Radio Test Report
Application for Grant of Equipment Authorization

FCC Part 27
[2496MHz – 2690MHz]

FCC ID: VBNAVHA-01

Nokia Solutions and Networks
Airscale Base Transceiver Station Radio Unit
Model: AVHA

Feature: CB013711

Report: NOKI0087.0 Rev. 0, Issue Date: September 8, 2025

Element Plano
1701 E. Plano Parkway #150
Plano, TX 75074 USA

ACCREDITED
CERT #214.19

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CERTIFICATE OF TEST

Last Date of Test: August 19, 2025
Nokia Solutions and Networks
EUT: Airscale Base Transceiver Station Radio Unit Model AVHA

Radio Equipment Testing

Standards

Specification	Method
Code of Federal Regulations (CFR) Title 47 Part 2 CFR Title 47 Part 27 Subpart C	ANSI C63.26-2015 with FCC KDB 971168 D01 v03r01 FCC KDB 662911D01 v02r01 FCC KDB 662911D02 v01 FCC KDB 971168 D01v03

Results

Test Description	Specification Section(s)	Method Section(s)	Results	Comments
Occupied Bandwidth	27.53 (m)	5.4	Pass	
Output Power	27.50 (h)	5.2	Pass	
Peak to Average Power (PAPR) CCDF	27.50 (h)	5.2	Pass	
Band Edge Compliance	27.53 (m)	5.7	Pass	
Spurious Conducted Emissions	27.53 (m)	5.7	Pass	

Deviations From Test Standards

None

Approved By:

Adam Bruno, Operations Manager
Signed for and on behalf of Element

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

FACILITIES

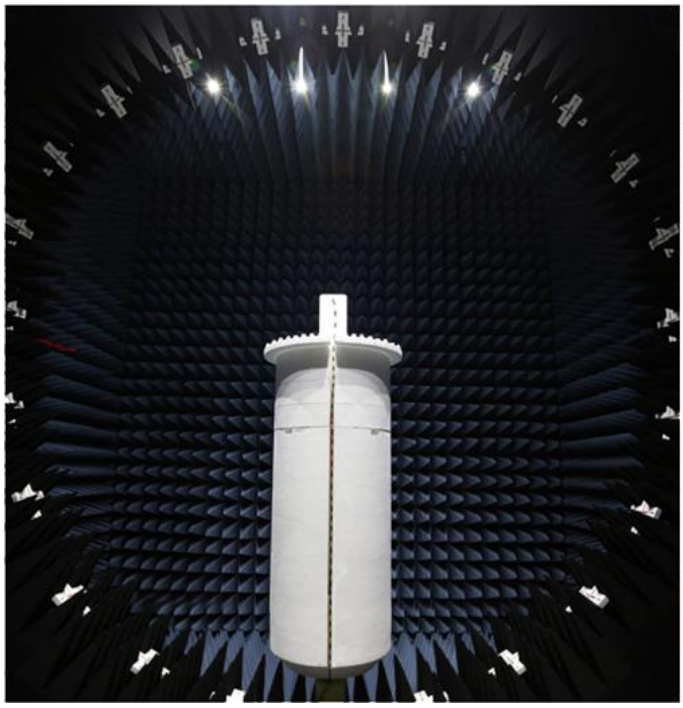
element
2025.07.17

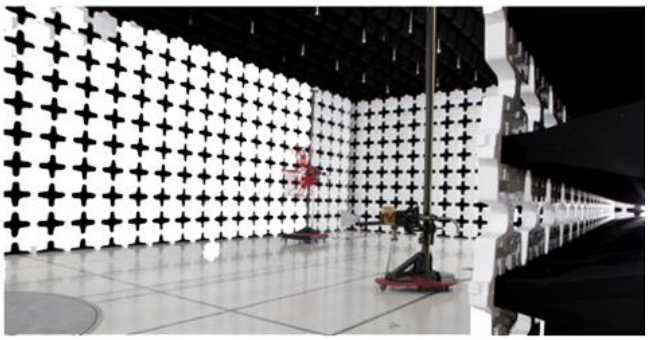
Testing was performed at the following location(s)

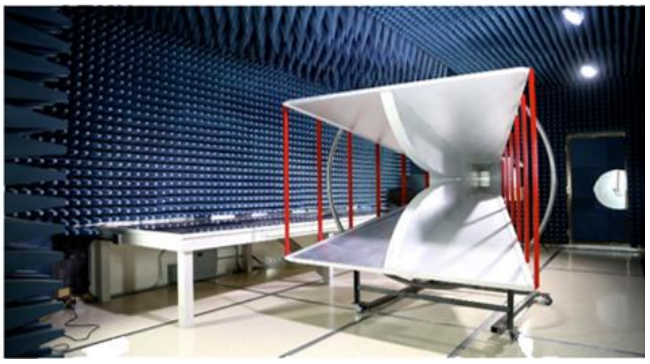
	Location	Labs (1)	Address	A2LA (2)	ISED (3)	BSMI (4)	VCCI (5)	CAB	FDA (6)
☒	Plano Texas	PT01-15	1701 E Plano Pkwy, Ste 150 Plano, TX 75074 (972) 509-2566	214.19	32637	SL2-IN-E-057R	A-0426	US0054	TL-137
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

(1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
(2) A2LA Certificate No.
(3) ISED Company No.
(4) BSMI No.
(5) VCCI Site Filing No.
(6) FDA ASCA No.







MEASUREMENT UNCERTAINTY

element
MU 2025-03-26

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation reported is based on statistical analysis that was performed by the laboratory. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (k=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable) and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Various Measurements

Test	All Labs (+/-)
Frequency Accuracy (%)	0.0007
Amplitude Accuracy (dB)	1.2
Conducted Power (dB)	1.2
Radiated Power via Substitution (dB)	0.7
Temperature (degrees C)	0.7
Humidity (% RH)	2.5
Voltage (AC) (%)	1
Voltage (DC) (%)	0.7
Near-field Measurement of E-Field (dB)	1.89
Near-field Measurement of H-Field (dB)	2.65

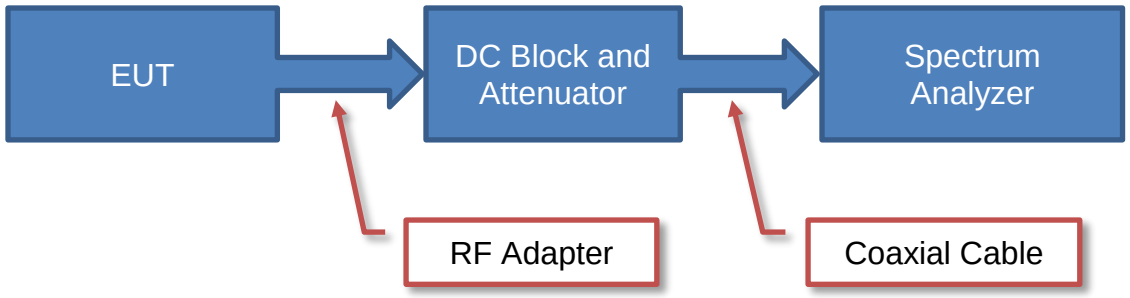
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

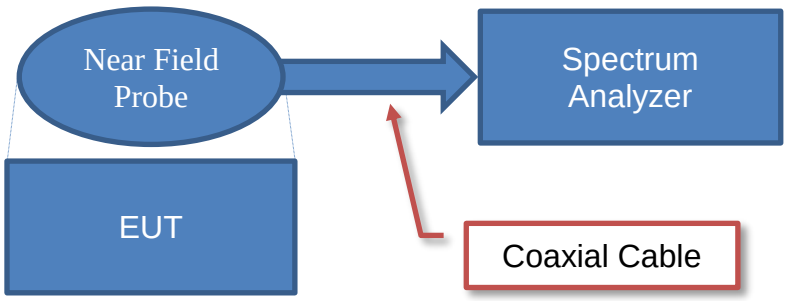
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

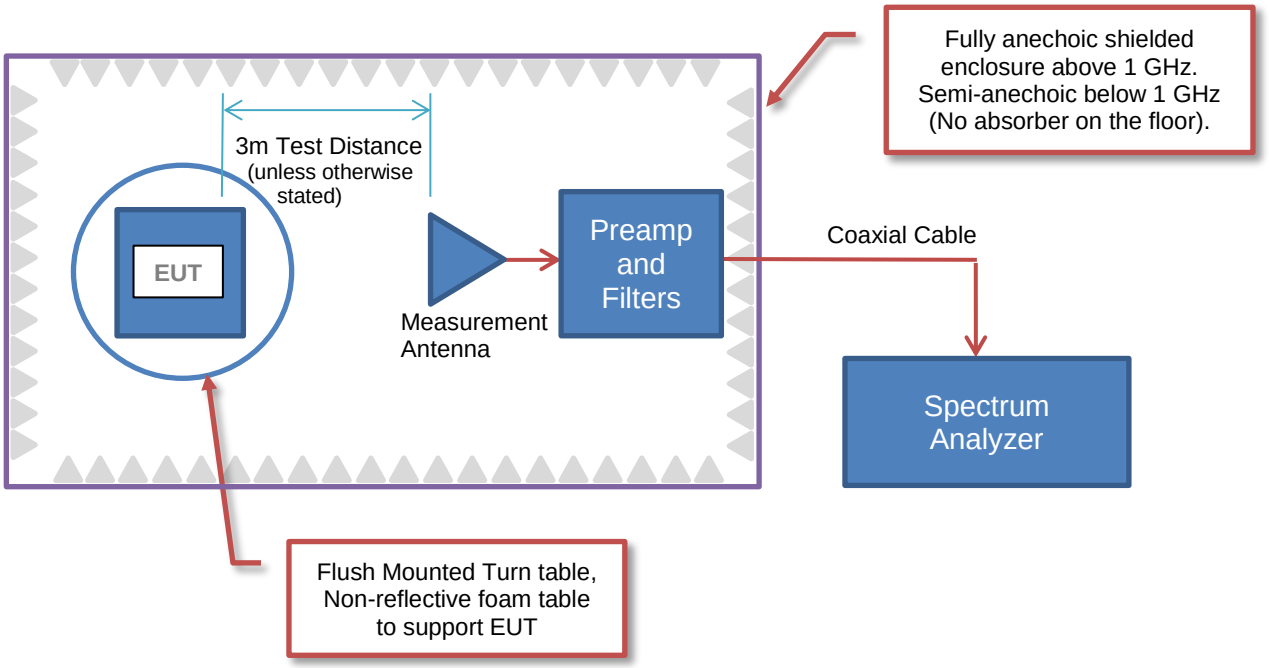


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)		Factor: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

Conducted Emissions:

Measured Level (Amplitude)		Factor: Transducer Factor		Factor: Cable Factor		External Attenuation		Adjusted Level
26.7	+	0.3	+	0.1	+	20.0	=	**47.1**

