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TESTING

NVLAP LAB CODE: 100275-0

Title 47 Code of Federal Regulations Test Report

Regulation:

Title 47 CFR FCC Part 96
Spectrum Allocation Server Test
WINNF-TS-0122 V1.0.2

Client:

Nokia Solutions and Networks, OY

Product Evaluated:

AWHQU AirScale Micro 4T4R n48 40W CBRS 20W

Report Number:

TR2023-0030-FCC96

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4/24/2023

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Revisions

Date	Revision	Section	Change
4/24/2023	0		Initial Release

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1. System Information and Requirements

Equipment Under Test:	AWHQU AirScale Micro 4T4R n48 40W CBRS 20W
Serial Number:	CBSD1: EB2250R2599 CBSD2: EB2250R2612
Hardware Version:	4762621A.X21
Software Version:	SBTS23R2 & SBTS23R3
GPCL Project Number:	2023-0030
FCC ID:	FCC ID: 2AD8UAWHQU01
Company:	Nokia Solutions and Networks, OY KARAKAARI 7, FI-02610 ESPOO FINLAND
AWPQY/BBU DP Software Version:	SBTS23R3
Frequency Range:	3550 – 3700 MHz
Applicant:	Nokia Solutions and Networks, OY 2000 Lucent Lane Naperville, IL 60563, USA Lee Klinkenborg
Test Requirement(s):	Title 47 CFR FCC Part 96 CBRSA-TS-9001-V1.0.0 WINNF-TS-0122 V1.0.2
Test Standard(s):	Refer to Section 1.5.2
Test Procedure(s):	Refer to Section 1.5.3
Test Type:	CBRS Alliance OnGo certification/FCC Winnforum Testing
Test Date(s):	3/13/2023 – 4/6/2023
Test Performed By:	Nokia Bell Labs Global Product Compliance Laboratory 600-700 Mountain Ave. P.O. Box 636 Murray Hill, NJ 07974-0636 Test Site Number: US5302
Product Engineer(s):	Ronald Remy
Test Engineer (s):	Raymond Johnson, Ronald Remy, Jeff Webb, Mark Nguyen
Test Results: The EUT, <i>as tested</i> met the above listed Test Requirements. The decision rule employed is binary (Pass/Fail) based on the measured values without accounting for Measurement Uncertainty or any Guard Band. The measured values obtained during testing were compared to a value given in the referenced regulation or normative standard. Report copies and other information not contained in this report are held by either the product engineer or in an identified file at the Global Product Compliance Laboratory in New Providence, NJ.	

1.1 Introduction

This Spectrum Access Server (SAS) Conformity Assessment Report applies to the **AWHQU AirScale Micro 4T4R n48 40W CBRS 20W**, hereinafter referred to as the Equipment Under Test (EUT) or the Citizens Broadband Radio Service Device (**CBSD**).

The Nokia AWHQU is a 4 port radio head that transmits 5 Watts per port over the B48/n48 spectrum (3550 – 3700 MHz). This product supports LTE 10MHz, 20MHz single carriers and 5G-NR 10, 20, 40, 80MHz single carriers. The product utilizes QPSK, 16QAM, 64QAM and 256QAM modulation formats.

This report documents the digital interface conformance and operational interaction between the SAS and the CBSD (AWPQZ with DP). The specific test requirements have been defined in FCC KDB documents and WinnForum Standards™.

1.2 Purpose and Scope

The purpose of this document is to documents the digital interface conformance and operational interaction between the SAS and the CBSD.

This test data is required for qualifying the EUT CBSD in compliance with FCC Part 96 requirements for certification under FCC Part 2, measured in accordance with the procedures set out in Section 2.1033 (c) (14) of the Rules. The AWHQU is being filed under FCC ID: 2AD8UAWHQU01.

The software versions for the LTE and 5G operation were SBTS23R2 and SBTS23R3.

The testing that is reported herein represents the mandatory CBSD – SAS test cases and conditional test cases considered mandatory identified in the Winnforum specification for FCC Certification and for OnGo Alliance Certification. Powertest measurements were performed for both LTE and 5G-NR maximum power configurations.

1.3 EUT Description

The **AWHQU AirScale Micro 4T4R n48 40W CBRS 20W** is a RRH that consists of a LTE (Long Term Evolution)/5G-NR RF TDD transceiver with 4 transmit/receive ports.

