1912230222-02.V7M.

A2 Description of Component Differences

The only diffrerence between FCC ID: V7MBSLC-120T42OGA and FCC ID: V7MBHSLCTOGA is the antenna. The new FCC ID: V7MBHSLCTOGA increases the antenna gain to 15.55dBi. All other hardware, software, and RF parameters are exactly the same between the 2 FCC IDs. Please note that this includes software for client SAS interoperability which is exactly the same between the 2 FCC IDs.

FCC ID: V7MBHSLCTOGA	POTEST:	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 11 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 11 of 15



A3 Spot Check Verification Data: [WINNF.PT.C.HBT.1] UUT RF Transmit Power Measurement

Spot Check Verification testing was performed on WINNF.PT.C.HBT.1 because of the antenna change and because the SAS client software is identical with referenced FCC ID: V7MBSLC-120T42OGA. See below for test execution steps and test results.

	Test Execution Steps	PASS	FAIL
1	 Ensure the following conditions are met for test entry: UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness UUT has registered with the SAS, with CBSD ID = C UUT has a single valid grant G with parameters {lowFrequency = FL, highFrequency = FH, maxEirp = Pi}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case Note: in order for the UUT to request a grant with the parameters {lowFrequency, highFrequency, maxEirp}, the SAS Test Harness may need to provide appropriate guidance in the availableChannel object of the spectrumInquiry response message, and the operationParam object of the grant response message. Alternately, the UUT vendor may provide the ability to set those parameters on the UUT so that the UUT will request a grant with those parameters. 		-
2	UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows: • UUT sends Heartbeat Request, including: • o cbsdld = C • o grantld = G • SAS Test Harness responds with Heartbeat Response, including: • o cbsdld = C • o grantld = G • o transmitExpireTime = current UTC time + 200 seconds • responseCode = 0		-1
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfil the requirements of the power measurement method. 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.	×	

FCC ID: V7MBHSLCTOGA	PCTEST*	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTEC	H Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 12 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Fage 12 01 15



RF Power Measurements:

Testing is performed per KDB 971168 D01.

Using a CMW500, the UUT was configured to transmit at maximum power from the main antenna. The EIRP was calculated by summing the conducted power level and antenna gain. Testing was performed on 20MHz BW signal.

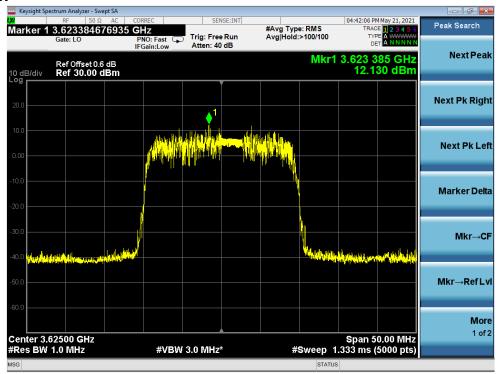
Freq [MHz]	SAS Granted maxEIRP [dBm/MHz]	Conducted PSD [dBm/MHz]	Ant Gain [dBi]	maxEIRP [dBm/MHz]	Margin [dB]
3625	31	12.13	15.55	27.68	-3.32
3625	27	11.42	15.55	26.97	-0.03
3625	24	8.23	15.55	23.78	-0.23

Table A-1 RF Output Power Measurements (WINNF.PT.C.HBT.1)

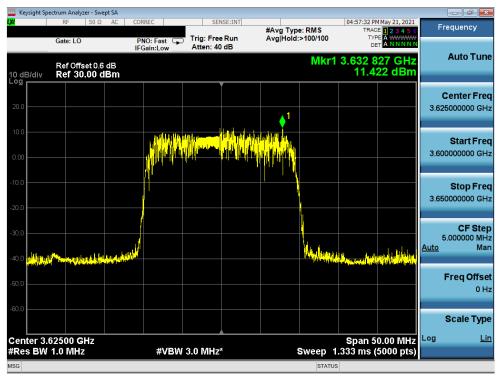
FCC ID: V7MBHSLCTOGA	POTEST:	MEASUREMENT REPORT (CERTIFICATION) SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 12 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router	Page 13 of 15



Test Plots:



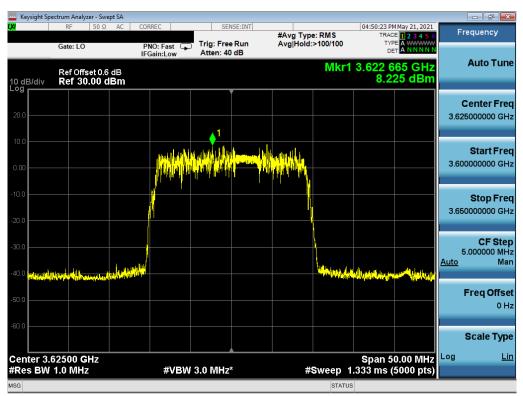
Plot 1. Conducted PSD, Mid-Channel SAS Granted maxEIRP 31



Plot 2. Conducted PSD, Mid-Channel SAS Granted maxEIRP 27

FCC ID: V7MBHSLCTOGA	PCTEST:	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dog 14 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router		Page 14 of 15
© 2021 PCTEST		•		V1.0





Plot 3. Conducted PSD, Mid-Channel SAS Granted maxEIRP 24

FCC ID: V7MBHSLCTOGA	PCTEST*	MEASUREMENT REPORT (CERTIFICATION)	SEOWON INTECH	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 15 of 15
1M2105060049 -02.V7M	5/19 - 5/24/2021	Outdoor LTE Router		Page 15 of 15