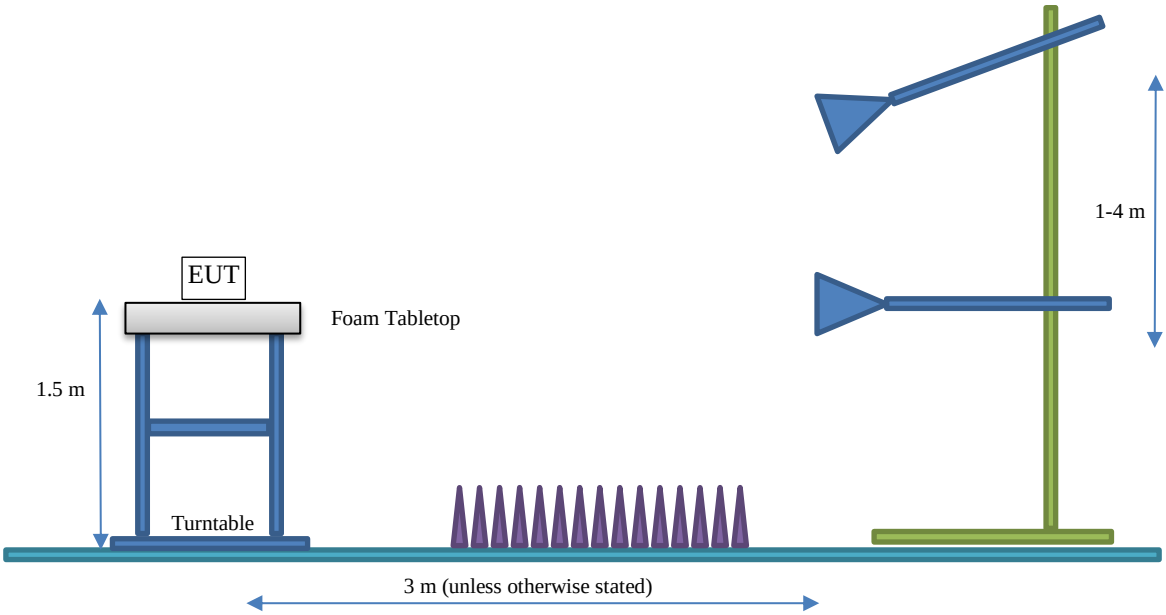
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)		Substitution Antenna Factor (dBi)		EIRP to ERP (if applicable)		Measured power (dBm ERP/EIRP)
10.0	+	6.0	-	2.15	=	**13.9/16.0**

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION

Client and Equipment under Test (EUT) Information

Company Name:	Nokia Solutions and Networks
Address:	3201 Olympus Blvd
City, State, Zip:	Dallas, TX 75019
Test Requested By:	Steve Mitchell
EUT:	Airscale Base Transceiver Station Radio Unit Model AVHA
First Date of Test:	August 13, 2025
Last Date of Test:	August 19, 2025
Receipt Date of Samples:	August 13, 2025
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Air Scale MAA 64T64R 192AE Radio Unit (RU) variant AVHA is being developed under this effort. The AVHA Radio Unit is designed to support 4G LTE and 5G NR (New Radio) TDD (Time Division Duplex) operations. **The scope of this testing effort is the FCC radio certification of the AVHA with focus on the addition of Nokia new feature** (CB013711) **Slim Carrier Bandwidths in TDD operations within the BRS/EBS Band.**

The AVHA RU supports 3GPP frequency band n41 operations for FCC BRS/EBS (BTS Tx/Rx: 2496 to 2690 MHz). the AVHA supports up to 64 ports MIMO operations. The maximum RF output power is 400 Watts (6.25W/TRX x 64 TRXs). The AVHA RU supports 5G NR TDD channel bandwidths of NR10, NR15, NR20, NR30, NR40, NR50, NR60, NR70, NR80, NR90, NR100. The AVHA RU with Slim Carrier feature (CB013711) supports 5G NR Slim Carrier bandwidths: 33MHz, 34MHz, 38MHz, 38.5MHz, 44MHz, 49MHz, 49.5MHz, 55MHz, 57.5MHz, 86MHz.

AVHA Single Carrier Maximum RF Output Power										
Carrier Power per	33MHz	34MHz	38MHz	38.5MHz	44MHz	49MHz	49.5MHz	55MHz	57.5MHz	86MHz
TRX	2.6W or 34.1dBm	2.7W or 34.2dBm	3.0W or 34.7dBm	3.0W or 34.8dBm	3.4W or 35.4dBm	3.8W or 35.8dBm	3.9W or 35.9dBm	4.3W or 36.3dBm	4.5W or 36.5dBm	5.9W Or 37.7dBm
Radio (64 x TRX)	165.0W or 52.2dBm	170W or 52.3dBm	190W or 52.8dBm	192.5W or 52.8dBm	220W or 53.4dBm	245W or 53.9dBm	247.5W or 53.9dBm	275W or 54.4dBm	287.5W Or 54.6dBm	378.4W Or 55.8dBm

The Slim Carrier bandwidths are supported in the Nokia feature (CB013711) which is a bandwidth reduction feature. This allows for the carrier bandwidths to be slimmed down from the original 3Gpp Base carrier bandwidth, see below table. The PSD (W/MHz), modulation and Band Edge center frequency for the Slim Carriers are the same as used in their base bandwidths. The power measured uses the same PSD (W/MHz) as the base carrier thus the reduction follows the reduced carrier bandwidth.

AVHA Slim Carrier to Base Carrier reference Bandwidth chart		
Slim Carrier Bandwidth	**PSD (W/MHz)**	**Base Carrier Bandwidth**
33.0MHz	5.0W/MHz	40MHz
34.0MHz		
38.0MHz		
38.5MHz		
44.0MHz	5.0W/MHz	50MHz
49.0MHz		
49.5MHz		
55.0MHz	5.0W/MHz	60MHz
57.5MHz		
86.0MHz	4.4W/MHz	90MHz

AVHA Multi Carrier Maximum Power for Slim Carrier Bandwidths			
Slim Carrier Bandwidth	**Base Carrier Bandwidth**	**Maximum Port power**	**Maximum Multi Slim carrier Power**
33.0MHz in 4CC configuration	40MHz	6.25Watts	1.29Watts or 31.1dBm per carrier
33.0MHz in 2CC configuration	40MHz	6.25Watts	2.58Watts or 34.1dBm per carrier
86.0MHz in 2CC configuration	90MHz	6.25Watts	2.99Watts or 34.8dBm per carrier
Note: Formula for Slim Multicarrier expected measured output: ((Slim carrier BW/ Base Carrier BW) *6.25W)/ # of carriers.			

The AVHA RU supports four downlink 5G NR modulation types (QPSK, 16QAM, 64QAM and 256QAM). The AVHA RU instantaneous bandwidth is 194MHz and covers the entire FCC BRS/EBS Band. The maximum occupied bandwidth is 190MHz. Multicarrier operation is supported. The 4G LTE radio certification will be performed under a separate effort.

The AVHA antenna assembly has an array of 4 rows and 8 columns of (±45°) cross-polarized (orthogonal) radiators. This antenna assembly has a beamforming gain of 26.0 dBi. The sixty-four AVHA transmitter outputs are connected to the antenna array (thirty-two are connected to +45° radiators/antennas and thirty-two are connected to the -45° radiators/antennas).

The radio unit has external interfaces including DC power (DC IN), ground (GND), optical (OPT1-4) and remote electrical tilt/EAC connector (AISG). The RU with applicable installation kit is pole mounted.

Tests performed include RF channel power, CCDF- peak to average power ratio, emission bandwidth (99% and 26 dB down), band edge spurious emissions (± 1MHz), and spurious emissions (conducted). The 5G NR modulation types for this testing are setup according to 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.2 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type).

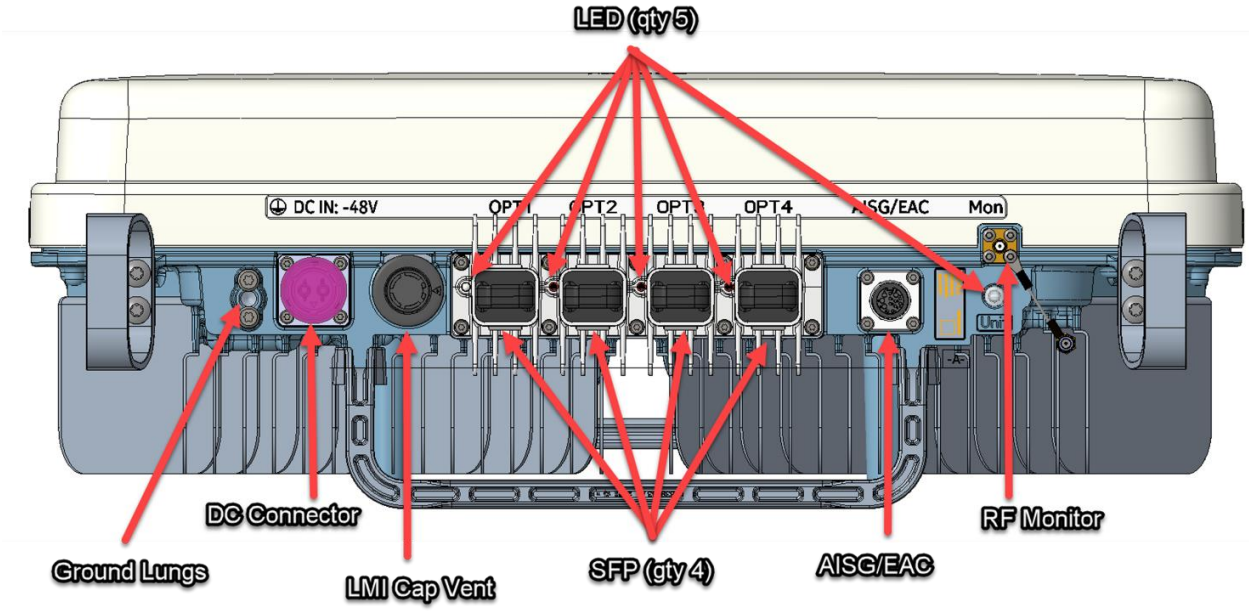
3GPP Frequency Band n41 5G NR Band Edge NR-ARFCNs

The 3GPP frequency band n41 (2496-2690 MHz) band edge NR-ARFCNs for 5G NR channel bandwidths (33, 34, 38, 38.5, 44, 49, 49.5, 55, 57.5, 86 MHz) are provided below. The NR-ARFCN is defined as New Radio - Absolute Radio Frequency Channel Number. The Slim Carrier bandwidths use the same center channel at Band Edge as their perspective base bandwidths from which they are derived. Original base bandwidth details can be referenced within the original Report-NOKI0079.1.

5G NR NR-ARFCN	Frequency (MHz)	Slim Carrier 5G NR Channel Bandwidth in MHz									
		33	34	38	38.5	44	49	49.5	55	57.5	86
Band Edge	**2496.00**	**Lower Band Edge**									
……											
500202	2501.01										
……											
500700	2503.50										
……											
501204	2506.02										
……											
502200	2511.00										
……											
503202	2516.01	Bot Ch	Bot Ch	Bot Ch	Bot Ch						
……											
504204	2521.02					Bot Ch	Bot Ch	Bot Ch			
……											
505200	2526.00								Bot Ch	Bot Ch	
……											
506202	2531.01										
……											
507204	2536.02										
……											
508200	2541.00										Bot Ch
……											
509202	2546.01										
……											
518598	2592.99	Middle Channel									
……											
528000	2640.00										
……											
528996	2644.98										Top Ch
……											
529998	2649.99										
……											
531000	2655.00										
……											
531996	2659.98								Top Ch	Top Ch	
……											
532998	2664.99					Top Ch	Top Ch	Top Ch			
……											
534000	2670.00	Top Ch	Top Ch	Top Ch	Top Ch						
……											
534996	2674.98										
……											
535998	2679.99										
……											
536496	2682.48										
……											
537000	2685.00										
……											
Band Edge	**2690.00**	**Upper Band Edge**									

AVHA Connector Layout

PRODUCT DESCRIPTION



AVHA External Interfaces

Name	Initials	Purpose	# of lines	Connector type
Power Supply In	DC IN	Power Supply input	1	Circular plug P511466 Circular Con
Grounding (GND Screws)	GND	Grounding		M8, 2 x M5
LMI (Local Management Interface)	LMI	Not for field use.		Minilink42
System Interface	OPT1, OPT2, OPT3, OPT4	eCPRI to/from FSMs	4 x Optical	SFP+ SFP28 SFP56 optical LC-connector
AISG/EAC connector	AISG	Connection for AISG	6 EAC input signals, 1 EAC output signal 1 AISG	Combined AISG / EAC mech CONNECTOR code P597765
RF Monitor	Mon	To measure RF outputs	1	SMA(F)

Testing Objective:

FCC radio certification of the AirScale MAA 64T64R Radio Unit variant AVHA for the Slim Carrier bandwidths designed for 5G NR TDD Single Carrier and Multi Carrier operations in the BRS/EBS Band.