The RRH specifications are as follows:

1.3.1 Specifications

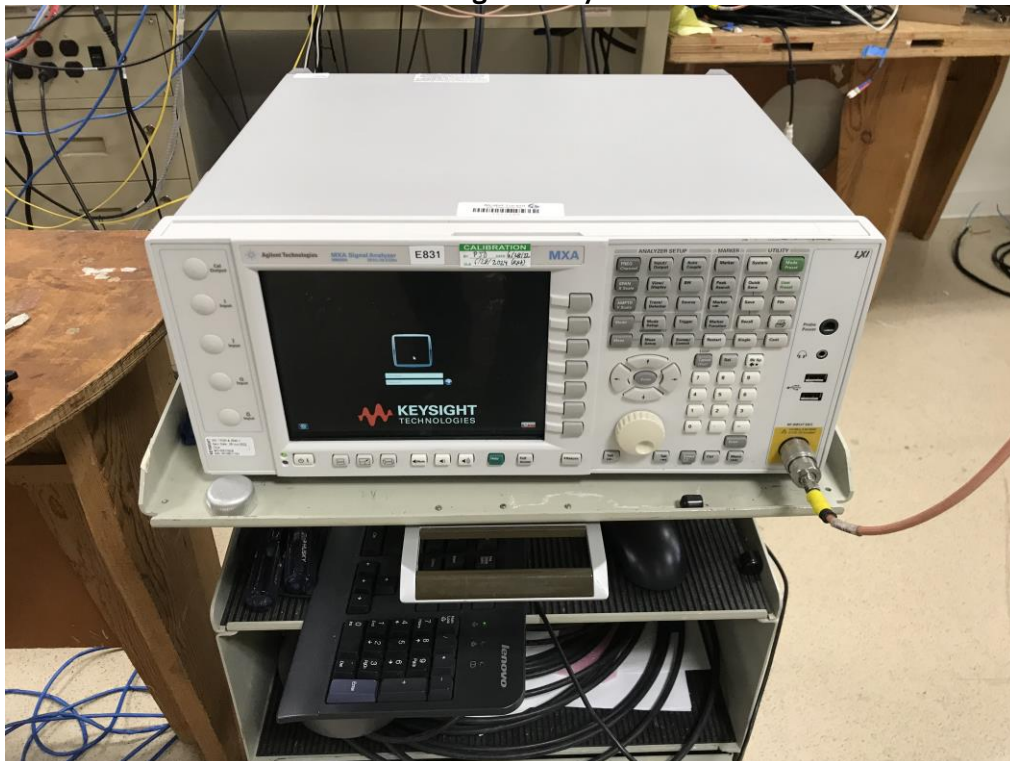
Specification Items	Description
Product Type	AWHQU AirScale Micro 4T4R n48 40W CBRS 20W
Radio Type	Intentional Transceiver
CBSD Category	Category B CBSD Device
Power Type	DC: -48V
Modulation	QPSK, 16QAM, 64QAM and 256QAM
Operating Frequency Range	CBRS (Tx/Rx: 3500 MHz)
Channel Bandwidth	LTE: 10, 20 MHz 5G-NG: 10, 20, 40, 80 MHz
Max Conducted Power (Rated)	Up to 4x5W (37.0 dBm)
Antenna Gain	Various between 4.0 & 18.0 dBi
Operating Mode	4T4R

1.3.2 Photographs

AWHQU



MXA Signal Analyzer



1.4 Test Rationale

The SAS testing was focused on the mandatory test cases necessary for FCC certification using the Winforum Specification, and for OnGo Alliance Certification.

The product has two modes of operation that have effect on the conducted power. For the purposes of the CBSD RF Power Measurement, a single port was measured with the product configured for 4 port transmit and with an antenna gain of 4.0, 6.0, and 18.0 dBi so that maximum conducted power could be used to obtain the measured value to compare to the 47 dBm/10MHz Part 96 limit for Category B CBSD.

1.4.1 Test Requirements

The test requirements are described in CFR47 Part 2 and WInnForum Standards™ Each required measurement is listed below:

WINNF-TS-0122	Paragraph 6.1	CBSD Registration Process
WINNF-TS-0122	Paragraph 6.2	CBSD Spectrum Inquiry Process
WINNF-TS-0122	Paragraph 6.3	CBSD Spectrum Grant Process
WINNF-TS-0122	Paragraph 6.4	CBSD Heart Beat Process
WINNF-TS-0122	Paragraph 6.5	CBSD Measurement Report
WINNF-TS-0122	Paragraph 6.6	CBSD Relinquishment Process
WINNF-TS-0122	Paragraph 6.7	CBSD Deregistration Process
WINNF-TS-0122	Paragraph 6.8	CBSD Security Validation
WINNF-TS-0122	Paragraph 7	SAS-CBSD/DP Interface Performance Test Specifications
WINNF-TS-0122	Paragraph 7.1	CBSD RF Power Measurement

1.5 Reference Documents, Test Standards & Procedures

A list of the applicable documents is provided herein.