CONFIGURATIONS

Test Configuration 1 (RF Conducted Testing)

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20250732.032
BTS Software Version (25R3)	SBTS25R3_ENB_9999_250304_000008
BTS Software Subset L1 Software Version	rf_l1_common_lib-25.02.R01_2

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.102	J8173107703
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224904438
ABIO (BTS Base Band Module)	Nokia Solutions and Networks	475266A.104	DH223246457
AVHA (Radio Module Model with RF adapter plate)	Nokia Solutions and Networks	476541A.101	L1252500217
10dB Attenuator 100 Watt	Weinschel Corp.	48-10-34-LIM	BJ1771
1.4GHz LPF 100Watts	Microwave Circuits	L13502G1	SN2454-01
SFP28 70M MM-ENB	Nokia	P462265	FR214716965
SFP28 70M MM-RADIO	Nokia	P462265	FR214716952
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable	rflambda	RFC6767A	AC20040005
3 Meter RF cable	Junsho	MWX241-03000KMSKMS/B	J12J105861-00
(63) 25W -50ohm -Terminating Load	API Weinschel, Inc	1427-2	CN1829
(63) 4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N
Fiber Optic cable 15m	Amphenol Fiber Optic	995741A	VZ1701
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
CAT5e data cable (EM-PC)	ETL	E316395	6066M

CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	15 meters	N	ABIO	AVHA
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVHA] Ant ports 2-64	25W -50ohm-Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable Junsho	Y	3 meters	N	EUT [AVHA] TAB port #1	Attenuator 100W/10dB
Attenuator 100W/10dB	Y	NA	N	2-meter RF cable Junsho	10MHz-1.4GHz LPF Filter
10MHz-1.4GHz LPF Filter	N	NA	N	Attenuator 100W/10dB	1-meter RF cable RF-Lambda
RF cable RF-Lambda	Y	1 meter	N	10MHz-1.4GHz LPF Filter	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup for 9kHz to 150kHz, 150kHz to 20MHz.

CONFIGURATIONS

Test Configuration 2 (RF Conducted Testing)

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20250732.032
BTS Software Version (25R3)	SBTS25R3_ENB_9999_250304_000008
BTS Software Subset L1 Software Version	rf_l1_common_lib-25.02.R01_2

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.102	J8173107703
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224904438
ABIO (BTS Base Band Module)	Nokia Solutions and Networks	475266A.104	DH223246457
AVHA (Radio Module Model with RF adapter plate)	Nokia Solutions and Networks	476541A.101	L1252500217
Attenuator 250W/40dB	API Weinschel	58-40-33	UN619
SFP28 70M MM-ENB	Nokia	P462265	FR214716965
SFP28 70M MM-RADIO	Nokia	P462265	FR214716952
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable	rflambda	RFC6767A	AC20040005
3 Meter RF cable	Junsho	MWX241-03000KMSKMS/B	J12J105861-00
(63) 25W -50ohm -Terminating Load	API Weinschel, Inc	1427-2	CN1829
(63) 4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N
Fiber Optic cable 15m	Amphenol Fiber Optic	995741A	VZ1701
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
CAT5e data cable (EM-PC)	ETL	E316395	6066M

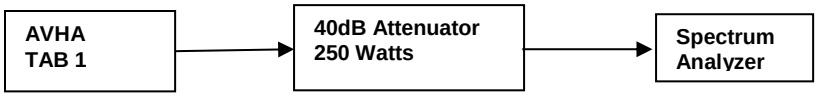
CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	15 meters	N	ABIO	AVHA
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVHA] Ant ports 2-64	25W -50ohm-Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable Junsho	Y	3 meters	N	EUT [AVHA] TAB port #1	Attenuator 250W/40dB
Attenuator 250W/40dB	N	NA	N	RF cable Junsho	RF cable RF-Lambda
RF cable RF-Lambda	Y	1 meter	N	Attenuator 250W/40dB	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup for 20MHz to 4GHz



CONFIGURATIONS

Test Configuration 3 (RF Conducted Testing)

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20250732.032
BTS Software Version (25R3)	SBTS25R3_ENB_9999_250304_000008
BTS Software Subset L1 Software Version	rf_l1_common_lib-25.02.R01_2

Equipment being tested (include Peripherals)			
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ABIO (BTS Base Band Module)	Nokia Solutions and Networks	475266A.104	DH223246457
AVHA (Radio Module Model with RF adapter plate)	Nokia Solutions and Networks	476541A.101	L1252500217
Attenuator 150W/20dB	AeroflexWeinschel	66-20-33	BZ1165
High Pass Filter 3.2-18GHz/15W	Microwave Circuits,Inc.	RHPF23G03G18	20121400043
SFP28 70M MM-ENB	Nokia	P462265	FR214716965
SFP28 70M MM-RADIO	Nokia	P462265	FR214716952
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable	RF-Lambda	RFC6767A	AC20040005
3 Meter RF cable	Junsho	MWX241-03000KMSKMS/B	J12J105861-00
(63) 25W -50ohm -Terminating Load	API Weinschel, Inc	1427-2	CN1829
(63) 4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N
Fiber Optic cable 15m	Amphenol Fiber Optic	995741A	VZ1701
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
CAT5e data cable (EM-PC)	ETL	E316395	6066M

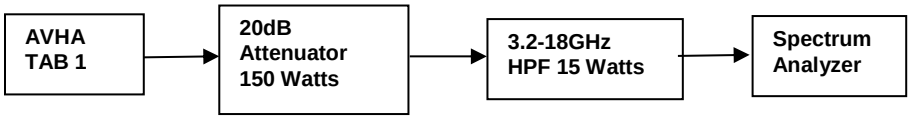
CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	15 meters	N	ABIO	AVHA
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVHA] Ant ports 2-64	25W -50ohm-Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable Junsho	Y	3 meters	N	EUT [AVHA] TAB port #1	Attenuator 150W/20dB
Attenuator 150W/20dB	N	NA	N	RF cable Junsho 3 Meters	3.2 – 18GHz HPF 15 Watts
3.2 – 18GHz HPF 15 Watts	N	NA	N	Attenuator 150W/20dB	RF cable RF-Lambda 1 Meter
RF cable RF-Lambda	Y	1 meter	N	3.2 – 18GHz HPF 15 Watts	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup for 4GHz to 18GHz



CONFIGURATIONS

element
2018-07-17

Test Configuration 4 (RF Conducted Testing)

Software/Firmware Running during test	
Description	**Version**
Radio Module Software	RF.SRM7.trunk.20250732.032
BTS Software Version (25R3)	SBTS25R3_ENB_9999_250304_000008
BTS Software Subset L1 Software Version	rf_l1_common_lib-25.02.R01_2

Equipment being tested (include Peripherals)			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AMIA (BTS System Module)	Nokia Solutions and Networks	473098.102	J8173107703
ASIB (BTS System Module)	Nokia Solutions and Networks	473764A.102	L1224904438
ABIO (BTS Base Band Module)	Nokia Solutions and Networks	475266A.104	DH223246457
AVHA (Radio Module Model with RF adapter plate)	Nokia Solutions and Networks	476541A.101	L1252500217
Attenuator 50W/10dB	AeroflexWeinschel	RFS50G26S10FF	20031701
High Pass Filter 8-40GHz/15W	RF-Lambda	RHPF23G08G40	17102700016
SFP28 70M MM-ENB	Nokia	P462265	FR214716965
SFP28 70M MM-RADIO	Nokia	P462265	FR214716952
Lenovo PC T490	Lenovo	T490	PF26RVZ0
Keysight- DC System power supply	Keysight	N8757A	US21D4054S
FPAC (DC-pwr supply)	Nokia	472438A.101	G7111007146
1 Meter RF cable	rflambda	RFC6767A	AC20040005
3 Meter RF cable	Junsho	MWX241-03000KMSKMS/B	J12J105861-00
(63) 25W -50ohm -Terminating Load	API Weinschel, Inc	1427-2	CN1829
(63) 4 Meter- RF cable	CBL	CBL-10F-SMSF-402J-N	402J-N
Fiber Optic cable 15m	Amphenol Fiber Optic	995741A	VZ1701
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-72
Reference cable (Frame Clock & Trigger)	Pomona	2249	C-48
GPS sync cable	Nokia	995426	CA2029
FYGB GPS receiver	Nokia	472748A	71231431
CAT5e data cable (EM-PC)	ETL	E316395	6066M

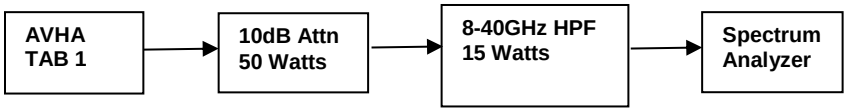
CONFIGURATIONS

Cables (Peripheral)					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
Fiber Optic Cable	N	15 meters	N	ABIO	AVHA
GPS Receiver Cable	Y	100 meters	N	ASIB	FYGB GPS receiver
Cat-5e Cable	Y	5 meters	N	ASIB	WebEM- PC
Reference cables (Frame Clock & Trigger)	Y	1 meter	N	ASIB	Analyzer
CBL RF-Cable – RF Load Cables (63)	Y	4 meters	N	EUT [AVHA] Ant ports 2-64	25W -50ohm-Load

Cables					
Description	**Shield (Y/N)**	**Length (m)**	**Ferrite (Y/N)**	**Connection 1**	**Connection 2**
RF cable Junsho	Y	3 meters	N	EUT [AVHA] TAB port #1	Attenuator 50W/10dB
Attenuator 50W/10dB	N	NA	N	RF cable Junsho	High Pass Filter 8-40GHz/15W
High Pass Filter 8-40GHz/15W	N	NA	N	Attenuator 50W/10dB	RF-Lambda cable
RF-Lambda cable	Y	1 meter	N	High Pass Filter 8-40GHz/15W	Analyzer

RF Test Setup Diagram:

Conducted Spurious Emissions Test Setup for 18GHz to 27GHz



MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2025-08-15	Average Power	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2025-08-15	Peak to Average Power (PAPR)CCDF	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2025-08-15	Occupied Bandwidth	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2025-08-18	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2025-08-19	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

AVERAGE POWER AND EIRP CALCULATIONS

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TEST DESCRIPTION

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The fundamental emission Output Power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

RF conducted emissions testing was performed on only one port. The AVHA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown within the original report NOKI0079.1 certification testing). Antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The RMS average power measurement method for FCC is detailed in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4. Measurements shall be performed at full power on the channel(s) and bandwidth(s) specified in this report.

The output power was measured for a single carrier over the carrier channel bandwidth. The total output power for multiport (64x64 MIMO) operations was determined based per ANSI C63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log N_{out}). The total output power for Sixty-Four port operation is single power +18.1 dB [i.e. 10*log(64)].

All Measurements were synchronized with the measurement receiver - gated with external trigger input (frame clock (100Hz) provided by the system module. Duty cycle correction is not needed for this testing since the transmit “on” time is synchronized with the measurement receiver.

FCC Requirements: §27.50 Power limits and duty cycle.

27.50 (h)(ii) The following power requirements apply to stations transmitting in the BRS/EBS band:

> If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula: EIRP = 33 dBW + 10 log(X/Y) dBW + 10 log(360/beamwidth) dBW, where X is the actual channel width in MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

AVERAGE POWER AND EIRP CALCULATIONS

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5G NR EIRP Calculations for Sixty-four Port MIMO Operations

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base station operational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced within the parameters of the base station configuration.

The AVHA antenna assembly has an array of 4 rows and 8 columns of (±45°) cross-polarized (orthogonal) radiators. This antenna assembly has a maximum beamforming gain of 26.0dBi. The sixty-four AVHA transmitter outputs are connected to the antenna array (thirty-two are connected to +45° radiators/antennas and thirty-two are connected to the -45° radiators/antennas).

Equivalent Isotopically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for a system of correlated output signals) from the results of power measurements (highest measured average power for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. Calculations of worst-case EIRP for sixty-four port MIMO are as follows:

Parameter	33MHz Ch BW	34MHz Ch BW	38MHz Ch BW	38.5MHz Ch BW	44MHz Ch BW	49MHz Ch BW	49.5MHz Ch BW	55MHz Ch BW	57.5MHz Ch BW	86MHz Ch BW
Power per Antenna Port	34.4 dBm	34.5 dBm	34.5 dBm	34.5 dBm	35.5 dBm	35.5 dBm	35.5 dBm	36.4 dBm	36.3 dBm	37.4 dBm
Ant Ports per	32	32	32	32	32	32	32	32	32	32
Polarization (+15.1dB)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Total Power per Pol	49.5 dBm	49.6 dBm	49.6 dBm	49.6 dBm	50.6 dBm	50.6 dBm	50.6 dBm	51.5 dBm	51.4 dBm	52.5 dBm
Max Ant Beamforming Gain per Pol	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi	26.0dBi
EIRP per Polarization	75.5 dBm	75.6 dBm	75.6 dBm	75.6 dBm	76.6 dBm	76.6 dBm	76.6 dBm	77.5 dBm	77.4 dBm	78.5 dBm
Number of Polarizations	2	2	2	2	2	2	2	2	2	2
EIRP Total (See Note 1)	75.5 dBm	75.6 dBm	75.6 dBm	75.6 dBm	76.6 dBm	76.6 dBm	76.6 dBm	77.5 dBm	77.4 dBm	78.5 dBm
EIRP Limit Calculation (See Note 2)	84.2 dBm	84.3 dBm	84.8 dBm	84.8 dBm	85.4 dBm	85.9 dBm	85.9 dBm	86.4 dBm	86.6 dBm	88.3 dBm

Note 1: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).
Note 2: The EIRP limit is defined by FCC part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. The AVHA antenna horizontal beamwidth is 13 ± 2 degrees or a maximum of 15 degrees. Y was selected to be 6MHz for this calculation.

Calculation Summary

The worst-case AVHA sixty-four port MIMO EIRP levels for all of the new Slim Carrier channel bandwidths are less than the FCC regulatory limits.

AVERAGE POWER AND EIRP CALCULATIONS

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight Technologies	N9030B	AGA	2025-06-09	2026-06-09
Block - DC	Centric RF	C0140	ANJ	NCR	NCR
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

Note: The RF Test Setup/ Network (RF cables/Attenuators/filter/etc.) is defined in the configurations section for each test. The RF Test Setup/Network is calibrated using the signal generator and spectrum analyzer prior to test. The RF insertion loss of the RF Test Setup/Network is accounted for by the spectrum analyzer's reference level offset during the RF conducted testing.

AVERAGE POWER AND EIRP CALCULATIONS

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EUT:	Airscale Base Transceiver Station Radio Unit Model AVHA	Work Order:	NOKI0087
Serial Number:	L1252500217	Date:	2025-08-14
Customer:	Nokia Solutions and Networks	Temperature:	27.3°C
Attendees:	Mitch Hill, John Rattanavong	Relative Humidity:	41.4%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0087-2

COMMENTS

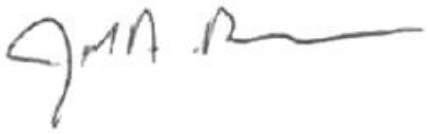
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
Port 1				
40 MHz Base Channel Bandwidth				
33.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2516.01 MHz	34.37	0	34.4	52.5
Middle Channel, 2592.99 MHz	34.196	0	34.2	52.3
High Channel, 2670.0 MHz	34.237	0	34.2	52.3
34.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2516.01 MHz	34.459	0	34.5	52.6
Middle Channel, 2592.99 MHz	34.257	0	34.3	52.4
High Channel, 2670.0 MHz	34.271	0	34.3	52.4
38.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2516.01 MHz	34.465	0	34.5	52.6
Middle Channel, 2592.99 MHz	34.28	0	34.3	52.4
High Channel, 2670.0 MHz	34.292	0	34.3	52.4
38.5 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2516.01 MHz	34.461	0	34.5	52.6
Middle Channel, 2592.99 MHz	34.303	0	34.3	52.4
High Channel, 2670.0 MHz	34.317	0	34.3	52.4

AVERAGE POWER AND EIRP CALCULATIONS

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	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
50 MHz Base Channel Bandwidth				
44.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2521.02 MHz	35.528	0	35.5	53.6
Middle Channel, 2592.99 MHz	35.377	0	35.4	53.5
High Channel, 2664.99 MHz	35.383	0	35.4	53.5
49.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2521.02 MHz	35.505	0	35.5	53.6
Middle Channel, 2592.99 MHz	35.336	0	35.3	53.4
High Channel, 2664.99 MHz	35.363	0	35.4	53.5
49.5 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2521.02 MHz	35.503	0	35.5	53.6
Middle Channel, 2592.99 MHz	35.292	0	35.3	53.4
High Channel, 2664.99 MHz	35.325	0	35.3	53.4
60 MHz Base Channel Bandwidth				
55.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2562.00 MHz	36.355	0	36.4	54.5
Middle Channel, 2592.99 MHz	36.106	0	36.1	54.2
High Channel, 2659.98 MHz	36.136	0	36.1	54.2
57.5 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2562.00 MHz	36.308	0	36.3	54.4
Middle Channel, 2592.99 MHz	36.143	0	36.1	54.2
High Channel, 2659.98 MHz	36.119	0	36.1	54.2
90 MHz Base Channel Bandwidth				
86.0 MHz Slim Carrier Bandwidth				
QPSK Modulation				
Low Channel, 2541.00 MHz	37.364	0	37.4	55.5
Middle Channel, 2592.99 MHz	37.206	0	37.2	55.3
High Channel, 2644.98 MHz	37.179	0	37.2	55.3
16QAM Modulation				
Middle Channel, 2592.99 MHz	37.255	0	37.3	55.4
64QAM Modulation				
Middle Channel, 2592.99 MHz	37.272	0	37.3	55.4
256QAM Modulation				
Middle Channel, 2592.99 MHz	37.236	0	37.2	55.3

AVERAGE POWER AND EIRP CALCULATIONS

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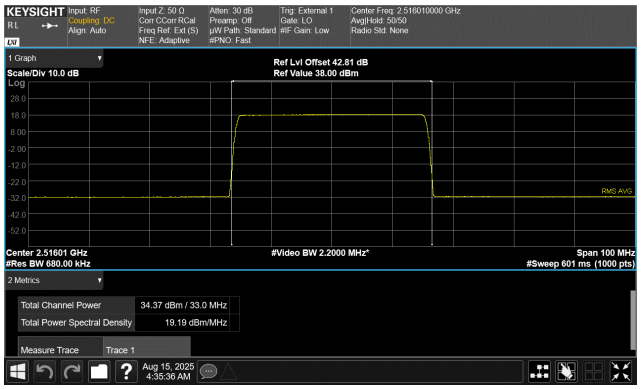
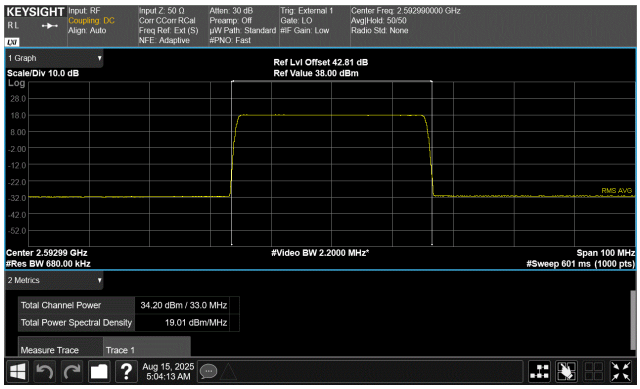
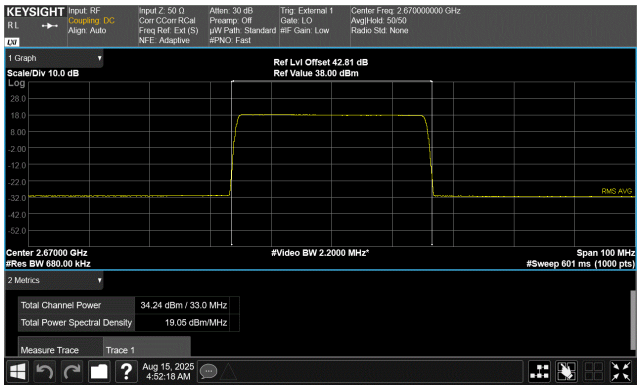


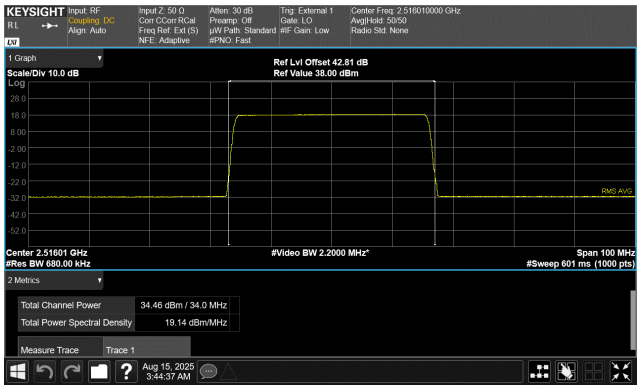
40 MHz Base Channel Bandwidth
33.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2516.01 MHz



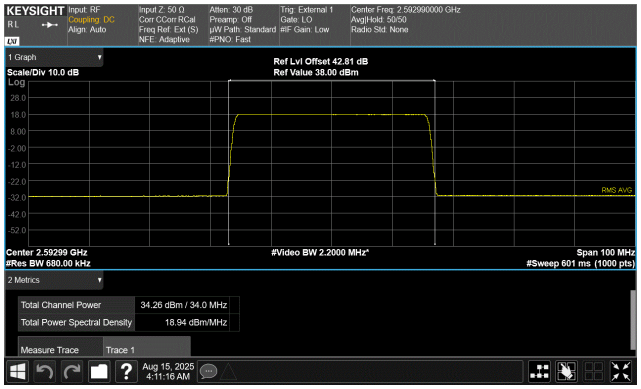
40 MHz Base Channel Bandwidth
33.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



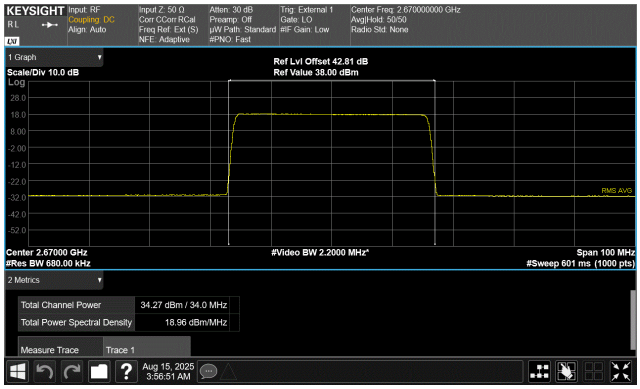
40 MHz Base Channel Bandwidth
33.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2670.0 MHz