1.5.1 Reference Documents

A list of the applicable documents is provided herein:

- 3GPP TS 36.104 (2019-12), “Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception”, Version 16.4.0 Release 16.
- 3GPP TS 38.141-2 (2019-12), “NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing.” Version 15.4.0 Release 15

1.5.2 Test Standards

- Code of Federal Regulations 47, Federal Communications Commission Part 96.
- 47 CFR FCC Part 96 Subpart E – Citizens Broadband Radio Services
- KDB 940660 D01 (Current Version) – Certification and Test Procedures for Citizens Broadband Radio Service Devices Authorized under Part 96 of The Rules, DR01
- KDB 971168 D01 (Current Version) - Measurement Guidance for Certification of Licensed Digital Transmitters
- CBRS-TS-9001-V1.0.0, CBRS Alliance Certification Test Plan

- WINNF-TS-0122, Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT), Version V1.0.2, 25 November 2020
- ANSI C63.26 (2015) entitled: “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services”, American National Standards Institute, Institute of Electrical and Electronic Engineers, Inc., New York, NY 10017-2394, USA.

1.5.3 Test Procedures

- GPCL Procedure FCC-IC-OB, Power measurement, Occupied Bandwidth, & Modulation Test Procedure
- GPCL Procedure FCC-WINN-SAS, Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT) Test Procedure

1.5.4 Measurement Uncertainty

The results of the calculations to estimate uncertainties for the several test methods and standards are shown in the Table below. These are the worst-case values.

Worst-Case Estimated Measurement Uncertainties

Standard, Method or Procedure	Condition	Frequency MHz	Expanded Uncertainty (k=2)
a. Classical Emissions, (e.g., ANSI C63.4, C63.26, CISPR 11, 14, 22, etc., using ESHS 30, AR-6 Semi-Anechoic Chamber	Conducted Emissions	10 – 10,000	±3.5 dB

1.6 Product Equipage

1.6.1 System Interconnect Block Diagram

The EUT was configured as in a normal installation and intended operation.

1.7 Executive Summary

RESULTS:

1. **COMPLIES** - Passed all applicable tests.
2. **N/A** – Not Applicable.
3. **NT** – Not Tested.

WINNF-TS-0122 Section	Description	Date Tested	Result	Comment
6.1	CBSD Registration Process	3/13/23 – 3/31/23	Pass	
6.2	CBSD Spectrum Inquiry Process	3/13/23	Pass	
6.3	CBSD Spectrum Grant Process	3/16/23	Pass	
6.4	CBSD Heart Beat Process	3/13/23 – 3/24/23	Pass	
6.5	CBSD Measurement Report	3/31/23	Pass	
6.6	CBSD Relinquishment Process	3/15/23	Pass	
6.7	CBSD Deregistration Process	3/16/23	Pass	
6.8	CBSD Security Validation	3/31/23	Pass	
7.1	CBSD RF Power Measurement	3/29/23 – 3/30/23 (5G) 4/3/23 – 4/6/23 (LTE)	Pass	

2. Detailed Results

The results of the individual test cases are detailed in below. Documentation of specific data items follow.

2.1 CBSD Registration Process

2.1.1 WINNF.FT.D.REG.2 (C1)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Multi-Step registration	P	winnf.ft.d.reg.2_2023-03-13T16.13.02Z	

2.1.2 WINNF.FT.D.REG.4 (C2)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Single-Step registration for Category A CBSD	NT	N/A	C2 – Not required for certification

2.1.3 WINNF.FT.D.REG.6 (C3)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Single-Step registration for CBSD with CPI signed data	NT	N/A	C3 – Not required for certification

2.1.4 WINNF.FT.C.REG.7 (C6)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Registration due to change of an installation parameter	P	winnf.ft.c.reg.7_2023-03-31T19.18.41Z	

2.1.5 WINNF.FT.D.REG.9 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Missing Required parameters (responseCode 102)	P	winnf.ft.d.reg.9_2023-03-13T17.12.19Z	

2.1.6 WINNF.FT.D.REG.11 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Pending registration (responseCode 200)	P	winnf.ft.d.reg.11_2023-03-13T19.16.22Z	

2.1.7 WINNF.FT.D.REG.13 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Invalid parameter (responseCode 103)	P	winnf.ft.d.reg.13_2023-03-13T19.38.22Z	

2.1.8 WINNF.FT.D.REG.15 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Blacklisted CBSD (responseCode 101)	P	winnf.ft.d.reg.15_2023-03-13T19.55.46Z	