40 MHz Base Channel Bandwidth
34.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2516.01 MHz



40 MHz Base Channel Bandwidth
34.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



40 MHz Base Channel Bandwidth
34.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2670.0 MHz

AVERAGE POWER AND EIRP CALCULATIONS

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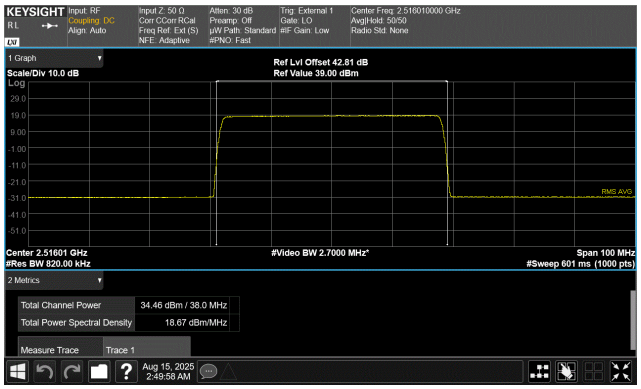
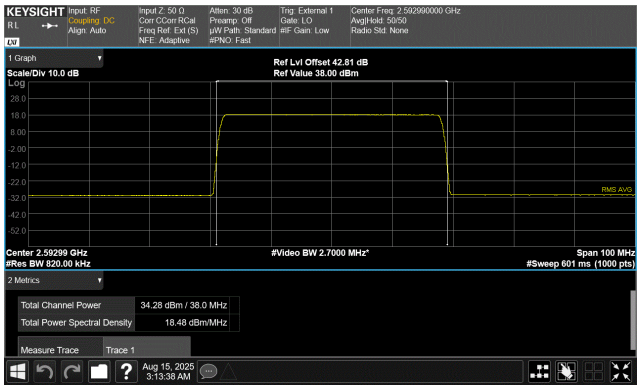
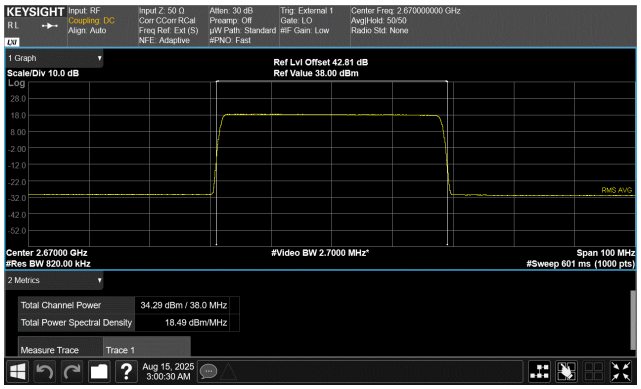


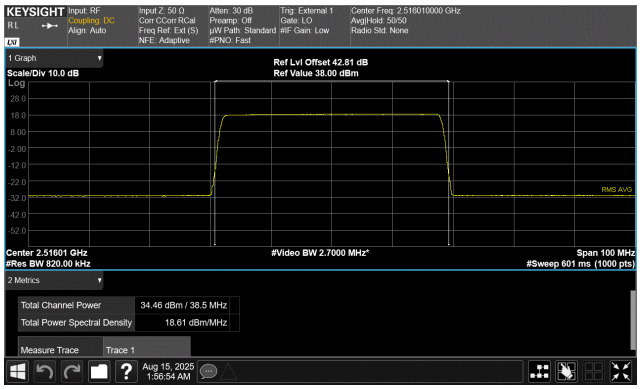
40 MHz Base Channel Bandwidth
38.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2516.01 MHz



40 MHz Base Channel Bandwidth
38.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz

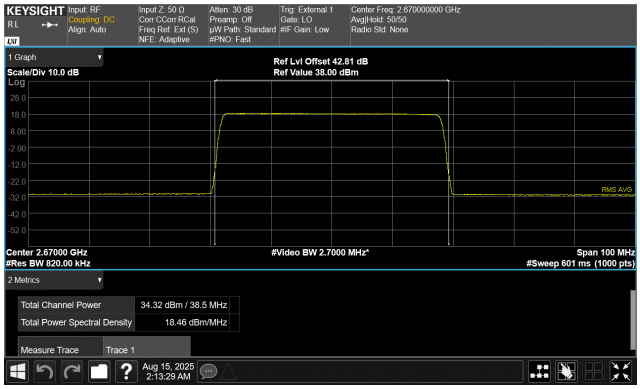


40 MHz Base Channel Bandwidth
38.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2670.0 MHz



40 MHz Base Channel Bandwidth
38.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2516.01 MHz

40 MHz Base Channel Bandwidth
38.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



40 MHz Base Channel Bandwidth
38.5 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2670.0 MHz

AVERAGE POWER AND EIRP CALCULATIONS

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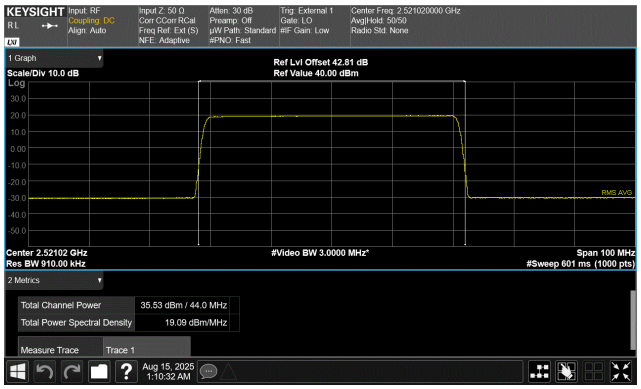
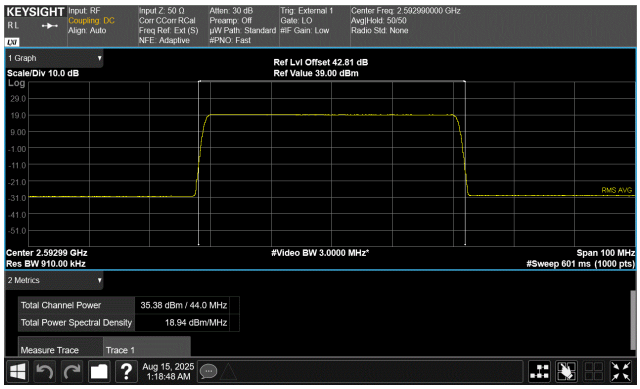
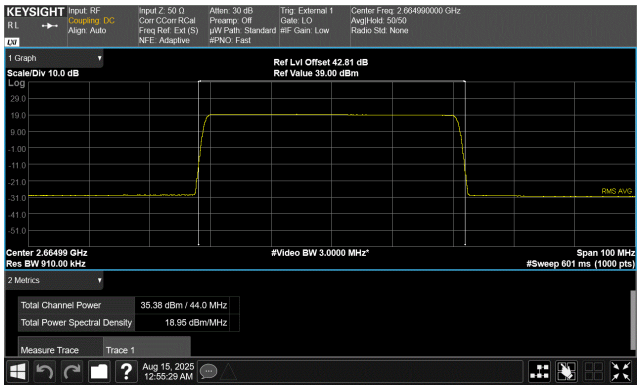
TbtTx 2025.05.09.1
WTD.2025.07.14.0



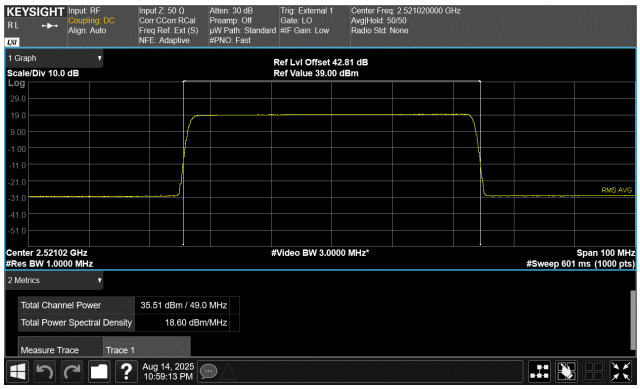
50 MHz Base Channel Bandwidth
44.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2521.02 MHz



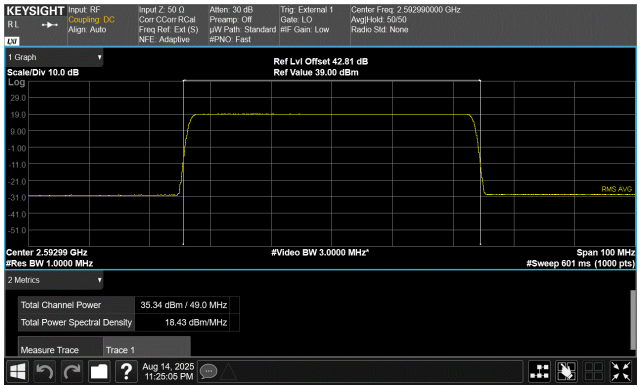
50 MHz Base Channel Bandwidth
44.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



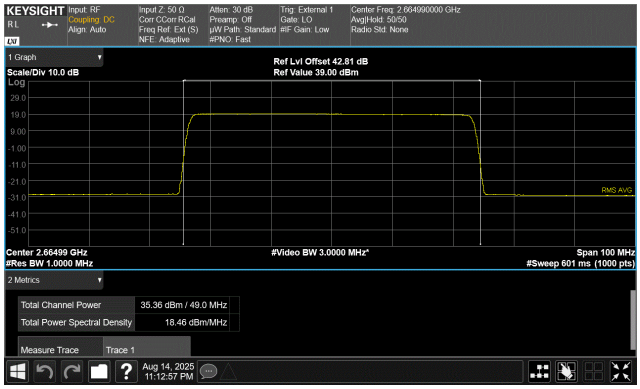
50 MHz Base Channel Bandwidth
44.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2664.99 MHz



50 MHz Base Channel Bandwidth
49.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2521.02 MHz



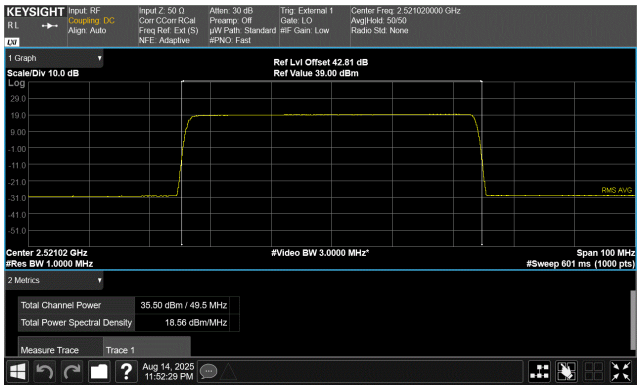
50 MHz Base Channel Bandwidth
49.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



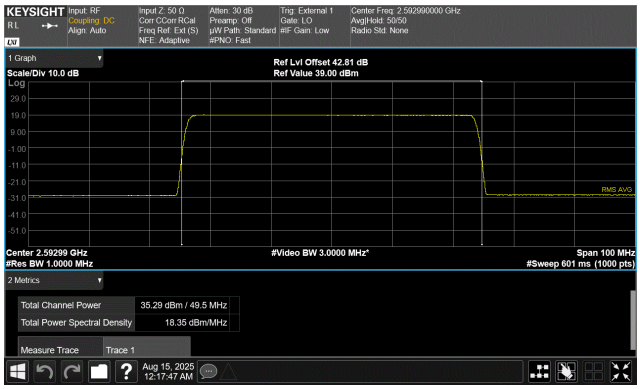
50 MHz Base Channel Bandwidth
49.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2664.99 MHz

AVERAGE POWER AND EIRP CALCULATIONS

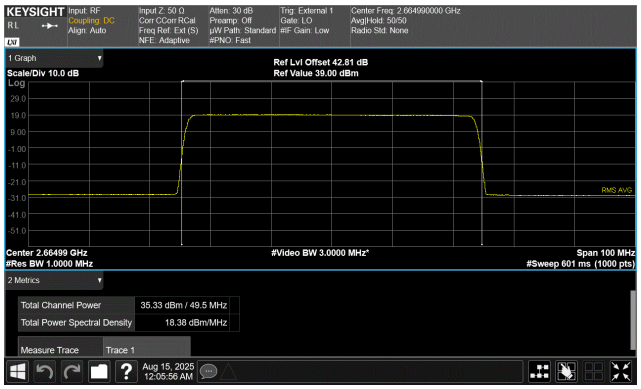
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