2.1.9 WINNF.FT.D.REG.17 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Unsupported SAS protocol version (responseCode 100)	P	winnf.ft.d.reg.17_2023-03-13T20.44.56Z	

2.1.10 WINNF.FT.D.REG.19 (M)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Group Error (responseCode 201)	P	winnf.ft.d.reg.19_2023-03-13T20.57.29Z	

2.1.11 WINNF.FT.C.REG.20 (C2)

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Category A CBSD location update	NT	N/A	C2 – Not required for certification

2.2 CBSD Spectrum Inquiry Process

2.2.1 Successful response from SAS Test Harness

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Successful response from SAS Test Harness (6.2.4.1)	P	Refer to WINNF.FT.D.HBT.2	

2.3 CBSD Spectrum Grant Process

2.3.1 WINNF.FT.C.GRA.1

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Unsuccessful Grant responseCode=400 (INTERFERENCE)	P	winnf.ft.c.gra.1_2023-03-16T19.33.08Z	

2.3.2 WINNF.FT.C.GRA.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	P	winnf.ft.c.gra.2_2023-03-16T20.08.19Z	

2.4 CBSD Heart Beat Process

2.4.1 WINNF.FT.D.HBT.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat Success Case (first Heartbeat Response)	P	winnf.ft.d.hbt.2_2023-03-13T21.48.20Z	

2.4.2 WINNF.FT.C.HBT.3

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat responseCode=105 (DEREGISTER)	P	winnf.ft.c.hbt.3_2023-03-16T20.46.57Z	

2.4.3 WINNF.FT.C.HBT.5

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	P	winnf.ft.c.hbt.5_2023-03-23T17.46.32Z	

2.4.4 WINNF.FT.C.HBT.6

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	P	winnf.ft.c.hbt.6_2023-03-23T20.59.25Z	

2.4.5 WINNF.FT.C.HBT.7

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	P	winnf.ft.c.hbt.7_2023-03-23T21.37.28Z	

2.4.6 WINNF.FT.D.HBT.8

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	P	winnf.ft.d.hbt.8_2023-03-14T15.18.05Z	

2.4.7 WINNF.FT.C.HBT.9

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat Response Absent (First Heartbeat)	P	winnf.ft.c.hbt.9_2023-03-24T19.10.28Z	

2.4.8 WINNF.FT.C.HBT.10

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat Response Absent (Subsequent Heartbeat)	P	winnf.ft.c.hbt.10_2023-03-24T20.14.33Z	

2.4.9 WINNF.FT.C.HBT.11

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Successful Grant Renewal in Heartbeat Test Case	NT	N/A	O – Not required for certification

2.5 CBSD Measurement Report

2.5.1 WINNF.FT.D.MES.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Registration Response contains measReportConfig	P	winnf.ft.d.mes.2_2023-03-31T20.43.00Z	

2.5.2 WINNF.FT.C.MES.3

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Grant Response contains measReportConfig	NT	N/A	O – Not required for certification

2.5.3 WINNF.FT.D.MES.5

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Heartbeat Response contains measReportConfig	NT	N/A	O – Not required for certification

2.6 CBSD Relinquishment Process

2.6.1 WINNF.FT.D.RLQ.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Successful Relinquishment	P	winnf.ft.d.rlq.2_2023-03-15T18.57.43Z	

2.6.2 WINNF.FT.D.RLQ.4

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Unsuccessful Relinquishment, responseCode=102	NT	N/A	O – Not required for certification

2.6.3 WINNF.FT.D.RLQ.6

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Unsuccessful Relinquishment, responseCode=103	NT	N/A	O – Not required for certification

2.7 CBSD Deregistration Process

2.7.1 WINNF.FT.C.DRG.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Successful Deregistration	NT	winnf.ft.d.drg.2_2023-03-16T15.14.29Z	

2.7.2 WINNF.FT.D.DRG.4

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Deregistration responseCode=102	NT	N/A	O – Not required for certification

2.7.3 WINNF.FT.C.DRG.5

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Deregistration responseCode=103	NT	N/A	O – Not required for certification

2.8 CBSD Security Validation

2.8.1 WINNF.FT.C.SCS.1

Test Case Title	Result P/F / (NT)	Log File Name	Comment
Successful TLS connection between UUT and SAS Test Harness	P	winnf.ft.c.reg.1_2023-03-31T15.43.53Z SCS1 AWHQU SCS1 Wireshark.pcapng	Pass, No RF Output

2.8.2 WINNF.FT.C.SCS.2

Test Case Title	Result P/F / (NT)	Log File Name	Comment
TLS failure due to revoked certificate	P	winnf.ft.c.reg.1_2023-03-31T15.47.07Z SCS2 AWHQU SCS2 crl Wireshark.pcapng	Pass, No RF Output