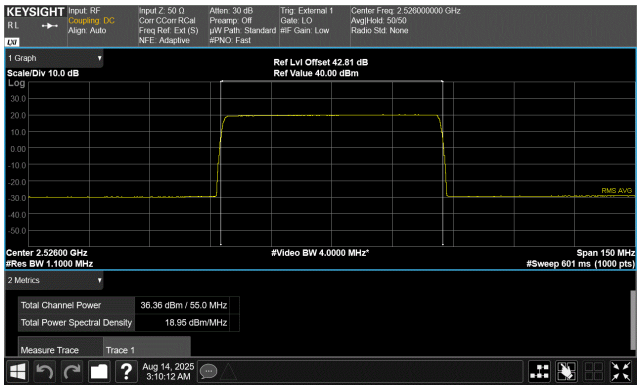
50 MHz Base Channel Bandwidth
49.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2521.02 MHz



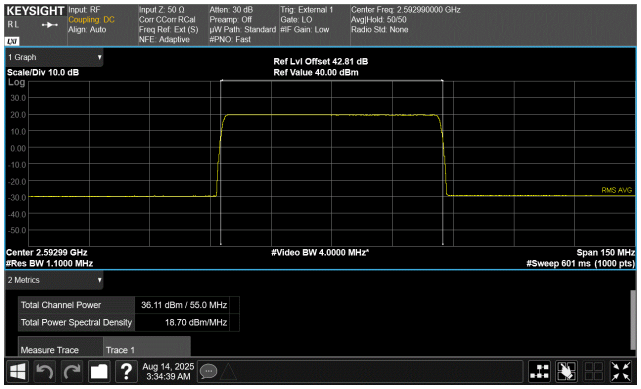
50 MHz Base Channel Bandwidth
49.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



50 MHz Base Channel Bandwidth
49.5 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2664.99 MHz



60 MHz Base Channel Bandwidth
55.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2562.00 MHz



60 MHz Base Channel Bandwidth
55.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz

60 MHz Base Channel Bandwidth
55.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2659.98 MHz

AVERAGE POWER AND EIRP CALCULATIONS

element
TbtTx 2025.05.09.1
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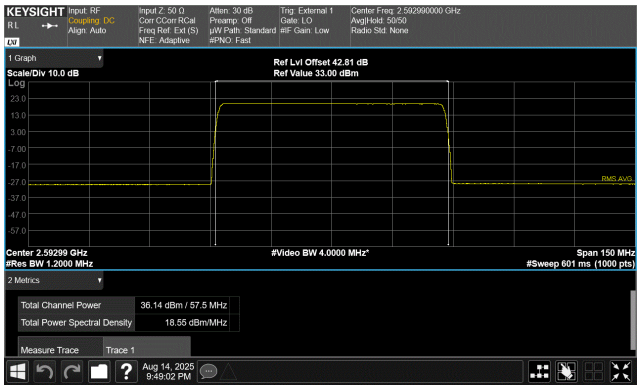
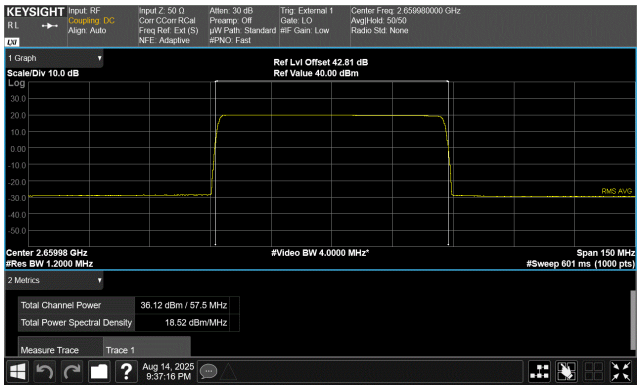
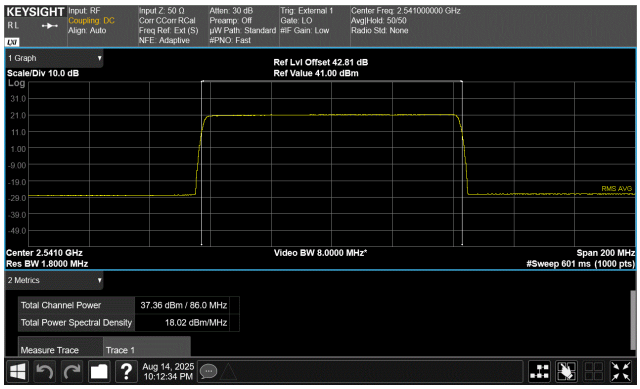
60 MHz Base Channel Bandwidth
57.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2562.00 MHz



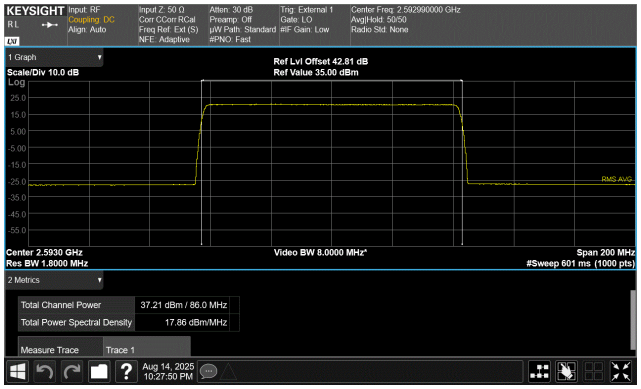
60 MHz Base Channel Bandwidth
57.5 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



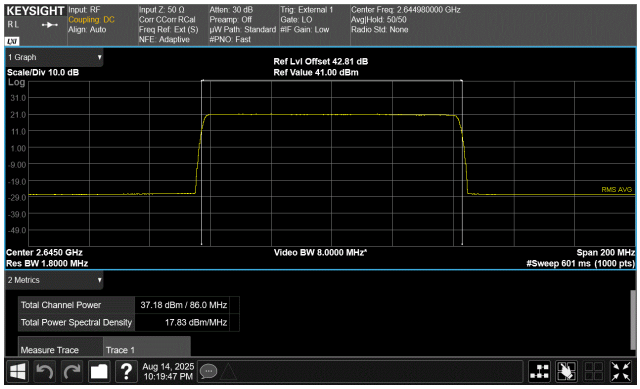
60 MHz Base Channel Bandwidth
57.5 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2659.98 MHz



90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Low Channel, 2541.00 MHz



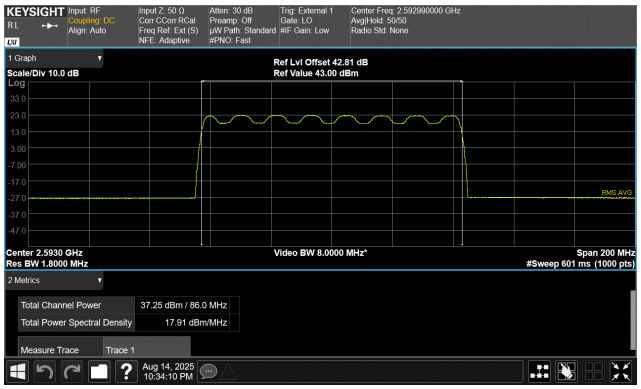
90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
QPSK Modulation
Middle Channel, 2592.99 MHz



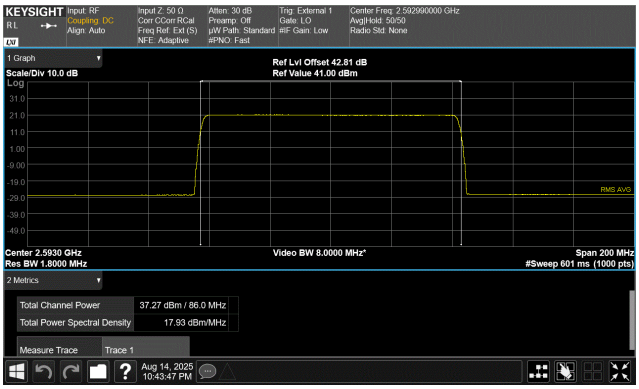
90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
QPSK Modulation
High Channel, 2644.98 MHz

AVERAGE POWER AND EIRP CALCULATIONS

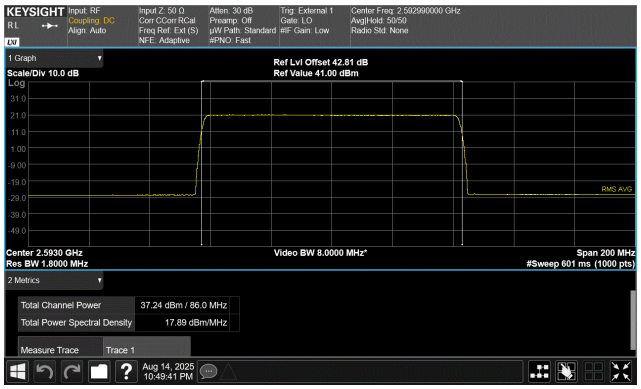
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
16QAM Modulation
Middle Channel, 2592.99 MHz



90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
64QAM Modulation
Middle Channel, 2592.99 MHz



90 MHz Base Channel Bandwidth
86.0 MHz Slim Carrier Bandwidth
256QAM Modulation
Middle Channel, 2592.99 MHz

AVERAGE POWER - MULTICARRIER

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The fundamental emission Output Power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

RF conducted emissions testing was performed only on one port. The AVHA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown within the original NOKI0079.1 certification testing). Antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The RMS average power measurement method for FCC is detailed in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4. Measurements shall be performed at full power on the channel(s) and bandwidth(s) specified in this report.

The output power was measured for a single carrier over the carrier channel bandwidth. The total output power for multiport (64x64 MIMO) operations was determined based per ANSI C63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 log N_{out}). The total output power for Sixty-Four port operation is single power +18.1 dB [i.e. 10*log(64)].

All Measurements were synchronized with the measurement receiver - gated with external trigger input (frame clock (100Hz) provided by the system module. Duty cycle correction is not needed for this testing since the transmit “on” time is synchronized with the measurement receiver.

Multicarrier test cases have been developed as shown below:

a) *Multicarrier Test Case 1:* Four contiguous Slim 33MHz carriers with minimum spacing between carrier frequencies at the lower band edge (2516.01MHz, 2549.01MHz,2582.01,2615.01) (ARFCN=503202,509802,516402,52302). The smallest channel bandwidth is selected to maximize carrier power spectral density. The maximum number of carriers per radio is 4. The carriers are operated at maximum power per Multi Slim carrier [1.29W/ 31.1dBm].

b) *Multicarrier Test Case 2:* Four contiguous Slim 33MHz carriers with minimum spacing between carrier frequencies at the upper band edge (2571MHz, 2604MHz, 2637MHz, 2670MHz) (ARFCN=514200, 520800, 527400, 534000) The smallest channel bandwidth is selected to maximize carrier power spectral density. The carriers are operated at maximum power per Multi Slim carrier [1.29W/ 31.1dBm].

c) *Multicarrier Test Case 3:* Two contiguous Slim 33MHz Carriers with minimum spacing between carrier frequencies at the lower band edge (2516.01MHz, 2549.01MHz) (ARFCN=532998, 526398) and two Slim 33MHz carriers at the Upper band edge (2653.5MHz, 2670MHz) (ARFCN=527400, 534000) at the top channel. The carriers are operated at maximum power per Multi Slim carrier [1.29W/ 31.1dBm].

d) *Multicarrier Test Case 4:* Two Non-contiguous carriers with one Slim 33MHz Carrier (2516.01MHz) (ARFCN=503202) at the bottom channel and one Slim 33MHz Carrier (2670.0MHz) (ARFCN=534000) at the top channel (maximum spacing between carriers). The carriers are operated at maximum power per Multi Slim carrier [2.58W/ 34.1dBm].

e) *Multicarrier Test Case 5:* Two Non-contiguous carriers with one Slim 86MHz Carrier (2541MHz) (ARFCN=508200) at the bottom channel and one Slim 86MHz Carrier (2644.98MHz) (ARFCN=528996) at the top channel (maximum spacing between carriers). The carriers are operated at maximum power per Multi Slim carrier [2.99W/ 34.8dBm].

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight Technologies	N9030B	AGA	2025-06-09	2026-06-09
Block - DC	Centric RF	C0140	ANJ	NCR	NCR
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

Note: The RF Test Setup/ Network (RF cables/Attenuators/filter/etc.) is defined in the configurations section for each test. The RF Test Setup/Network is calibrated using the signal generator and spectrum analyzer prior to test. The RF insertion loss of the RF Test Setup/Network is accounted for by the spectrum analyzer's reference level offset during the RF conducted testing.

AVERAGE POWER - MULTICARRIER

element
TbtTx 2025.05.09.1
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EUT:	Airscale Base Transceiver Station Radio Unit Model AVHA	Work Order:	NOKI0087
Serial Number:	L1252500217	Date:	2025-08-18
Customer:	Nokia Solutions and Networks	Temperature:	27.8°C
Attendees:	Mitch Hill, John Rattanavong	Relative Humidity:	45.5%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0087-2

COMMENTS

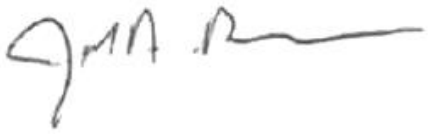
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



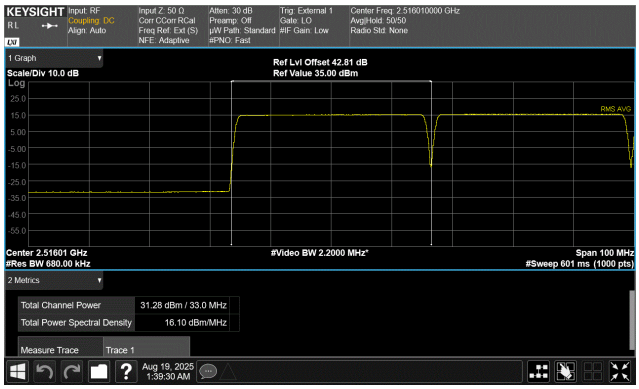
Tested By

TEST RESULTS

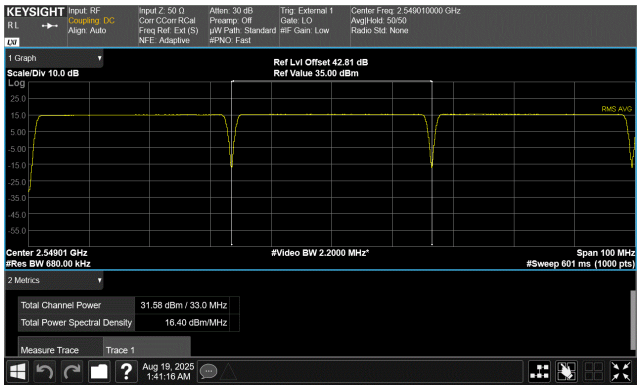
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Single Port dBm/Carrier BW	Sixty-four Port (64x64 MIMO) dBm/carrier BW
Port 1				
QPSK Modulation				
Multicarrier Test Case 1				
33 MHz Slim Carrier Bandwidth, 2516.01 MHz	31.281	0	31.3	49.4
33 MHz Slim Carrier Bandwidth, 2549.01 MHz	31.582	0	31.6	49.7
33 MHz Slim Carrier Bandwidth, 2582.01 MHz	31.637	0	31.6	49.7
33 MHz Slim Carrier Bandwidth, 2615.01 MHz	31.478	0	31.5	49.6
Multicarrier Test Case 2				
33 MHz Slim Carrier Bandwidth, 2571.00 MHz	31.576	0	31.6	49.7
33 MHz Slim Carrier Bandwidth, 2604.00 MHz	31.51	0	31.5	49.6
33 MHz Slim Carrier Bandwidth, 2637.00 MHz	31.34	0	31.3	49.4
33 MHz Slim Carrier Bandwidth, 2670.00 MHz	31.053	0	31.1	49.2
Multicarrier Test Case 3				
33 MHz Slim Carrier Bandwidth, 2516.01 MHz	31.257	0	31.3	49.4
33 MHz Slim Carrier Bandwidth, 2549.01 MHz	31.629	0	31.6	49.7
33 MHz Slim Carrier Bandwidth, 2637.00 MHz	31.42	0	31.4	49.5
33 MHz Slim Carrier Bandwidth, 2670.00 MHz	31.138	0	31.1	49.2
Multicarrier Test Case 4				
33 MHz Slim Carrier Bandwidth, 2516.01 MHz	34.43	0	34.4	52.5
33 MHz Slim Carrier Bandwidth, 2670.00 MHz	34.27	0	34.3	52.4
Multicarrier Test Case 5				
86 MHz Slim Carrier Bandwidth, 2541.00 MHz	34.567	0	34.6	52.7
86 MHz Slim Carrier Bandwidth, 2644.98 MHz	34.39	0	34.4	52.5

AVERAGE POWER - MULTICARRIER

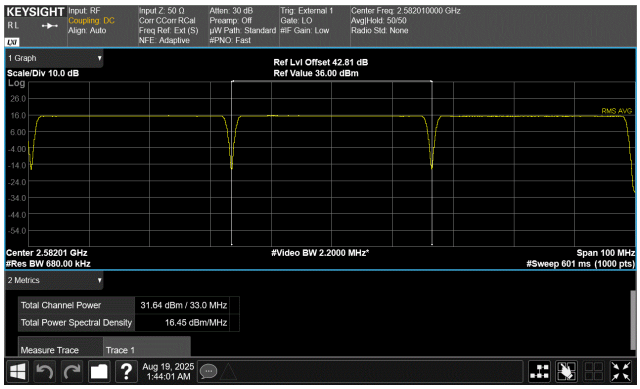
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



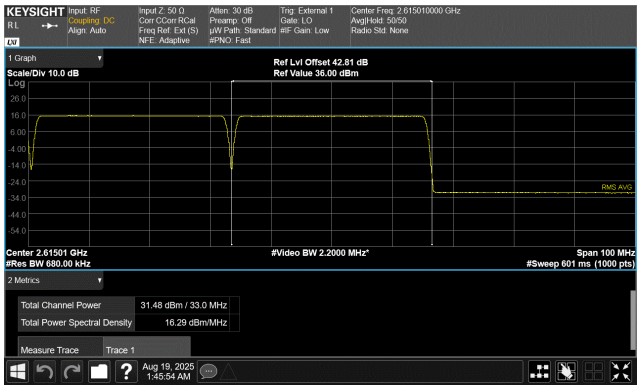
Port 1
QPSK Modulation
Multicarrier Test Case 1
33 MHz Slim Carrier Bandwidth, 2516.01 MHz



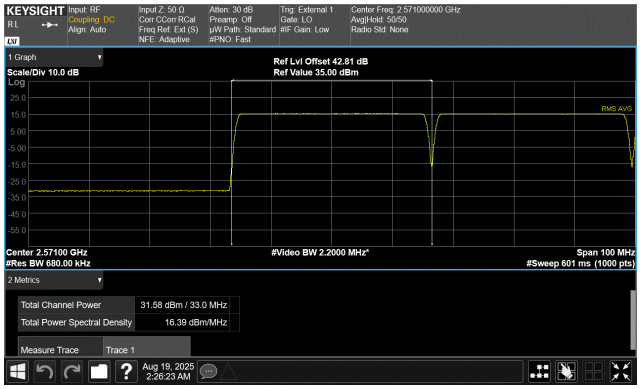
Port 1
QPSK Modulation
Multicarrier Test Case 1
33 MHz Slim Carrier Bandwidth, 2549.01 MHz



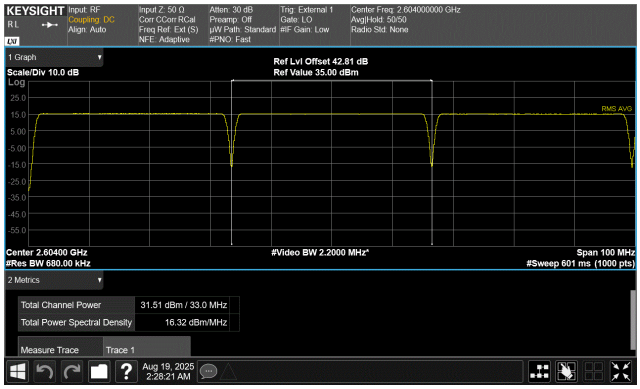
Port 1
QPSK Modulation
Multicarrier Test Case 1
33 MHz Slim Carrier Bandwidth, 2582.01 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 1
33 MHz Slim Carrier Bandwidth, 2615.01 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 2
33 MHz Slim Carrier Bandwidth, 2571.00 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 2
33 MHz Slim Carrier Bandwidth, 2604.00 MHz

AVERAGE POWER - MULTICARRIER

element
TbtTx 2025.05.09.1
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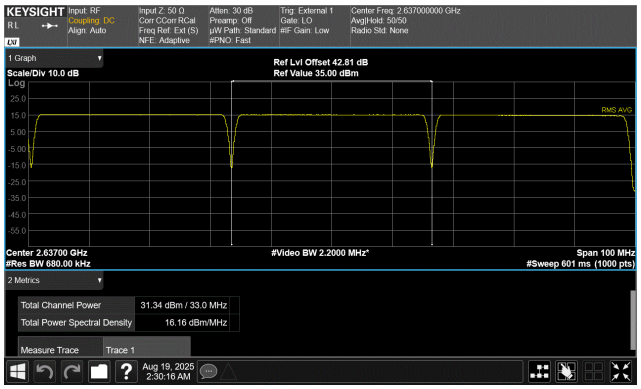
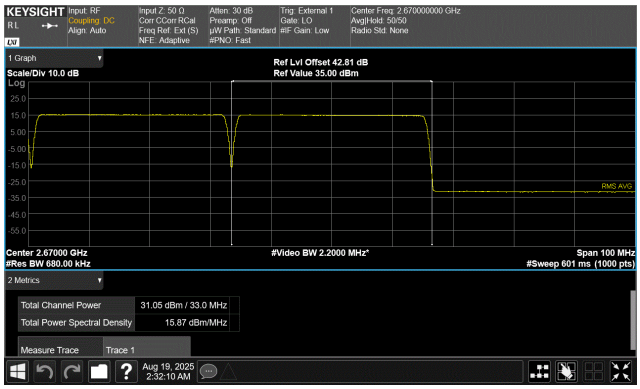
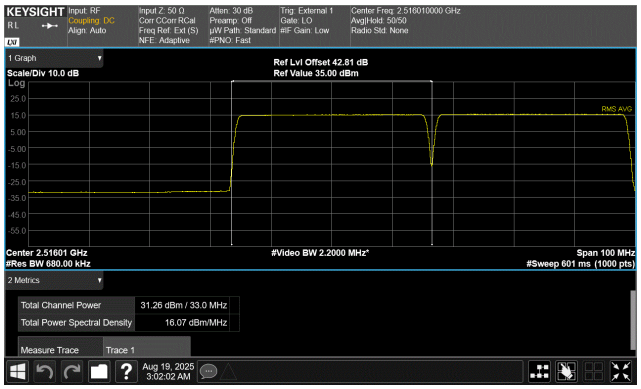