2.8.3 WINNF.FT.C.SCS.3

Test Case Title	Result P/F / (NT)	Log File Name	Comment
TLS failure due to expired server certificate	P	winnf.ft.c.reg.1_2023-03-31T15.50.45Z SCS3 AWHQU SCS3 Wireshark.pcapng	Pass, No RF Output

2.8.4 WINNF.FT.C.SCS.4

Test Case Title	Result P/F / (NT)	Log File Name	Comment
TLS failure when SAS Test Harness certificate is issue by unknown CA	P	winnf.ft.c.reg.1_2023-03-31T15.54.07Z SCS4 AWHQU SCS4 Wireshark.pcapng	Pass, No RF Output

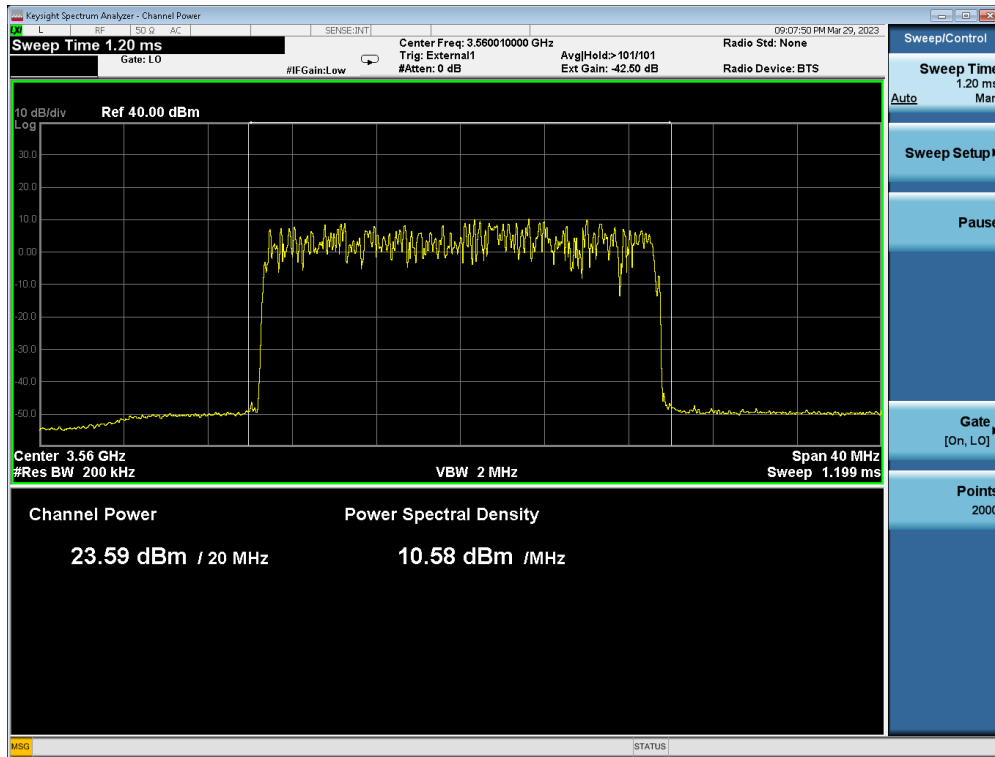
2.8.5 WINNF.FT.C.SCS.5

Test Case Title	Result P/F / (NT)	Log File Name	Comment
TLS failure when certificate at the SAS Test Harness is corrupted	P	winnf.ft.c.reg.1_2023-03-31T16.04.27Z SCS5 AWHQU SCS5 Wireshark.pcapng	Pass, No RF Output

2.8.6 WINNF.PT.C.HBT – Pmax (21 dBm, AG=4.0 dBi) – 5G-NR

Test Case Title	Result P/F / (NT)	Log File Name	Comment
UUT RF Transmit Power Measurement	Pass	PowerMeasTest_2023-03-29T19.41.14Z	<p>TX reading = 23.59 dBm/20 MHz</p> <p>Conducted Power = 23.59 dBm/20MHz/port + 10 log(4) (4 Ports) = 29.61 dBm/20MHz</p> <p>Total EIRP 29.61 dBm/20MHz + 4.0 dBi Gain = 33.61 dBm/20MHz EIRP 33.61 dBm/20MHz → 30.6 dBm/10MHz 30.6 dBm/10MHz ≤ 47 dBm/10 MHz Limit - PASS</p> <p>PSD = 10.58 dBm/MHz + 4dBi gain + 6.02dB(4ports) = 20.6 dBm/MHz ≤ 37 dBm/MHz - PASS</p> <p>Limit-EIRP is 47 dBm/10 MHz = 50 dBm/20 MHz, Limit PSD= 37 dBm/MHz</p> <p style="text-align: right;">PASS</p>

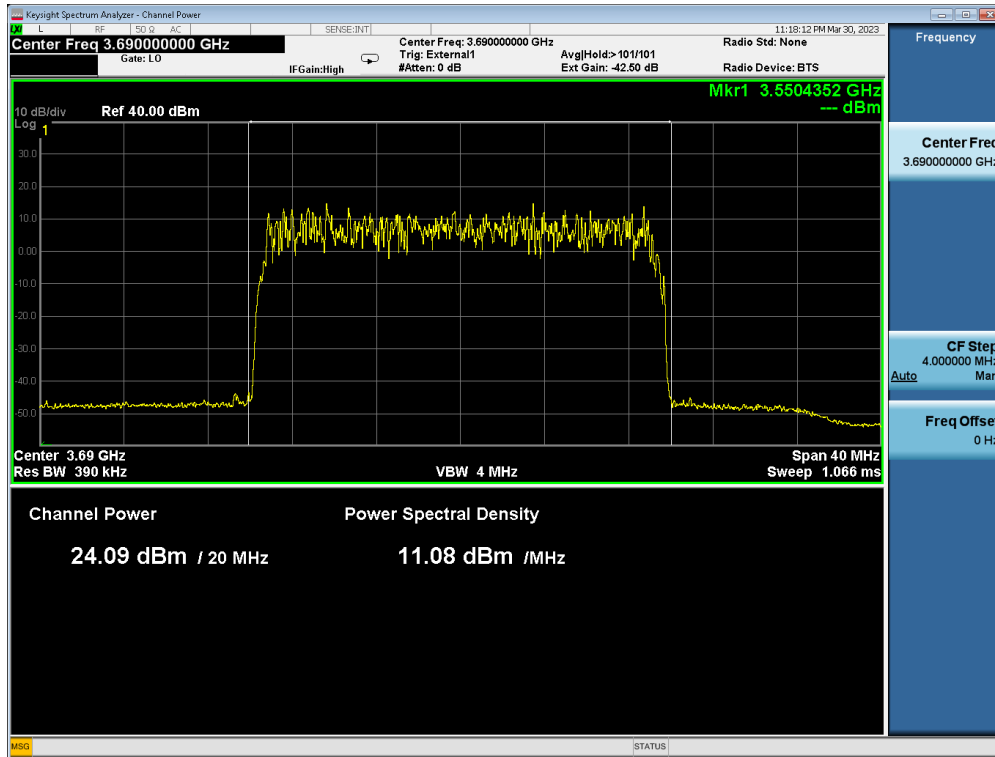
Pmax 21 dBm Measurement



2.8.7 WINNF.PT.C.HBT – Pmax (37 dBm, AG=18.0 dBi) – 5G-NR

Test Case Title	Result P/F / (NT)	Log File Name	Comment
UUT RF Transmit Power Measurement	Pass	PowerMeasTest_2023-03-30T22.05.09Z	<p>TX reading = 24.09 dBm/20 MHz</p> <p>Conducted Power = 24.09 dBm/20MHz/port +10 log(4) (4 Ports) = 30.11 dBm/20MHz</p> <p>Total EIRP 30.11 dBm/20MHz + 18.0 dBi Gain = 48.11 dBm/20MHz EIRP 48.11 dBm/20MHz → 45.1 dBm/10MHz 45.1 dBm/10MHz ≤ 47 dBm/10 MHz Limit - PASS</p> <p>PSD = 11.08 dBm/MHz + 18dBi gain + 6.02dB(4ports) = 35.1 dBm/MHz ≤ 37 dBm/MHz - PASS</p> <p>Limit-EIRP is 47 dBm/10 MHz = 50 dBm/20 MHz, Limit PSD= 37 dBm/MHz</p> <p style="text-align: center;">PASS</p>