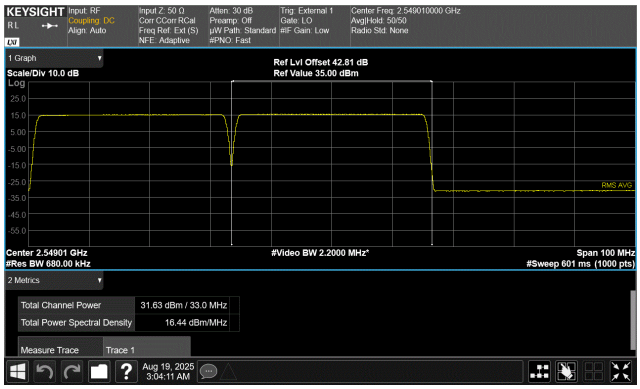
Port 1
QPSK Modulation
Multicarrier Test Case 2
33 MHz Slim Carrier Bandwidth, 2637.00 MHz



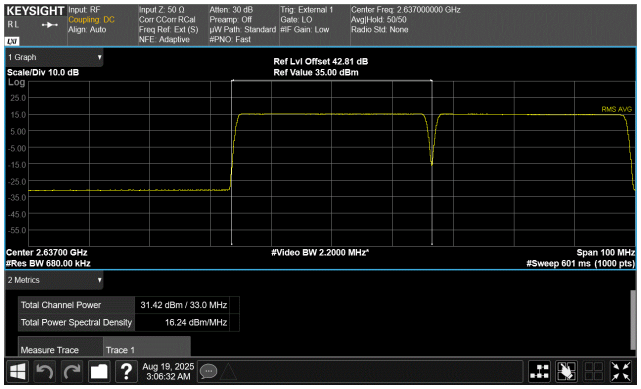
Port 1
QPSK Modulation
Multicarrier Test Case 2
33 MHz Slim Carrier Bandwidth, 2670.00 MHz



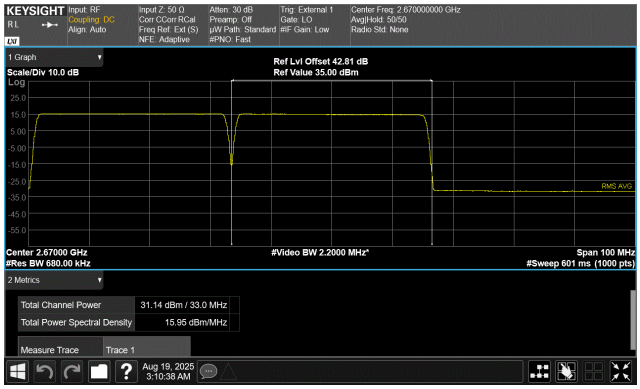
Port 1
QPSK Modulation
Multicarrier Test Case 3
33 MHz Slim Carrier Bandwidth, 2516.01 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 3
33 MHz Slim Carrier Bandwidth, 2549.01 MHz



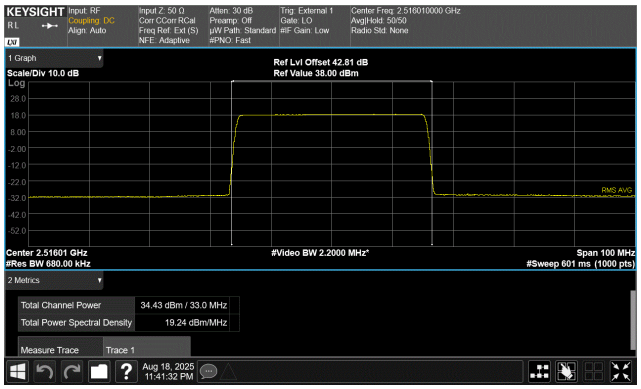
Port 1
QPSK Modulation
Multicarrier Test Case 3
33 MHz Slim Carrier Bandwidth, 2653.50 MHz



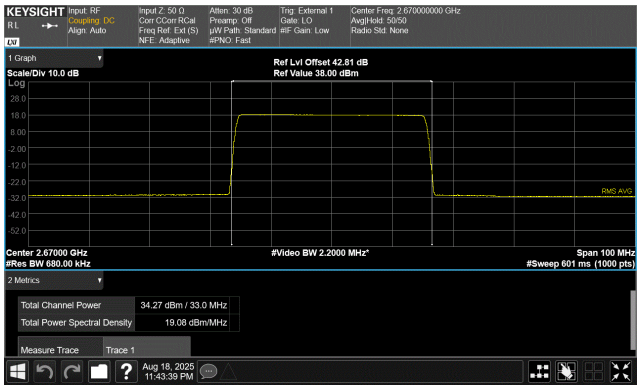
Port 1
QPSK Modulation
Multicarrier Test Case 3
33 MHz Slim Carrier Bandwidth, 2670.00 MHz

AVERAGE POWER - MULTICARRIER

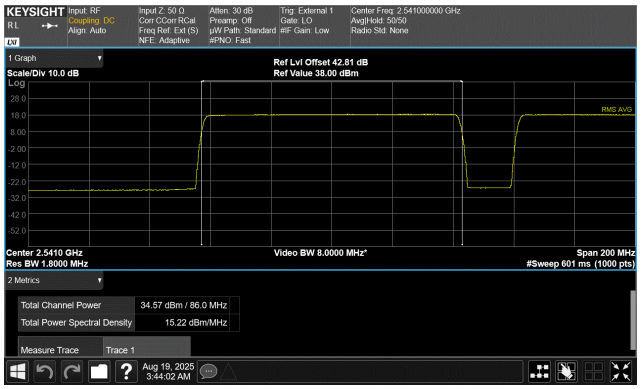
element
TbtTx 2025.05.09.1
WTD.2025.07.14.0



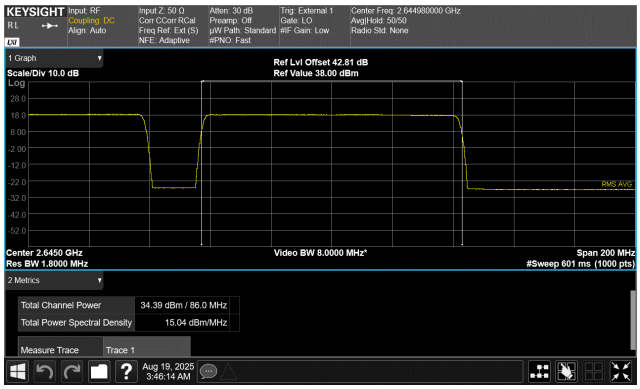
Port 1
QPSK Modulation
Multicarrier Test Case 4
33 MHz Slim Carrier Bandwidth, 2516.01 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 4
33 MHz Slim Carrier Bandwidth, 2670.00 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 5
86 MHz Slim Carrier Bandwidth, 2541.00 MHz



Port 1
QPSK Modulation
Multicarrier Test Case 5
86 MHz Slim Carrier Bandwidth, 2644.98 MHz

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

TEST DESCRIPTION

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The fundamental emission Peak to Average Power was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

RF conducted emissions testing was performed on only one port. The AVHA antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing). Antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed the rule part defined limit.

The PAPR measurement method is described in ANSI C63.26 section 5.2.3.4.

The PAPR was measured using the CCDF function of the spectrum analyzer.

The peak-to-average power ratio (PAPR) shall not exceed 13dB. The CCDF measurement method for FCC/IC is detailed in section 5.7.2 of KDB971168 D01v03r01 and ANSI C63.26-2015 section 5.2.3.4.

All Measurements were synchronized with the measurement receiver - gated with external trigger input (frame clock (100Hz) provided by the system module. Duty cycle correction is not needed for this testing since the transmit “on” time is synchronized with the measurement receiver.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight Technologies	N9030B	AGA	2025-06-09	2026-06-09
Block - DC	Centric RF	C0140	ANJ	NCR	NCR
Generator - Signal	Agilent	N5173B	TIW	2023-08-07	2026-08-07

Note: The RF Test Setup/ Network (RF cables/Attenuators/filter/etc.) is defined in the configurations section for each test. The RF Test Setup/Network is calibrated using the signal generator and spectrum analyzer prior to test. The RF insertion loss of the RF Test Setup/Network is accounted for by the spectrum analyzer's reference level offset during the RF conducted testing.

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

EUT:	Airscale Base Transceiver Station Radio Unit Model AVHA	Work Order:	NOKI0087
Serial Number:	L1252500217	Date:	2025-08-14
Customer:	Nokia Solutions and Networks	Temperature:	26.8°C
Attendees:	Mitch Hill, John Rattanavong	Relative Humidity:	41.5%
Customer Project:	None	Bar. Pressure (PMSL):	1017 mbar
Tested By:	Jarrod Brenden	Job Site:	PT14
Power:	54VDC	Configuration:	NOKI0087-2

COMMENTS

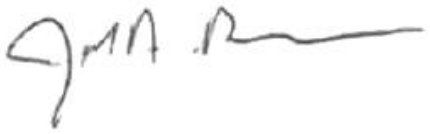
All losses in the measurement path were accounted for in the reference level offset; attenuators, filters, cables, and DC blocks.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass



Tested By

TEST RESULTS

	0.1% PAPR Value (dB)	0.1% PAPR Limit (dB)	Results
Port 1			
40 MHz Base Channel Bandwidth			
33.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2516.01 MHz	7.93	13	Pass
Middle Channel, 2592.99 MHz	7.85	13	Pass
High Channel, 2670.0 MHz	7.87	13	Pass
34.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2516.01 MHz	7.97	13	Pass
Middle Channel, 2592.99 MHz	7.81	13	Pass
High Channel, 2670.0 MHz	7.87	13	Pass
38.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2516.01 MHz	7.94	13	Pass
Middle Channel, 2592.99 MHz	7.78	13	Pass
High Channel, 2670.0 MHz	7.94	13	Pass
38.5 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2516.01 MHz	7.89	13	Pass
Middle Channel, 2592.99 MHz	7.78	13	Pass
High Channel, 2670.0 MHz	7.9	13	Pass

PEAK AND AVERAGE (PAPR) CCDF

element
TbtTx 2025.05.09.1
WTD.2025.07.14.0

	0.1% PAPR Value (dB)	0.1% PAPR Limit (dB)	Results
50 MHz Base Channel Bandwidth			
44.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2521.02 MHz	7.98	13	Pass
Middle Channel, 2592.99 MHz	7.77	13	Pass
High Channel, 2664.99 MHz	7.88	13	Pass
49.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2521.02 MHz	8.03	13	Pass
Middle Channel, 2592.99 MHz	7.79	13	Pass
High Channel, 2664.99 MHz	7.86	13	Pass
49.5 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2521.02 MHz	7.96	13	Pass
Middle Channel, 2592.99 MHz	7.84	13	Pass
High Channel, 2664.99 MHz	7.97	13	Pass
60 MHz Base Channel Bandwidth			
55.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2562.00 MHz	7.97	13	Pass
Middle Channel, 2592.99 MHz	7.76	13	Pass
High Channel, 2659.98 MHz	7.86	13	Pass
57.5 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2562.00 MHz	8.06	13	Pass
Middle Channel, 2592.99 MHz	7.8	13	Pass
High Channel, 2659.98 MHz	7.97	13	Pass
90 MHz Base Channel Bandwidth			
86.0 MHz Slim Carrier Bandwidth			
QPSK Modulation			
Low Channel, 2541.00 MHz	8.13	13	Pass
Middle Channel, 2592.99 MHz	7.83	13	Pass
High Channel, 2644.98 MHz	8.03	13	Pass
16QAM Modulation			
Middle Channel, 2592.99 MHz	7.84	13	Pass
64QAM Modulation			
Middle Channel, 2592.99 MHz	7.85	13	Pass
256QAM Modulation			
Middle Channel, 2592.99 MHz	7.83	13	Pass