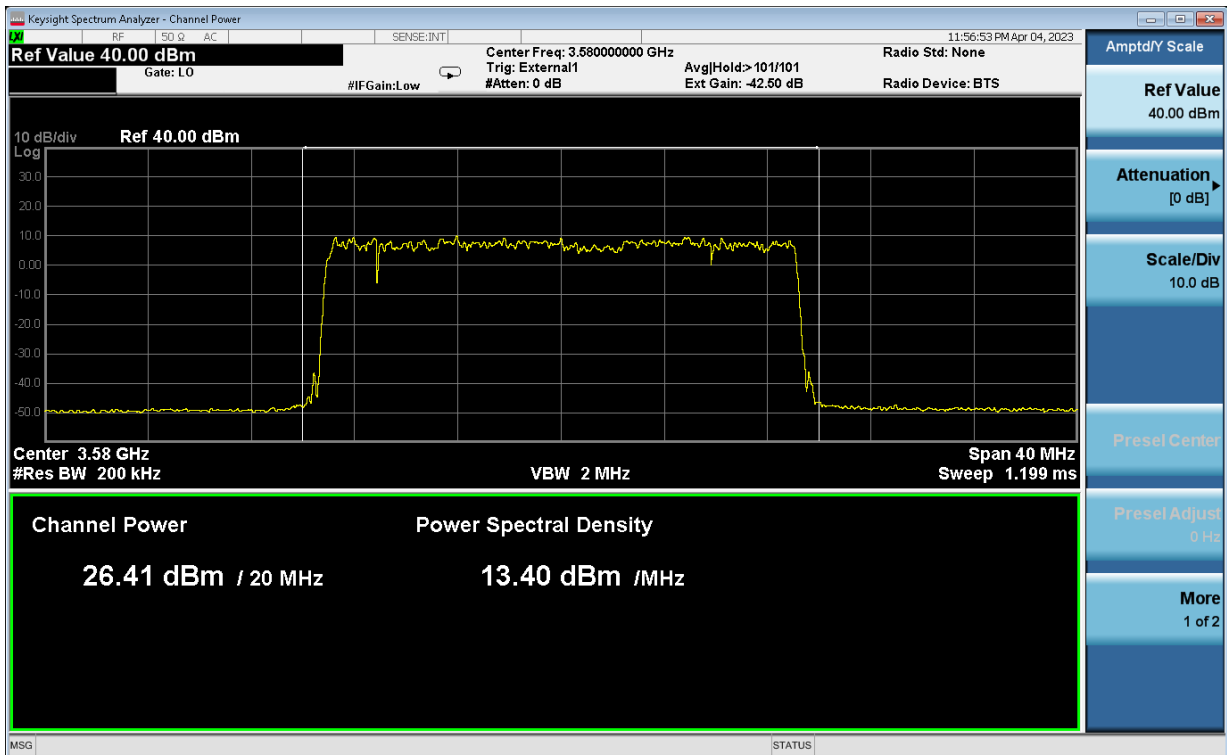
Pmax 37 dBm Measurement



2.8.8 WINNF.PT.C.HBT – Pmax (27 dBm, AG=6.0 dBi) - LTE

Test Case Title	Result P/F / (NT)	Log File Name	Comment
UUT RF Transmit Power Measurement	Pass	PowerMeasTest_2023-04-04T21.43.46Z	<p>TX reading = 26.41 dBm/20 MHz</p> <p>Conducted Power = 26.41 dBm/20MHz/port +10 log(4) (4 Ports) = 32.43 dBm/20MHz</p> <p>Total EIRP 32.43 dBm/20MHz + 6.0 dBi Gain = 38.43 dBm/20MHz EIRP 38.43 dBm/20MHz → 35.42 dBm/10MHz 35.42 dBm/10MHz ≤ 47 dBm/10 MHz Limit - PASS</p> <p>PSD = 13.40 dBm/MHz + 6dBi gain + 6.02dB(4ports) = 25.42 dBm/MHz ≤ 37 dBm/MHz - PASS</p> <p>Limit-EIRP is 47 dBm/10 MHz = 50 dBm/20 MHz, Limit PSD= 37 dBm/MHz</p> <p style="text-align: center;">PASS</p>

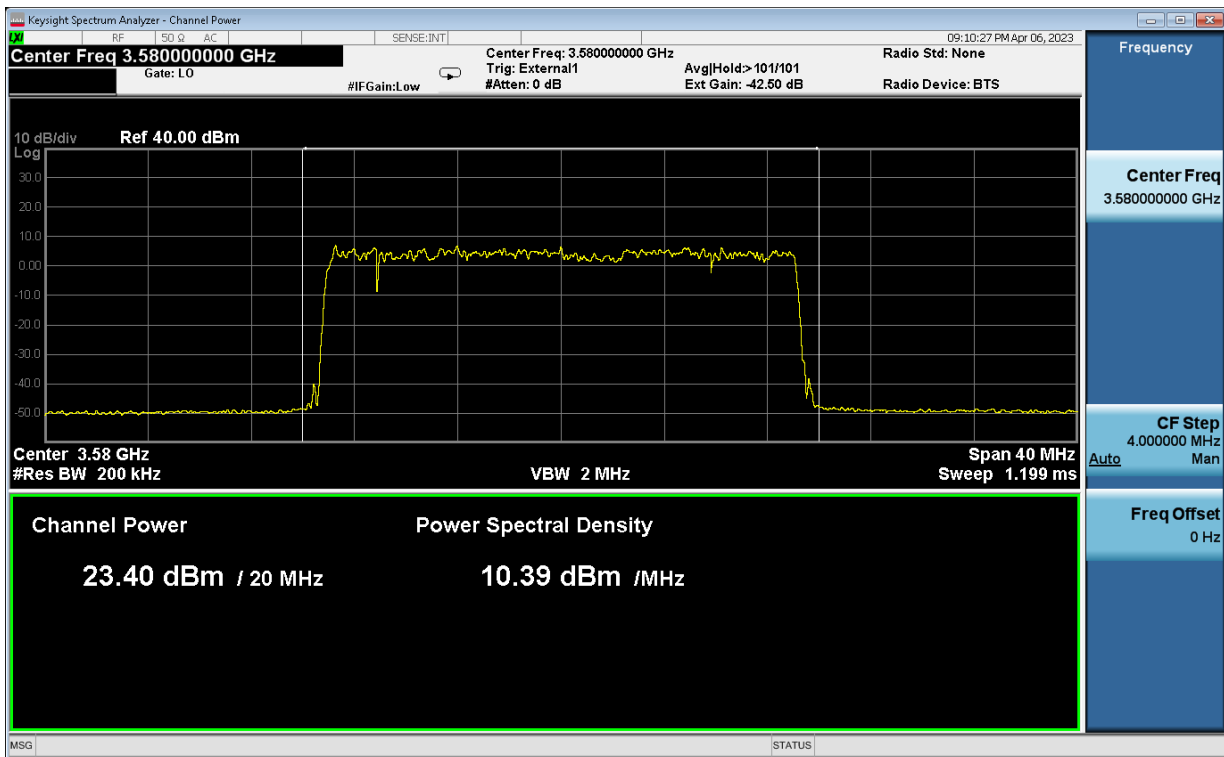
Pmax 27 dBm Measurement



2.8.9 WINNF.PT.C.HBT – Pmax (37 dBm, AG=18.0 dBi) LTE

Test Case Title	Result P/F / (NT)	Log File Name	Comment
UUT RF Transmit Power Measurement	Pass	PowerMeasTest_2023-04-06T18.56.56Z	TX reading = 23.40 dBm/20 MHz Conducted Power = 23.40 dBm/20MHz/port +10 log(4) (4 Ports) = 29.42 dBm/20MHz Total EIRP 29.42 dBm/20MHz + 18.0 dBi Gain = 47.42 dBm/20MHz EIRP 47.42 dBm/20MHz → 44.41 dBm/10MHz 44.41 dBm/10MHz ≤ 47 dBm/10 MHz Limit - PASS PSD = 10.39 dBm/MHz + 18dBi gain + 6.02dB(4ports) = 34.41 dBm/MHz ≤ 37 dBm/MHz - PASS Limit-EIRP is 47 dBm/10 MHz = 50 dBm/20 MHz, Limit PSD= 37 dBm/MHz <p style="text-align: center;">PASS</p>

Pmax 37 dBm Measurement



3. Test Equipment

The Equipment used for performance of the tests results are listed below.

3.1.1 Test Equipment

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
E831	Agilent Technologies	MXA Signal Analyzer	20Hz-26.5GHz	N9020A	MY48011791	2022-06-28	2024-06-28
E1139	Extech	Data Logger	BaroPre/Humidity/Temp/Datalogger	SD700	Q679360	2022-07-27	2024-07-27
EIH85	Control Company	Electronic Stopwatch		1051	221977439	2022-12-23	2024-12-23

3.1.2 Laboratory Environmental Conditions

Date	Temperature (°C)	Humidity (%)	Barometric Pressure (hPa)
3/13/23	23.4	25.0	994.5
3/14/23	23.9	23.8	981.3
3/15/23	22.2	21.4	990.6
3/16/23	21.7	19.6	999.4
3/23/23	23.1	26.3	995.3
3/24/23	22.1	22.1	996.1
3/28/23	21.5	27.5	999.8
3/29/23	21.0	24.9	1003.2
3/30/23	20.4	21.3	1006.7
3/31/23	20.8	22.1	1007.4
4/3/23	21.4	22.2	1002.8
4/4/23	22.3	27.5	998.3
4/6/23	23.6	31.7	1001.1

4. NVLAP Accreditation

United States Department of Commerce
National Institute of Standards and Technology




Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 100275-0

Nokia, Global Product Compliance Lab
Murray Hill, NJ

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2022-09-28 through 2023-09-30

Effective Dates





For the National Voluntary Laboratory Accreditation Program